



Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources

**Presentation by the
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Office of Research and Development**

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Study Background



- In FY2010, Congress urged EPA to study the relationship between hydraulic fracturing and drinking water
- EPA launched this study with the purpose to:
 - Assess whether hydraulic fracturing can impact drinking water resources
 - Identify driving factors that affect the severity and frequency of any impacts

SAB Involvement



- SAB Review of the proposed hydraulic fracturing drinking water **study scope** in April 2010
- SAB review of the Draft **Study Plan** in May 2011
- EPA release of revised **Final Study Plan** in December 2011
- EPA release of **Progress Report** in December 2012
- SAB consultation on the **Progress Report** held in May 2013

HF Study Progress



- EPA's HF study has produced multiple products:
 - 12 EPA technical reports
 - 4 journal publications from EPA scientists
 - 9 journal publications from colleagues at Lawrence Berkeley National Laboratory
 - **Draft Hydraulic Fracturing Drinking Water Assessment report**
- Completed products available online:
 - www.epa.gov/hfstudy

This Review



- EPA asked SAB to complete a technical review of the draft hydraulic fracturing drinking water assessment report
- The assessment includes:
 - Main report (Executive Summary and 10 chapters, 599 pages)
 - Appendices (10 appendices, 401 pages)

Draft HF Assessment Report



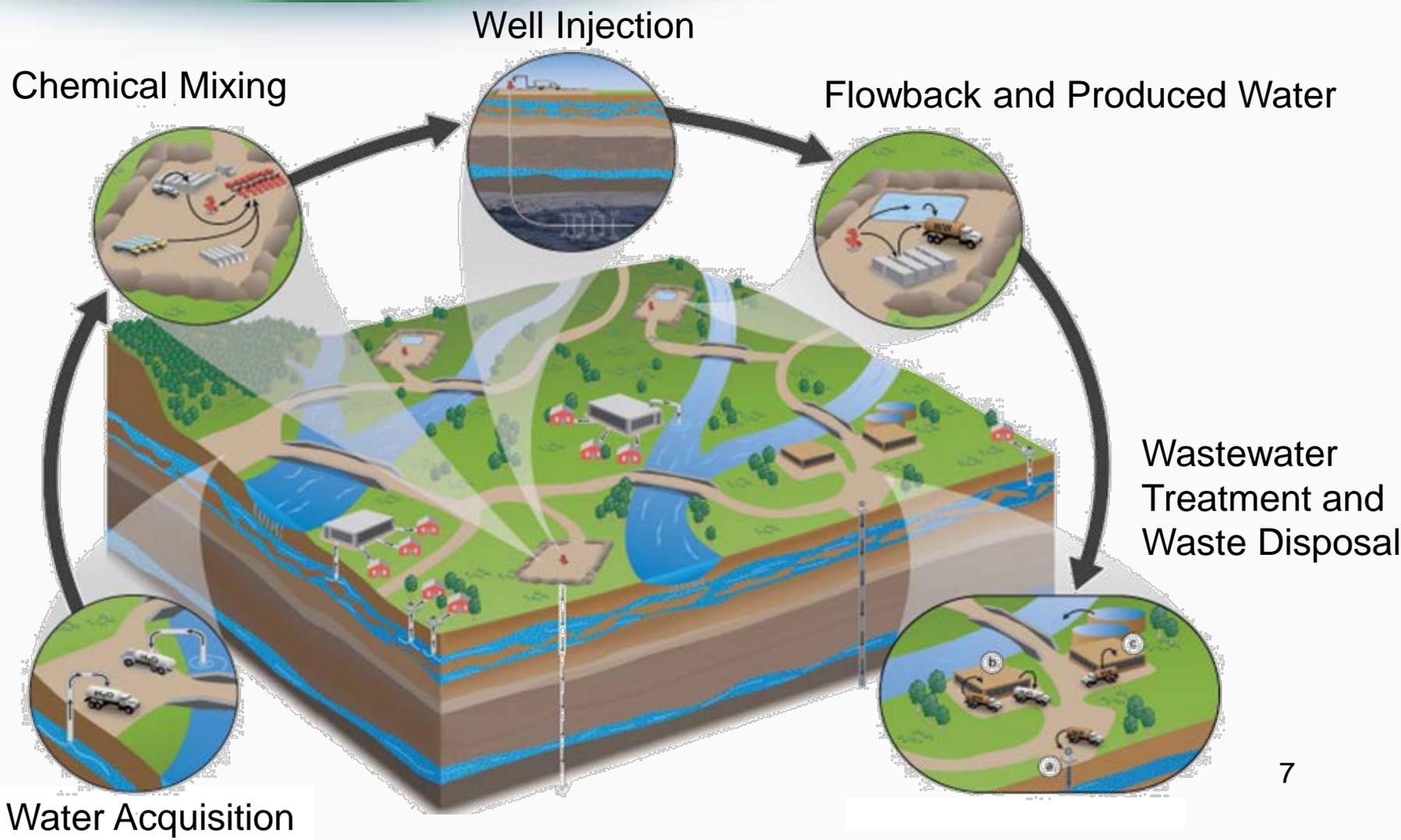
What it is:

- A state-of-the-science integration and synthesis of information concerning impacts on drinking water resources
- Based upon EPA research results, a robust literature review, and other information, including input from stakeholders
- Identifies potential mechanisms and addresses questions identified in the *Study Plan* and *Progress Report*

What it is not:

- Not a human health, exposure, or risk assessment
- Not site specific
- Does not identify or evaluate best management practices
- Not designed to inform specific policy decisions
- Does not identify or evaluate policy options

Hydraulic Fracturing Water Cycle: Follow the water



Assessment Conclusions



- Assessment identified potential mechanisms and impacts to drinking water resources due to hydraulic fracturing activities
- These mechanisms include:
 - Water withdrawals in areas with low water availability
 - Spills of HF fluids and flowback/produced water
 - HF conducted directly in formations containing drinking water resources
 - Well integrity failures
 - Subsurface migration of gases and liquids
 - Inadequately treated wastewater

Assessment Conclusions



- The number of documented impacts to drinking water resources is small relative to the number of fractured wells
- Despite vulnerabilities, there is no evidence of widespread, systemic impacts on drinking water resources due to hydraulic fracturing activities

Sources of Uncertainties



- Insufficient pre- and post-fracturing data on the quality of drinking water resources
- The paucity of long-term systematic studies
- Insufficient data available to characterize well integrity over time
- The presence of other sources of contamination precluding a definitive link between hydraulic fracturing activities and a potential impact
- The inaccessibility of some information on hydraulic fracturing activities and potential impacts

SAB Charge Questions – Part 1



- Charge Question 1:
 - The background, scope, approach and intended use of the assessment, and the context and background of hydraulic fracturing and drinking water resources so as to inform the remainder of the assessment
 - Chapters 1, 2 and 3
- Charge Question 2:
 - Water acquisition: the use of ground or surface water for hydraulic fracturing
 - Chapter 4

SAB Charge Questions – Part 2



- Charge Question 3:
 - Chemical mixing: the mixing of water, chemicals, and proppants at the well pad
 - Chapter 5
- Charge Question 4:
 - Well injection: the injection of hydraulic fracturing fluids into the well to fracture the geologic formation containing oil or gas
 - Chapter 6

SAB Charge Questions – Part 3



- Charge Question 5:
 - Flowback and produced water: the return of injected fluid and water produced from the formation to the surface and the subsequent transport for reuse, treatment, or disposal
 - Chapter 7
- Charge Question 6:
 - Wastewater treatment and disposal: the reuse, treatment and release, or disposal of wastewater generated at the well pad
 - Chapter 8

SAB Charge Questions – Part 4



- Charge Question 7:
 - Chemicals used in hydraulic fracturing or present in flowback and produced waters: known physicochemical and toxicological properties
 - Chapter 9
- Charge Question 8:
 - Integration and summary of major findings
 - Executive Summary and Chapter 10