DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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July 26, 1999

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 staff of the Defense Nuclear Facilities Safety Board (Board) has reviewed various aspects of the control of defense nuclear activities at the Los Alamos National Laboratory (LANL). The Board is aware of the substantial program LANL has put in place to implement the Integrated Safety Management concept and commends LANL management for this effort. Ensuring worker safety is one of the principal objectives. During an on-site review in April 1999, the Board's staff found that improvements in developing controls for protection of workers during nuclear weapons research and development activities have been made or are under development. The staff also observed a number of practices that could be further improved. These observations are included in the enclosed report which is provided for Laboratory consideration.

If you have comments or questions on this matter, please do not hesitate to contact me.

Sincerely,

John T. Conway
Chairman

c: Mr. Mark B. Whitaker, Jr.

Enclosure

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

April 15, 1999

MEMORANDUM FOR: G. W. Cunningham, Technical Director
J. K. Fortenberry, Deputy Technical Director

COPIES: Board Members

FROM: D. Burnfield

SUBJECT: Review of Worker Protection Practices at Los Alamos National Laboratory

This report documents the results of reviews of the implementation of worker protection practices at the Los Alamos National Laboratory (LANL), and highlights noteworthy practices and specific areas in which improvements may be possible, based on the staff's observations during the reviews.

These reviews examined the implementation of activity-level worker protection practices in the work planning for research and development (R&D) and facility projects for defense activities at LANL. The reviews included discussions with representatives of the Department of Energy (DOE) Los Alamos Area Office (LAAO), presentations by and discussions with responsible LANL staff, and walkthroughs of several projects in TA-55. The most recent review was conducted during April 5–8, 1999, by members of the staff of the Defense Nuclear Facilities Safety Board (Board), D. Burnfield, A. Jordan, and M. Helfrich, assisted by outside expert D. Volgenau. A previous review was led by J. Troan in August 1998.

Implementation of Safe Work Practices for R&D. LANL management is vigorously pursuing the implementation of an Integrated Safety Management System (ISMS). LANL developed Laboratory Performance Requirements (LPRs) and Laboratory Implementing Requirements (LIRs) to implement contractual requirements. These documents are supplemented by Laboratory Implementing Guidance (LIG) documents. Deviation from the LPRs and LIRs is permitted, through a formal approval process. LANL management is working to ensure that the principal investigators for R&D projects recognize their responsibility to conduct work safely. This is a strong underlying theme of the Safe Work Practices (SWP) LIRs, which are intended to implement an ISMS for R&D work.

LANL Documentation—The SWP LIRs impose significant responsibilities on the workers, but do not in our view, contain sufficient guidance to enable them to meet those responsibilities. An objective of the SWP LIRs is to ensure that principal investigators and line managers/supervisors retain responsibility for the safety of R&D work. While this objective is commendable, the requirements must be carefully and completely stated to ensure the desired results are achieved.

The LIRs require that a Hazard Control Plan (HCP) be written whenever new controls are developed, existing controls are modified, or established documentation is not adequate to communicate the hazards posed by the work. The HCP documents the hazards control system for a particular work activity. Workers are to use it directly in the field. However, the LIRs do not adequately describe the purpose and intended use of the HCP. Upon examination of a number of sample HCPs, the staff noted that this lack of specificity resulted in inconsistent HCPs that provide insufficient documentation to ensure the activity-level safety envelope can be maintained. Additional guidance (i.e, LIGs) and improved LIRs are needed to provide the necessary flexibility and yet document the hazards analysis and implementation of controls to ensure worker safety.

The LIRs contain a matrix designed to assist in estimating risk for an activity. The matrix requires the planner to estimate risk for each combination of severity and likelihood. The estimated risks are used to establish the levels of review and line management authorization. However, in order to allow the researcher to categorize activities or hazards consistently, additional guidance may be necessary in the LIRs. Guidance and examples for selecting the frequency category for the types of research tasks normally performed would be beneficial as would guidance for determining consequences. For example, the guidance could define the risk category for potential scenarios such as a fall from a height of 6 feet, a radiation exposure of 50 rem, or work in a glovebox containing gram level quantities of plutonium.

The LIRs could benefit from more emphasis on the effective use of integrated teams to plan work. Planning is done routinely in a serial manner. The use of environment, safety, and health (ES&H) subject matter experts (SMEs) is mentioned as a mechanism for providing assistance rather than being integral to a team approach. Also, the LIRs do not identify that an SME in an area other than ES&H might be appropriate. An interdependent team relationship for all tasks (both R&D and Facility work) not within the well-defined skill of a researcher/worker has proven successful at other sites.

The LIRs could benefit from additional guidance on how to select and document the methodologies to be used for hazards analysis. If the researchers are tasked to make these decisions, they need to be provided the necessary tools. In order to assist the researchers an annotated list of acceptable hazard analysis techniques (such as can be found in the Center for Chemical Process Safety Guidelines for Hazard Evaluation Procedures) could be developed to provide flexibility and assist the workers to choose the technique best suited for the activity. Given appropriate guidance, the researchers could develop and use their own techniques, provided they retained the documentation of the methodology. Presently however, formal activity level hazards analyses are not routinely being conducted for R&D work activities.

The LIRs require that each organization inventory its work activities. However, the LIRs do not specify the purpose and intended use of these inventories. Review of completed work activity inventories by various groups has revealed a lack of completeness, detail, and consistency.

Performance of Hazards Analysis—TSA-11, the LANL Probabilistic Risk and Analysis Group, does qualitative as well as quantitative hazards analysis in support of DOE and LANL missions. The group has a wide range of analysis capabilities and is staffed by experienced people. However, the group only participates in activity-level hazards analyses when specifically requested. The Lab might benefit from enlarging its role and assignments. For example, this organization could serve as mentors and help develop hazards analysis tools and techniques for use by researchers on R&D projects.

Feedback and Improvement—The process for capturing lessons learned from R&D work activities is not yet mature. Although LANL personnel share information internally from such sources as periodic management walkarounds, occurrences, and new directives, there is no program for capturing the lessons learned from individual work activities.

ISMS Training—Safe Work Practices training was to be provided to personnel likely to be assigned responsibility for developing or modifying controls to mitigate R&D work hazards, as well as to line managers who might authorize work once controls are in place. More than 2000 people have been trained. Yet, no evaluation was performed to determine whether all appropriate personnel have been trained, and there is no plan to conduct continuing training or training for new hires. Review of the training plan indicated many strengths. A significant strong point was the use of varied analysis techniques beyond job hazards analysis to analyze workplace hazards, together with examples of their use.

Implementation of SWP by Nuclear Materials Technology (NMT). The NMT Division requested and was granted a variance from the requirements of the SWP LIRs. As justification, NMT stated that the Division's existing activity level work control processes met or exceeded the major implementing criteria of the LIRs. For the conduct of R&D work, the NMT Division uses a combination of documents mandated by recently issued internal divisional procedures. These documents, which include safe operating procedures (SOPs), experimental plans, and special work permits, provide for written work authorization and are intended for field use. They are used to identify the hazards and controls associated with potentially hazardous R&D-related activities.

The Board's staff reviewed the NMT procedures and a sample of the documents associated with work in TA-55. The following observations resulted from this review:

- NMT requires process hazards analysis for all R&D activities. Although aspects of the associated process hazards analysis did flow down to the controls section of the SOP, there was no indication that specific activity level hazards analyses were routinely conducted to ensure that proper controls were developed and implemented. In addition, the SOPs reviewed did not always have a one-to-one correlation between controls identified in the hazards identification section of the procedure and those in the body of the procedure.

- Each SOP contained a training lesson plan. However, it appeared that individuals were not trained on all the hazards identified in the hazards identification and controls implementation sections in the procedure. Nor is there currently a provision for determining whether the knowledge, skills, and abilities associated with an SOP activity have been retained when the workforce has not performed the activity for an extended period of time.

- The recently issued requirements permit review and updating of SOPs within 2 years or by the next scheduled review date, whichever occurs first. A review of three SOPs revealed that allowing these procedures to stand until the regularly scheduled update will not adequately ensure protection of the workforce. At least a cursory review of the SOPs is needed to reveal those that do not provide adequate protection.

The Board's staff review of the implementation of safe work practices in NMT resulted in the following observations:

- TA-55 operators and principle investigators were interviewed regarding their responsibilities and knowledge of the processes. They were knowledgeable and appeared well qualified to execute their assigned responsibilities.

- In accordance with the ATLAS SOP, the operator uses data sheets containing abbreviated procedural steps to perform process operations. For each step on the data sheets a small space is provided in which the operator can make a comment or observation. The use of data sheets, without having the procedures readily available, is typical for most NMT operations. These data sheets do not stipulate the hazards or controls for the various operations. In addition, their use requires a detailed understanding of the procedure by the operator.

- Weaknesses in the manuals and codes of practice for hazard task-level screening, identification, and analysis for facility work in TA-55 were also noted during the August 1998 review. These documents could be improved in a manner similar to the LIRs and LPRs discussed above.

Conclusion. The staff considers that correction of the above will better ensure that hazards can be properly identified and analyzed, and adequate controls can be implemented. This will enable R&D and facility work to be conducted safely at the activity level with a higher degree of assurance.