Land and Property Valuations with Shale Development Spring 2014

Jeffrey Kern, ASA, AIMA Appraiser Resource Technologies Corporation

Setting the Stage Value Enhancement Transitory / Permanent Effects Case Study Value Diminished Transitory / Permanent Effects NIMBY

# Production/Consumption 2004 thinking

#### Natural Gas Production, Consumption, and Imports, 1970 - 2025 (trillion cubic feet)



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.

Mother Jones



Contractor of the local

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



# Drill Rig



# Horizontal Well and Fracing





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

















# Utica

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



- 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

CHK rates include

NAMES RESOURCES

#### From Q3 2012



# **Price Differential**

20

July 2013

26

#### 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.



# Rig Activity in PA – dry/wet gas MARCELLUS

#### **Rig Count in Pennsylvania 2011-present**



# Rig Activity in OH – wet gas/oil UTICA

#### **Rig Count in Ohio 2011-present**



#### HORIZONTAL UTICA - PT PLEASANT WELL ACTIVITY IN OHIO



August 2013 Investor Presentation

## LIQUIDS-FOCUSED PRODUCTION GROWTH





Drillbit production growth outpacing asset sales

## Marcellus Dry Gas Decline



2<u>5</u>

### SW PA Wet Area Marcellus Type Curve



# **Declining Pattern**



Year	Initial Production	Closing Production	Decline from Previous Year	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

## **NEPA Single Well Valuation Assumptions**

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UR Potential	4,400,000	Geolo
Acres	80	Geo /
Discount RI	0.184	highe
Discount WI	0.124	lower
Price	\$3.00	curre
Royalty	15.0%	avera
Cap Cost	\$5,500,000	avera
Op Cost	\$10,000	surve
Cost Inflate	0	
Price Inflate	0	
Years	15	conse
Plug Cost	\$0	avera
Initial Prod	1,553,000	avera
Ultimate Production	4,319,600	

Geologic Geo /experience technical pattern nigher risk ower risk current and forward average average survey (EY)

conservative average average

#### 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

									28	,
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
1* 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 Results	0	
Nesuis		-
	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 Results	5	
	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

									34	4
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
1*t 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 Results	5	
	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
## Vacant Land Values Higher

### Rural Property:

- Where oil and gas is owned in fee with the surface
- Sufficient size to develop and/or within a unit
- Within an active or desired drilling area
- Transient values

### Vacant Sales Before Gas Boom (2005-2007): Bradford County

45 vacant land sales of 30 acres or more during time period

O&G rights contributed no discernable amount to value of property

	2005-2007			
Acres	WITH Gas Rights	NO Gas Rights		
30-50	\$2,562	\$2,755		
50-100	\$2,131	\$2,373		
100+	\$1,599	\$1,461		

## Vacant Land: Bradford County

Vacant sales after start of gas boom (2009-2012)

• 17 vacant land sales of 30 acres or more during the time period

Owners started severing oil & gas rights from surface properties

Vacant Sales 2009-2012							
Acres	No Gas Rights With Gas Rig						
30-50	\$2,755	\$4,782					
50-100	\$2,373	\$4,776					
100+	\$1,461	\$7,797					

- Sales of vacant land without gas rights, on average, take 2 to 3 months longer to sell than sales with oil & gas rights.
- Buyers paid anywhere from \$2,000 to \$6,000 more per acre, for properties with oil & gas rights.
- The interest from Oil & Gas companies in leasing land for Shale gas exploration likely caused more severing of gas rights and less land being sold on the market.



### Vacant Land: Susquehanna County 41

#### Vacant Sales From 2012-2013

- Gas companies focused newer efforts and activity in Susquehanna County from 2012 to Present
- 13 vacant land sales of 25 acres or more during the time period of 2012-2013
- Sales of vacant land without gas rights, on average, take over four months longer to sell than sales with oil & gas rights.

Susquehanna Vacant Land Sales 2012 to 2013							
	No O&G	100% O&G					
	Rights	Rights					
Avg Per Acre: 2012-2013	\$2,629	\$9,450					
Avg Per Acre: 2013	\$2,629	\$8,147					
Avg Days on Market (DOM)	206	64					
List Price to Sales Price	-10%	-4%					
Gas Rights with Existing Lease	na	\$7,927					
Gas Rights without Existing Lease	na	\$10,527					

## Vacant Land in Southwest Pa Greene County / Washington County

### Greene County:

- 16 sales over 100 acres
- \$2,000 to \$3,000 more per acre if gas rights are included
- 200 300% of transaction value related to gas rights
- Before 2007 there was no discernable difference
- Washington County
  - Poor sales records
  - Assessment office personnel have observed \$3,000 to \$5,000 per acre difference between large lot vacant land sales with gas and those without gas rights since 2008

## Vacant Land Values: Transient <sup>43</sup>









## **FEE**—less Oil and Gas 44 AIR **SURFACE** Coal **MINERAL** Stone Royalty Other GAS **Mineral** 4/24/2014 www.resourcetec.com

# Case in Point Two Views: IRS/Taxpayer

- Estate: Surface and subsurface, less timber
- Date of Transaction:
  - Completed: March 2008
  - Recorded: June 2008
- Size (multiple adjacent tracts):
  - Surface: 9,000
  - Sub surface: 7,500
- Title Issues: some prior old prior claims on Oil and gas (up to 50% on some oil and gas)
- Value Issues: Fee Estate
  - Surface, less timber
    - Subject to wind farm lease
  - Subsurface subject to potential oil and gas lease
    - leased after transaction before recordation
    - No wells, no permits by recordation date
- IRS Valuation: \$ 28,000,000
- RTC Valuation: \$ 4,600,000

## Case in Point Two Views: IRS/Taxpayer

- IRS Value: \$28,000,000 based on sum of:
- Land Values
  - Comp Sales

#### Plus

Present worth of Wind farm lease payments

Signing lease and future rents/royalties

#### Plus

#### Gas Value

- Lease Bonus Values
  - (County search after transaction before recordation)
- Present worth of potential gas royalty income
  - established leases, assumed full development

### Subject Property



# Case in Point Two Views: Gas Estate

#### IRS

- Used all Acreage
- Used High Values
  - Bonus \$2,500/acre
  - Royalty value at 16%
  - <u>Countywide</u> pattern of leases increases after March Transaction
- Assumed large property could demand favorable terms
- Assumed full development
  - Entire property drilled +-80 wells
  - full production within 5 +- years
- Valued at:
  - \$2,600 per acre
  - \$25,000,000

#### **RTC** View

- Used acreage with more certain ownership
- Unlikely to be leased at high value
  - Bonus at \$500/acre
  - Royalty at 12.5%
  - Local pattern of leases 6 months prior to transaction
- No bargaining power related to size without consideration of location
- Unlikely to be developed soon
  - Only minimal well drilled to hold lease
  - Unlikely to ever see full production
- Value at:
  - \$500/acre
  - **\$3,700,00**

### Appraisal Assignment Retrospective Appraisal: Oil/Gas

- 7,500 total acres (not leased at date of transaction) (6,000 acres of more certain ownership but still with cloud on portion of title)
- Located:
  - South-central part of County, northeastern Pennsylvania
  - Within 20 miles north of southern Marcellus crop
- Regional Production
  - No drilling or production within 10 miles prior to 2008
  - Some successful drilling 25 miles to the north / none to south or east
- Closest pipeline 30 miles north and 15 miles south
- Lease activity:
  - High Bonus amounts in county to the north
  - Modest bonuses in central portion of county unless "tied" to large transaction with most acres to north
  - Non-existent in county to the south
- Informal negotiation was going on between transaction date and recording date at a reported \$1,500 per acre bonus
- Lease survey:
  - Sources:
    - 50+- leases in county, court house, door to door, and phone calls
    - Semi-monthly lease reporter
    - Other clients
  - Results
    - \$50 to \$3,000 per acre bonus, depending on date and location
    - 12.5% to 20% royalty, , depending on date and location

## **RTC** Valuation Factors

### Likelihood of development

- Absorption (Development Schedule)
  - Acres of resource
  - Acres of subject property
  - Market for gas (Supply/Demand)
  - Access to market/proximity to pipelines
  - Active rigs
- Lease Control/Ownership
  - Third party lease
  - Active company
  - Pooling practice

### Reserve Type

- Proven
- Probable
- Possible/Speculative

### Volumetric Adjustments

- Typical well
  - Nearby well performance
  - Wet vs. dry
- Property utilization)

### Market

- Price
- Consumption
- Timing
- Accessibility to market
- Pipelines
- Capital investments
  - Plants
  - Compressors
- Capital Investment

### Cost to Produce

- Acquisition
- Development
- Operating/Process
- Sales
- Discount Rate
  - Producer (Lessee) vs.
  - Land Owner (Lessor

# All Producing Wells Through 12/2007



# **Regional Local Examination**



## **Reserve Classifications**

### • <u>IRS</u>

- Proven Reserves
- Probable Reserves
- Possible Reserves
- Property
  - Recoverable Reserves

### Geophysical

- Proven Reserves
- Probable Reserves
- Possible Reserves
- Speculative Reserves

### **Reserve Designation Reality Check**

### Proven Reserves

- Field development
- Single to two offsets
- Probable Reserves
  - Field expansion (Step-out with excellent geology)
- Possible Reserves
  - Big step with excellent geology and solid play
- SpeculativeWild Cat

## Well Spacing / Offset Interpretation:



### Well Spacing / Offset Interpretation:



### Well Spacing / Offset Interpretation:



# Leasing Activity ~ Prior to 2008



# Leasing Activity ~ Early 2008



# Wyoming Leases Prior to Sale

60

#### **Exhibit 14: Summary of Lease Data**

	Company	Township	Acreage	Royalty	Term (Yr.)	Extension Payment/ac (+5 yrs.)
7/3/2007	Magnum Land Services		145.03	0.125	5	75
9/22/2009	Magnum Land Services		276.00	0.125	5	275
10/11/2007	Magnum Land Services		82.87	0.125	5	150
11/20/2007	Chesapeake		40.00	0.125	10	-
12/12/2007	Chesapeake		94.00	0.125	10	-
12/14/2007	Chesapeake		113.00	0.125	10	-
7/6/2007	Magnum Land Services		503.26	0.125	5	75
8/2/2007	Magnum Land Services		619.00	0.125	5	75
12/12/2007	Magnum Land Services		108.00	0.125	5	275
12/13/2007	Magnum Land Services		192.50	0.125	5	275
8/27/2007	Chesapeake		85.00	0.125	10	-
10/22/2007	Magnum Land Services		221.00	0.125	5	150
11/6/2007	Magnum Land Services		113.80	0.125	5	275
11/7/2007	Magnum Land Services		25.38	0.125	5	175
11/18/2007	Magnum Land Services		97.10	0.125	5	175
9/6/2007	Magnum Land Services		40.00	0.125	5	125
9/7/2007	Chesapeake		10.86	0.125	10	-
9/27/2007	Magnum Land Services		42.38	0.125	5	125
10/2/2007	Chesapeake		89.47	0.125	10	-
11/18/2007	Magnum Land Services		41.05	0.125	5	175
3/7/2008	Chesapeake		180.00	0.15	7	-
3/7/2008	Chesapeake		61.00	0.15	7	-
3/10/2008	Chesapeake		75.47	0.15	7	-
3/11/2008	Chesapeake		66.68	0.15	5	-
4/18/2008	Chesapeake		22.09	0.15	5	-
4/24/2008	Chesapeake		25.23	0.15	5	-

## Company Activity Map





### Marcellus Permit Activity by County (cumulative) 63

	Table 3.4-2 Active	e Companies:	2006 Throu	igh Janua	ry 31, 2010			
Company	Bradford	Lackawanna	Lycoming	Sullivan	Susquehanna	Tioga	Wayne	Wyoming
Allegheny Gas Company	0	0	0	0	0	1	Ő	0
Alta Opr Co	0	0	0	0	16	0	0	0
Anadarko E&P	0	0	26	0	0	0	0	0
Cabot Oil & Gas	0	0	0	0	138	0	0	0
Central New York Oil & Gas Co	5	0	0	0	0	0	0	0
Chesapeake Appalachia	273	0	1	1	44	0	1	3
Chief Oil & Gas	14	0	29	0	8	0	0	1
Citrus Energy Corp	0	0	0	0	0	0	0	9
Dominion Trans	0	0	0	0	0	8	0	0
East Resources	5	0	14	0	0	221	0	0
Enervest Opr	1	0	0	0	0	0	0	0
EOG Resources	26	0	0	0	0	0	0	0
EXCO North Coast Energy	0	28	6	0	6	0	0	0
Fortuna Energy	197	0	0	0	0	64	0	0
Novus Operating	0	0	0	0	0	8	0	0
PA Gen Energy Co	0	0	16	0	0	0	0	0
Penn Virginia Oil & Gas	0	0	0	0	0	1	0	0
Pennswood Oil & Gas	0	0	0	0	0	0	2	0
Range Resources Appalachia	5	0	88	0	0	0	0	0
Rice Drilling	0	0	4	0	0	0	0	0
Schrader	0	0	0	0	0	0	1	0
Seneca Resources	0	0	2	0	0	31	0	0
Southwestern Energy Production	10	0	5	0	4	0	0	0
Stone Energy	0	0	0	0	3	0	2	0
Turm Oil, Inc.	0	0	0	0	30	0	0	0
Ultra Resources	0	0	0	0	0	53	0	0
VAVCO	10	0	0	0	0	0	0	0
Victory Energy	0	0	0	0	0	2	0	0
XTO Energy	0	0	12	0	0	0	0	0
Total Permitted Sites	546	28	203	1	249	389	6	13
Total Active Rigs - Feb. 1, 2010	16	0	5	0	14	8	0	0

### Regional Activity "Absorption Rates"

		MAX					% OF CTY	YRS TO
COUNTY	AC. PRIME W	ELLS @	NO. OF	I RIGS	YEAR/Rig	YR AT AC	DRILLED	DRILL
	80	ACRES '			· _/	SPACING	ANNUALY	COUNTY
PENNSYL	illing '	WIII	<b>00</b> (	on to	r ma	nv ve	ears:	
BRADFORD	743,258	9,291	13	15	180	14,400	1.94%	52
CENTRE	285,379	3,567	2	3	36	2,880	1.01%	99
CLINTON	343,103	4,289	1	2	24	1,920	0.56%	179
LACKAWANNA	297,684	3,721	Rac	t is fi	ret	1,920	0.64%	155
LYCOMING	557,437	6,968	4		60	4,800	0.86%	116
LUZERNE	174,002	2,175	4	5	60	4,800	2.76%	36
POTTER	692,659	8,658	1	2	24	1,920	0.28%	361
SULL	289,441	3,6181			<b>1 1</b> 4	1.920	0.66%	151
SUSCLERGINA			, @n	ente	<u>140</u>		ease	37
TIOGA	727,840	9,098	6	8	96	7,680	1.06%	95
WAYNE	288,318	3,604	0	2	24	1,920	0.67%	150
WYOMING	259,270	3,241	1	2	24	1,920	0.74%	135
	5,191,227	64,890	47	63	756	60,480	1.17%	86
















### Development of a 7,500 acre area across Pennsylvania



### Development of a 7,500 acre area across Pennsylvania



### Development of a 7,500 Acre Area Across Pennsylvania



### Development of a 7,500 acre area across Pennsylvania



## Subsequent Facts 2012

### South of property:

- Three nearby wells drilled on leases to the south abandoned
- No new leases signed south of property since 2010

### North of property

- Wells 15 to 30 miles north of property have been successfully drilled
- Lease bonus values to the north continued to climb through 2010

No additional drilling on or near property since 2008





#### Producer vs. Land Owner Who has more risk associated with their income?

In a field development scenario, the producer/developer continues to drill so that the company can maintain or increase production.

#### Problem #1:

As older wells de-pressure through production over time, newer wells will dominate the system. This will prematurely decrease production levels from older wells, lowering the land owners income while the overall system maintains or increases total production.

#### Problem #2:

If petroleum prices falter, wells can be shut in for the benefit of the producer, decreasing income to the land owner to a bare minimum.

**Problem #3:** Pooling and the production unit designation and drilling pattern.

# **Discount Rates**

### Producer

- **12-14%**
- Based on S & P, Ibbotson, and Morningstar surveys of Weighted Average Cost of Capital for Oil and Gas Producers
- Risk related to:
  - Development costs
  - Market changes
- Rate would be higher in a "wildcat" situation

### Royalty owner

- **16** 18%
- 40 to 50 % higher than producer
- No control
  - Income at "mercy" of producer. Many wells currently shut-in or "squeezed-off"
- Risks related to Market

# Valuation Factors Used

### Likelihood of development

- Absorption (Development Schedule)
  - Acres of resource
  - Acres of subject property
  - Market for gas (Supply/Demand)
  - Access to market/proximity to pipelines
  - Active rigs
- Lease Control/Ownership
  - Third party lease
  - Active company
  - Pooling practice

### Reserve Type

- Proven
- Probable
- Possible/Speculative

### Volumetric Adjustments

- Typical well
  - Nearby well performance
  - Wet vs. dry
- Property utilization)

### Market

- Price
- Consumption
- Timing
- Accessibility to market
- Pipelines
- Capital investments
  - Plants
  - Compressors
- Capital Investment

### Cost to Produce

- Acquisition
- Development
- Operating/Process
- Sales
- Discount Rate
  - Producer (Lessee) vs.
  - Land Owner (Lessor

## Case in Point Outcome Gas Estate

RTC procedures accepted, Defendants dates rejected

### Value at +- \$12,000,000

- Bonus at \$1400/acre
  - Based of Recordation
  - Local pattern of leases following transaction and before <u>recording date</u>
  - Effected by cloud on title (50%)
- Perspective Income at \$1,500,000
  - Based on unlikely to be developed soon
  - Only minimal well drilled to hold lease
  - High discount rate
  - Unlikely to ever see full production

#### **Lessons Learned**

- Dates Matter:
- Gas Lease signed after transaction before recording
- Comparable "Sales" of contemporaneous date
- Geology must be considered
- Likelihood of Development Matters
- Rate of absorption or development is important
- Discount rates should match risk and circumstances
- Adjustments for reality:
  - Gas lease subsequently found defective because of title issues – discounted heavily

### Case in Point: Conclusion Total: Oil/Gas, Surface less timber with Wind farm

### Value at +- \$14,350,000

### Oil/Gas: +-\$12,000,000

- Bonus: \$1400/Acre: \$10,500,000
- Production \$200/Acre: \$1,500,000

#### Source

- Comp Leases
  - date specific
  - Discounted for title issues
  - Adjusted for location
- Income Approach
  - applied to speculative/possible reserves
  - Discount rate appropriate to risk and timing

### Surface: +- \$2,350,000

- Land with no timber rights in perpetuity: \$750,000
  - \$50 to \$100 per acre
- Speculative Wind farm: +-\$1,600,000,
  - No income
  - No development

- Comp Sales
  - Less Timber
  - Less control
- Capitalized Hunting lease
- Discussion with Wind developer
  - Likelihood of Development Matters
  - Rate of absorption or development is important

Gas Activities Effect On Housing And Commercial Values

Value IncreasesValue DecreaseTiming and Location



### Trends in "Higher" Value Housing demand:

- Temporary demand
  - During intense drilling /development period
    - After leases are "held" by drilling value to return
      - temporary housing demand diminished
  - Tends to affect the marginal properties (rentals, 'disposables')
  - Rents up / rents down
  - Can result in development of "marginal" motels etc.
- Sustained housing demand
  - Area has significant infrastructure development
  - Serves as a headquarters or staging area
  - More permanent development
    - New structures
    - Higher value development

# Trends in "Higher" Value Boom Time Examples

- Housing shortage in Greene County
  - population +-35,000
- Farmers leasing space for camper trailers at \$500 to \$600/month
- All the 5 motels are fully occupied
  - Prior to gas 2 existing motels maintained occupancy at 60+%
  - After gas development:
    - two new ones opened this past year
    - third under construction
- Common Level Ratio:
  - **2004: 88.7**
  - 2007: 86.4
  - 2010: 84.8
  - 2013: 71.1

Trends in "Higher" Value Boom Time Examples

- Williamsport area
  - Rural Areas: Shortage of Rental Units, very few occupied land transfers, prices up and rental rates up (Bradford, Susquehanna, Lycoming, Greene, rural parts of Washington)
  - Urban areas: More readily cope with surges in demand, demand while higher mimics normal market
  - Affluent areas; not interested in renting
- see Jonathan Williamson, Ph.D., Marcellus Natural Gas Developments Effect on Housing in Pennsylvania (2011

# **Negative Effects on Value**

Appears to be related to both time and location; a portion of loss based on perception

- while drilling is active value decrease because of nuisance and fear or perception of impact
- Amount of diminished value related to well water dependent vs. public water
- Nearness of well
- There is some recovery in value within 6 months of drilling (no water loss, nuisance minimized)
- Properties with public water experienced little value decrease, except during drilling period

# **Negative Effects on Value**

- Value of groundwater-dependent homes is negatively affected by nearby shale gas development.
- Homes dependent on piped water appeared to receive small benefits from that development -- drilling increases property values, likely through the boost to the local economy of increased activity.
- Wells permitted for more than a year but not yet drilled have a negative effect on property values that is larger than the positive effect from drilling in general.
  - Permitted, undrilled wells still creating a disamenity through the clearing of land, but could also be from a drop in expectations.
  - The expectation of damage is usually greater than actual effect.

Market Externalities Always Effect Somebody

Who
When
Where
How Long



## NIMBY (Not in My Backyard) Alive and Well

"The Plaintiffs have no adequate remedy at law for the injuries just described. The injuries and losses are continuing. The property and rights owned by Plaintiffs are unique and irreplaceable so that it will be impossible to measure accurately in monetary terms the damages caused..."

From a lawsuit filed by Exxon CEO Rex Tillerson and former Republican U.S. House Majority Leader Dick Armey to stop construction of a water tower that the complaint says will be used to support fracking near his horse ranch outside Dallas

(See :Wall Street Journal February 20, 2014, Exxon CEO Joins Suit Citing Fracking Concerns Residents of Dallas Suburb Fight Construction of Tower That Would Provide Water for Drilling)

# Where do we go from here?

## Questions?

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