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DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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May 15, 2000

Brigadier General Thomas F. Gioconda
Acting Deputy Administrator for
Defense Programs
Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-0104

Dear General Gioconda:

The Department of Energy (DOE) and its contractor at the Oak Ridge Y-12 Plant have been working for several years to address safety-related requisites for restarting hazardous but vital national security operations at Y-12. The Defense Nuclear Facilities Safety Board (Board) has highlighted a number of safety issues requiring attention, including those described in the enclosed reports: (1) delays in stabilizing fissile materials in Building 9206, (2) deficiencies in the implementation of consensus safety standards and contractual requirements in activity-level procedures that control work, (3) prolonged reliance on cursory or limited-scope safety analysis documents for nuclear facilities, and (4) deficiencies in emergency management.

These reports are provided for your information. The topics identified have been included among those discussed by the Board with your senior staff and staff of the Y-12 contractor during a trip to the Y-12 Plant in April 2000. The Board will continue to advise you on our observations as we continue our oversight efforts.

Sincerely,

A handwritten signature in black ink, appearing to read "John T. Conway".

John T. Conway
Chairman

cc: Ms. G. Leah Dever
Mr. Mark B. Whitaker, Jr.

Enclosures

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

February 29, 2000

MEMORANDUM FOR: G. W. Cunningham, Technical Director
J. K. Fortenberry, Deputy Technical Director

COPIES: Board Members

FROM: W. Andrews
R. West (OE)

SUBJECT: Enriched Uranium Operations Furnace

This report documents a review performed at the Oak Ridge Y-12 Plant by members of the staff of the Defense Nuclear Facilities Safety Board (Board). Staff members W. Andrews, W. White, and D. Moyle and outside expert R. West met with representatives of Lockheed Martin Energy Systems (LMES) to review the safety of Y-12 Enriched Uranium Operations (EUO) furnaces. Specifically, the Board's staff reviewed actions taken to address the previously identified deficiencies in the flowdown of safety requirements from the LMES Standards and Requirements Identifications Documents (S/RIDs) to plant procedures.

Background. The Holden natural gas furnace was included in the EUO Phase A2 restart. The Building 9212 Basis for Interim Operation (BIO) relies explicitly on the proper construction and testing of gas system components and the proper operation and surveillance of a flame management system to prevent a gas explosion in the furnace area. The BIO credits conformance with industry standards to ensure this protection. LMES personnel identified National Fire Protection Association (NFPA) Standard 86, *Ovens and Furnaces*, and NFPA 54, *National Fuel Gas Code*, as applicable (these standards are also listed in the Y-12 S/RIDs).

In September 1998, the Board's staff performed a review of the identification and implementation of safety basis controls for Phase A2 furnace operations. That review revealed a number of issues related to the application of the requirements of these two NFPA standards to the Holden gas furnace. These issues ranged from improper design of control circuit components to improper testing procedures. A letter from the Board, dated October 8, 1998, requested that the Department of Energy (DOE) provide information on further actions to be taken to ensure the safety of operations with the Holden gas furnace.

In a letter dated December 15, 1998, DOE forwarded a response to the Board's letter from DOE-Oak Ridge (OR) that reported the following information and actions relative to issues involving the Holden gas furnace.

- The identification of the root cause for failure to adequately flow down requirements as the failure of LMES management to recognize the necessary level of rigor and to require a detailed review of the applicable NFPA codes for the Holden furnace.
- Identification of the fact that the flowdown of standards to plant command media (e.g., procedures) was not specific.
- A description of actions taken or being taken to ensure that the Holden furnace would meet the appropriate code safety requirements.
- A commitment to conduct reviews and take the appropriate actions for other EUO furnaces.
- The establishment of an approved corrective action plan to address the generic problems with the flowdown of requirements, beginning at the site level (in particular NFPA and the American National Standards Institute codes).

At the time of the DOE-OR response, the above appeared to be an adequate set of corrective actions if effectively implemented.

Flowdown of Standards. As a result of this review the staff found that previously identified deficiencies with the flowdown of safety requirements from the LMES S/RIDs to plant procedures have not been corrected.

The staff reviewed a recently issued independent LMES management review report, *Holden Furnace Modification Design Implementation of National Codes* (Y/MA-7471, January 5, 1999), which was written in partial response to the Board's letter of October 8, 1998. This LMES independent review was to address the failure to adequately flow down the requirements from the NFPA and other industry standards into Y-12 work authorization documents. Instead, the review focused on where along a gas supply piping system the NFPA code became applicable and on the need to provide documentation of the engineering judgements and other decisions made that might be in conflict with the NFPA requirements.

In addition, information provided to the staff concerning local technical standards and training indicates that no actions have been taken to make them consistent with the applicable industry standards. The review of the Holden gas furnace conducted by the staff in September 1998 revealed that the site's *Engineering Technical Specification Master Manual* did not contain proper guidance and was inconsistent with NFPA 54 requirements. The engineer who discussed the use of the codes indicated that changes required to ensure the proper flowdown of NFPA 54 safety requirements have not been made.

Finally, an LMES Readiness Assessment was performed in September 1999 in preparation for restart of the reduction furnace. One of the prestart findings of the readiness assessment was as follows:

Pressure vessels, which were not stamped in accordance with the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, were planned to be used in applications where code-stamped vessels were required by the Code and local directives. Adequate actions had not been taken to ensure the implementation of measures to provide equivalent protection and ensure safety equal to or superior to the intent of the ASME Code as required by local directives, if the ASME Code was considered to be not applicable.

This finding is another example of the lack of flowdown of industry safety standards (required by the S/RIDs) to a process. This finding was made a year after the Board and its staff had identified the issue of standards flowdown to DOE and LMES.

In summary, DOE and LMES have not fixed the problem of contractual safety requirements, in the form of national consensus standards, not flowing into various plant installation, maintenance, testing, surveillance, and training documents. The failure to revise local technical standards and training development to make them consistent with the applicable industry standards indicates that DOE and LMES did not adequately address the systemic issues.

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

March 8, 2000

MEMORANDUM FOR: J. K. Fortenberry, Technical Director

COPIES: Board Members

FROM: M. V. Helfrich

SUBJECT: Response to Letter on Safety Bases at Y-12 Plant

On October 6, 1999, the Defense Nuclear Facilities Safety Board (Board) sent a letter to the Department of Energy (DOE) observing that DOE and its contractor at the Y-12 Plant had made progress toward improving the safety management of those operations that have been the focus of recent attention. It was also noted, however, that other activities had been less thoroughly examined or were being managed in accordance with outdated authorization bases, and that the program planned by DOE for upgrades to the safety analyses for operations and authorization bases at the site appeared to have faltered and to merit renewed emphasis. The Board conveyed its understanding that this issue would require vigorous staff effort, and expressed its desire to be advised of the path forward planned by DOE and its contractor at the Y-12 Plant for addressing this matter.

On January 19, 2000, members of the Board's staff P. Gubanc and M. V. Helfrich participated in a workshop on upgrades to the safety bases for nuclear facilities at the Y-12 Plant. This workshop was held in response to the Board's letter of October 6, 1999, and included attendees from both Lockheed Martin Energy Systems, Inc. (LMES) and the DOE Y-12 site office. LMES began the meeting by announcing a change in perspective on the safety bases for nuclear facilities, as outlined in the latest Implementation Plan for DOE Order 5480.23, *Nuclear Safety Analysis Reports*. LMES now plans to develop tailored Safety Analysis Reports (SARs) for all nuclear facilities, with the exception of 9206, 9201-4, and 9204-4 (which would remain as Bases for Interim Operation). Under the revised Implementation Plan, which had yet to be approved by DOE, LMES would continue to upgrade the current safety bases in fiscal year (FY) 2000 and would begin SAR development for seven facilities in FY 2001 (three SARs have already been developed).

After the workshop, the staff was concerned that although LMES had developed a schedule for this effort, prospects for any real progress were minimal, since neither money nor staff had been allocated for the SAR development effort. In late February 2000, the staff held further discussions with personnel in the DOE Y-12 site office, which revealed that LMES has made no substantive progress in implementing its plans to upgrade safety bases at the Y-12 Plant.

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

March 13, 2000

MEMORANDUM FOR: J. K. Fortenberry, Technical Director

COPIES: Board Members

FROM: T. L. Hunt

SUBJECT: Timely Hazard Reduction at Building 9206, Y-12 Plant

The Department of Energy's (DOE) December 22, 1999, response to the Defense Nuclear Facilities Safety Board's (Board) letter of November 2, 1999, requesting details on a path forward to achieve more timely hazard reduction at the Y-12 Plant's Building 9206, failed to fully satisfy the expectations of the Board's staff. In its response, DOE indicates that the present risks are manageable, and the currently proposed agenda for hazard reduction is inadequate; thus, no programmatic changes are deemed necessary. On the basis of this response, it appears that DOE attaches insufficient urgency to accelerating the cleanup and removal of hazardous materials from Building 9206.

The Board's letter asked explicitly how DOE proposes to achieve more timely hazard reduction in this building. It is recognized that some progress in risk reduction has recently been made, but the measures taken are not sufficient. There are other activities at Y-12, such as Enriched Uranium Operations, that rightly have higher priority, but the situation at Building 9206 cannot be ignored. There are hazards in this building that, if left uncorrected, will threaten public health and safety. For example, stabilization of solutions and pyrophoric materials needs to be accelerated. DOE has not presented an implementation schedule, based on a technically justified risk ranking, for accelerating the stabilization of hazardous materials.

The principal difficulty with the DOE *Building 9206 Phase Out/Deactivation Program Management Plan* referenced in DOE's response is that it does not ensure the commitment of adequate resources to the stabilization of these most hazardous residues. Without the benefit of a resource-loaded, integrated schedule, proposed activities are carried out in a haphazard manner, and deactivation activities have repeatedly been deferred without technical justification. Examples of the need for expedited risk reduction include the following:

- Pyrophorics are now planned to be moved from a hood to an argon glovebox during this fiscal year. The argon glovebox does not provide acceptable containment for extended storage of this material in this structurally vulnerable facility. Although the proposed action will improve safety marginally, it does not address the fundamental need to stabilize, package, and disposition this high-hazard material. DOE's response does not indicate when processing of these compounds will be initiated.

- Liquid in processing equipment, especially glass columns, will not be drained during this fiscal year, despite the schedule provided in the *Building 9206 Phase Out/Deactivation Program Management Plan*. DOE's response describes only how leaks from the columns will be handled. No mention is made of plans for actually reducing the ever-increasing risk associated with this equipment. The fact remains, however, that aging glass columns are not a safe storage configuration and should be emptied at the earliest opportunity.
- The containerized highly enriched uranium (HEU) inventory may be reduced 45 percent this year by being transferred off site; however, the facility cannot rely on similar circumstances for dispositioning of the entire inventory of HEU. The DOE response does not provide plans or a timetable for stabilization or removal of the remaining containerized HEU. Given the uncertainties associated with the availability of Building 9212 to process HEU from Building 9206, alternatives for alleviating this dependency need to be considered, such as the direct disposal option suggested in the Board's letter of November 2, 1999.
- Nondestructive assay of holdup in the facility continues to lag. DOE's response states that testing of the cadmium zinc telluride equipment has been completed, but does not indicate when demonstrable holdup characterization will be performed. Completion of this activity—especially in process areas—is very important to support deactivation and risk reduction (e.g., criticality safety evaluations). The video survey of underground uranium-contaminated ductwork has also been delayed again, and a proposed action date is not provided in DOE's response.

It is important that these materials be rendered safe as soon as possible. It would be appropriate for DOE to reevaluate the findings and suggestions provided in the Board's past correspondence regarding this facility, and to provide a supplemental response that includes details on what can be done to accelerate stabilization activities in Building 9206. The details provided should include clear disposition pathways and schedules for the various materials at risk.

DEFENSE NUCLEAR FACILITIES SAFETY BOARD**Staff Issue Report**

March 22, 2000

MEMORANDUM FOR: J. K. Fortenberry, Technical Director

COPIES: Board Members

FROM: Dudley Thompson

SUBJECT: Status of Implementation of Corrective Action Plan for Emergency Management, Oak Ridge

During March 1-2, 2000, members of the staff of the Defense Nuclear Facilities Safety Board (Board) W. Andrews, P. Gubanc, D. Moyle, I. Pyatt, and D. Thompson met with representatives of the Oak Ridge Operations Office (ORO), Oak Ridge contractors, and the State of Tennessee at the Y-12 Plant. The purpose of this site visit was to review the status of implementation of the Department of Energy's (DOE) corrective action plan (CAP) for addressing deficiencies in emergency management identified in previous visits by the Board's staff and in various internal DOE evaluations.

Background. In a letter dated July 9, 1999, the Board called on DOE to develop and implement a plan for correcting deficiencies in emergency management involving ORO and various contractors operating facilities on the Oak Ridge Reservation. On October 29, 1999, DOE responded to the Board's letter, outlining proposed corrective actions and setting forth a schedule for their completion.

Discussion. During this site visit, the Board's staff noted some progress on the CAP, but several key elements of the plan are behind schedule, including scheduling and conduct of drills and exercises at the Y-12 Plant, preparation of the implementing procedures for emergency response, and implementation of a new Reservation-wide dispersion model for determining potential consequences of a release of hazardous material. Furthermore, additional slippage appears likely.

An Emergency Management Working Group has been established, comprising representatives from each of the contractors and ORO, led by an experienced and knowledgeable member of the Emergency Management Program Office (EMPO). The working group appears to be working harmoniously, with due regard for the priorities and the available resources to accomplish the actions outlined in the CAP. Unfortunately, progress on the CAP remains slower than desirable, despite the good intentions and cordial working relationship among members of the working group.

A consolidated Reservation-wide Emergency Plan has been developed and is proposed for implementation by March 31, 2000. However, completion of the associated Emergency Plan Implementing Procedures (EPIPs) is currently forecast to slip to mid-summer. The Board's staff suggested that ORO evaluate the relative merits of prematurely implementing the revised Emergency Plan versus delaying implementation and concurrently expediting (1) completion of the EPIPs, and (2) implementation of a common plume model for determining potential consequences of release of hazardous material from any site on the Oak Ridge Reservation.

EMPO has adopted the Y-12 contractor's standard for the review and approval of emergency management hazard assessments (EMPO-558, *Oak Ridge Y-12 Plant Emergency Management Hazards Assessment Process*). This standard appears to be adequate. Unfortunately, ORO has only informally directed its use by all Oak Ridge contractors. As of the staff's review, ORO had not yet decided whether a Y-12 contractor revision to EMPO-558, currently being prepared, would be promulgated for implementation to all contractors.

The Y-12 Plant has made commendable progress in developing comprehensive hazard assessments for the highest-priority materials in its inventory. Completion of hazard assessments for materials presenting relatively low hazards will require an extended period of time, however, primarily because of limited resources. In examining the hazard surveys (which provide the basis for determining whether a hazard assessment is required), the staff noted that each individual chemical hazard was dispositioned on the basis of that hazard alone (per the guidance of EMPO-558). For some facilities (such as laboratories), the aggregate hazard of many small sources demands consideration for treatment with a hazard assessment.

The senior Lockheed Martin Energy Systems (LMES) representative at the meeting expressed his frustration at the limited availability of knowledgeable personnel. He candidly noted his inability to establish a meaningful schedule for emergency drills and exercises, due to the lack of sufficient personnel resources to develop drill and exercise scenarios while addressing other pressing emergency management issues.

ORO has decided to employ a single-plume model, the Computer-Assisted Protective Action Recommendation System (CAPARS), for assessing the potential consequences of the release of hazardous materials from any of the facilities on the Oak Ridge Reservation. This model will replace the various other plume models previously used at the facilities involved. Although CAPARS is an accepted model used at the Rocky Flats Environmental Technology Site, and possibly at other DOE sites, this decision appears to have been made without the benefit of a rigorous and formalized technical and cost-benefit analysis that would support abandonment of the previously used and accepted models.

LMES has developed a Web-based training program for emergency responders, which has been completed satisfactorily by 190 staff members from across the entire Oak Ridge Reservation. However, after expending considerable effort to establish and implement its own training program, ORO has exercised essentially no configuration management over the Reservation-wide training program. The Board's staff encouraged ORO to institute an effective

program for configuration management of the training of emergency responders, as well as for other emergency management functions and activities.

The ORO Assistant Manager for Environment, Safety, and Health (AM/ESH) stated that a decision has been made to establish a GS-15 position of Division Director for Emergency Management and Assessment. The staff believes that this will enhance the priority attached to that function. However, the AM/ESH stated his intention to attempt to fill the position from within DOE. This decision was subsequently reaffirmed by the ORO Manager, who cited manpower ceilings and the need to use the available external hiring flexibility for filling vacant legal staff positions. The Board's staff encouraged both the AM/ESH and the ORO Manager to reconsider their positions and advertise nationally to better ensure selection of the highest-quality candidate.

EMPO and senior managers in ORO continue to demonstrate only limited leadership and assertiveness in the integration of Reservation-wide emergency management functions. In view of the number of independent contractors operating facilities at Oak Ridge, ORO needs to exercise a stronger role in these functions. In addition, EMPO needs to be more aggressive in its internal self-assessments to address long-standing emergency management issues. The ORO Deputy Assistant Manager for ESH acknowledged that to date, ORO's self-assessment capability was essentially nonexistent, but that this capability would be established under the Director position described above.