Haynesville Shale Review 2008 - 2023

November 2023

Activity and well performance





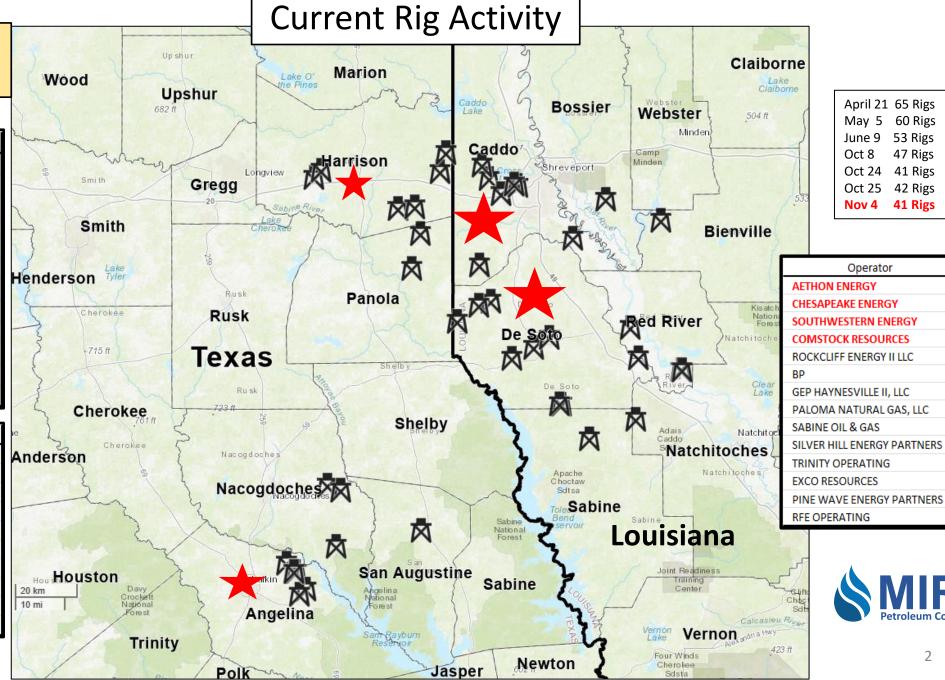


Kurt Mire, P.E.

Rigs 11/4/2023 **Total 41 Active Rigs**

County/Parish	Rigs
DE SOTO (LA)	8
CADDO (LA)	7
ANGELINA (TX)	6
HARRISON (TX)	6
RED RIVER (LA)	4
NACOGDOCHES (TX)	3
PANOLA (TX)	2
BIENVILLE (LA)	1
BOSSIER (LA)	1
NATCHITOCHES (LA)	1
SABINE (LA)	1
SAN AUGUSTINE (TX)	1

Drilling Contractor	Rigs
Patterson-UTI	8
Cactus Drilling	7
Helmerich & Payne	7
Scandrill	6
Nabors Industries	4
Precision Drilling	4
Independence Contract Drilling	2
Pinnergy	1
RAPAD Drilling	1
SWN Drilling	1

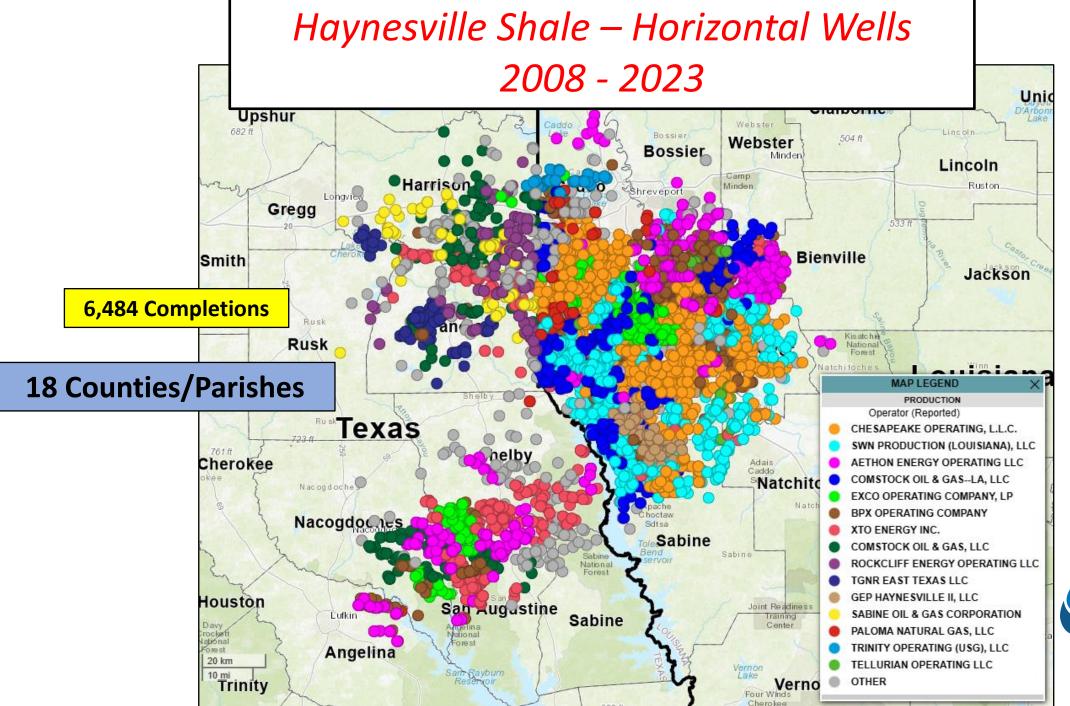


April 21 65 Rigs May 5 60 Rigs June 9 53 Rigs 47 Rigs Oct 24 41 Rigs Oct 25 42 Rigs Nov 4 41 Rigs

Operator

Rigs

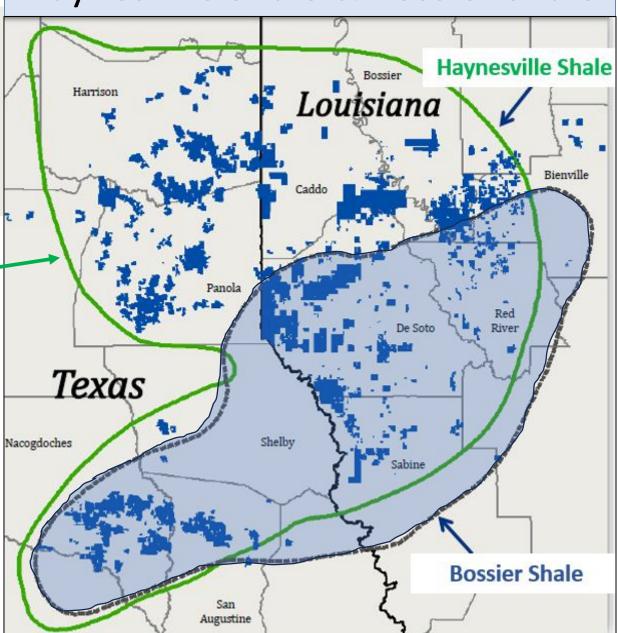


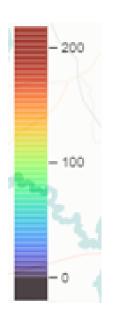




Haynesville Shale & Bossier Shale

Haynesville Shale

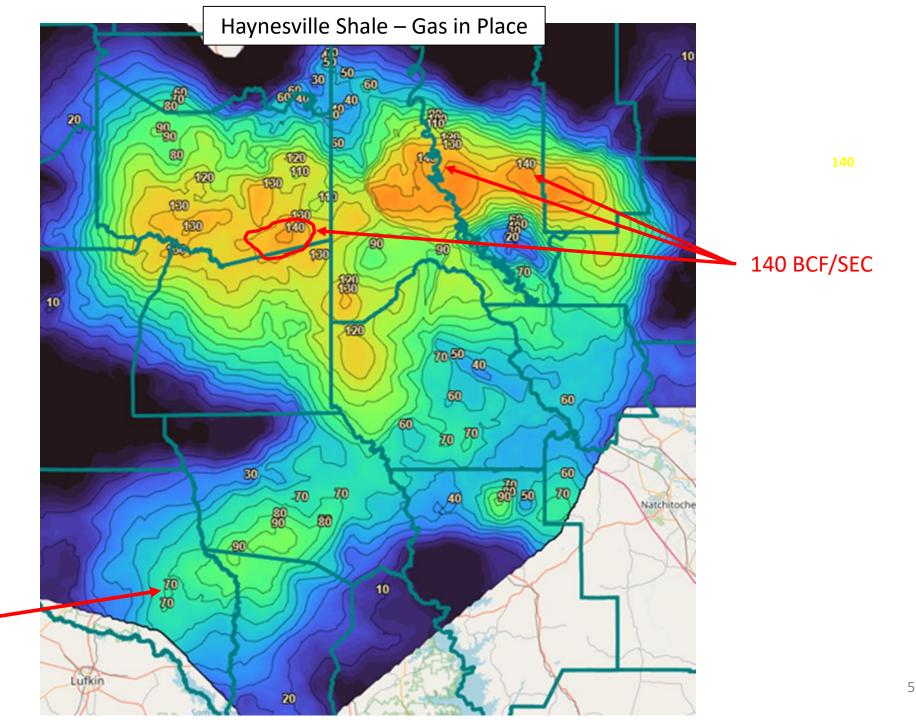




Gas in place BCF/Section

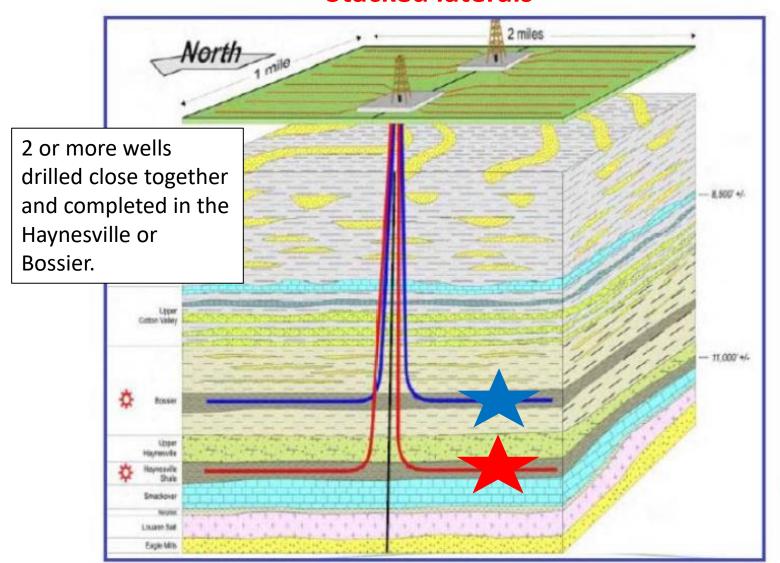


70 BCF/SEC

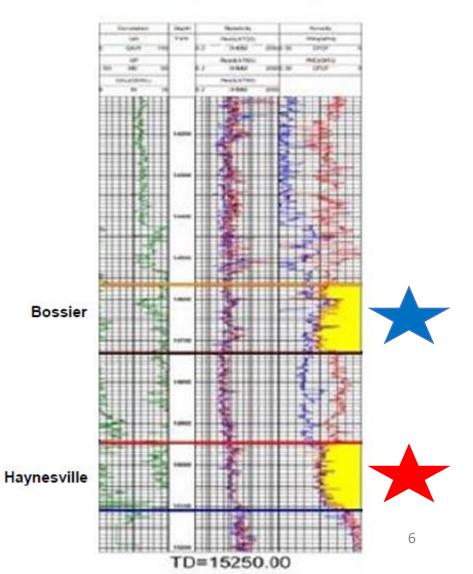


Bossier/Haynesville Wellbore Design

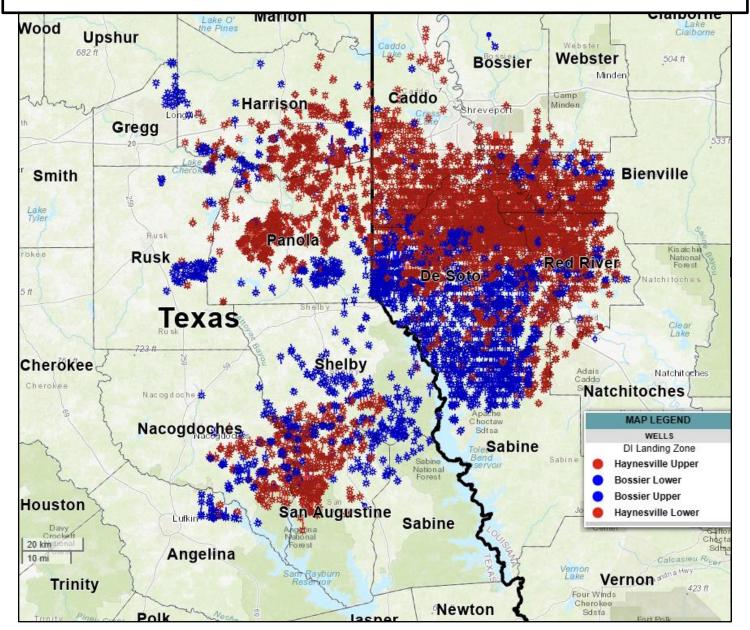
Stacked laterals



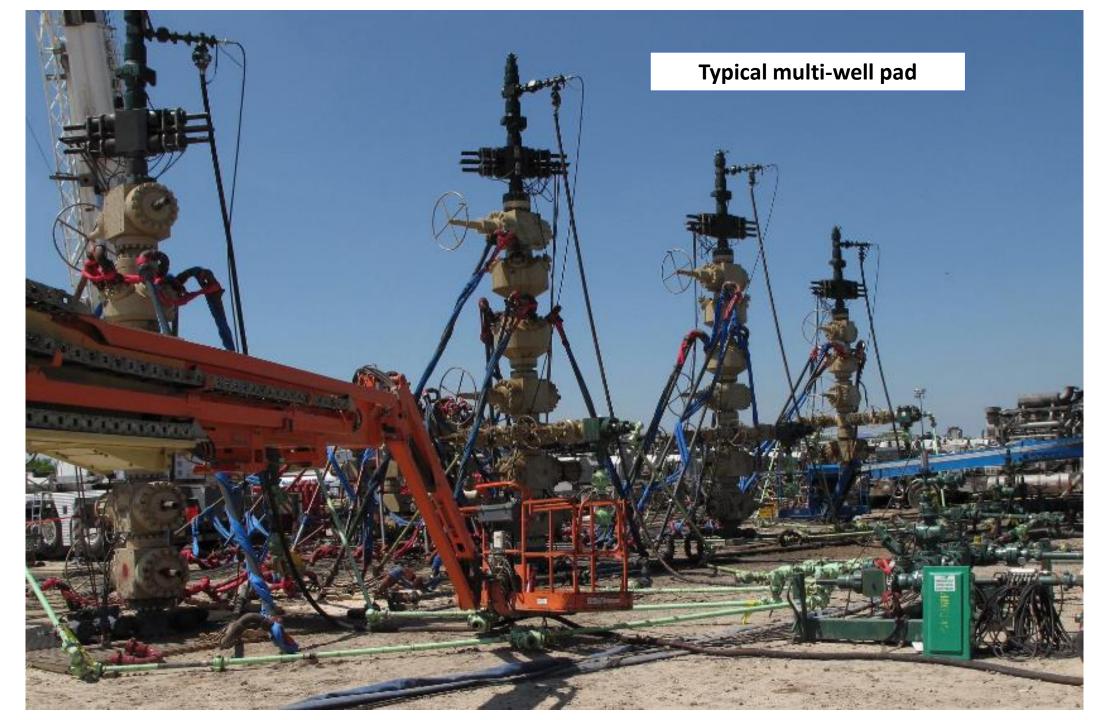
Goodrich SW Henderson Hay #1 42-005-30388 Angelina County

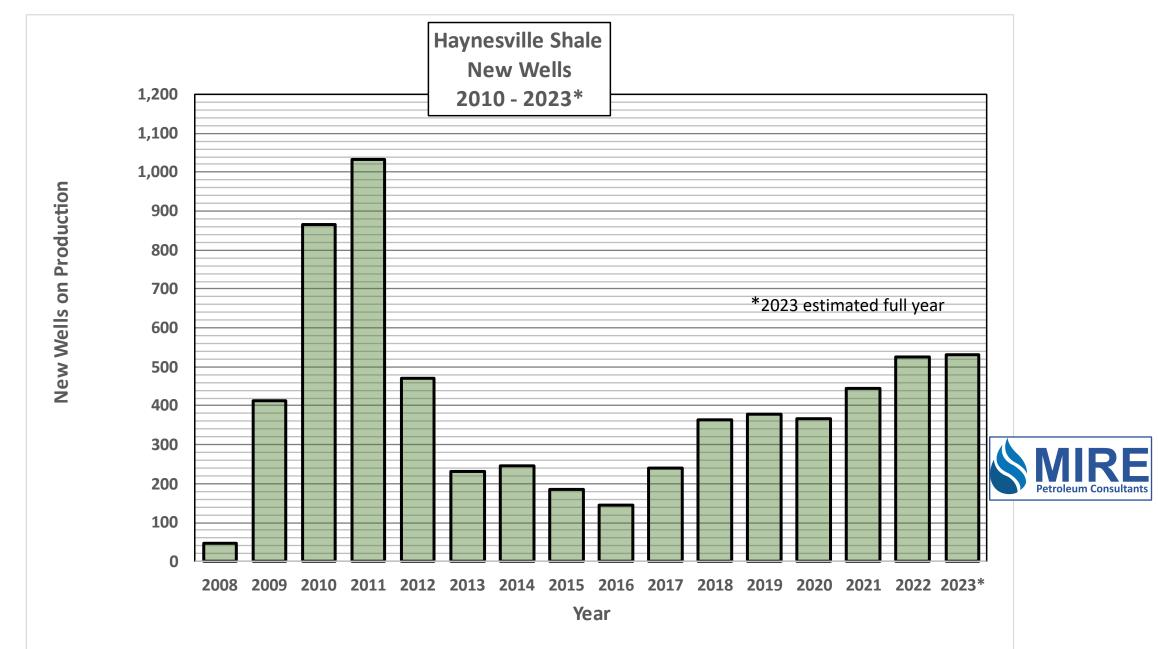


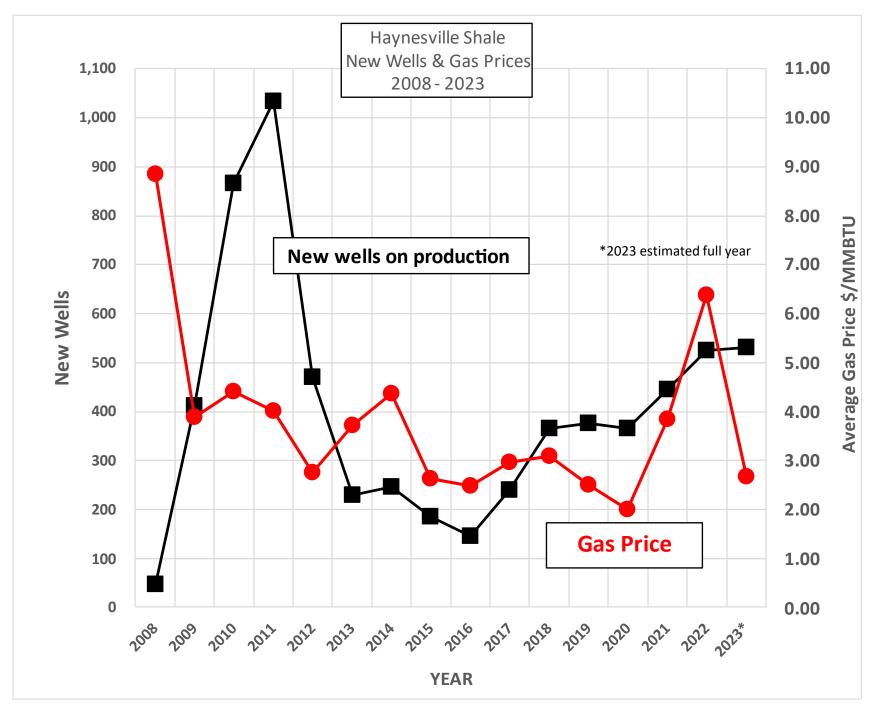
Haynesville Shale – Horizontal Wells 2008 - 2023



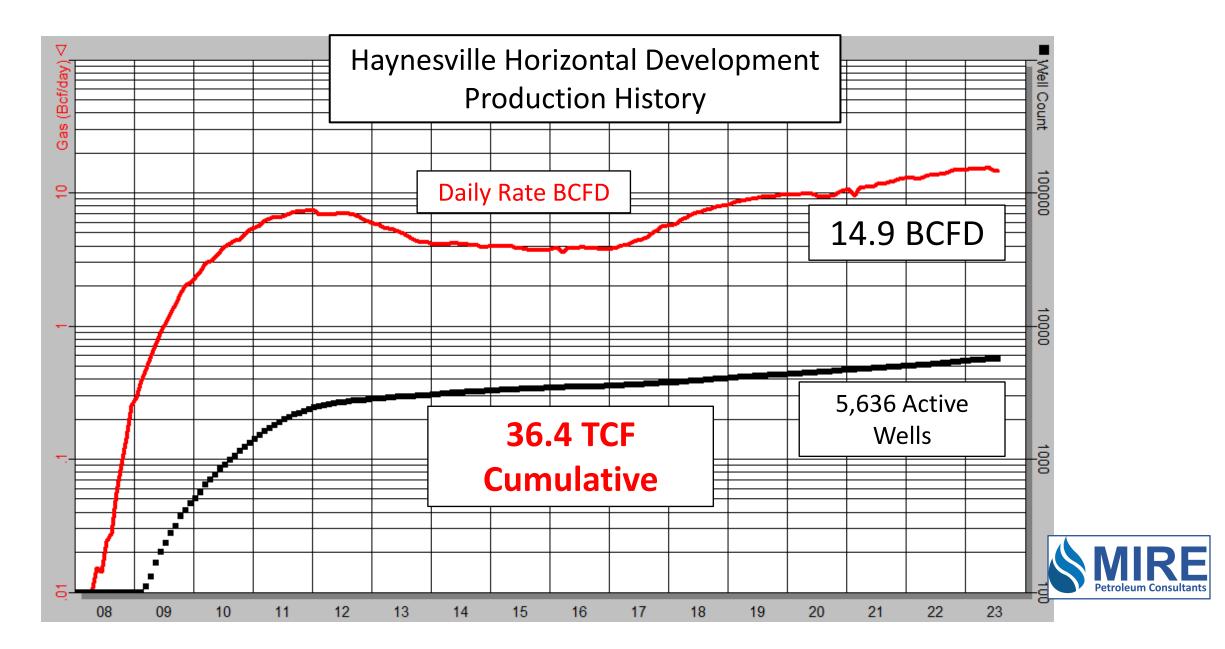




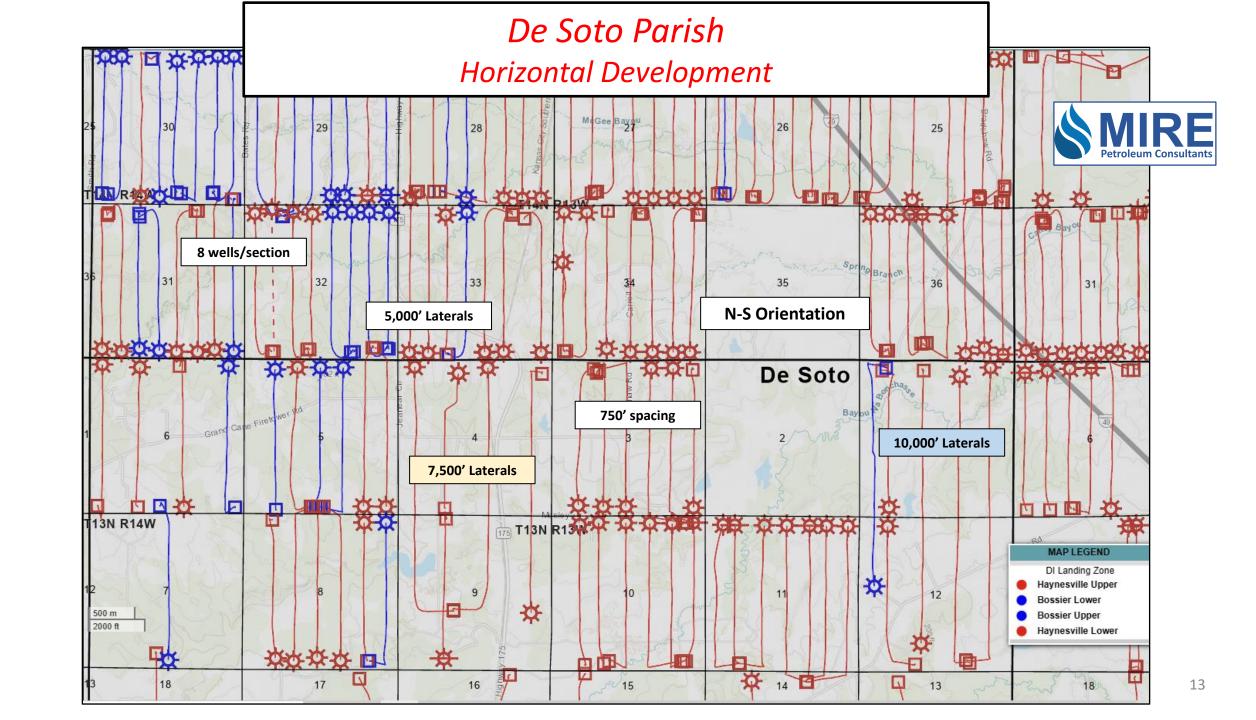


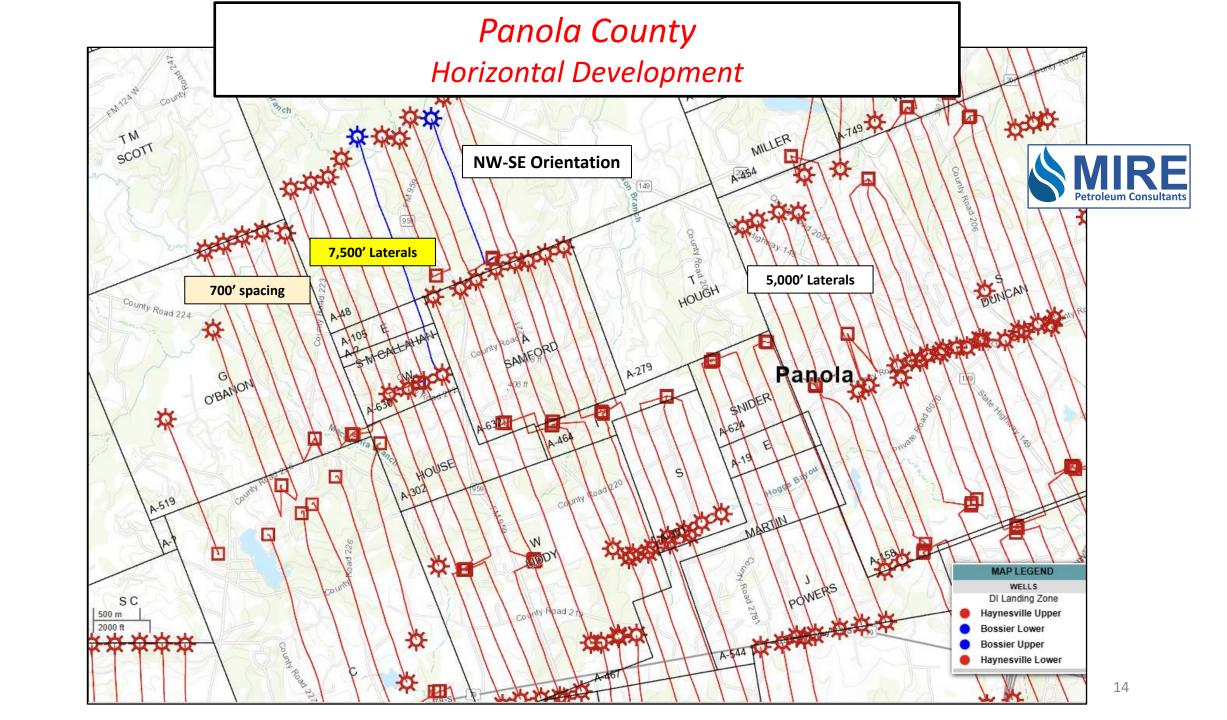


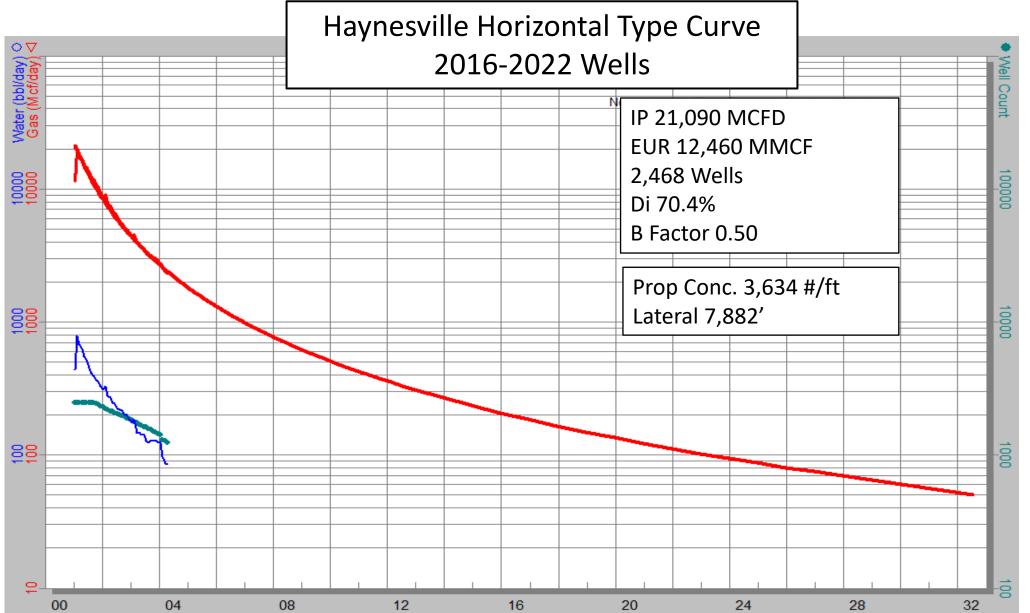




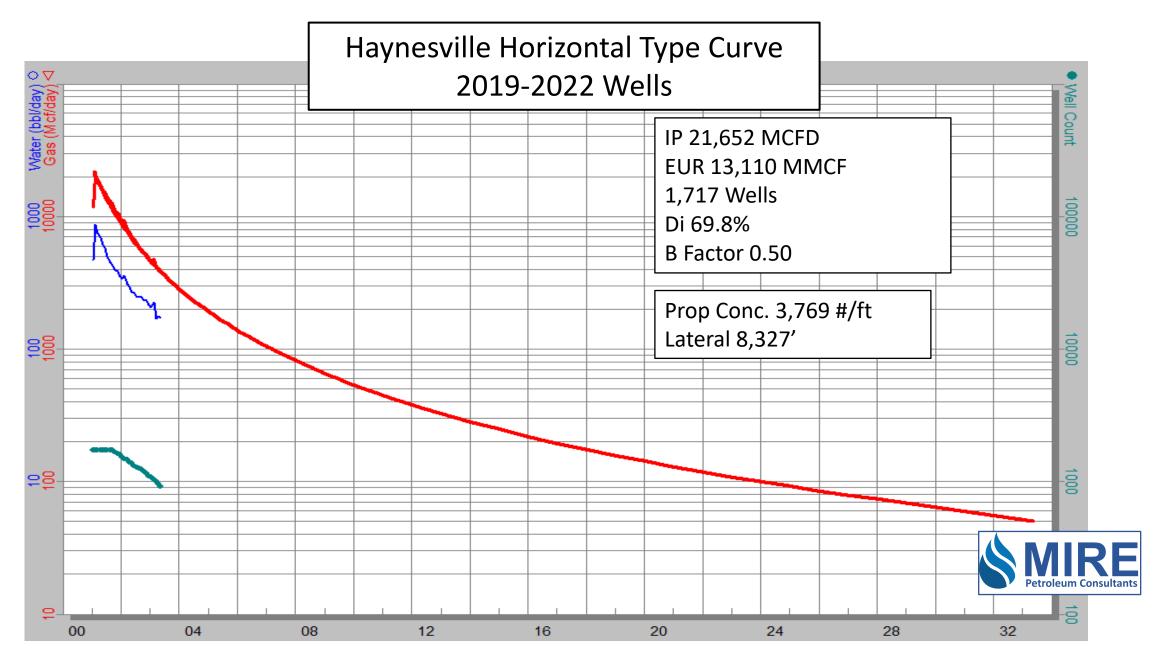
County/Parish	New Wells per Year																
County/Farisii	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023*	Total
DE SOTO (LA)	8	153	327	466	162	87	76	69	54	96	129	122	82	91	119	118	2,159
CADDO (LA)	18	68	90	78	11	25	32	28	18	27	43	55	44	74	113	79	803
RED RIVER (LA)	4	50	146	85	64	23	23	13	27	46	37	29	33	38	38	57	713
PANOLA (TX)	2	31	31	26	48	62	59	41	8	9	41	42	48	75	58	63	644
HARRISON (TX)	9	47	52	20	8	8	8		3	4	12	32	34	42	51	57	387
SAN AUGUSTINE (TX)		7	37	64	18	7	16	11	14	18	33	16	35	15	23	45	359
BOSSIER (LA)	5	27	31	39	14	5	15	11	6	20	21	21	25	17	37	31	325
SABINE (LA)		4	35	74	62	7	3	4	6	4	20	15	13	17	28	22	314
BIENVILLE (LA)	1	12	40	51	19	1	2	1			1	12	23	25	31	9	228
NACOGDOCHES (TX)		4	25	54	43		2	2	2	7	5	10	10	13	4	33	214
SHELBY (TX)		7	44	60	14	4	11	5	5		4	8	6	9	7	3	187
NATCHITOCHES (LA)				6	3							6	11	23	6	3	58
ANGELINA (TX)			1		1	1			2	5	10	9	1	2	8	3	43
SABINE (TX)			1	8	3											7	19
RUSK (TX)		2	5		1					4	3					0	15
WEBSTER (LA)			1	2							1		1	4	1	0	10
GREGG (TX)											5					0	5
UPSHUR (TX)			1													0	1
Totals	47	412	867	1,033	471	230	247	185	145	240	365	377	366	445	524	530	6,484





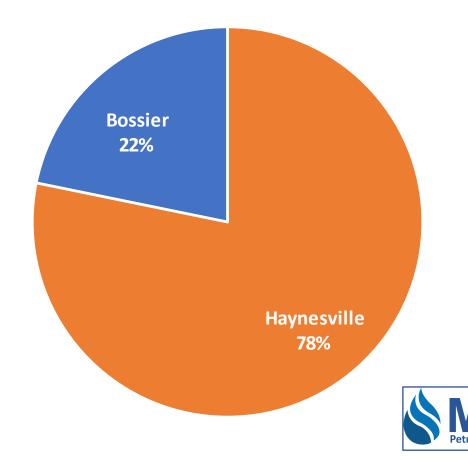




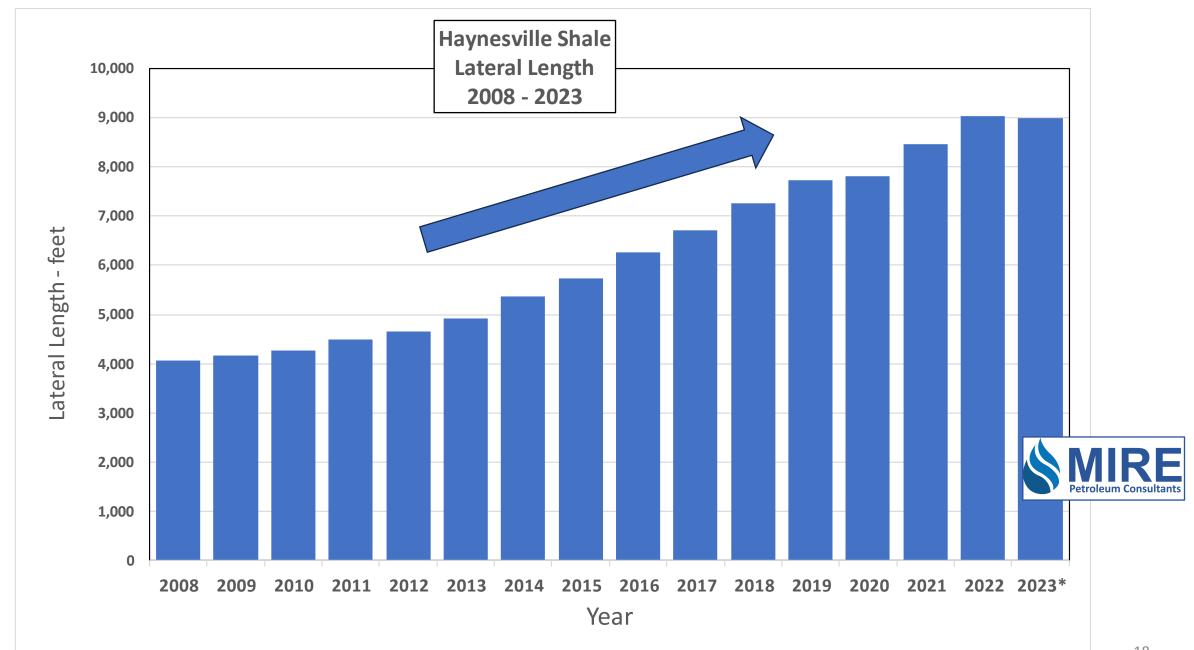


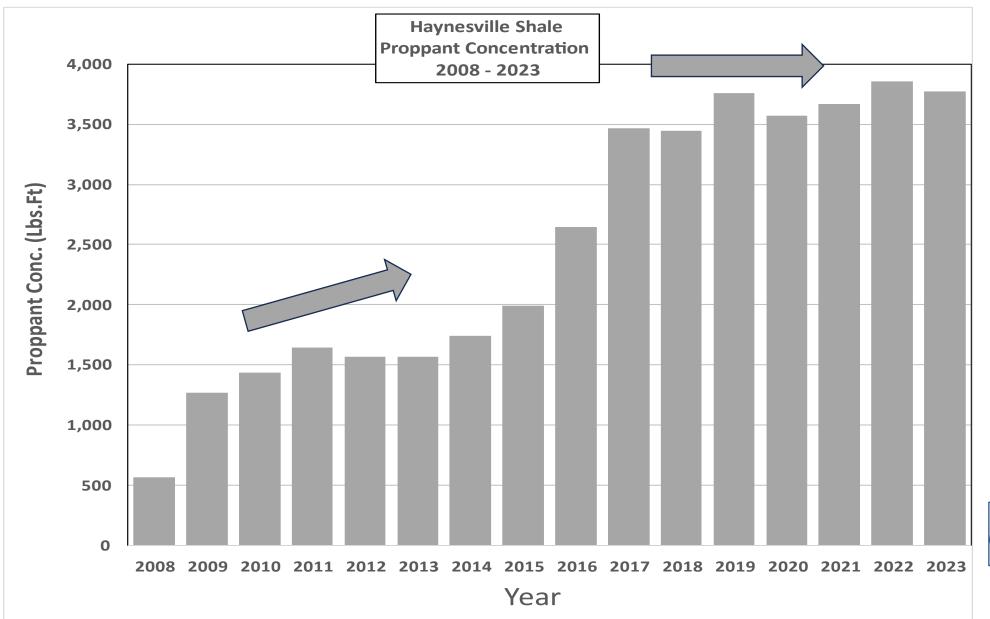
Year	Target Reservoir							
rear	Bossier	Haynesville	% Haynesville					
2008	28	100	78%					
2009	157	377	71%					
2010	337	699	67%					
2011	273	509	65%					
2012	64	184	74%					
2013	26	188	88%					
2014	31	179	85%					
2015	38	146	79%					
2016	35	111	76%					
2017	101	205	67%					
2018	98	269	73%					
2019	66	304	82%					
2020	4	337	99%					
2021	9	433	98%					
2022	10	527	98%					
2023	1	20	95%					
	1,278	4,588	78%					



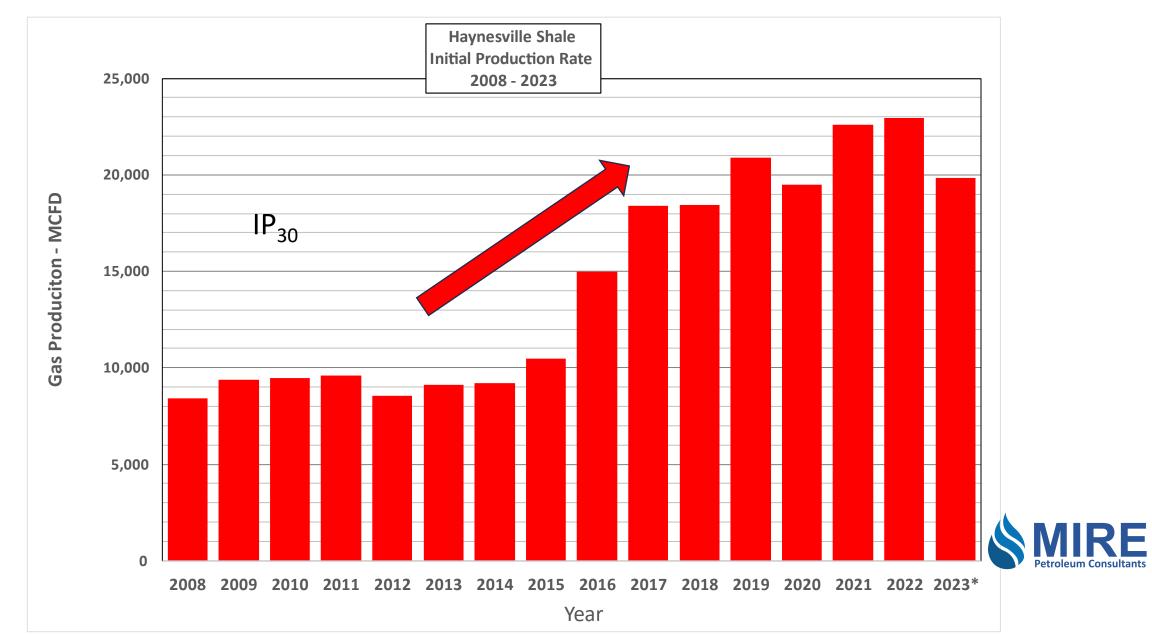


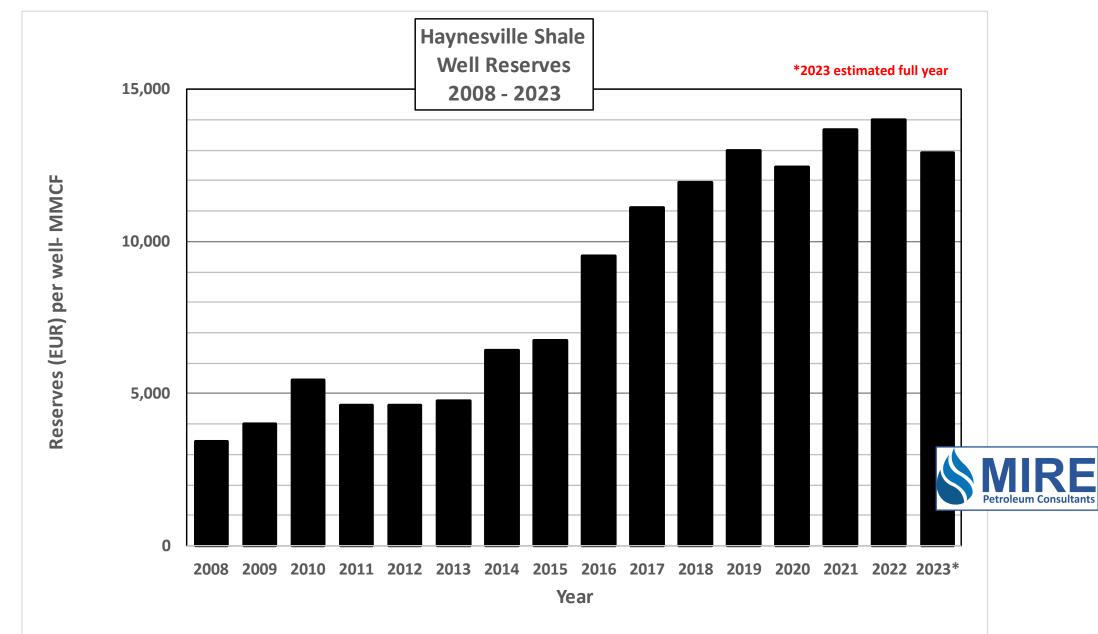
^{*} Drilling Info determinations

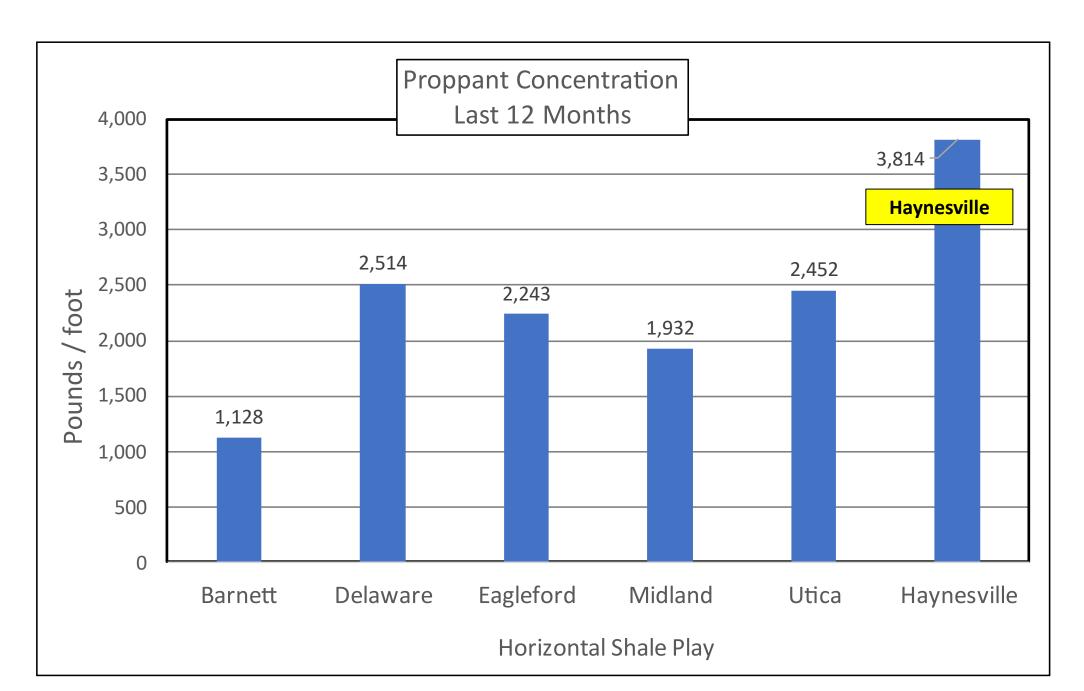


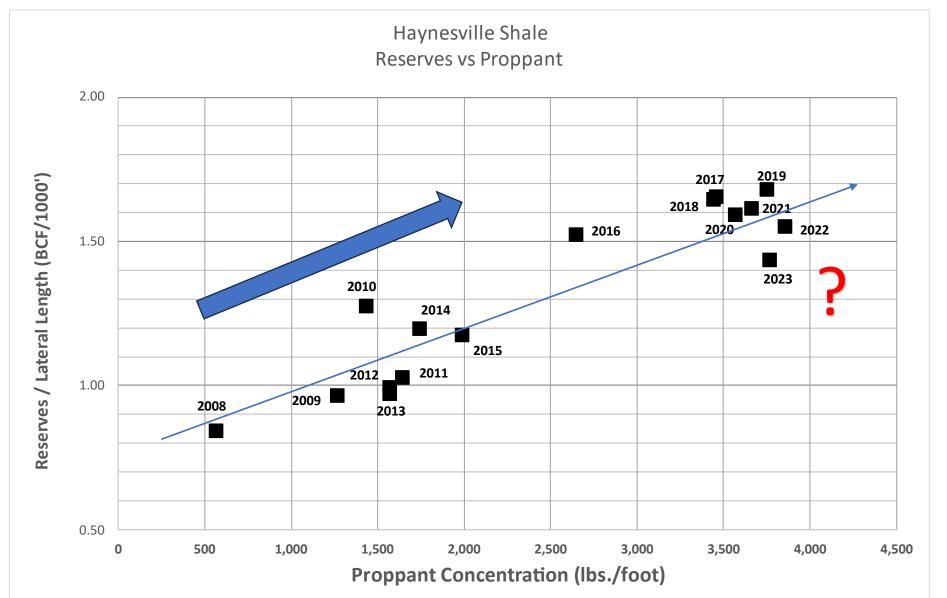




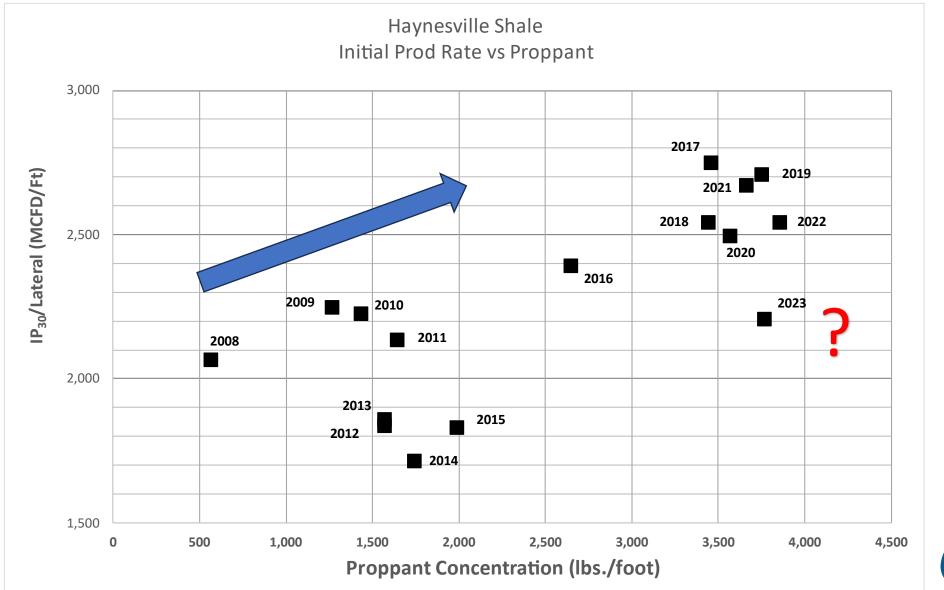








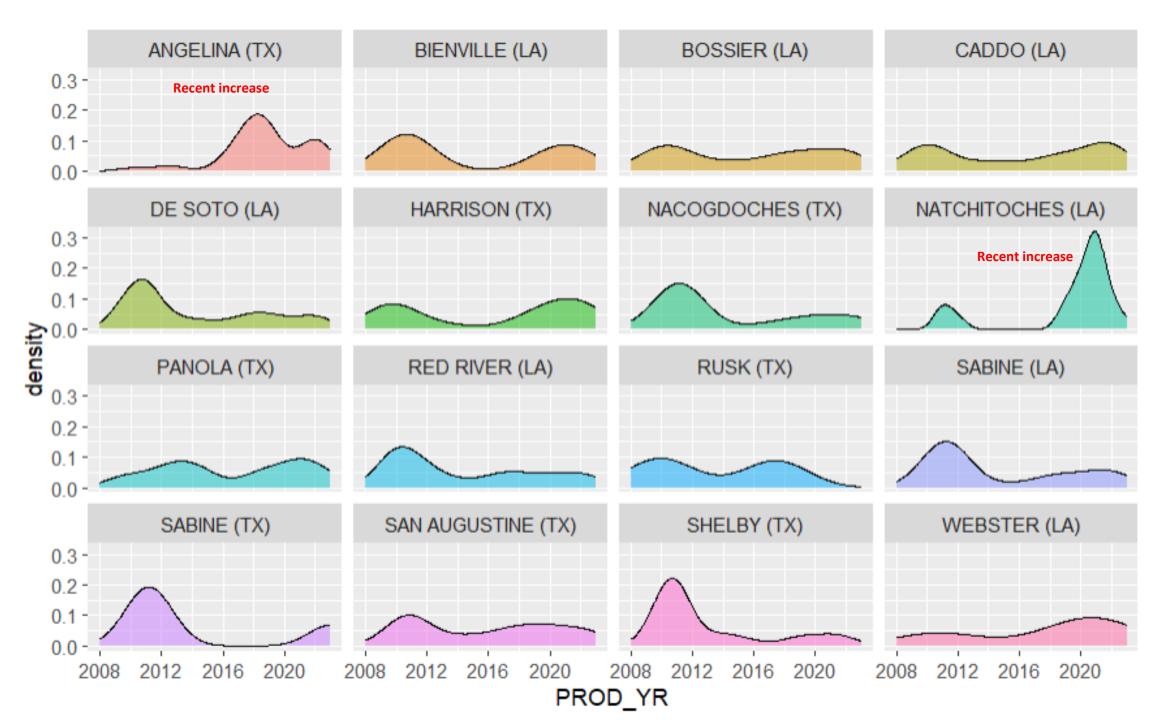


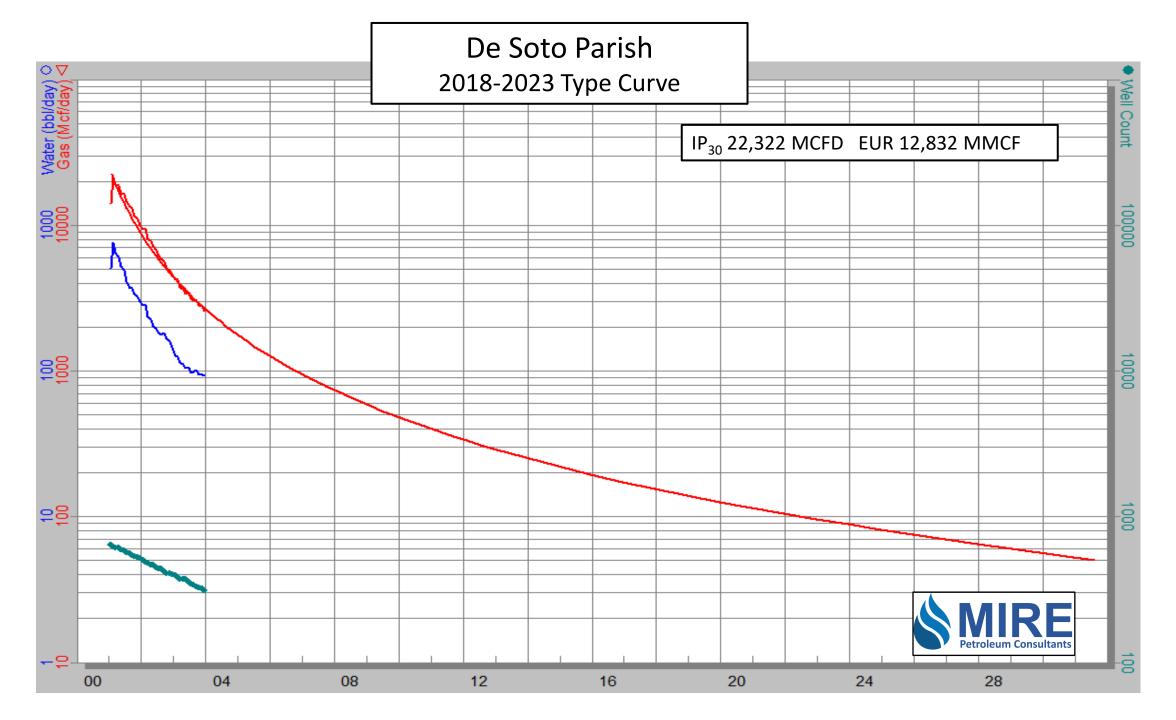


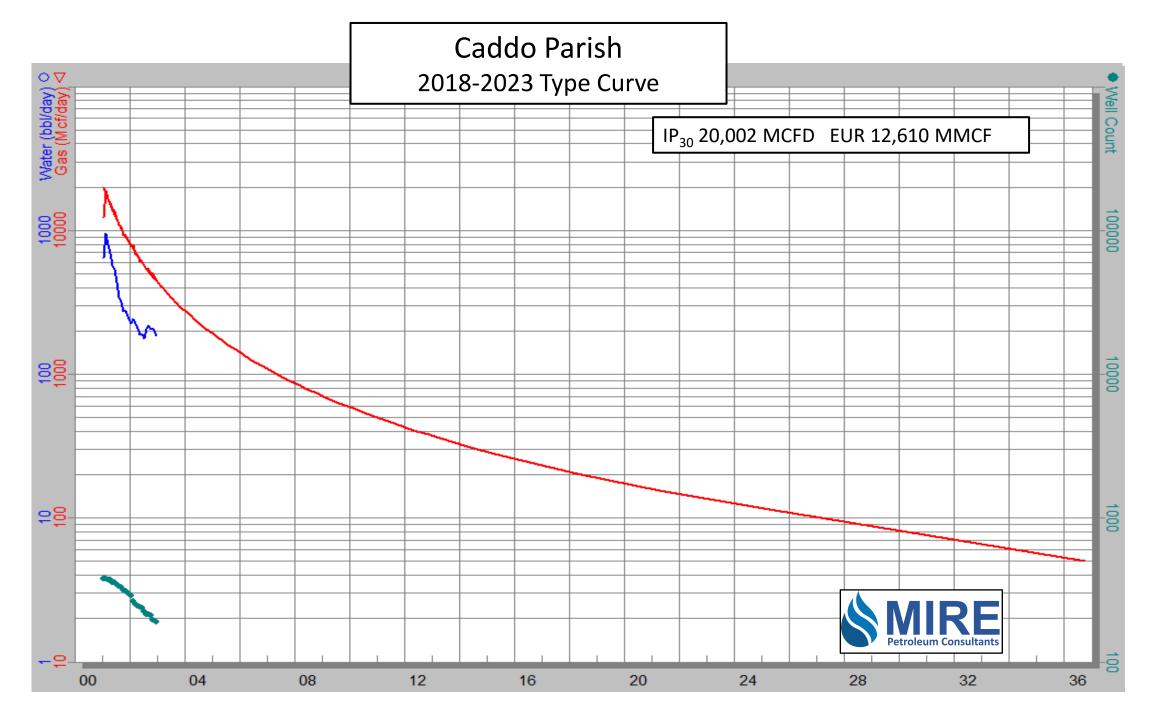


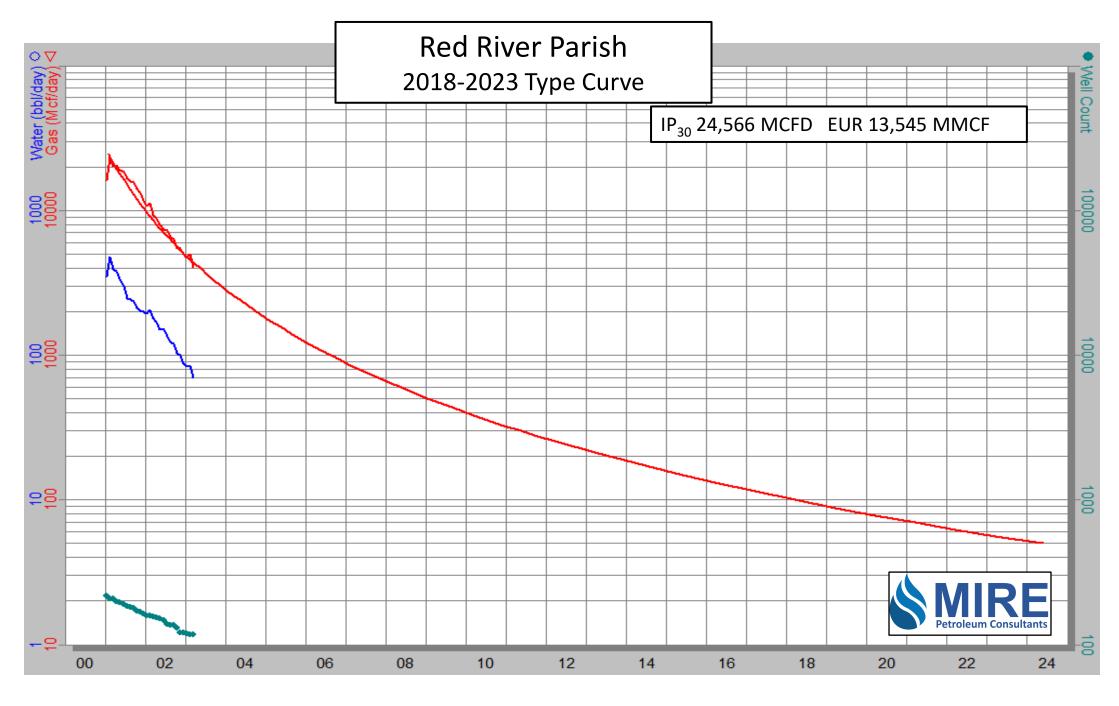
Recent Well Performance – Top Counties/Parishes

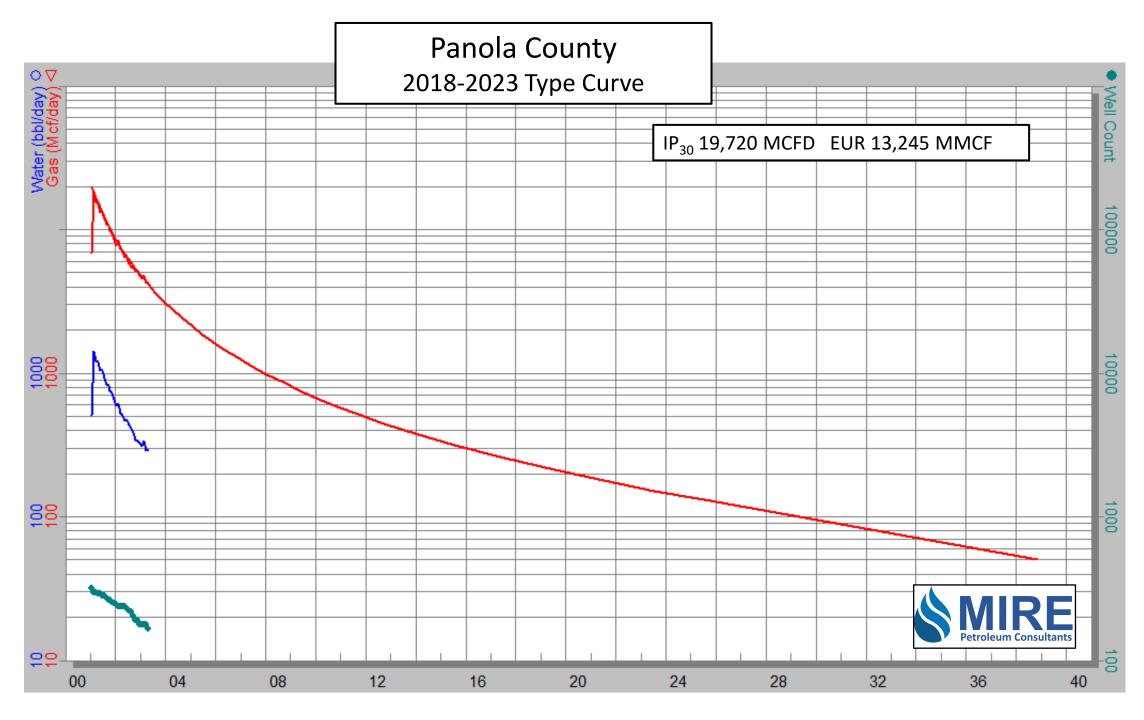
2018-2023 Well Performance										
County/Parish	Wells	IP ₃₀ (MCFD)	EUR (MMCF)	EUR/1000' (BCF)	IP ₃₀ /ft (MCFD)	Lateral (Ft)	Prop Conc (Lbs/Ft)			
De Soto (La)	638	22,322	12,832	1.63	2,828	7,894	3,825			
Caddo (La)	380	20,002	12,610	1.44	2,287	8,746	3,670			
Red River (La)	216	24,566	13,545	1.91	3,463	7,094	3,881			
Panola (Tx)	315	19,720	13,245	1.44	2,137	9,227	3,593			
Harrison (Tx)	206	20,004	12,200	1.26	2,064	9,690	3,577			
San Augustine (Tx)	149	16,517	12,716	1.68	2,188	7,550	3,417			

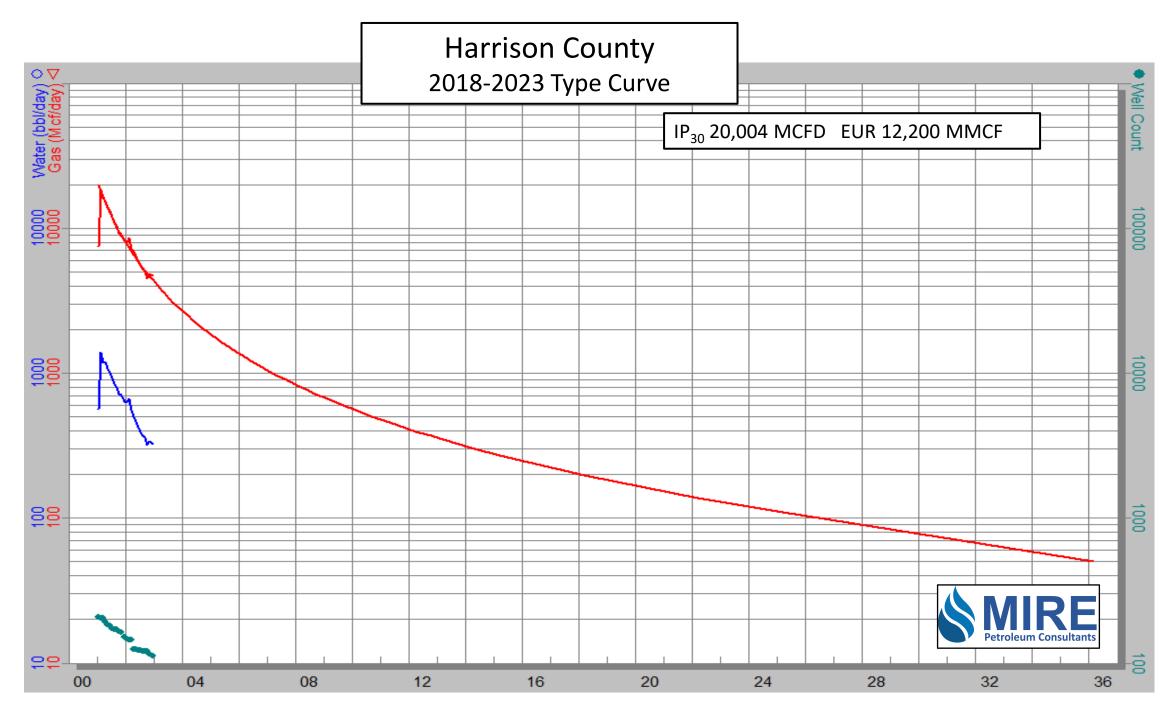


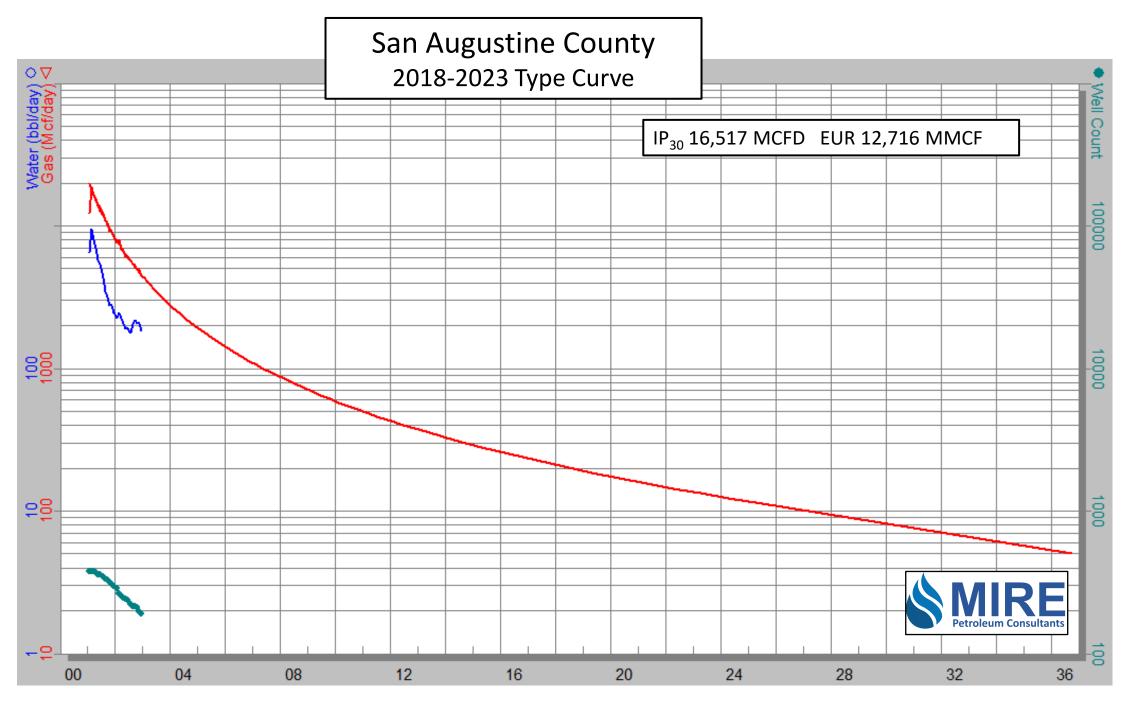










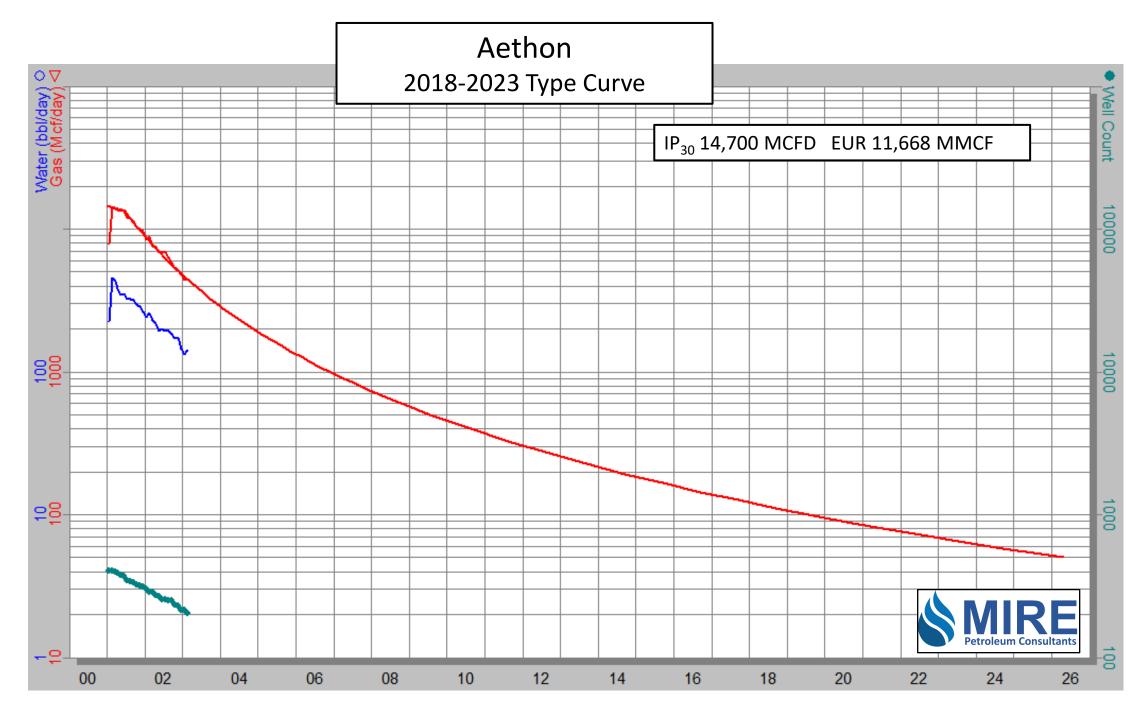


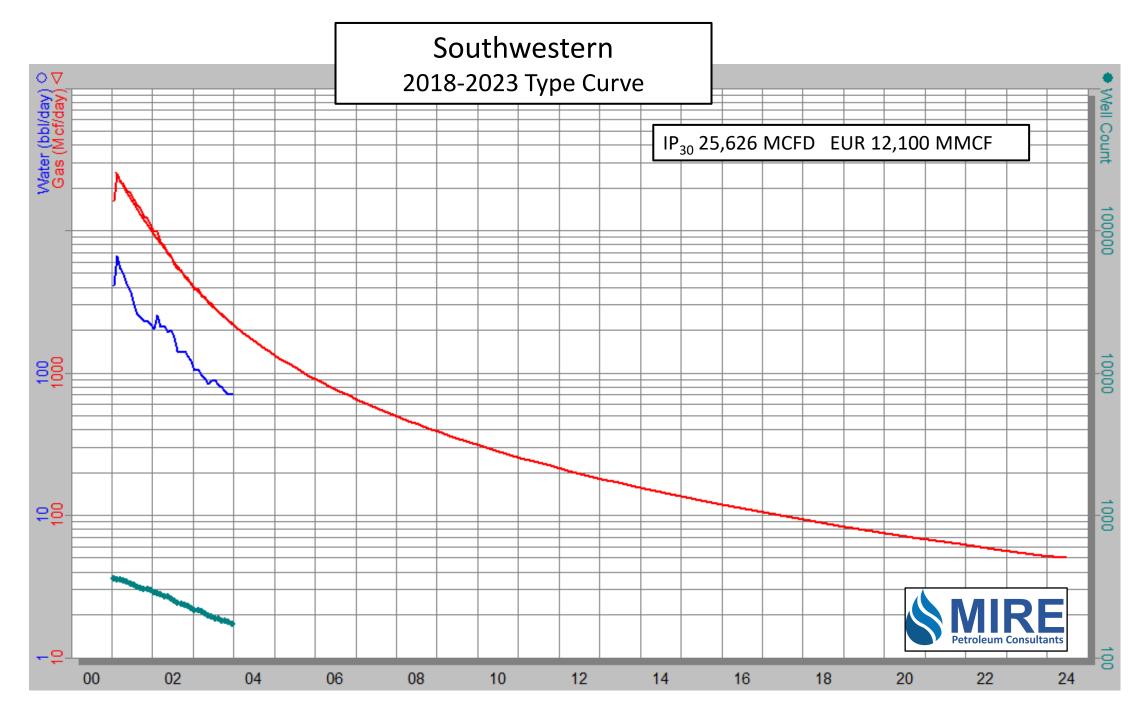
Most active operators

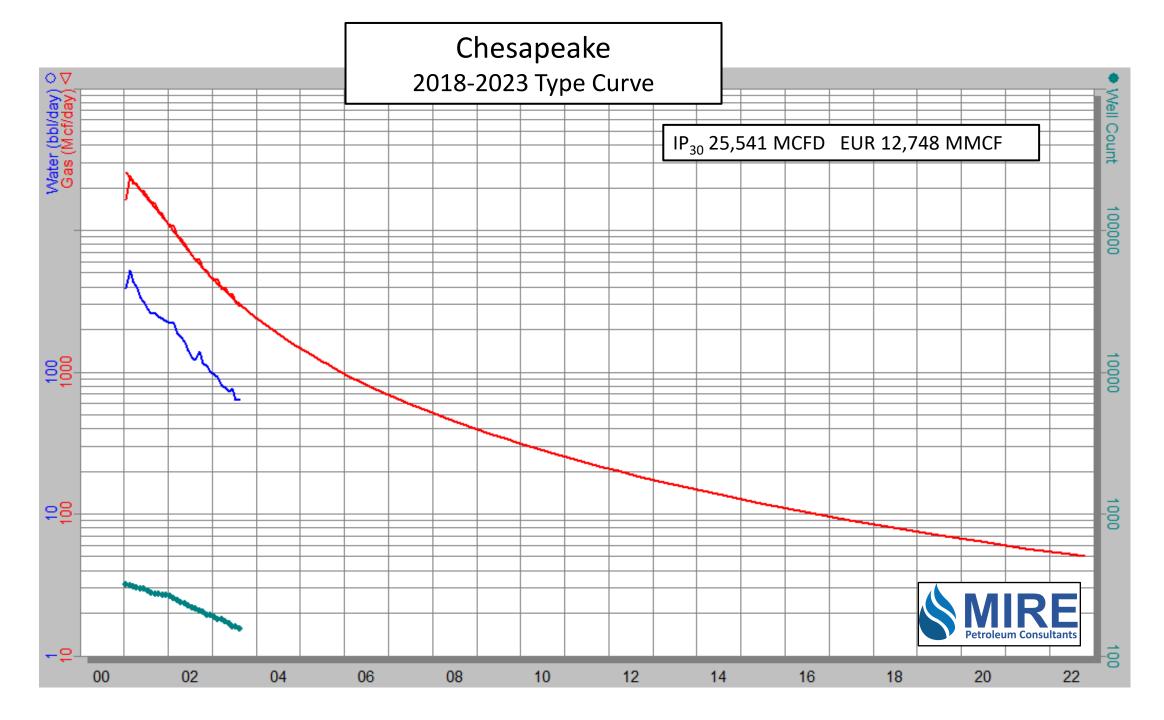
Operator	Current Production (MMCFD)	Operated Wells	Active Wells	% Active	Cummulative Production (BCF)	Production / Well (MCFD)
Aethon	2,667	689	582	84%	4,021	4,582
Southwestern	2,553	822	730	89%	5,428	3,498
Chesapeake	2,129	1,101	989	90%	7,117	2,152
Comstock	2,100	965	870	90%	5,674	2,414
Rockcliff	1,289	269	256	95%	1,747	5,035
BP	780	494	406	82%	3,503	1,922
Trinity	563	92	92	100%	352	6,123
Paloma	553	111	107	96%	667	5,171
GEP	491	132	116	88%	556	4,233
Sabine	450	126	120	95%	710	3,750
Exco	412	579	526	91%	2,814	784
XTO	400	328	303	92%	1,831	1,320
TGNR	72	223	222	100%	775	323

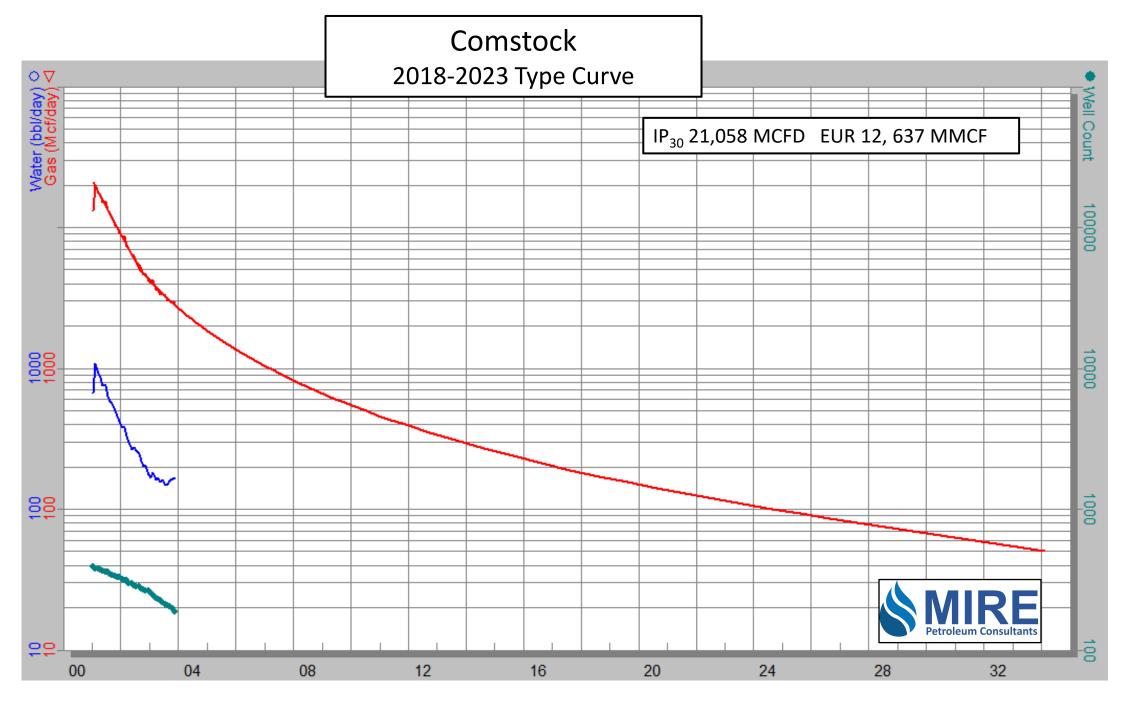
Recent Well Performance – Top Operators

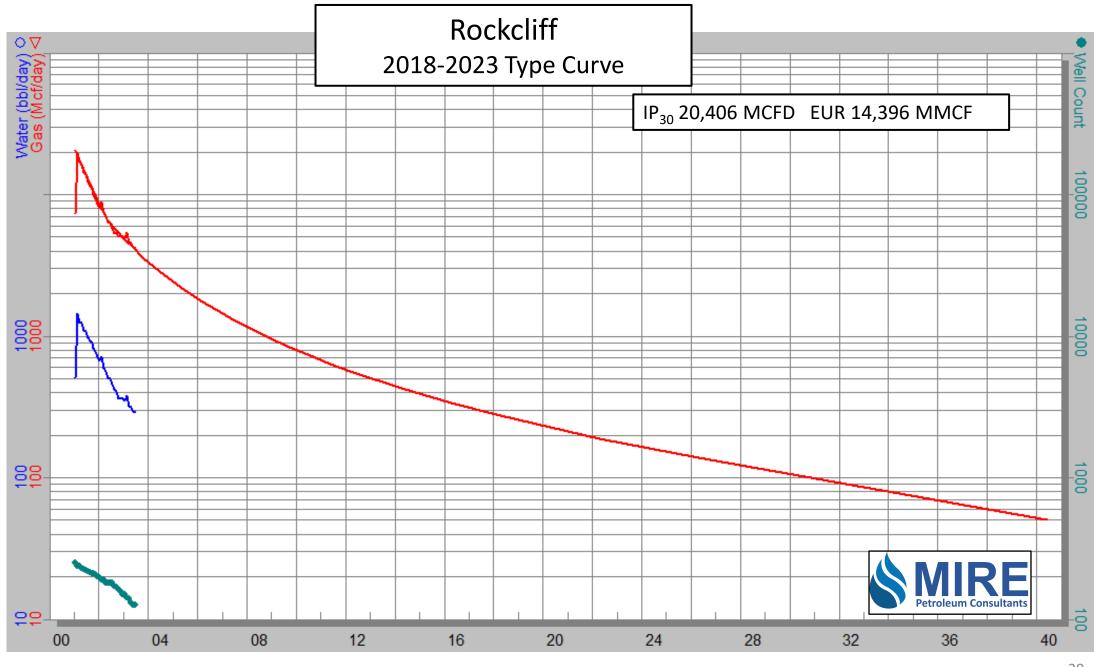
2018-2023 Well Performance										
County/Parish	Wells	IP ₃₀ (MCFD)	EUR (MMCF)	EUR/1000' (BCF)	IP ₃₀ /ft (MCFD)	Lateral (Ft)	Prop Conc (Lbs/Ft)			
Aethon	407	14,700	11,668	1.63	2,051	7,166	4,632			
Southwestern	359	25,626	12,100	1.54	3,270	7,838	3,790			
Chesapeake	316	25,541	12,748	1.57	3,138	8,139	3,444			
Comstock	390	21,058	12,637	1.43	2,385	8,830	3,532			
Rockcliff	251	20,406	14,396	1.54	2,181	9,358	3,473			
BP	110	20,344	15,004	1.85	2,509	8,107	3,257			

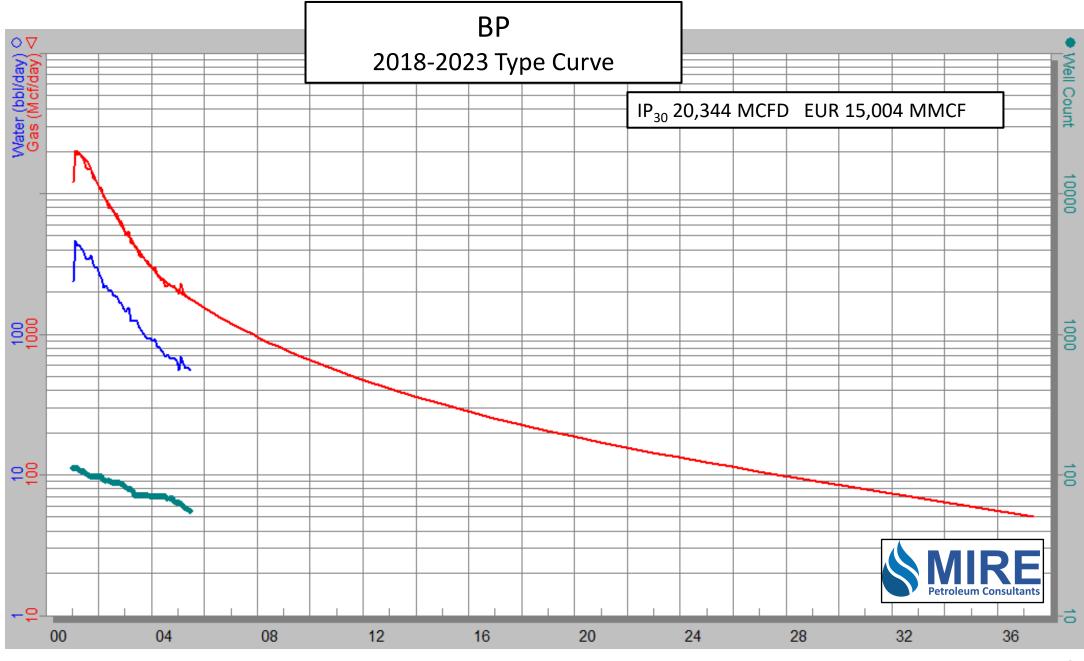


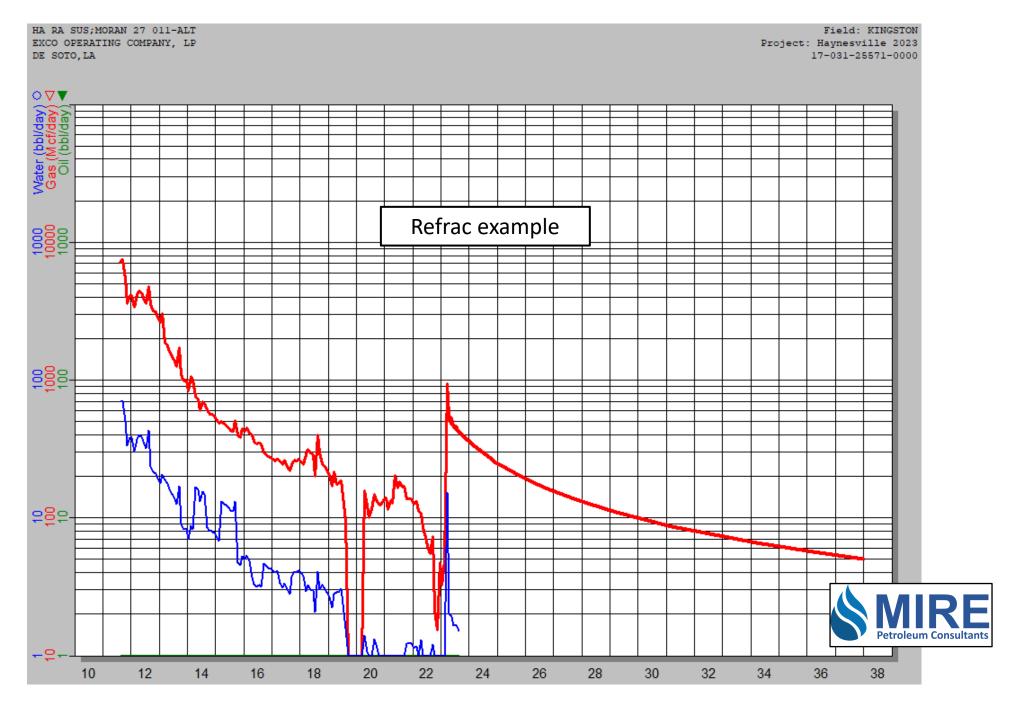


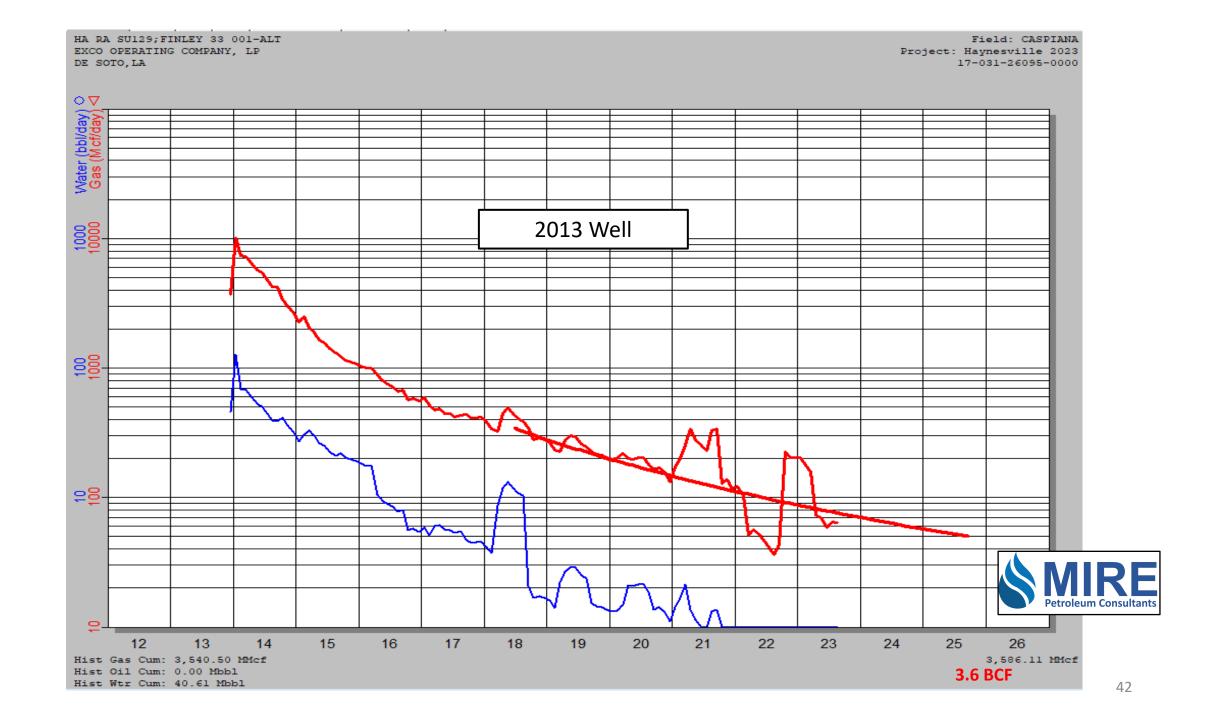


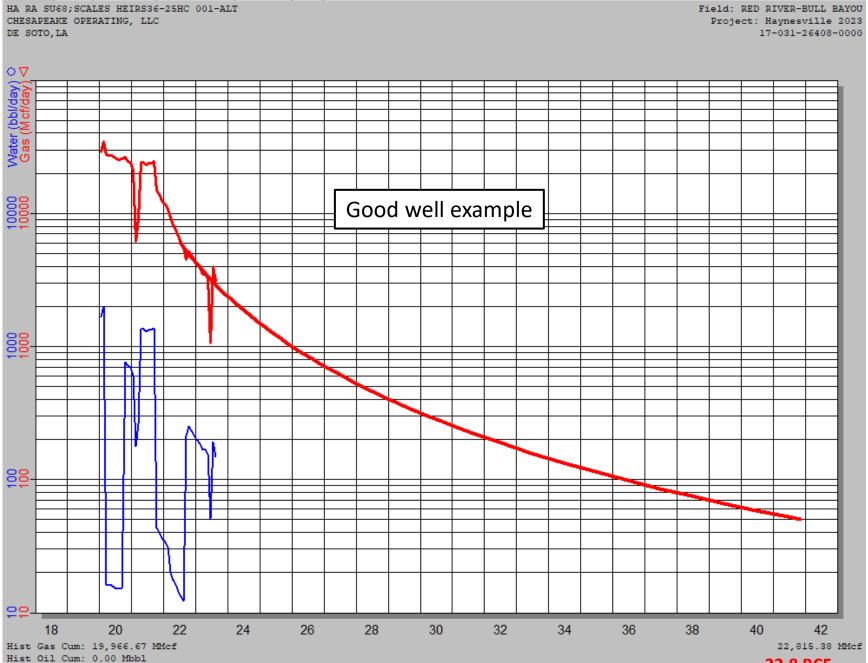








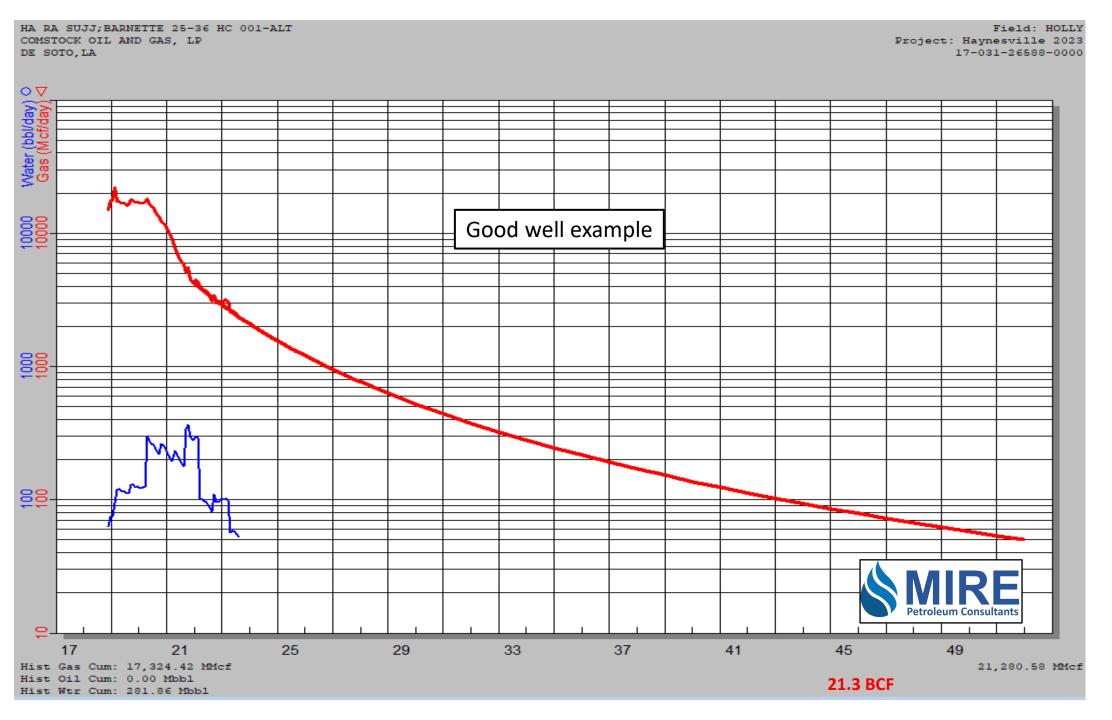


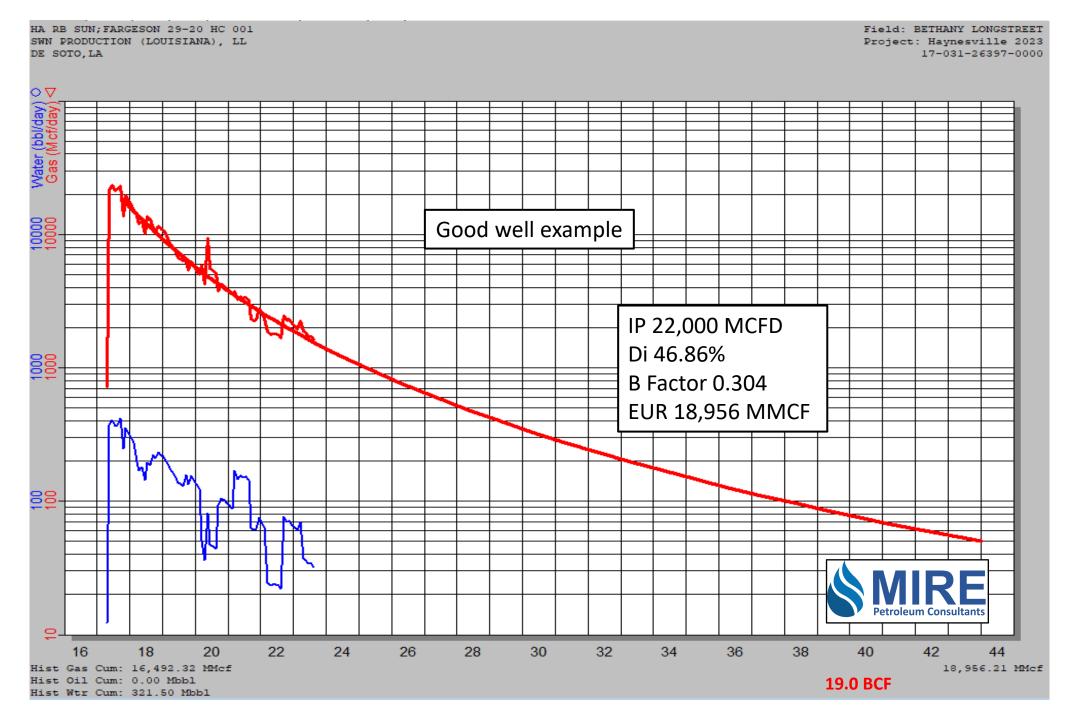




Hist Wtr Cum: 530.37 Mbbl

22.8 BCF





New Well Economics

- 2023 Type Curve (12,500 MMCF EUR)
- 100% WI & 80% RI
- Nov NYMEX Prices (IP Feb 2024)
- Drill & Completion Costs \$13.2 million
- Opex \$40,000 \$10,000 per month + \$0.25 /MCF



Date: 11/07/2023 7:28:51PM Partner: A11 Cases

Retrieval Code:

Reserve Cat. : Proved Undeveloped

0.00

0.00

Location :

Archive Set: defau lt

Est. Cum Oil (Mbbl):

Est. Cum Gas (MMcf) :

ECONOMIC PROJECTION

Haynesville 2023 2023 NEWDRILL

Discount Rate: 10.00

As of: 01/01/2024

TYPICAL NEW WELL (2023 TC) NOV 2023 NYMEX

Case: 2023 NEW DRILL Type: LEASE CASE

Field:

Operator: Reservoir : Co., State:, LA API No. :



Est. Cum Wa	nter (Mbbl) :	0.00										_	
Year	Oil Gross (Mbbl)	Gas Gross (MMcf)	Oil Net (Mbbl)	Gas Net (MMcf)	Oil Price (\$/bbl)	Gas Price (\$/M cf)	Oil & Gas Rev. Net (M\$)	M isc. Rev. Net (M\$)	Costs Net (M\$)	Taxes Net (M\$)	Invest. Net (M\$)	NonDise. CF Annual (M\$)	Cum Disc. CF (M\$)
2024	0.00	4,047.60	0.00	3,238.08	0.00	3.18	10,289.65	0.00	1,391.90	752.95	13,200.00	-5,055.20	-5,414.07
2025	0.00	2,340.02	0.00	1,872.01	0.00	3.73	6,991.86	0.00	935.00	485.37	0.00	5,571.48	-557.14
2026	0.00	1,336.69	0.00	1,069.35	0.00	3.77	4,028.05	0.00	634.17	278.89	0.00	3,114.99	1,910.97
2027	0.00	873.20	0.00	698.56	0.00	3.70	2,585.27	0.00	498.30	179.98	0.00	1,906.99	3,283.06
2028	0.00	620.45	0.00	496.36	0.00	3.64	1,805.28	0.00	335.11	126.36	0.00	1,343.81	4,161.72
2029	0.00	463.36	0.00	370.69	0.00	3.67	1,361.91	0.00	295.84	95.03	0.00	971.05	4,738.58
2030	0.00	361.25	0.00	289.00	0.00	3.62	1,046.87	0.00	264.31	73.37	0.00	709.19	5,121.61
2031	0.00	290.25	0.00	232.20	0.00	3.62	840.46	0.00	216.56	58.92	0.00	564.98	5,398.92
2032	0.00	239.37	0.00	191.49	0.00	3.64	696.10	0.00	203.84	48.73	0.00	443.53	5,596.86
2033	0.00	200.10	0.00	160.08	0.00	3.73	596.94	0.00	182.02	41.46	0.00	373.46	5,748.07
2034	0.00	170.41	0.00	136.33	0.00	3.83	521.59	0.00	114.60	35.94	0.00	371.04	5,884.80
2035	0.00	147.04	0.00	117.63	0.00	3.99	469.53	0.00	108.76	31.95	0.00	328.82	5,994.90
2036	0.00	128.61	0.00	102.89	0.00	4.17	428.64	0.00	104.15	28.81	0.00	295.68	6,084.86
2037	0.00	112.96	0.00	90.37	0.00	4.17	376.47	0.00	100.24	25.30	0.00	250.93	6,154.25
2038	0.00	100.33	0.00	80.26	0.00	4.17	334.37	0.00	97.08	22.47	0.00	214.81	6,208.26

2,707.86 1,375.01 1,150.87 812.49 0.00 4.17 181.98 186.86 Rem. 0.00 649.99 0.00 0.00 0.00 31.3 12,556.42 6,395.12 Total 0.00 12,244.11 0.00 9,795.29 0.003.58 35,080.84 0.006,856.91 2,467.50 13,200.00 Ult. 0.00 12,244.11

1.486

1.951

1.90

38.81

Major Phase : Gas

Initial Rate: 603,618.75 Mcf/month 2,097.65 Mcf/month Ab and onment:

b = 0.55Initial Decline: 70.120 %/year

Initial Ratio: 0.000 bb1/Mcf Ab and on Ratio: 0.000 bb1/Mcf Ab and on Day: 04/12/2055

Initial 1st Rev. 2nd Rev. Working Interest: 1.00000000 0.00000000 0.00000000

E co. Indicators

Years to Payout:

Return on Investment (disc):

Internal Rate of Return (%):

Return on Investment (undisc) :

Revenue Interest: 0.80000000 0.00000000 0.000000000 Rev. Date:

Present Worth Profile (M\$)

PW5.00%: 8,844.80 3,262.21 PW 20.00%: 7,271.25 8.00%: PW 30.00%: 1,269.07 PW10.00%: 6,395.12 PW 40.00%: -146.79PW 12.00%: 5,624.43 PW 50.00%: -1,218.61PW 15.00%: PW 60.00%: 4,623.80 -2,064.49





Kurt Mire, P.E.

Reservoir Engineer/Project Manager

Summary

Mr. Mire is a senior reservoir and production engineer with thirty-five (35) years of experience in E&P. This experience has been gained at major and independent oil companies and by projects done for Tier I consulting firms Ryder Scott Company and Netherland, Sewell & Associates. Domestic experience includes Louisiana, Texas, Gulf of Mexico, Mid-Continent, and Rocky Mountains. International experience includes Mexico, South America, Iraq and Trinidad. He has proven skills in reservoir and production engineering, operations, reserves estimation, Monte Carlo simulation, nodal analysis, field studies, project management and property evaluations.

Experience – 35 years

Mire Petroleum Consultants, Houston	2020 – 2023
Mire & Associates, Inc., Houston	2004 – 2020
BP America, Houston	2001 – 2003
Independent Consultant, Lafayette, LA	1999 – 2001
Subsurface Consultants, Lafayette, LA	1993 – 1998
Black Gold Production Co., Hammond, LA	1991 – 1993
Independent Consultant, Morgan City, LA	1988 – 1991
Texaco, Inc., Morgan City, LA	1983 – 1987

Education

B.S., Petroleum EngineeringUniversity of Louisiana at Lafayette, 1982

Texas Professional Engineer #115886





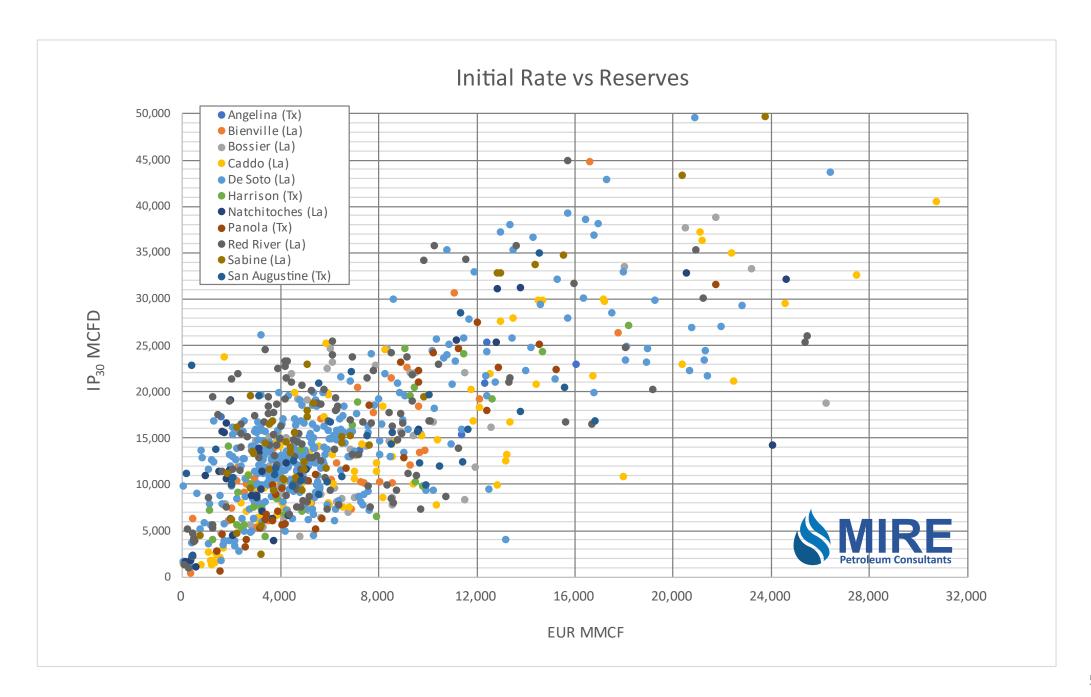
Fabian Vera
Petroleum Engineer

Summary

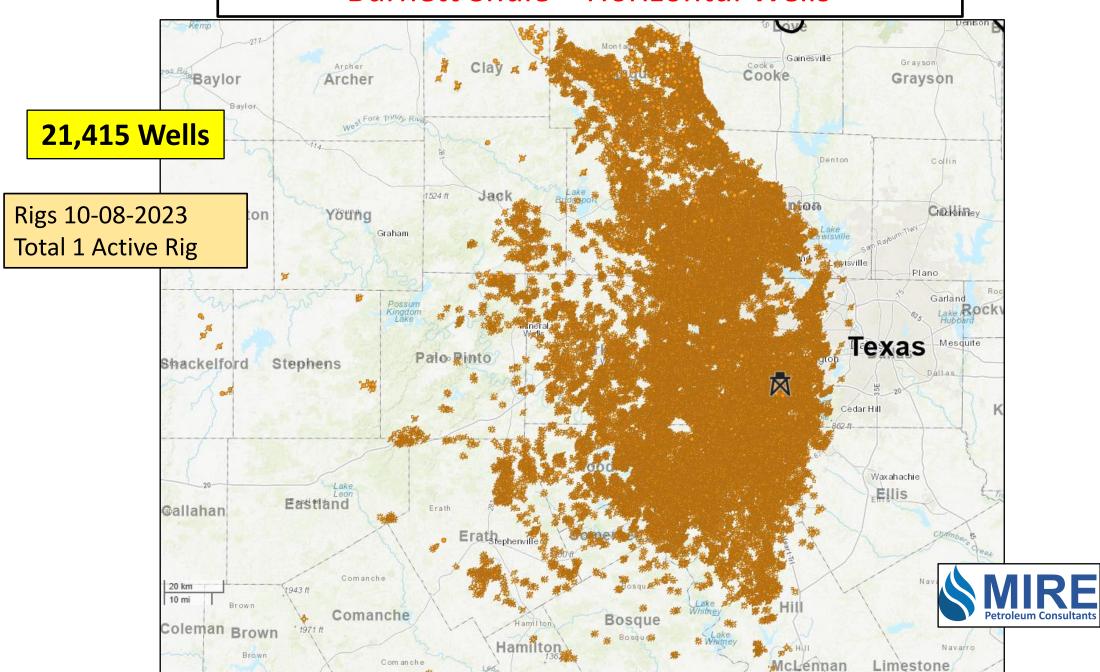
Mr. Vera is an engineering consultant and capital allocator with US and international experience. He is proficient in Spanish, German, and Portuguese, fluent with Bloomberg Terminal and Refinitiv, and experienced in coding languages like Python, R, and Matlab. Prior to his tenure at Mire Petroleum Consultants, Mr. Vera was a petroleum consultant for CDEUS helping with domestic and foreign reservoir simulation projects. Before joining CDEUS, he was a research engineer at Baker Hughes in the Applied Technology Division, working on unconventional assets in the US onshore, China, Poland, and Argentina. He started his US career as a research assistant at Texas A&M University. Fabian has authored several technical papers, participated in many industry panels, and given presentations at industry conferences.

Experience – 10 years		Education				
Mire Petroleum Consultants, Houston, TX	2020 – 2023	M.B.A., Finance and Data Analytics				
Mire & Associates, Inc., Houston, TX	2018 – 2020	MIT Sloan x Asia School of Business, 2023				
CDEUS, Houston, TX	2015 – 2019					
Baker Hughes, Houston, TX	2013 – 2015	M.Sc., Petroleum Engineering				
Texas A&M University, College Station, TX	2010 – 2012	Texas A&M University, College Station, TX, 2012				
Petrobras, Ecuador	2009					
		B.S., Petroleum Engineering				
		Espol University, Guayaquil, Ecuador, 2009				

Additional information

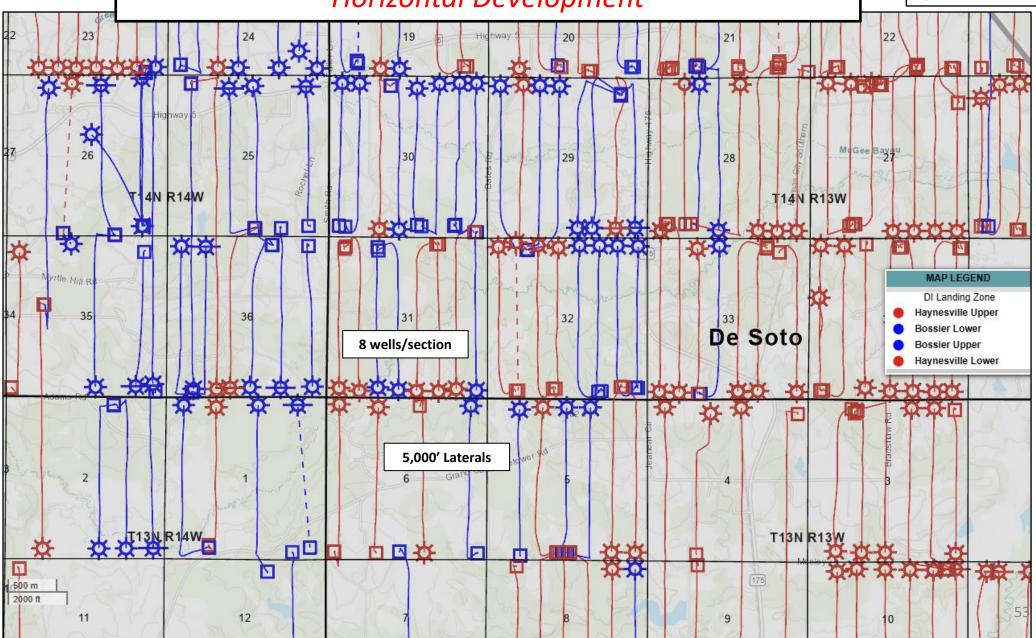


Barnett Shale - Horizontal Wells

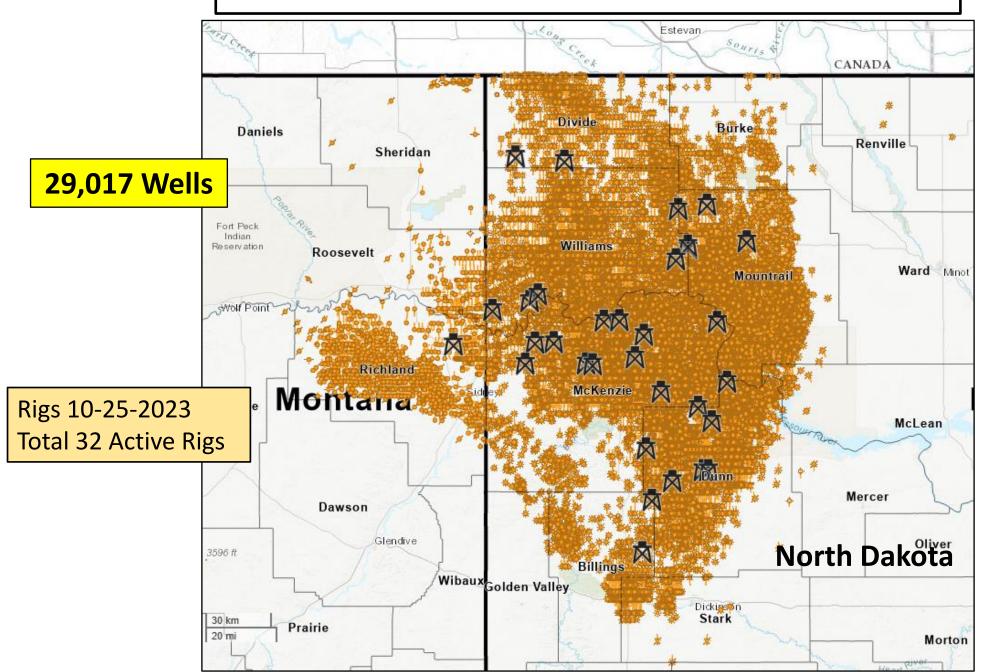


De Soto Parish Horizontal Development





Bakken Shale - Horizontal Wells

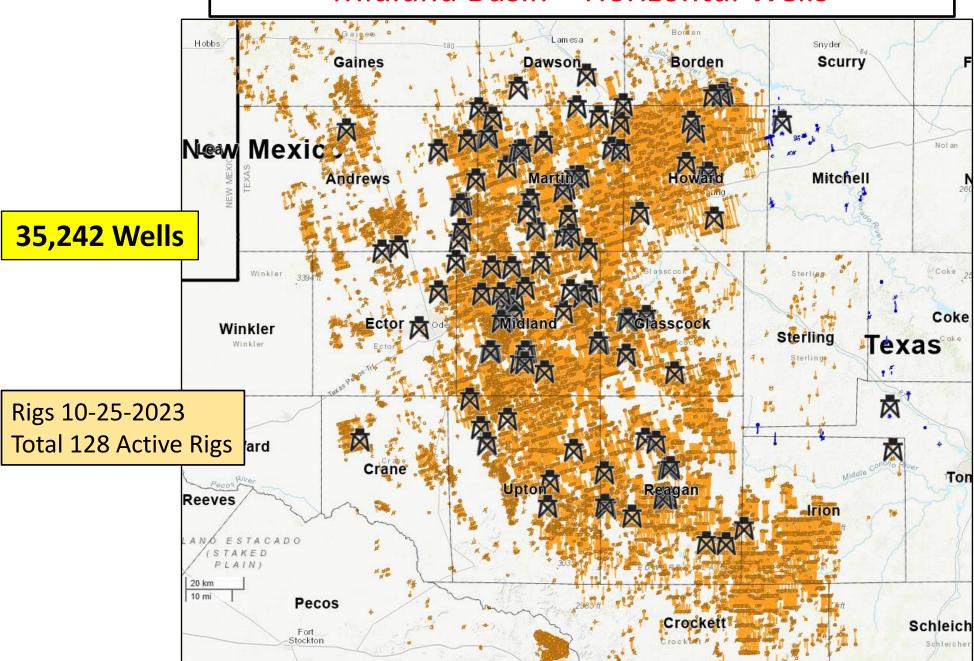




Delaware Basin – Horizontal Wells Chaves Gaines **41,667 Wells** May Nexico **Andrews** Otero Ector Texas **Ector** Winkle Rigs 10-25-2023 Total 173 Active Rigs Crane Reeves 20 km Pecos Jeff Davis

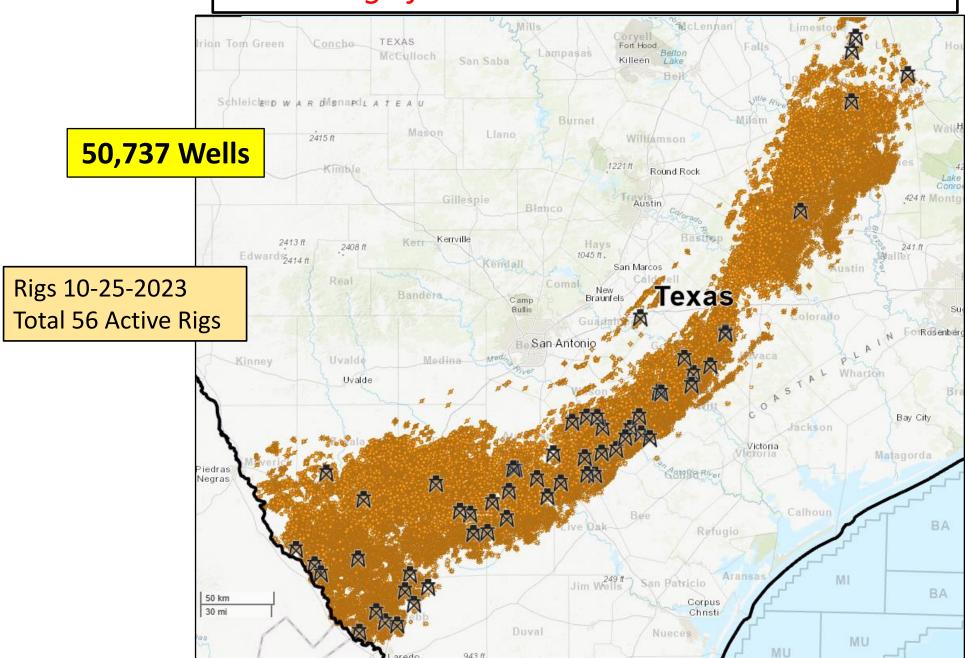


Midland Basin – Horizontal Wells



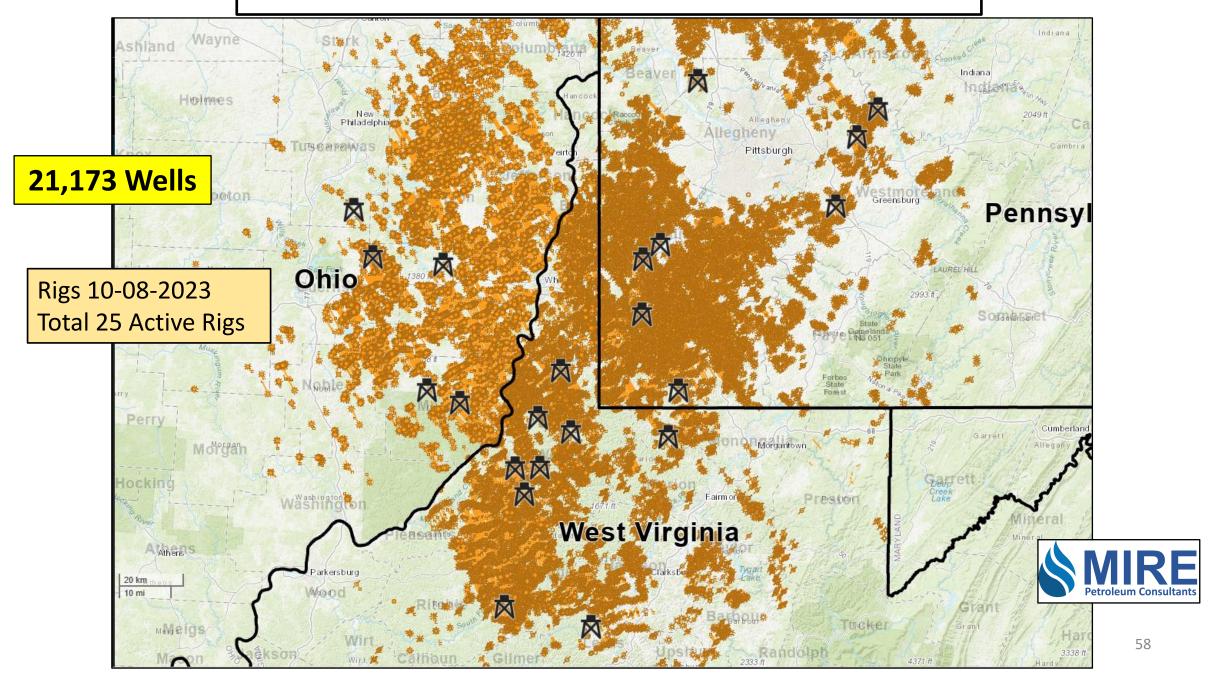


Eagleford Shale - Horizontal Wells

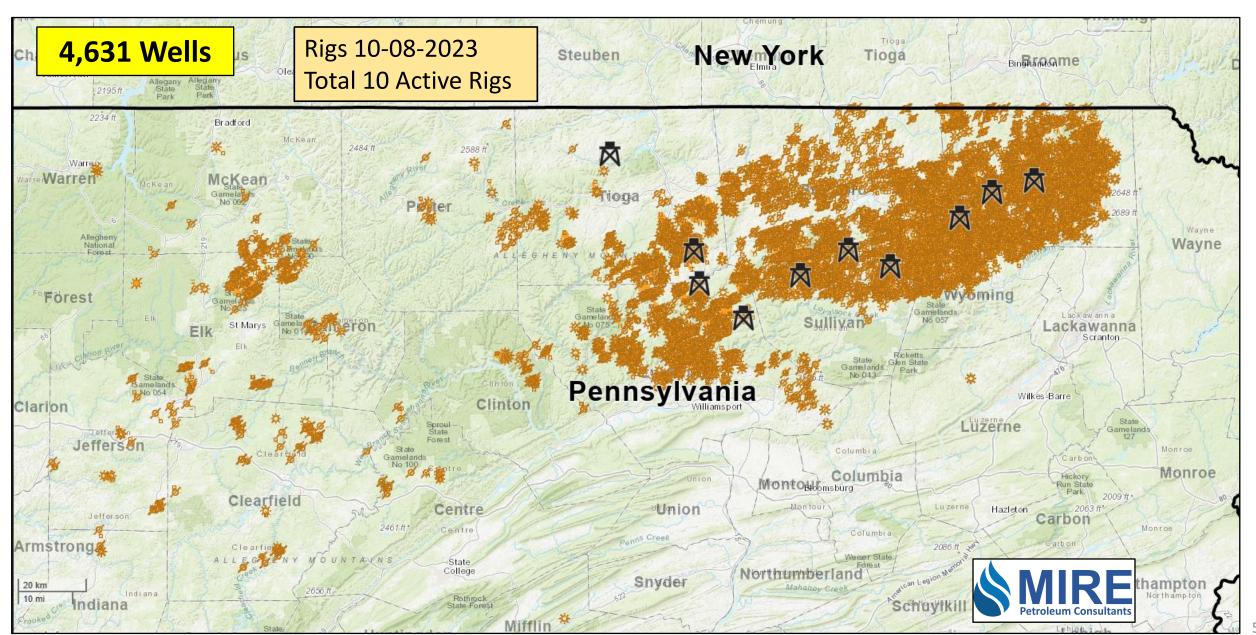




Utica Shale - Horizontal Wells



Marcellus Shale – Horizontal Wells



Haynesville Shale – Horizontal Wells 2008 - 2023

