

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

February 22, 1993

MEMORANDUM FOR: Technical Director

COPIES: Board Members

FROM: Matthew B. Moury

THROUGH: Steve Krahn

SUBJECT: Pantex Site - DNFSB Staff Trip Report - B53 Nuclear Explosive Safety Study

1. Purpose: This report provides a preliminary summary of a review by DNFSB Staff members M. Moury and J. Roarty of a trip on January 26-29, 1993, to the Pantex Site near Amarillo, Texas to observe the Nuclear Explosive Safety Study Group (NESSG) conduct a five- year review of the B53 operations.
2. Summary:
 - a. DOE Order 5610.11 (Nuclear Explosive Safety) requires all DOE nuclear explosive operations to undergo a NESS prior to beginning any operations. The NESS report is approved by the Deputy Assistant Secretary for Military Applications and updated every five years. The NESS is chaired by DOE Albuquerque (ALO) and is composed of personnel from the national laboratories, Pantex, DOE Nevada, ALO, Amarillo Area Office (AAO), DOE San Francisco, and DOE Headquarters. It evaluates all operations associated with nuclear explosives to identify any nuclear explosive safety concerns. The NESS also verifies that all operations are in compliance with the nuclear explosive safety standards and rules specified in DOE Order 5610.11.
 - b. The NESSG determined Pantex was not ready to proceed with B53 operations. This determination was based on the following NESSG observations:
 - (1) The Design Agency input documents and briefings provided to the NESSG by Los Alamos National Laboratory (LANL) were incomplete and lacked the depth required to make an informed assessment of issues related to nuclear explosive safety.
 - (2) Procedures were not completed, steps were missing and other changes to the procedures were made during the disassembly of the inert weapon.
 - (3) Tooling and rigging equipment used in the disassembly were deficient.

Padding was missing from stands and there were inadequate interlocks for lifting devices.

- (4) Weight tests had not been completed for all lifting equipment.
- (5) Several processes were determined to be unsatisfactory including; a drilling process to remove rivets, and a procedure to cap the pit to reservoir tube following removal of the reservoir.

The NESSG will provide approval for performing one limited disassembly to remove a limited life component from one B53.

c. Based on the Staff's observations of the NESSG process the following comments are provided:

- (1) The NESS lacked the formalization seen in other reviews such as Operational Readiness Reviews (ORRs), Operational Readiness Evaluations (OREs), and Design Reviews. DOE Order 5610.11 defines a minimum review scope, but the review and acceptance criteria for the NESS are not formally established.
- (2) The NESS relied on technical input documentation provided by the Design Agencies. Detailed analysis of this documentation does not appear to be in the purview of the NESSG. The review of this documentation was minimal, and summary statements concerning criticality and accident analysis were accepted without question by many of the committee members.

d. The Staff needs to conduct a thorough review of the NESS process. This will include the observation of additional NESSG, evaluation of the qualification of the NESSG committee members, and review of the NESS Master Study reports addressed below. The Staff has no cause to disagree with the conclusions of this NESSG.

3. Discussion/Observations:

- a. NESS Process - The chairman has functioned for about 10 years in his role and the balance of the committee is chosen by their respective organizations for each review. Figure 1 shows the composition of the NESSG. Most members have participated in NESSG before. Several were first or second time members. The review consisted of one day of presentations by Los Alamos National Laboratory (LANL), Sandia National Laboratory (SNL), and Mason and Hanger. A day and a half of procedure walk-throughs and demonstration of the B53 disassembly for surveillance and inspection followed the presentations.

DOE Order 5610.11 requires the NESSG to consider and evaluate, as appropriate, seventeen areas for the operation/weapon being reviewed. The NESS process relies on "Master Studies" to address several of these areas that are global issues, affecting more than one weapon. These studies include operating and staging facilities, electrical test equipment, transportation, security, and handling equipment. It was not apparent where the boundary between the NESS and the Master Studies exists, nor if all members of the NESSG were aware of what was reviewed in the Master Study and what they were responsible to review.

DOE Order 5610.11 requires the NESSG to review the "quantitative risk assessment for the disposal of radioactive material from the pit of a nuclear explosive as documented in a risk assessment report." This report has not been prepared for the B53. When questioned, the NESSG chairman explained that two studies have been completed on other weapons, and DOE-HQ was evaluating their approach and acceptance criteria and allocating resources for the development of additional risk assessments.

The LANL presenter was a last minute substitute for the scheduled presenter. He was not prepared to provide the briefing and could not answer many questions posed by the committee. The committee members, except for the chairman, exhibited little aggressiveness in questioning the presenters. The committee also reviewed the input documentation provided by the Design Agencies. The committee raised few questions on the documentation provided. DNFSB Staff review of this documentation showed it to lack quantitative design information and safety analysis basis.

The demonstration was conducted in the training facility on an inert weapon using qualified technicians. The presence of the Design Agencies technical representatives during the walk-through was not apparent. The involvement of the Pantex Nuclear Explosive Safety Division (NESD) was vague or non-existent during the NESS. The procedures used were draft procedures and had not been subjected to reviews by the various technical and oversight organizations, including the Pantex NESD. Mason and Hanger stated this was due to the lack of time to prepare for the NESS. The significant number of deficiencies in the procedures detracted from the conduct of the review.

Most of the tooling and rigging equipment was thirty years old and had not been updated to meet today's standards. For example, the roto-cage devices used for lifting and inverting the weapon lacked positive interlocks to ensure the cage is securely attached to the weapon. A similar device was being used last year when a weapon was dropped. In addition, some special tooling and handling equipment have not undergone a safety analysis, including weight testing, to " . . . assure that there is an adequate degree of safety inherent in their design and use," as required by DOE Order 5610.11.

The Board and its Staff were briefed on at least two occasions on changes proposed by the laboratories to increase nuclear explosive safety during the operations associated with the disconnecting of the reservoir from the weapon, and capping the pit to reservoir tube. These changes have not been invoked at Pantex and according to one member of the NESSG, may not have been well thought out. This operation applies to more than the B53 weapon system, and requires further review by the Staff.

- b. One-point Safety - This criterion is not a measure of safety as the title might imply, and should not be challenged during any operation on the weapon. It is a design criteria that is invoked to ensure the safety of the public. The Staff believes that operations at Pantex are at times being controlled based on this criterion, rather than on more conservative measures that could be invoked to preclude the detonation of the high explosive and potential fissile material dispersal. For example, during one operation performed on this weapon a hand held drill was used to remove rivets. The NESSG noted that it was inherently safer to perform this operation with a fixture that provides more positive control. In addition, several lifting or handling problems have been brought to light either as a part of this review, the QED process, or occurrences. It seems prudent for more detailed evaluation of lifting and handling be completed to ensure one-point safety is not challenged. The fact that these issues exist raises questions concerning the explosive safety standards being applied at Pantex. The Staff intends to pursue this area further during the procedure and standards development review as well as conduct of operations reviews at the site.
 - c. Criticality Safety - DOE Order 5610.11 requires the NESSG to consider and evaluate, as appropriate "Potential nuclear criticality risks associated with the operation or test to be performed." As such, the NESSG has a shared responsibility with the Design Agency for criticality safety. The Staff will review the qualifications of the NESSG to determine if it has adequate technical expertise to discern operational assembly or disassembly interfaces which might affect the fissile material.
4. Follow-up Activities - The NESS chairman stated that this NESS was very unusual because the level of preparedness was so deficient the committee was unable to write a report. However, discussions with Pantex personnel indicated that the expectations of the NESSG were more exacting than previous NESSG. This confusion may have resulted in the lack of preparedness by Pantex, and contributed to the Staff's concerns about the formality and thoroughness of the review. The following Staff actions are planned:
- a. Observe the conduct of at least one complete NESS, including the writing of a NESS report, to refine the Staff's assessment of the NESS process.
 - b. The Staff has requested copies of the NESS members resumes and will review their qualifications.

- c. Review the NESS Master Study reports at Pantex the week of February 15, 1993 to determine the content and scope of these documents.
- d. Follow the preparations for B53 operations including procedure upgrades, tooling and handling equipment redesign, and process refinements.
- e. Follow the resolution of the pit to reservoir tube capping process, which applies to more than this weapon system.