RYDER SCOTT COMPANY
PETROLEUM ENGINEERS

Reservoir Solutions

NEWSLETTER

September—November 1998 Vol. 1, No. 1

Introduction from the President

Ron Harrell

Welcome to the pages of *Reservoir Solutions* and thanks for giving it a look. We plan for this to be the first of a continuing series of quarterly newsletters that will present news and feature articles on a wide range of industry topics.

We'll provide information about new and improved services or on services we've had all along, but maybe very few know about. For instance, please notice on these pages that we have reorganized and formed a reservoir-simulation group. We've been doing simulation since the early 1970s, but surprisingly many of our clients do not realize that.

We will let you know when we release our highly usable reservoir-analysis freeware over our new web site. Please note the announcement on this page of our first utility-software offering to you. The downloadable applications, developed and used by Ryder Scott, are free and will be posted to our site, RyderScott.com, on a quarterly basis.

We may highlight a landmark project, such as our analysis of the Elk Hills field featured on page 4. The value of such articles is to show our clients and prospects that we have the capabilities to successfully complete almost any reservoir-analysis assignment, even if it is extraordinarily large or complex or is on the fast track.

We consider the highest calling of a newsletter is to

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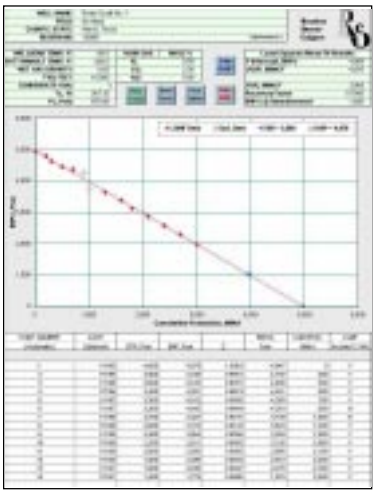
Inside Reservoir Solutions newsletter

Coming in December

RS announces second freeware download

News from the Calgary office



Using this template, a user can compute BHP/z vs. cumulative gas production and graph the relationship in presentation-quality, hard-copy output. A user can enter up to 400 data points in the template. The download from the Ryder Scott web site is free.

Material balance freeware downloadable from web site

Program used by Ryder Scott automatically calculates OGIP

PC users can now download a conventional gas material-balance program previously developed and used exclusively by Ryder Scott. They need Microsoft Excel '97 software, a file-decompression program and an Internet connection. The free download is accessible from the Ryder Scott web site at http://www.ryderscott.com.

Those interested in finding out more about the application or in getting the password to enable the program after downloading should contact Ryder Scott engineer James Latham at 713-651-9191, ext. 212 or at his e-mail at james_latham@ryderscott.com. Ryder Scott plans to offer other utility-software programs on a quarterly basis that can be downloaded from the firm's web site at no cost.

The material-balance application automatically calculates original gas in place (OGIP) and estimated ultimate recovery (EUR) based on user-specified criteria. Latham developed the program this year to automatically compute BHP/z vs. cumulative gas production and graph the relationship in black-and-white or color, presentation-quality, hard-copy output. Ryder Scott currently uses the application extensively.

"It's fast, convenient and easy to use. It's an ideal computer application, because it automatically generates results that would otherwise be time consuming to hand calculate," Latham said.

Once loaded, a user can enter up to 400 data points in the template. The program automatically calculates pseudocritical-temperature (Tc) and pseudocritical-pressure

Please see P/Z on Page 8

Model saves millions of dollars in development capital

Ryder Scott, working with the Nuevo Energy Co. engineering staff, has been successful in optimizing well-spacing requirements from full-field modeling results for the Santa Clara Lower Repetto oil field.

"Development-capital savings can be measured in the millions of dollars as well as improved economics on the remaining development plan," said Tom McCollum, senior exploitation engineer at Nuevo.

A key element in the engineering study was the modeling work performed by the Ryder Scott simulation team headed by engineer Dean Rietz. The team developed a basic black-oil model of the Lower Repetto reservoir and concluded that a proposed 28-well infill-drilling program to recover 800,000 barrels per well would not optimize field development. Based on initial model results, Nuevo and Ryder Scott drew up a recovery plan that included strategically locating about 12 wells in the 8,000-ft-deep field, which is located in 200 ft of water in the Santa Barbara channel seven miles offshore Ventura, California.

> "By increasing initial spacing requirements, we were able to capture more reserves per well and do a better job in controlling the initial reservoir pressure depletion around each wellbore."
>
> **—Tom McCollum, Nuevo Energy Co.**

"By increasing initial spacing requirements, we were able to capture more reserves per well and do a better job in controlling the initial reservoir pressure depletion around each wellbore. That gave us overall better economics per remaining development well and, as an added bonus, a longer per-well life that increased overall recoveries from the reservoir by almost five-million barrels," said McCollum. "Usually when you drill less wells, you expect to get less overall reserves. However, in this case, the model showed us the opposite. Without the modeling results, Nuevo could have very well over developed this reservoir."

Considering each well costs $4.5 million to $5.5 million to drill and complete, implementation of the new recovery plan will save more than $50 million by eliminating overdrilling. Development will be accelerated because the plan does away with the 45 to 60 days per well it would have taken to drill and complete the unnecessary wells.

The reservoir model is also showing an uncanny accuracy for predicting production of the Lower Repetto sands. Nuevo initially tested the model by comparing predictions to the actual production of the Santa Clara S-62 well. Production came within 90 percent of the modeling prediction. The operator then drilled the S-28 well to the east and ran the simulation with the new well as an additional test before producing S-28. Again, the model prediction to actual production came within 90 percent.

At first, S-28 was modeled with simulated production from two of the lowest four sands, M and N. Initial production was only half of the potential production indicated by the model.

After sufficient pressure drawdown was experienced in the M zone, the lower most N sand cleaned up and production peaked at 760 B/D. At that point, the well began behaving as the model initially predicted. S-28 hit a peak at 804 B/D before stabilizing at 780 B/D and then declining. The model showed initial production at 700 B/D with peak production averaging 757 B/D with both sands open.

In late July, the well was making 508 B/D and the model was tracking closely to that figure, said McCollum. "You can't get better estimates and our confidence in the model is growing each time we use it," he added.

Rietz said one of the reasons that the model behaves as the field does is the Ryder Scott team carefully performed a time-consuming history match and made sure that the pore volumes and the quantities and descriptions of the fluids in place were correct. From log data, the group initially determined the structure tops for each sand as well as porosity and permeability and the net-to-gross ratio of sand for each well.

> "You can't get better estimates. Our confidence in the model is growing each time we use it."
>
> **—Tom McCollum, Nuevo Energy Co.**

The engineering work involved preparing PVT data, generating relative-permeability relationships and preparing fluid contacts and completion/production histories. Once those were assembled, the team calibrated the model through history matching.

The model has thus far proved to be very accurate, but its beauty also lies in its simplicity and lower cost to construct. Although the multilayer model contains variable thicknesses of the beds, Rietz assigned homogenous reservoir properties to each of the five layers, including a constant porosity and permeability. Typically, a homogenous reservoir model has optimistic recovery predictions, however, in this

Please see Nuevo on next page

Publisher's Statement

Reservoir Solutions newsletter is published quarterly by Ryder Scott Company Petroleum Engineers. Established in 1937, Ryder Scott is one of the largest, oldest and most respected reservoir-evaluation consulting firms in the petroleum industry. The firm performs more than 1,000 consulting studies a year. Ryder Scott has issued reports on more than 200,000 wells or producing entities in North America. The firm has also evaluated hundreds of international oil and gas properties involving thousands of wells. Ryder Scott multidisciplinary studies incorporate geophysics, petrophysics, geology, petroleum engineering, reservoir simulation and economics. With 110 employees and more than 60 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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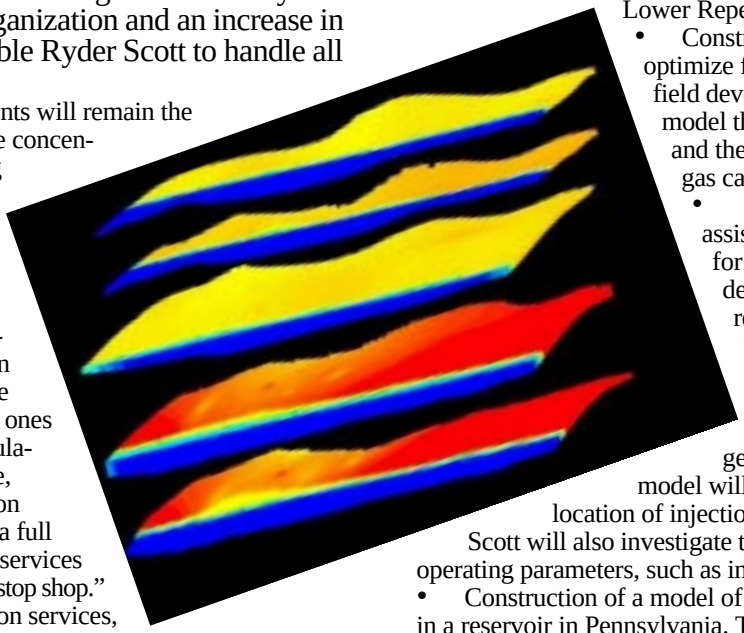
RS expands reservoir-modeling capabilities

In response to a growing demand, Ryder Scott formed a reservoir-modeling group July 1 headed by Dean Rietz, manager-reservoir simulation. The firm has performed reservoir modeling since the early 1970s, however the reorganization and an increase in personnel will better enable Ryder Scott to handle all client requests.

"Our commitment to clients will remain the same. We simply have a more concentrated approach to conducting this work," said Rietz.

The firm's traditional services—analyses in geology, geophysics, petrophysics and classical petroleum-reservoir engineering—will guide the simulation efforts so that the models have more practical relevance than ones built by "pure" reservoir-simulation modelers, said Ray Cruce, CEO. The improved simulation capabilities also complement a full range of reservoir-evaluation services so that clients deal with a "one-stop shop."

Clients using all evaluation services, including modeling, provide data one time, eliminating the need to gather and transmit the same information to separate service providers. Ryder Scott will also be able to use the results of its own simulations in reserves estimations rather than reviewing modeling data from other firms less skilled in estimations.



Reservoir simulation manager Dean Rietz reviews models constructed by his team.

However, the reservoir-simulation group routinely audits other modeling studies. In August, the group was auditing three such models, said Rietz. Ryder Scott was also working on four simulation projects in August besides the Santa Clara Lower Repetto work featured on page 2.

- Construction of a full-field model to optimize future drilling and offshore field development. Ryder Scott will model the encroachment of the aquifer and the continued development of the gas cap.
- Development of a model to assist in the design of a waterflood for sands that have already been depleted through primary recovery. The integrated study will provide an updated geological and petrophysical model through seismic interpretation and geostatistics. The simulation model will help determine the best location of injection and production wells. Ryder Scott will also investigate the optimization of future operating parameters, such as injection rates.
- Construction of a model of a proposed gas-storage project in a reservoir in Pennsylvania. The simulation group will construct a probabilistic model using geostatistics to account for uncertainty since the reservoir data are limited. The study will include an assessment of existing gas in place and an optimal development plan based on injection and production requirements.
- Continued development of a model for another gas-storage facility. The client routinely refers to the model to optimize hedging/futures positions. The model furnishes timely, accurate production profiles for blowdown scenarios.

"Our policy has always been to decline studies with time frames too short to allow us to complete useful models or where the objective of the work cannot be met through simulation. That will not change," Rietz remarked.

The group strives to develop useful models within fixed budgets. "We will provide the most cost-effective solution, but we must also maintain the high standards of Ryder Scott," Rietz said. His phone number is 713-651-9191, ext. 216.

Nuevo—Cont. from Page 2

case, the model served as a very effective tool for analyzing field-development options.

Although Ryder Scott has the capabilities to incorporate detailed geological modeling, including geostatistics, the firm intentionally kept the model simple. "In this case, we felt that we could provide a simplified, full-field model that would provide the details necessary to complete the client's objectives," said Rietz. "Regardless of the size of the field or budget, the client's objectives and the field characteristics dictate the complexity of the study."

Nuevo took advantage of the model's utility. "There is a skepticism about predicting future production from a

Please see Nuevo on Page 8

Elk Hills study facilitated the largest federal privatization in U.S. history

The final chapter in the largest federal divestiture in U.S. history came to a close earlier this year when Occidental Petroleum Corp. bought government interests in the Elk Hills Naval Petroleum Reserve for $3.65 billion. Crucial in preparing for the record sale was the presentation of the Ryder Scott reserves report on the Elk Hills field. Five audit firms used the independent estimate in performing valuations of the property for establishing a minimum acceptable sales price.

The exhaustive study was remarkable not only for its complexity, but because Ryder Scott completed it within a year. Mandated by Congress to award the sales contract by February 1998, the U.S. Department of Energy gave Ryder Scott an April 1997 deadline for completion. To meet that, the firm deployed 51 of its engineers and geoscientists, grouped them into reservoir asset teams and assigned each team to a specific Elk Hills reservoir.

True to the adage, "Promise less, deliver more," Ryder Scott, within the time constraints, committed to fully evaluating the Stevens and Shallow Oil (SOZ) zones, the two main producing stratigraphic sections, and auditing prior evaluation work on the Dry Gas (DGZ) and Carneros zones. In the end, the firm exceeded those goals by performing a full multidisciplinary study of all zones.

"Because Elk Hills is one of the largest oil and gas fields in the United States, a complete reserves evaluation required an immense effort and resulted in the development of large quantities of data," said Don Roesle, project leader and executive vice president of Ryder Scott.

The field, since 1912, has produced more than 1 billion barrels of oil and more than 1.6 Tcf of gas. Although the DOE and several consultants had performed various scientific studies of Elk Hills over the past half century, the Ryder Scott evaluation was the first independent fieldwide reserves study conducted in years.

> "We agreed that Ryder Scott was one of the best consultants in the world. ... Ryder Scott's management was excellent to work with and did a thoroughly professional job."
>
> **—Gary Latham, U.S. DOE**

For some idea of the enormity of the study, the firm's professionals reviewed hundreds of technical reports from several DOE libraries and selected more than 350 reports to be housed at the Ryder Scott Houston office for reference. Analyzing past work and assembling existing databases took two to three months and allowed the teams to avoid doing unnecessary work already completed by others.

"It was a major issue to determine how much independent work to do vs. using existing work, both from the standpoint of holding down costs and doing the job in the shortest possible time," said Gary Latham, a DOE technical representative involved in the divestiture.

This beam pump, used to reduce back pressure in a well and increase production, is one of many artificial-lift units in the Elk Hills field. To analyze the production history, Ryder Scott had to consider the extent of artificial-lift operations and many other factors.

Because of the voluminous amount of well data available on the field, Ryder Scott had to review and carefully select only necessary information to evaluate. Although more than 3,000 wells have been drilled in Elk Hills, the petrophysicists evaluated log data from a few hundred representative "key wells," selecting only those with modern, high-quality logging suites and core data.

Before Ryder Scott engineers could work with the digitized performance data from the DOE production data base, the team had to perform quality-control manipulations on the data bases and eventually converted the historical production data from Production Analyst to Aries.

The firm spent more than 40,000 hours (equivalent to more than 13 years of workdays) analyzing the field data and produced a massive three-volume report. The geologists produced about 400 hand-drawn and digital maps. It took 5 CDs to store Ryder Scott's evaluation and backup data that were presented to potential buyers along with other materials in a pre-bid package.

From the beginning, decision-makers in the DOE were free to choose a consultant by relying on "their own background and experience," said Latham.

"We agreed that Ryder Scott was one of the best consultants in the world. In this case, Ryder Scott's reputation served them well," said Latham. "Ryder Scott's management was excellent to work with and did a thoroughly professional job." Currently, the DOE retains Ryder Scott in an advisory capacity.

Editor's Note: The full-text version of this article is available on our web site at http://www.ryderscott.com.

Gaston takes semi-retirement after 31 years at Ryder Scott

Harry J. Gaston Jr., president emeritus, who began working for Ryder Scott in 1967, has recently taken semi-retirement, but will continue to work part time.

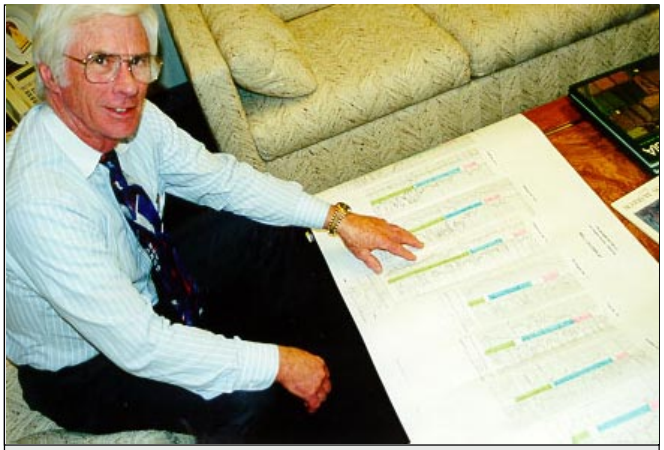
"I still plan to be involved at Ryder Scott for the foreseeable future. My attachment to the Company and its people, as well as my association with the many friends and acquaintances I have made in the oil and gas industry over the years, is still very important to me," he said. "I hope to continue to provide some benefit to the company through the years of experience I have achieved."

In the early 1960s when punch-card computer technology was used, Gaston and a young Rice University graduate student developed Ryder Scott's first cash-flow program. "As far as I know, we developed the first output that would place commas in numerical tabulations at each thousand level," he said. They also developed a technique that provided many levels of summary for the cash-flow report. "These features became a trade mark by which Ryder Scott reports were identified," said Gaston.

In a world of hand calculations and slide rules, Gaston was an early promoter of the use of computers to do engineering work. "It was not easy to convince my associates that the use of computer technology was imperative," he said. "As time has shown, the use of computer technology has opened up many opportunities in accounting for complicated ownership and in technical calculations—both too time consuming for hand calculations."

Among the most memorable projects for Gaston was a reservoir-modeling study he performed during the early 1970s. During that time, most oil fields in Texas were produced at full capacity because of relaxed allowables. Subsequently, reservoir pressures declined and gas caps formed or grew. That caused gas-oil ratios to increase and many operators were penalized with reduced allowables from the Texas Railroad Commission (RRC).

One client began to receive those penalties for production from a high structural position in the Tom O'Connor field in Texas. Acting on Gaston's advice, the operator presented the modeling study to the RRC and the report convinced the agency to reduce the maximum efficient rate (MER) allowable. The study also predicted an optimized production scenario based on the unitized operations of the field. Even though the client had said that unitization was impossible, the study convinced the disparate owners to unitize the field.



President Emeritus Harry Gaston examines well-log cross sections for a client company that he still continues to work with even though he is semiretired. "I still plan to be involved at Ryder Scott for the foreseeable future," he said. Gaston has worked at Ryder Scott 31 years.

Some of the most difficult studies for Gaston have involved abnormally pressured gas reservoirs. The variances between material-balance calculations and the volumetrically determined reserve estimates in those reservoirs became obvious to him as early pressure-performance data became available.

"My obstinate position that the material-balance data was misleading in the Port Acres field in southeast Texas proved to be correct. Later, I took a similar position on the Bolivar Point field, much to the dissatisfaction of the client. Again, time proved my analysis to be correct," he said. The discoveries of many more of those types of reservoirs have provided data encouraging a more cautious approach to the use of early pressure data alone for the estimation of gas reserves.

"The most difficult part of my employment has been submitting conclusions undesirable to the client," said Gaston. "In the long run, I believe clients are grateful for the objectivity and independence with which all of us at Ryder Scott have attempted to approach our assignments."

Gaston does not expect to slow down much in semi-retirement if recent history is any indication. He took up snow boarding a couple of years ago and his coworkers still kid him about reporting to work with a broken ankle from trying to negotiate a blue-black slope when, in his words, he was apparently going much faster than his ability would allow. "However, one year later and after a day-long lesson with a snow-board instructor, I can now take that slope safely," he said.

He is also been an avid motorcycle rider since 1964. "My flight instructor encouraged me to buy my first motorcycle so we could have something to do while not flying," said Gaston, who owns three motorcycles and four off-road dirt bikes. In addition to touring places like the Blue Ridge Parkway, Colorado, New Mexico and a planned fall trip to New England, he recently took a trip to the Copper Canyon in Chihuahua, Mexico to explore the canyon on an off-road bike.

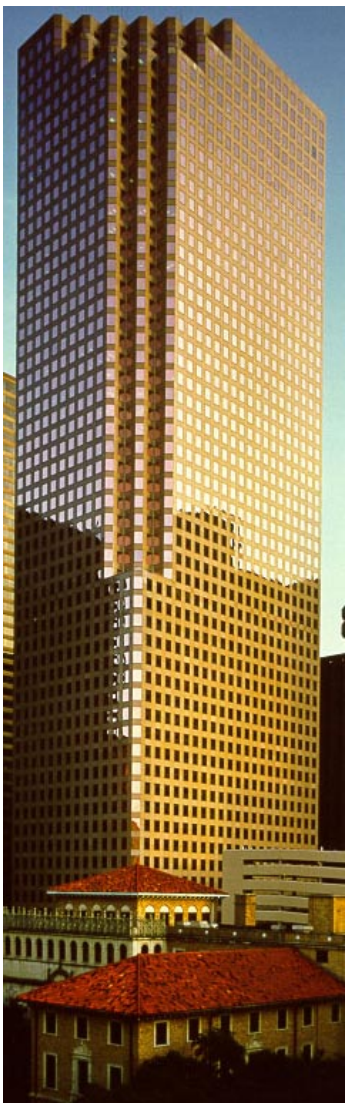
"Since accumulating a lot of farm and ranch equipment over the years, I spend a lot of time working on servicing and maintaining it. This satisfies my mechanic instinct," he said.

As he has more time to devote away from the daily activities at Ryder Scott, he will be doing more of those activities.

"The Ryder Scott family of employees are all my most favorite group of people. I could not help but single out Ray Cruce, our chairman, whom I have known and worked with since 1956 as special. We have together seen Ryder Scott grow both in size and reputation over the years and have had many open, unencumbered discussions," said Gaston. "I must also mention Ralph Fellows, Joe Allen and Ron Harrell who were all very instrumental in guiding the firm through good and bad industry times and for whom I have a special relationship."

What is Ryder Scott Co.?

Ryder Scott Co. Petroleum Engineers is one of the largest, oldest and most respected reservoir-evaluation consulting firms in the petroleum industry. The company performs more than 1,000 consulting studies a year for oil and gas producers—both major and independent—investors, banks, governmental agencies and accounting and law firms.



Ryder Scott offices are in the 1100 Louisiana Bldg. in Houston

Combining capable judgement with the latest computer technology, the company has earned worldwide recognition for its reliable predictions of the performance of complex oil and gas reservoirs. Ryder Scott has issued reports on more than 200,000 wells or producing entities in North America. The firm has also evaluated hundreds of international oil and gas properties involving thousands of wells.

Ryder Scott evaluates projects in various stages of exploration, development and production. The firm's studies range from basin evaluations of frontier plays to designing redevelopment programs for mature fields. Over the years, Ryder Scott has recruited and assembled very high quality geoscientists and engineers—seasoned by years of experience and highly respected for successfully tackling the toughest reservoir-evaluation challenges in the world.

Our geophysicists, petrophysicists, geologists, reservoir engineers and modelers work within their areas of expertise, combining their skills in close-knit, integrated teams. That synergistic, multidisciplinary approach facilitates the most precise, dependable scientific estimates possible of oil and gas reserves.

Over the years, energy companies, financial institutions, governments and others have come to rely on Ryder Scott independent certifications. The Ryder Scott report carries with it the assurances so essential in serious assessments of risks associated with buying, selling or evaluating petroleum properties or financing oilfield projects. The firm also analyzes project economics and generates computer-aided cash-flow projections after carefully estimating historical and future production and reviewing contractual arrangements and other client information.

Ryder Scott is by far the most widely used consulting firm for preparing year-end reserve estimates in accordance with U.S. SEC guidelines. In ongoing reviews of annual reports by Arthur Andersen, oil companies continually list Ryder Scott as their consultant of record by a 2-to-1 margin over the nearest competitor.

With 110 employees and more than 60 professional engineers and geoscientists, the firm has the capability to complete any type of consulting services on time and within budget. The Houston-based firm has branch offices in Calgary and Denver.

History

Ryder Scott Company Petroleum Engineers was founded in Bradford, Pennsylvania, in 1937 by Harry M. Ryder, an engineer, and partner David Scott Jr. The two originated chip-coring analysis and developed many of the most scientific laboratory methods of that time to test wells.

Consultants Ryder and Scott also developed selective-shooting practices involving core and log correlation and innovative well-placement methods. Rather than centering the fifth well in a "five spot" pattern, they located it in the center of the oil concentration as determined by core analyses from the other wells.

Ryder Scott's reputation grew, as it became known for expertise in designing waterflood and secondary-recovery projects. Oil producers in the waterflooding areas of Pennsylvania began to seek advice from Ryder Scott.

The firm responded by designing redevelopments under complete engineering control. New wells were chip cored and selectively shot. New production wells were strategically placed after studying the sand conditions at each new location. Data for each sand layer was obtained from chip-core analysis.

In some cases, Ryder Scott-designed redevelopments recovered as much oil as the original developments, even though the operators believed the fields were depleted or the wells were "watered out."

By 1946, the year Ryder retired, the firm had grown to 60 employees. It had clients in several areas of the United States and was involved in some projects overseas. In 1955, the firm relocated to Wichita Falls, TX, and continued to prosper there. Besides meeting the increased demand for waterflood design in Texas and elsewhere domestically, Ryder Scott went overseas and provided technical assistance in waterflooding to Argentina in the mid 1960s.

In 1967, the firm moved to Houston and acquired Robert W. Harrison & Co., a consulting company highly respected for its capabilities in reservoir evaluation. The "marriage" of the two provided the right balance of skills

and the newer, larger firm was able to offer a full range of services—from classical reservoir engineering to full field-development studies. By 1970, Ryder Scott had engineered about 700 waterfloods for almost 300 operators, but the demand for reserve-estimation work grew faster and soon became the mainstay of the firm.

As Ryder Scott's clientele increased, the firm opened a Denver office in 1978 and a Calgary office in 1995. Over the last 30 years, Ryder Scott has completed several landmark projects.

The most recent one was the 1997 evaluation of the Elk Hills Naval Petroleum Reserves for the U.S. Department of Energy. Ryder Scott spent more than 40,000 hours analyzing the billion-barrel producer and generated a three-volume reserves report. The work papers and maps filled five CD-ROMs. After presentation of the report, government interests in the field sold for $3.65 billion, the largest federal divestiture in U.S. history.

Geophysics

The Ryder Scott geophysics group analyzes seismic data for oil and gas projects in all stages of maturity from exploration to development to secondary and tertiary recovery. The firm interprets that data to aid in the development of full-scale geological models and volumetric estimates of oil and gas in place.

To investigate structural and stratigraphic reservoirs, Ryder Scott geophysicists carefully delineate the geology of faults, reefs, salt domes, anticlines and sand channels. To get the best possible geological picture, the geophysicists analyze and correlate well and seismic data.

Where well control is limited, geophysical interpretations enable Ryder Scott to project the extensions of hydrocarbon accumulations away from the bore holes. The geophysics group is familiar with the latest Geoquest and Landmark workstation technology and uses a wide variety of interpretation techniques including amplitude analysis, attribute analysis, stratigraphy studies, structural mapping and modeling, AVO analysis, inversion analysis, velocity analysis and forward modeling.

Geology

Ryder Scott performs geological analyses of fields and regions worldwide—from basin evaluations to production geology. The firm uses stratigraphic and structural analyses and the latest computer-mapping programs and techniques to help unravel structurally complex geology. The firm generates isopach and structure maps to better understand depositional environments and to define subsurface traps. Reservoir characteristics typically mapped include net and gross reservoir thickness, water saturation, porosity and pore volume. To produce a geologic model, Ryder Scott matches core and log data with the seismic stratigraphy and projects extensions of stratigraphic sections in unexplored areas. Ryder Scott integrates geological studies with geophysics, petrophysics and fluid properties to estimate the volumes of oil and gas in place.

> "The group has developed techniques for ... identifying some of the most challenging lithology and porosity systems in the world."

Petrophysics

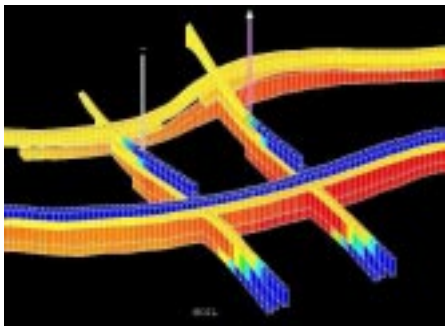
The Ryder Scott petrophysics group analyzes clastic and carbonate lithologies in a wide range of depositional environments. The group performs well-log analysis and correlations and core analysis and integrates those interpretations with well-test, geophysics and geology data.

The petrophysicists build crossplots for determining lithologies, porosity and permeability distributions, water-resistivity values, water saturations and shale parameters. Ultimately, the group has developed techniques for determining fluid-transport properties and identifying potential hydrocarbons in some of the most challenging lithology and porosity systems in the world.

Petroleum Engineering

The Ryder Scott engineering group is highly experienced in all phases of reservoir analysis, reserves determination and characterization, field development and reservoir management. The firm has optimized recovery for a variety of oilfield projects, including steam and water floods, development drilling, enhanced recovery and coal-bed methane.

Performance studies range from simple decline-curve analysis to material-balance studies to sophisticated modeling that simulates the behavior of complex reservoirs. Incorporating historical data and detailed fluid descriptions, those simulations range from black-oil to fully compositional formulations. Reservoir-management recommendations may involve stimulation techniques, additional well locations, facilities upgrading, horizontal drilling and enhanced recovery through the injection of water, steam, gas, carbon dioxide and nitrogen.



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provide usable information to the reader. We may explain the advantages and disadvantages of audits and full-scale evaluations. We may clear up misconceptions about complex reporting requirements. We may track an industry trend and comment on ways to take advantage of it. Again, we are open to your suggestions and comments.

You wouldn't have received *Reservoir Solutions* unless you were important to us. I personally invite you to send your comments about this publication to me or anyone else in the Ryder Scott organization. Because our aim is to provide information that you want and can use.

Please feel free to contact me at any time at 713-651-9191 or Ron_Harrell@RyderScott.com.

P/Z—Cont. from Page 1

(Pc) properties from gas gravity while adjusting for contaminants. Using the popular Cullender-Smith (1956) method as modified by Latham, the utility software also predicts shut-in bottomhole pressures from tubing pressures in gas wells. Additional features include automatic loading of the menus and macros for ease of use and an override function so certain calculated results can be changed manually.

Once in the web site, a user will click on the designated area, unzip the file using Winzip or another decompression program and read the installation instructions in an installpzcum.txt file. Installation is simple and involves loading files in the Excel start directory. Also, the user will be able to print and read a downloaded Excel document that serves as the user manual.

"I would advise our audience to please stay tuned to the web site and newsletter for other offerings," said Latham, who has designed other programs scheduled for release over the Ryder Scott web site.

Editor's Note: Ryder Scott does not guarantee or warrant the accuracy or reliability of this software.

Nuevo—Cont. from Page 3

model," said McCollum. "Usually you have to make several runs and struggle with different parameters before the results are reasonable. However, this time, we hit it on the head. No one in our office has seen anyone use the results of a model like our group has. Most simulations I have seen are done through a black box in a research department and then shelved."

Rietz was involved in the internal decisions of McCollum's group, which outsourced the simulation work to Ryder Scott. "The key to this and other modeling successes is working closely with clients and giving them workable models," said Rietz.

Before doing the modeling work, McCollum and Rietz agreed that they should avoid overengineering it and should instead concentrate on such fundamentals as determining original oil in place, delineating geological structures and identifying water encroachment. "Many models are overanalyzed and too many variables are put in the model in an attempt to control it," said McCollum, "Then, if an overly complex model does not match up, it's very difficult to find what needs to be corrected."

In late July, Nuevo was starting completion work on the S-61 well with anticipated first production in early September. The simulation for S-61 indicated the well should come in at about 600 BOPD.

"Ryder Scott is in the business of predicting and has a good track record, but it's a difficult job to put yourself on the line every time with a prediction," said McCollum. Even the most carefully constructed computer models don't always accurately predict real-world behavior.

"Luck is always a factor in how close any modeling predictions are to actual performance. In Nuevo's case so far, we have been a little lucky. However, we don't want to discount the hard work that went into the study and the fact that our diligence has paid off," said Rietz.

Having so far accomplished their exploitation objectives using the simulation, McCollum and his group are considering expanding the use of models. "Because of our modeling success, Nuevo is excited that it may be able to apply future Ryder Scott simulations to other larger, undeveloped fields," he said.

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