

**From:**  
**To:** [Carpenter, Thomas](#)  
**Cc:**  
**Subject:** Comments for the EPA Chartered Science Advisory Board on Hydraulic Fracturing  
**Date:** Wednesday, June 15, 2016 8:56:36 AM

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Dear Mr. Carpenter,

It has come to my attention that you are accepting written statements to the Chartered Science Advisory Board on Hydraulic Fracturing. I have attached a copy of the oral statement I delivered on February 1<sup>st</sup>, 2016 to the Science Advisory Board Hydraulic Fracturing Research Advisory Panel. During the presentation the SAB requested to see the studies I referenced, so I cited them in the written testimony and I have attached them to this email as PDFs. I understand that the PDFs cannot be distributed as public information, but I am hoping that you can make them available to the panel members. Many thanks for your help in this matter.

Regards,

Carol Kwiatkowski

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**To:** Mr. Edward Hanlon, Environmental Protection Agency Designated Federal Officer

**Re:** Written statement of oral comments presented February 1, 2016 to the EPA Science Advisory Board Hydraulic Fracturing Research Advisory Panel

**Date:** February 3, 2016

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Thank you for this opportunity to share new scientific information with the Science Advisory Board.

I'm Dr. Carol Kwiatkowski, Executive Director of The Endocrine Disruption Exchange, known as TEDX. TEDX is a non-profit organization whose mission is to educate people on the health and environmental impacts of chemical exposure. I am also an adjunct faculty member at the University of Colorado, Boulder. I am an author on three scientific articles on natural gas development, one of which is under review.

On the TEDX website we have a reference list of 48 peer-reviewed articles published since 2009 related to health impacts of unconventional oil and gas <http://endocrinedisruption.org/chemicals-in-natural-gas-operations/peer-reviewed-articles>. Some are very new and I want to highlight them for you today, particularly as they are related to reproduction, development, and hormone activity.

One study, published this year, evaluated the potential reproductive and developmental toxicity of 240 chemicals in fracking fluids and wastewater. Sixty-five percent were shown to affect reproduction, development, or both (Elliott, Ettinger et al. 2016). This corroborates work we published in 2011 (Colborn, Kwiatkowski et al. 2011).

Further, in a recent *in vitro* study, out of 24 oil and gas related chemicals tested, 23 had hormone activity. When a mixture of these hormonally active chemicals was given to pregnant mice, their male offspring had decreased sperm, increased serum testosterone, and increased organ weights (Kassotis, Klemp et al. 2015). Research has also demonstrated the presence of these chemicals in surface and ground water near oil and gas development (Kassotis, Tillitt et al. 2014). It's important to mention that chemicals that disrupt hormone function can do so at extremely low concentrations.

With regard to human evidence, several studies conducted by scientists at the University of Colorado describe possible, probable and actual health impacts of living near oil and gas development. The most striking of these was a study of 125K birth records from 57 rural Colorado counties (McKenzie, Guo et al. 2014). It revealed that pregnant women living near oil and gas development were more likely to give birth to babies with congenital heart defects.

Two other similar studies were published in 2015. One was conducted in Southwest Pennsylvania by scientists at the University of Pittsburgh studying over 15,000 birth records. Babies born near more wells had a greater likelihood of being born small for gestational age and had significantly lower birth weights (Stacy, Brink et al. 2015). Being born underweight has been linked to heart disease, diabetes, and childhood asthma.

The other study was conducted in Central and Northeast Pennsylvania by scientists at Johns Hopkins University, studying over 10,000 birth records. They found proximity to oil and gas development to be associated with an increased likelihood of high-risk pregnancy in the mothers, and preterm birth in the babies (Casey, Savitz et al. 2015).

The important points here are that data from tens of thousands of pregnant women and babies were analyzed in these studies, which were conducted in three different regions of the country, by independent scientists. We don't know if the health effects are from air or water exposure. What we do know is that this kind of industrial activity near people's homes is associated with adverse outcomes in two very vulnerable populations – pregnant women, and children developing in the womb.

There is simply no logic in waiting for widespread systemic impacts to be proven. The finding that hydraulic fracturing can and has contaminated drinking water should be the finding that triggers protective action. So I am urging you to act quickly to correct and finalize the EPA report, as people, including pregnant women and children, continue to be exposed to these chemicals.

Thank you.



Carol F. Kwiatkowski  
Executive Director, TEDX

## References

Casey, J. A., D. A. Savitz, S. G. Rasmussen, E. L. Ogburn, J. Pollak, D. G. Mercer and B. S. Schwartz (2015). "Unconventional Natural Gas Development and Birth Outcomes in Pennsylvania, USA." Epidemiology.

Colborn, T., C. Kwiatkowski, K. Schultz and M. Bachran (2011). "Natural gas operations from a public health perspective." Human and Ecological Risk Assessment **17**(5): 1039-1056.

Elliott, E. G., A. S. Ettinger, B. P. Leaderer, M. B. Bracken and N. C. Deziel (2016). "A systematic evaluation of chemicals in hydraulic-fracturing fluids and wastewater for reproductive and developmental toxicity." J Expos Sci Environ Epidemiol.

Kassotis, C. D., K. C. Klemp, D. C. Vu, C. H. Lin, C. X. Meng, C. L. Besch-Williford, L. Pinatti, R. T. Zoeller, E. Z. Drobnis, V. D. Balise, C. J. Isiguzo, M. A. Williams, D. E. Tillitt and S. C. Nagel (2015). "Endocrine-Disrupting Activity of Hydraulic Fracturing Chemicals and Adverse Health Outcomes After Prenatal Exposure in Male Mice." Endocrinology **156**(12): 4458-4473.

Kassotis, C. D., D. E. Tillitt, J. W. Davis, A. M. Hormann and S. C. Nagel (2014). "Estrogen and androgen receptor activities of hydraulic fracturing chemicals and surface and ground water in a drilling-dense region." Endocrinology **155**(3): 897-907; doi: 810.1210/en.2013-1697.

McKenzie, L. M., R. Guo, R. Z. Witter, D. A. Savitz, L. S. Newman and J. L. Adgate (2014). "Birth outcomes and maternal residential proximity to natural gas development in rural Colorado." Environ Health Perspect **122**(4): 412-417.

Stacy, S. L., L. L. Brink, J. C. Larkin, Y. Sadovsky, B. D. Goldstein, B. R. Pitt and E. O. Talbott (2015). "Perinatal outcomes and unconventional natural gas operations in southwest pennsylvania." PLoS One **10**(6): e0126425.