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Client Alert

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Studies Identify Flawed Well Construction (not Fracturing) as Source of Gas Contamination

More Questions Posed for Further Investigation

For the past several years, the rapid growth of oil and natural gas production from shale and other unconventional sources has prompted vocal and often sensationalized concerns regarding the potential for migration of gas from hydraulic fracturing operations into sources of drinking water. Studies issued this week indicate that the presence of gas in drinking water resulted from faults in well casing or completion, not from the fractures. However, researchers pose for further study the question of whether unconventional wells are more prone to well construction flaws than their conventional counterparts.

The Studies

The Department of Energy's National Energy Technology Laboratory (NETL) issued its report on the fracturing of six Marcellus Shale wells.[1] The researchers monitored pressures, conducted isotopic analyses of produced gas, and utilized tracers to detect gas migration. The results include:

- Pressure records before and after fracturing do not show migration of gas from the Marcellus Shale.
- Analysis of gas and produced water do not show isotopes indicative of migration.
- Testing showed no detection of perfluorocarbon (PFC) tracers that would have indicated migration of gas from fractures.

University researchers also published a paper concerning wells in both the Marcellus and Barnett Shales.[2] Their paper studied noble gas isotopes as indicators of whether fugitive gas had migrated from fractures into drinking water wells, concluding that:

- Poor well construction (casing or cementing) or well failure were the likely source of contamination.
- Data "do not suggest that horizontal drilling or hydraulic fracturing has provided a conduit to connect" deep shale resources to drinking water aquifers.

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Further Research Urged

These study results provide promising evidence that hydraulic fracturing of properly constructed wells does not result in gas migration to drinking water sources. However, the researchers suggested that attention should turn to a potential relationship between unconventional wells and the propensity for casing or cementing failures. The university researchers in particular prompted that future study "should evaluate whether the large volumes of water and high pressures required for horizontal drilling and hydraulic fracturing influence well integrity."[3] Accordingly, oil and gas producers should consider whether and how to anticipate additional scrutiny of their well construction procedures.

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[1] Hammack, et al. *An Evaluation of Fracture Growth and Gas/Fluid Migration as Horizontal Marcellus Shale Gas Wells are Hydraulically Fractured in Greene County, Pennsylvania*. NETL-TRS-3-2014 (Sept. 15, 2014).

[2] Darrah, et al. *Noble gases identify the mechanisms of fugitive gas contamination in drinking-water wells overlying the Marcellus and Barnett Shales*. PNAS Early Edition (Sept. 15, 2014).

[3] *Id.* at 6. This suggestion is consistent with a paper published a few weeks earlier indicating that risk of cement or casing impairment was elevated for unconventional wells in comparison to conventionally drilled wells. *See* Ingraffea et al. *Assessment and risk analysis of casing and cement impairment in oil and gas wells in Pennsylvania, 2000-2012*. PNAS 11:10955-10960 (July 29, 2014).