

# Fracking in Illinois

Chris Johnson



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Morning Minutes: Jan. 20

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OBITUARY: Wilma Jean Gibbs-Mills

...

## Southern Illinois bands in concert against fracking

# Public Hearings and Protests



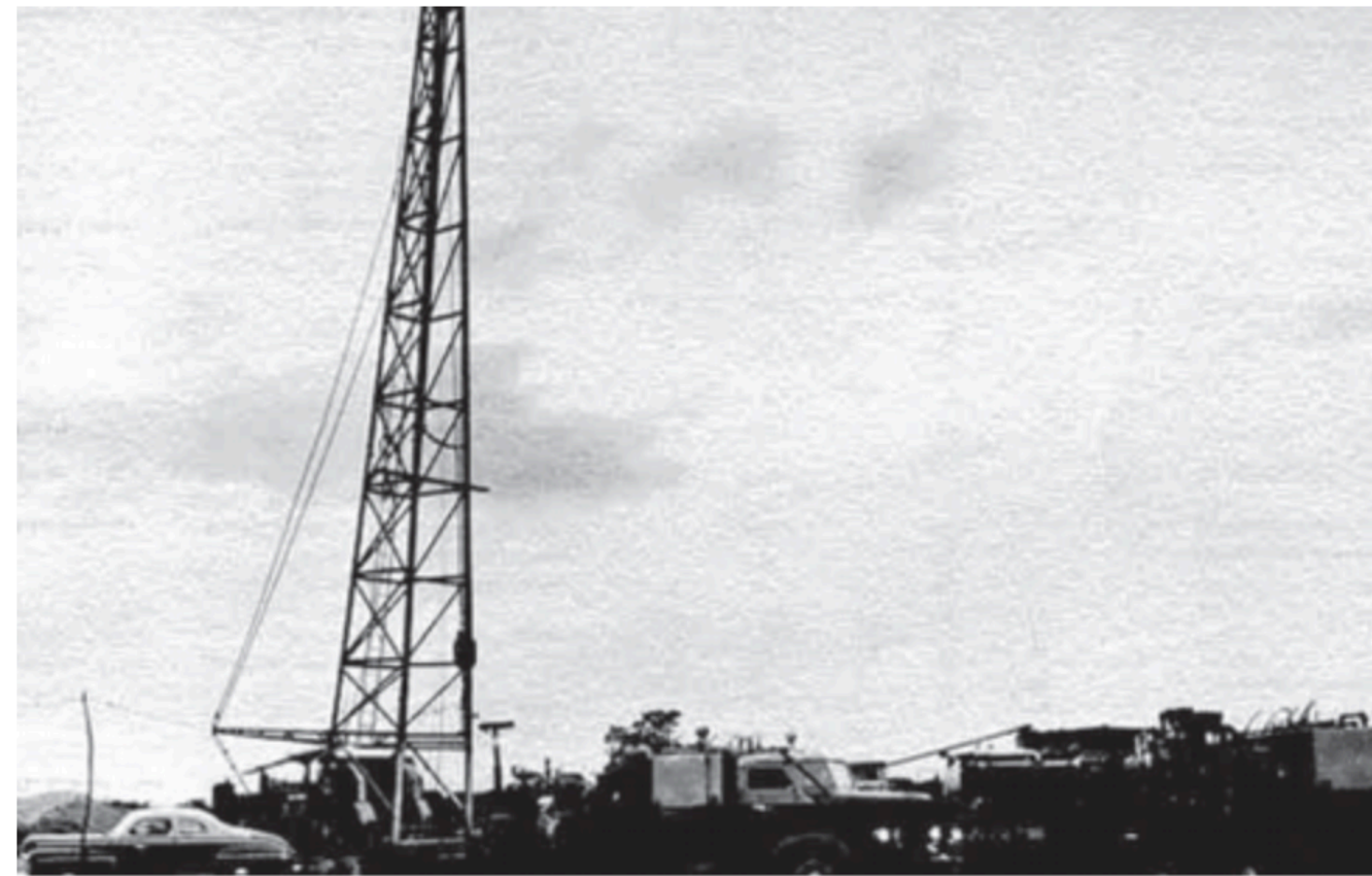
# Key Questions

- I. What is the process of hydraulic fracturing—i.e., fracking?
- II. How has fracking affected energy resources in the United States?
- III. What is the potential for natural-gas production in Illinois?
- IV. What are the arguments in favor of fracking?
- V. What are the arguments against fracking?
- VI. What is the impact of fracking on public lands?
- VII. How is Illinois planning to regulate fracking?
- VIII. How are citizens involved in this issue?

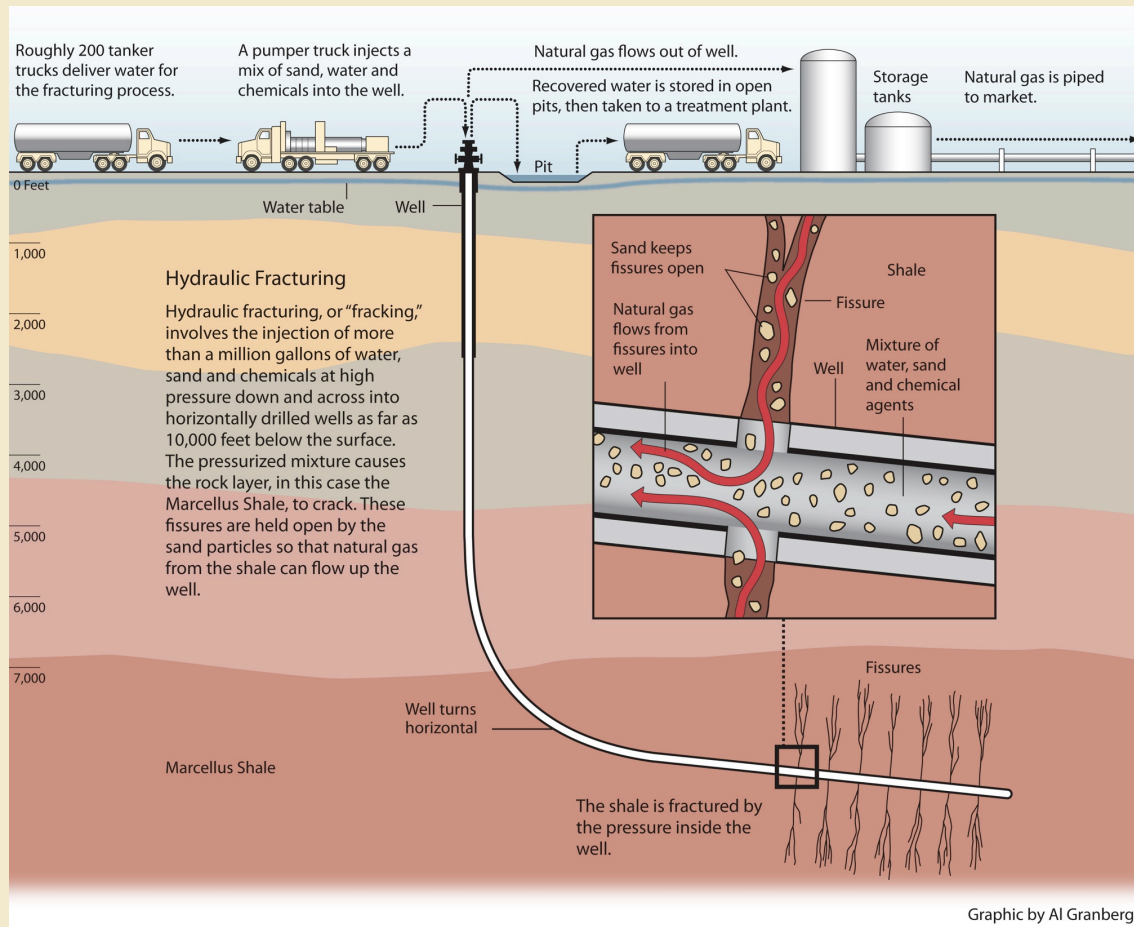
I. What is the  
process of  
hydraulic fracturing  
—i.e., fracking?



# Halliburton in 1949



# Hydraulic Fracturing Technology



# Recent Technological Developments

- Department of Energy funding
- Deep wells
- Horizontal drilling
- Multi-well pads
- Hydraulic fracturing—pumping fracturing fluids at very high pressures
- Use of chemicals to increase efficiency with which natural gas brought to surface
- 5.6 million gallons of water per frack
- Use of sand as proppants
- Return of flowback to surface

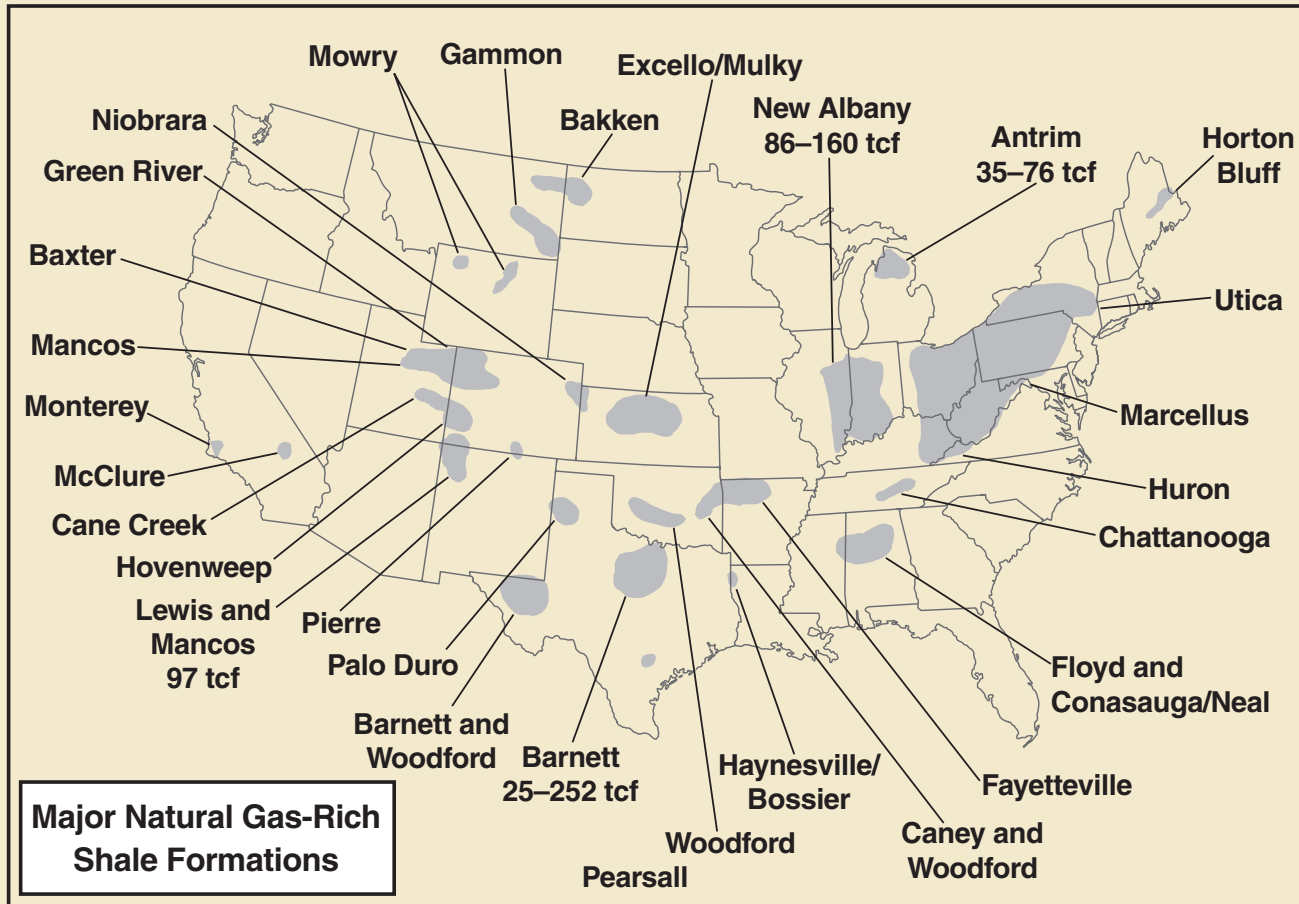
Source: *Modern Shale Gas Development in the United States: A Primer* (National Energy Technology Laboratory, 2009)



# Marcellus Shale Outcrop



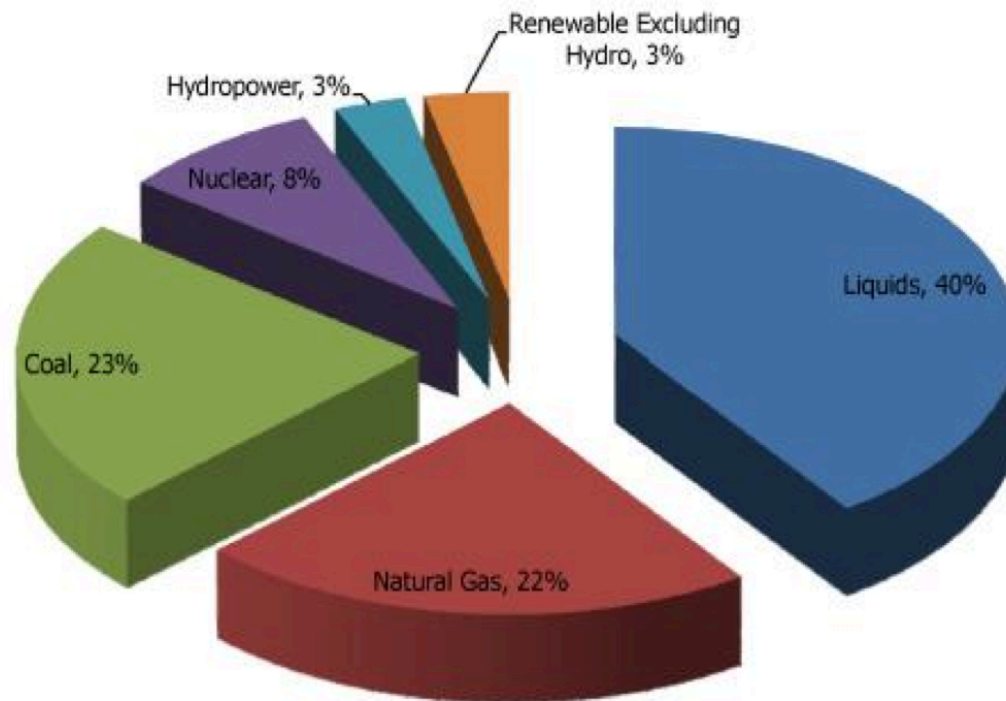
# Major Oil and Natural Gas Shale Formations—"Plays"



## II. How has fracking affected energy resources in the United States?

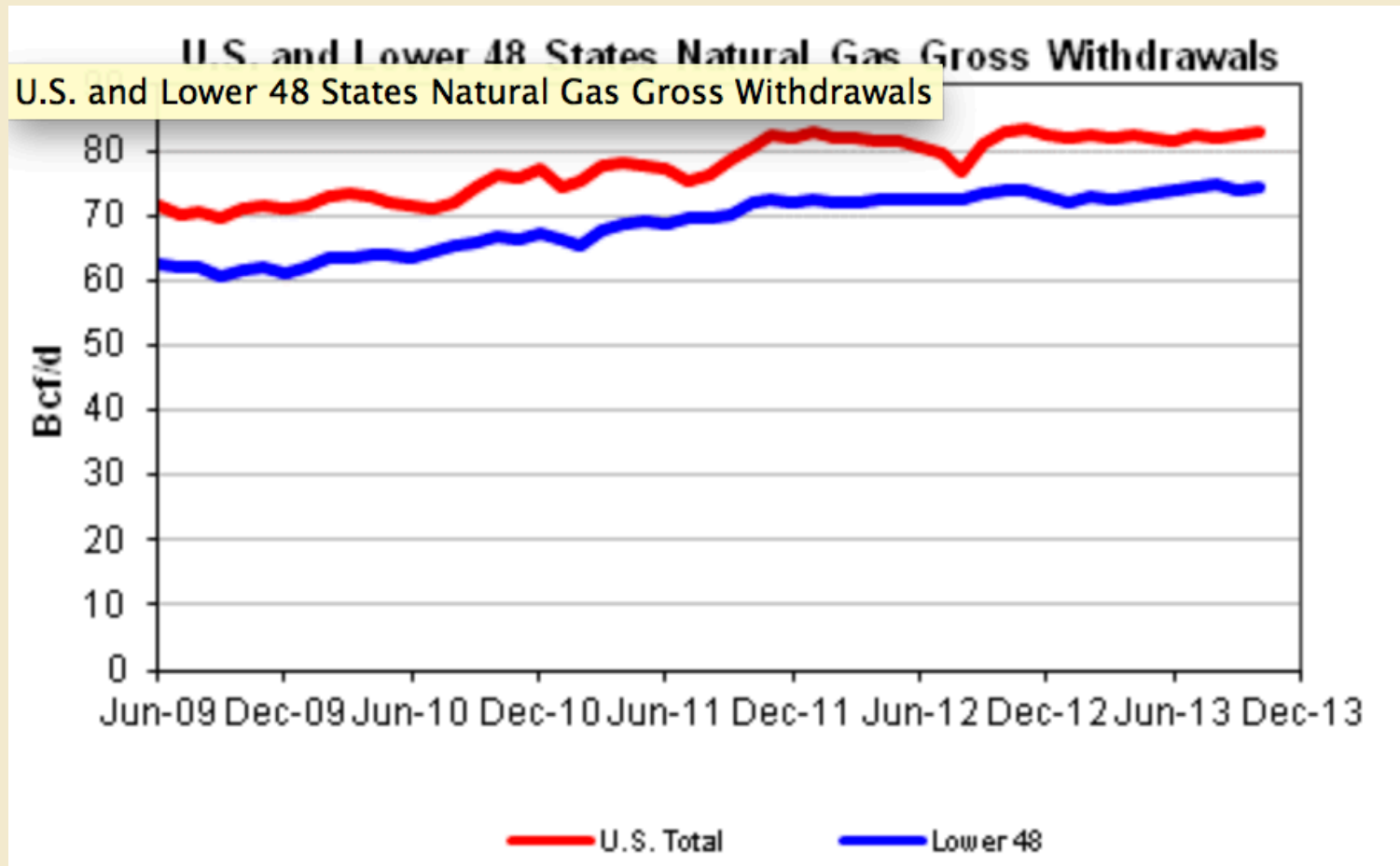


# U.S. Energy Consumption by Fuel

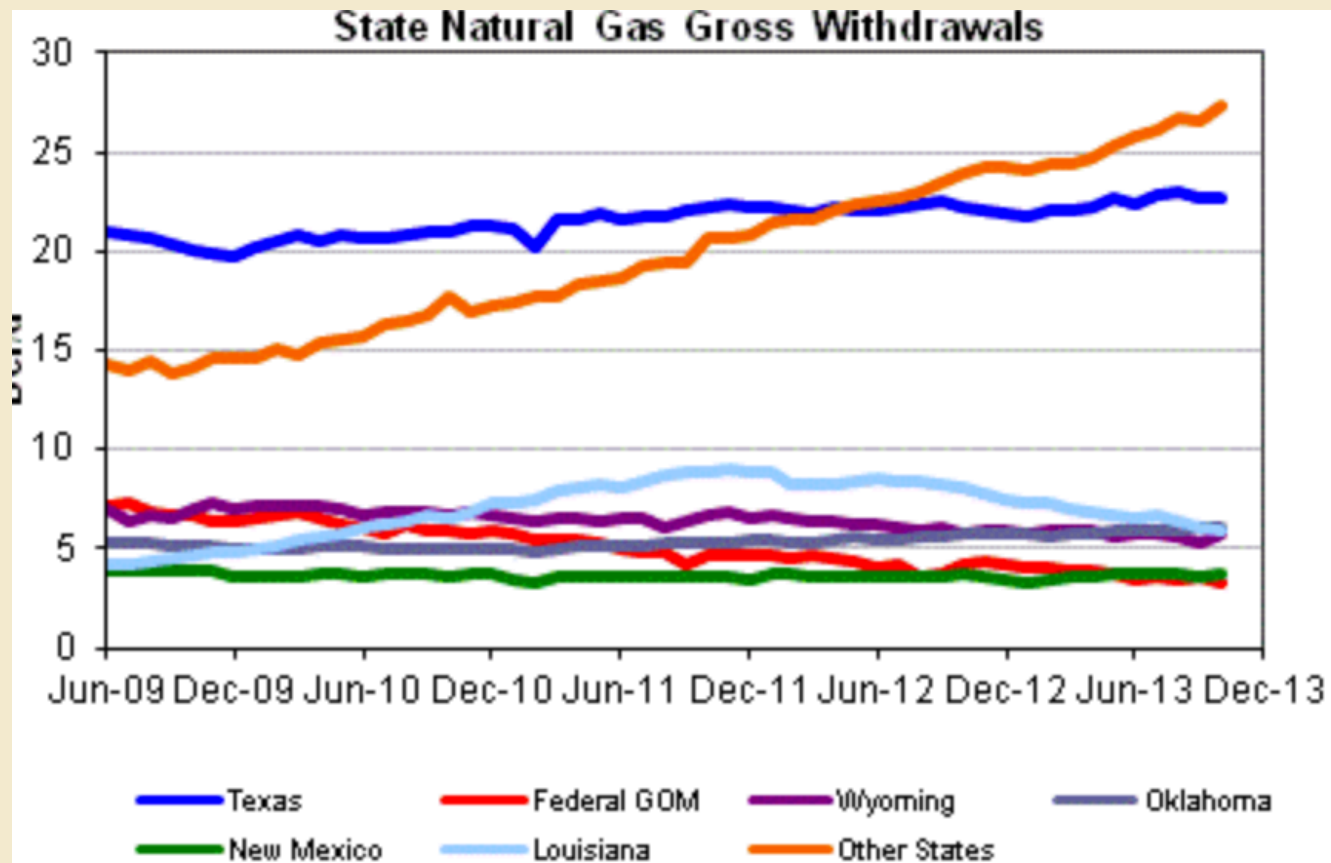


Source: EIA, 2008.

# Increase in Natural Gas Production

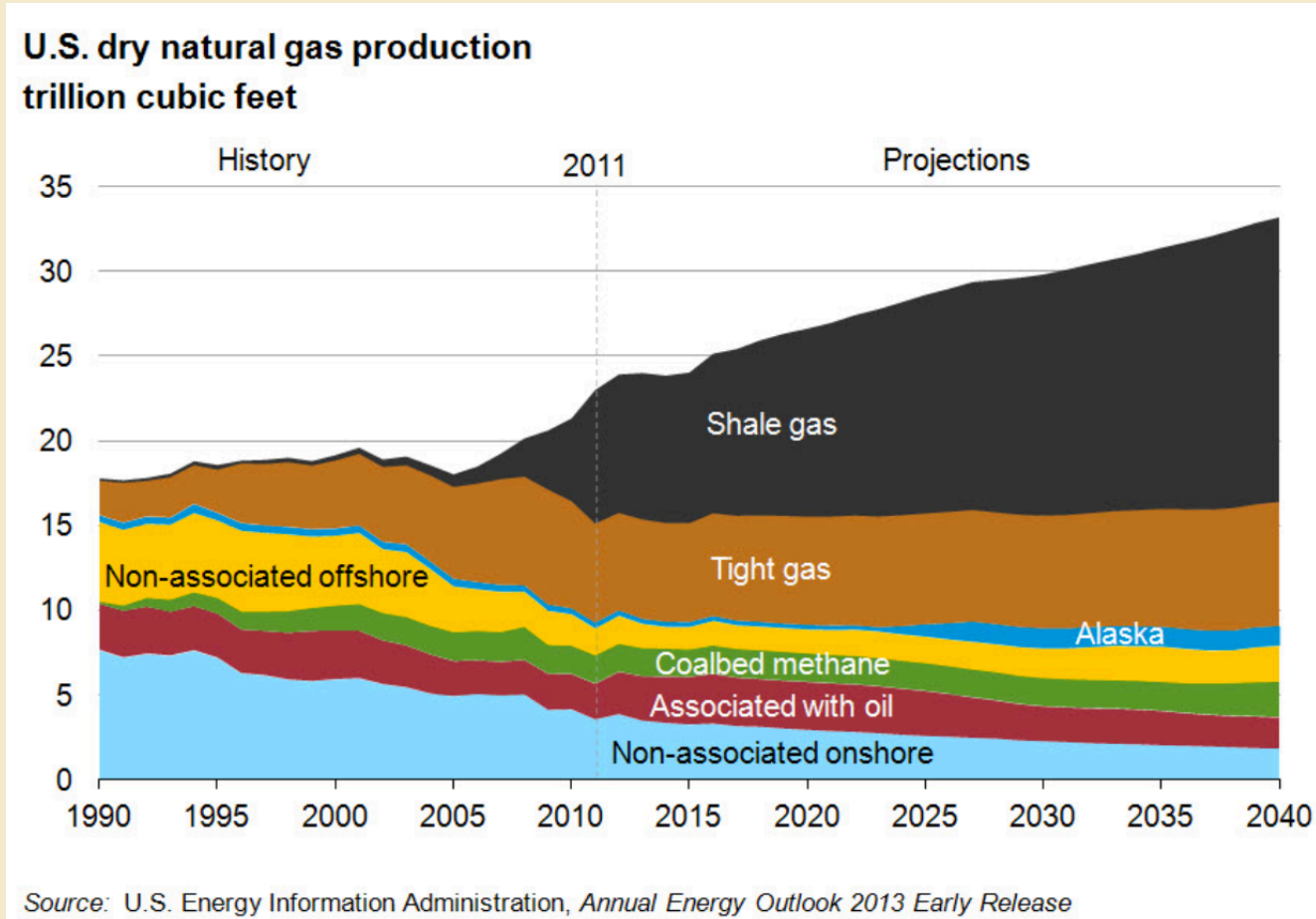


# Natural Gas by State



Source: Energy Information Administration

# U.S. Natural Gas Production by Source



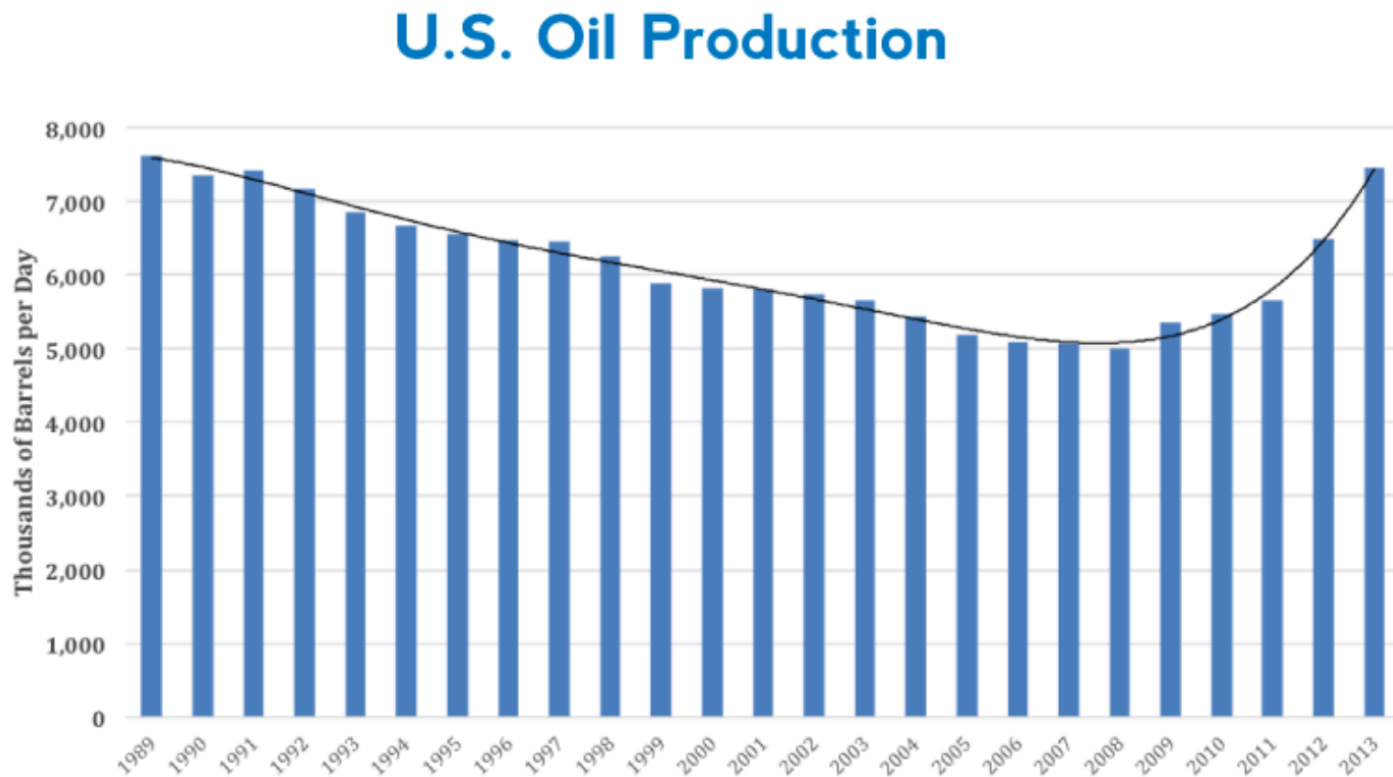
# Natural Gas Reserves in United States

- 1,744 trillion cubic feet (tcf)
- 211 tcf economically recoverable
- Enough to supply U.S. for at least 90 years
- Unconventional sources=60% of natural gas
- Natural gas from unconventional sources increased from 5.4 tcf/year in 1998 to 8.9 tcf/year in 2007.

*Source: Modern Shale Gas Development in the United States: A Primer (National Energy Technology Laboratory, 2009)*



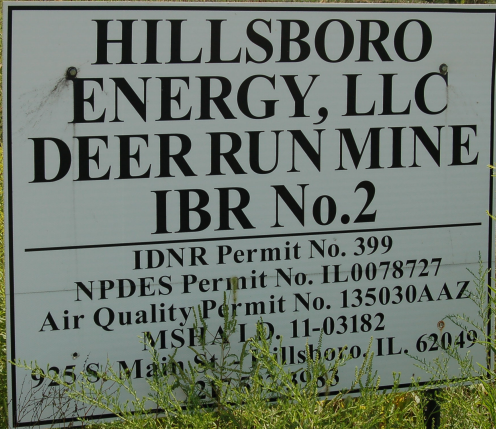
# Increase in U.S. Oil Production



# III. What is the potential for natural-gas production in Illinois?



# Illinois as Energy Producer



**HILLSBORO  
ENERGY, LLC  
DEER RUN MINE  
IBR No.2**

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IDNR Permit No. 399  
NPDES Permit No. IL0078727  
Air Quality Permit No. 135030AAZ  
MSHA I.D. 11-03182  
925 S. Main St., Hillsboro, IL. 62049  
217-522-4033

- Oil refining: **#1** in Midwest; **#4** in U.S.
- Coal reserves: **#3** in U.S.
- Ethanol: **#3** in U.S.
- Nuclear power: **#1** in U.S.; **12%** of nation's total
- Use **129 million Btu** of energy per home, **44% more** than U.S. average

Source: "Illinois State Profile and Energy Estimates,"  
U.S. Energy Information Administration



# New Albany Shale Formation



# Oil and Gas Proposed Sites in Illinois



# Natural Gas in Illinois

- New Albany Shale may contain as much as 11 tcf—almost half of U.S. natural-gas consumption in 2010.
- By April 2012, companies had spent nearly \$100 million in mineral rights—hundreds of thousands of acres
- Paying more than \$100/acre, with royalties up to 17.5%
- One-time payments of approximately \$50/acre
- Poverty rate in Johnson County—15%
- Poverty rate in Pope County—20%

Sources: "Illinois and Fracking," SourceWatch, October 10, 2013;  
"Southern Illinois Braces for Oil Rush as 'Fracking' Regulations Considered by Lawmakers,"  
Associated Press, May 6, 2013

# IV. What are the arguments in favor of fracking?



# 1. Economic Benefits

**“New developments like the Bakken Shale in North Dakota and the Marcellus Shale in Pennsylvania have created tens of thousands of new jobs with billions of dollars in economic output.”**

**--Brad Richards, Executive Vice President,  
Illinois Oil and Gas Association**



# 1. Economic Benefits

- U.S. the largest producer of natural gas in the world
- Economic benefits of \$1 billion/day
- Increase of domestic energy supplies from \$70 million/day in 2010 to \$900 million/day in 2012
- U.S. natural gas prices fell almost 90% since 2003
- Lower utility costs—savings of \$566 million/day
- Marcellus Shale projected to generate more than 100,000 jobs in Pennsylvania and add \$10 billion to state economy
- North Dakota unemployment rate: 3.3%

Sources: “A Billion-Dollar Daily Shot in the Arm for the American Economy,” [www.exxonmobilperspectives.com](http://www.exxonmobilperspectives.com), August 17, 2012;  
“Domestic Energy Supplies Boost U.S. Economy,” [usatoday.com](http://usatoday.com), July 11, 2012.

## 2. Energy Independence

- U.S. exporting \$67.9 million/day of petroleum products, such as diesel fuel and coal.
- U.S. imports less oil and uses more domestic and Canadian oil, saving \$56.2 million/day.
- In 2013, U.S. oil output grew 18 percent.
- U.S. will be world's largest producer by 2015.
- Imported oil will decline to 28% of domestic demand in 2014—lowest level since 1985. Peaked at 60% in 2005.
- Production of oil in Texas up 21% in 2013.
- Including oil, gas, nuclear, and renewables, U.S. met 86% of domestic demands in 2013—highest amount since 1986.

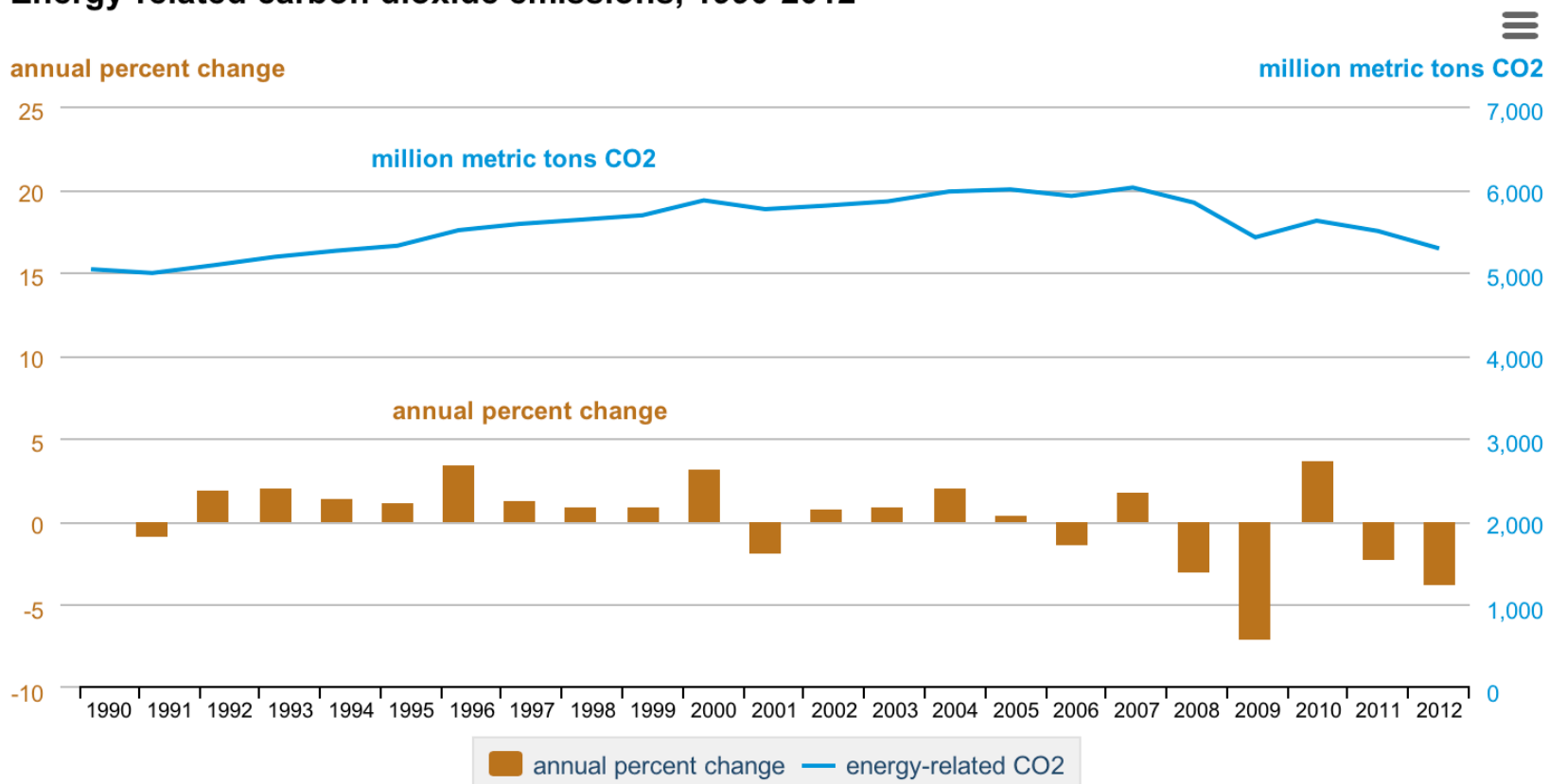
Source: "Fracking Boom Pushes U.S. Oil Output to 25-Year High," *Bloomberg News*, December 11, 2013

# 3. Natural Gas Emits Less Carbon Dioxide

<b>Energy Source</b>	<b>Pounds of CO<sub>2</sub> Per Million Btu of Energy</b>
<b>Coal</b>	<b>214.3 to 228.6</b>
<b>Diesel fuel and heating oil</b>	<b>161.3</b>
<b>Gasoline</b>	<b>157.2</b>
<b>Propane</b>	<b>139.0</b>
<b>Natural gas</b>	<b>117.0</b>
	Source: U.S. Energy Information Administration

# Energy-Related Carbon Dioxide Emissions, 1990-2012

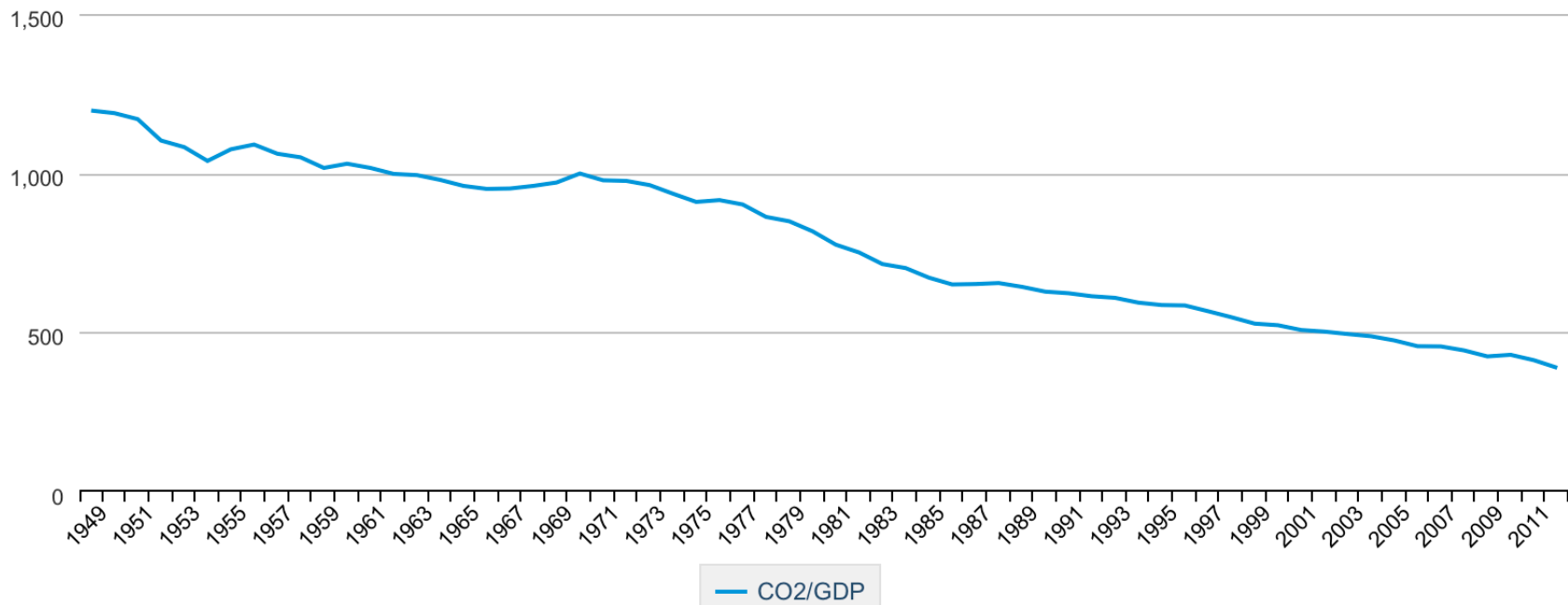
Energy-related carbon dioxide emissions, 1990-2012



# Carbon Intensity of U.S. Economy, 1949-2012

Carbon intensity of the U.S. economy, 1949-2012

metric tons carbon dioxide/\$million



# V. What are the arguments against fracking?



# 1. Water and Soil Contamination



- **Research by The Endocrine Disruption Exchange**
- **Used in fracking: 944 products containing 632 chemicals**
- **Chemicals used to increase viscosity, increase density and weight of fluids, facilitate return of fluids to the surface, prevent corrosion.**
- **75% of chemicals can affect skin and eyes**
- **40-50% can affect brain and nervous system, cardiovascular system, and kidneys**
- **37% can affect endocrine system**
- **25% can cause cancer and mutations**

Source: Colborn et al, "Natural Gas Operations from a Public Health Perspective," *Human and Ecological Risk Assessment* 17 (2011): 1039-1056.

# Well Failures

- Research by Professor Anthony Ingraffea, Professor of Engineering at Cornell University
- Data from Pennsylvania Department of Environmental Protection
- 2010: 1,454 wells drilled; 90 failed; 6.2% failure rate
- 2011: 1,937 wells drilled; 121 failed; 6.2% failure rate
- 2012: 262 wells drilled in Jan/Feb; 19 failed; 7.2% failure rate
- Of 100,000 projected wells in PA, 6,000 would be faulty

Source: Ingraffea, "Fluid Migration Mechanisms Due to Faulty Well Design,"  
*Physicians Scientists & Engineers for Healthy Energy*, October 2012.



# Well Failures, Part 2

- Only 25% to 60% of chemicals are recovered.
- 300,000 oil and gas wells in Alberta, Canada, currently leak.
- Aging wells in Gulf of Mexico have leakage rates as high as 60%.

Source: Andrew Nikiforuk, *The Tyree* (British Columbia), January 9, 2013.

# EPA Report on Pavillion, Wyoming— December 2011

- In 2010, residents complained about bad-tasting water and odors.
- EPA investigated and issued draft report in December 2011.
- From shallow sources, found high concentrations of benzene, xylene, gasoline, diesel fuel, and other toxins
- From deep sources, found high concentrations of benzene, toluene, ethylbenzene, and xylene.
- High levels of methane.

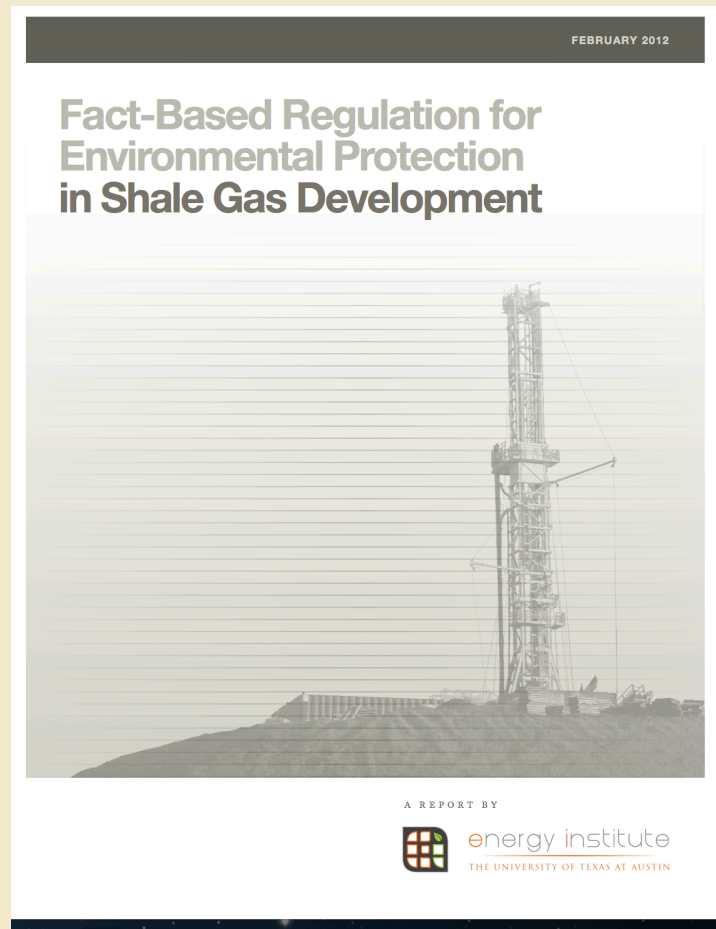
Source: DiGiulio, Wilkin, and Miller, *Investigation of Ground Water Contamination near Pavillion, Wyoming*, U.S. Environmental Protection Agency, December 2011.

# Pressures on EPA

- EPA stopped investigation of Pavillion in 2013.
- State will continue investigation, to be funded by EnCana, company accused of contamination.
- Closed investigation in Dimock, PA, site of *Gasland*.
- Ceased investigation that driller in TX released methane.
- Lowered estimate of methane released during fracking.
- Has not enforced ban on diesel fuel in fracking.

Source: "EPA's Abandoned Wyoming Study One Retreat of Many," [www.propublica.org](http://www.propublica.org), July 3, 2013.

# Report by the Energy Institute at University of Texas, 2012



# Report's Findings

- “[T]here is at present little or no evidence of groundwater contamination from hydraulic fracturing of shales at normal depths.” (18)
- Pavillion, Wyoming, dealt with in a short footnote.

Source: Groat and Grimshaw, *Fact-Based Regulation for Environmental Protection in Shale Gas Development*. Austin, Texas: The Energy Institute, 2012.

# Dr. Charles G. Groat, Principal Investigator

- Former Professor of Geology at the University of Texas
- Received more than \$400,000 in compensation from Plains Exploration and Production—involved in shale gas development
- Held more than \$1 million in company's stock
- Failed to disclose conflict of interest even to study's co-authors
- University of Texas investigated

Source: Andrew Revkin, "A Deeper Look at Undisclosed Conflicts of Interest in 'Frackademia'," *NYTimes.com*, August 1, 2012.

# Blowouts and Spills in North Dakota



- **Continental Resources: 11 blowouts since 2006**
- **11<sup>th</sup> blowout in August 2013 spilled more than 173,000 gallons of pollutants**
- **Continental has paid a total of \$7,500 in fines**
- **Spills, leaks, blowouts, and fires exceed increase in oil**
- **1 environmental incident for every 6 wells**
- **18.4 gallons of oil and chemicals spilled from 2006 to 2014**

–Deborah Sontag and Robert Gebelhoff, “The Downside of the Boom.” *New York Times*, November 23, 2014

# Blowouts and Spills in North Dakota

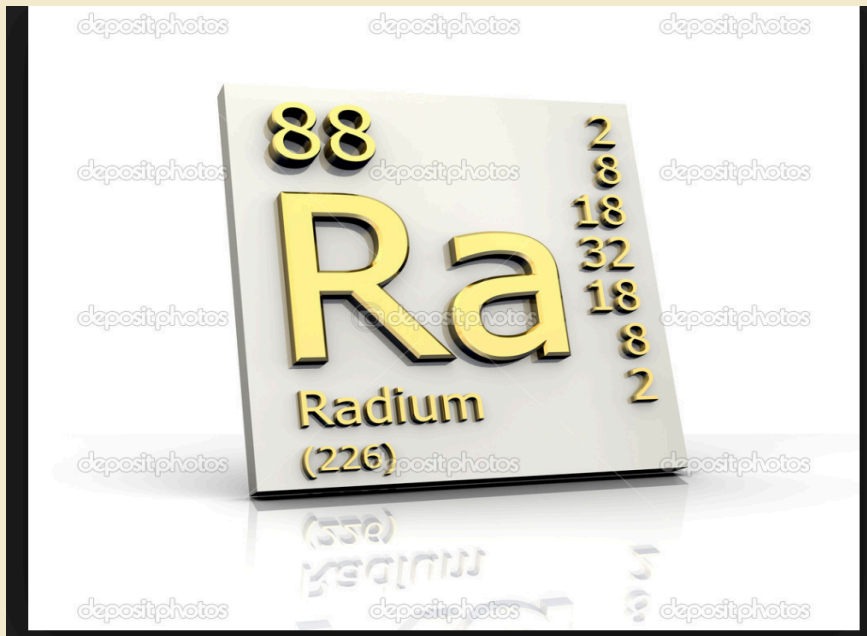


- **Continental Resources: \$2.8 billion in net income since 2006**
- **North Dakota's Industrial Commission has collected \$1.1 million in fines**
- **Texas has collected \$33 million in fines**

–Deborah Sontag and Robert Gebelhoff, “The Downside of the Boom.” *New York Times*, November 23, 2014



## 2. Potential Radioactive Materials



- Researchers found radioactive materials near wastewater treatment plant in western Pennsylvania
- 200 times amount of radium
- Radium accumulates in sediment
- Can make way into food chain
- Researchers believe contaminants come from fracking.

Source: "Fracking Wastewater Radioactive and Contaminated, Study Finds," LiveScience.com, October 2, 2013.

# 3. Air Pollution

- Toxic volatile compounds (VOCs) and methane can escape from fracking sites
- Asthma and chronic obstructive pulmonary disease
- Damages aspens, conifers, and other species
- In DISH, Texas, high levels of benzene, xylene, and naphthalene in the atmosphere
- Methane 20 times as effective as greenhouse gas as carbon dioxide

Source: Colborn et al, "Natural Gas Operations from a Public Health Perspective,"  
*Human and Ecological Risk Assessment* 17 (2011): 1039-1056.

## 4. Stress on Water Supplies



- **5.6 million gallons of water per frack**
- **Average family uses 300 gallons of water per year**
- **One frack uses water that a household would use for 51 years**
- **Cornell University: 100 cattle deaths tied to fracking fluid**
- **Duke University: methane 17 times higher within 1 km. of fracking well**
- ***Akron Beacon-Journal*: 50,000 to 70,000 gallons of chemicals**

–Ohio Environmental Council

## 5. Accelerates Climate Change

- Fracking leaks methane, which is 34 times more potent as greenhouse gas than carbon dioxide
- Well-constructed wells release minimal methane
- Many wells have significant leakage
- One of largest U.S. gas fields has 6% to 12% leakages
- Fugitive methane emissions could be 50% higher than EPA estimates

Sources: "More Bad News for Fracking," [thinkprogress.org](http://thinkprogress.org), October 2, 2013; "New Study Finds Higher Emissions from Fracking," [oilprice.com](http://oilprice.com), November 29, 2013.

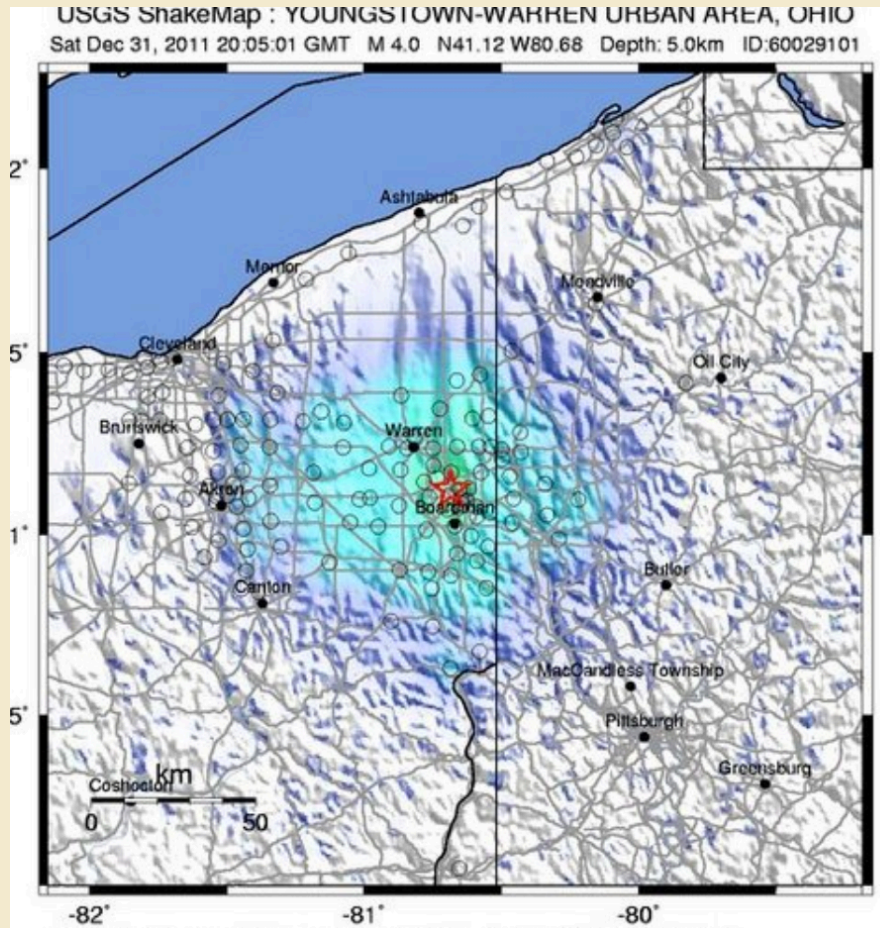
# Methane Migration-- George Zimmerman Farm in PA

Click image to enlarge



The Atlas well burns on Wednesday.

# 6. Causes Earthquakes



# Injection Well in Youngstown, Ohio

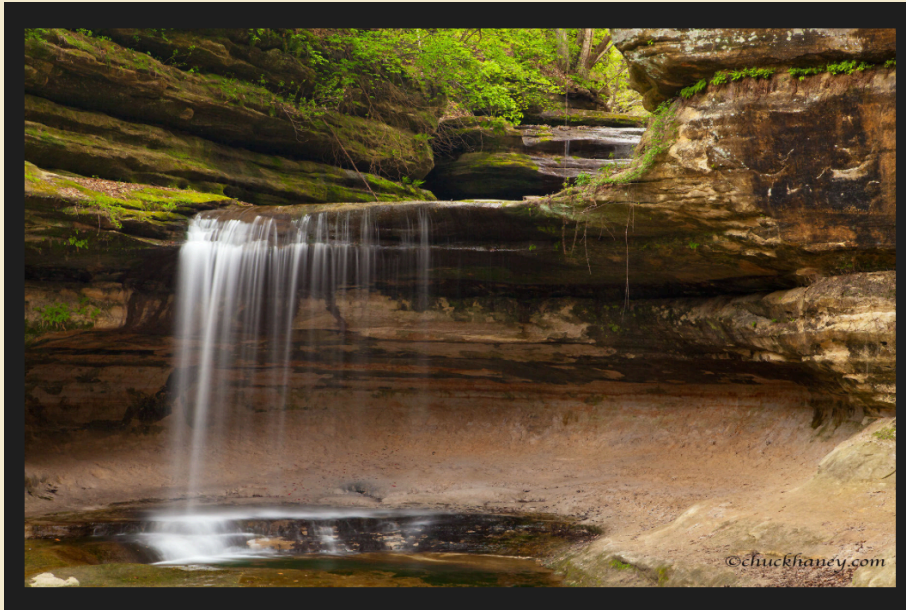


# 7. Pollution from Frac Sand Mining





# Starved Rock State Park, Illinois



- Highest quality frac sand
- Mining on 200-acre site outside park boundaries
- Threat of contamination of rivers and wetlands
- Threat of noise pollution and truck traffic
- Constant winds blow dust
- Economic payoff: 65 jobs and \$9 million
- Annual visitors to park: 12 million
- LaSalle County had \$168.5 million in tourism

Source: Lynn Peeples, "New Fracking Frontier Outside Illinois State Park," Huffington Post, December 11, 2012.

# 8. Delays Transition to Renewable Energy



- In 2011, 13 countries generated at least 30% of the power from renewables. The United States generated 13%.
- Canada generated 63% of its power from renewables.
- Germany generates 20.7% of its power from renewables and has set the goal of generating 35% by 2020.
- By 2030, New York could produce all its power from wind, solar, and hydroelectric power.
- In New York, updating the power grid could generate 58,000 jobs.

Source: Elisabeth Rosenthal, "Life After Oil and Gas," *The New York Times*, March 24, 2013.

# VI. What is the impact of fracking on public lands?



# Drilling in National Parks and National Forests

- Federal government controls 650 million acres of lands
- One of missions is to promote economic growth
- Split estate: separation of surface rights from mineral rights
- Leases 44.5 million acres to oil and gas companies
- 77,000 producing wells
- Drilling managed by Bureau of Land Management

Source: "What Would Happen to the Environment if U.S. Federal Lands Were Open to Oil Drilling?"  
Science.howstuffworks.com,

# Drilling in National Parks

Forty-two national park units where oil and gas drilling is occurring or could proceed in the future



# National Forests and Grasslands



- U.S. Forest Service (1905)
- Department of Agriculture
- Purpose: multiple use
- “The greatest good of the greatest number in the long run”
- Logging, grazing, mining, drilling permitted under supervision
- Hunting permitted
- Trails for off-road vehicles
- Protected wildernesses

# National Forests



# Arguments for Drilling on Public Lands

- Unconventional oil and gas drilling has created 1.7 million jobs
- Could create 3 million jobs by 2020
- Lower natural gas prices add \$926/household to household income every year
- Between 2007 and 2012, oil and gas industries created jobs 40 times faster than rest of economy
- Natural gas industry projected to create 600,000 jobs by 2020

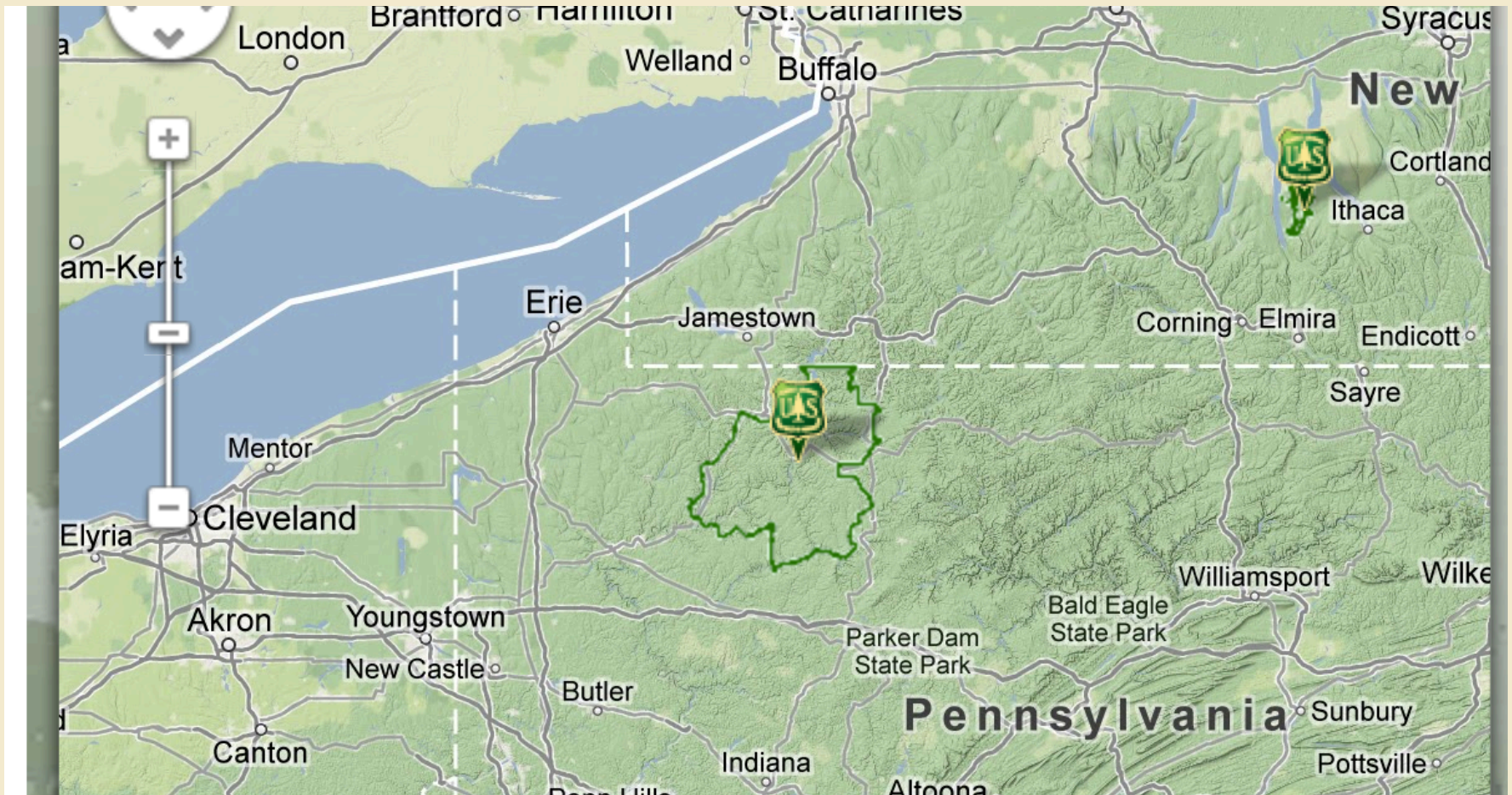
Source: American Petroleum Institute, August 23, 2013



# Arguments Against Drilling on Public Lands

1. Water and soil contamination
2. Air pollution
3. Radioactivity
4. Accelerates climate change
5. Misuse of public lands
6. Destruction of habitat

# Allegheny National Forest



# Industrial Uses of Allegheny National Forest

- Formed in 1923
- 513,000 acres
- 93% of forest subsurface privately owned
- On Marcellus Shale
- Approximately 11,000 conventional oil wells
- 2,000 new wells in 2009
- 600,000 to 800,000 barrels a year, with value of approximately \$70 million
- 15 billion cubic feet of natural gas a year, with value of about \$52 million
- Fracking has started in this national forest

Source: Pennsylvania Independent Oil and Gas Association

# Security



# More Than 11,000 Conventional Wells



# Forest Fragmentation Because of Drilling



# Forest Fragmentation



# Infrastructure: Oil-Containment Tanks





# Quarries



# Soil Contamination



# Soil Contamination



# Soil Contamination



# Heavy Truck Traffic and Erosion



# Waste



# Shell Oil Site with Capped Well



# Security





# Methane Migration— Warren, PA, January 2011



# Environmental Impact of Conventional Drilling on the ANF

- Each site removes 1.3 acres of wildlife habitat
- 241,000 acres of forest subject to drilling
- Potential for 48,200 wells
- 2,083 miles of roads for oil and natural-gas activity
- 1,243 Forest Service roads
- Of 1,500 species of plants and animals, 78 at risk
- Impact on aesthetic values and on recreation
- Methane migration

*Source: Allegheny National Forest Final Environmental Impact Statement, 2007*

# Fracking in Virginia— Banned in 2011. . . But Forever?

## FRACKING IN THE George Washington National Forest



As the largest national forest in the East, the George Washington National Forest (GW) plays a special environmental, economic, and recreational role for our region. Yet the U.S. Forest Service is weighing whether to open up the forest to horizontal natural gas drilling and the riskiest and most destructive form of fracking.

One of the country's most popular national forests, the GW is absolutely the wrong place for this.

### The Threat

In the spring of 2013, the U.S. Forest Service is expected to release the final new management plan for the GW, which will guide all activity in the over one million-acre forest for the next decade or longer. The Forest Service originally proposed to prohibit horizontal gas drilling on any future federal oil and gas leases in the GW, but due to pressure from the gas industry and other drilling proponents, the Forest Service has been reconsidering.

Prohibiting horizontal drilling in the GW would curb high-volume hydraulic fracturing—fracking—used to extract natural gas from shale deposits. This risky form of drilling could endanger public water supplies, the forest's fish and wildlife habitat, and the recreation opportunities in the GW.



# VII. How is Illinois planning to regulate fracking?



# Fracking in Illinois

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Thursday, March 28, 2013

## The cost of fracking

What are the risks of tapping Illinois' trapped oil and natural gas?

BY PATRICK YEAGLE



# Strength of Hydraulic Fracturing Law

**“Overall, the bill was the strongest package of regulations in the country.”**

**--Ann Alexander, Senior Attorney, Chicago Office,  
Natural Resources Defense Council**

# Complexity of Rules

**“For some perspective, California recently released their draft regulations for hydraulic fracturing. They are 13 pages in length. Our regulations are 130 pages.”**

**--Brad Richards, Illinois Oil and Gas Association**

# Illinois Hydraulic Fracturing Regulatory Act (June 17, 2013)

- Well construction standards
- Chemical disclosure standards—posted by DNR
- Trade secrets can be requested--and challenged
- Health needs trump privacy
- Natural gas must be captured and used
- Public hearings and appeals
- Citizen lawsuits



# Illinois Hydraulic Fracturing Regulatory Act (June 17, 2013)

- Open-air ponds prohibited—closed tanks required
- Wastewater tested for dangerous chemicals
- Wells shut down if fracking fluid released outside shale rock formation
- Baseline and periodic post-frack testing of water
- Presumption of liability for water pollution
- Setback from water sources

# Proposed Rules and Objections

@ <http://www.dnr.illinois.gov/oilandgas/documents/proposedhydraulicfracturing62-245.pdf>

Rule	Objection
<ul style="list-style-type: none"><li>• Flowback allowed in lined pits if tanks are full</li></ul>	<ul style="list-style-type: none"><li>• Open pits should not be allowed</li></ul>
<ul style="list-style-type: none"><li>• Disclosure of violations in other states for 5 years</li></ul>	<ul style="list-style-type: none"><li>• Disclosure time should be longer</li></ul>
<ul style="list-style-type: none"><li>• Setback of wells from waterways is 500 feet</li></ul>	<ul style="list-style-type: none"><li>• Setbacks should be farther</li></ul>
<ul style="list-style-type: none"><li>• Monitoring of various toxic substances</li></ul>	<ul style="list-style-type: none"><li>• No monitoring of radioactive materials</li></ul>
<ul style="list-style-type: none"><li>• Range of fines starts at \$50</li></ul>	<ul style="list-style-type: none"><li>• Fines too low</li></ul>
<ul style="list-style-type: none"><li>• Complex procedure for informing health professionals of chemicals</li></ul>	<ul style="list-style-type: none"><li>• Procedure too time-consuming and inefficient</li></ul>
<ul style="list-style-type: none"><li>• Request hearing if question</li></ul>	<ul style="list-style-type: none"><li>• Allows out-of-state people to request</li></ul>

# Final Rules Issued November 14, 2014

- Companies must explain why not economically feasible to capture escaping gas.
- Rules governing capture of water were eliminated.
- Companies not required to move away from schools or playgrounds.
- Scale back regulation of radioactive materials.
- Anyone who is “adversely affected” by fracking can demand public hearing. But no definition of “adversely affected.”
- NRDC: “There’s now less certainty, more potential loopholes, and all kinds of tinkering that’s clearly not in the public interest.”

Julie Wernau, “Fracking Rules for Illinois Published After Long Battle,”  
*Chicago Tribune*, November 14, 2014.

## VIII. How Are Citizens Involved in This Issue?



# Education and Awareness

These photos were taken in the same location. The photo on the left was taken in 2010 while the photo on the right was taken in 2013. What was once a forested area in the middle of the Allegheny National Forest is now a Marcellus shale gas well site. Scenes like this are unfortunately becoming all too common across Pennsylvania's forests and farmlands as the oil and gas industry pushes full steam ahead in the "shale gas rush."



# Working Against Fracking on National Forests

## A Guide to Keep Fracking from Damaging Our Eastern National Forests

*Stop the degradation of the woods, water and wildlife on our public lands.*

**FOREST  
VALUES**



**THREATS**



**ACTIONS TO  
TAKE**



**CASE STUDIES  
BY STATE**



**RESOURCES**



**LEGAL**



This guide is meant to educate citizens to understand the negative impacts of fracking and to be a resource for challenging and evaluating oil and gas extraction, and hydrofracking, on our national forests. It was created through a collaboration of many environmental groups and individuals.

Please contact us with any questions, information and additional documents to be shared with others.

# Legal Action

Westlaw®

670 F.3d 236, 73 ERC 1932  
(Cite as: 670 F.3d 236)

**H**

United States Court of Appeals,  
Third Circuit.

MINARD RUN OIL COMPANY; Pennsylvania Independent Oil and Gas Association; Allegheny Forest Alliance; County of Warren, Pennsylvania,

v.

UNITED STATES FOREST SERVICE, an agency of the U.S. Department of Agriculture; Tom Tidwell, in his official capacity as Chief of the U.S. Forest Service; Kent P. Connaughton, in his official capacity as regional Forester for the U.S. Forest Service, Eastern Region; Leanne M. Marten, in her official capacity as Forest Supervisor for the Allegheny National Forest; Attorney General of the United States of America; Forest Service Employees for Environmental Ethics; Allegheny Defense Project; Sierra Club Forest Service Employees for Environmental Ethics, Allegheny Defense Project, Sierra Club, Appellants.  
(Pursuant to Fed. R.App. P. 43(c)(2)).  
(Amended Pursuant to the Clerk's Order of June 18, 2010).

# Legal Action



## District Court Grants Summary Judgment to Mineral Owners Against the U.S. Forest Service

In [Minard Run Oil Co. v. United States Forest Serv.](#), C.A. No. 09-125 Erie (W.D. Pa. September 6, 2012), Judge Sean J. McLaughlin of the Western District of Pennsylvania granted summary judgment to plaintiff mineral owners in the ongoing litigation over the Forest Service's attempt to impose a moratorium on new drilling permits in the Allegheny National Forest.



# Resources

- Allegheny Defense Project: [www.alleghenydefense.org](http://www.alleghenydefense.org)
- Environment Illinois: [www.environmentillinois.org](http://www.environmentillinois.org)
- Forest Service Employees for Environmental Ethics (FSEEE): [www.fseee.org](http://www.fseee.org)
- Natural Resources Defense Council: [www.nrdc.org](http://www.nrdc.org)
- Sierra Club's Fracking Regulatory Action Center: [www.sierraclub.org/naturalgas/rulemaking](http://www.sierraclub.org/naturalgas/rulemaking)
- Southern Environmental Law Center: [www.southernenvironment.org](http://www.southernenvironment.org)
- Southern Illinoisians Against Fracturing the Environment (SAFE): [www.dontfractureillinois.net](http://www.dontfractureillinois.net)
- *A Guide to Keep Fracking from Damaging Our Eastern National Forests* ([www.saveblackwater.org/gasdrilling/](http://www.saveblackwater.org/gasdrilling/))

# Resources

- Energy in Depth: <http://energyindepth.org>
- Illinois Oil and Natural Gas Association: <http://www.ioga.com>
- Chevron: <http://www.chevron.com>
- American Petroleum Institute:  
<http://www.api.org/oil-and-natural-gas-overview/exploration-and-production/hydraulic-fracturing>
- ExxonMobil Perspectives:  
<http://www.exxonmobilperspectives.com/2011/06/17/facts-hydraulic-fracturing-process/?gclid=CPbPIND0hb4CFQsSMwodRQEAmA&gclsrc=aw.ds>

# Resources

- My Website: [www.chrisjohnsonwrite.com](http://www.chrisjohnsonwrite.com)
  - *Fracking in Illinois* (Power Point): Under “Presentations” at the Website.
  - “Fracking Comes to the Prairie State” (article in Spring 2014 issue of *Chicago Life*): Under “Writings” at [www.chicagolife.net](http://www.chicagolife.net)

# Further Reading

- Michelle Bamberger and Robert Oswald, *The Real Cost of Fracking: How America's Shale Gas Boom Is Threatening Our Families, Pets, and Food*
- Chris Faulkner, *The Fracking Truth: America's Energy Revolution: The Inside, Untold Truth*
- Russell Gold, *The Boom: How Fracking Ignited the American Energy Boom and Changed the World*

# Further Reading

- Richard Heinberg, *Snake Oil: How Fracking's False Promise of Plenty Imperils Our Future*
- Seamus McGraw, *The End of Country: Dispatches from the Frack Zone*
- Alex Prud'homme, *Hydrofracking: What Everyone Needs to Know*
- Gregory Zuckerman, *The Frackers: The Outrageous Inside Story of the New Billionaire Wildcatters*

# *Forests for the People: The Story of America's Eastern National Forests*

- Story of the Weeks Act
- 8 key issues:
  1. Timber harvesting in Mississippi
  2. Controlled burning in Florida
  3. Wilderness in West Virginia
  4. Recreation in Minnesota
  5. Wolf recovery in Michigan
  6. Shale oil drilling in Pennsylvania
  7. Emerald ash borer in Michigan
  8. Overdevelopment in Vermont and North Carolina
- My Web Site: [chrisjohnsonwrite.com](http://chrisjohnsonwrite.com)