# Drilling down into the fracking debate

Eight months ago, some **Conway Township** (Livingston Co.) residents had never heard of the word "fracking." They weren't worried about their community's water supply, and they didn't give much thought to the minerals that might lie under the fields where their cows grazed.

Everything changed in September 2013, when an oil and gas company received permission to drill for natural gas in the township. Suddenly, the township board found itself in the middle of a fracking controversy. News of the permit spread so rapidly through the central Michigan farming community that when the township board held its regular meeting, 100 people showed up instead of the usual three-person crowd.

Some residents believed drilling for oil and natural gas was a good thing, while others were strongly opposed. A third group of residents weren't sure what to think. Everyone had questions for the township board, and officials, including Clerk **Cindy Dickerson**, didn't have answers.

"With this being the first one in Livingston County, people weren't sure how to handle it," Dickerson said.

Fracking, or hydraulic fracturing, has come to the forefront of public discussion in recent years. As a mid-level producer of oil and natural gas, Michigan's shale and carbonate rock formations have attracted companies to drill throughout the state, especially in the northern and southeastern regions.

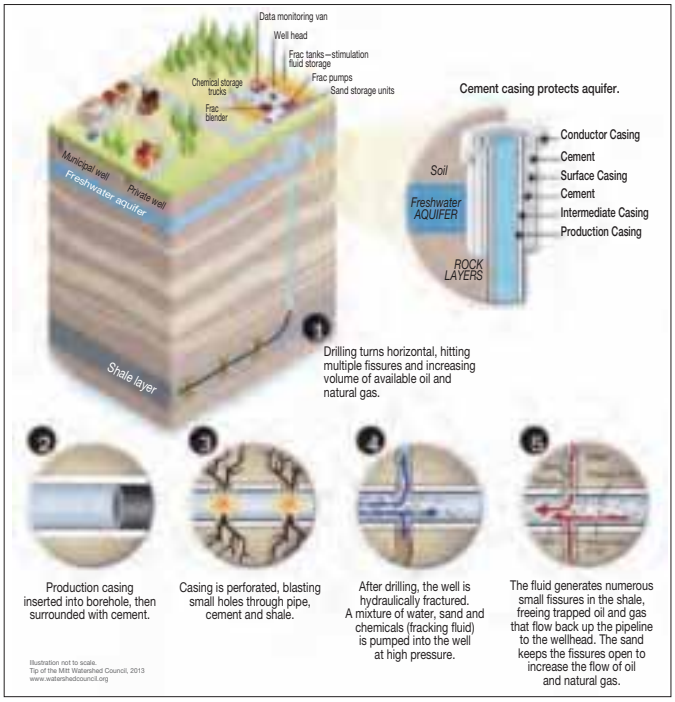
The oil and gas industry, as well as state agencies such as the Department of Environmental Quality (DEQ), say that fracking is a safe, time-tested technology that produces much-needed fuel for heating homes. They add that the process is helping the U.S. to become less reliant on foreign oil and gas while causing no major incidents in Michigan. Our state also has some of the most stringent requirements and restrictions to keep the industry in check.

At the same time, environmentalists and citizens worry about the possible effects on the water supply. They're concerned that an accident may contaminate a community's wells and aquifers, and that fracking operations may use so much water that they put unnecessary stress on the supply. Groups such as the Michigan Environmental Council (MEC) argue that as fracking technology changes, the DEQ's rules should also be adapted and toughened.

Townships, which under MCL 125.3205 are not allowed to adopt zoning ordinances that regulate oil and gas drilling operations, are meanwhile becoming the subject of more fracking debates. As citizens demand that their townships take action, officials are left unsure of what the law allows them to do.

Before the DEQ issued a permit in her township, Dickerson never imagined that an oil and gas company would want to drill there. Now, she knows any township in Michigan could one day face the same issue. She wishes she would have familiarized herself with all sides of the issue in advance and been ready when residents peppered her with questions. Other townships, however, have the chance to do so before fracking comes to their backyards.

"I think very strongly that everybody needs to know what is going on and educate themselves on all sides," she said.




**The above graphic illustrates the hydraulic fracturing process.**

## What is fracking?

Hydraulic fracturing, known as fracking, is the process in which high-pressured fluid made up of water, sand and chemicals is injected into deep wells. The pressure creates cracks in tight rock formations that are then held open with sand, allowing oil and natural gas to seep out.

Shale rock under the earth's surface contains carbon that with time, temperature and pressure creates oil and natural gas. Over time, these fossil fuels move into other rocks and become trapped. Fracking allows oil and gas companies to crack open rock formations and release the fuel.

This technology was developed in the 1940s and has been used in Michigan for 50 years to drill more than 12,000 wells. According to DEQ statistics, fracking has been used in 78 percent of Michigan's wells in recent years. However, with the decline of activity in the Antrim Shale formation, located in the northern area of the Lower Peninsula, most Michigan wells are drilled conventionally today.

Jim Peters, a spokesman for Michigan Oil and Gas Producers Education Foundation, says fracking is crucial to meeting the demand for natural gas. About 80 percent of Michigan homes are heated with natural gas, according to industry estimates.

"It really is embedded in how we live in colder climates to have a very inexpensive heating source," Peters said.

A University of Michigan (U-M) study calls Michigan a mid-level producer of oil and natural gas. Of the 12,000 wells that have been hydraulically fractured since 1952, about 10,000 were located in the Antrim Shale formation. Natural gas production peaked in 1996, when levels reached about 300 billion cubic feet a year. Most of these somewhat shallow wells are still in production today. Since 1996, however, production has leveled off to about half of the peak amount.

Low natural gas prices have slowed the demand for fracking. The process is so costly that companies will not drill unless they can produce enough natural gas to at least cover the expense of drilling. Mark Snow of the DEQ Office of Oil, Gas and Minerals said more than 100 wells were drilled and completed in Michigan last year. However, the majority of those wells involved conventional drilling, and only 10 were hydraulically fractured.

Today, much of the recent interest involving fracking is targeting the Utica-Collingwood deep shale formation in the northern Lower Peninsula, and in the A-1 carbonate formation in southwest Michigan. Four Utica-Collingwood wells are in production, and activity is concentrated in Kalkaska, Crawford, Missaukee and Roscommon counties, where 14 permits were issued in 2013. To date, fracking has not resulted in producing wells in the A-1 carbonate within Muskegon, Oceana and Sanilac counties, where five permits were issued last year.

## How it works

The fracking process is completed in stages, beginning with steel piping being placed in a drilled hole, called a wellbore, and encased in cement to prevent the rock and soil from caving in. Segments of the pipe are perforated, and a mixture that is 99.5 percent water and sand, and 0.5 percent chemicals, is pumped at a high pressure, creating cracks in the rocks. The sand in the mixture holds the cracks open and allows natural gas to flow more freely to the wellbore.

"It's been American ingenuity that has unlocked these resources," Peters said.

Once fracking is complete, about 10 to 25 percent of the fluid, called flowback, returns to the surface. This fluid is a contaminant and must be held in steel tanks until it can be taken to disposal wells, where the flowback is injected deep into rock layers that are far from fresh water supplies.

Until about 20 years ago, fracking worked by drilling a vertical hole until crews reached a natural gas reservoir. New technology has allowed drills to turn once they reach the reservoir and continue drilling horizontally for up to two miles. This process uses up to 20 million gallons of water to hydraulically fracture the equivalent of 10 to 20 vertical wells. Vertical drilling uses less water, but it can only access a small part of a gas formation.

About 0.5 percent of fracking fluid is made up of chemicals, though in some cases the percentage can be as much as 3 percent. This small percentage becomes more significant for horizontally drilled wells that use higher volumes of water. In some cases, as much as 250,000 gallons of chemicals are pumped into those wells.

Each chemical serves a specific purpose in easing the fracking process, Peters explained. For example, stabilizing chemicals help to condition the rock surface and keep the clay from shrinking and expanding. Surfactants such as soap reduce surface tension, allowing fluid to penetrate and flow back more easily. A friction reducer is added to reduce the amount of horsepower required to pump the water or other carrying fluid into the well. In addition, pH-adjusting agents help to maintain the effectiveness of the other chemicals.

In all, oil and gas companies choose one to three dozen chemicals from among about 760 possible choices of chemicals, Peters said. Many companies list these chemicals at http://fracfocus.org, where anyone in the public can search for wells in their county and find out which chemicals were used.

Most of the chemicals used in fracking are not known to be carcinogenic or toxic at the concentration levels they're used. However, what happens to those chemicals when they interact with the makeup of underground formations is still unknown. The flowback water containing these chemicals then contains not only the chemicals, but potentially other chemicals from the rock formation. The water's high saline content also leaves conventional water treatment out of the question.

## Potential impacts cause concern

For some environmental groups, fracking is a concern because of its potential for accidents, and the extent of damage that those accidents could cause.

Hugh McDiarmid, MEC communications director, said the organization isn't trying to ban fracking. Instead, it aims to strengthen rules and regulations in order to prevent accidents. Anything that could put the water supply or public health at risk should have proper regulations in order to take a proactive approach.

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"We are the epicenter of the Great Lakes," McDiarmid said. "We have a really unique stewardship role to protect our freshwater resources. There's no place like Michigan on the planet."

One aspect of fracking with the highest probability for an accident is the removal and transport of fracking fluid, McDiarmid said. This fluid that contains chemicals and other unknown substances from underground must be extracted from fracking wells and put into tanks. Workers moving the fluid risk exposure. Then, those tanks are hauled away by trucks to be stored in disposal wells. If those trucks were to crash, the fluid could spill.

Accidents could also occur if fracking chemicals were mishandled prior to drilling, or if well casings were to fail. The risk of an accident emphasizes the importance of companies disclosing the types of chemicals they use in their fracking fluid, McDiarmid said. First responders who would clean up the fluid need to know what they're dealing with when they arrive, both for efficiency and for their own safety.

Environmentalists have also frequently voiced the concern of possible drinking water contamination. They fear that fracking chemicals as well as gases such as methane could seep into wells and aquifers through cracks created by fracking, or if a drilled well is poorly constructed.

A U-M study notes that gases can naturally migrate into water aquifers because of the low viscosity of the gases. Baseline testing of water before drilling is necessary to confirm if aquifers were impacted because of fracking, or whether the impact happened naturally.

McDiarmid said the risk of drinking water contamination may be low, but the effects would be disastrous. Not only would it have an effect on the environment, but it could also pose a serious threat to public health.

"The one time that it malfunctions could really have devastating impacts," McDiarmid said.

Other environmental concerns include air quality due to cases of leaking gas from wells and exhaust from construction equipment and trucks. Citizens near fracking operations have also taken issue with the truck traffic that could damage local roads, as well as the noise and lights 24 hours a day when drilling is taking place.

Peters said that though there are risks of accidents that could hurt the environment, the risk is minimized by quality equipment and the training of workers. He points out that in the history of fracking in Michigan, there have been no accidents.

## Rules and regulations

All fracking operations are regulated under state authority. Both the oil and gas industry as well as the DEQ consider Michigan's rules for fracking some of the strictest in the country.

The DEQ's involvement begins after a fracking company secures a land lease and applies to begin drilling. Degreed geologists work with the company through the permit process and discuss regulations on everything from the drilling unit and the target depth to how the well will be built and the plan for plugging the well if no natural gas is found.

A DEQ representative inspects the proposed location to search for any potential sensitive ecosystems, including endangered species, streams, fisheries and other issues. For activities on state land, the Department of Natural Resources standard lease requires well sites to be located at least 1,320 feet from the nearest lake or stream.

In addition, wells that are expected to use more than 100,000 gallons of water are considered large-volume water withdrawals and are subject to further regulations. Operators that plan to withdraw large volumes of water are required to turn in relevant information and be cleared through a tool called the Water Withdrawal Assessment Tool. This assessment studies the impact that a large water withdrawal could have on rivers and streams nearby. About 2,000 other entities that use massive quantities of water, such as farmers who irrigate their fields, must also use the tool, even though they're not related to oil and gas. The DEQ will not approve water withdrawals if it is determined that they may create an adverse impact on water resources.

High-volume operations must also conduct additional water-level monitoring if at least one freshwater well is within a quarter-mile of the water withdrawal well. The DEQ requires these operators to monitor, record and report injection rates and pressure data, as well as turn in Material Safety Data Sheets (MSDS) disclosing the total chemical volumes and additives.

"The Office of Oil, Gas and Minerals regulations … have evolved over decades, and there are many safeguards in place to ensure that the surrounding environment is protected from oil and gas drilling and production activity," Snow said.

## Stricter rules are proposed

As technology changes, the DEQ is in the process of updating its rules guiding fracking operations. A major change would be a new requirement that all fracking operations must disclose the chemicals used in their fluid. Some chemicals are protected as a trade secret, much like a restaurant's secret recipe. However, companies would still be told to list the chemical family and trade name.

To make sure the fracking activities aren't contaminating water, operators would be required to test samples from up to 10 water supply wells within 1,320 feet. These samples must be collected no later than six months after drilling begins.

If adopted, the new rules would put into code the requirement for water withdrawal assessment and monitoring. High-volume hydraulic fracturing operations would need to turn in separate applications, and they must state in their application whether they expect to use the fracking process in their wells. The proposed rules also say operators must notify the DEQ at least 48 hours before starting a fracking operation, and they must monitor and report fluid pressures and volumes for all high-volume operations.

Another significant change that has already been approved is the notification process. Until recently, the permit applicant was only required to notify county clerks of a fracking permit application in their jurisdiction, and townships were notified only if they had a population of 70,000 people or more. Thanks to negotiations with MTA, however, this requirement has changed. The DEQ Office of Oil, Gas and Minerals has a new policy to notify township supervisors when permit applications are filed in their area. Supervisors who are notified will be given a copy of the permit application cover page, and they'll be asked to respond if they have any questions, concerns or comments.

Peters said many operators already make a habit of contacting a local unit's governing body before drilling begins. Notifying local officials of their plans is an important part of raising awareness and educating the public, he said.

## Some want even stricter rules

While the proposed rules and recent changes are an improvement, the MEC says they don't go far enough. McDiarmid said the advances in technology, the increased well depths and the massive quantities of water being used necessitate rules that address these changes. He compared the issue to a street that has a 25 miles-per-hour speed limit. The speed limit may work well, but if the number of cars traveling that street rapidly increases, the speed limit would have to be reviewed, he said.

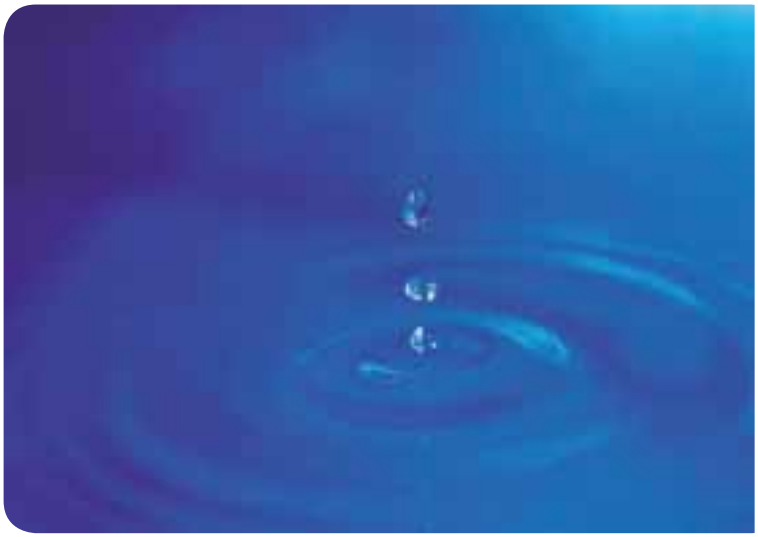
"We don't think the state has updated the rules to reflect the modern fracking operations," McDiarmid said.

One of the biggest issues is the chemical disclosure requirement. According to the proposed rules, well operators wouldn't be required to post the chemicals they use until 30 days after the operation is complete. That's too late to for area property owners to conduct a baseline test on their water for the chemicals being used nearby. A baseline test is necessary to prove that the chemicals in the water appeared after the fracking operation began and weren't present beforehand.

The MEC also believes that all communities, regardless of their size, should be notified if anyone applies for a fracking permit in their area. McDiarmid said that oil and gas developers should be required to work with communities to avoid potential conflicts with other users.

Though low gas prices have slowed fracking activity, McDiarmid envisions a day when demand for fracking is high. Stricter rules will help to protect water resources and public health, he said.





**Some environmental groups feel that anything that could put the water supply or public health at risk should have proper regulations in order to take a proactive approach.**

"This is the point where we do need stricter rules," McDiarmid said. "… The game has changed dramatically, but the rules are essentially the same as they were decades ago. That's why we need to update the rules now."

## What can townships do?

When a fracking permit is granted in a township, officials may find themselves flooded with questions and demands from residents. Citizens may point to other local units that have adopted moratoriums on fracking and ask their township officials to do the same. Officials, however, may wonder if such an action is legal, or if it would even have any power.

MTA Legal Counsel Catherine Kaufman, attorney at Bauckham, Sparks, Lohrstorfer, Thall and Seeber PC, says townships must first remember that the law specifically preempts them from enacting any zoning ordinances that attempt to regulate fracking. According to the law, "a county or township shall not regulate or control the drilling, completion or operation of oil or gas wells or other wells drilled for oil or gas exploration purposes and shall not have jurisdiction with reference to the issuance of permits for the location, drilling, completion, operation or abandonment of such wells." (MCL 125.3205)

Kaufman said her firm believes this law also applies to ancillary activities, such as building roads to a fracking operation or constructing an accessory building. It is her firm's opinion that these activities can't be regulated through zoning.

Instead, townships can regulate some of these activities through the adoption of a police power ordinance. For example, townships could adopt a truck route ordinance stating that trucks are not allowed to drive on certain roads and streets. Officials should keep in mind that these ordinances would apply to all trucks, not just those associated with the fracking operation. They must also be careful not to conflict with the DEQ Supervisor of Wells administrative rules, which include guidelines on noise and other issues.

Though the concept of adopting a fracking moratorium is becoming more popular, Kaufman said townships do not have specific authority to put fracking on hold. A moratorium would not stop a permit application from being granted since townships do not grant permission to drill. The only effect it might have is to hold up approvals for certain ancillary activities.

Some townships may still wish to pursue a moratorium, Kaufman said. However, townships considering taking this step should conduct a cost-benefit analysis of the time they would spend studying the issue during a moratorium compared to the possible cost of being sued.

If a moratorium is adopted, it should be for a short period of time and must be used for studying fracking, Kaufman said. "Doing a moratorium can't be a subterfuge for discouraging or stopping fracking," Kaufman added. "There has to be some legitimate studying and review going on."

Several bills were introduced in the Michigan Legislature last year that, if enacted, would change the legal landscape of fracking. Most importantly, the zoning preemption would be amended so that it would not apply to fracking, giving townships and counties the authority to regulate fracking through zoning ordinances. Language in the bills—House Bills 4061, 4070, and 4899-4905—would require a public hearing upon a local unit's request before the DEQ grants a permit application, among several other changes. However, these bills have not seen movement since they were first introduced in July 2013.

Under the current law, Kaufman said her firm advises taking a cautious approach to fracking regulations. She recommends that all townships consult with their municipal attorney before taking any kind of action. Officials should educate themselves and fully understand the risk before adopting an ordinance.

**Bethany Mauger**, MTA Staff Writer