

# Potential Relationships Between Hydraulic Fracturing and Drinking Water Resources

## *Initial Approach to Study Design and Stakeholder Involvement*

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## Directive to EPA from the FY10 Appropriation Conference Committee

*“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.”*

# Steps in Study Design

- Define scope of study
- Identify key research questions
- Evaluate background information, literature, and data relevant to research questions to identify research and information needs
- Develop initial framework for study and criteria for prioritization
- Prioritize research and develop initial study design
- Engage stakeholders to inform study design
- Peer review initial study design and revise as needed
- Implement study
- Monitor and report progress
- Develop research products: data, models, methods, tools, technologies
- Peer review research products

# Potential Elements of the Study

- Collection of background data and information
- Chemical characterization
- Case studies
- Technology assessment, modeling and tool development



# Information About the Science Advisory Board Meeting

- **Major Types of Stakeholders Participating on April 7-8, 2010:** Other Federal agencies, States and State agencies, local governments, non-governmental organizations and associations, public interest groups, industries, industrial organizations and associations, and private citizens
- **Number of Oral and Written Comments:** 64 written comments, 15 oral statements
- **Release Date of the SAB's Draft Report:** Thursday, May 20, 2010
- **Anticipated Release Date of the SAB's Final Report:** At least one month after the June 16, 2010 review by the Chartered SAB; therefore, July at best
- **For more information:** <http://www.epa.gov/sab>

# Charge Questions for the Science Advisory Board (SAB)

## 1. Scope

- What recommendations does the SAB Environmental Engineering Committee (EEC) have regarding the scope of the study?

## 2. Research questions and prioritization

- a. What recommendations does the SAB EEC have regarding the research questions identified?
  - Characterization of Hydraulic Fracturing Lifecycle
  - Potential Relationships to Drinking Water Resources
  - Potential Health & Environmental Risks
- b. What process does the SAB EEC suggest for prioritizing research needs given the Congressional request and a desire by the Agency to complete initial research products by the end of calendar year 2012?

## 3. Stakeholders

- What advice does the SAB EEC offer for designing a stakeholder process that provides for balanced input in developing a sound scientific approach for the overall research strategy?

# SAB Response to Charge Question 1: Scope

*What recommendations does the SAB EEC have regarding the scope of the study?*

- Short-term research should be directed to study sources and pathways of potential impacts of hydraulic fracturing on water resources, especially drinking water resources
- Use a lifecycle framework to identify the most important research questions
- Emphasize environmental concerns that are specific to hydraulic fracturing rather than on concerns that are common to all oil and gas production activities



# SAB Response to Charge Question 2(a): Research Questions

*What recommendations does the SAB EEC have regarding the research questions identified?*

## Characterization of the Hydraulic Fracturing Lifecycle

- Careful compilation and review of all available data and knowledge available in peer-reviewed literature, in industry, in professional and non-governmental organizations, and government agencies
- Water resources should be the central theme
- Current and potential sources of drinking water are recommended starting points and priorities, however other potential impacts on water resources related to aquatic ecosystems should eventually be investigated



# SAB Response to Charge Question 2(a): Research Questions

*What recommendations does the SAB EEC have regarding the research questions identified? (Cont.)*

## Potential Relationships to Drinking Water Resources

- It is important to inventory all available data
- Identify reasonable short-term goals and accomplishments (1-3 yrs) and long-term goals and accomplishments (5-10+ yrs)
- Use a case-study approach: provides valuable exchange of information between resource development companies and citizen groups
- Apply a broad definition of drinking water resources, including surface waters, underground sources of drinking water, and potential sources of drinking water

# SAB Response to Charge Question 2(a): Research Questions (cont.)

*What recommendations does the SAB EEC have regarding the research questions identified? (Cont.)*

## Potential Health and Environmental Risks

- These risks can only be assessed until sources and pathways of exposure are better understood
  - Characterization of the composition and variability of source fluids, flowback water and produced water
  - Assessment of synergistic effects of chemical mixtures in fracking fluids and with geologic materials in fracked zone
  - Potential pathways of exposure, transport pathways
  - Identification of most likely conditions leading to impacts on drinking water resources
- Assess impacts on water quantity as well as quality

## SAB Response to Charge Question 2(b): *Prioritization*

*What process does the SAB EEC suggest for prioritizing research needs given the Congressional request and a desire by the Agency to complete initial research products by the end of calendar year 2012?*

- Critical evaluation of all available data and information
- Prioritize research toward the reactions and transport of hydraulic fracturing fluids in complex subsurface environments including characteristics of the injected fluids, reactions occurring in the injected zone, and pathways for exposure



# SAB Response to Charge Question 2(b): *Prioritization*

*What process does the SAB EEC suggest for prioritizing research needs given the Congressional request and a desire by the Agency to complete initial research products by the end of calendar year 2012?*

## Fundamental questions

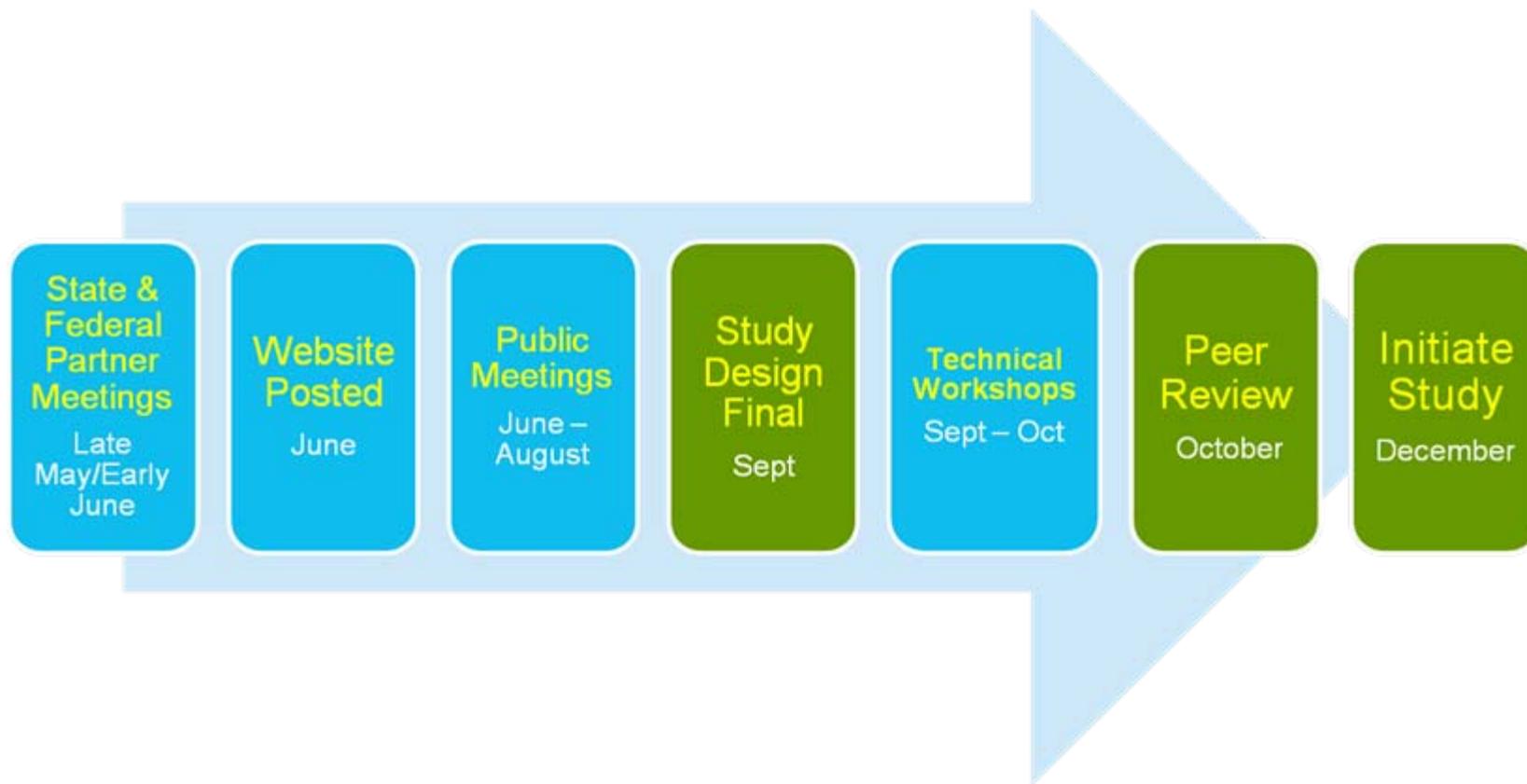
- What are the fundamental physical and chemical processes below and above ground?
- What is the quantity and quality of injected fluids, flowback and produced water? Mass balances for water and constituents of concern?
- How does TDS vary among flowback and produced water?
- What do field case studies tell us about fate and transport of fluids and contaminants in different regions and geologic settings?
- What do field data convey about region-specific issues?
- What are existing BMPs?
- What are opportunities for developing green chemicals for injected fluids?

## SAB Response to Charge Question 3: *Stakeholders*

*What advice does the SAB EEC offer for designing a stakeholder process that provides for balanced input in developing a sound scientific approach for the overall research strategy?*

- Development of a balanced, collaborative advisory group of stakeholders representing a broad range of perspectives
- Stakeholder engagement throughout the study and objectives and process for stakeholder engagement should be carefully designed based on best available social science
- Engage with relevant states to inventory and conduct performance evaluations of the effectiveness of state regulatory, technological development and BMP activities
- Engage with other federal agencies

# 2010 Timeline



Initial study results are expected to be published by late 2012.