Fracking Just the Facts

The history of fracturing technology's safe use in America extends all the way back to the Truman administration, with more than 1.2 million wells completed via the process since 1947. But only recently has the term hydraulic fracturing ("fracking") entered the public's vocabulary, a function of the enormous opportunities that the application of fracturing and horizontal drilling are making possible all around the country through the development of abundant resources from shale.

So what's this technology all about? And how does what you may have heard about the process square with the facts as they actually exist? In this section, we highlight – and correct – some of the most pervasive myths that have come to surround the debate over fracturing.

What is hydraulic fracturing, or "fracking"?

It's not a "drilling technique," for starters. It's a technology that's used to enhance the flow of energy from a well once the drilling is done and the rig and derrick are removed from the scene. On average, it's a process that takes about three to five days to complete start to finish. Once the fracturing operation is done, the well is considered "completed," and is now ready to produce oil and/or natural gas for years, even decades, to come.

- EPA: Background information on hydraulic fracturing
- AXPC: Real facts behind fracture stimulation technology (2010)
- IPAA: "Three E's" fracturing fact sheet (2009)

So it's only used for oil and natural gas, right?

Actually, no. Over the past 60 years, hydraulic fracturing has been used for a wide variety of purposes, from stimulating the flow of water from water wells, to bringing geothermal wells into commercial viability. It's even been called on by EPA to serve as a remediation tool for cleaning up Superfund sites – bet you didn't know that one.

- EPA: A Citizens Guide to Superfund Cleanup and Hydraulic Fracturing (2001)
- MIT: The Future of Geothermal Energy (2006)

How does the process work in an oil/gas context?

After the well is drilled and multiple layers of casing and cement are installed, the drilling crew is replaced by a fracturing crew, who then gets to work on preparing the water-based solution for delivery to the formation. Water is far and away the most important aspect of a successful fracturing operation, as it not only creates the tiny fissures in the deep shale rock that liberate the natural gas, but also acts as a carrier and delivery mechanism for the sand, which helps keep those newly created fissures open so that resources can be collected.

Of course, water alone can't create those tiny fractures in the rock – you need to apply some pressure as well. At a typical fracturing operation, dozens of "pump trucks" will be called in to help deliver the pressurized water down the wellbore. The solution itself is made up almost entirely of water and sand, 99.5 percent on average. The small percentage of materials that remain are additives that control the growth of bacteria in the wellbore (which, left unchecked, can corrode the pipes). Other additives alter the surface tension of the water so that it can be easily sent down the hole at the start, and then brought back up again when the fracturing operation is complete.

- Dept. of Energy: Modern Shale Gas Development in the U.S. – A Primer (2009)
- Video: 3-D rendering of the fracturing process (CHK, 2011)

Isn’t the composition of fracturing fluids a secret?

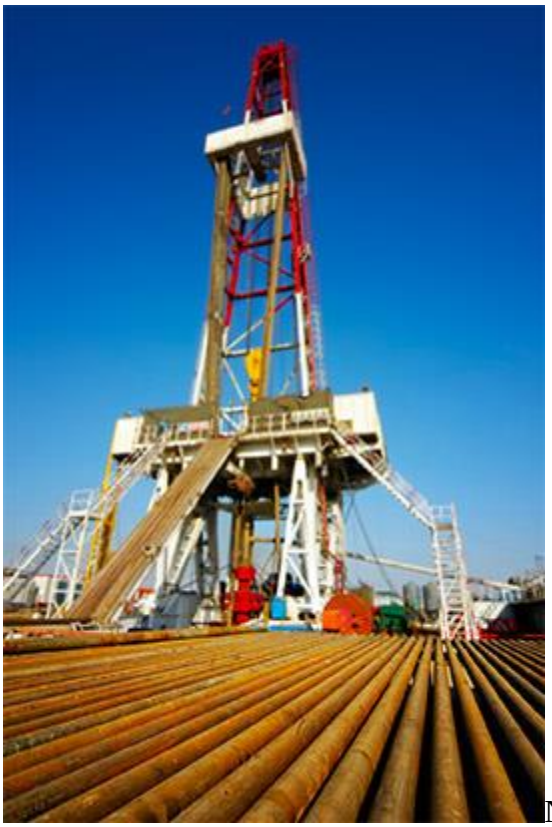
No, it’s not. As mentioned, greater than 99 percent of the fluid is composed of water and sand, and the small fraction of what remains includes many common industrial and even household materials that millions of American consumers use every day. By both weight and volume, the most prominent of these materials is a substance known as “guar.” Sounds scary, right? It’s actually an emulsifying agent more typically found in ice cream. In fact, the ice cream industry hasn’t been too pleased with us recently, since, thanks to shale, we’ve been using a good bit of the stuff as of late (though the guar bean growers don’t seem to mind).

The truth is, there isn’t a single “hazardous” additive used in the fracturing process that’s hidden from public view. On the federal level, operators are bound by requirements of the Community Right-to-Know Act (passed in 1986), which mandate that detailed product information sheets be drawn up, updated, and made immediately available to first-response and emergency personnel in case of an accident on-site. More recently, an effort led by the U.S. Department of Energy and the Ground Water Protection Council (GWPC) culminated in the creation of FracFocus.org. A searchable, nationwide database with specific well-by-well information on the additives used in the fracturing process. States themselves have also upped the ante, with no fewer than a dozen updating their regulations over the past 12 months to promote additional disclosure.

So what’s with all the controversy over “trade secrets”? In rare cases, a company may ask that a certain “constituent” contained within a larger “additive” set be protected, though even then under law that information must be released to response and medical personnel in case of an emergency. Even without an emergency, companies still disclose the general name of the constituent in question, its common industrial uses, and even the volumes at which it is being deployed. Indeed, the vast majority of these are considered “non-hazardous” by EPA – quite the contrast from what you’ve read in the papers.

- GWPC: Nationwide, searchable, well-by-well chemical disclosure database
- Halliburton: Regional breakdown of both the additives and constituents used in fracturing solutions
- Range Resources: Completion reports (with detailed fluid disclosure) for more than 120 individual wells

I hear a lot of talk about "shale gas." How is that different from natural gas?



No difference at all. Shale gas is simply natural gas that comes from shale formations instead of other rock strata like limestone or sandstone. Natural gas from shale is just as clean as natural gas from any of those other rock layers, and just as versatile as a reliable, low-cost power and fuel source for America. The difference is: in shale, there's just a whole lot more natural gas to be found. That's good news for folks who use natural gas to cook their food and heat their home – and even better news for companies in America that use natural gas to make everything from face-creams to fertilizers.

- API: Facts about natural gas from shale
- Union of Concerned Scientists: Great primer on clean energy aspects of natural gas

Folks say hydraulic fracturing will cause my water to catch on fire. Is that true?

It took an awful long time for the facts to show up to the dance on this one, but finally media are starting to catch up to the truth behind this easily discredited myth. It all started in 2009 with the release of the anti-natural gas film Gasland, whose most memorable scene was of a man in Colorado lighting his faucet on fire and then blaming it on hydraulic fracturing. After the film was released, regulators in Colorado issued a detailed fact sheet seeking to "correct several errors" made in the film – including the one about the flaming faucet.

According to regulators, the well featured in Gasland "contained biogenic gas that was not related to oil and gas activity." So where did the methane come from? "[T]the water well completion report … shows that it penetrated at least four different coal beds. The occurrence of methane in the coals of the Laramie Formation has been well documented."

Further east, states like Pennsylvania were instructing homeowners how to safely vent methane from their water wells long before Marcellus development came to the state. Here's a how-to guide issued by the Department of Environmental Protection (DEP) in 2004, and another pamphlet released by Penn State Univ. in 2006.

- Colorado regulators' fact sheet: Addressing myths in Gasland (2010)
- EID: Gasland Debunked (June 2010)
- MI Dept. of Public Health: Naturally occurring methane in Michigan's water wells (1965)
- PA DEP: Fact sheet on mitigating methane in water wells (2002)
- Flashback: Methane reported in PA water wells in early 1980s (Pittsburgh Post-Gazette)
- Fox on film: Gasland director admits methane in NY water wells goes back 80 years

Nearly 65 years of use, and not one case of groundwater contamination caused by hydraulic fracturing? How can that be possible?

You don't have to take our word for it. As recently as this summer, an official with the U.S. Department of the Interior told Congress that "we have not seen any impacts to groundwater as a result of hydraulic fracturing." In May 2011, EPA administrator Lisa Jackson told the U.S. Senate that she wasn't aware "of any proven case where the fracking process itself affected water." Letters from dozens of state environmental agencies – offices that have been regulating the fracturing process for decades — also confirm the safety of the technology.

Of course, just because fracturing's record is clean doesn't mean there's never been a single issue with a single one of the more than 500,000 natural gas wells active in America today.

Accidents, though rare, have occurred – and as long as humans beings are doing the work, we'll never be able to tell you that an accident in the future is impossible.

Drilling a natural gas well is not an endeavor without risk. Neither is crossing the street. The key question is: are those risks manageable? And in the case of natural gas, are regulations in place to ensure those risks are being managed in the proper way? Five-hundred thousand wells and 150 years of safe operations later, we'd suggest that they are. With that many wells out there, wouldn't it be pretty clear by now if they weren't?

- Video: EPA administrator — "I am not aware of any proven case where the fracking process itself affected water." (May 2011)
- Letters: State regulators set the record straight on safety, performance of fracturing technology
- EIA: Updated data on number of producing natural gas wells in America (2011)

Does hydraulic fracturing cause earthquakes?

In short, no – but that does require some clarification. Following numerous studies and research by experts on induced seismicity, such events are considered extremely rare and not a threat to the public. In the United States, hydraulic fracturing is only thought to have been a factor in two induced seismic events in the over its more than 60-year history – and those events were incredibly small (the size of the seismic event was at or below what the U.S. Geological Survey describes as being equivalent to a truck driving by). While the media occasionally mischaracterizes hydraulic fracturing as being the cause seismic events, those events are more often attributed to injection wells, which dispose of wastewater from a variety of industrial processes.

"A few very small earthquakes have occurred during hydraulic fracturing (such as a magnitude-2.3 earthquake near Blackpool, England, in April 2011), but such events are extremely rare." – Mark Zoback, Professor of Geophysics at Stanford University and former advisor to President Obama

"The process of hydraulic fracturing a well as presently implemented for shale gas recovery does not pose a high risk for inducing felt seismic events."- National Research Council, "Induced Seismicity Potential in Energy Technologies"

As USGS scientist Bill Ellsworth has said: "We find no evidence that [hydraulic fracturing] is related to the occurrence of earthquakes that people are feeling. We think that it's more intimately connected to the wastewater disposal." Ellsworth has also criticized the media's role in misrepresenting his work: "I was greatly surprised to see how words were being used in the press in ways that were inappropriate … We don't see any connection between fracking and earthquakes of any concern to society."

Wastewater injection wells serve many purposes, including long-term CO2 storage, enhanced oil recovery, and disposal from industrial activities. There are about 500,000 injection wells across the United States, and according to EPA, approximately 144,000 "Class II" wastewater injection

sites in operation. Class II, one of six classes in total recognized by EPA, covers wastewater from oil and natural gas development.

Interestingly, the link between injection wells and seismicity has been understood for decades, according to the U.S. Department of the Interior. In the 1960s, a series of small earthquakes around Denver were linked to disposal wells receiving wastewater from a nearby chemical plant. USGS has also noted that where these isolates incidents have occurred, it is easily manageable and making simple changes (i.e. reducing flow rates) safely mitigates any discernable risk.

- U.S. Dept. of the Interior: Is the Recent Increase in Felt Earthquakes in the Central US Natural or Manmade?
- Science Magazine (1968): Wastewater disposal triggers earthquakes near Denver, Colorado
- CNBC: Does Fracking Cause Earthquakes? (interview with Bill Ellsworth)
- EID: U.S. Geological Survey says no link between earthquakes and HF
- EID-Ohio: Ohio Regulators Update Rules to Further Reduce Seismic Risk

Speaking of regulation: What's this I keep hearing about a "loophole" in the law?

You've probably heard a lot about this one. Getting the public to believe that hydraulic fracturing is essentially unregulated is critical to some folks' strategy of shutting it down. But here's the truth: States have regulated the fracturing process for more than six decades now, and by any legitimate measure have compiled an impressive record of enforcement in that time.

Unfortunately, and for reasons that have nothing to do with that record of performance, some believe that EPA should step in and create a new role for itself — directly regulating the process from its offices in Washington, D.C. To do that, legislation has been introduced that its proponents say is about closing a "loophole" in the law preventing companies from having to disclose the contents of their solutions. In fact, it's not about either of these things, as any plain-reading of the actual bill will confirm.

Truth is, hydraulic fracturing has never in its nearly 65-year history been regulated under the Safe Drinking Water Act. Language adopted by bipartisan majorities of Congress in 2005 simply reaffirmed that fact. Here's a question for you: If a bill never covered you in the first place, how can you be considered "exempt" from it? Does that mean we're exempt from Medicare Part D too?

- Wheeling News-Register: Experts set the record straight on myth of "loophole" (2010)
- Fact Sheet: Federal statutes in play at each stage of the oil and gas development process
- Roll-call vote on Energy Policy Act of 2005 — Senate // House

Isn't there a study out there that says natural gas from shale is dirtier than coal?

Indeed, "out there" is probably the best way to describe it. No need to spend too much time on a paper that's been debunked now by the U.S. Department of Energy, the Council on Foreign Relations, Carnegie Mellon University, and even his own colleagues on campus. But back in April, two professors from Cornell made quite a stir by releasing a study that suggested natural gas from shale scored worse on greenhouse gases than coal.

Sure, we could tell you the paper was bought and paid for by the Ithaca-based Park Foundation, which funnels tens of millions of dollars a year to opposition groups working to institute a nationwide ban on fracturing. And sure, we could mention that both authors are actively involved in campaigns to prevent shale development from taking place in New York – they even wear pins! But we don't want you to think we're afraid of taking on the substance of the argument. So if you're interested in a point-by-point rebuttal of the study, click here. And if you're interested in seeing what other prominent third-party experts have to say about the paper, go ahead and take a look at this. We'll just warn you: it ain't pretty.

- EID: Five Things to Know about the Cornell Shale Paper – Long Rebuttal // Fact Sheet
- U.S. Dept. of Energy rebuttal: Lifecycle analysis of natural gas extraction and delivery (2011)
- Carnegie Mellon researcher: "We don't think [Cornell] is using credible data and some of the assumptions they're making are biased." (POLITICO, Aug. 2011)
- Council on Foreign Relations: "I worry about what this paper says about the peer review process and the way the press treats it." (April 2011)

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