DEFENSE NUCLEAR FACHXIIES SAFETY BOARD

625 Indiana Avenue, NW, Suite 700, Washington, D.C. 20004-2901
(202) 694-7000

May 31, 2005

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 staff of the Defense Nuclear Facilities Safety Board (Board) conducted a review of the fire protection program at Los Alamos National Laboratory (LANL) and its oversight by the National Nuclear Security Administration Los Alamos Site Office (LASO). Although LANL and LASO have increased their attention to fire protection and taken some actions to improve fire protection, resolution of issues has been piecemeal. The Board believes that a more comprehensive, multi-year approach fully identifying and prioritizing fire protection issues would lead to greater assurance of adequate fire protection at LANL.

Recent actions related to fire protection by LANL and LASO include: a re-validation of all open fire hazard analysis recommendations; a review by LASO of inspection, testing, and maintenance; the hiring of an additional LASO fire protection engineer; the completion of a Baseline Needs Assessment; and the on-going partial upgrade to the site-wide fire alarm system. Subsequent to the review by the Board's staff, LANL management authorized additional staffing and increased funding for its fire protection program. However, it is likely that more fire protection staffing will be needed.

As detailed in the enclosed report, some of the other significant issues that need to be addressed include: incomplete documentation and delays in the completion of inspections, tests, and maintenance; fire hazard analyses recommendations not all completed on a timely basis; no formal plan to address the Baseline Needs Assessment for fire and emergency services; no long-term contract for fire and emergency services with Los Alamos County; fire alarm systems in several defense nuclear facilities still requiring upgrades after completion of the partial site-wide fire alarm replacement project.

While the individual actions taken recently to address fire protection are commendable, it is not clear that all deficiencies and desirable changes in fire protection have been identified and prioritized. Therefore, pursuant to 42 U.S.C. § 2286b(d), the Board requests a report within 90 days of receipt of this letter describing the strategy that will lead to timely resolution of all fire protection deficiencies and achieve site-wide improvements in the laboratory's fire protection program for defense nuclear facilities. This strategy should involve a multi-year

project plan similar to those developed by LANL under the Operations Efficiency Project for other major institutional issues. This report should include a discussion of lessons learned at other DOE sites that have experienced similar challenges in fire protection, an estimate of engineering resources required and a projection of when all fire protection upgrades will be completed.

Sincerely,

A. J. Eg enberger
Acting Chairman

c: Mr. Edwin L. Wilmot
Mr. Mark B. Whitaker, Jr.

Enclosure

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

April 29, 2005

MEMORANDUM FOR: J. K. Fortenberry, Technical Director

FROM: C. March

SUBJECT: Fire Protection at Los Alamos National Laboratory

This report documents a review by the staff of the Defense Nuclear Facilities Safety Board (Board) of fire protection at Los Alamos National Laboratory (LANL). This review was focused on site-wide and programmatic issues.

Staff members C. March, F. Bamdad, A. Jordan, and C. Keilers met with laboratory personnel and representatives of the National Nuclear Security Administration's (NNSA) Los Alamos Site Office (LASO) to discuss the status of previously identified issues, and to assess the adequacy of elements of the fire protection program relied upon to ensure fire safety at LANL's defense nuclear facilities. Subsequent to this site visit, the staff obtained and reviewed additional documentation, and held telephone discussions to clarify specific issues.

Following the staff's site visit, LANL's Deputy Director issued a memorandum dated March 23, 2005, summarizing some of the shortcomings of the laboratory's fire protection program and identifying needs or tasks to address them. The memorandum further directed that the following actions be taken to address some of the shortcomings in the fire protection program:

- Increase staffing for the program by two, and provide additional funding in the current year.
- Increase the budget for the program in fiscal year (FY) 2006 to $3 million, a 50 percent increase over the budget for FY 2005.
- Prepare a follow-up report on the corrective action plan to address maintenance issues.

This action by the laboratory addresses some of the immediate needs and problems associated with the fire protection program. As discussed below, however, additional issues and capital improvements, such as response to the Baseline Needs Assessment and remaining work on the site-wide fire alarm system, have yet to be addressed. While LANL now appears to recognize the need for a comprehensive long-term effort to address these deficiencies, that effort needs to be sustained and warrants higher management priority than it has received in the past.

Staffing Deficiencies in the Fire Protection Program. The fire protection program has a number of identified deficiencies, including insufficient manpower available to accomplish the minimum required engineering tasks for fire protection. This condition manifests itself in numerous ways, including the following:

- Planning and scheduling are inadequate, resulting in fire hazard analyses (FHAs) being prepared with short completion schedules.

- There is little time to follow up on project-specific reviews and verify that proposed changes and modifications to projects have been implemented.

- Trending reports are prepared quarterly for such items. as past-due inspection, testing, and maintenance activities, but insufficient time is available to analyze the data, identify the root causes of trends, and prepare corrective actions to address deficiencies.

- Insufficient time is available for day-to-day direct interaction with facility and programmatic organizations, such as fire protection personnel visiting facilities on a regular basis to identify emerging issues, and to validate ongoing compliance with fire protection requirements and maintenance of appropriate fire protection features.

- Self-assessments of the fire protection program are not being conducted as required by Department of Energy (DOE) Order 420.1 A, *Facility Safety*.

- Work on program enhancements, such as updating and expanding the program manual and procedures to address known deficiencies and gaps, is performed only as time is available, resulting in incomplete, piecemeal guidance.

Insufficient staffing is likely a root cause of many of the other deficiencies. LANL estimates that the equivalent of seven and one-half fire protection engineers and five technicians are needed to maintain the fire protection program, exclusive of system and design engineering. The staff presently consists of three fire protection engineers, one engineering manager and four technicians. As discussed previously, LANL management committed to increasing fire protection staffing by two engineers and one technician, following the site visit by the Board's staff. Increasing staff appears to be a prerequisite for LANL's taking the next steps of systematically analyzing fire protection issues and developing a comprehensive plan for addressing these issues.

A recent reorganization brought fire protection engineering under the Emergency Operation Management Office, along with the Emergency Management and Response and the Hazmat groups. This appears to be a positive change, focusing resources for fire protection and emergency operations within a single organization, and providing higher-level management visibility to fire protection issues. This change also eliminated a conflict of interest that may

have been present when fire protection engineering was managed by an organization that also was responsible for operating facilities.

A remaining organizational issue is that fire protection engineering for the Plutonium Facility and the Chemistry and Metallurgy Research building reports to the Nuclear Materials Technology (NMT) division, which is responsible for the facilities, and not to the fire protection group. As site fire protection group staffing concerns are addressed, the organization should ensure that these facilities benefit from independent fire protection reviews.

Inspection, Testing, and Maintenance. LANL has had a long-standing problem with completing inspection, testing, and maintenance of fire protection systems on a timely and consistent basis. The backlog of maintenance items related to fire protection was reduced during the past year. However, there still appears to be a large inventory of buildings with delinquent inspection, testing, and maintenance of heat detectors, smoke detectors, manual pull stations, and fire alarm notification devices.

A review of fire protection maintenance conducted by LASO, issued in April 2004, contained 12 recommendations and 6 observations. These ranged from minor items, such as providing adequate clearance around a fire hydrant, to more significant issues, including laboratory personnel defeating safety systems (i.e., fire doors). The lack of required maintenance records and on-time maintenance was also noted. Ten of the findings from the LASO report warranted LANL's issuing a Price Anderson Amendments Act Non-Compliance Report. Thirty-three specific corrective actions were identified to address the deficiencies, in parallel with a root-cause analysis. Eight of these corrective actions were open at the time of the staff's on-site review, and may take more than a year to complete. The root-cause analysis may result in additional corrective actions when completed.

An ongoing review of fire protection inspection, testing, and maintenance by LANL indicates that up to 2,000 pieces of fire protection equipment lack sufficient detail in the site Master Equipment List and maintenance records to determine appropriate test criteria or preventive maintenance activities. Further, historical records on previous work are not available for most equipment. Many of these records are required by National Fire Protection Association (NFPA) standards so that system engineers can perform trending to anticipate impending failures or the need for equipment replacement or enhanced testing requirements.

While improvements have been made, the outstanding issues associated with fire protection inspection, testing, and maintenance are similar to those observed by the Board's staff during its last review in August 2003.

Status of Fire Hazard Analyses and Recommendations. LANL has experienced continuing problems with timely preparation and updating of FHAs. Furthermore, FHA recommendations have not been implemented promptly.

The LANL fire protection group recently completed an effort to verify and validate existing FHA issues, develop corrective action plans for addressing the associated

recommendations, and ensure that these plans are tracked to completion. Open deficiencies and recommendations include such issues as inadequate fire alarm systems, various areas lacking automatic suppression, and means of egress not complying with code. In some cases, even simple recommendations, such as removing and controlling oxyacetylene welding equipment in the basement of the Plutonium Facility, have not been fully implemented.

While it appears that FHAs for nuclear facilities are current, no FHA update process or maintenance schedule has been established to ensure their continuing accuracy. For example, the FHA for the Weapons Engineering Tritium Facility has not been updated to delete hazards that have been removed from the facility.

Fire Department Baseline Needs Assessment. LANL completed a Fire Department Baseline Needs Assessment in June 2004. This document is intended to identify staffing, training, and equipment needs for the Los Alamos Fire Department (LAFD) in support of laboratory activities as well as Los Alamos County, since the laboratory contracts for its fire department services from the county fire department. The Baseline Needs Assessment included 17 recommendations. It should be noted that a number of these recommendations date back to the 1993 and 1995 Baseline Needs Assessments. Significant observations and recommendations include the following:

- The LAFD does not comply with the requirements of NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments,* regarding deployment and response time. An increase in minimum staffing levels from 28 to 45 on-duty persons is recommended.

- Three fire stations need to be replaced with new facilities capable of housing recommended on-shift staffing levels, apparatus, and equipment compliant with NFPA standards.

- Implementation of the joint fire and police communications, alarm monitoring, and dispatch operations at the emergency operations center needs to be completed.

- Upgrading of LAFD emergency medical services from basic life support to advanced life support is recommended.

- Installation of remote fire alarm monitoring terminals in fire stations needs to be completed.

- Programs for wildland and forest stewardship, and fuels mitigation, should be carried out in accordance with LANL's wildfire management plan.

The LAFD's fire preplanning documentation familiarity tours need to be enhanced.

Many of these recommendations reflect recognition of the remote location and difficult access that challenge responses to LANL emergencies. Effective mutual aid is at least 1 and more likely 2 to 4 hours away. Therefore, the LAFD and LANL need to be self-sufficient for the initial phases of a fire or emergency response.

LASO and LANL are also continuing to discuss the need and capabilities for hazardous materials response by the fire department. Currently, LANL has a separate hazardous materials response group, which is fully trained and capable and responds to emergencies at the laboratory; indeed, emergencies have occurred recently at LANL's nuclear facilities, such as the Chemistry and Metallurgy Research building. However, these personnel are not readily available during off-shift hours and are frequently not on site because of other duties. A hazardous material response capability within the LAFD would likely require additional LAFD staffing.

Currently, there is no corrective action plan in place to address the findings and recommendations of the Baseline Needs Assessment. LANL intends to issue a plan by September 2005. Differences between LASO and LANL evaluations of minimum required LAFD staffing levels will need to be resolved as part of this effort.

Fire Department Response Contract. LANL and Los Alamos County have not had a long-term contract for services in place since 1997. Since that time, the laboratory has contracted with Los Alamos County using 90-day extensions to the 1997 contract. This situation has resulted in a host of issues associated with such matters as long-term staffing, long-term plans for upgrading and replacement of equipment and facilities, and the ability of the LAFD to respond adequately as anticipated in the safety bases of nuclear facilities. A new contract is in the final review process at LANL and is expected to go to DOE-Headquarters for procurement approval in the near future. A final contract could be in place as soon as the summer, depending upon the results of final negotiations between LANL and Los Alamos County. The current contract negotiations are based on the LAFD capabilities and LANL needs established in 1997, and are intended to formalize the ongoing 90-day extensions to the 1997 contract. This contract does not reflect the results of the Baseline Needs Assessment and will need to be modified in the future to implement its recommendations.

Partial Site-Wide Fire Alarm Replacement Project. The partial site-wide fire alarm replacement project, part of the Cerro Grande fire recovery effort, is currently well under way. Final designs for the current work are expected by July 2005, with all planned installations to be completed by January 2006. Full operation of the updated system is expected by April 2006. However, lower-priority work such as that at some nuclear facilities (e.g., the Plutonium Facility and the Weapons Engineering Tritium Facility) will not be addressed; thus, some facilities will still have fire alarm systems of questionable long-term reliability, and others will still have code deficiencies or be connected to the existing site security system.

No formal project has been established to complete the required upgrades. LANL's project staff has estimated that an additional $42 million will be required to upgrade the fire

alarm equipment to comply fully with the requirements of NFPA. The acquisition strategy needs to be identified to achieve timely closure.

Wildland Fire Protection. The Wildland Fire Management Plan has not been updated to meet the requirements of DOE Order *450.1, Environmental Protection Program*. NNSA and LANL cut funding for the *2005* work on continued forest thinning and repair of vulnerable fire roads, leaving this planned effort incomplete. The result is the potential for unnecessary wildfire threats to nuclear facilities.