PRIMARY VISION NETWORK

EAGLE FORD REFRACS: THE FUTURE IS NOW SAMPLE

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This report has many supplements to it that may or may not be included based on your subscription type. Some of the graphics are better viewed at full screen so we placed them in a link that accompanies this report.

Supplemental Downloads:

- State of the Frac Market 1st Half Graphics
- Integrated Energy Services Eagle Ford Refrac Case Studies Graphics
- Single Well Lease Breakdown & EUR
- Primary Vision Refrac Report
- Primary Vision Refrac Report Excel Output

Refrac

/rə ‘frak/

Organic shale refracs are designed to recover stranded hydrocarbons from wells that were previously stimulated.

Dear Reader,

Primary Vision and Integrated Energy Services took other variables and conditions into consideration to find quality examples in our database of past refracs. Our goal was to find recent success stories and present to the reader that refracs should, in fact, be a part of an operator’s completion program.

In this report we break down where the frac market is currently, why refracs are important and then dig deep to share sample refrac use cases.

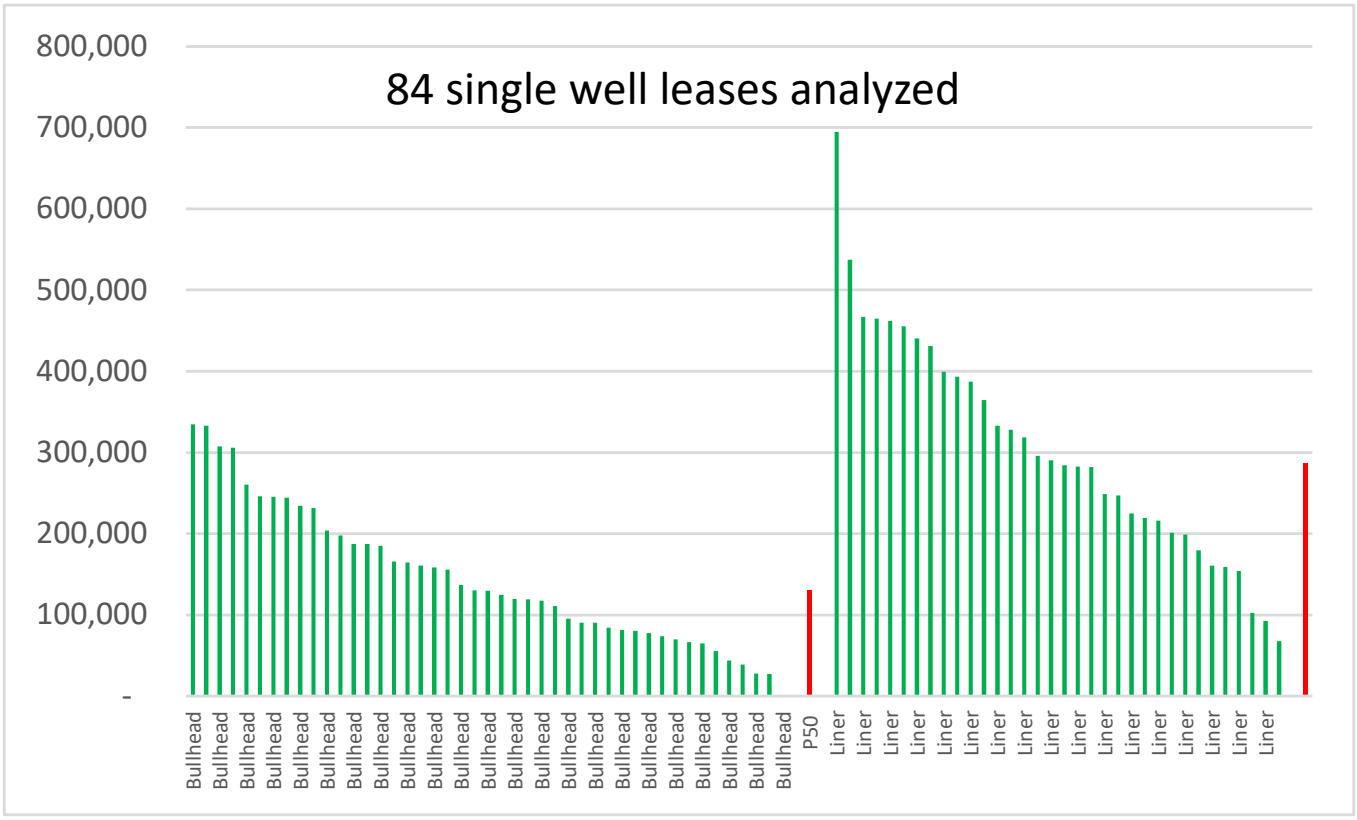
We’ll present to you similar reporting from all active basins, over the coming months, with the same goals of finding success stories based upon similar variables.

If you have any feedback, please contact me directly at mjohnson@pvmic.com

Sincerely yours,

Matt Johnson
mjohnson@pvmic.com

Eagle Ford Single Well Lease Post Refrac EUR Oil Summary



Summary by API in following slides and in excel sheet

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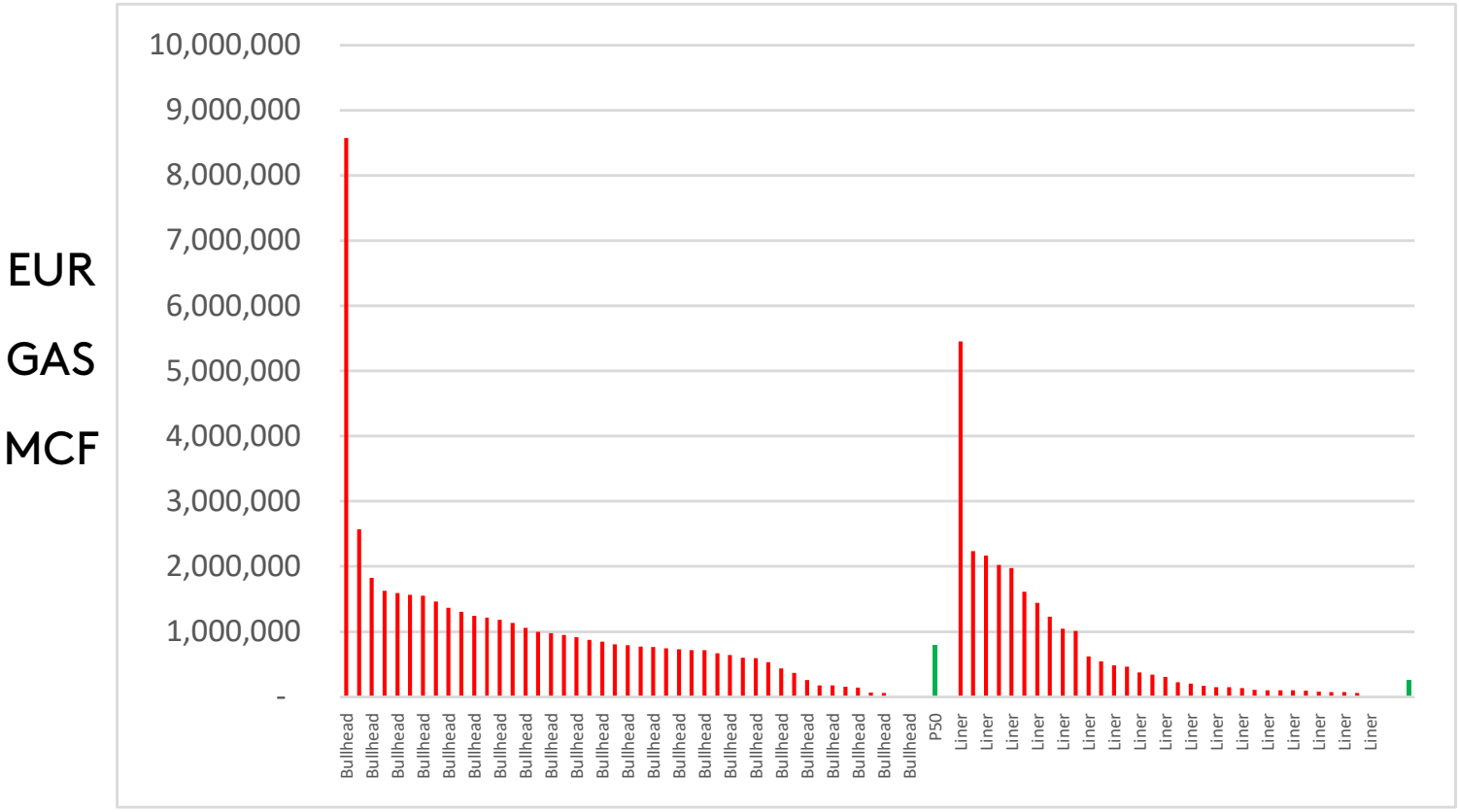
Eagle Ford Single Well Lease Post Refrac EUR Gas Summary



Summary by API in following slides and in excel sheet

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Eagle Ford Single Well Lease Post Refrac EUR Summary

Bullhead Summary	EUR Oil	BBL/ft	EUR Gas	MCF/FT
P10	278,611	61.9	1,606,256	382.1
P50	129,968	28.7	790,101	177.2
P90	41,891	10.5	110,684	25.0
Liner Summary	EUR Oil	BBL/ft	EUR Gas	MCF/FT
P10	465,815	89.2	2,095,987	482.8
P50	225,245	43.3	434,074	73.8
P90	128,439	25.5	64,586	11.6

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STATE OF THE FRAC MARKET 1ST HALF 2021

PRIMARY VISION STATE OF THE FRAC MARKET 1ST HALF 2021

by Mark Rossano

Through the first half of 2022, we have seen completion activity follow a steady seasonal path, but at a lower level than the historical norm. The U.S. saw a strong rally bounce in activity in Q1, which cooled off a bit in March (similar to 2018 and 2019). We remained fairly flat for April, which has happened in the past, depending on when the Holidays and Spring Break hit. Activity started to pick back up into the end of April and throughout May. We expect to see a similar bump in activity throughout summer, bringing us to between 290 and 300 spreads across the lower 48 states.

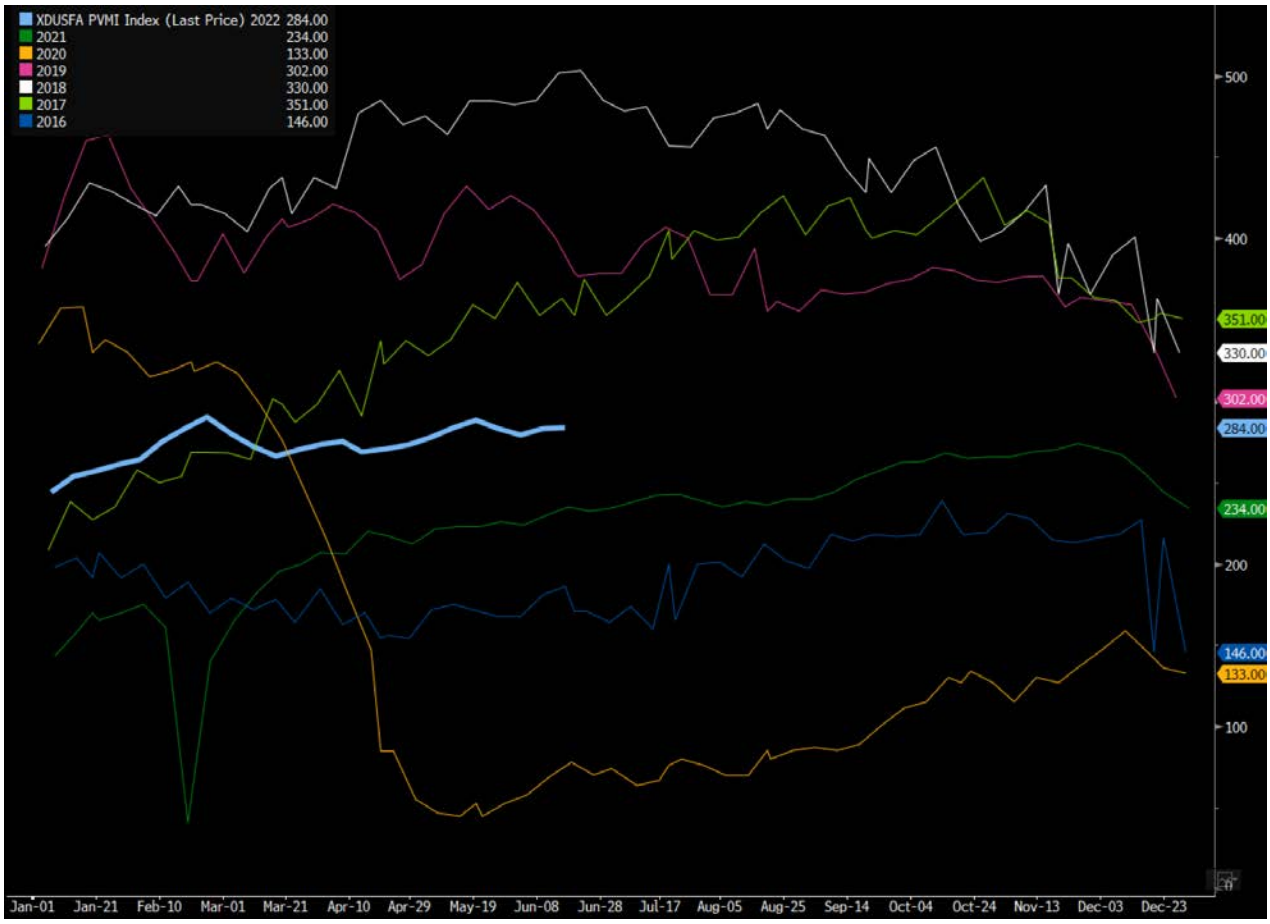

Chart 1: US Oil & Gas Exploration & Drilling Frac Spread Count

While the national spread count has been depressed in comparison to other years, the Permian has been operating at full tilt and setting seasonal records in activity. Operations were steady to kick off the year, but as the price of every hydrocarbon started to rally, so did the Permian. We have been either near or above seasonally adjusted highs as E&Ps look to capitalize on the strength and demand in the global market. U.S. crude exports will stay between 3.2M–3.3M on a 4-week rolling average as countries look to replace either blend oil or Russian crude.

The Permian's sheer size and proximity to the coast makes it an ideal spot for a step up in activity.

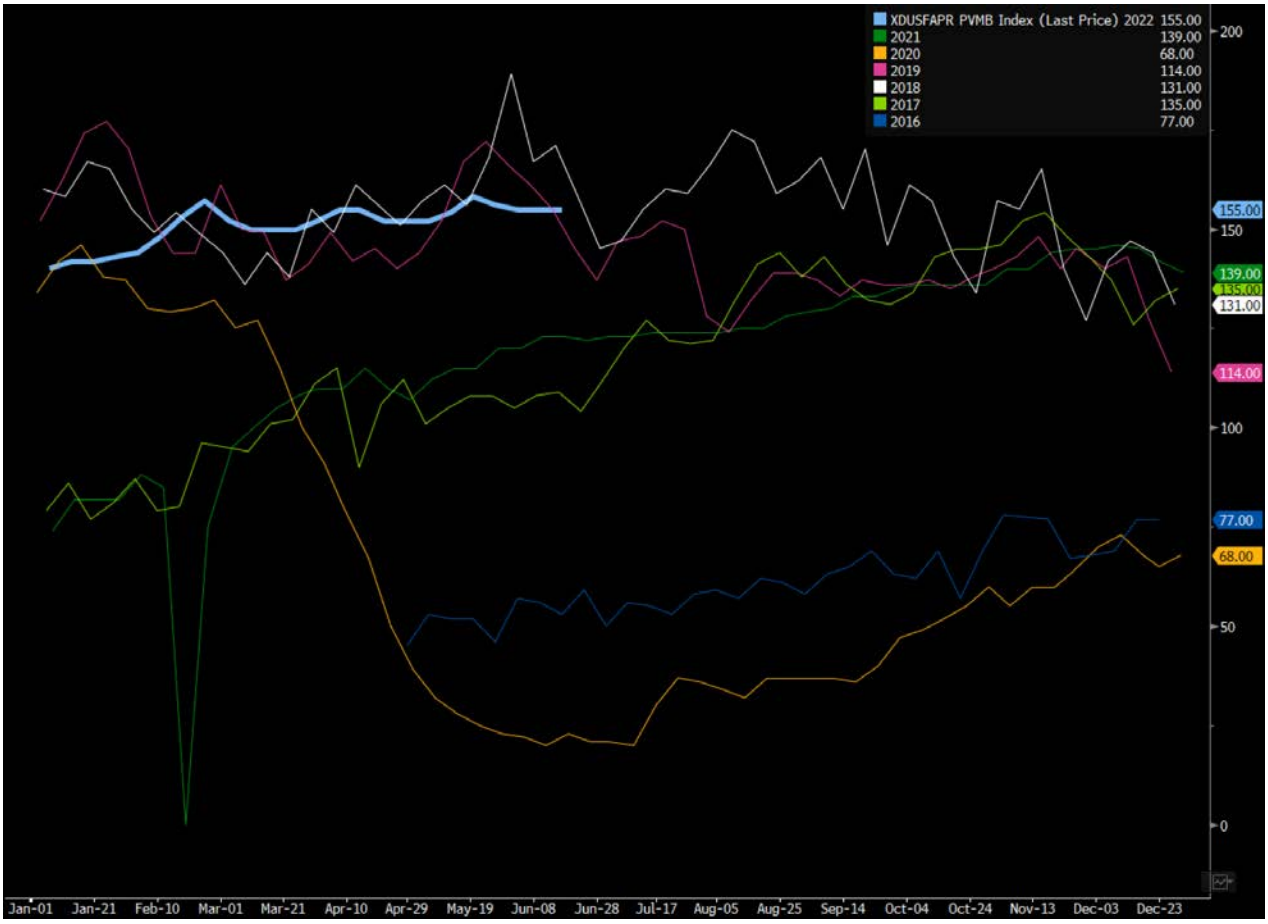

Chart 2: US Oil & Gas Exploration & Drilling Frac Spread Count Permian

The energy sector (along with many others) is currently facing a labor shortfall that isn't easily overcome. Many previous employees have tired of the boom-and-bust cycle and have taken jobs in construction, trucking, or other areas that saw a significant bounce prior to the recovery in energy. This left the industry struggling to fill jobs and train new employees that are not familiar with the oil patch. The energy sector also went through a significant contraction

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10 REASONS REFRACS ARE IMPORTANT TO CONSIDER IN 2022: BY BOB BARBA AND OSAMA RIZVI

10 REASONS REFRACS ARE IMPORTANT TO CONSIDER IN 2022:

BY BOB BARBA AND OSAMA RIZVI

1. **Oil Demand Rising:** Oil demand has finally started to recover, so much so that there are concerns regarding an impending supply crunch. In a recent report, OPEC said that they expect oil demand to rise by 4.15 mbpd this year. US public operators are limiting their capital budgets to provide cash flow to shareholders. At the recent DUG Eagle Ford and Permian conferences, Scott Sheffield indicated that Pioneer (with 10% of the Permian rig count) was limiting their production growth to 5% per year regardless of the price environment. He also indicated that operators that want drilling contractors to add rigs will need to agree to three-year contracts at a premium over the current rates, which will limit the growth in rigs required to drill new wells. There are currently 33 different operators running at least one rig in the Eagle Ford out of the 86 total Eagle Ford operators. Without a rig, the only options for the 53 rigless operators to significantly improve production are refracs or EOR.

   As prices have risen, there has also been a significant decrease in DUCs (Drilled But Uncompleted Wells). For context, it would have required 100 more rigs to get the same production as it did from DUC withdrawals (DUCs are at their lowest level since December 2013). This reduction in the DUC count, combined with the limitations on the additions of new rigs, creates an opportunity for refracs to step in and increase production. Even for the operators that currently have rigs, there was a lot of concern among the financial analysts at the recent DUG Eagle Ford conference that the top tier

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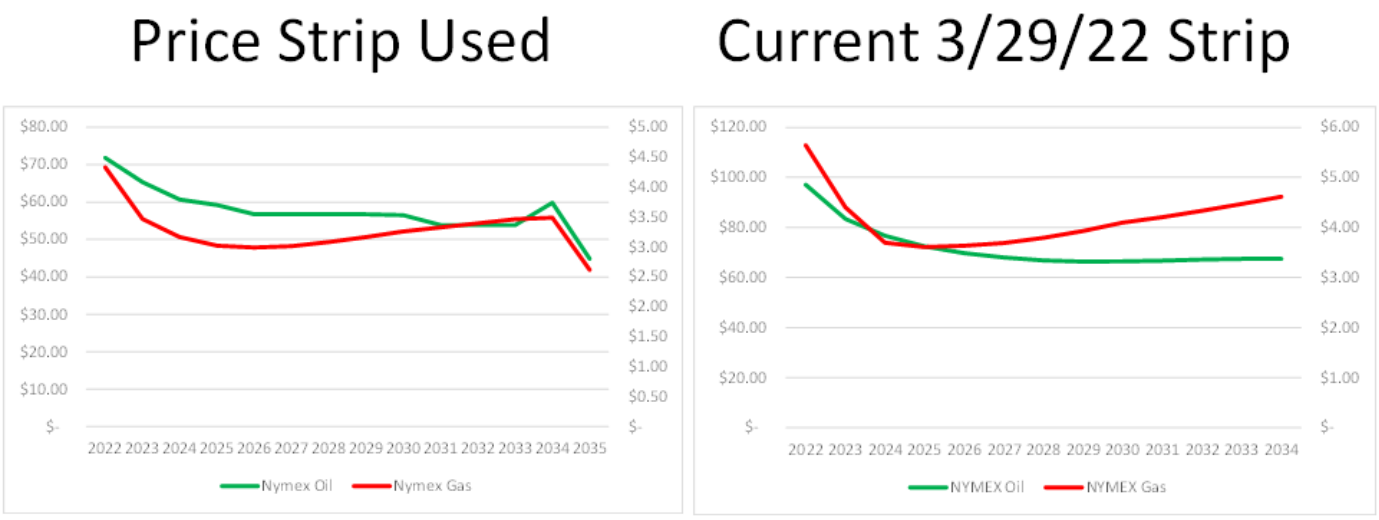
INTEGRATED ENERGY SERVICES EAGLE FORD REFRAC CASE STUDIES: BY BOB BARBA

INTEGRATED ENERGY SERVICES EAGLE FORD

REFRAC CASE STUDIES: BY BOB BARBA

A macro study was done late last year of 58 refrac'ed wells in the Eagle Ford to evaluate the economic performance of the refracs compared to new well completions. Actual post refrac decline data was used until the end of measured production, and the future production was forecasted using the Arps decline curve analysis routine. All of the wells evaluated had sufficient producing time to generate a stable decline analysis. This is, in part, a by-product of the large gap in refrac activity that started in 2020 following the Covid crash. There were only two refracs in the database from January 2020 forward, and both had stable decline data. Measured data was available up to October 2021, resulting in 97% of the wells having over 22 months of production. Spot checks were run on the most recent refracs to confirm the data was on trend with the forecasts and no outliers were observed. In short, the EUR input and future production forecast input to the study should be relatively stable.

The 58 wells in the initial study were run with the October 31, 2021 pricing, a $3.75 million AFE for liner refracs and a $1.5 million AFE for the wells without mechanical isolation. 54 of the 58 wells had rates of return over 20% and the statistics were run for those that met that criteria—three had uncertain diversion status, for a total of 51 wells. The average strip in that analysis was $59.83 for oil and $3.49 for gas (Figure 1).



Price strip used

10/1/2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Nymex Oil	$ 71.87	$ 65.31	$ 60.66	$59.24	$ 56.75	$56.75	$56.75	$56.75	$56.51	$53.85	$53.85	$53.85	$59.83	$44.88
Nymex Gas	$ 4.33	$ 3.47	$ 3.17	$ 3.02	$ 2.99	$ 3.01	$ 3.08	$ 3.17	$ 3.26	$ 3.33	$ 3.40	$ 3.46	$ 3.49	$ 2.62

3/29/21 NYMEX

3/29/2022	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
NYMEX Gas	$ 5.64	$ 4.40	$ 3.70	$ 3.61	$ 3.64	$ 3.69	$ 3.79	$ 3.93	$ 4.10	$ 4.21	$ 4.34	$ 4.47	$ 4.61
NYMEX Oil	$ 97.07	$ 83.42	$ 76.68	$ 72.48	$ 69.73	$ 67.98	$ 66.85	$ 66.39	$ 66.44	$ 66.73	$ 67.16	$ 67.45	$ 67.45

Figure 1 Economic analysis used conservative pricing all true IRRs and NPVs much higher

This was done in what was likely the last stable period of oil and gas prices, where there were no significant external influences other than supply and demand. While prices have certainly increased recently, completion costs have escalated as well to absorb some of the excess cash over the October levels. If operators were asked to choose a P50 value for expected pricing over the production period as a whole, the $60/$3.50 scenario might be in the range that most expect, and all of the analyses were thus done with that scenario. The assumed AFE for refracs in the three case studies and all analyses going forward was increased to $4 million.

A summary of the economics of the 51 wells is presented in Figures 2 and 3.

Well Rate of Return and NPV Summary

Group	Percentile	NPV	IRR
Diverter	P10	$ 7,093,105	367%
Diverter	P50	$ 2,925,653	177%
Diverter	P90	$ 687,364	41%
Liner	P10	$ 9,327,213	242%
Liner	P50	$ 5,911,423	80%
Liner	P90	$ 2,099,805	28%

Of the 58 refracs there were 35 liners and 16 diverters
3 without known liner or diverter status and 4 with rates of return less than 20%
Above numbers assumed a 10/31/21 price strip and $3.75 million AFE
$1.5 million AFE used for bullhead fracs
Initial candidates most likely from the P90 group
Does not include infill well asymmetric frac avoidance benefits
500,000 BO EUR new wells damage $4.5 million for direct offset infill

Figure 2

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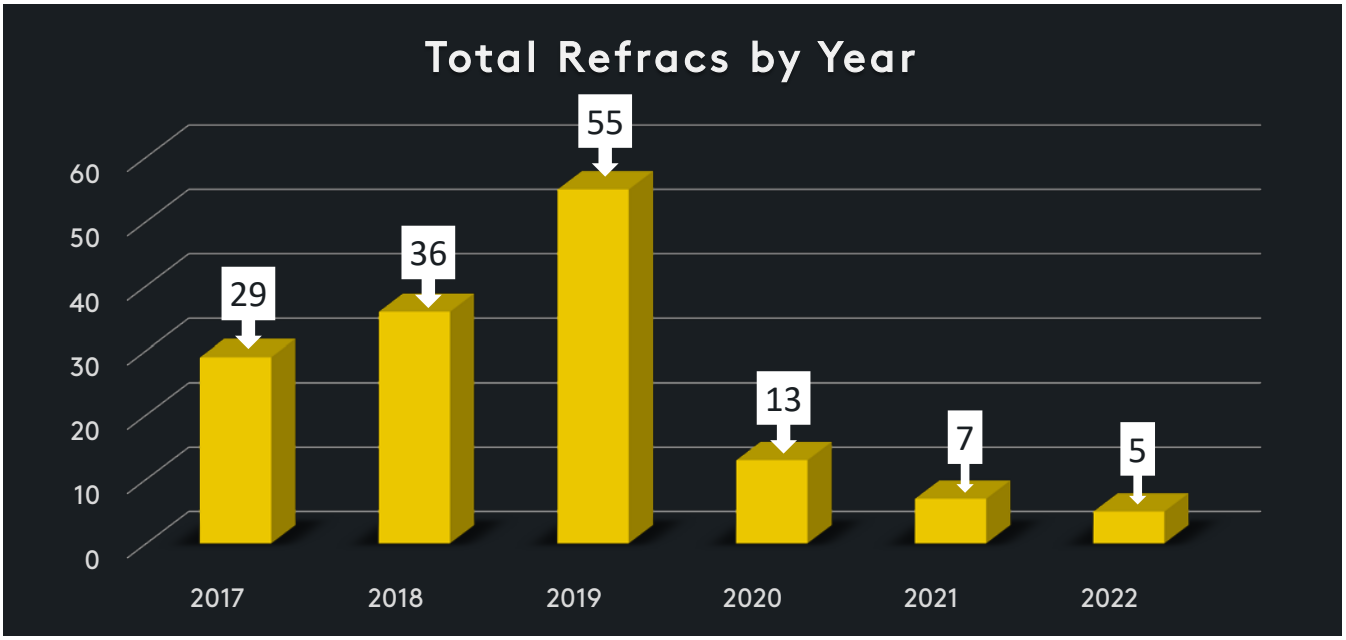
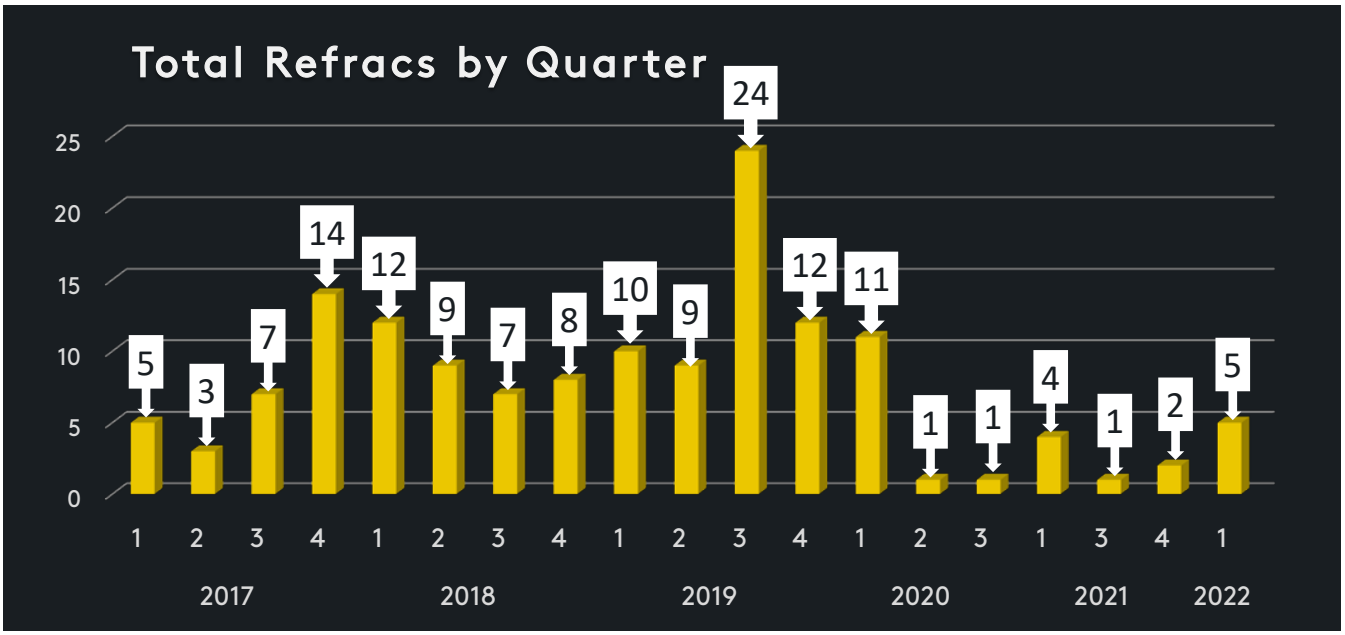
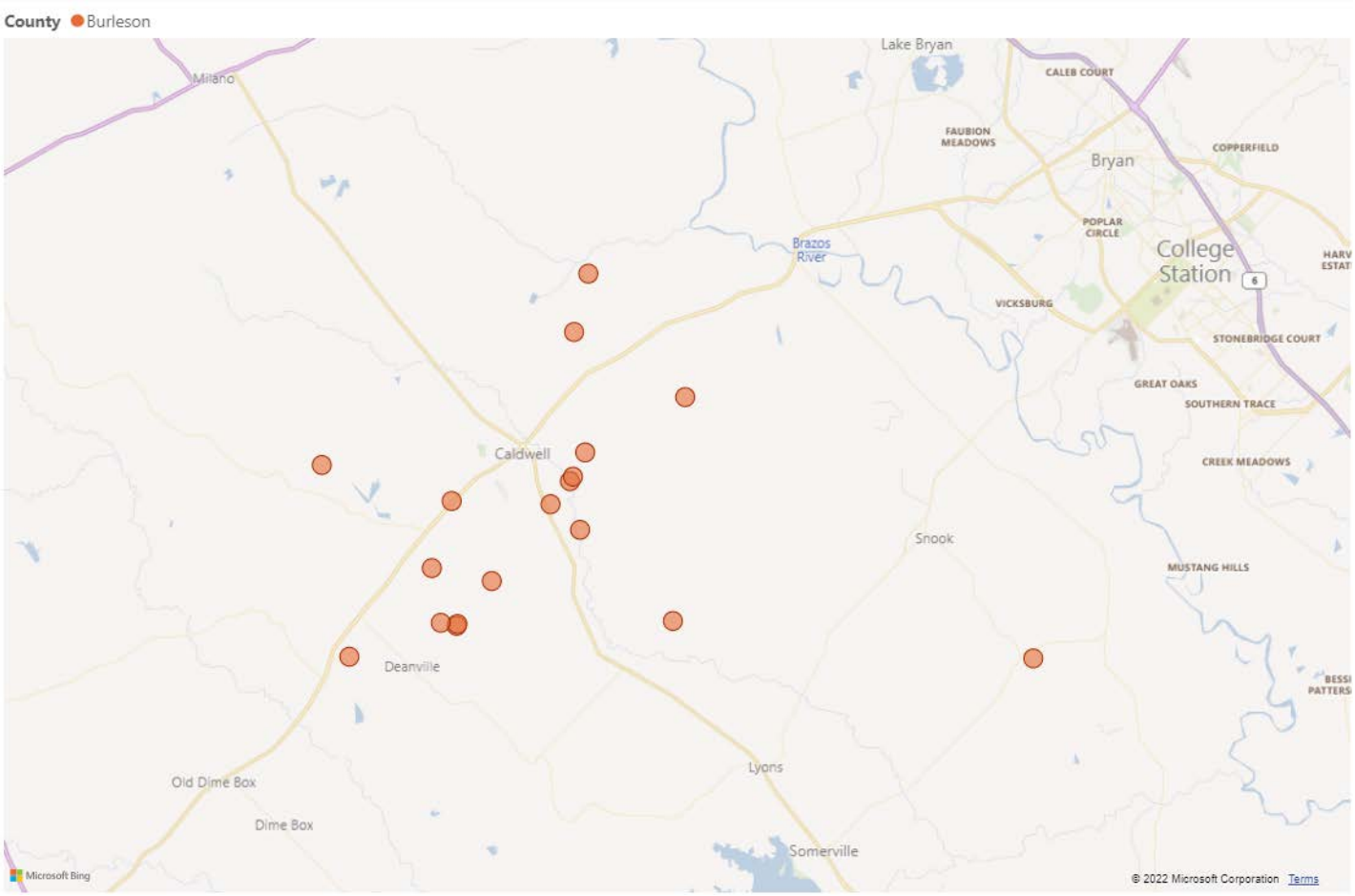
PRIMARY VISION REFRAC REPORT

PRIMARY VISION REFRAC REPORT





Refrac'ed Wells in Burleson County



PV AND IES CONSORTIUM

*A **consortium** (plural: **consortia**) is an association of two or more individuals, companies, organizations or governments (or any combination of these entities) with the objective of participating in a common activity or pooling their resources for achieving a common goal.*

Primary Vision Network, in collaboration with Integrated Energy Services is looking for operators interested in exploring their well history to select eligible refracs. We can offer you candidate selection, performance evaluation and execution.

Integrated Energy Services (IES) provides a wealth of knowledge about refracs in the United States. IES specializes in estimating the remaining mobile hydrocarbons in reservoirs by integrating petrophysics with reservoir and completion engineering data. Their principal petrophysicist, Bob Barba, has decades of experience working hands on with conventional and unconventional reservoirs and teaching those findings to companies and students alike. As a recognized industry expert on refracturing rock mechanics and practices, Bob pioneered techniques to evaluate well performance using production data and routine well log data, applying the concept to over 500 wells to date, significantly improving completion results in fields where the concept was applied.

Primary Vision Network (PVN) is a data driven news organization, providing market intelligence covering the global oil and energy space. Our "well to wheel" perspective provides clients with unique data and predictive insights and analytics, along with video content that is

exclusive to PVN. PVN is a trusted resource that monitors U.S. fracking activity and delivers accurate industry data to clients, thus allowing them to make better strategic decisions and predict market trends. Our data, insights, deep dive industry reports and video content is unparalleled and has proven to be indispensable for oil and gas professionals, news organizations, financial and educational institutions alike.

PVN has covered the commercial refrac market since 2013 with a variety of commercial reports, published papers and keynote presentations covering upstream participants and downhole consumables.

If you're interested in learning more about how Primary Vision and Integrated Energy Services can help your firm please contact Aurora Cowen at aurora@pvmic.com to schedule an appointment.

We specialize in:

- Refrac Selection
- Performance Evaluation
- Completion Execution
- Data Procurement & Validation
- Refrac Market Intelligence
- Report Creation

and so much more....

PRIMARY VISION NETWORK

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