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# DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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December 31, 1997

The Honorable Federico Peña  
Secretary of Energy  
Department of Energy  
1000 Independence Avenue, SW  
Washington, DC 20585-0104

Dear Secretary Peña:

The Defense Nuclear Facilities Safety Board (Board) and its staff have been actively following the Department of Energy's (DOE) implementation of Recommendation 95-2, *Safety Management*, at priority facilities such as Superblock at the Lawrence Livermore National Laboratory (LLNL). The priority facilities were selected as those where the hazards made safety management particularly important. Moreover, DOE and the Board have agreed that implementation of the integrated safety management (ISM) concept at these facilities might well serve as examples for accelerating implementation of improved ISM programs for all hazardous defense nuclear activities of DOE. DOE has moved ahead on achieving site-wide development of ISM systems through revision of DOE Acquisition Regulations and the modification of contracts accordingly. However, pending development by the contractors of the infrastructure to implement ISM systems site-wide, the priority facilities should have an adequate and defensible "interim" system in place per the commitments made in DOE's Recommendation 95-2 Implementation Plan.

Recent criticality safety infractions at LLNL Building 332 (B332) and reviews by the Board's staff, as noted in the enclosure to this letter, have identified deficiencies that are indicators of a basic problem with the "interim" ISM system at Superblock. The basic problem involves inconsistent development and implementation of safety control measures for the protection of the workers and of government property. This is the safety sector for which DOE has relied heavily on the contractor to identify and implement controls.

The safety management program for LLNL is based largely upon a system of performance measures. This philosophical approach to safety management relies on assessing results after the fact, rather than stressing pre-work planning per prescribed practices to establish requisite safety measures tailored to the hazards. This latter approach is the essence of ISM envisioned by the Board in its Recommendation 95-2 and articulated by DOE in Policy P 450.4 dated October 15, 1996. Performance measures are important for feedback and improvement, a key function

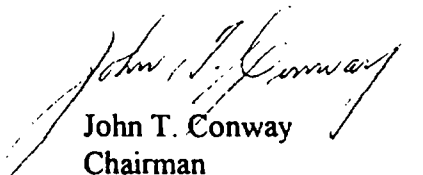
under ISM, but are no substitute for safety controls that are established by integrated work planning/safety planning processes. The challenge for the DOE Oakland Operations Office (DOE-OAK) is to bring its performance-based concept into line with the principles and objectives of DOE Policy P 450.4.

The number of criticality infractions and underlying systemic problems with work controls at LLNL, coupled with the improvements needed for ISM, raise questions as to whether DOE-OAK is staffed with the technical capabilities necessary to provide guidance and act as an effective demanding customer for ISM issues. While there appear to be deficiencies in DOE's oversight of B332 operations, there are no apparent efforts by DOE-OAK to develop a corrective action plan for its own involvement in and contribution to the current situation. Further, neither DOE-OAK nor LLNL management appears to recognize or fully appreciate all of the problems of hazardous work control, particularly at the activity and task levels, and have not performed an adequate root-cause analysis to address them.

The Board's staff has discussed the issues contained in the enclosure to this letter with Mr. Victor Stello, Dr. Robin Staffin, and other members of the Defense Programs staff. They appear to be cognizant of the issues at LLNL. Consistent with these staff-to-staff discussions, the Board looks forward to being briefed on the details of Defense Programs, DOE-OAK's, and LLNL's coordinated corrective action plans soon after they are finalized.

If the Board or its staff can be of additional assistance, please let us know.

Sincerely,



John T. Conway  
Chairman

- c: The Honorable Victor H. Reis
- Dr. Robin Staffin
- Dr. James Turner
- Mr. Mark B. Whitaker, Jr.

Enclosure

## Enclosure

### **Integrated Safety Management System (ISMS) in Building 332 (B332) at Lawrence Livermore National Laboratory (LLNL)**

This enclosure documents a review by the staff of the Defense Nuclear Facilities Safety Board (Board) of the current status of the implementation of an integrated safety management system in B332, the Plutonium Facility at LLNL. B332 is a priority facility under the Department of Energy (DOE) implementation plan for Board Recommendation 95-2. The staff's review was conducted during December 1-4, 1997, and included the LLNL institution-level ISMS; the criticality safety program; 1997 criticality safety infractions in B332; and work planning, authorization, and oversight in B332.

**Criticality Safety Infractions.** Two criticality infractions in B332 were reported in July and October 1997. Subsequent review revealed numerous additional criticality infractions. The infractions occurred primarily as a result of poor implementation of criticality safety controls, not deficiencies in criticality safety analyses.

- The LLNL criticality safety program has improved since the staff's last review in August 1996, but still has significant deficiencies. There is an inappropriate overreliance on mass controls that are known to be ineffective, i.e., personnel reliability and mass-tracking computer systems. With regard to firefighting guidance for fires involving fissile material, the staff noted no assessment of criticality safety versus fire risk, poor coordination with firefighters, and ineffective postings. There is poor quality control on criticality safety evaluations. Also, criticality safety personnel did not appear to have a presence in the workplace.
- There has not been sufficient root-cause analysis to ensure that corrective actions are adequate. While the incident analysis conducted after the July criticality safety infraction was well done, there has been insufficient analysis of subsequent events and problems. B332 has been in STAND-BY mode since July, yet continues to move nuclear material without implementation of corrective actions. As a result, numerous additional criticality infractions have occurred. Performance of work before an adequate root-cause analysis and implementation of corrective actions is cause for concern.
- The recent criticality infractions and associated incident analysis demonstrated that B332 operations lack sufficient procedures, formality, and supervision by line management. LLNL and DOE-Oakland (DOE-OAK) management did not appear to recognize many of these problems, and the planned corrective actions do not address them.

**Work Control.** Review of the work planning and authorization process, as well as direct observation of nuclear material movement and repackaging operations, revealed that work control lacks formality, consistency, adequate hazard analysis, use of the Unreviewed Safety Question (USQ) process, and supervision by facility management. There are few actual procedures for

work performed in B332. The staff observed a heavy reliance on the technicians' knowledge of the operation and a lack of implementation of safety programs.

- The work permits for movement and repackaging of some uranium parts (directly observed by the staff) contained work description errors and omissions. Performance of work in accordance with the permit descriptions would have led to unsatisfactory or unsafe results. The work was actually performed without regard to its description in the permits. The work was led by a senior fissile material handler and observed by the Facility Safety Officer (who signed the work permits) and a DOE Facility Representative, who failed to stop work when the controls (compensatory measures) could not be carried out as written.
- Because of LLNL's highly matrixed management structure, roles and responsibilities are diffuse and not clearly defined (line management responsibilities are particularly unclear). No supervisor seems to be responsible for the work being done by plutonium handlers and technicians. The facility manager is not able to exercise an appropriate level of control over the work process in his facility. The result is a lack of effective supervision of the technicians on the floor. LLNL stated that they understand there is a significant problem with supervision of work in B332, but there is no plan as yet for correcting the problem.

**Work Smart Standards Development.** LLNL is making progress in the development of its Work Smart Standards. LLNL does not anticipate completing modification of the implementing procedures for its requirements/standards set in time to support ISMS implementation at B332 on the schedule most recently provided to the Board, or in time to support desired restart efforts.

- LLNL and DOE-OAK have committed an extensive group of technical personnel to define the universe of work and associated hazards at LLNL.
- The "Convened Group's" intent is to complete the standards selection process in December, have the independent "Confirmation Team" complete its effort in early January, and have the LLNL Director and DOE-OAK Manager approve the set by the end of January. LLNL management confirmed that the schedule is too optimistic.

**Development of Implementing Procedures for ISMS.** The implementing procedures for LLNL's contract requirements are contained primarily in the Health and Safety Manual and Environmental Compliance Manual. While LLNL submitted an ISMS Description (since withdrawn) to DOE-OAK for review, this description did not reference the relevant manual chapters and therefore did not provide a roadmap of the LLNL system suitable for DOE verification.

- It appears that LLNL has pursued satisfaction of the 95-2 commitment to implement ISMS at B332 on a priority basis from the institutional level *only*. There was no evidence of effort to expedite the implementation and DOE verification of integrated

safety management (i.e., work definition, hazard analysis, identification and implementation of controls, work performance, and feedback/improvement) at B332.

- During the review it became apparent that LLNL could not establish that all sections of the manuals to be referenced in the description would be in place and accurate until July 1998 or even later. It is clear that continuing pursuit of an institutional-level ISMS on the more realistic schedules discussed during the staff's visit will not support expedited ISMS implementation on the B332 restart schedule LLNL currently anticipates.

**DOE Oversight.** There is insufficient DOE oversight in B332. A review of previous DOE-OAK assessments identified numerous indications of the symptoms that led to the current stand-down. However, these assessments apparently did not progress to root-cause analysis or the development and execution of effective corrective actions.

- DOE presence in B332 appears to be lacking. Senior DOE-OAK officials exhibited a lack of knowledge of current activities during walkthroughs with the staff. Several senior DOE managers had been in the facility once or not at all in 1997. The Facility Representatives are relied upon almost exclusively for DOE presence and operational awareness of B332 activities.
- No USQ Determinations (USQDs) have been performed by the contractor on the multiple criticality safety infractions. DOE ought to have recognized the need for and required these USQDs.
- It appears that DOE has not communicated adequately its expectations for resumption and approval of work while in the present STAND-BY mode. The staff drew this conclusion since work involving fissile material was performed without DOE's knowledge and contrary to DOE's understanding of the processes to be used in the STAND-BY mode.
- DOE-OAK has been involved with LLNL in developing the laboratory's corrective action plan, but has not yet conducted a formal evaluation of its own involvement in and contribution to the current situation. While there appear to be deficiencies in DOE oversight of B332 operations, there is at this time no apparent effort to develop a formal DOE-OAK corrective action plan.
- While DOE-OAK technical personnel appear to be appropriately involved in the Work Smart Standards development, it was unclear from the information provided whether DOE-OAK management is acting as a "demanding customer" in the process. A stated objective of the process is to *not* select "process or management standards;" instead, "the standards selected should be outcome oriented standards." One DOE-OAK manager (who was later contradicted by the Deputy Manager) stated that an objective of the process was to "have as few requirements in the contract as possible."