

August 8, 1997

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

Dear Dr. Reis:

The Department of Energy (DOE) recently completed the Hazard Analysis Report (HAR) that provides the activity-specific portion of the safety basis for dismantlement of W69 nuclear weapons. On July 18, 1997, Mr. Ives briefed the Defense Nuclear Facilities Safety Board (Board) on the HAR's use in establishing the safety measures and controls DOE planned to put in place for the W69 dismantlement program. While the Board agreed that there were no issues precluding safe start-up of the W69 dismantlement program, we did have a number of observations with respect to the HAR. These were summarized in our letter to you dated July 25, 1997. The enclosed report provides additional detail.

DOE has recently begun to develop HARs as the basis for establishing weapon-specific safety controls. It is to be expected that the process for developing HARs and the quality of the products will continue to improve for future nuclear explosive operations. The Board believes the issues highlighted in the enclosed report should be addressed to promote that continuous improvement process, and that any safety matters identified as a result of additional analysis should be addressed through the unreviewed safety question process. The Board would like to be informed of your plans for addressing the issues noted in the enclosure.

The Board notes that Building 12-64, in which the W69 dismantlement is to take place, has weaknesses compared with other facilities at Pantex that might have been chosen for the activity. It is not clear why the dismantlement of more than a thousand units should be conducted in Building 12-64, while operations at a much lower level of risk, such as weapons staging or activities that do not involve high explosives, are performed in facilities (e.g., the neighboring Building 12-84) that are better suited for higher-risk activities. Integrated safety management calls for consideration of the safety of facilities to be used at the outset of safety and hazard analyses.

The Board requests a report evaluating whether the relative hazards of operations and relative capabilities of facilities are factored into decisions on facility use. This report should also address the question of whether it would be feasible and advantageous to move the dismantlement of W69 units to another, superior facility in the near future. It is requested that this report to the Board be issued no later than 30 days from the date of this letter.

Sincerely,

John T. Conway
Chairman

c: Mr. Mark B. Whitaker, Jr.
Mr. Gene Ives
Mr. Bruce Twining

Enclosure

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

April 18, 1997

MEMORANDUM FOR: G.W. Cunningham, Technical Director

COPIES: Board Members

FROM: C. A. Miller

SUBJECT: W69 Dismantlement Hazard Analysis Report

This report documents a review of the W69 Dismantlement Hazard Analysis Report (HAR). Staff members C. A. Miller, F. Bamdad, and C. R. Martin reviewed the HAR included in the Single Integrated Input Document (SIID) for the W69 Nuclear Explosive Safety Study (NESS) and observed related NESS activities conducted during February 3–12, 1997.

The W69 dismantlement is the first nuclear explosive operation to undergo the full Seamless Safety (SS-21) process. In general, the methodology used by the hazard assessment task team (HATT) to identify and analyze hazards associated with the W69 dismantlement activities is sound and appears to have resulted in a systematic and thorough analysis of many of the associated hazards. The Board's staff observed two significant deficiencies, however. First, the performance of the hazard analysis does not appear to have been smoothly integrated into the SS-21 process. As a result, the HAR does not appear to have the support of all the different agencies involved in its production. Second, some potentially significant hazards in the W69 dismantlement process were not fully analyzed. Without the benefit of a comprehensive analysis, it is uncertain whether the appropriate set of safety controls has been identified.

Developing a high-quality HAR is a key to the success of the entire SS-21 process. That process, as described in Interagency Engineering Procedure EP401110, *Integrated Safety Process for Assembly and Disassembly of Nuclear Weapons*, requires that all hazards encountered in weapon activities be scrutinized by the HATT to identify a spectrum of accident scenarios. That analysis is then used to develop an appropriately graded set of controls to manage the safety basis for the operations. The ultimate purpose of the hazard analysis is to develop the safety basis for those aspects of a nuclear explosive operation not adequately addressed by an approved Safety Analysis Report (SAR) or Basis for Interim Operations (BIO).

The observations of the Board's staff regarding the SIID for the W69 NESS, which contains the HAR and Technical Supporting Documents, include the following:

- The W69 hazard assessment activity does not appear to have been the closely integrated team effort envisioned by EP401110. As presented to the NESS group,

some of the HAR analyses appeared to have been performed by members of the HATT who were acting independently. The Board's staff has learned that the Pantex contractor submitted requests to DOE Headquarters for exemptions against the HAR, indicating a lack of agreement with the HAR content on the part of the production agency.

- Although the HAR is much more comprehensive than past analyses of weapons operations and includes significantly more detail in the development of accident scenarios, it does not fully analyze several potential safety hazards unique to the W69 weapon and its dismantlement operations. The design laboratory's W69 Weapon System Specification identified several hazards that may require additional controls for safe dismantlement. These hazards, however, were dismissed without sufficient technical analysis, and without discussion of the trade-offs among potential controls. The following are examples of hazards that would require fuller analysis to meet the intent of the SS-21 process:
 - The HAR assumes that the weapons to be dismantled are in the normal condition and that weapon components have not suffered significant environmental or age-related degradation. The basis for these assumptions is not substantiated by data or analysis in the HAR or other SIID supporting documents, nor are alternative procedures proposed or discussed in the event these assumptions are determined to be invalid.
 - The hazard analysis input from the design laboratories recommends positive measures against electrostatic discharge during operations. The HAR, however, does not specify use of these positive measures in each of the recommended cases.
 - The HAR assumes that an insult to the “dogdish” would not pose any significant additional hazards over those from an insult to a cased or uncased primary. Because the design laboratory performed a finite-element analysis of the high explosive (HE) under this area showing analytically that the stress transposed as the result of an impact would not be sufficient to result in detonation, the scenario of HE insult from dropping was deemed to be incredible. It appears that under certain conditions that remain unanalyzed, it may be possible to develop much greater stresses on the HE than those calculated.
 - Materials used in the W69 generate hydrogen over time, which may build up inside the weapon casing. Thus, there is a potential for hydrogen deflagration when the casing is opened. According to the design laboratory, the deflagration would not have enough energy to cause a violent reaction of the HE, but is a worker safety concern. The design laboratory previously suggested purging the gas as a preventive step, but this control is not fully discussed in the HAR. Instead, a cover for the weapon was designed to be used to protect workers. The cover itself, however, introduces a new hazard into the operation: the workers must perform

procedural steps blindly under the cover; furthermore, the cover could conceivably redirect any flames produced into the weapon case.

- The HAR fails to address hazards associated with maintenance or other activities that may interfere with or be performed in parallel with W69 nuclear explosive operations.
- The interface between the SARs (or BIO) and a HAR is not well understood by the agencies involved in the development and implementation of these safety basis documents. The focus of the SAR is to analyze the aspects of the work common to all weapon dismantlements or disassembly and inspection. One would then expect the HAR to analyze the unique attributes of the specific weapon being worked and the safety hazards presented as that particular weapon is processed through the plant. Taken together, the SAR and the HAR constitute the safety analysis. The appropriate safety basis for performing a weapon-specific activity is a combination of all the hazard analyses and controls thus derived—the SAR with Technical Safety Requirements (TSRs), the HAR with Operational Safety Controls (OSCs), and Nuclear Explosive Safety Rules (NESRs). The following examples show how difficult it is to ensure that no gaps exist in the analysis of the W69 operations:
 - The W69 HAR references other safety documents not yet approved by DOE (such as the Bay and Cell SAR modules and the On-Site Transportation SAR) to identify the hazards and accident sequences pertinent to W69 dismantlement operations. If the W69 HAR is approved as a basis for W69 operations, the draft documents referenced will then have to be managed in a change control process. The Board’s staff and DOE’s own ongoing reviews of these documents have found them inadequate.
 - The SAR and HAR analyses conflict. The Bay SAR says scenarios that postulate heavy objects falling on a weapon are credible, but will not produce unacceptable consequences. In the HAR, HE violent reactions caused by heavy objects falling on a weapon are analyzed as potentially requiring additional controls.
- It is difficult to determine from the HAR whether the set of controls necessary to ensure safe W69 dismantlement have been identified and can be implemented. The SIID develops a set of positive measures for which credit is taken in the hazard analysis, but there is no attempt to determine the relative contributions of those measures. As a result, a large number of controls are proposed, but not further categorized (as TSRs or OSCs) to determine either the critical subset of controls or the significance of the controls with respect to safety-related systems, structures, or components. In addition, it is unclear what mechanisms or processes will be used to preserve the positive measures that have been identified.

The Board's staff future actions will be to discuss the implementation of the HAR process and the underlying assumptions regarding the W69 with DOE and the HATT during follow-up meetings and reviews.