



**Department of Energy**  
**National Nuclear Security Administration**  
Washington, DC 20585

01-0001402

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DNF SAFETY BOARD

July 25, 2001

The Honorable John T. Conway  
Chairman  
Defense Nuclear Facilities Safety Board  
625 Indiana Avenue, N.W.  
Suite 700  
Washington, D.C. 20004

Dear Mr. Chairman:

Thank you for your letter dated December 21, 1999, forwarding a staff issue report regarding the Lawrence Livermore National Laboratory (LLNL) Building 332 emergency power system, lightning protection system, and Y2K program. LLNL has made significant progress in addressing your concerns. Although the Department has not responded formally until now, our staff at the Oakland Operations Office and LLNL have interacted periodically with your staff on issues raised in the report and have informally kept them informed about progress. The enclosure contains the LLNL corrective action plan and a current status of the corrective actions.

Mr. Michael K. Hooper, Department of Energy Oakland Operations Office, Assistant Manager for National Security, is responsible for overseeing completion of the LLNL corrective actions. Please feel free to contact Mr. Hooper, or have your staff contact Mr. Andy De La Paz (OAK/AMNS; 925-423-4339) if you have any questions.

Sincerely,

THOMAS F. GIOCONDA  
Brigadier General, USAF  
Acting Deputy Administrator  
for Defense Programs

Enclosure

cc (w/cncl):  
M. Hooper, DOE-OAK  
M. Whitaker, S-3.1



United States Government

RECEIVED  
National Nuclear Security Administration

# memorandum

01 JUL 30 PM 4:41  
DNF SAFETY BOARD

DATE: JUN 28 2001

REPLY TO  
ATTN OF: Michael K. Hooper, NNSA Oakland Assistant Manager for National Security

SUBJECT: Transmittal of Lawrence Livermore National Laboratory (LLNL) Progress Report on Corrective Action Plan (CAP) for Defense Nuclear Facilities Safety Board (DNFSB) Staff Issue Report (AMNSNST:010095)

TO: Dennis Miotla, Director, Office of Facilities Management and ES&H Support (DP-17)

REFERENCE: NMTP-00-062 dated June 19, 2000, J. Sefcik to M. Hooper, *Submission of Updated Corrective Action Plan for Defense Nuclear Facility Safety Board (DNFSB) Staff Issue Report*

The attachment to this memo provides a progress report on LLNL's corrective action plan to address the issues raised in the November 1999 DNFSB Staff issue report. This issue report documented a DNFSB Staff review at Building 332. The reference provides the most recent LLNL corrective action plan for this DNFSB Staff issue report.


In general, the corrective actions specified in the reference have been completed. A related item from the attachment is provided below.

From the attachment, a high-level vulnerability assessment of the Building 332 Emergency Power System was completed by LLNL in May 2000. This assessment identified five electrical outage failure modes:

- 1) 13.8-kVolt source failure to unit substation T410;
- 2) 13.8-kVolt source failure to unit substation T500;
- 3) Automatic Transfer Switch Failure;
- 4) Emergency Generator Failure; and
- 5) Loss of 480-Volt distribution system to Motor Control Center E410A3.

LLNL is planning on completing implementation of actions to address Failure Modes 3) through 5) above by the end of 2002. An additional estimated \$700K is necessary to complete implementation of actions to address the remaining failure modes. The actions to address the failure modes above will increase the reliability of the Emergency Power System, as well as create redundancy.

Please contact Andrew De La Paz of my staff at (925) 423-4339 if you have any questions concerning this information.



Michael K. Hooper  
Assistant Manager  
for National Security

Attachment: LLNL Letter NMTP-01-034 dated March 22, 2001, J. Sefcik to M. Hooper, *Progress on Corrective Action Plan for Defense Nuclear Facility Safety Board (DNFSB) Staff Issue Report*

cc:

K. Loll, DP-17 w/attachment  
J. Felty, SAIC w/attachment  
R. Corey, OAK/DAMNS  
P. Hill, OAK/LSOD  
R. Mortensen, OAK/DPOD  
C. Sohn, OAK/AMNS w/attachment  
H. Rio, OAK/LSOD w/attachment  
D. Wechsler, OAK/DPOD w/attachment  
A. Garcia, LLNL, L-352  
K. Perkins, LLNL, L-360  
J. Sefcik, LLNL, L-359  
NST File  
AMNS File



## Lawrence Livermore National Laboratory

### Defense and Nuclear Technologies Nuclear Materials Technology Program

March 22, 2001  
NMTP-01-034

Mr. Michael K. Hooper  
Assistant Manager for National Nuclear  
Security Administration Operations  
U. S. Department of Energy  
Livermore Site Office  
P. O. Box 808, L-293  
Livermore, CA 94551

**Subject:** Progress on Corrective Action Plan for Defense Nuclear Facility Safety Board  
(DNFSB) Staff Issue Report

**References:** 1) Letter from Michael K. Hooper to Dennis Miotla dated June 12, 2000  
(AMLSNST:000057:A De La Paz:afd:061200)  
2) Letter from Joseph A. Sefcik to Michael K. Hooper dated June 19, 2000  
(NMTP- 00-0062)  
3) Letter from Joseph A. Sefcik to Michael K. Hooper dated December 21,  
2000 (NMTP-00-127)  
4) Letter from Dennis K. Fisher to Camille Yuan-Soo Hoo dated January  
24, 2001

*Mike*  
Dear Mr. Hooper:

This is a progress report on our Corrective Action Plan (Revision 2), Reference 2, that addressed the issues raised in the November 1999 DNFSB Staff Issue Report.

Section 2.0 Plan for Establishing Standards for Safety-Class and Safety-Significant Instrumentation and Control Systems included two activities:

- Survey nuclear and commercial safety standards (e.g., IEEE, ISA, IEC, IAEA, etc.) and assemble likely set for LLNL nuclear facilities applications; present to panel of LLNL facility electrical and I&C personnel. Prepare initial draft standards. (Completed prior to June 12, 2000)
- Evaluate initial draft standards to address specific requirements of Superblock and LLNL. Present to WSS Process Leader for evaluation by the Change Control Board. (Completed November 20, 2000.)

Section 3.0 B332 Emergency Power System included six activities:

- Adequacy of emergency electrical system design addressed in SAR2000 update. (Review determined that B332 SAR recognized inconsistencies with today's

standards for SC-SSC. Review also identified possible options for improving robustness for recovery from loss of power.)

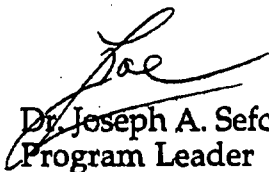
- Emergency electrical system classification re-evaluated and remains Safety Class in SAR update. (SAR review in progress; delayed per Refs. 3 and 4)
- Final Report on the vulnerability assessment of the B332 Emergency Power System. (UCNI report completed March 28, 2000.)
- Plan for implementing the newly created maintenance and calibration program for emergency power system components. (Completed July 14, 2000)
- Final plan for upgrading T500 transformer and switchgear seismic supports. (Completed prior to June 12, 2000)
- Completion of seismic support upgrades. (Completed prior to June 12, 2000)

Section 4.0 Defense in Depth for Lightning Protection in B332 included two items:

- Final report on enhanced lightning protection in B332. (Completed prior to June 12, 2000)
- The full protection system installed. (Completed prior to June 12, 2000)

The report referred to in the third bullet under Section 3.0 described five Action Plans that provide adequate protection for the emergency power equipment. Plans 2 and 4, budgeted at \$100K, are scheduled for completion in FY01. The work covers the purchase of spare ATS equipment and a jumper cable for connecting a temporary generator set. Funding for the remaining three plans, estimated at an additional \$700K, is being evaluated for out years. Conversations with Ajit Gwal and Matt Forsbacka during their September 2000 visit of the Superblock included discussion of the issues under Section 3.0. If you have any questions, please contact Ken Perkins at 4-6473 or Forrest Kahle at 3-7091.

Sincerely,



Dr. Joseph A. Sefcik  
Program Leader  
Nuclear Materials Technology Program

cc: A. Copeland, L-360  
M. Erickson, L-604  
C. Holm, L-360  
F. Kahle, L-360  
J. Lewis, L-360  
D. Miotla, DP 17  
B. Myers, L-359  
K. Perkins, L-360  
R. Corey, NNSA/OAK, L-293  
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C. Sohn, NNSA/OAK, L-293  
H. Rio, NNSA/OAK, L-293  
D. Wechsler, NNSA/OAK, L-293



## Lawrence Livermore National Laboratory

### Defense & Nuclear Technologies Nuclear Materials Technology Program

June 19, 2000  
NMTP-00-062

Mr. Michael K. Hooper  
Assistant Manager for Livermore Site  
U.S. Department of Energy  
Livermore Site Office  
P.O. Box 808, L-293  
Livermore, CA 94551

**Subject:** Submission of Updated Corrective Action Plan for Defense Nuclear Facility Safety Board (DNFSB) Staff Issue Report

- Reference:**
- 1) Letter from Joseph A. Sefcik to Michael K. Hooper dated May 19, 2000 (NMTP-00-0053)
  - 2) Letter from Michael K. Hooper to Dennis Miotala dated June 12, 2000 (AMLSNST:000057:A De La Paz:afd:061200)

Dear Mr. Hooper:

Attached is an updated Corrective Action Plan (Revision 2) that addressed the issues raised in the November 1999 DNFSB Staff Issue Report. The attachment has been revised to incorporate resolution of the open issue from the May 19, submission of the Corrective Action Plan, which we have discussed with your staff. The revision is reflected in a complete rewrite of Section 3.1, *Resolution of Mismatch between B332 SAR and Today's Standards for Safety-Class Structures, Systems, and Components (SSCs)*, of the Corrective Action Plan.

Additionally, the table in Section 5.0 has been updated to reflect the revised activities related to the SAR upgrade and safety system classification effort. It has also been changed to reflect the completion of previously scheduled activities. Specifically, the table reflects the completion of the upgrades to the seismic supports for the T500 transformer and switchgear and the installation of the lightning protection system.

In reference 2, you stated that "OAK did not request the Laboratory to reevaluate the classification of various existing safety-class systems using Change Notice No. 1 of DOE-STD-3009-94, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports (January 2000)*." However, members of your staff have indicated that our SAR submissions will be judged to Change Notice No. 1 of DOE-STD-3009-94 (January 2000) for grading on our Contract Performance Measures. We do not feel that we have a choice in this matter. If this is not correct, please feel free to contact me to resolve this discrepancy.

Sincerely,

A handwritten signature in black ink, reading "Joseph A. Sefcik". The signature is fluid and cursive, with a long, sweeping underline that extends to the left and under the first part of the name.

Dr. Joseph A. Sefcik  
Program Leader  
Nuclear Materials Technology Program

Attachments



## Lawrence Livermore National Laboratory

cc:

A. Copeland, L-360  
F. Kahle, L-360  
D. Mapes, L-125  
M. Mintz, L-358  
D. Miotla, DP 17  
B. Myers, L-359  
K. Perkins, L-360  
B. Vance, L-165  
R. Corey, DOE/OAK, L-293  
A. De La Paz, DOE/OAK, L-293  
C. Sohn, DOE/OAK, L-293  
H. Rio, DOE/OAK, L-293  
D. Wechsler, DOE/OAK, L-293

**LLNL and Building 332 Response to DOE Request for Corrective Action Plan**

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**LLNL and Building 332 Response to DOE Request for  
Corrective Action Plan**

**Revision 2**

**June 2000**

**Table of Contents**

1.0 Introduction..... 2

2.0 Plan for Establishing Standards for Safety-Class and Safety-Significant  
Instrumentation and Control Systems..... 2

3.0 B332 Emergency Power System..... 3

    3.1 Resolution of Mismatch Between B332 SAR and Today's Standards for  
    Safety-Class Structures, Systems, and Components (SSCs) ..... 3

    3.2 Vulnerability Assessment of B332 Emergency Power System..... 3

    3.3 Develop a Maintenance and Calibration Program for B332 Emergency  
    Power System Components ..... 4

    3.4 Upgrade B332 Emergency Power System Seismic Supports..... 4

4.0 Defense in Depth for Lightning Protection in Building 332 ..... 4

5.0 Plan Summary ..... 4

6.0 References..... 5



# **LLNL and Building 332 Response to DOE Request for Corrective Action Plan**

## **1.0 Introduction**

This plan responds to a Defense Nuclear Facilities Safety Board Staff Report dated November 23, 1999 (Reference 1). This plan addresses the concerns expressed in the report regarding: (1) LLNL's Work Smart Standards for safety-related instrumentation and control systems; (2) the B332 emergency power system design and maintenance, including an assessment of assumptions and limitations of the fault tree analysis in the B332 SAR; and (3) lightning protection in Building 332. Concerns regarding Y2K transition are not covered here since no Y2K issues were seen in transition.

DNFSB staff raised questions in 1995 about nuclear facility ventilation systems that included emergency power. DOE responded to these questions in a study report dated February 1996 (Reference 2). That report states clearly that the basis for showing adequacy of nuclear facility safety systems is found in DOE-approved facility safety analysis reports (SARs). The report explicitly states that none of the orders pertinent to the design of DOE nuclear facilities have retroactive features. A clear statement of DOE's position on applying newer design standards is also found in a memorandum from Richard L. Black, Director of the Office of Nuclear Safety Policy and Standards (Reference 3). Orders 5480.23, 420.1, and the 420.1 Implementation Guides do not contain a backfit requirement for existing authorized facilities. The part of this plan covering the emergency power issues was developed with the above in mind and with the objective of increasing the safety of the currently approved facility configuration both with affordable design changes and improvements in the maintenance and calibration program for these systems. In addition, we intend to reevaluate our SAR to determine the appropriateness of our current safety system classification. Based on the outcome of the reevaluation, we will make appropriate changes to the Building 332 SAR or facility configuration.

This plan is designed to provide response to the DNFSB staff report concerns as presented, as well as to respond to DOE OAK comments of Reference 4.

## **2.0 Plan for Establishing Standards for Safety-Class and Safety-Significant Instrumentation and Control Systems**

LLNL's Work Smart Standards (WSS) set does not include standards for electrical and instrumentation and controls thought to be appropriate for nuclear facilities such as Building 332. Preliminary discussions with experts in the field yielded no conclusive evidence that standards such as those in place for commercial or government facilities per IEEE, ISA, etc., will economically or pragmatically serve the needs of B332. We proposed first to employ LLNL subject-matter experts (SMEs) to sift and screen through national and international standards and prepare a list of those standards, or portions thereof, that are applicable to B332. This process is complete.

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**LLNL and Building 932 Response to DOE Request for Corrective Action Plan**

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An initial draft set of I&C standards has been prepared by the SMEs. Evaluation of the standards will be conducted to tailor the standards to the specific requirements of the Superblock and LLNL. Institutional implementation of the new I&C standards will be accomplished in accordance with established procedures agreed to by LLNL and DOE/OAK. The proposed standards will be submitted to the WSS Process Leader for evaluation by the Change Control Board for their recommendation for additions to the WSS set. LLNL and the Superblock will thereafter provide a gap analysis and plan for implementation.

### **3.0 B332 Emergency Power System**

#### **3.1 Resolution of Mismatch between B332 SAR and Today's Standards for Safety-Class Structures, Systems, and Components (SSCs)**

As indicated in the Introduction, the adequacy of the building's safety systems is demonstrated in the Safety Analysis Report. The first phase of this resolution will be a thorough evaluation and documentation of the assumptions and limitations of the current SAR analyses pertaining to the B332 emergency electrical system, considering past and current operational conditions and experiences. This evaluation will be completed and documented in conjunction with the current effort to upgrade the B332 SAR. The B332 SAR revision is following a resource-loaded project plan and is due for submittal for DOE review September 15, 2000. The revision to the SAR will lay the foundation for re-examining the specific performance criteria of the safety systems and the development of arguments for reclassifying, if justified, the safety-class SSCs in B332, which will be done subsequently.

The second phase will be based on the hazard analyses and accident scenario development in Chapter 3 of the B332 SAR 2000 revision and will be consistent with the guidelines in DOE-STD-3009-94, Change Notice 1. This phase will evaluate the possibility for change of the B332 emergency electrical system from safety-class to safety-significant. An independent review of the basis for determination of the classification of the system will be performed. Appropriate revisions to the SAR and TSRs will be drafted and independently reviewed by September 30, 2001, and the revisions submitted to DOE for review and approval.

#### **3.2 Vulnerability Assessment of B332 Emergency Power System**

A high-level vulnerability assessment of the B332 emergency power system was completed by the Facility on May 5, 2000. This assessment supported the conclusions drawn in the present B332 SAR regarding single-point failure. Further evaluation of single-point failure, redundancy, and physical separation will follow the SAR development work described in Section 3.1 if the conclusion is that the electrical power system is properly classified as safety-class. This evaluation will have, in turn, an independent verification review.

Included as part of the vulnerability assessment effort, a project to develop affordable modifications to facilitate response to plausible B332 electrical system failures was initiated with Plant Engineering, Maintenance and Operations Division in

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**LLNL and Building 332 Response to DOE Request for Corrective Action Plan**

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approximately November of 1999. Plant Engineering submitted a first-draft report on the results of this project to the Facility on March 31, 2000, for review and comment. Per this evaluation, Plant Engineering has the resources (equipment and personnel) to respond to all postulated failure scenarios. However, in some cases, changes to the Facility's electrical system were recommended to facilitate mitigating actions. This report will be in final form by May 26, 2000.

### **3.3 Develop a Maintenance and Calibration Program for B332 Emergency Power System Components**

The facility has in place a process for calibration of maintenance and test equipment—Quality Implementation Procedure (QIP) 8—which defines the requirements for selected devices identified by the Facility. Along with this, calibration checks of magnehelics and photohelics are implemented by ACP-B332-018. B332 emergency power system elements are not included in these documents. Plant Engineering, the responsible organization for maintenance and calibration of these elements, has developed preventive maintenance procedures (task codes) to address routine surveillance of air frame breakers, manual transfer switches, molded case breakers, motor control centers, per NFPA 70B. Implementation of the PE Task Codes must be coordinated with the Facility's ongoing operations and programmatic activities. An implementation plan is scheduled to be in place by July 1, 2000.

### **3.4 Upgrade B332 Emergency Power System Seismic Supports**

Plant Engineering performed an analysis to evaluate the seismic anchorage of the T-500 transformer and switchgear assembly. It was discovered that some anchor points are not consistent with current requirements. An informal report was submitted to the Facility, recommending changes to the anchors. Plant Engineering will complete a formal report by May 19, 2000. The facility will complete necessary changes to the anchors by June 6, 2000.

### **4.0 Defense in Depth for Lightning Protection in B332**

A study was conducted to evaluate the need for a lightning-protection system to protect B332. The conclusion of the evaluation was that a lightning-protection system for B332 as the Facility exists today was not necessary per NFPA 780 requirements. However, as low-cost defense in depth, provision for lightning protection was included in the design and installation of the helicopter entanglement cabling over the building. The entanglement system includes all necessary elements for catenary lightning-protection systems in accordance with NFPA 780 requirements. The lightning-protection analysis was completed on March 3, 2000, and the final report on April 19, 2000. The entanglement system, which includes lightning protection, was completed on April 21, 2000.

### **5.0 Plan Summary**

The table on the following page summarizes the LLNL and Building 332 Response to DOE Request for Corrective Action Plan as described in the text above.

LLNL and Building 332 Response to DOE Request for Corrective Action Plan**Building 332 and LLNL Electrical Power Standards and Upgrades Plan.**

Activity	Date Due*	Responsible Person
Standards for Safety-Class and Safety-Significant Instrumentation and Control Systems		
<ul style="list-style-type: none"> <li>• Survey nuclear and commercial safety standards (e.g., IEEE, ISA, IEC, IAEA, etc.) and assemble likely set for LLNL nuclear facilities applications; present to panel of LLNL facility electrical and I&amp;C personnel. Prepare initial draft standards.</li> </ul>	Complete	G. Johnson
<ul style="list-style-type: none"> <li>• Evaluate initial draft standards to address specific requirements of Superblock and LLNL. Present to WSS Process Leader for evaluation by the Change Control Board.</li> </ul>	9/30/00	G. Johnson
B332 Emergency Power System		
<ul style="list-style-type: none"> <li>• Confirm adequacy of emergency electrical system design in SAR 2000 update</li> </ul>	9/15/00	J. Lewis
<ul style="list-style-type: none"> <li>• Complete re-evaluation of emergency electrical system classification and incorporate in SAR update</li> </ul>	9/30/01	J. Lewis
<ul style="list-style-type: none"> <li>• Final Report on the vulnerability assessment of the B332 Emergency Power System.</li> </ul>	5/26/00	D. Rael
<ul style="list-style-type: none"> <li>• Plan for implementing the newly created maintenance and calibration program for emergency power system components</li> </ul>	7/01/00	D. Rael
<ul style="list-style-type: none"> <li>• Final plan for upgrading T500 transformer and switchgear seismic supports.</li> </ul>	Complete	D. Rael
<ul style="list-style-type: none"> <li>• Completion of seismic support upgrades.</li> </ul>	Complete	D. Rael
B332 Lightning Protection		
<ul style="list-style-type: none"> <li>• Final report on enhanced lightning protection in B332.</li> </ul>	Complete	D. Rael
<ul style="list-style-type: none"> <li>• The full protection system installed.</li> </ul>	Complete	D. Rael

**6.0 References**

- Reference 1. A.D. Gwal, Defense Nuclear Facilities Safety Board Staff Issue Report, *Electrical, Instrumentation and Control, and Fire Protection Systems and Year 2000 Program at Lawrence Livermore National Laboratory (LLNL)*, November 23, 1999.
- Reference 2. Department of Energy, *Plutonium Ventilation System Study Report*, February 1996.
- Reference 3. Memorandum from Richard L. Black, Director of the Office of Nuclear Safety Policy and Standards to E.C. Brolin, Associate Deputy Assistant Secretary, Office of Nuclear Material and Facility Stabilization, October 25, 1995.
- Reference 4. Memo from Michael K. Hooper to Abel A. Garcia, dated April 26, 2000, "Request to Modify and Resubmit Corrective Action Plan Addressing Defense Nuclear Facilities Safety Board (DNFSB) Issue Report (Document #AMLSNST:000021)."