DEFENSE NUCLEAR FACILITIES SAFETY BOARD
Washington, DC 20004-2901

June 20, 2023

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) is evaluating the safety of the Plutonium Facility at the Los Alamos National Laboratory, particularly in seismic and fire accident conditions. The Board held a public hearing on this and other topics in Santa Fe, NM, on November 16, 2022. On March 27, 2023, your staff transmitted a consolidated response to questions for the record from this hearing, updating initial responses provided on January 9, 2023. While the Board attempted to obtain the information requested below in both the hearing discussions and the questions for the record, the responses provided were not sufficient or complete. The Board has also received the Department of Energy's (DOE) crosswalk related to issues from Board Technical Report 44, *Los Alamos National Laboratory Plutonium Facility Leak Path Factor Methodology*. The Board thanks you for those responses and for your continued dialogue regarding safety at the Los Alamos National Laboratory Plutonium Facility. This letter provides more specificity and clarity in expectation that DOE can provide the additional information the Board seeks.

The Board requests the following information to better understand, and judge the adequacy of, the planned safety posture at the Plutonium Facility:

- Data (e.g., results of modeling, evacuation drills, emergency response exercises, responses to actual events, and timing studies) supporting the laboratory's conservative assumptions related to evacuation of the entire facility in five minutes, emergency responder ingress and egress in one minute, and the cumulative time the Plutonium Facility exterior doors are assumed to remain open during accident conditions. The response should also discuss whether these data account for post-accident conditions, such as failure of emergency lights or shifting of obstacles in the hallways and egress pathways.

- Analysis regarding the specific mechanisms by which the fire suppression system, when upgraded, will perform the safety function described in the March 15, 2023, letter from the Administrator of the National Nuclear Security Administration

(NNSA) to the Board (i.e., "much of the source term associated with the post seismic fire is eliminated").

- A crosswalk between the current status of the Plutonium Facility's confinement ventilation system and support systems, the planned end-state, the improvements that would be necessary to designate it as a safety class, Seismic Design Category 3 control, and the improvements that would be necessary to designate it as a safety significant, Seismic Design Category 3 control. The Board is interested in this final point of comparison because NNSA has stated that safety class reliability criteria (e.g., redundancy to eliminate single points of failure) are the primary contributor to the cost of upgrading the active confinement ventilation system to safety class.

Further description of the Board's specific requests can be found in the attachment.

Pursuant to 42 United States Code § 2286b(d), the Board requests a report on these subjects no later than 60 days from receipt of this letter. If any of this information or analysis cannot be provided to the Board due to continued development, please provide what has been developed and inform the Board when the balance of the information can be provided by the 60-day date.

Sincerely,

Joyce L. Connery
Chair

Attachment

c: Mr. Joe Olencz

Attachment

Following the Defense Nuclear Facilities Safety Board's (Board) public hearing in Santa Fe, New Mexico, on November 16, 2022, the Department of Energy (DOE) provided initial responses to several questions for the record (QFR) to the Board, and then updated them on March 27, 2023, after review by leadership at the National Nuclear Security Administration (NNSA). The Board has also received DOE's crosswalk related to issues from Board Technical Report 44, *Los Alamos National Laboratory Plutonium Facility Leak Path Factor Methodology*. The Board appreciates DOE's responses but requires further information in several areas to complete its evaluation of the safety systems at the Los Alamos National Laboratory (LANL) Plutonium Facility (PF-4). The Board requests a supplemental response on the following topics in the interest of ensuring that the offsite public is adequately protected during operations at PF-4.

Timing of Facility Egress and Emergency Response Actions—PF-4's active confinement ventilation system (ACVS), which uses fans to create a negative pressure differential relative to the external environment and draw airborne radioactive contamination toward the facility's high-efficiency particulate air filters, is not qualified to function during and after design basis seismic events. Accordingly, NNSA's safety strategy for protecting the public from seismic accidents at PF-4 involves passive confinement. The PF-4 safety basis states that most of the radioactive material released due to an earthquake will remain inside the building or be caught on filters, without using fans to draw air towards those filters. The facility doors represent a recognized gap in this strategy. An earthquake that disables the ACVS will allow radioactive material to leak outside while the doors are open, potentially leading to exposure of the public. In order for the Board to assess the adequacy of the passive confinement strategy, it is important to understand how long the doors could be open as workers evacuate after an earthquake, and as emergency personnel respond to the event.

During the November 16, 2022, public hearing, the LANL laboratory director asserted that workers can evacuate PF-4 following an earthquake and fire in five minutes or less. The safety analysis for the facility makes the same assumption. However, the Board noted during the hearing that drills in PF-4 are often performed with personnel pre-staged in the laboratory corridors (i.e., outside the rooms where most nuclear operations occur), and that the evacuation time observed in the drills does not include the time it takes to put nuclear operations into a safe and stable condition and exit the room into the corridors.

DOE's responses to the QFRs related to analysis of the leak path factor assumed in LANL's dose consequence calculations for accidents in PF-4 also state the following:

> *One of the parameters evaluated was emergency responders opening an external door 15 minutes after the accident starts for a duration of 1 minute to gain access to the facility. Fire Fighters bring their own fire hoses into the building, thus the doors fully close after they gain access. In this evaluation, the time step of 15 minutes as selected is a very conservative fast response and the one minute duration is an equally conservative time for fire fighters to gain access through a door.*

It is not clear how DOE determined that these assumptions bound real-world emergency response conditions. The Board requests that DOE provide the data available from drills, exercises, or simulations that support these assumptions regarding facility evacuation times, emergency responder ingress and egress, and the cumulative time that an unfiltered pathway (i.e., an open exterior door) would exist for radioactive contamination to escape PF-4 during a design basis accident. The Board also requests that DOE discuss whether these data include the potential for post-accident conditions (e.g., failure of emergency lights, shifting of obstacles in hallways) to affect the ability of personnel to evacuate the facility.

Fire Suppression System Role in Confinement—Per the March 15, 2023, letter from the NNSA Administrator to the Board, PF-4's fire suppression system (FSS) will be credited as a safety class control for the design basis seismic event, once LANL completes planned and in-progress seismic upgrades. DOE is pursuing this strategy instead of upgrading the ACVS to safety class. On this topic, DOE's response to the QFRs stated that "with the [FSS] seismic capacity upgrade, it was estimated that much of the source term associated with the post seismic fire is eliminated. As such, the seismic accident dose would be primarily related to the spill of material," which is calculated as seven rem total effective dose to the offsite public in the current documented safety analysis.

With near-term pit manufacturing milestones on the horizon, it is imperative that DOE understand the technical details of how the FSS will perform its safety functions before committing to this strategy. The Board therefore requests that DOE provide its analysis of how the FSS will perform the safety functions described in the March 15, 2023, letter from the NNSA Administrator to the Board. The FSS cannot prevent a fire; it can only control a fire after one starts. Even with an upgraded FSS, it is therefore possible for a fire to release radiological material to the air inside the building. In staff-level discussions, NNSA personnel informed the Board's staff that water from the FSS sprinklers could remove radioactive particles from the air, thereby confining the contamination inside the facility. If DOE is making this assumption, the analysis it provides to the Board should demonstrate the effectiveness of this strategy. Important considerations for such an analysis would include airborne radioactive particles that are generated by a fire prior to sprinkler actuation, airborne radioactive particles that are not within the spray from actuated sprinkler heads, the effectiveness of the spray at removing particles from the air, and any testing data involving a FSS that would validate any assumptions made.

Ventilation System Performance Criteria—Per the NNSA Administrator's March 15, 2023, letter to the Board, PF-4's ACVS will not be credited as a safety class control following a design basis seismic event. Instead, NNSA intends to upgrade the FSS to safety class for seismic events (discussed earlier).

The Board seeks to better understand the impact of this decision on the actual performance of the ACVS and the support systems needed to achieve an active confinement function. Specifically, the Board requests a crosswalk that compares the following:

- The ACVS and support systems as they exist today

- The currently planned end-state for the ACVS and support systems discussed in the Administrator's letter

- The improvements to the ACVS and support systems that would be necessary to achieve designation as a safety class, Seismic Design Category 3, Limit State C control, as defined in DOE-STD-1020-2016, *Natural Phenomena Hazards Analysis and Design Criteria for DOE Facilities*

- The improvements to the ACVS and support systems that would be necessary to achieve designation as a safety significant, Seismic Design Category 3, Limit State C control

The Board is interested in this final point of comparison because NNSA has stated in the past that the primary contributor to the cost of upgrading the ACVS would be meeting safety class reliability criteria (e.g., redundancy to eliminate single points of failure). In conducting this crosswalk, the Board requests NNSA delineate the specific system improvements that would be necessary to meet applicable codes and standards for ventilation systems (e.g., those listed as design requirements for safety systems in DOE Order 420.1, *Facility Safety*).