

To: Angela Nugent, Designated Federal Officer
EPA Science Advisory Board (1400F)
1200 Pennsylvania Avenue, NW
Washington, DC 20460
phone (202) 343-9981
fax (202) 233-0643
e-mail nugent.angela@epa.gov

From: Sandra G. and William J. Podulka
Date: June 9, 2010

Comments on the Science Advisory Board's 5/19/2010 Draft Committee Report on the EPA's Research Scoping Document Related to Hydraulic Fracturing ("Report")

We appreciate this opportunity to comment on the Science Advisory Board (SAB) Report.

We present the perspective of individuals who have a tremendous amount at stake with respect to gas drilling. As landowners with 100 acres over the Marcellus shale of New York, we could make a great deal of money in a signing bonus (at roughly \$5,000/acre) right now and potentially some royalties in the future. But, we have spent the last year and a half, full-time, researching this issue and have come to the conclusion that shale gas drilling by hydraulic fracturing (HF) greatly endangers the health of people and our environment, as well as damaging communities economically and socially. In our county, approximately 6% of the adult population holds a gas lease, and thus could reap great financial benefits, yet 100% of the population will be affected by the environmental, health, and other costs. Because gas drilling is exempt from zoning laws in New York, communities cannot determine if and where drilling will occur. It was not easy to find solid scientific information on the impacts of shale gas drilling, so we welcome the EPA study and wish all the scientists involved much luck in tackling this very complicated but important issue.

Because many of our neighbors have signed gas leases, by New York law we are likely to be forced into a drilling unit and to have, against our will, toxic chemicals injected at high pressure underneath our home, our property, and the aquifer that supplies our drinking well.

We have lived in this area for 34 years and we love it. We love the rolling hills dotted with wild areas and farms, the clean air and water, and the community. We have developed a system of nature trails on our property, and we planned to live here for the rest of our lives. But, we value the health of our family even more, and so if we feel a great threat from the looming gas drilling, we will have to move, reluctantly.

We are biologists and physicists, not geologists or engineers, but we have thought a great deal about the ethics of the issue, and how to frame questions whose answers will be useful to policy-makers and the public. We hope the EPA will consider these aspects of its study.

General Comment:

In discussing and researching hydraulic fracturing (HF) and its impacts, it will be important to distinguish between traditional HF and the current techniques used to extract gas from shale. Traditional HF, developed by Halliburton in the late 1940s, has been used for years. The gas industry is fond of saying that HF is an old, tried, and tested technique, and nothing to worry about.

The type of hydraulic fracturing that we assume the EPA intends to study, used to extract shale gas, was developed in the late 1990s and goes by various names. It may be called “slickwater hydraulic fracturing” because it uses a different mix of chemicals than the older methods, “high-volume” hydraulic fracturing (HVHF) because it uses much more fluid, and “multi-stage” because a series of fracking events are used along the pipeline. Although we refer to the newer type of hydraulic fracturing, we have used HF throughout these comments, to be consistent with the Report.

The EPA and SAB need to very clearly distinguish the different types of HF and which they are referring to at every stage of this study, from the Report and Scope through the research phase and when the results are presented to politicians and the public. Currently there is no clarification of this.

(1) Charge Question 1: Scope of the Research Program:

We agree strongly with the SAB’s support of the systems perspective and lifecycle framework taken by the EPA’s Office of Research and Development (ORD). On p. 2, line 29, however, the Report states that “*ORD should emphasize human health and environmental concerns that are specific to or significantly influenced by hydraulic fracturing rather than....concerns that are common to all oil and gas production activities.*” Although we realize that funds and time are limited, there are two problems with this approach:

(1) The parts of the hydraulic fracturing (HF) lifecycle that most strongly affect drinking water may be processes HF has in common with other types of oil and gas operations. As one set of examples, chemical spills, accidents, explosions, mishandling, and general corner cutting may be major factors. (We hope the BP oil spill has taught us at least that much. Furthermore, we are willing to bet that ANY oil or gas company put under similar scrutiny would show similar patterns of corruption, carelessness, and disregard for safety, health, and the environment.) If the EPA study chooses to ignore these factors because they are held in common, it may miss the forest for the trees, and waste a great deal of time and money picking apart technical processes that have smaller effects, while missing the most important things. Without looking at the entire HF lifecycle, shared or not, the EPA has no basis whatsoever for making any recommendations or conclusions as to the safety of HF. The EPA study needs to identify the ways that HF affects drinking water (and surface water, other environmental resources, and human health)—not just the problems unique to HF.

(2) Many of the problems with the new type of hydraulic fracturing (HVHF) are quantitative, when compared to other gas and oil operations, and not necessarily qualitative, so the EPA must be careful not to dismiss these problems as “common to all.” The Report acknowledges the importance of quantitative differences on p. 16, line 5, giving the example of produced water, but that must be extended to all other aspects.

One major problem is the sheer density at which shale gas is developed by the gas industry, because of the infrastructure involved and the desire for maximizing profit. For example, the recent prediction of there being a 50% chance of 17 trillion cubic feet of gas being produced over 5 years from the Marcellus Shale of NY¹ assumes a well pad every square mile with 8 wells per pad over 70% of the most productive part of the Marcellus shale. This scenario predicts 2,600 wells for my county, Tompkins, alone.² At this well density, the vast amounts of water, toxic fracking chemicals, and toxic drilling muds used and toxic flowback and toxic drill cuttings produced *per well* quickly produce a nightmare scenario and an incredible potential to contaminate groundwater (and everything else). Although some of these chemicals and processes are not unique to HF, the intensity of development combined with the intensity of chemical use is unique, and this **MUST** be incorporated into the EPA study, or else, as mentioned in (1), the forest will be missed for the trees.

(2) Charge Question 2A: Proposed Research Categories:

Again, as stated above, looking only at issues unique to HF is a ludicrous approach, if one is trying to assess the impact of the HF lifecycle. How can any meaningful conclusions be drawn as to the impact of HF if only unique aspects of the lifecycle are considered? The EPA must consider all pathways by which HF can impact drinking water, if the study is to have any scientific validity and usefulness to policy-makers. On p. 16, lines 26 to 32 and lines 36 to 44 focus on teasing apart those unique aspects. This is counterproductive, if one wants actual meaningful results, but useful if one is trying to appease the oil and gas industry and avoid dealing with its massive environmental impacts. It seems clear to most people except those in power, in denial, or in the dark that the time to face this is now.

To give one specific example, p. 16 line 41 states that the impacts of trucking are well understood. We would like to know, then, what the impact of truck traffic will be on the drinking water and health of people in my county, from the predicted 2,600 wells. At roughly 1,760 to 1,904 truck trips per well,³ this results in 4.6 to 5 million tanker truck trips. What type and how much air pollution will result? What effect will this have on asthma and cancer rates? Premature deaths?⁴ Growth of agricultural crops?⁵ How much of the air pollutants generated will be washed into surface water and reach ground water? At this intensity, what will be the environmental effects? What effect will the resulting traffic noise have on people's mental health and quality of life? We have not seen much solid research addressing these topics on this scale of development. We would argue that these types of impacts are actually not well-understood and most must be considered as part of the impact of the HF lifecycle. If there is solid data on these topics, then it must be included in the assessment of the risk HF poses on health and the environment. It should not be disregarded because it is common to other oil and gas operations or because it is already known (if it is).

We strongly support the Report's recommendation that both current and future drinking water sources and systems be considered and defined broadly (p. 17, lines 17 to 20 and 30 to 34), and also that secondary effects and the impact on other water resources be considered.

We hope that the longer-term goals are not neglected, but we fear that is likely to happen, given the current state of politics and corporate power. So we suggest that the EPA put everything necessary into the short-term agenda, while keeping sight of a longer-term agenda, but not counting on it ever happening.

On p. 18, lines 20 to 22, the Report suggests that the EPA partner with industry to gather data. We understand the economic necessity of this, but we would not trust the results. Because of the revolving door between government (including EPA) and industry, we suggest involving some groups opposed to gas drilling in this endeavor, as well. We do not refer to some of the major environmental groups, such as Sierra Club, who are getting money from the gas industry and thus are promoting natural gas, but some groups actually opposed—an actual balance to the gas industry. If the data collection were a collaborative effort between those promoting and those opposing drilling, the results might have some credibility, and might be acceptable to most sides of the issue.

In several places, the Report states that there are a limited number of peer-reviewed, science-based research studies on the effects of gas extraction by HF. One goal of the EPA must be to decide if enough is known for us to continue allowing HF. If not, a perfectly valid conclusion, applying the precautionary principal, is that we should wait until enough is known to make an educated and responsible decision as to whether HF should be used *at all*.

Can HF be Proven to Not Harm Drinking Water?

We would like to see a study designed to ask the question, "Can we prove that gas extraction activities that include HF do not harm drinking water?" It is very easy to *not* find evidence of harm, and to

conclude that something is safe, but this is not good science. The EPA standard should be to design studies that, within a standard level of confidence, prove or disprove the hypothesis that gas extraction activities involving HF do not harm drinking water.

If it is found that there is some risk to drinking water, then an effort should be made to quantify that risk (or at the very least, the range of that risk), so that policy-makers and the public can make informed decisions about whether or not to allow gas extraction by HF. For example, the public needs to know, at the realistic level of development that accompanies HF, how many private and public water supplies are likely to be contaminated, and how many people will get cancer and other diseases through water. Other important questions are “What is the chance that water contamination will go undetected?” and “In what ways, if any, can contaminated water be cleaned up, and at what cost?”

We hope that several important missing data sets may be filled in by authority of the EPA. One is the secrecy surrounding which chemicals are put down particular wells during HF. If the EPA has access to that data, researchers should be able to do large-scale testing of drinking wells, aquifers, and reservoirs surrounding a number of gas wells for every chemical used, as well as methane. A second missing piece of data is the stories of people whose drinking wells have been contaminated and who have made deals with the gas industry that include gag orders not to talk about their negative experiences. EPA access to these people’s stories could provide valuable information on the effects of gas extraction using HF on drinking water.

An important report on the relationship between gas drilling and methane in drinking water wells was written by Geoffrey Thyne.⁶

Potential Health and Environmental Risks:

Page 19, lines 24-25, state that “*Health and environmental risk associated with HF can only be assessed after sources and pathways of possible exposure are much better understood.*”

Although we certainly support learning more about the sources and pathways of exposure, this is not a necessary precursor to a preliminary assessment of the risks of health and environmental problems. In the few years HVHF has been used, a vast number of contamination incidents, explosions, spills, and so on, have occurred. There is a huge need for these incidents to be quantified across the nation, to assess the risk. Many of these incidents have not been fully recorded or taken seriously by municipal or state agencies. A lack of official documentation or proof of cause and effect does not mean there is no cause and effect. We strongly urge the EPA to accumulate all the reports of such incidents across the nation since HVHF began, and come up with a lower and upper boundary for the risk of environmental damage and impacts on health. The upper boundary must include all incidents not proved to have come from some other source. The magnitude of the range would give us an indication of how much is not known, and would allow an honest assessment of whether there is enough data to proceed with HVHF at all.

Furthermore, we need an assessment of how much greater risk is likely to be created with the proposed massive expansion of natural gas exploration. This needs to be put in context and assessed based on the current and predicted future degree of oversight by local and state governments, and their ability to regulate the industry given increasing state and federal budget shortfalls.

We think the EPA study should stay focused on answering the question, “Can we prove that gas extraction activities that include HF do not pose any risk to public health or the environment (drinking water)?” and if we cannot, the study should strive to quantify the risks. What is the risk that people will get cancer or other diseases due to pollution generated by gas extraction using HF? The people taking the risks need to know what those risks are, before they can determine if they are acceptable. These choices should not be made by the gas companies and large landowners wielding political clout who stand to make large profits from gas drilling at the expense of the many people they will harm. There is not much information in the scientific literature on the health effects of gas drilling, but two references by Witter

may be useful^{7, 8} as well as a recent study in the New England Journal of Medicine on the health effects of long-term exposure to low levels of ozone.⁴

(3) Charge Question 2B: Research Prioritization:

On p. 21, lines 11 through 22 discuss developing a “*risk-based research prioritization approach*.” We welcome this, but the language and focus in this section again lead me to believe that the forest is being missed for the trees. Although it is important to characterize the pathways by which injected fluids can reach water resources, these are widely thought to be the least risky parts of HF. A study that focused on this but did not address surface spills of chemicals; transport and storage of chemicals and used fracking fluid; storage and disposal of chemicals, flowback, produced water, drilling muds, and drill cuttings; and the risk of explosions, blowouts, and other disasters that are becoming daily news items, would be ludicrous and useless in assessing HF’s risk to health, drinking water, and the environment. Furthermore, we see no mention of the fact that many of the chemicals being used are endocrine disrupters, which can be highly toxic at extremely low doses, and are building up in our environment from many different sources—any serious study must address the cumulative and long-term effects of these endocrine disrupters in the environment, and to what extent HF contributes to this.

Is HF Too Risky to Use?

Although the Report doesn’t state it outright, the tenor is that we will be proceeding with HF and are trying to determine how best to mitigate the problems, no matter how serious they are determined to be. Several examples are p. 18, lines 32-33 “*...insight into ways to control this chemistry*” and p. 18, lines 43-44, and page 19, lines 1 to 3 “*After compiling and reviewing available data and knowledge on hydraulic fracturing.....ORD should identify how to best address any potential problems identified through this effort, such as water treatability issues and applicability of emerging treatment technologies.*”

This is completely the wrong approach. If EPA is undertaking a study to determine the impacts and risks of a set of procedures, the decision of whether or not they will be used should be based on the data obtained. It should not be a given that HF will proceed no matter the costs. This approach is guaranteed to bias the results before the study has begun.

We see two critical questions to be addressed in order to guide policy on gas extraction by HF:

- (1) How much risk to health and environment is acceptable before we say “No” ?
- (2) Can we learn enough about health and environmental effects—especially the effect on drinking water—to allow HF to proceed at this point? In other words, can we assess the risks thoroughly enough, and with enough confidence, to allow consideration of Question #1?

Question #1 is probably beyond the scope of the EPA study, although we would be happy to have the EPA address it. Question #2, however, must be considered the main purpose.

One key way to prioritize research questions is to always keep in mind the above two questions, and which research questions will best allow solid answers to Question #2. We think it is likely that the answer to Question #2 is “no” at this point, without longer-term study, but that remains to be determined. All research should remain focused on this ultimate question. In this respect, it is even more important to keep track of what we do not know, than to compile exhaustive lists of every detail that we do know,

especially with respect to mitigation of adverse affects. Mitigation of problems is extremely important, but could be done as smaller-scale research targeting specific problems, requiring smaller amounts of money, and therefore may not be the best use of the EPA's resources. Few researchers have the ability to address the larger picture—that is what we need the EPA to do. *We need the EPA to give us a clear understanding of the known risks being taken with gas extraction by HF and the magnitude of the known risks, and an honest appraisal of the unknown risks.*

If the US policy-makers are to keep the best interests of the citizens in mind—which is their duty--and not just profit-making by large (often multi-national) corporations, they must apply the precautionary principal. The policy-makers need the EPA's help to be able to do this. Because there is so much misinformation out there, so much money at stake, and such great potential for environmental and health devastation, this study must be done carefully and must be beyond reproach.

The Report reads as though a decision has already been made that gas extraction by HF is acceptable, and the EPA's job is to determine the details of mitigation and methodology that produce the least objectionable results. We would like to reframe the research to address the bigger question: do we know enough to be able to prove that gas extraction by HF is safe? This study needs to have a way for one possible valid outcome to be the answer "No." In any viable long-term scenario for the survival of humans on this planet, water is likely to become a more valuable resource than natural gas.

(4) Charge Question 3: Designing a Stakeholder Process:

Balance:

On p. 22, line 16, the Report discusses having a "*balanced, collaborative advisory group of stakeholders representing a broad range of perspectives.*" Generally when this type of statement is made in a government report, it means lots of people from industry, government, economic development groups, scientists getting funding from the gas industry, personnel from national environmental groups that receive money from the gas industry, and state regulators who work in a revolving door situation, with perhaps an actual environmentalist or health activist or two thrown into the mix.

If the EPA is serious about "balance" this scenario cannot be repeated. Instead, the EPA must actually balance the stakeholders between people in favor of proceeding with drilling and those opposed. That would provide true balance. Gas drilling is an issue with two fairly clear, opposing sides—this is not rocket science. Although it is possible to find a small range of views on each side, there is a clear split. Any balance must keep that major dividing line in view and choose equal numbers on both sides.

Furthermore, to provide true balance and not just balance on paper, the EPA will need to be sure people on both sides of this issue have equal access to the EPA. In general, this is not the case in Washington, D.C. as money translates to access, and money is enormously skewed toward the pro-drilling side of this debate. If input is to be truly balanced, the EPA will have to work very hard to overcome this inherent bias.

As one example, early in this process, the Scoping Materials were up for 11 days before the comments were due. Similarly, the comments on this Report were due approximately 3 weeks after it was issued. Even though we had commented on the scope, we received no notice that the Report was out.

This greatly favors organizations with a lot of money and personnel over people who are reading and commenting on this material after work and on a non-professional basis. Giving more time and more broad notice might have helped to overcome this bias. Once stakeholders are identified, it would be extremely helpful to communicate via mail or email, and not simply by posting notices in the Federal Register. The gas industry has many staff paid to monitor such news, but the average person does not, so this would further contribute to the existing bias. Because stakeholders are spread throughout the country, it also would be extremely helpful to use the EPA's regional offices for outreach. Every meeting held in

Washington, D.C., where large corporations, investors, and other people with more than the average amount of money and power have greater access, contributes more to the existing bias.

Reliance on State Records:

On p. 23, lines 14 to 16, the Report suggests that the EPA engage “*with relevant states to inventory and conduct performance evaluations of the effectiveness of state hydraulic fracturing regulatory, technological development and BMP activities.*”

This is clearly a case of putting the fox in charge of the henhouse. There are several serious problems with this approach. (1) State agencies have a self-interest in underreporting problems, and often do not even gather data on many environmental and health effects of hydraulic fracturing operations. In New York alone, Toxics Targeting has reported hundreds of cases of drinking water and other environmental contamination due to oil and gas operations that were not reported by the state or that were not mentioned in summaries of regulation success by the state.^{9, 10} (2) Many states are making a great deal of money by the leasing of state lands, and so have a conflict of interest with respect to gas drilling.

Furthermore, we would argue strongly that the best way to determine if state regulations are working is to examine the environment around gas drilling operations. This does not require guesswork or predicting the future, and does not rely on the reports of agencies with a vested interest in underreporting problems. The evidence should speak for itself.

In addition, we suggest that the EPA be careful, if using data from states, to ask not just what data on problems that they have found, but how they collected the data and what, specifically, they did and did not look for, what the reporting requirements are, and whether or not they relied on self-reporting by industry.

As an example of misleading information from states, consider the data on chemicals used in hydraulic fracturing provided by the New York Department of Environmental Conservation in its draft Supplemental Generic Environmental Impact Statement (dSGEIS) on shale gas drilling in the state. The dSGEIS states that many health effects of the chemicals to be used in HF in the state are not known (pp. 5-61 and 5-64). Furthermore, there are 45 products to be used for which DEC has incomplete ingredients (dSGEIS, Table 5.4) and 40 compounds whose ingredients are unknown because they are mixtures (dSGEIS p. 5-34). Nevertheless, the DEC concludes that there is not much to worry about regarding the health effects of HVHF, saying that there are no “potential exposure situations associated with horizontal drilling and high-volume hydraulic fracturing that are qualitatively different from those addressed in [a 1992 document called the GEIS].” *The GEIS, however, does not address health effects of hydraulic fracturing chemicals.*

Conclusions:

This EPA study is extremely important, but no matter how severe the health and environmental effects unearthed, we expect they will still be weighed by politicians against the perceived economic and energy supply benefits. This other half of the equation lacks as much solid scientific research as the health and environmental effects, and thus this research must be accompanied by a sister study that truly and carefully analyzes the net economic effect and the effect on energy supply and our future ability to kick the fossil fuel habit. In contrast to the statements on p. 22, lines 19 and 20, my reading has led me to the conclusion that shale gas drilling with HF brings net economic costs to the average person (see Headwaters study¹¹), does not contribute to energy security (see p. 10 in Krueger¹²), and will merely delay our vital and inevitable switch to fossil fuels. In the future, water will surely be a much more valuable resource than natural gas.

Thank you for considering these comments,

Sandy and Bill Podulka
153 Caroline Depot Rd.
Brooktondale, NY 14817

Endnotes:

- ¹The typical percentage of chemicals in hydraulic fracturing solutions for the Fayetteville Shale is reported as 0.44% by weight (SGEIS, Section 5.4.3, p. 5–44). 0.44% by weight of 5.6 million gallons is 205,000 lbs. (water weighs 8.34 lb./gallon). The SGEIS also states that chemical additives typically comprise 2% or less of the fracturing fluid (Section 5.4, p. 5–33). 2% by weight of 5.6 million gallons is 935,000 lbs.
- ²Penningroth, S. December 9, 2008. “Comments on Draft Scoping Document for Draft Supplemental Generic Environmental Impact Statement on Oil and Gas Drilling.” (See p. 6.)
[http://www.communityscience.org/documents/Gas Wells - Comments on scoping document for dSGEIS, Dec.pdf](http://www.communityscience.org/documents/Gas_Wells_-_Comments_on_scoping_document_for_dSGEIS,_Dec.pdf)
- ³HVHF one well one time requires about 1,540 tanker truckloads of water and waste, assuming 5.6 million gallons of water are used, truck capacity is 5,460 gallons, and half of the fracking fluid comes back out. This estimate of tanker truck size is based on road sizes and conditions in the Southern Tier of NY. Trucks could be somewhat larger or smaller, affecting the number of trips. 220 to 364 more trips are needed to bring in equipment, materials, and employees. [Moss, K. “Potential Development of the Natural Gas Resources in the Marcellus Shale.” National Park Service Geologic Resources Division. http://blogs.cce.cornell.edu/gasleasing/files/2008/12/grd-m-shale_12-11-2008_view.pdf]. So, assume 1,760 to 1,904 trips to build, drill, and HVHF one well. Old hydrofracturing requires 20,000 to 80,000 gallons of water. Making the same assumptions, this is 5 to 22 tanker truckloads of water and waste. Assuming the same number of trucks are needed to bring in equipment and materials as for HVHF (SGEIS, p. 6-138), 225 to 484 truck trips were required for each traditional well.
- ⁴<http://content.nejm.org/cgi/content/full/360/11/1085>
Jerrett, Michael, et al. 3/12/09 “Long-Term Ozone Exposure and Mortality.” *New England Journal of Medicine*, v. 360, n. 11, pp. 1085-1095.
- ⁵United States Department of Agriculture Agriculture Research Service. Accessed 4/28/10. *Effects of Ozone Air Pollution on Plants*. <http://www.ars.usda.gov/Main/docs.htm?docid=12462>.
- ⁶Thyne, G. December 20, 2008. “Review of Phase II Hydrogeologic Study.” (Report prepared for Garfield County, Colorado.) http://s3.amazonaws.com/publica/assets/methane/thyne_review.pdf
- ⁷Witter, Roxana, et al. Sept. 15, 2008. “Potential Exposure-Related Human Health Effects of Oil and Gas Development: A White Paper.” http://www.catskillcitizens.org/Gas_Drilling_health_2.pdf
- ⁸Witter, Roxana, et al. August 1, 2008. “Potential Exposure-Related Human Health Effects of Oil and Gas Development: A Literature Review (2003-2008).”
<http://www.ccag.org.au/images/stories/pdfs/literature%20review%20witter%20et%20al%202008.pdf>
- ⁹Toxics Targeting Letter to DEC Commissioner Grannis, April 2, 2010:
<http://www.toxicstargeting.com/MarcellusShale/documents/dec-letter>
- ¹⁰Toxics Targeting Letter to NY Governor Paterson, November 9, 2009.
http://www.toxicstargeting.com/MarcellusShale/coalition_letter

- ¹¹ Headwaters Economics. 2009. "Fossil Fuel Extraction as a County Economic Development Strategy: Are Energy-focusing Counties Benefiting?"
http://www.headwaterseconomics.org/energy/HeadwatersEconomics_EnergyFocusing.pdf
- ¹² Krueger, Alan B. October 15, 2009. Remarks at *American Tax Policy Institute Conference*, Washington, DC. <http://www.ustreas.gov/offices/economic-policy/AK-ATPI-1015.pdf>