

INSIGHTS ACROSS THE ENERGY VALUE CHAIN

“So the guidance is simple - recognize that unconventional drilling has added massive amounts of open hole logging and seismic data to the knowledge base of conventional reservoirs, and take note of the uphole and downhole potential of current unconventional producing reservoirs.”

Table of Contents

1. Oil Prices Down on Crude Stock Build and Proposed Steel Imports	3
2. Westward Ho: Stretching the Boundaries of the Permian Basin	6
3. Sale of Maersk Oil & Gas to Total Approved by Danish Government	13
4. Are There Missed Opportunities for Conventional Drilling in Unconventional Producing Reservoirs?	15
5. Providing a Startup a Fighting Chance in the Conventional Eagle Ford	24

1

Oil Prices Down On Crude Stock Build and Proposed Steel Import



US crude oil stocks increased by 2.4 MMBbl last week. Gasoline and distillate inventories decreased by 0.8 MMBbl and 0.6 MMBbl, respectively. Yesterday afternoon, API reported a large crude oil build of 5.7 MMBbl, a distillate build of 1.5 MMBbl, and a gasoline draw of 4.5 MMBbl. Analysts were expecting a smaller crude oil build of 2.7 MMBbl. **The most important number to keep an eye on, total petroleum inventory levels, was unchanged.** For a summary of the crude oil and petroleum product stock movements, see the table below.

US crude oil production was estimated to be up 86 MBbl/d from last week, per EIA. Crude oil imports increased by 721 MBbl/d last week, to an average of 8.0 MMBbl/d. Refinery inputs averaged 15.9 MMBbl/d (53 MBbl/d more than last week), leading to a utilization rate of 88%. **The report is bearish, as crude oil**

posted a decline and gasoline inventory draw was smaller than expected. Prompt-month WTI was trading down \$0.29/Bbl to \$62.31/Bbl at the time of writing.

Product (MMBbl)	3/2/2018	2/23/2018	Difference
Crude Oil (excl. SPR)	425.9	423.5	2.4
Gasoline	251.0	251.8	-0.8
Ethanol	23.1	23.0	0.2
Jet Fuel	42.7	43.1	-0.4
Distillate	137.4	138.0	-0.6
Resid	32.7	32.1	0.6
Propane	41.1	42.7	-1.6
Other	248.6	248.5	0.1
TOTAL (excl. SPR)	1202.6	1202.6	0.0

WTI prices traded in the \$61/Bbl-\$63/Bbl range last week. Prices were pressured by the weakness in global financial markets after the resignation of President Donald Trump’s economic advisor, Gary Cohn. Increasing US production also pressured prices, while supply outages and a new report released by IEA gave some support to prices.

Cohn’s resignation came after his stance against Trump’s planned 25% import tariff on steel and aluminum imports. Trump’s tariff plan raised the concerns of a possible trade war, which affected the global markets and oil prices as well. Global leaders including EU and China have said Trump’s planned tariffs could lead to retaliatory action and cause a global trade war, which would be detrimental to economic growth and oil consumption. Cohn’s resignation could be interpreted as meaning Trump will move forward with his decision. Even if the new plan does not spark a global trade war, it will still drastically impact the US shale industry and could act as the main catalyst in slowing down US production growth right when the US is set to pass Russia and become the top oil producer in the world.

The US oil industry is heavily dependent on imported steel, as steel used in oil pipelines and drilling activities must meet technical specifications; currently, more than three-quarters of pipelines in the US depend on imported steel. Pipeline takeaway capacity in the more prolific producing regions is already an issue and needs to be solved by adding new pipelines so additional product can hit the markets. A 25% cost increase in tariffs could lead to the delay or cancellation of these projects, which ultimately would

mean one thing: US oil output slowing down just as it is set to surpass Russia's. Russia and OPEC would be the biggest winners, as US production growth would be limited.

Prices got some support from the supply outages in Libya, with IEA stating they expect a strong oil demand growth, projecting a rise of 6.9 MMBbl/d by 2023. More than half is projected to come from India and China. IEA also stated that in the same time frame, US supply could grow by 3.7 MMBbl/d, OPEC could see growth of 0.75 MMBbl/d, and Venezuela could account for a 0.7 MMBbl/d decline. The demand growth projected is certainly supporting prices; however, the supply/demand picture could shift quickly depending on production levels for OPEC and Venezuela.

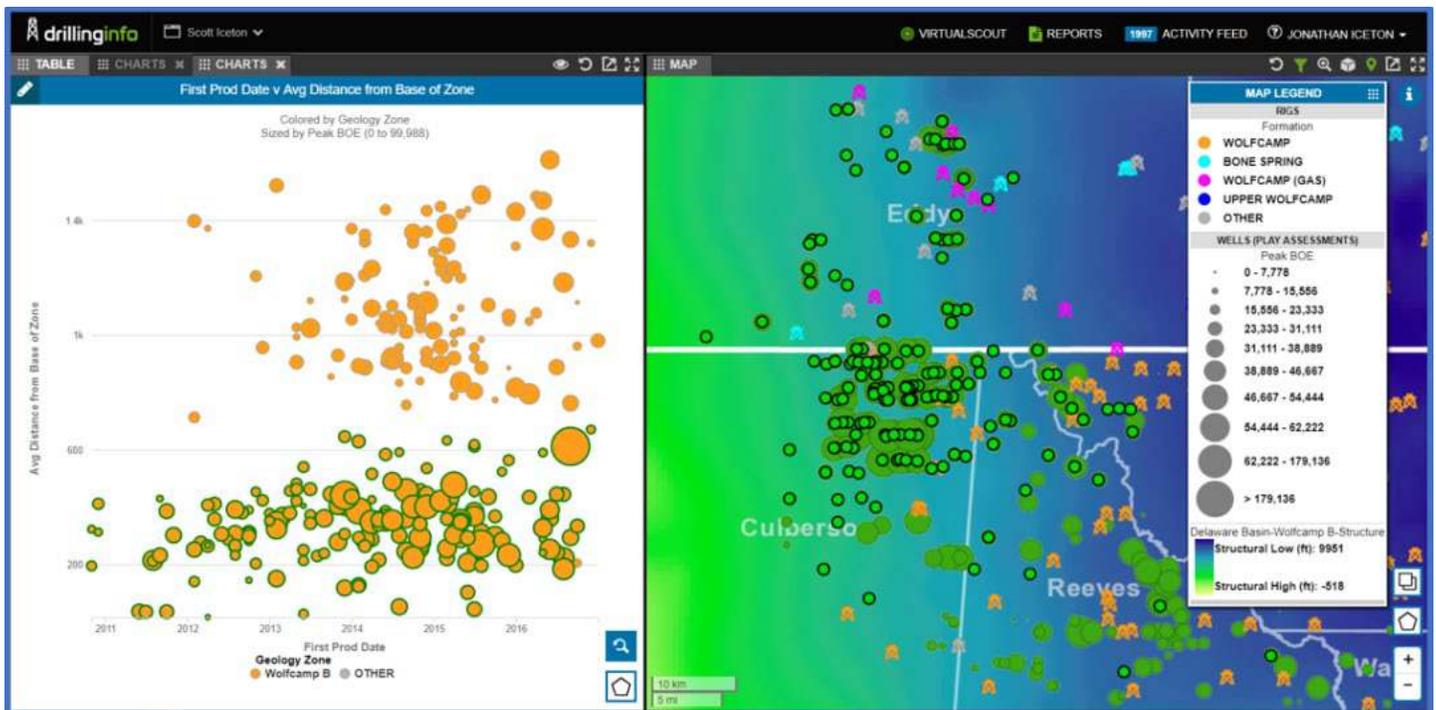
The market seems to be constructing a range (\$58/Bbl-\$64/Bbl) in the near term. Realization of longer-term supply/demand imbalance potential could have the market testing the lower end of the range. While additional news regarding OPEC quotas, inventory normalization, or temporary supply disruptions due to geopolitical issues might create short-term price gains and volatility, the promise of additional growth from US producers is likely to limit longer-term extensions. For the market to have any chance of normalizing inventories back to their levels prior to the price crash, it is critical that high quota compliance continue through 2018 and that the demand growth projected by IEA occur concurrently. Without inventory normalization, the price recovery cannot be sustained. **Drillinginfo expects prices to return to a less speculative price level, settling in a range around \$55/Bbl in the longer term.**

Please find the updated Drillinginfo charts on the link below:

[Weekly Petroleum Stocks Charts](#)

2

Westward Ho: Stretching the Boundaries of the Permian Basin



One message is being sent loud and clear by US E&Ps: shallow is king right now. Operators have had their eyes on the top and bottom lines of their balance sheets for quite some time now. Cost control is the name of the game as negotiated drilling costs fell dramatically from the 2014 peaks, mergers and acquisitions spiked as groups put blinders on to focus on their core assets, and optimizing treatment types and frac quantities continue to be at the forefront of our meetings and consulting projects. Current leasing and permitting booms in the Central Basin's San Andres, the Arkoma-Woodford, and the Eaglebine's Chalk/

Buda firmly establish new levers that are prioritized to reduce capital costs, lower land acquisition costs and target shallower drilling locations.

For those in the Permian, the answer is easy to see. The basin fringe represents a savings of \$125,000 to \$240,000 per well in drilling costs alone with 1,000- to 2,000-foot shallower targets. Figure 1 hints at what these players are seeing as a promising area, with peak rates and well performance for the more than 1,000-foot-thick Wolfcamp B averaging much higher than that of other counties. With the average wells coming on at over 1,000 barrels of oil equivalent per day in the Wolfcamp B, these wells have outpaced the core counties by getting around 50% more in peak rates (Figure 1), and people are starting to take notice. Culberson County in West Texas has quietly become a focus area for new production and investments as established operators start to see more private equity-backed neighbors.

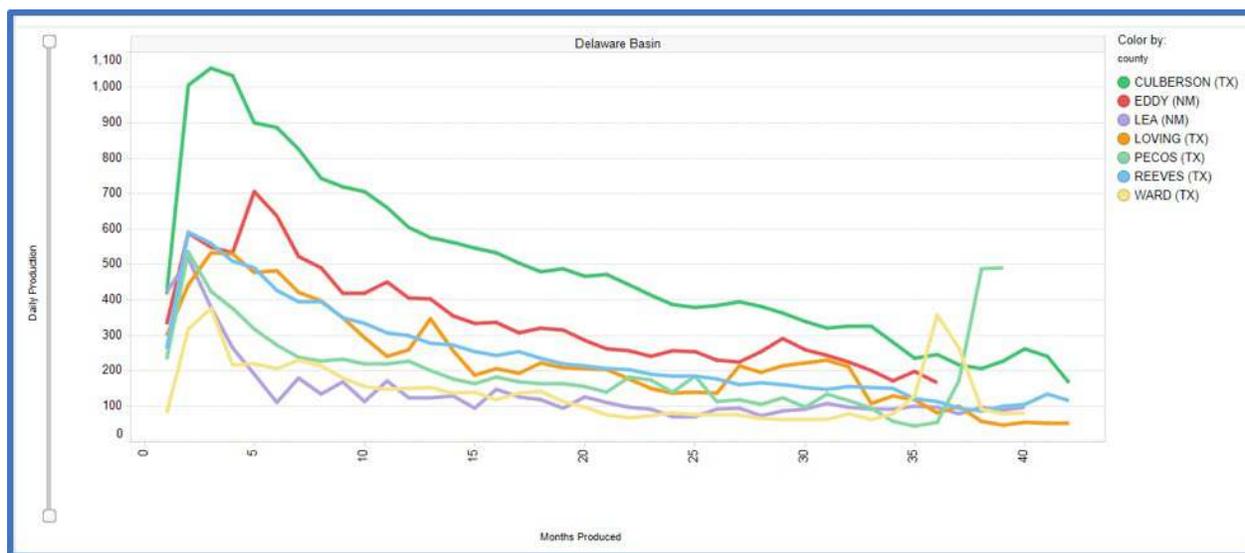


FIGURE 1: WOLFCAMP B WELLS: AVERAGE PERFORMANCE IN BOE (BARRELS OF OIL EQUIVALENT: 6 MCF:1 BARREL) BROKEN OUT BY COUNTY FOR ALL WELLS WITH A FIRST PRODUCTION DATE GREATER THAN OR EQUAL TO JANUARY 1, 2014, AND A PERFORATED LATERAL LENGTH OF GREATER THAN OR EQUAL TO 3,000 FEET.

Culberson County at a Glance

- Four main players in the county currently: Cimarex/Chevron (joint venture), Concho, Capitan, and Conoco
- Recent Investments: Capital firms recently funding upstream and midstream

- Oryx II (Quantum, Post Oak, and Wells Fargo) – Announced on Sept. 27 a new pipeline to connect Culberson with every producing Delaware county to be operational in 2018
- Aqua Grande (Hughes) – On Sept. 27, the county approved a 5 million gallon/day water pipeline to be built to deliver to frac operators
- Pinnacle Midstream (BP Capital) – New 60 MMcfd Sierra Grande Cryogenic gas plant, operational Q4 2017, with subsequent site expansion already planned
- Eagle Claw midstream (Blackstone) – 2016 gathering line into Toyah gas plant
- E&Ps – 3 Rivers III (Riverstone), Charger Shale (Oak Tree), and Scala (Encap)

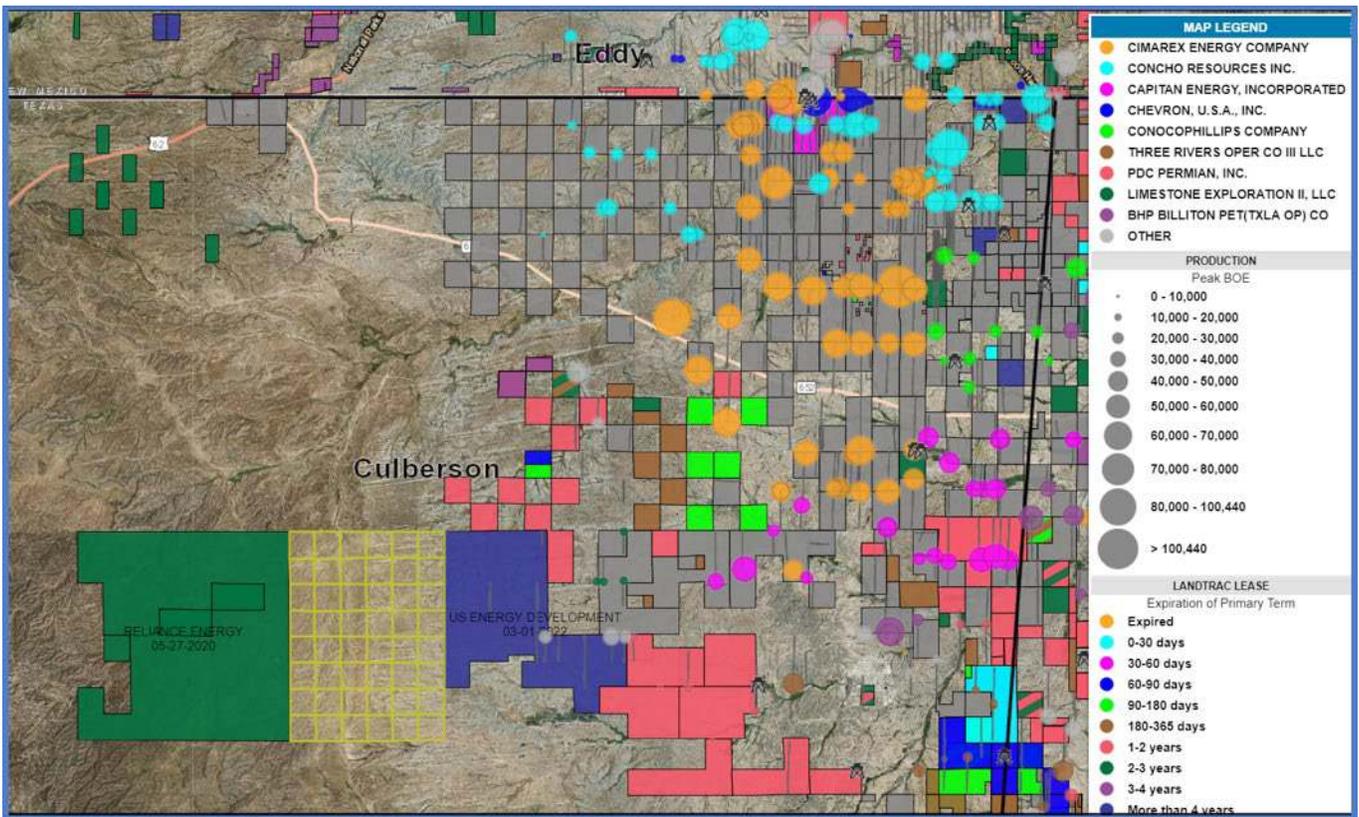


FIGURE 2: CURRENT LEASES COLORED BY EXPIRATION DATE AND PRODUCING UNITS IN GREY. HORIZONTAL PRODUCERS COLORED BY OPERATOR AND BUBBLED BY PEAK MONTH BOE VOLUME. SEPTEMBER 2017 UNIVERSITY LANDS LEASE SALE SHAPE IN YELLOW BOXES.

Entry Opportunities

In shallower fringe, costs saved are compounded by the reduction in casing and land acquisition cost compared to the saturated core areas. Figure 2 shows the relative open acreage surrounding some good production results, but it also shows interest in the area will be further intensifying as the yellow outlines to the southwest of the Culberson core marks a [public lease sale of current University Lands](#), drawing eyes further west to speculate how far west productivity could continue.

Perhaps even more eyes will be drawn to Culberson acreage as data rooms open on BHP's divestiture of their US assets. Their acreage now sports a shiny new well, the HS State 113-22X15 1H, brought on in February at a tidy 60,000 Peak BOE (highest month of production in barrels of oil equivalent) and demonstrates a result necessary to make folks comfortable expanding south in the trend. Aside from large-scale public bidding, there is an outer boundary of some solid producers a good 1,000-feet shallower still. Scala provided a promising result west when they brought the Norman State 14 1 H on in January at about 46,000 Peak BOE. Three Rivers III extended the boundary southeast from there with their Wise West State 703WA coming on last October at 45,000 Peak BOE. These results ensure opportunity to move on open acreage outside of the established acreage blocks without paying an arm and a leg.

Completion Practices

The Wolfcamp formation is between 3,000- to 5,500-feet thick throughout the active areas of the county, so breaking it into benches is very important. Earlier in the trend, large numbers of Bone Springs 2nd Sand wells were drilled, but today, 12 rigs are active in Culberson currently, and 11 are horizontal wells targeting the Wolfcamp. Historically we have seen twice as many Wolfcamp B than Wolfcamp A wells drilled there. It is important to note, geologists largely agree on where the Wolfcamp A starts, but in these areas picking the B and C differ from shop to shop. When looking at where these wells are landing in the zones, you can see a bimodal grouping with original Cimarex and Concho Wolfcamp B wells being completed at the base of the zone and the southern wells more recently moving higher in the zone (Figure 3).

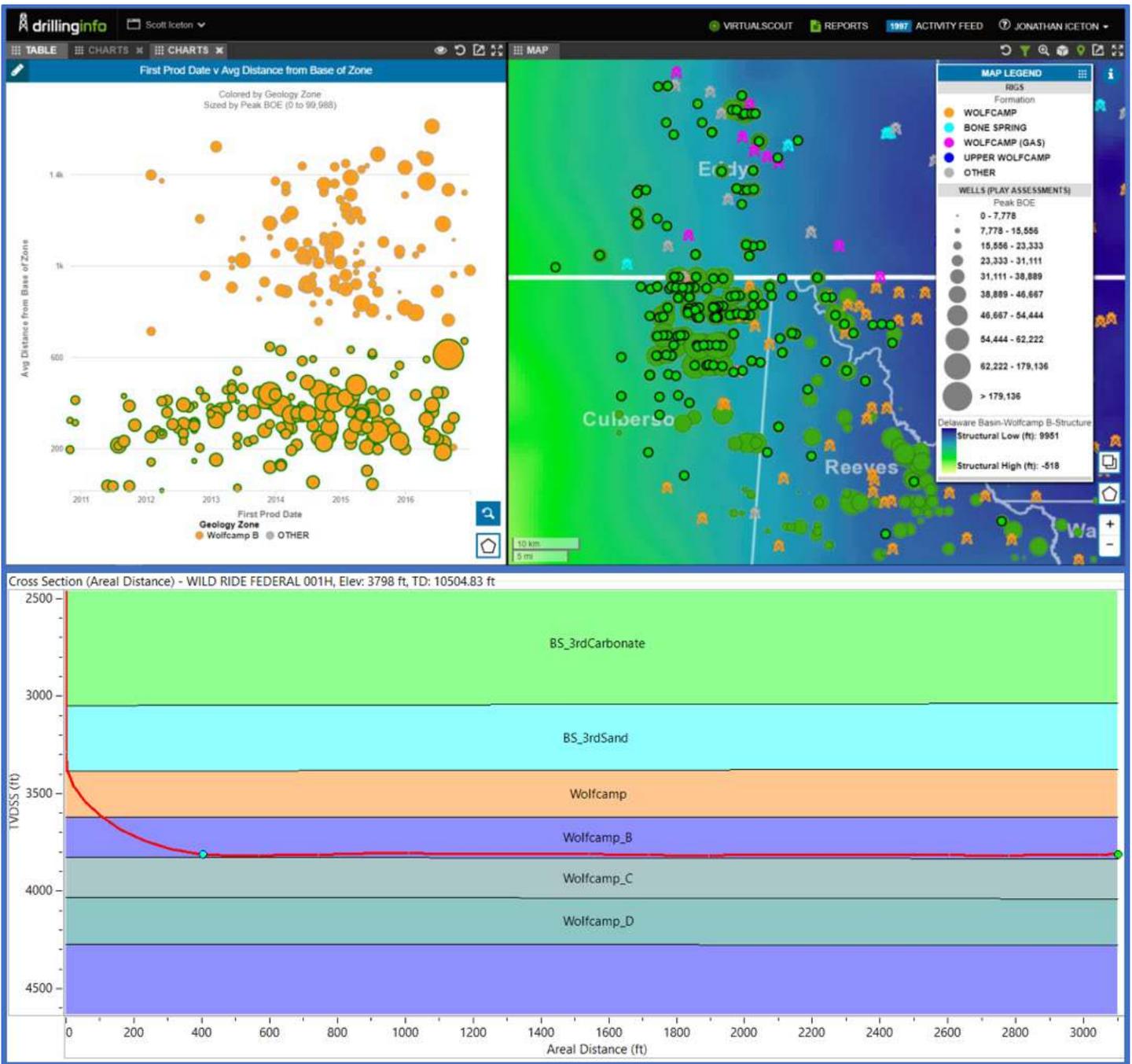


FIGURE 3: WOLF CAMP B WELLS SHOW STRONGER RESULTS HIGH IN ZONE IN REEVES COUNTY AND LOWER IN ZONE IN CULBERSON, SUGGESTING LOOKING TO MAINTAIN CONSISTENT PRESSURE AND TEMPERATURE AS THE BASIN SHALLOWS IN THIS GASSY AREA. BUBBLED BY HIGHEST MONTH OF PRODUCTION (PEAK BOE).

Figure 4 highlights the newer southern extension, starting in 2014 and drilling higher in the strat column, targeting gas-rich Wolfcamp A. Spatially, the western and southern boundaries show higher proppant loading within the more recent completions to mitigate fringe uncertainty. These spikes show up wells exceeding the 3,000-pounds-per-foot mark with Cimarex’s experiment with 4,800 pounds per foot coming in with a peak rate of over 52,000 BOE. While the active rigs in the county average 8,100-foot laterals, theirs are pushing larger 10,000-foot laterals. Looking through reports and industry talks, companies there routinely point to the importance of setting up in a less busy area than a congested core county in order to lease blocks big enough for long lateral completions. Cimarex’s investor relations group reports that their newer lower Wolfcamp completions average a 25% oil/45% gas/30% NGL (natural gas liquid) production mix. As they move up in zone to what they consider their upper Wolfcamp completions, they start to roll over to a more oil rich mix at 51% oil/28% gas/31% NGL. As they hug the bottom of the Wolfcamp A, their wells average about 700-feet higher than their Wolfcamp B wells.

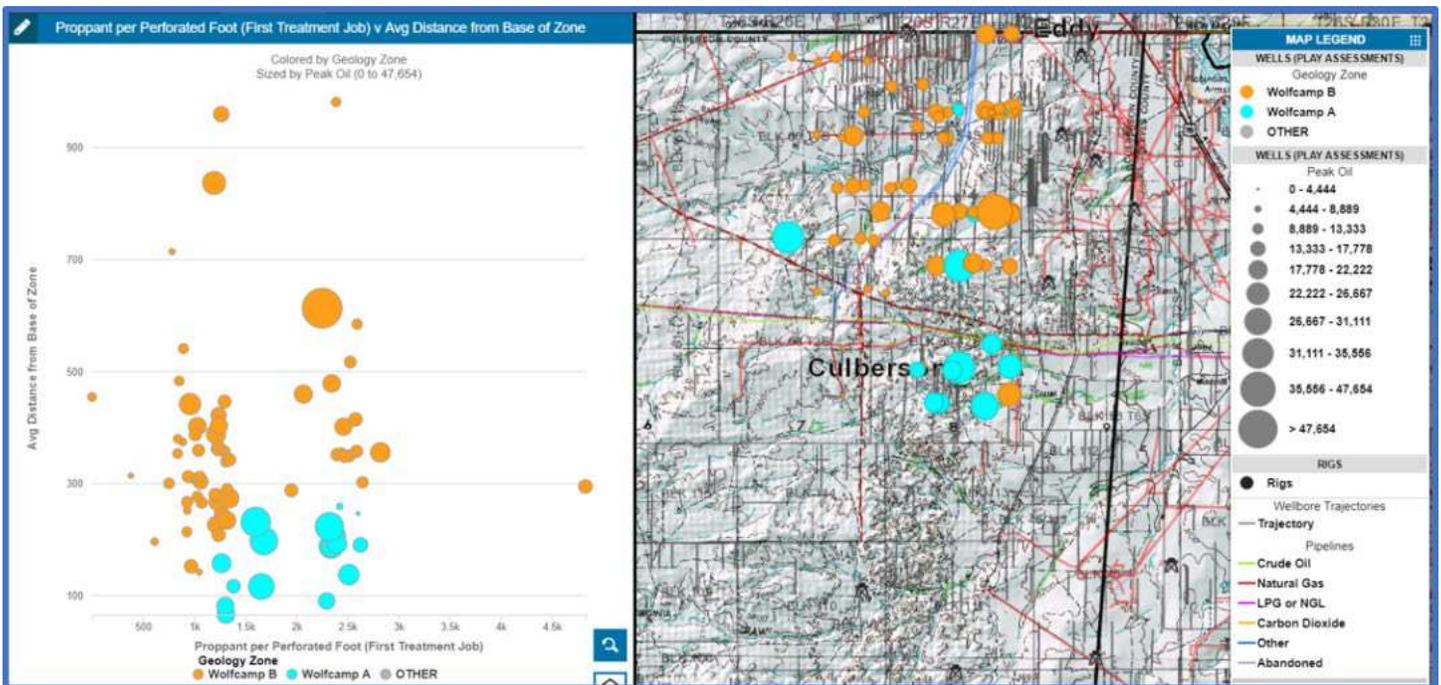


FIGURE 4: CIMAREX: SOUTHERN AND HIGH-ZONE WOLFCAMP B WELLS SHOW MIXED PROPPANT (BI-MODAL: 1,200 LBS/FT & 2,400 LBS/FT) LOADING BUT CONFIRM HIGH PEAK OIL. BUBBLED BY HIGHEST MONTH OF OIL.

West, West Texas: Investment Central

As private equity and public companies alike pour money into the infrastructure, Culberson is becoming a haven for a new wave of exploration. Operators are investing as well; they aren't shying away from spending on longer laterals and are steadily ramping proppant loading. Teamed up with events like the BHP divestiture, the University Lands sale, and the [2017 PDC bolt on acreage acquisition](#), Culberson is primed to expand its current footprint with operators and Wall Street alike. The trend of moving to revitalize shallower (Figure 5), less crowded (Figure 2) areas plays right into the hands of Permian fans looking for their next exploration effort, and the message is that the western boundary of the basin is once again drawing investors in flocks!

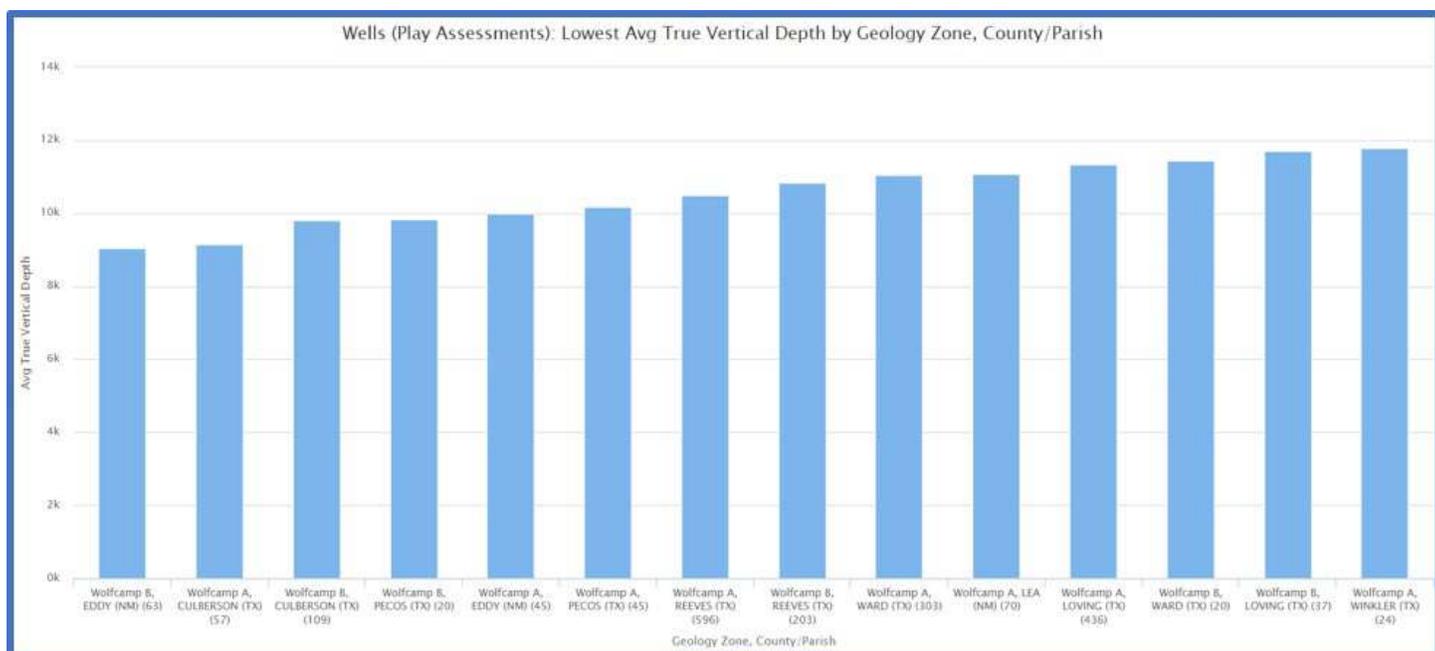
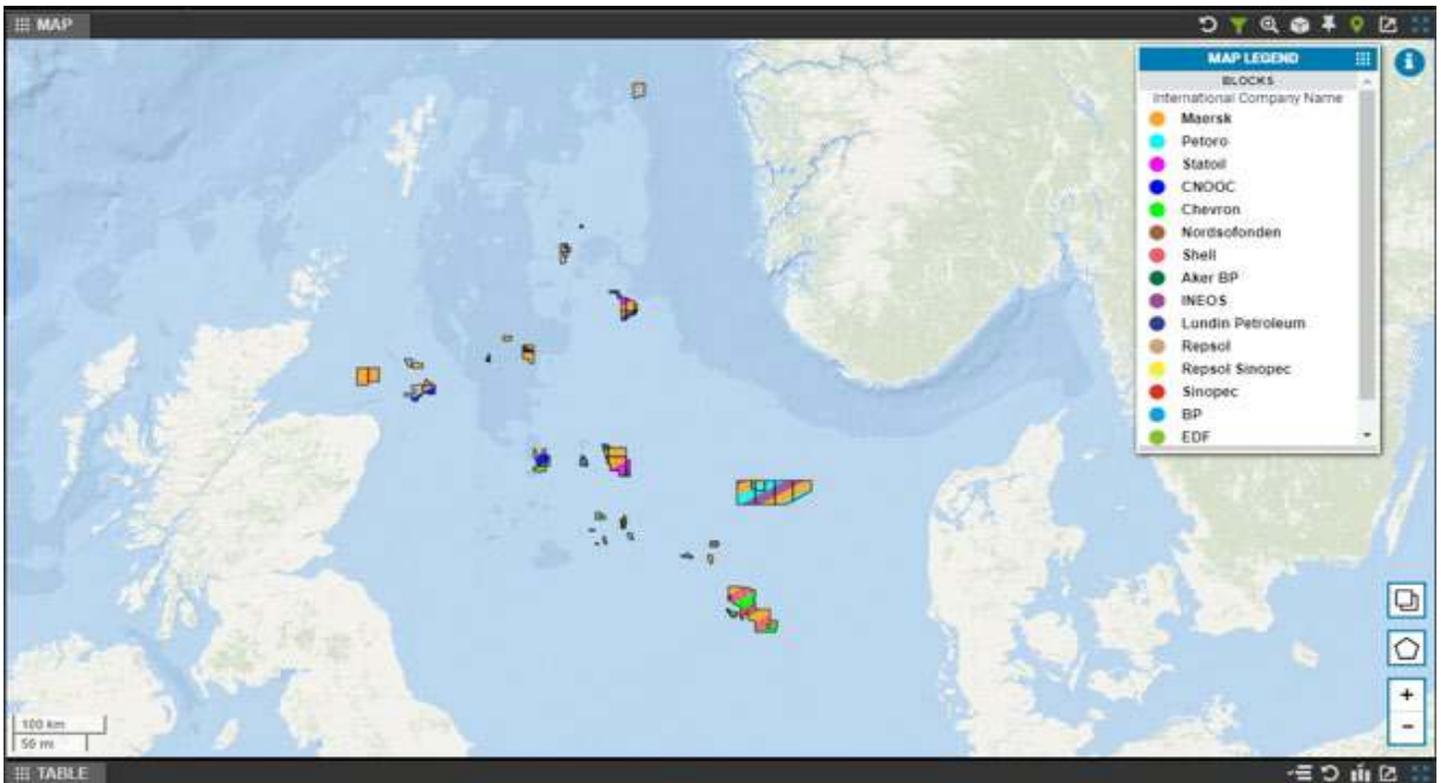


FIGURE 5: AVERAGE VERTICAL DEPTH FOR WOLFCAMP A AND B WELLS GROUPED BY COUNTY. CULBERSON'S A AND B ARE BOTH SHALLOWER THAN ALMOST ANY OTHER COUNTY IN THE DELAWARE.

3

Sale of Maersk Oil & Gas to Total Approved by Danish Government



On March 2, 2018, the Danish Energy Agency issued its approval of A.P. Moller-Maersk A/S's sale of Maersk Oil & Gas A/S to Total. The Danish Energy Agency's approval of the transfer contains conditions, including that A.P. Moller-Maersk, as seller, assumes a secondary liability for the decommissioning of existing Danish offshore facilities corresponding to Maersk Oil's 31.2% interest in the Danish Underground Consortium, should Total be unable to cover such costs.

On August 21, 2017, A.P. Moller-Maersk A/S announced the sale of Maersk Oil & Gas A/S to Total for a total US\$7.45 billion in shares and debt. Under the agreed terms, A.P. Moller-Maersk will receive a consideration of US\$4.95 billion in Total shares and Total will assume US\$2.5 billion of Maersk Oil's debt. Total will issue to Moller-Maersk, 97.5 million Total shares (based on the average Total share price on the 20 business days prior to August 21, 2017) which represents 3.75% of the enlarged share capital of Total.

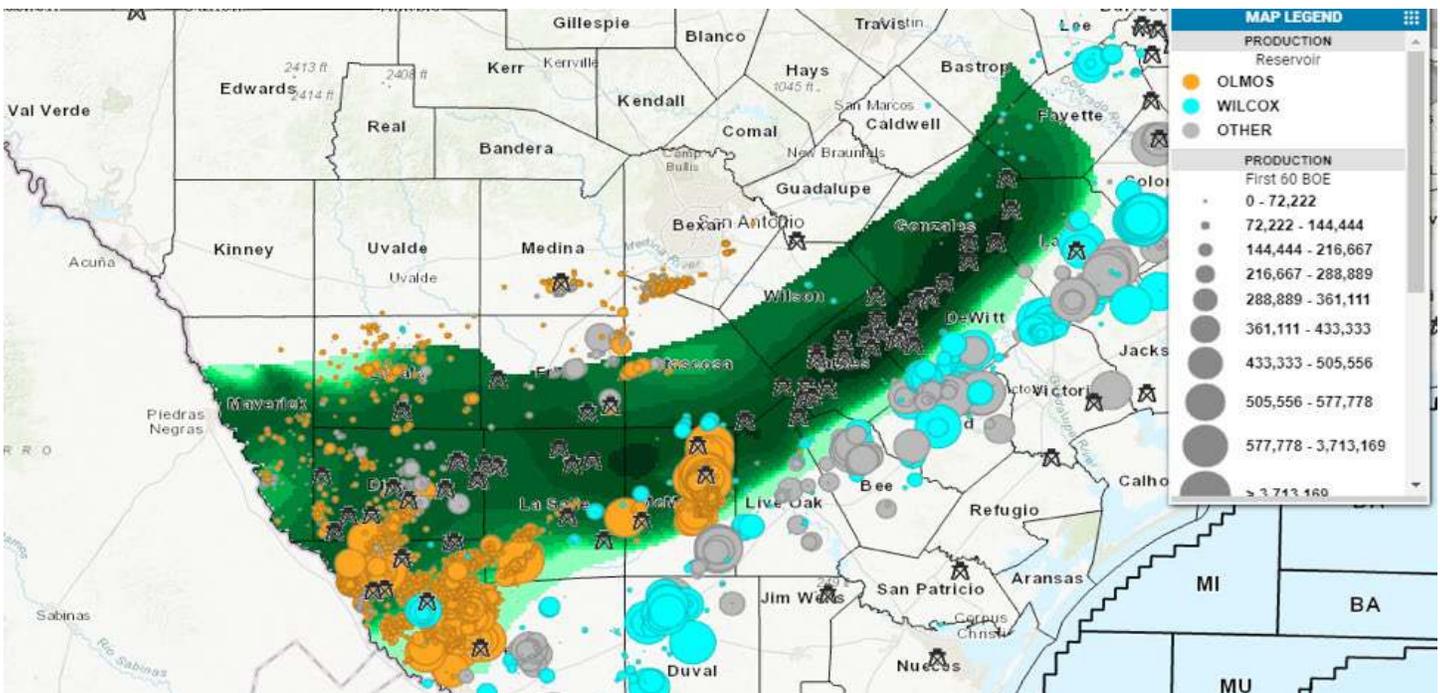
Total said Maersk Oil brings to Total the following:

- Proved plus probable reserves (2P) and resources (2C) of approximately 1 billion barrels of oil equivalent (BOE), 85% of which are in OECD countries (more than 80% in the North Sea).
- The addition of 160,000 BOE/d of mainly liquids production in 2018, acquired at an average price of US\$46,000 per BOE/d, offering high margins with an estimated free cash flow break-even of less than US\$30/barrel and growing to more than 200,000 BOE/d by the early 2020s, further strengthening Total's leading production growth outlook.
- Total expects to generate operational, commercial, and financial synergies of more than US\$400 million per year, in particular by the combination of assets of Total and Maersk Oil in the North Sea, an area of excellence for both companies.
- The transaction is immediately accretive to both earnings and cash flow per share underpinning Total's dividend profile.

Maersk Oil production comes from Denmark, UK, Norway, Kazakhstan, US Gulf of Mexico and Algeria. Exploration and development activities are ongoing in Angola, Kenya, Brazil, and Kurdistan in Iraq and in above producing countries. As at December 31, 2016, Maersk Oil proved plus probable reserves were reported to be 550 MMBOE.

4

Are There Missed Opportunities for Conventional Drilling in Unconventional Producing Reservoirs?

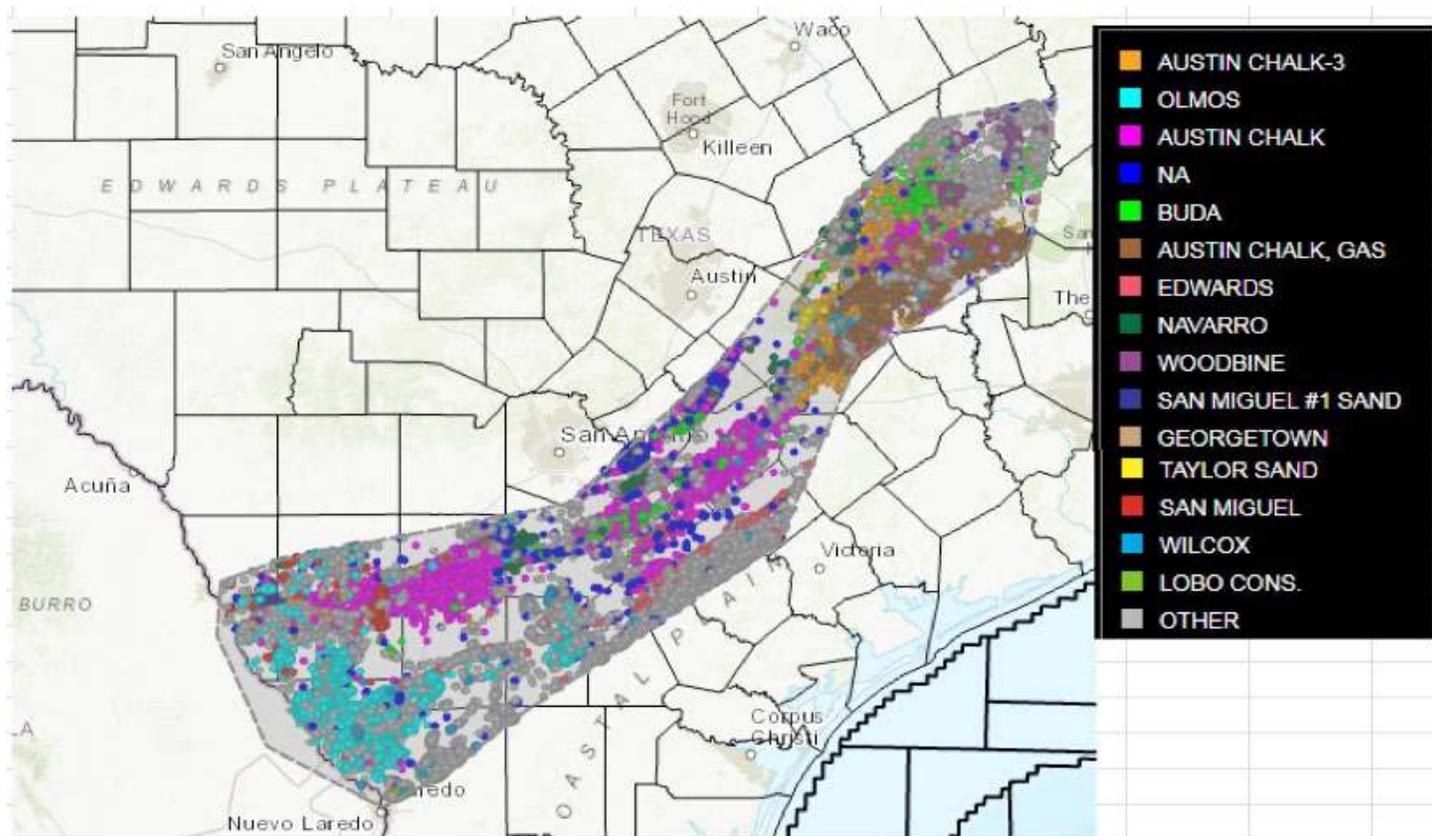


By now we're all used to the latest analyst opinions on the prospects of share price gains for publicly traded companies in the oil and gas space.

Company X drills an extension well on a sweet spot trend and underperforms on well tests, and the stock sinks. Company A goes to the fringe areas of a play to escape high lease pricing, drills a well and –BOOM—they prove up a 50% increase in IP results and first six-month decline rate forecasting, and they are Wall Street's darling-du-jour.

What no one seems to be paying attention to, or giving companies credit for, is the uphole (or downhole) potential that can be unlocked in all those conventional reservoirs that are held by unconventional production

For example, if you pull all the production from a polygon that outlines Eagle Ford production in South Texas, you'll find, once you export the production from the DI web app and sort by reservoir name, that



DI WEB APP-AOI POLYGON SEARCH

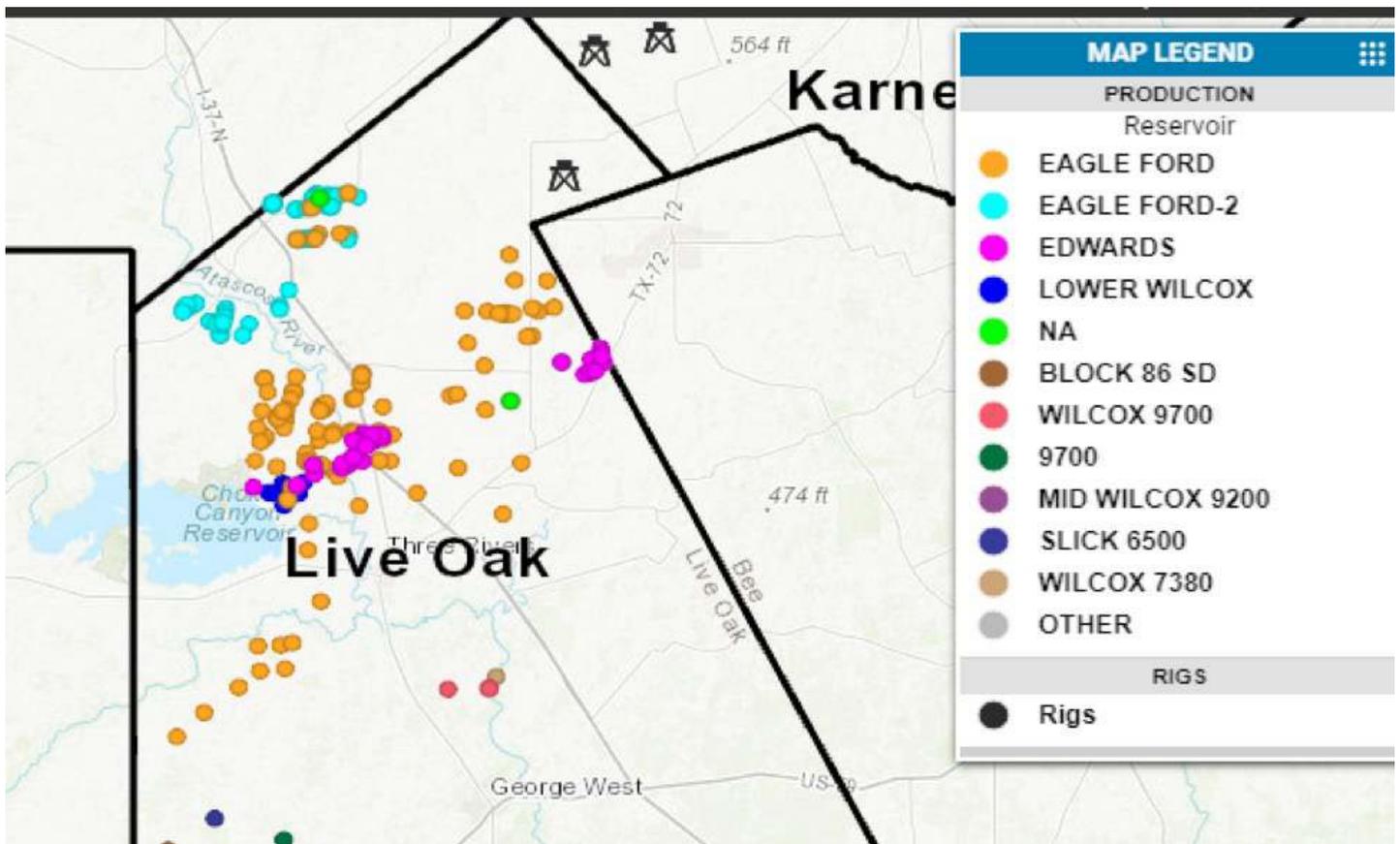
conventional reservoirs have produced about 2X Eagle Ford gas production and oil cumulative volumes that are comparable to the Eagle Ford.

Geologic and geophysical data densities have exploded in unconventional play areas. While the focus has rightly been on the geology of the unconventional target reservoirs—Eagle Ford, Niobrara, Haynesville, Bakken—tens of thousands of new wells, and untold square miles of new 3-D seismic, open hole logs, and near bore microseismic, have greatly improved companies' ability to identify and exploit uphole

conventional completion targets.

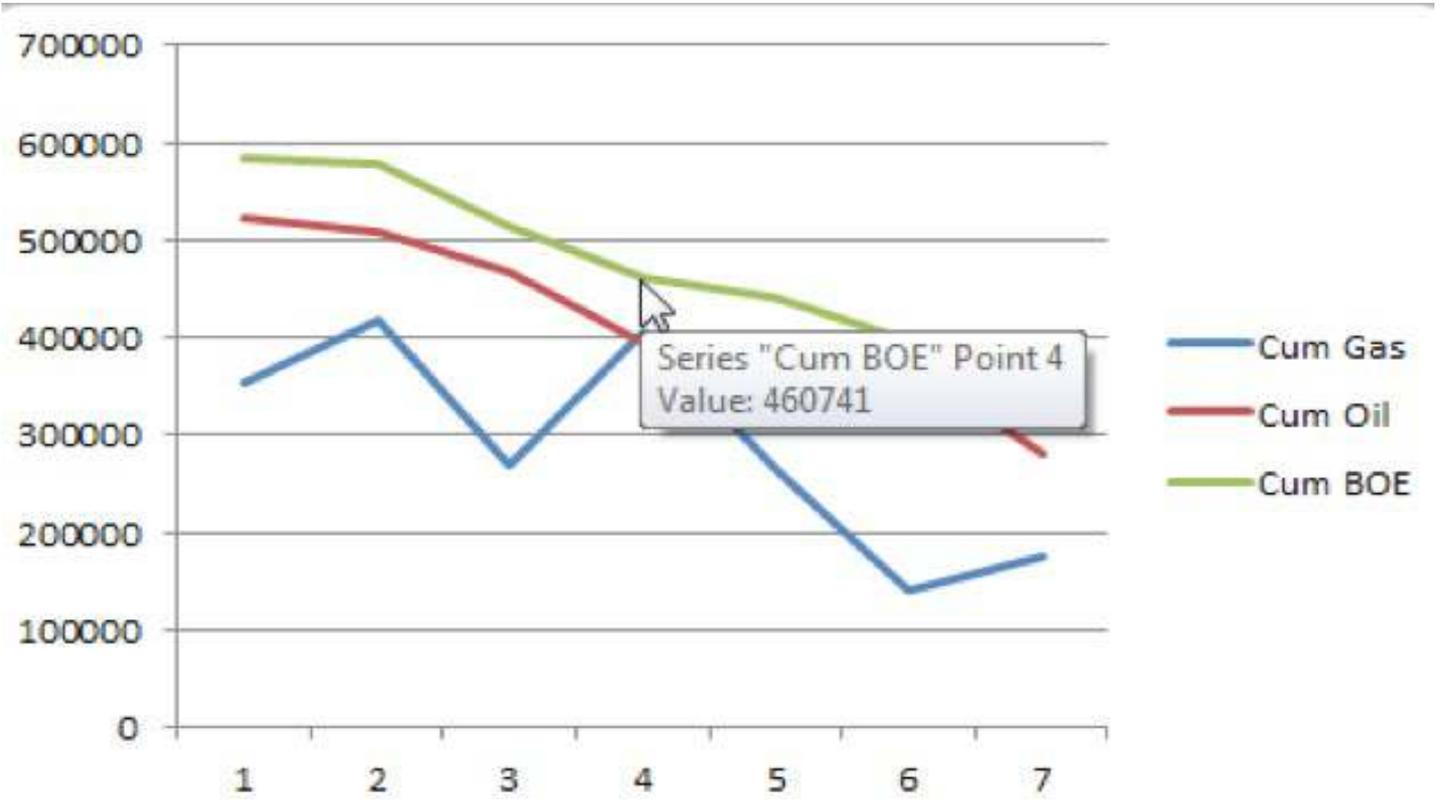
This conventional lagniappe could ultimately provide the strongest economic foundation for an operator’s future operational cash flow, and given the longevity of production, can provide a great hedge against depletion timing risk—drilling and completing high-decline horizontals in times of less-than-ideal wellhead pricing.

To get a sense of how intermingled these opportunities can be, look at Pioneer Natural Resources operated production in Live Oak County.



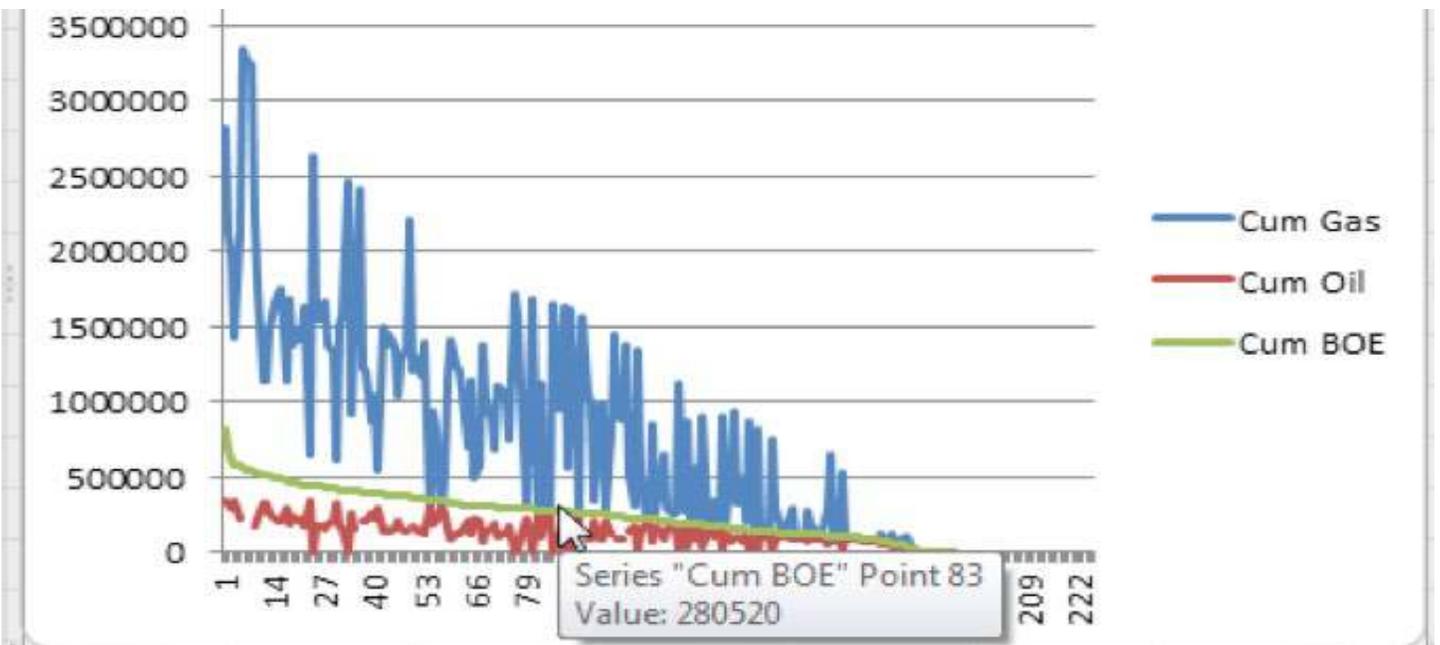
PIONEER NATURAL RESOURCES OPERATED PRODUCTION IN LIVE OAK COUNTY

Focusing in the Lower Wilcox production established at Sinor Nest field (blue wells), the median cum BOE for these wells at around 8,000 feet is just over 460,000.



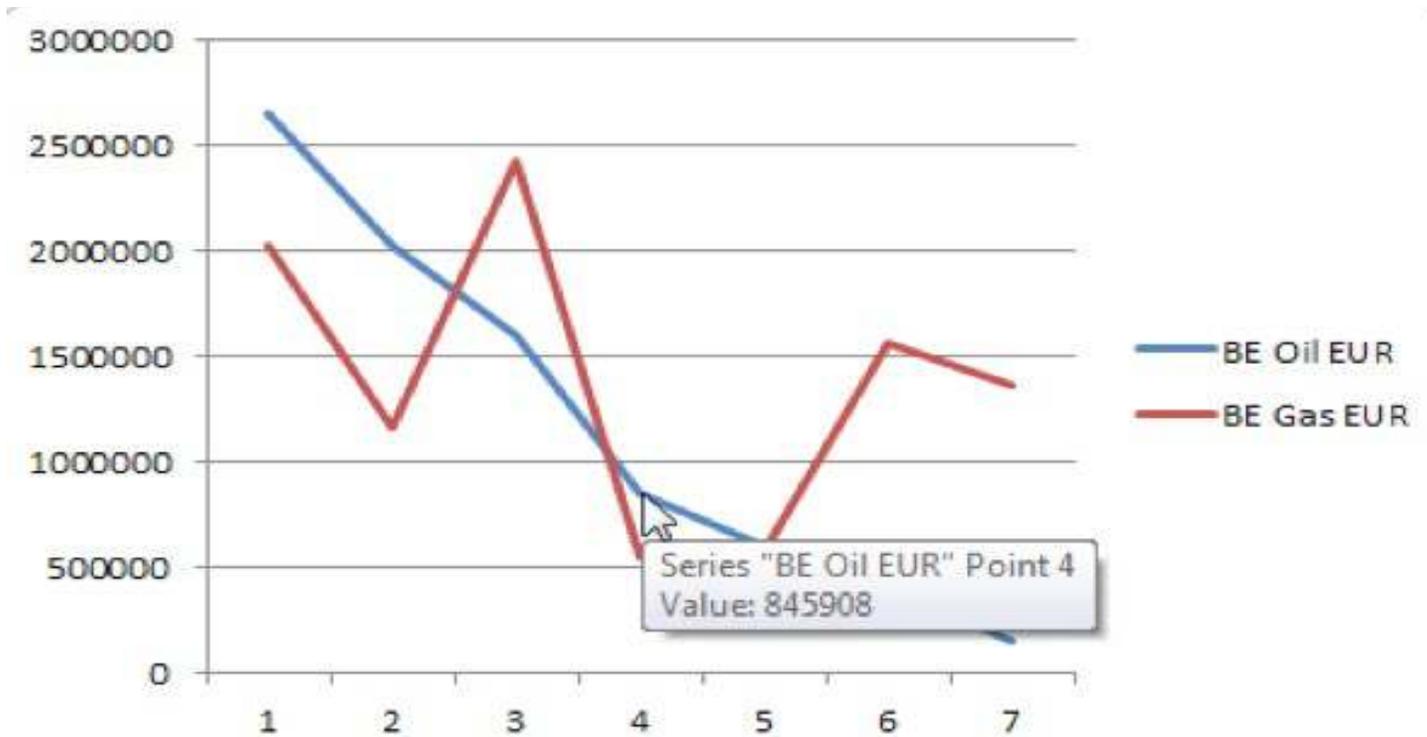
LOWER WILCOX PRODUCTION ESTABLISHED AT SINOR NEST FIELD

Median cum BOE for the Eagle Ford in their wells is just over 280,000.



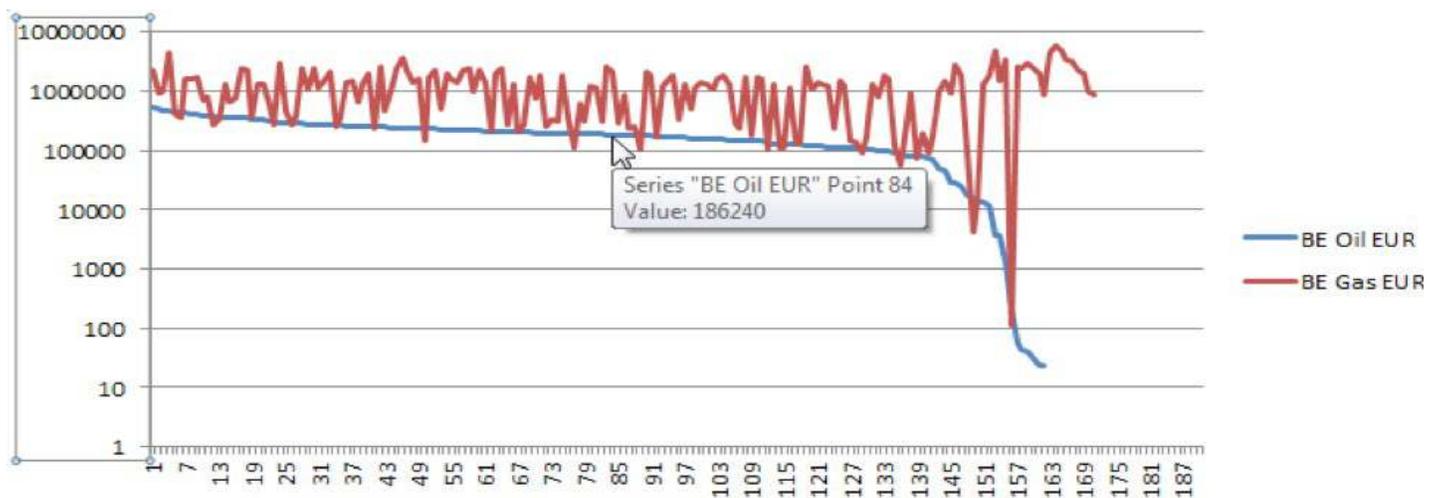
MEDIAN CUM BOE FOR PIONEER NATURAL RESOURCE'S WELLS IN THE EAGLE FORD

Now...the MONEY SHOT...median oil EUR for the Wilcox is nearly 850,000 BBL.



MEDIAN EUR FOR THE WILCOX

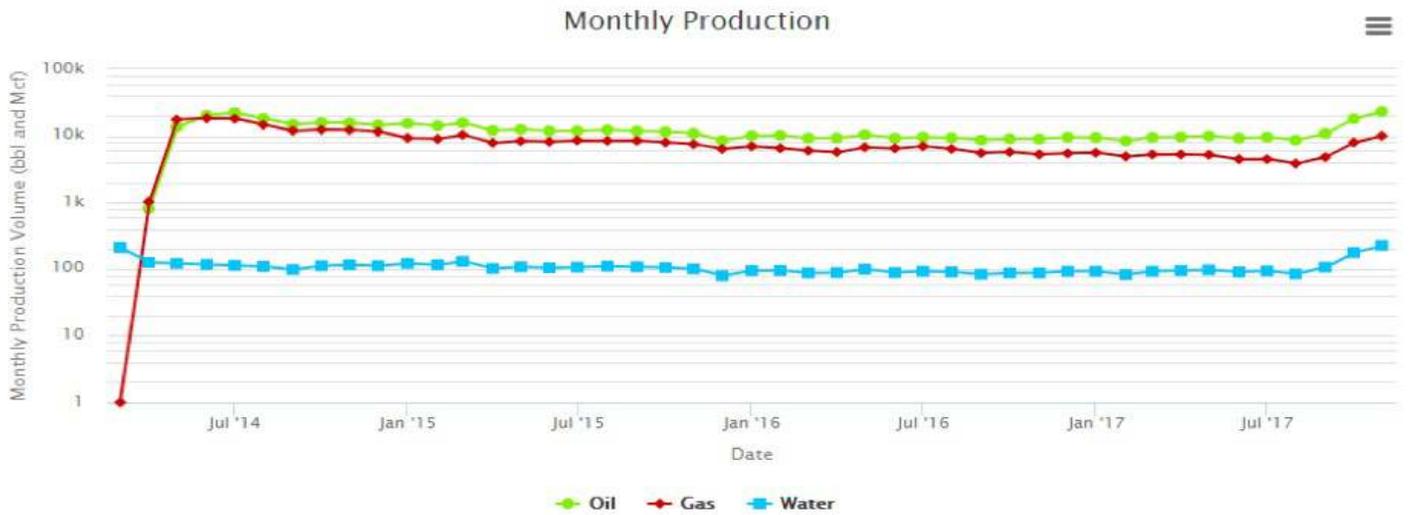
Median Oil EUR for the Eagle Ford on the other hand is around 186,000 BO.



MEDIAN EUR FOR THE EAGLE FORD

With relatively flat decline in the Wilcox, it's easy to understand the favorable EUR stats for the conventional Wilcox-in this area.

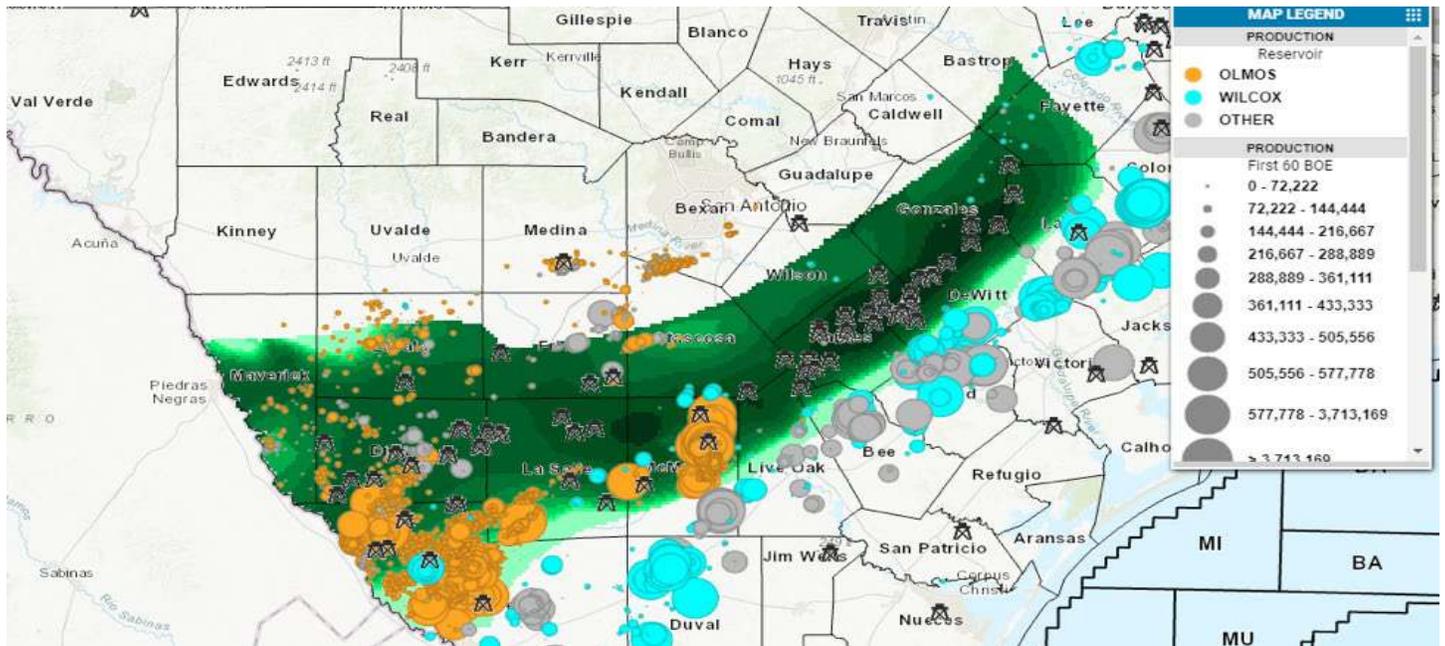
CHART



DI WEB APP- MONTHLY PRODUCTION

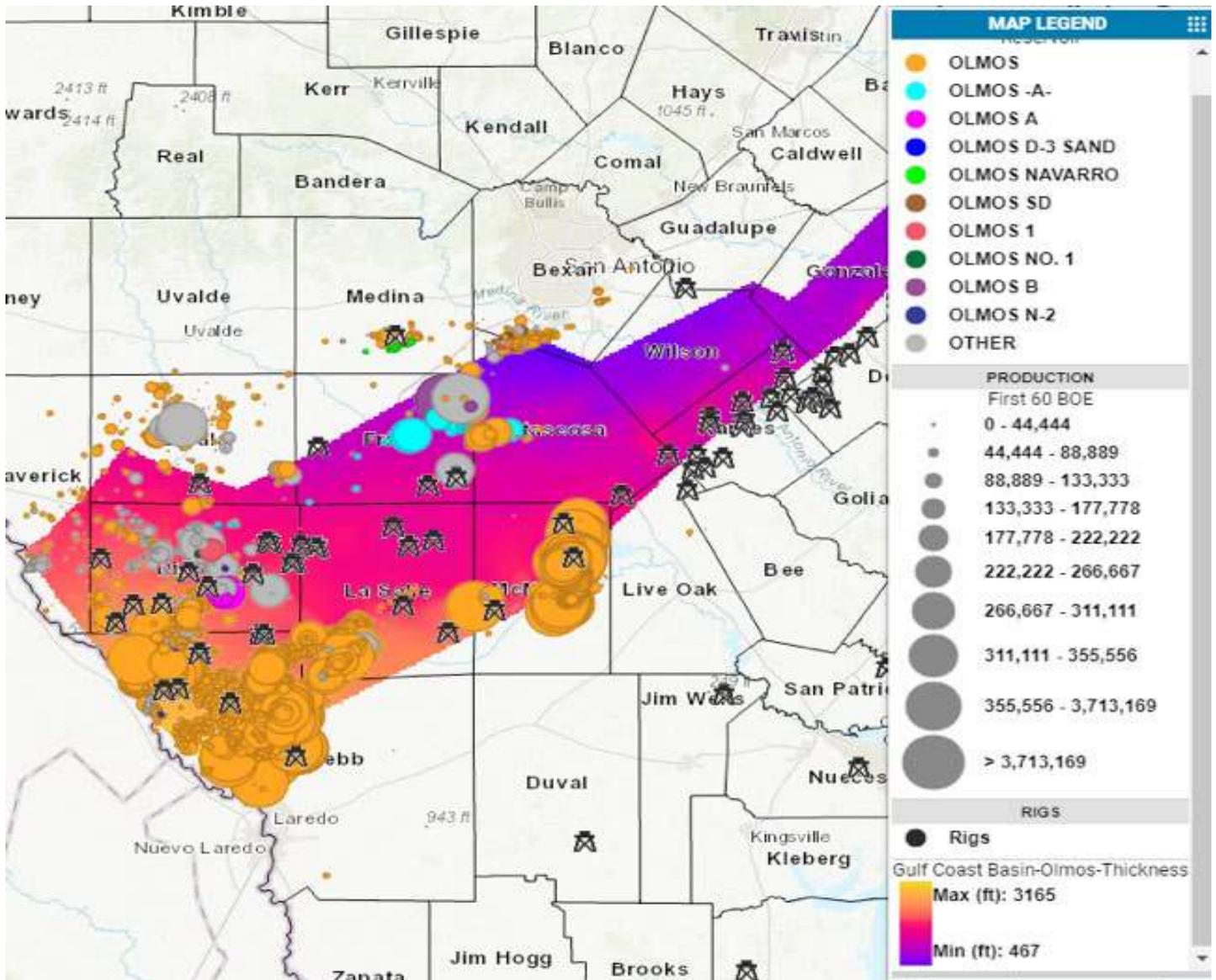
Conventional targets won't be uniformly distributed over all unconventional acreage, but they will/can be an important element of the production prize secured by smart buyers in M&A acquisitions or public equity purchasers.

For example, this map shows the presence of Olmos and Wilcox reservoirs, sized by first 60 month BOE over or adjacent to core Eagle Ford production.



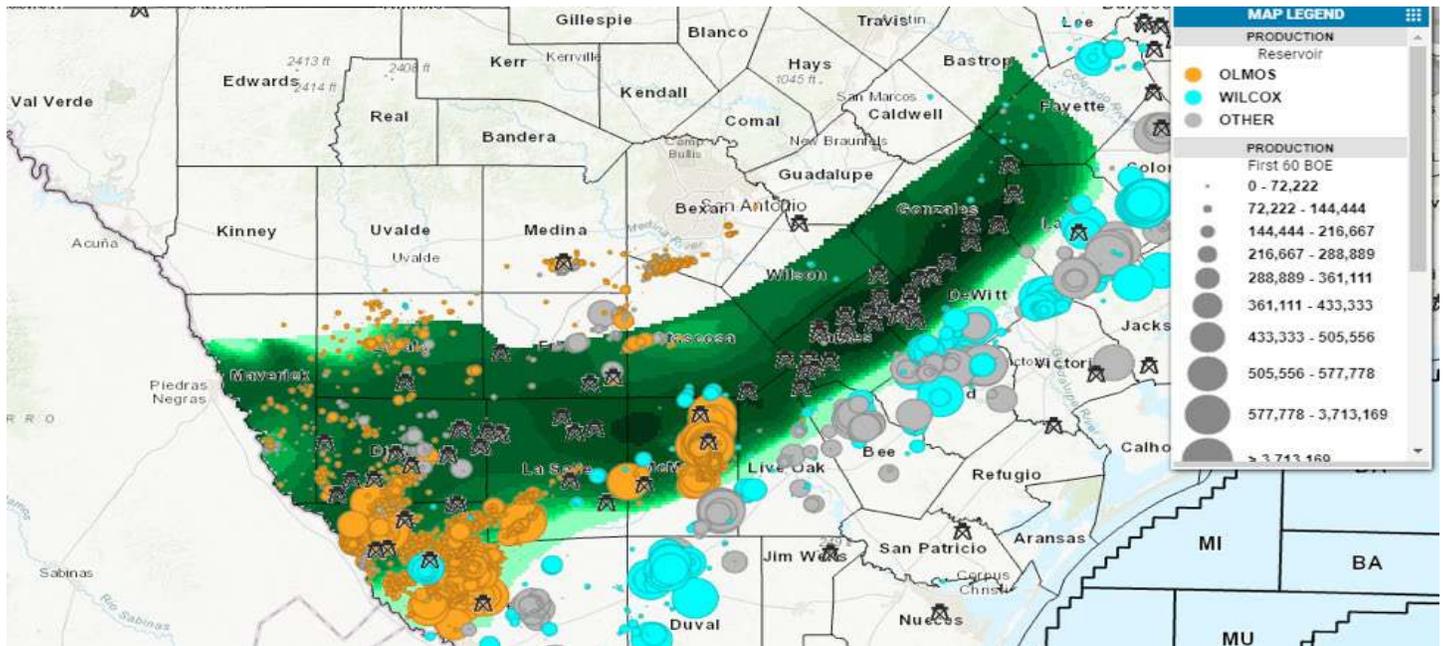
DI PLAY ASSESSMENTS/DI WEB APP—GREEN IS GROSS EAGLE FORD GRADED ACREAGE

Mapping Olmos thickness (over 50 separate reservoirs) shows that gross Olmos thickness in the Eagle Ford trend thins to the north and east, but that even in areas with less potential gross pay there is economic Olmos production.



DI PLAY ASSESSMENTS/DI WEB APP—OLMOS THICKNESS

And, there’s additional potential downhole as well—as this map of the Edwards first 60 month BOE production shows:



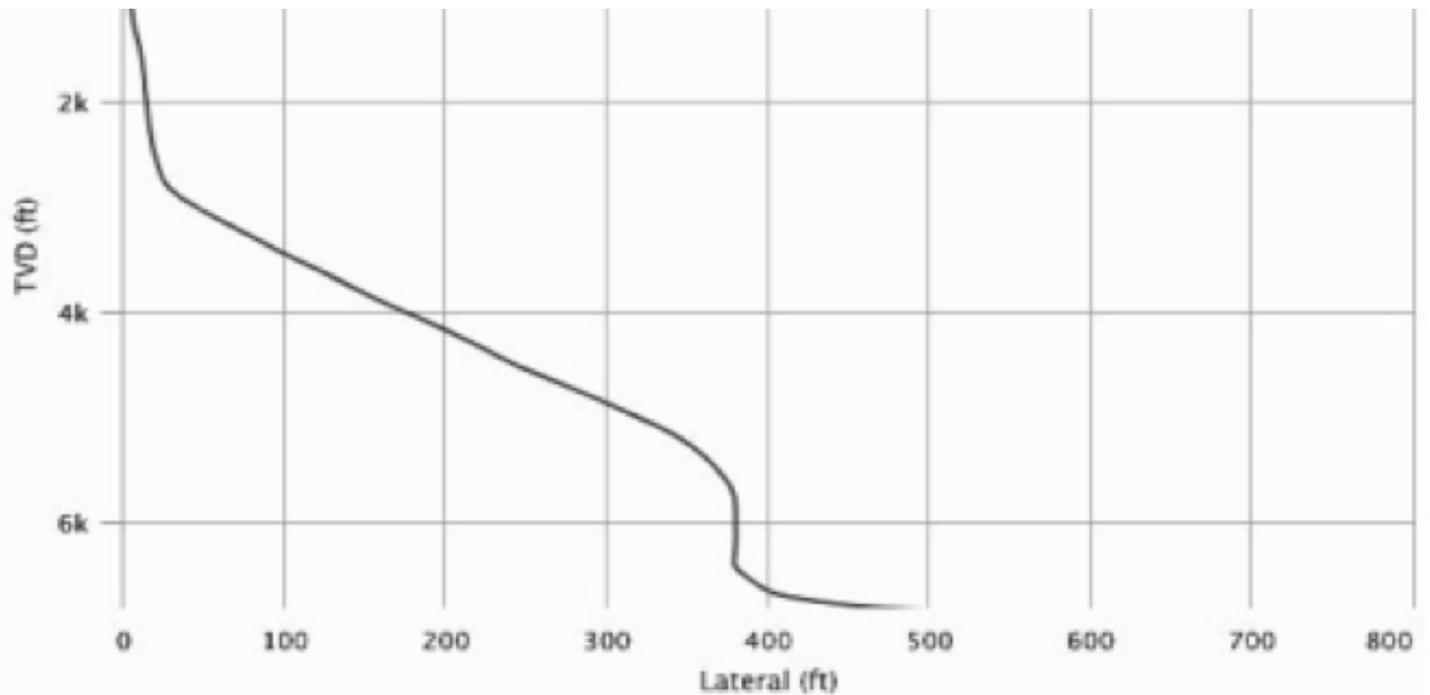
DI PLAY ASSESSMENTS/DI WEB APP—GREEN IS GROSS EAGLE FORD GRADED ACREAGE

So the guidance is simple-recognize that unconventional drilling has added massive amounts of open hole logging and seismic data to the knowledge base of conventional reservoirs, and take note of the uphole and downhole potential of current unconventional producing reservoirs. Be prepared to ride that HBP potential in the future!

Exploit the fact that \$/barrel, MCF break-evens can be much lower for shallower conventional wells, and be prepared to profit from that conventional HBP potential well into the future!

5

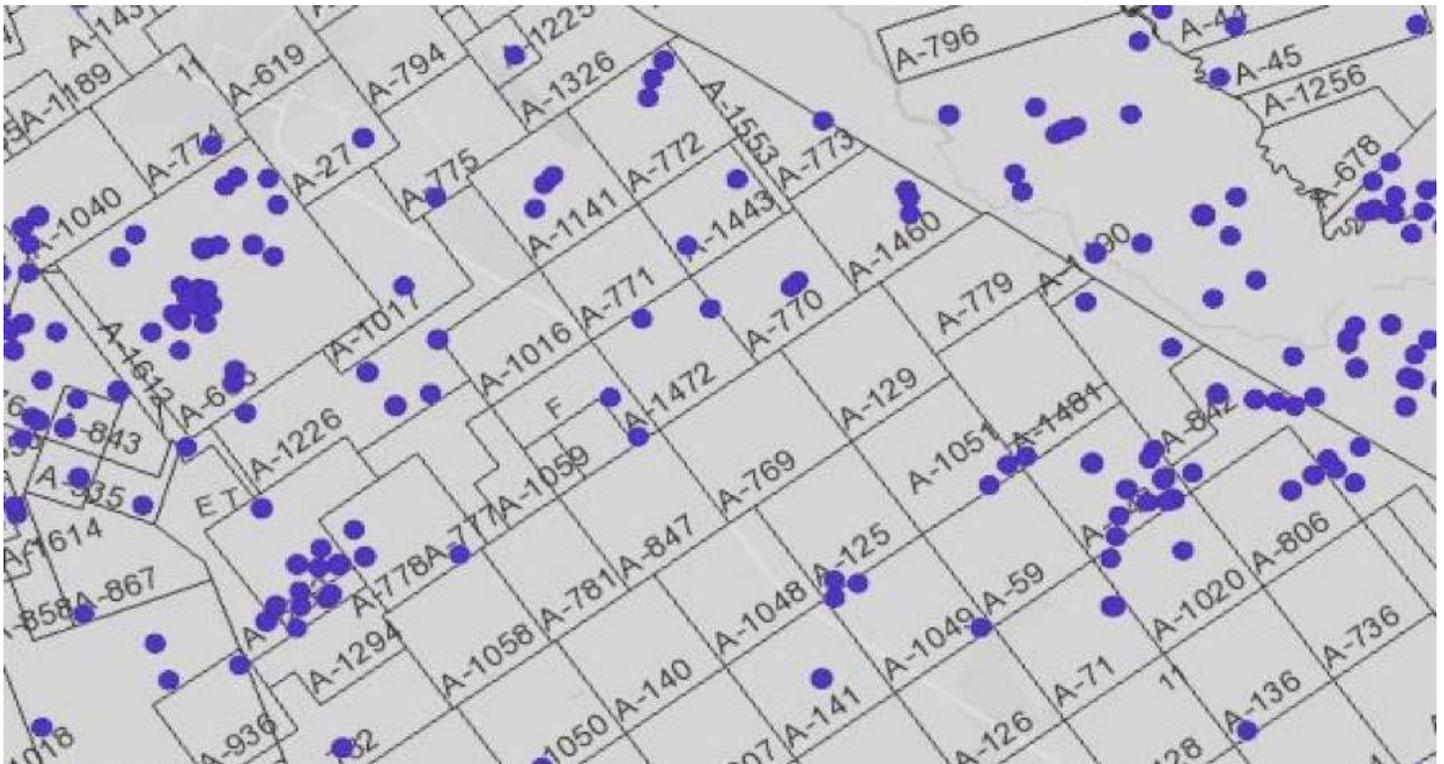
Providing a Startup a Fighting Chance in the Unconventional Eagle Ford



In December 2017, I graduated from Texas A&M University with a B.S. in Petroleum Engineering. During my tenure as a student, I prospected my own assets around Texas with the help of Texas A&M faculty members who I was able to consult and shape my engineering ideas with. Weeks before my graduation date, my partner and I came across an unconventional opportunity in South Texas that we both knew held significant upside potential. I reached out to Dr. Thomas Blasingame from Texas A&M, who I have always kept updated on my progress, and expressed to him how I needed Drillinginfo to perform a comprehensive analysis on this region in South Texas. Dr. Blasingame put me in touch with the founders

of Drillinginfo, and I was granted student access to Drillinginfo to complete my analysis.

My partner and I began our research on a region in South Texas where a family friend owns a ranch with active drilling throughout his 16,000-acre property. Using Drillinginfo, we uncovered a region in the Maverick Basin that is prime for new generation Eagle Ford development.



ABSTRACT & SECTION FEATURE OVERLAPPING ACTIVE WELLS

Using grids and township blocks on the map layers of the DI web app, we were able to identify term leases suited for our area of interest. We found two term leases significant to our AOI: one lease that was already expired and another set to expire in May 2018. Able to pull the memorandums of each lease, we discovered that the current term lease on the property we were studying did not even lease the Eagle Ford in this area. This gave us confidence that we were dealing with acreage we could actually capture. I was able to perform all this diligence before even contacting a landman to check via the courthouse the availability of the land.

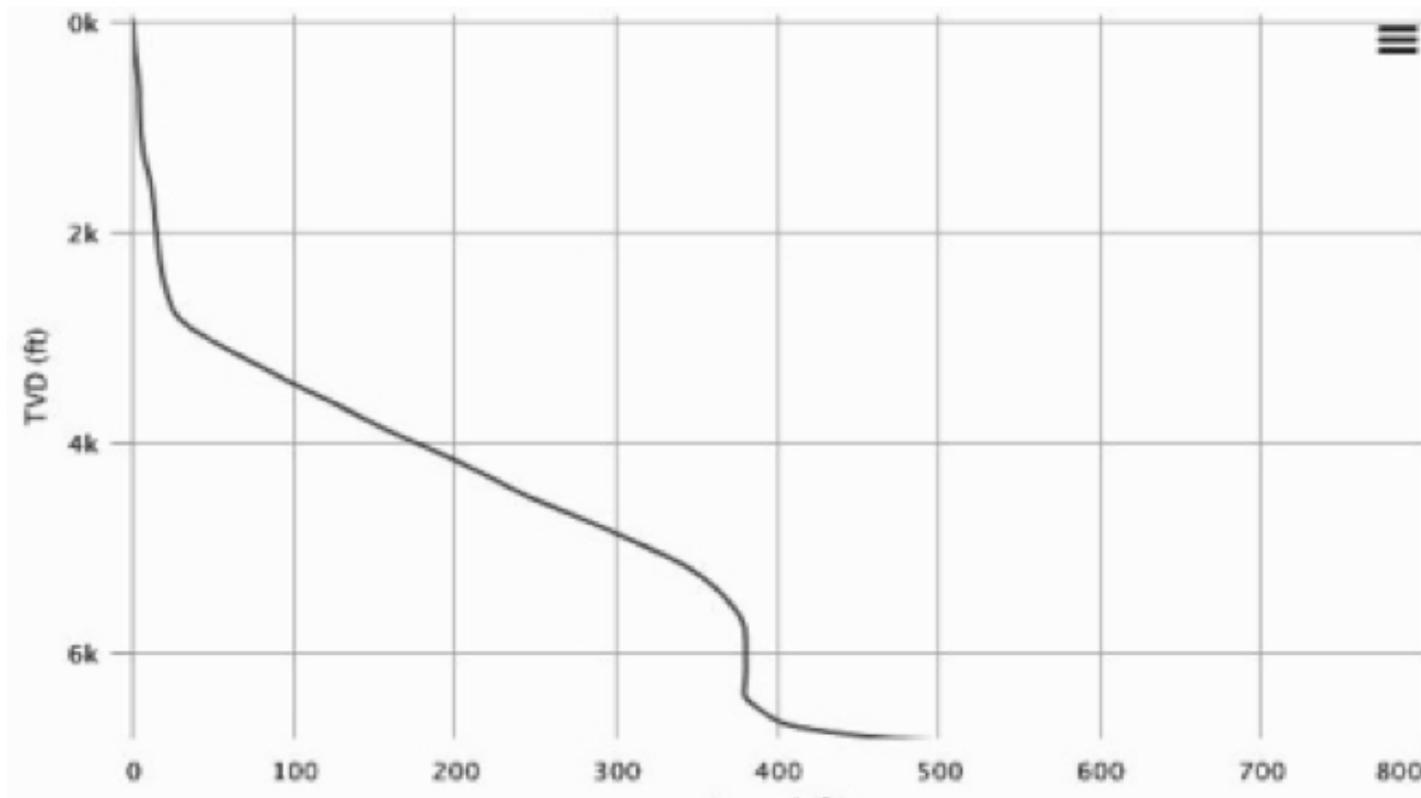
For our production analysis, we were able to identify two offset Eagle Ford wells less than a mile outside

our area of interest. With comprehensive well cards Drillinginfo has on each well, we were able to identify the general characteristics regarding the two offset Eagle Ford wells in proximity to our area of interest. I was able to understand the operator’s completions program as well as identify formation depths, landing zones, and lateral lengths of these two wells. With both of these wells being brought online in 2011, I knew much time had passed in the industry that reduced drilling and completions costs, increased technological efficiency, and improved completions programs.

Source	Job Start Date	Job End Date	Treatment Top (ft)	Treatment Bottom (ft)	Treatment Formation	Stage Count	Total Proppant (lbs)	Total Fluid (bbl)	Total Water (bbl)
Additive Summary	05-17-2017	05-29-2017					28,869,372		322,910
State Agency		06-10-2017	7,140	17,997					

COMPARISON OF PROPPANT LOADING OF OLD VS. NEW GENERATION EAGLE FORD

Looking at more recent wells in the same county, I located two Eagle Ford wells drilled in 2017 that had characteristics similar to the wellbore and completion design I am currently proposing. The decline curve and economics feature of Drillinginfo allowed me to run ROI models on both the offset wells nearby our AOI and compare them to the new generation wells I had found. The comparison of these wells have helped me show my investors the upside potential of the new generation of Eagle Ford wells I am proposing.



INSUFFICIENT WELLBORE TRAJECTORY IDENTIFIED IN AOI

I write this post in the middle of a round of funding, having spoken to various private equity firms and oil and gas companies about this project in hopes I can begin my career in oil and gas by drilling my first wells in the Eagle Ford. Drillinginfo has allowed me to perform a comprehensive analysis that I don't believe would have been possible to perform in any other point in time of our industry except in the Information Age. I am ever grateful to Mark Nibbelink, Allen Gilmer, and Dr. Thomas Blasingame for championing a young entrepreneur in his efforts to explore and produce hydrocarbons. I, along with the rest of the industry, have much more exploring to do in the years to come. Drillinginfo simply accelerates the process for all of us involved, especially the young and eager.

Innovating the Oil & Gas Industry
Volume I: US Oil & Gas Production

Copyright © 2015, Drillinginfo, Inc. All rights reserved.
All brand names and trademarks are the properties of their respective companies.



PROACTIVE



EFFICIENT



COMPETITIVE

By monitoring the market, Drillinginfo continuously delivers innovative oil & gas solutions that enable our customers to sustain a competitive advantage in any environment.

Drillinginfo customers constantly perform above their competitors because they are more efficient and more proactive than the competition.

[Learn more at drillinginfo.com](http://drillinginfo.com)