Study of the Potential Impacts of Hydraulic Fracturing for Oil & Gas on Drinking Water Resources

US Environmental Protection Agency
Presentation Outline

• Study Background
• Technical Goals: Hydraulic Fracturing Water Cycle
• Progress Report and Publications
• Stakeholder Engagement
• Draft Assessment Report
Study Background

In 2010, Congress urged EPA to study the relationship between hydraulic fracturing and drinking water.

The study purpose is to:

• Assess whether hydraulic fracturing can impact drinking water resources
• Identify driving factors that affect the severity and frequency of any impacts
Hydraulic Fracturing Water Cycle

WATER CYCLE STAGES

Water Acquisition → Chemical Mixing → Well Injection → Flowback and Produced Water → Wastewater Treatment and Waste Disposal
Hydraulic Fracturing
Water Cycle

What are the potential impacts on drinking water resources of:

- **Water Acquisition**: Large volume water withdrawals from ground and surface waters?
- **Chemical Mixing**: Surface spills on or near well pads of hydraulic fracturing fluids?
- **Well Injection**: The injection and fracturing process?
- **Flowback and Produced Water**: Surface spills on or near well pads of flowback and produced water?
- **Wastewater Treatment and Waste Disposal**: Inadequate treatment of hydraulic fracturing wastewaters?
Water Acquisition

What are the potential impacts of large volume water withdrawals from ground and surface waters on drinking water resources?

Research Projects Underway

**ANALYSIS OF EXISTING DATA**
- Literature Review | Service Company Analysis
- Well File Review | FracFocus Analysis

**SCENARIO EVALUATIONS**
- Water Availability Modeling
What are the possible impacts of surface spills on or near well pads of hydraulic fracturing fluids on drinking water resources?

Research Projects Underway

**ANALYSIS OF EXISTING DATA**
- Literature Review | Spills Database Analysis
- Service Company Analysis
- Well File Review | FracFocus Analysis

**LABORATORY STUDIES**
- Analytical Method Development

**TOXICITY ASSESSMENT**
- RETROSPECTIVE CASE STUDIES
Well Injection

What are the possible impacts of the injection and fracturing process on drinking water resources?

Research Projects Underway

**ANALYSIS OF EXISTING DATA**
- Literature Review
- Service Company Analysis
- Well File Review

**SCENARIO EVALUATIONS**
- Subsurface Migration Modeling

**RETROSPECTIVE CASE STUDIES**
Flowback and Produced Water

What are the possible impacts of surface spills on or near well pads of flowback and produced water on drinking water resources?

Research Projects Underway

ANALYSIS OF EXISTING DATA
- Literature Review
- Spills Database Analysis
- Service Company Analysis
- Well File Review

LABORATORY STUDIES
- Analytical Method Development
- TOXICITY ASSESSMENT
- RETROSPECTIVE CASE STUDIES
Wastewater Treatment and Waste Disposal

What are the possible impacts of inadequate treatment of hydraulic fracturing wastewater on drinking water resources?

Research Projects Underway

**ANALYSIS OF EXISTING DATA**
- Literature Review | Well File Review
- FracFocus Analysis

**SCENARIO EVALUATIONS**
- Surface Water Modeling

**LABORATORY STUDIES**
- Source Apportionment Studies
- Wastewater Treatability Studies
- Br-DBP Precursor Studies
Includes project-specific updates
- Research approach
- Status as of Sept. 2012
- Next steps

Does not include research results

Available at www.epa.gov/hfstudy
17 research projects are expected to produce >30 peer-reviewed journal papers or EPA reports

- Most will undergo an internal (EPA) and an external (journal or letter) peer review
- To date, 6 papers have been published:
  - Subsurface migration modeling (3)
  - Analytical method development (3)

These products will be considered together with scientific literature in the draft assessment report

- Draft assessment report is a Highly Influential Scientific Assessment
The Draft Assessment Report will:

- Answer primary research questions through synthesis of:
  - Available results from study’s research projects
  - Peer reviewed reports and scientific literature related to the study
  - Government reports and technical papers
  - Knowledge gained through technical stakeholder
  - Information submitted by stakeholders
    - EPA docket
    - Comments submitted to the Science Advisory Board
Impacts evaluated:
- Impacts related to normal operations reflecting modern typical practices
- Potential and actual accidents or unintended events
- Potential immediate, short-term, and long-term impacts

Spatial Scope:
- National: Evaluating available information for multiple regions
- Evaluating potential impacts at multiple scales:
  - Single well
  - Cluster of wells
  - Watershed
  - Shale plays

Intended Use:
- Contribute to understanding of potential impacts of hydraulic fracturing for oil and gas on drinking water resources
- Identify pathways of greatest concern
- Inform and promote dialogue among federal, tribal, state, and local government entities, industry, NGOs and other stakeholders
- Identify knowledge gaps and information needs
# The Assessment

<table>
<thead>
<tr>
<th><strong>What it is</strong></th>
<th><strong>What it is not</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• A state-of-the-science integration and synthesis of information</td>
<td>• Not a human health or exposure assessment</td>
</tr>
<tr>
<td>• Based upon EPA research results, a robust literature review, and other information</td>
<td>• Not site specific</td>
</tr>
<tr>
<td>• Information addresses questions identified in the <em>Study Plan</em> and <em>Progress Report</em></td>
<td>• Does not identify or evaluate best management practices</td>
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<td>• Not designed to inform specific policy decisions</td>
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<td></td>
<td>• Does not identify or evaluate policy options</td>
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The Assessment

• The assessment represents a synthesis of the science and contributes to overall understanding of potential impacts.

• EPA is helping to advance the science and understanding of hydraulic fracturing.

• Our findings will help inform dialogue among interested stakeholders.

• The assessment can also inform future decisions by industry and by federal, tribal, state, and local entities.
Stakeholder Engagement

EPA has received input through a variety of mechanisms at different stages of the study:

- Public meetings
- One-on-one meetings
- Technical meetings (workshops and roundtables)
- Public dockets
- Responses to information requests
# Technical Meetings

EPA conducted a series of five technical roundtables and a series of in-depth technical workshops to address specific topics related to the study’s research questions.

## Technical Roundtables
- Consult with technical representatives from key stakeholder groups:
  - State/local governments, tribes, oil and gas industry, water industry, non-governmental organizations, academia
- **November 2012**
- **December 2013**

## Technical Workshops
- Engage with subject-matter experts on specific topics:
  - Analytical chemistry methods
  - Well construction/operation and subsurface modeling
  - Wastewater treatment and related modeling
  - Water acquisition modeling
  - Case studies
- **Winter/Spring/Summer 2013**
Next Steps

EPA will continue to conduct research, analyze information and literature, and engage stakeholders

• Exchange information with industry, academia, states, NGOs, tribes, and public
• Completed research is undergoing peer review
• Draft assessment report will go to the Science Advisory Board for peer review
  – The public will have an opportunity to provide written and oral comments
US Congress urges the EPA to conduct a study (2010)

Peer review of draft study plan* (February – August 2011)
Release final study plan (November 2011)

Release progress report* (December 2012)

Draft Report for Peer Review & Public Comment

Technical workshops* (February – March 2011)
Meetings with stakeholders to identify concerns and study scope (July – August 2010)

Technical workshops* (Spring/Summer 2013)
Technical roundtable* (December 2013)

Technical roundtables* / information request (November 2012)

Final report

State Engagement
Questions?

For more information: www.epa.gov/hfstudy