Storied Nuke Plant Becomes Environmental Wasteland

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RICHLAND, Wash. (AP) — A stainless steel tank the size of a basketball court lies buried in the sandy soil of southeastern Washington state, an aging remnant of U.S. efforts to win World War II. The tank holds enough radioactive waste to fill an Olympic-sized swimming pool. And it is leaking.

In this Thursday, April 3, 2008 file photo, workers wearing protective suits bury contaminated debris in a landfill on the Hanford nuclear reservation near Richland, Wash. **(AP Photo/Ted S. Warren)**

For 42 years, tank AY-102 has stored some of the deadliest material at one of the most environmentally contaminated places in the country: the Hanford Nuclear Reservation. This complex along the Columbia River holds a storied place in American history. It was here that workers produced the plutonium for the atomic bomb dropped by the U.S. on Nagasaki, Japan, in 1945 — effectively ending the Second World War.

Today Hanford's legacy is less about what was made here than the environmental mess left behind — and the federal government's inability, for nearly a quarter-century now, to rid Hanford once and for all of its worst hazard: 56 million gallons of toxic waste cached in aging underground tanks.

Technical problems, mismanagement and repeated delays have plagued the interminable cleanup of the 586-square-mile site, prolonging an effort that has cost taxpayers $36 billion to date and is estimated will cost $115 billion more.

Add to that the leaks involving AY-102 and other tanks at the site, and watchdog groups, politicians and others are left wondering: Will Hanford ever really be free of its waste? If not, what will its environmental impact be on important waterways, towns and generations to come?

"One corner of our country and my state acted as a stalwart during World War II and the Cold War and did the right thing," Washington Gov. Jay Inslee said in a recent interview. "We want the federal government to fulfill its obligation to our state."

There is no greater challenge at Hanford today than its underground tank waste. The leaks inside AY-102, a double-walled tank that was supposed to provide more protection against spillage — as well as newer leaks found this year in six other single-walled tanks — show how critical the situation has become.

Put simply: Time is running out on Hanford's deteriorating tanks and, in turn, for completing work on a more permanent solution to store what's in them.

The federal government created Hanford at the height of World War II, moving 50,000 people to sagebrush fields, dotted with small farms, near the Washington-Oregon border for a top-secret construction project. The influx quickly made this area Washington's fourth-largest city, but most workers didn't even know exactly what they were building — the world's first full-scale nuclear reactor — until the bomb was dropped on Nagasaki.

In ensuing years, workers built eight more reactors to produce plutonium for the nation's nuclear weapons arsenal. They also built hundreds of ancillary projects, including large canyons where toxic chemicals were used to reprocess the plutonium and extract uranium.

All of this work produced massive amounts of radioactive and toxic waste, as reprocessing of the spent nuclear fuel created byproducts that were far too dangerous for human contact. Workers poured some of that waste directly into trenches in the ground at Hanford, but most of the deadliest waste was stored in 177 underground tanks, grouped into areas known as tank farms.

There isn't much to see at these tank farms. Gravel fields cover the tanks themselves. Exhaust pipes jut out of the ground above each of them. Underground, they hold a bubbling, brewing stew of radionuclides, hazardous chemicals and nitrates. Two radionuclides comprise much of the radioactivity: cesium-137 and strontium-90. Both take hundreds of years to decay, and exposure to either would increase a person's risk of developing cancer.

The first storage tanks, 149 of them, were built between 1943 and 1964 with just a single, stainless-steel wall. They were designed to last only 10 to 20 years, because they were intended as a stopgap measure until a more permanent solution could be found to deal with the waste. Turns out the tanks were susceptible to corrosion; some even buckled from the extreme heat radiated by the waste.

As early as 1956, workers suspected one tank was leaking. Between 1959 and 1968, the U.S. Energy Department confirmed that 12 tanks were leaking.

Around that time, workers started building 28 double-walled tanks to provide better protection, then began pumping the most dangerous liquid waste out of the leaking

tanks into these vessels. By 1995, they had gotten as much of the pumpable liquid out as possible, leaving behind sludge the consistency of peanut butter.

AY-102 was the first double-walled tank, put into service in 1971 with an intended lifespan of 40 years. The tank contains chunks of solids — many common metals, including aluminum, nickel, lead, silver, copper, titanium and zinc — as well as other common elements. It also holds more than a dozen radionuclides, such as plutonium, uranium, strontium and cesium, all of which can cause cancers upon contact.

Last fall, at 41 years of age, AY-102 was found to be leaking into the space between its inner and outer shells. So far, no waste has escaped the outer shell to the soil surrounding the tank, and a video review of six other double-shell tanks that began holding waste in the 1970s showed none of them was leaking.

"None of these tanks would be acceptable for use today. They are all beyond their design life, and yet they're holding two-thirds of the nation's high-level nuclear waste," said Tom Carpenter of the watchdog group Hanford Challenge.

There has since been more bad news involving still more tanks.

On Feb. 15, federal officials revealed that another single-shell tank was leaking. A week later, the governor said that actually six of the single-walled tanks were leaking. Officials now estimate that those tanks could be releasing as much as 1,000 gallons of waste a year into the soil.

In all, since that very first leak in the 1950s, at least 69 tanks are known to have excreted more than 1 million gallons of waste — and possibly far more — into the soil.

Add to that a concern that hydrogen gas could build up inside the tanks and possibly cause an explosion that would release radioactive material. The Defense Nuclear Facilities Safety Board recommended additional monitoring and ventilation of the tanks last fall to avoid such a disaster, and federal officials are working to develop a plan to implement the recommendation.

So what does all of this mean for the environment and the safety of nearby communities?

The groundwater at Hanford already is contaminated, but scientists gauge the risks to be minimal because it would take decades for contaminants already in the soil to reach the Columbia River, the largest waterway in the Pacific Northwest. The closest tank sits 5 miles from the river, home to endangered fish and a source of drinking water for some 175,000 people immediately downstream.

"From the standpoint of worrying about an immediate hazard, we're not there," said Ken Niles of the Oregon Department of Energy. "But the problem is that resolving these issues at Hanford takes so long."

The Energy Department previously built a $230 million plant to treat contaminated groundwater near the tank farms. The agency also is studying how best to handle the leak in AY-102, including whether to empty the tank immediately into another tank, said Kevin Smith, who heads the Energy Department's Office of River Protection in Richland. Smith acknowledged, however, that the double-shell tanks are nearing capacity.

One problem is knowing exactly what is in each tank. A database listing the contents of each is only a best-guess, relying on historical information about the site and waste samples that are very limited, said Cheryl Whalen of the state Department of Ecology.

Drawing a single sample and analyzing it, which requires exhaustive safety precautions, costs about $1 million, and it doesn't show everything that's inside, Whalen said. The sample might include liquid, but not the solids floating around inside or the sludge at the bottom.

Whalen also said some elements that are in very small quantities, but could be very hazardous, aren't even recorded. In addition, some of the radionuclides inside produce altogether new elements under the right conditions.

"The tanks create their own chemical environment. Between the heat and the radionuclides and the chemicals that are already in there, they're just their own nuclear reactors," Whalen said. "They're generating their own little world in there."

What officials do know is that the tanks are so thermally and radioactively hot that workers must wear white hazmat suits, often with supplied air tanks, when working nearby. To date a total of 10 single-shell tanks have had their contents emptied into double-walled vessels, and another five tanks are scheduled to be emptied by September 2014.

The permanent solution to eradicating Hanford's waste is a plant being built that would encase the waste in glass-like logs for disposal deep underground. The vitrification plant is among the largest industrial construction projects nationally, both in cost and sheer size. Originally bid at $4.3 billion, the price tag has since grown to more than $12.3 billion, a figure that is expected to rise even further.

The Energy Department fired its original contractor in 2000 amid mounting delays and costs. In 2006, construction was suspended for 22 months after an independent review concluded the department underestimated the force of ground movements at the site should a severe earthquake occur. Construction has been put on hold in some areas of the plant while the Energy Department works to resolve problems.

Once targeted for completion in 2011, the plant now won't be operating before 2019.

That pushes a deadline for treating all of the waste from 2028, under the original agreement, to 2047. Removal of contaminants from groundwater and long-term stewardship of the site will continue for at least two decades longer.

Ernest Moniz, the nation's new energy secretary, vowed during his confirmation hearings to visit Hanford and work to get the money needed to ensure the cleanup job is finished. The Energy Department spends roughly $2 billion each year on Hanford cleanup, or one-third of its budget for nuclear waste cleanup nationally. The federal government also directed $2 billion in stimulus money to speed up some Hanford projects.

"Clearly I support trying to meet the milestones (for completing the work) and that will require having the budget to do it," Moniz told the Senate Energy and Natural Resources Committee in April.

But as part of the federal spending cuts known as sequestration, some 250 Hanford workers have received pink slips while hundreds of others will be required to take weeks-long furloughs.

Despite the many challenges, there has been some progress in the 24-year cleanup of Hanford. Workers have removed spent nuclear fuel from two leak-prone pools near the Columbia River. They've dug up hundreds of waste sites and demolished contaminated buildings. Five of the nine reactors have been mothballed, and workers continue to monitor and treat groundwater tainted by radionuclides and toxic chemicals.

Today, the communities closest to the Hanford site comprise a science and technology hub that is among the fastest-growing regions in the country, where Hanford cleanup and a national laboratory drive the economy.

Locals celebrate their contribution to the U.S. defense effort. In Richland, a brewery offers "Half-Life Hefeweizen" and "Plutonium Porter" on tap. Richland High School adopted a mushroom cloud as its mascot and students are known as "the Bombers."

The risks that come with the cleanup project are taken in stride by those whose livelihoods still depend on Hanford.

"There's an inherent risk to what we do. But I live here, and I've never been fearful of anything," said Dave Molnaa, who has worked at Hanford for 34 years and serves as president of the Hanford Atomic Trades Council, a union representing 2,800 workers.

Inslee, Washington's governor, has long been a champion of Hanford cleanup; he was first elected to Congress in 1992 to represent a district that includes the Hanford site. Despite the many leaks and delays, Inslee maintains the belief that the project will one day be completed.

Failing to do so, he said, is just not an option.

"The country does have financial challenges, but we cannot tell our grandkids that we are going to allow pollution that may someday end up in the Columbia River,"

said Inslee. "That's inexcusable."

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