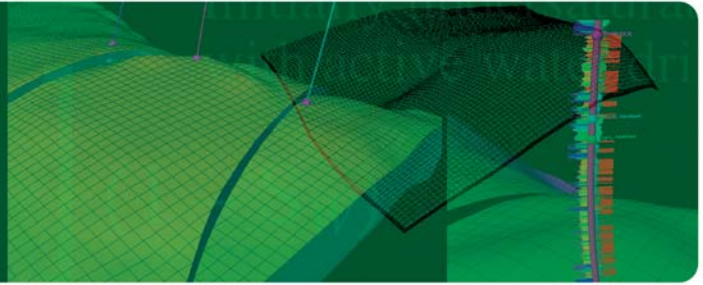


RESERVOIR SOLUTIONS



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CEO Roesle: It's a challenging time to be in O&G industry



Don Roesle, CEO, addresses record crowd at RS conference.

Don Roesle, CEO at Ryder Scott, told a capacity audience of 170 attendees at the Ryder Scott Reserves Conference on May 9 that it is a challenging time to be in the oil and gas industry amid public backlash to record oil profits and critical shortages of skilled personnel. He cited other current issues, including a willingness by U.S. regulators this year to consider changes to their 30-year-old system of petroleum reserves reporting.

“What an interesting time to be in the industry and in reserves reporting whether as an operating company or independent consultant,” he remarked. “It’s a time of record-high prices and revenues for E&P companies

and associated record-high expenses. That has generated discussion from our friends back east in Washington about implementing a windfall profits tax. Our politicians have jockeyed for position with their constituencies and talked about how tough they want to be with big oil.”

He added that elected officials are considering saddling the U.S. industry with an additional tax burden as it reaches out to explore new, higher cost frontiers with unconventional resources.

Roesle praised universities trying to alleviate shortages of industry staff by turning out graduates. “The process is rather slow and probably cannot fill the void, but we appreciate their attempts,” he said.

The industry’s largest organization, the Society of Petroleum Engineers, has issued a modified set of reserves definitions, the Petroleum Resources Management System, as the industry standard, said Roesle.

“The SEC, your chief regulator, has made our jobs a little more difficult on a daily basis, as we try to interpret exactly the intent of their guidelines,” Roesle told attending reserves evaluators. “However, the SEC is weighing in on possible changes to reserves reporting,” referring to SEC appointee **John Lee** as a possible influencer on change and the current SEC review of public comments this year as a start.

“This time is as demanding on your efforts as reserves evaluators as ever before. Company management, investors and regulators are all asking questions about your company’s reserves assets, compliance, corporate governance, independence and transparency. They are asking that critical question, are we SEC and SOX (Sarbanes-Oxley) compliant? And they are turning to evaluators for those answers,” said Roesle.

Inside Reservoir Solutions newsletter

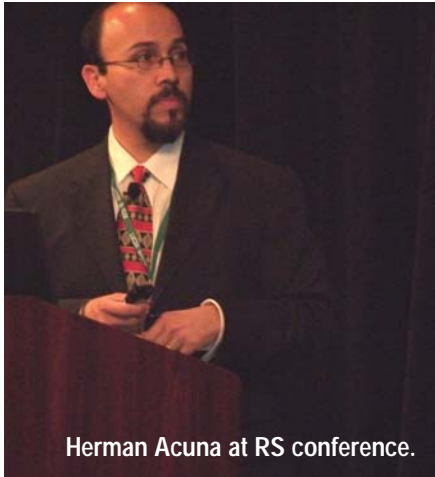
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Nationalized O&G ownership complicates reserves reporting

Fresh on the heels of Bolivia’s takeover of four oil companies May 1, **Herman Acuna**, managing senior vice president, chronicled the recent wave of nationalism in the industry and its effect on booking petroleum reserves. “It’s not only a south-of-the-equator type of event. It affects everybody,” he said, referring to a recent survey showing that 49 percent of Canadians and two of three Quebecers support nationalizing the industry.

Please see Nationalism on Page 2

Nationalism—Cont. from Page 1



Herman Acuna at RS conference.

Acuna made his remarks at the Ryder Scott Reserves Conference. He said popular sentiment for more government control was growing in Russia, where on May 6, TNK-BP was warned that it might lose oil production rights after alleged violations of licensing terms were found during an inspection. Acuna cited various press reports, including one on Venezuela's move toward nationalization.

In looking at how U.S. reporting companies can approach the

bookability of hydrocarbon volumes owned by host governments, Acuna began by citing four criteria that support the recognition of proved reserves under SFASB 69 and 19:

- To have a clear mineral interest
- Right to extract oil and gas
- Right to take volumes in kind
- Exposure to risk and potential reward

In looking at the criterion for a clear mineral interest, he cited original guidance for booking reserves under SFAS 19 that doesn't mention title to volumes but rather participation in the operation of the properties where the company is the producer of reserves. That opinion was clarified seven years ago when the U.S. Securities and Exchange Commission said that the economic interest method represents reserves entitlement under a production-sharing agreement where a host government retains the title.

Acuna also cited SFAS 69, paragraphs 102 and 104, in exploring the mineral interest issue. He said, "A clear mineral interest can be defined as an economic interest if the E&P enterprise participates as a producer and the economic outcome is tied to the results of the operations." Acuna added that custody transfer points indicate a risk operation, one of the

four bookability criteria.

He summarized points to support bookability and entitlement as follows:

- Participation in E&P activities.
- Income is subject to risk from outcome of E&P activities.
- Company is in a traditional concession under which net interest is most likely working interest minus royalties. If royalties are paid in cash, not in kind, then they may also be included as reserves.
- If the contract is not a concession, then the contractor's sources of revenue are examined, such as entitlement barrels based on revenue divided by price.
- The concession/contract is stable at the as-of date. If not, then the volumes may be classified as contingent resources.

Acuna said that recently, demonstrators in Mexico have staged massive rallies against the privatization of Pemex. "The reaction was in response to a call for oil and gas companies to contract with Pemex in the deep water," he remarked.

In assessing contract obligations and remuneration, Acuna argued that the Pemex contract contains fundamental elements required to book reserves under reporting requirements of the SEC using the economic interest method.

Publisher's Statement

Reservoir Solutions newsletter is published quarterly by Ryder Scott Company 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 115 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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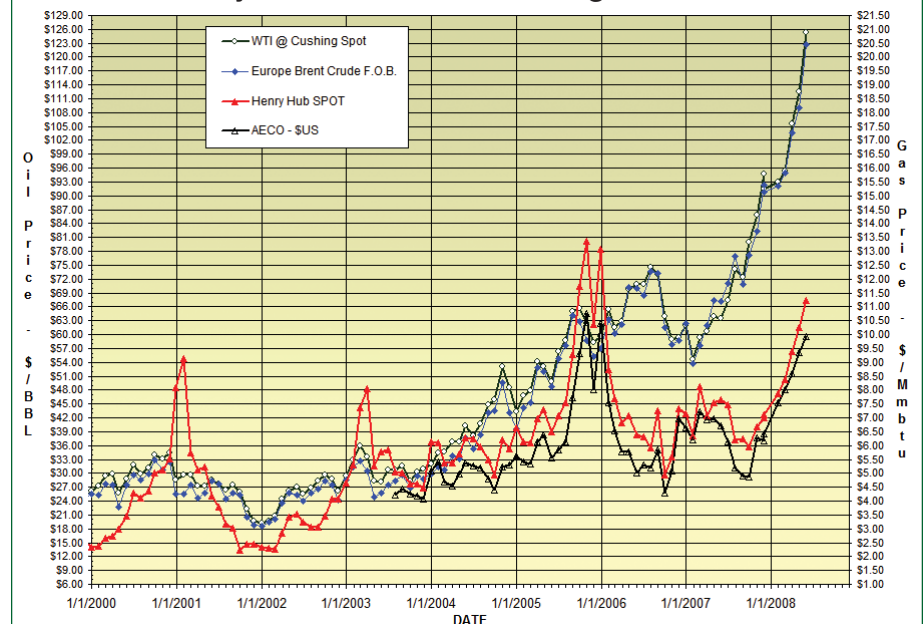
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Price history of benchmark oil and gas in U.S. dollars



The historical price chart shows published, monthly-average, cash market prices for WTI crude at Cushing (NYMEX), Brent crude and Henry Hub and AECO gas.

Industry expects SEC changes



Hodgin

John Hodgin, president, said that industry and the U.S. Securities and Exchange Commission are analyzing the costs vs. benefits of compliance to proposed petroleum reserves disclosure rules. He made his remarks at the Ryder Scott Reserves Conference where he summarized public comments to the SEC concept document released late last year.

Hodgin tabulated and classified responses to all 15 questions in the document under three

groups: E&P companies and consultants, finance and accounting community and regulators.

If industry expectations are a barometer of impending change, then change may be in the making. With a show of hands, about 170 attendees indicated that they believed changes in reserves disclosure rules will likely occur with only two disagreeing.

However, changes may be slow in coming because the SEC is not under a timetable. Hodgin said that after talking with SEC appointee John Lee, the "implication is that nothing is imminent and that the process will take some time," despite concern by several at the conference that any advanced notice for changes to year-end 2008 filings would have to be announced immediately to allow ample preparation time.

Hodgin also pointed out that immediate change may not be forthcoming because 2008 is a political year. He added that the SEC is also analyzing rippling effects. "Changes may have a rolling effect on financial accounting that is unintentional," he said. "The full-cost ceiling test write-down under SMOG is a thorny issue."

Flavor of the month: Unconventionals



The institutional investment market assigns higher enterprise values to U.S. oil and gas companies dominated by unconventional resource plays than to companies with conventional resources, said market analyst **John M.**

White at the Ryder Scott Reserves Conference. White showed various enterprise values per Mcf gas equivalents in reserves for U.S. independents.

In order, Southwestern Energy Co., Carrizo Oil & Gas Inc. and Petrohawk Energy Corp. had the three highest valuations.

"The flavor of the month is resource plays. They are perceived as lower risk and higher quality reserves," said White.

He also said that financial managers for equity transactions want more complete reserves disclosures

- Ryder Scott Reserves Conference presentations are posted under What's New at ryderscott.com.
- Brad Gouge, vice president, presented "Beyond Reserves Volumes," based on SPE paper 110617. That paper was summarized in *Reservoir Solutions* newsletter, September 2007, Page 6.
- The conference arguably set a record for the single largest gathering of senior reserves evaluators, as almost 150 guests attended the one-day conference, up 15 percent from the prior year.
- Fred Ziehe, managing senior vice president, presented SEC pricing to be published in September.

from public companies. White cited a recent survey of money managers and hedge-fund managers handling institutional investments in U.S. independents.

Respondents indicated that their top five preferences for reserves reporting rules are as follows:

- Disclose probable reserves volumes.
- Disclose PV10 based on sensitivity pricing.
- Disclose concentration of reserves in top fields.
- Require a management discussion and analysis section.
- Disclose PV10 of total proved base on average oil and gas prices.

White made a distinction between financial managers on the credit side handling bond transactions and those on the buy and sell sides of equity offerings. "Those weighted toward the credit side want proved reserves while those on the buy-sell sides want consistent disclosure of SEC proved plus probable reserves," he said, stressing consistency because "volatility of oil and gas prices and investing styles make it hard enough."



Ryder Scott representatives at the Boys and Girls Clubs of Greater Houston's annual dinner May 7, from left, were Michael Michaelides, Katherine Wauters, Tosin Famurewa, Brett Gray, Tiffany Katerndahl, Eric Nelson and Philip Jankowski.

OGRC needs industry examples



Hinkle

Society of Petroleum Engineers Oil & Gas Reserves Committee chairwoman **Delores J. Hinkle** said the most important document to be drafted by the committee lacks input despite appeals to the industry. She remarked that no usable examples for the applications guidelines for petroleum resources had been received by the reserves education subcommittee by May.

“If you want an applications guideline document that has meaning, then you have to step up and help us get examples together,” she told an audience of senior evaluators at the Ryder Scott Reserves Conference.

Hinkle requested “real world” guidance. “You don’t have to tell us that it is a field here and that you own it. We can sanitize it. We would never put anything in that document that has that level of detail in it,” she said, reassuring those with concerns about confidentiality.

Hinkle said that the SPE OGRC responded to the SEC concept release outlining how the Petroleum Resources Management System could be used in response to individual questions, but had not received a response from the agency.

She remarked that the International Accounting Standards Board accepted the SPE-PRMS in March as the petroleum basis for an accounting discussion document that may lead to the acceptance of the system as the premier reporting standard for the worldwide extractive industries. “That was the culmination of three years of work,” Hinkle said. “The PRMS could potentially replace the SEC reporting guidelines because the U.S. is a party to the IASB.”

“If you want an applications guideline document that has meaning, then you have to step up ...”—Hinkle

She added that the OGRC is reviewing mapping between the PRMS and template of the Committee for Mineral Reserves International Reporting Standards and between the Russian system and the United Nations Framework Classification. Hinkle said that the UN Economic Commission for Europe and SPE have similar grand visions. “The UN moves at glacial speed to get a unified outcome ...but I definitely see value and believe that it will be a great outcome,” she added.

OGRC also has posted a non-technical summary of the PRMS for the press and public on the SPE Web site, proposed a Spanish translation of the PRMS and investigated labels for contingent resources incremental categories.

For further information on submitting examples for the PRMS applications document, send an e-mail to reserves@spe.org.

PRMS should beef up terms for unconventional resources



Harrell

Ron Harrell, chairman emeritus, presented “Adapting the PRMS to Unconventional Resources” at the Ryder Scott Reserves Conference, saying that unconventional reservoirs that include tight gas sands, coalbed methane and gas shales accounted for 43 percent of U.S. gas production in 2006. Harrell covered several topics including the selection of analogs.

“Analogues are a super tool, but they are abused a lot, especially in unconventional plays,” he said, advising that evaluators document the candidate review process, including similarities and differences, leading to the selection. While reservoirs in the same geographical area and of the same age typically provide better analogs, such proximity alone may not be the primary consideration.

“If you don’t have a successful frac design in unconventional, you don’t have a commercial well ...”—Harrell

Not much in the PRMS applies to unconventional, remarked Harrell, saying that industry terms such as Poisson’s ratio, organic richness and sorption isotherms should be considered in the overall framework. “Some of these terms apply to frac design. If you don’t have a successful frac design in unconventional, you don’t have a commercial well,” he said.

Unconventional proved undeveloped locations should be defensible, including completion efficiency in technology plays. “There are high-risk wells in the Barnett shale. They are producing but were not successfully fraced and may never pay out. So completion efficiency is a factor into whether those locations are proved and that gets into certainty and uncertainty,” said Harrell.

He cited considerations in gas shale candidate selection as follows:

- Effect of matrix modulus and Poisson’s ratio
- Stress effects on fractures remaining open
- Effect of associated and unassociated oils
- Effects that create a rubblized drainage volume
- Location of faults, bedding planes, stresses, frac breakdown pressures, maturity variations, pore pressure, structures, frac barriers, kerogen types/development and water sources

Harrell also mentioned the use of microseismic monitoring to image the results of fracture stimulation using downhole or surface-located geophones. “This technique is not done for the purposes of reserves assessments. However, an evaluator could correlate the data with decline-curve analysis to find out what the microseismic data is telling us,” he said. “No paper has been published yet on how to use that data for reserves assessments, but perhaps one is warranted.”

SOS program upgrades ongoing



Wilson

At the Ryder Scott Reserves Conference, **Scott Wilson**, senior vice president and co-developer of the firm's SOS software, demoed the features of those programs, which are available to clients and potential clients over the Ryder Scott Web site. Those programs are the Snap nodal analysis package, ProCast gas deliverability modeling system, PTA pressure transient design system, Forecast decline curve

program and Tank material balance program.

He said that he is constantly updating the programs with features not available in commercial software. Wilson plans to add steam-lift calculations for steam-assisted gravity drainage projects into the SNAP nodal analysis program. A current enhancement is the gas-lift calculation feature that even works for gas wells.

"SNAP is the best gas-lift program in the industry. It also is very detailed for deep, complex completions," he said, showing how to set a tubing tail in a wellbore for a reservoir with multiple zones to 11,000 ft. The example was a 10-layer completion with various reservoir pressures, thicknesses and frac jobs.

Wilson also plans to make the SOS programs Windows Vista compatible. SOS users number 2,500 with ConocoPhillips, Devon Energy Corp. and Apache Corp. having the most users per company. Five universities have multi-user licenses managed by professors and hundreds of university and workshop students use the SOS programs.

Long-term plans include formalizing business systems for managing non-client, fee-based users and growing program functionalities.

Ethics presented by Fitzgerald



Fitzgerald

Jennifer Fitzgerald, senior petroleum engineer, presented "Ethics Issues in Reserves Evaluations," focusing on several case studies, including one in the mid 1990s involving the South Coast 3 reservoir in Louisiana where the company misrepresented 700 Mcfd well test results with a 8 MMcf/d fake well test to entice investors. The consultant signed off on the results, not bothering to check the well file.

"As a consultant, you cannot take what you are given at face value. It is your responsibility to review any and all data and to be diligent in asking for more information – not just a telephone call. Ask to see the well file," she said.

Fitzgerald also focused on the 1907 Quebec bridge collapse; 1937 New London, TX, school explosion; and Oscar Wyatt Iraqi oil purchase.

RS hires two petroleum engineers, several promoted

Two petroleum engineers joined Ryder Scott while numerous professionals were promoted as part of an internal restructuring of staff positions and reporting hierarchies.



Hein

Victor F. Hein joined Ryder Scott as a senior petroleum engineer after most recently working for Albrecht & Assocs. Inc. as a senior petroleum engineer and at Schlumberger Data and Consulting Services as a business development manager.

Before that, he was a senior petroleum engineer at DeGolyer & MacNaughton during 2002 to 2006 where he performed economic analysis, reserves evaluations and reservoir engineering. His

projects included evaluating acquisitions and divestitures and drilling prospects, including offshore, deep, sour and high-risk wells. Hein also performed petrophysical analysis for U.S. and international projects and designed and evaluated pressure-transient tests. He appraised oil and gas properties in Russia, Europe and west Africa as well as in the U.S.

During 1999 to 2002, Hein was the Utah district manager at Petroglyph Energy Inc., where he supervised drilling, operations and engineering. Before that, he was a principal at International Petroleum Consultants LLC for three years beginning in 1996. Hein provided engineering, operations and acquisition support for the U.S. Rockies, Gulf of Mexico, west Texas, Mid-Continent and Alaska.

He began his career at Leede Exploration Co. in 1973 where he worked for 23 years. He was a staff reservoir engineer, drilling engineer, chief reservoir engineer and director of underground storage. In 1984, Hein became manager of production and reservoir engineering. He managed engineering projects and pioneered horizontal drilling and completions in the Rockies and south Texas. Hein also conducted pressure-transient analysis and delineated fields to reduce workover costs. He has a BS degree in petroleum engineering from the University of Tulsa.

Scott Quinell joined Ryder Scott Canada as a petroleum engineer. He previously was a reservoir engineer at GLJ Petroleum Consultants from 2006 to 2008 where he performed a wide range of reservoir engineering evaluations and economic appraisals.

Quinell conducted engineering evaluations of coalbed-methane reserves throughout central Alberta. He also completed comprehensive pool analyses on mature oil fields redeveloped under waterflooding, optimized waterflood recovery schemes on newer oil pools and evaluated strong bottom aquifer-driven oil reservoirs with gas-cap cycling.

In addition, Quinell formulated deep basin type curves and appraised numerous acquisition targets. He has a BS degree in petroleum engineering from the

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Modern decline analysis aids in estimating recoveries, in-place fluids and in identifying reservoir issues

— Garth Stotts, P. Eng.



Stotts

Over the past few years, petroleum engineers increasingly have used modern decline analysis (MDA) to estimate transient characteristics (permeability and skin) and fluids in place.

Traditional decline analysis uses the prevalent trend (decline) of rate data only and extrapolates the trend by applying the well-known exponential or hyperbolic equations developed by J.J. Arps. That methodology has proven to be effective for estimating recoverable oil and gas thus making it a primary reserves evaluation tool.

MDA differs from traditional decline-curve analysis in several ways. The most significant difference is that traditional decline analysis relies on empirical relationships (Arps) between rate-time and rate-cum production whereas MDA applies the rate and flowing pressure data to an analytical solution.

Because of that difference, the two methods prove to be complementary and provide important checks. As traditional decline is an extrapolation of current production, the main result is the estimated ultimate recovery (EUR). MDA provides a material balance and an estimate of the original fluids in place (OFIP) when all reservoir boundaries have been contacted. By comparing the two results, a petroleum engineer can calculate the recovery factor and compare it to known recoveries in the field/reservoir.

Analysis of production data enables the engineer to estimate permeability, skin, recovery factor and OFIP. Those important quantitative measurements assist the engineer in predicting deliverability and recovery from the well.

An equally important aspect of

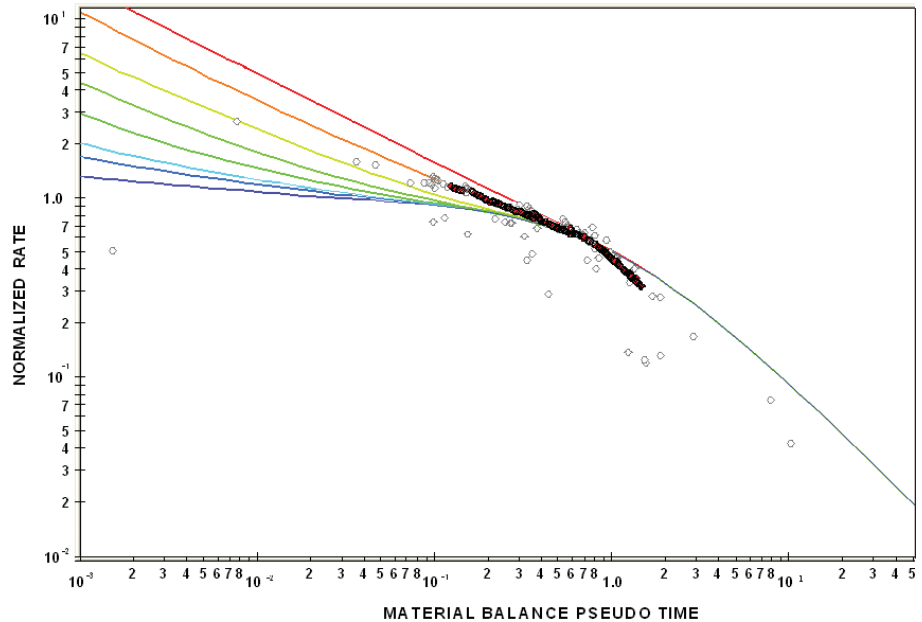


Figure 1: Data compared on a Blasingame type curve. F.A.S.T. RTA used to generate plot.

production data analysis is the identification of production and reservoir issues through recognizable diagnostics. As production data is continually collected and monitored, diagnostics allow the engineer to detect critical production issues, such as liquid loading, or reservoir issues, such as interference, in real time. Early detection enables the operator to act decisively to make corrections before production is materially affected.

Diagnostics are most easily recognized when a comparison is made between the actual production data and an ideal model, such as an MDA type curve. Those type curves are simply an analytical model represented graphically and provide a useful tool for recognizing diagnostics. Blasingame, et al, and Agarwal, et al, have provided two of the most common MDA type curves used in industry. Divergence of production data from those type curves indicates an issue is present in the well bore or reservoir that is unaccounted for in the model.

A common diagnostic with a significant effect on well deliverability and reserves is

interference that can be indicated by a downward inflection or deviation from a prior prevalent trend. An example of an interference diagnostic is shown in Figure 1. In that figure, the data is matched on an advanced type curve (Blasingame).

The engineer can easily identify the issue based on the drastic deviation from the type curve. Although he might suspect interference from the recognizable diagnostic, further investigation is required to confirm pressure communication between wells.

Two simple checks need to be considered when confirming an interference diagnostic. Firstly, ensure that the date of divergence coincides with the onstream date of the new offset well. Communication will be seen most dramatically in high-permeability gas reservoirs, such as those in the U.S. gulf coast region. For reservoirs of this nature, the diagnostic should be seen immediately following the activation of the new offset well if pressure communication exists.

For low-permeability reservoirs,

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MDA—Cont. from Page 7

such as tight-gas formations, the diagnostic may become more apparent later.

Secondly, history match either the rate or pressure data using an analytical or numerical model up to the date at which the diagnostic occurs. Note the modeled average reservoir pressure, not flowing, at the diagnostic date and compare it to the recorded initial reservoir pressure of the offset well, if available. If the modeled and recorded pressures agree, chances are very likely that the newly drilled offset has caused interference in the older producer.

All methods of analysis have limitations and MDA is no exception. Analytical models provide exceptional interpretations for almost all gas reservoirs if the engineer accounts for gas PVT properties with pseudo variables. Those variables are included in most commercial software.

Reservoirs experiencing considerable saturation and compressibility changes at various stages no longer meet many of the assumptions in analytical models. Those reservoirs include undersaturated oil reservoirs producing below bubble point, saturated oil reservoirs and retrograde condensate reservoirs.

To account for variations in compressibility and saturations, those reservoirs need to be history matched with an appropriate numerical model.

Staff Changes—Cont. from Page 5

University of Alberta.

At the Ryder Scott Denver office, **Jim Baird** and **Scott Wilson** were promoted to senior vice presidents.

At the Calgary office, **Al Frison** was promoted to senior vice president and **Jean LiuHalfe** to senior petroleum engineer.

Promotions at the Houston office were as follows: **Herman Acuna** and **Larry Connor** became managing senior vice presidents. **Kevin Gangluff**, **Harris Ghozali**, **Mike**

Nowicki, **Dan Olds**, **Steve Phillips**, **George Vance** and **Ken Whaley** became senior vice presidents.

Olga Basanko, **Jennifer Fitzgerald**, **Keven Fry**, **Anna Hardesty**, **Frank Jeanes**, **Larry McHalfey**, **Eric Nelson**, **Jim Stinson**, **Bruce Palmer**, **Paula Wood** and **Raymond Yee** became senior petroleum engineers.

Steve Golas and **Rob Walters** became senior geologists/geophysicists.

Tom Tally became a senior geologist.



This unidentified man takes a break from rescue operations in China after the May 12 earthquake, the worst there in a generation. In June, Ryder Scott donated more than \$20,000 to the American Red Cross to fund relief efforts for the country's earthquake victims. Employees made individual contributions totaling more than \$10,000 and the company matched that amount.

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