

## **Draft U-M report analyzes policy options for hydraulic fracturing in Michigan**

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University of Michigan researchers today released a detailed draft analysis of policy options for hydraulic fracturing, the natural gas and oil extraction process commonly known as fracking.

The draft final report of the U-M Hydraulic Fracturing in Michigan Integrated Assessment consists of seven chapters totaling more than 270 pages. Its key contribution is an analysis of Michigan-specific options in the areas of public participation, water resources and chemical use related to high-volume <u>hydraulic fracturing</u>.

The options discussed in the report include:

More extensive requirements for information about chemical use and water quality, possibly including the full disclosure to state officials of all chemicals used in the hydraulic fracturing process—even substances considered to be trade secrets.New ways to manage the disposal of wastewater from hydraulic fracturing wells in Michigan.Additional options for water-quality monitoring, possibly including long-term monitoring of groundwater and surface water near hydraulic fracturing wells.Requiring hydraulic fracturing well operators to prepare emergency response plans before drilling begins.Increasing public participation in decisions related to hydraulic fracturing.Updating the management of water withdrawals.

"This report does not advocate for recommended courses of action. Rather, it presents information about the likely strengths, weaknesses



and outcomes of various courses of action to support informed decision making," said John Callewaert, integrated assessment director at U-M's Graham Sustainability Institute, which is overseeing the project.

The draft report was written by U-M faculty researchers with support from students and Graham Sustainability Institute staff members. It is the main product of the integrated assessment's second phase.

The first phase of the two-year project featured seven detailed, peerreviewed hydraulic fracturing technical reports, released to the public in September 2013. Taken together, the two-part U-M integrated assessment is the most comprehensive Michigan-focused resource on hydraulic fracturing.

Though high-volume hydraulic fracturing in Michigan is limited today, the U-M study takes into account the possibility that it could become more widespread due to a desire for job creation, economic growth, energy independence and lower-carbon fuels.

For many of the issues addressed in the report, the state has already proposed rule changes. Those proposed changes—covering topics such as water withdrawal assessment and monitoring, water quality sampling, additional well monitoring and reporting, and additional chemical additive disclosure procedures—are included in the U-M analysis of policy options.

The draft final report will be revised in response to input from an expert peer review panel; an advisory committee with representatives from corporate, government and nongovernmental organizations; and public comments. The final version is expected to be completed this summer and will be shared with government officials, industry experts, other academics, advocacy groups and the general public.



In hydraulic fracturing, water, sand and chemicals (in a mix known as hydraulic fracturing fluid) are injected under high pressure deep underground to crack sedimentary rocks, such as shale, and to free trapped natural gas or oil. Recent technical advances have helped unlock vast stores of previously inaccessible natural gas and oil, resulting in a boom in some parts of the United States.

High-volume hydraulic fracturing—the focus of recent attention and public concern—is defined by the state of Michigan as a well that uses more than 100,000 gallons of hydraulic fracturing fluid. As of Dec. 22, 2014, there were 13 high-volume hydraulic fracturing wells currently producing natural gas in Michigan and 11 sites where drilling has been completed, according to the draft report.

For comparison, more than 12,000 oil and gas wells have been fractured in Michigan since the late 1940s using conventional techniques that typically include relatively shallow vertical wells.

While those earlier hydraulically fractured Michigan wells were drilled to a depth of 800-to-2,000 feet and used roughly 50,000 gallons of water apiece, present-day high-volume hydraulic fracturing wells in northern Michigan's Utica-Collingwood shale formation are drilled to a depth of 9,000-to-10,000 feet and use 10 million gallons, or more, of water.

"With the intensity of wastewater generation associated with highvolume hydraulic fracturing, it is not clear whether the laws and regulations written at a time of small-scale, shallow hydraulic fracturing options will be adequate," according to the draft report. The water resources chapter was written by Shaw Lacy, formerly of the Graham Sustainability Institute and now a postdoctoral researcher at the Catholic University of Chile in Santiago.

The current process for managing hydraulic fracturing wastewater fluids



in Michigan is deep-well injection into Class II wells, which are designed to keep underground drinking water supplies safe from contamination. This approach, combined with the prohibition against storing those fluids in open surface pits, has prevented surface contamination problems that other states have experienced, according to the report.

Even so, other options for managing and monitoring wastewater disposal could be explored, according to the draft U-M report. One option is wastewater recycling. Instead of being injected into disposal wells, wastewater could be treated and reused for gas development. Treatment of wastewater to be reused for hydraulic fracturing operations should focus on the removal of organic contaminants and inorganic constituents, according to the draft report.

Between 2005 and 2011, the U.S. Environmental Protection Agency identified more than 1,000 chemicals either used in hydraulic fracturing fluids or found in associated wastewaters.

But information on the human health risks and ecological risks posed by those chemicals is currently limited, and scientifically sound studies are greatly needed, according to the draft report's chapter on chemical use, written by Sara Gosman, Diana Bowman and Ryan Lewis. Gosman, formerly of the U-M law school, is now at the University of Arkansas. Bowman and Lewis are at the U-M School of Public Health.

Michigan is among 24 states that require well operators to disclose the chemicals used in hydraulic fracturing fluids. However, operators currently have up to 60 days after the well is completed to submit that list, and operators can protect the identity of chemicals deemed to be trade secrets.

"More extensive requirements pertaining to information on chemical use and water quality appear desirable—if they are in plain language—given



public concern relating to these aspects and their potential public health implications," according to the chemical use chapter by Gosman and her co-authors.

One option would be to require well operators to provide a list of all the chemicals they propose to use prior to the start of high-volume hydraulic fracturing activities. The information would be posted on the FracFocus website and a dedicated state government website.

Under that same precautionary approach, information about fracking chemicals considered to be trade secrets would not be posted on the websites. However, well operators would be required to disclose that information to the state.

Michigan is among the states that do not currently require operators to test groundwater and surface-water quality near hydraulic fracturing wells. One option proposed in the chemical use chapter would require high-volume hydraulic fracturing well operators to install test wells and to conduct long-term groundwater and surface water monitoring, with a specific focus on drinking water and ecologically sensitive sources.

At present, operators of high-volume hydraulic fracturing wells in Michigan are not required to prepare emergency response plans to be used in the event of a spill or accidental release of chemicals. Prior to announcing a statewide fracking ban in December, New York required both an emergency response plan and a specific surface spill prevention plan.

An option offered in the draft U-M report would require operators to create emergency response plans before operations begin. Immediate notification of spills greater than one gallon would also be required. Bonding requirements would be tightened, and operators would be required to carry a liability insurance policy of \$1 million per well.



Currently, Michigan does not require such insurance.

The draft report's chapter on public participation notes that, to date, Michigan has largely treated high-volume hydraulic fracturing as an extension of other types of oil and gas activities. As a result, the public has had few opportunities to weigh in on whether and where the process occurs.

The state could consider implementing a number of options to better represent public values in its policies, according to the chapter written by Kim Wolske of U-M's Erb Institute for Global Sustainable Enterprise.

"In the short term, the lack of opportunities for public participation may contribute to feelings that unconventional shale gas is being involuntarily imposed and, thus, lead to greater distrust of state agencies," according to the public participation chapter. "In the long term, leaving the public out of HVHF-related decision-making may result in decisions that inadequately account for location conditions and cultural values."

The option of imposing a moratorium on high-volume hydraulic fracturing in Michigan would give state officials time to conduct Michigan-specific impact studies and to devise regulations for mitigating those impacts, according to the report. A statewide ban on high-volume hydraulic fracturing is supported by at least 11 communities across the state, as well as several grassroots and nonprofit groups.

"Banning HVHF provides the most comprehensive solution for addressing concerns about the potential risks of unconventional shale gas development," according to the report. "However, this option comes at the cost of reducing income to the mineral rights owners, industry, and the state by preventing development of the resource."

Preparation of the draft final report was overseen by a team from U-M's



Graham Sustainability Institute, the Energy Institute, the Erb Institute for Global Sustainable Enterprise and the Risk Science Center. The hydraulic fracturing project is expected to cost at least \$600,000 and is being funded by the Graham Sustainability Institute, the Energy Institute and the Risk Science Center.

More than 200 public comments were submitted in response to the technical reports released in September 2013. Those reports were downloaded more than 1,500 times in the year following their release.

Public comments on the draft final report will be accepted through March 20 at myumi.ch/L4Vx6. On the same web page, you can register for a Feb. 26 public webinar and download the technical reports. As with preparation of the technical reports, all decisions regarding content of project analyses and reports will be determined by the integrated assessment's report and integration teams.

More information: See: <u>phys.org/news/2013-09-u-m-tech ... turing-</u> <u>michigan.html</u>

## Provided by University of Michigan

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