Abstract: **Permian basin and its impact on America's supply equation**

Speaker Bio.:

David Ramsden-Wood serves as Chief Operating Officer of OneEnergy Partners. Prior to OneEnergy was VP of Reservoir Engineering and Business Development at Sundance Energy and Business Unit Manager for Western US Operations at Enerplus Resources where he was responsible for the growth and operational execution in the Williston Basin. At Enerplus, was responsible for a four-rig, $300 MM capital budget drilling and completing in the Williston Basin, and overseeing production growth in the basin from 6,000 Boepd to over 20,000 Boepd. David began his career at Anadarko Petroleum where his roles included Manager of Planning and Reserves in the Rockies and Manager of Reservoir Engineering for the Greater Natural Buttes asset. David has a BS in Chemical Engineering from the University of Calgary and an MBA from both Cornell University and Queen's University.

About SPEE: http://www.spee.org SPEE was formed in 1962 as a professional, non-profit organization bringing together specialists in the evaluation of petroleum and natural gas properties. SPEE continues today to be strongly committed to providing educational and other services to its members and to the oil and gas industry, and to promoting the profession of petroleum evaluation engineering.

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Is $50 Oil Here to Stay?

How the Permian has changed the Supply equation in the US

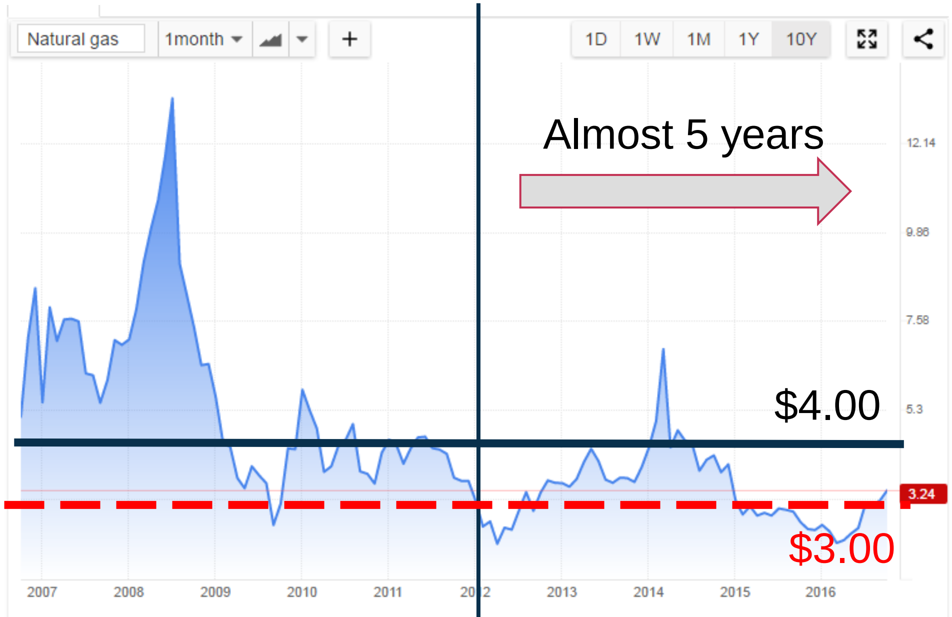
October 12, 2016

OneEnergy Partners

Talk Overview

Changes since 2014	▪ 1) Natural Gas production history and comparisons ▪ 2) Production performance ▪ 3) Completions ▪ 4) Rigs ▪ 5) Well spacing
Things to Watch in 2016/2017	▪ Well Spacing ▪ M&A Activity ▪ Public company equity prices ▪ IPO’s
What Does this Mean for Oil Prices?	▪ 2006 Comparison- natural gas and “gasco’s” ▪ Significant inventory in multiple benches leads to 125,000 locations in the Permian that are economic below $50/bbl

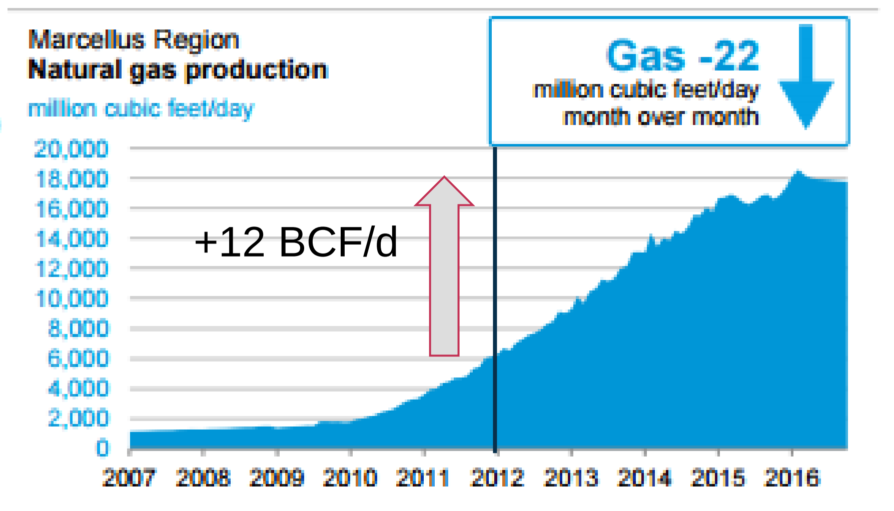
Natural Gas: The last 10 years



<u>Sept 28, 2016</u>

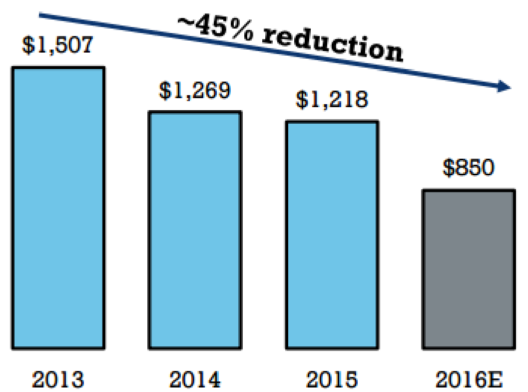
Why Did Rice Energy Pay $2.7B for Vantage Energy? It's Simple…

85,000 acres of Marcellus leases in Greene County, PA.

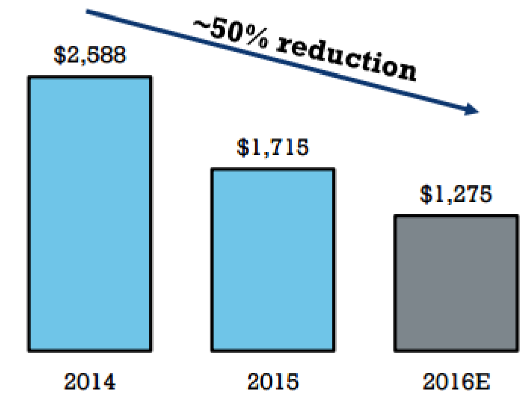


Rice Energy Performance in Marcellus/Utica Since 2013

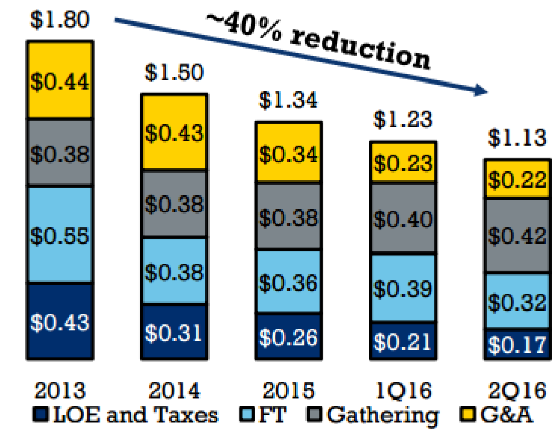
Marcellus D&C Costs ($/Ft.)



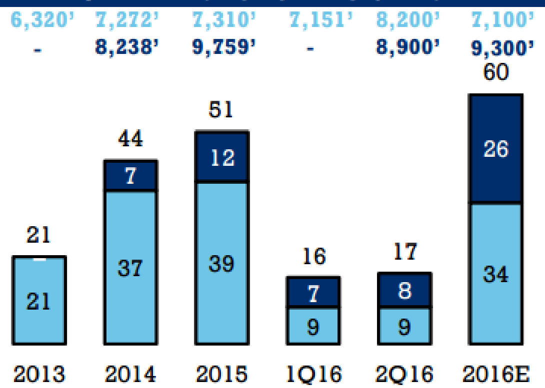
Utica D&C Costs ($/Ft.)



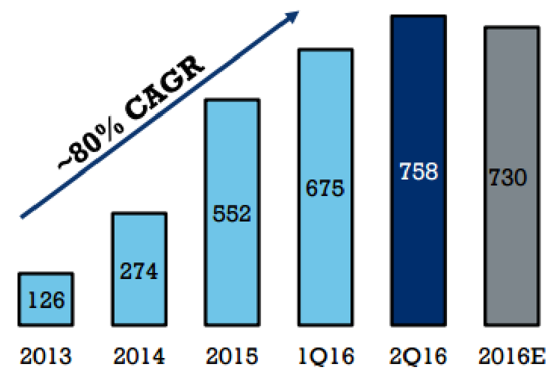
E&P Per Unit Cash Costs ($/Mcfe)[1]



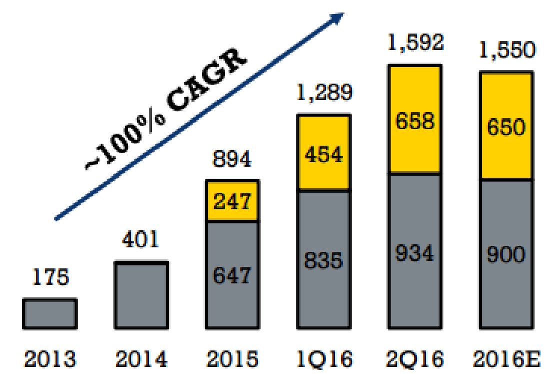
Net Wells Turned To Sales[2]



Net Production (MMcfe/d)



Midstream Throughput (MDth/d)



The Marcellus and Utica have been game changers moving the "Wall Street consensus" long term gas price from $4.00/mcf to $3.00/mcf driven by D&C, opex reductions and longer laterals

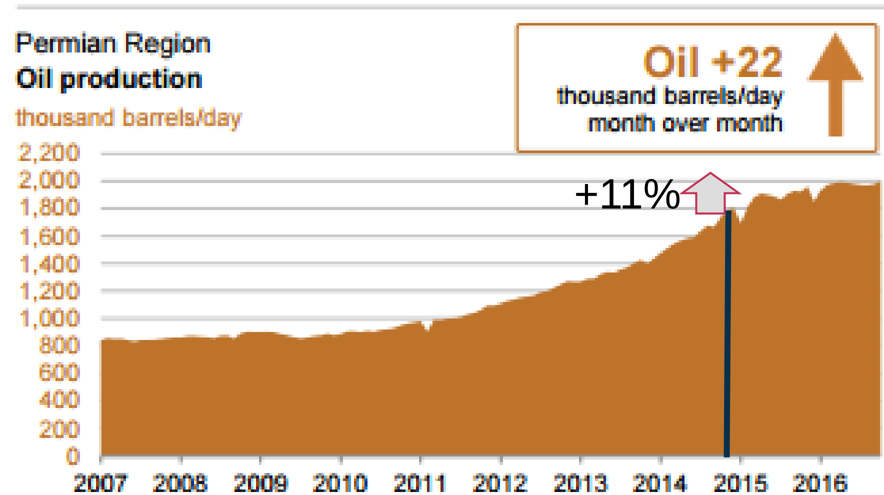
Source: Rice Energy IR presentations

Oil: The next 10 years?

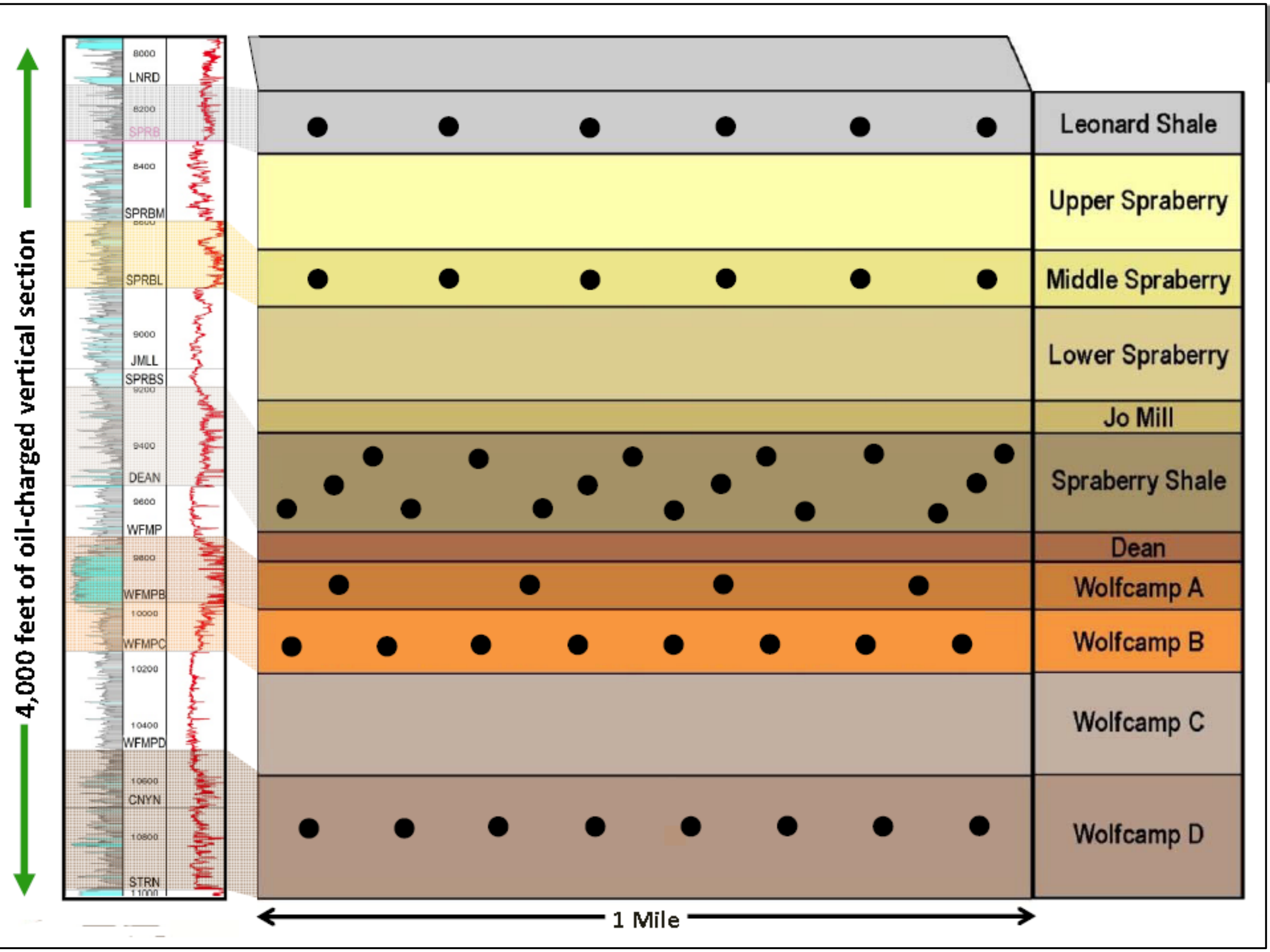
June 21, 2016

- Adds over 430 potential horizontal drilling locations across four target horizons
- Increases QEP Permian potential drilling locations by over 50%
- Leverages proximity of existing QEP Permian acreage for operational and technical efficiencies

DENVER, June 21, 2016 (GLOBE NEWSWIRE) -- QEP Resources, Inc. (NYSE:QEP) ("QEP" or the "Company") announced today that its wholly owned subsidiary, QEP Energy Company, has entered into a definitive agreement (the "Agreement") with certain individuals and entities (the "Initial Sellers") to acquire oil and gas properties in the Permian Basin from the Initial Sellers and other associated individuals and entities (the "Associated Owners") for an aggregate purchase price of approximately $600 million, subject



QEP Company Example in the Midland



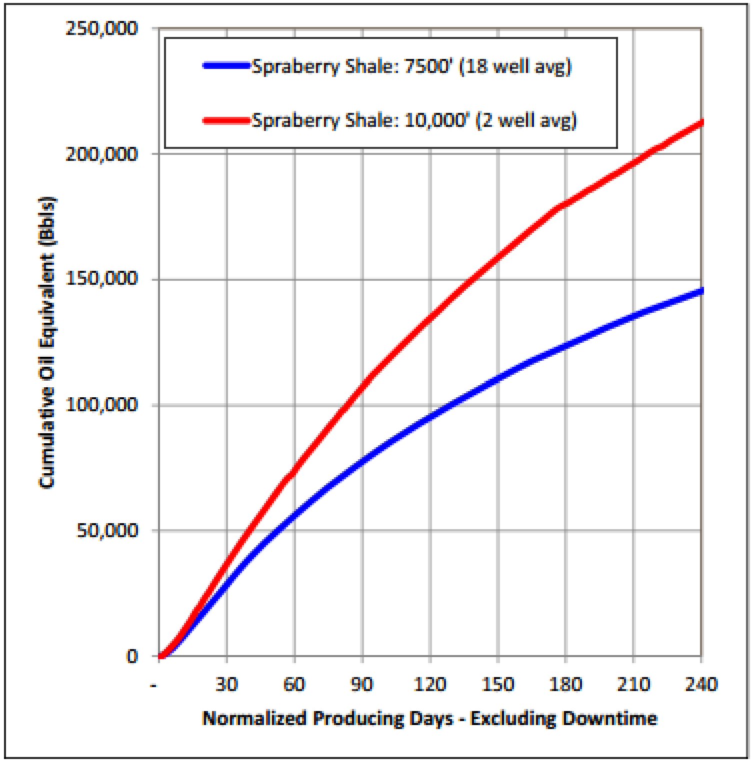
Commentary

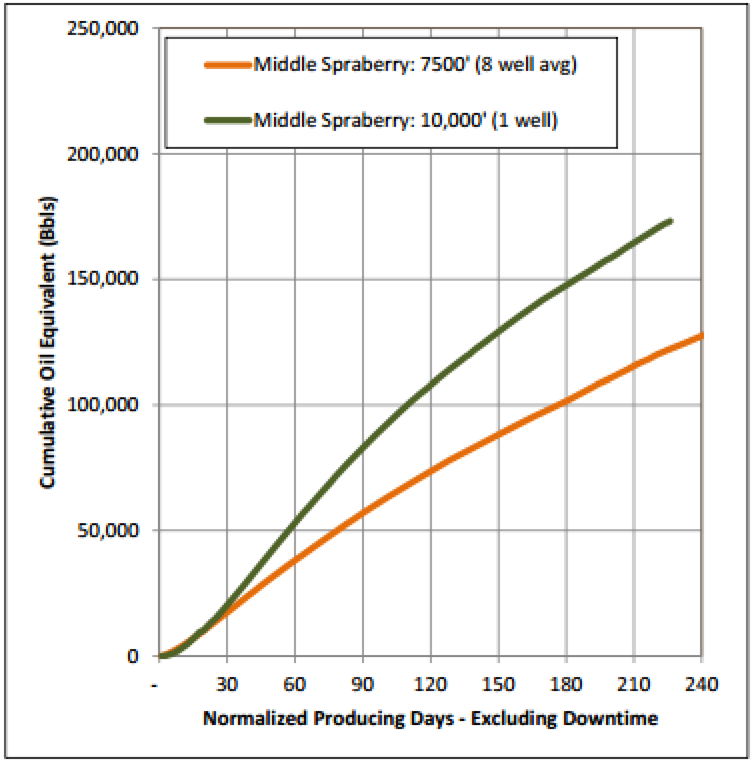
- Midland Basin
  - Last big QEP transaction was Helis in the Bakken where they paid the high water mark

Source: QEP Investor Relations Presentation

QEP: Well Performance Leading

PERMIAN BASIN – HORIZONTAL WELL PERFORMANCE





QEP RESOURCES

* Production figures are post processing and assume an average shrink (loss of heat content due to extraction of liquids and fuel gas) of 29%, and NGL yield of 138 Bbl/MMcf

QEP Acquisition

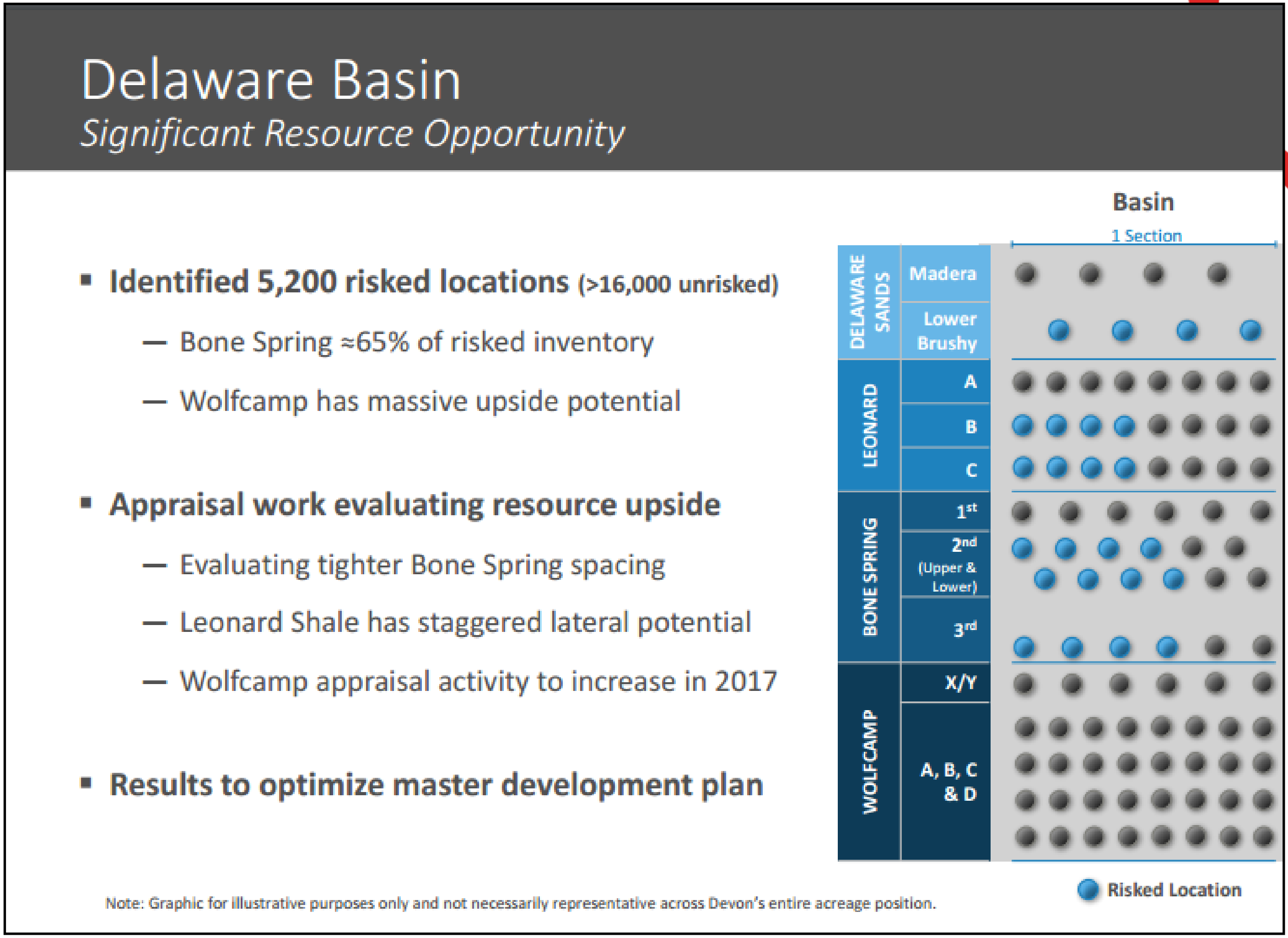
To fully develop its Midland Basin position, QEP would need to spend ~$11.6bn (or ~150% more than its current enterprise value)

Midland Basin Target	Gross Locations	EUR / Well (Mboe)	EUR / Bench (MMboe)	Capex per Well ($mm)(1)	Total Capex ($mm)
Leonard Shale	251	550 - 650	151	$5.8	$1,457
Lower Spraberry	670	750 - 850	536	$5.3	$3,551
Middle Spraberry	251	550 - 650	151	$5.8	$1,457
Wolfcamp A	168	400 - 450	71	$5.7	$955
Wolfcamp B	335	650 - 750	201	$6.2	$2,077
Wolfcamp D	335	400 - 500	151	$6.3	$2,094
Total	**2,010**		**1,260**	**$5.8**	**$11,591**

"At a conservative estimate, there's five billion gallons of shale gas under your lower molars."

Source: QEP Investor Relations Presentation

Other Public Company Example in the Delaware



Devon's unrisked well county per spacing unit is 94 wells with 14 potential benches in 4 productive reservoir packages.

Source: Devon investor relations presentation

What Are Operators Saying....

Concho

- Recent 4-well, 80-acre **downspacing** test in Avalon outperforming prior well performance
- Planning to drill several **long-lateral** Avalon Shale wells in 2H16
- **Completion optimization** enhancing well performance

EOG Resources

- Since 2014, **wells costs down** and **drilling days down** 43% and 46%, respectively
- **Downspacing** to 500’, **testing additional targets** and **extending lateral lengths**
- Field rumor 2017 rig count to be 6 to 16 rigs

Devon

- Bone Spring **completion costs down** 60% since Q4 2014
- LOE costs down by 50% due to improved electrical infrastructure and enhanced water handling infrastructure
- Wolfcamp appraisal activity to increase in 2017; *“Wolfcamp has massive upside potential”*
- Evaluating tighter Bone Spring potential, Leonard Shale has staggered lateral potential

OXY

- **Completion optimization** increasing results (recently drilled +1 MMBbl EUR well in 2BS for $5.5 million)
- **Increasing focus on New Mexico** as appraisal and delineation efforts indicate high return, multi-bench potential
- **Decreased drilling cost/lateral foot** by greater than 20% from 2015

Cimarex

- **Bigger completions** improve Avalon results (119% increase over first 180 days)
- **Upsided frac** improves Second Bone Spring results (70% increase over first 180 days)
- Drilled first 7,000 ft lateral in Second Bone Springs
- Focused on Wolfcamp **long laterals**

Matador

- Completed **downspacing** test to 7 wells per DSU in Wolfcamp A
- Wolfcamp X-Y **outperforming** expectations
- **Drilling and completion costs down** over 50% from 2014

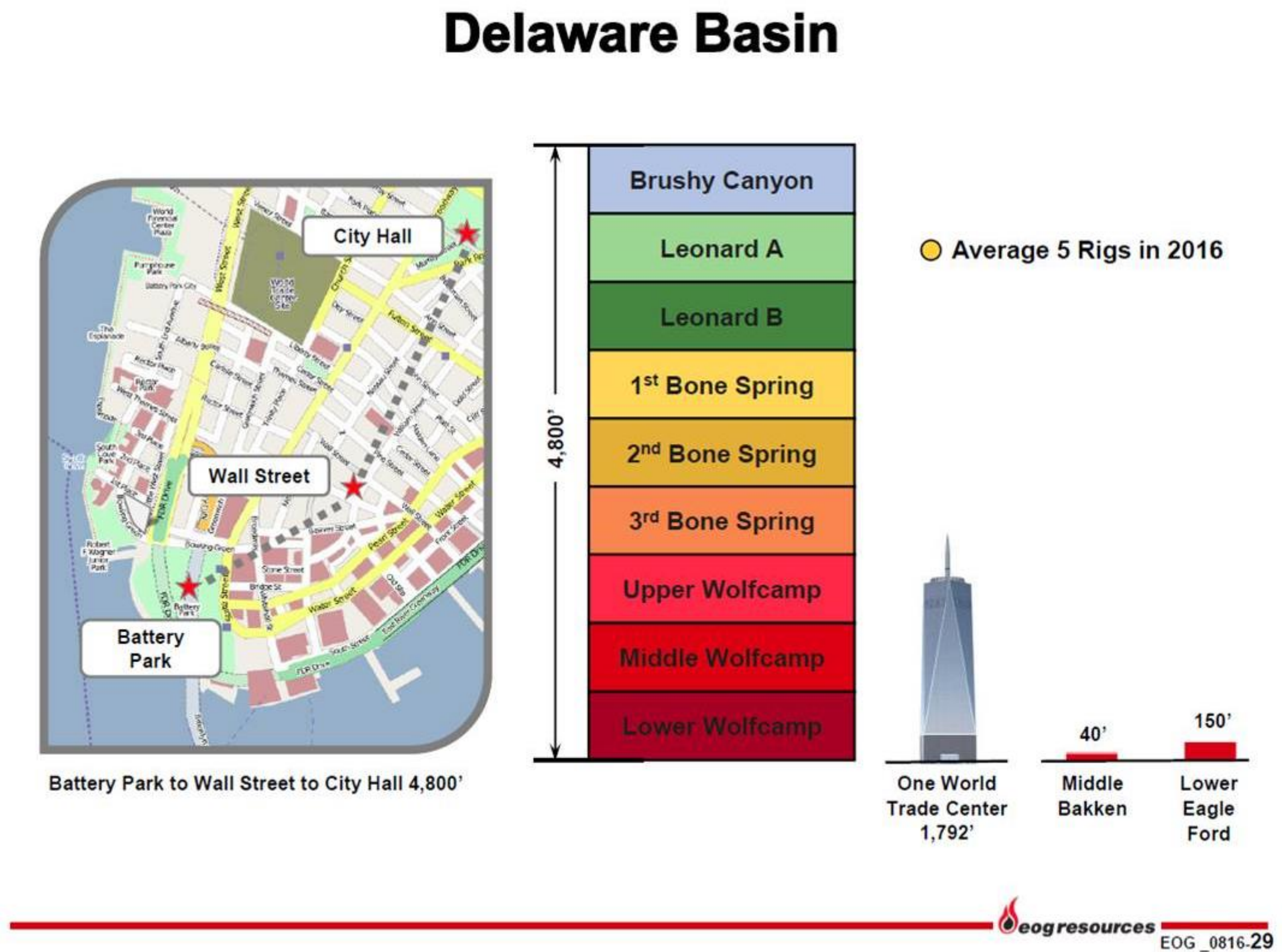
WPX Energy

- Adding 3rd rig in October and testing Wolfcamp D and X/Y wells
- Testing **larger completions** and **tighter cluster spacing**
- **Increased resource potential** by nearly 50% since August 2015 through **increased EURs, tighter spacing and additional benches**

Longer laterals, lower well costs and enhanced completions are evidenced across operators and zones

Source: IR presentations/ press releases from the companies mentioned

The Best Investment Banking Slide I've Seen



Source: EOG Investor relations Presentation

What Operators are Doing…..

- Snapshot of deal count/value:
- Global YTD: 869 deals for $70.23bn
- Global Weekly: 12 deals for $371.72mn
-
- US YTD: 452 deals for $38.19bn
- US Weekly: 6 deals for $371.72mn

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STACK/SCOOP

Marcellus

Buying Permian Deals at a significant rate. Data excludes the recent New Mexico sale that generated over $140 mm from BLM land with Matador and Energen as the two largest purchasers posting $/acre's >$30,000/acre

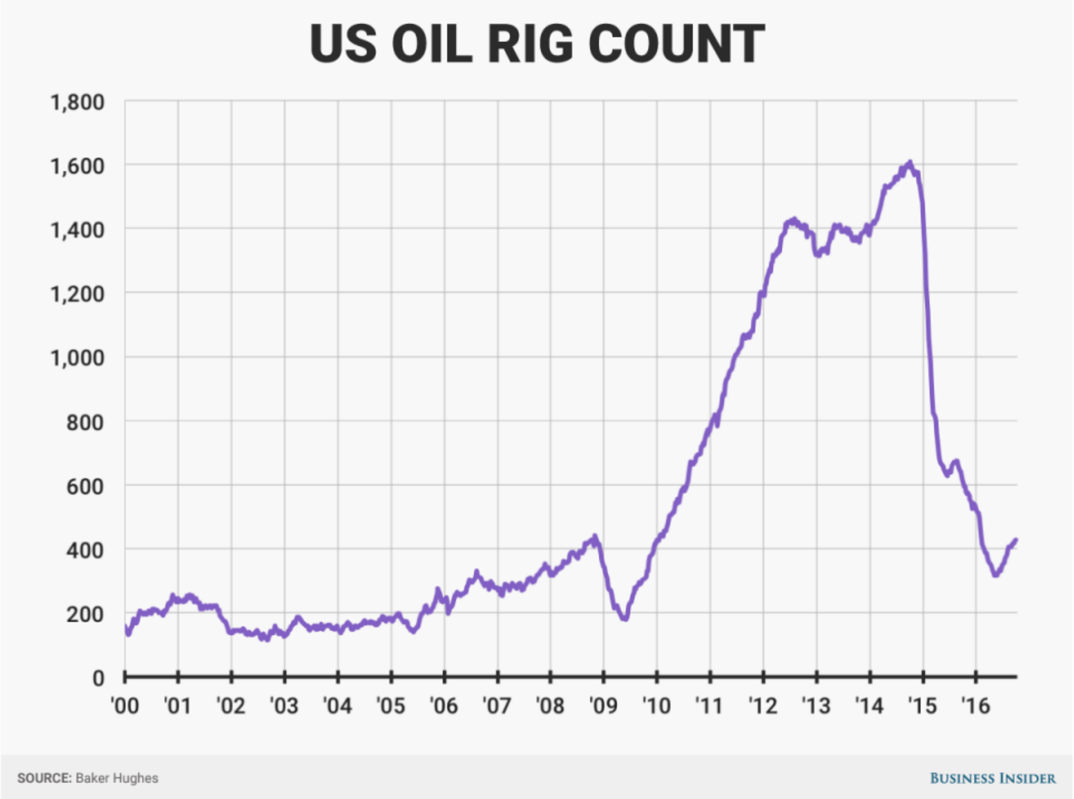
Rig Data

Commentary

- Rigs have climbed 6 weeks in a row
- Efficiency of rigs, pad drilling and faster drilling is making rig "equivalence" to the past much more difficult to draw out
- Permian accounts for 39% of all US rigs running
- More than All other major basins COMBINED
  - Williston+ DJ + Eagleford+ SCOOP/STACK is 120 rigs

Source: Baker Hughes Rig Count

Major Basin Variances	This Week	+/-	Last Week	+/-	Year Ago
Ardmore Woodford	0	0	0	-2	2
Arkoma Woodford	4	0	4	-4	8
Barnett	3	2	1	-3	6
Cana Woodford	35	0	35	-2	37
DJ-Niobrara	16	-1	17	-11	27
Eagle Ford	35	-1	36	-45	80
Fayetteville	1	0	1	-3	4
Granite Wash	10	0	10	-1	11
Haynesville	14	1	13	-10	24
Marcellus	32	0	32	-14	46
Mississippian	3	0	3	-10	13
Permian	203	-1	204	-32	235
Utica	15	0	15	-5	20
Williston	30	0	30	-35	65



Total Completions: Q2 2014 – Q2 2016

Row Labels	Count of API Number	% of All
Eagle Ford	1048	19%
Williston	660	12%
Marcellus	472	9%
Delaware	336	6%
Midland	325	6%
Miss Lime	324	6%
Denver	322	6%
OK/TX Panhandle	265	5%
Ft. Worth / Barnett	167	3%
Utica	153	3%
Fayetteville	149	3%
Deep Basin South	147	3%
West Central Saskatchewan	130	2%
Haynesville	114	2%
Eaglebine/Woodbine	98	2%
Uinta-Piceance	94	2%
Scoop	84	2%
Southern Plains	78	1%
Powder River	76	1%
Southeast Saskatchewan/Williston	58	1%
Stack	56	1%
Central Basin Platform	55	1%
Northwest Saskatchewan	43	1%
Other Canada	28	1%
Other Gulf Coast Basin	23	0%
San Juan	20	0%
North Eastern Plains	19	0%
Arkoma Woodford	17	0%
Deep Basin North	14	0%
Other MidCon	11	0%
Northwest Shelf	8	0%
Tuscaloosa	7	0%
San Joaquin	6	0%
Eastern Shelf	3	0%
Other Rest	2	0%
Green River	1	0%
Paradox	1	0%
Grand Total	**5414**	**100%**

Row Labels	Count of API Number
Eagle Ford	359
Midland	257
Delaware	231
Denver	183
Marcellus	164
Williston	151
West Central Saskatchewan	94
Stack	68
Utica	62
OK/TX Panhandle	53
Haynesville	42
Miss Lime	35
Central Basin Platform	22
Southern Plains	21
Southeast Saskatchewan/Williston	20
Uinta-Piceance	20
Scoop	20
Eaglebine/Woodbine	19
Arkoma Woodford	16
Northwest Shelf	13
Powder River	8
Other Gulf Coast Basin	8
San Juan	8
Other MidCon	7
Other Canada	6
North Park	5
Ft. Worth / Barnett	4
Green River	2
Eastern Shelf	1
Grand Total	**1899**

Source: NavPort Data

Total Changes in Q2 Completions 2014 - 2016

Commentary

- Midland and Delaware completion counts are down 21% and 31%
  - Of Major Resource plays, only STACK has increased
  - Permian production is still up 25% since Q2
- Marcellus down 65% and production has grown 29%

	Reduction	Total wells
Eagle Ford	66%	19%
Midland	21%	14%
Delaware	31%	12%
Denver	43%	10%
Marcellus	65%	9%
Williston	77%	8%
West Central Saskatchewan	28%	5%
Stack	-21%	4%
Utica	59%	3%
OK/TX Panhandle	80%	3%
Haynesville	63%	2%
Miss Lime	89%	2%
Central Basin Platform	60%	1%
Southern Plains	73%	1%
Southeast Saskatchewan/Williston	66%	1%
Uinta-Piceance	79%	1%
Scoop	76%	1%
Eaglebine/Woodbine	81%	1%
Arkoma Woodford	6%	1%
Northwest Shelf	-63%	1%
Powder River	89%	0%
Other Gulf Coast Basin	65%	0%
San Juan	60%	0%
Other MidCon	36%	0%
Other Canada	79%	0%
North Park		0%
Ft. Worth / Barnett	98%	0%
Green River	-100%	0%
Eastern Shelf	67%	0%

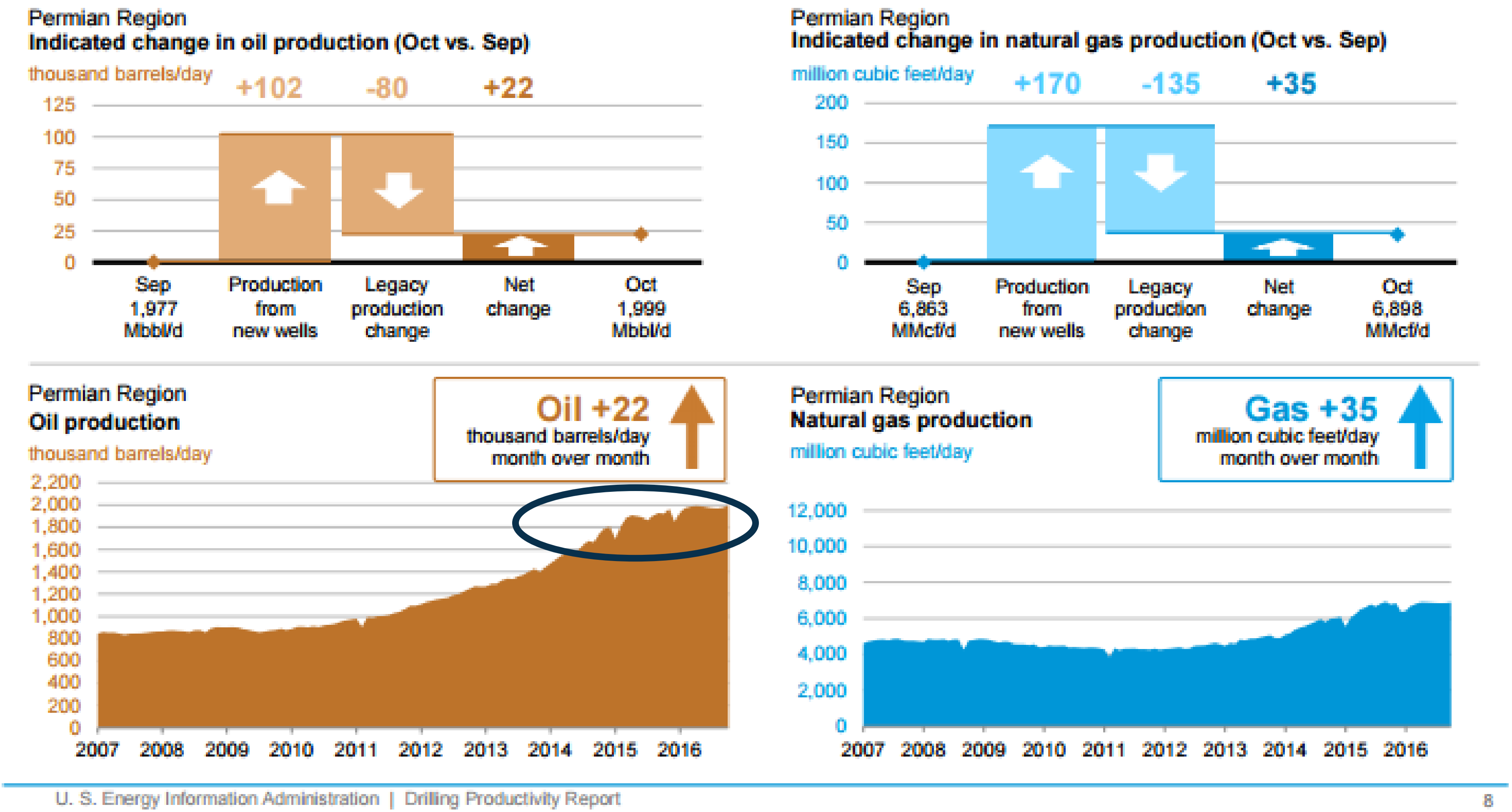
Source: NavPort Raw data

Permit Data

Count of API\UWI	Column Labels								
Row Labels	Anadarko	Appalachian	Eagle Ford	Gulf Coast	MidCon	Permian	Rockies	Williston	Grand Total
2014									
Q1	455	1036	1625	172	683	1150	400	26	5547
Q2	544	1065	1939	177	725	1374	806	27	6657
Q3	615	1065	2307	188	806	1915	912	57	7865
Q4	518	1030	2034	212	761	1686	1491	46	7778
2015									
Q1	437	931	1119	115	404	1169	1309	10	5494
Q2	311	754	831	155	251	1061	1330		4693
Q3	305	658	662	114	229	1081	1584		4633
Q4	213	677	648	106	178	1152	1535		4509
2016									
Q1	192	505	452	76	111	899	1942		4177
Q2	58	344	371	78	24	1089	1711		3675
Q3	38	363	364	69	14	1025	1622		3495
Grand Total	**3686**	**8428**	**12352**	**1462**	**4186**	**13601**	**14642**	**166**	**58523**

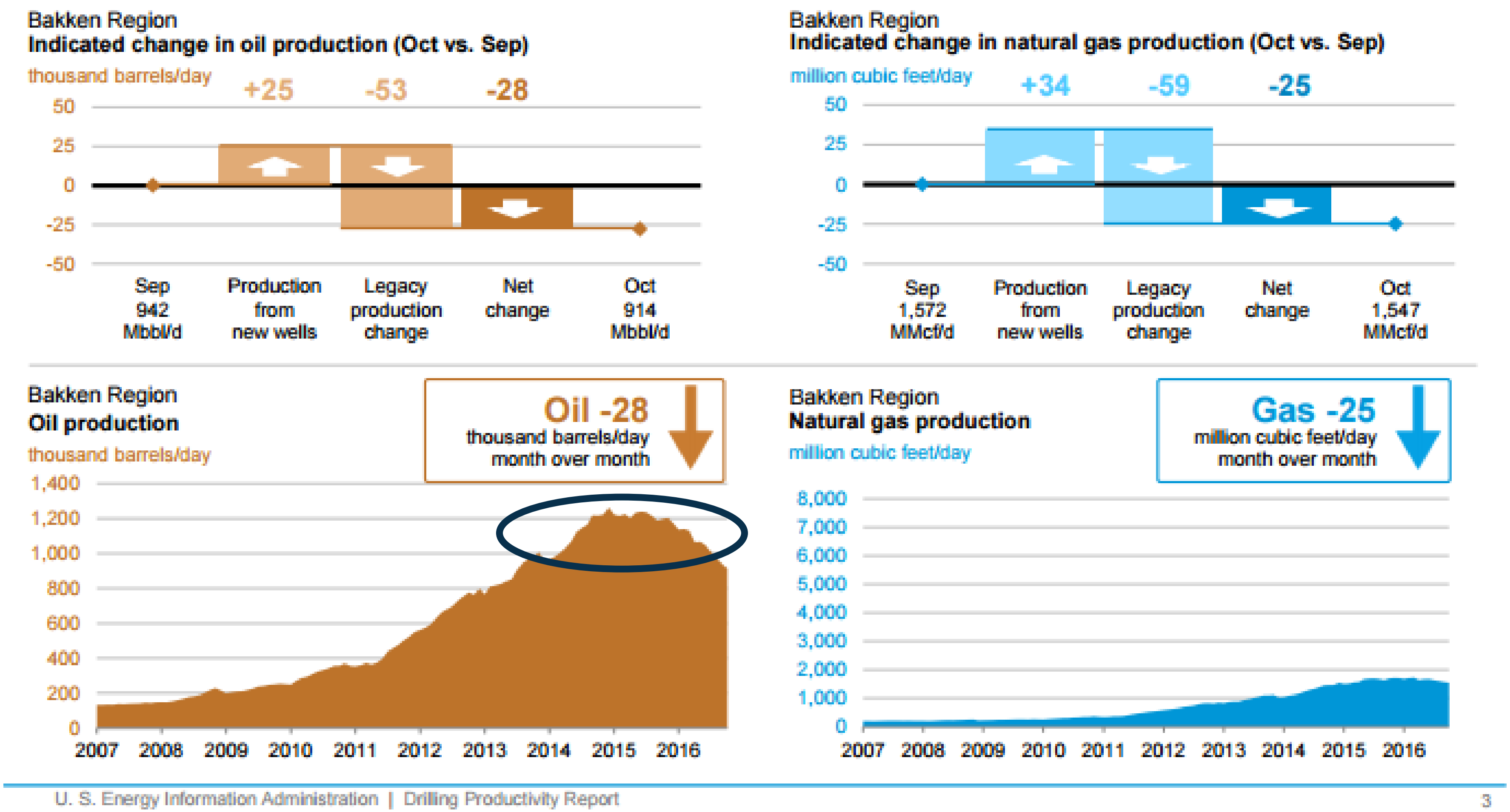
The Results….

Permian Production 2014 - 2016



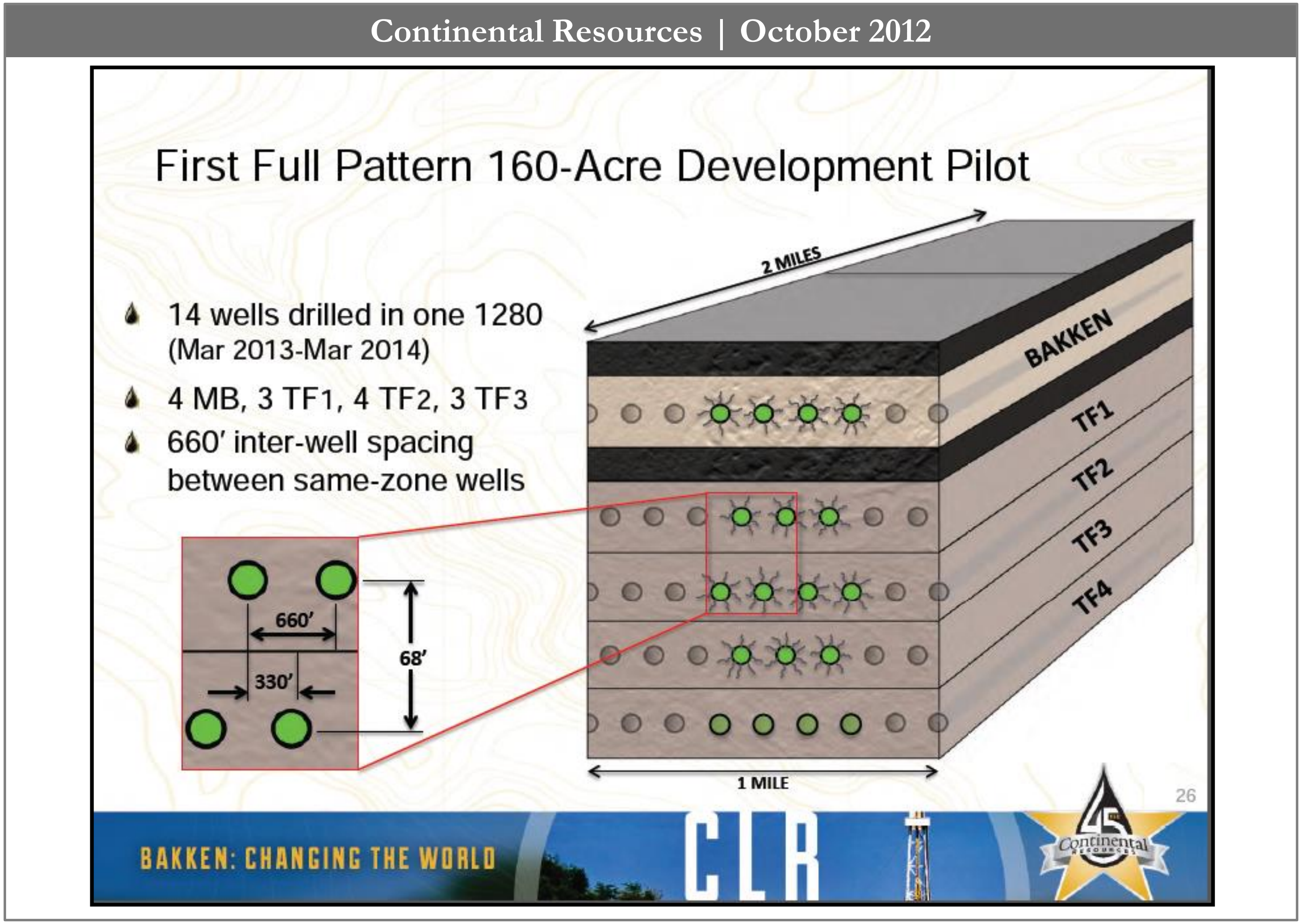
Source: EIA

Bakken Production Comparison



Source: EIA

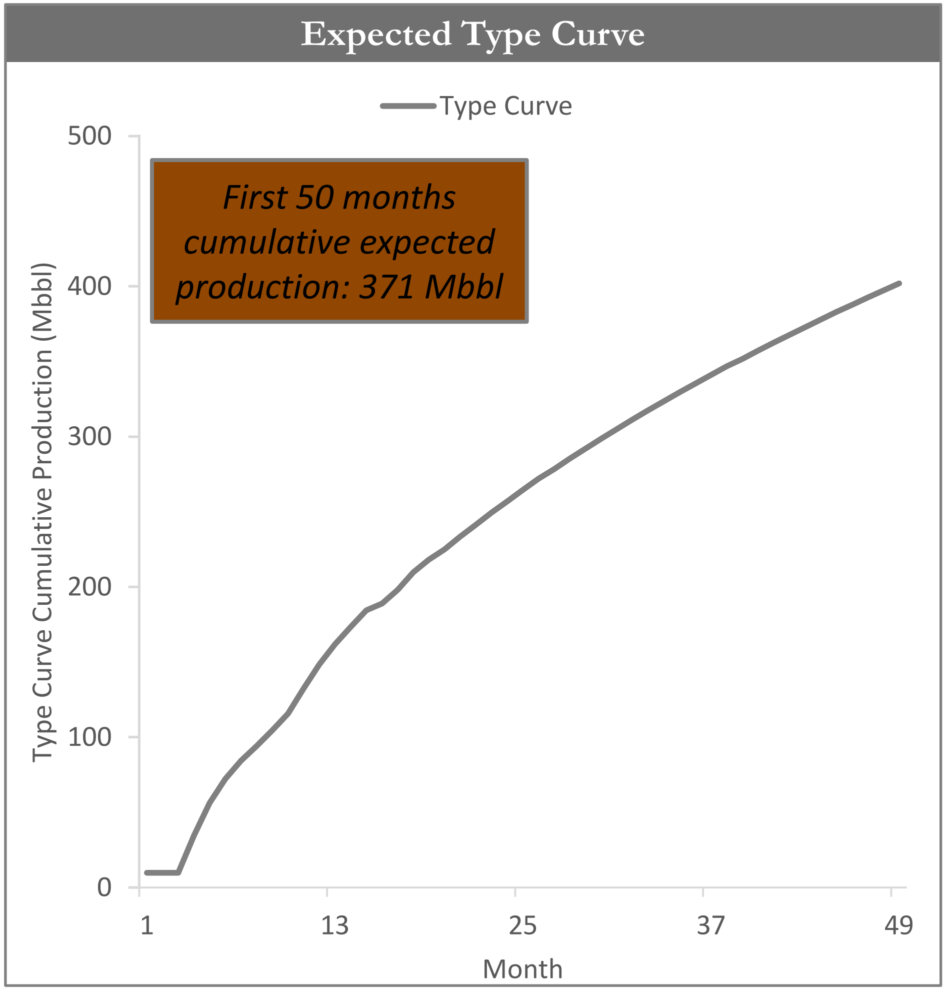
Have We Seen This Before?

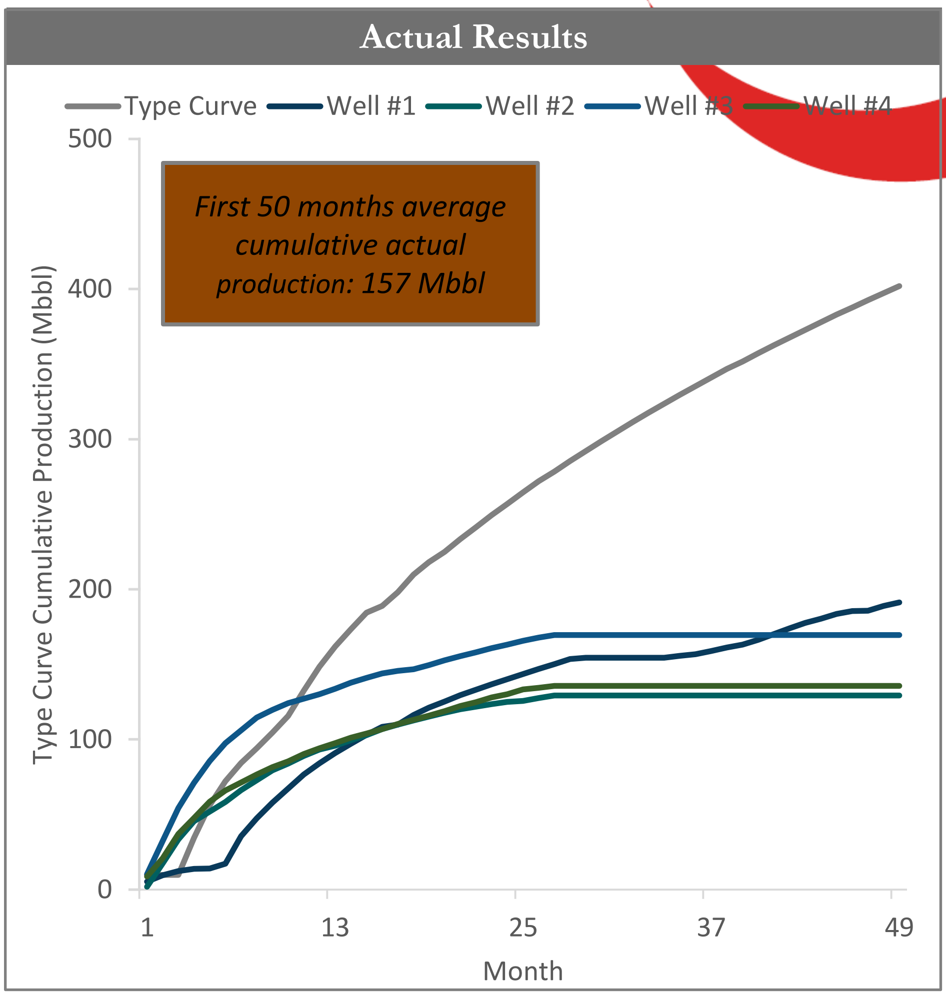


Source: CLR Investor Presentation October 2012

4 Years Later: How Did the Pilot Do?

Actual EUR was 42% below the type curve forecast



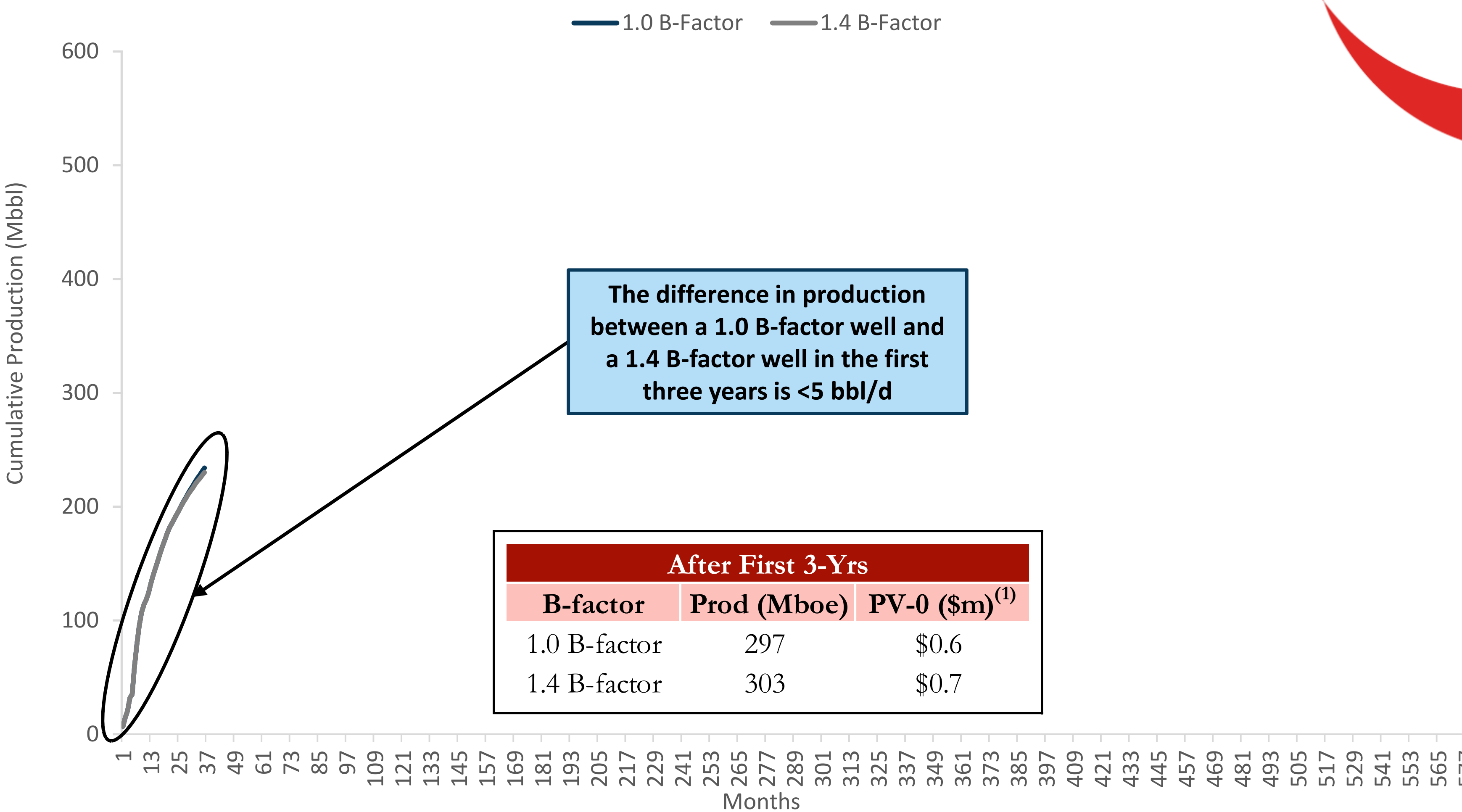


Source: IHS, Continental Resources Investor Presentation.

Source, NavPort raw data

Case Study: Early Play B Factor Variance

Small variances in B-factor are not apparent during the first three years of production…

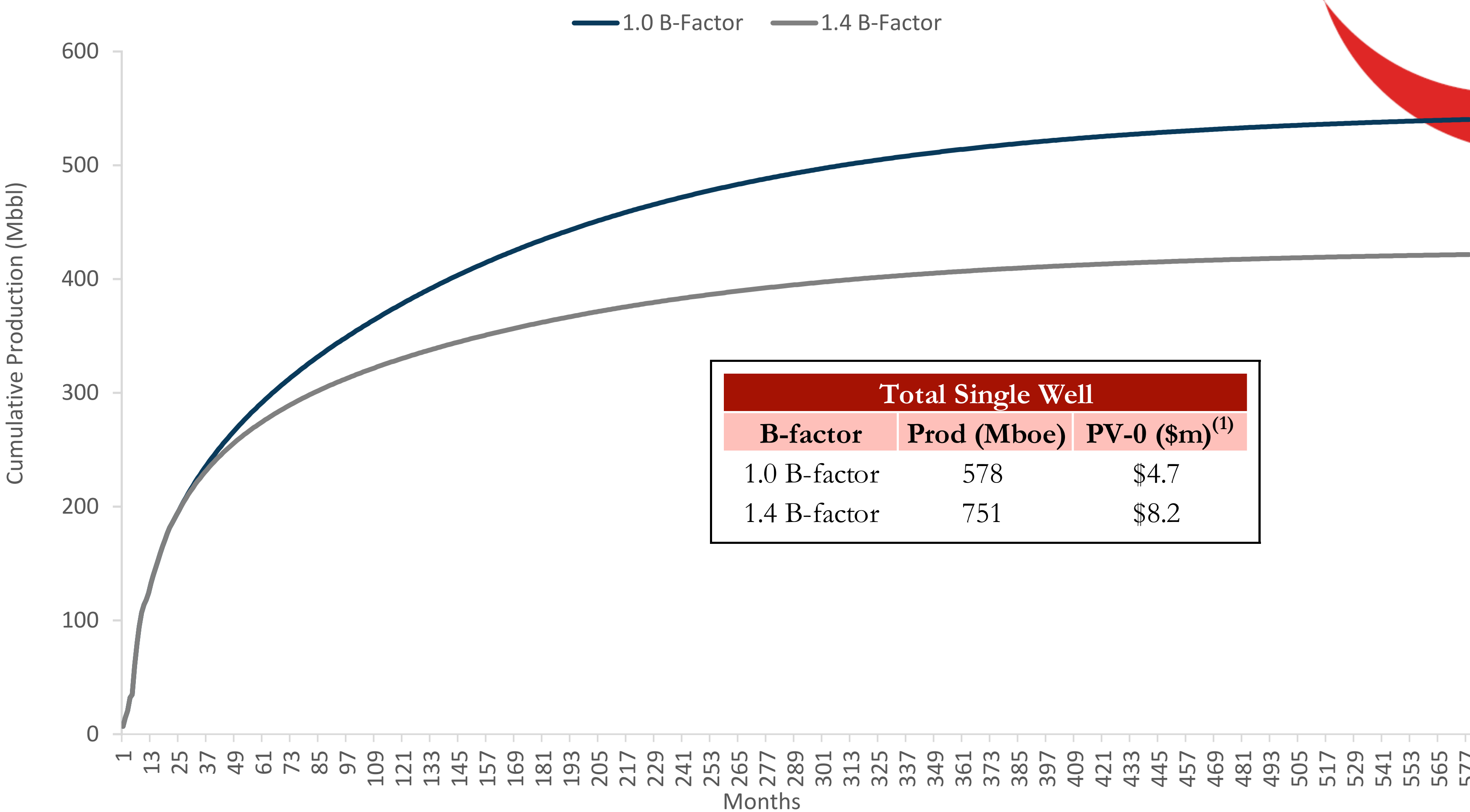


After First 3-Yrs		
B-factor	**Prod (Mboe)**	**PV-0 ($m)(1)**
1.0 B-factor	297	$0.6
1.4 B-factor	303	$0.7

(1) Assumes pre-tax, pre-G&A PV-0 value at $50/$2.50 price deck. Additionally, economics assume fixed LOE of $5,000/mo, variable LOE of $5.00/bbl and $0.75/mcf, ad valorem taxes of 2.5% of revenue generated, severance taxes of 4.6% for oil revenue and 7.5% for gas revenue, and $6,500k for D&C costs.

Case Study: Early Play B Factor Variance

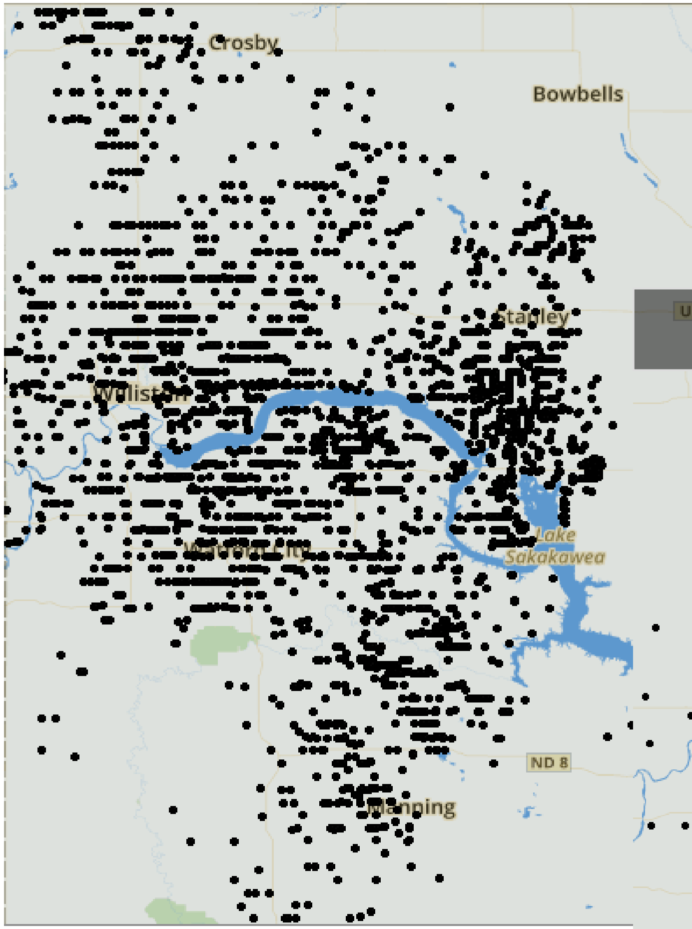
… But these small variances could have a material impact on economics



Total Single Well		
B-factor	**Prod (Mboe)**	**PV-0 ($m)[1]**
1.0 B-factor	578	$4.7
1.4 B-factor	751	$8.2

Proppant Evolution: Lots of Data- but do we have enough?

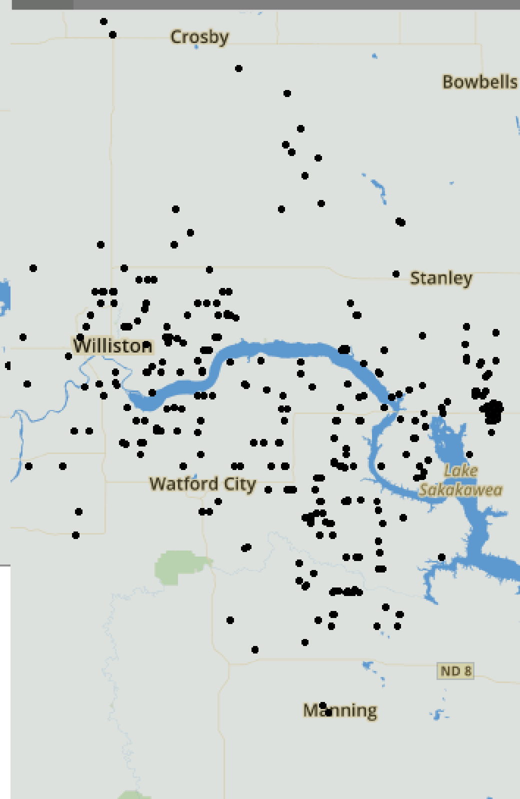
All Wells in Data Set

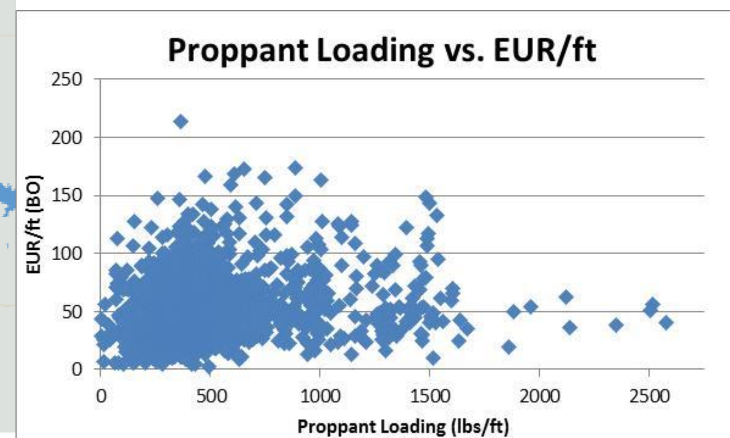


Wells with More than 600 lbs/ft Proppant

- 56 BO/ft overall average from total data set
- Oasis, Whiting, EOG, QEP and CLR make up 67% of the total completions executed over 600 lbs/ft
- For the overall Bakken dataset, 600 lbs/ft is the approximate demarkation of "diminishing returns"
  - However, each area needs to be evaluated independently on a township by township basis to draw more specific conclusions

Wells with >600 lbs/ft





Bakken Completions with >600 lbs/ft

Wells with More than 600 lbs/ft Proppant

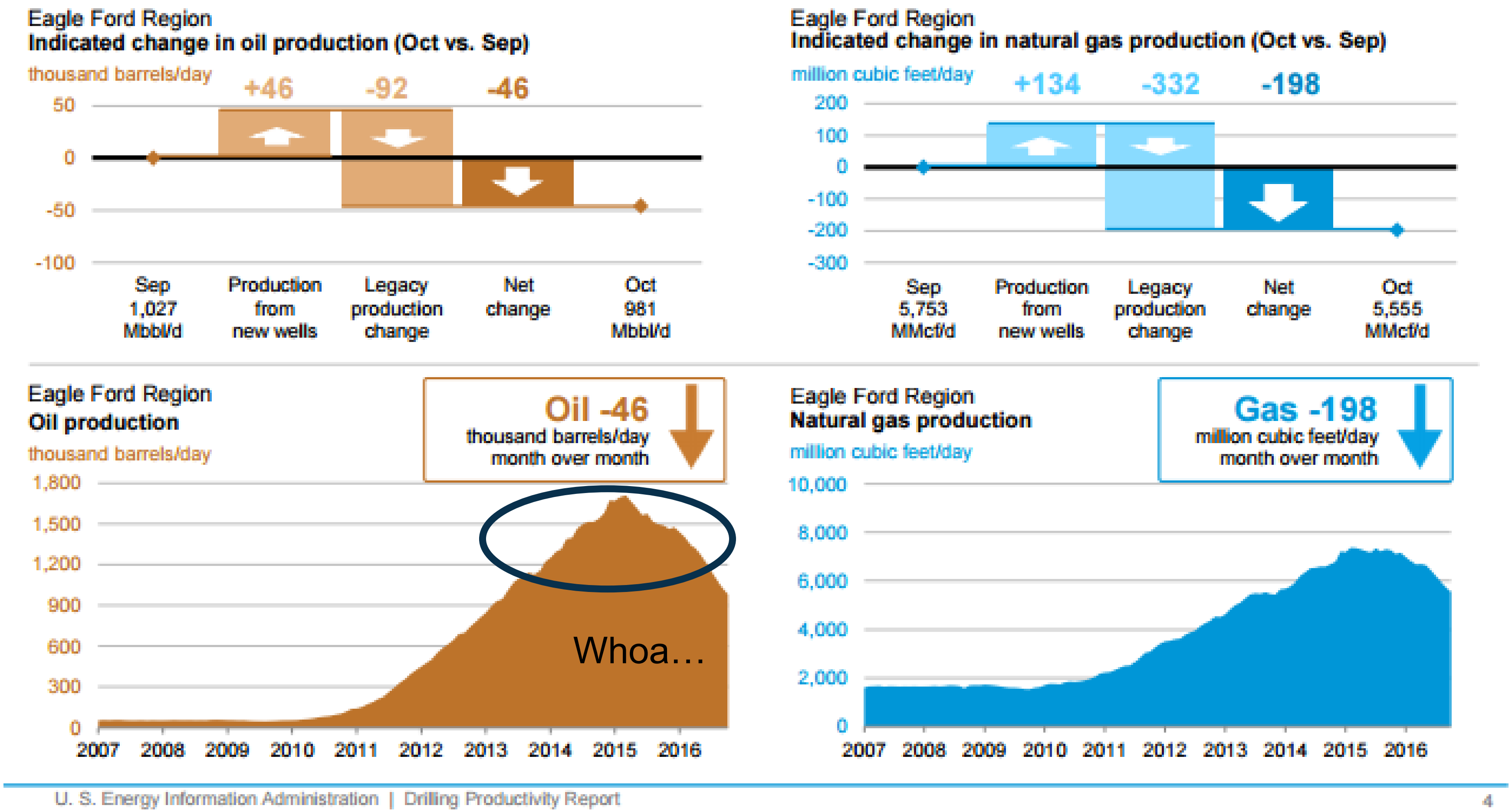
	104		103		102		101		100		99		98		97		96		95		94		93		92		91		90	
Row	Aver	Cou	Aver	Cou	Aver	Cou	Aver	Cou	Aver	Cou	Aver	Cou	Aver	Cou	Aver	Cou	Avera	Cou	Avera	Cou	Avera	Cou	Avera	Cou	Aver	Cou	Aver	Cou	Aver	Cou
160																			29.9	1										
159																			24.7	1	30.3	1								
158													34.8	1					25.2	1										
157									44.6	1			41.3	2											21.7	2				
156							66.1	2	49.5	3	43.5	1	27.4	1											43.2	1				
155							35.2	2	54.6	4			42.9	4	40.3	3					51.5	3								
154					68.8	1					60.6	4	46.6	8			46.3	4			49.2	3	69.7	1						
153							52.4	2	39.9	1	59.0	2	52.5	3	34.3	2	63.0	4	107.3	2			72.3	1	65.3	2			35.0	8
152					24.8	2	38.8	1	48.4	8	50.3	3					58.8	3	78.1	1	97.3	2	51.3	2	71.3	6	50.8	2	34.0	8
151									45.8	5	68.3	3			42.0	1	93.6	1	104.6	3	56.9	1	53.4	3	47.6	1			26.7	3
150	32.3	1															90.4	3	71.2	2	103.3	7	176.2	1	75.0	7				
149					30.7	3							42.1	4					68.7	31			77.6	4						
148													39.6	1					74.5	3	90.5	6			47.8	3				
147																	106.0	8	63.3	4	117.1	1								
146																	79.2	2	54.7	2										
145															52.3	1	61.9	1												
144															37.1	1	174.8	1												
143			0.0	1													50.2	2												

- Relatively small data set (243 wells)
- Average uplift is 22% but has significant variation and vintaging does play an issue
  - Areas with completions more recent than 2012/2013 will have smaller increases anecdotally as compared to pre 2009 wells
- Well spacing (wells per unit) also influences EUR performance

Foot	104	103	102	101	100	99	98	97	96	95	94	93	92	91	90
160										135%					
159										93%	111%				
158							134%			68%					
157					100%		129%						79%		
156				148%	87%	107%	100%						121%		
155				83%	79%		76%	111%			169%				
154			152%			105%	127%		114%		110%	211%			
153				178%	92%	94%	92%	85%	102%	144%		120%	160%		
152			60%	200%	103%	92%			121%	180%	132%	69%	141%	119%	
151					111%	133%		101%	170%	230%	62%	76%	101%		
150	135%								135%	120%	125%	221%	108%		
149			85%				118%			101%		110%			
148							102%			127%	138%		117%		
147									138%	108%	168%				
146									204%	103%					
145								119%	201%						
144								124%							
143									112%						

122%

Eagleford Production



Source: EIA

Permian Players Stock Performance

Pioneer Natural Resources (NYSE:PXD) Add to portfolio

191.40 -1.06 (-0.55%)

Real-time: 11:19AM EDT
NYSE real-time data - Disclaimer
Currency in USD

Range	190.07 - 192.13	Div/yield	0.04/0.04
52 week	103.50 - 193.39	EPS	-3.16
Open	191.20	Shares	169.61M
Vol / Avg.	337,290.00/1.72M	Beta	1.26
Mkt cap	32.33B	Inst. own	95%
P/E	-		

G+1 20

Compare: Enter ticker here Add Dow Jones S&P 500 AREX SDCJF EPE OXY BHP MXC more »

RSP Permian Inc (NYSE:RSPP) Add to portfolio

41.75 -0.01 (-0.02%)

Real-time: 11:21AM EDT
NYSE real-time data - Disclaimer
Currency in USD

Range	41.14 - 42.05	Div/yield	-
52 week	16.74 - 42.05	EPS	-0.38
Open	41.44	Shares	101.64M
Vol / Avg.	250,628.00/1.25M	Beta	-
Mkt cap	4.27B	Inst. own	88%
P/E	-		

G+1 0

Compare: Enter ticker here Add Dow Jones S&P 500 FANG AREX CPE PE CXO EPE more »

104.82 -0.02 (-0.02%)

Real-time: 11:20AM EDT
NASDAQ real-time data - Disclaimer
Currency in USD

Range	104.00 - 105.83	Div/yield	-
52 week	55.48 - 106.84	EPS	-7.84
Open	104.71	Shares	78.03M
Vol / Avg.	359,129.00/1.23M	Beta	1.03
Mkt cap	8.15B	Inst. own	102%
P/E	-		

G+1 5

Compare: Enter ticker here Add Dow Jones Nasdaq AREX PE CXO RSPP MTDR PXD more »

Concluding Remarks

- At current completion pace, there is 64 years of inventory in the Permian that is estimated to be economic below $50/bbl
- Pure play Permian stocks have access to retail capital and have a low costs of capital to accelerate development
  - FANG YE 2015 SEC Standarized measure is $1.4 Billion
  - Virtually 0 debt, $8.2 Billion in Market Cap (6x "value")
- It took from mid 2011 when gas dropped below $4/mcf "permanently" to June 2016 for UPL to declare bankruptcy
- Oil can stay below $50 as the Permian backfills Eagleford and Bakken declines
  - This doesn't necessarily imply Permian (and other) Public Companies trade at the correct valuations