Department of Energy
National Nuclear Security Administration
Washington, DC 20585

May 6, 2008

The Honorable A. J. Eggenberger
Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, NW, Suite 700
Washington, D.C. 20004-2901

Dear Mr. Chairman:

This is in response to your letter to me dated March 5, 2008. I appreciate the Defense Nuclear Facilities Safety Board's (DNFSB) comments regarding the Radioactive Liquid Waste Treatment Facility (RLWTF) Upgrade Project at Los Alamos National Laboratory (LANL). I am committed to the development of a more robust preliminary design and safety basis for this project, and I intend to use your recent review to help guide the needed improvements. I will also be relying on the resolution of comments from the integrated project teams (IPT) on the preliminary design to correct and improve the preliminary design for the project. Over half of the issues raised in the report enclosed with your letter were previously identified by the Los Alamos Site Office (LASO) and LANL IPTs.

Your letter noted that the integration of safety with design is weak for the RLWTF Upgrade Project. During the revised Preliminary Design for this project, expected to be completed in Fiscal Year 2008, a gap analysis will be performed between the recently approved DOE-STD-1189, *Integration of Safety into the Design Process,* and current project plans. The results of this gap analysis will be used to determine which portions of DOE-STD-1189 will be adopted for the project. In addition, appropriate LANL procedures will be revised to address: 1) change control of design inputs during the design life cycle of a project; and 2) traceability of functional and operational requirements and design criteria to approved design documents. The proper application of these new requirements to the RLWTF Upgrade Project will be validated through the design review process, as well as LANL and NNSA Readiness to Execute Reviews and the DOE External Independent Review.

Your second major item of concern is that Federal oversight of the project through the IPT is weak. LASO recently created two new job positions for subject matter experts (SMEs) that, when filled, will be assigned to the Project Management Team as IPT members for the RLWTF Upgrade Project. One will be assigned to focus on commissioning, startup, and transition to operations for the project and the other will be dedicated to safety system oversight for design activities. In addition, LASO is providing immediate additional support to the RLWTF Upgrade Project Federal Project Director (FPD) by assigning two LASO FPDs on a part-time basis, with one providing oversight of the integration of safety in design, and the other providing oversight of the Zero Liquid Discharge Subproject and development and implementation of NQA-1, *Quality Assurance Requirements for Nuclear Facility Applications*. Also, LASO will revise the Monthly Project

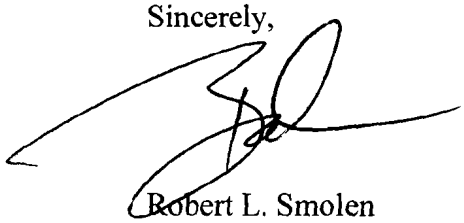
Watchlist process to include IPT member participation and strengthen senior management attention. I have directed Jim McConnell from the Office of Nuclear Safety and Operations to provide technical support to LASO as needed to strengthen Federal oversight of the revised preliminary design and corresponding safety basis.

Regarding the seismic design requirements for the RLWTF Upgrade Project, a preliminary Natural Phenomena Hazard (NPH) Performance Category (PC) of PC-2 has been determined for the project. This determination was made in accordance with the requirements of DOE Order 420.1B, *Facility Safety,* its implementation guides, and the accompanying DOE-STD-1021, *Natural Phenomena Hazards Performance Categorization Guidelines for Structures, Systems, and Components.* The NPH Performance Category for the project and safety structures, systems, and components will be revalidated during the revised Preliminary Design.

LASO and LANL reviewed the issues in the enclosure to your letter to identify the direct and contributing factors that led to the issues and identified actions to correct these factors. The enclosure to this letter describes further actions that LASO and LANL will take to address the root causes of the issues. Following the completion of the revised Preliminary Design for the RLWTF Upgrade Project, a report will be issued that will document lessons learned to be applied to other design and construction projects at LANL. Several of the actions in the enclosure are broadly applicable to design and construction projects at LANL.

I value the DNFSB's ongoing participation in the review of the RLWTF Upgrade Project. As requested in your letter, a briefing on the issues associated with the RLWTF Upgrade Project will be scheduled shortly. If you have any questions, please contact me or Mr. Donald Winchell, Jr., the LASO Revitalization Manager.

Sincerely,



Robert L. Smolen
Deputy Administrator
for Defense Programs

Enclosure

cc: Mr. Donald L. Winchell, Jr., LASO
Mr. Mark B. Whitaker, Jr., HS-1.1

UNITED STATES GOVERNMENT DEPARTMENT OF ENERGY

National Nuclear Security Administration
Los Alamos Site Office
Los Alamos, New Mexico 87544

memorandum

DATE: APR 30 2008
REPLY TO ATTN OF: NSM:3ET-002
SUBJECT: Response to Defense Nuclear Safety Facility Board (DNFSB) letter dated March 5, 2008 – Radioactive Liquid Waste Treatment Facility (RLWTF), Los Alamos National Laboratory (LANL)

TO: Gerald Talbot, Assistant Deputy Administrator for Nuclear Safety Operations, NA-10, HQ/FORS

This memorandum transmits the Los Alamos Site Office (LASO) draft response to the March 5, 2008 letter from the DNFSB regarding the RLWTF project at LANL.

The attached RLWTF response document has been prepared in coordination with LANL and addresses project specific and institutional issues identified in the DNFSB Staff Issue Report. Response format includes a statement of the finding, identification of the issues, and a statement of response to the finding/issues. As part of the response statement, timelines for completion of any actions are addressed through identification of milestones. LASO and LANL concur with the DNFSB Staff findings with the exception of concerns related to hazard analysis techniques. LASO and LANL believe that the current techniques for hazards analysis employed on RLWTF are compliant with DOE Orders/Standards consistent with the level of complexity for this facility.

In addition to the attached project-specific responses to DNSFB issues, the following efforts are underway by LASO to address historical project management performance issues, root causes, and incorporation of lessons learned into other projects:

- Continual development and maintenance of LASO Federal Project Management Oversight, Qualifications and Capabilities. The Federal Project Director for RLWTF, Eric Trujillo, is certified through the Project Management Career Development Program at Level II, consistent with the current CD-1 approved cost range for the project. Mr. Trujillo is nearing completion of requirements for PMCDP Certification at Level III.

- Continuous enhancement/improvement of Integrated Project Teams (IPTs), to include sponsoring programs/owners, operations, and safety. LASO is adding addition staff positions in the functional areas of project controls, safety system oversight, and startup/readiness that will provide additional capabilities in support of IPTs for RLWTF as well as other nuclear projects at LANL.

- Strengthening LANL performance and accountability through the M&O contract specifically in project management. LASO has implemented Performance Based Incentives specific to RLWTF and the Chemistry and

Metallurgy Research Building Replacement (CMRR) project. LASO will continue to implement PBIs for specific nuclear projects such as RLWTF in future LANL Performance Evaluation Plans.

- Continuous improvement of integration of safety in nuclear facility projects at LANL. LASO has initiated actions for incorporation of Standard 1189 in the LANL M&O contact for which implantation will be expected for RLWTF and other nuclear facility related projects at LANL. The RLWTF project team is also interfacing with the CMRR project team to identify and implement consistent approaches for demonstrating integration of safety with design. Furthermore, development of Nuclear Safety Strategies for nuclear projects and development and implementation of both design and safety basis Review Plans will support validation of safety basis and design integration.

- Continued use of Integrated Nuclear Planning Workshops to build consensus understanding and buy-in to approach and strategies for nuclear facility related projects. This process has proven effective for CMRR in maintaining routine dialogue and interactions with both CDNS and DNFSB elements regarding development of design and safety basis documentation and will be utilized for RLWTF and other nuclear projects.

The contributing factors related to project management deficiencies at LANL referenced by the DNSFB have been documented in previous reviews. Fundamental issues of strengthening IPT/federal oversight, incorporation of lessons learned (such as CMRR experience) and improving ability to demonstrate effective integration of safety with design are objectives of the efforts described above. LASO will ensure that LANL evaluates each individual finding as part of their Contractor Assurance System (CAS) and LASO will utilize internal issues management processes to track closure of federal oversight related issues.

Many of the issues identified in the DNFSB report were self-identified by LASO and the RLWTF project team as discussed during the staff visit conducted in December 2007. Eric Trujillo, Federal Project Director has established and will maintain routine communications and dialogue with NNSA Headquarters and DNFSB Staffs and is the LASO Point of Contact for this effort, Mr. Trujillo can be reached at (505) 665-5914.

Donald L. Winchell, Jr.
Manager

Attachments

cc: see page 3

cc/attachments:
M. Thompson, NA-17, HQ/FORS
J. McConnell, CDNS, HQ/FORS
P. Rhoads, NA-172, HQ/FORS
S. Jaghoory, NA-112, HQ/GTN
O. Taylor, NA-172, HQ/FORS
E. Trujillo, NSM, LASO
M. Weber, NSM, LASO
J. Leeman, PADWP, LANL, MS-A107
L. Goen, PADWP, LANL, MS-A107
K. Orr, ADPMGT, MS-P137
ADEP File, LANL, MS-J591
LASO Records Center

DOE Los Alamos Site Office/Los Alamos National Laboratory Responses
To
Defense Nuclear Facility Safety Board Letter (March 5, 2008)

1. Topic: Project Management

Comment: The Federal Integrated Project Team (IPT) is staffed by personnel from the Los Alamos Site Office (LASO), the NNSA Service Center, and NNSA Headquarters.

Issues:

a. Although the appropriate project management and technical disciplines are represented, the team does not appear to be well integrated or providing effective oversight to ensure the early integration of safety into the design process.
b. The IPT does not meet on a regular basis, and few team members are able to commit sufficient time to the project.
c. The team's involvement is typically limited to isolated document reviews at critical milestones, instead of a comprehensive and routine involvement in the design process.
d. The federal project director and his deputy are the only team members who support the project with greater than half of their time.

Response/Resolution/Actions:

- LASO Management Procedure 04.01 rev 1 for Integrated Project Teams is being updated to reflect organizational changes within LASO and further strengthen roles, responsibilities and expectations for IPT Members.

- The RLWTF IPT assignment memorandum is being updated to include clarification of expectations from each member in their functional area. This information will feed into the update to the Project Execution Plan under development in support of preparation for Critical Decision 2.

- LASO has two job postings for subject matter experts (SMEs) within the Office of Safety Oversight that will support the Office of National Security Missions (NSM), Project Management Team as IPT members on this project. One SME will focus on commissioning, startup and transition to operations in support of project activities, and the other SME is dedicated to safety system oversight for design activities. These additional SMEs, once hired, will be formally assigned to the RLWTF IPT to augment support to the FPD for these critical oversight areas.

- LASO will further strengthen senior management attention through the monthly project watch list process by direct involvement with the projects. Further more LASO will revise the Monthly Project Watchlist process to include mandatory IPT member participation.

- Following the approach being implemented on the Chemistry and Metallurgy Research Building Replacement at LANL, LASO has worked with NNSA program and CFO elements to incorporate additional funding in FY08 –FY10 Construction Project Data Sheets to provide budget resources needed to obtain independent SME technical review support for the balance of nuclear projects at LANL, including RLTWF. This independent SME support would be used to support cost estimating, design, and validation of safety-design integration.

- LASO National Security Mission (NSM) is augmenting the current RLWTF FPD with additional LASO FPDs to support RLTWF as follows:

    - One additional LASO FPD assigned to assist the RLWTF FPD with oversight of safety integration into design.

    - One additional LASO FPD assigned to assist with oversight of the ZLD subproject and assist in oversight of development and implementation of the NQA-1 Quality Program.

2. Topic: Weakness in the Design Process

Comment: *Technical Bases for Material Selection*: The material selected for the process tanks and piping, which serves as the primary confinement boundaries for the radioactive waste and hazardous chemicals, is reinforced thermoset plastic (RTP). Several critical design aspects of the use of RTP have not been fully considered.

Issues:

a. DOE Standard 1066-99, *Fire Protection Design Criteria*, states that combustible materials should not be used for process system confinement barriers. The RTP material specified for safety-significant process vessels and piping is Derakane, which may be combustible depending on the resin selected.

b. The impact of a facility fire on the confinement function of RTP components has not been evaluated. This information needs to be incorporated into the performance criteria for the safety-significant

fire suppression system, which is credited to prevent dispersal of radioactive material and hazardous chemicals during a facility fire.

c. The use of RTP material in a radiation environment during the 30-year design life of the equipment has not been evaluated. A paucity of data exists regarding this material's behavior when exposed to radiation.

d. No formal reviews have been performed to compare the guidance in DOE Guide 420.1-1, *Nonreactor Nuclear Safety Design Criteria and Explosive Safety Criteria Guide for Use with DOE O 420.1, Facility Safety* with the design standard adopted by the architect-engineer for safety significant RTP equipment-American Society of Mechanical Engineers (ASME) standard RTP-1, *Reinforced Thermoset Plastic Corrosion Resistant Equipment.*

Response/Resolution/Actions:

- During the Enhanced Preliminary Design, the RLWTF Project Team will review the historical precedent set in the current RLWTF for the use of fiberglass reinforced plastic (FRP) processing tanks and evaluate material selection for the process tanks and piping in regard to the combustibility and degradation. The Team will also evaluate material selection for the safety-significant process vessels and piping to ensure there is no impact from a facility fire. If there is a recommendation to select a material different than those materials specified in DOE Guide 420.1-1, Table 5.3, or DOE STD 1066-99, a position paper will be developed to document equivalency. The position paper will be reviewed and, if acceptable, approved at the proper authority level. The material selection including the design basis will be included in the Enhanced Preliminary Design Report.

- LASO is coordinating technical support from the NNSA Office of Chief, Defense Nuclear Safety to assist with determining the combustibility and degradation of fiberglass tanks and piping in a radioactive environment.

Comment: *Seismic Design Requirements*: Several structures, systems, and components (SSCs), including process equipment, the fire suppression system, and the treatment building structure, are credited to perform safety significant functions during and after a seismic event. These SSCs are designed to Performance Category (PC)-2 design criteria in accordance with DOE-STD-1021, *Natural Phenomena Hazards Performance Categorization Guidelines for Structures, Systems, and Components.* However DOE G 420.1-2, *Guide for Mitigation of Natural Phenomena Hazards for DOE Nuclear Facilities and Non-Nuclear Facilities*, contains guidance which states that when a safety analysis determines that a local confinement of high hazard material is required for worker safety a PC-3 designation may be appropriate.

Issues:

a. Given the need to ensure controls can reliably perform their safety function in all credited operating environments, the staff emphasized that PC-2 design criteria may not be adequate to ensure functionality during and after a seismic event.

b. Safety analysis should be performed to determine that a local confinement of high hazard material is required for worker safety.

c. The water supply supporting the fire suppression system is not safety-related or seismically designed.

Response/Resolution/Actions:

- A preliminary Natural Phenomena Hazard (HPH) Performance Category (PC) of PC-2 has been determined for the RLWTF upgrades project. This determination was made in accordance with the requirements of DOE Order 420.1B, its implementation guides, the accompanying DOE standard DOE_STD-1021-93. The Natural Phenomena Hazard (HPH) Performance Category will be revalidated during enhanced preliminary design.

- During the Enhanced Preliminary Design, the RLWTF Project Team will re-evaluate and clarify the functionality of SSCs during and following the design seismic event. The desired end states for safety-related SSCs following a seismic event will be defined based on the DOE STD 1020-2002 graded approach philosophy. The motivation for the graded approach in DOE STD 1020-2002 is that it enables the design or evaluation of DOE structures, systems, and components to be performed in a manner consistent with their importance to safety, importance to mission, and cost.

  In addition, Section 6.1.4 of DOE G 420.1-2 states: "PC-3 SSCs are those for which failure to perform their safety function could pose a potential hazard to public health, safety, and the environment because radioactive or toxic materials are present and could be released from the facility as a result of that failure. PC-3 SSCs would present or mitigate criticality accidents, chemical explosions, and events with the potential to release hazardous materials outside the facility. Design considerations for these categories are to limit facility damage as a result of design basis natural phenomena events so that hazardous materials can be controlled and confined, occupants are protected, and the functioning of the facility is not interrupted. When safety analyses determine that local confinement of high-hazard materials is required for worker safety PC-3 designation may be appropriate for the SSCs involved..."

- As part of Enhanced Preliminary Design, development of acceptable design criteria will accomplished commensurate with the required level of performance. The design criteria required to achieve the desired end states for safety-related SSCs may be require localized hardening (PC-3 designation) for the SSCs involved.

- LASO/LANL concurs that the water supplying piping will not meet PC-2 requirements in a seismic event. During the Enhanced Preliminary Design several options for using a safety-related water tower or having a water storage tank with pumps will be investigated.

- The Enhanced Preliminary Design review will be further strengthened by the expanded Federal IPT.

Comment: *Active Confinement Ventilation System* – The facility design includes an active confinement ventilation system, but it is not credited as safety-related in the draft Preliminary Documented Safety Analysis (PDSA).

Issues:

- NNSA has proposed excluding RLWTF from further evaluation under DOE's Implementation Plan for Board recommendation 2004-2 using the categorical exclusion criteria provided for existing buried or in-ground waste tanks and waste transfer line sections. The staff believes that this exclusion criterion does not apply to RLWTF.

- The design of the active confinement ventilation system for this facility should meet DOE expectations and performance criteria provided in *Ventilation System Evaluation Guidance for Safety-Related and Non-Safety-Related Systems.*

Discussion: LASO provided an updated 2004-2 exclusion report to NNSA HQ (NA-17) in October 2007 that proposed excluding the new RLWTF from performing a confinement ventilation evaluation. The decision to exclude the RLWTF from performing a 2004-2 confinement ventilation evaluation was based on the initial classification of the active ventilation system as not safety related. This initial classification was based on the fact that primary containment of the radioactive waste was provided by the waste tanks and on the form of the radioactive material (liquid and/or sludge). Since there was not a specific exclusion criteria for this type of confinement (waste treatment facility primarily consisting of tanks, and the ventilation system was not credited in the safety basis) in the guidance document for a confinement exclusion (CE), the Acting LASO Technical Deputy Manager proposed using the exclusion criteria for existing buried or in ground waste tanks that most closely related to configuration of the RLWTF in the submittal to NNSA HQ. After the DNFSB staff visit, NNSA HQ had discussions with LASO during consolidation and review of all the NNSA site office status updates for recommendation 2004-2. Based on the fact that the

RLWTF did not clearly meet the proposed exclusion criteria since it was not "buried in ground" tanks, and the understanding that there was potential benefit in performing the evaluation and validating the design met the non safety related performance criteria in table 5.1 of the DOE guidance, LASO agreed to perform the 2004-2 Confinement Ventilation Evaluation (CVE) for the RLWTF.

Response/Resolution/Actions:

- NNSA (NA-17) has removed the RLWTF from the NNSA revised 2004-2 exclusion report.

- LASO will work with LANL to ensure that the RLWTF CVE is funded and incorporated into the project schedule to be completed prior to CD-2 and final design.

- LASO will monitor LANL implementation of recently approved STD 1189 (Integration of Safety into Design) to ensure that internal LANL design reviews include a review of the design of any confinement ventilation system, regardless of its classification, using the criteria in table 5.1 of the DNSFB recommendation 2004-2 CVE guidance.

Comment: *Configuration Management* – The staff noted weaknesses regarding the configuration management of project design requirements. Requirements are scattered among a variety of design documents making the tracking and design verification processes onerous for the design authority.

Response/Resolution/Actions:

- LASO is in the process of providing authorization to LANL for development of a Requirements Tracking Database for the RLWTF Project as part of Enhanced Preliminary Design. The existing database used on the Chemical and Metallurgy Research Facility Replacement (CMRR) Project will be the starting point for developing the database for the RLWTF Upgrade Project.

- "PD 341, *Engineering Processes Manual,* Section 5.7 Configuration Management will be revised by LANL to address the change control of design inputs during the design life cycle of a project. All design inputs (including safety basis, fire protection, design life, etc.) are documented in Functional and Operational Requirements document and the Design Criteria document. AP-341-601, Functional and Operational Requirements will describe the process for developing, reviewing, approving, revising, and tracking implementation of the functional and operational requirements and AP-341-602, Design Criteria will describe the process for developing, reviewing, approving, revising, and tracking implementation of the design criteria. These documents will require that each functional and operational requirement and design criteria be

traceable to the appropriate approved design documents. The revision of PD341, AP-341-601 and AP-341-602 are scheduled for issue by September 30. 2008."

- The F&OR,FDD, and SDD will be revised and updated during Enhanced Preliminary Design and the Final Design to ensure flow down of requirements, traceability through the design documents, and through integration of safety into design. Furthermore, the F&OR, FDD, and the SDD will be validated through the design review process, LANL's ready to execute review and the DOE External Independent Review.

3. Topic: Safety Basis Development

Comment: *Safety Basis Development* - The staff reviewed the process and products relating to the development of the safety basis and observed several significant weaknesses with the hazards analysis technique, evaluation of worker consequences, and management of key safety basis assumptions.

Issues:

a. Hazards Analysis Technique – The LANL hazards and accident analysis procedure describes several acceptable techniques for analyzing hazards. Selection of a technique is based on the type and complexity of the process or activity being analyzed, along the with the facility's life-cycle stage. Omicron adopted a combination of the what-if and checklist techniques for the RLWTF hazards analysis, as commonly applied at other LANL facilities. Given the processes employed at RLWTF and the maturity of the preliminary design, the staff believes that a more robust and systematic technique may be appropriate to better integrate safety basis and design development processes.

b. Evaluation of Worker Consequences – The draft preliminary safety basis for RLWTF does not quantitatively evaluate radiological doses to collocated workers for use in the functional classification of controls. Although qualitative evaluation has historically supported safety basis development at LANL, quantitative evaluation is becoming standard practice across the complex. In 2006, DOE issued formal guidance directing Environmental Management projects to calculate doses to collocated workers to support classification of controls in the early stages of design. Furthermore, this practice will become a requirement as part of Appendix A of DOE STD 1189, *Integration of Safety into the Design Process.*

c. Inadequate Management of Safety Basis Assumptions – The staff noted deficiencies with the management of key assumptions in the

draft PDSA. Specifically, many assumptions are unprotected, are supported by weak technical bases, or drive design requirements that are not captured in preliminary design documents outside of the draft PDSA.

Response/Resolution/Actions:

- LASO/LANL recommends continued use of the current Hazard Analysis table format. The format of the Failure Modes and Effects Analysis table is contained within the format of the more robust Hazard Analysis (HA) table format. In addition to the standard FMEA table, the HA format contains a risk based assessment (for likelihood and consequence), and assesses both unmitigated and mitigated postulated scenarios to determine the adequacy of the proposed hazard controls and how important they are in terms of safety-class SSC, safety-significant SSC, or Important-To-Safety; finally, the assessment using the current HA table can determine whether or not additional controls may be necessary based on consequence or risk. The standard FMEA does not provide this level of detail.

- Hazards and Operability Analyses (HAZOP) are excellent tools for complex chemical facilities. Many variations exist. However, it is our position that the new RLWTF is not complex enough to justify using HAZOPs. HAZOPs work well for complex chemical facilities where the effects of chemical mixing or varying chemical concentrations are uncertain. The chemical processes for the new RLWTF are well known. HAZOPs do not lend themselves easily to be incorporated into a safety analysis.

- A GAP Analysis will be performed during Enhanced Preliminary Design to examine the potential impact of implementing the requirements specified in DOE STD 1189.

- Following NNSA direction, the RLWTF Project will implement DOE STD 1189, and the collocated worker will be included in the release assessment to assist in the determination of functional classification of controls.

- The RLWTF Project Team has developed an assumptions database for the RLWTF project subsequent to the DNFSB review in December 2007. The RLWTF Project Team (with the architect-engineer firm and their safety basis team) will hold bi-weekly meetings that in addition to discussing integration of safety into the design, will review design & safety basis assumptions as well as status of PDSA development.

- During the Enhanced Preliminary Design, the RLWTF Project Team will develop a Requirements Tracking Database. The existing database

used on the Chemical and Metallurgy Research Facility Replacement (CMRR) Project will be the starting point for developing the database for the RLWTF Upgrade Project.

- The LANL Safety Basis Division will review the Safety Basis Manual to ensure that the Lessons Learned from the RLWTF Upgrades Project have been adequately incorporated in the most recent version of the manual. If it is discovered that the Manual falls short of incorporating these Lessons Learned, revisions will be made to the Safety Basis Manual.