



Clean Water Network
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**Comments for EPA Science Advisory Board Meeting on the Hydraulic Fracturing
Research Plan**

March 29, 2010

The Clean Water Network, the largest national coalition focused on protecting and restoring all of our nation's waters, is appreciative of this opportunity to submit comments on the Environmental Protection Agency's proposed Hydraulic Fracturing Research Plan, for consideration by the Science Advisory Board's Environmental Engineering Committee Augmented for Hydraulic Fracturing Review. This issue is of great concern to our clean water community, and many of our member organizations have signed on to letters urging EPA to undertake a comprehensive study to assess the impact of hydraulic fracturing on water resources. Due to the short comment period provided by EPA, our member organizations did not have ample opportunity to weigh in on every issue of concern with the current proposed study. Therefore we respectfully request subsequent opportunities to review and comment on the scope and methodology of this study.

We cannot emphasize enough the importance of undertaking a rigorous scientific study that examines the hydraulic fracturing process from cradle to grave and measures potential public health risks and environmental impacts from this process. Throughout the country, numerous cases have been documented of incidents involving accidental spills of chemicals, sediments, or waste in to surface waters and the uncontrollable subsurface movement of fracturing chemicals or waste.¹ While drilling technology and the use of sophisticated hydraulic fracturing processes to exact natural gas from sources such as coalbed methane and shale gas formations have advanced greatly over the past decade, the knowledge of how this extraction might affect water resources has not kept pace.²

Because of concern about this lack of knowledge, in its 2010 Appropriations Conference Committee Directive to EPA, the U.S. House of Representatives requested that EPA conduct a study of hydraulic fracturing and its relationship to drinking water:

"The conferees urge the Agency to carry out a study on the relationship between hydraulic fracturing and drinking water, using a credible approach that relies on the best available science, as well as independent sources of information. The conferees expect the study to be conducted through a transparent, peer-reviewed process that will ensure the validity and accuracy of the data. The Agency shall consult with other Federal agencies as well as appropriate State and interstate regulatory agencies in carrying out the study, which should be prepared in accordance with the Agency's quality assurance principles."

In response to this request, EPA's Office of Research and Development (ORD) drafted the document, *Scoping Materials for the Initial Design of EPA Research Study on Potential Relationships Between Hydraulic Fracturing and Drinking Water Resources*. While we believe it

¹ New York City Department of Environmental Protection, *Rapid Impact Assessment Report, Impact of Natural Gas Production in the New York City Water Supply Watershed*, 49-69, (September 2009).

² Soeder, D.J., and Kappel, W.M., *Water Resources and Natural Gas Production from the Marcellus Shale: U.S. Geological Survey Fact Sheet 2009-3032*, (2009).



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is imperative that EPA conduct a scientific study on potential relationships between hydraulic fracturing and drinking water resources, we are concerned that the current study approach is not focused explicitly enough on the Congressional directive. For example, one of the potential research questions would ask EPA to consider the economic viability and “tradeoffs” of alternative fracturing techniques that “may have less potential for impacts to drinking water resources.” The Congressional directive is quite clear that EPA should conduct a *scientific* study on the relationship between hydraulic fracturing and drinking water and while we believe there is value in EPA collecting economic data and analyzing tradeoffs of alternative fracturing techniques, EPA should not engage in a cost-benefit analysis that weighs environmental impacts against economic benefits.

In order to meet this Congressional directive, EPA must develop a comprehensive field and monitoring study to assess potential risks to water resources at every stage of natural gas development – from well pad siting and construction to the final disposal of wastewater and site closure. It must also consider the potential risks of subsurface fluid movement long after production is completed – even decades later, seismic activity or the degradation of the well casings could result in the migration of fracturing chemicals that remain underground after production, which is estimated to be between 30-70%.³ EPA also must obtain reliable information on the chemical additives used in fracturing fluids. While the exact chemical composition of fracturing fluids is mostly unknown, the potential toxicity and hazardous make-up of these additives is widely acknowledged.^{4,5,6} Without this critical information EPA cannot adequately evaluate potential risks hydraulic fracturing poses on drinking water resources.

Detailed comments on EPA ORD’s proposed approach follow.

Introduction

EPA should add “temporary onsite storage of produced water and waste” to its list of Hydraulic Fracturing (HF) activities. The storage of waste in open, lined pits generated during oil and gas extraction is the industry standard⁷ and there is a potential for run-off into surface waters or for seepage into drinking water aquifers, particularly in regions that have shallow aquifers. This study should also take in to account the potential for liner breaching.

Approach to Determining the Scope of the Study

³ U.S. Department of Energy, Office of Fossil Energy, *Modern Shale Gas Development in the United States: A Primer*, (2009).

⁴ The Endocrine Disruption Exchange, *Products and Chemicals Used in Fracturing*, (February 2009). Available at: <http://www.endocrinedisruption.com/files/ProductsandChemicalsUsedinFracturing2-16-09.pdf>

⁵ New York State Department of Environmental Conservation, *Draft Supplemental Generic Environmental Impact Statement on Oil, Gas and Solution Mining Regulatory Program*, (September 2009).

⁶ Environmental Protection Agency, *Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs*, (June 2004).

⁷ New York City Department of Environmental Protection, *Rapid Impact Assessment Report, Impact of Natural Gas Production in the New York City Water Supply Watershed*, 49-69, (September 2009).



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Framing the Research Questions

Characterization of the Hydraulic Fracturing Lifecycle

In general, the “cradle to grave” lifecycle study approach is a good one, though as the study is developed EPA needs to clearly define all the stages in the HF life cycle and explicitly discuss what the potential risks to water resources during each stage in the life cycle are. It is also important to consider possible routes of contamination long after the site is closed, due seismic activity, changes in groundwater level, well casing failures (both HF wells and any nearby drinking water wells and surface waters), drilling of additional wells in the area, anticipated climate change, etc. The study should also consider length of time of individual drilling operations – obviously a well that is active for 60 years⁸ will have a much greater potential to impact water resources and the environment than a well that is active for only a few weeks or months. A thorough life cycle analysis must also address regional and geological differences and differences in shale formations.

The study also should consider baseline data - what are the hydrogeologic and environmental conditions prior to drilling? How might natural conditions exacerbate potential risks of HF?

Additional questions EPA should consider:

How do the stages in the HF lifecycle vary in different regions in the country (and how does that affect water resources in those regions?)

What is the potential for subsurface migration of fracturing fluids left in wells after site closure?

What is the volume of fracturing fluid left underground and what is its chemical makeup?

What additional migration pathways could be created due to well casing failures, drilling of additional wells, seismic activity, changes in water table, or abandoned wells that have not been capped properly?

EPA must also consider how aquifers and shale formations will change over time, as these are not static environments.

EPA should evaluate the subsurface migration potential of fracturing chemicals, methane, and saline water during natural gas development. Existing geologic features such as faults and fractures as well as new fractures generated during well production can act as migration pathways for contaminants, methane, and saline water. In addition, casing or grouting failures of improperly sealed wells can facilitate the migration of fracturing chemicals and other fluids. These hydraulic pathways can permit fluids within geologic formations to contaminate groundwater and/ or surface waters.

⁸ Congressional Research Service, *Unconventional Gas Shales: Development, Technology, and Policy Issues*, (October 30, 2009).



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Potential Relationship to Drinking Water Resources

We strongly agree that potential water quality impacts need to be identified and assessed within the context of local geology and hydrology. This study should also consider the impact climate change may have on water quality in different geographic regions.

Hydraulic fracturing uses millions of gallons of freshwater per well, and this study should consider how this substantial water usage might impact water supplies and drinking water quality. In particular, EPA should give special consideration to how hydraulic fracturing might impact communities with Filtration Avoidance Determinations and existing measures in Source Water Assessment & Protection (SWAP) plans for protecting drinking water at the source.

Comments on proposed research questions:

Question one should clarify that the potential for drinking water contamination during *every* stage of HF life cycle should be considered, including after a well pad is closed. Alternatively the question could ask: what stages of the HF life cycle have the highest potential to pose the greatest risk to water resources?

While we agree that it is important to consider viable, environmentally friendlier fracturing alternatives, EPA should not be spending its limited resources weighing the economic viability of alternatives. In light of the fact that there is a dearth of scientific literature on the subject of the potential impact of hydraulic fracturing on water quality and quantity, the main focus of this study needs to be on collecting and analyzing the relevant data needed to address that issue first. Moreover, this question is clearly outside EPA's Congressional mandate.

Potential Health and Environmental Risks

We strongly agree that it is important to recognize that interconnections between surface water and ground water resources might affect the magnitude and extent of potential exposures and risks. However, the study must also address how climate change might affect the magnitude and extent of potential exposures and risks, due to changes in precipitation levels and groundwater recharge, timing of run-off, etc. Additionally, cumulative impacts should be addressed – one well pad alone may not pose a significant risk to human health or the environment, but what is the potential impact of multiple wells in the same watershed or specified geographic area? How might gas drilling impact existing drinking water infrastructure? How might future drilling impact these resources?

We agree that it is important to generate public awareness of potential environmental benefits and potential risks, but this question is outside the scope of EPA's Congressional directive.

Approach for Compiling Background Data and Information

We agree that there is a limited body of peer-reviewed literature on the relationship between hydraulic fracturing and drinking water, particularly as it relates to the drilling of shale, which has



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only been widely practiced in the last decade. However, the dearth of scientific literature on the subject should not be used as a rationale for EPA to not actively pursue field studies. Because this specific technological practice is fairly new, the impact it poses on water resources may not be immediately apparent, so this study needs to factor in the time necessary to gather additional scientific information as it becomes available. Because of a lack of information on the subject, it is important for EPA to take a precautionary approach when assessing potential risks.

Another question to consider is what can EPA do to encourage scientific research in this area (work with colleges/universities, other research facilities)?

Potential Elements of Research Study
Chemical Characterization and Modeling

We strongly agree that it is important to determine the chemical composition of produced water following the introduction of HF fluids, especially considering we have limited information on the precise composition of fracturing chemicals because they are considered proprietary information. For example, flowback needs to be analyzed for hazardous chemicals, known carcinogens, toxicity and radioactivity.

The field study steps recommended in this section are critical and EPA must focus much of its resources on them in order to fulfill its Congressional directive. EPA should conduct on the ground investigations of citizen and/or local authority reported spill/contamination incidents due to hydraulic fracturing activities to assess if water quality has been impaired.

Other questions about the chemical characterization and modeling:

The study should also try to quantify the composition of fracturing fluids left underground and consider how they will degrade and migrate over time (and also how they will react to/with the existing geology). How much of the fracturing fluid is stranded in the formation and how much of it flows back? What is the chemical fate and transport potential of fracturing fluids trapped underground?

EPA needs to gather information on the flow back rates of the various chemicals used in hydraulic fracturing, while taking into account variations in the geology of specific shale formations.

Can chemicals used in hydraulic fracturing biodegrade into byproducts that are more toxic than the originally injected chemicals? Do the chemicals present in fracturing fluids break down into products that are more or less toxic to humans or other organisms?

Because the fate of chemicals injected into underground formations is complex, EPA needs to consider the full range of factors that can affect chemical concentrations, or the relative importance of the various processes in controlling the concentrations of chemicals in groundwater.



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This study should also consider the impact of changes in the groundwater table (i.e. changes in recharge rates and lowering due to the pumping of water for hydraulic fracturing).

EPA cannot claim that concentrations of known hazardous substances used in fracturing fluids (such as benzene) are reduced to safe levels in the environment without providing empirical data to substantiate such a claim.

EPA should review existing literature on the toxicity of fracturing fluid chemicals (i.e. toxicological studies).

Do chemicals flow back at equal rates or are some chemicals more likely to get “trapped” in shale formations?

Initial Approaches for Stakeholder Involvement

It is critical that EPA engage the communities that have been most impacted by this practice. If EPA wants meaningful stakeholder input it needs to provide adequate notification and availability of background information at least a month prior to stakeholder meetings. It did not provide adequate time and notification for this first meeting. The press release that went out on March 18th, 2010 only mentioned that EPA was launching a hydraulic fracturing study and did not mention the public meeting, which is only mentioned in the federal register notice and on the EPA SAB website. CWN and its member organizations strongly encourage the EPA to provide additional opportunities for stakeholder involvement. Additionally, the EPA should make this involvement meaningful by providing ample notification and availability of materials. We recommend that EPA conduct additional public stakeholder meetings in New York, Pennsylvania, Texas, Colorado and Wyoming. Several watershed groups in Colorado and across the country have already started their own surface and groundwater monitoring programs in search of pollutants attributed to gas well development. They are very concerned about this practice and need to be proactive in order to protect their communities, or alternately, prove that the gas companies are correct in their assertion that hydraulic fracturing does not impact their water. It would be extremely useful to have technical advice from the EPA on this program that would help coordinate these individual efforts into a consolidated data collection initiative that can be used to integrate these many studies into a comprehensive study on conclusions. This would be especially beneficial in the need for standard collection protocols when studying gas well pollutants. There is a big potential volunteer resource available out there to collect samples and also disseminate accurate information about this practice. We believe the EPA can do themselves a lot of good by engaging the grassroots with the help of many regional and state organizations.

Respectfully submitted,

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