Liquid Nuclear Waste Tank Farms

The radioactive waste from the Savannah River Site chemical separations process is present in the tank farms in both solid and liquid forms: insoluble solid chemicals and water-soluble salts. Over 140 million gallons of nuclear waste has been generated and concentrated by evaporation to a present volume of about 36 million gallons.

The wastes are stored in 49 waste tanks in the Savannah River Site's F and H areas. Two of the original 51 tanks have been operationally closed. In storage tanks, the insoluble solids settle and accumulate on the bottom of the tanks. This is referred to as sludge. Liquid above the sludge is concentrated by evaporation to reduce its volume. As the concentrated supernate cools a portion crystalizes forming a solid saltcake. This concentration process not only reduces the volume, but also makes the waste less mobile. There are three operating evaporator systems at SRS. They were placed in service in 1980, 1982 and 2000. Two older evaporator systems have been removed from service.

Since 1954, SRS waste tanks have provided safe storage for nuclear waste. These tanks include four designs.

- Types I and II, the oldest tanks, have 5-foot high secondary steel containment pans within a concrete vault and forced cooling systems. Type I tanks are 75 feet in diameter and hold 750,000 gallons. Type II tanks are 85 feet in diameter and hold 1.03 million gallons. Some of these tanks have developed small hairline cracks that leaked salt solution into secondary pans below the tanks. The cracks were induced by high nitrate concentration in the waste solutions and residual stresses near weld sites. Waste levels within those tanks have been lowered below all known leak sites, and there are no active leak sites.

  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 and then through a concrete vault joint into the ground. A few tens of gallons of waste escaped to the soil. The tank was removed from service and cleaned. Currently, Tank 16 is empty awaiting decommissioning and is included in the Resource Conservation and Recovery Act (RCRA) Facility Investigation Remedial Investigation program. 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.

- Type III tanks have full-height secondary containment, i.e. they are constructed as a tank within a tank. The Type III tanks also have forced cooling systems. These tanks, built since the mid-1960s, have been successfully stress-relieved to prevent stress cracking. Corrosion and pitting of the tanks are controlled through a special waste-chemistry program. Under this program, the waste is sampled and chemicals added, if necessary, to maintain corrosion inhibitors within prescribed limits.

  The Type III design holds 1.3 million gallons and is 33 feet high and 85 feet in diameter. The inner (primary) tank that actually holds the waste is shaped like a doughnut around the central concrete column that supports the roof. A secondary containment tank completely surrounds the primary. The secondary tank is surrounded by a 2- to 4-foot thick concrete vault. As a fourth independent containment for the

waste, a minimum 10-foot layer of specially selected, impermeable clay is placed around the tank. No cracks or leak sites have occurred in any of the Type III tanks.

- Type IV tanks have a single wall and do not have a forced cooling water system. Type IV tanks are designed for waste storage that does not require auxiliary cooling and for waste materials with low levels of radioactive contamination. This tank type is basically a steel tank within a prestressed concrete vault with a domed roof. Each tank holds 1.3 million gallons and is 85 feet in diameter and 34 feet high.

Current plans call for removing the wastes from all of the tanks with priority given to the Type I, II and IV tanks first.

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