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**DEFENSE NUCLEAR FACILITIES
SAFETY BOARD**

Washington, DC 20004-2901



January 4, 2023

The Honorable Jill Hruby
Administrator
National Nuclear Security Administration
US Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-1000

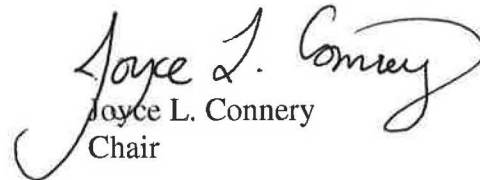
Dear Administrator Hruby:

The Defense Nuclear Facilities Safety Board (Board) continues to evaluate deliverables provided by the National Nuclear Security Administration (NNSA) in response to Recommendation 2019-1, *Uncontrolled Hazard Scenarios and 10 CFR 830 Implementation at the Pantex Plant*. In particular, the Board recently conducted a review of the implementation of several safety improvements at the Pantex Plant.

As part of Recommendation 2019-1, the Board noted the incomplete closure of various legacy conditions of approval (COA) that persisted in the Pantex safety basis for many years. From this recent review, the Board found that the actions taken by the NNSA Production Office (NPO) and the Pantex management and operating contractor, Consolidated Nuclear Security, LLC (CNS), are consistent with the Department of Energy's Implementation Plan for Recommendation 2019-1 and are addressing most of the Board's safety concerns about these legacy safety conditions. However, NPO and CNS are closing a few of the legacy COAs (e.g., implementing non-flammable solvents and minimizing hoisting operations) without fully addressing the specific safety improvements. NPO and CNS are calling these legacy COAs continuous improvement initiatives versus actions needed to address deficiencies in the safety basis. This approach may result in valuable process improvements not being implemented. As discussed in the enclosed report, the Board believes it would be prudent for NNSA to track the initiatives categorized as continuous improvements to maintain progress to resolution.

The Board continues to review all the Recommendation 2019-1 Implementation Plan deliverables as they are completed. When all the deliverables described in the Implementation Plan are complete, the safety posture at Pantex will be improved, more effectively ensuring the adequate protection of Pantex employees and the public. The enclosed staff report is provided for your information and use.

Sincerely,


Joyce L. Connery
Chair

Enclosure

c: The Honorable Jennifer Granholm
Ms. Teresa Robbins
Mr. Joe Olencz

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Report

September 20, 2022

Review of Legacy Planned Improvements and Conditions of Approval at the Pantex Plant

Summary. During 2021 and 2022, the Defense Nuclear Facilities Safety Board's (Board) staff conducted a review of the path to closure for various legacy planned improvements and conditions of approval (COA) at the Pantex Plant. In Recommendation 2019-1, *Uncontrolled Hazard Scenarios and 10 CFR 830 Implementation at the Pantex Plant*, the Board found that some COAs remained open for many years after being imposed by the National Nuclear Security Administration (NNSA) field office, now the NNSA Production Office (NPO). This allowed the Pantex contractor, now Consolidated Nuclear Security, LLC (CNS), to operate under an approved safety basis but without making the safety upgrades required by NNSA as a condition of approval. As part of the Department of Energy's (DOE) Implementation Plan for Recommendation 2019-1, NNSA committed to disposition the open legacy COAs. The Board's staff reviewed the closure packages for several of these COAs and assessed the progress achieved by NPO and CNS toward closing the remaining open actions. The staff also evaluated the path to closure for multiple planned improvements identified in the Pantex safety basis. NPO and CNS generally provided technically defensible responses to support the closure of the various COAs and planned improvements assessed by the team.

Background. The previous Pantex contractor identified planned safety improvements to improve the existing infrastructure to protect against hazard scenarios defined in the safety basis and to further streamline the analysis to evaluate additional hazards. These legacy planned improvements, as well as legacy COAs imposed by NNSA, have persisted at Pantex for over a decade. As part of the Board's ongoing evaluation of NNSA's completion of milestones established in DOE's Implementation Plan for Recommendation 2019-1, the Board's staff assessed the path to closure for various legacy COAs and planned improvements. During December 2021 and February 2022, the staff team held onsite discussions with NPO and CNS to discuss the status of these efforts. Observations from this review are provided below.

Vacuum Chamber. In 2005, the previous NNSA field office—the Pantex Site Office—approved a safety basis document that governed vacuum chamber operations (i.e., the *Vacuum Chamber and Manifold Safety Analysis Report*). In its approval, the field office required the following: 1) eliminate two fire scenarios via the specification of a high flashpoint oil in the vacuum pumps within the vacuum chamber equipment room, and 2) determine whether the sitewide fire analysis bounded an oil pool fire that might occur in the vacuum chamber. Prior to the Board's staff review, CNS acquired vacuum chamber oil at the site's lower acquisition level, AL-0, without performing rigorous acceptance activities to validate the fire rating of the oil. CNS has now modified its acquisition requirements, including acceptance and inspection, for vacuum pump oil to ensure that it complies with a National Fire Protection Association low-flammability rating. CNS will now perform commercial grade dedication for the pump oil with

the requisite high flashpoint to meet these requirements.¹ Qualifying the oil to the higher industry standards protects the safety basis assumption that the pool fire scenario is incredible for vacuum chamber operations.

In addition to evaluating the COA, the Board's staff assessed the gaskets that seal the door to the vacuum chamber, forming part of the chamber's Faraday cage to protect against electrical insults. CNS did not previously test these gaskets to ensure that they will perform their safety function as required by the design agency. Instead, CNS only performed a continuity check between the door flange and gasket after its installation. CNS personnel stated they will acquire a conductance tester from the manufacturer to use for commercial grade dedication of gaskets prior to installation in the future.

False Ceiling Replacement. For several years, CNS has planned on replacing wood-framed false ceilings in two nuclear explosive cells. The wood-framed false ceilings required a wet pipe fire suppression system above them, resulting in a safety concern that the firefighting water could cause ceiling tiles to fall, potentially impacting an in-process nuclear explosive below. NNSA committed to replace these false ceilings, and resolve the associated COA and planned improvement, as part of the Recommendation 2019-1 Implementation Plan. CNS has commenced false ceiling replacement for the first of these nuclear explosive cells; the second is scheduled to begin later this calendar year. This replacement project is scheduled to be complete in 2023. CNS indicated that this effort has been fully funded. Completion of false ceiling replacement will significantly improve the safety of operations in these cells.

The Board's staff was able to observe construction in support of this effort including installation of the ceiling framing system; replacement of the fire suppression system (i.e., removal of the wet pipe system above the ceiling and installation of a deluge system supported by the new ceiling); installation of heating, ventilation, and air conditioning (HVAC) equipment; and mounting and alignment of infrared fire detector heads.² The Board's staff is currently evaluating the design change packages associated with construction in these facilities and reviewing procurement and commercial grade dedication activities. While reviewing calculations associated with this work, the Board's staff identified errors in hydraulic calculations and drawings. In response, CNS plans to correct these documents.

Weapon Response Values. The staff team evaluated planned improvements related to how CNS applied weapon response values. In evaluating the hazards to nuclear explosive operations, CNS routinely requests design agency input on how a weapon might respond, as well as the associated likelihood, to a given insult. The design agency provides its answer to CNS in the form of a weapon response rule. If the response is unfavorable (i.e., adverse consequences could occur given a specific scenario, with a likelihood exceeding defined criteria), CNS needs to implement a safety control to prevent or mitigate the accident. CNS acknowledged that, while it is no longer the current practice, the previous Pantex contractor applied weapon response rules in the safety basis without design agency concurrence. This practice included assigning screened weapon responses for some hazard scenarios, which would then not require the application of

¹ National Fire Protection Association (NFPA) 30, *Flammable and Combustible Liquids Code*.

² Infrared fire detectors detect smaller fires than the previously installed ultraviolet detectors, further improving facility response to an incipient fire.

safety class or safety significant controls. Even though this is not consistent with section 6.2.7 of DOE Standard 3016, *Hazard Analysis Reports for Nuclear Explosive Operations*, Pantex has operated with these assigned weapon responses for a few scenarios for over a decade. For the approximately ten legacy planned improvements related to weapon response discussed during the review, CNS plans to take one of the following actions:

- 1) In most cases, CNS has, or will, conservatively assume an unfavorable response (i.e., the postulated insult results in an unacceptable response from the weapon), which will not require further design agency confirmation but will require the implementation of controls. CNS plans to apply existing controls to these hazard scenarios. CNS will implement these changes as part of fiscal year 2022 and fiscal year 2023 safety basis change packages.
- 2) For one impact scenario, CNS applied a different weapon response rule that bounds the impact parameters for the event. This change did not alter the event consequences and resulted in no required changes to the control set.
- 3) In two cases, CNS has, or will, request that the applicable design agency confirm its application of weapon response rules. Until design agency confirmation is received, it would be appropriate for Pantex to consider application of a conservative weapon response value and implement safety controls as necessary.

In addition to the actions related to weapon response described above, CNS plans to resolve a few other inconsistencies identified by the Board's staff. For example, CNS plans to formally add a planned improvement related to design agency confirmation of weapon responses for certain high explosive transportation cart impact scenarios.

Hoists. Over the past several years, CNS has undertaken a considerable effort to complete planned improvements to replace pneumatic and manual hoists and cranes used in nuclear explosive operations with equipment designed, built, and procured to higher pedigree. This effort to procure and install hoists and cranes that meet current industry standards (e.g., NQA-1³ and NUM-1⁴) will continue through 2024. At the time of this report, approximately 85% of the nuclear explosive facilities at Pantex have received these upgrades. The Board's staff review team examined the associated design change packages, the procurement and dedication documentation, and maintenance practices for these items. In response to the review, CNS plans to update several engineering calculations to correctly reflect maximum speed hoist data and will add language about recent problems encountered with limit switch devices to retain this knowledge for future reference.

Of note, one legacy COA involves minimizing hoisting operations within vacuum chamber facilities. NPO and CNS are closing this COA, stating it is a continuous improvement

³ American Society of Mechanical Engineers (ASME), *Quality Assurance Requirements for Nuclear Facility Applications* (NQA-1).

⁴ ASME, *Rules for Construction of Cranes, Monorails, and Hoists (with Bridge or Trolley or Hoist of the Underhung Type)* (NUM-1).

initiative. Nevertheless, completion of the planned improvement for hoist and crane replacements will significantly improve the safety of operations in these facilities.

Procedures. During this review, the staff team identified several maintenance procedures that were mislabeled as *general use* where they should have been designated as *specific use* (i.e., a procedural use category that requires a high level of formality). In addition, several procedures did not identify in-service inspection steps. CNS plans to update and correct these procedures in the coming months to reflect the best practices identified by the staff team.

Conclusion. NPO and CNS generally provided technically defensible responses to support closure of the various COAs and planned safety improvements assessed by the staff team. Furthermore, the team identified some additional opportunities for safety improvement. NPO and CNS plan to or already have acted on most of the staff team's observations. NPO and CNS are closing a few of the legacy COAs (e.g., implementing non-flammable solvents and minimizing hoisting operations) without fully addressing the specific improvements by noting that they are continuous improvement initiatives versus actions needed to address deficiencies in the safety basis. This approach may result in valuable process improvements not being implemented. It would be prudent for NPO and CNS to enter these specific improvement initiatives into an improvement or local issue tracking system to ensure continued effort is applied to maintain progress to resolution.