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DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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February 6, 1998

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

Dear Dr. Reis:

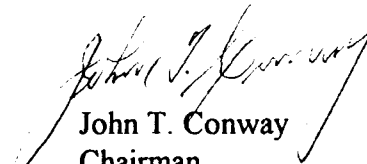
The staff of the Defense Nuclear Facilities Safety Board (Board) recently reviewed the status of Department of Energy's (DOE) phaseout activities for Building 9206 at the Y-12 Plant on the Oak Ridge Reservation. The enclosed report is a summary of observations resulting from a facility tour by Board staff with DOE staff and contractor personnel on November 20, 1997, and subsequent discussions. This report merits senior management attention.

DOE has identified Building 9206 as one of the most vulnerable highly enriched uranium (HEU) facilities in the weapons complex, but little progress is being made toward improving the safety posture of this facility. Numerous vulnerabilities have been identified in the facility by both the Board (in DNFSB/TECH 9, *Status of Highly Enriched Uranium Processing Capability at Building 9212, Oak Ridge, Y-12, Plant*) and DOE (in its *Highly Enriched Uranium Environmental, Safety and Health Vulnerability Assessment Report*). The Board wishes to draw several key concerns to your attention. These concerns include the questionable capability of the sprinkler system to mitigate fires in parts of the building, material and packaging weaknesses that pose the potential for a chemical reaction or explosion, inadequate characterization of contamination in the ventilation systems, and the potential for spills of HEU during a natural phenomenon event. Although these hazards have been documented for some time, it is not apparent that a concerted effort has been made to evaluate, address, and alleviate some of the identified vulnerabilities.

The Board notes that the objectives and timing for the initiation of facility phaseout have to date not been clearly defined and recognizes that a successful phaseout will ultimately play a critical role in the safe decommissioning of this facility. The Board believes it is crucial that this facility, particularly the systems and programs important to safety, not be allowed to deteriorate any further because of a lack of funding or management attention prior to the initiation of phaseout activities. The facility needs to be carefully transitioned to a safe, stable condition and maintained in a configuration that will subsequently facilitate a safe and efficient decommissioning.

The facility needs to be included among the long-term environmental management planning goals in order to reduce risks at the Y-12 Plant. The Board understands that DOE is in the process of developing a phaseout plan for Building 9206. The enclosed observations should be of assistance in this effort, which the Board encourages be done expeditiously. The Board looks forward to reviewing this document as it develops.

Sincerely,



John T. Conway
Chairman

Enclosure

c: The Honorable Ernest J. Moniz
Mr. James C. Hall
Mr. Mark B. Whitaker, Jr.

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

December 10, 1997

MEMORANDUM FOR: G. W. Cunningham, Technical Director

COPIES: Board Members

FROM: T. L. Hunt

SUBJECT: Review of Phaseout Activities of Building 9206 at the Y-12 Site, November 20, 1997

This memorandum documents a review by the staff of the Defense Nuclear Facilities Safety Board (Board) of the Department of Energy's (DOE) preparations for phaseout operations in Building 9206 (B9206) and Building 9720-17 at the Y-12 Site on the Oak Ridge Reservation. This review was conducted by T. L. Hunt, S. L. Krahn, and R. W. Zavadoski.

B9206 is a legacy Defense Programs facility with significant amounts of material at risk. It is vintage 1943 steel-frame construction with hollow clay tile in-filling. The 64,000 ft² facility is about 1,300 ft from the site boundary and is presently in a stand-down operational status. The original design mission of the building was recovery of myriad enrichments of highly enriched uranium (HEU). Current use is limited to storage of excess "in-process" fissile material awaiting processing—more than 2,600 batches of uranium-bearing material in several forms and various enrichments, including metals, oxides, compounds, combustibles, residues, solutions, and ventilation duct holdup. The material is packaged in cans, vessels, plastic bags and containers, drums and tanks, and is located throughout the facility in vaults, piping, hoods, and tanks.

Numerous vulnerabilities have been identified in B9206 by both the Board's staff and DOE (in its *Highly Enriched Uranium Environmental, Safety and Health Vulnerability Assessment Report*, December 1996). The majority of these vulnerabilities have yet to be addressed by DOE.

The identified B9206 vulnerabilities include incomplete fire protection by sprinklers, possible chemical reactions/explosions with spread of HEU, inadequate characterization of contamination in underground ventilation, and potential for HEU spills caused by an earthquake:

- Fire dominates all Y-12 accident release scenarios. The absence of sprinklers in portions of the building means that manual firefighting equipment would have to be available to suppress an HEU fire. In addition, radioactive combustible material stored in the building could allow fires to spread to areas where HEU is stored or processed.

- Five large (up to 24" diameter) stoneware ventilation ducts running under B9206 have been sealed off and abandoned, some for almost 40 years. There is evidence that groundwater has infiltrated into the sump that services these ducts. Grab samples taken from the duct in 1983 revealed the presence of HEU contamination. The actual condition of the ducts and their precise contamination levels are still largely unknown.
- Existing material/packaging vulnerabilities in B9206 can create an environment in which energetic chemical reactions can occur, releasing HEU into the atmosphere. The current sampling and inspection program for material characterization and storage containers is flawed (e.g., the protocol for container monitoring does not require evaluation for overpressurization). The improper storage of pyrophoric material (e.g., ill-fitting or deteriorated seals, corrosion) and chemicals could result in reactions that rapidly produce gas, create spills, and generate excessive amassment of material. The planned resumption of use of natural gas for the B9206 recovery furnace also creates the potential for an explosive accumulation.
- The potential exists for extensive HEU spills and exposures in B9206 should the building experience forces for an earthquake. Seismic evaluations have generally indicated a low seismic capacity, particularly for the in-fill clay tile walls. Also, storage racks and configurations are not adequate to prevent multiple spills during an earthquake.

It is not evident that a concerted effort to address the identified vulnerabilities has been made. The Unreviewed Safety Question Determination process has not been implemented to ascertain whether the probability of an occurrence or the consequences of an accident were previously evaluated by the existing safety analyses. It does not appear that corrective actions are being taken to alleviate the more serious concerns.

Sufficient resources are not being committed by Defense Programs to treat the excess in-process material and transition B9206 to decommissioning status. The facility also seems to be seriously understaffed and resource limited. Very little progress has been made toward bringing the facility into a safer condition since the Board's reporting requirement in February 1996 and DOE's HEU vulnerability assessment in December 1996. There is a perceived lack of urgency with regard to activities associated with B9206. For example, (1) of the hundreds of corroded and deformed cans of HEU stored in the facility, only 20 were repackaged in FY97; (2) building personnel have not commenced development of the Preliminary Hazards Analysis, which was scheduled for issuance by November 1997; (3) a criticality safety deficiency that was noted during the last tour of B9206 by the Board's staff in March 1997 remains outstanding because of the lack of manpower to move the out-of-specification container to an approved storage rack; (4) knowledge and documentation of the holdup in the processing systems and ventilation are severely lacking, with no effort being made to quantify the material; and (5) the surveillance and maintenance program to monitor carbon-steel containers for corrosion appears to be arbitrary and informal.

The Y-12 Site needs a funded program dedicated to stabilizing the special nuclear material, moving it from B9206, and allowing decommissioning to commence as soon as possible. The goals of the current B9206 phaseout plan include (1) using the deactivation approach employed at the PUREX facility in Hanford (e.g., utilizing the end-point method, involving stakeholders, using an integrated safety and health strategy), (2) establishing a surveillance and maintenance mode, and (3) maintaining the building in a safe and stable condition (e.g., no material access areas or hazardous materials remaining, limited utilities) until decommissioning. Although B9206 has yet to be declared excess to DOE's mission needs, DOE needs to make a commitment to include this facility in its long-term environmental management planning goals in order to reduce the hazards at the Y-12 Site.

The Board's staff will continue to review issues related to deactivation and decommissioning activities in B9206. The next staff visit is planned for May 1998 to assess the Basis for Interim Operations, phaseout plan, remedial activities to address documented vulnerabilities, and recovery furnace operations.