



Left: Ronald Carter, whose well water was polluted by natural gas drilling. Right: Activists rally against proposed natural gas drilling in New York.



In 2006, a representative from Cabot Oil & Gas showed up at Ronald Carter's door with a paper, a pen, and an offer: Grant his company ownership of the natural gas that lay deep below Carter's home, and Cabot would pay him \$25 for every acre of his property. It was a tempting deal.

Carter lives in Dimock, Pa., a town with about 1,000 residents. A retired assembly line worker, he and his wife, Jean, live in a trailer on a limited budget with 75 acres of mostly wilderness property to their names. Twenty-five dollars times 75 acres meant \$1,875 his family could truly use.

Still, Carter was concerned: If he signed, what would happen to his home? And what would happen to the well his family had been drawing freshwater from for generations? "[The oil company representative] said, 'Your neighbors all signed. If you don't, we're just going to snake under your land and suck out the gas anyway. The only difference is, you won't get the money.'" Carter signed.

Today, he looks back at that decision and sighs. His family's well is now tainted with natural gas that has leaked from nearby drilling. The water in it is too poisonous for drinking, cooking, or bathing. The oil company also built a storage tank about

Gas Leaks

By Joshua Kors

Does natural gas drilling threaten the country's water supplies?

100 meters (330 feet) from his home. The tank holds chemicals that are by-products of drilling, and area residents say it is venting fumes into the air day and night. Carter and his wife now have respiratory problems. "We'll have guests out here on the porch, but most people can't take it," he says.



The Marcellus Shale is a huge underground region of shale. Shale is a fine-grained sedimentary rock that consists of compacted and hardened clay, silt, or mud.

"Their eyes get watery, throats gets scratchy. One young lady had to leave. She couldn't breathe with all the fumes."

The oil company was drawn to Dimock because it sits above the Marcellus Shale, a massive rock formation that exists about 2,130 meters (7,000 feet) below the ground. The formation is much larger than Dimock. It's 965 kilometers (600 miles) wide, stretching across western New York, Pennsylvania, Ohio, West Virginia, and into Tennessee. It contains an estimated 500 trillion cubic feet of natural gas.

The Marcellus Shale is one of many underground formations in



A hydraulic fracturing well in Dimock, Pa.

the United States that hold natural gas. In the next decade, hundreds of thousands of natural gas wells are slated for construction to extract it. Many of those projects have drawn fire from environmentalists, who see natural gas drilling as a potential poisoner of local water supplies. "Towns that are considering approving natural gas drilling should take a close look at Dimock," says Josh Fox, the director of *Gasland*, a documentary about natural gas drilling.

A CLEANER FUEL

Natural gas is a fossil fuel that consists primarily of *methane* (CH_4), a colorless, odorless gas that can be burned to generate electricity or heat buildings. Natural gas combustion releases relatively little *carbon dioxide*

(CO_2), a gas that scientists believe is the major cause of global warming. The natural gas of the Marcellus Shale could also bring billions of dollars in revenue to the companies that extract it, stimulating the economy in troubled times.

To access natural gas, oil companies are using a relatively new technique called *hydraulic fracturing*, or *fracking*. A drill bores a long, narrow hole hundreds or thousands of meters into the crust. A mixture of water, sand, and chemicals is then blasted into the hole. The pressure cracks the deep layer of rock, freeing the natural gas, which is then pumped to the surface and trucked away.

The fracking process also releases millions of gallons of wastewater, which contains the original fracking fluid as well as



Contaminated water from a well in Dimock, Pa.

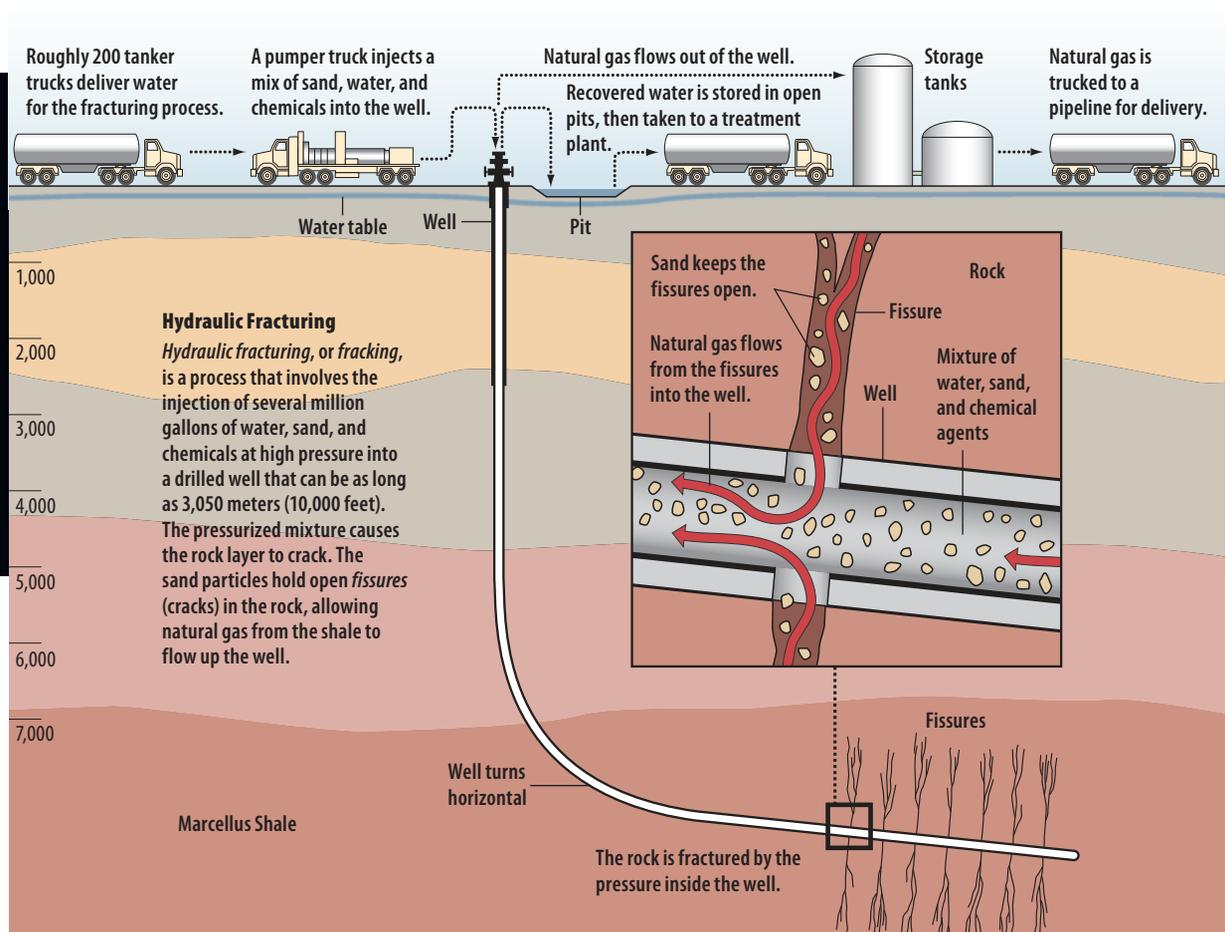
dissolved minerals from the crust. In some areas of the country, that wastewater is injected underground. In other areas, it's brought to the surface and trucked to local wastewater treatment plants.

"Theoretically, [fracking] should be completely safe," says Susan Riha, director of the New York State Water Resources Institute. In practice, fracking has proved to be dangerous in many places. More than 1,000 cases of water contamination linked to fracking have been documented by U.S. courts and state and local governments, according to ProPublica, a nonprofit investigative journalism service. In one case, a house in Ohio exploded after methane released by fracking found its way through a system of underground cracks into a municipal water supply.

MORE QUESTIONS

Exactly how natural gas drilling puts water supplies at risk is not entirely clear. Some instances of contamination have occurred when drilling chemicals were accidentally spilled on the ground. The chemicals then leached into the groundwater.

Many questions about the fracking process remain, however. Are fracking wells vulnerable to cracking? Does the fracking process open major fissures that allow



natural gas and chemicals to escape upward into the groundwater? Is the wastewater that's injected into the ground safely stored there? And what about the wastewater that's trucked to local treatment plants? Can it be properly filtered when many plants lack the means to test for or remove many of the impurities that occur in the wastewater?

"This is a field where there is almost no research," Geoffrey Thyne told ProPublica about the multitude of questions surrounding fracking. Thyne is a former professor at the Colorado School of Mines. "It is very much an emerging problem."

The issue of fracking is further complicated by the lack of uniform regulations governing fracking across the country. Some states have strict laws; others don't. Some states lack enough staff to inspect drilling operations and enforce the laws.

What concerns Fox most is the so-called Halliburton loophole in

the federal Safe Drinking Water Act. (Halliburton is one of the world's largest suppliers of products and services to the oil and natural gas industries.) The Safe Drinking Water Act regulates industrial activities that affect water supplies across the United States. In 2005, at the request of then Vice President Dick Cheney, who is a former president of Halliburton, the U.S. Congress relieved natural gas companies of the need to abide by regulations in the act. The companies don't have to report which chemicals they put into the ground. If "we don't know exactly what's being injected into our land," says Fox, "how can we know whether it's safe or not?"

ENERGY DEMAND

For the foreseeable future, natural gas drilling is a fact of life in the United States, says Riha. "There's an incredible demand for energy in this country, and the gas from the Marcellus Shale could help in

that respect," she says. "To those who oppose fracking, I would say, 'You can't just be against gas drilling. You have to be for something. Our energy has to come from somewhere.'"

Riha believes, though, that the impact of fracking on water quality and public health needs more investigation. Last year, the Environmental Protection Agency announced that it had begun a study of fracking and its impact on community drinking water.

Meanwhile, in Dimock, the oil company that leased the rights to drill under Ronald Carter's land delivers him a large tank of freshwater every week. The company's storage tank continues emitting fumes, and Carter still has difficulty breathing.

"I've lived here almost all my life, but at this point, we'd be ready to move out of Dimock," he says. "But without fresh running water, there's no way we could sell our land. Who would buy it?" **CS**