



Department of Energy
National Nuclear Security Administration
Washington, DC 20585



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DEFENSE NUCLEAR FACILITIES SAFETY BOARD

December 7, 2006

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:

I am writing this letter on behalf of Ambassador Brooks in response to your letter dated September 22, 2006. Your letter informed the Administrator that you remained concerned that the recently completed revision of the Criticality Experiments Facility (CEF) Project Preliminary Documented Safety Analysis (PDSA) did not address safety-related design issues that were brought to our attention in your letter dated March 27, 2006. In my response to your letter of March 27, 2006, I indicated that the Board's concerns would be addressed in the next revision of the PDSA.

I am pleased to inform you that most of the outstanding Safety Basis Review Team (SBRT) issues, and issues raised by the Board pertaining to CEF, have been satisfactorily dispositioned. Revision 3 of the PDSA was issued on November 13, 2006, for the SBRT final review and on December 4, 2006, the Nevada Site Office Manager approved the Safety Evaluation Report, with some Conditions of Approval (COA) on the few remaining design issues. A path forward for each COA has been agreed upon between the SBRT and the project team.

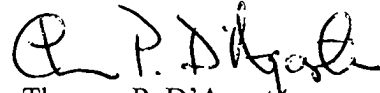
I will approve Critical Decision (CD)-3D in the near future to start modifications of the Device Assembly Facility Buildings where the CEF operations will be housed. Approval of CD-3D is necessary to support the project baseline completion date and is consistent with 10 CFR 830.206, which requires approval of the PDSA before the contractor can procure materials or components or begin construction.

The enclosure to this letter identifies the resolutions to each of the Board's concerns raised in your September 22, 2006, letter as well as an updated response to the Board's March 27, 2006, letter.



If you have any questions, please call me or have your staff call Ms. Deborah D. Monette of the Nevada Site Office at (702) 295-3128.

Sincerely,

A handwritten signature in black ink, appearing to read "T. P. D'Agostino". The signature is fluid and cursive, with the first letters of the first and last names being capitalized and prominent.

Thomas P. D'Agostino
Deputy Administrator
for Defense Programs

Enclosure

cc:

L. Brooks, NA-1

J. Norman, NSO

M. Whitaker, HS-1.1

Enclosure to the Letter from Thomas P. D'Agostino
Response to the Defense Nuclear Facilities Safety Board
Regarding

Letters dated March 27, 2006 and September 22, 2006, from
Chairman, A.J. Eggenberger to the Honorable Linton Brooks, Administrator NNSA



Design & Preliminary Documented Safety Analysis Issues
of the Criticality Experiments Facility (CEF) Project

November 2006

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| <p>Neither the PDSA nor the design criteria documents demonstrate how the fundamental design requirements of Department of Energy (DOE) Order 420.1 A, <i>Facility Safety</i>, such as multiple layers of protection for prevention or mitigation of unintended release, are fulfilled.</p> | <p>PDSA Revision 3 has been developed consistent with the Order 420.1A requirements and the current version demonstrates how all applicable requirements are met. Board members were briefed on the approach when visiting the Nevada Test Site in early October 2006.</p> <p>PDSA Revision 3 Section 3.3.2.3.2 summarizes significant aspects of defense in depth, and identifies associated SS-SSCs, TSR-level controls and other items needing TSR coverage including both the facility design and administrative features of defense in depth. These multiple layers consist of 1) Engineered controls, 2) TSR level controls, 3) Engineered Features Important to Safety, and 4) Administrative and Programmatic Rules.</p> <p>The individual features that comprise defense in depth are identified in the Process Hazard Analysis (PrHA) documented in Tables A-1 to A-5 in Appendix A.</p> |
| <p>The PDSA does not address the impact of an explosion in the facilities adjacent to DAF and the resulting ground acceleration on the critical experiment assemblies. This external hazard, as well as a seismic event, could have a severe impact on the support and stability of these assemblies.</p> | <p>The PDSA Revision 3 requires all four machines to be sufficiently anchored to meet PC-3 Seismic requirements. This is consistent with the DAF structure such that ground acceleration associated with an explosion in the adjoining buildings or the design basis earthquake will not result in materials on the critical assembly machines interacting with each other. The anchorage design, which is under development, will be based in-structure response at the mounting locations of the machines.</p> |
| <p>A fire suppression system has not been designed to prevent small incipient fires from spreading and resulting in a release from the facility. The revised PDSA discusses the alternatives for addressing</p> | <p>The CEF project has agreed to install a single interlocked pre-action fire suppression system in the assembly cells and general purpose bays. The PDSA Revision 3 reflects this decision. A Condition of Approval (COA) is</p> |

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| <p>this issue and recommends an INERGEN fire suppression system for compatibility with the criticality experiments; however, the design and implementation of such a system have not been determined despite the advanced stage of the project activities.</p> | <p>expected from the Safety Evaluation Report that requires CEF to demonstrate compliance with nuclear safety design requirements prior to any modifications to the existing fire suppression system at DAF.</p> |
| <p>Since December 2005, the Board has been trying to raise DOE's awareness of the need to incorporate safety into the design of new defense nuclear facilities from the early stages of design. At public meetings, DOE has emphasized the importance of incorporating safety into facility design and resolving safety-related design issues early in a project's life cycle. DOE is taking actions to integrate this emphasis into its directives system. The Board notes that the CEF project is in the process of preparing for its Critical Decision (CD)-3 milestone, which indicates that final design activities have largely been completed, and procurement and construction activities will begin following PDSA approval. As noted above, major safety-related design issues raised by the Board remain unresolved in spite of assurances otherwise. It should also be noted that safety-related design issues raised by the Nevada Site Office's safety basis review team remain unsatisfied as well. The Board believes such fundamental design issues ought to have been addressed before CD-2 was granted.</p> | <p>While the DOE Order (413.3) requires submittal of a draft PDSA at the time of CD-2 approval, CEF is the first project among the NNSA nuclear facilities projects that had a completed PDSA with the PSER issued in July 2005, well prior to the CD-2 approval of December 2, 2006. PDSA Rev. 3 addresses and resolves the outstanding safety concerns raised by the Board. The resolution of these issues has resulted in some additional design, such as the conversion to the single interlocked pre-action fire suppression system and anchorage of two additional CAMS, however, this additional design will be completed well in advance of any related construction.</p> |

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| <p>Fire Protection: . . . <i>Software Quality Assurance-The CEF fire analysis does not meet current software quality assurance (SQA) requirements of Title 10 of the Code Federal Regulations, Part 830, Nuclear Safety Management.</i></p> | <ul style="list-style-type: none"> • A new Consolidated Fire and Smoke Transport analysis has been performed and is incorporated into the PDSA Rev. 3. The Consolidated Fire and Smoke Transport (CFAST) code, version 5.1.1 was used in the CEF fire modeling. The CFAST code is one of the DOE toolbox codes, therefore, meets the DOE software quality assurance requirements contained in 10 CFR 830. User guidance is provided in “<i>CFAST Computer Code Application Guidance for Documented Safety Analysis – Final Report, 2004</i>, DOE-EH-4.2.1.4 – Final CFAST Code Guidance, DOE. • The Preliminary Fire Hazards Analysis (PFHA) has been revised to reflect appropriate fire damage and modeling. • The PDSA Revision 3 reflects the technical basis for fire protection system changes, as required. • A Pre-Action “Dry-Pipe” fire suppression system will be installed in the two critical assembly cells, the two general purpose bays, and the two storage vaults. • The PFHA results are reflected in the PDSA Revision 3. |
| <p>Ventilation System: The operation sequence of the fire dampers/suppression system and the HVAC system needs to have clear design criteria, along with system description(s) describing how those criteria have been met. Additionally, further guidance in DOE Technical Standard 1066, Fire Protection Design Criteria, regarding fire protection for filtration units has not been addressed.</p> | <ul style="list-style-type: none"> • The CEF project has modified the ventilation systems in the storage vaults to add High Efficiency Particulate Air filtration. • The assembly cell and the general-purpose bay ventilation systems will not be modified. • The CEF ventilation systems will be retained as a safety-significant system, for consistency with the DAF. The final design and the procurement packages reflect this change. |
| <p>DAF Emergency Response (Fire): The contractor's evaluation lacks sufficient detail to permit the conclusion that a fire</p> | <p>The PDSA Rev. 3 includes a single interlocked pre-action fire suppression system. This, combined with significantly lower MAR limits</p> |

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| <p>in these areas with no suppression system would not result in untenable life safety conditions for workers and firefighters, extensive damage to adjacent criticality experiment equipment and materials, or the release of hazardous materials.</p> | <p>has reduced the worst case accident offsite dose to 0.7 rem. In addition, DAF has well-established emergency response plans and procedures. Fire scenarios are developed and exercised on a regular basis in drills as part of the Emergency Response Program.</p> <p>The general fire response strategy at DAF is to not fight fires involving nuclear materials, but rather to focus on protection of personnel by evacuating them to safety.</p> |
| <p>Combustible Loading Separation Distance: Combustible loading assessments performed by the fire protection system engineer indicate the need for a 6-foot standoff of combustibles from the criticality experiment equipment. The contractor could not describe the basis for that distance. No technical basis for the combustible loading limits or standoff distance has been provided.</p> | <p>The current six foot stand-off distance at DAF is required for explosive handling operations. CEF operations will not involve explosives. Therefore, this standoff requirement is not applicable to CEF.</p> <p>The PDSA Rev. 3 documents the basis for combustible loading limits.</p> |
| <p>Loss of Criticality Experiment Capabilities: The Board has expressed concern in the past regarding the potential loss of criticality experiment capability at DOE while these machines are being moved from LANL to DAF.</p> | <ul style="list-style-type: none"> • The Nuclear Criticality Safety Program (NCSP) Manager has provided funding to Lawrence Livermore National Laboratory for hands-on criticality safety training in FY06 and FY07. • The NCSP Five Year Plan dated August 2006 includes specific plans and tasks for maintenance of capability. • The NCSP Manager briefed the Board staff on current plans on April 11, 2006. • The Criticality Safety Support Group (CSSG) continues to be involved. |
| <p>DOE Oversight/Identification of Safety Systems and Controls: The Board's staff is concerned that numerous technical issues affecting the identification of safety systems and controls remain unresolved. The staff does not understand how DOE could approve CD-2 without addressing the issues</p> | <p>The DOE Office of Engineering and Construction Management (OECM) validated the CEF baseline, including review of the PDSA Revision 1, in November of 2005 which formed the basis of the CD-2 approval. The SER that was issued in July by the Safety Basis Review Team exceeded the conditions and requirements for approving the CD-2.</p> |

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| associated with removal of the fire suppression systems. | |
| Preliminary Documented Safety Analysis (PDSA):.... For example, the PDSA was prepared using an outdated revision (Change Notice 1) of DOE Standard 3009-94, Preparation Guide for U.S. DOE Nonreactor Nuclear Facility Documented Safety Analysis, that was in effect when the DAF DSA was prepared, instead of the latest revision (Change Notice 2). Although this was deemed by the project to be inconsequential; the design ramifications may be considerable. | <ul style="list-style-type: none"> • PDSA Revision 3 is prepared in accordance with DOE-STD-3009, Change Notice 2. • All four machines will be anchored to prevent them from being over-turned by the design-bases earthquake or explosions in the nearby DAF buildings. • PDSA Revision 3 addressed all conditions of approval issues identified in the PDSA Revision 1. |
| Water in-leakage into DAF has been poorly assessed for its potential impact on the project design. | <ul style="list-style-type: none"> • The overall DAF leak-repair plan was sent to the Board in a letter dated March 13, 2006. Board members were briefed on the DAF leak repair progress in October when some Board members visited the Nevada Test Site. |
| Criticality Accident Alarm System (CAAS):... significant worker safety issue associated with CEF operations is radiation exposure due to inadvertent criticality, yet LANL and LLNL have not resolved their disagreement on what portions of CEF will require a criticality alarm system. | <ul style="list-style-type: none"> • CEF operations will utilize a CAAS in the two General Purpose Bays. • The inclusion of a CAAS in the General Purpose Bays satisfies the requirements of LLNL and recommendations made by the Criticality Safety Study Group evaluation performed in February 2006. |
| DAF/CEF Criticality Safety Requirements: Authorization of operations may also prove difficult with respect to criticality safety requirements, as expectations for criticality safety documentation differ between the procedures used by LANL to conduct the critical experiments and those used by LLNL to govern DAF activities. | <p>LLNL as the DAF operator has a well-established and functioning criticality safety program. For work at the DAF, LANL will work according to the DAF criticality safety requirements or develop a mutually acceptable criticality safety program to support the CEF operations.</p> <p>The FY08 DAF DSA annual update will incorporate LANL developed safety management programs and Technical Safety</p> |

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| | <p>Requirements for the CEF. These will be validated during the CEF Operational Readiness Review process.</p> <p>The newly created Office of Joint Nevada Test Organization (JNTO) will ensure that uniform process and procedures are used for all operations at the Nevada Test Site, including operations at the DAF/CEF.</p> |