ENVERUS

USE CASE

How to Avoid Overestimating Remaining Inventory of Acquisitions

Using Algorithmically Derived Well Locations vs. Acreage Math

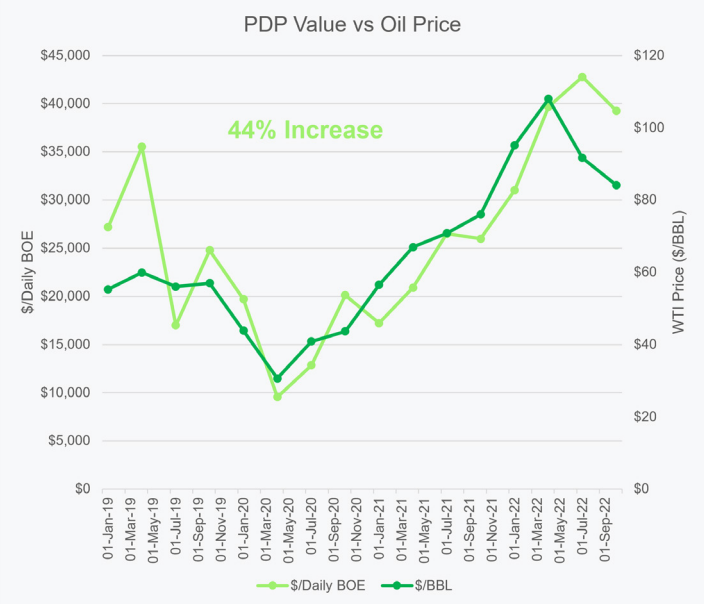
In this use case, we put inventory workflows to the test by looking at a recently transacted piece of acreage, the Baytex acquisition of Ranger Oil in the Eagle Ford Basin. We took two separate approaches — one using traditional acreage math, the other using Enverus Placed Well Analytics, which is a data-driven approach to remaining inventory calculated by placing lateral sticks, honoring various spatial and economic parameters.

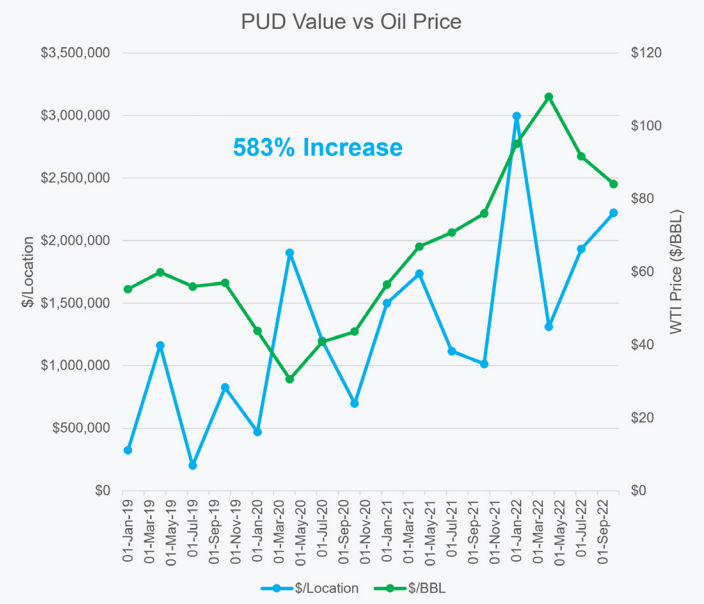
In the end, we found that acreage math overestimated remaining inventory by nearly 2x.

Background

Upstream M&A markets are heating up. Assessing the quantity and quality of undeveloped reserves is more important than ever. Within the past four years, we've seen an almost 6x increase in the value attributed to undeveloped locations for transacted deals in the upstream market. With this trend of increasing proven undeveloped acreage (PUD) value (**Figure 1**), the search for high-quality inventory is amplified across all North American unconventional resource plays.

FIGURE 1 | Trends of PDP and PUD value vs oil price.





Source | Enverus M&A Transactions

Acreage math is a common, simple and straightforward way of quickly determining reserves across an asset. To appropriately value an asset, most use this method to calculate remaining inventory locations. To do this, you take the number of locations that have been drilled, apply a drainage radius assumption based on horizontal well spacing and lateral length and subtract that cumulative drained acreage from the gross acreage in question.

Because the remaining acreage is assumed to be undeveloped, to obtain remaining locations, you apply the same methodology of go-forward spacing and lateral length to obtain single well drainage acres and divide gross undeveloped acres by the drainage acreage per well. It is challenging to get an accurate model using this method because the appropriate type curve production profile and spacing assumption must be applied to each region of acreage across the entire asset.

$$\text{Remaining Locations} = \text{Total Acreage} - \left[\frac{(\text{Current Locations} * \text{Current Drainage Radius})}{\text{Drainage Radius per Well}}\right]$$

If you assume the entire acreage position will produce the same results and have the same spacing or completion design, your reserve estimates can be wildly inaccurate.

We covered some common pitfalls with acreage math in this blog.

Baytex Acquisition – A Remaining Inventory Analysis Using Two Methods

One of the largest, most notable acquisitions of 2023 is Baytex's acquisition of the Eagle Ford operator Ranger Oil. The deal was announced Feb. 28, 2023 for a total acquisition price of $2.5 billion. The operated assets acquired by Baytex covered 162,000 acres (96% operated), primarily in Gonzales, Lavaca, Fayette and Dewitt County. Although there is economic potential for development of the Upper Eagle Ford and Austin Chalk formations, the following analysis focuses on determining the undeveloped potential of the Lower Eagle Ford, which is the primary target across the acquired acreage position.

In this use case, we evaluate the remaining locations using acreage math and Enverus Placed Well Analytics. For both approaches, we started with the same filtering process of well data and type curves in Enverus PRISM®, the Enverus energy market data and analytics platform, then calculated remaining inventory with the different methods.

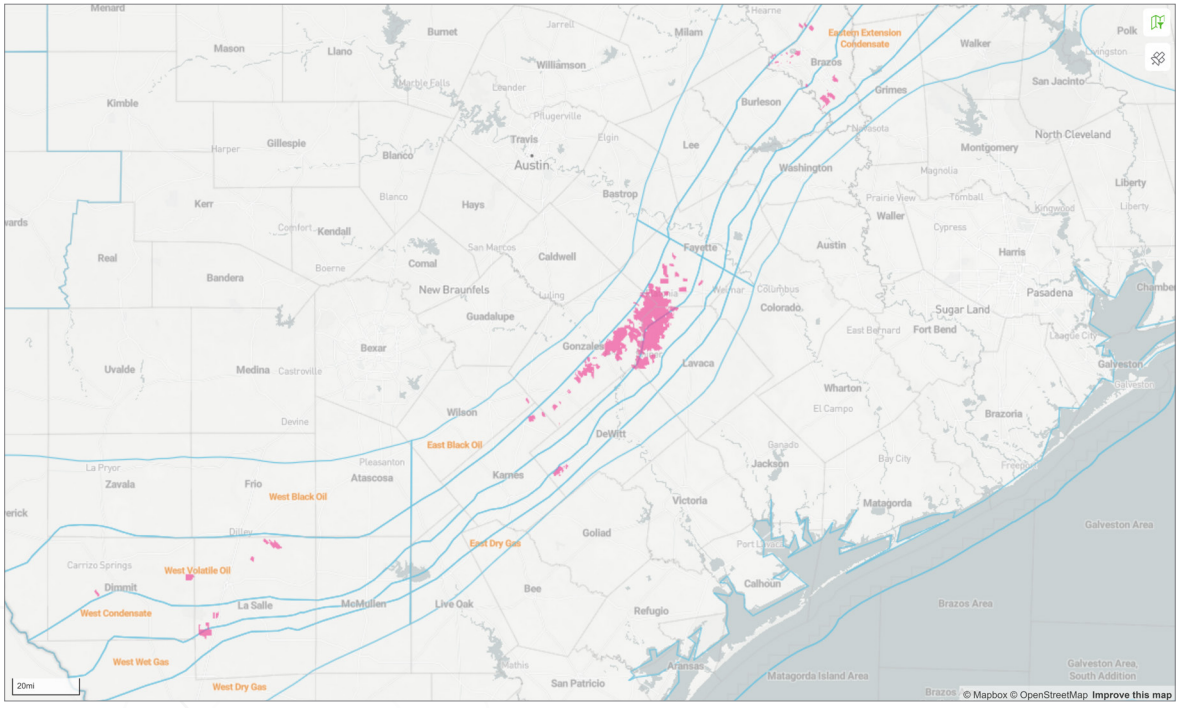
Summary:

1. Setting Up Type Curves in Enverus PRISM®
2. Using the Acreage Math Method to Calculate Inventory
3. Placed Well Analytics Method
4. Conclusion

1. Setting Up Type Curves in Enverus PRISM®

Although Ranger's acreage position is primarily located in the volatile oil windows of Lavaca and Gonzales County, the footprint extends all the way from the western wet gas window in Dimmit County to the eastern extension condensate window of Brazos County (**Figure 2**). With such a geologically diverse study area, the acreage needed to be split into many different subdivisions to accurately portray a realistic inventory development scenario.

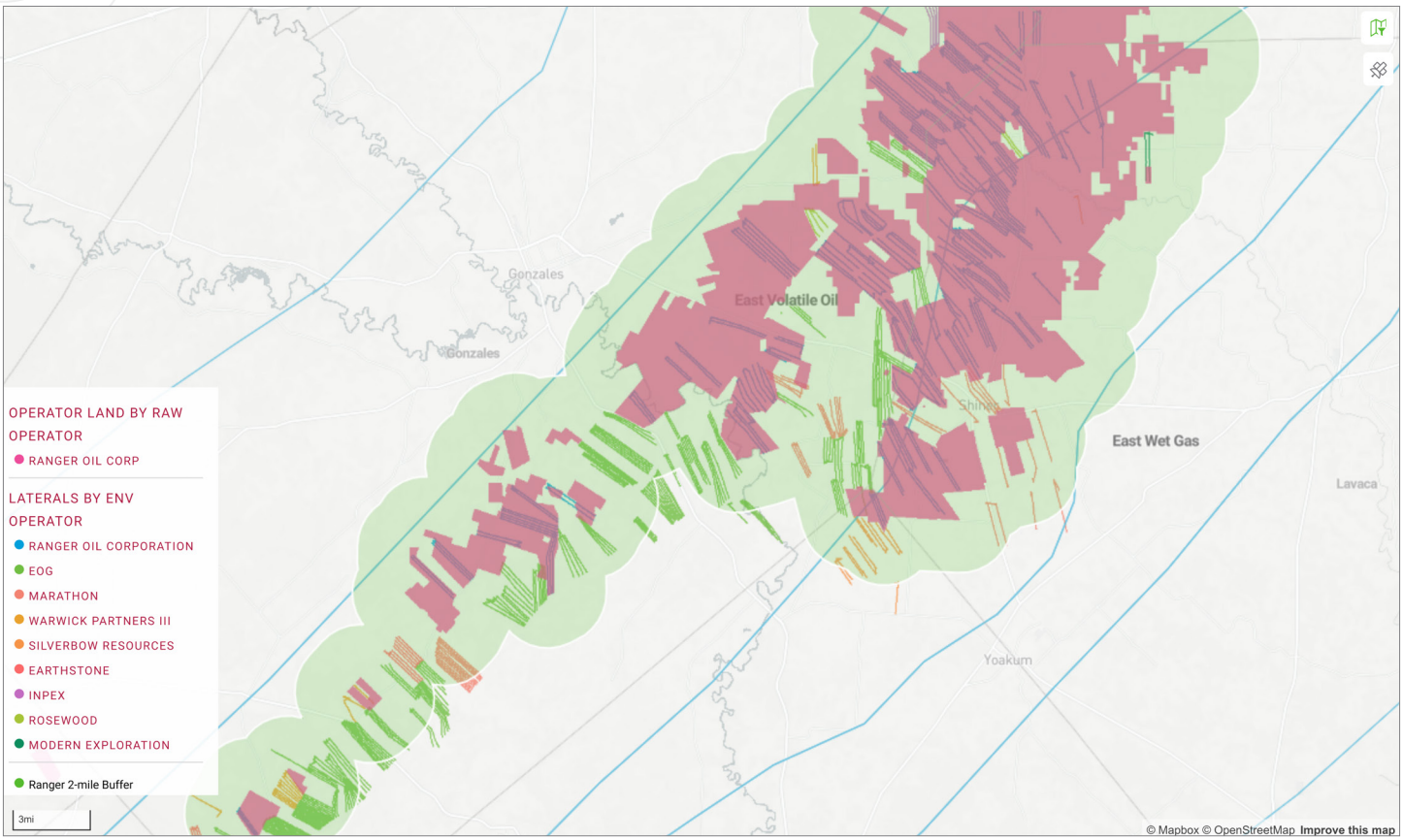
FIGURE 2 | Map of Ranger Oil's acreage in the Eagle Ford Basin.



Source | Enverus PRISM®

1. To perform this acreage delineation, we applied a two-mile geospatial filter in PRISM to the Ranger acreage to account for any offset wells operated by other companies that could be used for informing a type curve. This is because Ranger had yet to substantially prove resource potential in the Lower Eagle Ford within any given piece of acreage (**Figure 3**).

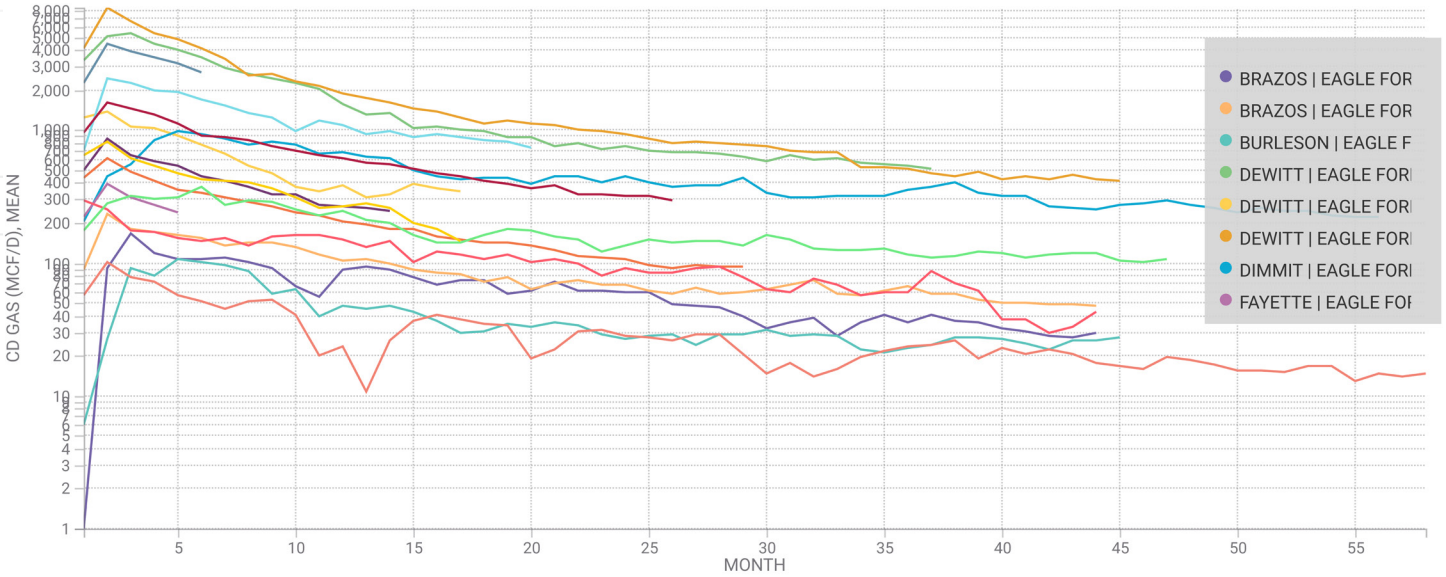
FIGURE 3 | Ranger Oil acreage with two-mile geospatial filter capturing all producing horizontal wells targeting the Lower Eagle Ford. Well sticks are colored by operator.



Source | Enverus PRISM®

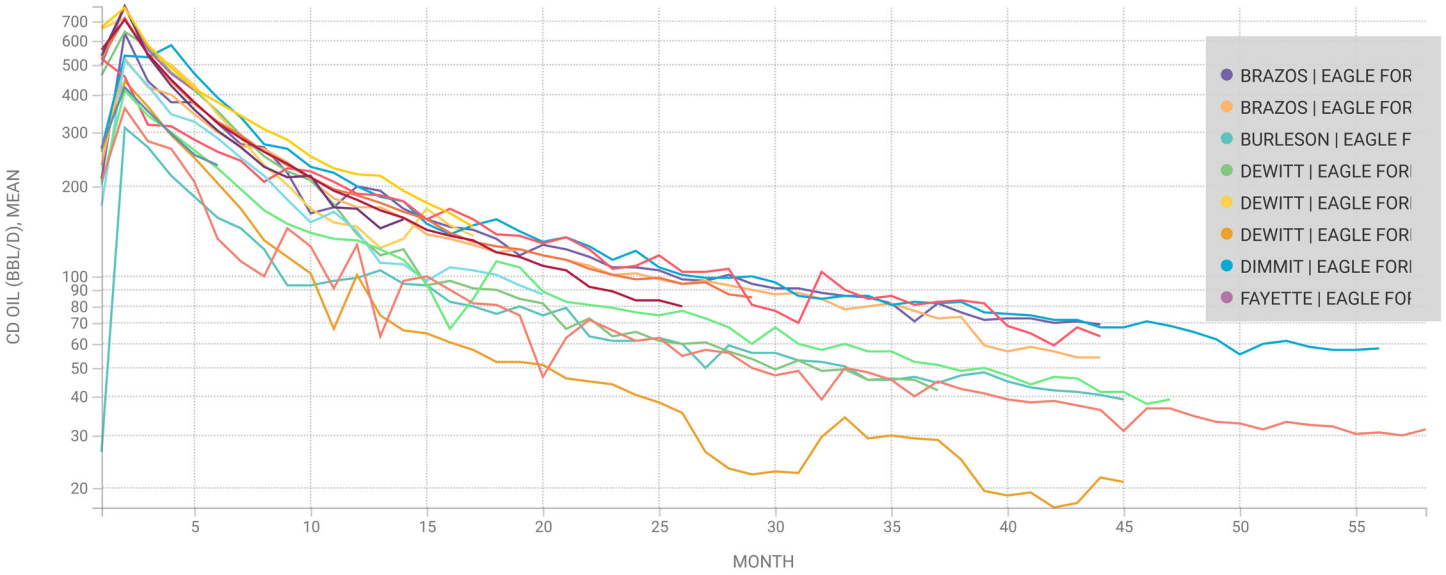
2. Taking into consideration recent completion technology, where most wells had proppant intensities ranging from 2,220 to 2,600 lbs/ft, the producing wells used for the type curves were also filtered to first production dates between 1/1/2018 and 12/31/2022 to further normalize the dataset.
3. Because these areas would have different spacing patterns and, subsequently, different production assumptions, we also grouped the wells by county and by Enverus sub-play (outlined in blue in **Figure 1**) to account for changes in geology across the play.
4. To determine the average spacing assumption for the type curve areas, by analyzing offset development trends, we filtered only wells that were co-completed, developed as multi-well pads to determine average horizontal spacing by sub-play and county. This is the assumed go-forward development pattern for the remaining inventory.
5. These regionally specific groupings were then used as oil and gas type curves (**Figures 4** and **5**) for go-forward development within the corresponding acreage for each county and sub-play. This also allowed for detailed single-well economic analysis to quickly prove economic viability of undeveloped wells within each region.

FIGURE 4 | Oil curves for Ranger assets (BBL/D), colored by region.



Source | Enverus PRISM®

FIGURE 5 | Gas curves for Ranger assets (MCF/D), colored by region.



Source | Enverus PRISM®

These curves were all consolidated into a single development model that gives a comprehensive view of what undeveloped potential might look like.

Source | Enverus PRISM®

2. Using the Acreage Math Method to Calculate Inventory

1. Using the Enverus Operator Land dataset, which has daily updated acreage positions of more than 1,300 public and private operators, we quickly determined the amount of surface acreage Ranger has in each county and sub-play.
2. Those acreage breakout surface values were then put into the development model by type curve region. A single go-forward spacing assumption was placed on each development scenario that was consistent with the spacing patterns of the Lower Eagle Ford represented by each type curve. With the surface acreage and the average spacing value, we can then use acreage math or calculate how much space there would be on the surface acreage. This assumes the land is a perfectly orientated acreage shape to allow for optimal placement of wells at the assumed spacing (**Figure 6**).

FIGURE 6: Sample from the development model for Ranger Oil, using a set spacing assumption by type curve region.

		BRAZOS | EAGLE FORD E EXTENSION BLACK OIL (9)	BRAZOS | EAGLE FORD E EXTENSION CONDENSATE (1)	BRAZOS | EAGLE FORD E EXTENSION VOLATILE OIL (28)	DEWITT | EAGLE FORD E CONDENSATE (46)	DEWITT | EAGLE FORD E VOLATILE OIL (13)	DEWITT | EAGLE FORD E WET GAS (7)	DIMMIT | EAGLE FORD W VOLATILE OIL (27)	FAYETTE | EAGLE FORD E VOLATILE OIL (5)	GONZALES | EAGLE FORD E VOLATILE OIL (408)	KARNES | EAGLE FORD E VOLATILE OIL (74)	LA SALLE | EAGLE FORD W CONDENSATE (26)	LA SALLE | EAGLE FORD W VOLATILE OIL (45)	LA SALLE | EAGLE FORD W WET GAS (15)	LAVACA | EAGLE FORD E CONDENSATE (76)	LAVACA | EAGLE FORD E VOLATILE OIL (50)	ROBERTSON | EAGLE FORD E EXTENSION BLACK OIL (6)
Net Acres	*acres*	1,000	6,387	3,940	563	381	3,475	3,160	26,641	64,577	2,607	3,366	4,955	3,859	43,572	21,115	620
Viability	%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Risked Net Acres		1,000	6,387	3,940	563	381	3,475	3,160	26,641	64,577	2,607	3,366	4,955	3,859	43,572	21,115	620
Zones		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Historical Lateral Length	*ft*	8,500	6,582	8,530	5,469	4,916	5,516	9,516	7,732	7,829	6,814	8,593	7,941	10,985	8,154	7,720	7,175
Historical Spacing	*ft*	1,056	1,056	1,056	440	440	440	440	440	440	330	660	660	660	528	528	660
Historical Drainage	*acres*	206	160	207	55	50	56	96	78	79	52	130	120	166	99	94	109
Go-Forward Lateral Length	*ft*	8,500	6,582	8,530	5,469	4,916	5,516	9,516	7,732	7,829	6,814	8,593	7,941	10,985	8,154	7,720	7,175
Go-Forward Spacing	*ft*	1,056	1,056	1,056	440	440	440	440	440	440	330	660	660	660	528	528	660
Go-Forward Drainage	*acres*	206	160	207	55	50	56	96	78	79	52	130	120	166	99	94	109
Net Locations Drilled to Date	#	1	4	5	4	3	19	27	101	332	11	7	15	15	165	160	3
DUCs	#	0	0	0	0	0	0	0	2	5	0	0	0	0	4	7	0
Net Remaining Locations	#	4	36	14	6	5	43	6	238	480	40	19	26	8	272	59	3
Net Drills Check	#	4	36	14	6	5	43	6	238	480	40	19	26	8	272	59	3
Net Completions Remaining	#	4	36	14	6	5	43	6	240	485	40	19	26	8	276	66	3
Net Completions Check	#	4	36	14	6	5	43	6	240	485	40	19	26	8	276	66	3
Years of Inventory	*yr*	0	3	1	1	0	4	1	20	40	3	2	2	1	23	6	0

Source | Enverus PRISM®

After modeling the existing developed locations, the model implied 1,258 remaining Lower Eagle Ford locations for the entire Ranger acreage position.

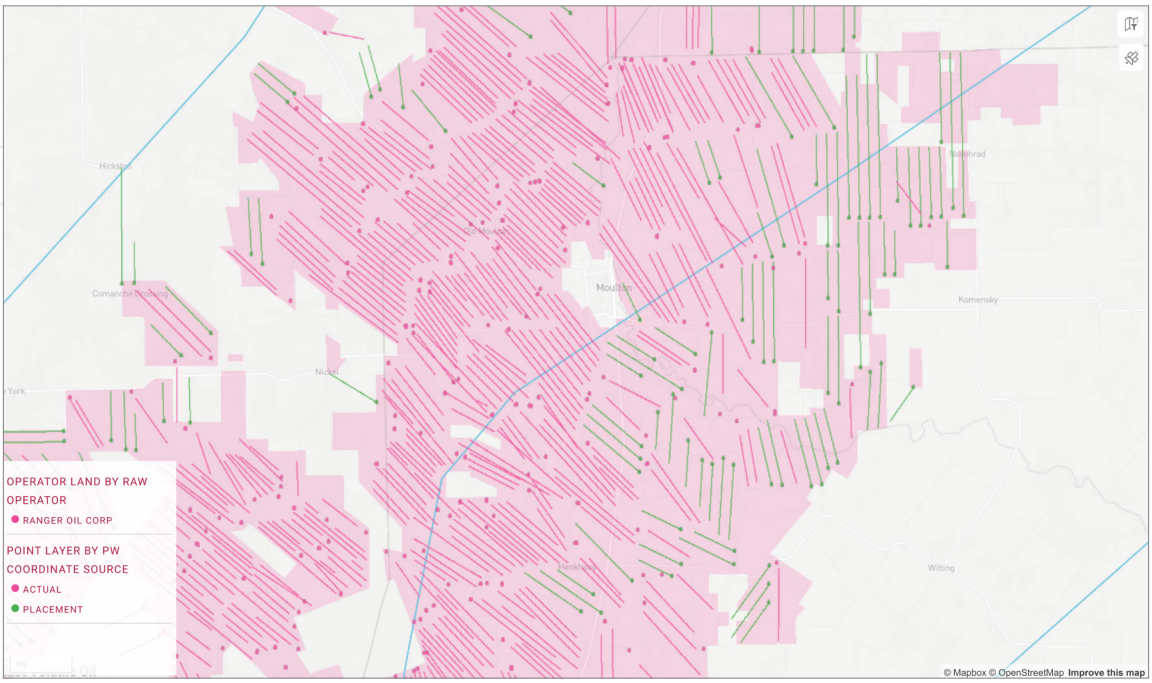
Although this is a fast approach and fairly accurate representation of what the undeveloped resource could look like for the newly acquired acreage, there are still many factors of inaccuracy that are not considered. When proper allocation of capital hinges on accurate inventory valuation, "fairly accurate" is not good enough. To further refine this exercise, we will use the Placed Well Analytics model to see if we can get a truer inventory figure.

3. Using Enverus Placed Well Analytics to Calculate Inventory

Placed Well Analytics, available in the Enverus PRISM® platform, are individual well sticks algorithmically created using specific Enverus spacing assumptions. By placing individual sticks, we can more accurately choose where wells can and cannot be drilled. This can greatly reduce errors that are caused when doing acreage math, which has no spatial considerations.

1. Similar to the acreage math method, the average horizontal distance assumption determined previously is input for each type curve area to calculate the remaining inventory (**Figure 7**).
2. Each type curve region scenario is then run through the model in the PRISM interface.
3. Placed Well Analytics algorithmically assesses the spatial distribution and orientation of the wells over the acreage and their orientation, using our calculated and Enverus analyst informed DSU grid, providing a more accurate number of remaining locations to drill.

FIGURE 7 | Wells sticks placed on the operator acreage. Green sticks are remaining inventory locations, pink are existing producing wells in the Lower Eagle Ford.



Source | Enverus PRISM®

Using Placed Well Analytics, we determined the go-forward inventory is approximately 741 Lower Eagle Ford locations, almost half the number calculated from acreage math. We not only determine inventory count, but also the operator land they will fall under, to benchmark remaining inventory by operator or to identify non-op interest in an acquisition.

Additionally, the sticks are tagged to the reservoir properties, to further risk off locations based on subsurface characteristics. We are also able to categorize the locations by breakeven, giving us further flexibility to determine which locations that should have value assigned. Not only is this a more accurate inventory count, but it also ties directly to the value we place on the undeveloped acreage.

This means we are less likely to overpay for locations that will not be developed.

Conclusion

Using Enverus PRISM®, filtering to the right dataset to build accurate type curves is a rapid approach to informing the acreage math method. While acreage math is fast, it simplifies a critical calculation because it overlooks spatial distribution of the wells and other key factors for identifying true remaining inventory. Placed Well Analytics accounts for acreage orientation, it doesn't assume uniform spacing and sticks are tagged to other properties such as economics and geologic properties. This allows you to further risk off locations, understand how much remaining inventory is available in your acquisition target or determine the best development plan for your acreage. Inventory is the best way to accurately forecast future development and value of any asset, and it is the most important factor driving operator valuations today. Make sure you are assessing your inventory faster and with more confidence than simple acreage math.

Interested in learning more about Enverus Placed Well Analytics?
Contact us by email **businessdevelopment@enverus.com** or call **1-800-282-4245**.