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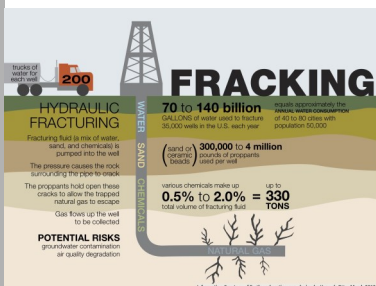
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Just What IS "Fracking? - Hydraulic Fracturing 101



A Primer On . . . Hydraulic Fracturing 101



I was once again reminded of the dangers of "assuming" while having breakfast with relatives recently. The conversation turned from excitement over lowering gas prices to the "supposed" reduction of oil production in the Bakken deposits of North Dakota, on to Saudi Arabia's vast oil reserves and resulting price manipulations.

Somewhere in that conversation, the question arose, "Exactly what **IS** fracking?" Being peripherally involved in the industry (our company has fabricated a number of potable water tanks for Target Logistics' worker facilities in North Dakota), I tried to explain the process, **ASSUMING** that my audience had a basic understanding of the process, as well as a minimal confidence in my overall general intelligence . . . **BIG MISTAKE.**

Whether it was due to my less-than-exalted status as the youngest, let alone only female, member of a family of six children, it became immediately apparent that I was in deep trouble trying to explain the process to a group of lay-people to the industry, whose main source of information came from breakfast group hearsay, the local (fairly biased)

newspaper, and Facebook op-eds. Hence my bright idea to try and reduce the "Fracking" process to the lowest possible denominator, so that most anyone could understand the basic process. I mean, surely my family can't be the **ONLY** people that are a little uninformed or even misinformed on the subject, can they?

Hydraulic fracturing -- or **hydro fracking**, or just plain **fracking** -- is one way that we can get at "hidden" reserves of natural gas, petroleum -- even water, that lie far beneath the Earth's surface in previously inaccessible areas.

It sounds extremely complicated (it is, in fact, a pretty cool feat of science and engineering), but fracking is a fairly simple process. Far underground, rocks like shale can hold gases, water, or oil in their pores. Hydraulic fracturing moves that resource from the pores of the rocks to production wells.

It's done by creating horizontal "veins" off a vertical well, and then pumping that horizontal well full of water (plus sand and chemical additives) at an extremely high pressure. This causes fissures in the rock that branch off, releasing gas, oil or water into the cracks created. The gases and oils are then forced into the horizontal wells, that then flow back up to storage tanks with the water that comes up with the mineral resources sought.

This sounds like a win-win situation for everybody, doesn't it?

The United States now has access to previously inaccessible resource deposits, our reliance on foreign energy supply decreases, and, hopefully, the general public benefits from an abundance of domestically sourced fossil fuels. What could possibly be wrong with that scenario, right?

In fact, many people feel that it all sounds to be good to be true. And, there is vehement debate about fracking, from the resulting dangers to the environment, the resources (such as silica sand) mined and depleted to facilitate the process, and the affects upon the communities where fracking or supply mining takes place. So, as Paul Harvey used to say, "Here's the **REST** of the story."

Fracking was developed because traditional mining processes were not able to reach large, often vast, domestic oil and natural gas deposits located deep (like 7,000 feet) below the Earth's surface, trapped in shale deposits.

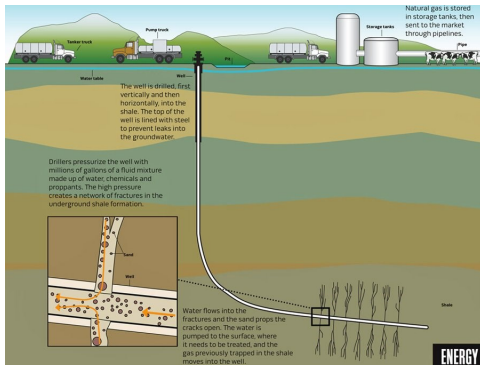
A traditional drilling operation taps into a big pool of gas or water underground, allowing it to be pumped to the surface. The trouble was, when the resource you're trying to capture is trapped tightly in the pores of shale, how do you release it and bring it to the surface?

It starts off pretty much the same way as traditional drilling. In fracking, a deep well is drilled. It is estimated that the average depth of a frack well is approximately 7,700 feet,

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with a diameter of 12.25 inches, called a **wellbore**. When the wellbore reaches the appropriate depth, it takes a right or left turn, referred to as a the **kick off point**. The drilling then becomes horizontal, which can span from between 1,000 to 6,000 feet.



Steel casing is then fitted into the wellbore, which is intended to protect groundwater and the surrounding area from any potential leakage during the fracking process. Down at the kick off point, the steel is then perforated in order to create small holes for water or tiny particles to escape through. At this point, a water solution is pumped in at an extremely high pressure.

When the solution reaches these perforations, the liquid is unable to be absorbed into the rock, which then fractures, creating fissures (hence the term “fracking.”) It can take from three to 10 days for this process to be completed. Additives and sand found in the water mixture hold open these fissures, allowing the gas (or whatever the resource) to escape and be brought to the surface via the water that’s pumped back up, which is then separated. The resource can flow from these cracks for years or potentially decades. The process wastewater is then stored and treated, pumped into injection wells, or recycled; it’s also stored in open-air pits or used on roads.



The equipment used in fracking is extremely heavy duty and usually requires large quantities. Up to 200-400 tanker trucks are needed to bring the estimated 1,000,000 gallons of water necessary for the process to a well. Deeper shale beds may require between 2,000,000 to 10,000,000 gallons of water. Additionally, dozens more pump trucks are required to shoot the pressurized solution down into the wellbore.

Once you become aware of the nitty-gritty of the fracking process, it doesn’t take long to extrapolate that people are going to be concerned about a plethora of both positive and negative issues.

Opponents of fracking cite concerns ranging from the damage heavy equipment creates on local roads to worries about taxing local water resources and groundwater aquifers on up to increased crime in the resulting “boomtowns” created by frack mining operations. And that doesn’t even touch the overall environmental concerns such as eventual groundwater contamination, creating large voids in the Earth’s interior, and the affects of the silica sand mining operations necessary in other regions of the country, from which the sand necessary for fracking is resourced.

But as usual, there are two (or three or four) sides to every issue. Proponents of fracking cite the numerous advantages to the process, as well. Foremost amongst these is that fracking provides access to previously inaccessible resources that are normally trapped in the pores of rock.

Aesthetically, there are the benefits of **instead of** drilling multiple wells, the process involves drilling one well that shoots off horizontally, which has advantages for the surface landscape. It’s also argued that natural gas accessed through fracking is a more environmentally friendly fuel than oil or coal. While large natural gas reserves occur throughout the U.S., there are a few large swaths known as **shale regions**, which can be accessed only through fracking. These include the Marcellus region (which covers parts of Ohio, Pennsylvania, West Virginia, Maryland and

New York), the Antrim shale region in Michigan and the Barnett shale field in Texas.



Proponents of fracking are quick to point out that any time the U.S. reduces its dependence on foreign oil, it’s advantageous to American consumers. In addition to greater availability of US-produced natural gas, fracking operations create jobs and revenue for mining regions, positively impacting local employment rates. The advantages spread outward, not only in the mining regions, but extending to surrounding regions (and sometimes, states) that support the resultant “boomtowns” created by the mining operation. These benefits run the gamut from increased equipment suppliers, hotel, campground, and restaurant revenues to hiring more law enforcement personnel, increased hourly rates for minimum wage earners, and creating revenue for the entire supply chain for fracking mines and their operations personnel.

But beauty or “advantages” in this case, are in the eye of the beholder. For nearly every “advantage” of fracking cited, there can be an argument for a counterbalancing “disadvantage.”

Wisconsin is on track to sell about 50 million tons of frac sand a year, the Department of Transportation estimates.



Credit: Kate Prengaman, Wisconsin Center for Investigative Journalism
Source: Sandstone, U.S. Geological Survey; Sand Estimate: Wisconsin DOT

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You could fill pages with arguments for or against the fracking process. I haven't even gone into our own state and local controversies here in Wisconsin regarding the silica sand mining operations necessary for fracking. Evidently, Wisconsin (as well as Minnesota, Illinois, Missouri) has large areas of the prime sand deposits that are ideally suited for fracking operations. Nor have we covered the concept of property rights—should property owners have the right to maximize the potential of their land ownership, whether those resources be surface or mineral rights? And what of the impact of maximizing those “rights” upon the surrounding local area?



If you don't think **THAT** argument is heated, go sit in on a township board meeting where sand mining operations are being considered or currently exist.

Once you educate yourself a bit about the frack mining process, it's as if a light bulb turns on in your mind. You become aware of the issues that are being brought into play in the regions affected by the industry. Hopefully, you will become more educated on the pros and cons of the industry. It's as if frack mining is the pebble that is dropped into a huge thought process . . . the ensuing ripple affect can be monumental.

Frack mining and its affects is an extremely nuanced subject. It is **NOT** my goal here to be all-inclusive; that's a gargantuan task. The best thing you can do with a topic this diverse is keep reading and researching new developments such as fracking as they are introduced in our communities and then become involved in the process.

At the very least, it'll give you more comprehensive, factual ammunition for those animated Sunday morning breakfast discussions with your older siblings. Providing, of course, you can avoid my

pitfall of once again defining that old adage about **ASSUMING** . . .



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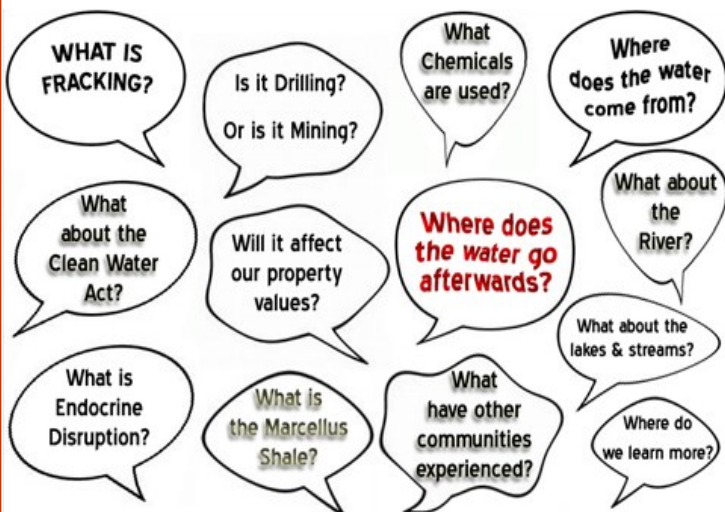
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It's easy to say, “**NO**” to silica sand mining operations in your area, unless you happen to be the land owner that is sitting on hundreds of acres of the stuff. And it isn't hard to empathize with a farmer who can no longer afford to continue agricultural operations, but is unable to open his property to sand mining operations due to his neighbors' personal or environment concerns on how that farmer wants to utilize **his own** land. If the situation were reversed, would **you** want **YOUR** neighbor to tell you what you could and could not do with your own land? Probably not, right?



Pros and Cons

For & Against

 Reduced Dependence on Foreign Oil	 Ground Water Contamination
 Clean Fossil Fuel	 Air Contamination
 Economic Renewal	 Animal Death and Disease
 Future Energy Needs	 Human Harm
 Lower Energy Costs	 Earthquakes