6.4 Underground Waste Storage Tanks

Much of the waste stored at Hanford is contained in large underground single-shell (1 wall) and double-shell (2 walls) tanks. These tanks are located in the 200 Areas; a grouping of tanks is referred to as a tank farm. The single-shell tanks are older, and some are known to have leaked. Liquid in the single-shell tanks is being transferred to double-shell tanks to prevent additional environmental releases. The following sections summarize waste tank-related activities that took place in 2004. Additional information on Hanford's underground waste storage tanks can be found in Section 5.8.2.

6.4.1 Waste Tank Status

L. P. Diediker and D. L. Dyekman

This section provides information about the 149 single-shell and 28 double-shell tanks on the Hanford Site and activities related to their closure. The quantities of liquid waste generated in 2004 and stored in underground storage tanks are included in an annual dangerous waste report (e.g., DOE/RL-2004-23). Table 6.4.1 is a summary of the liquid waste generated from 1999 through 2004 and stored in underground storage tanks.

6.4.1.1 Single-Shell Tanks

J. D. Doughty

The Tri-Party Agreement (Ecology et al. 1989) formally establishes a schedule for interim stabilization, retrieval, and closure of the Hanford 200 Areas waste storage tanks. Interim stabilization is achieved by removing all pumpable liquid from a tank; pumpable liquid is that which will, under the force of gravity, flow from the waste matrix to the pump intake. Retrieval is achieved by removing all waste that can be accessed, mobilized, and retrieved from a tank to the limits specified in a Tri-Party Agreement

Table 6.4.1. Quantities of Liquid Waste[a] Generated and Stored Within the Tank Farm System on the Hanford Site During 2004 and During Each of the Previous 5 Years, L (gal)

Type of Waste	1999[b,c]	2000[b]	2001[b]	2002	2003	2004
Volume of waste added to double-shell tanks	5,420,000 (1,432,000)	8,920,000 (2,357,000)	2,980,000 (788,000)	9,280,000 (2,452,000)	9,710,000 (2,565,000)	3,316,000 (876,000)
Total volume in double-shell tanks (year end)	73,290,000 (19,363,200)	79,630,000 (21,038,000)	79,980,000 (21,131,000)	87,683,000 (23,166,000)	92,693,000 (24,487,000)	95,275,000 (25,169,000)
Volume evaporated at 242-A evaporator	3,097,000 (818,200)	2,580,000 (682,000)	2,580,000 (682,000)	1,578,000 (417,000)	4,720,000 (1,247,000)	734,000 (194,000)
Volume pumped from single-shell tanks[d]	2,930,000 (774,100)	2,250,000 (595,000)	590,000 (155,000)	5,288,000 (1,397,000)	6,185,000 (1,634,000)	2,778,000 (734,000)

(a) Quantity of liquid waste is defined as liquid waste sent to double-shell underground storage tanks during these years. This does not include containerized waste (e.g., barreled) included in the solid waste category.
(b) Quantity of liquid waste is defined as shown by different categories on left-hand side of table during these years. This does not include containerized waste (e.g., barreled) included in the solid waste category.
(c) Quantity of liquid waste shown is corrected figure for these years.
(d) Volume does not include dilution or flush water.

milestone. All waste removed from a single-shell tank during stabilization and retrieval activities is transferred to the double-shell tank system.

The Tri-Party Agreement established a September 2004 due date for completion of single-shell tank interim stabilization. Roughly 6 months ahead of this due date, CH2M HILL Hanford Group, Inc. concluded its interim stabilization field work. Through the remainder of 2004, CH2M HILL Hanford Group, Inc. continued to collect data to document that tank-specific interim stabilization criteria had been met; this activity continued into 2005.

Eighteen single-shell tanks were in retrieval status at the end of 2004, meaning that they had been formally selected for retrieval or were in some stage of planning or construction. Waste retrieval activities were conducted throughout the year in tank 241-S-112; completion is expected in early 2005. Retrieval activities were initiated in tank 241-S-102 in December 2004; completion is scheduled in 2006. The Washington State Department of Ecology stated that waste retrieval in tanks 241-S-112 and 241-S-102 were so close to being completed that the tanks did not require interim stabilization. Therefore, the September 2004 milestone date for completion of interim stabilization did not apply to tanks 241-S-102 and 241-S-112.

During 2004, CH2M HILL Hanford Group, Inc. conducted post-retrieval evaluation of the modified sluicing retrieval technology, used in combination with acid dissolution, for waste retrieval in tank 241-C-106. The use of saltcake dissolution technology, where water is used to dissolve and mobilize tank waste, continued at tank 241-S-112. During 2004, CH2M HILL Hanford Group, Inc. also prepared to implement an additional retrieval technology, the mobile retrieval system, intended for use on solid waste. The mobile retrieval system consists of a remote-controlled in-tank vehicle (used to push tank waste to a central location) and an articulated mast (used to guide the vacuum pump intake to the waste positioned for retrieval by the in-tank vehicle). The articulated mast, coupled with a vacuum retrieval system, was deployed for retrieval of waste in the four C-200 series tanks, the first being tank 241-C-203. The entire mobile retrieval system, both mast and in-tank vehicle, is planned for deployment to retrieve waste from selected C-100 series tanks.

6.4.1.2 Double-Shell Tanks

J. D. Doughty

The tank farms contain 28 double-shell tanks. Current fill limits give the double-shell tank system a storage capacity of approximately 119 million liters (31.44 million gallons). This storage space is being managed to store waste pending treatment by the Waste Treatment Plant or a supplemental treatment process (i.e., bulk vitrification). At the end of 2004, there were 95.26 million liters (25.16 million gallons) of waste in the double-shell tanks. During the year, 605,800 liters (160,100 gallons) of waste were transferred from the single-shell tank system into the double-shell tank system. Waste was received from retrievals in tanks 241-C-106, 241-C-203, 241-S-112, and 241-S-102. In addition, 1.778 million liters (470,000 gallons) of miscellaneous waste (condensates, laboratory waste, chemicals, Plutonium Finishing Plant [Z Plant], etc.) were transferred into double-shell tanks.

Activities were underway in 2004 to improve the use of double-shell tank storage space to support further single-shell tank waste retrievals. Activities to improve storage space in the double-shell tanks included:

- Improving the ability of the waste transfer system and waste tanks to receive and store more highly concentrated waste from the 242-A evaporator.
- Evaluating, by an expert panel, to raise the operating waste level in selected tanks to increase storage capacity.
- Coordinating the allocation of emergency space with the Waste Treatment Plant to reduce the number of tanks and tank storage space set aside for emergency use only and using the space in tanks that had previously been restricted.

6.4.2 Waste Tank Closure Acceleration

J. D. Doughty

In 2004, CH2M HILL Hanford Group, Inc. continued to evaluate bulk vitrification as a supplemental treatment technology, working toward a 2005 field demonstration of the technology. The demonstration will be conducted

as a Research Development and Demonstration Project for treatment of the saltcake fraction of low-activity tank waste. The demonstration project will evaluate the ability of bulk vitrification, or in-container vitrification, to produce immobilized low-activity waste in a form comparable to that proposed for the Hanford Site Waste Treatment and Immobilization Plant immobilized low-activity waste. Vitrification will be achieved by mixing waste from tank 241-S-109 and matrix materials (glass formers) in a container and then applying electrical resistance heating through electrodes buried in the waste and glass-forming mixture. The heat produced will melt the glass formers and encapsulate the low-activity waste. If selected for full-scale implementation, this technology will provide treatment capacity to supplement that provided by the Waste Treatment Plant, facilitating accelerated tank retrieval and closure. A Research Development and Demonstration permit and air permits were obtained to support the demonstration project. Construction of a new bulk vitrification research and development facility is scheduled to begin in early 2005, and the demonstration will commence in late 2005.

CH2M HILL Hanford Group, Inc. continued its evaluation of a separate disposal path for contact-handled transuranic mixed tank waste. Contact-handled transuranic mixed tank waste will be retrieved, treated by dewatering, and packaged in 208-liter (55-gallon) drums for shipment and final disposal at the DOE Waste Isolation Pilot Plant in New Mexico. The Waste Isolation Pilot Plant is not currently authorized to receive this tank waste. Shipment cannot occur until the Pilot Plant RCRA permit has been modified to allow receipt of this waste and the packaged waste has been certified to meet the waste acceptance criteria. CH2M HILL Hanford Group, Inc. submitted *National Environmental Policy Act* documentation and a RCRA permit application to DOE for review and approval. Supporting atmospheric release permit applications were submitted to the regulatory agencies. A contract was awarded in 2004 to design and fabricate the waste treatment and packaging system. Current plans call for the construction of two mobile systems. Initially one will be located in the T Tank Farm and the other in B Tank Farm.