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DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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July 10, 2000

Brigadier General Thomas F. Gioconda
Acting Deputy Administrator
for Defense Programs
Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-0104

Dear General Gioconda:

The staff of the Defense Nuclear Facilities Safety Board (Board) continues to review the development of safety-related work controls at Los Alamos National Laboratory (LANL). A recent review covered the planning for worker protection in research and development activities and the safe management of chemicals. The staff's observations on worker protection and chemical safety at LANL are presented for your consideration in the enclosed reports.

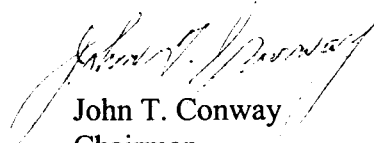
During an on-site review in April 1999, the staff observed that improvements were needed in analyzing hazards and developing controls for protection of workers during research and development activities. The laboratory undertook an improvement effort. During a follow-up review in April 2000, the staff found that a majority of these improvements had been made, and that the Nuclear Materials Technology (NMT) Division had taken additional steps to implement related site-wide procedures.

LANL should be commended for taking these steps to improve its work planning process using the principles of Integrated Safety Management. In attempting to implement the associated site-wide procedures, however, the Board's staff noted inconsistencies between the NMT operating procedures and the Laboratory Implementing Requirements and Guidance, which would severely weaken their implementation. This variance has since been corrected, to the benefit of the program. The Board considers the LANL system of manuals and codes of practice for worker protection to be exemplary for a research and development environment. The Board believes that if they are implemented at all facilities in the intended manner, research and development work can be conducted safely at the activity level.

The Board's staff also reviewed a Laboratory Implementation Requirement (LIR) issued by LANL on December 23, 1999, for chemical management. The staff noted that the new LIR appears comprehensive, but its impact on safety cannot yet be assessed because it is not yet widely implemented. The Board understands that assessments of implementation are planned for summer 2000.

During the same visit to Los Alamos, the Board's staff reviewed staffing levels at the Department of Energy Los Alamos Area Office (DOE-LAAO). DOE-LAAO has only eight facility representatives compared to a minimum of the seventeen needed to meet the guidance of DOE-STD-1063-97, *Facility Representatives*. This is a matter the Board believes merits your attention.

Sincerely,



John T. Conway
Chairman

c: Mr. Mark B. Whitaker, Jr.
Mr. Richard E. Glass

Enclosure

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

June 8, 2000

MEMORANDUM FOR: J. K. Fortenberry, Technical Director
COPIES: Board Members
FROM: D. Burnfield
SUBJECT: Review of Worker Protection at Los Alamos National Laboratory

This report documents the results of a review of the implementation of worker protection practices at the Los Alamos National Laboratory (LANL), and highlights noteworthy practices and specific areas for potential improvement. This review, conducted during April 12–13, 2000, addressed the implementation of activity-level worker protection practices in the work planning for research and development (R&D). It was conducted by members of the staff of the Defense Nuclear Facilities Safety Board (Board), D. Burnfield, A. Jordan, M. Helfrich, and W. Von Holle, assisted by outside expert D. Boyd.

Implementation of Safe Work Practices for R&D. LANL management has implemented an Integrated Safety Management (ISM) system at the activity level, with only minor corrections required at this time. In the process, LANL has developed Laboratory Performance Requirements (LPRs) and Laboratory Implementing Requirements (LIRs) to implement contractual requirements. These documents are supplemented by Laboratory Implementing Guidance (LIG) documents.

Documentation—The LIRs and LIGs have been improved to correct weaknesses noted in a similar review conducted during April 1999; however, one area for improvement remains. The laboratory manuals and codes of practice could better describe the integration and use of environment, safety, and health (ES&H) subject matter experts (SMEs), as well as SMEs such as welders, nondestructive testing examiners, and engineers, as team members in work planning activities.

The Nuclear Materials Technology (NMT) Division chose to implement the site-wide LIRs and LIGs as a means of improving work planning following a preliminary notice of violation with regard to work planning activities at the Chemistry and Metallurgy Research (CMR) building. To accomplish this task, NMT revised its Standard Operating Procedure (SOP) to incorporate the LIRs and LIGs. In the process, however, several of the salient points of the LIRs and LIGs were left out, thus creating deficiencies in the work planning system. After this problem was revealed during discussions with the Board's staff, NMT management stated that the SOP would be revised to use the site-wide LIRs and LIGs to the extent practicable and allow for deviations only when absolutely necessary. In discussions with the Board's staff following

The staff believes that the implementation of the LIRs and LIGs will require a more complex level of work than NMT has been planning. To meet the proposed schedule for implementation at Technical Area 55 (TA-55) and CMR, a creative process of choosing which work activities to upgrade may be necessary.

Training as a Part of Feedback and Improvement—The initial training was developed to ensure that research scientists are knowledgeable about the principles of ISM and its application for activity-level R&D. LANL management has not yet had the opportunity to determine the level of knowledge retention or to develop continuing training based on a systematic review of performance weaknesses. Continuing training is a strong tool in the improvement process and could be used to correct institutional problems that may exist.

The staff considers the LANL manuals and codes of practice to be exemplary for an R&D environment. If they are implemented at all facilities in the intended manner, the staff believes R&D work can be conducted safely at the activity level with a very high degree of assurance.

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

June 8, 2000

MEMORANDUM FOR: J. K. Fortenberry, Technical Director

COPIES: Board Members

FROM: W. Von Holle

SUBJECT: Chemical Safety Review at Los Alamos National Laboratory

This memorandum documents a review of the chemical safety program at the Los Alamos National Laboratory (LANL). This review was conducted by members of the staff of the Defense Nuclear Facilities Safety Board (Board), A. Jordan and W. Von Holle and outside expert D. Boyd.

Chemical Management Laboratory Implementation Requirement. A Laboratory Implementation Requirement (LIR) on chemical management was issued on December 23, 1999, and became effective on April 1, 2000. The LIR defines elements of the laboratory's chemical safety program. It includes a chemical hygiene plan that applies to laboratory activities; a hazard communication plan that applies to production, construction, or maintenance activities; and several attachments on storage, labeling, spill control, personal protective equipment (PPE), and handling. The LIR consolidates requirements from nine documents in one directive and establishes a comprehensive laboratory-wide program for managing chemicals.

The Automated Chemical Inventory System (ACIS) is now required to be used for tracked chemicals, and provides the capability to maintain a database on and to display and report receipt, content, quantity, location, ownership and disposal of tracked chemicals. User requirements are being reviewed for the development of enhancements. Before 1999, chemical users were not required to use ACIS. The inventory became inflated because new chemicals were added to the system when received by materials purchasing, but not removed from the system when disposed of by owners. The ACIS was rebaselined following a March–September 1999 inventory conducted by the Industrial Hygiene and Safety Group (ESH-5), which identified 134,230 of 238,000 containers on the starting inventory as no longer being in the inventory. Requirements for owners to maintain the ACIS database were established in July 1999 and incorporated in the chemical management LIR. The hazardous material protection officer in the Nuclear Material Technology (NMT) division has independently developed some new capabilities using an off-the-shelf chemical management program and spreadsheet software, linking the inventory database to the LIR storage requirements.

In January 1999, the Laboratory Operations Working Group started a chemical management initiative, and a project team with laboratory-wide representation to champion chemical management at LANL. The team's activities include identifying and developing

elements of an effective program, requesting and justifying resources to support the program, developing user requirements for a new tracking database, developing a methodology to manage various ways of purchasing chemicals, defining a procurement specification for selecting a chemical vendor, and helping to determine which chemicals should be tracked.

Some problems with implementation of the LIR for chemical management may exist at the activity level. For example, the staff reviewed a survey of a small chemical analysis laboratory in Technical Area 55 (TA-55), conducted on March 28, 2000, by the NMT safety officer and the NMT hazardous material protection officer. The staff found that corrective actions from that review involving serious chemical incompatibilities had not been completed. The occupant of the laboratory appeared to be unaware of the responsibilities of a chemical owner, including requirements to maintain familiarity with the chemical management LIR, the identity of carcinogens in the room, and the use of ACIS. TA-48¹ may also be out of compliance. The DOE Los Alamos Area Office (DOE-LAAO) completed a conduct-of-operations review of TA-48 in anticipation of the staff's review, and reported several chemical safety and radiological issues

The Board's staff believes the new LIR is a positive step, but its impact on chemical safety cannot yet be assessed. Most divisions have not met the April 1, 2000 implementation date. ESH-5, the document owner, has received numerous questions about implementation, and a focus team will be reconvened to consider issues and revisions to the LIR. Assessments of implementation are planned for summer 2000.

Status of Previous DOE Chemical Safety Initiatives. Chemical safety was the object of two previous DOE safety initiatives at LANL. The Chemical Safety Vulnerability Review (CSV) conducted in 1994 and the Secretary of Energy's directives following the 1997 Hanford explosion required assessment of several specified vulnerabilities. LANL reported that all corrective actions identified in response to the CSV and DOE 1997 initiatives have been completed. Additional vulnerabilities may be present in facilities with significant chemical inventories that were not included in either of these studies. An example is TA-48, Building RC-1, as noted above.

Perchlorate Issues in CMR and TA-48. Since the review of the Chemistry and Metallurgy Research (CMR) facility perchlorate issue by the Board's staff, conducted on September 9, 1999, CMR has begun facility maintenance inside the heating, ventilation, and air conditioning (HVAC) ducts. All work in the ducts has been done under strict work controls, including extensive and heavy personal protective equipment (65-75 lbs). The Energetic

¹ TA-48, Building RC-1, Radiochemistry Facility, is designated as a hazard category 3 nuclear facility. Earlier this year it had not been identified as a defense nuclear facility since it was thought that defense activities were not performed there. As a result, DOE-LAAO plans to require a Basis for Interim Operation within a year, followed by an Authorization Agreement.

Materials Research and Testing Center (EMRTC), Socorro, New Mexico, carried out drop hammer impact and thermal tests on several surrogate perchlorate mixtures thought to be conservatively representative of the CMR residues. The results of these tests, presented in a EMRTC report, indicate that the materials' threshold areal densities for shock sensitivity are 1.5 to 7 grams/ft²—at least three times greater than any densities found. Thermal tests, in which some perchlorate mixtures underwent violent reactions when heated in small chambers, indicate that sensitivity to thermal explosion remains a hazard. Planned system upgrades include completion of the manual washdown system and replacement of the HVAC High Efficiency Particulate Air (HEPA) filters, known to contain perchlorates. The duct washdown system upgrade and reactivation will be coordinated with the replacement of the HEPA filters in Wings 2, 3, 5, and 7 so as not to degrade the new filters. Future fuming operations in CMR with perchloric acid must await development of a qualified and tested fume capture system, which has not yet been completed.

The perchlorate problem in Building RC-1, TA-48, is less extensive, but involves heavier deposits of perchlorates—up to 3,600 mg/ft². However, testing done in LANL DX Division on samples of the material obtained from the ducts indicates that the material is inert to the drop hammer impact, spark, and friction tests, and it does not propagate a flame when ignited with a torch. It appears that perchlorates may not be the contact hazard they were originally thought to be. The staff will monitor any new results as they become available.