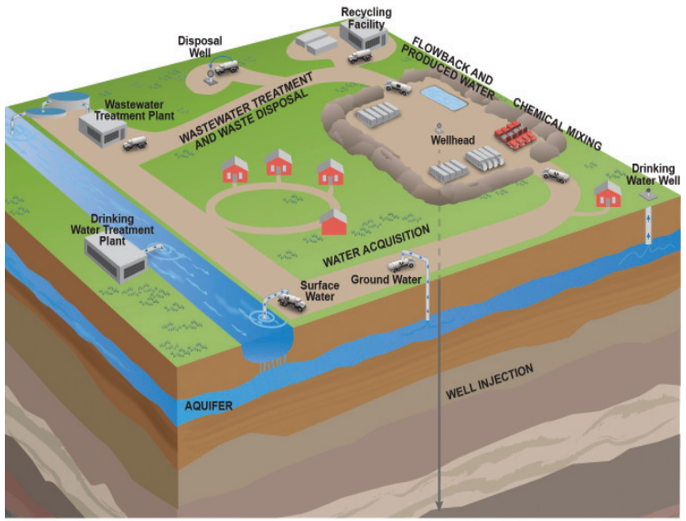
# EPA's Hydraulic Fracturing Research in Brief

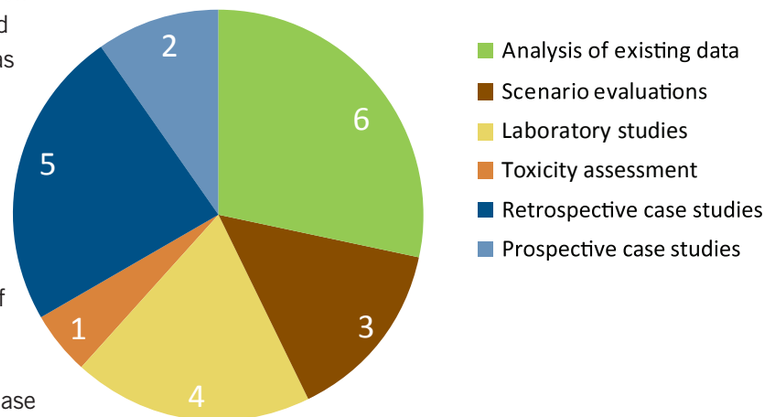



## Hydraulic Fracturing Water Cycle

The EPA's study includes research on hydraulic fracturing of shale formations to extract natural gas and oil. The scope of the research is defined by the hydraulic fracturing water cycle—five areas where the process has the potential to impact drinking water resources. It begins with water acquisition and ends with treatment and/or disposal of wastewater.

## Number of Projects by Research Activity

The EPA is using a variety of research activities to answer five primary and 16 secondary research questions, as outlined in the Agency's *Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources*, www.epa.gov/hfstudy. EPA researchers are conducting 21 individual research projects that fall under five types of activities: analysis of existing data, scenario evaluations, laboratory studies, toxicity assessments and case studies. Research progress for each type of research activity is summarized in the 2012 Progress Report.




EPA
United States Environmental Protection Agency

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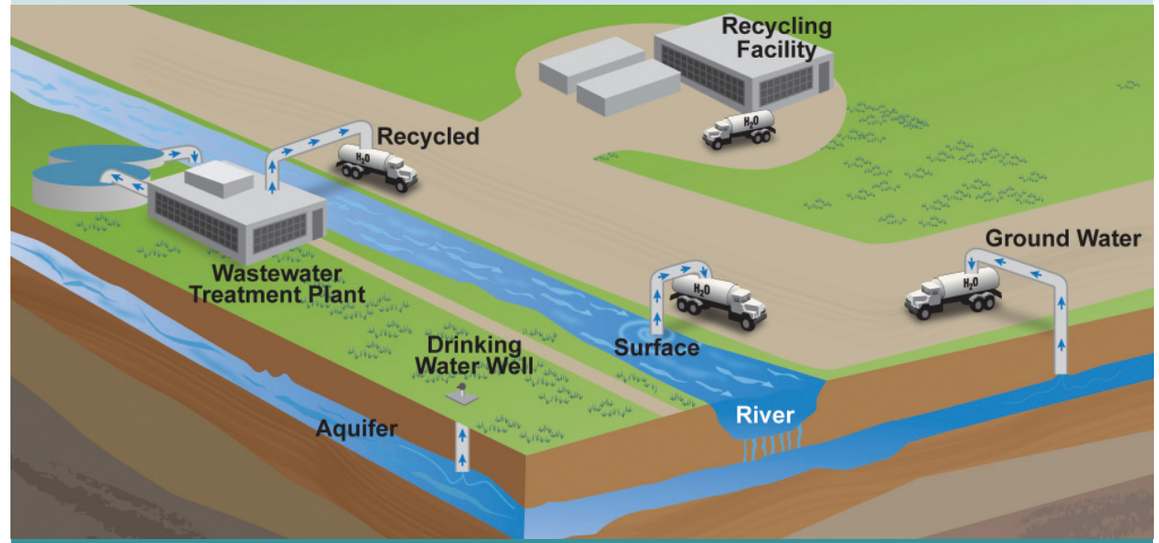
Study of the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources

2012 Progress Report

# Water Acquisition

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# Water Acquisition

## What is water acquisition?

- The first stage of the EPA's hydraulic fracturing water cycle that requires large volumes of water to fracture rock formations
- Water sources include ground water, surface water and recycled wastewater from the process itself—treated flowback and produced water
- Treated wastewater can include wastewater from hydraulic fracturing operations as well as other types of wastewater

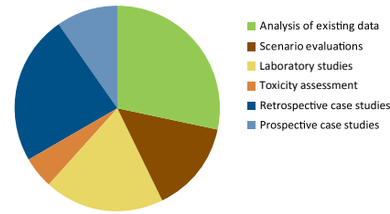
## Why is the EPA looking at water acquisition as part of this study?

- Characterize sources and volumes of water currently used in hydraulic fracturing operations
- Understand how withdrawals may change the quality and availability of local drinking water

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

| Secondary Research Questions | Research Projects |
|---|---|
| How much water is used in hydraulic fracturing operations, and what are the sources of this water? | • Literature Review<br>• Well File Review<br>• FracFocus Analysis<br>• Service Company Analysis<br>• Water Availability Modeling |
| How might water withdrawals affect short- and long-term water availability in an area with hydraulic fracturing activity? | • Literature Review<br>• Water Availability Modeling |
| What are the possible impacts of water withdrawals for hydraulic fracturing operations on local water quality? | • Literature Review |

# Research Projects




### Literature Review

Review and summarize literature on:
- Volumes and sources of water used in hydraulic fracturing fluids
- Local impacts to water availability in areas with hydraulic fracturing activity
- Water quality impacts from ground and surface water withdrawals

### Service Company Analysis

Summarize data provided by nine hydraulic fracturing service companies—owners and operators of production wells—on volumes and sources of water used in hydraulic fracturing fluids

### Well File Review

Well files are records of activities that occurred at production wells that have been provided by the nine hydraulic fracturing operators. This effort will summarize data from 333 randomly selected well files on volumes and source of water used in hydraulic fracturing fluids

### FracFocus Database Analysis

Compile and summarize total water volumes reported at FracFocus.org—a voluntary industry database—by geographic location, well depth, water types and oil/gas production

### Water Availability Modeling

- Summarize data on water usage for hydraulic fracturing in a semi-arid climate (Upper Colorado River Basin) and a humid climate (Susquehanna River Basin)
- Use watershed models to explore water availability for public water supplies under a variety of scenarios, focusing on water usage in the Upper Colorado and Susquehanna River Basins

www.epa.gov/hfstudy