

## Anadarko Petroleum

### Day 2 of APC Week: Delaware Basin Deep Dive; Past Results Are Not Indicative of the Bright Future

**JPM View:** On Day 2 of Anadarko Week, we perform a deep dive of APC's Delaware Basin acreage position. Despite its advantaged acreage position that is concentrated in the deepest, thickest, and over-pressured portion of the basin, APC's historical performance has been maligned given below-average well productivity. Our own analysis confirms that APC's 2017 well performance was in the bottom quartile relative to the peer group. We believe the company's historical results have been hindered by limited infrastructure as well as the company's operatorship capture activities that have come to a close. **The key finding in our work is our expectation that past drilling results are not indicative of the future.** We analyzed optimized wells in close proximity to infrastructure and these wells are not only significantly outperforming historical results, but also the company's 1.6 MMBoe type curve. In 2H18, we expect a strong growth inflection in the Delaware given the anticipated completion of significant infrastructure projects in Reeves and north Loving and the full adoption of Gen 2.0 completions in the basin. Based on our bottoms up modeling, we are forecasting 66%, 47%, and 31% oil growth from the Delaware between 2018 and 2020, which is a key driver supporting the company's double digit oil growth objective through 2020. From a bigger picture standpoint, the Delaware not only anchors the corporate-wide oil growth objectives, but also provides important growth projects for Western Gas to sustain strong future distribution growth at the MLP. Judging by recent A&D activity and our analysis, we think acreage in the northern Delaware Basin core is among the most valuable in all of U.S. E&P. We reiterate our OW rating and Dec-18 price target of \$72 per share.

- **Delaware Basin is core "franchise asset" for APC:** One of the most important characteristics of a successful E&P company is the ownership of core franchise assets that provide an inventory of low-cost and low-risk development drilling opportunities. APC holds interests in 589,000 gross (240,000 net) acres in the Delaware Basin with a large portion of the acreage concentrated in prolific Loving, Reeves, and Ward Counties (see Figure 3). The company's acreage position includes multiple stacked pays across a hydrocarbon column that is up to 8,500 ft. thick from the shallower Avalon horizons to the Bone Spring and deeper Wolfcamp objectives. APC estimates 5,500 undrilled Wolfcamp A (WC A) wells and 4,500 wells from other stacked pay objectives across its acreage. We see 58% wellhead IRRs for optimized WC A wells at the current strip.

#### Anadarko Petroleum Corporation (APC;APC US)

FYE Dec	2016A	2017A	2018E	2019E
Adjusted EPS (\$)				
Q1 (Mar)	(1.12)	(0.60)	0.32	0.67
Q2 (Jun)	(0.60)	(0.77)	0.46	0.49
Q3 (Sep)	(0.89)	(0.77)	0.53	0.44
Q4 (Dec)	(0.49)	0.20	0.63	0.55
FY	(3.07)	(1.96)	1.93	2.14
Bloomberg EPS FY (\$)	-3.05	-2.04	1.65	1.74

Source: Company data, Bloomberg, J.P. Morgan estimates.

## Overweight

APC, APC US

Price: \$63.46

Price Target: \$72.00

### Large Cap Oil & Gas Exploration & Production

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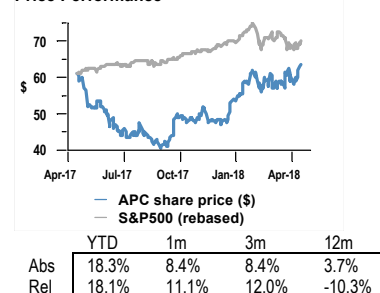
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J.P. Morgan Securities LLC

#### Price Performance



#### Company Data

Price (\$)	63.46
Date Of Price	16 Apr 18
52-week Range (\$)	63.81-39.96
Market Cap (\$ mn)	32,702.71
Fiscal Year End	Dec
Shares O/S (mn)	515
Price Target (\$)	72.00
Price Target End Date	31-Dec-18

#### See page 41 for analyst certification and important disclosures.

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- **APC's Delaware basin acreage is in a good neighborhood:** Based on our estimates, APC's acreage position consists of ~118K net acres in Loving, ~60K net acres in Reeves, ~48K net acres in Ward, and ~13K net acres in Winkler/Lea Counties. In order to assess the quality of APC's acreage, we have pulled all Delaware Basin horizontal wells drilled by industry in Texas and New Mexico using state data and have analyzed well productivity by County on an adjusted basis for lateral lengths. As illustrated in Figure 20, oil well productivity as measured by average 6-month oil IPs in Loving, Reeves, and Ward were second, third, and fourth highest in the basin after Lea County (Loving, Reeves, and Ward 6-month oil IPs per 1,000 ft. of lateral were 103 Bo/d, 98 Bo/d, and 94 Bo/d).
- **APC's historical results have lagged the peer group given limited infrastructure and operatorship capture activities:** When assessing Delaware Basin well productivity by operator, APC's results have been in the bottom quartile and admittedly lagged their peers (see Figure 26). In our view, this reflects the fact that the company was engaged in operatorship capture and has more limited infrastructure in place to support optimized well completions. The company should be able to optimize a greater proportion of its wells once it completes construction of the Reeves County and Loving County regional oil treating facilities (ROTFs) over the summer of 2018. Once its key infrastructure projects are completed, we believe APC's well productivity could be on par with RSPP, which has acreage offset of APC in Loving and Winkler Counties. RSPP's results are near the top of the Delaware Basin peer group with EOG, OXY, and NBL.
- **Analysis of APC's wells completed near infrastructure provides a look into future potential:** We identified 12 completions that were completed near infrastructure. As illustrated in Figure 37, these wells are meaningfully outperforming the company's 1,600 MBoe Wolfcamp A type curve. We show the performance of each individual well relative to the type curve in Figure 38 through Figure 49. In the Delaware Basin, APC's Gen 1.0 completion design included 1,500 lbs of proppant per lateral foot and 35 bbls per foot of fluid. In 2017, APC successfully tested its Gen 2.0 completion design that included 2,500 lbs of proppant per lateral foot and 55 bbls per foot of fluid. As APC adopted its Gen 2.0 completion design in 2H17, we do not believe that a significant number of APC's wells completed in 2017 included its most enhanced completion design. On the other hand, the optimized wells that we analyzed near infrastructure had average proppant loads of 2,334 lbs per lateral foot and 51 bbls per foot of fluid.
- **Growth juggernaut:** In Figure 11, we highlight our Delaware Basin production model. We expect Anadarko to average 6 completion crews in the Delaware bringing online 160 operated Delaware wells. On the back of 190 completions (160 operated wells and 30 non-operated wells), we are forecasting 2018 production of 101 MBoe/d, implying 67% YoY growth for total volumes. In 2019, we model 43% production growth on a boe basis.
- **Recent M&A transaction from one of the Delaware Basin's savviest operators shines the light on APC's acreage.** Concho Resources (CXO) announced a \$9.5 billion merger for RSPP at a valuation of \$76K per acre. RSPP's assets included 92K net acres (47K in Midland and 45K in Delaware, which directly offset APC's acreage position in Loving County). Figure 7Error! Reference source not found. illustrates the close proximity of APC's acreage position relative to RSPP concentrated in Loving County. Applying the average Permian acreage cost from recent A&D transaction of \$37K per acre and using \$40K per flowing boe of

production, we get to an APC Delaware valuation of \$12 billion, which is almost 27% of APC's current enterprise valuation. Using what Concho paid for APC's Delaware offset operator RSPP, could support a valuation of \$21 billion for APC's Delaware Basin position, which is almost 47% of APC's current enterprise valuation. On the CXO-RSPP call, CXO management indicated that RSPP's Permian assets, including their state line position in Loving County would go to the top of CXO's development queue. We see this as a positive read through for the value of APC's Delaware Basin inventory position.

## Delaware Basin is Core Franchise Asset for APC

### Ownership of core franchise asset is the key for success

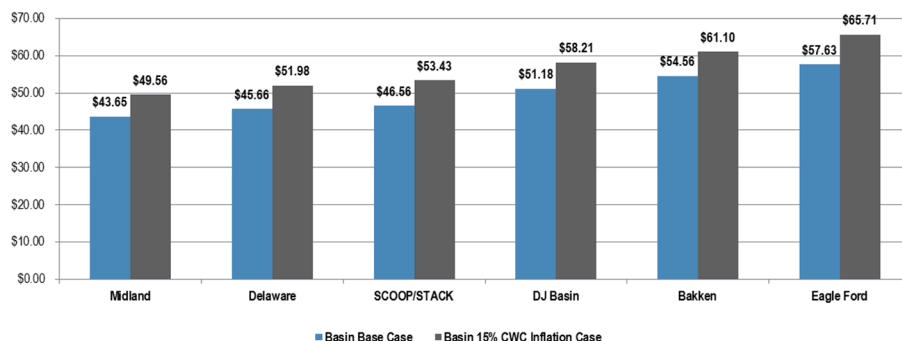
The shift to unconventional shale resources dramatically altered the competitive balance of the industry. Shale resources were located in formations that contained significant accumulations of natural gas and oil that were easily identified through seismic interpretation. The development of unconventional oil and gas mimicked a manufacturing process as geological risk declined. Key to picking stocks in the shale era is to identify companies with the highest quality inventories that can drive value creation in development (i.e., manufacturing) mode. We have coined the term “franchise assets” to reflect high-quality inventories with scale located in a specific oil and gas play.

Given the impact of decline on growth rates and cash flows, one of the most important characteristics of a successful E&P company is the ownership of core franchise assets that provide an inventory of low-cost and low-risk development drilling opportunities. We utilize several criteria to identify franchise assets:

- *Attractive drilling economics:* E&P is a capital-intensive sector where the cash flow from drilling operations fund the next well in inventory. As such, plays with high investment returns above a company’s cost of capital are more likely to be considered franchise assets. However, it takes more than just high single-well economics to meet the criteria of a franchise asset.
- *Significant inventories that provide long-run growth visibility:* Franchise assets should provide an abundant inventory of development drilling opportunities.
- *Repeatable set of development opportunities:* Franchise assets should provide a plethora of development drilling opportunities that provide line of sight for growth. As such, plays with limited running room do not qualify.
- *Significant resources in place:* Another positive characteristic of a franchise asset is significant hydrocarbons in place that provide opportunities to increase recovery factors through downspacing or stacked pay development.

Figure 1 illustrates our estimated rates of return by basin. In our view, the key franchise assets in U.S. E&P are the Midland Basin, DJ Basin, and Delaware Basin. The Bakken has also emerged as a value added play although inventory depth is a longer-term challenge for the Williston.

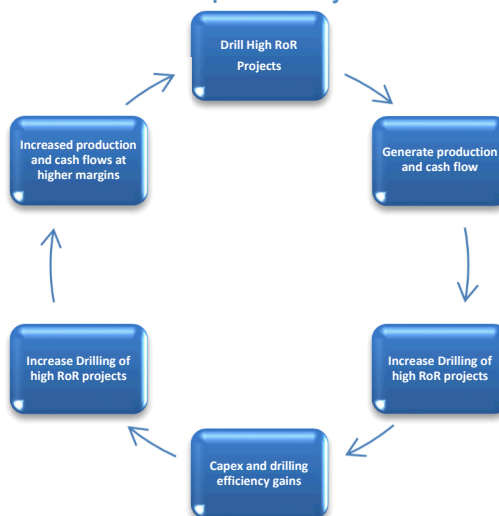
Figure 1: U.S. E&P Basin Returns



Source: J.P. Morgan estimates, Drilling Info, and industry data.

Figure 2 illustrates the life cycle of unconventional resource development in the U.S. and why franchise assets can help drive differential production and cash flow growth in the shale “manufacturing” life cycle. It should be no surprise that companies levered to franchise assets have generally been winners in the stock market on a relative basis. Based on our analysis, APC's position in the northern Delaware Basin could be one of the most attractive franchise assets in U.S. E&P.

Figure 2: Unconventional Resource Development Life Cycle—The Franchise Asset Advantage

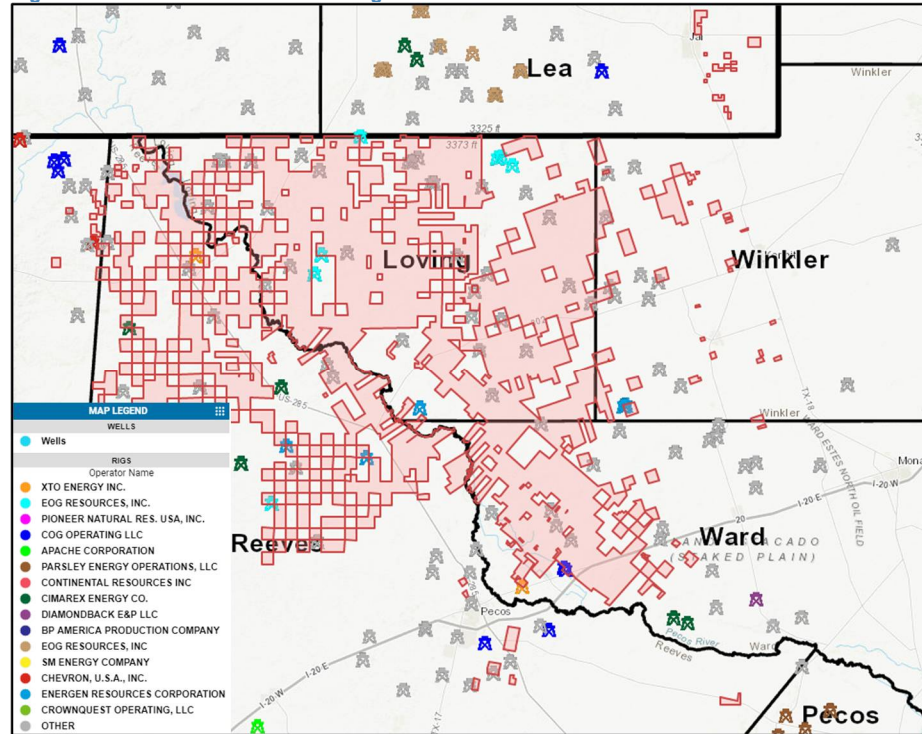


Source: J.P. Morgan.

#### APC's Delaware Acreage in “core of the core” of Basin

Anadarko (APC) holds interests in 589,000 gross (240,000 net) acres in the Delaware Basin with a large portion of the acreage concentrated in the prolific Loving, Reeves, and Ward Counties (see Figure 3Error! Reference source not found.). APC conducted its operations in the Delaware Basin in conjunction with a participation agreement with Shell that lapsed in July 2017.

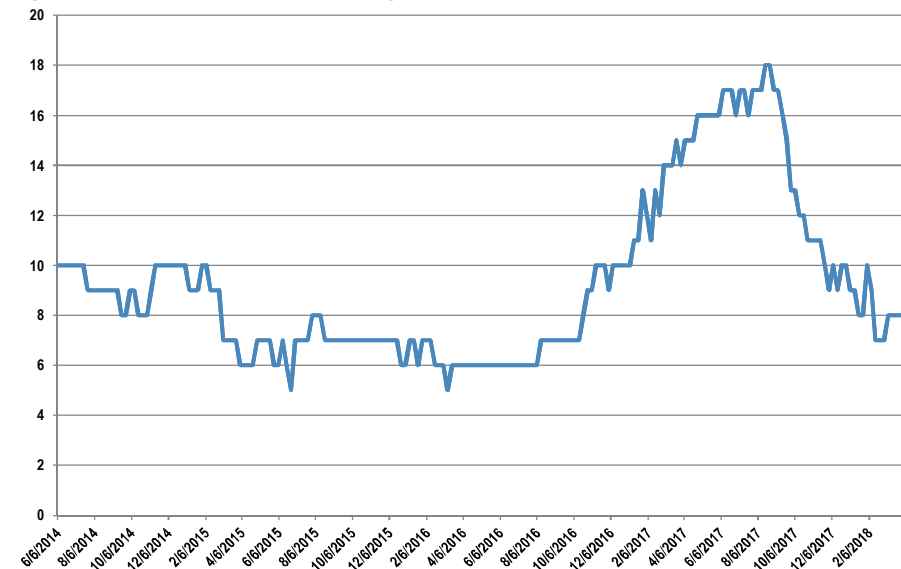
Figure 3: APC's Delaware Basin Acreage Position



Source: Drilling Info.

Prior to the conclusion of this participation agreement with Shell, APC completed well proposals that now enable the company to operate approximately 70% of the joint venture acreage on a go-forward basis. When engaged in operatorship capture activities last year, APC's Delaware Basin rigcount was running in the mid-teens before declining to 10 rigs at year-end 2017.

Figure 4: Anadarko's Delaware Basin Rigcount—Normalization Post Operatorship Capture



Source: Drilling Info

The company's acreage position includes multiple stacked pays across a hydrocarbon column that is up to 8,500 ft thick from the shallower Avalon horizons to the Bone Spring and deeper Wolfcamp objectives. APC's recent drilling activity has been targeting the Wolfcamp Shale play, while testing the Bone Spring and Avalon plays.

**Figure 5: Delaware Basin: Significant Stack Pay Potential**

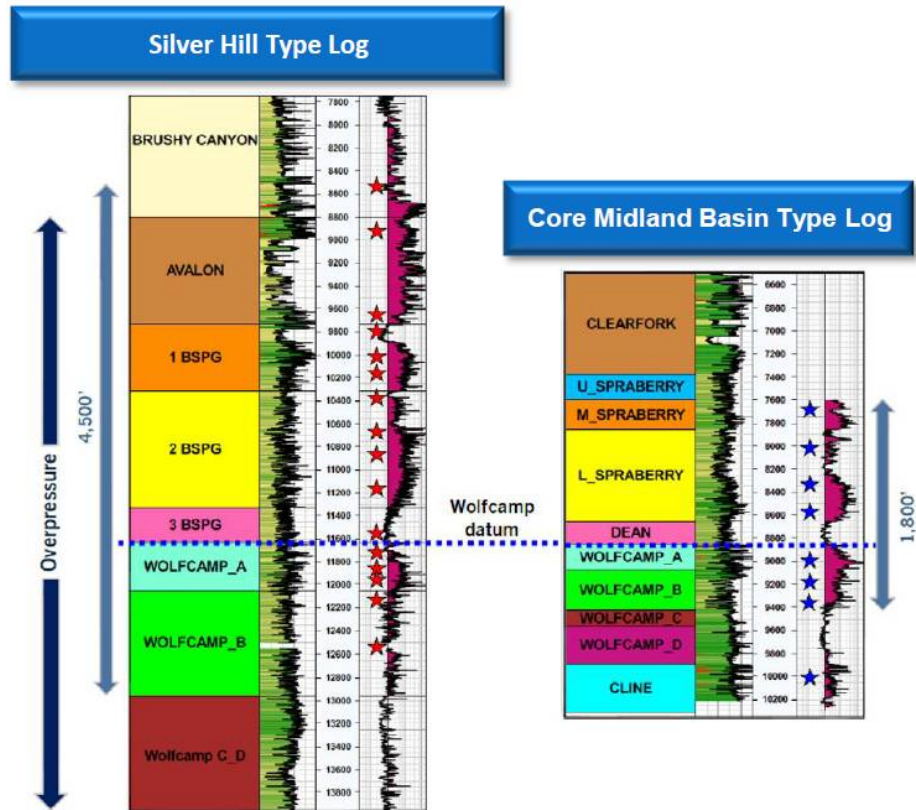


Source: Anadarko Petroleum.

In Figure 6, we highlight RSP Permian's Silver Hill acreage type log in Loving County, which illustrates the thickness of this oil saturated section within the over-pressured Wolfcamp, Bone Spring, and Avalon sections.



Figure 6: Delaware Basin Type Log



Source: RSP Permian.

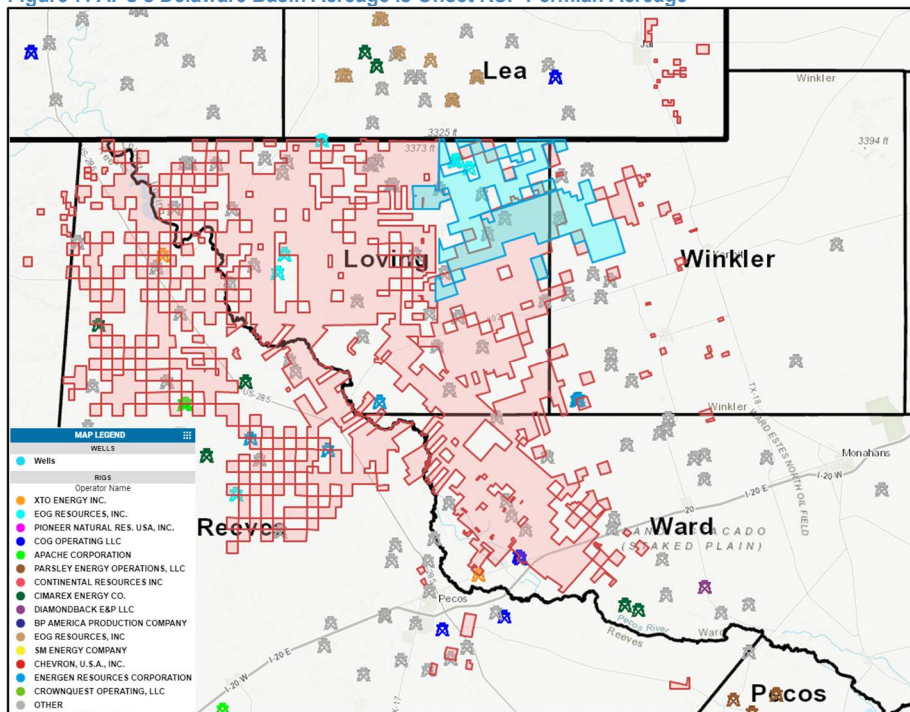
APC is encouraged with its delineation activities across the bulk of its acreage and is testing multiple zones within the Wolfcamp and several development ideas to boost efficiencies. In particular, APC is testing multi-well pads, extended reach laterals, enhanced completion designs, and well spacing. As of year-end, management estimated 5,500 undrilled Wolfcamp A locations that could support 3.3 BBoe of net resources plus more than 1 BBoe net from the rest of the stack.

#### APC's acreage position is offset RSPP

Concho Resources (CXO) announced a \$9.5 billion merger announcement for RSPP at a valuation of \$76K per acre. RSPP's assets included 92K net acres (47K in Midland and 45K in Delaware, which directly offset APC's acreage position in Loving County). Figure 7 illustrates the close proximity of APC's acreage position relative to RSPP concentrated in Loving County.



Figure 7: APC's Delaware Basin Acreage is Offset RSP Permian Acreage



Source: Drilling Info. Anadarko acreage in red and RSPP acreage in blue.

**CXO transaction highlights the value of acreage in the northern Delaware Basin core**

Applying the average Permian acreage cost from recent A&D transaction of \$37K per acre and using \$40K per flowing boe of production, we get to an APC Delaware valuation of \$12 billion which is almost 27% of APC's current enterprise valuation. Using what Concho paid for APC's Delaware offset operator RSPP, could support a valuation of \$21 billion for APC's Delaware Basin position, which is almost 47% of APC's current enterprise valuation. On the CXO-RSPP call, CXO management indicated that RSPP's Permian assets, including their state line position in Loving County would go to the top of CXO's development queue. We see this as a positive read through for the value of APC's Delaware Basin inventory position.

Figure 8: Permian Basin A&D Metrics

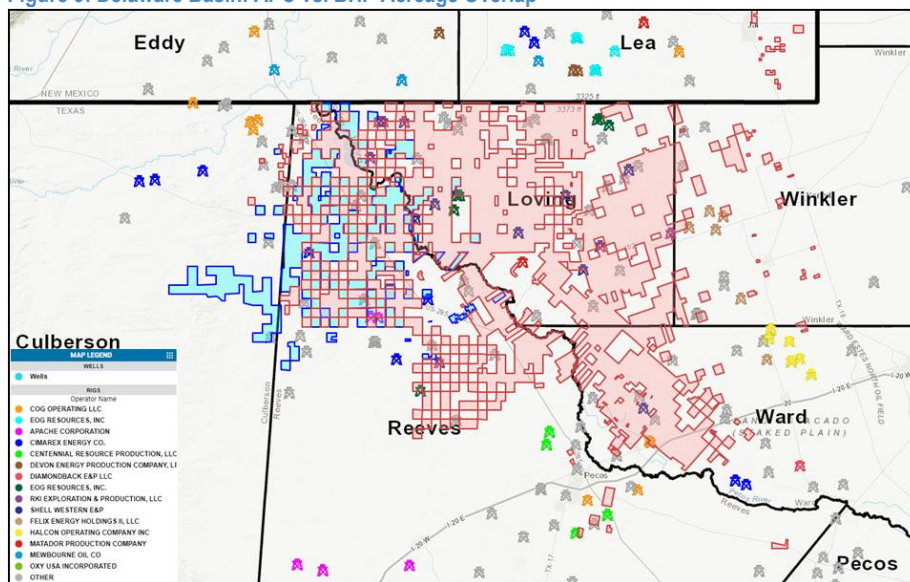
	Target	Purchaser	Date	Transaction		
				Value	\$/Acre	\$/Location
1	Private Sellers	QEP	6/22/2016	\$600	\$59,404	\$1.27
2	NGP	Centennial	7/22/2016	\$1,735	\$35,892	\$1.34
3	Reliance Energy	Concho Resources	8/15/2016	\$1,600	\$33,264	\$2.51
4	Arris Petroleum	PDC Energy	8/23/2016	\$1,505	\$23,542	\$2.03
5	Yates Petroleum	EOG Resources	9/6/2016	\$2,451	\$9,031	\$0.98
6	Silver Hill	RSP Permian	10/13/2016	\$2,400	\$48,157	\$1.01
7	Browning Oil	Occidental Petroleum	10/13/2016	\$1,765	\$41,523	\$2.08
8	Q Star	SM Energy	10/18/2016	\$1,600	\$42,922	\$0.85
9	Ameredev	Callon Petroleum	12/13/2016	\$615	\$33,427	\$2.61
10	Brigham Resources	Diamondback Energy	12/14/2016	\$2,430	\$26,912	\$1.72
11	Clayton Williams	Noble Energy	1/16/2017	\$3,225	\$32,268	\$1.19
12	Bass	ExxonMobil	1/17/2017	\$5,600	\$19,995	NA
13	Double Eagle	Parsley Energy	2/7/2017	\$2,800	\$36,511	\$1.44
14	BC Operating	Marathon	3/9/2017	\$1,100	\$18,394	\$2.73
15	Private Sellers	QEP	7/26/2017	\$732	\$51,203	\$0.96
16	RSP Permian	Concho Resources	3/28/2018	\$9,500	\$75,504	\$1.74
<b>Total/Avg</b>				<b>\$39,658</b>	<b>\$36,747</b>	<b>\$1.63</b>

Source: PLS, J.P. Morgan estimates, Company data. Transaction value in millions.

**BHP asset sale could also shine the light on the attractiveness of APC's position and provide growth opportunities for Western Gas**

BHP's Delaware Basin package (~24 MBoe/d of production and 83K net acres concentrated in Reeves) is up for sale. APC has acknowledged in the past that BHP Delaware Basin assets would be a good strategic fit as they would block up the company's checkerboard acreage position in Reeves County (see Figure 9) and the company is evaluating the potential to participate in the bid process. Despite the strong asset overlap and ability to extract significant upstream/midstream synergies from a combination, we think it's unlikely that APC would bid at a low enough full cycle RoR to ultimately be the winning bidder given its financial discipline. Having said that, we think that the buyer of BHP's assets would be incentivized to work with Western Gas to leverage its existing midstream footprint in Reeves County. The buyer of BHP's Delaware package would also be incentivized to work with Anadarko to help drill and complete longer laterals benefitting Anadarko's rate of return from Delaware wells.

Figure 9: Delaware Basin: APC vs. BHP Acreage Overlap

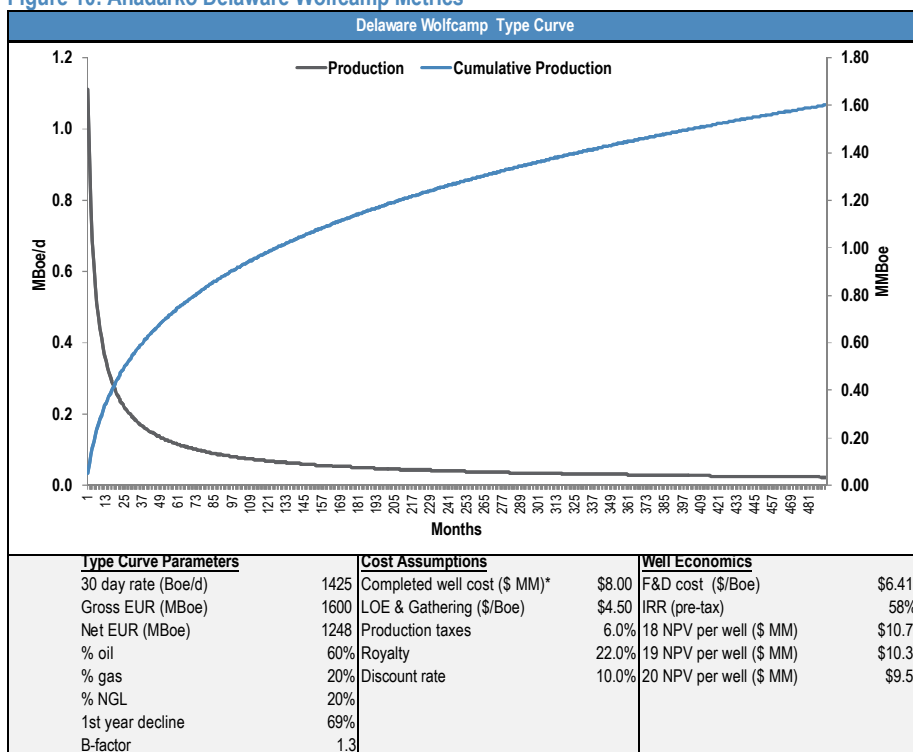


Source: Drilling Info. Note: APC – Red; BHP – Blue.

#### Attractive drilling economics

In Figure 10, we highlight the single well economics of Anadarko's Delaware acreage. On a pre-tax basis, APC's Wolfcamp A program in the Delaware Basin generates impressive IRRs of 58% at the current strip (see Figure 10). For our Delaware Wolfcamp type curve, we assume average EURs of 1,600 MBoe, which is in-line with company guidance. This EUR assumption of 1,600 MBoe could be conservative as state data suggests that optimized Delaware Basin wells near midstream infrastructure are delivering well productivity far exceeding the 1,600 MBoe Wolfcamp A type curve (see Figure 37). We use a half cycle well cost assumption of \$8 MM. We acknowledge upside risk to Anadarko's Delaware well cost guidance of \$8 MM from service cost inflation. However, inflationary pressure should be partially offset from a transition to more pad development mode, which should support efficiency gains.

Figure 10: Anadarko Delaware Wolfcamp Metrics



Source: J.P. Morgan estimates.

## Delaware Basin Production Forecast

In 2018, APC expects to operate an average of seven drilling rigs in the Delaware Basin and six completion crews. The company expects to drill more than 100 wells, while tying in more than 160 wells to sales. APC is targeting \$1.0 billion in upstream capex, which is expected to drive more than 50% oil growth in 2018.

In Figure 11, we highlight our Delaware Basin production model. We assume an average of 11 Delaware Basin rigs in 2018 including 7 operated rigs and 4 non-operated rigs. We expect Anadarko to average 6 completion crews in the Delaware bringing online 160 operated Delaware wells online. We model a total of 190 completions including 160 operated and 30 non-operated wells. On the back of 190 completions, we are forecasting 2018 production of 101 MBoe/d, implying 67% YoY growth (see Figure 11). In 2019, we expect Anadarko to participate in 227 wells from a mix of 13 operated and non-operated rigs (see Figure 11). In 2019, we anticipate 43% Delaware Basin production growth.

Figure 11: Anadarko Delaware Production Model

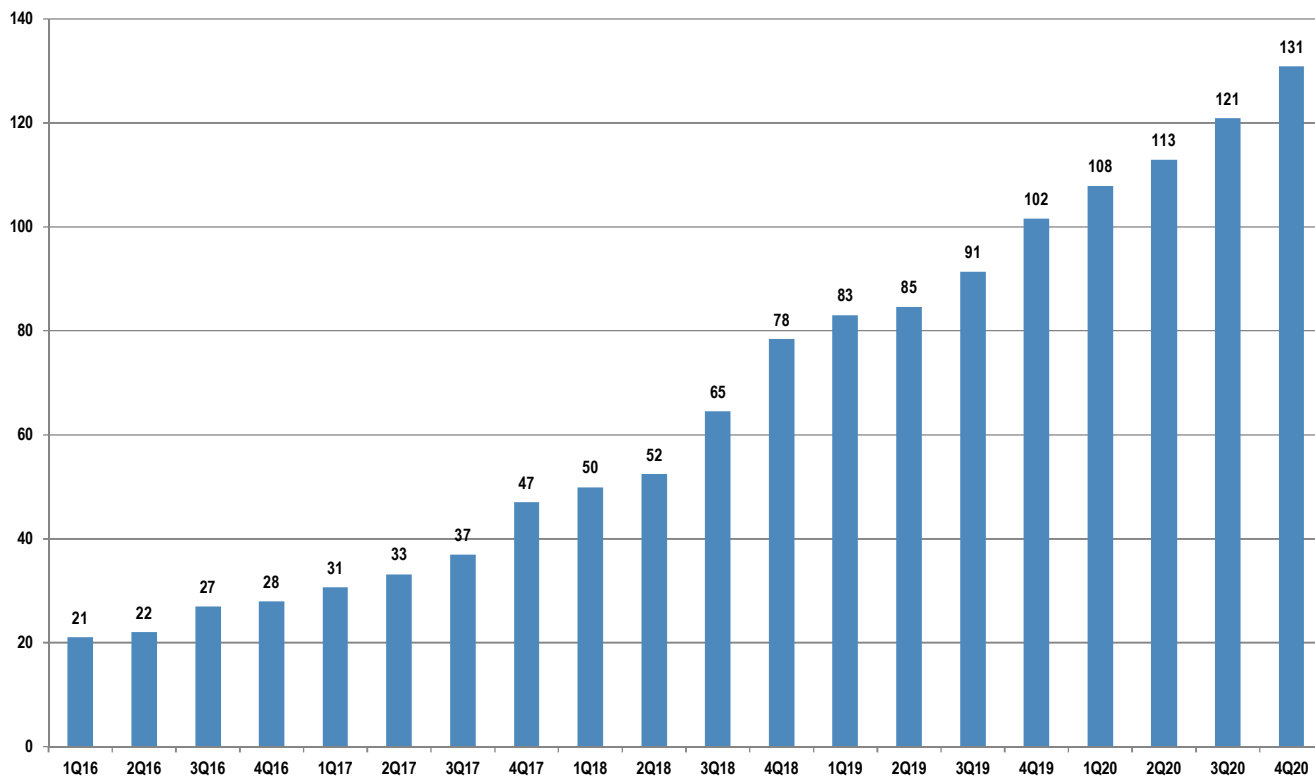
Delaware Basin	1Q18	2Q18	3Q18	4Q18	FY18	1Q19	2Q19	3Q19	4Q19	FY19	FY20
Operated + Non Op Rigs	11	11	11	11	11	12	13	14	14	13	16
Days to Drill	28	28	28	27	28	27	26	25	25	26	24
Wells Drilled	35	36	36	37	145	40	46	52	52	189	245
Wells Completed	10	38	68	74	190	42	45	60	80	227	289
IP 30 Mboe/d	0.95	0.95	1.50	1.50	1.23	1.50	1.50	1.50	1.50	1.50	1.53
New Production (Mboed)	3	12	34	37	22	21	23	30	40	28	37
Base Production (Mboed)	214	215	244	299	243	331	337	352	385	351	449
<b>Total Delaware Basin Production (Mboed)</b>	<b>217</b>	<b>227</b>	<b>278</b>	<b>336</b>	<b>265</b>	<b>353</b>	<b>359</b>	<b>382</b>	<b>424</b>	<b>380</b>	<b>485</b>
<b>Net Delaware Basin Production (Mboed)</b>	<b>83</b>	<b>86</b>	<b>106</b>	<b>128</b>	<b>101</b>	<b>134</b>	<b>137</b>	<b>145</b>	<b>161</b>	<b>144</b>	<b>184</b>

Source: J.P. Morgan estimates, Company data.

Anadarko and Western Gas are completing a comprehensive infrastructure project in the Delaware Basin, which should help support an inflection point to growth in 2H18. Anadarko exited 2017 at 50+ MBo/d of Delaware oil production. As highlighted in the company's 2018 guide, APC's Delaware Basin volumes will be relatively flat until the ROTFs in Reeves and Loving are completed over the summer of 2018. We model 1Q18 Delaware oil volumes at 50 MBo/d growing to 52 MBo/d in 2Q18 (see Figure 12).

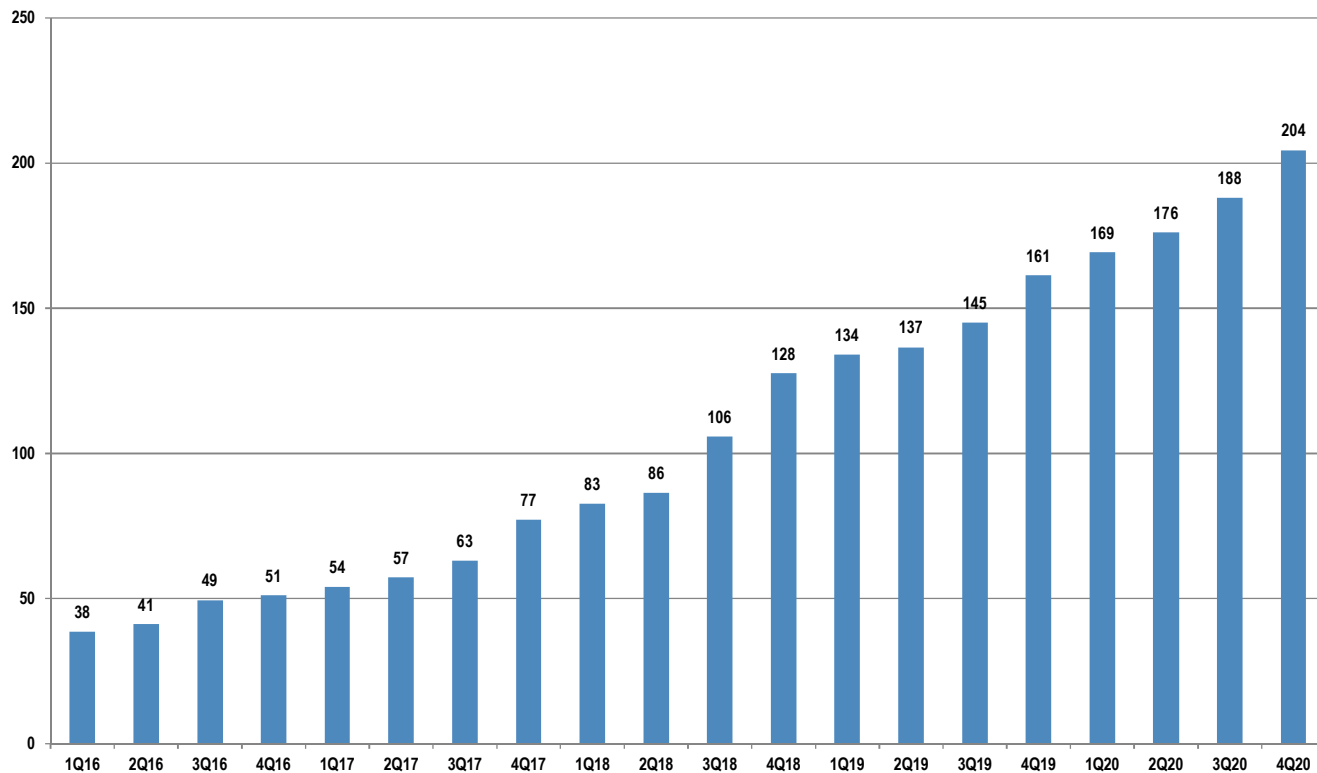
With infrastructure set to come online in 2H18, we expect 3Q18 Delaware production to grow 25%, or 13 MBo/d, on a sequential basis to 55 MBo/d (see Figure 12). In 4Q18, we expect APC Delaware production to grow another 13 MBo/d sequentially to 68 MBo/d. In 2018, we are modeling 66% YoY Delaware Basin oil growth, which compares to the company's guide of more than 50% oil growth. For 2019 and 2020, we are forecasting 48% and 31% Delaware Basin oil growth, respectively. In 2018, APC has earmarked \$1.0 billion in upstream capital to the Delaware Basin, which will include 7 rigs and 6 completion crews (100 operated spuds and 160 operated well tie-ins). As illustrated in Figure 4, APC's Delaware Basin rigcount has been in a more recent run-rate of 7-8 rigs following the completion of operatorship capture activities.

Figure 12: APC - Delaware Basin Oil Volume Forecast (MBo/d)



Source: J.P. Morgan Research estimates.

Figure 13: APC - Delaware Basin Total Volume Forecast (MBoe/d)

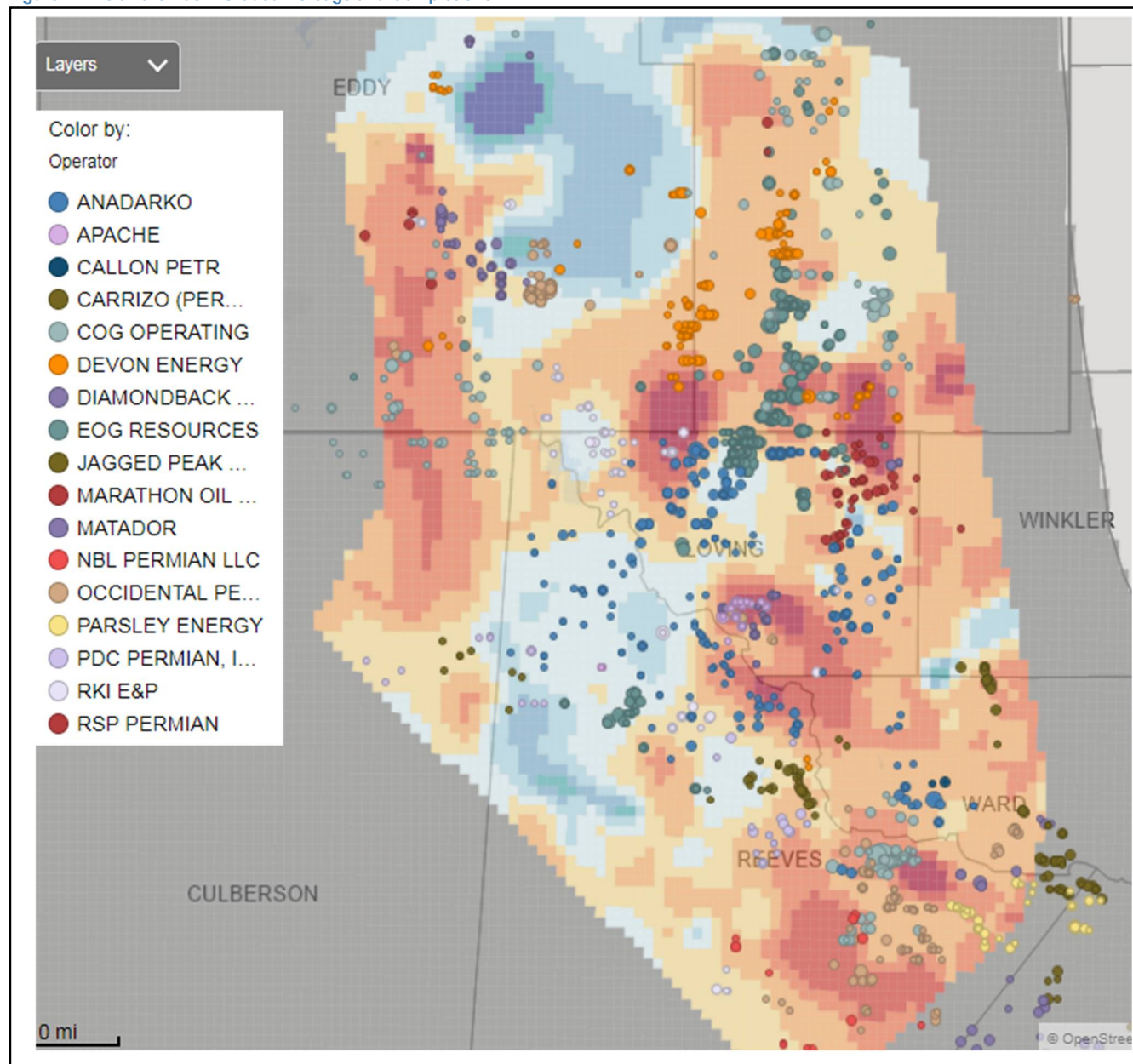


Source: J.P. Morgan Research estimates.

The map in Figure 14 illustrates recent completions from public operators as well as a heat map, with acreage graded according to productivity, with gas converted at a 20:1 ratio. This map highlights the sweet spots within the basin. We do note that some of the blue areas have seen relatively limited drilling thus far, and could thus move up the ranking. Sweet spots in the Delaware Basin include the state line area (APC, CXO, EOG, WPX and RSPP) in southern Lea and Loving Counties as well as large chunks of Reeves and Ward Counties.



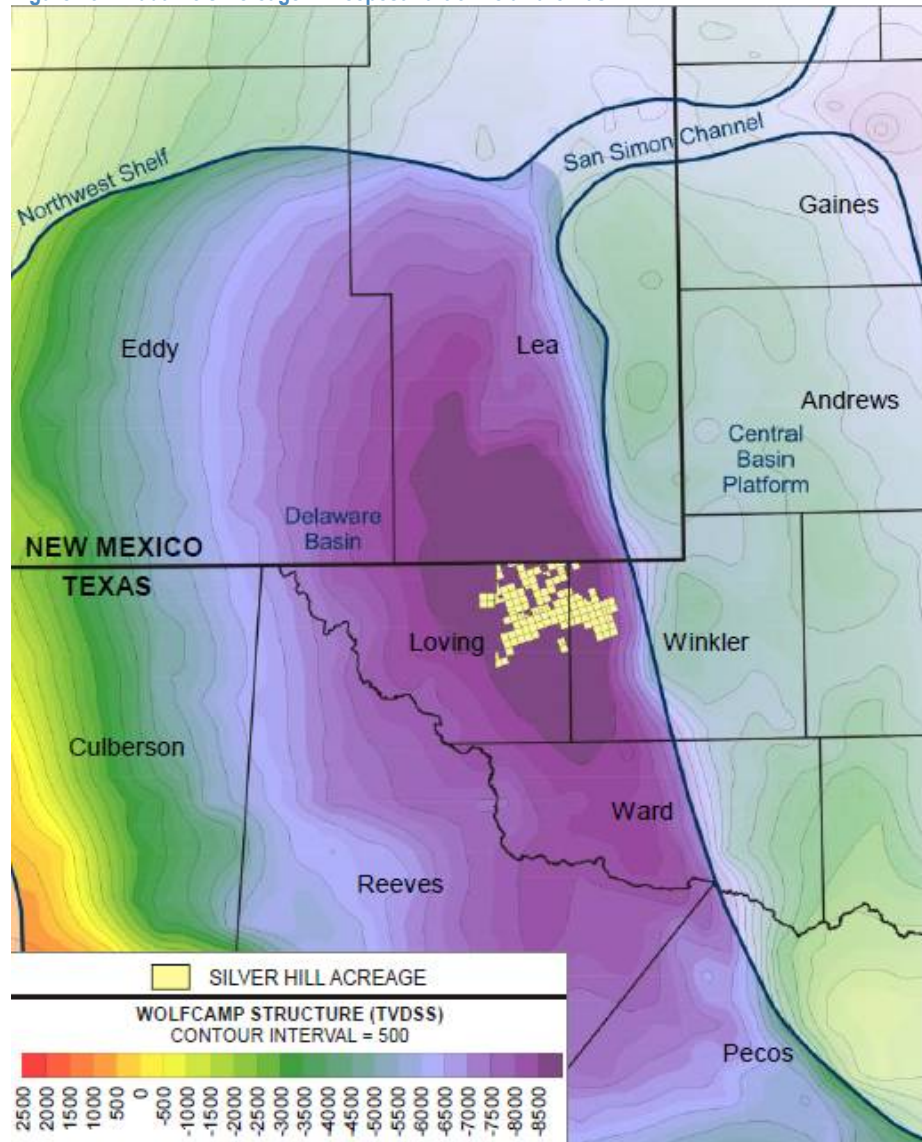
Figure 14: Delaware Basin Graded Acreage and Completions



Source: Drilling Info.

APC's acreage position concentrated in Loving, Reeves, and Ward Counties is in the deepest, thickest over-pressured portion of the Delaware Basin. Not only does this support a higher number of potential wells per section, but also enhanced well productivity relative to other project areas within the Permian Basin. In Figure 15, we highlight the Wolfcamp structure map by Anadarko's offset operator RSPP. This map illustrates the attractiveness of APC's acreage position that is in the heart of the Delaware Basin. Anadarko estimates ~5,500 Wolfcamp A locations and ~4,500 mid-lateral locations in other intervals.

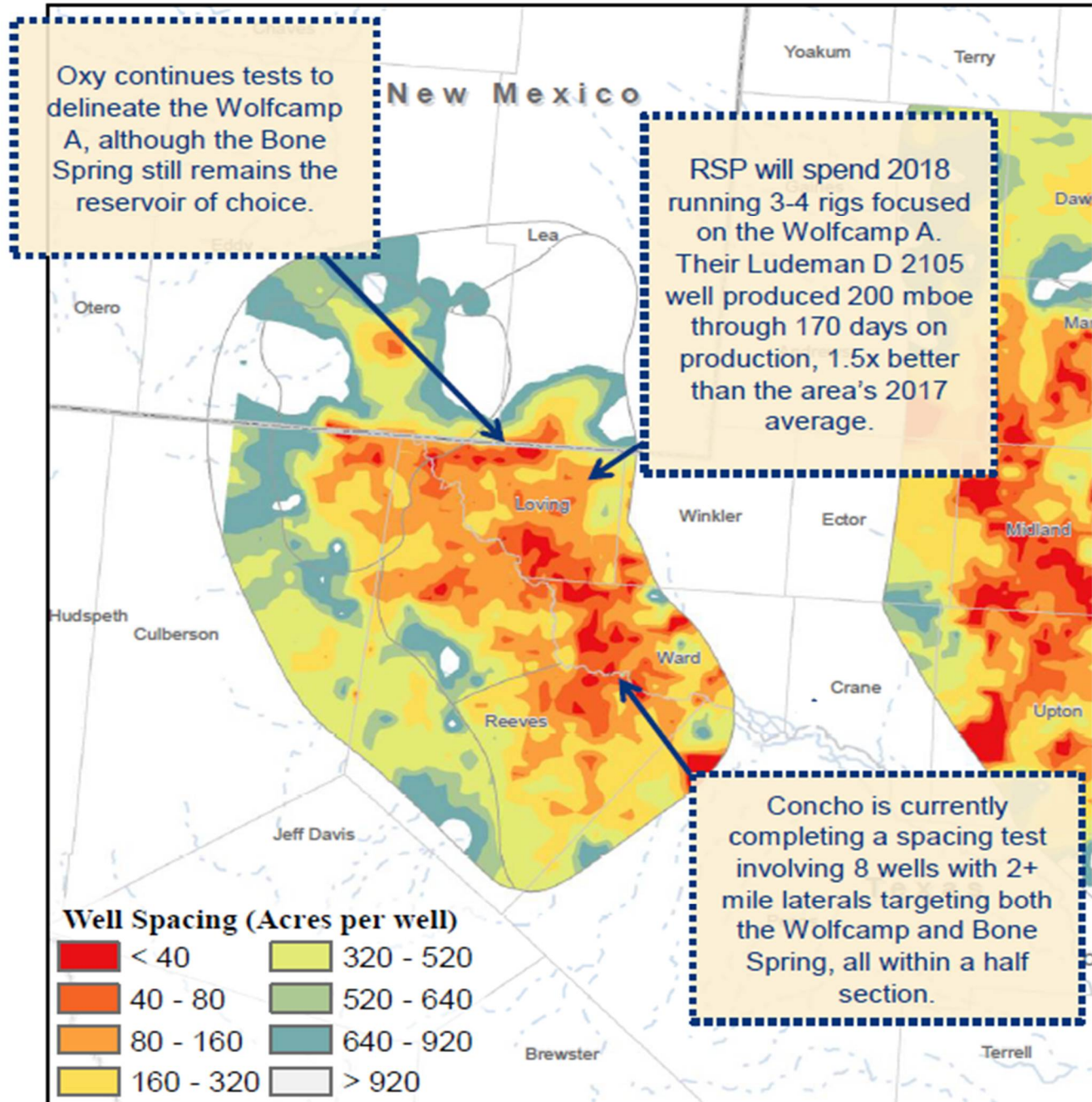
Figure 15: Anadarko's Acreage in Deepest Part of Delaware Basin



Source: RSP Permian.

In Figure 16, we highlight analysis from Wood Mackenzie, which estimates potential well spacing in parts of the Delaware and Midland Basins. Wood Mackenzie's heat map suggests that Loving and Ward Counties should support some of the tightest well spacing in the basin, corroborating some of the early testing by APC, EOG, CXO, and RSPP.

Figure 16: Loving County supports some of the tightest Well Spacing in the Basin

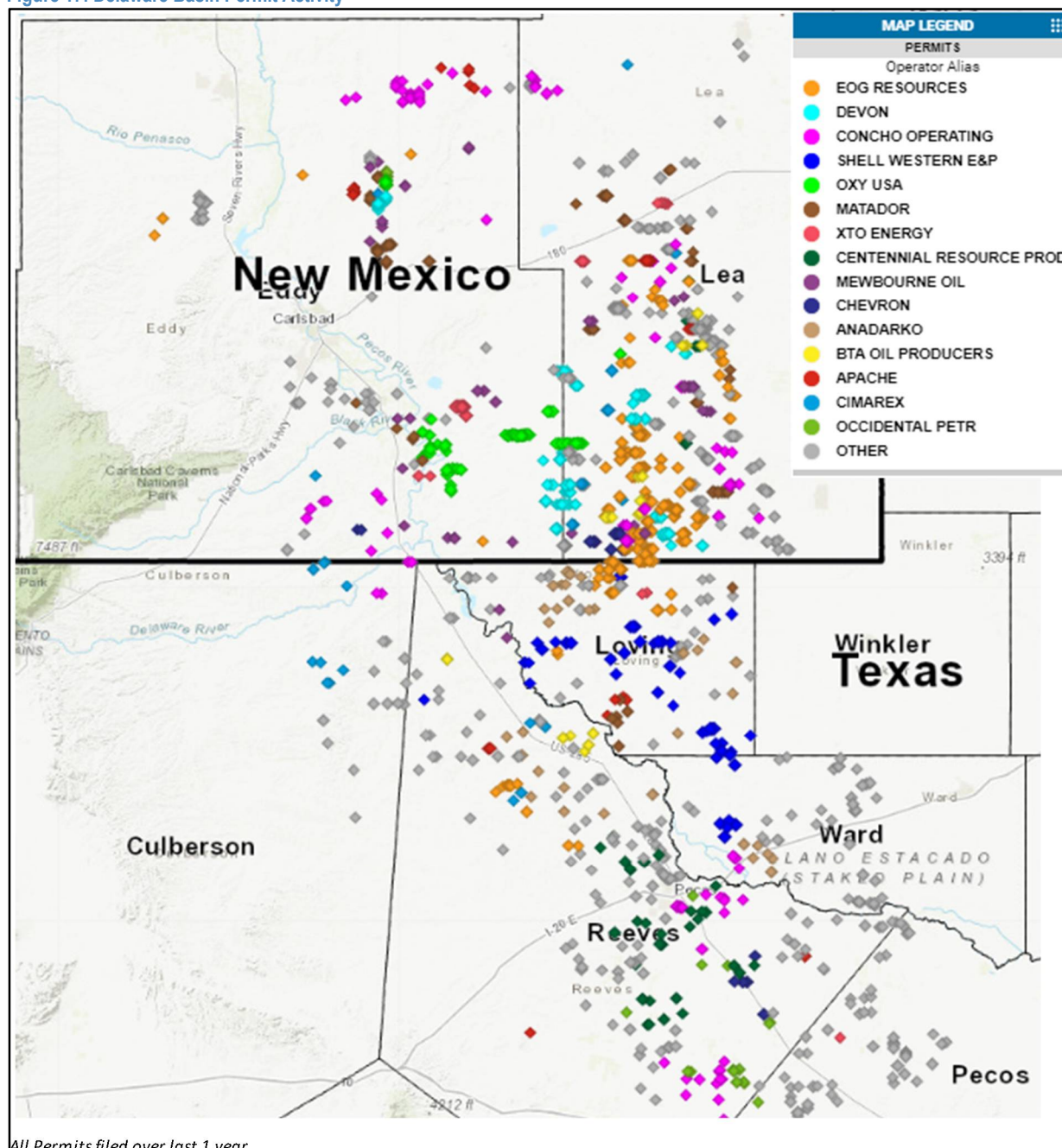


Source: Wood Mackenzie

In Figure 17, we plot permitting activity for Delaware Basin operators since January 2017. APC's permitting activity is highlighted in brown and has been focused on the state line area of Loving County as well as Ward County. Meanwhile, APC's joint venture partner (Shell) has also been active with permits in southern and central Loving and Ward.



Figure 17: Delaware Basin Permit Activity



All Permits filed over last 1 year

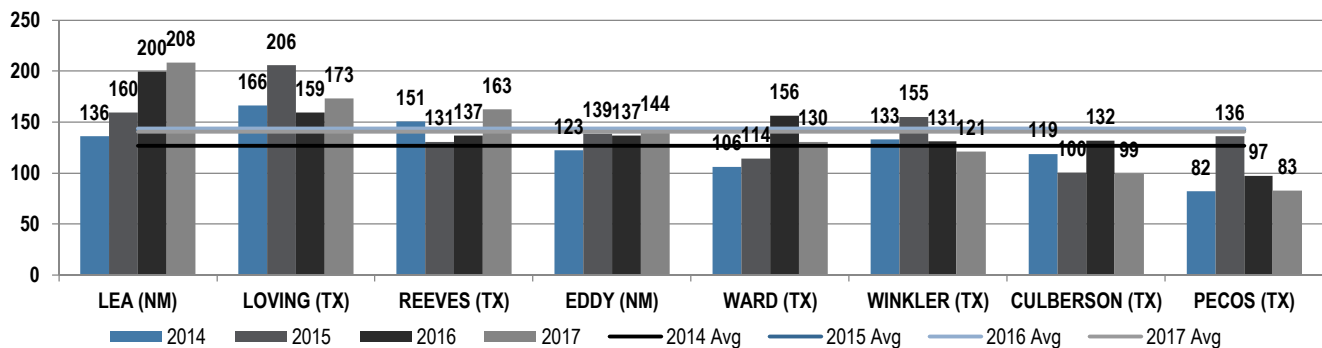
Source: Drilling Info

### APC's Delaware Basin Acreage is in the "Core of the Core"

In order to assess the quality of APC's acreage, we have pulled all Delaware Basin horizontal wells drilled in Texas and New Mexico using state data and have analyzed well productivity by County on an adjusted basis for lateral lengths. At the County level, Lea, Loving, and Reeves Counties screen well with strong oil well productivity based on initial rates as well as with longer production history. As illustrated in Figure 18, oil well productivity as measured by peak IP-24's in Loving and Reeves

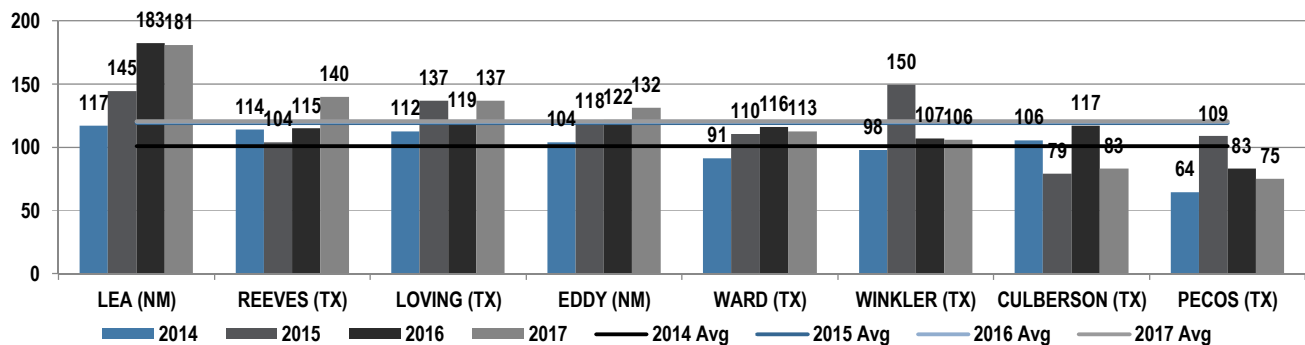
was second and third highest in the basin after Lea County (Loving and Reeves peak oil IP-24's per 1,000 ft. of lateral were 173 Bo/d and 163 Bo/d). In Figure 19, we calculated well productivity on an IP-30 basis and note that Lea County delivered the highest well productivity at 181 Bo/d per 1,000 ft. of lateral followed by Reeves and Loving at 140 Bo/d and 137 Bo/d, respectively. In Figure 20 and Figure 21, we analyzed 6 month and 12 month oil cum'es and observe similarly strong well productivity for Loving and Reeves Counties with Ward in the middle of the pack.

Figure 18: Delaware Basin: Peak Oil IP's per 1K Foot by County



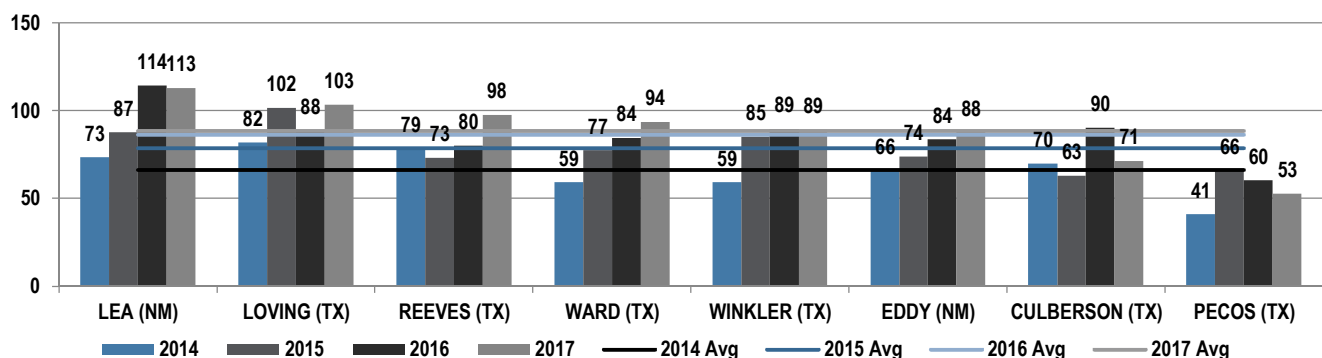
Source: J.P. Morgan estimates, Drilling Info

Figure 19: Delaware Basin: Oil IP-30's per 1K Foot by County



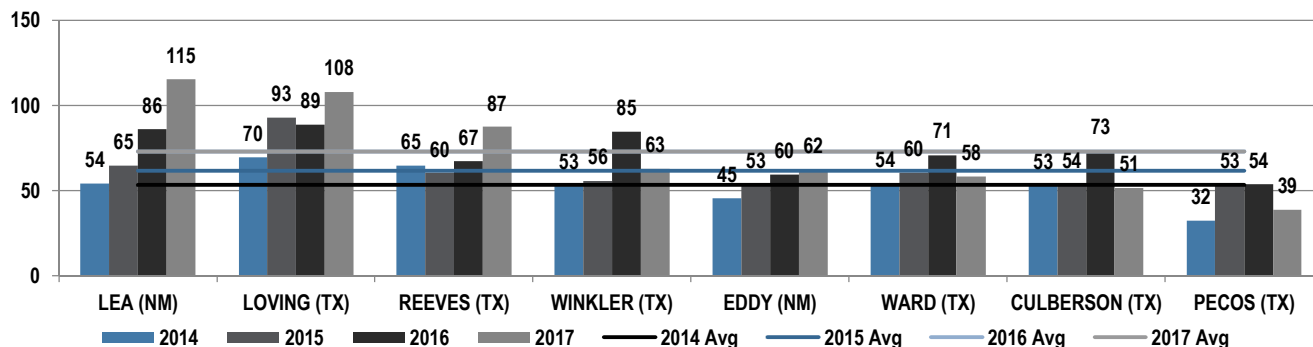
Source: J.P. Morgan estimates, Drilling Info

Figure 20: Delaware Basin: 6-Month Oil IPs per 1K Foot by County



Source: J.P. Morgan estimates, Drilling Info.

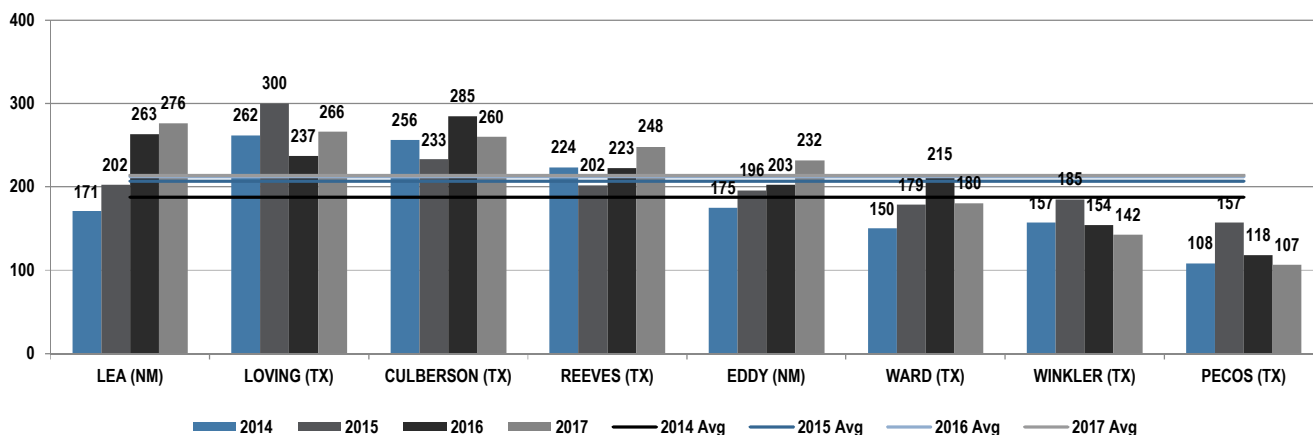
Figure 21: Delaware Basin: 12-Month Oil IPs per 1K Foot by County



Source: J.P. Morgan estimates, Drilling Info

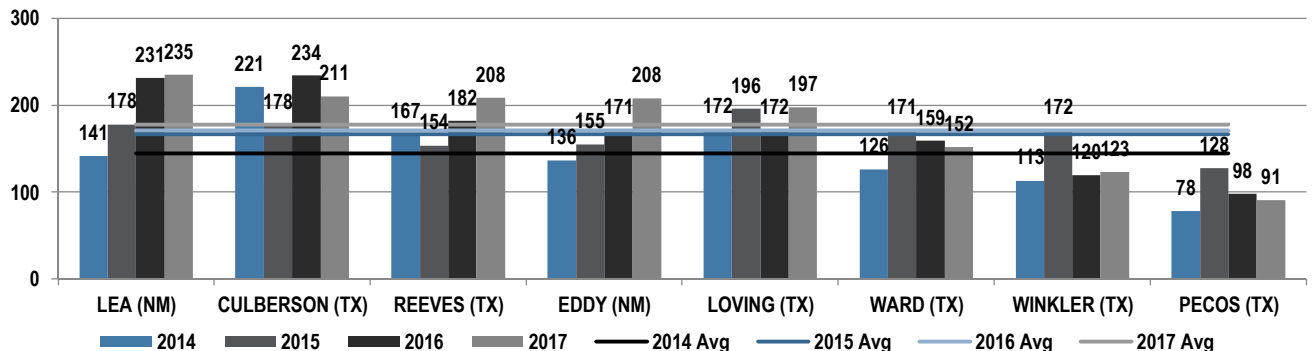
In Figure 22, Figure 23, Figure 24, and Figure 25, we illustrate well productivity on a total boe basis including oil and natural gas volumes for key counties in the Delaware Basin. On an overall basis, Loving and Reeves Counties screen positively on a total boe basis as well.

Figure 22: Delaware Basin: Peak IPs per 1K Foot by County



Source: J.P. Morgan estimates, Drilling Info.

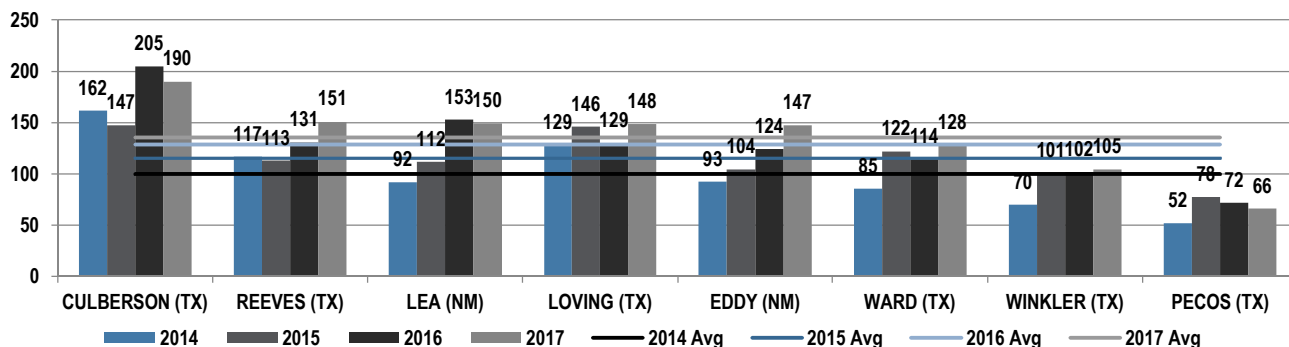
Figure 23: Delaware Basin: Peak IP-30s per 1K Foot by County



Source: J.P. Morgan estimates, Drilling Info

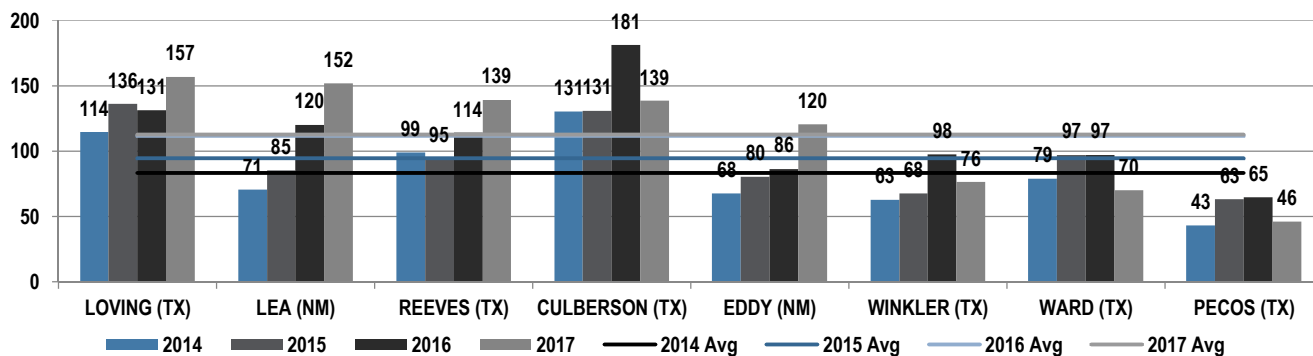


Figure 24: Delaware Basin: 6 Month IPs per 1K Foot by County



Source: J.P. Morgan estimates, Drilling Info

Figure 25: Delaware Basin: 12 Month IPs per 1K Foot by County



Source: J.P. Morgan estimates, Drilling Info

## Delaware Basin: Operator Benchmarking Analysis

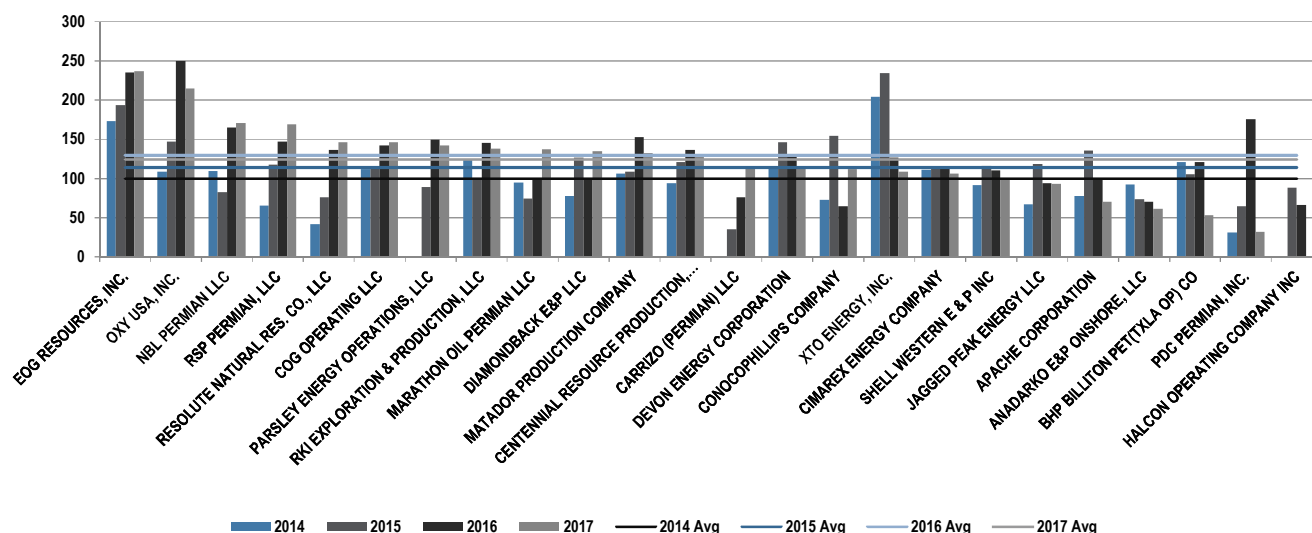
Until recently, Anadarko had been focused on operatorship capture in its joint development area with Shell. As such, the company was primarily completing shorter lateral length wells that were not optimized given the lack of infrastructure. One of the key objectives of the company is to complete a strategic infrastructure buildout in the Delaware Basin. In 2017, APC expanded its midstream infrastructure for Bone Spring, Wolfcamp, and Avalon production, which included 60 miles of oil and water gathering lines and a 20 MBo/d expansion of its oil processing capacity at its Avalon central production facility.

APC's infrastructure buildout will largely be completed by year-end 2019 and will include three new gas processing facilities (Ramsey VI in 4Q17, Mentone I in 2H18, and Mentone II in 2H18) and three regional oil treating facilities (Reeves in 2Q18, North Loving in 3Q18, and East Loving in 2019). In total, APC and Western Gas will complete the construction of 120 MBo/d of oil treating facilities in Reeves and Counties, which should support an inflection point to growth in 2H18. As highlighted in the company's 2018 guide, APC's Delaware Basin volumes will be relatively flat until the ROTFs in Reeves and Loving are completed in 2Q18 and 3Q18, respectively.

In Figure 26 and Figure 27, we sort operators by initial oil productivity standardized by lateral length. When assessing Delaware Basin well productivity by operator,

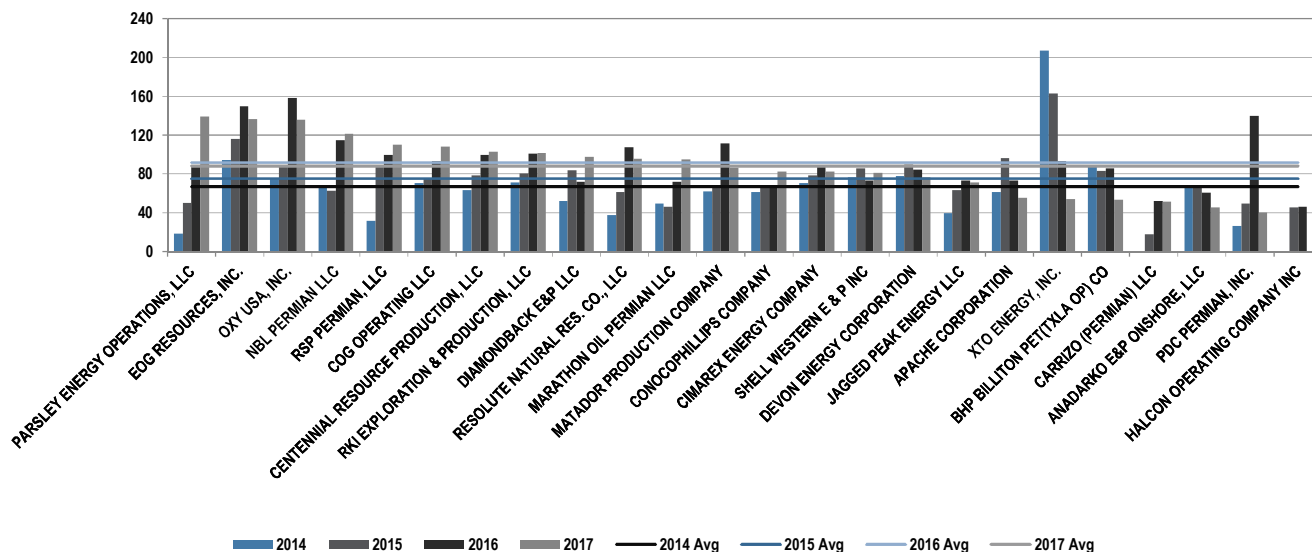
APC's results have admittedly lagged their peers. In our view, this reflects the fact that the company was engaged in operatorship capture and has more limited infrastructure in place to support optimized well completions. Management indicates that the company should be able to optimize a greater proportion of its wells once it completes construction of the Reeves County and Loving County ROTFs. Once its key infrastructure projects are completed, we believe APC's well productivity could be on par with RSPP, which has acreage offset of APC in Loving and Winkler Counties (see Figure 27 **Error! Reference source not found.**). RSPP's results are near the top of the Delaware Basin peer group trailing PE, EOG, OXY, and NBL.

Figure 26: Delaware Basin: Oil IP-30 per 1K Foot: 14-17 (sorted by 2017)



Source: J.P. Morgan estimates, Drilling Info.

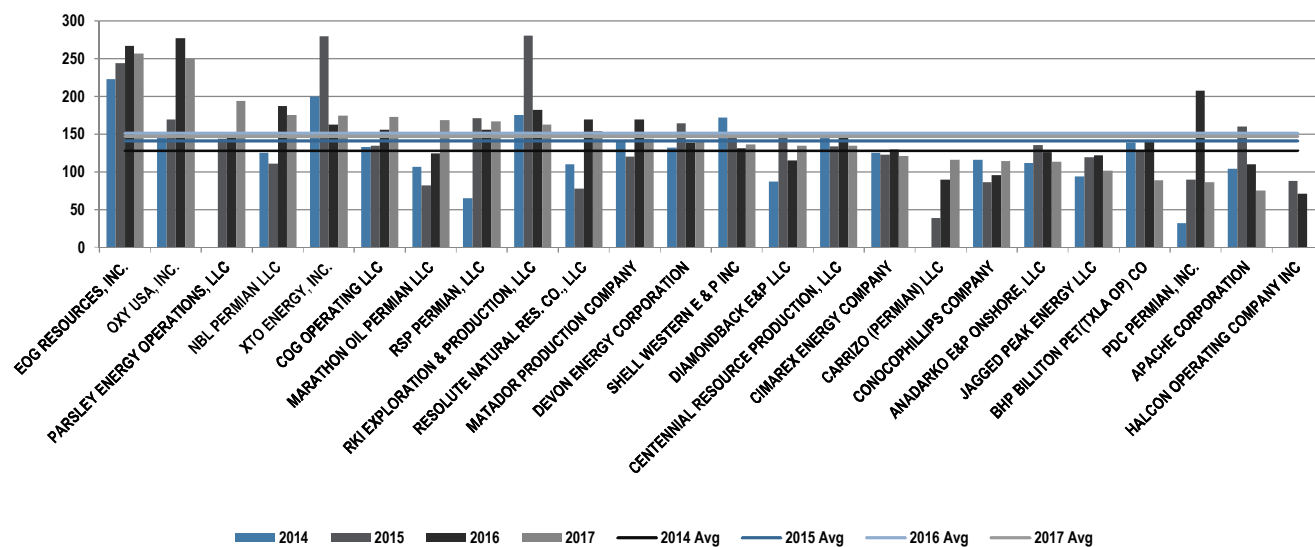
Figure 27: Delaware Basin: 6 Month Oil IP's per 1K Foot: 14-17 (sorted by 2017)



Source: J.P. Morgan estimates, Drilling Info.

In Figure 28, we plot the peak oil IP's per 1K foot for Delaware Basin operators.

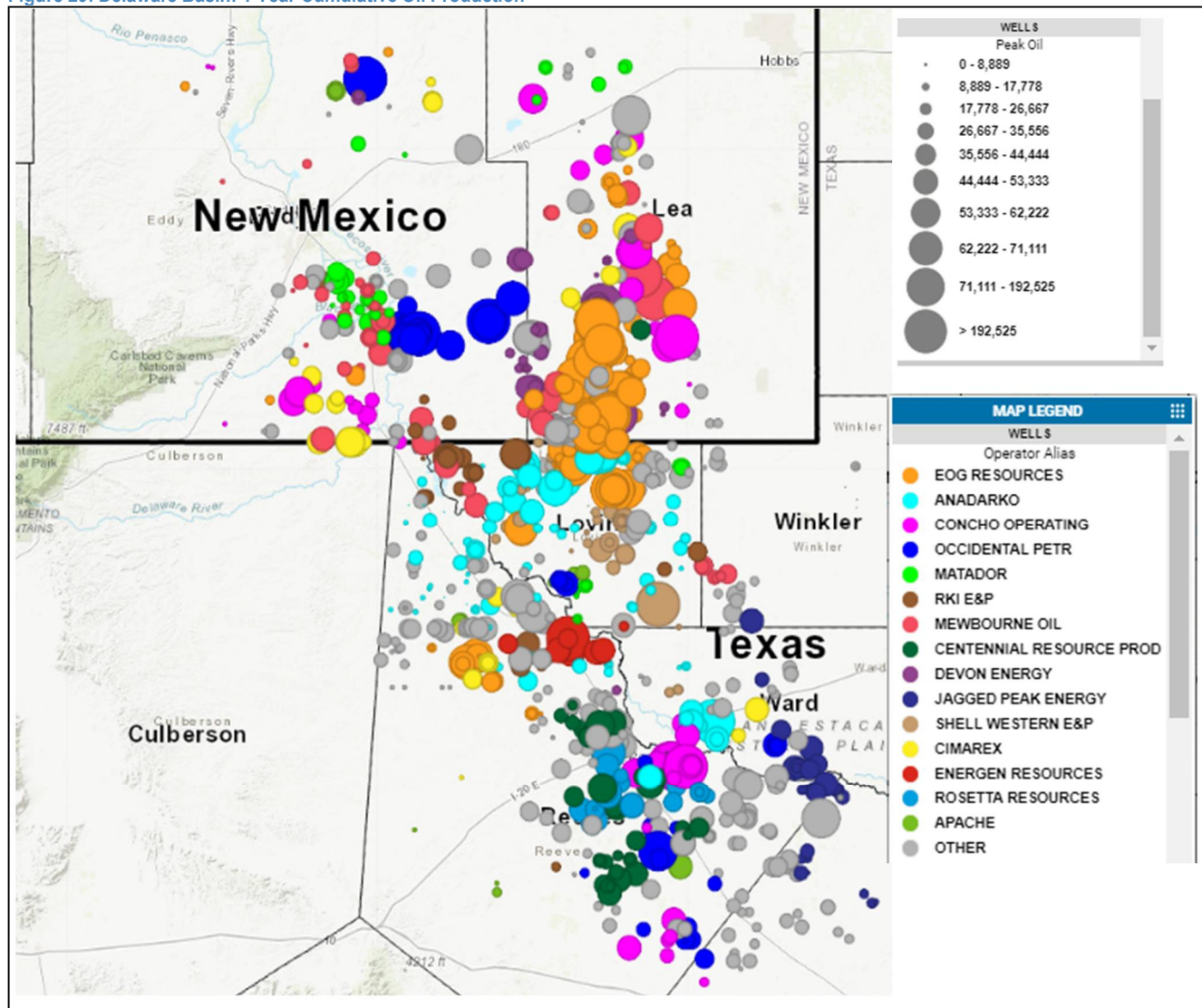
Figure 28: Delaware Basin: Peak Oil IP's per 1K Foot 14 -17 (sorted by 2017)



Source: J.P. Morgan estimates, Drilling Info.

We also plot Delaware Basin one-year cumulative oil production in a bubble map (see Figure 29). As the bubble map illustrates, EOG and CXO stand out in the state line area of the basin. APC has also brought online some strong wells in Loving and Ward along with some solid completions in Reeves.

Figure 29: Delaware Basin: 1-Year Cumulative Oil Production

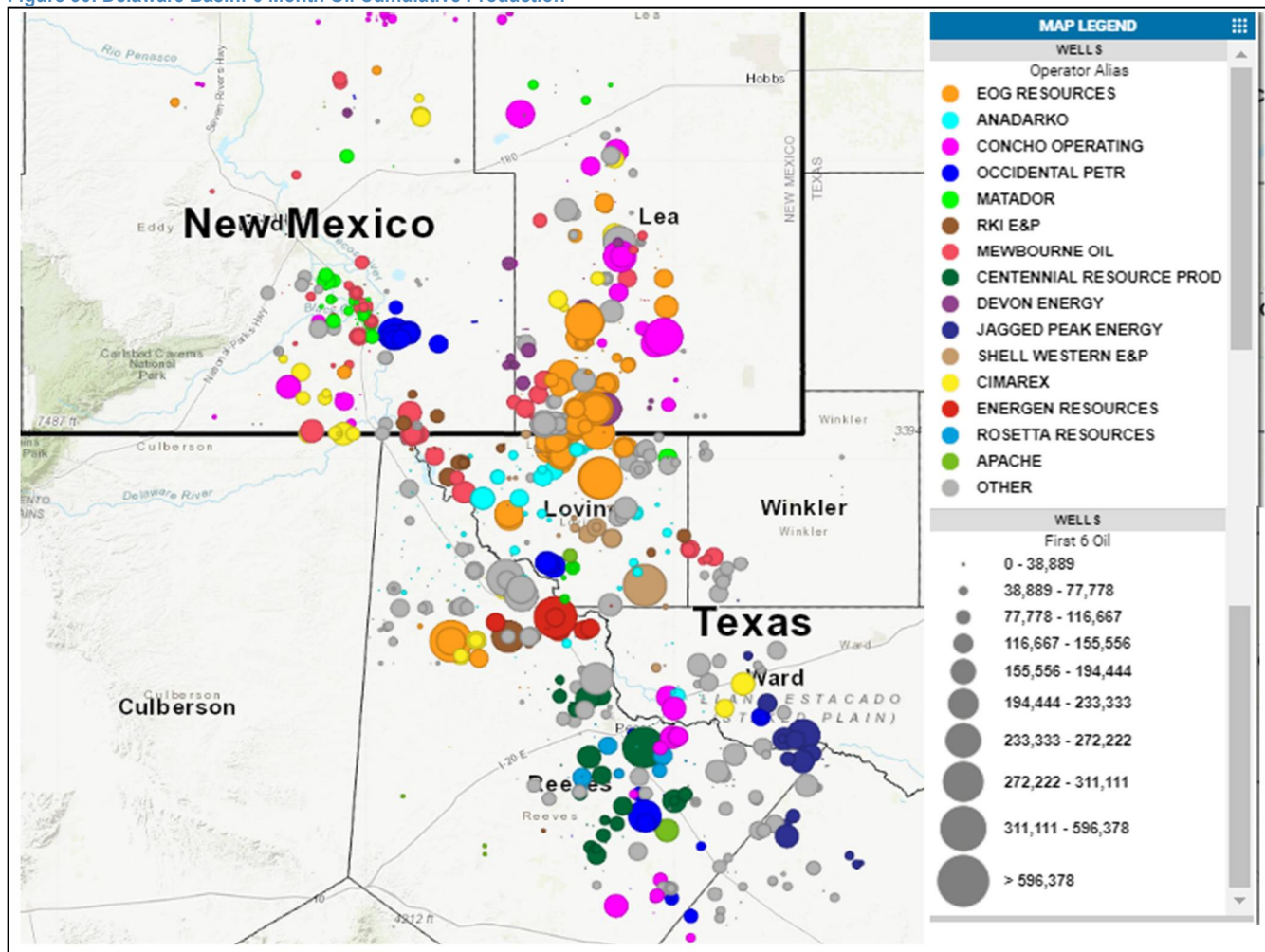


Includes wells from Jan 1st 2017 till date

Source: J.P. Morgan estimates, Drilling Info.

We also show 6 month oil cumulative production results on a map (see Figure 30). EOG, CXO and OXY are standout companies on this basis.

Figure 30: Delaware Basin: 6-Month Oil Cumulative Production

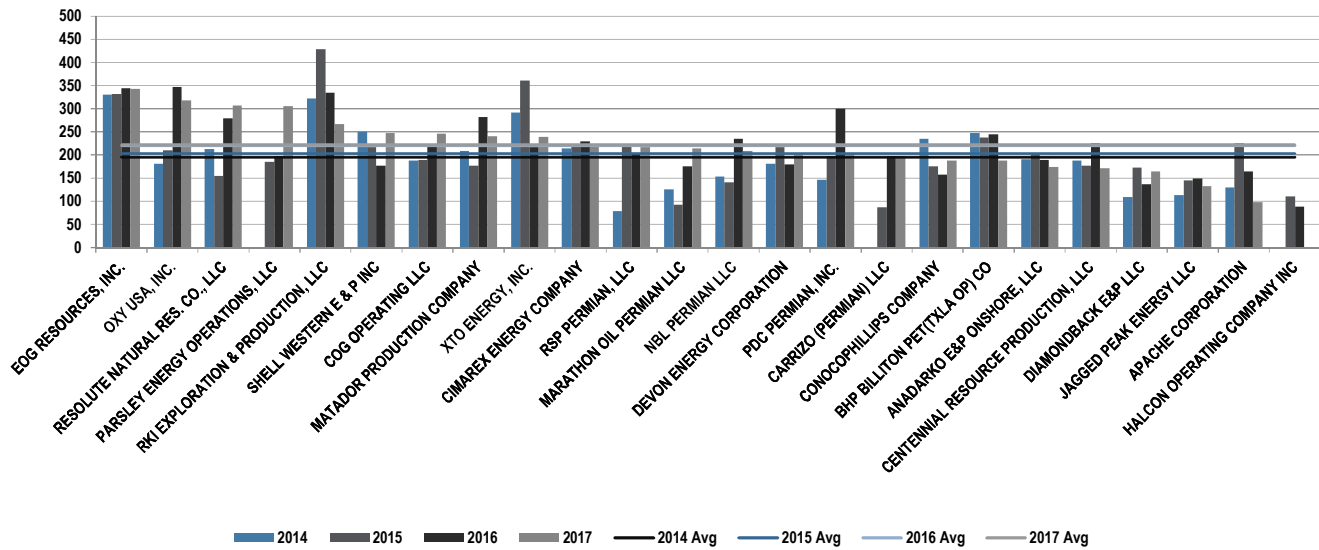


Includes wells from Jan 1st 2017 till date

Source: J.P. Morgan estimates, Drilling Info.

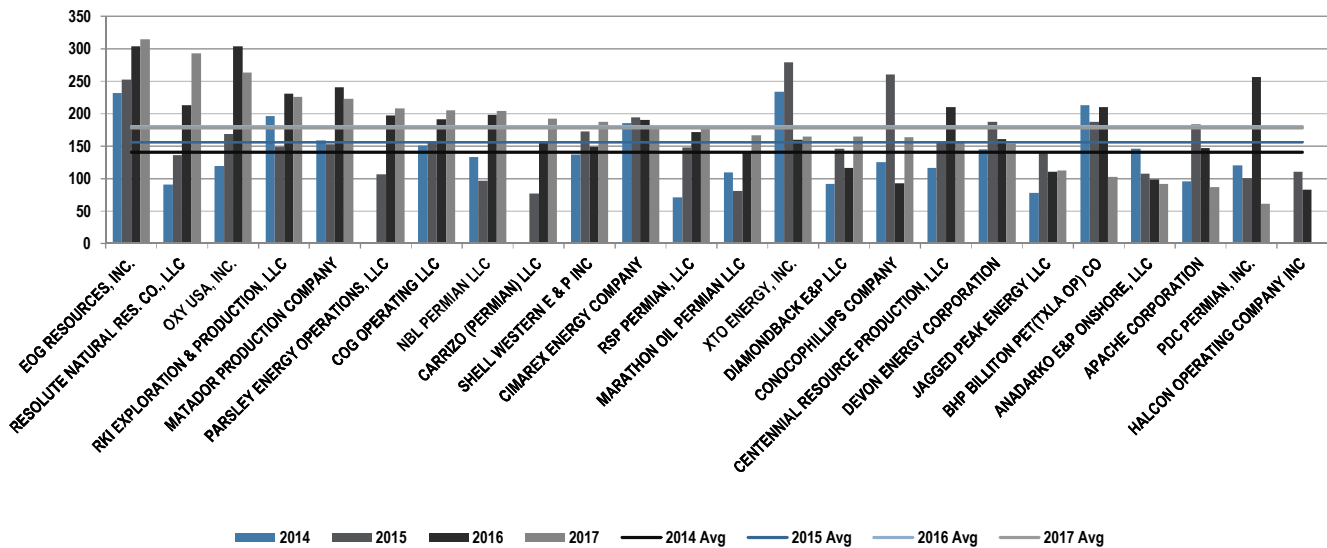
In Figure 31, Figure 32, and Figure 33, we plot Delaware Basin well productivity on a total boe basis adjusted for lateral length. With respect to Anadarko, we see similar trends versus our analysis of oil productivity per lateral foot as the company's overall well productivity lags the peer group.

Figure 31: Delaware Basin: Peak Total IP per 1K Foot (14 - 17) sorted by 2017



Source: J.P. Morgan estimates, Drilling Info.

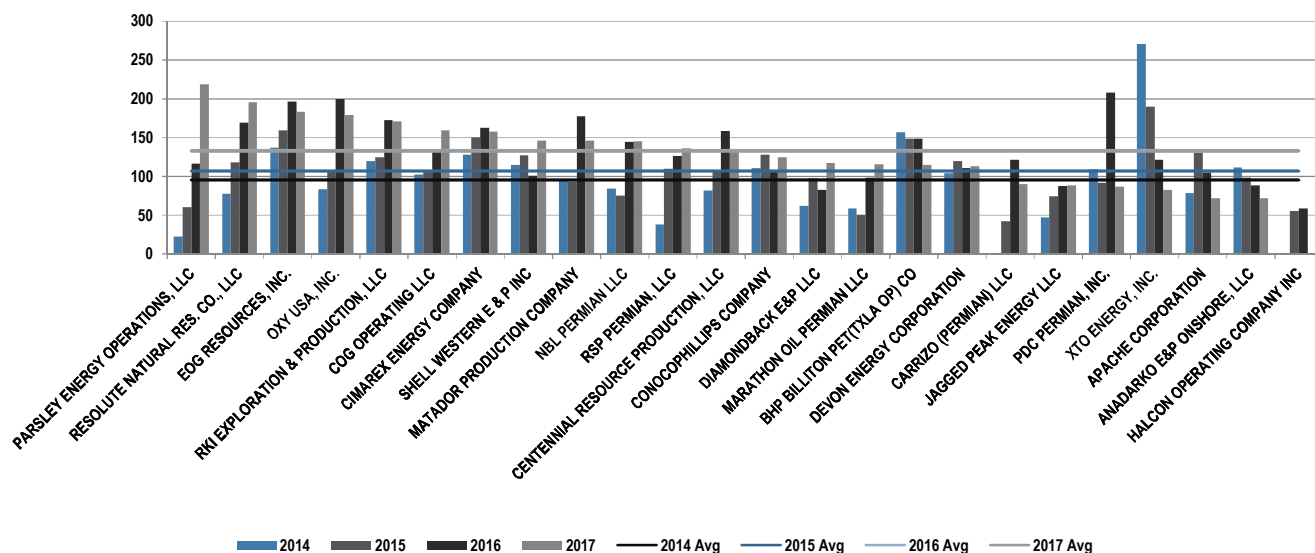
Figure 32: Delaware Basin: Peak Total IP-30 per 1K Foot (14 - 17) sorted by 2017



Source: J.P. Morgan estimates, Drilling Info.



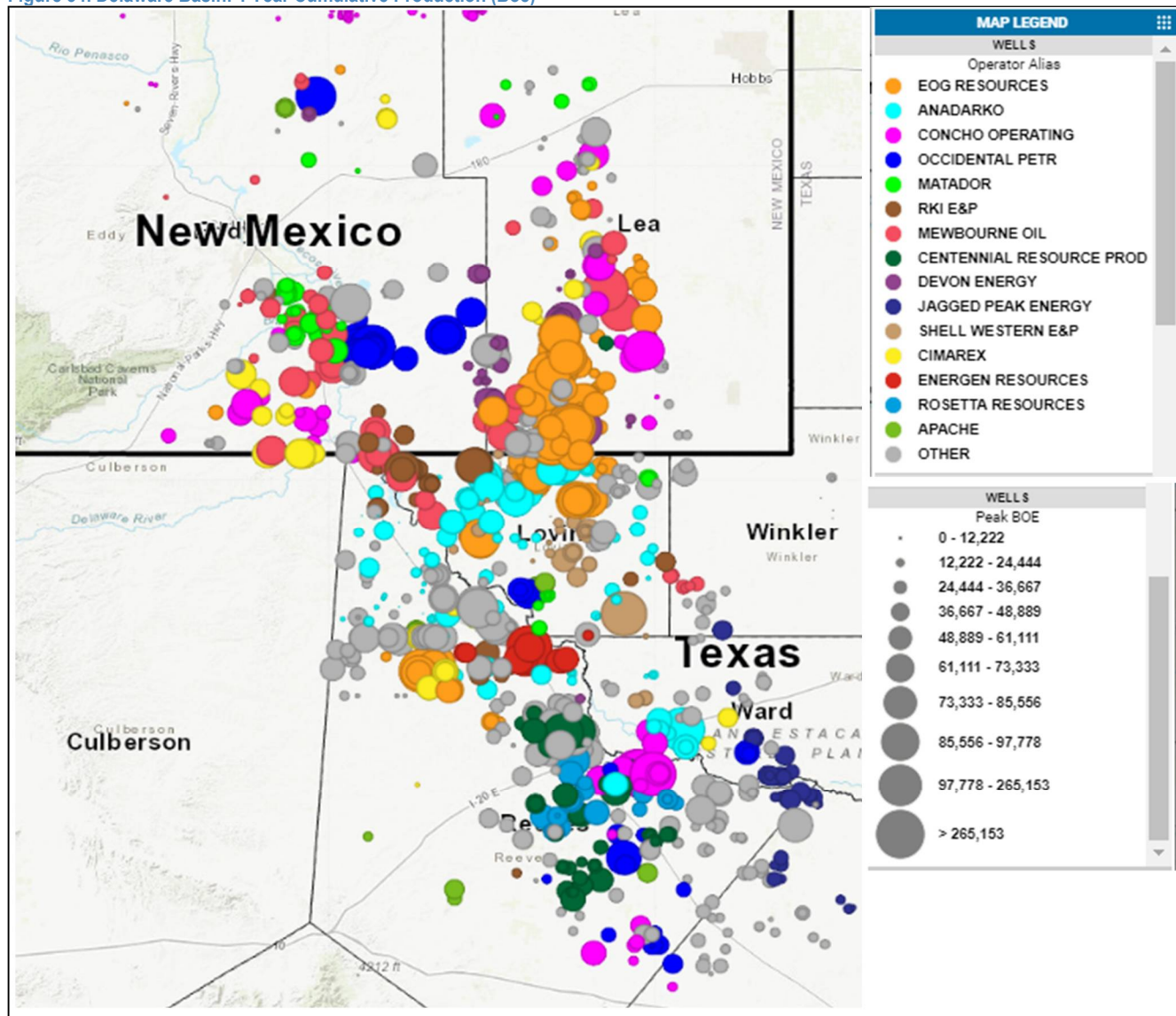
Figure 33: Delaware Basin: Total IP-180 per 1K Foot (14 - 17) sorted by 2017



Source: J.P. Morgan estimates, Drilling Info.

We plot Delaware Basin one-year cumulative production to highlight the most prolific wells completed in the basin since the beginning of 2017 (see Figure 34). As the bubble map illustrates, EOG and CXO stand out in the state line area. We have also observed some solid wells for APC in Loving, Reeves, and Ward.

Figure 34: Delaware Basin: 1-Year Cumulative Production (Boe)

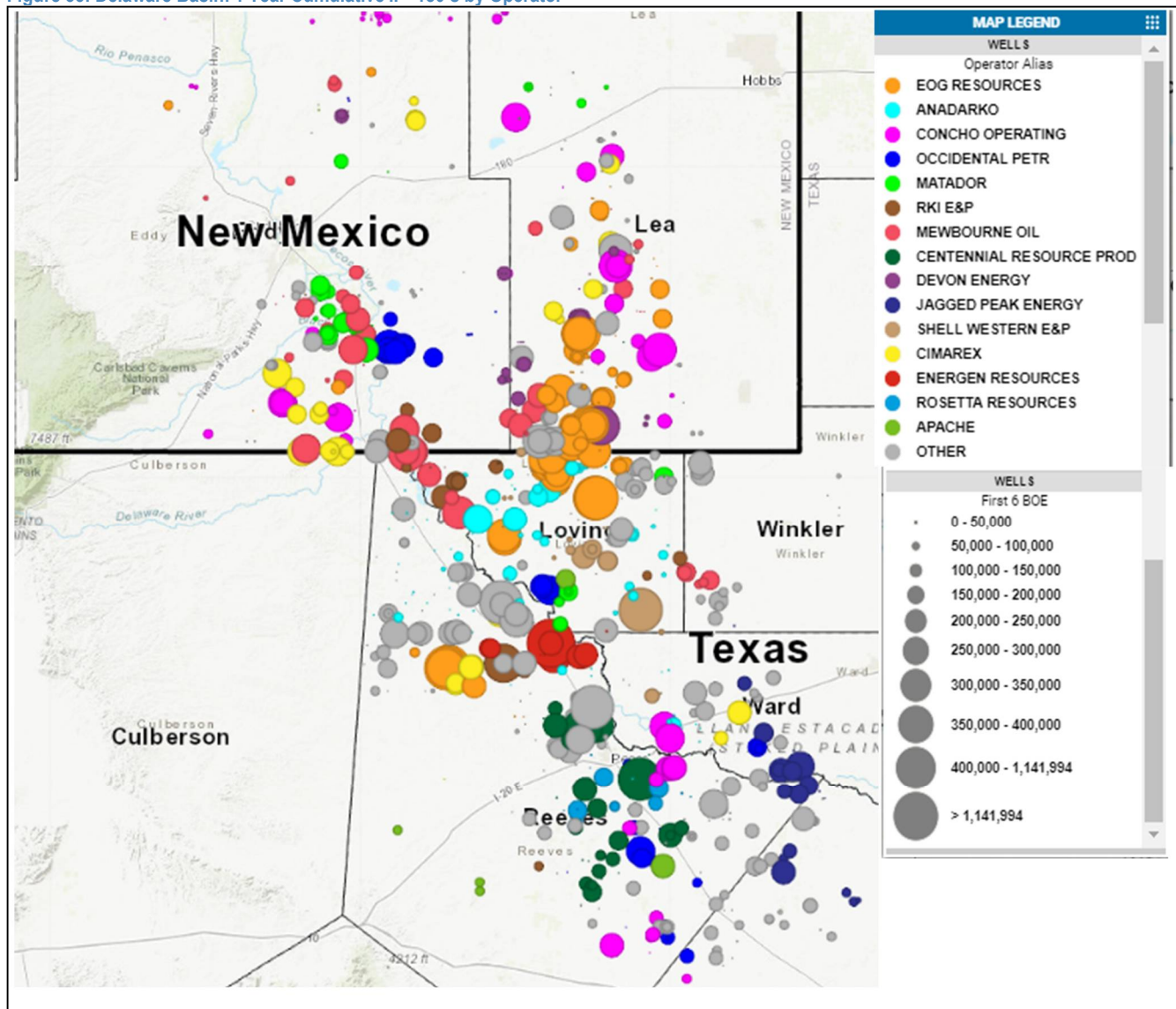


Includes wells from Jan 1st 2017 till date

Source: J.P. Morgan estimates, Drilling Info.

In Figure 35, we plot the 6 month cumulative production for Delaware operators since the beginning of 2017. EOG, CXO, OXY, EGN, CDEV, and APC are among the standouts on this measure.

Figure 35: Delaware Basin: 1 Year Cumulative IP -180's by Operator



Includes wells from Jan 1st 2017 till date

Source: J.P. Morgan estimates, Drilling Info.

## Well Productivity Analysis

**APC sees 1.6 MMBoe recoveries from optimized wells**

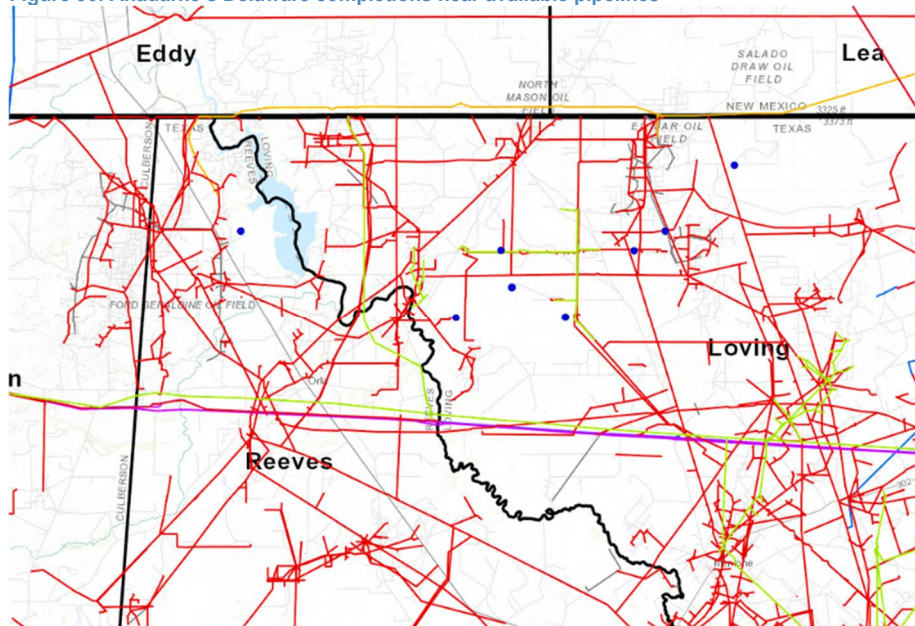
Anadarko's guidance for an optimized Delaware Basin Wolfcamp A type curve is 1,600+ MBoe with an oil mix of 60%. This type curve is based on a lateral length of 7,500 feet and well cost of \$8 million. Given limited infrastructure and the company's operatorship capture efforts, APC's historical results have mostly underperformed the type curve.

**We identified a dozen wells that were brought on-line near infrastructure**

We overlaid a pipeline map on Anadarko's Delaware Basin acreage to identify potentially optimized completions that were brought online near infrastructure (see Figure 36). We observed 12 completions that were located near infrastructure. These include the Dusk 54-1-34 Unit, Magnolia 55-2-1 Unit, Texas Sabal 55-1-40 Unit,

Vortex 54-1-40 Unit, Hickory 55-2-1 Unit, Boz 55-2-6 Unit, Walnut 55-1-46 Unit, Silvertip 76-7 Unit B, Silvertip 76-15 Unit S, Jumpstart 55-2-6 Unit, Gorgon 57-1-33 and Becker 6-30 Unit B wells.

Figure 36: Anadarko's Delaware completions near available pipelines

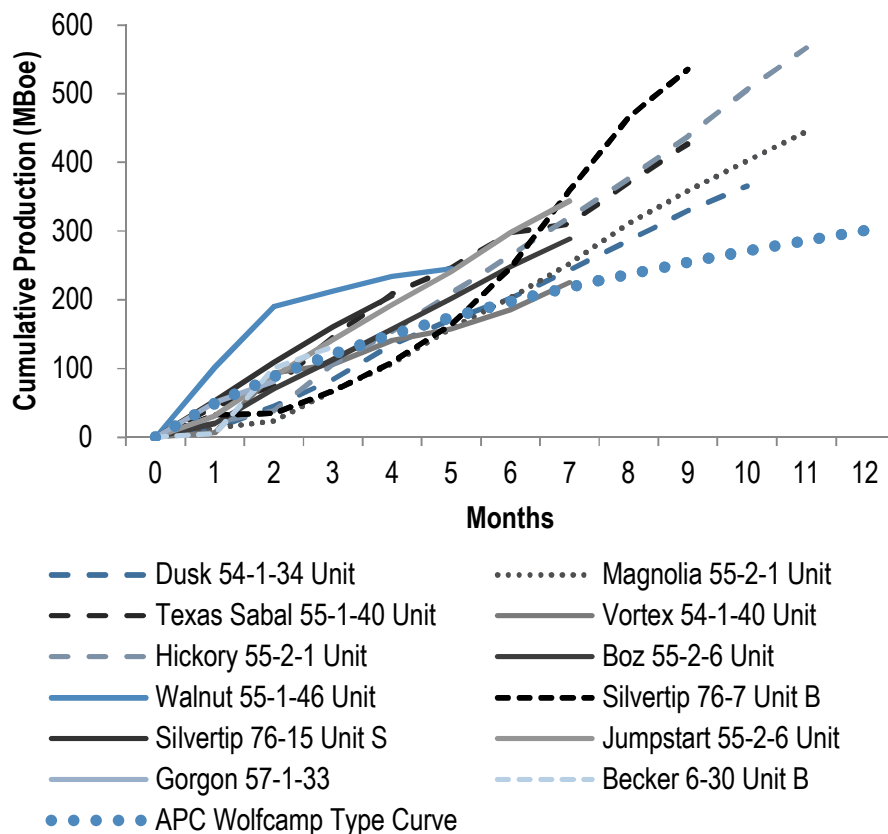


Source: J.P. Morgan estimates, Drilling Info.

**APC operated wells brought online near infrastructure appear to be sharply outperforming type curve**

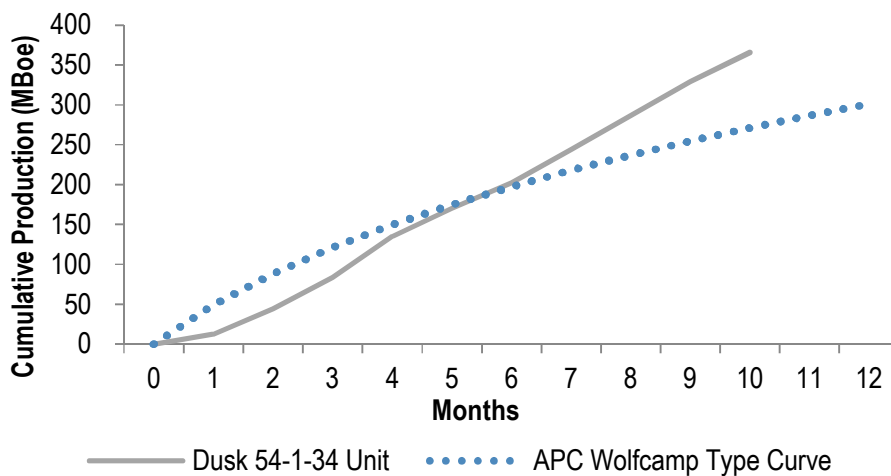
As illustrated in Figure 37, the wells that we analyzed that appear to be near infrastructure are meaningfully outperforming the company's 1,600 MBoe Wolfcamp A type curve. We show the performance of each individual well relative to the type curve in Figure 38 through Figure 49. In the Delaware Basin, APC's Gen 1.0 completion design included 1,500 lbs of proppant per lateral foot and 35 bbls per foot of fluid. In 2017, APC successfully tested its Gen 2.0 completion design that included 2,500 lbs of proppant per lateral foot and 55 bbls per foot of fluid. These wells located near infrastructure appear optimized as they were completed with average proppant loads of 2,334 lbs per lateral foot and 51 bbls per foot of fluid.

Figure 37: Anadarko's Delaware Optimized Completions vs. Type Curve



Source: J.P. Morgan estimates, Company data, HPDI.

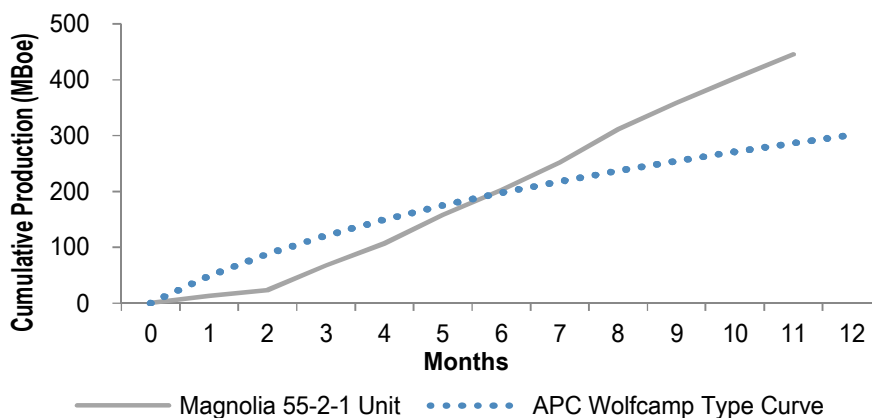
Figure 38: Dusk 54-1-34 Unit vs APC Wolfcamp A Type Curve



Source: J.P. Morgan estimates, HPDI

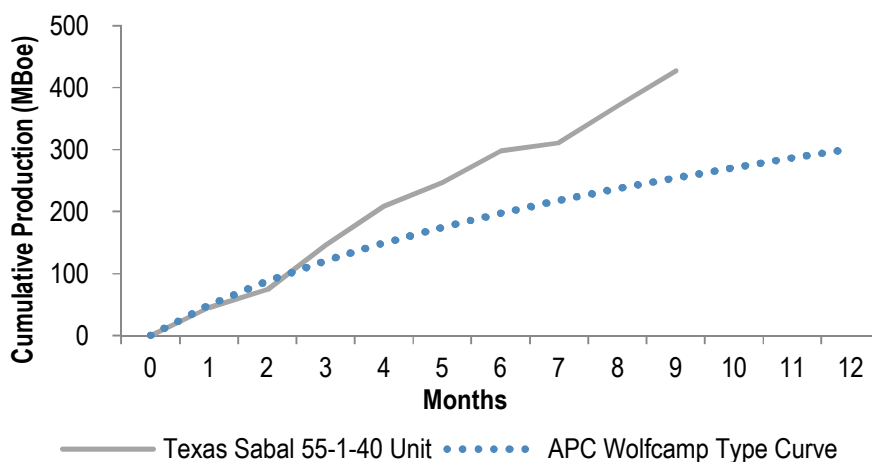


Figure 39: Magnolia 55-2-1 Unit vs. APC Wolfcamp A Type Curve



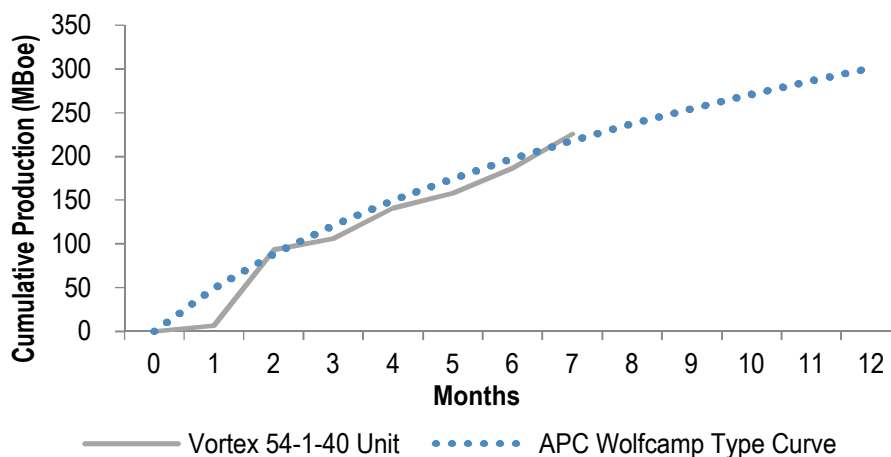
Source: J.P. Morgan estimates, HPDI

Figure 40: Texas Sabal 55-1-40 Unit vs. APC Wolfcamp A Type Curve



Source: J.P. Morgan estimates, HPDI

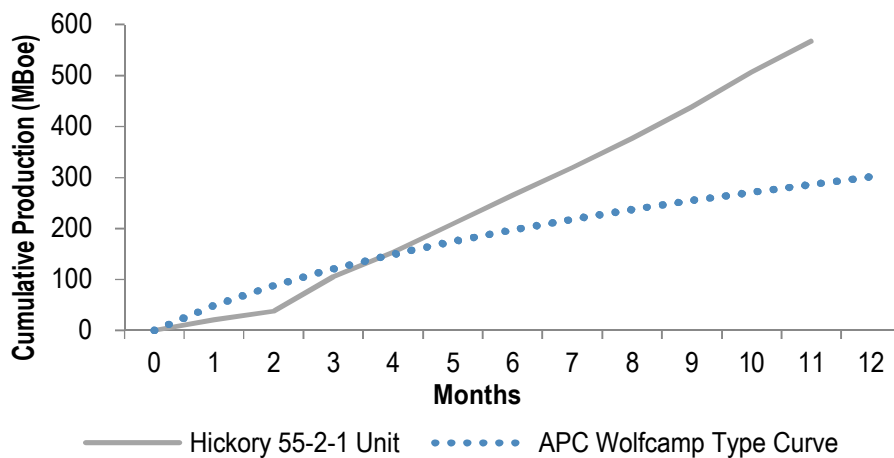
Figure 41: Vortex 54-1-40 Unit vs. APC Wolfcamp A Type Curve



Source: J.P. Morgan estimates, HDPI.

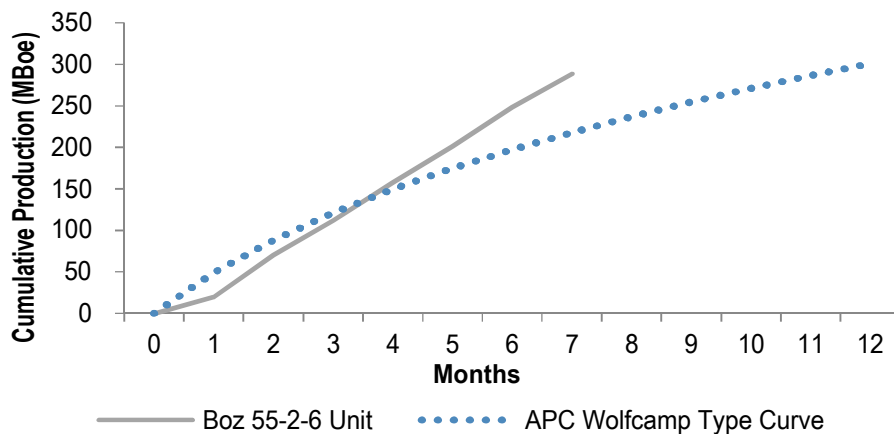


Figure 42: Hickory 55-2-1 Unit vs. APC Wolfcamp A Type Curve



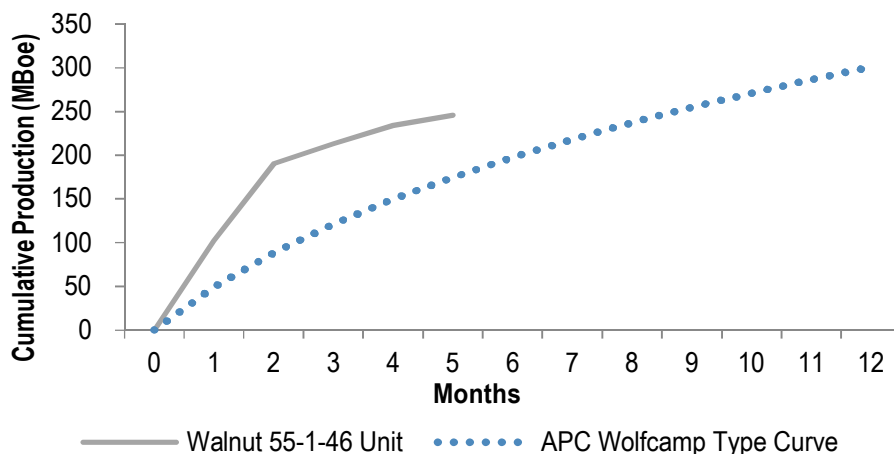
Source: J.P. Morgan estimates, HDPI.

Figure 43: Boz 55-2-6 Unit vs. APC Wolfcamp A Type Curve



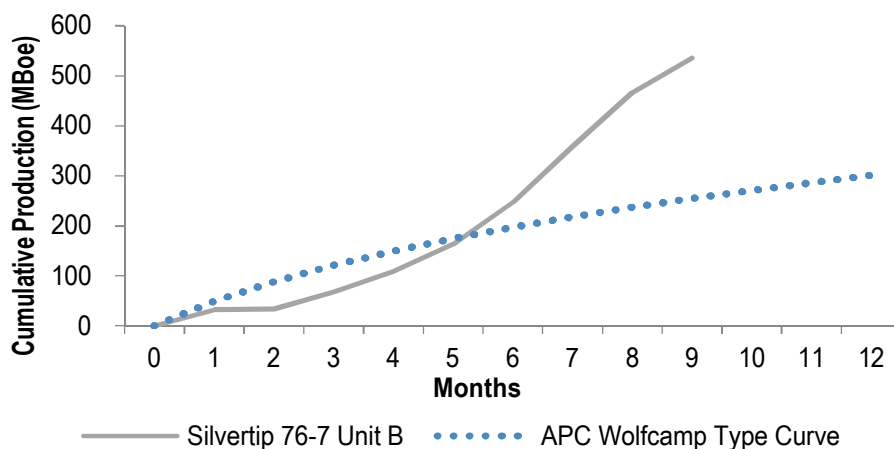
Source: J.P. Morgan estimates, HDPI.

Figure 44: Walnut 55-1-46 Unit vs. APC Wolfcamp A Type Curve



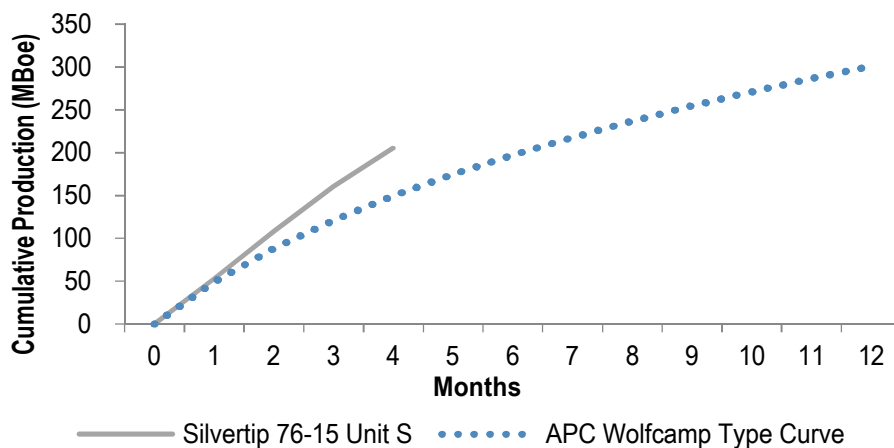
Source: J.P. Morgan estimates, HDPI.

Figure 45: Silvertip 76-7 Unit B vs. APC Wolfcamp A Type Curve



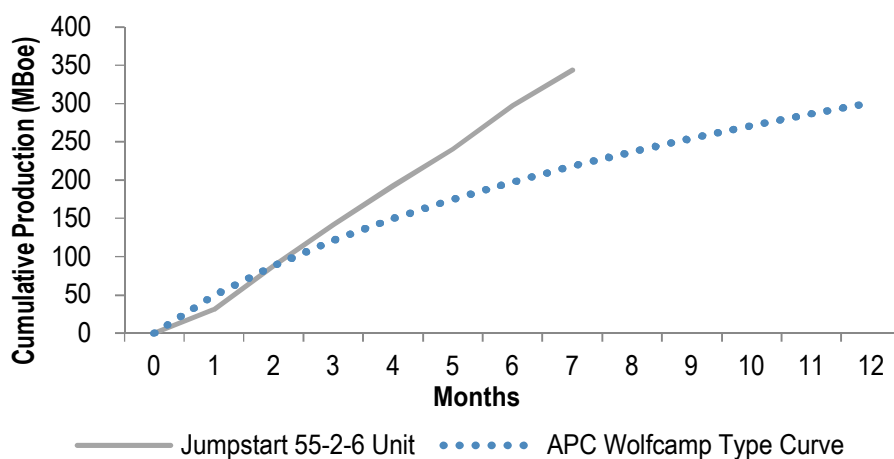
Source: J.P. Morgan estimates, HDPI.

Figure 46: Silvertip 76-15 Unit S vs. APC Wolfcamp A Type Curve



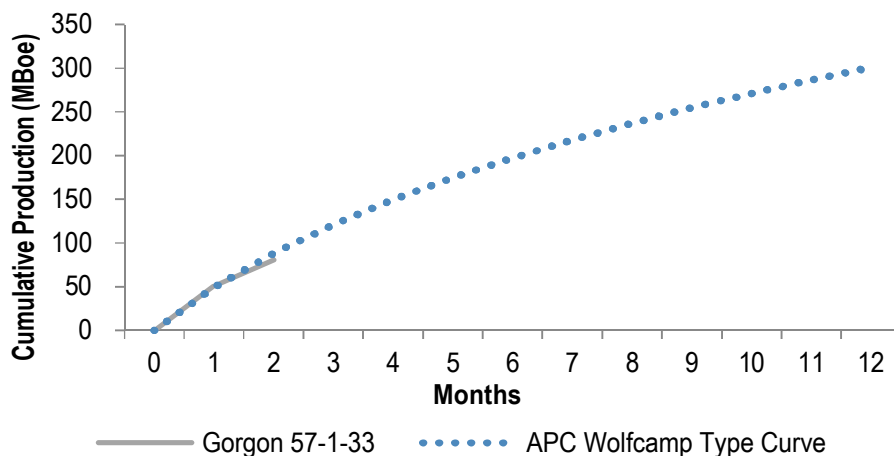
Source: J.P. Morgan estimates, HDPI.

Figure 47: Jumpstart 55-2-6 Unit vs. APC Wolfcamp A Type Curve



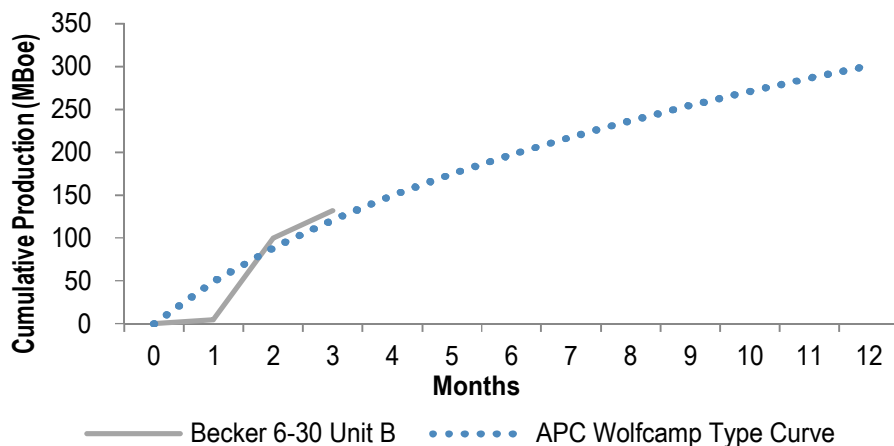
Source: J.P. Morgan estimates, HDPI.

Figure 48: Gorgon 57-1-33 vs. APC Wolfcamp A Type Curve



Source: J.P. Morgan estimates, HDPI.

Figure 49: Becker 6-30 Unit B vs. APC Wolfcamp A Type Curve



Source: J.P. Morgan estimates, HDPI.

**Extended flowback tests confirm strong well productivity, but wells will not be optimized until 2H18**

As previously mentioned, APC completed extended flowback tests (average flowback period of 30 days) on ~30 wells during 2H17 that primarily utilized a Gen 2.0 completion design. The majority of these wells were not turned onto sales until December 2017 or later and were not connected to gas gathering lines during the flowback test (the wells were flared and gas was metered). In Figure 50 **Error! Reference source not found.**, we highlight a subset of wells that were tested under the company's extended flowback tests. The wells are outperforming the company's Wolfcamp A type curve by more than 25% based on initial production rates. These wells are expected to be optimized in 2H18 once APC completes its key infrastructure projects in the basin.

**Figure 50: Delaware Basin Completions Will Be Optimized in 2H18**

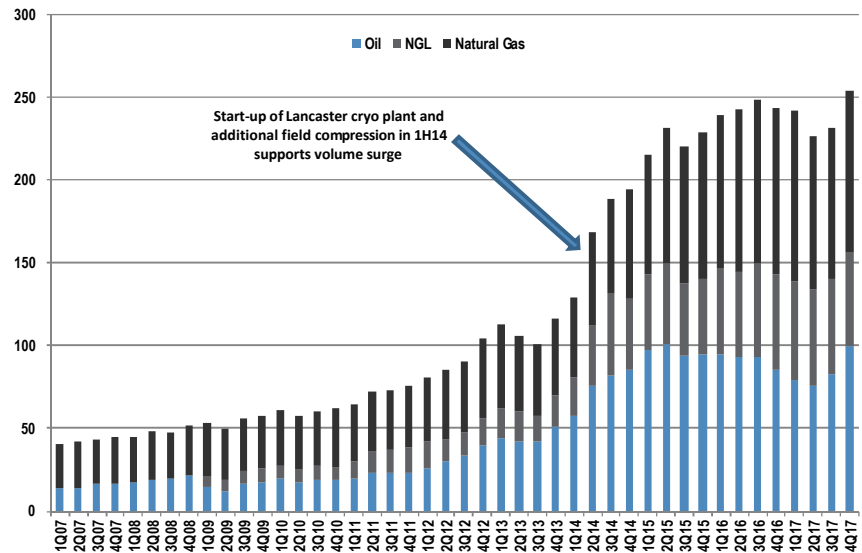
<b>Well Name</b>	<b>Status</b>
VORTEX 54-1-40 UNIT 1H	Commenced production, will be optimized in 2H18
COTTONWOOD 55-1-14 UNIT 1H	Commenced production, will be optimized in 2H18
MONROE 34-172 4H	Commenced production, will be optimized in 2H18
CROSS V RANCH 34-170 UNIT 1H	Commenced production, will be optimized in 2H18
PELICAN BAY 34-180 UNIT 1H	Commenced production, will be optimized in 2H18
CASCADES 55-1-26 UNIT 1H	Commenced production, will be optimized in 2H18
ELM 55-1-36 UNIT 1H	Commenced production, will be optimized in 2H18
WALNUT 55-1-46 UNIT 1H	Commenced production, will be optimized in 2H18
SILVERTIP 76-10 UNIT H 1H	Commenced production, will be optimized in 2H18
BIG CYPRESS 56-2-13 1H	Commenced production, will be optimized in 2H18
RAYMORE 1-48 UNIT 1H	Commenced production, will be optimized in 2H18
BECKER 6-30 UNIT B 1H	Commenced production, will be optimized in 2H18
SEVENGILLS 55-1-35 UNIT A 2H	Commenced production, will be optimized in 2H18
SASSAFRAS 55-1-24 UNIT 1H	Commenced production, will be optimized in 2H18
ALCATRAZ STATE 34-141 UNIT 1H	Commenced production, will be optimized in 2H18
COOPER STATE 34-139 UNIT 1H	Commenced production, will be optimized in 2H18
SAGE STATE 34-141 UNIT 1H	Commenced production, will be optimized in 2H18
EBONY 55-1-40 UNIT 2H	Commenced production, will be optimized in 2H18
CORSAIR C26-20 2H	Will be tied in line and optimized in 2H18
GORGON 57-1-33 1H	Will be tied in line and optimized in 2H18
SKYHAWK 57-1-28 UNIT 1H	Will be tied in line and optimized in 2H18
MANTICORE STATE 55-3-3 UNIT 1H	Will be tied in line and optimized in 2H18
KAPPA 56-2-27 1H	Will be tied in line and optimized in 2H18
VICKSBURG STATE 55-4-26 UNIT 1H	Will be tied in line and optimized in 2H18
VALKYRIE STATE 57-2-40 UNIT 1H	Will be tied in line and optimized in 2H18
PIKE PLACE 57-2-15 1H	Will be tied in line and optimized in 2H18
BULL RUN STATE 55-4-22 UNIT 1H	Will be tied in line and optimized in 2H18
SHILOH STATE 55-4-34 UNIT 1H	Will be tied in line and optimized in 2H18

Source: Anadarko Petroleum

**Production impact could be analogous to what was experienced in the DJ Basin during 2Q14**

We believe production from legacy wells could benefit from increased field compression and gas processing capacity analogous to what occurred in the DJ Basin during 2Q14, when production grew 30% sequentially, or 39 MBoe/d, when the new Lancaster plant came on-line with new cryogenic processing capacity (see Figure 51).

Figure 51: Historical DJ Basin Production

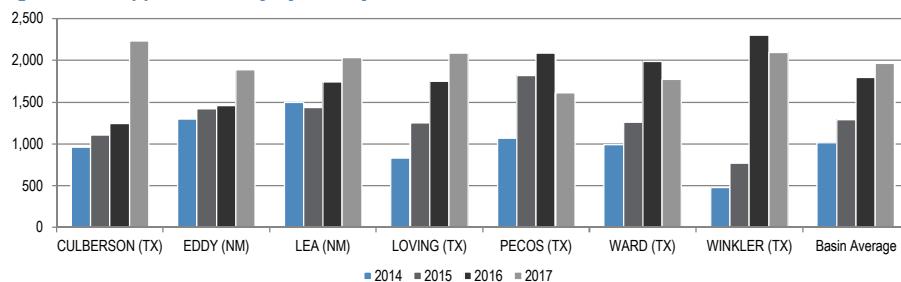


Source: Company data, J.P. Morgan Research estimates.

## Scale is becoming a bigger differentiator of companies

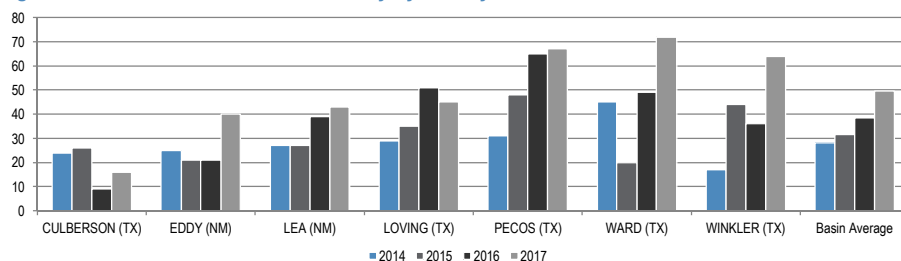
During 4Q17 earnings season, the industry highlighted numerous operating and logistical challenges in the Delaware Basin associated with significant industry activity. In Figure 52, we highlight trends in proppant intensity and note that proppant loads continue to increase, with average proppant loads increasing from 1,796 lbs per lateral ft. in 2016 to 1,960 lbs in 2017 (+9%). Enhanced completions continue to drive productivity improvements, but the rate of change does appear to be slowing. Given average lateral lengths of 6,156 ft. (see Figure 54), the average Delaware Basin well requires approximately 12.2 MM lbs. of sand, which equates to 200 truckloads of sand as a single truck can carry approximately 60,000 lbs of sand. Given the magnitude of wells that will be completed in the Permian Basin in 2H18 and beyond, there will undoubtedly be execution challenges for E&Ps. We believe companies such as APC with scale will be best positioned to navigate through these challenges. Finally, the company's tankless architecture should deliver longer-term benefits including more capital efficient development, lower opex, and reduced environmental footprint. Anadarko has 50% of Delaware 2018 oil volumes on firm transport. By end of 2019, Anadarko should have 100% of Delaware oil volumes on firm transport eliminating exposure to widening Midland differentials.

Figure 52: Proppant Intensity by County



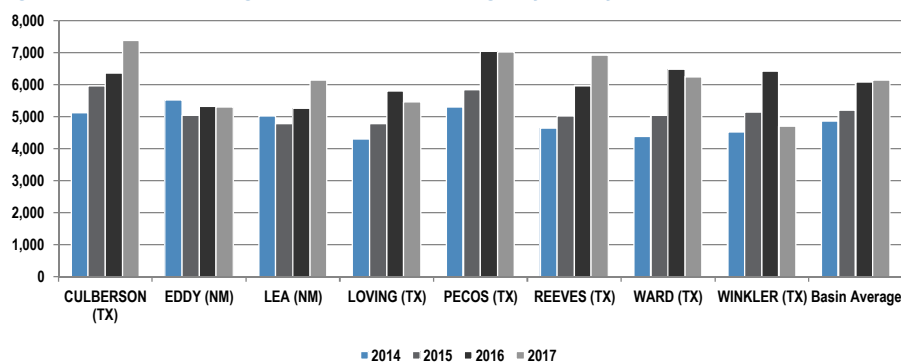
Source: J.P. Morgan estimates, Drilling Info.

Figure 53: Delaware Basin: Fluid Intensity by County



Source: J.P. Morgan estimates, Drilling Info.

Figure 54: Delaware average Perforated Interval Length by County



Source: J.P. Morgan estimates, Drilling Info.

## **.Anadarko Petroleum** (*Overweight; Price Target: \$72.00*)

### **Investment Thesis**

We see several emerging positives that could support more upside in the stock (APC trades at a ~13.8% 2020E sustaining FCF yield vs. group average ~9.1%). We believe near-term and long-term oil growth outlooks are largely intact, with the near-term outlook buoyed by surprising strength in the GoM and long-term growth supported by visibility in the Delaware and DJ Basins. Meanwhile, APC's \$4.5+ billion cash hoard provides optionality to support higher levels of cash return to shareholders. APC has one of the highest quality franchise assets at Wattenberg, and its U.S. onshore position is further enhanced by its Delaware Basin position. We believe a key catalyst for the stock is the potential shift into development mode in the Delaware Basin Wolfcamp play, where APC has significant running room in the core. In particular, we believe APC's Delaware Basin volumes could hit a meaningful growth inflection point by mid-year 2018 when it completes its midstream backbone project.

### **Valuation**

Using our NAV methodology, we calculate a net asset value of \$72 per share for APC at the strip. We believe an Overweight rating on APC is justified, as the stock is trading at a discount to our NAV. Our Dec-18 price target of \$72 assumes that the stock trades at parity with our NAV estimate. In summary, we value proved developed NAV (net of liabilities) at ~\$30.90 per share and undeveloped/unproven reserves at ~\$40.70 per share to arrive at a total proved developed and undeveloped net asset value of \$72 per share.

### **Risks to Rating and Price Target**

- Post the Firestone incident, the regulatory and legal overhang could linger over APC's DJ Basin asset, which represents approximately 20% of our NAV estimate. The DJ Basin has historically had infrastructure issues including delays, high-line pressures, and a lack of natural gas processing capacity, which have all curtailed production at some point over the past several years.
- Post the Freeport-McMoran deepwater purchase, APC has increased its leverage to the U.S. GoM, which could lead to higher volatility in production levels and higher asset concentration risk, particularly at the Lucius development.
- There could be a delay in getting the midstream infrastructure ready, which is the key assumption that underpins our APC growth rates and rate of change in Delaware Basin well productivity.
- Continued oil price volatility could negatively impact play economics and ultimately corporate level cash flow, which could cause the stock to underperform our expectations..



## Anadarko Petroleum: Summary of Financials

Income Statement - Annual						Income Statement - Quarterly					
	FY16A	FY17A	FY18E	FY19E	FY20E		1Q18E	2Q18E	3Q18E	4Q18E	
Revenue	7,869	11,908	13,783	15,094	-	Revenue	3,207	3,364	3,536	3,677	
SG&A	(1,440)	(1,075)	(990)	(1,000)	-	SG&A	(245)	(245)	(250)	(250)	
Adj. EBITDAX	4,075	5,732	8,127	8,903	-	Adj. EBITDAX	1,852	1,982	2,098	2,196	
Exploration expense	(946)	(2,541)	(395)	(557)	-	Exploration expense	(110)	(96)	(98)	(92)	
Adj. EBITDA	3,129	3,191	7,733	8,345	-	Adj. EBITDA	1,742	1,886	2,000	2,104	
D&A	(4,301)	(4,279)	(4,583)	(5,155)	-	D&A	(1,082)	(1,117)	(1,170)	(1,214)	
Adj. EBIT	(1,172)	(1,088)	3,150	3,190	-	Adj. EBIT	660	770	830	890	
Net Interest	(890)	(932)	(951)	(898)	-	Net Interest	(239)	(237)	(237)	(237)	
PBT	(3,829)	(1,688)	2,199	2,292	-	PBT	421	532	593	653	
Tax	1,021	1,477	(879)	(879)	-	Tax	(185)	(216)	(232)	(246)	
Minority Interest	(263)	(245)	(330)	(340)	-	Minority Interest	(70)	(80)	(90)	(90)	
Adj. Net Income	(1,604)	(1,074)	990	1,073	-	Adj. Net Income	166	237	270	317	
Reported EPS	(5.89)	(0.83)	1.93	2.14	-	Reported EPS	0.32	0.46	0.53	0.63	
Adj. EPS	(3.07)	(1.96)	1.93	2.14	-	Adj. EPS	0.32	0.46	0.53	0.63	
DPS	-	-	-	-	-	DPS	-	-	-	-	
Payout ratio	-	-	-	-	-	Payout ratio	-	-	-	-	
Shares outstanding	522	548	513	502	-	Shares outstanding	524	517	509	502	
Balance Sheet & Cash Flow						Ratio Analysis					
	FY16A	FY17A	FY18E	FY19E	FY20E		FY16A	FY17A	FY18E	FY19E	FY20E
Cash and cash equivalents	3,184	4,553	3,349	3,540	-	ROE	(12.8%)	(9.4%)	9.7%	10.8%	-
Accounts receivable	1,728	1,829	1,829	1,829	-	ROA	(3.5%)	(2.4%)	2.4%	2.6%	-
Inventories	-	-	-	-	-	ROCE	(5.3%)	(7.6%)	7.4%	7.9%	-
Other current assets	354	380	380	380	-	Net debt/equity	78.1%	79.7%	94.6%	82.4%	-
Current assets	5,266	6,762	5,558	5,749	-	Interest cover (x)	3.5	3.4	8.1	9.3	-
PP&E	32,168	27,451	27,897	27,845	-	P/E (x)	NM	NM	32.9	29.7	-
LT investments	-	-	-	-	-	EV/EBITDA (x)	15.3	14.6	6.2	5.6	-
Other non current assets	8,130	7,873	7,873	7,873	-	P/DCF (x)	10.8	8.1	5.2	4.5	-
Total assets	45,564	42,086	41,328	41,467	-	EV/BOE (x)	-	-	-	-	-
Short term borrowings	-	-	-	-	-	EV/EBITDAX (x)	11.7	8.1	5.9	5.2	-
Payables	2,288	1,995	1,995	1,995	-	Dividend yield	-	-	-	-	-
Other short term liabilities	1,040	1,911	1,911	1,911	-	Tax rate	(26.7%)	(87.5%)	40.0%	38.4%	-
Current liabilities	3,328	3,906	3,906	3,906	-	Sector data					
Long-term debt	15,281	15,547	15,433	14,533	-	Natural gas price - \$/mcf	2.40	2.23	2.87	2.79	-
Other long term liabilities	11,458	8,843	9,221	9,690	-	Crude oil (WTI) - \$/bbl	43.34	50.89	62.93	59.21	-
Total liabilities	30,067	28,296	28,560	28,129	-	Daily oil production (mbblpd)	316	355	388	444	-
Shareholders' equity	12,212	10,696	9,673	10,244	-	NGLs Production (MMbbl)	46.85	36.22	37.21	41.68	-
Minority interests	3,285	3,094	3,094	3,094	-	Daily gas production (mmcfpd)	2,093	1,312	1,103	1,230	-
Total liabilities & equity	45,564	42,086	41,328	41,467	-	Daily production (mboed)	-	-	-	-	-
BVPS	23.41	19.52	18.86	20.42	-	Total Production (mmboe)	290	245	246	279	-
y/y Growth	(7.3%)	(16.6%)	(3.4%)	8.3%	-	Proved reserves (mmboe)	-	-	-	-	-
Net debt/(cash)	12,097	10,994	12,084	10,993	-	Unit costs per boe	-	-	-	-	-
Cash flow from operating activities	3,000	4,009	6,281	7,036	-	Lease operating expense	-2.79	-4.07	-4.69	-	-
o/w Depreciation & amortization	4,301	4,279	4,583	5,155	-	Taxes other than income	-1.85	-2.37	-2.91	-	-
o/w Changes in working capital	104	(306)	0	0	-	DD&A	-14.82	-17.44	-18.64	-	-
Cash flow from investing activities	(2,762)	(482)	(3,799)	(4,306)	-	G&A	-4.96	-4.38	-4.03	-	-
o/w Capital expenditure	(3,505)	(4,344)	(4,399)	(4,606)	-	Exploration expense	-3.26	-10.35	-1.60	-	-
as % of sales	44.5%	36.5%	31.9%	30.5%	-	-	-	-	-	-	-
Cash flow from financing activities	2,007	(1,613)	(2,457)	(1,742)	-	Operating margin/boe	-6.90	-6.69	9.14	-	-
o/w Dividends paid	(105)	(112)	(513)	(502)	-	Cash margin/boe	7.93	10.74	27.78	-	-
o/w Net debt issued/(repaid)	(790)	208	(114)	(900)	-	EBITDAX margin	51.8%	48.1%	59.0%	59.0%	-
Net change in cash	2,245	1,914	26	989	-	Discretionary cash flow	3,076	4,315	6,281	7,036	-
Adj. Free cash flow to firm	(314)	(1,291)	653	1,633	-	DCF/share	5.90	7.87	12.24	14.02	-
y/y Growth	(96.0%)	311.1%	(150.6%)	150.0%	-						

Source: Company reports and J.P. Morgan estimates.

Note: \$ in millions (except per-share data). Fiscal year ends Dec. o/w - out of which

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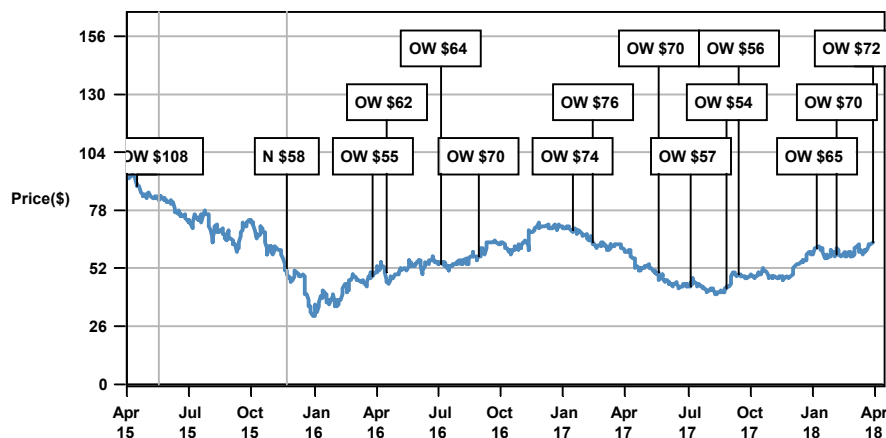
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Source: Bloomberg and J.P. Morgan; price data adjusted for stock splits and dividends.  
Initiated coverage May 06, 2002.  
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