Food & Water Watch • 1616 P St. NW, Suite 300 • Washington, DC 20036
T +202.683.2500 • F +202.683.2501 • www.foodandwaterwatch.org

Remarks of Hugh MacMillan, Senior Researcher, Food & Water Watch

February 1, 2016

To the members of the EPA SAB and the Hydraulic Fracturing Scientific Advisory panel,

Thank you for your consideration of my comments on the January 7, 2016 draft report.

I have a PhD in applied mathematics from the University of Colorado at Boulder. I spent ten post-graduate years as a computational scientist. Then, after one year as a scientific advisor in Congress, I joined Food & Water Watch as a researcher.

I am an activist scientist, in the sense that I work to prevent incrementalism from becoming a virtue when science demands urgency on an issue.[1]

At Food & Water Watch, we organize and fight for safe and affordable food and water for all. That means we organize and fight for democracy and justice.

The people who've been affected in Pavillion, Dimock, Parker County and other locations, do not view their cases as closed. I'm pleased you will hear again from many of them today.

Know that they are speaking for many others who have been silenced in settlement agreements.

Food & Water Watch will continue to call for the EPA to resolve these cases.

As the panel knows, there's more to the "widespread, systemic" line than the generic dictionary meanings of these words.

In our original written comments from August, Food & Water Watch encouraged EPA to make the definition of "widespread, systemic" explicit and quantitative.

If data allow it, a star plot of what would constitute "widespread, systemic" would be informative — each spoke, or dimension, in the plot could show the frequency of one type of fracking or fracking-related impact.

But there is more than just being quantitative, there is the question of scale. Perhaps widespread and systemic, at a national scale, should not be where we set the bar.

In Flint, Michigan, lead poisoning in the water is widespread and systemic.

At the Aliso Canyon storage facility in Porter Ranch, California, there's widespread and systemic aging and deterioration of Sempra Energy's fleet of natural gas storage wells.

[1] This is borrowing from the author Ta'Nehisi Coates.

In both cases there are also hard numbers to quantify what widespread, systemic means.

Also, the quantitative meaning in each example is tied to the scale of the system in question — whether it's the population of Flint, or the number of Sempra Energy storage wells.

I would also like to comment on what must have been behind the "widespread, systemic" line.

At the end of the second day of your meetings in October, after many of you broke out in applause, I suggested that the line appeared to be a late intervention in the framing of the study, from someone apart from the EPA's core writing team.

Since then, we took a deep look at the historical and political context of the EPA's hydraulic fracturing study. We made a timeline to try to help everyone — including us — understand what is happening. (See https://goo.gl/EP4g9h).

Stepping through the web-based timeline it becomes evident that the tension today over the "widespread, systemic" line has simple roots.

It boils down to what definition of energy security should we follow?

The oil and gas industry and big banks have big stakes in equating energy security with widespread fracking, to maximize oil and gas production.

The "no widespread, systemic impacts" topline from the June draft assessment legitimizes this vision of energy security.

Now, when I say widespread fracking, I mean fracking on the order of ten wells per square mile, throughout a region, to maximize the surface area exposure created by multi-stage fracturing. The general sense is that it would take decades to do if all goes as planned.

So, widespread fracking is defined quantitatively, and on a regional scale.

It may remain an unknown known, as far as how the June draft took its shape, but we think that equating widespread fracking with energy security is what led the Obama EPA to clumsily dismiss past harms as "vulnerabilities" and to dismiss impacts as not "widespread."

We think it's time to rethink that definition of energy security.

Beyond the direct impacts on communities, the problem with equating widespread fracking with energy security is the scientific consensus on our climate, and on climate pollution.

Through climate change, widespread fracking will bring forth unacceptable threats to our food, water, health and economic security. To have a decent chance of staying well below 2

degrees C, and stabilizing below 1.5 degrees C, there's simply no room in the carbon dioxide budget. Science is clear we must maximize what we keep in the ground.

True energy security will only come when we are meeting our energy needs without destabilizing the climate, and without giving up health and welfare along the way.

Now, finally, I have some specific comments on language in the draft report, and I sincerely thank you for your consideration and time on them:

Page 2, line 10: Re "conducting fields studies in order to develop a much more comprehensive exposure database," it should be made explicit that an aspect of such a database is accurate characterizations of subsurface fluid fate and transport parameters.

Page 4, lines 34-41: The words "improvements," "accomplishments," and "can minimize" presume data that is known to be limited and uncertain. "Toward reducing" is preferable to "that can minimize" on line 36. "Changes" is preferable to "improvements" on line 41. Also, for lines 37 through 40, it is most accurate to state: "Also, the draft Assessment Report should summarize how technological and regulatory oversight have evolved since 2012, with respect to well construction, well integrity, well injections. "

Page 11, line 25: EPA, and the public, would benefit from the panel expounding on "the limitations of such models" or reference where such limitations have been addressed in the EPA SAB report.

Page 17, line 19: Here the report refers to "findings in prospective … investigations" but to date there has been no progress toward carrying out prospective investigations. This should be addressed.

Page 24, line 31: Again, the use of "improved" should not be used unless supported by data. "Altered" or "changed" would be objective and accurate.

Page 30, lines 27-40: More accurate to say "increase water re-use" than "improve water re-use." This discussion raises the question of how much of water use is water re-use and what are estimates of localized limits on that quantity assuming large increases in water re-use?

Page 31, line 22: The mention of "benefits" here is a reference to acid mine drainage. This should either be dropped or be made clear that this is the sole source of "benefits" being referenced; otherwise, readers will not understand how "water use" for hydraulic fracturing might be considered to have benefits.

Page 46, line 33: The term "minimizing to the extent possible" would be more informative than "minimizing," as it would recognize that the actual minimum is not known, and in fact a matter of probability.

Page 47, lines 5-7: The word "changes" suffices. The text needn't describe the evolution of methods and practices used in hydraulic fracturing and related activities as "improvements" and "accomplishments" without data on incidence frequency and severity. Would requiring FracFocus reporting be a regulatory "improvement", for example? We would make the case that it sets up a performance of transparency, due to lack of complete disclosure, and that that might not prove to be an improvement.

Page 48, line 23: The discussion should include a statement on what is known about how the probabilities of risks have changed, in order to clarify the implicit statement that changes in practices have "changed the probability of risk… ."

Page 50, line 34: Clarification is needed for the phrase "critical in diffusing migration pathways." Perhaps rather than say "can be critical in diffuse" just say "may diffuse" or "would be expected to diffuse."

Page 50, line 47 to page 51, line 1: Is "improved over time to help mitigate such gas instances" a reference to what are known as reduced emissions completions? Also, is this a reference to leaks from within annular regions of cement, or from outside of the cement at the well site and adjacent to the well site?

Page 54, lines 5-6: Perhaps inherent limitations to understanding — epistemic and economic — should be recognized when making this statement about "the importance of understanding the regional geology of an area prior" to widespread hydraulic fracturing.

Page 58, lines 24-25: Again, "improvements" given the uninformed reader a sense that impacts are being minimized with regulatory improvements when data are lacking. It is best to leave this request without presupposing judgment and narrowing discussion.

Page 63, line 33: Re "generally do not"….Does this mean not a trace? Our understanding is that the time-release of injected chemicals and any reactive byproducts of injected chemicals is not resolved to this level of certainty.

Page 64, lines 7-12: Comparisons to conventional gas are moot. At present, unconventional gas is what makes up almost all of the non-oil-associated natural gas being targeted by the U.S. oil and gas industry.

Page 69, lines 21 to 27: Thank you for making this recommendation. The SAB may wish to include a brief discussion of how a selected model structure corresponds to a high-dimensional parameter space, and that Moridis repeated simulations of the model for different points in the high-dimensional parameter space to explore model outcomes. That could then be followed by a discussion of the "curse of dimensionality" and what it, and what current limits on super-computing, mean for the prospect simulating scenarios beyond just a single well, such as widespread fracking on a regional scale.

Page 70, line 20: Calling the incident reports and disclosures of different states "advancements in electronic databases" overstates the ease with which these disclosure sites can be navigated and searched and the extent to which the disclosure reports are informative of the significance of resulting impacts.

Page 81, line 28: The word "removed" implies removal in totality. Perhaps reduced (concentration) would be most accurate.

Thank you sincerely for the years of work overseeing the scientific integrity of this process,

Hugh MacMillan