HGS Bulletin
Houston Geological Society
Volume 47 Number 7
March 2005

Extensional Rafting: A New Idea for Structural Control of Shelf Margin and Slope Facies Deposition in Upper Wilcox Strata of South Texas, Northwestern Onshore Gulf of Mexico

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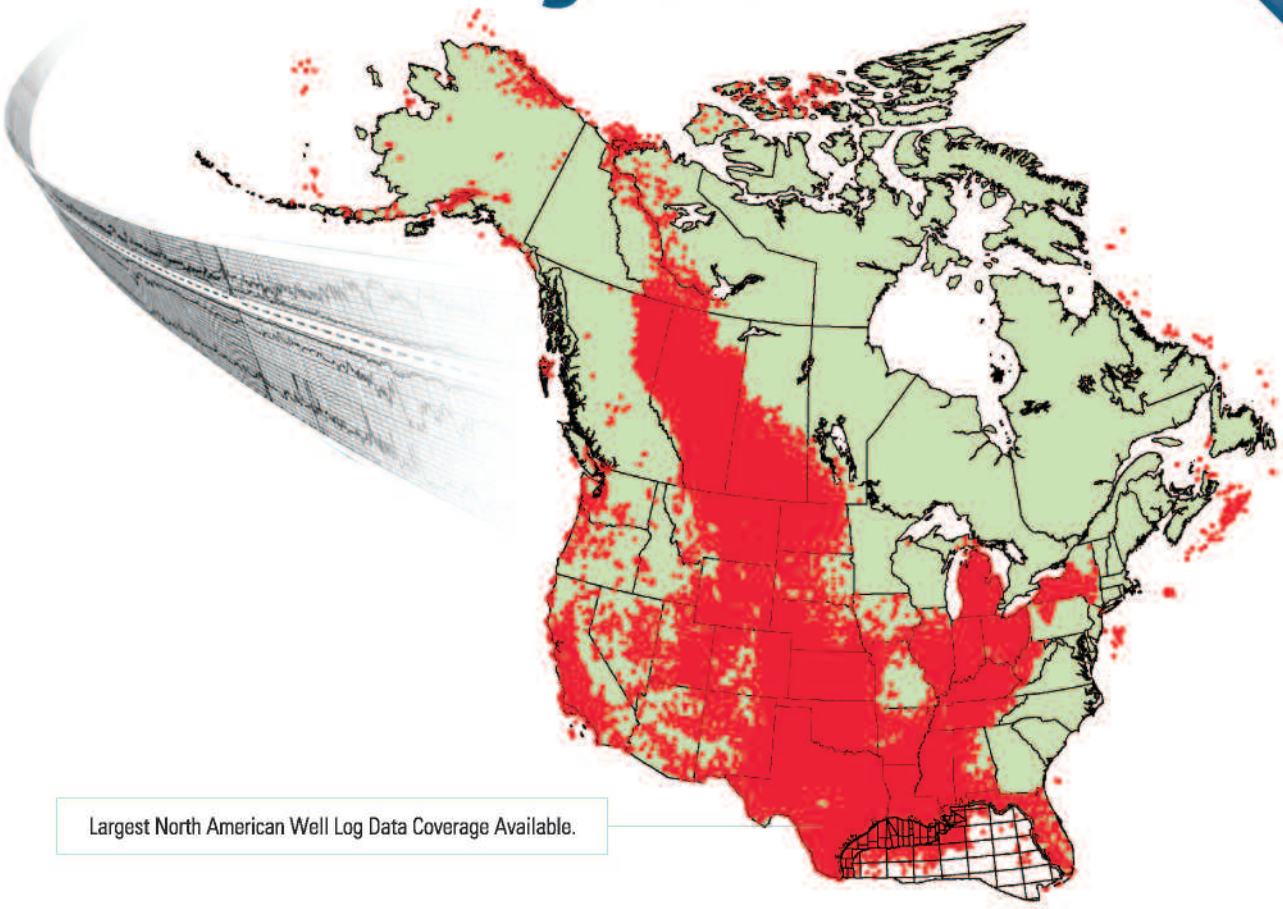

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The Bulletin
Houston Geological Society

Volume 47, Number 7 March 2005

In Every Issue

about the cover: Great Sand Dunes National Park and Preserve, 35 miles northeast of Alamosa, Colorado. North America's tallest dunes rise over 750 feet high against the rugged Sangre de Cristo Mountains. The wind-shaped dunes glow beneath the rugged backdrop of the mountains.
Photo by William R. Dupré.

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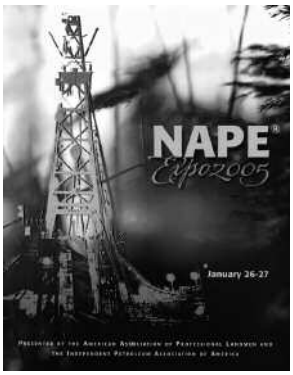

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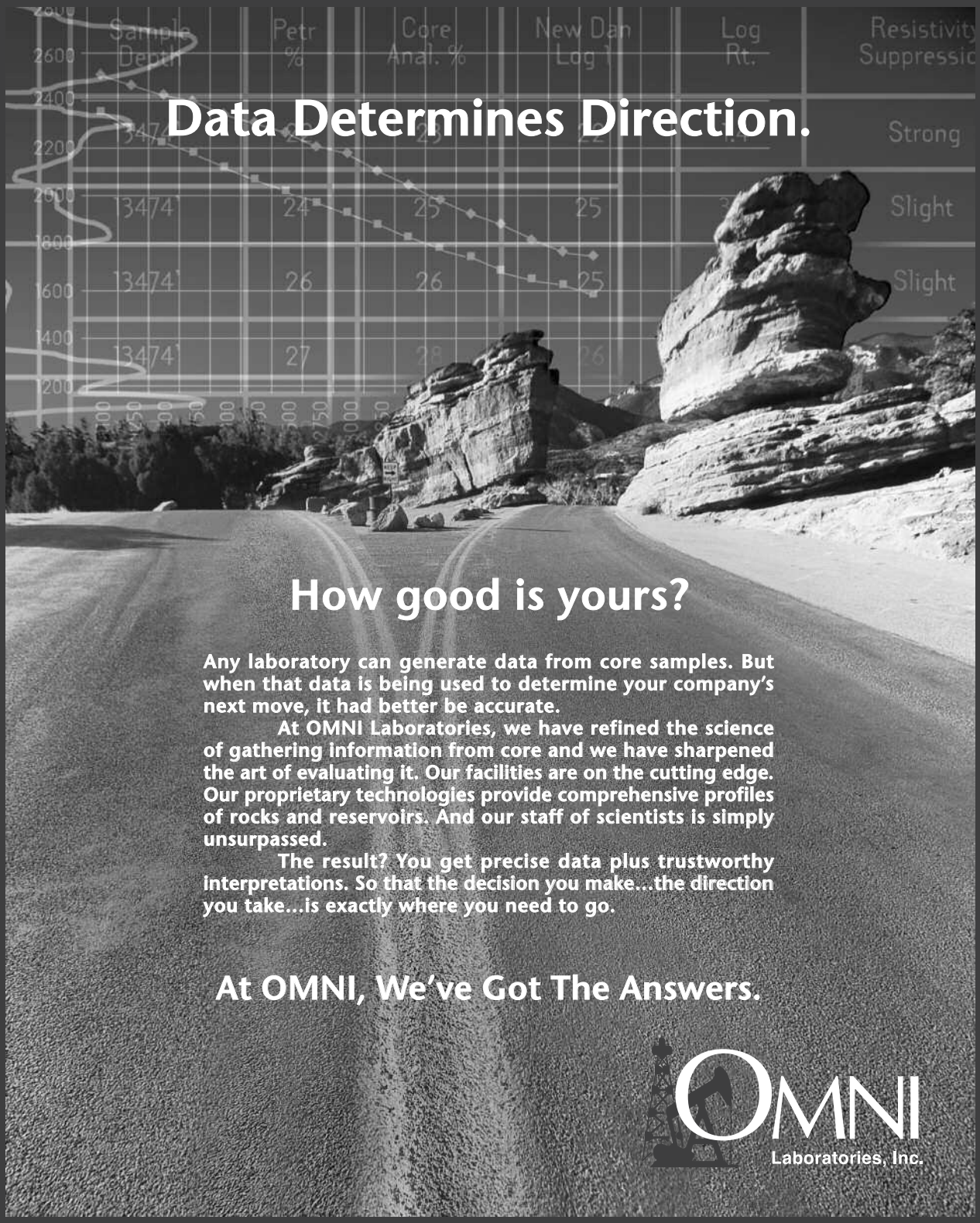
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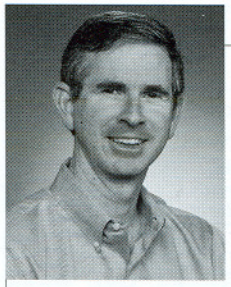

President's Letter

by Steve Levine

Declining Science Education Puts Nation at Risk

Is the United States losing its edge in science education? Science graduates from U.S. universities decrease each year. Will many, if not most, of the world's future scientific discoveries come from outside the United States?

These concerns are supported by test results and graduation statistics. Military leaders, major corporations, and immigration authorities are keeping an eye on this dangerous trend. As scientists, we must be advocates for better science education for our youth. It is critical for the success of our state and nation.

The State of Science in the State of Texas

The state of Texas must improve science education. Assessments of U.S. science proficiency scores for grade 8 public school students show that Texas trails 24 other states among a pool of 42 states and U.S. territories. Results from the 2000 National Assessment of Educational Progress (NAEP) tests further show that that only four states significantly trail Texas: California, Hawaii, Louisiana, and Mississippi.

Assessments of U.S. science proficiency scores...show that Texas trails 24 other states among a pool of 42 states and U.S. territories.

Even in Connecticut, the state with the highest NAEP science achievement test results, news is discouraging with 65% of the grade 8 students scoring below basic or basic scores. Just 35% of the students were assessed proficient (31%) or advanced (4%). Texas results show that an astonishing 77% of grade 8 students earned below basic or basic scores! A mere 23% of the students received proficient to advanced scores.

The NAEP 2005 assessment in science is to be administered again to U.S. students in the first quarter of 2005 in grades 4, 8, and 12. Results will be released in the spring of 2006 and, hopefully, the scores will not decline much further.

Asian Nations Lead in Science Test Results

Average U.S. science scores between 1995 and 2003 for some grade levels improved slightly relative to other surveyed nations. The Trends in International Mathematics and Science Study (TIMSS) results showed that grade 4 U.S students performed above average, scoring 536 vs. the international average of 489. Grade 8 U.S. students also outperformed their peers in 32 of the 44 surveyed countries. Singapore, Korea, the Hong Kong sector of China, and Japan showed much higher results than other nations surveyed while Belgium and Sweden dropped significantly. Sweden has since committed to revamping its entire science education program.

Fewer Science Graduates at U.S. Universities

At universities in the United States, first degrees in science are awarded to only 11% of graduates. Of this pool of science graduates, over half (53%) of degrees awarded were in life sciences, followed by 22% in computer science, 16% in the physical sciences (includes the geosciences), and 10% in mathematics and statistics.

Declining science enrollments by U.S. students has lead Congress to increase the number of student visas issued to qualified foreign nationals.

Because university funding levels are based largely on enrollment, geoscience and other relatively smaller departments now find themselves with insufficient resources for scholarships, student research and faculty staffing.

What Steps Can We Take as Scientists

Get involved! Volunteer in area schools during Earth Science Week or at other times with a local school district's science research center. Participate as a judge in a local science fair such as the upcoming 46th Annual Science Fair of Houston at the George R. Brown Convention Center, March 17-19. Volunteer at the Houston Museum of Science (HMNS) or other community museum, even if it is only a few hours a year. Encourage your own children to consider science as a career.

The Houston Geological Society will continue to support youth education programs. Volunteers are needed in the fall to assist with Earth Science Week and the Houston Gem and Mineral show. I encourage our members to get involved for our nation's sake! ■

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We also offer a Banner ad across the top of our monthly Newsletters sent to registered users of the Website. Job postings are free to any registered user of the Website, but they must be geoscience jobs of interest to our members. Current HGS members may post their resumes at no charge. If you have a product or service available at no charge, you can post it in the Business Directory at no charge. Geo-related Business Cards and job openings may be posted directly by any registered user and members may post their own resumes. They will be activated as soon as practical.

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Houston Geological Society Night Out

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Article and Photos
by ***Arthur E. Berman,***
editor@hgs.org

Editor's **Letter**

The End of a Stage

A PDF version of the print article contained in this Editor's Letter are available for viewing and downloading at http://www.hgs.org/2005/March/EditorsLetter/

*End of a Stage** is possibly the best short story ever written. I first read *End of a Stage* (*Fin de Etapa*) in the 1990s and life keeps returning me to it. In the story, Diana visits a provincial art museum in a sleepy town in Argentina. Here she encounters a series of paintings that hover somewhere between art and realism. The theme of all the works consists of scenes from inside a house with repetitive geometric patterns of tables, chairs, windows and an occasional distant person with back turned. The museum closes for lunch before Diana can see the final work, in a separate room by itself, considered special by the artist, according to the museum's guard.

After lunch she walks through the town and encounters an open door to a courtyard and, within, a deserted house also with an open door. When she enters the house she realizes that this house and its various rooms are the source for the paintings she saw earlier in the day in the museum. As *End of a Stage* builds to a climax that involves discovering her destiny, Diana finds herself racing back and forth between the museum and the house, trying to determine what is real and what is a reflection and representation of life.

The **Bulletin** *is no longer intended to stand alone as a print document. At the beginning of the 21st century, we find ourselves in the midst of the biggest advance in communication (the World Wide Web) since the invention of moveable metal type for the printing press in 1455…We can communicate more effectively and offer readers more, much more, and at a lower cost, by linking future printed* **Bulletins** *into the web of electronic information that is already available. Rather than a contraction, it's an expansion that cannot be achieved through the print medium alone.*

HGS 2005 Budget Deficit

Like Diana in Cortázar's short story, the Houston Geological Society *Bulletin* has reached the end of a stage. The HGS's projected budget deficit for 2005 is between $85,000 and $128,000. About 40% of the deficit is due to payroll and the next biggest component is the *Bulletin*. Membership is down to about 3800 from nearly 5000 a few years ago. Advertising income for the *Bulletin* is down; this is, in part, is counteracted by advertising income on the Website. Attendance at technical meetings (HGS General Luncheon and Dinner meetings, International and North American Explorationists meetings, Northsiders meeting) is down, especially luncheon meetings.

The HGS receives a major infusion of income whenever it hosts the AAPG annual meeting—nearly $200,000 from the last meeting in Houston in 2002. It will be two more years before income from the 2006 meeting begins to flow and, ideally, alleviate the deficit we have. The amount of the AAPG influx is not certain. In the meantime, changes must be made to cut costs, and the *Bulletin* is the largest segment of the deficit where costs can be controlled.

"Are we in financial danger?" asks HGS Treasurer Ken Nemeth. "This year, no. Despite the deficit, we have funds that we can withdraw from Schwab (our savings reserve account). We were fortunate to have had that big influx from AAPG [in 2002] to get us in to the Private Clients section [a preferred level of investment return from Schwab]. However, we have taken out $55,000 since June 1 [2004] and will probably take another $30,000 out by the end of the fiscal year. Can we 'refill' the account? Only if we get another $200K from the next convention [AAPG 2006 Annual Meeting]."

The HGS *Bulletin* currently costs approximately $16,000 per issue. Advertising covers about 2/3 of the cost and membership dues help some, though not very much. **Editor's Letter** *continued on page 8*

**The author is Julio Cortázar, an Argentine who is probably best known for the 1966 Antonioni movie* Blowup *that was based on another of his short stories,* Drool of the Devil *(Babas del Diablo). Both stories were published in 1951 as part of the book* La Autopista del sur y Otros Cuentos.

Editor's Letter continued from page 9

The magazine's cost is a function of the number of pages we design and print so the obvious way to reduce *Bulletin* cost is to reduce the number of pages in each issue.

The March of Technology

I have written every month about the role of technology and the necessary but uncomfortable change that it brings. Last month I suggested that the World Wide Web really began in 1883, when news of Krakatoa's eruption brought geology and the restless Earth to the forefront of everyone's consciousness. A new network of submarine telegraph cables changed the pace of information in the world forever.

For the past eight years, the HGS's own piece of the World Wide Web, the HGS Website, has quietly grown, thanks largely to the vision and persistence of Bill Osten and with the help of many members. For at least the last two years, with a major revision and update of the Website and hiring Dave Crane as Webmaster, the HGS Website has become increasingly important in the life of our Society. The *Bulletin* and the Website have become more closely integrated and intertwined. Members have come to see both as sources of information about, and interaction with, the organization.

Like Diana in *End of a Stage*, we find ourselves going back and forth between the *Bulletin* and the Website searching for destiny or perhaps just trying to figure out how to register for the next HGS event that interests us. We are unquestionably at the end of a stage in which the print and electronic voices of the HGS were separate.

The Next Stage for the *Bulletin*

Last month we tried an experiment. We put the entire *Bulletin* on the HGS Website a few days before members received the print version in the mail. What appeared at the end of January at http://www.hgs.org/2005/February was a fully interactive *Bulletin*. It combined sites already developed by Webmaster Dave Crane to give information about technical talks and other HGS events, with PDF extractions of the features and columns in the February *Bulletin*. My February "From the Editor" column was presented with full-color figures (unlike the print version) that Dave made "clickable" so they could be zoomed and copied at high resolution. This was really exciting!

The March 2005 *Bulletin* has a new format that is different from previous issues. The announcements of technical talks, meetings and events are presented in true abstract format, 600 words or less, as opposed to the sometimes extended versions we have seen previously of 2000 words or more; where lengthier summaries are submitted, you will find these in full on the Website. We were much more selective about which, and how many, photos to put in the print *Bulletin* but will include all photos in the Website mirror. Feature articles may be slightly abridged in the print *Bulletin* but may be found unabridged on the Website.

The *Bulletin* is no longer intended to stand alone as a print document. At the beginning of the 21st century, we find ourselves in the midst of the biggest advance in communication since the invention of moveable metal type for the printing press in 1455. Technology has made print communication a more expensive and less effective medium for information exchange than some combination of print and electronic alternatives. I feel I can communicate more effectively and offer readers more, much more, and at a lower cost, by linking future printed *Bulletins* into the web of electronic information that is already available. Rather than a contraction, it's an expansion that cannot be achieved through the print medium alone. The print *Bulletin* is meant to provide basic information about Society events and to deliver solid technical content in feature articles and columns. The idea is that the truly interested and motivated scientist can satisfy all his/her curiosity through a combination of print and electronic investigation.

I don't anticipate that the print version will be drastically different on the face of things, at least initially. All the familiar and dependable features will remain as they have always been: the phone list, the calendar, the meeting announcements and abstracts. I envision issues of 50–60 pages (60 was the average before my editorship) that provide more than enough basic information about events and probably more content than many read.

The intent is not to forcibly convert people into Web surfers or to gut the *Bulletin*. The intent is to adapt to budget issues and the march of technology. The hope is that, instead of less, the new integrated *Bulletin* and Website will be more to those who choose to use both and not appreciably or noticeably less to the more casual member-reader. I think the people most affected by the change will also be those most willing and accustomed to going online for more.

I intend to keep quality in the *Bulletin*—good covers, glossy paper, as many color figures as our advertising allows, and, most of all, quality articles and writing and timely reporting on Society events.

Diffusion Theory predicts that approximately 5% of you will immediately and enthusiastically embrace this change because it is a good idea. It also predicts that about 15% will disparage the change and vow to accept it "over my dead body." Most will wait-and-see but will adopt and accept the new form in time. As with all inventions, you must explain the application to its inventors until it works correctly for you; the *Bulletin* and Website await your comments and reactions so we can make the new product better.

In Cortázar's short story, Diana was accustomed to recognizing the many different stages in her life. Each involved a new set of friends, lovers, places, hotels and restaurants. She passed comfortably from one stage to the next because, like the geometric repetition of tables, chairs, windows and rooms in the provincial fine arts museum, one stage in her life was not substantially different from the previous, or the next. What was revealed to Diana in the small town with the art museum and the deserted house was that she was an observer of life and had avoided the commitment and risk that come from engagement.

The next stage for the *Bulletin*, for many, may not be particularly noticeable, especially for the more casual reader. It will be, however, both a quantitative and qualitative change that may only become obvious over some period of time and with use. It will definitely not be a simple re-ordering of familiar items and patterns. It is a commitment and an experiment and, yes, there are risks that come along with this change.

We who work on the *Bulletin* and the Website do not have everything figured out and we will be discovering how to do this as we proceed. Dave Crane and I request and need input, help and patience from members and readers as we move forward into our next stage. ■

Many thanks to Dave Crane for his advice and suggestions in the preparation of this Letter and for his ongoing collaboration with the Bulletin *as HGS Webmaster.*

See this month's Web *Bulletin* mirror at http://www.hgs.org/2005/March/ and simply change the month to see future issues.

Letters to the Editor

Mr. Arthur E. Berman
Editor, Houston Geological Society *Bulletin*

Dear Mr. Editor,
My learned friend, Dr. István Bérczi, President of the Hungarian Geological Society, has relayed to me your article "The Northern Sumatra Earthquake of 2004" published in the latest number of your Bulletin. The article is an exceptionally well-written presentation of the scientific background of this unprecedented cataclysm. Please accept the warm congratulations of a layman who witnessed this tragic event from the direct neighbourhood (Java). I wonder, whether you would consent to this article being circulated among top Indonesian decision makers and foreign diplomats based in Jakarta, for a more profound understanding of what really happened. I would be honored if my Embassy could disseminate your article, truly a gem of science made comprehensible to the un-initiated. The current international summit on infrastructure development under way in Jakarta, attended by most Government ministers and top businessmen of Indonesia, would be an exceptionally good setting to distribute your article, in, let's say, 50–100 copies. If you consent to my idea, my Embassy is ready to do the job. This unorthodox approach might be useful as the people I mentioned would rarely have the opportunity to reach your Website or obtain your publication. I hope I am not overtly intrusive with my approach. Seeking your indulgence, I remain, Sir, most respectfully, Dr. György Busztin Ambassador of Hungary Jakarta

———

Mr. Berman,
As a person who has lost a work companion (his wife, aunty and uncle also died), I am disgusted in you [sic] smug article of how you 'could have told us it was going to happen' or 'that it should not have been a surprise.

Someday when you loose [sic] a friend or family member (in a motor vehicle accident) and someone tells you — I could have predicted they would die in a road accident, don't you read the statistics — I am sure you will be understanding and laugh it off.

You really must be a jerk.

If you want to continue such article or follow this matter further, you have my e-mail address, I can assure you I will forward all such articles and communications to the appropriate people within the oil and gas industry.

Thank you for nothing.
David Richards
Principal Consultant
Australian Industry Training Providers Pty Ltd

———

Sir:
I, too, made the 100th anniversary field trip to Spindletop, led by Mike Halbouty.

What was not mentioned in the recent HGS articles, however, is the fact that Mr. Halbouty also led the 50th anniversary field trip to Spindletop.

Truly remarkable!

Respectfully,
Bil Kalil
HGS Member #3587

———

Career Choices
Dear Editor:
It was with a semi-heavy heart that I read a reminder in a recent HGS Bulletin that the particular issue would be the last for members who hadn't paid their 2004–2005 dues. The comment reminded me that next year will mark my own last issue, since I'm in the process of dropping most memberships in oil and gas related organizations now that I'm one **Letters to the Editor** *continued on page 11*

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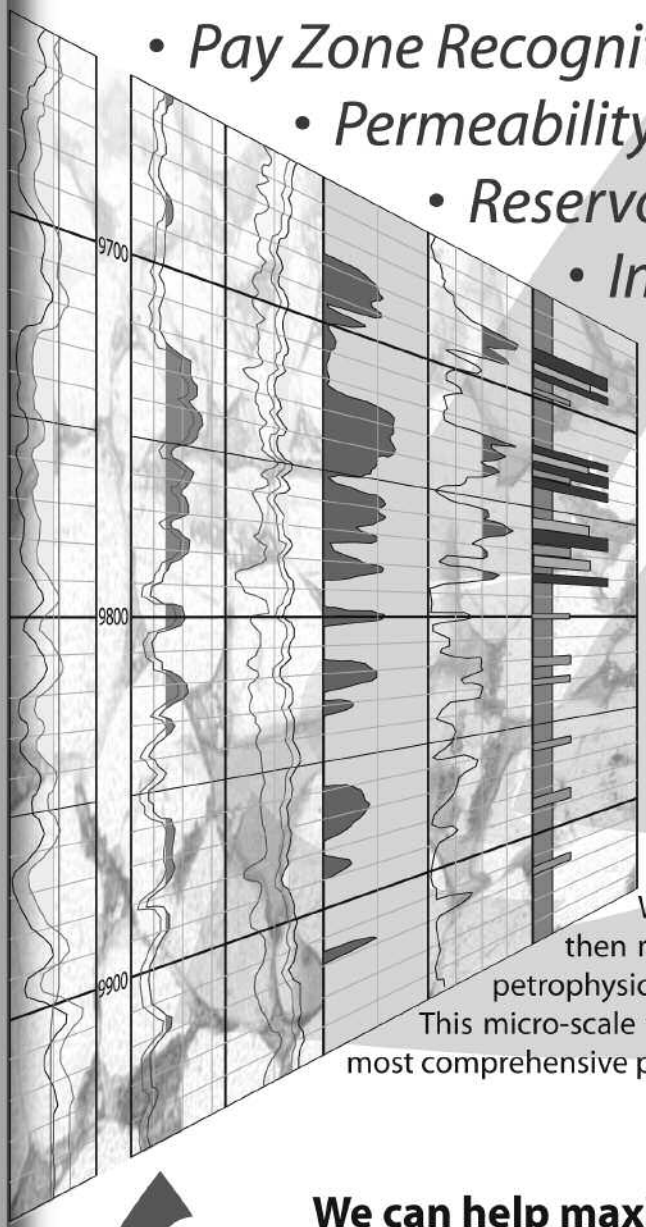

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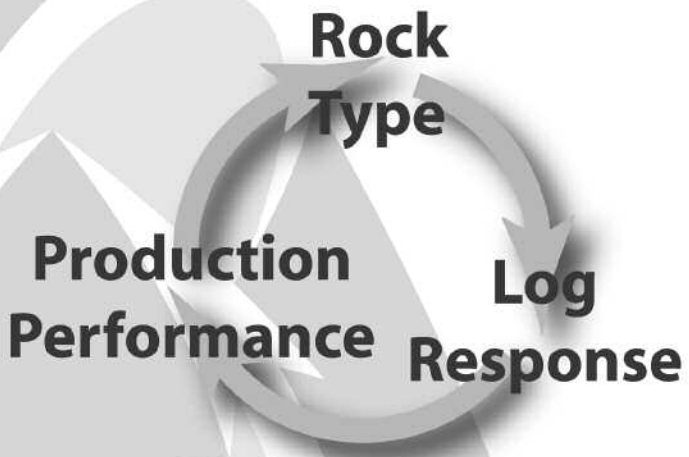

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Letters to the Editor continued from page 9

of those 60+ year-old geophysicists/geologists who have been nudged into retirement and/or new careers by company downsizings. I may not get much sympathy, since I have now moved from Houston back to Western Colorado, where my grandchildren represent the sixth generation of our family to have continuously lived and worked in the county. I, also, now have an interesting, low-paying, government job.

I stayed in Houston a little longer than I should have, since I thought anyone should be able to sell a 300 BCF prospect—even without the 3-D survey. How wrong I was—probably due to underestimating the negative impact of the relatively large $3–4MM drilling costs and the probability of minor (if there is such a thing) amounts of CO_2 and H_2S. The inability to get access to the 3-D dataset again and the generally poor market for wildcat prospects probably didn't help either, even though the majority of the acreage was available.

I would like to offer a couple of comments and bits of advice from my biased, but distant, perspective. First, give yourself no more than two years to remain in the pool of prospect promoters/consultants if you know you would really prefer to live in another part of the country. Move back there and start something new, particularly, if you haven't made something equivalent to six months of your previous salary or sold half your prospect within that two-year period of time. Second, become active in the local and national professional societies. Look at the attempts to reorganize society operations to become more efficient, put everything on the internet, etc. The first volunteer job is the hardest to commit to—the rest come almost too easily, until you're president of something. The last time I volunteered to work on the OTC, I got in free and got free parking.

Right now, I plan to retire my 70-page report of maps and displays along with the package of detail logs to the basement (for those of you in Houston and New Orleans, that's a big hole in the ground under your house where you put the kids' bedrooms and store stuff) while I wait for the next boom.

Jim Wood
1390 East 3rd Street
Delta, Colorado 81416
Phone: 970-874-5036
E-mail: jawood04@msn.com or
jawood.63@alum.mines.edu

Dear Art:
I would like to congratulate you to your HGS Editor's Letters. They are well written, extremely lucid and to the point. Most importantly, they address very relevant issues. I can hardly wait for the next one to arrive.

So it will not surprise you that I enjoyed the one on "New Ideas and Their Diffusion" tremendously (HGS *Bulletin*, Dec 2004). It reminded me that Amoco did address remaining opportunities in its evaluation of international basins and plays between early 1987 and about 1994.

Amoco, initiated a worldwide Exploration New Ventures group. The group had initially about 65 people in 5 regional teams and a worldwide basin studies team, which I led. This was one of the most rewarding assignments of my career. We had the task to look at all basins where Amoco was not represented and select the best ones for entry regardless of the current political conditions.

We created a worldwide basin catalog in 1987 and 1988, first on paper and then digitally. The basin catalog contained relevant geological information and well statistics on most basins, sometimes down to the play level. The catalog was built based on major geological contributions by Ray Leonard, Dick Steinmetz, Pete Norton, Willis Tyrrell, Don Rusk, Chris Heath, Gary Minke, Martin Cassidy, George Kronman, Pete Carragher and many, many others. Most of the drilling statistics we took from the Petroconsultants (now IHS) data base and similar sources. It was the early work by Dick Steinmetz and Ray Leonard and later work by Pete Carragher using well statistics that allowed us to apply simple methods to assess remaining potential quickly. We knew, of course, that drilling history alone was not opening up new plays. For that we used strong geologic reasoning and wildcatters' instinct.

In my later functions I always used the basin catalog for prioritization of opportunities. Amoco entered new basins and plays in Azerbaijan, Algeria, Angola, Norway, Romania, Russia, Trinidad, Venezuela etc. We also exited certain basins and we re-focused our efforts based on remaining potential. One example for re-focusing was that Amoco entered the Nile Delta basin in Egypt in 1987 when the maturity of the Gulf of Suez basin became apparent (Amoco and BP extracted more than 4 billion gross barrels of oil from the Gulf of Suez).

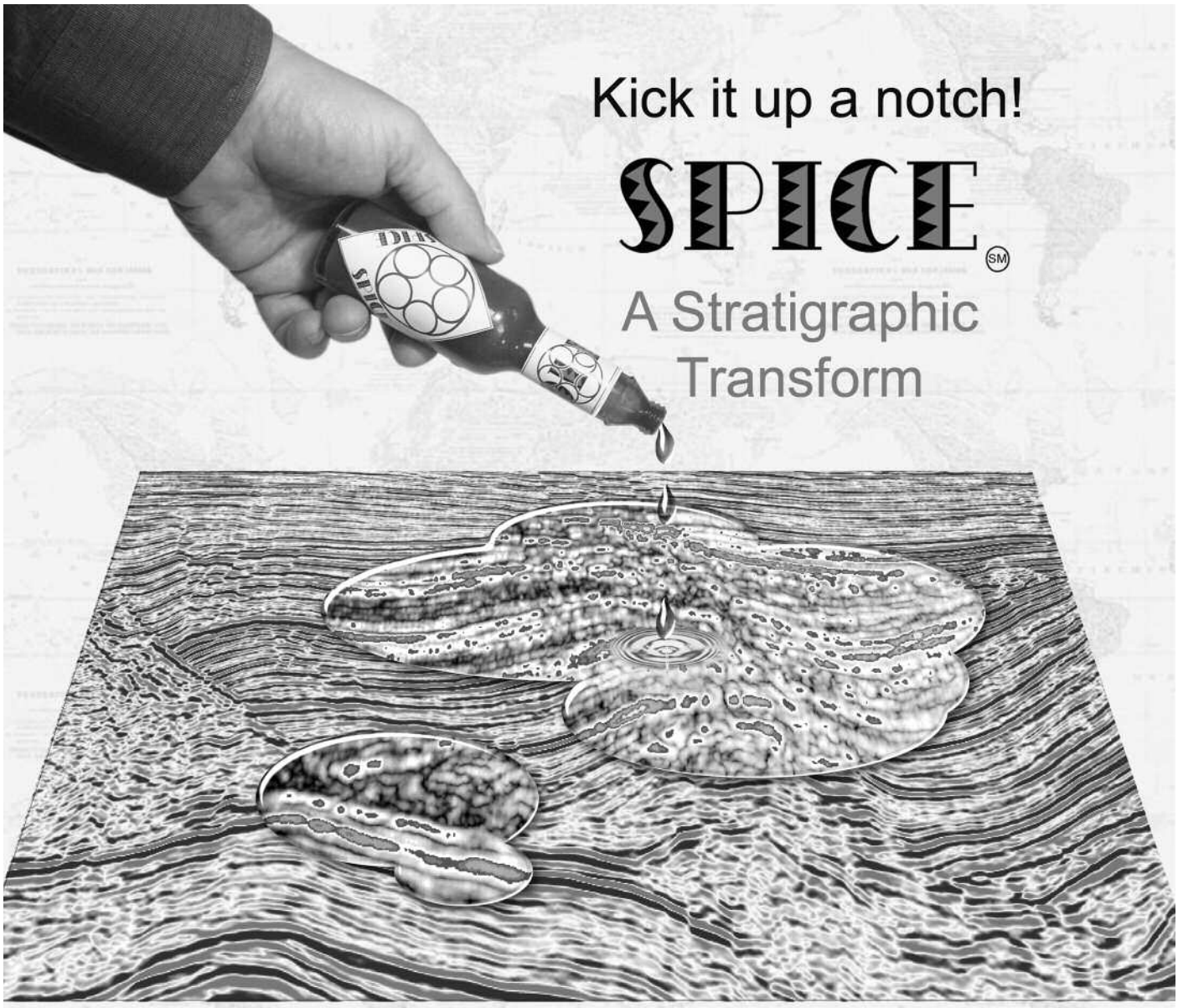
In all, I would say that the diligent evaluation of the remaining potential in basins and plays, while far from the rigorous statistical model of "Diffusion Theory," has greatly improved the quality of Amoco' s exploration opportunities in the 90s. I published some of the simpler statistical methods (Schollnberger, 1996).

BP and Amoco merged in December 1998. There is no doubt that Amoco's excellent portfolio of exploration prospects at merger time played a major role in making BP the "largest oil company" according to *Fortune* magazine (2004).

Art, keep those wonderful "Editor's Letters" coming.

Wolfgang E. Schollnberger

[Editor's note: The cited article is republished on page 13 of this issue.]



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By ***Wolfgang E. Schollnberger***
Vice President Exploration and Production Technology
Amoco Corp., Houston, Texas.

First Steps Toward Focused Exploration

This article was first published in OIL GAS European Magazine *in 1996 and is reprinted with permission from the Urban-Verlag, Hamburg.*
SCHOLLNBERGER, W.E. (1996): First steps Toward Focused Exploration: *OIL GAS European Magazine*, vol. 22, (1/1996), pp 10–13, Hamburg - Wien (Urban Verlag).

ABSTRACT

Focus is an important ingredient of an exploration effort that aims for creation of financial wealth. The simple statistical methods compiled and discussed in this article are useful tools in targeting exploration at the right basins and plays.

1. INTRODUCTION

Exploration builds the future for the petroleum industry. Exploration also is a risky business that requires the application of complex and costly technologies. Over the last decade, return on investment has been disappointing for exploration and production companies, and it has become a big challenge to create value growth through exploration [1].

Exploration in emerging and established basins has generally a higher chance to create financial growth than exploring in mature basins, and is much less risky than exploring in frontier basins. New technologies...can boost finding rates and flatten or even temporarily reverse declining finding rate trends.

The capability to build a diversified portfolio of exploration options that generate high financial value is based on recognizing the resource potential of basins or plays and the skill to focus on the best ones. Of course, fiscal aspects, operational/cost aspects and marketing/price aspects are as important as the resource aspect. In this article, however, we shall present a few simple methods which have proven useful to predict the remaining petroleum resources of basins and plays. All the discussed methods are based on the results of past drilling and cannot directly be applied to undrilled basins/plays.

2. PREDICTING FUTURE RESOURCES FROM PAST DRILLING

We found a few simple statistical cross-plots very helpful in focusing exploration early, before the appropriate high-tech explorations methods are applied.

All cross-plots discussed in this article can he applied to basins or to plays. If applied to basins they require only three input parameters:

- location (where each exploration well was drilled)
- time (when each exploration well was drilled)
- the petroleum resources (liquid or gas discovered by each exploration well, including zero for a dry hole).

Location and time are straightforward; the resources discovered are not because the estimated resources of a petroleum field may not be fully known from one exploration well only; later drilling and production history often leads to upward or downward revisions of resources. In this article, we always use the most current resource estimate for a field and attribute it back to the first exploration well drilled into that field.

If the cross-plots are applied to plays, a fourth input parameter is required:

- the rock formation(s) in which the petroleum resources have been found in a well.

All four inputs are generally openly available from a number of sources, such as national and state geological surveys, national and state petroleum companies, and from commercial enterprises such as Petroconsultants S.A.(Geneva, Switzerland) for fields outside the United States and from Petroleum Information Corporation (Littleton, Colorado) for fields within the United States.

Let us now discuss how these simple inputs can help focus an exploration effort in the right areas before any time-consuming geological field work or extensive stratigraphic, geochemical, seismic and drilling activity is started.

Letter to the Editor *continued on page 14*

Letter to the Editor

continued from page 13

2.1. RESOURCES PER SUCCESSFUL EXPLORATION WELL

On the abscissa we plot the successful exploration wells in a basin or play in time sequence as they were drilled with the first well positioned nearest to the origin and equal spacing between each well. On the ordinate we scale the resources found per exploration well, e.g., in barrels of oil equivalent (BOE). In most petroliferous basins the resources found per successful exploration well increase rapidly after some initial dry holes, then the growth flattens, and finally, the resources added per well decline (Fig. 1). This cross-plot is useful in roughly estimating at any time, resources expected to be found by future successful exploration wells in a basin or play; its usefulness can be further increased if it is combined with success ratios (Fig. 6).

For many petroliferous basins, the curve has the general shape exhibited in Figure 1, and it can be subdivided into distinct portions which characterize the exploration maturity of a basin/play (Fig. 2). The portion before any commercial quantities of oil or gas have been found is called the frontier stage; as the resources found in each exploratory well increase we say the basin is in the emerging stage. When the resources found per well crest and taper off, the basin is in the established stage, and once the findings per well decline overall, the basin has reached the mature stage. Exploration in emerging and established basins has generally a higher chance to create financial growth than exploring in mature basins, and is much less risky than exploring in frontier basins. New technologies such as new 3D-seismic acquisition, 3D-processing and 3D-visualization, migration before stacking (especially in pre-salt and overthrust plays), amplitude versus offset (AVO) analysis, etc. can boost finding rates and flatten or even temporarily reverse declining finding rate trends. Empirically, we find that petroliferous basins with one exploration well per 500 km^2 to 5000 km^2 are in the emerging stage, basins with one exploration well per 50 km^2 to 500 km^2 are in the established stage, and basins with more than one exploration well per 50 km^2 are in the mature stage. This empirically determined broad relationship between exploration well density and basin maturity stages can help in estimating how many wells it will take to fully explore a basin, although it is not valid for all basins.

In many publications graphs similar to Figure 1 are plotted with time (e.g., years, equal spacing between each year) on the abscissa instead of successful exploration wells. We recommend against

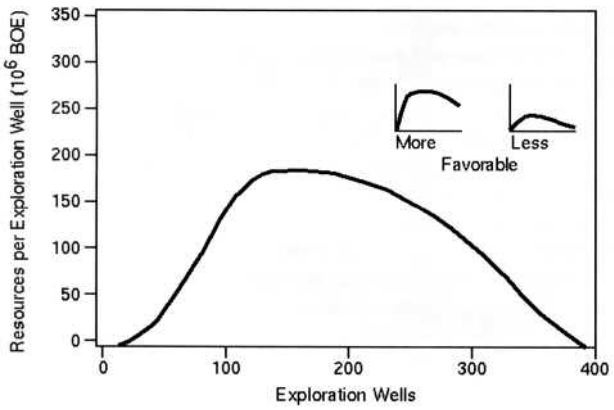

Figure 1. Resources per exploration well; generic example.

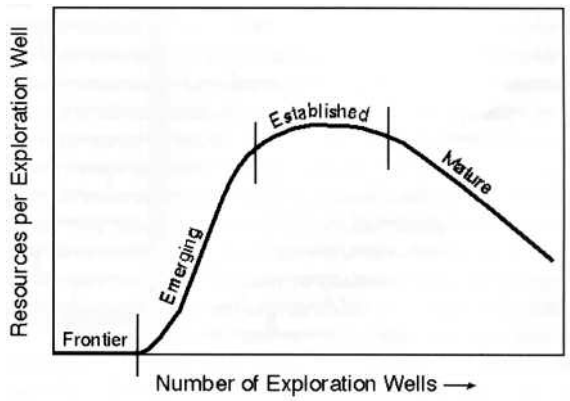

Figure 2. Basin maturity, based on resources per exploration well; generic example.

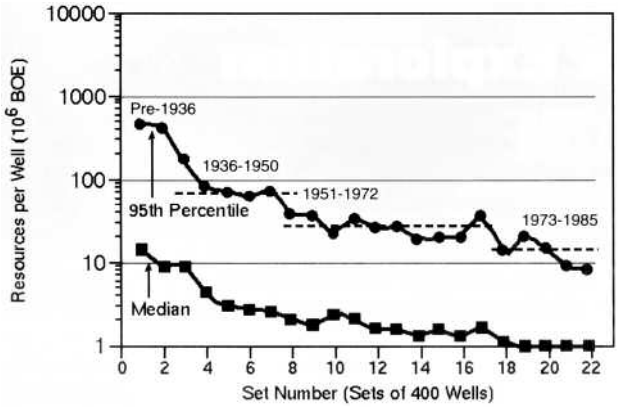

Figure 3. Trends in discovery size: United States for wells with liquid resources.

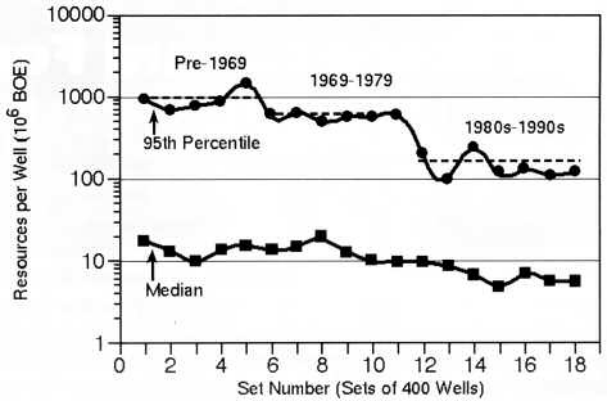

Figure 4. Trends in discovery size: Outside United States for wells with liquid resources.

that practice because the resulting cross-plot can be very irregular and difficult to interpret. The number of wells drilled in basins/plays may vary greatly from year to year for a variety of reasons. For example, military actions may temporarily prevent drilling or a government might open acreage for exploration intermittently, resulting in spurts with high exploratory drilling activity separated by periods of low activity. This all makes a cross-plot with time in the abscissa less useful for determining the maturity of a basin/play or the resources that future exploration might find.

In a variation of the cross-plot shown in Figure 1, we can bundle the successful exploration wells of a basin or play into sets of, let us say, 400 wells, and plot the sets on the abscissa in the sequence as they were drilled, with the same spacing between sets. On the ordinate the average field size for each set is plotted (Figs. 3 and 4).

For a global analysis of successful exploration wells recorded in Amoco's basin catalogue, we have grouped the wells into sets of 400. The results for all exploration wells that found oil have been plotted for the United States through 1985 (Fig. 3) and for the world outside the United States through 1991 (Fig. 4). It can seen that the resources found per well decline stepwise over time; it is also evident that the expected amount of oil in the U.S. on average is smaller than 1 million barrels, whereas outside of the U.S. the amount is still around 10 million barrels, an order of magnitude higher! No wonder that U.S. majors, but also U.S. independent oil companies, are now looking outside of the U.S. to replenish their resources. More oil found per well also means that the cost of finding outside of the U.S. is generally lower than within the U.S.

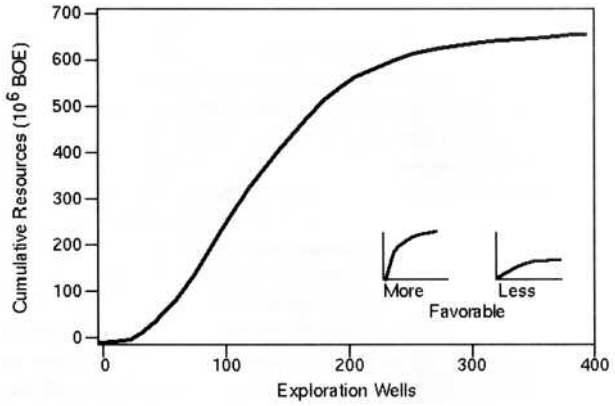

Figure 5. Cumulative resources; generic examples.

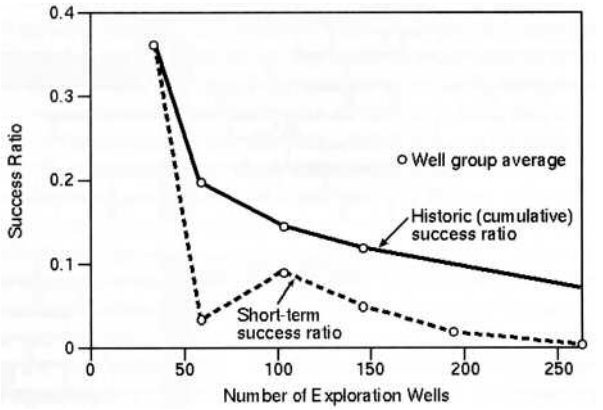

Figure 6. Success ratio: North Sumatra Basin, Indonesia: wells with less than 1 million BO counted as dry holes [2].

2.2. CUMULATIVE RESOURCES

On the abscissa we plot each successful exploration well in a basin/play in time sequence with equal spacing between each well. On the ordinate we plot the cumulative resources found in that basin for each well (Figure 5). This cross-plot is very useful in estimating the ultimate petroleum recovery from basins or plays.

In most petroleum basins the cumulative resources found by a sequence of exploration wells increase more rapidly during earlier drilling than during later drilling. Exploring in a basin whose cumulative resources are rapidly increasing is generally more favorable than drilling in a basin with small incremental resource additions per well. It is interesting to note that the initial slope of the cumulative resource curve is steeper for carbonate platform plays than for deltaic elastics plays: field sizes are usually smaller in deltas and discoveries are normally spread over a longer time period than in carbonate platforms.

2.3. SUCCESS RATIO

On the abscissa we plot all exploration wells (not only the successful ones) in a basin/play in time sequence. On the ordinate we plot the success rates of groups of exploration wells, let's say for wells 1 through 35, 36 through 58, etc. Both a short-term success rate for each individual set, as well as a historic success rate of all sets until a certain point in time can be derived. Figure 6 shows the decay of success ratio with exploration maturity in the North Sumatra Basin, Indonesia (wells with less than 1 million BO counted as dry holes). After 250 wells, the short-term success ratio had dropped effectively to zero, while the cumulative success ratio still indicated 1 in 10 [2]. Generally, success rates in petroliferous basins increase after some initial dry holes, then they start to decrease. Short-term success rates, however, can go up even if historic success rates decline, e.g., as a consequence of new technology; this is very well demonstrated in many basins around the world with the extensive use of 3D-seismic acquisition combined with advanced 3D-seismic processing techniques since 1992. The exploration success ratio in certain plays in the Gulf of Mexico offshore Louisiana and Texas increased from about 0.15 to 0.40; similar improvements are reported from the mature Hugoton Basin of the mid-continent U.S., where in the deep Morrow play, success rates increased from about 0.25 to 0.65, and from many other places.

Letter to the Editor *continued on page 16*

Letter to the Editor

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2.4. FIELD SIZE HISTOGRAM

We select classes of field (=discovery) sizes, e.g., each class around a certain median size, and plot these classes on the abscissa with field sizes increasing away from the origin. On the ordinate, we plot the frequency of each class (Fig. 7); in this way we construct a histogram of the frequency of field (=discovery) size classes.

Many basins or plays indeed show a Gauss normal distribution of the frequencies of field size classes. For basins and plays where the assumption of a normal distribution of field size classes seems reasonable, the field size frequency histogram identifies field size classes that are missing or under-represented. The assumption can be made that future exploration will discover the missing fields in those size classes. The histogram also allows some estimation of the ultimate petroleum recovery of a basin/play. The example given in Figure 7 represents the Arabian Basin in the Middle East, the world's most prolific petroleum basin. The data base used is the Amoco basin catalogue, with most discoveries through 1992 included. The shading within each field size class indicates the decades when the discoveries were made. It is obvious that even in the Arabian Basin certain field sizes are under-represented if the field sizes are correct and the assumption of a normal distribution of field size frequencies is right; under those assumptions future exploration drilling in the Arabian Basin could lead to the discovery of some 10 to 15 fields with recoverable reserves of between 200 and 350 x 10^6 BOE and some 5 more fields with recoverable reserves between 2800 and 5400 x 10^6 BOE.

2.5. CUMULATIVE FREQUENCY OF FIELD SIZES

On the ordinate we plot field (= discovery) sizes increasing away from the origin (preferably on a logarithmic scale). On the abscissa we plot the percentage of fields (=discoveries) smaller than a certain field size on the resulting curve. This cross-plot gives a good idea about the distribution of field sizes in a basin/play. Basins/plays with a high frequency of large fields are more favorable to value-adding exploration than those with high percentages of small fields.

Figure 8 shows the cumulative frequency of field sizes for the British part of the North Sea Basin plotted for fields discovered by exploration in the 1960s, 1970s, and 1980s. A small overall decline in field sizes over time is indicated. Once again, the data base is the Amoco basin catalogue.

3. EXPLORATION EFFICIENCY

Using the same basic information as for all the graphs in this article (see Section 2.0) we can construct a graph that indicates how efficient exploration efforts have been in a basin or play (Figs. 9 and 10).

On the ordinate we scale the cumulative resources found in a basin or play (e.g., 109 BO). The abscissa is used in three different ways:

a) to plot the successful exploration wells in a basin/play in order of the resources found, the well that found the largest resources nearest the origin, the well with the second largest resources second, etc., until the well with the smallest resources is plotted last (we call this "Well Rank A");

b) to plot the successful wells in time order as they were drilled ("Well Rank B");

c) to plot the successful exploration wells in such a sequence so that the resulting cumulative resources curve becomes a straight line, connecting the origin with the total cumulative resources found ("Well Rank C").

Each of the three well ranks results in a different cumulative resources curve. Obviously the cumulative resources curve that results from "Well Rank A" represents 100% exploration efficiency: we found the largest field with the first exploration well, the second largest field with the second exploration well, etc. It can't get any better! The straight cumulative resources line resulting from "Well Rank C" can be seen as representative for random drilling with 0% exploration efficiency. The area between 0% line

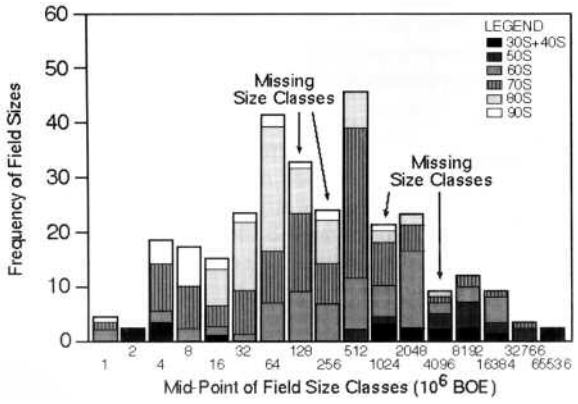

Figure 7. Field size histogram:frequency of discovery sizes, Arabian Basin through 1980.

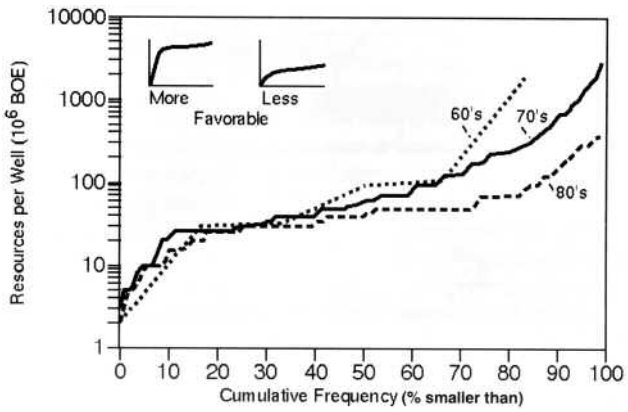

Figure 8. Cumulative frequency of field sizes: North SEa basin, U.K.

("Well Rank C") and the cumulative resources curve from actual drilling ("Well Rank B") as a percentage of the total area between the 0% line ("Well Rank C") and the 100% curve ("Well Rank A") is the exploration efficiency. lt is 79% in the Arabian Basin (Fig. 9) and 13% in the pre-salt play of the Gabon Basin (Fig. 10). lt should be noted that the efficiency index can be negative, indicating that the efficiency of exploration drilling in that basin or play is worse than the efficiency of random drilling would be.

It is likely that a basin/play with low exploration efficiency will have more resources remaining than a basin/play with high exploration efficiency. There is no doubt that technological advances can improve exploration efficiency.

4. CONCLUSION

The simple statistical methods discussed in this article are robust management tools that allow us to make generalized, high-level predictions about future success ratios of exploration wells, future field sizes and remaining petroleum resources in basins, or even more importantly, in plays. The cross-plots are useful in ranking basins or plays according to their resource potential before more precise exploration methods are applied. Constructing the simple cross-plots is a first step towards building a portfolio of exploration options that create wealth. Try it and make your exploration investment work! ■

NOMENCLATURE

BO: barrel of oil
BOE: barrel of oil equivalent
1BOE=1BO; 1 BOE=6,000 cu. ft. of gas
Petroleum: Oil, gas, gas liquids
Resources: The amount of petroleum that can ultimately be recovered from a field using all known, economically justifiable recovery methods, including future wells
Booked Reserves: The amount of petroleum that a company books as recoverable for existing well completions

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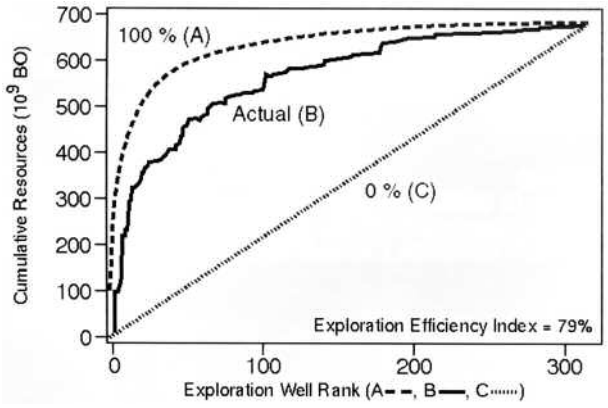


Figure 9. Exploration efficiency: Arabian Basin through 1990.

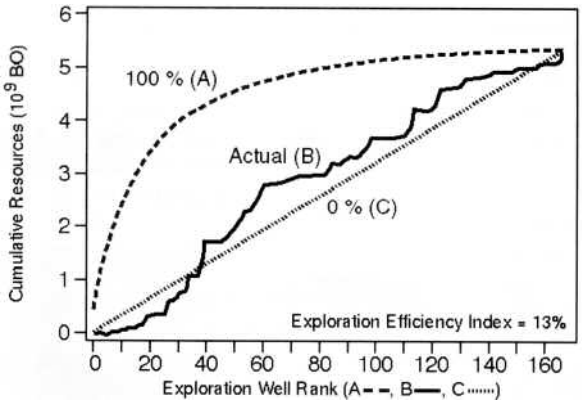
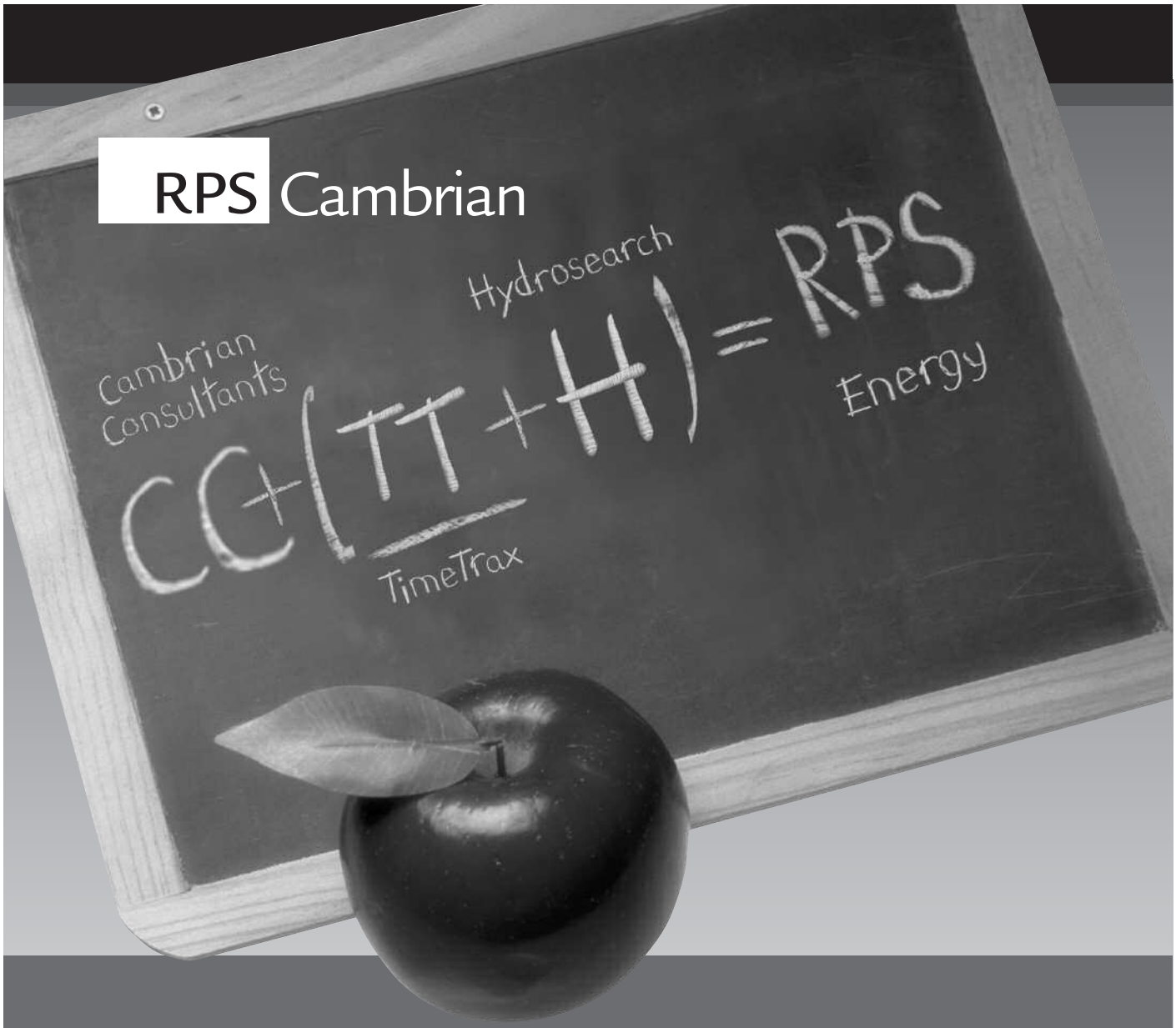


Figure 10. Exploration efficiency: Gabon Basin presalt play through 1990.



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by ***J. Carl Fiduk, Lynn E. Anderson and Mark G. Rowan***
CGG Americas, Inc.

Extensional Rafting: A New Idea for Structural Control of Shelf Margin and Slope Facies Deposition in Upper Wilcox Strata of South Texas, Northwestern Onshore Gulf of Mexico

The prevailing paradigm for Upper Wilcox deposition in South Texas is that margin sedimentation was accommodated by growth faulting and slope failure. This same general mechanism is invoked around the Gulf of Mexico but fails to explain why Upper Wilcox deltaic sediments are greatly expanded but also relatively confined compared to other Paleogene deltaic centers.

Examination of 2D seismic data in South Texas has identified what is now interpreted to be a large, rafted block of Eocene, Paleocene, and Cretaceous strata, analogous to rafts identified in the Kwanza Basin of Angola.

Examination of 2D seismic data in South Texas has identified what is now interpreted to be a large, rafted block of Eocene, Paleocene and Cretaceous strata, analogous to rafts identified in the Kwanza Basin of Angola. Preliminarily named the "Wilcox raft" because of its association with the Wilcox depotrough, it has been identified in the subsurface extending from Starr County on the Texas - Mexican border, northward over 200 kilometers into Live Oak County, Texas. The actual extent of rafted material may extend farther to the north and/or south. The raft's detachment surface is interpreted to be at the base of the Jurassic Louann salt.

The Wilcox raft contains one primary block more than 150 kilometers long and 15 to greater than 30 kilometers wide. The primary raft block may be segmented, and the entire rafted unit may include a number of smaller branching arms, ramps and offset fault blocks.

A proposal for rafting in this area of South Texas is not entirely new. Earlier models were predicated on large-scale salt withdrawal and incorporated more than 3 kilometers (>10,000 feet) of autochthonous salt occupying the area of the Wilcox depotrough. We believe that a much thinner autochthonous salt layer existed beneath South Texas.

Extensional rafting is recognized along the South Atlantic margins of West Africa and Brazil, but not in South Texas. Back-filled incisions across raft structures, turbidites draped over or between rafts, and basin floor fans downdip of rafts are known exploration targets elsewhere but not recognized in South Texas. Additionally, because updip extension requires downdip contraction, contractional structures of this age could exist basinward of the raft. Employing a raft model explains why Upper Wilcox shelf margin deposition was confined and opens new exploration possibilities in this mature producing trend. ■

Biographical Sketch

Carl Fiduk has a BS (1979) and an MS (1982) in geology, both from the University of Florida. He later received his MBA (1985) from the University of Texas of the Permian Basin and his PhD in geology from the University of Texas in Austin (1994). He has worked for the USGS, Gulf Oil, Discovery Logging, the Texas Bureau of Economic Geology, British Petroleum and the University of Colorado and as a private consultant. He is a member of the AAPG, SEG, GCSSEPM, HGS and GHS and is an AAPG Certified Petroleum Geologist. His research interests cover sequence stratigraphy, sedimentology, salt structural deformation and evolution, basin analysis, deep marine depositional processes, petroleum systems analysis and the use of three-dimensional time and depth data in petroleum exploration. Carl has authored 50+ papers and abstracts and has given several hundred presentations. Carl is presently Chief Geologist for CGG Americas, Inc. working with their depth imaging group in Houston.

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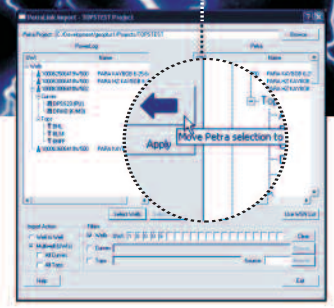

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Tuesday, March 15, 2005

Environmental and Engineering Group Dinner Meeting

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by ***Don Grauer***
EDR
Houston, Texas

The Federal "All Appropriate Inquiry" Rule: A New Phase in Phase I's

Thursday, August 26, 2004, marked a truly historic moment for the environmental site assessment industry. On this date, the US EPA proposed the first federal standard for "all appropriate inquiries"—the term used for the investigation into a property's potential for environmental contamination prior to purchase. By year-end 2005, the developing federal standard will be promulgated into federal law, changing the forces that govern the way environmental due diligence is conducted significantly in some respects. The AAI law will establish specific regulatory requirements that a property owner (and the owner's environmental consultant) must follow to determine the previous ownership, uses and environmental conditions of a property for the purposes of qualifying for certain landowner liability protections under CERCLA. Within the proposed rule is text that will not only dictate who can perform Phase I environmental site assessments (ESAs) in the future, but also calls for significant changes in how ESAs can be performed—from historical research documentation to reviews of local and tribal government records to documentation of data gaps. As such, it is imperative for anyone conducting Phase I environmental site assessments to stay up-to-date on this important new ruling as it nears promulgation. At this workshop, attendees will learn about the implications of the new federal environmental due diligence standard so that they can prepare for any necessary changes to their Phase I practices now, rather than later. ■

The AAI (All Appropriate Inquiry) law will establish specific regulatory requirements that a property owner...must follow to determine the previous ownership, uses and environmental conditions of a property for the purposes of qualifying for certain landowner liability protections ...

Biographical Sketch

Don Grauer is EDR's South Texas Regional Manager based in Houston, Texas. His duties include servicing and maintaining EDR's current client base, and exploring new business opportunities across different market segments. Don is available to meet with clients in person for training and other client needs.

Don has been with EDR for four years where he started out as an Account Executive for the state of Florida, after which he was promoted to Senior Account Executive. Don holds a bachelors degree in business management from the University of Connecticut.

Call for Volunteers

The HGS and GSH are locating for several volunteers to assist the Arrangements Committee for the upcoming OTC Conference from May 2 through May 5. A half-day volunteer will receive full registration for the convention and a free parking pass good for the entire convention. Please contact Lynn Coyle at 281-578-6397 daytime, or 281-491-2294 evenings, or email lynn@velocitydatabank.com or Claudia Ludwig at 713-723-2511 or email at petra@hal-pc.org.

HGS CONTINUING EDUCATION COMMITTEE PRESENTS

Part Three of the Mini-series

Petroleum Reserves-Avoiding Write-downs:
An Overview of Recommended Engineering Practices

by

William M. Kazmann and Edward P.Travis
LaRoche Petroleum Consultants, LTD

Friday, May 20, 2005
8 am - 4 pm
Registration Table opens at 7:30 am

Marathon Oil Corporation
Conference Center
5555 San Felipe Road
Houston, TX 77056

Reserve write-downs in 2003 and 2004 have increased attention of financial analysts, investors, rating agencies, banks, the U.S. SEC and corporate boards to the process of estimating and reporting reserves. Both geologic and engineering technical errors can contribute to erroneous reserve estimates.

- Learn basic reservoir evaluation techniques from performance to volumetric analysis.
- Learn which common engineering errors contribute to the inaccuracy of reserves estimates.
- Learn the recommended engineering practices to avoid these reserve pitfalls.
- Learn the fundamentals of economic evaluations and their impact on reserve volumes.

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An Overview of Recommended Engineering Practices

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GSH Potential Fields Group
Dinner Meeting

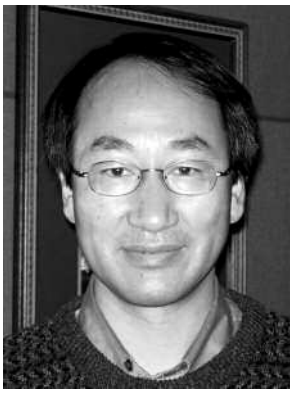
by ***Yaoguo Li***
Colorado School of Mines

3D Inversion of Potential-field Data and its Applications in Exploration Problems

Gravity and magnetic methods have been applied successfully to a wide variety of problems such as archaeological mapping, environmental clean up and mineral and petroleum exploration. Unfortunately, these methods have frequently been stigmatized as being non-unique and viewed with suspicion. The notion of non-uniqueness, however, stems mainly from the mathematical properties of potential fields and has little to do with realistic geologic scenarios. In reality, geologic units producing the gravity or magnetic data that we acquire in real-world problems do not have an arbitrary variability. Imposing simple restrictions on admissible solutions often leads to a definitive interpretation of potential field data. Practicing geophysicists have been implicitly doing it for decades, and now generalized inversion algorithms following a similar philosophy can do it too and perhaps do it better. In this presentation, I will first outline one basic approach to the 3D inversion of potential-field data using Tikhonov regularization. This approach focuses on constructing physical property models or interfaces by minimizing a model objective function subject to fitting the observed data. Prior conception of geology and other independent information can be easily incorporated into the inversion so that geologically plausible models are produced. I will discuss aspects of numerical computation for large-scale problems and illustrate the effectiveness of the method by examples drawn from mineral and petroleum exploration. ■

In reality, geologic units producing the gravity or magnetic data that we acquire in real-world problems do not have an arbitrary variability. Imposing simple restrictions on admissible solutions often leads to a definitive interpretation of potential field data.

Biographical Sketch



Yaoguo Li received his BSc in geophysics from the Wuhan College of Geology in 1983 and a PhD in geophysics from the University of British Columbia in 1992. He worked with the UBC Geophysical Inversion Facility at UBC from 1992 to 1999, first as a Post-doctoral Fellow and then as a Research Associate. He is currently an Associate Professor of Geophysics at the Colorado School of Mines and leads the Center for Gravity, Electrical, and Magnetic Studies (CGEM). He is a member of the Editorial Board of the *Journal of Applied Geophysics*. He is a co-recipient of the 1999 Gerald W. Hohmann Award. His research interests include inverse theory; inversion of gravity and magnetic, and electromagnetic data arising from applied geophysics; and their application to resource exploration and environmental problems. He is the principal developer of many software packages including DCIP3D, GRAV3D, GG3D, and MAG3D for inverting electrical, gravity, gradient, and magnetic data in 3D.

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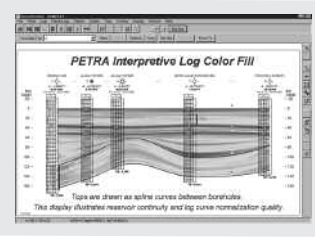

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CROSS SECTIONS

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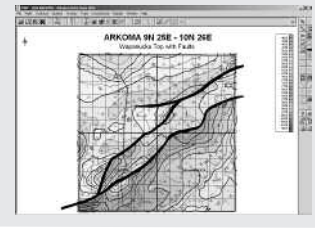
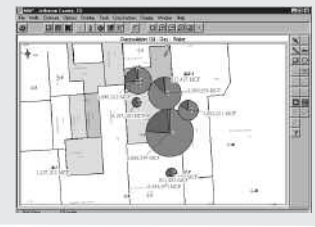


CONTOUR MAP

MAPPING

Contours w/Faults
Contour Editing
Commercial Land Grids
Geo Referenced Images
Import Digitized Contours
Log Curve Maps
Grid Operations - Volumetrics



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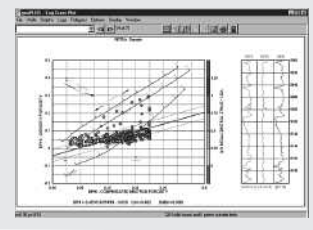
Bubble Maps
Production Charts
Compute EUR, RR etc.



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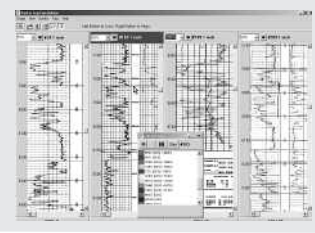

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An Interview with Jim Hackett,
Anadarko Petroleum CEO, January 7, 2005

by ***Arthur Berman***

Anadarko is the 11th-largest publicly traded oil and gas company in the world with assets of $20.5 billion. Anadarko has activities in more than a dozen countries and employs a worldwide work force of about 3,400. The U.S., Canada and Algeria represent the majority of the company's proved reserves and production. The company was ranked 34th among the 100 "fastest-growing companies" by Fortune magazine in 2003 and was 345 on the "Fortune 500" list in 2004.

Anadarko is an independent oil and gas exploration and production company and does not operate refineries or gasoline stations. It is the 8th-largest natural gas producer in North America. In 2004, Anadarko produced 190 million barrels of oil equivalent (BOE) and had year-end proved reserves of 2.37 billion BOE.

Anadarko's world wide headquarters are in The Woodlands, Texas. The company also has offices in Anchorage, Calgary, Tunis, Doha, London and Algiers.

Arthur Berman: E&P companies have not really done very well in the last decade or two at finding big new reserves, at least relative to the rate that we're using them in the United States and elsewhere. The biggest source of reserve additions has been mergers and acquisitions. What's your opinion on that and what's your strategy for Anadarko?

Jim Hackett: On the former point, I think there's a lot of truth to that. I think when we look back 20 years we could've counted many companies that could grow through exploration. When you look forward at U.S.-based public companies, there are probably only a handful that you could name that can succeed in growing organically through exploration. We hope to be one of those companies, and have been in the last 15 years. But it's difficult to do it unless you're very competent and, increasingly, internationally oriented, because of the laws of physics in North American basins. While it's not impossible, the probability for growth through exploration is lower for large companies in North American basins.

So, increasingly the industry's going into very deep waters in the Gulf of Mexico, or into frontier areas like the MacKenzie Delta, or into international arenas. In these areas it takes not only a good balance sheet, which many of the companies have, but also a skill set that you're willing to acquire and nurture. It's not as easy as being an acquire-and-exploit company. There's higher G & A [General and Administrative] associated with an exploration focus. There's a greater need for management of scarce intellectual capital and there aren't, frankly, enough good oil-finders to go around. As we've gone through different cycles since the late '70s, the growth and progression of true exploration companies has been something that's been hard to find. We haven't had the right kind of environment to proliferate that strategy with associated staff talent in a greater way.

We've talked about the demographics and the poor public image (of the oil industry). I think that's changing. With the recent increase in oil prices, media coverage has not claimed that the oil companies are to blame. People are starting to see that we haven't built a refinery in this country for 20 years; people are finally seeing that we're not to blame. We don't have enough oil being found and discovered for the first time in my career; we're seeing consumer-oriented associations joining with producer organizations to try to figure out how to get more supplies to North America.

Arthur Berman: Is that an issue of demographics or an ability to adapt to changing technologies?

Jim Hackett: I think it's a combination. I think the demographics follow the environment that's created for young people to pursue careers in the petroleum field. I don't think that the lack of college graduates coming out of engineering, petroleum geology, and geophysical programs is necessarily a reflection of the schools' willingness to offer the programs, or students not being willing to go into them under the right circumstances. I think it is because the industry itself has not provided the kind of long-term career and the right image, if you will, for young people to pursue petroleum jobs in the kind of numbers that they did back in the 1970s.

An Interview with Jim Hackett *continued on page 27*

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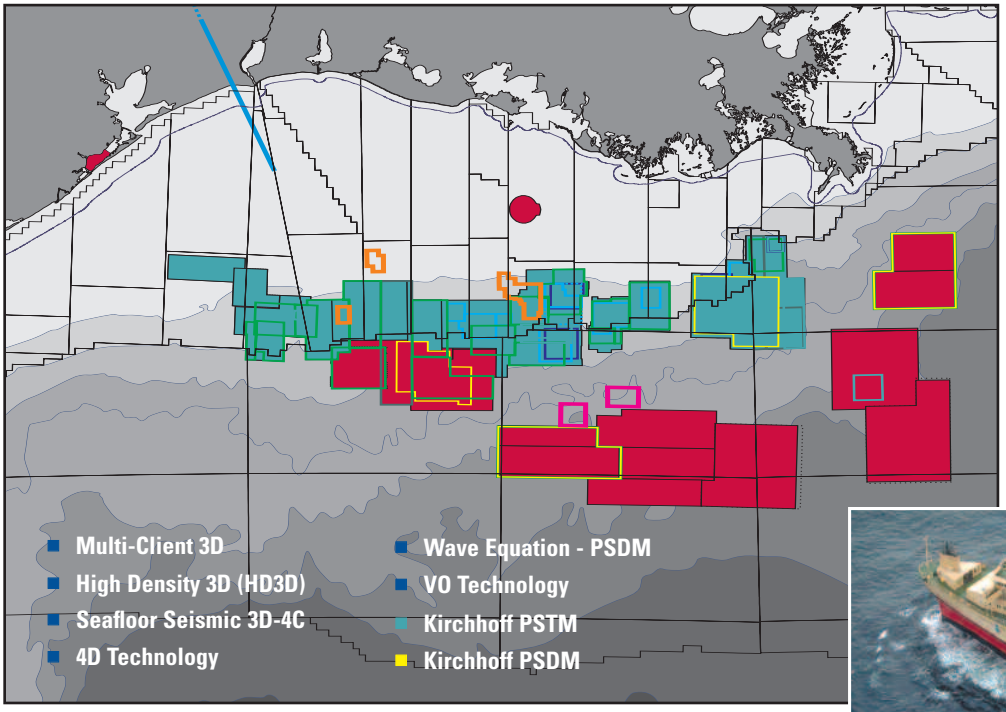

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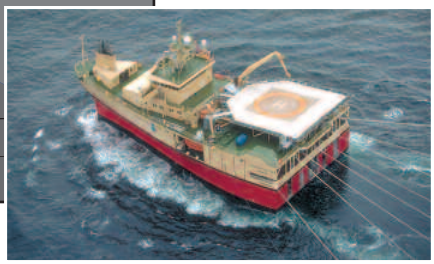

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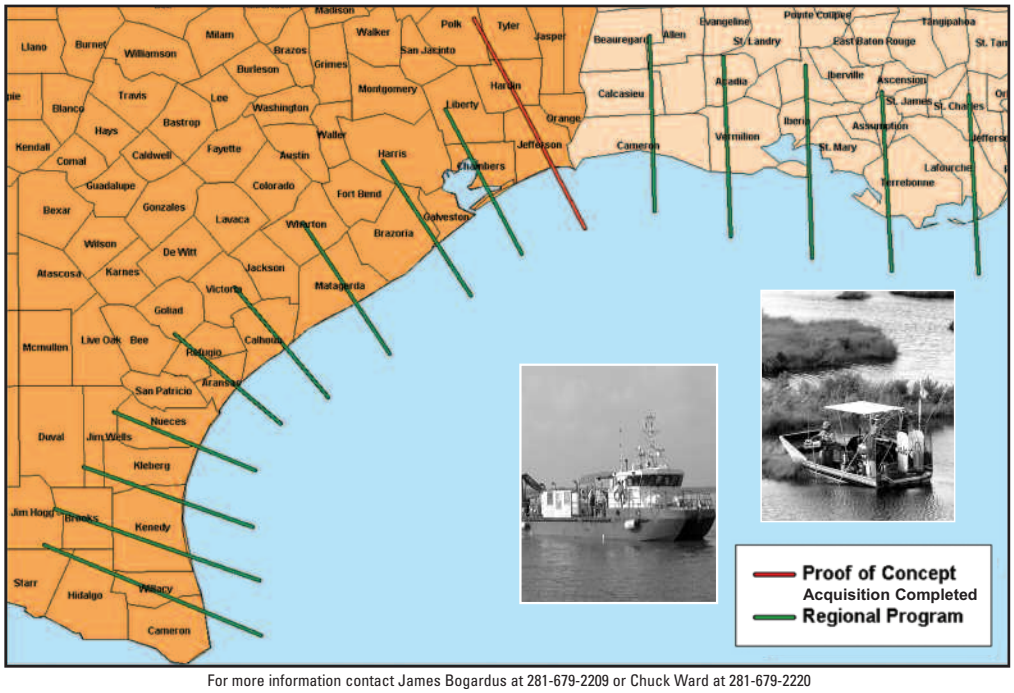

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An Interview with Jim Hackett

continued from page 25

So, I think it's actually a cause-and-effect situation: the cause is the industry itself; the effect is that you don't have as many people wanting to be in the industry now. Although, it has been shifting slowly in the last 3 years. But I would add that the difficulty and expense of pursuing exploration programs of the size needed by public companies is also a pressure that has built up over the last 15 years or so.

Most notably, in the last 5 years investors really had a sea-change shift in how they looked at the energy sector. Now they view energy as just one of several alternatives among the whole S&P 500 for their investment dollars. Prior to that, there had been a tendency to allocate a certain portion of their investment dollars into the energy sector.

I think 1998 was kind of the crowning blow for that prior philosophy. Investors got so punished with the price drop from '98 through '99 that they just said, "Hey, listen. We're actually going to take a negative approach towards the energy stocks, absent really compelling evidence to the contrary, and we're going to insist that they get good returns on capital because they haven't done it for 20+ years as an industry." That started to drive a different behavior pattern in the management of companies to start taking less risk, in my opinion. And I think that factor, along with the difficulty of acquiring and nurturing good intellectual capital on the exploration side, drove management teams to be more cautious about spending money on exploration. It doesn't get immediate returns, it is riskier, and it gets no option value in the marketplace, whereas acquisitions and exploitation are near-term, lower risk strategies with more immediate rewards for investors.

So I think the managements of public companies have, understandably, reacted to that sentiment in the investment community and I think that's what's driven, to a great degree, the acquire-and-exploit strategy. I would tell you that any company that doesn't want to be an exploration company is a company that's working without one leg of the oil and gas "stool". Anadarko is clearly committed to staying an exploration company. We feel we've had an unparalleled track record in terms of organic reserve replacement over an extended period of time and therefore feel comfortable pursuing an exploration strategy, even amid the reluctance of investors to necessarily pay you for that up-front.

But we also have a very strong desire to be opportunistic in acquisitions. We think that in the right environment where Anadarko has technology advantages, or where we have scale advantages in a particular locality, or where we see compelling opportunity to

An Interview with Jim Hackett *continued on page 28*

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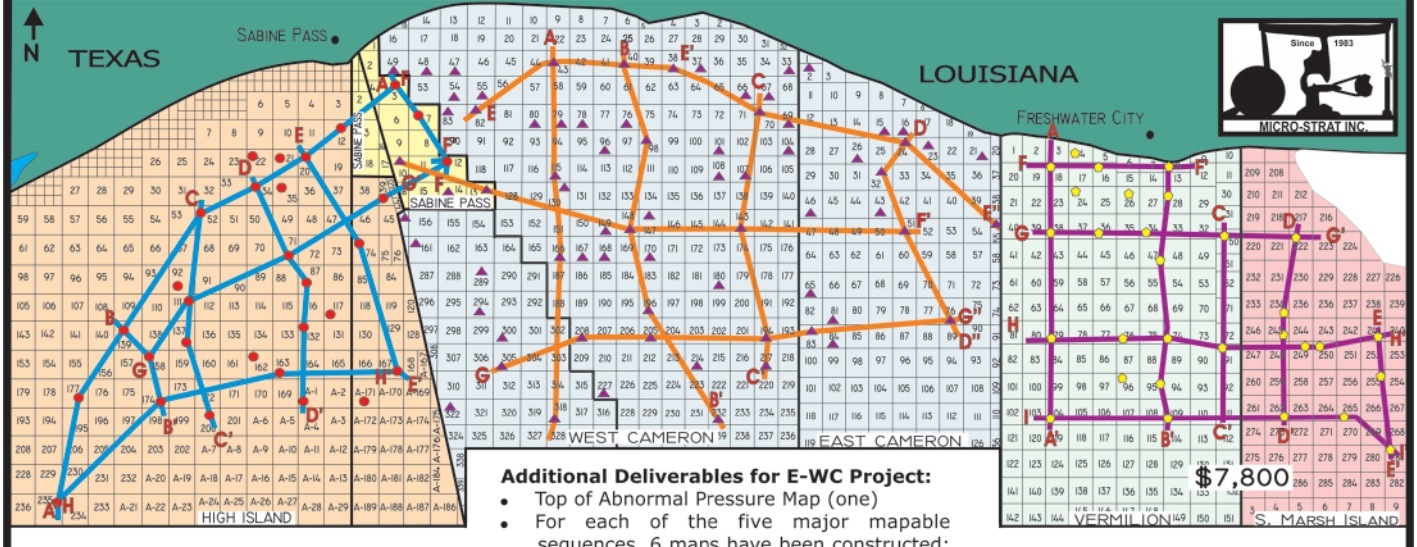

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An Interview with Jim Hackett

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advance a strategic initiative, if you will, we do acquisitions. We did in LNG. We bought a plant in Canada to get into the LNG business. We thought that was the right thing to do, instead of taking three years to do it ourselves.

We would consider an acquisition internationally to get into the right areas. We did that, in fact, with Gulf Stream for entry into Qatar and Oman. We did it to grow bigger in some of the exploration and exploration plays in Canada when we bought Berkeley.

One thing that has helped make the acquire-and-exploit strategy successful for companies is the unrelenting increase in commodity prices, with some limited cyclicity since 1999, when we hit a low of $10 a barrel. The price rise has made most acquisitions look very attractive in hindsight.

So, there was a self-reinforcing event occurring where people said, "Okay, you bought this. It paid off. Let's go do it again." There are some companies that are very, very good at this strategy, but it's getting a lot tougher in the current price environment to be only an acquire-and-exploit company. The returns are slimmer and slimmer as we go forward. We want to pursue exploration, acquisitions and exploitation because each has a role in successfully pursuing our goals.

Arthur Berman: You look at Hubbert peak-type calculations that say that peak world oil production either has or will soon occur, and recognize that Saudi Arabia's in decline, most of the Persian Gulf countries are in decline and Russia will be pretty soon. I assume Anadarko intends to be around beyond 2015. Where's the future? You can go into some competitive areas right now and, hopefully, find big enough reserves to make it worth your while, but where do you go after that?

Jim Hackett: Well, I think that the answer for our company may be different than the answer for the world. I think your point about peaking production is hugely valid for most of the developed areas of the world. I'm not convinced yet that it is true for the OPEC nations, in the Middle East in particular. If we had full exploration and exploitation of those reserves, I might have more confidence that there was a peaking of production in the Middle East, but I'm not personally convinced of that. I think there could be a peak, even in the Middle East, in a decade if there is a more open-door policy, but we've only selectively started to see some of the barriers to foreign investments be relaxed.

I think that in many parts of the world there is a gate keeper mentality that is difficult to overcome. With high oil and gas prices there is competition from former state oil companies like in Russia or from state companies like the Chinese national oil companies. With public companies trying to pursue worldwide reserve growth, there is a sense among oil-rich developing countries that people will do almost anything to get access to the resource base. That is a negative in terms of the opportunity for western companies to grow through international work. The great positive is that the resource base sits there and there is a strong belief on the part of most countries that they need access to outside technology and capital. Mexico, which has been one of the toughest ones to crack, continues to try to figure out a way to invite foreign capital into their energy industry, because they know that's what's necessary.

Venezuela knows it. You can go on and on about every different country. So, while there are forces at work in a high commodity environment to make competition tougher, there are still, I think, niches to be exploited by companies that have a technical advantage and a willingness to pursue those opportunities. This is especially true for Anadarko, because we are committed to exploration, which very few of our peer group are, and we have a track record in successful exploration. So when we go into a foreign country, we think we have something unique to offer. We also have a balance sheet that is much more like what the majors have in relationship to an individual country's requirements for capital spending.

So, we've created these mini-major companies, like Anadarko, that are still small

An Interview with Jim Hackett continued on page 33

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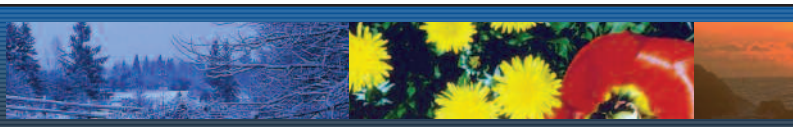

Sunday	Monday	Tuesday	Wednesday
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6 **SEPM Microfossils 2005 Conference** Geologic Problem Solving with Micorfossils See page 52	7 **HGS General Dinner Meeting** by J. Carl Fiduk, Lynn E. Anderson and Mark G. Rowan, *"Extensional Rafting: A New Idea for Structural Control of Shelf Margin and Slope Facies Deposition in Upper Wilcox Strata of South Texas, Northwestern Onshore Gulf of Mexico"* See page 21	8	9
13	14	15 **Environmental and Engineering Dinner Meeting** by Don Grauer *"The Federal 'All Appropriate Inquiry' Rule: A New Phase in Phase I's"* See page 25	16
20	21 **International Explorationists Dinner Meeting** by Sandro Serra, *"Structural Trap Styles of Recent Large Gas Discoveries, Tarim Basin, Western China"* See page 42	22	23
27	28 **North American Explorationists Dinner Meeting** by Robert Scott, *"The Maverick Basin: New Technology—New Success* See page 47	29	30 **HGS General Luncheon Meeting** by Rick Fowler and Ed Frame, *"Riegel Field Appraisal Development"* See page 49

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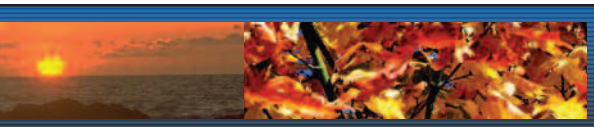

GeoEvents

Thursday	Friday	Saturday
3	4	5
10	11	12
17 **GSH Potentail Fields Dinner Meeting** by Yaoguo Li *"3D Inversion of Potential-field Data and its Applications in Exploration Problems"* See page 27	18	19
24	25	26
31 **Reservations:** The HGS prefers that you make your reservations on-line through the HGS website at www.hgs.org. If you have no Internet access, you can e-mail reservations@hgs.org, or call the office at 713-463-9476. **Reservations for HGS meetings must be made or cancelled by the date shown on the HGS Website calendar, normally that is 24 hours before hand or on the last business day before the event.** If you make your reservation on the Website or by email, an email confirmation will be sent to you. If you do not receive a confirmation, check with the Webmaster@hgs.org. Once the meals are ordered and name tags and lists are prepared, no more reservations can be added even if they are sent. **No shows will be billed.**		

Upcoming GeoEvents

April 5
Executive Board Meeting
6:00 PM, HGS Office

April 6–9
PHI Oil History Symposium
Morgantown WV

April 11
HGS General Dinner Meeting
John Blickwede, "The Trident Discovery: Play Opener of the Perdido Foldbelt, Deepwater Northwestern Gulf of Mexico"
5:30 PM,Westchase Hilton

April 12
Northsiders Dinner Meeting
Dan Orange, "Advances in Oceanography as Applied to Hydrocarbon Exploration and Production"
5:30 PM, Sofitel Hotel

April 18
International Explorationists Dinner Meeting
Colin Grant, "Deep Water Clastic Turbidites of NW Borneo"
5:30 PM, Westchase Hilton

April 23
NeoGeos Galveston Beach Cleanup
9:00 AM, Menard Park, Galveston TX

April 23
HGS Road Rally
10:00 AM, University of Houston

May 9
HGS General Dinner Meeting
Cindy Yeilding, "How Workstations Killed Geology"
5:30 PM,Westchase Hilton

May 27
Northsiders Luncheon Meeting
Larry Zara, "The Wilcox - Outcrop to Deep Water"*5:30 PM, Sofitel Hotel*

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An Interview with Jim Hackett

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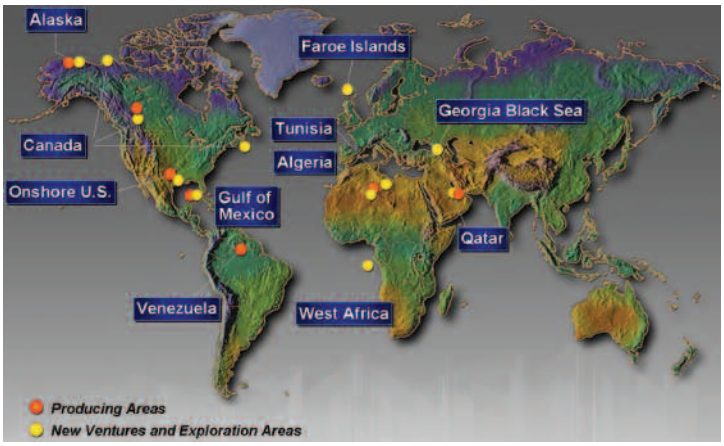
enough to react and be creative and aggressive but also have access to technology and capital. Their balance sheets allow them, in selected countries, to execute very large projects, especially in frontiers like deep water drilling, and large infrastructure-type activities like LNG development.



Absent a big opening in the Middle East for investment of foreign capital, there is a narrower market for oil growth worldwide in the near-term. But a creative, internationally oriented company there may be able to create selective opportunities for growth nonetheless.

Gas, however, is another story. The natural gas resource base is huge and it's continuing to be exploited in a more aggressive way. It does not have the same dynamic as the oil business, but I still think that in the short-term there is some room for growth on the supply side. It just isn't going to happen quickly. It's going to take huge amounts of money; and it's going take more of the gatekeepers saying "We want you to come in a big way."

Arthur Berman: What do you do about a place like Mexico? They know it. But Vicente Fox, in four or five years, hasn't been able to get anything past the legislature. He's had a hard time just getting Pemex's budget approved each year before the year's over. Do you think that the pressure you speak of is going to be enough to push a change like that?

Jim Hackett: I don't know about Mexico, in particular. We've been waiting for 15 years for change. We, as a company, don't depend on that and don't have that as a major focus area at all. But, I think it's a signal of what occurs around the world when you start to have declining production and strains on national oil companies feeding the government coffers. Even at these oil prices, you have people saying "We need to do something different, because we need this revenue base to continue as oppose to shrink." So, as long as oil and gas prices continue to increase maybe they continue to get bailed out; but if things level out or decline, it becomes a tougher equation. I hope Mexico does invite foreign companies to invest and they need to. But, we've been waiting for that for a number of years. I'm not a good enough prognosticator to tell you whether it's going to occur in the next five years, the next ten, or the next 15 years.

Arthur Berman: But, it will happen?

Jim Hackett: It should happen but these things change, sometimes quicker than you expect and sometimes much slower. Who would've dreamed about what's going on in South America in the last five years? Who would've dreamed what's going on in Russia in the last 10 years? Who would've dreamed what's going on in a number of West African nations? It's just stunning the pace at which things change once the direction starts to be affected by either a national need or national politics.

Arthur Berman: Let's talk for a minute about this issue of risk that you've mentioned before. It strikes me that to be an effective exploration company you've got to have an appetite or tolerance for risk that exceeds what I see, and I think most observers see generally, in the industry, at least among the majors. And there have to be technical people who feel comfortable making risky interpretations and forwarding unconventional ideas. What's your take on risk in general and how do you try to foster risk-taking and inventive thinking among your technical people at Anadarko?

Jim Hackett: It's a difficult question and I don't have a simple answer, but in general we believe that risk matches reward. I think most people would agree with that. So to eliminate risk means that you eliminate large rewards. So, our attitude towards risk is that we are willing to take it and we expect to be rewarded for it. To be a risk-oriented exploration company means that risk management is very important. You have to have an active risk management effort to be successful.

Now, what that implies is that a company takes the learnings that have occurred over many years, particularly in the exploration risk management arena, and proliferates that around the company. There are two reasons why that's important.

One is so that you can, in fact, properly quantify your range of outcomes. Two is that you then can codify what you thought was going to happen. This forces people to think about and describe risk elements in black-and-white, and to weigh and gauge them, as opposed to just having a gut instinct. Although ultimately, gut instincts drives the outer ranges of risk, we must have a probabilistic determination of what that means, which is a much more reliable science, if you will. Once the technical experts give you the ranges, the 90% confidence levels in both upside and downside cases,

An Interview with Jim Hackett continued on page 35

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An Interview with Jim Hackett

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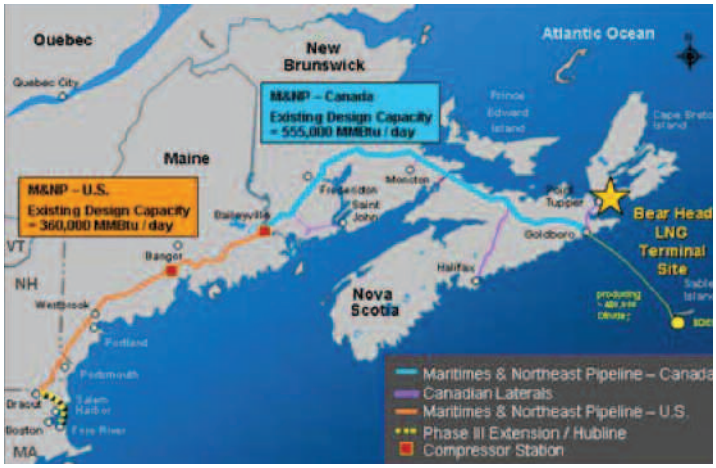
it's much more reliable to use probabilistic determinations of what the mean outcome ought to be.

A company also needs to take common approaches on how to determine reserve distributions and "calculate" risk factors. Once you codify those, then you can actually track how your judgments worked and whether you need to alter certain assumptions. For example, during the course of 30–40 projects over three to four years, if you are consistently underestimating reservoir seal-risk, you then start to send people back to reservoir "seal" school, if you will, or perhaps you do a 50,000 foot (high-level) seal adjustment on every one of the projects because we've generally tended to underestimate the risk in that particular area. The very process of codifying risk judgements is good, because it forces people to think it through more carefully. And it allows you to learn better by comparing actual results against the predictions.

Third, and very importantly, it is the only way to make people feel comfortable that capital allocation is occurring properly in a large, multi-geography, multi-disciplinary company. It's very difficult for a geologist, a reservoir engineer or a manager up in Alaska, in our case, to give up $10-$20 million dollars to drill a deep water, Gulf of Mexico well unless he believes that common risk elements and approaches are being utilized. He or she wants to know that management is comparing apples against apples instead of apples against oranges when allocating capital. So, there's a basic fairness in a large company that good risk management affords you. It allows you to have more confidence in capital decision making and better morale because you're actually allocating capital, precious capital, to the best and highest uses. Also, counter-intuitively, a company with good risk management



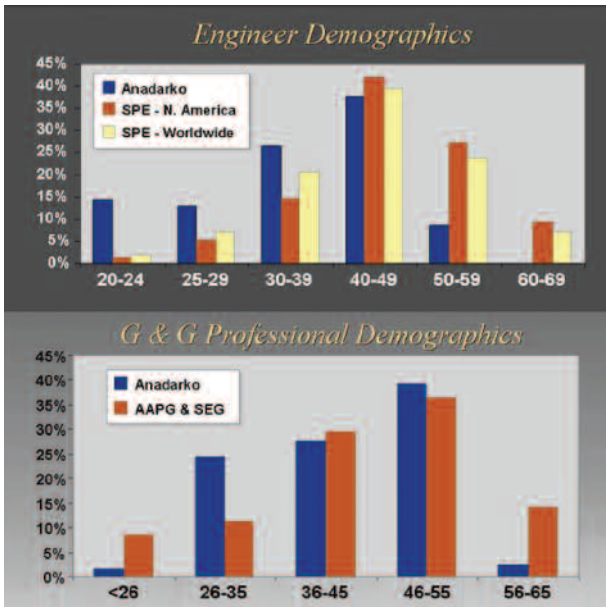
can actually take greater individual project risk and have lower overall enterprise risk.

Arthur Berman: How do you encourage a population of scarce, talented geoscientists and engineers to take the personal risk that's required to give you the big ideas?

Jim Hackett: That's a cultural factor. That's different than just good risk management. Good risk management allows you to have confidence that when you encourage people to take risks that you're also quantifying what kind of risk you're taking as an enterprise. What you want is to serve your share holders as well as the individual. You need to reward the technical people for winning and you also don't punish them for occasionally losing. One of our values at Anadarko is that we'll learn from failure, and that's a very important concept. In the wildcat exploration business, you fail at least three-fourths of the time and it's unlike any other industry that I know of. Even baseball hitters don't stay around real long unless they've got great fielding skills along with a 250 average, but a 250 average is very good for a wildcat exploration company. What you don't want to do is let yourself fail the same way three times. If you fail differently every single time, you're going to beat everybody in the business because you're learning all the time. You don't pillory somebody who has failed. If you want to be a risk-oriented company, you have to make sure that you have individuals who will champion things at the risk of occasionally failing.

Arthur Berman: Would you drill a big, expensive project in deep water without a 3D survey?

Jim Hackett: Generally not. Through good risk management you're applying science, you're doing peer reviews so that people ask if we've done the right kind of up-front work; this is the cheapest work to get ready to drill a prospect. We have a philosophy that we won't generally drill expensive deep water wells at 100%. An exploration **An Interview with Jim Hackett** continued on page 36



An Interview with Jim Hackett continued from page 35

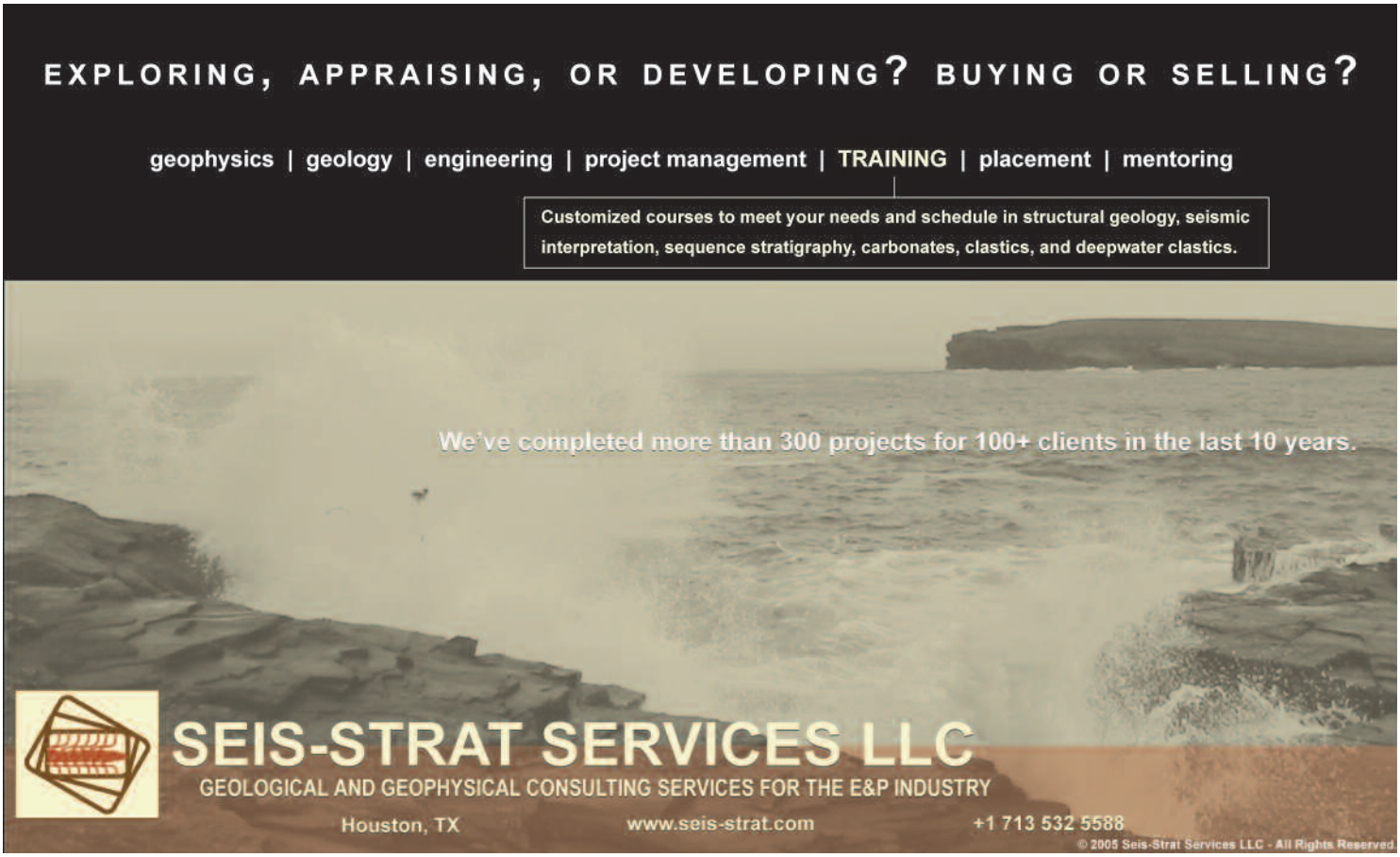
team may come up with a great prospect and we hopefully ask ourselves why do we want to drill this at 100%? Generally, we don't. Statistically, good risk management tells you that you'd rather have four wells at 25% than one at 100%. In addition to that statistical understanding is the fact that good risk managers want technical validation from a partner on expensive projects. The risk management process fails if somebody does not understand that.

So a person knows when they bring in a prospect, or they want to farm into one, that we're willing to generally accept 50%. We don't always have to operate and have 100% in every case. That's a philosophy a company must adopt to let people recognize that you're going to pursue risk management even in the partnership interest that you have. You are going to get the technical validation from somebody else as well as the financial risk management benefit.

We've talked about the demographics and the poor public image [of the oil industry]. I think that's changing. With the recent increase in oil prices, media coverage has not claimed that the oil companies are to blame. People are starting to see that we haven't built a refinery in this country for 20 years; people are finally seeing that we're not to blame. We don't have enough oil being found and discovered for the first time in my career; we're seeing consumer-oriented associations joining with producer organizations to try to figure out how to get more supplies to North America.

We are also launching efforts through the API (American Pertoleum Institute), and have been doing that for several years, to address the public image of our business. We understand that we have not put as much funding behind it as we need to. Part of it is that it's not an easy business to explain to people. It's very technical. There are a lot of mom-and-apple-pie arguments that are easy to make in the media against the industry that have no semblance to reality and that are, unfortunately, very difficult to battle.

What we need is an almost impeccable record, environmentally, which I think we have in the Western world in the upstream portion of the industry. We spend billions of dollars doing research and spending money on environmental protection. I think the real key is to continue to fight the responsible fight. We need to let people know that after air, water and food, we need energy and we must have it as cheaply as possible with the proper environmental protection—so we can continue to grow the world economy. It's a great business to be in. ■



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International Explorationists Dinner Meeting

by ***Sandro Serra***
Serra GeoConsulting LLC
Houston, TX

Structural Trap Styles of Recent Large Gas Discoveries, Tarim Basin, Western China

The Tarim Basin is one of several blocks or "microplates" which together compose the Asian continent. Central and southern Asia was formed by the successive accretion of these microplates to the Siberian craton. The general sequence of accretion proceeded from north to south, beginning with the suturing of the Tarim and Junggar blocks to the Siberian craton in the Permian, and ending with the docking of India along the southern margin of Tibet in the late Tertiary. The mountain belts that presently surround the blocks represent a complex variety of plate margin and island arc terranes that were deformed during the suturing process.

The Kuche Fold and Thrust Belt (KFTB) forms the 250-km-long central segment of the nearly 1000-km-long deformed northern margin of the Tarim Basin in western China. The primary transport direction on major thrusts is from north to south. Deformation in the Kuche area affects a 12,000-m-thick Mesozoic and Tertiary section composed primarily of conglomerates, sandstones, shales, coals, and evaporites deposited in near-shore, alluvial and lacustrine settings.

Seismic and outcrop data indicate two major periods of structural growth in the KFTB. The first occurred at the end of the Cretaceous, as evidenced by a top Cretaceous erosional unconformity, and the depositional thinning and onlap of base Tertiary units on the flanks of thrust-cored folds. Another occurred during the late Tertiary, as evidenced by the depositional thinning of Neogene units across fold crests. Recent earthquakes and offset gravel terraces also indicate presently active north-south shortening in the KFTB.

The deformed section in the KFTB can be subdivided into at least four tectonostratigraphic units. The regional basal detachment occurs in lower Triassic shales. Another important detachment is in a salt horizon at the base of the Tertiary. A Miocene salt horizon, depositionally restricted to the eastern KFTB, is the locus of another detachment in this part of the belt. Where they can be clearly observed in outcrop, supra-salt folds are often box-shaped, with varying sense of vergence from fold to fold, and along strike on a single structure.

...one 6-8Tcf field has been found ...and two or more with potentially similar reserves are being tested. PetroChina has just completed construction of a 4200km pipeline to transport gas ...to Shanghai to supply growing markets in eastern China.

Commercial hydrocarbon exploration and production in the KFTB dates to combined Chinese and Russian efforts in the 1950s. A few small, shallow oil and gas fields were found. Declining production in eastern China spurred the current phase of exploration activity by PetroChina in the KFTB, beginning in the early 1990s. The main targets now are the deeper, thrust-associated folds below the salt detachments. This has posed several challenges, including accurate seismic imaging of complex structures below salt and drilling through thick salt into highly overpressured sections. Despite these difficulties, one 6-to-8-Tcf field has been found (dry gas, methane content >98%), and two or more with potentially similar reserves are being tested. PetroChina has just completed construction of a 4200-km pipeline to transport gas from the KFTB fields to Shanghai to supply growing markets in eastern China. ■

Biographical Sketch

Dr. Sandro Serra is a consultant specializing in structural geology. He received a BS from City College of New York (1970), MS from Syracuse University (1973) and a PhD from Texas A&M University (1978). He has worked in the upstream oil and gas industry for over 25 years. During his tenure at Amoco and BP (1977–2003), he has worked with many teams in a variety of structurally complex areas. His expertise is predicting and determining the geometry of structures at both regional and prospect scales using a variety of approaches and tools. He is an Associate Editor for the *AAPG Bulletin*, and a member of the HGS, AAPG and GSA.

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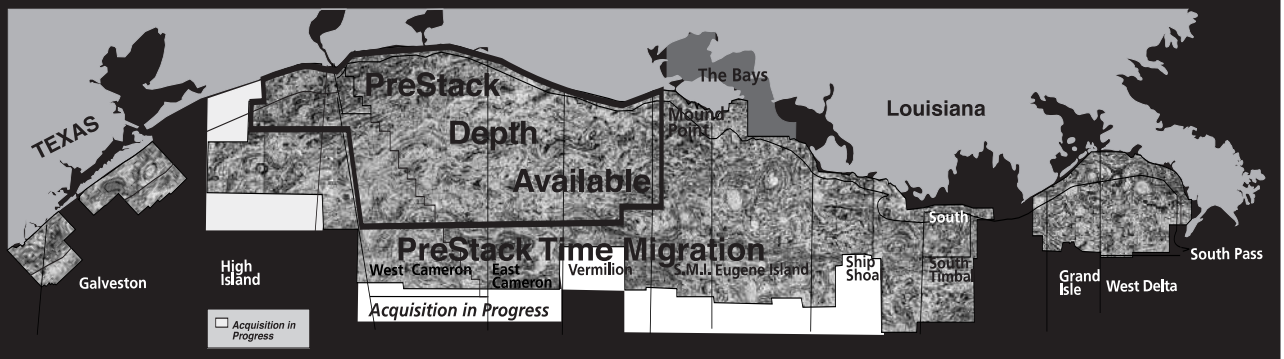

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by ***Robert J. Scott***
The Exploration Company
San Antonio, TX

The Maverick Basin: New Technology—New Success

The Maverick Basin is a small carbonate basin geographically associated with the large sand- and shale-rich Gulf Coast Basin. Oil company managers have often rejected exploration programs for the Maverick Basin in favor of more glamorous objectives in the Gulf Coast Basin. As a result, the Maverick Basin has remained under-explored. In the past 10 years, new technologies like 3-D seismic and directional drilling have led to new plays and significant increases in production in the Maverick Basin. Three-D seismic has been absolutely essential. It has defined the structural framework of the basin and found new reef trends and unique structural plays. Directional drilling is now allowing operators to produce oil and gas from low-permeability reservoirs that have been troublesome in the past. Current activities place the Maverick Basin at the threshold of prominence for oil and gas exploration in the Gulf Coast area. ■

Current activities place the Maverick Basin at the threshold of prominence for oil and gas exploration in the Gulf Coast area.

Biographical Sketch

ROBERT J. SCOTT received his BA in geology from Augustana College, Rock Island, Illinois, and his MS from the University of Wisconsin in Madison. He then worked the Permian Basin for various companies between 1962 and1975. After moving to San Antonio in 1975, he has concentrated on South Texas carbonate plays. Robert joined The Exploration Company in 1989 and is presently its Chief Geologist.

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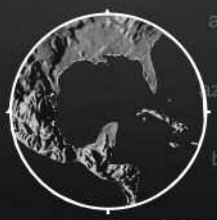

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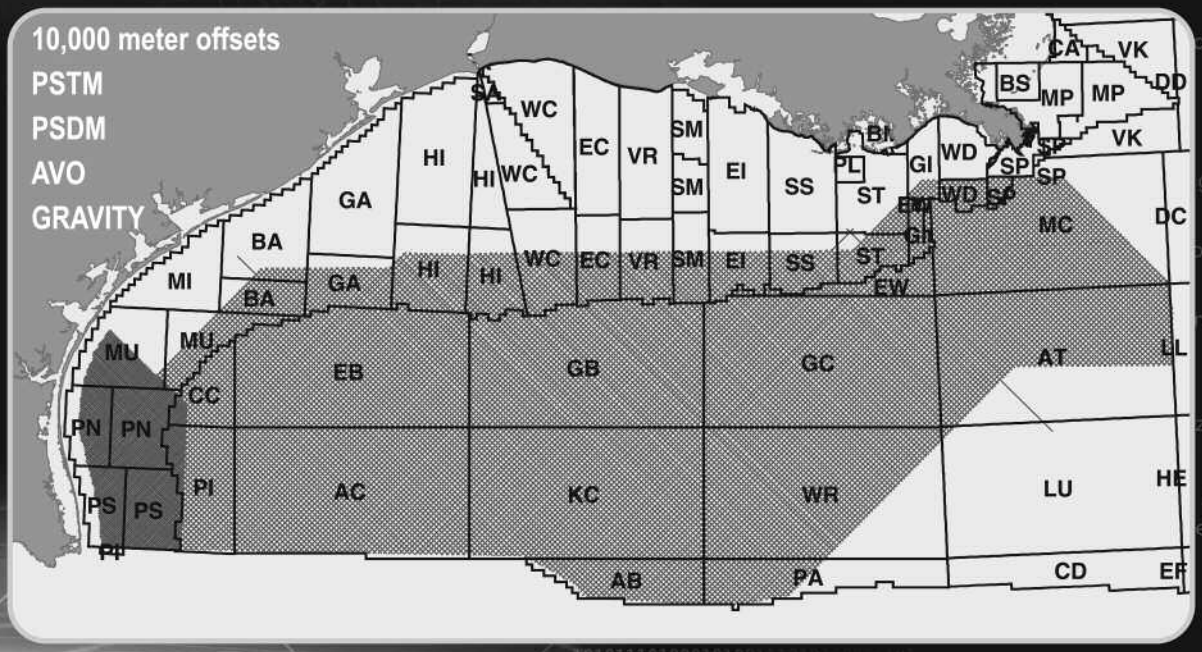

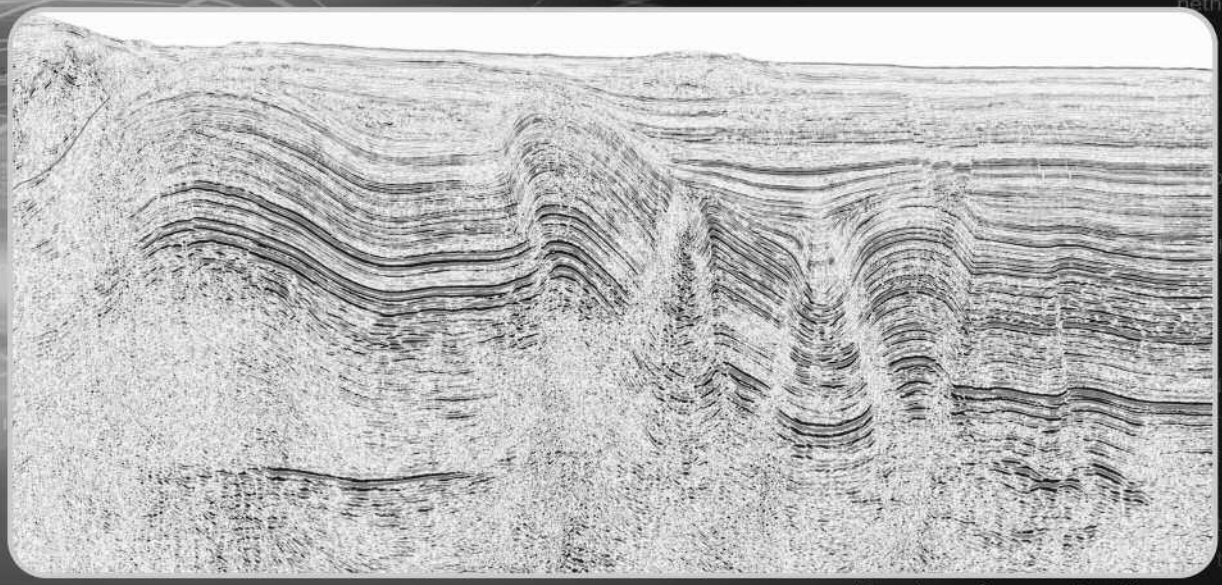

Alaminos Canyon Depth

For additional details on this program, please contact:

Kenneth Mohn
Fugro Multi Client Services
Tel: +1 713 369 5859
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HGS General Luncheon Meeting

by ***Richard Fowler and Ed Frame***
Dominion E&P

Rigel Field Appraisal and Development

The Rigel exploration well, the Texaco OCS-G-18207 #1, was drilled in 1999 in GOM block MC252 in 5200' water depth. The well targeted a Miocene age, low-relief downthrown closure/stratigraphic trap that was supported by a strong amplitude response on the 3D seismic data. The results of the Rigel exploration well were disappointing (see log strip below). The well encountered what was interpreted to be a 176' thick gas-charged, low-permeability siltstone in the Rob E-age target. This reservoir was believed to be uneconomic at that time. This presentation focuses on a few stalwart individuals' efforts to continue to pursue appraisal of this marginal discovery. These efforts included pre-appraisal geologic modeling, reservoir modeling and analog work. The presentation will show the results of the appraisal drilling and compare the post-appraisal model with the pre-appraisal model.

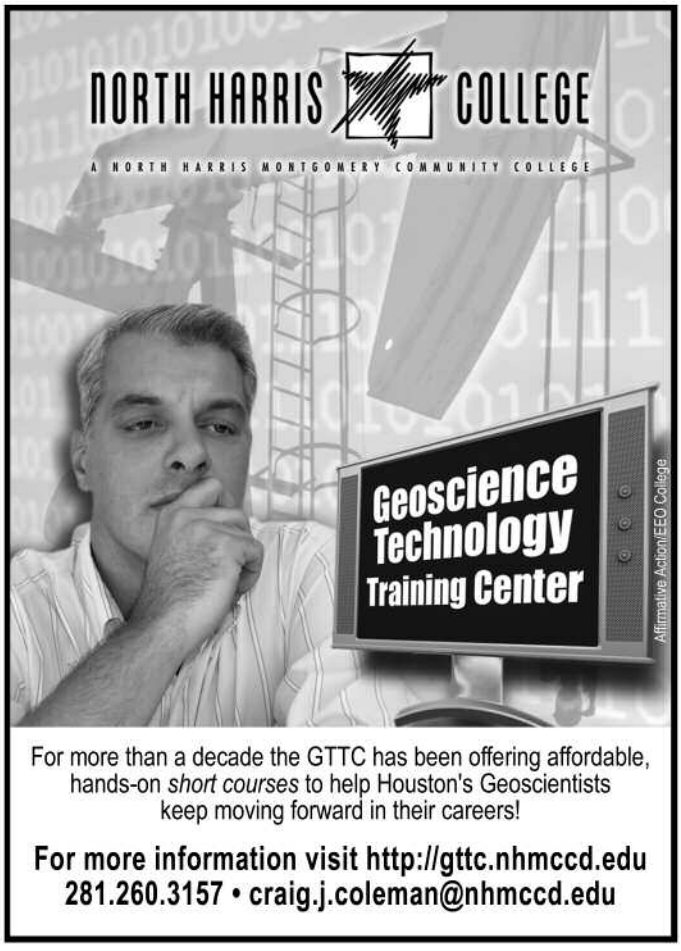
...the Rigel Field is currently being developed as a one-well subsea tieback, as part of a larger subsea system. The project is well underway and expected to begin production in 2005.

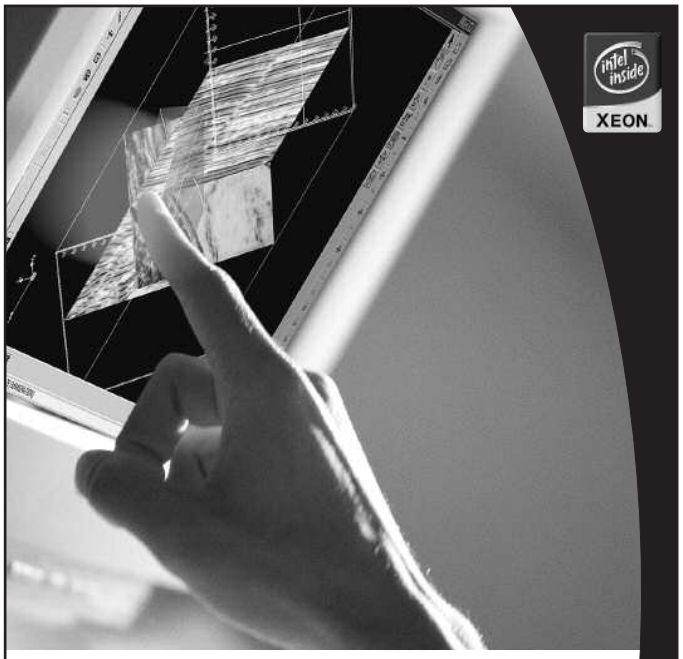
The appraisal drilling by Dominion, the operator, with its partners, Mariner and Newfield, was highly successful. As a result, the Rigel Field is currently being developed as a one-well subsea tieback, as part of a larger subsea system. The project is well underway and expected to begin production in 2005. The presentation will also demonstrate the methods used to enhance the profitability of the development after appraisal drilling was completed. ■

Biographical Sketch

Richard Fowler is the Deepwater Development Manager for Dominion E&P. He has been heavily involved in all of Dominion's Deepwater Projects including the Devils Tower Spar Development, the Front Runner Spar Development, and the Spiderman and San Jacinto developments in the Eastern Gulf of Mexico. He has been with Dominion (formerly CNG Producing) for eight years and previously with Exxon for 12 years in various reservoir engineering and operational assignments. Rick has a Bachelor of Science degree in mechanical engineering from Tulane University. He has been President of the SPE Delta Section, Chairman of the GOM Deepwater Symposium and committee member for the Geology and Geophysics Session for the SPE ATCE. He currently serves on the OTC Program Committee.

Ed Frame is a Staff Geologist in the Deepwater Exploration Group of Dominion E&P's Offshore Business Unit. He has worked on several deepwater exploration projects, including Rigel, Spiderman, San Jacinto and the recent Thunder Hawk discovery. He has been with Dominion (formerly CNG Producing) for 16 years, working a variety of geological and technical assignments. Ed has a Bachelor of Arts degree in geology and anthropology from the University of Delaware.





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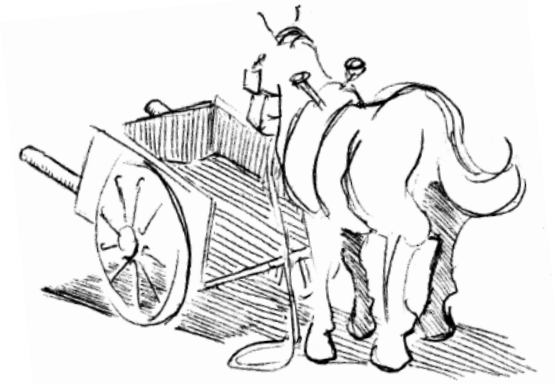

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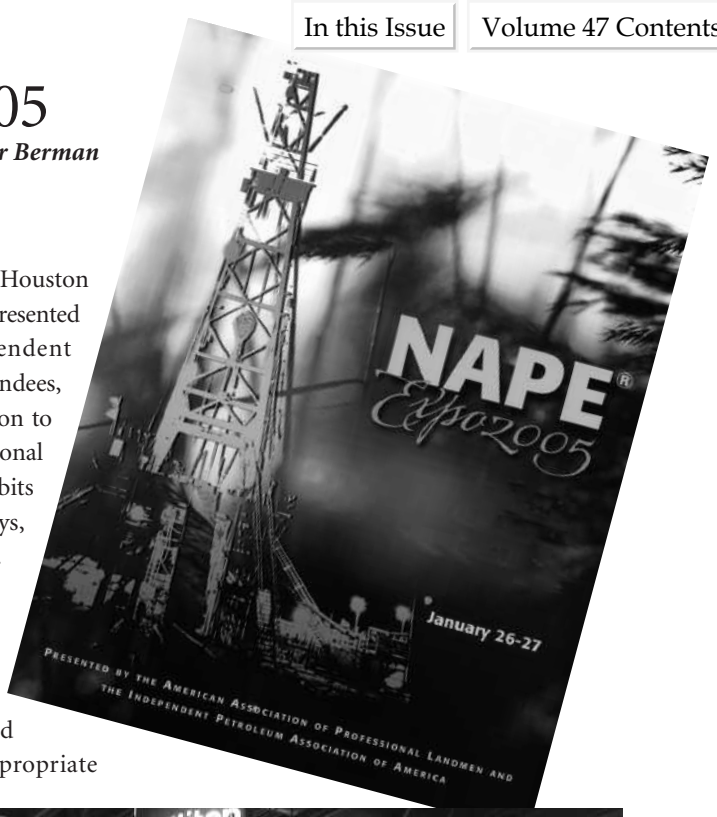
NAPE 2005

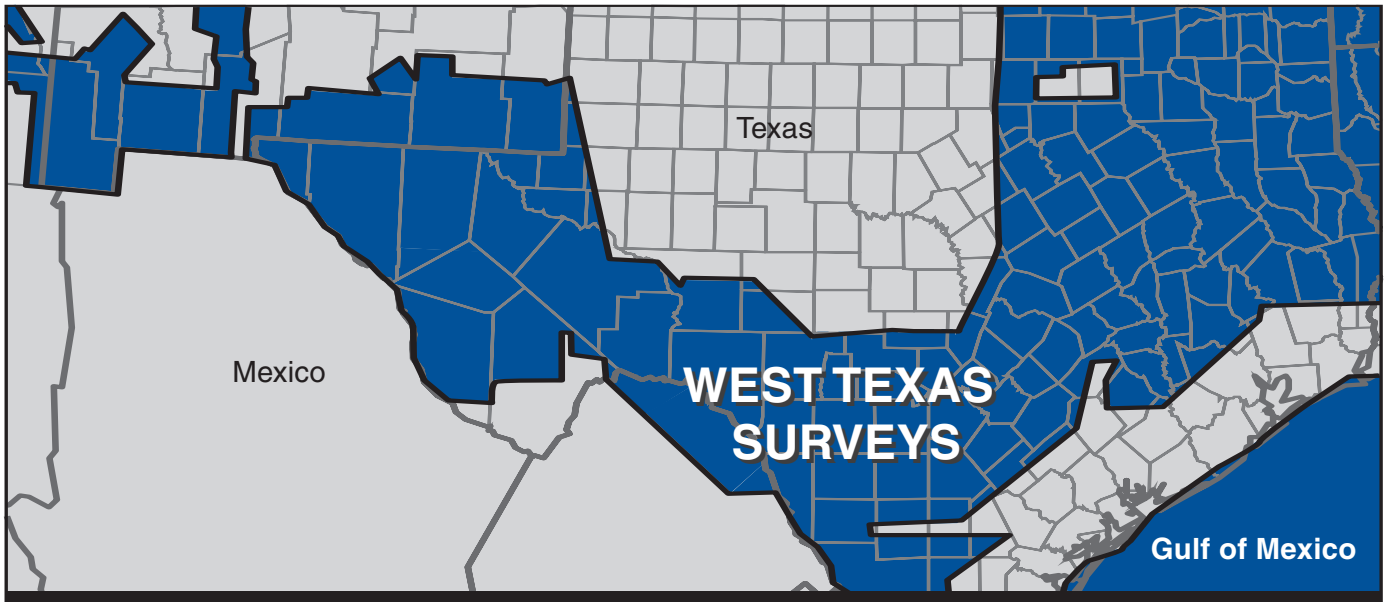
Article and Photos by ***Arthur Berman***



The annual North American Prospect Exposition (NAPE) was held in Houston January 26–27, 2005, at the George R. Brown Convention Center. It was presented by the Association of Professional Landmen (AAPL) and the Independent Petroleum Association of America (IPAA). This year, with at least 12,000 attendees, NAPE was even larger and more successful than last year's expo. In addition to the two-day exposition, this year's meeting also featured an all-day International Forum on Tuesday, January 25. The Exposition included more than 900 exhibits featuring prospects, producing properties, U.S. onshore and offshore plays, international opportunities, capital providers and networking opportunities.

In its 13th year, the popular NAPE Expo provides a forum for more than 500 oil and gas companies to introduce their domestic and international oil and gas prospects and producing properties to more than 12,000 interested professionals. Additional exhibit booths were provided for financial and investment institutions representing potential sources of capital for appropriate companies.

Along with the International Forum, sponsored by IHS Energy Group, there was a NAPE Institute and AAPL Model Form Operating Agreement Workshop. A luncheon, underwritten by Randall & Dewey, featured a presentation by Mac McLarty, formerly President Clinton's chief of staff, on Wednesday, January 26. A hybrid live/Internet auction sale conducted by The Oil & Gas Asset Clearinghouse, a Petroleum Place company, was held on Wednesday, January 26, in conjunction with NAPE. ■



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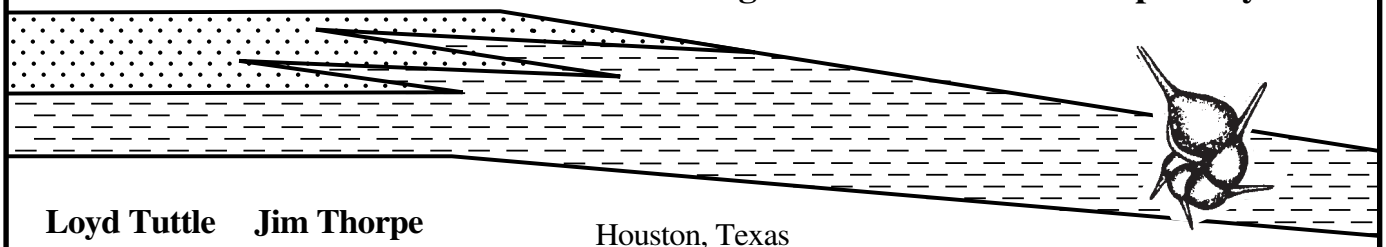

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America's First Gold Rush and the Double Eagle

Brent Glass, Ph.D., director, Smithsonian's National Museum of American History
Tuesday, March 1, 6:30 p.m. $12 members, $15 nonmembers

In 1799, John Reed found a large metallic rock on his farm in North Carolina. For three years, this chunk of metal was used as a door stop, until a jeweler recognized it as a 17-pound gold nugget! This event launched America's first gold rush—years prior to the more famous gold rush in California.

Brent Glass, director of the Smithsonian's National Museum of American History, will tell the story of how gold transformed North Carolina and made way for the later gold rushes in the western United States. Glass will also tell the intriguing story of the 1933 Double Eagle, one of the world's rarest and most sought after collector coins.

Exploring Florida's Earliest Spanish Galleon

Roger C. Smith, Ph.D., Florida Bureau of Archaeology
Tuesday, March 15, 6:30 p.m. $12 members, $15 nonmembers

In 1559, a fleet of Spanish galleons led by Tristan de Luna y Arellano brought the first European immigrants to the Southeast in an attempt to colonize Florida. Scholars have long known that Pensacola Bay was the site of such a colony, but no remains from the Spanish colonial period had been found until recently. In 1992, Roger C. Smith and a team of underwater archaeologists discovered the remains of one of Tristan de Luna's galleons, which sunk in a hurricane off of the coast of Pensacola. The shipwreck, the earliest to be discovered in Florida, has proven to be an invaluable resource in reconstructing the story of the nearly 2,000 colonists and soldiers who made the trip to Florida. Thousands of artifacts have been recovered, including pottery, cannonballs and coins.

Smith is the state underwater archaeologist with the Florida Division of Historical Resources in Tallahassee. He has directed a number of underwater surveys and excavations throughout Florida, and has worked extensively in the Caribbean, Mexico, the Bahamas, Bermuda and Africa. Smith specializes in 15th and 16th century Spanish and Portuguese maritime history, and he has participated in the excavations of several of the earliest European shipwrecks in the New World. He has also been instrumental in establishing several shipwreck preserves in Florida.

Cultural Feast—A Taste for Gold

Tuesday, March 8, 7 p.m.
Hosted at the Warwick Hotel

Nearly every culture has myths associated with gold, a long-coveted metal that has influenced the world since ancient times. A Taste for Gold will explore the historical figures and legends that celebrate the noblest of metals, including greedy King Midas of Turkey; the legendary City of Gold, El Dorado; the mythical Jason and the Golden Fleece; and King Louis XIV of France. A glittering menu will feature dishes and banqueting lore inspired by these renowned golden stories. Participants will also indulge in a feast of information as they dine. The guest of honor will be gold itself, as it is incorporated into various dishes throughout the meal. Join us for a sparkling celebration of gold and those it has inspired to greed, folly, intrigue and greatness.

behind-the-scenes tour

Gold! Natural Treasure, Cultural Obsession
March 8, 6 p.m.
April 5, 6 p.m.
May 10, 6 p.m.
June 7, 6 p.m.

Tour the special exhibition Gold! Natural Treasure, Cultural Obsession with Mark Mauthner, associate curator of Gems and Minerals. This special tour through the dazzling exhibition will give participants an insider perspective through background stories about the pieces on display as well as how the Houston Museum of Natural Science created the exhibition.

Hands-On Class—Jewelry Making

Tuesday, April 12, 6 p.m.

Local artist Margaret Hardman-Muye will introduce the basic techniques and tools used **Adult Education Programs** *continued on page 47*

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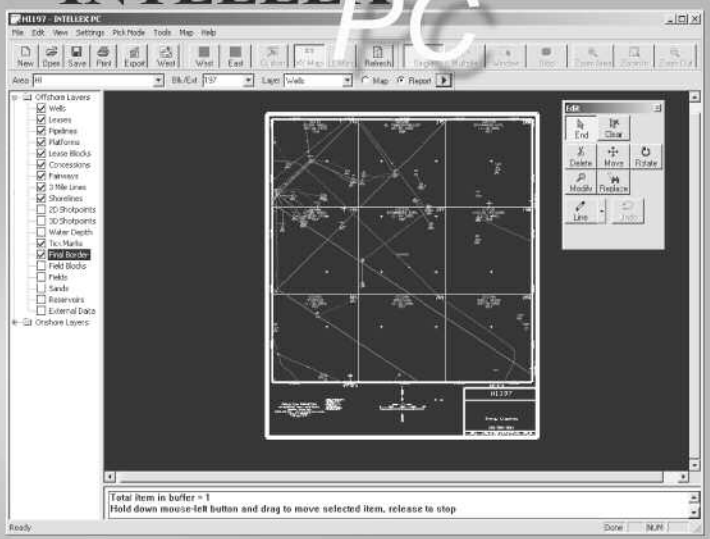

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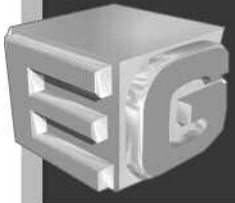

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Gold! Adult Education continued from page 45

to create jewelry pieces from Precious Metal Clay®, a clay-like material created when microscopic particles of silver or gold are suspended in an organic binding agent. The clay is shaped and heated in a kiln to form solid metal that can be worked with conventional tools. Participants will complete a piece of sterling silver jewelry that will be ready to wear at the end of the evening. Limited to 12 participants, adults only. ■

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Remembrances

Since the last report from the Remembrances Committee (12/7/04), our geological community has lost the following members:

Charles Leroy Wehnes passed away on December 13, 2004 at the age of 64. He earned a BS in math from Northeastern State University of Oklahoma in 1967 and pursued graduate Geology studies at the University of Southwestern Louisiana in Lafayette. Charles also served in the US Marine Corps during the Vietnam War. He was currently employed as a Senior Geophysicist with Penn Virginia Oil and Gas in Houston. He was an active member of the HGS, GSH, and SEG. A memorial donation will be made to the Make a Wish Foundation.

Thomas David Barber passed away on January 15, 2005, at the age of 85. He earned a BS in geology in 1940 and a MS in geology in 1942, both from Texas Christian University. Tom then served in the U.S. Navy during World War II. He moved to Houston in 1946 to work as a geologist for Amoco and Michael T. Halbouty before leading his own company, Barber and Associates, Inc. He was an Honorary Member of the HGS and AAPG. A memorial donation will be made to the San Gabriel Presbyterian Church Building Fund.

Albert Hodges Wadsworth, Jr. passed away on January 29, 2005, at the age of 88. He earned a MA in geology in 1941 from the University of Texas in Austin. Al began his career as a geological scout for Texaco, was a field geologist for the USGS, served as a E&P manager for Commonwealth Oil Company, and spent most of his career as a worldwide independent oil producer and mining consultant. Professionally he helped start The Gulf Coast Geological Library and The Society of Independent Earth Scientists (SIPES). He was an Active Member of the HGS and AAPG. A memorial donation will be made to the HGS Undergraduate Scholarship Fund.

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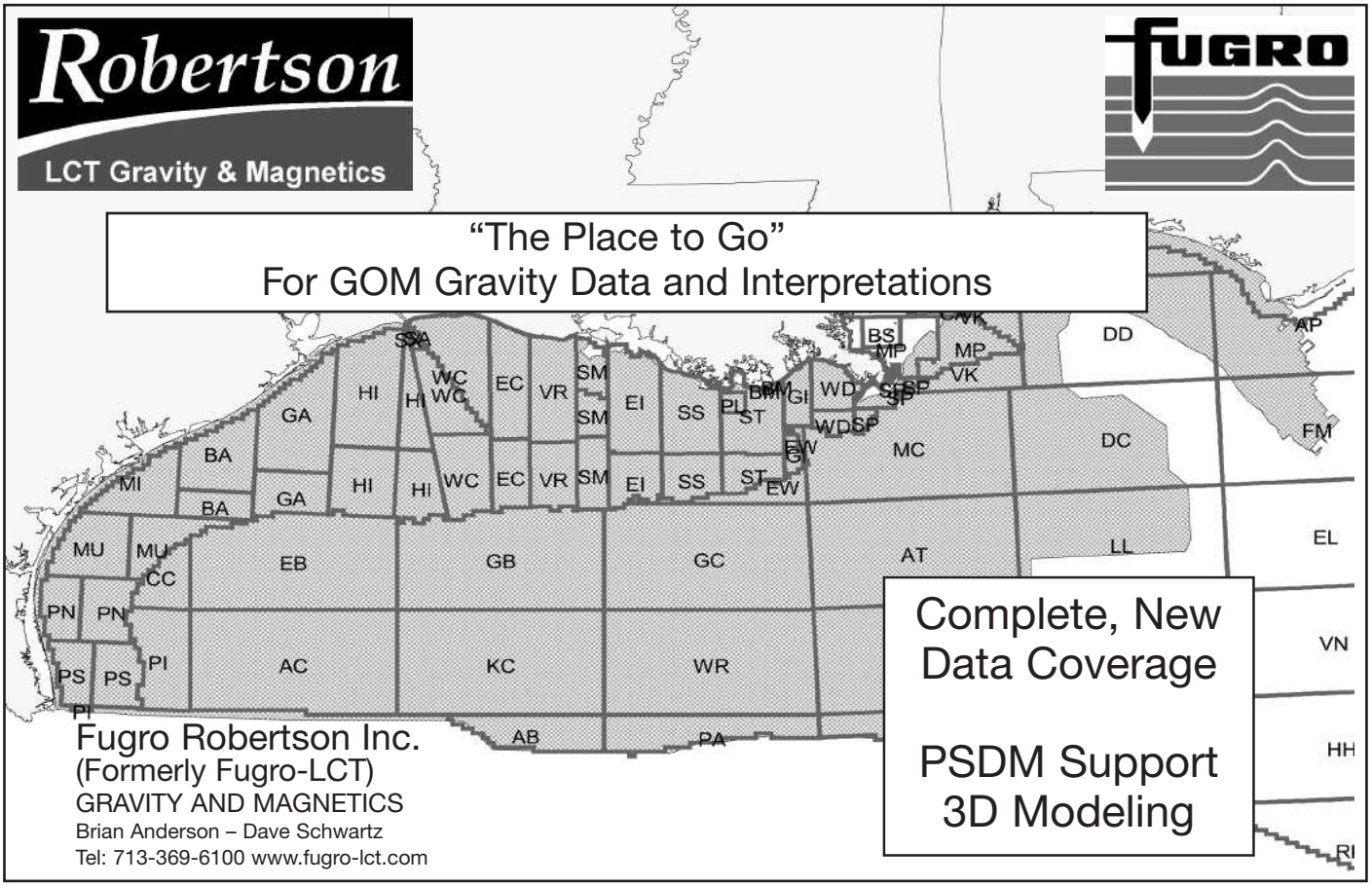

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Louisiana Oil and Gas Park, Jennings Louisiana

by ***Burt and Mary Tietje***

The birthplace of the Louisiana oil industry is looking to build a museum to commemorate the momentous event that took place in September 1901. The Jennings Oil Company Clement No. 1 discovery well was located about five miles northeast of the south Louisiana town of Jennings. Drillers penetrated a high-pressure oil sand at 1832 feet on top of a salt dome and the resulting gusher signaled the beginning of the oil industry in the state.

The city has long eyed the project ever since the state legislature dedicated 11 acres of land as the Louisiana Oil and Gas Park in 1975 alongside the Jennings exit on Interstate 10. The project languished for years until the city hosted the Louisiana Oil Centennial celebration in 2001. The successful centennial celebration produced a surplus of funds that was earmarked as seed money for the museum effort. Additional planning money was secured from the state and a separate foundation was established to oversee the effort.

The Louisiana Oil and Gas Museum Foundation hired Burt Tietje as executive director and charged him with developing the project. The foundation has established its 501-c3 status with the IRS and has hired Southwest Museum Services of Houston as consultants to help write the master plan for the museum. "We have had the luxury of a well-funded project and have taken the time to be very deliberate in our decision-making. We don't want to make any mistakes in this process," said Tietje. "We feel we will be successful raising funds for the museum project only if our plan is good enough. We have a good local story to tell about the discovery of oil and hope to partner with those in the industry who want to tell the wider story of the oil industry."

"Our location in the park alongside Interstate 10 offers unparalleled visibility and accessibility to the 14 million vehicles passing each year. We will partner with our parish Tourist Commission which already operates in the park and registers over 30,000 visitors a year with its mix of information and a live alligator exhibit. Those are very powerful numbers for any museum to begin with," said Tietje.

Exhibits about geology and history will, of course, be central to our story," said Tietje, "but I would like to explore other avenues like a geologist's hall of fame to honor a portion of the industry that has produced many remarkable men and women whose stories have not been told. Most of today's hope for the industry lies in advances in seismic technology and the geologist's ability to use it."

Education will be central to the mission of the museum. Programs will center not only on history but also the physical sciences and even sociology and ecology.

The group has received a lead donation from the Zigler Foundation of $500,000 and has raised some $1.3 million to date. Mr. Gene Gibson of Arizona, whose grandfather Elmer Dobbins was the driller on the discovery well, has been an early and enthusiastic supporter of the museum concept. When he ran across a restored 1918 Oldsmobile oil-hauling truck for sale in Kansas, he just had to have it for the future museum. "Gertie," as the truck is affectionately called, is on display temporarily in Oregon, where it awaits the completion of its home in Louisiana. "This will be a great object to use in fundraising and publicity," said Tietje "as well as a valuable addition to our exhibits." ■

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ANNOUNCEMENT AND CALL FOR PAPERS

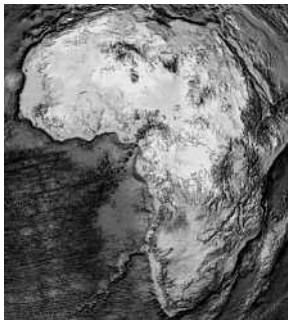
The 4th HGS/PESGB International Conference on African E&P

Path to Discovery

Houston, 7–8 September 2005

This annual conference, which alternates between London and Houston, has become established as the primary technical E & P conference on Africa. Scheduled for 7-8 September 2005 in Houston, a two-day program of talks is planned along with poster presentations and exhibits from sponsoring companies. The conference covers all aspects of African E&P, with particular emphasis on new ideas for exploration, the geology of the continent, application of emerging technologies and case histories of discoveries.

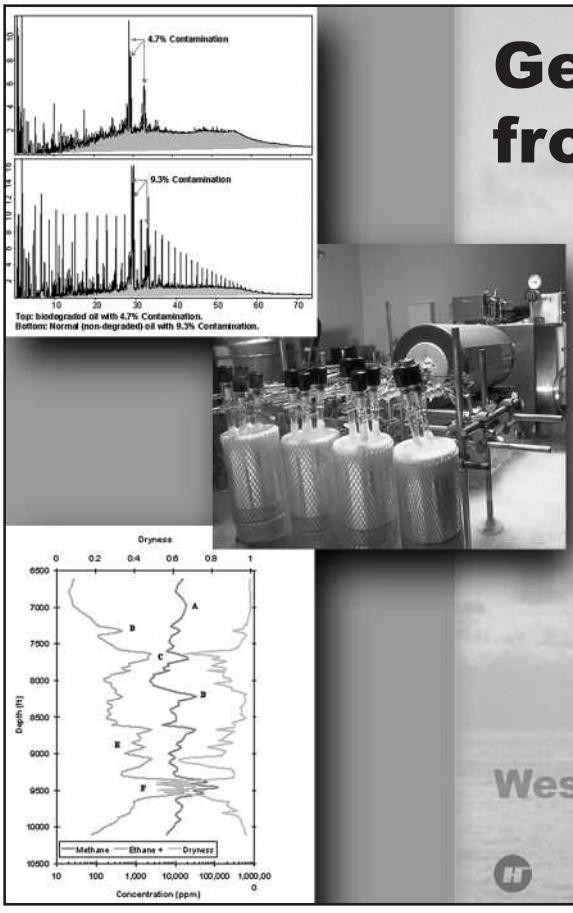
The conference series is organised jointly by members of the International Explorationists Group of the Houston Geological Society (HGS) and the Petroleum Exploration Society of Great Britain (PESGB). The intention this year is to limit the program to two days by selecting the very best talks.



Technical submittals and sponsorships are welcomed now. Although the program will not be finalized until May, please submit topics or abstracts as soon as possible for consideration of the Technical Program Committee by email to africa05@sbcglobal.net.

Special thanks are due Exploration Consultants Limited (ECL) for their continuing support by committing to prepare the CD of the 2005 conference proceedings.

Committee:
Houston: Al Danforth, Steve Henry and Ian Poyntz
London: Ray Bate, Duncan MacGregor, Mike Lakin and Val Clure



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Government Update

by ***Henry M. Wise, P.G.*** *and* ***Arlin Howles, P.G.***

PE Board Water Quality Planning Stakeholders Meeting

The stakeholders meeting on the proposed Texas Board of Professional Engineers (TBPE) Policy Advisory Statement on water quality planning was held on January 11, 2005, and was heavily attended by approximately 30 people. The TBPE had also received a large number of written statements, including one from the HGS Board of Directors. With the large stakeholder response, the TBPE will rewrite the policy opinion and hold another stakeholders meeting in February. A more in-depth article is on page 51 in the HGS *Bulletin.*

From the *Texas Register*

The January 7, 2005 *Texas Register* contains an opinion that may be relevant to the use of the Professional Geoscientist Seal. The question was whether the seal of a professional engineer licensed in Texas may be placed on engineering plans, specifications and other documents relating to projects not to be constructed in Texas (RQ-0244-GA). The opinion's summary states, "A professional engineer licensed in Texas must place his seal on engineering plans, specifications, plats, and reports prepared under authority of his Texas license, even if the project will not be constructed in Texas. Whether documents prepared and sealed by an engineer under authority of his Texas license may legally be used for construction in another state or country depends upon the laws of that jurisdiction."

TCEQ Applications for Air Permit by Rule

The Texas Commission on Environmental Quality (TCEQ) now provides a new service for facilities applying for an air authorization under a Permit by Rule (such as used for permitting soil vapor extraction equipment). Applicants can now complete the PI-7 form on-line and submit it, along with a Core Data Form, checklists and other supporting documents. The signature line has been removed from the form PI-7 to accommodate electronic submittals of the form. These forms can be found at
http://www.tnrcc.state.tx.us/permitting/airperm/nsr_permits/announce.htm#pi7

DOI Estimates More Natural Gas Reserves

The Minerals Management Service (MMS) announced an interim update of offshore energy resources that estimates undiscovered technically recoverable offshore gas resources at 406.1 trillion cubic feet. This mean estimate for 2003 is 12 percent higher than MMS's 2000 national assessment of 362.2 tcf.

The update is available online at http://www.mms.gov/revaldiv/PDFs/2003NationalAssessmentUpdate.pdf

Education/Evolution Update

Pennsylvania

On December 14, eleven parents from Dover, Pennsylvania, represented by the Pennsylvania chapter of the American Civil Liberties Union, Americans United for Separation of Church and State, and attorneys from Pepper Hamilton LLP, filed suit in federal court to overturn the "intelligent design" policy of the Dover Area School Board. The plaintiffs in Kitzmiller et al. v. Dover Area School District argue that teaching intelligent design, which consists of creationist criticisms of evolution that are supposed to lead to the conclusion that supernatural intervention by an "intelligent designer" must have been responsible for the history of life, is government establishment of religion when taught as science in a public school science class. Vic Walczak, attorney for the Pennsylvania chapter of the ACLU, said that "Teaching students about religion's role in world history and culture is proper, but disguising a particular religious belief as science is not," at the press conference announcing the suit. He added, "Intelligent design is a Trojan Horse for bringing religious creationism back into public school science classes."

Missouri

On December 1st, House Bill 35 was introduced in the Missouri House of Representatives. HB 35 would require that: "All biology textbooks sold to the public schools of the state of Missouri shall have one or more chapters containing a critical analysis of origins. The chapters shall convey the distinction between data and testable theories of science and philosophical claims that are made in the name of science. Where topics are taught that may generate controversy, such as biological evolution, the curriculum should help students to understand the full range of scientific views that exist, why such topics may generate controversy, and how scientific discoveries can profoundly affect society."

http://www.house.state.mo.us/bills051/biltxt/intro/HB0035I.htm.

HGS Welcomes New Members

Effective February 1, 2005

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Marshall Byrd
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Change Seems to be a Way of Life for the HGS Website (That's the Nature of the Entire Internet, for that Matter)

New HGS Website Features

1. Potential new members can now make application for membership directly on the HGS Website. They can still use the old paper form if they like, but that creates extra work for the HGS office because the application must be on the Website for the Membership Committee to process it. This new feature will streamline the approval process and reduce the time it takes for action by the Executive Committee. The Website Committee is now reviewing what is needed to add on-line dues renewal to the Website.

2. Be sure to read Art Berman's "Editor's Letter" in this issue of the *Bulletin*. It describes a long-range plan to more tightly integrate the HGS *Bulletin* and the HGS Website. Prior to February, 2005 a black-and-white copy of the *Bulletin* was posted on the Website in Adobe PDF format. It was very large and fairly difficult to download and read. We will continue to post the PDF version but, beginning with the February issue, a color version of many articles will be available, complete with active URL links and, when possible, expanded content. Each new issue will be posted about the same time as the print *Bulletin* is mailed. Two issues are now on-line at http://hgs.org/2005/February/ and http://hgs.org/2005/March/.

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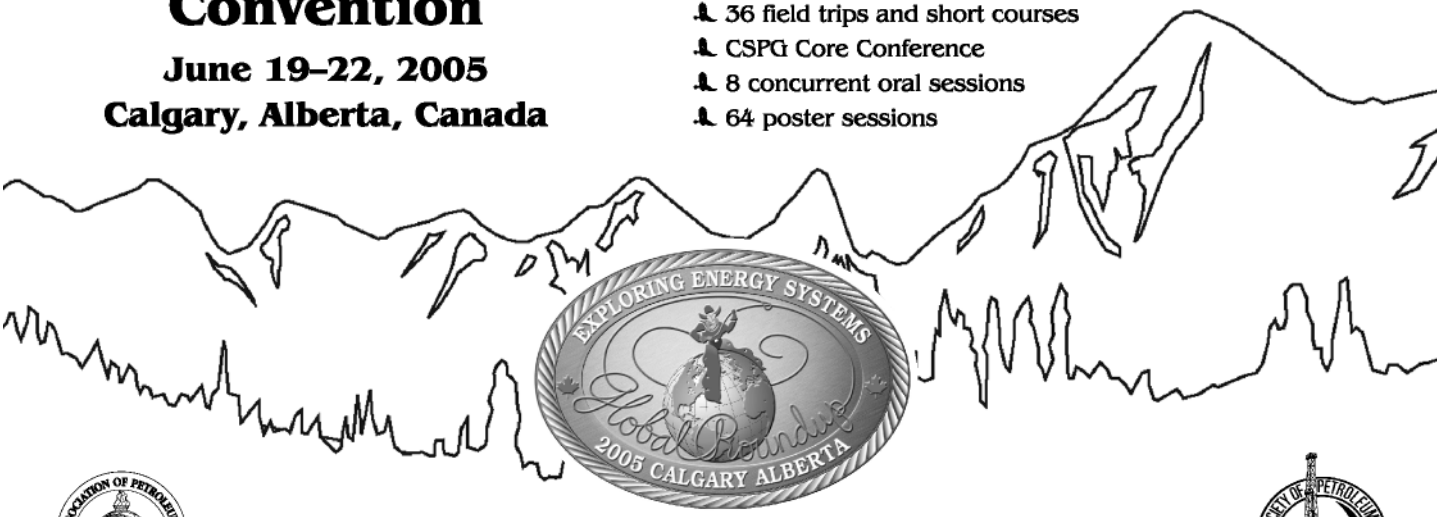

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HGA *and* GeoWives **News**

HGA

by Vicky Pickering, Third Vice President

It is time to enjoy the beautiful spring weather in Houston. Come join the ladies of HGA for two luncheons.

Thursday, March 31, 2005, the ladies of HGA will enjoy a Spring Style Show with Fashions by Harold Powell with luncheon at the Houston Racquet Club. Shirley Gordon and Norma Jean Bacho will chair this luncheon with their excellent committee.

On Thursday, May 12, 2005, HGA will have the yearly Business Luncheon with musical entertainment by The Kingsmen, a barbershop chorus. Lois Matuzsak will be chairperson of this party with her able committee.

Two bridge groups are available for those interested in bridge. Contacts are Audrey Tompkins at 713-686-0005 and Daisy Wood at 713-977-7319.

Wives of members of HGS and women geologist members of HGS are invited to be members of HGA. Contact our president Margaret Jones at 281-558-3171 for information on membership.

Geo-Wives

In March Lois Matuszak is preparing a wonderful program on India.

April 14, 2005 is the Spring Trip for GeoWives. They are going to the oldest town in Texas—Nacogdoches. There are many sites involving Texas history as well as the oil industry. Hostesses are Martha Lou Broussard and Linnie Edwards. Mark you calendar for a fun-filled day.

As a member you are invited to join

GeoWives

2004–2005 dues are $7.50

make check payable to *GeoWives* and mail to:

Dene Grove
12715 Pebblebrook
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Please provide the following

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Notification / Phone Committee ☐
Courtesy / Hostess ☐
My home is available for a meeting ☐

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Houston Geological Auxiliary

2004–2005 dues are $20.00

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Get away from it all on an AAPG Field Seminar!

AAPG's exciting and unique Field Seminar program continues in 2005 with several new offerings and some returning favorites. You can choose to go to the mountains, the valleys, or anything in between! Check out these spring offerings coming up very soon….

Exploration Potential, Tectonic Framework, and Depositional Systems of Strike-Slip and Extensional Basins
Leaders: Tor H. Nilsen, Consultant, San Carlos, CA; Arthur G. Sylvester, University of California at Santa Barbara
Date: April 2-8, 2005 ***NEW DATE!!***
Location: Begins in Palm Springs, CA, ends in Las Vegas, NV
Tuition: $2,050 (increases to $2150 after 2/25/05), includes lodging, field transportation, some lunches, guidebook and maps

Clastic Reservoir Facies and Sequence Stratigraphic Analysis of Alluvial Plain, Shoreface, Deltaic, and Shelf Depositional Systems
Leader: Thomas A. Ryer, The ARIES Group, Inc., Katy, TX
Date: April 24-30, 2005
Location: Begins and ends in Salt Lake City, UT
Tuition: $1,500 (increases to $1600 after 3/28/05), includes field transportation, lunches in the field, guidebook

Controls On Porosity Types and Distribution in Carbonate Reservoirs
Leaders: Evan K. Franseen, Kansas Geological Survey; Robert H. Goldstein, University of Kansas; Mateu Esteban, Carbonates International, Mallorca, Spain
Dates: May 8-13, 2005
Location: Almeria Region, SE Spain, begins and ends in Las Negres, Spain. Fly from London/Barcelona/Madrid
Tuition: $2,500 USD (dependent on exchange rate; increases to $2600 after 3/28/05), includes field transportation, all meals and lodging during trip, guidebook

Photo courtesy of Tom Ryer

Go to the AAPG Website at http://www.aapg.org/education/fieldseminars/index.cfm for complete details on these and all our other 2005 Field Seminars!!

For further information, please contact the AAPG Education Department
Phone: 918-560-2650; Fax: 918-560-2678; e-mail: educate@aapg.org

vrroooom!!

HGS Annual Road Rally

The Annual HGS Road Rally is Coming

A team or individual is given a packet with clues directing you to travel by car to secret cultural, historical, and geological sites in and around Houston. The team that answers the most questions based on the sites/clues and does it in the least mileage wins a trophy.

Coffee and donuts and a souvenir tee-shirt are included. The course takes 3 to 4 hours to complete and ends in a social event where trophies are awarded (meal/drinks not included).

HGS Road Rally

WHEN??
Saturday April 23, 2005 at 9:00 AM

HOW??
Registration forms and more information will be available in the next *Bulletin* and on the HGS website (www.hgs.org).

HGS Road Rally

START FORMING TEAMS NOW

If you want information on how to volunteer please contact Diane Yeager 713-646-1138 or 281-486-1732.

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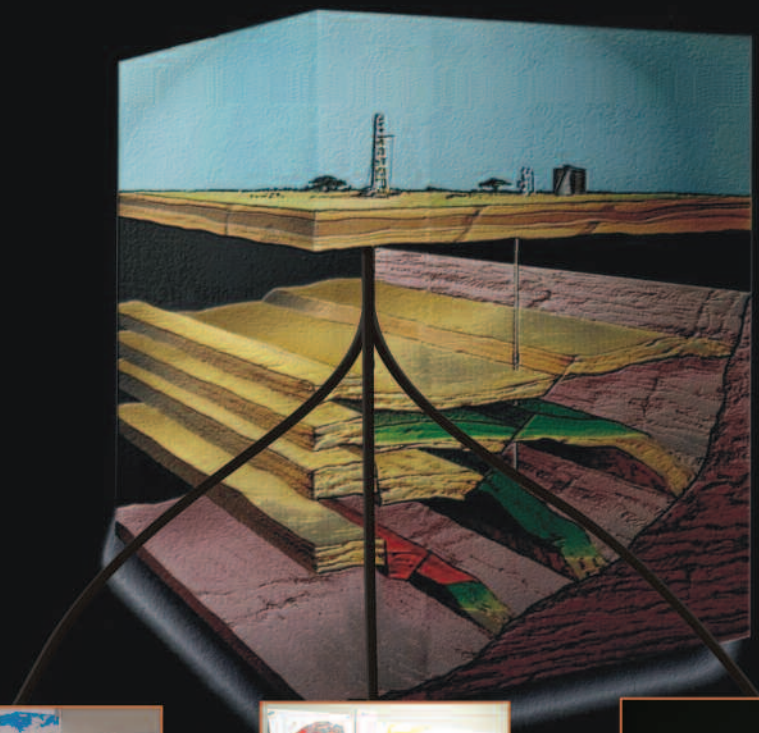

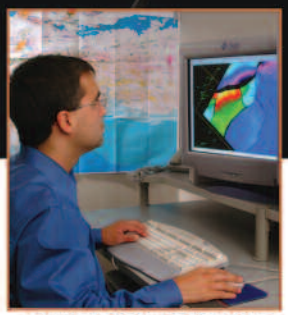

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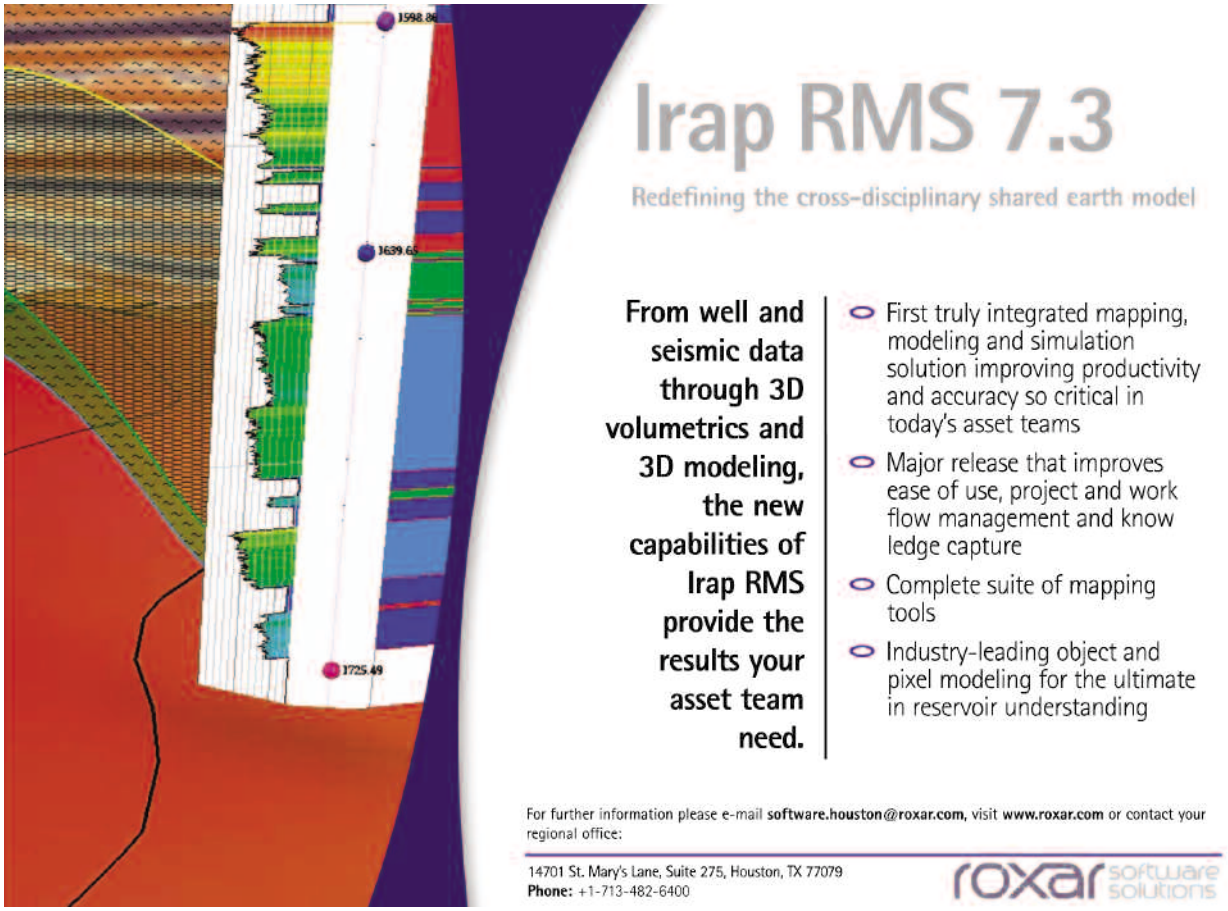

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