

A.J. Eggenberger, Vice Chairman
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DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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April 20, 2005

The Honorable Everet H. Beckner
Deputy Administrator for Defense Programs
National Nuclear Security Administration
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585-0104

Dear Dr. Beckner:

The staff of the Defense Nuclear Facilities Safety Board (Board) recently conducted a review of the structural deficiencies of Building 9212 at the Y-12 National Security Complex. These deficiencies are noted in safety basis documentation submitted to the National Nuclear Security Administration (NNSA) for review and approval. Results of analyses of the building's structure indicate that it would not withstand performance category-2 seismic loads and that many of the building's systems and components have insufficient seismic restraint. The enclosed report prepared by the Board's staff summarizes observations noted during this review.

The Y-12 contractor, BWXT, recommended to NNSA that modifications addressing the structural deficiencies of Building 9212 not be made because of the facility's limited life, given the planned construction and startup of a replacement facility by 2013. The Board recognizes the need for a new facility—the Uranium Processing Facility (UPF)—for enriched uranium operations that would significantly improve safety and security at Y-12. The Board also believes, as indicated by Y-12 management, that NNSA should work aggressively to eliminate the backlog of nuclear materials (especially solutions) that have accumulated in Building 9212 during many years of operations. At the same time, however, there are opportunities to implement near-term structural improvements or other facility modifications that would reduce the structural vulnerabilities associated with the building.

The Board recognizes that NNSA is evaluating the contractor's proposal and has not determined a path forward. The Board believes that an appropriately balanced plan encompassing construction of a new facility, reduction of material at risk, and implementation of practical facility modifications is prudent and necessary for Building 9212. Therefore, pursuant to 42 U.S.C. § 2286b(d), the Board requests a briefing on NNSA's path forward regarding the structural deficiencies of Building 9212 within 30 days of NNSA's taking action on the proposed

safety basis, including plans to eliminate the backlog of nuclear materials. The Board also requests a discussion of the impact on these plans if UPF is delayed, including the point at which more aggressive remedies with respect to Building 9212 would be required.

Sincerely,

A handwritten signature in black ink, appearing to read "A. J. Eggenberger". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

A. J. Eggenberger
Acting Chairman

c: Mr. William J. Brumley
Mr. Mark B. Whitaker, Jr.

Enclosure

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

Staff Issue Report

April 11, 2005

MEMORANDUM FOR: J. K. Fortenberry, Technical Director
FROM: W. Linzau
SUBJECT: Structural Deficiencies, Building 9212

This report documents a review by the staff of the Defense Nuclear Facilities Safety Board (Board) regarding structural deficiencies of Building 9212 at the Y-12 National Security Complex (Y-12). To conduct this review, staff members W. Linzau, M. Moury, D. Owen, and T. Davis participated in discussions with site personnel and a walkdown of the facility on March 3, 2005. This report was supplemented by follow-up phone calls with contractor during the week of March 20, 2005 and April 11, 2005.

Background. Building 9212 was constructed in stages during the 1940s and 1950s. Its primary mission is to recover and process enriched uranium for defense missions, as well as to store various forms of enriched uranium. The contractor, BWXT, submitted a new Documented Safety Analysis (DSA) for Building 9212 to the National Nuclear Security Administration's Y-12 Site Office (YSO) for approval. YSO is currently evaluating the DSA and plans to issue a Safety Evaluation Report by June 2005.

In December 2004, approval of Mission Need (Critical Decision-0) was received for the new Uranium Processing Facility (UPF). This facility will assume the primary mission functions of Building 9212, allowing the latter facility to be deinventoried and deactivated. Startup of UPF is projected for 2013. Uncertainties in the timing and level of funding could negatively impact the proposed schedule.

Structural Deficiencies. To support the DSA, BWXT completed an analysis of the building's structural response to natural phenomena events. The results show that portions of the facility would fail during a performance category (PC)-2 seismic event, and the roof would be damaged by a PC-2 wind event. The structural deficiencies include numerous failures of the bracing providing lateral force resistance, with failures typically occurring at the connections that are bolted or riveted. Other bracing has been cut or removed in the past. Moreover, sections of the facility were constructed without an adequate lateral load path, thus allowing excessive deformation of beams and columns during a PC-2 seismic event.

BWXT also performed an evaluation of the seismic resistance capacity of components and systems within the facility. The results show that seismic resistance was not considered in the design of most of the supports and anchorages of various tanks, glass columns, storage racks, throughout the facility.

BWXT prepared order-of-magnitude cost and schedule estimates for bringing the facility into PC-2 compliance. Addressing all the deficiencies is estimated to cost \$35–72 million and to take more than 60 months. The cost to fix only equipment, such as the glass columns, racks, and tanks, is estimated to be \$29–57 million.

Given the cost and schedule estimates for full PC-2 compliance and the expected remaining life of the facility, BWXT has concluded that it would not be cost-beneficial to make the necessary structural improvements. Additionally, BWXT has concluded that low-cost modifications would not significantly reduce the overall consequences of a seismic event. BWXT believes resources should be focused on the reduction of material at risk in Building 9212 and on the design and construction of UPF.

Observations. BWXT has not supplied YSO with detailed options for structural improvements or other modifications, including refined cost estimates and analyses of the safety benefits and risk prioritization of such options. In addition, simple, straightforward upgrades appear practical, such as adding support for at-risk beams and replacing understrength bolts and braces with higher-capacity members. During a walkdown of Building 9212, the staff noted numerous loose or missing nuts and bolts for equipment supports that compound the structure's weak seismic resistance. Tightening existing equipment supports would help ensure that their limited capacity is maximized. Such improvements ought to be prioritized considering the material at risk, impacts to operations, and available resources. A systematic evaluation of improvement options would allow YSO to make an informed decision on the proper path forward regarding the structural deficiencies of Building 9212.

An example of a hazard that might be addressed by a low-cost modification is the potential for rupture and ignition of flammable gas lines during a seismic event. To prevent large postearthquake fires, automatic seismic isolation valves are often used for such supply lines. Building 9212 uses this type of valve for the hydrogen fluoride supply line because of the toxicological hazard, but does not use such valves for the natural gas lines that supply the building.

Additional Information. During the walkdown of Building 9212, the staff noted that one of the structural members in an adjacent support building—the Stack 110 Bag House—was missing. The missing member is a first-floor structural brace that appears to be essential in providing lateral support for the structure. The required work packages were completed and the missing brace was replaced April 7, 2005. YSO is working with BWXT to understand the broader safety implications of the loss of configuration management indicated by the identification of a missing structural brace.