



Hydraulic Fracturing in the Marcellus Shale

August 6, 2010

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Women's Council on Energy and the Environment (WCCE) Webzine

Recently, increased drilling and natural gas production from the Marcellus Shale formation and proposed federal legislation to regulate those activities have focused attention on the use of hydraulic fracturing in producing natural gas. Hydraulic fracturing or "fracking" involves pumping water-based fracturing fluids into a rock formation to generate sufficient pressure to fracture or crack the formation. The water-based fluid cracks the rock, and sand in the fluid fills into the cracks in the formation to prop it up and allow natural gas to flow to the well bore.[1]

Congressional proposals would amend the Safe Drinking Water Act to require drillers to disclose the chemical formulations used in hydraulic fracturing to state regulators or the United States EPA and to increase federal oversight of onshore wells that use fracking. Several states, including Wyoming and Pennsylvania, have also considered additional controls for oil and gas drillers who use hydraulic fracturing. Last month, Wyoming's Oil and Gas Conservation Commission approved rules requiring regulators to collect information about chemicals used in hydraulic fracturing fluids used in that state. WCEE member, Lynn McKay, asked Kathryn Klaber, President and Executive Director of the Marcellus Shale Coalition, to talk about the use of hydraulic fracturing and the production of natural gas from the Marcellus Shale formation.

1) What is the Marcellus Shale Coalition and what type of work does it do?

Officially formalized at the end of 2009, the Marcellus Shale Coalition (MSC) is an industry organization committed to the responsible development of natural gas from the Marcellus Shale -- which underlies much of Pennsylvania, stretching from West Virginia to New York's southern tier -- and the enhancement of the region's economy through this production. The members of the coalition -- who represent nearly 100 percent of the shale gas producers in Pennsylvania -- work with our partners across the region to address issues with regulators, local, county, state and federal government officials and communities on all aspects of producing clean-burning, job-creating natural gas from the Marcellus Shale.

2) How long have oil and gas operators used hydraulic fracturing?

For more than 60 years, the energy industry has relied on hydraulic fracturing to enhance the production of domestic energy. To date, this process has been safely deployed in over 1.1 million oil and natural gas wells across the nation. And because of the strong commitment from industry to protect groundwater, ensuring that the integrity of the wells are not compromised -- coupled with tight regulations over the process -- fracturing has never contaminated groundwater. Top water officials at the EPA and the PA DEP have confirmed this fact.

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3) How long have oil and gas operators been using hydraulic fracturing in the Marcellus Shale formation?

The first horizontal well drilled in the Marcellus was by Range Resources in 2004. Since then, 1,681 wells have been drilled in Pennsylvania. For perspective, Pennsylvania currently has 55,631 producing natural gas wells.

4) What steps do Marcellus Shale operators take to protect groundwater during hydraulic fracturing?

Safety and environmental protection is the MSC's highest priority. Every step of the hydraulic fracturing process -- from the initial boring of the well to its sealing after it has run dry -- is conducted in accordance with state requirements. Specifically, well holes are cased with steel piping and cement to ensure that fracturing fluids from deep below the surface do not come in contact with the aquifers. When the fracturing fluids return to the surface, they are impounded, treated and in the majority of cases are recycled and used to fracture additional wells.

5) What's in fracking fluid?

Composed almost entirely of a water and sand (more than 99.5 percent)[2], this fluid is pumped at high pressures down the well bore to "fracture" the dense, tightly-packed shale rock that contains the natural gas. The sand, or proppant, is used to keep the rock open, allowing natural gas to flow freely up the well bore and to the surface for processing and transportation to market. A tiny fraction of other additives -- which are commonly found in everyday household products and available on DEP's website -- are typically used to prevent corrosion of the well casing, increase viscosity of the fracture fluid, and prevent the formation of bacteria.

6) The EPA is presently conducting a Congressionally-mandated study of the impacts of hydraulic fracturing. Is this the first time that EPA and other organizations have studied hydraulic fracturing in oil and gas production?

No. Over the past decade, several well-respected authorities have analyzed, reviewed and scrutinized hydraulic fracturing. And in each case, the final analysis has been that fracturing is safe, is effectively regulated and does not pose a threat to groundwater contamination. In 2004, the EPA[3] found "no evidence" suggesting the fracturing of shallow coalbed methane reserves posed a threat to underground drinking water supplies. It's important to note that coalbed methane strata reside thousands of feet closer to the water table than shale formations, and that the technology used today to access clean-burning natural gas from these formations is much more advanced and sophisticated than what was available in the past. The Ground Water Protection Council (GWPC), the Interstate Oil and Gas Compact Commission (IOGCC), and series of other independent studies have confirmed this finding, as well.

7) Why did Congress recommended that EPA conduct another study of the use of hydraulic fracturing in oil and gas production?

That's a good question. As noted in the previous response, the EPA analyzed this issue at length in 2004 and found fracturing to be unquestionably safe. While some in Congress are working aggressively to strip state regulators of their ability to tightly regulate this critical technology and to give that authority for the first time ever to the EPA, there was a sense that an additional study would be prudent. We are extremely confident that this study -- just the like the host of others -- if based on straightforward, scientific analysis, will once again arrive at the well-known fact that fracturing is an environmentally effective technology and that it does not threaten groundwater.

8) What are Marcellus Shale operators doing to lessen the environmental impacts and improve safety?

Each and every day, virtually every industry -- be it health care, telecommunications or freight rail -- gets better, smarter and more effective. The energy industry, particularly shale gas production, is no different. Take our water recycle efforts, for example. Because of new, cutting-edge technologies, MSC producers are now recycling at least

60 percent of the water used in the production process – and that figure is only anticipated to grow. Some of our producers are at the 100 percent recycle rate. These efforts not only make great business sense, but they also dramatically reduce overall water usage, which is an enormous environmental winner.

9) Are Marcellus Shale operators conducting studies to examine the potential impacts of increasing production from that formation?

Penn State University, using widely accepted economic models, released an economic analysis in May on the impact Marcellus development will have on the Commonwealth. The professors found that nearly 212,000 new jobs across the Commonwealth would be created over the next 10 years. Here are some of the most significant findings in the study:

- Over just the next 18 months, this work is slated to generate nearly \$1.8 billion in state and local tax revenues.
- Each Marcellus well generates more than \$6.2 million in economic impact per well.
- For every \$1 that the Marcellus industry spends in the state, \$1.90 of total economic output is generated.
- Looking long-term, the study's authors suggest that the Marcellus Shale could "be the second largest natural gas field in the world" if fully developed – providing an amount of energy to American consumers "equivalent to the energy content of 87 billion barrels of oil." For scale, the entire U.S. currently consumes seven billion barrels of oil a year, with Pennsylvania consuming about 253 million barrels of that.
- And in 2008 alone, natural gas companies paid over \$1.8 billion in lease and bonus payments to Pennsylvania landowners.

10) Can you recommend references or studies about hydraulic fracturing for readers who would like to learn more about the process and its impacts?

The Environmental Protection Agency(EPA), the Ground Water Protection Council (GWPC) and the Interstate Oil and Gas Compact Commission (IOGCC) have all studied hydraulic fracturing, and have all determined that this tightly regulated 60-year old technology is environmentally sound, and critical to domestic energy production. EnergyInDepth.org – a national coalition of independent oil and gas producers – is an extremely helpful resource, as well. I'd also encourage those interested in learning more about the fracturing process, and the work that the MSC does, to visit MarcellusCoalition.org and to become a "Friend of the Marcellus" on our sign-up page.

1] More information about hydraulic fracturing is available from the United States Department of Energy publication prepared by Ground Water Protection Council and ALL Consulting, "Modern Shale Gas Development in the United States: A Primer." (April 2009), http://www.fossil.energy.gov/programs/oilgas/publications/naturalgas_general/ShaleGasPrimer_Online_4-2009.pdf; accessed July 20, 2010. [2] Energy In Depth. "A Fluid Situation: Typical Solution* Used in Hydraulic Fracturing." Energyindepth.org, <http://www.energyindepth.org/frac-fluid.pdf>; accessed July 20, 2010. [3] United States Environmental Protection Agency. "Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs; National Study Final Report." Hydraulic Fracturing Background Information, http://www.epa.gov/safewater/uic/pdfs/cbmstudy_attach_uic_final_fact_sheet.pdf; accessed July 20, 2010.

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