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DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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February 25, 1998

The Honorable Ernest J. Moniz
Under Secretary of Energy
Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-0104

Dear Mr. Moniz:

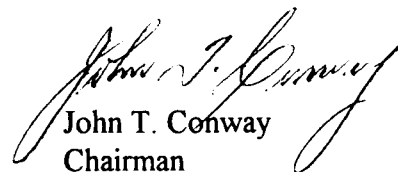
Enclosed for your consideration and action, where appropriate, are the observations developed by the members of the staff of the Defense Nuclear Facilities Safety Board (Board) concerning the electrical and control systems of the Spent Nuclear Fuel Project (SNFP) at the Hanford Site. These observations are based on reviews of available documents and discussions with Department of Energy (DOE) staff and contractor personnel for the SNFP on December 9-11, 1997.

The enclosed report identifies deficiencies in the design of the battery room ventilation system that could lead to increased potential for an explosion hazard. This condition needs to be addressed as soon as possible. The Board's staff also concluded that the failure of recently installed distribution transformers manufactured by ELMA, a California-based company, located at the K-West Basin and the Canister Storage Building, may be indicative of a major design and/or manufacturing problem. Failure of these transformers challenges the standby systems and may impact the schedule for removal, stabilization, and storage of the deteriorating spent nuclear fuel in the K-East and K-West Basins. The Board believes a thorough investigation of the failure of these distribution transformers needs to be performed and reported in accordance with the guidance provided in DOE Order 5484.1. Additionally, DOE needs to determine whether other facilities use distribution transformers manufactured by ELMA and evaluate their adequacy.

The Board would be interested in the Department of Energy's actions to address the findings from the enclosed report.

Feel free to contact me if you have any questions on these matters.

Sincerely,


John T. Conway
Chairman

- c. Mr. Mark B. Whitaker, Jr.
Mr. John D. Wagoner

Enclosure

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

January 7, 1998

MEMORANDUM FOR: G. W. Cunningham, Technical Director
S. L. Krahn, Deputy Technical Director

COPIES: Board Members

FROM: A. K. Gwal

SUBJECT: Review of Electrical, Control, and Fire Protection Systems at the Hanford Spent Nuclear Fuel Project (SNFP), December 9–11, 1997

This memorandum documents a review by members of the staff of the Defense Nuclear Facilities Safety Board (Board) A. K. Gwal and D. J. Wille of the electrical, control, and fire protection systems at the SNFP at the Hanford site. This review was conducted December 9–11, 1997. The review revealed design deficiencies in the battery room ventilation systems of K-Basins (East and West) and concerns related to the procurement of safety-class components of cold vacuum drying (CVD) systems.

Battery Room Hydrogen Explosion Hazard. The Board's staff noted to project personnel that the existing battery rooms at K-Basins (East and West) did not comply with the applicable codes and standards (ANSI C2, NFPA-70, and IEEE-450) related to battery room ventilation systems. Specifically, these rooms had no detection system to alarm the loss of the exhaust system that prevents hydrogen accumulation generated by the batteries. The operations staff procedurally checks the operation of the battery room exhaust fans on a monthly basis. The Board's staff evaluated one of the battery rooms and observed that the exhaust fan motor was running, but the belt was broken, resulting in the loss of flow from this room. An explosion could result if the concentration of accumulated hydrogen were to exceed the lower flammability limit (4 percent) and come in contact with an electrical spark from the batteries interconnecting cables and connections. Flour-Daniel Hanford (FDH) personnel indicated that an evaluation will be performed to resolve this issue.

Procurement of Safety-Class Components. Project personnel noted that ongoing safety analyses have resulted in the CVD systems having a number of safety-class components, such as temperature switches, pressure switches, flow switches, and solenoid-operated valves. If safety-class components are needed, procurement of these components may require an extensive amount of preplanning and qualification effort because many are unavailable as prequalified safety-class components. Nonqualified components will have to undergo qualification processes that may require long lead times because of the unavailability of the qualified laboratories in the desired time frame. The Board's staff believes procurement of identified safety-class components is not being aggressively pursued.

Failure of Distribution Transformers. On November 27, 1997, failure of the power transformer (1500 kVA, 13.8 kV/480Vac) resulted in the loss of normal power to K-West Basin. Another transformer (1000 kVA, 13.8kV/480Vac), installed at the Canister Storage Building, failed on January 2, 1998. Hanford had procured six transformers (four 1500kVA, one 1000kVA, one 500kVA) from ELMA, a transformer manufacturer in California. Both of the failed transformers are from this package and were installed/energized in 1996. These types of transformers do not generally fail in such a short time. Such failure may be indicative of a major design and/or manufacturing problem.

The Board's staff believes SNFP is currently utilizing other transformers manufactured by ELMA. It would be prudent for the Department of Energy (DOE) and FDH to investigate and report on the above incident in accordance with the guidance provided in DOE Order 5484.1. The report ought to adequately describe the circumstances leading up to the event, and the post-event activities, as well as any electrical power management systems that should have prevented the occurrence and post-event deficiencies. Additionally, DOE and FDH need to evaluate the adequacy of all the distribution transformers being used for the SNFP to determine what repair or procurement actions, if any, need to be taken.

Calibrations of Protective Devices. To reduce the possibility that the electric protective devices will not perform, they ought to be maintained and calibrated at recommended intervals. During a tour of the switchgear room of K-West Basin, the Board's staff observed that the calibration date has expired for many of the protective devices. DOE and FDH need to perform the calibration tests on the expired relays and bring them to within allowable limits.

Future Staff Actions. The Board's staff will continue to follow the resolution of the issues identified in this report. The staff will also closely monitor design and procurement activities associated with safety-related systems and components.