

## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

November 13, 1998

**MEMORANDUM FOR:** G. W. Cunningham, Technical Director  
**FROM:** J. Kent Fortenberry  
**SUBJECT:** SRS Report for Week Ending November 13, 1998

**Potential Inadequacy in High Level Waste Fill Limits** - Current tank fill limits for SRS high level waste tanks were based not only on overflow considerations, but also on structural integrity. Fill limits were determined as a function of the waste specific gravity and the size of any existing cracks. These fill limits were based on maintaining the combined stress resulting from a design basis earthquake below the limit for ductile tear at the crack tip. In cases where the crack length was not known, a length of 6 inches was used since this was the largest crack that had been measured in the tank farm. A 12 to 15 inch crack discovered in Tank 15 prompted reassessment of tank integrity and the tank fill limits. In addition, the previous analysis did not take into account stress concentration in the crack tip. WSRC has been applying fracture mechanics methodologies, including a draft American Petroleum Institute code (API-579) "Recommended Practice for Fitness-for-Service." Preliminary results indicate that some of the current tank fill limits are non-conservative. WSRC has declared a Potential Inadequacy in the Safety Analysis (PISA). Tank 13 appears to be the most vulnerable tank because it contains a significant amount of sludge and supernate. Preliminary results indicate that a postulated crack of 1 inch or greater located at the high stress region near the bottom of the tank would propagate given the current tank level and specific gravity. No cracks are known to exist in the high stress region based on visual inspection of the observable tank exterior (about 90% of the tank exterior). Existing compensatory measures preclude waste additions to Tank 13 and other Type I and II tanks. The finalization of these analyses could require that the level of waste in some tanks be reduced. WSRC had initiated contingency planning for Tank 13 in the event that a reduction in the fill limit is necessary. Reducing the allowed amount of waste in some tanks would potentially aggravate tank farm capacity constraints.

Note that this PISA affects only Type I and II tanks (tanks 1 through 15). This PISA does not affect the Type III stress relieved high level waste tanks (tanks 25 through 51), nor the Type IV steel lined prestressed concrete tanks (tanks 17 through 24).

**Tank 8 Re-wetting and Sludge Waste Removal** - Following water addition to Tank 8, there has been no indication of tank leakage. Sample results to determine the nature of the re-wetted sludge are not yet available. However, other problems have arisen associated with preparations for sludge waste removal. Four slurry pumps are to be installed in Tank 8 for waste removal operations. Several slurry pumps being 'run-in' at the TNX facility have experienced out-of-specification vibration conditions that must be resolved. In addition, video observation of one Tank 8 riser in which a slurry pump is to be installed revealed a steel obstruction that will need to be removed before the pump can be installed.