May 23, 2000

Brigadier General Thomas F. Gioconda
Acting Deputy Administrator for
Defense Programs
Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-0104

Dear General Gioconda:

The Defense Nuclear Facilities Safety Board's (Board) Recommendation 98-2, *Safety Management at the Pantex Plant*, highlights the need to simplify and expedite the Seamless Safety for the 21st Century (SS-21) process at the Pantex Plant. Completing the SS-21 process for all weapon systems at Pantex will substantially increase the safety and reliability of nuclear explosive operations at the site. In some cases, the Department of Energy (DOE) has opted to divide the process into two steps instead of performing "full" SS-21. The first of the two steps is primarily analytical and is intended to establish a safety basis for existing operations. The second step is intended to result in more thorough reengineering and improvement of operations.

The two enclosed reports prepared by the Board's staff identify several specific issues related to hazard analysis, implementation of controls, and feedback and improvement. These issues are much less prevalent in programs that have gone through the full SS-21 process. Although Step 1 of the two-step SS-21 process includes identifying enhancements to increase the margin of safety, areas in which the largest increases in the safety margin might be gained (e.g., tooling, testers, trainers, and facilities) are generally deferred to Step 2. In this light, the Board believes that performing SS-21 as one "full" process expedites the development and implementation of substantial safety improvements and is in keeping with the original intent of Recommendation 98-2. Therefore, the Board believes DOE should reassess its plans for weapon systems that involve implementing SS-21 in a two-step process and incorporate changes accordingly in the Implementation Plan for Recommendation 98-2.

Sincerely,

John T. Conway
Chairman

c: Mr. Mark B. Whitaker, Jr.
Mr. Dave Beck
Mr. Rick Glass

Enclosures

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

April 13, 2000

MEMORANDUM FOR: J. K. Fortenberry, Technical Director

COPIES: Board Members

FROM: D. L. Burnfield

SUBJECT: Review of Tooling, Design, Manufacturing, and Procurement Program, Pantex Plant

This report summarizes the results of a review performed by members of the staff of the Defense Nuclear Facilities Safety Board (Board) in support of the Board's Recommendation 98-2, *Safety Management at the Pantex Plant*. Staff members D. Burnfield, J. DeLoach, and M. Moury met with representatives of the Department of Energy (DOE) and Mason and Hanger Corporation (MHC) during February 22–24, 2000, to review activities associated with tooling design, manufacturing, procurement, and control. Further review of site documentation was completed on March 21, 2000.

Background. Special tooling is used at the Pantex Plant to lift, move, and measure weapons systems and components during their assembly, disassembly, or evaluation. Since 1995, Pantex has undertaken various efforts to increase the level of formality associated with tooling design, maintenance, configuration control, and usage. These efforts have included the development of the integrated safety process commonly referred to as Seamless Safety for the 21st Century (SS-21). The objective of this process is to integrate safety systematically into management and work practices at all levels, including tooling design. Evaluations by the Board's staff revealed that dismantlement programs developed using SS-21 result in improved tooling that is safer and more reliable and has better configuration control than that developed using previous processes. Unfortunately, not all programs are carried out using SS-21.

In 1996, following several tooling-related occurrences, DOE performed an extensive 4-month review of special tooling. All actions resulting from this review are complete, with the exception of several that require additional funding. However, a number of recent reportable occurrences involving tooling have raised concerns about the control of special tooling at Pantex and prompted this review by the Board's staff.

Discussion. The staff identified a number of issues, which are presented below in the framework of the core functions of Integrated Safety Management (ISM). These issues were found to be less prevalent in programs that used the full SS-21 process.

Analysis of Hazards:

- Hazard analyses are not performed to determine the failure modes of complex tooling. The site specifically chose to delete a requirement for failure modes analysis of tooling because of the development of the Hazard Analysis Reports (HAR). However, the HAR specifically excludes analysis of those accidents unlikely to result in an insult to the nuclear explosive. Thus tooling failures that could result in severe injury to a worker or damage to the facility are not analyzed. This analysis, if performed, could be used to reduce the industrial accident rate and to improve the reliability of tooling.

Implementation of Controls:

- The staff noted that because of its broad experience base, the Tooling Design Department has generally designed high-quality tooling. However, the design process relies too heavily on an expert-based approach and could be improved if lessons learned in the past were incorporated more formally into the ISM System. For example, the *Tooling Fabrication and Inspection Manual* (MNL-10666) could be upgraded to include more detailed guidance on weapon tooling design in the areas of material selection, torquing of dissimilar metal joints, and welder qualification.

- Acceptance criteria for visual inspection of tooling performed by production technicians or tooling warehouse personnel are vague and do not provide specific information on potential failure modes that could result from normal wear and tear. For example, critical dimensions are not measured, and no disassembly and inspection is required.

- Several authorization bases for weapon activity take credit for safety functions performed by tooling. However, the processes for periodically testing these safety functions are not well defined or controlled.

- The training of production technicians (PTs) in the use of tooling and in the reasons behind specific design features has shown some improvement in both quality and standardization, but this improvement is uneven. In particular, those PTs not on a start-up crew for a weapon program receive significantly less instruction in tooling design features and engineering decisions involved in the process flow/tooling development.

- While observing PT training, the staff noted that PTs were sometimes performing minor maintenance on tooling. The limits of such minor maintenance are not defined. Further, Tooling and Machine Design personnel stated emphatically that minor maintenance by PTs is not permitted.

Feedback and Improvement:

- There is no process in place to collect, analyze, and examine trends in historical information obtained from tooling failures due to usage that could be used to develop a formal preventative maintenance program for tooling. Currently, only rudimentary visual inspections and limited functional tests are performed on tooling prior to its use. In large part, tooling is operated in a "use-to-failure" mode. For example, a certain W88 vacuum lifting device, which has been in use for approximately 12 years, has a 1-year inspection cycle, but experience has shown that it will cease to maintain vacuum after three to four uses (approximately 3–4 weeks).

- PTs and managers reported that tooling has become damaged and electrical testers have malfunctioned as a result of movement or storage, resulting in production downtime while awaiting replacement tooling. There is no process in place to collect, analyze, and examine trends in historical information obtained from tooling failures due to movement of tooling from the warehouse to the bay or cell and/or storage in the warehouse. This information could be used to develop additional protective measures for storage and movement of sensitive tooling and electrical testers, improving the equipment's availability and reducing production downtime.

- The tooling design engineers at the site do not have a formal system to promote feedback of information from the Manufacturing Division on methodologies to improve tooling.

- There is no system that provides procurers, tooling fabricators, or tooling vendors with information on minor manufacturing deficiencies in tooling that is accepted without rework. The lack of such a system hinders the formulation of actions that could improve the manufacturing process.

- Improvements could be made to allow the flowdown of critical requirements to tooling suppliers. Currently only those items listed on the applicable drawing are passed to suppliers. This means requirements that are invoked on site are not always levied on the supplier. For example, one procurement reviewed by the Board's staff did not pass down welder qualification and certification requirements.