

## Cleaning up nuclear waste at Hanford: Secrecy, delays and budget debates

A plan to turn radioactive waste into glass logs has raised a lot of questions, many of which don't appear to have public answers.

by [John Stang](#) / August 16, 2021 /

Stephen Wiegman has worked for about three decades on the Hanford Nuclear Reservation's project to convert the radioactive waste in its huge underground tanks into safer glass logs.

Although he's retired now and involved in an advisory capacity, he understands the project — and its ongoing challenges — better than almost anyone.

Wiegman sees this task with a mix of cautious optimism, frustration, sympathy for the people dealing with its complexities, and a deep belief that the tank wastes must be dealt with. "There isn't an emotion that I haven't felt," he said.

The project faces a cluster of challenges: financial, technical and political. And the secrecy around the plans to solve these issues makes it difficult for anyone to gauge whether the most polluted spot in the nation will ever become a benign stain on the landscape of eastern Washington.

Wiegman said a retired Oregon state official who also has about 30 years invested in the glassification project recently told him: "We've never been so close to treating the tank wastes, and never so far from getting it started."

A Hanford engineer since 1980, Wiegman helped create the Office of Protection, the Department of Energy's unit in charge of dealing with the nuclear waste stored in those tanks, serving as a senior technical adviser since the late 1990s.

Now 75 and retired since 2012, Wiegman is on the Hanford Advisory Board, which represents environmentalists, Tri-Citians, tribes, health officials, business interests and governments from across the Northwest. Currently, Wiegman is the board's chairman.

Hanford dates back to late 1942, when it became a super-secret World War II site to create plutonium for the first atomic bomb exploded — in New Mexico and later over Nagasaki, Japan. The nuclear reservation continued that mission during the Cold War and through 1987.

During four decades of production, uranium rods and other nuclear waste were stored in 149 single-shell tanks, of which at least 68 have since sprung leaks. Hanford added 28 safer double-shell tanks and transferred the liquid wastes into them.

Hanford has 56 million gallons of radioactive waste in those 177 underground tanks at this remote decommissioned nuclear production site near the Columbia River in Benton County.

Those leak-prone tanks are arguably the most radiologically contaminated place in the Western Hemisphere.

At least 1 million gallons of radioactive liquids have leaked into the ground, seeping into the aquifer 200 feet below and then into the Columbia River, roughly seven miles away. Since the mid-1990s, Hanford's plans involve mixing the waste in the tanks with benign melted glass and then storing it in glass logs.

The U.S. Department of Energy declined to provide anyone to be interviewed for this story, and refused a Crosscut request for a tour of the complex. However, DOE provided written answers to our questions. Bechtel, the primary contractor on the glassification project, deferred questions to DOE.

#### Busted budgets and deadlines

The original \$4 billion glassification plant was supposed to be ready by 2009, but both budgets and deadlines have been busted several times over the past decades.

Today, the project's budget is at least \$17 billion, and the first glassification plant for low-activity waste is scheduled to start up in late 2023. So far, the federal government has spent \$11 billion on the glassification project, according to the Government Accountability Office, the investigative agency of Congress.

That one plant, however, will only handle 40% to 50% of the low-activity wastes, depending on who is doing the estimating. A second low-activity waste plant or a still-to-be-determined new approach is needed to the remaining wastes. What will happen to the rest of the waste is still up for debate.

After 2023, a second low-activity waste treatment plant, as well as a high-level waste treatment facility, will still need to be built. Other than a vague target of the mid-2030s to start the high-level waste melter, the federal government has yet to release a detailed plan for these next steps, including when the work is expected to be completed.

"The department cannot project with certainty when the (pretreatment) and (high-level-waste) facilities will be completed," said a 2019 DOE letter to the Washington Department of Ecology.

For the past two years, the state of Washington and the Department of Energy have been in secret "holistic talks" about the next steps in the glassification project. Both sides have agreed not to publicly discuss the talks until they are finished.

Originally, that legal deadline to finish glassification was 2019. Right now, Hanford’s legal target is removing all the waste from the single-shell tanks and closing those tanks by 2043 and closing the double-shell tanks by 2052. DOE has moved those targets back to 2069, a date not reflected in its current cleanup agreements with the state of Washington, [according to a 2021 report by the Government Accountability Office](#).

“It bothers me because I thought we would be making high-level glass by now,” Wiegman said.

“It’s not clear whether the high-level waste plant will ever operate,” said Tom Carpenter, executive director of Hanford Challenge, a watchdog organization. Carpenter has been a leader in Hanford watchdog groups since the mid-1980s.

Another problem still to be resolved: What happens to the glass logs after they are created? They were supposed to be stored permanently in an underground tunnel complex at Yucca Mountain, Nevada. Faced with strong bipartisan opposition from Nevada’s congressional delegation, Congress has not appropriated money to Yucca Mountain since 2010, stalling that project indefinitely.

Technical problems haunt the project

All of the single-shell tanks and the majority of the double-shell tanks are way past their design lives. So far, only one double-shell tank has sprung a leak in its inner wall, and can no longer be used.

Since the early 1990s, Hanford has explored both glassifying and a process called grouting to deal with the tank wastes. By 1993, DOE settled on glassifying — a process called vitrification.

Dubbed the “vit plant,” this project has been jinxed since the beginning. The original contractor, BNFL Inc., was fired, and Bechtel took over. DOE fired its first manager and exiled the second to a smaller project in Tennessee, after each argued that the original \$4 billion budget was not enough.

Since then, technical problems have mushroomed and, as the managers predicted, so have the costs.

The [2021 GAO report](#) said DOE believes there is a 95% chance that Hanford will run out of space in its 27 remaining double-shell tanks before the next steps happen. If leaks occur in more double-shell tanks, that could add several years of delays to finishing glassification and may create further problems.

“What are you going to do if there is a huge leak?” Carpenter asks.

It would take seven years and \$1.5 billion to build four 1 million gallon double-shell tanks, the GAO reported. Since 2018, the Hanford Advisory Board has been pushing DOE to get started on this contingency plan.

“DOE officials agreed that building more [double-shell tanks] could be time-consuming but said that doing so is not necessary since DOE plans to begin treating certain tank waste in 2022, which will create more [double-shell tank] space,” the 2021 GAO report said.

Despite what it told the GAO, in its written response to Crosscut, DOE said thorough testing has shown “the double-shell tanks remain fit for service and are likely to have many decades of useful life.”

DOE plans to keep 1.2 million gallons of tank space empty to handle emergencies. Once the low-activity waste treatment plant goes into operation, DOE expects to glassify 1 million gallons of waste a year, which is about what one underground tank can hold.

“Spending resources on creating new double-shell tanks at this time, when adequate space exists, diverts critical resources from the long-term solution to tank waste at Hanford,” DOE’s statement said.

#### Whistleblower alarm

Red flags have also been raised over the quality of construction of the new treatment facilities.

In 2010, Walt Tamosaitis, a senior manager at a subcontractor designing the pretreatment plant, URS Corp., alerted his superiors and managers at lead contractor Bechtel to a risk of hydrogen gas explosions that could bend and burst pipes in the plant, spraying radioactive fluids. He also pointed out that radioactive sludge could clog the pipes and tanks in the plant, increasing the chance of uncontrolled releases of radiation. And he raised the issue of corrosion causing leaks in the pretreatment plant.

Tamosaitis’ superiors told the Energy Department that the design problems were fixed as of July 1, 2010 — over Tamosaitis’ protests, but in time for Bechtel to collect a \$5 million bonus from the department.

For raising the alarm, he was demoted and exiled to an insignificant offsite job, [Tamosaitis alleged in a lawsuit against Bechtel](#). He alleged illegal retaliation, [eventually reaching a \\$4.1 million settlement](#) with the company. Meanwhile, in 2011 and 2012, the Defense Nuclear Facilities Safety Board, a technical advisory body monitoring DOE, plus the Government Accounting Office, confirmed Tamosaitis’ concerns.

In 2015, the Energy Department announced that it would not have the entire complex operational by 2022, the deadline at the time. Department officials pointed to the same issues Tamosaitis had identified in 2010.

Also on hold is construction of the pretreatment plant — a prerequisite to the high-level waste glassification project, which is scheduled to begin production in 2023, according to the current state and federal agreement.

## What the future holds

The U.S. Department of Energy has been giving contradictory signals about new plans for dealing with some of the high-level waste.

In June 2019, DOE announced it has the authority to reclassify some high-level wastes into low-activity wastes based on how radioactive they are. [A December 2020 DOE report to Congress](#) said this measure could be applied to its sites at Savannah River, South Carolina; Idaho Falls; and Hanford. So far, it is being tried only at Savannah River.

“DOE sort of granted itself the authority to do that reclassifying,” said Suzanne Dahl, tank waste treatment manager of the Washington Department of Ecology’s nuclear waste program. Like Wiesman and Carpenter, she has worked on Hanford issues for more than 30 years.

“We’re not convinced of any need to reclassify any of the high-level wastes,” said Ecology Department spokesman Randy Bradbury.

Besides protesting the decision in 2019, the state Department of Ecology and the Washington Attorney General’s Office — in a Feb.26, 2021, letter to DOE — objected again to DOE’s having that reclassification authority.

“We believe this rule lays the groundwork for the department to abandon significant amounts of radioactive waste in Washington State precipitously close to the Columbia River,” the attorney general wrote in the letter, which was also signed by representatives of the Yakama Indian Nation and three environmental organizations. They wrote that redefining the waste fails to hold the Energy Department and the federal government responsible for adequately cleaning up the waste left over from the establishment of the U.S. nuclear arsenal.

At Hanford, the wastes were classified as “high level” based on where they originated in the Cold War plutonium process. DOE wants to change that to the radioactivity levels of the waste. A December 2020 DOE report to Congress said this reclassification could cut the volume of high-level waste at Hanford by two-thirds.

## The list of challenges goes on

To Wiegman, the big question is how well the direct-feed low-activity waste plant will work when it goes online with real tank waste. “I wouldn’t make any predictions until I see a run,” he said.

The project is complicated and likely to require them to employ untried technology to solve problems like how they will replace and repair parts in the melting facility if it will be so highly radioactive that no humans can safely enter the main chamber after glassification begins. Remote control robots will likely be involved.

For example, the two melter in the 2023 low-activity waste plant are expected to last five years, according to DOE. Then it will take several months of remote-control work to replace a burnt-out melter.

But the pretreatment plant has been in limbo for almost nine years with nothing nailed down in timetables or budgets to finish it.

Technical challenges stopped construction of the pretreatment plant in 2012 when it was 40% finished, which is where it stands today. Bechtel and DOE have come up with solutions to the technical challenges, but have not done the actual nuts-and-bolts engineering work to implement them, [a 2020 GAO report said](#). The federal report said part of the project is already well over budget and way behind the deadline.

“We invested a lot of money out there, and it is getting older every day,” Wiegman said.

The financial and technical challenges are clearly intertwined. The 2020 report makes it clear that the DOE’s highest funding priority is to begin the glassification process for low-activity wastes as soon as possible, bypassing the pretreatment facility for now. But if that is the new plan, stakeholders wonder what is the plan for dealing with the more radioactive waste.

“If they have a plan, they are not sharing it with anyone. You start to suspect they don’t have a plan to deal with high-level wastes,” Carpenter said.

In written response to Crosscut’s questions, DOE said it is studying alternative ways to deal with the low-activity wastes, and confirmed that the high-level radioactive wastes will be glassified.

Also in its December 2020 report to Congress, DOE said up to 80% of Hanford’s tank waste could be converted into cementlike grout — skipping the whole glassification process. Grouting that much waste could save up to \$210 billion over the next few decades, the report said.

Reclassifying a significant amount of high-level waste into low-activity waste is key to reaching that 80%, the report said.

Carpenter opposes the grout concept.

His reasons include DOE has not said how it reached the \$210 billion savings estimate; DOE has not mapped out budgets or schedules for setting up a grouting approach; and the technology is not nailed down.

Carpenter zeroed in on DOE’s 2020 report to Congress, saying there is no mention of taking the waste out of the tanks before mixing it with grout. Consequently, there is a loophole in which tank wastes could be left inside the tanks, Carpenter argued.

Wiegman believes grouting is inevitable. however. “In my opinion, a lot of this stuff can be safely grouted. ... We just need to be smart about how we do it,” he said. A key question is what radioactive substances will be locked up in the grout, he said.

In its written responses to Crosscut, DOE wrote that no high-level wastes will be grouted and that it is examining several alternatives beyond glassification for dealing with the low-activity wastes.

There is an experimental grouting project at Hanford. A company called Perma-Fix is experimenting with mixing low-activity tank wastes with grout to be shipped to an existing Texas low-level radioactive waste dump site.

So far Perma-Fix did one test run in 2017 with 3 gallons of tank waste, successfully trucking that small sample to a mixed-waste dump in Texas. The second test run, involving 2,000 gallons, is on hold pending completion of the “holistic talks” between DOE and the state Ecology Department.

DOE sees grouting as a possible alternative to classifying some low-activity wastes. Wiegman sees grout as a way to move low-activity out of Hanford, which would be important politically to start cleaning up the site.

“We need to get some stuff out of here, or we’ll end up with it permanently staying here,” Wiegman said.

Ultimately, this project, originally scheduled to be finished this decade, will likely be completed in the latter half of this century. In other words, it could take 70 to 75 years (mid-1990s to 2069) to deal with the 56 million gallons of radioactive tank waste created by 42 years of manufacturing plutonium.

“This is a generational problem,” Wiegman said.

The state Department of Ecology’s Dahl frets about the likelihood of the high-level waste treatment plant going online by the mid-2030s.

“I don’t have another 30 years in me. It’s sad that this is going to be finished by someone else,” she said.

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