



Bringing Fracking to the Surface

More Scrutiny Needed on Natural Gas Development

Tom Kenworthy June 2011

The Obama administration is moving to examine more closely the environmental and health impacts of a surge in natural gas production across the country, particularly where hydraulic fracturing is used. But with the oil and gas industry enjoying numerous exemptions from some of our most important environmental laws, the administration can do more to assure the public that drilling for gas, particularly in shale formations, can be done in ways that protect our water, air, health, and climate.

Concerns intensify over natural gas development

It's a pretty clear signal that the debate over natural gas development is heating up when a song about hydraulic fracturing, or fracking—a form of natural gas drilling—becomes a minor hit on YouTube. As suggested in the first two lines of the chorus of “[The Fracking Song](#)”—produced by a partnership between Pro Publica and New York University’s journalism school—the entire subject is in need of more clarity:

*What the frack is going on with all this fracking going on?
I think we need some facts to come to light*

In recent weeks the Obama administration took a number of steps to shed additional light on growing public concerns over natural gas drilling, in particular the widespread use of fracking. That technique, deployed in unconventional gas settings such as shale gas and coal bed methane gas formations, uses large volumes of water combined with sand and chemicals to fracture underground rock formations. Pumped deep underground at high pressures, the fracking fluid creates fissures in the rock so natural gas can escape from the rock. The gas is then transported to the surface.

In combination with improved horizontal drilling, hydraulic fracturing has opened up vast new gas reserves in shale formations stretching from Texas to New York State. But as drilling has accelerated so have [concerns about the threat of contamination](#) of both underground and surface drinking water supplies as complaints from homeowners about methane contamination of private water wells and reports of chemical spills and radioactive contamination of streams and rivers have multiplied.

New studies point to problems

Adding urgency to the important task of answering some of the fundamental questions surrounding natural gas drilling and hydraulic fracturing are new studies into methane contamination of domestic water wells near drilling operations, as well as conflicting inquiries into whether using natural gas to produce electricity will significantly reduce carbon emissions relative to coal.

A [new Duke University study](#) revealed that drinking water wells within 3,000 feet of natural gas drilling operations had 17 times the levels of methane contamination than water wells farther away from gas development. While the study did not have data on baseline methane contamination levels in the drinking supplies prior to the onset of drilling for gas, it lends credence to numerous complaints by landowners that drilling has led to methane intrusion into their water supplies and homes.

Methane contamination of water wells can occur when the cement and steel casing on natural gas wells fails, [as it did last year on a Chesapeake Energy well](#) in Bradford County, Pennsylvania. Sixteen domestic water wells were contaminated in that incident, leading to a \$1 million fine levied on Chesapeake by Pennsylvania regulators.

Meanwhile, the argument over the true lifecycle greenhouse gas emissions of natural gas is intensifying with the recent release of a [National Energy Technology Laboratory study](#) that reaches far different conclusions [than one by Cornell University researchers](#) released just a few weeks earlier that found natural gas could be just as bad, or worse, than coal.

The NETL study found that when used for electricity, gas is 50 percent cleaner in terms of greenhouse gas pollution over a 20-year time period and 54 percent cleaner over a century.

The administration begins steps to address concerns

Early this month, [Energy Secretary Steven Chu](#) appointed a new subcommittee to his department's energy advisory board. The panel will examine a wide range of issues associated with shale gas drilling with the goal of producing:

... recommendations as to actions that can be taken to improve the safety and environmental performance of shale gas extraction processes...

The panel's charge is to recommend to federal agencies within six months steps that can be taken to make fracking more protective of public health and the environment, in areas ranging from well design and construction, risk management, and water disposal to additional research that is needed. [Chu also called on the energy industry](#) to develop best practices to ensure that shale gas development is not leading to contamination of water supplies. As part of that effort, Chu said the industry should publicly disclose the chemicals used in hydraulic fracturing.

The Department of Energy study overlaps to some extent a study underway by the Environmental Protection Agency into the potential impacts of fracking on drinking water supplies. The preliminary results of that inquiry are due to be ready by the end of next year, with the full study scheduled to be completed in 2014.

At the same time, Department of Interior officials have been holding a series of public sessions on shale gas development on public lands. The goal, said Bureau of Land Management Director Bob Abbey, is to:

... study the potential impacts and to identify commonsense, best management practices that should be used in fracturing operations on public lands to ensure that this development is carried out in the right way and in the right places.

Current environmental laws exempt the gas industry

Underlying all of the Obama administration's efforts to get a better handle on the risks associated with fracking is a fundamental question: Is there adequate federal and state oversight of natural gas production to ensure that our health and safety are being protected?

You might assume that natural gas is already sufficiently regulated given the battery of landmark environmental laws enacted by Congress in the 1970s and 1980s. But the oil and gas industry enjoys numerous exemptions to those statutes that, collectively, raise important questions about how well we are being safeguarded.

Under-regulated?

Environmental laws and exemptions for the oil and gas industry

Environmental law	Exemption
Safe Drinking Water Act	Hydraulic fracturing exempt from regulation
Clean Water Act	Oil-and-gas operations exempt from stormwater runoff regulation
Clean Air Act	Oil-and-gas exploration and production exempt from the act's regulation of aggregated small sources of air pollutants
Emergency Planning and Community Right to Know Act	Oil-and-gas exploration and development exempt from reporting toxic emissions in the Toxic Release Inventory
Resource Conservation and Recovery Act	Oil-and-gas field wastes exempted from control
Comprehensive Environmental Response, Compensation, and Liability Act	Oil and gas are not defined as hazardous substances
National Environmental Policy Act	Oil-and-gas development enjoys broad categorical exclusions from comprehensive environmental impact statements

Major U.S. environmental laws that include exemptions for the oil and gas industry include:

Safe Drinking Water Act

Enacted by Congress in 1974, the Safe Drinking Water Act, or SDWA, was designed to protect the quality of drinking water supplies, both surface and underground. As part of that effort, the Environmental Protection Agency is directed to regulate the underground injections of liquids, solids, and gases to prevent contamination of subsurface drinking water supplies.

But hydraulic fracturing was exempted from SDWA regulation, as part of the Energy Policy Act of 2005, unless the fracturing fluids included diesel fuels.

The industry defends that exemption on the grounds that hydraulic fracturing occurs deep underground, far beneath shallow drinking water aquifers. Migration of fracturing fluids through thousands of feet of intervening rock is next to impossible, the industry argues. But failures of the concrete casing around well bores can lead to the escape of both methane—as happened in the Chesapeake Energy well in Pennsylvania—and fracking fluids.

But determining whether hydraulic fracturing is responsible for contamination of drinking water supplies is difficult, in part because with few exceptions drilling companies are not required to disclose the chemicals they use in fracking fluids. [Legislation](#) has been introduced in both the House and Senate to end the SDWA exemption and require disclosure of fracking chemicals.

Controversy over hydraulic fracturing has prodded some in the industry to support disclosure of the chemicals in fracking fluids. A new website, [FracFocus](#)—a project of the Interstate Oil and Gas Compact Commission and the Ground Water Protection Council—allows drilling operators to voluntarily list information about chemicals used in individual wells. The information is far from complete, however, as Amy Mall of the Natural Resources Defense Council [explains on her blog](#).

Clean Water Act

Dating to 1972 the Clean Water Act regulates the discharge of pollutants into U.S. surface waters and sets water quality standards for rivers, streams, and lakes, and wastewater discharge standards for industry. The act makes it illegal to discharge point source pollutants (from a pipe or other conveyance) into navigable waters unless permitted under the National Pollutant Discharge Elimination System. Almost all states—including all the shale-gas-producing states—have EPA approval to enforce the NPDES system.

The CWA is important for shale gas development because hydraulic fracturing, used in an estimated 90 percent of shale gas wells, uses huge quantities of water that are pumped underground in combination with sand and chemicals to fracture rock formations. A majority of the several million gallons of water used in a typical frack job comes back to the surface. That flow-back water is laced with fracking chemicals (which the industry does not have to disclose), as well as underground contaminants including naturally occurring radioactive materials that are brought to the surface—as much as 15,000 gallons in a 3 million gallon frack job, [according to the U.S. Geological Survey](#).

Those flow-back waters—if re-injection underground is not feasible—have to be treated if allowing them to return untreated to surface waters would violate water quality standards. After treatment in either an industrial treatment facility or a public wastewater treatment facility those waters must meet outgoing limits in the facility’s CWA discharge permit.

Oil and gas companies are subject to the above regulations. But they are exempted from other parts of the CWA that regulate how to handle water that flows off drilling sites during rain or storms. That loophole can have serious consequences if contaminated flow-back liquids stored in ponds onsite overflow and run into streams and rivers. Some states, including New York and Pennsylvania, have imposed their own rules requiring permitting for erosion and sediment control.

Clean Air Act

The Clean Air Act controls hazardous air pollution from both major sources and smaller sources that are under common control and in close proximity. In the case of those smaller sources, if their emissions in aggregate meet the threshold for control that major sources do, then they must comply with national emission standards for hazardous pollutants. So if an industrial operator makes several changes to a facility and each results in increased air emissions, those must be considered in aggregate rather than individually.

But oil and gas exploration and production is specifically exempted from the aggregation requirement.

Rep. Jared Polis (D-CO) has introduced legislation (the [BREATHE Act](#)) to end the oil and gas industry’s exemption from the aggregation standard, noting that oil and gas operations emit large quantities of volatile organic compounds—a primary ingredient of smog, which causes severe health impacts—and that the release of such compounds from oil and gas will reach 950,000 tons annually by 2018 in five western states.

Emergency Planning and Community Right-to-Know Act

This 1986 law requires many industries to report their toxic emissions. But the oil and gas industry is exempt from reporting its toxic emissions in the Toxic Release Inventory even though many toxic chemicals are used in hydraulic fracturing.

As a recent report by minority Democratic members of the House Energy and Commerce Committee noted, “Between 2005 and 2009, the oil and gas service companies used hydraulic fracturing products containing 29 chemicals that are (1) known or possible human carcinogens, (2) regulated under the Safe Drinking Water Act for their risks to human health, or (3) listed as hazardous air pollutants under the Clean Air Act. These 29 chemicals were components of more than 650 different products used in hydraulic fracturing.”

National Environmental Policy Act

NEPA requires environmental reviews of federal actions—either an environmental assessment or a more comprehensive environmental impact statement. Actions that have been previously determined to have no significant environmental impact can be categorically excluded from those types of analyses.

The Energy Policy Act of 2005 authorized broad categories of categorical exclusion for oil and gas activities on federal lands. But the Government Accountability Office found in 2009 that the Bureau of Land Management’s widespread use of the exclusions did not comply with either NEPA or the agency’s own guidelines. The Department of Interior, in onshore drilling reforms announced in 2010, said it would only grant categorical exclusions after “an extraordinary circumstances” review had been conducted. Also in 2010 the Interior Department announced it would sharply limit categorical exclusions pending a thorough review of its NEPA processes.

Resource Conservation and Recovery Act

Passed by Congress in 1976, the Resource Conservation and Recovery Act, or RCRA, requires cradle-to-grave management of wastes that are hazardous to human health or the environment. In separate legislation passed by Congress in 1980, oil and gas field wastes were specifically exempted from control under RCRA.

The exemption covers the disposal of wastes—including fracking fluids and other flow back liquids—coming from the well as well as wastes that come in contact with the oil and gas production stream even if they are hazardous to human health and the environment.

Comprehensive Environmental Response, Compensation, and Liability Act

Enacted by Congress in 1980, CERCLA regulates the cleanup of hazardous waste dumps and holds responsible parties financially responsible for the cleanup. But it excludes oil and natural gas from the definition of hazardous substances even though they contain substances such as benzene that on their own are defined as hazardous substances.

Steps to more transparent natural gas development

The Energy Information Administration projects that shale gas production will increase fourfold between now and 2035 and that natural gas will account for 25 percent of the nation's electricity generation by that date. Given that outlook we recommend that policymakers take a number of steps to protect Americans' health and safety, particularly in communities where natural gas reserves are abundant:

- The EPA should be given authority to oversee hydraulic fracturing under the Safe Drinking Water Act. Policymakers should give careful consideration to ending the oil and gas industry's many other exemptions from environmental laws.
- The Obama administration should publicly and repeatedly call for the oil and gas industry to voluntarily disclose the chemicals it uses in hydraulic fracturing until full mandatory disclosure is required.
- The National Academy of Sciences should conduct a thorough study of the lifecycle greenhouse gas pollution of natural gas relative to coal.
- Drillers should be required to track and disclose the disposition of wastewater from the time it is withdrawn from wells to its final disposal.
- Adequate testing should be required for radioactive elements and other contaminants in wastewater and in drinking water supplies near drill sites before, during, and after drilling to track contaminants.
- Based on best management practices, the EPA should develop air and water emission limits for drilling operations, with enforcement by the states.
- For wells above a certain size, [EPA's voluntary Natural Gas Star program](#) for capturing and recycling of methane emissions should be made mandatory.

Natural gas still holds considerable promise as a cleaner replacement for coal in generating electricity even amid conflicting studies on its lifecycle emissions of global warming pollution. It produces far less nitrogen oxide and almost no sulfur dioxide, mercury, and particulates. But additional steps must be taken to ensure that in transitioning to gas-fired electricity we aren't creating a new set of environmental problems as we solve another.

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