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DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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May 28, 1996

The Honorable Victor H. Reis
Assistant Secretary for Defense Programs
Department of Energy
Washington, D.C. 20585-0104

Dear Dr. Reis:

Members of the Defense Nuclear Facilities Safety Board's (Board) staff and an outside expert recently performed two reviews at the Oak Ridge Y-12 Plant. The staff reviewed readiness preparations for resumption of the Disassembly and Assembly (D&A) mission area prior to the authorization to start D&A operations by the Oak Ridge Operations Office on March 22, 1996. In another recent review, the staff assessed implementation of criticality safety requirements used in Highly Enriched Uranium (HEU) operations. The enclosed reports are provided for your information and use.

The Board is pleased to note the progress made in D&A operations since September 1994 in implementing Board Recommendation 94-4, *Deficiencies in Criticality Safety at Oak Ridge Y-12 Plant*. Improvements were observed in implementation of criticality safety requirements, conduct of operations, compliance with operational safety requirements, and the training of Department of Energy and contractor personnel.

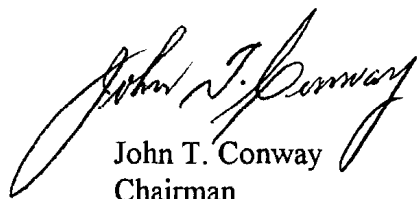
The enclosed report on Y-12 D&A operations contains an observation that preparations for operations on weapon systems in the future may not require an independent readiness review of the procedures, personnel training, and equipment specific to that system. In general, the Board has observed that appropriately scoped, independent reviews of procedures, personnel training, and equipment are useful in order to confirm readiness prior to startup of such operations. Reviews of this kind are performed at Pantex for startup and restart of specific weapon system assembly and disassembly activities. However, such independent reviews may not be warranted for every D&A operation, especially those on weapon systems that have hazards, procedures, and equipment similar to those recently worked.

With respect to implementation of criticality safety requirements in HEU operations, the staff noted that many deficiencies still exist and that insufficient analysis is being done to identify the

root causes for these deficiencies. On the other hand, the process by which these deficiencies are identified and corrected is much improved.

The Board would appreciate being advised of the actions taken regarding the above observations.

Sincerely,



John T. Conway
Chairman

c: Mr. Mark B. Whitaker, Jr.
Mr. James Hall

Enclosures

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

April 3, 1996

MEMORANDUM FOR: G. W. Cunningham, Technical Director**COPIES:** Board Members**FROM:** W. Andrews**SUBJECT:** Staff Review of Y-12's Criticality Safety Approvals in Highly Enriched Uranium (HEU) Processing

1. **Purpose:** This memorandum provides Defense Nuclear Facilities Safety Board (Board) staff observations during a review of Y-12's Criticality Safety Approvals in HEU Processing. Board staff members W. Andrews, D. Hayes, and S. Krahn conducted the review March 14-15, 1996.
2. **Summary:** On March 7, 1996, Lockheed Martin Energy Systems (LMES) submitted an Unusual Occurrence Report, which identified 966 Criticality Safety Approval (CSA) nonconformances in the HEU processing area. The report did not indicate whether the nonconformances were in addition to or a subset of the original 1344 nonconformances identified in September 1994. The staff review revealed that only a cursory analysis had been performed to determine whether the current nonconformances were new and unique, or merely mirrored those discovered in September 1994. However, the distribution of nonconformances among the various categories was clearly different from those identified in September 1994. LMES and the Department of Energy (DOE) assumed that the root causes for these nonconformances were the same as those found in 1994. While deficiencies were noted by the Board's staff, this CSA walkdown exhibited improvement from the walkdowns of 1994. Areas of improvement included team composition, procedures used, and corrective actions taken. Although the walkdowns and subsequent corrective actions serve only to "band-aid" the problems, the efforts are necessary to establish a baseline and raise the facility to minimum compliance with national standards. Comprehensive long term solutions are required prior to restarting HEU operations.
3. **Background:**
 - a. On September 22, 1994, several members of the Board's staff identified a violation of a CSA for a special nuclear material (SNM) storage vault at Y-12. LMES management decided to curtail Y-12 activities performed under CSAs. LMES also began a comprehensive site-wide review of compliance with all CSAs that eventually identified 1344 violations. The majority of these were in the area of HEU processing. Subsequently, the Board issued Recommendation 94-4, *Deficiencies in Criticality Safety at the Oak Ridge Y-12 Plant* that recommended DOE take steps to resolve Y-12 deficiencies in: nuclear criticality safety; Operational Safety Requirements compliance; conduct of operations; and experience, training, and performance of DOE and contractor personnel.

- b. Since DOE's acceptance of Recommendation 94-4, LMES and DOE have engaged in a number of initiatives to prepare the Y-12 facilities for resumption, in accordance with the DOE Implementation Plan for Recommendation 94-4. DOE's course of action for resumption of operations was to take immediate steps to correct safety deficiencies and then validate them through a formal restart process in accordance with Order 5480.31 (425.1), *Startup and Restart of Nuclear Facilities*. This has been completed for the Receipt, Shipping and Storage, and the Disassembly & Assembly mission areas. Management's focus has now shifted to HEU processing mission area.

4. Discussion:

- a. LMES had done little, if any, analysis to determine whether the nonconformances were similar to those identified in 1994. In 1994, of the 1344 total nonconformances identified at Y-12, 1058 of them were in HEU processing. Corrective actions were completed for these nonconformances. Nevertheless, 966 nonconformances were identified during the most recently completed CSA review. In fact, it became clear during the review that corrective actions had not been adequately implemented on many of the original nonconformances. In addition, there were significant differences between the 1994 and 1995 data. That data is shown below.

Category	1994%	1995%
Dimensions and Tolerances	27	21
Accuracy and Clarity of CSA	20	58
Configuration Control	29	6
Signage	9	8
Adherence to CSA Requirement	6	5
Equipment Inspection	2	1
Other	7	1

The differences are notable. Twenty-four CSAs were reviewed by the staff to determine the proportion of nonconformances that could be construed to be "technically significant." This portion was <10% even with a very liberal interpretation of what could be considered "significant." However, some of the nonconformances had potentially significant technical impacts. Examples included water collecting inside an array of fissile material, posting limit exceeding the mass limit within the same CSA, and material stored with a higher uranium concentration than allowed by the CSA.

In order to fully resolve the occurrence report, it would appear that further analyses committed to in the report should include, at a minimum, a statistical analysis of the 966 nonconformances compared to: (1) the population of the 1344 from 1994, (2) the subset of the 1344 that applied only to HEU processing, and (3) an evaluation of why the CSAs improved through the Special Package process failed the walkdown. Finally, the follow-up occurrence report should describe the corrective action program established to resolve the nonconformances identified with an associated scheduled completion date. LMES is currently planning to implement this approach.

- b. LMES and DOE had assumed that the root causes for these nonconformances were the same as those found in 1994. It is difficult to understand how one could come to this conclusion without any of the analyses described above. The HEU processing mission area does not draw significantly on the support functions of the rest of Y-12 and thus is perceived to be a very "closed society." It is reasonable to believe that the root causes that led to the nonconformances of September 1994, as well as those that allowed 966 nonconformances to exist for the following year and a half, are potentially different from those for the other mission areas at Y-12. A new root cause analysis focused on HEU processing needs to be accomplished along with a discussion of how management systems now in place, or to be developed, will address these root causes (e.g., Special Package System, new Criticality Safety Program, etc.).
- c. The most recent walkdowns of CSAs were much improved over those of 1994. The team composition, procedures used, and corrective actions identified were all improved. Four "fix-it teams" comprised the effort to walkdown the CSAs. Each team consisted of a nuclear criticality engineer, an operations supervisor, and a mentor or quality evaluation individual. In addition, a checklist was developed for the 1995 walk down which detailed specific typical nonconformances which the "fix-it" teams should attempt to identify. In 1994 the walkdowns were accomplished by operations personnel with little guidance or a checklist. Personnel had only a cursory knowledge of the CSAs which they were walking down. Finally, because of the large number of "repeat" nonconformances identified in 1995, one could assume that the corrective actions implemented with respect to the 1994 nonconformances were not effective.

In 1995, all 245 CSAs required for shutdown operations (storage, special projects, etc.) were walked down, nonconformances noted (966), and corrective actions identified and begun. In spite of the improved nature of the walkdowns, some additional deficiencies were noted by the Board's staff.

- d. This effort appeared to be a necessary initial step to raise the facility to a minimum level of compliance with national standards and establish a baseline prior to instituting comprehensive, long-term solutions. However, prior to restarting HEU operations, LMES will have to revise all CSAs in accordance with a new criticality safety management program they are currently implementing.

5. **Future Staff Actions:** The Board's staff will review follow-up reports issued and adequacy of corrective actions. They will also continue to monitor restart activities for HEU processing at Y-12.