EPA
United States
Environmental Protection
Agency

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

US Environmental Protection Agency

Office of Research and Development

April 30, 2015

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Presentation Outline

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

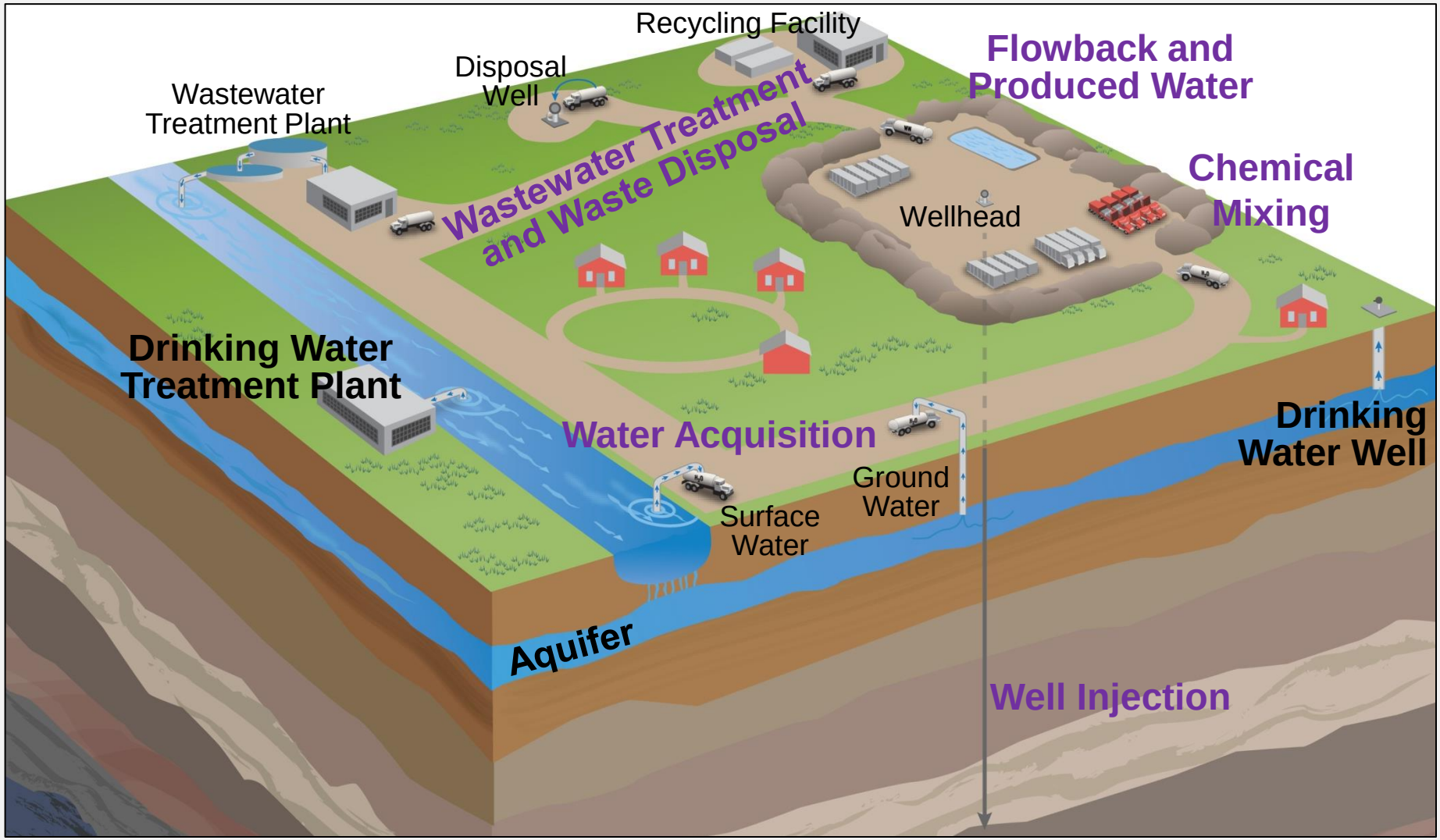
Study Background

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

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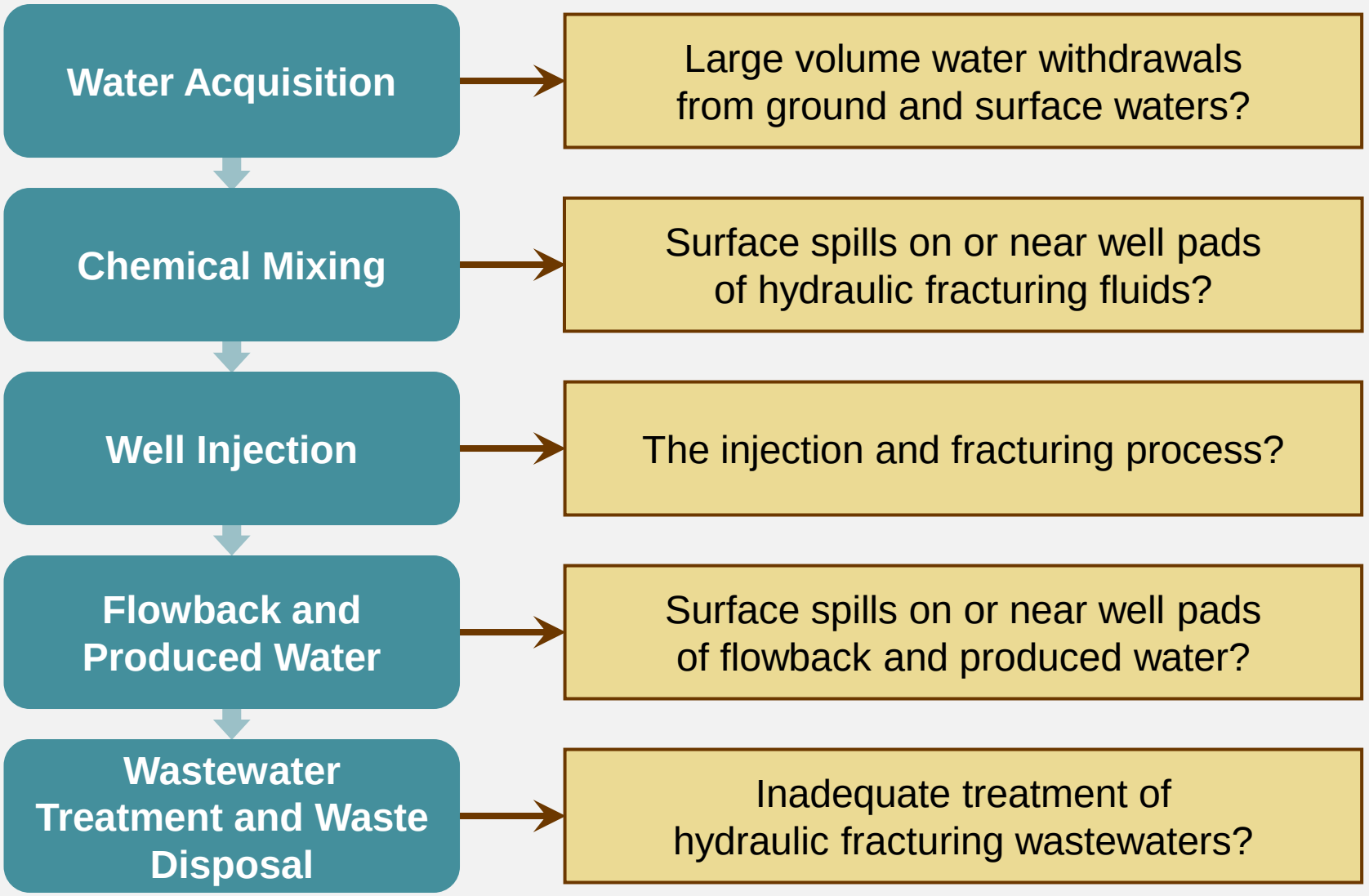
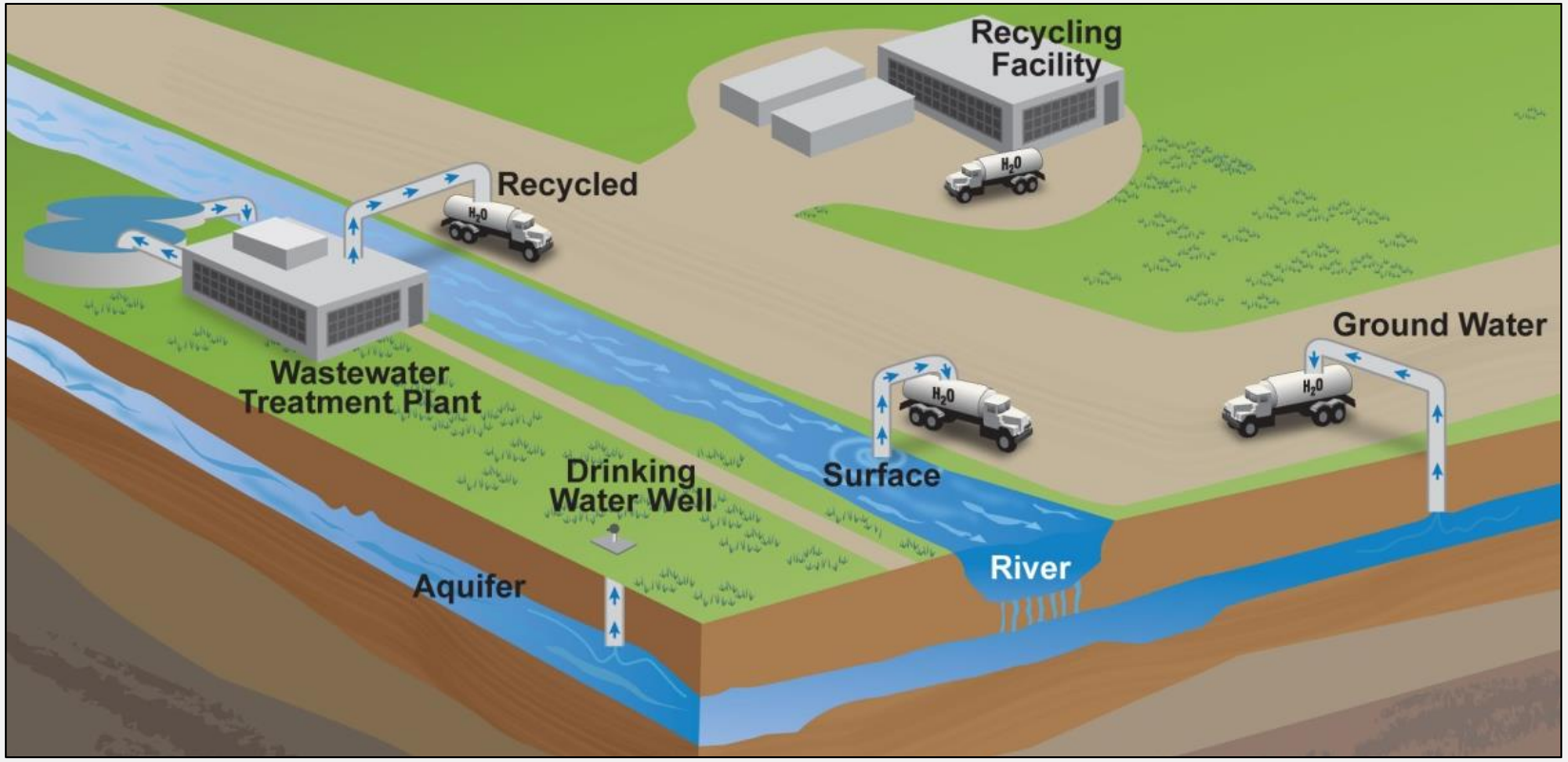
Hydraulic Fracturing Water Cycle

What are the potential impacts on drinking water resources of:



Water Acquisition

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



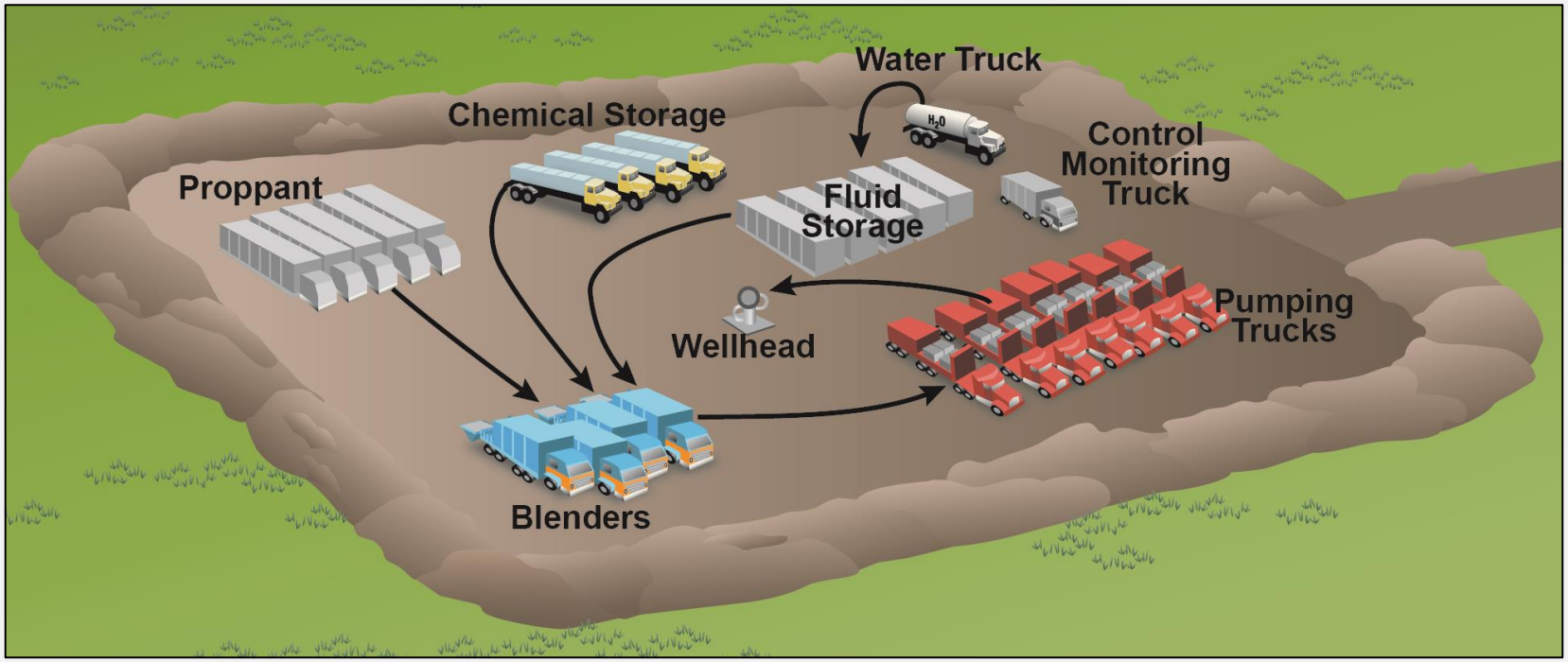
Research Projects Underway

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

SCENARIO EVALUATIONS
Water Availability Modeling

Chemical Mixing

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

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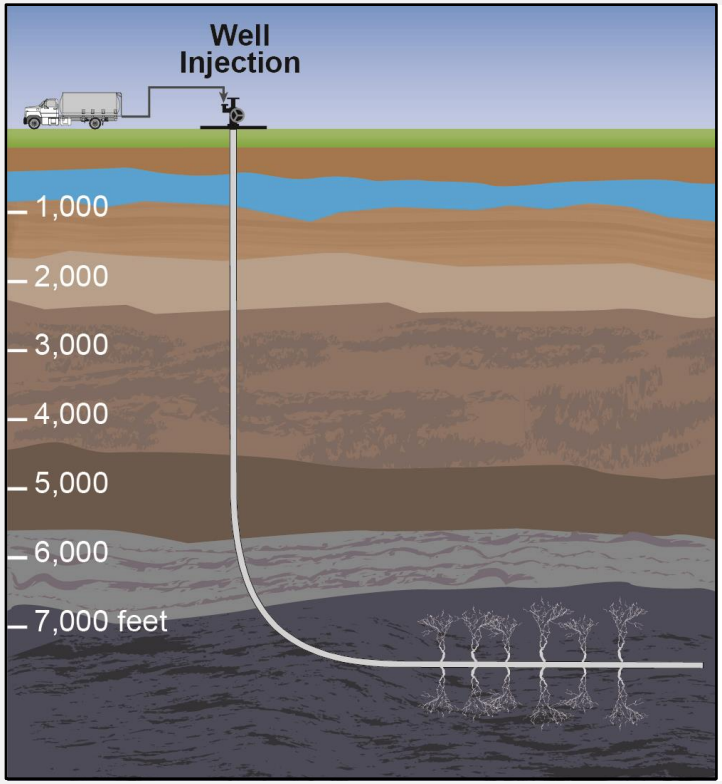
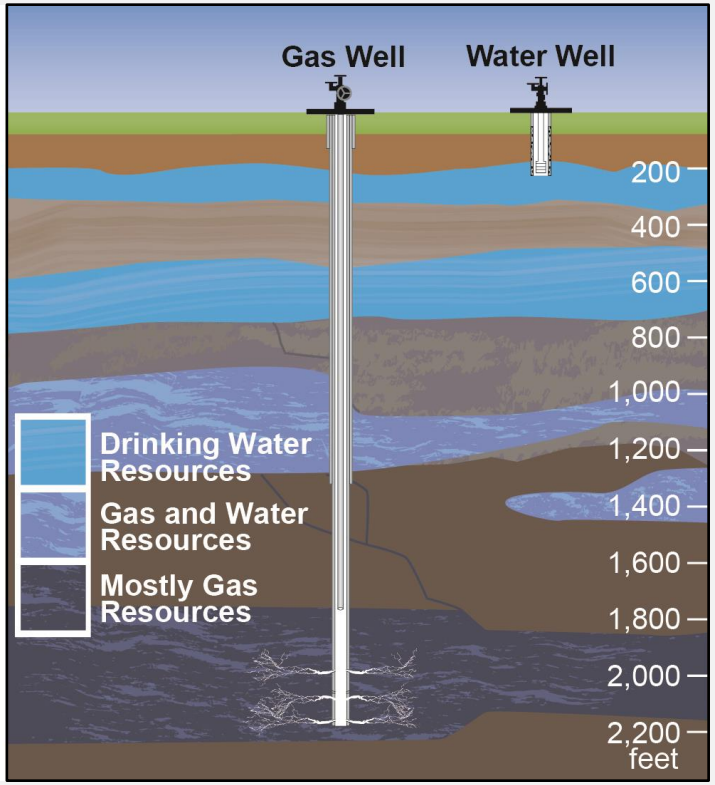
Well Injection

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





Research Projects Underway

ANALYSIS OF EXISTING DATA
Literature Review
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Well File Review

SCENARIO EVALUATIONS
Subsurface Migration Modeling

RETROSPECTIVE CASE STUDIES

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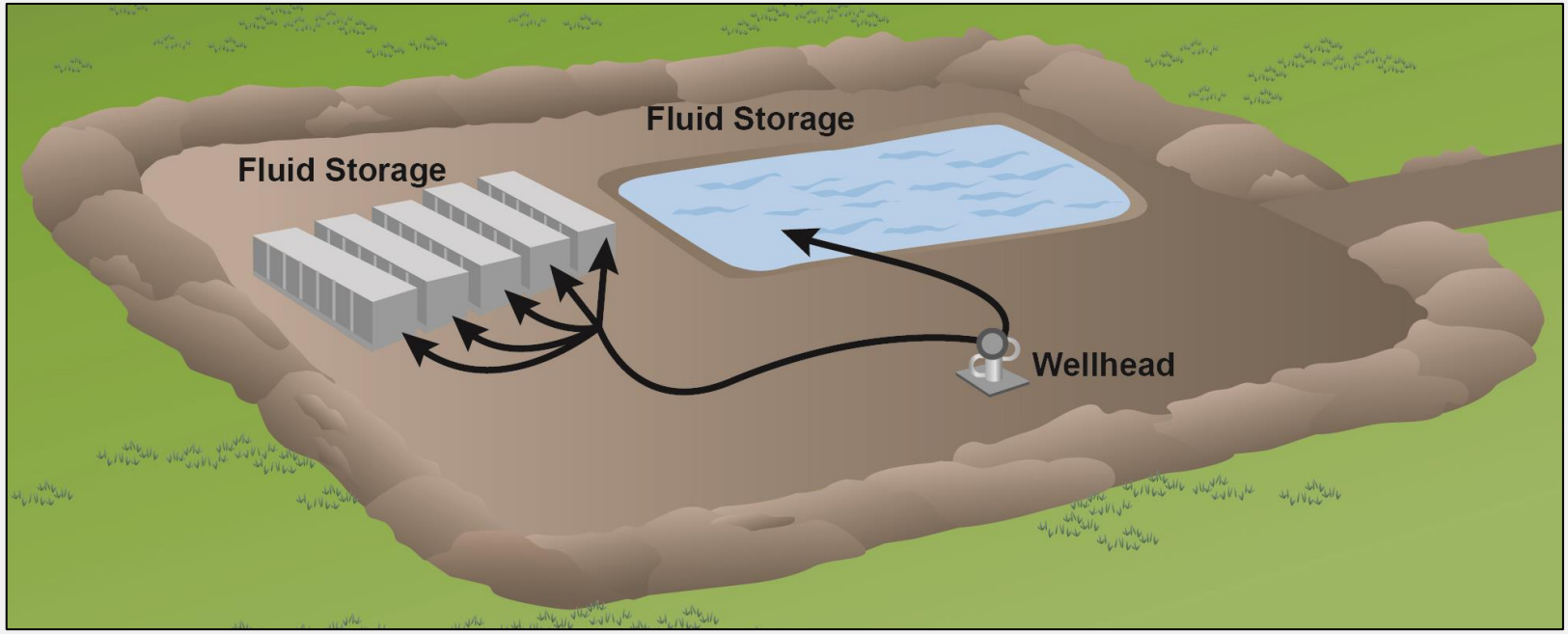
Flowback and Produced Water

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

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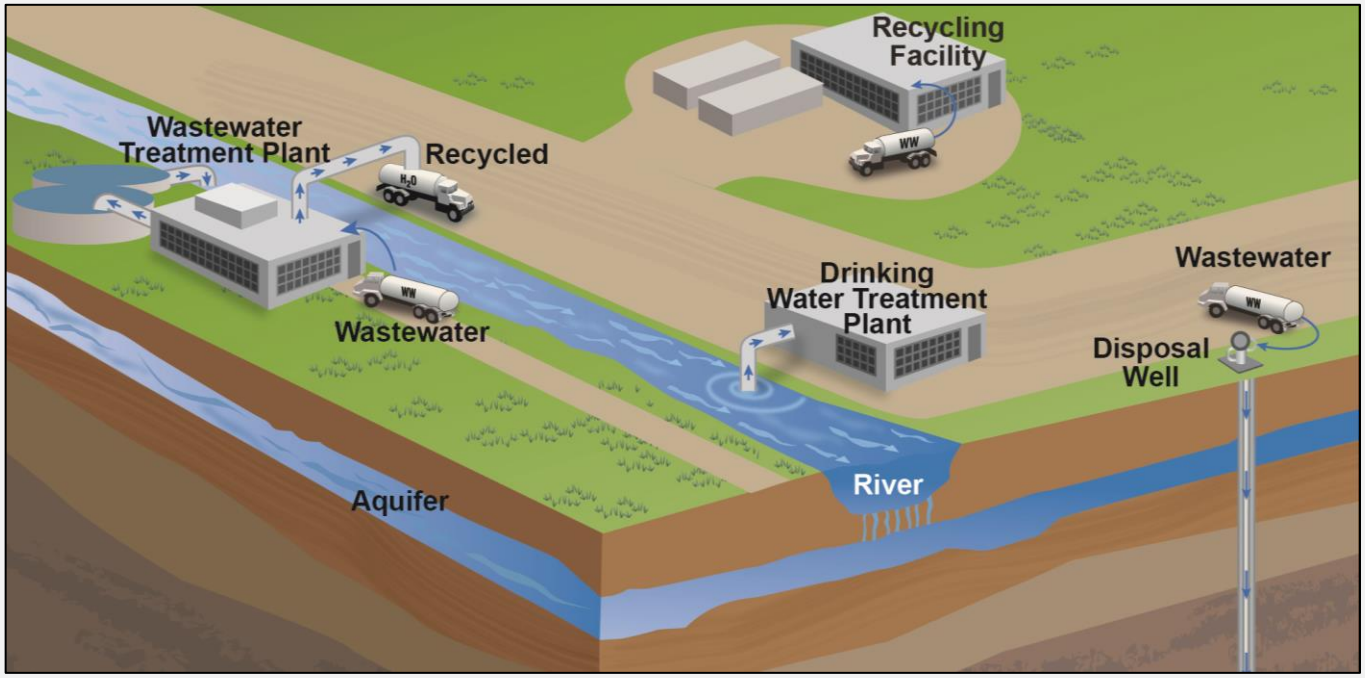
LABORATORY STUDIES
Analytical Method Development

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
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FracFocus Analysis

SCENARIO EVALUATIONS
Surface Water Modeling

LABORATORY STUDIES
Source Apportionment Studies
Wastewater Treatability Studies
Br-DBP Precursor Studies

Progress Report

- Includes project-specific updates
  - Research approach
  - Status as of Sept. 2012
  - Next steps
- Does not include research results
- Available at www.epa.gov/hfstudy

Research Projects and Products

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

Draft Assessment Report

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

Draft Assessment Report

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

What it is

- A state-of-the-science **integration and synthesis** of information
- Based upon EPA research results, a robust literature review, and other information
- Information addresses questions identified in the *Study Plan* and *Progress Report*

What it is not

- Not a human health or exposure 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

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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

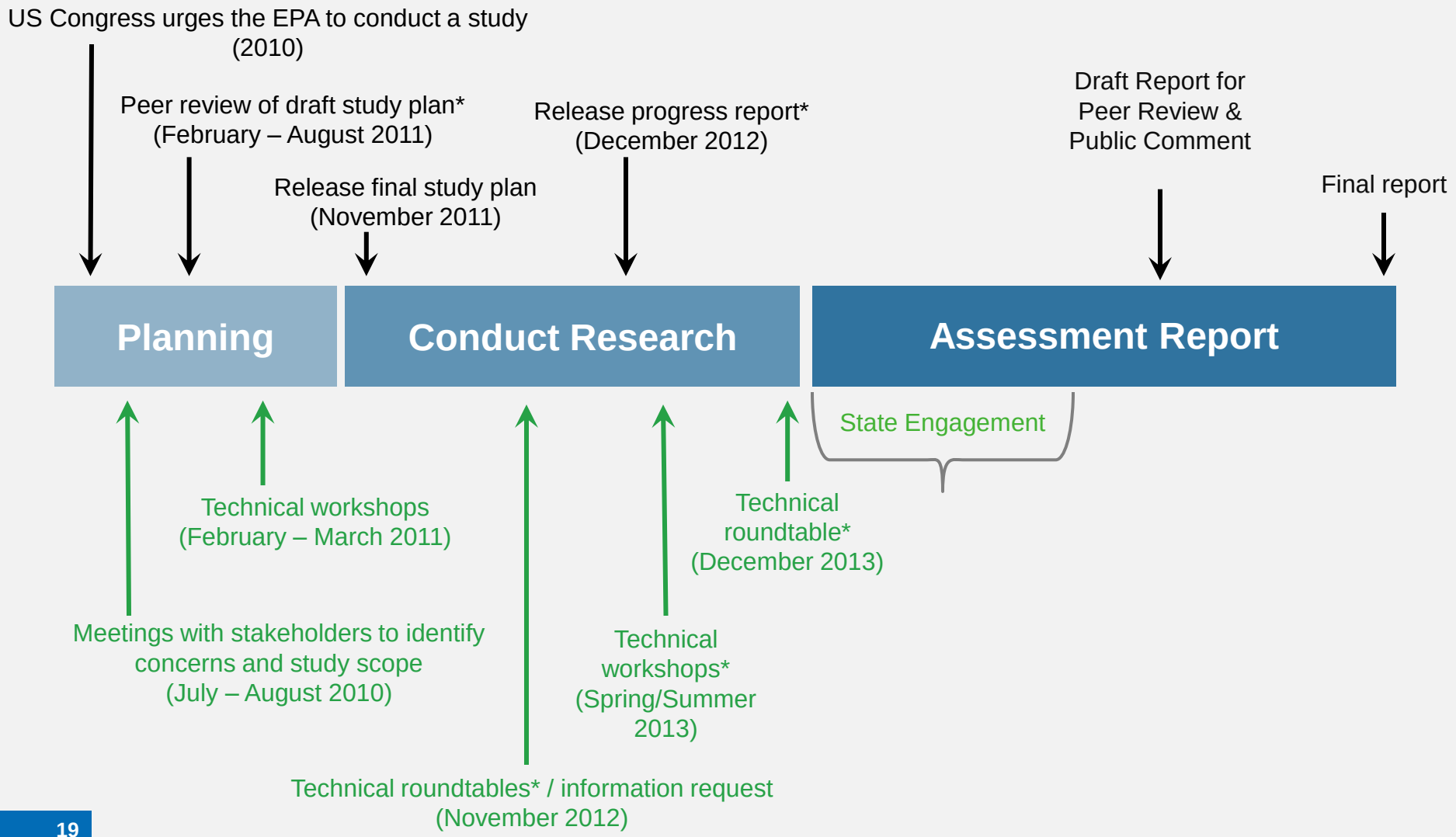
- **Engage with subject-matter experts on specific topics:**
  - Analytical chemistry methods
  - Well construction/operation and subsurface modeling
  - Wastewater treatment and related modeling
  - Water acquisition modeling
  - Case studies
- **Winter/Spring/Summer 2013**

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

Study Timeline



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Questions?

For more information:
www.epa.gov/hfstudy