



# EPA Study Plan on the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources: Approach to Study Potential Health Impacts

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# Directive to EPA from the FY10 Appropriation Conference Committee

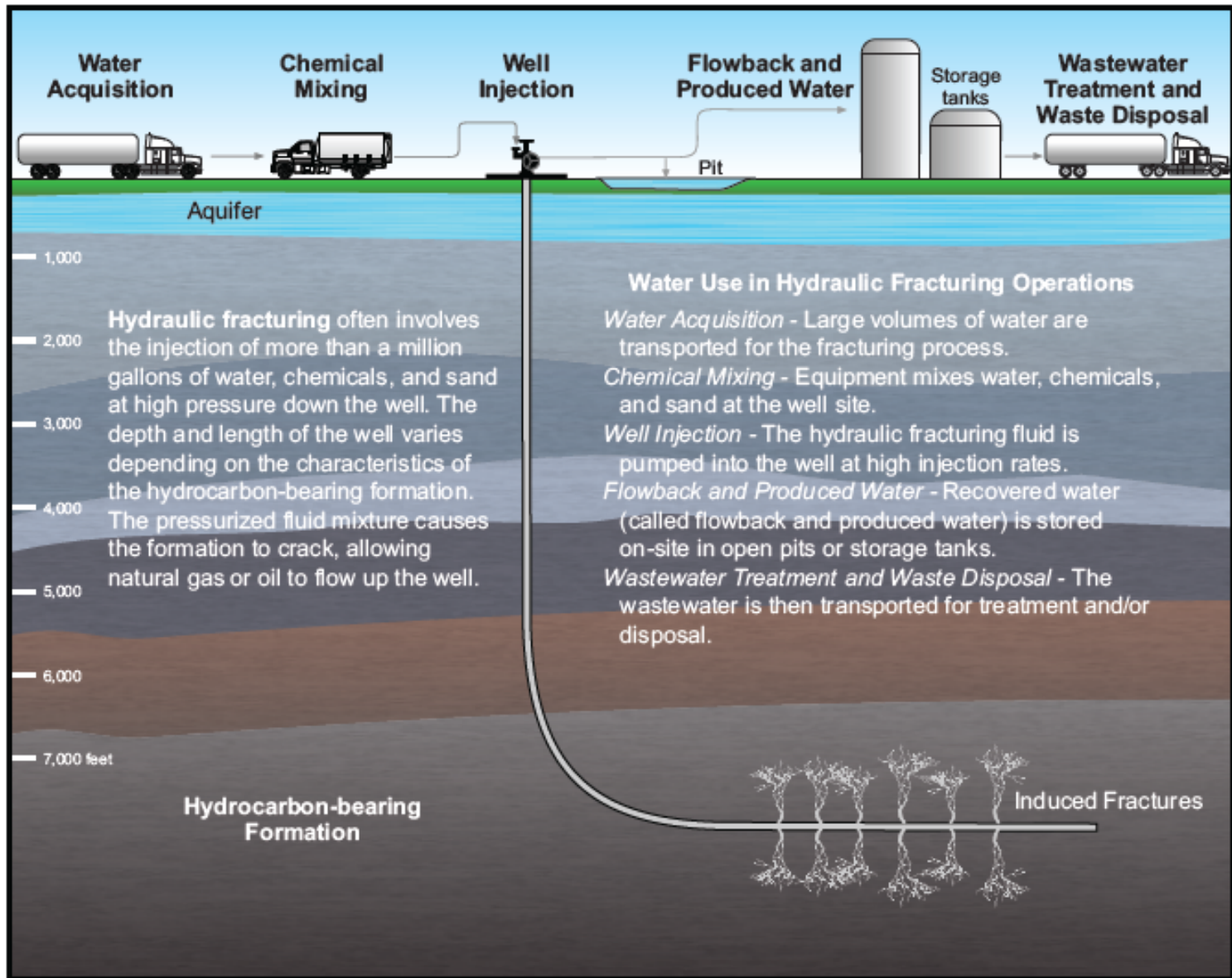
*“The conferees urge the Agency to carry out **a study on the relationship between hydraulic fracturing and drinking water**, using a credible approach **that relies on the best available science**, as well as **independent sources of information**.”*

# Purpose of EPA's Study of Potential Impacts of Hydraulic Fracturing on Drinking Water Resources

- To assess whether hydraulic fracturing can impact drinking water resources
- To identify driving factors that affect the severity and frequency of any impacts

*EPA's study plan focuses on the water cycle in hydraulic fracturing*

# Water Cycle



# Research Approaches

- Gather and analyze existing data
- Case studies
- Scenario evaluations
- Laboratory studies
- **Toxicity assessments**

*EPA's Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources*

<http://www.epa.gov/hfstudy>

# Toxicity Assessments

*Focused on: Hydraulic fracturing fluids, wastewater, and naturally occurring substances that enter wastewater*

- Summarize known chemical, physical, and toxicological properties
- Estimate chemical, physical, and toxicological properties using structure-activity relationships (e.g., QSAR)
- Screen chemicals for priority attention

# Component Materials Used in HF Fluids

- Acids; Acid inhibitor
- Biocides
- Breakers
- Buffers
- Clay Stabilizers
- Corrosion inhibitors
- Crosslinkers
- Foaming agents
- Friction Reducers
- Gelling agents
- Iron control
- pH adjusting agents
- Proppants
- Scale inhibitors
- Solvents
- Surfactants



# Specific Chemical Mixtures in HF Fluids

- Many chemicals used in HF. Not all chemicals are used in every job.
- Some chemicals mixtures are proprietary or unknown.
- Appendix E of EPA Study Plan lists publicly known chemicals as of November 2011.
- Hydraulic fracturing is only regulated under the Safe Drinking Water Act when diesel fuel is used.
  - HF requires Underground Injection Control Permit when diesel used
  - Diesel fuel contains benzene, toluene, ethylbenzenes & xylenes
  - Health effects include carcinogenicity, CNS, liver and kidney toxicity



# Decision Framework

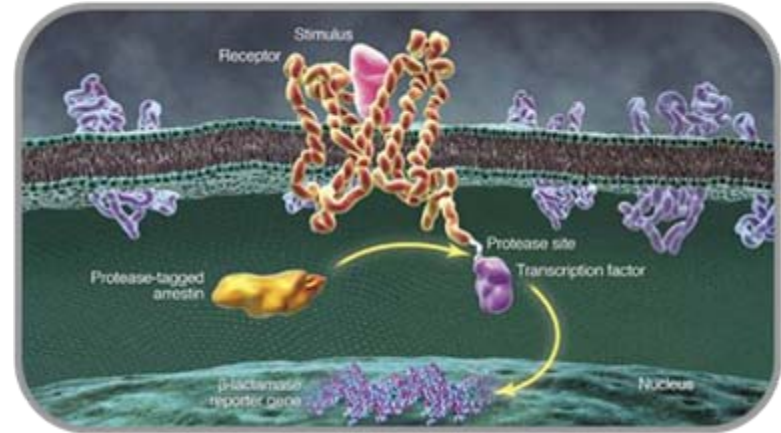
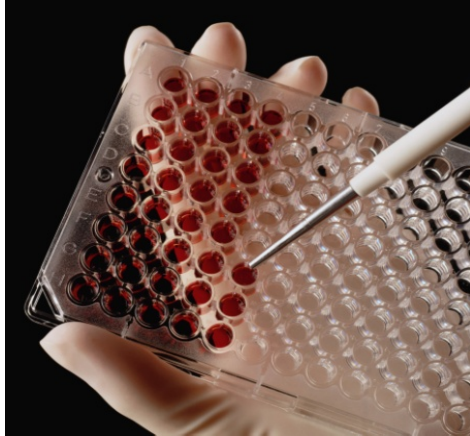
- Identify 10-20 chemical indicators to track fate and transport of fluids through the environment
- Criteria for selecting indicators:
  - Potential frequency of occurrence
  - Toxicity of chemical
  - Expected fate & transport
  - Detection methods

## How Information Will Be Used

- EPA examining two components of risk:
  - Understanding circumstances where drinking water resources may be impacted by HF
  - Understanding potential hazards which might be of concern if there were exposure to materials associated with HF
- The current study does not include a quantitative risk assessment



# Reporting Results



- EPA is committed to transparency about our research and have incorporated a strong outreach component at each stage of the study
- Public and key stakeholders have been consulted during study plan development
- Plans have been posted on EPA's public website

# Reporting Results

- 2012
  - Analysis of existing data
  - Retrospective case studies
  - Scenario evaluations
  - Laboratory studies
- 2014
  - Analysis of existing data
  - Retrospective and prospective case studies
  - Scenario evaluations
  - Laboratory studies
  - Toxicity assessments

