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DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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January 28, 1999

The Honorable Victor H. Reis
Assistant Secretary for Defense Programs
Department of Energy
1000 Independence Avenue, SW
Washington, D.C. 20585-0104

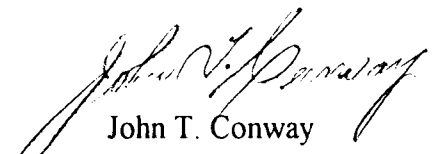
Dear Dr. Reis:

Enclosed for your consideration are observations developed by members of the staff of the Defense Nuclear Facilities Safety Board (Board) during recent reviews at the Oak Ridge Y-12 Plant.

The Board is pleased that appropriate hazard analyses of certain operations within the lithium hydride production facilities in Building 9204 have been carried out in accordance with Integrated Safety Management principles. The same rigor now should be applied universally across the site. For example, procedures for performing hazard identification and analysis need to be thoroughly implemented in engineering, design, and construction for new activities such as the replacement hydrogen fluoride system, and in the E-Wing of Building 9212 for mission operations or maintenance.

In furtherance of the good progress being made, Y-12 programs must institutionalize and formalize the basic functions of Integrated Safety Management for all facilities and activities. The Board encourages the site to complete implementation of an Integrated Safety Management System for all facilities and activities without delay.

Sincerely,


John T. Conway
Chairman

c: Mr. Mark B. Whitaker, Jr.
Mr. Richard Kiy
Mr. Steve Richardson

Enclosure

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

January 6, 1999

MEMORANDUM FOR: G. W. Cunningham, Technical Director

COPIES: Board Members

FROM: D. Burnfield

SUBJECT: Review of Worker Protection at Y-12 Site for Building 9212 E-Wing Maintenance and Operations and Construction of Hydrogen Fluoride System for Enriched Uranium Operations

This report documents a review by the staff of the Defense Nuclear Facilities Safety Board (Board) concerning the Y-12 Integrated Safety Management System (ISMS) at the activity level for E-Wing maintenance and operations and the construction of the hydrogen fluoride (HF) system for enriched uranium operations. This review was conducted during December 8–10, 1998, by staff members D. Burnfield and J. Troan and outside expert D. Volgenau. Previous reviews of the work planning processes at Y-12 were conducted by the Board's staff in December 1996 and June 1998.

An ISMS is in various stages of implementation at Y-12. Recent Department of Energy (DOE) reviews have indicated that an ISMS has not been completely implemented across the site. Although positive steps have been taken in activity-level work planning since December 1996, some areas previously observed as requiring improvement remain deficient. Noteworthy practices and areas in which improvement may be possible are identified below under each of the five ISMS functional areas.

Work Scope Definition. The manuals and codes of practice appeared to be formal and consistent with the ISMS core functions. (The term "manuals and codes of practice" is used in this report for site-wide procedures such as the Planner's Guide to avoid confusion with specific procedures used to conduct the activity-level work for facility operations or maintenance.) However, these manuals and codes of practice do not adequately ensure that all work undergoes a formal mandated planning process. For example, "new work" is mentioned, but not defined, and discussions with individuals involved in work planning revealed their confusion as to the appropriate work planning process for some "new work." The site-wide manual governing planning for maintenance activities (Planner's Guide) is confusing and complicated, hindering its effective use.

Although the ISM Program at the Y-12 Plant mandates worker participation in work planning and safety assessments through a mechanism called the Operational Safety Board, the

staff's review indicated that supervisors and workers routinely are not fully integrated into the work planning team for maintenance activities. Some safety disciplines (e.g., radiological protection) did not participate in the up-front work definition process. Further, although job walkdowns may be conducted, they serve primarily as a work definition effort and are not used as tools for identification and analysis of potential work hazards.

Identification and Analysis of Hazards. The staff's observations in this area relate to mission operations; maintenance; HF system fabrication and nondestructive testings; and engineering, design, and construction.

- **Mission Operations.** The expected process for analysis of hazards appears to be well documented in the Y-12 Plant manuals and codes of practice; however, there are still some deficiencies in application at the activity level. For example, the site requirement to perform a hazard analysis was not referenced whenever a readiness review was required. In addition, while the figures in the manuals and codes of practice indicate that a hazard analysis is to be performed for operations, the staff could find no actual reference to the manual for job hazard analysis (JHA).

The staff observed a number of instances of noncompliance with the prescribed manuals and codes of practice. For example, required checklists were not completed or were filled out incompletely, a JHA was not always completed as required, some checklists had no provision for indicating who completed the form, the process was not conducted as a multi-disciplined team effort, and people with appropriate expertise were not always involved in the planning or were involved late in the planning process.

There have been recent occurrences of uranium intake by several workers conducting casting-related material-handling activities in the E-Wing of Building 9212. Actions being taken to reduce the hazards to a level at which the workforce can do work without using respiratory protection are appropriate. However, significant improvement is needed in the implementation of the process for identifying and analyzing hazards and developing and implementing controls at the activity level in E-Wing. As identified in the Y-12 manuals and codes of practice, the goal ought to be improving the engineered controls used to protect the workforce and decreasing the hazardous conditions in E-Wing to reduce the risks.

- **Maintenance.** The process for identifying and analyzing hazards in the maintenance area is well documented in the Y-12 Plant manuals and codes of practice; however, implementation of the process was observed to be deficient for several maintenance activities. Currently, an Operations Maintenance Coordinator, who has had little training in hazard analysis techniques, is responsible for identifying the hazards for work under his purview. As with mission operations, crafts personnel perform the hazard analysis with little or no assistance from safety disciplines such as industrial health, industrial safety, and radiological controls. DOE Guide 440.1-1, *Worker*

Protection Management for DOE Federal and Contractor Employees Guide, provides valuable guidance concerning the need to use an effective team-based approach to hazard analysis. For activities in E-Wing, hazard identification and analysis would be improved if this guidance were consistently followed.

Further, the Y-12 planning process does not adequately define the skills workers are expected to maintain for performing routine low-risk work or “skill of the craft.” An adequate definition of the skill of the craft allows low-risk work to be completed safely and expeditiously. The lack of an adequate definition of skill of the craft could lead to workers performing tasks in unidentified hazardous areas or to unnecessary work planning activities.

- **HF System Fabrication and Nondestructive Testing.** As part of the review, the staff evaluated the work plan for conducting radiography of HF system welds. The work plan consisted of two parts, one covering only the radiography and the other the preparations and support for the radiographic testing. The review revealed a number of new concerns related to worker safety and indicated that the issues identified in the Board’s letter of August 24, 1998, had not yet been satisfactorily corrected. For example, a JHA had not been completed for the radiographic testing; a Radiological Work Permit (RWP) was not included in the plan; the checklist used to scope the work (Y10-012, Hazard Identification Planning for Maintenance and New Work Tasks) was outdated and had been superseded; the Health and Safety Hazards Identification checklist of Y10-012 had not been fully completed; and when an in-situ change was required, the plan was not revised to include provision for the change. (Subsequent radiography attempts did reveal at least one rejectable weld that would not have been identified had the radiography not been performed.)
- **Engineering, Design, and Construction.** The Lockheed Martin Energy Systems (LMES) engineering organization at the Y-12 Plant has responsibility for managing the design and completion of construction projects. In general, the planning and execution of activities associated with these responsibilities do not include the application of the basic tenets of ISM at the activity level. Specifically, the processes used for planning these activities do not follow the site-wide manuals and codes of practice for hazard identification and analysis, which would result in the implementation of appropriate controls. An effective ISM approach for these activities is not evident.

Development and Implementation of Controls. The work packages reviewed appeared to include adequate controls for worker safety. However, these procedures were for relatively simple work, and in one case controls were added after the job had been stopped by the workforce. The weaknesses observed in hazard identification and analysis procedures and processes raise the question of whether hazards will be fully assessed and associated controls implemented for more complex tasks. For example, because of the risk of high airborne activity in E-Wing, respirators are mandated for people engaged in work. However, there has been no

evaluation of the hazards associated with using a respirator while performing tasks originally planned to be done without a respirator.

Performance of Work. To the credit of Y-12 personnel, a formal process exists for the approval of work packages and for the authorization to commence work. By procedure, written work packages are required. These packages are approved by facility operations line management. Work is authorized by the shift manager on a daily basis through the plan-of-the-day.

Feedback and Continuous Improvement. The lack of an effective self-assessment and feedback program to serve as a mechanism for continuous improvement at the Y-12 Plant defense nuclear facilities is a deficiency recognized by both LMES and DOE. The staff's review revealed that neither of the manuals and codes of practice governing planning for the conduct of production or maintenance work provides for a close-out discussion upon completion of the work or a method for capturing lessons learned as input for improvements in work processes. An assessment and feedback program is outlined in the ISM Program directive (Y10-202), but this program has not yet been effectively implemented in the Y-12 defense nuclear facilities.

Conclusion. Based on the above observations, it is not apparent that the work planning and control processes in effect at Y-12 can adequately and consistently be relied upon to ensure worker safety.

Future Staff Actions. The staff will continue to monitor efforts at Y-12 to improve the processes for work planning in order to ensure worker protection.

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

December 11, 1998

MEMORANDUM FOR: G. W. Cunningham, Technical Director

COPIES: Board Members

FROM: W. Von Holle

SUBJECT: Review of Chemical Safety at the Y-12 Plant

This report documents information obtained by the staff of the Defense Nuclear Facilities Safety Board (Board) in a review of chemical safety at the Oak Ridge Y-12 Plant on December 8-9, 1998. The Board's interest in chemical safety is limited to hazardous chemical materials that are also radiological, or hazardous chemicals that share buildings with or are adjacent to radiological materials that might be affected by the chemical hazards.

Y-12 Chemical Safety Management Program. The Department of Energy (DOE)-Oak Ridge Office (ORO) submitted a response to the 1994 DOE Chemical Vulnerability Study generic vulnerabilities. No comments were received from DOE-Environmental Health (EH) regarding this response.

After the explosion in the Hanford Plutonium Finishing Plant in 1997, the Secretary of Energy initiated requests for information about the condition of chemicals at all sites in the DOE complex and the status of each site's chemical vulnerabilities. Specific site vulnerabilities were addressed in response to these requests. However, as representatives from ORO admitted to the Board's staff during its review, site vulnerabilities were not adequately addressed by the ORO response. The walkdowns were brief, personnel involved were not qualified to identify the chemical hazards, and a self-assessment that included specific chemical safety and lessons learned was not included. Nonetheless, DOE-EH did not provide any comments on the site's response.

The DOE Y-12 Site Office (YSO) and the contractor are continuing attempts to develop a site-wide chemical safety program that will institutionalize and formalize programs at all facilities. The latest Lockheed Martin Energy Systems (LMES) proposal was rejected by DOE-YSO as providing insufficient detail on implementation of the program.

Follow-up on Safety Review of Building 9204 Lithium Operations. This facility experienced several serious incidents prior to the last visit by the Board's staff in August 1998. At that time, the staff strongly encouraged the performance of a hazard analysis for each of the lithium production operations, since the previous piecemeal approach to resolving the safety problems was not working. Since this last staff review, the contractor has performed a design review of a reactor wash operation and a hazard evaluation of the lid wash, vessel wash, and

hydride production. Based on this internal design review, two equipment enhancements were suggested. The hazard evaluation of the washing and hydride production operations was led by JBF Associates and included a team of process engineers and a chemical operator. What-if/checklist and hazards and operability analysis methods were used. One recommendation was made for the reactor vessel and lid wash operations; six recommendations were identified for reactor furnace operations and equipment. Most of the recommendations for remediation of the risks involved in the operations were adopted, and lid washing and furnace operations have resumed. Additional hazard evaluations of operations in the facility have been planned.

Building 9206 Chemical Hazards Management. The building is currently being used to store various forms of in-process highly enriched uranium (HEU) material. From the standpoint of chemical hazards, the staff found no new hazards connected with the discontinued uranium operations beyond those already noted in previous staff reviews of this building. As in Building 9212, uranium solutions in contact with the organic solvents in the extraction columns have been diluted, greatly reducing the likelihood of creation of explosive compounds at the organic-aqueous interfaces. However, in contrast with Building 9212, the chemical recovery operations in this facility are not scheduled for resumption. Many of the materials in Building 9206 are going to be processed in Building 9212 equipment following restart of uranium recycle and recovery operations and completion of a project to establish separate parallel processing streams for a range of other material. Currently, if a column leaks, it is drained, and solution is stored for subsequent treatment. An HEU pyrophoric material is being stored under an argon atmosphere, with the goal of converting it to a form suitable for utilization in the 9212 HEU chemical recovery process, but the staff was given no schedule for the conversion. The Operational Safety Board, which provides integrated safety oversight and technical support, has been chartered and is functioning in Building 9206; over the next several months, it will begin to support deactivation. The budget for FY99 has not yet been approved, but the staff was told that approval was imminent.

Disposal of Excess Chemicals in Buildings 9202, 9203, 9205, and 9731. The staff received a briefing on progress made in disposing of excess chemicals in Development Organization facilities. For Building 9731, the staff verified progress in removing excess chemicals and inventorying the remaining materials, mainly old reagent chemicals. The contractor management for these facilities questioned the effectiveness of the Hazardous Material Inventory System for tracking hazardous materials, and explained that they have augmented that site-wide system with their own. Under Integrated Safety Management efforts, LMES recently developed a screening tool used in these facilities for determining whether a task requires a job hazard analysis; the staff believes this tool will enhance the safety of operations in these facilities.

Future Staff Actions. The staff will monitor the development of a site-wide chemical management system at the Y-12 Plant. In addition, the staff will begin a separate analysis of each Phase B Enriched Uranium Operations startup operation and closely follow the preparations for deactivation of Building 9206.