

UPSTREAM

TEXAS

WINTER/SPRING 2019

A PUBLICATION OF THE TEXAS
INDEPENDENT PRODUCERS AND
ROYALTY OWNERS ASSOCIATION

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> TEXAS OIL & GAS AT FOREFRONT OF ENVIRONMENTAL EFFORTS

ALSO INSIDE:

Feature:
Unraveling the Complexity of Well Spacing

Legislative Profile:
U.S. Representative Henry Cuellar

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Welcome to this edition of *Upstream Texas!*

TIPRO is the voice of Texas' upstream sector and represents members by lobbying at the state and federal levels to ensure they can continue to explore for and produce oil and natural gas. As the official bi-annual magazine of the association, *Upstream Texas* features insights into the opportunities and challenges currently facing the Texas oil and gas industry, as well as profiles key industry players and regulators.

Turn to page 8 to learn how Texas producers are lowering their environmental footprint by voluntarily adopting practices that deliver cleaner air and water supplies. Relying on new innovations and advancing technologies, oil and gas companies are committed to improving efficiencies of operations while in the process also proactively managing the industry's environmental performance. Learn some of the pioneering actions underway by independents to achieve environmental accomplishments.

In addition, experts from Enverus share insight with TIPRO into well spacing trends in unconventional formations starting on page 11 in this issue of *Upstream Texas*. As Texas producers deploy new strategies to enhance development of resources, one important approach relates to the delineation of optimal distance between operating oil and gas wells. Finding the right balance between parent and child wells under a company's drilling plans could allow producers to recover greater volumes of hydrocarbons and in turn pay big rewards. Read why spacing is so important in optimizing field development, and hear what some operators are doing to test new boundaries in search of ideal well distances for oilfields in Texas.

Inside this publication, also find profiles of top industry, state and federal leaders, including: Texas Congressman Henry Cuellar (page 14); Texas Commission on Environmental Quality Commissioner Emily Lindley (page 15); and Texegy President Michael Pedrotti (page 16).

TIPRO members, this is your magazine, and we welcome your feedback. Please contact TIPRO's Director of Communications Kelli Snyder [ksnyder@tipro.org] or Content Strategist John McCurdy [jmccurdy@naylor.com] with your ideas, recommendations or comments.

UPSTREAM TEXAS IS PUBLISHED FOR THE **TEXAS INDEPENDENT PRODUCERS & ROYALTY OWNERS ASSOCIATION** 919 CONGRESS AVE. SUITE 1000, AUSTIN, TX 78701 **PHONE** 512.477.4452 **WWW.TIPRO.ORG** **OFFICERS | CHAIRMAN** EUGENE GARCIA **PRESIDENT** ED LONGANECKER **PUBLISHED BY NAYLOR ASSOCIATION SOLUTIONS** 5950 NW 1ST PLACE GAINESVILLE, FL 32607 **PHONE** 800.369.6220 **WWW.NAYLOR.COM** **PROJECT TEAM | GROUP PUBLISHER** TAMARA PERRY-LUNARDO **CONTENT STRATEGIST** JOHN MCCURDY **SALES MANAGER** MICHELLE HUGHES **BOOK LEADER** CARLOS SANTANA **MARKETING** AUSTIN DUNN **ADVERTISING REPRESENTATIVES** AYRIS ABAD, SHAUN GREYLING, TRACY JONE, DEBBI MCCLANAHAN, NORBERT MUSIAL, DEBBIE PHILLIPS, MATTHEW YATES **PRODUCT COORDINATOR** ALYSSA WOODS **LAYOUT & DESIGN** MAHENDER VEER **PUBLISHED** NOVEMBER 2019 | TIP-B0219 | 17486 | ©2019 Naylor, LLC. All rights reserved.
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SECTOR

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KEY FACTS

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Phase 1

42 MW

Phase 2

5

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THE MARKET SPEAKS AND THE OILFIELD RESPONDS: THE EVOLUTION OF COMPLETION AND PRODUCTION STRATEGIES

Eugene Garcia

CHAIRMAN – TEXAS INDEPENDENT PRODUCERS & ROYALTY OWNERS ASSOCIATION

HISTORY HAS TAUGHT US that economic cycles are real. No industry is immune from market forces that stress commodity prices, question investment decisions, upend cost structures and ultimately challenge the strategies and tactics employed to achieve our desired results. Today, economists and news show pundits are certain of an impending recession. For some, the prognosticated date has already come and gone, and for others it is just one fiscal quarter away. However, one thing is certain: a recession is coming. They always do. The question for our nation's thought leaders is how we prepare and respond. For the Texas oil and gas industry, this is old hat. We've been here before, adapted and reinvented ourselves to continue to succeed. In fact, we are doing this right now as Texas producers continue to evolve and improve their completion and production strategies in unconventional plays.

Oil and gas development results achieved in our shale fields in Texas are unparalleled. TIPRO has chronicled the rise and growth of oil and gas production reaching historic levels. As detailed in TIPRO's "State of Energy Report" published earlier this year, the record oil and combined natural gas production are not only impressive numbers but have also helped drive even more impressive employment across the state. Now, as an industry, we are being asked to do it again. To borrow a phrase from Intel's Andy Grove, capital markets want us to do it "faster, better and cheaper," the presumption being that the oil and gas industry can create an equivalent of Moore's Law by continuing to reduce cost while maximizing production in the development of our shale fields. At the heart of the question is, "how can we continue to innovate?" Most technologies, products and processes follow a life cycle. These life cycles track an "S"-shaped curve that defines a period of investment followed by growth and expansion and culminating in maturation. The reality is that a series of these "S" curves govern most industries. Can we kick off another improvement cycle in our unconventional development strategy? In short, yes, and several TIPRO members are leading the way.

With drilling operations becoming more and more advanced, oil and gas producers must continue to consider the best methods to capture hydrocarbons from shale formations in order to achieve the highest rates of return for any given project. One facet in the innovation around completion

and production of wells is determining the optimal distance between those wells. Well spacing has risen to prominence in the continued evolution of an unconventional producer's strategy. Stressed commodity prices have brought into focus the overall efficiency and inherent interconnected nature of unconventionally developed fields comprised of multiple, highly stimulated laterals. The characteristics and physics of how these wells bores interact is complex and pivotal in overall field efficiency, and well spacing plays a key role.

There are multiple considerations producers must weigh when evaluating how many wells to drill in a particular area and at what distance to set those wells, specifically the laterals: factors such as the geologic structure, engineering design and, of course, funding available to finance complicated drilling operations. Historically, well spacing was a principle beholden to Railroad Commission or field rules and lease obligations for the distance between wells. In order to achieve the efficiencies the market is demanding, the process has become more complex.

Proper well spacing has proven to be critically influential to the rate of recovery of oil and gas from a field. Additionally, well spacing can affect the producing life of a reservoir. This is why operators need to get it right when choosing the proper well spacing and density for development plans.

At a time of increased pressures from shareholders, producers based out of the Permian Basin are particularly keen to discover the right balance between so-called parent and child wells when considering well spacing. Later in this issue of *Upstream Texas* magazine, TIPRO's partner Enverus, formerly DrillingInfo, provides TIPRO readers with greater explanation on the complex relationship between well spacing and asset development. This is just one example of how our industry has responded to the market and continued to evolve completion and production strategies.

TIPRO is proud to work with the visionaries and thought leaders in our industry to continue to bring inexpensive and reliable energy to the Texas and world markets. Supporting the sharing of this kind of research between independent operators will facilitate collaboration and ultimately lead to the extension of the Texas miracle. I can't say if there is an equivalent to Moore's Law for the oil patch, but I do know that the people in this industry are proven innovators. ■



To borrow a phrase from Intel's Andy Grove, capital markets want us to do it "faster, better and cheaper," the presumption being that the oil and gas industry can create an equivalent of Moore's Law by continuing to reduce cost while maximizing production in the development of our shale fields. At the heart of the question is, "how can we continue to innovate?"

TEXAS PRODUCERS ELEVATE ENVIRONMENTAL PERFORMANCE TO NEW HEIGHTS

Ed Longanecker

PRESIDENT – TEXAS INDEPENDENT PRODUCERS & ROYALTY OWNERS ASSOCIATION

NEVER BITE THE HAND that feeds you. It's an expression I heard growing up, and today this saying evokes an important correlation to the need of our nation to truly appreciate the powerful contributions being made by America's oil and natural gas industry.

Despite challenging market conditions in more recent years, the oil and gas industry has successfully propelled itself to reach new heights and continues to expand production of oil and natural gas to historic levels. The United States is now the world's top producer of crude oil and natural gas, overtaking super producers like Russia and Saudi Arabia to lead in global petroleum and natural gas output. As the top producing state in the country, much of America's supply of oil and gas in fact originates from the Lone Star State, with Texas energy producers on average delivering 4.971 million barrels of oil daily and providing 27.316 billion cubic feet of gas, according to the Railroad Commission of Texas.

The energy abundance we enjoy today also has brought enhanced national energy security, along with many other substantial economic benefits, including vast opportunities for job creation in addition to much-needed revenue for government coffers. More than \$300 billion per year of economic output comes from America's oil and gas production. And in Texas, the oil and gas industry supports over 1.9 million direct and indirect jobs, equivalent to more than 12 percent of the state's total workforce. Industry jobs also offer Texans strong salaries, on average paying 132 percent more than the average private sector job in the state.

Aside from the vital economic stimulus generated from domestic energy production, we also are doing our part for the environment. Producers continue to responsibly develop oil and natural gas and, thanks to new strategies and advancing technologies, are constantly improving their environmental performance to be more sustainable. Increasing efficiencies coupled with rising use of clean-burning natural gas are just two ways that the industry is reducing its emissions of greenhouse gases.

Furthermore, as you'll read more about inside of this issue of *Upstream Texas*, many of TIPRO's member companies are voluntarily adopting measures that further diminish energy emissions. By implementing best practices and investing over \$300 billion in greenhouse gas-mitigating technologies over the past 20 years, oil and gas operators continue to contribute towards improving the industry's environmental footprint.

Beyond complying with regulatory requirements, producers are pursuing other outside strategies to lower emission intensity from upstream operations, as well as working to establish comprehensive water management policies that lessen the use of freshwater supplies. In some cases, producers also are partnering with special service companies to take advantage of options to make operations more "green," from recycling waste from drilling operations to deploying electric fracking or "E-fracs" that replace diesel-powered engines with natural gas turbines to produce electricity for hydraulic fracturing and drilling activities. Oil and gas companies are not shy about testing new innovations to integrate environmentally friendly measures into E&P processes.

With the right regulatory environment in place, companies have greater ability to dedicate larger investments towards technologies that deliver greater emission reductions and otherwise help make oil and gas operations more sustainable. To ensure continued progress on this front, we must keep pushing for balanced government policies empowering U.S. businesses to improve environmental impact by deploying innovative solutions, without imposing harsh unrealistic standards that hinder development goals. Our industry track record of increasing production, while improving its environmental stewardship, is clear evidence of our ability to address these issues directly.

As an industry, we should also continue to inform the public of the many environmental accomplishments reached by the U.S. oil and gas sector, particularly at a time when the political debate over fossil fuel development remains rampant. Sharing our side of the story and highlighting the work being done – including the powerful investments made for the sake of environmental progress and programs voluntarily integrated by the oil and gas industry – is very important to the collective conversation surrounding energy. After all, the U.S. today has become a global leader for both energy production and environmental success! The two items are not mutually exclusive.

So, whenever anti-fossil fuel protestors are spending their time trying to spread falsehoods and other inaccuracies regarding energy development, may they be reminded that one should not act out against benefactors that are actually helping our society, economy and the environment in a meaningful way. ■



“Sharing our side of the story and highlighting the work being done – including the powerful investments made for the sake of environmental progress and programs voluntarily integrated by the oil and gas industry – is very important to the collective conversation surrounding energy. After all, the U.S. today has become a global leader for both energy production and environmental success!”

TEXAS OIL & GAS

AT FOREFRONT OF ENVIRONMENTAL EFFORTS

SINCE THE FIRST COMMERCIAL producing oil well in Texas struck black gold on September 12, 1866, the state's oil and natural gas industry has become one of the most innovative, resilient and impactful sectors in the world. Oil and natural gas well drilling technologies have evolved from the ancient spring pole to the modern rotary rigs that today can drill miles into the earth both vertically and horizontally. Over the past 153 years,

Texas producers have conquered a mountain of technical, political and environmental issues through sheer grit, determination and innovation, finding new ways of extracting oil and natural gas from deep beneath the earth's surface.

"The oil and natural gas industry today is almost unrecognizable from over a century ago, but a constant throughout its evolution

are the extraordinary people that make up this industry. What these individuals and the companies they represent have accomplished is nothing short of miraculous from an economic, geopolitical and innovation perspective," said Eugene Garcia, chairman of the Texas Independent Producers & Royalty Owners Association (TIPRO) and president of San Antonio-based Hurd Enterprises.



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Much like the relentless, entrepreneurial spirit exhibited by Lyne Taliaferro Barret, Benjamin P. Hollingsworth, Charles Hamilton, John Flint and John B. Earle after they formed Melrose Petroleum Oil Company in 1865 and discovered oil with their No. 1 Isaac C. Skillern well the following year, the desire to improve exploration and production methods and overcome adversity of all forms holds true to this today and will continue for decades to come.

"Thanks to independents, today the United States is the largest producer of oil and natural gas in the world. The economic benefit and positive impact from oil and natural gas production on our society is truly without compare, even if some choose to ignore its impact and importance," said TIPRO President Ed Longanecker.

"Aside from the obvious benefits of domestic production, we need more of an emphasis on the proactive and successful efforts of producers to address a variety of issues negatively perpetuated by anti-fossil fuel activists to bolster a one-sided narrative," added Longanecker.

As the industry looks to the future, what do increasing levels of production mean for the environment, including energy emissions? It may not be intuitive, but increased production is actually a good thing. By utilizing new technologies, industry best practices and participating in voluntary programs, the U.S. has realized many positive energy emissions accomplishments side-by-side with growing levels of production.

Natural gas has been driving a decline in carbon emissions for years now. The Energy Information Administration (EIA) reported that since 2005, increased use of natural gas has prevented more than 2 billion metric tons of carbon dioxide emissions. In fact, the rising use of natural gas has made America a world leader in reducing CO₂ emissions. Increased natural gas use in the power sector specifically is credited with almost two-thirds of the energy-related carbon reductions in the U.S. since 2005.

The industry has also undertaken voluntary initiatives to continue driving down emissions. Many prominent U.S. oil and gas companies participate in the Environmental Partnership, which is committed to improving the industry's environmental performance. According to its most recent annual report, the methane leak occurrence rate across member operations was only 0.16 percent.

"It's not just members of the Environmental Partnership seeing lower methane emissions, but the industry as a whole as well: from 2011 to 2017, methane emissions from oil and natural gas production fell 24 percent, while oil and natural gas production rose 65 percent and 19 percent, respectively, according to data from the Environmental Protection Agency and the EIA," said Elizabeth Caldwell, energy expert with FTI Consulting.

Policies implemented by the current administration have also expanded the U.S. economy and opened new doors for environmental advancements, as the president and his cabinet have continued to champion new breakthroughs that keep the environment clean. As recently stated by President Donald Trump, a strong economy is vital to maintaining a healthy

environment. When we innovate, we are able to unleash technologies and processes that make the environment better while supporting domestic production, taking it away from foreign polluters and bringing it back to American soil.

Only through a fair, stable regulatory environment has the country been able to accomplish such major achievements, leading to cleaner air and water resources in the United States. Meanwhile, unbalanced policies like the so-called "Green New Deal" – a proposal announced in Congress that would force the U.S. to move away from use of fossil fuels – would not only have a detrimental impact on the nation's energy supply but also harm the economy, all while hindering important advancements and innovations pursued by U.S. companies to help the environment.

The U.S. today continues to dominate as a global leader in environmental success. Although the U.S. withdrew its participation from the Paris Accord, America is still making great strides to improve the environment and protect our natural resources. In all likelihood, the U.S. will still satisfy the commitments required under the Paris Agreement without spending tens of billions of dollars on other countries that do not have our same commitment to environmental stewardship. Since 2005 – the starting point for the Paris Climate Accords – total U.S. greenhouse gas (GHG) emissions have dropped by 12 percent, and total GHG emissions from fossil fuel combustion have decreased nearly 15 percent. Meanwhile, every one of the signatories of the Paris Accord lags behind America in overall emissions reductions.

But that's just the beginning. New technologies are again mapping the future for lower-emissions oil and gas production. Over the past 20 years, the U.S. oil and natural gas industry has invested \$300 billion in greenhouse gas mitigating technologies. Many energy companies are also pursuing new partnerships to further research and deploy technologies like carbon capture and sequestration (CCS). The U.S. Department of Energy is running a carbon capture program, aiming to demonstrate technology that could capture CO₂ for a cost of less than \$40/metric ton between 2020 and 2025.

Occidental Petroleum (Oxy) signed a deal in 2019 with Carbon Engineering Ltd., based in Squamish, British Columbia, to design a plant capable of pulling an expected 1 million tons of carbon dioxide annually from the atmosphere. Oxy plans to pump the carbon dioxide it will gain from its partnerships into aging oilfields in Texas, where the gas can be simply sequestered or can be sequestered while also helping boost production – a process known as enhanced oil recovery, or EOR. In turn, the carbon will be stored below ground safely and permanently.

In 2018, Congress doubled tax credits for carbon storage that some say could pump tens of billions of dollars into technology that captures and stores CO₂ emissions, including oil and natural gas projects. Some advocates say the changes will drive cost reductions that could bring carbon capture technology into the mainstream.

Occidental President and Chief Executive Officer Vicki Hollub has expressed the need for new laws to support development of carbon sequestration infrastructure beyond the adoption of tax credits for sequestration products. "As much as some people want oil and gas to go away in the next couple of decades, it cannot," said Hollub. "What we can do is make sure all companies have access to these technologies."

Meanwhile, the British energy major, BP, recently announced that it will deploy a system of continuous measurement of methane emissions for all of its new major projects worldwide and that it will use frequent drone flights to detect methane emissions at its existing wells ranging from West Texas' Permian Basin to the United Kingdom's North

Sea. This new technology will help detect methane emissions in real time. The company said the faster and more accurately they can identify and measure leaks, the better they can respond and, informed by the data collected, work to prevent them.

New and established product and service-oriented companies are expanding their efforts to provide fresh, innovative solutions with a focus on Texas. As an example, Recover Energy Services Inc. ("Recover") is an environmental clean technology company that has developed a patented process to recover and refine diesel from oil-based drilling waste. Using this new technology, Recover is able to offer an alternative to operators and recycle waste that would have otherwise been disposed of into landfills, resulting in substantial cost savings for operators, while reducing emissions by 60 to 85 percent and significantly mitigating the potential for future liabilities associated with this waste stream. Recover produces a high-quality diesel base oil that meets or exceeds all required specifications, and the operator's costs are limited to the amount of waste generated. "Recover is in the business of recovering energy, and our team is proud to help make the energy industry more cost effective and sustainable. Recover has constructed and operates a commercial scale facility in Lodgepole, Alberta, and is presently targeting expansion into the Permian and other major U.S. shale basins," said Shane Kozak, chief financial officer for Recover.

Another leading provider, Reach Production Solutions, is offering producers expanded options when it comes to artificial lift and frac hit recovery solutions. At the heart of Reach's product offering is its proprietary multi-phase compression technology with compression ratios of up to 40:1. Reach's system connects to a well at the surface and reduces wellhead flowing pressure to increase gas velocities and propel liquids out of the well, increasing production and recoverable reserves in both oil and gas wells without any well intervention required. By eliminating liquid loading events, removing the need for wellhead separation and liquids storage facilities and getting rid of the inherent leakage points in traditional compression systems (e.g. pneumatic valves, packings, etc.), Reach can virtually eliminate compression-related methane emissions. Currently, compressor stations are responsible for 43 percent of emissions across the natural gas supply chain.

"We are extremely proud of the innovative technology we have developed. Our lift solution enables operators to do more with less, which is precisely what is needed in today's difficult commodity price environment – and to be able to do that in an environmentally responsible way can only help the oil and gas industry as a whole," said Rob Perry, CEO of Reach Production Solutions.

Some TIPRO members are also utilizing electric fracking, which replaces diesel-powered engines with natural gas turbines to produce electricity to power their hydraulic fracturing operations. E-frac, as the new technology is called, is being adopted by EOG, Exxon Mobil Corp. and others because of its potential to lower costs, reduce air pollution and operate much quieter than conventional diesel-powered frac fleets. Some analysts estimate e-fracs could save over \$300,000 from the cost of shale wells that run \$6 million to \$8 million apiece, but widespread adoption in the short term is unlikely due to the significant cost for service providers, which can be double that of conventional fleets to build.

"It's clear that one size does not fit all for the U.S. oil and natural gas industry from a policy or technology perspective," observed Longanecker. "Large and small operators continue to use the latest drilling techniques, comply with all state and federal regulations, and produce oil and natural gas in a responsible manner. As the cost of new, innovative solutions declines, more operators will adopt the appropriate tools for their specific operations. The state and federal government has a role in providing regulatory certainty to allow the private sector to solve its own challenges. They can certainly suggest environmental goals, but they should not dictate how an entire industry should to get there."

Oil and gas is an industry defined by innovation, and the industry's commitment to reducing emissions and the responsible development of domestic oil and gas promise a bright future ahead. Cleaner operations, facilities and products – all are part of the natural gas and oil industry's commitment to improve its environmental performance while producing the energy required by a modern economy. Much like the drive and innovation that unleashed the U.S. shale revolution, the oil and gas industry will continue to address the challenges and opportunities that lie ahead for the benefit of all Americans. ■

UNRAVELING THE COMPLEXITY OF WELL SPACING

By Riteja Dutta, Senior Product Manager, Engineering and Analytics, Enverus

AS OPERATORS ADD OR consolidate acreage, their primary focus is optimally developing these assets. In the early stages of unconventional reservoir development, operators were mainly concerned with quality of the reservoir and size and type of completions. In more recent times, another important variable to help optimize field development has emerged: that of well spacing.

In today’s free-cash flow era, operators must make decisions on optimizing their field development plans by either maximizing well-level returns or hydrocarbon recovery. These investment decisions directly impact well spacing and development, depicted in the graphic below.

While the overarching goal of understanding well spacing is to optimize the development of an asset and spacing between new wells being drilled, well spacing decisions are associated with understanding well interactions and their impact on both past and future well productivity. Consequently, well spacing is not just a function of distance but also a function of time. In relation to this, the industry commonly uses several terms to help understand wells in relation to one another.

- “Child” and “parent” wells signify when these wells were brought online within a defined geographical area, that is, parent wells are brought online prior to child wells.
- “Standalone” wells signify wells that do not have any neighbors in its vicinity.

- “Co-completions” indicate multiple neighboring wells that were completed together.
- “Infill” drills indicate child wells surrounded by multiple parent wells on either side.

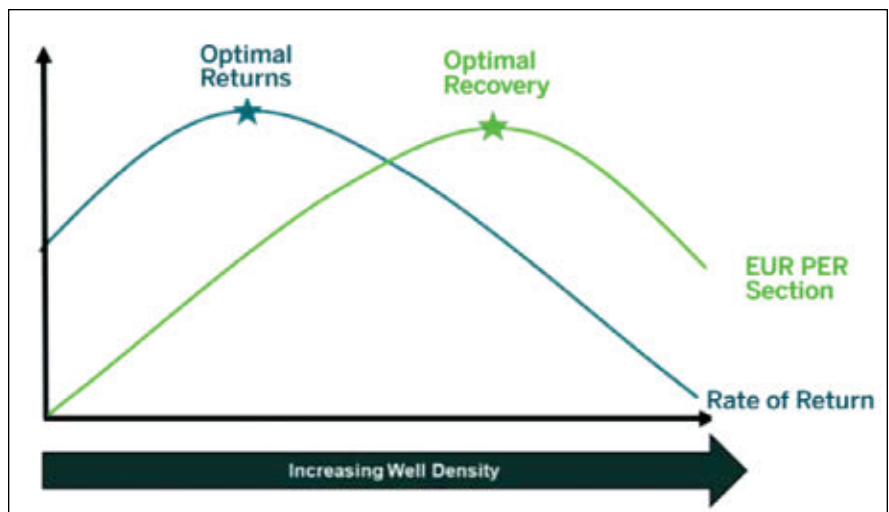
Although this may seem just a smattering of the terminology used, they emphasize the time component of the spacing problem and how these categories of wells should be analyzed differently in terms of well productivity.

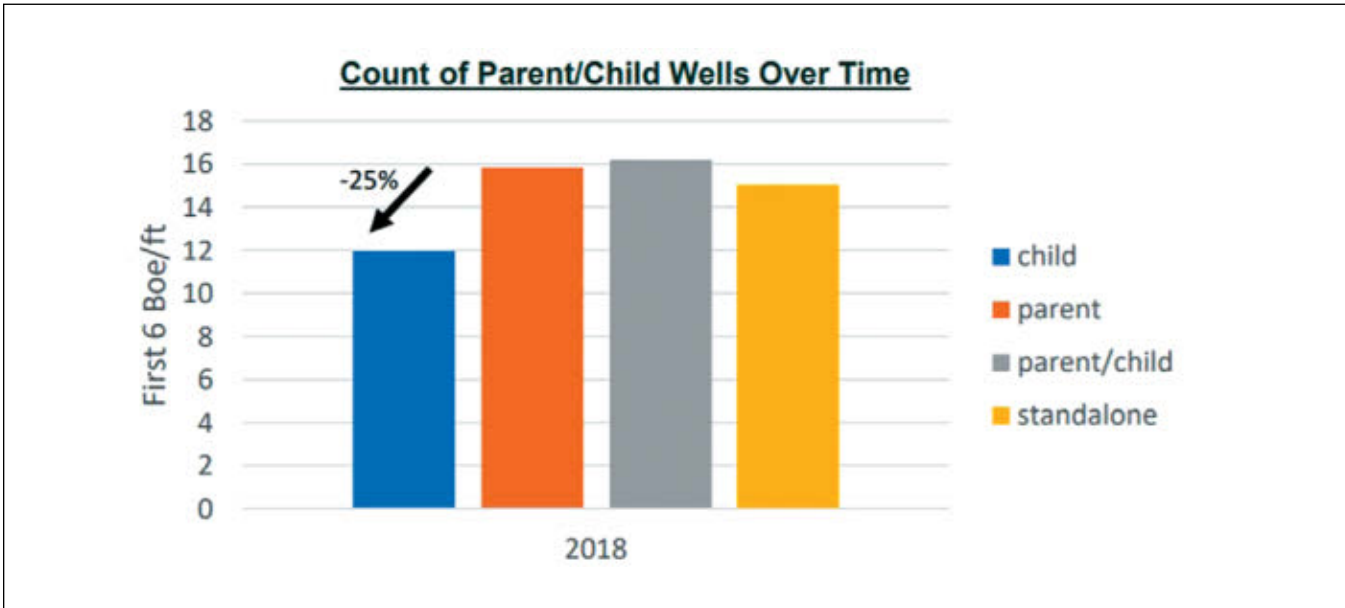
So why is the time component of spacing important in optimizing field development? The length of time after which a well is brought online in the vicinity of an existing well is indicative of the extent of reservoir depletion and drainage. A child well brought on later in the life of an asset can sometimes negatively

or positively affect the productivity of the existing well (parent well) in its vicinity – this is loosely termed a “frac hit.” These frac hits manifest themselves when material used to frac the child well gets pulled into the area of low pressure surrounding the parent well, resulting in an under-stimulated child well, consequently affecting the parent and/or child well productivity.

As an example, in the SCOOP/STACK play, wells completed in 2018 showed that child wells underperformed as compared to the parent wells by about 25 percent (see graph on the following page).

At times, the effect on both child and parent wells may be positive – a result of a combination of factors that include depletion





and the type of completion that was used to frac the parent well. The distance at which wells interact often varies by basin and by formation – the relationship between rock properties, geomechanical stress variation and extent of depletion dictate what this distance will be. Multiple technical publications address this issue, which can be demonstrated through comprehensive reservoir and fracture modeling. Recent research has shown that in some cases, it may be better to recomplete a well than actually drill a new child well.

As Wall Street reacts to underperforming child wells, the industry continues to innovate in search of methods to increase child-well performance – an interplay between finding the right drilling inventory in an area, preventing frac hits and optimizing completion strategies. Several industry conferences dedicate sessions on this very topic, showcasing their research and learnings to help the industry make significant strides in moving forward. Recently, several companies revealed their latest field development strategies in their earnings calls that have shown a mixed bag of results.

At the outset, calculating well spacing distances may seem simple, but it truly is much more than a simplistic point-to-point calculation. So far, the industry has relied on simple mid-point measurements between laterals or similar elementary calculations. Enverus recently unveiled its latest solution that fundamentally changes how well spacing should be calculated. To help the industry improve its well spacing decisions, the company’s method is based on a rigorous approach in distance measurements along the length of the wellbore lateral alongside a comprehensive list of 300-plus derivatives. As an example, in the Bakken, a midpoint-based spacing calculation would underestimate average spacing by 10 percent compared to the true well spacing in the play. This could have far-reaching consequences on forecasting and planning well inventory when the well density falls short of expectation in developing an asset. This highlights the importance of ensuring that decisions are made using accurate well spacing metrics.

In September 2019, Laredo reported significant gains in capital efficiency (an increase of 22 percent Internal Rate of Return, or IRR) and reduced decline rates by transitioning to a wide spacing development strategy (“up-spacing”) in the Upper Wolfcamp (UWC), Middle Wolfcamp (MWC) and Cline formations. Laredo highlighted achieving this through reducing the number of target landing points in the UWC/MWC from four to three,

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reducing overall well spacing vertically and horizontally. This marks a substantial shift from Laredo's well spacing and targeting strategy to mitigate both horizontal and vertical communication between wells in the UWC/MWC reservoirs. Laredo has also re-introduced the Cline as a primary target in certain regions. Laredo's wider spacing shift falls in line with an aggressive up-spacing trend in the Midland over the past year.

Recently, Concho's valuation came under pressure following an update on one of the operator's spacing test projects. In this case, Concho selected a historically top-performing area with greater than 80 percent IRRs based on type curve economics at \$50 oil. With the project, Concho pushed the boundaries in search of optimal spacing in the area. Specifically, in the Wolfcamp A bench in Lea County, the Dominator project had a combined average well spacing of 230 feet, versus the average of 600 feet for Lea County. This project is encouraging, as they help operators continue to test the limits in search for an optimal development plan and help the industry as a whole learn and move forward.

Alongside examples of down-spacing and up-spacing, active well defense or pre-loading is another strategy that operators are implementing in the field. In this technique, operators inject water – sometimes mixed with chemicals – at low rates into the parent well to fill up the natural fracture network and create a high-pressure barrier around the parent well by changing the local stress regime. By doing this, they ensure that the debris from the child well does not enter the depleted region of the parent well and mitigate frac hits. The technique may not completely prevent frac hits, but it has been deemed a successful strategy in preventing costly decreases in well productivity.

The number of co-completions has risen significantly since 2013 across most major unconventional basins, including the Permian, Gulf Coast and Williston basins. Alongside planning for the right well spacing or co-completion strategy, operators have also been experimenting with the size and type of completions. In an area where wells are spaced densely, smaller-sized completion designs may help prevent frac

interactions, as compared to wells that are more widely spaced.

The most optimal development plan is a complex relationship between geological and engineering variables, including well spacing, with a goal of optimizing returns or hydrocarbon recovery. As operators strive to innovate in this price environment, solutions continue to emerge that help answer in part how to mitigate frac hits and well interaction, as well as how to better plan field development.

Several operators have shown significant improved results by way of changes in well spacing plans and optimized completions. By no means do we have a simple answer or the silver bullet – the industry is still chipping away at understanding this complex issue – this is a challenge that the industry will continue to face and overcome with innovative technical solutions. But with so many other complex challenges the industry has faced, there's great reason to believe producers will conquer this one too. ■



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HENRY CUELLAR

U.S. Representative, Texas 28th Congressional District

IN WINTER 2005, ONLY a month into his first congressional term, U.S. Representative Henry Cuellar was dining in the White House with the president of the United States. The freshman Democrat, whose Texas district includes Laredo, Mission, Rio Grande City and San Antonio, had been invited to dinner because of a close friendship with President George W. Bush, which they had formed during Bush's stint as Texas governor. Near the end of an enjoyable visit, Cuellar wanted to express his appreciation to everyone involved.

"On the way out that evening, I stopped by the kitchen to thank the staff for preparing the wonderful meal," he says. "Many of them were Hispanic, and we immediately fell into speaking in Spanish. I told them how I was a dishwasher while I was in school in Georgetown University."

Of course, Cuellar recalls, the kitchen staff still had work to do, and he could see that the dishes weren't washing themselves.

"I borrowed an apron and helped wash dishes along with them," he says. "In short order, Secret Service was alerted and immediately came in to speak to me directly to see what was going on. I assured them it was all my idea, but they had never seen a congressman in the kitchen, much less doing dishes! Of course, President Bush knew me much better and wasn't surprised at all."

That's Cuellar: at ease in both the White House dining room and the kitchen. He has run a law firm and a customs brokering business, and peers consistently recognize him as one of their most bipartisan colleagues. As the most degreed member of Congress, he is comfortable in the halls of higher education; and as one of eight children to parents who performed migrant farm work around the nation, Cuellar is very much at home among the sweat and toil in the oilfields of South Texas.

With a master's degree in international trade and a district featuring a major trade conduit at the United States' southern border, the congressman agrees with the administration that Congress should pass the U.S.-Mexico-Canada Agreement (USMCA). However, he expresses dismay at some of the president's other trade moves, including the Commerce Department's tariffs.

"I was alarmed at the tariffs when they were imposed," Cuellar observes. "It is absolutely contrary and counterproductive, so much so that I called the White House directly for clarification on how this would impact both American consumers and businesses. I was getting calls from numerous U.S. companies in my district that were panicking

at the idea. Not only was it counterproductive, it flew in the face of the USMCA and our progress toward ratifying it. I've been one of the biggest proponents of the deal, and the tariffs completely reverse all the progress we've made."

Nevertheless, Cuellar still persists in laying groundwork for Congress to ratify USMCA, bringing the same mentality that prompted him to roll up his sleeves, grab an apron and plunge his hands into the White House dishwasher. The congressman's tireless advocacy for the trade deal among business interests, labor groups and both sides of the aisle in the House have been noted by *Politico*, which has dubbed him the "USMCA Whisperer" for efforts that include countless one-on-one meetings with colleagues and a running tally of how they plan to vote.

"My Democratic counterparts are still processing it, but I have taken several Congressional delegations to Mexico to visit with key government officials and am confident that we will be able to come to an agreement," he shares. "While I have always been a 'yes' vote on USMCA, I believe my colleagues understand the value of this important relationship and do want to get to a 'yes' vote. This bill is going to revitalize international trade and stimulate Texas' economy."

He adds, "As it stands, we receive over \$1 million per minute across our entire southern border, and this agreement only serves to bolster that."

Congressman Cuellar says he also feels passionate about convincing his fellow lawmakers in Congress to support legislation harnessing the nation's energy resources in order to enhance U.S. energy security and independence.

"When we find a reliable and affordable energy supply and utilize it properly, it has always benefitted every aspect of our economy," describes Cuellar. He cites South Texas as "a perfect example" of an area seeing a recent resurgence in exports of oil and natural gas, bringing new opportunities for economic growth as well as prospects for trade, especially as new pipeline infrastructure comes online that will send oil and gas produced in the Eagle Ford to other regions, such as Texas' neighbor to the south, Mexico.

"The Eagle Ford Shale area encompasses a majority of counties in my district and has contributed over \$300 billion to the South Texas economy. I'm confident that we can facilitate additional avenues to export our vast natural energy resources to Mexico and other countries in the future," asserts Cuellar. ■



EMILY LINDLEY

Commissioner, Texas Commission on Environmental Quality

WHEN TEXAS COMMISSION ON Environmental Quality Commissioner Emily Lindley raises the hypothetical situation of a world in which her agency does not exist, she sticks to the facts: Without TCEQ, the U.S. Environmental Protection Agency (EPA) would run many relevant programs in Texas; EPA would handle permitting, compliance and enforcement.

But TCEQ (or one of its predecessor agencies) has existed since before EPA was created, and it now has delegated authority to run most federal environmental programs here in Texas. It is due to the agency's expertise in the state's environment and natural resources that the agency has obtained the ability to run its own programs, rather than having to leave it up to EPA.

Granted, as someone whose resume also includes a short stint at EPA, Lindley does not cast the federal agency as a villain, but she does acknowledge that even her EPA experience has deepened her appreciation of TCEQ, where she first began work in 2008.

"I did not fully appreciate how lucky Texans are to have the TCEQ, an established, credible regulatory agency," she says. "States that do not have delegated authority, like the TCEQ does, are all left with the EPA as the regulatory authority in their backyards."

She was nominated to the commission by Governor Greg Abbott and sworn in August 2018, not long before the 2019 Texas Legislative Session kicked off. As soon as she took office, she hit the ground running on a number of matters in preparation of session, recalling that permitting timeframes were a hot topic. She expresses pride in the improvements that followed the agency's deep dive into its air quality permitting process prior to and during session.

She goes on to indicate that TCEQ also has received considerable citizen input regarding the concerns about aggregate production operations and notes that more than 50 bills dealing with the topic surfaced during the 2019 Texas Legislative Session.

The issue also touched another prominent TCEQ matter during a session in which the agency analyzed 844 bills, 184 of which received a gubernatorial signature and 74 that passed without signature.

"Making sure our agency receives the money we need in order to run it is very important to me," Lindley notes. "Our number one priority going into session was getting funds and employees to improve our expedited air permitting program. I monitored that bill closely all session."

Among the 90 new statutes TCEQ must implement are 30 that require rulemakings. Other important assignments from lawmakers include applying House Bill 2771, which upon federal delegation, transfers from the Texas Railroad Commission to TCEQ the authority to issue permits for the discharge of produced water, hydrostatic test water and gas plant effluent resulting from certain oil and gas activities into Texas waters.

"Transferring a program from one state agency to another is no small task; there are several logistics involved," she explains. "Seeking federal delegation of a program is also a heavy lift. We have done it before and are experienced in the process. We are already having discussions on how to go about getting this done, and we are gearing up for that."

Once TCEQ obtains delegation for that program, those seeking a permit to discharge waters covered under the program will no longer have to seek a second authorization from EPA. They will only need to deal with TCEQ.

As for TCEQ's overall approach, Lindley indicates the commission's culture emphasizes compliance.

"We are not out there doing investigations in order to collect penalties. Raising dollars for general revenue is not our primary goal," she says. "We are out there to make sure companies are obtaining permits when necessary and abiding by what is allowed in their permit from the TCEQ. If they are not, then yes, we will penalize, but our primary goal is compliance."

Pursuing public service is a mindset Lindley says she inherited from her family's long line of teachers. As a Midland native, she acknowledges her initial instincts directed her toward the Railroad Commission.

"A commissioner there was a friend and encouraged me to look into working at the TCEQ because it touches everything," she says. "After I got to the TCEQ, I started to get more informed and more excited about environmental work. I learn something new daily, and that is a thrill." ■



MICHAEL PEDROTTI

President of Texegy, LLC

MICHAEL PEDROTTI FIRST FELT the tug of an oilfield career as a boy. Oil and gas put food on the table in his family, but the draw was not only about following in his father's footsteps. He recalls the sense of possibility that permeated every step of the oil and gas projects that provided the backdrop of his childhood.

Or in Pedrotti's own words, he first gravitated toward the industry "having grown up with a father who was an independent geologist – a true wildcatter – and seeing the excitement of pursuing a prospect from the drafting table to drill-ready, then on to logging and hopefully a new field discovery."

After graduating from Texas A&M University in 1984 with a B.S. in agriculture economics, Pedrotti began work as a landman for TXO Production in 1985, before launching his first oil and gas exploration company, Pedrotti Oil & Gas Inc., the next year. His positions and companies would change during the course of the next couple decades, but pursuit of the next oil and gas project remained the common thread. Today, as chief executive officer of Texegy Royalty LLC and president of Texegy, LLC & Texegy Operating Company LLC, he is as enthusiastic as ever about the industry.

According to Pedrotti, Texegy's core strategy centers on acquiring, developing and operating oil and gas assets in Texas and Louisiana. The company's Texas assets include producing fields in McMullen and Austin counties, which he says represent conventional long-lived/low decline oil production, with numerous opportunities in the area of proved developed producing, proved non-producing and proved undeveloped assets.

In western Louisiana, he notes, Texegy Royalty LLC also owns 83,000 net mineral acres in the Austin Chalk, properties that were acquired as a result of Texegy's strategic alliance with Swift Energy when Swift emerged from bankruptcy in the spring of 2016. Through that process, Pedrotti explains, Texegy Royalty acquired Swift Energy's 83,000 net Austin Chalk acres in Vernon Parish, Louisiana, and Texegy, LLC acquired Swift Energy's South Bear Head Creek Field, a 5,000-acre Upper and Lower Wilcox field in Beauregard Parish, Louisiana.

The Austin Chalk has a long history of traditional production, but recently has drawn considerable interest from a number of companies that suspect modern unconventional completion techniques could turn the Austin Chalk into another prolific horizon with repeatable output over a broad area. With its acreage foothold, Texegy has found a partner that it hopes can help unlock the next big unconventional play.

"Last year, we leased 60,000 acres to Equinor," Pedrotti shares. "Equinor is currently conducting a 107 square miles 3-D seismic shoot across this acreage and plans to start its drilling campaign with two horizontal Austin Chalk wells after full evaluation of this 3D seismic data."

Pedrotti explains that Texegy, LLC was founded in October 2014 as a partnership when OT, a Delaware LLC with Egyptian origin, bought the assets of SV Resource Partners, which was a company co-founded by Michael Pedrotti as CEO and Rajan Ahuja, president, with GCP Capital as its private equity partner. The company gets its name from the combination of Texas and Egypt.

"Texegy's lion icon, Aker, as explained by our managing member and partner Sherif Wadood, is the god of horizons east and west in ancient Egypt," he says. "Aker is moving towards the west, symbolizing the company's Egyptian origin and destination in Texas."

Coming to the West, OT teamed with the management of SV out of Corpus Christi, Texas, to acquire, develop and operate oil and gas assets in Texas and Louisiana.

As for his role within the company, Pedrotti says he focuses on responsibilities associated with partner relations, capitalization, land, legal issues and managing the company's day-to-day activities.

That includes membership in and involvement with the Texas Independent Producers & Royalty Owners Association, which he deems a key aspect of smart company management, citing regulatory matters in areas including water disposal, air quality and other environmental considerations as some of the tallest hurdles companies such as his have faced during his more than three decades in the industry. TIPRO's advocacy on the industry's behalf about those matters, as well as state and federal tax policies, demonstrates the association's value to its members, he says.

Of course, Pedrotti acknowledges, the benefits of TIPRO membership extend beyond the arena of public policy, adding that he appreciates how TIPRO helps him network with other industry professionals.

And as TIPRO strives to do the industry proud going forward, Pedrotti vows his company will do the same.

"Texegy is a company based on integrity, diligence and innovation," he emphasizes. "We value our stakeholders, respect our environment and genuinely care about our employees." ■



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December 11, 2019

IPAA/TIPRO "Leaders in Industry" Luncheon
Houston Petroleum Club
Houston, Texas
For more information, call (202) 857-4733.

February 12, 2020

IPAA/TIPRO "Leaders in Industry" Luncheon
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April 8, 2020

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March 11, 2020

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May 13, 2020

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February 5-7, 2020

NAPE Summit Expo
George R. Brown Convention Center
Houston, Texas
For more information, call (817) 847-7700.

March 23-24, 2020

TIPRO's 74th Annual Convention
Hilton Anatole Hotel
Dallas, Texas
For more information, call (512) 477-4452.

June 10, 2020

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