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DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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July 16, 2007

The Honorable William C. Ostendorff
Acting Administrator
National Nuclear Security Administration
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-0701

Dear Mr. Ostendorff:

The safe startup of weapon program activities at the Pantex Plant is ensured by a rigorous process set forth in pertinent Department of Energy (DOE) Orders. The Defense Nuclear Facilities Safety Board (Board) closely follows weapon program startup activities at Pantex to verify that these activities are performed in a manner consistent with those requirements. During the last 18 months, the Board has observed several instances in which the National Nuclear Security Administration (NNSA) circumvented DOE requirements and best practices for startup activities. In some instances, the effectiveness of the startup activity was compromised.

The enclosed report prepared by the Board's staff provides examples of activities that were conducted at the Pantex Plant in a manner inconsistent with DOE requirements and typical good practices. The Board views problems encountered during the startup activities for W76 Mod 1 operations as the most compelling example of these shortcomings. Prior to the W76 Mod 1 Nuclear Explosive Safety Study (NESS), NNSA approved an exemption to allow the NESS to begin without an approved safety basis in place. In addition, the NESS was conducted without the availability of important input documents, such as Engineering Analyses and Design Requirements Documents. The contractor readiness assessment (RA) for W76 Mod 1 assembly operations was also initiated prior to approval of the safety basis. Furthermore, despite line management's declaration of readiness, the contractor RA encountered procedures that contained numerous errors and discovered that some procedures could not be performed as written.

In a January 30, 2007, letter to the Deputy Secretary of Energy, the Board commended DOE's Chief Operating Officer for Environmental Management (EM) for clarifying DOE-EM's expectation that a contractor RA will not begin without an approved safety basis in place, and expressed concern that NNSA had not benefitted from the lessons learned provided by DOE-EM. It is clear from the problems listed above that NNSA did not apply this lesson in establishing and verifying readiness for W76 Mod 1 operations.

The Board is concerned that NNSA's willingness to deviate from DOE requirements and typical good practices may result from pressures to meet growing production demands. As a specific example, the readiness activities necessary to support the startup of W76 Mod 1

operations could not be performed with the expected level of rigor in the time frame specified by NNSA. The pressure to complete the W76 Mod 1 First Production Unit by the end of September 2007 created a situation that compromised the effectiveness of the W76 Mod 1 NESS and contractor RA.

Production milestones should not be pursued at the expense of safety, nor should they be allowed to create an environment in which deviation from DOE requirements and typical good practices is considered normal. Therefore, pursuant to 42 U.S.C. § 2286b(d), the Board requests a report within 30 days of receipt of this letter detailing the following:

- What specific actions will be taken by NNSA to verify that startup activities for the W76 Mod 1 project have been adequately performed?
- What specific actions will be taken by NNSA to ensure compliance with, and minimize exemptions to, DOE requirements and expectations during startup and restart of nuclear explosive operations at Pantex?
- When will the above actions be completed?

Sincerely,

A handwritten signature in black ink, appearing to read "A. J. Eggenberger". The signature is fluid and cursive, written over a white background.

A. J. Eggenberger
Chairman

c: Mr. Glenn S. Podonsky
Mr. Mark B. Whitaker, Jr.

Enclosure

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

July 9, 2007

MEMORANDUM FOR: J. K. Fortenberry

COPIES: Board Members

FROM: R. Rauch

SUBJECT: Adherence to Department of Energy Requirements for
Weapon Startup Activities at the Pantex Plant

Background. The Department of Energy (DOE) has established specific requirements and guidance for the review of weapon startup and restart activities at the Pantex Plant. When conducted in a manner consistent with DOE requirements, these reviews provide an adequate level of assurance that the proposed operation is ready to be conducted safely. At Pantex, the primary methods for reviewing weapon startup activities are the Nuclear Explosive Safety Study (NESS), as required by DOE Order 452.2C, *Nuclear Explosive Safety*, and the readiness assessment (RA), required by DOE Order 425.1C, *Startup and Restart of Nuclear Facilities*.

The ability to perform an effective NESS or RA is contingent on the quality of the input documentation provided to the review team. Although the type of input documentation may vary from program to program or with the type of review being performed, the safety basis for the proposed operation typically constitutes a primary source of information for the reviewer. DOE Order 452.2C requires that a NESS not begin until preparatory work on the facilities and operations has been completed, including DOE approval of the safety basis for the operation. DOE Order 425.1C does not explicitly require an approved safety basis in place before an RA can commence, but DOE has established its expectation in guidance documents that the safety basis for a proposed operation will be in place prior to the start of the readiness review.

In September 2001 and February 2005, the Pantex Site Office (PXSO) formally documented its expectations for completion of preparatory activities prior to commencing RAs. These expectations include the following: the safety basis has been approved, conditions of approval have been closed, operational procedures have been fully implemented, procedures have been evaluated through the Unreviewed Safety Question process, and training has been completed. Failure to meet these expectations can significantly degrade the quality of the readiness review.

In a January 30, 2007, letter to the Deputy Secretary of Energy, the Defense Nuclear Facilities Safety Board (Board) commended the Chief Operating Officer for DOE's Office of Environmental Management (EM) for issuing a memorandum to clarify similar expectations after a contractor at the Savannah River Site conducted an RA before the safety basis for that

operation had been approved. In this letter, the Board expressed concern that the National Nuclear Security Administration (NNSA) had not benefitted from the lessons learned from this Savannah River Site event.

Observations from Recent Weapon Program Startup Activities. The Board's staff has recently observed a lack of rigorous adherence to DOE requirements for weapon program startup activities. The staff believes these occurrences to be noteworthy because they establish an environment in which deviation from the DOE requirements and expectations for weapon program startup activities is routine.

As a specific example, the Board's staff noted three violations of the requirement in DOE Order 452.2C to have an approved safety basis in place before the start of a NESS:

- In February 2006, the W87 NESS was convened before three Satellite Facility Documented Safety Analysis (DSA) change packages had been approved.
- In March 2006, five Safety Analysis Report change packages had not been approved before the start of the B61 NESS.
- The NESS for W88 cell disassembly and inspection (D&I) operations began on October 10, 2006. PXSO conditionally approved the DSA and the Technical Safety Requirements for the operation that same morning.

In all the above cases, approval of the safety bases was achieved in a relatively expeditious manner, and with little impact on the ability of the NESS group to perform its evaluation. However, NNSA allowed these violations to occur without a formal exemption to the safety basis requirement in DOE Order 452.2C.

W76 Mod 1 Startup Activities. A major NNSA milestone is the completion of the First Production Unit of the W76 Mod 1 by the end of fiscal year 2007. NNSA's strong emphasis on meeting production milestones for W76 Mod 1 startup activities placed a substantial amount of pressure on the W76 Mod 1 project team. When the project team could not support startup activities, NNSA granted exemptions to DOE requirements for the NESS and allowed deviations from typical good practices for the BWXT RA. As a result, the effectiveness of the NESS, the BWXT RA, and the overall readiness process was compromised, as indicated by the number and significance of findings from these reviews. The staff's observations on these activities are detailed below.

W76 Mod 1 Nuclear Explosive Safety Study—The W76 Mod 1 NESS was conducted in two phases. Phase I covered D&I operations, while Phase II covered assembly and satellite operations. The W76 project team's level of readiness was inadequate to support either phase of the study. In both cases, tooling was still being procured and tested, tooling analyses and documentation were incomplete, training was incomplete, and procedures were frequently being revised. The impact of these shortcomings on the quality of the Phase I NESS was somewhat

mitigated by the fact that the D&I operation had changed little from the W76 Mod 0 process. However, changes to Phase II operations were more substantial, which caused the project team to fall further behind in its level of readiness to support the NESS. As a result, the quality of Phase II of the NESS was placed at risk.

The Hazard Analysis Report (HAR) was not approved prior to the start of Phase II of the NESS. Rather than request a delay of the NESS, PXSO requested and received an exemption to the safety basis requirements of DOE Order 452.2C. The attachment to the March 21, 2007, exemption request stated that BWXT would confirm the following had been accomplished at the time the safety basis was submitted for approval prior to the start of the NESS: (1) weapon program operating procedures written and approved, (2) tooling design and Design Requirements Documents complete and validated, (3) Engineering Analyses needed to support assumptions in the safety basis complete, (4) program-specific controls could be implemented as written, and (5) the Process Validation Tryout/Engineering Evaluation completed and all relevant changes incorporated into the safety basis. However, according to the April 10, 2007, declaration of readiness by PXSO to begin the NESS, many of these activities had not been completed. For example, procedures had not been updated to implement program-specific controls, Engineering Analyses were incomplete, and Design Requirements Documents had not been completed and validated.

The activities surrounding the W76 Mod 1 NESS are cause for concern on several levels. First, the safety basis documentation, which is relied upon as the primary source of information for study participants, was incomplete. Other important input documentation, such as Engineering Analyses and Design Requirements Documents for special tooling, also was not available for NESS review. Second, NNSA approved the exemption to DOE Order 452.2C even though BWXT had not completed many of the activities cited as justification for using a submitted but unapproved safety basis as input for the NESS; in fact, many of these activities were still incomplete at the start of the NESS. This led to difficulties for the NESS Group, which was forced to rely on draft information and change control processes in preparation for and during the NESS. Third, the staff considers the lapse of 28 days between the start of the Phase II NESS and final approval of the W76 Mod 1 safety basis to be excessive. The NESS chair reviewed the Safety Evaluation Report when it was issued to determine whether the NESS should be reconvened, but this was a highly undesirable situation that ought to have been avoided.

W76 Mod 1 Contractor Readiness Assessment—The BWXT RA for W76 Mod 1 assembly operations also began without a DOE-approved safety basis in place. NNSA did not, as suggested in the Board's letter of January 30, 2007, learn from the weaknesses in the readiness review process identified by DOE-EM at the Savannah River Site. The following is a summary of the issues associated with the BWXT RA:

- The lack of an approved safety basis delayed the Unreviewed Safety Question process for certain procedures.

- The lack of an approved safety basis led to a situation in which some tooling did not have completed Design Requirements Documents.
- The project team had not received the NESS report; therefore, Nuclear Explosive Safety Requirements and Immediate Action Procedures had not been written, approved, or entered into the Nuclear Explosive Operating Procedures.
- Procedures contained numerous errors and some could not be performed as written, and the flowdown of requirements into procedures was inadequate.
- One of the three process engineers and one of the two production section managers had not completed their qualifications.

The contractor RA team identified several lessons learned that provide insight into the pressure to meet the September 2007 First Production Unit milestone. First, BWXT attempted to perform five RAs simultaneously, which ultimately delayed all the reviews. Second, the final RA report stated that the review team should not allow the project manager to pressure them into expediting the review at the expense of the review's thoroughness and quality. Third, the RA team noted that production technicians became fatigued by the long hours required to maintain the schedule, and the error rate increased after 10 or 11 hours of demonstrations in a day.

Conclusions. DOE has established requirements and guidance for weapon startup activities at Pantex to ensure that proposed operations are ready to be conducted in a safe manner. These requirements include the conduct of readiness reviews, such as NESSs and RAs, which should be used as a means to determine, not achieve, readiness. The Board's staff has observed instances in which NNSA has allowed exemptions and deviations from DOE readiness requirements because the contractor was unable to achieve readiness to operate in a time frame dictated by NNSA's production milestones. In the case of the W76 Mod 1 NESS and the contractor RA for W76 Mod 1 operations, the quality of these reviews was placed at risk by the pressure to meet an NNSA production milestone, which in turn led to a lack of readiness by the project team and drove exemptions to DOE requirements and deviations from typical good practices.