DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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August 26, 2009

Gerald L. Talbot, Jr.
Assistant Deputy Administrator for
Nuclear Safety and Operations
National Nuclear Security Administration
1000 Independence Avenue, SW
Washington, DC 20585-0701

Dear Mr. Talbot:

Pursuant to the certification mandate provided in Section 3112 of the Duncan Hunter National Defense Authorization Act for Fiscal Year 2009, the Defense Nuclear Facilities Safety Board's (Board) staff responsible for certification activities has reviewed design data for the Chemistry and Metallurgy Research Replacement (CMRR) Project provided to date by the National Nuclear Security Administration (NNSA). The Board's staff is focusing its review on topics previously raised regarding the nuclear safety strategy for CMRR, the Preliminary Documented Safety Analysis, and design of safety-class and safety-significant systems. Those topics were provided electronically to NNSA on November 20, 2008. The staff has documented specific technical issues on a Findings Form. For purposes of the certification review, the staff considers a Finding a design topic related to an issue raised by the staff regarding the CMRR design that has not been adequately resolved and that could preclude certification by the Board.

Finding 4, PDSA and Safety Strategy--Inadequate Identification of Safety-Related Controls, Functional Requirements, and Performance Criteria, was transmitted to your office on March 16, 2009. NNSA provided an initial response to Finding 4 on April 21, 2009, and a final response on August 14, 2009. The Board's staff has evaluated the NNSA response and has determined that Finding 4 can be considered closed. Enclosed is the completed Finding Form that includes the Board's Final Resolution to Finding 4. Should you have any questions regarding this matter, please contact me at (202) 694-7128.

Sincerely,

Roy E. Kasdorf
Nuclear Facility Design and
Infrastructure Group Lead

Enclosure

c: Mr. Mike Thompson
Mr. James McConnell
Mr. Patrick Rhoads
Mr. Herman LeDoux
Mr. Mark B. Whitaker, Jr.

Board Findings

Chemistry and Metallurgy Research Replacement Facility: Congressional Certification Review

Topic: PDSA and Safety Strategy

Finding Title: Inadequate Identification of Safety-related Controls, Functional Requirements, and Performance Criteria

Finding:

The Hazard Analysis (HA) section of the Preliminary Documented Safety Analysis (PDSA) is to identify the spectrum of hazards potentially posed by the operations, and identify an adequate set of controls to protect the public and the workers. This HA has been documented in Appendix 3B of the PDSA. It appears to be relatively comprehensive for this stage of the PDSA (the project has made a commitment to perform a process HA for the next revision of the PDSA). Appendix 3B highlights (in blue) the "safety-related" controls that are needed to protect the public or the workers from significant consequences.

Section 3.4 of the PDSA quantitatively evaluates the unmitigated consequences of major accidents from the HA, and identifies the "safety-class" (SC) controls for events potentially exceeding 5 rem Total Effective Dose Equivalent (TEDE) at the site boundary. The quantitative analysis should also evaluate the unmitigated consequences to the Collocated Workers (CLW) at 100 meters for comparison with the DOE criterion. This evaluation is not presented in this PDSA (the project has committed to provide that information in the next revision to the PDSA). Chapter 4 of the PDSA collectively lists all the safety-related controls (i.e., safety-significant (SS) structure, systems, and components (SSC) from Appendix 3B and safety-class SSCs from Section 3.4), and identifies functional requirements (FR) and performance criteria to ensure that the controls meet their intended functions.

The following deficiencies have been identified (the Attachment to this Finding provides examples for demonstration purposes only, and by no means is expected to be an all inclusive list: Note attachment provided on March 16, 2009):

(1) The set of safety-class and safety-significant controls identified in the PDSA have not been demonstrated that they will ensure adequate protection of the public and the workers.
(2) The functional requirements and performance criteria identified for safety-related controls in Chapter 4 of the PDSA do not support the credit given to them in the Chapter 3 analysis.

Basis for Finding:

10 CFR 830, 202(b): "(4) Prepare a documented safety analysis for the facility; and (5) Establish the hazard controls upon which the contractor will rely to ensure adequate protection of workers, the public, and the environment."

10 CFR 830, 204(b)(4): "Derive the hazard controls necessary to ensure adequate protection..., demonstrate the adequacy of these controls to eliminate, limit, or mitigate identified hazards."

10 CFR 830, G.3: "Safety structures, systems, and component require formal definition of minimum acceptable performance in the documented safety analysis...by first defining a safety function...then placing functional requirements."

DOE O 420.1B, 3.a.(1): "(a) Safety analyses must be used to establish the identity and function of safety class and safety significant SSCs, and (b) the significance to safety of functions performed by safety class and safety significant SSCs."

Suggested Resolution or Path Forward:

- **Pre-certification:** The project must (1) submit a process plan for addressing the PDSA deficiencies, and (2) prepare a document that briefly, but thoroughly and comprehensively, describes all safety-class and safety-significant controls and their support systems that envelope the identified events in the PDSA, including its Appendix 3B. This document should also identify the functional requirements for all those SSCs, along with their performance categorization, to ensure appropriate credit can be given to them in the hazard or accident analysis. This document should be placed in a configuration control system as this document will be part of the Board's certification.

  The process plan should include commitment to:

  - Revise Chapter 2 to describe safety-related SSCs and their support systems as portrayed in the SDDs and credited in the PDSA.
  - Revise Chapter 3 to include the process HA and CLW dose calculations, identify any new controls from these analyses, and implement/incorporate Board specific comments.
  - Revise Chapter 4 to capture all SS and SC controls from Chapter 3 and Appendix 3B including their support SSCs, and clearly identify the FR for all those SSCs along with their performance categorization to demonstrate the credit given to them in the hazard and accident analyses.
- **Post-certification:** Within 6 months of the certification, the PDSA must be revised to (1) address the identified deficiencies, (2) implement the results of the Process hazards analysis, (3) evaluate unmitigated dose consequences to the collocated workers, (4) incorporate the above list, as well as any new safety-related SSCs from the process HA and the CLW dose calculations, and their corresponding performance criteria and system evaluations, and (5) notification of any deviation from the above document of safety SSCs.

NNSA Response: An Initial NNSA response was provided on April 21, 2009, and a final response was provided on August 14, 2009. The final NNSA response attaches a letter from the Los Alamos Site Office providing supplemental responses from the CMRR Project to each of the Board's issues identified in the path forward. Technical information provided by the CMRR Project was forwarded electronically to the Board separately.

DNFSB Final Resolution: CMRR Project personnel developed a plan for addressing the deficiencies identified by the Board. The plan would systematically and comprehensively identify the credited controls in the hazard analysis, including the functional requirements for those controls, in a table that will be used to prepare the next revision of the PDSA. The Board reviewed this approach and found it acceptable.

Subsequently, project personnel performed the activities committed to and completed its review of all the potential hazards. Project personnel identified the controls that were credited for protection of the public and workers; correlated the controls with its safety functions; identified the functional requirements for those controls consistent with its credited safety functions; and documented the results in a new set of tables for review by the Board. New safety-related controls were also identified for several events of concern to the Board.

The Board's staff reviewed the new set of tables and provided detailed comments on July 7, 24, and 30, 2009. The project addressed each of these comments by email, committing to modify the tables as needed. The Board's staff comment on the operations center was not addressed, pending discussion with NNSA and LANL management. The Board's staff agrees that resolution of this comment can be deferred to after CMRR Certification; but the personnel in the Operations Center must be adequately appropriately protected from hazards including hazards from adjacent facilities.

Given the above, the Board's staff concludes that a complete set of safety-class and safety-significant controls was identified that will prevent or mitigate all the hazards identified in the hazard evaluation. The Board's staff found this set of safety-related controls to be comprehensive and the identified functional requirements to be adequate for final design of those safety-related controls.

These actions result in Finding 4 being closed.

DNFSB: Roy G. Kasdorf 8/25/09 Roy Kasdorf Date	NNSA: NNSA Response Signed by Gerald L. Talbot, Jr. NA-17 Date: August 14, 2009