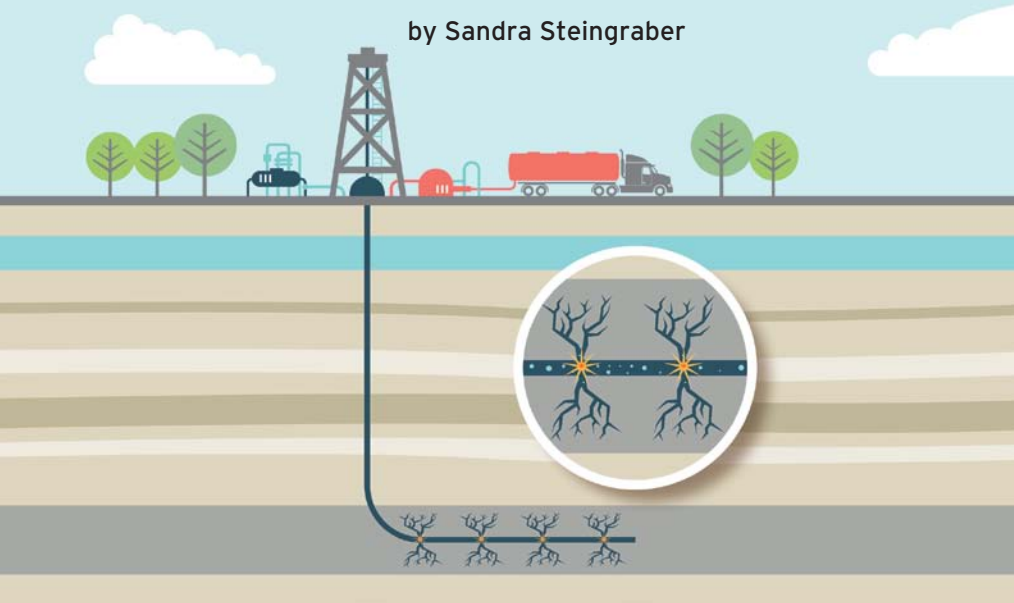


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FRACKING WRECKS AMERICA'S BEDROCK

Clear and Present Dangers

by Sandra Steingraber



Current environmental policies must be realigned to safeguard our health, sustain planetary life-support systems and free us from dependence upon fossil fuels.

Under the misleading banner of clean and green, the global natural gas rush is on, and nowhere more so than in the United States. We are literally shattering America's bedrock to bring methane out of the Earth and consuming enormous quantities of precious fresh water to do so, without any clear knowledge of the health or environmental consequences. Due to economies of scale and required infrastructure, fracking is an all-or-nothing proposition, and each state decides its own fate.

The Marcellus Shale forms a 600-mile-long basement foundation for communities spanning New York, West Virginia, Pennsylvania and Ohio. As the largest natural gas deposit in the country, it has become ground-zero for high-volume, slickwater hydraulic

fracturing, or fracking. Many more states are equally vulnerable (see GaslandTheMovie.com/map).

In a two-to-200-foot-thick bedrock layer up to a mile below Earth's surface, the shale and its captured methane, uranium, mercury, arsenic and lead have remained locked in place for millions of years. Above it lie drinking water aquifers.

Prior to the 21st century, capturing methane gas bubbles dispersed within such a horizontal formation, instead of a vertical well, was deemed uneconomical and labeled unrecoverable. Now, modern drills can bore down steel piping, some portions encased in cement, and direct pressure-packed explosions of up to 10,000 pounds per square inch of water, sand and chemicals into the rock,

fracturing it. Next, hundreds of chemicals are injected to reduce friction (thus the term slickwater) so that the fracking fluid can flow easily. The mixture includes acids, rust and scale inhibitors and pesticides to kill microbes, plus sometimes gelling agents, petroleum distillates, glycol ethers, formaldehyde and toluene.

The result is that gas flows back up the borehole along with 30 to 60 percent of the injected cocktail of water and chemicals. The rest is left behind. Fracking a gas well once requires 2 to 8 million gallons of fresh water, 10,000 to 40,000 gallons of chemicals and at least 1,000 diesel truck trips. Wells can be fracked multiple times before they run dry.

Between 34,000 and 95,000 wells are envisioned for New York State alone, according to Cornell University Engineering Professor, Anthony Ingraffea, with 77,000 likely over the next 50 years. While New York residents are watching the result of fracking in other states and have elected a temporary moratorium on fracking, Pennsylvania has issued thousands of permits since 2004.

Continued unknowns stir debate. Meanwhile, scientists across leading institutions are certain of five universal impacts.

First, fracking industrializes rural landscapes, clearing and fragmenting vital woodlands and wetlands. It diminishes capacities to host migratory birds and other wildlife, filter rainwater and prevent flooding while causing more erosion and runoff, sending sediments into waterways.

Second, fracking brings urban-style air pollution to the rural countryside. Studies like those from the Colorado School of Public Health, along with monitoring data from Utah's extensively fracked Uinta Basin, show that drilling and fracking operations release ozone-making, smog-producing volatile compounds. These gases, along with combustion byproducts, are linked to cancer and heart disease in adults and, in children, to lowered IQ, preterm birth, asthma and stunted lung development. The airborne contaminants from gas drilling such as in the Haynesville Shale, in Louisiana and Texas, can travel up to 200 miles from wellheads,

according to a 2010 study published in *Environmental Science and Technology*.

Third, accidents happen, necessitating the evacuation of surrounding communities. In Pennsylvania, in less than three years of fracking, 1,500 environmental violations have been recorded, including an exploded well that streamed poisonous fluid for 16 hours. In many cases, petroleum products, fracking chemicals or flowback fluids have entered creeks, streams or groundwater, according to reports published in *Science* magazine and *The Philadelphia Inquirer*.

Fourth, fracking makes huge volumes of Earth's limited fresh water disappear forever. Instead of drawing down a community's reservoir or depleting a regional aquifer as part of nature's normally restorative fresh water cycle, a single fracking well permanently removes several million gallons of fresh water from aquifers and poisons it all with chemicals. Much of it will be entombed in geological strata up to a mile or more below the water table.

Fifth, sooner or later, the gas will run out, while the environmental damage remains.

Known and Unknown Dangers

Beyond these certainties lie questions. Drilling proponents may claim that there have been no confirmed cases of drinking water contaminated by

“The United States and the world could rely 100 percent on green energy sources within 20 years if we dedicated ourselves to that course”.

~ M.Z. Jacobson and M.A. Delucchi, “A Path to Sustainable Energy by 2030,” Scientific American, 2009

fracking. Yet in Pavillion, Wyoming, residents noticed a few years ago that their water was yellow, cloudy and oily, bubbled and smelled like chemicals. Some people felt sick.

A joint investigation by the U.S. Environmental Protection Agency (EPA) and the Agency for Toxic Substances and Disease Registry found petrochemicals—including diesel fuel, benzene, cyclohexane, methane, propane and ethane, plus traces of arsenic and a microbe-inhibiting pesticide—in 20 water wells. The EPA recommended that residents not drink their water. Turning on a fan while showering to avoid possible methane explosions was also suggested.

Fracking enjoys special exemptions from many regulations—the Clean Water Act, Clean Air Act, Superfund Act and National Environmental Policy Act—that govern other types of industrial activities. Fracking also gets a pass on federal right-

to-know laws, because natural gas operations do not report their air and water emissions under the EPA Toxics Release Inventory. A special amendment to the 2005 Energy Policy Act grants fracking exclusion from the Safe Drinking Water Act, which authorizes the EPA to regulate all injection of toxic chemicals into the ground. Thus, a drilling company doesn't have to disclose the formulation of its fracking fluids.

Eco-Horrors and Economics

Biologist Theo Colborn and her research team at The Endocrine Disruptor Exchange report that of the 353 chemicals tested as presumed ingredients of fracking fluid, 60 percent can harm the brain and nervous system, 40 percent are endocrine disruptors and one-third are both suspected carcinogens and developmental toxicants.

What should we do with this lethal fluid—a million or more gallons with every wellhead? The trend, say gas industry service providers like Halliburton, is to recycle it, but flowback water gets more poisonous with every reuse. At some point, this highly concentrated toxic liquid still has to be disposed of via designated underground wells or municipal sewage-treatment plants or else it's clandestinely dumped.

Then there's the lure of fracking's economics. In many cases, a homeowner can receive \$5,000 per acre, plus 12 to 20 percent royalties, from

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**“Wherever Marcellus
Shale natural gas
development has occurred
in Pennsylvania, reports
of poisoned water, sick
kids and dead animals
have followed.”**

*~ Marcellus Protest, a Pennsylvania
alliance to halt fracking operations*

leasing land to a gas company. The Marcellus Shale may be worth a trillion dollars and possibly provide enough natural gas to supply the nation’s consumption for six years, according to the U.S. Energy Information Administration’s most recent estimates. (It’s unknown how much gas is recoverable or how often wells may need to be refracked to stimulate production.)

No study of the cumulative impact of fracking on public health or agriculture, including its full lifecycle greenhouse gas emissions, has been conducted; it’s an economic gamble and a bona fide environmental crime.

A Community Speaks Out

In New York’s Tompkins County, 40 percent of the land acreage covering the Marcellus Shale is leased to gas drillers. Local feelings are mixed. Some people just wish the whole practice would go away. Some find fracking such a vile and preposterous idea that they don’t believe it will really happen. Others, seeking personal gain or believing that it’s inevitable, plan to “ride the tiger,” hoping for greater future oversight.

At a recent community meeting, candidates for mayor and the village board declared their unified opposition to fracking. Soon afterward, at a packed town meeting on fracking at the village library, someone noted that a nearby community had successfully turned away frack waste trucked in from Pennsylvania that was headed to an old well for disposal. An elderly man declared passionately, “We have to be ready to lie down in front of the trucks.”

Take a stand at Tinyurl.com/FrackMedia, Tinyurl.com/FrackingMap and Tinyurl.com/FrackAction (scroll to petitions).

Note: Find films at GaslandTheMovie.com; and Tinyurl.com/FilmPromisedLand.

Biologist Sandra Steingraber, Ph.D., is the acclaimed author of *Living Downstream*, now also a documentary film, and *Having Faith*, on the threat of environmental toxins to infant development. A visiting scholar at New York’s Ithaca College, she often testifies at hearings. She adapted this article from *Raising Elijah: Protecting Our Children in an Age of Environmental Crisis*, reprinted courtesy of Da Capo Press.



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