OIL AND GAS:

Contaminated drinking water linked to faulty wells, not fracking -- study

Phil Taylor, E&E reporter

Leaky oil and gas wells are to blame for the contamination of drinking water above shale plays in Pennsylvania and Texas, but hydraulic fracturing does not appear to be at fault, according to a study published today in the *Proceedings of the National Academy of Sciences*.

The peer-reviewed study by researchers from five universities says faulty cement jobs and well casings allowed methane from deep underground to escape into drinking water near the earth's surface.

The drinking water wells were sampled in 2012 and 2013 in seven counties in northeastern Pennsylvania and in Parker County, Texas, near Fort Worth. The methane likely came from production zones between 6,000 and 8,500 feet below in the Marcellus and Barnett shale formations in Pennsylvania and Texas, respectively.

But there was no indication that any methane migrated upward through rock layers due to horizontal drilling and hydraulic fracturing, the common, though controversial, technique used to coax oil and gas from shale rocks.

In hydraulic fracturing, operators inject millions of gallons of water, sand and chemicals at high pressure to create fractures in rock that help release hydrocarbons.

The study comes amid a vigorous national debate over whether drilling and fracking for oil and natural gas has contaminating drinking water and, if so, how. One of the sample sites is near where Steve Lipsky, who lives west of Fort Worth, in 2010 found methane in his drinking water well that he could literally light on fire (*EnergyWire*, May 29).

Hydraulic fracturing is credited with unleashing production booms in Pennsylvania, Texas and North Dakota, but concerns over its safety have prompted several communities to pursue fracking bans.

The upshot of today's study, according to authors from Duke, Ohio State and Stanford universities; Dartmouth College; and the University of Rochester, is that contamination may have been prevented with sturdier wells.

"The good news is that most of the issues we have identified can potentially be avoided by future improvements in well integrity," said Thomas Darrah, assistant professor of earth science at Ohio State, who led the study while he was a research scientist at Duke. "There's a lot of reason to be optimistic we can eliminate a lot of the contamination."

Researchers believe their study is the first to use both noble gas and hydrocarbon tracers to help determine whether methane in drinking water wells occurred naturally or migrated from nearby drilling sites.

Researchers sampled 113 drinking water wells and one natural methane seep above the Marcellus and 20 wells overlying the Barnett.

The sampled wells were both within and beyond 1 kilometer of drilling sites. Some of the water wells had previously been suspected of being contaminated, while others were known to have naturally high levels of methane and salts that are not uncommon above shale gas deposits.

Noble elements such as helium, neon or argon mix with natural gas and can be transported with it, but they are inert and are not altered by microbial activity or oxidation, researchers said. By measuring the ratios of noble elements in drinking water aquifers, researchers concluded they were likely transported through the wells' steel casing or the annulus, which is the space between the steel casing and the well bore, rather than through the rock layers.

If methane migrated outside the well, it would have arrived at the aquifers with higher concentrations of helium and neon because those elements migrate faster through layers of rock and water than argon and methane, Darrah said.

Darrah said methane levels did not appear to pose a health hazard. The study did not find toxic metals or fracking fluids in the wells.

But more research is needed on whether the high volumes of water and pressures used in hydraulic fracturing affect well integrity, said the study, which was funded by the National Science Foundation and Duke's Nicholas School of the Environment.

"In our opinion, optimizing well integrity is a critical, feasible, and cost-effective way to reduce problems with drinking water contamination and to alleviate public concerns accompanying shale-gas extraction," the study added.

An email to the Independent Petroleum Association of America was not returned this morning.