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# DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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99-0002019



July 30, 1999

The Honorable Victor H. Reis  
Assistant Secretary for Defense Programs  
Department of Energy  
1000 Independence Avenue, SW  
Washington, DC 20585-0104

Dear Dr. Reis:

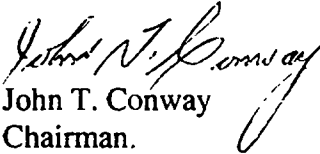
In response to Defense Nuclear Facilities Safety Board (Board) Recommendation 98-2, *Safety Management at the Pantex Plant*, the Department of Energy (DOE) has been working to improve the safety basis and controls for nuclear explosive operations at Pantex, particularly the W62 Disassembly and Inspection (D&I) Program. It is vital that these efforts be completed in a timely and effective manner to support safe and reliable operations of the nation's enduring nuclear weapons stockpile. To achieve this objective, DOE needs to ensure the quality of each individual initiative to analyze operations and develop controls, and also to carefully coordinate the interdependencies among separate safety improvement initiatives.

The enclosed report prepared by the Board's staff documents observations concerning the DOE effort to upgrade the W62 D&I safety basis and controls. This upgrade is necessary to ensure the safety of Pantex operations on this particular weapon. The staff identified a number of areas requiring improvement in the development of W62-specific activities. Among these are the flowdown of controls to implementing (floor-level) documents, the effectiveness of the controls for fire suppression, and the apparent lack of incorporation of failure modes and effects analyses into tooling design enhancements. The staff also identified potential problems with the integration of various safety upgrade projects at Pantex.

The Board is concerned that the appropriate management attention and resources needed to resolve these issues may not be focussed as necessary to meet national and programmatic objectives. The Board believes the information in the enclosed staff report will be useful to DOE in its continuing pursuit of safety initiatives at Pantex. It is the Board's experience that safety issues such as those identified in the staff's report are easier to address early in a

development process rather than later. If you have comments or questions on this matter, please do not hesitate to call me.

Sincerely,

  
John T. Conway  
Chairman.

c: Mark B. Whitaker, Jr.

Enclosure

## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

## Staff Issue Report

May 11, 1999

**MEMORANDUM FOR:** G. W. Cunningham, Technical Director  
J. K. Fortenberry, Deputy Technical Director

**COPIES:** Board Members

**FROM:** M. Helfrich

**SUBJECT:** Review of Status of W62 Disassembly and Inspection Program,  
Pantex Plant

This report summarizes the results of a review by the staff of the Defense Nuclear Facilities Safety Board (Board) in support of Board Recommendation 98-2, *Safety Management at the Pantex Plant*. Members of the Board's staff, F. Bamdad, D. Burnfield, and M. Helfrich, met with Department of Energy (DOE) and Mason and Hanger Corporation (MHC) personnel on May 5-6, 1999, to review the preparations for restarting the W62 Disassembly and Inspection (D&I) Program. This review included the status of the draft Hazard Analysis Report (HAR) and its supporting documentation. The scope of the HAR encompasses activities from the unloading of the weapon on the dock through the separation of the high explosives from the special nuclear materials in the cell. During the course of this review, several deficiencies were identified by the Board's staff that could result in a less than adequate safety margin for the W62 operations.

**Performance of the Hazard Analysis.** As indicated in a previous staff issue report (*Review of Hazard Analysis for the Disassembly and Inspection of the W62, Pantex Plant*, dated January 22, 1999) on the performance of the hazard analysis for the W62 D&I, the hazard analysis team did not do a thorough process hazard analysis as recommended by DOE Standard DOE-STD-3016-99, *Hazard Analysis Reports for Nuclear Explosive Operations*. The most recent draft of the HAR indicates that for several of the W62 D&I activities (such as electrical testing, gas sampling, radiography, transportation and operation of the vacuum chamber), the hazard analysis was limited to a review of the procedures; a walkdown of the operations was not performed because of the immature state of the project and lack of sufficient time. Additionally, the HAR cites the use of the preliminary hazard analysis methodology. This technique is most often conducted early in the development of a process (i.e., during conceptual design or research and development), when there is little information on design details or operating procedures.

**Integration of the Various Hazard Analyses.** The HAR relies on other documents that have not yet been completed and are not scheduled to be finished in time to allow for their incorporation in the hazard analysis and identification of controls being done for the W62 D&I. For example, the HAR relies on the Transportation Basis for Interim Operations (BIO) module to document an evaluation of the hazards of on-site transportation and to identify an adequate set of

controls for hazards from the movement of nuclear explosives on the ramps. This BIO, which has not yet been completed, is behind schedule and is not linked to the startup of the W62 D&I. Furthermore, there are several events that are not in the scope of the Transportation BIO and are not evaluated in the HAR.

Although the hazard analysis was performed for W62 D&I activities in specific bays (13 and 15) in Building 12-84W, MHC reportedly intends to delete the reference to the specific bays and obtain more flexibility to perform the operations in any bays within that building. Such a decision, combined with the fact that the on-site transportation hazard analysis is incomplete and inadequate, could result in overlooking accident scenarios and therefore developing an inadequate set of controls. This approach is inconsistent with DOE's Development and Production Manual, Chapter 11.4, *Authorization Basis for Pantex Plant Nuclear Explosive Operations*, where it states: "The HAR shall demonstrate that all hazards potentially resulting in accidents with consequences that meet or exceed the [Nuclear Explosive Operations] evaluation guidelines have been identified and analyzed;" and "The HAR shall demonstrate that the safety envelope established for the facility (SAR/TSR) and the nuclear explosive operation. (HAR/ABCD) cover [sic] all parts of the operation."

**Configuration Management of Controls.** The HAR identifies several controls to prevent or mitigate the hazardous events. Some of these controls are elevated to the Technical Safety Requirement (TSR) level, and the rest are designated as defense-in-depth controls, to be managed by the contractor in its own change control program. MHC, however, has chosen only a limited number of these defense-in-depth controls to be registered in its change control program, Pantex Activity Controls Manual (PACMAN). Pantex does not have a procedure or a guidance document for selection of these defense-in-depth controls that would be implemented and maintained by PACMAN. Although MHC representatives stated that all defense-in-depth controls would be implemented, there is no system in place to ensure this. Lack of implementation of these defense-in-depth controls would invalidate the assumptions made in the HAR.

**Controls Developed for Fire Suppression.** One of the most hazardous events for W62 D&I activities is fire. The controls for this event, however, do not appear to be adequate:

- The controls identified to prevent a fire scenario in bays or cells need to be improved. The HAR identifies an administrative control to maintain a distance of 7 feet between the combustible materials and the weapon to prevent heating of the conventional high explosives (CHEs) which could lead to an explosion. The heat flux threatening the CHEs, however, is dependent on the type and amount of the combustibles, not just the distance. A strict combustible loading program to control the type and amount of materials allowed in the bays and cells would, therefore, be more effective and practical.

- About a year ago, a generic fire hazard analysis was performed by MHC to support the authorization basis upgrade program at Pantex. This fire hazard analysis identified a fire as the most hazardous event for weapon activities involving CHE. The report recommended that the fire suppression deluge system be connected to the ultraviolet (UV) fire detectors for automatic actuation in case of a fire. The system could also be modified to allow for a delay so that the operator could override the automatic function in the event of an inadvertent actuation. This recommendation, however, has not been implemented for activities related to W62 operations that involve CHE. It should be noted that on May 6, 1999, after the review by the Board's staff, the DOE Amarillo Area Office and MHC reached an agreement in principle to reconnect the UV fire detectors to the deluge systems.

**Analysis Performed To Support Tooling Design Enhancement.** During a discussion of the tooling design enhancements being made to support the W62 D&I, the Board's staff noted that MHC does not appear to do a failure modes and effects analysis on its design changes. Recent tooling changes on other programs (e.g., the W56 dismantlement program) may have resulted in designing and building tooling that could not complete its intended function.

**Lessons Learned Program.** The Board's staff noted that several deficiencies identified in this review pertaining to the W62 activities had also been identified previously in the reviews of W87 and W69 operations, as well as reviews of the W62. DOE and MHC do not appear to have an effective program in place to implement the lessons learned from other activities and to improve the safety of nuclear explosive operations. DOE and MHC have developed lessons learned from previous programs, but they continue to fail to effectively implement or execute corrective actions based on those lessons learned in subsequent programs. Furthermore, several scenarios (such as fire involving CHE) have been identified by either MHC or the Board's staff in the past as requiring further corrective actions, but have not been acted upon. Finally, the W62 activities have not incorporated certain explicit lessons learned, and commitments for future programs, that were promulgated as a result of a DOE senior manager review of the W56 and W87 programs.