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Problems and Advances in Fracking

Hydraulic fracturing (fracking) has suddenly given us more than 7 billion barrels of oil and 600 trillion cubic feet of natural gas. Fracking accounts for about 35% of the U.S. natural gas production, and is projected to increase to 50% by 2040.

The process involves drilling deep into the earth to get to gas reserves trapped in shale. The fracking industry has gone through about eight years of brute force fracking, through aquifers which they seal with steel and metal castings to prevent fluid loss and contamination. Once the shale bed is reached (about 7000 feet), horizontal drilling is started.

About every 1200 feet fracturing is attempted, water and a “proppant” are pumped into the shale to open fractures. Each round of fracking may use several million gallons of water and 300,000 pounds of proppant. The process generally includes vast amounts of fresh water, with 10% proppant (e.g., sand) and 1% fluid additives.

The two major problems are contamination of drinking water (aquifers), and recovery of the material used in fracking. Another potential problem is the generation of mini-earthquakes.

A drilling company wants to lose the least amount of product; thus the well-head is usually well sealed. However, there are incidents of well-head leakage. Unfortunately, previous wells have been drilled into these areas without sufficient wall castings, and some have not been capped properly before being abandoned.

The Federal Bureau of Land Management is charged with the inspection of oil and gas wells, but has failed to inspect 2100 of the 3702 wells that it has specified as high priority. Often, the states are in a better position to regulate oil and gas drilling. However, in Pennsylvania there are probably 200,000 abandoned oil and gas wells, and the state knows the location of only about 4% of these wells.

Although the Pennsylvania Department of Environmental Protection (DEP) is working to identify and plug abandoned wells, in a recent fracking incident, a 30-foot geyser of natural gas erupted through a long-forgotten well drilled in 1932. Meanwhile there are hundreds of reports of well-water being contaminated with fossil fuel, leading to investigations and pending law suits.

The use of fresh water and the clean-up of the fracking fluid are also major problems. In principle, the fracking fluid should remain in the ground or come back up the well-hole being captured with the product. The collected water and proppant might then be reused, but there are losses and contamination results from the additives.

Alternatives to the use of millions of gallons of fresh water are also possible. Water for fracking could be pumped out of underground saline aquifers and used in place of fresh water. Even

better, GasFrac uses liquid propane as the fracking fluid. This process uses 90% less fluid, eliminates the need for the biocide and friction reducer, and the propane becomes part of the product. The operation is almost waste-free. To date the GasFrac technology has been used in 2600 fracking operations in 720 wells in the U.S. and Canada, but this accounts for only about 1% of the fracking market.

The Department of Energy (DOE) is supporting the use of CO₂ as a fracking fluid. Using pressurized supercritical (liquid) CO₂ as the fracking agent, as much as half of the CO₂ stays in the ground (carbon sequestration). The usual approach is to drill several injection wells and send CO₂ into the shale bed. A single production well is centered to collect the excess CO₂ and the product. At present about 60 million tons of CO₂ are being used per year to recover 300,000 barrels of oil. Unfortunately, most of this CO₂ comes from geological/mineral sources and industrial sites.

The DOE objective is to use CO₂ from coal-fired power plants. A large-scale power plant with CO₂ capture and CO₂ pipeline to a nearby fracking facility is under construction. Unfortunately, this power plant is already \$1.6 billion over budget.

A cost on carbon emissions would solve this problem, and many others. Meanwhile traditional fracking occurs, unabated. Letting our representatives know that we want solutions to these problems is a first step to remedy these problems.

By Reading's Climate Advisory Committee member David L. Williams