RESERVOIR SOLUTIONS

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# To solve well-spacing problems, Lee proposes pre-run simulations

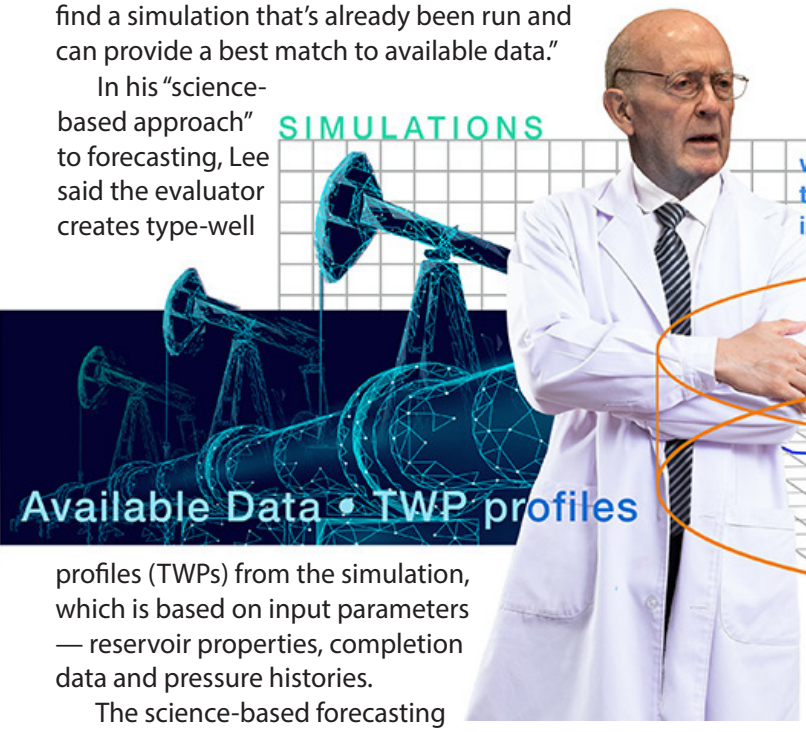
## *Results more "accurate" than decline-curve analysis (DCA) and just as fast, he says*

Evaluators may not have to endure the painstaking steps of history matching (HM) individual well histories to head off well-spacing problems — that is, if the right data is available, according to **John Lee**, professor at Texas A&M University.

Overly dense spacing per acre causes excessive interference between wells which eventually leads to steeper declines and deteriorating economics. In those cases, overlap of stimulated reservoir volumes (SRVs) is the root of the problem. A frac hit.

"Simulations are already available within the ranges of parameters considered important," he said. "We can fairly quickly find a simulation that's already been run and can provide a best match to available data."

In his "science-based approach" to forecasting, Lee said the evaluator creates type-well profiles (TWPs) from the simulation, which is based on input parameters — reservoir properties, completion data and pressure histories.




The science-based forecasting (SBF) process leverages stored simulation results in a system that retrieves reservoir and completion data that correspond to the best matching profiles. "It finds a best match to historical data using the parameters for the best fit," Lee said.

In other words, the evaluator history matches actual data from the primary (in some cases, parent) well to develop best-fit spacing and timing scenarios for the offsets. The goal is to settle on a pre-drill field development plan built around well-placement patterns, timing and interference.

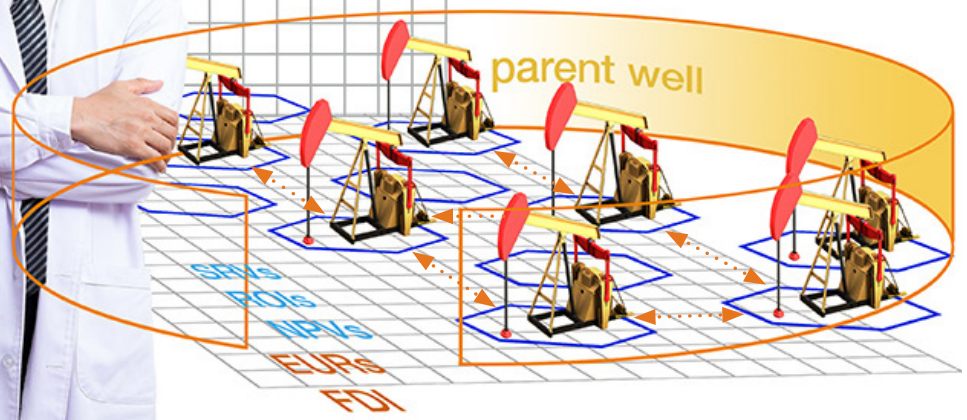
"We can compare pre- and post-drill TWP profiles. Based on practical simulation, we can analyze well spacing and interference caused by overlapping SRVs," he said. "We can examine the effect of timing of infill-well drilling, and the results, and infill quickly after drilling the primary well or wait 6, 12 or 18 months."

The plan can vary depending on whether the producer wants to boost return on investment (ROI), net present values (NPVs) or estimated ultimate recoveries (EURs).

Data acquisition can be costly. "If some of the data is not available (for the model), then we have to make certain assumptions about what's most appropriate," Lee said.

He stressed that robust simulations can be time consuming while the practical, physics-based simulations he proposes "can be applied to more wells, more quickly."

*John Lee*




### Accelerated production at what cost?

Too much cross-well communication caused by tight spacing and pad drilling is hurting production and returns on invested capital. The press has criticized some oil and gas companies in the U.S. market for overly optimistic production forecasts for child (infill) and parent wells in pressure communication.

Researchers are gathering historical data and using multivariate data analysis and other techniques to put together a clearer picture.

In the slide deck, Lee showed a Bakken modeling study that

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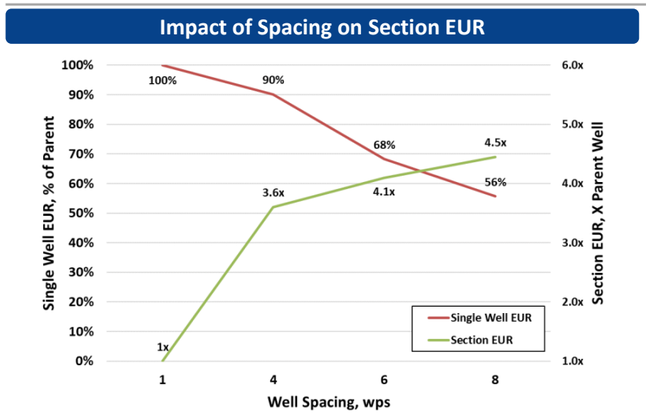
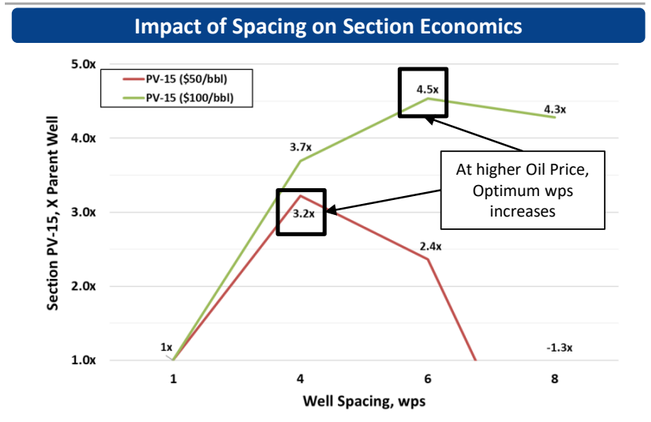
was presented at the Houston Geological Society luncheon on March 27, 2019. The study analyzed well spacing and related factors, including economics.

Lee said, "Based on actual field performance, the study shows interference occurs in the section studied."

Optimal well spacing is based on the economic goals of the producer in maximizing ROI, discounted NPV or EUR. The following two charts plot well spacing and economics, respectively, in the Bakken section.

**Illustrative Well Spacing and Economics**
**What is the Right Inter-Well Spacing?**




The top plot on the left shows a single well EUR (red line) as a percent of the EUR from the parent well vs. the EUR from four, six or eight wells per section. With one well per section (WPS), the producer is at 100 percent of EUR. With four wells, each has, on average, about 90 percent of the EUR from the original well. For six wells, it drops to 68 percent and eight wells to 56 percent. The green line shows multiples of the single-well EUR as more wells are added. More wells increase interference and degrade well performance.

The chart on the bottom attempts to answer how spacing affects section economics. A multiple of the NPV discounted at 15 percent for the parent well is plotted against different well-spacing densities per section. The red line shows the multiples of the NPVs for the parent well, as calculated if oil is at $50 per barrel. The green line is the multiple of NPVs for $100-per-barrell oil.

"What we see is that, we can improve recovery from the section by drilling more wells, but the cost of drilling and completion is not justified by the accelerated production," said Lee. "It turned out in this study, at $50 a barrel, four WPS were optimum in this area of the Bakken, and anything more led to poor economics."

The study concluded that "drilling more wells in a higher-price environment is a rational decision while widening spacing in low-price environments also makes sense."

## DCA vs. SBF

Lee compared the strengths and limitations of DCA and SBF, examining well spacing, interference and timing sensitivity results.

DCA, which is easily learned and applied, is the No. 1 choice for evaluators. On unconventional assets, they use a modified Arps equation with changing b factor and terminal decline. DCA does not model the physics of fluid flow, but with reasonable assumptions, it adequately accounts for the behavior of flow regimes.

"If we use a two-segment Arps decline model, for example, we have to select a decline rate at which we switch from a segment dominated by transient flow to one with boundary-dominated flow (BDF)," said Lee. "We also have to assume what the Arps b parameter is during BDF."

The assumptions are where a calculation can go awry. "Many assume that b will be zero, but that's not necessarily the best choice," said Lee. "In fact, my analysis indicates that a b between 0.3 and 0.5 for that final segment of boundary-dominated flow is actually a much more realistic modeling technique."

Arps defined parameters for the hyperbolic b factor to be 0<b<1. Lee summarized the advantages of using SBF vs. DCA in the chart as follows on the next page.

**Comparison of SBF and DCA-Based TWPs**

**SBF**
- Fast, easily learned and applied
- Models well interference
- Includes multiphase flow when pressure drops below bubble point or dew point
- Allows studies of different well spacing alternatives
- Allows investigation of variable timing of infill drilling
- EUR based on rigorous modeling

**DCA**
- Fast, easily learned and applied
- Interference modeled only if present in well data used to construct TWP
- Includes multiphase flow only if present in data used to construct TWP
- Restricted to well spacing affecting data used to construct TWP
- Restricted to actual timing of infill wells in available data
- EUR depends on $D_{min}$ and final $b$ assumed

Lee said that he has been asked for a long time whether interference shows up in decline curves, and although he cannot generally confirm it, he cited situation-specific information that documents the phenomena. His source is "Well Spacing Optimization in Eagle Ford Shale: An Operator's Experience," SPE Paper No. 2695433-MS, **Mehdi Rafiee** et al, Equinor ASA, 2017. It is available at www.onepetro.org.

Lee said, "It's interesting that in terms of what appears to be rather conventional Arps decline curve analysis that well spacing clearly showed up in decline curves. The authors found that there's really quite a correlation between the parent Arps b factor, which fits the average of the data, and the well spacing."

The study incorporates fracture modeling, production HM and pressure communication from offset wells in the Eagle Ford shale play. Rafiee et. al conducted data analytics on almost 400 wells. The authors modeled stimulation of wells with sensitivities to fluid and proppant job sizes.

"When there is a single well, far from any others, a b factor of 1.1 was good for forecasting for longer durations up to 160 months post-completion," said Lee.

At 800 ft spacing, the b factor fit dropped to .9. then at 500 ft, dropped to 0.7, and settled at 0.5 at 250 ft. "I don't have the backup info to tell you more," said Lee.

## RTA and full-scale simulation

Besides comparing SBF with DCA, Lee also cited other methods to ascertain optimum well spacing, including rate-transient analysis (RTA) and full-scale, HM reservoir simulation.

Evaluators use analytical flow models in RTA software packages to HM available transient data to solve for major unknowns, such as effective matrix permeability and fracture half-length. In the forecast, they vary the well spacing to analyze the effects of interference.

"The limitation is that analytical solutions, despite efforts to improve, ultimately depend on simplifying assumptions, such as single-phase solutions to flow equations," said Lee. "If pressure drops to bubble point or dew-point pressure in an oil or gas condensate reservoir, then multiphase solutions are needed."

He also remarked that reservoir simulation, although time consuming, solves well-spacing problems. Lee said that coupling geomechanical and flow models is an effective approach discussed in "Time Dependent Depletion of Parent Well and Impact on Well Spacing in the Wolfcamp Delaware Basin," SPE Paper No. 191799-MS, **Cyrille Defeu** et al, Schlumberger Ltd., 2018. It is available at www.onepetro.org.

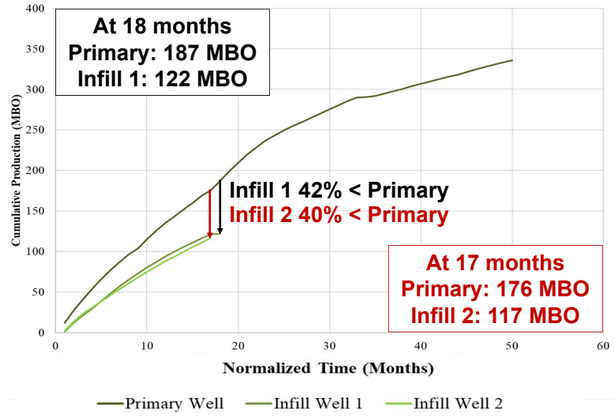
A high-resolution simulator feeds an updated pressure profile into the geomechanical simulator at selected timesteps during the production phase, the authors stated. The coupled simulators then compute the corresponding 3D change in stress, deformation and rock displacement in the reservoir and beyond in the adjacent rock formation.

"In this way, the spatial and temporal changes in the in-situ stress field from parent well production are computed," they stated. The paper presents an advanced modeling workflow to determine the impact of parent depletion on infill-well spacing at various periods of the parent well production.

## Tit for tat: DCA and SBF

Lee said he was involved in a side-by-side study of SBF- and DCA-derived TWPs for the Delaware Basin Wolfcamp A formation. The study was based on public information. From the 44 wells, he chose a primary well that outperformed its two child wells. Both methods matched the 18-month history for Infill Well 1. They also matched the 17-month history for Infill Well 2. See the following chart.

**The Fundamental Problem Illustrated:**
**Primary Well Outperforms Two Infill Wells**




"So far, no real advantage has shown up," said Lee. "However, I'm going to claim, based on other studies, that with data to estimate bottom-hole pressure, we can match much more of the production profile. At least we can match by the time the bottom-hole pressure has settled down, and get rather close."

The chart of P50 cumulative oil results on the next page shows that with SBF, the best match for Infill 1 was 2 percent higher than the actual cum and 6 percent higher than Infill 2. With DCA, estimates were 11 and 12 percent higher for infills 1 and 2, respectively.

He remarked that DCA cannot quantify the effect, if any, of

*Please see To Solve Well-Spacing Problems on page 4*

**Summary P50 Cumulative Oil Results**

**Infill Well 1**

| Cum at 18 months | Actual C1 (MBO) | SBF P50 Cum (MBO) | DCA P50 Cum (MBO) | DCA 2018+P50 Cum (MBO) |
|---|---|---|---|---|
| Case 1 | 122 | 125 | 136 | 127 |
| % Difference (wrt C1) | | 2% | 11% | 4% |

**Infill Well 2**

| Cum at 17 months | Actual C2 (MBO) | SBF P50 Cum (MBO) | DCA P50 Cum (MBO) | DCA 2018+P50 Cum (MBO) |
|---|---|---|---|---|
| Case 1 | 117 | 124 | 132 | 122 |
| % Difference (wrt C1) | | 6% | 12% | 4% |

- **SBF accurately approximates infill production.**
  - **I1: 2% difference in actual vs. SBF**
  - **I2: 6% difference in actual vs. SBF**
- **DCA also approximates infill production accurately.**
- **Cannot quantify effect of interference with DCA alone.**

*To Solve Well-Spacing Problems – Cont. from page 3*

interference while SBF enables an evaluator to look at optional development strategies for well spacing and completion techniques.

"It's difficult to model interference with the DCA approach, unless interference effects are present in the histories and the well spacing in those histories are roughly the same for future wells," said Lee. "It's difficult to model the effects of timing infill wells and their spacing."

## Conclusion

The rest of Lee's presentation covered sensitivity analyses of well spacing in the Delaware Basin, sensitivity of EURs to infill-well spacing, infills to optimize EURs and quantifying fracture interference with a fracture-driven interaction (FDI) calculation. He also discussed the effect of FDI on production forecasts and effect of fracture interference on EURs.

Lee concluded that relying solely on DCA-based TWP construction underestimates interference caused by close well spacing and long fractures in resource plays. His slide deck, which has charts and graphs, is posted at https://ryderscott.com/presentations/.

*Editor's Note: Dr. John Lee is a recognized expert in petroleum reserves evaluations. Ryder Scott is grateful for his annual participation in our events as a speaker. The content of conference presentations is based on our speakers' fact finding and opinions, and are not necessarily those of Ryder Scott. Our firm's speakers also present content that does not necessarily reflect the views of Ryder Scott.*

# SBF promising but not the answer for every situation

— **Miles Palke**, *managing senior vice president*

Ryder Scott offers a full range of reservoir simulation services, from single-well conceptual models to full-field models with hundreds of wells. Our simulation modeling experience ranges from the simplest gas reservoirs to fully compositional models of gas recycling projects.

While science-based forecasting is a promising new technique, there are many situations in which a detailed, bespoke model for a particular well, reservoir or entire field is the preferred approach. Ryder Scott is in a unique position because the firm possesses high-end technical simulation expertise, combined with unmatched geoscience capability and a wealth of traditional reservoir engineering experience with every sort of reservoir imaginable. The blending of those skills enables Ryder Scott to assist clients with a wide variety of simulation-based needs. For more information, please send an email to miles_palke@ryderscott.com

*Miles Palke*



# Average annual oil price for SEC reserves reporting lowest since modernization of rules

The annual average prices for reporting year-end 2020 petroleum reserves to the U.S. Securities and Exchange Commission are the lowest since regulators modernized its rules 11 years ago. Please see chart below.

The WTI Cushing crude oil benchmark did not break $40, tumbling from $55.69 a barrel to $39.57 — a 29-percent decline over last year.

Public issuers apply differentials to benchmark prices, adjusting them for quality — including gravity and sulfur content — and for energy content, transportation fees, and regional and local differences. The adjusted prices are used to prepare annual reserves filings with the SEC.

Current rules require public issuers to use an unweighted, arithmetic average of the first-day-of-the-month price for each month in the calendar year. Before 2010, average annual prices were based on the last day of each month, including Dec. 31.

The additional 30 days have given companies more time to prepare and publicly file petroleum reserves by the March 15 deadline, which has remained the same.

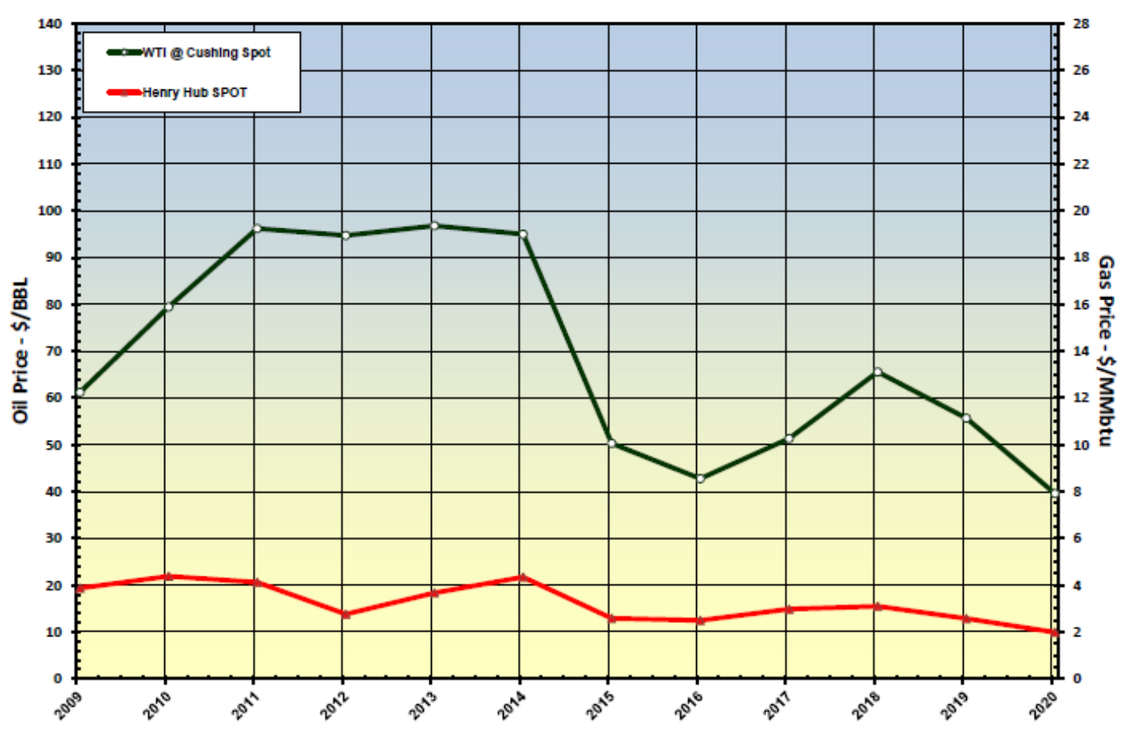
The Brent crude oil benchmark settled in at $41.77 per barrel for the year — a significant 34-percent decrease from $63.15. The price of Brent is used to set prices for about two-thirds of the world's oil.

The Henry Hub gas benchmark had a more modest decrease of 23 percent from $2.577 per MMBTU to $1.985.

Other benchmarks and information on using differentials are posted at www.ryderscott.com/wp-content/uploads/FDOM_Benchmark_Prices.pdf.

More than 160 oil benchmarks have been established worldwide. For clarifications on 2020 year-end prices, please send requests via email to **Fred Ziehe**, advising senior vice president, at fred_ziehe@ryderscott.com.

## Average YE Prices for Oil and Gas Benchmarks Used in U.S. SEC Filings




**WTI Cushing average annual oil prices and Henry Hub gas prices dropped to lows not seen during the "modernized" era of reserves reporting to the U.S. SEC.**

## SPEE Monograph 5: A work in progress

Monograph 5 is still a work in progress despite anticipation by the Society of Petroleum Evaluation Engineers working committee two years ago for "final publication" in 2020. The monograph will focus on recommended practice guidelines for constructing type well profiles (TWPs).

Lately, the news media, investors and others have criticized E&P companies in the Permian Basin and other unconventional plays for overly optimistic production forecasts derived from TWPs.

In October, an SPEE Denver meeting video presentation at https://vimeo.com/473489413 provided updates, including discovery of "significant error" using a simple, common approach to TWPs. The committee found that averaging individual monthly rates and dividing by the producing well count results in unsubstantiated, inflated EURs.

A simple adjustment to the common approach, namely implementing a constant well count, leads to more reliable TWPs. The evaluator starts by including production rates over the full-life cycle — historical plus projected out to a technical limit — of all underlying producing wells. Then, if necessary, the evaluator includes additional "zero" months to extend the life of individual wells after reaching the end of their forecasts, including any shut-in or abandoned wells that are part of the sample set.

That results in a group of wells with the same lifespan, and when normalized to a common point in time, a TWP is generated based on a constant well count. This process improves the match between the EUR of the TWP and the average of the well samples, as well as the overall rate-time profile.

The presentation has numerous charts that illustrate the approaches.

## Denver manager elected to SPEE board

**Steve Gardner**, managing senior vice president, was elected to the board of directors of the Society of Petroleum Evaluation Engineers in November. He took his seat in January 2021 for a three-year term, concluding in December 2023.

Gardner manages the Ryder Scott Denver office, where he conducts and supervises petroleum evaluations, audits and process reviews of both upstream and midstream assets. He has approximately 20 years of on- and offshore experience in petroleum engineering and has been a member of SPEE since 2012.

"Steve has earned the recognition and reputation among SPEE members such that his bid to join the board has been successful," said **Guale Ramirez**, president at Ryder Scott.

*Steve Gardner*

## Wilson sees gas potential in wake of 2020


*Scott Wilson*

"When two black swans—weak industry fundamentals and a global pandemic—collided midair, a downward spiral became a freefall," wrote **Scott Wilson**. "Accompanied by the human tragedy of illness and financial hardship, industry employment shrunk at a pace not seen since 1986 and caused a contraction to the lowest international rig count since Baker Hughes started keeping records 43 years ago."

That dramatic "lead" kicked off a Nov. 1 article in *JPT* magazine, the flagship publication of the Society of Petroleum Engineers. The article is at https://pubs.spe.org/en/jpt/jpt-article-detail/?art=7787

Wilson is a senior vice president for Ryder Scott in Denver.

In his article, he answers the question: How has this upheaval affected the demand for natural gas and our industry supplies? Not very much, opined Wilson.

He cited natural gas and its reliability in maintaining essential goods and services. Wilson maintained that gas-fired electricity usage has increased, as stay-at-home orders nullify the economies of scale provided by shared workspaces.

*Please see Wilson Sees Gas Potential on page 11*

## Market volatility and uncertainty create potential for oil price swings


*K. Lehi Woodrome*

Oil prices last year fluctuated wildly as crude from shale plays overwhelmed available storage and a worldwide pandemic stifled demand.

"As long as supply exceeds demand, there is a limited margin of error in oil prices," said **K. Lehi Woodrome**, vice president. "Anything can swing it, both up and down, at this time, probably more downward."

He made his remarks at the Ryder Scott webinar in September. Woodrome researched the oil market and created custom-built graphs for his presentation, "The Supply and Demand Imbalance Leading into Oil Price Volatility."

Woodrome used petroleum data, rig counts and oil pricing from the U.S. Energy Information Administration, Baker Hughes Co. and CME Group Inc. His presentation is available at https://ryderscott.com/presentations/.

He said the worldwide market "could be affected by drastic swings in oil prices caused by events such as limited storage, shutdowns due to further outbreaks (of the pandemic) and price wars."

Woodrome also looked at the prices of West Texas Intermediate (WTI) light sweet crude, a widely traded benchmark, and various news articles to explain the April 20 oil price meltdown. The July 2020 *Reservoir Solutions* newsletter reported on the collapse at https://ryderscott.com/wp-content/uploads/Rs3rdQTR-July16th.pdf.

The article stated that on April 20, traders hurried to sell off positions in the near-term May crude oil futures contract because it was expiring the next day and set to mature April 21.

"Futures traders could see that the crude held in Cushing was rapidly increasing and there was nowhere else to put it," Woodrome remarked. "Cushing is an important gathering hub for shale oil production."

Cushing, OK, is the settlement point for WTI on the New York Mercantile Exchange. Woodrome said that Cushing has 90- to 93-million barrels of shell storage capacity with about 76- to 77-million barrels of working storage capacity, which is the volume between the maximum safe fill and quantity above effective pump suction. That working capacity was rapidly declining at the time of the April 20 selloff, as oil closed at negative $37.

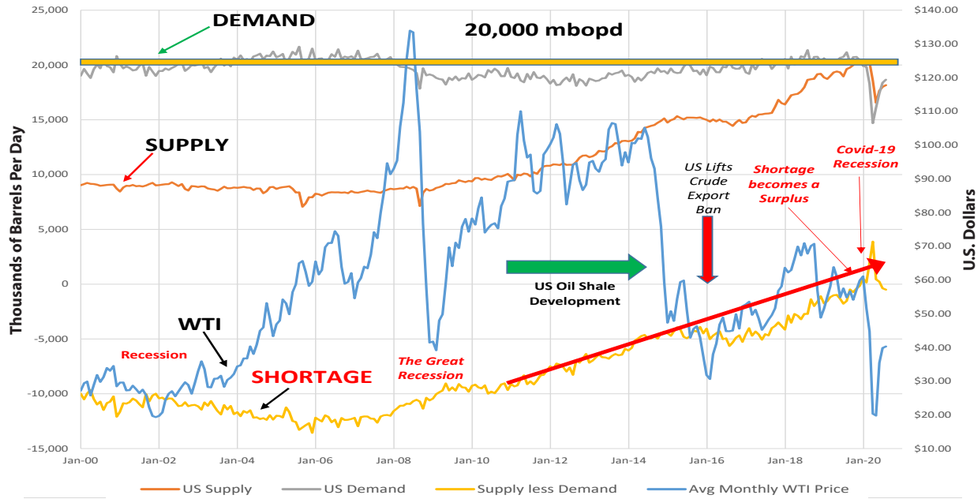
Woodrome analyzed WTI price vs. Cushing storage utilization in a chart not shown. Storage utilization is based on working capacity and does not include oil in pipelines, in transit by rail or water or in the Strategic Petroleum Reserves.

### WTI prices, supply and demand

Woodrome plotted EIA data for U.S. supply and demand curves as well as WTI prices and historical shortages and surpluses caused by past events. Please see the following chart.

*Please see Market Volatility and Uncertainty on page 8*

**WTI Price vs US Supply/Demand**



*Market Volatility and Uncertainty – Cont. from page 7*

The supply-and-demand curve includes total petroleum products, not just crude oil. The EIA counts crude oil, lease condensate, NGLs and other liquids in the totals.

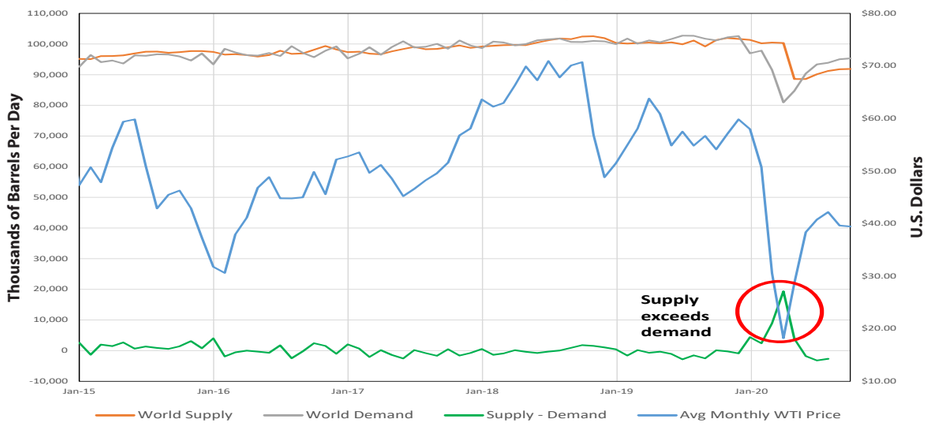
Woodrome pointed out that during the 2008 great recession, oil prices dropped drastically from almost $135 per barrel to $40. The chart also indicates other important time frames and events in the U.S. causing surpluses, shortages and price swings, including the 2001 recession, shale oil development starting in 2011, lifting of the crude oil export ban in 2015 and the Covid-19 recession in 2020.

Over the past 20 years, U.S. demand for total petroleum products has been fairly steady, hovering around an average of about 20-million barrels per day.

"Really, 2011 is where you can see a strong inflection point where the beginning of U.S. shale development began," said Woodrome. "This is where supply really started to take off. Subsequently, because demand remained steady over the last 20 years, the supply/demand curve slowly but surely, grew from a shortage to a surplus."

He showed a chart of WTI price trends and worldwide supply and demand as follows.

**WTI Price vs Worldwide Supply/Demand**




***World supply and demand movements are at the top of the chart. The difference between supply and demand has been at a balanced equilibrium and remained fairly constant until December 2019 when supply started to exceed demand in the global market. This was a precursor to April 20.***

Woodrome also plotted the reaction of the industry to the April price plunge which resulted in immediate, significant cuts in capital spending. See the chart on the top of the next page.

"I was very shocked when I put this chart together, because you can see there was an immediate reaction," he said. "Rig counts are a good reflection of capital spending."

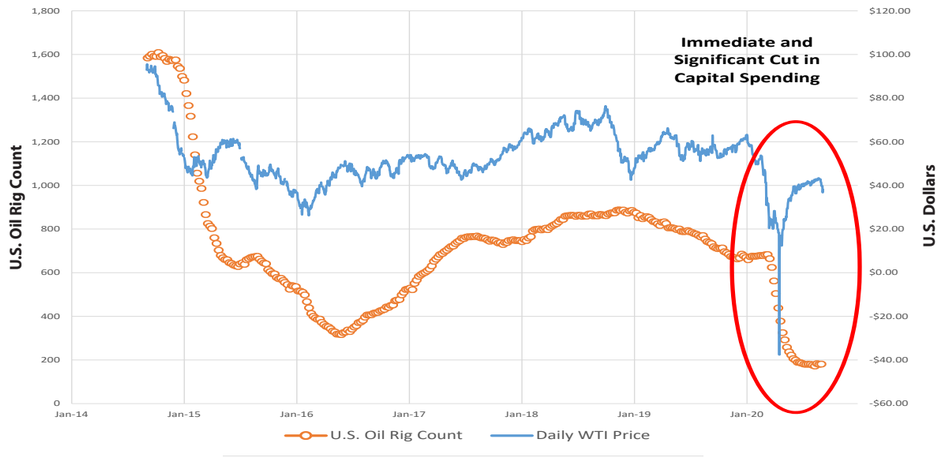
At the beginning of 2020, those counts dropped from roughly 650 to 700 rigs to about 180.

"That's a very rapid drop," said Woodrome. "You can see in the previous five years, including the previous recession, we didn't see a sudden rig count drop like that."

He also concluded that the market is efficient. "U.S. operators responded appropriately by drastically cutting capital expenditures as evident in both the Cushing storage utilization and the oil rig count in the aftermath of the dramatic price drop," said Woodrome.

WTI for February delivery settled at $48 a barrel on the NYMEX — an increase of $2.57 or almost 6 percent on optimism that Covid-19 vaccines will lead to a swift recovery in global energy demand as soon as this year.

**WTI Price vs US oil Rig Count**




# ESG should be daily business practice, says attorney

***Katherine Wauters, staff writer***

*Jamie Jost*

As stakeholder demands rise, "ESG is becoming a leading factor in where financial institutions and private equity will place their money," said **Jamie Jost**, founder and managing shareholder of Jost Energy Law PC. She made her remarks at the virtual 16th Annual Ryder Scott Reserves Conference in September. In her ethics presentation on Zoom, she focused on ESG (environmental, social and governance) issues and their influence on legislation in Colorado at federal, state and local levels.

## SB 19-181: What Colorado needs to know

Signed into law in April 2019, SB 19-181 was "adopted to prioritize the protection of public safety, health, welfare and environment, and wildlife in the regulation of the oil and gas industry by modifying the oil and gas statute and by clarifying, reinforcing, and establishing local governments' regulatory authority over the surface impacts of oil and gas development."

Some key provisions of the law include changing the language from "foster" to "regulate," the creation of a professional commission, broadened authority at city/town/county levels, and a change in the definition of "waste."

The full text of the law is at https://leg.colorado.gov/sites/default/files/2019a_181_signed.pdf.

Prior to SB 19-181, much of the authority was concentrated at the state level in organizations such as the Colorado Oil and Gas Conservation Commission (COGCC) and the Colorado Department of Public Health and Environment (CDPHE). Today, local governments are "charged with regulating the surface impacts of oil and gas operations in a reasonable manner… and to protect and minimize adverse impacts to public health, safety, welfare and the environment."

This redistribution of authority to local governments has led to moratoria on oil and gas in several cities and counties. The city of Boulder has had a moratorium in place for more than seven years.

Jost discussed oil and gas regulations at both the county and city levels, as well as lobbying from environmental groups to reinstate fracing bans.

The demand by investors for ESG and socially responsible investment (SRI) has led to an overhaul of Colorado's oil and gas regulations at every level of government. The COGCC is currently working on modifying its 100-to-1200 Series rules.

"The work ranges from new definitions for every series rule, procedural modifications, and limitations on transfer of operatorship, to name a few," said Jost.

*Please see ESG Should Be Daily Business Practice on page 10*

*ESG Should Be Daily Business Practice – Cont. from page 9*

She presented the following takeaways:

- Consult an ESG expert and educate yourself on impacts ESG can have on your business.
- Remain proactive with regard to ESG, realizing that environmental and social factors can sometimes be most crucial.
- Understand that ESG factors and criteria remain fluid, so be open to change.
- Incorporate ESG into daily business practices. After all, it's just good business sense.

## ESG in general

Jost clarified ESG activities as follows:

- **Environmental criteria** — How a company performs as a steward of nature
- **Social criteria** — How a company manages relationships with employees, suppliers, customers and communities
- **Governance** — Relates to company leadership, executive pay, audits, internal controls and shareholder rights

The origins of ESG date to 2004. Today, more than 70 percent of institutional investors use ESG principles as part of their investment approaches and decision-making processes, according to a survey of more than a year ago by RBC Global Asset Management Inc.

Jost said it is critical for the oil and gas industry to incorporate ESG into daily business practices. "ESG leadership comes from the top and runs down through the company in every aspect. It is expected the company's governing body will work to create an ESG-centric culture and mandate a culture that exudes from all levels of the business," she said.

Topics for corporate consideration include, but are not limited to, the following:

- Environmental justice
- Sustainability
- Pollution reduction
- Racial equity and diversity
- Good stewardship of stakeholders' interests
- Corporate reputation and treatment of companies by the media

Jost's complete presentation is posted at https://803.9a5.myftpupload.com/wp-content/uploads/09_JOST_Presentation.pdf






*Wilson Sees Gas Potential – Cont. from page 6*

On the demand side, natural-gas-powered delivery trucks bring goods to homes as people stay away from crowded stores. While office buildings are kept cool or warm for a small number of onsite workers, work-from-home employees now demand a comfortable home 24 hours a day rather than just evenings and weekends.

Worldwide demand has dropped but Wilson writes that decline has been matched by the decrease in associated gas from shut-in oil wells.

"Natural-gas suppliers continue to provide uninterrupted service despite fewer people and smaller budgets. Like other essential workers, they are heroes and deserve our sincerest thanks," wrote Wilson.

He introduced three related SPE technical papers for November and recommended additional papers.

## Ryder Scott is a top workplace

Ryder Scott won a Top Workplaces 2020 honor from the *Houston Chronicle* newspaper. The award is based on a third-party survey measuring employee feedback on 15 drivers of engaged cultures — including alignment, execution and connection.

In the small company category (50 to 149 employees), Ryder Scott was in the top 19th percentile.

Employees have consistently rated issues of connection and alignment most important in the surveys, with pay and benefits taking on less importance. Employees rate "connection" high when they feel appreciated and their work is meaningful. If an employer and employee agree on the direction and values of the company, then alignment is high.

"Workplace engagement during 2020 was especially challenging considering the repercussions of a pandemic and a greatly expanded work-from-home environment," said **Dean Rietz**, CEO. "This honor confirms that the environment we have cultivated for decades, including an esprit de corps throughout Ryder Scott, has held up."

## Obituaries

*Douglas L. McBride*

**Douglas L. McBride**, 68, a petroleum engineer at Ryder Scott for 25 years, died Nov. 8. He worked at Ryder Scott from 1981 to 2006, and was a senior vice president.

"I traveled overseas with Doug on business. He was always a gentleman. Please keep Doug and his family in your thoughts and prayers," said **Dean Rietz**, CEO at Ryder Scott.

Before working at Ryder Scott, McBride was a reservoir engineer at Amoco Production Co. during 1974 to 1979. He graduated with a BS degree in architectural engineering from the University of Texas-Austin in 1975. McBride was a registered professional engineer in Texas.

He founded his own company, Morning Star Consultants LLC in Austin, TX, in 2006.

*Ronald Arthur Lenser*

**Ronald Arthur Lenser**, 88, of Dallas died Oct. 9. In 1967, he joined Ryder Scott in Wichita Falls, TX, and later, moved to Houston to help establish the firm's new office.

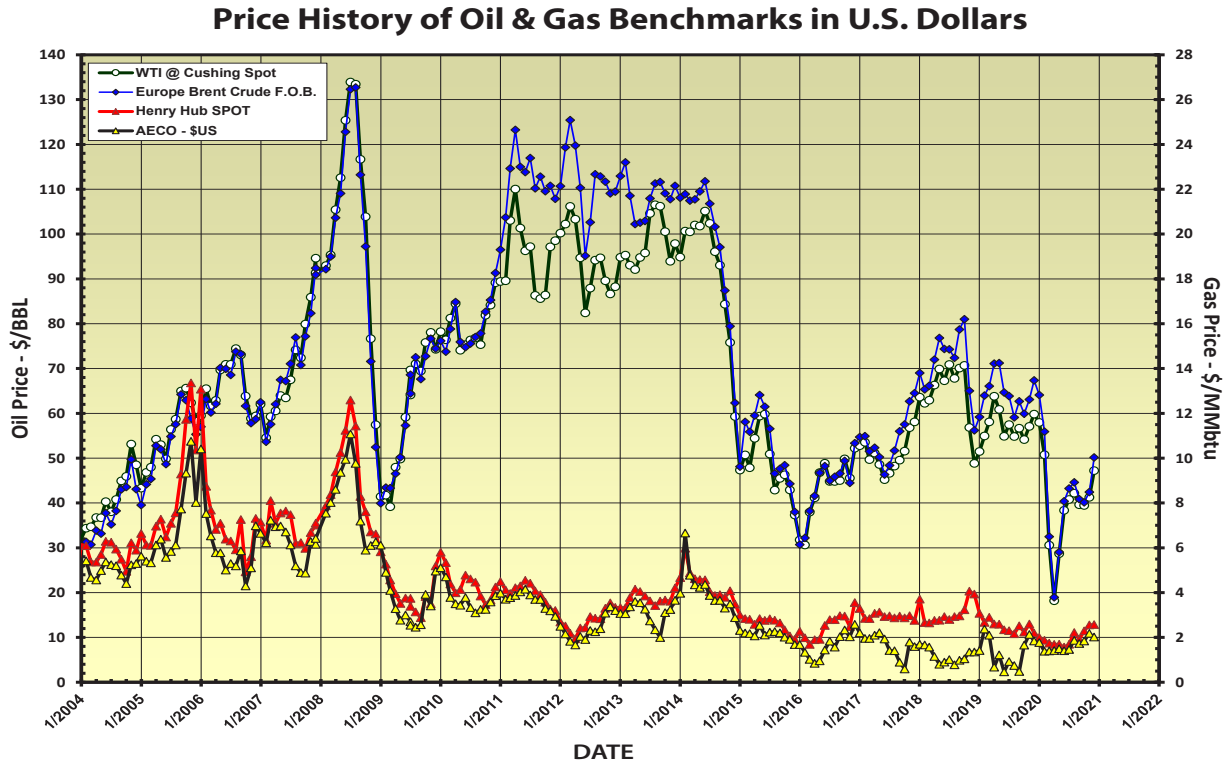
"Ron was one of the early leaders of our consulting firm, and helped transition it from waterflood engineering to petroleum reserves evaluations," said Rietz.

In 1980, Lenser started R. A. Lenser & Associates Inc. He graduated from Kansas University in 1956 with a BS degree in petroleum engineering.

# EIA redesigns U.S. Energy Atlas

On Jan. 4, the U.S. Energy Information Administration (EIA) released the U.S. Energy Atlas which is posted at **https://atlas.eia.gov/**. The improvements include a new interface for web map applications and a comprehensive open data catalog. The U.S. Energy Atlas shows detailed energy infrastructure in redesigned maps with enhanced navigation and data accessibility features. With the U.S. Energy Atlas, users can now combine EIA's data with information from other sources to customize their own geospatial analysis.

The U.S. Energy Atlas features 84 map layers, 60 of which are based on EIA surveys. EIA data published in the U.S. Energy Atlas includes locations of power plants, coal mines, oil and natural gas wells, pipelines, storage facilities, natural gas processing plants, refineries, and other types of energy facilities.




## Publisher's Statement

*Reservoir Solutions* newsletter is published quarterly by Ryder Scott Co. LP. Established in 1937, the reservoir evaluation consulting firm performs hundreds of oil and gas reserves studies a year. Ryder Scott multi-disciplinary studies incorporate geophysics, petrophysics, geology, petroleum engineering, reservoir simulation and economics. With 119 employees, including 80 engineers and geoscientists, Ryder Scott has the capability to complete the largest, most complex reservoir evaluation projects in a timely manner.

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