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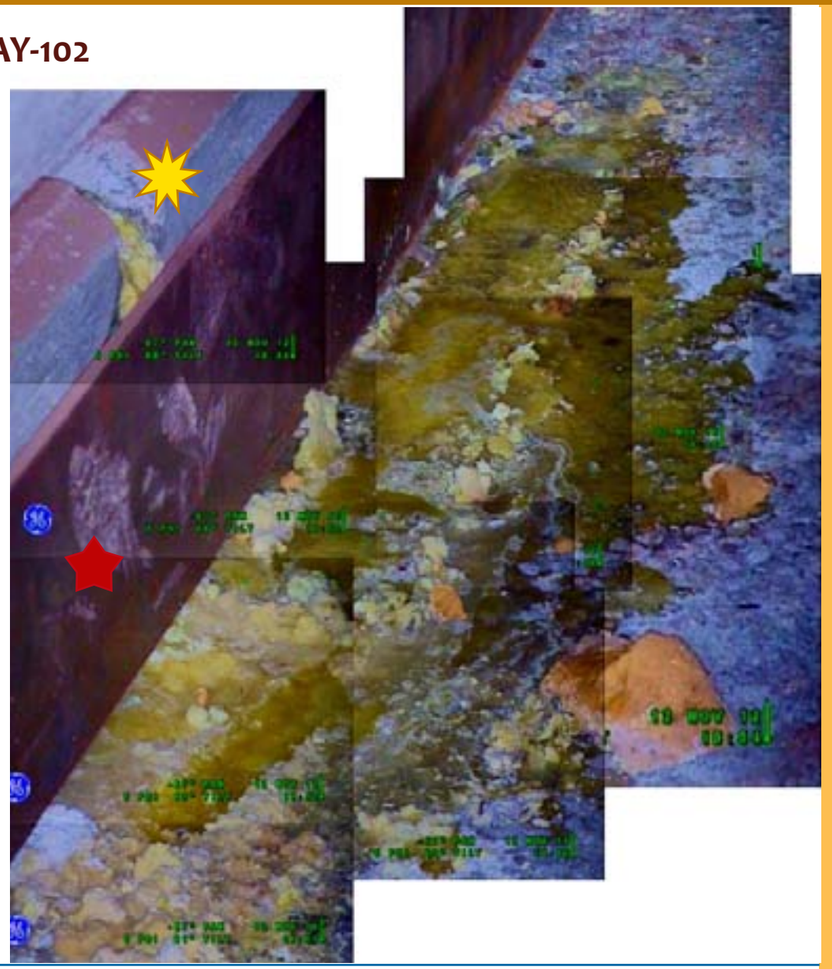
A view inside tank AY-102



This photo montage shows waste leaked into tank AY-102's annulus, or space between the primary and secondary tanks.

The floor area shown is about 12 inches wide by 24 inches long.

The waste does not appear to be liquid, according to USDOE contractors.

The vertical surface on the left of the image is the stabilizing ring (see the matching red star on the photo on page 2 for a wider view.)

Page 1 photo: A closeup up of the tank AY-102 leak source. The yellow starburst in the photo montage at right corresponds with the vent in the photo on page 1.

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Providing the Washington State Department of Ecology's views on Hanford tank closure

Tank Closure Topics

March 2013 Volume 3, Issue 1

In this issue:

Why It Matters

The 586-square-mile Hanford Site is located in south-central Washington along the Columbia River.

Hanford's mission was defense-related nuclear research, development, and weapons production activities from the early 1940s to 1989.

Cleanup began when the Tri-Party Agreement was signed in 1989.

Update: Leak in double-shell tank AY-102

With double-shell tank (DST) AY-102 no longer in service due to a leak from the primary tank, Washington State does not believe there is adequate available tank space to retrieve waste from the single-shell tanks (SSTs), as is required in the Consent Decree. As a result, Governor Inslee is in agreement with the Hanford Advisory Board and State of Oregon, asking for new DSTs.

AY-102 holds some of most radioactive high-level waste at Hanford. It was originally planned to be the first tank to feed the Waste Treatment Plant (WTP), which is designed to turn waste into glass.

The Washington State Department of Ecology is working with the Washington State Department of Health, the U.S. Department of Energy Office of River Protection (USDOE), and their tank farm contractor, Washington River Protection Solutions (WRPS), in an Integrated Project Team (IPT). The IPT's purpose is to determine the path forward for tank AY-102, changes for the DST integrity program, and impacts to other Hanford cleanup actions, such as SST waste retrieval, WTP planning, and 242-A Evaporator operations.

WRPS has increased monitoring of the tank. They are preparing to pump the supernatant (liquid waste) from the tank, and developing plans to remove all remaining waste from the tank.

Ecology continues to closely monitor the situation.

Program underway to evaluate changes in single-shell tank waste levels

During a recent press conference, Governor Inslee responded to USDOE's announcement that the waste levels in some SSTs were decreasing. USDOE and Ecology have been meeting and discussing changing liquid levels (both increases and decreases) since last May when USDOE released their report *Suspect Water Intrusion in Hanford Single-Shell Tanks* (RPP-RPT-50799).

Between 1944 and 1964, 149 SSTs were constructed at Hanford to store radioactive waste generated by nuclear fuels reprocessing operations. The radioactive waste stored in the tanks consists of liquids, hydrated metal oxide sludges, and salt cake. Beginning in 1978, as much liquid as possible was removed from SSTs using an "interim stabilization" process, which was completed in 2010.

Continued on p. 2

Inside the annulus, or space between the primary and secondary tanks, of tank AY-102, the steel stabilizing ring at the base of the inner tank is 6 $^{1}/_{2}$ inches tall, $^{3}/_{8}$ inches thick, and supports the base of the inner tank.

The red star provides reference for comparison with the close-up photo on page 4.

Learn more online

Have you ever read the Dangerous Waste Regulations that protect Washington's air, land, and water?

Washington provides easy online access to all laws, both the Washington Administrative Code (WAC), and the Revised Code of Washington (RCW.)

Visit **leg.wa.gov** to search for laws that interest you.

SST Levels, continued from p. 1

During interim stabilization, pumpable liquid was removed, leaving behind a moist, solid phase material. The remaining liquid in the solid mass in the tanks is *interstitial liquid*. Some SSTs met interim stabilization criteria without pumping – these were "administratively stabilized." At the same time, process and drain lines connected to individual tanks were cut and capped, and pipeline encasements and process pits were filled with foam. These measures were designed to protect the SSTs from rainwater and snowmelt intrusion for 20 years.

From 2011 to 2012, USDOE reviewed historical data monitoring surface levels (SL) and interstitial liquid levels (ILL), looking for waste level changes in the 149 SSTs. The review identified 52 SSTs with SL or ILL increasing trends (*Single-Shell Tank Suspect Intrusion Evaluation Plan,* WRPS-1203139), and 72 tanks with decreasing trends (*Draft Single-Shell Tank Level Decrease Evaluation Plan*). Six of these tanks are currently classified as leaking.

USDOE is preparing a two-phase program to investigate the observed SL and ILL change trends, with the ultimate objective of ensuring the long-term safe storage of the waste remaining in the SSTs. One phase addresses SSTs with increasing level trends. The other addresses SSTs with decreasing trends.

SST Level Increase Evaluation

USDOE is conducting in-tank video inspections of 20 tanks that exhibit increases in SL or ILL. Twelve SST inspections will occur this fiscal year, which ends September 2013.

Waste retrieval from the single-shell tanks continues

In 2012, USDOE and WRPS completed waste retrieval on three SSTs: C-104, C-108, and C-109. They believe they have met Consent Decree requirements "to deploy at least two retrieval technologies to each of their 'limit of technology' in an effort to obtain a waste residue goal of 360 cubic feet of waste or less in each tank." Ecology is awaiting final data packages that will support WRPS' conclusion that retrieval is complete.

Modified sluicers were used in each of these three tanks as the first retrieval technology. The second technology involved a chemical process of adding sodium hydroxide, a caustic, and circulating the waste, breaking and dissolving waste chunks to a size retrievable by the pump.

Ecology is pleased to see the progress and, until recently, expected all seven remaining tanks in C-Farm waste to be retrieved by September 2014, meeting the Consent Decree Milestone. However, sequestration may create delays.

Three in-tank video inspections have been completed on tanks with level increases. Tanks BY-101 and BY-111 were examined, and there was no observable evidence of intrusion nor any structural anomalies noted with the tank dome. Evidence of intrusion was observed from a pit drain leading into tank BY-102. Active dripping was noted. No tank dome structural anomalies were seen.

In-tank inspections will help determine if the changes are due to different factors, such as:

- ILL increase due to consolidation of porous waste above the ILL measurement factors.
- Inadvertent liquid additions to the tanks during characterization or other operations.
- Gas generation and entrapment within the waste.
- Chemical or physical changes within the waste.
- Incomplete interim stabilization measures.

If the video inspections indicate water intrusion, for example, as the probable cause of the level increase in a particular tank, then an evaluation will be performed to locate the intrusion source, identify the most probable intrusion pathway(s), and identify mitigation measures for that tank.

Mitigation measures will also be identified, as needed, for cases where video inspections indicate that water intrusion is not a probable cause of the level increases (for example, replacement or repairs of measuring equipment).

After evaluating possible mitigation measures, USDOE and Ecology will determine which measure, if any, will be implemented.

SST Level Decrease Evaluation

During the 2011 to 2012 review of historical monitoring of SLs and ILLs, USDOE identified 72 tanks displaying decreasing ILL or SL trends. Some of these tanks were not previously known or suspected to have leaked.

Tank T-111 has been inspected with an in-tank camera. The waste sludge surface is smooth with some cracks in the sludge. The tank wall is corroded in places. Salt-like material is on the tank dome and wall. The cause of the surface decrease has not been clearly determined.

USDOE is continuing the plan for investigation of the observed SST level decreases. The planned evaluation steps include expanded data analysis, field investigations, and leak mitigation measures.

Expanded data analysis will vary depending upon the specific tank but may include:

- Estimating the liquid evaporation rate.
- Re-estimating the drainable liquid quantity to better understand the volume of potential releases.
- Assessing the relative inventories of mobile contaminants that could threaten groundwater.
- Analyzing other tank conditions that could explain the observed level decreases (for example, measuring equipment error).

Tanks will be selected for direct field investigation to provide additional information to assess the cause of the level decrease. Field investigations may include logging of drywells associated with the tank of interest and visual inspection of the tank interior.

Data and field investigation findings will help determine appropriate leak mitigation measures.

For the latest information on tank leaks or other tank-related information, please visit our website or Facebook page. See page 4 for web addresses.

Probe in tank BY-102 measuring the supernatant (liquid waste) level.