RESERVOIR SOLUTIONS

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Ryder Scott professional staff reaches 72 in 2006

Ryder Scott has grown to meet an increasing demand for consulting services, recently hiring 11 professionals for a total of 72 staff petroleum engineers and geoscientists. They and additional technical-support personnel will enable the firm to put together project-specific, multidisciplinary evaluation teams for more assignments and clients worldwide.

"Our new employees have diverse work backgrounds and cultures. They come from majors, independents, national oil companies and consulting firms and from different countries," said **Don Roesle**, CEO. "Diversity is a strength in our work environment. Our integrated studies are a product of collaborative, multidisciplinary team efforts. Diversified teams generally outperform homogenous teams in problem-solving tasks."

Baird

Jim Baird, petroleum engineer, joined the Ryder Scott Denver office recently. He has more than 36 years of diverse oil and gas experience. His experience includes reservoir management, reservoir simulation, reserves evaluation, petroleum accounting, business planning and evaluations, property acquisition and divestiture analysis and regulatory compliance. Geographic areas of expertise include northern Rocky Mountains; Uinta, Paradox and San Juan basins and Mid-Continent and U.S. gulf coast areas.

Before joining Ryder Scott, Baird was a manager for the Rocky Mountain Region Reservoir Engineering group at Questar Exploration & Production Co. during 1999 to 2006. He was chief engineer at Celsius Energy Co. from 1986 to 1999 where he prepared quarterly and annual reserves reports. He also worked at Wexpro Co., Mountain Fuel Supply Co., Northern Natural Gas Co. and Gulf Oil Corp. where he began his career in 1970 as a production engineer. Baird has a BS degree in petroleum engineering from the University of Missouri at Rolla.

Elizabeth A. DeStephens joined Ryder Scott as a petroleum engineer. Before that, she was a senior business analyst and corrosion engineer for three years at Exxon Mobil Corp.

DeStephens

She determined market value for divestments of fields and facility assets. DeStephens assisted in evaluating entry into the Barnett shale play, provided economic case studies for LNG projects and developed economic models to assist in contract negotiations.

She also evaluated U.S. market fundamentals and developed annual business plans for the gas processing group. As a corrosion engineer, she conducted fit-for-service analysis, analyzed inspection results and planned yearly budgets. DeStephens has a BS degree in materials science and engineering with honors from the University of Florida.

Please see Staff on Page 3

Inside Reservoir Solutions newsletter

EU reserves reporting rules: A mixed bag

With high commodity prices and low costs of capital from equity markets, initial public offerings by E&P companies, some with more E than P in their portfolios, have proliferated on the AIM stock exchange and other regulated markets in the European Union. Benchmarking listed companies based on oil and gas reserves reported in prospectuses and

Please see EU on Page 7

Roesle presentation on reserves at accounting event posted on RS Web site

Roesle

Don Roesle, CEO, presented "Reserves Estimation in Accounting and Reporting" Nov. 16 at the Oil & Gas Accounting Conference at Oklahoma State University. He cited the following most common errors in reporting proved petroleum reserves to the U.S. Securities and Exchange Commission:

- Spacing violations for PUDs
- PUDs too optimistic based on supporting data
- Seismic amplitudes without compelling corroborating data to identify downdip limits
- Use of non-hydrocarbon revenue streams
- Misuse of reservoir simulation results
- Use of field-level decline-curve analysis
- Declining opex with declining well count
- Allocation of development costs to probable category to justify proved-reserves economics
- Justification of proved reserves by analogy with non-analogous properties
- Misuse of statistical analysis
- Reserves declared proved when no sales market exists
- Scheduling of reserves that extend beyond the term of foreign concessions

Roesle also focused on SEC-compliant reserves reports and SEC comment letters and hot-button issues. In addition, he outlined how to validate a reserves report through a series of questions to help assess risk.

The presentation is posted under What's New at www.ryderscott.com.

Industry has until Feb. 1 to comment on new reserves guidelines at www.spe.org

Industry has until Feb. 1 to comment on the proposed Petroleum Reserves and Resources Classification, Definitions and Guidelines, which are posted on the Society of Petroleum Engineers Web site at www.spe.org/reserves. Sponsoring organizations include the World Petroleum Council, American Association of Petroleum Geologists and Society of Petroleum Evaluation Engineers. They will review comments and present the final draft definitions to their boards for approval in 2007.

The new guidelines will replace the 1997 SPE/WPC Petroleum Reserves Definitions and the 2000 SPE/WPC/AAPG Petroleum Resources Classification and Definitions.

The industry will formally launch an approved training program with industry-recommended practices for petroleum reserves evaluators after SPE and its co-sponsors adopt the revised standards in March. With a mission to fulfill that need, the Joint Committee on Reserves Evaluator Training, formed last July, will approve instructors and course material for the program.

Last June, *Reservoir Solutions* published articles on the work of the organizations in drafting new guidelines and in kicking off a co-sponsored training initiative.

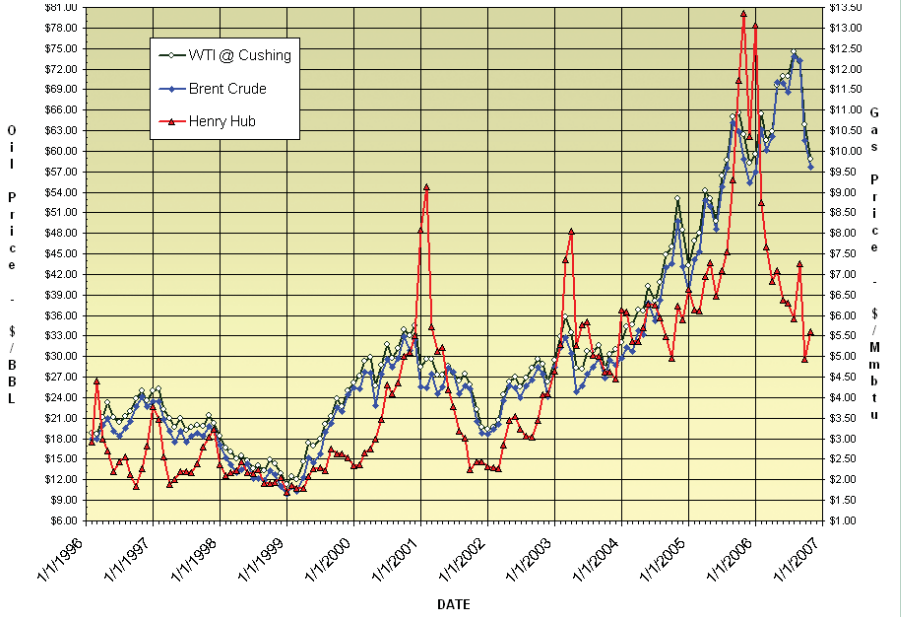
Publisher's Statement

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 72 engineers and geoscientists, Ryder Scott has the capability to complete the largest, most complex reservoir-evaluation projects in a timely manner.

Reservoir Solutions
Editor: Mike Wysatta
Business Development Manager

Ryder Scott Company LP
1100 Louisiana, Suite 3800
Houston, Texas 77002-5218
Phone: 713-651-9191; Fax: 713-651-0849
Denver, Colorado; Phone: 303-623-9147
Calgary, AB, Canada; Phone: 403-262-2799
E-mail: info@ryderscott.com

Price history of benchmark oil and Henry Hub gas



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

Staff—Cont. from Page 1

Famurewa

Tosin Famurewa, petroleum engineer, recently joined the firm from Chevron Corp. where he worked for four years as a reservoir engineer, project controls engineer and petroleum engineer. He evaluated waterflood and steamflood enhanced-oil-recovery projects working with heavy and light oil and associated gas. Famurewa prepared E&P business plans, cost estimates and budgets. He conducted decline-curve analysis and analyzed field economics.

After internships at Texaco Inc., he began his career there in 2001 as a production engineer. Famurewa has a BS degree in chemical engineering and material science/engineering from the University of California and an MS degree in petroleum engineering from the University of Southern California.

Gardner

Stephen E. Gardner, petroleum engineer, joined Ryder Scott from Exxon Corp. He began his career there as a subsurface engineer evaluating carbonate and sandstone reservoirs undergoing primary, secondary and tertiary recovery in west Texas and Utah in 2001. Gardner also evaluated the Madison formation, a deep, HT/HP carbonate reservoir in Wyoming, in addition to other tight- and sour-gas projects.

As a reservoir engineer, he evaluated the Canyon and Strawn formations, multilayer carbonate oil reservoirs undergoing secondary and tertiary recovery in the Permian Basin. Gardner also evaluated pattern analysis, enhanced oil-recovery mechanisms, production declines and volumetrics and economics of remedial workovers. He has a BS degree in mechanical engineering from Brigham Young University.

Guzman

Daniel Guzman joined Ryder Scott as a petroleum engineer. He has experience in Mexico, Venezuela, Peru, Colombia, Bolivia and Ecuador and has evaluated reserves and project economics. Guzman has conducted field development planning, portfolio and economic analysis, production optimization, 3D reservoir modeling and pressure-transient analysis.

His most recent reservoir engineering experience includes work at Maxus Energy Co./Repsol YPF SA, Tricon Geophysics Inc./Petroleum Services Inc. and Core Laboratories NV and includes properties in the prolific Burgos and Oriente basins. He began his engineering career at Petroleos del Peru/Pluspetrol in Peru in 1988 and worked there 10 years.

Guzman also was a reservoir engineer at Schlumberger and Petroleos de Venezuela, where he analyzed performance of gas condensate fields. He has a BS degree in petroleum engineering from National University of Engineering in Peru.

Hadjali

Mohamed Hadjali joined the Calgary office as an evaluation specialist—geology. He most recently worked as a geologist at GeoLogic Systems Ltd., Calvalley Petroleum Inc. and Petroleum Services Group, all in Calgary. He evaluated hydrocarbon potential and technical risk in Algeria and mapped reservoirs in northern Alberta and western Saskatchewan. This involved defining geological tops and calculating gross and net pay. He also assessed exploration risk and estimated resources in the rift basins in Yemen.

Before that, Hadjali worked for almost 10 years at Sonatrach starting in 1992 as an exploration geologist and later as a senior geologist. He conducted detailed geological studies in the Berkin and Illizi basins in Algeria, analyzing Triassic channel and Carboniferous delta sands and Ordovician quartzite reservoirs. He also supervised staff geoscientists. Hadjali also was a reservoir and operations geologist at Anadarko Algeria Corp. He has a BS degree in petroleum geology from Institut Algerien du Petrole.

Hardesty

Anna Milena Hardesty joined the firm as a petroleum engineer. She was president at Hardesty & Assocs. during 1993 to 2006. Hardesty performed reserves evaluations and economic analyses of petroleum properties valued from $500,000 to more than $1 billion. Her appraisals were used in acquisitions, mergers, sales, annual SEC filings, bank loans and year-end reports. Properties included those in Canada, Argentina, Venezuela, Colombia, China and U.S. offshore areas.

Hardesty also evaluated areas in Mexico, Brazil, Ecuador, Russia, Siberia, Gabon and Cote d'Ivoire. This work involved calculating pay, reserves and future production; analyzing economic projections; field development planning and estimating fair market values and rates of return. She began her engineering career at Exxon Corp. where she worked five years. For the next seven years, Hardesty held engineering and management positions at three consulting firms. She has a BS degree in mechanical engineering, magna cum laude, from Tulane University and an MS degree in business, with honors, from the University of Texas.

Donald M. Hausen, petroleum engineer, joined Ryder Scott from ExxonMobil Production Co. As a senior and staff petroleum engineer there, he performed reserves evaluations of tight gas and Permian

Please see Staff on Page 4

Staff—Cont. from Page 3

Hausen

Basin properties. He conducted engineering analysis used to determine drilling funds for properties in the Mesaverde formation in the Piceance basin. Hausen also prepared detailed economic evaluations of joint-venture proposals for several Midland basin properties and assisted in the determination of resource potential of a Devonian reservoir in the Wilshire field.

He also evaluated reserves of fields in the Spraberry trend, identified flood patterns and assisted in designing a field development scheme for CO_2 flooding. Hausen has a BS degree in chemical engineering from Brigham Young University.

Oukil

Linda Oukil joined the Ryder Scott Calgary office as an evaluation specialist—geology. Most recently, she was an area geologist at IHS Energy where she focused on properties in the southern plains of Alberta and in southwest Saskatchewan.

Before that, she worked at Trigil Energy Inc. as a consulting geologist evaluating shallow gas sands in the Sibbald and Farrow areas in Alberta. Oukil also performed geological analysis of shallow gas in south central Alberta and southwest Saskatchewan for Petro-Canada.

Before that, she worked at the Geological Survey of Canada assessing the geospatial framework of stratigraphy of the Great Slave Plain in the Northwest Territories. Oukil began her career at Sonatrach in 1994 where she worked six years as a geologist. She analyzed seismic attributes of the Upper Devonian/Carboniferous reef gas accumulations, evaluated Silurian shale and calculated geologic risk in portions of the Tilrhemt Dome in Algeria.

Oukil also determined prospectivity of a Triassic play northwest of the 40-Tcf Hassi R'mel field and conducted detailed facies interpretation of a north Sahara area. She as a BS degree in petroleum geology from the University of Boumerdes in Algeria.

Simangunsong

Roly Simangunsong, petroleum engineer, joined the reservoir simulation group in Houston. He is an expert in both classical-engineering and simulation techniques. Simangunsong has experience in pressure-transient analysis, nodal analysis, material balance, decline-curve methods, volumetric studies and PVT/rock properties analysis. Simangunsong has also performed history matches of reservoir simulation models and predicted oilfield depletion performance.

At Weatherford International, he conducted reservoir engineering and simulation studies to screen and identify potential candidates for underbalanced horizontal drilling. Simangunsong also worked at Schlumberger Oilfield Services where he began his career in 2000. He used black oil and streamline simulators to evaluate waterflooding implementation, perform history matches and reallocate water injection. Simangunsong has BS and MS degrees in petroleum engineering from Bandung Institute of Technology and Texas A&M University, respectively.

Venglar

Also joining the Denver office is **Thomas E. Venglar**, petroleum engineer, who has more than 25 years of experience in reservoir studies, reserves evaluations and economic analysis. He also has conducted prospect risk evaluation, pressure analysis, waterflood evaluations and production engineering.

Most recently, Venglar was manager of reservoir engineering at Grynberg Petroleum Co. for 13 years since 1993. He managed assets comprising remaining reserves, net present value, etc. Venglar conducted prospect-risk analysis and reserves analysis and performed reservoir field studies. He evaluated field development projects in Wyoming, Colorado, New Mexico and Oklahoma.

He also worked at Anadarko Petroleum Corp. during 1979 to 1990. Venglar conducted yearly evaluations of reserves for 500 properties in the Rocky Mountain region, including the Powder River and Williston basins and Moxa Arch. He assessed risk and examined the economic feasibility of more than 100 drilling projects and acquisitions ranging up to $2 million in the Mid Continent and Rocky Mountain regions. He has a BS degree in petroleum engineering from Texas A&M University.

Upcoming Events

Feb. 1-2—NAPE 2007 convention, Houston, Ryder Scott Booth No. 2722. For more info, go to napeonline.com.

Feb. 27-28—SPE Denver section short course on reserves. Instructors: John Hodgin, president, and Bob Wagner, former senior VP. For more info, go to http://denver.spe.org/.

March 26—SPE workshop on reserves, Muscat, Oman; Ron Harrell, retired CEO, to present. E-mail: shyde@spe.org.

April 1-3—SPE-HEES, Dallas, TX. Ryder Scott Booth No. 131. For more info, go to spe.org.

May 4—Ryder Scott Reserves Conference (OTC week), DoubleTree Hotel, downtown Houston. Agenda TBA.

Non-U.S. petroleum professionals to fill supply void

The E&P industry will have to recruit technical professionals internationally to get the expertise to find and produce oil and gas to meet the fastest annual growth in global demand in 29 years.

U.S. baby boomers—representing the top of a bell-shaped curve of petroleum geologists and engineers—are moving to the end of their career life cycles. At the same time, the number of U.S. undergraduates and graduates in petroleum geology and engineering is only increasing slightly.

New graduates in petroleum engineering are entering the workforce at about one-third the levels of the early 1980s. Enrollment in geosciences across the U.S. has decreased by 70 percent in the past 20 years.

A projected decline in U.S. petroleum geology and engineering workforce segments is consistent with decreased E&P activity domestically. The latest data from the U.S. Bureau of Labor Statistics indicates that U.S. producers employed 9,000 petroleum engineers in 2004, an almost 3 percent increase over the previous year.

However, by 2014, that number will decrease 3.6 percent, the bureau predicts. U.S. producers also employed 6,000 petroleum geoscientists, a 2 percent increase from the prior year but within 10 years, that number will decrease 11 percent.

The ranks of petroleum engineers and geologists will shrink because of falling domestic E&P activity, greater efficiencies and the retirement of a generation of U.S.-educated professionals.

The demographics of Society of Petroleum Engineers members reflect demographics of the industry. The latest information shows that more than 60 percent of the membership is 45 years and older. A majority of members is in North America even though this segment will be the minority in the near future. Call it the "graying" of the industry, particularly in the U.S.

Those demographics also give a glimpse into the future. From 2002 to 2005, SPE membership surged from 55,000 to almost 70,000 — a 27 percent increase primarily because of the rapid influx of more than 10,000 new SPE student members mostly from outside North America.

During the next decade, some from those ranks will begin careers in a global industry hungry for qualified professionals. These young professionals will play a crucial role in easing the human resources shortfall.

And they will have to come from non-U.S. four-year accredited colleges—a break from the past when U.S. academia produced oil and gas professionals that not only worked for U.S companies but abroad as ex-pats transferring petroleum technology to less developed countries.

McLaughlin's O&G career choice not typical of young U.S. engineers

John McLaughlin, a 28-year-old petroleum engineer at Ryder Scott, recently shared his career path experiences in the oil and gas industry. Many others of his generation have chosen engineering careers in other industries, causing a workforce shortage in the E&P industry. However, as McLaughlin discovered, the rewards are ample for those choosing the road lightly traveled.

Why and how did you choose your field?

I started at the Colorado School of Mines. I was interested in civil engineering and hoped to build a career in helping the third world by working on development projects. It was at Mines that I met professors who opened my eyes to the importance of energy and, specifically oil and gas, to both the developing and the more developed world. Seeing the chance to potentially help countries in Africa, Asia and Latin America better manage their resources was a huge draw.

Additionally, economics, geology and chemistry were some of my favorite courses in my first year of school. I saw working in oil and gas as a way to build a comfortable and interesting life for myself working with the best technology in areas that interested me and also to feel like I was making a difference in the world.

What subjects, courses or internships were instrumental in helping you get a foothold?

Once I made up my mind to study and excel in petroleum engineering, I jumped in with both feet. At school, I was involved. I attended technical presentations by students, faculty and industry speakers. Some of these events were sponsored by the SPE

Please see McLaughlin on Page 6

McLaughlin—Cont. from Page 5

student chapter, but many speakers were graduate students talking about their research or professors previewing upcoming publications. Additionally, I participated in a student exchange program with the Montanuniversitat in Leoben, Austria, as a way to learn more about the industry outside of the United States.

Of course this is in addition to the normal classes Mines offers to undergraduates in petroleum engineering. I studied drilling, reservoir engineering, fluid properties, core and rock properties, structural geology, stratigraphic geology, environmental engineering, chemistry, thermodynamics, fluid mechanics, strengths, economic analysis, reservoir simulation and programming to name a few of the key courses.

During the summers of my sophomore and junior years, I worked for Phillips Petroleum—first in Odessa doing reservoir engineering and prospecting and the second summer based in Houston, but working at drilling sites in east Texas and north Louisiana. The summer after my senior year, I went to Venezuela to learn Spanish and particularly oilfield vocabulary in Spanish before moving to Houston to start work with ExxonMobil.

I chose my position with ExxonMobil because the company offered me a job where I could work on international projects from day one. I then spent three years working on development planning, reserves booking and reservoir studies in west Africa. During that time, I also completed an MS degree in petroleum engineering at the University of Houston focused on reservoir engineering. I also trained for approximately 12 to 14 weeks at ExxonMobil, which all new engineers go through.

All of this training and work experience made me a good fit for Ryder Scott and the position I currently have that allows me to draw regularly from the large tool box of skills that I developed at Mines, UH, the Montanuniversitat, Phillips Petroleum and ExxonMobil.

What do you think of the oil and gas industry now that you're here?

It is just as exciting and opportunity rich as my professors led me to believe. In both working at ExxonMobil and with many of our clients at Ryder Scott, I feel that I have made a difference in the regions that I have worked. Increasing a project's earnings by tens of millions of dollars when the government has a 5- or 10-percent stake makes a huge impact on an underdeveloped country's bottom line and that has been the kind of results that I have been lucky to have been a part of.

It has also been gratifying to travel to countries in west Africa, Latin America and the Former Soviet Union and build relationships with people there. Over time, they see improvements that are driven by oil's positive impact on their economies. Clearly, I have also seen the price of development in these regions, but overall and in a global sense, I still feel like I am part of an industry that can be a positive force pushing progress.

What challenges do you face in the industry?

For anyone in the industry now who still has 20 to 25 years left in his or her career, it will remain a challenge to continue to stay ahead of the technology curve. Today's engineer will likely need to be a lifelong student to continue to be relevant technically.

What are the most surprising aspects of your job?

It shocks me how few professionals evaluate reserves given its importance. I am still shocked when I first meet with clients and find out that they have already invested millions of dollars in projects without detailed reservoir engineering studies. I think some of this is a direct function of the lack of qualified, entrepreneurially conscious reservoir engineers.

What is the most exciting technological tool that you have used?

I think integrated production management is a fairly amazing tool. It is especially powerful when it can be tied to reservoir simulators. This tool is one of the best ways to model a closed system with defined constraints like a deepwater FPSO. The tool is evolving from just a software program into a new workflow in the industry.

Do you speak any foreign languages? If so, how are they helpful in your position?

Yes, Spanish very proficiently and German and French at the novice level. At Ryder Scott, I meet many Spanish-speaking clients. For some, their English is not proficient enough for us to work efficiently in that language, so Spanish is crucial.

For others who are proficient in English at a high level, I still like to do introductions and have a short conversation in the client's mother tongue before we revert back to English. Usually the gesture is an appreciated courtesy that can often convey respect and understanding in a way that would otherwise take longer with English alone.

Proved reserves: A maligned term

The *Wall Street Journal* refers to proved reserves as "proven." A search on Google, a gauge of common vernacular, generates 516,000 hits for "proved reserves" and 437,000 for "proven reserves."

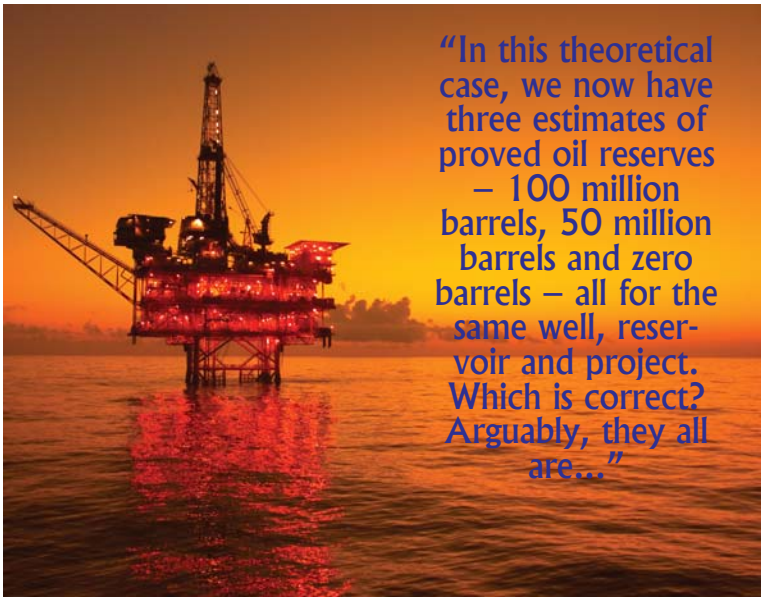
Even the defining body for reserves, the Society of Petroleum Engineers, has trouble with the terms. A search on the SPE database for technical papers shows 3,507 hits for proved reserves and 2,216 for proven. The term, according to SPE, is proved reserves. After publishing more than 270 pages over eight-and-a-half years, *Reservoir Solutions* has never published the term, proven reserves – that is till now.

Varied definitions yield divergent petroleum reserves estimates

— Ron Harrell, retired chairman and CEO

Do the various definitions and their vintages have a material effect on the quantity and value of estimated reserves? The answer is an emphatic "yes" and is illustrated in the following theoretical case.

Let's assume a producer drilled an exploration well in the Gulf of Mexico in 8,000-ft water depths where the cost of drilling may exceed $50 million. Before any drilling began, the producer invested thousands of hours interpreting the underlying subsurface geological environment and the enormous amounts of processed seismic data to establish a drillable prospect. That was all done with the clear understanding that a discovery requires hundreds of millions of dollars to develop and that it will take years before revenues are generated.



Let's further assume that the discovery well penetrated a thick, highly permeable, oil-saturated sandstone reservoir at a subsea depth of 16,000 ft. Numerous subsurface pressure measurements and fluid samples confirmed the positive log interpretations.

Although this first well did not penetrate the reservoir at a location and depth where the oil-water contact could be observed, the evaluator used a combination of 3D seismic and pressure-gradient information to estimate the oil-water contact, which limits the size of the reservoir. The evaluator concluded that the knowledge gained through the integrated analysis of all data was adequate to provide a reliable estimate of the reserves sufficient to declare this as a commercial discovery and to begin a development plan.

In that example, one might ask what set of reserves definitions did the evaluator rely on for his management's decision to sanction the project? Let's say that in the eyes of a qualified evaluator, the collective data is conclusive enough for the producer to estimate 100 million barrels of proved oil using 1997 Society of Petroleum Engineers/World Petroleum Congress reserves definitions that allow for the use of subsurface log and test data along with seismic information to establish reservoir limits.

Please see Definitions on Page 8

EU—Cont. from Page 1

other filings is not a simple apples-to-apples comparison. In many cases, those reported reserves numbers are factored into DD&A, earnings and performance metrics, such as reserves-replacement ratios and finding-and-development costs, all closely scrutinized by investment analysts.

Investors have long criticized the U.S. Securities and Exchange Commission for reserves reporting rules that they claim lead to the underreporting of value. The SEC engineers have countered that the U.S. Financial Accounting Standards Board rules establish a standardized measure, not a market value, enabling investors to compare listed companies using a common yardstick.

The EU, which has adopted International Accounting Standards, has no common yardstick for reporting reserves. This despite a European Commission directive that seeks to ensure that all member states follow equivalent disclosure standards.

Last year, an advisory group to the EU Commission received public comments calling for the adoption of Society of Petroleum Engineers reserves guidelines. However, the Committee of European Securities Regulators decided to retain reserves definitions based on the European Reporting Code, which essentially defers to local market regulators.

While the London Stock Exchange "prefers" SPE/World Petroleum Congress definitions, they are not required for initial offerings. Issuers use definitions from the SEC, Alberta Securities Commission, Norway Petroleum Directorate, etc., but not the Russian ABC classification system. For annual reporting, LSE issuers use the U.K. Statement of Recommended Practices, but it does not offer a full reserves-classification system or recommended evaluation practices.

"The European exchanges would struggle to attract international listings if a single code was required," said **Jim Moran**, a technical specialist at CESR. "The European markets are a multi-jurisdictional world, so there are difficulties for investors."

EU regulators want consistency within a given definition set. "We want clarity within the context of the particular (reserves reporting) code. It is up to the investor to understand the definitions used in the prospectus," said Moran.

For an example of how widely reserves estimates can vary in a market without a single standardized measure, see article, "Varied definitions yield divergent petroleum reserves estimates," on this page.

Definitions—Cont. from Page 7

Had the evaluator used other definitions, the results could have been dramatically different. The U.S. Securities and Exchange Commission, relying on their 1978 definitions, would most likely limit the quantity of proved reserves to, say, 50 million barrels of oil by applying the guidelines on lowest known oil as determined by the well-log penetration depth and without reliance on any other information.

The 2002 definitions of the Canadian Institute of Mining, Metallurgy and Petroleum may not allow any proved reserves because the reservoir was not flow tested, that is, no actual oil was physically produced to the surface demonstrating the commerciality of the discovery. Accordingly, the discovery reserves could be classified no higher than the probable category which, incidentally, must be reported to the Alberta Securities Commission in addition to the proved reserves of a securities issuer. Those CIM definitions were adopted by the ASC and placed into use about three years ago.

We now have three estimates of proved oil reserves – 100 million barrels, 50 million barrels and zero barrels – all for the same well, reservoir and project. Which is correct? Arguably, they all are because they comply with recognized reserves definitions. Then again, even the two larger numbers remain only estimates that will undoubtedly be revised over time through use of more information. Confusing? You bet!

One other wrinkle: The producer may not be able to report the 50-million-barrel estimate during the year of discovery because this volume may not be adequate to economically justify field development and therefore would not qualify as proved SEC reserves. Reporting reserves initially to the SEC would then await the drilling of an additional well or wells.

This is not intended as a complaint about the SEC reporting practices. It is simply an explanation of the agency's guidelines under current reserves reporting requirements. This seems to serve the agency's unique purposes, perhaps its purposes alone.

Another striking example of the differences in proved reserves can be seen through a hypothetical case study involving the production of reserves reported under different sets of definitions, each with different price parameters. Assume that an onshore U.S. field has hundreds of mature gas wells that produce smaller and smaller volumes of gas each year as the reservoir pressure declines as a function of gas withdrawals. The established individual well-production and pressure-decline trends can be extrapolated into the future with a relatively high level of confidence.

The proved reserves represent the estimated quantities of gas that can be produced at a profit using known operating costs, royalties and taxes and forecast revenues. The estimated proved SEC reserves may be 20 Bcf using the mandated one-day, year-end gas price established on an unusually cold day in December when demand and prices are high.

The 1997 SPE/WPC reserves may be 12 Bcf relying on an average price as demonstrated over the past 12 months. The ASC proved reserves would be, say, 15 Bcf using the producer's reasonable price forecast.

The higher price has the effect of increasing net revenue per Mcf and also extends the property life and reserves, given a fixed, estimated operating cost unrelated to gas prices. The volatile dynamics of supply, demand and pricing coupled with the use of any one of three sets of reserves definitions is complex.

The SPE, WPC, American Association of Petroleum Geologists and Society of Petroleum Evaluation Engineers recommend the application of internal forecasts for future economic conditions in their current draft of new petroleum reserves and resources definitions. This conceivably could produce a reserves estimate similar to that mandated by the ASC.

The organizations have scheduled approval and official release of these new definitions for next March.

And we wonder why investors are confused!

Ryder Scott Co. LP
1100 Louisiana, Suite 3800
Houston, Texas 77002-5218
Phone: 713-651-9191; Fax: 713-651-0849
Denver, Colorado; Phone: 303-623-9147
Calgary, AB, Canada; Phone: 403-262-2799
E-mail: info@ryderscott.com
Web site: www.ryderscott.com