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Abstract

- Hydraulic fracturing (fracking) is a method of gathering oil from the shale formations underground. The process works by drilling a mile underground into shale and injecting millions of gallons of water, mixed with sand and chemicals, at a very high pressure. While the water mixture is being injected, the shale breaks and releases the natural gases and oil.
- Fracking has both positive and negative effects for the United States, more specifically Ohio.
- On the positive side, it can be used to make the US less dependent on foreign oil and create jobs.
- However, since waste water injection began near Youngstown there was an increase in earthquake activity with approximately 130 seismic activities with magnitudes as high as 4.0.
- Fracking or the disposal of waste fluids may also cause pollution of groundwater. This poster will outline the risks and benefits fracking poses to Ohio.

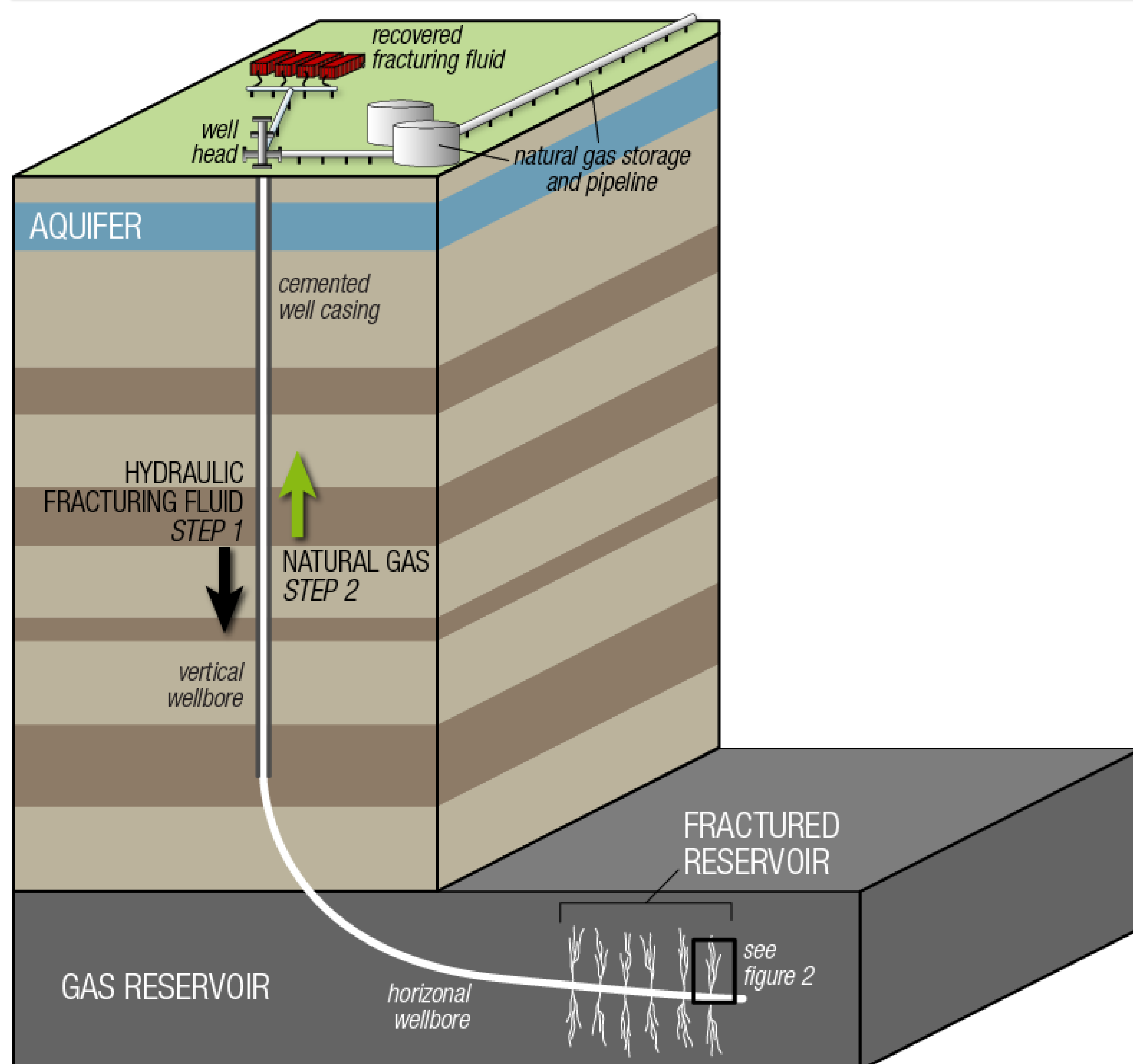


Figure 1. Hydraulic fracturing diagram

Economic

A 2015 study by Brookings Institution, estimated

- Natural gas prices were 47 percent lower in 2013
 - Residential consumer gas bills decreased \$13 billion per year from 2007-2013 due to fracking
- In 2017, 1,869 shale wells out of 45,000 total wells in Ohio produces,
- ~97% of natural gas (1,725,495,877 mcf)
 - ~85% of oil (16,535,808 barrels of oil)

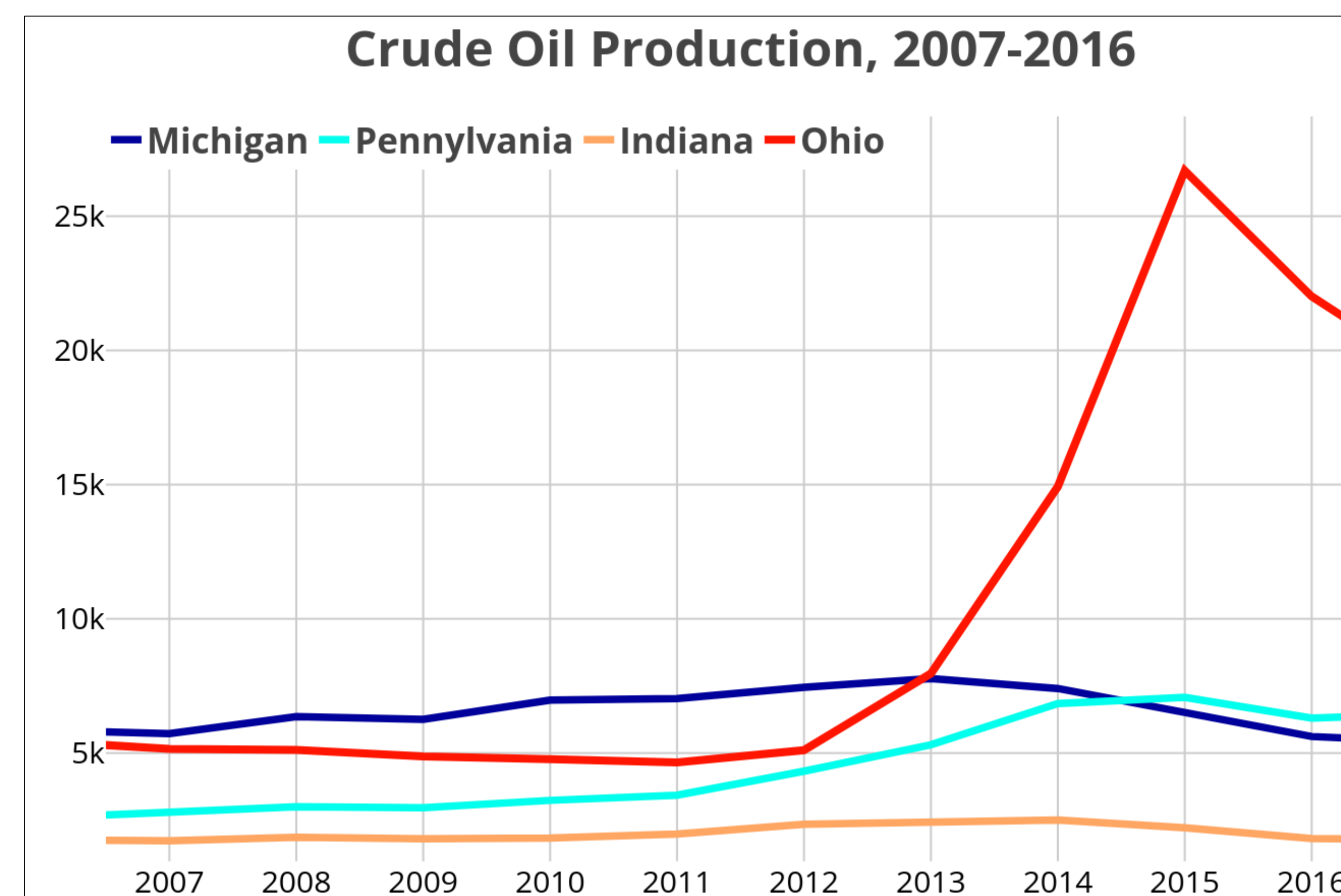


Figure 2. Crude oil production from 2007-2016 in four states (thousands of barrels of oil)

Ohio Regulations

The Division of Oil and Gas Resources within the Ohio Department of Natural Resources (ODNR) is responsible for regulating fracking in Ohio.

- The disclosure of the types of fluids, the volume, and a description of each chemical additive
 - The maximum amount of surface and injecting pressure
 - Well siting, construction, design, and operation
 - The monitoring of induced seismicity
 - The transportation and disposal of fracking waste
- Ohio requires fracking operators to submit a list of chemicals used to FracFocus.org. Chemicals or concentrations that are considered a trade secret are allowed to withheld these from public disclosure.

Environmental Concerns

According to a 2016 EPA study,

- Fluid and chemical spills that contaminate groundwater
- Injection of fluids into wells with inadequate mechanical or casing features that allow fluid to leak
- Disposal of fracking wastewater into unlined pits, resulting in contamination of groundwater

Fracking can result in induced seismicity from high pressure on rocks.

An ODNR preliminary report of an injection well near Youngstown concluded,

- Northstar #1, injected saline waste water 1 km within Youngstown starting on 28 December, 2010
- From March 2011 to March 2012, Youngstown experienced 12 low-magnitude, ranging from 2.1 to 4.0, earthquakes

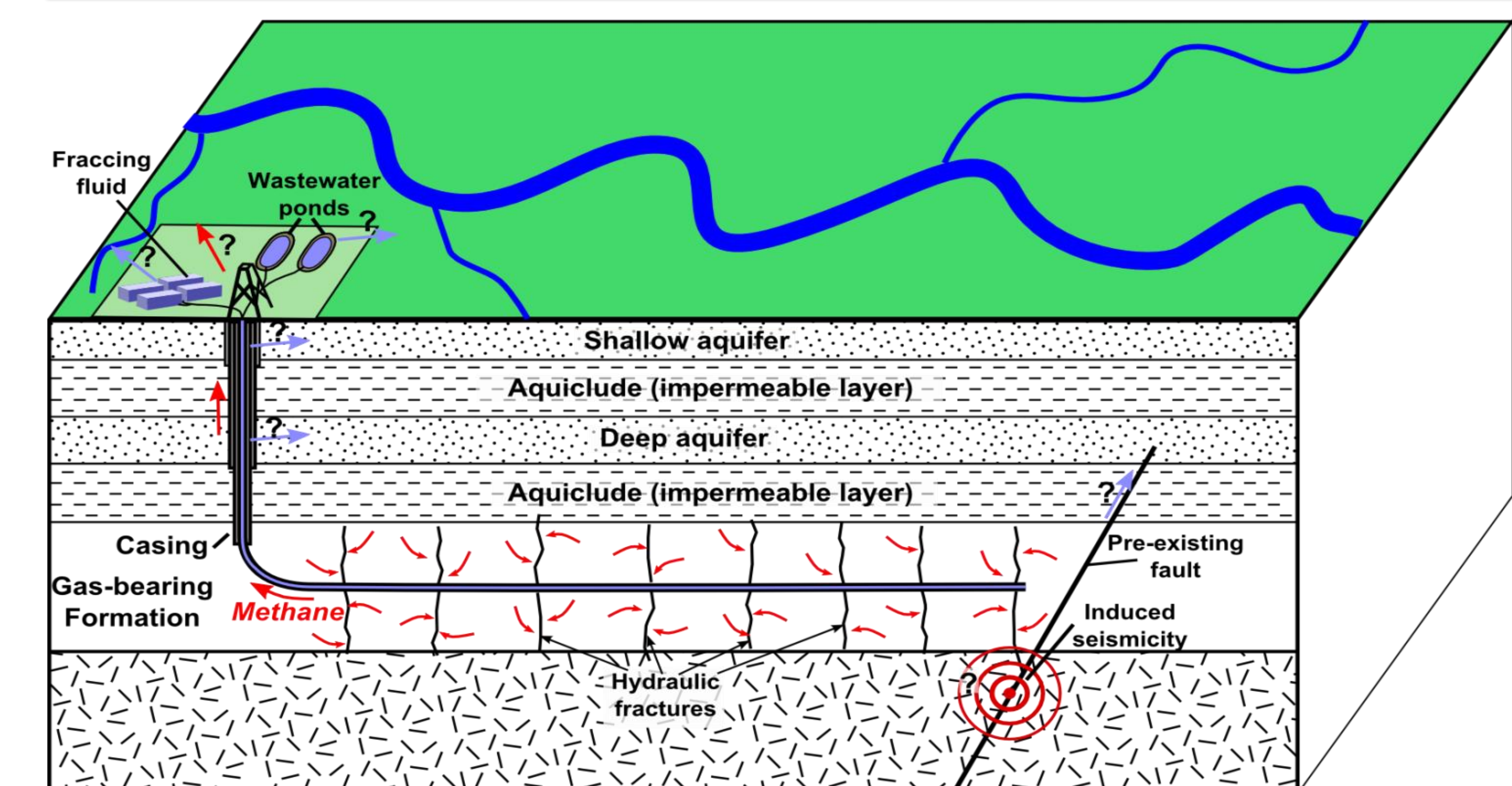


Figure 3. Potential Pollution from Fracking Diagram

Future Work

- LPG (liquefied petroleum gas) is a potential as an alternative fluid to fracture the rock that lessens the use of water
- Membrane filtration technology is a possibility as a method to filter out contaminants and reuse fracking fluids

Acknowledgments

- Cleveland State University
- Choose Ohio First

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