AAPG AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS, AN INTERNATIONAL ORGANIZATION

EXPLORER

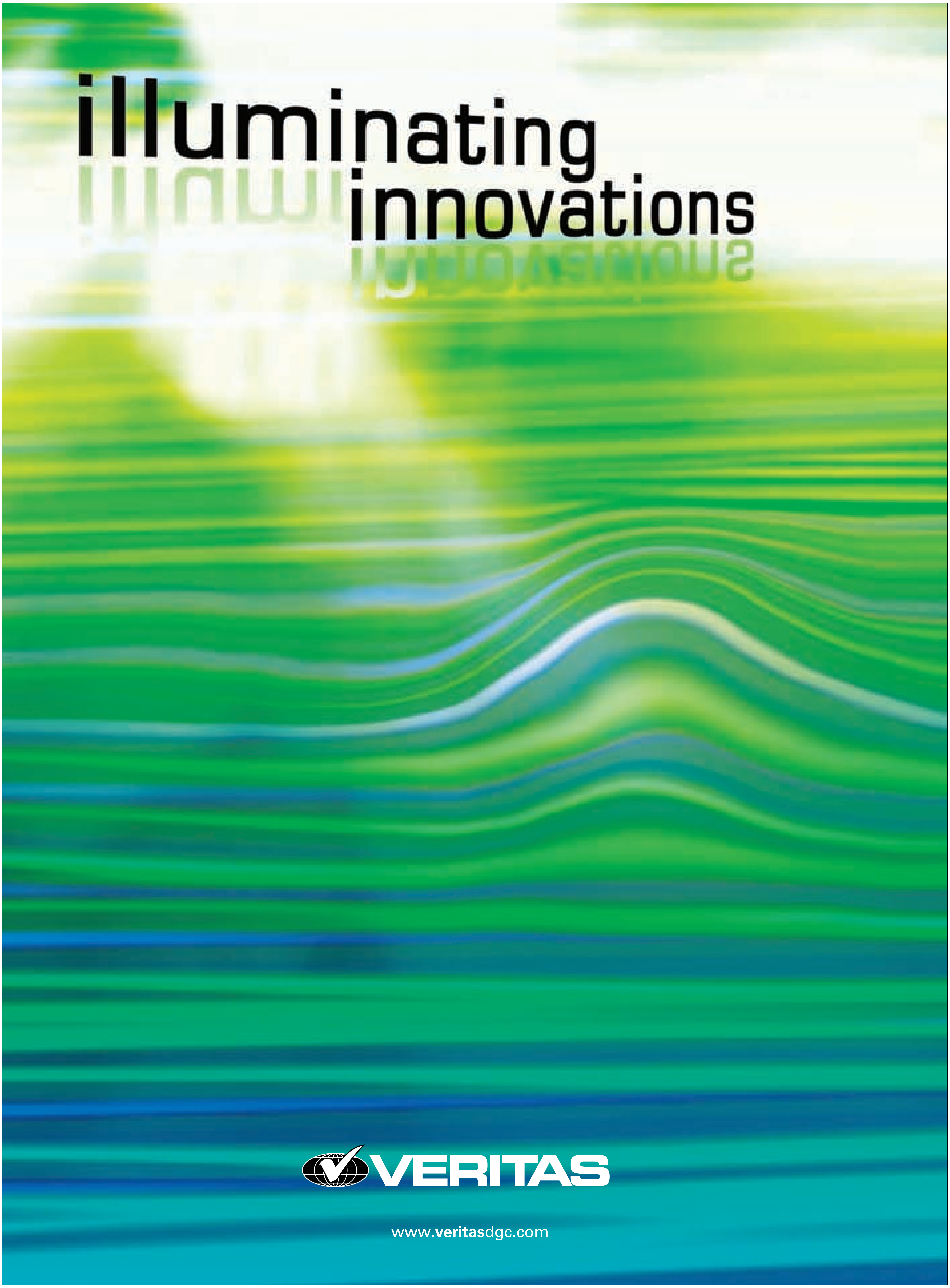
DECEMBER 2006

Get Down, Get Data

4-D Gets a Big Boost With In-Well System

See page 18

EXPLORER



On the cover: We start our annual Downhole Geology issue with a computer-generated graphic that shows the configuration of a permanent in-well optical seismic system as being used by BP Norway and Weatherford at the Valhall Field – a big step forward in securing effective 4-D data, and an example of how technology is helping geoscientists find success. Story on page 18; other theme stories are found throughout the issue. Graphic courtesy of Weatherford.

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PRESIDENT'S COLUMN

AAPG Nomination Process Under Way

By LEE T. BILLINGSLEY

I have just completed the fall convention circuit to Lafayette, La. (Gulf Coast Section), Buffalo, N.Y. (Eastern Section), and Perth, Australia (international).

Conventions are fun for your elected officers because they allow us to mingle with members, but they also are intense because of all the information and stimuli we get. It is like being a small town farmer and taking a trip to New York City. I can hardly sleep after I get back, because I have so many ideas from members.

As I have previously written, members are extremely appreciative of the officers' efforts. They also are concerned and ask, "How are you doing?"

I can honestly tell you that I have really enjoyed my time as president. It is very challenging, and in some ways it is like being back in graduate school; your work is never done until the year ends.

At times when I start to feel overwhelmed, I remind myself of the soldiers in Iraq and Afghanistan, and my responsibilities do not seem so tough.

* * *

This is the time of year when AAPG's Advisory Council (AC) begins to collect information on potential nominees to stand for election to the Executive Committee (EC). The AC will formally meet in April to submit nominees to the EC, but the deadline for submission of names and support data is late January.

Members who would stand for office should contact their local society officers and ask them to forward a nomination and the backup materials to the AC. Or members can simply send their information directly to the AC.

(Note: we do not "run" for office at AAPG, we "stand," which is much more civilized. Running is too aggressive and unbecoming to professionals.)

The EC functions like a board of directors, except we cannot grant ourselves large stock options. AAPG's dedicated staff does the daily work, and it is the EC's mission to keep the organization focused through our policies. In order to be an effective EC member or president, you do not have to be the best geologist, but you do need some of the attributes of Michael Jordan. He was not only one of the best individual basketball players, but his teams won six championships because he made other players better.

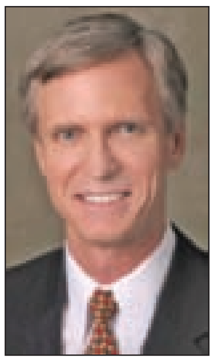
So it is with being an AAPG officer, we have a dedicated, talented staff ready to execute our policies. When asked, members are anxious to volunteer, and it is the officers' challenge to organize both the members' and staff's efforts into the most beneficial tasks for the good of the entire organization.

Thus, if you are willing to help make others better or if you know a member with leadership qualities, perhaps you should ask your local society to make an important nomination.

* * *

The recently completed AAPG All-Member Survey yielded some interesting results. The results summary are shown on page 4, but the following items are noteworthy to me:

❑ Only about 10 percent of members completed the survey, which is not an unusually low number according to our survey consultant. I do not think that 90 percent of members simply do not care about AAPG, but rather they are busy and do not have a strong opinion. They are reasonably happy with what we are doing.


Billingsley

❑ About 70 percent of responses indicated the top two categories of satisfaction with AAPG overall, and only 7 percent were in the "unsatisfactory" categories. Wow!

(But we will work toward improving the 21 percent that are ambivalent.)

❑ Members value the professionalism and networking promoted by AAPG.

Of all our offered products and services, our publications (EXPLORER, BULLETIN, and Special Publications) rank highest.

❑ Two proposed bylaws changes from the EC to the House of Delegates (HoD) received mixed endorsements by respondents: A graduated dues structure was mildly supported, but a large group was unsure; and an adjustment to petition candidate rules was mostly viewed negatively, but with a large uncertain group.

The HoD will consider both proposals in April.

❑ Web site usage increased. (Did we need a survey for this?) Satisfaction with Web site is good, but could improve.

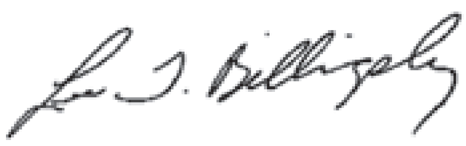
❑ Our GEO-DC office received overwhelming support for its mission of informing both members about government and government about science and energy. Furthermore, AAPG is encouraged to take a public stance on global climate change and to generate a scientific summary for members. Message received, loud and clear.

❑ AAPG staff handled over 94 percent of requests or contacts from members satifactorily.

This year's Executive Committee is doing its best to maintain the high quality of AAPG in certain areas, to improve it in others and to take it in some completely new areas.

In this process of being AAPG president, I have come to appreciate an old saying: "When you are up to your rear in alligators, it's hard to remember your original intention was to drain the swamp."

'Til next month,



Survey Shows High Level of Satisfaction

AAPG Scores High With Members

By LARRY NATION
AAPG Communications Director

The 2006 All-Member Survey results showed a "remarkably" high level of member satisfaction across-the-board, tracking similar responses in the 2003 statistical study.

The overall satisfaction rate was 92.8 percent of the membership responding positively. Also, 43 percent of the respondents had contacted headquarters in the previous 12 months and 94.21 percent of those indicated their questions/concerns were handled to the members' satisfaction.

"Anything above 80 percent in either category is phenomenal," said David Anderson, of Anderson Marketing Services, which handled the survey. "AAPG members are very satisfied, especially compared to surveys conducted by other groups." He also noted the results echoed the responses received in 2003 "showing from a worldwide viewpoint there is no slippage in perception of services in the short term and verifies the previous response rates."

The 2006 survey was published on the AAPG Web site and inserted in the August issue of the EXPLORER and drew 2,937 responses – or 9.9 percent of the total distribution. Of that total, 538 surveys were tallied from the printed forms and 2,399 were collected via the Internet. The 2003 survey drew 5.1 percent response rate.

Anderson noted the responses again tracked very close to the age and geographic distribution of the membership at large.

A summary of the results:

❒ Overall Satisfaction – Members said they are overwhelmingly satisfied with 7.11 percent giving AAPG dissatisfied or extremely dissatisfied. Anderson noted the results track the 2003 survey.

❒ Membership Importance – Members were asked to report the perceived level of importance to their membership in two areas: general factors and services.

✓ Professionalism and networking were deemed the most important general factors.

✓ The EXPLORER, BULLETIN and Special Publications were the most important service factors.

In 2003, members said North American Conventions was the third most important service factor.

❒ Headquarters Service – Many members have contacted AAPG headquarters in the past year and Anderson noted a "remarkably" high 94 percent were satisfied with the service received.

❒ AAPG Brand Name – Members were asked about the use of the word "American" in the AAPG name. Overall, members opted not to remove "American" from the name. Members split statistically along geographic lines regarding the use of the word "American" in the identity. Sixty-six percent recorded that "American" be retained as the Association name and 34 percent disagreeing.

❒ EXPLORER – Again chosen as the number one Member Importance Factor, the EXPLORER continues to enjoy extremely high readership, Anderson said. Most reported that articles are very timely and over 84 percent felt the articles are "good" or "excellent." Readers presented mixed views as to whether the format should be altered to incorporate technical information.

❒ BULLETIN – Continued to enjoy good readership and a positive level of satisfactions in terms of quality and content. E&P Notes ranked number one in terms of usefulness while the Annual Report rated last. The majority was not willing to pay extra to obtain paper copies.

❒ Special Publications – Many have purchased special publications and cost is the primary reason reported for non-purchase, as it was in 2003. Less than one-half of the respondents indicated an interest in less-expensive publication formats.

❒ Convention – About 60 percent attended a convention in the past three years and indicated that the technical program, location and networking were the most important factors when considering attendance.

❒ Sponsorship Changes – Members indicated they do not think the two-sponsor change has compromised AAPG membership standards. Members indicated by a small margin they believe that 15 years of industry experience should substitute for one member sponsor.

❒ Dues Increases – About 57 percent felt a dues increase was not justified. Of those who did feel an increase was justified, pricing thresholds began to display negativity at the $100 level, Anderson said. Regarding graduated dues, members were mixed regarding their support for a graduated structure. Those who supported such a structure felt it should be based on age, economics, industry and academic discounts.

❒ Voting Rights – Members indicated they felt voting rights are an important part of their membership, with a dissenting or undecided group of about 46 percent. If a graduated dues structure was instituted, members felt full voting rights should be afforded to all members.

❒ International Vice President – Members supported the move already instituted.

❒ Petition Candidates – Members either did not support or were unsure of their position regarding increasing the number of signatures required to place a candidate on the ballot. Those who felt the number should be increased indicated the quantity required should fall into the 100-200 range. Regarding whether signatures should come from outside the candidate's Region or Section, members were somewhat mixed in the responses, with a large undetermined group.

❒ Professional Liability – 51 percent of respondents said this program would not appeal to them and 23 percent were not sure.

❒ Continuing Education – Most have not participated in a continuing education offering. Overall, 2-3 daytime courses and $100-$249 appear to be the desired length and cost of course with a large group indicating a preference for online offerings.

❒ Distinguished Lecture – The majority had not attended a Distinguished Lecture in the past year, but those who did offered very positive ratings.

❒ Web Site – About 90 percent of the respondents have visited the site and most felt it easy to navigate. This has increased from the 70 percent usage reported in the 2003 survey.

❒ Government Affairs/Public Outreach – Respondents strongly expressed support for AAPG taking an active role concerning information the public and government on geoscience and energy issues. Over 87 percent favored an active to extremely active role in policy public

See **Survey**, page 6

Overall Satisfaction

(7) Please indicate your overall level of satisfaction or dissatisfaction with your AAPG membership on a scale of 1 - 5 (with "1" being extremely dissatisfied and "5" being extremely satisfied):

	Counts	Percents
1	33	1.21%
2	161	5.90%
3	574	21.05%
4	1423	52.18%
5	536	19.66%
Totals	2727	100.00%

Services Importance Factors

Services - Importance	1 Not Important	2	3	4	5 Very Important	Totals	Mean
Group insurance	1167.0 41.50%	492.0 17.50%	437.0 15.54%	363.0 12.91%	353.0 12.55%	2812.0 100.00%	2.375
Membership in DEG, EMD or DPA divisions	982.0 35.07%	579.0 20.68%	618.0 22.07%	406.0 14.50%	215.0 7.68%	2800.0 100.00%	2.390
Hedberg Research Conferences	860.0 30.89%	631.0 22.67%	707.0 25.40%	394.0 14.15%	192.0 6.90%	2784.0 100.00%	2.435
Technical training centers	695.0 24.75%	711.0 25.32%	757.0 26.96%	488.0 17.38%	157.0 5.59%	2808.0 100.00%	2.537
Certification	816.0 29.08%	464.0 16.54%	616.0 21.95%	521.0 18.57%	389.0 13.86%	2806.0 100.00%	2.716
Government affairs	707.0 25.30%	519.0 18.57%	700.0 25.04%	550.0 19.68%	319.0 11.41%	2795.0 100.00%	2.733
American Geological Institute support	602.0 21.48%	593.0 21.16%	787.0 28.08%	554.0 19.76%	267.0 9.53%	2803.0 100.00%	2.747
International conventions and meetings	697.0 24.80%	509.0 18.11%	622.0 22.14%	620.0 22.06%	362.0 12.88%	2810.0 100.00%	2.801
Scholarships	571.0 20.30%	491.0 17.45%	672.0 23.89%	641.0 22.79%	438.0 15.57%	2813.0 100.00%	2.959
Field trips	392.0 13.87%	584.0 20.66%	869.0 30.74%	668.0 23.63%	314.0 11.11%	2827.0 100.00%	2.975
K-12 education support	523.0 18.72%	439.0 15.71%	680.0 24.34%	687.0 24.59%	465.0 16.64%	2794.0 100.00%	3.047
Short courses	319.0 11.32%	513.0 18.20%	817.0 28.98%	762.0 27.03%	408.0 14.47%	2819.0 100.00%	3.151
Visiting geologists	315.0 11.20%	437.0 15.54%	874.0 31.08%	806.0 28.66%	380.0 13.51%	2812.0 100.00%	3.177
Distinguished lecturers	233.0 8.27%	320.0 11.36%	781.0 27.73%	932.0 33.10%	550.0 19.53%	2816.0 100.00%	3.442
The AAPG Web site	163.0 5.81%	415.0 14.78%	657.0 23.41%	862.0 30.71%	710.0 25.29%	2807.0 100.00%	3.549
North American conventions	253.0 9.05%	285.0 10.20%	531.0 19.00%	931.0 33.31%	795.0 28.44%	2795.0 100.00%	3.619
Special publications, memoirs, etc.	91.0 3.25%	207.0 7.39%	537.0 19.18%	974.0 34.79%	991.0 35.39%	2800.0 100.00%	3.917
The "Bulletin"	77.0 2.72%	184.0 6.50%	452.0 15.97%	901.0 31.83%	1217.0 42.99%	2831.0 100.00%	4.059
The "Explorer"	41.0 1.44%	124.0 4.35%	350.0 12.29%	1094.0 38.40%	1240.0 43.52%	2849.0 100.00%	4.182

Should AAPG remove "American"?

(31) Should AAPG remove the word "American" from its name, adopting a more generic identity?

	Counts	Percents
Yes	937	33.75%
No	1839	66.25%
Totals	2776	100.00%

HQ Contact

(46) Have you contacted AAPG Headquarters in the past 12 months?

	Counts	Percents
Yes	1219	43.29%
No	1597	56.71%
Totals	2816	100.00%

HQ Contact Satisfaction

(47) If the answer to #46 is "yes" were your questions/concerns handled to your satisfaction?

	Counts	Percents
Yes	1138	94.21%
No	70	5.79%
Totals	1208	100.00%

Governmental Affairs Office

(85) AAPG has recently opened a non-political governmental affairs office in Washington, D.C. Do you support this action?

	Counts	Percents	Percents 0–100
Yes	2014	83.19%	
No	407	16.81%	
Totals	2421	100.00%	

Stance on Global Climate Change

(87) Should AAPG adopt a science-based public stance on global climate change that is likely to generate controversy?

	Counts	Percents	Percents 0–100
Yes	1586	64.76%	
No	419	17.11%	
Not sure	444	18.13%	
Totals	2449	100.00%	

Survey

from page 4

information, 83 percent support the opening of the AAPG Washington office, 79 percent said AAPG should generate objective, balanced summaries on the science of global climate change for the members and 65 percent supported AAPG adopting a science-based public stance on global climate change.

Meanwhile, Government Affairs ranked 14th of 19 on the hierarchy of services importance factors, with the EXPLORER and BULLETIN at the top of the list.

Heading up the 2006 ad hoc Survey Committee was David Rensink, with Apache in Houston.

Full survey results are available on the AAPG Web site. ❑

Candidates Online

Biographies, pictures and statements from all AAPG officer candidates are now available on the AAPG Web site, www.aapg.org.

The candidates responded briefly to the subject: "Why I Accepted the Invitation to be a Candidate for an AAPG Office." Responses and biographical information, provided by each candidate, were edited only for grammar, spelling and format.

This information will remain online through the election period, and will be in the January EXPLORER.

Online balloting will be made available in the spring of 2007. Ballots will be counted on May 16.

The candidates are:

President-Elect

❒ **Neil F. Hurley**, Colorado School of Mines, Golden, Colo.

❒ **Scott W. Tinker**, Bureau of Economic Geology, University of Texas, Austin.

Vice President (Regions)

❒ **John R. Hogg**, ConocoPhillips, Calgary, Alberta, Canada.

❒ **John Kaldi**, University of Adelaide, Adelaide, SA, Australia.

Vice President (Sections)

❒ **John M. Armentrout**, Cascade Stratigraphic, Clackamas, Ore.

❒ **John B. Curtis**, Colorado School of Mines, Golden, Colo.

Secretary

❒ **Edward A. (Ted) Beaumont**, independent geologist, Tulsa.

❒ **Terence G. (Terry) O'Hare**, Emerald Energy, Dallas.

Editor

❒ **Gretchen Gillis**, Schlumberger, Houston.

❒ **Barry J. Katz**, Chevron, Houston.

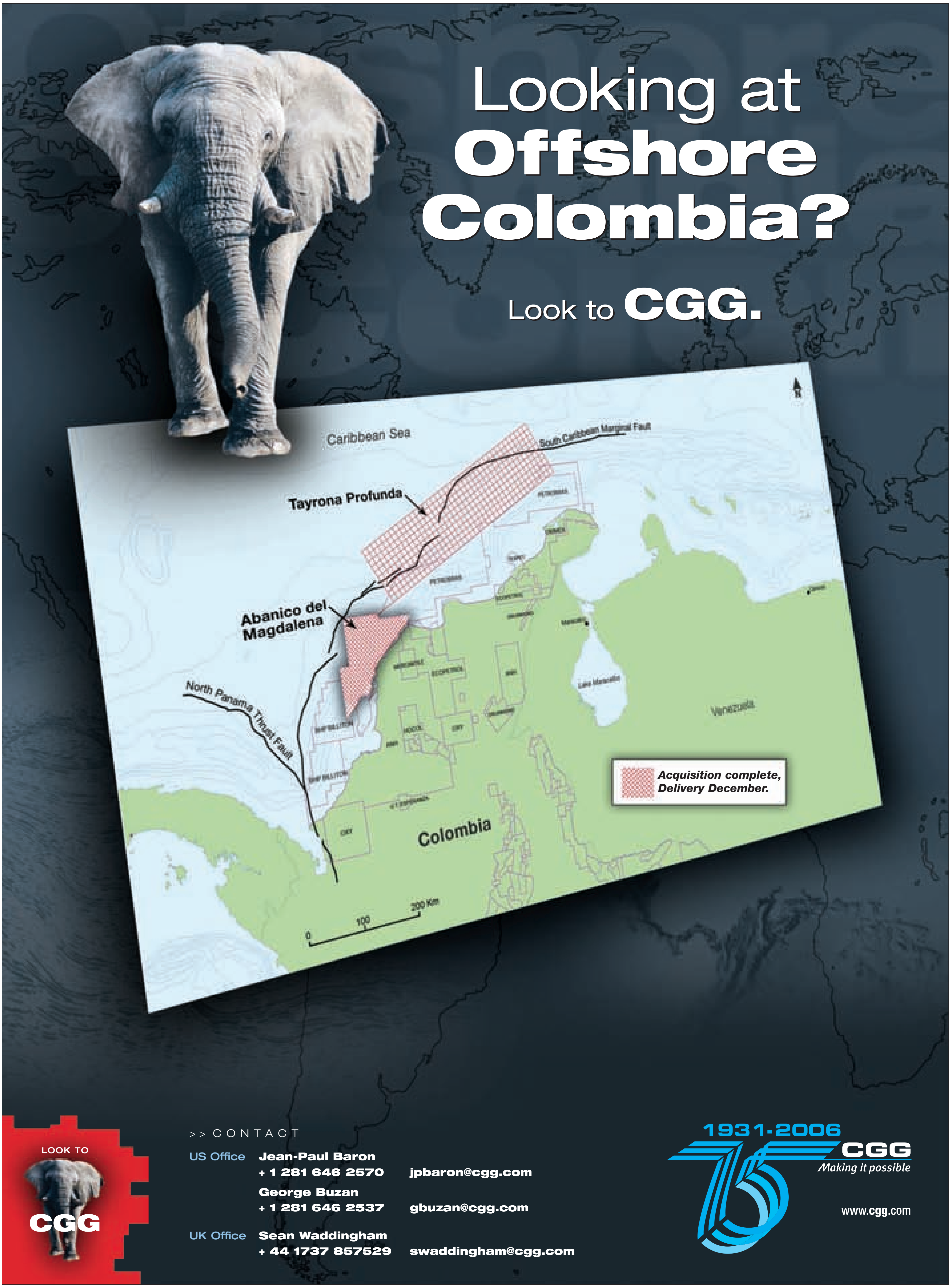
Baku Conference Abstracts Invited

The Azerbaijan Society of Petroleum Geologists will host the XII Republic Student Scientific Conference March 27, 2007 in Baku, Azerbaijan.

Conference topics include: geophysical data processing and interpretation; oil and gas field exploration and production; and ecological problems of oil production.

Deadline for abstract submission is Feb. 5, 2007. Abstracts should not exceed one A4 page including information about authors, and must be in Azeri, Russian or English.

Abstracts should be sent electronically to Elshan Abdullayev at aspg@list.ru. ❑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Emerging Steps for a Proven Technology

Slimhole CTD Targets Shallow Plays

By DAVID BROWN
EXPLORER Correspondent

Get ready for a quiet revolution in drilling.

The next few years will begin a dramatic increase in coiled-tubing drilling (CTD), slimhole drilling and microbore applications. That could bring a handsome payoff to anyone who solves the downhole geology puzzle.

And the biggest prize might be existing, low-production wells.

This drilling technology can't be used everywhere, but with the right conditions it produces substantial cost savings and minimizes both formation and environmental damage.

It's one more reason geologists need to keep up with emerging drilling applications.

"Overall, I think this kind of drilling will replace conventional rotary drilling in the shallow depths all across the United States," said Kent Perry, managing director for E&P research at the Gas Technology Institute (GTI) in Des Plaines, Ill.

The definition of slimhole keeps changing, and getting slimmer.

Once used to describe wellbores less than seven inches in diameter, then less than six inches, slimhole now generally includes wells completed at 4.75 inches or smaller.

Slimhole CTD carries the unusual status of being both an emerging and a proven technology. Frequently used in western Canada and on Alaska's North Slope, CTD has been deployed to some extent around the world.

But drilling with coiled tubing never became commonplace, and a broad new range of slimhole tools and equipment is just beginning to appear.

"I think right now is prime time for moving coiled tubing equipment into the United States," said David Wennerstrom, technical sales representative for Technicoil Corp. in Calgary.

A Good Start

A CTD field test conducted by Perry and GTI, with funding from the U.S. Department of Energy, shows why.

Perry said the test employed a self-contained and fit-for-purpose – actually more built-for-purpose – CTD rig.

"Oftentimes in the past, you'd have some kind of derrick someone would set up and then they'd bring in a coiled tubing unit," he said.

In this case, the highway-capable drilling rig could be quickly set up and moved from one location to another.

Perry credited DOE's Roy Long and rig designer Tom Gipson of Advanced Drilling Technologies Inc. for making the project go.

With Rosewood Resources of Dallas as operator, the rig was deployed to drill gas wells in the mature Niobrara formation play of western Kansas and eastern Colorado.

Perry said the nature of the shallow, underpressured and low-permeability formation made economics a critical factor.

In the Niobrara, "you can't afford to spend 20 days drilling a horizontal well," he noted.

Slimhole CTD met the requirements for speed, low impact and minimal chance of formation damage. The test included drilling 40,000 feet of hole for 23 wells from 1,500 to 3,100 feet deep.

"Long story short, by the end of the field test they were able to drill one

Photos courtesy of Gas Technology Institute

More than 40 wells and more than 300,000 feet of hole in Colorado and Kansas have been drilled with the slimhole CTD rig, which has proven itself to be especially efficient with the shallow Niobrara gas targets.

3,000-foot well a day," Perry said.

"We were out there measuring everything carefully," he added, "because we wanted to know exactly how much time each activity was taking."

With faster drilling and shorter on-site times, cost savings ranged from 25 to 35 percent per well.

"There were significant environmental savings," Perry said. "Location costs were minimal. No pits were required, other than a small pit for the cuttings."

Other advantages included:

✓ Good hole quality.
✓ Improved safety.
✓ Minimal cuttings.
✓ Low emissions and noise.
✓ Reduced chance of damaging the underpressured formation.

"You're not surging," Perry said. "Every time you make a connection (with jointed pipe) you get a surge, which can aggravate formation damage."

The Perfect Storm

In Canada, Technicoil operates a rig fleet that includes hybrid CTD/pipe drilling rigs and CTD well service rigs.

"What developed here was a desire to drill shallow gas wells, less than 6,000 feet in depth. It's a very suitable area for coiled-tubing drilling," Wennerstrom said.

"Basically, it's kind of the perfect storm," he added. "You have a lot of things that came together at the right time" to popularize CTD.

Wennerstrom called 2-7/8-inch tubing the workhorse of the industry for drilling. At one time, he noted, quality was so low that people said CT stood for "continuous trouble" instead of coiled tubing.

"Coiled tubing used to be very unreliable – the metallurgy has improved so much, he said. "The reliability of the product is just night and day compared

Small drill pads, no mud pit, less drilling mud, smaller access roads, minimum noise: There are many reasons why slimhole CTD is considered environmentally friendly.

to what it was 20 years ago."

A typical, basic drilling array for CTD includes a mud motor, measurement tool, bit sub and PDC bit. Wennerstrom said Technicoil also adds a deviation tool.

Drilling begins with a larger hole and casing to isolate water zones, typically seven-inch casing down to 425 feet for Technicoil, and the company most often completes the drilled well with 4-1/2-inch casing, he said.

Limitations still affect the depth of CTD-drilled wells, including tubing strength and weight. While the CTD market may include wells up to 10,000 feet deep in the future, practical commercial drilling depths are now less than 6,000 feet.

"For physical reasons, we have a bit of a logistical barrier," Wennerstrom said. "For us to be able to put a coil on one of our trucks and not break all the highway weight limits, we're pretty well limited to 2,000 meters of coiled tubing on our truck at any one time."

Let's Get Small

In addition to drilling improvements and the advent of larger and stronger coiled tubing, slimhole technology has seen advances in tools and equipment.

And these can be teeny-tiny tools.

Jack Kollé, president of Tempress Technologies in Kent, Wash., said his company's smallest tool measures 1.165 inches.

"The reason it's so small is that it's a re-entry tool designed to go out of casing sideways for a couple of hundred feet. It's really a technology that will compete with fracing," he said.

CTD helps deploy that kind of tool by making it easier to get in and out of the hole. Using the re-entry tool would require multiple pipe trips, Kollé observed.

See **Slimhole CTD**, page 10

AAPG EXPLORER

Slimhole CTD

from page 8

"Every one of these is a trip; then you have to set the shoe, deploy the milling tool, mill it and do the application," he said.

To improve the effectiveness of water jets in work like descaling, Tempress has developed a gas separator tool and a downhole intensifier for use with CTD, Kollé said.

Some cleaning work requires 10,000 psi pressure, but the pressure across the jets is normally about 5,000 psi, he noted.

"With the downhole intensifier, we can take that 5,000 and essentially double it," he said.

"We're also interested in jet drilling tools. You need to be up to 15,000 psi to start drilling sandstone and rock like that," Kollé added.

Even with recent improvements, Kollé thinks it will take time for slimhole CTD to penetrate the U.S. drilling market.

"It'll take five to 20 years for that to occur," he said. "It's expensive equipment, and people are reluctant to make that investment until they see it used extensively the next county over," he said.

Concerns

Slimhole CTD will have to overcome other objections to gain wide acceptance:

✓ With minimal weight on bit, CTD can develop push-pull and torque problems. That also limits horizontal drilling applications.

"The ability to go horizontal with the lightweight coil is limited, but there are some things being done to overcome that," including the use of downhole tractors, Perry noted.

✓ The drilling industry has relatively little experience with CTD outside of western Canada and Alaska.

✓ Production engineers worry about the ability to rework wells and the future use of wellbores in slimhole drilling.

✓ Even the speed of slimhole CTD can be a problem for an industry accustomed to much longer drilling times.

"A lot of that burden has fallen on the geologist and the landman. The whole infrastructure has had to adapt to the faster drilling," Wennerstrom said.

But it's the speed and cost savings that give CTD an edge in shallow-depth drilling for the worldwide oil and gas industry.

"If you take that 25 percent cost savings that we documented, it adds up to billions of dollars," Perry said.

Slimhole CTD's low impact also gives the technology a major advantage. In the DOE-GTI project "we wanted to investigate a zero-discharge drilling system. In this case, you would just take the cuttings with you," he explained.

Even essentially zero-impact drilling could be possible with CTD.

"A booted tarp would be laid down," Perry said, "and they'd just drive the rig on top of that."

Promotional Considerations

Well re-entry and workover provide another area for CTD growth, in applications that can be both fast and highly effective.

"They (major service and supply companies) have all developed rapid re-entry systems," Kollé said. "They've certainly been promoting that as a business."

One promising area for CTD, and a significant reason for funding of recent CTD research, is its potential use in boosting low-production wells – primarily stripper wells and low-pressure gas wells.

If that use takes off, "the market will just explode," Wennerstrom said.

Knowledge of downhole geology will point the way for the spread of slimhole CTD. New drilling technology and techniques present a learning-curve challenge for the entire industry.

Perry thinks the Niobrara demonstration project shows that slimhole CTD has a bright future, with cost only a minor barrier.

"This rig cost about a million, a million-and-a-half dollars to put together," he said. "And there's no reason someone couldn't put together another one tomorrow." ❑

In addition to reducing drilling costs, the 50-foot long slimhole CTD rig is highway capable – and good at moving through fields, too.

Separating the Oil from the Water

EM Detecting Fluids on the Rocks

By LOUISE S. DURHAM
EXPLORER Correspondent

Widely available and ever-popular seismic technologies are great for detecting subsurface structures and identifying potential reservoirs.

But when it comes to determining the type of fluid contained in the reservoir, seismic methods just don't measure up.

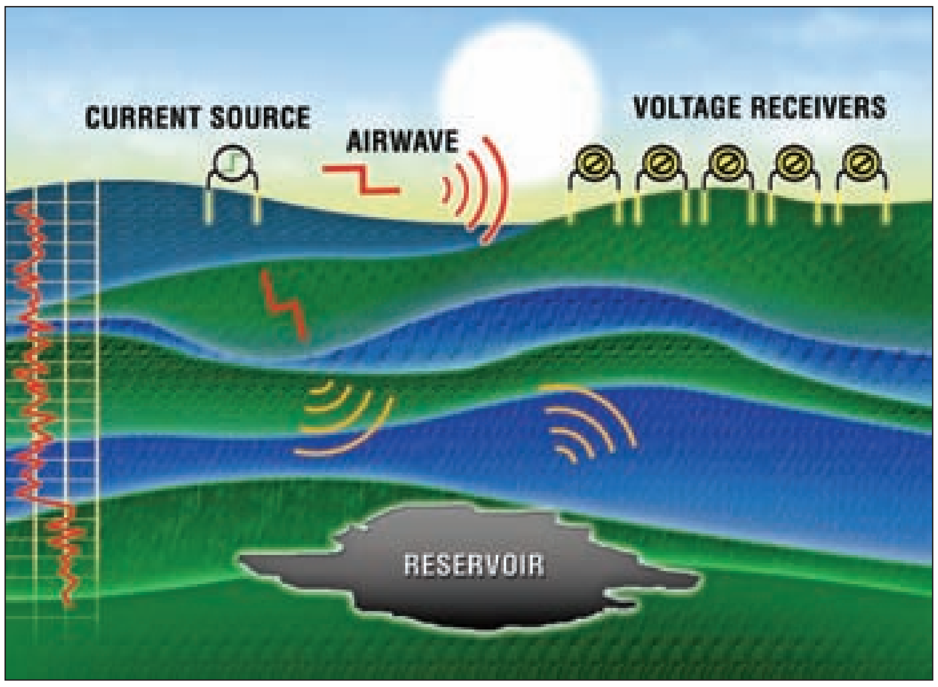
As a result, there's increasing industry interest in using electromagnetic (EM) survey methodology to try to reduce the risk of drilling dry holes given EM's potential to identify fluid content in the rocks prior to drilling. Just count the cost savings if hydrocarbons are determined to be absent in a structure without ever turning the drill bit.

Non-invasive EM technology for the oil and gas industry evolved within the hallowed halls of academia in North America and Europe during the 1980s, generating some interest on the part of a few companies. Yet EM long-languished in the dark corners of the oil industry toolkit for the most part.

That began changing a few years ago.

"EM is becoming quite a key component to a lot of companies' exploration efforts," said Richard Kellett, senior geophysicist in exploration at Pioneer Natural Resources Canada. Kellett, who earned a doctorate in marine EM in the late 1980s noted: "It's always been in the background with maybe 2-3 percent of company geophysicists having exposure to EM methods, and now a lot of companies are scrambling to get staff and learn more about them."

Just count the cost savings if hydrocarbons are determined to be absent in a structure without ever turning the drill bit.



Graphics courtesy of MTEM

Land EM with MTEM method encodes the transient pulse in a pseudorandom binary sequence (PRBS).

Downhole Geology

EM applications have the capability to differentiate between low resistivity water-saturated reservoirs, and high resistivity hydrocarbon-containing reservoirs.

"When the pore fluid within the rocks changes from hydrocarbons to water, it is accompanied by a change in the rock's physical properties, and this significantly impacts electrical resistivity," said Anton Ziolkowski, technical director at Edinburgh-headquartered MTEM.

"A change in electrical resistivity of as much as three orders of magnitude may occur when oil is replaced by brine in a reservoir," he said. "Yet this has little effect on acoustic impedance."

The overriding reason that surface EM methods have long been overlooked in the oil industry is that resolution of conventional EM data has been low compared with seismic resolution.

"That's the nature of EM," Kellett said. "It's based on the physics of diffusion rather than wave propagation, so it's always going to be lower resolution than seismic."

Seismic pulses travel long distances with little loss of resolution. Today, novel signal processing techniques and high precision multi-channel recording systems have significantly increased both the

continued on next page

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frequency bandwidth and the dynamic range of EM data, Ziolkowski noted.

Two categories of EM methods are used for hydrocarbon exploration – passive EM and active EM – according to Jason Robinson, MTEM's vice president for North and South America.

The MTEM (multi-transient electromagnetic) method is an active application, which creates a localized EM field, as opposed to the passive, or magnetotelluric (MT) method, which looks at local distortion in the earth's natural magnetic field to estimate subsurface resistivity.

The active MTEM method can be used both onshore and offshore in contrast to another increasingly popular active EM approach called controlled source electromagnetic (CSEM), which is limited to deep water. Another active method – DC resistivity (electrical resistivity imaging) – has very limited depth penetration, which restricts it to shallow targets.

EM first became a major industry buzzword in the late 1990s when a major financial publication featured a front-page story about ExxonMobil's reportedly successful operations using its proprietary CSEM technology dubbed remote reservoir resistivity mapping (R3M).

"That was our sort of 'going public' after many years of industry work," said Len Srnka, senior research adviser at ExxonMobil upstream research company. "There's a 25-year history inside our company pursuing this (EM)."

Statoil is another big-name devotee of CSEM technology. Its method is often called Sea Bed Logging, and the company has played a key role in commercializing CSEM.

CSEM tows an electric source in the marine environment only, emitting a continuous monochromatic signal tuned to detect the target reservoir, according to Robinson. Some of the radiated energy becomes an airwave, traveling through the water to the water/air interface, then along this interface and back through the water to the receivers, and contaminating the received signal.

CSEM currently is confined to deep water where the water column attenuates up-going and down-going energy.

Shell became seriously involved in using CSEM beginning in 2004, according to Mark Rosenquist, senior staff geophysicist in the E&P research division.

"We've put it to good use in a number of basins around the world," he said, "mostly looking for deep water turbidites where it seems to be an awfully good fit.

"In shallow burial turbidites, if they do have hydrocarbons in them they have a big resistivity contrast with the surrounding sediments," Rosenquist said, "that makes them stand out and give a really strong CSEM response.

"In particular, we like it in thrust belts where the main risk is you have a blown trap because of faulting or seal failures at the crest of thrusts," he noted. "CSEM is just great for that because it's almost like an on/off switch.

"If you have high saturation hydrocarbons it gives a really strong response, and with low saturations you get almost nothing back," Rosenquist noted. "It's really sensitive to hydrocarbon saturation, so when that's the major risk, it's the ideal tool."

It Matters Because...

You're likely thinking this is all well and good but wondering where it fits in with your land prospects where a tool with some hydrocarbon sensitivity could go a long way toward zeroing in on the pay zone(s).

As a result of EM technology evolving and kicking into high gear in the oil patch, you now have options.

The MTEM system, which is often referred to as "logging before drilling," is a relatively new option garnering lots of attention – and kudos – these days. Like EM in general, it originated in academia, specifically the University of Edinburgh.

"It's one technology that's separating itself from the others in terms of really advancing," Kellett said. "They're taking a unique approach to processing the EM signal, and they're listening to other people with experience, for example the mining and environmental industries.

"They have three parallel processing

See **MTEM System**, next page

MTEM on Trial in Wyoming Basin

Currently, there's considerable excitement about an Anadarko-hosted joint industry project (JIP) using the MTEM R-Land recording system in the Anadarko-operated Middle Baxter Basin gas field on the Rock Springs uplift in southwestern Wyoming.

The project is a test of the technology involving three target sandstone horizons of Cretaceous age. The JIP participants include Anadarko, Shell, Total and Hydro, among others.

"The instrument worked straight out of the box as soon as it went into the field," MTEM's Jason Robinson said, "which would be unheard of when dealing with brand new seismic equipment. We had only one instrument downtime incident the first three weeks, and that's phenomenal.

"We're proving execution now," he added, "and the final part is the data itself."

Robinson noted two of the targets – a 50-ohm, 25-ft. thick sandstone at 1,700 feet in depth and a 40-ohm 35-foot. thick sandstone at 2,300 in depth – will be more challenging to see.

The third target is a 200-ohm, 75-foot. thick fluvial sandstone at a depth of 2,850.

Because it has the largest resistivity contrast, Robinson noted they will definitely be able to see it.

"We're really hoping the project works," said Mark Rosenquist, at Shell. "We're just waiting for results."

So far, so good, according to Robinson.

"The initial data quality is excellent with strong signal-to-noise ratio," he said. "The real time QC pseudo resistivity sections are also very encouraging – but the real proof will be seen when we invert the data."

These type trials are crucial to widespread adoption of any of these new technologies.

"The biggest challenge for the new (EM) technologies is to have an audience familiar with the product," said Richard Kellett at Pioneer Natural Resources Canada. "You have to have the client use the data and see the value of it.

– LOUISE S. DURHAM

MTEM System

from previous page

workflows to satisfy immediate demands, and they're approaching it from a very technical strong point of view," Kellett noted. "It's got a lot of potential."

Here's the blueprint, according to Robinson.

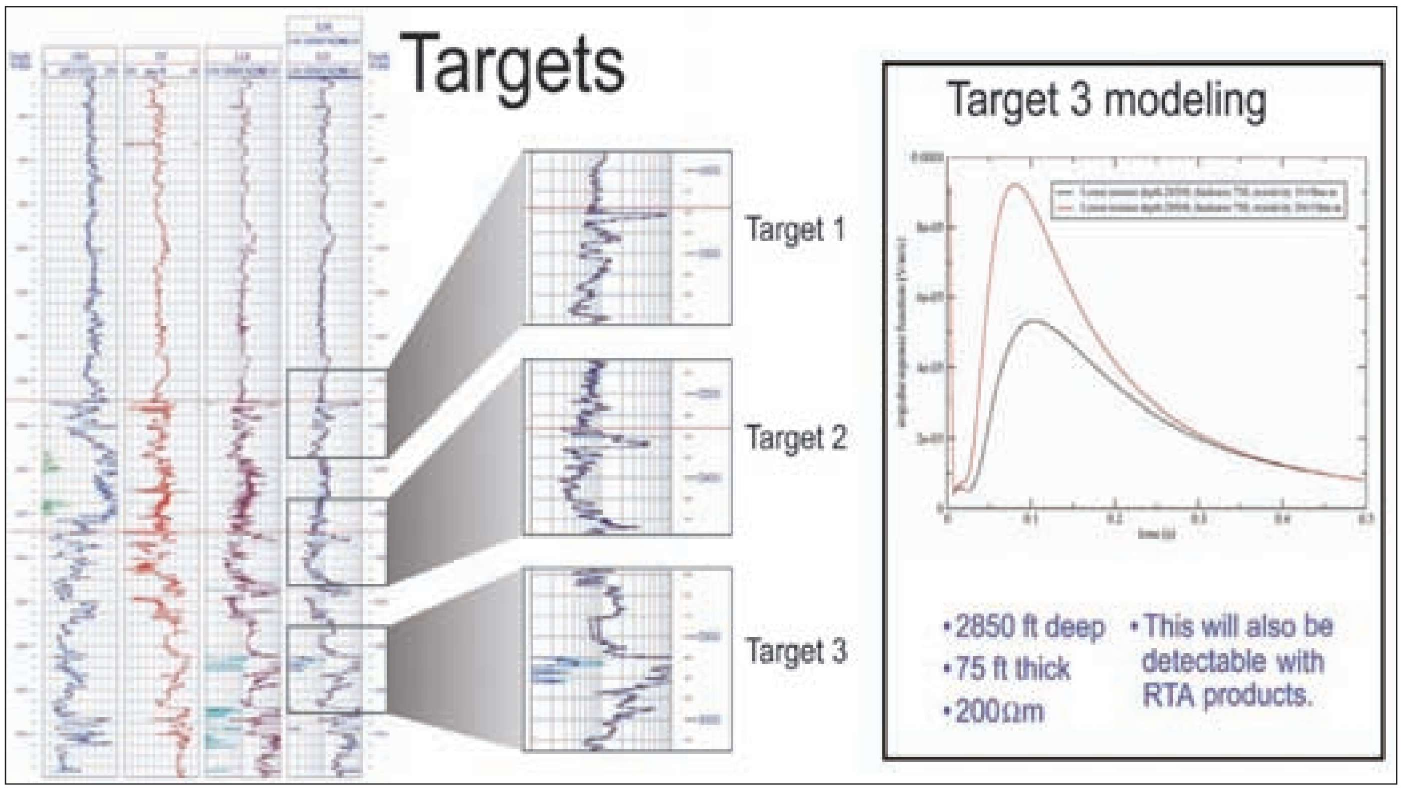
The MTEM method works by injecting a series of pulse-coded electrical transient signals into the ground and measuring the voltage response between pairs of receiver electrodes along the recording line at different offsets, or distances, from the source. The acquisition geometry entails multiple source and receiver positions.

The impulse response of the earth is extracted at the receiver, and signal processing techniques are used to produce a resistivity cross section. Zones identified as highly resistive may indicate the presence of hydrocarbons.

Real Time Appraisal on site provides both QC and initial processing results within hours of recording.

Land MTEM has no airwave problem. In the marine environment, the method is suited for shallow water applications down to 300 meters because of its capability to remove the airwave.

"Onshore case studies show delineation of hydrocarbon reservoirs both laterally and with depth," Robinson said. "We often can image the reservoir when seismic can't see anything, plus the system is capable of identifying stacked resistors and placing them at their correct depths."



Wyoming MTEM JIP targets from resistivity log.

Applications

MTEM land applications include:

✓ Exploration: wildcat and high-grading.
✓ Field appraisal.
✓ By-passed pay I.D. in mature fields.
✓ Gas/water flood monitoring.
✓ 4-D monitoring.
✓ Shallow gas/drilling hazards.
✓ Fresh water detection.

The company has reported results from a number of case studies.

"A Real Time Appraisal of the data acquired over a gas storage reservoir in southern France indicated the depth and lateral extent of a subsurface resistor," Robinson said, "which correlates with known gas in a relatively shallow sandstone reservoir having simple structure.

"The MTEM data were processed blind with no input from the client," he noted, "yielding an exact match with the seismic and log data provided after analysis."

A tar sands project in northern Alberta clearly demonstrated the technology is positioned to play a role in today's hot arena of unconventional reservoirs, which often are difficult to evaluate via seismic and traditional EM methods.

"MTEM is being used routinely in tar sands," Kellett noted. "It works because the oil sands are very thick, resistive and close to the surface."

A sampling of the Alberta project results include:

✓ Ability to see the resistors in the subsurface.
✓ Inversion distinguished hydrocarbons from glacial deposits.

Len Srnka of ExxonMobil envisions a bright future for EM technology.

"I think the future is one of expansion of the technology into pretty well all of the upstream – certainly offshore – and especially the deepwater offshore," Srnka said. "Almost all the applications today are in exploration, and we expect that to roll through the rest of the upstream in both development and production." ❑

‘Triple-Double’ Logs Recorded

Downhole Geology

By LOUISE S. DURHAM
EXPLORER Correspondent

No one would question there’s an ongoing high level of activity in Saudi Arabia’s oil patch.

Yet little of what’s happening at national oil company (NOC) Saudi Aramco is transparent – even though it reportedly manages 260 billion barrels of proven crude oil reserves.

At least one thing is certain: the NOC is into some mighty high-tech new downhole applications.

Indeed, Weatherford International recently announced it successfully ran Saudi Aramco’s first ever EMPulse Logging While Drilling (EM-LWD) triple combo operation (resistivity, neutron, density) with extended range set-up.

It’s all about transmitting the critical downhole information up to the surface – not a simple task.

In order to send information to the surface while a well is being drilled, some kind of transmission mechanism is required. There are two types of transmission systems available to accomplish this task, according to Tony Branch, eastern hemisphere drilling services technical manager for Weatherford:

✓ The mud pulse system requires turning on the rig’s pumps to build pressure, and a downhole pulser device sends information uphole through a series of pressure pulses, which are decoded at the surface.

✓ The other option is to transmit information to the surface via an EM telemetry device, which sends information to the surface via a low frequency electromagnetic wave.

“The EM system has an advantage in the sense there’s time savings,” Branch said. “With the mud pulse system, you have to turn on the mud pumps to send data to surface. With EM it’s automatic and continuous, so you don’t depend on your surface pumps.

“As you’re connecting pipe, you can send information while you’re waiting on the pump pressure to build up.”

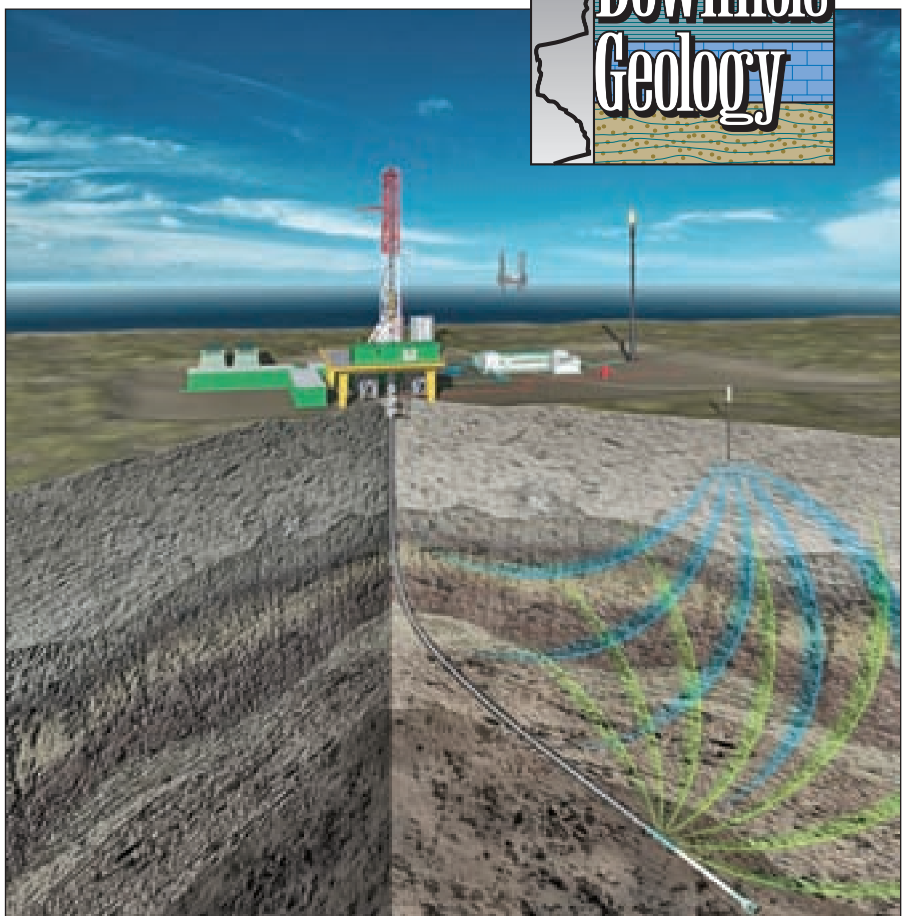
It is noteworthy that one of the capabilities of EMPulse-LWD centers on underbalanced drilling conditions (UBD).

“In underbalanced drilling conditions utilizing drillpipe injection, you may not have the fluid column you need to transmit information uphole with mud pulse MWD systems because UBD is basically drilled with a liquid and gas two-phase fluid flow system,” Branch noted. “If the percentage of gas injected with the liquid is too high, then conventional mud pulse MWD systems will struggle to transmit the signal to surface due to excessive signal attenuation.

“In this case you have to transmit through EM – where you’re independent of what type of fluid is in the borehole.”

The objective of the successful proof-of-concept of EMPulse-LWD with annulus pressure technology at the Saudi Aramco facility was to evaluate the feasibility of EM transmission in conjunction with LWD triple combo and annulus pressure sensors in a 6-1/8 in. horizontal section. The section was drilled underbalanced from 8,109 to 11,189 feet in a single run, according to Weatherford.

The company said drillpipe gas injection on future wells will preclude the use of mud pulse telemetry. Instead, EM telemetry will allow a continuation in the UBD planning process to include real time LWD technology.

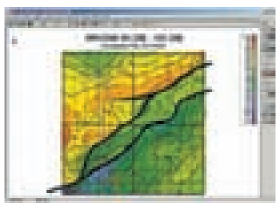
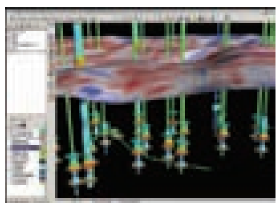


Illustrated is a LWD trace taken with data transmitted using the EM Pulse system.

Branch noted the evaluation objective at Saudi Aramco was met.

“Real time data allowed 3,080 feet of 6-1/8 in. horizontal section to be successfully geosteered in one bit run while maintaining underbalanced conditions,” he said. “Additionally, the well was flow and pressure tested with real time annulus pressure data acquired during pumps-off operations.

“One advantage of EM versus conventional mud pulse telemetry is that real time updates are possible, independent of wellbore hydraulics.” ❏

				
CONTOURING Faulted contours Isopachs Volumetrics Grid operations New flexing options	**CROSS SECTIONS** New Unassigned Tops Digital and/or Raster Geocolumn shading Stratigraphic/Structural Shade between crossover Dipmeter data	**MAPPING OPTIONS** Expanded GIS Functions Bubble maps Production charts Log curves Posted data Highlighted Symbols	**3D VISUALIZATION** Deviated wellbores Digital logs Grid surfaces Tops, Shows and Perfs Land grid overlay Map images	**DECLINE CURVES** Compute EUR, RR, etc. Hyperbolic or exp. Rate/Time or Cum P/Z User defined Econ. Limit User defined Extrap. Time

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Seismic Monitors North Sea Field

In-Well Optical System at Work

Downhole Geology

By LOUISE S. DURHAM
EXPLORER Correspondent

Installation of a permanently placed seismic cable system to acquire time lapse, or 4-D, seismic at the BP-operated Valhall Field in Norway in August 2003 created a goodly bit of buzz – particularly in the geophysical community. An experimental array had been installed in 1995 by Shell and BP at Foinhaven, but Valhall was the first such system to be financed and purchased by a business unit.

The permanent cable array on the seabed affords a high degree of repeatability – and repeatability is key to 4-D seismic data acquisition, which is increasingly viewed by operators as a must-have as early as possible in the productive life of a reservoir both for monitoring and management purposes.

Valhall recently was the site of yet another milestone installation of technology geared toward its 4-D program. This time, it's a downhole application that appears destined to move the 4-D effort forward in giant steps.

A two-year collaboration between BP Norway and Weatherford culminated in the world's first successful offshore installation of a permanent in-well optical seismic system, according to Weatherford. The system was installed in BP Norway's G-24 injector well at Valhall.

The installation represents an important extension of the existing permanent seismic monitoring system over the field,

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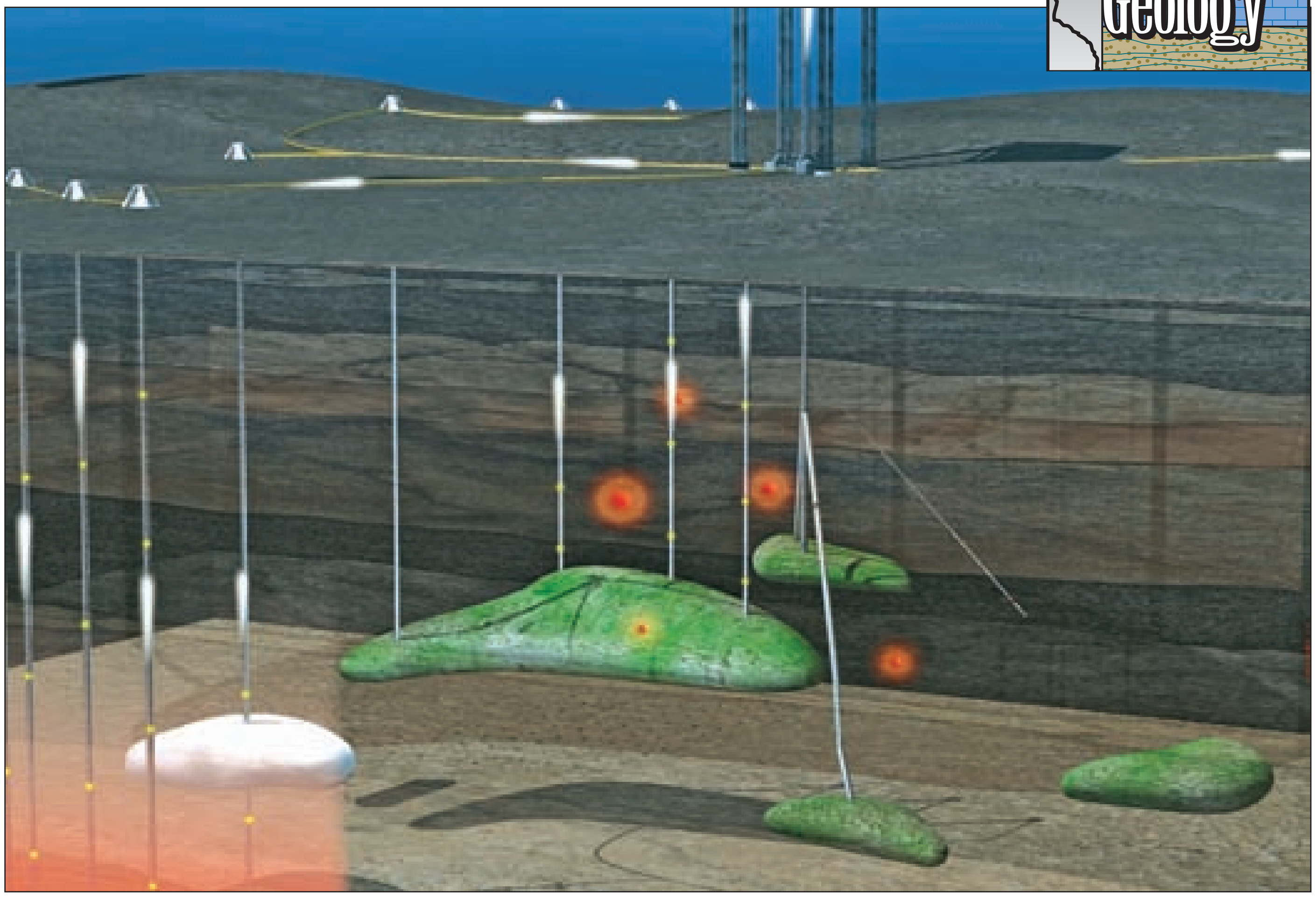

Graphics courtesy of Weatherford

The Clarion™ permanent in-well seismic system delivers a high-quality seismic data stream through optical seismic sensing stations, which are connected together and at the surface through rugged optical cable.

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according to Olav Barkved, lead geophysicist for BP at Valhall.

The permanent in-well seismic system provides continuous seismic and P/T monitoring data, and it's interfaced to the permanent OBC system. Both seabed and downhole seismic data are collected simultaneously.

"This is the first time permanent seabed sensor arrays and permanent in-well sensor arrays have been joined and recording both types of permanent sensing at the same time," said Tad Bostick, vice president of optical sensing systems at Weatherford. "From a permanent reservoir monitoring standpoint, this is a milestone."

A Better Image

Ocean bottom sensors deliver an image in time only, according to Graham Gaston, business development manager for Weatherford's optical sensing systems group. It's necessary to convert time to depth to translate the image such that it represents the real subsurface.

This is routine for individual surveys; but when collecting data over a period of several years, variables exist that make it difficult to compare one survey to the next, Gaston noted.

The in-well seismic sensors provide a constant reference point over the course of the years of 4-D seismic activity; the calibration reference enables the operator to acquire far better comparative images from the seafloor cable system. Another plus afforded by the sensors is production of a detailed image close to the borehole, improving upon the overall subsurface image.

In-well seismic sensors have other applications as well:

✓ Passive listening for acoustic events to improve understanding of fluid movement, drainage efficiency, active fractures and formation compaction.

✓ Analyzing reservoir connectivity between wells at a finer scale than possible using surface seismic.

✓ Optimizing well placement by sensing seismic signals from drill bits.

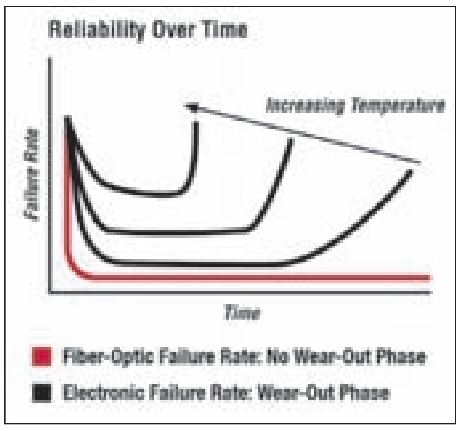
BP's in-well optical seismic system at Valhall: "From a permanent reservoir monitoring standpoint, this is a milestone."

The Clarion permanent in-well seismic system is made up of highly sensitive, multi-component miniature optical accelerometers. The system features advanced optical multiplexing based on Bragg grating technology.

The optical sensors are made of machined glass that withstands temperatures as high as 345 degrees and pressures as much as 20,000 psi. In fact, the tensile strength of glass is superior to steel. The sensors have no moving parts and no downhole electronic components, and – unlike traditional electronic sensors, which are susceptible to vibration-induced failure – they can handle hundreds of Gs of shock stress without degradation or interruption of measurements.

To combat the phenomenon of "hydrogen darkening," whereby hydrogen gas permeates unprotected fiber at very high temperatures and darkens the glass such that the light-dependent optical sensor is undetectable, uses several layers of protection ensures the hydrogen doesn't actually get to the glass. Should darkening occur over time, Gaston noted the sensitivity of the system is such they have proved there is no problem over a 20-year life span.

This life span is critical because the reliability of the fiber optics is paramount. After all, permanent monitoring – by definition – requires that the sensors never be moved.



Electronic sensors follow the classic "bath tub" failure characteristic – early failures, then level reliability, and then a wear-out phase that produces a sudden and sharp increase in failure rates. The higher the operating temperature, the sooner this wear-out phase occurs.

Weatherford technicians install the in-well optical seismic system in the North Sea.

Coming to a Field Near You?

It is noteworthy that the brains of the Clarion system are on the surface in readily accessed instrumentation. This means the hardware and/or software can be easily upgraded to improve the performance of sensors, which may have been deployed years earlier.

The use of the sensitive in-well optical sensors, which can actually detect microseismic events, is particularly timely in an area such as the maturing North Sea fields, where operators' goals today are focused on production optimization through reservoir life extension and increased recoverable reserves.

Expect to see more in-well optical sensor projects fairly soon.

Installations in the Gulf of Mexico and elsewhere are imminent, according to Gaston.

Meanwhile, Bostick gives kudos to BP for being a trail-blazer.

"A key aspect of the project (at Valhall) was the collaboration between BP and Weatherford," he said. "The field is in a high profile offshore environment where there's no room for error, and we had strong guidance from BP on delivering technology suitable to them as a lead adopter of this technology." ❏

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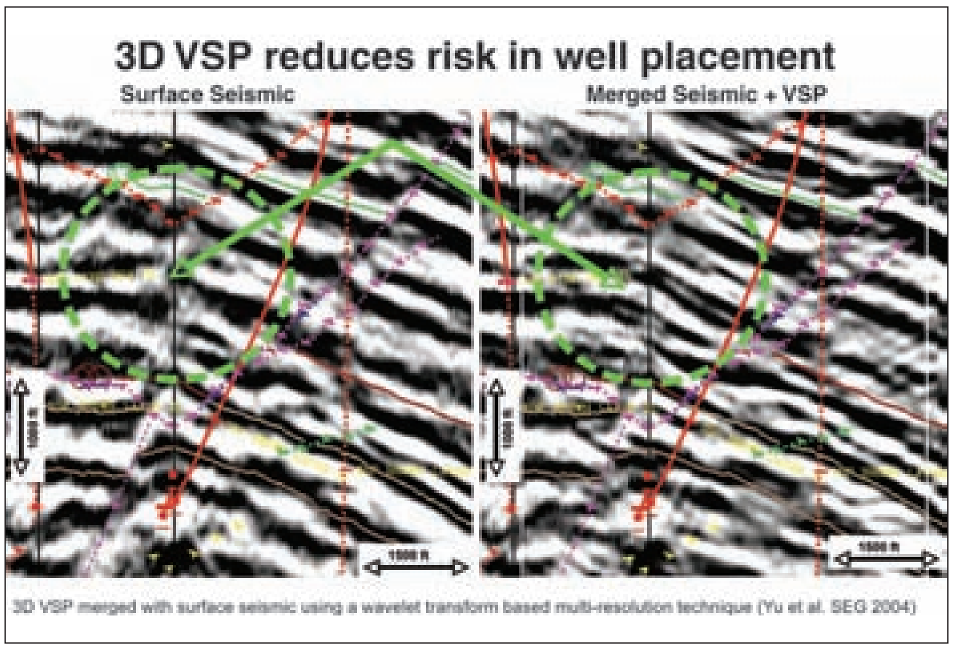
Drawing a 'Walk-Away Line'

3-D VSP Proving Its Deep Value



3D VSP merged with surface seismic using a wavelet transform based multi-resolution technique (Yu et al. SEG 2004)

Downhole Geology

By LOUISE S. DURHAM
EXPLORER Correspondent

Vertical seismic profile (VSP) has been around for some time as a tool to provide time-to-depth for seismic well-ties.

But VSP for time-to-depth is so yesterday.

Today, VSP has moved beyond its roots to include a number of other sophisticated applications. Think 3-D imaging and inversion using geophones temporarily deployed in newly drilled wells.

"There's growing interest in 3-D VSP imaging," said Brian Hornby, senior adviser at BP. "There have been extensive surveys acquired on land and also offshore – mainly in the deep water. These are huge efforts that have focused on trying to see the value of 3-D VSP to get higher resolution and image where you can't image with surface seismic."

Simply described, an offshore 3-D VSP imaging project is comprised of receivers in the borehole and a 2-D surface source geometry using a seismic shooting vessel. The downhole array acquires signals reflected off the subsurface structure, and these data typically are migrated using a prestack depth migration algorithm to create a 3-D image volume around the wellbore.

Hornby noted it is important pre-survey to evaluate what survey is required to attain the potential imaging "prize" and to examine the trade-off in survey parameters and expected results.

For example, rather than sensors deployed throughout the wellbore, would a less expensive limited array suit the purpose?

"My ultimate vision for 3-D VSP imaging is to have receivers everywhere in the borehole," Hornby said, "from reservoir top to mudline, as much as possible. You get huge coverage and potentially get the best images away from the wellbore.

"Standard arrays give us a very limited geometry for VSP," Hornby noted. "My push is to get very large arrays at reasonable cost."

A Direct Image

VSP long has been used to determine the location of salt flanks. The traditional approach requires up-front information that is not always available, e.g., accurate knowledge of the shape of the salt.

Recent improvements in salt flank imaging methods are noteworthy.

In fact, if you never thought of interferometry as being cool – cool being an apt description for a technique using VSP to image salt flanks sideways – you're missing the boat.

The interferometry method redatums the surface sources to the receiver array, resulting in virtual sources in the borehole at each geophone location.

"You end up with a series of

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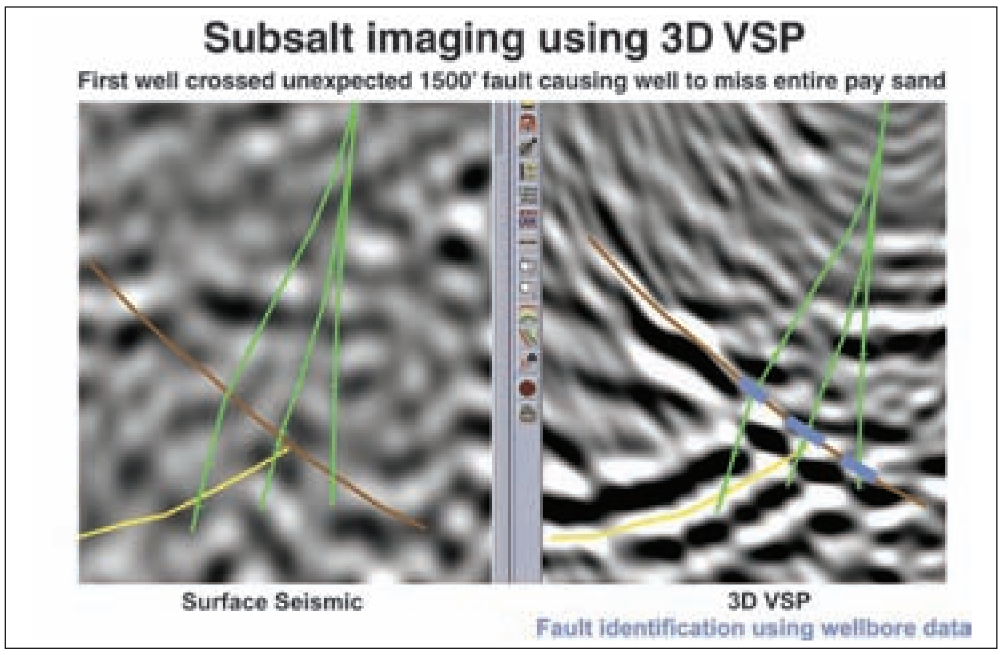

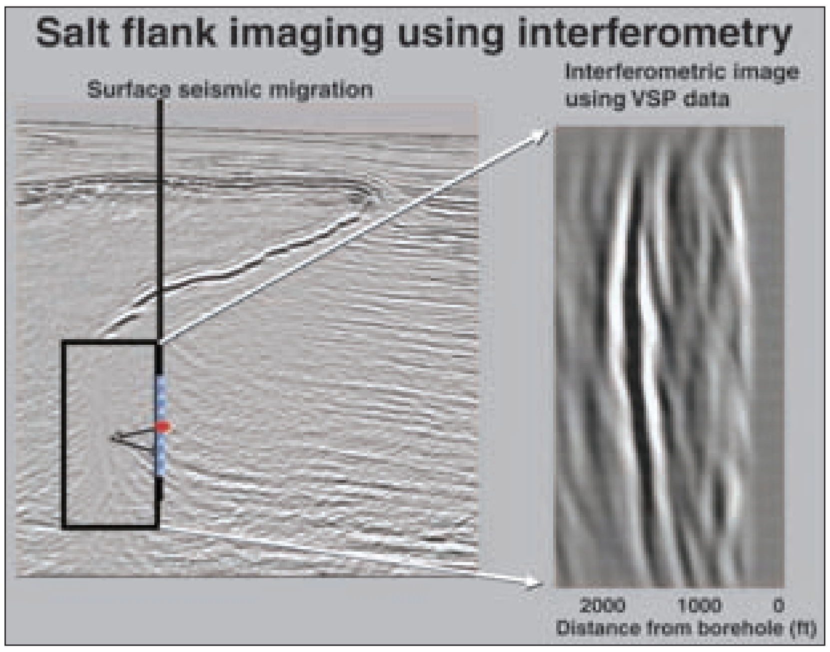

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common shot gathers where each receiver becomes the source one after another in the borehole," Hornby said. "The big advantage there is, for example, imaging sideways to a salt flank, you don't have to know what the overburden is or worry about anisotropy – and you don't worry about what raypath to get through the salt.

"You just directly get the image – sideways."

Safety in the Salt

Speaking of salt, there's a concerted effort under way using VSP to help drillers safely exit salt with the drill bit. The potential impact of this application is huge, particularly in the Gulf of Mexico where such a high percentage of deepwater wells are drilled sub-salt.

A goodly number of these wells have problems exiting the salt, resulting in lost wells, sidetracks and other problems. It typically costs about $5 million to $20 million-plus each time that happens, according to Hornby.

Pore pressure beneath the salt is always a big unknown, and there's an ongoing effort to look at the pore pressure aspect of the sub-salt environment using a variety of techniques that basically revolve around putting the VSP tool in the well.

"The driller stops just before the base of salt," Hornby said. "They normally plan to set casing there, so they pull out, and we go in the well with the VSP tool and take a walk-away line. This is a 2-D survey comprised of a single line of source positions where the source vessel goes past the rig to some distance on each side of the rig and gives us a 2-D set of data.

"We take the data and use them to try to estimate the velocity below base of salt," Hornby said. "After getting the numbers, we come up with an opinion on what the velocity is, and we convert that to pore pressure."

The group then meets with the drilling engineer to provide input on mud weight, so the engineer can formulate a plan for the mud weight.

"This has been successful in several cases where they've changed the mud weight according to these measurements," Hornby said, "and that has saved the well." ❑

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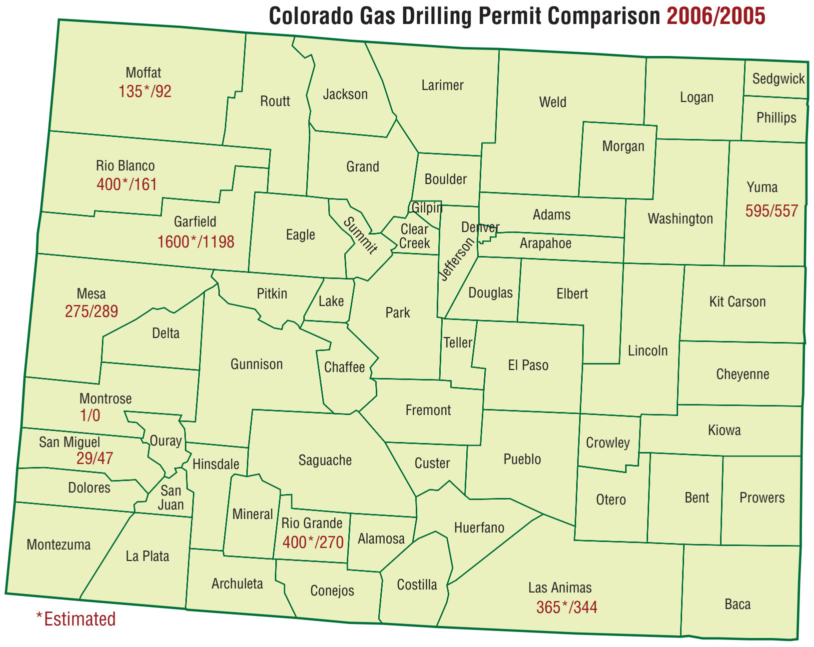
Colorado Gas Drilling Permit Comparison 2006/2005



’07 to See Exploration Spurt

Permitting Soars On Western Slope

By DIANE FREEMAN
EXPLORER Correspondent

Improved drilling technology and higher commodity prices have resulted in a burst of gas drilling activity on the Western Slope of Colorado.

The number of gas drilling permits issued this year has soared as a result of renewed interest in the area, said Brian Macke, director of the Colorado Oil and Gas Conservation Commission.

“Northwest Colorado is expected to see upward of 2,500 permits this year, compared to 2,000 last year. That amounts to about a 42 percent increase in activity in the entire area for all of northwest Colorado,” Macke said.

“Although natural gas prices have softened considerably over the last year, they’re still at a level that’s encouraging natural gas production,” Macke said.

Thousands of new gas wells are expected to be drilled in the next year in the Piceance Basin, Colorado’s fastest growing area, Macke said.

Garfield County is the focus of energy development on the Western Slope, he said. So far this year the commission has issued 1,355 permits to drill with 1,600 expected for the year.

“In Garfield County, we’re expecting about 1,600 gas drilling permits for 2006. Last year there were 1,198. This is a significantly higher level of activity and a good forward indicator of new well drilling in the next year,” Macke said.

Most of the drilling in Garfield County is located in the Colorado River corridor area between the towns of Silt and Parachute.

“It’s the Williams Fork Tight Gas Formation,” he said. “It’s tight sand natural gas development.

“That whole corridor both north and south of the Colorado River has been a very active area in the Piceance Basin. It has been happening for a number of years, but activity has really increased dramatically in the last three years because of improved oil and gas commodity prices and improvements in drilling and completion technology,” he said.

Some of the energy companies active in the area include Williams Production Co., Noble Energy, Bill Barrett Corp., Petroleum Development Corp. and Laramie Energy, he said.

Drilling activity also has picked up in Mesa County where some 275 gas drilling permits are expected to be issued this year, up from 189 last year. “That’s a significant increase,” Macke said.

Rio Grande County also has experienced growth lately. “We’re expecting to see 400 permits to drill this year while we had 270 last year. It’s primarily for natural gas development,” Macke said.

Rio Grande County includes the towns of Meeker and Rangely. “There’s a lot of drilling activity there just north of the southern county boundary next to Garfield County,” he said. “It’s an extension of the Piceance Basin.”

Another area, Moffatt County, also is experiencing a rapid increase in permits for natural gas drilling. “We’re expecting 135 permits there this year, compared to 92 the year before,” he said.

Macke said drilling in Rio Blanco County may double this year to about 400 permits. So far this year some 280 permits have been issued for the county. Last year the total permits for the county amounted to 161, he said.

Meanwhile, Yuma County in northeast

See **Colorado**, page 27


Geoscientists
redefine stamina
It takes a special type of person to find energy. Someone who is ready to break new ground in the industry – as well as their career. A person with determination. Knowledge. And the will to use that intelligence to change things for the better.
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Do You Have One?

Concepts Are the Latest Buzz

By DAVID BROWN
EXPLORER Correspondent

It's the newest idea in exploration today.

The current catchphrase, the latest buzzword.

It can be helpful to use, or dangerous if misused.

Don't have a concept?

Then you're out of luck, because "concept" is the hot idea of the moment.

Instead of areas of interest, company reports now discuss exploration concepts.

Instead of chasing a play, exploration managers want to extend a concept.

"It's a catchword that's going around," said AAPG member Charles Wickstrom, managing partner of Spyglass Energy in Tulsa.

You can't have just a play.

You've got to have a play concept.

Here's a comment on the 2004 Utah hingeline discovery by Wolverine Gas and Oil, from the September issue of *World Oil*:

"The Wolverine team spent a year and a half developing a play concept for central Utah."

A recent issue of *Oil & Gas Journal* included this description of two electromagnetic surveys:

"The surveys were conducted in 110-140 m of water over an untested play concept ..."

The Web-based information service Offshore247.com carried this item about UK independent Burren Energy:

"Burren Energy has reported success with its onshore Loufika exploration prospect in Congo-Brazzaville's Atlantic Coast, which has uncovered a new play concept."

Concept implies portability, the chance to take a set of ideas from one area and apply them to another.

As Offshore247.com noted:

"The discovery of an entirely new play ... has the possibility to extend throughout the Congolese coastal basin."

Think About It

When you consider how "concept" is used in the industry today, you realize it's not an easy concept to grasp – conceptually.

"It can work from a play concept in an area that's not been drilled at all to an area that's had some light drilling 20 years ago," said Ralph Baird of Baird Petrophysical in Houston.

It also can come from a heavily drilled area, and be an international or purely domestic concept, he added.

An industry consultant, Baird lists one of his specialties as adviser on exploration concept management."

A current concept in exploration?

"What's going on right now is that everybody's drilling seismic amplitude. That's a concept that has been pretty well developed," he said.

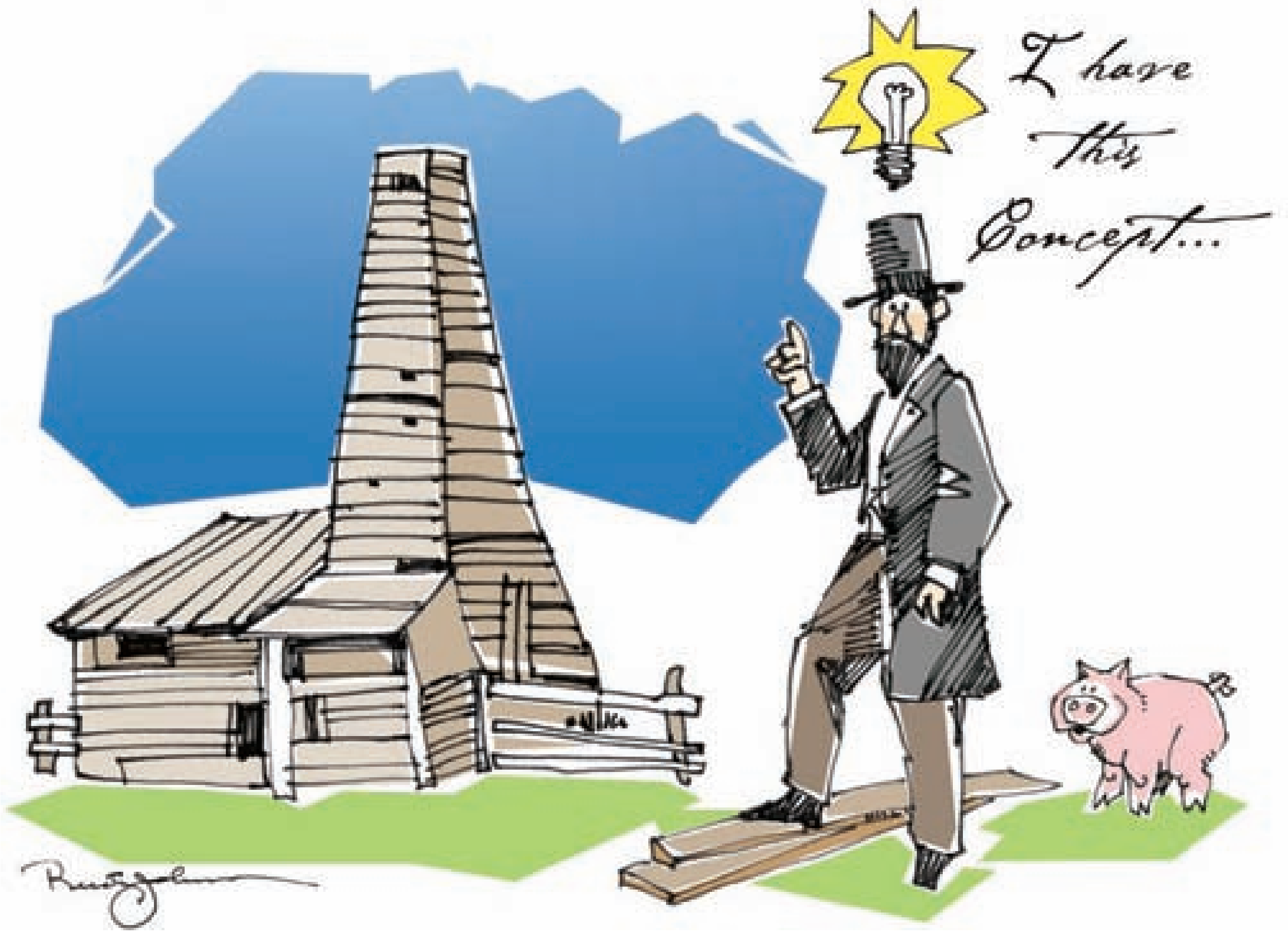
Part of Baird's business involves concept development prior to exploration.

"We take a look at a basin and then develop a concept for that basin," he explained. "Sometimes, it starts out as a land acquisition concept."

That process of gathering information, data and background on a prospect is part of what's now called "developing a concept."

"You would have called this research, years ago," Baird noted.

New technologies and techniques play a large part in frontier, non-conventional and enhanced recovery projects. Concepts sometimes are built around applications.



"You need to know a little about geology, also. Some people today don't seem to think that's too important. But that's where it all starts."

"What's interesting," Baird said, "is that you have a grab bag or a cafeteria of tools and you can select the tools you need in a given situation."

No Short Cuts

One danger in this approach comes from too much reliance on technology and too little focus on fundamentals. Even now, great technology can't save a poor prospect.

"You need to know a little about geology, also," Baird said. "Some people today don't seem to think that's too important. But that's where it all starts."

He's worried about the industry losing a treasure of experience as older professionals retire. New hires won't get the mentoring that previous generations enjoyed, he said.

Good concepts often grow out of access to experience, a deep understanding of exploration that shapes decisions.

"I like to use the 'i' word – the 'i' word is intuition. It takes intuition to come up with the right approach," he said.

From a different view, new concepts usually require a new perspective and new approaches. New ways of thinking continue to revitalize well-explored areas.

"We've got a long way to go in the future in putting these play concepts together," Baird said.

"The game's open. It takes an exceptional exploration manager to be open to new ideas. You aren't going to develop a new play concept that way," he added.

And new ideas are essential to new concepts, although the line between ideas and concepts can be fuzzy.

Here's a Thought ...

A paper presented at the Society of Exploration Geophysicists' annual meeting in October looked at Upper Jurassic reservoirs in the National Petroleum Reserve-Alaska, and concluded:

"Fresh ideas and a new play concept emerged with the discovery of the Alpine Field."

With so many concepts claimed for so many new play areas, it's hard to talk about "proven concepts."

Like everything else in exploration, concepts are subject to the test of time.

Wickstrom said the oil and gas industry has a history of chasing exploration concepts, though they might not have been called concepts.

"Up to a few years ago, the main concept or buzzword was coalbed methane. Everybody had to have a coalbed methane play in their portfolio," he said.

"In conventional oil and gas, it became 3-D seismic. On every play, you had to shoot 3-D seismic. That became a concept," he added.

Today, concepts buzz around non-conventional resource plays.

Work in the Barnett shale has generated a number of new concepts, from the smack-it and frac-it approach to horizontal well drainage.

New players entering the shale-gas chase often talk about applying previously tested concepts.

"Now I'd say unconventional resources like shale gas – and the Barnett shale really kicked that off – and the information from the Barnett have allowed people to follow that concept," Wickstrom noted.

That creates another danger.

A concept that fits one play cannot always be moved whole and applied to a completely different area.

In shale gas, not every organic-rich shale is a potential producer, Wickstrom observed. Geologists need to understand all the parameters involved.

"There are key elements behind the concept," he said.

A concept sometimes grows out of extensive work in developing a productive play.

And sometimes the thought is no more than:

It worked once.

Maybe it will work again.

In the end, the industry might decide that the best exploration has always come from the best ideas. And always will.

What a concept. ❑

Colorado

from page 22

Colorado also is experiencing a growth spurt. In 2005 there were 551 permits issued to drill there while at the beginning of October there were already 595, he said.

"That's shallow Niobrara Formation natural gas development. It's a very prolific formation out there in the Denver Julesberg Basin. It has some chalk, shale and mud stone in it," Macke said.

"There's a strong level of activity in the Raton Basin, too, in Los Animas County. We've had 365 permits so far this year (in October) compared to 344 for the entire year in 2005," he said. "It's still a very robust trend."

Elsewhere, the Paradox Basin in western Montrose County may be the next Colorado region to expand in oil and gas development, Macke noted. The Paradox Basin is one of the most underdeveloped parts of the state of oil and gas, he said.

In the last couple of years energy companies had shown hardly any interest in developing areas of the Western Slope south of Mesa County, Macke said. In fact, there were no permits issued to drill in Montrose County last year and only one issued so far this year.

A total of 29 permits have been issued so far this year for San Miguel County, compared to 47 permits to drill there last year, he said.

However, the under-exploration in this area has recently prompted some interest among energy companies, he said.

The Bureau of Land Management had more than 24,500 acres up for lease in San Miguel and Montrose counties in a November oil and gas lease sale, Macke said. Most of the land on the auction block in Montrose County is located along Colorado Highway 141 north of Naturita, covering more than 12,400 acres.

The San Miguel County land amounts to 12,227 acres and is located along Highway 141 north of Egnar, he said. ❑

Long Beach Registration, Housing Set to Open

Preparations continue for the 2007 AAPG Annual Convention in Long Beach, Calif., with important steps due in December.

✓ Registration and housing will open in mid-December.

✓ The convention announcement – containing all of the meeting's technical program, short courses, field trips and other details – will be mailed to the AAPG membership in the latter part of the month.

✓ Exhibit space contracts are available, and space is assigned on a first-come, first-serve basis, at www.aapg.org.

The annual convention is set April 1-4 at the Long Beach Convention and Entertainment Center, located right on the Pacific Coast. The theme is "Understanding Earth Systems – Pursuing the Checkered Flag."

Long Beach, located at the center of California oil production in the prolific Los Angeles Basin, boasts good weather, spectacular outcrops and nearby oil field analogs.

The technical themes are:

✓ Deepwater Reservoirs.

✓ Stratigraphy and Sedimentology.

✓ Structural Innovations and Applications.

✓ Global Exploration Portfolio.

✓ Reservoir Characterization and Modeling.

✓ Geoscience Tools.

✓ Unconventional Reservoirs and Resources.

✓ Hydrocarbon Systems and Basin Analysis.

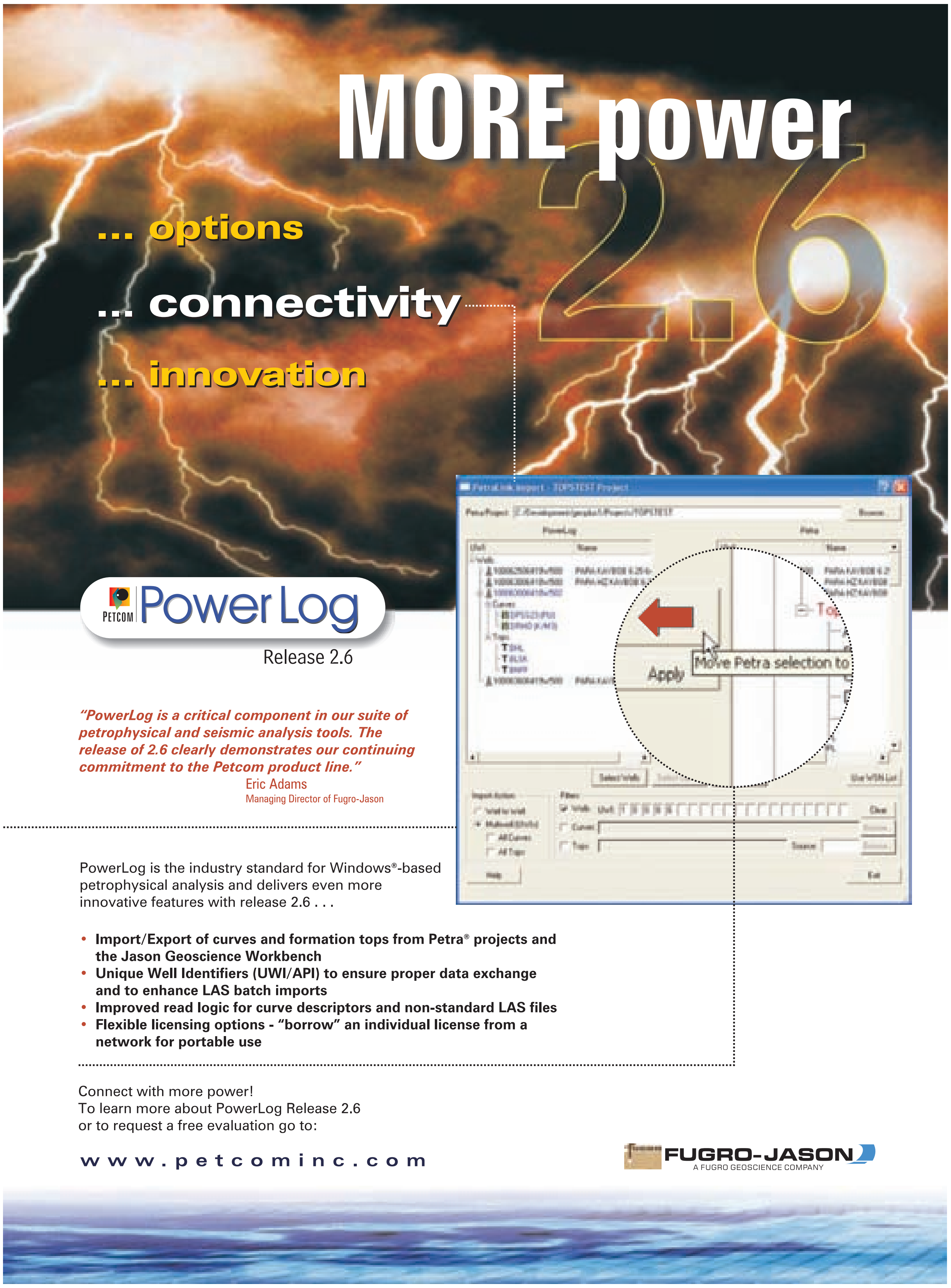
✓ The New Oil Business.

✓ Astrogeology and the "Bigger" Picture.

✓ Geoscience and Public Policy.

✓ Student Sessions.

Updated information on the meeting and technical program – including instructions for registration and housing options – can be found on the AAPG Web site, at www.aapg.org.



Origin from Massive Yellowstone Volcanoes?

Ash Deposits Can be Deceiving

By BARRY FRIEDMAN
EXPLORER Correspondent

In and around the Gulf of Mexico one can expect to find an unruly mix of jazz, heartache, gumbo, prolific petroleum reserves and, if a new study is to be believed, volcanic ash.

And this volcanic ash, according to one researcher, has the potential to contribute to the rising cost of petroleum exploration by playing a kind of cat and mouse game with the industry.

The theory, according to AAPG member Matthew Totten, an associate professor at Kansas State University, is that seismic readings of ash deposits look a lot like those of petroleum reserves and, to put it simply, it's tough to tell the difference.

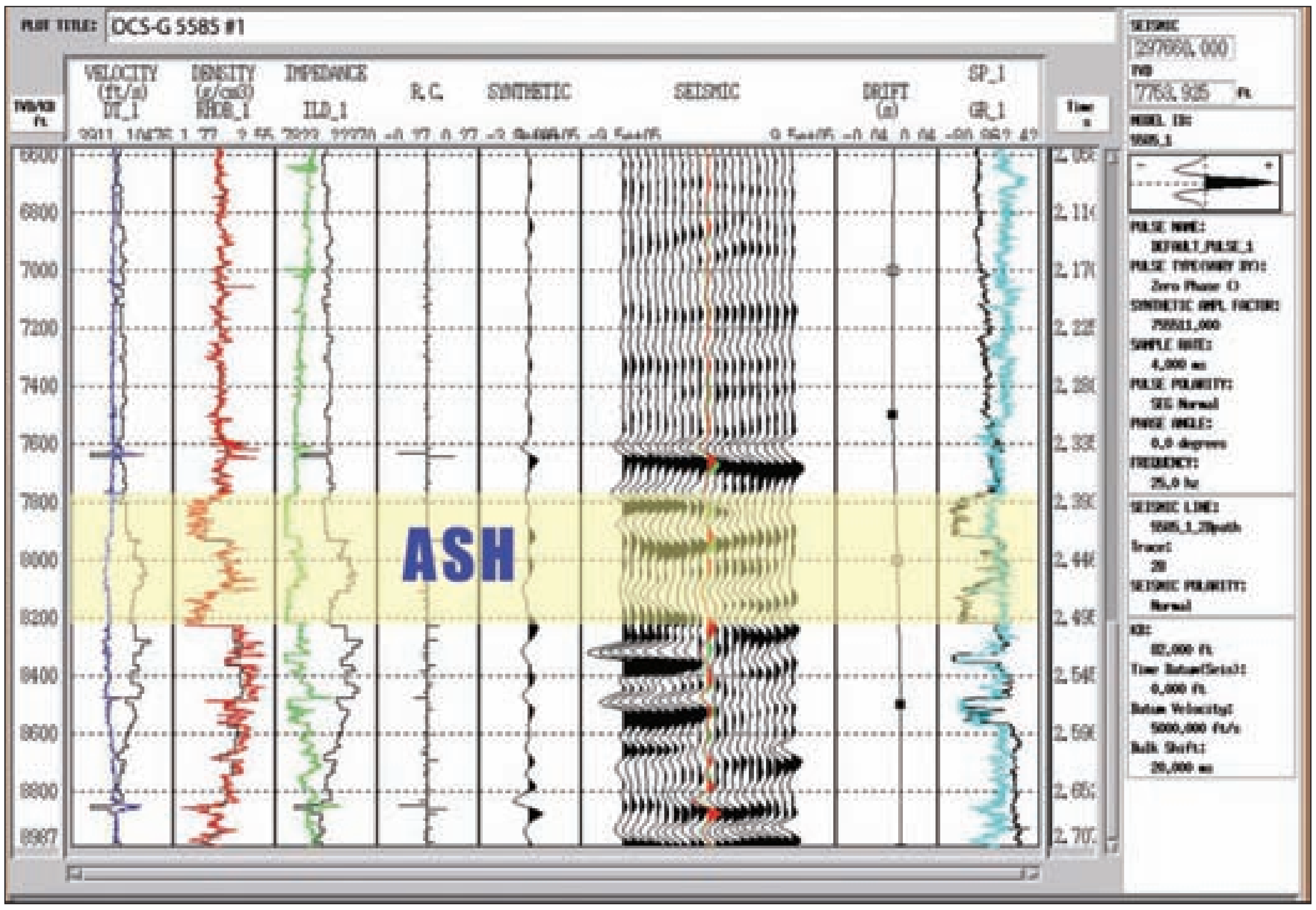
And, apparently, the Gulf has been collecting this ash for millions of years.

"In the beginning we were a little incredulous ourselves," says Totten, who recently authored a study that indicated large beds of volcanic ash are in the Louisiana bayou.

Totten believes that massive volcanic eruptions (3,000 to 4,000 times more powerful than Mount St. Helens) that occurred two million years ago in what is now known as Yellowstone National Park covered parts of the Midwest, including Kansas and Nebraska, made its way, via the Mississippi River, to the Gulf of Mexico.

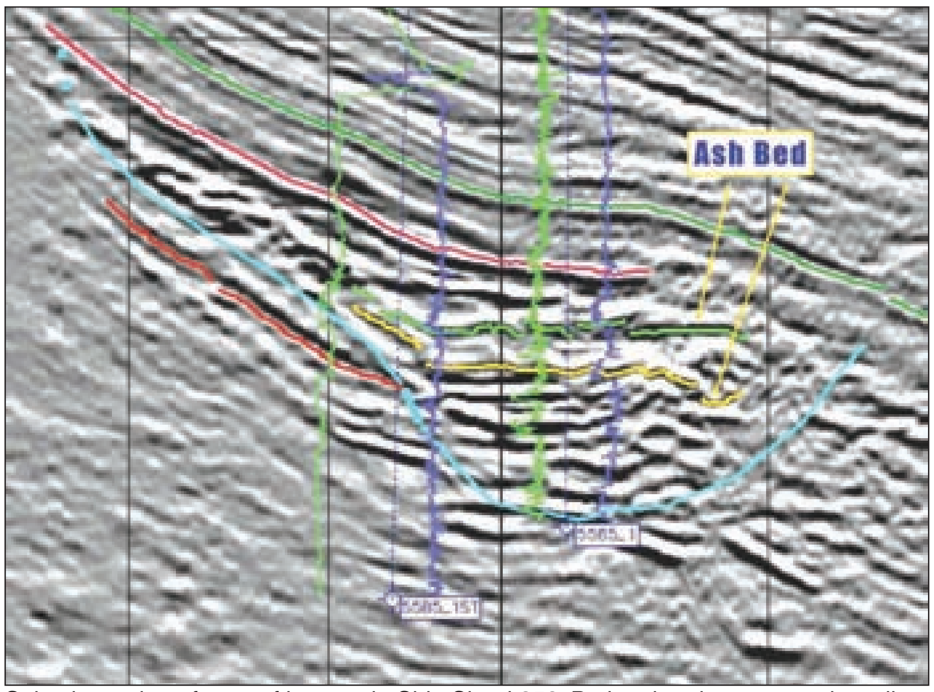
(As to the effects of Mount St. Helens, Totten says it was too small of an eruption and too far west to be significantly concentrated in the Mississippi River

See **Volcanic Ash**, page 30

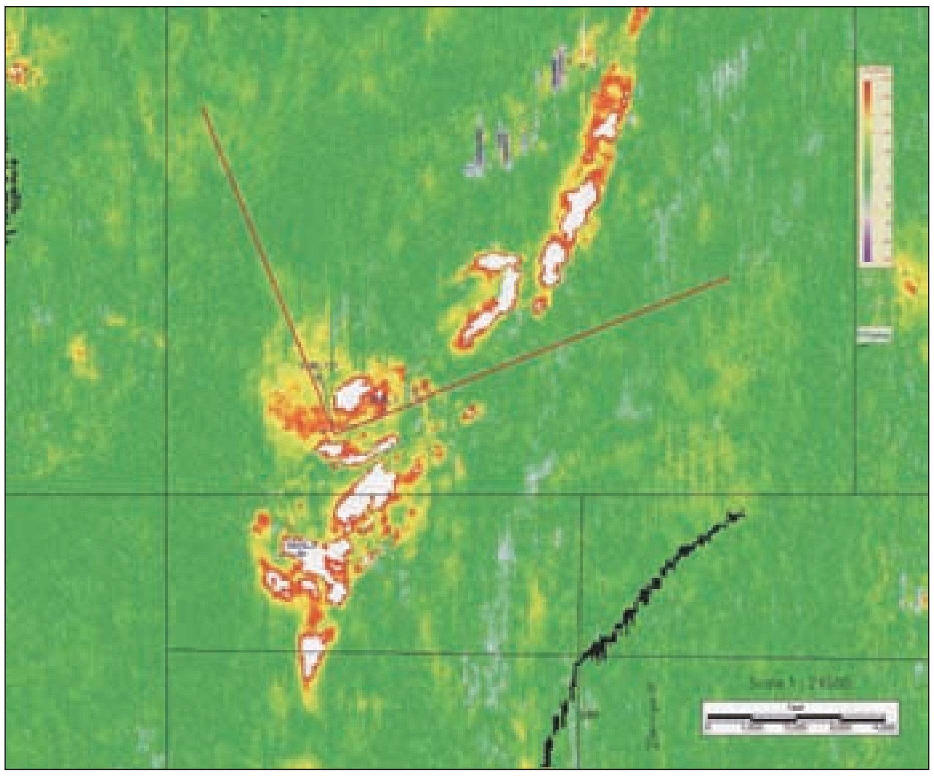


Graphics courtesy of Matthew Totten

Synthetic seismogram for Mobil OCS-G 5585 #1 in Ship Shoal 358. Base of two separate ash units generate an acoustic response.



Seismic section of area of interest in Ship Shoal 358. Both ash units are seen in well #1, but converge into one unit in the sidetrack well. Ash interval occurs within larger, amalgamated channels.



Amplitude extraction of amalgamated channel complex in Ship Shoal 358/Ewing Bank 944. Three wells with ash occurrence are within this amplitude.

Volcanic Ash

from page 28

drainage.)

"The magnitude of these eruptions is outside normal experience," Totten said. "When you find thick deposits in Kansas, halfway between Wyoming and Louisiana, you realize that the drainage system must have been full of ash for some time."

The Fresh Connection

Totten, a former University of New Orleans professor who left for KSU shortly before Hurricane Katrina slammed into the Gulf Coast, has been studying the ash-bayou connection for years.

"Volcanic ash was spread over a tremendous area of the United States, and has been recovered from a wide variety of locations in the western U.S., the Great Plains, the Gulf of Mexico and even the Pacific Ocean. The ash outcrops in Kansas show evidence of a system overwhelmed with ash ... and record a time when the Mississippi River drainage system was literally choked with ash."

Totten says that over time, the ash reached the depocenters in the Gulf of Mexico.

How much time?

"Based upon the paleomarker we used in our most recent study (GCAGS, 2006)," Totten said, "and assuming it is correctly dated, then the maximum amount of time from eruption to final deposition in the deepwater GOM, is about 100,000 years."

Why this is important, is that if the Gulf is filled with ash and if that ash "looks" like oil, industry may spend millions of dollars looking – and drilling – in the wrong places.

"The seismic reflection of sands with about 20 percent ash seems similar to a hydrocarbon-rich sand," Totten said, adding that not enough is known about the minimum amount of ash within a sand to lower the density enough to generate this response.

While saying one of the byproducts of finding all this ash is how much it will likely affect climate, water chemistry, etc., Totten believes the more pressing implication to the industry is the possible misinterpretation of an ash-rich bed as a DHI (direct hydrocarbon indicator).

"The ash is very low density," Totten said. "A mixture of low-density ash within sand can give an amplitude anomaly similar to hydrocarbon-bearing sand. So avoiding this is important."

continued on next page

‘Down Under’ Meeting Is Over the Top

The 2006 AAPG International Meeting at the remote venue of Perth, Australia, proved as prolific as the petroleum geology of the region with a record-setting 2,650 registrants, the largest attendance ever for an AAPG international gathering.

The meeting’s opening session attracted a large crowd to the Perth Convention Center, featuring welcoming addresses from AAPG President Lee Billingsley, PESA President David Cliff, meeting General Chairman Agu Kantsler and Alan J. Carpenter, the premier of Western Australia, who delivered an upbeat assessment of his region’s on- and offshore potential.

Carpenter also emphasized the significant contribution of petroleum exploration and development to the economy of the region and the country.

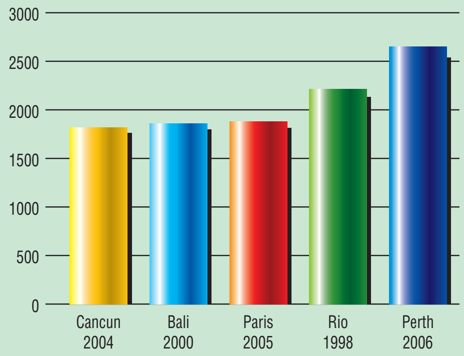
Speakers at the opening technical session reviewed the 500-million-year geological history of Gondwana, and some history of exploration in the region.

Exploration in Australia began in 1892, with discoveries to date of seven billion barrels of oil and 170 trillion cubic feet of gas, yet significant potential remains. Speakers forecast the eventual rise of Australian LNG production to place it in the top five nations.

The Monday morning plenary session echoed the conference theme, “Reunite Gondwana – Realize the Potential, and attracted a large crowd estimated at over 1,500 attendees.”

The Perth meeting topped the previous AAPG international meeting high attendance mark of 2,214 set in 1998 in Rio de Janeiro, Brazil.

Top Five Attendance for AAPG International Meetings



AAPG Executive Director Rick Fritz said, “the Perth meeting was one of the highest quality technical sessions AAPG has produced. The technical sessions and venue drove record attendance.”

Perth was the 18th designated “international meeting” for the Association, with the average attendance for those 18 meetings being 1,528. However, the last five meetings have drawn an average of 1,977 registrants, indicating the growing global participation in the Association.

A complete Perth report will be included in the January EXPLORER. ❑

continued from previous page

A Tough Sell

At first, his findings were a tough sell.

“Some of what we were battling was the conception that all of the ash was airfall, instead of reworked airfall into the river system,” he said. “Airfall deposits are much too thin to be found in the 300-foot-thick beds we see. Airfall ashes from Central America are reported in the Gulf, but millimeters thick – and we can’t think of a mechanism to rework the ash up the continental slope into the deposits we see.

“I think some of the well-publicized TV documentaries on super-volcanoes have helped. Once you recognize the magnitude of these eruptions, the occurrence of ash in the Gulf of Mexico seems inevitable, at least to me.

“Also, as more work on the hotspot became widely known, and as we also realized the extent of the ash across the continent, it became easier to convince the industry that it almost has to come from this area.”

Here, There and … Everywhere?

Totten says he hasn’t been able to look at enough of the Gulf to determine the full impact, but does say, “it isn’t concentrated everywhere. We reported that it seems to occur within higher order channel deposits in amalgamated channels.

“That being said,” he continued, “it does seem to occur in at least trace levels in every sample we looked at of the appropriate age.”

And this isn’t just an academic exercise. Totten points to two instances where industry has drilled false positives: One happened in the late 1970s, when Shell explored an area in the Green Canyon, and the other involved a project conducted by Spirit 76 a few years ago.

“I met an independent at GCAGS (in September) that had just drilled an ash-filled false positive, but I was not told exactly where,” he said.

Totten believes that once “we get all of this worked out,” industry will have the ability to “determine what sediment pathways are active during the time period of ash deposition.”

As for now, Totten says there isn’t a device that can uniformly and consistently detect the differences between a positive finding of oil reserves and a concentration of ash, which is why finding out where the deposits are beforehand are so important.

“After the well is drilled,” he said, “ash is reasonably easy to identify on well logs.” ❑

AAPG EXPLORER

GEOPHYSICALCORNER

Take Your Pick: Skeptic or Proponent

(The Geophysical Corner is a regular column in the EXPLORER, edited by Bob A. Hardage, senior research scientist at the Bureau of Economic Geology, the University of Texas at Austin.)

By BOB A. HARDAGE
KHALED FOUAD
and GLENN WINTERS

Intriguing seismic examples are being developed in multi-component seismic research at the Bureau of Economic Geology, specifically examples documenting which one of the S-wave seismic modes images a key geologic feature better than does the P-wave mode – the only seismic mode many explorationists have ever used.

One of those examples is illustrated here.

The prospect is a carbonate Strawn play in West Texas. Traditional P-wave seismic data in the area are good quality, produce accurate structure maps and sometimes, but not consistently, provide reservoir-sensitive attributes across Strawn targets.

At this particular prospect, the Strawn play is stratigraphic, not structural, and traditional P-wave data were having limited success in predicting optimal drill sites. A modest-size 3C3D seismic survey was acquired to determine the value of multi-component seismic data for prospect evaluation.

* * *

Figure 1 shows time-structure maps at the reservoir level created from the PP (compressional) and PS (converted shear) modes provided by the 3C3D data. In making these maps, we depth registered the PS data to the PP data before interpreting the PS data volume.

The equivalence of the structural geometry shown by these two maps suggests that the PS data processing has been done well and that the PP-to-PS depth registration is reasonably accurate across the reservoir interval.

Superimposed on the maps are existing wells, both producers and non-producers, showing that there is no obvious relationship between structure and producing facies. Some producers are lower on the structure than are non-producers.

Drilling targets are thus controlled by stratigraphic conditions, not by structure.

* * *

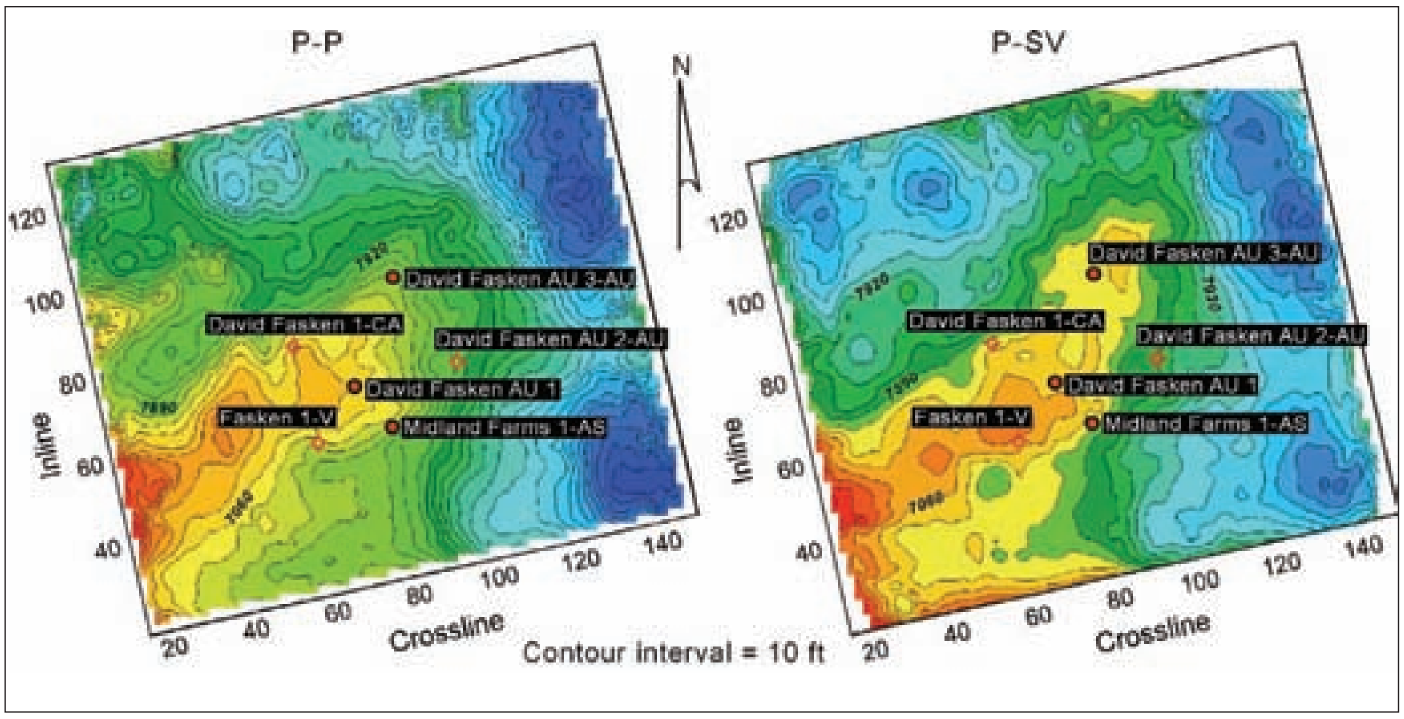


Figure 1 – PP time-structure map (left) and PS time-structure map (right) showing producing (solid circle) and non-producing (open circle) wells occurring randomly relative to structure. The position and general appearance of the northeast-plunging structural nose are reasonably equivalent in each image space (P-P and P-SV).

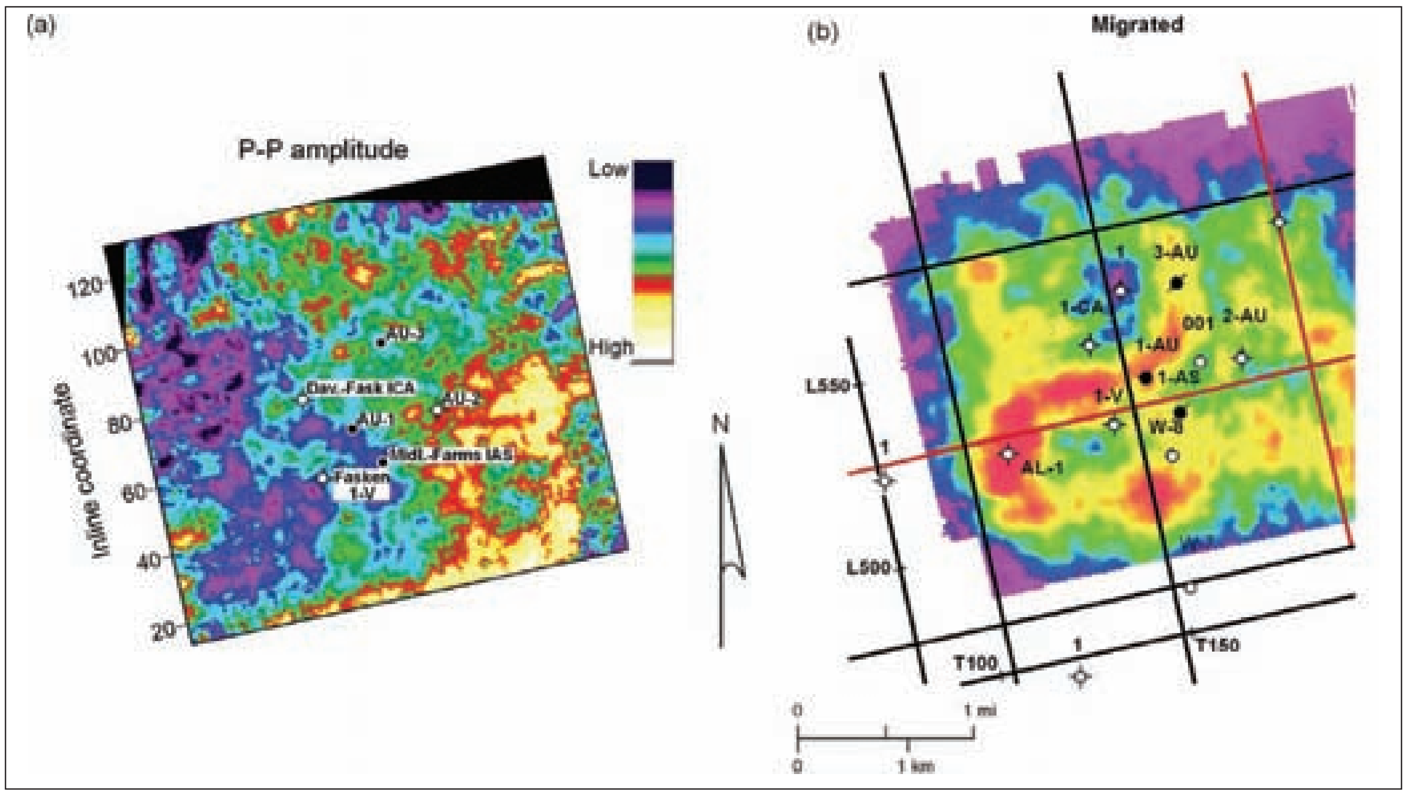


Figure 2 – PP amplitude attribute (a) and the depth-equivalent PS amplitude attribute (b) across the reservoir interval. PP amplitude facies cannot be related to productive and nonproductive reservoir facies. In contrast, PS amplitude facies tend to segregate productive facies (high amplitudes; yellow/red colors) from non-productive facies (low amplitudes; green/blue colors). Well AL-1 was drilled to test this PS amplitude-facies map.

Figure 2 shows one amplitude attribute (rms amplitude) extracted from narrow windows spanning the reservoir interval across the PP and PS data volumes.

In other areas, PP amplitude attributes have successfully delineated productive carbonate reservoirs in the Strawn; here, PP reflectivity is not definitive, as an inspection of figure 2a shows.

PP reflection amplitudes are random in nature, and amplitudes at non-producer wells look like PP amplitudes at producing wells. In contrast, PS reflection amplitude appears to react to productive and non-productive reservoir conditions (figure 2b). The PS data show a sinuous, high-amplitude anomaly (yellow/red) that reasonably segregates producing wells from non-producers.

This reservoir facies is a low-porosity carbonate unit; porosity ranges from 1 to 7 percent across the prospect, and minimum productive porosity is 4 percent. Detecting the narrow porosity range between non-productive facies (1 to 3 p.u.) and productive facies (4 to 7 p.u.) is beyond seismic sensitivity for both the PP mode and the PS mode.

Rather than using seismic data to segregate areas of productive porosity from areas of nonproductive porosity, interpreters try instead to use seismic attributes to find maximum reservoir thickness. They then cross their fingers and hope that zones of favorable porosity will be found across intervals where there is maximum unit thickness.

In this instance, the predictive value of PS reflection amplitude was tested by drilling well AL-1, labeled on the PS map (figure 2b). This well found the thickest reservoir facies (122 feet) of all the wells shown on the maps. In other wells, the reservoir interval ranged from 80 to 111 feet.

From the standpoint of reservoir thickness, this project supports the use of multi-component seismic technology for carbonate strat-trap exploration, because the PS data defined a maximum-thickness reservoir interval when conventional PP seismic data could not.

However, even though well AL-1 penetrated a maximum-thickness reservoir unit, insufficient productive porosity occurred across the interval to make the well commercial. This AL-1 well falls into that famous category many call "technical success but economic failure."

* * *

Skeptics can say that multi-component seismic data did not yield a productive well. Proponents can say that the PS mode delivered exactly what was needed – a definition of the maximum thickness of the reservoir.

Take your pick: skeptic or proponent.

The real message is that at this prospect, the PS mode provided vital reservoir information that the PP mode could not.

Acknowledgment: This research was funded by DOE/NETL.

(Editor's note: Hardage and Fouad are both with the Bureau of Economic Geology in Austin, Texas; Winters is with Fasken Oil and Ranch, Midland, Texas.)

WashingtonWATCH

Congress Rests, But Work Goes On

By DON JUCKETT
GEO-DC Director

As you read this column, the results of the mid-term elections will be relegated to the annals of history – at least we can hope that is the case and we are not mired in issues of "hanging chads" or other election process quarrels.

On the other hand, with some notable exceptions, Washington has benefited by having senators and congressmen back in their own states and districts. Commuter traffic is a little lighter, parking is easier to find in the District and it is much easier to communicate with congressional staff about issues that are likely to emerge in the waning days of the 109th Congress and what will be the direction and agenda of the 110th Congress.

Some of these issues, while not entirely new, will have both short- and long-term impact on AAPG members. As Congress entered into the election recess period, they left a large portion of the federal government operating under a continuing resolution budget.

Continuing resolution, while generally providing for ongoing programs, usually precludes any new program initiation.

* * *

Efforts among the academic and industry petroleum geosciences support groups have continued, even in recess, to draw attention to the impact that budget action in both houses of Congress has had on the support for geoscience students as the result of severe reduction in R&D spending for petroleum-related university programs.

Congress recessed with no resolution between the House and the Senate on the two disparate bills addressing Outer Continental Shelf access. Staffs continued their quiet negotiations in the absence of members, but there will be little time and probably not much enthusiasm for bringing closure to a final bill in the 109th Congress. The elections and the prospects of a change in the majority in the House and possibly in the Senate did not create great optimism for some of these important issues will be resolved.

If anything, a change in the House and/or Senate majority portended that much of the first months of the 110th Congress would be consumed with leadership selection and pressure to sort through the budget issues remaining. That assumed the 109th Congress would not be successful in bringing closure to the multitude of budget differences that have stalled its deliberations so far.

All in all, it is difficult to be inspired by the gridlock and lackluster performance of the legislative process during the past year.

* * *

Dec. 1 marked the first year anniversary of the AAPG Geoscience and Energy Office in Washington. Over the past 12 months, AAPG's presence as a professional society with significant resources to bring to the policy dialog has become well recognized by the Energy and Resources staff of both Houses of Congress, in the administration and among the industry associations and organizations in Washington.

The GEO-DC office, AAPG members and AAPG headquarters staff have:

✓ Responded to a significant number of requests for information, testimony and drafted written materials on a wide range of subjects ranging from resource potential to impacts of federal budget impacts to the science of climate change.

✓ Provided AAPG members and leadership with analysis of specific legislative initiatives and responded to special requests for information on pending and proposed legislation.

✓ Together with the Division of Professional Affairs and the Government Affairs Committee we have reinstituted the "Action Alert" procedures and provided materials for three "alerts" for members on the AAPG Web site.

✓ Assisted the president and the Executive Committee in preparation of testimony on geosciences research and development, OCS access and support for university petroleum geosciences programs funded by the various federal agencies.

In establishing the GEO-DC office, AAPG's members have gained recognition and presence in Washington activities through visits to Senate and House members' offices during Congressional Visits Days, an annual science-related event of which AAPG has become a sponsor.

Members have briefed and provided background materials for House and Senate staff. AAPG members are playing an active role in the National Petroleum Council's study on Global Oil and Gas Study requested by the Secretary of Energy.

In a recent conversation with one of the senior House Energy and Minerals Resources staff, I was told that the staff increasingly holds up AAPG's decision to establish a Washington presence as a challenge to other energy and minerals professional organizations as the most effective avenue to informing policy makers of the importance of natural resources to the national and global economy.

That reflects well on the AAPG leadership and members who have worked to establish the GEO-DC office.

(Editor's note: Don Juckett, head of AAPG's Geoscience and Energy Office in Washington, D.C., can be contacted at djuckett@aapg.org, (703) 575-8293.)

www.UPDATE

Historical Archives Are Coming Online

By JANET BRISTER
Web Site Editor

Having access to the published science of AAPG is one of the greatest benefits of being an AAPG member.

Most members already know they can log into the "Members Only" access point, found near the upper left part of the home page. Click the "Bulletin Archives" gold button and enter http://search.datapages.com. This is the location of the articles that have been published in the BULLETIN since its inception.

Easy. Simple.

And, there's something new.

Before the end of the year *every publication ever published by AAPG* will be available in search.datapages.com.

At that site, in the bulleted items at the top of the column on the right, you will find "Browse AAPG Books." The resulting list offers the various publishing series of AAPG.

When you select "Memoirs" you'll find a numbered list of every memoir published. The first link in the list, *Classification of Carbonate Rocks – A Symposium*, was a memoir published in 1962.

These are papers from a symposium arranged by the AAPG Research Committee along with the Association and the Society of Economic Paleontologists and Mineralogists, at Denver on April 27, 1961.

Now go back to the "Electronic Index of AAPG Special Publications" and follow the "Special Publications" link.

The first publication listed here is "Geology of Salt Dome Oil Fields" published in 1926, the result of a March 1924 meeting in Houston whose program committee desired to present "a comprehensive picture of American salt domes, and to collect and record in permanent form the information that has accumulated during 20 years of exploration for petroleum around the salt domes of the Gulf Coastal Plain."

What Does It All Mean?

It means that before the end of 2006 every publication AAPG has printed will be available behind the "Bulletin Archives" golden button in the Members Only area.

Both out of print and new publications will appear here for every AAPG member to access, search and review.

In other words, here is another useful tool to encourage your peers to join the AAPG – an enormous amount of peer-reviewed scientific content is at their fingertips.

Send them to the online membership application at www.aapg.org/join and encourage them to join up today.

Bonus: Remind them to note your name as the person who recruited you and start building your recruiting points (www.aapg.org/recruit/)

Good browsing! ❑


Financial history
Revenue, $million
Profit,
$80
400
300
200

PROFESSIONAL NEWS BRIEFS

Laurel Alexander, to senior geologist, Chesapeake Appalachia, Charleston, W.Va. Previously senior geologist, PGE, Warren, Pa.

Jim Blagg, to senior exploration geophysicist, Addax Petroleum, Houston. Previously senior geophysicist, Veritas DGC, Houston.

Jason Bossard, to geologist, Chesapeake Appalachia, Charleston, W.Va., Previously geologist, Columbia Natural Resources, Hammondsprot, N.Y.

Lindell Bridges, to geoscience manager, Chesapeake Appalachia, Charleston, W.Va. Previously senior geologist, Chesapeake Energy, Oklahoma City.

Scott Byrum, to senior geologist, Chesapeake Appalachia, Charleston, W.Va. Previously senior geologist, Noble Energy, Houston.

A. Ewan Campbell, to senior production geologist, Shell International E&P, Rijswijk, The Netherlands. Previously senior geologist, Wintershall, Kassel, Germany.

Rick Campbell, to senior geophysicist, Chesapeake Appalachia, Charleston, W.Va. Previously senior geophysicist, Columbia Natural Resources, Charleston, W.Va.

B.J. Carney, to geophysicist, Chesapeake Appalachia, Charleston, W.Va. Previously geophysicist, Columbia Natural Resources, Charleston, W.Va.

William Catanese, to geological consultant, Englehart Energy, Houston. Previously geological engineer, Newfield Exploration, Houston.

Richard L. Chambers, to senior product architect-earth modeling solutions, Halliburton-Landmark, Houston. Previously partner, Quantitative Geosciences, Broken Arrow, Okla.

Adel Fawzy Douban, to exploration manager, Sahara Oil & Gas, Cairo, Egypt. Previously team leader, Petronas Carigali Sdn Bhd, Kuala Lumpur, Malaysia.

Chris Gardner, to associate geologist, Chesapeake Energy-eastern division, Charleston, W.Va. Previously student, University of Memphis, Tenn.

Charles F. "Charlie" Garvey, to geoscience manager-Rockies/Mid-continent, Noble Energy, Denver. Previously senior geological adviser-Latin America/Far East, Noble Energy, Houston.

Robert C. German, to senior geologist, Enduring Resources, Denver. Previously consultant, Boulder, Colo.

James W. Granath, to principal structural geologist, Midland Valley Exploration, Golden, Colo. Previously senior explorationist, Forest Oil, Denver.

Kerima Haddad, to senior geologist, Chesapeake Appalachia, Charleston, W.Va. Previously senior geologist, Columbia Gas Transmission, Charleston, W.Va.

Virginia Hebert, to associate geologist, Chesapeake Energy-eastern division, Charleston, W.Va. Previously geologist, Minerals Management Service, New Orleans.

Greg Hummel, to senior geologist, BreitBurn Energy, Los Angeles. Previously geologist, Armstrong Petroleum, Newport Beach, Calif.

Dan Krygowski, to senior petrophysicist, The Discovery Group, Denver. Previously senior petrophysicist, Chevron Energy Technology, Houston.

Lee Lehtonen, to producing asset manager-Permian/Mid-continent, Pioneer Natural Resources, Dallas. Previously exploitation and development manager, Pioneer Natural Resources, Buenos Aires, Argentina.

Joe Lemon, to senior geophysicist, Chesapeake Appalachia, Charleston, W.Va. Previously senior geophysicist, Columbia Natural Resources, Charleston, W.Va.

Brian Panetta, to geologist, Chesapeake Appalachia, Charleston, W.Va. Previously consultant, Tuscaloosa, Ala.

Mark Rawls, to president, Prairie Fuel, Duncan, Okla. Previously senior geologist, Mack Energy, Duncan, Okla.

Ed Rothman, to senior geologist, Chesapeake Appalachia, Charleston, W.Va. Previously senior geologist, Columbia Natural Resources, Charleston, W.Va.

Thomas A. Ryer, to geological consultant-clastic stratigraphy, Occidental Oil and Gas, Houston. Previously consultant, The Aries Group, Katy, Texas.

Benjamin Sloan, to planning analyst, Chevron International E&P, San Ramon, Calif. Previously exploration manager, Chevron Norge A/S, Oslo, Norway.

(Editor's note: "Professional News Briefs" includes items about members' career moves and the honors they receive. To be included, please send information in the above format to Professional News Briefs, c/o AAPG EXPLORER, P.O. Box 979, Tulsa, Okla. 74101; or fax, 918-560-2636; or e-mail, smoore@aapg.org; or submit directly from the AAPG Web site, www.aapg.org/explorer/pnb_forms.cfm.)

IN MEMORY

Marcus Milling, senior adviser and past executive director of the American Geological Institute, in Alexandria, Va., died Oct. 17 after an illness. He was 68.

Milling

Milling was named AGI adviser in July after having served as executive director of AGI, an umbrella organization serving some 32 member geosciences societies with over 100,000 members – including AAPG – since 1992.

He received his bachelor's degree from Lamar University and his master's and doctorate from the University of Iowa. He joined Exxon Production Research in 1968 and was a researcher and research supervisor. He later worked in Exxon's domestic exploration and production line operation groups in south Texas and New Orleans.

In 1980 he became general manager of Arco's geological research group at their central R&D facility in Plano, Texas. He subsequently served as Arco's chief geologist and exploration manager.

In 1987 Milling joined the University of Texas at Austin as associate director of the Bureau of Economic Geology, where he was responsible for coordinating its oil and gas industry consortia programs and environmental and water resource investigations.

During his years as executive director AGI increased its membership from 19 to 44 societies. AGI announced it will rename its Legendary Geoscientist Award in his honor.

A member of AAPG since 1966, Milling was an AAPG Foundation Trustee Associate, received Honorary Membership in 1998 and served on the Membership, Distinguished Lecture, Research and Visiting Geologist Program committees.

He was voted to receive an AAPG Special Award at the 2007 AAPG Convention in Long Beach, Calif., and will be honored there posthumously.

* * *

Robert W. Sabaté, independent geologist in New Orleans, longtime AAPG member and past president of the Division of Professional Affairs, died Nov. 3 after an illness. He was 75.

* * *

Clyde McKee Becker, 78
Ponca City, Okla., Oct. 4, 2006
Mikhail Danilovich Belonin, 69
St. Petersburg, Russia, Oct. 10, 2006
Dorsey Randle Buttram, 90
Oklahoma City, Sept. 15, 2006
Lynn D. Ervin (EM '40)
Lufkin, Texas
August Goldstein Jr., 85
Tulsa, Oct. 16, 2006
Raymond Henry Greutert, 76
Pasadena, Calif., Oct. 2, 2006
Paul Francis Hamlin, 80
Wichita, Kan., Oct. 28, 2006
Edward R. Hewitt, 80
Wakefield, R.I., Aug. 16, 2006
Alan Jackson, 81
Hattiesburg, Miss., Aug. 17, 2006
Alfred B. Long (AS '47)
Beaumont, Texas
Alan John Martin, 73
Norfolk, England, October 2006
Marcus Eugene Milling, 68
Alexandria, Va., Oct. 17, 2006
George Roger Pinkley, 101
San Antonio, Sept. 24, 2006
Robert Warren Sabaté, 75
Metairie, La., Nov. 3, 2006 ❑

AAPG EXPLORER

REGIONS AND SECTIONS

Energy Libraries Are a Valuable Tool

(Editor's note: Regions and Sections is a regular column in the EXPLORER offering news for and about AAPG's six international Regions and six domestic Sections.

News items, press releases and other information should be submitted to the EXPLORER/Regions and Sections, P.O. Box 979, Tulsa, Okla. 74101.

Contact: Carol McGowen, AAPG's Regions and Sections manager, at 1-918-560-9403; or e-mail to cmcgowen@aapg.org.

This month's column is provided by Jim McGhay, chief geologist of Mid-Con Energy Corp., and director of the Oklahoma Well Log Library, both in Tulsa.)

By JIM McGHAY

The upstream energy business, particularly exploration and production, is a creative, intellectual and knowledge-based enterprise – and every energy industry professional knows that to compete, you need area-specific information on prior drilling and production activities, including:

✓ Well locations.
✓ Base maps.
✓ Results of down-hole surveys and tests.
✓ Open-hole well logs.
✓ Data on attempted completions.
✓ Information about abandoned wells.
✓ The production histories on producing wells.

Where do you find the hand written "scout" tickets about the old wells, the driller's and geologist's notes and files?

Where are the collections of data from companies previously active in the area and now long moved, merged or sold out of business?

In the energy industry, you must find and integrate this information with geological and engineering research to help make sound business decisions and maximize your production.

Information that defines the very foundation of your efforts to find and produce more energy for the American marketplace is collected and made available to companies large and small through the **energy information libraries**. Independent operators, independent and consulting geologists, engineers, landmen and others benefit daily from their membership in these libraries.

* * *

What is an energy information library?

Excluding state agency and academic collections, there are perhaps 40 of these organizations in the United States. These are typically regionally focused facilities, started by the contributions and shared materials of companies and individuals working the area, or contributions by folks retiring and leaving their data collections for others to use.

Many are non-profit organizations, some are owned and operated by professional geological societies, and others are commercially owned. All are managed for the benefit of members and their clients. They are independent-minded institutions, fiercely holding on to their hard-earned private donations and collections of truly "one-of-a-kind" and historical information.

With a few exceptions involving reciprocal use agreements, these organizations had never communicated nor interacted with the other energy libraries – until now.

Launched from an initial meeting of several Mid-continent libraries the previous year, the 2006 Energy Libraries Conference in Tulsa brought together 32 people from 12 libraries that ranged across five states and four AAPG Sections, located from Billings, Mont., and Casper, Wyo., to Corpus Christi and Tyler, Texas.

Several critical issues facing these institutions were identified by the earlier conference group and were examined in depth at this recent conference during forums led by professional presenters, including:

✓ Copyrights and intellectual property basics.
✓ The uses of copyrighted information by lending institutions and their membership, and possible exemptions and fair use provisions applied to these materials.
✓ Current changing data access and utilization trends in industry.
✓ The preservation and security of information assets.
✓ "Digitization" of paper asset collections and software and hardware related to storage and retrieval of digital information.
✓ Defining the capital needs of these library missions, obstacles to acquiring outside capital, success factors of funding campaigns including planning, leadership and implementation of the solicitation efforts and development of appropriate capital sources.

* * *

The issue of **changing data access and utilization trends in the petroleum industry** is a prime consideration for energy information libraries right now. Since the collections of most energy libraries are in paper format, the pressure is on to convert historical collections to digital format. Library staffs are scrambling to identify the quickest, most cost-effective methods for scanning, indexing and storing documents for easy access, downloading and viewing.

The interface between data storage and data access is a challenge shared by all of the Energy Libraries Conference attendees. During some of the conference sessions, energy information library staff shared stories of re-writing software for a third time in response to library user feedback. For example, software rewrites were needed to accommodate split screen, side by side viewing of well logs and scout tickets.

Another challenge is the computer capacity to handle the enormous size of multiple megabyte geological information files.

continued on next page

Table 1

City	Facility Name	Manager Name	Phone
Billings, MT	Northern Rockies Geologic Data Center	Rita Frasure	406-255-0322
Casper, WY	Wyoming Geological Association	Mary England	307-237-8471
Corpus Christi, TX	Corpus Christi Geological Library	Jean Carson	361-884-1362
Fort Worth, TX	Oil Information Library of Ft. Worth	Roy R. English	817-332-4977
Midland, TX	Subsurface Library	Mona Koshaba	432-683-5588
Norman, OK	Oklahoma Geological Survey, Petroleum Information Center	Gene Kullmann	405-360-2886
Okla. City, OK	OCGS Resource Library	Pam Yeakley	405-235-3648
San Antonio, TX	Balcones Energy Library	Mary Ann Zorola	210-820-0814
Tulsa, OK	Oklahoma Well Log Library, Inc.	Jan Weaver	918-582-6188
Tyler, TX	Petroleum Data Library	Juquita Hall	903-597-8881
Wichita, KS	Kansas Geological Society Library and Walters Digital Library	Rebecca Radford	316-265-8676

continued from previous page

Additional workshop sessions focused on the daily management and operations of the libraries; staffing and training needs; continued data acquisition; organization and maintenance; associated services provided by the library; the continuing development of communication and cooperation between these separate organizations and their forming of an energy libraries association.

* * *

Given the urgent desire for maintaining communications, forging common resources for digital uses and continued professional guidance, action plans were initiated for Web-based inter-library communications, additional joint meetings addressing specific digital archiving and technology issues and for planning of the 2007 conference and workshop which will continue to expand the number and range of libraries, including those from all AAPG Sections.

The purpose of these organizations is to assure this important historical data is preserved for future generations of geologists and other energy industry professionals and that it is accessible in the most efficient and cost effective format possible for use in effective exploration and production of energy resources. (For contact information for the participating libraries, please see table 1.)

This unique and timely conference was financially sponsored by several of the libraries and by other professional organizations, including the AAPG, AAPG Sections and local geological societies, all of whose members rely and depend upon these important energy information institutions.

There may be other libraries not mentioned in this article. If you know of other energy information libraries located in your Section or Region, please send contact information to cmcgowen@aapg.org. ❏

MEMBERSHIP AND CERTIFICATION

The following **candidates** have submitted applications for membership in the Association and, below, certification by the Division of Professional Affairs. This does not constitute election, but places the names before the membership at large. Any information bearing on the qualifications of these candidates should be sent promptly to the Executive Committee, P.O. Box 979, Tulsa, Okla. 74101. (Names of sponsors are placed in parentheses. Reinstatements indicated do not require sponsors.)

Membership applications are available at www.aapg.org, or by contacting headquarters in Tulsa.

California
Byl, Jason Michael, Bankers Petroleum, Camarillo (J.M. Hill, Sr., D.D. Miller, M.D. McCaskey)

Colorado
Mitchell, Sean Jared, Pason Systems USA, Golden (J.R. Watson, W.R. Nagel, J.M. Barclay)

Massachussettes
Sablock, Peter E., Salem State College, Salem (D.A. Billman, J.B. Blankenship, P. MacKenzie)

Oklahoma
Harmon, Charles Edward, C.E. Harmon Oil, Tulsa (R.E. Harmon, R.B. Banks, R.V. Hall); **Herndon, Mark Warren**, Tallgrass Resources, Norman (M.F. Hutchison, D.K. Bellis, K.A. Hedrick); **Keller, Kent L.**, Kirkpatrick Oil, Oklahoma City (reinstate); **Kvale, Erik Peter**, Devon Energy, Oklahoma City (H.J. White, B.D. Keith, W.J. Lamle)

Texas
Barron, Eric James, University of Texas at Austin, Austin (reinstate); **Clark, Jonathan Cree**, ExxonMobil, Houston (S.P. Moore, A.C. Tuminas, W.A. Burroughs); **Kirsch, Don F.**, PEC Minerals, LP, Fort Worth (B.M. Greenwood, R.M. Timpanelli, C.T. Hellier); **Reynolds, David James**, ExxonMobil, Houston (P.E. Patterson, M.J. Hayes, K.M. Bohacs); **Rousselot, Lee Jay**, independent, Midland (W.R. Green, A.D. James, L.J. Rulla); **Wood, M. Jay**, ExxonMobil, Houston (S.H. Schaps, D.A. Hutchison, H.L. Quevedo)

Australia
Direen, Nicholas G., FrOGTech, Adelaide (T.S. Loutit, J.P. Teasdale, R.R. Hillis)

Azerbaijan
Ibrahimov, Bagir, BP, Baku (D.A. Bodnar, S. D. Spradlin, I. Guliyev)

Brazil
Oliver, Flavio Zaborne, Schlumberger, Natal (L.C. Vaillard, J.N. Vogt, W.E. Arias)

Canada
Hill, Alastair Edward, Encana Corp., Calgary (M. Cooper, I.D.V. Young, R.J. Fife); **LaPlante, Hannah**, Petro-Canada, Calgary (F.J. Hein, G. R. MacFarlane, M. Connelly); **Philipchuk, Peter A.**, Win Energy, Calgary (reinstate); **Yousuf, Muhammad**, ProGeo Consultant, Calgary (S.T. Hasany, T. Baig, R. Earle)

England
Thomson, Kenneth, University of Birmingham, Birmingham (J.R. Underhill, P. Turner, R.R. Hillis)

New Zealand
Bowler, Samuel Joseph, New Zealand Oil & Gas, Wellington (J.P. Salo, M.A. Webster, J.M. Beggs)

Norway
Dart, Christopher James, E.ON Ruhrgas Norge AS, Stavanger (G. Hollmann, A. J. Pope, Pettersson)

Russia
Kuzina, Ekaterina, TNK-BP, Moscow (J.C. Dolson, A.A. Sutter, A.M. Carter); **Medvedev, Alexey**, Halliburton International, Moscow (J.C. Dolson, A.A. Sutter, A.M. Carter)

Certification

Texas
Donica, David R., Consultant, Houston (S.H. Alen, L.B. Backsen, R.W. Crockett).

READERS' FORUM

Editor's note: Letters to the editor should include your name and address and should be mailed to Readers' Forum, c/o AAPG EXPLORER, P.O. Box 979, Tulsa, Okla. 74101, or fax (918) 560-2636; or e-mail to forum@aapg.org. Letters may be edited or held due to space restrictions.

Off Base

I have just read the letter (Back Off, October EXPLORER) critical of the AAPG's position on climate change and global warming. The writer is off base.

Geologists are uniquely qualified to have an opinion on climate change and global warming. Their education and working experience contribute to an appreciation for the vastness of time and the record in the rocks that appears to be lacking among the current alarmists.

Furthermore, the writer never addresses the data presented on the Climate Card, but instead chooses to call it an "abomination," apparently for no other reason than he disagrees with it. I suspect that most of the AAPG members who will be "alienated" by the Card are not as thin-skinned as the writer surmises and will approach the data objectively, which might result in (as it did for me) further study on the topic.

We're experiencing global warming all right, and it may bring on the next Ice Age sooner than we would like; but man won't be any more responsible for the next one than he was for the last one.

W.P. Buckthal
Amarillo, Texas

A Tidy Sum

Regarding the article on the William Smith map in London (November EXPLORER): the plural form of the informal financial term "guinea" is "guineas," not "guinies." The guinea was never represented by a bill or coin of its own, but represented a value of one pound sterling plus one shilling, the shilling being a twentieth part of a pound.

Therefore a membership fee of five guineas was equivalent to five pounds and five shillings, or 5 1/4 pounds, quite a bit more than the 1 1/2 pounds you made it out to be. No question that it was a sum beyond the means of all but the idle rich of those days.

Henry M. Lieberman
Houston

FOUNDATION UPDATE

The Foundation Trustee Associates elected new officers for 2006-07 at their recent annual meeting in San Antonio. They are:

❒ **Michael R. Wisda**, Houston, chair.
❒ **Ed Heath**, Durango, Colo., vice chair.
❒ **John Edwards**, Boulder, Colo., secretary/treasurer.

Also during the meeting, Trustee Associate **Robert W. Esser**, Huntington, N.Y., was awarded the Foundation Chairman's Award, which is given to recognize persons who have made extraordinary contributions to the AAPG Foundation, and also to call attention to the role and value of the Foundation.

✓ The AAPG Foundation has received funding to endow a Digital Products University Subscription for the University of Miami, Fla., through the generosity of **Marta Weeks**.

The Foundation's Digital Products University fund is designed to help alums give back to their alma maters by making it easier for students to have access to crucial geological data.

To help assure the future of geosciences at your alma mater contact Rebecca Griffin, AAPG Foundation, at 1-888-945-2274, ext. 644.

✓ **Robert E. Hilty**, Boerne, Texas, has joined the Foundation Trustees, bringing total group membership to 259.

In other Foundation news:

Foundation (General)
Selegha Abrakasa
Adedapo Michael Adepoju
Robert James Ardell
In memory of Clyde Becker
Joseph Chukwudi Ashiedu
John Michael Austin
Jeremy Boak
William Christopher Boyers
BP Foundation
Matching gifts from David Ramsey Fisher and Jerome P. Siok
Janet Sue Brister
Cathy Linda Buckle
Joseph Kent Campbell
Patricia Fay DuBois
Tarek Fathy El Azhary
William H. Elson Jr.
In memory of August Goldstein
William E. Gipson
In memory of Robert Wynn Grayson
Lisa Lynch Harrell
Jaime Leonardo Hernandez
Robert E. Hilty
Tiffany Lynn Hopkins
Simon Thomas Horan
Christopher Neil Izatt
Jeroen Antonius Kenter
Knut Kvingan
Roy Oliver Lindseth
Xiandong Liu
Roy Burvil Luck
Thomas Mairs
Tim Colin McCullagh
Reginald Victor McLaughlin
Herbert Pratt Mosca
Alaa El-Din Ramadan Mostafa
Larry Nation
Oladipo Ezekiel Olumuji
Aisha Noreshi Paez
Thomas Martin Parris
George Bruno Pichel
In memory of Robey Clark
Loughlon C. Quinn
Dennis Alexander Rossi
Hesham Talaat Shebl
Daniel Ryan Smith
T. Chris Stiteler
Raymond Tracy Stotler Jr.
In memory of Richard R. Bloomer
Brandt Oliver Temple
Bruce John Uszynski
Manoj Vallikkatthachaparambil
Matthew A. Von Der Ahe
Matthew C. Weinreich
Thomas Michael Whitsett
Rudy C. Wildenstein
Guohong Zong

Awards Fund
Best Student Paper and Poster Award
John P. Klein
Xiandong Liu
Ritchie Wayland

Ziad Beydoun Memorial Award
Erik Carl E. Palmlov
Hesham Talaat Shebl

A.I. Levorsen Memorial Award
Jerome Paul Kelly

Continuing Education Fund
Richard Eugene Kelley

Indiana University Alumni
Brad C. Hoffman

Distinguished Lecture Fund
BP Foundation
Matching gift from Jerome P. Siok

Grants-in-Aid Fund
Jerry Curtis Greenawalt
In memory of Robert R. Berg
BP Foundation
Matching gift from Jerome P. Siok

Herbert G. and Shirley A. Davis Named Grant
Herbert G. Davis
In memory of Clyde M. Becker

Fred A. and Jean C. Dix Named Grant
James E. Briggs
William E. Gipson
In memory of Robey H. Clark

Jean G. Funkhouser Memorial Grant
William E. Gipson
In memory of E. Rogers Kemp

Arthur A. Meyerhoff Memorial Grant
Michael Ramsaroop

K-12 Fund
BP Foundation
Matching gift from Jerome P. Siok
Paul H. Dudley Jr.
In memory of Paul H. Dudley Sr.
Julius Homer Johnson
Sandra Meyer
Joseph Bruce Schindler

Public Service Fund
Hugh M. Looney Excellence Fund
Tillie Looney
In memory of Hugh M. Looney

E.F. Reid Scouting Endowment Fund
Ronald L. Hart
Bryan Haws

CLASSIFIEDADS

POSITION AVAILABLE

Faculty Position in Sedimentary Geology - University of Wisconsin-Madison.

The Department of Geology and Geophysics invites applications for a position as tenure-track assistant professor or associate professor, beginning August 2007. The evaluation of candidates will focus primarily on their potential for innovative scientific research and teaching. We invite applications from outstanding candidates from a variety of fields within sedimentary geology. We encourage candidates who would engage in interdisciplinary research involving our existing programs, and who would complement our current research strengths (see www.geology.wisc.edu). Petroleum industry interest is also desirable. Teaching responsibilities are at both the graduate and undergraduate level, and include field-based courses. Ph.D. required by start of appointment. Applicants should submit a resume, statement of research and teaching interests, and names of three or more references to:

Sedimentary Geology Search Committee Chair
Department of Geology and Geophysics
University of Wisconsin-Madison
1215 W. Dayton St.
Madison, WI 53706-1692

To ensure full consideration, applications must be received by December 15, 2006.
The University of Wisconsin-Madison is an equal-opportunity/affirmative action employer and encourages applications from women and minorities.

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Job Opportunity: Technical Sales Professional

Geo-Logic Systems, LLC of Boulder, CO seeks a dynamic sales professional to manage worldwide marketing and sales of LithoTect, the premier Geology Interpretation program. Candidates must possess a proven record in client prospecting, marketing, and sales. Degree in Geology is preferred, as well as 5 to 10 years experience in marketing/sales of geological software to the O&G industry. Compensation package: base + incentive program + benefits. Location is flexible. Start Q1, 2007.
Please e-mail resume, inclusive of salary history, to info@geologicsystems.com. All inquiries are strictly confidential.

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Deputy Director – Kansas Geological Survey-University of Kansas, Lawrence. Academic rank position to play major role in the planning and execution of research programs that position the Survey to meet earth-sciences challenges of the future. Ph.D. and professional experience in the geosciences with supervisory/management experience in scientific programs or organizations. Demonstrated experience in budgeting, personnel evaluation, and program development. Position provides opportunities to continue active research. Women and minority candidates are particularly encouraged to apply. Further information at www.kgs.ku.edu/General/jobs.html. Priority date: Feb. 1, 2007. For questions about the position contact Evan Franseen at evanf@kgs.ku.edu.

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Geology. Western State College of Colorado invites applications for the Moncrief Chair in Petroleum Geology starting August 2007. Teaching responsibilities include courses in an expanded petroleum geology curriculum and core courses in the geology curriculum. Requirements include a master's degree or doctorate in geology and a commitment to undergraduate education and excellence in teaching. For full position information and application procedures visit http://www.western.edu/hr/jobs. Screening of completed applications will begin January 4, 2007. AA/EOE.

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U.S. Geological Survey, Chief Scientist, Central Energy Team, Supervisory Geologist/Geophysicist/Chemist/Physical Scientist, GS-1350/1313/1320/1301-15

The U.S. Geological Survey (USGS) invites applications for the position of Chief Scientist, Central Energy Resources Team, in Lakewood, Colorado. The Team Chief Scientist supervises a staff of approximately one hundred ten (110) research and operational personnel. Strong scientific leadership and managerial skills are essential. Also required is a comprehensive knowledge of the scientific principles, concepts, and practices that apply to the Team's principal areas of investigation, which include the assessment of solid, liquid, and natural gas energy resources, energy economics, geochemistry, and geophysics related to petroleum systems. The primary research emphases of the Team are the geologic and geochemical processes that lead to assessment of oil, natural gas, and coal. Strong written and oral communication skills are required in order to effectively convey the USGS results to other Federal and State agencies, universities, and other institutions, and to engender their support and participation of USGS programs.
This is an interdisciplinary position that can be filled as either a Supervisory Geologist, GS-1350-15 (CR-2007-0083), Supervisory Geophysicist, GS-1313-15 (CR-2007-0089), Supervisory Chemist, GS-1320-15 (CR-2007-0090), or Supervisory Physical Scientist, GS-1301-15 (CR-2007-0091).
This is a permanent position with the starting annual salary ranging from $109,342 to $142,142. The position is located in Lakewood, CO, a suburb of Denver. This vacancy opens on 11/06/2006 and closes on 1/26/2007. **You must apply online in order to be considered for this position.** Complete qualifications information and application procedures can be found at: http://www.usgs.gov/ohr/oars/. Contact: Mary Dunlap, mmdunlap@usgs.gov or 303-236-9563 or Tina Garcia, tpgarcia@usgs.gov or 303-236-9569 with any questions**. U. S. citizenship is required.**

The U.S. Geological Survey is an equal opportunity employer.

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UNIVERSITY OF WYOMING: DISTINGUISHED PROFESSORSHIP IN GEOPHYSICS

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DIRECTOR'S CORNER

AAPG Looks to Grow K-12 Program

By RICK FRITZ

One of my favorite activities is to visit my kid's school and talk about earth science. I often wear my geology garb and talk about rocks and dinosaurs.

One of the kid's favorite experiments is building stratigraphic layers with dirt, sand and gravel in a large clear plastic container. Then we compress the sediment from the bottom and side to make faulted blocks. Finally, I let them run water on the model and develop streams and a little lake.

I let them do most of the experiment and it helps them understand a little about geologic processes. This includes small chicken bones for "fossils."

The only problem is when I am done I have a plastic container that weighs about 150 pounds! It is a lot of fun to try and get it out of the school.

* * *

Both the AAPG Association and Foundation are considering expanding our K-12 programs. Based on surveys of members it is clear that earth science education is a high priority.

Based on surveys of members it is clear that earth science education is a high priority.

AAPG's primary involvement has been support of Earth Science Week and the AGI K-12 curriculum program. AAPG's Foundation has provided direct support for program development and the Association supports it through AGI dues. AAPG is one of many entities that has supported the AGI programs, and we believe that their curriculum is one of the best.

I cannot talk about AGI's program without mentioning the work of Marcus Milling, past AGI executive director. Marcus recently passed away and will be greatly missed (page 38). He had a great passion for K-12 education and leaves a tremendous legacy of building a world-class K-12 program.

Now that AGI has built earth science curriculum for all grades through high school we feel it is important to make sure AAPG supports its application in as many schools as possible. As a result, AAPG is talking to AGI about how we can assist them in making sure their K-12 program reaches teachers and students.

An important part of that effort is making sure that we teach the teachers. AAPG President Lee Billingsley and first lady Joanne, have made geoscience education of teachers a high priority this year.

One of the other programs AAPG supports is the "Rocks in Your Head" short course for teachers that is taught by Janie Schuelke. It should be noted that this course was developed by Patty Holyfield. She passed away in 2002 and is recognized as a pioneer in developing the course to teach teachers earth science.

AAPG provides regular support of this course especially to Section meetings. We encourage societies to consider scheduling a "Rocks in Your Head" course and request support from both the AAPG Association and Foundation.

AAPG's Youth Education Committee (YEA) continues to develop ideas to "increase the knowledge and appreciation of geoscience among students and teachers." The committee works to expand participation in the Rocks in Your Head program and manages the Earth Science Teacher of the Year Award and Teachers' Days at national and Section meetings. The committee also assists and coordinates earth science and energy programs of national youth organizations.

We want to expand and take advantage of emerging opportunities in earth science education. To accomplish this, the AAPG Foundation is making K-12 education a key component of its fundraising focus.

If you are interested in supporting AAPG activities or would like to be involved in YEA activities, please contact YEA committee chair Robert W. Krantz at bob.krantz@conocophillips.com.

Rick

Student Sponsorships

Chevron

Chevron Corporation has graciously agreed to provide corporate sponsorship for Student Member dues, effective immediately.

Upon joining as an AAPG Student Member, applicant can choose to allow Chevron to pay the dues for the year – which is $10 (US), plus a $10 postage surcharge for non-U.S. students. The sponsorship for dues also can be renewed yearly for current members.

The arrangement is presently set to run for three years. The new membership form with Chevron's sponsorship option is available on the AAPG Web site.

AAPG extends our appreciation to Chevron for the generosity and concern for the students of today who are the explorationist professionals of tomorrow.

Activities Offer Opportunities

DEG Making Plans for the Future

By JANE McCOLLOCH
DEG President

Every so often it is good to review and evaluate DEG's mission and goals. This year AAPG is preparing a five-year tactical business plan, and as an AAPG Division, DEG also is preparing one. Though somewhat painful, it is an insightful and empowering process that gives us a much clearer picture of where we are, where we want to go and what we need to do to get there. The tactical business plan is a means to build continuity into the operation of DEG and to better align DEG with other groups and entities within AAPG.

* * *

Environmental geoscience activities at two recent AAPG Section meetings provided DEG members and others excellent opportunities to learn new things.

✓ Approximately 40 percent of the presentations at the GCAGS meeting in Lafayette, La., were about environmental geosciences. Environmental sessions covered a wide range of topics including hydrogeology, geochemistry, remote sensing, environmental geophysical techniques and site remediation.

The meeting also included sessions about Geologic Record of Hurricanes, Coastal Processes, Louisiana Hurricane Impacts and Coastal Processes, Paleostorm Records from around the World and Reconstruction of Gulf of Mexico and Atlantic Hurricane Chronologies.

✓ Environmental geoscience presentations at the Eastern Section meeting in Buffalo, N.Y. involved aspects of carbon dioxide (CO_2) sequestration, including CO_2 sequestration in saline aquifers, CO_2 sequestration and enhanced oil recovery and coal-seam sequestration.

The New York State Geological Association field trips were held in conjunction with the meeting, and the environmental field trip, "Famous Hazardous Waste Sites and Fractured Rock Hydrology of the Niagara Falls Area, Niagara County, New York State," included a field stop at the infamous Love Canal.

* * *

DEG Vice President Mike Jacobs has been the driving force in revitalizing DEG committees and developing new ones. One of the objectives of these committees is to assist in planning DEG sessions, short courses, workshops and field trips at AAPG annual meetings and future DEG publications.

Three of these committees are currently seeking members: Carbon Dioxide Sequestration Committee, Environmental Geophysics Committee and Hydrogeology Committee. If you are interested in being actively involved in any of these committees, please contact Mike Jacobs at Michael.Jacobs@pxd.com.

Matt Grobe, chair of the EMD/DEG CO_2 Book Committee and lead editor, reports the proposed volume titled "Carbon Dioxide Sequestration in Geological Media—State of the Art," has been approved for publication as an AAPG Special Publication. DEG recently received an AAPG Foundation grant to help fund production costs of this volume, and we are most appreciative of their support.

* * *

The 2008 AAPG Annual Convention is scheduled for April 20-23 in San Antonio. DEG again will sponsor technical sessions, and we are specifically seeking your ideas for sessions, field trips and short courses with an environmental focus.

Of particular interest are issues related to mineral, gas and oilfield waste disposal, ground water management, remote sensing, environmental forensics and near-surface geophysics for site assessment and monitoring, exploration and production in environmentally sensitive areas, carbon dioxide sequestration, carbon credits and climate change, as well as geoscience and public policy.

Recent DEG Technical Sessions included:

❒ Naturally Occurring Oil Seeps, Impact of Synthetic Muds and Discharge of Cuttings.

❒ Ground Water Issues: Resource, Exploration, Exploitation and Remediation.

❒ Remediation of Affected Soil and Groundwater.

❒ Exploration and Production Environmental Issues and Best Management Practices: Impacts on Water, Soil and Ecosystems.

❒ Environmental Issues Related to Unconventional Resources.

❒ CO_2 Sequestration: Coals/Shales/Produced and Unproduced Reservoirs as Sequestration Targets.

❒ Carbon Management and Acid Gas Sequestration.

❒ Uranium Energy: Source to Power to Repository.

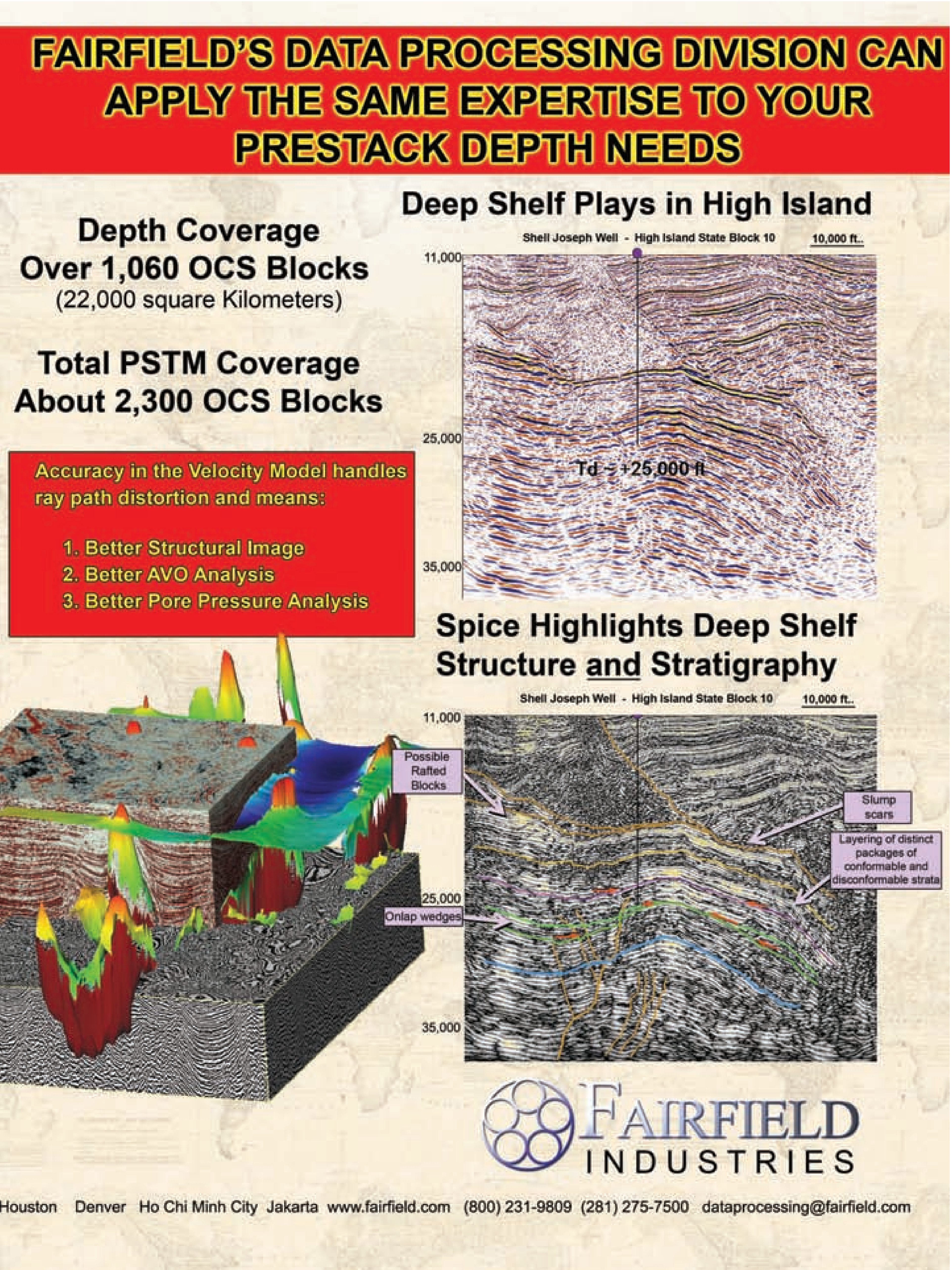
❒ The Future of Global Energy: Technical, Environmental, Economic and Policy Issues.

Please send your suggestions for DEG-sponsored sessions to the DEG technical vice chair, Cynthia Dinwiddie at cdinwiddie@swri.org. Please provide contact information with your recommendations and indicate your willingness to chair a session.

The submittal of an idea for a session, short course or field trip does not guarantee its inclusion in the 2008 AAPG program, but your submittal ensures the Program Committee will have a productive resource from which to develop a program that all will enjoy.

The deadline for submitting your ideas for technical sessions, field trips and short courses is Dec. 15. ❏

DIVISION OF ENVIRONMENTAL GEOSCIENCES AAPG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