Department of Energy
Germantown, MD 20874-1290

October 28, 1997

Mr. John T. Conway
Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, NW., Suite 700
Washington, D.C. 20004

Dear Mr. Chairman:

In our September 8, 1997, response to your letter of August 8, 1997, I agreed to provide a written response concerning issues in your staff's trip report dated April 18, 1997.

The enclosed paper on the W69 Dismantlement Hazard Analysis Report (HAR) addresses your staff's concerns. These responses were developed in consultation with the national laboratories, the Pantex Plant operating contractor, the Albuquerque Operations Office, and the Department of Energy Headquarters. The personnel who participated in the preparation of the W69 Dismantlement HAR were major contributors.

Many of the responses refer to analyses that are documented in various sections of the input documents used to support the W69 Nuclear Explosive Safety Study (NESS). In your request of July 25, 1997, you asked that all documents used to support future NESSs be furnished to your staff. My staff will furnish these input documents prior to each NESS so that your staff may conduct a timely review. In addition, the final NESS reports will also be furnished to your staff.

If you have questions, please contact me or have your staff contact Mr. Edward Cassidy of my staff at 301-903-7559.

Sincerely,

Gene Ives
Deputy Assistant Secretary
for Military Application and
Stockpile Management
Defense Programs

Enclosure

cc:
M. Whitaker, S-3.1
K. Carlson, AL
C. Mangeng, LANL
R. Hagengruber, SNL

DNFSB Memorandum C.A. Miller to G.W. Cunningham
Re: W69 Dismantlement Hazard Analysis Report

In response to your cover letter, it should be further noted that the bay was chosen to minimize the transportation of the unit. The transportation risk was balanced against the risk of the bay itself. Given the most recent analysis, this decision is considered to remain sound.

Below are our responses to the issues identified in your staff trip report:

Issue 1:

"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."

Response:

The apparent independent acts by the HATT had to do with numerical probabilities of a few scenarios and the scope of the effort. The project team believed that the HATT information was overly conservative in these cases. The data to support any point value probability was agreed by all parties to be sparse; thus, disagreements are expected. In the end, a qualitative assessment by the NESSG, HATT, various experts from the laboratories, and the Project Team was used. These discussions were welcomed as they provide the atmosphere to allow experts to come to the most appropriate conclusions based on the best available data and expertise. The resolution of the scope issue continued to evolve through the development of the ABCD and ISP process.

The HATT worked very closely with the Project Team throughout the development process for the last three years. In fact, the implementation/application of SS-21 philosophy was considered exceptional based on the main purpose of "designing safety into the process" as opposed to waiting until the end to review it. The result is that the process was developed with HATT concerns in mind.

It should be noted that MHC participated heavily in the HATT activities. The one area that was lacking was Risk Management. The lack of MHC Risk Management involvement was identified as an issue early in the process. MHC did not have the resources to lead the HAR effort when this project began. At that time it was deemed appropriate to proceed with the HAR effort with LANL as the lead agency. LANL and SNL have the dual lead for weapon response information,

so this compensatory action is considered appropriate. Pantex drafted an exceptions document roughly a year ago based on an early draft of the W69 HAR. These exceptions addressed issues such as "end use", change management, analytical methods, agreement with other authorization basis documents, and external events. These issues have been resolved and the exceptions report was never finalized or submitted. The resolutions of these issues are incorporated in the HAR and ABCD (Rev. 2, 7/11/97).

Issue 2:

"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."

Response:

References include the LANL input to the W69 NESS (pages 58-63) and the W69 WSS (pages 30-32). The operational data was based on information provided on pages 8-10 of the W69 NESS Report. The W69 TSD in Appendix C.1 summarizes operational data based on DOE Unusual Occurrence Reports, DoD Unsatisfactory Reports, Pantex Plant Nuclear Explosive Safety Incidents and Q-0278 Disassembly Observation Forms. An extensive discussion of the 1E31 Detonator System is presented in the W69 Dismantlement NESS SIID, Volume 4A - W69 Addendum Report No. 96-MHSM-AE-001. For the purpose of the W69 hazard assessment the nuclear explosive was assumed to be in a normal condition consistent with component conditions identified in the aforementioned documents.

The effect of aging of the HE main charge and detonators was briefed in detail during the NESS. The documentation and briefings, presented in the NESS Addendum were based on W69 surveillance data, relevant high explosive data, and expert judgment. For instance, aging was considered to potentially affect the removal of the detonators. An appropriate contingency plan was developed and has been executed several times during dismantlement thus far.

The technicians are trained and required to cease operations immediately if they identify anything out of the ordinary/expected during disassembly process(i.e. see NEOP N69-421745, Step 1 of the General Instructions). The design labs and plant will use the existing process to approve any procedure that deviates from the approved NEOP.

Prior to completing the pilot lot of WR units, a WR safety evaluation and NESS validation were conducted to ensure there were no unforeseen or unplanned issues with dismantlement. The validation was completed with no further actions necessary. The WR SE team updated the engineering release from conditional to acceptable.

Issue 3:

"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."

Response: (reference pages D-10, E-21, and E27 of Appendix E of the HAR TSDs, page 14 of the WSS, the W69 SIID, and summary information on page 9 of W69 NESS report)

1. The HAR identifies ESD accident scenarios regarding Sandia components as discussed in the W69 WSS in Section 3.4.2. The accident scenarios are presented in the HA spreadsheet in Appendix D.3.4 and Appendix F of the TSD. ESD process hazards were evaluated and found to not pose an accidental nuclear/nonnuclear detonation safety issue or threat. Based on detonator surveillance data and LANL detonator expert opinion, human ESD does not pose an HED/D threat. The W69 process tooling and equipment was determined not to pose an ESD threat based on experimental measurements by the Sandia National Laboratory ESD experts.

Specific W69 process requirements identified in the LANL input documentation for the W69 NESS (Ref: ESA-WE-96-8135) were carried forward as recommended control requirements in the HAR. The W69 ABCD lists these requirements in Appendix D.

Issue 4:

"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."

Response:

The insult to the HE transposed from the dogdish was not deemed credible. The analysis was complete and was used to assess the likelihood of an HED/D given an insult to the dogdish. These scenarios are in both the HAR and ABCD. Specific scenarios are in the HA spreadsheets in Appendix F of the TSD.

Detailed analysis of mechanical insults to the dogdish for several representative bounding scenarios showed no significant mechanical response that might result in HED/D (See W69 SIID

Addendum, Presentation Narrative, M&H Report No. 96-MHSM-AE-001, Rev 0.0, 5/10/97, pages 272-283 and page 96). Hence the HAR assumes that an insult to the dogdish would not pose any significant additional hazards over those from an insult to the cased or uncased primary.

Issue 5:

"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."

Response:

A comprehensive analysis of the hydrogen issue including the drawbacks of purging and backfilling the unit is included in LANL engineering input to the SIID (Enclosure H, pages 1-129).

The cover would not redirect any flames. The analysis indicates the worst case scenario at 18 inches from the unit (where the cover is located) to be 111 degrees Fahrenheit for about 90 milliseconds. This would pose no threat to personnel or the weapon. The two fold purpose of the cover is to provide a standoff for personnel to ensure at least 18 inches, and mitigate the spread of contamination in the very unlikely event of a hydrogen burn.

The cover is not considered to introduce a new hazard into the operation. The "blind operation" is for the technicians to turn the crank about ten times to separate the unit. This operation is not sensitive to visually ensuring separation. Separation is guaranteed by the tooling. The HATT carefully evaluated this activity and addresses potential hazards such as failure to remove screws.

Issue 6:

"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."

Response:

The stated scope of the W69 HAR was to exclude consideration of possible parallel maintenance or other operations that could pose a threat to the W69 during dismantlement. There are no planned parallel maintenance and weapon operations. Hazards associated with Emergency Maintenance Operations during W69 disassembly operations are discussed on page 2-39 of the HAR. Prior to conducting maintenance in a bay or cell, the weapon should be removed from the area if at all possible. The specific references to plant standards may be provided if necessary.

Control of combustibles that maintenance personnel utilize was addressed in the NESS and must be addressed by the plant (reference pages 45-46 of W69 NESS report).

The Mason and Hanger Safe Work Permit Program will address the hazards associated with any unanticipated operations. One key issue raised by the HATT and NESS were hazards associated with radiation protection contingencies. At the direction of the NESS, the NEOPs were modified to incorporate actions to be taken by radiation protection personnel. The hazards associated with these activities have been recently addressed by the HATT and Project Team.

Issue 7:

"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."

Response:

The information/analysis in the draft documents was reviewed by the HATT and in most instances considered to be an improvement to the existing, approved SARs/BIOs. The HATT used the draft safety basis information to provide generic facility descriptive information and to help identify potential facility hazards. The HATT and project team believed that the best available facility descriptive information should be used. This does not require that the draft documents would require change control. Currently, there is a rigid change-control process for changes to the NEOPs. Additionally, there is a change control process for general plant standards. These documents (NEOPs and plant standards) implement the required controls.

Volume 2F of the W69 TAD, Appendix F.3 pages 173-185 (5/10/97) present the W69 Transportation HA spreadsheets. These spreadsheets were inadvertently left out of the original Appendix F.

Issue 8:

"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 a heavy object falling on a weapon are analyzed as potentially requiring additional controls."

Response: (Reference page 69 of the NESS report)

This issue has been studied in detail from the potential of the hoist falling as well as pieces of concrete from the ceiling. Ongoing analysis of the facility structure response to a seismic event indicates the threat to the weapon is far less than originally postulated. (reference page 69 of the NESS report). This issue will be addressed by the BIO upgrade Project Team at the Pantex plant.

Issue 9:

"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 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."

Response:

The relative contributions of positive measures, in most cases, is subjective and difficult to rank. There is not sufficient data that can be relied upon to provide an objective value of a given measure. The measures were considered more than adequate by the collective expertise of the NESSG, HATT, and the Project Team.

There is an on-going effort to establish criteria to aid in the process of establishing the adequacy of controls in general. This effort is lead by upper DOE/AL and HQ management. Once the criteria is established, it will be formalized and implemented.

The existing NEOP change control system, along with the pilot change control of the ABCD, will be used to ensure that all of the positive measures are preserved.

In addition, processes to assure the readiness of positive measures (TSRs and OSCs) are provided through a surveillance program.