

Wastewater from fracking could be too much to handle, study says

John Roach, NBC News, 1-28-13

The practice of hydraulic fracturing, or fracking, produces a relatively small amount of wastewater, given all the gas the technique recovers, according to a new analysis of operations in Pennsylvania. Nevertheless, the number of fracking operations has grown so rapidly that the wastewater being produced threatens to overwhelm the region's capacity to properly treat it.

In fracking operations, 3 million to 5 million gallons of water are injected deep underground, along with sand and a chemical cocktail, to fracture shale rock and extract the embedded natural gas. Some of that water returns to the surface immediately after the fracturing. The rest comes back over the course of months and years. The result is that each well brings up hundreds of thousands to millions of gallons of wastewater.

Pennsylvania has invested very little in the infrastructure needed to deal with wastewater, even though the region was where the U.S. oil and gas industry got its start more than 150 years ago, Brian Lutz, a biogeochemist at Kent State University, told NBC News.

What's more, the geology of the region limits the ability to dispose of the massive quantities of wastewater generated during fracking operations by injecting it deep underground, as is done in other regions of the country.

"That's critical," Lutz said, "because that means we're generating large wastewater streams in a new geography of the country where we don't necessarily have a pre-existing capacity and, perhaps, we don't have the necessary physical capacity to handle these wastes that we have in other regions."

Conventional vs. fracking

He and colleagues analyzed data from 2,189 active Marcellus Shale wells in Pennsylvania, and compared gas production and wastewater volumes to conventional well data. They found that shale gas wells typically produced 10 times the amount of wastewater as conventional wells, but they also produced about 30 times more natural gas.

Lutz noted that the study is the first to put shale gas production into the perspective of conventional production in order to benchmark the amount of wastewater being produced per unit of gas recovered from shale gas wells.

The findings make the point that "as we expand domestic natural gas production, even if the expansion were driven by conventional production, our wastewater challenge would be no less and perhaps much worse," Lutz said.

Despite the greater efficiency in getting the gas out with fracking, however, the region has seen 570 percent growth in the amount of wastewater generated since 2004, due to the boom in natural gas production.

In 2011, the last year data were analyzed, more than 830 million gallons of wastewater were generated in Pennsylvania's Marcellus Shale formation, Lutz and colleagues report in their study, which was published Wednesday in the journal [Water Resources Research](#).

Natural-gas boom

begun. Hydraulic fracturing was pioneered by the U.S. Department of Energy and its industry partners, and is largely responsible for a boom in natural gas production that some forecasts indicate will help make the country energy independent by 2035.

But independence comes at a price. As the fracking boom has accelerated, so too have concerns about the wastewater it generates and groundwater contamination from the chemicals injected into the wells.

Surprisingly, Lutz and colleagues note, only about a third of the wastewater from the Marcellus Shale wells was classified as flowback — the wastewater that comes back to the surface within a few days of a frack. The rest is brine, water that is generated in the wells over a much longer time.

"What surprised us about this, and what's certain, is that waste was definitely being documented as being generated at the well and taken to treatment facilities two, three, four years out after the well began producing and substantial quantities of waste," Lutz said.

Much of the controversy surrounding fracking has focused on the chemicals in the flowback, many of which are unknown to outside researchers because the drilling companies consider them proprietary. But the brine often contains a much higher pollution load than the flowback, Lutz noted. What's more, the finding suggests that truck traffic on back roads will have to continue long after the few weeks required for the initial fracturing operation, in order to haul the wastewater off to treatment zones.

Water issues overblown?

John Krohn is a spokesman for Energy in Depth, a gas industry trade group. He said the study highlights the water efficiencies that have come with the technological advancements used to access oil and gas in shale rock formations.

Those findings, coupled with increasing water recycling rates in the natural gas industry show that wastewater issues surrounding hydraulic fracturing "are at the very least overblown and discredited, potentially, by this study," he told NBC News.

Krohn noted that wastewater recycling rates in Pennsylvania were 70 percent in 2012, and some companies have reported rates of 100 percent. Recycling for the industry means using one of many technologies to clean the flowback and brine sufficiently to be used for subsequent fracturing operations.

"In a lot of areas, natural gas producers are able to use this fracturing fluid in excess of 20 to 25 times," he said. "And so what that does is it lessens the water footprint of the entire industry."

Lutz acknowledges that the industry has made strides in wastewater recycling, but he's concerned about a future when new wells aren't being drilled rapidly enough to handle the recycled waste.

"As soon as your well population starts to stabilize or decline, then you are left with a large volume of wastewater, and there currently is no method than can recycle that water for an alternative use — municipal or agricultural or something like that," he said.

Krohn said he doubted that such a slowdown in well drilling would occur. If it does, other options such as injection wells will offer viable alternatives, he said.

Given the unlikelihood of a slowdown, Lutz hones the wastewater issue stays in the discussion

ancillary problem that is perhaps going to solve itself, but something that really needs to lead the discussion, at least from the environmental side of things, as we think about future development."