Hydraulic Fracturing Information Sheet 1

Hydraulic Fracturing: The Basics

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This is the first in a series of bi-weekly information sheets that will be provided to Michigan legislators on hydraulic fracturing or "fracking," a natural gas and oil extraction technique.

What is Hydraulic Fracturing ("Fracking")?

Fracking is a technique used to produce natural gas flow from previously unproductive or uneconomical natural gas sources. Once a natural gas well has been drilled, the fracking process can be used to create fractures, or cracks, in the rock formation in order to release natural gas. This is completed in stages. During each successive stage, fracking fluid—large quantities of water mixed onsite with sand and other chemicals—is pumped into the well at high pressures to create and deepen fractures in the rock formation and "free" natural gas deposits. A single fracking stage can last upwards of an hour.[1] Some components in the fracturing fluid, such as sand, are "proppants," which prop open the cracks created by the pressure of fracking. Other chemicals serve a variety of purposes, for example, to ensure that bacteria doesn't grow and interfere with extraction.[2] While some components are harmless, others are toxic. Many of the chemical components used in fracking fluid are proprietary or "trade secrets," and their disclosure is guarded against by oil and gas service companies.[3]

As the well is produced, 25 to 75% of the fracturing fluid returns to the surface.[4] This "flowback" contains chemicals and dissolved solids that prevent its reuse without treatment.

History of Fracking

Although used commercially since 1949,[5] fracturing technology has only recently been used at the depths required to develop "unconventional" shales. Unlike conventional oil and natural gas sources found in porous rock, unconventional shales are impermeable without natural or artificial fractures. Such wells are deeper and use substantially more water[6] and chemical additives.

High natural gas prices have stimulated interest in development of these unconventional shales. Partly because of fracking, natural gas production in 2010 reached its highest level in decades.[7]

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[1] Congressional Research Service, *Unconventional Gas Shales: Development, Technology, and Policy Issues*, at 24, Oct. 30, 2009, www.fas.org/sgp/crs/misc/R40894.pdf.

[2] EPA, Office of Research and Development, *Draft Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources*, Table 4, Feb. 7, 2011, http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/upload/HFStudyPlanDraft_SAB_020711.pdf. (describing how biocides such as Glutaraldehyde are used to eliminate bacteria).

[3] Staff of H. Rep. Comm. on Energy and Commerce, 112th Cong., *Chemicals Used in Fracturing*, April 2011.

[4] Office of Geological Survey, Department of Environmental Quality, *Hydraulic Fracturing of Natural Gas Wells in Michigan*, May 31, 2011, http://www.michigan.gov/documents/deq/Hydrofrac-2010-08-13_331787_7.pdf

[5] *Crocker v. Humble Oil & Refining Co*., 419 P.2d 265, 271 (Okla. 1965).

[6] Clean Water Action of Michigan, *Natural Gas Drilling: The Facts on Fracking*, available at www.cleanwateraction.org/files/publications/mi/factsheet_fracking.pdf. ("Natural gas fracking can use up to 100 times more water than historic wells, meaning up to 5 million gallons would be used per well.").

[7] Congressional Research Service, *Unconventional Gas Shales: Development, Technology, and Policy Issues*, at 1, Oct. 30, 2009, available at www.fas.org/sgp/crs/misc/R40894.pdf.

While the most active natural gas extraction in Michigan is conventional and takes place in the lower peninsula's shallow, Antrim formation at 500-2,000 feet, two fracturing wells have been drilled in the deeper Collingwood shale, one at 5,000 feet and another at 9,500 feet, with some contribution from the Utica shale.[8] One is the Pioneer well in Missaukee County, drilled in the winter of 2009, and the other was drilled in the fall of 2010 in Cheboygan County. Both are owned by the Canadian company Encana.[9] The initial success of the Pioneer well garnered $178 million for the Natural Resources Trust Fund during a natural gas auction in May 2010.[10]

Environmental Concerns

Because contemporary fracturing technology is relatively recent, there has been little scientific inquiry into the technique's environmental impact.[11] However, there is growing environmental concern about the amount of water consumed by a fracking operation, the possibility of contamination of drinking water wells and groundwater and surface water contamination from drilling activities, and fracturing fluid waste disposal. For example, in June of 2010, well operators lost control of a Pennsylvania well while preparing to extract natural gas after fracking the well. The well released natural gas and flowback onto the ground and 75 feet into the air, creating a fire hazard and contamination threat to nearby streams.[12]

The EPA is currently researching potential environmental impacts of fracking in a report slated for release in 2014.[13]

Current Regulation

The oil and gas industry is exempt from various federal laws, including the Safe Drinking Water Act, the Resource Conservation and Recovery Act, and the Emergency Planning and Community Right to Know Act (EPCRA).

In Michigan, natural gas drilling is permitted by the Michigan Department of Environmental Quality (DEQ) Office of Geological Survey, and regulated by the department and the Michigan Public Service Commission.

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[8] Michigan Department of Licensing and Regulatory Affairs, *About Michigan's Natural Gas Industry: Exploration and Production*, available at http://www.dleg.state.mi.us/mpsc/gas/about1.htm

[9] Jim Lynch, *Gas Drilling Technique Sparks Fears in Michigan*, The Detroit News, Oct. 4, 2010, available at http://detnews.com/article/20101004/BIZ/10040329/Gas-drilling-technique-sparks-fears-in-Michigan.

[10] Michigan Department of Natural Resources, *State Oil and Gas Lease Auction Sets Historic Record for Revenue*, May 6, 2010, http://www.michigan.gov/dnr/0,1607,7-153-10371_10402-236600--,00.html.

[11] Stephen G. Osborn, Avner Vengosh, Nathaniel R. Warner, and Robert B. Jackson, *Methane Contamination of Drinking Water Accompanying Gas-well Drilling and Hydraulic Fracturing*, 2011, National Academy of Sciences.

[12] Pennsylvania Department of Environmental Protection, *DEP Plans Thorough Investigation in to Marcellus Shale Well Blowout in Clearfield County*, June 4, http://www.portal.state.pa.us/portal/server.pt/community/newsroom/14287?id=11864&typeid=1

[13] EPA, Office of Research and Development, *Draft Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources*, Feb. 7, 2011.

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