

Hydraulic Fracturing (Fracking)



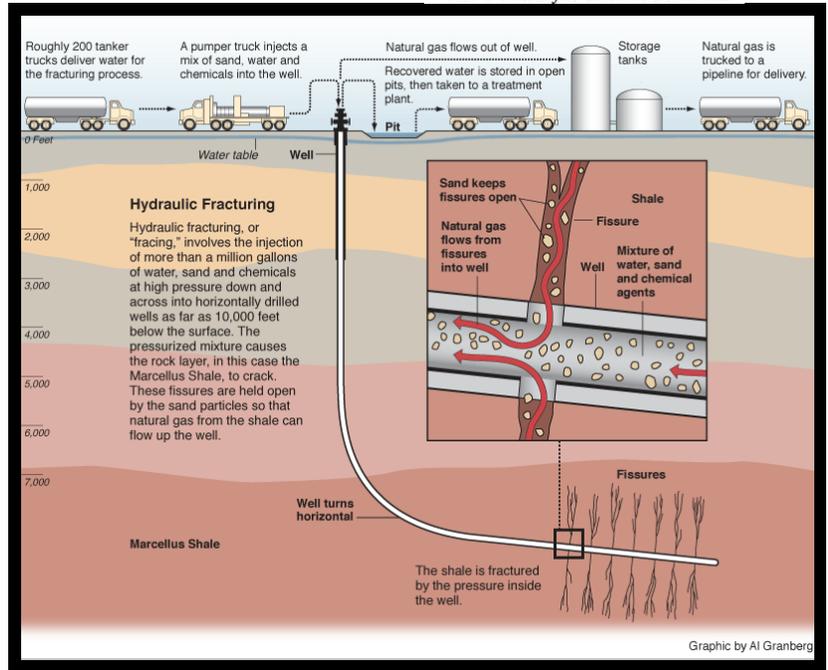
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What is Fracking?

Hydraulic fracturing, commonly referred to as fracking, is a technique which allows natural gas and oil producers to recover natural gas and oil from deep shale formations.

The process:

After drilling a wellbore, a hydraulic fracture is formed by pumping the fracturing fluid into the wellbore at a rate sufficient to fracture the formation of rock below. The pressure causes the formation to crack, allowing the fracturing fluid to enter and extend the crack farther into the formation. To keep this fracture open after the injection stops, a solid proppant, such as sand, is added to the fracture fluid. The propped hydraulic fracture then becomes a high permeability conduit through which the formation fluids can flow to the well.



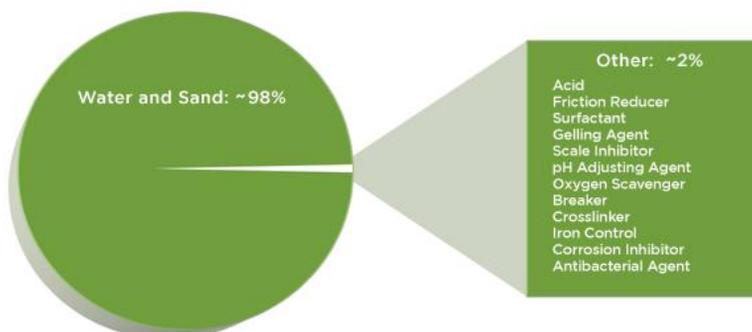
Experts have known for years that natural gas and oil deposits existed in deep shale formations, but until recently the natural gas and oil in these formations were not thought to be recoverable. Today, through the use of fracking, combined with horizontal drilling, natural gas and oil from deep shale formations across the United States are recovered. Fracking has been used by the natural gas and oil industry since the 1940s and has become an element of natural gas and oil development worldwide. This process is used in nearly all natural gas wells drilled in the United States today.ⁱ

History

Hydraulic fracturing for stimulation of oil and natural gas wells was first used in the United States in 1947. It was first used commercially by Halliburton in 1949, and because of its success in increasing production from oil wells was adopted industry wide, and is now used worldwide in tens of thousands of oil and natural gas wells annually. The first industrial use of hydraulic fracturing was as early as 1903. Before that date, hydraulic fracturing was used at Mt. Airy Quarry, near Mt Airy, North Carolina where it was (and still is) used to separate granite blocks from bedrock. Volcanic dikes and sills are examples of natural hydraulic fractures. Hydraulic fracturing incorporates results from the disciplines of fracture mechanics, fluid mechanics, solid mechanics, and porous medium flow.ⁱⁱ

Fracking Fluid Makeup

In addition to water and sand, other additives are used in fracturing fluids to allow fracturing to be performed in an effective manner. Additives used in hydraulic fracturing fluids include a number of compounds found in common consumer products.



Example of Typical Deep Shale Fracturing Mixture Makeup

A representation showing the percent by volume composition of typical deep shale gas hydraulic fracture components (see graphic) reveals that ~98% of the fracturing mixture is comprised of freshwater and sand. This mixture is injected into deep shale gas formations which are typically thousands of feet below the surface.ⁱⁱⁱ

Environmental and Health Effects

Environmental and human health groups have raised concerns with the possibility that hydraulic fracturing can contaminate ground water, risk air quality and facilitate the migration of gases and hydraulic fracturing chemicals to the surface. In a study published in 2010, the EPA discovered contaminants in drinking water including: arsenic, copper, vanadium, and adamantanes. These contaminants are known to cause a variety of illnesses such as cancer, kidney failure, anaemia, and fertility problems. New technological advances and appropriate state regulations are working to study and safely implement the fracking process.

Arguments against fracking center around the extent to which fracturing fluid used far below the earth's surface might pollute fresh water zones, contaminate surface or near-surface water supplies, impact rock shelf causing seismic events or lead to surface subsidence. In many instances, well casing failures and failures of the well grouting systems may have been responsible for gas migration into drinking water aquifers in certain circumstances. The relationship between water-related pollution events that occur from hydraulic fracturing is unclear because they get noticed on or relatively near the surface. With the transport, handling, storage and use of chemicals and chemical-laden water, accidents that release materials into the environment may occur, introducing a level of uncertainty on how deep the original source of contamination lies.^{iv}

Regulation

The Energy Policy Act of 2005 exempted wells which are hydraulic fractured from being re-classified as injection wells, which would place them under federal regulation under the Safe Drinking Water Act, which was originally intended to regulate disposal wells. Due to industry investment into fracturing fluid research, a complete listing of the specific chemical formulation of additives used in hydraulic fracturing operations is not currently made available to landowners, neighbors, local officials, or health care providers. However, the industry contends that the chemicals in use have been adequately disclosed through Material Safety Data Sheets (MSDS) available on the OSHA website and that additional regulation is burdensome. Chemicals which can be used in the fracturing fluid include kerosene, benzene, toluene, xylene, and formaldehyde.

EPA Hydraulic Fracturing Study

The purpose of the EPA study regarding Hydraulic Fracturing is to examine the effects of hydraulic fracturing on the water supply, specifically for human consumption. The research aims to examine the full scope of the water pathway as it moves through the hydraulic fracturing process, including water that is used for the construction of the wells, the fracturing mixture, and subsequent removal and disposal. The Scientific Advisory Board reviewed the study plan in early March 2011. Research should be completed by the end of 2012, and the EPA's Hydraulic Fracturing Report is expected to be completed in 2014.

The EPA Hydraulic Fracturing Draft Study Plan can be found here:

http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/upload/HFStudyPlanDraft_SAB_020711.pdf

The U.S. FRAC Act of 2009

In June 2009 two identical bills named the FRAC Act were introduced to both the United States House and the Senate. FRAC stands for Fracturing Responsibility and Awareness of Chemicals Act. These bills were designed to amend the Safe Drinking Water Act. This would allow the Environmental Protection Agency to regulate hydraulic fracturing that occurs in states which have not taken primacy in UIC regulation. The bill required the energy industry to reveal what chemicals are being used in the sand-water mixture. The 111th Congress adjourned (Jan. 3, 2011) without taking action on the FRAC Act. The 112th Congress has not re-introduced the bill or an equivalent.^v

i http://www.chk.com/Media/CorpMediaKits/Hydraulic_Fracturing_Fact_Sheet.pdf

ii http://en.wikipedia.org/wiki/Hydraulic_fracturing

iii <http://www.hydraulicfracturing.com/Fracturing-Ingredients/Pages/information.aspx>

iv <http://www.iwapublishing.com/template.cfm?name=news412>

v <http://www.propublica.org/article/frac-act-congress-introduces-bills-to-control-drilling-609>