

The Debrosse Memorial Report 2016 Oil & Gas Activity in Ohio



70th Annual Winter Meeting



SHUMWAY RESOURCES, LLC

JAMES KNOBLOCH
PETROLEUM CONSULTANTS INC.



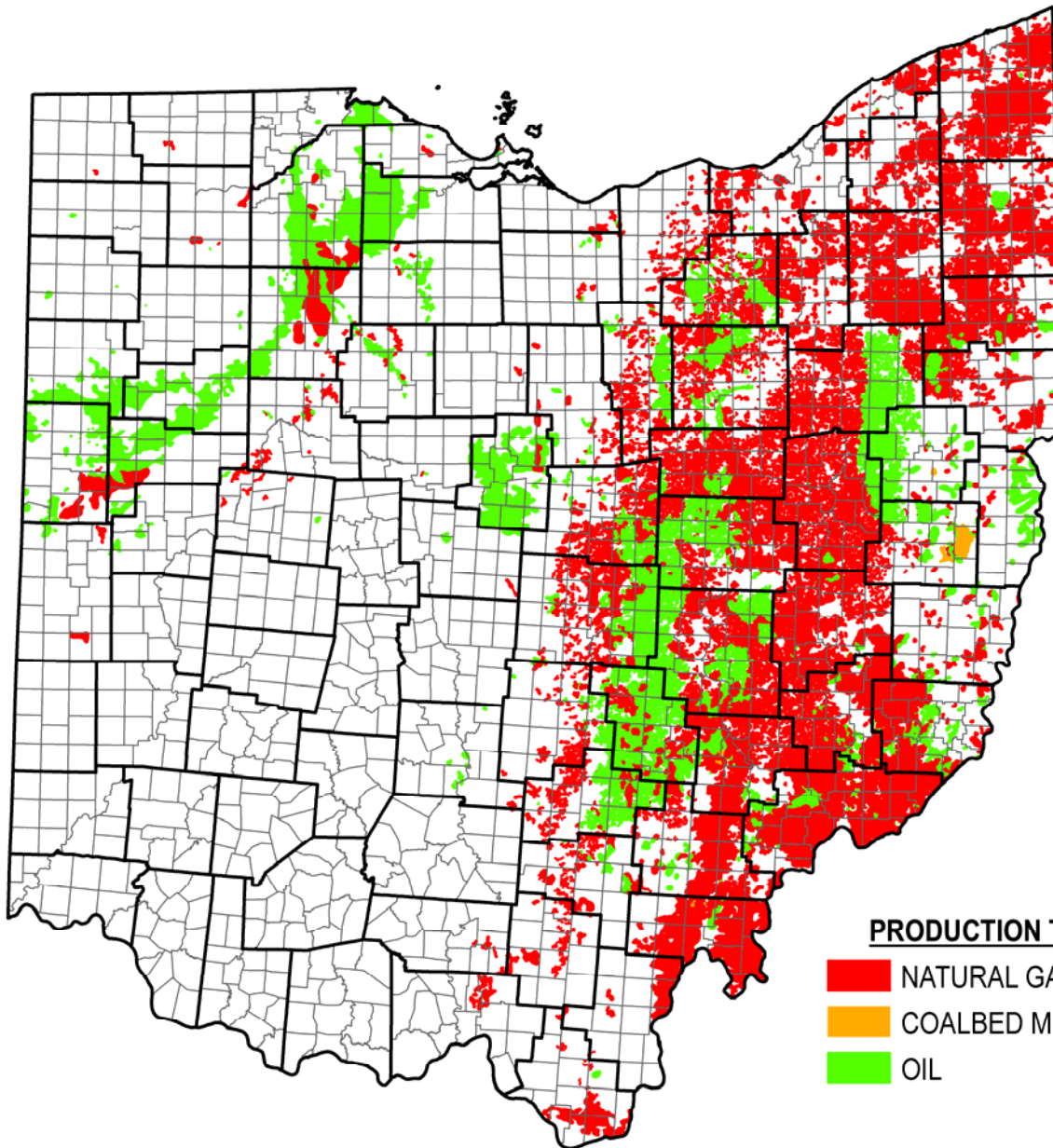
Prepared by:

Marty Shumway – Locus Bio-Energy Solutions LLC; Shumway Resources LLC
Bill Arnholt - Northwood Energy Corporation
Tim Knobloch - James Knobloch Petroleum Consultants, Inc.

The Debrosse Memorial Report 2016 Oil & Gas Activity in Ohio - Outline

- General overview of Ohio oil & gas production
- Permits & completion summaries
- Operator activity (footage drilled, number of wells)
- Activity by county (footage drilled, number of wells)
- IP analysis for horizontal wells
- Change of owners
- Production summary
- Utica EUR summary
- Class II injection well summary

Oil & Gas Production in Ohio



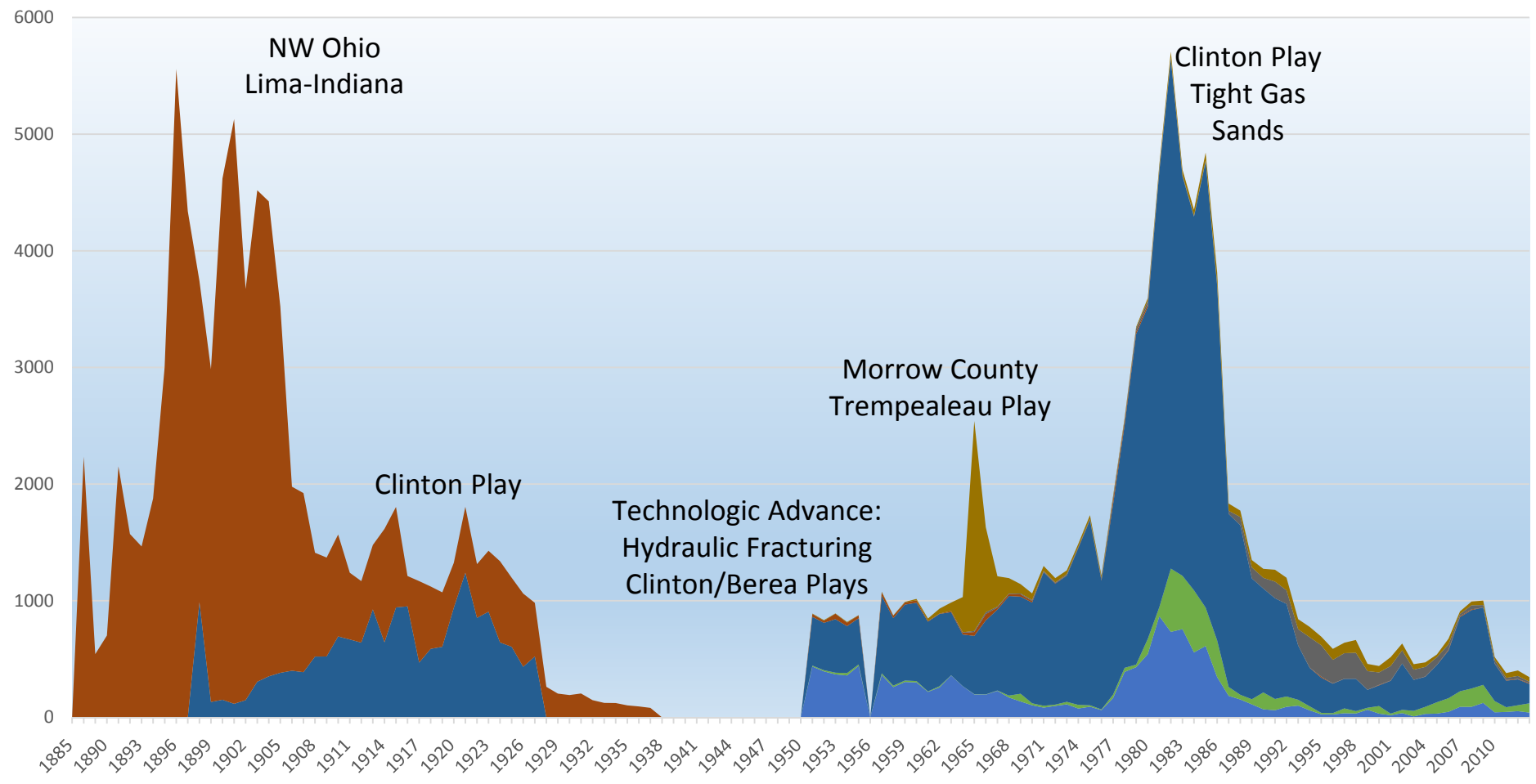
- More than 275,000 oil and gas wells drilled in Ohio since 1860
- More than 50,000 producing wells in 49 of 88 Ohio counties

PRODUCTION TYPE

- NATURAL GAS
- COALBED METHANE
- OIL

History of Ohio Wells Drilled by Year and Reservoir

BEREA OHIO SHALE CLINTON TRENTON ROSE RUN CAMBRIAN



2016 Permit & Completion Activity



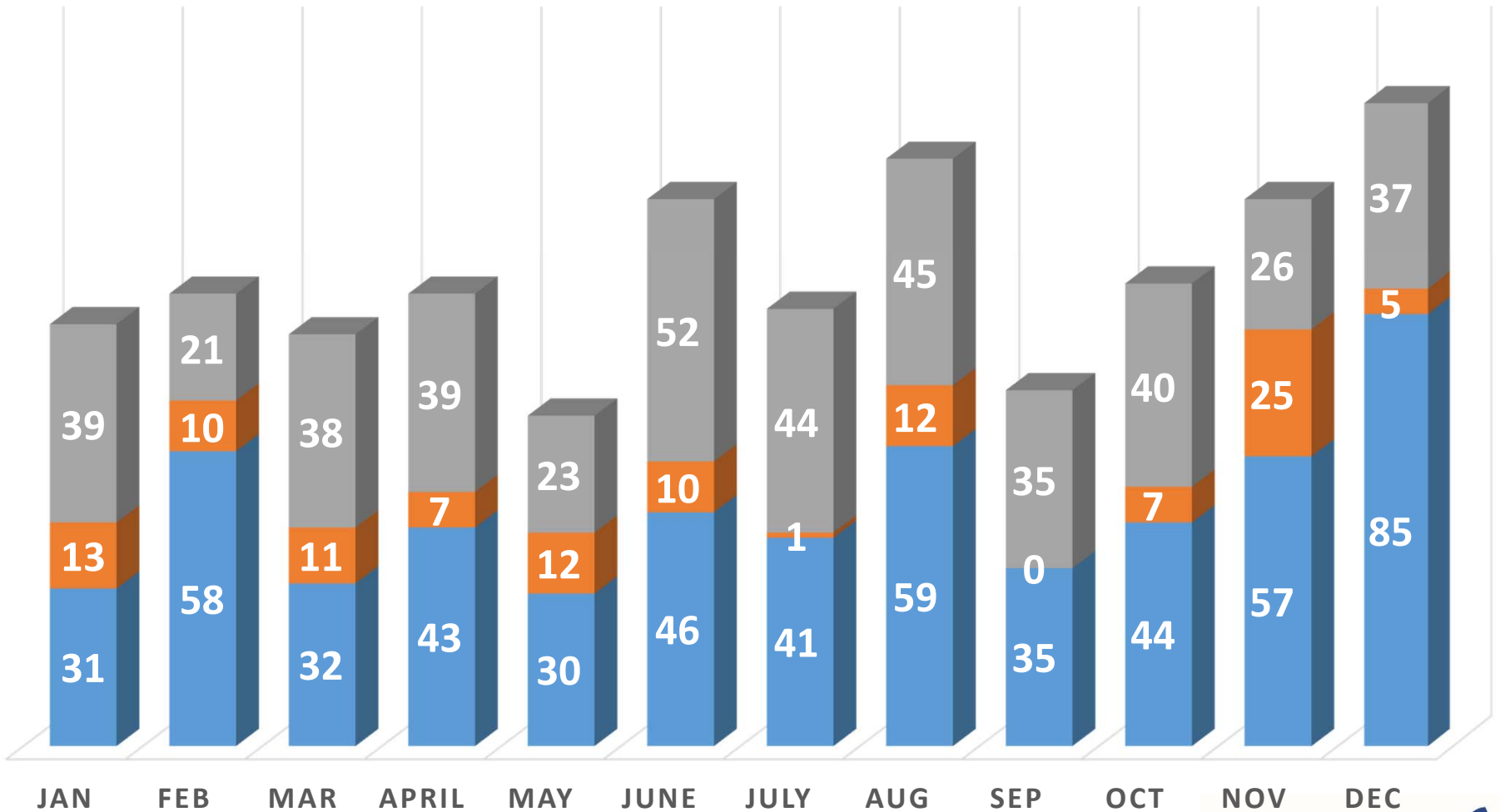
PHOTOGRAPHS COURTESY OF LARRY WICKSTROM

Permits & Completions - 2011 - 2016

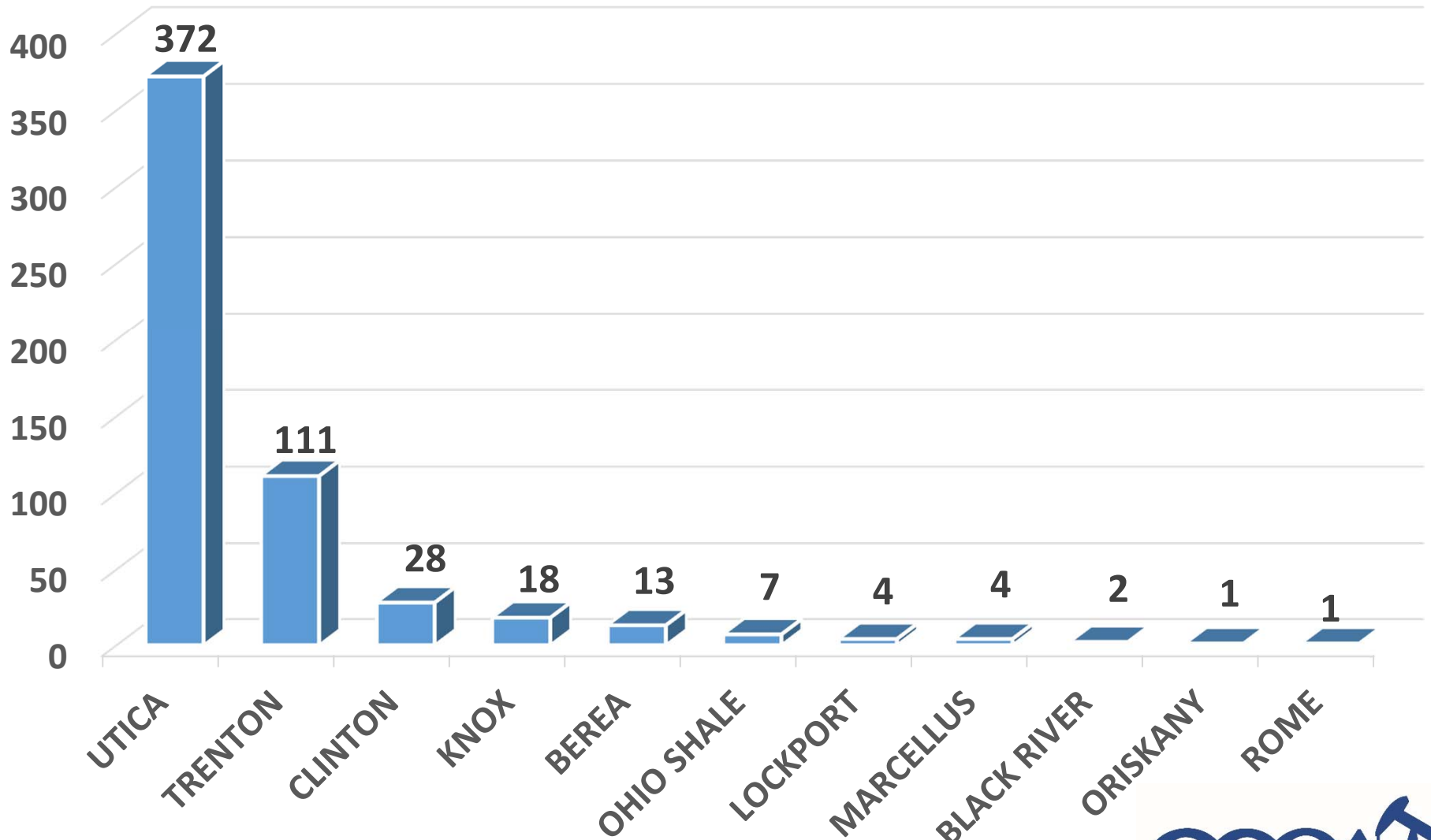
TYPE	2011	2012	2013	2014	2015	2016	▲ ('15 to '16)	▲ %
PERMIT	690	903	1,608	1,659	997	561	-436	-44%
COMPLETION	460	553	580	654	534	620	86	16%
PLUG	571	473	630	629	511	439	-118	-14%
TOTAL	1,533	1,929	2,818	2,942	2,318	1,113	-1205	-52%

Permit and Completions By Month

■ Permits ■ Completions ■ Plugging Permits



Permitted Formations

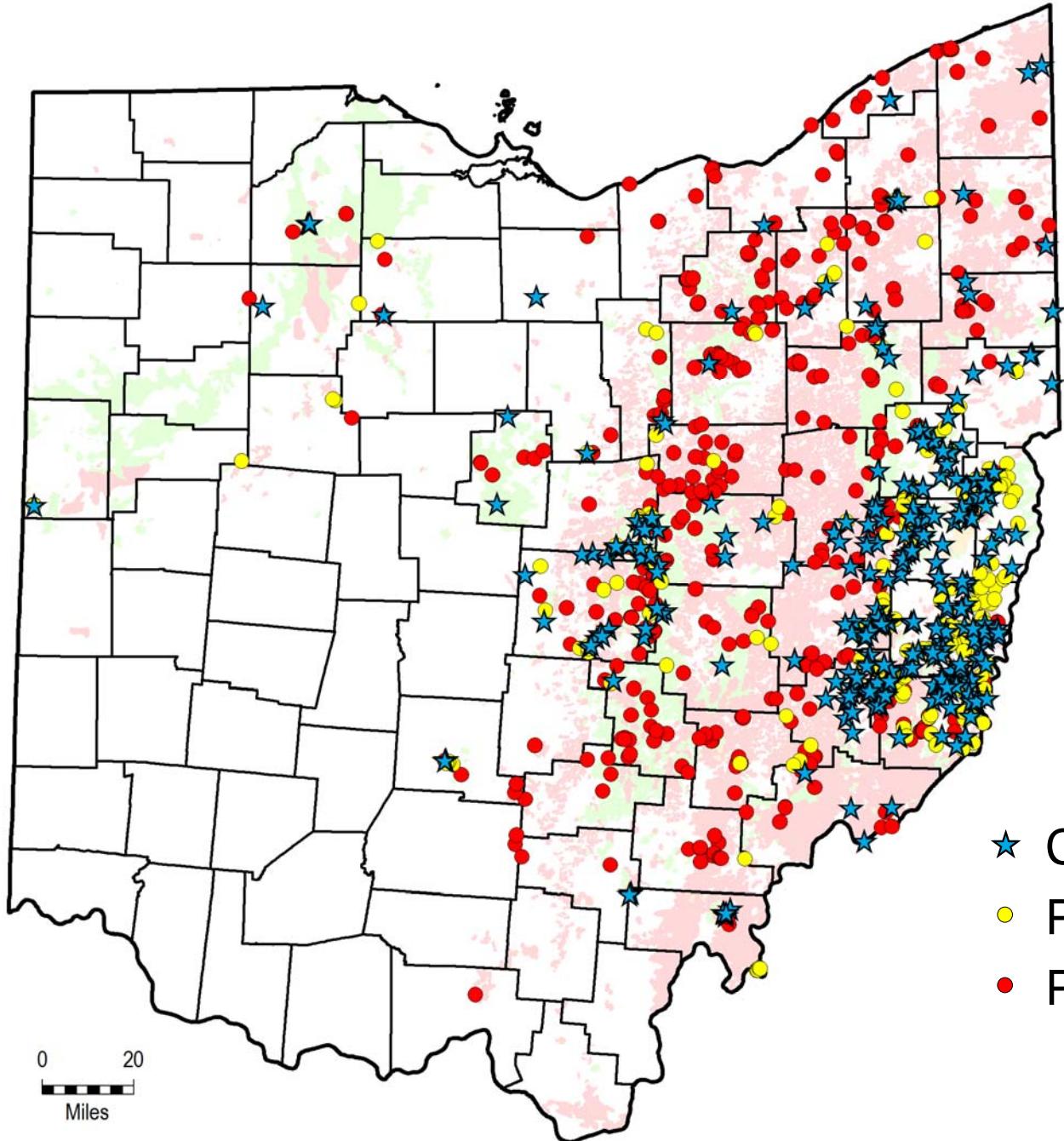


2016

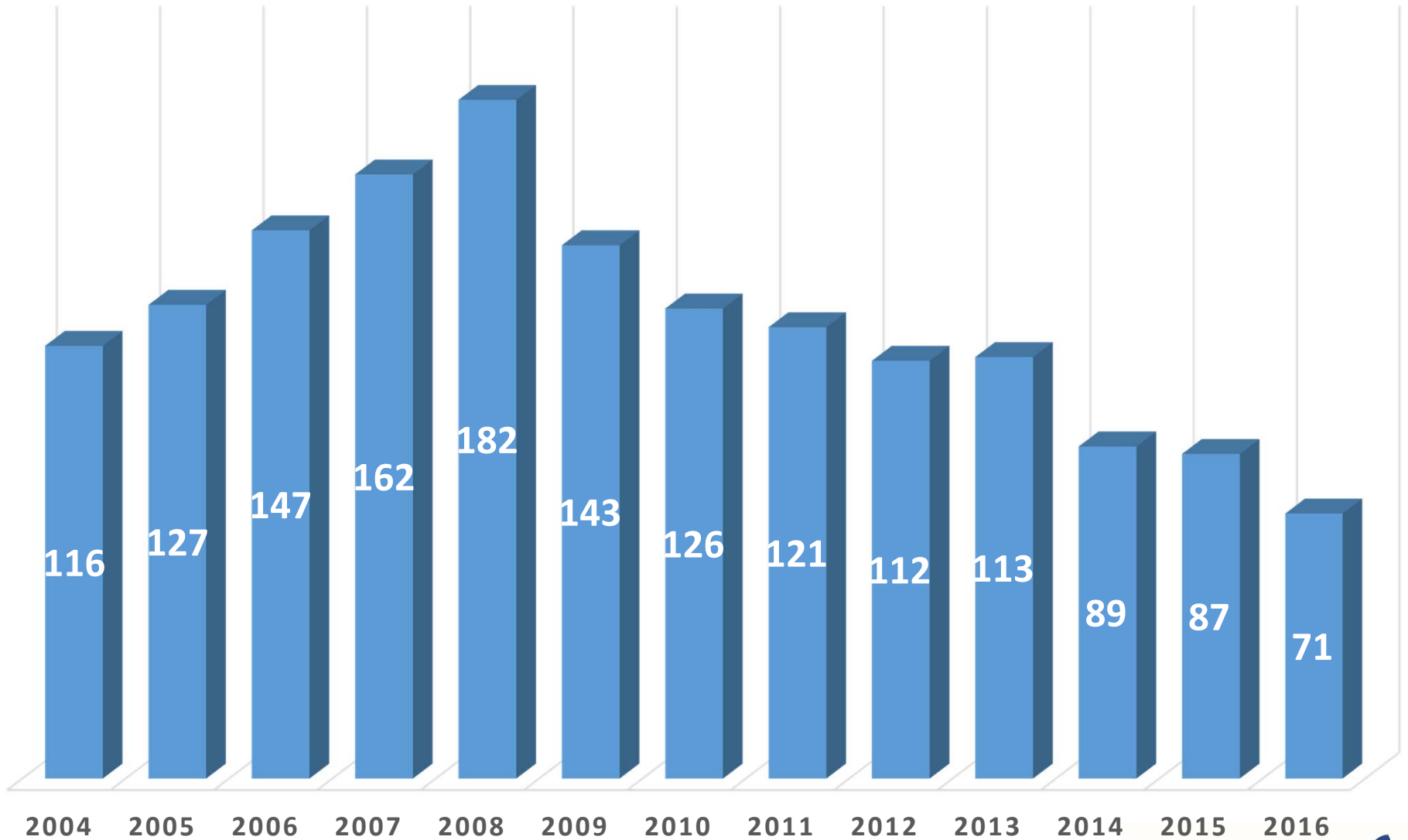
Completions
Permits to Drill
Permits to Plug

- ★ COMPLETIONS (620)
- PERMITS (561)
- PLUG PERMITS (439)

0 20
Miles

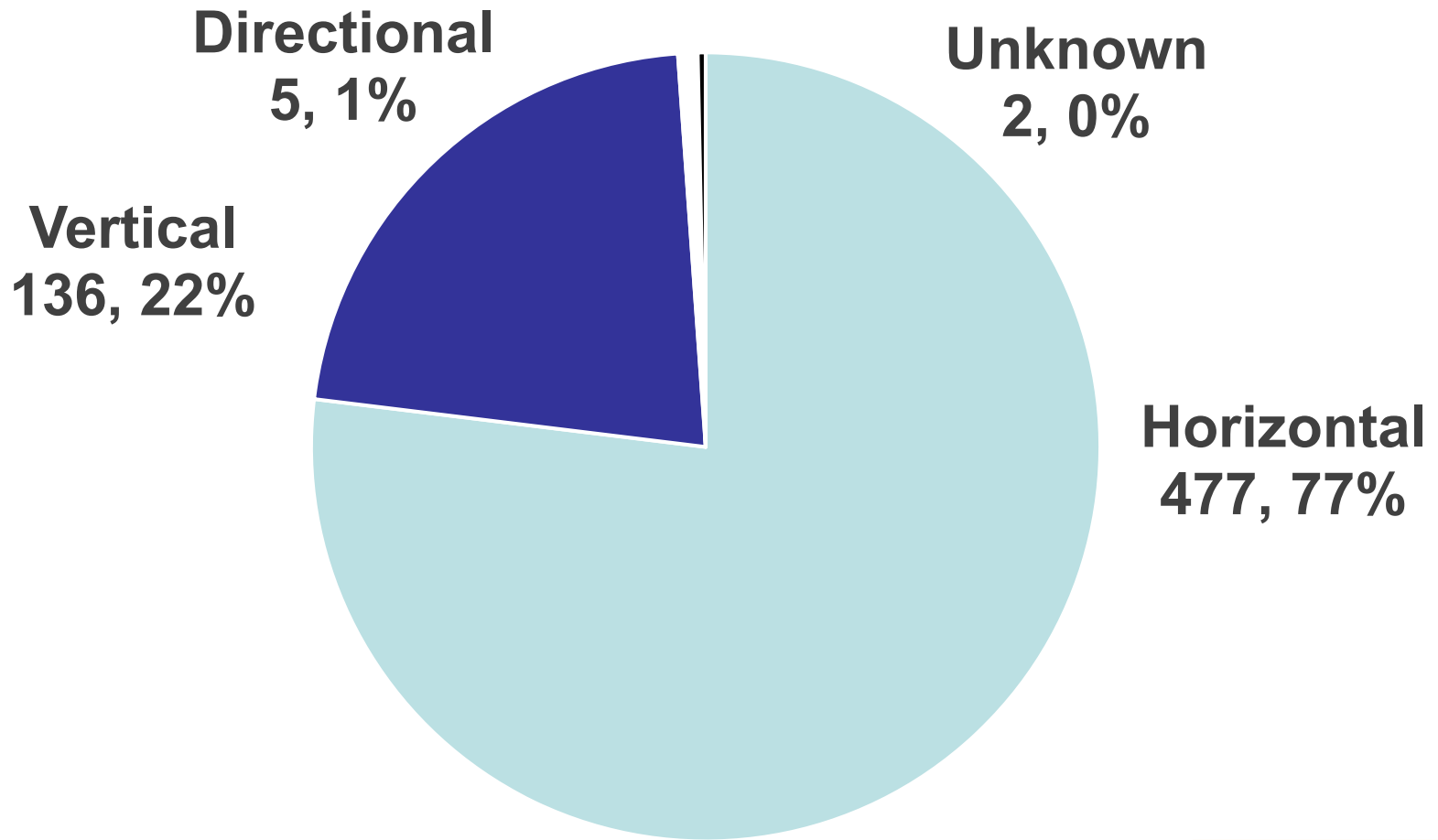


Operators Completing Wells By Year



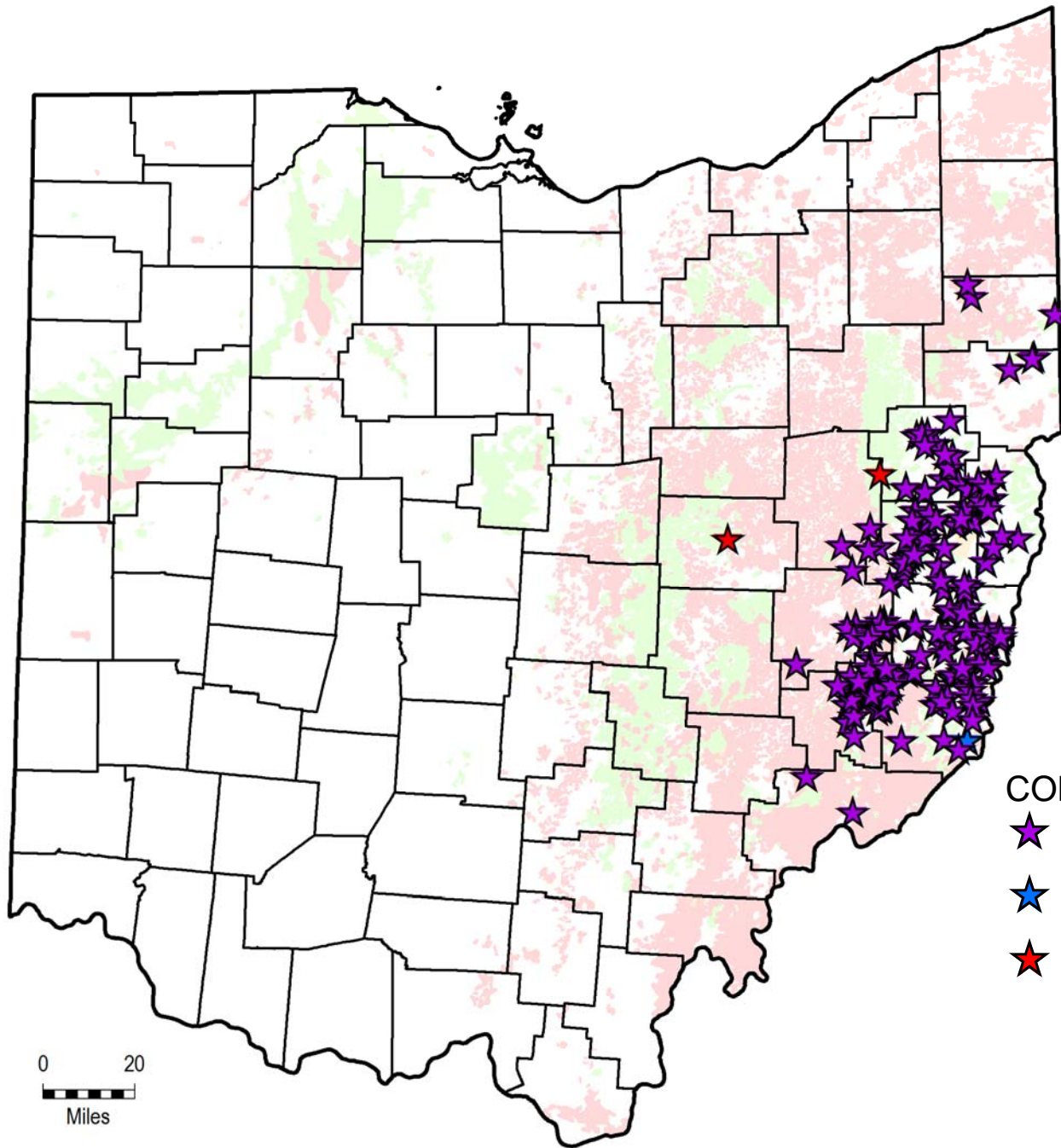
Wells Completed – Type

620 Total Completions



2016

Horizontal Completions By Formation

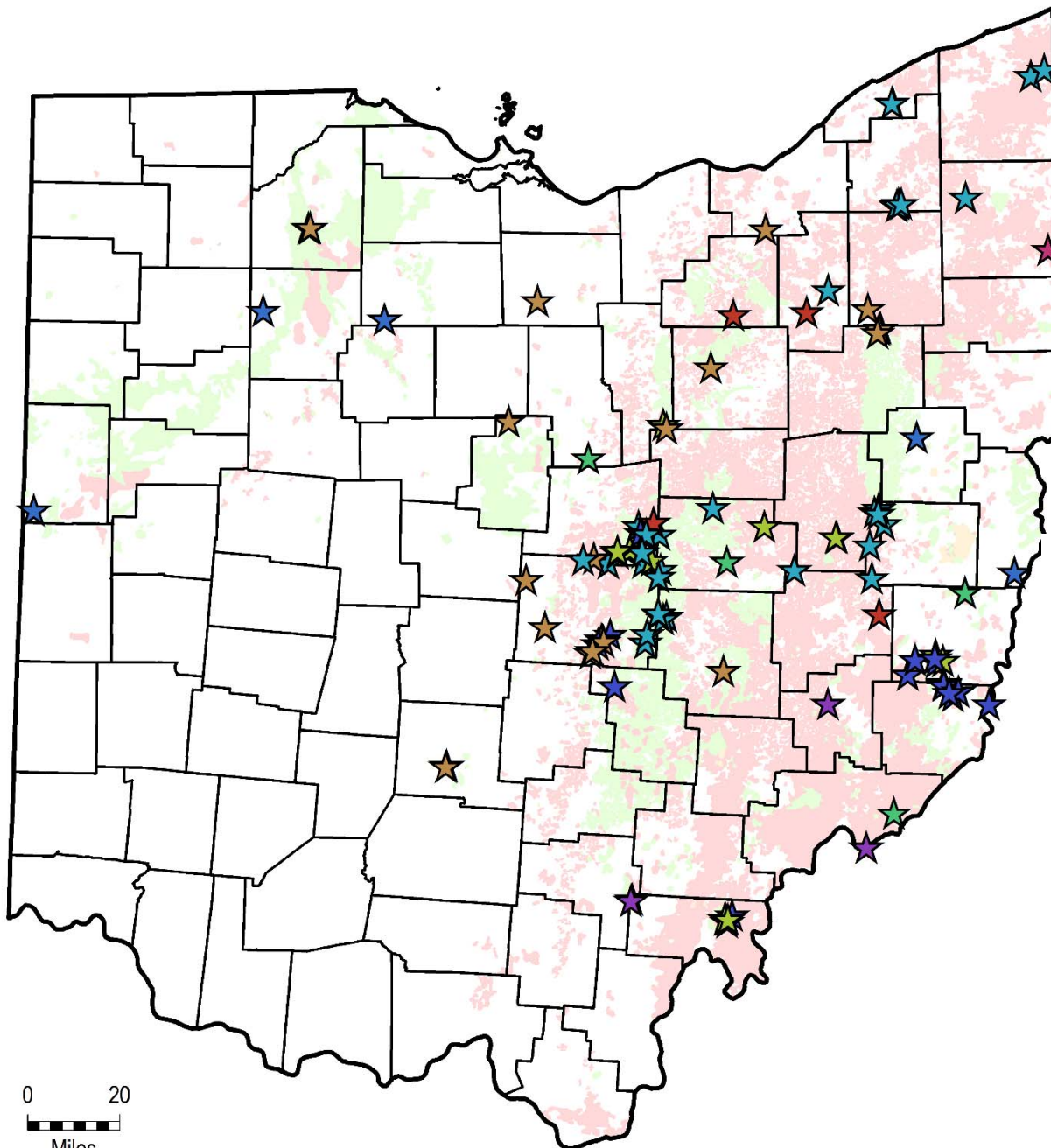


- COMPLETIONS - TD FORMATION
- ★ UTICA/POINT PLEASANT (466)
 - ★ MARCELLUS SHALE (7)
 - ★ CLINTON (2)

0 20
Miles

2016

Vertical Completions By Formation

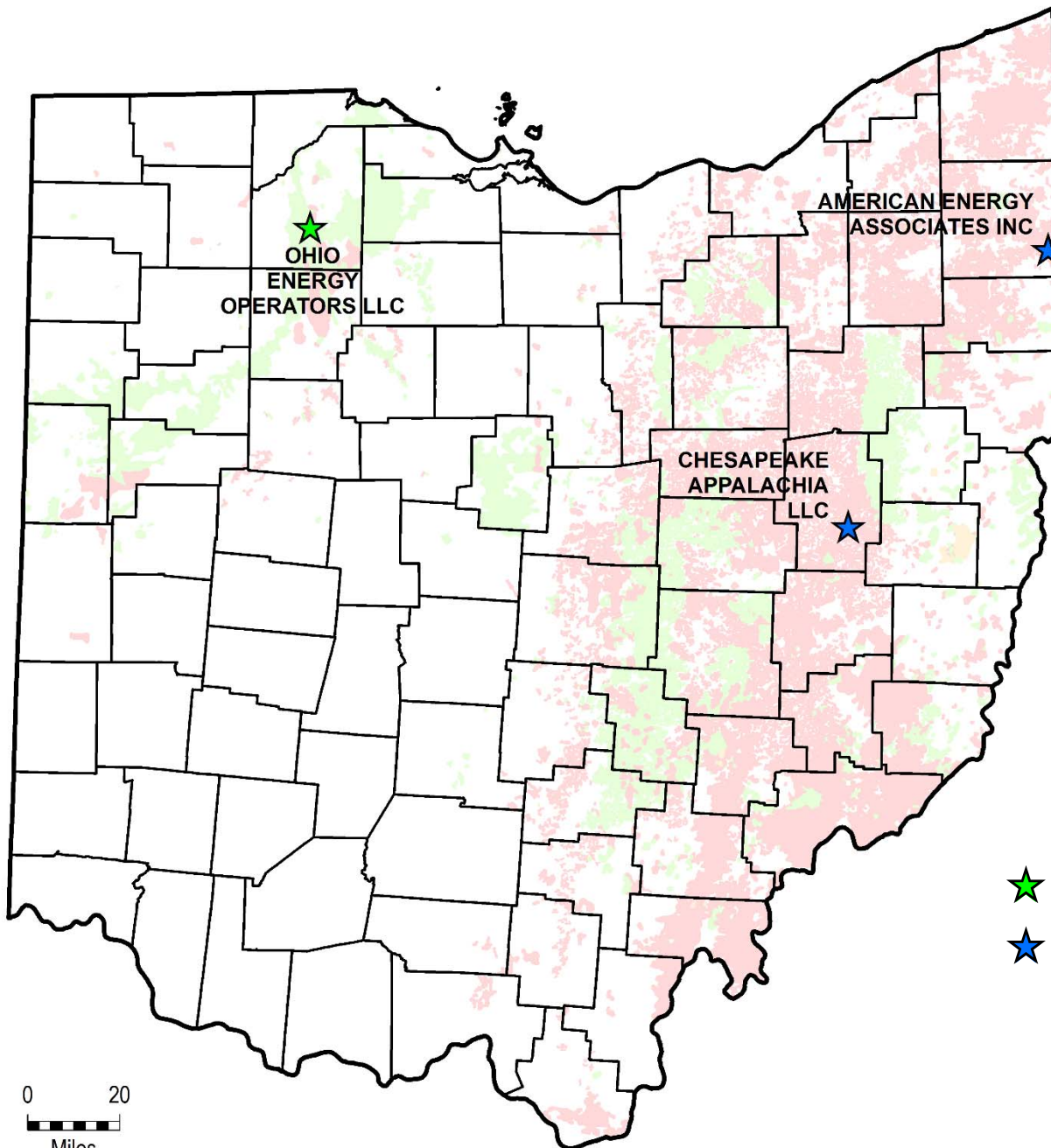


- ★ BERA & SHALLOWER (16)
- ★ DEVONIAN SHALE (5)
- ★ BIG LIME, NEWBURG (4)
- ★ CLINTON-MEDINA (33)
- ★ POINT PLEASANT (4)
- ★ TRENTON-BLACK RVR (7)
- ★ KNOX UNCONFORMITY (21)
- ★ ROME FORMATION (1)
- ★ UNKNOWN (22)

0 20
Miles

2016

Class II Injection Well Completions By TD Formation

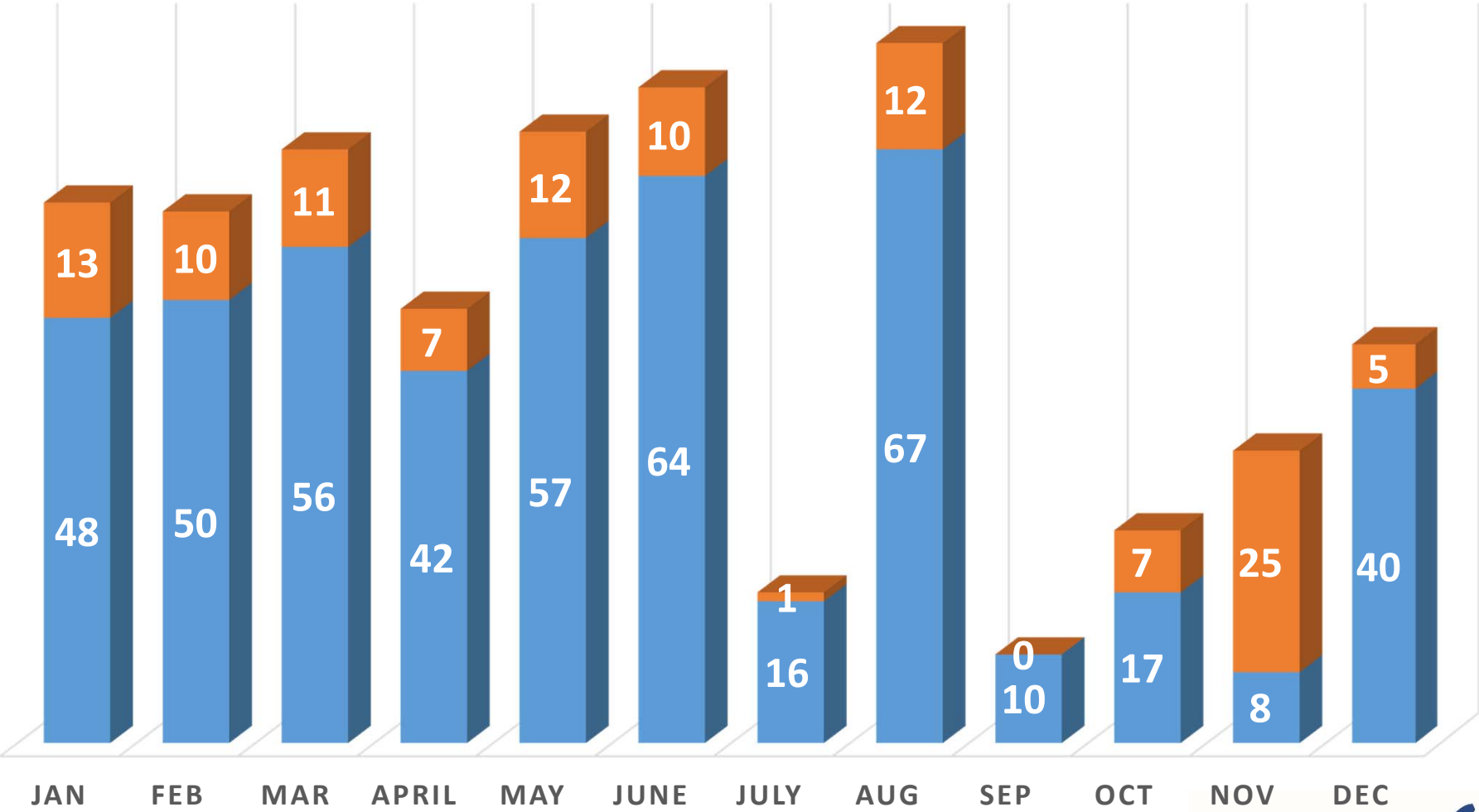


- ★ CONASAUGA FORMATION
- ★ ROME FORMATION

0 20
Miles

Completions By Month

■ Horizontal Wells ■ Vertical Wells



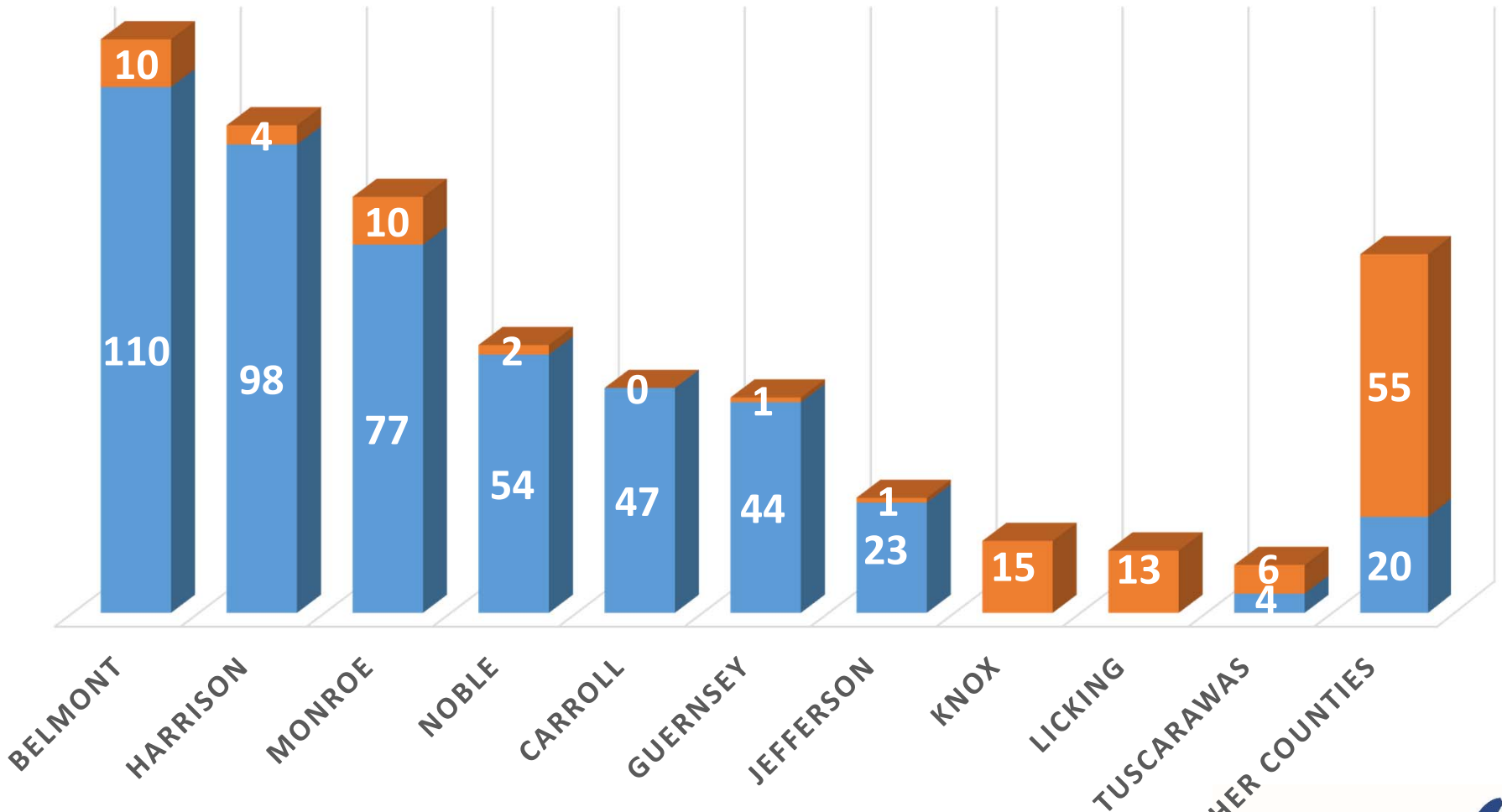
Completions – Top 10 Counties

COUNTY	TOTAL	HORIZONTAL	VERTICAL*
BELMONT	120	110	10
HARRISON	102	98	4
MONROE	87	77	10
NOBLE	56	54	2
CARROLL	47	47	0
GUERNSEY	45	44	1
JEFFERSON	24	23	1
KNOX	15	0	15
LICKING	13	0	13
TUSCARAWAS	10	4	6
OTHER COUNTIES	75	20	55
TOTAL	594	477	117

*INCLUDES “DIRECTIONAL” AND “UNKNOWN”

Completions By County

HORIZONTAL VERTICAL



Top 12 Most Active Operators – By Wells

OPERATOR	% TOT WELLS	2016 WELLS	▲ % 2015
CHESAPEAKE EXPLORATION LLC	17%	99	-31%
ASCENT RESOURCES UTICA LLC	11%	66	200%
ANTERO RESOURCES CORPORATION	11%	64	31%
GULFPORT ENERGY CORPORATION	10%	62	-13%
ECLIPSE RESOURCES I LP	8%	46	156%
CNX GAS COMPANY LLC	5%	29	N/A
XTO ENERGY INC.	4%	24	300%
RICE DRILLING D LLC	3%	18	-5%
ATLAS NOBLE LLC	3%	17	750%
AMERICAN ENERGY CORP.	3%	17	1600%
HESS OHIO DEVELOPMENTS LLC	2%	11	-59%
R E GAS DEVELOPMENT LLC	2%	11	22%

TOP 12 OPERATORS DRILLED APPROXIMATELY 78% OF TOTAL WELLS IN 2016

Hess Ohio – CNXGUE10N7W #H-8



PHOTOGRAPH COURTESY OF LARRY WICKSTROM

Top 12 Most Active Operators – By Footage

OPERATOR	% TOTAL FOOTAGE	2016 FOOTAGE	▲% 2015
CHESAPEAKE EXPLORATION LLC	20%	1,600,323	-41%
ANTERO RESOURCES CORPORATION	14%	1,086,226	25%
GULFPORT ENERGY CORPORATION	13%	1,069,335	-8%
ASCENT RESOURCES UTICA LLC	13%	1,000,606	67%
ECLIPSE RESOURCES I LP	9%	728,559	62%
XTO ENERGY INC.	6%	449,723	78%
CNX GAS COMPANY LLC	5%	415,226	100%
RICE DRILLING D LLC	4%	298,320	9%
HESS OHIO DEVELOPMENTS LLC	2%	187,974	-148%
ATLAS NOBLE LLC	2%	186,037	88%
R E GAS DEVELOPMENT LLC	2%	135,725	10%
PDC ENERGY INC	1%	115,876	29%

TOP 12 OPERATORS DRILLED APPROXIMATELY 91% OF TOTAL FOOTAGE DRILLED IN 2016

Top 12 Most Active Counties – By Wells

COUNTY	% TOT WELLS	2016 WELLS	▲% 2015
BELMONT	20%	120	67%
HARRISON	17%	102	13%
MONROE	15%	87	64%
NOBLE	9%	56	33%
CARROLL	8%	47	-42%
GUERNSEY	8%	45	-8%
JEFFERSON	4%	24	2300%
KNOX	3%	15	0%
LICKING	2%	13	30%
TUSCARAWAS	2%	10	150%
COLUMBIANA	1%	8	-43%
MEIGS	1%	7	-22%

OPERATORS REPORTED COMPLETIONS IN 36 OF 89 COUNTIES IN 2016 VERSUS 34 IN 2015. TOP 12 COUNTIES – 90% TOTAL WELLS

Top 12 Most Active Counties – By Footage

COUNTY	% TOT FOOTAGE	2016 FOOTAGE	▲% 2015
BELMONT	24%	1,944,150	72%
HARRISON	20%	1,562,810	8%
MONROE	16%	1,283,768	68%
NOBLE	11%	858,620	53%
CARROLL	9%	705,687	-44%
GUERNSEY	8%	642,440	-8%
JEFFERSON	5%	363,946	3772%
COLUMBIANA	1%	118,211	-43%
MAHONING	1%	100,365	N/A
TUSCARAWAS	1%	72,388	139%
WASHINGTON	1%	46,608	-35%
LICKING	1%	42,232	106%

TOP 12 COUNTIES ACCOUNTED FOR 97% OF TOTAL FOOTAGE DRILLED IN 2016

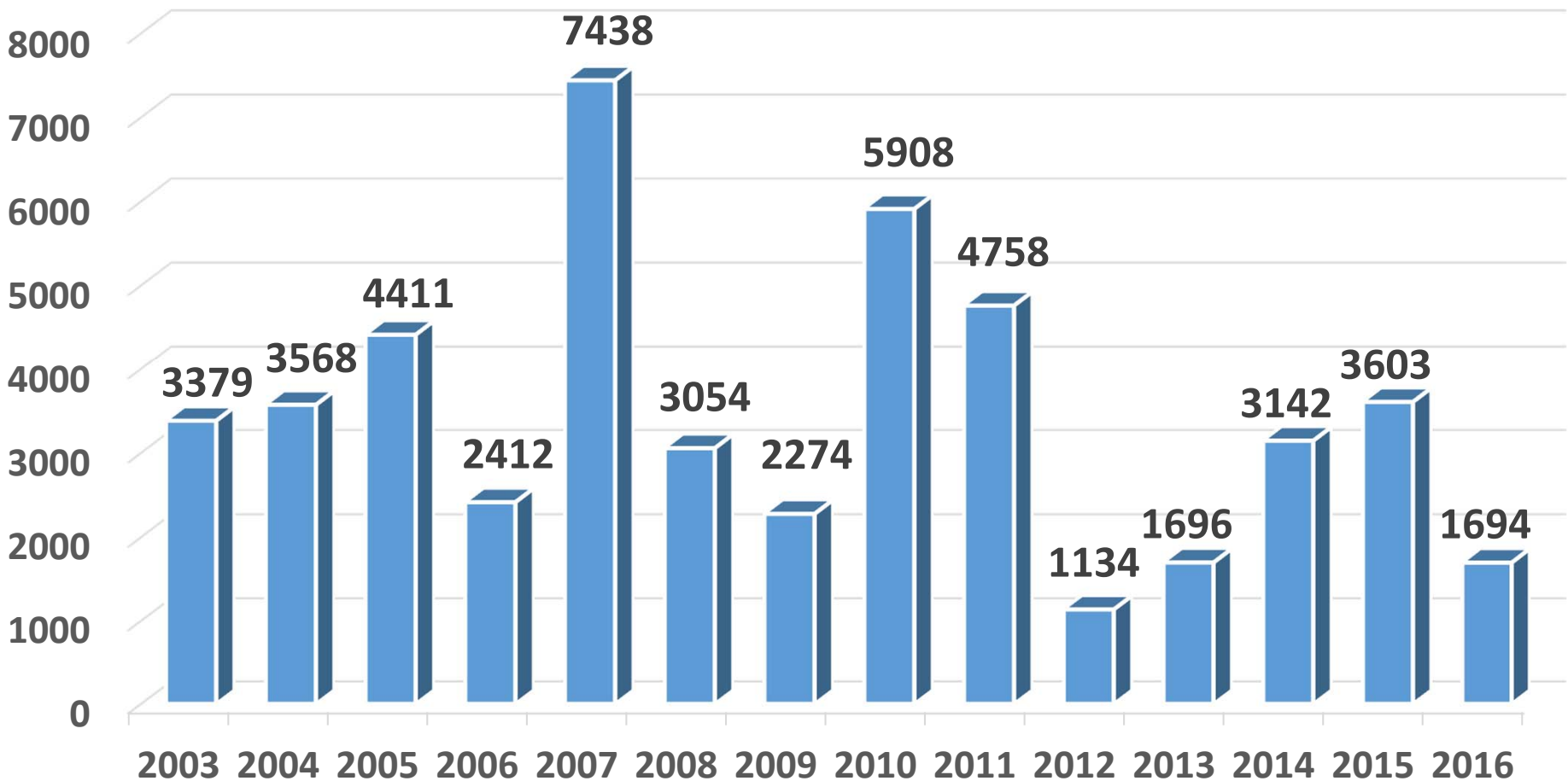
Drilling Footage and Wells – By Year

YEAR	TOTAL FOOTAGE	WELLS	FOOTAGE PER WELL	AVG IP GAS	AVG IP OIL
2016	7,955,832	594	14,206	6,095	196
2015	6,587,714	534	12,336	5,432	279
2014	5,854,693	654	10,398	2,703	122
2013	3,898,408	569	7,570	1,361	97
2012	2,580,821	511	5,388	481	34
2011	1,832,121	454	4,192	136	7
2010	2,224,761	633	3,883	50	3
2009	3,036,431	927	3,767	223	2
2008	4,249,247	1149	3,750	54	3
2007	4,030,319	1094	3,928	70	3
2006	3,601,375	945	3,927	79	4
2005	2,718,759	673	4,095	123	4
2004	2,324,308	589	4,107	133	4
2003	2,419,254	561	4,359	88	5
2002	2,780,935	643	4,507	91	4

2015 TO 2016 AVG IP-GAS UP 12%; AVG IP-OIL DOWN 30%

2015 TO 2016 AVG FOOTAGE PER WELL UP 15%

Change of Owner – Wells By Year



YEAR 2016 NO LARGE CHANGE OF OWNER RECORDS, LARGEST WAS 269 WELLS



Rice Energy “Razin Kane” and “Krazy Train”



62294
RICE ENERGY
RICE DRILLING D, LLC
RAZIN KANE
62294 SECRET ROAD
BELMONT, OH 43718
GOSHEN TOWNSHIP
BELMONT COUNTY
ACCESS ROAD ENTRANCE: 39° 38' 54.07"N 81° 02' 38.20"W
WELL API:
24 HOUR EMERGENCY CONTACT NUMBER: Toll Free 1-888-818-7263

62268
RICE ENERGY
RICE DRILLING D, LLC
KRAZY TRAIN
62268 SECRET ROAD
BELMONT, OH 43718
GOSHEN TOWNSHIP
BELMONT COUNTY
ACCESS ROAD ENTRANCE: 39° 39' 54.07"N 81° 02' 38.20"W
WELL API:
24 HOUR EMERGENCY CONTACT NUMBER: Toll Free 1-888-818-7263

NO SMOKING
ALL WELL SITES ARE SMOKE FREE FACILITIES
RICE ENERGY

NO TRESPASSING

RAZIN KANE KRAZY TRAIN
2014

FIRE

Top 12 Counties – By Average IP (MCFE)

COUNTY	WELLS	AVG IP GAS (MCF)	AVG IP OIL (BBLS)	AVG IP (MCFE)
HARRISON	100	5,188	449	14,176
JEFFERSON	21	12,000	0	12,000
GUERNSEY	44	3,145	396	11,055
BELMONT	105	9,960	20	10,367
MONROE	72	9,225	52	10,267
CARROLL	45	4,230	302	10,260
NOBLE	54	4,686	194	8,564
TUSCARAWAS	7	1,629	269	7,009
MAHONING	7	3,941	32	4,581
WASHINGTON	5	2,632	78	4,200
COLUMBIANA	6	3,506	0	3,506
LICKING	9	182	22	617

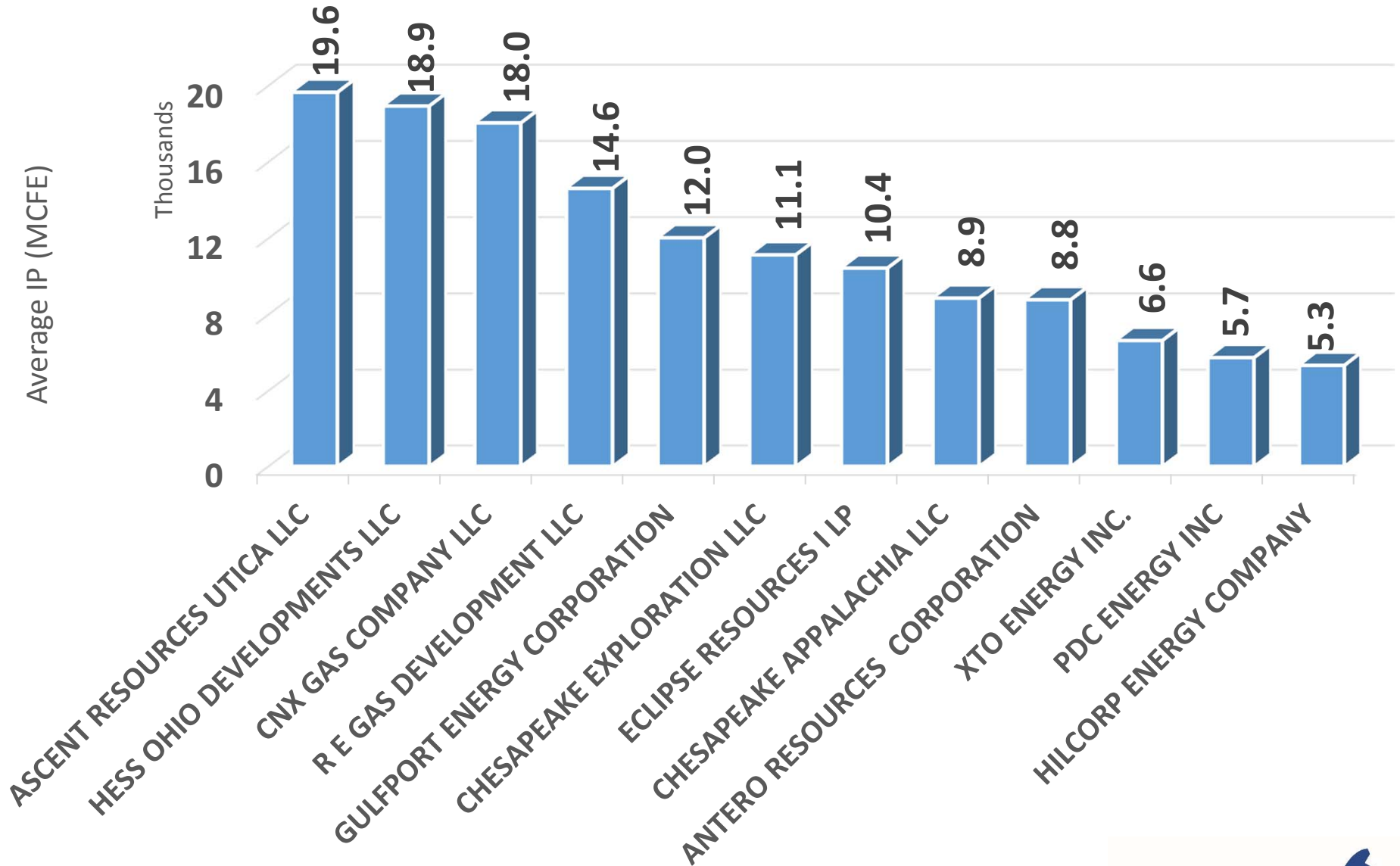
COUNTIES WITH LESS THAN 4 WELLS ARE NOT INCLUDED
MCFE CALCULATED USING OIL GAS RATIO OF 20:1

Top 12 Operators – By Average IP (MCFE)

OPERATOR	WELLS	AVG IP GAS (MCF)	AVG IP OIL (BBLs)	AVG IP (MCFE)
ASCENT RESOURCES UTICA LLC	66	9,776	493	19,645
HESS OHIO DEVELOPMENTS LLC	11	13,372	277	18,920
CNX GAS COMPANY LLC	29	4,693	667	18,033
R E GAS DEVELOPMENT LLC	11	3,242	568	14,604
GULFPORT ENERGY CORPORATION	62	11,208	40	12,012
CHESAPEAKE EXPLORATION LLC	99	5,538	279	11,119
ECLIPSE RESOURCES I LP	46	6,214	210	10,423
CHESAPEAKE APPALACHIA LLC	5	8,853	0	8,853
ANTERO RESOURCES CORPORATION	64	6,938	91	8,767
XTO ENERGY INC.	24	6,630	0	6,630
PDC ENERGY INC	9	1,102	231	5,731
HILCORP ENERGY COMPANY	7	5,327	0	5,327

**OPERATORS WITH LESS THAN 4 WELLS ARE NOT INCLUDED.
MCFE CALCULATED USING OIL GAS RATIO OF 20:1**

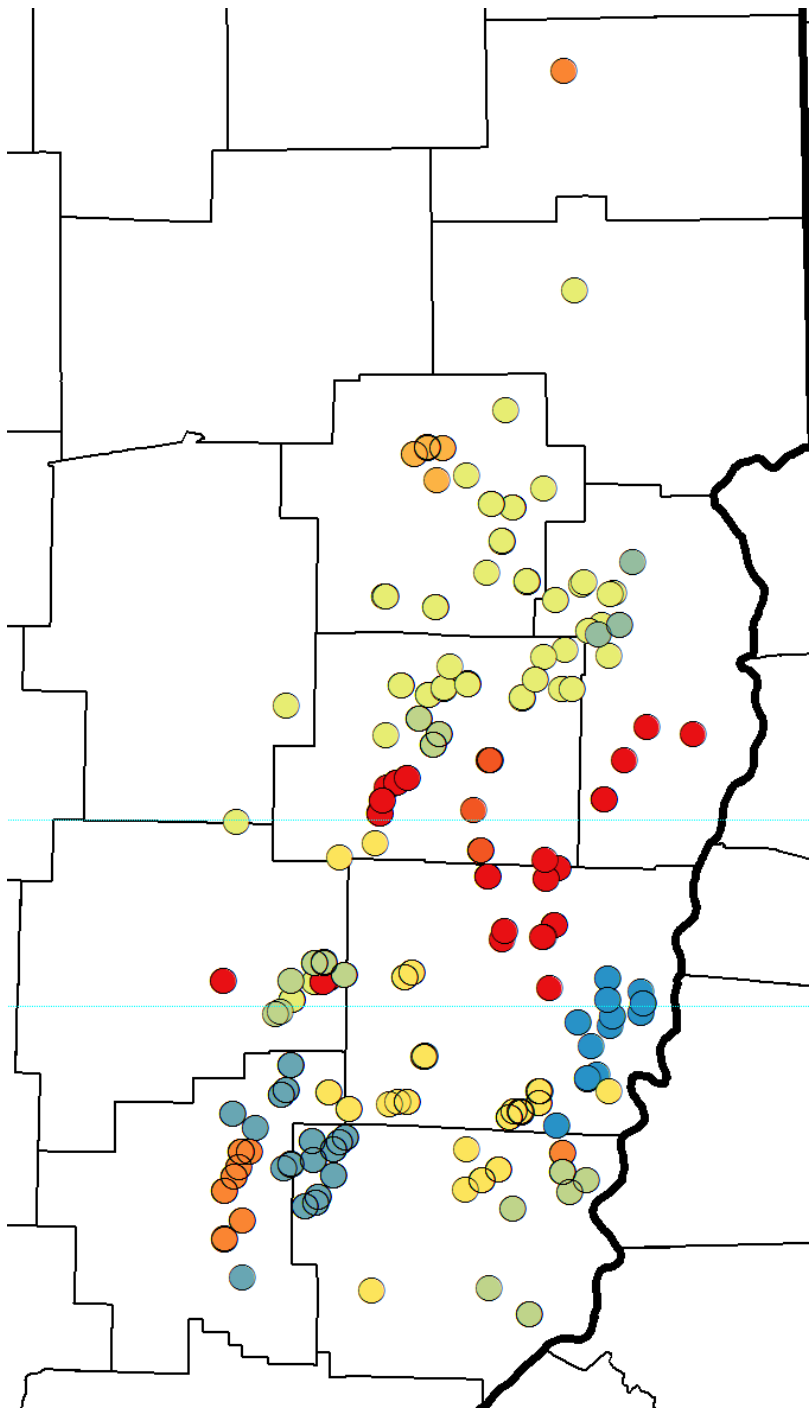
Top 12 Operators – By Average IP (MCFE)



**OPERATORS WITH LESS THAN 4 WELLS ARE NOT INCLUDED.
MCFE CALCULATED USING OIL GAS RATIO OF 20:1**

2016

Top 10 Operators – By Average IP (MCFE) Well Locations



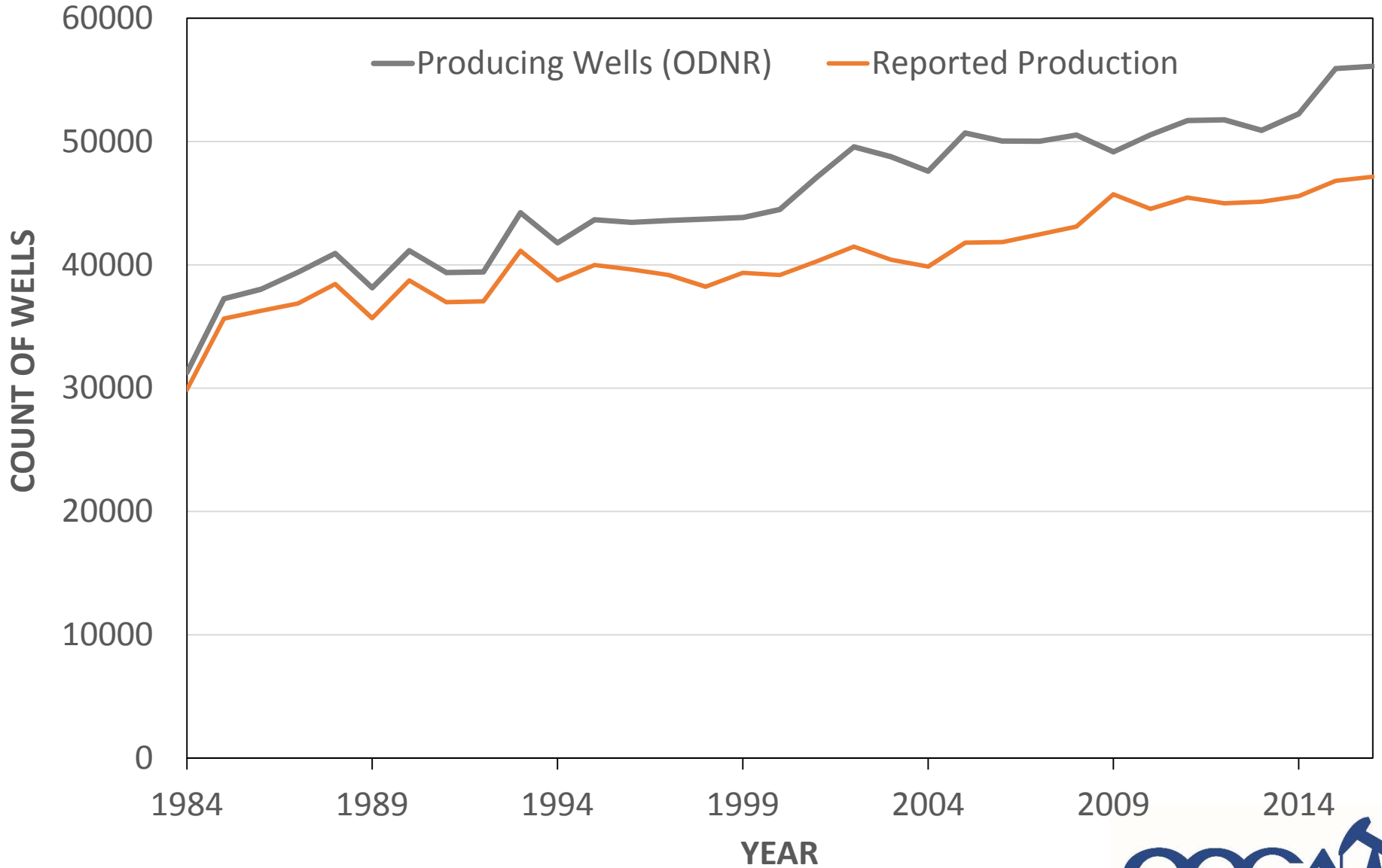
- ASCENT RESOURCES UTICA LLC
- HESS OHIO DEVELOPMENTS LLC
- CNX GAS COMPANY LLC
- R E GAS DEVELOPMENT LLC
- GULFPORT ENERGY CORPORATION
- CHESAPEAKE EXPLORATION LLC
- ECLIPSE RESOURCES I LP
- CHESAPEAKE APPALACHIA LLC
- ANTERO RESOURCES CORPORATION
- XTO ENERGY INC.

Ohio Oil & Gas Production



PHOTOGRAPH COURTESY OF LARRY WICKSTROM

Producing Wells – By Year

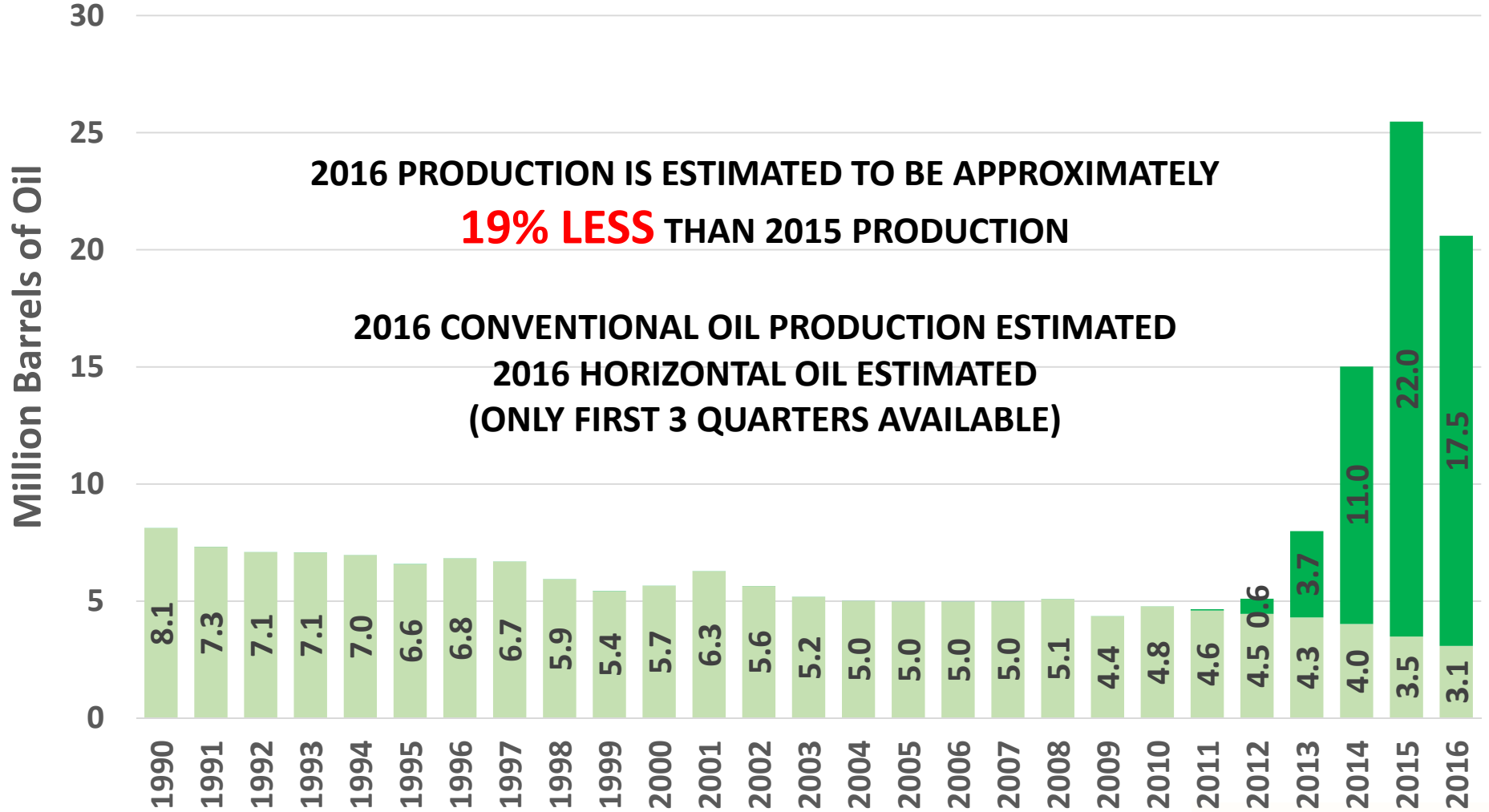


YEAR 2016 WELL COUNT IS ESTIMATED



Production Summary – Oil By Year

■ Conventional Oil ■ Horizontal Oil



2016 PRODUCTION IS ESTIMATED TO BE APPROXIMATELY
19% LESS THAN 2015 PRODUCTION

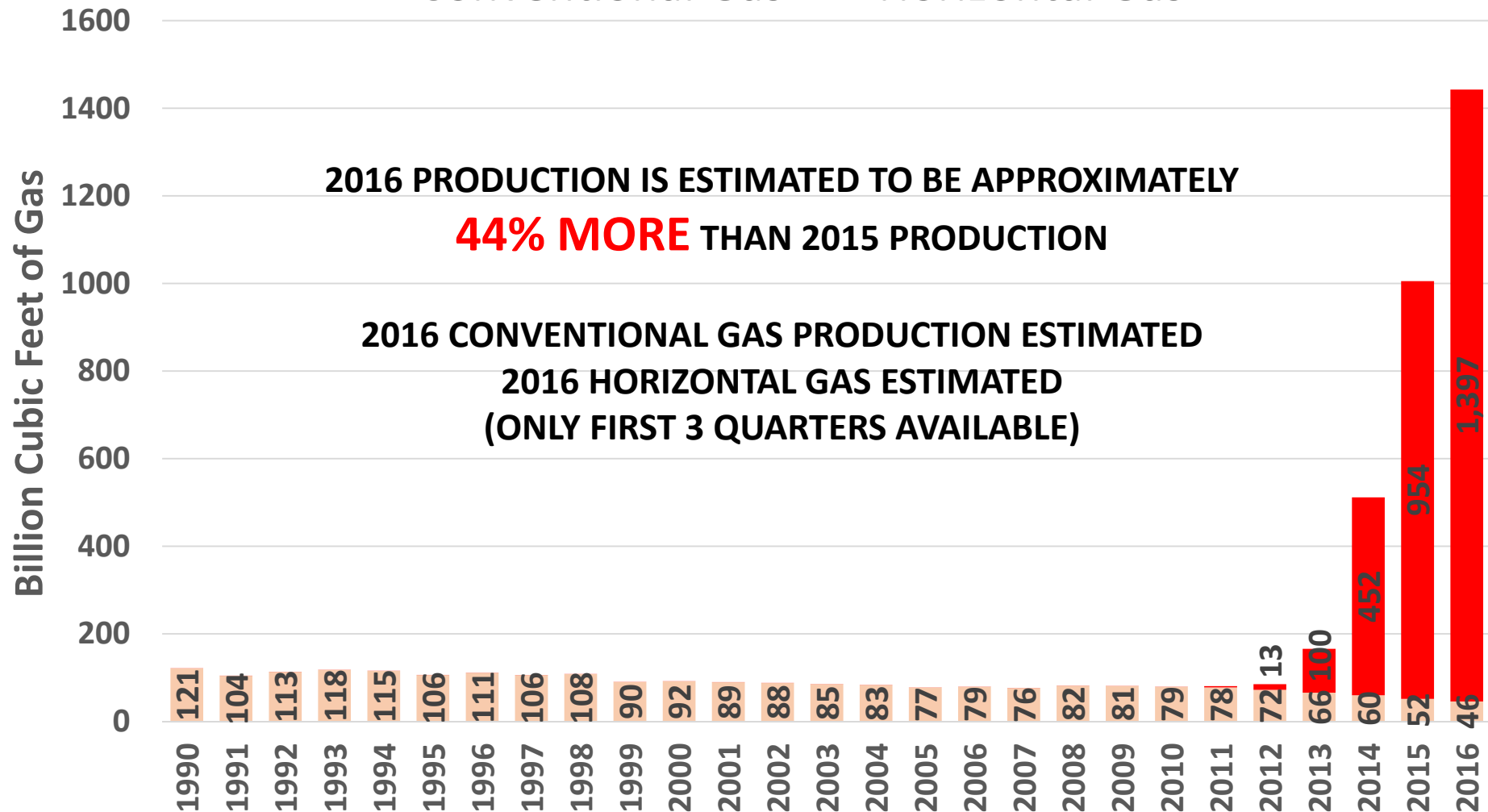
2016 CONVENTIONAL OIL PRODUCTION ESTIMATED
2016 HORIZONTAL OIL ESTIMATED
(ONLY FIRST 3 QUARTERS AVAILABLE)

YEAR 2016 CONVENTIONAL PRODUCTION IS ESTIMATED BY USING AVERAGE ANNUAL PERCENT DECLINE FOR YEAR 2012-2015.



Production Summary – Gas By Year

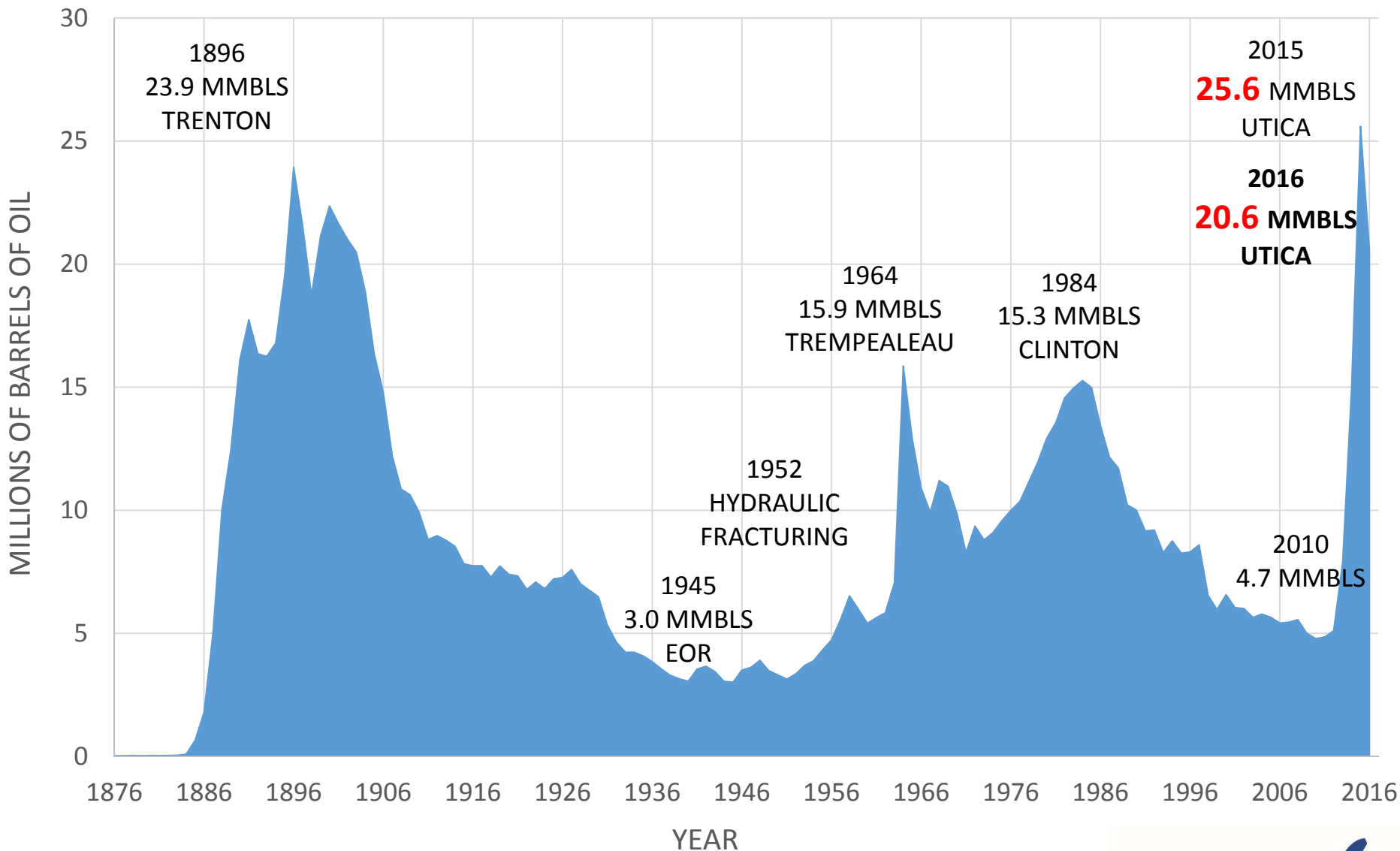
Conventional Gas Horizontal Gas



YEAR 2015 CONVENTIONAL PRODUCTION IS ESTIMATED BY USING AVERAGE ANNUAL PERCENT DECLINE YEAR 2012-2014.



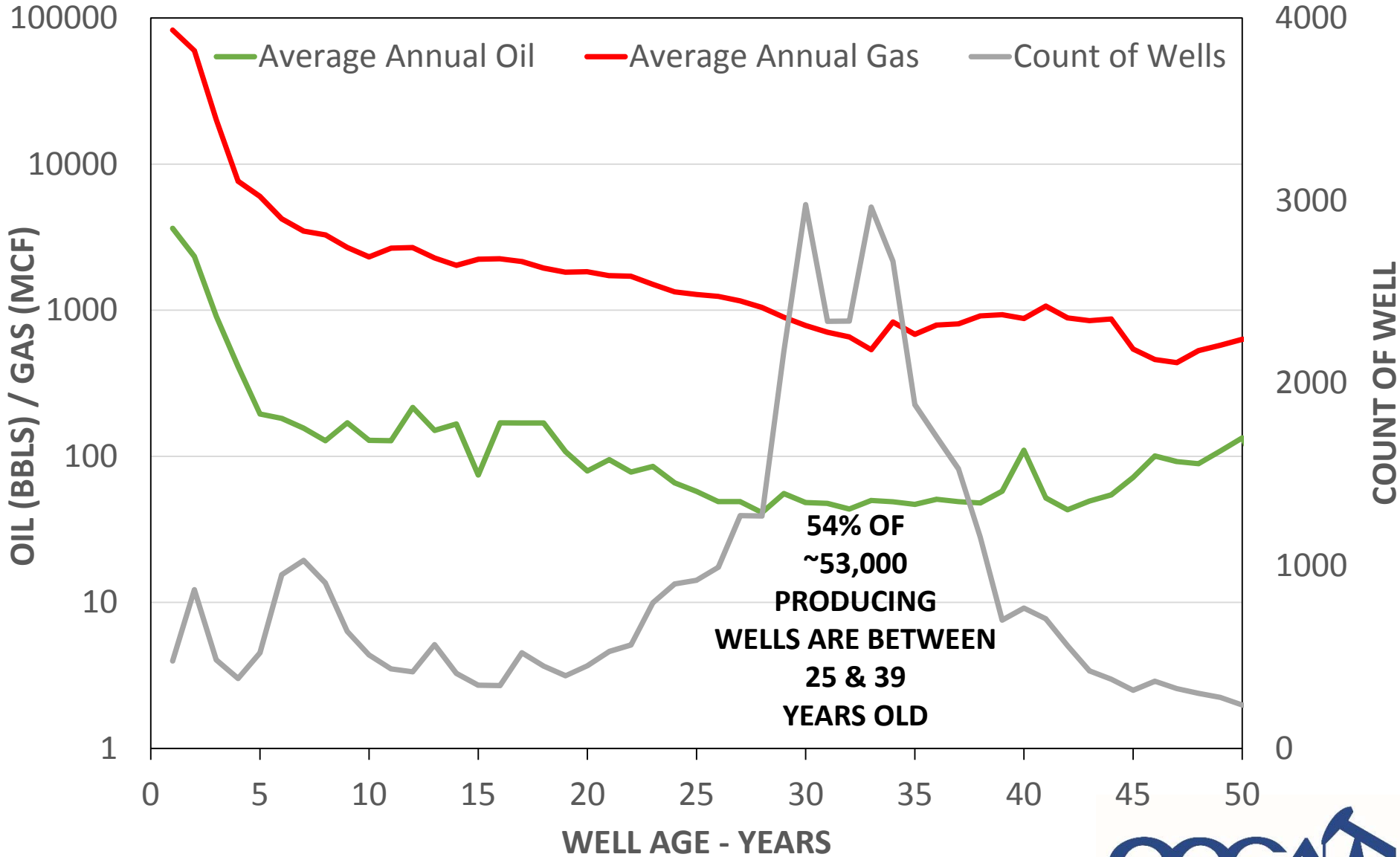
Ohio Oil Production 1886-2015

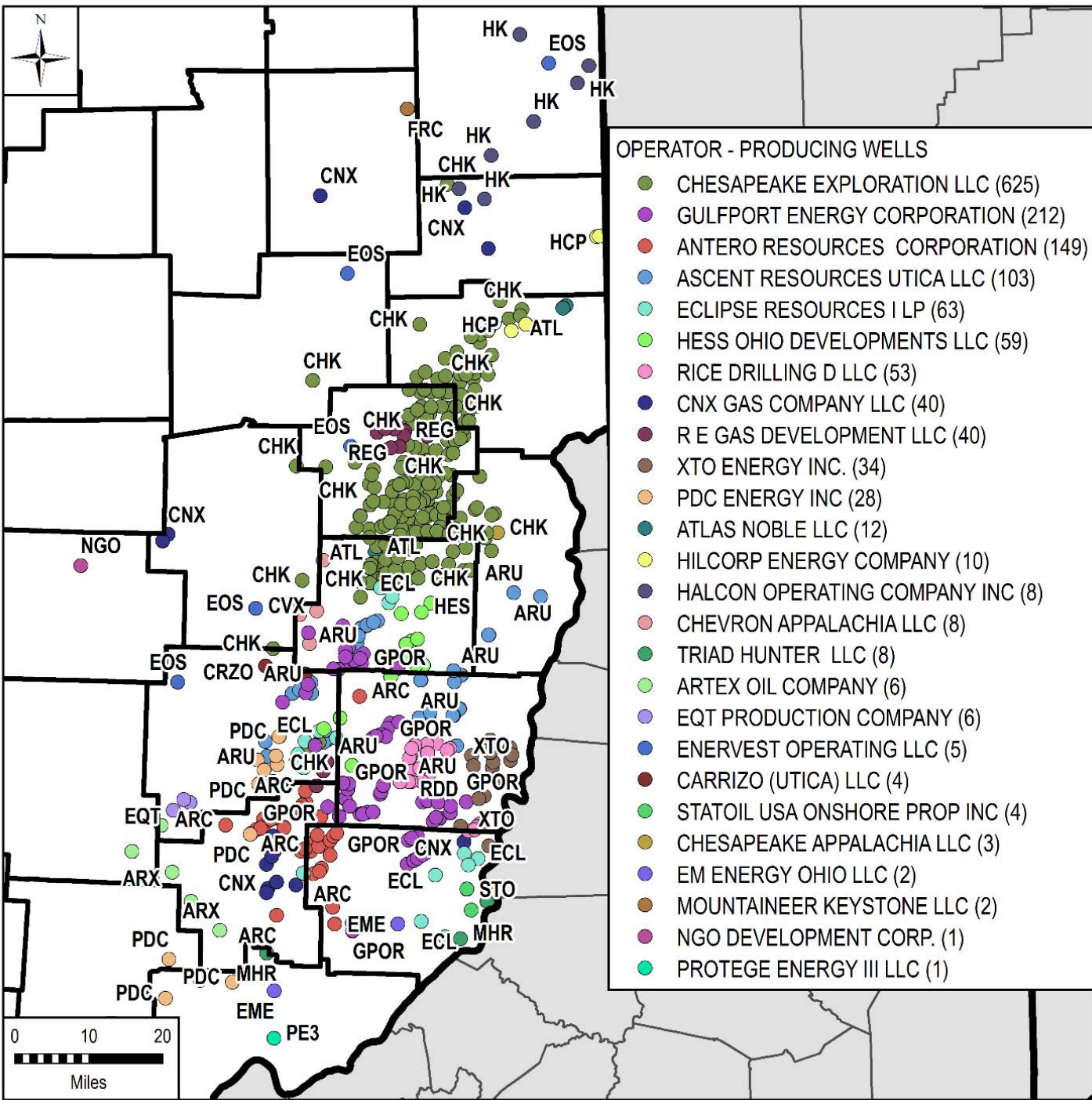


HISTORICAL DATA COURTESY OF WICKSTROM GEOSCIENCE, LLC



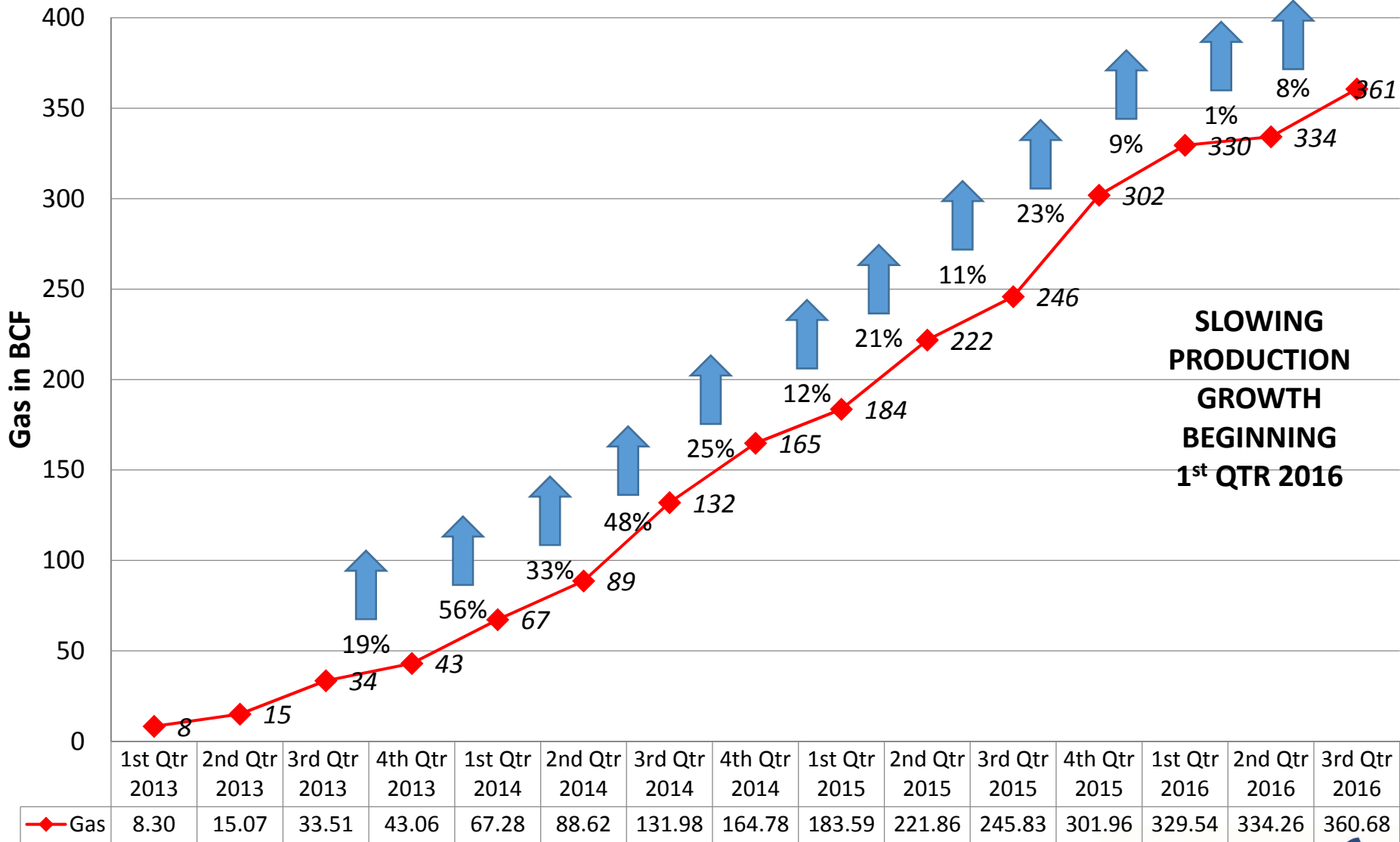
Ohio's Aging Wells



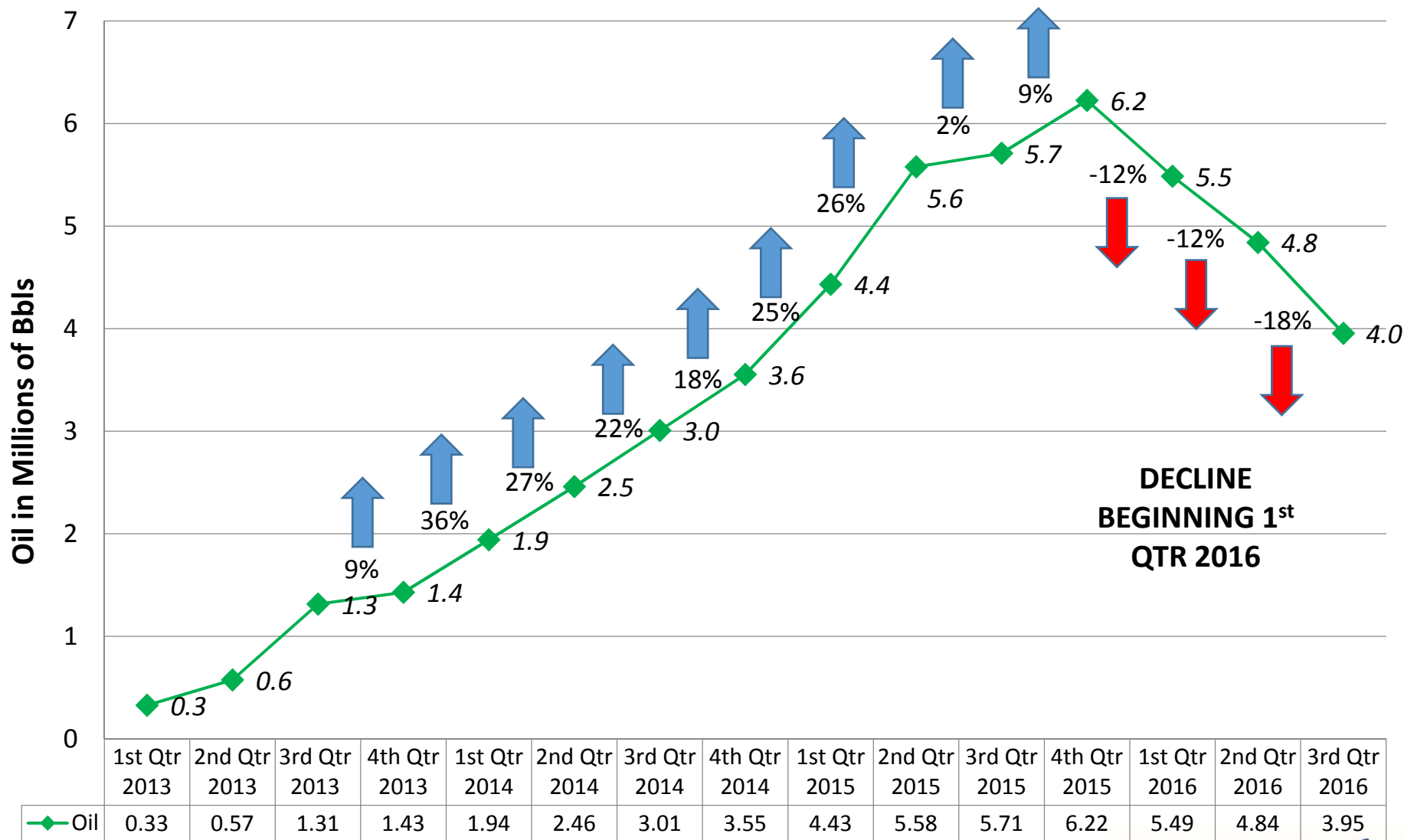


UTICA PRODUCING WELLS BY OPERATOR Through 12/31/2016

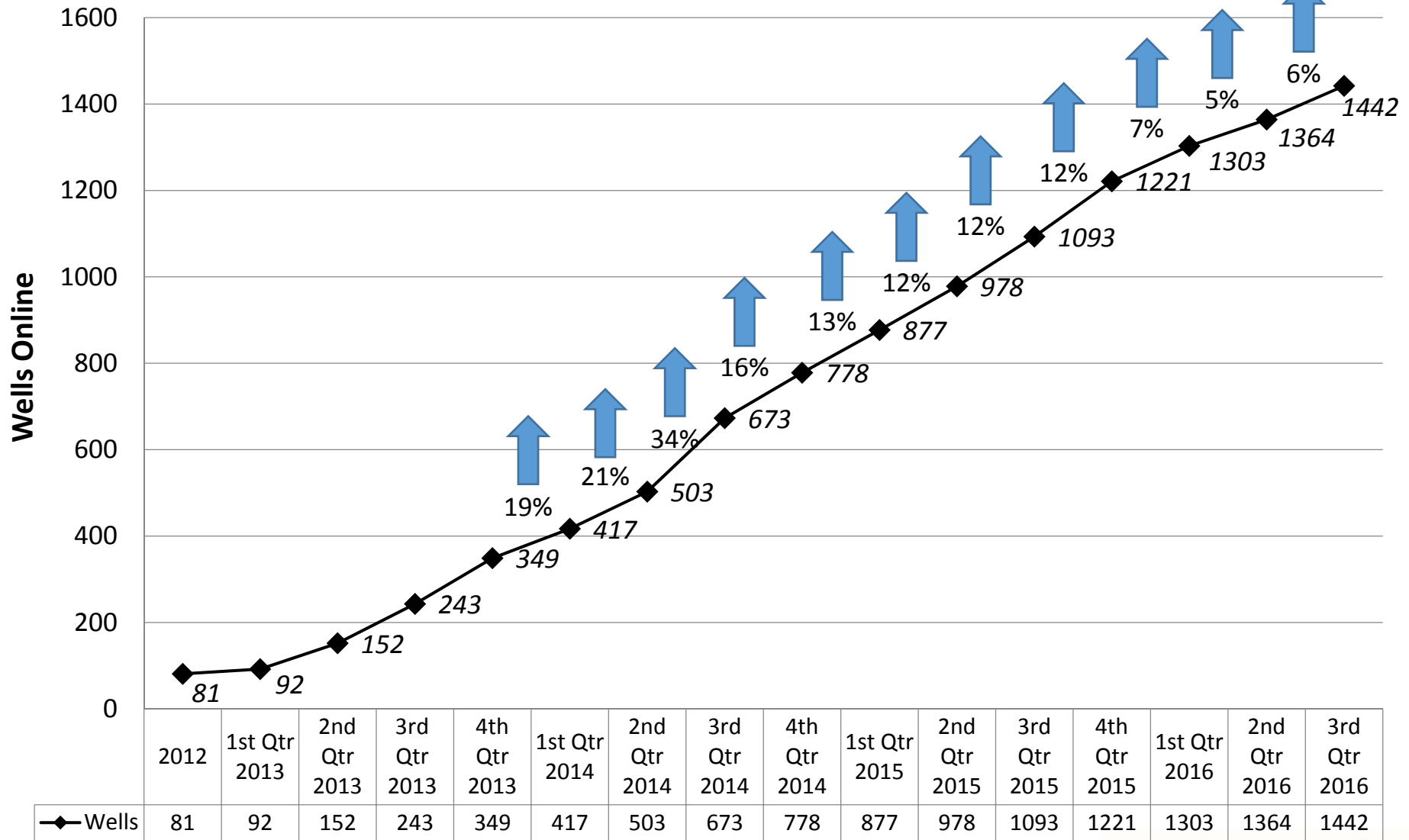
Utica – Gas Production By Quarter



Utica – Oil Production By Quarter



Utica – Wells Online By Quarter



Utica EUR Estimation

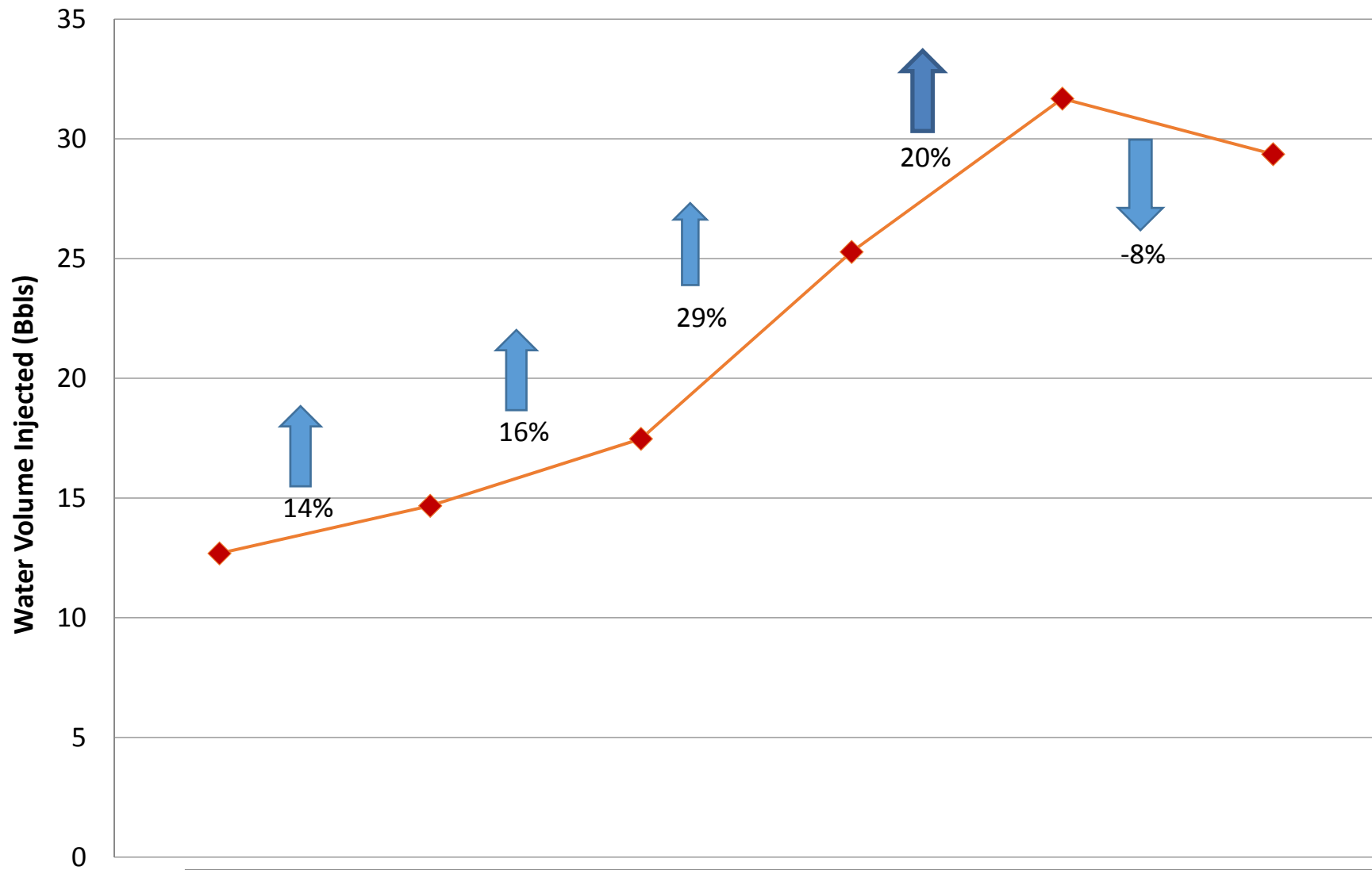
- Used operator reported production to ODNR through 3rd Qtr 2016
- Calculated EUR values for each well
- Adjusted EUR to gas equivalents (BCFE)
 - used GAS/OIL ratio of 20:1 (based on current market prices)
- Determined treated length (stimulated interval) and then calculated EUR per 1000' of lateral

Class II Injection Wells



PHOTOGRAPH COURTESY OF LARRY WICKSTROM

Annual Injection Volume - Statewide



	2011	2012	2013	2014	2015	2016
Series2	12,689,735	14,675,408	17,474,821	25,277,646	31,681,718	29,359,014

Top 12 Class II Injection Wells – By Volume

OPERATOR	COUNTY	WELL	VOLUME (BBLS)
REDBIRD DEVELOPMENT	WASHINGTON	RED BIRD (SWIW #18)	1,937,197
ENVIRONMENTAL ENERGY SOLUTIONS	MUSKINGUM	PATTISON TRUST (SWIW #30)	1,697,250
ELKHEAD GAS & OIL	TUSCARAWAS	MOZENA (SWIW #13)	1,498,932
CLEARWATER THREE, LLC	GUERNSEY	CLEARWATER 111 (SWIW #15)	1,486,103
CLEARWATER THREE, LLC	GUERNSEY	BO (SWIW #20)	1,372,107
REHYDRO LTD./MASON DRILLING	TUSCARAWAS	RE-HYDRO (SWIW #10)	1,033,143
BUCKEYE BRINE LLC	COSHOCTON	ADAMS (SWIW #12)	931,329
BUCKEYE BRINE LLC	COSHOCTON	ADAMS (SWIW #11)	821,424
K & H PARTNERS LLC	ATHENS	K & H PARTNERS LLC (SWIW #10)	813,095
HEINRICH ENT.	WASHINGTON	HEINRICH UNIT	800,775
NUVERRA/HECKMAN	MUSKINGUM	GOFF SWD (SWIW #27)	734,493
K & H PARTNERS LLC	ATHENS	K& H PARTNERS LLC (SWIW #8)	733,388

THE TOP 12 WELLS ACCOUNTED FOR **47%** OF TOTAL WATER INJECTED IN 2016

THANK YOU!

Marty Shumway

(614) 846-1391

marty@shumwayresources.com



SHUMWAY RESOURCES, LLC

Special Thanks To:

Ohio Oil and Gas Association

Bill Arnholt, Northwood Energy

Tim Knobloch, James Knobloch Petroleum Consultants, Inc.

Larry Wickstrom, Wickstrom Geoscience, LLC

