

BULLETIN

Corpus Christi Geological Society



and

Coastal Bend Geophysical Society



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2022
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CORPUS CHRISTI GEOLOGICAL SOCIETY
P.O. BOX 1068* C.C.TX. 78403
2021-2022

www.ccgeo.org

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GEOLOGICAL SOCIETY COMMITTEES & CHAIRPERSONS

MEMBERS PLEASE NOTE COMMITTEES CONTINUE TO FUNCTION WITHOUT A NAMED CHAIR, ALL ARE WELCOME TO ANY COMMITTEE THAT SUITES YOUR INTEREST

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History	OPEN (Ray Govett)	361-855-0134	ray30@hotmail.com
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Type Logs			



COASTAL BEND GEOPHYSICAL SOCIETY
P.O. BOX 2741 *C.C. TX. 78403
2021-2022

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President	Dr. Subbarao Yelisetti	361-593-4894	subbarao.yelisetti@tamuk.edu
Vice President	Dr. Mohamed Ahmed	361-825-3278	mohamed.ahmed@tamucc.edu
Secretary/Treasurer	Charles Benson	402-319-0064	charlesljr.@icloud.com
Golf Chairman	Mark Wiley	361-902-2844-office 361-445-6712-mobile	Mark_Wiley@eogresources.com
Scholarship Chairman	Matt Hammer	361-888-4792 361-563-6137	mhammer@royalcctx.com

**Visit the geological
web site at
www.ccgeo.org**

CCGS/CBGS JOINT MEETING SCHEDULE 2021-2022

September 2021							October 2021							November 2021						
S	M	T	W	Th	F	S	S	M	T	W	Th	F	S	S	M	T	W	Th	F	S
			1	2	3	4						1	2		1	2	3	4	5	6
5	6	7	8	9	10	11	3	4	5	6	7	8	9	7	8	9	10	11	12	13
12	13	14	15	16	17	18	10	11	12	13	14	15	16	14	15	16	17	18	19	20
19	20	21	22	23	24	25	17	18	19	20	21	22	23	21	22	23	24	25	26	27
26	27	28	29	30			24	25	26	27	28	29	30	28	29	30				
							31													

2021-22 Membership Kickoff—
Nueces Brewing Co. Downtown
Thursday, Sept., 9, 2021
5:30p.m.-til

Oct. 20th meeting at
Crawdaddy's Downtown.
Presenter: Barry J Rava-
Exploration consultant to
international companies.
"Subtle Prospects in the
21st Century: Are They
Relevant?"

Nov. 17th meeting at
Crawdaddy's Downtown.
Presenter: R. Scott Pollard
"Magnus Opus --A Long Look
Back"

December 2021							January 2022							February 2022						
S	M	T	W	Th	F	S	S	M	T	W	Th	F	S	S	M	T	W	Th	F	S
			1	2	3	4							1			1	2	3	4	5
5	6	7	8	9	10	11	2	3	4	5	6	7	8	6	7	8	9	10	11	12
12	13	14	15	16	17	18	9	10	11	12	13	14	15	13	14	15	16	17	18	19
19	20	21	22	23	24	25	16	17	18	19	20	21	22	20	21	22	23	24	25	26
26	27	28	29	30	31		23	24	25	26	27	28	29	27	28					
							30	31												

Jan. 19 meeting at
Crawdaddy's Downtown.
Presenter: Robert Schneider
"Seismic Stratigraphy Via
Attribute Analysis, Brooks
County, TX."

Feb. 16 meeting at
Crawdaddy's Downtown
Presenter: Dr. Rajesh
Vayavur, Research
Associate-Geophysics,
Harquail School of Earth
Sciences, Laurentian Univ.,
Sudbury, Ontario, Canada
"Mineral Exp. In Canada

CCGS/CBGS Joint Meeting Schedule 2021-2022

March 2022							April 2022							May 2022						
S	M	T	W	Th	F	S	S	M	T	W	Th	F	S	S	M	T	W	Th	F	S
		1	2	3	4	5						1	2	1	2	3	4	5	6	7
6	7	8	9	10	11	12	3	4	5	6	7	8	9	8	9	10	11	12	13	14
13	14	15	16	17	18	19	10	11	12	13	14	15	16	15	16	17	18	19	20	21
20	21	22	23	24	25	26	17	18	19	20	21	22	23	22	23	24	25	26	27	28
27	28	29	30	31			24	25	26	27	28	29	30	29	30	31				

**April 20 meeting at
Crawdaddy's Downtown**

**May meeting at Crawdaddy's
Downtown**

Calendar of Meetings and Events Meetings and Events

Calendar of Area Monthly Meetings

Corpus Christi Geological/Geophysical Society.....	Third Wed.—11:30a.m.
SIPES Corpus Christi Luncheons.....	Last Tues.—11:30a.m.
South Texas Geological Society Luncheons.....	Second Wed—noon San Antonio
San Antonio Geophysical Society Meetings.....	Fourth Tuesday
Austin Geological Society.....	First Monday
Houston Geological Society Luncheons.....	Last Wednesday
Central Texas Section of Society of Mining, Metallurgy & Exp.....	2 nd Tues every other month in San Antonio



From the President's Desk

Rick Paige

A New Beginning.

Happy New Year! I hope your holidays were Merry and Bright. At the time of this writing, I'm just finishing off Thanksgiving leftovers, college football conference championship games are several days away, and nights are starting to bring a little nip in the air.

Unfortunately, also announcing itself as of this writing is the Omicron variant of the Covid-19 virus. Still in the first week of its announced discovery, much about it remains unknown. Consequently how it will affect our Society activities also remains unknown at this time. For now, we will continue with our planned meetings and events.

First on that list is our monthly technical luncheon meeting, Jan 19th, at Crawdaddys. Robert Schneider, Assistant Professor of Geology at Texas A&M Kingsville, will be talking to us about delineating channel sands within a middle Wilcox submarine canyon, a subject of great interest to many of us, myself included (it was my thesis topic)!

The February 16th meeting features a speaker provided by the CBGS, Dr. Rajesh Vayavur, who will shift our gears a little with a talk about mineral exploration. He will explain how he uses field modelling and seismic inversion to identify metal endowed areas. Dr. Vayavur is based in Sudbury Ontario, and so we

will be trying something a little different, a live-stream Zoom meeting delivered to our in-person Crawdaddys luncheon venue.

Fermin Munoz has confirmed the annual golf tournament, canceled the last two years due to (what else) COVID, is now a go! He has reserved Friday, April 22nd at North Shore Country Club for the event. He could use sponsorship, volunteer helpers, and of course players! If you enjoy golf, or just want to be helpful, please contact Fermin at fmunoz04@hotmail.com, 361-960-1126. More information will follow via email as we get closer to the date.

Fifty people attended our November meeting, which included the awarding of Fall College scholarships. See Dawn Bissell's report in this issue to see a list of the recipients. Thank you Dawn, and the entire Scholarship committee for your important work.

A New End? A Frank Discussion on the Future of the CCGS.

I must now discuss a subject important to every member of the CCGS, and indirectly the CBGS as well: the longevity of our professional society. Our membership has fallen steadily over the last decade primarily due to "The Great Crew Change" in the oil and gas sector. At the same time the number of volunteers stepping forward to assist in stewarding our organization has also fallen, and in my opinion, is in danger of dropping below critical mass - i.e. volunteer numbers too low to keep the society running each season without overloading any one individual. The past 4 years has seen, essentially, the same volunteers sit on your board of directors. When I first joined the CCGS in 1990 nearly all board members served 1 term only. Heck, back then we actually held multi-candidate elections! I can't remember the last time we had multiple candidates for any board position.


Also back then, chair positions, such as advertising, arrangements, membership coordinator, continuing education, etc. usually served multiple years (typically two), but recently those terms have increased as few members step up to volunteer to take a turn. I don't want to single out any of our board or chairpersons by describing their specific job tenures, but many of you have been members for decades, so you know who they are, and have a good idea how long they have held their respective positions.

As for me, I have been on the board for 12 of the last 13 years, 3 as president, including the last 2 consecutively. While satisfying, I'm not going for 3 in a row.

Recently, your board has discussed this situation. It has been suggested that the time might have arrived to fold back into some other, larger geological society, ending 86 years of stellar service to the geological community in the Corpus Christi area. **Frankly, I hope it never gets to that.** But a ship without a crew cannot sail. If you value the services provided by your professional society, if you want to continue to meet for technical luncheons, partake of educational seminars held locally, then I **URGE** you to step up and offer to take a turn at the helm. Maybe you have a different vision for the mission of our society. Here's your chance to act on it. Either way, it's rewarding, straight-forward, and not very time-consuming. If you feel unqualified, I promise you're not. If you can run a household budget, organize an after-work gathering, or meet a project deadline, you can handle the CCGS. And you never do it alone. That's the main reason for having a board. Further, I, or any of the present board members, can help guide you through your term. Past-President (a position that has gone unfilled lately) is a real, voting board position, which means I will be available to guide. Besides, I would be delighted to ease anyone into board or chair positions anytime, regardless my board status.

Despite the decline in membership (at last count, 77 professionals, 45 of whom are local) we have more than enough to fill the 7 board positions, and 10 chair slots on a quasi-rotating basis. Please become part of the crew that keeps our Society intact!

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CBGS President's Letter

CBGS Board 2020-2021

President- Dr. Subbarao Yelisetti

Vice President- Dr. Mohammed Ahmed

Secretary/ Treasurer-Charles Benson

CBGS Scholarships

The Coastal Bend Geophysical Society (CBGS) has donated \$10,000 to the Department of Physics and Geosciences, Texas A&M University-Kingsville in support of the multidisciplinary Petrophysics Graduate Program that has been requested. These funds will be used as scholarships in attracting quality graduate students.

The board awarded three scholarships of \$2,000 each to undergraduate geophysics majors from Texas A&M University-College Station, University of Houston and Texas A&M University-Kingsville. We will be awarding the scholarships again this year.

Scholarship Requirements

Criteria for awarding the Scholarship from Coastal Bend Geophysical Society of Corpus Christi, Texas:

1. Scholarships are open to undergraduate or graduate students.
2. Must have declared major in Geophysics, or Geology with a concentration in Geophysics or Petrophysics.
3. Preference is given to students attending Coastal Bend schools (TAMU-K, TAMU-CC and Del Mar College), then to Coastal Bend natives attending other universities.
4. Must have a GPA of at least 3.0 and be in good standing with the school.
5. Must make effort to attend a Coastal Bend Geophysical Society Meeting in Corpus Christi Texas after being awarded a scholarship to be recognized by the society.

News

- According to Baker Hughes Co, the oil and gas rig count is 576 in the week of December 10, 2021, which is the highest since April 2020. This also reflects a 70% increase compared to this time last year.

- As of December 10, the U.S. crude futures were trading at ~\$71 a barrel, as reported by Scott DiSavino on reuters.com.
- According to U.S. government projections, the U.S. oil production is expected to decrease to 11.2 million bpd in 2021 from 11.3 million bpd in 2020. This is expected to rise to 11.9 million bpd in 2022.

CBGS Business

CBGS currently has 43 active members, 4 honorary members, and 40 student members. Raised \$1,450 towards student scholarships through membership revenue this past year.

CBGS workshops/talks

CBGS will be hosting two luncheon meetings in February and April, 2022 featuring international speakers, Dr. Rajesh Vayavur, Canada and Dr. Snons Cheong, South Korea, respectively.

CBGS is looking forward to offer workshops/talks in the future. Topic/speaker suggestions are welcome. Email your suggestions to Subbarao.Yelisetti@tamuk.edu

New Degree Tracks at TAMUK and Graduate Scholarships

- Texas A&M University-Kingsville (TAMUK) started its first cohort of MS Petrophysics program in Fall 2018. If you are interested in joining this program in Spring 2022, please contact the graduate coordinator for MS in Petrophysics, Dr. Subbarao Yelisetti at Subbarao.Yelisetti@tamuk.edu.
- The Department of Physics and Geosciences at TAMUK is offering competitive scholarships for MS Petrophysics students. For additional details about the program and scholarships, please visit the website:
<https://www.tamuk.edu/artsci/departments/phge/phys/academics/gp.html>
- **BS degree in Geophysics, Minor in Geophysics and Certification in Geophysics** offered at Texas A&M University-Kingsville since Fall 2017. Interested students can contact Dr. Subbarao Yelisetti (Subbarao.Yelisetti@tamuk.edu) for additional information.

Education/Events

-SEG

SEG 2022 annual meeting will be held in Dallas, TX from September 10th -16th. See <https://seg.org/AM/> for additional details.

See <https://seg.org/Education/Lectures/Distinguished-Lectures> for information about upcoming SEG distinguished lecture in Houston and other locations.

See <https://seg.org/Education/Lectures/Honorary-Lectures> for SEG honorary lecture locations in Texas.

-AGU

2021 Fall AGU annual meeting will be held in New Orleans, LA from December 13-17th, 2021.
<https://www.agu.org/Fall-Meeting>

Monthly Saying

"Predictions are fraught with danger especially when they pertain to the future" – Unknown.

Monthly Summary

Texas Oil and Gas Info	Current Month	Last Month	Difference	
Texas Production	MMBO/BCF	MMBO/BCF	MMBO/BCF	
Oil	139.8	142.4	-2.6	August
Condensate	20.3	20.9	-0.6	August
Gas	888.6	904.1	-15.5	August
	Current Month	Yr to date - 2021	Yr to date - 2020	
Texas Drilling Permits	842	7890	4801	November
Oil wells	202	1848	1151	November
Gas wells	121	689	342	November
Oil and Gas wells	479	5006	2991	November
Other	6	75	109	November
Total Completions	1028	12546	17529	November
Oil Completions	779	9512	13746	November
Gas Completions	249	3034	3783	November
New Field Discoveries	0	13	11	November
Other	313	5036	7195	November

Subbarao Yeliseti
 President, CBGS



**CORPUS CHRISTI GEOLOGICAL SOCIETY
COASTAL BEND GEOPHYSICAL SOCIETY**



LUNCHEON MEETING ANNOUNCEMENT

January 19th, 2022

- Location:** Crawdaddy's Downtown, 317 Mesquite St. CC, TX 78401
- Student Sponsor:** Viper Exploration, Nye Exploration, Imagine Resources. Thank you!
- Time:** 11:30 AM Bar, Lunch follows at 11:45 AM, Speaker at 12:00 PM
- Cost:** \$30.00 (additional \$10.00 surcharge without reservation: NO SHOW may be billed.)
- Reservations:** Please RSVP by 11:00 AM on Monday, January 17th before the meeting!

Email: arrangements@ccgeo.org

Please note that luncheon RSVPs are a commitment to Crawdaddy's Downtown and must be paid even if you can't attend the luncheon.

SPONSORSHIP OPPORTUNITIES ARE AVAILABLE! IF YOU WOULD LIKE TO SPONSOR, PLEASE CONTACT US AT:

arrangements@ccgeo.org

CBGS Luncheon Presentation – January 19, 2022

Crawdaddy's Downtown

Channel Delineation in Middle Wilcox Formation, Southeast Texas: Integrated Seismic, Well Log and Modeling

Robert V. Schneider¹ and Michael E. Ellis²

¹Assistant Professor of Geology, Department of Physics and Geosciences, Texas A&M University, MSC 175, 700 University Boulevard, Kingsville, TX 78363-8202

²Director, Threeway Resources LLC, 16600 Park Row, Houston, TX 77084-5019

Abstract

This paper reviews a re-processing and re-interpretation of a middle Wilcox offshore canyon sand channel play, originally discovered by drilling from 2-D seismic data. After two subsequent dry wells were drilled a 3-D survey was acquired for better illumination. A problem occurred when acquisition parameters were modified to satisfy last-minute environmental issues at the project site. The resulting volume yielded pre-stack gathers that were of varying near-to-far offsets, and when stacked left a dead trace at every other crossline. The data were then interpolated through the dead traces for continuity purposes, including a spatial antialiasing filter. This filter removed meaningful wavelet signatures from the volume prior to interpretation. By returning to pre-stack migrated gathers for re-stacking and resolving latent phase issues, the geology was restored to the reflectors. Channel sands were interpreted across the dead traces in

the migrated post-stack volume, meaning that frequency filtering was eliminated. Results revealed reflectors consistent with stratigraphy at both the producing well and dry holes. Subsequent 3-D line-by-line interpretation yielded an identifiable set of meandering channels along the canyon thalweg. In order to determine the meaning of the new reflector character, forward amplitude modeling was pursued at key locations within the 3-D volume. Synthetic results were then compared to gather reflectors at the three well sites. Results revealed that amplitude character could only be reliable at locations where channels intersected to make stacked sand plays. Fluid substitution in the models showed that a gas signature was found where channels stacked to a thickness greater than ~30 m (~100 ft). This character was shown to be present at the producing well but absent at the dry holes. Subsequently, a revised set of drilling target locations was proposed.

Biography

Robert V. Schneider
Assistant Professor of Geology
Texas A&M University - Kingsville
Biography

Robert is a native of Minnesota, gaining his B.S. in geology at the University of Minnesota, Duluth. From there he made the trek to El Paso for graduate school. He received his M.S. in 1985 at the University of Texas at El Paso, with the thesis *"The vertical distribution of Uranium, Thorium and Potassium in the Canadian Shield, Sudbury, Ontario, Canada."* He continued for his doctoral degree, receiving it in 1990. His dissertation title was *"An integrated geophysical and geological investigation of the transition zone between the Colorado Plateau, Rio Grande Rift, and Basin and Range provinces: Arizona and New Mexico."* This thesis won the university's Outstanding Dissertation award for 1990.

Robert began his career at Amoco Production Company, eventually working in exploration, production and research. From there he worked in the service industry, with a short stay as a professor at the University of Louisiana – Lafayette as Director of the Energy Institute. He was instrumental in the project to bring immersive visualization technology to south Louisiana, with a State of Louisiana commitment of \$18.5 million and a new building on the university's research campus. He returned to Houston to become a global training instructor for SMT's Kingdom Suite in 2006. He subsequently took a position at Alta Mesa Resources LLC as a senior geophysicist, where he worked on challenging data volumes to lower risk within the company's E&P portfolio. He gained valuable experience in Texas Gulf Coast operations, south Louisiana salt dome production and Mississippian unconventional work in Kingfisher County, Oklahoma.

Robert came to Texas A&M University in the fall of 2016 in order to teach courses, perform research and build the curriculum for a new undergraduate geophysics degree. Its first student graduated in 2019. His research areas include (but are not limited to) subsurface mapping, pre- and post-stack attribute analysis, petroleum history and tectonics of the Texas Gulf Coast. His classes include Petroleum Geology, 3-D Seismic Reflection Interpretation, Borehole Geophysics, and (coming soon) Environmental Geology. He has served as board members for both the Southwest Louisiana Geophysical society and the Coastal Bend Geophysical society, where he currently serves as Continuing Education chair. He has been recognized for his work in the industry and in the community. He has also consulted with local companies on a variety of E&P issues in south Texas.



**CORPUS CHRISTI GEOLOGICAL SOCIETY
COASTAL BEND GEOPHYSICAL SOCIETY**



LUNCHEON MEETING ANNOUNCEMENT

February 16th, 2022

- Location:** Crawdaddy's Downtown, 317 Mesquite St. CC, TX 78401
- Student Sponsor:** Viper Exploration, Nye Exploration, Imagine Resources. Thank you!
- Time:** 11:30 AM Bar, Lunch follows at 11:45 AM, Speaker at 12:00 PM
- Cost:** \$30.00 (additional \$10.00 surcharge without reservation: NO SHOW may be billed.)
- Reservations:** Please RSVP by 11:00 AM on Monday, February 14th before the meeting!

Email: arrangements@ccgeo.org

Please note that luncheon RSVPs are a commitment to Crawdaddy's Downtown and must be paid even if you can't attend the luncheon.

SPONSORSHIP OPPORTUNITIES ARE AVAILABLE! IF YOU WOULD LIKE TO SPONSOR, PLEASE CONTACT US AT:

arrangements@ccgeo.org

Scholarship Awards November 2021

The Corpus Christi Geological Society awarded \$6,750 in scholarships to 10 local students from TAMU-K, TAMU-CC, and Del Mar College in November 2021. These scholarships are to be used for the Spring 2022 semester. Congratulations to:

TAMU-K

Elora Afrin, MS Petrophysics;
Tahiry Andriamiharisoa, BS Geoscience;
Jenny Rivera, MS Petrophysics;
Iris Rodriquez, MS Petrophysics;
Miranda Shaffer, BS Geology; and
Hailey Smith, MS Petrophysics.

TAMUCC

Meghan Bygate, BS Geology; and
Evan Carley, BS Geology and Energy Resources.

Del Mar College

Daniel Sandoval, AS Geology

The CCGS Scholarship fund receives donations from member contributions during the due's renewal in the Fall, the CCGS Fishing Tournament, and the Corpus Christi Oilman's Tennis Tournament. We always appreciate the hard work of the organizers – Leighton Devine for the fishing tournament, and Brent Hopkins for CCOTT. Plans are being made for the next CCGS Golf Tournament on April 22, 2022 (organized by Fermin Munoz) and the CCGS Pub Crawl on April 23, 2022 (organized by BJ Thompson). These events also benefit the scholarship fund, so mark your calendars for a fun weekend. All donations are vital to allow for the funding of scholarships for our local students. Every donation is very much appreciated. Thank you for your support.

The Scholarship Committee members are:

Brent Hopkins, Treasurer; Rick Paige, CCGS President
Casey Mibb, Lou Lambiotte, and Breanna Wells, Members

Dawn S. Bissell
Scholarship Committee

November 30, 2021

Dear CC Geological Society Scholarship Committee,

Thank you for your time considering me for and awarding me a scholarship. This is helpful to me in so many ways that I couldn't possibly begin to list them all here but know that this

scholarship is SO APPRECIATED. The program at Texas A&M Univ – Kingsville has still been going well and your generosity has allowed me to continue next semester with less burden than before.

I am still on track to graduate at the end of next semester (Spring 2022) and due to your generosity, accomplishing this goal feels more do-able. Thank you!!

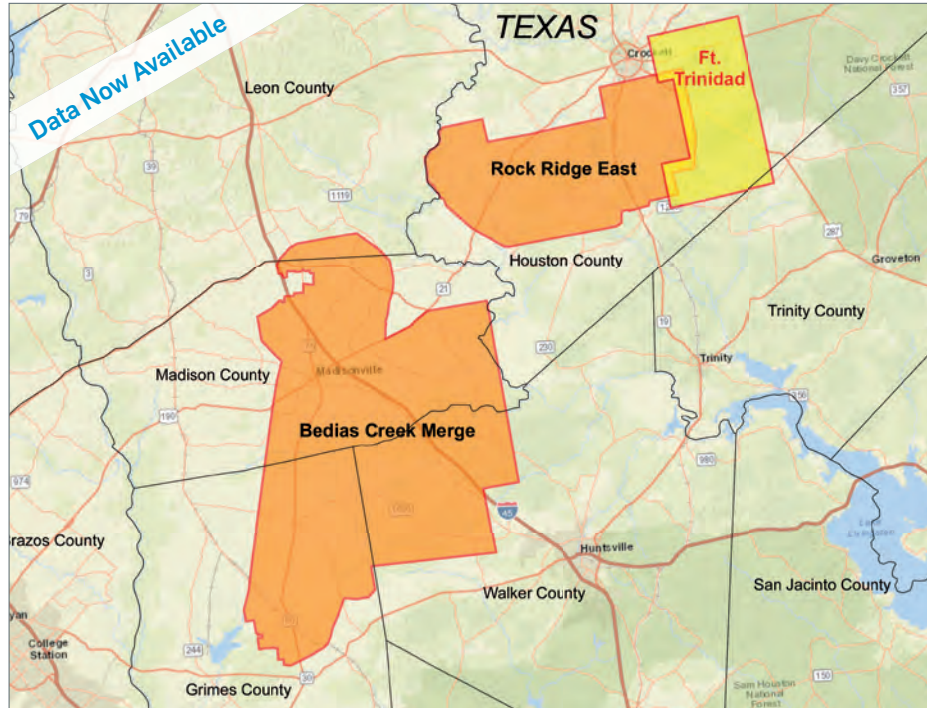
Respectfully,

Hailey Smith



New Ft. Trinidad 3D Survey Houston and Trinity Counties, TX

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Cheryl Oxsheer
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Lets talk about insurance based financial planning

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Jason Downing

Insurance Representative/Former O&G Professional

361-742-9252

Jason.downing@mutualofomaha.com

U.S. Oil & Gas Prices vs Production 2014 to 2020 **(2017 to 2019 Service Sector Boom)**

I have been a Petroleum Geologist and Oil Scout for 40 years now. Since the crash in natural gas prices in 1981 and subsequent collapse of oil prices in 1986 I have been monitoring Oil and Gas prices. It was easy to believe they were the key to my business financial future. I often have reduced my observations to writing on current situations. Recently I have felt compelled to take a longer look back as so many people seem to be misguided as to how got in the situation we are in and where we might go from here. It is more than I have attempted before so I titled it my Magnus Opus.

Analysts and Journalists tend to explain the world of Supply vs Demand on a “Week to Week” and “Year over Year” basis. There are longer trends. This affects how they view the world and how they present it to us. They also assign omnipotent powers to drive trends up and down as opposed to market forces. There are many forces at work. The years 2017 through 2019 are one of the of greatest stories never told. These years were remarkable in terms of the US Oil and Gas production. Certain sectors of the industry were very active. In the end few operators were able to generate net income or Free Cash Flow. A friend and operator from Midland, Donny McClure, described it as a “Service Sector Boom”.

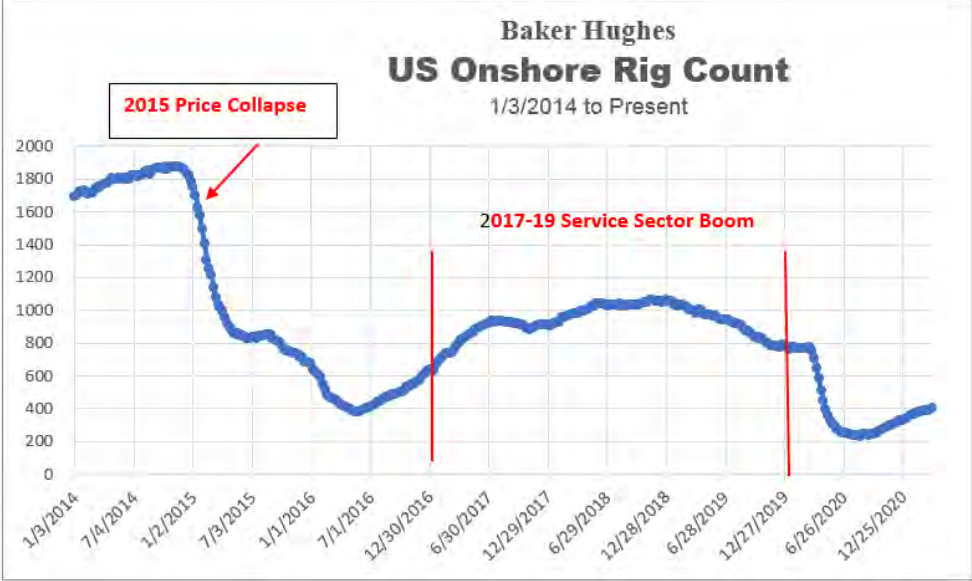
Most media and industry analysts explain it all as OPEC vs US Shale (as if that were a single entity) and their battle for market share. It is often poorly described and sometimes flat wrong. In the end it is the questions that don’t get asked that bother me the most. For example, it was oft described that Saudi Arabia and Russia drove the price down because they refused to come to an accord. At the time due to pandemic worldwide oil consumption was down 30%. It was not a matter of if they would cut because there was no market for their oil. Cut production or pour it on the ground. Worldwide consumption had been about 100 MMBOPD. That means consumption was down 30 MMBOPD. Russia exports 6 MMBOPD. Saudi Arabia exports 9-10 MMBOPD. They both could export 0 Bbls and there still would be too much oil. The media acted like these two oil dependent nations could take the price to \$0/Bbl in order to obtain market share. It would be cheaper to pour it on the ground. I never heard the question, “Can either of these countries afford not to cut?”. Based on what Saudi provides to its government they require a \$65/Bbl oil price to breakeven. Forty percent of the Russian budget comes from oil and gas sales. They were going to cut oil exports together or they were going to cut separately. The rest was theater. They came to an accord on April 12, 2020 but the price continued to fall. Why? We were in a pandemic and Demand was down by 30%!

How can you ever guess where you are going if don’t know where you have been? Look at US Oil and Gas production over the past six to seven years. See if it matches the story you have been told. It is true the industry has come to be dominated Shale activity. On 8/20/2021 the Baker Hughes Rig Count showed 90.3% of wells being drilled were horizontals. Most of these are Shale wells. The years 2017 to 2019 have got to be some of the most remarkable years ever on record in the Oil and Gas Industry, yet production companies seldom showed a profit. Is Shale production amazing? Is it unprofitable? Can it be both?

In the heady days of 2011 through 2014 it was obvious why we were so excited. Oil prices were hovering around \$100 per barrel and gas prices while not as good as in 2008 but they weren’t bad with prices in the \$4-5 per MCF range. Even natural gas liquids were trading at 85% of a barrel of oil. Beginning in June 2014 oil prices began to fall. By November they began to fall precipitously and by February of 2016 oil was below

\$30/bbl. Natural Gas fell to \$2/MCF and NGL's fell to 35% of barrel of oil (\$10-11/bbl). Obviously, this was a disaster. Activity and then production responded accordingly.

Most of us, when wanting to assess the health of our industry, turn to Baker Hughes to see what the Rig Count is. With a drop in commodity prices in 2014 to 2016 Rig Activity plummeted as you would expect. Rig activity did bounce back in 2017 but it only recovered about half of rigs lost during the downturn. Rigs weren't really "booming". With the advent of Shale production, a new concept evolved; the DUC (drilled but uncompleted lateral). The well's lateral could be drilled and cased and the completion could wait an indeterminant amount of time until it was more opportune. Since completion costs accounted for 2/3rd to 3/4th of the well cost this made sense. This really diminished Rig Counts as a tool to evaluate the industry. How many wells were completed and how much production was brought on was not directly linked to how many rigs were running.



In the beginning Shale Plays were all Gas Plays. Look how flat Gas Production was between '98 and '08. Then Barnett Shale, Fayetteville Shale, and Haynesville Shale all contributed to boosting production from '07 to '12, but however nothing like what has happened since 2017.

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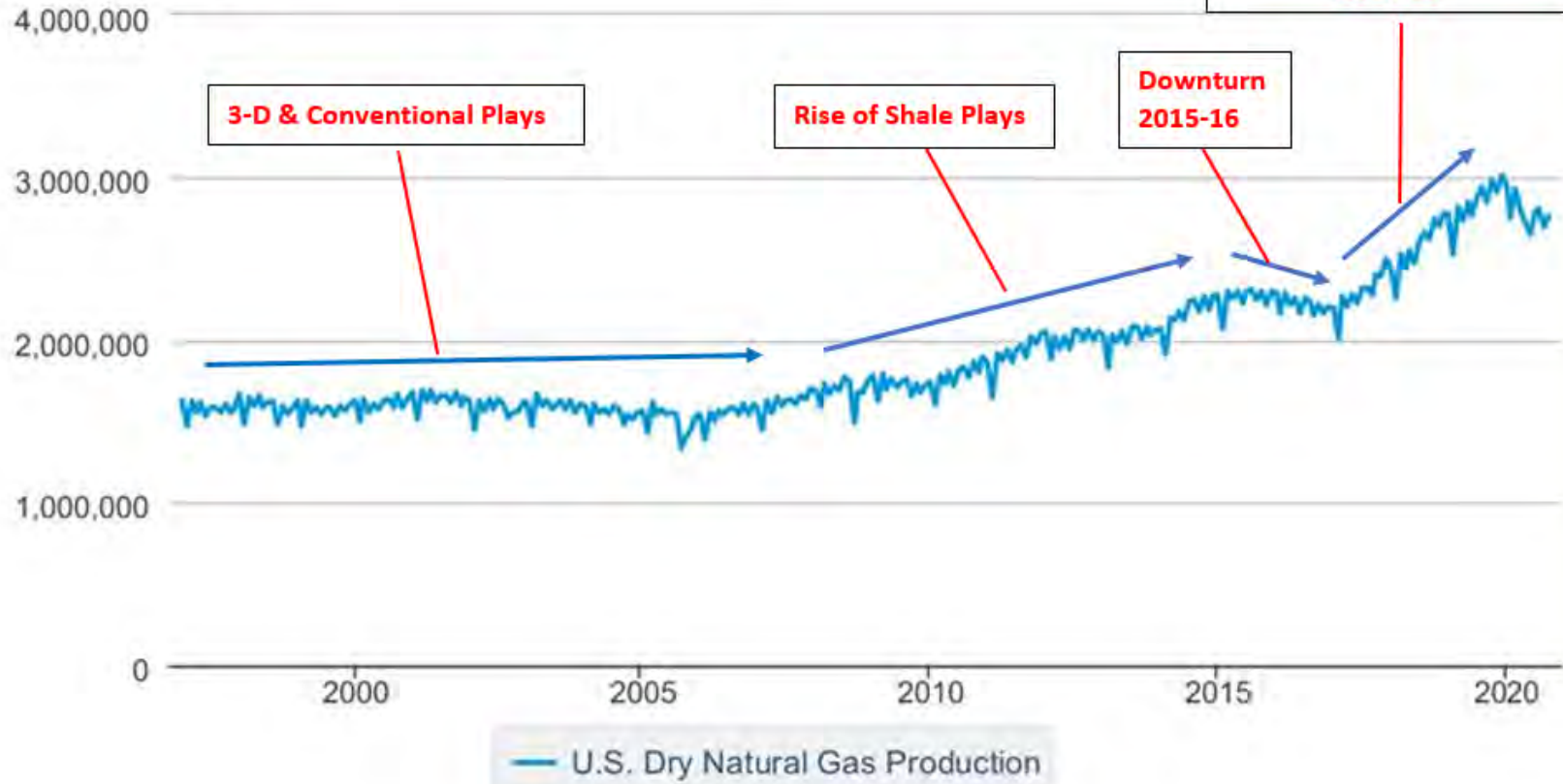


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U.S. Dry Natural Gas Production

Million Cubic Feet



Oil production looked very similar as would be expected.

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US Oil Production (MBOPD)

EIA Monthly
Jan '12 to Dec '20

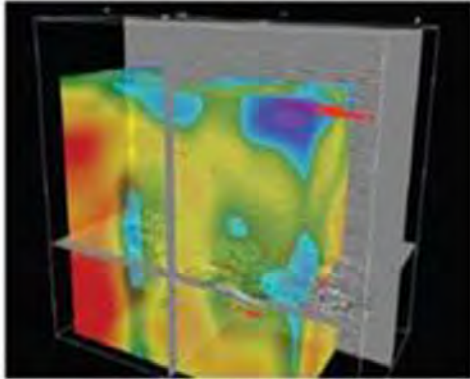


As of December 2020, approximately 72% of US Oil production and 92% of US Gas production comes from Shale Regions. This “Service Sector Boom” led to an increase of 4.3 MMBOPD and 26.5 BCF/D; virtually all from Shale Plays.

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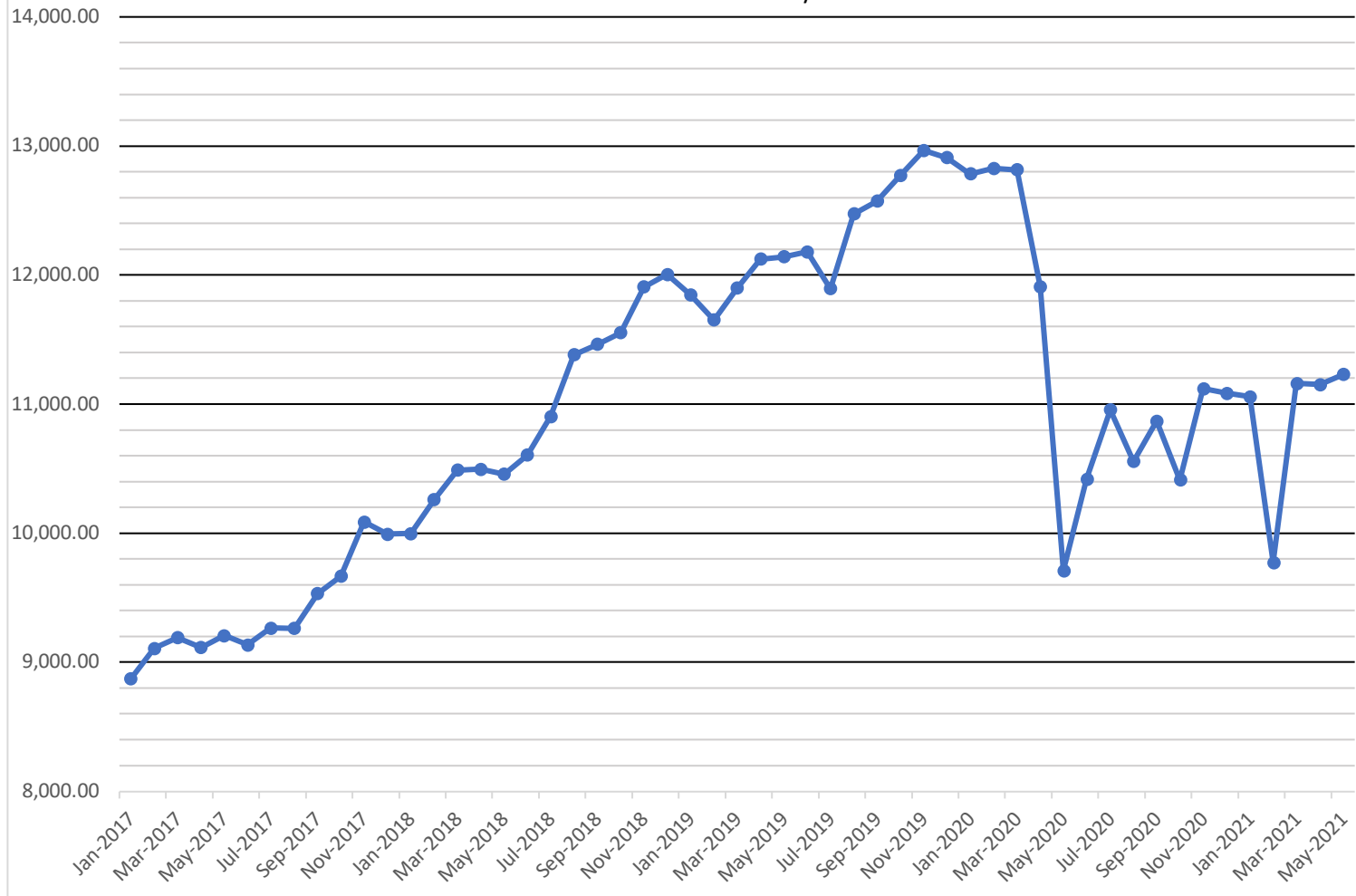
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US Oil Production (MBOPD)

EIA Monthly
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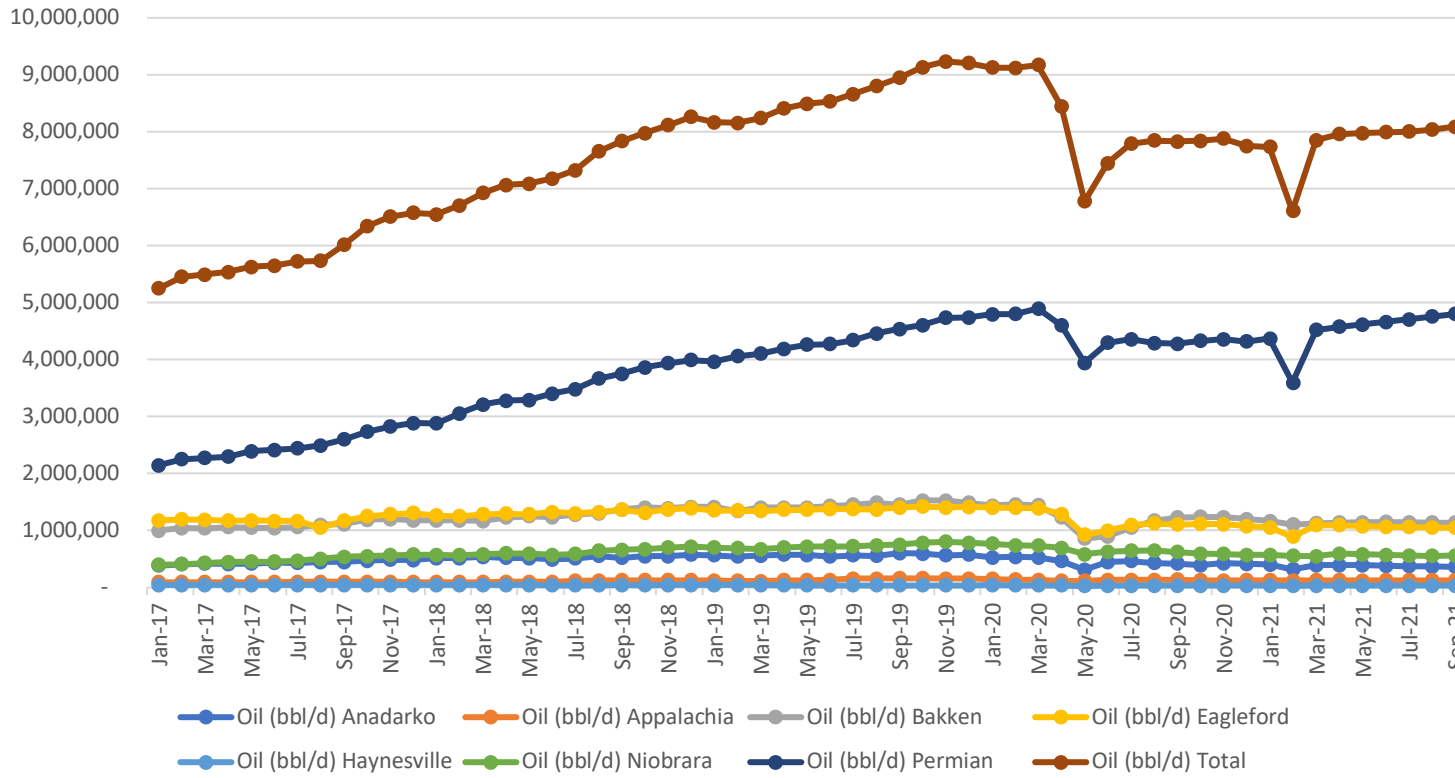
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EIA US Shale Oil Production by Region

August 2021



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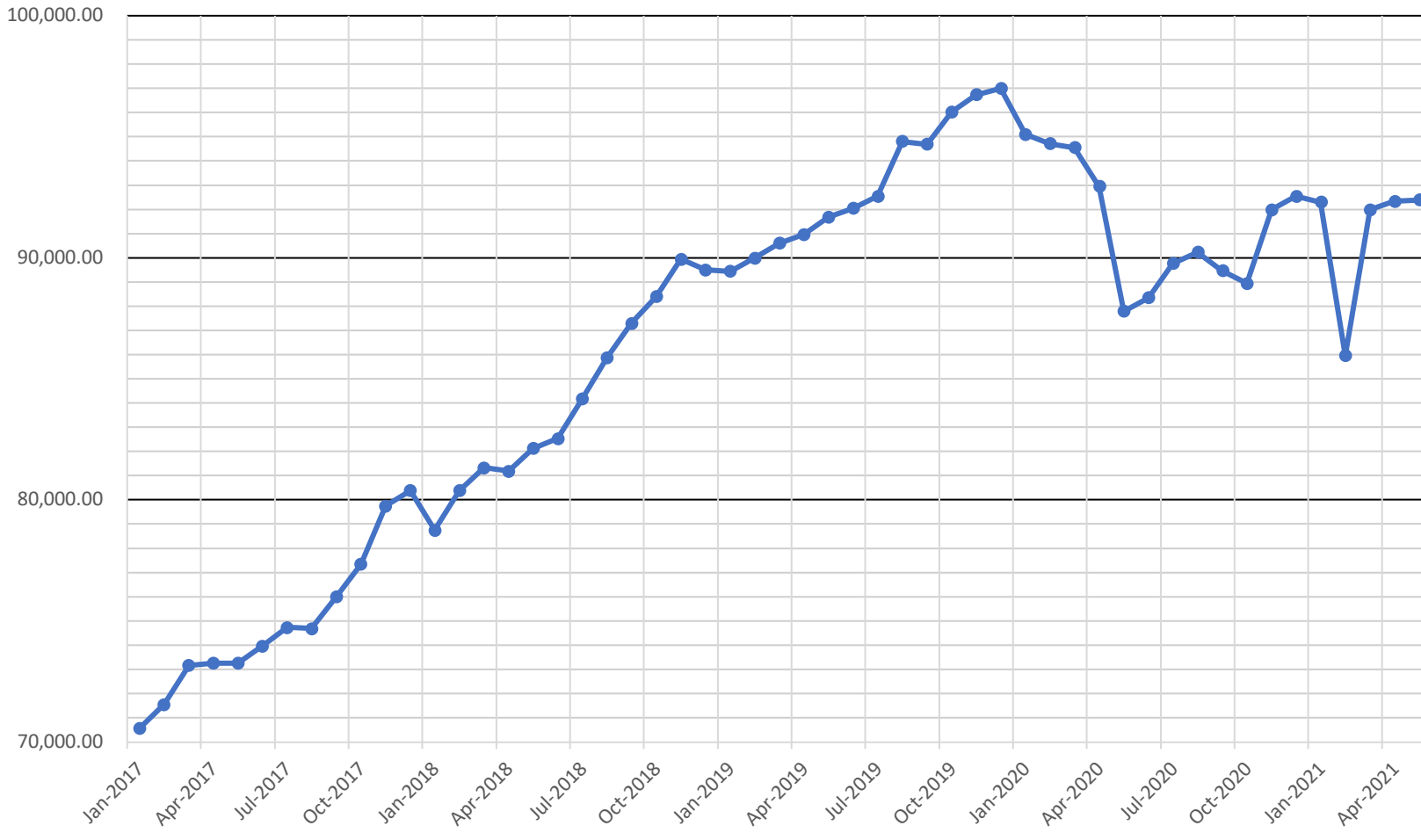
EXPLORING SINCE 1968

A tall oil rig is illuminated with green lights at night. The background is a stylized American flag with blue stars and stripes. The rig is positioned on the right side of the image, and the sky is a mix of blue and purple hues, suggesting a sunset or sunrise.

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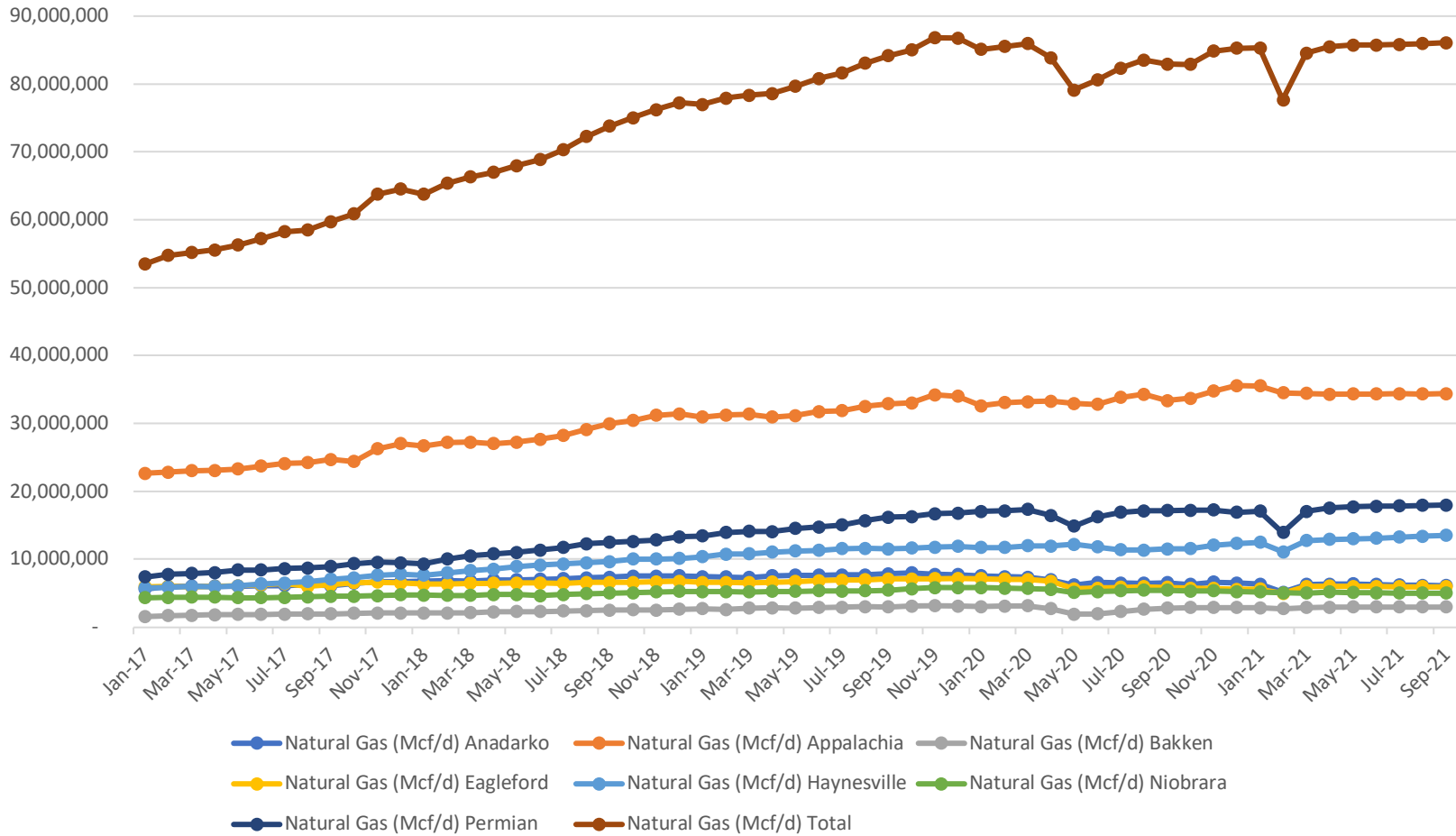
US Dry Gas Production (MMCF/D)

January 2017 to May 2021



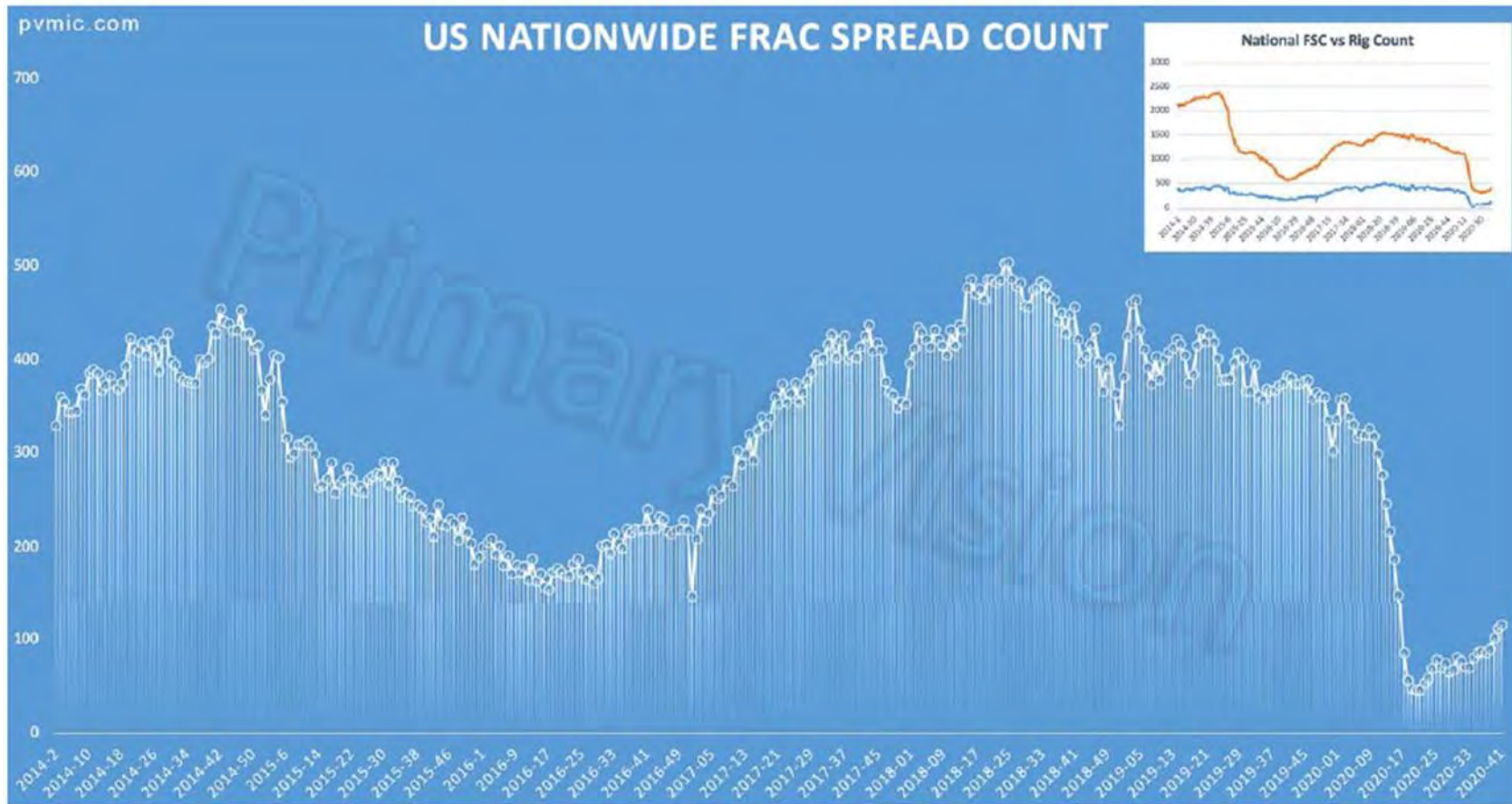
EIA US Shale Gas Production by Region

August 2021



I am sure friends thought it was weird that I was almost giddy over this piece of data. When I found public data on Frac Crew Counts (also known as Frac Spreads) I thought for sure I was going to be able to figure it all out.

Nope! It left me with a lot more questions.

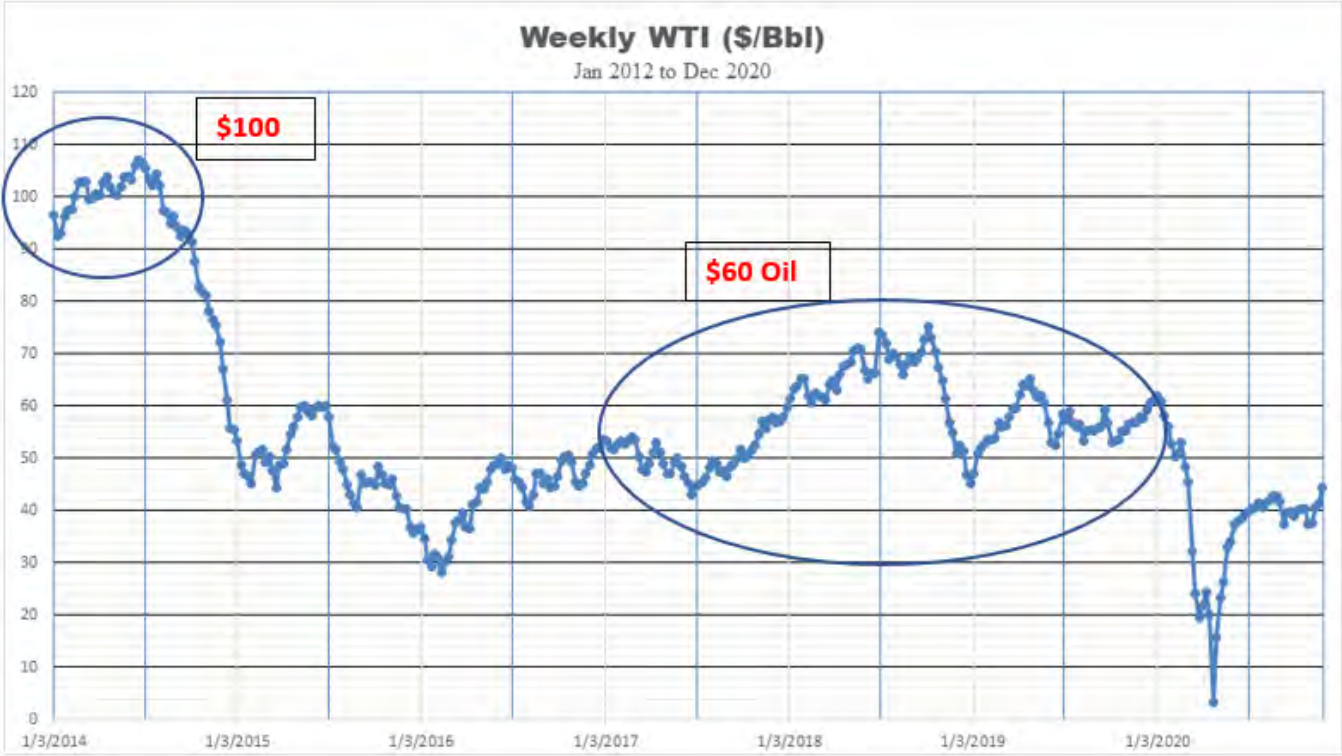


Why is it so amazing? To start with this graph is the number of Frac Crews running nationwide on a weekly basis between January 9, 2014 through October 9, 2020. Look at the number of Frac Crews in 2017-19 vs 2014. The changes in Frac techniques made the chart even more telling. In 2014, at least in the Eagleford, that Frac Jobs were using 1200#-per lateral ft compared to over 2000# per lateral foot in 2018 and thereafter. The average lateral length in the Eagleford was about 6000' compared to 8000' today. Also, in 2014 there were still people concerned about holding acreage and while zipper frac's and simu-frac's were performed they were not common. The footage frac'd in 2017 to 2019 is not just more than 2014 it is much more.

Please note the tremendous jump beginning in January 2017. It grew from 200 Frac Crews to 400 Frac Crews in five months.

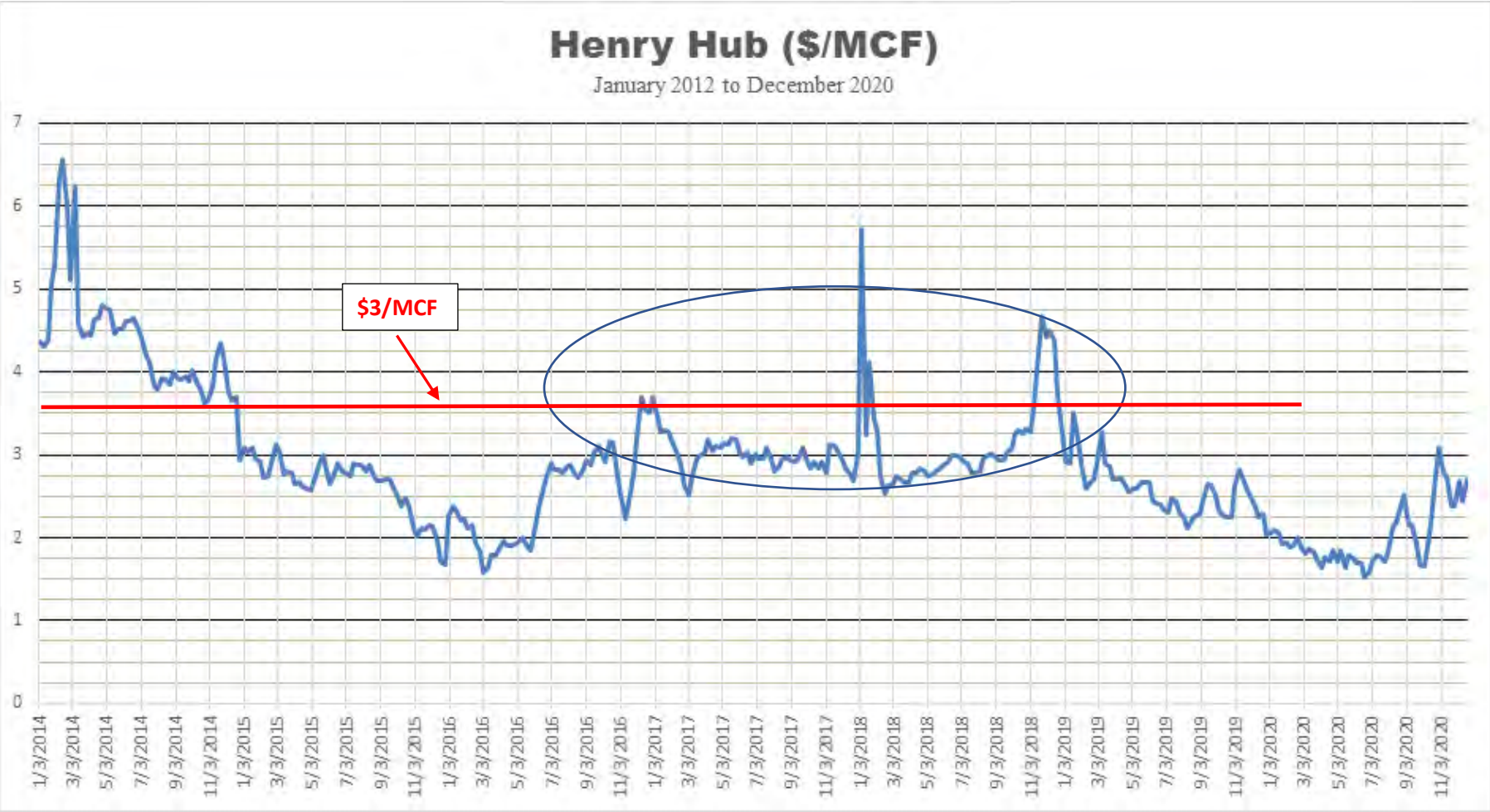
Which begs the question...WHY?

OIL PRICE 2014 to 2020



How could it be that the oil price was more inviting in 2017-19 than it was in 2014.

GAS PRICE 2014 to 2020

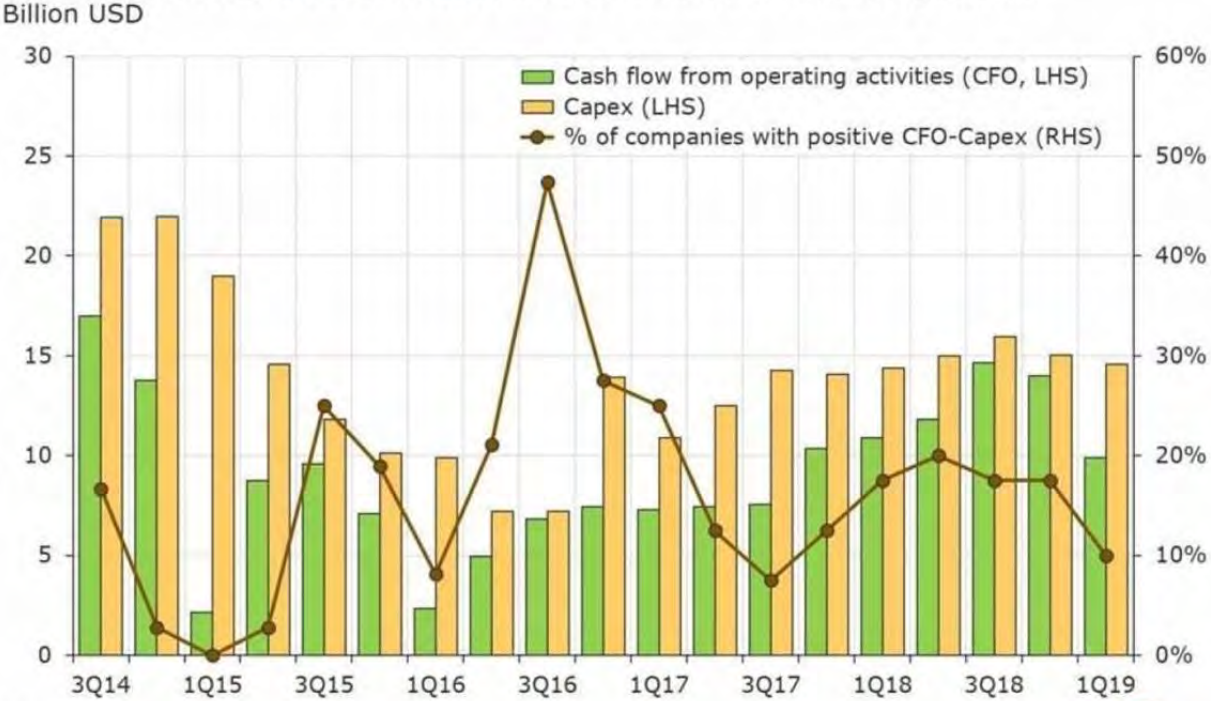


It certainly wasn't the gas price that drove activity upward.

My uncle, Clayton Williams, was fond of saying that his ventures in the Oil and Gas business were just like Christopher Columbus' discovery of the New World. "When he left he didn't know where he was going; when he got there he didn't know where he was; when he got back he didn't know where he'd been;...and he did it all on borrowed money".

Since the collapse of 2014 few companies have been able to raise money issuing new stocks or bonds. Virtually all of the Shale Companies had negative Cash Flow and no net income. For the most part OTC (over the counter/Wall Street) companies used their Revolving Bank Loans to fund their Capital Expenditures and Private Equities borrowed wherever they could.

Cash flow statement evolution for US shale oil companies*



*Based on a peer group of 40 dedicated US shale oil companies

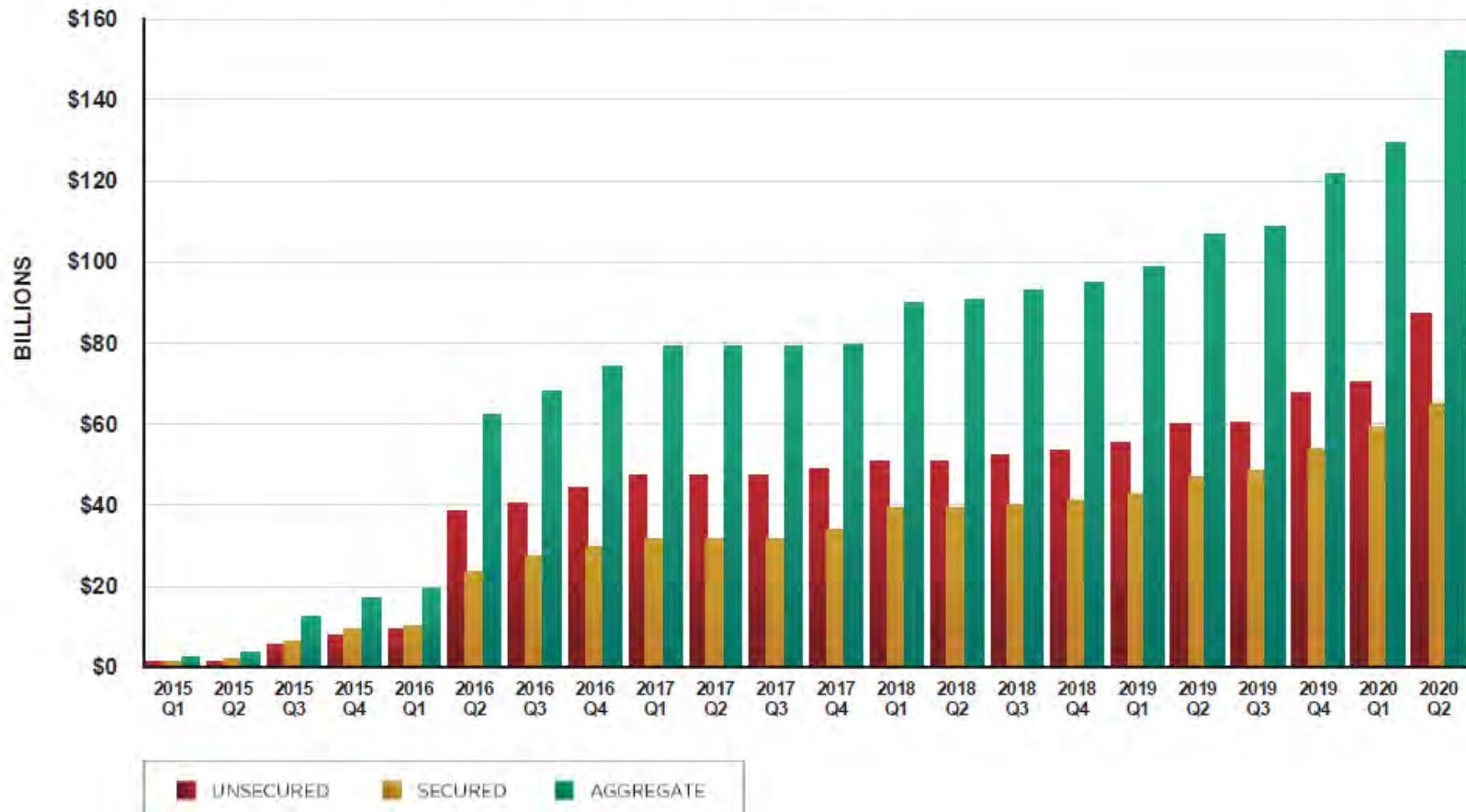


This Rystad graph is from a limited sample size but I think it makes a valid point. In four and a half years never did oil and gas revenue exceed or even match what was spent. In the third Quarter of 2016 almost 50% (not quite) of the operators had positive cash flow (cash flow from operations exceeding capital expenditures). This was when Cap Ex was at its lowest not when companies were making more revenue. In the other 17 Quarters over 70% of the companies operated with negative cash flow.

As a result debt among companies in the Energy Sector soared.

2015-2020 CUMULATIVE E&P UNSECURED DEBT, SECURED DEBT AND AGGREGATE DEBT

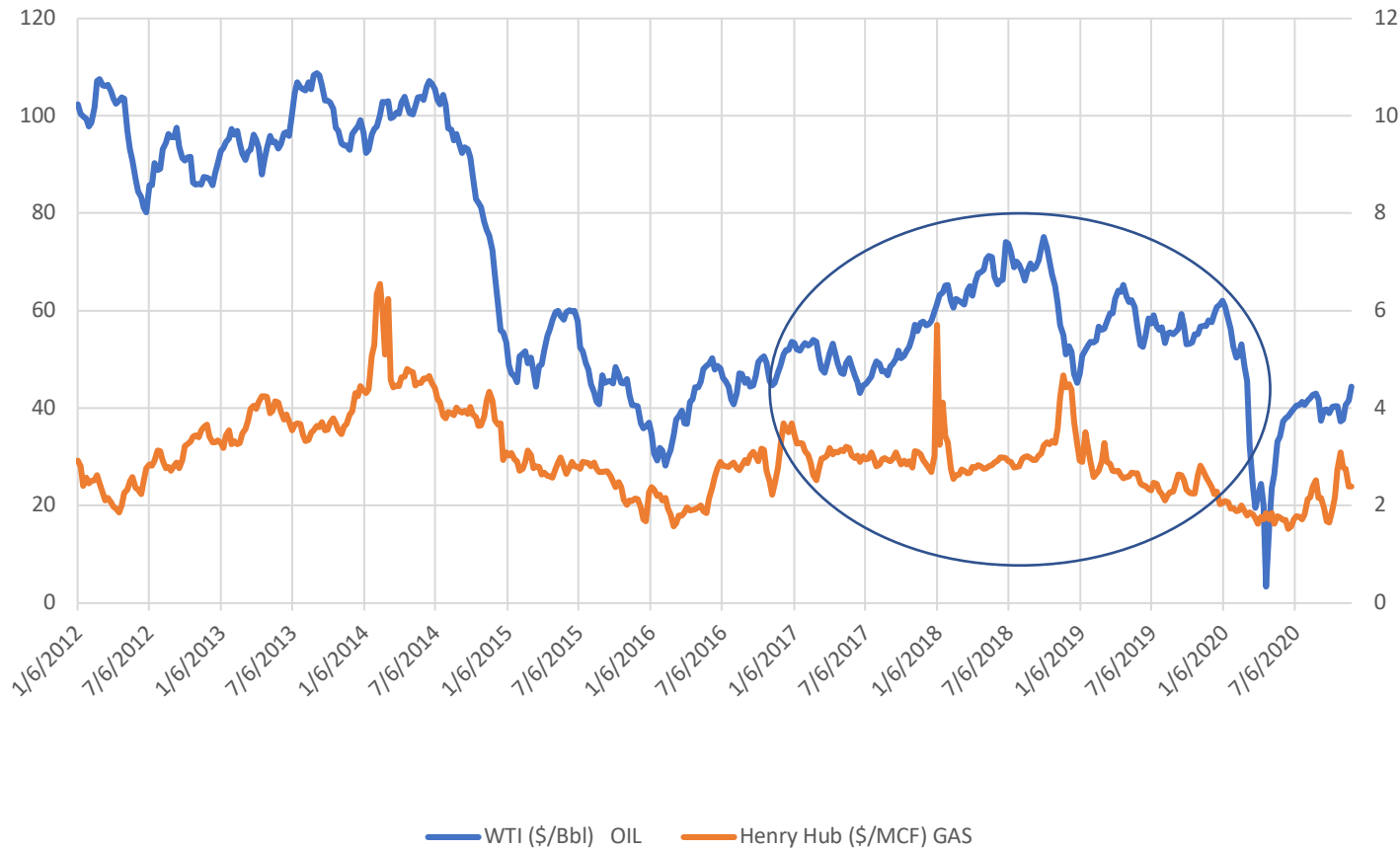
HAYNES AND BOONE OIL PATCH BANKRUPTCY MONITOR



Borrowing began in advance of the 2017-2019 Boom but it accelerated through 2020.

WTI Oil vs Henry Hub Gas Pricing

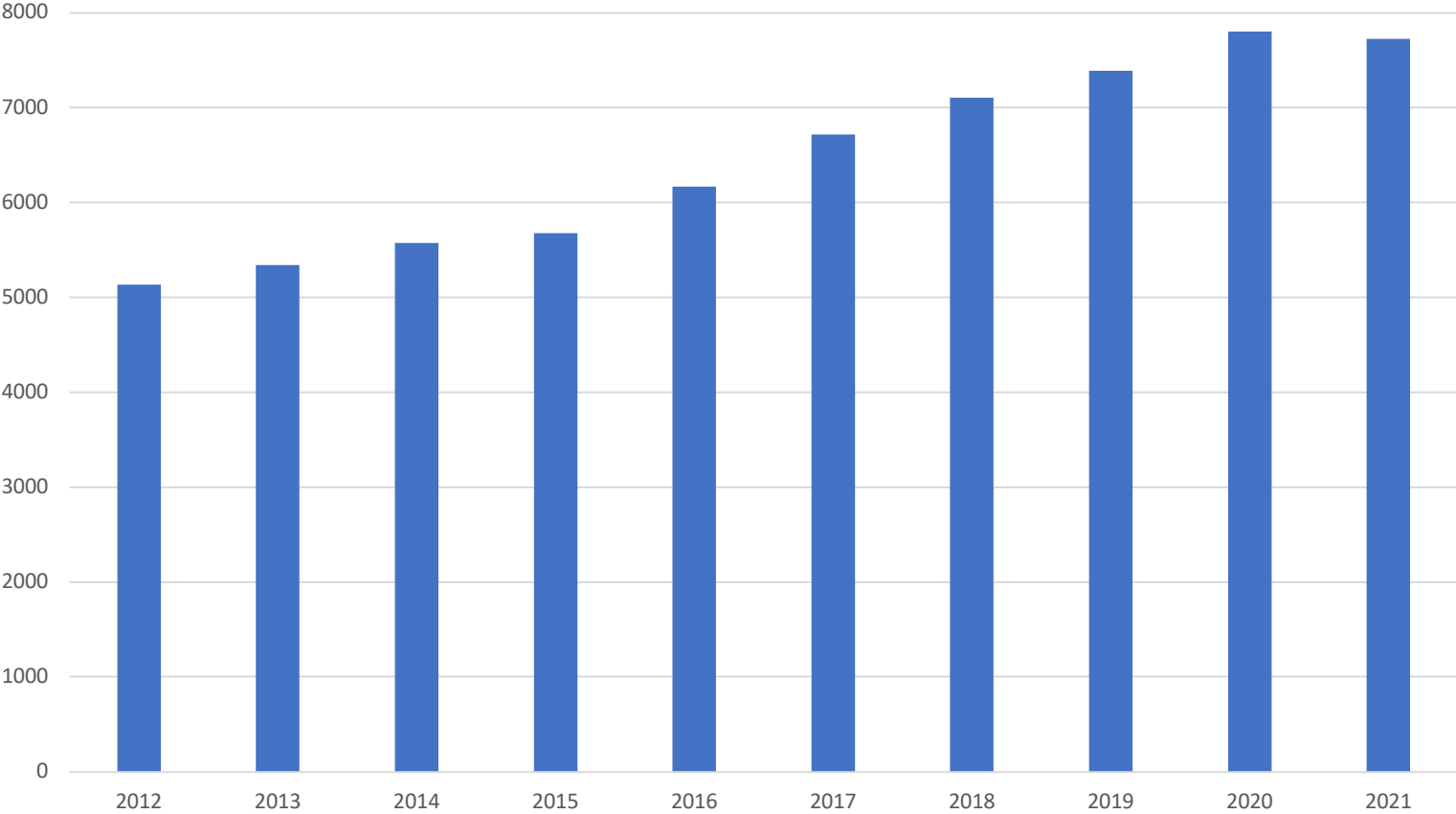
2012 -2020

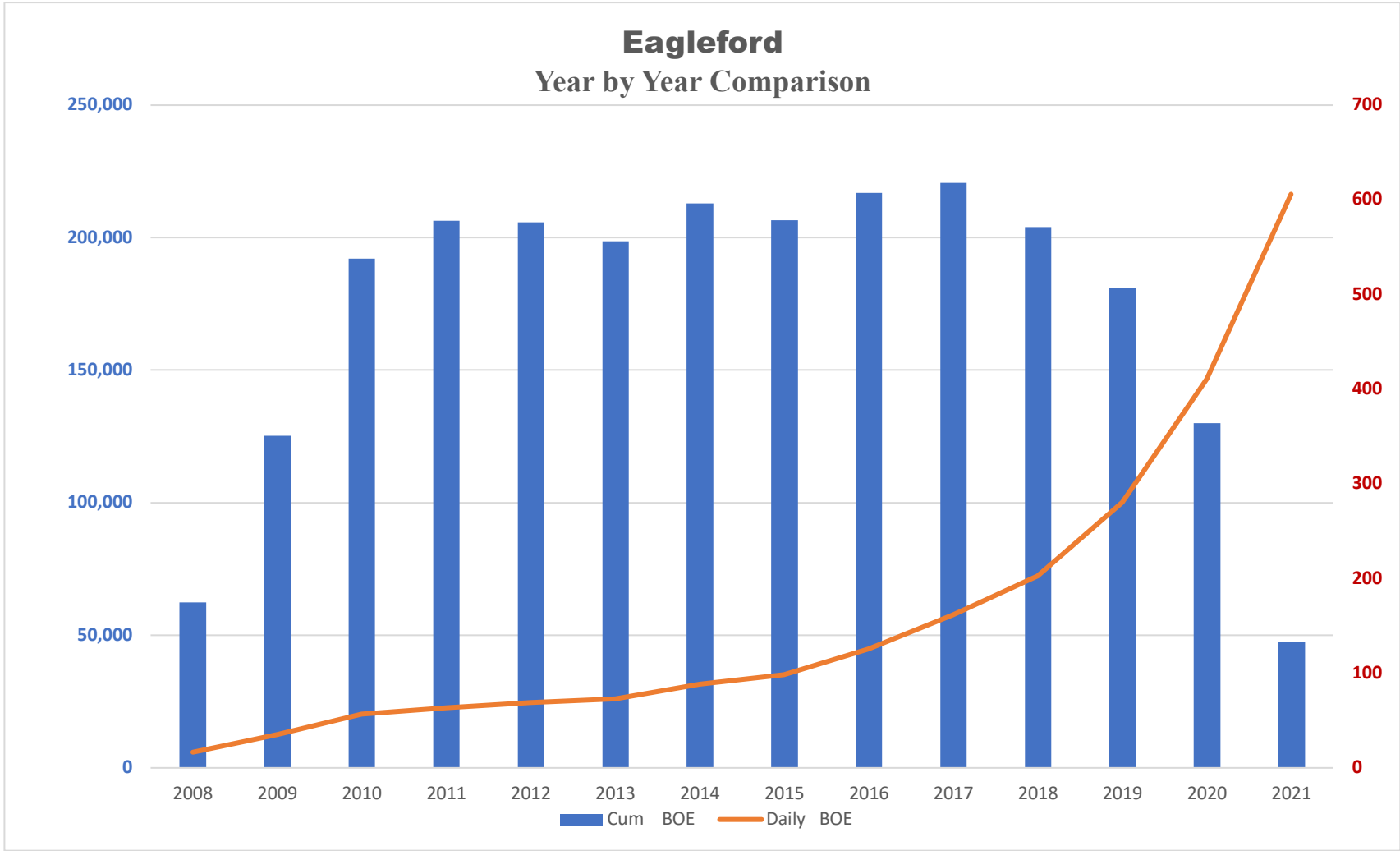


Commodity prices improved in 2017 to 2019 but only modestly so.

Costs had come down from the 2010 to 2014 Boom and operators were trying to get more for less. The industry was drilling longer laterals and frac'ing them with much more proppant. I offer data from the Eagleford and Haynesville as an example. Hopefully this will help explain how with fewer rigs and more Frac Crew we grew production faster than ever before. What is lacking in this data is how much more proppant was being used.

Eagleford
Average Lateral Length per Well
By Year



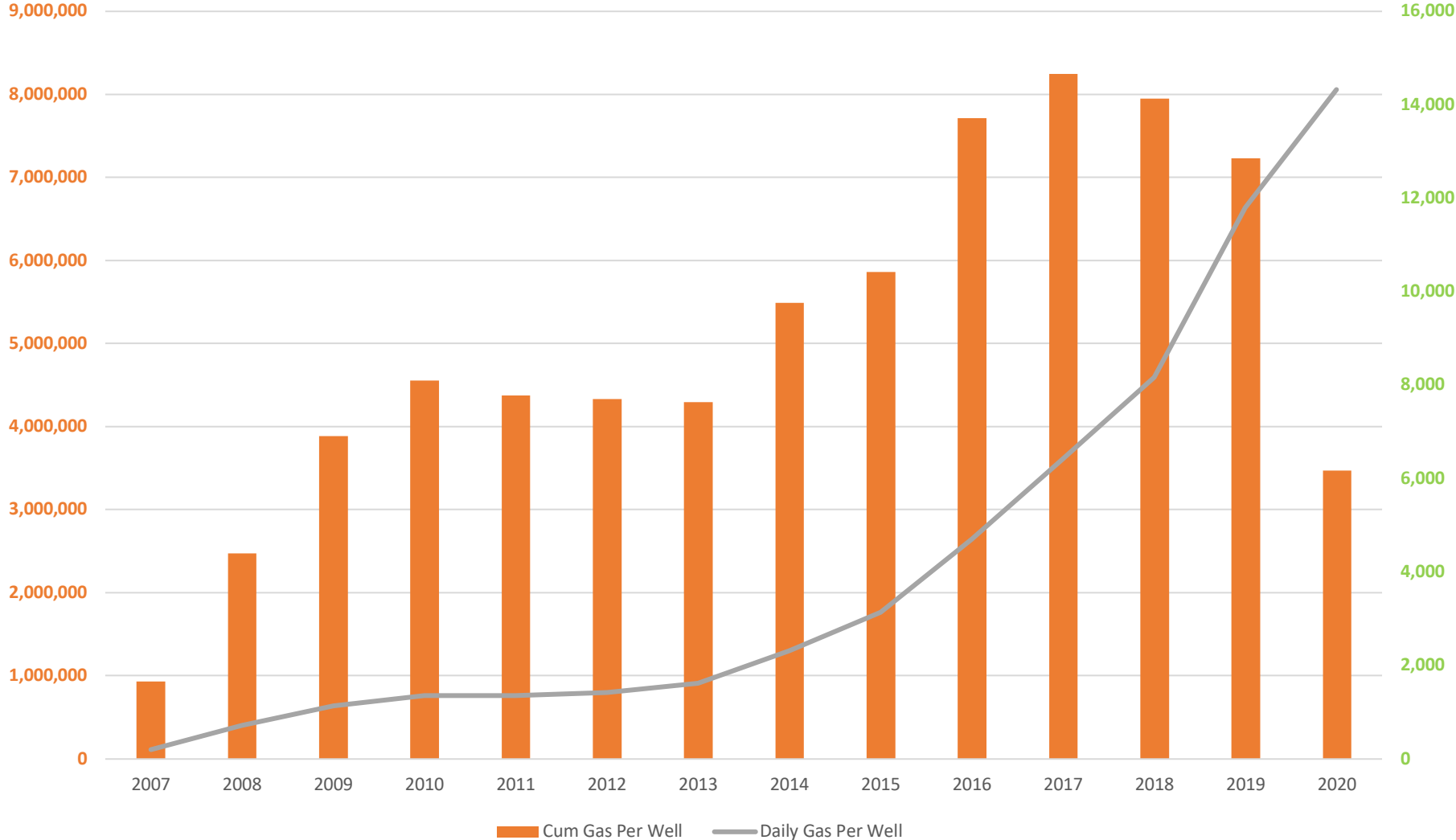


***Note Eagleford wells drilled in 2017 have already produced more than prior years. That should not happen all things being equal older wells should have more cumulative production and should be producing less. Wells are broken out by the year in which they began producing. I use $MCF/20 + BO = BOE$

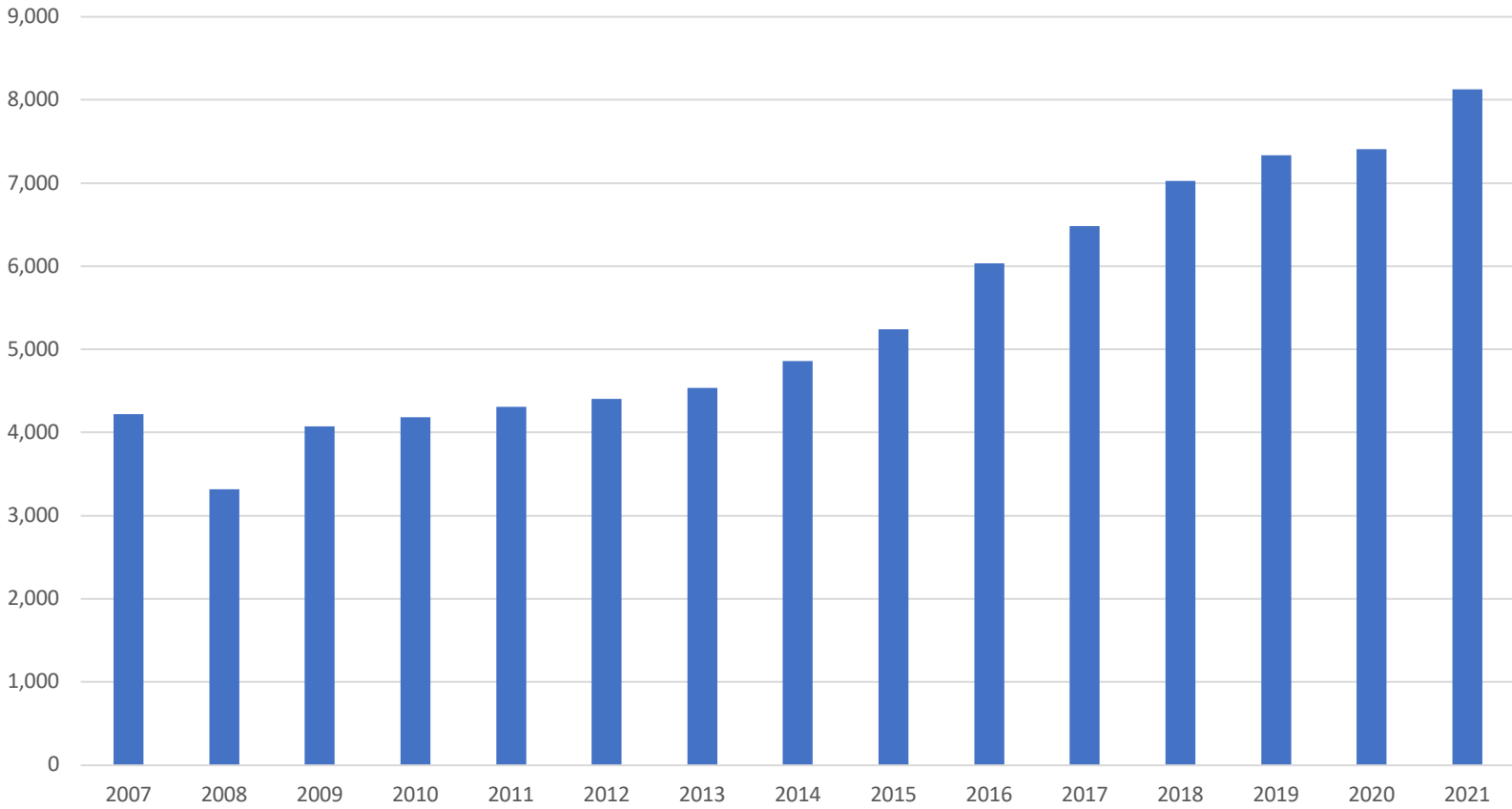
Bossier-Haynesville Shale

Year by Year Comparison

Louisiana



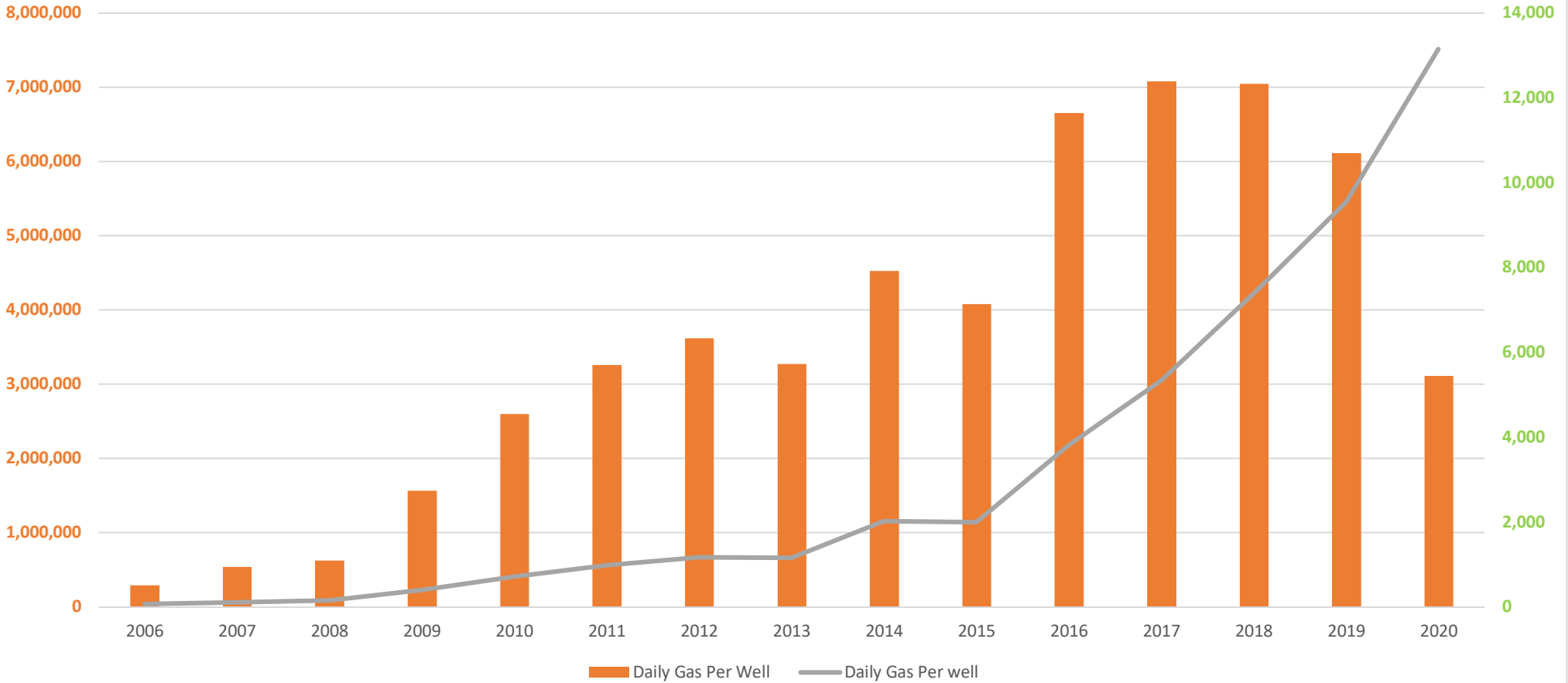
Haynesville Shale Louisiana
Average Lateral Length per Well
By Year



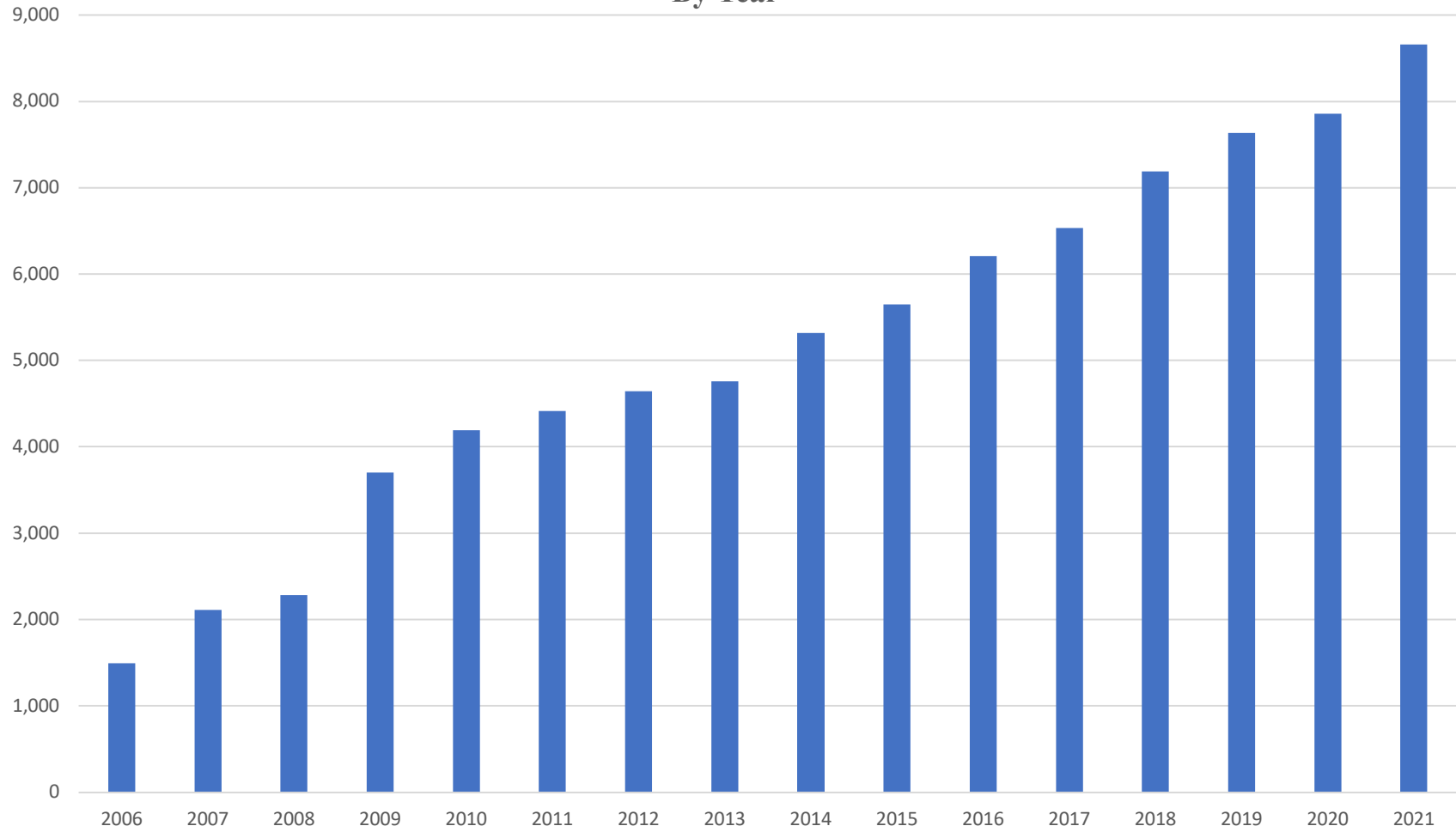
Bossier-Haynesville

Year by Year Comparison

Texas

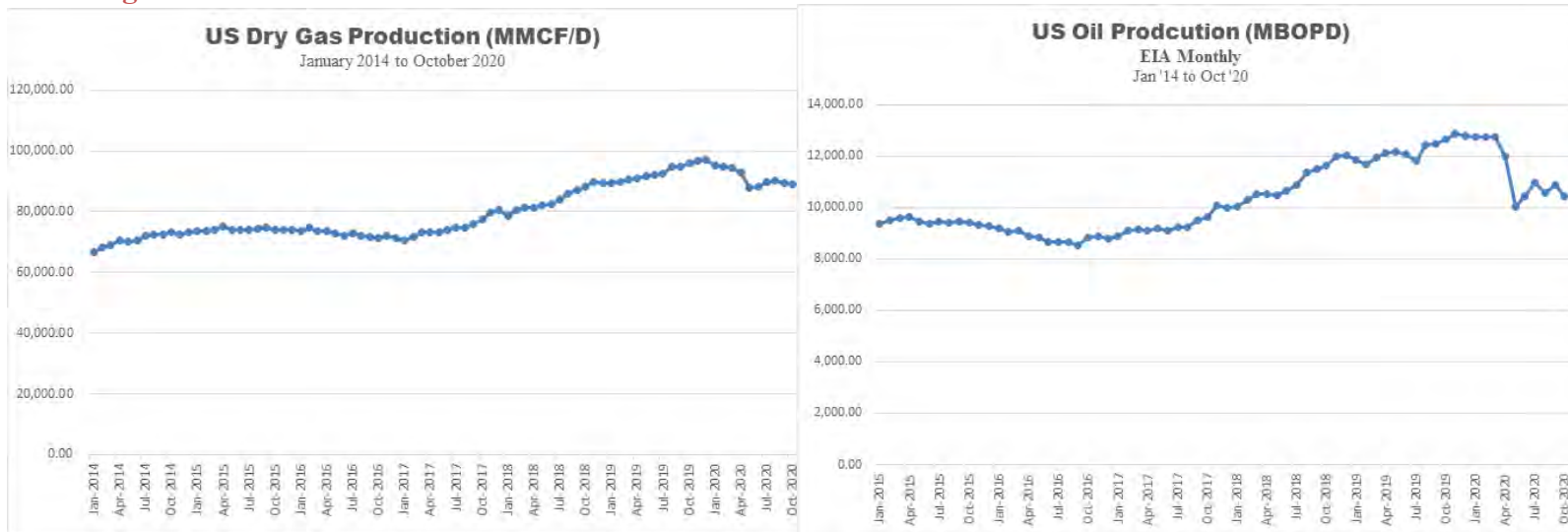


Haynesville Shale texas
Average Lateral Length per Well
By Year



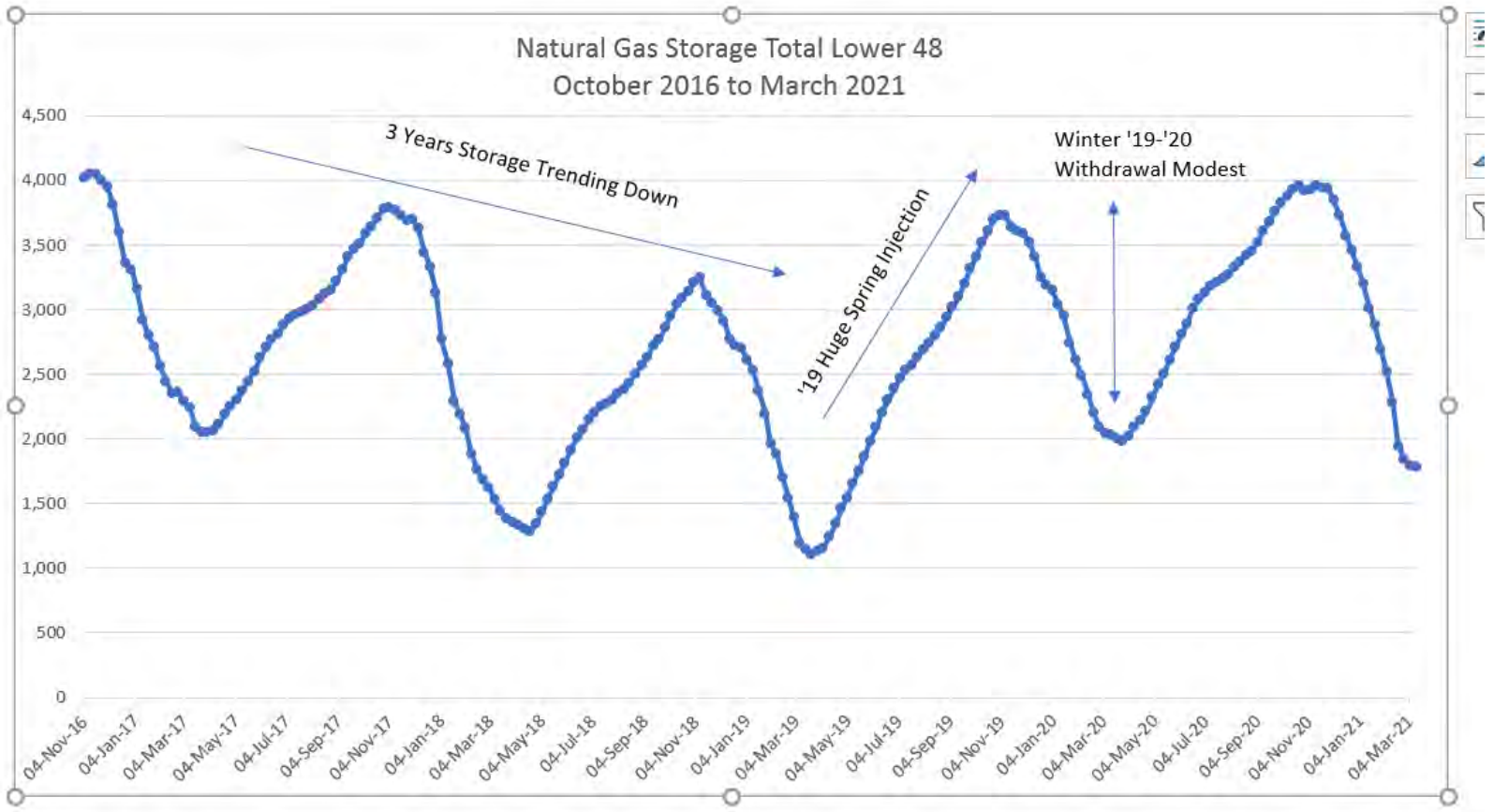
A Closer Look at Production

Again the “Service Sector Boom” led to an increase of 4.3 MMBOPD & 26.5 BCF/D



The main reason for this irrational exuberance was probably that after two years of bickering OPEC had finally come to an accord and agreed to production cuts in December 2016. I also think on the gas side a contributing factor was that in the Marcellus region 8 BCF/D of new pipeline capacity was opened up. That led to Appalachian production growing from 22 BCF/D to 34 BCF/D.

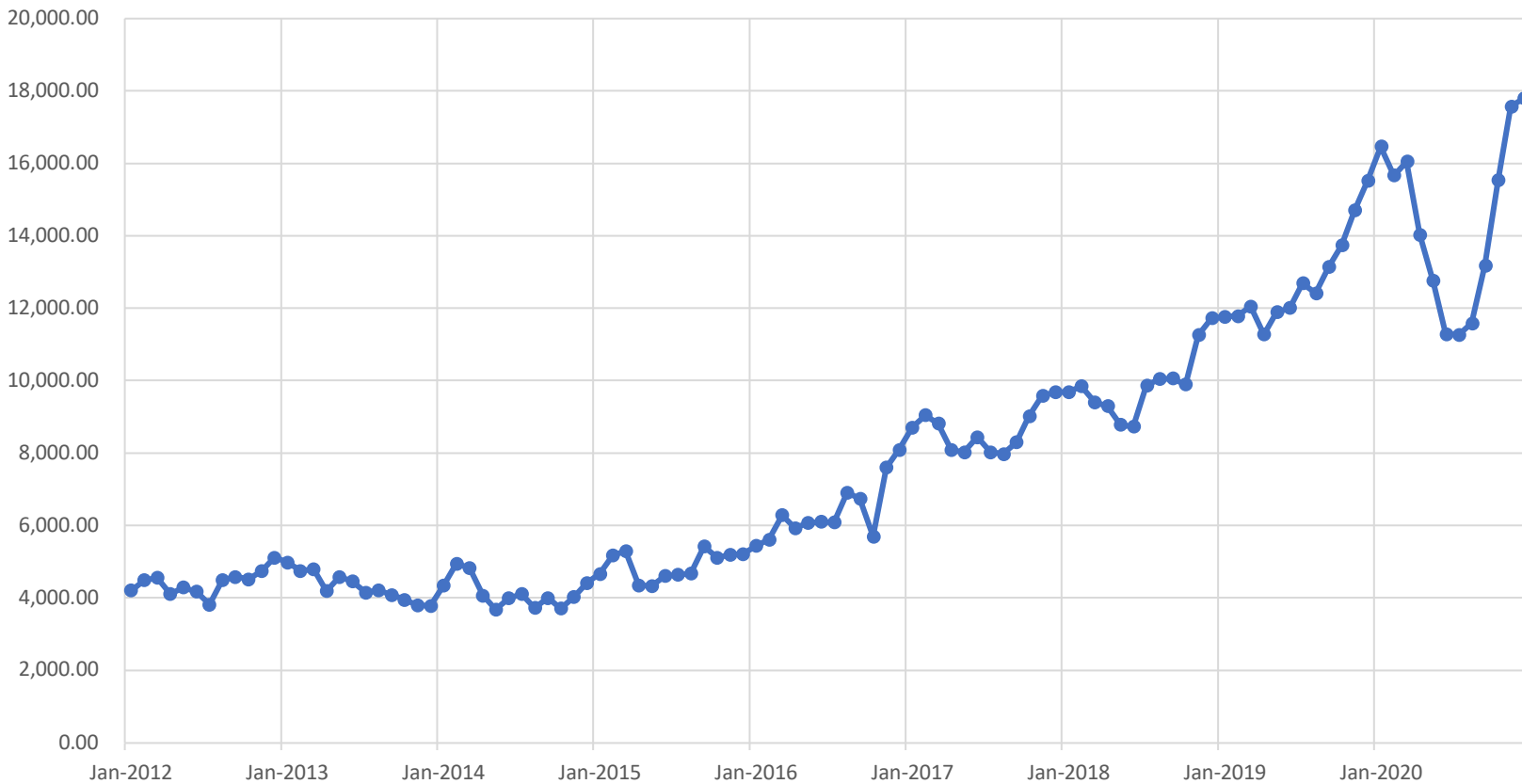
Big numbers! Perhaps they are better expressed in percentages. Between October 2016 and December 2019 US Oil production grew by 50.6%. US Gas production grew 37%. The US has for decades consumed almost 20 MMBOPD of oil so growing to 12.8 MMBOPD didn't cause much of a problem but gas... was amazing! Somehow as Gas production grew Demand grew even faster, well until 2019 and the mildest winter in 30 years. To be fair it may have started with the prior injection season.



While Gas Production was growing by almost 20% Natural Gas Inventories fell two years in a row. With record production came record injections in the Spring and Summer of 2019. Did the Service Sector Boom create too much gas production? I don't think the story is finished.

U.S. Gas Exports (MMCFeet) BCF/D

January 2012 December 2020



There is currently 4.5 BCF/D of LNG under-construction. That will take a couple of years. Current LNG capacity is about 11 BCF/D. Mexico is taking 5-6 BCF/D. The US has capacity to deliver 9 BCF/D to Mexico now but infrastructure on the Mexican side is going painfully slow. It will come. Point is the rate of growth in Exports will slow down a bit. It has to... because production is flat.

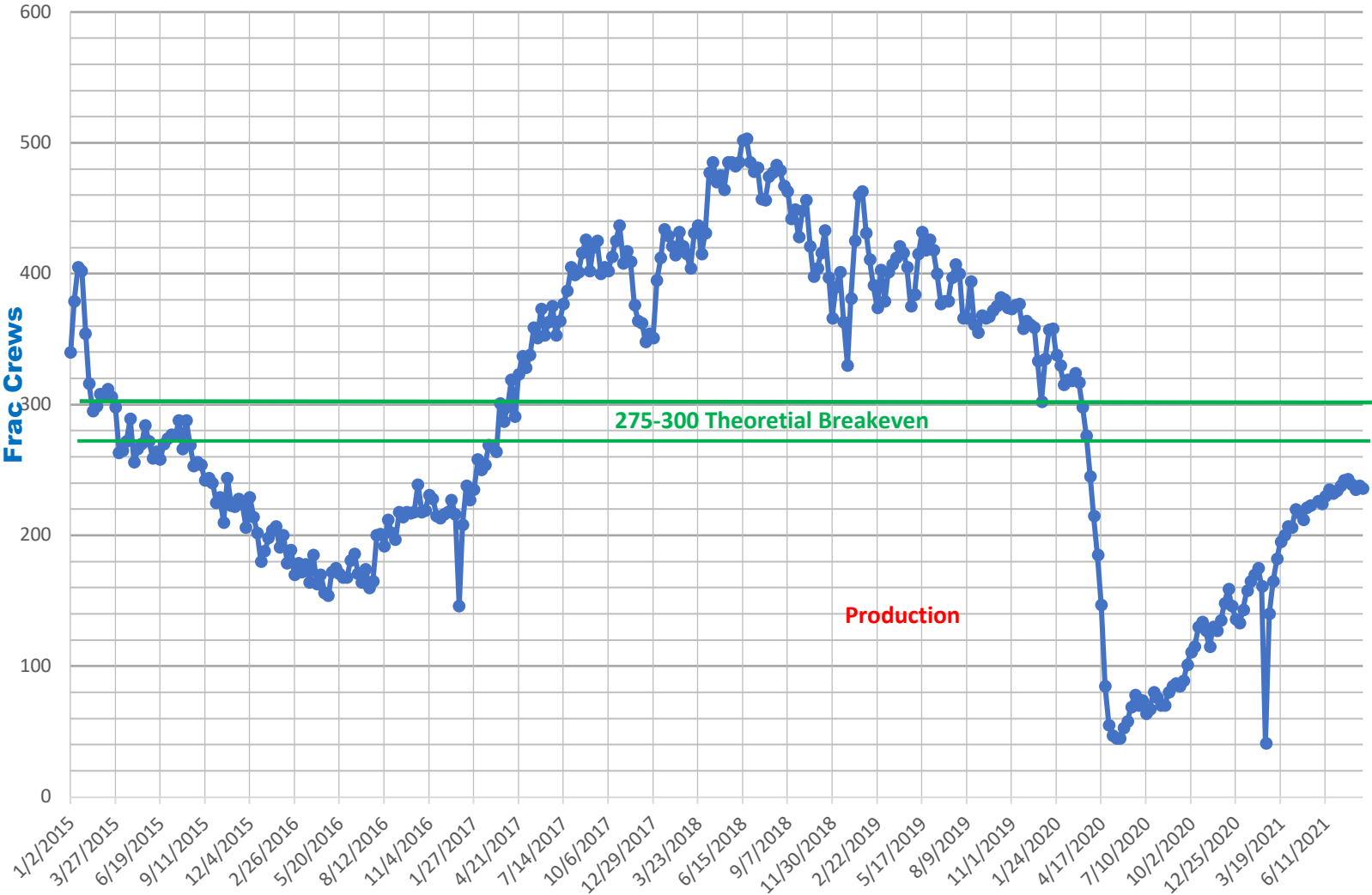
Once more; 72% of US Oil comes from Shale and 92% of US Gas comes from Shale. All Sale declines rapidly.

In order to determine how many wells must be completed to offset the decline in production and keep up with Demand? This is probably an impossible question to answer. No two wells are ever alike. It depends on oil and gas composition, rock quality and pressures. In this case the answer is simple, it takes more. Rigs and Frac Crews have been operating below historic lows since the Covid-19 Shutdown. According to the EIA

in 2020 we completed 48% fewer Shale wells than 2019. Through July we are still down by 38.5%. It is not close or I wouldn't speak so emphatically. Note I picked 300 Frac Crews as a "Breakeven Point" because that is where we were in early 2015 and our production was kinda, sorta flat.

Primary Vision Frac Spread Count

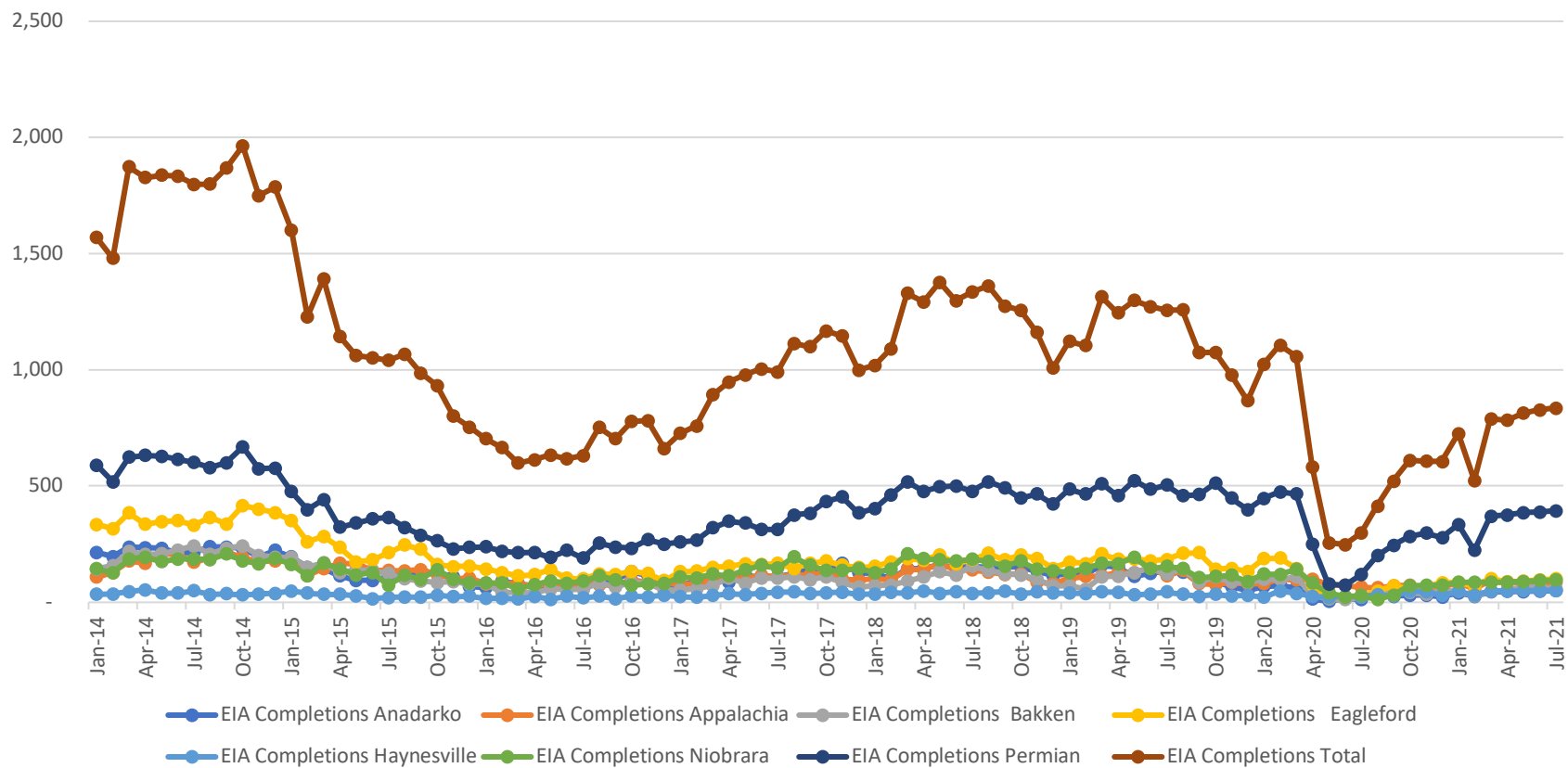
1/2/2015 to 8/20/21



Monthly Completions in Shale Regions

January 2014 to July 2021

Source: EIA



The US consumes 80 BCF/D and is exporting 18 BCF/D. It is producing 92 BCF/D. So with weather affecting so much of our consumption and starting off at near record high inventory; it is hard to see that we have a problem. Same with oil. We are burning through perceived large inventories and believing that Demand is down so we don't have a problem. In truth, demand is down, but production is down even further and that is why we are burning through inventories. Analysts will get it eventually. Perception is always more important than reality...until it's not.

Sincerely,

R. Scott Pollard

Please call or e-mail me if you have any questions.

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Ray-Wilcox
San Domingo

Tulsita Wilcox

Strauch_Wilcox

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ERF

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Gyp Hill West

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CALHOUN COUNTY

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Heyser

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Magnolia Beach

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Bombs

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Donna

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Mustang Island St.

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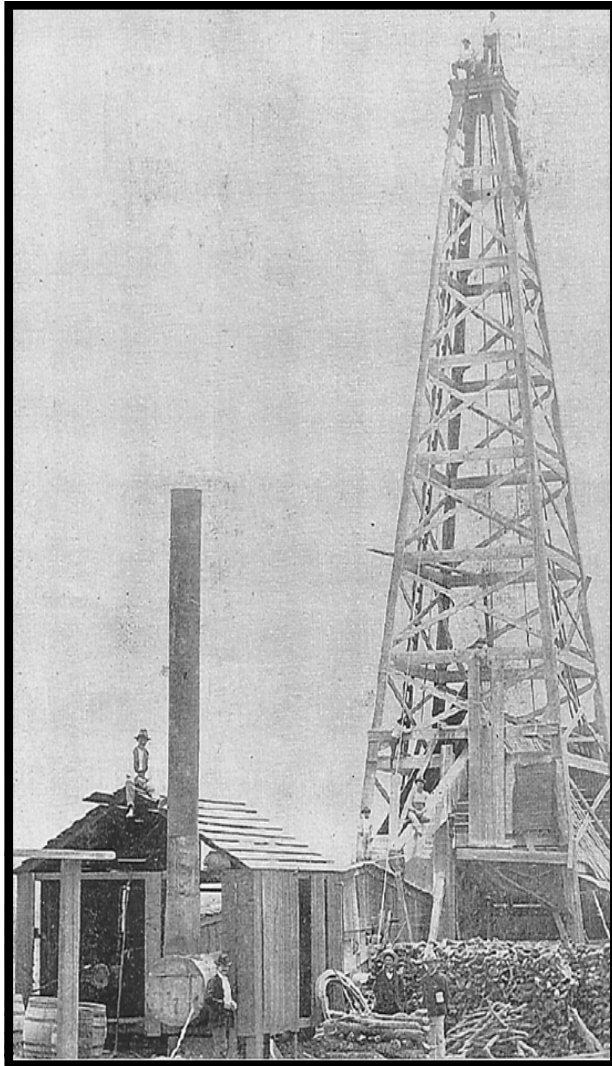
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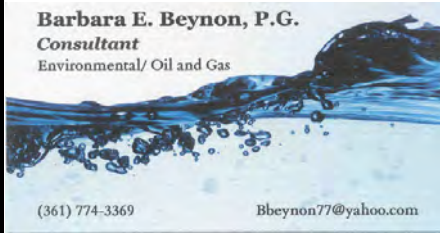
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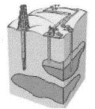
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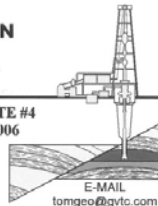
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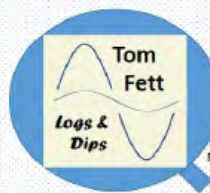
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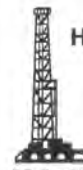
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