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Remarks of Dr. Hugh MacMillan, Senior Researcher, Food & Water Watch
Re the EPA SAB panel's second-draft peer-review report

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To the members of the Hydraulic Fracturing Scientific Advisory panel,

Thank you for your consideration of these comments on the second draft of your report, and congratulations for being so close to sending your final report to the EPA, to the Obama administration, and to the public.

Mr. Hufford's dissent

In his respectful dissenting opinion, regarding the agency's controversial topline, Mr. Hufford states that the June draft "could have articulated the agency's statistical assessment more clearly."

I think most everyone agrees on this point, judging by the applause at the end of the second day of the meetings in October, and judging by the support for the statement still in this panel's peer-review report, which recommends that EPA clarify the "widespread, systemic" line.

Mr. Hufford, I look forward to hearing your clarifying contributions today, but my understanding is that you do not think improved articulation of "the agency's statistical assessment" is necessary.

You agree that EPA plainly "did not find evidence of widespread, systemic impacts" and you think that the EPA's "holistic conclusion," as you put it, is fine as is, without clarification.

This is where Food & Water Watch begins to disagree with you.

First, we feel it is paramount that the EPA be clear about the quantitative basis of its claims. Doing so lends credibility to the agency's claims.

We agree with the rest of the panel that it is entirely appropriate to ask EPA for clarification. Is the bar set at impacts being widespread, systemic, nationwide, every year? Is it set at widespread, systemic, in any one of many counties, after 5-7 years of widespread and intensive drilling and fracking?

There is a significant difference between these two senses of scale.

We further urge this panel to ask the EPA to add to its assessment what an unacceptably "widespread, systemic" array of impacts might look like — perhaps, as we suggested in our comments in August, by using a star plot, with a radial semi-axis for each of the types of potential impacts.

Second, when it comes to our drinking water resources — our rivers, lakes and aquifers — should the EPA really use "widespread, systemic impacts" as a threshold for triggering concern?

Food & Water Watch doesn'tt think so. In recent years, the EPA has called impacts "widespread" when they reach near 20 percent (under various sampling schemes). In Flint, Michigan, the contaminated drinking water is widespread and systemic, and it's criminal.

Supporters of the final draft assessment's topline hold it up as proof that current (though fought at every step) state regulation of oil and gas industry injections is going just fine, and totally suffices.

There's history here, and my written testimony for today links to a timeline useful for understanding that history, and understanding what's shaped this study. (https://goo.gl/ZX3YiH)

This leads us to our third comment: what is this "holistic" point of view that led the EPA to choose its topline conclusion?

Mr. Hufford calls the EPA's "widespread, systemic" line a "holistic conclusion" —it's supposedly comprehensive with the big picture point of view. But this so-called "holistic" view happens to leave out what the topline really is, and what it really entails.

It's a promise and commitment toward maximizing North American oil and gas production — through widespread, systemic fracking. It's a promise to promote widespread fracking in the false name of North American energy security, and at the expense of the stability of our climate.

Note that when we say widespread fracking, we mean on the order of ten wells per square mile, for many thousands of square miles. We define what we mean.

The problem with equating widespread fracking with North American energy security is that it also means decades more climate pollution, bringing dangerous and disruptive climate change impacts, including food and water insecurity.

That's what you see if you take a truly "holistic" view. That's our "holistic conclusion."

As one panelist put it back in February, the EPA made a choice when it ran with the "widespread, systemic" line, and it didn't have to make that choice.

Use of the term "potential"

An additional comment we would like to emphasize is that the second draft report is inconsistent in places with respect to its use of "potential" as a qualifier of conceivable impacts.

A careful review of the use of this word is in order, and perhaps "potential impact" should be defined in the report, and in the EPA's finalized assessment, to clear up any confusion for the public. (See below additional, specific comments by line number.)

We suggest that "potential impacts" be defined as impacts that have the potential to occur, based on knowledge of what could occur and what has occurred."

That would help the public avoid interpreting each statement of the phrase "potential impacts" in error, as only a reference to hypothetical, undemonstrated impacts.

Asking EPA to critically analyze of sources of data gaps and uncertainties

From the first to second draft, there is an important shift in focus toward simply asking the EPA to simply state what the obstacles and complications are to reducing data gaps and uncertainties.

This clarifying shift appears in most charge questions for the different realms of potential impacts on water resources.

Mr. Hufford argues that there is sufficient data, it's just not in a format amenable to analysis.

We agree that the EPA should reconcile and report on all sources of data gaps and uncertainties.

Some history on this issue is important for people to know, so they can appreciate how it is that the EPA SAB, seven years into the study, is still asking for clarity on such a basic question: what are the reasons for the data gaps and uncertainties?

Back in 1980, the Reagan EPA began reviewing issues with spills, releases and hazards associated with managing drilling and hydraulic fracturing wastes, and after seven years determined that it was O.K. to not regulate these wastes as hazardous.

This action exempted drilling and fracking wastes from being covered as hazardous under the Resources Conservation and Recovery Act.

Back in 2004, the Bush EPA released a study focused on hydraulic fracturing for coalbed methane production. The administration's topline was that no more study was needed.

That determination led to Congress exempting most hydraulic fracturing from the basic protections that are outlined under the Safe Drinking Water Act for other oil and gas industry injections — that exemption became known as the Haliburton Loophole, given Dick Cheney's path from Haliburton CEO to Vice President.

A third important reason why data gaps and uncertainties persist is sealed court documents tied to settlement agreements between drilling and fracking companies and private citizens claiming harmful impacts.

I'm pleased you will hear again from people who have not been so silenced. Food & Water Watch will continue to call for the EPA to resolve and reconcile contamination cases.

Now, it's a testament to this history, and to the entrenched political and economic power of the oil and gas industry, that today the EPA SAB is reduced to simply asking the Obama EPA to at least outline what could be done to better identify and fill in the data gaps, toward ultimately reducing the known uncertainties.

Historical and political context on the EPA's study and how we define energy security

Food & Water Watch took a deep look at the historical and political context of the EPA's hydraulic fracturing study, and we made a timeline to try to help everyone — including us — understand what shaped the June draft assessment. (https://goo.gl/ZX3YiH).

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's become an ill-fated definition of U.S. energy security.

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

We think that equating widespread fracking with energy security is what led the Obama EPA to be so clumsy — in the eyes of the EPA SAB — in dismissing past harms as "vulnerabilities" and to dismissing impacts as not "widespread" and "systemic."

The EPA knew it was imprinting the notion that fracking's impacts on drinking water are not really a problem.

As headlines ran with the no "widespread, systemic" topline, one of the officials involved in the roll out wrote, four days after the June release, "[hydraulic fracturing] news clips continue to appear to be as expected and mostly fair in my opinion."

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.

We think it's time to rethink the definition of energy security that led to the controversial topline.

True energy security will only come when we are meeting our energy needs without destabilizing the climate, and without giving up health and welfare in communities across the country.

Additional, more specific comments

Thank you for your consideration and attention to the below additional, more specific comments on the text of the second draft of your peer-review:

> Page 1, line 24 of the redlined second draft cover letter: Toward consistence in meaning and use of "potentially," it would be most accurate to insert "has resulted or" before "potentially."
>
> Page 3, line 23 of the redlined second draft cover letter: Is acquisition at end of sentence a reference to acquisition by companies for more hydraulic fracturing injections? Perhaps replace "acquisition" with "availability, including acquisition for more hydraulic fracturing" if so.
>
> Page 4, line 2 of the redlined second draft cover letter:
> Why just mention the potential impacts from techniques deemed "poor"? Perhaps it would be most accurate to state "… various techniques, including some no longer be allowable in some states" assuming that is the case.
>
> Page 5, line 7 of the redlined second draft cover letter**:** "Toward reducing" or "that aim to minimize" is preferable to "that can minimize" given lack of understanding of what is the minimum impact, and what the timescale is on achieving that minimum impact. For example of "aim to minimize" already used by EPA SAB, see page 10, line 19 of the redlined second draft report.
>
> Page 3, line 31 of the redlined second draft report**:** Here is an example where "potential" has been inserted while the potential impacts being referenced in the

sentence have clearly occurred, and are not just hypothetical. This is an example for why Food & Water asks that EPA "potential impacts" be defined.

Page 4, line 28 of the redlined second draft report**:** 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 made clear here, or the reference to "prospective" should be dropped.

Page 6, lines 37-41 of the redlined second draft report: The words "improvements," "accomplishments," and "can minimize" presume data known to be limited and uncertain. "Changes" is preferable to "improvements" on line 40. EPA SAB may deem it best to simply 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. " This comment is relevant to page 54, lines 34 -40.

Page 14, line 46 - page 15 line 1 of the redlined second draft report**:**
EPA SAB should consider dropping "that" in line 1 and adding "how" after "state" in line 46. (This change should also be made at page 56 lines 23-24.

Page 15, line 26 of the redlined second draft report**:** The public, would benefit from the panel expounding on "limitations," perhaps with two or more descriptors. (Abstracting from page 63.).

Page 15, line 39 of the redlined second draft report**:**
At the end of "required" it would be clarifying to add "toward ensuring that the integrity of a given well will endure." In the previous sentence, it appears the EPA SAB is trying to say that "more responsible (for lack of a better word) well construction and operations practices have reduced impacts." If so, this should be tied to data that supports it, with critical analysis.

Page 16, lines 8-10 of the redlined second draft report**:**
This is an important point worth emphasizing.

Page 27, line 7 of the redlined second draft report**:**
Here is an example of the word "potential" being struck in a manner inconsistent with its use elsewhere in the peer-review report..

Page 31, lines 2-3 of the redlined second draft report**:**
This is a place where the language used elsewhere, such as "aim to reduce impacts" or "aim to minimize impacts," would be most accurate, rather than give impression of great improvements made. For example, see page 33, lines 17-18.

Page 37, lines 1-15 of the redlined second draft report**:** This paragraph raises the question: How much of water use comes from water re-use and what are estimates of localized limits on that quantity assuming large increases in water re-use? Is the

EPA SAB proposing that sinking money into infrastructure to facilitate water re-use encourages water re-use "could be a major finding that might inform development of this technology in other areas"? So, the "technology" is the infrastructure that comes with widespread, systemic fracturing coupled with collective dedication to water re-use?

Page 35, line 28 of the redlined second draft report**:** 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 with respect to water supply balances.

Page 55, lines 6 -10 of the redlined second draft report: See comment for page 6. 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? The case can be made that FracFocus sets up a performance of transparency, due to lack of complete disclosure, and that that might not prove to be an improvement.

Page 59, line 3 of the redlined second draft report**:** Clarification is needed for the phrase "critical in diffusing migration pathways." Perhaps rather than say "can be critical in diffusing" just say "may diffuse" or "would be expected to diffuse" and clarify what is being diffuse — "migration pathways" or something chemical in nature.

Page 59, line 21 of the redlined second draft report**:** Is "improved over time to further mitigate such gas release incidences" a reference to what are known as reduced emissions completions? That should be stated if so. Or, is "such gas release incidences" 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 63, lines 31-34 of the redlined second draft report**:** 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 63, line 35 of the redlined second draft report**:** The 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 83, line 33 of the redlined second draft report**:** Calling the incident reports and disclosures of different states "advancements in electronic databases" suggests, wrongly we feel, that these disclosure sites can be navigated and searched with ease, and it overstates the extent to which the disclosure reports are actually informative of the significance of resulting impacts.

Thank you again for your attention to these comments, and for the years of work you have done overseeing the scientific integrity of this process,

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[1] My Ph.D. is in Applied Mathematics from the University of Colorado at Boulder, from 2001, for numerical analysis research on an inverse problem (generally, such problems are when parameters that define the governing partial differential equation of some dynamic system are sought, given sparse data). My research as an academic focused on computational challenges modeling of molecular and genetic factors in the production of neurons from neural stem cells, and modeling the biogeochemistry of constructed wetlands for waste disposal treatment. I joined Food & Water Watch in 2011, after spending one year working in Congress, as an aide and science advisor, owing to the American Association for the Advancement of Science fellowship program.