

Ryder Scott confirms major Argentina oil shale play

Repsol YPF SA announced in February that its Vaca Muerta oil and gas shale formation contains more than 21 billion BOE of prospective resources, as independently estimated by Ryder Scott. The play in the Neuquén basin could double oil and gas production in Argentina in 10 years, said Repsol, adding that “this would require a vast investing effort that would reach \$25 billion per year in order to develop all the existing prospective resources.”

Ryder Scott estimated the total resource potential of the 7.4 million-acre play based on 116 Mboe of 3P reserves, 1.525 Bboe of contingent resources and 21.167 Bboe of prospective resources. Preliminary results indicate that 77 percent of the area contains oil with the rest containing dry and wet gas, said Repsol.

The reserves estimates comply with rules of Argentina stock market regulatory agency and the U.S. Securities and Exchange Commission. Ryder Scott evaluated the contingent and prospective



By late last year, Repsol YPF had produced from 15 vertical wells in the Loma la Lata Norte area north of the Loma la Lata and Loma Campana areas. Initial flows ranged from 200 to 600 BOE/D.

resources in accordance with the 2007 Society of Petroleum Engineers Petroleum Resources Management System.

Repsol YPF said it has partnered with shale producers in the United States, analyzed (extraction) technologies and adapted those technologies to the geological conditions in the country in “record time.” Apache Corp., Exxon Mobil Corp., EOG Resources Inc. and others are exploring Vaca Muerta.

Repsol said that production from shale has been so successful in the U.S. that prospecting is now being carried out on all corners of the globe. “This is not just a passing fashion. These resources have such a large volume that focusing on their development is going to be well justified,” stated **José María Moreno**, Repsol director of technical analysis and special projects, in a recent company newsletter.

In the Vaca Muerta formation, Repsol YPF aims to drill 20 wells in

2012 solely and jointly with several partners to continue investigating prospective resources.

By the end of January, YPF SA had drilled 28 new wells and re-completed one existing well. That included 24 vertical wells with two- to four-stage hydraulic fracturing. Currently 20 of them produce with initial flows ranging from 180 to 600 BOE/D. That surpasses some horizontal wells in the Bakken and Eagle Ford shale oil plays in North Dakota and Texas, respectively.

“Vertical wells with four fractures produce similarly to horizontal wells with more than 25 fractures in comparable fields in the U.S.,” said Repsol.

Tomás García Blanco, YPF upstream executive director, said that the 3,000-ft deep Vaca Muerta compares favorably to major U.S. shale formations, remarking that it is three times as thick as Eagle Ford. YPF drilled four horizontal wells in late 2011 and an evaluation is pending.

Inside Reservoir Solutions

- Historical price chart for oil, gas..... 2
- Russia postpones reserves rules..... 2
- SEC seeks more granularity..... 3
- Ryder Scott 75th anniversary..... 4
- Modern RS era led by Cruce..... 5
- Buckwalter and “Mad Men” age..... 6
- Eagle Ford knowledge grows..... 7

Russia postpones launch of reserves reporting rules

Russia has postponed this year's planned rollout of a new petroleum reserves classification-and-categorization system to next year. The FGU State Commission on Mineral Reserves (GKZ) said Dec. 29 that the system was not ready for its planned implementation Jan. 1, 2012.

The one-year delay will allow further improvement of the system's evaluation methodologies, stated the GKZ. The country had planned to implement the RF-2005 Russian Federation Classification Scheme of the Russian Ministry of Natural Resources on Jan. 1, 2009 but then postponed it to 2012.

Last year, joint-committee members representing the GKZ and the Society of Petroleum Engineers mapped the RF-2005 standards to the 2007 SPE Petroleum Reserves Management System. However, the GKZ asked that publishing of the mapping be delayed until additional economic criteria could be incorporated into the Russian system.

"We are all a bit confused," said **John Etherington**, one of the experts who participated in the mapping exercise and who served on the SPE Oil and Gas

Reserves Committee (OGRC) from 2004 to 2008. In announcing the delay, GKZ emphasized the importance of the system being developed, which will change "historical practices" in reserves evaluations.

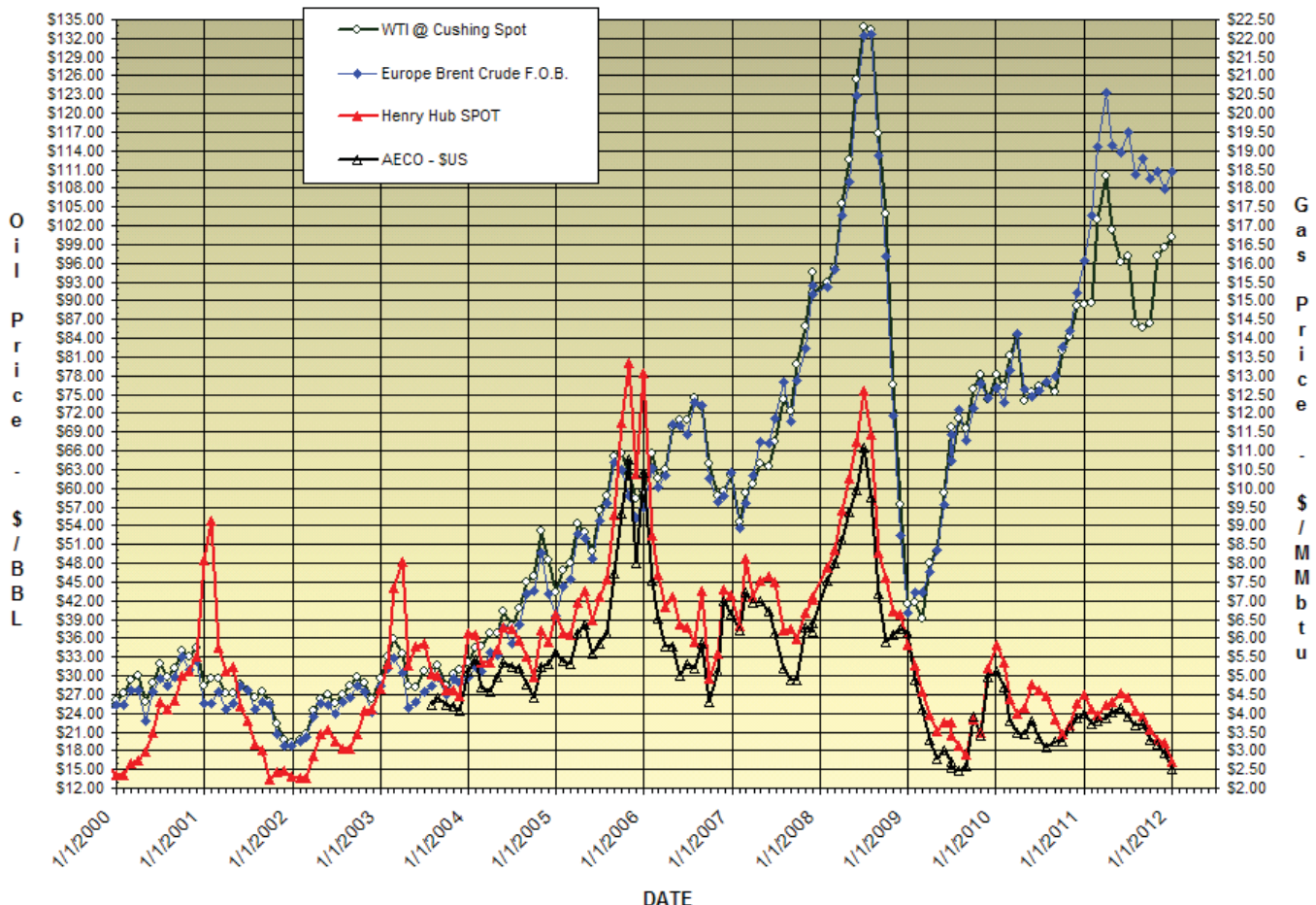
Reportedly, the government considers the RF-2005 guidelines to be outdated, but has not published an updated official version. Three reserves reporting classification systems—each promoted by a group of experts—are competing for GKZ acceptance, according to unconfirmed reports.

The worldwide oil and gas industry considers the SPE-PRMS to be the de-facto international standard for reserves reporting. SPE originally mapped RF-2005 to its older 2000 standards. SPE said that the latest mapping exercise is not expected to change either system.

However, SPE added that if the two systems are aligned, that will help to ensure greater consistency of petroleum reserves and resource estimates.

Alexander Shandrygin of Gazpromneft NTC recently became a member of the OGRC as a Russian representative.

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.

SEC seeks more granularity in reserves reporting



Roesle at recent conference.

The U.S. Securities and Exchange Commission latest comment letters to oil and gas producers continue to focus on more specificity in reserves disclosures. Addressing the year-end 2010 filings, the SEC wanted to know the type of reliable technology used to justify reserves bookings.

The agency wanted evaluator's qualifications in detail and internal controls used for reserves estimating. The SEC also asked for annual production and costs at the entity level if the field or region contributed to 15 percent or more of the total reserves.

The most granular information requested though was in comment letters worded as follows:

Please furnish to our petroleum engineer the engineering reports you used as the basis for your June 30, 2011 proved reserve disclosures including:

(a) One-line recaps in spread sheet format for each property sorted by field within each proved reserve category including the dates of first booking and estimated first production for your proved undeveloped properties.

(b) Total company summary income forecast schedules for each proved reserve category with proved developed segregated into producing and non-producing properties.

(c) Individual income forecasts for all the wells/locations in the proved developed and proved undeveloped categories

(d) Engineering exhibits, e.g., maps, rate/time plots, volumetric calculations, analogy well performance for each of the three largest wells/locations in the proved developed and proved undeveloped categories

(six entities in all) as well as the AFE for each of the three PUD properties. Please ensure that the decline parameters, EURs and cumulative production figures are presented on the rate/time plots.

Don Roesle, CEO at Ryder Scott, said that the implications of that comment letter are far reaching. He made his remarks during his presentation "SEC Reserves Reporting: Moving Forward with the Insight Gained on Matters of Disclosure and Compliance" at a luncheon three months ago sponsored by the Houston Chapter of the Society of Petroleum Engineers and the American Petroleum Institute.

H. Roger Schwall, assistant director in the SEC Division of Corporate Finance, said in late April 2010 that the agency wanted more detailed explanations after reviewing annual filings under the first year of the new regulations. He remarked that areas needing more disclosure involved the use of technology, new and significant bookings, credentials of reserves evaluators, costs of converting proved undeveloped reserves, use of average prices and assigning PUD locations more than one offset from a producing well.

"After the first year of the new regulations, the SEC really wasn't sure exactly what it wanted in terms of additional information," said Roesle. "Now the agency is continuing to expand the scope of inquiry for more information."

Comment letters do not form new regulations but serve as guidance in formulating effective disclosure.

"That limitation has led some to believe this is informal conversation that is non-binding on their disclosures," said Roesle. "However, responding to SEC comment letters is time consuming and costly and to be taken very seriously.

"After the first year of the new regulations, the SEC really wasn't exactly sure what it wanted in terms of additional information. Now the agency is continuing to expand the scope of inquiry for more information."—Roesle

Less than a year after the year-end 2008 rules changes went into effect, the SEC published compliance-and-disclosure interpretations. Rarely, however, does the agency make industry-wide pronouncements. Rather, the SEC prefers to deal individually with public issuers through comment letters.

For now, this iterative comment-and-reply process is the cornerstone of the agency's public information program. For the year, the SEC has published two comment letters to oil and gas producers on its Edgar site as of March 5. During the same period last year, the SEC posted 79 comment letters.

Ryder Scott start in 1937 detailed by first employee



Ryder Scott is celebrating its 75th anniversary this year. The firm incorporated in 1937 in Bradford, Pennsylvania, as the first laboratory in the world devoted to solving oilfield waterflood problems.

However, much more recently, an improbable reunion enabled Ryder Scott to discover that an engineer's mistake ironically led directly to startup operations in 1936, a year before incorporation. In 2000, former Ryder Scott engineer **Donald T. May**, then 89 years old, revealed his mistake cutting well cores and the role it played in the firm's early history. He died four years later, but not before sharing his recollections, which



In 2001, Don May (left) tells Jim Bryner, director of the Penn-Brad museum, about the microscope that he donated.



Don May, back row, second from left, and former president John F. Buckwalter, row above front row, second from right, appear in photo of undetermined vintage.

formed the basis for an article in the September 2000 *Reservoir Solutions* newsletter.

May had discovered a company history on the Ryder Scott Web site stating that founders **Harry M. Ryder** and **David Scott Jr.** originated chip-coring analysis, a technique developed by May. The history made no reference to May, who was hired by Scott in 1935 as the first employee.

To set the record straight, May wrote a letter to **Ron Harrell**, then CEO at Ryder Scott, narrating the genesis of the coring technique. That started a dialogue leading to an interview over two days with May close to his home in Muleshoe, TX.

Chip-coring analysis, a selective shot method for open-hole completions developed by Ryder and a modified five-spot well pattern were responsible for the uncanny success of Ryder Scott-engineered waterfloods in the Bradford field in the mid 1930s.

At that time, Ryder Scott was a producing company and so successful that other Bradford operators began asking for technical assistance. "Oil was only a couple of dollars a barrel, so Ryder and Scott figured that they could be more profitable as consultants rather than as producers," said May.

The firm continued to implement the best techniques under total engineering control to slow the production decline in the Bradford area during the 1940s. Ryder Scott used selective plugging in zones of water inflow. The firm recommended improvements in core acquisition, logging, completion practices, injection waters and pressures, well spacing and oilfield equipment.

With the Bradford area's inevitable decline in the 1950s, Ryder Scott moved to Wichita Falls, TX, to design successful secondary recovery projects. May relocated and worked there until he retired in 1967, the year Ryder Scott acquired Robert W. Harrison & Co. and moved to Houston.

A silk purse from a sow's ear

May's story begins in 1936 on a Bradford lease at a Ryder Scott cable-tool drill site. To cut away cores for lab analysis, the company used a Baker core barrel designed to hold a six-foot stack of biscuit-shaped formation pieces. May should have taken a stack of biscuits at every foot interval of the core but instead took only one. After coring 60 feet of the formation, May delivered the samples to a lab but was told that he did not have enough biscuits for a complete

analysis.

"I thought I might lose my job for not taking proper samples," said May. "Then, as I walked down the hall with the one sand biscuit in my hand, an idea came to me."

He walked into Ryder's office and told him about the mistake. May said, "While standing in front of Mr. Ryder with the biscuit, I said, 'Mr. Ryder, I believe a procedure can be found wherein all measurements can be made on this one piece of sand.' Mr. Ryder got a big smile and said, 'Don, get with it.' This made me feel like jumping to the ceiling."

May immediately changed the lab setup to begin his research. In less than a year, he figured out how to completely analyze a piece of sand the size of the end of one's little finger. Chip coring used with cable-tool drilling enabled a complete analysis to be made on a single plug of sand, providing engineers with accurate data to do their jobs.

As a result, oil recoveries were increased several fold by proper engineering of the Bradford water floods. Ryder Scott sold its oil



Ryder Scott moved to this Wichita Falls, TX, office in the 1950s. Employees from Bradford, PA, who relocated to the city complained of 100-degree heat and scorpions.

properties by 1937 and became a consulting firm with about 40 employees almost overnight.

May's revelations in 2000 helped fill in some missing pieces of the early chronologies. Ryder Scott had visually identified cofounder Scott from a boxed-up stack of archived historical photos, but not Ryder. At the interview, May pointed to Ryder in a couple of photos. In that instant, if even through mere

photos, the company was reunited with its primary founder after decades of estrangement.

May provided insights into the characters of Ryder, Scott and other early Ryder Scott personnel, including John F. Buckwalter, who was president from 1956 to 1972. May also discussed major Ryder Scott projects. His remarks were transcribed and have become part of the firm's corporate history.

Modern era for Ryder Scott, led by Cruce, began in 1967

Ray Cruce guided the evolution of Ryder Scott beginning in the late 1960s as it intensified its business focus on independent petroleum reserves estimations. In 1967, the firm moved from Wichita Falls, TX,

to Houston after acquiring Robert W. Harrison & Co. Cruce had joined the firm from Harrison in 1966 as a partner. The "marriage" of Ryder Scott and Harrison, a consulting company known for

advanced skills in reservoir evaluation, provided the right balance of skills.

Cruce's background was primarily in reserves estimations. He sensed greater opportunities for that type of work, so he began contacting financial institutions after becoming chairman of the board and president in 1972.

New York investment bankers and commercial lenders, keen on reducing risks in reserves-based lending, listened to Cruce, whose personality and credibility helped open doors. They became convinced that third-party certification was the best method of establishing a reasonable value for petroleum properties used as collateral.

Reservoir evaluations became the mainstay of the firm as bankers recommended to their clients that they obtain reports from reputable consultants as prerequisites for loan considerations. Ryder Scott's name became a standard on most bankers' lists of qualified evaluators. Cruce retired in 2000 and died in 2003.



Ray Cruce (sitting), former CEO, reviews company agenda in the mid 1970s with (from left) Charles Milner, a former president; William Fickert, a former senior vice president, and Harry Gaston, a former president.

Buckwalter: “Parachuter” with bold vision in “Mad Men” age

— Martha Denham, special contributor

Perhaps the greatest American television buzz in this young millennium has been around *Mad Men*, a cleverly crafted cable TV drama about the golden age of advertising and the elegantly dressed, impeccably coiffed ad men and women of America’s 1960s who made it so.

What of petroleum consulting? In honor of Ryder Scott’s 75th anniversary, we salute one of the stylish and savvy catalysts behind our industry’s ongoing boom.

Handsome, astute and assertive, Ryder Scott’s third president was also its most enigmatic. The quiet Quaker roots of **John Franklin Buckwalter** connected him to Ryder Scott co-founder **Harry Ryder**, who hired him in 1939 for data analysis at the Ryder Scott laboratory in Bradford, Pennsylvania.

Buckwalter held an associate’s degree in mathematics and could effectively translate data from core analysis into reports for customers. He supplemented his education with reservoir engineering courses at Pennsylvania State University, for which he eventually taught night school classes on petroleum production.

By 1947, he had begun applying his knowledge to contribute to technical articles for the American Petroleum Institute and other industry associations. And as oil production in the Bradford area ebbed significantly, he put his writing to a new use—composing pamphlets to drum up more business.

These pamphlets were not advertising fluff. There were no discounts offered, no comparisons to competitors and no modern-day sales tactics. The messages offered something more powerful: bold, concise explanations – with escalating detail per pamphlet – of a cutting-edge waterflooding technique Ryder Scott used to extract oil from otherwise used-up fields.

Don May, Ryder Scott’s first employee, would later share that he “could never figure (Buckwalter) out,” but esteemed him as likely the best technical mind in the firm after Ryder in his day.

Although the allure of properties suitable for waterflooding in



Buckwalter, standing, at the Shamrock Hotel in Houston. Date and other photo subjects unknown.

Texas finally prompted the company to fully relocate its offices to Wichita Falls in 1955, the Bradford pamphlet series demonstrated Buckwalter’s remarkable ability to spin the proverbial straw of copious, complex data into the gold of simple, potent messages.

Soon this gift would make him the firm’s nominee to go before the Texas Railroad Commission to teach the regulatory body how waterflooding worked. A major Ryder Scott-engineered flood project in Wichita Falls was producing so much oil that the commission worried it would jeopardize the market price. The articulate young executive’s presentation assuaged the regulators’ concerns, and Ryder Scott was allowed to proceed with a growing number of projects.

The same charisma that earned the rising star accolades from upper management and outside groups (he received the API Citation for Service in 1957) invited some disdain from the lower ranks. It was said that he “liked to show that he knew things and maybe liked to show too much.”

Braggart or not, Buckwalter was named president of Ryder Scott in 1956, managing the Wichita Falls

office and laboratories and offering the only engineering support for engineer **William Fickert** in Ryder Scott’s Midland, Texas, office upon its opening in 1960. When the company decided that its offices should be consolidated in the ‘big city’ in 1967, Buckwalter made the second move to Houston.

Others such as May and newer engineer **David Shih** declined to relocate, electing to continue on their own in Wichita Falls. Fickert’s account of the transition revealed Buckwalter’s altruistic side. Out of appreciation and respect for May and Shih’s contributions, “John gave them some of the local clients for support,” said Fickert.

Such amicable exchange was not typical in the executive offices in Houston. The title of “president” already existed at Ryder Scott in Houston for “office president” Ray Cruce. Though both men were professional, the confusion of rank and managerial responsibilities created a natural friction.

“Both of them were take-charge kind of guys,” recalled Fickert, but the buck stopped at Buckwalter as president of the firm. His unflinching pursuit of new business avenues

Please see Buckwalter on Page 8

Eagle Ford knowledge grows as development surges

Analysis of Ryder Scott database confirms success of producers in developing this emerging play

As the sample size of empirical evidence grows, E&P companies in the rapidly developing Eagle Ford shale play are making strong cases for the assignment of proved undeveloped reserves more than one location from producing wells. Besides considering the proximities of undeveloped locations to producing wells (well control), producers are justifying PUD bookings based on their use of reliable geologic and engineering technology, especially in the more developed areas.

Consistent with definitions of the U.S. Securities and Exchange Commission, producers are limiting locations to those areas with both established geologic consistency and sufficient statistical performance data and assigning proved volumes that are much more likely to increase or remain constant than to decrease.

Ryder Scott has incorporated and aggregated public and proprietary information from various sources for the entire Eagle Ford play into a database, which it uses for reserves analysis. The firm has analyzed seismic and well log data, test production and fluid properties to establish geologic consistency. In addition, Ryder Scott has evaluated statistical performance data and found that much of it yields predictable, repeatable reserves estimates in analogous areas. The database has thousands of potential well locations.

Mike Stell, a managing senior vice president at Ryder Scott, has evaluated about 1,000 Eagle Ford wells and 650 wells in the core development area that runs along a southwest-to-northeast line from Webb County to Karnes County. He has analyzed daily production on a larger regional basis for those core-area producing wells to project oil and gas EURs.

Stell also has analyzed corresponding offsets and developed performance analogs and type curves that rapidly changed over the past year as field development surged dramatically. His compilations include drilling and completion statistics, such as true vertical depth, lateral length, number of frac stages and pounds of proppant.

Stell also uses Texas Railroad Commission information on completions, tests and other pertinent data to create a comprehensive database of active wells. He has generated typical estimated ultimate recoveries by area and depth. Stell has also collected and compared thermal maturity data from clients.

He has concluded the following:

- ◆ Economic producing wells surrounding the area of interest are fundamental to the evaluation.
- ◆ If well-log control surrounding an area of interest shows continuity of the reservoir, then that is a significant factor in booking PUDs.
- ◆ Type curve parameters are fairly consistent with the Arps hyperbolic b factor equaling 1 to 1.5 and first-year production declining 80 to 85 percent from initial rates.
- ◆ Structure and depth are important for economic producibility but they are well known from historical and current penetrations in the Eagle Ford.



Eagle Ford operators are vying for service, equipment and supplies, such as this drill pipe at an SM Energy Co. well site. Photograph by Jim Blecha courtesy of SM Energy.

- ◆ Log analysis works well to identify the better, productive economic areas.
 - ◆ Extensive pressure-volume-temperature data has been taken and gas- and liquid-formation volume factors agree for the most part with commonly used correlations.
 - ◆ Rate-transient analysis models agree with historical production and flowing pressures. Calculated recovery factors from models and geologic mapping match those derived from PVT data.
 - ◆ In the entire Eagle Ford play, EUR results from more than 500 wells correlate with geologic mapping.
 - ◆ Wells are typically 5,300 ft in horizontal direction and are completed similarly with 15 to 20 stages and 3- to 5-million pounds of proppant. Few instances of completion failure in the proved areas have been claimed by those filing reserves.
 - ◆ Product ratios are well known in the proved areas; pressure and temperature correlate with depth.
- For more information, contact Stell at mike_stell@ryderscott.com.

Ryder Scott Co. LP
1100 Louisiana, Suite 3800
Houston, Texas 77002-5235
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

PRSR STD
US POSTAGE
PAID
HOUSTON TX
PERMIT NO 11296

—Cont. from Page 6

would not be hampered. Archival photographs suggest that Buckwalter actively entertained clients and prospects, capitalizing on lush urban amenities. He eagerly researched unfamiliar oil territories. To Buckwalter, potential project areas for Ryder Scott were not only in the North America oil patch but in oil and gas producing provinces around the world.

An evaluation project for Forest Oil Corp. in the mid '50s whetted his appetite for overseas work. Buckwalter hired former Forest engineer **William T. Simmons** in the late '60s, and together they chased a sales lead for waterflooding consultation for an Argentine company. They landed the project and successfully carried it out. Nicknamed "the parachuters," the duo swept in with the lowest bids for two new water-flood engineering projects in Argentina, winning both. Among their awarded projects was Shell Oil Co.'s Diadema oil field. Their efforts for Ryder Scott in South America laid the groundwork for a subsidiary, Servicios Ryder Scott.

Under Buckwalter's leadership as president, Ryder Scott expanded geographically to a wider physical presence than at any time in its history. The firm had offices in Houston, Midland, Shreveport (Louisiana), Buenos Aires and an outpost organization in Caracas, Venezuela. A smart-looking company brochure circa 1969 included a world map with red-dot indicators of Ryder Scott's projects on six continents, or as the text read, "...in virtually every oil and gas producing region of the free world."

Not everyone at Ryder Scott shared this presidential zeal for global potential. Many were reticent to invest beyond domestic borders, especially where operational activities were added to consulting services. The true test of Buckwalter's mettle came in 1972, when the growing Argentine subsidiary became a source of contention for Ryder Scott's financial and labor commitments. He supported the divestiture of Servicios, and the spinoff was finalized by unanimous vote in October of that year.

In true entrepreneurial spirit, Buckwalter exchanged all of his ownership in Ryder Scott, the brilliant company he proudly guided, for the novel

endeavor he boldly created. Departing after three decades, Buckwalter might not have imagined that his message would be a permanent, integral part of the company's long-term success.

The company's collective awareness had been indelibly broadened to include international possibilities. Office facilities were eventually redistributed to Houston, Denver, and Calgary, but Ryder Scott's service involvement in South America and elsewhere overseas proliferated. Today Ryder Scott has evaluated fields in virtually every major producing basin for hundreds of companies worldwide. Buckwalter's signature on Servicios letterhead in 1975, confirming full payment for his Ryder Scott shares, marks the end of his recorded company path.

Whether Buckwalter was "mad" to leave a burgeoning, venerable establishment and what fortune followed are not fully known at this time. Only hazy legends exist of Buckwalter in South America. But perhaps to a Pennsylvanian mathematician-cum-Argentinian adventurer nothing could be better.

Editor's Note: Ryder Scott is currently interviewing contemporaries of Buckwalter and others to obtain additional material for the planned publishing of a complete, detailed history of the firm.

Board of Directors

Don P. Roesle Chairman and CEO	Guale Ramirez Managing Senior V.P.
John E. Hodgins President	George F. Dames Managing Senior V.P.
Fred P. Richoux Executive V.P.	Herman G. Acuña Managing Senior V.P.
Dean C. Rietz Managing Senior V.P.	Jeffrey D. Wilson Senior V.P.

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

Publisher's Statement

Reservoir Solutions newsletter is published quarterly by Ryder Scott Co. LP. Established in 1937, the reservoir evaluation consulting firm performs hundreds of studies a year. Ryder Scott multidisciplinary studies incorporate geophysics, petrophysics, geology, petroleum engineering, reservoir simulation and economics. With 130 employees, including 90 engineers and geoscientists, Ryder Scott has the capability to complete the largest, most complex reservoir-evaluation projects in a timely manner.