EPA
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Agency

Draft Plan to Study the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources

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Overview

- Introduction to Hydraulic Fracturing
- Purpose of the Study Plan
- Study Plan Development
- Study Plan

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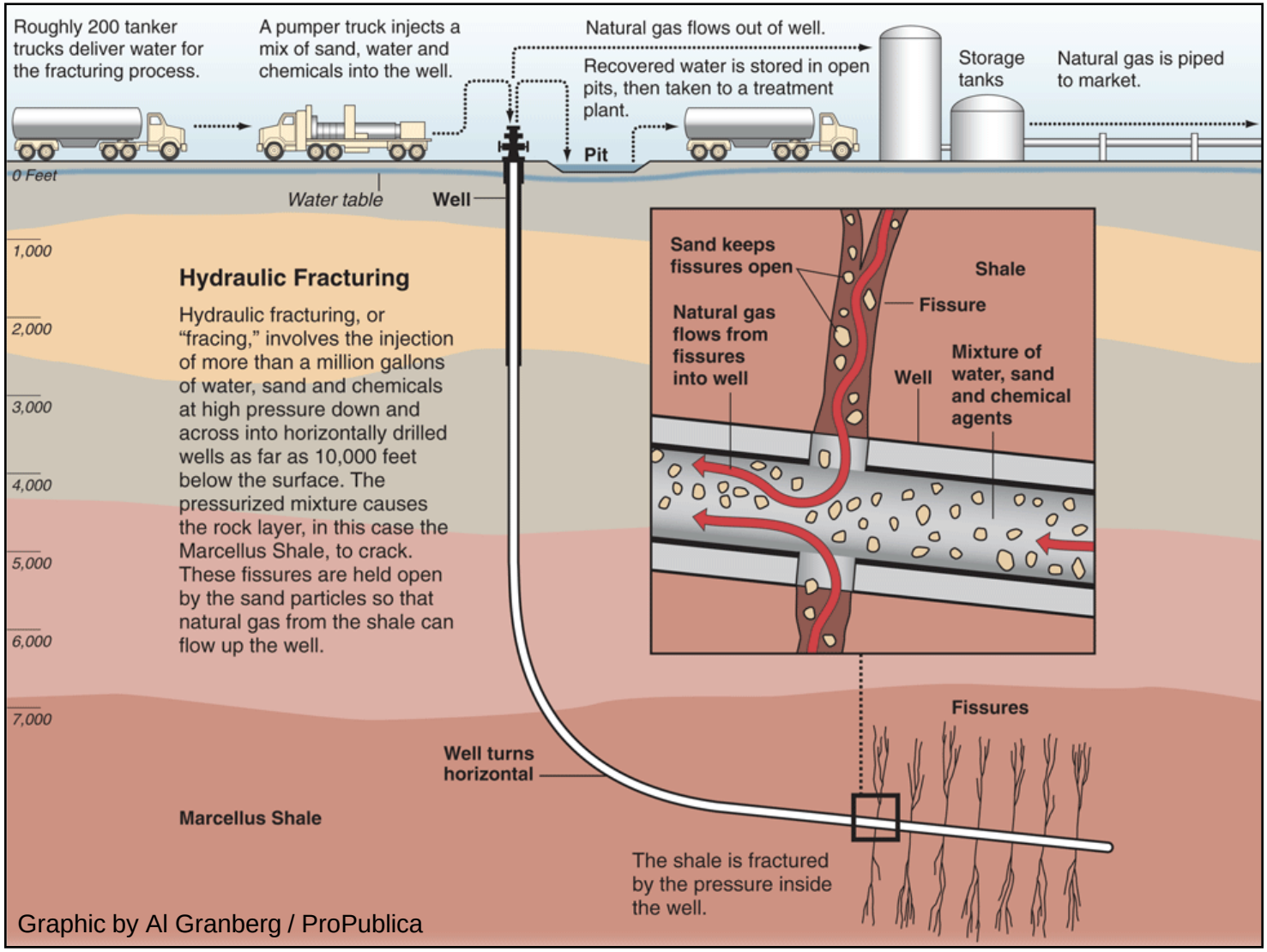
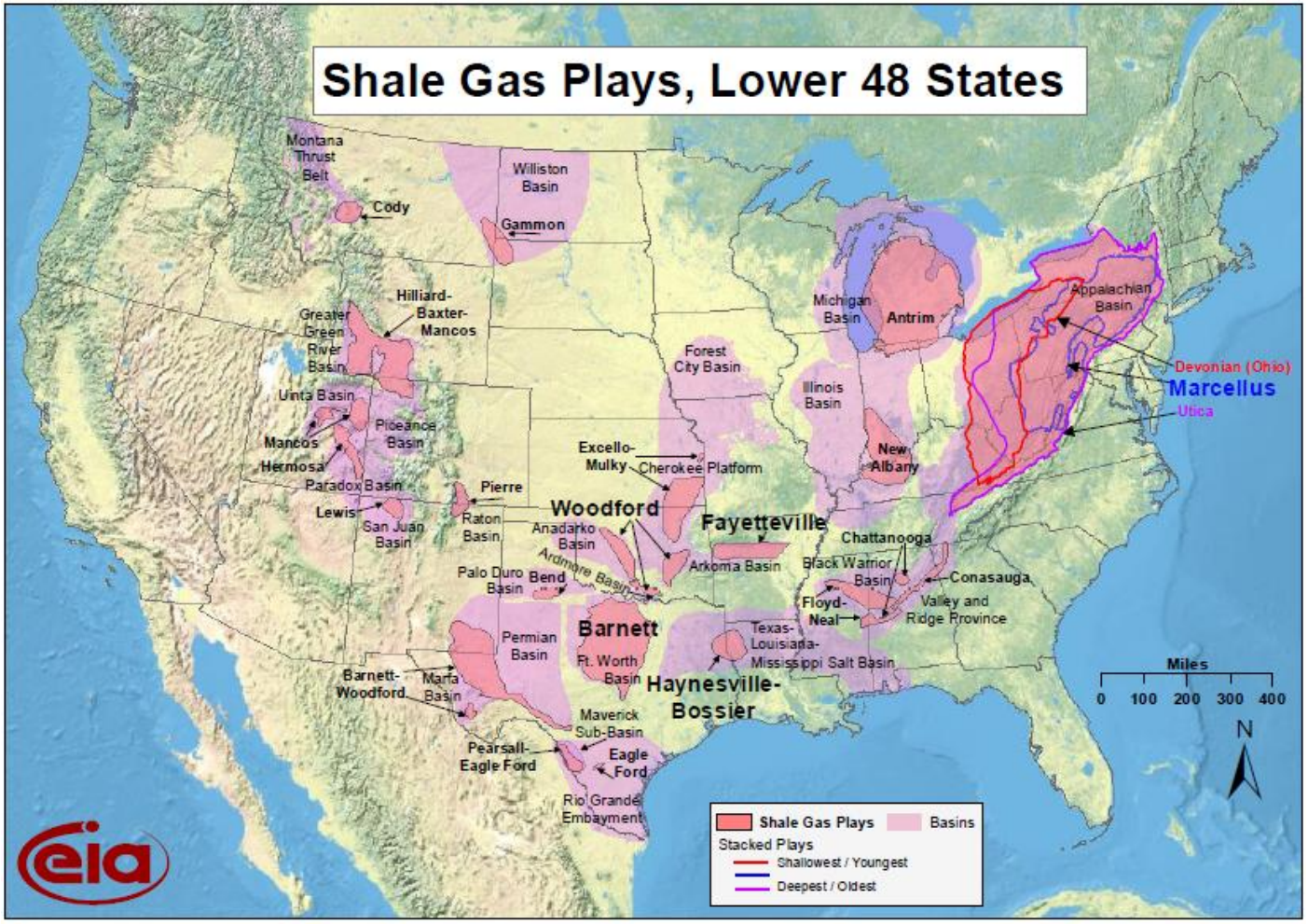
Hydraulic Fracturing



Graphic by Al Granberg / ProPublica

Hydraulic Fracturing

The combination of hydraulic fracturing and horizontal drilling has opened new areas for oil and gas development.



Source: Energy Information Administration based on data from various published studies.
Updated: March 10, 2010

Stakeholder Concerns

- Ground and surface water contamination
- Air pollution
- Ecosystem impacts
- Seismic risks
- Public safety
- Occupational risks
- Economic impacts

Purpose of the Study Plan

In its FY 2010 Appropriations Committee Conference Report, Congress directed EPA to study the relationship between hydraulic fracturing and drinking water using:

- Best available science
- Independent sources of information
- Transparent, peer-reviewed process
- Consultation with others

Development of the Draft Study Plan

- Science Advisory Board suggestions
- Stakeholder input
- Literature review
- Internal EPA review
- External federal agency review

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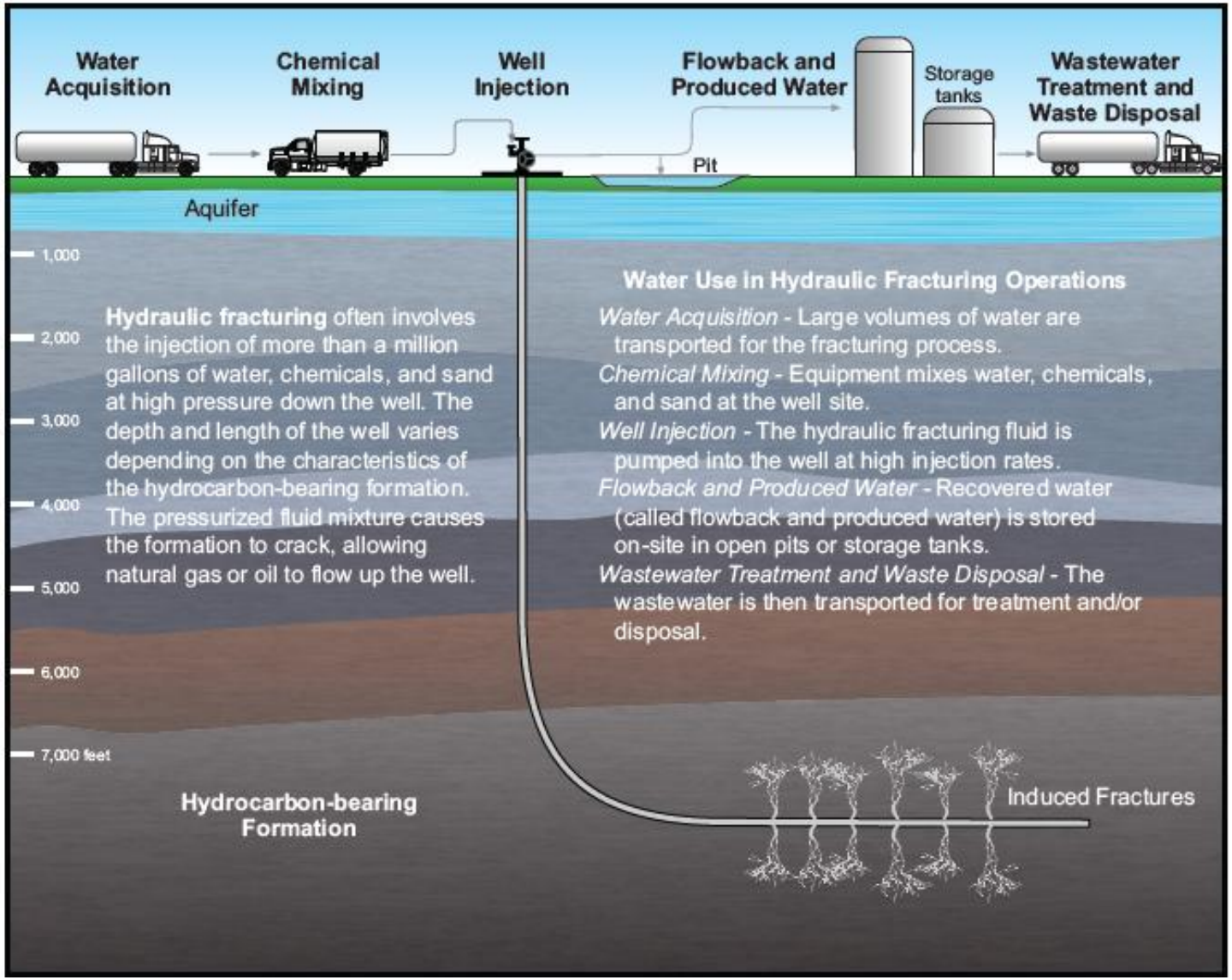
Water Use in Hydraulic Fracturing



Research Questions

Water Use in Hydraulic Fracturing Operations	Fundamental Research Questions
Water Acquisition	How might large volume water withdrawals from ground and surface water impact drinking water resources?
Chemical Mixing	What are the possible impacts of releases of hydraulic fracturing fluids on drinking water resources?
Well Injection	What are the possible impacts of the injection and fracturing process on drinking water resources?
Flowback and Produced Water	What are the possible impacts of releases of flowback and produced water on drinking water resources?
Water Treatment and Waste Disposal	What are the possible impacts of inadequate treatment of hydraulic fracturing wastewaters on drinking water resources?

Research Approach

- Analysis of existing data
- Laboratory-scale studies
- Scenario evaluations
- Case studies
  - Retrospective
  - Prospective

Water Acquisition

How might large volume water withdrawals from ground and surface water impact drinking water resources?

- What are the impacts on water availability?
- What are the impacts on water quality?

Chemical Mixing

What are the possible impacts of releases of hydraulic fracturing fluids on drinking water resources?

- What is the composition of hydraulic fracturing fluids and what are the toxic effects of these constituents?
- What factors may influence the likelihood of contamination of drinking water resources?
- How effective are mitigation approaches in reducing impacts to drinking water resources?

Well Injection

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

- How effective are well construction and operation practices at containing fluids during and after fracturing?
- What are the potential impacts of pre-existing man-made or natural pathways/features on contaminant transport?
- What chemical/physical/biological processes could impact the fate and transport of substances in the subsurface?
- What are the toxic effects of naturally occurring substances?

Flowback and Produced Water

What are the possible impacts of releases of flowback and produced water on drinking water resources?

- What is the composition, quantity, and variability of flowback and produced water and what are the toxic effects of these constituents?
- What factors may influence the likelihood of contamination of drinking water resources?
- How effective are mitigation approaches in reducing impacts to drinking water resources?

Wastewater Treatment and Waste Disposal

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

- How effective are treatment and disposal methods?

Retrospective Case Study Finalists

Formation	Location
Bakken Shale	Killdeer and Dunn County, ND
Barnett Shale	Wise and Denton Counties, TX
Marcellus Shale	Bradford and Susquehanna Counties, PA
Marcellus Shale	Wetzel County, WV, Green and Washington Counties, PA
Raton Basin (CBM)	Las Animas County, CO

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Prospective Case Study Finalists

Shale Play	Location
Bakken Shale	Berthold Indian Reservation, ND
Barnett Shale	Flower Mound / Bartonville, TX
Marcellus Shale	Green County, PA, or TBD
Niobrara Shale	Laramie County, WY

Collaboration with Others

EPA will work with other federal agencies, states, and other organizations, such as:

- Department of Energy
- US Geological Survey

Examples of activities:

- Cooperate on research
- Evaluate data

Expected Results

EPA plans to synthesize the results of the research to assess:

- Whether hydraulic fracturing may impact drinking water resources, and if so, to what extent and under what conditions
- What are the driving factors for any potential impacts

2012 Interim Report

- Analyze and map existing water quality and quantity data
- Compile a list of chemicals found in HF fluids, flowback and produced water
- Identify known toxicity of HF chemicals, other constituents associated with HF, and naturally occurring substances in wastewater
- Identify possible chemical indicators and analytical methods
- Review scientific literature on surface chemical spills
- Test well failure and existing subsurface pathway scenarios
- Assess existing data on treatment and/or disposal of HF wastewaters
- Identify HF chemical constituents that create disinfection byproducts
- Evaluate potential impacts of high chloride concentrations on drinking water utilities

- Results from retrospective case studies

2014 Report

- Assess impacts of cumulative water withdrawals
- Analyze well files
- Study reactions between HF fluids and target formations
- Develop additional analytical methods
- Predict the toxicity of unknown chemicals
- Develop provisional peer reviewed toxicity values (PPRTVs) for chemicals of concern

- Results from prospective case studies

Next Steps

- Complete Science Advisory Board review
- Research
- Publish an interim report of results in 2012
- Provide additional results in a 2014 report

Additional Information

A PDF of the study plan can be found at:

http://www.epa.gov/hydraulicfracturing

Find more information on the Science Advisory Board review of the draft study plan at:

http://yosemite.epa.gov/sab/SABPRODUCT.NSF/0/d3483ab445ae614185257759006 03e79!OpenDocument&TableRow=2.0#2.