

Questions and answers about hydraulic fracturing in Michigan

What is fracking?

Fracking is a slang term for hydraulic fracturing, a process that maximizes the output of natural gas and oil wells to make them productive.

How does hydraulic fracturing work?

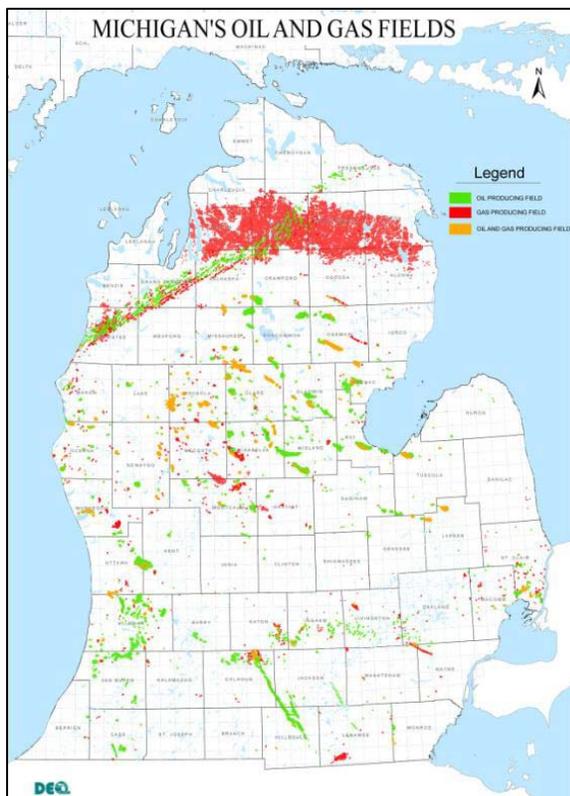
When a well is fractured, an operator pumps a mixture of water, sand and a small amount of chemicals into an oil or gas formation deep underground and applies pressure. The pressure fractures rock layers, releasing oil or gas reserves. The sand holds the fractures open to continue allowing the oil or gas to flow into the well.

As gas or oil comes to the well head under pressure, it brings with it the fracturing water that was pumped, along with natural brines that are present in the deeper layers. That “flowback” water is separated from the gas and oil at the surface, contained in steel tanks, and sent to deep injection wells for disposal.

Is hydraulic fracturing new?

No. Gas and oil operators have been using hydraulic fracturing around the country since the late 1940s.

Is hydraulic fracturing used in Michigan now?



Yes. Companies in Michigan have been using it to facilitate oil and gas production for about 50 years. Approximately 12,000 wells have been fractured in that time, and fracturing has never jeopardized the environment or public health.

Has hydraulic fracturing been responsible for environmental damage in Michigan?

No.

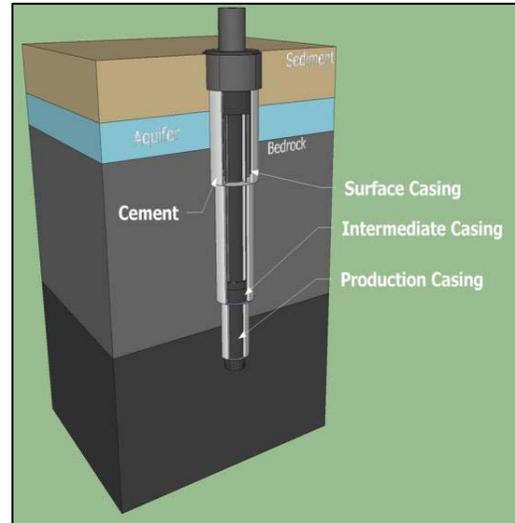
Some are calling for a halt on fracking so it can be studied. What does DEQ think?

State regulators have been studying hydraulic fracturing in action for five decades. As the lead regulatory agency in Michigan, the DEQ does not support halting an activity that has been regularly used without serious incident.

How do Michigan regulations protect the environment?

Michigan has strict rules about how much water can be used for fracturing, how wells are constructed, how they are tested before they are employed, and how the used 'flowback' water is contained and disposed of.

These are the four top risks from gas and oil development. The DEQ has developed a regulatory structure that has effectively protected Michigan's environment and public health for decades.



Does the DEQ support hydraulic fracturing?

The Michigan Department of Environmental Quality exists to protect the environment and public health by regulating industrial activity that may impact Michigan's air, water and soil.

The DEQ regulates gas and oil production in Michigan. Hydraulic fracturing is a common technique that has been used on more than 12,000 wells in Michigan for more than 50 years without any consequence to the environment or public health.

If this process posed a threat to the public or the environment, the DEQ would further regulate it or outlaw it. To the contrary, Michigan's regulatory structure has been held up as a national model for effective, protective regulation.

Is hydraulic fracturing necessary?

Hydraulic fracturing has been used on 78% of all wells drilled in recent years in Michigan for a simple reason: it works. Traditional gas and oil development involved drilling into rock formations that allowed oil and gas to flow freely through the rock and into a well bore.

Hydraulic fracturing technology allows for development of "tight" rock formations that contain oil or gas but do not allow it to flow into a well without this technology. Hydraulic fracturing has dramatically increased the production of oil and gas in the United States and reduced the need for imported energy supplies.

Does the DEQ support further regulating or stopping hydraulic fracturing?

The DEQ regularly updates its regulations to reflect changes in the environment, available technology, and industry practices. The hydraulic fracturing regulations were updated in 2011.

The DEQ monitors gas and oil production in Michigan very carefully. The DEQ is confident in its ability to protect the public and allow the gas and oil industry to continue developing local energy sources.

What kinds of chemicals are used?

Many people are surprised to learn that 99.5% of ‘fracking fluid’ is water and sand. The remaining half percent varies, but the chemicals used are determined by the type of rock targeted for production. Below is a breakdown of common fracturing fluid components.

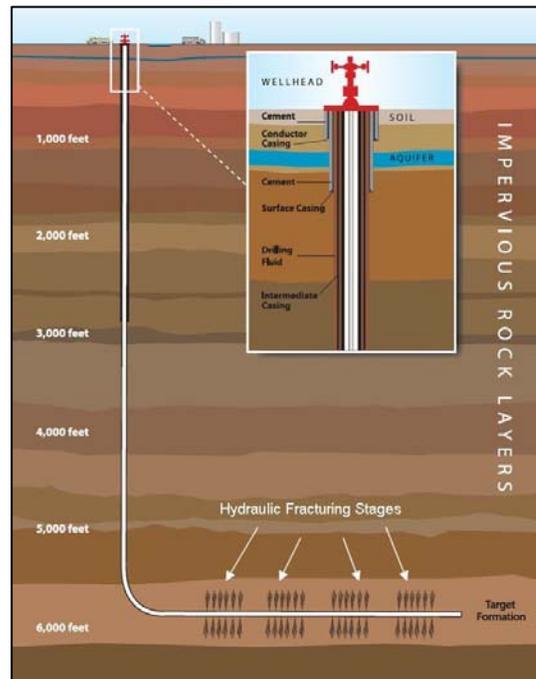
| Component / Additive Type | Example Compound(s) | Purpose | Percent Composition (by volume) |
|---------------------------|-----------------------------------|--|---------------------------------|
| Water | | deliver proppant | 90 |
| Proppant | Silica, quartz sand | keep fractures open to allow gas flow out | 9.51 |
| Acid | Hydrochloric Acid | dissolve minerals initiate cracks in the rock | 0.1230 |
| Friction Reducer | Polyacrylamide, mineral oil | Minimize friction between fluid and the pipe | 0.0880 |
| Surfactant | isopropanol | Increase the viscosity of the fluid | 0.0850 |
| Potassium chloride | | create a brine carrier fluid | 0.0600 |
| Gelling agent | guar gum, hydroxyethyl, cellulose | Thicken the fluid to suspend the proppant | 0.0560 |
| Scale inhibitor | Ethylene glycol | prevent scale deposits | 0.0430 |
| pH adjusting agent | Sodium or potassium carbonate | Maintain the effectiveness of the other components | 0.0110 |
| Breaker | Ammonium persulfate | allowed delayed breakdown of the gel | 0.0100 |
| Crosslinker | Borate salts | maintain fluid viscosity as temperature increase | 0.0070 |
| Iron Control | Citric Acid | prevent precipitation of metal oxides | 0.0040 |
| Corrosion Inhibitor | N, N-dimethyl formamide | prevent pipe corrosion | 0.0020 |
| Biocide | Glutaraldehyde | eliminate bacteria | 0.0010 |

I’ve heard “horizontal” fracturing is different. Is it?

In past years, most natural gas exploration in Michigan targeted reserves ranging up to 2,000 feet below the surface. Energy companies more recently have started to target deposits that are 5,000 or more feet underground.

The process for fracturing the wells remains the same. What is different is the amount of oil or gas recovered, the amount of water required for hydraulic fracturing, and the increasing use of horizontal drilling.

One typical deep horizontal well can replace 10 to 20 vertical wells, reducing the footprint on the landscape. These deposits are even further from the surface, which further reduces any potential threat to aquifers. However, deep horizontal wells use more water than a shallow, vertical well operation.



Does hydraulic fracturing cause earthquakes?

There is one instance in British Columbia where hydraulic fracturing is believed to have caused very low-level earthquakes; only one was felt by humans, and none caused any damage or safety risks. There have been instances of similar earthquakes in other states associated with deep wells used for disposal of waste fluids from oil and gas

development under specific conditions. Michigan does not have the conditions necessary for this to occur.

I saw a video where someone lit their tapwater on fire. Is that from hydraulic fracturing?

No. There have been a few rare cases where gas from drilling operations has escaped into fresh water aquifers; however, that was caused by improper well construction, *not* hydraulic fracturing. Where gas occurs in water wells, it is almost always from natural pockets of methane gas. Over time, gas seeps into the water well and is transmitted into the home. It has been documented in Michigan public health advisories dating back to the 1960s. It has never been associated with hydraulic fracturing.

Has hydraulic fracturing in other states polluted rivers?

The actual process of hydraulic fracturing has not polluted rivers. However, in other states flowback water had been trucked to local wastewater plants for treatment and then discharged to surface waters. The wastewater plants were not equipped to remove naturally occurring salts from the water.

This has never happened in Michigan because Michigan regulations require flowback water to be contained in steel tanks and sent to deep injection wells for disposal. Operators are not allowed to use any other containment or disposal method.

Does use of water for horizontal fracking threaten water supplies?

No. Oil and gas companies are subject to the same requirements as other users of large volumes of water—they must first evaluate the potential effects of the withdrawal using a computer program Michigan regulators designed to track and measure water use and protect local aquifers.

If it appears that proposed local uses put dangerous stress on local water supplies, the proposed withdrawal request is denied.

Michigan's water withdrawal assessment tool is a nationally lauded environmental protection technique. Learn more about it at <http://www.miwwat.org/>