

Crosscut

Hanford report reveals problem with nuclear waste solution

An internal federal document says the preparation for turning nuclear waste into glass logs will produce toxic vapors.

by John Stang
April 11, 2022



In this July 9, 2014, file photo, workers wearing protective clothing and footwear inspect a valve at the "C" tank farm on the Hanford Nuclear Reservation near Richland. (Ted S. Warren/AP)

Fourteen years behind its original deadline, the Hanford Nuclear Reservation is scheduled to begin turning radioactive wastes into benign glass in 2023.

However, an internal federal document said the preparatory process for this work will produce toxic vapors from a substance called acetonitrile, which would be unsafe for workers and people and animals that live nearby.

In fact, that complication has not been studied, said the U.S. Department of Energy report dated Aug. 27, 2021.

On March 2, 2022, the Washington State Department of Ecology sent a message to the U.S. Department of Energy, asking for answers on this issue. That came after the state agency received a March 1 letter on the matter from the Seattle-based watchdog organization Hanford Challenge, which obtained the internal document.

As of Friday, the state has not received a reply from the DOE. And DOE's Hanford headquarters declined to provide anyone to discuss the matter with Crosscut. A spokesperson wrote in an email that the issue has been resolved, but did not provide any details.

In emails, the DOE and major contractor Washington River Protection Services, which designed the glassification equipment, both said the public can ask questions about this matter at a May 10 public hearing related to permits for acetonitrile-related equipment at the glassification plant. But neither the federal government nor its contractor would elaborate on the internal memo that raised concerns about acetonitrile, which will be used to re-treat the nuclear waste before it is turned into glass logs.

[Written public comment](#) is being accepted through June 4.

Acetonitrile, which exists in liquid and vapor forms, is easily ignited by heat, sparks or flames. When ignited, it gives off hydrogen cyanide fumes and potentially flammable vapors. Short-term effects from exposure can range from eye, nose and lung irritation to heart irregularities and death. Long-term, exposure could enlarge the thyroid gland and damage the liver, lungs, kidneys and the central nervous system.

The Hanford Nuclear Reservation was created in late 1942 to create plutonium for America's atomic bombs in World War II and the Cold War. Producing plutonium required nuclear reactors and massive radioactive chemical extraction plants. The worst of the radioactive wastes from those facilities ended up as liquids, sludge and gunk in 177 leak-prone underground tanks on the 586-square-mile complex along the Columbia River in Benton County in south-central Washington. These tanks hold 56 million gallons of waste on what is arguably the most radioactively and chemically contaminated spot in the Western Hemisphere. The site's overall cleanup began in 1989.

Hanford's longtime master plan has been to convert those wastes into benign glass. Originally, glassification was supposed to begin in 2009 and completed by 2021 at a cost of \$4 billion. Numerous budget, technical and engineering problems have bumped the price to \$17 billion, with glassification to begin in late 2023 and end by 2069.

The first glassification facility is scheduled to start its work glassifying the least radioactive wastes in late 2023. Dubbed the "direct-feed low-activity-waste" plant, or DFLAW. It will glassify the least radioactive and least complex of the tank wastes following some preprocessing of the material. That pretreatment and acetonitrile are the subject of the 2021 memo.

While Washington River Protection Solutions, the DOE's major contractor on the project, did computer-model testing on the possibility of a liquid acetonitrile leak during the pretreatment process, it did not calculate for the possibility of acetonitrile vapors, according to the internal DOE memo.

“WRPS designers stated they performed modeling to observe the effects of a hypothetical spill from the condensate tank but did not perform any modeling or calculations to determine the effect of a vapor leak,” the memo said.

Acetonitrile vapor concentrations, the memo said, could reach from 49,910 parts per million up to 463,343 parts per million at different parts of the preprocessing facility.

The U.S. Environmental Protection Agency and the Centers for Disease Control and Prevention both put the safety threshold for acetonitrile vapors at 170 parts per million. The federal Occupational Safety and Health Administration has a maximum permissible exposure limit of 40 parts per million, while the American Conference of Governmental Industrial Hygienists has set a threshold of 20 parts per million for acetonitrile vapors, the DOE memo said.

“This is really toxic stuff. [Acetonitrile] is known to be dangerous in fairly small amounts. ... If this gas in concentrations would escape, it would affect nearby workers,” said Tom Carpenter, who stepped down April 1 as executive director of Hanford Challenge.

Carpenter noted that the secondary wastes — which could contain acetonitrile in the materials — would be trucked at least 12 miles from central Hanford to a facility in northern Richland to be mixed with a cementlike substance known as grout. He said the facility — owned and operated by Perma-Fix — is located within five miles of an estimated 30,000 Tri-Cities residents. That includes the huge Pacific Northwest National Laboratory less than a mile away, a high school and Washington State University’s Tri-Cities campus a couple miles away, and a significant number of homes.

Perma-Fix treats low-level radioactive and mixed chemical-radioactive wastes from across the nation.

In March, the Washington Department of Ecology sent a series of questions and comments to the DOE about various aspects of the DFLAW project, including several questions about the concerns over significant amounts of acetonitrile vapors wafting into the air. So far, the DOE has not responded to those questions, said Department of Ecology spokesman Ryan Miller.

“No one mentions this document. No one mentions the worker exposure issues. ... As far as I’m concerned, DOE hid this document [the August 2021 memo] from disclosure,” Carpenter said.

Meanwhile, Carpenter also criticized Perma-Fix’s safety record, specifically pointing to two on-site fires involving hazardous materials in 2019. In 2020, Hanford Challenge [published a report critical](#) of Perma-Fix’s safety records in the 21st century, of which the two 2019 fires were the most recent incidents.

Citing information made to state and federal agencies, the Hanford Challenge report said one of the fires happened at Perma-Fix when some hot glassified radioactive material from Chicago ended up on a wood pallet, which caught fire.

Hanford Challenge quoted a state Ecology Department report that said: “The fire at Perma-Fix Northwest could have been catastrophic, as the fire alarms were not working, and hourly fire inspections (in place of the fire alarms) were not being performed when the fire occurred.” Additionally, Perma-Fix stated there are no fire sprinkler systems installed at the facility because of potential radiological contamination issues.

Then in December 2019, Perma-Fix notified the EPA that its staff found and extinguished a small fire inside a metal box of low-level, nonhazardous depleted uranium waste from a national laboratory near San Francisco. Hanford Challenge quoted DOE research: “Solid uranium, either as chips or dust, is a very dangerous fire hazard.”

Carpenter also criticized the DOE for not having a plan for disposing of grouted secondary waste produced by Perma-Fix. “They don’t have a disposal pathway for acetonitrile,” he said.

Perma-Fix spokesman David Waldman responded to emailed questions to the company, saying, “Currently, we do not have a request to treat the waste you mentioned, so we cannot comment any further.”

Waldman wrote: “The fires you mentioned were very minor incidents. The fires were managed by our own staff and fully disclosed to our regulators, as required. We had no injuries to our employees; no escape from hazardous materials; no damage to the building; and our fully trained and experienced staff professionally managed the situation. The Richland fire department responded only as a precaution to one of the fires, but just to confirm that everything was under control.”