

John T. Conway, Chairman  
A.J. Eggenberger, Vice Chairman  
John E. Mansfield  
R. Bruce Matthews

## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

625 Indiana Avenue, NW, Suite 700, Washington, D.C. 20004-2901  
(202) 694-7000



March 24, 2004

The Honorable Jessie Hill Roberson  
Assistant Secretary for Environmental Management  
U.S. Department of Energy  
1000 Independence Avenue, SW  
Washington, DC 20585-0113

Dear Ms. Roberson:

The Defense Nuclear Facilities Safety Board (Board) has been reviewing Bechtel National Incorporated's (BNI) research and development processes for addressing hydrogen hazards related to non-Newtonian high-level wastes. During this year-long effort, BNI has attempted to build its technical basis with an experimental program using surrogate materials and integrating the results as the program progressed and matured. It is the Board's understanding that the Department of Energy (DOE) is using these test results to make a number of key design and operating decisions. To date, however, a complete review of these test data and their presentation in final report form has not occurred, and current schedules indicate that finalized data/reports may not be issued until months after major design decisions have been made. The Board believes that the use of preliminary data, particularly when based so heavily on experimental testing with surrogate materials, which has not undergone a thorough quality review, increases the chance of introducing errors into the design that may be irreversible.

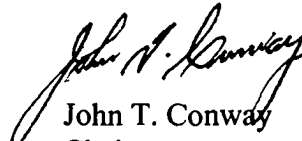
The Board has also reviewed the report of DOE's Office of River Protection (ORP) on the adequacy of the "black cell" design concept. This report identifies five recommendations and 30 open items that appear sufficiently significant to require resolution before proceeding with certain final design activities. For example, the report states that BNI's material selection basis is not technically defensible and ORP recommends that BNI reassess the technical basis for the erosion wear rates to determine whether they are adequate. The Board believes this open item to be significant since materials selection and erosion/corrosion allowances are critical to meeting the black cell design objective of 100 percent reliability during the 40-year life of the Waste Treatment and Immobilization Plant.

The Board understands that the effort to closely couple design and construction entails certain risks. However, the Board believes that decisions to proceed with the final tank mixing system design(s) and development of an operating strategy to prevent hydrogen deflagrations/explosions are premature, given the degree of uncertainty that presently exists.

In a March 10, 2004 briefing to the Board, the ORP Manager acknowledged these key issues and challenges and is taking action to address them. The Board is encouraged by this action and commitment, however, the Board remains concerned with the significant technical uncertainty that still exists at this stage of the tank mixing system design.

Therefore, pursuant to 42 U.S.C. § 2286b(d), the Board requests a report within 60 days of receipt of this letter identifying the critical information needed to design mixing systems for non-Newtonian high-level wastes and complete black cell designs, and the quality and adequacy of test data being used to provide this information. This report should also discuss, in sufficient technical detail, the relevant mixing properties of non-Newtonian high-level waste, acceptability of using surrogate materials to bound in-situ waste behavior, the amount of excess capacity in the design to address experimental uncertainty, the impact of the mixing design(s) on interfacing safety structures, systems, and components, the ability to meet established design requirements and standards, and any other options being pursued to supplement or replace pulse jet mixing. The report should discuss as well how the findings, recommendations, and open items in the body of the ORP black cell report are being addressed.

Sincerely,



John T. Conway  
Chairman

c: Mr. Roy J. Schepens  
Mr. Mark B. Whitaker, Jr.