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**DEFENSE NUCLEAR FACILITIES
SAFETY BOARD**

Washington, DC 20004-2901



November 24, 2021

The Honorable Jennifer M. Granholm
Secretary of Energy
US Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-1000

Dear Secretary Granholm:

The Defense Nuclear Facilities Safety Board (Board) recognizes the Department of Energy's (DOE) approval of Critical Decision-1 for the Los Alamos Plutonium Pit Production Project (LAP4)—a major modification to the Plutonium Facility at Los Alamos National Laboratory. The Board has completed a review of the LAP4 conceptual design package and considers it to be adequate for this project stage. The enclosed staff report includes observations for strengthening the project's safety design strategy in future revisions.

Major modification projects are required to analyze the interface between the project and the existing facility. The Board is interested in the path forward for upgrading deficient safety systems in the Plutonium Facility.

Therefore, pursuant to 42 United States Code § 2286b(d), the Board requests a written report within 90 days of receipt of this letter that describes DOE's strategy for the Plutonium Facility ventilation system, the planned end-state of the ventilation system, the schedule for achieving that end-state, and how the system will be credited in the facility safety basis.

Sincerely,

Joyce L. Connery
Joyce L. Connery
Chair

Enclosure

c: Mr. Ted Wyka
Mr. Joe Olencz

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Report

August 25, 2021

Conceptual Design of the Los Alamos Plutonium Pit Production Project

Project Summary. The Los Alamos Plutonium Pit Production Project (LAP4) is a major modification to the Plutonium Facility (PF-4) at Los Alamos National Laboratory (LANL) intended to increase production capabilities from 10 to 30 pits per year. The project scope includes decontamination, decommissioning, and equipment upgrades. The project requires the installation of approximately 60 new pieces of equipment, including gloveboxes, dropboxes, transfer boxes, hoods, and radiography. Other activities include removal and replacement of interior laboratory walls and connection and/or disconnection of utilities and facility support systems (including the fire suppression, criticality alarm, and site paging systems). On April 27, 2021, the Deputy Secretary of Energy approved Critical Decision (CD)-1, *Approve Alternative Selection and Cost Range*, for the project [1].

Staff Review. The Board's staff reviewed the LAP4 conceptual design package, including revision 2 of the safety design strategy (SDS) [2], conceptual design reports for decontamination, decommissioning, and installation of gloveboxes and equipment [3, 4], and supporting calculations. On June 29, 2021, the staff met with personnel from the National Nuclear Security Administration (NNSA) Los Alamos Field Office (NA-LA) and its contractor, Triad National Security, LLC (Triad) to discuss the LAP4 conceptual design and the path forward for upgrading deficient PF-4 safety systems.

While the PF-4 system upgrades are outside the scope of LAP4, they are existing safety controls that interface with the project and are important to the overall safety posture of the facility. LAP4 will be executed concurrently with ongoing operations at PF-4, as well as other PF-4 modernization projects. The safety basis for this project will be developed in parallel with development of the new Department of Energy (DOE) Standard 3009-2014 compliant PF-4 safety basis. This approach requires close coordination across these efforts. The staff considers the CD-1 package to be adequate for this project stage, but DOE and Triad must maintain focus on the status of PF-4 system upgrades as they represent a risk to LAP4.

Path Forward for Safety System Upgrades—As noted in the Board's letter dated November 15, 2019 [5], PF-4 has several safety systems with identified deficiencies that prevent them from being credited in the seismic accident scenario. On February 7, 2020, in response to the Board's letter, NNSA senior management provided a briefing to the Board. During the briefing, NNSA indicated that the future control strategy for PF-4 would include a safety class, seismic design category (SDC)-3 confinement structure, an active confinement ventilation system, and fire suppression system, as well as their support systems. These systems need to meet safety class and SDC-3 requirements for Triad to credit them with preventing or mitigating hazards to the public from an evaluation basis earthquake with subsequent fires.

During this review, however, Triad and NA-LA personnel clarified their position that a safety class, SDC-3 ventilation system is a “goal” and not a fully scoped and funded set of projects. Triad plans to upgrade all fans and ducting for the bleed-off subsystem (the subsystem

that pulls air from the laboratory rooms through the exhaust stack) and the fans for the glovebox exhaust system to meet SDC-3 requirements by the end of fiscal year 2025. The upgrades for the remainder of the system, the end-state of the system, and how the system will be credited in the safety basis are not well defined. The staff remains concerned that due to the lack of defined scope and schedule for completing upgrades to the ventilation system, the future PF-4 control strategy as identified by NNSA to the Board is at risk.

While the ventilation system end-state is unclear, Triad is planning several projects to upgrade and modernize other safety systems in PF-4, which are more clearly defined. Triad stated that by 2026, the fire suppression system, the facility control system, emergency power, and uninterruptible power supply will be SDC-3. Also, the instrument air system and approximately half of the glovebox systems will be SDC-2. These upgrades will improve the PF-4 safety posture.

Weaknesses in the SDS—The staff identified two areas where the SDS could be improved in future revisions to appropriately identify hazards and the project interface with the existing facility and controls.

- DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets* [6], requires an SDS to provide “preliminary information on the scope of anticipated significant hazards and the general strategy for addressing those hazards.” The SDS identifies three activities with hazards outside of the current PF-4 safety basis: installation of new radiography equipment, a new parts-staging glovebox, and an additional final assembly station. The hazards and general control strategy are well defined for the first two activities, but not for the additional final assembly station. Triad safety basis personnel clarified that the additional final assembly station will contain nearly identical equipment and controls (e.g., credited pressure vessel, pressure relief device) as the current final assembly station. Triad plans to install the new equipment adjacent to the current system and may need to excavate two to three feet through and below the basement slab.
- DOE Standard 1189-2016, *Integration of Safety into the Design Process* [7], requires an SDS for a major modification to address the interface with the existing facility. The LAP4 SDS anticipates modifying the ventilation system¹, fire suppression system, and criticality alarm system due to equipment installation and reconfiguration of laboratory rooms. The SDS does not discuss the margin in these systems to accommodate changes in demand or reconfiguration. During the review, Triad personnel indicated that the ventilation system has significant margin to support increased demand. For the fire suppression system, a recent hydraulic calculation showed the system has sufficient margin in each laboratory area to accommodate anticipated modifications. For the criticality alarm system, Triad personnel plan to run an updated version of the design calculation with new equipment and shielding to determine if the existing detectors would be able to detect all credible criticality events or if additional detectors are needed.

¹ LAP4 modifications to the ventilation system are related to potential increased flow demands on the glovebox exhaust subsystem and not related to the seismic performance or safety classification of the overall system.

Construction Activities—The staff walked down PF-4 to become familiar with the current pit production flowsheet and infrastructure improvements related to LAP4. The staff noted the challenge of maintaining current production work while construction efforts to add and upgrade equipment are in progress. While the construction work occurs primarily on the backshift, scaffolding and other equipment increase congestion in the process rooms. Triad personnel indicated that they review egress and life safety issues prior to installing construction equipment.

Conclusion. The staff reviewed the LAP4 conceptual design package and concludes that it is adequate for this project stage. The staff also met with NA-LA and Triad personnel to better understand the path forward for the deficient PF-4 safety systems identified in the Board's letter dated November 15, 2019. For the active confinement ventilation system, Triad and NA-LA personnel clarified their position that a safety class, SDC-3 ventilation system is a “goal” and not a fully scoped and funded set of projects. Due to the lack of defined scope and schedule for completing upgrades to the ventilation system, the future PF-4 control strategy as identified by NNSA to the Board is at risk.

References

- [1] Turk, D.M., *Approval of Critical Decision (CD)-1, Approve Alternative Selection and Cost Range, for the Los Alamos Plutonium Pit Production Project (LAP4)*, April 27, 2021.
- [2] Triad National Security, LLC, *Safety Design Strategy for Los Alamos Pit Production Project (LAP4)*, SDS-103998-LAP4-00001, Revision 2, February 24, 2021.
- [3] Merrick & Company, *LAP4 PF-4 Conceptual Design Report – D&D, Rev. 0*, August 14, 2020.
- [4] Merrick & Company, *LAP4 PF-4 Conceptual Design Report – Install, Rev. 0*, August 11, 2020.
- [5] Defense Nuclear Facilities Safety Board, *Safety Basis for the Plutonium Facility at Los Alamos National Laboratory*, November 15, 2019.
- [6] Department of Energy, *Program and Project Management for the Acquisition of Capital Assets*, DOE Order 413.3B, Change Notice 6, January 12, 2021.
- [7] Department of Energy, *Integration of Safety into the Design Process*, DOE Standard 1189-2016, December 22, 2016.