Los Angeles Times

High levels of benzene found in fracking waste water

Oil pumps and drilling equipment in an oil field in Kern County, where the majority of California's oil and gas production is centered. A year's worth of data from tests on water coming out of hundreds of fracked wells found high concentrations of benzene, a human carcinogen. (Brian van der Brug / Los Angeles Times)

by Julie CartJulie Cart
Feb 11 2015

Levels of benzene up to 700 times the federal standard have been found in waste water from fracking, data show

Hoping to better understand the health effects of oil fracking, the state in 2013 ordered oil companies to test the chemical-laden waste water extracted from wells.

Data culled from the first year of those tests found significant concentrations of the human carcinogen benzene in this so-called "flow-back fluid." In some cases, the fracking waste liquid, which is frequently reinjected into groundwater, contained benzene levels thousands of times greater than state and federal agencies consider safe.

The testing results from hundreds of wells showed, on average, benzene levels 700 times higher than federal standards allow, according to a Times analysis of the state data.

The presence of benzene in fracking waste water is raising alarm over potential public health dangers amid admissions by state oil and gas regulators that California for years inadvertently allowed companies to inject fracking flowback water into protected aquifers containing drinking water.

The federal Environmental Protection Agency called the state's errors "shocking." The agency's regional director said that California's oil field waste water injection program has been mismanaged and does not comply with the federal Safe Drinking Water Act.

The discovery adds urgency to a mounting list of problems at the state Division of Oil, Gas and Geothermal Resources, which regulates the oil and gas industry.

State officials attribute the agency's errors to chaotic record-keeping and antiquated data collection. And they emphasize that preliminary tests on nine drinking water wells have found no benzene or other contaminants.

"The problem is foundational and it's serious," said Steven Bohlen, who took over the troubled Division of Oil, Gas and Geothermal Resources seven months ago.

The Times analyzed self-reported testing results that oil well operators submitted to the state for the first time in 2014, complying with new fracking regulations that legislators approved in 2013. The law requires well operators using so-called well stimulation techniques such as fracking, steam injection and acidizing to report water testing results to an online database.

It grew out of fears about health risks from chemicals used in fracking, in which a slurry of chemicals is injected underground to unlock deposits of oil or gas.

The raw data, compiled by the Center for Biological Diversity, showed that 98% of waste water samples taken from 329 fracked oil wells exceeded federal and state water quality standards for benzene concentrations.

The data publicly reveal, for the first time, the components of oil production fluids that companies dispose of by pumping them into underground waste wells. Those wells are now the subject of federal and state review: The state Division of Oil, Gas and Geothermal Resources recently conceded that for decades it erred by allowing oil companies to dispose of drilling waste water through more than 170 disposal wells bored into aquifers that contained water classified as clean by federal law.

The EPA contends that an additional 279 disposal wells were drilled into aquifers containing water suitable for drinking if treated. An additional 48 waste wells were allowed to discharge in aquifers that lack any water quality classification, federal regulators say.

Waste disposal wells are legally required to be sited in aquifers that contain water too contaminated for human consumption or agricultural use.

The data that oil companies reported to state regulators, however, probably do not account for the full extent of benzene present in fracking flowback. Many operators failed to comply with reporting requirements. And at least 150 reported some results but either failed to test for or provided no data for benzene and a host of other dangerous contaminants.

California oil wells often produce 10 or more gallons of water for each gallon of oil that comes out of the ground. Operators dispose of drilling wastewater either by injecting it into a disposal well or dumping into a pit.

Bohlen said determining the extent of potentially illegal well placement is hampered by the agency's haphazard record keeping. Many of the Division of Oil, Gas and Geothermal Resources' files, including documents that would shed light on where waste water wells are operating, exist only on paper, and each district office in the state organizes them differently, he said.

Jared Blumenfeld, the U.S. Environmental Protection Agency's regional administrator, hesitated to call the state's record-keeping system dysfunctional "because there isn't any system."

Hollin Kretzmann, an attorney for the Center for Biological Diversity, which is monitoring the injection program, said the situation is "a disaster. The aquifer information is a complete mess. They are trying to piece it all together — in some cases decades after these injections started."

The EPA has the authority to administer federal water laws, but a 1983 agreement gave California the responsibility for monitoring water quality in its injection well program.

The state is required to submit periodic reports to the EPA, but the federal agency has long complained that the documents have been late and incomplete.

An audit in 2011 exposed widespread, systemic problems and the EPA concluded that the Division of Oil, Gas and Geothermal Resources had lost control of its well injection system.

The report cited concerns that included the training of inspectors, the frequency of inspections and the lack of clarity about the location of clean water sources. Bohlen said some of the issues have already been addressed.

Those problems are more troubling because oil operators are disclosing the content of the waste and authorities better understand where it is going.

In December, the EPA gave the Division of Oil, Gas and Geothermal Resources until last week to submit a plan to safeguard drinking water and two years to implement much of it. The federal government has the authority to revoke California's right to manage water associated with the state's extensive oil and gas operations. In a conference call with reporters Monday, Bohlen unveiled the plan and said "we are focused on the fixes."

Blumenfeld said the EPA is directing $500,000 to help California establish a baseline for water quality.

Environmental groups and some public health advocates are calling on authorities to test all of the affected aquifers.

Benzene is often part of the chemical cocktail — along with sand and large amounts of water — injected into oil-bearing formations to break open fissures for oil or gas to escape.

Benzene also occurs naturally in some areas and may account for its presence in oil field wastewater.

Regardless of the source, benzene is potentially dangerous to humans, experts say.

Timothy Krantz, a professor of environmental studies at the University of Redlands, said that when he initially saw the levels of benzene in the test results he thought there was a reporting error. “They are just phenomenal numbers,” he said.

Fracking and other well-stimulation techniques have been divisive issues in communities across the country. Some cities have banned the practice outright, and others have imposed moratoriums until more is known about effects on water quality and quantity and whether the high-pressure injections stimulate small-scale seismic activity.

The industry says that fracking is safe and that there is there is little evidence that water supplies have been contaminated.

Rock Zierman, chief executive of the California Independent Petroleum Assn., said the question of disposal into protected California aquifers turns on a discrepancy between what aquifers the state and the EPA deem appropriate for disposal wells.

Zierman said he’s confident that the areas where the disputed disposal wells are operating will be reclassified as acceptable.