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DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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May 11, 1999

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

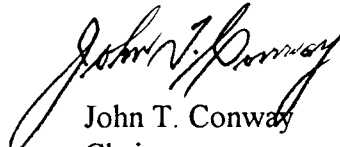
Dear Dr. Reis:

The Defense Nuclear Facilities Safety Board (Board) has been following actions taken at the Los Alamos National Laboratory (LANL) to resume operations of the Technical Area 18 (TA-18) Pajarito Laboratory and to improve Integrated Safety Management following a stand down of TA-18 on August 12, 1998. This facility is key to completion of the Department of Energy's (DOE) Implementation Plan for Board Recommendation 97-2 on the continuation of nuclear criticality safety at defense nuclear facilities. Operation of TA-18 has now resumed.

As discussed in the enclosed report, the Board's staff notes that LANL, with DOE guidance, has completed a safety management assessment to verify the sustainability of the resumption effort and to ensure that deficiencies in Integrated Safety Management at TA-18 are addressed. However, there appears to be no firm schedule for addressing the issues identified by LANL. Further, it is desirable that TA-18 quickly complete a Basis for Interim Operations to replace its existing Safety Analysis Report, and to use it as part of the basis for an Authorization Agreement.

Therefore, pursuant to 42 U.S.C. §2286 b(d), the Board requests DOE to report on the plans and schedule for addressing the issues in the LANL safety management assessment and for establishing a TA-18 Authorization Agreement. The Board anticipates that these plans will minimize any impact on Recommendation 97-2 commitments such as the 10-day criticality training program under development. The Board requests that DOE provide the report within 30 days of receipt of this letter.

Sincerely,


John T. Conway
Chairman

c: Mr. Mark B. Whitaker, Jr.

Enclosure

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

March 25, 1999

MEMORANDUM FOR: G. W. Cunningham, Technical Director

COPIES: Board Members

FROM: A. Jordan

SUBJECT: Resumption of Operations and Integrated Safety Management at Pajarito Laboratory, Los Alamos National Laboratory

This report documents observations of T. Burns, M. Forsbacka, A. Jordan, and C. Martin of the staff of the Defense Nuclear Facilities Safety Board (Board) resulting from a review of resumption of operations and of Integrated Safety Management (ISM) at the Pajarito Laboratory, situated at Technical Area 18 (TA-18), Los Alamos National Laboratory (LANL).

Background. The Pajarito Laboratory is the site of the Los Alamos Critical Experiments Facility (LACEF), which is the last remaining general-purpose facility for nuclear criticality experimentation in the United States. The Pajarito Laboratory also supports a range of national security programs, such as the Nuclear Emergency Search Team, Strategic Arms Reduction Treaty verification research, and development of instrumentation for nuclear waste assay and high-explosives detection. LANL management placed the Pajarito Laboratory in stand-down mode on August 12, 1998, to improve work planning and formality of operations.

Discussion. Observations of the Board's staff are summarized below.

Resumption Process—Under guidance of the Department of Energy (DOE) Los Alamos Area Office (LAAO), LANL managed the resumption as a project with a resumption manager, clear roles and responsibilities, reviews of hazards and controls for the activities being resumed, and independent validation by a committee of readiness for resumption of each activity. Mentoring was funded and provided by the LANL program office and appears to have been effective. The Board's staff reviewed initial resumption plans on site on August 19–20, 1998.

The LANL Reactor Safety Committee (RSC) provided line management with independent reviews of activities to be resumed. Their reviews appear to have been thorough and to have led to a better understanding by TA-18 of the level of rigor expected. The RSC reviews were

consistent with the committee's charter, which states that its primary purpose is "...to assure that high standards of safety are maintained in the Laboratory's nuclear reactor facilities" (see also the discussion of software quality assurance below). However, adequate funding for future activities of the RSC has not been identified; thus, the committee's future effectiveness is in jeopardy.

Work planning for new or changed nonfacility activities, typically Research and Development (R&D), will be in accordance with the TA-18 Activity Approval Process. That process implements the site-wide LANL Safe Work Practices requirements for ISM and addresses waste generation, security, and environmental requirements. The process requires a Hazard Control Plan that defines the scope of the activity; identifies and evaluates hazards; documents the controls implemented (e.g., procedures, training, Unreviewed Safety Questions, records); authorizes the activity; and authorizes the personnel who will perform the activity. However, the committee that is to approve activities, the Facility Safety Review Committee, had not yet been formed at the time of the staff's review.

Safety Management Assessment—The goal of reviews following stand-down was not only to resume operations, but also to verify the sustainability of the activity resumption effort and to ensure that deficiencies in the TA-18 ISM System had been addressed. To this end, a safety management assessment, led by the LANL Materials and Manufacturing program division, was completed in conjunction with the resumption. LANL is in the process of developing an implementation plan to address issues raised during this assessment. The implementation plan is expected to include development of a long-range strategic plan by November 1999.

Safety Basis—The current Safety Analysis Report (SAR) was approved in February 1995. The SAR, as well as subsequent revisions that have been drafted, does not comply with DOE Order 5480.23, *Nuclear Safety Analysis Reports*, and needs to be revised to include modern hazard and accident analyses. In addition, the Technical Safety Requirements for this facility are not related to the SAR in a clear manner. The plan as of August 1998 had been for LANL to deliver to DOE-LAAO an updated SAR in February 1999. Because of work needed on Unreviewed Safety Questions and facility resumption, as well as underestimation of the effort required, LANL stated that another 2 to 2 ½ years would be needed to update the SAR. The lack of an up-to-date SAR delays completion of an Authorization Agreement and makes evaluation of Unreviewed Safety Question Determinations more difficult and time-consuming, sometimes delaying proposed R&D.

The Board's staff suggested that DOE-LAAO and LANL consider quickly completing a Basis for Interim Operations (BIO), which would include hazard and accident analyses, followed by a SAR satisfying the requirements of Order 5480.23. DOE and LANL responded by exploring this possibility, and DOE issued a memorandum on February 26, 1999, providing guidance to LANL on writing a BIO within 6–9 months. LANL replied by memorandum dated March 15, 1999. This memorandum presented a schedule showing completion of a BIO in about 7 months beginning April 1, 1999, although some budget issues remain to be resolved.

Software Quality Assurance—During the staff's review, quality assurance for software used in two types of applications was discussed:

- **Safety-basis calculations**—In reviewing a positive Unreviewed Safety Question concerning placement of security personnel closer to one of the Kivas than assumed in the existing SAR, DOE-LAAO noted that software previously used in determining potential accident consequences had undergone little or no quality assurance. Thus, the results obtained could not be relied upon with confidence, and other software was used to evaluate the positive Unreviewed Safety Question. Ultimately, DOE-LAAO approved the placement of security personnel closer to the Kiva.
- **Control systems for criticality assemblies**—Software is frequently used to control experiments, including the approach to criticality during experimental work on critical assemblies such as Planet, Sheba, and Comet. However, LANL emphasized that all criticality assemblies have protection systems that operate independently of any software. Control systems software in use at the criticality assemblies is not part of safety-class or safety-significant systems, but it does contribute to defense in depth and is therefore important to safety.

A review of software quality assurance requested by the LANL RSC, as a part of the resumption process, revealed a number of deficiencies with regard to control systems for criticality assemblies. These deficiencies included the following: the requirements documents typically described functions at the system level and not specific software functions; reviews of changes to software were conducted by personnel familiar with the system, but not by software professionals; the software test plans were not detailed enough to test the functionality of individual modules and did not have acceptance criteria for each step; documentation of testing was incomplete; and there was no quality assurance review. Standard industry methods of software Verification and Validation (V&V) were not used.

LANL developed short- and long-term plans for addressing these deficiencies. Short-term plans included identifying and upgrading the safety-related functions of the software; describing the method of implementation for each requirement; upgrading the test plan to test the safety functions, including defining the method of test and the acceptance criteria; performing and documenting the testing; obtaining reviews of the documentation and testing; and freezing the software until an acceptable change control program is developed. Long-term plans include recruiting an external consultant with expertise in software and control systems quality assurance, selecting a process or standard for conducting software quality assurance, and preparing and implementing the new quality assurance process. The new quality assurance process is expected to include upgrading the software descriptions and defining the process for developing new computer-controlled systems. Subcontractor proposals for the long-term upgrades were expected in the near future.

The Board's staff suggested that DOE and LANL review existing industrial standards for software quality assurance and V&V to determine whether any of these standards would be appropriate for inclusion in the DOE/University of California contract for operation of LANL.

Effect of Changes in Safety Management on Creative and Productive R&D—The Board is on record as favoring implementation of safety management in a manner that fosters creative and productive R&D. The stand-down, effective August 12, 1998, and subsequent resumption activities negatively impacted the ability of the scientists at the laboratory to perform R&D. The scientists expressed concern that unless they receive adequate assistance in implementing ISM from subject matter experts on topics such as safety analyses, waste generation, the National Environmental Policy Act, air quality, and security, their ability to perform R&D will continue to be impacted.

Nuclear Criticality Safety Course—LANL presents nuclear criticality safety courses to personnel across DOE; these courses provide students unique opportunities to participate in nuclear criticality experiments. During the staff's August 1998 review of TA-18, the question of whether the courses appropriately emphasize the importance of conduct of operations in nuclear criticality operations was discussed. LANL is reviewing the courses and plans to make some modifications. Also planned is an independent verification of the courses by personnel external to LANL.

DOE and LANL Plans—In order for TA-18 to function efficiently, as well as safely, changes including additional support personnel are needed. LANL is completing an implementation plan for these changes and negotiating the additional funding needed with DOE.

Additional Comment Not Specific to TA-18. The Board's staff also reviewed with DOE the status of posters displaying a hotline phone number for use by LANL employees and others in anonymously identifying safety concerns to DOE. Such a poster has now been printed and distributed.