



Fracking
Gas Drilling's Environmental Threat

In New Gas Wells, More Drilling Chemicals Remain Underground

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For more than a decade the energy industry has steadfastly argued before courts, Congress and the public that the federal law protecting drinking water should not be applied to hydraulic fracturing [2], the industrial process that is essential to extracting the nation's vast natural gas reserves. In 2005 Congress, persuaded, passed a law prohibiting such regulation.

Now an important part of that argument -- that most of the millions of gallons of toxic chemicals that drillers inject underground are removed for safe disposal, and are not permanently discarded inside the earth -- does not apply to drilling in many of the nation's booming new gas fields.

Three company spokesmen and a regulatory official said in separate interviews with ProPublica that as much as 85 percent of the fluids used during hydraulic fracturing is being left underground after wells are drilled in the Marcellus Shale, the massive gas deposit that stretches from New York to Tennessee.

That means that for each modern gas well drilled in the Marcellus and places like it, more than 3 million gallons of chemically tainted wastewater could be left in the ground forever. Drilling companies say that chemicals make up less than 1 percent of that fluid. But by volume, those chemicals alone still amount to 34,000 gallons in a typical well.

These disclosures raise new questions about why the Safe Drinking Water Act, the federal law that regulates fluids injected underground so they don't contaminate drinking water aquifers, should not apply to hydraulic fracturing, and whether the thinking behind Congress' 2005 vote to shield drilling from regulation is still valid.

When lawmakers approved that exemption, it was generally accepted that only about 30 percent of the fluids stayed in the ground. At the time, fracturing was also used in far fewer wells than it is today and required far less fluid. Ninety percent of the nation's wells now rely on the process, which is widely credited for making it financially feasible to tap into the Marcellus Shale and other new gas deposits.

Congress is considering a bill that would repeal the exemption, and has directed the Environmental Protection Agency to undertake a fresh study of how hydraulic fracturing may affect drinking water supplies. But the government faces stiff pressure from the energy industry [3] to maintain the status quo -- in which gas drilling is regulated state by state -- as companies race to exploit the nation's vast shale deposits and meet the growing demand for cleaner fuel. Just this month, Exxon announced it would spend some \$31 billion to buy XTO Energy, a company that controls substantial gas reserves in the Marcellus -- but only on the condition that Congress doesn't enact laws on fracturing that make drilling "commercially impracticable."

The realization that most of the chemicals and fluids injected underground remain there could stoke the debate further, especially since it contradicts the industry's long-standing message that only a small proportion of the fluids is left behind at most wells.

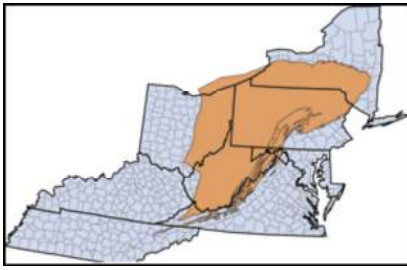
But while the message has not changed, the drilling has.

In the nation's largest and most important natural gas fields, far more chemicals are being used today than when Congress and the EPA last visited the fracturing issue, and far more of those fluids are remaining underground. Drilling companies say that as they've drilled in the Marcellus they've discovered that the shale rock -- which is similar to many of the nation's largest natural gas projects in Louisiana, Texas and several other states -- holds more fluids than they expected.

During hydraulic fracturing, drillers use combinations of some of the 260 chemical additives associated with the process, plus large amounts of water and sand, to break rock and release



A hydraulic fracturing operation in Bradford County, Pa. It's possible that for each modern gas well drilled in the Marcellus and places like it, more than three million gallons of chemically tainted wastewater could be left in the ground forever. (Photo courtesy of the New York State Environmental Impact Statement)



The Marcellus Shale, denoted in brown, primarily cuts across large swaths of New York, Pennsylvania, Ohio and West Virginia. (Map by Jennifer LaFleur/ProPublica)

gas. Benzene and formaldehyde, both known carcinogens, are among the substances that are commonly found.

If another industry proposed injecting chemicals -- or even salt water -- underground for disposal, the EPA would require it to conduct a geological study to make sure the ground could hold those fluids without leaking and to follow construction standards when building the well. In some cases the EPA would also establish a monitoring system to track what happened as the well aged.

But because hydraulic fracturing is exempt from the Safe Drinking Water Act, it doesn't necessarily have to conform to these federal standards. Instead, oversight of the drilling chemicals and the injection process has been left solely to the states, some of which regulate parts of the process while others do not.

As the industry was lobbying Congress for that exemption -- and ever since -- the notion that most fluids would not be left underground continued to emerge as a recurring theme put forth by everyone from attorneys for Halliburton, which developed the fracturing process and is one of the leading drilling service companies, to government researchers and regulators.

"Hydraulic fracturing is fundamentally different," wrote Mike Paque, director of the Ground Water Protection Council, an association of state oil and gas regulators, to Senate staff in a 2002 letter advocating for the exemption, "because it is part of the well completion process, does not 'dispose of fluids' and is of short duration, with most of the fluids being immediately recovered."

In May, ProPublica heard a similar explanation from the industry-funded American Petroleum Institute.

"Hydraulic fracturing operations are something that are done from 24 hours to a couple of days versus a program where you are injecting products into the ground and they are intended to be sequestered for time into the future," said Stephanie Meadows, a senior API policy analyst who has been closely involved in fracturing legislation issues. "I don't see the benefit of trying to take that sort of sequestration type activity and applying it to something that is temporary in time."

Asked how much fracturing fluid can remain underground, and whether it could be as high as 30 percent, the figure that was still being included in government reports earlier this year, Meadows said: "I guess I didn't know that the statistics are that high."

Neither the American Petroleum Institute nor the Ground Water Protection Council responded to requests for further comment.

EPA officials maintained in 2005, and say now, that the volume of fluids left underground had little to do with its opinion that hydraulic fracturing for gas wells is not the same as underground injection. They say that distinction is because the primary function of the two types of wells is different: Gas wells are for production processes, while most EPA-regulated underground injection wells are intended for storage.

But Stephen Heare, director of the EPA's Drinking Water Protection Division in Washington, said that both the circumstances and the drilling technology have evolved. When asked to explain how hydraulic fracturing today is different from other forms of underground injection, he said the bottom line was simple.

"If you are emplacing fluid, it does not matter whether you are recovering 30 percent or 65 percent of it, if you are emplacing fluids, that is underground injection," Heare said. "The simple explanation for why hydraulic fracturing is different from other injection activities," he added, is that hydraulic fracturing "is exempt from regulation under the Safe Drinking Water Act."

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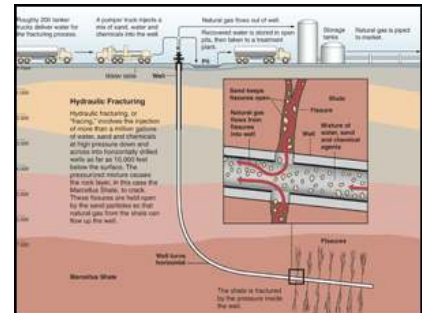
The argument that fracturing should not be regulated by the EPA became prominent in the 1990s, after the EPA said that fracturing lay outside the scope of the Safe Drinking Water Act, because the primary purpose of gas wells was energy production, not fluid disposal.

A 1997 Alabama lawsuit challenged that position, and the 11th Circuit Court of Appeals ruled against the EPA.

[2] In that decision, the judges wrote that "According to the state agency, hydraulic fracturing is not underground injection because it does not result in permanent subsurface 'emplacement' of the fluids, as these fluids are pumped out of the ground before methane gas is extracted out of the well." But the judges called that assertion "untenable" and ordered the EPA to regulate fracturing in Alabama under the Safe Drinking Water Act. They also ordered the EPA to more clearly define fracturing as a type of underground injection, a move that could have paved the way for regulation in other states as well.

But in 2005, before such regulation could happen, Congress stepped in and gave hydraulic fracturing its special exemption from the Safe Drinking Water Act.

When Congress voted for the exemption, it referred to a 2004 EPA report, which concluded that fracturing did not pose a threat to drinking water. That report, which has since been criticized as incomplete, said that while some of the fracturing fluids remained underground,



"Most of the fracturing fluids injected into the formation are pumped back out of the well along with groundwater and methane gas."

What is hydraulic fracturing? Click here to see it explained. (Graphic by Al Granberg)

Lee Fuller, vice president of government affairs for the Independent Petroleum Association of America, said that the emphasis on wastewater removal was made to help legislators understand how fracturing was different from underground injection, but that those legislators also knew that much of the water stayed underground when they voted for the exemption.

"The EPA study said there was a certain amount of the water that does stay in the fractured formation. That information was known," he said, adding that more of the water may seep out over the life span of the well. "So I think there was an understanding of it on the part of the proponents of the proposal."

In the 2004 report, the EPA said as much as 59 percent of fracturing fluids can remain underground. A 2009 Department of Energy report titled Modern Shale Gas put that figure at 30 to 70 percent, but emphasized that most wells fall into the lower end of that range, explaining that "the majority of fracturing fluid is recovered in a matter of several hours to a couple of weeks."

Just six months ago that point was reiterated in testimony before the House Committee on Natural Resources, when the Interstate Oil and Gas Compact Commission repeated a statement that former Alabama state geologist Donald Oltz made in the 1997 Alabama court case: "Almost all hydraulic fracturing fluid is recovered to the surface after a hydraulic fracturing operation."

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That statement contrasts sharply with the latest reports from regions where gas drilling is on the upswing.

Spokesmen for Cabot Oil and Gas, Range Resources and Fortuna Energy -- three of the most active companies developing gas resources in the Marcellus Shale -- say that more water is trapped underground in newer drilling areas because the "tight shale" that is loath to give up the gas is likely to hold on to the fluids too.

"It's not like you pump a volume of water into the frack and then it gives you that volume back," said Ken Komoroski, a spokesman for Cabot Oil and Gas, who says only 15 to 20 percent of the fluid comes back out. "Most of the water and sand stays in the formation compared to in other geologic formations."

In Pennsylvania, where regulators had once predicted that drilling in the Marcellus would produce about 19 million gallons of wastewater per day, that estimate has been revised to just a fraction of that volume, largely because so much of the fluid is remaining underground.

Range Resources now reuses 100 percent of the wastewater it extracts from its Pennsylvania wells by diluting it with fresh water and using it to drill more wells, said spokesman Matt Pitzarella. Range has been able to do that, Pitzarella said, in part because it's extracting only 20 percent of the 4 million gallons it pumps underground for each of its wells.

Gas industry officials say the amount of fluids they leave behind in their wells should have no bearing on whether hydraulic fracturing is or is not regulated by the federal government. What's important is managing the risk, says the Independent Petroleum Association's Fuller, a job he says the industry is doing very well without additional oversight.

"You are wrapping yourself around a distinction of whether something should or should not be regulated under the Safe Drinking Water Act as opposed to whether something does or does not pose an environmental risk," said Fuller, who asserts that despite numerous reports of contamination in drilling areas, the fracturing process has never been conclusively proven to be the cause.

Regulation, Fuller said, "may shut down natural gas drilling for a long time, but it is not going to make the environment any better."

It will fall to Congress -- and then to the EPA -- to decide whether that is truly the case. Sponsors of the Frac Act [4] hope for a vote this spring. If it passes, and if the EPA finds reason to change the conclusions it reached in 2004, the agency would then have to decide exactly how fracturing will be addressed by the Safe Drinking Water Act.

"The thinking we did then, the study that we did then, we were really looking at a different set of circumstances," said Heare, the EPA's Drinking Water Protection Division director. "The agency has not investigated the impacts of hydraulic fracturing in other settings such as shale gas production and at this time is unable to quantify the potential threat."

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1. <http://www.politico.com/>
 2. <http://www.propublica.org/special/hydraulic-fracturing-national>
 3. <http://www.propublica.org/feature/energy-industry-swags-congress-with-misleading-data-708/>
 4. <http://www.propublica.org/feature/frac-act-congress-introduces-bills-to-control-drilling-609/>

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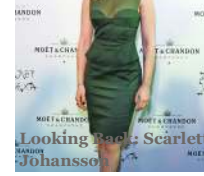
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