

The Sacrifice Zone

Hanford's Endless Assault on the Columbia River

by Paul Koberstein

Althea Halvorson was a young woman at the time of the world's first nuclear blast. Now 88, she finds it deplorable that the U.S. is at war in Iraq over a nuclear threat that wasn't real, yet has made little progress at removing a nuclear threat close to the Columbia River that is very real.

Situated next to the Columbia in Eastern Washington, the Hanford Nuclear Site is one of the world's most contaminated places and will be dangerous forever.

Hanford produced the plutonium that leveled the city of Nagasaki on Aug. 9, 1945, killing hundreds of thousands of people. Another nuclear bomb factory at Oak Ridge, Tenn., enriched the uranium that destroyed Hiroshima three days earlier. Today Nagasaki and Hiroshima are safe places to live, unlike Hanford, Oak Ridge and more than 100 other places across the country that contributed to the U.S. arsenal of 70,000 nuclear warheads.

Until recently, the debates have been over how thoroughly these sites will be cleaned up. But in recent months the owner U.S. Department of Energy has changed the tune. Why not limit the cleanup to the bare minimum? The taxpayer would save a total of \$100 billion at sites across the country. At Hanford, officials claim the risk to the river and the public from the waste is quite low.

Powerful opponents beg to differ, and are lining up to fight the agency, including the U.S. Environmental Protection Agency, several Native American tribes,

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citizens groups and Oregon and Washington. They say the Department of Energy would break several environmental laws and shred legally binding contracts that require the removal of the dangerous waste.

"The effect," says Gerald Pollet of the watchdog group Heart of America Northwest, "would be to turn the Hanford Reach National Monument and Columbia River into a national nuclear waste sacrifice zone."

The DOE is basing its plan on the unproven and strongly disputed premise that the waste will never harm the Columbia as it flows through the nuclear site and the adjacent national monument. Yet the agency acknowledges its waste is already doing serious and irreversible damage to Hanford's groundwater which flows directly into the river, and that the contamination of both the river and groundwater will continue for thousands of years. Some of the contamination will remain radioactive for billions of years. Under the new plan, critics say the risk to the river, already great, would increase significantly.

Speaking as "just a citizen," Althea Halvorson says this new attitude at DOE shows her that the U.S. government is far more obsessed with ridding Iraq of its mythical "weapons of mass destruction" than ridding the Northwest of the vast wastes left over from our own WMD production.

"Here we've got WMD going into our river, and they tell people they don't have the money to stop it," Halvorson said at a public hearing on the DOE's plans in December in Portland. "It's shameful."

Should we worry about Hanford? What's really the threat? And what can we do? Scientists at Hanford who are looking at these questions say they can produce few verifiable answers about the future impacts of this waste. There's much uncertainty about how things may turn out. New discoveries pop up continually, and sometimes a haunting old event gets rediscovered. These shifting facts increase the uncertainty all the more.

Political appointees at the Department of Energy, on the other hand, are brimming with answers, and seem willing to accept a small but potentially catastrophic risk to the Columbia on the chance that they might also have the correct facts.

Some of those facts are in dispute. For example, the agency is ignoring new data showing the pollution is moving faster toward the river than scientists previously thought, according to Ken Niles, assistant director of the Oregon Energy Office.

"Why should we be surprised?" asks Greg deBruler of Columbia Riverkeeper, an environmental organization based in Bingen, Wash. "Hanford has a history of secrecy, a history of deception, a history of manipulation of models and manipulation of data."

The stakes are greater than ever, especially for Native Americans who have treaty rights to fish along the polluted Hanford Reach of the Columbia, says Russell Jim of the Yakama Indian Nation. He says his people have a "vested interest" in the outcome of the cleanup and restoration of the site and the river. "When cleanup is finished," he says, "if radioactive waste remains to the extent that anxiety exists about the potential risks, some may choose to move away. We cannot."

In the annals of Hanford's long-forgotten, top-secret, and finally declassified history of environmental damage, a major spill on March 20, 1951, stands out. Scientists are buzzing about it as a case study of how contamination can sometimes surprise scientists by abruptly turning from a tortoise into a hare. It also underscores what Niles is saying: how quickly scientific knowledge about Hanford can change.

The accident occurred near the middle of the site, about 5 miles south of the Columbia River, in an area known as the Central Plateau. It's an area where five chemical plants churned spent fuel rods into weapons-grade plutonium, a process that created enormous amounts of deadly wastes. Details about what happened that day are sketchy. The only primary source is a classified monthly production report that was declassified in 1992.

The document says 91,600 gallons of a liquid metal waste spilled into the soil when an underground waste tank known as BX-102 was being overfilled. The waste contained a dense metal slurry of about 7 tons of uranium 232, 233, 234, 235, 236 and 238, among a long list of radioactive isotopes like plutonium 239, technetium 99, strontium 90, iodine 129, radium 226 and europium 155.

"There were no documented cleanup efforts associated with this release," one Hanford report blithely stated.

In the years after the 1951 spill, the uranium's journey to the groundwater was lengthy. The waste took 40 years to **travel** the 250 feet down through the soil and meet the water table. The uranium did not go straight down, but rather zig-zagged its way between layers of sand, sediment and clay. When it reached the groundwater about 400 feet east of its starting point, it headed northwest toward a gap between two basalt outcrops, Gable Butte and Gable Mountain.

Since reaching the groundwater, the uranium has moved 4,000 feet toward the river. Not bad for an "effectively immobile" element. More importantly, it appears to be moving much faster with the groundwater than it did through the soil.

In 1991, the DOE dug two monitoring wells near the uranium spill. One hit groundwater at 247 feet, the other at 254 feet. In January 1994, one of the holes detected the first uranium concentration in groundwater. The other well found uranium as well as another fission product, radioactive technetium-99, at

concentrations of more than 10 times the drinking water standard for groundwater. Uranium levels have also exceeded the drinking water standard by a factor of 10 in that area.

Uranium has always been considered by the DOE as among the slowest moving radionuclides in the soil or groundwater at Hanford. Last year's annual Hanford environmental report said uranium is "effectively immobile" in groundwater. Hanford's 1994 annual groundwater monitoring report said a few samples had found uranium in the groundwater in the general area of the 1951 spill, but noted, "The source of this uranium is not understood." Today, the source is understood to be the 1951 spill, 15 underground waste tanks that have leaked and a number of unlined waste dumps known as cribs and trenches. The waste tank involved in the spill, known as BX-102, later sprang leaks in its walls, possibly as early as 1954.

In all, some 23 tons of uranium spilled in that general area, as well as billions of gallons of water laden with untreated radioactive chemicals.

In 1997, Hanford officials finally acknowledged that tank waste was the cause of at least some groundwater contamination in that area only after scientists Casey Ruud and John Brodeur went public with the evidence.

Well monitoring data shows that the plume of uranium contamination continues to move with the groundwater toward the northwest, to a point where the river is just 5 miles away. Concentrations of uranium in the groundwater near the leading edge of the plume rose from near zero to about 270 micrograms per liter between 1995 and 2003. The highest reported concentrations near the plume's center reached 360 in 2003. At its current pace, the uranium may reach the river within a few decades, though as always no one can say for sure.

Some experts, such as Dirk Dunning, a chemical engineer with the Oregon Department of Energy, Nuclear Safety Division, speculate that waste flows through the ground in odd and unpredictable ways. This adds to the uncertainty.

"Everything I see tells me the stuff is moving faster than the DOE says it is," Dunning says.

Since the late 1990s, Hanford has been drilling hundreds of other monitoring holes around the waste sites to dig up more information about the growing and glowing contamination in the groundwater. A continuous stream of fresh data is flowing from these wells, and some of it is appearing in 1,000-page reports posted to DOE web sites.

Anthony Knepp, a scientist listed as the primary author of one of the voluminous tracts, presented the National Academies of Science panel with some new information from a group of storage tanks known as the "C Farm."

One of his charts showed how a fission product known as technetium-99 might pose a risk to someone drinking contaminated Hanford groundwater. It concluded the risk would be very small over the next 1,000 years. Yet it was based on calculations that other experts said were far from precise. Said Dunning of the state of Oregon, "The margin of error is from zero to infinity."

In the big picture, that one uranium spill is like a single puff from the Hanford smokestack. In the area surrounding tank BX-102, nearly 23 tons of uranium have spilled to the soil. These spills tell scientists a lot about how waste moves, but there are other things to worry about, such as the 54 million gallons of waste still sitting in buried waste tanks.

The waste came from one of the five plutonium processing plants at Hanford. Processing operations discharged about 346 billion gallons of chemically contaminated, radioactive liquids to the soil.

There are 177 underground waste tanks at Hanford, and 67 of them have leaked about 1 million gallons of radioactive hazardous waste into the soil. They are leaking today, and are expected to continue leaking until they are empty.

Nearly 10 percent of that 1 million gallon estimate was spilled that one day in 1951, yet the accident has received little if any publicity in the media or Hanford's own press releases. The Hanford Site's annual environmental report published in September 2003 fails to mention the accident or the uranium plume moving with the groundwater to the northwest.

Most of the waste from the nation's nuclear weapons production is at Hanford, including more than 80 percent of its highly radioactive spent reactor fuel, almost 60 percent of its high-level radioactive wastes, more than half of its buried "transuranic" wastes (elements heavier than uranium), and the largest amount of contaminated soil and groundwater. The most worrisome issue is the fate of high-level radioactive waste that escaped from underground storage tanks near the center of the Hanford site. Estimates of the volume of this leaked waste range from 1 million to 6 million gallons. And the numbers are growing

Under federal law and court orders, the DOE is supposed to remove as much as it can from those tanks. Now it is reconsidering.

Eventually, the waste will break free if not removed. All of the waste tanks have surpassed or are nearing the end of their life span. The DOE acknowledges these tanks will spill more of their contents, perhaps as much as 5 million gallons. The DOE would remove the rest and treat it in a new "vitrification" plant now under construction. The vitrification plant will turn waste into glass.

Over the next 10,000 years, the rest will move down through the ground. Some may reach the Columbia. How much? Well, that depends on who you ask.

Cascadia Times asked three Hanford experts whether the DOE understands all the risks associated with its plans to leave the waste behind. They were asked to consider, for example, whether the DOE could keep the most dangerous waste out of the Columbia River. This is the radioactive, hazardous waste that was dumped, spilled or leaked into the soil on the Central Plateau in the heart of the 586-square mile Hanford site.

Mike Thompson, a groundwater expert for the DOE at Hanford, was unequivocal. "We should be able to keep (those) contaminants out of the Columbia River."

But Dunning, was asked the same question: Can the DOE keep that waste out of the river? "No," he said, "Not by a long shot, not without a lot of work. Success protecting the river will require a lot of concerted effort, including the development of new technologies."

Suzanne Dahl of the Washington Department of Ecology was also asked. Is the Columbia safe? "Oh baloney, no," she said. "I don't agree."

The Department of Ecology goes so far as to make one fairly specific prediction: waste that leaked from underground storage tanks - some of the worst of the worst waste Hanford - "may reach the Columbia River in the next decade."

The DOE, however, does acknowledge that there's little that can be done to restore Hanford's groundwater. In a recent environmental impact statement, the DOE said the contamination is "irreversible and irretrievable."

At least 100 square miles of this irreversibly contaminated groundwater is polluted in excess of federal drinking water standards. It all flows directly into the Columbia River.

In a letter posted to the Ecology web site, the agency's director, Linda Hoffman, says the DOE's decision to give up hope for cleaning up the groundwater has troubling implications. Ultimately, she worries that the policy "might be cited as a basis to allow further groundwater degradation or to forgo every effort to restore ground water to its highest beneficial use."

Fifteen years ago — on May 20, 1989 — the DOE, the Environmental Protection Agency and the Department of Ecology signed the landmark "Tri-Party Agreement" setting in place a 30-year timetable for cleaning up Hanford. Though the DOE has missed numerous deadlines over the years, never has it proposed to weaken the agreement as it is now doing.

The idea of weakening the cleanup program appears to have origins in a November 2001 memo written by DOE Assistant Secretary Jesse Roberson. In it, she directed officials at former nuclear weapons sites like Hanford to reduce the

overall cleanup cost by \$100 billion and shave 30 years off the expected cleanup timetable.

Roberson also directed the DOE to eliminate the need to process the most dangerous, high level wastes, which are the most costly part of the cleanup program. The agency responded by reclassifying some high-level wastes as lower-level wastes, but was thwarted by a federal judge. The DOE then tried to persuade Congress to pass a law, but failed.

Later, the DOE threatened to withhold cleanup funds from states that refused to approve weaker cleanup plans at DOE sites in their states.

"They withheld \$800 million to bribe states to sign plans, or letters of intent, to come up with quicker ways to clean up the sites," says Susan Gordon of the Alliance for Nuclear Accountability.

New Mexico Governor Bill Richardson recently labeled "extortion" the DOE's attempt to withhold funds from the Los Alamos Lab unless the state agreed to weakened cleanup requirements.

The state of California complained that the DOE intended to overthrow a legally binding agreement "mandating cleanup of contaminated water" at the Lawrence Livermore Lab site in Berkeley.

The Washington Department of Ecology, which regulates the DOE cleanup at Hanford, is one that won't, says John Price, environmental restoration manager for the state at Hanford. In fact, Ecology won't even consider them.

"The proposed variances are so incompletely developed that we can't do an independent review of them," Price said.

The Washington Department of Ecology said the proposed vision "fails to recognize 15 years of work, debate and compromise on the part of the DOE, regulators, tribes, stakeholders and the public to achieve the most effective and protective cleanup within the limits of what is achievable and affordable."

"This strategy is very troubling," Nick Ceto, the top EPA official at Hanford, told a panel of National Research Council scientists at a recent meeting in Richland, Wash., located about 10 miles south of the Hanford site. "They expect us to change regulations."

Ceto also said he has learned that if the EPA finds the new plan a violation of several environmental laws, the DOE will ask Congress to change those laws.

Shirley Olinger, a DOE official at Hanford who is overseeing the development of the new cleanup "vision," as she put it, denied that the agency wants to undermine laws. She says the DOE headquarters in Washington, D.C., simply is

looking for information about alternative ways to cleanup the site. "It's all very innocent," she said.

The bureaucratic term for the DOE's plan is called "risk-based end states." The phrase means that the DOE will do only the minimum amount of cleanup work as it itself deems necessary to reduce risk to the environment and human health — even if citizen groups. Not only is the DOE threatening to take unilateral action, but hasn't even been listening to the EPA or other groups, Ceto said.

At a March 9 meeting of a panel of experts assembled by the National Academies of Science, Olinger explained how Roberson's vision would be put into action at Hanford.

The DOE is considering eight major changes in its operation of Hanford, Olinger said. For example, it would retrieve only 90 percent of the high-level waste within underground storage tanks, down from the 99 percent now required. Eventually, this "residual waste," as it's called, could reach the river — whether in 100, 1,000 or 10,000 years.

The DOE's new plan would leave behind radioactive substances at levels so dangerous that no one will be allowed to live at Hanford for at least 1,000 years. The previous plan envisioned resettlement in 150 years. The amount of deadly wastes left in often-leaky underground storage tanks would increase 10-fold, said Suzanne Dahl, an official with the Department of Ecology.

The most dangerous areas would be paved over to slow down radioactivity and toxins percolating through the soil. "No trespassing" signs will be hoisted, fences will be built, and a security force will be posted on site for those 1,000 years to keep Native Americans, homesteaders, or the potential terrorist out. For their own protection, of course.

Members of the public have an altogether different vision of Hanford's future.

The bottomline says Columbia Riverkeeper's Greg deBruler, is simply this: "The groundwater has to be clean enough to drink, and the shoreline has to be clean enough to live on."

Adds Ken Niles of the Oregon Energy Office, "Oregon's vision for successful cleanup of Hanford centers around protection of the Columbia River — now and forever."

Paul Koberstein is editor of Cascadia Times. He is a co-author of *The Clean Water Act: An Owner's Manual*.