

RESERVOIR SOLUTIONS

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Ryder Scott Houston Reserves Conference

September 13th

HOUSTON

RESERVES
CONFERENCES

CANCUN

Ryder Scott Mexico Reserves Conference

October 29th and 30th

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Ryder Scott Houston Reserves Conference

Practical and principles-based topics featured at the Houston reserves conference

The 14th Annual Ryder Scott reserves conference is slated for Thursday, Sept. 13, at the Hyatt Regency hotel in downtown Houston. Organizers anticipate the event will draw more than 350 attendees, making it the largest single gathering of reserves evaluators once again.

Agenda will be diverse — from hands-on topics, such as using Cloud computing for forecasting, to principle-based subject matter, such as analyzing the new 2017 Society of Petroleum Engineers Petroleum Resources Management System.

Details at a Glance

Date: Thursday, Sept. 13

Time: Check-in starting at 7 a.m.; conclusion of ethics presentation at 5 p.m.

Where: Hyatt Regency Hotel, Imperial Ballroom, 1200 Louisiana St., Houston, Texas 77002

Ethics Hour: Starts at 4 p.m.

Cocktail Reception: 5 p.m. to 7 p.m.

Email requests, questions or comments to RSCConfHouston@ryderscott.com.

Other Details

Ryder Scott maintains a wait list of those requesting reservations but who are unable to be admitted because the event is fully booked and registration is closed. Those on the wait list may be admitted in place of those who cancel their reservations or who are no-shows.

To be fair to all guests and clients, Ryder Scott may need to limit the number of attendees from a single company. Attendance is mostly by invitation only. However, closer to the event date, a limited number of reservations will be available to non-invitees.

Attending licensed petroleum engineers will receive six to eight hours of CEUs (Continuing Education Units). State-licensed engineers are required annually to maintain their licensing through continuing education.

Those who attend the ethics presentation will receive a one-hour credit, which fulfills the annual requirement of most states for licensed engineers.

Light buffet breakfasts and full buffet lunches are provided by hotel catering services. Hotel parking is validated.

Larry Connor, technical coordinator and advising senior vice president, manages the event, which is fully underwritten by Ryder Scott.

Conference presentations will be posted on the Ryder Scott website at ryderscott.com/presentations in September.

Schedule of Events

"Evaluation Challenges in a Changing North America"

Time	Speaker	Affiliation	Topic
8:00 a.m. – 8:30 a.m.	Don Roesle & Dean Rietz CEO / President	Ryder Scott Co. LP	Welcome and Introduction
8:30 a.m. – 9:15 a.m.	John Lee Prof. of Petroleum Engineering	Texas A&M University	Death by Bubble Point: Fact or Fantasy
9:15 a.m. – 10:00 a.m.	Marc H. Folladori Senior Counsel	Haynes & Boone LLP	2017–2018 SEC Comments Issued to Public E&P Companies
10:00 a.m. – 11:00 a.m.	James Ruiz Cofounder	QEngineering LLC	Using Cloud Technology to Drive Smarter Predictions
11:00 a.m. – 11:30 a.m.	Joshua J. A. Firestone Associate Petroleum Economist	Ryder Scott Co. LP	Analytics in Unconventional Plays
11:30 a.m. – 12:30 p.m.			Buffet Luncheon
12:30 p.m. – 1:15 p.m.	Samantha (Sam) Holroyd Managing Director	Lantana Energy Advisors	Integrating and Aligning Reserves and Business Strategy
1:15 p.m. – 2:00 p.m.	Tom Gardner President	Millennium Energy Advisors	Recent Trends and Emerging Disruptors in M&A&D and Energy Finance
2:00 p.m. – 2:15 p.m.			Break
2:15 p.m. – 3:00 p.m.	Dan Olds Managing Senior VP	Ryder Scott Co. LP	The New PRMS
3:00 p.m. – 3:45 p.m.	H. Roger Schwall Consultant		Reserves Disclosures to the U.S. SEC
4:00 p.m. – 5:00 p.m.	Lance Kinney Executive Director	Texas Board of Professional Engineers	Ethics – Recent Updates to the TBPE
5:00 p.m. – 7:00 p.m.			Cocktail Reception

Ryder Scott to host reserves conference in Cancun, Oct. 29 to 30



“Catch a wave of expertise” at Ryder Scott’s first reserves conference in Cancun, Mexico. The two-day event will be held at the Grand Fiesta Americana Coral Beach Cancún — a resort hotel on the turquoise waters of the Caribbean, Oct. 29 to 30.

High-profile speakers and their agenda include a presentation on Pemex strategies to complement its capabilities from **Ulises Hernandez** – director of resources, reserves and alliances at Petróleos Mexicanos Exploración y Producción (Pemex). **Jose Alfonso Rodriquez**, subdirector of resources & reserves at Pemex, will present, “Reserves Behavior in a Fast Changing Environment.”

Ryder Scott also will feature a presentation on the new 2017 Society of Petroleum Engineers Petroleum Resources Management System. The SPE-PRMS is the de-facto international standard on petroleum reserves definitions and guidelines, including best practices for evaluating reserves and economics. Presenting will be **Dan Olds**, managing senior vice president at Ryder Scott. Olds serves on the SPE oil and gas reserves committee that finalized the PRMS.

All presentations will be bilingual. Attendees will hear uninterrupted interpretations – from English to Spanish or from Spanish to English – on headphones.

Options will be available for guided tours before and during the conference. A special hotel rate will be offered pre- and post-conference, and those rates are extended to families.

“The conference will highlight some of the major business and technical issues in Mexico’s oil and gas industry, and will provide ample opportunities to network with professionals in the industry,” said **Guale Ramirez**, executive vice president, who is managing the event. “Also, attendees and their families will be able to enjoy Cancun, a fun destination known for its natural beauty, beach activity and field trips to various nearby historical sites.”

For invitation requests, questions or comments, please contact Ryder Scott at RSCConfMexico@ryderscott.com. The cost is \$250 USD. This includes admittance to all presentations, breakfasts and lunches over two days and a cocktail reception.

Ryder Scott will email invitations to the conference in August. The email will display a link to easily register online for conference, hotel and events. After registering, a confirmation notice will be sent via email. Final conference agenda will accompany invitations.

Details at a glance: _____

- Date:** Monday, Oct. 29 to Tuesday, Oct. 30
- Check-in:** Starts at 7 a.m., Oct. 29
- Where:** Grand Fiesta Americana Coral Beach Cancun, Km 9.5, Blvd. Kukulcan, Zona Hotelera, Cancun 77500, Quintana Roo, Mexico; Phone: 011 52 998 881 3200
- Who:** Conference managed by Guale Ramirez at guale_ramirez@ryderscott.com

Preliminary Schedule of Events			
"Evaluation Challenges in a Changing, Growing Mexico"			
DAY 1			
Time	Speaker	Affiliation	Topic
7:00 a.m. – 8:00 a.m.			Registration
8:00 a.m. – 8:15 a.m.	Guale Ramirez Executive Vice President	Ryder Scott Co. LP	Welcome and Open Conference
8:15 a.m. – 9:40 a.m.	Dan Olds / Guale Ramirez Mng. Sr. VP - Member PRMS Cmte / Exec. VP	Ryder Scott Co. LP	The NEW (approved June 2018) SPE-PRMS Reserves Definitions
20 Min. Coffee Break			
10:00 a.m. – 11:30 a.m.	Dan Olds / Guale Ramirez Mng. Sr. VP - Member PRMS Cmte / Exec. VP	Ryder Scott Co. LP	The NEW (approved June 2018) SPE-PRMS Reserves Definitions
30 Min. Coffee & Networking			
12:00 p.m. – 12:10 p.m.	Guale Ramirez Executive Vice President	Ryder Scott Co. LP	Introducing Ryder Scott - GX Technology Working Together on Integrated Solutions
12:10 p.m. – 1:00 p.m.	Stefano Volterrani Vice President	GX Technology	Extracting the Maximum Information from Your Seismic Data
90 Min. Lunch			
2:30 p.m. – 4:00 p.m.	Steve Phillips Mng. Senior VP - Head of Geoscience	Ryder Scott Co. LP	Building a Geostatic Model for the Purpose of 1P, 2P & 3P Reserves Estimation
15 Min. Coffee & Refreshments			
4:15 p.m. – 5:30 p.m.	Miles Palke Mng. Senior VP - Head of Simulation	Ryder Scott Co. LP	Building a Dynamic Simulation Model for the Purpose of 1P, 2P & 3P Reserves Estimation
5:30 p.m. – 7:00 p.m. Drinks and Hors D'oeuvres			

DAY 2			
8:00 a.m. – 8:15 a.m.	Guale Ramirez Executive Vice President	Ryder Scott Co. LP	Welcome to Second Day of Conference
8:15 a.m. – 9:00 a.m.	Jose Alfonso Rodriquez Subdirector of Resources & Reserves	Pemex E&P	Reserves Behavior in a Fast Changing Environment
9:00 a.m. – 9:50 a.m.	Ulises Hernandez Director of Resources, Reserves and Alliances	Pemex E&P	Pemex Strategies to Complement its Capabilities
20 Min. Coffee & Networking			
10:20 a.m. – 11:10 a.m.	Gildardo Guerrero Cruz Manager of Operations in Mexico	Ryder Scott Co. LP	Potential for Reserves Growth in the Onshore Southern Region
11:10 a.m. – 12:00 p.m.	Carlos Morales CEO	Petrobal	Wearing a Different Hat - The Private Perspective
15 Min. Coffee Break			
12:15 p.m. – 1:00 p.m.	Luis Ramos Subdirector of Portfolio	Pemex E&P	Managing a Changing Portfolio
90 Min. Lunch			
2:30 p.m. – 3:15 p.m.	Leonardo Aguilera Subdirector of Exploration	Pemex E&P	Strategies for Exploiting Mexico's Unconventional Resources
3:15 p.m. – 4:00 p.m.	Herman Acuña Managing Senior VP	Ryder Scott Co. LP	Evaluating Reserves and Resources for Unconventional Plays
15 Min. Coffee & Refreshments			
4:15 p.m. – 5:00 p.m.	Sandeep Khurana Vice President	Granherne	One Gulf Reaching 50 Billion BOE and Growing
5:00 p.m. – 5:45 p.m.	Enzo Aconcha Senior Geologist	Ryder Scott Co. LP	Case Study - El Flanco Area - Cinco Presidentes - A Joint Project with GX Technology
5:45 p.m.	Guale Ramirez	Thanks in Closing	

Auto forecasting test on Pouce Coup South supports manual adjustments

Despite a break from low prices, E&P companies continue to insist on increased staff productivity in the face of workforce and budget cuts and greater technical challenges. It's called doing more with less.

For instance, preparing manual oil and gas production forecasts for hundreds, sometimes thousands of wells, is prohibitively time consuming. To overcome that, engineers are turning to algorithm-based routines featured in auto-forecasting software programs.

Those programs enable engineers to conduct type-well analysis more rapidly. Used properly, auto forecasting generates best-fit declines and decline models, including the commonly used two-segment Arps.

When the evaluator merges historical production data with production forecasts to build type wells, they represent the best available interpretation of the underlying data.

History is key

Anton Siyatskiy, senior petroleum engineer at Ryder Scott Canada, presented, "Auto Forecasting – Its Current Reliability and Uses," at the Calgary reserves conference in May. In his study, he compared manual forecasting (base case), auto forecasting with built-in defaults and manually adjusted auto forecasting. For the comparison, he considered 780 producing wells, including 505 horizontal producers, in the Doig/Montney reservoirs in the Pouce Coupe South area in Alberta.

Siyatskiy presented known challenges with auto forecasting that include the following:

- Having sufficient well history for extrapolation.
- Knowing flow mechanism up front.
- Identifying basic Arps parameters, such as the B-factor, initial decline, switch time for linear- to boundary-dominated flow (BDF) for horizontal wells and terminal decline (Dmin).

His examination procedures included the following:

1. Selecting area with significant historical production data.
2. Performing manual evaluation (well-by-well examination) in desired bin of wells to generate the reference point (reference type well). Siyatskiy used modified Arps because most wells are in BDF.
3. Conducting auto forecasting by using six scenarios:
 - Three cases with default software settings for 100 percent of production data, 73 percent and 36 percent. Data cutoff times for the three cases correspond to date of study, time period before YE 2014 and time period before YE 2010, respectively.
 - Three cases with manually adjusted auto-forecasting parameters to mimic development of producers, specifically modifying the initial B-factor and Dmin.
4. Identifying how close the auto forecast estimated ultimate recoveries (EURs) were to reference-case EURs.

Methods

Siyatskiy used the binning method to segment out a group of wells for manual forecasting, the reference case. Vintage of production, well location, product type and type of drilling were binning criteria. Siyatskiy binned 45 horizontal gas wells in relatively close proximity with production starting between 2007 and 2009. He then generated a type-well profile to compare to the other methods.

To identify flow-regime deviations, he used frequency histograms to segment out time spans for linear flow (LF) at three to eight months and for BDF at 26 to 39 months. Siyatskiy then generated type-well profiles for those wells.

Please see the six scenarios — three with default software settings, three with manually adjusted, history-matched auto forecasts — on the following chart:

Scenarios Description

Initial production starts in 2007-2009

	Full Data	2015 (27% data cut)	2011 (64% data cut)
Method	Scenarios		
Default software settings	Scenario 1 B-factor max = 1.5, D _{min} = 5% (no production cut)	Scenario 3 B-factor max = 1.5, D _{min} = 5% (cut well's production data after 2015)	Scenario 5 B-factor max = 1.5, D _{min} = 5% (cut well's production data after 2011)
Mimicking that operator's play intelligence is growing with time. Auto Forecast is manually adjusted to fit the history.	Scenario 2 B-factor max = 1.5, D _{min} = 10% (no production cut)	Scenario 4 B-factor max = 1.5, D _{min} = 10% (cut well's production data after 2015)	Scenario 6 B-factor max/min = 2/1.5, D _{min} = 10% (cut well's production data after 2011)

Siyatskiy showed a series of slides documenting the steps he took for every scenario of the six to generate reasonable Arps parameters. The results of the comparison showed a range of differences between the reference case and default and manual auto forecasting. With the complete data set, auto forecasting using defaults was 31 percent higher than the reference case. Auto forecasting using manual tweaks was only 4 to 7 percent higher than the reference case at any one of the three data cutoff points.

Please see the following chart:

Representation of Results for Every Scenario Compared to Reference Case

Reference case, EUR	3,719		
	Production Elimination		
Scenario	Until 31st of Dec 2010	Until 31st of Dec 2014	Full Data Set
Auto Forecast Default, EUR	4,570	4,601	5,371
Auto Forecast with Manual Tweak, EUR	4,001	3,797	3,871
Difference with Reference Case			
Auto Forecast Default, %	+19%	+19%	+31%
Auto Forecast with Manual Tweak, %	+7%	+2%	+4%

Conclusions

Siyatskiy concluded the following:

- Avoid the default blinded auto forecasting option. This result shows that predicted EURs are significantly over-estimated vs. eventual outcomes.
- The percentages of difference would be even higher if remaining technical volumes were estimated vs. EURs.
- Basic understanding of reservoir and well behavior plus application of this knowledge to auto forecast outcomes provide better results for evaluations of type-

well profiles. For quick assessments, the study methods cited may be sufficient depending on tolerance levels.

- Always review a well's auto forecast before generating type-well profiles. Always investigate suspicious software results. Automation programs do not understand more or know better than a skilled engineer.

- This relatively simple study used a generic set of data. Industry should conduct more testing. The binning selections in this study may differ from other options, which, if chosen, might cause interpretations to differ.



Anton Siyatskiy

New COGEH defuses ARC debate with principles-based approach

An updated Canadian Oil & Gas Evaluation Handbook — a compendium of industry-best practices — will offer a practical, principles-based approach to handling abandonment-and-reclamation costs (ARCs) in the discounted cash flow model. At issue is the Alberta Securities Commission rule, Item 2.1(3) (b) of NI 51-101F1. It requires a reporting issuer (RI) to cashflow oil and gas production net of ARCs for all wells, surface facilities and pipelines up to the sales point.



Doug Wright

“Best practice is to include all ADR (abandonment, decommissioning and reclamation) costs to the salespoint,” said **Doug Wright**. “However, it’s probably not practical to include all those costs. We had to consider what that would do to some companies.”

Wright is one of the framers of the new guidance to be issued by the Calgary chapter of the Society of Petroleum Evaluation Engineers. At press time in early July, the handbook had not been posted.

Wright presented the society’s progress in May at the Ryder Scott reserves conference in Calgary.

If ADR costs are excluded, COGEH recommends that the RI disclose those omissions to reconcile unaudited (supplemental) information in the 10-K with the audited financial statement. On the accounting side, all ADR costs are reported annually as asset retirement obligations.

COGEH clarifies that ADR costs should address producing wells, suspended wells, service wells, gathering systems, facilities and surface land development.

Updates, additions to COGEH

Eight oil and gas companies, three consultants, two regulators and SPEE members commented on the COGEH draft. “The banks did not provide much feedback, but we made some concessions to banks,” said Wright, who chaired the 2017 SPEE update committee.

SPEE followed up on recommendations received during the comment period by creating a digital COGEH draft document. “The handbook was over 600 pages long. We eliminated duplication, consolidated and cleaned up the document and added a couple of new topics to keep it in line with other jurisdictions. With the use of hyperlinks, we reduced the draft to about 400 pages,” said Wright.

While consolidating COGEH, the committee did not remove any previous content from Volumes 1, 2 and 3 or from the “Guidelines for the Estimation and Classification of Resources Other Than Reserves (ROTR)”

COGEH will be a live, evergreen document. “Changes will be done when needed, but won’t be done in December, for instance, during the year-end evaluation cycle,” said Wright. “Updates are planned for the spring so they don’t fall into that cycle.” He added that SPEE will consider new guidelines on such topics as handling carbon taxes.

At press time, subscription sales of COGEH to individuals at an annual rate and to corporations at a higher rate were imminent.

SPEE also updated or made additions to COGEH for the following topics:

- Product types
- Undeveloped reserve bookings and timing
- Type-well generation
- Statistical methods
- Social and environmental considerations

Market perspectives on resources assessments presented at Calgary conference

Investment banker **Morad Rizkalla**, at BMO Capital Markets A&D advisory, presented the impact of resources assessments on the A&D market in Canada at the Ryder Scott Canada reserves conference in May. He discussed case studies of transactions with significant resources components over the past five years.

The details of those transactions are included in his presentation posted on the Ryder Scott website at ryderscott.com/presentations.

They are as follows:

- PetroChina/Encana Corp. Duvernay joint venture in 2012
- Mitsubishi Corp./Encana Montney joint venture in British Columbia in 2012
- Petronas/Progress Energy Resources Corp. acquisition in 2012
- Seven Generations Energy Ltd. IPO in 2014
- Concho Resources Inc./RSP Permian Inc. acquisition in 2018
- Various oil sands royalty transactions during 2016 to 2018

“As resource plays have become a significant contributor to the WCSB (Western Canadian Sedimentary Basin), contingent



Morad Rizkalla

and prospective resource assessments have gained importance in asset valuations and transactions,” said Rizkalla.

“Companies acquiring long-term resources are generally the larger organizations,” he added. “They have goals to convert resources to reserves, production and cash flow.”

Rizkalla also discussed some current market considerations of BMO Capital Markets. He characterized the Canadian IPO and equity market as

“challenged” over the last year and a half. The latest Canadian IPO was Seven Generations.

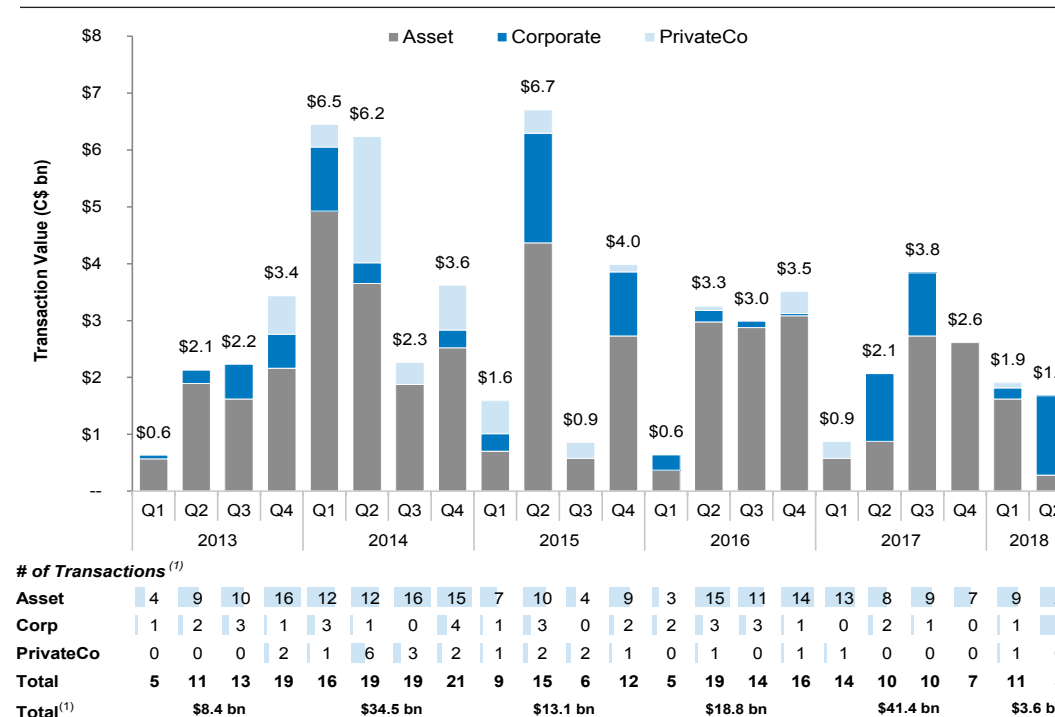
Only nine E&P issuers accessed the market in 2017 and there were no new issues at midyear 2018. “M&A (mergers and acquisitions) activity has tapered because public Canadian energy companies have limited access to capital amid weak equity market sentiment,” said Rizkalla.

He added that non-traditional buyers — such as International Petroleum Corp., Torxen Energy Ltd. and Schlumberger Ltd. — have been the most active in the M&A market.

“Companies with strong paper that can raise equity or issue shares for direct share exchange are the buyers,” said Rizkalla.

Canadian M, A&D Transaction Trends*

EXPLORATION & PRODUCTION (2013 - PRESENT)



*Chart courtesy of BMO Capital Markets

News Roundup

SEC may relax reserves reporting rules, says U.S. congressman

Market Watch on June 21 reported that the U.S. Securities and Exchange Commission is considering loosening its rules on producers to allow them to report more reserves. "Current rules limit companies from reporting reserves 'as proved' to those they plan to unearth within five years," wrote **Steve Goldstein**, D.C. bureau chief.

He reported that Rep. **Frank Lucas**, a Republican from Oklahoma, asked SEC Chairman **Jay Clayton** whether the five-year rule still makes sense considering the shale revolution.

"This has been the policy since 2008," Clayton reportedly said. "At that time, shale accounted for a much smaller percentage of oil and gas production than it does now, and I would suggest to you that this five-year rule might not reflect the realities of the new American energy landscape."

Clayton said the agency was considering a rewrite of the rule, wrote Goldstein, quoting the chairman as saying, "I'm concerned in this space that the way our rules require disclosure is inconsistent with the way investors value these companies. So they are looking for additional disclosures, and we should make sure that our rules line up with what investors think is the material information."

Shale producers are overestimating proved reserves, says blog

A Vancouver-based blog site, *DeSmog Blog*, claims that rules of the U.S. Securities and Exchange Commission have made it easier for public companies with drilling rights in shale plays to inflate proved undeveloped reserves. "... Drillers can count all of the oil and gas they expect to pump out over the well's entire lifetime — before they've found out how fast that well flows or seen a single drop of oil from it," wrote **Sharon Kelly**, a freelance reporter.

Her article is posted at <https://www.desmogblog.com/2018/06/14/proved-undeveloped-reserves-sec-rule-change-risks-shale-fracking-pipelines>.

Kelly marks 2008 as a turning point for looser SEC rules, specifically in regard to the agency scrapping the flow test as a requirement for justifying reserves as proved. The SEC actually nixed the flow-test requirement four years earlier, as reported by *Reservoir Solutions* in June 2004. At that time, companies drilling in the deepwater Gulf of Mexico (GOM) asked the SEC to do away with the requirement, saying it was too costly and environmentally risky.

The SEC agreed. **H. Roger Schwall**, then an SEC assistant director, told a Houston crowd at a local forum that "after considering responses (from GOM offshore industry), we were able to reach a position of not objecting to their recognizing proved undeveloped reserves."

In lieu of a flow test, the agency said a

company could use four procedures in combination to justify booking PUDs — openhole logs, core samples, wireline formation sampling and seismic surveys.

Schwall formalized his comments a day later on an SEC website posting, "Letter to Companies with Oil and Gas Operations in the Gulf of Mexico (GOM)." The SEC reaffirmed that the flow-testing exception applied to the GOM only, so it had no effect on shale reserves.

Reliable technology

Kelly wrote that companies in 2009, after the 2008 "modernization" of the SEC rules, were able to replace the flow test with new technologies. "As long as a company considered those technologies reliably able to predict whether oil and gas could be pumped, the SEC would be satisfied," she stated.

First of all, the SEC didn't replace the flow test with new technologies in its 2008 rules revisions. Secondly, the

SEC doesn't defer to industry; it regulates industry. The watchdog agency has criteria for acceptable use of "reliable technology." It has to be "one or more technologies (including computational methods) that has been field tested and has been demonstrated to provide reasonably certain results with consistency and repeatability in the formation being evaluated or in an analogous formation."

So the burden of establishing and documenting the technology is on the producer.

Secondly, producers don't always "satisfy" the SEC in their filings. To complete some of its reviews, the agency issues comment letters to public oil and gas companies. The SEC annually cites Rule 4-10 (a) (25) of regulation S-X, and asks for more information on technologies used to justify reserves estimates.

Kelly credits SEC acceptance of field-tested technology as the driving force behind increased PUD bookings. That arguably may be the case, but an equally compelling or stronger argument can be made that abolishing the one-offset rule provided more booking flexibility for producers in the shale. That rule allowed PUDs to be booked in drilling locations beyond immediate offsets (legal well spacing requirements) if the reasonable certainty criterion was met.

Kelly also asserts that lenders "turned a blind eye" to reserves values when prices dropped and continued to stay "lower for longer." She cited a September 2017 article by **Laura Freeman** in the *Oil & Gas Financial Journal* to support this contention.

"In 2015, after oil prices slumped, drillers started claiming that their as-yet-undrilled wells (those in the proved undeveloped reserves category) would have higher initial production rates and last longer, resulting in higher total production — even though nothing changed about the physical assets — which let them add proved reserves to their books, the *Journal* reported.

That point is valid if tempered with the fact that industry

has recognized that learning curves and associated step changes in drilling and completions have increased production and reserves despite unchanged physical assets.

Banking, bankruptcies and bailouts

Eventually, "drillers had to write down billions of barrels of proved reserves in what *Bloomberg* called a 'puff of accounting smoke,'" quoted Kelly.

Generally, banks routinely review borrowing bases for their loans, making sure they are covered by enough collateral (reserves), she wrote. However, loan agreements are not ironclad when financial disasters strike.

Kelly cited the *Journal* article, which stated, "... despite a 75 percent contraction in oil prices from 2014 to 2016, many of these loans were not reduced in 2015, 2016 or 2017." Kelly said that banks bailed out the companies, for example, by cutting interest rates.

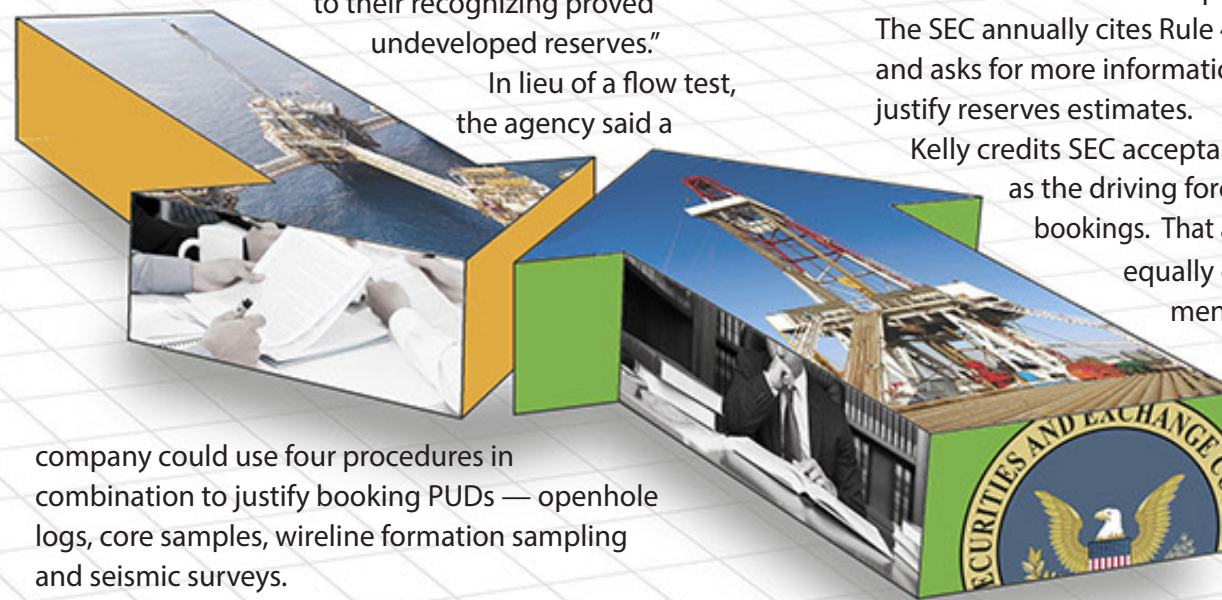
The oil and gas sector owes more than \$833 billion to lenders, a May 31 analysis by *Reuters* found, and nearly half of that — roughly \$400 billion — is due to be paid off or refinanced by the end of 2019, *DeSmog Blog* republished.

"That means banks and drillers will be re-negotiating hundreds of billions of dollars in loans relatively soon," Kelly stated.

Those renegotiations are poised to cause some repercussions in the industry. A June 26 advisory, "Next Stop: The Twilight Zone. Enforceability of OCC Reserve-Based Lending (RBL) Guidelines," from Haynes and Boone LLC, examines two-year-old guidelines of the E&P Handbook published by the U.S. Office of the Comptroller of the Currency (OCC). They have already prompted some banks to downgrade loans based on a new "total debt" analysis.

As to why banks did not hemorrhage more during the spate of oil and gas bankruptcies, "a few of the senior bank loans also suffered losses, but on balance, losses attributable to RBL were very low, in large part, because the junior debt acted as a heat shield that protected the first lien RBL banks from the meteoric collapse in energy prices," wrote **Buddy Clark**, co-chair of the Haynes Boone energy

Please see Shale producers on Page 12



Shale producers – Cont. from page 11

practice group in Houston.

Please see recap of his analysis, “Reserves-based lending is subject to OCC guidelines, not rules,” on this page.

All in all, Kelly’s article is insightful, if a bit off target, and uses credible newswire and trade publication information as well as industry-accepted sources, such as the 2011 SPE technical paper, “Reserves Overbooking: The Problem We are Finally Going to Talk About,” by **Grant T. Olsen, W. John Lee** and **Thomas A. Blasingame** at Texas A&M University.

“PUDs now make up an average of just over half of the proved oil reserves at 40 drilling companies active in shale gas basins nationwide, according to SEC filings reviewed by DeSmog,” Kelly wrote. “For drilling companies that are less heavily involved in shale drilling, the average mix is roughly 30 percent PUDs — similar to the industry’s average before the SEC rule change.”

Cause and effect, contributing factor or unrelated? Comments are welcome at the Ryder Scott LinkedIn site at <https://www.linkedin.com/company/ryder-scott-petroleum-consultants-ryder-scott-company-l-p-/>.

Reserves-based lending is subject to OCC guidelines, not rules

A June 26 advisory from Haynes and Boone LLC — “Next Stop: The Twilight Zone. Enforceability of OCC Reserve-Based Lending (RBL) Guidelines” — examines two-year-old guidance in the E&P Handbook published by the U.S. Office of the Comptroller of the Currency (OCC). The handbook introduces far-reaching metrics for national banks to use to evaluate repayment risks on RBLs.

Please see the expert analysis at http://www.haynes-boone.com/-/media/files/alert-pdfs/2018/enforceability_of_occ_reserve_based_lending_guidelines.ashx?la=en&hash=B4B4CEC49268A92B63063BED61580B-C5F70575D9.

The guidelines have already prompted some banks to downgrade reserves-based loans based on a new “total debt” analysis in the handbook. During the downturn, “the changes ... added to the angst and consternation among energy lenders and their oil and gas borrowers,” wrote **Buddy Clark**, co-chair of the Haynes Boone energy practice group in Houston.

The E&P Handbook instructed bank examiners to review

not only their RBL debt, but to look at the borrower’s total committed debt (whether or not fully drawn), including second-lien and unsecured debt, when risk-rating repayment of senior loans, wrote Clark.

Once the E&P Handbook was issued, energy lenders began to apply the new metrics and many loans which were likely to be repaid in full were nevertheless downgraded based on analysis of total debt, the advisory stated.

A 2016 advisory from Haynes and Boone stated at the time, out of “58 publically reporting E&P companies, ... only five would pass the strict guidelines under the E&P Handbook.”

Guidelines rule

The Congressional Review Act (CRA) requires all federal agencies to submit proposed rules to the General Accounting Office (GAO) and Congress before they can become effective. A logical conclusion is that because the OCC has not submitted the E&P Handbook, it is not in effect.

Precedent also comes into play. Before the handbook was issued, the OCC and other oversight agencies issued similar guidance for evaluating leveraged loans. The agencies issued the Leverage Lending Guidelines without first submitting them to Congress for review and approval under the CRA.

The GAO decided this was improper and the OCC and Fed have publically refrained from enforcing those guidelines.

“The same analysis should apply to the E&P Handbook because it is similar in scope, purpose and effect on banks. ... If properly challenged, the binding nature of the E&P Handbook should be similarly questioned,” wrote Clark.

From its enactment in 1996 through 2016, the CRA was invoked only once to invalidate an agency rule, wrote Clark. However, since President Trump’s inauguration in 2017 to date, 15 rules have been overturned by joint congressional resolution under the CRA.

Clark surmises that if the handbook is properly challenged, then the conclusion may be that the guidelines should have been submitted to the GAO and Congress under the CRA.

Deregulation is a rallying cry now for most U.S. legislators. “... It is not hard to imagine if given the opportunity, the Republican-led Congress sitting today would be willing to wield its power afforded under the CRA to overturn both the Leveraged Lending Guidance and E&P Handbook,” wrote Clark.

Criticism of SPE-PRMS draft stirs debate unresolved by final guidelines

Editor’s Note: The Society of Petroleum Engineers board unanimously approved the final 2017 SPE Petroleum Resources Management System (SPE-PRMS) in late June. The new SPE-PRMS is available on request at <http://www.spe.org/industry/reserves.php>. The following analysis took into account differences between sections of the draft PRMS reviewed in an Oil & Gas Journal article referenced below and the final PRMS sections. No substantive differences were found. However, SPE did revise a chart criticized by the authors. SPE also maintained its “recommendation” not to include fuel gas as reserves in keeping with the author’s view, albeit not going far enough.

Bob Harrison and **Patrick Quinn** at Lloyd’s Register wrote a blistering review of the draft of the 2017 SPE-PRMS in a March 4 OGJ article, “Review suggests draft SPE PRMS 2017 unfit for public resource reporting.”

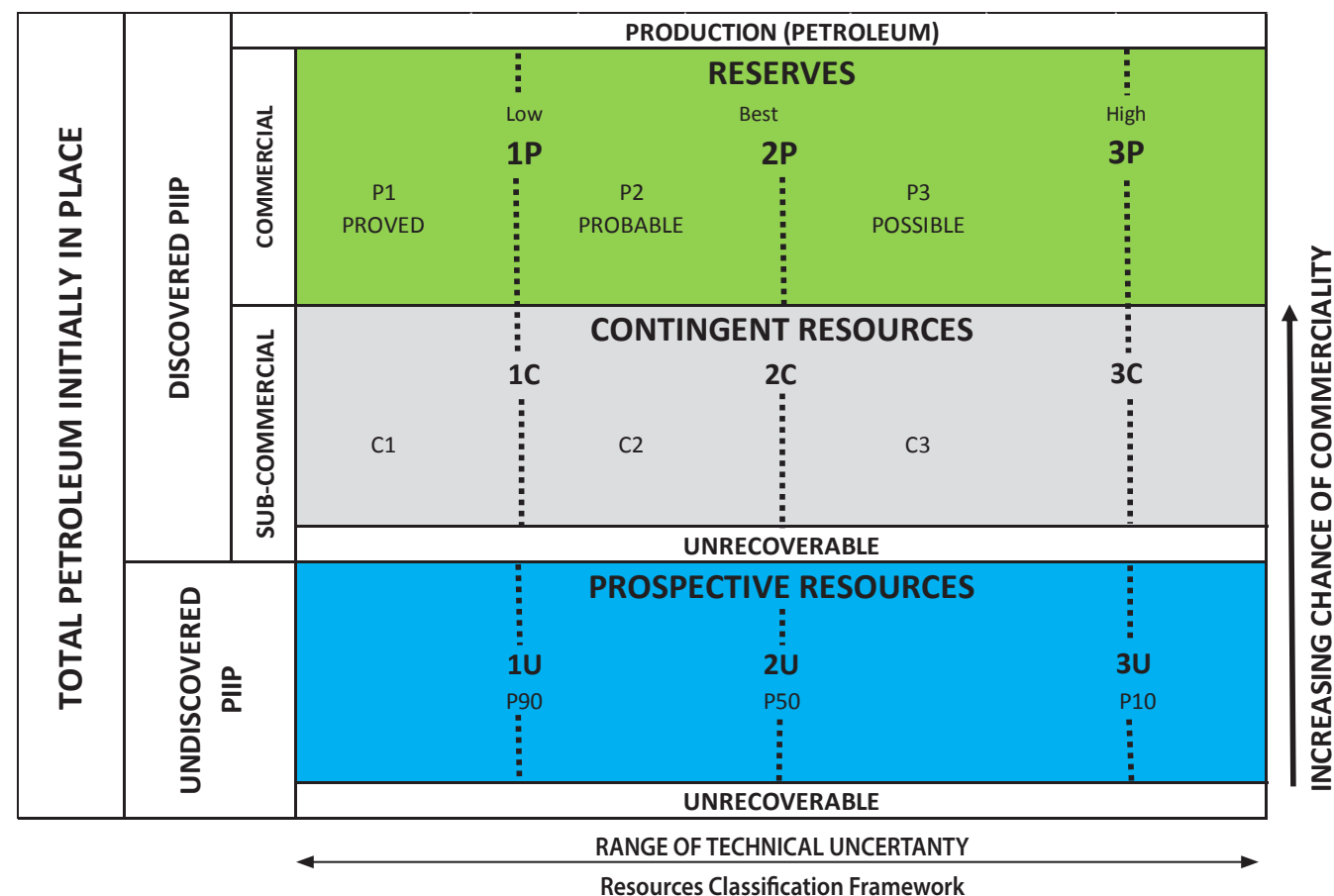
The following arguments by Harrison and Quinn and counterarguments are presented as follows:

- The authors wrote, “... the often misinterpreted and misused term ‘reasonable certainty’ is a probability statement without an assigned probability and should have been replaced with ‘high degree of confidence.’”
 - Not only does “high degree of confidence” not have an assigned probability, the SPE-PRMS draft and final versions state that “if deterministic methods are used, the term reasonable certainty is intended to express a high degree of confidence that the quantities will be recovered,” making the two phrases somewhat interchangeable.
- The OGJ article refers to the new resource classification framework (petroleum production box), stating that “these changes imply that the resource estimates from the scenario and incremental deterministic approaches and probabilistic methods are interchangeable.”
 - The frameworks in the draft and final are the same on that point and show deterministic discrete values that fall within probabilistic ranges of value. However, the two don’t appear to be interchangeable, but rather related, which is more than a nuance. See draft framework on Page 14.

- Citing a 37-year-old SPE paper, the authors state that “this misguided assumption of compatibility between the (deterministic and probabilistic) methods is further reinforced by the draft stating that any of the methods can be used and that the subsequent results should be reconcilable, which is nearly impossible to achieve.”
 - The SPE-PRMS draft states that “when using the probabilistic approach, the resultant P10, P50, and P90 case scenarios should reconcile with the deterministically derived quantities for the low, best, and high estimate cases, respectively. Key comparative inputs to the probabilistic results are the contacts, specifically for the lowest known hydrocarbons, and the areal extent.” The final SPE-PRMS is essentially the same. Whether deterministic and probabilistic approaches are compatible is arguable. The SPE-PRMS focuses on deterministic inputs to the probabilistic model, which some would say is some sort of compatibility and reconciliation.
- The authors say that the “PRMS 2017 also redraws the petroleum production box. ... , and the chance-of-commerciality arrow stops at the interface between contingent resources and reserves ... which implies that all classes of reserves have a 100-percent chance of commerciality.”
 - In the draft, the arrow stops at that interface but it is a directional arrow with the assumption that as the classifications move from prospective resources (undiscovered) to contingent resources to reserves, the chance of commerciality increases from the bottom to the top of the Y axis. See resources classification framework in the draft on the next page. SPE did extend the arrow past the interface in the final, which rectified what Harrison and Quinn saw as misleading.

Please see SPE-PRMS on Page 14

SPE-PRMS – Cont. from page 13



- The *OGJ* article criticizes the PRMS draft for stating “that fuel gas may now be included in reserves,” arguing that “booking resources that are consumed in operations is unwarranted and should be removed ... entirely.”
 - SPE has been consistent on this issue. The 2007 guidelines state that “...where claimed as reserves, such fuel quantities should be reported separately from sales” The 2017 draft and final SPE-PRMS state that “although reserves are recommended to be sales quantities, the CIO (consumed in operations) quantities may be included as reserves or resources....”
- The article’s point of view and SPE recommendations agree, except for the “exception,” which is the “elephant in the room.” The authors’ opinions on public disclosure also agree with the S-K regulation of the U.S. Securities and Exchange Commission that “gas consumed in operations should be omitted (from production).” S-X rule 4-10, however, does not address gas volumes consumed in operations. In practice, public companies in U.S. markets disclose proved reserves associated with fuel gas in annual filings.

At press time, the new Canadian Oil and Gas Evalu-

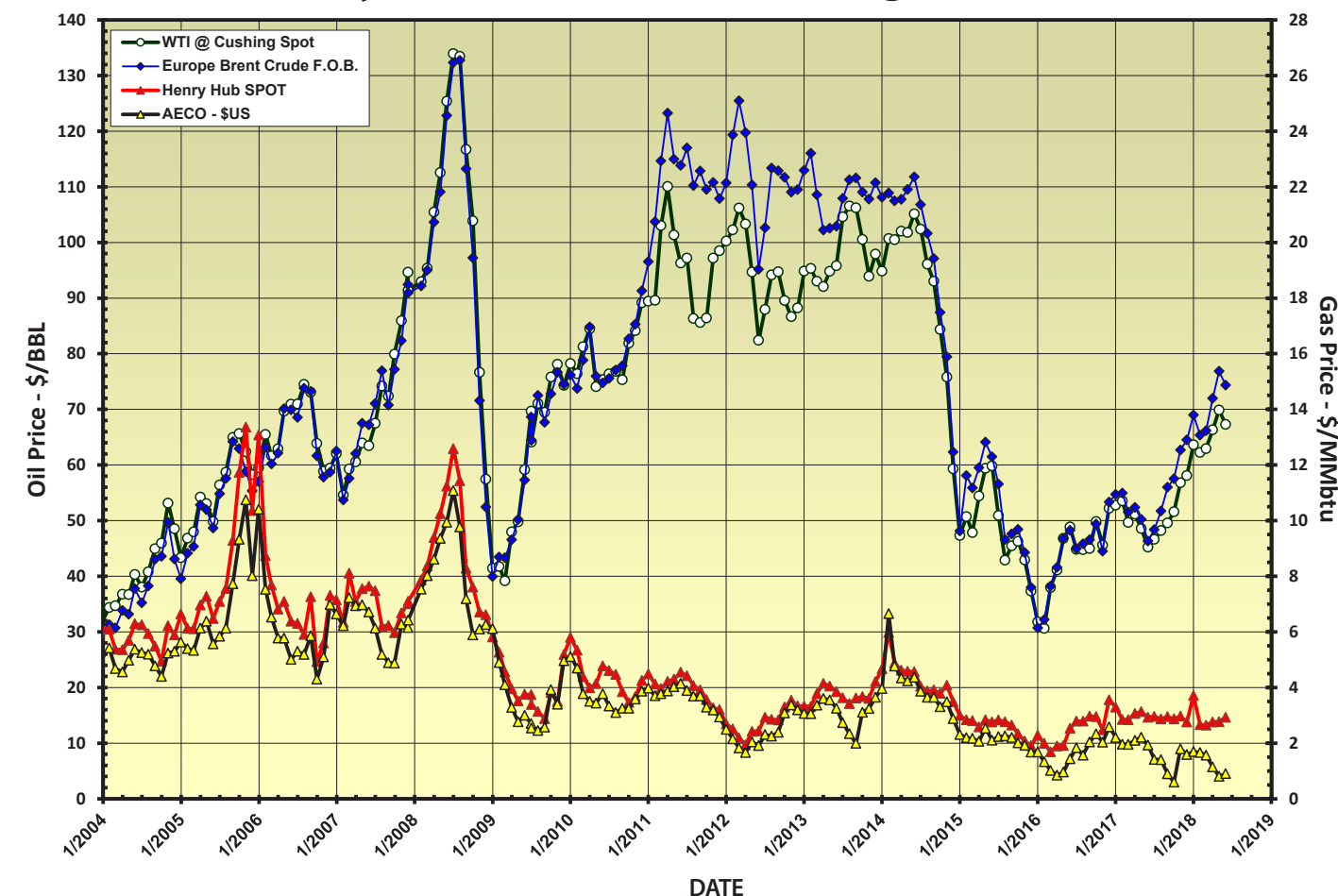
ations Handbook had not been released, but it also states that fuel gas removed before the sales point should not be reported as reserves. Stock market regulators worldwide accept public disclosures of petroleum resources and reserves prepared under guidelines of the 2007 SPE-PRMS, which is principles based, not prescriptive.

If the article’s main premise is the SPE-PRMS draft, and in large part the final PRMS, is unfit for public resource reporting, then the authors should also direct their criticisms to entities worldwide that consider the PRMS to be the best de-facto set of international technical guidelines. Moreover, those oil and gas companies, professional associations and government agencies have provided feedback to the framers of the PRMS to help shape it.

The authors nevertheless raise valid points, especially on fuel gas, which for some companies is more than 10 percent of their reserves.

Comments are welcome at the Ryder Scott LinkedIn site at <https://www.linkedin.com/company/ryder-scott-petroleum-consultants-ryder-scott-company-l-p-/>.

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.

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Please see Desktop delivery on Page 16

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Desktop delivery – Cont. from page 15

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Digital communications have reduced the production of graphic paper worldwide. However, overall, paper production is growing, based, in part, on increased use of packaging materials.

Ryder Scott, which participates in the Go Green office recycling program, wants to widen environmental efforts by limiting production and waste of graphic-paper products as well.

Ryder Scott promotions announced

The following Ryder Scott employees were promoted earlier this year:

Tosin Famurewa to managing senior vice president and group leader; **Steve Gardner** to managing senior vice president and manager of the Denver office; **Becky Carson, Marsha Wellman, Christine Neylon, Eric Sepolio** and **Clark Parrott** to vice president; **Syed Rizvi** to senior petroleum engineer; **Mary Guidry** to engineering analyst; and **Hannah Ottoson** to senior engineering technician.

“Congratulations to all of these staff members on well-deserved promotions,” said **Don Roesle**, CEO.

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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 120 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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