

Thomas A. Summers, Acting Chairman
Patricia L. Lee

**DEFENSE NUCLEAR FACILITIES
SAFETY BOARD**

Washington, DC 20004-2901



June 12, 2025

The Honorable Chris Wright
Secretary of Energy
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-1000

Dear Secretary Wright:

The Defense Nuclear Facilities Safety Board (Board) conducted a safety review of decontamination and decommissioning (D&D) work planning and control at the Plutonium Facility at Los Alamos National Laboratory (LANL). The Board identified weaknesses in D&D work planning and opportunities for LANL to better align its work with the principles of integrated safety management.

The Board notes that these weaknesses have so far contributed to project delays and, if left unchecked, could result in additional safety issues. LANL needs to accomplish an increasingly complex mission, including pit production, under significant time constraints, and proper work planning and control prevents work stoppages. While LANL is addressing several of these deficiencies, the Board will continue to monitor D&D work planning as part of routine safety oversight activities. The enclosed document provides additional details from the Board's review to assist LANL in improving work planning and control for D&D activities.

Sincerely,

A handwritten signature in black ink that reads "Thomas A. Summers".

Thomas A. Summers
Acting Chairman

Enclosure

c: Ms. Teresa Robbins, Acting NNSA Administrator
Mr. Theodore Wyka, NNSA Field Office Manager at Los Alamos
Mr. Joe Olencz, Director, Office of the Departmental Representative to the Board

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Report

November 19, 2024

Decontamination and Decommissioning (D&D) Work Planning at Los Alamos National Laboratory

Background. LANL PF-4 D&D Project—The ongoing D&D project at Los Alamos National Laboratory’s (LANL) Plutonium Facility (PF-4) includes removal of more than 100 pieces of large equipment, including approximately 90 gloveboxes and several banks of pencil tanks of varying levels of contamination. D&D work in PF-4 is managed under several projects, including plutonium sustainment and the Los Alamos plutonium pit production project (LAP4). The D&D project management team has developed an integrated schedule for all D&D activities, such that activity-level work should not differ based on which project is driving them.

The staff review team conducted several facility walkdowns with project managers to view gloveboxes prepared for removal, including temporary contamination control measures. The team observed cutting of a pencil tank in a mock-up glovebox, scheduling meetings, pre-job briefings, removal of gloveboxes from the facility, and fact findings related to D&D work. The team received and reviewed five work packages that included a total of 19 task-specific integrated work documents (IWDs), which describe the scope of work and potential hazards involved.

Requirements and Guidance—In August 2012, the Board communicated to the Department of Energy (DOE) on work planning and control in Technical Report 37, *Integrated Safety Management at the Activity Level*. DOE subsequently published DOE Handbook 1211-2014, *Activity-Level Work Planning and Control Implementation*. The handbook cites DOE Guide 226.1-2A, *Federal Line Management Oversight of DOE Nuclear Facilities* for the criteria and review approach document.

The contractor requirements for project work planning and control are prescribed in 48 Code of Federal Regulations (CFR) Department of Energy Acquisition Regulation (DEAR) clause, [48 CFR 970.5223-1](#), *Integration of Environment, Safety, and Health into Work Planning and Execution*. The DEAR clause paragraph (c) states the five steps required of the contractor’s safety management system for work planning and execution:

- “(1) Define the scope of work;
- (2) Identify and analyze hazards associated with the work;
- (3) Develop and implement hazard controls;
- (4) Perform work within controls; and
- (5) Provide feedback on adequacy of controls and continue to improve safety management.”

The DEAR clause paragraph (b) states, “(5) Before work is performed, the associated hazards are evaluated and an agreed-upon set of ES&H [environmental, safety, and health] standards and requirements are established which, if properly implemented, provide adequate assurance that employees, the public, and the environment are protected from adverse consequences. (6) Administrative and engineering controls to prevent and mitigate hazards are tailored to the work being performed and associated hazards” [1].

LANL D&D project management has focused efforts on some challenging activities to mitigate facility risk. Project personnel built mock-ups for the T-Base lathe glovebox to validate the plans for the downsizing required to get the glovebox out of a PF-4 room. They also built a mock-up glovebox to test cutting equipment and procedures for downsizing pencil tanks. The mock-ups were tested in non-radiological facilities in advance of attempting the in-facility evolutions.

Safety Basis Applicability—Per the PF-4 safety basis, *Technical Area (TA)-55 Documented Safety Analysis (DSA)*, gloveboxes are workstations for safely handling and processing hazardous and radioactive material that serve as the primary confinement for radioactive material. Providing a barrier against the release of radioactive material in this manner is credited as a safety-significant (SS) control focused on worker safety. The portion of the overall facility ventilation system that interfaces with gloveboxes—and maintains cascading differential pressures from low to high contamination areas—is also considered part of the primary confinement system and credited as an SS control. The ventilation system supports operational gloveboxes and must maintain functionality throughout D&D activities [2].

Analysis of D&D work in PF-4 is spread across several safety basis documents. The implemented facility safety basis [2], which authorizes all ongoing operations within the facility, includes generic analysis of D&D of gloveboxes or other equipment. When an individual job is proposed (such as cleanout and disconnection of one glovebox), the specific work documents for that job go through the site’s unreviewed safety question (USQ) process, which compares the job against the existing safety basis to determine whether the planned work is within the safety envelope already authorized. If it is, the work can proceed; if not, more safety controls are required. Individual jobs of this sort are common, considered routine work, and usually are found to be within the authorized safety envelope.

As a major modification to an existing facility and as a project above a certain cost threshold, LAP4 requires additional safety basis documentation, including a safety design strategy (SDS) and safety basis technical reviews (SBTR) [3][4]. While the scope of LAP4 involves the removal of about 60 existing gloveboxes, these documents do not generally include specific safety analysis of the removal process. Instead, they reference the existing facility DSA and generically state that glovebox removal is a standard or routine operation and can be performed using the existing USQ process.

Other significant projects involving D&D, such as plutonium sustainment, do not necessarily require additional safety basis documentation beyond the approved facility DSA. Unlike for LAP4, there is no SDS or SBTR for plutonium sustainment activities.

Discussion. The staff team assessed the D&D project management and work planning based on the five concepts of integrated safety management identified in the DEAR clause. Based on the review observations, LANL has areas for improvement in each of the five areas.

Analysis of Project Scope—The staff team has concluded that there is a gap in project safety basis documents such that they do not fully analyze the impact to facility safety systems. While removal of individual gloveboxes may be routine, removal of a large percentage of the gloveboxes in the facility is not routine and warrants detailed evaluation of cumulative safety impacts to communal facility safety systems. However, there is no such holistic evaluation in the safety basis documents, leading to insufficient consideration of the cumulative safety impacts of D&D work.

The SS glovebox ventilation system is one example of where this gap in understanding scope could result in a safety issue. Since many gloveboxes are connected to communal ventilation headers, changes to one glovebox can affect the safety performance of others. As gloveboxes are removed and their ventilation connections are capped, airflow to the SS exhaust header is incrementally reduced. This change in airflow can adversely impact glovebox ventilation for other operational gloveboxes, which require a certain differential pressure to comply with facility technical safety requirements. A 2021 LANL engineering study identified the need for a bypass modification to maintain airflow within defined limits for certain laboratory rooms [5]. However, this modification was not referenced in either project schedules, the SDS, or other work planning documents.

Further, different overarching projects can have differing safety basis documentation (e.g., LAP4 has an SDS while plutonium sustainment does not), which could mean that individual jobs occurring at the same time and potentially in the same laboratory space are analyzed differently. While there is no requirement to have one consolidated safety document from which all work is derived, having such an integrated approach would (1) simplify the USQ process, (2) help ensure that individual jobs are analyzed consistently, and (3) help ensure that jobs are not analyzed in a vacuum, and adequately consider nearby work that could affect safety. In the absence of a consolidated safety basis document, it is important to carefully analyze work being performed concurrently and plan accordingly, such that jobs are done safely.

Identification of Hazards—PF-4 D&D work planning processes do not consistently identify hazards or properly grade activities, which can lead to incomplete safety control strategies.

The staff team found that D&D work documents do not always meet the requirements of LANL policy document P300, *Integrated Work Management*, which sets the requirements for the hazard identification process [6]. Among other things, it states that the hazard analysis method must be documented, and that such activities must include subject matter experts and workers to accurately identify potential hazards. IWDs do not consistently record these items, making it difficult to ascertain whether the appropriate experts were consulted. For example, out of 19 IWDs reviewed by the staff team, only one listed the members of the hazard analysis team. The hazard analysis methods are also not typically listed in the IWDs, which makes performing quality reviews for already-completed documentation more difficult.

The staff team also found that work documents often have conflicting or missing hazard grades. Identifying the hazard grade is important because it informs work planners to follow certain processes for “high-hazard” activities when applicable (e.g., heightened level of awareness reviews or meetings, or additional subject matter expert involvement). The staff team reviewed two IWDs with no hazard grading recorded, despite associated radiological protection documentation indicating a “high” hazard and potentially driving additional controls. The staff team also found that four IWDs to remove separate gloveboxes—each with similar hazards and controls—were inconsistently graded (one as moderate, the others as high).

In discussions with the staff team, LANL D&D management indicated that they are developing corrective actions to close the gaps and weaknesses in hazard identification and work documents that the staff team identified. Additionally, LANL D&D management has initiated hazard review boards to review high hazard activities and recently approved the procedure for conducting these review boards.

Identification and Implementation of Controls—PF-4 D&D work documents do not consistently establish adequate controls for the boundaries of influence associated with each activity. Without clear identification and control of work boundaries, D&D work may adversely affect nearby safety systems or operations.

LANL engineering analysis identified vulnerabilities—such as the potential impact of glove box removal on the SS ventilation systems and seismic performance of adjacent gloveboxes—but these safety concerns are not consistently addressed in work packages. As noted previously in this paper, although a ventilation system modification was recommended to accommodate reduced airflow, work packages did not mention that this study existed, or prompt any checks on whether adequate ventilation would exist throughout the work activity, until prompted by staff team observations. Additionally, while previous safety analysis of a specific glovebox cluster in one laboratory room identified that removal of one glovebox could affect the seismic performance of the remaining gloveboxes, the IWDs the staff team reviewed for similar jobs did not address this concept.

The work planning process also does not adequately consider whether controls and contingencies are needed to ensure safety during interim or transient conditions of work evolutions. This is most clearly illustrated with regards to the process for the final disconnection of a glovebox from its ventilation header. The SDS, SBTR, and USQs assume that the ventilation and inter-glovebox connections will be sealed and isolated prior to disconnecting gloveboxes. However, IWD steps are usually written in the opposite order, such that the glovebox vent connection is separated and then caps are applied, leaving a time where ventilation is open to the laboratory room. Changing the orders of these steps would have implications for the necessary controls for preventing contamination spread in the laboratory room and ensuring necessary ventilation flow in adjacent or nearby gloveboxes. Inconsistent or conflicting assumptions could result in an incorrect set of controls being applied.

In response to this last item, project personnel informed the staff team that they coordinate the order of glovebox removal to prevent personnel from working in adjacent and potentially influenced gloveboxes. They also stated that the key steps of disconnecting and

capping ventilation are typically performed in rapid succession, taking on the order of minutes. However, IWDs do not convey these coordination activities, or specifically note that workers should perform ventilation separation and capping in rapid succession (e.g., within minutes, or without a break or shift turnover). Without these important concepts being recorded in work packages, IWDs may be performed in such a way that they do not represent an adequate set of controls.

Performance of Work—The staff team noted several quality issues with IWDs that would make it difficult to perform work as intended. Some approved and completed IWDs have missing steps or editorial errors combining actions that make the required action unclear. One IWD was missing the step to support the glovebox prior to disassembling the legs, which would have made the IWD difficult to complete as written. In another work package, the step to cap and restore ventilation combined steps, making the action unclear.

Some IWDs contain generic content not tailored to the specific task. IWDs tend to start with several pages of general precautions that include general facility training information and the full list of precautions that might be encountered in the facility, with little tailoring to specific job activities. This section does not require place-keeping and can include precautions that will not be encountered in the work package; for example, confined space entry precautions were included when no confined space is entered for the associated job task.

The staff team also found widespread issues with place keeping and signoffs, including steps that were not checked off, steps signed and dated before the prerequisites were signed off, steps with “N/A” written in the margin without explanation, and a signoff that left the “complete date” blank. During the staff team’s review, the site self-identified similar issues with inadequate signoffs after discovering a missing signature on a criticality hold point. The site held a fact finding to identify better practices for procedure copy control.

Issues with Work Planning Procedures and Continuous Improvement—LANL lacks formal procedures specific to D&D work planning, resulting in inconsistent and sometimes unclear IWDs. In the absence of procedures, planners rely on templates and unofficial tools, leading to work packages that include unnecessary steps, missing details, and editorial errors. The staff team noted examples of each of these during the review of IWDs, and identified multiple instances of IWDs that could not be performed as written by omitting critical job steps.

Other procedures supporting reviews of D&D work also need improvement. The team found that attachments used during radiological reviews were confusing and hard to interpret, that procedures did not clearly delineate the duties of the room monitor (used when there are concurrent hot jobs in the same room), and that procedures for erecting temporary radiological barriers did not drive an immediate inspection by fire protection personnel (and instead require one only within 30 days).

Conclusion. LANL D&D personnel are working on corrective actions to address some of the deficiencies identified by the staff team, but further safety improvement efforts are necessary to align with the core concepts of integrated safety management. LANL should:

- **Ensure the full project scope is analyzed** for potential impacts on safety systems.
- **Identify the hazards** specifically associated with work activities.
- **Establish adequate controls** on work scope to drive adequate checks on interdependent safety systems.
- **Ensure work is performed properly** by improving document quality and reinforcing expectations for place keeping and signoffs.
- **Improve the development and implementation** of D&D work planning procedures.

References

- [1] Code of Federal Regulations, *Integration of Environment, Safety, and Health into Work Planning and Execution*, 48 C.F.R. 970.5223-1 Department of Energy Acquisition Regulation (DEAR) clause, December 2000.
- [2] Los Alamos National Laboratory, *TA-55 Documented Safety Analysis*, TA55-DSA-2021-R1 (implemented), June 2022.
- [3] Los Alamos National Laboratory, *Safety Design Strategy for Los Alamos Pit Production Project (LAP4)* Rev. 6, April 2024.
- [4] Los Alamos National Laboratory, *LAP4 Decontamination and Decommissioning (D&D) Design Change Forms (DCFs) Safety Basis Technical Review*, SBTR-TA55-678-R0, July 2021.
- [5] Merrick and Company, *LAP4 Project Demolition Effects on Area 300 and 400 Ventilation Systems*, Engineering Design File #0729-EDF-001, December 2021.
- [6] Los Alamos National Laboratory, *Integrated Work Management*, P300 Revision 18, March 2023.