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Science Advisory Board, Hydraulic Fracturing Research Advisory Panel
Office of Environmental Information
U.S. Environmental Protection Agency, 1200 Pennsylvania Ave. NW.
Washington, DC 20460

RE: Docket ID No. EPA-HQ-OA-2015-0245
Draft Report- *Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources*

Dear Science Advisory Board members,

As members of Physicians for Social Responsibility, a health professional led organization of over 40,000 living and serving across the United States, we are writing to express our concerns with the EPA draft report, *Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources*, (May, 2015 External Review Draft, EPA/600/R-15/047 draft assessment). The purpose of the report was to synthesize the science to assess the impact of hydraulic fracturing (fracking) for oil and gason the quality or quantity of drinking water resources and to identify specific factors leading to these impacts.

The report confirms specific cases (over 450 spills of chemicals and contaminated wastewater) of water contamination caused by drilling and fracking-related actions. It also identifies the numerous mechanisms by which these impacts occurred, including spills of fracking fluid and fracking wastewater; discharge of fracking waste into rivers and streams; and underground migration of fracking chemicals, including gas, into drinking water wells. The report specifies vulnerabilities which place water resources at higher risk: water withdrawals in areas with low water availability; fracking conducted directly into formations containing drinking water resources; inadequately cased or cemented wells resulting in below ground migration of gases and liquids; inadequately treated wastewater discharged into drinking water resources; and spills of hydraulic fluids and hydraulic fracturing wastewater, including flowback and produced water.

Despite these clear findings, the report uses language that is misleading and has since been misinterpreted by the media, industry and the public to suggest that fracking is safe and without evidence of harm to our water resources. In the report EPA states, "hydraulic fracturing has not led to widespread systemic impacts on drinking water supplies." But the report fails to make clear the limitations imposed on it by inadequate access to data and by a flawed study design. EPA had to work with incomplete and insufficient data, little to no baseline water testing, and a lack of long-term systematic studies. These design issues preclude EPA from making any definitive conclusions about how widespread the impacts of fracking are on water. In a separate part of the report, EPA acknowledges this, stating, "data limitations preclude a determination of the frequency of (fracking) impacts with any certainty."

Along with inherent design issues is the failure to include injection wells in the study. Injection wells force millions of gallons of fracking wastewater underground, potentially contaminating groundwater in sites across the U.S., sometimes distant from fracking extraction sites. This form of disposal of fracking's toxic wastewater increases the risk and expands the geographic reach of fracking's threats to drinking water supplies and should be acknowledged in the study.

Regulations governing fracking have proven inadequate to assure that our communities' drinking water sources are protected from contamination, and evidence suggests that these risks simply cannot be controlled by rules. For example, a 2014 study in Texas highlighted how methane can migrate into aquifers through cracks in the rock surrounding fracking wells in ways that even the most stringent cementing or casing protocols would be unable to prevent.[1] In West Virginia, long-abandoned wells have become re-pressurized during nearby drilling operations and have served as agents for the contamination of drinking water.[2]

As health professionals we believe in preventing harm and protecting the public's health from environmental contamination. We further believe that the public has a right to know the risks associated with allowing or continuing to allow fracking in their communities. For those reasons, we urge the EPA to clearly state in its report that specific mechanisms associated with fracking and fracking-related activities place our drinking water at increased risk of harm; that evidence exists of harm to drinking water resources caused directly by fracking and its related activities, and that data limitations preclude EPA from determining whether fracking has in fact caused widespread impacts on water resources.

Thank you for this opportunity to articulate our concerns and recommendations.

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[1] Darrah, T.H., Vengosh, A., Jackson, R.B., Warner, N.R., and Poreda, R.J. (2014). Noble gases identify the mechanisms of fugitive gas contamination in drinking-water wells overlying the Marcellus and Barnett Shales. Proceedings of the National Academy of Sciences, 111 (39), 14076-14081. doi: 10.1073/pnas.1322107111. Accessed on 8-8-15. http://www.pnas.org/content/111/39/14076.full

[2] Board, G. (2014, November 3). September drilling accident contaminated water in Doddridge County. West Virginia Public Broadcasting. Accessed 8-8-15. http://wvpublic.org/post/dep-september-drilling-accident-contaminated-water-doddridge-county

Sincerely,

Catherine Thomasson, MD
Executive Director
Physicians for Social Responsibility

Appendix

Study Design Flaws:

For a more definitive finding of whether hydraulic fracturing impacts drinking water quality EPA needs to look at the entire lifecycle of fracking: sample water before sites are developed and drilled, after the well is constructed, before and after fracking occurs and for a period while the well is producing gas. The EPA was unable to gain cooperation from industry to undertake this type of lifecycle analysis. Thus, they abandoned undertaking baseline or prospective study data. Without this type of data a complete a lifecycle analysis is impossible. Prospective water studies are critical because they provide chemical snapshots of water immediately before and after fracking and then for a year or two afterward. This would be the most effective and sound method to determine if oil and gas development contaminates surface water and nearby aquifers.

EPA concurs about the limits of the data used in its study. Limiting "factors (in the study) include: insufficient pre- and post-fracturing data on the quality of drinking water resources; the paucity of long-term systematic studies; the presence of other sources of contamination precluding a definitive link between hydraulic fracturing activities and an impact; and the inaccessibility of some information on hydraulic fracturing activities and potential impacts." EPA should make it clear in its study findings the data limitations. From a public health perspective lack of data should not preclude safety, and in actuality the latest science and anecdotal reports reveal otherwise.

Additional evidence of fracking's impact on water-newer science/data

In the five years since the EPA study's launch, academic research into fracking's effect on water has taken off and provided some answers that the EPA study was intended to find. For instance, Duke University researchers found in a June 2013 study that drinking-water wells in northeastern Pennsylvania within a kilometer of fracking had methane concentrations six times greater and ethane concentrations were twenty-three times higher on average than wells farther away. Propane was also detected in 10 samples, all of them from homes within a kilometer of drilling. The study highlighted that distance to gas wells was, by far, the most significant factor influencing gases in the drinking water sampled. The study also demonstrated that the integrity of gas wells, as well as variations in local and regional geology, played major roles in determining the possible risk of groundwater impacts from shale gas development.[3]

In a 2014 study of Pennsylvania wells, fracked wells were 6 times more likely to have well casing failures than conventionally drilled wells. The study examined Pennsylvania Department of Environmental Protection inspection records that show compromised cement and/or casing integrity in more than 6 percent of the

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[3]Jackson et al. 2013. Increased stray gas abundance in a subset of drinking water wells near Marcellus shale gas extraction. PNAS. vol. 110. no. 28. Accessed 8-10-15. http://www.pnas.org/content/110/28/11250.full.pdf

active gas wells drilled in the Marcellus region of Pennsylvania. This study shows up to a 2.7-fold higher risk for unconventional wells – relative to conventional wells – drilled since 2009 in the northeastern region of the Marcellus in Pennsylvania.[4]

A July 2013 study by the University of Texas-Arlington indicated that groundwater near fracking sites in Texas' Barnett Shale had higher levels of arsenic and other heavy metals. The study found quite a few examples of elevated levels of arsenic, selenium and strontium. Each of those metals were at levels above EPA's maximum contaminate limit for drinking water. The heavy metals do naturally occur in the groundwater in this region. But the study included a historical dataset that points to the fact that the levels found are not natural. And when looking at the location of the natural gas wells, the study found that any time water wells exceeded the maximum contaminate limit for any of these heavy metals, they were within three kilometers of a natural gas well.[5]

Researchers analyzing publicly available data from Colorado found over seventy surface spills impacting groundwater in one county alone. Samples of these spills often exceeded drinking water maximum contaminant levels for benzene, toluene, ethylbenzene and xylene; for benzene, a known carcinogen, 90% of the samples exceeded the legal limit. The study provides evidence that benzene can contaminate groundwater sources following surface spills at active well sites.[6]

Fracking wastewater processed by sewage treatment plants contributes to the formation of carcinogenic chemical byproducts an analysis reveals. Even when fracking wastewater was diluted by a factor of 10,000, the bromides and iodides in the waste reacted with organic matter to create toxic halogenated compounds—at high concentrations. These hazardous compounds are not filterable by municipal wastewater treatment plants. These findings increase public health concerns when downstream surface water is used for drinking.[7]

Injection wells

The lack of inclusion of injection wells where millions of gallons of wastewater are disposed of is a critical flaw of the EPA's study. Nationwide, over 170,000 injection wells accept fracking waste; some are known to have contaminated drinking water. [8]

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[4]Anthony R. Ingraffea, et al. Assessment and risk analysis of casing and cement impairment in oil and gas wells in Pennsylvania, 2000–2012 PNAS 2014 111 (30) 10955-10960; published ahead of print June 30, 2014, doi:10.1073/pnas.1323422111. Accessed on 8-10-15. http://www.pnas.org/content/111/30/10955.full

[5]Brian E. Fontenot et al. An Evaluation of Water Quality in Private Drinking Water Wells Near Natural Gas Extraction Sites in the Barnett Shale Formation Environmental Science & Technology 2013 47 (17), 10032-10040 DOI: 10.1021/es4011724. Accessed on 8-10-15 http://pubs.acs.org/doi/abs/10.1021/es4011724

[6]Gross SA et al. Analysis of BTEX groundwater concentrations from surface spills associated with hydraulic fracturing operations. J Air Waste Manag Assoc. 2013 Apr;63(4):424-32. Accessed on 8-10-15. http://www.ncbi.nlm.nih.gov/pubmed/23687727

[7]Kimberly M. Parker, et al. Enhanced formation of disinfection byproducts in shale gas wastewater-impacted drinking water supplies. Environmental Science & Technology 2014 48 (19), 11161-11169 DOI: 10.1021/es5028184 Accessed on 8-10-15. http://www.ncbi.nlm.nih.gov/pubmed/25203743

[8] United States Government Accountability Office. DRINKING WATER EPA Program to Protect Underground Sources from Injection of Fluids Associated With Oil and Gas Production Needs Improvement. June 2014. Accessed on 8-10-15 on http://www.gao.gov/products/GAO-14-555

In the United States, at least two billion gallons of fluids are injected into the ground each day to enable oil and gas extraction via fracking or to dispose of liquid waste from fracking operations.