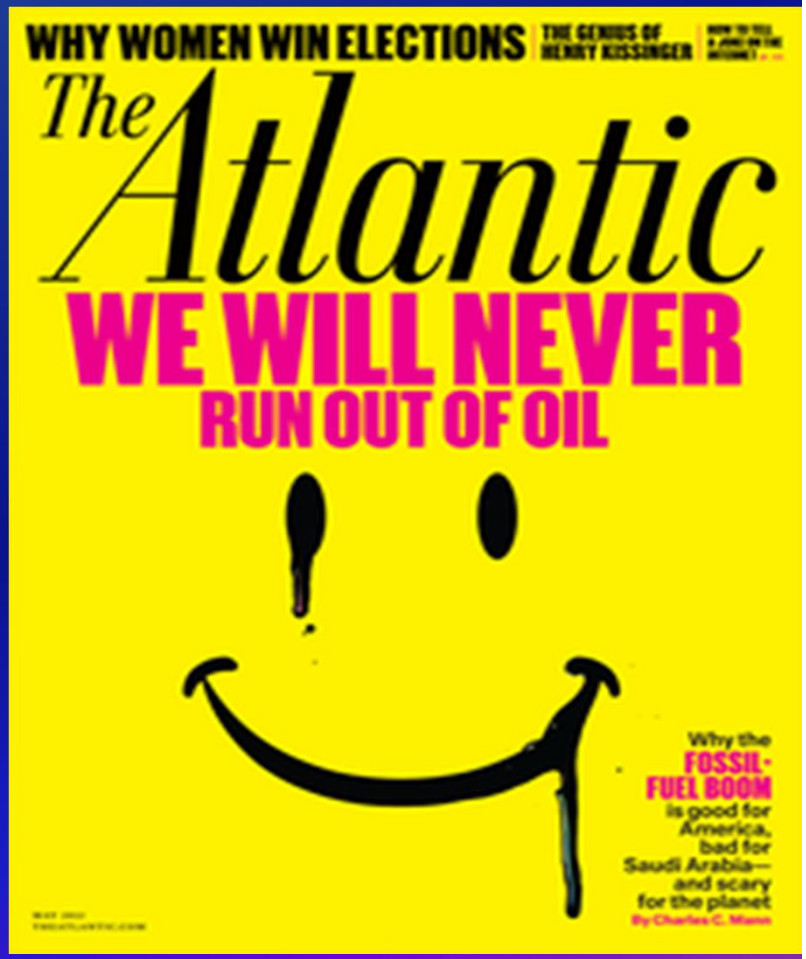
SHALE-GAS VALUATION ISSUES OHIO & PENNSYLVANIA

Hydrocarbon Estate

Summer 2013

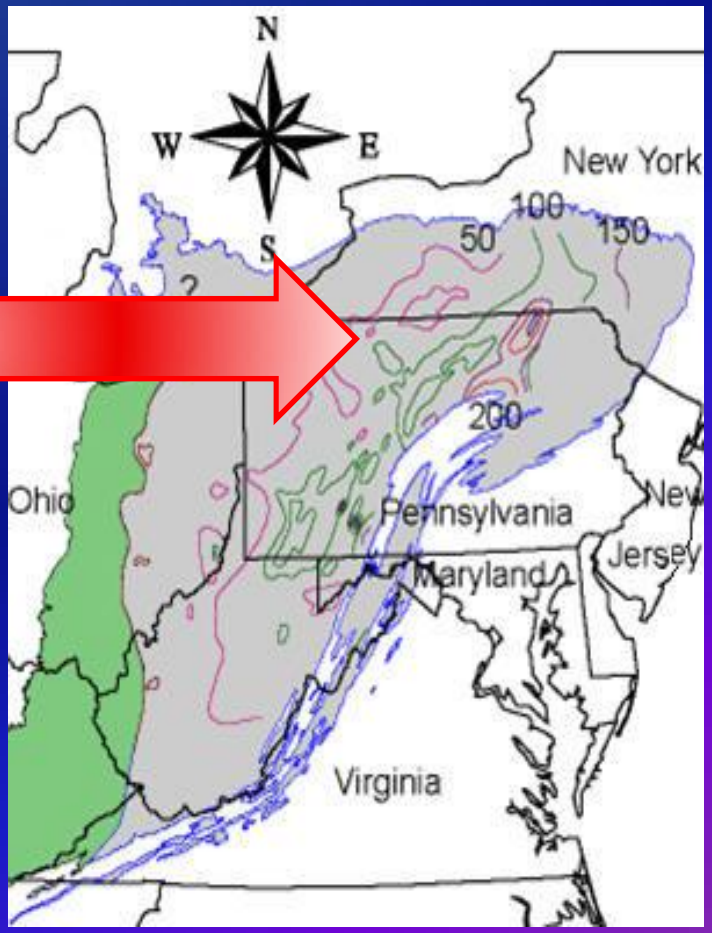
J. R. Kern, ASA, AIMA
Resource Technologies Corporation

What If We Never Run Out of Oil?
New technology and a little-known energy source suggest that fossil fuels may not be finite. This would be a miracle—and a nightmare.

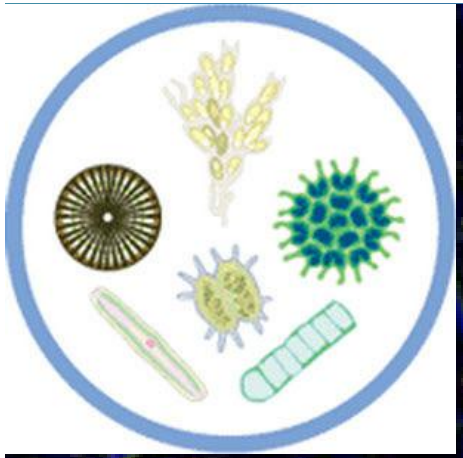


Drill Rig

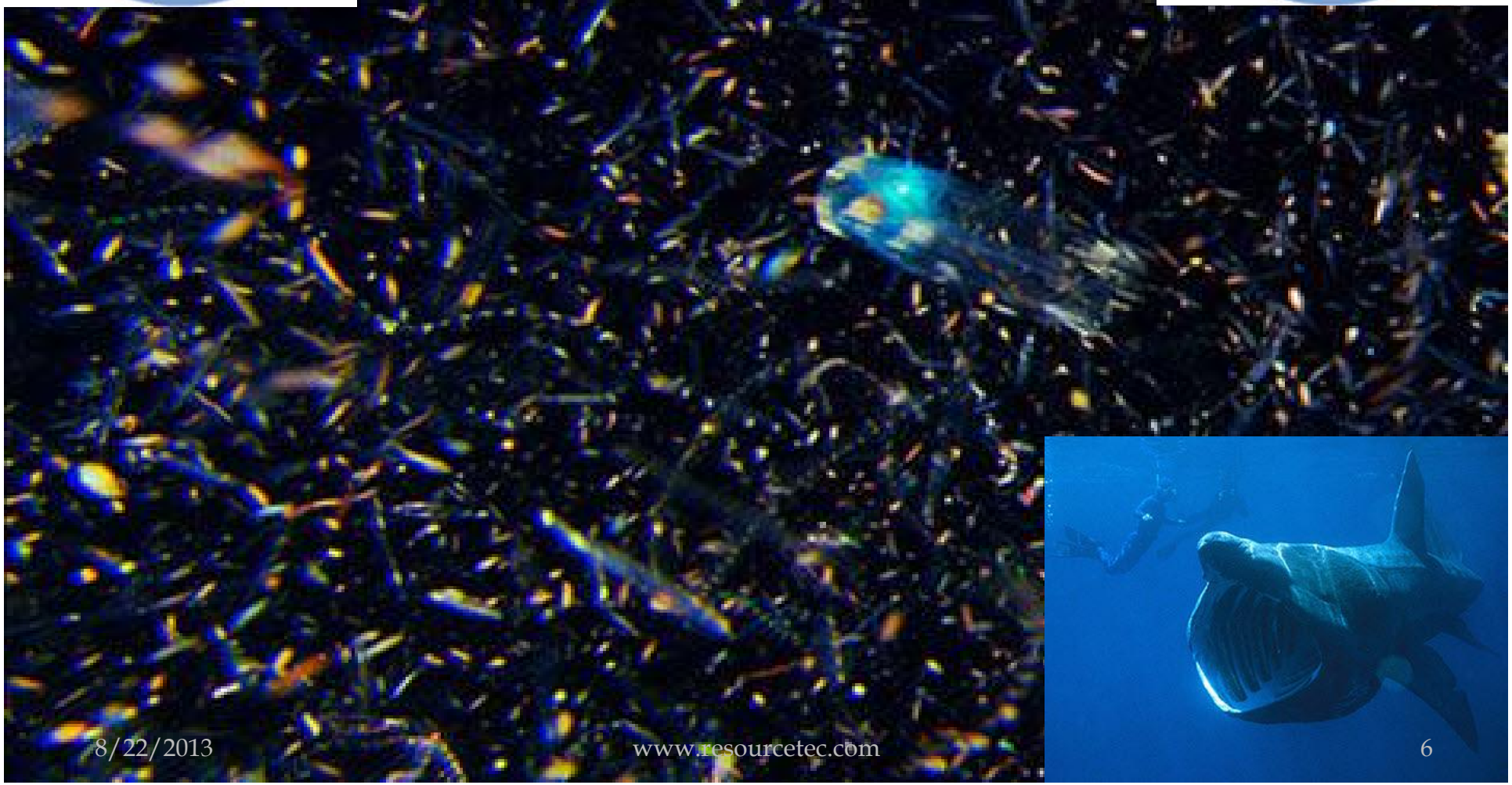
From Then to Now



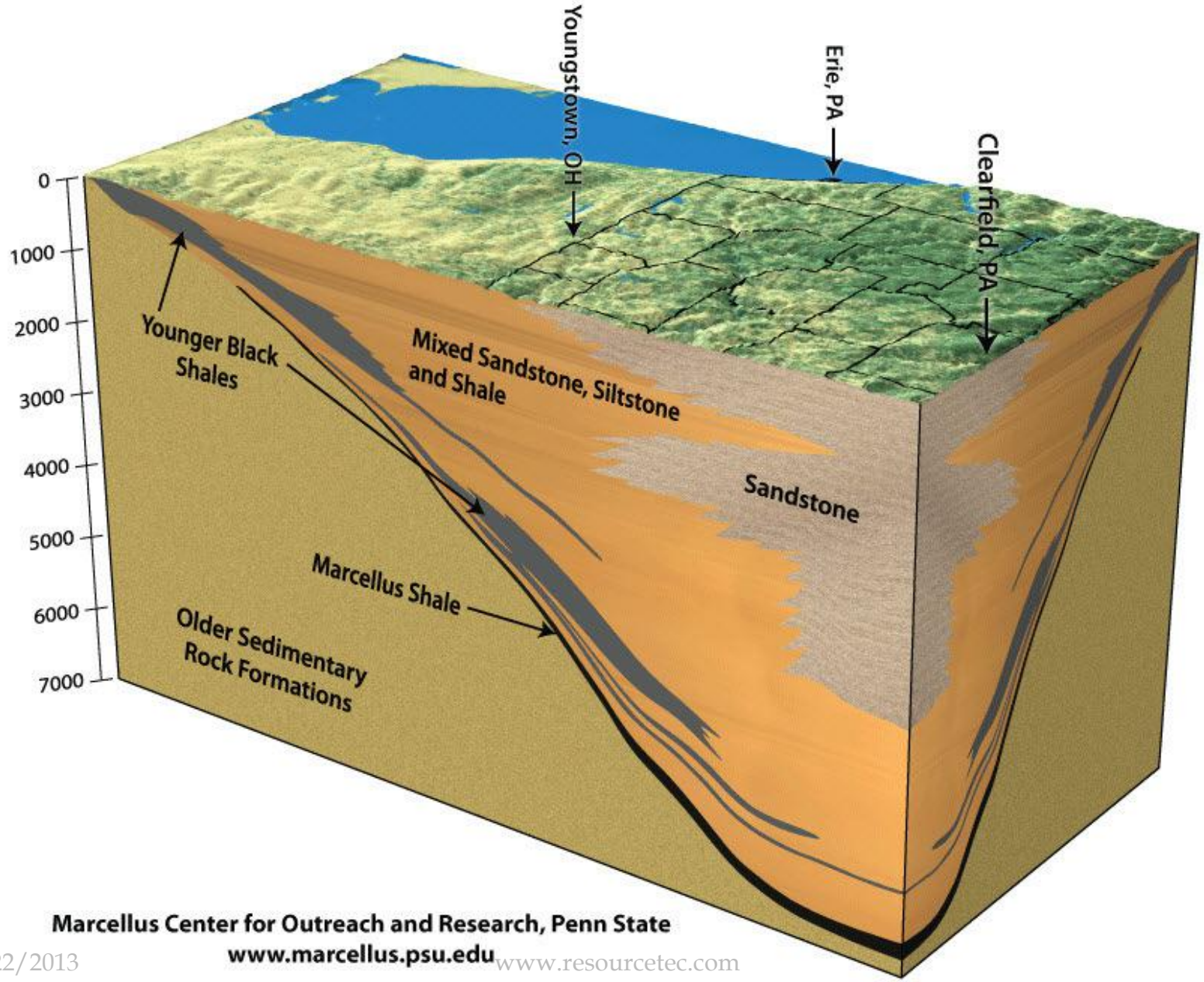

Univ. of Michigan Exhibit Museum of Natural History -- Life Through the Ages Diroama



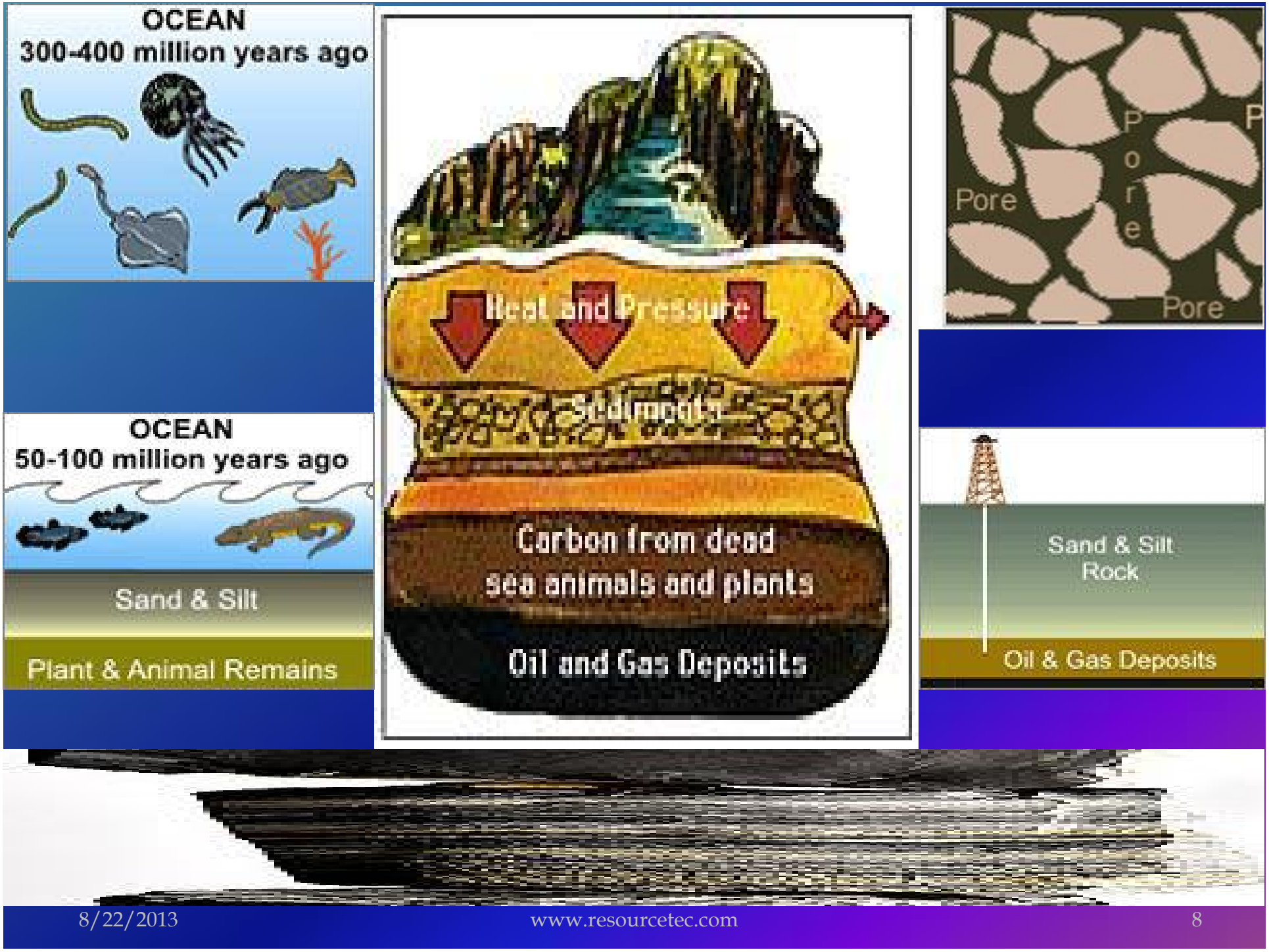
PHYTOPLANKTON & ZOOPLANKTON



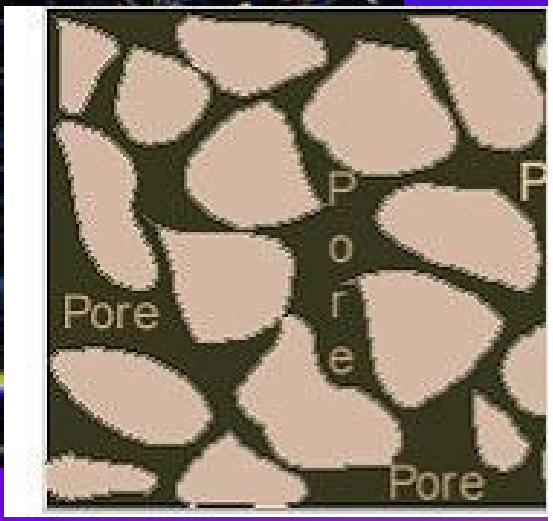
Generalized Geologic Cross Section Showing Marcellus Shale in Western Pennsylvania



Marcellus Center for Outreach and Research, Penn State
www.marcellus.psu.edu


OCEAN
300-400 million years ago
OCEAN
50-100 million years ago
Sand & Silt
Plant & Animal Remains
Heat and Pressure
Sediments
Carbon from dead
sea animals and plants
Oil and Gas Deposits
Pore
Pore
Pore
Pore
Sand & Silt
Rock
Oil & Gas Deposits

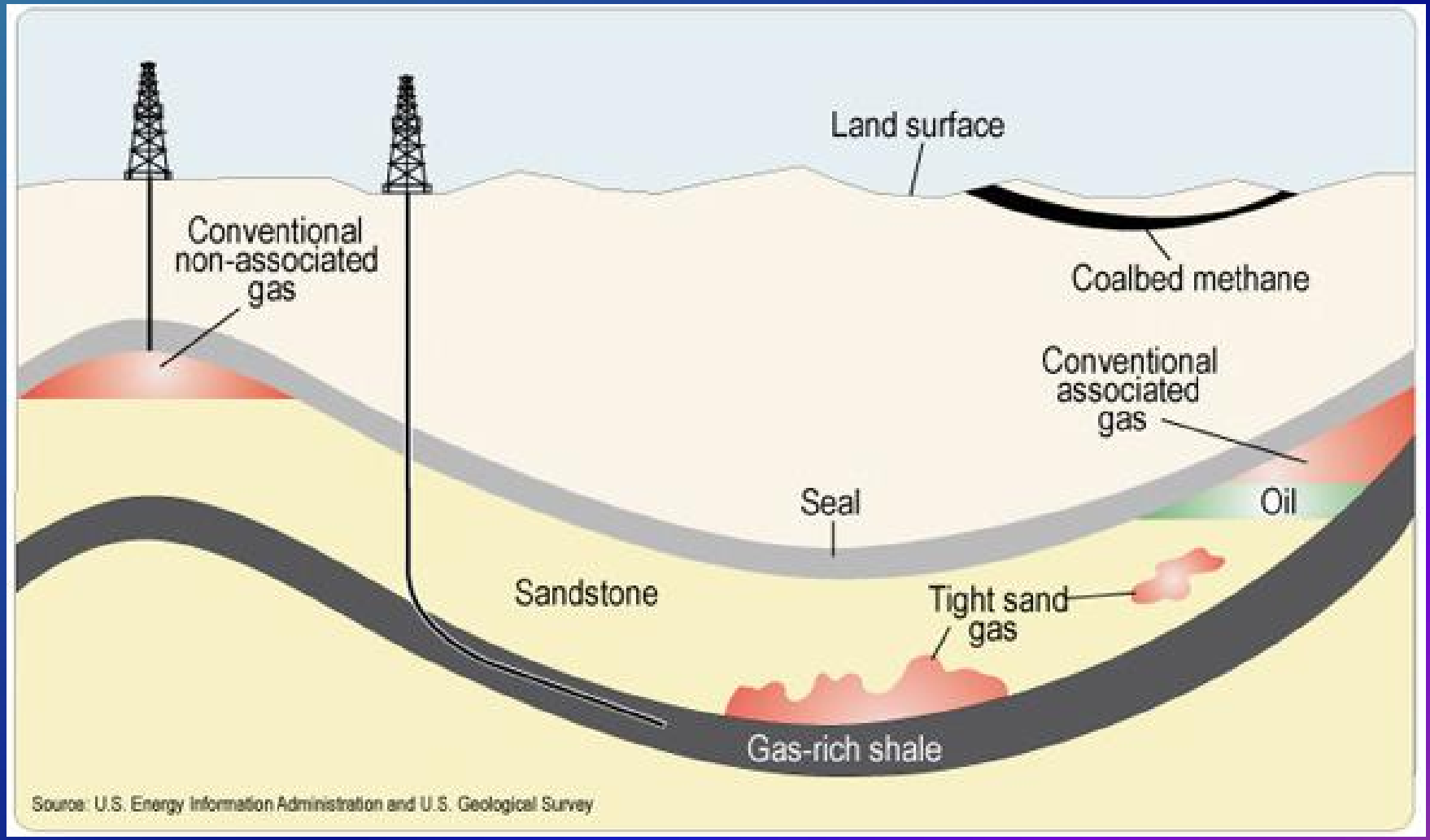
Formation of Oil & Gas - Plankton



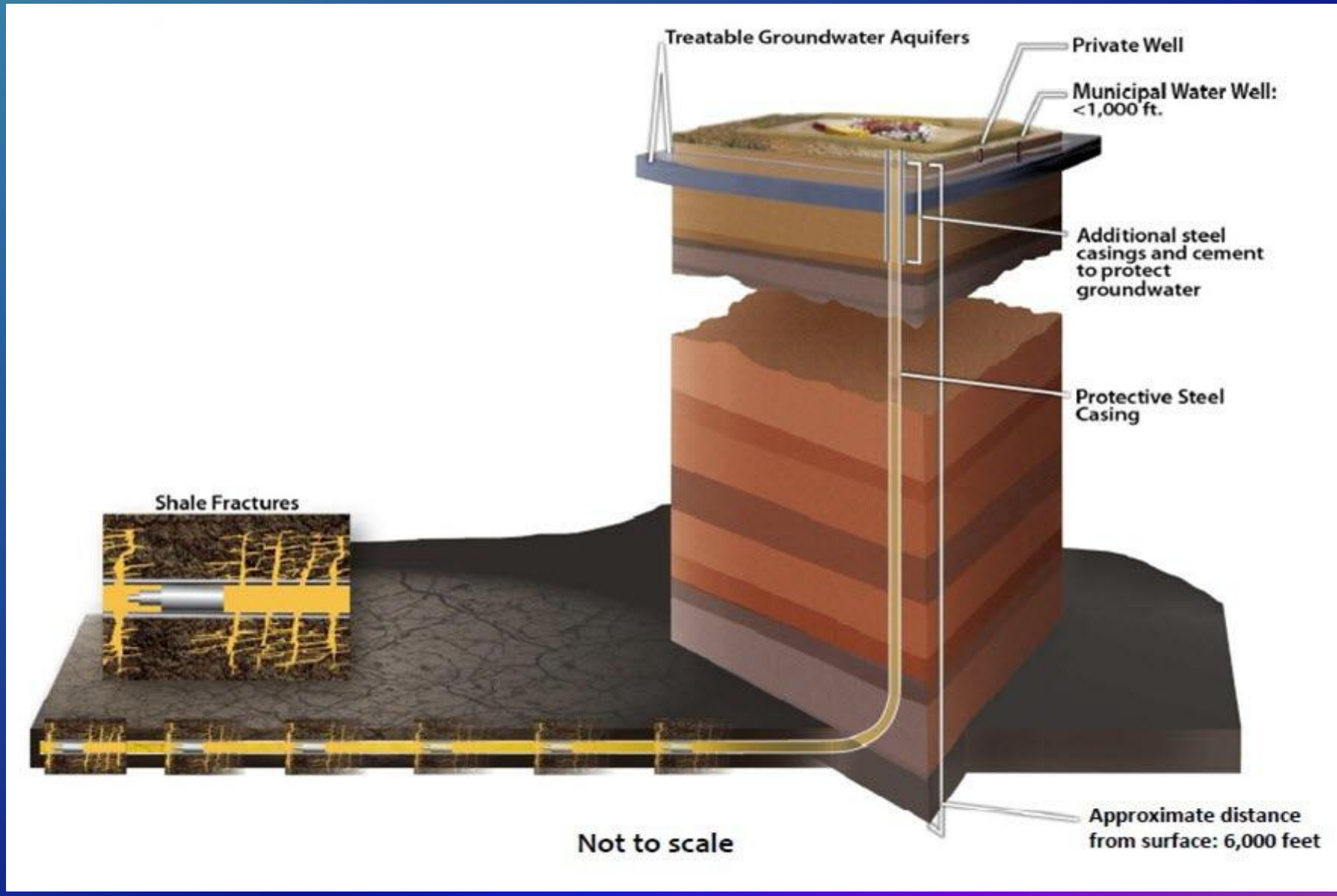

GENUINE HICKORY

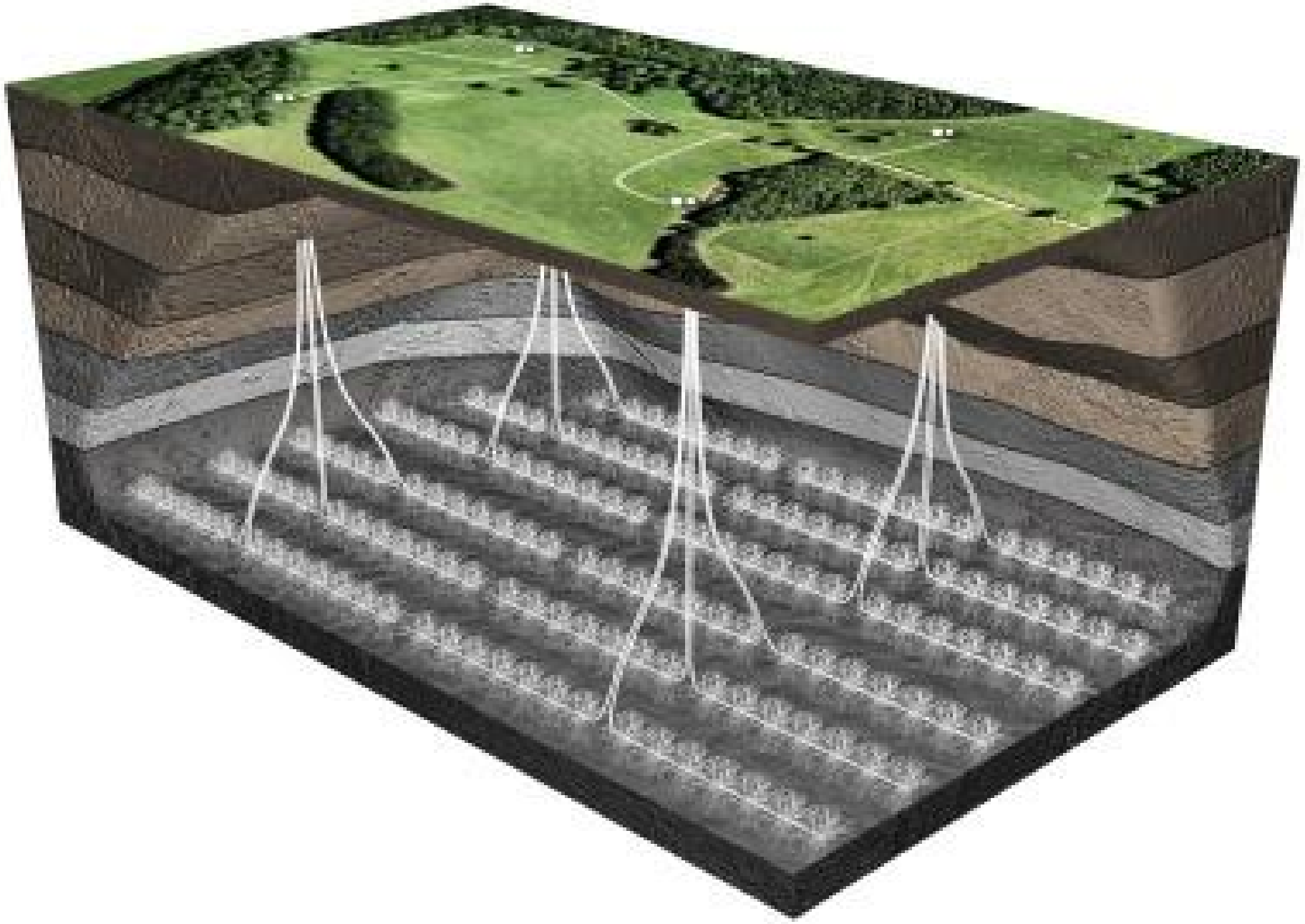

Devonian Industries

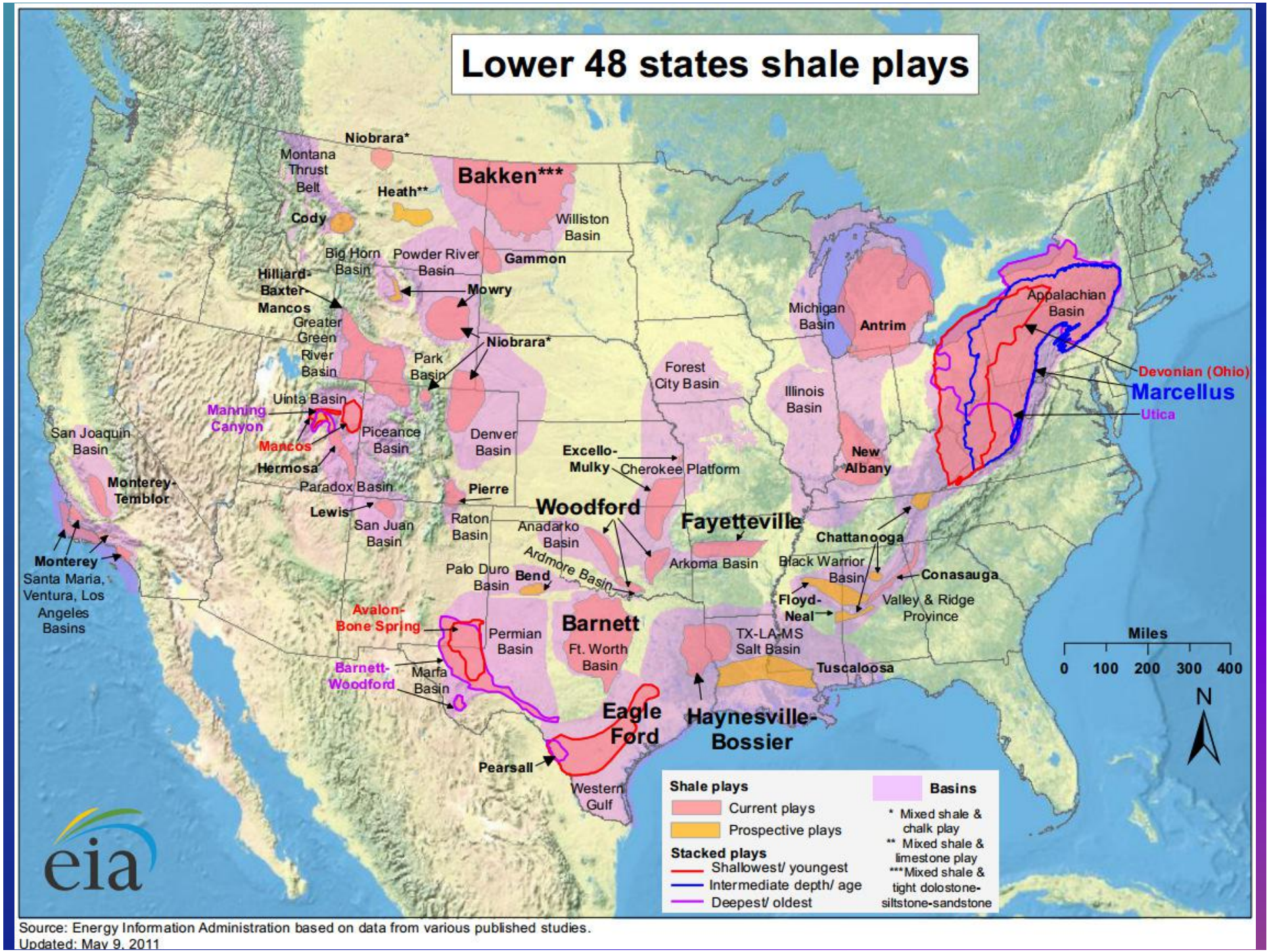
GAS SOURCE TERMINOLOGY



Horizontal Well and Fracing

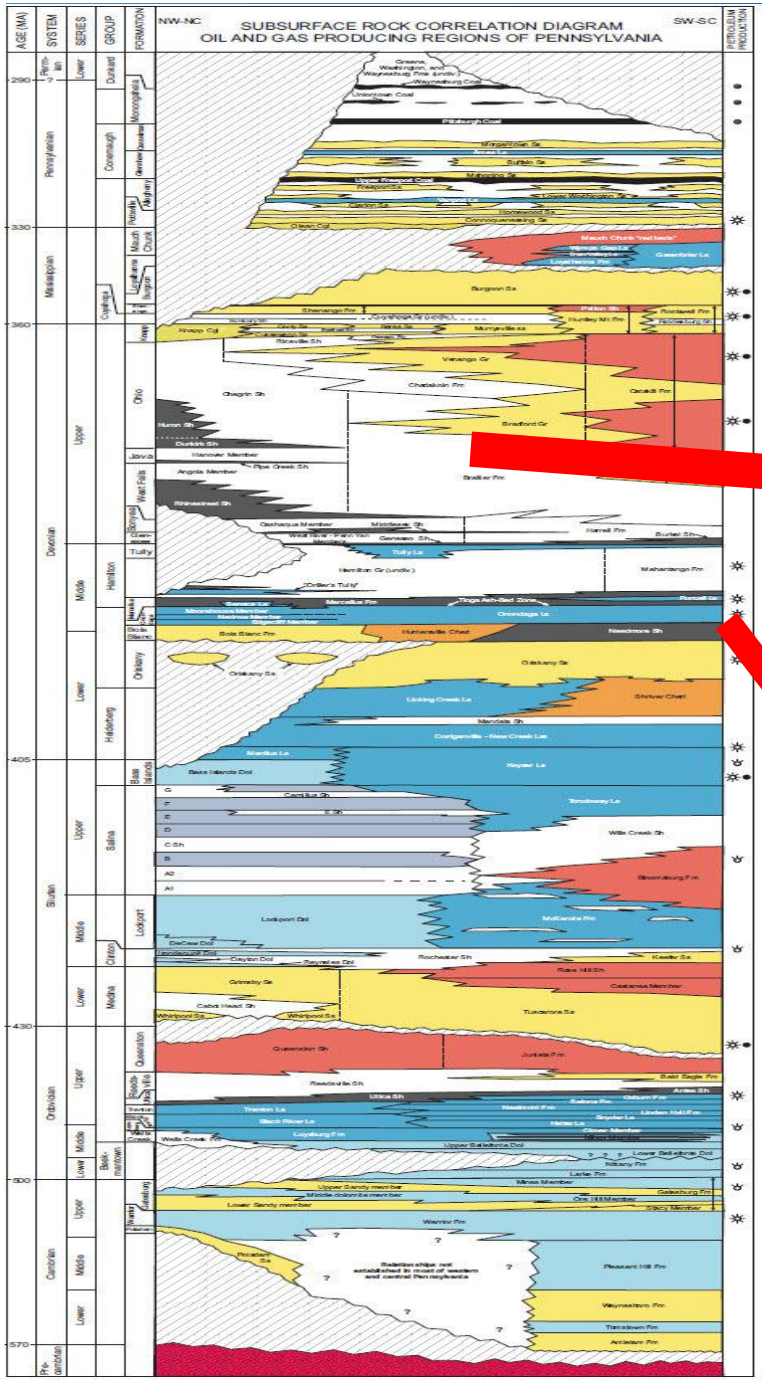


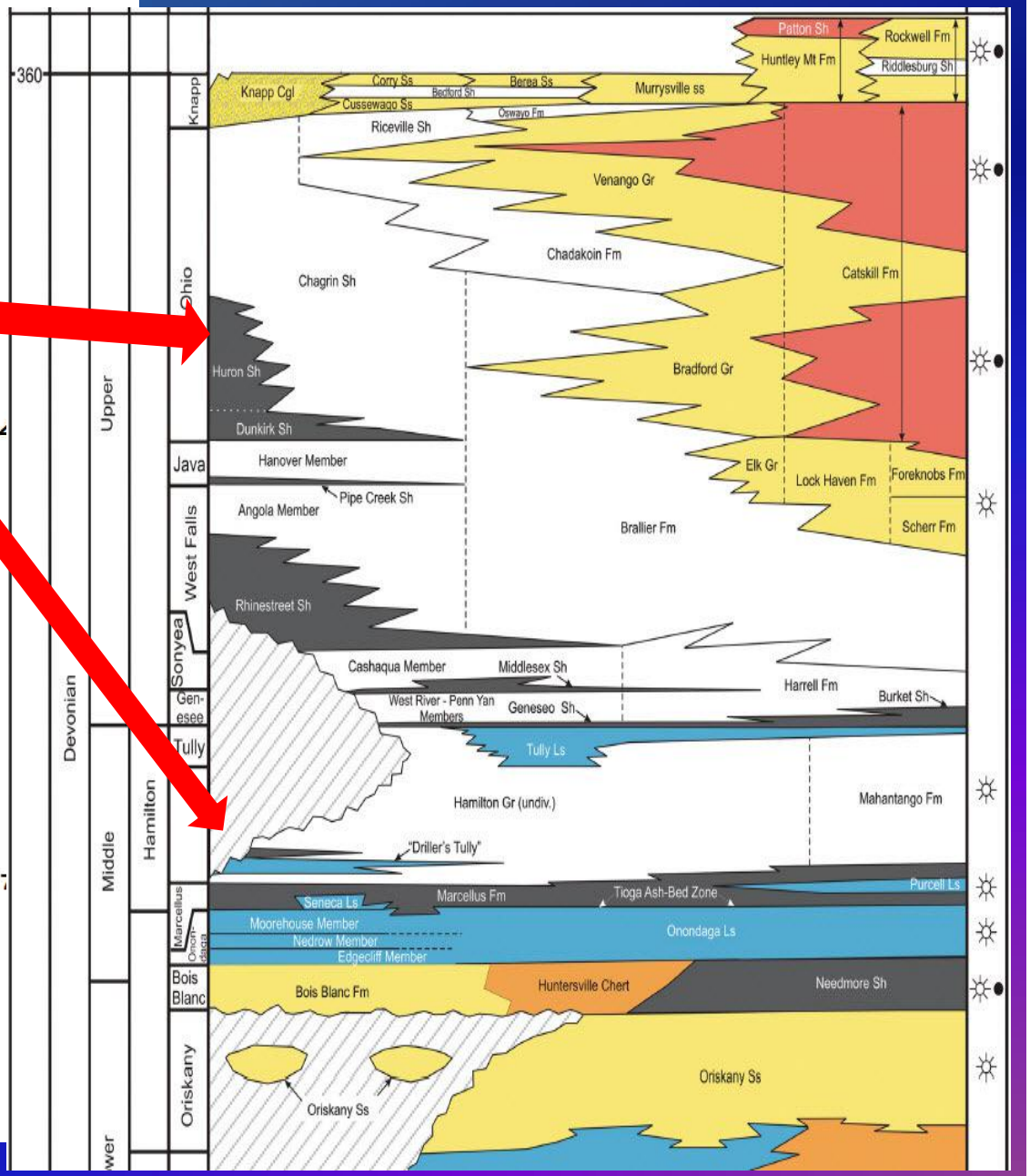


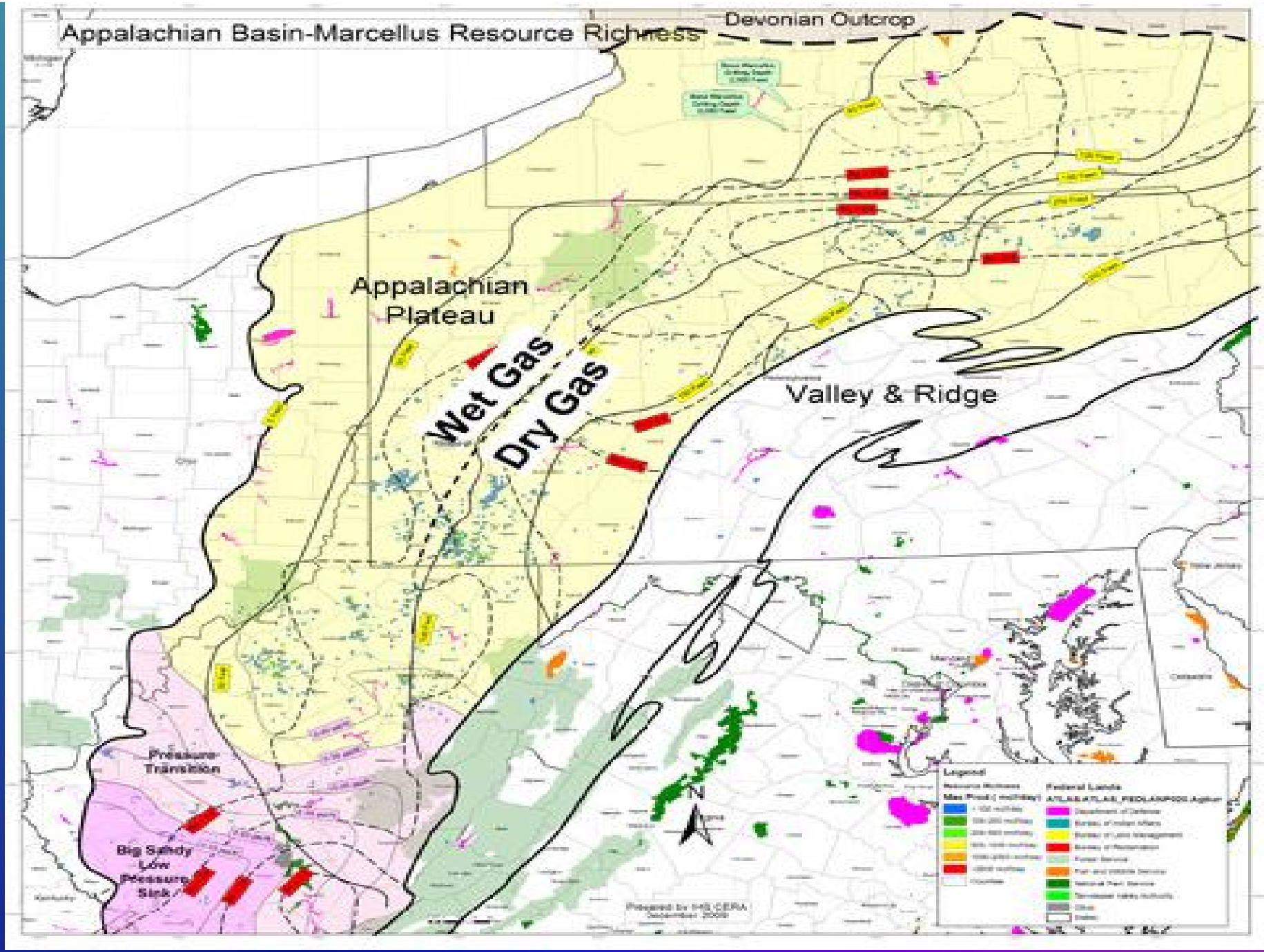


Source: Energy Information Administration based on data from various published studies.
Updated: May 9, 2011

Rock Correlations

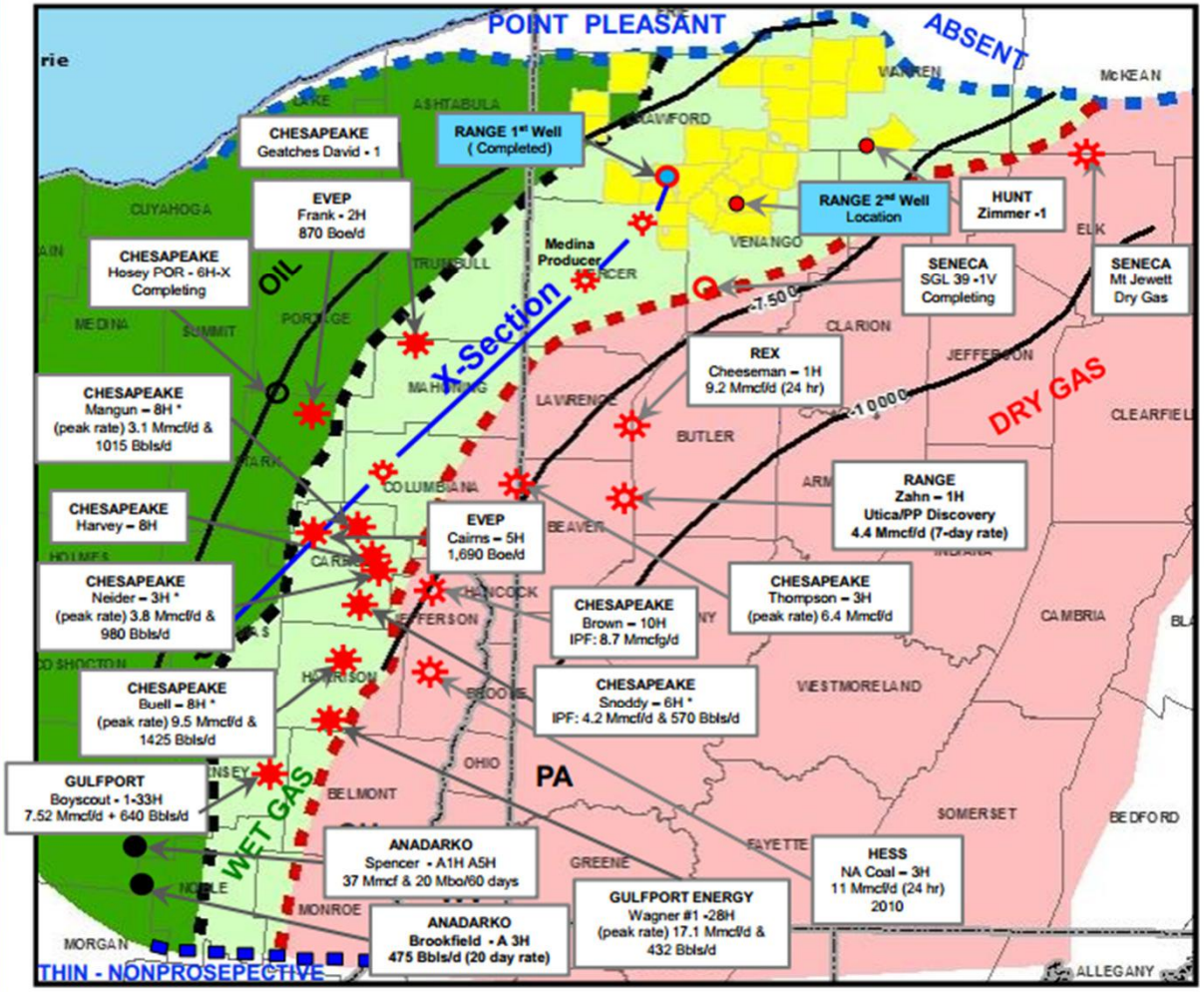





Appalachian Basin-Marcellus Resource Richness
Devonian Outcrop
Appalachian Plateau
Wet Gas
Dry Gas
Valley & Ridge
Pressure Transition
Big Sandy Low Pressure Sink

Utica

Northwest PA – Range holds ~190,000 net Utica/Point Pleasant acres



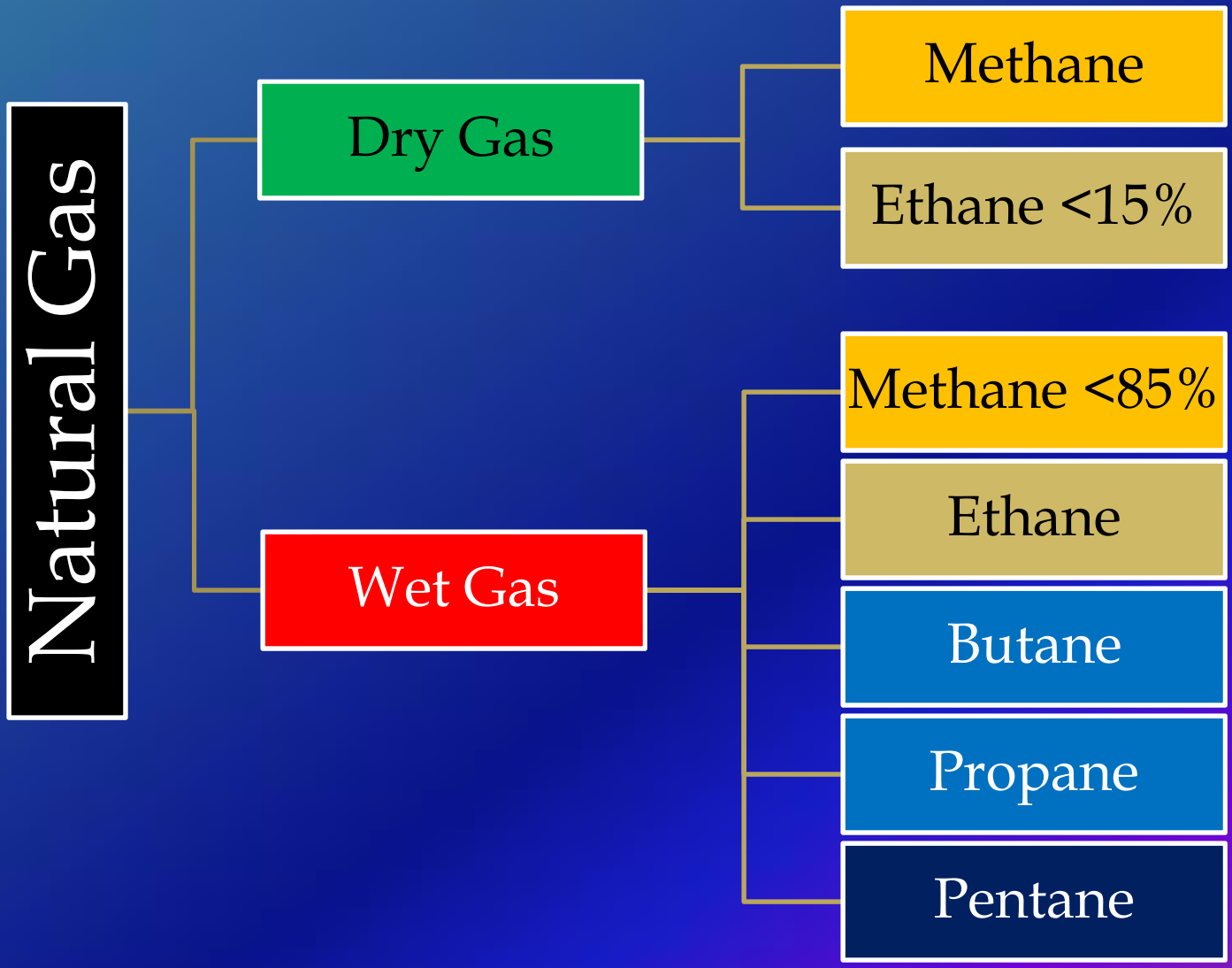
* CHK rates include ethane

Note: Townships where Range holds 3,000+ acres are shown in yellow

- **Net Point Pleasant Thickness = 150 - 250 feet**
- **Organic Content = TOC up to 7.0%**
- **Higher carbonate content and low clay content similar to Eagle Ford**
- **Expect good porosity and permeability in section**
- **First well drilled and completed during 3Q 2012**
- **Second well expected to be spud in 4Q12**

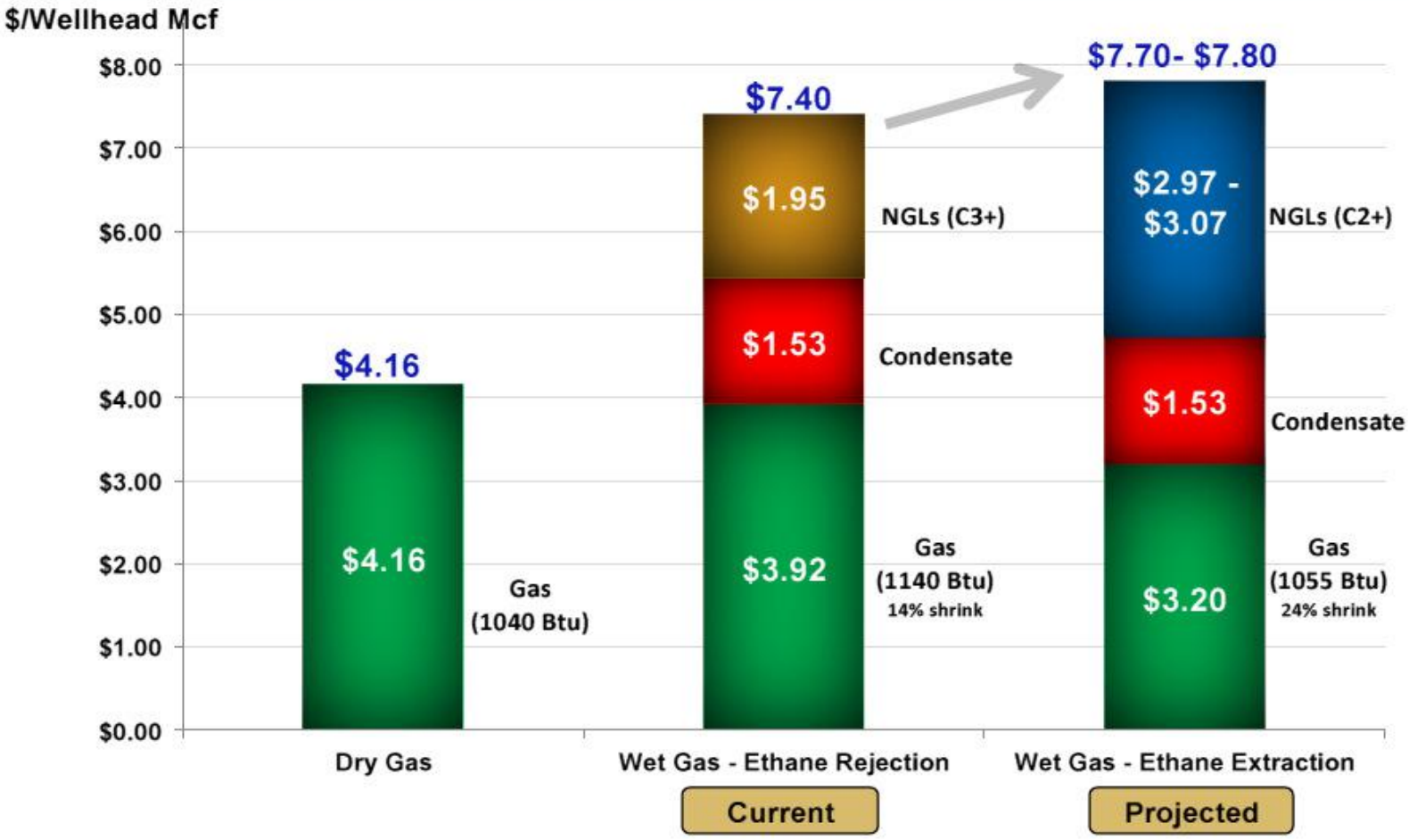
Wet Gas // Dry Gas

Dry/Wet


Natural Gas
Dry Gas
Methane
Ethane <15%
Wet Gas
Methane <85%
Ethane
Butane
Propane
Pentane

Price Differential

Marcellus Wet Gas Provides Significant Price Uplift



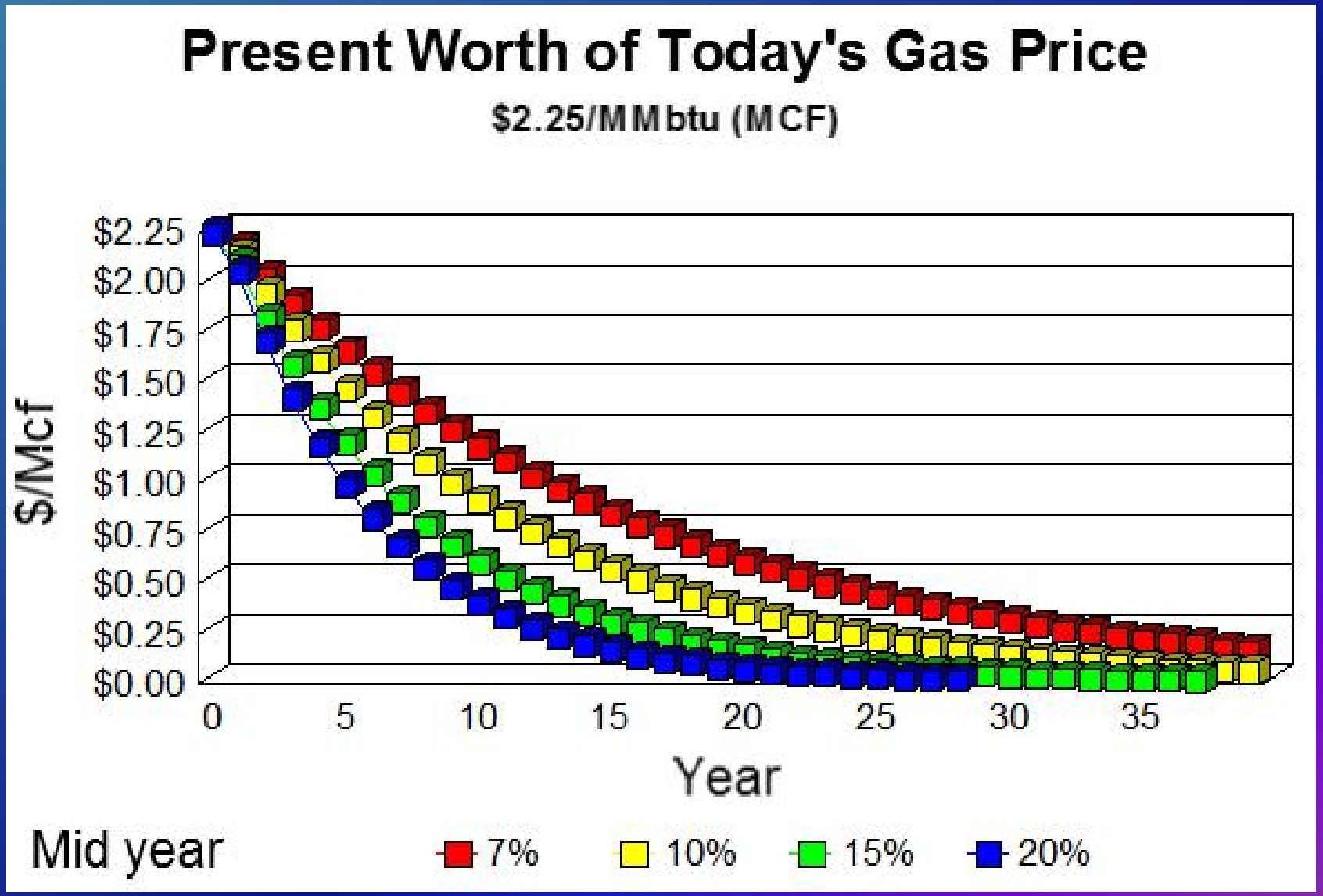
Assumptions: $4.00 NG, $90.00 WTI, 40% WTI (C3+), 2.27 GPM (ethane rejection), 5.60 GPM (ethane extraction), all processing, shrink, fuel & ethane transport included. Based on SWPA wet gas quality (1275 processing plant inlet btu). Wet Gas (Ethane Extraction) based on full utilization of current ethane / propane agreements.

2
Today's Market

Why do estimates Change?

- Changing Reserve Oil Estimates
  - 1919: out of oil in 9 years (USGS)
  - 1943: Out of Oil in 30 years (ESSO)
  - 1970: Out of Oil in 30 years (Club of Rome)
  - 1998: Peak oil in 2010's
  - 2003: Peak oil in 2020's
- Price Price Price
- Technology
- Knowledge
- Present Worth of a Dollar Discounting

The Rule of 30



Recent Transactions

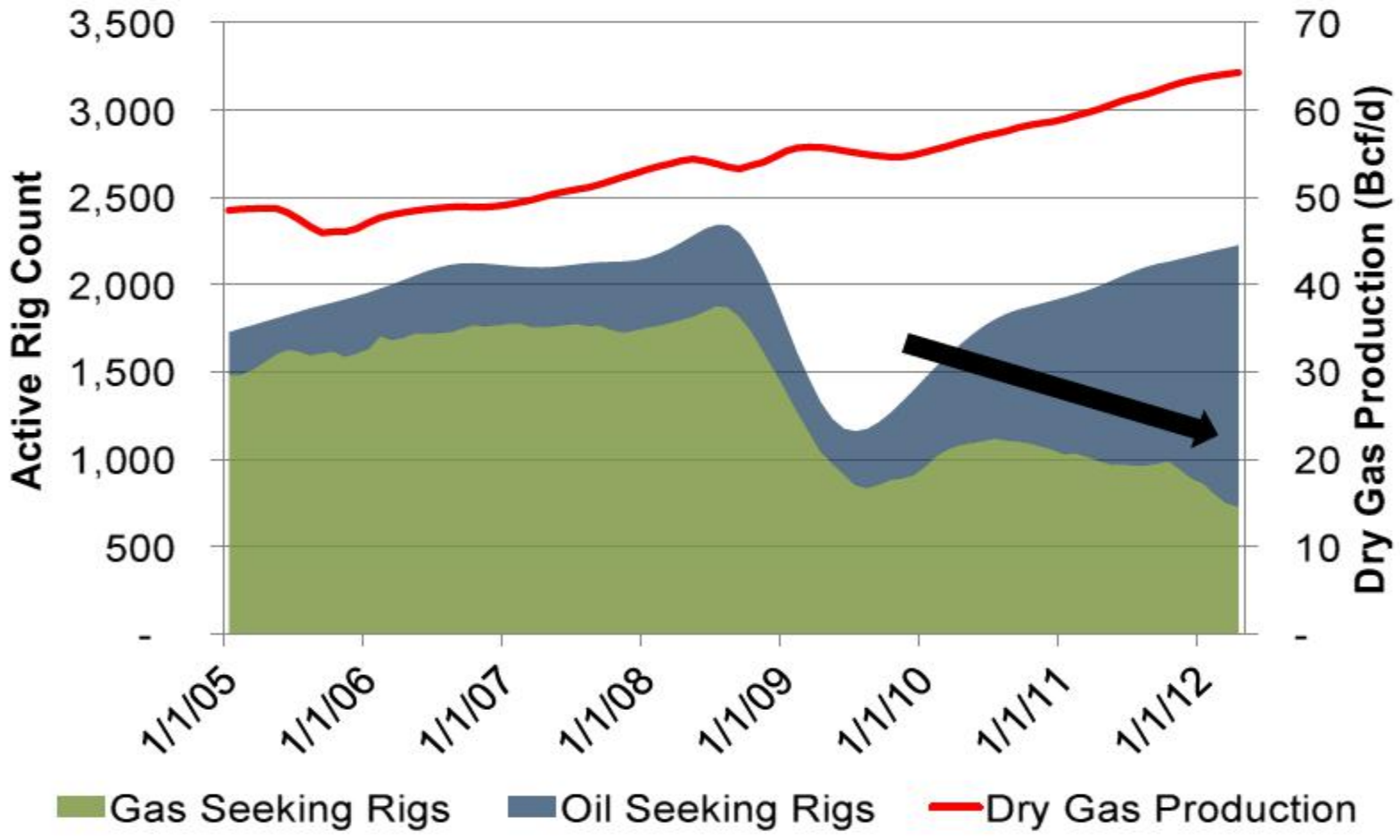
Market Watch -- Transactions involving unconventional oil-and-gas resources reached a record high $75 billion in 2011 as national oil companies and international firms rushed to buy shale assets

01 June 2012 Hess Corp (HES) 85,000 net acres in Utica	$ 9,375
01 April 2012 Magnum Hunter acquires Utica Acreage (non operating)	$ 2,027
Spring 2012 Enervest $2.32 billion for 25% stake in 619,000 net acres (CHK) Utica shale	$15,000
01 Oct 2011 PDC Energy (PETD) acquires 40,000 net acres in the Utica shale	$ 1,750
16 May 2011 Enerplus Corporation announces sale of non-operated Marcellus interests	$ 6,300
13 Jan 2011 EXCO Resources acquires additional Marcellus properties for $95 million	$ 3,393
21 Dec 2010 EXCO & BG acquire Marcellus assets from Chief Oil & Gas and partners	$ 9.188
01 Dec 2010 Chevron acquires Atlas Energy	$ 8,848
31 Aug 2010 Rex Energy forms JV with Sumitomo to develop Marcellus Shale	$ 8,595
28 May 2010 Shell acquires Marcellus acreage from East Resources for $4.7 billion	$ 7,231
25 May 2010 Williams acquires Marcellus acreage from Alra Resources for $501 million	$11,929
10 May 2010 BG forms $950 million JV with EXCO to develop Marcellus Shale	$10,215
21 April 2010 Atlas Energy and Reliance jointly acquire additional Marcellus assets	$ 4,532

Market Is Happening Now

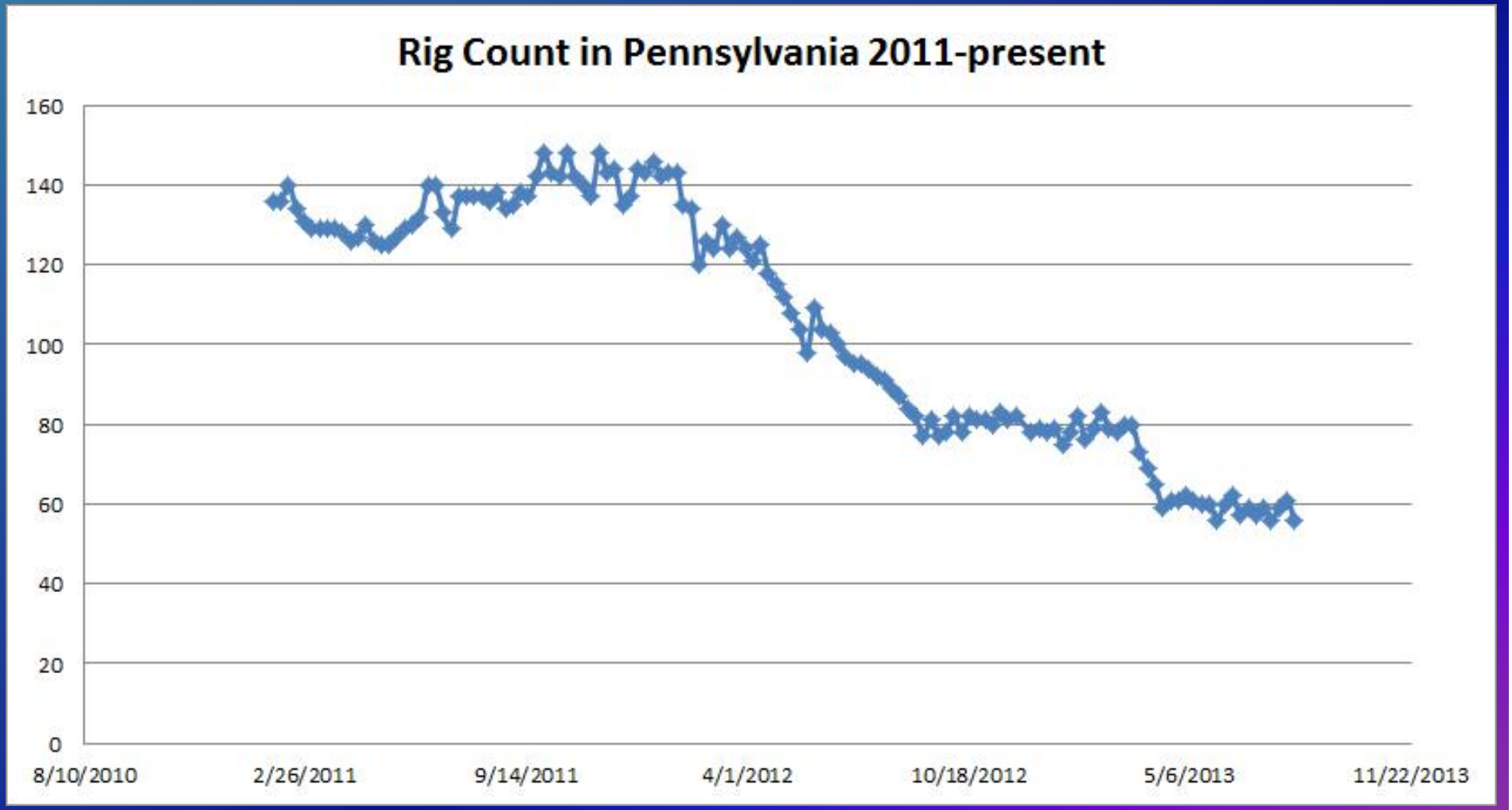
- **Dominion Applies to Export Natural Gas**
  - LNG
  - 1bcf per day
  - Ohio River Terminal / Chesapeake Bay Terminal
- **Range to send Natural Gas Liquids to Canada for Processing**
  - Ethane, Butane, Propane
- **DOW plans to build new Chemical Plant In West Virginia**
- **Shell to build worlds largest ethane cracker plant**
  - Marcellus Area
  - Polyethylene
- **Enterprise Partners – Pipeline to Gulf**
  - 125,000 BPD
  - $650 M
  - 1,230 miles
- **US Energy Development Corp to build Processing Plant in Northern Pa.**

Gas Rigs Plummet as Producers Turn to Oil and Liquids

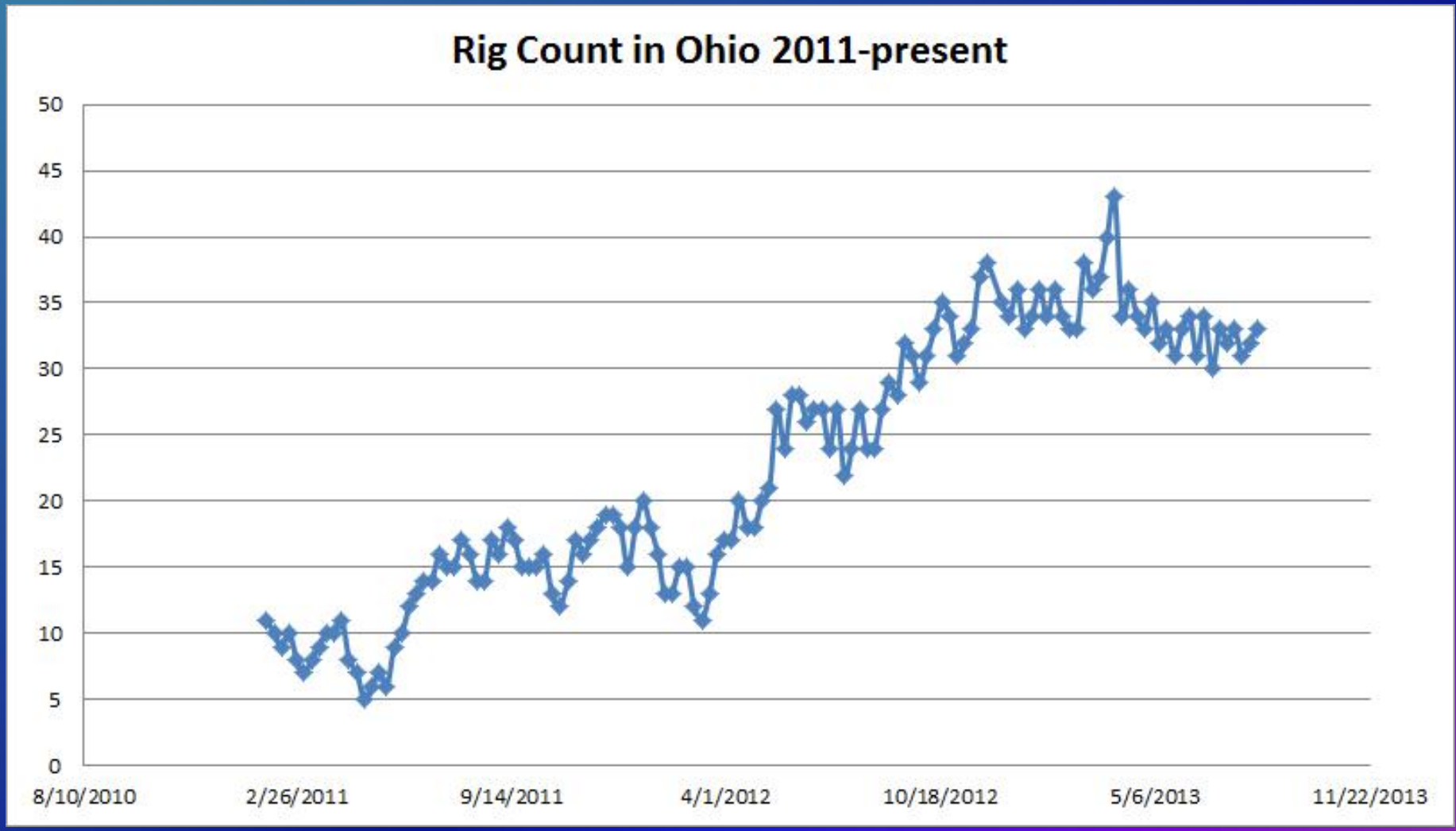


www.BentekEnergy.com

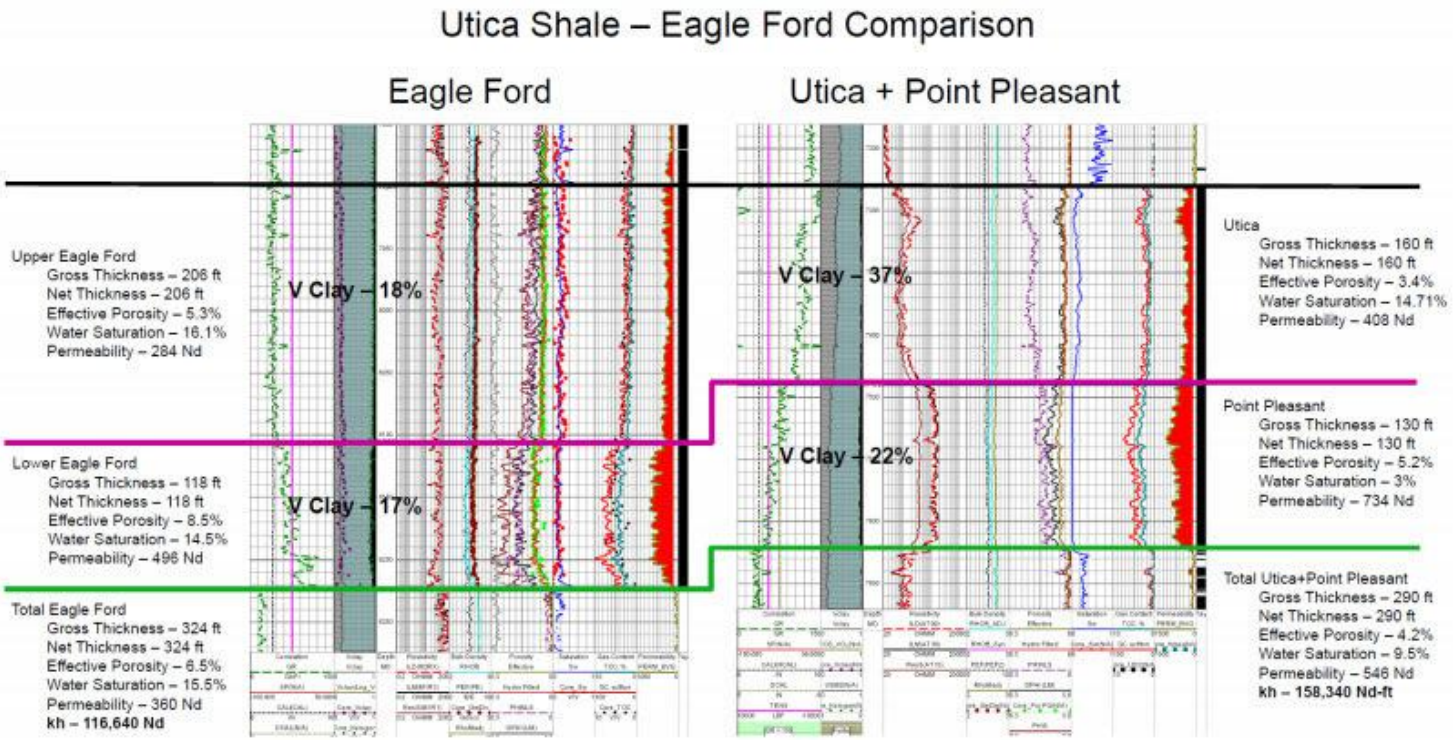
Rig Activity in PA – dry/wet gas MARCELLUS



Rig Activity in OH – wet gas/oil UTICA



Utica / Point Pleasant Shale – Eagle Ford Analog



- **The Point Pleasant member of the Utica is similar to the Eagle Ford**
  - ~50% calcite and 20% clay content (which is similar to the Eagle Ford)
    - Higher carbonate content and low clay content have been important factors contributing to high deliverability Eagle Ford well
  - Porosity is in excess of 5%
  - 95% is an intrakerogen porosity system
  - Permeability is similar to that of the Eagle Ford

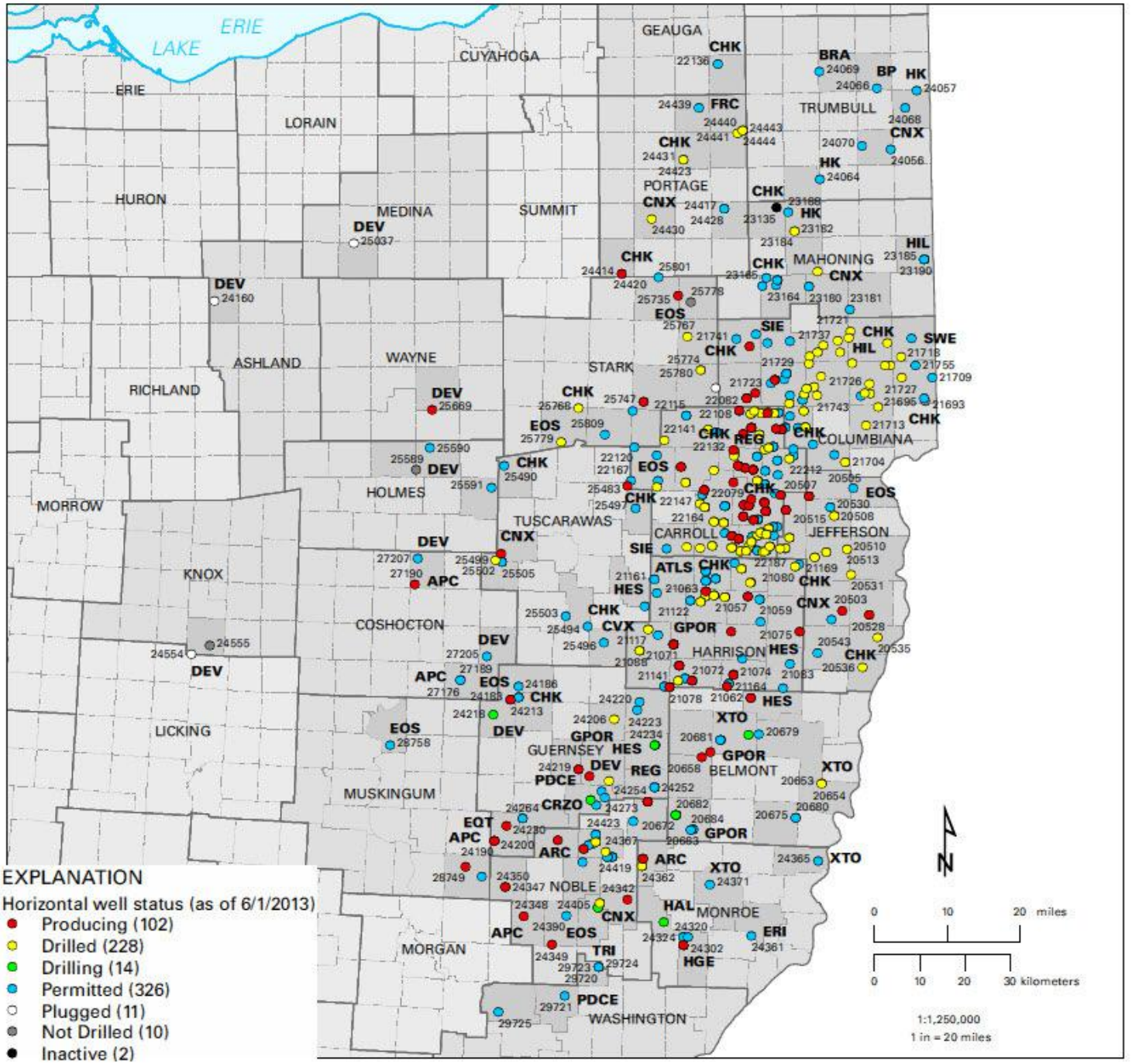
- **The Point Pleasant member of the Utica delivers excellent economics**
  - Gulfport's position in the heart of the Utica wet gas window could yield well performance results on par with the most attractive shale plays
  - The Point Pleasant thickness appears to be essentially constant and thick across our acreage

Note: Sourced from W.D. Von Gonten Study

Oil & Gas Companies in Ohio – June 2013

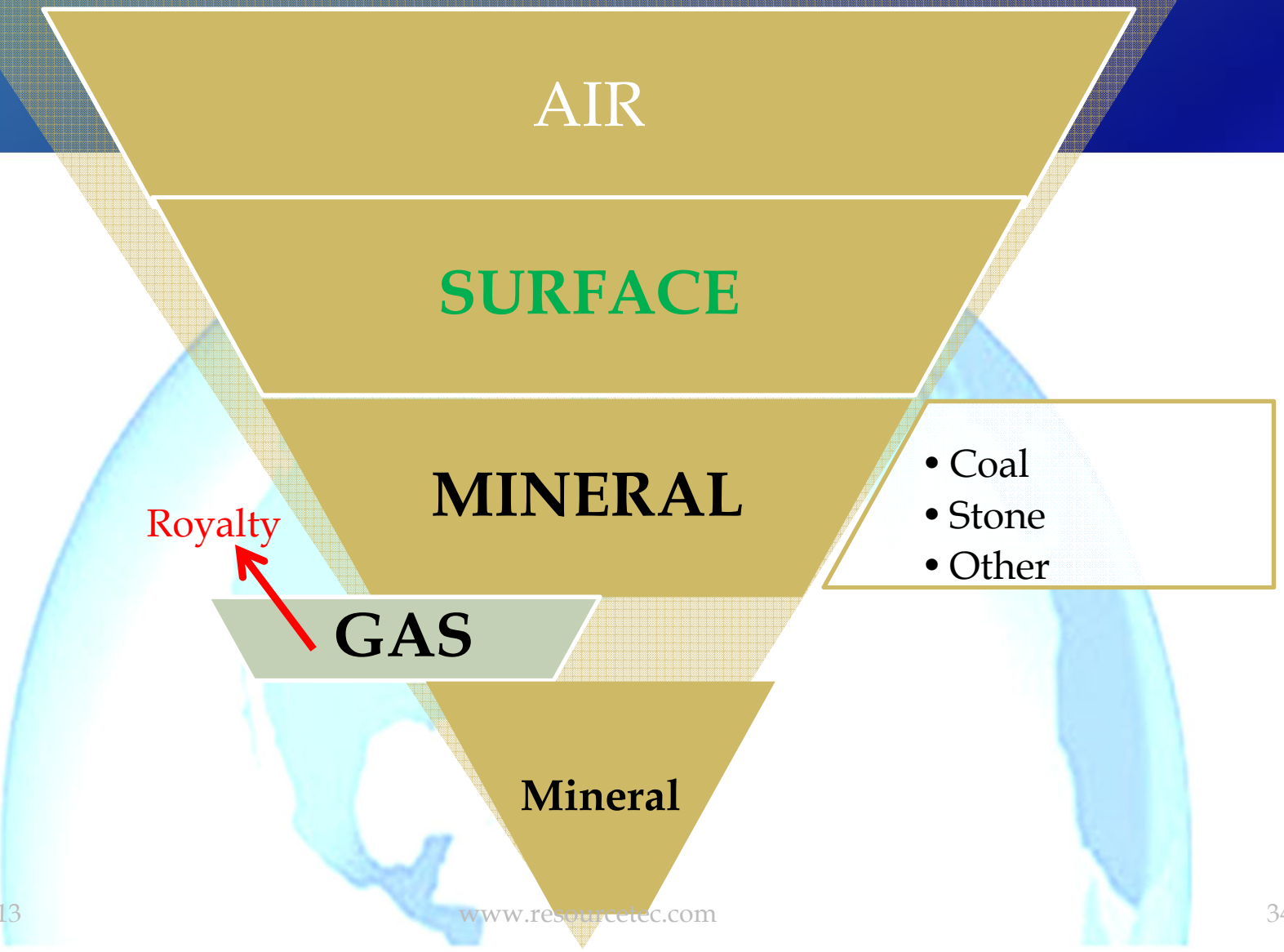
OPERATOR	MAP LABEL	COUNT
ANADARKO E & P ONSHORE LLC	APC	12
ANTERO RES APPALACHIAN CORP	ARC	25
ATLAS NOBLE LLC	ATLS	5
BP AMERICA PRODUCTION COMPANY	BP	2
BRAMMER ENGINEERING INC	BRA	1
CARRIZO (UTICA) LLC	CRZO	3
CHESAPEAKE APPALACHIA LLC	CHK	6
CHESAPEAKE EXPLORATION LLC	CHK	428
CHEVRON APPALACHIA LLC	CVX	4
CNX GAS COMPANY LLC	CNX	30
DEVON ENERGY PRODUCTION CO	DEV	13
ECLIPSE RESOURCES I LP	ERI	1
ENERVEST OPERATING L	EOS	16
EQT PRODUCTION COMPANY	EQT	3
GULFPORT ENERGY CORPORATION	GPOR	57
HALCON OPERATING COMPANY INC	HK	4
HALL DRILLING LLC (OIL & GAS)	HAL	1
HESS OHIO DEVELOPMENTS LLC	HES	13
HESS OHIO RESOURCES LLC	HES	7
HG ENERGY LLC	HGE	15
HILCORP ENERGY COMPANY	HIL	5
MOUNTAINEER KEYSTONE LLC	FRC	8
PDC ENERGY INC	PDCE	6
R E GAS DEVELOPMENT LLC	REG	16
SIERRA RESOURCES LLC	SIE	3
SWEPI LP	SWE	1
TRIAD HUNTER LLC	TRI	3
XTO ENERGY INC.	XTO	5
		693

HORIZONTAL UTICA-POINT PLEASANT WELL ACTIVITY IN OHIO



3
Ownership and Title

FEE –less Oil and Gas



Title Issues
Who owns it?

- Old severance
  - Mineral = all minerals
  - Mineral ≠ oil and gas
  - Old mineral deeds may or may not be recorded (may only be noted as reservations from the fee)
- Divided ownership
  - Heirs and assigns
- Multiple seams / multiple zones
- Old reversions / leases / transfers
- Tax and other quit claim deeds in the past
- Gas Storage rights – precedent ?

Creation of an Oil and Gas Estate

PA Supreme Court (1910) found that the taxation of mineral estates including oil and gas was "well settled" (Rockwell vs. Warren County; 228 Pa. 430; 77 A. 665; 1910 Pa. LEXIS 502):

- It should always be borne in mind that real estate is the thing being dealt with, that oil and gas are considered real estate, and if there be no oil and gas there is no real estate.

- A mere naked reservation of oil and gas in a deed without any other facts to base a valuation upon is not sufficient to warrant the assessment of taxes.

- Development in the neighborhood, sales of oil or gas lands in close enough proximity to add value, or any other element of value which may form a basis of valuation may be taken into consideration by the assessor or other taxing authorities.

Severed Mineral (Oil and Gas)

The lease creates a fee simple interest (working interest) in the Oil and Gas.

- Pa Com. Pl. 1938 (Brown v. Thompson, 86 P.L.J. 497, I Fay L.J. 178)
- Pa Super. 1975 (21 P.S. § 2 see also Baird's Appeal, 132 PA Super. 573, 1 A.2d 485)
- Pa. Super. 224 (Pennsylvania Bank and Trust Co., Youngville Branch v. Dickey, 355 A. 2d 483, 232 Pa. Super. 224)
- Pa. Com. Pl. 1940 (Bickerton v. Vaughn, 38 D. & C. 645, 88 P.L.J. 393, # Fay. L.J. 105)

Is gas a mineral? Yes / No

Early Pennsylvania case said no!

- Pennsylvania Supreme Court (1882,Dunham and Shortt v. Kirkpatrick) decided that reserving "all the minerals" did **not** include oil and gas,
  - Oil and gas, while minerals, were not regarded as such by most (many) sellers/buyers
  - The intention to reserve oil and gas.
  - For the most part, the Pennsylvania courts have tended to uphold this finding since then, though they are definitely in the minority.

- However, later Pennsylvania cases do classify natural gas as a mineral.
  - In a taxation case, the Pennsylvania Supreme Court (1910) found that the taxation of mineral estates including oil and gas was "well settled" (Rockwell vs. Warren County):
    - "The question involved here is whether the oil, gas and minerals reserved from the grant of the surface of several tracts of unseated land and now in separate ownership can be taxed as real estate.
    - Mere license to mine coal or to drill for oil and gas, unaccompanied by the right of ownership in the minerals, does not constitute an estate in land.
    - O**il, gas, and coal are minerals** when the title to the same is severed from the owner of the surface and is vested in a separate owner
      - an estate in land is thus created
      - if it be of any value, may be taxed.

Gas is or isn't a Mineral

- Pa Com. Pl. 1938: An oil and gas lease, granting the right to take minerals that are exclusive and unlimited in quantity and purpose, is a sale in place. The grantee is vested with a freehold estate in minerals (Brown v. Thompson, 86 P.L.J. 497, I Fay L.J. 178).
- Pa Super. 1975: A lease agreement granting to the lessee the exclusive right to remove all oil and gas on the premises for a term of one year "and as long thereafter as oil or gas is found" results in a separate mineral estate being created. (21 P.S. § 2 see also Baird's Appeal, 132 PA Super. 573, 1 A.2d 485).
- Pa. Com. Pl. 1940: Where a lease gives the right to mine and operate for oil and gas for a definite period and to continue as long as oil and gas should be produced, the lessee acquires an interest in the gas as real estate (Bickerton v. Vaughn, 38 D. & C. 645, 88 P.L.J. 393, # Fay. L.J. 105).
- Section §5020-419 of the PA Assessment Code, the legislature specifically reminded the local assessors to not reduce the assessed value of minerals including oil and gas when reducing forest land values:
    - " All surface land which has, since the fifth day of June 1913, been classified and set apart as auxiliary forest reserves, in the manner provided by law.... be rated in value for the purpose of taxation, not in excess of one dollar .... **Provided, however, that if the said surface land be underlain by coal, iron ore, oil, gas, or other valuable minerals, said minerals may be assessed separately.**"

Who owns the Gas

- The leasehold interest is:
  - "working interest" or "operating interest,"
  - conveys a fee simple determinable from the lessor (landowner) to the lessee.
    - Subject to conditions
    - Revocable ownership.

- Chesapeake as an example:
  - "As part of the mineral-leasing process, Chesapeake takes ownership of a percentage of the mineral rights.
  - As the owner, Chesapeake has the legal right to mortgage its leased interest in the minerals.
  - Because Chesapeake cannot mortgage any property interest other than what it already owns, this action should have no effect on any other property owner's ability to act on their own property interests .“1

1: Brian Grove, senior director for corporate development at Chesapeake Energy

Ohio: Oil and Gas Estate

Ohio courts have been inconsistent concerning lessee's interest in the oil and gas pursuant to a lease:

- Ohio Supreme Court has held that:
  - "oil and gas in place are the same as any part of the realty, and capable of separate reservation or conveyance." (Pure Oil Co. v. Kindall, 156 N.E. 119, 123 (Ohio 1927).
  - A lessee acquires a "vested, though limited, estate in the lands for the purposes named in the lease" as soon as the lessee takes possession, commences operations, drills wells, and produces oil. (48 N.E. 502, 506 (Ohio 1897))

OR

- Ohio case law also suggest that:
  - Oil or gas belongs to no one until reduced to possession. (Back v. Ohio Fuel Gas Co., 113 N.E.2d 865, 869 (Ohio 1953))
  - The lessee's interest in an oil and gas lease is merely a license to explore with no interest in the oil and gas until reduced to possession. When that occurs, the lessee acquires an interest in the oil and gas as personalty, not realty.

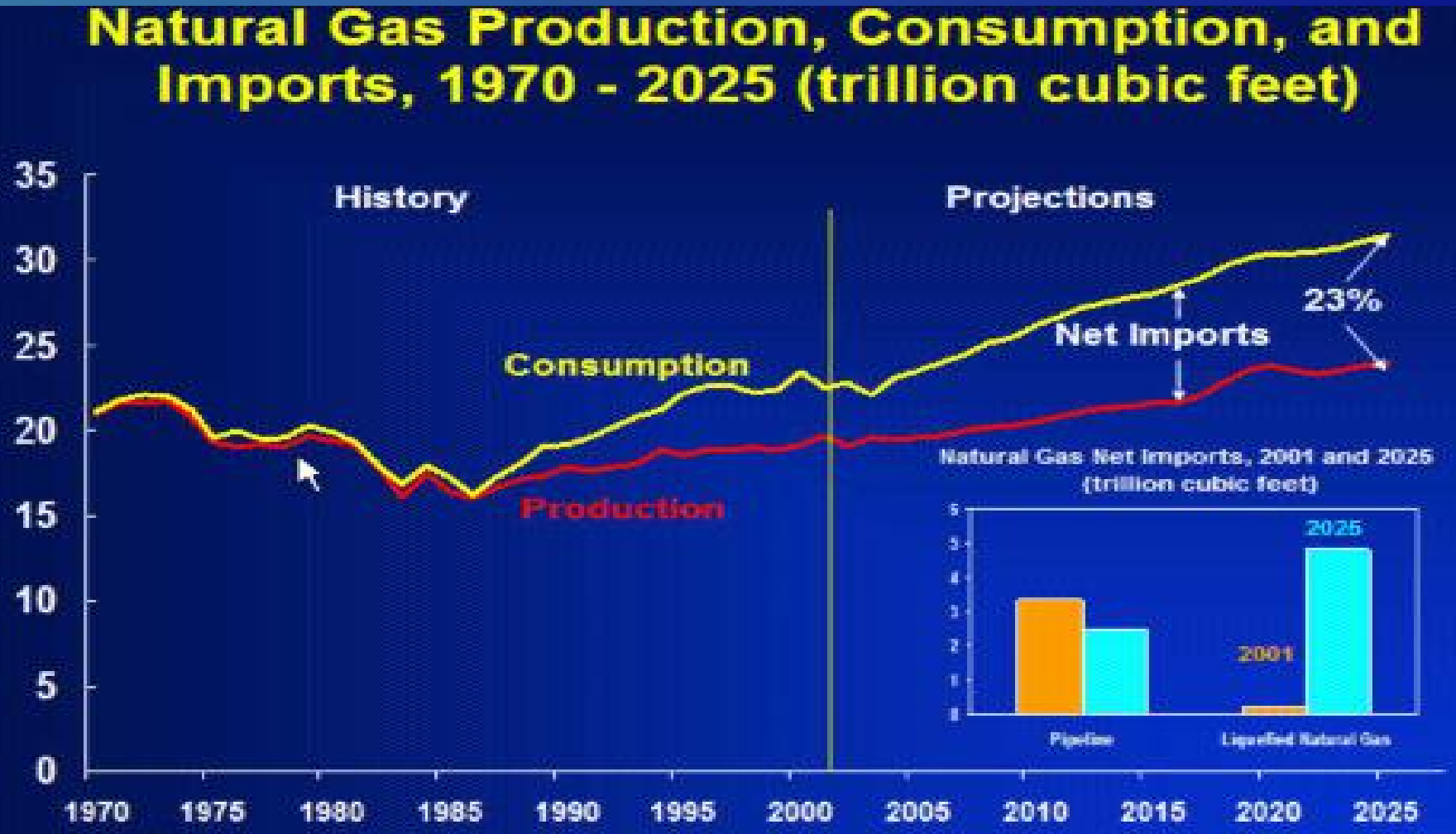
Diligent Development Ohio

- Under an oil lease which is silent as to the number of wells to be drilled, there is an implied covenant that the lessee shall reasonably develop the lands, and reasonably protect the lines.
- The development and protection of lines … is such as is usually found in the same business of an ordinarily prudent {operator} -- neither the highest nor lowest, but about medium or average.
- There is an implied covenant in this lease to reasonably develop the lands, by drilling and operating such number of wells as would be ordinarily required for the production of the oil contained in such lands, and afford ordinary protection to the lines.

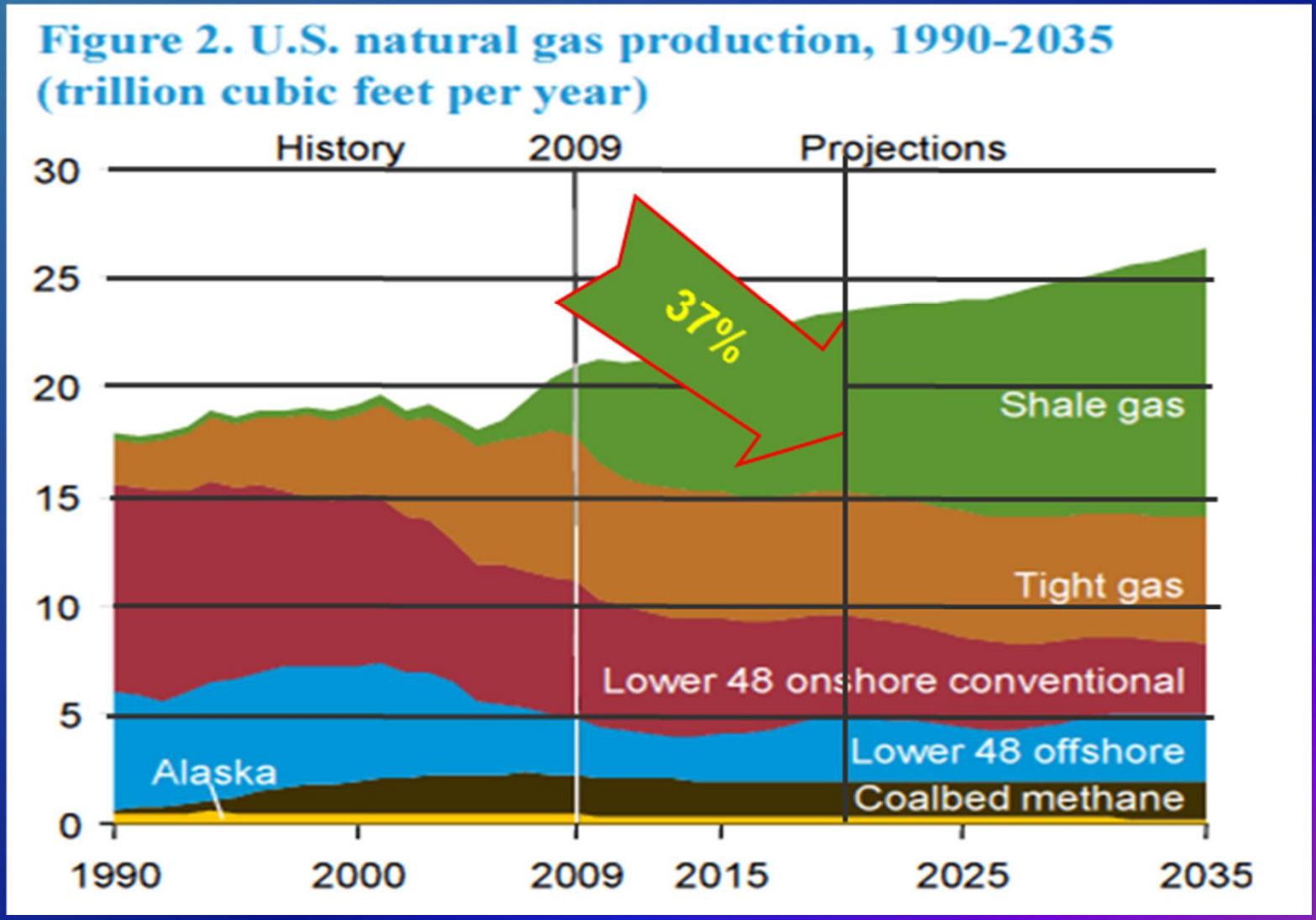
(Harris v. Ohio Oil Co., Harris, 48 N.E. at 505, Ohio Supreme Court)

4
Changing Thinking

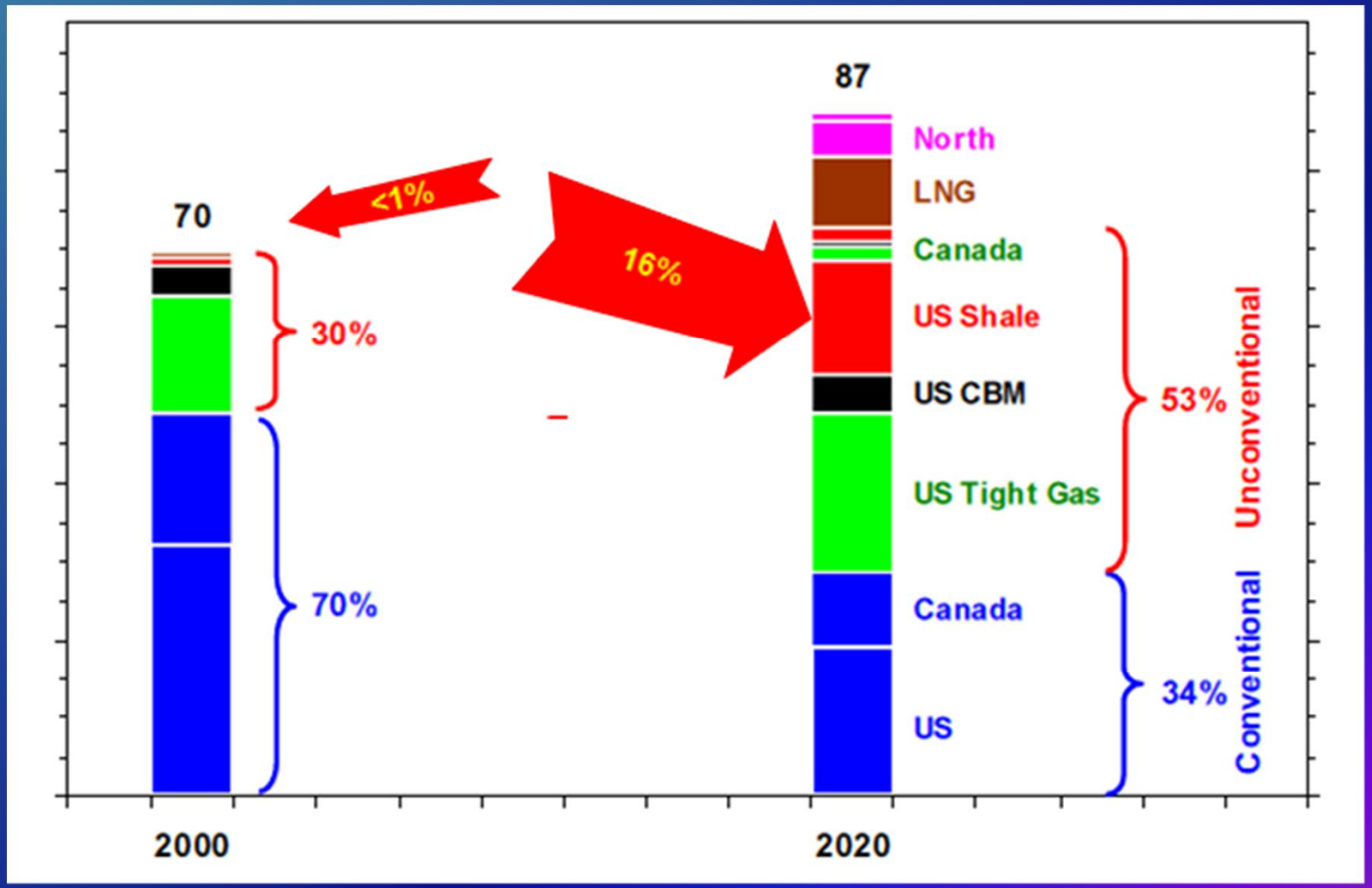
Production/Consumption 2004 thinking



EIA's 2010 Prediction



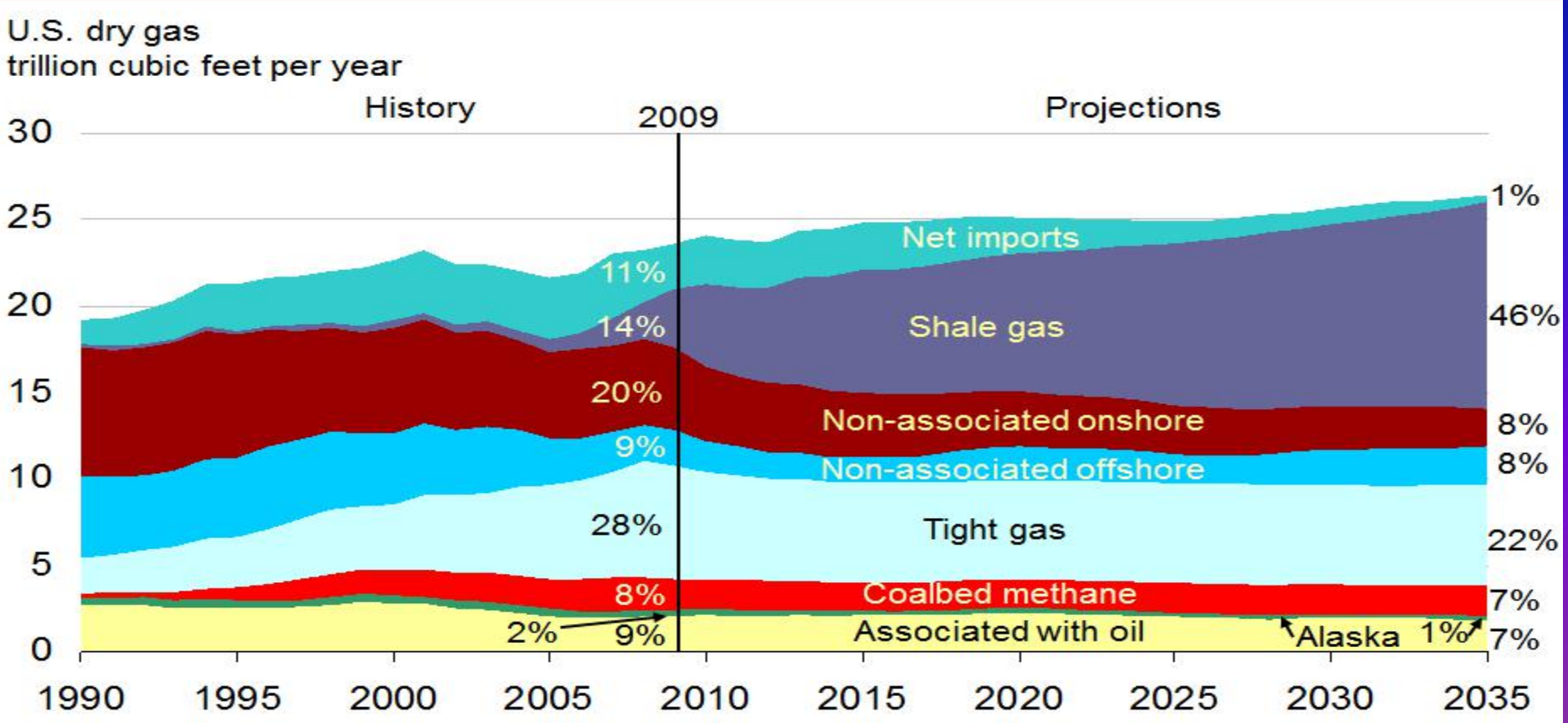
Energy Outlook 2010 thinking



Ziff Energy's outlook for unconventional gas production growth to 2020.

EIA 2012 Predictions

Four-fold increase in shale gas production offsets declines in other U.S. supply, meeting consumption growth and lowering import needs



Shale Boom Prompts Gas Market Decoupling from MFG Index

- "The price of gas has been on a historic decline, while PMI rose"

  "Natural gas prices now appear to be primarily influenced by supply economics,"

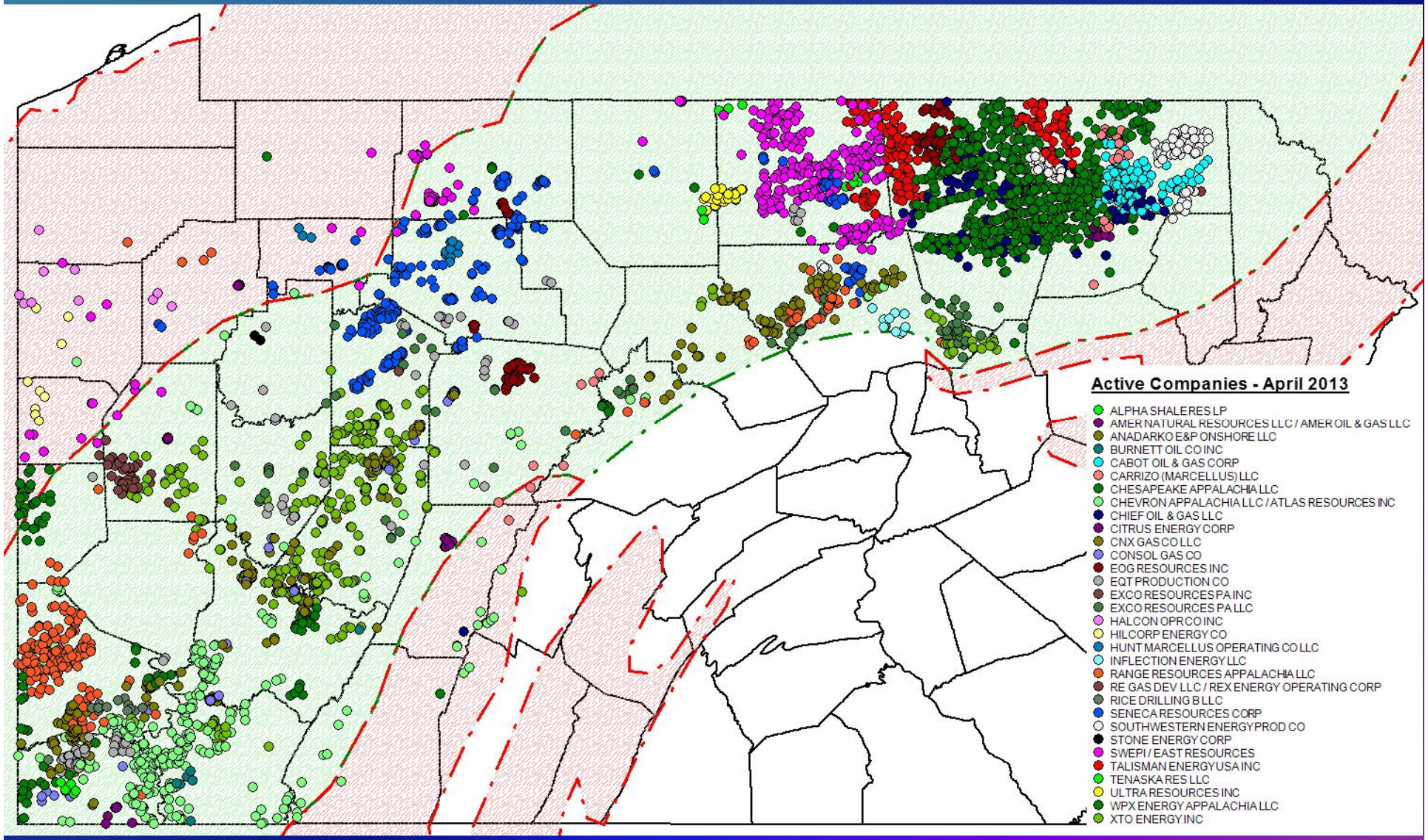
- "Every basin has its own set of economics when looking to drill, but once production starts, it's simply the marginal production costs that determine whether or not to produce,"

- An increasing volume of gas is coming from oil wells as associated gas. "In this case it's the price of oil and [natural gas liquids] that matter."

- "For the last few years, the shale boom has created a chronic surplus -– one so severe that the surplus tends to overwhelm shifts in economic activity,"

Gas Business Briefing Monday, March 25 2013

Active Companies April 2013



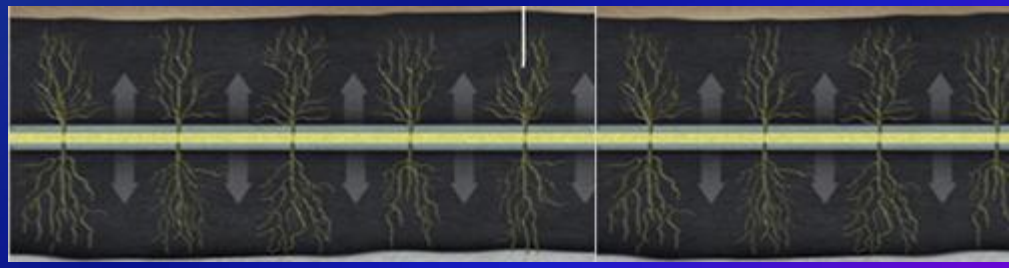
5
Development Activity

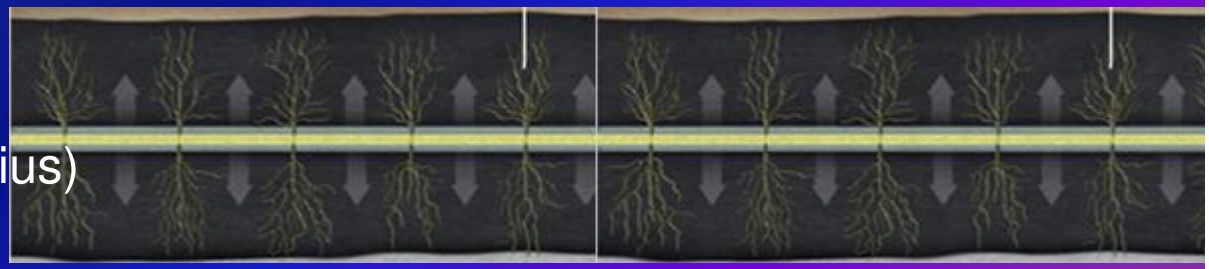
Before 2003 Thinking

1.9	trillion	likely cf in place
5%		likely recovery
95	Billion	cubic feet
60	Million	acres
2,000		cubic feet per acre
2		MCF/ Acre
$4.00		$/ MCF (Wellhead Price)
$10		$ Gas per acre
$800		per property (80 acre)
$100	12.50%	Royalty
$5,000,000		Drill Cost
-$4,999,300		Net

Progress in Completion

- 2006/2007 Well:
  - 3.5 BCF
  - 42 acres (3,500 x 600)
  - 5 – 6 frac's (300ft radius)
  - 80,000 Mcf /acre
- 2008 / 2009 Well:
  - 5.5 BCF
  - 60 acres (4,600 x 600)
  - 7 – 9 frac's (300ft radius)
  - 100,000 Mcf / acre
- 2010 / 2011
  - 8.5 BCF
  - 78 acres (5,800 x 600)
  - 9 – 10 frac's (300ft radius)
  - 106,000 Mcf/ acre





2005/2008 Thinking

4,800	trillion	likely cf in place
10%		likely recovery
480	trillion	recoverable cubic feet
17	million	acres
28,235,000		cubic feet per acre
28,000		MCF/ Acre
$7.50		$/ MCF (Wellhead Price)
$211,760		$ Gas per acre
$16,940,800		per property (80 acre)
$2,117,600	12.50%	Royalty
$5,000,000		Drill Cost
$1,694,080		Operating Cost
$8,129,120		Net

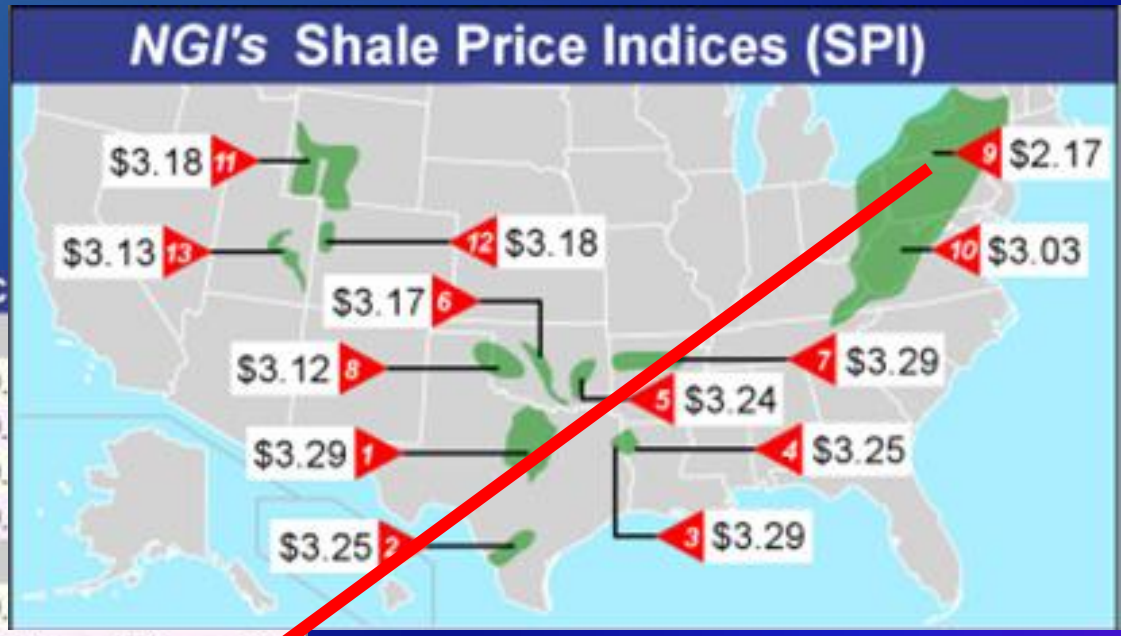
2008/2011 Thinking

4,800	trillion	likely cf in place
25%		likely recovery
1,200	trillion	recoverable cubic feet
17	million	acres
70,588,235		cubic feet per acre
70,588		MCF/ Acre
$4.50		$/ MCF (Wellhead Price)
$317,650		$ Gas per acre
$25,412,000		per property (80 acre)
$3,811,800	15.00%	Royalty
$7,500,000		Drill Cost
$3,812,000		Operating Cost
$10,288,200		Net

2011/2013 Thinking (Dry Gas)

4,800	trillion	likely cf in place
25%		likely recovery
1,200	trillion	recoverable cubic feet
17	million	acres
70,588,235		cubic feet per acre
70,588		MCF/ Acre
$3.00		$/ MCF (Wellhead Price)
$211,764		$ Gas per acre
$16,941,120		per property (80 acre)
$2,964,696	17.50%	Royalty
$7,500,000		Drill Cost
$3,812,000		Operating Cost
$2,664,424		Net

August 2013 Prices



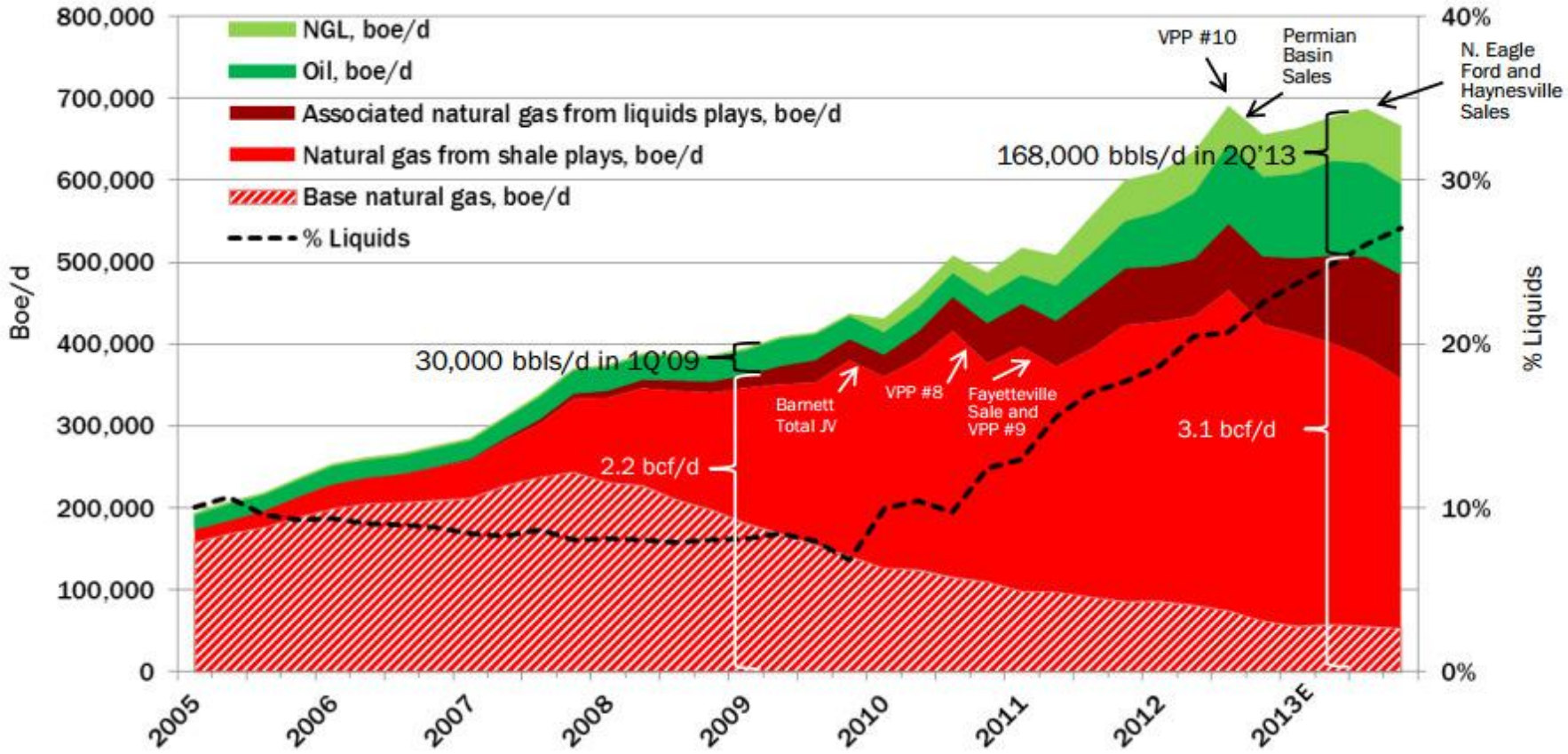
Basin/Region	Range	Avg	C		
Gulf Coast					
1. Barnett	$3.23 - $3.33	$3.29	0.		
2. Eagle Ford	$3.20 - $3.30	$3.25	0.		
3. Haynesville - E. TX	$3.19 - $3.33	$3.29	0.		
4. Haynesville - N. LA	$3.20 - $3.29	$3.25	0.		
Mid-Continent					
5. Arkoma - Woodford	$3.20 - $3.27	$3.24	0.		
6. Cana - Woodford	$3.15 - $3.22	$3.17	0.02	273	4
7. Fayetteville	$3.20 - $3.34	$3.29	0.02	331	56
8. Granite Wash*	$3.05 - $3.28	$3.12	-0.01	59	120
Northeast					
9. Marcellus - NE PA					
Tenn[1]	$1.77 - $2.02	$1.87	-0.38	131	44
Other[2]	$1.90 - $3.25	$2.20	-0.47	1154	223
Combined[3]	$1.77 - $3.25	$2.17	-0.45	1284	267
10. Marcellus - SW PA/WV	$2.90 - $3.33	$3.03	-0.07	3801	640
Rocky Mountains					
11. Green River Basin*	$3.10 - $3.23	$3.18	-0.04	643	105
12. Piceance Basin*	$3.17 - $3.19	$3.18	-0.04	34	4
13. Uinta Basin*	$3.10 - $3.18	$3.13	-0.02	191	32

Hydrocarbon Pricing

- Natural Gas
  - Methane: $0.43 / gallon (assume 6 mcf / barrel) @ $3.00 / mcf
- NGL & Condensates
  - Propane: $0.87 / gallon
  - Butane: $1.75 / gallon
  - Ethane: $0.30 / gallon
  - Gasoline: $2.91 / gallon
- Oil: $2.24 /gallon (assume $94/barrel WTI)

1st qtr 2013

LIQUIDS-FOCUSED PRODUCTION GROWTH



Drillbit production growth outpacing asset sales

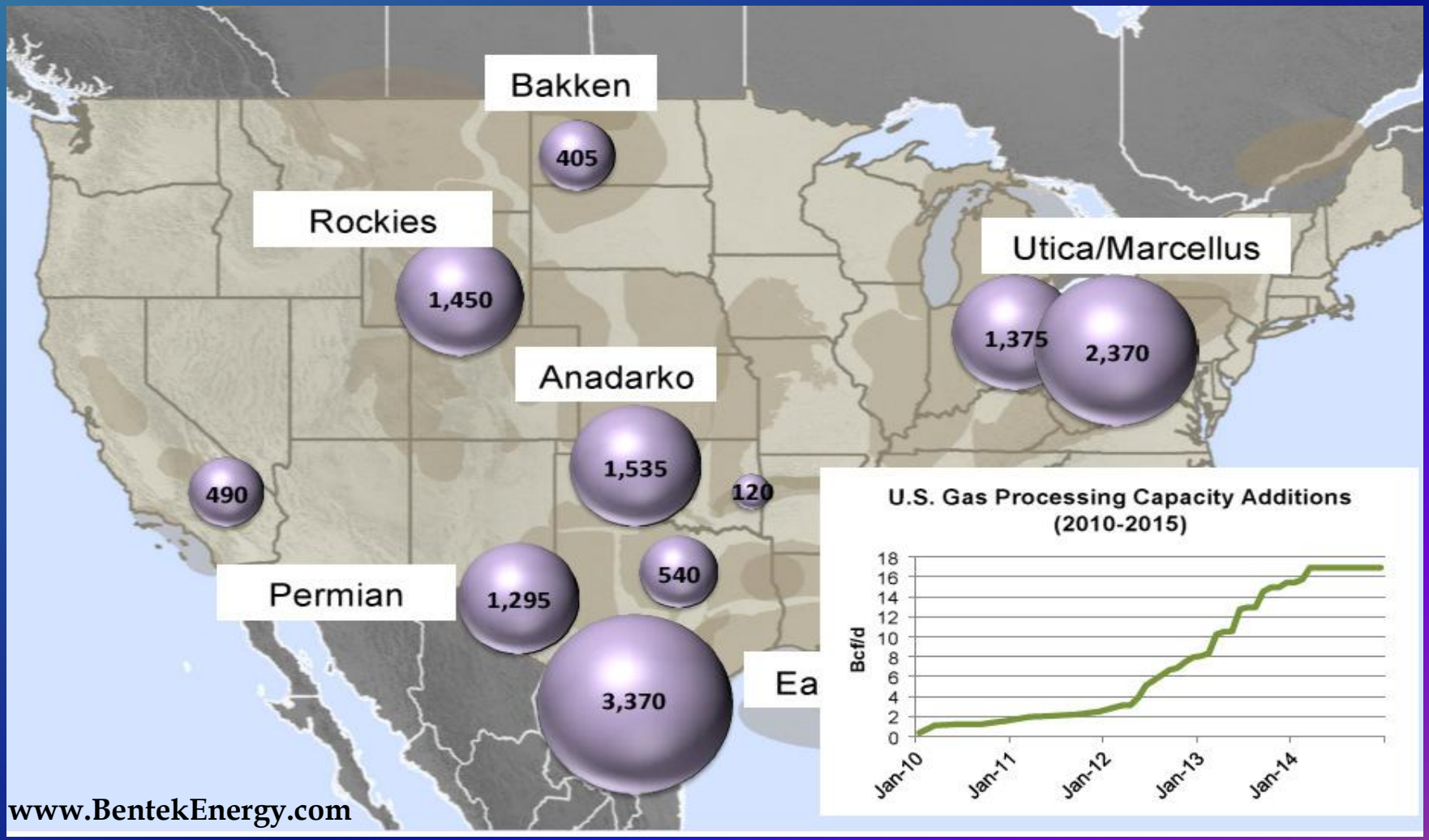
Wet Gas Processing

- Majorsville, WV Gas Processing Plant (MarkWest)
  - Chesapeake, Statoil-Hydro, Range Resources
  - 70 miles of gathering line (southwest PA)
- U.S. Energy Development Corporation
  - Northwest/Central West PA
- Houston, Washington County, PA (MarkWest)
  - Range Resources
- Sunoco processing plant in Van Port, Beaver County, PA

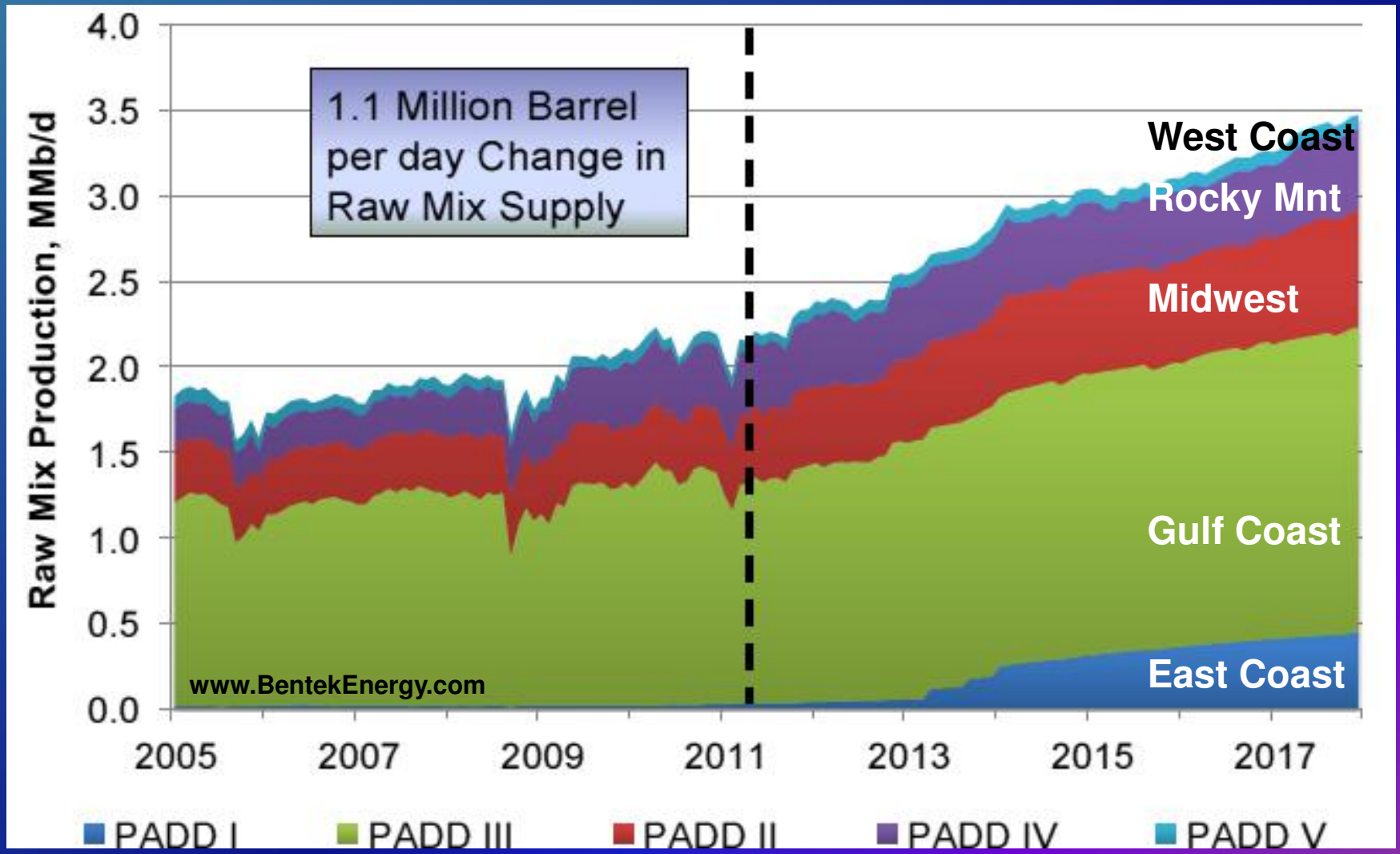
2011/2013 Thinking (Wet Gas)

4,800	trillion	likely cf in place
25%		likely recovery
1,200	trillion	recoverable cubic feet
17	million	acres
70,588,235		cubic feet per acre
70,588		MCF/ Acre
$6.20		$/ MCF (Wellhead Price) (20% NGL & Cond 80% Dry)
$ 437,500		$ Hydro Carbon per acre
$35,000,000		per property (80 acre)
$ 6,125,000	17.50%	Royalty
$ 5,500,000		Drill /Complete Cost
$ 7,625,000		Operating Cost
$17,750,000		Net

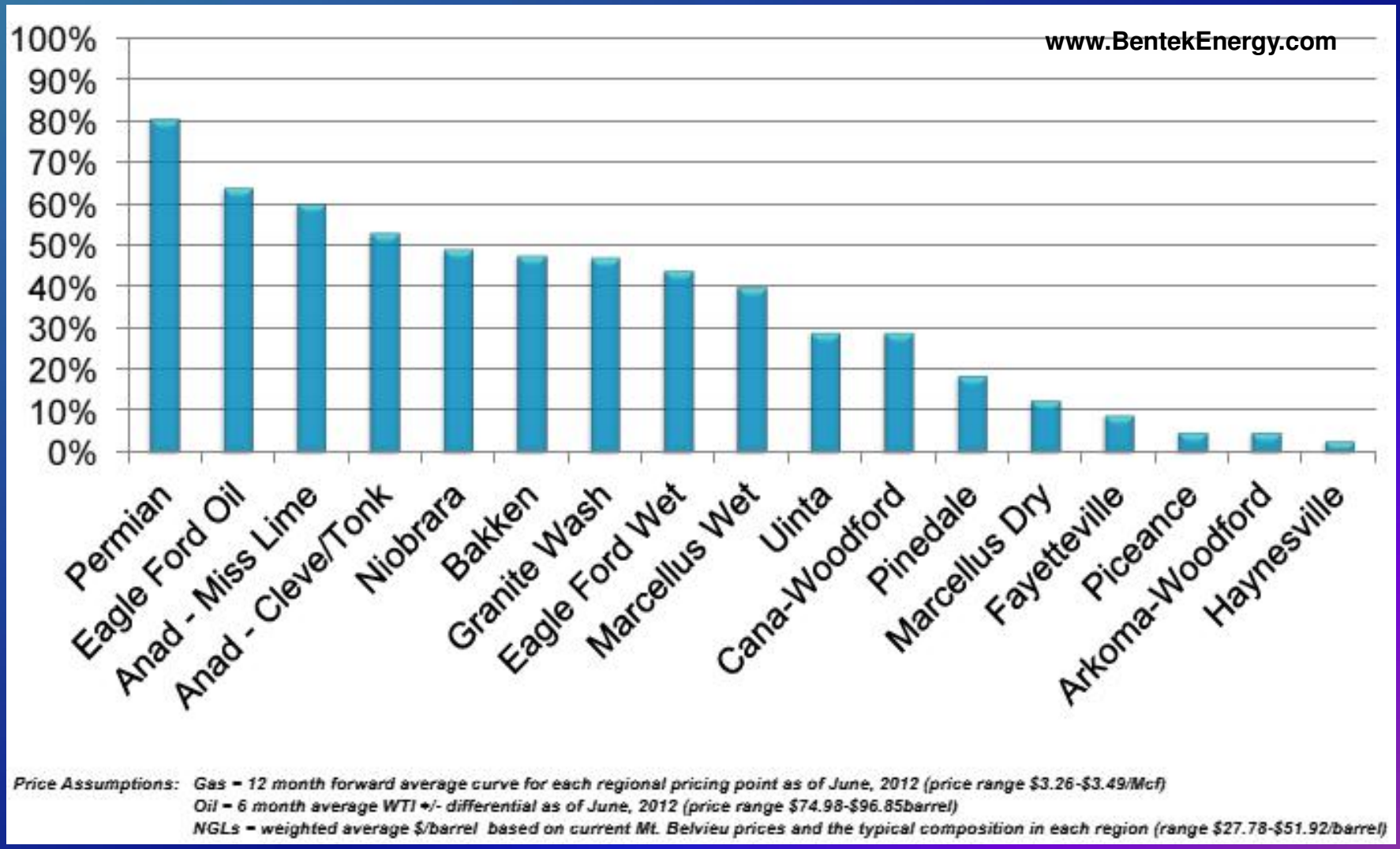
U.S. Shale Infrastructure Boom Resulting in More than 13 Bcf/d of New Processing Infrastructure By 2015



U.S. NGL Production to Increase 49% over the next Five Years

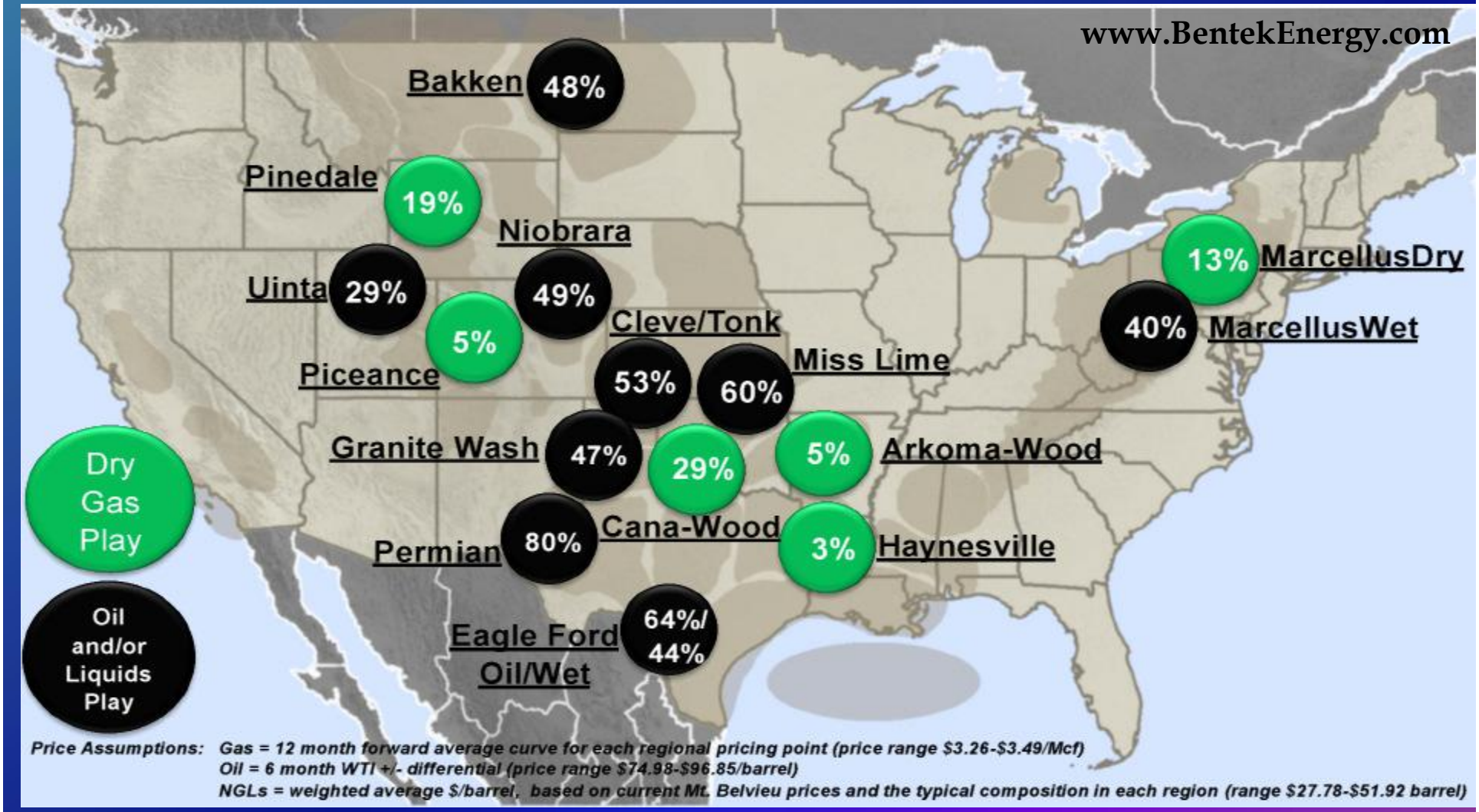


Oil Plays Top of IRR



Price Assumptions: *Gas = 12 month forward average curve for each regional pricing point as of June, 2012 (price range $3.26-$3.49/Mcf)*
Oil = 6 month average WTI +/- differential as of June, 2012 (price range $74.98-$96.85barrel)
NGLs = weighted average $/barrel based on current Mt. Belvieu prices and the typical composition in each region (range $27.78-$51.92/barrel)

Rates of Return Falling, Even in Wet Plays

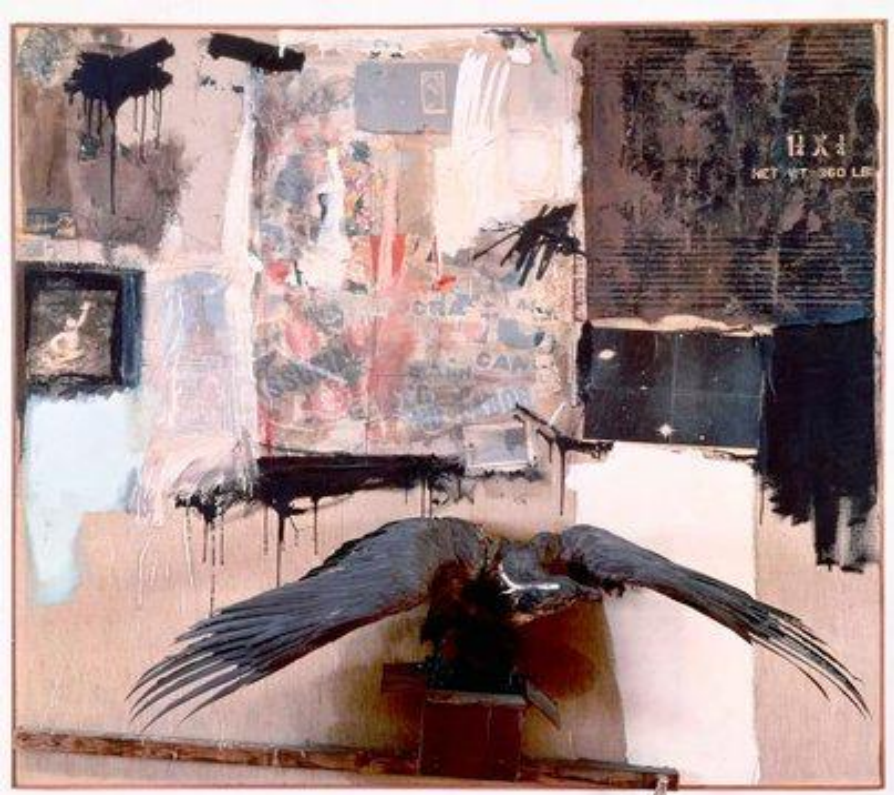


6
Valuation Standards

Why Appraise

- Merger and Acquisition
- Ad-Valorem Taxation
- Estate Planning
- Financing

Valuation is Critical



Art "Canyon" Robert Rauschenberg

Heirs of NYC art dealer Ileana Sonnabend
Internal Revenue Service

IRS: $65,000,000 value
$26,500,000 Inheritance Tax

Owner's Appraisal: $0
$0 Inheritance Tax

Art's Sale Value? Zero. The Tax Bill? $29 Million.
New York Times July 22, 2012

Inheritance Valuation - PA

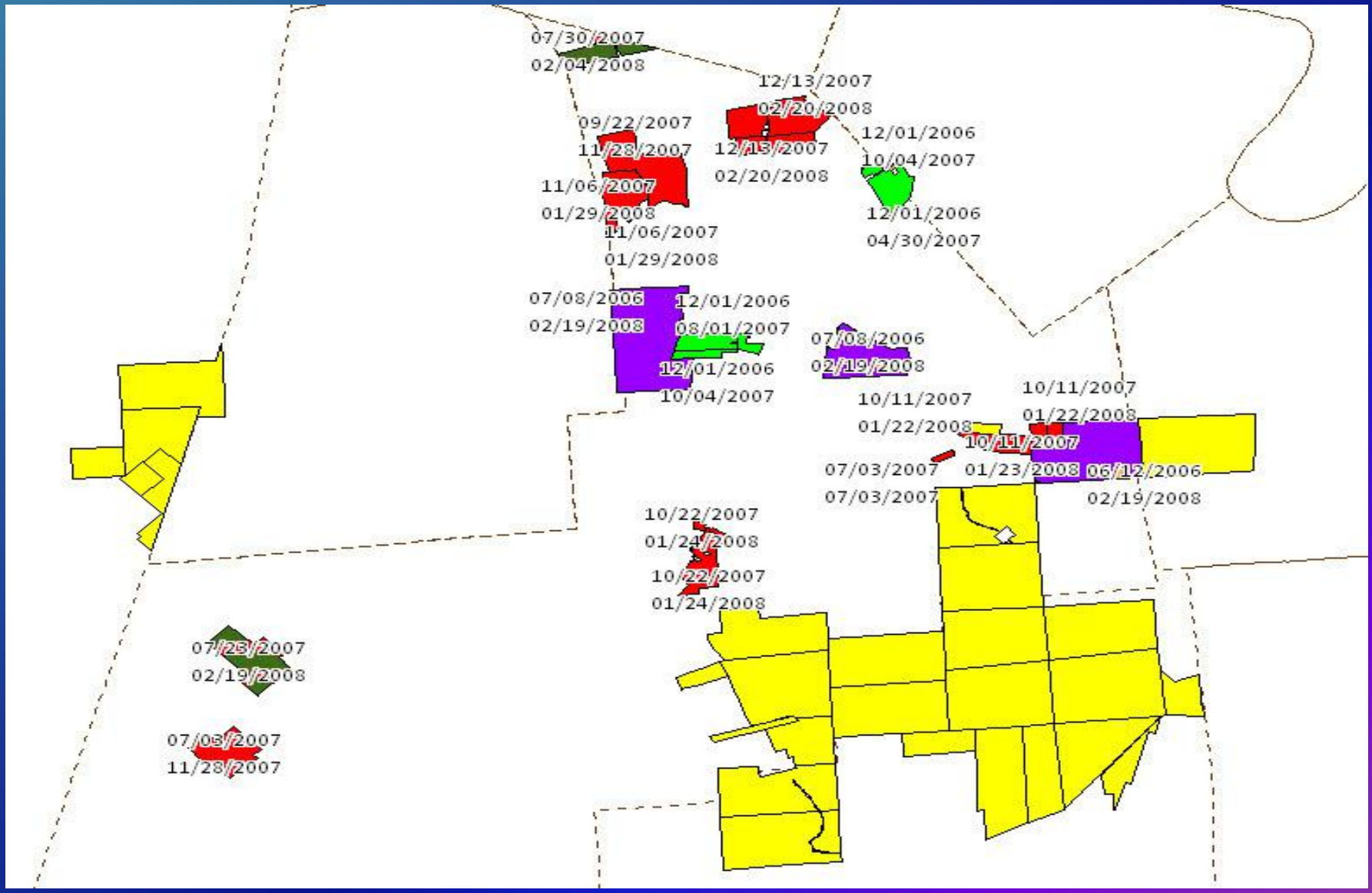
- Property with Production
  - 2 X last years production or credible appraisal
    - 2X Could be a large number
  - Property not defined
    - % developed?
    - Pooled/Unitized
- No Production
  - No Value
  - Certainly in contrast with market and IRS

Case in Point

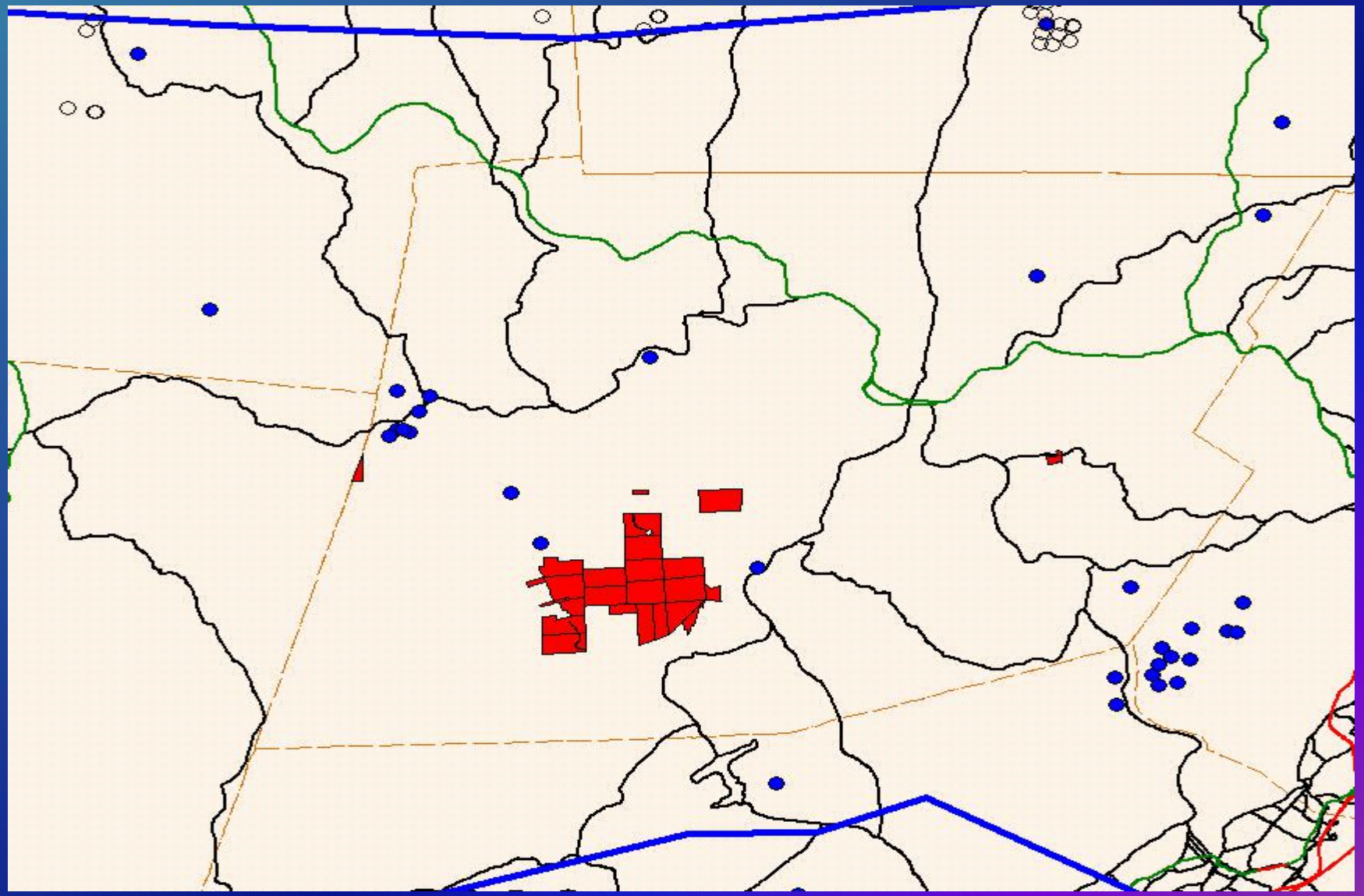
Two Views: IRS/Taxpayer

- 7,500 acres
- Located:
  - South-central Part of County
  - Within 20 miles of southern Marcellus crop and (Anthracite dead-zone)
- Regional Production
  - No drilling or production within 10 miles prior to 2008
  - Successful drilling to the North
- Closet Pipeline 30 miles north and 15 miles south
- Lease activity:
  - High in county to the north
  - Non-existent in County to the south
- Informal negotiation was going on at a reported $1,500 per acre bonus
- Lease survey:
  - Sources:
    - 50+- leases in County, court house and door to door and phone calls
    - Semi monthly lease reporter
    - Other Clients
  - Results
    - $50 to $3,000 per acre bonus
    - 12.5% to 20% royalty

Leases in place, 2008



Wells By March 2008



Case in Point
Two Views: IRS/Taxpayer

RTC VIEW

- Unlikely to be leased at high value
- Unlikely to be developed soon, let alone fully (100 wells) developed
- Valued at $500/acre
  - likely lease bonus
  - nominal present value of speculative future production
- Value at:
  - $610/acre
  - $4,575,000

IRS

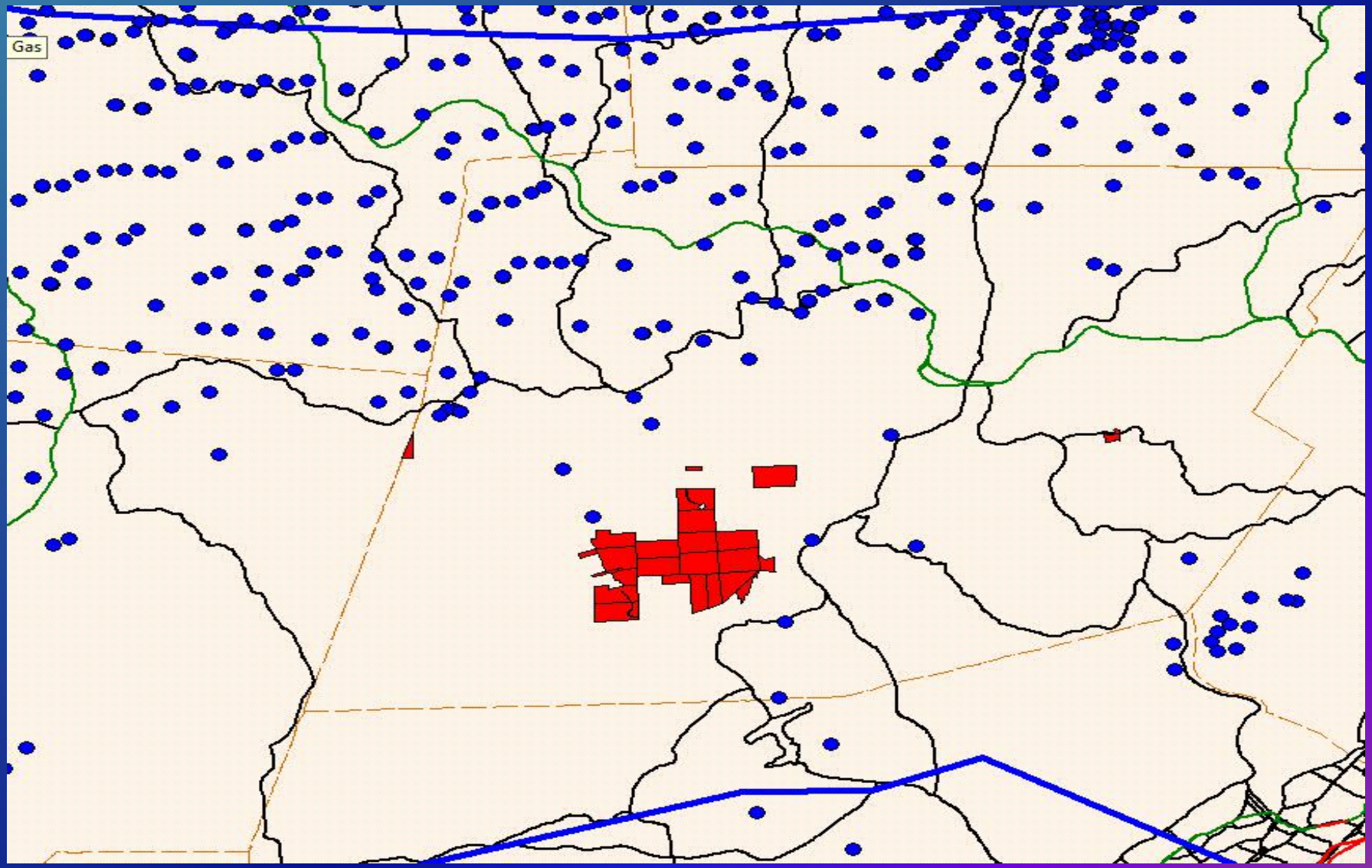
- Used High Values
  - Bonus $2,000/acre
  - Royalty Value at 20%
  - County-wide pattern of lease increases
- Assumed large Property could demand favorable terms
- Assumed Full development
  - Entire property drilled
  - full production
  - Within 5 +- years
- Valued at:
  - $2,800 per acre
  - $21,000,000

Case in Point
Two Views: IRS/Taxpayer

SUBSEQUENT FACTS 2012

- South of Property:
  - Three nearby wells drilled on leases to the south have been abandoned
  - No new leases signed south of property since 2010
- North of Property
  - Wells 10 to 20 miles north of property have been successfully drilled
  - lease bonus value continued to climb through 2010
- No Drilling on or near property

Wells 2012



Reserve Classification

Reserve Classifications

- IRS
  - Proven Reserves
  - Probable Reserves
  - Possible Reserves
  - Property
    - Recoverable Reserves
- Geophysical
  - Proven Reserves
  - Probable Reserves
  - Possible Reserves
  - Speculative Reserves

Reserve Classification (SEC) Proven Reserves

- "Reasonably Certain" to be producible:
  - current technology
  - current prices
  - current commercial terms
  - current government consent
    - P90, having a 90% certainty of being produced.
    - Proven reserves are usually applied to:
      - producing wells
      - single offset wells from the actively producing well.

Reserve Classification (SEC) Probable Reserves

- "Reasonably Probable" of being produced:
  - current or likely technology
  - current prices
  - current commercial terms
  - government consent:
    - P50., having a 50% certainty of being produced.
    - Probable reserves are generally applied to single well offsets from Proven Reserves as long as the offset follow known production trends.

Reserve Classification (SEC)

- Possible Reserves :
  - "having a chance of being developed"
  - under favorable circumstances (3P):
  - P10., having a 10% certainty of being produced.
  - Possible reserves are generally applied to single well offsets from Probable Reserves as long as the offset follow known production trends.
- Speculative (Prospective) Reserves
  - less than a 10% probability that reserves will be discovered and developed.

IRS: Reserves to be Valued

- "Reserves" as of any date: the number of units expected to be recovered
- Estimates of reserves of oil: "according to the method current in the industry and in light of the most accurate and reliable information obtainable" [Treas. Reg. 1.611–2(c)(1)] including:
  - "developed" or "assured"
  - "probable and prospective"
- Industry definitions of proved reserves (proved developed and proved undeveloped):
  - reasonably known, or
  - on good evidence believed to exist
    - when the estimates or determination is made
    - according to the method current in the industry
    - In the light of the most accurate and reliable information obtainable.
- The examiner should closely review the taxpayer's reserve estimation
  - in the light of operations or development work prior to the close of the taxable year
  - including additional reserves required by applicable regulation
    - consistent with industry standards
    - supported by taxpayer's actual practices

IRS Statements

Treas. Reg. 1.611–2(d): Prioritizes methods used to determine the fair market value of mineral properties

Treas. Reg. 1.611–2(d)(2) provides that the **present value method will not be used** in either situation:

1) Value can be determined based on cost or comparative values and replacement value of equipment

2) Value can reasonably be determined by any other method.

Green v. United States , 460 F.2d 412 (5th Cir. 1972); 29 AFTR 2d 72–1138; 72–1 USTC 84,494.

However:

However:

(Continued) Treas. Reg. 1.611-2(e)(4)

- Value of mineral deposit is measured by:
  - Expected gross income less the estimated operating cost
  - Reduced to present value at the rate of interest commensurate with the risk for the operating life
  - Reduced by the value of the improvements and of capital additions, if any, necessary to realize the profits.

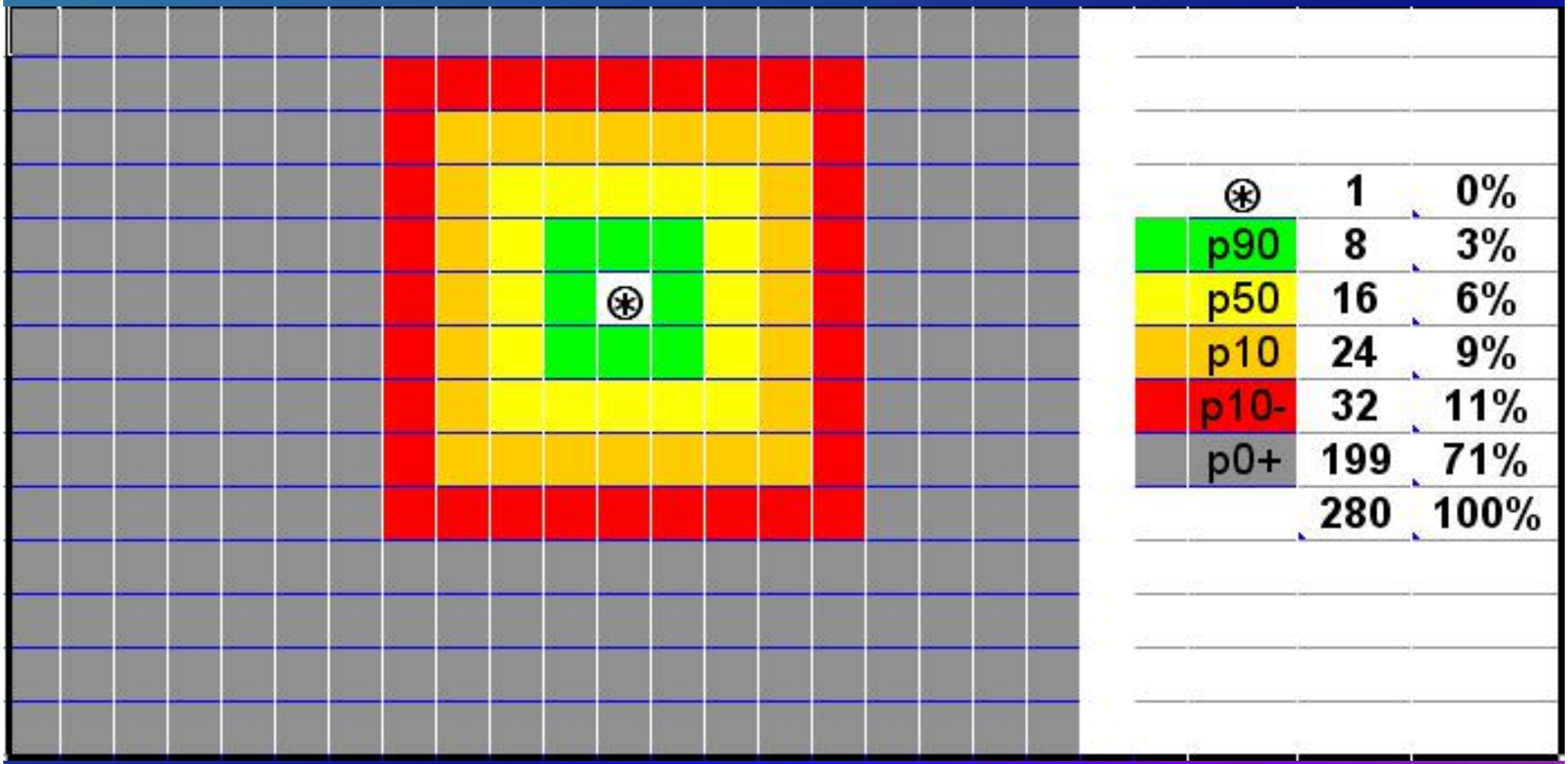
What to Consider In Mineral Appraisal (IRS)

- Proper royalty rate can be derived from comparable mineral lease transactions
- Mineral unit price to which the royalty rate is applied may be derived from appropriate market transactions
- Annual amount of production and the number of years of production
- Other factors

Society of Petroleum Engineers

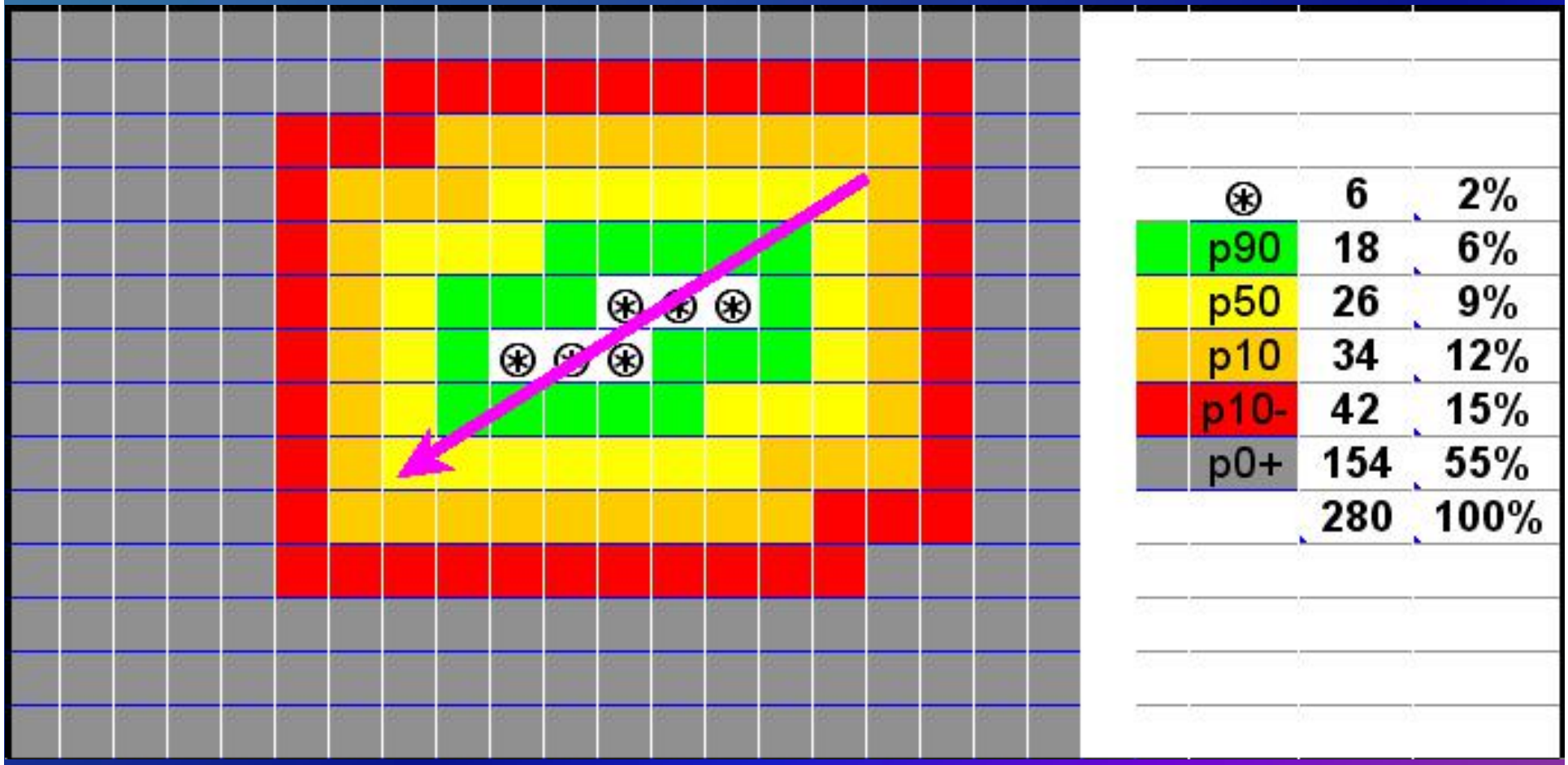
- **Proved reserves:** estimated with reasonable certainty to be commercially recoverable from a given date forward:
  - Known reservoirs defined by geologic and engineering data
  - Assuming current:
    - economic conditions
    - operating methods
    - government regulations.
  - Proved reserves can be categorized as:
    - **Developed (INCLUDE IN IRS VALUATION) or**
    - **Undeveloped (INCLUDE IN IRS VALUATION)**
- **Unproved reserves**: based on geologic and/or engineering data but:
  - Technical, contractual, economic, or regulatory uncertainties preclude such reserves being classified as proved.
  - Unproved reserves classified as:
    - **Probable reserves:** more likely than not recoverable **(INCLUDE IN IRS VALUATION)**
    - **Possible reserves:** less likely to be recoverable than probable reserves

Well Spacing



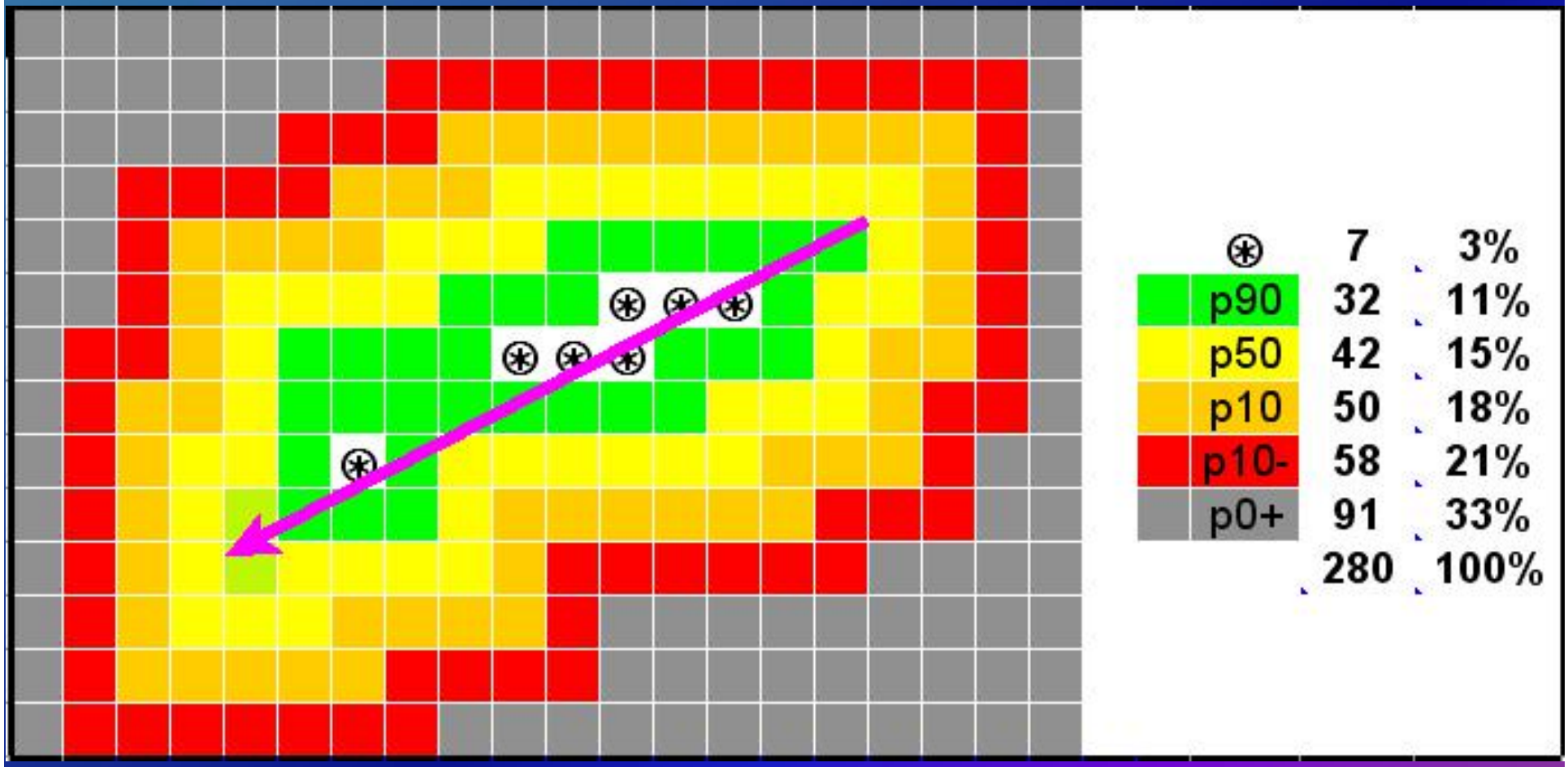
	⊛	1	0%
	p90	8	3%
	p50	16	6%
	p10	24	9%
	p10-	32	11%
	p0+	199	71%
		280	100%

Well Spacing / Offset Interpretation:



	⊛	6	2%
	p90	18	6%
	p50	26	9%
	p10	34	12%
	p10-	42	15%
	p0+	154	55%
		280	100%

Well Spacing / Offset Interpolation



Recent Law Updates

PA: SB 13
OH: S.B. 315

Well Permitting (PA S.B. 13)

- 15 day comment period
- 45 days permit or denial
- Transfer of permits must be approved by DEP
- Must have permission to withdraw water from DEP based on approved water management plan
- Permit must consider:
  - Public lands
  - Natural features
  - Habitats
  - Drinking water

Well Placement and Control (PA S.B. 13)

- If a driller believes a local zoning law is too restrictive, the driller can appeal it to the Public Utility Commission.
- Location Restrictions:
  - Property owners within 3,000 of a well permit must be notified of the new permit
  - New wells must be drilled:
    - 300 feet away from streams, springs, bodies of water or wetlands greater than one acre
    - 500 feet away from existing buildings or water wells.
    - 1000 feet from public water supply
    - New wells must be drilled at least 300 feet away from streams, springs, bodies of water or wetlands greater than one acre (used to be 100 feet).
- Drillers must start using FracFocus.org to publicly disclose all chemicals used in the frac'ing of individual wells.

Permitting/Location & Municipal Control PA SB 13

- Municipalities can not regulate gas drilling in their borders, but can enact zoning restrictions to address industrial effects from drilling :
  - Truck traffic
  - Noise
  - Light
  - Other
- Municipalities can comment on Permit and well location but **cannot** appeal decisions of DEP

Drilling PA SB 13

- Must be cased and cemented through
  - fresh water
  - Coal
- If water affected
  - Land owner notifies DEP
  - DEP investigates
  - Operator responsible for to replacement
    - (must refute unless in an exempted – more than 1000 feet away, previously contaminated, 6 months after drilling)
- Location of contaminated site s published on WEB

Hydrofrac'ing (SB 13)

- Chemicals are to be listed on Department Registry
- Trade Secrets can be noted
- Trade secrets can include specific chemical, type, blend, and or quantity
- If Secret the registry will show the family or range of chemicals
- If secret the info must still be provided to a health professional proving health services

Bonding (PA SB 13)

Wells		< 6000 horizontal feet		
	Min	$/Well	Max	$/Well at Max
< 50	$0	$4,000	$35,000	$700
51 - 150	$35,000	$4,000	$60,000	$400
151 - 250	$60,000	$4,000	$100,000	$400
> 251	$100,000	$4,000	$250,000	

Wells		> 6000 horizontal feet		
	Min	$/Well	Max	$/Well at Max
< 25	$10,000	$10,000	$140,000	$5,600
25 - 50	$140,000	$10,000	$290,000	$5,800
51 - 150	$290,000	$10,000	$430,000	$2,900
>150	$430,000	$10,000	$600,000	

Ohio Law S.B 315 Updates

- Revises the sections of
  - Code 1509
  - Code 4906.
  - includes new restrictions and controls on:
  - oil and gas producers
  - well construction
  - hydraulic fracturing chemical disclosure
  - pre-drilling water testing
  - water usage reporting
  - increased insurance requirements for horizontal wells,
  - does **not** contain an increase in the severance tax

Horizontal Well S.B. 315

- As well producing from the Utica, Point Pleasant or Marcellus formations.
- Subject to heightened regulatory requirements such as:
  - higher insurance requirements ($5,000,000 per well)
  - include an environmental endorsement
  - required testing of water wells (out to 1,500 feet from the wellhead
  - well pad pre-construction site visits with the ODNR inspectors
  - road use and maintenance agreement or an affidavit that the operator attempted, in good faith, to enter into such an agreement

Permitting S. B. 315

- Agreement between the applicant and the public official of each applicable local government who has legal authority to enter into an agreement concerning maintenance and safe use of the roads, streets and highways
- Identification of each proposed source of groundwater and surface water that will be used in the production operations of the well and of the applicable watershed and the estimated rate and volume of the water withdrawal for the production operations;
- The estimated volume of recycled water to be used if recycled water will be used in the production operations;
- Water Sampling
  - Vertical well: water wells within 300 feet of the proposed well prior to commencement of drilling
  - Horizontal Well water wells within 1,500 feet of the proposed well prior to commencement of drilling/
- Notify an inspector from the ODNR prior to the commencement of well pad construction. The ODNR is required to conduct a site review prior to commencement of well pad construction.

New York

- In March 2013, New York State Assembly passed a bill to further delay permits for hydraulic fracturing until at least 2015.
  - Original moratorium went into effect in 2008.

Typical Frac Components

Typical Frac components per well

Compound	Purpose Common application	Common application	%	Gallons	Pounds
Acids	Helps dissolve minerals and initiate "ssure in rock (pre-fracture)	Swimming pool cleaner	0.123%	4,900	41,100
Glutaraldehyde	Eliminates bacteria in the water	Disinfectant; Sterilizer for medical and dental equipment	0.001%	40	300
Sodium Chloride	Allows a delayed break down of the gel polymer chains	Table Salt	0.010%	400	3,300
n-Dimethyl formamide	Prevents the corrosion of the pipe	Used in pharmaceuticals, acrylic fibers, and plastics	0.002%	100	700
Borate salts	Maintains fluid viscosity as temperature increases	Used in laundry detergents, hand soaps and cosmetics	0.007%	300	2,300
Polyacrylamide	Minimize friction between fluid and pipe	Water treatment, soil conditioner	0.008%	300	2,700
Petroleum distillates	“Slicks” the water to minimize friction	Make-up remover, laxatives, candy	0.088%	3,500	29,400
Guar gum	Thickens the water to suspend the sand	Thickener used in cosmetics, baked goods, ice cream, toothpaste, sauces, and salad dressing	0.056%	2,200	18,700
Citric Acid	Prevents precipitation of metal oxides	Food additive; food and beverages; lemon juice	0.004%	200	1,300
Potassium chloride	Creates a brine carrier fluid	Low sodium table salt substitute	0.011%	400	3,700
Ammonium bisulfate	Removes oxygen from the water to protect the pipe from corrosion	Cosmetics, food and beverage, processing, water treatment	0.060%	2,400	20,000
Sodium or potassium carbonate	Maintains the e#ectiveness of other components, such as crosslinkers	Washing soda, detergents, soap, water softener, glass and ceramics	0.011%	400	3,700
Proppant	Allows the fissures to remain open so the gas can escape	Drinking water filtration, play sand	0.450%		150,300
Ethylene glycol	Prevents scale deposits in the pipe	Automotive antifreeze, household cleansers, deicing, and caulk	0.043%	1,700	14,400
Isopropanol	Used to increase the viscosity of the fracture !uid	Glass cleaner, antiperspirant, and hair color	0.085%	3,400	28,400
Water			99.041%	4,000,000	33,400,000

7
Lease Issues & Factors

Lease Terms / Features

- Lease term
  - 3 year / 5 year / 7 year
  - Renew / renegotiate
- Limited to depth, horizon, or all gas
- Hold by
  - Drilling
  - Production
  - Rent
- Royalty %
  - Net
  - Gross
- Free Gas
- Bonus/Signing Payment
- Land Use Fee / Well Site Fee

Lease Issues

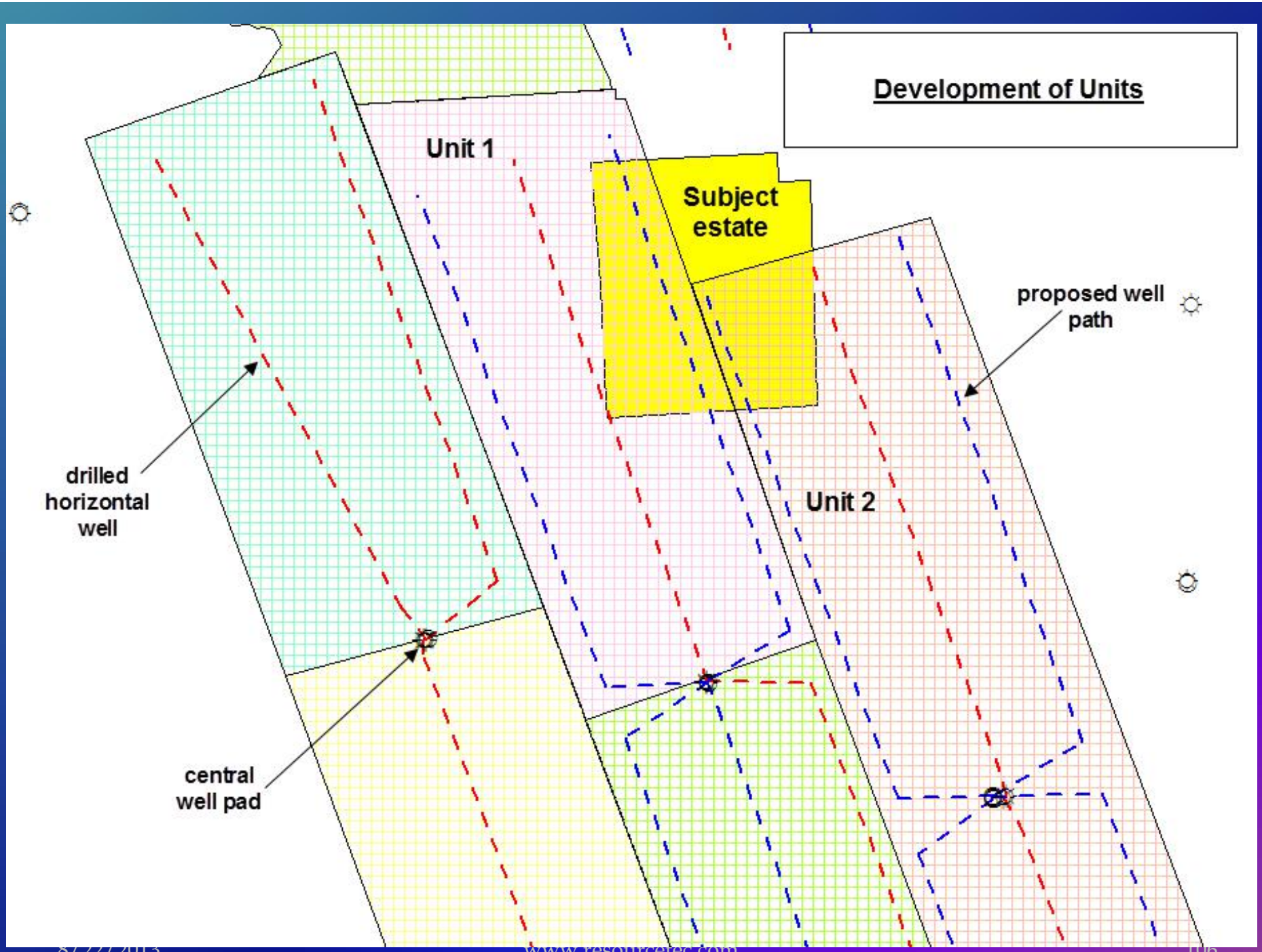
- Automatic renewal / Renegotiate
- Require land owner to defend the title
- Environmental protection clauses [+-]
- Hold beyond the primary term without defining activities
- Pooling / Unitizing
  - With or without notice
  - Pugh Clause
    - Proportion of all land in unit held (no Pugh)
    - Proportion of producing land held (Pugh)
- Net Royalty / Gross Royalty
- No production requirement
  - Shut in
  - Constrained
- Land held by old “shallow” lease

8
Value Factors

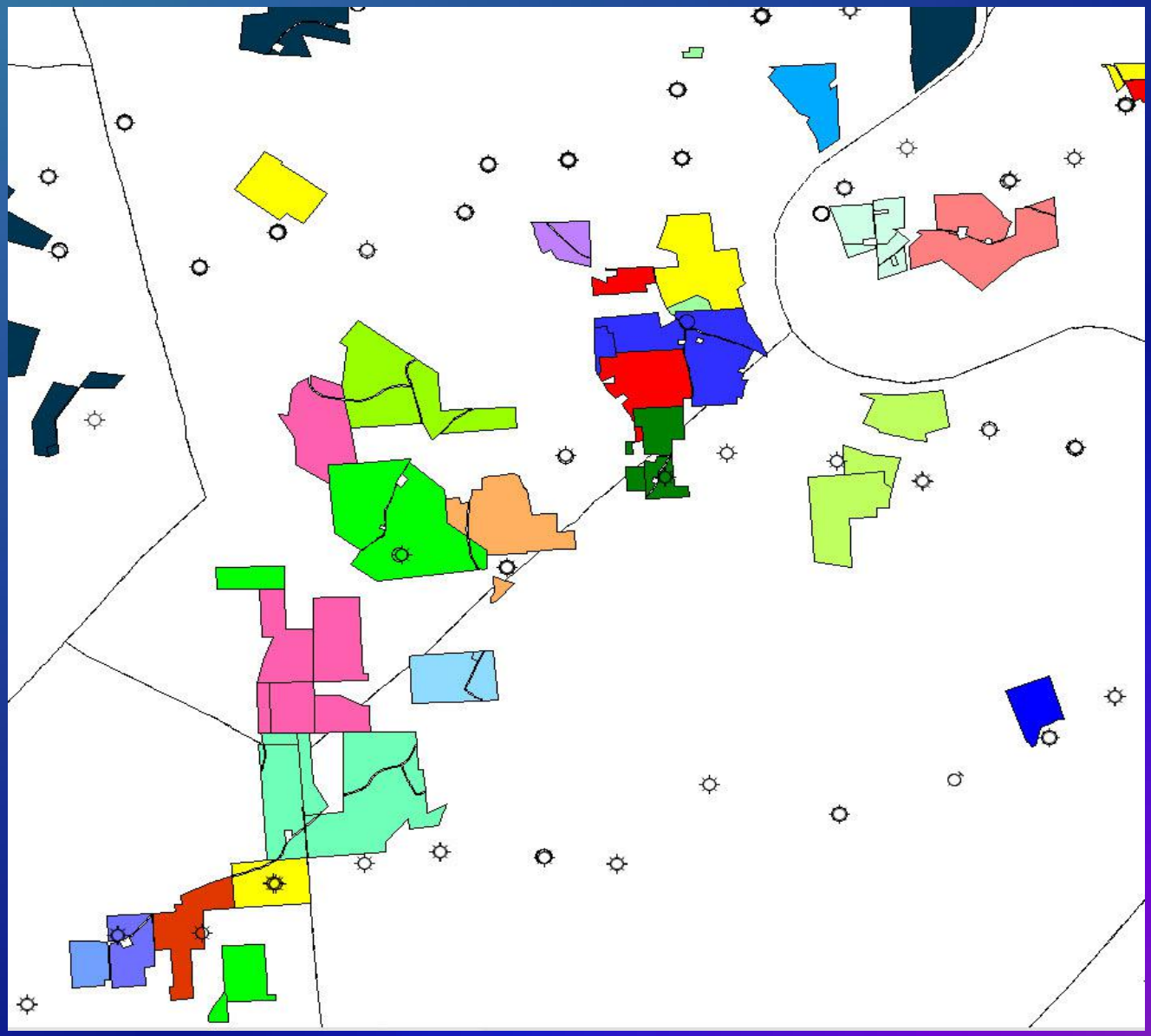
Factors

- **Probability Volumetric Adjustments**
  - Well Spacing
- **Likelihood of development**
  - Absorption
    - Acres of leased
    - Number of rigs
    - Time to drill
    - Market for gas
  - Location of Rigs
  - Lease Control/Ownership
  - Pooling
- **Quality of Reserve / Well**
  - Thickness
  - Nearby performance history
  - Wet vs. Dry Gas
  - Rate of
    - Production
    - Decline
- **Likelihood of Full Property Development**
  - Lease holding needs of developer/driller
  - Capital Investment
- **Cost to Produce**
  - Acquisition
  - Development
  - Operating/Process
  - Sales
- **Market**
  - Price
  - Consumption
- **Timing**
  - Accessibility to market
  - Pipelines
  - Capital Investments
    - Plants
    - Compressors

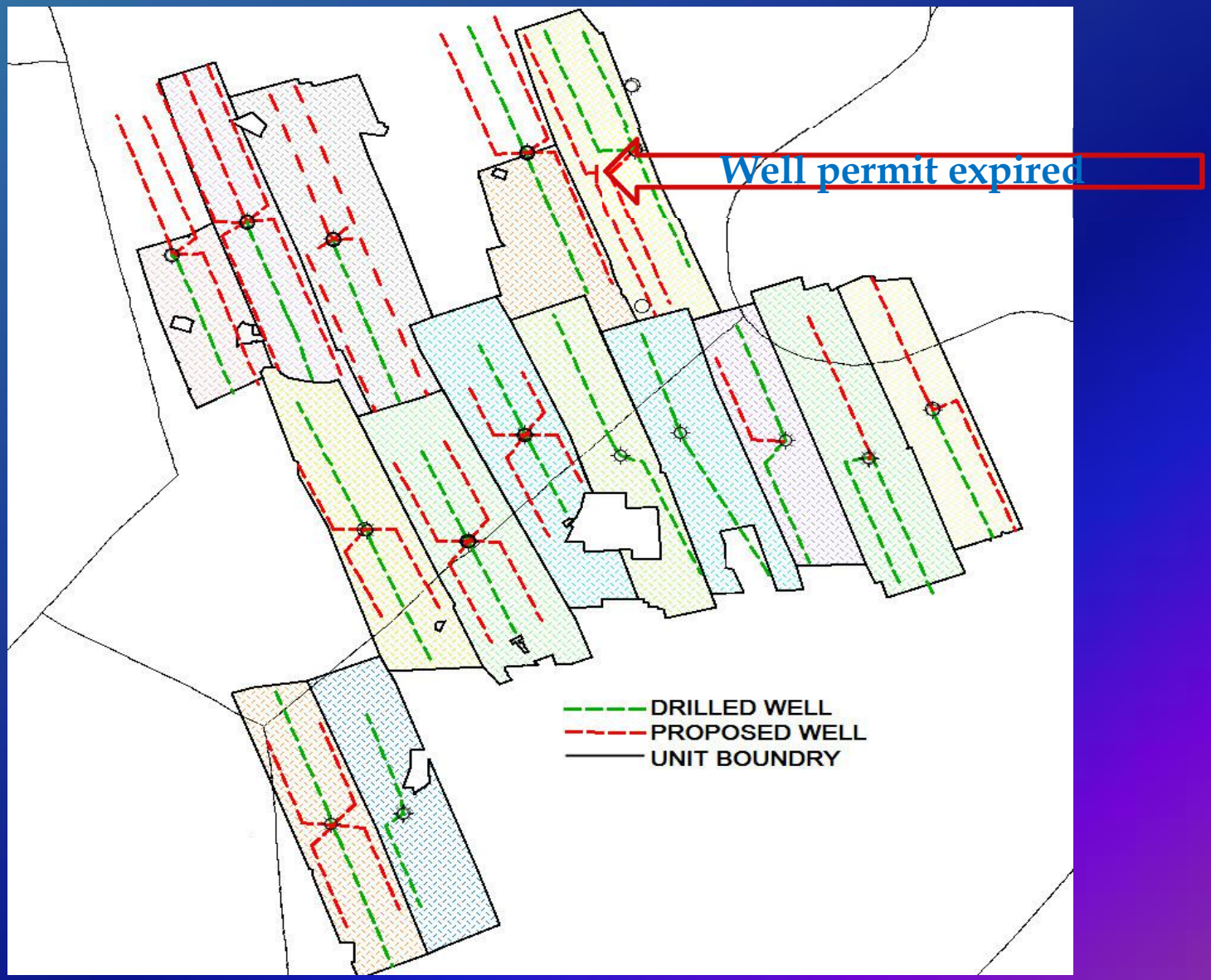
9
Rate of Development


Development of Units
Unit 1
Subject estate
Unit 2
proposed well path
drilled horizontal well
central well pad

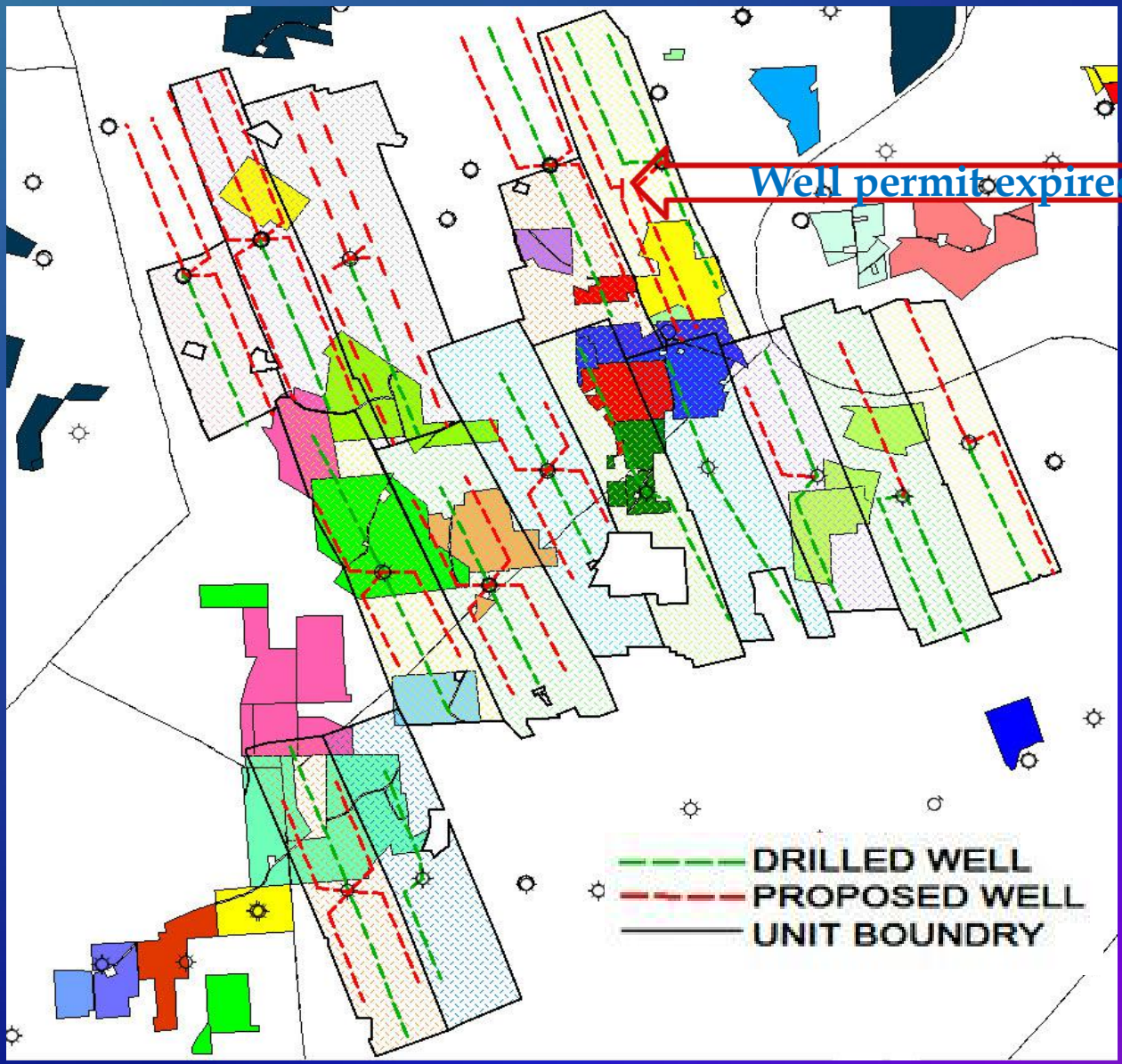
Bradford Properties with Well Locations



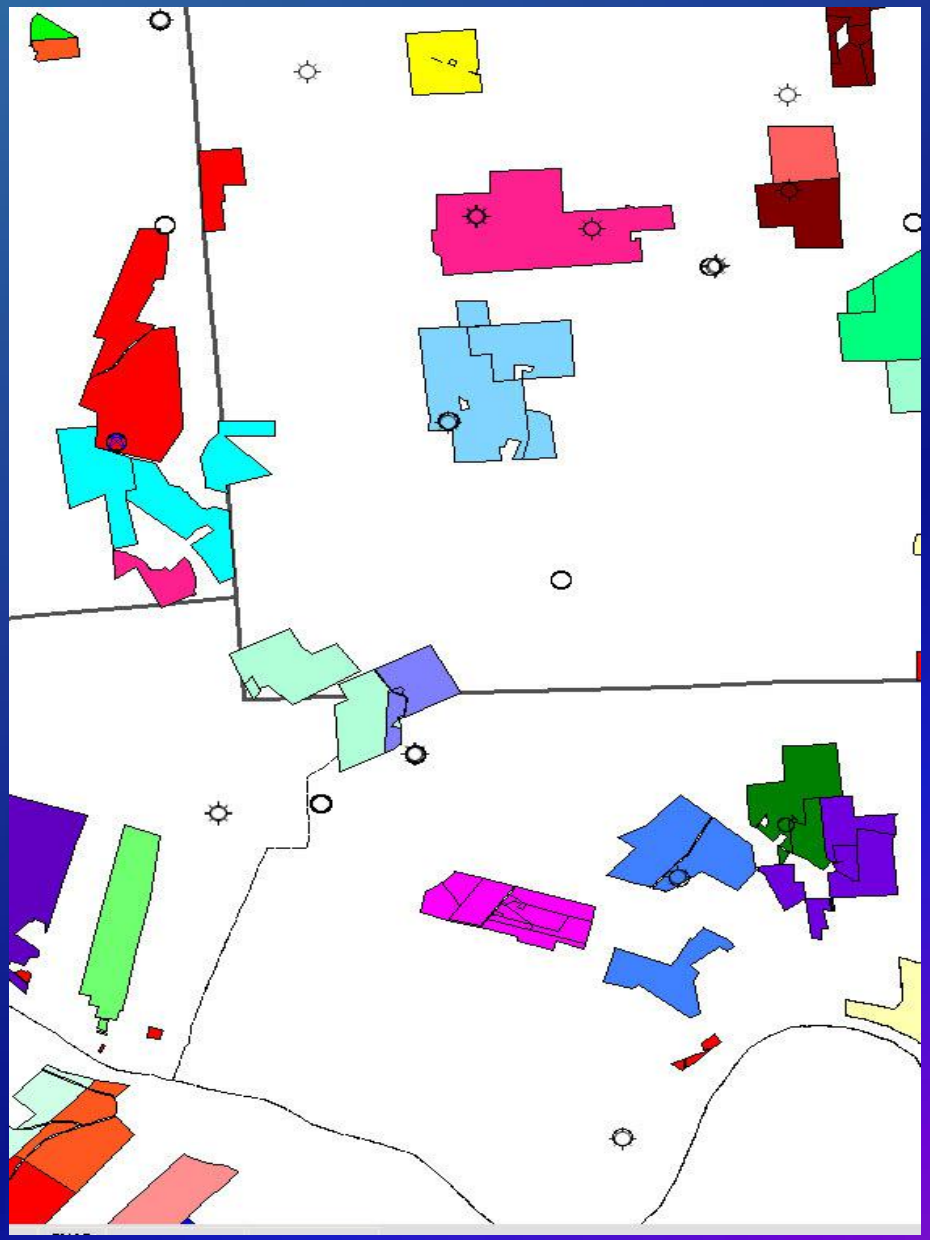
Bradford Horizontal Drilling Plans and Units



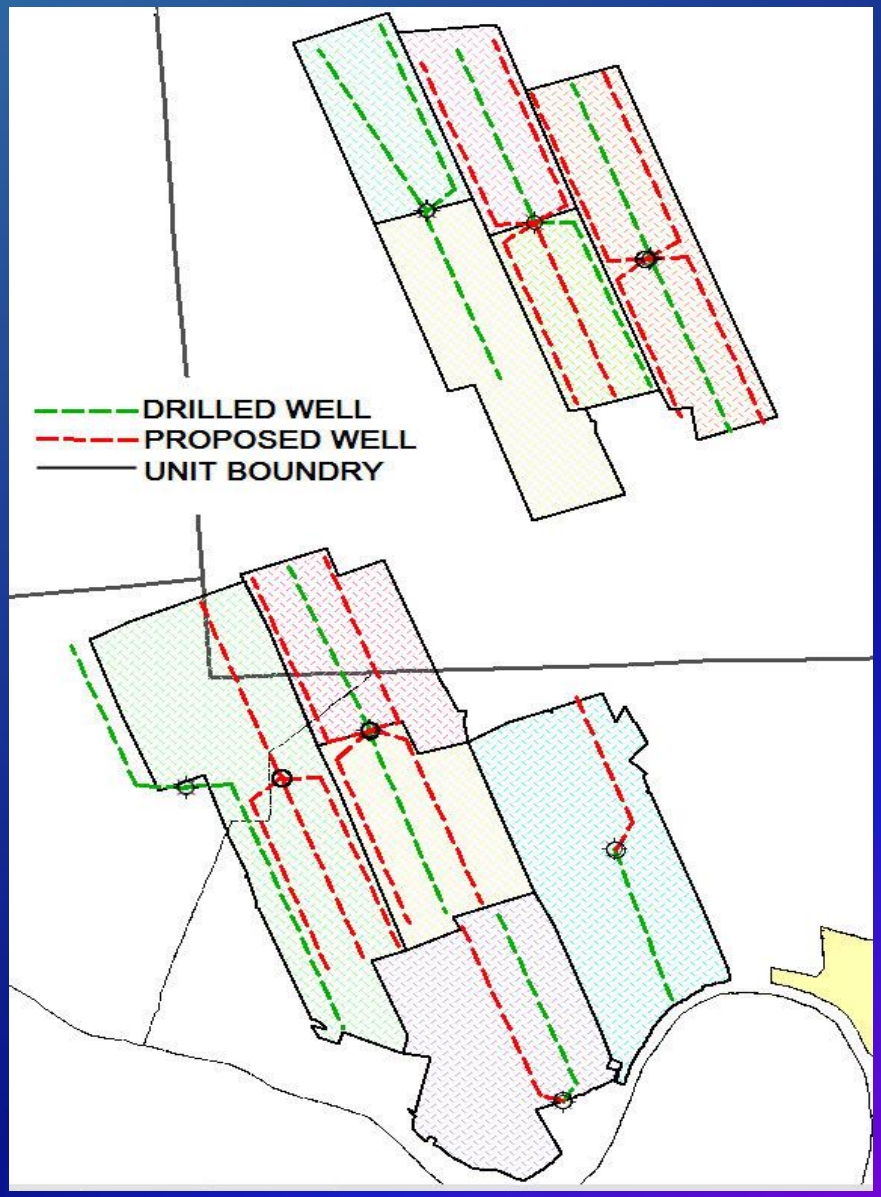
Bradford Units, Wells, and Properties



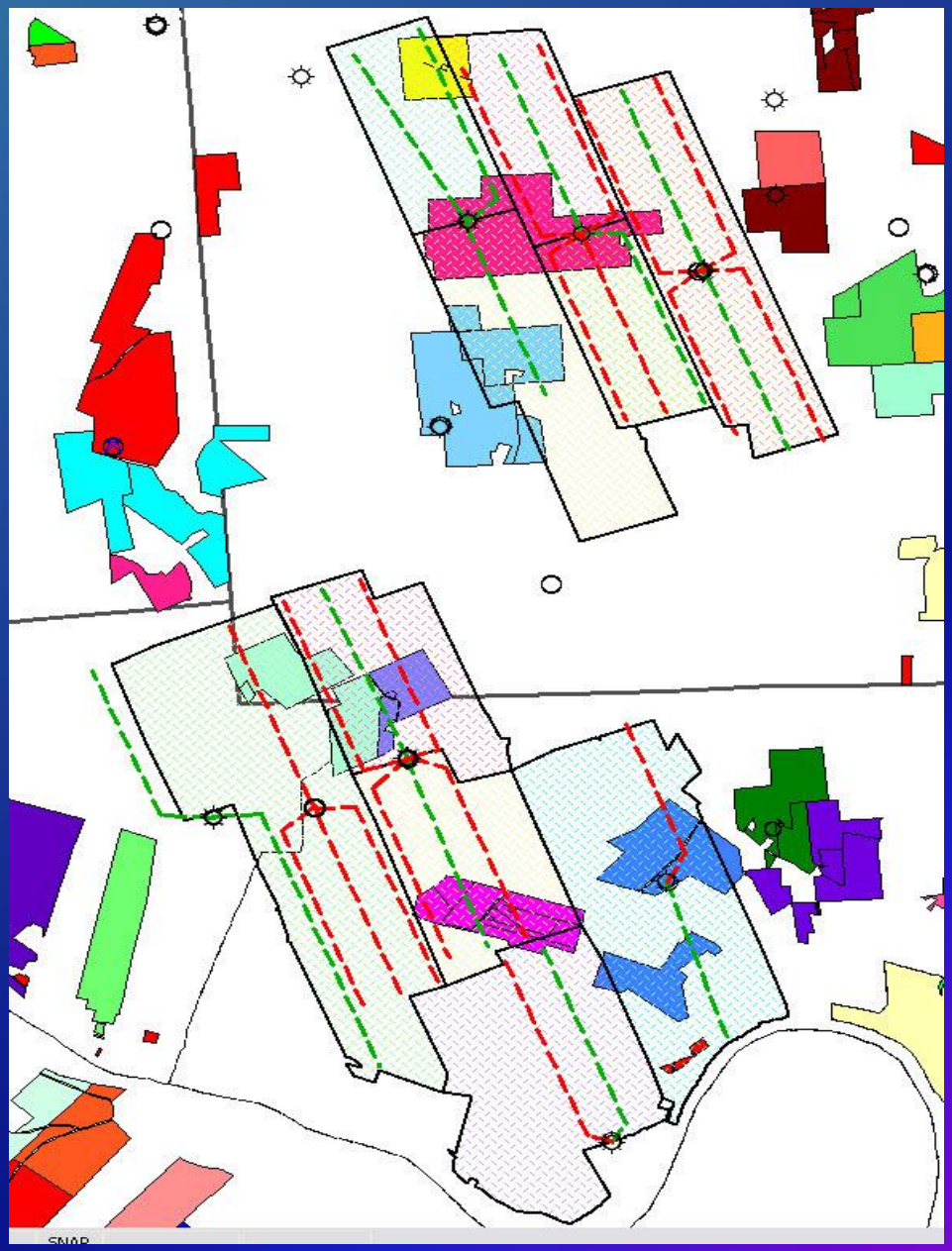
Susquehanna Wells and Properties

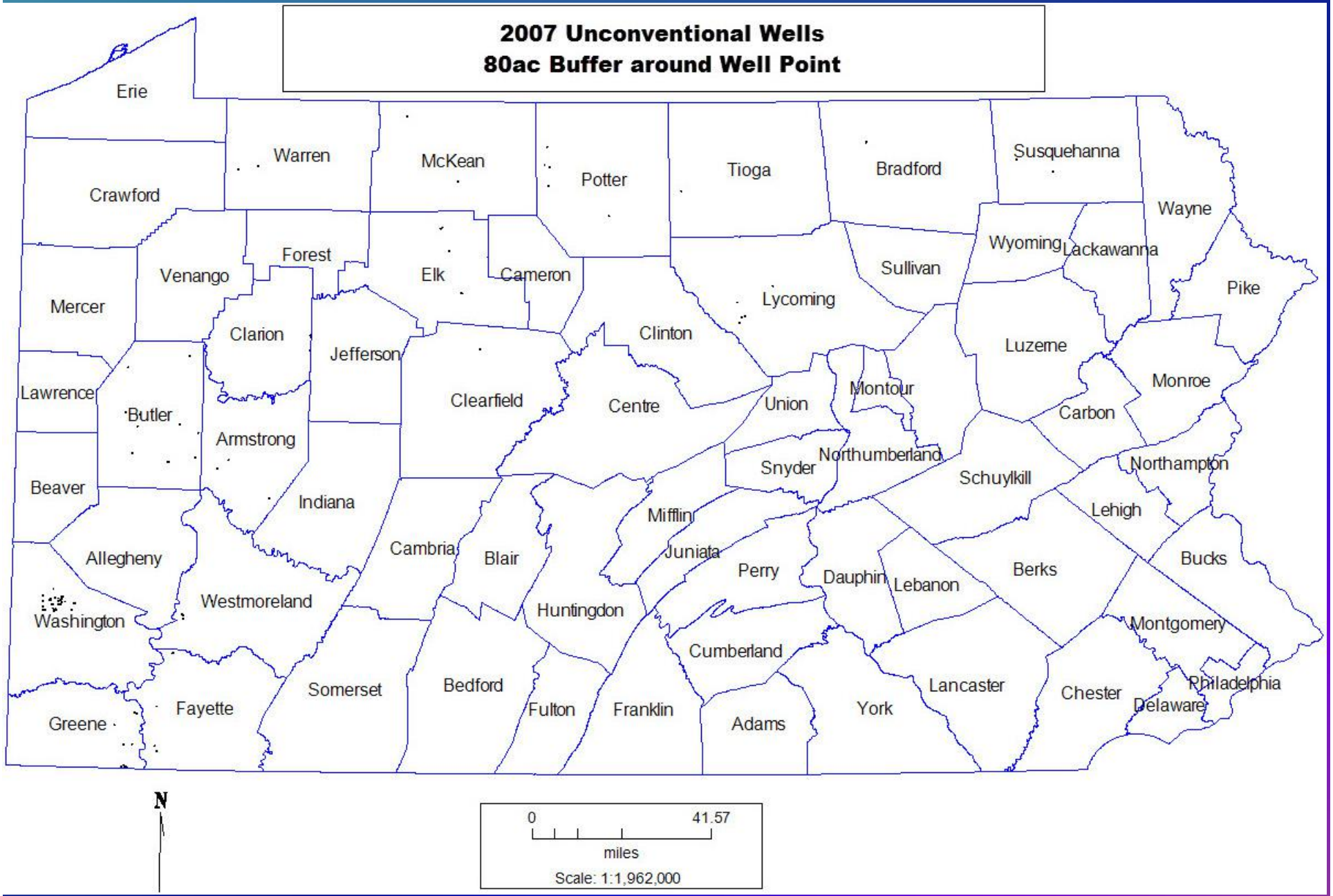


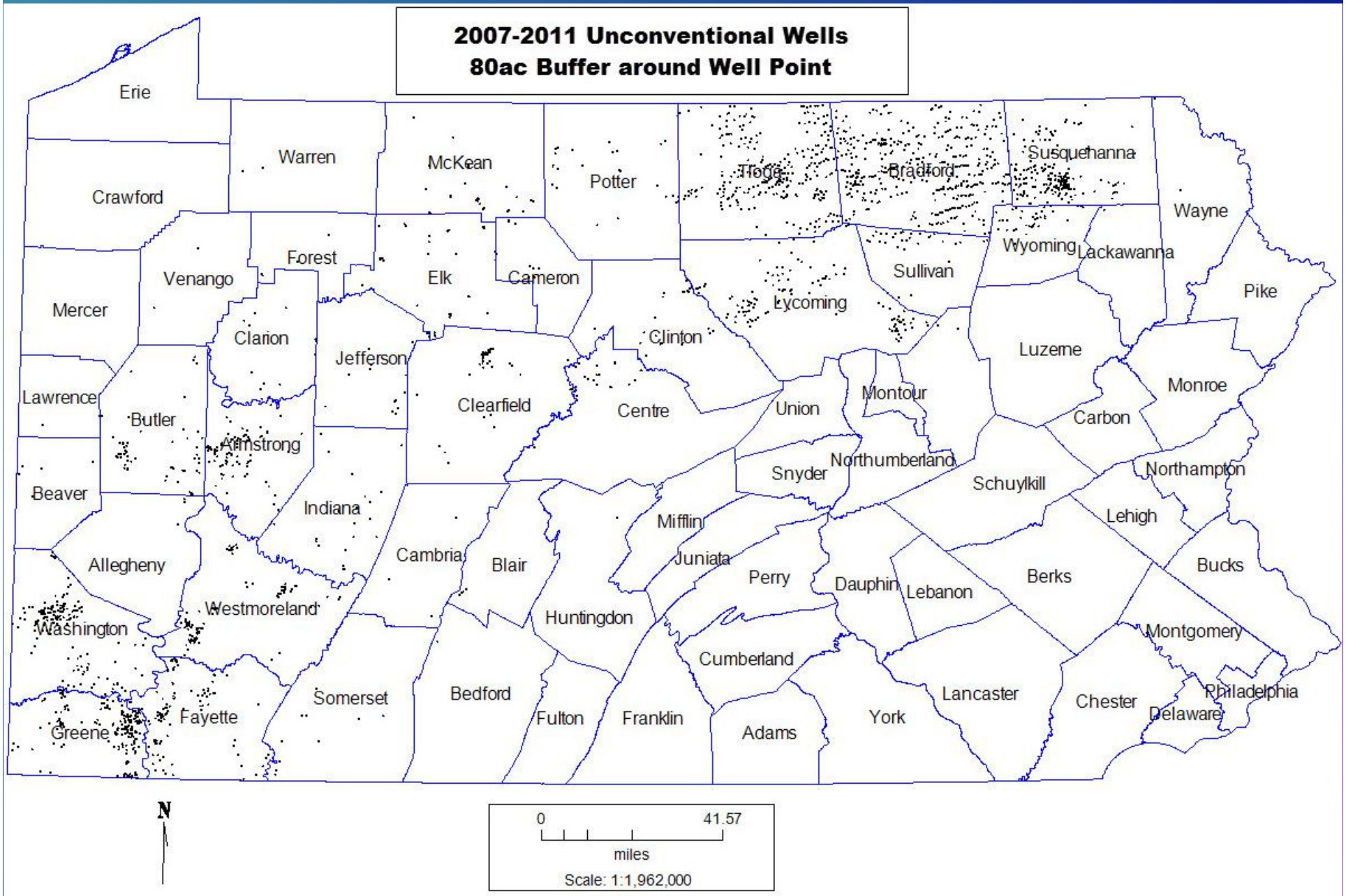
Susquehanna Wells, Horizontals and Units



Susquehanna, Wells, Units and Properties




2007 Unconventional Wells
80ac Buffer around Well Point
Erie
Warren
McKean
Potter
Tioga
Bradford
Susquehanna
Wayne
Crawford
Forest
Venango
Elk
Cameron
Wyoming
Lackawanna
Sullivan
Pike
Mercer
Clarion
Jefferson
Clinton
Lycoming
Luzerne
Lawrence
Butler
Armstrong
Clearfield
Centre
Union
Montour
Monroe
Carbon
Beaver
Indiana
Snyder
Northumberland
Schuylkill
Northampton
Allegheny
Cambria
Blair
Mifflin
Juniata
Perry
Dauphin
Lebanon
Berks
Lehigh
Bucks
Washington
Westmoreland
Huntingdon
Cumberland
Montgomery
Somerset
Bedford
Fulton
Franklin
Adams
York
Lancaster
Chester
Philadelphia
Delaware
Greene
Fayette
N
0
41.57
miles
Scale: 1:1,962,000


2007-2011 Unconventional Wells
80ac Buffer around Well Point
Erie
Warren
McKean
Potter
Tioga
Bradford
Susquehanna
Wayne
Crawford
Forest
Venango
Elk
Cameron
Wyoming
Lackawanna
Sullivan
Pike
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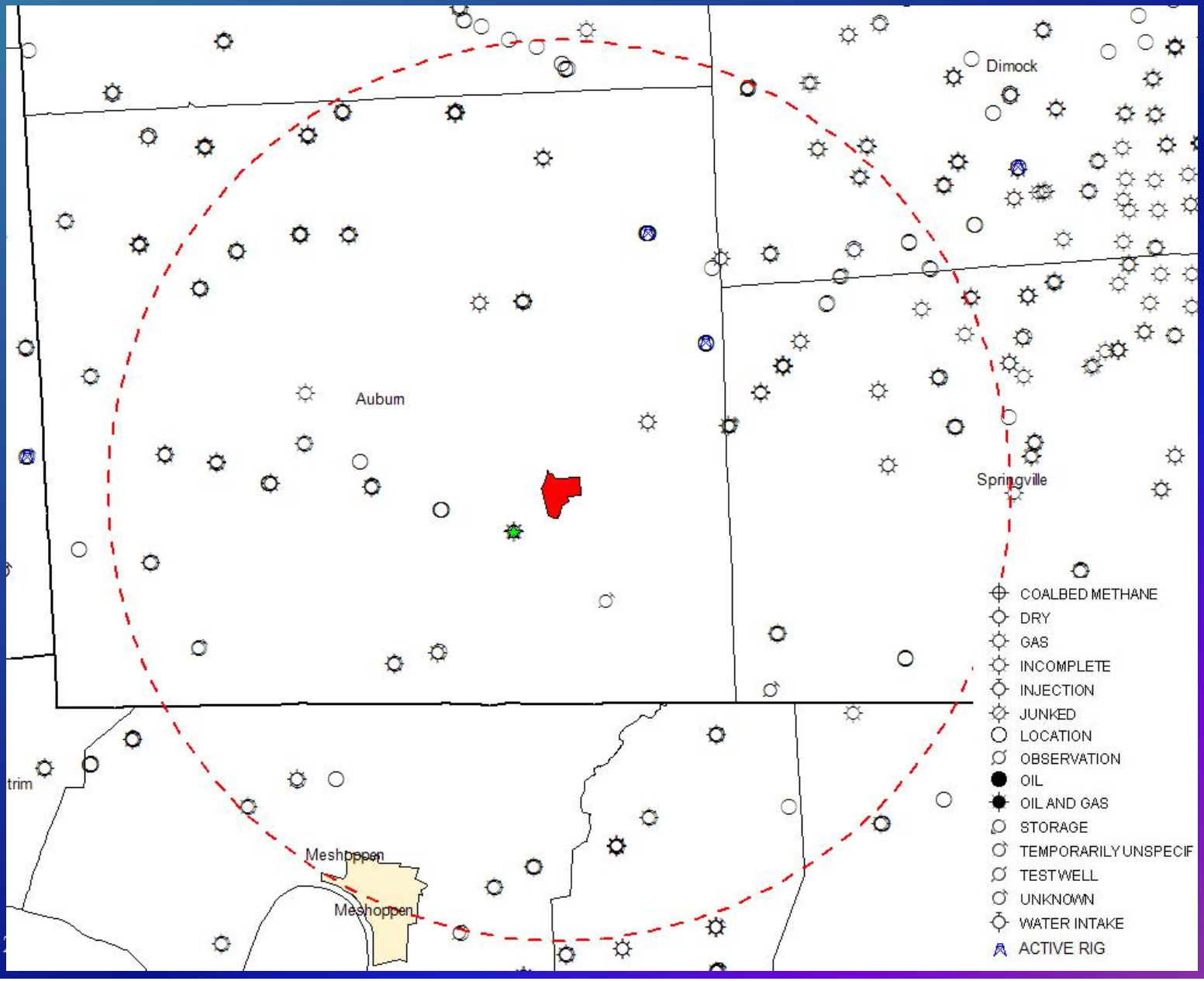
Chester
Philadelphia
Fayette
Fulton
Franklin
York
Delaware
Greene
Adams
N
0
41.57
miles
Scale: 1:1,962,000

Regional Analysis



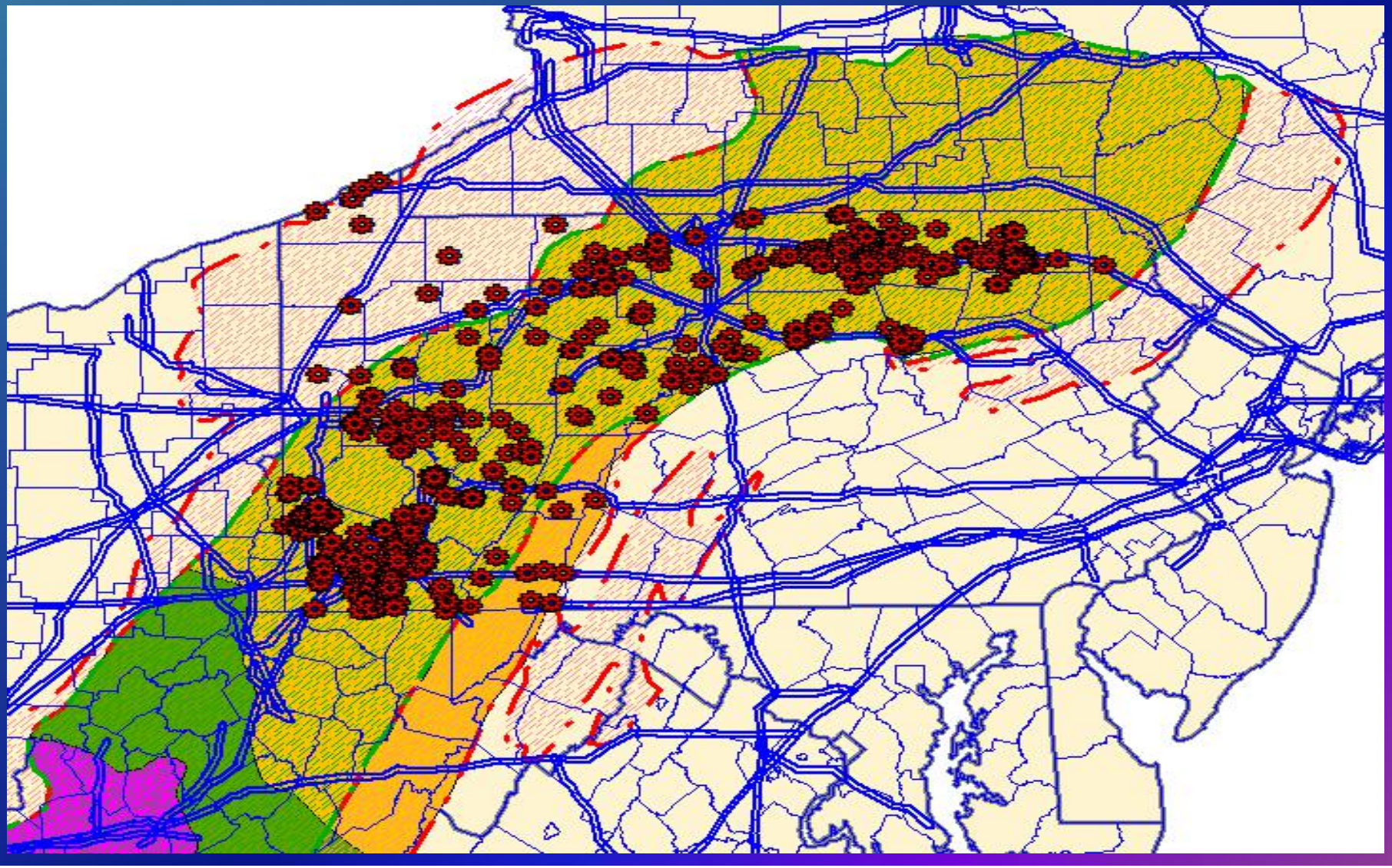
Regional Analysis

- The closest drilled Marcellus well is ~0.6 miles away (green star)
- Within 5 miles of the subject estate there are
  - 102 gas wells
  - 101 permitted locations
  - 2 rigs

Regional Analysis

- Acreage within 5 mile radius is 50,266 acres
  - 102 wells at 80 acres/well = 8,160 acres developed since 2008, or 16%
  - Assuming those 2 rigs continuously develop the 5 mile radius, it would take **44 years** for full development

Drilling/Completion Near Pipelines



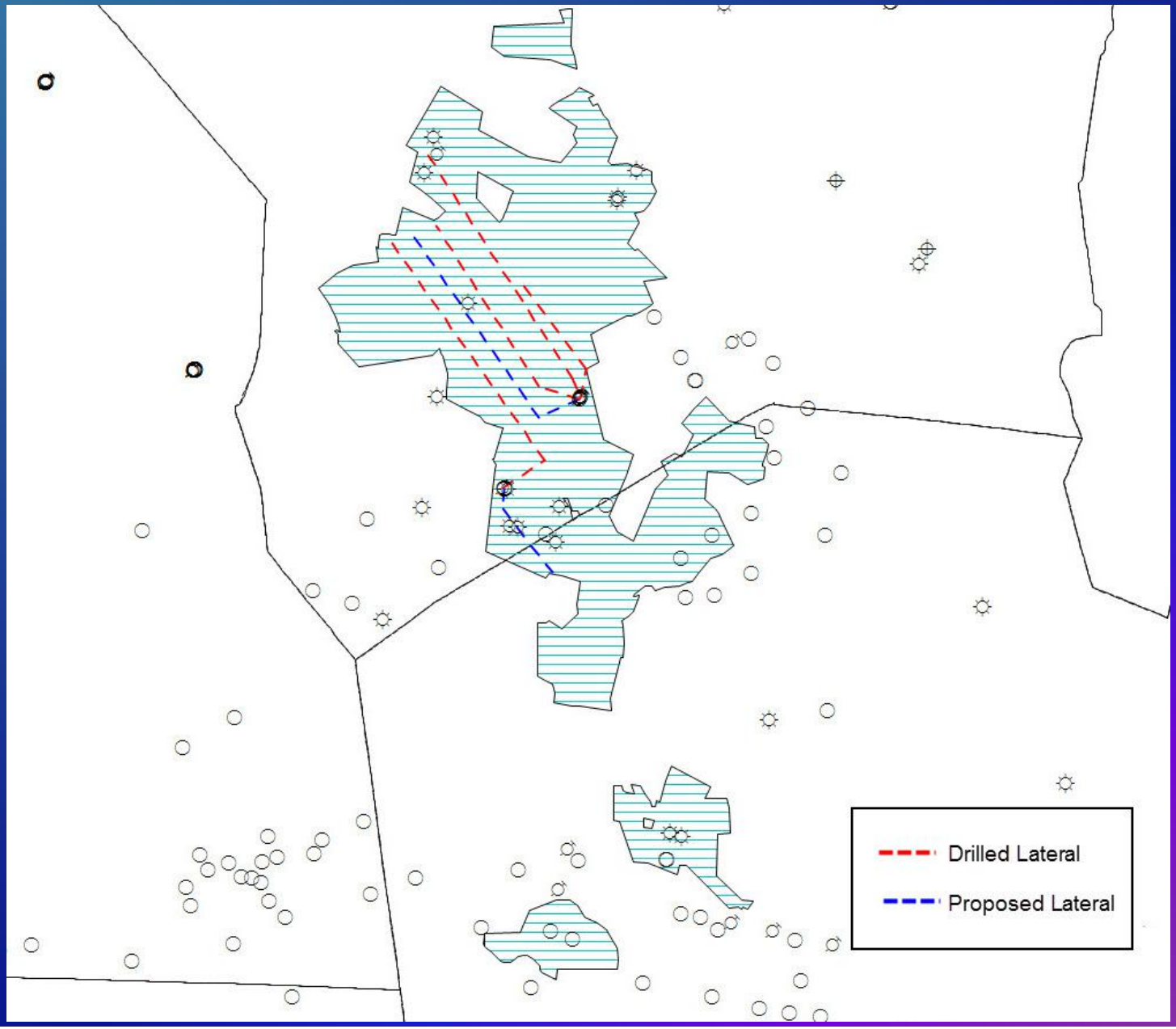
"Held By Production"

- When a well is commenced during the primary term, the leasehold is said to be "held by production."
- So long as a leasehold is held by production, the energy company holds all rights granted through the lease agreement.
  - Thus, the landowner will be limited or prevented from acquiring additional lease bonus payments.

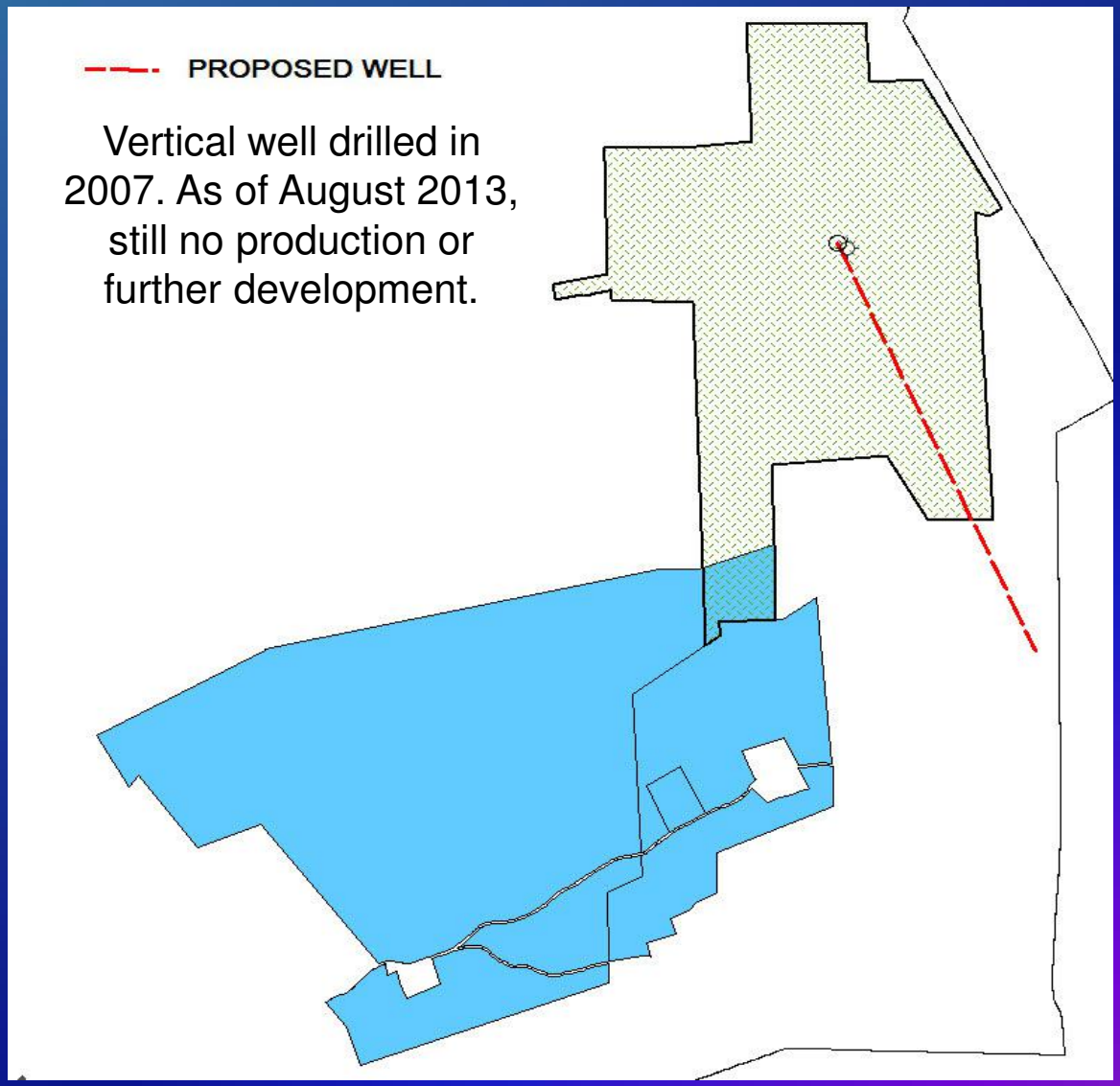
Pooling / Unitization

- Where only a portion of a leasehold is included in a drilling unit, generally all of the leasehold will be held by production.
- A Pugh Clause in the lease agreement can provide for the release of portions of the leasehold that are not included within a drilling unit.
- Some leases have limits on how many acres a unit can be… Otherwise they can be over 2,000 acres

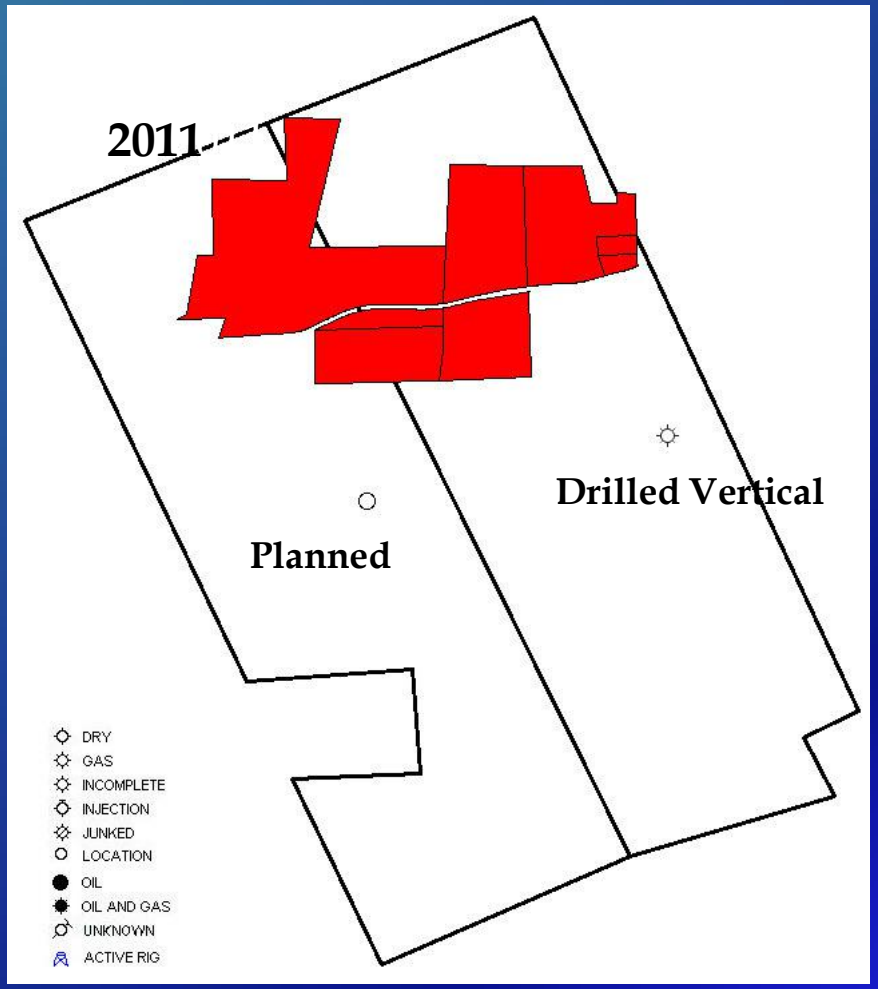
2,000+ Acre Unit in Greene County

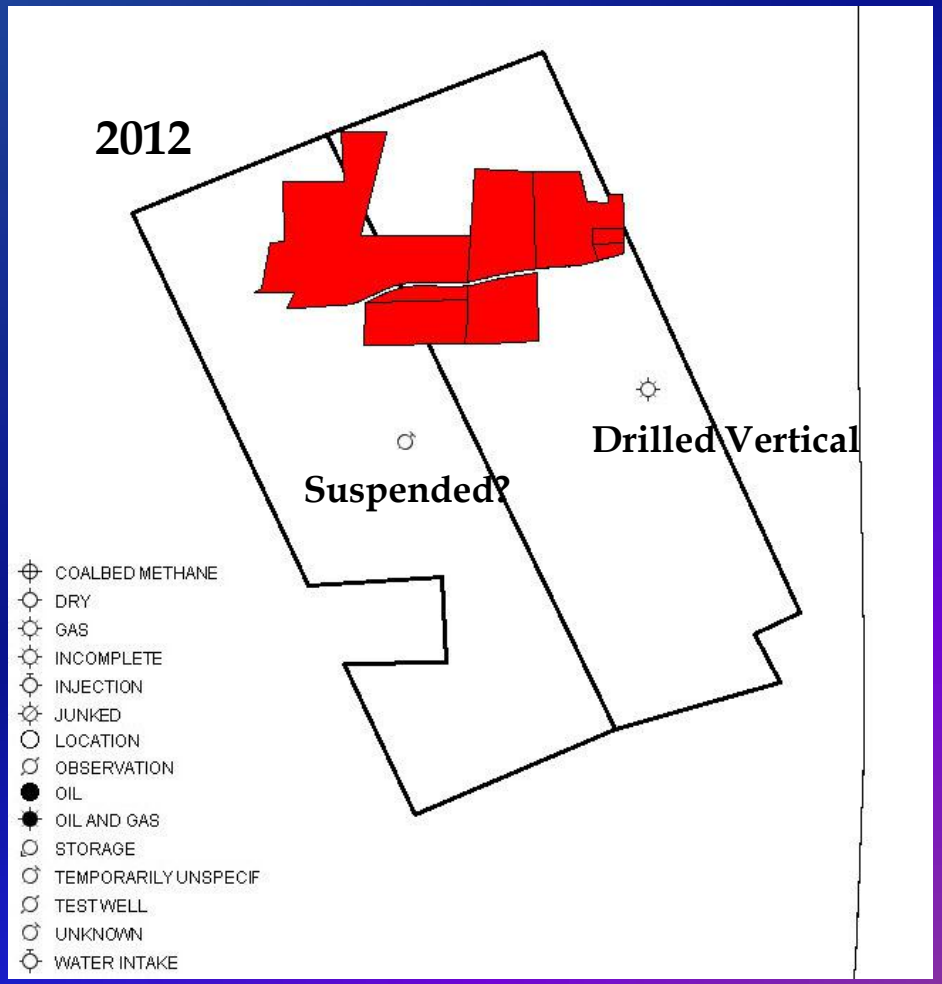


Avoiding Drilling
no horizontal completion, all held

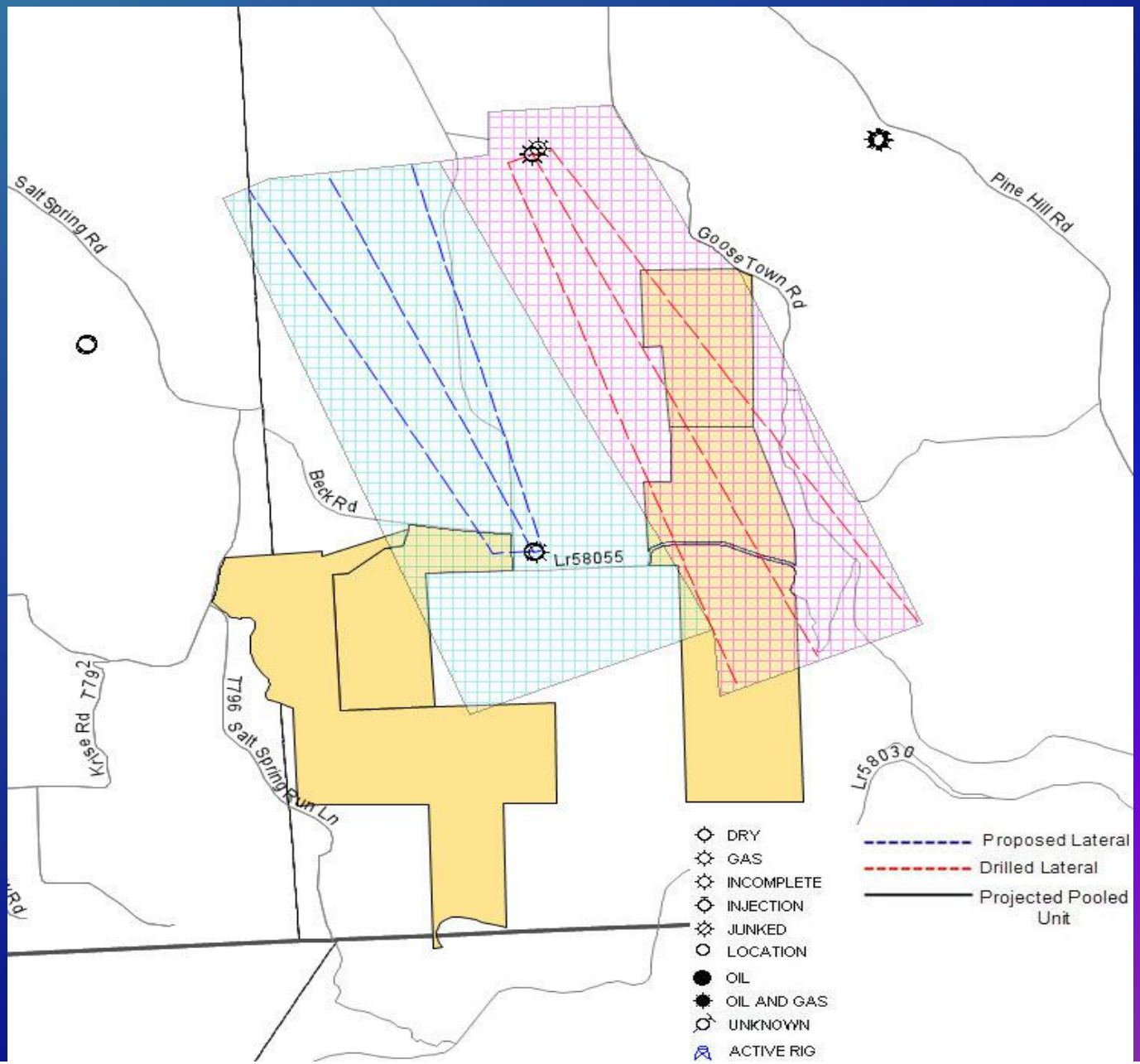


Pooled


2011
Drilled Vertical
Planned
DRY
GAS
INCOMPLETE
INJECTION
JUNKED
LOCATION
OIL
OIL AND GAS
UNKNOWN
ACTIVE RIG


2012
Drilled Vertical
Suspended?
COALBED METHANE
DRY
GAS
INCOMPLETE
INJECTION
JUNKED
LOCATION
OBSERVATION
OIL
OIL AND GAS
STORAGE
TEMPORARILY UNSPECIF
TEST WELL
UNKNOWN
WATER INTAKE

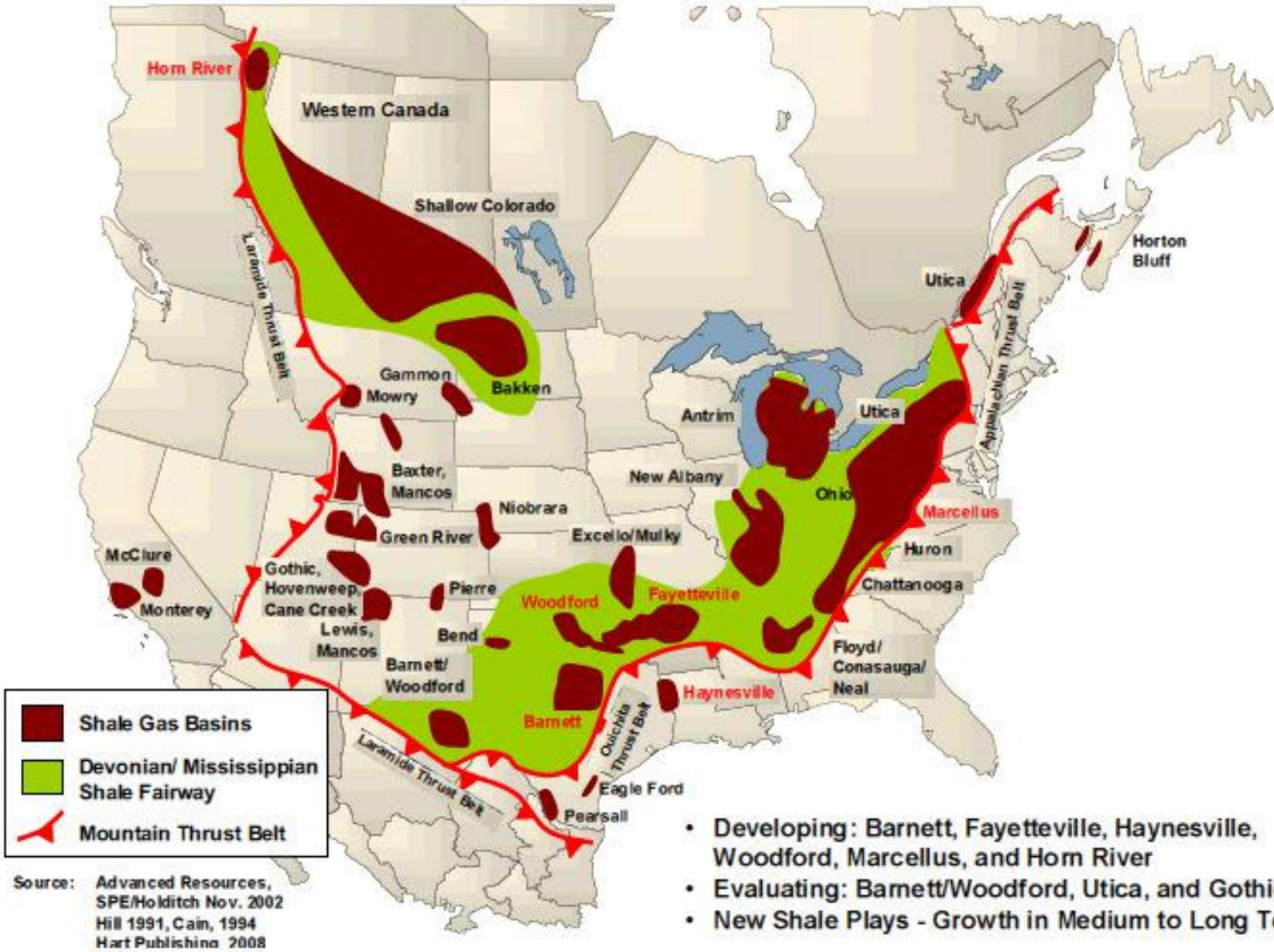
Pooling


Salt Spring Rd
Goose Town Rd
Pine Hill Rd
Beck Rd
Lr58055
Lr58030
T796 Salt Spring Run Ln
DRY
GAS
INCOMPLETE
INJECTION
JUNKED
LOCATION
OIL
OIL AND GAS
UNKNOWN
ACTIVE RIG
Proposed Lateral
Drilled Lateral
Projected Pooled Unit

Rule of Capture

- "The owner of a tract of land acquires title to the oil and gas which he produces from wells drilled thereon, though it may be proved that part of such oil and gas migrated from adjoining lands."
  - Robert E. Hardwicke (1935)

North American Shale Gas Plays



Source: Advanced Resources, SPE/Holditch Nov. 2002
Hill 1991, Cain, 1994
Hart Publishing 2008

- Developing: Barnett, Fayetteville, Haynesville, Woodford, Marcellus, and Horn River
- Evaluating: Barnett/Woodford, Utica, and Gothic
- New Shale Plays - Growth in Medium to Long Term

Completing it all takes time

- 27,000,000 acres in Pennsylvania
- 80 acre well
- 80 drill rigs
- 7 wells per year per rig
- 600 years of drilling

- Obviously there will be selectivity in where and how to drill
- Industry talks in 50 to 100 plus year increments

10
Valuation Methods

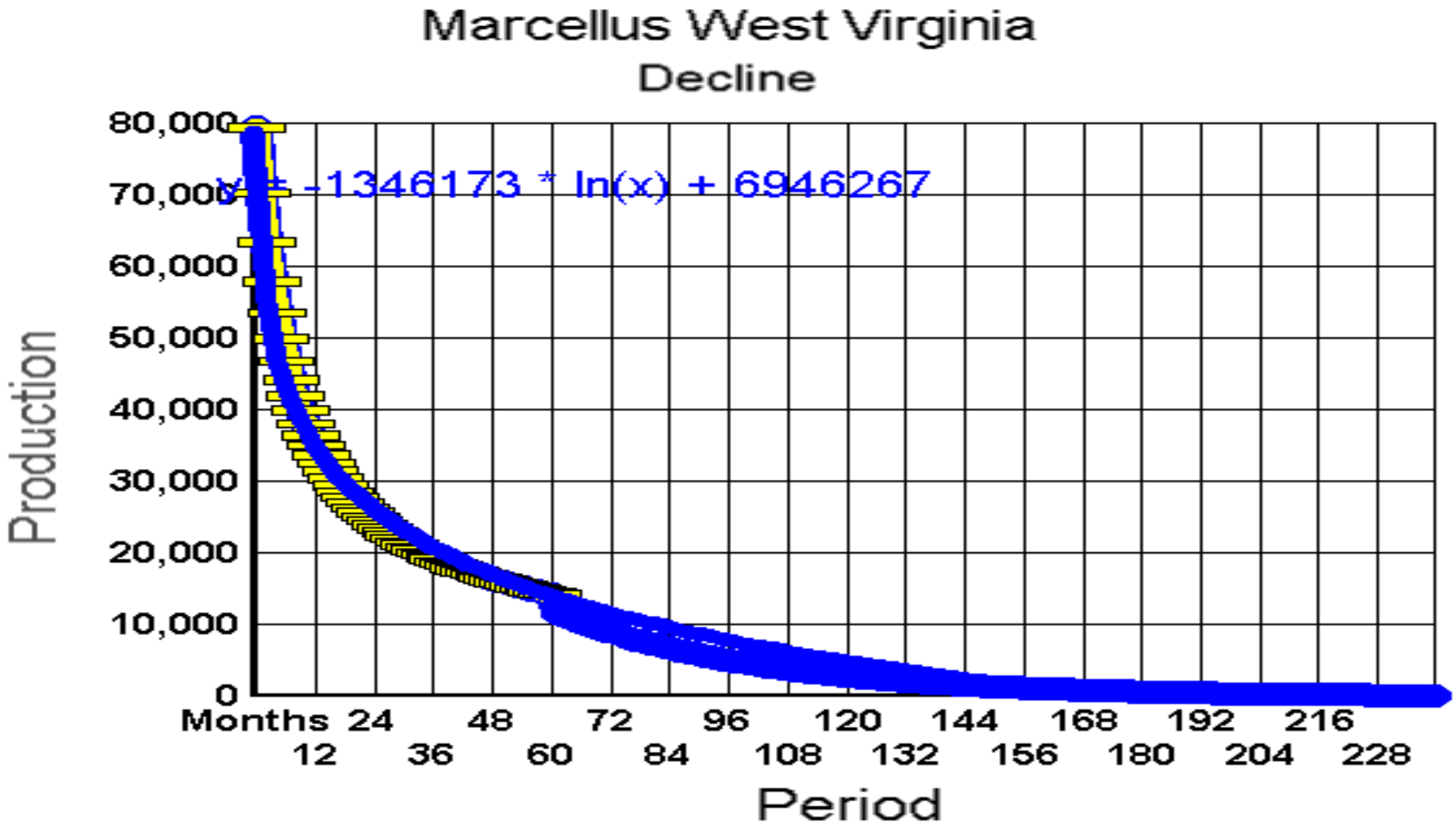
Summary of Process

Adjustment Factors

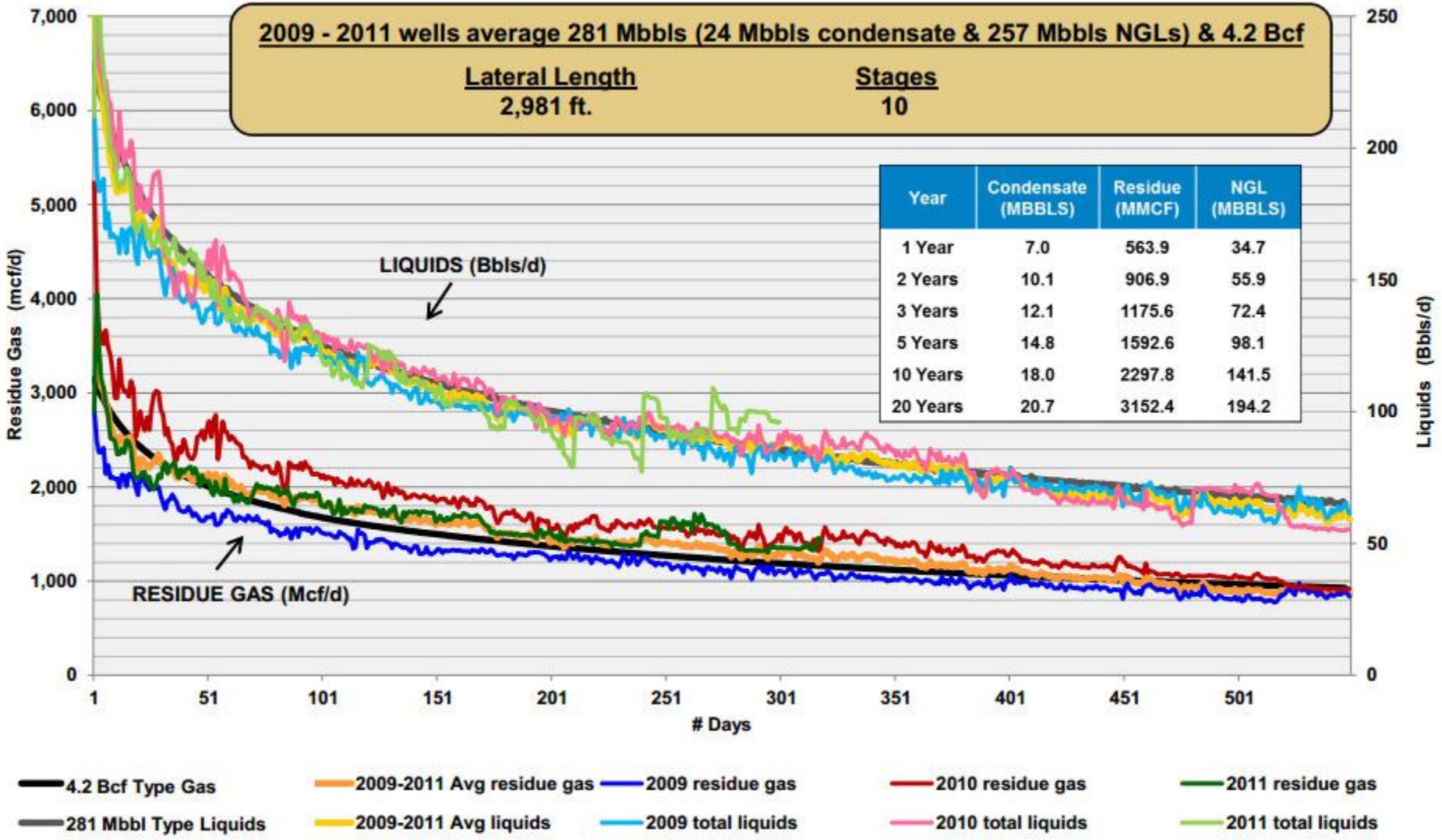
- **Likely date of well development (time)**
  - **Lease conditions**
  - **Location**
    - **Other wells**
    - **Pipelines**
    - **Infrastructure**
- **Likelihood of full development / Full production**
  - **Absorption (drilling rate)**
  - **Gas Demand / Gas Price**
  - **Success of on-site / adjacent development**

Production Trends

Marcellus Dry Gas Decline

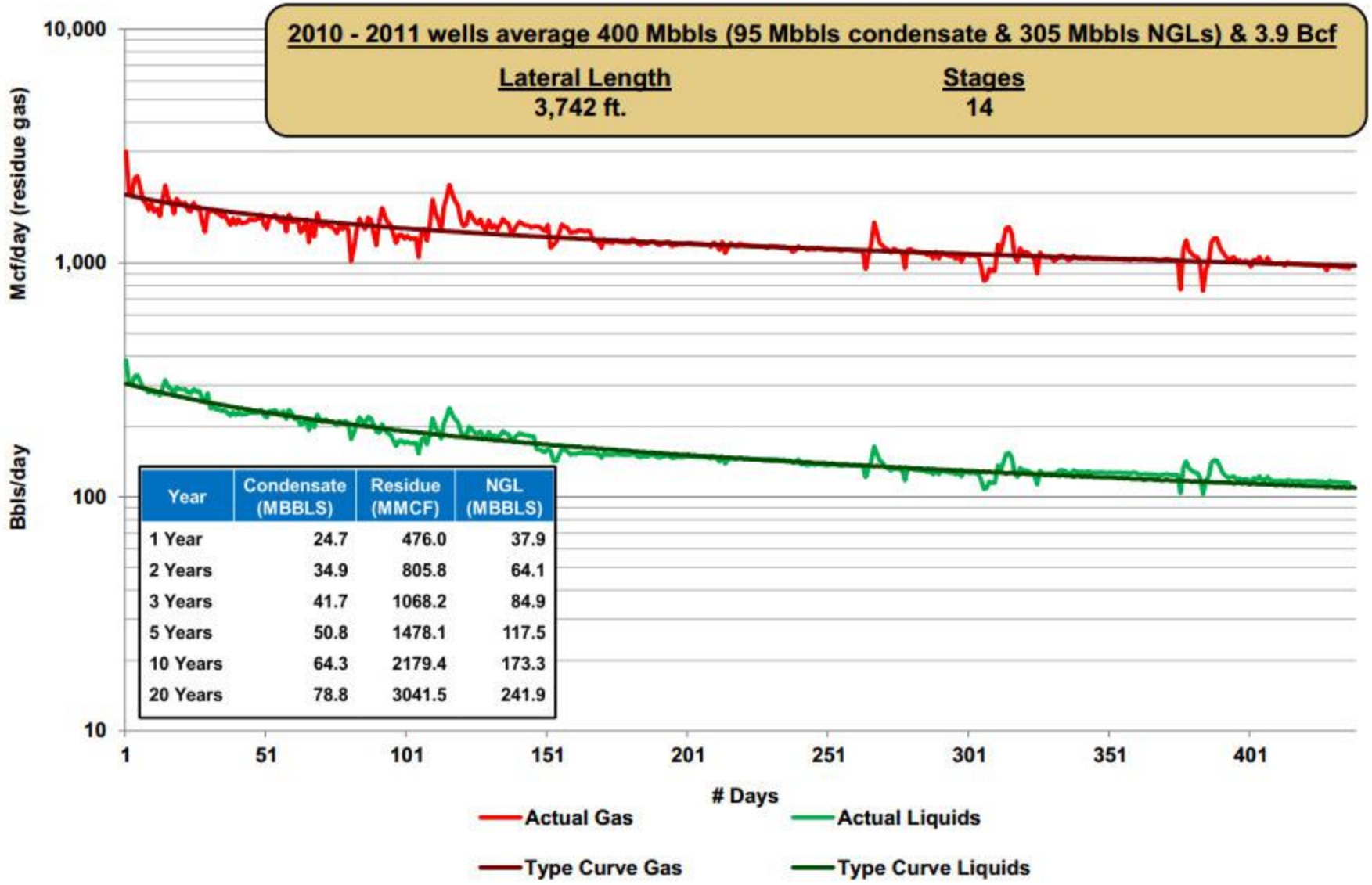


SW PA Wet Area Marcellus Type Curve



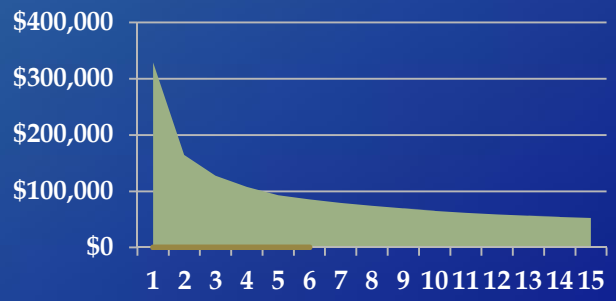
From Q3 2012

SW PA Super-Rich Area Marcellus Type Curve



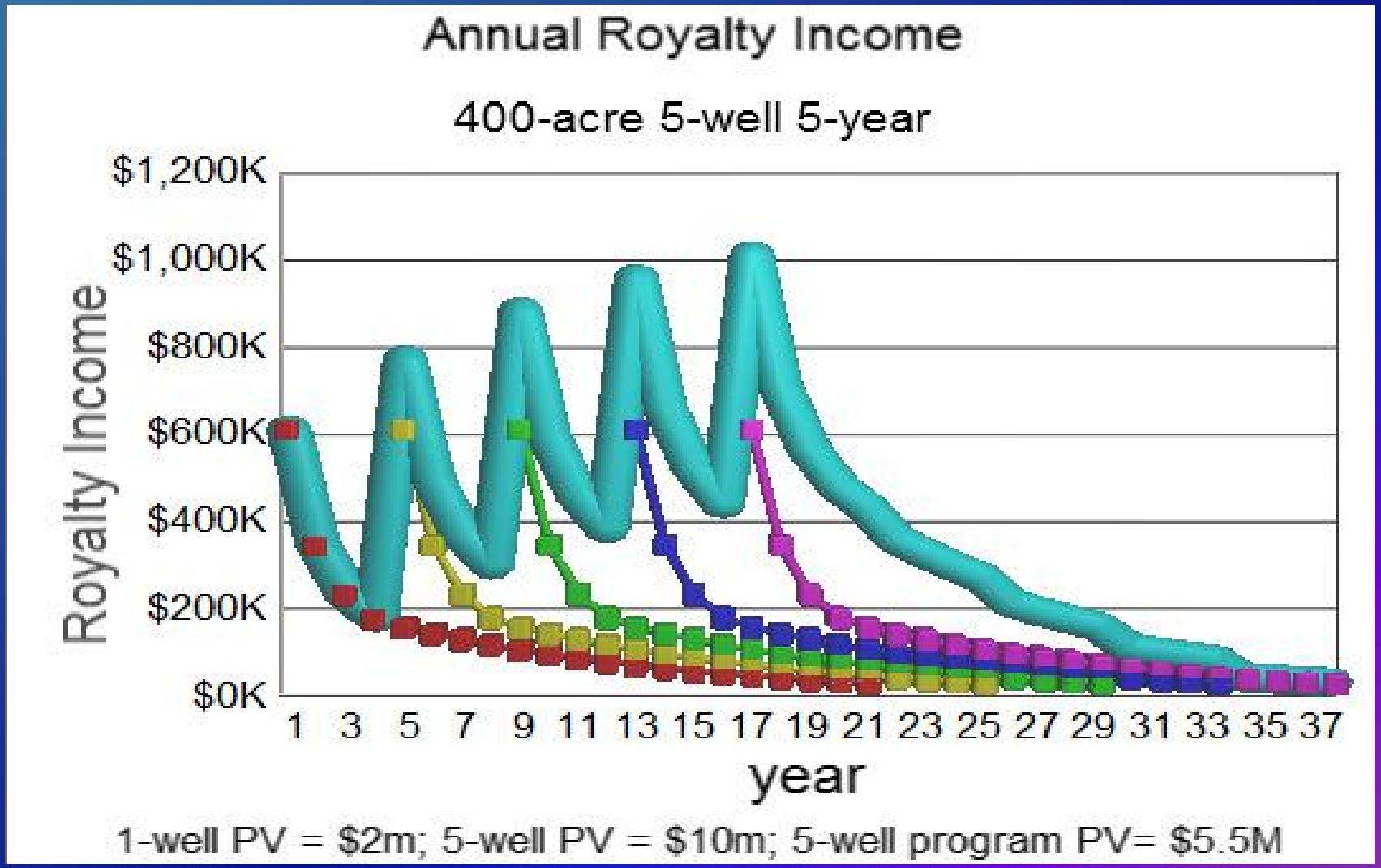
Year	Condensate (MBBLS)	Residue (MMCF)	NGL (MBBLS)
1 Year	24.7	476.0	37.9
2 Years	34.9	805.8	64.1
3 Years	41.7	1068.2	84.9
5 Years	50.8	1478.1	117.5
10 Years	64.3	2179.4	173.3
20 Years	78.8	3041.5	241.9

Declining Pattern



Year	Initial Production	Closing Production	Decline from Previous Year	Annual Royalties $4/mcf Gas 12.5% Share
First	5.0 Mmcf/d	1.1 Mmcf/d	78%	$328,500
Second	1.1 Mmcf/d	0.79 Mmcf/d	28%	$164,250
Third	0.79 Mmcf/d	0.62 Mmcf/d	22%	$127.750
Forth	0.62 Mmcf/d	0.52 Mmcf/d	17%	$107,675
Fifth	0.52 Mmcf/d	0.48 Mmcf/d	8%	$93,075
Sixth	0.48 Mmcf/d	0.43 Mmcf/d	11%	$85,775
Total	8.51 Mmcf/d			$779,402

Value of Likely Income



NEPA SINGLE WELL VALUATION ASSUMPTIONS

UR Potential	4,400,000	Geologic
Acres	80	Geo /experience technical pattern
Discount RI	0.184	higher risk
Discount WI	0.124	lower risk
Price	$3.00	current and forward
Royalty	15.0%	average
Cap Cost	$5,500,000	average
Op Cost	$10,000	survey (EY)
Cost Inflate	0	
Price Inflate	0	
Years	15	conservative
Plug Cost	$0	average
Initial Prod	1,553,000	average
Ultimate Production	4,319,600	

Harmonic Well Decline: q=q1*(1+b*D*t)^-(1/b)

q - flow at time t	
d – decline	0.711
D - decline fraction (1/d)	1.406
t - unit of time	Years
b - hyperbolic exponent	1

Single Well Cash Flow NEPA – Dry Gas

Year	NGL Production (Bbls)	Gas Production (Mcf)	Gross	Royalty Revenue Stream	Free Gas Revenue Stream	Annual Cost	Working Interest	PV Royalty Interests	PV Free Gas	PV Working
2013						$3,695,000	($3,695,000)	$0	$0	($3,485,229)
2014	0	1,553,000	$4,659,000	$698,850	$0	$1,825,000	$2,135,150	$542,446	$0	$1,791,756
2015	0	645,450	$1,936,349	$290,452	$0	$10,000	$1,635,897	$190,413	$0	$1,221,350
2016	0	407,382	$1,222,145	$183,322	$0	$10,000	$1,028,824	$101,504	$0	$683,375
2017	0	297,611	$892,833	$133,925	$0	$10,000	$748,908	$62,629	$0	$442,568
2018	0	234,440	$703,320	$105,498	$0	$10,000	$587,822	$41,669	$0	$309,052
2019	0	193,391	$580,172	$87,026	$0	$10,000	$483,147	$29,031	$0	$225,995
2020	0	164,575	$493,724	$74,059	$0	$10,000	$409,665	$20,866	$0	$170,483
2021	0	143,232	$429,697	$64,455	$0	$10,000	$355,243	$15,338	$0	$131,526
2022	0	126,790	$380,370	$57,056	$0	$10,000	$313,315	$11,467	$0	$103,205
2023	0	113,734	$341,202	$51,180	$0	$10,000	$280,022	$8,688	$0	$82,063
2024	0	103,116	$309,347	$46,402	$0	$10,000	$252,945	$6,653	$0	$65,950
2025	0	94,311	$282,933	$42,440	$0	$10,000	$230,493	$5,139	$0	$53,466
2026	0	86,891	$260,674	$39,101	$0	$10,000	$211,573	$3,999	$0	$43,663
2027	0	80,554	$241,662	$36,249	$0	$10,000	$195,413	$3,131	$0	$35,879
2028	0	75,078	$225,235	$33,785	$0	$10,000	$181,450	$2,465	$0	$29,640
2029	0	70,300	$210,899	$31,635	$0	$10,000	$169,264	$1,949	$0	$24,599
2030	0	66,093	$198,279	$29,742	$0	$10,000	$158,537	$1,548	$0	$20,498
2031	0	62,361	$187,084	$28,063	$0	$10,000	$149,021	$1,233	$0	$17,142
2032	0	59,028	$177,085	$26,563	$0	$10,000	$140,523	$986	$0	$14,381
2033	0	56,034	$168,101	$25,215	$0	$10,000	$132,886	$791	$0	$12,100
2034	0	53,328	$159,985	$23,998	$0	$10,000	$125,987	$635	$0	$10,206
2035	0	50,872	$152,616	$22,892	$0	$10,000	$119,724	$512	$0	$8,629
2036	0	48,632	$145,896	$21,884	$0	$10,000	$114,012	$413	$0	$7,310
2037	0	46,581	$139,743	$20,961	$0	$10,000	$108,782	$334	$0	$6,206
2038	0	44,696	$134,088	$20,113	$0	$10,000	$103,975	$271	$0	$5,277
2039	0	42,958	$128,873	$19,331	$0	$10,000	$99,542	$220	$0	$4,495
2040	0	41,349	$124,048	$18,607	$0	$10,000	$95,441	$179	$0	$3,834
2041	0	39,857	$119,572	$17,936	$0	$10,000	$91,636	$146	$0	$3,275
2042	0	38,469	$115,407	$17,311	$0	$10,000	$88,096	$119	$0	$2,801
2043	0	37,174	$111,523	$16,728	$0	$10,000	$84,795	$97	$0	$2,399
1st 15 Years	**0**	**4,319,555**	**$12,958,665**	**$1,943,800**	**$0**	**$5,660,000**	**$5,354,865**	**$1,045,437**	**$0**	**$1,904,741**
30 Year Total	**0**	**5,077,289**	**$15,231,866**	**$2,284,780**	**$0**	**$5,810,000**	**$7,137,086**	**$1,054,870**	**$0**	**$2,047,894**

Single Well Value Brought on Line Today – NEPA

Delay	0	
Results		
	Total	Present Worth
Production	4,319,555	
Gross	$ 12,958,665	
Royalty	$ 1,943,800	$ 1,045,737
Working	$ 5,354,865	$ 1,904,741
Total	$ 7,298,665	$ 2,950,478

Single Well Value
Brought on Line 5 Years - NEPA

Delay	5	
Results		
	Total	Present Worth
Production	4,319,555	
Gross	$ 12,958,665	
Royalty	$ 1,943,800	$ 531,975
Working	$ 5,354,865	$ 1,193,358
Total	$ 7,298,665	$ 1,725,333

SWPA SINGLE WELL VALUATION ASSUMPTIONS

UR Potential	3,800,000 mcf 260,00 bbls	Geologic
Acres	80	Geo /experience technical pattern
Discount R	0.184	
Discount W	0.124	
Price	$3.00/mcf $37.99/bbl	current and forward
Royalty	15.0%	average
Cap Cost	$5,500,000	average
Op Cost	$10,000	survey (EY)
Cost Inflate	0	
Price Inflate	0	
Years	15	conservative
Plug Cost	$0	average
Initial Prod	1,106,100 75,320	average
Ultimate Production	3,813,072 mcf 259,652 bbls	

Harmonic Well Decline: q=q1*(1+b*D*t)^-(1/b)

q - flow at time t	
d – decline	1.076
D - decline fraction (1/d)	0.930
t - unit of time	Years
b - hyperbolic exponent	1

Single Well Cash Flow SWPA – Wet Gas

Year	NGL Production (Bbls)	Gas Production (Mcf)	Gross	Royalty Revenue Stream	Free Gas Revenue Stream	Annual Cost	Working Interest	PV Royalty Interests	PV Free Gas	PV Working
2013						$3,695,000	($3,695,000)	$0	$0	($3,485,229)
2014	75,320	1,106,100	$6,179,707	$772,463	$0	$1,825,000	$3,582,243	$599,584	$0	$3,006,115
2015	39,030	573,168	$3,202,252	$400,282	$0	$10,000	$2,791,971	$262,414	$0	$2,084,467
2016	26,339	386,802	$2,161,039	$270,130	$0	$10,000	$1,880,909	$149,569	$0	$1,249,354
2017	19,876	291,893	$1,630,788	$203,848	$0	$10,000	$1,416,939	$95,329	$0	$837,342
2018	15,960	234,383	$1,309,482	$163,685	$0	$10,000	$1,135,797	$64,651	$0	$597,153
2019	13,333	195,805	$1,093,947	$136,743	$0	$10,000	$947,204	$45,616	$0	$443,060
2020	11,449	168,131	$939,336	$117,417	$0	$10,000	$811,919	$33,082	$0	$337,882
2021	10,031	147,311	$823,017	$102,877	$0	$10,000	$710,140	$24,481	$0	$262,924
2022	8,926	131,079	$732,332	$91,541	$0	$10,000	$630,790	$18,398	$0	$207,781
2023	8,040	118,070	$659,647	$82,456	$0	$10,000	$567,191	$13,997	$0	$166,220
2024	7,314	107,409	$600,088	$75,011	$0	$10,000	$515,077	$10,754	$0	$134,295
2025	6,708	98,514	$550,393	$68,799	$0	$10,000	$471,594	$8,331	$0	$109,393
2026	6,195	90,980	$508,300	$63,537	$0	$10,000	$434,762	$6,498	$0	$89,724
2027	5,755	84,516	$472,187	$59,023	$0	$10,000	$403,164	$5,098	$0	$74,024
2028	5,373	78,910	$440,866	$55,108	$0	$10,000	$375,758	$4,020	$0	$61,380
2029	5,039	74,001	$413,441	$51,680	$0	$10,000	$351,761	$3,184	$0	$51,122
2030	4,744	69,668	$389,229	$48,654	$0	$10,000	$330,575	$2,532	$0	$42,742
2031	4,482	65,813	$367,695	$45,962	$0	$10,000	$311,733	$2,020	$0	$35,860
2032	4,247	62,363	$348,419	$43,552	$0	$10,000	$294,867	$1,617	$0	$30,177
2033	4,035	59,257	$331,064	$41,383	$0	$10,000	$279,681	$1,298	$0	$25,466
2034	3,844	56,445	$315,355	$39,419	$0	$10,000	$265,936	$1,044	$0	$21,543
2035	3,670	53,888	$301,070	$37,634	$0	$10,000	$253,436	$842	$0	$18,265
2036	3,511	51,553	$288,023	$36,003	$0	$10,000	$242,020	$680	$0	$15,518
2037	3,365	49,412	$276,060	$34,507	$0	$10,000	$231,552	$551	$0	$13,209
2038	3,231	47,441	$265,051	$33,131	$0	$10,000	$221,919	$446	$0	$11,263
2039	3,107	45,622	$254,886	$31,861	$0	$10,000	$213,025	$363	$0	$9,619
2040	2,992	43,937	$245,472	$30,684	$0	$10,000	$204,788	$295	$0	$8,227
2041	2,885	42,372	$236,729	$29,591	$0	$10,000	$197,138	$240	$0	$7,046
2042	2,786	40,915	$228,587	$28,573	$0	$10,000	$190,013	$196	$0	$6,042
2043	2,693	39,554	$220,986	$27,623	$0	$10,000	$183,363	$160	$0	$5,187
1st 15 Years	**259,652**	**3,813,072**	**$21,303,381**	**$2,662,923**	**$0**	**$5,660,000**	**$12,980,458**	**$1,341,823**	**$0**	**$6,175,886**
30 Year Total	**314,280**	**4,615,313**	**$25,785,448**	**$3,223,181**	**$0**	**$5,810,000**	**$16,752,267**	**$1,357,290**	**$0**	**$6,477,172**

Single Well Value
Brought on Line Today - SWPA

Delay Results	0	
	Total	Present Worth
Prod	3,813,072	
	34,280	
Gross	$ 21,303,381	
Royalty	$ 2,662,923	$ 1,341,823
Working	$ 12,980,458	$ 6,175,886
Total	$ 15,643,381	$ 7,517,709

Single Well Value
Brought on Line 5 Years - SWPA

Delay	5	
Results		
	Total	Present Worth
Production	3,813,072	
	34,280	
Gross	$ 21,303,381	
Royalty	$ 2,662,923	$ 682,792
Working	$ 12,980,458	$ 3,869,314
Total	$ 15,643,381	$ 4,552,106

11
Valuation Assumptions & Factors

PA Department of Tax and Revenue The Quandary

2001: Oil and gas estate declared non-assessable by Pa Supreme Court (IOGA v Fayette County)

- Decision based on courts determination that:
  - The Oil and Gas were not specifically identified as taxable real estate by the local tax enabling legislation (see 72 P.S. § 5020-201)
  - Oil and gas significantly different species of asset than those listed
- However, same law states:
  - "All other things and persons now taxable" (72 P.S. § 5020-201-(c))
  - Exemptions limited to list (see 72 P.S. § 5020-204)
  - Lands classified as "auxiliary" forest lands are to be taxed at reduced values…"Provided, however, that if the said surface land be underlain by coal, iron ore, oil, gas, or other valuable minerals, **said minerals may be assessed separately."** (see 72 P.S. § 5020-419)

PA Department of Tax and Revenue
The Quandary

Informational Notice 10/10/2012

- Real Estate = 3 separate estates
  - Surface
  - Mineral (Includes Oil and Gas)
  - Support
- Oil and Gas in-place are real estate
- Oil and gas lease once in production is a conveyance of real estate and creates a fee simple determinable interest in the lessee
- Transfer of the estate is a taxable transfer
  - Working interest
  - Royalty interest
  - Overriding royalty interests
  - Leases are consider perpetual or until exhaustion (30 years – indefinite)
- Receiving income from a royalty interest is not taxable real estate; it is income
- Taxable Value is based on
  - Bona fide sale
  - A computed value based on assessed value and common level ratio 72 P.S. § 8101-C)
  - Actual monetary worth (72 P.S. § 8101-C) as delineated by an appraisal (61. Pa. Code § 91.136)

Factors

- **Probability Volumetric Adjustments**
  - Well Spacing
- **Likelihood of development**
  - Absorption
    - Acres of leased
    - Number of rigs
    - Time to drill
    - Market for gas
  - Location of Rigs
  - Lease Control/Ownership
  - Pooling
- **Quality of Reserve / Well**
  - Thickness
  - Nearby performance history
  - Wet vs. Dry Gas
  - Rate of
    - Production
    - Decline
- **Likelihood of Full Property Development**
  - Lease holding needs of developer/driller
  - Capital Investment
- **Cost to Produce**
  - Acquisition
  - Development
  - Operating/Process
  - Sales
- **Market**
  - Price
  - Consumption
- **Timing**
  - Accessibility to market
  - Pipelines
  - Capital Investments
    - Plants
    - Compressors

12
Additional Discounts

Additional Discounts

- Discount for Marketability
- Discount for Lack of Control

QUESTIONS

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