T Plant at 60 years — where Hanford's past, present and future meet

T Plant, the oldest nuclear facility in the world that still performs an active function, celebrates its 60-year anniversary this month. A luncheon for facility personnel and invited guests is planned to commemorate the groundbreaking for the plant on June 26, 1943, as well as T Plant's rich history since then and its continuing contributions to Hanford Site missions.

"I extend my heartfelt congratulations and thanks to current and past T Plant personnel for a long history of contributions to our nation," said Dale McKinney, acting director of Fluor Hanford's Waste Management Project.

"T Plant is a survivor of significant changes in assigned functions, operational requirements and culture over the past 60 years," McKinney said. "Every era, including the present, has brought its share of challenges and issues. We will continue to meet our challenges, and we will continue to make contributions to our current mission — Hanford Site closure."

T Plant workers test an apparatus used to take headspace gas samples. Doug Smith has the clipboard, and Jim Dudley works on the drum.

T Plant workers conduct waste verification at 2706-T. Verification is one of a variety of waste-processing services performed at the facility.

A renowned history

T Plant was the first and largest of the early chemical-separation-plants at Hanford, a crucial link in the first full-scale plutonium-production operation in the world's history. As the home of "step three" in the production process, the T Plant canyon was the original bismuth-phosphate separation facility, serving as the

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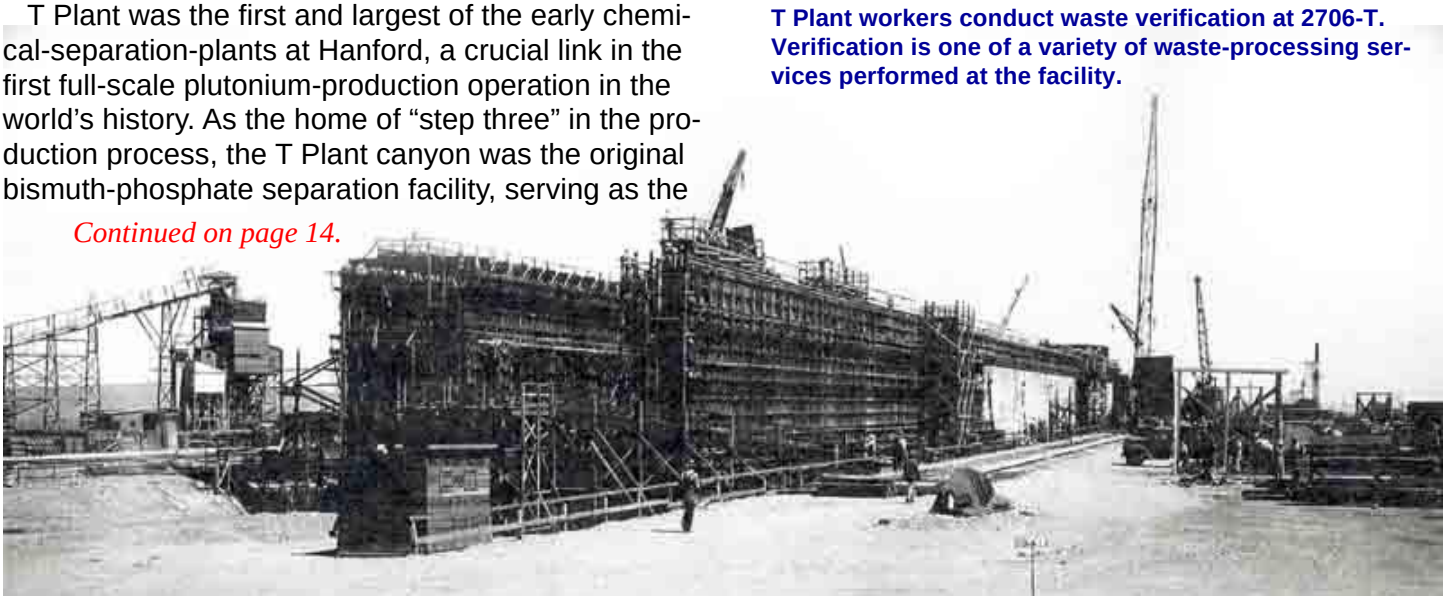

Ground was broken for T Plant on June 26, 1943. It was the first and largest of Hanford's early chemical-separation plants, and now it's the oldest nuclear facility in the world still performing an active mission. Other workforce priorities slowed construction for the first six months, but the pace then quickened enough to allow some operations to start in September 1944.

T Plant at 60 years, cont.

headquarters for chemical-processing operations from construction until the opening of the REDOX plant in 1952.

After the groundbreaking in June 1943, manpower for 200 Area construction was in short supply, and work moved slowly toward the goal, which was stated as “completion 30 days after the completion of the 100B Area.”

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In the fall, workers were diverted to Camp Hanford housing needs. The “construction hold” ended in November, and the construction workforce returned to normal assignments. The crane for transferring irradiated slugs from railroad cars to the dissolvers arrived early and was installed to aid construction.

Some operations began by September, but design changes, dry runs and construction “finish work” continued through 1944. T Plant processed the first batch of irradiated fuel rods from B Reactor Dec. 26-27, 1944, and continued to operate in a production capacity until 1956, when it was converted to a decontamination facility.

Decontamination operations were the primary mission for T Plant from 1956 through 1990. In more recent times, the plant has continued to provide waste container processing services to the Hanford Site. The facility is still capable of decontaminating a wide range of equipment, from small components dipped into thimble tanks to steam-cleaning of rail cars and truck-sized vehicles. The T Plant staff has also been assigned special missions from time to time, including operations on components from the Three Mile Island reactor accident.

Waste processing

Several types of waste-processing activities are conducted at T Plant to support the eventual closure of the Hanford Site. T Plant workers segregate, treat, repackage, verify and store contact-handled waste in boxes and drums. Treatment processes consist of adding sorbent or grout material to the waste matrix and neutralizing or amalgamating mercury with other metals. Workers can also macroencapsulate equipment and debris at the plant.

In addition, headspace gas sampling performed at T Plant contributes to Hanford’s increased ability to prepare transuranic waste to be shipped to the Waste Isolation Pilot Plant in New Mexico for permanent disposal. Drums of TRU waste are moved to T Plant for headspace gas sampling after assay and examination at the Waste Receiving and Processing facility. The drums are prepared for sampling by being placed in a heated environment for three days. Then they’re sampled for volatile organic compounds to confirm that the waste meets the acceptance criteria for shipment to WIPP.

Headspace is the area between TRU-contaminated debris in a drum and the drum lid. To sample the gases in that space, a needle is inserted through the drum’s one-way vent filter, a specialized opening at the top of the drum. Then the vent filters are replaced and the drums are moved back to the Central Waste Complex, the hub of Hanford’s TRU-waste preparation mission. Fully characterized drums are collocated so they can be efficiently moved to WRAP when it’s time to load them into WIPP shipping containers.

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The headspace gas samples taken at T Plant are sent to a WIPP-certified analytical laboratory, typically Hanford's Waste Sampling and Characterization Facility. As a result of accelerated TRU characterization, T Plant is currently capable of processing 72 drums per week, whereas the previous rate was 18 per week.

Shippingport fuel is removed from the water-filled pool at T Plant by a modern grappler attached to a 1938-vintage crane (not shown). Eight of 18 planned shipments have been made to move the fuel out of T Plant and into dry, interim storage.

Spent-fuel sludge storage

After a major two-year effort to clear the 221-T Canyon of radiologically contaminated debris and equipment, T Plant is ready to receive and store sludge from the K Basins — a mixture of small fuel particulates, dust, dirt and water generated by fuel corrosion. The plant, which is about eight miles from the Columbia River, was selected as the storage location for K Basins sludge until further treatment plans are finalized.

Eight process cells and 15 sections of canyon deck in the 850-foot-long T Plant canyon were cleaned out to prepare for storing sludge. The job required removing and disposing of 30,000 cubic feet of waste, including six PUREX towers, 19 large pieces of equipment and 145 empty drums. The effort reduced contamination levels, improved working conditions in the canyon and got four underground cells ready to receive sludge.

Specialized sludge-containment equipment was installed in four cells by August 2002. In each cell, a free-standing steel liner, integrated with a metal storage rack and a leveling frame, will hold up to six sludge containers. T Plant completed all readiness preparations in April and is awaiting the first shipments of sludge from the Spent Nuclear Fuel Project. Sludge operations are scheduled to begin in August.

Shippingport fuel removed

Since the late 1970s, a water-filled cell at T Plant has stored spent nuclear fuel from the Shippingport, Pa., Atomic Power Station, the world's first nuclear power plant to produce electricity. The Shippingport fuel represents Hanford's second-largest collection of spent nuclear fuel. In addition to preparing the facility for storing sludge, workers are moving the Shippingport fuel out of T Plant and into dry, interim storage at Hanford's Canister Storage Building until it's time for permanent disposal.

The Shippingport fuel comprises 72 fuel assemblies, representing nearly 16 metric tons of irradiated uranium. The "blanket" fuel assemblies are of a different design than those at the K Basins. The canisters the fuel assemblies are being placed into have the same outer shape and size as those used for the K Basins fuel, and both types of fuel canisters were manufactured by the Joseph Oat Company of Camden, N.J.

The Shippingport fuel is also being moved on the same specially designed trailers used to move K Basins fuel into dry interim storage, and the Waste Management and Spent Nuclear Fuel projects coordinate the use of the trailers. The first of 18 planned shipments of Shippingport fuel took place in September, culminating several years of planning and preparation. Eight shipments have now been completed.

Crane links past, present

Most canyon operations, including receiving sludge, packaging waste and removing fuel, depend on the

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221-T canyon overhead crane. The crane, like T Plant itself, tangibly links the past, present and future. Built in 1938 and installed in 1943, the canyon bridge crane is still being used in 2003.

Operated by master crane operators seated in a cab behind a thick concrete wall, the crane rides along rails the entire length of T Plant above the canyon deck. Operators Mike Yencopal and Wayne Gentry take turns at the controls in the cramped, lead-lined, windowless cab, viewing through a series of no-longer-manufactured periscopes of the type used in World War II bombers. They sight through a series of mirrors located at right-angle bends in the periscopes that snake down from the cab, up and over the canyon shielding wall and down to the crane. Gentry described it as being “like working through an optical illusion,” and Yencopal said it’s “like running a crane through binoculars.”

The operators lower the crane hook nearly 40 feet to within a half inch of the canyon deck and have developed the skill to stay within tolerances of as little as three-eighths of an inch while placing a Shippingport fuel assembly into a canister. A very modern, remotely operated, six-foot-long fuel-removal grappler is critical to the operation. The 21st-century grappler and the 1938 crane work together to lift fuel from the pool into canisters — the modern grappler suspended from the vintage crane hook.

Workday challenges

Dave Levinskas, project support manager, provided insight into the day-to-day challenges at T Plant. “The amount of cleanup performed in the canyon takes on a whole new meaning when you recognize the conditions under which the work is accomplished,” Levinskas said. “Because of the past production and decontamination missions, some canyon areas still have high levels of removable surface contamination, airborne contamination and general area radiation.

“Personnel working in the T Plant canyon have to use two layers of anti-contamination protective clothing and must also wear respiratory protection. There are no heaters or air conditioners in the canyon. In winter, workers appreciate the extra layer of protective clothing, but in the summer it can get hot. Workers have to take extra precautions, like limiting stay times and using cooling vests, to ensure the work gets done safely.”

Continuing mission support

T Plant anticipates continuing its support of Hanford Site closure activities. And T Plant is also considered a prime candidate for a future mission to process remote-handled transuranic and mixed waste. ■