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DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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April 7, 2009

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

Dear Secretary Chu:

The Defense Nuclear Facilities Safety Board (Board) remains concerned that the safety-class vault water bath system at the Plutonium Facility at Los Alamos National Laboratory (LANL) is unable to fulfill its safety function in a reliable manner. This system is relied upon to protect the public by preventing one of the laboratory's highest consequence accident scenarios. Despite this critically important safety function, significant unresolved issues with this safety-class system are unaddressed, leaving it in an indeterminate and degraded state with respect to operability, reliability, and effectiveness—a situation that is unacceptable to the Board.

Many of the highest consequence accidents at LANL involve the processing, handling, and storage of plutonium-238 enriched heat source plutonium (HS-Pu). The vast majority of LANL's inventory of HS-Pu is stored in the Plutonium Facility's vault water baths, which are relied upon to dissipate heat generated by the intense radioactive decay of HS-Pu. This heat dissipation prevents about 200 non-safety-class containers—some of which have no reliable design information—from overpressurizing, failing, and releasing their contents. The unmitigated offsite consequences of an overpressurization event involving even a single container of HS-Pu amount to nearly 500 rem; the consequences of multiple failures are much higher.

In a letter to the National Nuclear Security Administration (NNSA) dated October 16, 2007, the Board identified deficiencies in a number of vital safety systems and urged both NNSA and the laboratory to take actions that would rapidly increase confidence in credited safety systems. In particular, inadequacies were identified in the safety basis associated with the safety-class vault water baths. The Board has determined that the safety function of the vault water baths has not been effectively defined, implemented, or protected. As a result, inadequate controls exist to make certain that vital water level and cooling are maintained to ensure that all of the non-safety-class HS-Pu containers will remain submerged and adequately cooled during all anticipated normal and abnormal conditions. In particular, a failure of the system cooling function for the vault water baths, which is not credited as a safety control, could allow the water in the baths to boil in as little as 18 hours, followed shortly by uncovering of the containers. Insufficient information exists to reliably predict how some of the containers would respond to such a loss of cooling.

Notwithstanding these facts, the existing LANL system surveillance required only a monthly verification of water level and a spot check that the non-safety-class containers were submerged. The Board has identified a number of other weaknesses related to the vault water baths that further challenge their ability to perform the required safety function. Based on recent interactions with the Board's staff, both LANL and the Los Alamos Site Office have acknowledged the existence of these issues, however, it is not clear that proposed near-term actions will resolve the issues in an acceptable manner.

The Board is deeply concerned by this lack of progress in addressing deficiencies with the safety-class vault water baths to ensure that this critical system can perform as a reliable and effective control. The Board notes that an assessment of the vault water baths performed by LANL in 2008 failed to identify any of the issues outlined in this letter. This calls into question the laboratory's ability to conduct credible assessments of system safety functions. Based on the severity and persistence of these issues, as well as other safety system deficiencies identified in the Board's October 16, 2007 letter, the Board believes emphasis must be placed on improving the ability to identify and expeditiously address operability issues associated with the vault water baths and other vital safety systems at LANL.

Therefore, pursuant to 42 U.S.C. § 2286b(d), the Board requests a report and briefing within 45 days of receipt of this letter describing (1) any compensatory measures and immediate actions NNSA has taken to improve the safety posture of non-safety-class HS-Pu containers stored in the vault water baths, and (2) the strategy for fully characterizing and correcting vault water bath deficiencies identified by the Board or for improving the robustness of HS-Pu containerization. Additionally, the Board requests a briefing within 60 days of receipt of this letter describing the plan of action, including milestones and completion dates, to improve the process used to identify and resolve operability issues related to other vital safety systems at LANL.

Sincerely,

A handwritten signature in black ink, appearing to read "A. J. Eggenberger". The signature is fluid and cursive, with the first name "A. J." being more distinct than the last name "Eggenberger".

A. J. Eggenberger
Chairman

c: The Honorable Thomas P. D'Agostino
Mr. Donald L. Winchell, Jr.
Mr. Mark B. Whitaker, Jr.