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# DEFENSE NUCLEAR FACILITIES SAFETY BOARD

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August 29, 2007

The Honorable James A. Rispoli  
Assistant Secretary for Environmental Management  
U.S. Department of Energy  
1000 Independence Avenue, SW  
Washington, DC 20585-0113

Dear Mr. Rispoli:

The Defense Nuclear Facilities Safety Board (Board) acknowledges receipt of your letter of August 16, 2007, which describes your plans for low-temperature aluminum dissolution and subsequent storage of aluminum-rich supernate in Tank 11 at the Savannah River Site's high-level waste tank farms. The Board has reviewed the safety aspects of using Tank 11 to store the aluminum-rich supernate and has no objections to the Department of Energy's (DOE's) proposed plans.

In Revision 4 of the Implementation Plan for the Board's Recommendation 2001-1, *High-Level Waste Management at the Savannah River Site*, DOE stated that additions to Type I and Type II tanks were to be restricted to those required to facilitate waste removal activities. As noted in the enclosure to your letter, this proposed use of Tank 11 is not associated with a waste removal activity and would not normally be permitted. The Board notes that Tank 11 is one of seven Type I high-level waste tanks with known leak sites. However, the Board recognizes that limited space in the high-level waste tanks has forced DOE to choose non-ideal alternatives in order to manage high-level waste at the Savannah River Site. The aluminum-rich supernate to be stored in Tank 11 is low-activity liquid separated from sludge waste that is to be vitrified at the Defense Waste Processing Facility. DOE plans to store the aluminum-rich supernate in Tank 11 until it is processed at the Salt Waste Processing Facility, once that facility begins operation.

The Board has reviewed the safety aspects of using Tank 11 to store the aluminum-rich supernate, and has discussed with DOE the important actions that will be taken to minimize or mitigate the impact of a possible leak from the tank. As described in the enclosure to this letter, these actions include limiting the maximum level of the waste to a level below the lowest known leak site, and implementing the corrosion control program, tank visual inspections, leak detection requirements, and leak response procedures. Based on its review, the Board believes there is reasonable assurance of safety in storing the aluminum-rich supernate in Tank 11.

Please contact me if you have any questions on this matter.

Sincerely,

A handwritten signature in black ink that reads "A. J. Eggenberger". The signature is written in a cursive style with a large, stylized initial "A".

A. J. Eggenberger  
Chairman

c: Mr. Jeffrey M. Allison  
Mr. Mark B. Whitaker, Jr.

Enclosure

## Enclosure

### Safety Considerations for Storage of Aluminum-Rich Supernate in Tank 11

The Defense Nuclear Facilities Safety Board (Board) has reviewed the plans for low-temperature aluminum dissolution and subsequent storage of aluminum-rich supernate in Tank 11. Tank 11 is a Type I high-level waste tank with known leak sites in the upper tank wall. The Department of Energy (DOE) plans to add the aluminum-rich supernate to a maximum level of 43 inches below the lowest known leak in Tank 11. The estimated cesium source term of the supernate (approximately 0.1 curie/gallon) is significantly lower than that of the waste previously stored in Tank 11 (1.0 curie/gallon). The Board believes this operation can be conducted safely provided that the following actions are meticulously implemented to prevent, detect, and respond to potential leaks until the waste in Tank 11 is processed.

1. **Corrosion Control Program.** The Corrosion Control Program in the tank farms specifies waste chemistry requirements designed to minimize the possibility of corrosion and its detrimental effects on tank integrity.
  - a. DOE will conduct and document an evaluation of the final composition of the aluminum-rich supernate to ensure compliance with the Corrosion Control Program. The evaluation will account for the wide uncertainty range of the final supernate composition.
  - b. DOE will continue to monitor the chemistry conditions in Tank 11 and make adjustments to meet the requirements of the Corrosion Control Program while the supernate remains stored in the tank.
2. **Transfer Control Program.** The documented safety analysis for the tank farms requires that transfers of waste comply with the Transfer Control Program.
  - a. DOE will meet the requirements of the Transfer Control Program to ensure that only compatible waste will be transferred into Tank 11.
  - b. DOE will also ensure that the aluminum-rich supernate in Tank 11 is not transferred to any other tank or evaporator system in violation of the Transfer Control Program or the evaporator waste acceptance criteria.
3. **Visual Inspections.** The *In-Service Inspection Program for High-Level Waste Tanks* defines the requirements for visual inspection of Type I tanks. Per this program, the tanks must be visually inspected at least every 2 years. DOE completed a visual inspection of Tank 11 in March 2006 and found the tank walls to be in good condition except for the two known leak sites.

- a. DOE will continue the visual inspections of Tank 11 as required by the In-Service Inspection Program.
  - b. DOE will implement real-time video surveillance in the annulus while Tank 11 is receiving waste.
4. **Leak Detection Equipment.** Tank 11 is subject to a Technical Safety Requirement that mandates operable leak detection equipment in the tank annulus. This detection equipment consists of a pair of conductivity probes that are linked to a control room alarm to allow for continuous monitoring. The probes and the alarm receive a required instrument loop test every 7 days.
  - a. DOE will comply with the Technical Safety Requirement for leak detection.
5. **Leak Response Procedures.** The contractor maintains procedures and equipment for responding to leaking tanks. These procedures include, but are not limited to, the Contingency Transfer System, which is designed to pump the annulus down to a 2 inch level at a flow rate well in excess of any expected leak rate.
  - a. DOE will ensure the leak response procedures are in place and will validate the operability of all associated contingency transfer equipment prior to transferring waste to Tank 11.
6. **Capability to Transfer Waste out of Tank 11.** The contractor also maintains procedures and equipment for responding to a leak by removing waste from Tank 11 until the waste level has been lowered below all leak sites. Such transfers would rely on maintaining sufficient space in other tanks to allow receipt of the waste.
  - a. DOE will ensure that adequate emergency tank space is maintained to implement contingency transfer operations.
  - b. DOE will validate the operability of the Tank 11 waste transfer pump prior to adding waste to Tank 11, and will periodically validate operability throughout the period the aluminum-rich supernate is stored in Tank 11.
7. **Feed Specification for the Salt Waste Processing Facility.** Site analysts expect that the aluminum-rich supernate will meet the feed specification for the Salt Waste Processing Facility (SWPF). Once it is operational, SWPF will provide the final disposition pathway for the supernate and DOE plans to include the Tank 11 material in an early SWPF campaign.

- a. DOE will verify by sampling prior to transferring to Tank 11 that the waste can be processed in SWPF. Additional sampling during the SWPF processing campaign will ensure that the aluminum-rich supernate meets the SWPF feed criteria.

The above actions provide assurance of safety for the transfer of supernate from the low-temperature aluminum dissolution process into Tank 11. The Board withholds judgment on the storage of this aluminum-rich supernate in any tank other than Tank 11. The Board agrees with the stated objective of shortening the life cycle of the tank waste system and reducing risk, as presented in the DOE letter to the Board dated August 16, 2007.