HYDRAULIC FRACTURING RESEARCH STUDY

Why is EPA Studying Hydraulic Fracturing?

Natural gas plays a key role in our nation's clean energy future and hydraulic fracturing is one way of accessing this vital resource. Over the past few years, the use of hydraulic fracturing for gas extraction has increased and has expanded over a wider diversity of geographic regions and geologic formations. It is projected that shale gas will comprise over 20% of the total U.S. gas supply by 2020. Given this expansion and increasing concerns, EPA announced in March 2010 that it will study the potential adverse impact that hydraulic fracturing may have on drinking water.

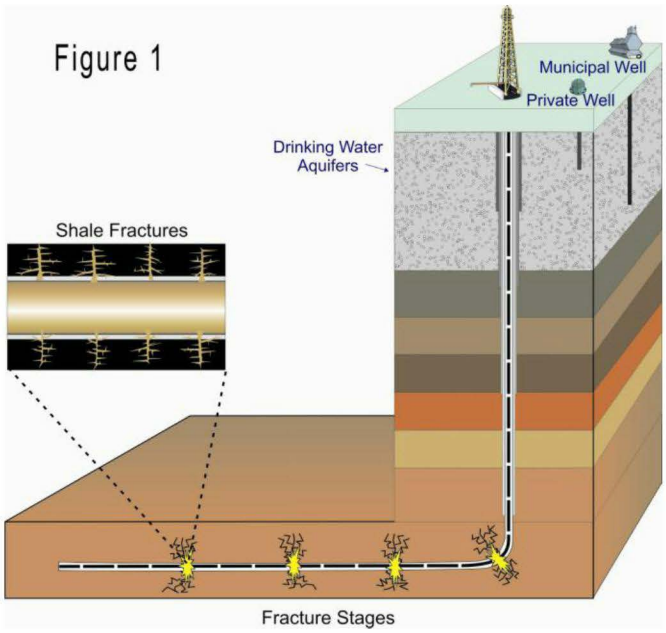
EPA has sought advice regarding the potential scope of the study plan from EPA's Science Advisory Board (SAB) Environmental Engineering Committee, an independent, external federal advisory committee. The SAB's input will help ensure that a sound scientific approach is used to develop the study plan.

During this summer, EPA will conduct a series of meetings to receive broad, balanced input on the study plan from stakeholders in key regions affected by hydraulic fracturing.

EPA will use the results from the study to help evaluate potential risks associated with hydraulic fracturing in an effort to protect America's communities and resources.

What is Hydraulic Fracturing?

Hydraulic fracturing is a well stimulation process used to maximize the extraction of underground resources – oil, natural gas and geothermal energy. The *hydraulic fracturing process* includes the acquisition of source water, well construction, well stimulation, and waste disposal.



Hydraulic fracturing involves the pressurized injection of fluids commonly made up of water and chemical additives into a geologic formation. The pressure exceeds the rock strength and the fluid opens or enlarges fractures in the rock. As the formation is fractured, a "propping agent," such as sand or ceramic beads, is pumped into the fractures to keep them from closing as the pumping pressure is released. The fracturing fluids (water and chemical additives) are then returned back to the surface. Natural gas will flow from pores and fractures in the rock into the well for subsequent extraction.

Wells used for hydraulic fracturing are drilled vertically, vertically and horizontally, or directionally (Figure 1 depicts vertical and horizontal drilling). Wells may extend to depths greater than 8000 feet or less than 1000 feet, and horizontal sections of a well may extend several thousands of feet away from the production pad on the surface.

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What is the Connection Between Water and Hydraulic Fracturing?

Water is needed during the process, and it is a central component of the waste products. Potential impacts to drinking water supplies have been suggested from many recent reports.

Fracturing fluids can be up to 99% water. The volume of water needed for hydraulic fracturing varies by site and type of formation. Fifty thousand to 350,000 gallons of water may be required to fracture one well in a coalbed formation while two to five million gallons of water may be necessary to fracture one horizontal well in a shale formation. Water used for fracturing fluids is acquired from surface water or groundwater in the local area.

Wastewaters from the hydraulic fracturing process may be disposed in several ways. For example, the flowback water following fracturing may be returned underground using a permitted underground injection well, discharged to surface waters after treatment to remove contaminants, or applied to land surfaces. Not all fracturing fluids injected into the geologic formation during hydraulic fracturing are recovered. Estimates of the fluids recovered range from 15-80% of the volume injected depending on the site. Some companies reuse flowback to hydraulically fracture more than one well as a way of conserving water and recycling the fluids.

Public concerns have focused recently on the impacts of the hydraulic fracturing process used during natural gas production from shale and coalbed methane formations.

Potential risks to surface and underground sources of drinking water might occur at various points in the hydraulic fracturing process. The likelihood of those risks causing drinking water contamination will be evaluated during the EPA hydraulic fracturing study. Contaminants of concern to drinking water include fracturing fluid chemicals and degradation products and naturally occurring materials in the geologic formation (e.g. metals, radionuclides) that are mobilized and brought to the surface during the hydraulic fracturing process.

REFERENCES:

http://www.epa.gov/ogwdw000/uic/wells_hydrofrac.html
http://www.epa.gov/safewater/uic/wells_coalbedmethanestudy.html

EPA is interested in receiving comments on the proposed hydraulic fracturing research study. Please submit your comments to EPA at hydraulic.fracturing@epa.gov, or send written comments to Jill Dean, 1200 Pennsylvania Ave. NW, Mail code 4606M, Washington, DC 20460.

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