Savannah River Site
Citizens Advisory Board

Recommendation 181
HLW Tank Longevity versus Expected Lifetime

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 fifty 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, and IV tanks and do not meet RCRA standards for secondary containment requirements. Seven 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 cracks located near the weld joints.

Tank 16, a Type II tank, is the only tank to have had a release of waste from the secondary pan. The leak, which occurred in 1960, was from the primary tank into the secondary pan where it overflowed via a concrete vault joint into the ground. A few tens of gallons of waste escaped to the soil. Monitoring wells were installed and the tank was removed from service and cleaned. The location where the waste contacted soil has been monitored to ensure that the surrounding soil retained the waste and that it has not migrated to other areas. Currently, Tank 16 is empty awaiting decommissioning; however, large quantities of insoluable salts remain in the annulus. SRS is currently working on technologies to remove this waste residue.

The SRS waste is broadly characterized as "sludge waste" or "salt waste". The sludge consists of metal hydroxides, carbonates, and oxides. Sludge generally contains the radionuclides plutonium, uranium and strontium and is approximately 8% (3 million gallons) of the waste volume and 55% (220 million curies) of the waste radioactivity. Salt waste is 92% the SRS waste volume (33 million gallons) and 45% of waste radioactivity (180 million curies). The salt waste is soluble and is supernate (liquid containing dissolved radioactive salts) or saltcake (previously dissolved salts that have now crystallized out of solution). The Defense Waste Processing Facility (DWPF) is currently being operated to convert the insoluble sludge portion of HLW into a borosilicate glass. This glass is poured into stainless steel canisters, sealed and stored temporarily at SRS until shipments can begin to a permanent geologic repository.

Incoming liquid waste to the HLW Tank Farm is evaporated to make better use of tank space. Historically, SRS has had more than enough tank space to easily accommodate the waste streams from its processing canyons and an in-tank salt removal and treatment process planned to startup in the mid-1990s was to continue to ensure that adequate space was available. However, safety concerns about the planned in-tank precipitation salt treatment process made it unavailable and the cesium extraction replacement process is at least than 6 years away (FY 09). With none of the roughly 33 millions gallons of salt leaving the system within the next 6 years (FY 09), and no new tanks scheduled to be built, effective tank space management has become critical for SRS to continue its material stabilization and environmental management missions.

The SRS HLW storage tanks and piping systems have exceeded their original design life yet are expected to be in use for another 30-40 years. A multi-disciplined aging management program called Structural Integrity Program, is being used to verify and assure the operational integrity of SRS HLW tanks. Periodic visual and ultrasonic (UT) nondestructive examinations (NDE) have been performed on the tanks to monitor the effects of service. These inspections revealed that several of the older tanks had suffered through-wall cracking as detected by visual indications. A new UT in-service inspection program has been recently established to

provide for detection and characterization of cracking, thinning, or pitting of the sidewalls of the waste tanks. The program specifies examination of regions of the tank that would be most susceptible to corrosion attack, and to characterize the flaws and demonstrate acceptance to protect against potential leakage and instability (Ref. 2).

With no future plans to build additional storage tanks, it is essential to continue to validate the integrity of current tanks and transfer systems and repair them until all the HLW is removed. The HLW Tank Inspection Program identifies/documents damage mechanisms of interest, which directs the inspection activities and the overall tank life management program.

Comment
While the HLW Tank Inspection Program provides some additional safeguards, it does not directly increase tank space or expedite tank closures. Of particular concern to the SRS Citizens Advisory Board (CAB) is the lack of working space, which can result in the shutdown of DWPF if the sludge feed runs out in 3-4 years, increasing the probability that much larger amounts of radioactivity will be left behind at SRS. The continuing reliance on old HLW tanks whose design would be unacceptable today, on support systems that have exceeded their design life, and on tanks known to have numerous cracks, is unacceptable.

The SRS CAB is concerned about the increased probability that a single catastrophic failure of a HLW tank would forcibly shut down HLW tank operations (this could happen with even a simple failure such as happened to Tank 16). Continued delays in achieving long-term tank closure solutions increase the risks to public safety and the environment. As a result, a decision to proceed with tank closure today would not allow the schedule for the next set of tanks (6/30/04 for Tank 18 and 3/31/04 Tank 19 per the Federal Facilities Agreement) to be met. The only acceptable solution is to move forward with HLW tank closure continuing with the older Type IV tanks (Tank 18 and Tank 19) as soon as possible.

In addition, some resolution is needed to begin disposition of salt waste through Saltstone as soon as possible. This will increase the available tank space to allow sufficient feed preparation for DWPF to keep it operating and help relieve concerns about SRS meeting its material stabilization and environmental management missions. At the November 17, 2003, CAB meeting in North Charleston, SC, DHEC stated that it does not believe that additional legislation is necessary to resolve the issue regarding the classification of high-level waste (HLW). They believe that the Judge's ruling concerning the Waste Incidental to Reprocessing (WIR) process provides sufficient latitude that would allow DOE to proceed with tank closure and Saltstone operation (Ref. 3).

If the WIR and salt concentration issues are not resolved, the construction of new high level waste tanks may have to be considered or process shutdowns may have to be made.

Recommendation
Despite the recent setbacks to DOE's Waste Incidental to Reprocessing (WIR) process, the SRS CAB wants to see tangible, near-time progress made toward HLW tank closure and recommends that:

1. SCDHEC brief the SRS CAB before the end of March 2004 to elaborate on their position discussed at the November 17, 2003, meeting and clarify how SRS can proceed to meet its closure dates of HLW Tank 18 (6/30/04) & Tank 19 (3/31/04) in the FFA.
2. DOE-HQ, DOE-SR and SCDHEC provide an update to resolve the issues surrounding waste removal in the HLW tanks by May 24, 2004.
3. By May 24, 2004, DOE-HQ, DOE-SR and SCDHEC provide an update regarding determination ofe an acceptable permit limit to begin disposition of salt waste through Saltstone in order to provide adequate HLW tank working space to prevent the slowdown or shutdown of DWPF operations.
4. DOE-HQ, DOE-SR and SCDHEC restart tank closures as close to the original date assoon as possible and provide a timeline by July 26, 2004.
5. DOE-HQ brief the SRS CAB before the end of March 2004 on its position regarding the long-term operation and closure of the SRS HLW system.

References

1. "Savannah River Site High Level Waste System Plan", Westinghouse Savannah River Company, Report HLW-2002-00025, Revision 13, March 2002.
2. "High Level Waste Tank Inspection Program", presentation to the WM Committee by David Little, November 6, 2003.
3. SRS CAB Combined Committee Meeting Minutes, North Charleston, South Carolina, November 17, 2003

Agency Responses

Department of Energy-SR
South Carolina Department of Health and Environmental Control (PDF)