"With proper care, I think we can extract the gas. We need it, and it can both make us more energy independent and contribute to job creation and growth. " -President Bill Clinton; From his book "Back to Work: Why We Need Smart Government for a Strong Economy."

"I am not aware of any proven case where the fracking process itself affected water." Former U.S. Environmental Protection Agency -Administrator Lisa Jackson during testimony before Congress in May 2011

"I think natural gas is going to remain, in many ways, the most desirable traditional fuel-both for its cleanliness and for its relative efficiency. Natural gas is a very important transition fuel in moving towards a post-gasoline society." -Newt Gingrich, Former Speaker of the House of Representatives, author, and political consultant

"The infrastructure created through this effort (conversion of Commonwealth Vehicles to Natural Gas) will be available to fuel passenger vehicles and other commercial fleets . . . [and] reduce our dependence on foreign oil."..."Not only is this good for the government and the environment, but ultimately, it will be good for consumers and the economy as well," -Virginia Governor Bob McDonnell

"We have not seen any impacts to groundwater as a result of hydraulic fracturing." - U.S. Department of the Interior to Congress, Summer 2012

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Hydraulic Fracturing

Unlocking Virginia's Natural Gas Resources

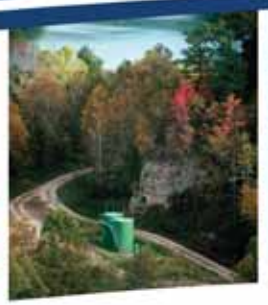
Virginia's clean burning natural gas is crucial to American manufacturing jobs, to farmers for fertilizer, to households for heating and cooking, as fuel for transportation and for hundreds of other American products and materials.

Virginia's Natural Gas Industry does more than just power a clean tomorrow… it provides jobs for thousands of Virginians.

Virginia's Natural Gas industry was the recipient of the 2012 IOGCC Chairman's Stewardship Award for assisting emerging habitats in Southwestern Virginia, through its work on the first successful reintroduction of Elk in the Commonwealth in more than one hundred years.

2013

Frequently Asked Questions



WHAT IS HYDRAULIC FRACTURING?

Hydraulic fracturing is the process in which fluid pressure is applied to reservoir rock causing fracturing. The fluid carries a proppant (usually sand) into the fractures. The fractures close on the sand, which generally has a higher porosity than the reservoir rock. Natural gas can then flow more freely to the wellbore.

IS HYDRAULIC FRACTURING A NEW TECHNOLOGY?

No. Hydraulic fracturing was first used in 1903 with widespread commercial use beginning in 1948. Since then, more than 2 million frac treatments have taken place. Up to 90% of all wells drilled in the U.S. are hydraulically fractured each year with no record of harm to groundwater.

In Virginia, more than 9,300 wells have been drilled with no cases of groundwater contamination associated with hydraulic fracturing.

WHAT MATERIALS ARE USED DURING HYDRAULIC FRACTURING?

Virginia's horizontal shale wells are typically stimulated with only Nitrogen, which is an inert gas that makes up 78% of the air we breathe. Typical fracs for vertical wells are 75% Nitrogen, 18-20% water, 4% sand and less than 1-2% additives.

"We have a supply of natural gas that can last America nearly 100 years…The development of natural gas will create jobs and power trucks and factories that are cleaner and cheaper, proving that we don't have to choose between our environment and our economy."

-President Barack Obama; 2012 State of the Union Address

IS HYDRAULIC FRACTURING REGULATED IN VIRGINIA?

Yes. The Virginia Department of Mines, Minerals and Energy's Division of Gas and Oil regulates all aspects of natural gas drilling.

Article 4 of the Virginia Gas and Oil Act requires gas companies to replace any domestic water well affected by gas operations. The Division is charged with investigating all water complaints and has found no evidence of ground water contamination related to hydraulic fracturing.

IS THERE DATA IN SUPPORT OF HYDRAULIC FRACTURING?

Yes. The EPA, the Groundwater Protection Council and the U.S. Geologic Survey all testified before Congress that there is no evidence that hydraulic fracturing poses any risk to groundwater quality.

States accounting for more than one third of all U.S. production have passed resolutions in favor of hydraulic fracturing after determining there is no risk to groundwater.

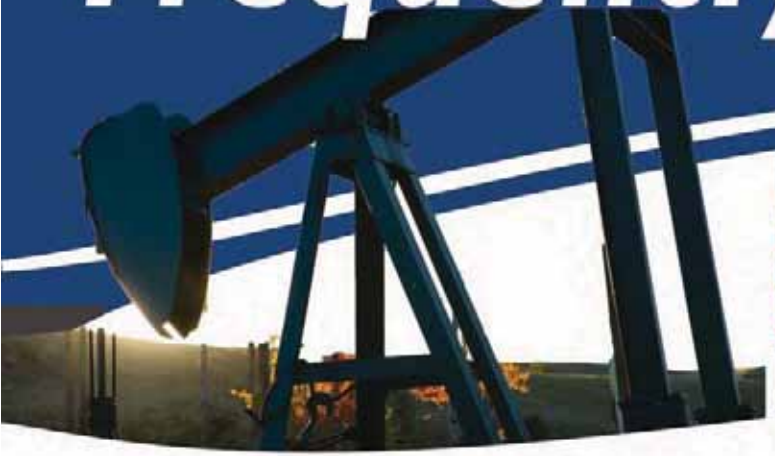
To learn more about the facts that support how safe hydraulic fracturing is, watch the short movie Truthland (www.truthlandmovie.com)

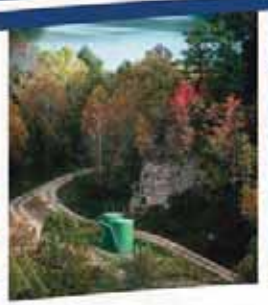
IS THERE A WAY TO TRACK HYDRAULIC FRACTURING IN MY AREA?

Yes. The Ground Water Protection Council and the Interstate Oil and Gas Compact Commission created a web site where the public can monitor chemicals being used for hydraulic fracturing. The site began in 2011 and is voluntary, but currently has 200 companies participating with around 30,000 wells being registered. Visit the site and learn more about hydraulic fracturing at: www.fracfocus.org

The following pages outline the materials used during typical fracturing jobs.

Frequently Asked Questions





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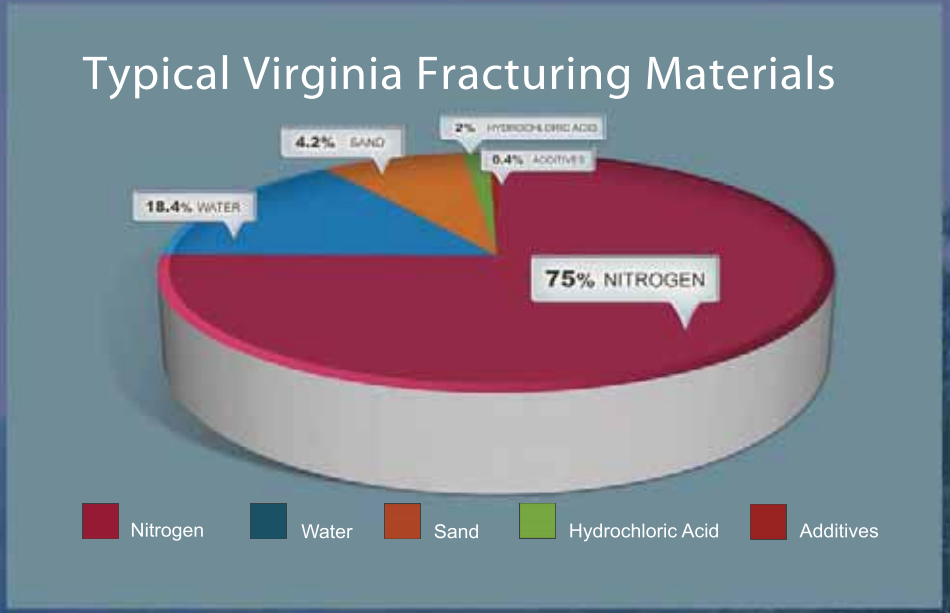
Hydraulic Fracturing in Virginia

Description of Materials

Typically, horizontal Lower Huron shale wells in Virginia are fractured using nitrogen, instead of the millions of gallons of water used to fracture other shales found in other parts of the Appalachian Basin. The rock properties of the Lower Huron shale are different from other Appalachian Basin shales and make the use of nitrogen the best method for fracturing it.

Vertical wells in Virginia are typically stimulated with a mixture of 75% nitrogen, 18.4% water, 4.2% sand (proppant) and 2.4% additives. A description of each of these components is listed below.



Typical Vertical Well Fracture Materials

◆ 75% Nitrogen:
- an inert gas
- makes up 78% of the air we breathe
- is not a greenhouse gas

◆ 18.4% Water:
- approximately 25-35,000 gallons per frac job

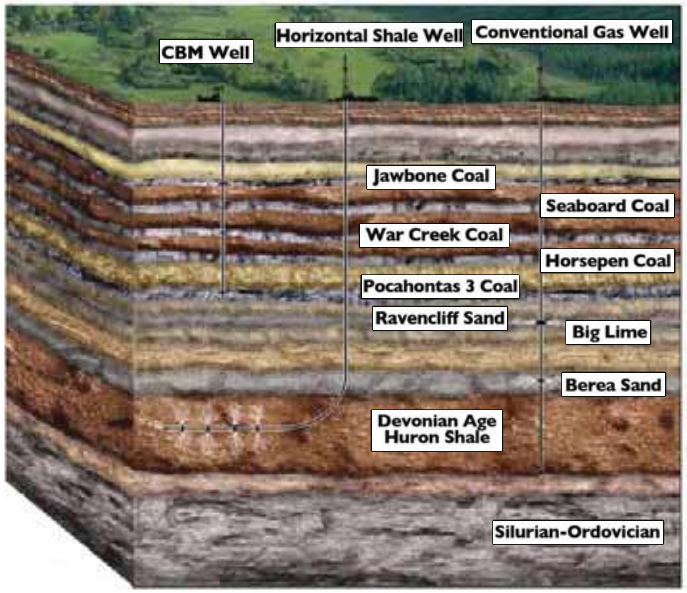
◆ 4.2% Sand:
- Common uses include: mortar for masonry, water treatment filtration, general construction

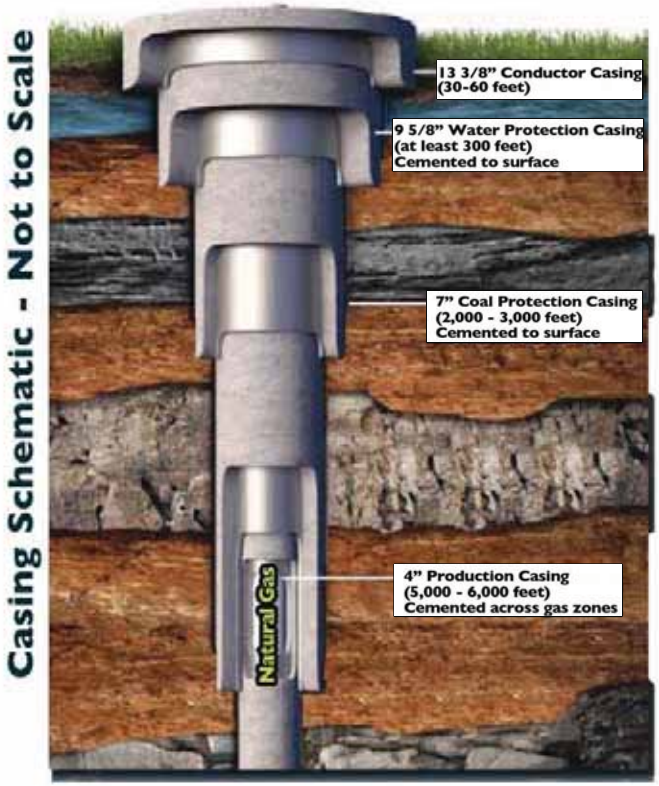
◆ 2% Hydrochloric Acid:
- Typically a 15% solution
- Also known as Muriatic Acid and is the same thing as gastric acid
- Commonly used in medicines and other pharmaceuticals, as pH control for swimming poolss

◆ 0.4% Additives:
Small amounts of additives are used such as clay stabilizers,iron control additives, biocides for water treatment, friction reducers and fluid loss additives.

Examples include:
- Guar Gum – gelling agent also used as an ice cream thickener and in ketchup
- Surfactant – foamer/friction reducer also used in dish detergent, fabric softener, shampoo and toothpaste
- Biocide – bacteria control also used in swimming pools, municipal water treatment, and as a hospital disinfectant

Protecting Virginia's Groundwater





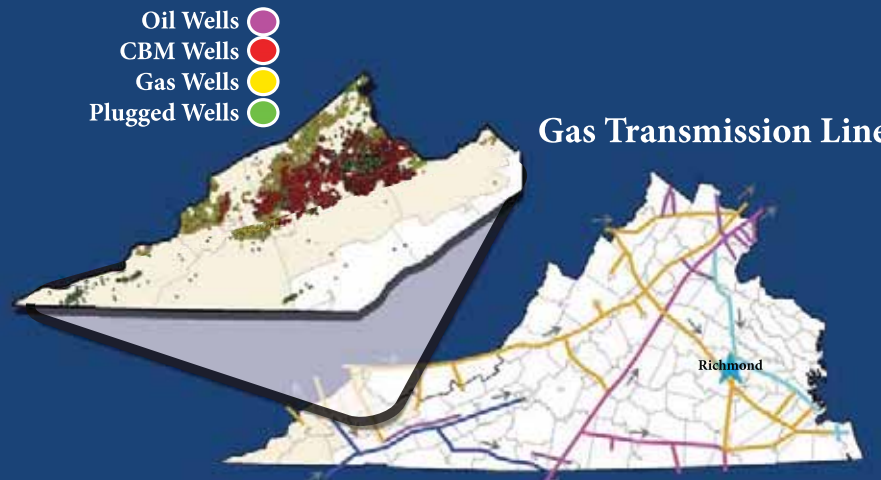
Fresh water in Virginia is generally less than 300 feet deep. Rock formations containing natural gas are several thousand feet to more than a mile deep. Several casings are cemented to surface to isolate natural gas from coming into contact with fresh water resources as illustrated in the diagram to the left.

Natural Gas in Virginia

- Virginia produced 151 billion cubic feet of gas in 2011, which is equivalent to 26 million barrels of oil.
- Virginia ranks 18th in the nation for overall gas production and 4th for coalbed methane production.
- More than 9,300 wells have been drilled in Virginia.
- Since the 1990 Virginia Gas and Oil Act, the natural gas industry has paid:
  - $190 million in Severance Tax
  - Hundreds of millions in Royalties
  - More than $2 billion in Capital Expenditures

Natural Gas and Oil fueling Virginia's Economy

- 141,000-Total statewide Jobs provided or supported by Oil/Gas Industry
- $57,281- Average salary for non-gas station oil & natural gas employees
- $11.6 billion- Contribution to VA economy



Natural Gas production in Virginia is located in the southwest Virginia counties of Buchanan, Dickenson, Lee, Russell, Scott, Tazewell and Wise