

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

August 12, 2008

MEMORANDUM FOR: T. J. Dwyer, Technical Director

COPIES: Board Members

FROM: T. L. Spatz
C. R. Martin

SUBJECT: Nuclear Explosive Safety Study for W87 In-Situ Mechanical Safe Arming Device Operations

Members of the staff of the Defense Nuclear Facilities Safety Board (Board) T. Spatz and C. Martin observed the W87 In-Situ Mechanical Safe Arming Device (MSAD) Operations (ISMO) Nuclear Explosive Safety (NES) Study at the Pantex Plant during April 1–May 5, 2008. Staff member T. Spatz performed a follow up review of the safety basis for ISMO operations at Pantex during August 13–14, 2008.

This NES Study was considered a limited-scope study because Seamless Safety for the 21st Century (SS-21) processes are already in place at Pantex for W87 disassembly, inspection, and assembly operations. The purpose of this NES Study was to evaluate the use of a new tester for the surveillance activity of testing the MSAD *in situ*. The study also evaluated the disassembly steps following testing of the MSAD, including an option for on-site transportation of the unit using the enhanced transportation cart-II (ETC-II).

The electronic tester that was the focus of this NES Study is technologically advanced compared with other testers used at Pantex. From the time the tester is turned on until the time the MSAD is tested and the tester is turned off, the nuclear explosive operating procedure (NEOP) is vocalized by the tester, not by the human reader. No written NEOP was available for the steps performed when the tester was verbally instructing the production technicians to connect the tester to the nuclear explosive and perform the test.

It is also noteworthy that the design agency for the tester was Lawrence Livermore National Laboratory (LLNL) instead of Sandia National Laboratories (SNL), which has traditionally been the design agency for electronic testers. LLNL personnel informed the Board's staff that they used SNL's design guide for electrical testers to be used with nuclear explosives (Design Guide DG10001/N, *Electrical Testers for Use with Nuclear Explosives*).

Involvement of National Nuclear Security Administration (NNSA) Management. A conference call was held on April 15, 2008, among the NES Study Group (NESSG), an NNSA manager, and LLNL management. The Board's staff was present with the NESSG during this conference call. Its purpose was to determine what new paperwork was needed from LLNL (the design agency) to avoid a pre-start finding by the NESSG. This conference call was documented in the report of the NES Study as a deliberation topic titled, *Inappropriate Attempt by Line Management to Influence NESSG*. The report states that the NNSA manager "behaved unprofessionally and attempted to bully and intimidate the NESSG and certain individual members into changing their technical evaluations with regard to the indirect lightning threat." The report also states that, "It was the NESSG's perception that the LLNL technical manager appeared to be pressured by the NNSA manager to change his technical position on the weapons response." The NES Study Chairman polled the NESSG members individually to determine if they could remain independent and could reach an impartial determination. The vote was unanimously yes.

NESSG Decision Making. One of the senior technical advisors (STAs) for the NES Study wrote some insightful comments regarding the process used by this NESSG to determine whether a finding should be designated pre-start or post-start. He noted that, "Considerations for making this decision included the following:

- Potential impact on nuclear explosive safety (NES),
- Ease of correction by the plant,
- Impact on the schedule for initiation or continuation of operations,
- Whether the NESSG deemed near-term action a necessity or not—it appeared that the plant does not aggressively respond to an issue if it is deemed a post-start finding."

The last three items are not NES-related and should not be a factor in making pre-start/post-start decisions. After discussing these STA comments, the NESSG reverted to the same considerations when discussing a minority opinion related to electrical isolation properties of the tester's fiber-optic cables.

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August 12, 2008

MEMORANDUM FOR: T. J. Dwyer, Technical Director

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FROM: A. Matteucci
C. Martin

SUBJECT: Nuclear Explosive Safety Master Study of On-Site Transportation and Staging, Pantex Plant

This report documents a review of the National Nuclear Security Administration's (NNSA) Nuclear Explosive Safety (NES) Master Study for On-site Transportation and Staging activities at the Pantex Plant. The staff of the Defense Nuclear Facilities Safety Board (Board) observed the Master Study, which commenced on February 4, 2008.

Background. The NES Study Group (NESSG) consisted of members representing the three design agencies, Pantex contractor (B&W Pantex), and NNSA Headquarters, as well as two senior technical advisors. The study addressed the on-site transportation and staging of nuclear explosives, materials, and components at Pantex, including loading and unloading activities associated with these operations.

NES Master Study Summary. The NESSG received briefings on the documented safety analysis for transportation, loading, and unloading operations. The NESSG was also briefed on the on-site trailer movement of multiple units from the same program and mixed loads of units from different programs. The NESSG observed a loading operation in Zone 4, transport to Zone 12, and off-loading operations. The study involved deliberations on, and the formal resolution of, approximately 30 lines of inquiry (LOIs). The final report, issued on March 28, 2008, describes 5 pre-start findings, 8 post-start findings, 13 deliberation topics, 5 minority opinions, and 6 comments by the senior technical advisors.

The study was suspended for half a day to address the security classification of one of the deliberation topics. To have a full and open discussion of all relevant information needed to develop well-informed opinions, future NESSGs may need to make special arrangements to receive and discuss certain sensitive information.

Prior to review and approval of the NESSG's final report, the NNSA Assistant Deputy Administrator for Science, Engineering and Production Programs (NA-12) received a memo from the Pantex Site Office (PXSO) requesting that three of the pre-start findings be changed to deliberation topics and one pre-start finding be changed to a post-start finding. In its approval memorandum dated June 25, 2008, NA-12 downgraded four out of five pre-start findings.

Summary of Pre-Start Findings. Several LOIs addressing postulated accident scenarios could not be adequately resolved because the supporting analyses to disposition the issues were lacking. The design agency responded to these LOIs by stating that the scenarios had been screened using expert judgment. In four cases, the majority of the NESSG disagreed and categorized the NES deficiencies as pre-start findings based on a lack of detailed analysis and testing to address credible accident scenarios. These findings are summarized below.

NESSG concerns with accident scenarios associated with the use of the high explosive (HE) transportation cart (HETC) to move HE at Pantex led to a pre-start finding. The HETC provides protection for the HE and reduces the possibility of an adverse reaction of the HE resulting from a credible accident scenario. Use of the HETC is intended to eventually eliminate the need for the current practice of restricting all nuclear explosive transport in ramps during the movement of HE. The NESSG recognized the additional protection afforded by the HETC but was concerned about the possible generation of a high-energy fragment in the event of an accidental violent reaction of the HE within the HETC. The NESSG noted the need for additional analysis of the interaction between materials being transported in the HETC and nuclear explosives if the current restrictions on simultaneous movement are removed.

In another pre-start finding, the NESSG noted that analysis was lacking for credible accident environments involving the movement within ramps of multiple and mixed loads containing specific sensitive components. A similar concern associated with the on-site movement of multiple and mixed loads between zones also resulted in a pre-start finding. A fourth pre-start finding identified the lack of analysis of the implications of cargo being transported and staged within trailers on-site by the Office of Secure Transportation as part of a safe haven protocol. The final pre-start finding—the only pre-start finding approved by NA-12 as categorized by the NESSG—recognized that the criteria for the configuration of tie-down patterns for units during on-site transportation are not managed under a NES change control process.

Staff Issues. The staff identified the following issues with the execution and approval of the Master Study:

NESSG Access to Sensitive Information—The staff is concerned with the NESSG access to sensitive information and its potential to impact the thoroughness of the NES evaluation. In this instance, an interpretation of the classification guidance was applied to an issue under deliberation, creating the potential to limit the scope and depth of the discussion regarding a possible safety concern. Some information was made available to the NESSG only after the Board's staff communicated its concern to cognizant individuals.

Compensatory Measures—The staff is concerned with the actions taken after the final report for the Master Study documented several pre-start findings. According to the Department of Energy (DOE) Standard 3015-2001, *Nuclear Explosive Safety Evaluation Process*, approval of the NESSG report constitutes NNSA tasking to take action on the findings. However, responsible site offices have “the authority to act on NESSG findings in advance of this approval.” DOE-Standard-3015 states that “[w]hen NESSG findings impact ongoing operations, the Site Office or NA-15 [Assistant Deputy Administrator for Secure Transportation] should provide direction to operations personnel deemed appropriate based on the information in the findings. The range of options include [sic] suspending the affected operations, implementing corrective or compensatory measures, and allowing operations to continue unchanged pending further evaluation or NA-12 decision.”

In accordance with DOE Order 452.2C, *Nuclear Explosive Safety*, “prestart findings involve concerns that must be addressed before initiation or *continuation of the affected NEOs*.” [Emphasis added.] The nine-member expert panel performing the Master Study should have possessed sufficient credibility and influence with NNSA management to merit more immediate action when the NESSG designated findings as “prestart.” In this case, the final NES Study approval did not occur for approximately three months and operations were allowed to continue without resolution of all the issues that led to the pre-start findings or implementation of compensatory measures.

The lack of action on the part of the PXSO during the study approval period indicates a disconnect between the understanding of the NESSG members and the decision authorities regarding the safety significance of the categorization of NES deficiencies. This highlights the need for clear criteria in the NES directives for declaring pre-start versus post-start findings, especially for ongoing operations, and for additional and clearer guidance on the actions to be taken between the time that a report is signed by the NESSG members and the time that the approval authority acts on the study recommendations.

Approval Process—The current approval process requires the NESSG members to concur on the NES Study report and send it to NA-12—with concurrent transmittal to the PXSO manager—for programmatic approval. As noted above, NA-12 downgraded four of five pre-start findings in its approval memorandum for the Master Study, as requested by PXSO. The NES process is intended to provide an independent review of nuclear explosive operations, free from interference and pressure from operations personnel responsible for meeting production schedules. Downgrading pre-start findings based on the recommendations of the production plant, if done, has the potential to compromise the independent review process for NES. While DOE Standard 3015 permits the site office manager to provide additional information regarding the NES evaluation, such widespread disagreement with and wholesale changes to the NESSG’s recommendations ought to be infrequent if the perceived stature of the NESSG meets expectations. The NESSG’s conclusions and report should be accepted unless adequate technical justification can be provided to the contrary.

NESSG Credibility—The NES Study process is designed to use highly qualified and respected personnel to provide a rigorous, independent review of nuclear explosive operations proposed by NNSA. In the case of this Master Study, the stature of the NESSG report is called into question, as indicated by the decision by NA-12 to downgrade four of the pre-start findings as well as the decision at the site level to not institute compensatory measures for the pre-start findings while the final report awaited approval. This divergence of opinion between the NESSG and NNSA management indicates that a reevaluation of the expectations and responsibilities of the NESSG is in order.