

## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

October 18, 2024

**TO:** Timothy J. Dwyer, Technical Director  
**FROM:** A. Holloway and C. Stott, Resident Inspectors  
**SUBJECT:** Pantex Plant Activity Report for Week Ending October 18, 2024

**Special Tooling:** Recently, CNS discovered failures of a certain component within two lifting and rotating fixtures (see 8/30/2024 report). The identified failure involved breaking of a pawl-type feature that prevents uncontrolled rotation of the nuclear explosive in the fixture. This week, the resident inspectors met with personnel from CNS Tooling and Machine Design (TMD) to discuss a recent engineering evaluation that asserts these failures do not degrade the safety function of the special tooling. Safety functions for this tooling include maintaining structural integrity and positive control of the unit—i.e., not dropping the configuration—during normal loading and other design basis scenarios.

The resident inspectors questioned statements from the engineering evaluation, including (1) surrounding tooling components retain the completely fractured pawl, which prevents free rotation of the unit; (2) forces required to break the component are greater than those expected from analyzed events; and (3) analysis of dynamic loading conditions is prohibitively difficult.

While CNS has previously evaluated loading of the affected component during tooling design, the site contractor has not analyzed the local stresses at the specific failure point in the tooling design document or the engineering evaluation. Nevertheless, TMD personnel determined that both failures resulted from *dynamic overloading*. During the discussion, CNS reiterated that the component failures can only be caused by a dynamic event and that their analyses—using simplified static load scenarios—are not suited to evaluate this failure mechanism.

Additionally, as stated in the safety basis document for this weapon program, CNS shall ensure that each tooling component located in the load path will not yield—i.e., plastically deform—or break when subject to normal or design basis loads. After reviewing the lifting and rotating tool analysis, the resident inspectors noted that the failed component was not designed to withstand certain analyzed loads without some amount of plastic deformation. In the analysis for this lifting and rotating fixture, CNS specifies that the failed component is in the load path, subsequently requiring that it will not yield during design basis events. Consequently, the special tooling may not meet this safety basis requirement. CNS noted in the tooling analysis that slight deformation of the component may occur during loading but will not result in loss of positive control of the unit. TMD personnel contend that the forces imparted on the failed components were much greater than they were designed to withstand and may be indicative of improper tool use. As a result, TMD asserted that no further evaluation was required. The resident inspectors were not provided quantitative technical justification to support this position.

Furthermore, CNS may not have analyzed hazard scenarios in the safety basis that result from credible operator errors with this special tooling during unit rotation (e.g., the operator losing control of tooling handles). This scenario may introduce dynamic loading on the component, exceeding its design, and potentially resulting in component failure during use with multiple weapon programs.