

Meeting Discussion Notes from Members of the EPA Science Advisory Board (SAB) Panel for the Review of EPA's Hydraulic Fracturing Study Plan

Presented at March 8, 2011 Public Meeting
Westin Alexandria Hotel located at 400 Courthouse Square, Alexandria, VA, 22314

Charge Question 5: Research Outcomes

If EPA conducts the proposed research, will we be able to:

- a. Identify the key impacts, if any, of hydraulic fracturing on drinking water resources; and
- b. Provide relevant information on the toxicity and possible exposure pathways of chemicals associated with hydraulic fracturing?

I. The following text was projected onto the viewing screen at the March 8, 2011 meeting during the Charge Question 5 discussion on overall toxic effects:

1. What is the potential for HF ingredients to migrate to drinking water based on chemical/physical properties and amount used by industry?
2. What is the quality of the information?
3. What exposures have been identified?
4. What are the potential health effects from chemicals associated with HF?
5. What is the quality of that information?

Potential products

1. Use 1 to develop a list of known or expected chemical/physical properties of HF chemicals.
2. Use 1 and 2 to identify potential indicator compounds or for testing drinking water sources for contamination.

3. Use 3 to prioritize ingredients for additional toxicologic testing (probably at a later date).
4. Use 4 and 5 to develop a list of known or predicted health effects by chemical (include potency?).
5. Use 4 and 5 to provide qualitative information about potential health effects for different HF formulations being used and/or suggestions to consider for reformulating HF

Potential usefulness of products – high, low

1, 2 and 3 – high

4 and 5 - low

II. The following PowerPoint presentation was projected onto the viewing screen at the March 8, 2011 meeting during the Charge Question 5 discussion on Research Outcomes:

If EPA conducts the proposed research, will we be able to:

a. Identify the key impacts, if any, of hydraulic fracturing on drinking water resources?

b. Provide relevant information on the toxicity and possible exposure pathways of chemicals associated with hydraulic fracturing?

6.1 POTENTIAL RESEARCH OUTCOMES: WATER ACQUISITION

Identify possible impacts on water availability and quality associated with large volume water withdrawals for hydraulic fracturing.

Determine the cumulative effects of large volume water withdrawals within a watershed and aquifer. **[Highly site-specific.]**

Develop metrics that can be used to evaluate the vulnerability of water resources.

Provide an assessment of current water resource management practices related to hydraulic fracturing. **[What does this mean? An assessment or a survey?]**

6.2 POTENTIAL RESEARCH OUTCOMES: CHEMICAL MIXING

Summarize available data on the identity and frequency of use of various hydraulic fracturing chemicals, the concentrations at which the chemicals are typically injected, and the total amounts used.

Identify **what is known about** the toxicity of **some** chemical additives, **estimate toxicity of other additives based on QSARs**, and apply tools to prioritize data gaps and identify chemicals for further assessment.

Identify a set of chemical indicators associated with hydraulic fracturing fluids and associated analytical methods.

Determine the likelihood that surface spills will result in the contamination of drinking water resources, **taking into account operational and site-specific hydrogeological conditions.**

Assess current management practices related to on-site chemical storage and mixing. **[If a broad survey of such practices is conducted.]**

6.3 POTENTIAL RESEARCH OUTCOMES: WELL INJECTION

Determine the frequency and severity of well failures, as well as the factors that contribute to them. **[If a broad survey of such practices is conducted.]**

Identify the key conditions that increase or decrease the likelihood of the interaction of existing pathways with hydraulic fractures. **[Can any such results be generalized in a useful way?]**

Evaluate water quality before, during, and after injection. **[Of local potable water source? Very low chance of success.]**

Determine the identity, mobility, and fate of **some** potential contaminants, including fracturing fluid additives and/or naturally occurring substances (e.g., formation fluid, gases, trace elements, radionuclides, organic material) and their toxic effects, **and identify research needs for other potential contaminants.**

Develop analytical methods for detecting chemicals associated with hydraulic fracturing events. **[Worthwhile at this stage?]**

6.4 POTENTIAL RESEARCH OUTCOMES: FLOWBACK AND PRODUCED WATER

Compile **available** information on the identity, quantity, and toxicity of **indicator** flowback and produced water components.

~~Develop analytical methods to identify and quantify flowback and produced water components.~~

Provide **preliminary estimates of the likelihood and magnitude of potential exposure to inform the need for further investigations of human health effects** ~~a prioritized list of components requiring future studies relating to~~ toxicity and human health effects.

~~Determine~~ **Provide a risk-based assessment of** the likelihood that surface spills will result in the contamination of drinking water resources.

Evaluate risks posed to drinking water resources by current methods for on-site management of wastes produced by hydraulic fracturing **(including spills)**.

6.5 POTENTIAL RESEARCH OUTCOMES: WASTEWATER TREATMENT AND WASTE DISPOSAL

Evaluate **effectiveness of** current treatment and disposal methods of flowback and produced water resulting from hydraulic fracturing activities.

Assess the short-**term** and **identify possible** long-term effects resulting from inadequate treatment of hydraulic fracturing wastewaters.

If EPA conducts the proposed research, will we be able to:

a. Identify the key impacts, if any, of hydraulic fracturing on drinking water resources?

Under typical conditions? BMP conditions? Worst-case scenario conditions?

If EPA conducts the proposed research, we hope to be able to:

- Identify possible impacts of HF [much already done]; and
- **Identify conditions [if any] under which the impacts are likely to be significant, estimate the likelihood that those conditions will occur, and estimate the magnitude of the effect.**

If EPA conducts the proposed research, will we be able to:

b. Provide relevant information on the toxicity and possible exposure pathways of chemicals associated with hydraulic fracturing?

If EPA conducts the proposed research, we hope to be able to:

Identify chemicals and pathways that can lead to significant human exposures to chemicals associated with HF;

Prioritize possible toxicological or other health effects studies that are needed based on the exposure analysis.

If EPA conducts the proposed research, we will be able to:

c. Identify environmental justice issues, if any, associated with current HF practices, and identify possible approaches for dealing with those issues.