A First Look at Production and Completion Data from the Utica-Point Pleasant Shale Play or...Having Fun with Numbers*

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Abstract

The first "Utica Play" horizontal well in the U.S. was drilled by Range Resources in 2010 in Beaver County, Pennsylvania followed closely by wells in Ohio by Chesapeake Energy. Even though most refer to this as the "Utica Play", the Point Pleasant Formation is the primary target and producing interval. The Point Pleasant consists of interbedded light gray to black limestones, brown to black organic-rich calcareous shales, and, quite often, brachiopod coquina layers. The overlying Utica Shale is mostly light gray to black calcareous shales with few limestone layers and is, in general, more massive and denser than the Point Pleasant. In most wells analyzed, the Point Pleasant has higher source rock potential than within the Utica. Clay content of the Point Pleasant is fairly low (5-20%) while the overlying Utica can be 30-40%. Low water saturation is also prevalent (5-20%) and post-fracture "soaking" periods appear to be effective.

Most of the drilling in this play thus far has been concentrated in Ohio where operators have found the best section of the Point Pleasant Formation in a wet gas window. Until recently, it has been difficult to assemble sufficient completion and production information from public sources to provide any meaningful analysis of the play and its potential. Necessary infrastructure development slowed early completions and production. Until June of 2013, Ohio only required annual production statements from oil and gas operators, and since then quarterly production statements have been required.

Quarterly production statements and completion reports are now available for over 500 producing Utica-Point Pleasant wells allowing us to finally look at geology, completion methodology and resultant production. We have created a database that contains many factors from each well including: total lateral length, number of fracture stages, stage spacing, rest periods, reported initial production, average daily production, depth, and location. These items have been compared and mapped along with geologic factors to provide an early analysis of the geology and production from this still-developing play.

Reference Cited

Wickstrom, L.H., J.D. Gray, and R.D. Stieglitz, 1992, Stratigraphy, structure, and production history of the Trenton Limestone (Ordovician) and adjacent strata in northwestern Ohio: Ohio Department of Natural Resources, Division of Geological Survey Report of Investigations 143, 78 p.

A First Look at Production and Completion Data from

The Utica-Point Pleasant Shale Play

Or…
Having Fun with Numbers

Larry Wickstrom and Marty Shumway

2014 Eastern Section AAPG
London, Ontario

BACK TO THE SOURCE

Wickstrom Geoscience, LLC

SHUMWAY RESOURCES, LLC

Independent Statistics & Analysis

U.S. Energy Information Administration

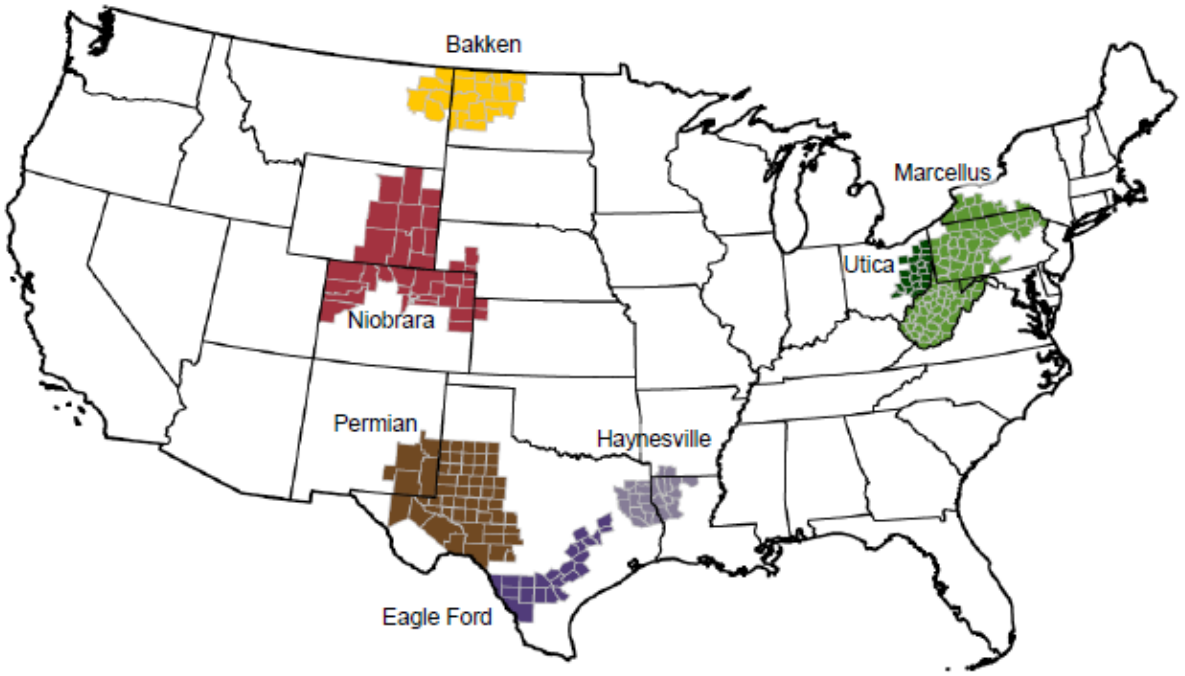
September 2014

The "Play" Makes the Big Time!

Drilling Productivity Report

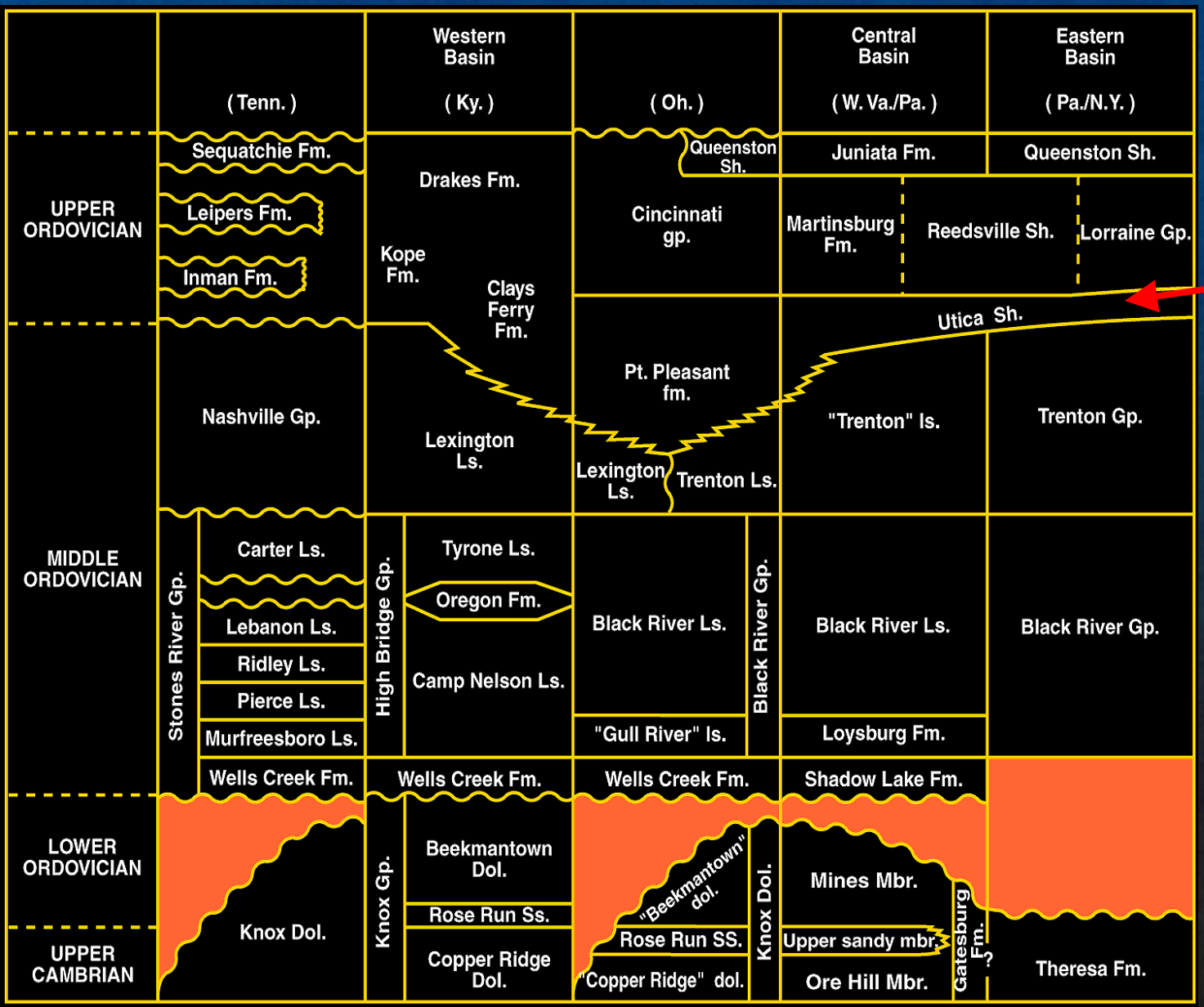
For key tight oil and shale gas regions

EIA lists the Utica Play with the other "Big Six" plays in their reporting



The seven regions analyzed in this report accounted for 95% of domestic oil production growth and all domestic natural gas production growth during 2011-13.

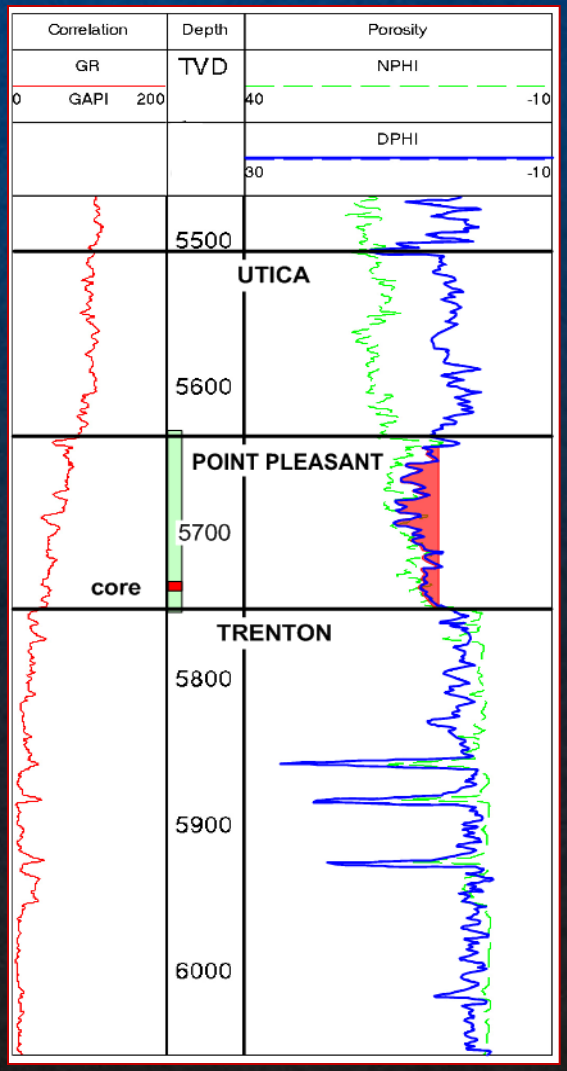
A Quick Look At Utica-Point Pleasant Stratigraphy



The Point Pleasant is, in part, the lateral equivalent of the upper portion of the Trenton Limestone and is in a gradational relationship with the overlying Utica Shale, which thickens into the Appalachian Basin.

Wickstrom, 1992

The presence, thickness, fracability, and source-rock-richness, of the Point Pleasant Formation are the primary factors that make this play.



COSHOCTON COUNTY BARTH #3

- Low density shale
- AVG TOC = 2.78
- High TOC = 7.3
- High carbonate %
- Responds to HCL
- Interbedded limestone and black shale

Energy Equivalence VS Economic Equivalence

In the past, when the price of oil and gas were somewhat linked, it made sense to compare oil and gas production on an energy equivalence basis, which is roughly:

1 BO = 6 MCF

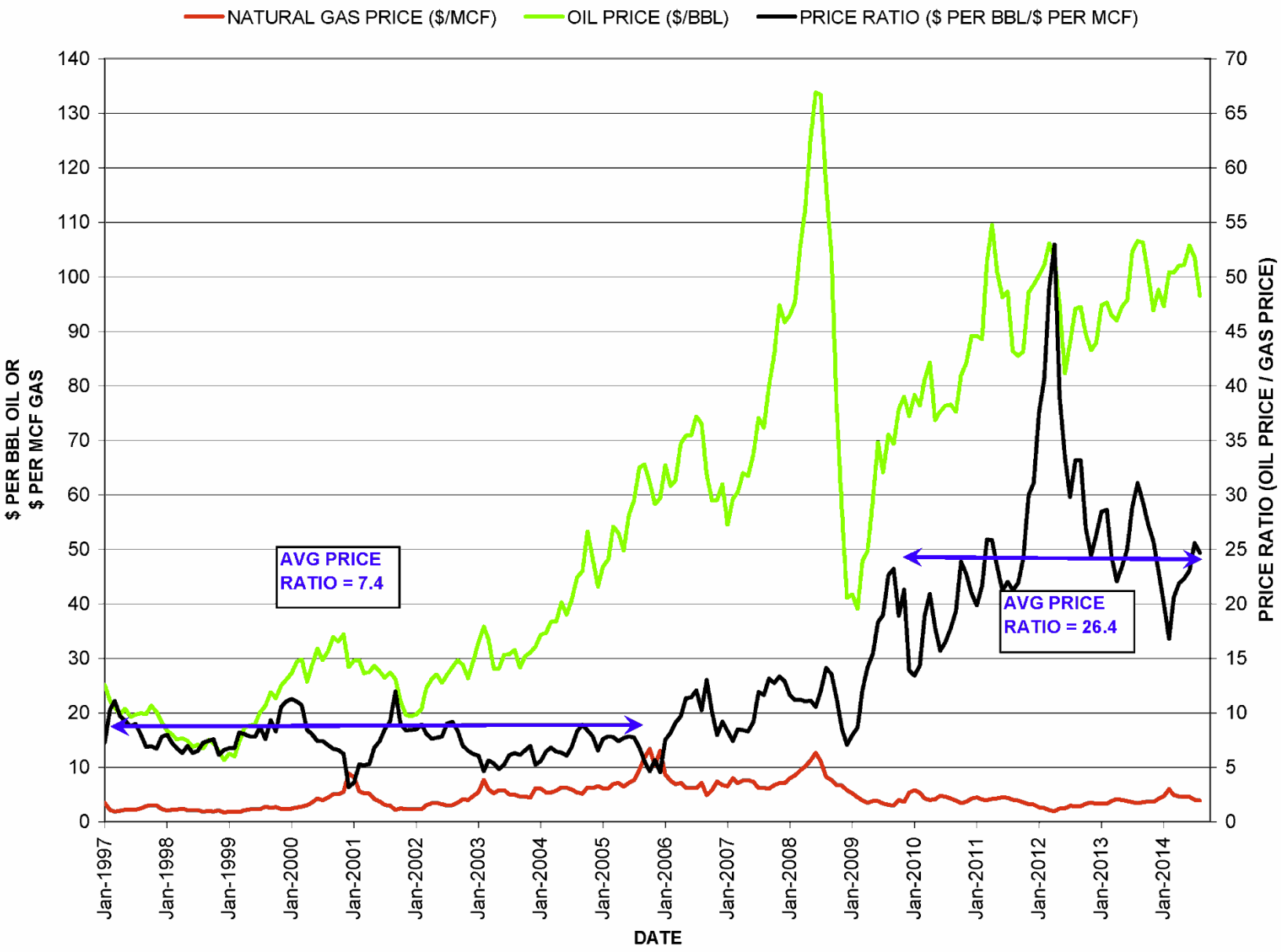
But with oil and gas prices being completely unlinked now, and price swings so prevalent, especially for natural gas, things are not so easy to compare. One way is to use an economic equivalent to try to even out the value received for the different commodities. If oil is $80 and gas is $4/MCF, then this factor is about:

1BO = 20 MCF

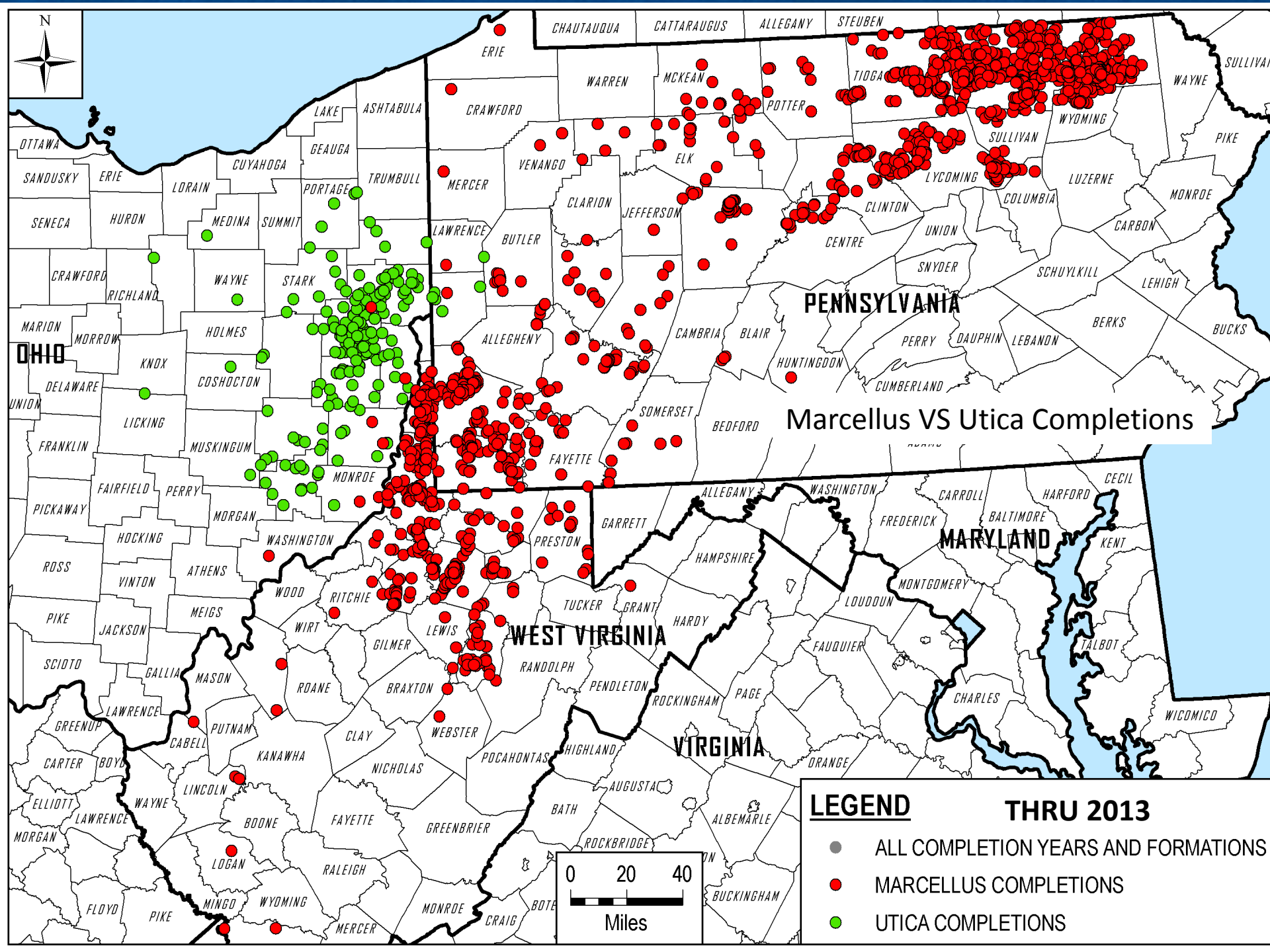
Using these different equivalence factors can yield fairly large differences in our comparisons, rankings, etc.

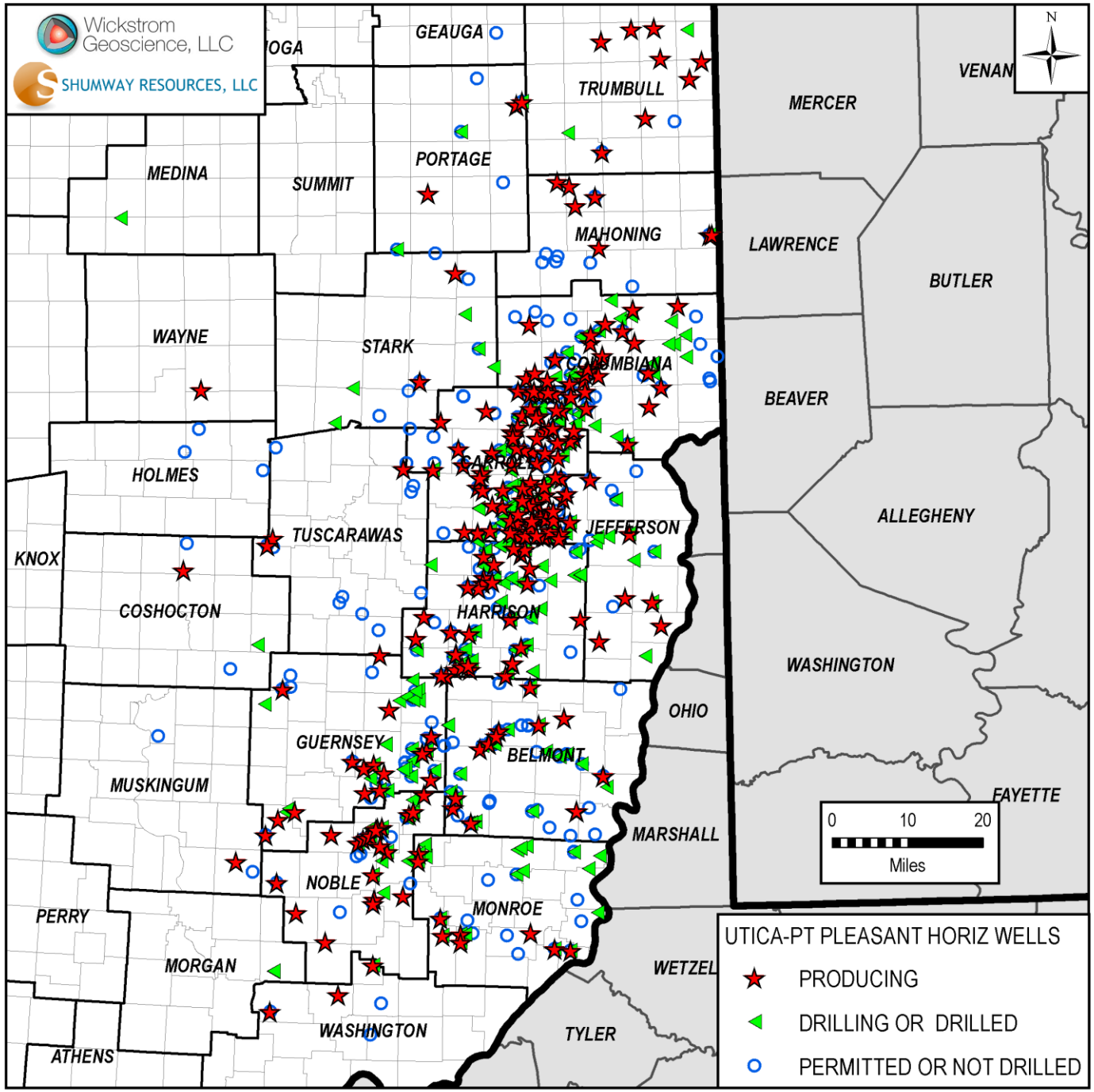
Of course, throwing natural gas liquids (NGL) and their price swings into the picture further complicates any such analysis. NGL yields are not publically reported in Ohio.

Oil vs Natural Gas Prices and Price Ratio – 1997 thru September 2014



Source: EIA


Marcellus VS Utica Completions
PENNSYLVANIA
OHIO
WEST VIRGINIA
MARYLAND
VIRGINIA
CHAUTAUQUA
CATTARAUGUS
ALLEGANY
STEUBEN
ERIE
WARREN
MCKEAN
POTTER
TIOGA
WAYNE
SULLIVAN
WYOMING
PIKE
LAKE
ASHTABULA
CRAWFORD
VENANGO
ELK
LYCOMING
LUZERNE
MONROE
OTTAWA
SANDUSKY
ERIE
GEAUGA
CUYAHOGA
TRUMBULL
MERCER
CLARION
JEFFERSON
CLINTON
COLUMBIA
CARBON
LORAIN
PORTAGE
SENECA
HURON
MEDINA
SUMMIT
LAWRENCE
BUTLER
CENTRE
UNION
SNYDER
SCHUYLKILL
LEHIGH
CRAWFORD
RICHLAND
WAYNE
STARK
MARION
MORROW
HOLMES
ALLEGHENY
CAMBRIA
BLAIR
PERRY
DAUPHIN
LEBANON
BERKS
BUCKS
KNOX
HUNTINGDON
DELAWARE
COSHOCTON
CUMBERLAND
UNION
LICKING
SOMERSET
BEDFORD
FRANKLIN
MUSKINGUM
FAYETTE
MONROE
FAIRFIELD
PERRY
ALLEGANY
WASHINGTON
CARROLL
HARFORD
CECIL
PICKAWAY
MORGAN
GARRETT
FREDERICK
BALTIMORE
HOCKING
WASHINGTON
PRESTON
HAMPSHIRE
KENT
ROSS
VINTON
ATHENS
WOOD
RITCHIE
TUCKER
GRANT
HARDY
MONTGOMERY
LOUDOUN
PIKE
JACKSON
MEIGS
WIRT
LEWIS
GILMER
RANDOLPH
FAUQUIER
TALBOT
SCIOTO
GALLIA
MASON
ROANE
BRAXTON
PENDLETON
ROCKINGHAM
PAGE
CHARLES
WICOMICO
LAWRENCE
GREENUP
PUTNAM
CABELL
CLAY
WEBSTER
POCAHONTAS
HIGHLAND
ORANGE
CARTER
BOYD
KANAWHA
NICHOLAS
AUGUSTA
ELLIOTT
WAYNE
LINCOLN
BATH
ALBEMARLE
LAWRENCE
BOONE
FAYETTE
GREENBRIER
MORGAN
ROCKBRIDGE
LOGAN
RALEIGH
BUCKINGHAM
FLOYD
PIKE
MINGO
WYOMING
MONROE
CRAIG
MERCER
0
20
40
Miles
LEGEND
THRU 2013
ALL COMPLETION YEARS AND FORMATIONS
MARCELLUS COMPLETIONS
UTICA COMPLETIONS



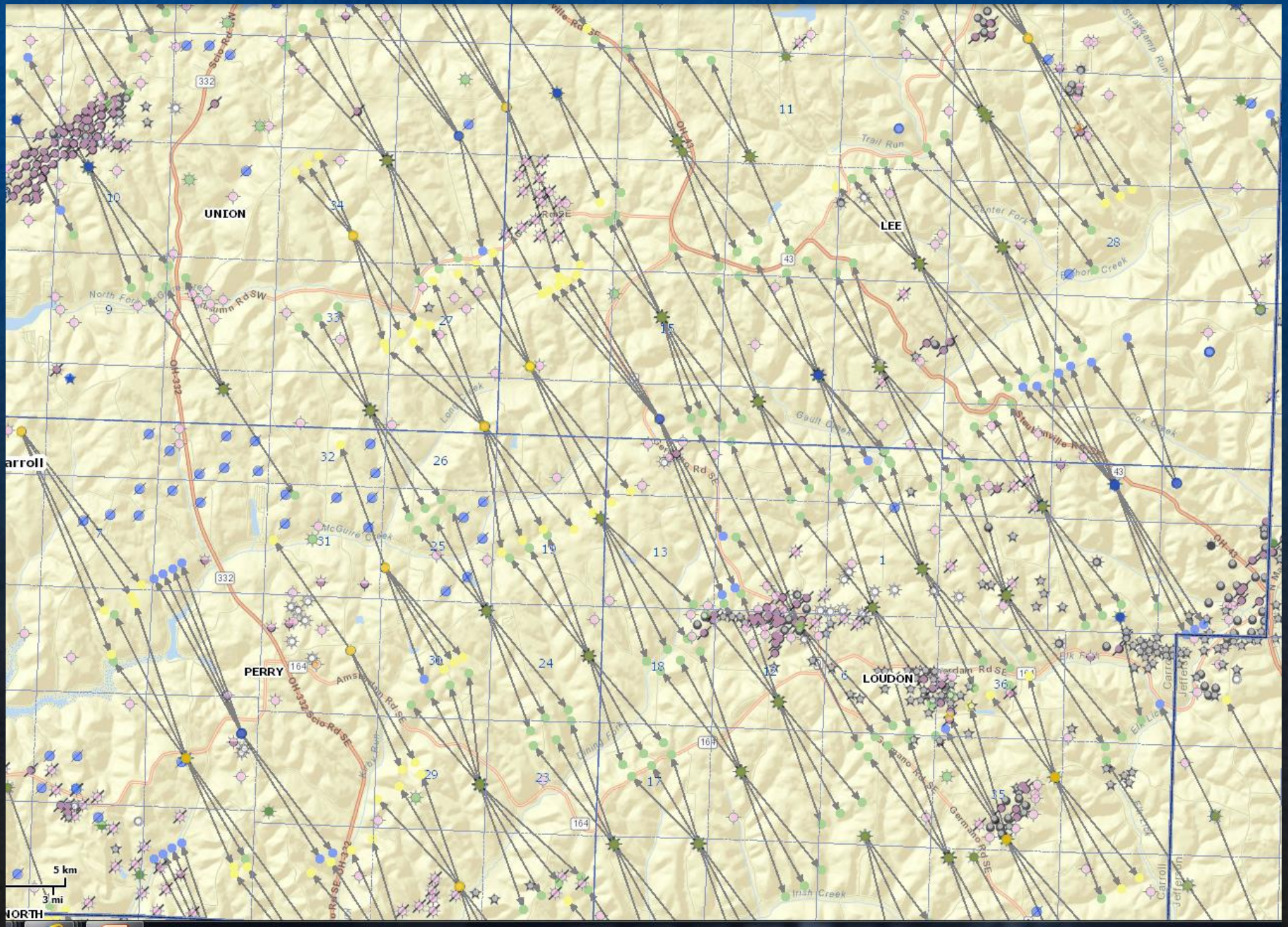
Map of Utica Activity in Ohio Thru 9-20-14

Permits – 1,520
Drilled - 1,081

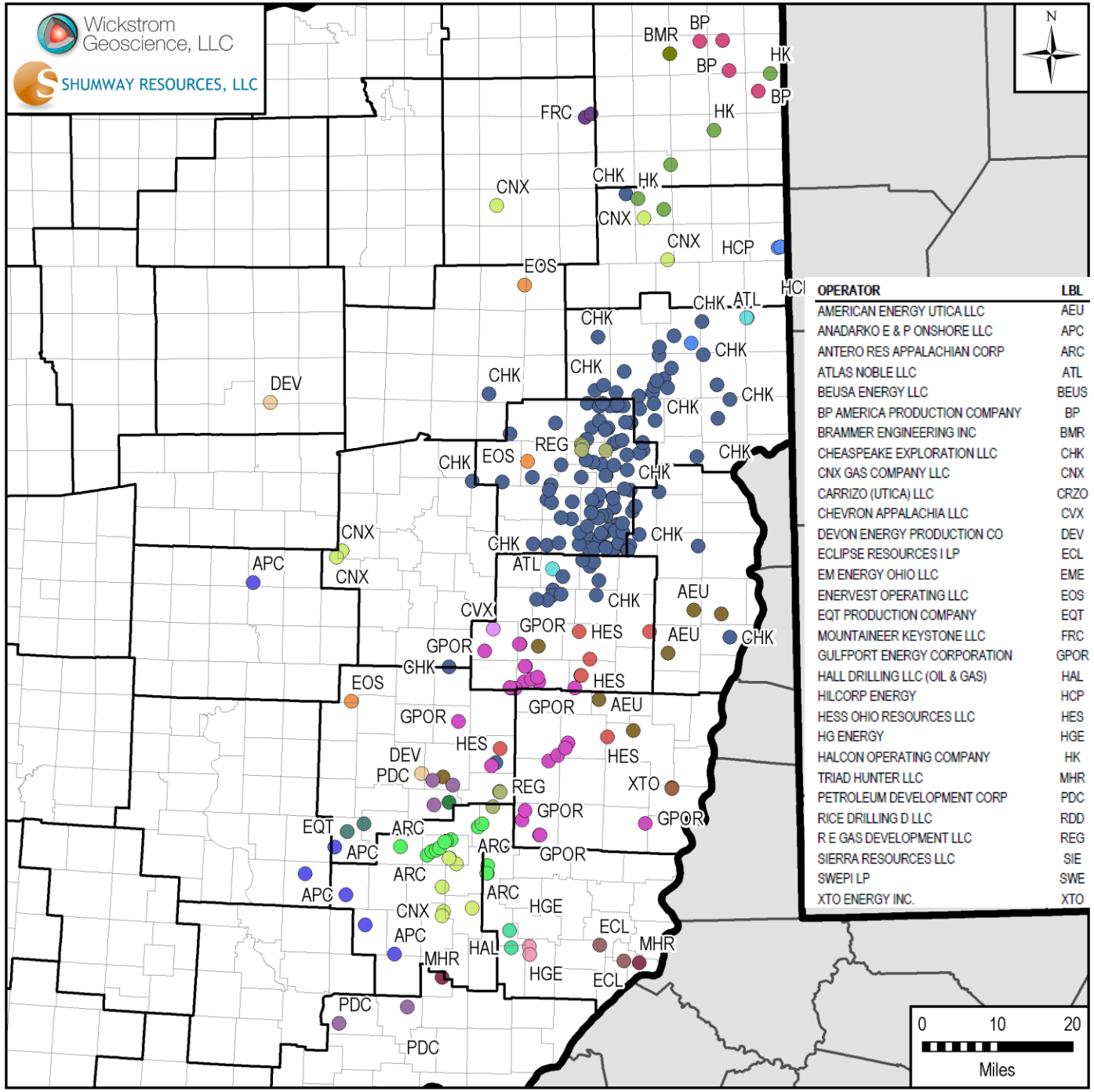
Rigs – 44

Production filed For ~ 530 wells Thru 6-30-14

Southeast Carroll County, Ohio – CHK in Development Drilling Mode

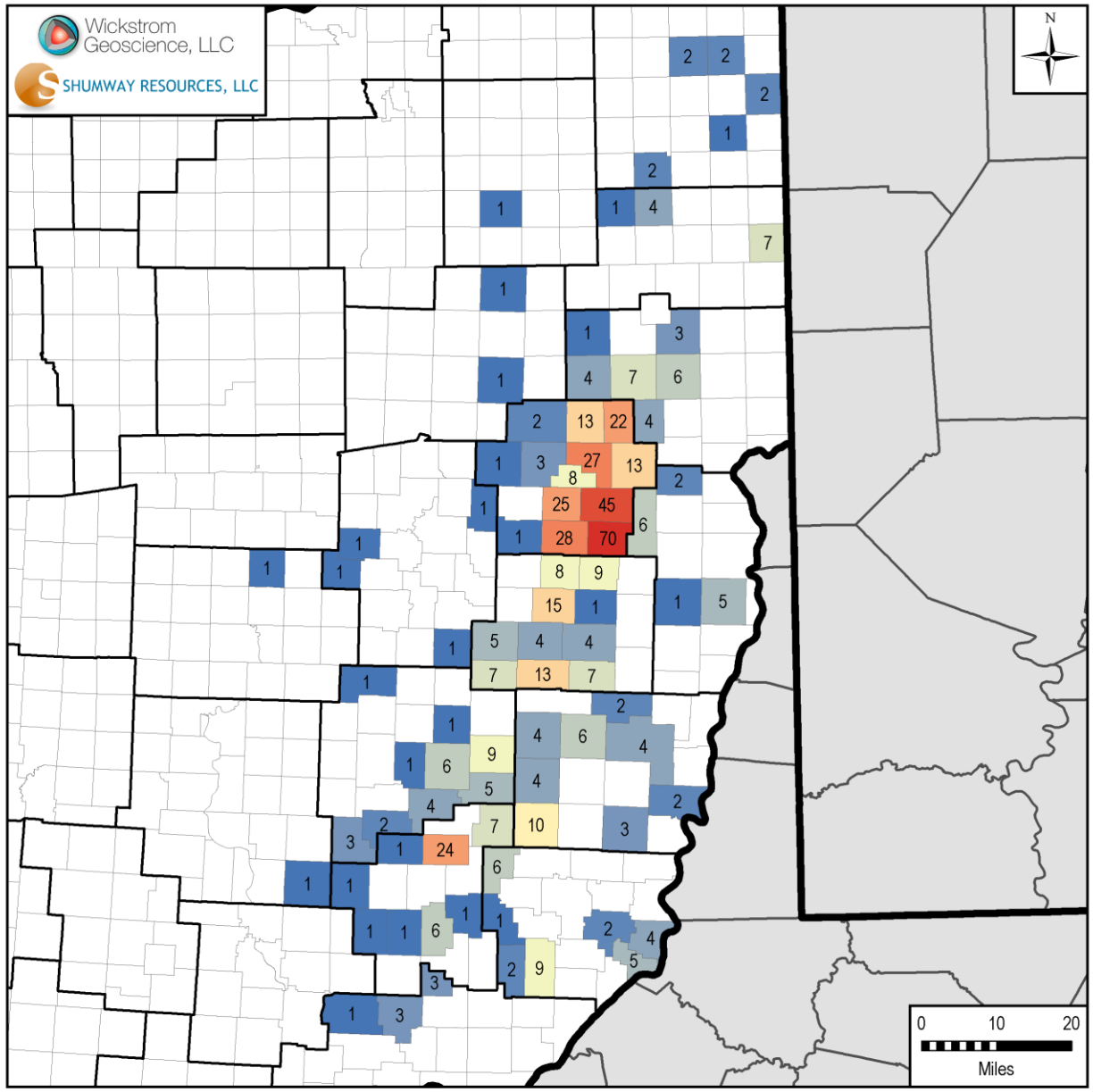


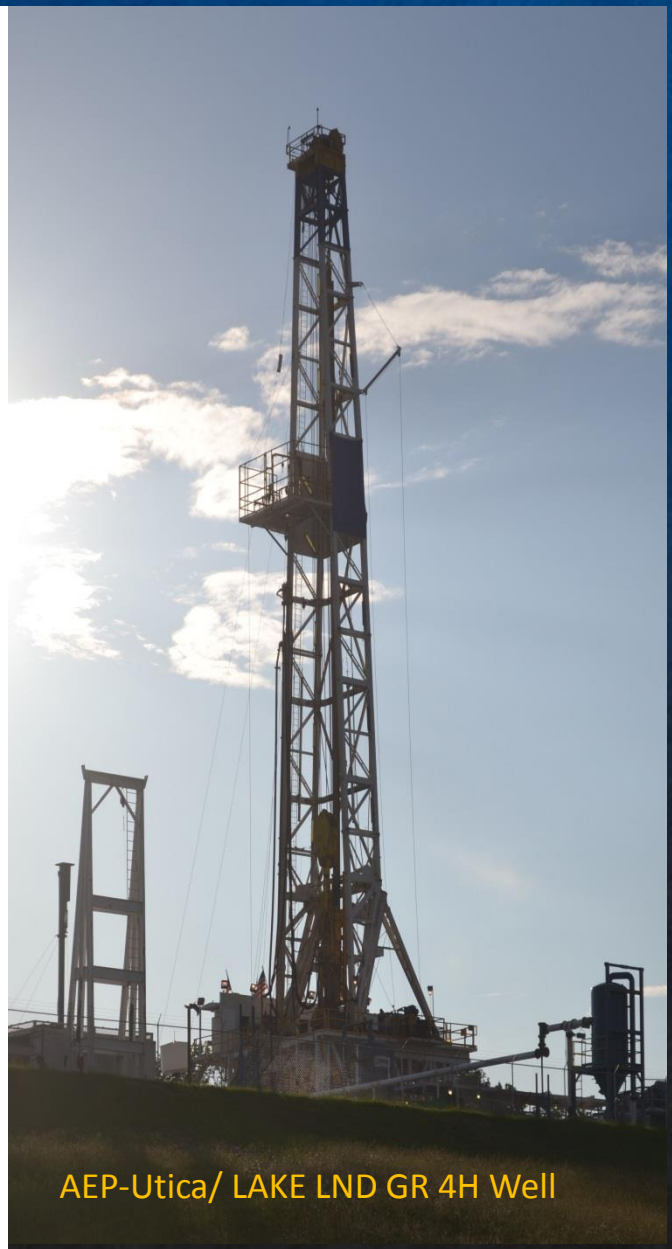
PRODUCING WELLS BY OPERATOR



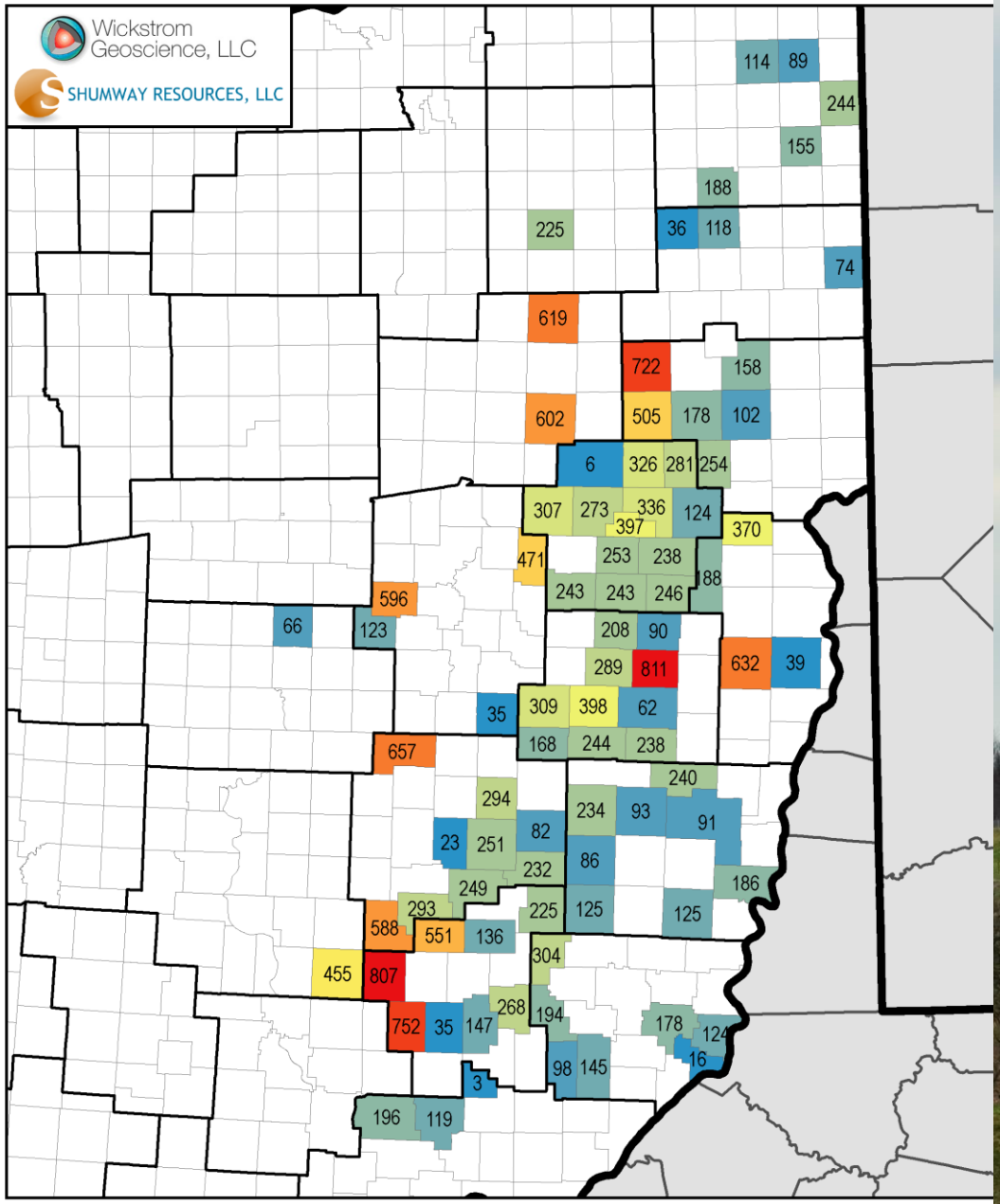
OPERATOR	LBL
AMERICAN ENERGY UTICA LLC	AEU
ANADARKO E & P ONSHORE LLC	APC
ANTERO RES APPALACHIAN CORP	ARC
ATLAS NOBLE LLC	ATL
BEUSA ENERGY LLC	BEUS
BP AMERICA PRODUCTION COMPANY	BP
BRAMMER ENGINEERING INC	BMR
CHEASPEAKE EXPLORATION LLC	CHK
CNX GAS COMPANY LLC	CNX
CARRIZO (UTICA) LLC	CRZO
CHEVRON APPALACHIA LLC	CVX
DEVON ENERGY PRODUCTION CO	DEV
ECLIPSE RESOURCES I LP	ECL
EM ENERGY OHIO LLC	EME
ENERVEST OPERATING LLC	EOS
EQT PRODUCTION COMPANY	EQT
MOUNTAINEER KEYSTONE LLC	FRC
GULFPORT ENERGY CORPORATION	GPOR
HALL DRILLING LLC (OIL & GAS)	HAL
HILCORP ENERGY	HCP
HESS OHIO RESOURCES LLC	HES
HG ENERGY	HGE
HALCON OPERATING COMPANY	HK
TRIAD HUNTER LLC	MHR
PETROLEUM DEVELOPMENT CORP	PDC
RICE DRILLING D LLC	RDD
R E GAS DEVELOPMENT LLC	REG
SIERRA RESOURCES LLC	SIE
SWEPI LP	SWE
XTO ENERGY INC.	XTO

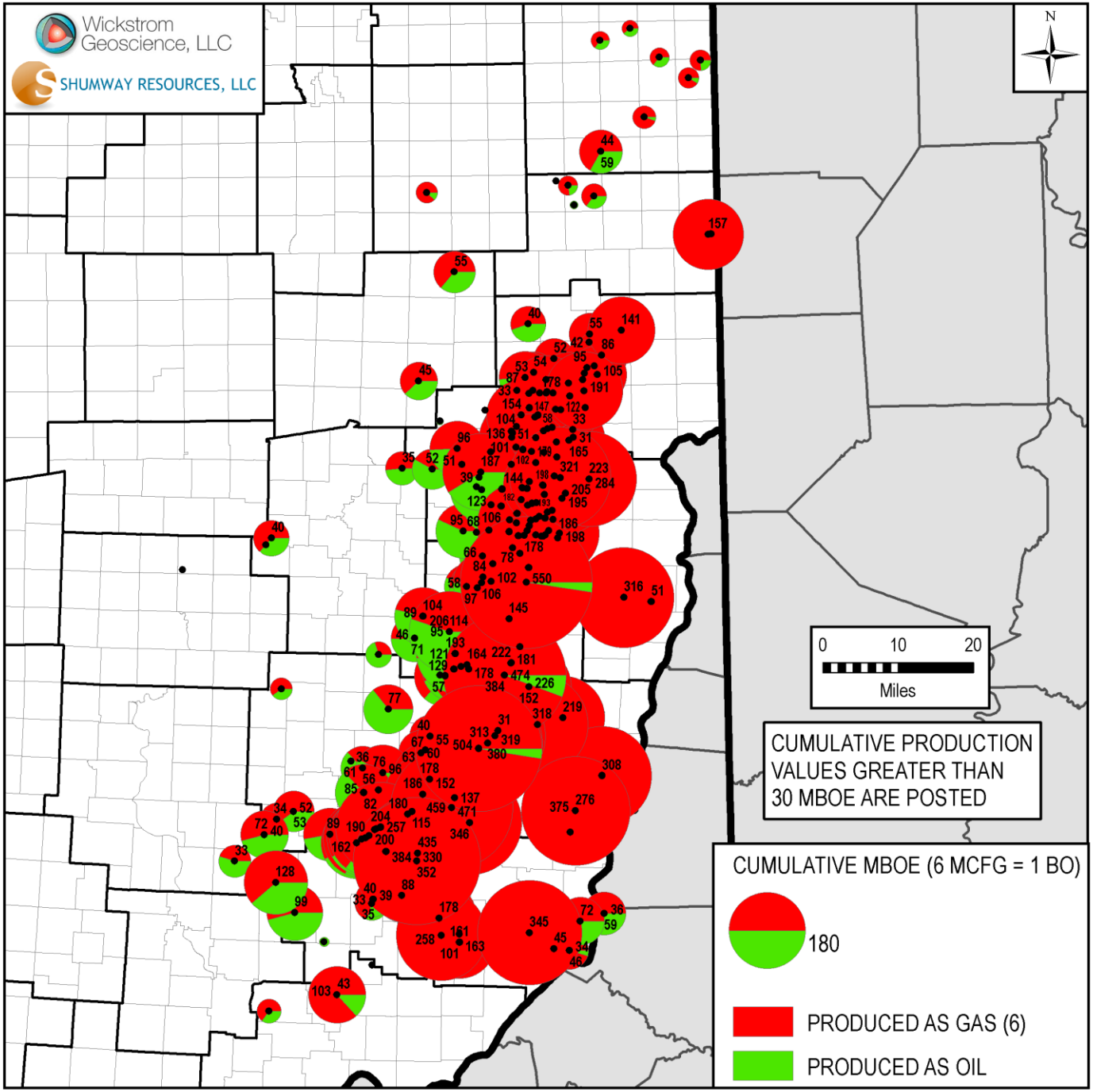
Number of Reported Producing Wells by Township Thru 6-30-14





AVERAGE PRODUCTION DAYS PER WELL BY TOWNSHIP

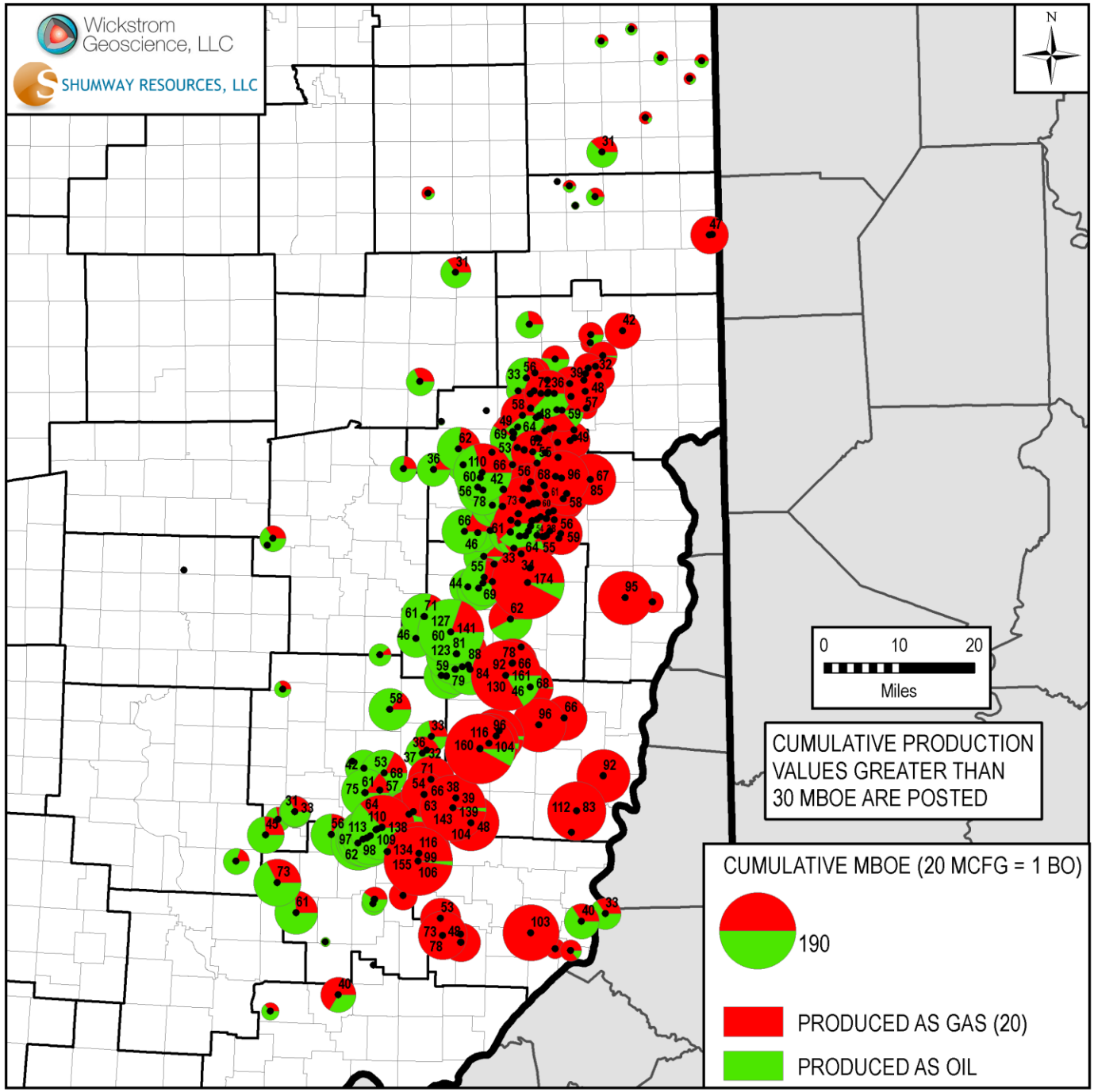




Cumulative Production Reported Per Well

Shown as Energy Equivalence

1 BO = 6 MCFG



Cumulative Production Reported Per Well

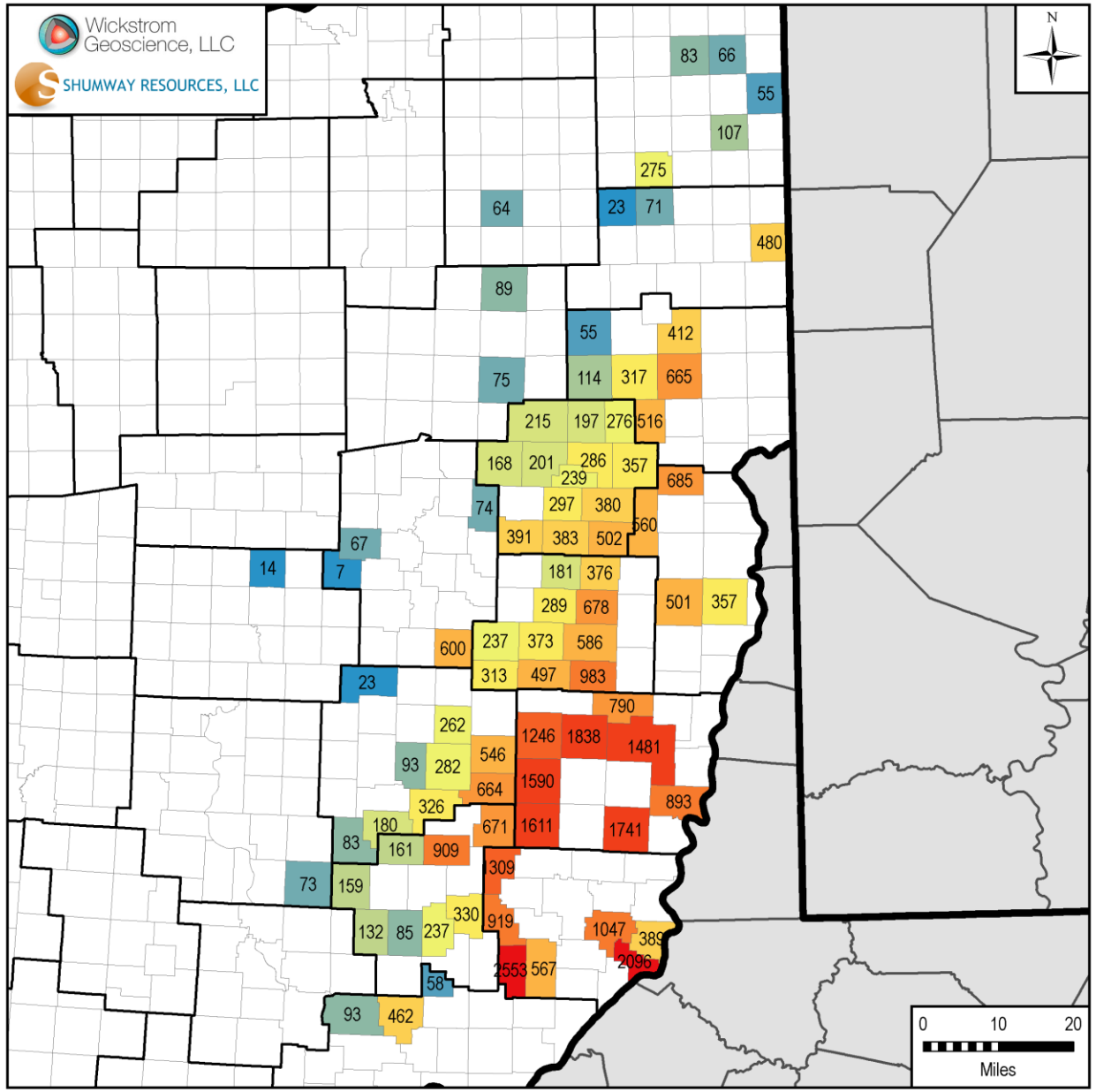
Shown as Economic Equivalence

1 BO = 20 MCFG

Economic Equivalence reduces size of dry gas wells, increases size of oilier wells

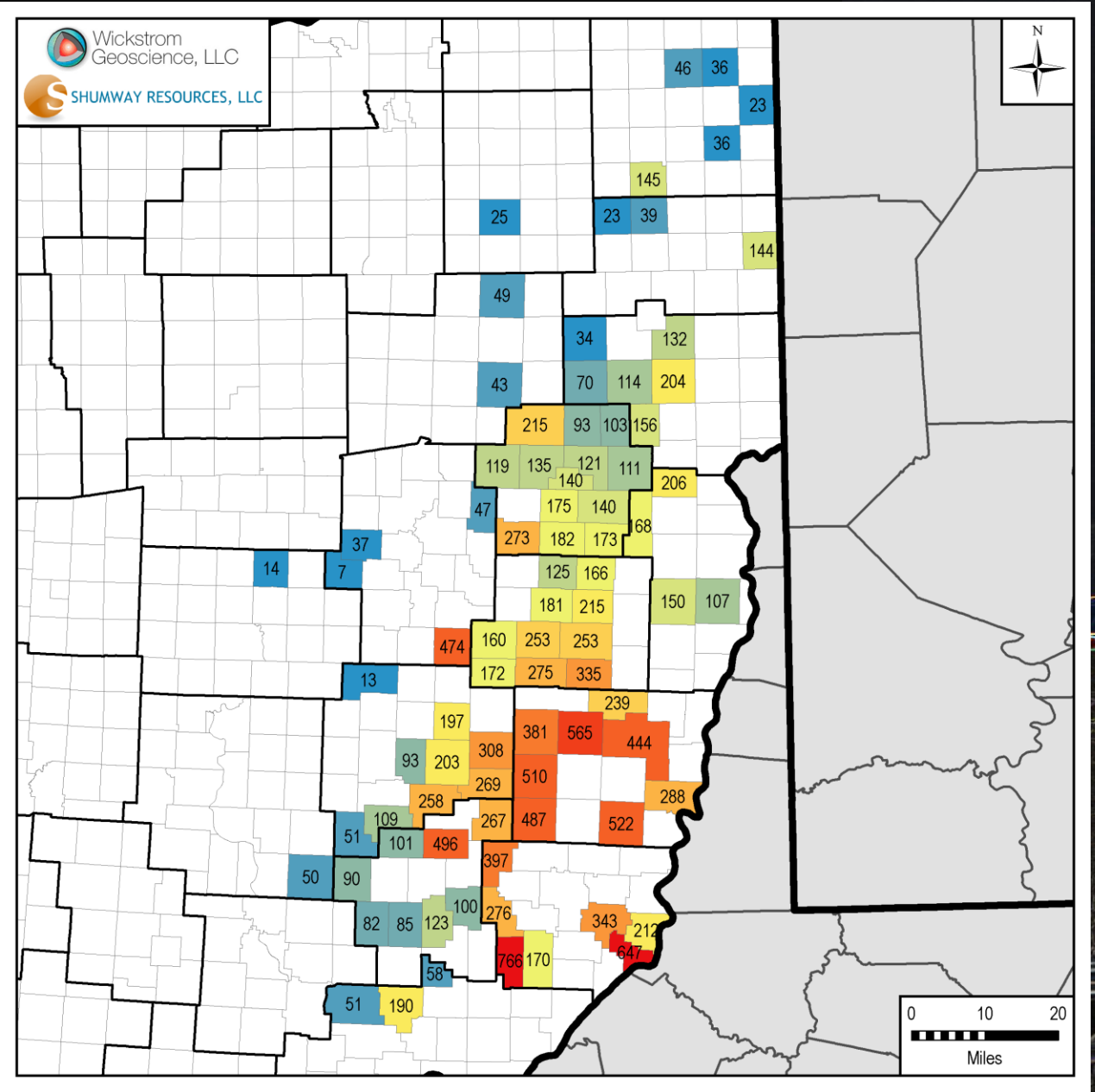
If we could include NGL's the wet window wells would be larger also

Average Barrels of Oil Equivalent Per Day (BOEPD) - energy equivalence - by Township

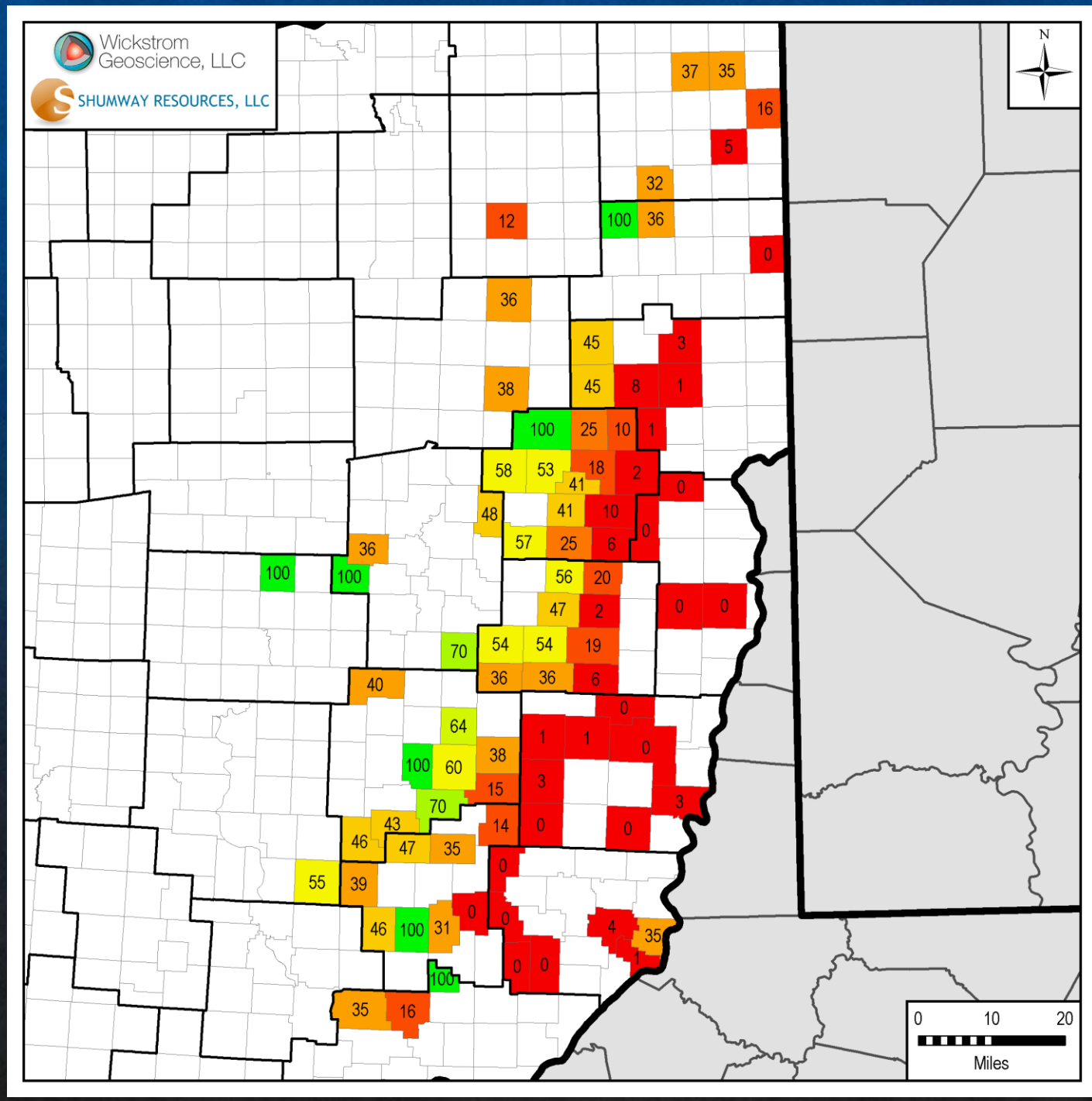


Background image – CHK's Walker 12-12-5

Average Barrels of Oil Equivalent Per Day (BOEPD) - economic equivalence - by Township



Background image – rendition of Hess_CNXGUE 10N7W from I-70



Percent of Cumulative Production Reported to date That is Oil

Top 25 Utica Gas Wells
Production thru 2nd QTR 2014

RANK	API_WELLNO	COUNTY	Company	LEASE_NM	WELL_NO	DOL	GasMMCF	OilMBO
1	34067210570100	HARRISON	CHESAPEAKE EXPLORATION LLC	ROYALTY CO BUELL	8H	811	3219	13.02
2	34111243740000	MONROE	ANTERO RESOURCES CORPORATION	GARY UNIT	2H	231	3040	3.12
3	34013206580100	BELMONT	GULFPORT ENERGY CORPORATION	SHUGERT	1-12H	310	2947	13.11
4	34013206770000	BELMONT	GULFPORT ENERGY CORPORATION	MCCORT	2-28H	292	2809	2.72
5	34013206720000	BELMONT	GULFPORT ENERGY CORPORATION	MCCORT	1-28H	294	2743	1.69
6	34067211270000	HARRISON	GULFPORT ENERGY CORPORATION	WAGNER	3-28H	402	2681	26.76
7	34111243690000	MONROE	ANTERO RESOURCES CORPORATION	ET RUBEL UNIT	2H	325	2578	4.88
8	34111243700000	MONROE	ANTERO RESOURCES CORPORATION	ET RUBEL UNIT	3H	321	2295	1.22
9	34013206570100	BELMONT	GULFPORT ENERGY CORPORATION	SHUGERT	1-1H	377	2258	3.48
10	34013206750100	BELMONT	GULFPORT ENERGY CORPORATION	IRONS	1-4H	197	2248	0.02
11	34111243310100	MONROE	ANTERO RESOURCES CORPORATION	ET RUBEL UNIT	1H	314	2237	1.63
12	34067210620100	HARRISON	GULFPORT ENERGY CORPORATION	WAGNER	1-28H	465	2173	21.78
13	34111243620000	MONROE	ANTERO RESOURCES CORPORATION	YONTZ UNIT	1H	312	2112	0.17
14	34013206650100	BELMONT	GULFPORT ENERGY CORPORATION	STUTZMAN	1-14H	175	2073	0.08
15	34111243610100	MONROE	ECLIPSE RESOURCES I LP	TIPPENS UNIT	6HS	183	2067	0.00
16	34013206880000	BELMONT	GULFPORT ENERGY CORPORATION	SHUGERT	3-1H	189	2029	2.45
17	34111243630000	MONROE	ANTERO RESOURCES CORPORATION	NORMAN UNIT	1H	318	1976	0.23
18	34019220900100	CARROLL	CHESAPEAKE EXPLORATION LLC	TANNER 24-12-4	10H	414	1925	0.03
19	34013206790000	BELMONT	HESS OHIO RESOURCES LLC	LUDE # 1H-34	1H-34	220	1910	0.02
20	34013207090000	BELMONT	GULFPORT ENERGY CORPORATION	FAMILY	1-32H	170	1901	2.23
21	34081205030000	JEFFERSON	AMERICAN ENERGY UTICA LLC	NAC GAS UNIT B	3H-3	632	1898	0.07
22	34013207070000	BELMONT	GULFPORT ENERGY CORPORATION	FAMILY	3-32H	168	1858	3.00
23	34013206540100	BELMONT	XTO ENERGY INC.	KALDOR	1H	201	1848	0.00
24	34013207080000	BELMONT	GULFPORT ENERGY CORPORATION	FAMILY	2-32H	166	1807	2.65
25	34067211260000	HARRISON	GULFPORT ENERGY CORPORATION	WAGNER	2-28H	259	1721	6.43

DOL = Days on Line

Top 25 Utica Oil Wells
Production thru 2nd QTR 2014

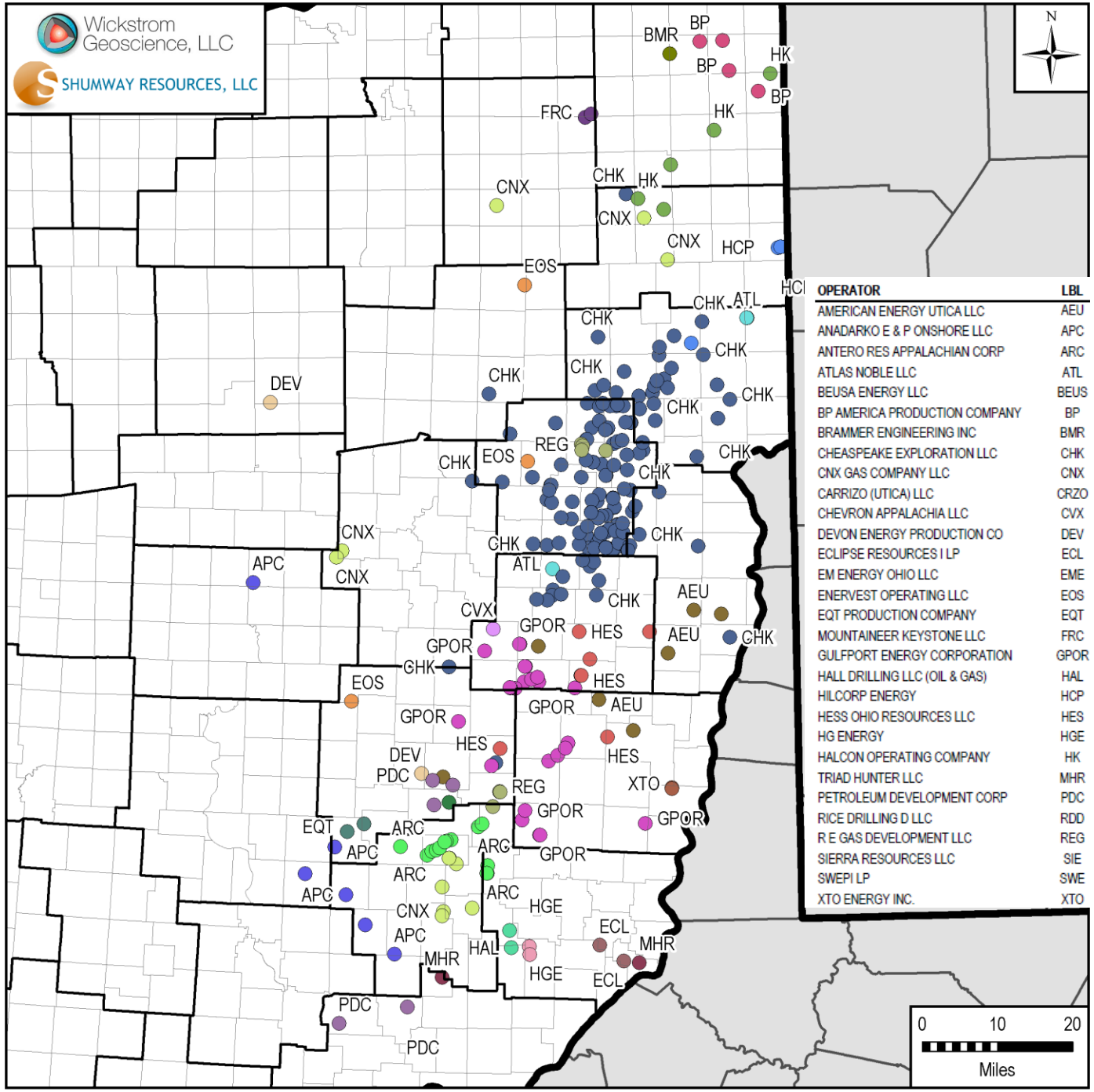
RANK	API_WELLNO	COUNTY	Company	LEASE_NM	WELL_NO	DOL	GasMMCF	OilMBO
1	34067210650100	HARRISON	GULFPORT ENERGY CORPORATION	BOY SCOUT	1-33H	490	557	113.57
2	34067210960000	HARRISON	GULFPORT ENERGY CORPORATION	BOY SCOUT	2-33H	325	437	105.07
3	34067211250000	HARRISON	GULFPORT ENERGY CORPORATION	RYSER	3-25H	233	599	92.98
4	34121244330000	NOBLE	ANTERO RESOURCES CORPORATION	MYRON	1H	98	1019	86.72
5	34121244280000	NOBLE	ANTERO RESOURCES CORPORATION	NEUHART UNIT	3H	155	662	79.52
6	34019220850000	CARROLL	CHESAPEAKE EXPLORATION LLC	BURGETT 7-15-6	8H-RS	570	659	77.23
7	34121243870000	NOBLE	ANTERO RESOURCES CORPORATION	WAYNE UNIT	3HA	306	780	69.57
8	34121244320000	NOBLE	ANTERO RESOURCES CORPORATION	MYRON UNIT	2H	99	812	69.11
9	34121244100000	NOBLE	ANTERO RESOURCES CORPORATION	MILEY UNIT	2H	286	557	69.02
10	34059242430000	GUERNSEY	PDC ENERGY INC	STIERS	3-H	314	228	64.02
11	34121244120000	NOBLE	ANTERO RESOURCES CORPORATION	COAL UNIT	3H	159	689	63.76
12	34121244110000	NOBLE	ANTERO RESOURCES CORPORATION	COAL UNIT	2H	150	764	60.09
13	34019221640000	CARROLL	CHESAPEAKE EXPLORATION LLC	RUTLEDGE 10-14-6	6H	408	387	58.80
14	34067211400000	HARRISON	GULFPORT ENERGY CORPORATION	RYSER	4-25H	220	442	58.68
15	34067210970000	HARRISON	GULFPORT ENERGY CORPORATION	BOY SCOUT	5-33H	456	338	57.82
16	34059242730100	GUERNSEY	CARRIZO (UTICA) LLC	RECTOR	1-H	118	0	57.37
17	34059242920000	GUERNSEY	PDC ENERGY INC	DETWEILER	3H	207	246	57.16
18	34067211180000	HARRISON	GULFPORT ENERGY CORPORATION	STOUT	2-28H	416	435	56.76
19	34067210900000	HARRISON	CHEVRON APPALACHIA LLC	KINSEY	1-24 HD	322	289	56.17
20	34059242240000	GUERNSEY	PDC ENERGY INC	DETWEILER	42-3H	424	241	56.11
21	34059242440000	GUERNSEY	PDC ENERGY INC	STIERS	2-H	274	177	55.12
22	34067212610000	HARRISON	GULFPORT ENERGY CORPORATION	MICHAEL	1-23H	119	651	55.11
23	34019221560000	CARROLL	CHESAPEAKE EXPLORATION LLC	GARTRELL 23-13-6	8H	243	245	54.13
24	34121244270000	NOBLE	ANTERO RESOURCES CORPORATION	SCHEETZ UNIT	2H	126	484	53.05
25	34067210690000	HARRISON	CHESAPEAKE EXPLORATION LLC	12-6	1H	344	319	53.00

DOL = Days on Line

PRODUCTION BY OPERATOR – SORTED BY DESCENDING BOE PER DAY (20mcfg = 1bo)

COMPANY	WELLS	AVG DAYS ONLINE	AVG BOED20	AVG BOED6
HALL DRILLING LLC (OIL & GAS)	3	130	603	2010
ANTERO RESOURCES CORPORATION	31	191	597	1254
ECLIPSE RESOURCES I LP	5	80	498	1622
CARRIZO (UTICA) LLC	1	118	486	486
HESS OHIO RESOURCES LLC	1	220	434	1447
GULFPORT ENERGY CORPORATION	61	197	375	976
TRIAD HUNTER LLC	6	54	356	956
HESS OHIO DEVELOPMENTS LLC	11	110	231	521
HG ENERGY LLC	9	145	218	726
CHEVRON APPALACHIA LLC	2	323	204	300
PDC ENERGY INC	13	226	196	312
AMERICAN ENERGY UTICA LLC	7	207	195	647
R E GAS DEVELOPMENT LLC	16	300	188	468
HILCORP ENERGY COMPANY	8	110	187	623
STATOIL USA ONSHORE PROP INC	1	222	182	326
XTO ENERGY INC.	3	126	182	558
CHESAPEAKE EXPLORATION LLC	312	252	175	421
CNX GAS COMPANY LLC	14	165	162	293
ATLAS NOBLE LLC	5	289	99	136
EQT PRODUCTION COMPANY	3	292	96	159
DEVON ENERGY PRODUCTION CO	1	23	93	93
HALCON OPERATING COMPANY INC	6	185	83	165
ANADARKO E & P ONSHORE LLC	7	513	60	88
BRAMMER ENGINEERING INC	1	109	53	96
ENERVEST OPERATING L	3	647	52	85
BP AMERICA PRODUCTION COMPANY	3	162	34	69

PRODUCING WELLS BY OPERATOR



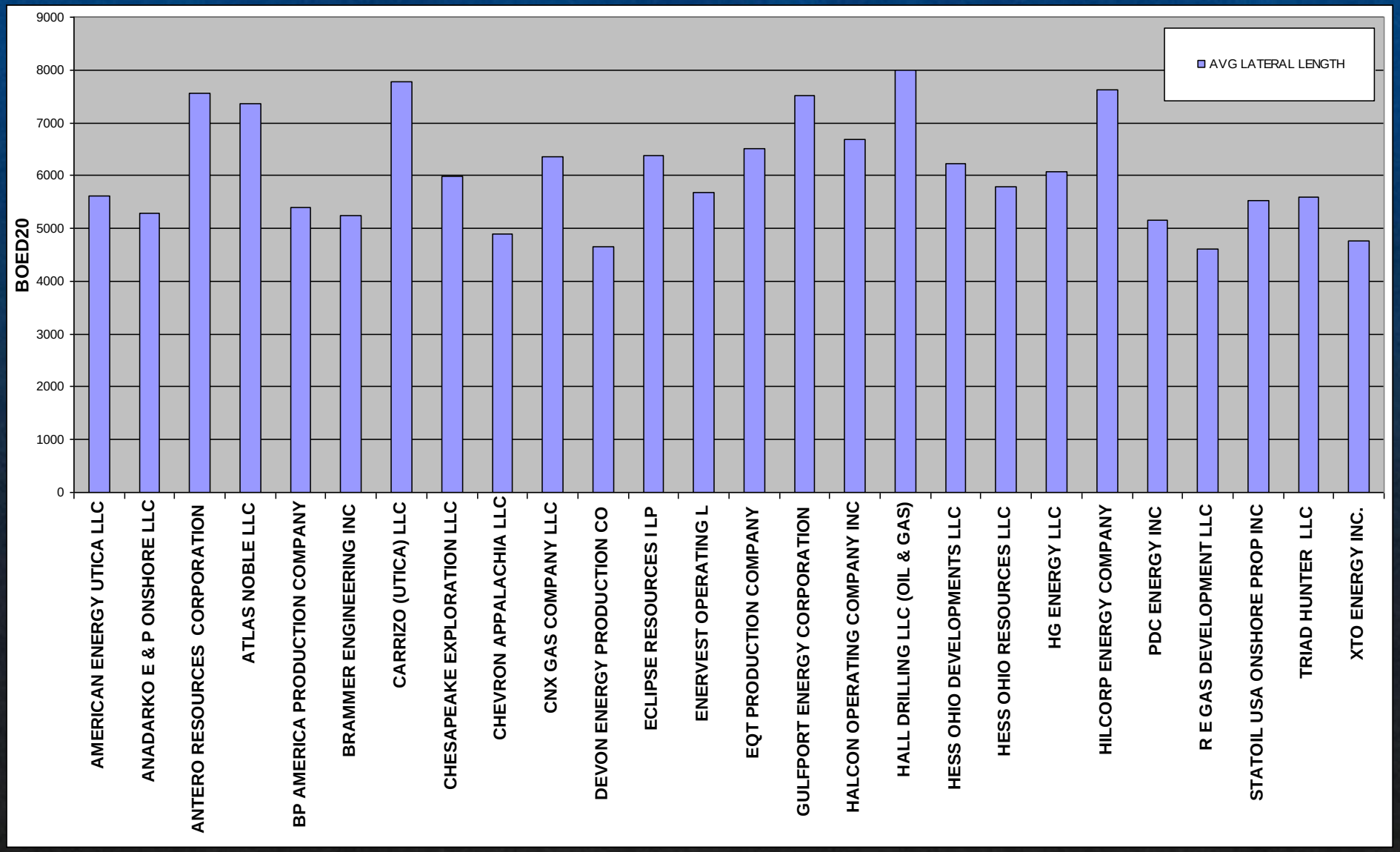
OPERATOR	LBL
AMERICAN ENERGY UTICA LLC	AEU
ANADARKO E & P ONSHORE LLC	APC
ANTERO RES APPALACHIAN CORP	ARC
ATLAS NOBLE LLC	ATL
BEUSA ENERGY LLC	BEUS
BP AMERICA PRODUCTION COMPANY	BP
BRAMMER ENGINEERING INC	BMR
CHEASPEAKE EXPLORATION LLC	CHK
CNX GAS COMPANY LLC	CNX
CARRIZO (UTICA) LLC	CRZO
CHEVRON APPALACHIA LLC	CVX
DEVON ENERGY PRODUCTION CO	DEV
ECLIPSE RESOURCES I LP	ECL
EM ENERGY OHIO LLC	EME
ENERVEST OPERATING LLC	EOS
EQT PRODUCTION COMPANY	EQT
MOUNTAINEER KEYSTONE LLC	FRC
GULFPORT ENERGY CORPORATION	GPOR
HALL DRILLING LLC (OIL & GAS)	HAL
HILCORP ENERGY	HCP
HESS OHIO RESOURCES LLC	HES
HG ENERGY	HGE
HALCON OPERATING COMPANY	HK
TRIAD HUNTER LLC	MHR
PETROLEUM DEVELOPMENT CORP	PDC
RICE DRILLING D LLC	RDD
R E GAS DEVELOPMENT LLC	REG
SIERRA RESOURCES LLC	SIE
SWEPI LP	SWE
XTO ENERGY INC.	XTO

Top 10 Lateral Lengths in Utica Wells

(Calculated from surface hole to bottom hole location)

RANK	API_WELLNO	COUNTY	Company	LEASE_NM	WELL_NO	LENGTH	SumOfOIL	SumOfGAS	DOL
1	34121244330000	NOBLE	ANTERO RESOURCES CORPORATION	MYRON	1H	12048.8	86715	1018778	98
2	34121244320000	NOBLE	ANTERO RESOURCES CORPORATION	MYRON UNIT	2H	11138.8	69105	812145	99
3	34099231960000	MAHONING	HILCORP ENERGY COMPANY	POLAND-CLL2	5H	10608.7	0	118531	22
4	34019222570000	CARROLL	CHESAPEAKE EXPLORATION LLC	JC ACRES 12-12-5	3H	10549.9	25164	688163	169
5	34121244130000	NOBLE	CNX GAS COMPANY LLC	PROPERTIES CO	U	10496.6	2489	2545	5
6	34013206990000	BELMONT	GULFPORT ENERGY CORPORATION	STUTZMAN	3-14H	10404.2	16	527492	75
7	34013206900000	BELMONT	GULFPORT ENERGY CORPORATION	SHUGERT	3-12H	10363.9	1538	106907	13
8	34121243960100	NOBLE	CNX GAS COMPANY LLC	PROPERTIES CO	U	10160.4	4390	62106	11
9	34013206970000	BELMONT	GULFPORT ENERGY CORPORATION	SHUGERT	4-12H	10086.0	1686	116509	14
10	34013206960000	BELMONT	GULFPORT ENERGY CORPORATION	MCCORT	4-28H	9994.7	397	298931	31
11	34013206910000	BELMONT	GULFPORT ENERGY CORPORATION	SHUGERT	2-12H	9810.5	1	2632	6
12	34111244090000	MONROE	HALL DRILLING LLC (OIL & GAS)	HERCHER NORTH	1H	9738.4	0	1550369	103
13	34099231850200	MAHONING	HILCORP ENERGY COMPANY	POLAND-CLL1	1AH	9694.0	100	938581	394
14	34111244140100	MONROE	HALL DRILLING LLC (OIL & GAS)	HERCHER NORTH	2HA	9671.0	0	1467346	94
15	34013206770000	BELMONT	GULFPORT ENERGY CORPORATION	MCCORT	2-28H	9528.2	2719	2808823	292

AVERAGE LATERAL LENGTH BY OPERATOR



Infrastructure Constraints

Development of pipelines, processing and fractionation facilities has slowed completions and severely limited production on many producing wells to date. This is becoming less of a problem in some areas and most of the core play area should have ample infrastructure by the end of 2015.

MarkWest's Cadiz, Ohio Gas Processing Plant

Production Records in Ohio

Ohio did not require production reporting until 1972
– and then only annual by lease/meter

In 1983 annual production statements by well were required
– 1983 to present is all available in digital format

Very little enforcement had been aimed at policing production statements

With the shale plays coming into the state & desires for increasing severance taxes…

Quarterly production records for large Shale Wells Only have been required since June 2013 – and records are now cross-checked with the Department of Taxation

Only 5 wells had production in 2011, 81 in 2012

~ 530 wells now have production records on file from the Utica Play

Production in Ohio

Ohio's Conventional Production has been on the decline since 1984

In 2010 the State produced 4.8 Million Barrels of Oil and 78.1 BCF of Gas

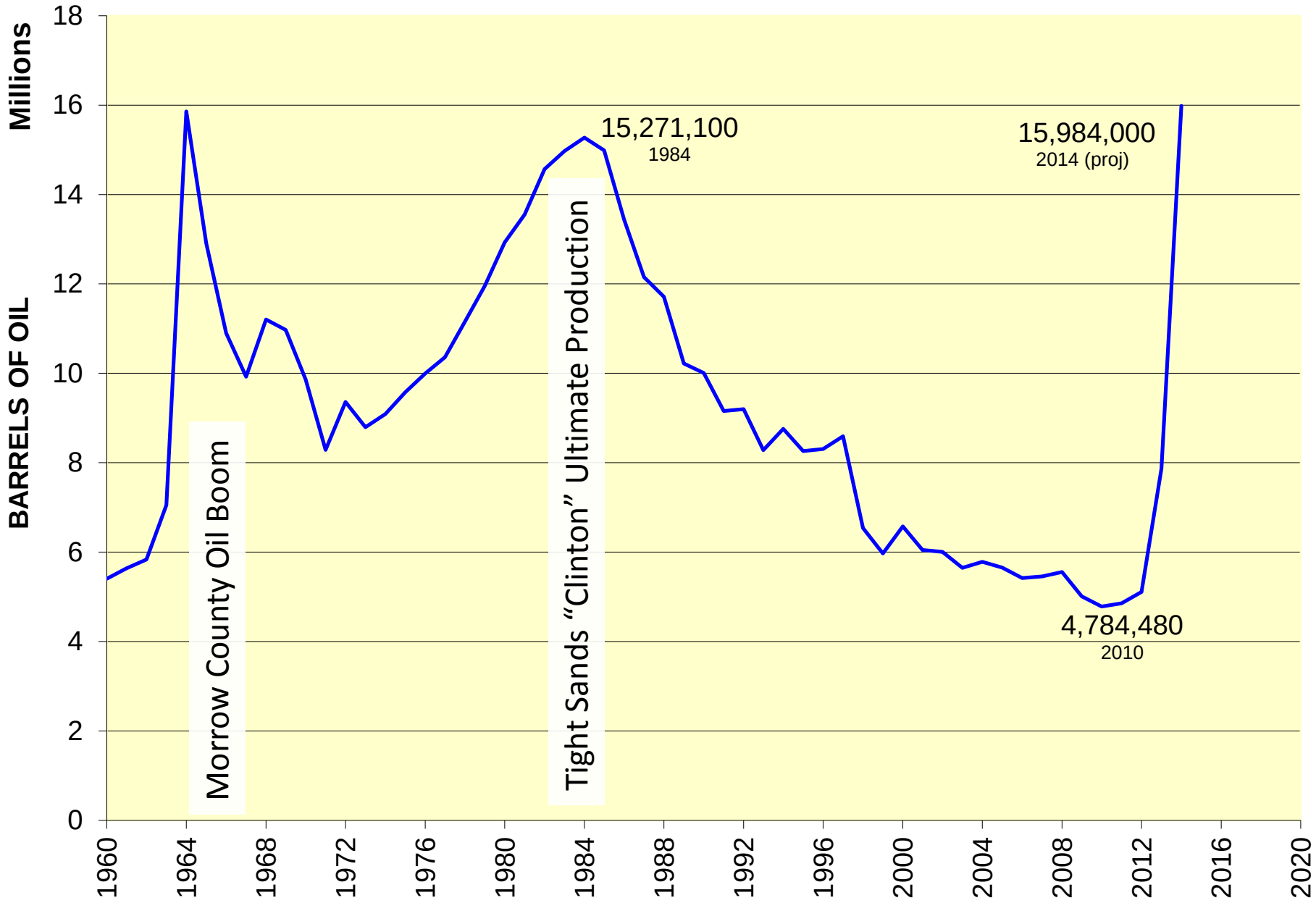
Or about 13,722 BOPD and 214,032 MCFPD

In the 2nd Quarter of 2014 the Utica-Point Pleasant wells alone produced

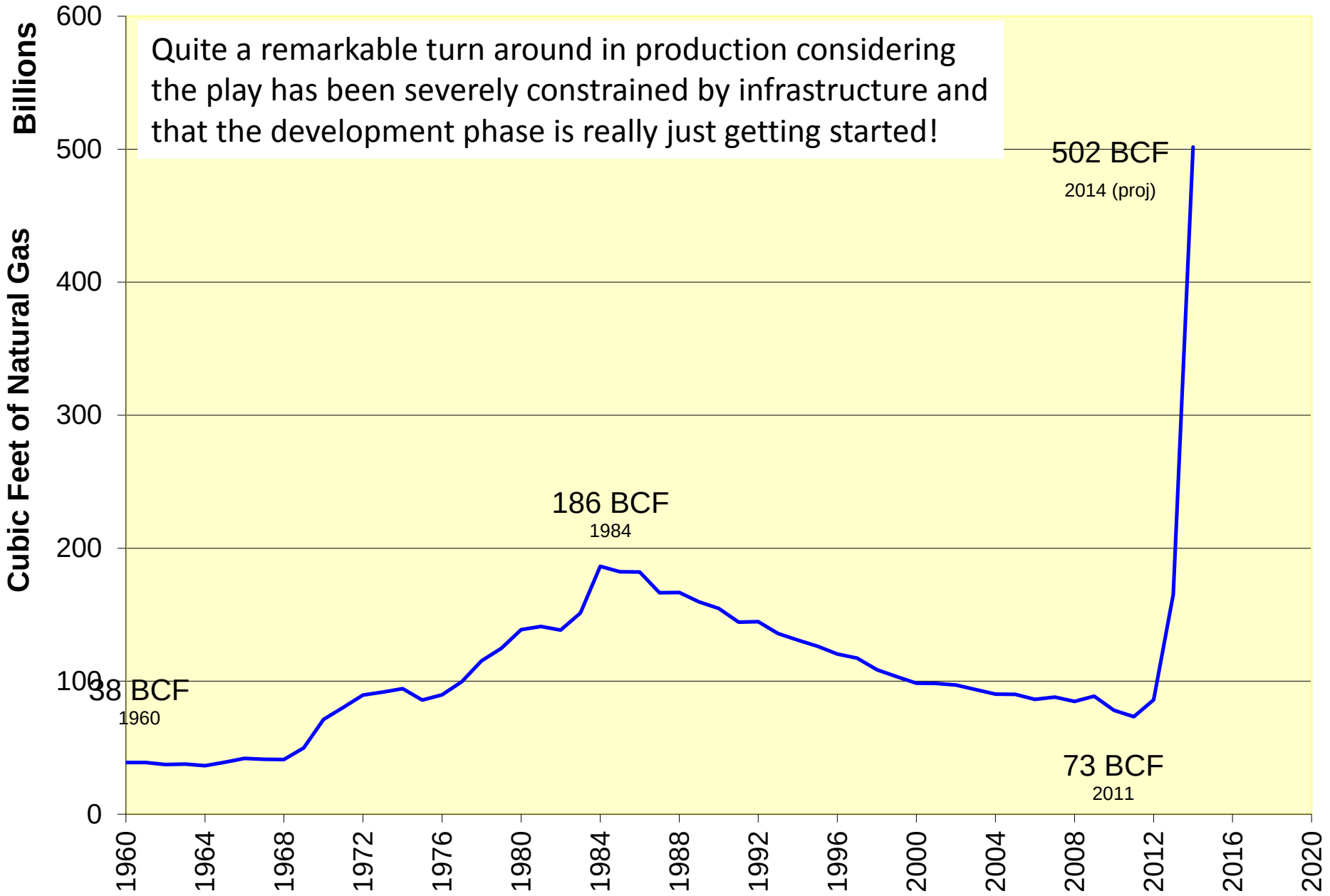
2.5 Million Barrels of Oil and 88.7 BCF of Gas = 27,113 BOPD and 974,437 MCFPD
= More than 2X the daily rate for oil and 4.5X for natural gas compared to 2010

So, doing a conservative estimate/projection of Ohio's oil & gas production for 2014 yields the following astounding numbers:

Ohio Yearly Crude Oil Production



Ohio Annual Natural Gas Production



It is GREAT to see this economic development happening in an area of this great state that can really use it!

Thank You!!!

Wickstrom Geoscience, LLC

SHUMWAY RESOURCES, LLC

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