DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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November 9, 1999

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

Dear General Gioconda:

Since the spring of 1997, the Defense Nuclear Facilities Safety Board (Board) has been following closely efforts by the Department of Energy (DOE) and Lockheed Martin Energy Systems (LMES) to resume Enriched Uranium Operations (EUO) at the Y-12 Plant. During this period, numerous reports prepared by the Board's staff have been forwarded to DOE. Most of these concerns are the result of inadequate safety management and insufficient attention to technical safety issues. The Board has also been reviewing the conceptual design of the proposed Highly Enriched Uranium (HEU) Materials Facility at the Y-12 Plant and recently determined that common safety problems exist on this project and EUO activities. The Board's staff issue report discussing these safety problems is enclosed for your consideration.

These recurring safety issues are indicative of weaknesses in the implementation of Integrated Safety Management (ISM) at the Y-12 Plant. Therefore, pursuant to 42 U.S.C. § 2286b(d), the Board requests a report from DOE within 30 days of receipt of this letter, addressing how DOE intends to identify the root causes of the problems associated with execution of safety management principles and resolution of technical safety issues at the Y-12 Plant. This response should include consideration of the need for an independent assessment. This report should specifically address root causes and issues within the DOE organization, the contractor's organization, and the interface between DOE and the contractor.

The Board was informally briefed on November 5, 1999, by Mr. David E. Beck, Deputy Assistant Secretary for Military Application and Stockpile Management, on his preliminary plan for addressing this matter. The Board wishes to be further advised as this plan is finalized and actions initiated. Therefore, the Board requests further that within 90 days of forwarding its response to the above request, DOE provide an additional report outlining the corrective actions to be taken to remedy identified root causes and problems as well as changes to ISM practices at the Y-12 Plant.

The Board will continue to monitor DOE's progress on this matter, and has directed its staff to continue to follow this issue closely. If you have any questions, please do not hesitate to call.

Sincerely,

John T. Conway
Chairman

c: Ms. Gertrude Leah Dever
Mr. Mark B. Whitaker, Jr.

Enclosure

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

September 7, 1999

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

COPIES: Board Members

FROM: J. Blackman

SUBJECT: Review of Hydrogen Fluoride Supply System Project and Conceptual Design of Highly Enriched Uranium Materials Facility, Y-12 Plant

This memorandum documents a review by the staff of the Defense Nuclear Facilities Safety Board (Board) of the Hydrogen Fluoride Supply System (HFSS) Project and the conceptual design of the Highly Enriched Uranium Materials Facility at the Y-12 Plant. Continuing problems experienced by the Department of Energy Oak Ridge Operations Office (DOE-ORO) and Lockheed Martin Energy Systems, Inc. (LMES) with these projects prompted the Board's staff to review key technical attributes of the projects to determine whether common issues were involved. J. Blackman, P. Gubanc, M. Helfrich, D. Moyle, and D. Thompson of the Board's staff participated in this review on August 9–11, 1999.

Hydrogen Fluoride Supply System Project. On August 24, 1998, the Board transmitted to DOE a report containing the results of a staff review of the hydrogen fluoride (HF) system. Two issues highlighted in that report were the lack of an effective implementation of the process for hazard analysis and development of controls and a breakdown in weld quality assurance.

In general, DOE requires that safety-class systems be designed, constructed, and started up in accordance with a prescribed process. This process generally consists of initially determining system performance requirements; performing a safety analysis; determining controls required to prevent and mitigate accidents; specifying the safety classification of components to aid in defining codes and standards for the procurement, construction, and inspection of these components; designing and constructing the system; and finally testing the system to ensure that it meets its performance requirements before being turned over to operations. While work was begun on determining system performance requirements and preparing a Safety Analysis Report for the HF system, this work was never completed by LMES. Moreover, the system was designed and constructed without a finalized or DOE–approved safety basis and without a complete rational basis for specifying safety requirements for system components.

LMES took initial steps to remedy problems associated with the hazard analysis and development of controls by initiating preparation of a Safety Analysis Report for the HF system. In addition, they performed radiographic inspection of suspect welds and replaced defective welds for the system. However, LMES performed little follow-through on these initial steps, nor did they undertake corrective actions to remedy the root causes of the problems. For example, although LMES performed an assessment of the welding program at the Y-12 Plant in December 1998, they did not act on the findings of this assessment, which were well focused and pointed to the need for substantive organizational changes. Only when the HF system had been turned over to Enriched Uranium Operations in March 1999 and final testing and inspection of the system had begun did LMES realize the extent of the problems with the system and undertake an independent management review of the entire project.

As a result of the subsequent independent assessment of the HF system, performed in July 1999, LMES senior management has acknowledged that the project management team leadership for the HFSS was weak and lacked detailed involvement and understanding of all aspects of the project, from design and procurement through testing and evaluation. The need for corrective actions was also acknowledged.

It appears that DOE has not been responding actively to technical issues associated with the HF system or providing guidance to the contractor. In fact, DOE acknowledged that work on the HF system was allowed to continue and be completed without an approved safety basis being in place. Furthermore, the Board's staff could not determine whether DOE had undertaken any substantive actions to resolve these technical issues, even after they had been identified in the above-referenced staff report. During a general discussion on project management conducted as part of this review, DOE maintained that its primary role in oversight is related to cost and schedule matters and that it has been deemphasizing technical oversight for years. This is contrary to DOE's own position descriptions, according to which a project manager "assists in assuring that project related environmental, health and safety requirements are implemented for the protection of Government and contractor personnel and the general public [and] assures that the Oak Ridge Operations Quality Assurance Program is appropriately implemented for assigned projects."

Conceptual Design Report for Highly Enriched Uranium Materials Facility. On May 12, 1999, following staff reviews of recent facility upgrades at the Y-12 Plant and the conceptual design report for the Highly Enriched Uranium (HEU) Materials Facility, the Board transmitted to DOE a staff report concluding that increased effort would be required to integrate safety into the planning process to ensure overall success. The Board stated further that a disciplined process for controlling the design of facilities—based on the principles of systems engineering; Integrated Safety Management; and guidance contained in DOE Order 430.1A, *Life Cycle Asset Management*—should achieve this goal, and that failure to follow such a process would jeopardize the successful completion of the Y-12 Site Integrated Modernization (Y-SIM) effort.

LMES subsequently corrected some of the technical and program deficiencies outlined in the above staff report. Furthermore, they acknowledged the need to further improve technical

management of the facility design. During the August 9–11, 1999, staff review, DOE and LMES personnel made presentations and provided documentation demonstrating that they had responded to the Board's concerns regarding the design of the HEU Materials Facility by performing additional seismic and structural analyses, as well as further criticality safety analyses. Review of these analyses indicate that they have satisfactorily addressed issues raised by the staff.

LMES also made a presentation on the mission analysis and ongoing development of a System Requirements Document (SRD) for the Y-SIM program, of which the HEU Materials Facility is an initial key component. The approach presented was logically structured and at a level of development consistent with the very early stages of a major project. It appeared that the ongoing development of an SRD was initiated only after the Y-SIM program (specifically the design of the HEU Materials Facility) was well under way. The present stage of SRD development is consistent with what one would expect a year before publication of the Conceptual Design Report (CDR), since the SRD normally serves as a major determinant for the CDR. Despite the late start, it is probable that supporting systems engineering documentation can be completed during the remainder of the year before capital funds become available. The development of an SRD and associated activities suggests that LMES is initiating a disciplined process for controlling the design of Y-SIM facilities.

During a general discussion on its implementation of project management, DOE acknowledged that it has only recently become involved in the technical oversight of the HEU Materials Facility. However, DOE's level of management attention to Y-SIM in general and the HEU Materials Facility in particular has not been focused on providing an institutional, disciplined process for controlling the design of facilities. Review of the existing processes and procedures in place at DOE for overseeing projects in general and Y-SIM in particular indicated that they are not based on the principles of systems engineering, Integrated Safety Management, or the guidance contained in DOE Order 430.1A, and are inconsistent with concerns expressed in the Board's letter of May 12, 1999.

Future Actions Related to Technical Project Management and Integrated Safety Management. LMES senior management has stated its intention to conduct reviews of similar projects and undertake any necessary corrective actions. Similarly DOE senior management indicated its need to rectify problems with project oversight. However, it is not clear to the staff how DOE and LMES will proceed in this regard. Nor is it clear whether they have the organization, expertise, and sense of mission required to conduct a successful independent assessment of their roles and effect necessary changes. This concern stems from the fact that while DOE Order 430.1A is part of the DOE-LMES contract, neither organization has initiated significant efforts to implement the Order's provisions or undertaken the more challenging task of defining the interface between DOE and LMES.

These recurring issues are also indicative of weaknesses in the implementation of Integrated Safety Management (ISM) at the Y-12 Plant. Specifically, it does not appear that the feedback and improvement core function is consistently resulting in actions that address institutional weaknesses, as well as specific technical issues, in a manner that will prevent their

recurrence. This concern with a lack of effective and lasting corrective actions has been the subject of previous discussions between the Board and DOE, and was most recently reaffirmed in the LMES annual self-assessment of ISM implementation.