RESERVOIR SOLUTIONS

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More than 350 attended the conference at the Hyatt hotel in downtown Houston, again making it the single largest gathering of senior reserves evaluators in the world.

Low prices, PUD rule intensify dialogue between E&P industry and U.S. SEC

Dean Rietz, president at Ryder Scott, opened the Ryder Scott conference in September by saying, "The differences between the way a typical E&P company runs its business operations and the SEC interprets its guidelines continues to expand. We cannot remember a time when the impact of the mismatch and difference of opinion was so problematic."

He added that the SEC is working harder to protect the public and prepare investors for the consequences of severely reduced prices.

Please see Low prices, PUD rule on page 4

New method for estimating shale reserves introduced

He Zhang, a petroleum engineer at Ryder Scott, introduced an empirical method of estimating petroleum reserves in shale plays at the Society of Petroleum Engineers Annual Technical Conference and Exhibition in September.

Even though the "shale revolution" began three decades ago, the oil and gas industry still does not fully understand how to forecast hydrocarbon production from ultra-low permeability reservoirs. Estimating oil and gas production from tight formations with intricate fracture networks is difficult because of the complicated flow dynamics.

So rather than attempting to physically model gas and fluid flow, evaluators look at the past to forecast the future through decline-curve analysis (DCA). With this technique, a reservoir engineer plots the historical production rate vs. time to forecast future well performance.

DCA techniques

Zhang presented a short history of DCA. Unconventional reservoirs experience transient flow initially and typically, do not transition to boundary-dominated flow for a few years. Since 2008, the industry has introduced four DCA techniques that model transient flow — Extended Power Law, Stretched Exponential Decline Model, Duong method and now the Extended Exponential Decline Analysis (EEDA) model developed by Zhang and his colleagues.

The modified Arps equation is a fifth DCA option and is the most common and accepted for estimating future production from shale plays. The traditional Arps method, in use for more than 70 years, does not model transient flow and was intended to be used for wells draining a conventional reservoir from its boundaries.

The industry modified the original Arps equation to forecast hyperbolic declines early in the life of a horizontal shale well when it is producing from natural and man-made fracture networks and rates are the highest. Modified Arps also enables an evaluator to estimate when the steep decline begins to curve, as calculated by a b factor, and flatten out leading to exponential terminal decline with a minimum decline (Dmin). The durations of exponential declines can be much longer than time periods for hyperbolic declines.

Although modified Arps does not model the subsurface flow mechanics influencing well performance, it is a reliable, empirical, field-tested method if done correctly. Nevertheless, industry is still looking for better empirical or analytic methods to forecast production while the use of modified Arps is controversial and spurs debates in the reservoir engineering community.

Please see Summary of Literature Models, Table 1, for comparisons of the four DCA models that preceded EEDA.

EEDA

Zhang presented the SPE technical paper, "An Empirical Extended Exponential Decline Curve for Shale Reservoirs," SPE 175016, which he wrote with **Adam Cagle** and **Dean Rietz** at Ryder Scott and **Martin Cocco** then at the firm. **John Lee**, then a professor at the University of Houston, also contributed significantly.

Unlike modified Arps with a Dmin, EEDA does not require a switch from a transient model to a boundary-dominated-flow model. EEDA generates a smooth decline profile without discontinuity. Zhang et al. kept the exponential form of the Arps equation for simplicity but varied the exponent with time. Please see EEDA equation in Table 2.

Although this new method provides similar results when compared to the combination methods found in literature, EEDA is simpler and requires less effort. Developers tested it in more than 2,000 wells in shale basins worldwide.

"The results have been positive and encouraging," said Zhang.

Table 1 – Summary of Literature Models

DCA Model	Valid for Transient Flow?	Valid for BDF?	Need to change parameters?	Good with limited data?	Combined with Economics Software?
Arps – original	No	Yes	Yes	No	Yes
Arps – modified	No	Yes	Yes	No	Yes
Stretched Exponential	Yes	No	Yes	No	Somewhat
Extended Power Law	Yes	Yes	No	No	No
Duong	Yes	No	No	Yes	No

Cited from J. Lee, 2015 SPE webinar, *"Critique of Simple Decline Models"*

Table 2 – Extended Exponential Decline Equation

- Keep the same exponential form of Arps equation for simplicity:

$$q = q_i e^{-at}$$

where q *is the flow rate at time t;*
q_i *is the initial flow rate;*
a *is the nominal decline rate*

- But exponent should vary with time:

$$a = \beta_l + \beta_e e^{-t^n}$$

where β_e *is a constant to account for the early (fully-transient) period, which should be larger than* β_l *as recommended;*
β_l *is a constant to account for the late-life period;*
n *is an empirical exponent with a recommended range of 0 to 0.7;*
t *is the time in months*

A weakness of EEDA is that it generates unrealistic forecasts for unconstrained input parameters. "As with any unconventional approach, more late-time data is needed to ascertain the realistic boundaries of each parameter. The original Arps equation also requires a range of 0 to 1 for b factors," said Zhang.

The results of EEDA in forecasting production from shales compare favorably with detailed reservoir simulation modeling.

Zhang et al. also used hindcasting to test the predictive power of the model in more than 100 Haynesville wells with production histories. In his presentation, which is posted on the Ryder Scott website, Zhang showed the declines of eight of those wells. The forecasts exhibited no significant, high or low bias when plotted with the well histories during the hindcasting period.

Among the current unknowns and concerns are the effects of pressure, appropriateness of early time data affected by well clean-up, wellbore storage and curtailed production, variations in fluid properties and completion techniques, appropriateness of input-parameter boundaries and influence and relationship of early-time performance to late-time.

"Other peer-group DCA methods cannot circumvent those concerns either," said Rietz.

Editor's Note: EEDA is at an experimental stage and requires further testing. Ryder Scott does not endorse EEDA and does not use it for reserves evaluations at this time.

He Zhang

RYDER SCOTT

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11th Annual Reserves Conference

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"A year ago, oil was $100 a barrel and then the dramatic changes started in the fourth quarter. We've pretty much had bad news ever since," remarked Rietz.

How does this devastating drop affect our industry? Rietz said, "Producers face the challenge of staying profitable or even staying alive while service companies adjust to the levels of reduced business activities."

He outlined major issues for reserves estimates:

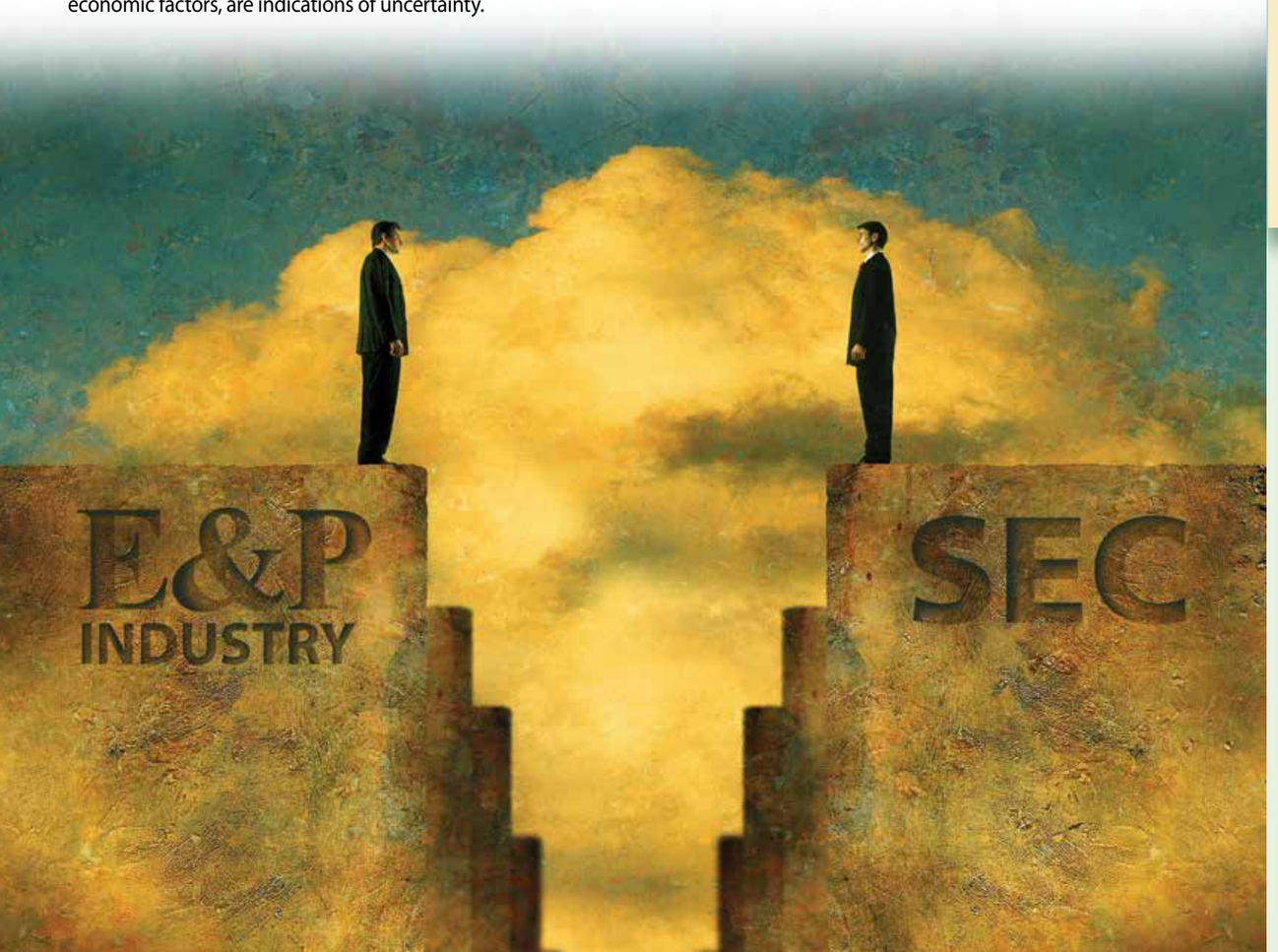
1. Changes to the five-year plan for proved undeveloped (PUD) reserves are typically viewed by the SEC as non-commitment to the approved plan, hence a lack of reasonable certainty.
2. Reduced drilling activity, particularly if not adhering to the plan, shows uncertainty and lack of commitment.
3. FID (final investment decision) means different things to different companies and varies by project size.
4. Moving PUDs on and off the books, even due to actual economic factors, are indications of uncertainty.
5. Five-year development plan with FID will not likely be carried out exactly as planned, particularly as the project moves out to later years.

Among issues for E&P industry as a whole were as follows:

- Crippling financial cash flow of E&Ps
- Needed changes to capital budgets and development scenarios
- Reserves write-downs are potentially significant
- Banking issues (borrowing bases/loan covenants)
- Bankruptcies, restructuring and downsizing
- A&D market likely to expand
- Those with hedges in place may be OK for now

The presentations of Rietz and the other conference speakers are posted on the Ryder Scott website at www.ryderscott.com.

More than 350 attended the conference at the Hyatt hotel in downtown Houston, again making it the single largest gathering of senior reserves evaluators in the world.



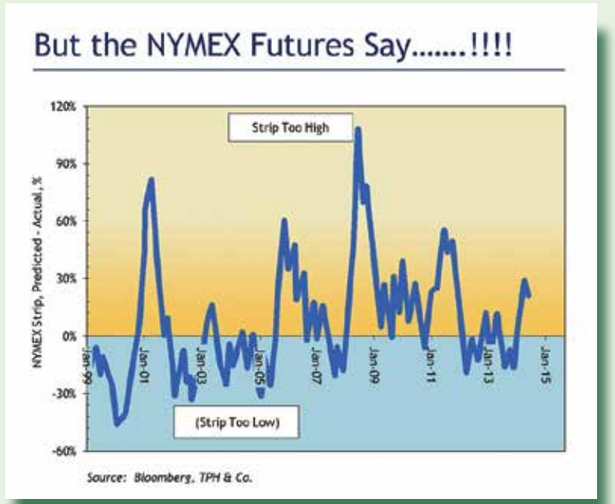
Oil prices could rise to $80 a barrel in 2016, says TPH


David Pursell

"The big story this month is one of tightening supply, with the spotlight firmly fixed on non-OPEC," stated the International Energy Agency in September. "Oil's price collapse is closing down high-cost production from Eagle Ford in Texas to Russia and the North Sea, which may result in the loss next year of half a million barrels a day—the biggest decline in 24 years."

The beginning of slowed production growth and lower inventories reported in the 3rd quarter may have given a shot of "cautious optimism" to an industry mired in low prices, but it didn't quell doom-and-gloom forecasts. In a Sept. 18 article in *The Globe and Mail* newspaper, **David Milstead** wrote, "Futures prices suggest oil will stay in the $50 range for more than 18 months. Some forecasters say even this may be too rosy a scenario."

"The ability of the Nymex futures strip to predict price doesn't exist," Pursell said, showing a graph of the differences between predicted vs. actual prices.



Goldman Sachs Group Inc. was more pessimistic, predicting that a global surplus seen persisting next year amid OPEC output growth could drive prices as low as $20 a barrel.

David Pursell, a managing director at Tudor, Pickering, Holt & Co., isn't buying that notion. TPH is an energy investment and merchant banking firm headquartered in Houston.

"This is the big tent revival portion of the show," said Pursell at the Ryder Scott reserves conference in September. "Oil prices will be better." The head of macro research at TPH, Pursell thinks oil will be $80 a barrel in the second half of 2016.

He doesn't rely on the 12-month Nymex futures forward curve for his predictions. "The ability of the Nymex futures strip to predict price doesn't exist," Pursell said, showing a graph of the differences between predicted vs. actual prices.

"The 12-month average is rarely accurate within plus or minus 10 percent," he said. "Reserves engineers have to use the strip but it is not a predictor. It is a market around which oil and gas companies can transact," he remarked.

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Oil prices could rise – Cont. from page 5

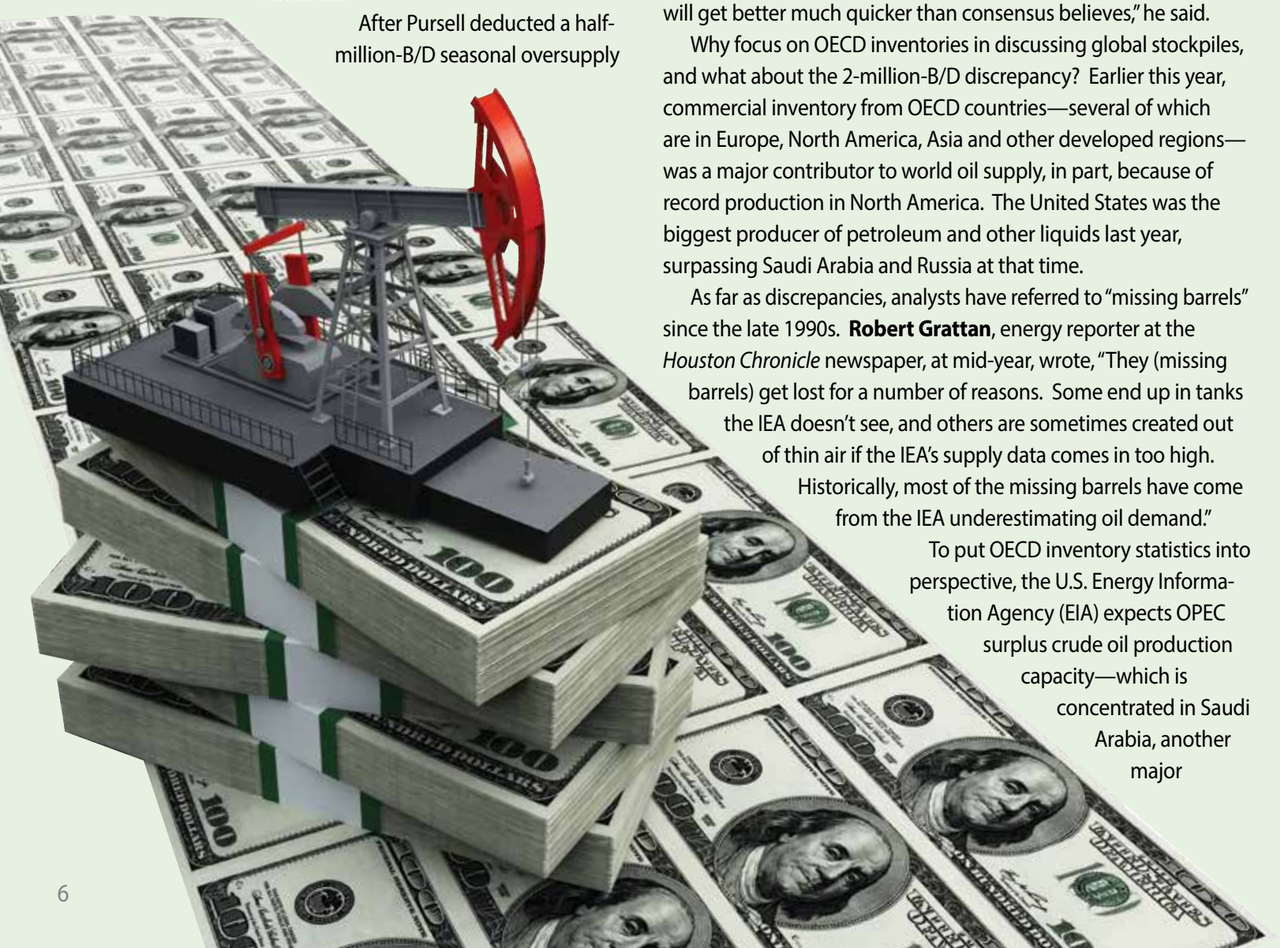
Inventory builds tell the story

Inventory data and supply-and-demand trends should synch up. A higher-than-expected increase in crude and gasoline/distillate inventories indicates oversupply or weaker demand. A lower-than-expected increase in inventories indicates weaker supply or greater demand.

Inventory and supply/demand metrics did not line up this year, said Pursell, with oversupply being less than what was reported. For the 2nd quarter of this year, the International Energy Agency (IEA) indicated a 3-million-B/D global oversupply with a half million of those barrels reflecting a seasonal surplus.

However, the excess stockpiles did not add up, according to Pursell. He said 2nd quarter inventory builds of crude plus refined products reported by member countries of the Organization for Economic Cooperation and Development (OECD) reached only 1-million B/D in the 2nd quarter. "That is a big difference," he remarked.

After Pursell deducted a half-million-B/D seasonal oversupply from the OECD figures, the surplus was a half-million B/D. "If you believe we are 2-½-million-barrels-per-day oversupplied, then 2016 is going to be terrible. But at a half million a day, maybe the market will get better much quicker than consensus believes," he said.



Why focus on OECD inventories in discussing global stockpiles, and what about the 2-million-B/D discrepancy? Earlier this year, commercial inventory from OECD countries—several of which are in Europe, North America, Asia and other developed regions—was a major contributor to world oil supply, in part, because of record production in North America. The United States was the biggest producer of petroleum and other liquids last year, surpassing Saudi Arabia and Russia at that time.

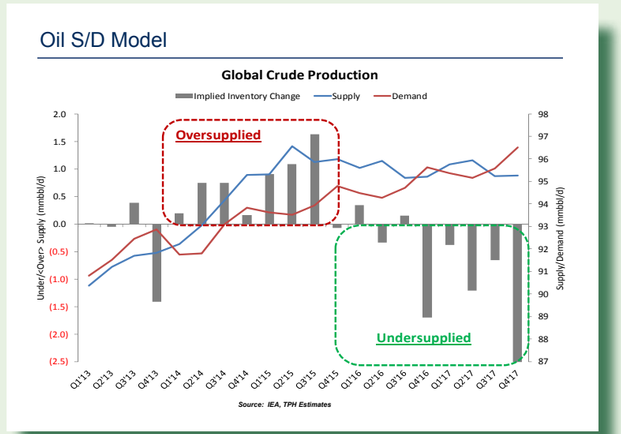
As far as discrepancies, analysts have referred to "missing barrels" since the late 1990s. **Robert Grattan**, energy reporter at the *Houston Chronicle* newspaper, at mid-year, wrote, "They (missing barrels) get lost for a number of reasons. Some end up in tanks the IEA doesn't see, and others are sometimes created out of thin air if the IEA's supply data comes in too high. Historically, most of the missing barrels have come from the IEA underestimating oil demand."

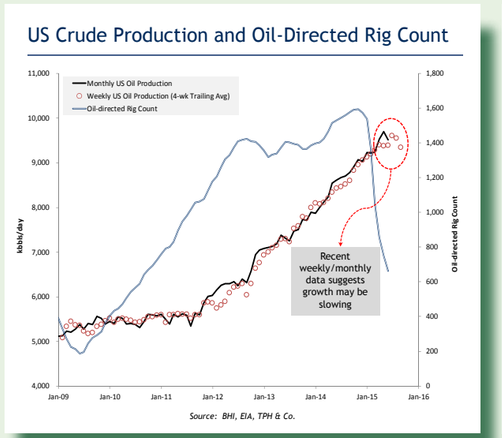
To put OECD inventory statistics into perspective, the U.S. Energy Information Agency (EIA) expects OPEC surplus crude oil production capacity—which is concentrated in Saudi Arabia, another major contributor to global inventories—to average 1.5-million B/D in 2015. Surplus capacity lower than 2.5-million B/D indicates a relatively tight oil market, the agency states.

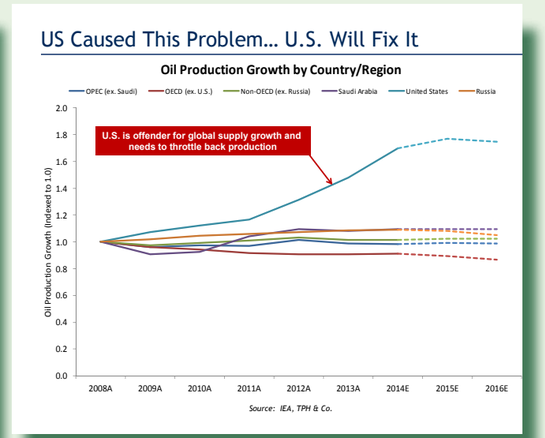
Pursell said that Saudi Arabia may cut production this year. "It's rumored that Saudi might take half-million B/D of production offline this year due to summer demand increase," he remarked.

The comparison between EIA and IEA data has shortcomings because of different approaches and forecasts in their energy models.

"What is fascinating is a fairly small degree of oversupply has caused oil prices to get more than cut in half," said Pursell. "Commodity theory says commodities are priced in the market. A little bit of oversupply crushes the entire complex.







Not a surprise but instructive."

He added, "If a million-barrel oversupply caused this apocalypse we are now living through, maybe a million-barrels-a-day undersupply is all it takes to get oil prices working again."

World supply and demand

Not accounting for seasonality fluctuations, Pursell's forecasts indicate that world demand growth will slow to a million B/D annually the rest of the year and into 2016 compared to 1.7-million B/D growth the first half of 2015.

"We are actually dialing down demand growth in our forward outlook," he said. "I am not making a lot of heroic supply assumptions to get the market to balance as long as demand grows," said Pursell.

The TPH model holds OPEC supply constant at current levels and U.S. and non-OPEC stockpiles down. OPEC increased production through June 2015, but output was expected to flatten and remain that way through 2016.

"We have supply declining in '16 and growing a little bit in '17," Pursell said. "OECD inventories are high no question, but it is the trend that matters. You don't have to get inventories back to normal to see price improvements. The market has predictive capabilities. Once inventories trend lower than normal, prices will move materially higher. Again, that is our view."

Rig count

Rig counts are a precursor to production and supply. With counts down now, Pursell said the TPH model forecasts U.S. supply sliding 250,000 B/D next year. The production decline will not be as steep as the decline in rig counts, the model predicts, in part, because rig counts will modestly increase next year.

"If rig counts held flat, production in 2016 would be down 450,000 B/D which would tighten the market even more," said Pursell.

He predicts that this year and next, the U.S. will supply two-thirds of the demand growth or 650,000 B/D and the rest will be taken up by OPEC and an occasional growth of non-U.S./non-OPEC producers.

"To do that, rig count has to go up meaningfully," Pursell remarked, saying that service costs would increase.

Demand

He called refinery crack spreads "the single best indicator of demand today by region." Higher-than-expected demand for liquid fuels in Europe and some countries outside the OECD contributed to the global rise in gasoline crack spreads this year, said the EIA.

"Betting against demand is the wrong bet," said Pursell, remarking that over the past nine years, demand has only fallen once, and that was during the 2008-09 world financial collapse. Despite that, he acknowledges that "demand is much more opaque."

"I don't know where demand is going next year for China. I am going to the place where there is no light, the most opaque place in the world to fit my narrative," said Pursell.

China, which will contribute about one quarter of global demand growth this year, remains the biggest source of

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Lee examines SEC-acceptability of production forecasting techniques for resource plays

John Lee, who assisted the U.S. Securities and Exchange Commission during its rules modernization process, said that although the agency does not have special regulations for resource plays, it has provided guidance, through comment letters, on traditional and recent production-forecasting technologies used in low-permeability formations. Lee, now a professor at Texas A&M University, presented those technologies in his presentation, "Monograph 4, Monograph 3 and the SEC," at the Ryder Scott reserves conference.

The Society of Petroleum Evaluation Engineers published Monograph 3 to address the evaluation of undeveloped reserves in resource plays, and Monograph 4 to focus on the estimation of developed reserves in unconventional reservoirs.

Lee cited four traditional technologies that are generally acceptable to the SEC for estimating reserves in unconventional reservoirs: modified Arps hyperbolic model, analogy, volumetric analysis and reservoir simulation. "The use of those methods will minimize comment letters from the SEC," he said.

Modified Arps is the most accepted method, according to Lee, but he cautioned that b factors cannot be too high and terminal declines cannot be too low.

The use of analogs is acceptable with reservations, he remarked. "For analogies, the SEC will accept a meaningful average of production of existing wells in type curves," said Lee, but he warned that in the past, the SEC has reviewed proved reserves estimated with analog methods and found the volumes to commonly be inflated 25 percent.

Lee added that volumetric analysis is also accepted, but with reservations, because in-place hydrocarbons, net pay and recovery factors are hard to calculate.

He said that reservoir simulation is suspect in some cases, because as one SEC staff engineer has stated, "Any creative reservoir engineer can history match almost anything and use the history match to project the future and that projection, even into the near term, is just as likely to be wrong as be correct."

Recent Technologies

Booking proved undeveloped reserves in resource plays using the SPEE Monograph 3 method for extending PUD locations beyond immediate offsets is acceptable to the SEC if certain criteria are met. Lee said that comment-letter correspondence between filers and the SEC attest to that, with final SEC letters stating "no further comments."

The SEC rarely broadcasts guidance. Industry has had to assume that SEC letters terminating correspondence on a given issue constitute tacit approval in cases where respondents have built compelling cases.

On the offset issue, "the resource has to be a resource play with a repeatable statistical distribution of reserves. The assumption is that the distribution will be repeated when we look at areas that have not been drilled yet," Lee remarked.

Monograph 4 has not been published yet but is slated to be final in December.

Evaluation technologies in Monograph 4 may not necessarily be approved by inspection from the SEC, said Lee. He remarked that while the SEC accepts Arps hyperbolic models with minimum declines as reliable in individual cases, "the agency may not accept alternative DCA models that, in certain circumstances, allow us to do a better job of estimating reserves in resource plays."

See article, "New method for estimating shale reserves introduced," on Page 2.

"Those decline-curve techniques are not well known to a lot of people and not well known to the SEC," said Lee. He outlined the SEC criteria for "reliable technology" and how it applies to the monographs.

"In interchanges with SEC staff, some filers have been able to demonstrate that they have field evidence that their applications of Monograph 3 meet SEC criteria. But there is no blanket approval," said Lee. "There have been similar outcomes for methods in Monograph 4, but again with no blanket approvals."

He also cited the SEC five-year rule on PUDs as the most important for conventionals along with the reliable technology criteria.

Lee said in all cases, forecasts must meet the agency's long-held standards for proved reserves. "As historical data is added, EURs for fixed groups of wells should remain constant or increase," he remarked. "The SEC will accept this, if demonstrated, but it's underutilized by industry."

His presentation and others from the conference are posted on the Ryder Scott website at www.ryderscott.com.

SPE-PRMS update in the works

John Ritter, a former chair of the SPE Oil & Gas Reserves Committee (OGRC), presented a progress report on the society's plans to update the 2007 SPE-PRMS, which includes revising the definitions to bring them more in line with unconventional reservoirs.

"This is an update, not a rewrite," he said. "It's part of system maintenance. We have a great opportunity for greater clarity on unconventionals."

The OGRC schedule calls for the draft of the updated PRMS to be published in 2015. Ritter said he expects it will be published in late 2016 or early 2017.

The evaluation of unconventional resources is challenging because of the significant variability of productivities and recovery efficiencies. "We see uncertainty in production but still don't understand recovery efficiencies. Those issues will drive some of the changes in the PRMS as it applies to unconventionals," said Ritter at the Ryder Scott reserves conference.

SPE will consider different trapping mechanisms and production processes involved with unconventionals. They will affect evaluation conditions and procedures as follows:

- Production histories are relatively limited and analogs on which to base evaluations are relatively few.
- Traditional petrophysical analysis may not be relevant. Log analysis models are still evolving.
- Porosity and water saturations may be of little relevance in some unconventional reservoirs.
- Parameters, such as total organic carbon or mechanical rock properties, may be critical.
- Production mechanisms are not the same as those for conventional reservoirs. Stimulation is generally required.
- Unconventional reservoirs may be very thick and laterally extensive with ill-defined boundaries and variable mineralogy and mechanical properties.


John Ritter

Ritter also said that the OGRC will leverage the Canadian Oil and Gas Evaluation Handbook (COGEH) in updating SPE-PRMS

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SPE-PRMS update – Cont. from page 5

definitions. The two are scheduled to be merged next year.

A COGEH-ROTR (Resources Other Than Reserves) study indicated the following:

- Net Pay is not defined in SPE-PRMS but is one of the most important parameters in the estimation of petroleum initially in place. The study defined net pay as "the net portion of a reservoir from which petroleum can be produced or extracted, given a specific recovery technology."
- Similarly, a cutoff, which is important in assessing in-place volumes, is not defined in SPE-PRMS. The study defined a cutoff as "a limiting value of a reservoir parameter that removes noncontributing intervals from resource calculations."

Ritter's presentation is posted on the Ryder Scott website at www.ryderscott.com.

Oil prices could rise – Cont. from page 5

uncertainty because its economic outlook is difficult to forecast and its fuel data is unclear.

October Update

Pursell said that forecasting demand is harder than estimating future supply. Six weeks after he forecast that world demand growth would slow to 1-million B/D the rest of the year, that number matched up with the IEA forecast fairly closely. In mid-October, the agency predicted global oil-demand growth to slow to 1.2-million B/D next year from a high of 1.8-million B/D in 2015.

Pursell's forecast that world supply would remain steady was also on track with the IEA October report.

Oil prices slumped on market fears that if sanctions are lifted next year, Iran's boost in production will cause a global glut of crude. The IEA said, "… supply will continue to be strong amid

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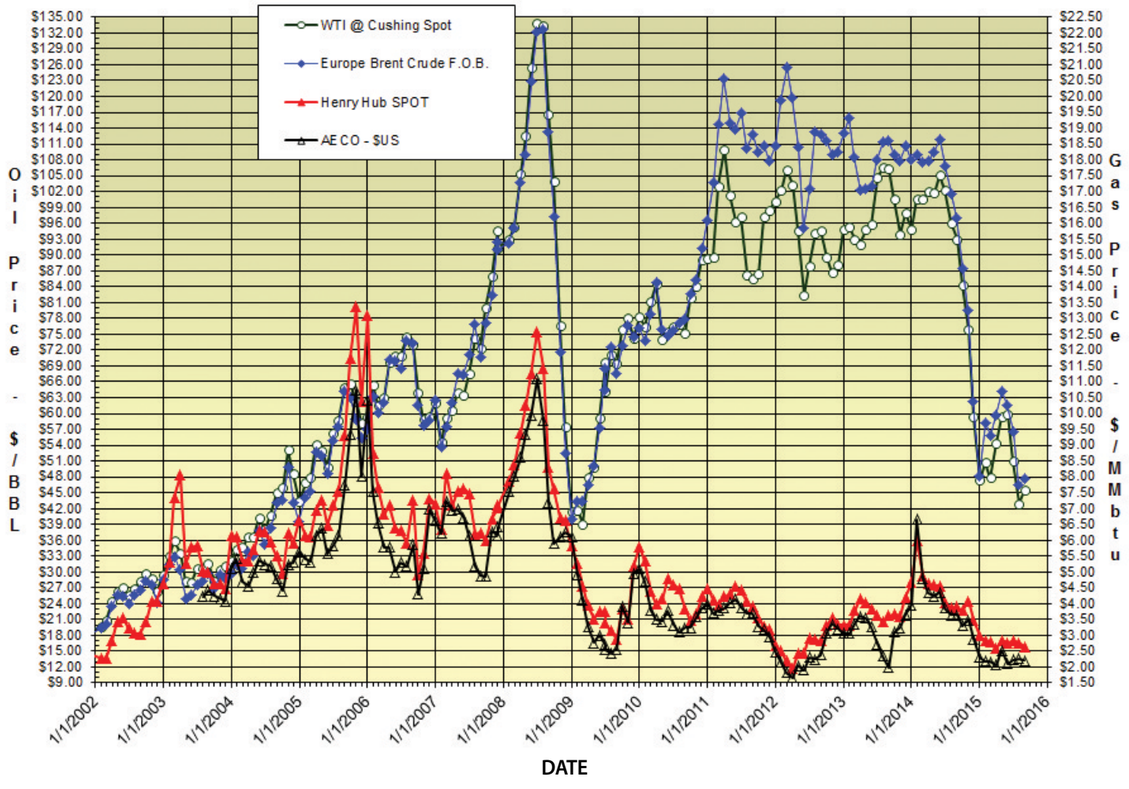
Price history of benchmark oil and gas in U.S. dollars



Published, monthly-average, cash market prices for WTI crude at Cushing (NYMEX), Brent crude and Henry Hub and AECO gas.

Petroleum engineers, geologist join Ryder Scott Houston office

David Garcia

Two petroleum engineers and a geologist have joined Ryder Scott. **David Garcia** is a senior petroleum engineer in one of the international petroleum engineering groups. Previously, he was a senior reservoir engineer at Occidental Petroleum Corp. where he worked seven years, starting as a drilling engineer. Garcia performed field development planning, production forecasting and economic analysis for tight-gas reservoirs and managed drilling and recompletion projects. He calculated, compiled and reported reserves complying with U.S. SEC rules and corporate policies.

Garcia developed depletion plans and conducted reservoir surveillance in the heavy oil, waterflooded Wilmington field in California, examining individual well performance to recommend upside or remedial work, which he verified with reservoir simulation. He started his career as a field engineer at Schlumberger Ltd. where he worked three years and provided openhole and cased-hole logging services, perforation services, log analysis and training.

He has BS and MS degrees in petroleum engineering from the University of Oklahoma and is a member of SPE.

Andres Suarez

Andres Suarez, senior petroleum engineer, joined Ryder Scott from Hocol SA in Colombia where he was a technical manager and worked 19 years in the production and reservoir engineering divisions. He managed resources-to-reserves process maturation, reservoir management and field-development planning. He also was the corporate coordinator for external reserves/resources process audits.

Suarez managed chemical-enhancement oil recovery projects and implemented an alkaline-surfactant-polymer flood from lab design to startup of field operations. Also, he developed business development strategies to maximize the company portfolio.

Suarez participated in integrated reservoir studies to select infill-drilling locations and workover candidates. He also conducted integrated formation-damage and rock-mechanics studies. Suarez conducted well tests for black-oil and gas-condensate reservoirs, artificial-lift optimization, stimulation design and water-injection optimization in field operations.

Before that, Suarez worked as a field engineer in stimulation and well completions at Halliburton Latin America in Colombia and Venezuela.

Suarez has a BS degree in petroleum engineering from Universidad de America in Colombia and an MS degree in petroleum engineering from Texas A&M University. He is a member of SPE.

Susan Owen

Susan Owen joined the Ryder Scott geology group in Houston as a senior geologist. She worked for Ryder Scott as a contract geologist and has more than 30 total years' experience as a petroleum geologist.

Her experience includes subsurface mapping, well-log correlation and interpretation, reservoir evaluations, as well as petrophysical interpretations incorporating core, drill-stem-test and production data. She also has conducted field studies for potential corporate investments in various basins and lithologies worldwide.

At Ryder Scott, Owen evaluated developed and undeveloped oil, gas and condensate reserves within the U.S. and internationally. Before that, she worked at Southern Union/Panhandle Energy Co. as the principal petroleum geologist in gas supply and at CMS Energy Corp. as the principal petroleum reserves geologist starting in 1999.

Owen gained experience as a corporate reserves geologist at Duke Energy Corp. and at PanEnergy Corp. where she worked seven years starting in 1988. She began her career at Panhandle Eastern Corp. in 1982, where she worked as a division geologist in reserves and gas supply.

Throughout her career, Owen has conducted reserves and deliverability evaluations involving the preparation of geological and engineering studies with a focus on potential

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Oil prices could rise – Cont. from page 10

an expected return of Iranian crude to the market."

Pursell forecasts that Iran's reemergence will only result in an "incremental" 500,000-BOPD production capacity increase – from its current 2.8-million B/D total productive-capacity to 3.3-million B/D.

Editor's Note: Price forecasts are highly uncertain by their nature. Ryder Scott does not endorse, use or encourage reliance on the price forecast in this article.

Erratum

Brian Shane Everitt, a 35-year old petroleum engineer at Ryder Scott, died June 16 in Cypress, TX, not in Hempstead, TX, as reported in the July *Reservoir Solutions* newsletter. We apologize for the error.

Petroleum engineers, geologist – Cont. from page 11

gas-pipeline system expansions and pipeline acquisitions.

Owen has a BA degree in mathematics from the University of Texas at Austin and a BS degree in geology from the University of Houston. She is a member of AAPG, Houston Geological Society and SPE.

In other news, **Jean Liuhalfe**, formerly a senior petroleum engineer at the Calgary office, was promoted to vice president project coordinator.

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 studies a year. Ryder Scott multidisciplinary studies incorporate geophysics, petrophysics, geology, petroleum engineering, reservoir simulation and economics. With 130 employees, including 90 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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