The Oil Drum
DISCUSSIONS ABOUT ENERGY AND OUR FUTURE

API, EPA, and Hydrofracking Gas Shale

Posted by Heading Out on April 2, 2010 - 10:16am
Topic: Supply/Production
Tags: american petroleum institute, environmental protection agency, gas shale, heading out, hydrofracking [list all tags]

There has been some ongoing discussions around the country about the possibility of drinking water contamination as a result of hydrofracking natural gas wells, most particularly those that would be placed in the Marcellus shale, which, in part, underlies sections of New York state which provides the watershed for New York City. And to put this in context, it should be born in mind that hydraulic fractures are generally relatively short, and occur in the shale at depths of thousands of feet, while ground water is usually obtained from wells that are less than 500 ft deep.

There have been some ongoing discussions around the country about the possibility of drinking water contamination as a result of hydrofracking natural gas wells, most particularly those that would be placed in the Marcellus shale, which, in part, underlies sections of New York state which provides the watershed for New York City. And to put this in context, it should be born in mind that hydraulic fractures are generally relatively short, and occur in the shale at depths of thousands of feet, while ground water is usually obtained from wells that are less than 500 ft deep.

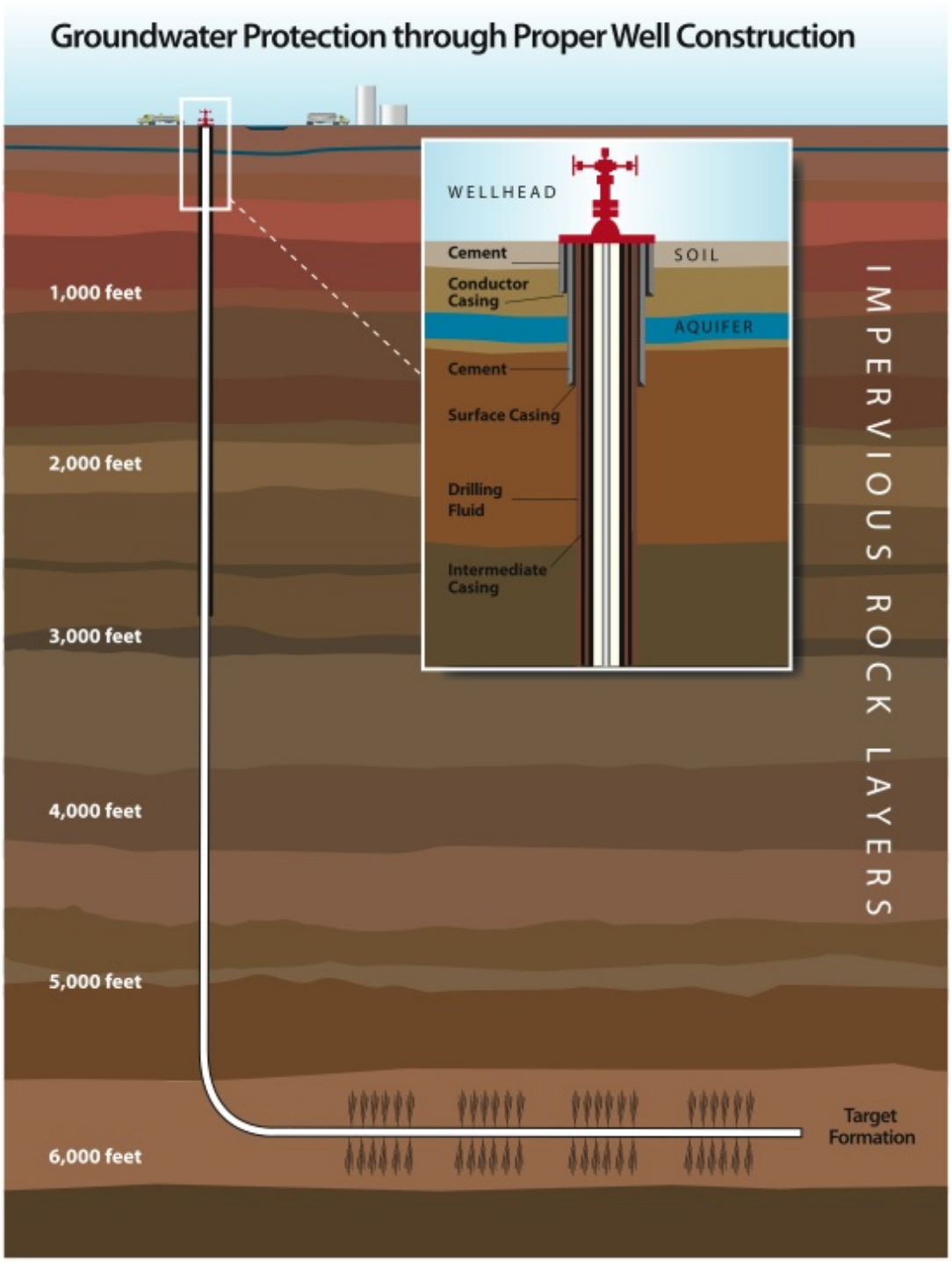
I first mentioned this at the time of the House hearing on the topic and have returned to the topic intermittently over the past few months as the issue had been dragged more and more before the public. I have also covered the basic technology behind hydrofracking natural gas wells, including direction to a video which illustrates how hydrofracking improves production and makes the well productive. And there is a Primer on the subject (that includes the composition of a typical fracking fluid).

Well a couple of weeks ago the EPA announced that they were going to conduct a study of the process. More precisely:

> The U.S. Environmental Protection Agency (EPA) announced that it will conduct a comprehensive research study to investigate the potential adverse impact that hydraulic fracturing may have on water quality and public health. Natural gas plays a key role in our nation's clean energy future and the process known as hydraulic fracturing is one way of accessing that vital resource. There are concerns that hydraulic fracturing may impact ground water and surface water quality in ways that threaten human health and the environment. To address these concerns and strengthen our clean energy future and in response to language inserted into the fiscal year 2010 Appropriations Act, EPA is re-allocating $1.9 million for this comprehensive, peer-reviewed study for FY10 and requesting funding for FY11 in the president's budget proposal.

One wonders, given the input from the state agencies at the Congressional Hearing, who said, since they have been doing most of the monitoring for the past several decades, that there wasn't a problem, who will provide the research study, and who will be doing the peer-review? But perhaps I am being a little cynical so early in the process.

With all that as background, last Thursday the American Petroleum Institute (API) held a phone conference for a number of those of us who blog on energy, so that we could ask questions on hydrofracking from a group of industrial experts.



Graphic of Hydraulic Fracturing, provided by API.

API had previously noted that EPA had already carried out such a study in 2004, although that one dealt more specifically with hydrofracking coal seams to extract coal bed methane. That study had concluded:

> Based on the information collected and reviewed, EPA has concluded that the injection of hydraulic fracturing fluids into CBM wells poses little or no threat to USDWs and does not justify additional study at this time.

It should be noted that that coal seams are typically quite significantly shallower than a typical gas shale, generally by several thousand feet, so are closer to drinking water than gas shale.

And since I haven't defined an underground source of drinking water (USDW), let me do that by quoting that earlier EPA document:

> A USDW is defined as an aquifer or a portion of an aquifer that:
>
> A.1 Supplies any public water system; or
> 2. Contains sufficient quantity of groundwater to supply a public water system; and
> i. currently supplies drinking water for human consumption; or
> ii. contains fewer than 10,000 milligrams per liter (mg/L) total dissolved solids (TDS); and
> A. 1. B. Is not an exempted aquifer
>
> NOTE: Although aquifers with greater than 500 mg/L TDS are rarely used for drinking water supplies without treatment, the Agency believes that protecting waters with less than 10,000 mg/L TDS will ensure an adequate supply for present and future generations

API noted, both then and at the conference call, that hydrofracking is an integral part of much of the oil and gas industry, and has been for over sixty years, during which time there have been over a million wells that have used the technology.

The transcript of our conversation is now available on the web and I am only going to summarize portions of it, since the full transcript runs to 21 pages. I'll also add the odd comment of my own.

The experts fielded by API to talk with us were:
Sara Banaszak, Senior Economist
John Felmy, Chief Economist
Stephanie Meadows, Senior Policy Advisor
Erik Milito, the Group Director for Upstream/Industry Operations
Richard Ranger, Senior Policy Advisor
Andy Radford, Senior Policy Advisor

Jane Van Ryan of API acted as Moderator, and had invited me to join the others in the conference.

Gail Tverberg (representing The Oil Drum) opened the discussion by asking about the fate of all the fluids that were used in generating the hydrofrack, which can run from hundreds of thousands, to millions of gallons. Stephanie Meadows answered that most of the water comes

back out of the ground, though it may take weeks or months to recover most of the fluid, and recovery rates can range from 30 – 70% of the fluid injected. The rest can slowly trickle out during production, but can remain, within the producing formation until then. Richard Ranger added that water can't come back up through the rock, because the impermeable rock layers form a seal. Instead it comes back up through the wellbore, which is the weak link.

(This was something that I had wanted to have clarified and in the three questions I had submitted before the conference, I asked about the risk of various shales being water sensitive. The concern being that if the water in the fracking fluid is in contact with the shale, for a significant time, it can wet and weaken certain shale to the point that it can soften and deform – which would prematurely close the fractures and lower the volume produced, both as a rate and total amount. You can inhibit the wetting by adding different polymers to the water (for example, the Gumbo shale in Texas when they drill using a water-based mud through the Gumbo shale remember the ones that they often use are also used to keep the froth in beer from collapsing.)

Jazz Shaw (The Moderate Voice) mentioned that there continue to be repeated claims of groundwater contamination, and wondered whether an analysis had been done of whether any of the claims had been substantiated. Jazz cited one instance in which Maurice Hinchey, a Congressman from New York, claimed on a recent CNN program that there were multiple cases of groundwater contamination from hydraulic fracturing. Congressman Hinchey even refused to acknowledge the fact that the host pointed out that the claim could not be substantiated – I followed with a similar comment that in congressional testimony about hydrofracking, there seemed to be claims of groundwater contamination, but a state agency who requested information from other state agencies monitoring hydrofracking testified that it could find no substantiated claims. Stephanie Meadows of API pointed out that the Ground Water Protection Council had also been unable to find any instances of groundwater contamination related to hyrofracking occurring.

Erik Molito pointed out that over the million wells that had been hydrofracked, while there had been some surface spills (which were not defended) there was not one instance where a hydrofrac in the formation had led to groundwater contamination, over the 60-years that the practice has been in existence. At present 90% of current natural gas wells that are drilled are hydrofracked. It is not only practiced in shale, one of my questions related to use in Colorado, where I was told that

> Virtually every drilled well into the tight Cobell sandstone of the La Plata County area, or into the Williams Fork sands of the Mesa Verde group in the Piceance Basin on the Western Slope involves hydraulic fracturing for well completion. HF is also used in a substantial amount of methane coal bed production in the San Juan Basin southwest part of the state.

In later discussion it was also pointed out that Colorado requires that the ingredients in the fracking fluid formation be listed, but not the specific amounts or recipes. (In much the same way that Coke lists the ingredients but not the formula, so that no-one can gain the commercial benefit of copying their recipe). Other states also follow that requirement.

Richard Ranger pointed out that as a protective measure increasingly drillers are working with state agencies to take water samples both before and after drilling and fracking the wells to substantiate the claims of no impact. He also noted that the state agencies work closely together through groups such as the Interstate Oil and Gas Compact Commission to ensure that the wells that are drilled are properly monitored, and that nothing is done without following a detailed

permitting process. And knowledge gained, for example in Texas, is quickly transferred to Pennsylvania.

When it came to the impact of any proposed regulation, asked by Rich Trzupek of Big Journalism, the Economists on the panel noted that up to 60% of current natural gas production comes from hydrofracked wells, and that slowing or stopping that amount of natural gas would obviously have significant impact. And it was noted that natural gas increasingly provides a fall-back reserve of power should the wind not blow, or the sun not shine, to support renewable energy supplies. (And in a subsequent follow-up API pointed to the jobs that could be gained by growing the natural gas industry to get natural gas from the Marcellus shale in Pennsylvania.)

Tim Hurst of Ecopolitology raised the question of the new EPA investigation, and he was assured that API would participate in whatever way they could contribute.

Gail asked about the source of the water, and in response Richard Ranger noted that while a typical 7 – 10,000 ft well might use 3 million gallons of water. This is the amount used by a typical golf course in a week, a 5-acre cornfield in a season, or a municipality of 8 million people (e.g. New York City) in 4 minutes. The amount of water required to generate a million Btu's from natural gas is about 10% of that required to produce the same amount from coal, and about 0.1% of that required to get the same amount of energy from corn-based ethanol.

Geoff Styles of Energy Outlook asked about the use of diesel, but it was pointed out that while this is sometimes used as the basis for drilling fluids and muds, where water based muds might create problems in reacting with the rock, diesel is not used in the hydrofracking process.

One of the possible risks of hydrofracking was posited as being that the fractures would intersect other wells drilled in the same location, but Andy Radford pointed out that the degree of control ensures that fractures are grown under tight enough control, and limited ranges, to ensure that this does not happen, and that when wells are spent, that the sealing of the well is done sufficiently well to ensure that there is no risk of subsequent leakage.

The conference went on for over an hour, so I would recommend that those interested in more detail review the entire transcript. It was, as I have tried to illustrate, quite informative.