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Testimony for Kim Lebak
Defense Nuclear Facilities Safety Board Public Hearing

PF-4 MAR Reduction

Thank you, Mr. Chairman, Members of the Board. I appreciate the opportunity to be here this evening to discuss the safety improvement and risk reduction activities in the Plutonium Facility (PF-4) at Los Alamos National Laboratory (LANL). I will address actions that the National Nuclear Security Administration (NNSA) has already taken or is planning to take to address reduction in the plutonium inventories associated with nuclear material-at-risk, or “MAR”, as well as initiatives to improve safety and worker protection.

PF-4 provides multidisciplinary activities essential for defense programs, nuclear stockpile stewardship, plutonium-238 heat source fabrication for space power supplies, nonproliferation, special nuclear material storage, and nuclear material disposition. These efforts require plutonium inventories for the research and processing capabilities that reside in PF-4, which is specifically designed and maintained for these critical operations.

PF-4 has operated for over 38 years. NNSA and LANL management have made substantial safety upgrades to the facility and implemented strategies to reduce public consequences and enhance protection, in the event of a natural disaster, the most significant of which is an earthquake that has a probability of occurrence once in 10,000 years. The postulated accident that has affected the most substantive improvements is a large-scale seismically induced fire on the processing main floor in PF-4, which could be caused by a significant seismic event.

It is important to note that facility and operational improvements have resulted in a reduction of more than 60 percent of the MAR in LANL’s PF-4 since 2009. Facility limits to MAR are established taking into consideration operational needs and the radiation dose that a member of the public would receive from the worst-case hypothetical accident using the conservative analytical methodologies prescribed in the governing Department of Energy (DOE) requirements.

MAR reduction within PF-4 has been achieved using multiple, concurrent strategies including the shipment of radiological nuclear material off-site, disposing of legacy plutonium residues, storage of plutonium materials in robust, certified containers and storage of nuclear material in multiple means such as robust certified containers, the PF-4 vault, and fire-rated containers.

LANL regularly assess the handling and storage of nuclear material to provide a safe and secure environment for our employees, mindful of the “As Low as Reasonably Achievable” (or ALARA) principle, while simultaneously providing for enduring mission objectives compliant with approved safety bases.

In 2015, the Defense Nuclear Safety Board (DNFSB) issued a technical report (TECH-39) that summarizes further opportunities to reduce MAR in PF-4. Recent progress has focused on inventories located on the PF-4 main operating area, prioritizing nuclear material located outside of gloveboxes in containers in storage and high MAR locations inside of gloveboxes. In the last year, 168 kg of material-at-risk located outside of gloveboxes was placed in approved

storage locations or shipped offsite. High MAR areas, such as the heat source Pu-238 operations using safety-class containers for material storage inside of gloveboxes, providing both containment and significant MAR reduction of material potentially susceptible to unintended/accidental release. Some safety-class containers also prevent the MAR from being involved in the accident sequence.

MAR reduction activities at LANL require careful consideration and planning. Since packaging legacy plutonium inventories in more robust containers can generate a radiation dose to a plutonium worker, the pace of MAR reduction is influenced by our implementation of the ALARA principle, to keep radiation exposure as low as reasonably achievable. Further, progress in MAR reduction has been impacted by both the limited ability to generate and dispose of transuranic (TRU) waste due to the current unavailability of Area-G and Waste Isolation Pilot Project (over the last three years), the fact that our new Transuranic Waste Facility (TWF) is not yet in service, and ongoing efforts to resume all operations in PF-4 following the operational pause declared in 2013.

Although MAR varies with the programmatic workload, LANL Technical Area - 55 (TA-55) is required to remain below the MAR limits established in the Document Safety Analysis (DSA). These limits ensure safety, but minimizing MAR is a prudent objective to minimizing risk exposure. The considerations for reducing MAR are both related to the existing inventory and to potential future missions. For example, Los Alamos has been directed by Congress to establish the capability to make 30 War Reserve pits per year by 2026, and be able to demonstrate a capability of up to 80 pits per year around 2030.

While such a large increase in pit production will necessarily result in a net increase in MAR at the PF-4, NNSA and LANL are working to minimize the impact of such an increase. For example, one of the areas of concern for MAR during processing is with operations where the plutonium is in a molten metal state for significant durations. For these operations, the stands to the gloveboxes either have or are planned to be upgraded to meet more stringent seismic standards, such that the ability of the molten plutonium to affect the MAR is reduced; the MAR would not be released in a post-seismic event. In the longer term, modular additions to PF-4 have been proposed by Los Alamos as a means to reduce the operational risk profile and expand programmatic operations with several different configurations and are being evaluated as part of an analysis of alternatives.

PF-4 Safety Systems

I would like to talk for a moment now about NNSA's strategy to ensure the efficacy of the PF-4's safety structures, systems, and components for current and future mission needs at LANL.

In addition to focused efforts to reduce MAR at PF-4, NNSA and LANL are making headway in addressing operational and infrastructure challenges at PF-4.

Early this year, the Board closed Recommendation 2009-2, *LANL Plutonium Facility Seismic Safety*, as the DOE has made, and continues to make, upgrades to improve PF-4's ability to withstand the evaluation-basis seismic hazard.

Analysis from NNSA and LANL shows that the facility was safe prior to the DNFSB Recommendation and upgrades. For example, the seismic hazards analysis in the approved DSA showed that the deflection at the roof of the PF-4 during a design basis earthquake and the building remained in a safe condition. There were components within the building that needed strengthening and that work was completed – as a priority - in 13 months – and each year additional components have been strengthened. NNSA and LANL maintain the safety basis for PF-4 with appropriate controls, to assure adequate protection of the public, workers and environment.

As a result of the DNFSB Recommendation 2009-2, we made a number of additional seismic improvements to the PF-4. The facilities' ability to withstand a postulated seismic event now exceeds DOE's requirements for existing buildings.

The Board indicated in its January 3, 2017 letter closing Recommendation 2009-2 that questions remain regarding the suitability of the PF-4 for long term operations. NNSA recognizes the need to look ahead and maintain safe operations of the Plutonium Facility to ensure reasonable assurance of adequate protection for the worker, public, and environment. NNSA has overseen more than 90 seismic upgrades to structural components and safety systems. Each of these upgrades enhances the overall safety posture of the facility. The current safety basis reflects a complete analysis of all operations that could be affected by a seismic event.

I would also observe that the PF-4 ventilation system is robust, reliable, and has redundancy; however, it is aging. As part of the overall strategy to make safety improvements at the PF-4, we have completed several projects that enhance the operability of the ventilation system. These projects are documented in the TA-55 Project Execution Strategy from December 2016. They include structural upgrades, anchorage of electrical equipment to meet higher seismic loads, and anchorage of ductwork to meet these seismic loads. All FY17 scope identified in the Project Execution Strategy is funded and being executed. NNSA continues to work improvements as recapitalization modifications.

In summary, we continue to make design, operating, and facility improvements to maintain the Nation's only operational Plutonium Facility of this kind.

- Since 2009, there has been a 60% MAR reduction in the facility.
- Current operational restrictions exist which limit the amount of material in various operations.
- An approximate \$95M recapitalization project will conclude in 2018.
- We have invested \$5-15M/year since 2011 in building and structural seismic upgrades.

Thank you again for the opportunity to be here tonight, and I look forward to answering any questions you might have.