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## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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June 1, 2005

Mr. Charles E. Anderson  
Principal Deputy Assistant Secretary for  
Environmental Management  
U.S. Department of Energy  
1000 Independence Avenue, SW  
Washington, DC 20585-0113

Dear Mr. Anderson:

The Defense Nuclear Facilities Safety Board (Board) has been following closely the effectiveness of the high-level waste tank integrity program for double-shell tanks (DSTs) at the Hanford Site. In letters dated August 29, 2000, November 15, 2002, and January 18, 2005, the Board noted problems associated with preserving both tank leak integrity and tank structural integrity.

The Board was encouraged that the contractor at the Hanford tank farms convened an expert panel, composed of nationally known chemistry and corrosion experts, to establish initiatives for the chemistry optimization of DSTs. The Board's staff reviewed the experimental test plan for corrosion studies recommended by the panel—*Test Plan for Evaluating the Corrosivity of Double Shell Tank 241-AN-107 Waste*. As a result of the experimental tests defined in this test plan, tank chemistry limits will likely be revised. The staff concluded that the test plan is adequate for optimizing chemistry in the supernate and sludge of high-level waste tanks to minimize corrosion that could lead to leaks.

Recently, the Board's staff learned of new data on corrosion in the vapor space regions in DSTs (reported at the National Association of Corrosion Engineers [NACE] Corrosion 2005 Meeting in Houston, Texas, in a paper entitled "The Application of Electrochemical Noise Based Corrosion Monitoring to Nuclear Waste Tanks Vapor Space Environments at the Hanford Site"). These data revealed localized crevice corrosion that occurred between 1 and 5 months after insertion of electrochemical noise probes into the vapor space of Tanks AN-104, AN-105, and AN-107 at Hanford. A sample removed from the vapor space of Tank AN-107 showed crevice corrosion had occurred on the electrochemical noise probes. The Board is concerned that these new findings indicate a potential for vapor space corrosion in DSTs. Additionally, the current experimental test plan recommended by the expert panel does not include tests that simulate vapor space conditions.

Tank AN-107 will be the first tank whose waste chemistry limits may be revised on the basis of results from the current experimental test plan. The Board is aware that multilevel, multisensor corrosion monitors are to be placed in Tank AN-107 in the sludge, in the supernate, at the liquid-air interface, as well as in the vapor space regions of the tank. However, the Board believes it prudent to have a better understanding of any impact on vapor space corrosion before implementing revised waste chemistry limits.

The Board encourages DOE to continue the laboratory studies identified in the experimental test plan on an expedited schedule. However, DOE should ensure that the panel is aware of these recent findings and provide panel members the opportunity to suggest additional tests in the experimental program to help understand vapor space corrosion. The Board also requests that DOE provide timely updates to the Board's staff regarding laboratory test results and any changes to the test plan incorporating vapor space corrosion experiments.

There are risks and benefits in revising waste chemistry limits. The benefits of reducing inhibitor additions to the tanks include saving the costs of making the inhibitor additions, saving tank space, reducing processing costs at the Waste Treatment Plant, and possibly reducing the number of canister shipments to a deep geologic repository. However, the risk is that one or more tanks may leak prematurely. Although emergency tank space is maintained as an immediate contingency should a tank leak occur, there are longer-term questions of risk versus benefit that should be addressed before revising waste chemistry limits. These include the safety impacts of any leaks, what would be done with the supernate removed from one or several tanks that leaked, and what would be the impact of leaking tanks on overall operations of the high-level waste system. These are questions that should be addressed before revising waste chemistry limits.

Pursuant to 42 U.S.C. § 2286b(d), the Board requests that DOE provide a briefing to the Board within 90 days of the receipt of this letter on (1) the incorporation of vapor space data into the ongoing test programs for DSTs, and (2) the risk versus benefits of revising waste chemistry limits.

Sincerely,



A. J. Eggenberger  
Acting Chairman

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