

DEFENSE NUCLEAR FACILITIES SAFETY BOARD

January 30, 2004

MEMORANDUM FOR: J. Kent Fortenberry, Technical Director
J. J. McConnell, Deputy Technical Director
FROM: R. T. Davis/ T. D. Burns
SUBJECT: SRS Report for Week Ending January 30, 2004

Citizens Advisory Board: On Tuesday, a site representative briefed the Citizens Advisory Board (CAB) on the Board's report to Congress concerning plutonium storage at SRS. The briefing focused on the staff reviews conducted in preparing the report and the proposals identified by the Board to enhance the safety, reliability, and functionality of the plutonium storage facilities. The briefing was well received by the CAB.

Tank Farms Safety Basis: The Documented Safety Analysis (DSA) covering Concentration, Storage, and Transfer operations performed in the Tank Farms recognizes the potential for sludge solids to trap hydrogen gas generated in the waste. This phenomenon can present a transient explosive hazard if large volumes of hydrogen accumulate in the sludge and are subsequently released instantaneously during an energetic disturbance (i.e. seismic shaking or pump mixing). To account for this phenomenon and prevent unacceptable transient hydrogen concentrations in the tank headspaces, a program is in place (the Quiescent Time Program) to periodically run tank mixing pumps (where installed) in a controlled manner to release trapped hydrogen before unacceptable inventories accumulate. Pertinent assumptions used to determine the appropriate periodicity for controlled pump runs are outlined in the DSA.

Recent review of operational data from sludge washing evolutions in Tank 51 during November and December of 2003 indicate that two of the assumptions outlined in the DSA regarding computation of trapped hydrogen inventories are potentially non-conservative. The first errant assumption is that the top 40 inches of sludge do not retain hydrogen. The recent data indicates that though a hydrogen-free top layer of sludge does exist, it is smaller than 40 inches. The second errant assumption is that the fraction of generated hydrogen retained in the sludge is a constant 50%. The recent data indicates that the retained fraction is actually a function of the sludge height and that the 50% assumption is not bounding for sludge heights in excess of 90 inches.

In response to these findings, WSRC issued a Potential Inadequacy in the Safety Analysis (PISA), performed an Unreviewed Safety Question Evaluation, and made a Positive Unreviewed Safety Question Determination. Subsequent review of the pump run frequency calculations indicate that, though allowed, the assumption regarding the absence of hydrogen in the top 40 inches of sludge was not invoked. Survey of tank sludge levels also indicate that none currently exceed a height of 90 inches. Compensatory measures have been instituted to disallow use of the hydrogen-free 40 inch assumption in future pump run frequency calculations and preclude any waste transfers that would result in a sludge height exceeding 90 inches. A DSA revision effort has commenced to correct the invalid assumptions.