

Pooling:

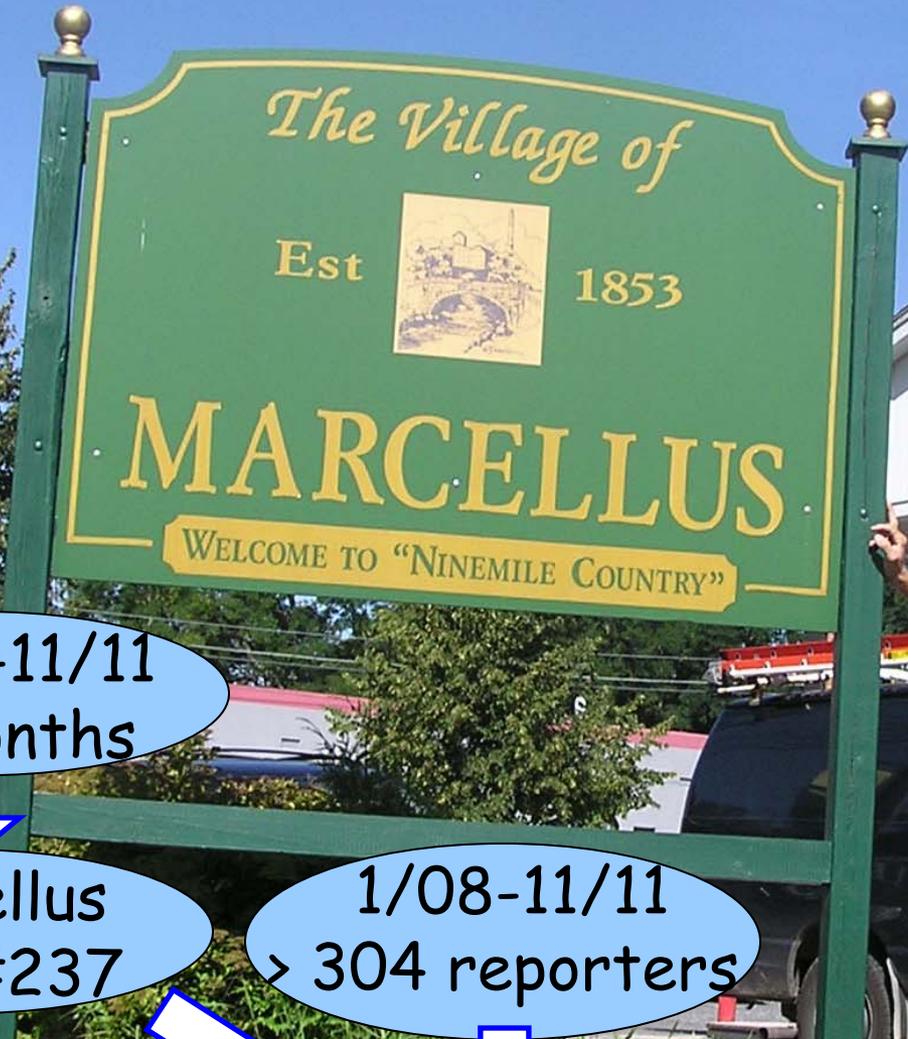
A question poised on the tip of
an ethical knife

Terry Engelder

Professor of Geosciences

Pennsylvania State University





10/07-11/11
49 months



Marcellus
Talk #237



Cumulative
Attendance
14,298

1/08-11/11
> 304 reporters



10/07-11/11
public testimony
> 1000 hours



Terry Engelder

Clayton Williams

George Mitchell

Mitchell

MIT Class of '40

Terry Engelder
MIT M.A. '73
PENN STATE '66

Clayton Williams '54

Tom Corbett
Libanon Valley
'71

Tom Corbett

Tom Ridge

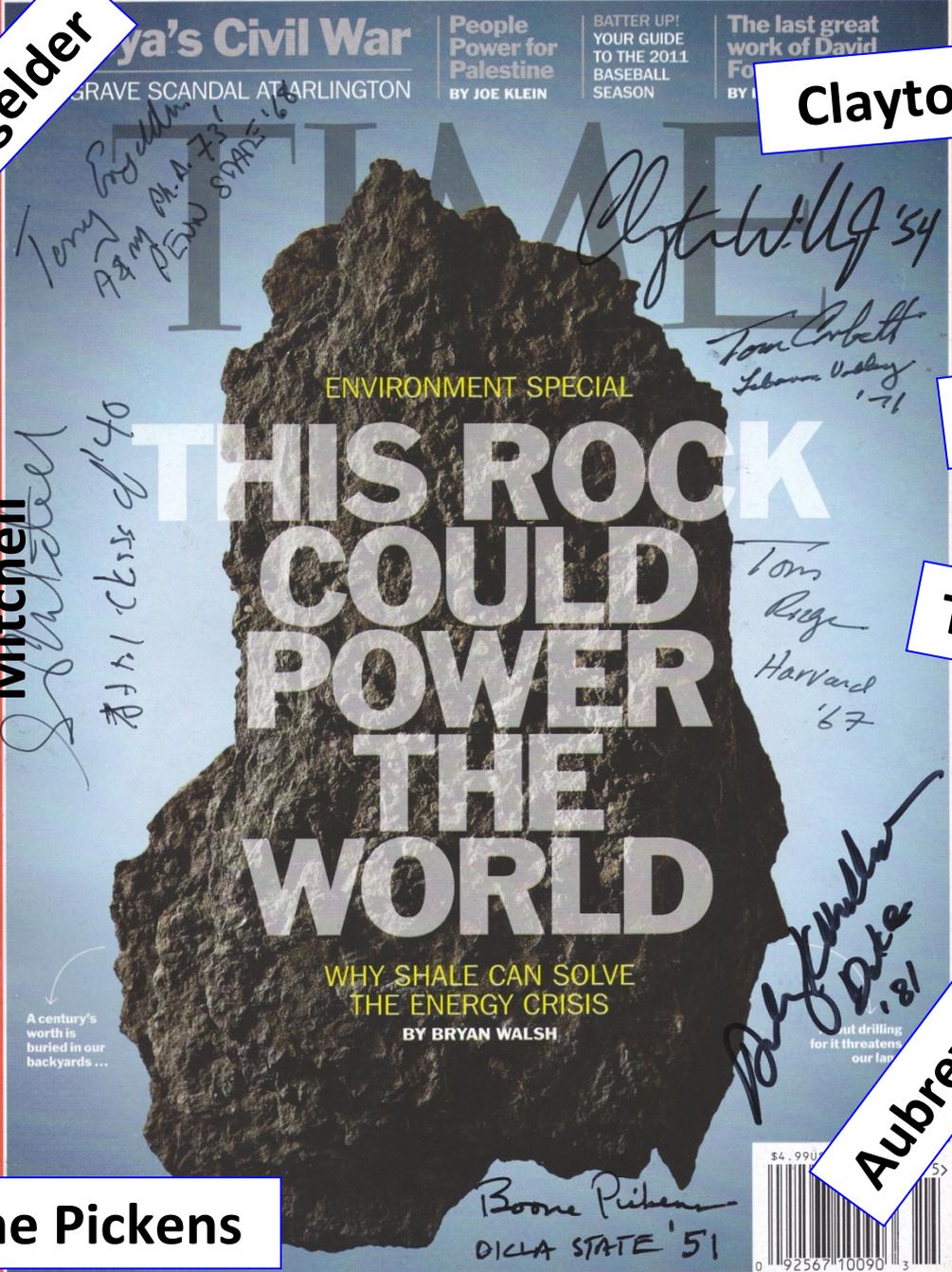
Tom Ridge
Harvard
'67

Aubrey McClendon

Aubrey McClendon
Duke
'81

T. Boone Pickens

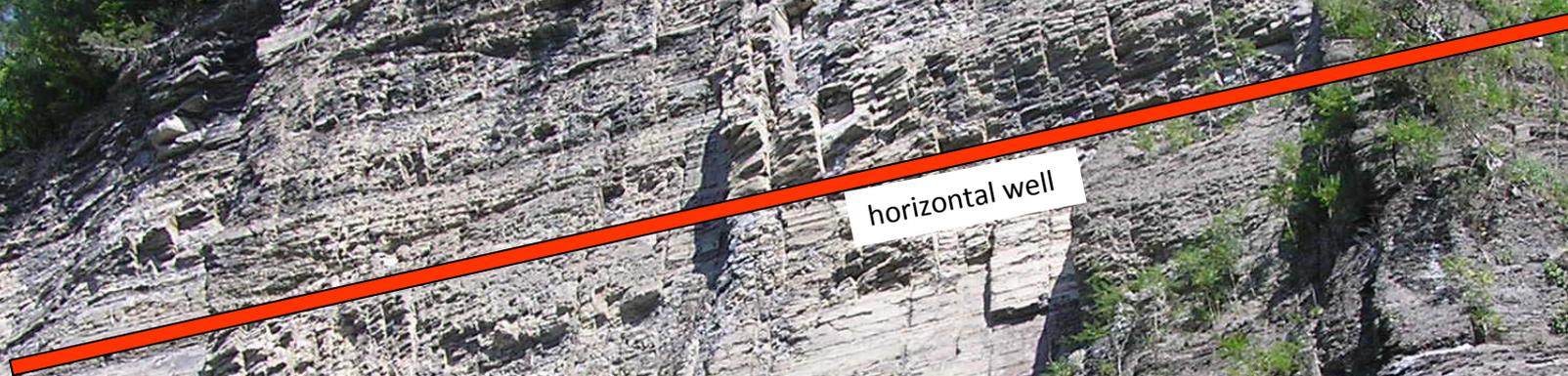
Boone Pickens
DICKA STATE '51



A century's worth is buried in our backyards ...

... but drilling for it threatens our law

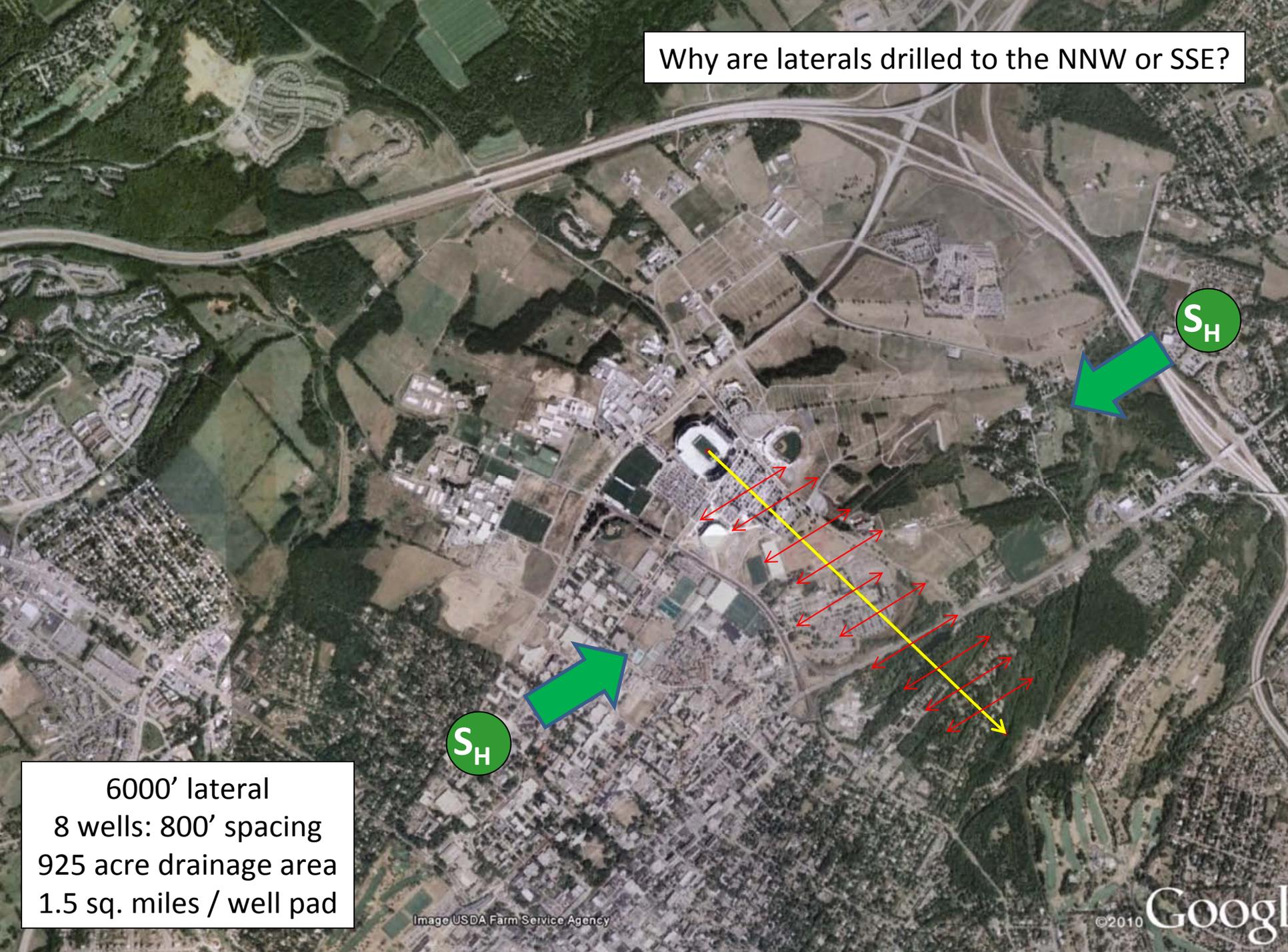




horizontal well

These are the natural fractures (joints) along which sand and other chemicals are pumped:

Why are laterals drilled to the NNW or SSE?



6000' lateral
8 wells: 800' spacing
925 acre drainage area
1.5 sq. miles / well pad

Large
drainage
units:

S_H



S_H



Pooling:

All property owners joint one drainage unit

Image USDA Farm Service Agency

6000' lateral
8 wells: 800' spacing
925 acre drainage area
1.5 sq. miles / well pad

OA Home

Information Technology

Human Resources

Public Safety Radio

Pennsylvania Justice Network

Strategic Services

Continuity of Government

Records & Directives

Executive Orders

2010 - 2010

[Records & Directives](#)



2011-01 - Expired - July 22, 2011 - Creation of Governor's Marcellus Shale Advisory Commission

EXECUTIVE ORDER
Commonwealth of Pennsylvania
Governor's Office

Subject:

Creation of Governor's Marcellus Shale Advisory Commission

Number:

2011-01 - Expired - July 22, 2011

Date:

03/08/2011

By Direction of:

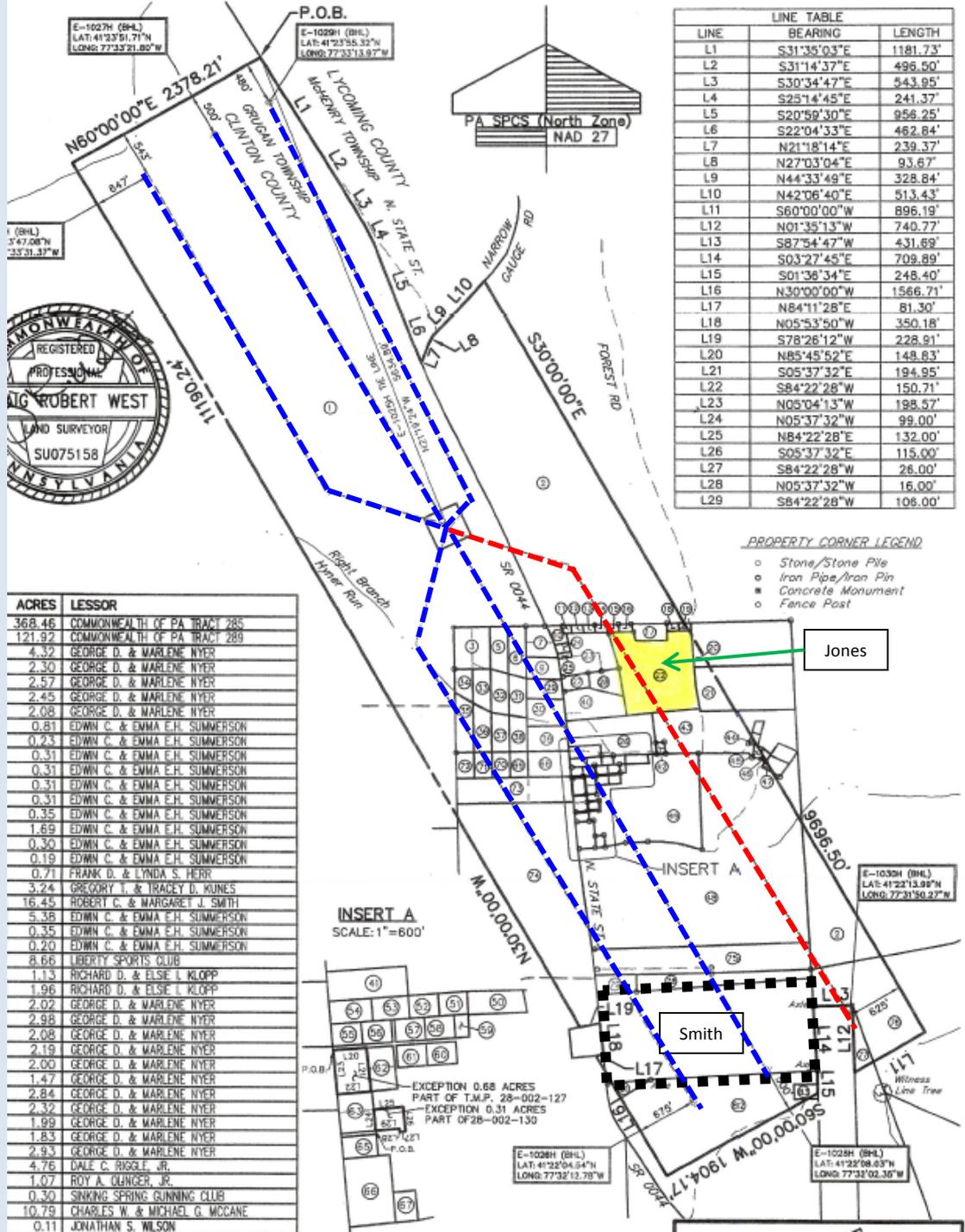
Tom Corbett, Governor

Purpose. The Commission shall develop a comprehensive, strategic proposal for the responsible and environmentally sound development of Marcellus Shale.

Responsibilities. The Commission shall provide analysis and recommendations regarding the promotion of efficient, environmentally sound and cost-effective development of Marcellus Shale and other unconventional natural gas resources.

The Marcellus Shale Advisory Commission learns that present laws support neither the most environmentally sound nor efficient production of gas

Commission visits
Anadarko Pad E
State Forest Tract 285



Anadarko Pad E in State Forest Tract 285 899.55 Acre Unit

-Anadarko obtains 82 leases
- Jones holdouts 22 acres
(2.4% of unit)

- One holdout means that
1 well in **6** is not drilled!
(16.7% of unit)
- One holdout potentially
costs the State's economy
5 Bcf of gas or more
Or
\$20,000,000 @ \$4/Mcf

- Jones holdout costs
Smith family over
\$200,000 in revenue
over lifetime of wells

Gas drilling can spark neighbor disputes

Decisions on leases divide residents

Sunday, May 29, 2011

By Erich Schwartzel, Pittsburgh Post-Gazette

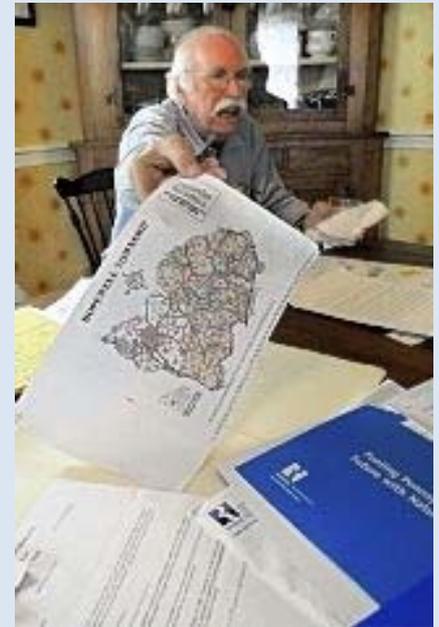
Mr. Parker's seven acres in Avella are "right in the middle, like the hole in the middle of a doughnut, "

"Well, that's how it's gonna be!" he said. "I'm gonna be the last man to sign. Because I'm never going to sign!"

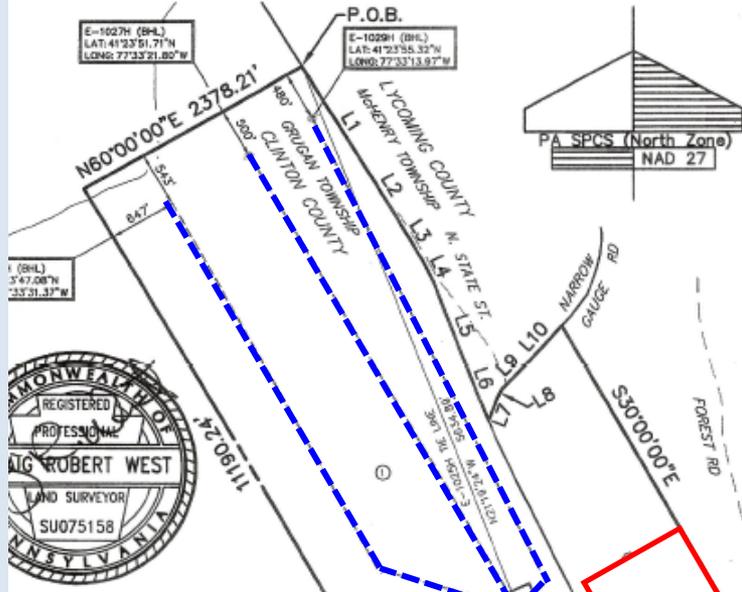
One neighbor said he wished Paul Parker would move back to Pittsburgh already.

Cases like Mr. Parker's have brought attention to the **issue of forced pooling**, which is a practice that allows companies to drill horizontally and gather gas from land they haven't leased. Gov. Tom Corbett opposes the practice, but it's a hot debate in New York, where a drilling moratorium is expected to lift soon.

<http://www.post-gazette.com/pg/11149/1150044-503.stm>



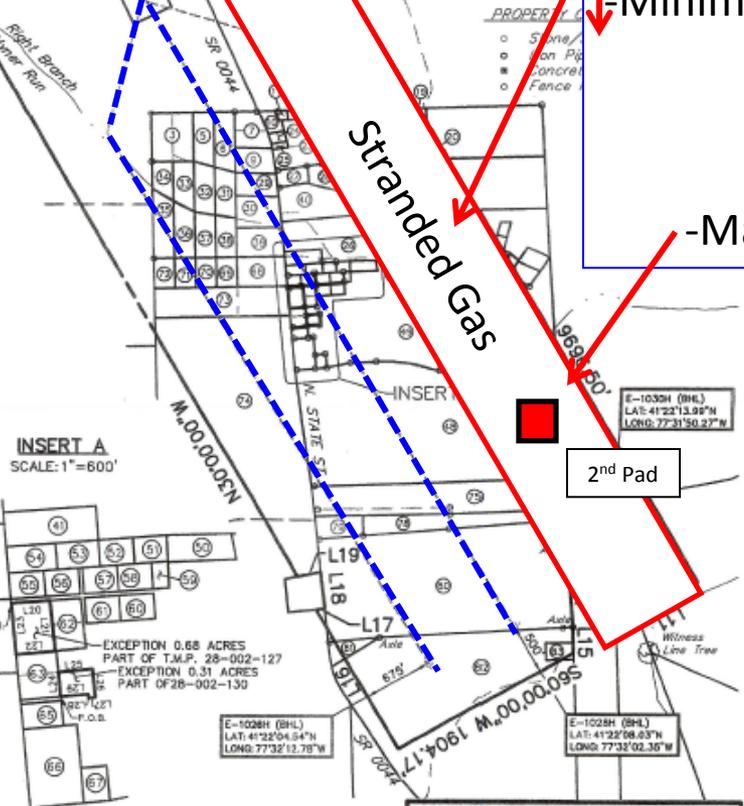
From his collection of documentation on gas leasing and drilling near his home, Paul Parker shows a map of gas leases in Hopewell.



LINE	BEARING	LENGTH
L1	S31°35'03"E	1181.73'
L2	S31°14'37"E	496.50'
L3	S30°34'47"E	543.95'
L4	S25°14'45"E	241.37'
L5	S20°59'30"E	956.25'
L6	S22°04'33"E	462.84'
L7	N21°18'14"E	239.37'
L8	N27°03'	
L9	N44°33'	
L10	N42°08'	
L11	S60°00'	
L12	N01°35'	
L13	S87°54'	
L14	S03°27'	
L15	S01°38'	
L16	N30°00'	
L17	N84°11'	
L18	N05°53'	
L19	S78°26'	
L20	N85°45'	
L21	S05°37'	
L22	S84°22'	
L23	N03°04'	
L24	N05°37'	
L25	N84°22'	
L26	S05°37'	
L27	S84°22'	
L28	N05°37'	
L29	S84°22'	

ACRES	LESSOR
368.46	COMMONWEALTH OF PA TRACT 285
121.92	COMMONWEALTH OF PA TRACT 289
4.32	GEORGE D. & MARLENE NYER
2.30	GEORGE D. & MARLENE NYER
2.57	GEORGE D. & MARLENE NYER
2.45	GEORGE D. & MARLENE NYER
2.08	GEORGE D. & MARLENE NYER
0.81	EDWIN C. & EMMA E.H. SUMMERSON
0.23	EDWIN C. & EMMA E.H. SUMMERSON
0.31	EDWIN C. & EMMA E.H. SUMMERSON
0.31	EDWIN C. & EMMA E.H. SUMMERSON
0.31	EDWIN C. & EMMA E.H. SUMMERSON
0.31	EDWIN C. & EMMA E.H. SUMMERSON
0.35	EDWIN C. & EMMA E.H. SUMMERSON
1.69	EDWIN C. & EMMA E.H. SUMMERSON
0.30	EDWIN C. & EMMA E.H. SUMMERSON
0.19	EDWIN C. & EMMA E.H. SUMMERSON
0.71	FRANK D. & LYNDA S. HERR
3.24	GREGORY T. & TRACEY D. KUNES
16.45	ROBERT C. & MARGARET J. SMITH
5.38	EDWIN C. & EMMA E.H. SUMMERSON
0.35	EDWIN C. & EMMA E.H. SUMMERSON
0.20	EDWIN C. & EMMA E.H. SUMMERSON
8.66	LIBERTY SPORTS CLUB
1.13	RICHARD D. & ELSIE I. KLOPP
1.96	RICHARD D. & ELSIE I. KLOPP
2.02	GEORGE D. & MARLENE NYER
2.98	GEORGE D. & MARLENE NYER
2.08	GEORGE D. & MARLENE NYER
2.19	GEORGE D. & MARLENE NYER
2.00	GEORGE D. & MARLENE NYER
1.47	GEORGE D. & MARLENE NYER
2.84	GEORGE D. & MARLENE NYER
2.32	GEORGE D. & MARLENE NYER
1.99	GEORGE D. & MARLENE NYER
1.83	GEORGE D. & MARLENE NYER
2.93	GEORGE D. & MARLENE NYER
4.76	DALE C. RIGGLE, JR.
1.07	ROY A. GUNGER, JR.
0.30	SINKING SPRING GUNNING CLUB
10.79	CHARLES W. & MICHAEL G. MCCANE
0.11	JONATHAN S. WILSON

- In a country based on majority rule, one holdout can dictate to the **majority**
 - Conservation laws are written to assure that a holdout does not:
 - Maximize waste for the Majority
 - Minimize economic gain for the Majority
- Or
- Maximize Environmental Footprint



Anadarko Pad E
in
State Forest Tract 285
899.55 Acre Unit

All but One of the Major Natural Gas Producing States have Pooling Statutes

State (Gas Shale/Tight Sandstone)

WHY?

Texas (*Barnett, Eagle Ford Shales*)

Louisiana (*Haynesville Shale*)

Oklahoma (*Woodford Shale*)

Arkansas (*Fayetteville Shale*)

Colorado (*Mesa Verde Sand*)

Wyoming (*Green River Sand*)

WV, OH, VA, KY, etc.

IT'S KANSAS, TOTO!



Why? Pooling Statutes:

1. Maximize Economic Benefit
2. Minimize Wasteful Stranded Gas
3. Minimize Environmental Footprint
4. Provide Just and Fair Compensation

All private property would contribute to the greater public good while providing each and every land owner with just and fair compensation.



*Late 19th Century Industry
without a Compact (1868)*

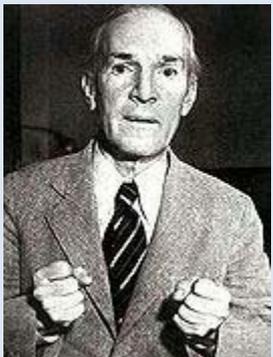
*Maximizes Environmental Damage
Maximizes Waste
Minimizes Economic Benefit
No Compensation*

EMPIREWELL
FURNACE
1863

Early 20th Century Industry without a Compact

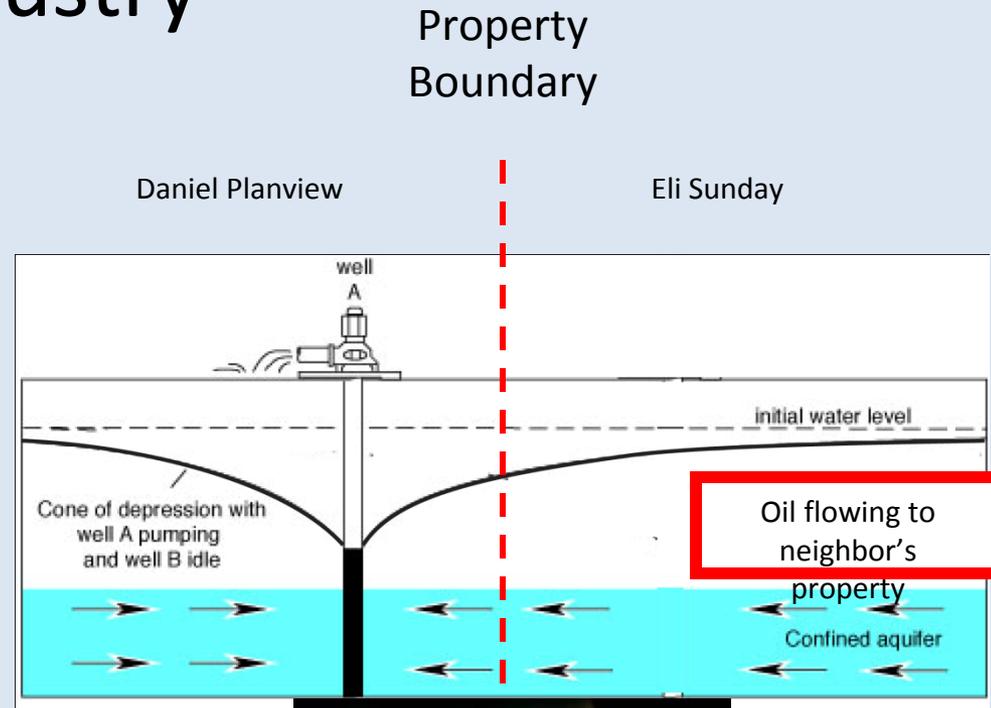
- **Conventional Vertical Oil Wells**: Production decreases formation pressure around well, thus causing flow toward the well.

- Seen as a cone of depression in water wells.



Upton Sinclair, 1927, Oil

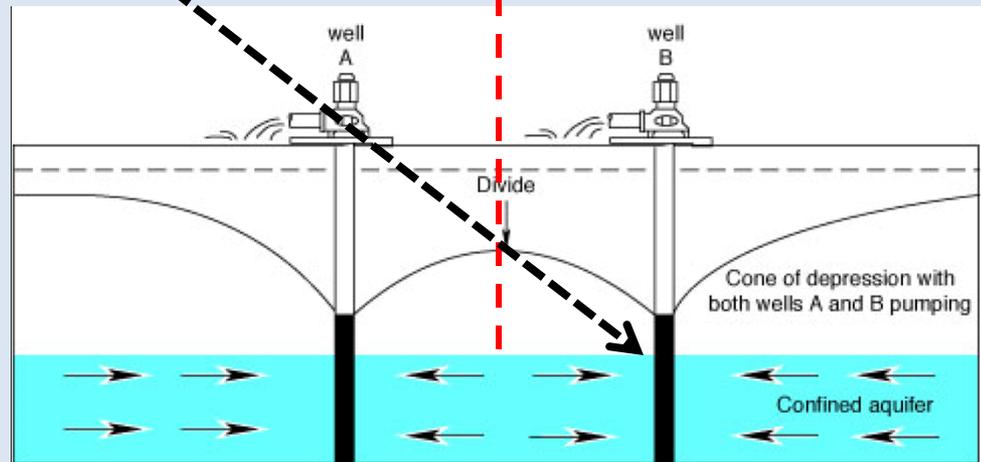
Arguably the most influential champion for a compact



Early 20th Century Industry without a Compact

Property Boundary

- **Conventional Vertical Oil Wells**: Only protection against loss was drilling offset wells.
- **Offset wells** reduced pressure on reservoir, thereby reducing production and assuring maximum waste!



Drainage from under non-consenting properties is a lawful practice

- Simple stated, the Rule of Capture allows drainage of unleased land without any benefit to the owner of the mineral rights
- Hydraulic fractures that cross under property boundaries are not subject to the laws of subsurface trespass

Nothing would persuade Mr. Parker to sign a lease, anyway, so he doesn't benefit from a gas-drilling rig right up the road.

Hydraulic Fracturing

Fractures opened by hydraulic pressure generally drain a swath of a production unit about 300-500 feet either side of a well

- This is a common drainage distance even under unleased land

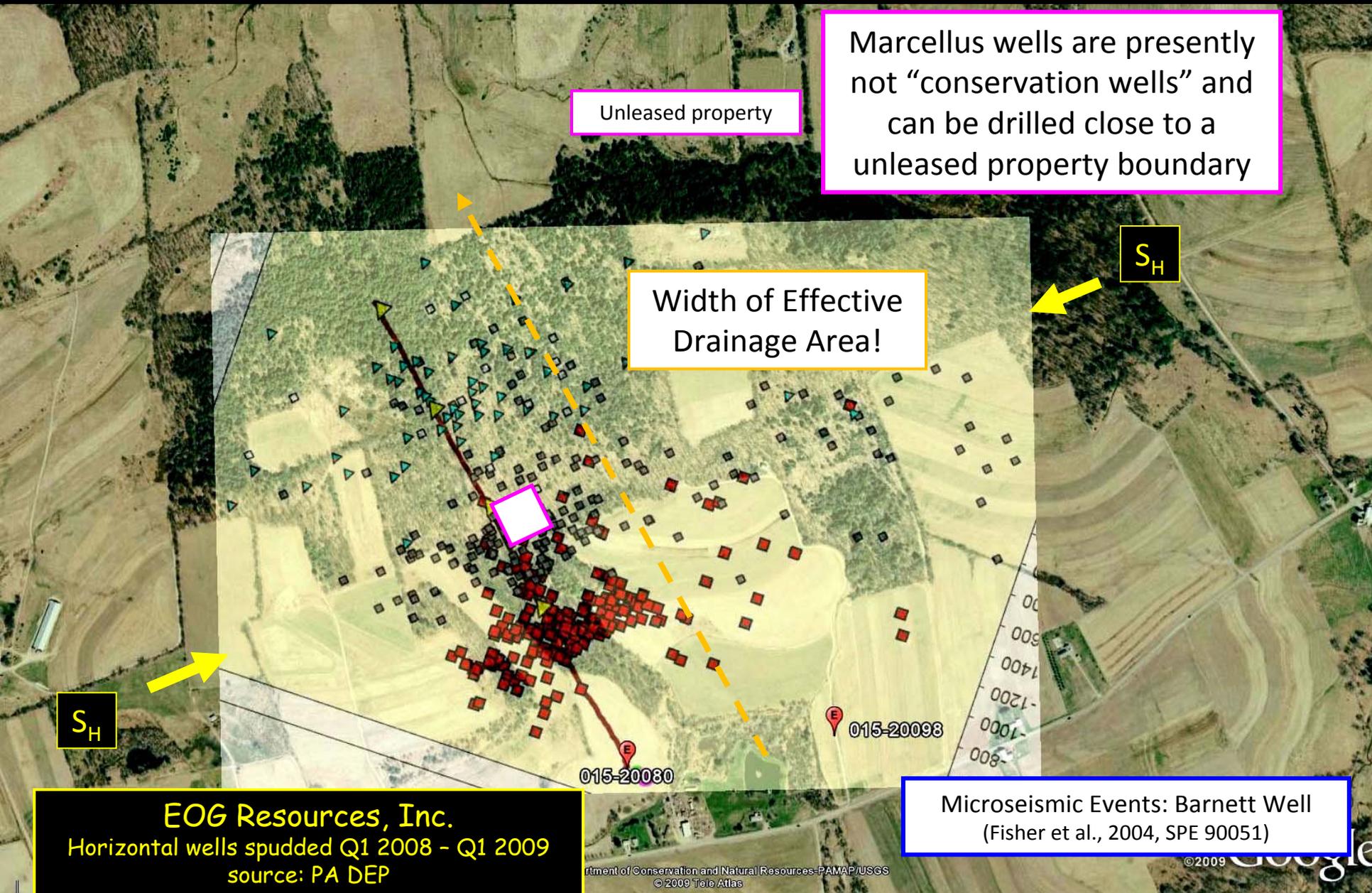
Rock splitting by hydraulic pressure is known to travel as much as 2000 feet from a horizontal well

- Some gas may come from distances up to 2000 feet although the volumes from this distance are very low.

Why might 'Rule of Capture' apply to the gas industry?

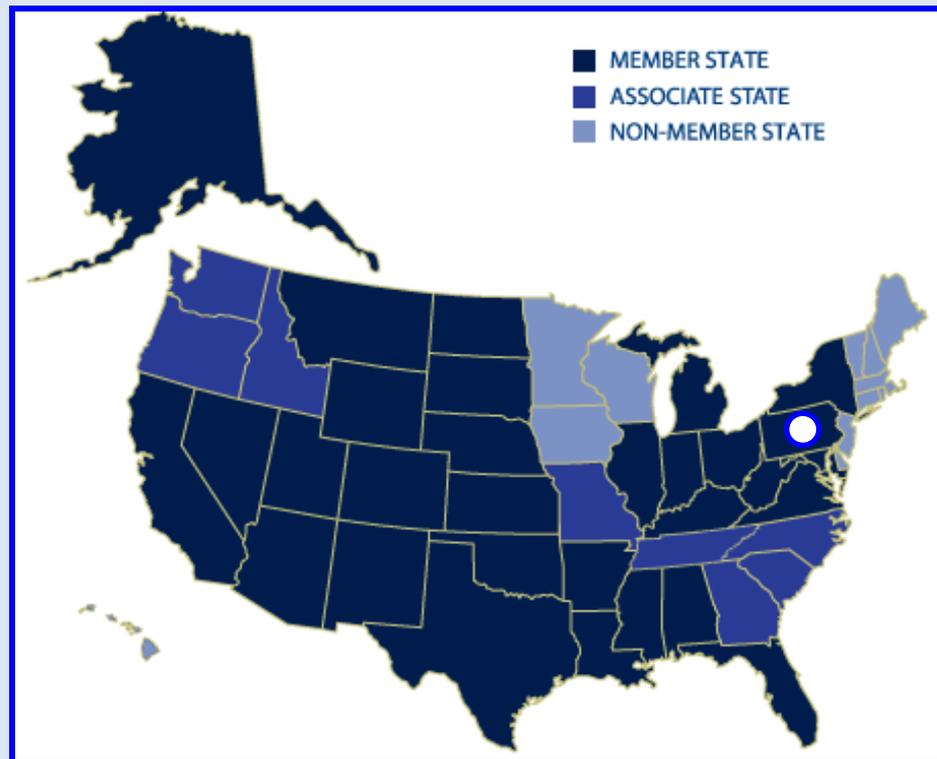
- *Hydraulic fracturing is essential to America's energy security* (and PA's economic growth)
- The lateral growth of hydraulic fractures can not be predicted during engineering well design
- The lateral growth of hydraulic fractures can not be controlled during well stimulation
- Drainage after well stimulation and not be restricted within certain defined boundaries

Hydraulic Fracturing Crosses Property Boundary



The Interstate Oil and Gas Compact Commission (1935)

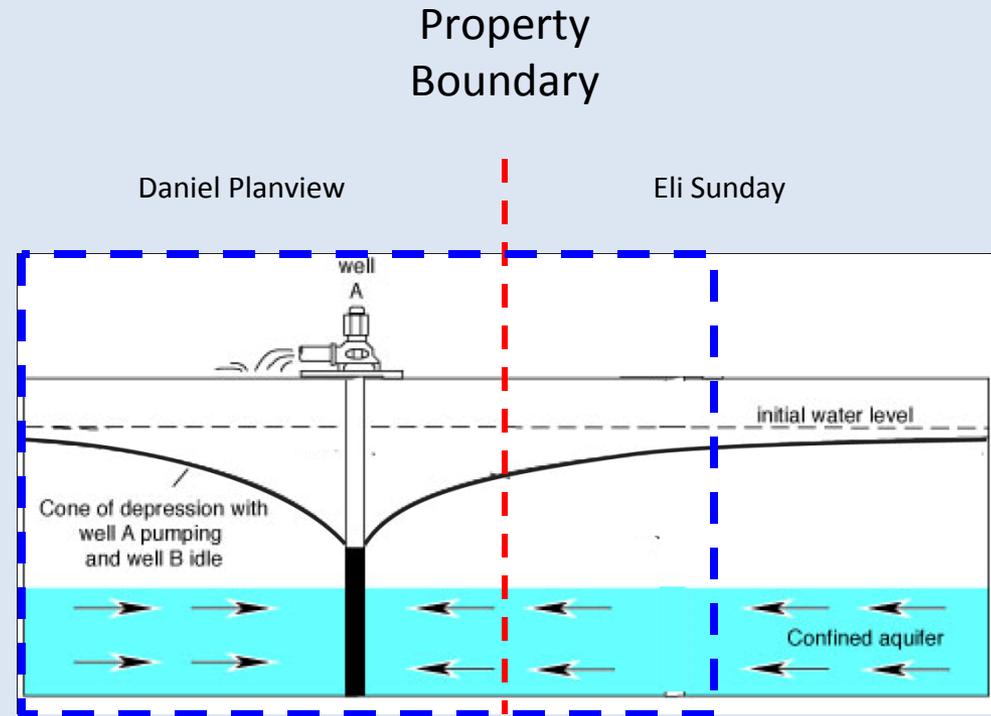
Commission mission: Ensure our nation's oil and natural gas resources are conserved and maximized while protecting health, safety and the environment.



*Pennsylvania
joined in
1941*



The Interstate Oil and Gas Compact Commission



A drainage unit

Conservation Efforts:

Unitization of land (Daniel & Eli are one)

Spacing requirements (Daniel drills > 330 ft from Eli)

Pooling of interests (Royalties: Dan – 75%; Eli – 25%)

both see greater profit because pressure was managed appropriately

PA OIL AND GAS CONSERVATION LAW



Act 1961-359

What did PA legislators have in mind when framing the Conservation Law?

- *This Law makes it illegal to 'waste natural gas' in PA*
 - to foster, encourage, and promote the development, production, and utilization of the natural oil and gas.... in such manner as will encourage discovery, exploration, and development **without waste!**
 - to provide for the drilling, equipping, locating, spacing and operating of oil and gas wells so as to protect correlative rights and **prevent waste** of oil or gas or loss in the ultimate recovery thereof

PA OIL AND GAS CONSERVATION LAW



Act 1961-359

What did legislators have in mind when framing the Conservation Law?

- to regulate such operations so as to protect fully the rights of royalty owners and producers of oil and gas to the end that the people of the Commonwealth shall realize and enjoy the maximum benefit of these natural resources

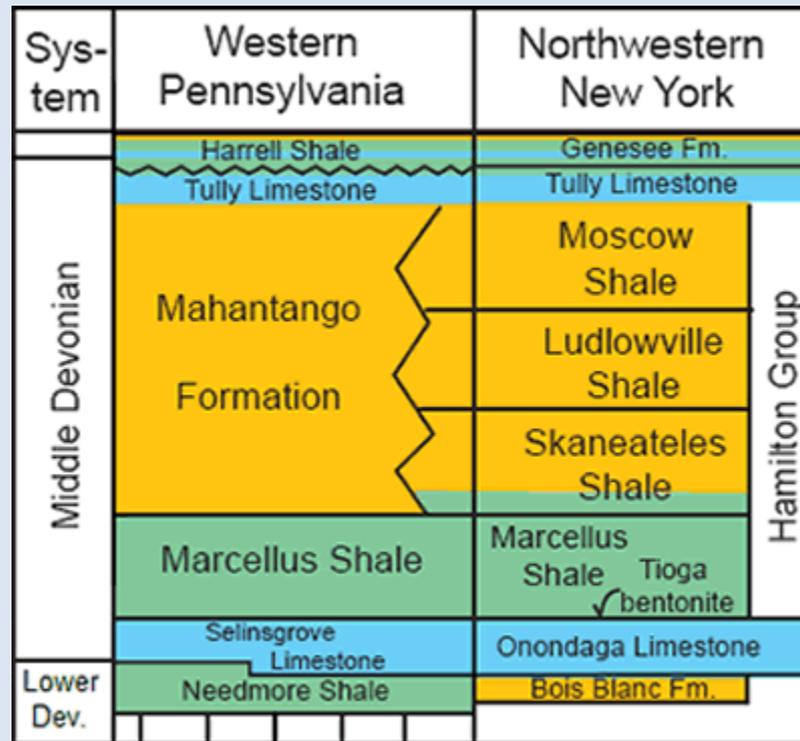
The charge to the Marcellus Shale Advisory Commission is to assure this

happens.

Conservation well

- A “conservation” well is defined as any well penetrating the top of the Onondaga Limestone (or equivalent formation when the Onondaga is absent) and is at least 3,800 feet deep.

Reports of high initial production (IP) as well

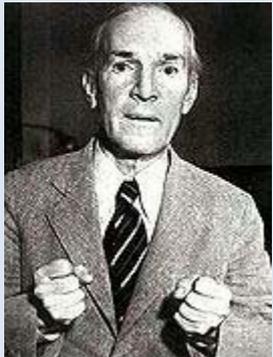


Conservation

Wells

*Act 1961-359 was written in
the Upton Sinclair era of
vertical drilling!*

*Are Sinclair-era conservation
laws relevant for the
horizontal drilling era?*



Upton Sinclair, 1927, Oil

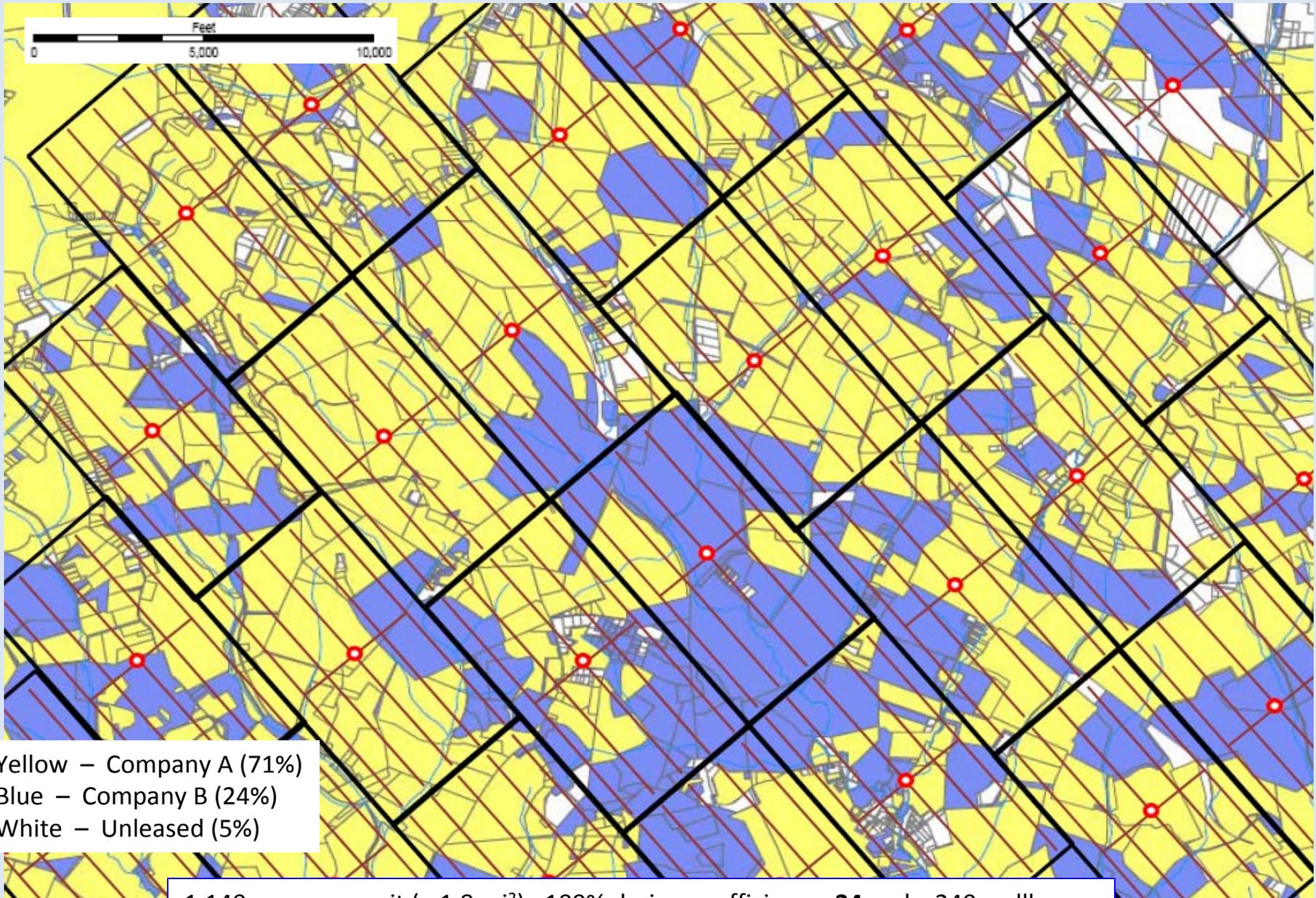
Arguably the most influential champion for conservation laws

Background:

- Of the various legislative initiatives that have been discussed, *the large drainage unit* (i.e., pooling) has been the most controversial. Landowners who oppose natural gas development have been outraged by a proposal that would allow their property to be included in a natural gas production unit without their consent, even though there would be no surface impact on the land and they would be entitled to receive royalties. Although there was no legislation officially introduced, just the mention of *pooling* ignited a vociferous debate.

Dale A. Tice on February 08, 2011

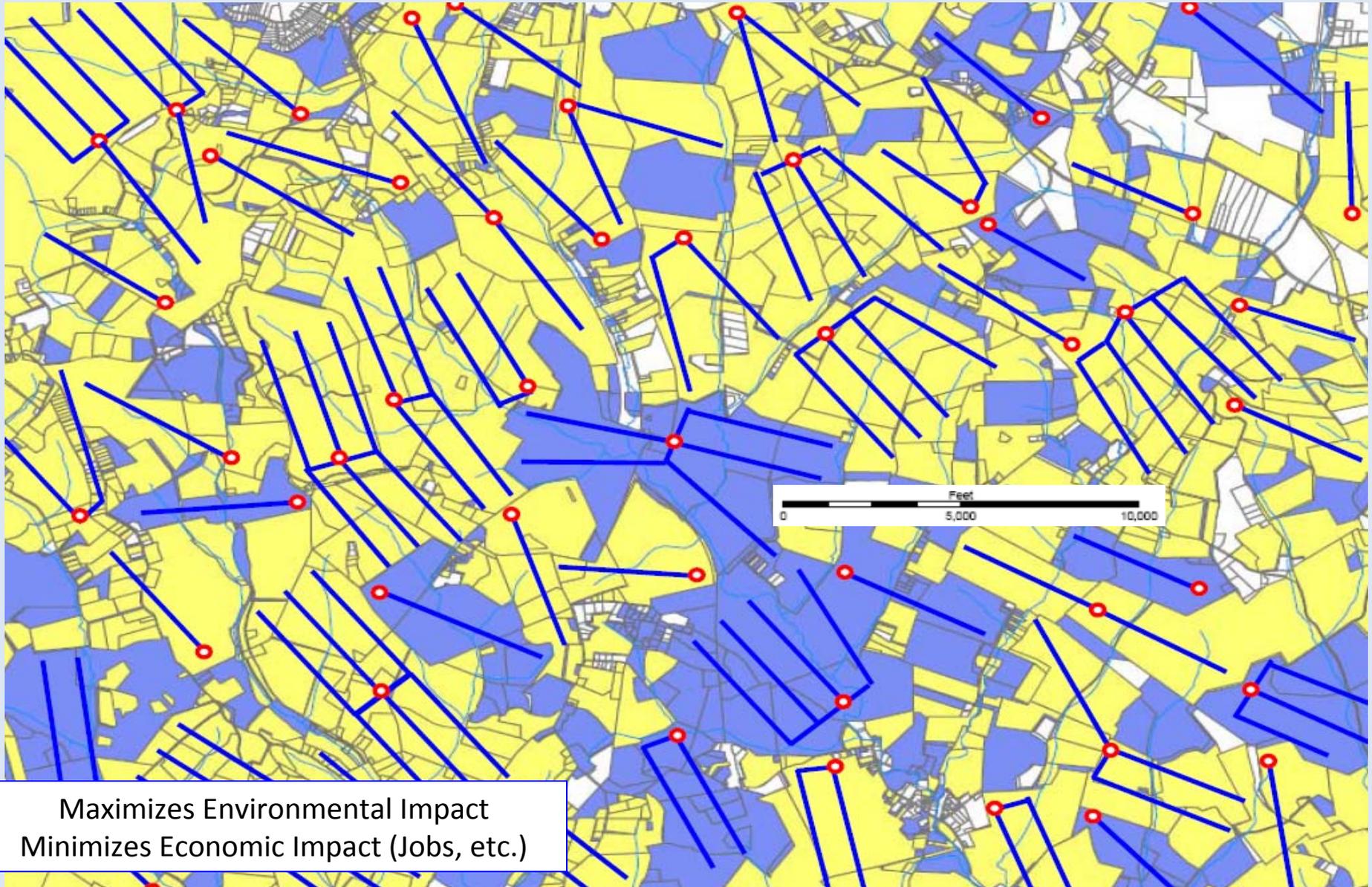
Hypothetical lease position: Marcellus Play, PA (27,000 acres = 42.2 mi²)



Yellow – Company A (71%)
Blue – Company B (24%)
White – Unleased (5%)

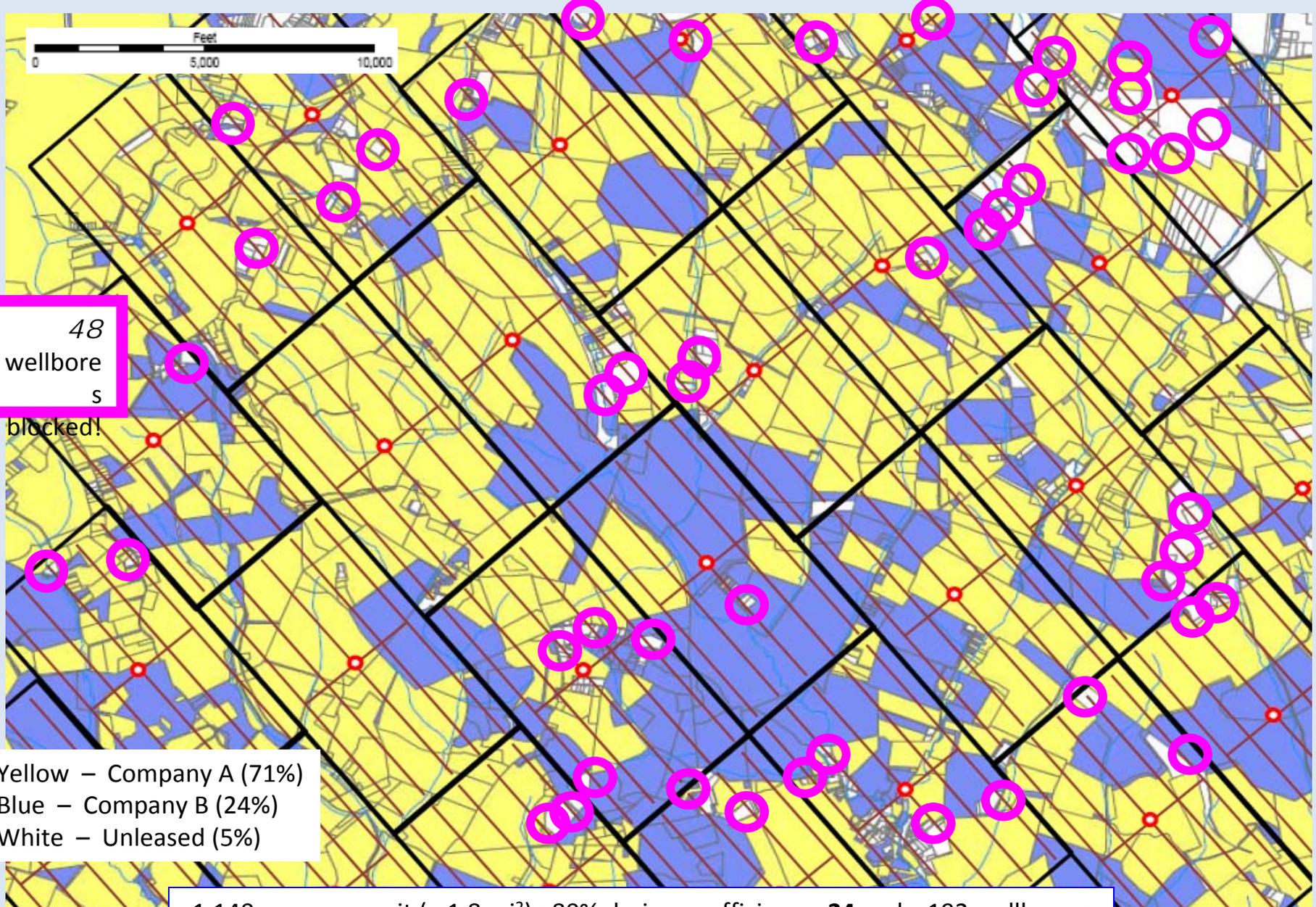
1,140 acres per unit (= 1.8 mi²) ; 100% drainage efficiency; **24** pads; 240 wellbores;
960 bcf recoverable gas; \$4.8 billion revenue; \$768 million royalties

Hypothetical lease position: Present state laws



60 % drainage efficiency; 53 pads; 109 wellbores;
436 bcf recoverable gas; \$2.2 billion revenue; \$349 million royalties

Subsurface trespass is the real post-Sinclair problem, not pooling



48
wellbores
blocked!

Yellow – Company A (71%)
Blue – Company B (24%)
White – Unleased (5%)

Waste

1,140 acres per unit (= 1.8 mi²) ; 80% drainage efficiency; **24** pads; 192 wellbores;
192 bcf stranded gas; \$0.96 billion lost revenue; \$153 million lost royalties

The greater public good
would be achieved with
post-Sinclair era legislation
coupling pooling with just
and fair eminent domain of
the subsurface.*

- * 1. Maximized Economic Benefit
- 2. Minimized Wasteful Stranded Gas
- 3. Minimized Environmental Footprint
- 4. Just and Fair Compensation

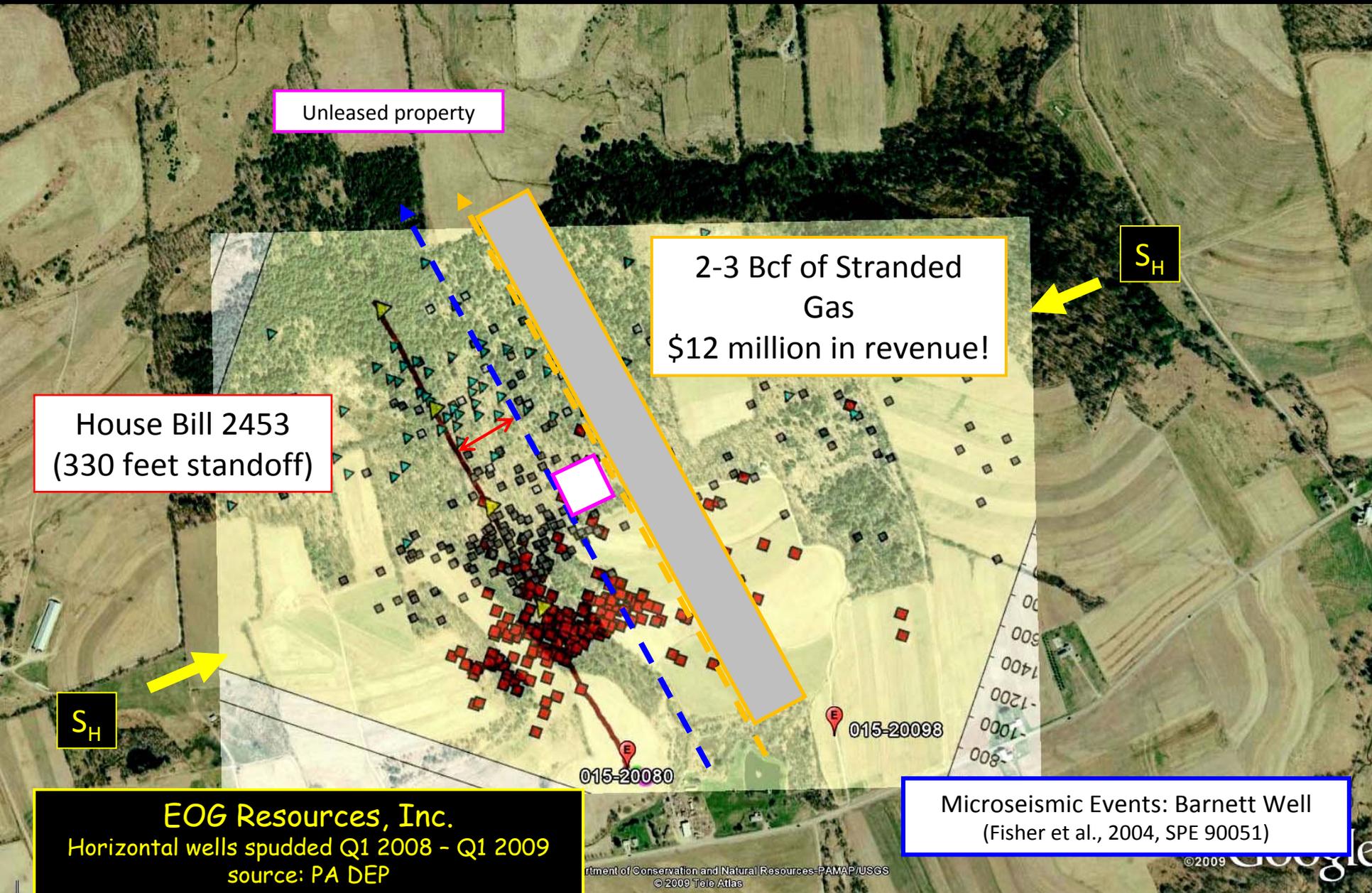
Pooling may be the answer for the environmentalists but not for the conservationists, the lessors, & other citizens of the State!

Why?

2008 Legislation (not passed)

- **House Bill 2453** - allows Marcellus Shale to be included in “oil and gas conservation law “ Act-359
 - Outcome #1: No well to be drilled within 330 feet of land not leased.
 - Outcome #2: Act-359 sanctions pooling.
- **House Bill 2453** would have engendered further waste because it did not solve the subsurface eminent domain problem!

Hydraulic Fracturing Crosses Property Boundary



Unleased property

2-3 Bcf of Stranded Gas
\$12 million in revenue!

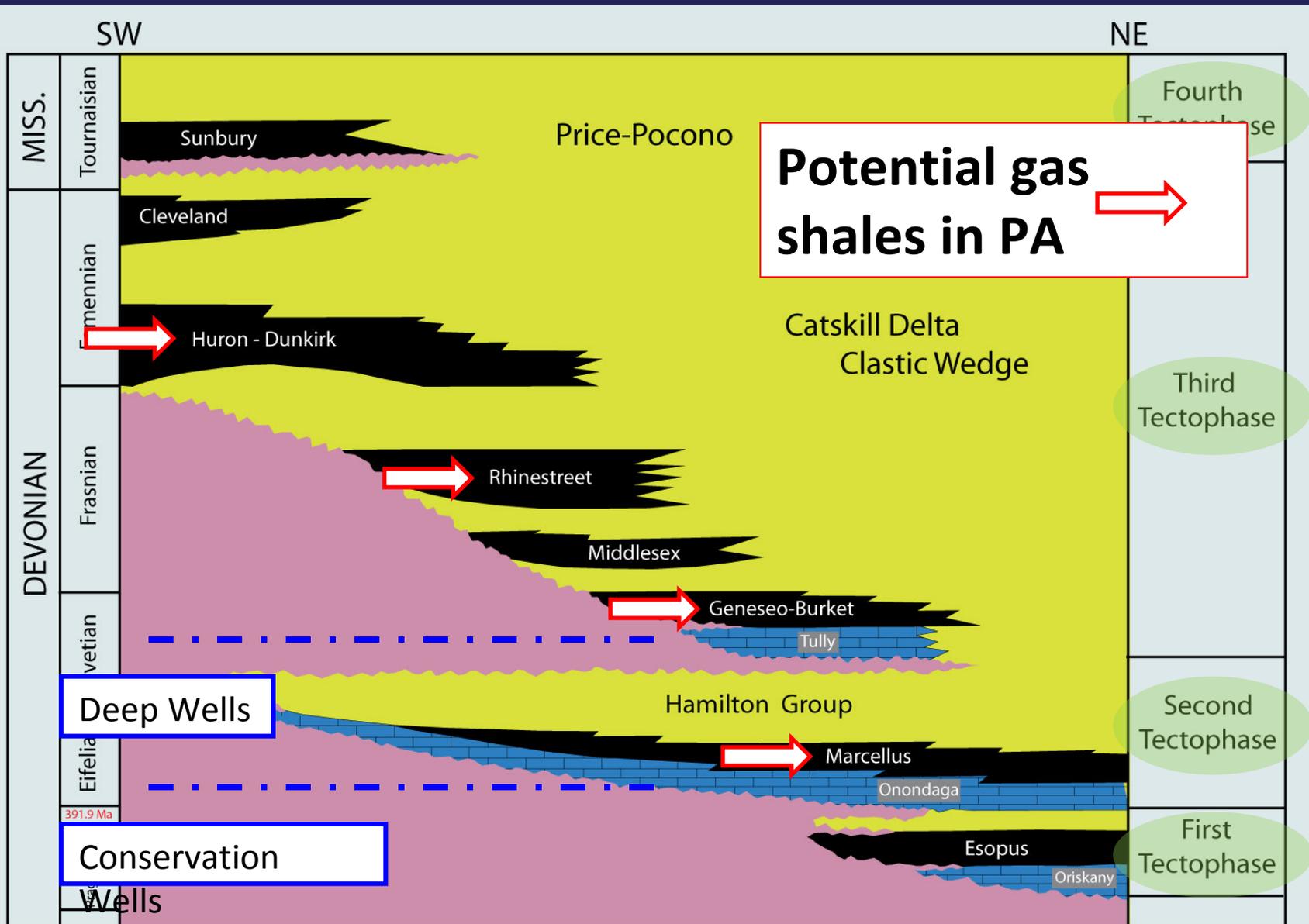
House Bill 2453
(330 feet standoff)

EOG Resources, Inc.
Horizontal wells spudded Q1 2008 - Q1 2009
source: PA DEP

Microseismic Events: Barnett Well
(Fisher et al., 2004, SPE 90051)

Department of Conservation and Natural Resources-PAMAP/USGS
© 2009 Tele Atlas

© 2009 Google



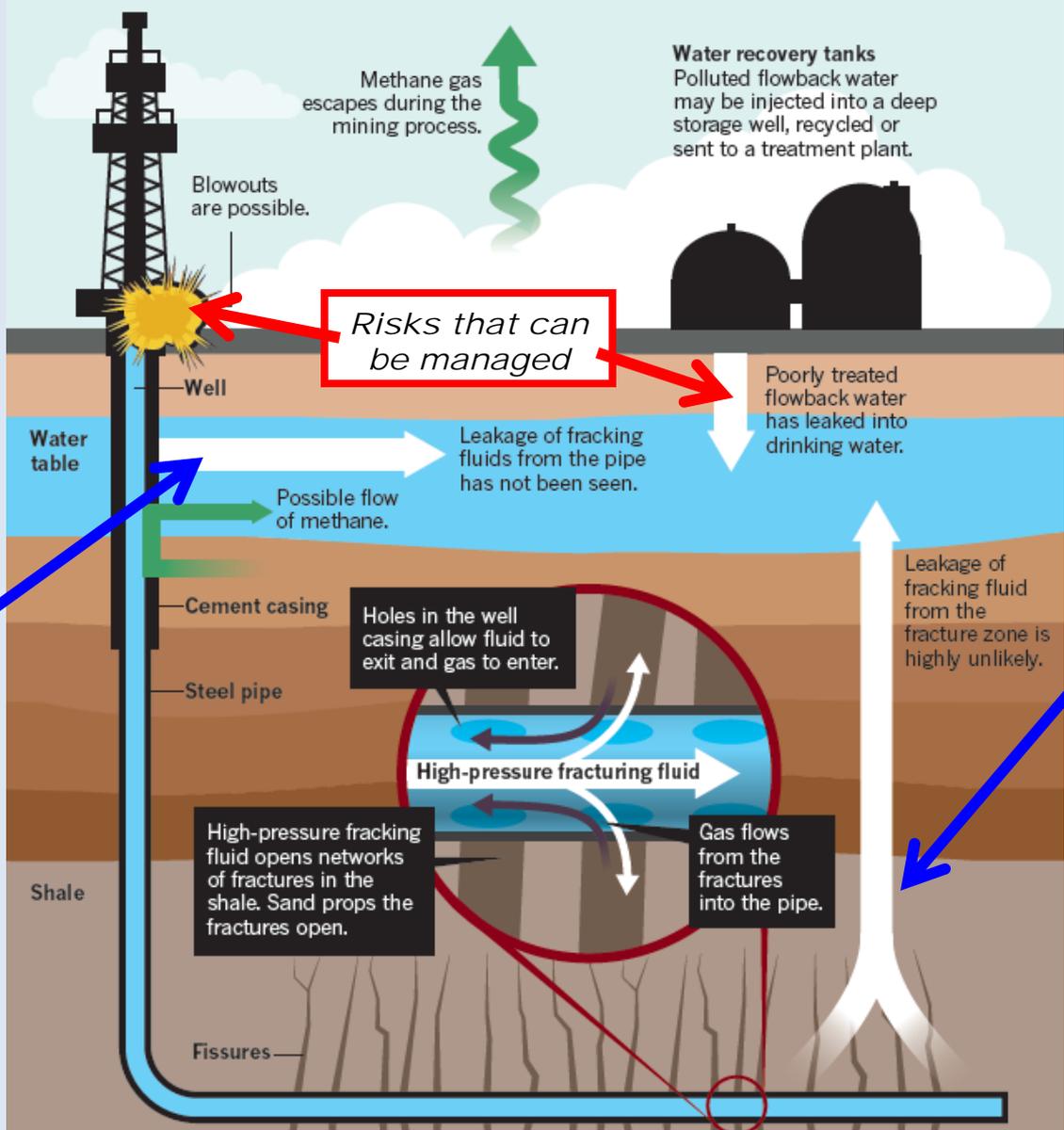
House Bill 2453 sets a precedent for stipulating that all gas shales in PA will be drained as by Conservation Wells! Is this a good

FRACKING FOR FUEL

Hydraulic fracturing is used to access oil and gas resources that are locked in non-porous rocks.

CMU, NETL, Worldwatch Institute (2011) studies: Externalities from coal greater threat to mankind.

Duke study:
Frac fluid **NOT**
detected.



Highly unlikely because water does **NOT** flow uphill.