

Hydraulic Fracturing



An overview of the process

Hydraulic fracturing, also known as “fracing,” is the process of creating small fractures in underground rock formations to allow oil and natural gas to flow from where it is trapped.

Hydraulic fracturing captures large quantities of oil and natural gas from geological formations that have a poor flow rate due to low permeability or porosity.

Simply put, hydraulic fracturing stimulates oil and gas production. To keep the oil and gas or any other fluids from entering the water supply, a steel casing and cementing process, detailed below, is performed first. Once complete, perforating guns are lowered to production depth, at intervals spaced 50 feet or more apart. Then electrical signals are sent down to create holes in the casing and once the perforation process is complete the perforating guns are removed.

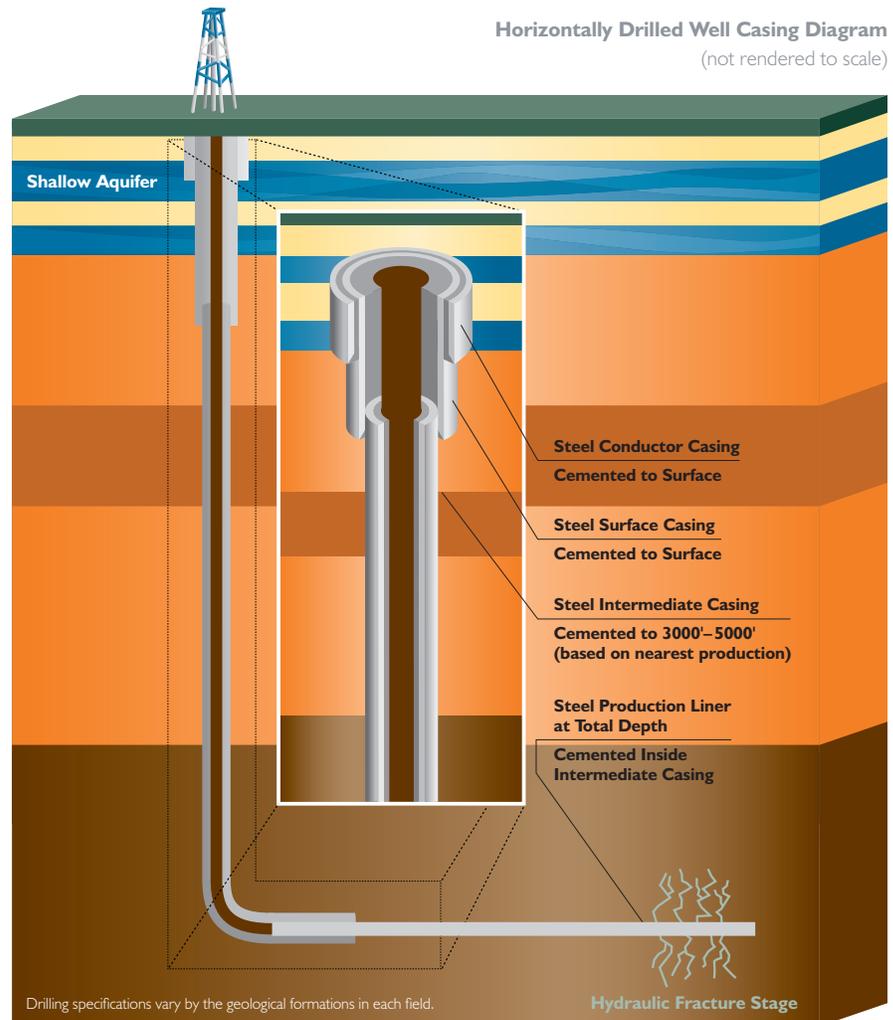
Fracturing fluids, which are composed of water, sand and additives are then pumped deep into the well at increased pressures to cause the reservoir rock to fracture. As pressure builds, rock beds begin to crack, creating small paths for trapped oil and gas to flow into the well and up to the surface. Grains of sand within the fracturing fluid act as proppants and help keep fractures open, creating a “highway” for oil and natural gas to flow. Once the rock bed fractures are complete, the fluid used during the fracturing process returns to the surface along with water produced naturally by the source rock. It is then collected and disposed of in an environmentally safe and approved process allowing the production of oil to and natural gas occur.

Understanding the safeguards

Myth #1: Hydraulic fracturing is a relatively new and untested process

Hydraulic fracturing is a proven technology that has been used for more than 60 years. The first commercial hydraulic fracturing operation was performed in 1949, and by 1988 it had been applied

Horizontally Drilled Well Casing Diagram
(not rendered to scale)



more than one million times. Today, operators “frac” about 35,000 wells each year in the U.S.

Myth #2: Hydraulic fracturing is harmful to drinking water

Groundwater protection is of utmost importance to Encana Oil & Gas (USA) Inc.'s (Encana USA) operations, and it starts with effective wellbore design and the proper execution of construction procedures. As with all aspects of the drilling program, the casing and cementing program detailed below conforms to an engineered design, prepared by Encana USA and installed by qualified contractors under the company's supervision.

“What is at stake here is at least 90 percent of natural gas production and perhaps 70 percent of oil production in the United States.”

– Dr. Michael Economides, on the importance of hydraulic fracturing
*University of Houston Professor of Chemical and Biomolecular Engineering**

*Source: *Houston Chronicle*, August 8, 2010. Author: Dr. Michael Economides

Myth #3: Hydraulic fracturing is not well regulated

Hydraulic fracturing is highly regulated by state and federal government agencies, and Encana USA not only meets but strives to exceed the requirements where possible. This includes reporting the chemical makeup of hydraulic fracturing fluid with regulatory and safety personnel and disclosure of additives used. Fracturing fluids are comprised of sand, water and additives. Many of these additives are those that we encounter in everyday life— swimming pool chemicals, disinfectants, bleach, table salt, mineral oil, citric acid and sodium carbonate.

Encana USA supports the disclosure of information regarding the composition of the fluids we use for hydraulic fracturing. As part of the engineered well completion program, we specify the types of fluids to be used in the fracture operation based on the geology and the geochemistry of the hydrocarbon-bearing rock we are accessing. Our contractors continually advance the development of more environmentally responsible fluid additives. In addition, Encana USA is a participating operator with <http://fracfocus.org>, a disclosure registry under the Ground Water Protection Council and Interstate Oil and Gas Compact Commission that provides further information on the hydraulic fracturing process and activity.

Visit <http://fracfocus.org> for specifics on the disclosed additives of Encana USA's and other operators' hydraulic fracturing fluid.

Innovation & collaboration

Encana USA is committed to working alongside industry peers, trade associations, and fluid suppliers, regulators and other stakeholders to identify, develop and advance hydraulic fracturing best practices.

Advancing Encana USA's technology to protect the environment and water supplies continues to be of paramount importance. We maintain a collaborative partnership with operators, government entities and associations to uphold our commitments to safety and advanced technology.

Encana USA strives to use water responsibly and innovatively in our operations. Recycling and use of non-potable water whenever possible are part of all of our hydraulic fracturing operations and we recycle or reuse as much water as possible. Operating practices specific to the location provide guidance on the use of non-potable water, water recycling, and water storage and handling and take into account conditions and regulations in that area.

“In the more than 60 years following those first [hydraulic fracturing] treatments, more than 2 million frac treatments have been pumped with no documented case of any treatment polluting an aquifer.”

– Kevin Fisher, Executive Vice-President, *Flotek*

Source: *Energy in Depth*

Hydraulic fracturing by the numbers

Natural gas production utilizing hydraulic fracturing—sometimes referred to as unconventional gas activity—is having a profound economic impact:

- by 2015, the employment contributed by unconventional gas activity is projected to reach nearly 1.5 million;
- by 2015, the annual contribution of unconventional gas activity to GDP is projected to reach nearly \$197 billion
- by 2015, government revenue provided by unconventional gas activity is projected to reach nearly \$50 billion.

Source: *IHS*, June 2012, *The Economic and Employment Contributions of Unconventional Gas Development in State Economies*

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