UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
RESEARCH AND DEVELOPMENT

February 8, 2011

MEMORANDUM

SUBJECT: Request for review of the *Draft Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources*

FROM: Fred S. Hauchman, Director
Office of Science Policy (8104R)

TO: Edward Hanlon, Designated Federal Officer
EPA Science Advisory Board Staff (1400R)

This memorandum requests that the Science Advisory Board (SAB) review and comment on the EPA Office of Research and Development's (ORD) *Draft Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources.* The purpose of this draft study plan is to identify research activities that will answer the following questions:

- Can hydraulic fracturing impact drinking water resources?
- If so, what are the conditions associated with the potential impacts on drinking water resources?

Background

Hydraulic fracturing, which involves the pressurized injection of water, chemical additives, and proppants into geological formations, induces fractures in the formation that stimulate the flow of natural gas or oil, thus increasing the volume of gas or oil that can be recovered from coalbeds, shales, and tight sands. As natural gas production has increased, so have concerns about the potential environmental and human health impacts of hydraulic fracturing in the U.S., particularly with respect to drinking water resources. In its Fiscal Year 2010 Appropriation Conference Committee Directive to EPA, the U.S. House of Representatives urged EPA to conduct a study of hydraulic fracturing and its relationship to drinking water, specifically:

> *"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 March 2010, EPA asked the SAB to review an initial research scoping document related to hydraulic fracturing.[1] This document outlined the initial approach for determining the scope of the study, potential research questions, and an initial approach for conducting the study. In its response to EPA[2] in June 2010, the SAB endorsed a lifecycle approach for the study plan, and recommended that: (1) initial research be focused on potential impacts to drinking water resources, with later research investigating more general impacts on water resources; (2) five to ten in-depth case studies be conducted at "locations selected to represent the full range of regional variability of hydraulic fracturing across the nation"; and (3) engagement with stakeholders occur throughout the research process.

Following the receipt of the SAB comments in June 2010, EPA developed the attached *Draft Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources.* The draft plan focuses on the full lifecycle of water in the hydraulic fracturing process, from water acquisition, through the mixing of chemicals and actual fracturing, to the post-fracturing stage, including the management of flowback and produced water and its ultimate treatment and/or disposal. The research questions outlined in the study plan address how activities in each of these stages may impact drinking water resources. EPA has identified these research questions from stakeholder meetings and a review of the existing literature on hydraulic fracturing. Stakeholders have also helped EPA to identify the potential case study sites discussed in the draft study plan.

Specific Request

ORD requests that the SAB comment on the scope, proposed research questions, research approach, research activities, and research outcomes outlined in the *Draft Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources.* Comments from the SAB will be considered during the development of the final plan to study the potential impacts of hydraulic fracturing on drinking water resources.

We appreciate the efforts of the SAB to prepare for the upcoming review of the *Draft Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources*, and we look forward to discussing the plan in detail on March 7-8, 2011. Questions regarding the enclosed materials should be directed to Susan Burden at burden.susan@epa.gov or 202-564-6308.

Charge to the SAB

We ask the SAB to focus on the questions below during the review of the *Draft Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources:*

1. **Water Use in Hydraulic Fracturing**

   EPA has used the water lifecycle shown in Figure 7 to characterize hydraulic fracturing and to identify the potential drinking water issues. Please comment on the appropriateness

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[1] http://yosemite.epa.gov/sab/sabproduct.nsf/0/3B745430D624ED3B852576D400514B76/$File/Hydraulic%20Frac%20Scoping%20Doc%20for%20SAB-3-22-10%20Final.pdf

[2] http://yosemite.epa.gov/sab/sabproduct.nsf/0/CC09DE2B8B4755718525774D0044F929/$File/EPA-SAB-10-009-unsigned.pdf

of this framework for the study plan. Within the context of the water lifecycle, does the study plan adequately identify and address the areas of concern?

2. **Research Questions**

   EPA has identified both fundamental and secondary research questions in Table 2. Has EPA identified the correct research questions to address whether or not hydraulic fracturing impacts drinking water resources, and if so, what those potential impacts may be?

3. **Research Approach**

   The approach for the proposed research is briefly described in Chapter 5. Please provide any recommendations for conducting the research outlined in this study plan, particularly with respect to the case studies. Have the necessary tools (i.e., existing data analysis, field monitoring, laboratory experiments, and modeling) been identified? Please comment on any additional key literature that should be included to ensure a comprehensive understanding of the trends in the hydraulic fracturing process.

4. **Proposed Research Activities**

   Proposed research activities are provided for each stage of the water lifecycle and summarized in Figure 9. Will the proposed research activities adequately answer the secondary questions listed in Table 2 for each stage of the water lifecycle? Please provide any suggestions for additional research activities.

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?

Attachment: *Draft Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources*