Hydraulic Fracturing

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More environmental interest groups are endorsing natural gas as a necessary transition fuel from coal to renewable energy. Industry also supports natural gas and has discovered larger reserves than previously thought. With these two driving forces, natural gas will likely become a larger component of our national economy. However, production of natural gas is not economically feasible without hydraulic fracturing so, as demand for natural gas increases, so will the demand for this currently controversial process.

Hydraulic fracturing, frequently called fracing (pronounced 'fracking') or hydrofracing, is a process used to stimulate production from oil and natural gas wells. Already, hydraulic fracturing has helped produce over 7 billion barrels of oil in the United States alone. Pioneered by Halliburton, hydraulic fracturing is a process by which water, sand, and other chemicals are injected deep underground at high pressures in order to fracture rock formations. The sand, which can be actual sand, man-made ceramics, or other solid particle, is carried into the fractures to keep the cracks open once the injection stops. The type of sand is chosen to be more permeable than the surrounding formation so fluids can easily flow through the fractures and into the well bore where they are easier to pump to the surface.

Hydraulic fracturing technology is typically employed in unconventional gas plays. Generally, unconventional gas plays are tight, fine-grained, and relatively impermeable to fluid flow; however, unconventional gas plays can come in many sizes, shapes, and can be located in a variety of locations and depths within the Earth's subsurface. What is termed unconventional gas includes, but is not limited to: deep gas, tight gas, gas-containing shales, coalbed methane, and geopressurized zones.

Deep natural gas reservoirs are found thousands of feet below aquifers and surface water. Such gas is typically 15,000 feet or deeper. Aquifers and surface water are usually found between 0 and 200 feet deep. Tight gas is gas that has been trapped in an extremely tight formation with little to no permeability. These formations can be found at a variety of depths and sizes. Gas shales are formations in which gas is trapped between layers of muds and fine-grained materials. Shales can break easily, making hydraulic fracturing an extremely promising production tool. A prime example of gas shale is the Marcellus shale along the east coast. Coalbed methane is a deposit of gas found in coal seems underground. Such deposits have been found close to the surface water and aquifer table. Coalbed methane is found in the middle United States, mostly in Montana, Colorado, New Mexico and Alabama. Geopressurized zones are formations under extremely high pressure that contain natural gas. Typically such formations are full of clays, silts and sands, and are located at great depths (over 10,000 feet deep).

Controversial Technology

Although fracturing fluid is over 99 percent water and sand by volume, much controversy surrounds the remaining one percent which is comprised of relatively unknown chemicals. There has recently been much concern over the extent to which fracturing fluid could contaminate surface and ground water reservoirs. In 2004, the Environmental Protection Agency (EPA) conducted a study on the effects of hydraulic fracturing and concluded the process was not a potential hazard to ground water sources although the report did find uncertainties in knowledge of how fracturing fluid migrates through rocks. The results of this study were used as support in

the 2005 exemption of hydraulic fracturing from the Safe Drinking Water Act. As a result, there are currently no federal regulations on hydraulic fracturing. Many non-industry parties discredit the 2004 EPA study because it primarily focused on the use of hydraulic fracturing in coal bed methane production but was applied to all hydraulic fracturing processes. As opponents of 2004 EPA study argue, geology varies greatly depending on the particular site. Therefore, analyzing the effects in coal bed methane production is not sufficient evidence for hydraulic fracturing in marcellus shale and other geological sites. Furthermore, those against the study point out that the data for the study was gathered from industry sources with no independent gathering of scientific data.

Funding for a new EPA study was approved in March in an attempt to shed unbiased light on this issue. It will likely take many years to complete this study so there is still debate as to how much regulation should be put in place until the results are disclosed. While industry organizations agree regulation is required, they do not necessarily believe that federal regulation is necessary, or even feasible. Government agencies are also concerned about requiring federal regulation because that regulation would likely be created and enforced by the EPA which is already over worked and simply lacks both the manpower and budget to be effective. Industry leaders also argue that no steps should be taken until after results from the new EPA study are obtained. On the other hand, many environmental groups are driven by a need to protect natural resources and ensure a healthy environment for future generations. To these organizations, the burden of proof should be on companies to show that hydraulic fracturing is safe rather than for the public to show the process is hazardous. Therefore, they feel the 2005 exemption should be reversed so that hydraulic fracturing is formally regulated.

Disclosure is also very controversial because it is unclear to what degree disclosure should be required. Industry does not want to release the exact contents of the hydraulic fracturing fluid because this is how they get ahead in business. Years of research, resources, and time have gone into developing specialized fracturing fluids and releasing this information would allow other companies to take advantage of that same technology without any expenditures. On the other hand, landowners want to know what is going into the ground and may potentially be contaminating ground and surface water sources. One proposed compromise is to have industry disclose the specific ingredients to the EPA alone. It is unclear how this compromise will be received.

As natural gas production continues to increase, it will be important to find a means of regulating hydraulic fracturing and an appropriate medium by which to disclose the ingredients of hydraulic fracturing fluid so industry, land owners, and environmental groups all benefit. In doing this, it is important to acknowledge the impact of geology. Not all sites are the same. Although hydraulic fracturing is primarily used in the development of unconventional gas plays, unconventional gas plays are unique between each deposit and should be regarded as such.