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Mello Aff #1, par 17: http://www.dnfsb.gov/pub_docs/staff_issue_reports/lanl/sir_20080530_la.pdf

May 30, 2008

The Honorable Thomas P. D'Agostino
Administrator
National Nuclear Security Administration
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-0701

Dear Mr. D'Agostino:

The Defense Nuclear Facilities Safety Board (Board) understands the vital role that the National Nuclear Security Administration (NNSA) has envisioned for the Plutonium Facility and the Chemistry and Metallurgy Research Replacement (CMRR) facility at Los Alamos National Laboratory. These facilities will likely provide much of the nation's enduring capacity for research, development, and manufacturing involving plutonium and other actinide materials. As a result, two of the Board's priorities are to ensure the development of a high-quality safety basis for the Plutonium Facility and a safe design for the CMRR. The Board's staff recently reviewed both of these efforts. The staff's observations are detailed in the attached reports, which include areas that could benefit from additional examination

The Board was encouraged that NNSA's review of the September 2007 Documented Safety Analysis for the Plutonium Facility largely identified the core deficiencies of the submission, and charted a course for an improved safety basis in the near term that explicitly identified necessary improvements for the future. In the first report, the Board's staff noted several issues and weaknesses that were not fully captured by NNSA's comments and warrant attention. These weaknesses dealt with hazards analysis, controls, software quality assurance, leak path factor calculations, and the criticality safety program. The Board reminds NNSA that the Plutonium Facility continues to operate using a safety basis that was approved more than a decade ago.

The CMRR project is discussed in the second attached report. The Board is encouraged that NNSA plans to complete a technical Independent Project Review before proceeding to the final design stage. This review should provide additional confidence in the nuclear safety strategy employed and the design adequacy of safety-related systems. The Los Alamos Site Office's review of the draft Preliminary Documented Safety Analysis is also important, particularly in addressing significant previously identified shortcomings.

plenums (gloveboxes and laboratory/room areas, respectively), along with three 50 percent capacity sets of fans that are powered from three different electrical buses. Each electrical bus is connected to the two offsite power sources and the two onsite emergency diesel generators. Zone 1 and 2 portions of the ventilation system and their support systems are designed to be operational after a PC-3 seismic event.

Project-specific analyses indicate that operation of one exhaust fan for Zone 1, one exhaust fan for Zone 2, and one supply fan for Zone 2 would be adequate to maintain a cascading flow and negative pressure with respect to the atmosphere during a fire event (with one door left open for emergency response activities). To protect the HEPA filters during a fire, the current design includes a deluge system and demisters, as well as a temperature sensor in the ductwork prior to the deluge spray that would shut down active ventilation on activation. The Board's staff expressed concern about the shutdown of active ventilation during a fire as a result of this temperature sensor. The staff will review the control logic and conditions under which the active confinement ventilation system would maintain negative pressure during a fire.

Preliminary Structural Design. The Board's staff received an overview of the current structural layout of CMRR. NNSA has mandated that the laboratories of the nuclear facility have a flexible, open floor plan to accommodate as-yet unknown future missions. This "hotel concept" prevents the addition of shear walls through the laboratory wings and has resulted in major seismic design challenges. Project personnel had been using a preliminary estimate of seismic motions for the facility until Los Alamos National Laboratory (LANL) completed its update of the probabilistic seismic hazards analysis; however, they did not anticipate that the final seismic motions, particularly vertical motions, would be in resonance with various sections of the nuclear facility. The laboratory portion of the nuclear facility has been most problematic, with the fundamental frequency for the floor and ceiling matching that of the input seismic motions.

The "hotel concept" has generated seismic amplifications in the CMRR facility; it is not clear whether the facility and equipment can be designed to accommodate such demands. To reduce the vertical seismic amplifications in the CMRR structure, the facility design was altered to thicken the basemat and slabs of structure. Few walls have been added in an effort to avoid disrupting the "hotel concept" or the systems layout. This change (stiffening of the structure) responds to recommendations of LANL's structural/seismic parametric studies.

Additionally, the project currently lacks a Structural Acceptance Criteria document to guide in the design of the facility; the Board's staff believes such a document is important for a successful design and encouraged the design team to develop one. As discussed above, project personnel noted that Sargent & Lundy are in the process of preparing a document on the structural analysis approach that may address some of the issues raised by the Board's staff. The staff does not yet have a clear understanding of the structural behavior of the nuclear facility and plans to perform a detailed review of this matter in the near future.