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# DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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September 22, 2006

The Honorable Linton Brooks  
Administrator  
National Nuclear Security Administration  
U.S. Department of Energy  
1000 Independence Avenue, SW  
Washington, DC 20585-0701

Dear Ambassador Brooks:

The Defense Nuclear Facilities Safety Board (Board) has completed a review of the Nuclear Criticality Safety (NCS) program at Los Alamos National Laboratory (LANL). The enclosed report prepared by the Board's staff provides detailed discussion of the results of this review.

As discussed in a Board letter dated June 28, 2006, the Board has been encouraged by the increased influence being exerted by the Criticality Safety Support Group and the increased frequency of reviews under the Criticality Safety Monitoring Program. The Board has followed closely the NCS Improvement Plan developed by LANL in response to the findings of an October 2005 review performed under the auspices of the Department of Energy Criticality Safety Monitoring Program. The review team concluded that LANL's NCS program was noncompliant with several requirements of the American National Standards Institute (ANSI)/American Nuclear Society (ANS) Series 8 standards on nuclear criticality safety. The actions in the Improvement Plan initially scheduled for completion by the end of 2006 are being delayed. Additionally, it is not clear that the incremental risk of an inadvertent criticality incurred as a result of a deficient NCS program is fully understood and formally accepted by federal site management. Thus, the actions identified in the NCS Improvement Plan to address the LANL criticality safety deficiencies are not receiving appropriate attention and priority from National Nuclear Security Administration (NNSA) management.

The Board has three observations regarding this situation. First, compensatory measures beyond acting on the immediate safety recommendation have not been, but should be, implemented to minimize risk until the NCS program is brought into compliance. Second, it is imperative that the risk of an inadvertent criticality be minimized through completion of the actions in the NCS Improvement Plan and by compliance with the ANSI/ANS Series 8 standards. Plans to increase significantly the fissile material throughput at the LANL Plutonium Facility increase the importance of achieving a compliant NCS program. Third, although the Criticality Safety Monitoring Program assessment was effective in identifying criticality safety deficiencies at LANL, there should be a definitive mechanism to ensure that identified criticality deficiencies are quickly and effectively resolved.

Therefore, pursuant to 42 U.S.C. §2286b(d), the Board requests a report within 45 days of receipt of this letter, addressing the following:

- Interim compensatory measures being employed to reduce the risk of inadvertent criticality prior to achieving compliance with the ANSI/ANS Series 8 standards, or justification for accepting the incremental risk of an inadvertent criticality.
- A description of the management approach being used to ensure that the NCS Improvement Plan milestones are completed in a timely manner, including (1) the resources being applied to this effort, (2) when a full-time qualified federal NCS engineer will be added to the NNSA site office, and (3) how NCS program performance is monitored to prevent a recurrence of this situation.
- A description of the mechanism NNSA is using to ensure that findings resulting from Criticality Safety Monitoring Program assessments are promptly addressed.

Sincerely,



A. J. Eggenberger  
Chairman

c: Mr. Thomas P. D'Agostino  
Mr. Edwin L. Wilmot  
Mr. Mark B. Whitaker, Jr.

Enclosure

# DEFENSE NUCLEAR FACILITIES SAFETY BOARD

## Staff Issue Report

September 6, 2006

**MEMORANDUM FOR:** J. K. Fortenberry, Technical Director

**COPIES:** Board Members

**FROM:** E. Elliott

**SUBJECT:** Nuclear Criticality Safety at Los Alamos National Laboratory

This report documents results of a review conducted by the staff of the Defense Nuclear Facilities Safety Board (Board) at Los Alamos National Laboratory (LANL) of the Nuclear Criticality Safety (NCS) Program Improvement Plan. The review was conducted on August 1, 2006, by staff members B. Broderick, E. Elliott, C. Keilers, and J. Plaue.

**LANL NCS Program Improvement Plan.** The National Nuclear Security Administration (NNSA) performed a review of LANL's NCS program in October 2005 using a team composed of members of the Criticality Safety Support Group and Criticality Safety Core Team. The review was conducted using Department of Energy (DOE) Standard 1158 (DOE-STD-1158), *Self-Assessment Standard for DOE Contractor Criticality Safety Programs*, and the results were documented in a report issued on December 8, 2005, titled *Technical Evaluation of the Los Alamos National Laboratory Nuclear Criticality Safety Program*. The review team concluded that LANL's NCS program was noncompliant with several requirements of the American National Standards Institute (ANSI)/American Nuclear Society (ANS) Series 8 standards. The report identified 14 findings (considered noncompliances with requirements) and numerous recommendations (considered opportunities for improvement). Three safety recommendations requiring immediate action to assess and minimize the risk of an inadvertent criticality were also provided. LANL developed an NCS Improvement Plan to address the findings and recommendations from this review, a previous DOE review,<sup>1</sup> and a LANL self-assessment done by the NCS organization in 2004. The status of these efforts and of the resources necessary to support them is given below.

*Safety Recommendations*—The NNSA review required that the three safety recommendations be addressed within 90 days of the report's issuance. They are summarized as follows: (1) a documented review of all ongoing fissile material operations should be performed to ensure that they are in compliance with NCS requirements and that the posted limits, NCS evaluations, and operating procedures exist and are consistent with each other; (2) all passive and active engineered controls relied upon for criticality safety should be evaluated for formal configuration control; and (3) inadequacies documented in the review called for by the first

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<sup>1</sup>Office of Environment, Safety and Health, *Report to the Secretary of Energy on the Review of Nuclear Criticality Safety at Key Department of Energy Facilities*, March 2000.

recommendation should be incorporated into a formal corrective action plan, with priorities based on potential criticality risks.

LANL developed a triage process using NCS experts from other sites within the DOE complex and has completed the safety recommendations for the highest-risk operations. Lower-risk operations were scheduled to be evaluated by December 19, 2006, but a lack of resources has placed this date in jeopardy.

*Improvement Plan*—Completion of the Improvement Plan is essential to bring LANL's NCS program into compliance with requirements of the ANSI/ANS Series 8 standards, which is required by DOE Order 420.1A, *Facility Safety*. Some of the actions in the Improvement Plan have been completed, but many depend on sufficient resources for completion by the target date. One essential action—developing NCS evaluations and limits for fissile operations currently lacking such evaluations—does not have a target date since it is strictly dependent on staff resources for completion (see below). If priority is not placed on increasing resources to address the findings from the NNSA report, it is unclear when compliance will be achieved.

*Technical Staff Resources*—LANL currently has 10 staff NCS engineers. The latest staffing plan indicated that a total of 15 engineers were needed to support ongoing operations, and an additional 18 would be needed to complete the actions in the Improvement Plan within a year. Further NCS-qualified staff will likely be needed to support increases in the scope and tempo of operations in the Plutonium Facility that are planned for the next few years. Apart from the possibility of obtaining a few engineers from corporate partners of Los Alamos National Security, efforts to obtain additional resources are lacking. Lack of sufficient staff will further delay bringing the NCS program into compliance with requirements of DOE Order 420.1A and may lead to adverse schedule impacts on current or planned fissile material operations.

**Federal NCS Oversight.** According to an October 2005 briefing to the Board on the proposed DOE NCS Oversight Program, findings and/or recommendations were to be addressed under the auspices of the Chief of Defense Nuclear Safety and the Central Technical Authority, an arrangement that has not been effective in this case. The Los Alamos Site Office still does not have a full-time, qualified federal NCS engineer to provide day-to-day oversight as noted by the DOE reviews conducted in 2000 and 2005. It is not clear that the incremental risk incurred as the result of a deficient NCS program is fully understood and has been formally accepted by federal site management, nor have any compensatory measures been identified to minimize that risk.