DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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October 31, 2000

The Honorable Madelyn R. Creedon
Deputy Administrator for
Defense Programs
Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-0104

Dear Ms. Creedon:

The Defense Nuclear Facilities Safety Board (Board) continues to follow with keen interest the Department of Energy's (DOE) pursuit of more timely hazard reduction in Building 9206. While it is recognized that some progress in risk reduction recently has been made, the measures taken are not sufficiently aggressive, and the overall level of hazards of most concern to the Board have not been markedly alleviated. The Board recognizes there are other important missions at the Y-12 Plant, such as Enriched Uranium Operations, that have high programmatic priority, but the situation at Building 9206 cannot be neglected. The enclosed issue report describing recent observations made by the Board's staff is forwarded for your information and use as you pursue expedited deactivation of Building 9206.

The principal difficulty with DOE's approach to deactivation of Building 9206 is that it does not ensure the commitment of adequate resources to the stabilization of the most hazardous residues. Deactivation and materials stabilization activities continue to be deferred without technical justification. For example, uranium solutions continue to be stored in vulnerable glass columns, and it remains unclear how and when the problem will be addressed.

There are no firm plans or timetable for stabilization or removal of a large portion of the remaining containerized highly-enriched uranium (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. The options DOE is presently considering for ultimate disposition of this material—converting the B9206 storage building into a long-term residue repository, establishing a limited process capability in B9206, or using the facility to blend down HEU for commercial reactor fuel—are relatively dubious.

It is important that unstable materials be rendered safe as soon as possible and that this vulnerable and deteriorating facility be deinventoried in an expeditious manner. It would be appropriate for DOE to reevaluate the findings and suggestions provided in past Board

correspondence regarding this facility. The Board would like to be briefed by DOE in the near future concerning the resolution of issues raised in the enclosed issue report, plans for reducing hazards in B9206, and proposals for accelerating the schedule.

The Board will continue to focus its attention on this important area as DOE moves to address excess facilities at the Y-12 Plant.

Sincerely,

John T. Conway
Chairman

c: Mr. Mark B. Whitaker, Jr.

Enclosure

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

October 17, 2000

MEMORANDUM FOR: J. K. Fortenberry, Technical Director

COPIES: Board Members

FROM: T. L. Hunt

SUBJECT: Review of Building 9206 Deactivation and Risk Reduction Activities at Oak Ridge Y-12 Plant

This report documents a review by the Defense Nuclear Facilities Safety Board's (Board) staff of deactivation and risk reduction activities at the Y-12 Plant's Building 9206 (B9206). The review was performed by staff members T. Hunt, J. Troan, and D. Moyle on September 8, 2000.

Background. Building 9206 is a Hazard Category 2 nuclear facility currently functioning in a standby mode as an in-process storage building. There are no plans to restart operations. B9206 contains highly-enriched uranium (HEU) in many unstable forms, including uranyl nitrate solutions in glass columns and plastic bottles, pyrophoric compounds, hundreds of kilograms of unstabilized residues, and poorly characterized fissile material hold-up in ducting and other systems. These material forms are of concern because of the potential for criticality, release of radioactive material, fire, and violent reactions.

The Board issued a letter to DOE in February 1998 noting that the lack of attention the building and materials were receiving was allowing its hazards and risks to increase. The Board issued a second letter in November 1999 reiterating the importance of not allowing the facility and its systems to deteriorate any further and the need to expedite risk reduction activities. A third letter to DOE issued in May 2000 discussed inadequacies in the DOE response to the November 1999 letter regarding the need to accelerate stabilization of fissile materials in B9206 and the need to commit adequate resources to this task.

Staff Observations. Three noteworthy accomplishments were realized by the B9206 staff in the past year in support of deactivation and risk reduction. First, a significant reduction in the containerized HEU inventory has been achieved. Compared to the May 1999 baseline, 54 percent—by weight of uranium—of the HEU in storage at B9206 has been shipped off site (most to the United States Enrichment Corporation [USEC]). Second, the depleted uranium chip crusher was cleaned out. This equipment and associated hazards were identified in the *B9206 Basis for Interim Operation* (BIO) as posing one of the highest risks to workers. Third, a Baseline Deactivation Schedule was issued in mid-October, subsequent to the staff's visit to Building 9206, and will be technically evaluated by the Board's staff. This document was

developed to define deactivation subprojects, determine cost profiles, and evaluate resource availability scenarios. This analysis should allow management to focus on reducing hazards in a technically justified and systematic manner, as well as facilitate integration and planning to ensure deactivation operations make steady progress.

Despite these accomplishments, the hazards of most concern to the Board have not been markedly alleviated. Examples of deactivation activities that have been repeatedly limited or deferred and where expedited risk reduction is still needed include the following:

- Draining of liquid from processing equipment, especially glass columns, will again be deferred, now beyond FY 2001. Based on limited funds and a perception of low relative risk, B9206 has decided to defer draining and stabilization of solutions. B9206 personnel assert that the lack of available bottle storage space precludes draining the uranium solutions. B9206 presently has 6–8 storage locations for 10-liter poly bottles, but would need 95 spaces to handle all the solutions that need to be drained from the primary and secondary extraction columns. It does not appear that there is a comprehensive plan to remove and dispose of liquids from processing equipment. It would benefit the plant to vigorously attempt to find disposition alternatives for the bottled solutions—freeing up essential storage space—rather than waiting for B9206 or B9212 processing capabilities.

- The pyrophoric uranium compound stored under less than ideal conditions in B9206 is considered one of the building's highest hazards and requires close attention. B9206 management has set the goal of stabilizing the material in FY 2001 or potentially repackaging and shipping it to Los Alamos National Laboratory for programmatic use. The facility is abandoning the previous plan to stabilize this material using wet chemistry and is pursuing an alternate method that will thermally decompose the uranium compound. This stabilization option seems very immature at this time. No technical evaluation exists to demonstrate and document the feasibility of using this process under the existing conditions or to describe the optimal process parameters. It has not been shown that thermal decomposition is clearly better than wet chemistry in the areas of safety, schedule, and cost. Neither has it been shown that flammable gas generation can be safely controlled during high-temperature operations in the building's existing argon glovebox. The facility BIO must also be reanalyzed and revised, as necessary, and equipment modified/installed prior to the proposed February 2001 Operational Readiness Review. With all the uncertainties and work to be done, the projected safe startup of stabilization operations by early next year appears optimistic.

- The facility plans to pursue additional opportunities to disposition containerized HEU in FY 2001. If B9206 personnel are successful in processing surplus uranium fluoride and shipping it to USEC for downblending, this would bring the total HEU dispositioned since May 1999 to 70 percent (by uranium weight); however, the

facility cannot rely on similar circumstances for dispositioning the entire inventory of HEU. Addressing the final 30 percent appears to be much more challenging. About 20 percent of original inventory is contaminated with regulated chemicals and is not as attractive to a potential buyer. Since this material may be very difficult to dispose of, the facility is evaluating the option of converting the B9206 storage building into a long-term residue repository. Also, uncertainties associated with the availability of Building 9212 (B9212) to process HEU from B9206 have led to the evaluation of other alternatives. Dubious options under consideration include establishing a limited process capability in B9206 or using the facility to blend down HEU for commercial reactor fuel. Due to the questionable feasibility of these options, direct disposal of these materials as waste, as suggested in the Board's November 2, 1999, letter to DOE, warrants more aggressive pursuit.

- Characterization of uranium holdup in the process equipment, piping, and ducting continues to advance at a slow pace. Although holdup in 11 components has been characterized this FY, progress is slow and much remains to be done to support deactivation planning. Also, the prioritization of systems/equipment for assay is not based on risk, but is done in an improvised manner (e.g., by room or area). An expedited, risk-based approach to characterization appears appropriate. The video survey of underground uranium-contaminated ductwork has also been delayed again, and a proposed action date has not been determined. Funding to perform this activity was eliminated during FY 2000, leaving at least another year of uncertainty before the videotaping and radiation surveys of the 1200 feet of ducting will be performed. The surveys will facilitate determination of the potential for an uncontrolled criticality.

Steady cutbacks in funding continue to be cited as the primary reason for the inability of the facility to increase the pace of transitioning B9206 to a safe condition. The facility requested approximately $3 million in FY 2000 for deactivation activities but received only $2.5 million (precluding, among other activities, the survey of the underground ductwork). The deactivation budget for FY 2001 is expected to decrease even further, to $2.0 million. The only deactivation activities presently budgeted in the FY 2001 workscope are maintaining the deactivation program, continuing nondestructive assay activities, and processing the pyrophoric material. It does not appear that the rate of deactivation/risk reduction activities at B9206 will be accelerated without additional funding, although pursuit of direct disposal of HEU residue materials and alternative disposition routes for HEU solutions may hold promise.