

Brown heads Calgary office

New manager brings in-depth understanding of the financial side of evaluations

Keith Brown became the new manager of the Ryder Scott Calgary office and a vice president March 1. Previously, he was manager of the Oil & Gas Evaluations Group at Royal Bank of Canada in Calgary.

Brown, a petroleum engineer since 1970, also worked at Gulf Canada Resources Ltd. and Shell Canada Ltd. "I saw this as an opportunity," he said. "Ryder Scott is continuing to develop a reputation as a reliable, consistent consultant. The Canadian operation started out four years ago with only four customers and now has about 70 clients."

Brown graduated from Technical University of Nova Scotia with a degree in chemical engineering. He is a member of the Association of Professional Engineers, Geologists and Geophysicists of Alberta (APEGGA); the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) and the Society of Petroleum Evaluation Engineers (SPEE).

"Clients have to know that the independent interpretations by petroleum consultants will stand up to the test of time — from initial production to final abandonment," he said. "That comfort only comes in working with engineers and geoscientists experienced in evaluating many, diversified reservoirs and basins. The Ryder Scott Calgary office has that caliber of talent from top to bottom."

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Brown

Using this Excel 97 template, a user can compute screening economics and run complete reserves and cashflow projections for individual wells or properties. The download from the Ryder Scott web site is free. Material balance and pressure-analysis freeware for gas production are also posted.



Economics evaluation freeware is newest download in series

Ryder Scott has just released its "quick look" economics evaluation program that is downloadable from the company's web site at www.ryderscott.com. This free software is a customized application for Microsoft Excel 97.

This latest program is the third in a continuing series of periodic releases available to the industry over the Internet. The economics evaluation software gives the user a simple, fast tool to compute screening economics for prospects, evaluate workovers and recompletions and run preliminary lending economics.

"This easy-to-use program can benefit explorationists, production companies, consultants and financial institutions."

Although this application is used by Ryder Scott as a quick-look, screening tool, the firm does not use it for in-depth economic analyses, but instead relies on a comprehensive, in-house program carefully developed over many years.

"In short, this easy-to-use program can be beneficial to explorationists, production companies, consultants and financial institutions," said James Latham, the Ryder Scott engineer who developed the application. The add-in program enables the user to run complete reserves and cash-flow projections for individual wells or properties. Users can select customary (U.S.) or metric units of production and different in-

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Coming in June

Expert witness, Latin America projects, et al

Tejas estimates limits of gas withdrawal using model

Ryder Scott model ensures gas availability for futures contracts

When the price of gas suddenly soars, the conference room at Tejas Energy LLC turns into a “war room.” It’s the “reps vs. the techs” — two groups on the same team in a tug-of-war.

A marketer, eager to cash in on a gas-price spike, says he wants to open up wells all the way to quickly withdraw gas from underground storage so he can sell on the spot market.

Bill Peebles, director of reservoir engineering, says, “If we open ‘em up too hard, we may damage the gravel packs.”

The marketer counters, “We’d make so much money that we can afford to break ‘em and fix ‘em.”

Peebles abruptly says, “Put it in writing.”

In a deregulated industry, gas-storage facilities have evolved from pipeline-operations tools to marketing tools. Against this backdrop, the marketing-vs.-engineering balancing act is played out

every day in meeting rooms of the companies that own some 400 underground storage sites across 27 states in the U.S. The two sides recognize the validity of each other’s arguments.

“It’s true what our marketer said. We could have made enough profits on the contract purchase to more than cover the cost of fixing a gravel pack, which costs between \$300,000 to \$400,000,” said Peebles. “Our management is well aware that we have to strike while the iron is hot and take our chances.”

For Peebles, a one-person reservoir-engineering department assisting in operations management at the West Clear Lake gas storage facilities, his moderating influence is embodied in the Ryder Scott field model. “By referring to the model, we estimate the upper limits for withdrawal rates without causing well failures,” he said, referring to built-in well controls that prevent excessive draw-down.

The two-phase, black-oil model is also an ally of the marketing representatives because it serves as a reservoir management tool by forecasting expected gas-delivery and -injection rates during cycling. The reps follow the production decline-curve and make sure they withdraw initial deliveries at a rate below the curve to ensure that they have enough capacity to meet their future end-of-the-

month contractual obligations.

“The model gives us the confidence in production to allow us to get closer to the curve and sell as much as possible,” said Steve Lichty, who handles business development at Tejas. “We have to meet delivery dates on (price) hedges and if we didn’t have the gas, we would suffer multi-million-dollar losses.” He added that the model also enables the reps to understand what hedges they can commit to in the future.

Ryder Scott first performed numerical simulation on the depleted gas reservoir turned storage facility in 1993 to assist in evaluating the property before Tejas acquired it from Exxon Corp. West Clear Lake, near the Houston ship channel, is one of the largest gas-storage reservoirs in Texas.

“Exxon operated it to accommodate swings in the pipeline system. We now use the facility to store working gas to sell to our Houston ship channel customers and to expanded markets through the interstate pipelines,” said Peebles.

This is not just the classic case of an independent buying a domestic property from a major and operating it more profitably and efficiently. Under deregulation, Tejas and other interstate pipeline companies are operating their storage facilities as business centers rather than

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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 115 employees, including 64 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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Reservoir Solutions

Editor: Mike Wysatta
Business Development Manager

Ryder Scott Company
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

Wagenhofer joins growing simulation group



Wagenhofer

Thomas Wagenhofer joined Ryder Scott in January as a petroleum engineer in the reservoir simulation group. Previously, he worked at Arco E&P Technology in Plano, TX, where he provided reservoir-engineering and simulation support to Arco’s North and South America operations by conducting screening and long-term reservoir studies.

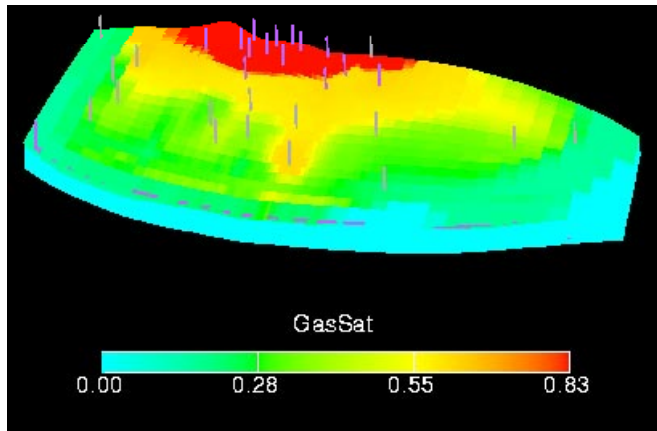
Wagenhofer’s expertise includes waterflood development and optimization studies, deepwater Gulf of Mexico recovery mechanisms and modeling, immiscible CO₂ flooding, surveillance and optimization of double displacement processes and classic reservoir performance analy-

ses. Wagenhofer, an English-speaking native of Austria, is fluent in German and conversant in French and Italian.

He earned M.S. and B.S. degrees in petroleum engineering at the University of Texas and University of Alaska at Fairbanks, respectively.

Ryder Scott formed a reservoir-modeling group last year headed by Dean Rietz, vice president. The firm has performed modeling since the 1970s, however the reorganization and latest increases in personnel will enable Ryder Scott to handle a growing demand for simulation services.

With the addition of Wagenhofer, the reservoir simulation group has four engineers, one technician and access to three other Ryder Scott engineers outside the group with extensive modeling experience.



The model shows well sites and gas saturations, with the lowest saturations indicated in blue and green, which are areas of aquifer invasion. The complex reservoir is not amenable to a conventional evaluation due to the aquifer.

transportation hubs.

As a result, great demands are placed on the technical staff to quickly anticipate maximum efficient rates for the wells in a commodity business that changes day to day. "There's a large incentive to increase deliverability to meet instantaneous swings in demand. We may be injecting gas one day and withdrawing the next," said Peebles.

The complicated reservoir is not amenable to conventional evaluation methods, such as a P/Z material-balance analysis, because an active aquifer invades varying levels of the anticline Frio sand and acts as a lower boundary with the shale cap rock acting as a sealing boundary. So Ryder Scott engineer Tina Obut performed a history match of the reservoir-pressure behavior and water-level movement during depletion and cycling to incorporate in predictive simulation runs.

"Predicting when the wells would 'water out' was the most difficult challenge," she said. Ryder Scott engineer Tim Torres performed nodal analysis to evaluate the benefits of gravel-pack and frac-pack technologies on well deliverabilities. Tejas refers

to the analysis estimates to maximize each well's deliverability without causing excessive completion pressure drawdown and gravel-pack failure.

The frac-packs limited completion pressure drops and enabled well deliverabilities of more than 100 MMcf/D of gas. "The frac-packs have allowed us to produce at safe, yet high rates, allow gas to move more efficiently and keep the fractures open while controlling the sand," Peebles said.

Additional nodal analysis was used to evaluate bottlenecks in well-tubing strings, chokes and surface flow lines. Then the historical performance and nodal analysis were incorporated into the model.

Ryder Scott continues to update the model with additional data so that it becomes an even more accurate tool to evaluate the various strategies of maximizing deliverability and injectivity while minimizing pad or cushion gas volume through well recompletions, infill drilling and debottlenecking of wellbore and surface facilities.

Since initiation of the project more than five years ago, individual well deliverabilities have increased from 30 to 40 MMcf/D to 100 MMcf/D. Ryder Scott also modeled the addition of compression facilities that have increased available gas and operational flexibility.

"We can now withdraw 780 MMcf/D of gas, which is the maximum that our dehydration facilities can handle," said Peebles. "We analyze the addition of wells and surface facilities by referring to the model. Expansion is a continuous process."

Although there has been no recent period of sustained withdrawal to check the accuracy of the model, three years ago, Tejas did withdraw enough over a time period to compare the real deliverability curve and predicted one and Peebles remarked that they matched. "Following the model, we've had no well failures either, so it's worked," he said.

Last year, Ryder Scott assigned another engineer, Miles Palke, to assist Obut in refining the model on a continuous basis. "I'm very happy with the work of Miles and Tina. When we've needed quick work for what-if scenarios, they've been very responsive and timely. Both of them can run the model, so if one is busy with another project, the other one takes over."

As technology improves, Antrim reserves increase

During this decade, northern Michigan's Antrim shale-gas area has evolved from a marginal resource considered attractive as a tax shelter to a bona-fide revenue-generating shallow-gas play. "We don't need to factor in tax credits when we estimate reserves there under an economic-limits basis," said Pat McInturff, a Ryder Scott engineer who specializes in evaluating the Antrim shale. "Most of the wells in the areas being developed today pay out nicely on their own."

Each year, production improvements have been achieved through new, cost-saving field applications. In the past four years, operators have substantially increased production from the shallow, black Devonian shale as the number of active wells jumped from 3,734 to 6,175. By September 1998, estimated cumulative production had reached more than 1 Tcf of gas. Over the past six years, Ryder Scott has evaluated all 405 units that produce an average of 531 MMcf/D of gas.

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A CMS Nomeco gas well is drilled in an Antrim shale property acquired from Terra Energy. CMS, a Ryder Scott client, pioneered production methods with the Gas Research Institute and is the largest operator of Antrim wells.

Fanny field model used to ask for more pipeline allowables

A Ryder Scott simulation of the Fanny field in Ecuador not only helped operator City Investing Co. understand reservoir behavior but presentation of the model was instrumental in persuading the government to increase pipeline allowables. "Based on the wells proposed in the simulation and supported by seismic maps, the model helped persuade the regulatory agency in Ecuador to increase allowables," said Rene Mensias, the City Investing engineer who works with the model.

The Ecuadorian National Hydrocarbons Directorate increased allocation in the Trans-Ecuadorian (SOTE) pipeline from 19,000 BOPD to 25,000 BOPD during the last six months of 1998. The new allowables permit added production from five wells drilled from the Fanny 20 pad during the first half of 1998.

City Investing asked for the increase after completing construction of the 130,000-B/D main production facility (MPF) last November. In addition, City, as well as the other private operators in Ecuador, was awaiting the latest allowable revision from the government expected in February.

The capacities of the MPF were based on predicted production rates. "Since the model can predict the future behavior of the wells, water-disposal wells included, the production facilities were constructed partly on the basis of model results," said Mensias. "The model helped us redefine the production facilities based on proposed wells and allowables and the corresponding production forecasts."

He added that the use of the model and subsequent internal refinement helped City Investing understand that the Fanny Field is a complicated combination of faults and

Please see continuation on next page



H&P rig 23 drills the Dorine-1 discovery well in City Block. Presentation of a Ryder Scott model helped persuade the government of Ecuador to grant new allowables for production from five wells drilled and completed last year.

Antrim—Cont. from Page 3

Although the first Antrim shale gas production was reported in 1940, it wasn't until the 1980s that activity increased as the low cost of shallow drilling and the characteristic flat production declines attracted producers to the highly fractured trend. Drilling permits increased from 9 in 1983 to 1,200 in 1989. A year later, Washington established the Section 29 federal tax credit for unconventional fuels and Antrim operators ramped up operations.

The tax credit is now worth \$1.02/Mcf of produced gas or \$37,200 annually for a well producing 100 Mcf/D. However, operators have learned new ways to profitably produce gas from the shale without the aid of tax breaks. In large part, they owe thanks to the Gas Research Institute, which has played a pivotal role in helping operators develop and implement new technologies.

Those applications include improved completion, stimulation, and production practices; development and application of a reservoir predictive model and optimization of fracture-treatment design. As far back as 1994, a study by GRI showed a threefold increase in net present values when using these improved technologies.

The most effective artificial-lift methods are plunger lift, progressive-cavity pumps or beam-pumping units. In these techniques are more efficient at maintaining low fluid levels and increasing drawdown to maximize production.

As a direct result of GRI's work in improving log-acquisition applications, Ryder Scott and Antrim operators now estimate gas content from density logs. "GRI research

resulted in bulk-density-to-gas-content correlations based on core analysis. We now use those analogs in our gas-in-place calculations," said McInturff.

He cautions, however, that even though the bulk density may be favorable, the pay zone must contain natural fractures to be commercially viable because of the low matrix permeability of the shale. Those permeable paths may be detected as close as a few inches apart using fracture-identification logs.

McInturff uses volumetric calculations as a starting-point upper limit for estimating the recoverable volumes from the gas in place. Analogies in the Antrim shale for complete production histories do not exist.

"The oldest producing project is 30 years old, but monthly volumes recorded before 1990 are not readily available to the public," said McInturff.

Even with all the technology improvements, "the tax credits are still a big part of the value," said McInturff, who analyzes the economics of Antrim projects using the Ryder Scott in-house cash-flow program. In addition, the tax credits have spurred a natural-gas rush to Michigan where more than 4,500 wells qualifying for the credit have been drilled in the Antrim shale play.

Now 65 percent of the state's gas production comes from shale wells. Also, the credit has encouraged new E&P methods that have brightened the gas-supply prospects for the United States. When the tax credits expire at the end of 2002, the purposes for which they were established will have been well served.

facies affected by strong aquifer action. The structural architecture of the field plays a significant role in the movement of water during depletion.

The series of structurally low channels, created by the succession of anticlines and synclines and by differential compaction, provides avenues for water advancement, said Herman Acuña, the Ryder Scott engineer who constructed the model. The model demonstrated to all parties that water production was caused by the inherent reservoir characteristics typical of a highly permeable sandstone reservoir with a strong edge aquifer drive and not by existing field-operating practices.

But more importantly, the model addressed regulatory concerns that higher initial production might lower sweep efficiencies, decrease ultimate recoveries and revenues and ultimately reduce government royalties. That scenario would have supported the continuance of restricted allowables.

“Using the active drilling case as the reference point, the model showed that oil recovery would be slightly improved by producing wells at high initial rates,” said Acuña. He conducted sensitivity runs of the 3D, black-oil model under various development schemes.

“We demonstrated to the authorities that we could have easily lost around 25 million to 30 million barrels of oil by the end of the contract, if we would have been forced to produce under the reduced allowables,” said Mensias. “The modeling report’s conclusion that the optimization of reserve recovery could be achieved through high production rates aided us in convincing the government authorities to let us use high-capacity pumps and to increase our allowables.”

City Investing also used the model to analyze recoveries of

different offset-well spacings. The operator recently drilled a second horizontal well based on geophysical analysis of 3D seismic while using the main reservoir parameters from the model.


“In addition, the model predicts the behavior of disposal wells and how they affect the final recovery of offset wells. We have seen different recoveries from the wells offsetting the disposal wells,” said Mensias.

Ryder Scott carefully integrated core, PVT data, saturation tables, historical data and aquifer characteristics in the construction and calibration of the model. As a result from the start, the predicted performance agreed closely with actual performance.

However, the difference grew to 9 percent, because the model is geared to natural production decline whereas SOTE pipeline constraints have forced City Investing, a subsidiary of Canadian company Pacalta Resource Ltd., to curtail production, said Mensias. Transport bottlenecks are common in Ecuador.

Ryder Scott designed the model to be flexible so Mensias could update it to account for the effects of planned drilling. “The model very easily handles updates for more wells, core data and production history,” he said.

Acuña and Ryder Scott geologist George Dames spent a week at Ryder Scott offices with Mensias to review how the reservoir model was built and what parameters were used in the geological model.

“The session greatly increased his ability to assimilate and understand the reservoir,” said Bruce Harwell, manger of exploitation for City Investing. Now Mensias is revising the model himself as new core analysis and production histories become available. 

Issaran cap funding facilitated by Ryder Scott reserve report

A Ryder Scott Calgary team experienced in evaluating western Canadian heavy-oil projects studied the Issaran heavy-oil field in Egypt and issued an independent report last year that served various purposes for operator Scimitar Production Egypt Ltd.

“The Ryder Scott study was critical. It assisted in determining capital requirements to undertake major expenditures for the project. The report also provided the credibility needed for what is considered a simple exploitation project in western Canadian terms of reference,” said Peter Lubey, director of exploitation engineering at Scimitar Hydrocarbons Corp., the parent company of the operator.

“The historical producing characteristics of the dolomite heavy-oil reservoir do not appear to be all that different from the sandstone heavy-oil reservoirs of western Canada.”

Establishing Western Canadian analogs to the field was difficult because Issaran has higher reservoir temperatures, lower viscosity oil and thicker net pay zones at relatively shallow depths with slightly lower porosity and water saturations. The main distinguishing feature of the reservoir, though, is the heavy-oil deposits that exist in three carbonate zones, the Upper and Lower Dolomite and Nukhul.

“The historical producing characteristics of the dolomite heavy-oil reservoir do not appear to be all that different from the sandstone heavy-oil reservoirs of western Canada,” said Doug Meiklejohn, the Ryder Scott engineer who evaluated Issaran. “However, the Nukhul’s production profile appears to be characteristic of a light-oil, active water-drive reservoir.”

Ryder Scott’s geological analysis involved analyzing digital log data and core descriptions from nine existing wells to prepare structure and net pay maps for the Issaran structure, a general north-south trend controlled by five fault

Please see Issaran on next page



Scimitar and Egyptian field personnel discuss recovery operations at this well site in the Issaran heavy-oil field.

Outsourcing seen as option during downturn

As exploration-and-development budgets are slashed, outsourcing advanced geoscience and engineering services may be one avenue to hold the line on costs, E&P companies and service providers alike say. E&P companies still have to compete using high technology, but because of layoffs and capex reductions, some may no longer have the internal resources and budgets to adequately do so.

As company after company announces layoffs, most workforce reductions are coming from the E&P sector. However, the engineering ranks may not be affected as much as other upstream work groups.



Meador

Samantha Meador, a Ryder Scott petroleum engineer, has found that a significant portion of the eliminated job positions in E&P are field personnel, including drilling and

production workers and administrative and technical support personnel at the corporate and subsidiary levels. Technical-support personnel from engineering departments have not been spared from the cutbacks.

Meador is serving on a special Society of Petroleum Engineers committee investigating the impact of the recent industry downturn on petroleum engineers. Although the committee's main goal is to encourage student interest in pursuing a petroleum engineering education, in the course of that pursuit, the group has undertaken this latest research.

"Data is scarce and it is too early to see the full extent of local downsizing, but some preliminary

feedback indicates that petroleum engineers not directly affected by layoffs are feeling the effects in their day-to-day jobs," said Meador. Those remaining engineers are finding that they have less support so consequently they perform more administrative- and technical-support tasks like data gathering, input and overall data management.

"As a result, engineers have less time to devote to large projects like the design of waterflood and gas-injection programs that require a considerable time commitment and advanced reservoir, drilling and production engineering expertise," said Meador. She anticipates that E&P companies attempting to meet corporate objectives of maintaining production and reserve growth will look to outside resources for additional engineering.

Besides staffing reductions, the cut in E&P budgets will also affect decisions on outsourcing. Last month, a survey by Reuters news service provided a glimpse of what kind of bare-bones budgets to expect this year. "World oil firms pounded by meager petroleum prices in 1998 and bracing for further weakness in the year ahead have already slashed capital spending by an estimated \$17.4 billion in 1999," the survey showed. "The lion's share of savings have been extracted from E&P budgets..."

The biggest capital expenditure reductions may come from independent companies. "Budget adjustments by a wide range of smaller independents are for the most part more severe, cutting as deep as 64 percent," the survey stated.

Reduced capital spending may be the driver for decisions on whether to outsource engineering or other types of services on an as-needed basis, because what was once steady work will now ebb and flow with project cycles. Doug

Foshee, chairman and CEO of Nuevo, said last January, "We have already taken steps ... by restructuring our outsourcing arrangements, including taking some functions in-house, outsourcing others and keeping many with Torch Energy Advisors."

Service providers also see this as a time when their services may be in greater demand. In February, Eldad Weiss, president and CEO of Paradigm Geophysical Ltd., said, "We are committed to a continuation of this expansion strategy for our geophysical data analysis services. We see the market increasingly demanding outsourced, high-value-added, expert services."

Ryder Scott has served as an outsource in good and bad times and in various capacities for a variety of clients. The most obvious example of continuing work is the current arrangement the firm has with a large independent to act as the in-house reservoir evaluation manager. In that case, an onsite Ryder Scott engineer reports daily to offices of the client and actually helps implement the reservoir evaluation work of the independent engineering firm hired to estimate reserves.

Ryder Scott has also provided reservoir-modeling services to engineering staffs without those capabilities. In other cases, Ryder Scott has provided outsourced services on an ad-hoc basis for acquisitions and divestitures, trust liquidations, prospect evaluations and other projects.

Ultimately, the management of each organization must identify which core competencies stay in-house and which should be delegated to an outside contractor.

Issaran—Cont. from Page 5

blocks and down dip by the water/oil contacts.

Derry MacFarlane, a member of the Ryder Scott geological team, said, "There are very few heavy-oil carbonate fields in the Western Canadian sedimentary basin. The Issaran dolomite is unique and the reservoirs are much thicker. The net pay in the upper dolomite is more than 250-ft thick in some areas."

Ryder Scott reinterpreted existing 2D seismic data to provide a structural

interpretation tied to mappable seismic reflectors and then conducted a depth-migration analysis. Based on the volumetric analysis, Ryder Scott estimated the original oil in place.

"The interpretation helped build a clear picture of reservoir parameters, including net pay, water saturation and porosity," said Lubej.

Ryder Scott estimated future production rates from Issaran horizontal wells and laterals by using Canadian sandstone analogies and by reviewing horizontal predictive models. "We

know what type of recoveries can be expected from those production mechanisms," said Meiklejohn.

Scimitar plans to acquire 3D seismic data on the field this year. Future analysis of seismic reflections from deeper structures may help delineate the reefal Nukhul reservoir that is not visible on the older 2D data or on a Geoquest seismic model analyzed by Ryder Scott.

Current data are from shallow wells so well control does not assist in defining Nukhul. ♦

Digital database transfer from client to consultant seen as latest step to optimize workflow efficiency

Use of digital data reduces costs, integrates earth sciences and petroleum engineering through information sharing

A leaner industry is continuing to look for ways to improve oilfield data management practices. In the last few years, Ryder Scott has increasingly received more digital information and fewer boxes of paper records and maps. Last year, clients began furnishing entire relational databases to Ryder Scott.

Those digital data were transferred as backup tape copies of such databases as OpenWorks, a Landmark Graphics Corp. program, and GeoFrame, a similar software from GeoQuest. In those forms, all types of oilfield data are stored in tables that are readable by the related suite of earth science and engineering applications at Ryder Scott.

Restoring a copy of the client's database on Ryder Scott's system eliminates costly, time-consuming preparation steps and facilitates interpretation work. This backup-tape procedure has somewhat eclipsed the older method of transferring digital data in separate files on diskettes and CD-ROMs. Although Ryder Scott typically receives digital data that way, to ready that information for analysis requires individual processing of well locations, log curves, directional surveys, stratigraphic picks and perforation depths.

Now, the consolidation of that data and other types of information into transferable, relational databases has streamlined the workflow and maximized efficiencies. At the conclusion of a project, the database is securely archived or returned to the client containing any new information or interpretation added by Ryder Scott.

"We foresee potential for considerable mutual benefit from the emerging information technologies in the petroleum industry," said Steve Phillips, a Ryder Scott geologist. "Clients planning to use us for ongoing evaluations are invited to provide copies of their digital databases. Not only would this accelerate the initial evaluation, but could greatly improve the turnaround for revisions due to new wells, recompletions or seismic surveys."

The content, format and media of digital data delivered by clients are highly variable. "Effective coordination of the digital information flow is, therefore, more and more critical to the speed and quality of a field study," said Phillips. "Opportunities for lower costs and more accurate reservoir definition increase when both parties communicate early in a project regarding the availability and structure of computerized information."

Saving Time

During a recent field study, Phillips needed an additional map from a client to adequately define the extent of a reservoir. In the past, this would have required the client to create and ship a paper copy.

This time, during a brief phone discussion, the client logged on to a workstation, produced a graphic-image file of the map and e-mailed the compressed-format image to Ryder Scott. Moments later the map was in the Ryder Scott workstation system, hundreds of miles from the client, and rolling off a 36-in color plotter.

The inevitability of more frequent, larger online data transfers prompted Ryder Scott to establish an FTP (File Transfer Protocol) site to speed up the upload and download of



Engineer Harris Ghozali (left) and geologist George Vance examine a digitized stratigraphic map. Most projects begin with an emphasis on the geological and geophysical attributes of a field or reservoir. However, from the onset, earth-science work must also incorporate knowledge about wellbore design, completion and production characteristics. Likewise, engineering work depends on the quality subsurface definition of a reservoir.

reservoir and economic data over the Internet. (See "FTP site facilitates data transmission for clients" in December–February 1999 *Reservoir Solutions*, Page 7.)

Although not an online transfer, digital data on tape recently facilitated an evaluation by Ryder Scott geologist Steve Golas. He recently returned from overseas carrying hundreds of map images on 8-mm tape cassettes, instead of lugging a thick roll of expensive paper. Golas then previewed the maps on a workstation and only plotted them when paper copies were required.

Databases Link Geoscience, Engineering

Virtually every operating company generates and interprets a wide array of digital earth-science and engineering data on PCs, UNIX workstations or both. Most have established, sophisticated databases in which this information is stored, accessed and analyzed. In such a work environment teams can perform such tasks as slicing through a 3D seismic cube, observing complex wellbore paths, correlating wireline log profiles, relating cumulative production to porosity trends or comparing test rates to seismic amplitude.

Most projects begin with an emphasis on the geological and geophysical attributes of a field or reservoir. However, from the onset, earth-science work must also incorporate knowledge about wellbore design, completion and production characteristics. Likewise, engineering work depends on the quality subsurface definition of a reservoir.

"Integration of these processes relies on sharing information effectively," said Phillips. "The widespread use of digital data has accelerated the integration of separate scientific disciplines and created closer working relationships among engineers and geoscientists."

Freeware—Cont. from Page 1

ternational currencies, making this a universal application.

The economics evaluation software computes up to four distinct product streams, two oil and two gas, and secondary product streams based on gas-oil ratios or condensate yields. The program provides options for exponential, hyperbolic, harmonic and manual product projections. It also uses “stream arithmetic” in its computations, which basically allows a user to subtract or add together streams.

Latham designed the program to be flexible by including multiple expense-, tax- and investment-parameter options as well as a provision for abandonment costs. “All the capabilities of this program take advantage of the user friendly graphics interface provided with Excel 97 together with the powerful automation available through Visual Basic add-in procedures,” said Latham.

The download file is self extracting and compressed. The “zip” file includes the program files, installation documentation (EconInstall.doc) and a complete user manual (EconManual.xls). Installation involves loading files in the Excel start directory. Ryder Scott will assist new “downloaders” with installation and basic startup procedures. However, users are encouraged to thoroughly review installation procedures and user manuals before contacting Ryder Scott.

All three freeware programs are posted on the Ryder Scott web site. They initially require passwords to enable after downloading. Ryder Scott will e-mail a password to the user after receiving information from the form that is filled out and submitted by the user.

A material-balance application currently posted on the site automatically calculates original gas in place (OGIP) and estimated ultimate recovery (EUR). A posted gas-pressure analysis program is used to evaluate the performance of producing gas or gas-injection wells. It calculates flowing bottomhole pressures (FBHP), associated back-pressure equation parameters, absolute open flow (AOF) potential and static bottomhole pressure (SIBHP).

Ryder Scott plans to continue offering freeware on a periodic basis that can be downloaded from the web site.

Editor's Note: Ryder Scott does not guarantee or warrant the accuracy or reliability of this software and disclaims its fitness for any particular purpose.

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The office has 24 staff members with wide-ranging backgrounds in the petroleum sciences. The staff has evaluated properties not only in the Western Canada Sedimentary Basin but throughout Canada from offshore East Coast to British Columbia. Last year, the Calgary staff also evaluated reservoirs in Azerbaijan, Ecuador, Egypt, Poland, Russia and the Ukraine.


“Several substantial acquisitions and divestments have been completed based on Ryder Scott reports,” said Fred Richoux, former manager of the Calgary office, who is returning to Houston headquarters.

Speaking about merger and acquisition (M&A) activity amid the industry downturn, Brown said, “Beneath that dark cloud of uncertainty sits a field of opportunity.” He remarked that “record low” oil prices have precipitated M&A activity that creates a demand for reliable third-party opinions from independent consultants.

“After the merger, some properties undoubtedly won't fit into the new plans. Once again, a third-party consultant can facilitate the divestiture of minor properties.”

“A consultant can prove invaluable in ensuring a fair and equitable recognition of each company's value,” said Brown. “After the merger, some properties undoubtedly won't fit into the new plans. Once again, a third-party consultant can facilitate the divestiture of minor properties.”

He also sees the latest round of staff cuts forced on the industry by depressed prices as creating a need for expertise that consultants can provide via outsourcing. (A related article on Page 6 states that downsized E&P companies attempting to meet corporate objectives of maintaining production and reserve growth will look to outside resources for additional engineering.)

To contact Brown, please call 403-262-2799 or visit the 37th-floor offices at 700 2nd St. S.W. in Calgary. 



Ryder Scott Co.
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

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