

# DEFENSE NUCLEAR FACILITIES SAFETY BOARD

John E. Mansfield, Vice Chairman  
Joseph F. Bader  
Larry W. Brown  
Peter S. Winokur

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



December 2, 2009

The Honorable Thomas P. D'Agostino  
Administrator  
National Nuclear Security Administration  
U.S. Department of Energy  
1000 Independence Avenue, SW  
Washington, DC 20585-0701

Dear Mr. D'Agostino:

The Defense Nuclear Facilities Safety Board (Board) is conducting a series of reviews to evaluate the effectiveness of efforts of the National Nuclear Security Administration (NNSA) to institutionalize Integrated Safety Management (ISM) at the activity level. Recently, the Board's staff evaluated work planning and control processes and their execution by Los Alamos National Security, LLC (LANS) at Los Alamos National Laboratory (LANL). This review assessed maintenance and programmatic work in the Plutonium Facility and the Radioactive Liquid Waste Treatment Facility. Additionally, the staff evaluated the effectiveness of the Los Alamos Site Office's (LASO) oversight of work planning and control processes. The staff's review revealed deficiencies in both of these areas, and raises concerns about the implementation of ISM core values and guiding principles at LANL.

The staff identified several instances in which LANS's work planning and control efforts were inconsistent with the NNSA guidance document *Activity Level Work Planning and Control Processes: Attributes, Best Practices, and Guidance for Effective Incorporation of Integrated Safety Management and Quality Assurance*. Of particular concern, LANS's work planning and control directives lack specificity, roles and responsibilities for work planning are not clearly defined, hazard analysis processes are not proceduralized, document control is poor, and the contractor self-assessment program has not been effective at identifying these deficiencies. As documented in the attached staff report, these shortcomings resulted in procedures and maintenance work packages that do not adequately stipulate the controls and instructions necessary to ensure worker safety.

The staff's review revealed that LASO has not institutionalized the prescribed criteria and review approach documents so that activity-level work is routinely assessed by the site office. This clearly conflicts with your memorandum to all site office managers dated January 23, 2006, in response to the Board's Recommendation 2004-1, *Oversight of Complex, High-Hazard Nuclear Operations*. Specifically, no dedicated work planning and control assessments have been conducted this year, nor are any planned for the near future. LASO does not have a work

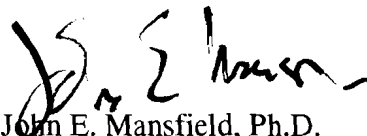
planning and control subject matter expert on its staff to direct its oversight efforts in this important area.

The Board believes that a complete reverification of the LANL Integrated Safety Management System would be appropriate based on the above deficiencies, consistent with the guidance in Department of Energy (DOE) Manual 450.4-1, *Integrated Safety Management System Manual*, and DOE Guide 450.4-1B Volume 1, *Integrated Safety Management System Guide for use with Safety Management System Policies (DOE P 450.4, DOE P 450.5, and DOE P 450.6); the Functions, Responsibilities, and Authorities Manual; and the DOE Acquisition Regulation*. This reverification would provide a necessary focus on the work planning and control efforts at LANL and would provide LASO with a solid baseline from which to provide oversight in this area.

DOE-Headquarters could enhance LASO's oversight of work planning and control by providing tools to assist in identifying problems and driving corrective actions. LASO's oversight would benefit from the issuance within the DOE directives system of a technical standard for work planning and control and a guide supporting DOE Order 226.1A, *Implementation of Department of Energy Oversight Policy*. This guide should include a criteria and review approach document for critical work activities. The need for such a technical standard and guide was previously identified in the Board's January 22, 2009, letter to NNSA regarding work planning at the Y-12 National Security Complex, and the Board's March 23, 2009, letter to the DOE Office of Environmental Management regarding work planning for the Idaho Cleanup Project at Idaho National Laboratory.

Based on the above observations, and pursuant to 42 U.S.C. § 2286b(d), the Board requests a report within 90 days of receipt of this letter outlining actions taken or planned by LASO and LANS to address the work planning and control deficiencies detailed in the enclosed report.

Sincerely,



John E. Mansfield, Ph.D.  
Vice Chairman

Enclosure

c: Mr. Donald L. Winchell  
Mr. Glenn S. Podonsky  
Mr. Mark B. Whitaker, Jr.

## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

### Staff Issue Report

September 17, 2009

**MEMORANDUM FOR:** T. J. Dwyer, Technical Director

**COPIES:** Board Members

**FROM:** R. Verhaagen

**SUBJECT:** Activity-Level Work Planning at Los Alamos National Laboratory

This report documents a review by the staff of the Defense Nuclear Facilities Safety Board (Board) of the work planning and control processes at Los Alamos National Laboratory (LANL). This review examined how Integrated Safety Management (ISM) is used to protect workers from activity-level work hazards associated with maintenance and programmatic work at the Plutonium Facility and the Radioactive Liquid Waste Treatment Facility (RLWTF). Additionally, the staff evaluated the oversight of work planning and control by the Los Alamos Site Office (LASO). The review was conducted by staff members R. Verhaagen, J. MacSleyne, J. Pasko, B. Broderick, and T. Davis, assisted by outside expert D. Volgenau.

**Background.** The Department of Energy (DOE) has yet to publish specific requirements in its directives system outlining expectations for how activity-level work planning and control should be conducted. The current sparse or informal guidance is contained in:

- Title 10 Code of Federal Regulations (CFR) Part 851, *Worker Safety and Health Programs*
- DOE Guide 440.1-8, *Implementation Guide for Use with 10 CFR Part 851, Worker Safety and Health Programs*
- A National Nuclear Security Administration (NNSA) document entitled *Activity Level Work Planning and Control Processes: Attributes, Best Practices, and Guidance for Effective Incorporation of Integrated Safety Management and Quality Assurance*.

The NNSA document has not yet been published in the DOE directives system. This document is referenced in DOE Guide 440.1-8 as a particularly useful tool for activity-level work planning for complex and/or hazardous tasks. The requirements and guidance in this document were derived from the ISM core functions and guiding principles; the ten criteria of DOE Order 414.1C, *Quality Assurance*; and DOE Order 433.1A, *Maintenance Management Program for DOE Nuclear Facilities*. Although these requirements and guidance have not been

published in the DOE directives system, their implementation was mandated at NNSA sites in a January 23, 2006, memorandum from the Assistant Deputy Administrator for Program Integration to NNSA site office managers entitled, *Revitalizing Integrated Safety Management: Site Office Action Plans for Improving Activity Level Work Planning and Control Processes*.

Los Alamos National Security, LLC (LANS) assumed contract responsibilities for LANL in June 2006. The contractor manages several types of activity-level work at LANL, including research and development (R&D), programmatic and facility support operations, preventive and corrective maintenance, and construction. LANS has developed both institutional and facility- or work-specific directives covering these activities. In the review documented in this report, the Board's staff focused on these procedures, their accompanying processes, and specific activity-level work planning and control in the Plutonium Facility and RLWTF. The review was aided by briefings and discussions with responsible individuals, discussions with workers, and tours of work sites.

**Observations and Comments.** The staff identified several weaknesses in the integration of ISM into activity-level work planning and control processes at LANL. The most significant of these weaknesses were as follows: (1) institutional-level directives for work planning and control do not contain sufficient detail to clearly define management's expectations for planning and control of activity-level work; (2) the roles and responsibilities of those involved in work planning and control are not clearly defined; (3) LANS does not have a documented and approved process for performing hazard analysis of activity-level work; (4) the document control system fails to ensure that the correct revisions of work planning and control directives are used to plan work; and (5) the contractor's work planning and control self-assessment program has not been effective in identifying and correcting problems. These weaknesses result in work planning and control processes and procedures that do not fulfill their intended function of adequately integrating ISM into activity-level work planning and control and ensuring worker safety. The following observations and comments regarding the application of the core functions and guiding principles of ISM support these conclusions.

**General Work Planning and Control.** The staff observed discrepancies in the implementation of the core functions of ISM. Posters and handbooks used for education and reinforcement of the ISM principles listed the fifth core function as "ensure performance"; this function is supposed to be "provide feedback and continuous improvement." The modification of this core function deemphasizes the important role of feedback and improvement in an ISM System. The staff also observed many cases in which "risk analysis" was confused with "hazard analysis" in documents designed for activity-level work. This modification of an ISM core function could mislead planners into believing that they should be conducting a risk analysis when in fact they are expected to analyze the hazards associated with the work being planned. The result could be an incomplete set of controls to ensure worker safety.

**Define the Scope of Work.** The roles and responsibilities of those involved in work planning and control are not clearly defined in institutional and local directives. For example, although LANL institutional procedure P313, *Roles, Responsibilities, Authorities, and Accountability*, specifies the roles and responsibilities of those involved in work planning and

control of activity-level work, it does not discuss the roles and responsibilities for R&D and maintenance activities. In addition, at the Plutonium Facility, a single individual frequently assumes the roles of planner, procedure writer, subject matter expert, and worker. However, neither the institutional nor the local Plutonium Facility directives provide guidance on how to ensure sufficient peer review of the hazard analyses and work instructions.

Defined processes exist for the identification, prioritization, and scheduling of work at the Plutonium Facility and RLWTF. However, reviews of work packages and discussions with work planners revealed errors and inconsistencies in the development of work procedures. An improved document control system would prevent the following noted deficiencies:

- A work package reviewed by the staff referenced three different revisions of the same work planning procedure. It was difficult to ascertain which of the revisions was used; forms from all three revisions were included in the work package.
- There is no requirement to include a table of contents or list of effective pages with work packages. As a result, workers cannot readily determine whether they are using complete and up-to-date work instructions.
- Instructions to make revisions to work packages are not sufficiently detailed, and the requirements for review and concurrence are not well defined. Two work packages reviewed by the staff had not been revised in accordance with existing LANS directives.

**Analyze the Hazards, and Develop and Implement Controls.** Approved methods for performing a hazard analysis are not specified in work planning directives. When a hazard analysis is required, the overarching LANL institutional procedure P300, *Integrated Work Management*, directs the work planner to “conduct a hazard analysis.” Currently, the identification and analysis of activity-level work hazards are heavily dependent on the experience of the work planner, hazard analysis training, and the use of an automated Job Hazard Analysis (JHA) tool. This approach does not adequately compensate for the lack of procedural direction. Work planners interviewed by the staff could not clearly describe management’s expectations for the hazard analysis processes that they had used for planning work. One planner was unfamiliar with hazard analysis processes and had to be assisted in completing the JHA for an operating procedure he had prepared. Managers at the Plutonium Facility stated that the hazard analysis needed for conducting work already existed in the form of Process Hazard Analyses that had been prepared to support development of the facility’s safety basis. This statement indicates that they do not clearly understand what it means to conduct a hazard analysis for activity-level work to ensure worker safety. The following are examples of the inadequacy of hazard analysis:

- A Detailed Operating Procedure to overpack an item and seal weld it inside a safety-class container allowed the use of cheesecloth soaked in ethyl alcohol to dry the item before the container was welded shut. The item being packaged generates significant heat, and the procedure specified precautions for handling with care. However, ethyl

alcohol was not identified or analyzed as a potential hazard to workers, and no related controls were specified.

- A maintenance work package written for performing the calibration of a tank level detector had been revised to incorporate additional hazard controls identified during an internal quality assurance (QA) review. The initially approved work package did not specify the complete set of controls required to protect workers from sodium hydroxide contained in the tank. Contributing to this deficiency, Industrial Hygiene did not sign for approval on the initial work package.
- The JHA process generates generic hazards and controls that may not be specific to the task at hand. Given the extraneous controls specified in work packages reviewed by the staff, it appears that work planners do not adequately analyze the hazards generated by the JHA process to ensure that only germane hazards are identified in the final work packages.

**Perform the Work within Controls.** Formal processes exist to ensure that appropriate preparations are completed before work is released for execution. Facility management is required to be involved directly in work release. Pre-job briefings are prescribed for all types of work conducted at LANL. The pre-job briefing process and its execution could be strengthened. The staff observed pre-job briefings for welding in a glovebox and a routine maintenance activity. Both briefings could have been improved by worker interaction and engagement. The maintenance activity briefing was conducted in a noisy, busy hallway; the briefings by the radiological control technician and the job supervisor were perfunctory.

The staff reviewed a work package for welding a container in a glovebox. Because of a technical difficulty with the welding process, the welding current had been reduced to prevent weld failures. This parameter change occurred in March 2009. However, a procedure change was not issued until August 7, 2009, just prior to the staff's visit. Approximately 40 safety-class containers have either been welded with the incorrect electric current or welded using parameters contrary to those specified by the approved procedure. A Nonconformance Report has been issued.

The staff observed the conduct of this welding procedure and noted the following poor practices and weaknesses in procedural compliance:

- The procedure included a prerequisite step to have a QA specialist (QAS) present for the weld. An attached data sheet contained the requirement for a QAS review and signature. No QAS was present. When questioned as to why, the person in charge (PIC) said it had been determined that no QAS was required. Further discussions with a lead weld engineer confirmed this assertion. However, the PIC had proceeded without requesting a procedural change to document this allowance.

- During performance of the welding procedure, workers intentionally paused for about 5 minutes prior to welding. The pause was not a procedural requirement. The workers stated that they had determined through trial and error that 5 minutes was the optimal time for the temperature to reach equilibrium. Although this action was common practice, this additional step was not included in a recently issued procedural change.
- Despite procedural cautions, the staff noted a number of instances during the glovebox welding procedure in which a worker handled high-temperature surfaces with glovebox gloves alone when he could have used an outer thermal glove.

In addition to a lack of sensitivity to following procedures precisely as written, these examples illustrate another lack of document control involving activity-level work and reemphasize the need for a clearly prescribed process for revising work packages.

**Provide Feedback and Continuous Improvement.** LANS management noted that the organization's feedback and continuous improvement process requires improvement. Many of the deficiencies identified by the Board's staff during this review had not previously been identified by LANS management. Moreover, a Director's Institutional Assessment of Integrated Safety, Security, and Work Management Systems conducted in fall 2008 failed to identify any significant deficiencies in the activity-level work planning and control system.

Post-job reviews are optional and are not normally conducted unless problems are encountered during work execution. There is no mechanism in place to link lessons learned from post-job reviews with the work planning process. Work planners would benefit greatly from a system that would allow them to search lessons learned and post-job briefs to aid them when planning new work.

**DOE Oversight.** LASO does not have a work planning and control subject matter expert on staff or a program focused on the oversight and assessment of LANS's activity-level work planning and control. LASO integrates its assessment plans with those of the contractor. The schedule for fiscal year 2009 did not contain any plans for a LASO assessment of the contractor's work planning and control programs, and no such assessment had been accomplished. LASO's model for providing oversight of work planning and control includes shadowing the contractor's assessments (e.g., assessment selection and monitoring), having Facility Representatives and others observe work and evaluate such matters as conduct of operations, and implementing contract performance-based incentives.

DOE has not performed a verification of LANL's ISM System since the most recent contract change, asserting that the LANS ISM System is substantially similar to the previously verified contractor's system. LANS has made a number of procedural and process changes since contract assumption, including a significant update to the ISM System Description. LASO approved the updated ISM System Description in May 2007, but did not conduct a verification of the ISM System. The staff concludes that a complete reverification of the ISM System is appropriate and would greatly benefit LANL's work planning process. This conclusion is based

on the lack of rigor in the LANS document control system, and the lack of specificity in activity-level work planning documents. This conclusion is also consistent with the guidance in DOE Manual 450.4-1, *Integrated Safety Management System Manual*, and DOE Guide 450.4-1B Volume 1, *Integrated Safety Management System Guide for use with Safety Management System Policies (DOE P 450.4, DOE P 450.5, and DOE P 450.6)*; *the Functions, Responsibilities, and Authorities Manual*; and *the DOE Acquisition Regulation*.

The staff continues to emphasize that DOE-Headquarters could considerably enhance site office oversight of work planning and control by providing the impetus and tools necessary to identify problems and drive corrective actions. Of particular benefit would be issuance within the DOE directives system of a technical standard for work planning and control and a guide supporting DOE Order 226.1A, *Implementation of Department of Energy Oversight Policy*, which would include a criteria and review approach document for critical work planning activities.