

Fear at the tap: Uranium contaminates water in the West

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In this Sept. 16, 2015 photo, a student drinks from a water fountain below a sign signaling the water as safe to drink at Westport Elementary School in Ceres, Calif. The school, which draws on its own wells for its drinking fountains, sinks and cafeteria, is one of about 10 water systems in the farm region to install a uranium removal facility on site. (AP Photo/John Locher)

In a trailer park tucked among irrigated orchards that help make California's San Joaquin Valley the richest farm region in the world,

16-year-old Giselle Alvarez, one of the few English-speakers in the community of farmworkers, puzzles over the notices posted on front doors: There's a danger in their drinking water.

Uranium, the notices warn, tests at a level considered unsafe by federal and state standards. The law requires the park's owners to post the warnings. But they are awkwardly worded and in English, a language few of the park's dozens of Spanish-speaking families can read.

"It says you can drink the [water](#)—but if you drink the water over a period of time, you can get cancer," said Alvarez, whose working-class family has no choice but keep drinking and cooking with the tainted tap water daily, as they have since Alvarez was just learning to walk. "They really don't explain."

Uranium, the stuff of nuclear fuel for power plants and atom bombs, increasingly is showing in [drinking water](#) systems in major farming regions of the U.S. West—a naturally occurring but unexpected byproduct of irrigation, of drought, and of the overpumping of natural underground water reserves.

An Associated Press investigation in California's central farm valleys—along with the U.S. Central Plains, among the areas most affected—found authorities are doing little to inform the public at large of the growing risk.

That includes the one out of four families on private wells in this farm valley who, unknowingly, are drinking dangerous amounts of uranium, researchers determined this year and last. Government authorities say long-term exposure to uranium can damage kidneys and raise cancer risks, and scientists say it can have other harmful effects.

In this swath of farmland, roughly 250 miles long and encompassing

major cities, up to one in 10 [public water systems](#) have raw drinking water with uranium levels that exceed federal and state safety standards, the U.S. Geological Survey has found.

More broadly, nearly 2 million people in California's Central Valley and in the U.S. Midwest live within a half-mile of groundwater containing uranium over the safety standards, University of Nebraska researchers said in a study published in September.

Everything from state agencies to tiny rural schools are scrambling to deal with hundreds of tainted public wells—more regulated than private wells under safe-drinking-water laws.

That includes [water wells](#) at the Westport Elementary School, where 450 children from rural families study outside the Central California farm hub of Modesto.

At Westport's playground, schoolchildren take a break from tether ball to sip from fountains marked with Spanish and English placards: "SAFE TO DRINK."

The school, which draws on its own wells for its drinking fountains, sinks and cafeteria, is one of about 10 [water systems](#) in the farm region that have installed uranium removal facilities in recent years. Prices range from \$65,000 for the smallest system to the millions of dollars.

Just off Westport's playground, a school maintenance chief jangles the keys to the school's treatment operation, locked in a shed the size of a garage. Inside, a system of tubes, dials and canisters resembling large scuba tanks removes up to a pound a year of uranium from the school's wells.



In this Sept. 15, 2015 photo, water is pumped from a well into an irrigation ditch near Fresno, Calif. Officials with the U.S. Geological Survey's Sacramento office and elsewhere believe the amount of uranium increased in Central Valley drinking-water supplies over the last 150 years with the spread of farming. (AP Photo/John Locher)

The uranium gleaned from the school's well water and other Central California water systems is handled like the nuclear material it is—taken away by workers in masks, gloves and other protective garments, said Ron Dollar, a vice president at Water Remediation Technology, a Colorado-based firm.

It is then processed into nuclear fuel for power plants, Dollar said.

Before treatment, Westport's water tests up to four times state and federal limits. After treatment, it's safe for the children, teachers and staff to drink.

Other Central California farm schools opt to buy bottled water in place of drinking fountains, which are off limits because of uranium and other contaminants.

"We don't have a choice," said Terri Lancaster, principal of the 260 students at Waukena elementary school in rural Tulare County. "You do what you have to do."

Until winning a state grant to pay for trucked-in drinking water, her school was spending \$10,000 a year from its general fund on bottled water.

Meanwhile, the city of Modesto, with a half-million residents, recently spent more than \$500,000 to start blending water from one contaminated well to dilute the uranium to safe levels. The city has retired a half-dozen other wells with excess levels of uranium.

State officials don't track spending on uranium-contaminated wells. But the state's Water Resources Control Board identified at least \$16.7 million the state has spent since 2010 helping public water systems deal with high levels of uranium.

In coming years, more public water systems likely will be compelled to invest in such costly fixes, said Miranda Fram, a researcher with the U.S. Geological Survey in Sacramento.

Fram and colleagues at USGS have taken the lead over the past decade in identifying the problem in farm centers including Central California, which produces a quarter of the country's agriculture.

Geologists and water experts are still piecing together the ways levels of uranium exceeding federal and state health standards are seeping into more public water systems and household wells in major farm areas.



In this Monday, Sept. 14, 2015 photo, 9-year-old Carlos Velasquez drinks well water from a hose at a trailer park near Fresno, Calif. Residents of the trailer park receive notices warning that their well water contains uranium at a level considered unsafe by federal and state standards. (AP Photo/John Locher)

Fram and her colleagues believe the amount of uranium increased in Central Valley drinking water supplies over the last 150 years with the spread of farming.

In California, as in the Rockies, mountain snowmelt washes uranium-laden sediment to the flatlands, where groundwater is used to irrigate crops.

Irrigation allows year-round farming, and the irrigated plants naturally create a weak acid that is leeching more and more uranium from sediment, said Fram and Bryant Jurgens, a fellow researcher at the

federal agency's office in California's capital.

Groundwater pumping pulls the contaminated water down into the earth, where it is tapped by wells that supply drinking water.

California is now experiencing its driest four-year span on record, and farmers and other users are pumping groundwater at the highest rates ever, helping to pull yet more uranium into areas of aquifers tapped by water wells.

"This has been a decades-long process that has occurred," Jurgens said.



In this Sept. 17, 2015 photo, a man picks cucumbers as the sun rises on farmland near Modesto, Calif. U.S. Officials with the Geological Survey's Sacramento office and elsewhere believe the amount of uranium increased in Central Valley drinking-water supplies over the last 150 years with the spread of farming. Irrigation allows year-round farming in the region, and the irrigated plants naturally create a weak acid that is leeching more and more uranium from

sediment into the groundwater. (AP Photo/John Locher)

And even if authorities were to intervene to somehow curb uranium contamination—and no such effort is under way—"we expect that it's going to take many decades to reverse this," Jurgens said.

The USGS calculates that the average level of uranium in public-supply wells of the eastern San Joaquin Valley increased 17 percent from 1990 to the mid-2000s. The number of public-supply wells with unsafe levels of uranium, meantime, climbed from 7 percent to 10 percent over the same period there.

But the problem remains so unpublicized that even Fresno County farmer Mark Sorensen—who grows grapes and blueberries in one of the most impacted parts of the country, and deals with water issues routinely as a leader of the local farm bureau—admits to not knowing about it.

"To be honest, I have never spoken to anybody about uranium," said Sorensen, a fifth-generation farmer. "I've never even heard of it in drinking water."

Scientists have long known that uranium can damage kidneys and increase the risks of cancer when consumed over a year or more, which is why authorities have set maximum levels for drinking water.

Drinking water tainted by uranium is the chief concern—but uranium also sticks to potatoes, radishes and other root vegetables if they're not properly washed. (While studies have confirmed livestock and people can ingest high levels of uranium by eating contaminated vegetation, scientists have yet to fully research the dangers involved.)

Though people think mainly about uranium's radioactivity, the danger in water mainly comes from the toxic chemical effects of the metal.

Old public health models for uranium date back to the U.S. uranium boom of the 1940s and 1950s, when the U.S. Atomic Energy Commission set off a nuclear-age mining boom in the Central Valley and other points West as the country sought to build uranium stockpiles. Countless miners succumbed to cancer from breathing radioactive gas.

But those models now need revising to deal with the larger population exposed through sources like drinking water, academics say.

"We should not have any doubts as to whether drinking water with uranium in it is a problem or not. It is," said Doug Brugge, professor of public health and community medicine at Tufts University School of Medicine in Boston. "The larger the population that's drinking this water, the more people that are going to be affected."

Because "there has not been an appreciation of the number of people exposed, it has received a lot less attention" than it should, said researcher Johnnye Lewis at the University of New Mexico, which along with Brugge's team is studying the health impacts of uranium on communities.

Research teams at Tufts and the University of New Mexico also link long-term exposure to signs of reproductive and genetic damage, among other problems.

In California, changes in water standards since the late 2000s have mandated testing for uranium in public water systems, and the state frequently helps public water systems deal with wells testing at high levels.



In this Sept. 14, 2015 photo, kids play in well water from a hose at a trailer park near Fresno, Calif. Residents of the trailer park receive notices warning that their well water contains uranium at a level considered unsafe by federal and state standards. (AP Photo/John Locher)

For private well owners and small water systems, however, officials were unable to point to any public health campaigns in the most-affected areas or any help with testing or dealing with wells that do test for high levels.

USGS researchers recently sampled 170 domestic water wells in the San Joaquin Valley, and found 20 to 25 percent bore uranium at levels that broke federal and state limits.

State and federal regulators say the U.S. Congress, outlining drinking water standards, has limited their enforcement authority to public water systems. "Your home's your castle. If you've got a well at home, that's

your business," said Bruce Macler, a San Francisco-based water program toxicologist for the U.S. Environmental Protection Agency.



In this Sept. 14, 2015 photo, Dora Martinez washes potatoes at her home in a trailer park near Fresno, Calif. Residents of the trailer park receive notices warning that their well water contains uranium at a level considered unsafe by federal and state standards. (AP Photo/John Locher)

Uranium is on the radar of California water officials, but the officials are paying more attention to other farming-related contaminants, including nitrates, as well as simply having enough water in the fourth year of the state's drought, said John Borkovich, head of water quality at the state Water Resources Control Board.

"When it comes to private domestic wells, we do what we can to get the

word out," Borkovich said. "It's safe to say that there's always more that can be done."

The Associated Press commissioned sampling of wells at five homes in the countryside outside Modesto, to look more closely at whether unregulated private wells that families depend on were as vulnerable as contaminated public water systems nearby.

The results: Water from two of the five wells contained dangerous levels of uranium.

None of the five families, however, had ever heard that uranium could be a problem in groundwater—let alone that it was a problem in their area.

"That's something I'm sure a lot of people are unaware of," said Reyna Rico, whose rural home overlooking farm fields had a well that tested three times the federal and state health limits.

"It would be nice to be informed, so we can make an informed decision, and those wells can be tested," said a resident nearby, Michelle Norleen, who was relieved to know that her own water—unlike those of two of her neighbors—tested below the limits in the AP sampling.



In this Sept. 14, 2015 photo, 16-year-old Giselle Alvarez stands at the door of her family's home in a trailer park near Fresno, Calif. Residents of the trailer park receive notices warning that their well water contains uranium at a level considered unsafe by federal and state standards. (AP Photo/John Locher)

Even for bigger water systems for which government help is available, accessing safe water doesn't always come quickly. That's true at the Double L Mobile Ranch outside Fresno, where Giselle Alvarez lives in the one-room trailer with her mother and father.

Authorities have recorded years of tests showing dangerous levels of uranium in the water provided to the Double L's low-income residents.

The park's owner, Carl Hunt, minimized the health risks to the families who live there.

"Not afraid of that water at all," Hunt told the AP.

An independent water test commissioned by the AP found water at Hunt's trailer park remained over the limits for uranium.



In this Sept. 14, 2015 photo, Dora Martinez cooks food at her home in a trailer park near Fresno, Calif. Residents of the trailer park receive notices warning that their well water contains uranium at a level considered unsafe by federal and state standards. (AP Photo/John Locher)

Officials trying to set up delivery of safe water for the Double L's families have arranged with a local farm town, Kerman, to run its own water lines out to the trailer park—but Kerman is awaiting funding to deal with its own, [uranium](#)-contaminated well first. State officials expect it will take another three years to get safe water to the trailer park.

For now, families in the rural trailer park mostly throw away the regular water notices, unable to comprehend their meaning. Suspicious in

general of the park's tap water, families at the Double L who can afford it buy bottled water.

That doesn't include Alvarez's family.

"We can't really do anything about it," she says on the wooden steps of her mobile home. "As you can see, we're not rich."



In this Sept. 18, 2015 photo, a man loads a truck on farmland near Fresno, Calif. U.S. officials with the Geological Survey's Sacramento office and elsewhere believe the amount of uranium increased in Central Valley drinking-water supplies over the last 150 years with the spread of farming. Irrigation allows year-round farming in the region, and the irrigated plants naturally create a weak acid that is leeching more and more uranium from sediment into the groundwater. (AP Photo/John Locher)



In this Sept. 17, 2015 photo, two men ride on horseback along an irrigation canal in agricultural land near Modesto, Calif. Uranium, the stuff of nuclear fuel for power plants and atom bombs, increasingly is showing up in drinking-water systems in major farming regions of the U.S. West, as an unexpected by-product of irrigation and, increasingly, of drought and the overpumping of natural underground water reserves. (AP Photo/John Locher)



In this Sept. 17, 2015 photo, pipes are used to blend water from a well at the location with treated water from other sources in Modesto, Calif. The city of Modesto, with a half-million residents, recently spent more than \$500,000 to start blending water from one contaminated well to dilute the uranium to safe levels. The city has retired a half-dozen other wells with excess levels of uranium. (AP Photo/John Locher)



In this Sept. 17, 2015 photo, Walter Esteban feeds his horse at his home near Modesto, Calif. Esteban like many residents, was unaware that uranium levels were a problem at some private wells in the area. (AP Photo/John Locher)



In this Sept. 15, 2015 photo, water is pumped from a well into a drainage ditch along agricultural land near Fresno, Calif. Uranium is increasingly seeping at unhealthy levels into the drinking water of major farming regions of the U.S. West. While uranium is a naturally occurring element, it gets into water supplies as an unexpected by-product of irrigation, drought and over-pumping of groundwater. (AP Photo/John Locher)

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