May 31, 2013

The United States Senate, Committee on Energy and Natural Resources
Full Committee Forum: Shale Development-Environmental Protection and Best Practices

Supplemental Submission for the Record

At the conclusion of the May 23rd forum, *Shale Development – Environmental Protection and Best Practices*, Chairman Wyden expressed a desire to continue discussions with colleagues and stakeholders to find ways to advance the ideas discussed. As part of this effort, the Chairman and Senator Mary Landrieu requested that the panel respond if possible to several questions raised during the forum concerning: claimed links between hydraulic fracturing and drinking water contamination; FracFocus and chemical disclosure; and flaring.

Baker Hughes respectfully submits a supplemental response for the record on two of these issues:

Claims Linking Hydraulic Fracturing and Drinking Water Contamination

At the May 23rd hearing, Senator Mary Landrieu asked the panel if any participant could identify a single instance of contamination of a water supply from hydraulic fracturing. The question focuses on the possibility of underground communication of contaminants and drinking water caused by the propagation of fractures during hydraulic fracturing.

Given the long history of hydraulic fracturing and the sheer number of wells that have been hydraulically fractured, we cannot presume to have the comprehensive knowledge needed to affirm the absence of *any* underground communication of contaminants and drinking water of *any* kind, *any*where.

Our experience teaches that the potential impacts of hydraulic fracturing derive primarily from surface activities and that these potential impacts can be substantially mitigated. These points were echoed in the forum. In the continuing dialogue concerning hydraulic fracturing, it is important to recognize how the well-understood and controllable operational risks stand in relation to the recognized benefits and opportunities that hydraulic fracturing offers.

The growing body of studies—from industry, the government and academia—concerned with potential subsurface communication with drinking water generally concludes that hydraulic fracturing can be done safely; moreover, it fails to identify any examples of subsurface contamination associated with hydraulic fracturing itself. In part this is because, as the New York Department of Conservation noted in its Revised Draft Supplemental Generic Environmental Impact Statement:

> The induced fractures create a pathway to the intended wellbore, but do not create a discharge mechanism or pathway beyond the fractured zone where none existed before. The pressure differential that pushes fracturing fluid into the formation is diminished once the rock has fractured, and is reversed toward the wellbore during the flowback and production phases. Accordingly, there is no likelihood of significant adverse impacts from the underground migration of fracturing fluids.

New York State Department of Environmental Conservation, *Revised Draft Supplemental Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program—Well Permit Issuance for Horizontal Drilling and High-Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low-Permeability Gas Reservoirs*, page 12 (September 7, 2011).

Below we have provided citations and links to some additional resources. While Baker Hughes has not been involved in many of these studies or in the underlying events giving rise to them (as in

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Dimock, PA and Parker County, TX), we believe these references may be of some use to the Committee:

- *"EPA Completes Drinking Water Sampling in Dimock, PA"* [Press Release], U.S. Environmental Protection Agency (July 25, 2012). Retrieved from http://yosemite.epa.gov/opa/admpress.nsf/d0cf6618525a9efb85257359003fb69d/1a6e49d193e1007585257a46005b61ad!opendocument

- *Notice of Withdrawal of Imminent and Substantial Endangerment Order,"* U.S. Environmental Protection Agency. (March 29, 2012). Retrieved from http://www.rangeresources.com/rangeresources/files/4b/4bdd072d-a0fc-4084-8a22-77defab10da7.pdf

- *"Geochemical and Isotopic Variations in Shallow Groundwater in Areas of the Fayetteville Shale Development, North-Central Arkansas,"* Nathaniel R. Warner, et al. Applied Geochemistry, Nicholas School of the Environment, Duke University (May 15, 2013). Retrieved from http://www.sciencedirect.com/science/article/pii/S0883292713001133

- *"State Oil and Gas Agency Groundwater Investigations And Their Role in Advancing Regulatory Reforms: A Two-State Review: Ohio and Texas,"* Ground Water Protection Council (August 2011). Retrieved from http://www.gwpc.org/sites/default/files/State%20Oil%20%26%20Gas%20Agency%20Groundwater%20Investigations.pdf

- *"National Human Health Risk Evaluation for Fracturing Fluid Additives,"* Gradient Environmental Consultants (May 1, 2013). Retrieved from http://www.slideshare.net/MarcellusDN/national-human-health-risk-evaluation-for-hydraulic-fracturing-fluid-additives

- *"Hydraulic Fracturing Study: PXP Inglewood Oil Field,"* Cardno ENTRIX (Oct. 10, 2012). Retrieved from http://www.inglewoodoilfield.com/res/docs/102012study/Hydraulic%20Fracturing%20Study%20Inglewood%20Field10102012.pdf

- *"Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs,"* U.S. Environmental Protection Agency (June 2004). Retrieved from http://www.epa.gov/ogwdw/uic/pdfs/cbmstudy_attach_uic_exec_summ.pdf

- *"Hydraulic Fracturing 101: What Every Representative, Environmentalist, Regulator, Reporter, University Researcher, Neighbor, and Engineer Should Know About Hydraulic Fracturing Risk,"* George E. King, Apache Corporation (April 2012). Retrieved from http://www.mogpef.org/Portals/0/HF_101_April2012.pdf

- *"Separating Fact from Fiction in Shale Gas Development," Dr. Charles Groat, Energy Institute, The University of Texas at Austin* (Feb. 2012). Retrieved from http://www.slideshare.net/MarcellusDN/separating-fact-from-fiction-in-shale-gas-development

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- *"Methane contamination of drinking water accompanying gas-well drilling and hydraulic fracturing,"* Stephen G. Osborn, et al., Center on Global Change, Duke University (May 2011). Retrieved from http://www.eenews.net/assets/2011/05/09/document_pm_01.pdf

- *"Evaluation of Methane Sources in Groundwater in Northeastern Pennsylvania,"* Lisa J. Molofsky, et al., GSI Environmental, Inc. (May-June 2013). Retrieved from http://op.bna.com/env.nsf/id/jstn-986v5p/$File/PaFrackStudy.pdf

- *"Revised Draft Supplemental Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program—Well Permit Issuance for Horizontal Drilling and High-Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low-Permeability Gas Reservoirs*," New York State Department of Environmental Conservation (September 7, 2011). Retrieved from http://www.dec.ny.gov/data/dmn/rdsgeisfull0911.pdf

FracFocus and Chemical Disclosure

We concur with Chairman Wyden's statement during the May 23rd forum that the FracFocus endeavor has been constructive. Chairman Wyden raised a number of important points for continued discussion regarding FracFocus. Several questions go to the administration and funding of FracFocus, and we would defer in the first instance to the supplemental response of the Interstate Oil & Gas Compact Commission (IOGCC) and the Groundwater Protection Council (GWPC) on those issues, as those organizations own and administer FracFocus. It bears emphasis that the IOGCC and the GWPC are consortiums of *state regulators* charged, respectively, with regulating oil and gas production and with groundwater protection.

One question was raised with regard to the standardization of chemical identities through disclosure of the Chemical Abstracts Service registry number (CASRN) along with chemical identities. We are not aware of a state that has adopted FracFocus as a regulatory disclosure platform but has not required CASRN to be disclosed along with chemical identities, subject to proprietary information claims. Baker Hughes specifically has centralized and standardized our chemical disclosure in an automated system. This system reduces the potential for data entry or calculation errors, standardizes information on chemistry and products, and speeds delivery of the information to the operator and ultimately to the public.

Chairman Wyden also asked the panel for its views on whether compliance with the disclosure of chemicals contained in fracture fluid should be required before hydraulic fracturing commences, after it concludes, or both. We understand that Chairman Wyden appreciates that the chemical composition of hydraulic fracturing fluids may change in response to a variety of factors, so we will not belabor the point. Regulators have examined and confirmed this basic fact. *See, e.g.,* Bureau of Land Management, *Oil and Gas; Hydraulic Fracturing on Federal and Indian Lands*, 78 Fed. Reg. 31636, 31649 (May 24, 2013) ("operators may justifiably change the chemical composition of hydraulic fracturing fluids after approval of fracturing operations in response to such factors as availability of chemicals and unexpected geologic conditions"). It has never been evident to us that utilizing FracFocus for pre- and post-hydraulic fracturing disclosures provides much practical value in terms of public education compared to the detriments of potential confusion and additional administrative burden. This is a conclusion shared by BLM, which concluded that the "post fracturing disclosures and certifications would provide adequate assurances that the hydraulic fracturing operations protect public health and safety and protect Federal and Indian resources." *Id.*