



Recommendation No. 135

January 23, 2001

HLW Tank Annulus Cleaning

Background:

The first SRS High Level Waste (HLW) tanks were placed in service in the early 1950's. In total, 51 HLW tanks were constructed at SRS. These HLW tanks were not intended to be a permanent storage method for HLW but were only considered as interim storage. Some forty-five years later, only two tanks have been closed leaving 49 underground HLW storage tanks still in operation at the Savannah River Site (SRS). Twenty-four of the original 51 tanks are classified as Type I, II, or IV tanks and do not meet present secondary containment requirements. Five of the twelve Type I tanks, all four of the Type II tanks, and two of the eight Type IV tanks have leaked (Ref. 1). This leakage has occurred without exception at stress corrosion cracks located near the weld joints.

Both Type I and II tanks have a steel annular pan that is 5-feet high. The annulus is a two and one-half foot wide area between the steel primary tank and the steel annular pans providing a path for ventilation. Ventilation air circulates between the outside of the primary tank wall and the annular pan. It is dehumidified and heated to minimize the amount of corrosion in the annulus and to arrest any leak sites. The air will dry the leak site, causing the crystallized salt to plug the leak. The Type IV tanks are single walled steel tanks surrounded by thin pre-stressed concrete outer shells. The Type III tanks are basically a tank within a tank and have not experienced any leakage because these tanks were stress relieved. This Recommendation only addresses the Type I and II HLW tanks that have leaked.

Removal of the leaked HLW from the annular pan has been attempted at SRS on only one tank (Tank 16). HLW was removed from the inside of the tank but the operation only partially cleaned the tank annulus. It has been estimated that 70% of the leaked HLW salt in the annulus was removed. Large quantities of insoluble salts remain in the annulus of this tank. What remains in the annulus is a visible, dry, insoluble heel containing 30,000 curies of Cs-137 (Ref. 2). In addition, it is expected, although not verified, that some HLW has leaked between the bottom of Tank 16 and the annular pan. This same condition may exist on other Type I and II HLW tanks.

Leakage contained in the HLW tank annulus (Type I & II tanks) was discussed with the Salt Team Focus Group on August 8, 2000 (Ref. 3) and potential cleaning options were discussed on October 24, 2000 (Ref. 4). Cleaning options include mechanical and chemical cleaning. Mechanical cleaning using long reach arms, magnetic crawler vehicles, robotic walking machines, and waste retrieval tooling were identified as cleaning methods under consideration. Obstructions, radiation levels, and geometry configurations encountered in the annulus will hamper mechanical removal of HLW from the annulus. Other concerns include potentially solidified or hardened waste in the annulus and the potential for waste to be in the dehumidification supply ducts and between the primary tank bottom and the secondary concrete bottom any of which will be difficult to remove. Chemical cleaning was mentioned in the August 8 briefing. Presently, no budget exists to fund and demonstrate cleaning of the HLW tank annulus (Ref. 4).

Comment:

The SRS Citizens Advisory Board (CAB) believes the removal of HLW from the tank annulus will be difficult and time consuming and the SRS CAB is concerned about the impact these issues will have on the overall HLW tank closure process and regulatory commitments. For example, the current HLW System Plan shows Tank 11 as the next tank that will require annulus cleaning. According to the Waste Removal Schedule (Target Case), Tank 11 closure will be completed in 2008. To meet this target date, the annulus must be cleaned before 2008. Another tank (Tank 14) will also require annulus cleaning around this time period to meet the regulatory (FFA) commitment date of 2010 (Ref. 5).

Recommendation:

The SRS CAB is concerned about the low priority SRS appears to be placing on annulus cleaning and

recommends that:

1. SRS develop, test and have a method for annuli cleaning ready for use no later than 2007.
2. SRS develop a HLW tank annulus-cleaning plan with a schedule for demonstration of elements of the program to meet the above date and present the plan to the Waste Management Committee before the end of July 2001.
3. SRS provide periodic HLW tank annulus cleaning program updates to the Waste Management Committee containing applicable technologies and funding status.

References:

1. "Salt Team Focus Group Update", presentation to the WM Committee by Mike French, November 11, 2000.
2. "Annual Radioactive Waste Tank Inspection Program – 1999", WSRC-TR-2000-00067, Published May 2000.
3. "Meeting Summary-August 8, 2000-Salt Processing Focus Group, Holiday Inn Express, Aiken, South Carolina".
4. "HLW Tank Annulus/Secondary Containment Cleaning", briefing to Salt Team Focus Group by Eloy Saldivar, October 24, 2000.
5. "Savannah River Site High Level Waste System Plan", Westinghouse Savannah River Company, Report HLW-2000-00019, Revision 11, April 2000.

Agency Responses

[Department of Energy-SR](#)