

Frack Attack

New, dirty gas drilling method threatens drinking water

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A technology used by the oil and gas industry to obtain natural gas is raising major concerns across the United States and is equally suspect for areas being drilled in Western Canada. Called hydraulic fracturing (or “fracking” in the trade), it allows drilling companies to access “unconventional” natural gas deposits trapped in shale, coal-bed, and tight-sand formations – potentially at the expense of underground water supplies.

On August 27, 2009, Reuters reported that the U.S. Environmental Protection Agency (EPA) had found toxic chemical contaminants in drinking water wells near gas-drilling operations in Pavillion, Wyoming, where EnCana has 248 natural gas wells. Calgary-based EnCana is Canada’s second biggest energy company (after Suncor) and is now a major player in B.C., with hundreds of new natural gas wells in the province.

Eleven of 39 water-wells tested in Wyoming by the EPA earlier this year showed chemicals that can cause cancer, kidney failure, anaemia, and fertility problems. Among the contaminants in three of the wells was 2-butoxyethanol (2-BE), a highly toxic solvent often used in fracking.

The ongoing EPA investigation is significant because it is the first time the U.S. federal agency has investigated and documented such well-water contamination close to natural gas drilling sites, although, according to research by the U.S. journal ProPublica, in the last few years there have been more than a thousand similar cases documented by courts and local governments across the U.S.

Currently, companion legislation (S.1215/H.R. 2766) is before both houses of Congress to require regulation of hydraulic fracturing under the federal U.S. Safe Drinking Water Act. On Sept. 10, 160 national, regional, state, and local organizations jointly issued a letter to Congressional representatives, urging them to co-sponsor the “Fracturing Responsibility and Awareness of Chemicals (FRAC) Act,” introduced on June 9. Their letter stated: “Our organizations represent communities across the country that are concerned about drinking water contamination linked to hydraulic fracturing operations.”

Canada has no national water standards and collects little information about groundwater.

Hydraulic Fracturing

Invented in the 1950s by Halliburton Co., hydraulic fracking was initially used for drilling only about one in a hundred natural gas wells, but now it’s being applied to most production in North America. Before the end of 2009, the industry plans to complete at least 4,000 hydraulic fracturing jobs in northern B.C. alone – mostly in the Motney shale region of northeastern B.C. and the Horn River Basin near Fort Nelson.

According to the Oil & Gas Inquirer (June 2009), fracking is also “in high demand” in the Bakken natural gas field in southern Saskatchewan.

Once the well-bore has been drilled and prepared, hydraulic fracturing is used to create fractures that extend into the surrounding rock or shale formation, allowing the gas to travel more easily from the rock pores to the production well. To create these fractures, a mixture of water, proppants (sand or ceramic beads), and chemical fracking fluid “stimulants” is injected under extreme pressure into the formation in several stages.

One “frac-job” of a single well can utilize millions of gallons of water and sand, mixed with tens of thousands of gallons of fracking fluid chemicals.

Eventually, the underground formation is not able to absorb the huge amount of fluids as quickly as it is being injected, and the pressure causes it to crack. These fractures are held open by the proppants, and the gas is then able to flow along the lubricated fissures to the well.

Some of the fracturing fluids are pumped out of the well and into surface pits or holding tanks during the process of extracting the gas and contaminated water, but even the industry admits that as much as 70% of the original fracturing fluid volume may remain underground.

Fracking fluids and natural gas can both migrate underground from the fracture site. According to Business Week (Nov. 11, 2008), a 2004 EPA study found that “fracturing fluids migrated unpredictably through rock layers in half the cases studied,” and the injected fluids are “likely transported by groundwater.”

More recent research indicates that such injected fluids have been known to travel underground as far as 3,000 feet from a natural gas well.

In Alberta, where fracking of coal-bed methane natural gas deposits has been common practice for more than four years, there have been cases in which landowners can literally light their well-water on fire. The Pembina Institute notes that, “in some [Alberta] communities, oil and gas companies are therefore now providing water to residents.”

Trade Secrets

Following the release last August of the EPA’s initial report on the contamination, EnCana spokesman Randy Teeuwen conceded that a source of the Wyoming well-water contaminants “could be oil and gas development,” but told Reuters that many of the chemical substances “tentatively identified” by the EPA were “naturally occurring and some are commonly found in household products and agricultural degreasers.”

In 2006, when EnCana was fined \$266,000 by the state of Colorado for “failure to protect water-bearing formations,” a company spokesman complained to the press that environmentalists had been spreading “misinformation” about fracking and creating a climate of fear about hydraulic fracturing fluids.

The public, however, has no way of knowing what’s in the fracking fluids because the chemicals used are considered a “trade secret” – or rather, many trade secrets.

Oil and gas companies like EnCana, Imperial Oil, ConocoPhillips, ExxonMobil, Nexen, etc., generally don't do the hydraulic fracturing themselves, but instead hire speciality services to do it. Each of the big players in the multi-billion-dollar fracking industry – Halliburton, Calfrac Well Services, Schlumberger, BJ Services (all of which operate in Western Canada) – has its own recipe for fracking fluids, of which it is fiercely protective.

As Halliburton spokeswoman Diana Gabriel has told the press, "If these formulas were to become available to other companies, it is possible that we could lose our competitive advantage... not only [here], but throughout the world."

The precise nature and concentrations of the chemicals in these "proprietary fluids" are not even fully known to government regulatory agencies, though in its 2004 study the EPA found biocides and lubricants that "can cause kidney, liver, heart, blood, and brain damage through prolonged or repeated exposure."

By examining drillers' patent applications and government worker health and safety records, some environmentalists and regulators in the U.S. have been able to piece together a list of some of the fracking fluid ingredients. These include potentially toxic substances such as diesel fuel (which contains benzene, ethylbenzene, toluene, xylene, and naphthalene), polycyclic aromatic hydrocarbons, methanol, formaldehyde, ethylene glycol, glycol ethers, hydrochloric acid, and sodium hydroxide. According to Business Week, "Of more than 300 chemicals thought to be in use by drillers, more than 60 are listed as hazardous."

But that proprietary secrecy may be about to change.

Government Action

The pending U.S. FRAC Act, besides regulating hydraulic fracturing under the Safe Drinking Water Act, would also require public disclosure of the chemicals used in fracturing fluids.

Of course, industry has been lobbying fiercely against the FRAC Act, claiming that its chemical fracking solutions constitute less than 2% of the large volume of water and proppant mixture injected into natural gas wells and are therefore diluted. On the other hand, industry also claims that "disclosure would only make people nervous," Business Week reported: "'We have a proven process in place to protect groundwater,' says Doug Hock, a spokesman for EnCana... 'Information about the chemicals used in fracturing is complex and could unnecessarily frighten the public,' he adds."

Several state and local governments aren't waiting for the pending FRAC Act, but are already taking action to tighten rules on the use of hydraulic fracturing, which has been expanding rapidly across the U.S. By 2007, there were 449,000 natural gas wells in 32 U.S. states – an increase of more than 30% since 2000 -- with serious episodes of groundwater contamination near drilling sites documented in seven states.

Given the massive development set for the huge Marcellus Shale area -- which stretches from upstate New York through Pennsylvania, West Virginia, and eastern Ohio -- several New York City councillors (and a New York Times editorial) are now calling for a ban on hydraulic fracturing throughout the watershed from which the city obtains most of its drinking water.

Meanwhile, in Western Canada, because of the economic downturn, the industry has forecast “only 10,000” new wells to be drilled in 2009.

The B.C. government has been pushing drilling for unconventional sources of natural gas since at least 2005, offering \$50,000 royalty credits for every well drilled before December 2008, and selling oil and gas “sub-surface rights” (see sidebar) at a fever pitch. In 2006, researchers for West Coast Environmental Law published a report noting that the oil and gas industry had identified at least six areas of B.C. holding coal-bed methane natural gas potential: Peace country in the northeast; Elk Valley in the southeast; Vancouver Island; the south-central interior (around Merritt and Princeton); northwestern B.C. (around Telkwa and Iskut); and the Queen Charlotte Islands.

Both B.C. and Saskatchewan have been courting the industry with lax or no environmental regulations and promises of low royalties charged to the companies. Alberta has recently promised a one-year extension on incentives to boost drilling, including royalty credits of C\$200 for each meter of new well depth drilled.

Critics are calling this natural gas development a “massive industrialization of rural landscapes and lives,” but it is also a threat to communities’ drinking water. The provincial government of B.C. allows companies to drill and frack natural gas wells within 100 metres of people’s homes.

The American Petroleum Institute website displays a “Hydraulic Fracturing Q & A’s” page that includes this paragraph: “Isn’t there [also] a risk that hydraulic fracturing will use up an area’s water supplies? No. Local authorities control water use and can restrict it if necessary. In many areas, water is recycled and reused; in some cases companies pay for the water they use, which comes from a variety of sources.”

The huge volumes of water used in fracking are taken from rivers, lakes, private water sources, or municipal water sources.

We appear to be trading the safety and security of our water for the safety and security of the natural gas industry. While natural gas is touted as a “clean energy” source, the method of extracting this fossil fuel is dirty, indeed.

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