

**[DNFSB LETTERHEAD]**

September 23, 1996

The Honorable Victor H. Reis  
Assistant Secretary for Defense Programs  
Department of Energy  
1000 Independence Avenue, SW  
Washington, DC 20585-0104

Dear Dr. Reis:

The Defense Nuclear Facilities Safety Board (Board) wrote to you in March 1996 regarding a Nuclear Explosive Safety Study (NESS) conducted at the Department of Energy (DOE) Nevada Operations Office (DOE-NVOO) to evaluate the addition of a Coded Optical Device Enabling System (CODES) to the existing arming and firing system utilized by Lawrence Livermore National Laboratory.

In a response to the Board dated March 21, 1996, Mr. Thomas Seitz acknowledged that the NESS on CODES had shortcomings, particularly in the adequacy of technical information and the way in which the study was conducted. Mr. Seitz assured the Board that the CODES study would be upgraded to meet established requirements before being considered for his approval. Members of the Board's staff observed the reconvening of the CODES NESS in August. The [enclosed trip report](#) is forwarded for your information and use.

The Board is pleased to note the beneficial effect the full and open discussion of technical safety issues in this second NESS forum had on its recommendations for safety enhancement. Yet these recommendations probably did not go far enough because certain input information that was needed had not been prepared or asked for. That information included a comprehensive safety analysis of hazards, operational controls, and mitigative measures. Future NESS groups considering the safety of Arming, Timing, and Firing systems will need such information if they are to make more informed safety determinations.

The Board will continue to monitor improvements made in integrated safety management and the NESS process as DOE moves forward with implementation of the new orders for safety of nuclear explosive operations.

Sincerely,

*John T. Conway*  
Chairman

c:  
Mr. Victor Stello, Jr.  
Mr. Thomas Seitz  
Mr. Mark B. Whitaker, Jr.  
Mr. Terry A. Vaeth

Enclosure

## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

September 3, 1996

**MEMORANDUM**  
**FOR:** G. W. Cunningham, Technical Director  
**COPIES:** Board Members  
**FROM:** Cynthia A. Miller  
**SUBJECT:** Trip Report on the Reconvening of the Nuclear Explosive Safety Study for the Coded Optical Device Enable System

- Purpose:** This report documents Defense Nuclear Facilities Safety Board (Board) staff observations from the second convening of the Nuclear Explosive Safety Study (NESS) for the Coded Optical Device Enable System (CODES). The NESS Group reconvened August 13-15, 1996, to work through the Chairman's proposed changes to the February NESS Report, including a new recommendation section, and to upgrade the NESS Report for the Department of Energy Defense Program's (DOE-DP) approval.
- Background:** The staff reviewed the first convening of the CODES NESS in February 1996, and noted several deficiencies in a trip report that was subsequently forwarded to the DOE via a Board letter on March 6, 1996. In his response to the Board letter, dated March 21, 1996, Mr. Thomas Seitz, DP-20, concurred that the study had shortcomings and noted that members of his staff, who also observed the study, made similar observations regarding the adequacy of technical information and the way in which the study was conducted. Mr. Seitz also stated that the CODES study would be upgraded to meet established requirements before it would be considered for his approval. Consequently, the original NESS Report from February was never submitted by DOE-Nevada (NV) to DOE-DP for approval.
- Summary:** During the reconvened session, the group did a superb job in accomplishing the Chairman's objective, which was to review changes made to the report and upgrade it for submittal to DP-20. The group made significant revisions to most of the report; several corrections were made to technical sections, and findings sections were rewritten to reinstate the emphasis of concerns toned down in the February report. In the process, the open discussion and technical review of the CODES device that was missing from the February study was accomplished. Unfortunately, the group was working again without the benefit of adequate input documents. No new safety analysis, risk assessment, or additional information with respect to CODES response in credible abnormal environments or CODES impact on the safety of the existing system had been requested by or provided to the group. Without the benefit of upgraded input documents, the group, again, relied largely upon their expert judgement and experience (undocumented) base for technical analysis and safety determinations with respect to CODES.
- Discussion:** CODES was developed by Lawrence Livermore National Laboratory (LLNL) after the 1992 Arming & Firing/Timing & Control (A&F/T&C) NESS Master

Study as an enhancement to the LLNL A&F system at the Nevada Test Site (NTS). CODES is intended to provide a measure of use control and an additional level of lightning protection to the LLNL arming and firing system at NTS.

In the February trip report, the staff noted several problems with the conduct of the CODES NESS and the safety analysis presented to the NESS Group, as highlighted below in italics. Although the revised report produced by the reconvened group addressed several deficiencies noted in the staff's trip report and resulted in two significant recommendations for enhancement of the nuclear explosive safety of the CODES device, the reconvened NESS did not alleviate the following deficiencies.

a. **Conduct of the NESS**

1. *Input documents did not adequately address the potential impact on safety from the introduction of CODES into the A&F system.*
2. *The Memorandum on Nuclear Explosive Safety Study Interim Guidance directs that "all studies shall have a system risk analysis." An adequate risk analysis was not presented. The documented analysis of abnormal events is incomplete and inadequate.*

Comment: Although they appeared to agree in February that they were not presented adequate information, new or augmented input documentation was not requested or provided to the NESS group. Several times the group tried to refer to the input documents to resolve new or revisited technical questions on design, safety analysis, or performance in abnormal environments and could not find the needed information.

b. **Safety Analysis**

1. *The study failed to assess the merits or shortcomings of the addition of CODES to the A&F system from a safety analysis standpoint.*
2. *Plausible accident scenarios that could affect the operation of CODES and the A&F system were not discussed. The Interim Guidance states that "the response of that operation or system to abnormal environments is required for input to the NESSG."*

Comment: The group spent considerable time discussing the difference between the CODES device and the A&F system. There were positive measures in the design of the CODES device that could appropriately be taken credit for in the report. But, there were positive measures in the design of the A&F system (one of which will be the CODES device itself, after approval for nuclear explosive operations) that could not be taken credit for in the report. Discussion of whether

the addition of CODES to the system has a positive or negative impact on nuclear explosive safety was also belabored by an unclear understanding of these subtle differences.

Regardless, the group was able to appropriately focus their discussion regarding the second safety standard i.e., determining whether the CODES design and manufacturing process provided adequate controls to meet the intent of the safety standards. The group made a recommendation for institution of positive controls on the CODES TC 1055 component that will allow it to be considered an additional positive measure for the A&F system.

5. **Future Staff Action:** Implementation of the recommendations produced by the NESS Group should improve CODES to sufficiently meet the intent of the nuclear explosive safety standards in DOE Order 5610.11 (the applicable Order of record at the time of the study). Continued improvement in conduct of NESSs in the areas that remain deficient will be pursued during staff observations of subsequent NESSs convened by DOE-NV.