DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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December 1, 1999

Brigadier General Thomas F. Gioconda
Acting Assistant Secretary for Defense Programs
Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-0104

Dear General Gioconda:

In response to Recommendation 98-2, *Safety Management at the Pantex Plant*, of the Defense Nuclear Facilities Safety Board (Board), the Department of Energy (DOE) has been attempting to improve and simplify the safety basis for nuclear explosive operations at Pantex. Two enclosed reports prepared by the Board's staff highlight issues that appear to indicate that DOE's efforts in this area have not been entirely successful.

Instead of becoming simpler, the safety basis at Pantex is actually becoming more complex. Significant issues associated with the integration and completeness of the various hazard analyses and associated controls are being observed. In some cases, voids exist in which one analysis depends on another to assess the activity, but it is later discovered that the follow-on analysis has not been completed or implemented. In other cases, there are inconsistencies in similar, if not identical, analyses. The most recent letter from the Board to DOE on this issue is dated July 30, 1999.

In addition, both enclosed reports highlight deficiencies with information on warhead response being provided to the Pantex contractor by the nuclear design laboratories for use in determining the hazards and resulting controls associated with nuclear explosive activities. Although the Pantex contractor is responsible for conducting the necessary safety analyses, only the nuclear design laboratories can provide the information with respect to warhead response to specific environments. This input must be of the highest fidelity possible, with a defensible technical basis and appropriate uncertainties, to be useful for safety basis development.

The Board is aware that DOE has been working to achieve improvements in both of these areas, and in another letter to you has offered its assistance in safely resolving such problems and similar ones at Pantex and the Y-12 Plant. The Board would like to be briefed on your plans and actions for resolution of the problems discussed in the enclosed memoranda when they are sufficiently well developed. If you have any questions on this matter, please do not hesitate to call.

Sincerely,

by RVO FOR

John T. Conway
Chairman

c: Mr. Richard E. Glass
Mr. Mark B. Whitaker, Jr.

Enclosures

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

October 8, 1999

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

COPIES: Board Members

FROM: A. Matteucci

SUBJECT: Review of Transportation Basis for Interim Operations Module, Pantex Plant

The staff of the Defense Nuclear Facilities Safety Board (Board) completed a review of the latest draft Transportation Basis for Interim Operations (BIO) Module during and following a trip to the Pantex Plant. The main objective of the Transportation BIO is to identify and assess the full spectrum of potential hazards associated with the movement of nuclear explosives (NEs) within the Pantex Plant. This effort includes identification of the hazards, analysis of weapon response, and estimation of the frequency of occurrence of accident scenarios.

Background. In 1997, after problems occurred in the development of Safety Analysis Reports (SARs), the decision was made to upgrade the BIO for the Pantex nuclear facilities and activities using a modular concept. The first of these modular BIOs, the Transportation BIO, is being developed in two phases: the first phase was submitted to the Department of Energy (DOE) for approval on September 7, 1999; the second phase, to be released October 26, 1999, will update phase one.

Discussion. Observations made by the Board's staff during its review fall into three categories: the scope of the Transportation BIO, integration, and identification and implementation of controls.

Scope of Transportation BIO—The scope of the Transportation BIO upgrade is limited to on-site movements of NEs/nuclear explosive-like assemblies (NELAs) in an ultimate user configuration, in shipping containers, in the custody of Mason and Hanger Corporation (MHC). The scope includes ramp, road, and loading and unloading movements at the Pantex site. It stops at bay, cell, and magazine doors, and it does not include transportation of partial assemblies or high explosives by themselves (which can be an initiating event for other accidents). The partial assemblies are currently being covered by some, but not all, individual process Hazard Analysis Reports (HARs). It is unclear when or if these activities will be addressed by the Transportation BIO.

Integration—The integration of the Transportation BIO with other site authorization documents, including other BIOs, appears to be problematic. There is much confusion and no

clear path forward with regard to how this BIO module will be integrated into the site's authorization basis. The authorization basis will include the facility BIO (broken down by building type), the BIO modules addressing cross-cutting issues (e.g., transportation, fire protection, and lightning), the General Information Document, weapon process-specific HARs, Technical Safety Requirements (TSRs), and Activity-Based Control Documents (ABCDs). Given this plethora of authorization basis documents, a significant effort will be required to ensure adequate integration and implementation. No evidence was provided to the Board's staff that such an effort had been initiated. Additionally, there is currently no implementation plan for the TSR-level controls, and the implementation budget has not been finalized. A number of identified controls may be difficult to implement from an operational, programmatic, and budgeting standpoint.

Complicating this issue is a lack of communication among the various teams involved in site authorization documentation. For example, the project manager for the Transportation BIO had not seen the transportation portion of the W62 HAR; likewise, the W62 HAR team had not seen the draft Transportation BIO.

Laboratory Support—The hazard analysis methodology used by MHC to develop the BIO results in the postulation of specific weapon environments for each event, initiating event frequencies, weapon responses, and probabilities for these weapon responses. This methodology is then used again with selected safety controls to identify the residual risk. The specific weapon environments were determined through plant walkdowns and a review of various documents, including current ABCDs from other weapon programs. The initiating event frequencies were determined through statistical means and engineering judgement. On the basis of the initiating event scenarios produced by MHC, the design agencies predicted weapon responses and weapon response frequency bins (roughly two orders of magnitude). The Transportation BIO and its supporting documentation provide little or no qualitative or quantitative rationale for these weapon response frequencies. During the staff's review, no design agency personnel were available to provide support for their probability numbers. In addition, several of the design agency documents cited in the Transportation BIO include caveats indicating that the weapon response probabilities are neither supportable nor statistically valid. The use of statistically invalid assumptions with little or no qualitative supporting rationale is incompatible with safety.

Given the range of issues noted with the Transportation BIO, it would appear that MHC continues to experience problems with analyzing accidents, determining adequate controls, and establishing a path forward for adequately integrating the modular authorization basis documents into a coherent, comprehensive document. Deficiencies in the inputs of the design agencies to the hazard analysis contribute significantly to the problems with the safety analysis. The accident analyses in the Transportation BIO do not include sufficient qualitative detail or rationale to support and defend the many assertions made in the document. The errors noted with regard to accuracy of references and correlation of information also indicate a lack of adequate review prior to submission of the BIO.