



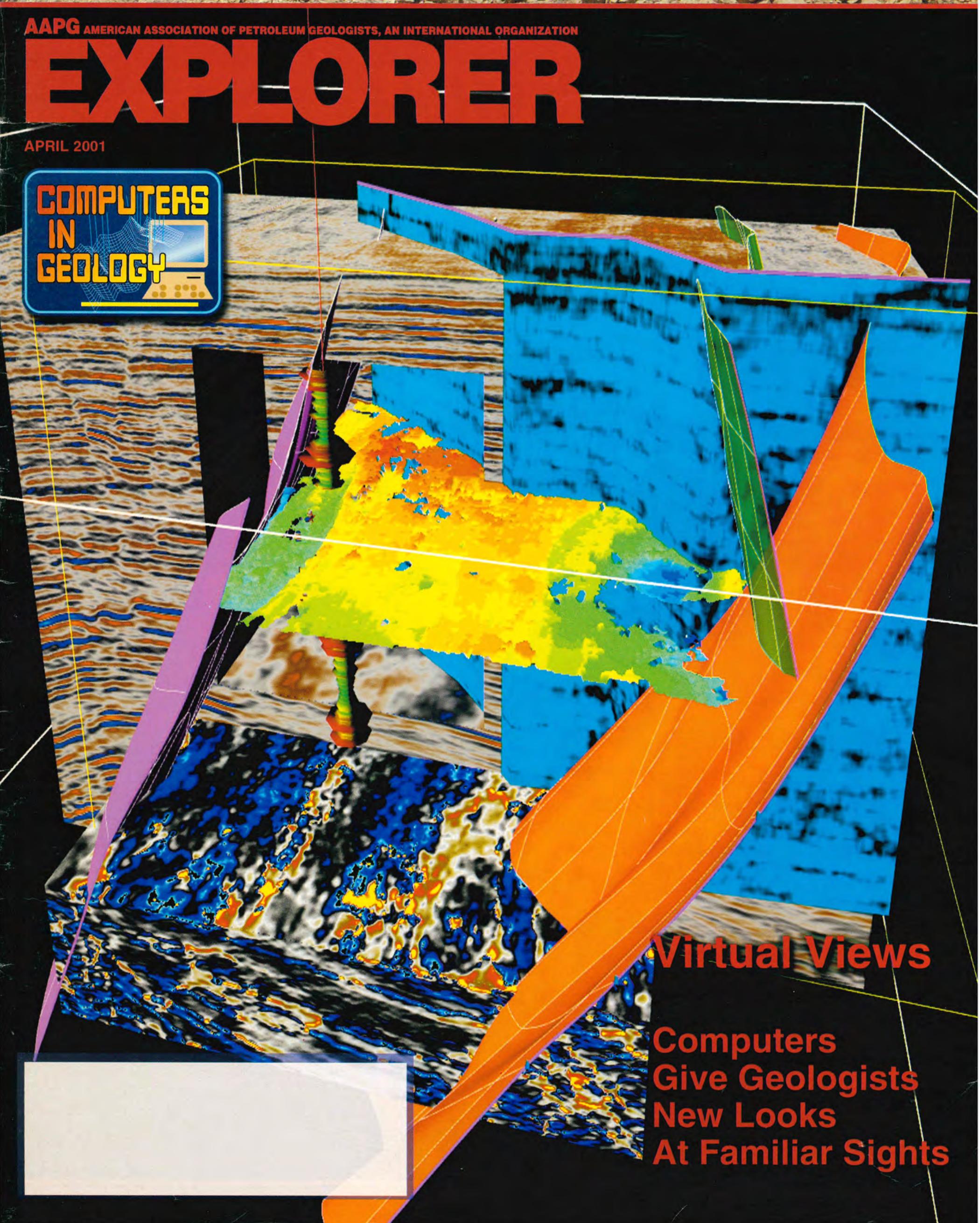
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AAPG AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS, AN INTERNATIONAL ORGANIZATION

EXPLORER

APRIL 2001

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Virtual Views

Computers Give Geologists New Looks At Familiar Sights



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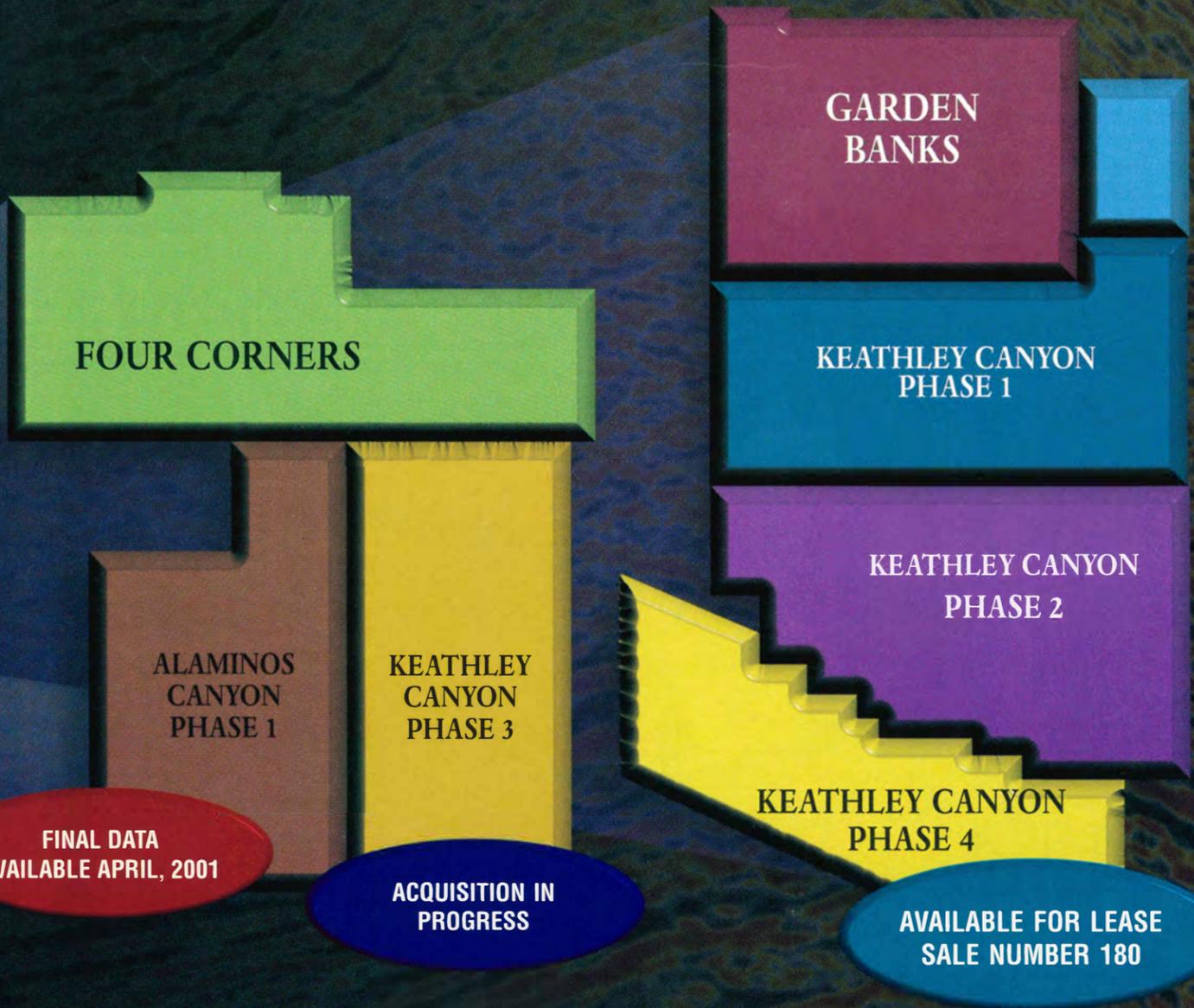


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On the cover: Computer technology is making it easier – and much more colorful – to study the subsurface, a subject that several of our articles address in this month's "Computers in Geology" issue of the EXPLORER. At the top is an interpreted photomosaic of laterally accreting bar deposits within a delta plain distributary channel in the Cretaceous Ferron Sandstone, Utah. Interpretation by Rucsandra Corbeanu, University of Texas-Dallas. See page 6. Below, an image that shows the results of incorporating several visualization and interpretation tools into one single workflow. Image courtesy of Magic Earth. See page 12.

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AAPG is at the forefront of two major initiatives in Washington, D.C. – a **Congressional appearance** and a special **Energy Summit** – designed to further the profession of petroleum geology. **31**

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Photo courtesy of Denver Metro Convention and Visitors Bureau

This beautiful sunset is outlining the dynamic skyline of Denver, site of this year's AAPG annual meeting on June 3-6 in the Colorado Convention Center. For those planning to attend, there's an important date to remember: April 26, the preregistration deadline, is coming fast. For more information see story on page 30.

PRESIDENT'S COLUMN

Meetings, Airports Have Correlation

By MARLAN DOWNEY
Continuing our conversation...
Recently I've been spending a lot of tedious time in airplanes, airline terminals and lengthy meetings. Would you like to hear how this impatient curmudgeon copes? I convince myself that God has made a private agreement with me: Every minute spent in helpless tedium

will be subtracted from my time in Hell!
(It doesn't make the time go faster, but it makes me feel as though I'm achieving something.)

DPA Energy Statistics

The AAPG Division of Professional Affairs is making this information available to all AAPG members and other interested parties so that discussions regarding energy policy can be documented with accurate statistics. Unless otherwise noted, all energy statistics are from the database of the US Energy Information Agency (www.doe.eia.gov). 1999 figures are actuals, and 2000 figures are projections.

The weekly "Industry Scoreboard" in the *Oil & Gas Journal* is a good source for additional statistics.

Total U.S. Energy Consumption by Primary Energy Source, 1998 (EIA September 1999)

Petroleum	40.7%
Natural Gas	24.1%
Coal	23.3%
Nuclear	7.9%
Hydro	3.8%
Other	0.2%
Total:	100.0%

U.S. Electricity Supply by Source in 1999 (Calculated from EIA, October 2000 data)

Coal	50.6%
Nuclear	19.6%
Natural Gas	15.0%
Hydroelectric	8.3%
Petroleum	3.8%
Geothermal, Solar, Wind	2.4%
Other gaseous fuels	0.3%
Total:	100%

Data provided by the Division of Professional Affairs.

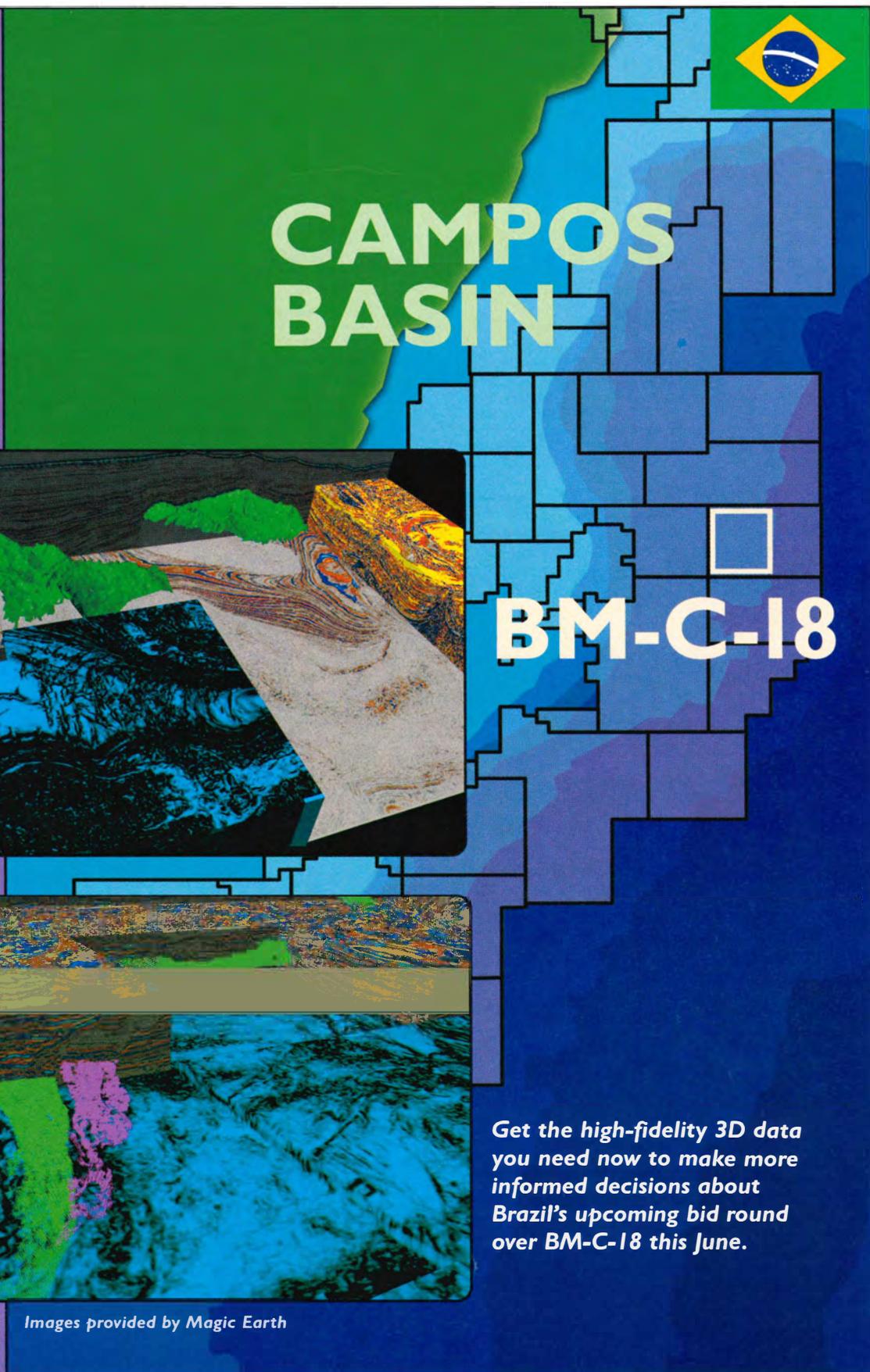
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An interpreted photomosaic of laterally accreting point bar deposits within a delta plain distributary channel in the Cretaceous Ferron Sandstone, Utah.

To 'Tell the Truth' About Reservoirs

Outcrops Never Looked So Good

By DAVID BROWN
EXPLORER Correspondent

You may never see an outcrop the same again.

Thanks to years of research and newly cost-effective technology, 3-D outcrop analysis has become a viable tool for geologists.

"Literally in the past couple of months, we've made some really important breakthroughs," said Janok Bhattacharya, an associate professor and researcher at the University of Texas-Dallas.

Outcrops are cropping up in 3-D everywhere:

✓ This year Schlumberger will conduct a 3-D outcrop project in Namibia.

✓ Outcrop work is planned for both the Frontier Sandstone and the Lewis Shale in Wyoming.

✓ AAPG's annual meeting in Denver will offer presentations about 3-D imagery and outcrops (see

"My feeling in general is that outcrops tell the truth about what a reservoir is made up of."

related story, page 20), including a poster session and an e-poster session by Schlumberger researchers involved in the Namibia project.

Call this, in part, the result of G-technology: GIS, GPR, GPS, GOCAD – or in long form, geological information systems, ground-penetrating radar, the Global Positioning System and geologically oriented computer-aided design.

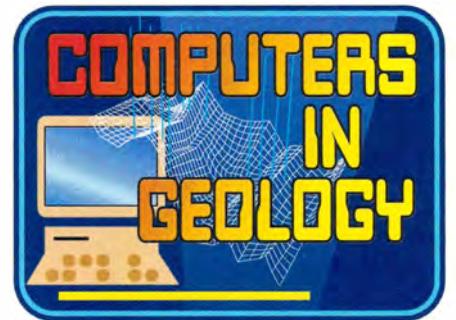
Today's geologists and researchers use these tools to peer into outcrops to create three-dimensional studies, and to gather detail for digital 3-D photo-

representations.

Outcrops remain the best guide to stratigraphy and provide key evidence of reservoir make-up, according to Roger Slatt, director of the University of Oklahoma School of Geology and Geophysics.

"My feeling in general is that outcrops tell the truth about what a reservoir is made up of," Slatt said. "They're the only way you can get continuous information about the reservoir."

Bhattacharya said work on 3-D outcrop imaging, including the use of GPR, began in the 1980s. UT-Dallas has spent years researching the



problem, with funding from industry and the U.S. Department of Energy, he said.

After almost 20 years in the oil industry, Bhattacharya moved from Arco to UT-Dallas two and a half years ago. He thinks of outcrop studies as one step leading toward a better understanding of the reservoir in production.

See **Outcrops**, page 8

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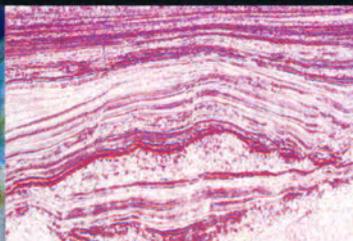
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Outcrops

from page 6

The ultimate beneficiary is not the petroleum geologist, he said, but the reservoir engineer.

"Part of my work has been putting the fear of geology into engineers – explaining how complicated rocks are, but giving them the knowledge to understand how to work with those complexities," Bhattacharya said.

"What companies need are good descriptions of what the connectivities of sandstones are. For that, a lot of companies go to outcrops."

Challenges and Obstacles

Geologists probably have mapped outcrops for as long as they've seen outcrops. The resulting 2-D approach was useful, but limited as a predictor of rock volumes and other reservoir characteristics.

"The problem is, oil companies want to know, 'What is the volume of oil you can get out of there? What's the recovery factor?'"

"We all know what we need are 3-D reservoir models," Bhattacharya continued, "but they are hard to come by."

Since outcrops are at the surface, ground-penetrating radar might seem like a natural choice for gathering near-subsurface data. However, use of GPR has proven problematic.

"People have tried to use GPR before, without much success," he explained. "You have to be able to process that data to get what you want and eliminate what you don't want."

GPR has some of the same features of seismic data, Bhattacharya said – lots of good data masked by useless data, misleading data and just plain noise.

At UT-Dallas, a team led by George McMechan has worked on developing algorithms to clean up GPR data, he said. The data can then be used in 3-D seismic-like visualizations.

"In some cases, it's taken us a year to write the algorithms to process that data," McMechan said, "but that's an absolutely critical step."

Drilling and coring wells behind an outcrop adds valuable information, as well as providing a reality check for the 3-D picture, he added.

But the cost of that approach – Bhattacharya estimated \$15,000-\$20,000 for the GPR and another \$15,000-\$20,000 for the holes to be cored – can be prohibitive for an academic research program.

"For industry that's not so expensive," he said. "For us, as a university, that is expensive."

Carlos Aiken and Xueming Xu at UT-Dallas have developed a 3-D, photorealistic virtual outcrop of the Austin Chalk, according to Bhattacharya.

"This outcrop already has been placed within the immersive visualization rooms at Norsk Hydro and Exxon," he said.

"We also have nearly finished work on a 3-D interpretation of deep-water deposits of the Jackfork Sandstone outcrop at Big Quarry, Ark., based on integrating digital terrane maps with digital photomosaics."

continued on next page

"Oil companies want to know, 'What is the volume of oil you can get out of there?'"

Let's Get Real

In the past, the industry's efforts usually focused on obtaining detailed 2-D outcrop representations, said David McCormick, senior research scientist for Schlumberger-Doll Research in Ridgefield, Conn.

"One of the things that has always been hard for industry consortia is that they produce mosaic panels (of outcrops) and lots of detailed

sedimentological work," he said, "but in the end those are 2-D and they're on paper."

Now Schlumberger and Shell in Oman, with other industry partners, are funding a 3-D study of outcrops about 150 miles south of Namibia's capital, Windhoek. McCormick gets to conduct the outcrop survey, and he's excited.

"In these sections in Namibia are the world's oldest shelly fossils," he said. "It's just before the Cambrian

explosion everybody knows about. It's a scientifically hot place to be working."

McCormick said the project aims to provide an analog for deep drilling targets in Oman that are poorly imaged on seismic. John Grotzinger and two post-doctoral researchers from the Massachusetts Institute of Technology also will conduct associated studies in Namibia, he said.

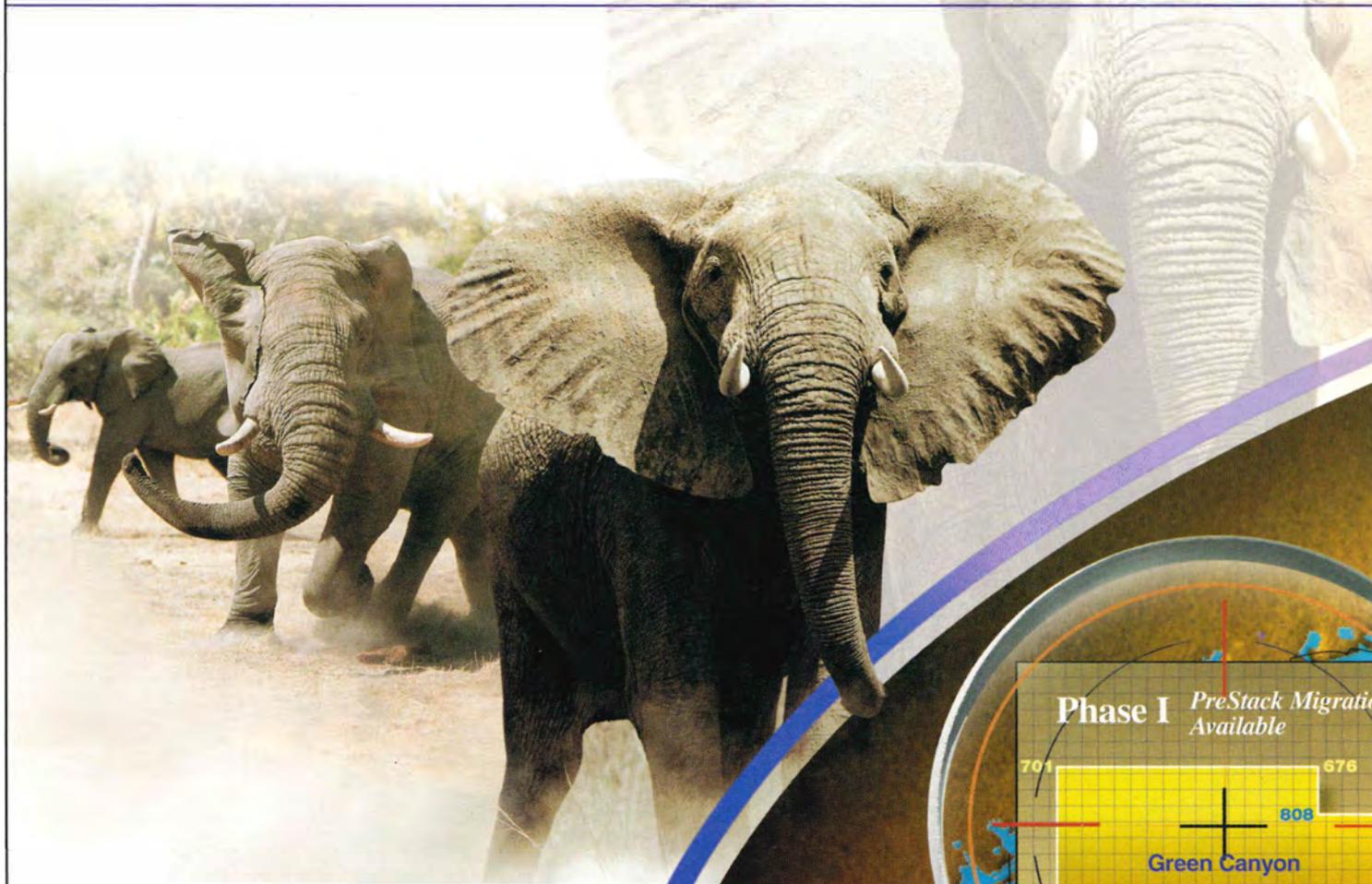
And McCormick has another reason to look forward to the trip:

"For me, personally," he said, "this will be the first time I've taken an outcrop all the way through to reservoir simulation."

Schlumberger will use real-time kinetic (RTK) differential GPS and

continued on next page

HUNTING FOR ELEPHANTS? . . .



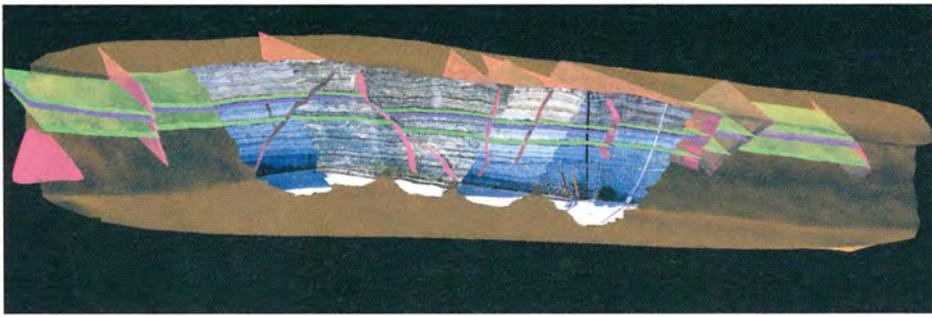
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Above, a photomosaic of the Austin Chalk outcrop behind the Dallas post office has been draped on a digital terrane map on the cliff. Beds and faults have been mapped and the surfaces rendered in GoCad. The result is a virtual 3-D outcrop. To the right, Xueming Xu, inventor of photodraping and digital mapping techniques at the University of Texas-Dallas, interprets faults in an immersive visual environment at the offices of Norsk Hydro.

Graphics, photos courtesy of Janok P. Bhattacharya

continued from previous page

laser-optical measurement instruments to obtain outcrop data. McCormick said he'll wear a backpack with equipment and gather readings as he moves.

"You can do it very quickly and you can combine volumetrics with purely geological information," he said. "And you can do that in an extremely efficient way. You can map as fast as you can walk."

RTK solves and corrects for wavelength ambiguities in GPS signals. It maintains the correct algorithms and locks onto a specific set of GPS satellites throughout a survey, using one or multiple positioning instruments.

Its major advantages are accuracy and fineness of scale. Schlumberger's Namibia outcrop survey will have 2-centimeter resolution, according to McCormick.

Data can be loaded into a portable computer and processed in the field, allowing the geologist to work with real-world readings in real time, McCormick noted. Once a digital topography map is generated, it can be combined with aerial photos, photogrammetry or other digital photos.

"If you're concerned about shales as barriers and baffles, you can go out there (to an outcrop) and measure the important characteristics and the distribution of the shales," he said.

"The process is both time-effective and cost-effective – the prices have come down to where even academic groups can use these tools."

Finding What's Important

Outcrop imaging in 3-D provides a useful tool, but one that's secondary to a three-dimensional look at reservoir geology, according to McCormick.

"Visualization is an important and enabling technology that we use to support the work we do," he said, "but the point is to quantify geology in 3-D — connect a variety of measurements and interpretations to their 3-D spatial position.

"Reservoir simulators don't care about visualization," he continued, "they care about where, in 3-D, the porosity, permeability, fluid saturations and pressures are."

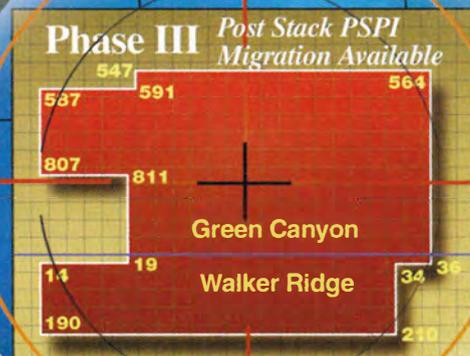
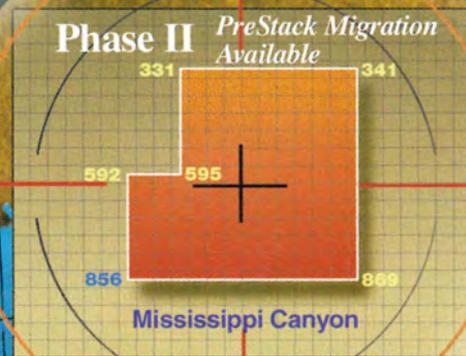
Imaging is an important tool for spatial insight, "but the engineering and economic exercise is driven by

See **Virtual News**, next page



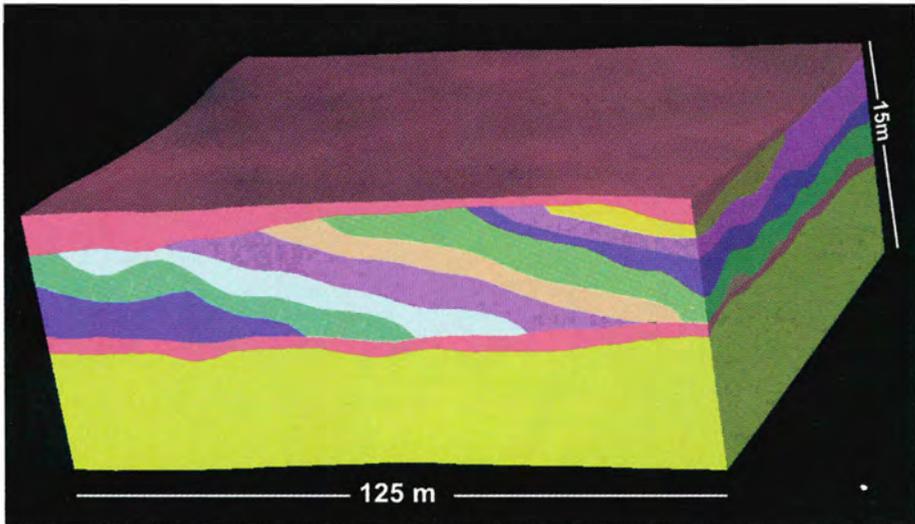
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New Ideas for New Frontiers



Three-D volume of point bar deposits, rendered in GoCad by Xueming Xu. Surfaces were interpreted from 3-D ground penetrating radar surveys, borehole data and outcrop data.

Virtual News from previous page

the 3-D locations of key data and information," he added.

McCormick and Peter Kaufman, also a Schlumberger geologist, will present information about digital geology and outcrop studies at the 2001 AAPG annual meeting.

Continuity: The Key Issue

Slatt, who before coming to OU, directed the geology and geological engineering program at the Colorado School of Mines (CSM), has done pioneering work in outcrop studies.

"Years ago, I helped to popularize gamma-ray logging of outcrops," he

said. "I also have championed going behind the outcrop and drilling wells, then logging the wells, including borehole image logs, and coring them to get a picture of reservoir continuity beyond the outcrop."

And continuity, not just rock volume, determines the character of a reservoir and provides a primary focus for outcrop analysis.

"Continuity is a real key issue," Slatt noted. "You can get a high volume of sands, but if it's all discontinuous and broken up by shale, you're not going to have a good reservoir."

Slatt still works on outcrop studies with colleague Roger Young at OU and AAPG Elected Editor Neil Hurley at CSM. He's leading CSM/OU's Lewis Shale Consortium, sponsored by 16 companies, which will produce 3-D visualizations in Wyoming.

GPR has proven very successful in the Lewis Shale, as excellent 3-D images of channel sandstones have been obtained from behind two outcrops.

That project also received "tremendous support" from the Gas Research Institute, now the Gas Technology Institute, he added.

A special area of interest for Slatt is reservoir characterization on subsurface scale.

"A lot of features that control production, fluid flow, show up on the subsurface scale," he said.

His research mainly extends to deep-water reservoir types.

Because of those interests, he's intrigued by the kind of insights outcrop studies can provide.

"There are some key questions in deep-water development," he said. "For instance, 'How widely spaced must our wells be when going into production?' That's a question addressed by the lateral continuity of the reservoir."

Companies typically take seismic data and control from two or three of the wells, then try to draw up a comprehensive production plan for an offshore reservoir, according to Slatt.

He quoted one company that realized the importance of outcrop analogs too late:

"They evaluated their work later on (after beginning production) and said, 'If we had looked at the continuity and character of the reservoirs, we could have saved ourselves a whole lot of money.'"

Now the largest companies maintain catalogues of outcrops, he said, based on extensive research and analysis.

Research Continues

At UT-Dallas, Bhattacharya said, researchers take 3-D seismic models and "feed them to our reservoir engineering cohorts," including Chris White at Louisiana State University.

"What heterogeneity really matters? That's up to the engineers, and that work is really just starting," Bhattacharya said. "It's more of a matter of cost right now."

McCormick also acknowledged that 3-D outcrop studies have gained importance as guides for engineering, not fancy geology.

"I get paid to help the bottom line," he said. "It became clear to me early on that the people who hold the purse strings are the reservoir engineers and the drillers."

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See **GOCAD**, page 31

CANADIAN GAS

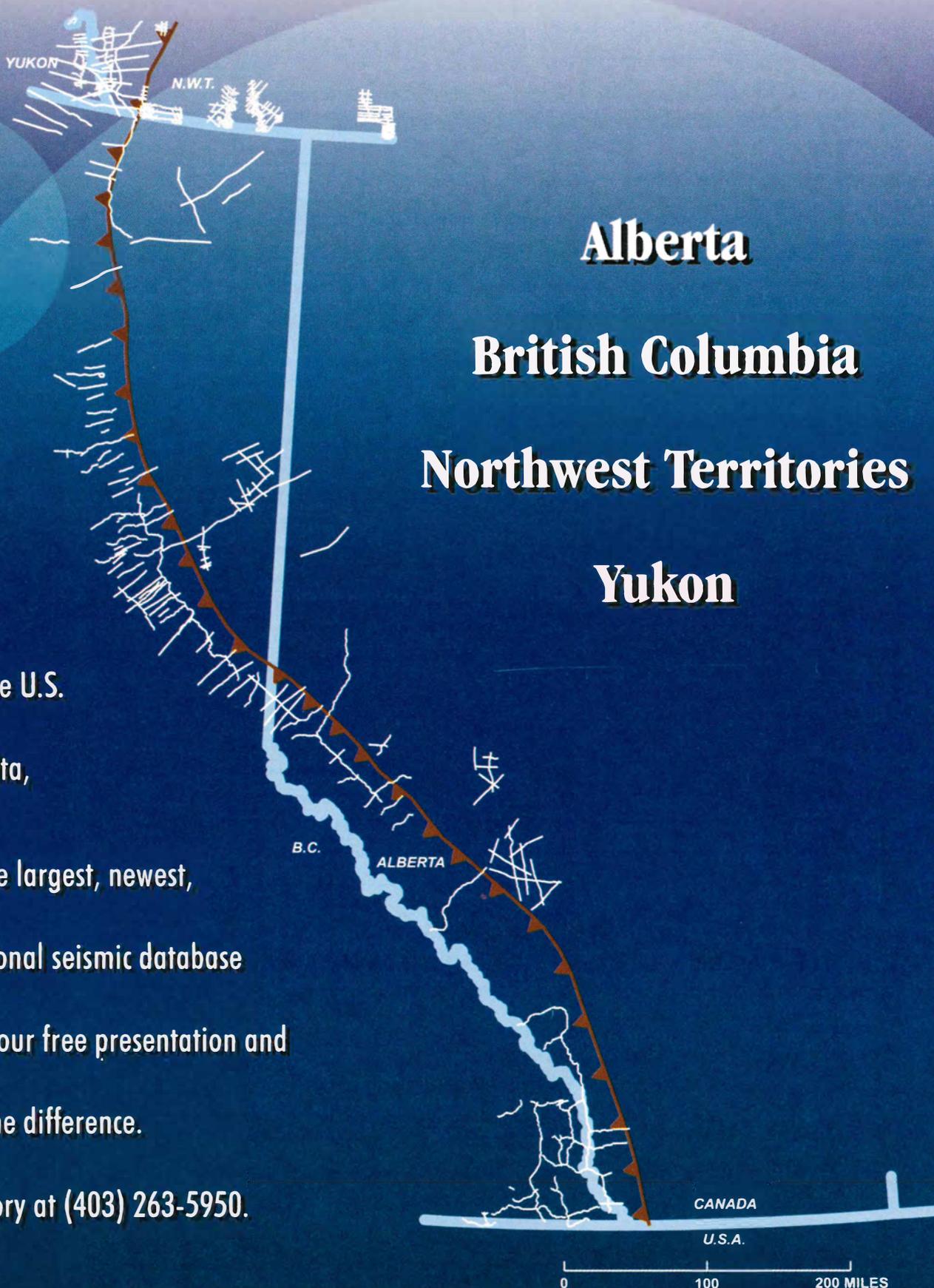
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*Doors Opening to All Players***3-D Theater More Than Gee-Whiz**

By KATHY SHIRLEY
EXPLORER Correspondent

Look for yourself, and you can see signs of it almost everywhere: Geology is firmly entrenched in the virtual age.

Scattered across Houston – and, increasingly, other locales as well – state-of-the-art visualization centers are allowing geoscientists to literally step into the subsurface and explore its mysteries.

Talk about “downhole geology” – geologists are getting gee-whiz views of scenes they only could imagine before.

Like most cutting-edge technologies, major oil companies developed visual interpretation – and the vast majority of visualization centers worldwide are housed in the hallowed halls of big oil.

However, specialized companies are now bringing the new technology to independents, offering visualization theaters, software and technical support for anybody with the “vision” to see the benefits of virtual reality.

“This technology was initially developed to help large oil companies who have a huge amount of data but not enough time to look at all the data and keep a project economical,” said Michael Zeitlin, president and chief executive officer of Magic Earth, a relative new kid on the visualization block.

“But now that visualization techniques have evolved to the commercial stage, independents will benefit as much – if not more – than the major companies,” he continued. “Visualization technology will allow smaller companies to play with the big boys.”

Schlumberger, Veritas, Halliburton, Landmark and WesternGeco are just some of the commercial players boasting visualization centers.

Universities are part of the mix as well – often, thanks to industry support, such as that given the new immersive virtual reality workroom at the University of Colorado in Boulder. That 7,800-square-foot, state-of-the-art visualization center was funded largely through an \$11 million gift to the university by BP Amoco (a gift that includes hardware, software and intellectual property used by Arco’s Visualization Technology group).

Landmark Graphics also is providing a \$1 million grant in support of the CU center, who said in announcing the project, that they will work with the Colorado School of Mines, Colorado State University and similar programs at universities throughout the country “to explore the universe of immersive visualization.”

And then there’s Magic Earth, another example of major industry expertise filtering out into the independent sector. The company was formed by former Texaco scientists to further develop and market Texaco’s 3-D visualization technology, GeoProbe. Texaco (soon to be Chevron-Texaco) retains a 25 percent share in the new company.

“Few independents can afford to build million dollar visualization theaters in-house,” Zeitlin said, “(but) the cost of renting out a visualization center is affordable and offers all the same benefits. They can load their data into the visualization center’s system and in less than a week they can come up with prospects.

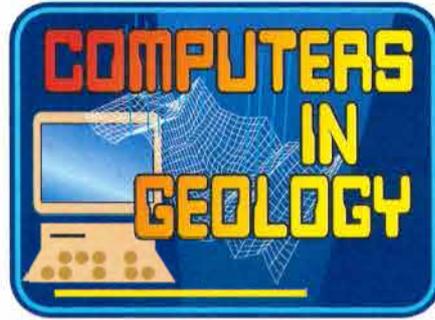
“Companies spend large sums of

money to acquire 3-D seismic data,” he said, “and for just a few thousand dollars more this technology allows them to look at and analyze the data in a whole new way.”

Start Spreading the News

Here’s how the process works: Companies typically contract with the visualization firms and provide the data to build models that are loaded into the immersive visualization computer programs.

Oil companies can take advantage of these companies’ experts, or bring



in their own geoscientists to analyze and interpret the data.

The client also can come to the 3-D

theater to work on projects or make presentations to management, partners or investors.

Roice Nelson, formerly chief visualization officer with Continuum Resources, said visualization companies must first ensure the industry is aware these stand-alone centers exist.

“I think we have done a reasonable job of that, at least in Houston,” Nelson said. “Then we must show the industry the benefits that can be derived from

continued on next page

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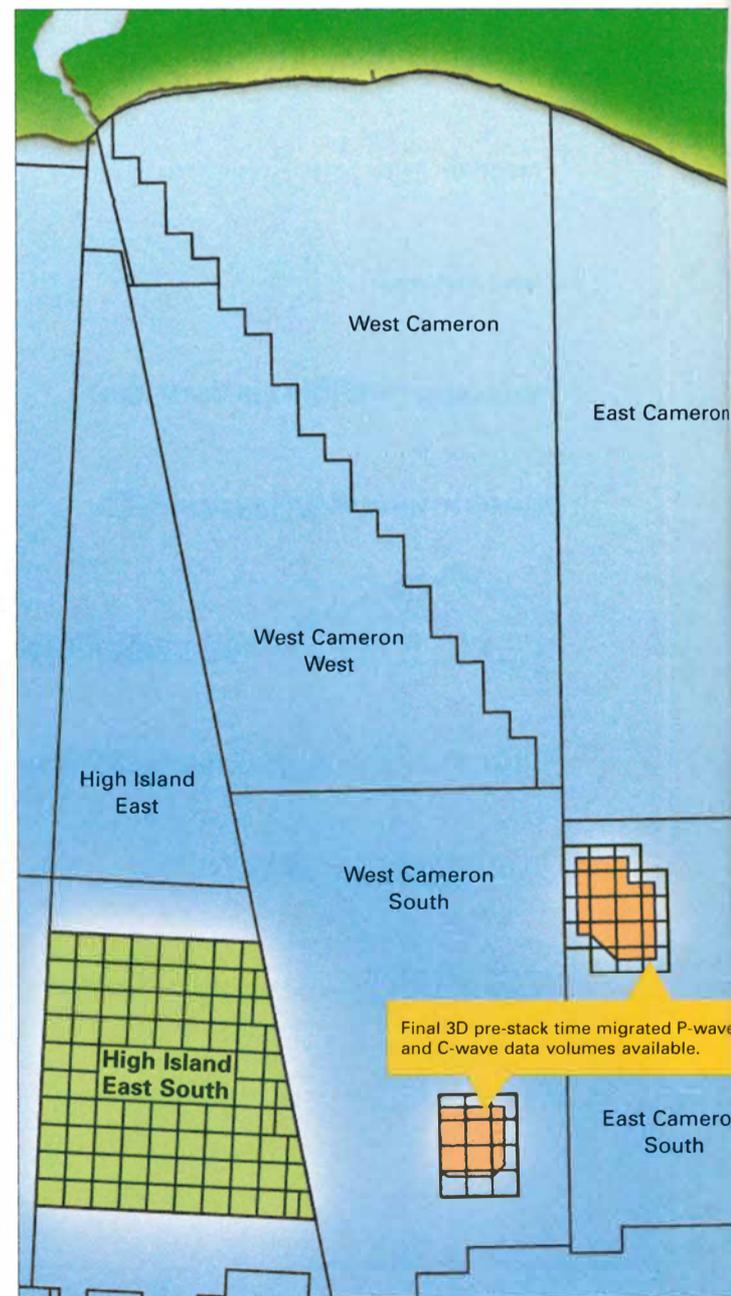


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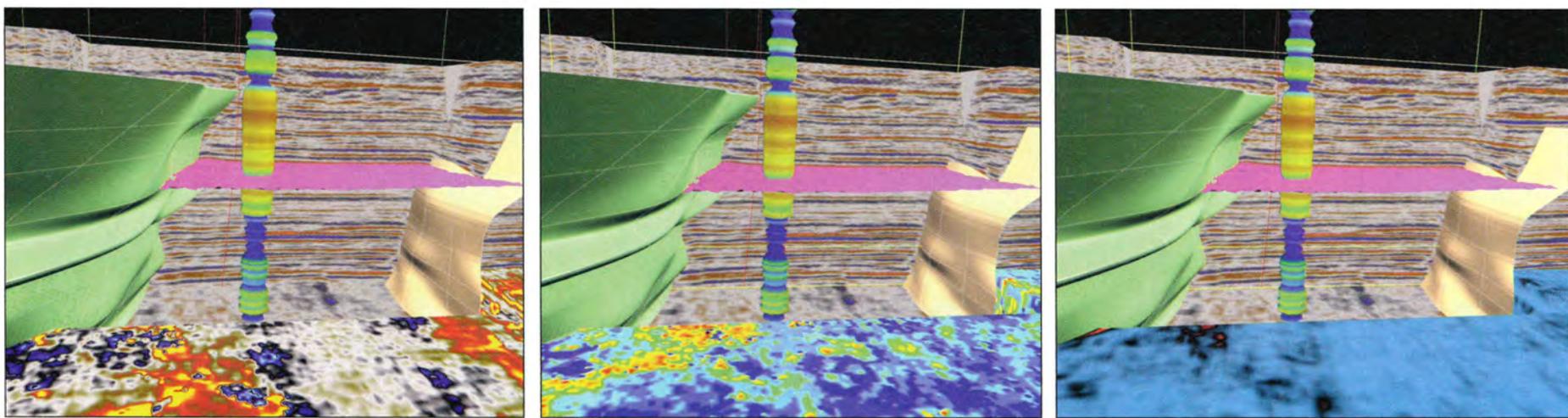
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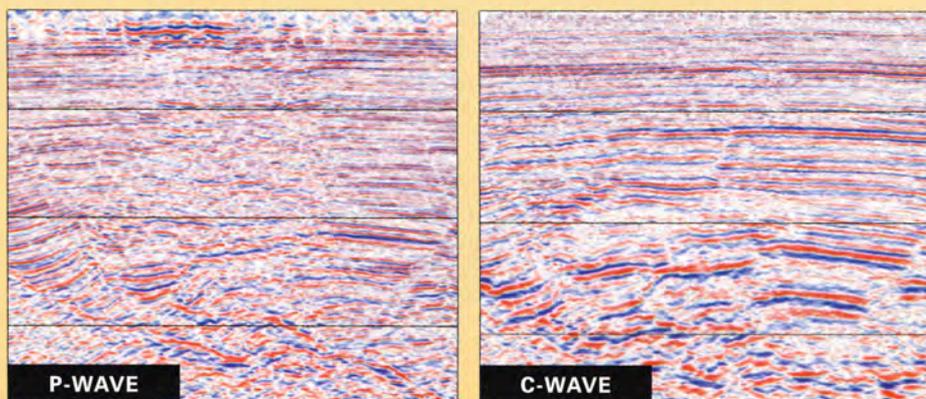
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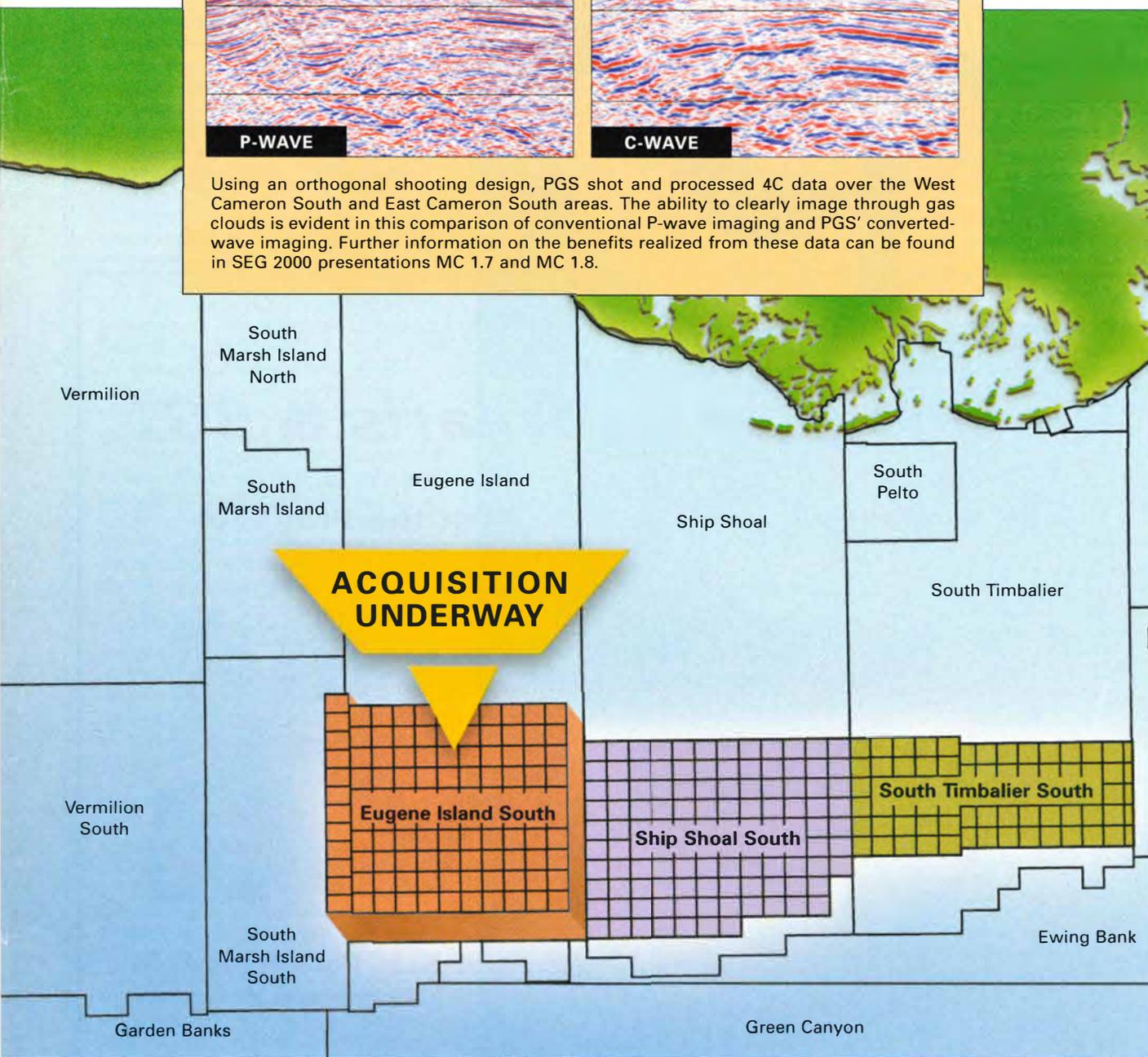
Graphics courtesy of Magic Earth

Screen shots showing GeoProbe's ezFault™ interpretation tool, horizon autopicking and well log 3-D display – an example of images available via visualization centers. Multi-attribute displays help the eye recognize and confirm patterns that are more difficult to detect using only amplitude volumes. Attributes in view – amplitude in the background, semblance in the foreground.

4C DATA VOLUMES DELIVERED IN DECEMBER 1999!



Using an orthogonal shooting design, PGS shot and processed 4C data over the West Cameron South and East Cameron South areas. The ability to clearly image through gas clouds is evident in this comparison of conventional P-wave imaging and PGS' converted-wave imaging. Further information on the benefits realized from these data can be found in SEG 2000 presentations MC 1.7 and MC 1.8.



continued from previous page

using this new technology. "Many managers view virtual reality as some gee-whiz game their kids play with," he said. "But the real purpose of virtual reality is to present data to users in a way that fits their natural comprehension of the world around them – to make a virtual model of reality."

This helps, Nelson said, because "when you display all your data proportional to where it comes from in the subsurface you can see patterns. The human mind is able to identify automatically boundaries and forms and make predictions in terms of lithology, movement, fluids, and other issues."

"I would say the technology is becoming more widely known and accepted, but you always have those people who don't see the advantages," he added.

"Many see this technology as an extension of existing 3-D seismic interpretation systems, for instance, but immersive visualization pulls in all kinds of data – everything from 3-D seismic volumes down to notes written on bits of paper years ago by people no longer with the company."

A 'Natural Extension'

Zeitlin agreed that visualization technology is more than just an extension of existing techniques.

"This technology is a paradigm change from the traditional way geoscientists work," he said. "It is a disruptive technology because it will force geologists and geophysicists to work differently."

And here's an added bonus, he said: Geologists have long been cartographers, drawing maps and cross sections. But immersive visualization will allow them to once again become geologists.

"Maps and cross sections are obsolete," Zeitlin said, "and I say that as a trained geologist. This technology allows us to work volumetrically. This technology has to grow. Young geologists coming into the industry have grown up playing virtual reality games. They are not looking to draw maps and cross sections."

"Visualization technology will be a natural extension for them."

The Entire Package

Once independents have determined the benefits of the virtual

See **Visualization Centers**, next page

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Visualization Centers

from previous page

world, they can take advantage of the new centers. However, for the time being that means coming to Houston for geoscientists in other parts of the country.

"Before we can build facilities in other cities we must generate the demand," Zeitlin said. "It's a growth process."

For now, the technology is ahead of the demand.

"Although we've been very visible, the majority of our colleagues in the industry have just started hearing the buzz on us," Zeitlin said. "They're now in the process of kicking the tires and examining this new technology."

"But this time next year we expect to have an entire technical session at the AAPG annual convention on visualization interpretation techniques," he said. "We will move from the exhibit floor into the technical program as more people start asking for papers and work in this area."

"Courses will be taught on how to apply this technology."

Zeitlin said there are two segments to the visualization technology, and today industry at large is only becoming familiar with one facet – the large visualization centers cropping up everywhere.

"That's only part of the story," he said. "The second area, which is much more valuable and important, is the software package."

"Today the industry is experiencing and experimenting with the big



Graphic courtesy of Magic Earth

What you see is what you get? Visualization centers feature technology that allows geoscientists to scan from reservoir detail to regional views as fast as the mouse moves.

screens in a theater setting, which is great for collaboration," he continued. "But software that brings the technology to the desktop is vital – and that's what will leverage this technology for independents."

"The big theaters – the ultimate immersive environments – are at the top end and are wonderful for asset teams to extract knowledge quickly from complex heterogeneous data,"

said Dave Ridyard, chief operating officer of Continuum, "but they are equally wonderful for their ability to efficiently communicate this acquired knowledge to management, partners and investors."

Ridyard thinks there is a big market emerging for smaller conference room systems where members of an asset team can have democratic access to information.

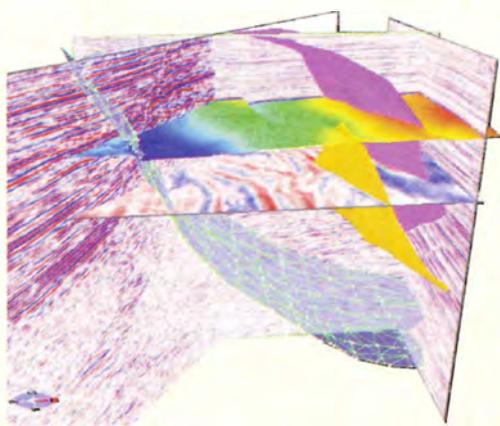
"When they leave that conference room they need to be able to go back to their desktop computer and continue to work in the same kind of environment," he said. "The real challenge is scalable solutions that will allow people to use one product all the way from the desktop through

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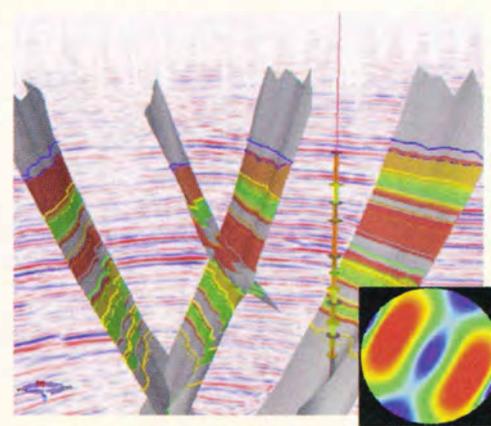
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Distinguished Lecturers Set Global Tours

AAPG's Distinguished Lecture program continues its international outreach with two speakers slated to begin tours in April.

Clifford J. Ando, ExxonMobil Exploration, will visit the southern part of South America April 14-27, and on those same dates Bradford Prather, Shell International E&P, Houston, will continue his speaking obligations this season with a tour of Eastern Europe/Central Asia.

Ando is this year's Dean A. McGee Distinguished Lecturer, funded by the AAPG Foundation. His lecture will be titled "Structural Interpretation in the Upstream



Ando



Prather

Petroleum Industry: Application of Global Experience and Key Technologies."

Ando's tour in April will include stops in Buenos Aires, Argentina; Rio de Janeiro, Brazil; Santiago, Chile; and possibly Santa Cruz and La Paz, Bolivia.

In May he will return to South America with a speaking tour that will include groups in the northern part of the continent.

Prather's tour will visit groups in Azerbaijan, Bulgaria, Croatia, Czech Republic, Hungary, Poland, Romania, Slovakia and the Ukraine.

Prather's lecture, which is also

funded by the AAPG Foundation, will be titled "Controls on Reservoir Distribution and Architecture in Slope Setting; Implications for the Global Deepwater Play."

This will be the second tour for Prather this season. In February he lectured throughout western Europe, with stops in the United Kingdom, Norway, Spain, the Netherlands, Austria and Germany.

For more information on the Distinguished Lecture program contact the AAPG education department, or go online to the AAPG Web site at www.aapg.org. □

continued from previous page

the conference room set up to the high-end theaters."

On a day-to-day basis it's just not practical for a team to go out to a theater – and that's particularly true for independent companies and geologists.

"Size does matter – geologists have known all along that it's better to make a wall-size cross section that you can step back from versus scaling it down to a piece of paper," Nelson said. "Large scale visualization does have a place in our ability to see patterns in the geology – but you don't need them all the time.

"It's the software that brings visualization to the desktop that really leverages this new technology."

Ridyard believes that large scale immersive environments and integrated software present complex interdisciplinary models, the decision making process is "transformed from a sequence of solo activities to a true collaborative process."

"In today's global economy, the collaborators could be in the next office, or half way around the world," he said.

"The next wave of immersive virtual reality software must also address the specific needs for partners and service providers to collaborate between users scattered around the world – often with vastly differing hardware configurations."

Programmed to Succeed

Magic Earth's software program and the package planned for fall release by Continuum Resources both allow geoscientists to apply visualization at their workstation.

Zeitlin and Ridyard said training is a relatively simple matter.

"If we write the software right, you won't have to learn the software because you will have learned it all your life as you learned how to explore the world around you," Ridyard said.

"That's why we're putting a lot of work into issues like speech recognition. We think it's a real barrier to understanding if you have to know which command to pull down from a menu to get another menu to bring up a window to ask the computer a question.

"If we use virtual reality right, the whole training issue goes away."

Nelson said Continuum hasn't defined all the aspects of training for its software, but he's watched the guys in the office – from geotechs to advanced geophysicists – all find that within a couple of weeks "they are able to get data into the environment and make things work." □

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E-Commerce Still Developing

Digits Offer Prospecting Medium

By KATHY SHIRLEY
EXPLORER Correspondent

Remember when we all thought that e-commerce was an automatic way to make millions of dollars?

Well, you should, since it was only one year ago. E-commerce was *the* buzzword for business – including the oil industry – although the concept clearly suffered through a less-than-stellar “shakedown” period that left many rightfully wondering exactly how the Internet can produce profits.

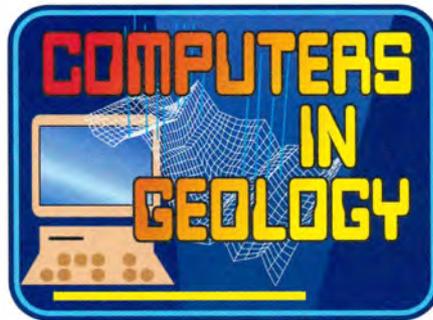
Geologists, take heart: Unlike many retailers and other industries that have learned the hard way, it appears the

“Marketing and Evaluating Prospects Online,” a paper by Perry White, will be presented at 8:45 a.m. Wednesday, June 6, at the AAPG annual meeting in Denver.

White’s talk is part of the DPA session on “Marketing in the 21st Century in the Oil and Gas Exploration Business.”

Internet can in fact be a valuable tool for oil companies.

That’s the message of one Dallas-based business development manager who says that an important use of the



Internet emerged in the last year or so: online marketing and evaluating of producing properties and prospects.

The Internet, according to Perry White, with Petroleum Place Inc., provides a unique medium for companies looking to sell properties or prospects, allowing them to get their message to a wide audience – and in the last year more and more oil firms of all sizes have recognized the tool’s potential.

“The Internet accelerates the marketing and due diligence process,” White said. “When a company is selling either prospects or producing properties, they want to increase deal flow or deal velocity and compress the marketing cycle time.

“These are both goals the Internet and an e-marketplace can help meet.” White called the Internet “a great mechanism for putting out a significant amount of information, allowing people to look at that information and indicate their level of interest.

“Following that initial step,” he continued, “companies can screen potential buyers and selectively allow them into deeper levels of data via electronic data rooms on the Internet and/or through a physical data room.”

White is in a position to know. His company works with oil companies to establish electronic data rooms (EDR) where they can market prospects and properties, and buy, sell and trade assets through a marketplace supported by its subsidiary in Houston, The Oil & Gas Clearinghouse.

Know Your Audience

White’s advice is this: Before jumping in and using the Internet to market a prospect, companies should determine what type of a prospect they have and define their target audience.

“Generally, oil and gas assets, whether it be producing properties or prospects, lend themselves to online marketing,” White said. “Prospects, for example, have a great deal of geological and geophysical data that prove their value – and the Internet is an efficient medium to present this type of information. Additionally, according to how the data is presented online you can be creative with the story you want to tell.

“For example,” he continued, “we have a prospect in the Gulf of Mexico we would expose on the Internet with a limited amount of information in the form of an executive summary, consisting of an index map, a brief geological and geophysical description of the prospect and contact information. An e-mail with a link to the electronic data room is then e-mailed to several thousand people who have indicated an interest in that type of prospect.

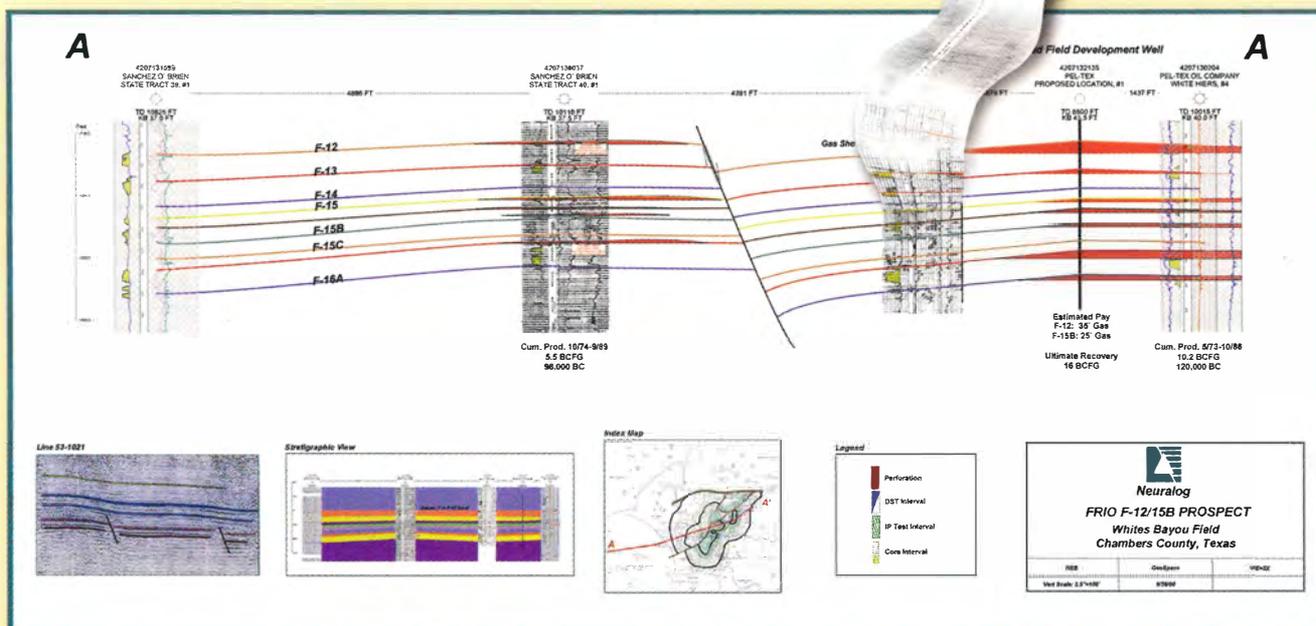
“We in turn might receive hundreds of visitors to the electronic data room.” Once company officials have a chance to determine “who’s interested in your prospect ... a list of say 100 potential buyers might be culled to 20 who are selected as viable candidates.

“These are the companies that are provided access into the highly secure electronic data room where they can view economic projections, detailed geologic and geophysical data in an interactive environment and other information,” he said.

That will likely lead to offers, and then the company “can negotiate with

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Tools Are in Place for Web Marketing

Practical Ideas for Business Discovered Daily

Technically, the tools needed to make online marketing and evaluating of prospects possible already are in place on the Internet.

"I have a laptop that costs about \$2,000 – certainly in the price range of independents and consultants," said Petroleum Place's Perry White. "With that laptop and a \$40 a month DSL connection I'm in business to be able to access and interact with a lot of information and data over the Internet."

Access via DSL and cable modem, he added, has been a huge advance in

terms of speed.

"Right now we are on the low end of the spectrum with DSL connections, but I have seen demonstrations of 10 megabit per second lines, which we refer to as Virtual Private Networks (VPNs), because they are almost a direct connection from one site to another.

"For example, Houston's networked on the Metropolitan Fiber Optic Loop," he continued. "Via that network you can be in company X's office and actually interpret seismic data that's being

hosted and served from a neutral location. We've demonstrated this, and the performance is remarkable.

"This will change the way people work – and I think we will see a lot of pilot programs in the next year testing the limits of what the Internet brings to business."

Another emerging Internet technology is taking a familiar software application and modifying it to run via the Internet from host servers of the Application Service Provider.

"Tantamount to these capabilities is

access to additional dynamic data sources – both proprietary and public in nature – that will allow further evaluation of a prospect if necessary," White said.

"We are seeing a cultural change today with less fear and skepticism concerning the Internet, and I think that will continue," White said.

"The Internet is not a panacea for business, but we are discovering, every day, new ways to more efficiently conduct business using this powerful tool."

– KATHY SHIRLEY

continued from previous page

those companies directly or through us as an agent to consummate a transaction."

Step by Step

Marketing a prospect online, White said, involves several steps:

□ First, a Web site developer meets with an asset group from the oil company to get an idea of what they are selling and what they consider the key highlights of the prospect or property.

□ Based on this information, the service company can determine the architecture of the electronic data room, with the EDR customized to reflect the image of the company.

"It can take anywhere from a week to a month to put together an EDR, depending on how elaborate they are," White said.

□ After the initial meetings, everything is done by virtual collaboration.

"Once we get the information, we can then build the EDR and then publish it on a secure site where only the client can view it. This allows us to fine tune the EDR with the client before it is viewed by the public," White said.

This service is viable for companies of all sizes, but any company should consider working with a service provider that can establish these EDRs.

"We developed 70 to 80 EDRs last year, and clients range from three- to four-person companies up to large independents, major oil companies, and national oil companies."

Online marketing, he added, is definitely catching on in oil companies.

"We are starting to see more and more oil companies with some type of e-commerce initiative – especially larger companies," he added. "They are at least establishing pilot programs to test the waters for different uses of this medium.

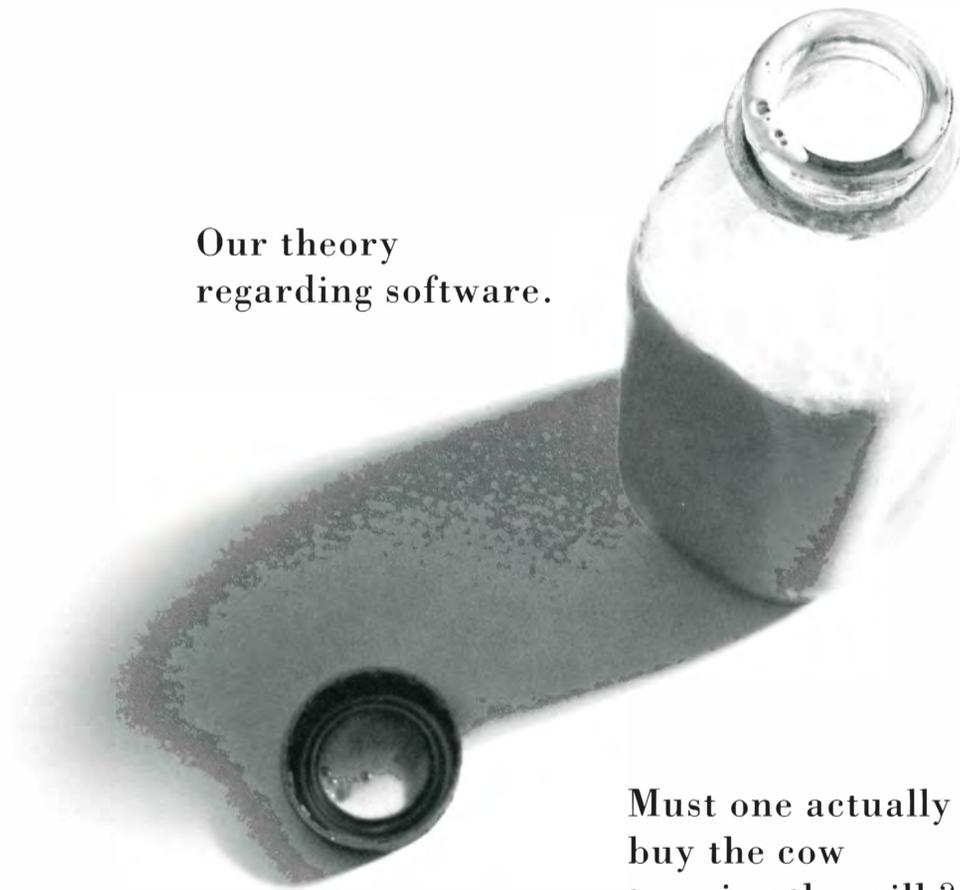
"It's difficult to ignore the Internet today when the number of people coming on line every month is exploding."

Family Business

In addition to marketing and evaluating prospects and producing properties online, companies are finding that the Internet can be an

See **Marketing**, next page

**Our theory
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Internet Marketing

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important internal tool to better manage their own business.

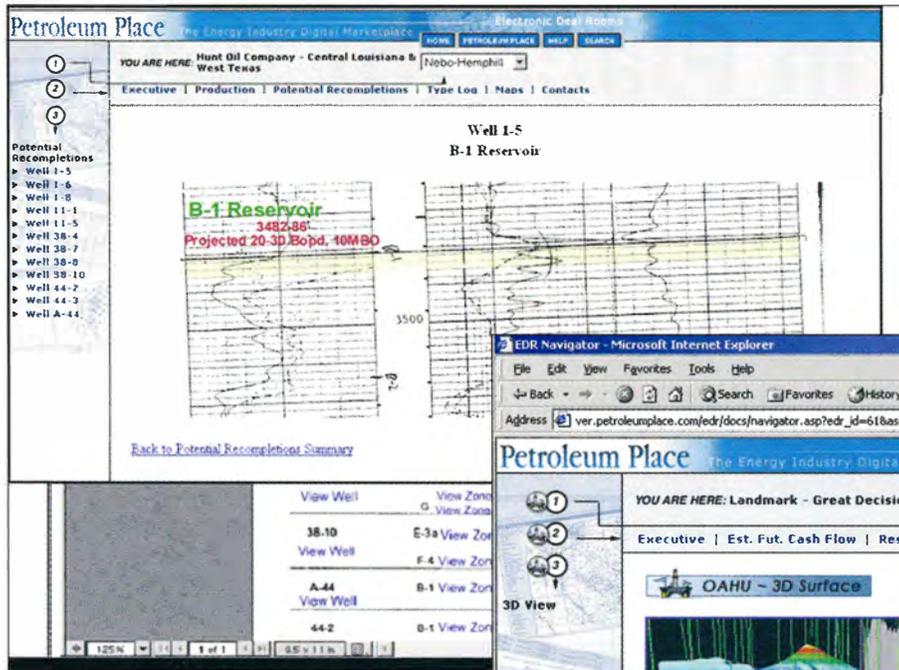
"We have discovered as we go through the process of setting up EDRs that often companies know the most about an asset the day they are ready to sell it," White said. "This has been very revealing for companies, and executives are beginning to understand what an important data management tool the Internet can be internally."

"The Internet is valuable for marketing and evaluating prospects, but there is probably equal or more value in being able to get a better handle on their own portfolio," he added. "It's taking a lot of different turns that people never thought about before."

Once the EDR is established, an e-marketplace can help oil firms in other ways – such as providing statistical analysis of those entering the EDR.

"At the initial level we can determine who is visiting the EDR," he said. "This information may then be used by the seller to proactively market to those companies with the most interest, or where there may be the best fit," he said.

"Also, we can tell what pages a given company is downloading," he said. "If a company is selling a mature producing field in Louisiana and the key element to the project is recompleting wells to tap missed zones, by tracking the documents that



potential buyers download we can determine if they understand the emphasis.

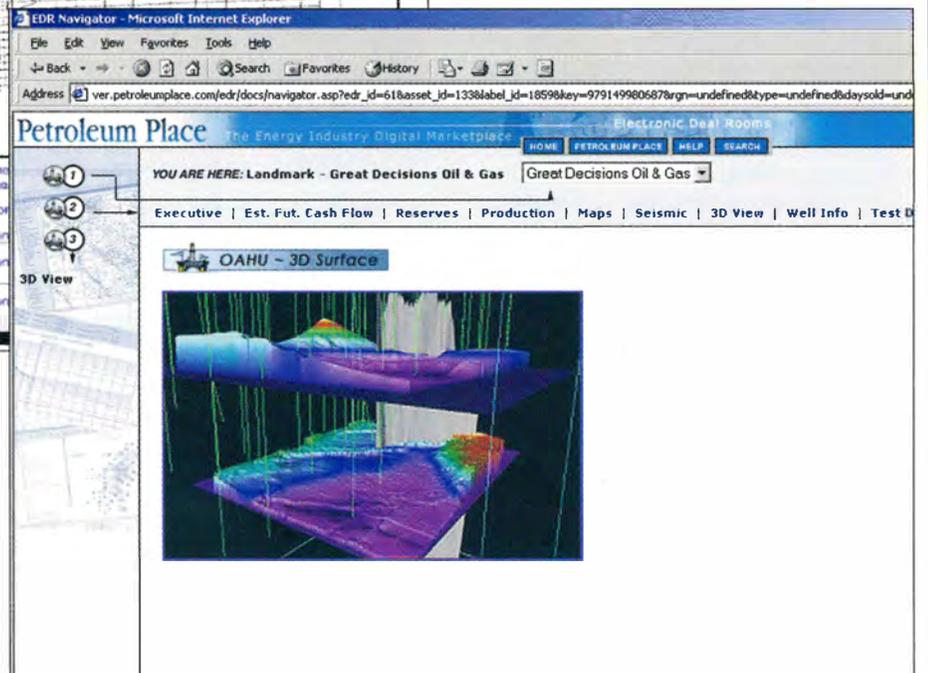
"Once a smaller group of interested companies has been identified, authenticated and administered a password to additional information, we can track detailed usage and access of this information," he continued. "That type of knowledge is very useful to sellers, and enables them to hone their marketing efforts."

An e-marketplace also can help an oil company get the word out to a large number of potential buyers as well.

"Putting something on the Internet is like building a billboard – if you put it on a dirt road nobody is going to see it," White said. "The key is getting it on the interstate highway where people will see it. That's where an e-

Web pages like these depict the latest trends in the marketing of producing properties and prospects. Data can be discussed in online electronic data rooms – lending a modern edge to the art of the deal.

Graphics courtesy of Perry White



marketplace comes in ... We can get the word out to both a wide range of companies using the Internet and also to the right people within those companies by leveraging the immense amount of transaction data and buyer profiles that have accumulated over the many years both offline and online."

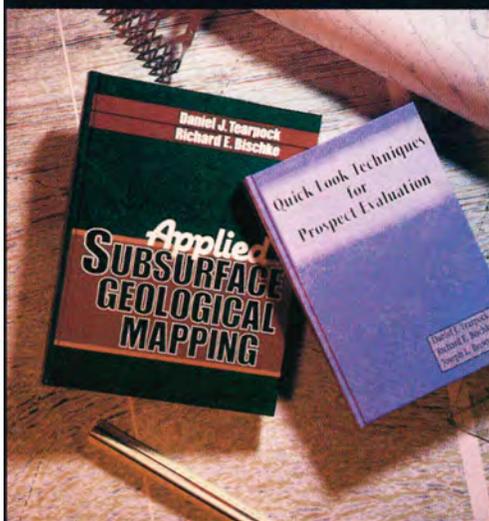
Money Matters

Of course, the big question is always how much does this cost – and how much will it save?

White said his company's business

continued on next page

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Aug 27-31	Aberdeen	\$1,650
Oct 15-17	Houston	\$1,250
Nov. 5-9	London	\$1,650

Applied Subsurface Structural Geology

Jul 23-27	Houston	\$1,250
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Basic Reservoir Engineering

June 18-21	Houston	\$1,200
Aug 13-16	Aberdeen	\$1,500

Deepwater Sands and Petroleum Analysis

May 14-17	Houston	\$1,200
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Direct Hydrocarbon Indicators, AV0, and Rock Physics

Jun 12-13	Calgary	\$700
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Introduction to Petroleum Geology

Aug 13-17	Houston	\$1,500
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Petroleum Engineering for the Geoscientist

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model is built on three components: a technical service fee to build the EDR and to market the asset, a monthly fee to host and manage the EDR – including the creation of detailed usage reports for the EDR – and a risk-share success-based transaction fee upon closing.

That cost is offset by other savings – personnel, document costs, travel and other expenses – that can be achieved through the Internet's accessibility and through the use of a marketing firm.

"Even though at some point many interested buyers still want to see the coffee stains on the real maps, we can dramatically reduce the costs associated with marketing a prospect by using the Internet," he said.

"If you are active and do several of these deals a year and you can cut a couple of months off the marketing cycle, that's quite a cost savings."

The Bottom Line

Marketing prospects online seems to be paying off for oil companies.

"We have cases where we have put an EDR online on a Monday morning and had 150 visitors by the first morning," he said. "Thirty of these visitors downloaded the confidentiality agreement and four executed the signed agreement back to the seller by noon on Monday."

"At the beginning of 2000 I saw a lot of companies put their toe in the water and post maybe one rank prospect outside of their core area as a low risk test of this new way of doing business," he said. "Over the last year we've seen the value of producing properties and prospects increase, the EDRs become more elaborate and more producing asset transactions closed online."

"Today we are seeing a good deal of repeat business from clients who have realized the value of this medium."

White said the North American oil industry is a very active acquisition and divestiture market, and that a big part of that business is being able to efficiently manage a portfolio while maximizing the value of all the assets within the portfolio.

"Marketing and evaluating producing properties and prospects online can offer that efficiency and value," he said.

But while technical hurdles to online marketing and evaluating have been overcome in recent months, business hurdles remain.

"For example, you can present a prospect in the deep-water Gulf of Mexico, but may or may not be able to get the seismic data owner to provide a license to actually view the data on the Internet," White said. "The geophysical contractor industry has not yet fully updated its contract language to reflect the capabilities of using the Internet to view and interpret seismic data."

"That's a pure business issue," White said.

They have to answer business questions like:

Are we going to let this information on the Internet?

Are we going to limit access – and if so, by how much?

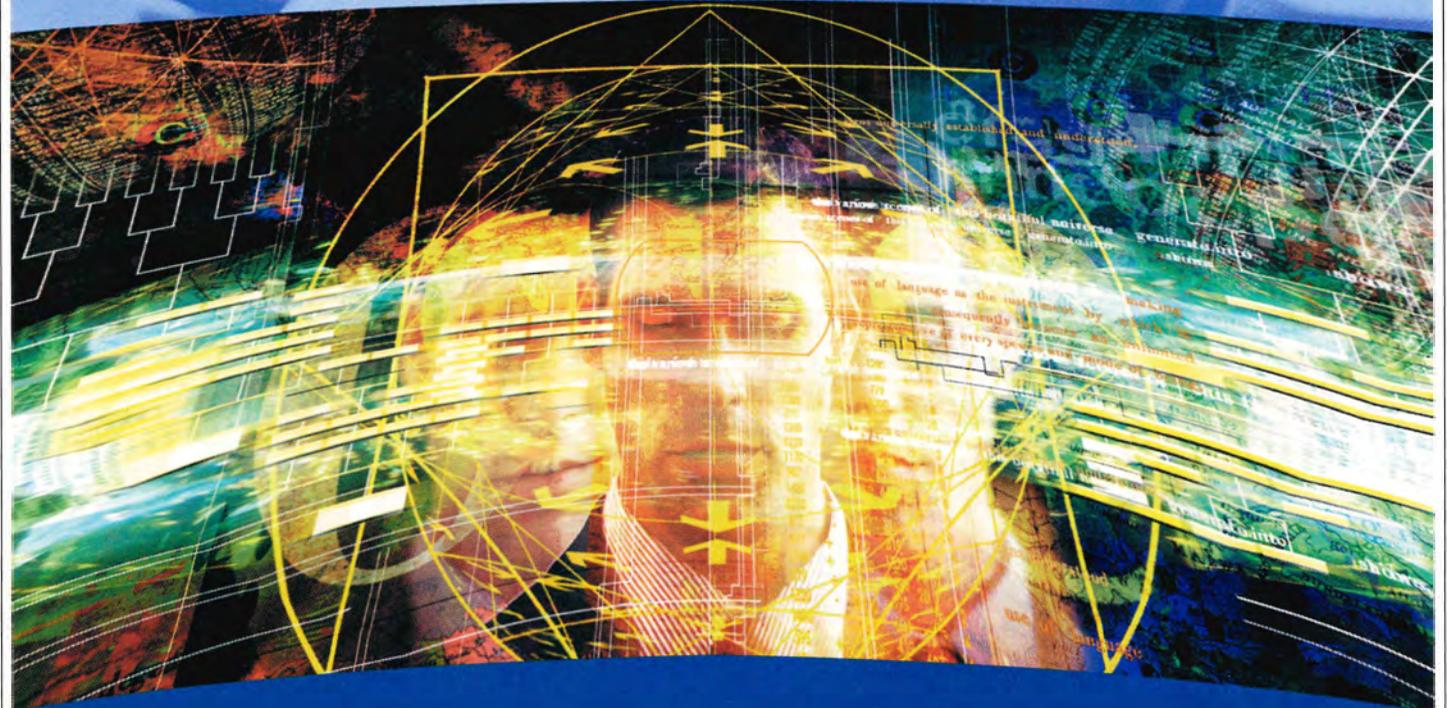
What kind of business model can be put together based on viewing the data from a central location?

"It brings up some very interesting business questions for all sectors of the industry," White continued. "Today we are grappling with those difficult issues, because this is a cutting edge situation that's never been encountered before." □



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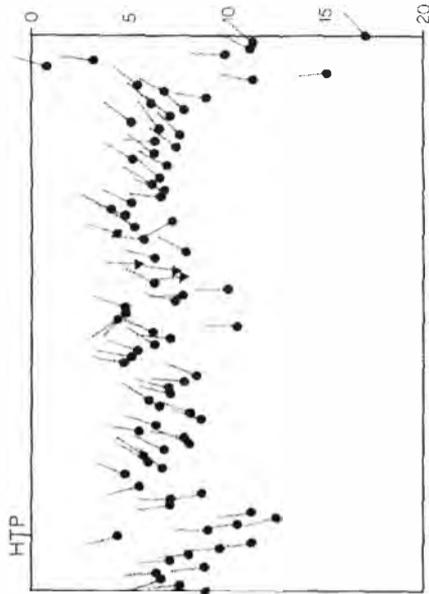
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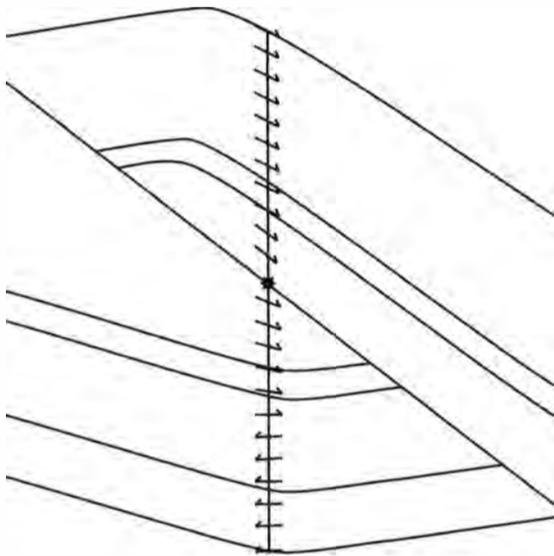
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Denver Sessions Promise E-ventful Poster Innovations

*Online Presentations
Scheduled for Annual Meeting*

The new AAPG Interactive E-Poster technical sessions will be held June 4-6 during the annual meeting, in Exhibit Hall C of Denver's Colorado Convention Center.

The Monday-Tuesday sessions are morning-afternoon events; the final Wednesday presentations will be in the morning only.

By LOUISE S. DURHAM
EXPLORER Correspondent

It's a common occurrence: There are two presentations on your "gotta hear" list at a professional meeting – both scheduled in the same time slot.

Take heart. If the Interactive E-Poster (iEP) sessions at the upcoming AAPG annual meeting in Denver are the harbinger of the future, this kind of dilemma may soon be a thing of the past.

The iEP setup is a natural progression of the relatively recent digitization of, well, so darned much in the meetings arena.

It took a few years, but PowerPoint has now become a popular tool-of-choice in a presentation milieu long dominated by 35 mm slides. And it's not so long ago that professional associations began burning CDs containing abstracts or, in some instances, extended abstracts that meeting attendees could have for themselves to take home and view on a PC.

The iEP arena takes a giant step forward from electronic abstracts to allow full-blown presentations to be seen and heard not just at a scheduled time, but to be viewed online at anytime during an event – at the convenience of the attendee.

The Denver iEP sessions are the brainchild of Andy Pulham, research associate in the Department of Geological Sciences at the University of Colorado and a current AAPG Distinguished Lecturer, and Randi Martinsen, senior lecturer and research scientist in the Department of Geology and Geophysics at the University of Wyoming.

Martinsen also is the technical sessions chairperson for the Denver meeting.

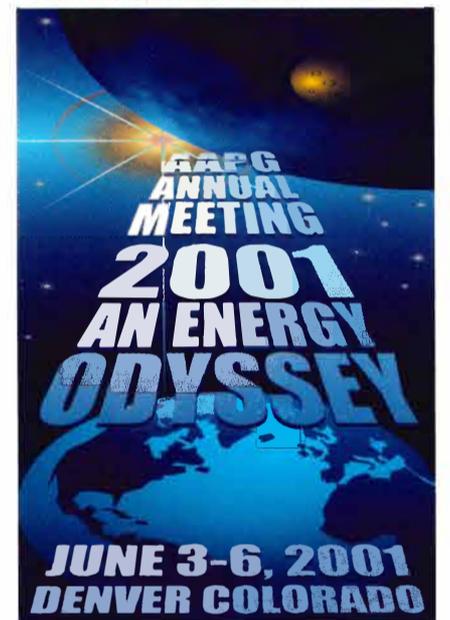
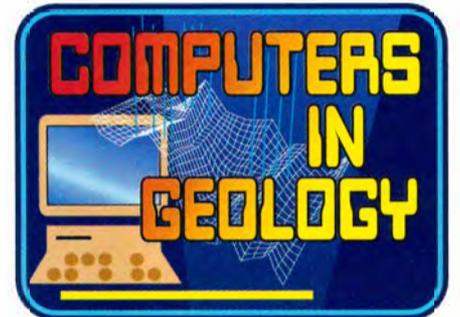
"The idea of the interactive sessions is, there's been a big advance in presenting in digital formats," Pulham said, "and we wanted to create another opportunity to do that."

Flexibility

This is how it will work in Denver: The presentation area will resemble a large-scale exhibitor's booth with a large screen and seating for 50-60 people – a broader audience than a regular poster session and a more intimate setting than the typical big-room venue of oral presentations.

Adjacent to this setup will be an area with a minimum of six computer terminals, each surrounded by three or four seats.

The scheduled live iEP presentations



will be computer projection-based, and all contributions will be in Portable Document Format (PDF). The papers can be viewed online at the terminals throughout the duration of the meeting. Attendees can access the papers alone, with colleagues or even perhaps one-on-one with the author.

There can be no downloads, so security for the papers is not an issue.

The online version of the presentation could include far more than the live talk. For instance, a speaker might present a regional overview of Caspian Sea hydrocarbon potential and show a couple of seismic lines. Online at the terminal, there may be 20 or more seismic lines.

Authors also might provide the opportunity for viewers to look through such things as field outcrops, as well.

"The digital world gives opportunities to both authors and attendees to get more value out of the science brought to the meeting than they get now," Pulham emphasized.

Consider, for instance, that an author typically has about 20 minutes to deliver an oral presentation. There often is a subset community within the audience with a particular interest in the subject matter.

Taking the iEP route, the author can bring in, say, a 200-page document to share with that select group.

The flexibility allowed with iEP extends still further.

Say, for example, a presenter wants to show a movie in a presentation, or use a particular piece of software for

continued on next page

'APPEX' to Debut in Houston

AAPG Sets Autumn Prospect Expo

Have a prospect you want to sell? Are you interested in looking at the deals others have to offer?

Both opportunities are available Aug. 27-29 at the inaugural AAPG prospect expo.

Titled the AAPG Property and Prospect Exposition (APPEX), the event is a cooperative effort involving AAPG, the Houston Geological Society and the Society of Independent Professional Earth Scientists.

APPEX, which will be held at the Adams Mark Hotel in Houston, will invite those who have deals to exhibit their offerings in the manner of the North American Prospect Expo, held annually in the early part of the year by the American Association of Petroleum Landmen.

APPEX will emphasize both domestic and international prospects. Torch Energy/PLS, Houston, which

formerly sponsored a fall prospect exposition, has agreed to accept a marketing role in APPEX, which will be held in lieu of the previous PLS Dealmakers meeting.

Last fall, the Dealmakers meeting drew about 1,200 attendees and 135 booths. By comparison NAPE attracted over 8,000 attendees and over 1,000 booths at the 2001 meeting.

The timing for APPEX is designed to be complementary with NAPE, allowing buyers and sellers to come together before the year-end rush to

peruse fall/winter drilling deals, development projects, waterfloods and producing property opportunities.

A steering committee has been named for APPEX. Members are David Campbell, A.T. "Toby" Carleton, Paul Hoffman, Craig Moore, Charles "Chuck" Noll, Deborah Sacrey and Daniel Smith.

All are AAPG members, with Moore being the HGS president; Hoffman, HGS president-elect; Carleton, SIPES president; and Sacrey, SIPES president-elect. Campbell and Smith are candidates for AAPG

president-elect.

A pre-exhibition conference will be a part of APPEX, which will include educational workshops. Topics for past workshops include acquisitions and divestitures, exploration, sourcing capital, Internet services, marketing and hedging.

APPEX will be administered by AAPG, including exhibit sales and participant registration. Michelle Mayfield Gentzen is the staff liaison.

Watch the EXPLORER and the AAPG Web site for details.
— LARRY NATION

continued from previous page

something specific. The software can be changed because the schedule is not as tight as an oral session.

Pulham predicts some of the planned presentations will include movies as well as GIS data.

He said there will be a minimum of 30 and maybe as many as 100 papers available for viewing online. Thirty-two of the online papers will be presented live.

Mass Appeal

If you think this is a medium only for computer sophisticates, you're in for a nice surprise.

For starters, Martinsen emphasized it's not all that difficult or pricey to get a presentation into PDF. "It's all Windows-driven, and it just takes a little patience.

"The Acrobat software used to read PDF files is free, and it's easy to utilize," she added. "And while it takes a different software to construct the files, it's not particularly expensive."

Onsite at the desktop terminals, the setup "will work like the easiest Web site in the world," according to Pulham.

"There's no typing," he said. "You just click the mouse."

Nevertheless, he, Martinsen and a host of students will be available should assistance be needed.

The opportunities afforded by iEPs are generating excitement among the authors involved in the Denver event.

"It's going to allow us to present not only to a large audience but have one-on-one time with interested folks afterward," said Mark Gregg, president of Kiwi Energy, who co-authored a paper that is on the iEP schedule. "I think it combines the best of both worlds between regular oral presentations and poster sessions.

"It's kind of a neat hybrid."

Will iEP sessions eventually reign supreme as the *de rigueur* format for meeting presentations?

Martinsen thinks they are definitely the wave of the future, but predicted there will always be a place for regular poster sessions and oral presentations, as well.

What is even more intriguing is the possibility that maybe in a couple or years, such online sessions can be put in some type of medium to actually carry home, after a few problems — such as the authors' comfort zone — can be resolved, Pulham noted. □

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de Boue (Great Geologist?) Gets Last Laugh

This Web Site Has An Attitude

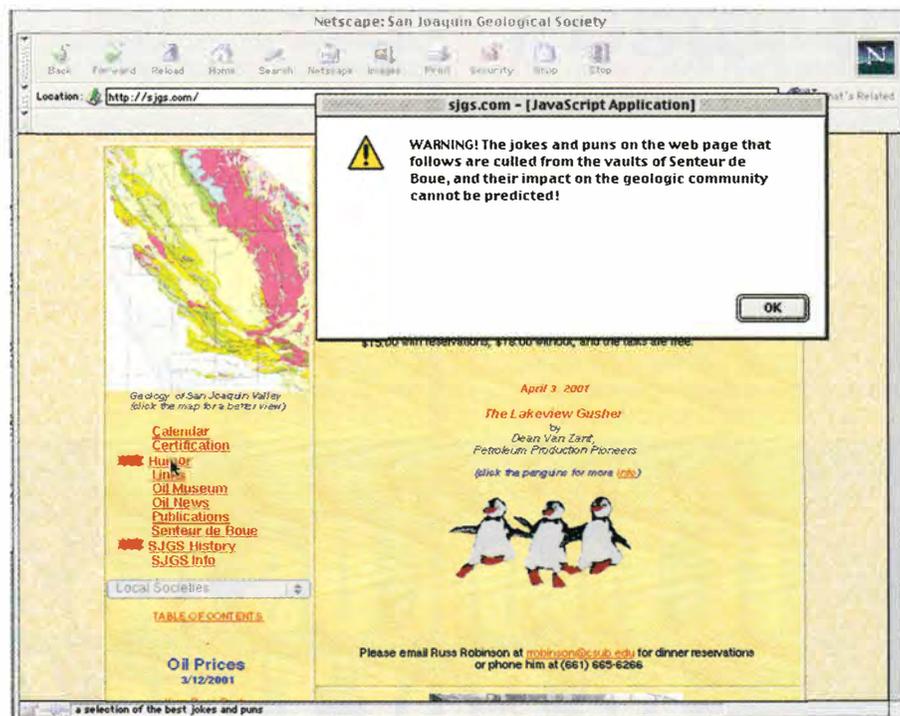
By DAVID BROWN
EXPLORER Correspondent

Ten reasons to visit www.sjgs.com, the Web site of the San Joaquin Geological Society (SJGS) in Bakersfield, Calif.:

10. To see Dan the Otter.
9. It's one of the few geological Web sites to carry a lewd photograph of a cactus. (Really. See page 23.)
8. For meeting information, click the dancing penguins.
7. Short refresher course on "How to Find Oil and Gas."
6. Find the flying pig.
5. Scope out SJGS publications.
4. Clinton jokes. Lots of 'em.
3. A history of oil in Kern County, Calif.
2. Bad puns. Very bad puns.
- And the Number One reason to visit the society's Web site:
1. It includes a shrine to that most elusive of geological geniuses, the "possibly fictional" Jean B. Senteur de Boue.

Beyond that, the SJGS Web pages provide an interesting study for other groups hoping to establish a presence on the Internet.

It gives information. Lots of it. But it also has a certain *Mad Magazine*-esque personality that defies the stereotypical self-important, multiple-pins-on-the-lapel approach to communicating. In short, it's hip, irreverent and it makes it apparent that petroleum geologists actually have a



Who said geological or society Web sites had to be all work and no play?

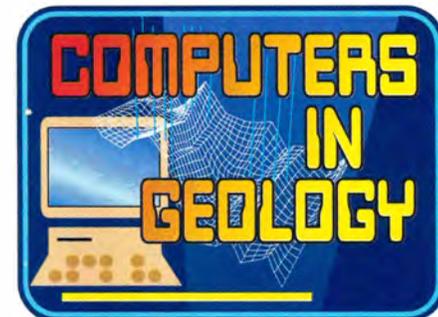
sense of humor. The site maybe should include CAUTION: The fun these geologists are having maybe contagious.

The creative mind behind the site belongs to Web master Mike Clark, staff geologist for Chevron in Bakersfield. Clark said the idea for a Web page started four years ago with

the society's executive committee.

"We sat down and came up with a page initially to notify members of when the meetings were. As it developed, other people had suggestions and those were included," he explained.

Today, the Web page has become "part of the lifeblood" of SJGS, according to Clark. "If I said I was tired



of this and want out, there would be a committee come together very quickly to keep it going," he said.

Creative Interpretations

But what of Senteur de Boue?

Like many geologists, Senteur de Boue had rocks in his head from an early age. He allegedly attended the University of Lyons, near Lyons, France, and later moved to the United States.

According to the SJGS site, "Monsieur de Boue's name in French loosely translates to 'Mud Sniffer'."

Clark called Senteur de Boue a "legendary member" of the San Joaquin society. His name supposedly appears in the 1955 directory of the Pacific Section of AAPG, listing him as an independent consultant with an office on Oak Street in Bakersfield.

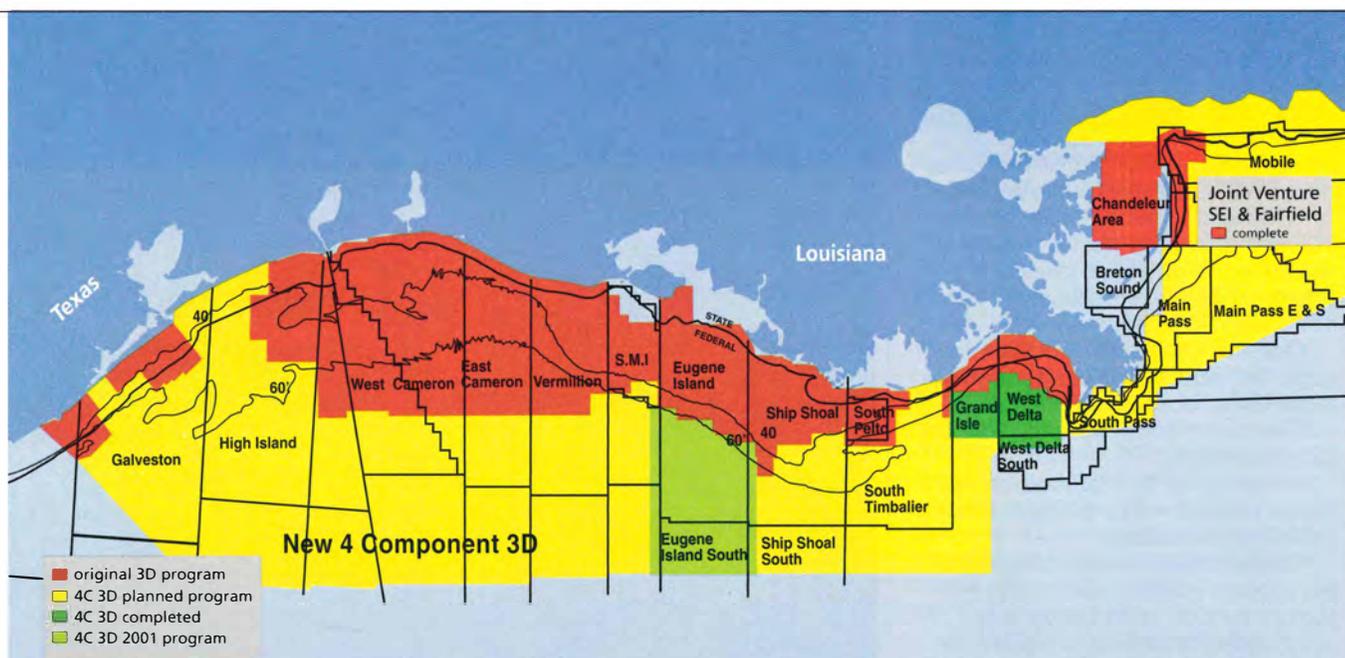
As SJGS records show, "this

continued on next page

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continued from previous page

address corresponds to a Tidewater service station that was once located across from the Oceanic (Oil Company) offices."

Senteur de Boue's name may be most closely linked to his pioneering work in Negative Isopach Theory. The SJGS Web site carries a precis of this important contribution.

The author explains that "many maps containing negative isopachs are computer-generated and result from sophisticated software packages incapable of producing erroneous data.

"Nonetheless, because negative isopachs require the rocks in question to have negative thickness and volumes, some geologists of the old school reject this possibility."

By closely studying negative isopachs, Senteur de Boue traced their origin to two processes: bi-directional erosion and ultra-high rates of erosion.

He observed that such isopachs "are economically appealing because of rock properties that include porosities and net-to-gross sandstone ratios greater than 1.0.

"For example, if a reservoir rock is saturated with oil, and total pore volume within the reservoir exceeds the volume of rock matrix, then the volume of oil exceeds the negative volume represented by the negative isopach. Thus, infinite production is possible."

These concepts also apply to calcareous, calciclastic and recalcitrant formations.

In an alleged poster presentation at a 1997 meeting of the San Joaquin society, Senteur de Boue offered a new and disturbing interpretation of the likely origins of California's Ventura Basin.

Rejecting earlier theories of tectonic rotation, he suggested that the entire basin resulted from a meteor impact.

The SJGS site presents his novel ideas about giant clinofolds in the area.

Even more disturbing is recent "evidence" uncovered by Hanswurst, Zopenco, et. al., indicating that the San Joaquin Valley itself may be an elaborate hoax.

"If the valley is, in fact, spurious," Zopenco noted, "somebody went to an amazing amount of trouble." Hanswurst, Zopenco et. al could not be contacted by the EXPLORER for comment.

Starting the Web Site

Clark said SJGS started out with a Geocities Web site but wanted its own, copyrighted site name. The society found a Web hosting service associated with the local newspaper, and now pays \$100 annually for its proprietary site.

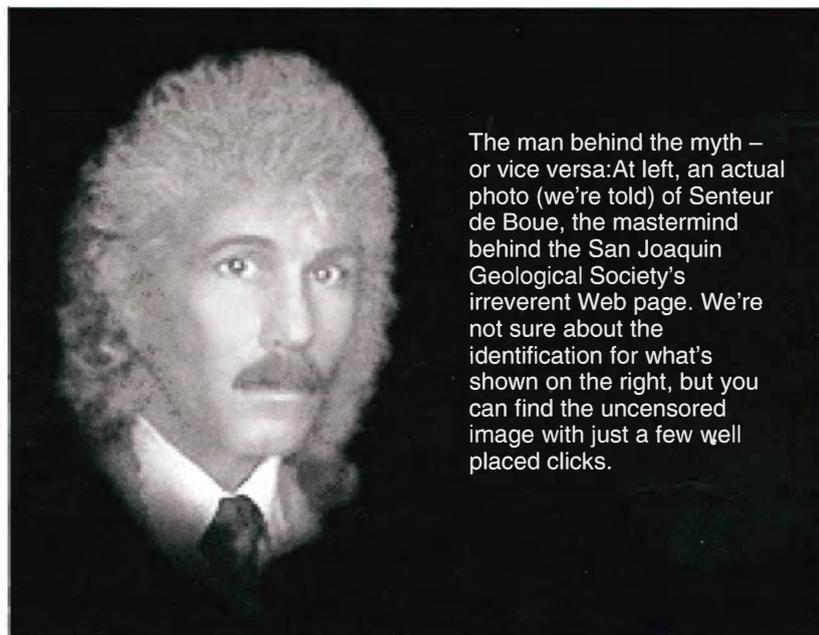
"You can contact local organizations to see if there's one willing to sponsor a site," he said. "However, if you want to have your own site name, you'll need to go ahead and make the payments."

Clark considers the hosting fee a bargain. "What we get for \$100 a year, other outfits are paying \$50-\$60 a month for," he said.

The society's Web site serves as a centralized information point, according to Frank Cressy, a consulting geologist in Bakersfield and former secretary of AAPG's Pacific Section.

"There's just a lot of information you can get from it," he said. "I use it a lot for the links. There must be 30-40 links on there."

An organization wanting to start a Web site should get its own site address and find a local hosting service, Clark advised. He said the designated Web master should solicit the membership for help, ideas and quality control.



The man behind the myth – or vice versa: At left, an actual photo (we're told) of Senteur de Boue, the mastermind behind the San Joaquin Geological Society's irreverent Web page. We're not sure about the identification for what's shown on the right, but you can find the uncensored image with just a few well placed clicks.



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See **Web Attitude**, page 33

From 20 Percent to 75 Percent

AVO Boosted Field Success Rate

John Hastings will present the "E-Poster," "Developing an Exploration Tool in a Mature Trend: A 3-D AVO Case Study in South Texas," at 1:30 p.m. Tuesday, June 5, at the AAPG annual meeting in Denver.

Hastings' presentation is part of the AAPG session titled "Interactive E-Posters: Outcrop to Subsurface," Business Through Technology.

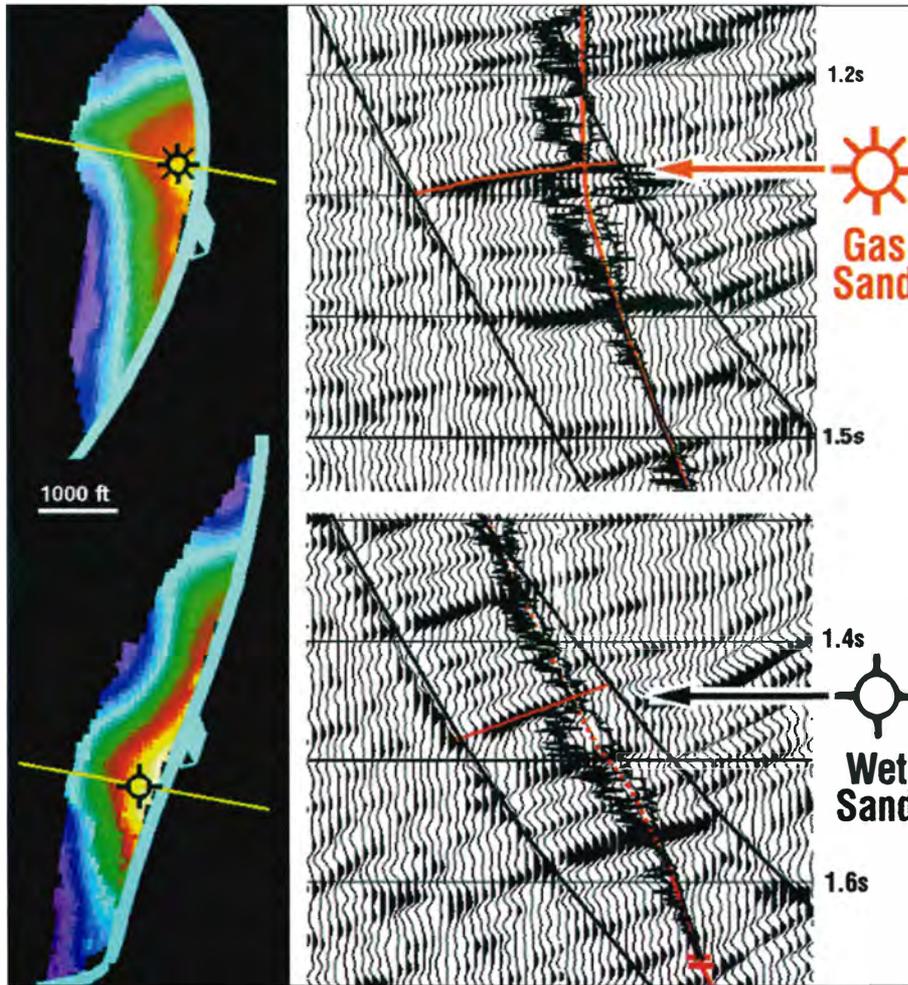
For a story on the inaugural E-Poster concept, see related story on page 20.

By LOUISE S. DURHAM
EXPLORER Correspondent

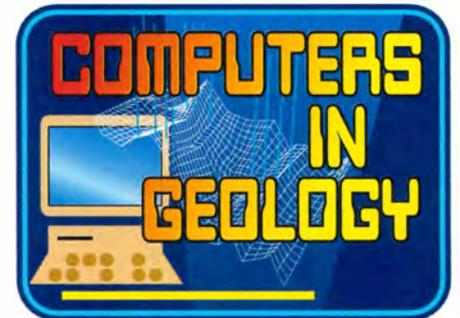
No matter how mature the field, geoscientists seem to always come up with either a new technology or another twist on the tried-and-true to pull more hydrocarbons out of the reservoirs. When commodity prices are looking good, producers have an added incentive to use the technology to go after deeper targets and also explore for smaller ones in producing trends that historically have been exploited at shallow depths.

The heavily drilled Oligocene Vicksburg sands in south Texas are a prime example of a mature area where moderate-potential fault block drilling targets in productive zones and higher-potential targets in deeper, untested intervals offer the lure for continued drilling.

Over the trend's 80-year productive life, more than three TCF of gas and



Structure map and migrated seismic section through two geologically analogous prospects – one drilled as a commercial gas discovery, the other drilled as a dry hole.



100 million barrels of oil have been produced in Starr and Hidalgo counties. A large non-exclusive 3-D seismic survey by WesternGeco (nee Western Geophysical) beginning in 1994 spurred a whole new round of interest in pursuing the hydrocarbons that likely remain.

Edge Petroleum and Carrizo Oil and Gas seized the opportunity to better explore in the area when they licensed 450-square-miles of the 3-D survey in 1995.

The ensuing drilling program using 3-D imaging to pinpoint untested pockets in productive zones between 5,500 and 7,500 feet deep yielded a disappointing 20 percent success ratio.

"Two of the wells were only a few miles apart and had been determined to have analogous stratigraphy, structure, timing of trap formation and source proximity," said John Hastings, vice-president of exploration at Edge.

See **AVO Study**, page 26

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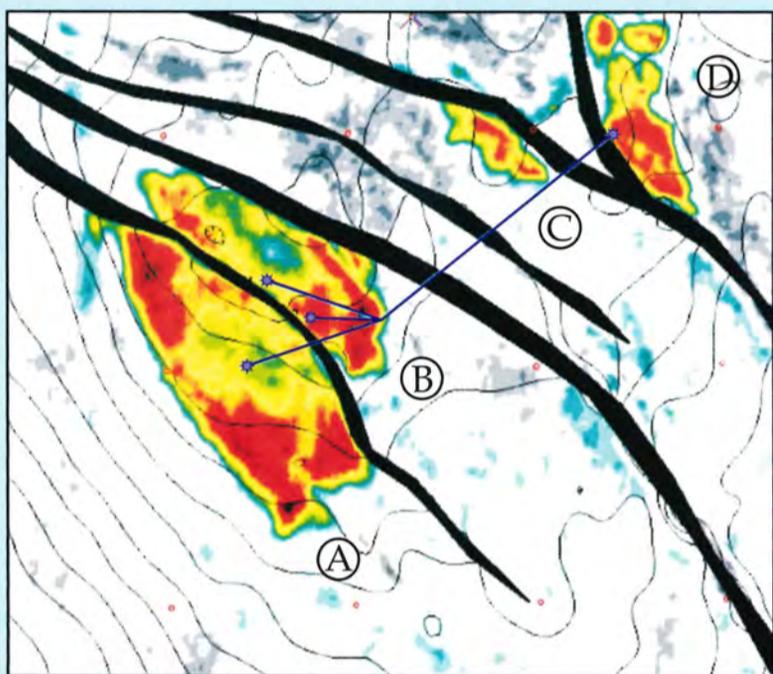
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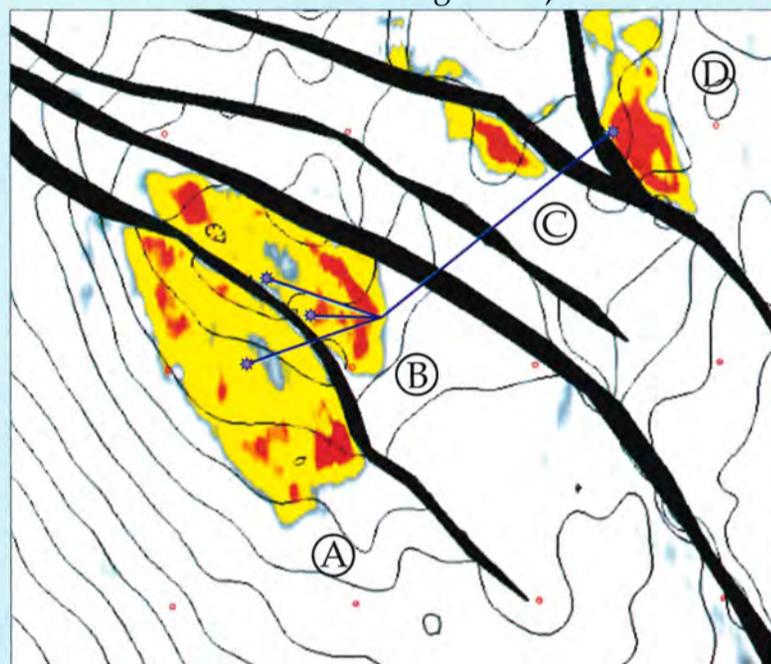
◆ As an example, let's look at a so called "depleted field" that went offline in the mid 1990's. ◆

CONVENTIONAL 3-D AMPLITUDE EXTRACTION MAP
(Reds and yellows indicate strong amplitude values.)



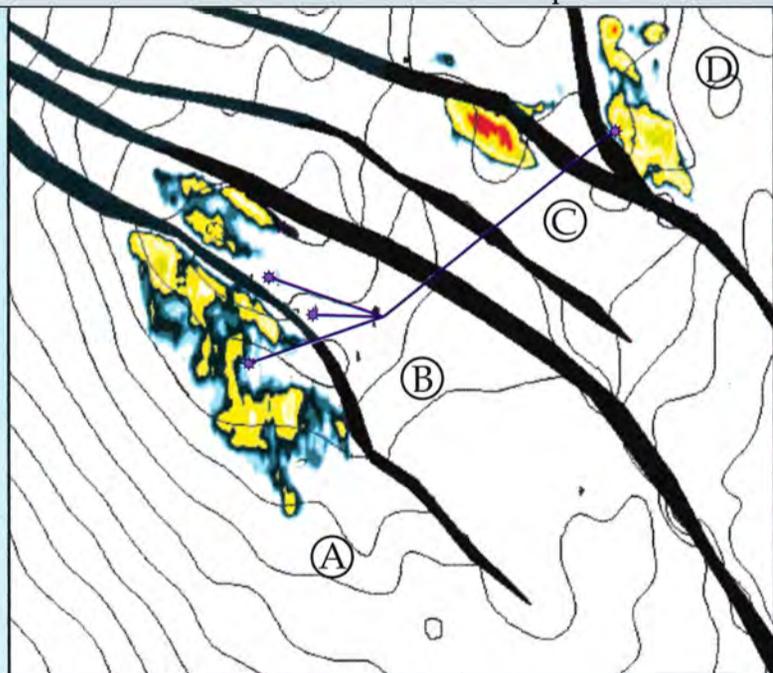
Shows strong amplitudes related to a depleted area around abandoned wells in fault blocks A, B and D.

3-D AVO STRENGTH EXTRACTION MAP
(Reds and yellows indicate amplitudes increasing with increasing offset.)



Shows a positive AVO response related to the depleted areas. (Beware of hydrocarbon indicators such as AVO and bright spot technology as they cannot differentiate between low and high hydrocarbon saturation.)

3-D DENSITY CONTRAST EXTRACTION MAP
(Red, green and yellow indicate areas of hydrocarbon rich section. White and gray indicates depleted zone areas.)



Shows the depleted zones (white) and potential "bypassed pay" in red, green and yellow. (The Density Contrast derivative can discriminate between low and high hydrocarbon saturation.)

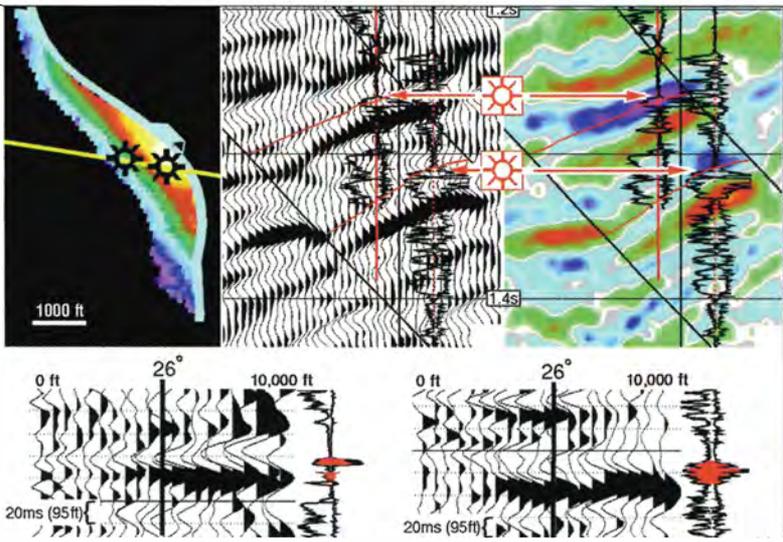
OBSERVATIONS / IDEAS

- 1) Notice the updip hydrocarbon potential in fault blocks A and B as seen on the 3-D Density Contrast map.
- 2) Notice the "missed opportunity" in fault block C as seen on the 3-D Density Contrast map.
- 3) Notice the bypassed pay in fault block D that was not produced completely. This is because the well was not drilled in the optimum location.
- 4) Imagine being able to generate higher yields in existing fields, reevaluate old or declining fields, optimize new fields and explore efficiently by applying this exciting new technology.
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Structure map, conventional seismic section, far-angle (26-45 deg) stack, and CDP gathers at the two gas discoveries. The AVO analysis lowered the risk of these two small prospects and made them economically attractive.

AVO Study

from page 24

"But even though both reservoirs proved to have the predicted facies, only one well had a commercial gas accumulation."

Undaunted, the exploration team returned to the drawing board to determine how to better risk future drilling prospects.

The One-Two Punch

Subsurface geology along with structural and stratigraphic interpretation of seismic data historically have been the tools used to explore the Vicksburg. There is a dearth of bright spot examples

because the trend is not an amplitude-supported play.

But Hastings and his colleagues soon found that a novel seismic processing technique combined with close attention to rock properties provided the one-two punch needed to beat the odds in their drilling program. Indeed, the resulting activity yielded six commercial discoveries (including two stratigraphic traps) and two dry holes for a 75 percent success rate.

The turnabout from the early drilling disappointment began when the group acquired comprehensive log suites that included dipole sonic data in order to better understand rock properties of the target zones in the two initial wells.

To predict AVO behavior, synthetic common reflection point, or common depth point (CDP) gathers were modeled using log data. Small contrasts in acoustic impedance between both the gas-bearing and wet sands and the encompassing shales were evident. Poisson's ratio – a measure of a rock's rigidity – in the gas sand was observed to be significantly lower, however, than in either the encasing shales or the wet sands, Hastings noted.

On the modeled gathers, the small acoustic impedance contrast at the top of the gas reservoir resulted in a weak reflection at near offsets, while the strongly negative Poisson's ratio contrast yielded a strong negative reflection at far offsets – a Class 2 AVO anomaly, according to exploration team member Mark Gregg, formerly with Edge.

The onset of the anomaly is at an offset equal to reservoir depth, or an incident angle of about 26 degrees. Positive reflections at near-offsets exhibited at the tops of the water sands weaken with offset.

"Because of the modeling study, we were motivated to undertake a pilot prestack reprocessing project to test the hypothesis that Vicksburg gas fields exhibit Class 2 AVO anomalies," Hastings said.

"The reprocessing technique that was used yielded useable data at incident angles more than 40 degrees to enhance observation of the targeted anomalies."

Seeing Something Different

In the two early wells, which were used as test sites, reprocessed CDP gathers with non-hyperbolic moveout revealed a distinct difference in AVO character between the wet sands and the gas-bearing sands. The gas zone produces a clearly defined Class 2 AVO anomaly, but the wet sands do not.

The pronounced far-offset reflectivity that characterizes this type anomaly is realized only at incident angles greater than 26 degrees or so. Hastings noted the most highly developed part of the anomaly would be muted on a stack processed with conventional normal moveout.

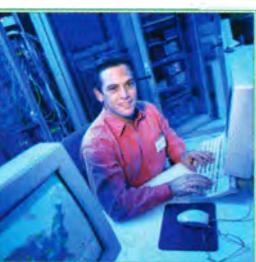
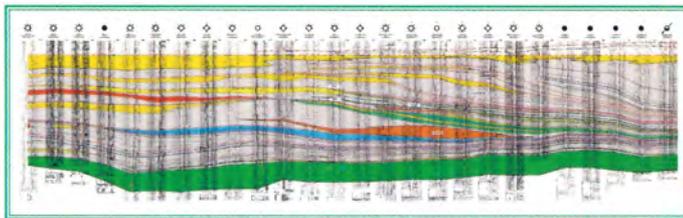
Angle stacks through the two wells were used as a tool to identify and assess the weak near-offset and strong far-offset reflections of the targeted Class 2 anomalies. This evaluation provided the impetus to reprocess a larger part of the 3-D survey.

Near-angle and far-angle stacks in the reprocessed volume were compared, providing invaluable insight into the Vicksburg trend, according to Hastings:

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See **South Texas**, page 28

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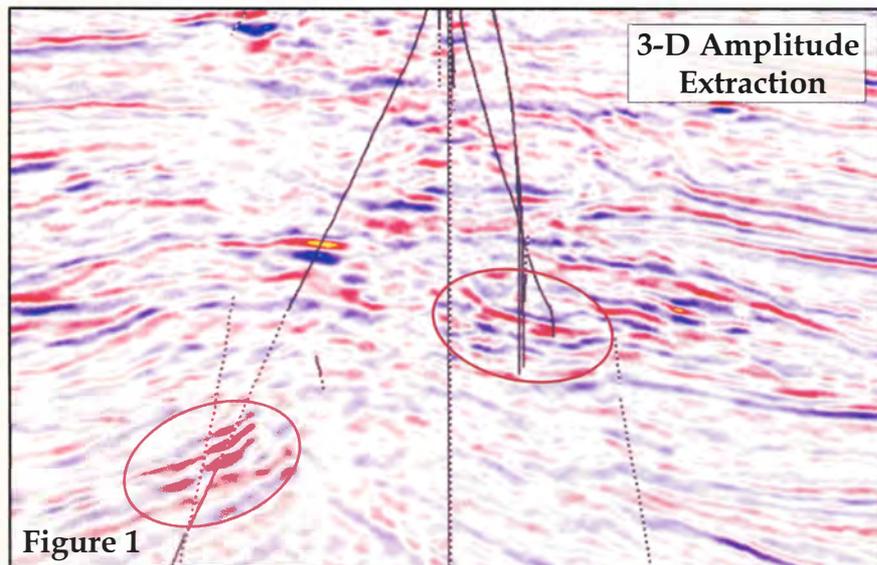


Figure 1

Figure 1 shows a conventional 3-D seismic profile in which we've circled events that are associated with non-bright pay. Notice there are no distinct brightness variations around these pay zones relative to the surrounding

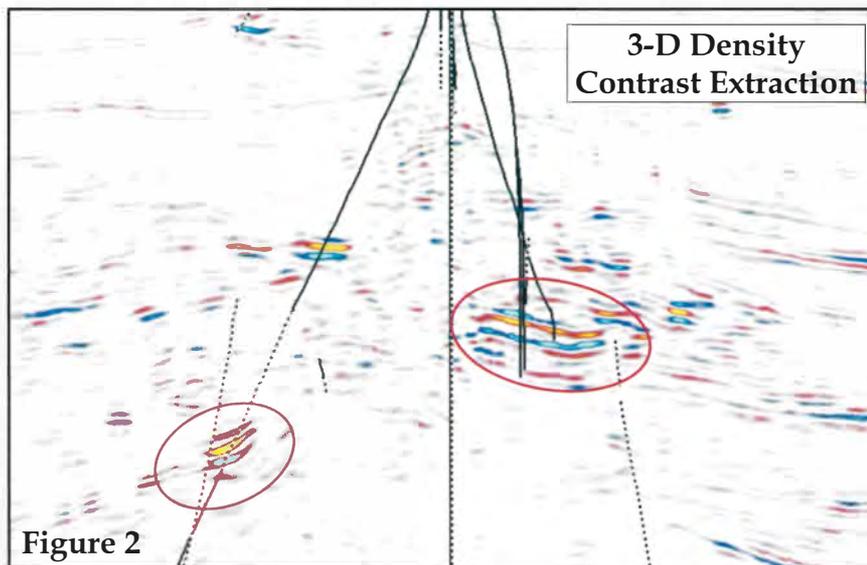


Figure 2

area. Compare this same profile to the 3-D Density Contrast Extraction in Figure 2. As you can see, these pay zones have an associated density anomaly on the Density Contrast extraction, not evident in Figure 1.

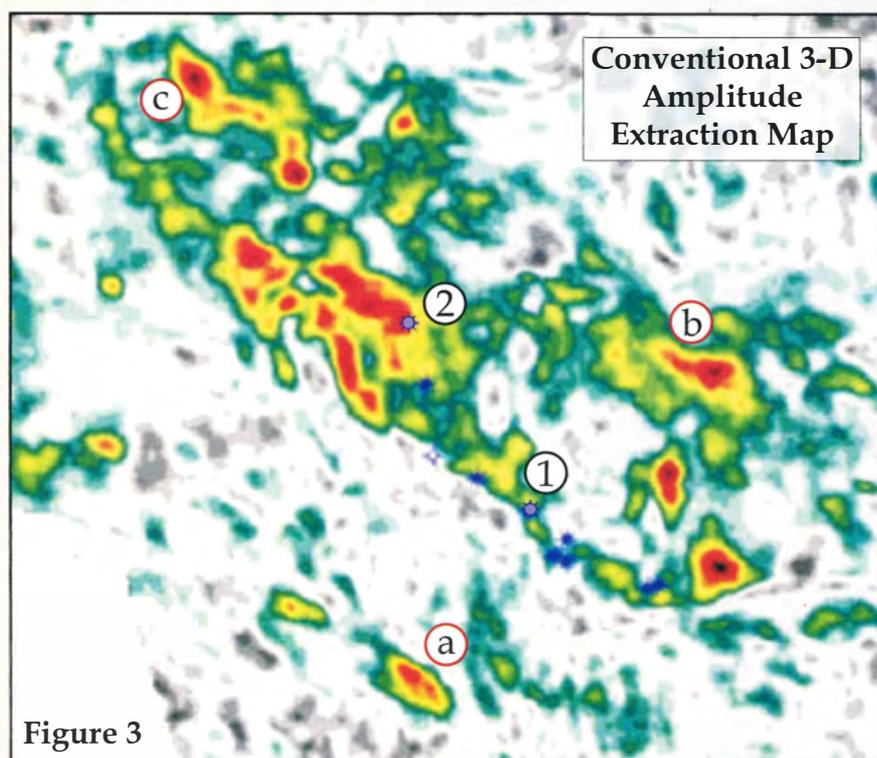


Figure 3

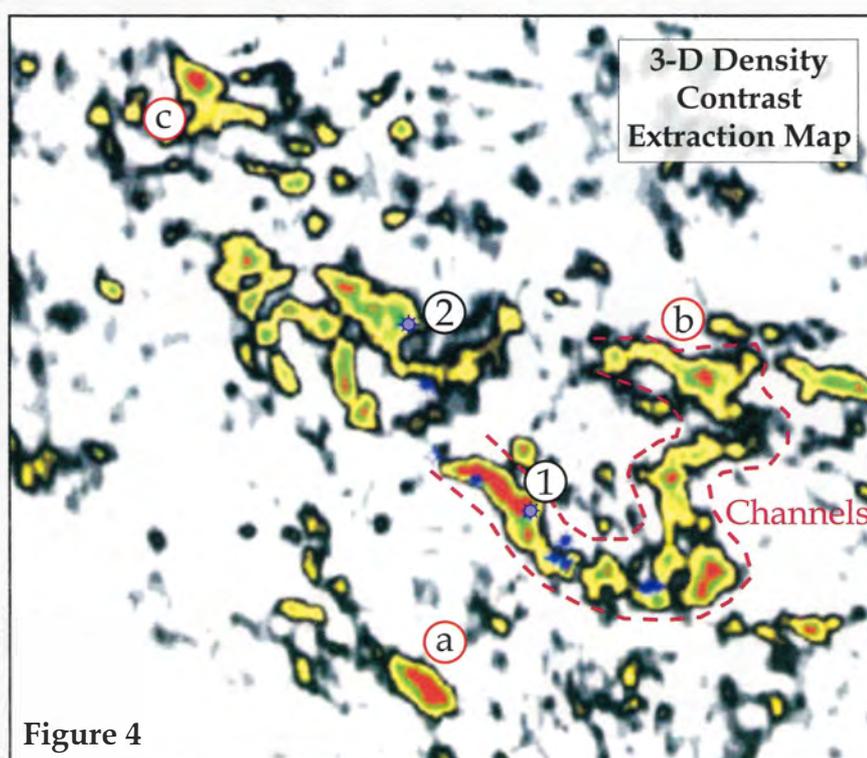


Figure 4

OBSERVATIONS / IDEAS

- 1) Notice the well defined channel system on the Density Contrast Extraction (figure 4) that is not evident on the amplitude extraction (figure 3).
- 2) Well No. 1, the field's top producer (2000 bbls/day), does not penetrate a strong amplitude anomaly (figure 3) but it does penetrate the strong density anomaly within the channel system as seen in figure 4.
- 3) The No. 2 well tagged the brightest part of the conventional amplitude anomaly (which is also within the corresponding density anomaly, but not the optimum location) and it only produced 1000 bbls/day.
- 4) Notice the missed opportunities in areas a, b and c.
- 5) Since the Density Contrast tool identifies the sweetest (optimum) part of the reservoir, field development costs could be reduced by as much as 50%! (Fewer wells to deplete the reservoir will translate into significant savings!)

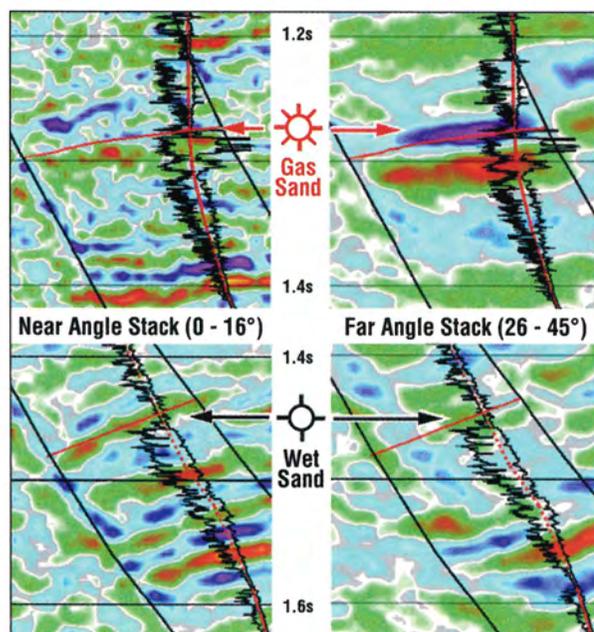
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Far-angle (26 – 45 deg) and near-angle (0 – 16 deg) stacks through two test wells. The gas well shows a strong Class 2 AVO anomaly at the gas reservoir, while the wet sand shows no AVO anomaly.

Graphics courtesy of
Edge Petroleum

South Texas

from page 26

□ In the study area, roughly half of the 100 or so Vicksburg gas wells with cumulative production of more than one BCF were associated with Class 2 AVO anomalies.

□ About 65 percent of the approximately 70 anomalies drilled that appeared to be geologically valid targets had commercial gas accumulations.

□ Thicker, better developed reservoirs had the most distinctive AVO anomalies.

□ Most of the productive anomalies occurred at depths between 5,000 and 10,000 feet.

The exploration team members

concluded that near- and far-angle stacks appeared to be a valid exploration tool to identify prospective Class 2 AVO anomalies in the Vicksburg, with an anticipated success rate of 65 percent.

They proceeded to conduct reconnaissance exploration within the reprocessed data by visualizing anomalies in the far-angle stack data set.

Anomalies visually “popped out” of the data, according to Gregg. He said they catalogued known gas reservoirs as productive analogs and readily identified untested anomalies as prospective targets.

The initial well – drilled on the basis of information derived from the reprocessing exercise – had both stratigraphic and structural trapping components, adding an element of risk over a relatively simple structural trap.

Drilling commenced based on the strength of the AVO anomaly, and the bit encountered a 100-foot gross interval with 72 feet of net pay at the anomaly. Initial production was three MMCFD. The conventional NMO stack showed no evidence of an anomaly.

“If we hadn’t had the AVO tool,” Gregg said, “the prospect most likely would have been missed because of its stratigraphic nature.”

‘Dramatic Improvement’

A couple of the successful AVO-based wells involved a small upthrown fault trap associated with two Class 2 AVO anomalies.

“During the pre-AVO program, the small trap wasn’t deemed prospective because it was unattractive economically, with a 20 percent probability of success,” said Charles Bukowski, formerly with Edge. “Using the statistical AVO success rate of 65 percent, Edge decided to drill, and the combined EUR for the two producers is 4.5 BCF.”

One of the unsuccessful AVO attempts was drilled where a Class 2 AVO anomaly was interpreted as a stratigraphically-trapped gas reservoir. With no well control to validate the anomaly, the prospect was drilled based on the anomaly, and the bit encountered 105 feet of clean, low-gas saturation sand.

Hastings noted this dry hole highlights two pitfalls of the AVO method:

✓ Anomalies can be caused by reservoirs having either commercial or non-commercial gas deposits.

✓ Great-looking anomalies can be tempting to drill even though they don’t really satisfy criteria for conventional prospect evaluation.

Still, the positives vastly outweigh the negatives.

“The 75 percent success rate we realized using the AVO method is similar to the 65 percent rate predicted by statistical analysis,” Gregg said, “and it represents a dramatic improvement over the 20 percent we achieved with conventional subsurface and structural mapping evaluation.” □

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SNEAK PREVIEW

Welcome to our Birthday Party!

As President in the 50th Anniversary year of the EAGE, I'm very proud to be inviting the geoscience and engineering family around the world to Amsterdam 2001. We are planning a very special celebration of the history and 'golden' achievements of our community over the last five decades. It is worth coming for this alone. But it will also be a very important occasion for looking forward.

The industries we serve are in a period of great change, in structure and in competitive outlook. For many EAGE members this has meant a time of turmoil and fundamental adjustment in the traditional divisions between geoscientific and engineering disciplines. We have tried to reflect this by choosing as the theme for this year's conference and exhibition – People and Technology. To me, this signals that only a combination of people and technology can meet the very challenging years ahead. My hope is that those coming to Amsterdam 2001 will recognise that the event –

conference and exhibition – presents the very best in science and technology for our industry, and provides the opportunity to meet the dedicated people involved. So, Amsterdam 2001 will offer many indicators as to where we are heading, as well as reminders of the great journey so far.

Highlights for me will be the technical programme, a genuine mix of geoscience and engineering; the interactive sessions, making the people behind the technology more accessible; the exhibition and the particularly strong opening session. Of course, there is much more, which you can read about elsewhere. I would personally insist that everyone makes the most of the lighter moments we have organized for the EAGE's 50th Birthday. Take time, too, to appreciate the great city of Amsterdam. But above all, just be there. Amsterdam 2001 will be special!

Etienne Robein
President EAGE

Counting down to our 50th Anniversary

Workshops

W1 Sunday 10 June 09.00 - 17.00
Environmental Geophysics

W2 Sunday 10 June 09.00 - 17.00
Downhole Geophysics, the next leap!

W3 Sunday 10 June 09.00 - 17.00
Geophysical Applications of the Wavelet Transform

W4 (Educational)
Sunday 10 June 09.00 - 17.00
Seismic anisotropy for the rest of us

W5 Monday 11 June 09.00 - 17.00
Integration between 4D and reservoir fluid flow properties

W6 Monday 11 June 09.00 - 17.00
What is wrong with the current practice of constructing HCIIP and reserves expectation curves!

W7 Monday 11 June 13.00 - 17.00
Practical P-wave imaging and processing in VTI media

The full technical programme is available on our website: www.eage.nl

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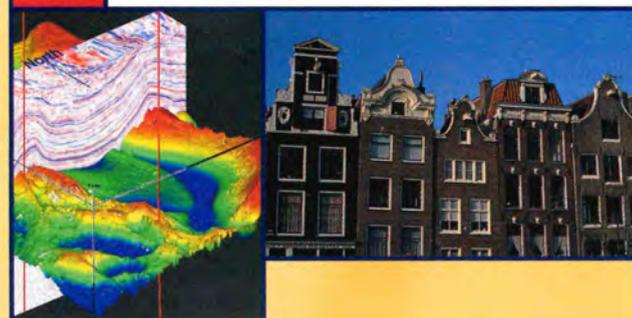
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For the latest updates, see our website at www.eage.nl



AMSTERDAM 2001



For more information and registration check our website (www.eage.nl) or the 2nd Announcement

Harald Nordberg, Technical Programme Officer, reports on the Conference programme

Our Golden Anniversary Conference in Amsterdam is fast approaching. Maybe not for most of you, for whom it's an event still several months down the road. In other words, plenty of time!

But, for some, preparing for Amsterdam has been a major focus of activity for many months. Dozens of volunteers have been hard at work to ensure that the event is a success, and we believe that their efforts will materialize into something very special this year.

We are at the stage where the Technical Programme Committee liaises with the reviewers of all the submitted abstracts to choose the final papers to which delegates can look forward in Amsterdam. It's been particularly encouraging that the preliminary count of submitted abstracts is up on recent years. Hopefully this is a sign that our industry is recovering from the turmoil of the last year, at least for the time being.

If we allow ourselves a sneak preview of the menus being planned for Amsterdam, we can see a number of special sessions led by invited chairpersons distinguished in their own fields. They have taken responsibility for preparing their

sessions which should guarantee a very high quality in the presentations.

This year is also exciting because we are introducing Interactive Sessions. One lecture hall will be dedicated to these sessions, where we are aiming to stimulate a level of discussion and exchange of ideas which cannot normally be accommodated in a standard oral presentation.

Oral and poster presentations will of course dominate the programme, and virtually every topic in the geosciences and engineering disciplines to do with exploration and exploitation of natural resources is touched upon. In addition the Forum for Continuing Education, initiated at the Glasgow EAGE meeting last year, will be followed up in Amsterdam.

We would also encourage you to consider participating in some of the workshops held in conjunction with the main event. This year we are offering access to all seven workshops for a single, specially priced Workshop Package Fee. And don't forget the EAGE/SEG sponsored DISC course being offered this year by Fred Hilterman on Seismic Amplitude Interpretation.

We welcome you in Amsterdam!

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Convention Runs June 3-6

Denver Pre-Meeting Deadline Is April 26

An important date regarding your plans to attend the AAPG annual meeting in Denver is about to arrive.

The preregistration deadline – which allows members to register at the special advance meeting rate – is April 26.

By registering before the deadline members will be able to save as much as \$70 off on-site fees – and can help reserve a place in any of the attractive short courses or field trip offerings planned both before and after the meeting.

Some of the field trips will visit sites that are among the most spectacular displays of geology's beauty that you'll find. (See the announcement for specific information.)

This year's annual meeting will be held June 3-6 at the Colorado Convention Center in downtown Denver, organized under the theme "2001: An Energy Odyssey."

The official meeting announcement has been mailed to the membership, and is also available online on the AAPG Web site at www.aapg.org.

The meeting will offer an extensive technical program, exhibition, forums, luncheons and activities that will include the inaugural Interactive E-Poster session (see related story, page 20) and the Career Transition Workshop.

The technical program is organized around the following themes.

- ✓ Business, Opportunity and Vision.
- ✓ Environment.
- ✓ Technology.
- ✓ Gas.
- ✓ Petroleum Systems.
- ✓ Depositional Systems and Sequence Stratigraphy.
- ✓ Reservoir Geology and Characterization.
- ✓ Structure and Tectonics.

And also scheduled are four special forums, all at the convention center. They are:

□ **History of Petroleum Geology: Petroleum-Geology History in Selected States**, to be held from 1-3 p.m. Sunday, June 3.

□ **Public Lands Access**, which is the first joint DPA, EMD and DEG forum, to be held from 3-5 p.m. Monday, June 4.

□ **The Michel T. Halbouty Lecture: Through a Crystal Ball**, a newly established lecture series, this year sponsored by the Astrogeology Committee and featuring a presentation by Carolyn Shoemaker, planetary advisor at the Lowell Observatory in Flagstaff, Ariz.

□ **Applied Sustainability Forum: Integration of Metrics and Applications**, a DEG forum to be held at 8 a.m. Wednesday, June 6.

There are several ways to preregister for Denver:

□ **By fax** (the fastest and preferred method) – Use the form found in the back of the meeting announcement and fax it to 1-800-281-2283 (United States and Canada only), or 918-560-2684. The fax line is open 24 hours.

(For a downloadable registration form that you can complete and fax, go online to www.aapg.org/meetings/annual2001.)

□ **By mail** – Mail the form to AAPG Annual Convention, P.O. Box 979,

Tulsa, Okla. 74101-0979, or 1444 S. Boulder Ave., Tulsa, Okla. 74119-3604.

□ **By phone** – Telephone 1-888-945-2274, ext. 617 (United States and Canada only), or 918-560-2617.

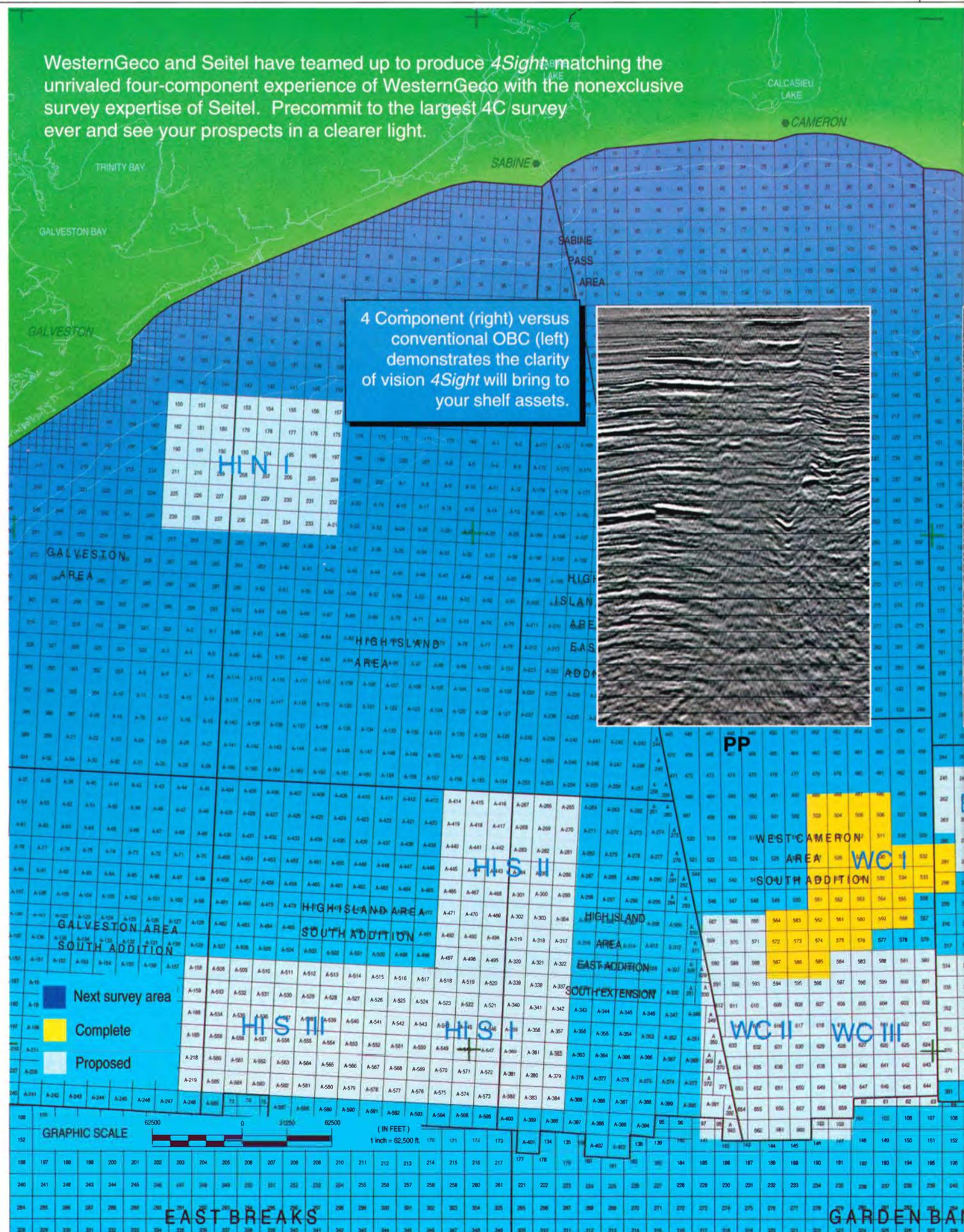
This is for AAPG members using credit cards only; have your member number and complete information handy.

For more information, go to the AAPG Web site at www.aapg.org. □



Photo courtesy of Chris Cornelius

A field trip to the Raton Basin and mountains of the Spanish Peaks intrusive complex will be included as part of this year's annual meeting program.



Congressional Hearing, Energy Summit

AAPG Pushes Policy Initiatives

AAPG is at the forefront of two major initiatives to further the profession of petroleum geology that are planned in Washington, D.C., involving an invited appearance before Congress in March and a special AAPG-convened Energy Summit in April.

AAPG President Marlan W. Downey is scheduled to present testimony before the U.S. House Subcommittee on Energy & Mineral Resources, chaired by Rep. Barbara Cubin (R-Wyo.) on March 15. Downey will present testimony concerning the U.S. onshore and offshore natural gas

resources and the need for access to federal public lands.

The invitation on behalf of Rep. Cubin was offered following previous AAPG testimony before both House and Senate panels concerned with U.S. natural resources.

AAPG's legislative effort also will be assisted by David Applegate, of the American Geological Institute, and others.

In April, AAPG will be the convening body for a major Energy Summit that is attracting the attention of highly placed staffers in Congress, the Executive Branch and regulatory

agencies.

The focus of the by-invitation-only Summit will be to "pull together National Energy Policy recommendations," according to organizers.

"Our nation faces an ever-growing production shortage of domestic oil and ever-increasing imports of foreign oil – a dependence that holds America hostage," Downey wrote in explaining the need for the Summit.

"The fact is," he continued, "we lack an effective U.S. Energy Policy."

Carl J. Smith, of the West Virginia Geological Survey, and Lee C.

Gerhard, of the Kansas Geological Survey, are instrumental in coordinating the agenda and logistics, which will include the presidents of other scientific, professional and learned societies that are joining with AAPG in the Summit. Gerhard is chairman of the Division of Professional Affairs Government Affairs Committee.

Co-conveners are the American Association of Professional Landmen, American Institute of Professional Geologists, Association of American State Geologists, Society of Professional Earth Scientists and the Society of Exploration Geophysicists.

Summit co-sponsors are the American Geological Institute, Interstate Oil and Gas Compact Commission, Potential Gas Committee, National Petroleum Council and the National Association of State Energy Officials.

Reports on the AAPG initiatives in Washington will appear in the May and June EXPLORERS. □

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GREEN CANYON

GOCAD

from page 10

enhance the move to outcrop visualization:

□ Researchers are now building 3-D outcrop models with GOCAD software, developed in France.

The GOCAD Research Program was begun by the computer science group of the National School of Geology in Nancy, France, and is managed by the Association Scientifique pour la Geologie et ses Applications (ASGA).

Bhattacharya said use of GOCAD has been a breakthrough application at UT-Dallas, and McCormick said he hopes to load GOCAD for his Namibia project.

□ Another breakthrough development might be use of seismic instead of ground radar for deeper penetration of outcrops.

"The problem with GPR is that it doesn't penetrate very far," Bhattacharya said.

□ And in the future, you may walk into a 3-D outcrop display instead of walking up to an outcrop.

"Most of the biggest corporations have these visualization rooms," Bhattacharya observed. "They're realizing those are good places to visualize the guts of these reservoirs." (See related story, page 12.)

Technologies for 3-D outcrop studies may have become less expensive, but that's probably not the major consideration for industry, Bhattacharya said. Getting good, applicable information in a timely manner makes the difference.

"Companies can't afford to send their best geologists into the field for three months to gather outcrop data," he said. "The big cost for the oil companies is in time."

He has no doubt 3-D outcrop visualization will become a standard for the industry. You may never see outcrops in 2-D, even mentally, again.

"Once a technology is developed," he said, "everybody wants it." □

*But Pockets of Activity Possible***Questions Cloud Hydrate Potential**

By THOMAS G. DOLAN
EXPLORER Correspondent

The resource known as gas or methane hydrates, which lies frozen in combustible ice crystals below the ocean floor – or closer to the surface in the Arctic regions – has been estimated to represent double the energy potential of all of the world's conventional oil, gas and coal reserves combined.

That is a potential that has many geoscientists and industry companies anxious about the future – and with good reason.

But Timothy S. Collett, a research

A poster session on gas hydrates, sponsored by the Energy Minerals Division, will be presented Wednesday morning, June 6, in Denver at the AAPG annual meeting.

The session will feature 12 posters, including:

- ☐ "A Worldwide Assessment of Coincidental Gas Hydrate and Petroleum Gas Occurrences."
- ☐ "Gas Hydrates in a Complex

geologist for the U.S. Geological Survey, Denver, who has been involved in the research of gas hydrates for the

Geologic Province, Northern Gulf of Mexico."

☐ "New 2-D and 3-D Seismic Data from a Dynamic Gas Hydrate/Free Gas System, Blake Ridge."

☐ "Thermogenic Gas Venting and Gas Hydrate in the Gulf of Mexico: Potential Significance to Climate Change."

☐ "MITI Nankai-Trough Gas Hydrate Drilling Program – An Overview of Field Operations."

past 20 years, sees the question marks that accompany the potential.

Collett, who delivered a paper on

the subject at last year's AAPG Wallace C. Pratt Memorial Conference on Petroleum Provinces in the 21st Century, believes that along with the vast possibilities, there are considerable uncertainties.

For starters, Collett lists three main issues.

✓ There are hazards involved.

Typically, when a conventional drilling installation is set up on the ocean floor that will drill through the hydrate crystals, the gas can become separated from the water, causing an explosion. Also, this separation can upset the solidity of the sediment on the ocean floor, creating a landslide effect.

The latter is not a danger on Arctic land surfaces, but the explosion danger is there.

✓ It is not yet clear whether these methane gases can be harvested in an environmentally safe way without contributing to the greenhouse effect, or destabilizing continental margins, possibly triggering undersea landslides and potentially cataclysmic tsunami waves.

Some experts point to evidence that massive, naturally occurring releases of these gases in the past contributed to abrupt changes in the earth's climate, as well as towering tsunami waves like one that wreaked havoc in northern Europe 8,000 years ago.

✓ The harnessing of these gases as an energy resource is a difficult proposition, although, in this issue, real progress has been made.

Collett said that since the 1970s the Ocean Drilling Program (ODP) and its parent Deep Sea Drilling Program (DSDP) have acquired a significant number of samples of direct geologic data relating to these hydrates. These explorations have been scientific, and dealt with issues such as plate movements and climate changes regarding these hydrates.

"Basically, these hydrates have been revealed to exist around the ocean margins of the world," Collett said. "However, many occur within clay dominated rock sequences, which would not be considered as a conventional reservoir."

Collett adds that there are often low concentrations of this gas, though they are distributed over a broad area.

On the other hand, highly concentrated quantities of this gas have been discovered within conventional reservoir routes in the Arctic, specifically in the west Siberian basin of Russia, the McKenzie River Delta in Canada and on the North Slope in Alaska.

Accidents and Intentional Lessons

In the late 1960s and early 1970s, Russians drilling in the Messoyakha field in northeast Siberia discovered this gas by accident.

The Russians were drilling for conventional gases, which were underlain by the hydrate gases. The drilling changed the pressure of the reservoir, releasing the underlying gases, producing a bonanza that hadn't been anticipated.

It was only afterwards, in noting the

continued on next page

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Web Attitude

from page 23

"I'm very dependent on people spotting things that are wrong," he said. "I can't go through it and QC everything."

Time to Laugh

In addition to details about Senteur de Boue (no relation to Ame de Boue of the Bush Administration), the SJGS site carries a humor page with several entries dedicated to the antics of Bill Clinton.

This may be a crisis of sorts for the site, since Clinton has given up his role as Washington's premier goret. "I'll have to get around to doing something

about that," Clark acknowledged.

In an area of the site devoted to personal information, Clark lists himself as an "ISTP" type on the Myers-Briggs personality test. He ranks highest in Introverted, Sensing, Thinking and Perceiving qualities. This compares to the typical profile of politicians on the extended Myers-Briggs test, with high scores in Judging, Extroversion and Responsibility, in addition to Knowledge and Sensing.

An astonishing number of politicians fit this JERKS profile, he said.

Clark estimated that he spends an hour updating the Web site every other week. "During the past couple of years it's been more of a maintenance activity," he said. He also runs a site for a local Boy Scouts of America troop.

A committee can help a site get started and succeed, but there should

be only one Web master, Clark warned.

"You can't have multiple Web masters," he said. "Then you're both uploading and you don't know what each other's doing."

Clark mastered enough Web coding to build the SJGS site himself, although many, easy-to-use Web design products are available, he noted.

"I write it from scratch," he said. "It's very simplistic, once you learn the basics on the code. It's not very intimidating at all."

If he sees something he likes elsewhere on the Web, he examines the code and can add it to the SJGS site. Other ideas are suggested by society members.

"People say, 'It would be neat if we had this,' and if I get a free block of time, I go and round it up," he said.

The SJGS Web site includes links to

other societies, basic information about oil and gas, and a number of links to sites of interest to petroleum geologists. "Click spot," the home page directs, "cause he knows where to go."

It also provides information about the AAPG's Division of Professional Affairs Certified Geologist program as well as an oil industry exhibit at the Kern County Museum.

In addition to jokes about the foibles of human beings, the site includes humor related to engineers and lawyers.

It takes care to follow the commandment, "Thou shalt not be boring."

Clark knows SJGS members value their Web site, and watch it closely:

"If it goes down, or if it isn't available for awhile, I'll hear about it pretty quickly." □

continued from previous page

changes in the reservoir pressure, that the Russians concluded the existence of the hydrate gases. The nature of the findings, however, was not particularly helpful for future research.

A more intentional – and more valuable – effort in terms of measurable results was made in 1998 by the Japanese National Oil Corp. and Geological Survey of Canada in McKenzie, in the Mallik 2L-38 gas hydrate research well.

The results of this venture (published in the 1999 Geological Survey of Canada Bulletin 544) confirmed both the existence of the hydrates and the viability of the engineering technology designed to harness the same.

Partnerships are now being formed for actual drilling in 2002. The USGS and Department of Energy will be involved as secondary partners, along with others. In fact, in 1993, Collett published through the USGS an AAPG article reviewing the distribution of gas hydrates around the Prudhoe Bay oil fields.

"From this study," Collett said, "I concluded that the Prudhoe Bay field may contain as much as 45 trillion feet of gas."

There When You Need It?

The driving force in these endeavors, however, is the Japanese National Oil Corp., in partnership with its government. Japan has been engaged in the Mallik venture mainly to learn what it could for its more immediate project in the Nanakai Trough, just off of the southeast coast of Japan.

The reason is clear.

"Japan imports 98 percent of its energy resources," Collett said, "so that country has the motivation to spend much more time and money in making gas hydrates a viable source of energy."

Collett adds that, in terms of gas hydrates, the Mallik and Nanakai wells are geologically very similar.

The United States, however, doesn't face a similar urgency, and Collett doesn't see the existing structure for energy exploration being challenged soon.

"I don't believe there will be a rush to market the gas hydrates," Collett said. "I don't think there will be a significant offshore interest in marine gas hydrates for 30 or more years."

"However, in very localized areas, such as the North Slope in Alaska, I believe there may be some real domestic activity within the next 10 years or so." □

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UK Research Bobs for Bubbles

Can Lasers Help Stop Blowouts?

By KATHY SHIRLEY
EXPLORER Correspondent

Blowouts are bad, right? Scientists have worked hard to prevent and minimize the damage to life, property and the environment caused by these out of control wells.

But wouldn't it be nice to have some method to anticipate a blowout and take measures to prevent it *before* it happens?

That's just what one research project could potentially bring to the industry.

A recent three-year study conducted at Reading University in the United Kingdom tested the use of lasers to

detect and quantify the presence of gas bubbles in the drilling slurry during drilling operations.

This new method measures simultaneously the velocity, size and refractive index of large, optically transparent bubbles and droplets – based on the time displacement of refracted and reflected beams scattered from the moving particles, according to David R. Waterman, a physicist with the J.J. Thompson Physical Laboratory at Reading University.

"Phase Doppler anemometry techniques used today have an upper

size limitation and do not address the velocity of gas bubbles coming into the well," Waterman said. "The pulse displacement technique developed in this project has the ability to measure simultaneously the size, velocity and refractive index of particles and bubbles up to several millimeters in diameters.

"Detection of the bubbles gives the operator important information," he continued, "so the pressure of the slurry can be increased to push against the imminent increase in pressure from the gas pockets, potentially preventing a dangerous explosion."

Tiny Bubbles

The project was initiated when Schlumberger Cambridge came to the university with an interest in looking at bubbles in the drilling slurry, hoping to develop a method of using a fiber optic sensor.

"We started off looking at something that we could actually put down the borehole on fiber optics to detect gas bubbles and therefore gas pockets," Waterman said.

Researchers "realized early on" that the limited amount of funding meant they would have to develop a system that worked in the laboratory, and then "see where that would take us.

"But the idea was borne specifically to address the needs of the oil industry," Waterman added.

Basically the system used a laboratory bench laser and diffraction grating to get three sheets of laser light.

"Sheets of light rather than a beam was necessary," he explained, "because, as you can imagine, these bubbles coming into a wellbore are not moving in a nice regular column – they are all over the place."

Detecting all the bubbles demanded a broader coverage with the laser.

"That's one of the limitations of the Doppler systems used today," he said, "because they only use a beam and miss a great deal of the bubbles."

A diffraction grating is used to obtain multiple beams from a laser light source. A cylindrical lens placed in front of the grating transforms the three circular beams into three planar sheets. The two outer sheets define the probe volume.

"As the bubbles move through the sheets of laser light they light up like dust particles through a cinema projector beam, and we look at how the light is reflected and also refracted," he said. "We have two detectors that pick up these different pulses."

This analytical method relates the time interval between pulses from the refracted and reflected beams to the velocity, diameter and refractive index of the gas bubbles.

✓ The velocity is obtained from the time-of-flight measurement of refracted pulses, from either detector.

✓ The diameter of the particle is determined from the time of flight of reflected pulses between the two detectors.

✓ The refractive index is obtained from the ratio of the time of flight of the refracted pulse and the reflected pulse between the two detectors.

The minimum measurable particle diameter with this configuration is estimated at about 0.2 times the sheet thickness.

Eventually the pulses become so broad that they merge, resulting in an inability to measure the velocity accurately.

This method potentially gives oil companies another benefit: The refraction index allows operators to distinguish between actual gas bubbles and other debris floating around in the drilling slurry.

"Little bits of rock and such will give you pulses on the detectors and you need to be able to detect the difference," Waterman said. "By knowing the refractive index of gas you

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can tell exactly when you have a gas bubble."

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Initially the Reading University researchers used the laser pulse displacement method to measure gas bubbles in a large glass column in the laboratory. After fine-tuning the system they moved on to water droplets.

That laboratory experiment used a laser with a beam diameter of 1.5 millimeters, and the beam was split by a 20 lines millimeter diffraction grating, followed by a 40-millimeter focal length, cylindrical lens to create three laser sheets approximately one millimeter in thickness and 10 millimeters wide.

The average spacing of the three laser sheets was five millimeters along the direction in which the droplets fell.

Two photodiode detectors without receiving optics were located at 80 millimeters from the point of intersection of the falling line and the central laser sheet.

The nominal diameter of the water droplets was estimated by determining the volume of 200 droplets and the average diameter of water droplets were 5.78 millimeters. A typical recording signal was captured on a waveform recorder. The experiment confirmed the validity of the theory behind the new pulse displacement method.

Unfortunately, the project has not advanced past the laboratory stage due to funding limitations.

"It would be nice to develop the system further – to commercially develop the method – but until additional industry funding becomes available we are limited," Waterman said. "While we know

To 'E,' or Not to 'E'?

Online BULLETIN Now Available

AAPG is introducing MemberNet, an electronic alternative to the printed AAPG BULLETIN that offers members the option of receiving either a printed BULLETIN or an electronic version.

AAPG/Datapages now produces an all-electronic version of the AAPG BULLETIN for members who want to receive their BULLETINS via the Internet and CD-ROM rather than in the traditional printed form.

With MemberNet, all BULLETIN articles and monthly features are placed on a specially designed Internet Web site that will be available for members only. The articles also will be archived on a disc that is mailed to each subscriber every six months.

Members can select either the electronic BULLETIN option or the printed option as part of their annual dues; there is no additional charge unless a member wants to receive both.

Those who select the MemberNet option will receive a password via e-mail allowing immediate access to the new MemberNet Web site. For those members the mailing of printed BULLETINS will be suspended

immediately.

The service was first offered on this year's dues statements that were mailed to Active AAPG members in February. Other member classes will receive their dues statements later this month.

James H. Kempf, a retired geologist living in San Antonio and an Emeritus AAPG member since 1953, became the first AAPG member to subscribe to the new online BULLETIN.

Kempf, who has been retired for 16 years, said he likes the MemberNet offer because of the space he will save when one CD-ROM replaces 12 printed issues.

But saving space isn't the only benefit to the MemberNet subscriber. Other features include:

- ☐ Everything printed in the BULLETIN is available online – including memorials, convention information, announcements, calendars, reviews, etc.

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the science is viable, converting the method for downhole application would take a good deal of work."

The most challenging aspect of converting the system for field use, he said, would be developing the best way to withstand the downhole environment.

"Fiber optics is certainly the best

option to deliver the tool downhole," he continued, "and the one advantage this system would have over other downhole sensors is the fiber optic cable would simply be delivering the laser light downhole – the sensors and other equipment would still be on the surface."

He believes it would take another

three years to finalize a commercial instrument, but added that "this technology could potentially save the oil industry millions of pounds a year in blowout prevention.

"The earliest possible detection of potentially dangerous blowouts is the key to this method." ☐

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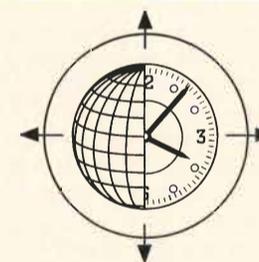
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GEOPHYSICAL CORNER

3-D Helps See Through the Mist

Precision Is Now the Norm For Pool Development

The Geophysical Corner is a regular column in the EXPLORER, edited by R. Randy Ray. This month's column is titled "3-D Seismic and Underground Gas Storage, or 'Will My Gas Be There When I Want It?'"

By H. JACK MEYER

The storage field geologist, while worrying about such things as spill points and thief zones, is primarily concerned with "location, location, location."

Is the pool where it is supposed to be?

Do the leases cover it and all possible escape routes?

Can I get a well into the reservoir where it needs to be?

The recent expansion of the Mist Storage Facility in northwest Oregon demonstrated that a well-designed 3-D seismic survey can yield an accurate geological framework from which these issues and more can be addressed.

* * *

The Mist Gas Field is located about 60 miles northwest of Portland, Ore., in the Coast Range Mountains near the town of Mist. The field is structurally very complex and consists of individual gas pools located in discrete fault blocks that range in size from 20 acres to 120 acres.

The productive interval, Clark and Wilson Sandstone of the upper Eocene Cowlitz Formation, is found at depths ranging from 1,200-2,700 feet. The marine deltaic reservoir sandstone is highly porous and permeable and has AVO characteristics similar to a class 3 gas sand of Rutherford and Williams (*Geophysics*, 1989).

The gas shows as a strong bright reflector because of increased amplitude with offset.

An accurate reservoir model is a prerequisite to successful gas storage development. In the Mist Gas Field, 2-D seismic and well data were used to discover and develop gas pools. In the late 1980s the conversion of a depleted pool to storage utilized this same data

set, augmented by more "observation" well data to define the pool's boundaries.

A subsurface geologic map of the depleted pool was constructed that fit the reservoir model developed from production.

From the mid-1990s on, the deregulated gas market has placed prime value on deliverability. A high volume horizontal well, which can replace several vertical wells, is the "new" tool that enables the Mist Storage Field to respond to the changing market. This fundamental shift in field operation requires that the geologic mapping be accurate enough to ensure that a horizontal well encounters the reservoir and stays inside it, as well as being detailed enough to guide and constrain reservoir modeling.

There is also a more critical reason for a crystal clear image of a storage reservoir; product security. There is a history in the storage industry of stored gas migrating to places out of control of the operator. Large "buffer" areas generally surround a storage field. An accurate geologic structure map of the reservoir is paramount.

At Mist, this meant acquiring 3-D seismic data over a 3.9-square-mile area of the field.

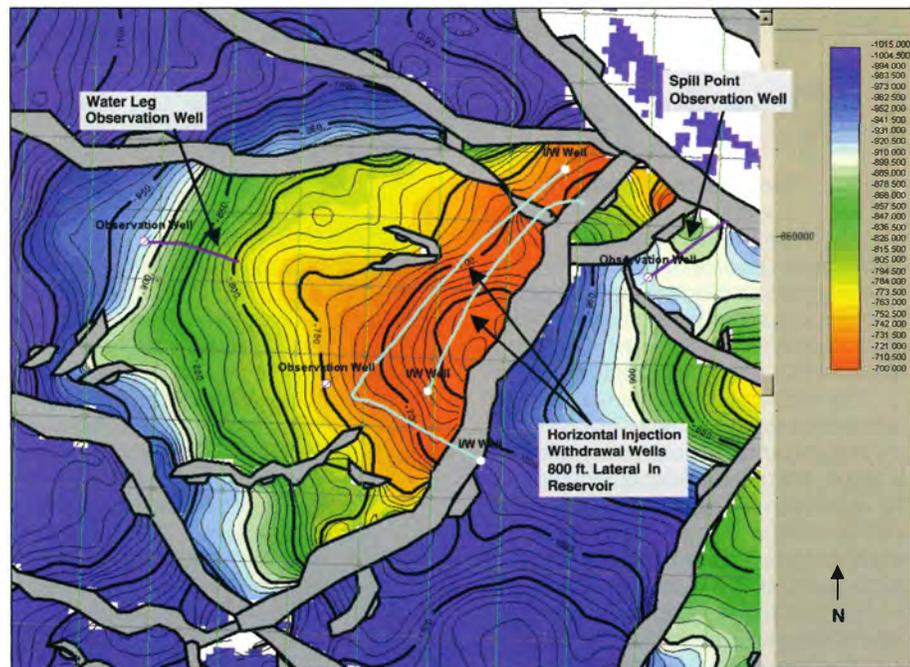
Specifications, Definition and Design

The shallow depth of the reservoir, high frequency content of the 2-D data and numerous steeply dipping fault surfaces dictated that a 40-foot bin size was required to clearly image the target.

Groves of 150-foot tall Douglas Firs, thick forested undergrowth, and steep topography (many slopes >100 percent) complicated data acquisition, not to mention data processing. Dynamite in shallow holes augured with heli-portable drills was the energy source.

Figure 1 is the subsea structure map

continued on next page



(Figures 1-3, 5-6 courtesy of NW Natural; Figure 4 courtesy of BP.)

Figure 1 – Subsea structure map to top of reservoir sandstone. The map was created by multiplying the time structure map, as interpreted from the 3-D data set, by the velocity gradient map. Color transition from white to green represents the pool's original gas/water contact. Grid distance is 400 feet on a side.

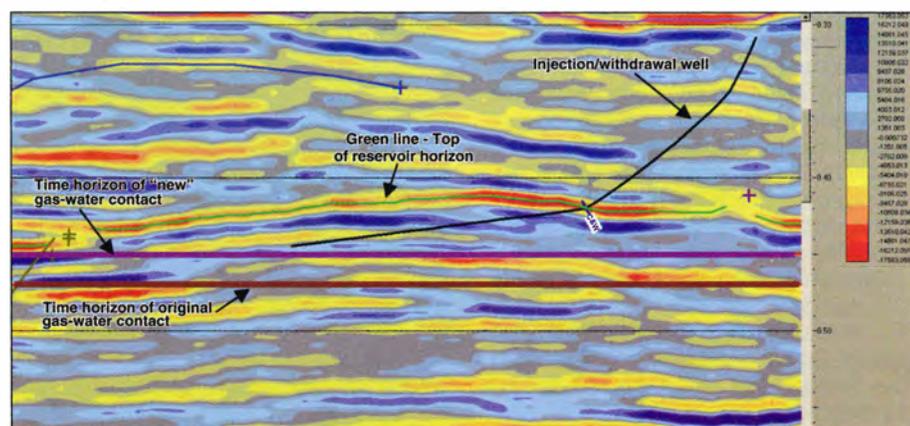


Figure 2 – Vertical seismic section parallel to the path of a "horizontal" well. Looking at many sections like this, and at time slices and flattened time slices, is invaluable when planning a well path. The amplitude anomaly continuity gives a "feel" for a variability of internal reservoir stratigraphy or structure.

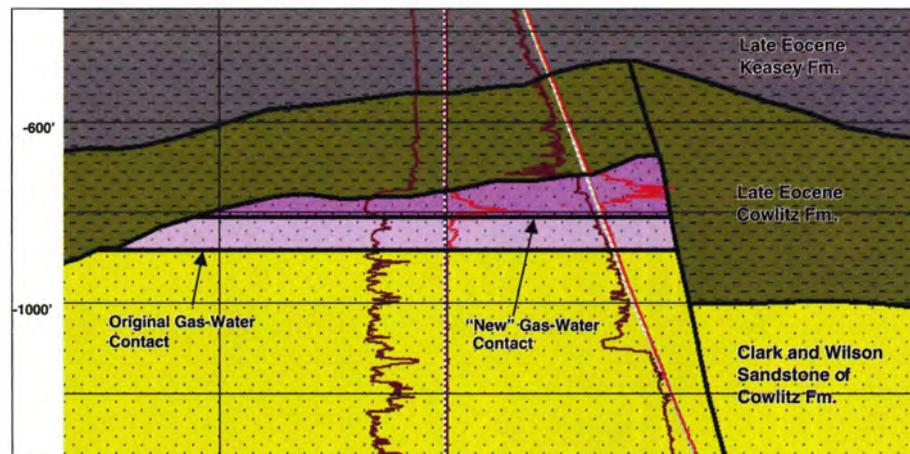


Figure 3 – Cross section through a Mist gas pool after primary production. Note the position of the "new" gas-water contact. Discovery well on left; injection/withdrawal well on right. Vertical exaggeration 1.7-to-1.

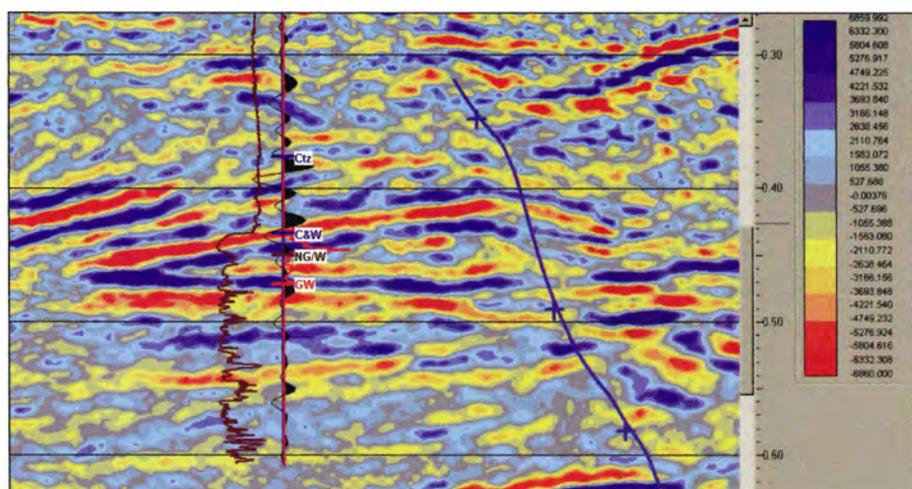


Figure 4 – Two-D seismic line acquired prior to primary production. Note strong trough (red) amplitude anomaly at top of Clark and Wilson Sandstone (C&W), and strong, flat peak (blue) amplitude anomaly at the gas-water contact (GW). (Figure published with permission of BP.)

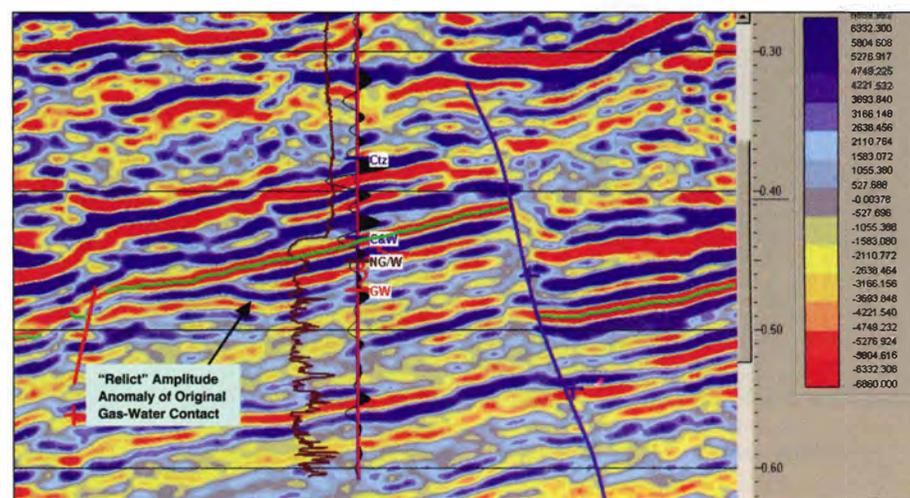


Figure 5 – Vertical seismic section from 3-D survey parallel to 2-D seismic section of figure 4. The top of the Clark and Wilson Sandstone (C&W) has a strong trough (red) amplitude anomaly. There is a "relict" amplitude anomaly near the downdip edge of the original gas-water contact (GW). There is no amplitude anomaly associated with the "new" gas-water contact (NGW).

continued from previous page

of the top of the reservoir sand derived from the 3-D data surrounding a gas pool that was converted to storage. It is the key product from the 3-D seismic survey:

- ✓ The reservoir engineer uses it to construct the reservoir model for production and drainage studies.
 - ✓ The geologist uses it to assign target depths to wells, to map gas migration paths, to pinpoint fault locations and measure fault throws for "thief" assessment. The geologist also uses it to site observation wells outside the pool to monitor the spill point(s).
- The accuracy of fault location and throw provided by the 3-D image allows the geologist and reservoir engineer to model a fault and its impact on reservoir transmissivity and water migration.

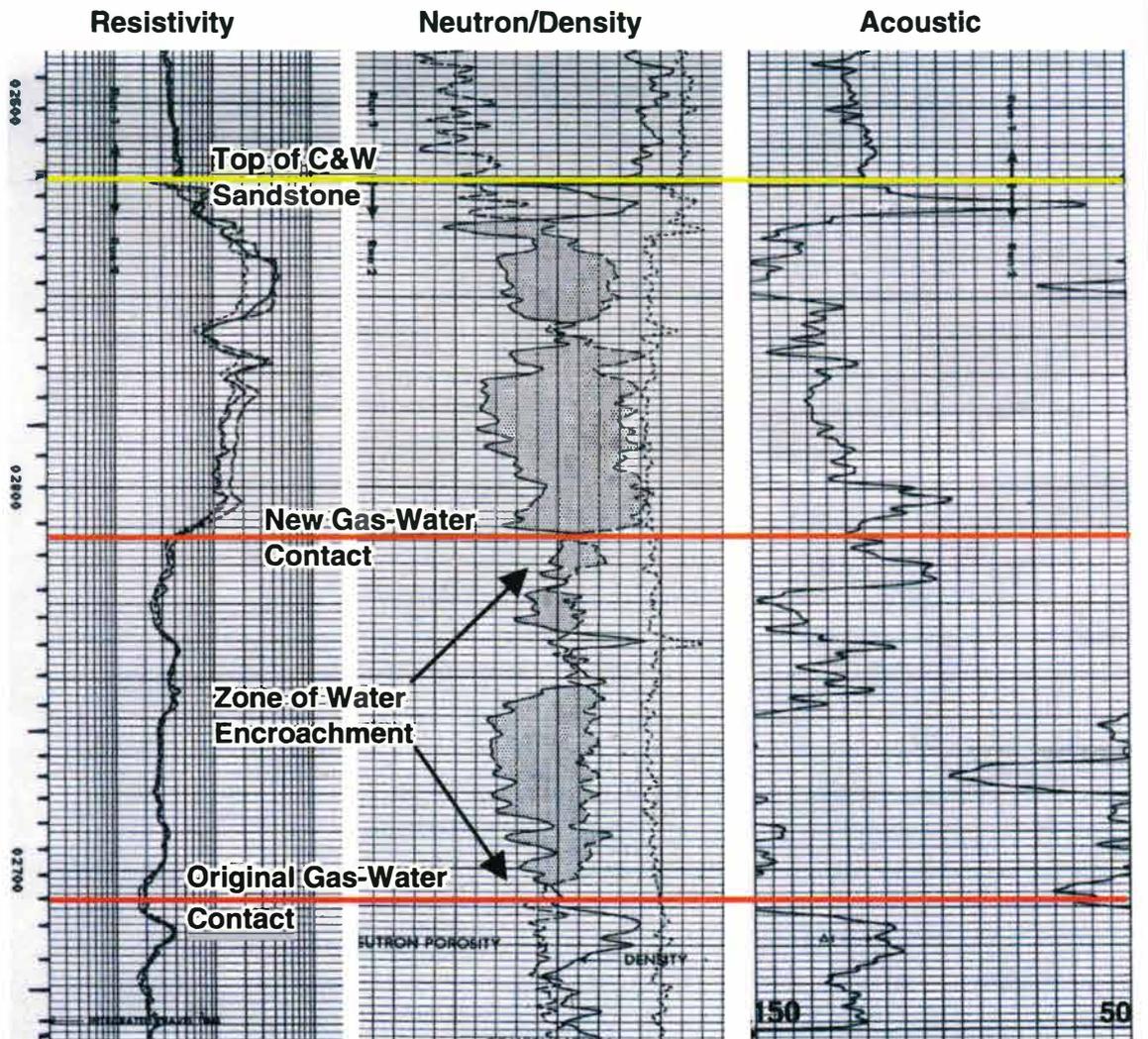
Figure 2 is a vertical seismic section parallel to the path of an injection/withdrawal well. The ability to visualize the well path is one of the powerful tools of a 3-D data set.

Gas-Water Contact

The depth to the gas-water contact is a critical piece of data for storage pool development when horizontal wells are to be used as injection/withdrawal wells. The objective is to cut as much of the reservoir rock as possible to defeat any permeability barriers while stopping comfortably short of the water leg.

Figure 3 is a cross section through a depleted pool that illustrates the dynamic nature of the aquifer. During primary production, water encroached into the reservoir several tens of feet

Figure 6 - The resistivity and neutron density logs of the mist storage pool development clearly identify the "new" gas-water contact. The sonic log, however, continues to respond to the original gas-water contact.



and defined a "new" gas-water contact. While the water invaded the reservoir from the bottom up, the "new" gas-water contact is not necessarily flat across the entire reservoir. At Mist,

variations resulting from changes in internal stratigraphy or faulting may be of a magnitude that would affect the performance of a horizontal well.

Figure 4 is the 2-D seismic line shot

through the pool prior to production. The line shows a strong trough amplitude anomaly (red) at the top of

See **Geophysical Corner**, page 39

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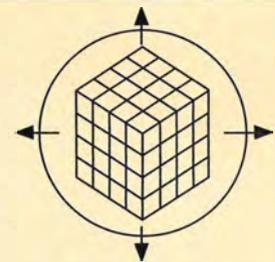
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BUSINESS SIDE OF GEOLOGY

A Case Against 'Most Likely'

By PETER R. ROSE

In the early days of E&P risk analysis, one of the most widely used terms was "most likely," representing some perceived intermediate outcome.

Back when many firms employed triangular diagrams to characterize the ranges of uncertainty attending various prospect parameters (such as productive area, average net pay, gross rock volume, HC-recovery factor, porosity, etc.), the peaks of the triangles were labeled – correctly – "most likely," corresponding to the statistical mode of the distribution.

But triangular distributions are poor proxies for the lognormal frequency distributions they purport to represent, leading in most cases to overestimating, i.e., optimistic bias (Figure 1).

Moreover, most prospectors just didn't recognize how severely skewed such natural distributions really are – the correctly plotted peak of most lognormal frequency distributions usually lies far to the left of the peak of most counterpart triangular distributions.

"Most likely" began to mean different things to different prospectors.

* * *

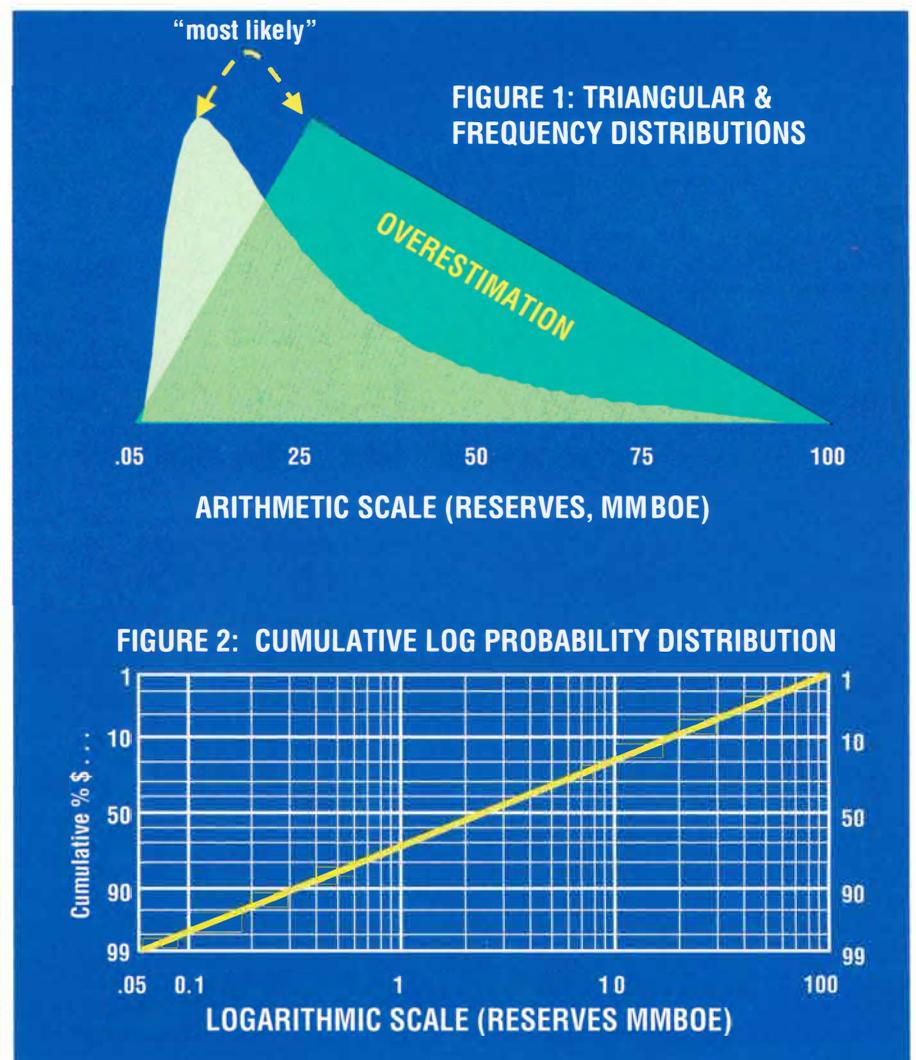
Today, most explorationists use cumulative log probability

Problem is, in most companies explorationists don't agree about what "most likely" really means.

distributions (Figure 2) rather than the frequency (or probability density) form of portrayal, because of their superior analytical and iterative capabilities.

For any estimated parameter, geoscientists can postulate tentative high-side and low-side outcomes, plot them provisionally at the P10 percent and P90 percent points, and then evaluate the plausibility of the consequential P1 percent, P50 percent, P99 percent and Mean outcomes. Taking all such values under consideration, geoscientists can then iterate and reiterate the cumulative probability distribution until a "best fit" is obtained,

continued on next page



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consistent with all pertinent data.

The location of "most likely," however, is not apparent on the cumulative probability distribution – its position varies with the slope of each distribution.

Nevertheless, "most likely" – undefined – has stubbornly persisted in the operational terminology of prospect risk analysis. It is used regularly in the E&P vernacular, and it commonly appears as a formal prospect parameter in company evaluation data forms used to evaluate projects on which companies are prepared to spend millions of dollars!

Problem is, in most companies explorationists don't agree about what "most likely" really means.

Does it correspond to the mean (= average) of the distribution?

The median (= P50 percent)?

The mode?

Or does it simply represent the prospector's best guess?

We regularly inquire of our classes as to what "most likely" means to them, as individuals. We also ask students to identify, on an example prospect, "most likely" values for parameters such as productive area, average net pay, HC-recovery factor and prospect reserves.

Results are startling: "Most likely" is used for a wide range of outcomes corresponding to probabilities ranging from about P90 percent to P20 percent.

Sad to report, we also hear a few

Geophysical Corner

from page 37

the reservoir sandstone. It also shows a strong and flat peak anomaly (blue) that tunes as it approaches the down dip edge of the reservoir. The flat peak event represents the gas-water contact.

Seismic data clearly imaged the gas-water contact, and with a good velocity model this interface can be converted to depth.

Figure 5 (page 36) is a parallel line from the 3-D seismic survey, shot a number of years after primary production. The top of the reservoir sandstone has a negative (red) amplitude response. However, the once visible gas-water contact has disappeared.

What happened?

One plausible explanation is that the "physics" of the reservoir changed. Production reduced the reservoir

pressure, and water encroachment changed the density and gas saturation at the original interface and throughout the "encroached" interval.

The resistivity and neutron density logs of Mist storage pool development wells (figure 6, page 37) clearly identify the "new" gas-water contact (in most instances, the encroached zone is also identifiable on the neutron density log). The sonic log, however, continues to respond to the original gas-water contact. The residual low gas saturation associated with the original gas-water contact is still an acoustic contrast, but the change in density as a result of water encroachment has decreased the reflectivity.

At the "new" gas-water contact there is a density contrast but only a small acoustic response. In addition, there has been an increase in the bulk density of the highly porous reservoir rock as it compacted in response to pressure reduction.

The physical changes within and to the reservoir may be combining to mask both the "new" and the "old" gas-water contacts. (See Ian Jack's 1998 SEG publication *Time-Lapse Seismic in Reservoir Management* for a discussion

of rock physics and 4-D seismic where similar effects are observed in other gas fields over time.) Thus the 3-D seismic data set could not be used to model the "new" gas-water contact across the reservoir. The engineering reservoir model had to be relied on for estimates of vertical water movement and for predicting the position of the newly established gas-water contact.

Summary

In summary, the application of 3-D seismic technology to the expansion of the Mist Storage Field provided maps with the geologic accuracy necessary to enable the economic utilization of horizontal well technology.

Because of this advanced imaging technology, precision placement of wells is now the norm for storage pool development.

(Editor's note: H. Jack Meyer is a geologist in the Gas Storage Development Department at NW Natural and specializes in storage reservoir development. He also is a speaker for AAPG's VGP program.) □

cynical suggestions that "most likely" means whatever outcome is required to sell the prospect!

* * *

After reviewing hundreds of Industry prospects over the past 10 years, I cannot identify any meaningful or unique use in prospect risk analysis for "most likely." All the important statistical measures for prospect reserves

parameters can be expressed using the P1 percent, P10 percent, Mean, P50 percent, P90 percent, P99 percent convention.

Moreover, "most likely" can very easily lead to misleading, systematically biased prospect evaluations – and, consequently, unfortunate management decisions.

If you need to describe some subjective intermediate case that is probabilistically undefined, try "best guess" (which also has the virtue of

intellectual forthrightness).

"Most likely" is a throwback to the past, a dangerous term because it is generally undefined, leading frequently to miscommunications. All it can do is get you in trouble.

Recommendation: Expunge the term from your E&P vocabulary.

(Rose, an AAPG member, is managing partner, Rose & Associates, Austin, Texas.) □

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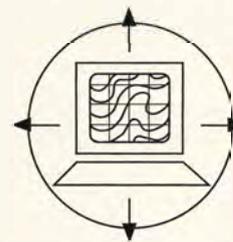
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'A Widely Distributed Commodity'

3-D An 'Onshore Business Driver'

By DIANE FREEMAN
EXPLORER Correspondent

The future distribution of 3-D seismic data will result in a changing business model that could impact the entire oil industry, according to one petroleum geologist whose company specializes in 3-D imaging.

"We're heading toward three to four major information providers of 3-D seismic data," said Thomas Mazza, senior vice president of DDD Energy Inc. in Denver. He also predicted that "3-D will become a widely distributed commodity," and that "information providers will offer more advanced data to find prospects."

Mazza, who referred to the revolutionary quality of 3-D seismic as an "onshore business driver," also speculated that traditional information providers and exploration and production companies will continue to blur their shared borders when it comes to obtaining 3-D seismic data.

His remarks came as keynote speaker at the recent 3-D Seismic Symposium in Denver, sponsored annually by the Rocky Mountain Association of Geologists and Denver Geophysical Society. More than 480 people attended the one-day event in early March, including delegates from not only Colorado but from as far away as California and Texas.

Mazza, an AAPG member who

"We can see things that are too small to be economical. We have to show some discipline so that we don't drill everything we can see. It's very much a reality of using this powerful technology."

previously worked for Enron Oil and Gas, Marathon Oil and Tenneco Oil, couched his observations by noting

that the profitability of onshore 3-D seismic projects has been highly variable.

Ski Mishap Claims Mazza

Thomas Mazza, senior vice president of DDD Energy in Denver, was killed in a skiing accident on March 10, eight days after speaking to 480 geologists and geophysicists in Denver.

Mazza, 44, had been an AAPG member since 1982. He died after losing a ski and crashing into trees along a black diamond ski slope at Copper Mountain resort. He was wearing a helmet, but suffered massive chest injuries.

Copper Mountain resort officials said Mazza was found unconscious about 9:20 a.m., a few minutes after

crashing on Rosi's Run. He was taken to the Copper Mountain Medical Center, where he was pronounced dead 50 minutes later.

Family members said Mazza was an expert skier who traveled to the mountains twice a month with his wife, Peggy, and daughters, Alyson and Danielle.

One week before his death Mazza delivered the keynote address at the seventh annual 3-D Seismic Symposium, sponsored by the Rocky Mountain Association of Geologists and Denver Geophysical Society (see accompanying article). □

"The widespread application of 3-D seismic as an exploration, exploitation and development tool across the onshore basins of the United States has truly revolutionized the E&P industry," Mazza said.

"Wildcat success rates, new pools found among old production and reservoir characterization detail and accuracy have all increased dramatically.

"The business ramifications of onshore 3-D projects, however, have been highly variable."

Mazza's talk was based on experiences in a wide variety of 3-D seismic ventures encompassing more than 10,000 square miles of onshore data acquired by Seitel and its subsidiary DDD Energy.

Reducing Risk

Financial results have been dependent on the complex interplay of several factors, including:

- Business models.
- Deal structures.
- Timing.
- Geography.
- Acquisition parameters.
- Processing techniques.
- Interpretation methods.
- Geology.

In fact, DDD has had much success thanks to 3-D seismic, he

continued on next page

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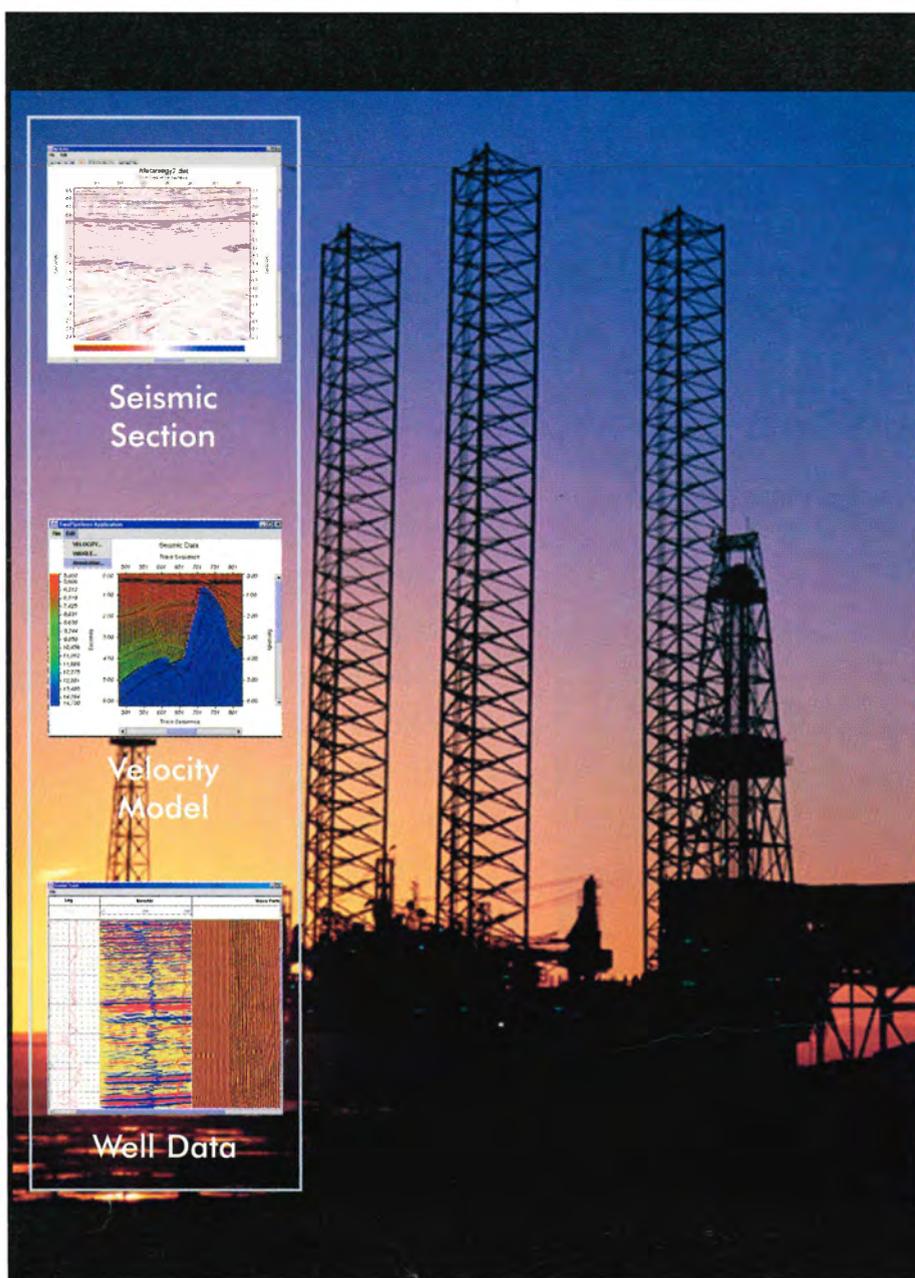
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INFORMATION DISPLAY SOLUTIONS



continued from previous page

added. The company seeks prospects that use 3-D seismic for a "quantum leap" in risk-reduction in areas that have great sonic contrast for clear imaging of hydrocarbon targets.

This is primarily in areas of "soft rocks," like the onshore Gulf of Mexico and California.

The results? Since 1993, DDD drilled 300 new wells, with an 80 plus percent success rate on new-field wildcats.

"At DDD we've been forced to take advantage of the 3-D tool onshore," he said. "This is really all we've done. Our business school has been the school of hard knocks."

Regarding the company's spectacular gains in terms of return on investment using 3-D seismic data, Mazza said they are "totally focused on the application of 3-D."

"It turns out that 3-D helps reduce risk," he said. "We go out every day and look for places where the tool ... can make a quantum leap in reducing risk."

True Costs of Seismic Ownership

But good data alone doesn't ensure success. With 3-D seismic, the resolution is so great that geologists often see hydrocarbons that are not worth drilling for economically, Mazza told the group.

Often these anomalies, which appear to be so obvious, turn out to be low volume, rapidly depleted gas sands.

"What we have found is we have a lot of areas where we can see things that are too small to be economical," he said. "We have to show some discipline so that we don't drill everything we can see. It's very much a reality of using this powerful technology."

Digesting and synthesizing information, he said, is more important than just obtaining seismic data – and to succeed in the coming years, operators will need a blended business model that balances the use of less expensive "off the shelf" spec data from providers versus more costly proprietary data.

From an information provider's perspective, the true cost of ownership of 3-D data includes:

- ✓ Acquisition costs.
- ✓ Resale potential.
- ✓ Value of the data over time and enhancement viability, which gives the data new life and allows it to be resold.

From the exploration and

production side, the true cost of ownership of proprietary seismic data includes:

- ✓ Acquisition and leasing costs.
- ✓ Quality and timing of when the property is acquired.
- ✓ The competitive advantage value.

"If you're the only one who has it," he said, "you have a dominant advantage."

Partners for Success

The backdrop of price cycles is what the entire energy industry is painted upon, Mazza said, and "great companies are not hurt by them, but harness them."

"We're in a commodities market and we moan about the downside price and cheer on the upside price," he said, "(but) our ability to harness

the profit throughout the cycle is what has made successful companies."

Mazza noted that other industries have managed to harness their business cycles and make them pay off in the down cycle as well, but only a few great exploration and production companies have succeeded in that practice.

He also cited the attributes of a perfect project from the provider side as one that includes lease ownership volatility, prolific hydrocarbons and geological complexity, so there's a perpetual wave of customers trying to obtain the data.

From the E&P side, a perfect project requires the presence of hydrocarbons, high density of targets, available lease positions and aligned partners, he said.

His advice: Geologists must do

their homework upfront to choose the best "real estate" to prospect in. They also must strive for partner alignment on projects, so all efforts move toward finding prospects and establishing production.

DDD Energy has over 100 partners, and Mazza believes that successful partnering will become more critical in the industry's future.

"Partners are super critical – we've learned that painfully in many cases," he said. "Good partners need to bring talent and focus to the project, as well as money."

And after collecting the right data, he added, geologists and geophysicists need to integrate their interpretations completely and move decisively.

"If you don't hook it up, you won't make any money, even if you have the perfect real estate." □

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Search for Papers, Authors

Web Site Features Denver Program

By JANET BRISTER
AAPG Web Site Editor

It happens every year: As the annual meeting approaches many begin to start looking to find a specific someone who is giving a paper during one of the technical sessions – or when a paper is going to be presented.

Yes, your first look is the official announcement, where technical sessions are broken down into easy-to-identify themes – but what if your area of interest

doesn't fit within the theme scheme used to plan the sessions?

How do you find that speaker or the papers of interest to you?

An easy way is to use the Site Search tool on the AAPG Web site, which will help you quickly locate the sessions you seek. It is found on the AAPG home page and many subsequent pages after (top left corner).

Click on the tool; the resulting window is simply a field where you enter what you are looking for.

Maybe you're looking for papers on chert reservoirs. If that's the case, simply enter "chert reservoir" in the field provided. The resulting list will be the first ten of the pages found containing these two words.

However, there is a bonus to this search.

Listed at the bottom of the page are the number of matches to your search string.

A little below that are two other searches that were made: One on the word "reservoir" and one on the word "chert." The number of documents containing each of these words is noted.

If you follow these links you will have a wider list of options to consider.

This tool is so fast that you may want to make several searches while you are there.

(NOTE: The AAPG Web site contains only the titles and authors of those presenting at the meeting. The complete abstract is located at another site that our search engine does not have access to.)

* * *

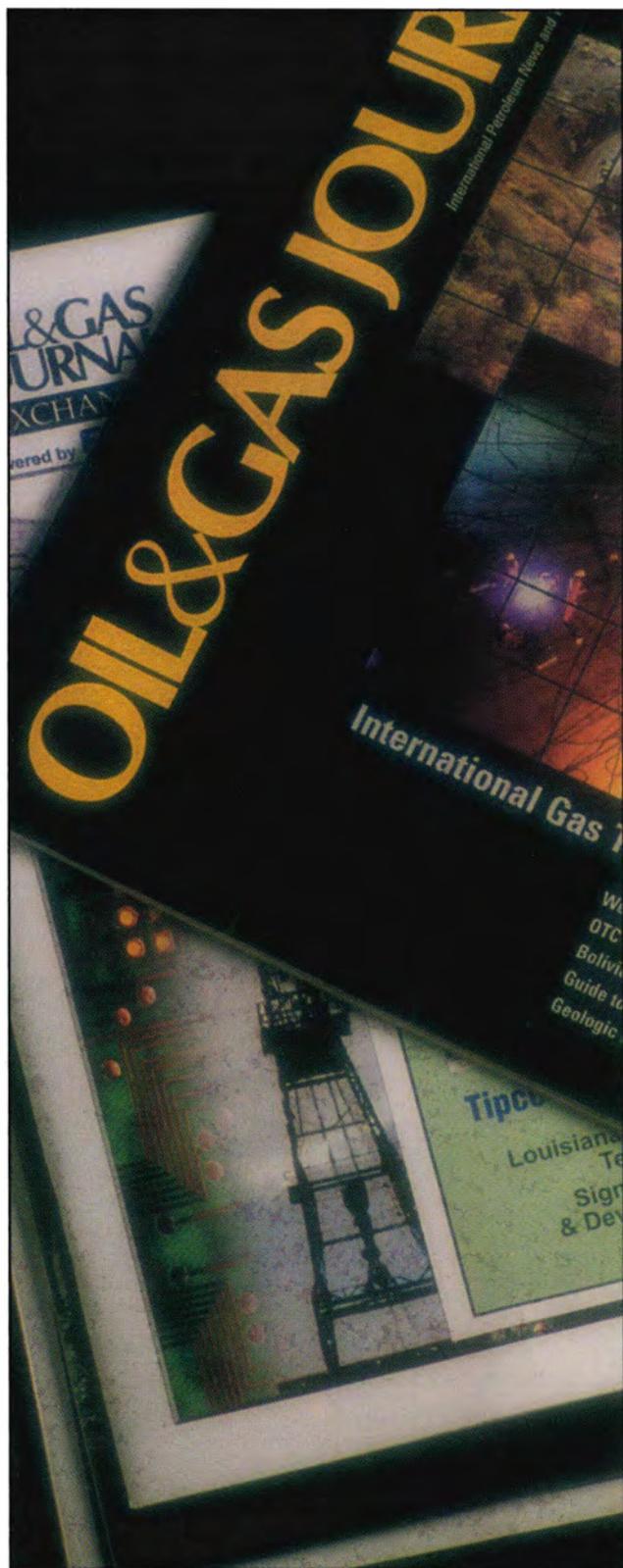
Search Tip: When looking for a specific author, you will notice that the authors are listed with their first initial and then their last name.

For the best results enter "Denver" and only the last name of the author or speaker in which you are interested. This will keep your search specific to the annual meeting.

* * *

Once pre-registration has closed and the processing of this information is completed, a directory of attendees will be provided. So keep checking the AAPG Web site for updates.

Good browsing! ☐



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Search and Discovery

Online Journal Adds Nine New E-Articles

The following articles were posted to Search & Discovery (<http://www.searchanddiscovery.net>) during February and March.

Search and Discovery is a free Internet journal published by AAPG/Datapages, dedicated to the upstream petroleum industry.

☐ Tectono-Stratigraphic Framework of the North Falkland Basin: Post-Drilling Analysis, by P.C. Richards and B.V. Hillier (adapted from *Journal of Petroleum Geology*, Scientific Press).

☐ Petroleum System and Future Prospects of the North Falkland Basin: Post-Drilling Analysis, by P. C. Richards and B. V. Hillier (adapted from *Journal of Petroleum Geology*, Scientific Press).

☐ Pseudo-Well Logs for Characterizing Deepwater Fan Reservoirs: The Tanqua Karoo "Laboratory" Model, by J.B. Thomas (adapted from AAPG Memoir 72).

☐ Tectonic Control on the Creation of Supergiant Fields in the Central and South Caspian Area, by Steve Hall and Vanessa Sturrock (adapted from the Houston Geological Society *Bulletin*).

☐ Analog Models of Restraining Stepovers in Strike-Slip Fault Systems, by Ken McClay and Massimo Bonora (adapted from the AAPG BULLETIN).

☐ Misener Sandstone in Northern Oklahoma, report by Masera Corp.

☐ New Exploration Concepts for the Edwards and Sligo Margins, Cretaceous of Onshore Texas, by Dale A. Fritz, Terry W. Belsher, James M. Medlin, John L. Stubbs, Robert P. Wright and Paul M. (Mitch) Harris (adapted from the AAPG BULLETIN).

☐ Tectonostratigraphic Framework of the Columbus Basin, Eastern Offshore Trinidad, by L.J. Wood (adapted from the AAPG BULLETIN).

☐ Selections from "The Geophysical Corner" (from the AAPG EXPLORER).

Authors, please send manuscript or inquiries to editor@searchanddiscovery.net. ☐

AAPG Will Have Presence At OTC, Set April 30-May 3

With AAPG member Wolfgang Schollinger serving as chairman of the Offshore Technology Conference April 30-May 3 in Houston, the meeting promises to continue its legacy as a prominent gathering of the industry in its 32nd year.

Schollinger, technology vice president of BP Amoco in Sunbury, England, is serving his second year as OTC chair.

Over 300 technical papers will be presented with more than 43,000 participants expected to attend this year. But the big attraction is always

the exhibition, where over 1,800 companies will be showing the latest in what the upstream-to-downstream industry has to offer.

Rilwanu Lukman, Nigerian presidential Advisor on Petroleum and Energy, will be the keynote speaker at the annual OTC awards luncheon. Lukman has spoken previously to geologists at the AAPG International Conference and Exhibition held in 1997 in Vienna, Austria, when he was serving as OPEC secretary general.

OTC information can be accessed at www.otcnet.org.

Morocco
Safi Haute Mer & Ras Tafelney, 3D Survey
3,000 sq. km.
CGG M/V *Symphony* began
January 26, 2001

Senegal
Dakar Offshore Profond 2D Survey
1,500 km.
Veritas M/V *Akademik Nemchinov* began
February 19, 2001

Côte d'Ivoire
CI-112 3D Survey
1,200 sq. km.
WesternGeco M/V *Trident* began
February 15, 2001

Equatorial Guinea
Corisco 3D Survey
3,120 sq. km.
WesternGeco M/V *Trident* begins
April 1, 2001

Namibia
License Area 1711 3D Survey
650 sq. km.
Aker M/V *Amadeus* completed
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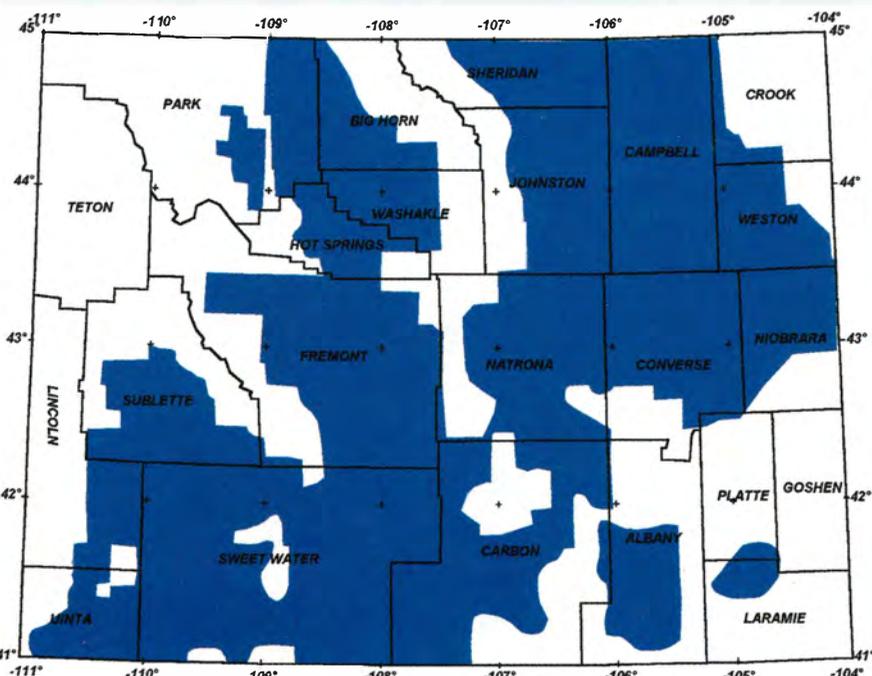
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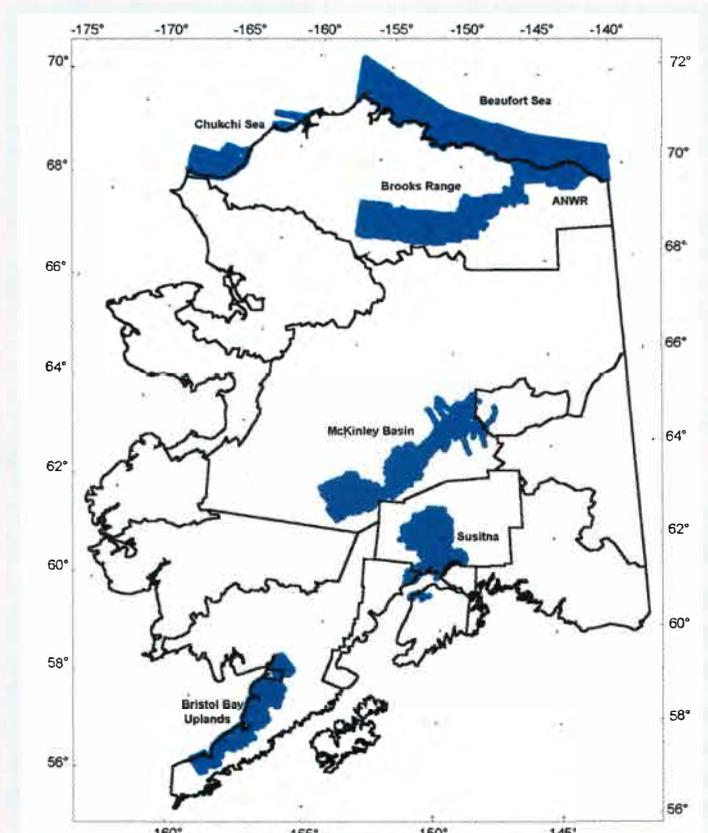


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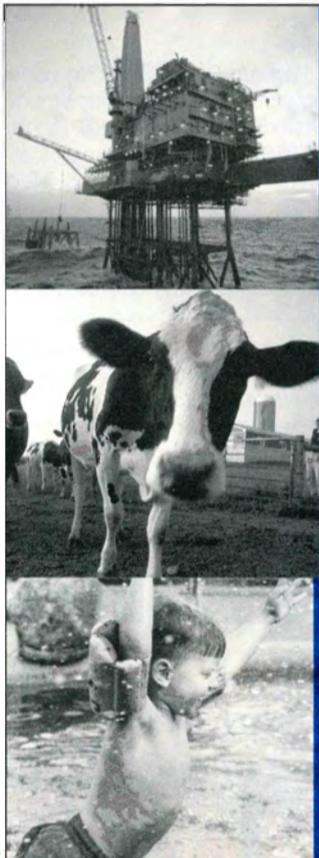
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PROFESSIONAL NEWS BRIEFS

Michael A. Andersen, to regional manager, business development, Middle East and North Africa, Ivanhoe Energy, Doha, Qatar. Previously associate, Rose & Associates, Dallas.

Kim R.W. Bennetts, to vice president-exploration, Presco, The Woodlands, Texas. Previously directed exploration and development programs for Presco.

James Booth, to team leader, Greenfield exploration, Brunei Shell Petroleum, Brunei. Previously staff geologist, Shell Deepwater Services, New Orleans.

Glenn Breed, to president and CEO, UpstreamInfo, Houston. Previously a member of UpstreamInfo's board of directors and president, The Information Store, Houston.

Steve Carlson, to staff geophysicist, Chroma Energy, Sugar Land, Texas. Previously senior geophysicist, Paradigm Geophysical, Houston.

Mark S. Chalmers, to senior exploration geologist, Gulf Canada Resources, Calgary, Canada. Previously senior geologist, Crestar Energy, Calgary.

Dan M. Cox, to senior geophysicist-attribute analysis, Veritas Exploration Services, Houston. Previously senior geophysicist-owner, Delta Sigma Exploration, Carthage, Texas.

Alan M. Crawford, to president and chief executive officer, Kriti Exploration,

Houston. Previously U.S. onshore exploration general manager, Fina Oil and Chemical, Houston.

Dodd DeCamp, to senior vice president-worldwide exploration, Phillips Petroleum, Bartlesville, Okla. Previously vice president-worldwide exploration, Phillips Petroleum, Bartlesville.

Russell R. Dutcher has been awarded the Gilbert H. Cady Award by the Geological Society of America. He is with Southern Illinois University department of geology, Carbondale, Ill.

Maia Gageanu, to Petrom Sa, Bucharest, Romania. Previously engineer geologist, BP Houston.

Anne Grau, to project geologist, EOG Resources, Denver. He recently received his Ph.D. from the Colorado School of Mines, Golden, Colo., and previously was geologist II, Marathon Oil Petroleum Technology Center, Littleton, Colo.

Matt Hall, to senior geoscience consultant, Landmark Graphics, Calgary, Canada. Previously senior geologist, Statoil, Stavanger, Norway.

Bradley J. Huizinga, to senior

geochemical specialist, Phillips Petroleum, Bartlesville, Okla. Previously senior petroleum geochemist, BP Amoco, Plano, Texas.

Brent A. Jackson, to consultant, Jackson Geophysical Consulting, Perth, Australia. Previously senior geophysicist, Talisman Energy (UK), Aberdeen, Scotland.

Chris Johns, to chief development geologist, Premier Oil, London, England. Previously valuations manager, Scott Pickford Group, London.

George D. Klein has been awarded the Laurence L. Sloss Award by the Geological Society of America. He is currently an emeritus professor, University of Illinois, and an independent consultant, Sed-Strat Geoscience Consulting, Sugar Land, Texas.

Richard B. Koepnick, to consultant geologist, Dukhan development division, Qatar Petroleum, Doha, Qatar. Previously associate geological research advisor, Mobil E&P Technical Center, Dallas.

Lee R. Lehtonen, to senior staff geoscientist, international exploitation

team, Pioneer Natural Resources, Irving, Texas. Previously staff geologist, Gulf Coast exploration team, Pioneer Natural Resources, Irving.

Ray Leonard, to vice president-exploration and new ventures, YUKOS, Moscow, Russia. Previously vice president-exploration, First International Oil Corp., Almaty, Kazakhstan.

Robert (Bob) J. Menzie Jr., to corporate environment professional, Marathon Oil, Houston. Previously advanced HES professional, Marathon Oil, Anchorage, Alaska.

Mark Milliken, to geologist, Critique, Casper, Wyo. Previously geologist, U.S. Department of Energy, Casper.

Victor H. Noguera, to manager-government relations and public affairs, Chevron Latin America, Caracas, Venezuela. Previously chief sequence stratigrapher, exploration and reservoir characterization group, Caltex Pacific Indonesia, Rumbai, Sumatra.

Steve Ross, to senior geologic advisor, Petrotel, Plano, Texas. Previously staff geologist, Arco, Plano.

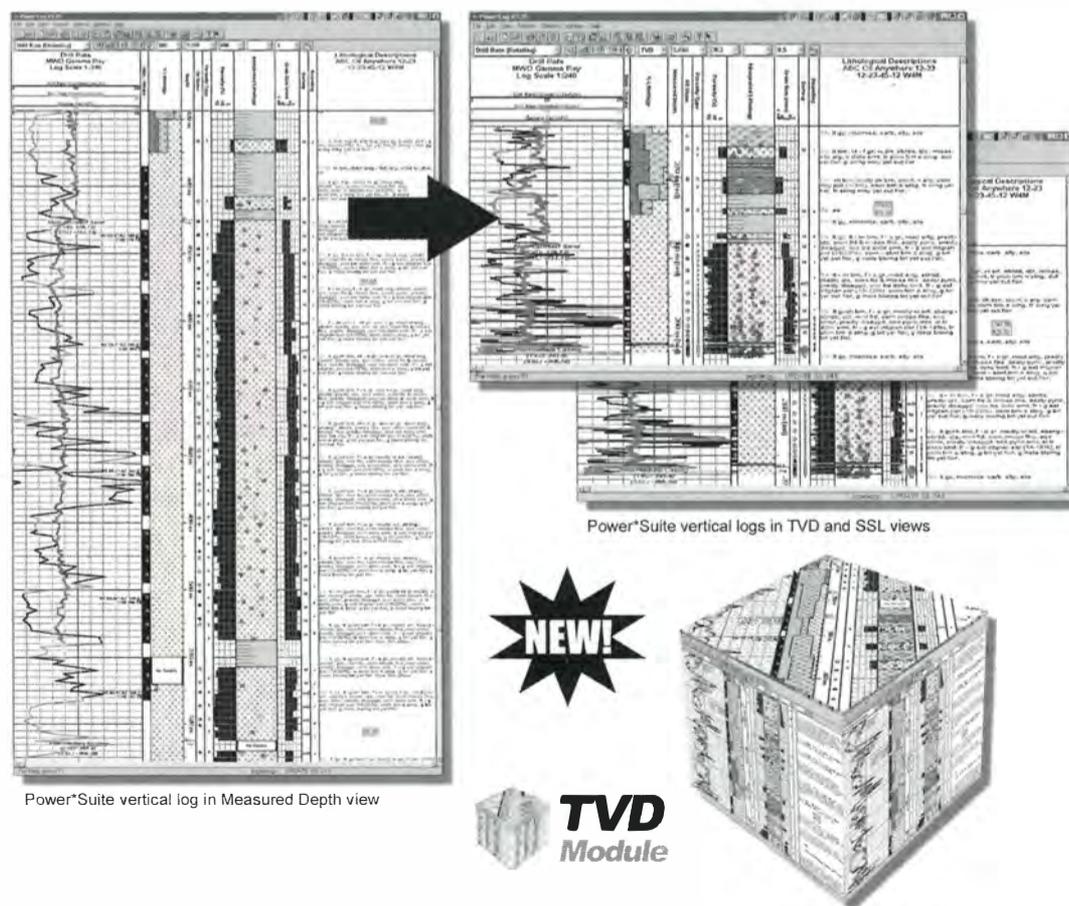
Thomas N. Sudderth has retired as president of Ralph E. Davis Associates, Houston. He had been with the firm for 25 years, and president since 1985.

Peter Swift, to manager, total system

(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, rockwell@aapg.org; or submit directly from the AAPG Web site, www.aapg.org/explorer/pnb_forms.html)

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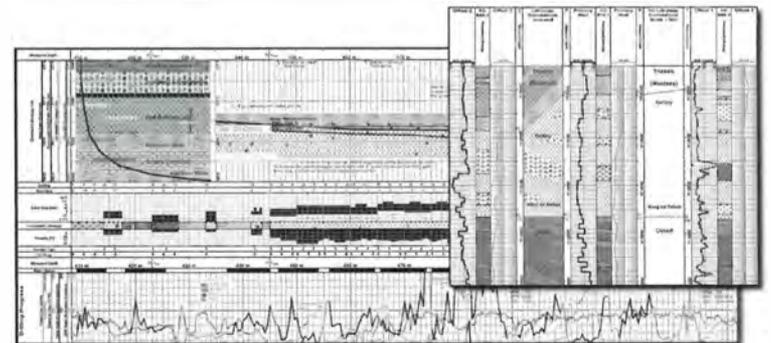


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Eastern Section Cites Scotian Basin Paper

A paper dealing with exploration in Canada's Scotian Basin has earned author John R. Hogg the Eastern Section's A.I. Levorsen Award for the best oral presentation at the Section's annual meeting.

Hogg, with PanCanadian Petroleum, Calgary, Canada, won the award for his paper, "An Overview of Exploration Trends in the Scotian Basin, Offshore Nova Scotia, Canada."

Other presentations picked to receive Eastern Section honors are:

□ The Vincent E. Nelson Award, given for best poster, goes to Mark Obermajer, with the Geological Survey of Canada, Calgary, for the poster "Thermal Maturity of Petroleum Source Rocks from Ontario as Determined from Reflectance and Fluorescence of Dispersed Organic Matter." His co-authors were Lavern D. Stasiuk and Fariborz Goodarzi, both also of the Geological Survey of Canada, Calgary.

□ The Margaret Hawn Mirabile Award, given for best student paper, goes to Jennifer C. McIntosh, University of Michigan, Ann Arbor, for the paper "Hydrogeochemistry of the

Eastern Margin of the Michigan Basin: Implications for Devonian Shale Gas." Her co-author was Lynn M. Walter, also of the University of Michigan.

□ The DEG best paper award goes to Kerry J. O'Shea, Trow Consulting Engineers, Brampton, Canada, for the paper "Groundwater Interference Issues Related to Natural Gas Pipeline Construction Programs: Seven Years of Assessment."

The awards will be presented at the Eastern Section's 2001 annual meeting, set Sept. 22-25 in Kalamazoo, Mich. □



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- Binkley, Margaret Delano, 87
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- Critz, James Stubbs, 83
Harker Heights, Texas
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- Jeffers, Joseph William, 73
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- Kubler, Bernard, 69
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- Law, James Marvin (AC '50)
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- Mazza, Tom, 44
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- Oxford, William Mayfield, 69
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- Roach, Cyril Bloomfield, 94
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- Slamal, Robert L., 49
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- Voigt, Harold E., 89
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- Wilson, George William, 78
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- Wolcott, Edward Roscoe, 75
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(Editor's note: "In Memory" listings are based on information received from the AAPG membership department. Age at time of death, when known, is listed. When the member's date of death is unavailable, the person's membership classification and anniversary date are listed.)

continued from previous page

performance assessment department, Sandia National Laboratories, Albuquerque, N.M. Previously distinguished member of the technical staff, Sandia National Laboratories, Albuquerque.

Ken Whetstone, to director of exploitation, upper Gulf Coast/North Louisiana, El Paso Production, Houston. Previously onshore exploration manager, Coastal Oil and Gas, Houston. □



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INTERNATIONAL BULLETIN BOARD

(Editor's note: This column is devoted to international items of note to the AAPG.)

News items, press releases and other information should be submitted to the EXPLORER/International Bulletin Board, P.O. Box 979, Tulsa, Okla. 74101; telephone – 918-560-2616; fax – 918-560-2684; or e-mail – dfree@aapg.org.

This month's column was co-written by Mikhail Belonin, head of VNIGRI, and Wolfgang Schollnberger, general chairman of the St. Petersburg regional international conference.)

A host of workers are busy preparing for the upcoming regional international conference, to be held July 15-18 in a city that is hailed as one of the most beautiful and most "European" cities in all of Russia.

The VNIGRI/AAPG international conference, built on the theme "Exploration and Production Operations in Difficult and Sensitive Areas," will be held in St. Petersburg, a treasure of world culture that lies close to areas of hot petroleum potential for the coming century.

The conference's technical program will focus largely on the arctic and icy conditions that await explorers in this compelling and challenging region – in both geologic and environmental terms. The meeting host is VNIGRI, the leading Russian research institute for

petroleum sciences, and it is being organized in collaboration with EAGE and SEG.

There are three reasons why many should attend the conference – its program will represent:

- ✓ Challenging geology.
- ✓ Good business.
- ✓ A marvelous venue.

For example, more than 85 papers and about 120 posters will deal with clastic and carbonate reservoirs and hydrocarbon systems in extensional, compressional and transform settings. The newest estimations of oil and gas reserves and resources in the Arctic will also be discussed.

The extensive technical program is being worked out with the active participation of the EAGE, DEG and SEG. It also includes a short-course and field trips – both pre- and post-meeting – plus the chance to network and acquaint attendees with the unique data bases characterizing the petroleum potential of the Russian petroleum-bearing provinces, which



will be present at the VNIGRI Data Room.

Also, the conference will include the participation of the leading experts in the Arctic and sub Arctic petroleum geology, Timan-Pechora, Western Siberian, Eastern Siberian and Precaspian petroliferous basin geology and petroleum production.

For that reason, the conference represents an excellent

opportunity to catch up with the newest results and relevant events, such as:

□ In Greenland, a bid round will be held in 2001 shortly after the St. Petersburg conference.

□ In Europe, security of energy supplies is high on the agenda of companies, governments and the European Union (EU). Europe is looking to arctic Scandinavia and Russia for large oil and gas resources.

It is expected that the Russian Duma and President Putin will ratify

the Energy Charter Treaty during the first half of 2001. The Energy Charter includes the very important Transit Protocol, which forms a framework for efficient, uninterrupted, and secure transit for oil and gas across national boundaries.

□ An EU-Russia summit dealing with energy supply is expected to take place in Moscow in May.

As a bonus, the conference is being held during the season of "white nights," the best time for the acquaintance with the beautiful architectural ensembles, channels and parks as well as the world-famous museums and theatres of St. Petersburg.

Participants will be able to experience excursions to the Hermitage, Peter and Paul Fortress, famous Petrodvorets park (with its wonderful fountains), cathedrals and churches, and nighttime sails on city rivers and channels.

In addition to the Icebreaker opening reception in the famous Smolny Cathedral and end-of-the-day receptions in the poster area, a special culture event will be offered by the city government – in fact, the conference is supported by city government and personally by St. Petersburg Gov. Vladimir Yakovlev.

Comfortable hotels, convenient highways and unique tourist routes make this a meeting to attend.

For more information go to the AAPG Web site at www.aapg.org, or contact the AAPG convention department. □

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MEETINGS OF NOTE

Editor's note: Meetings listed here are sponsored by AAPG or an affiliated group. An asterisk denotes a new or changed listing. For further information on these listings contact the AAPG convention department (convene@aapg.org)

Also, a comprehensive list of earth science meetings is maintained by the American Geological Institute on its Web site, which can be accessed via a link from AAPG's Web page (www.aapg.org).

Groups are urged to check the list before scheduling meetings, both to avoid conflicts and to report meetings that are scheduled.

Petroleum Geologists, annual meeting, Calgary, Alberta, Canada.

July 15-18, AAPG International Regional Conference, St. Petersburg, Russia.

Sept. 4-7, Offshore Northwest Europe, annual meeting, Aberdeen, Scotland.

*Sept. 6-12, International Association for Mathematical Geology, Cancun, Mexico.

October, AMGP/AAPG International Conference, Veracruz, Mexico. □

2001 U.S. Meetings

April 9-11, Pacific Section, AAPG, annual Section meeting, Universal City, Calif.

April 25-28, Society of Independent Professional Earth Scientists, annual meeting, Galveston, Texas.

April 30-May 3, Offshore Technology Conference, Houston.

June 2-3, SEPM, 75th anniversary mid-year meeting, Denver.

June 3-6, AAPG annual meeting, Denver.

June 3-6, Rocky Mountain Section, AAPG, annual Section meeting, Denver (concurrent with AAPG annual meeting).

June 16-20, Society of Professional Well Log Analysts, annual meeting, Houston.

Sept. 9-14, Society of Exploration Geophysicists, annual meeting, San Antonio.

June 20-23, History of the Oil Industry-Symposium and field trips, co-sponsored by AAPG, Oil City, Pa.

Sept. 22-25, Eastern Section, AAPG, annual Section meeting, Kalamazoo, Mich.

Sept. 23-26, The Society for Organic Petrology, 18th annual meeting, Houston.

Sept. 30-Oct. 2, Mid-Continent, AAPG, annual Section meeting, Amarillo, Texas.

Sept. 30-Oct. 3, Society of Petroleum Engineers, annual meeting, New Orleans.

Oct. 17-19, Gulf Coast Section of Geological Societies, AAPG, annual Section meeting, Shreveport, La.

Oct. 31-Nov. 4, AAPG Foundation Trustee Associates, annual meeting, Tucson, Ariz.

Nov. 5-8, Geological Society of America, annual meeting, Boston.

2001 International Meetings

June 11-15, European Association of Geoscientists and Engineers, annual meeting, Amsterdam, The Netherlands.

June 18-22, Canadian Society of

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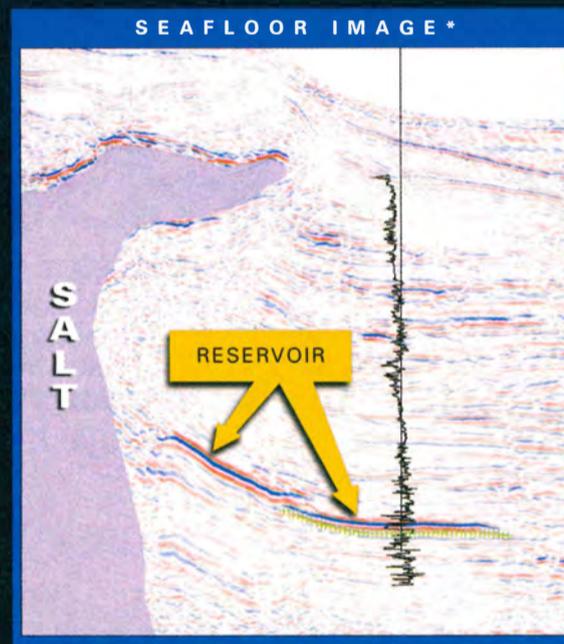
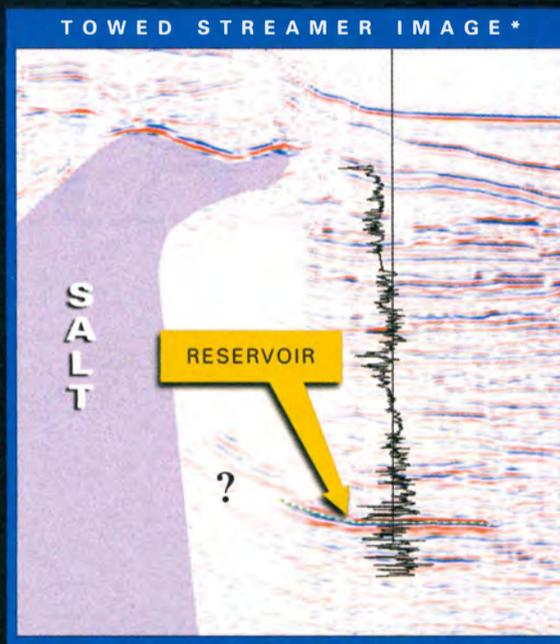
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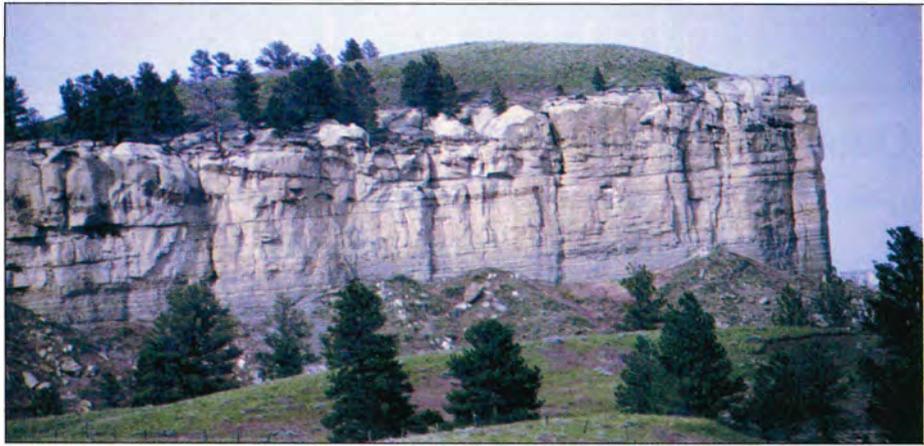


Photo courtesy of Thomas Ryer

The lithologic variations that characterize clastic reservoir facies and development of models that can be used to predict these variations in the subsurface will be the focus of "Clastic Reservoir Facies and Sequence Stratigraphic Analysis of Alluvial-Plain, Shoreface, Deltaic and Shelf Depositional Systems," an AAPG field seminar that will be offered April 22-28, originating and ending in Salt Lake City.

EDUCATION CALENDAR

2001 SCHOOLS, SHORT COURSES

* Structural Styles and Hydrocarbon Traps in Compressive Basins
April 23-27, Houston

Reservoir Characterization: Principle Methods and Case Studies
May 7-8, Dallas

High-Resolution Well-Log Sequence Stratigraphy
May 14-18, Denver

How to Evaluate Carbonate Reservoirs from Well Logs

June 2-3, Denver
(with AAPG annual meeting)

* Deep Water Sands, Integrated Stratigraphic Analysis
June 2-3, Denver
(with AAPG annual meeting)

* Prospect Evaluation "Surgical Theater" and Workshop
June 2-3, Denver
(with AAPG annual meeting)

E&P Methods and Technologies
June 7-9, Denver
(with AAPG annual meeting)

Applied Subsurface Mapping
July 9-13, Dallas

* Overpressure in Petroleum Systems in Deep Water Plays
July 14-15, St. Petersburg, Russia
(with AAPG regional international meeting : Register through AAPG convention department)

Well Log Analysis and Formation Evaluation
Aug. 7-10, Austin, Texas

Probability and Statistics for Exploration and Exploitation
Aug. 20-22, Dallas

Introduction to the Petroleum Geology of Deep-Water Clastic Depositional Systems
Sept. 8-9, San Antonio
(with SEG annual meeting)

Quantification of Risk – Petroleum Exploration and Production
Oct. 8-11, Houston

Terrigenous Clastic Depositional Systems and Sequences – Applications to Reservoir Prediction, Delineation and Characterization
Oct. 16-17, Shreveport, La.
(with GCAGS Section meeting)

Practical Salt Tectonics
Oct. 29-31, Houston

* Advanced Risk Analysis for the Energy Industry
Nov. 12-13, Houston

continued on next page

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JULY 15-18, 2001

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Geologists, geophysicists and environmental experts from East and West will convene in St. Petersburg, Russia, July 15-18, 2001, for the VNIGRI/AAPG Regional International Conference. VNIGRI, the leading Russian research institute for petroleum sciences, is hosting this event.

Join us as we explore the revolutionary technologies that will make oil and gas exploration and production increasingly viable in the most extreme arctic and icy conditions on the planet. A top-quality technical program will examine the challenges facing polar

offshore operations and seismic data acquisition, as well as those of the environmentally sensitive tundra, the North Caspian, and elsewhere. Social opportunities brimming with Russian hospitality will provide time for in-depth exchange of ideas. Presentations will be simultaneously translated into English and Russian. You can also take advantage of field trips and a short course before and after the conference.

Check our Web site for the online version of the announcement, including a registration form and hotel reservation form.



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PREREGISTRATION DEADLINE IS JUNE 1!

continued from previous page

2001 FIELD SEMINARS

Carbonates

Carbonate Sequence Stratigraphy, As Illustrated By Lower Cretaceous Platform Carbonates, Central Texas
April 16-20
Begins in San Antonio
Ends in Austin, Texas

Sequence Stratigraphy and Reservoir Distribution in a Modern Carbonate Platform, Bahamas
June 25-30
Begins, ends in Miami, Fla.

Arid Coastline Depositional Environments
Nov. 4-9
Begins, ends in Abu Dhabi, U.A.E

Clastics – Ancient

Clastic Reservoir Facies and Sequence Stratigraphic Analysis of Alluvial-Plain, Shoreface, Deltaic and Shelf Depositional Systems
April 22-28; April 30-May 6
Begins, ends in Salt Lake City

Wave-Dominated Shoreline Deposits, Book Cliffs, Utah: Depositional Models for Hydrocarbon Exploration
May 14-22; Aug. 20-28
Begins, ends in Grand Junction, Colo.

* Cretaceous Outcrops of the Western Interior, Ferron Sandstone, Fall River Formation and the Muddy Sandstone – Utah, Wyoming and South Dakota
June 7-14
Begins in Wyoming
Ends in South Dakota
(following AAPG annual meeting)

Clastics – Modern

Modern Clastic Depositional Environments
April 18-24 **SOLD OUT!**;
May 18-24; Sept. 12-18
Begins in Columbia, S.C.
Ends in Charleston, S.C.

Modern Deltas
Sept. 10-14
Begins in Baton Rouge, La.
Ends in New Orleans

Sequence Stratigraphy

Sequence Stratigraphic Influence on Sandstone Reservoir Characteristics of Cretaceous Foreland Basin Deposits
June 24-29
Begins in Rock Springs, Wyo.
Ends in Steamboat Springs, Colo.

Sequence Stratigraphy Field Seminar: Sequences and Facies on an Active Margin
Oct. 14-19
Begins, ends in La Jolla, Calif.

Tectonics and Sedimentation

Grand Canyon Geology via the Colorado River, Arizona (An AAPG Geotour)
June 10-18
Begins in Marble Canyon, Ariz.
Ends in Marble Canyon; South Rim, Ariz.; or Las Vegas, Nev.
(following AAPG annual meeting)

Utah-Nevada Overthrust Belt and Eastern Great Basin Tectonics
June 18-22
Begins in Salt Lake City
Ends in Las Vegas, Nev.

E&P in Thrusted Terrains, Practical Applications of Structure and Stratigraphy in the Montana/Alberta Thrust
Aug. 5-10
Begins in Great Falls, Mont.
Ends in Calgary, Canada

Submarine Fan and Canyon Reservoirs, California
Sept. 17-21
Begins, ends in San Francisco

* New AAPG course or field seminar.



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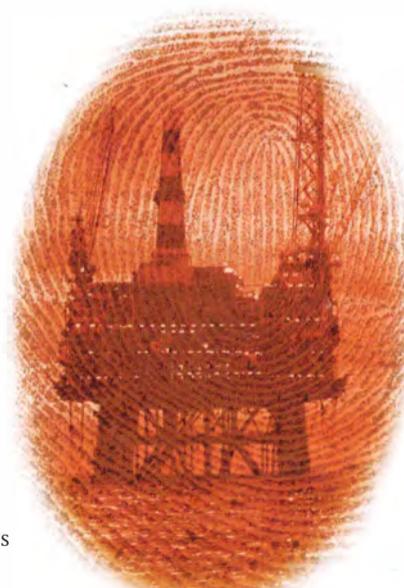
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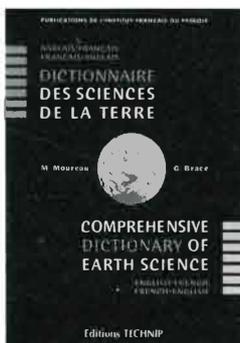
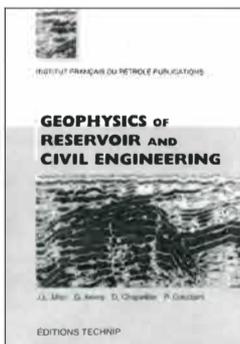
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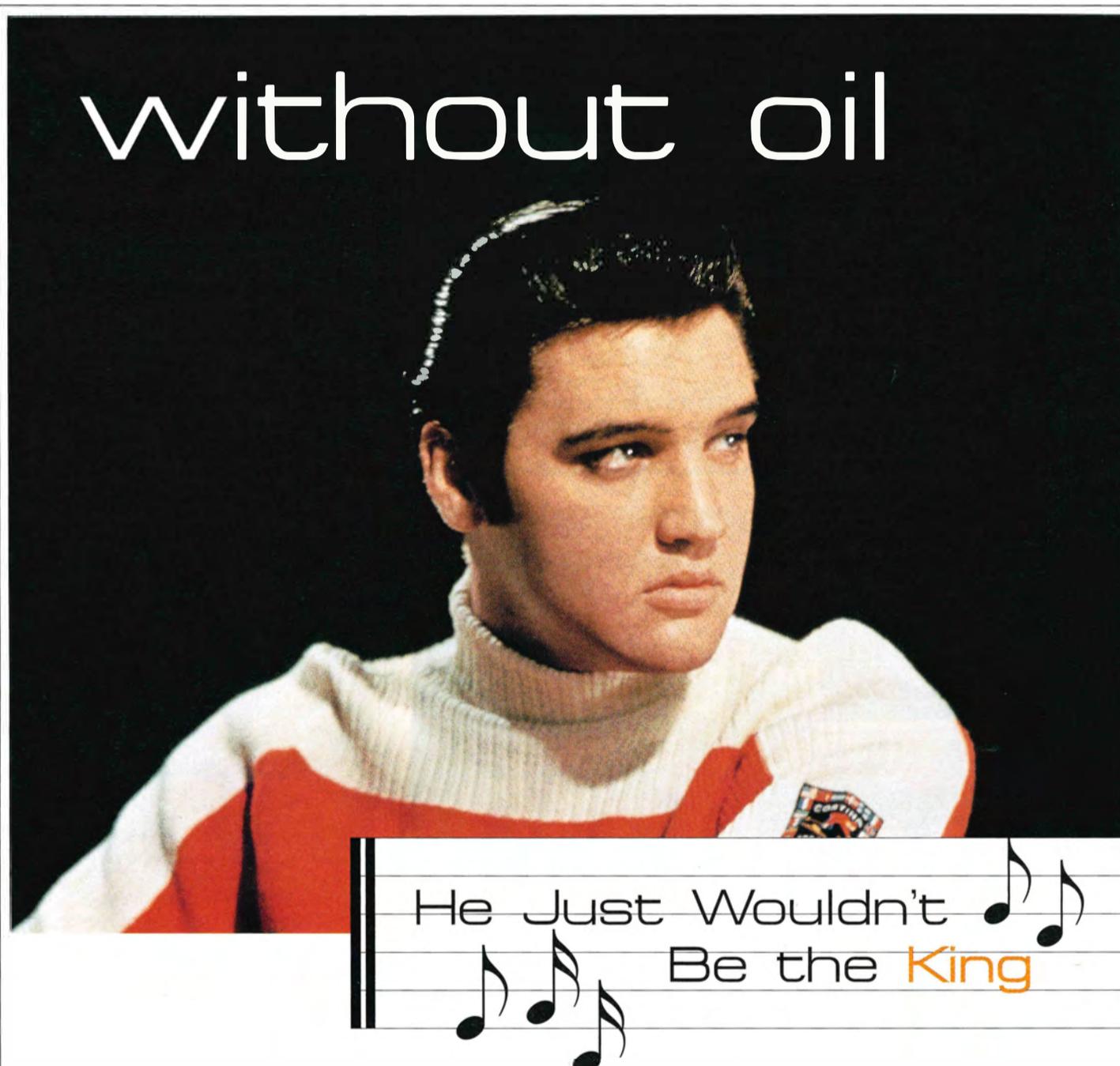
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READERS' FORUM**Alaskan Realities**

Regarding the letter "Don't Drill ANWR," March EXPLORER: The writer cites four "geologic realities" having to do with dependence upon finite resources and vanishing wilderness values. Then he offers four policies, including urging AAPG members to be "energy professional."

I find myself generally in agreement with these points, but never does the writer address the issue of the ANWR (Arctic National Wildlife Refuge) coastal plain itself.

My membership in AAPG dates from 1956. In these years I have seen the efficiency and technology of this industry grow exponentially. This includes vastly reducing the footprint upon the natural environment, especially in the Arctic.

My present efforts are largely on Alaska's North Slope, where the company I consult for has a large lease and farmout position. I have backpacked in the Brooks Range, driven the pipeline road, observed the infrastructure at Prudhoe Bay and talked with many Alaskans in and out of our industry.

In the Colville Delta Area, the Alpine oilfield, largest U.S. onshore discovery in over a decade, has just gone on line at some 75,000 BOPD from its first 17 wells. These wellheads are but 10 feet apart, and the pad from which they are drilled and produced occupies less than 50 acres. There is an airstrip but no year-round road. This is now the state-of-the-art in arctic production.

Alpine supplies the nearby native village of Nuiqsut with natural gas, a new luxury for these citizens that we

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.

have long taken for granted elsewhere. In fact, the native people of the Arctic are overwhelmingly in favor of oil and gas development on their ancestral lands.

The ANWR coastal plain is only 1.5 million acres of the 19 million-acre reserve. It is a flat, mosquito-infested wetland in the brief summer, frozen most of the year, and most of it is far enough from the mountains that they are not visible from the plain. This is and always has been the only part of ANWR under consideration for oil and gas exploration.

Sen. Frank Murkowski's Web site (<http://www.senate.gov/~murkowski/oped/anwrfacts.html>) contains a detailed refutation of environmental fictions. I recommend it, and wish to personally address one point here. Thirty years ago, opposition to the Alaskan pipeline largely centered on the supposed effect it would have on the wildlife.

At that time, the central Arctic caribou herd numbered some 5,000 animals. In last December, the Alaska Department of Fish and Game counted over 27,000 animals in this herd.

I have photographed caribou, grizzly bears, Dall sheep, foxes and lots of waterfowl from the pipeline road and in and around production facilities. These same arguments are being made today against the ANWR coastal plain developments, and they simply are without fact.

Two final points, please:

First is that most Alaskans, their governor, legislature, senators and congressman are strongly in favor of environmentally clean development of ANWR. It is arrogant of us outside the state to seek to deny them that right.

Second, the North Slope is one of the greatest hydrocarbon systems on this continent, sparsely explored to date, bigger than the state of Kansas, with only 10,000 residents, one road and one pipeline. And radical environmentalists tell us that it is an "ecological disaster area."

Question: Have you been there to see for yourself?

Alfred James III
Wichita, Kan.

Hair Shirt, Anyone?

Regarding "Personnel Issues Loom Large," March EXPLORER: It has often been said during the last 10 years or so that being in the graying petroleum industry is like attending a continuing school reunion (i.e. the numbers decline but everyone is always the same age).

Actually I believe the slight increase in the rate of aging (correct me if I am wrong but I believe the average age of a professional is now about 48) may be seen as a positive sign – the recent upturn in oil prices may have allowed some lucky souls to make it past the magical 50 barrier without being laid

off.

Is this bad? For society's sake, perhaps, but I didn't notice society caring very much when tens of thousands of oil industry workers were laid off. For those of us left, still soldiering away, I don't think it's a particularly bad prospect to think that there really isn't a lot of competition from younger guys (with better eyesight) on the horizon!

And, in case seismic, oil and service companies are wondering why there seems to be so few students at college willing to devote 20 years of schooling to a career in our industry, let me draw your attention to that perennial question of compensation. The median starting salary (total compensation) of an MBA graduating from, say, Stanford is \$135,000 (source: www.stanford.edu). I'm sure a flood of outraged letters will come in to the EXPLORER to say, "Oh yeah, sure, but what kind of career stability will those kids have?"

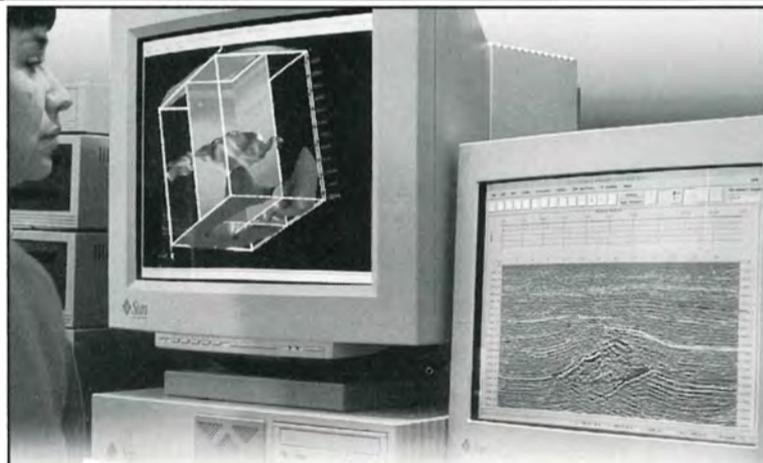
Ladies and gentlemen, what kind of career stability do we have?

I love being a geoscientist and have had great fun over the years. But my opinion of people willing to take up the profession nowadays is akin to the awe people in medieval times felt for those who wore hair shirts.

Paul Ware
Sugar Land, Texas.

(Editor's note: The average age of AAPG members is 49, and has been for the past four years).

continued on next page

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Yes, We Meant 'Psychic'

I was very pleased to see the story of the discovery of Albion-Scipio included with the article on Trenton-Black River activity (March EXPLORER).

Some years ago, I wrote an overview paper on Ordovician oil production in North America, and included the story of Albion-Scipio. The reviewer gave me a hard time, insisting that I clearly meant "physicist" and not "psychic." There's a lesson there.

Steve Schutter
Houston

E&P Benign?

I must disagree with several of the comments made by Lee Gerhard ("Industry Moves to Society's Norms," February EXPLORER).

Gerhard describes the E&P sector of today's industry as "benign" and notes that environmental "impacts (from E&P) are transitory." These statements are simply not true.

The following observations are based upon 16 years experience in E&P and eight years experience in environmental consulting.

E&P operations of a significant percentage of operators are extremely damaging to the environment. The spillage of crude, saltwater and drilling fluids is a routine occurrence in many oilfield operations. Unlined, bermed areas around tank batteries are often used as overflow tanks and contain standing produced fluids more often than not. Surface soil and groundwater are contaminated. In areas of significant production, the area of impact may cover thousands of acres.

This contamination is certainly not transitory. Significant biodegradation of most crude oils takes many decades, and most remediation technologies are either ineffective or too costly to be utilized. Case studies show that aquifers remain highly contaminated at present even when the actual spillage occurred in the 1930s and earlier.

I will grant Gerhard that E&P operations have improved greatly since the days of Spindletop, and many operators do conduct "benign" E&P operations. However, many current operators are not benign, and the effects of their operations are not transitory. Finally, to compare the pollution caused by the modern automobile to a horse is just plain ludicrous.

Rick Railsback
Dallas

Required Reading

Lee Gerhard's commentary (February EXPLORER) should be required reading for every member of the U.S. Congress. His balanced approach to this "high-voltage" issue provides a firm footing for future discussions.

As an interesting aside, I recently read a book titled "The Little Ice Age," by Brian Fagan, a professor of archaeology at the University of California at Santa Barbara. The book is based on extensive research of historical documents, mostly from Europe, concerning climate conditions from 1000 to the present.

Although it is tedious reading, he vividly describes the travails of humankind during the wide swings of seasonal temperatures.

In the closing chapter he states that the Little Ice Age climate was remarkable due to its rapid changes. There would be decades of fairly stable weather followed by a sudden shift to much colder temperatures. He continues by stating the same pattern of sudden change extends back as far

as the Great Ice Age of 15,000 years ago – and probably to the beginning of geologic time.

Nevertheless, Fagan, to the largest extent, believes global warming since the 1860 has been caused by anthropogenic activities. Still, the book is a worthwhile read.

Again, thanks to Lee Gerhard for his excellent, unbiased contribution.

Edward B. Picou Jr.
New Orleans

(Editor's note: The article contained a typographical error we need to correct. The total impact of the Kyoto Agreement would be about \$700 billion – instead of the stated \$700 million).

Damn Right!

Regarding the recent Spindletop celebrations (see February EXPLORER): Thanks to all who participated and encouraged others to carry the torch onward by looking back at a successful collaborative industry effect.

The look back points out the difficulties that were overcome by innovation and "stick-to-itiveness" by the men and women who persevered to complete Spindletop.

In recent years the changes in the industry highlight the need for more collaboration, innovation and teamwork that continues to challenge our industry and individual aspirations to succeed. And God willing, we shall do so.

James E. Wolfe
Houston

West Africa Excitement

Regarding the report on West Africa activity (January EXPLORER): This story is indeed thorough concerning West Africa, especially as it relates to the deepwater discoveries and the plans for the fields' development.

This is a great period for West African nations to take this advantage of the times and shoot ahead on various grounds that makes up the economy, as they pull to their regions various multi-million dollar contracts in this first decade of this millennium.

Indeed they are the trigger points to watch out for in this era.

Gbenga Odusote
Lagos, Nigeria

They Never Said 'Geology'

The editors of *Science*, "fending off furtive strategists" (*Science*, v. 285, No. 5435, p. 1,847), attempt to counter the political efforts of creationists, which they feel "undermined the solidity of" the "scientific acceptance" of "evolution and cosmology." The authors cite plate tectonics, the depth of the ocean, heat flow data, magnetic reversal, annual layers in ice core and "many additional observations rooted in physics, chemistry, astronomy and biology."

Nowhere do they recognize the field of geology, which incorporates the topics to which they have reference. Yet geology concerns itself with the dynamics of our planet and relates to the features that they cite.

Why not tell other scientists in an editorial in *Science* that geology is the science of the earth, its composition and structure as well as its history not the least important of past events have been the gradual development of life and evolution, which relates to the special condition of the earth's surface?

The above paragraphs were transmitted to *Science* editors on Oct. 29, 1999. I have never received a reply: They remained "puzzlingly silent."

Gerald M. Friedman
Troy, N.Y.

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**DPA Energy Statistics**

The AAPG Division of Professional Affairs is making this information available so that discussions regarding energy policy can be documented with accurate statistics. Unless otherwise noted, all energy statistics are from the US Energy Information Agency. 1999 figures are actuals; 2000 figures are projections

Oil and Gas Wells Drilled

In 1999, there were only 20,770 oil and gas well completions in the United States. This is a pathetic shadow of the 70,000-85,000 wells drilled per year in the period 1980-1985, when we were able to actually increase deliverability and make significant new reserve additions beyond just replacing annual consumption.

Potential – Undiscovered U.S. Oil and Gas Resources

The most recent assessment by the U.S. Geological Survey demonstrates that the petroleum and natural gas resource base is large enough to sustain an active domestic petroleum industry for many decades. The technically recoverable onshore U.S. resource base is estimated to be 110 billion barrels of oil and 1,015 trillion cubic feet of gas.

The National Petroleum Council (NPC) in its 1999 study concluded that the United States has a remaining gas resource base in the Lower 48 States of 1,466 TCF. It should be noted that only 157 TCF, or just 10 percent of the identified resource, is considered proven. There are an additional 313 TCF in Alaska; however, this gas is useless without a pipeline to the Lower 48 markets.

The total identified U.S. gas resource,

including Alaska, is a whopping 1,779 TCF. Even at 32 TCF/year consumption, there is more than a 50-year supply. Cumulative domestic production over the past hundred plus years is estimated to be about 890 TCF.

The 1999 NPC report concluded that the most prospective areas for major new discoveries, particularly natural gas, are on public lands in the Rocky Mountain sedimentary basins, offshore in the Gulf of Mexico, in the Eastern Gulf of Mexico and on the Atlantic and Pacific OCS. Despite the huge potential of these areas, Federal law presently prohibits exploration on the Atlantic and Pacific OCS, and in the Eastern Gulf of Mexico. Access to much of the remaining resource potential of the Rocky Mountain basins is restricted or closed. A total of 213 TCF gas resources have been identified by the NPC in the areas that are closed and/or subject to severe access restrictions.

The total area of the U.S. Federal offshore, including Alaska, to the 200-mile economic limit, is about two billion acres. Only 2 percent has been leased. In its 1995 study, the Minerals Management Service assessed a mean undiscovered recoverable resource of 46 billion barrels of oil and 268 trillion cubic feet of natural gas in the Federal OCS. This is 2.5 times the offshore reserves found to date.

Working Drilling Rigs

The number of drilling rigs working on a daily basis has decreased from over 4,000 in 1982 to an average of only 623 in 1999.

Data provided by DPA.

AAPG Education Offerings
— July, 2001 —**Abnormal Formation Pressures in Petroleum Systems: Perspectives from East and West**

Instructors: V.I. Slavin (Consultant, Germany), and R.E. Swarbrick (GeoPOP, UK)

Date: Saturday and Sunday, July 14-15, 2001
Location: St. Petersburg, Russia, with AAPG Regional Meeting

Time: 8:00 a.m. to 5:00 p.m. both days

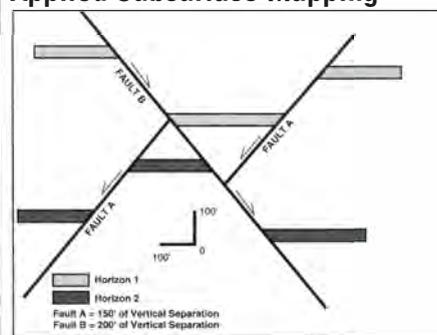
Cost: \$245 per person, includes course notes and refreshments

Content: 1.5 CEU

This short course is designed to offer: a) insights into abnormally pressured petroleum systems with reference to classic worldwide examples, b) an understanding of the origin and distribution of abnormally high pressures, c) knowledge of methods available for pore pressure detection/prediction, and d) an appreciation of the potential effects of abnormal pressures on the petroleum system (seal, reservoir, migration and maturation). It will be taught from the perspective of drilling operations, exploration and production of petroleum reserves. An objective of AAPG in offering this course at St. Petersburg is to compare and contrast how the petroleum industry in Russia and the West deals with abnormal high formation pressures.

The afternoon of the second day will be spent in group discussions centered around

the examples provided, 1) to identify the differences in distribution of abnormal pressures in Russia and the West, 2) to assess how the experiences in each area might be applied usefully in the other, 3) and where are the main uncertainties in pore pressure prediction/detection which will need to be addressed in the future, particularly in relation to deep reservoirs and deep water plays?

Applied Subsurface Mapping**Instructor: Joseph L. Brewton**

This school is a complete and thorough exposition of subsurface petroleum geologic methods. The textbook, Applied Subsurface Geological Mapping by Daniel J. Tearpock and Richard E. Bischke is included as the course notes.

July 9-13

See Education Calendar page 3 for details.

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NYSE listed International Energy Company is seeking an experienced Exploration Geophysicist/Geologist to work in its Houston

Exploration & Production office where the work environment is challenging and results oriented. The successful candidate will have major oil company experience and more than 10 years of broad technical experience, including at least 5 years in the international arena. Must have a track record of developing new play concepts and progressing these concepts to documented, drillable prospects. Must be workstation proficient and be comfortable in a team environment. A degree in geophysics or geology is required, must be willing to travel extensively, and able to possibly relocate overseas in the future. Proficiency with languages other than English is desirable.

Salary is commensurate with experience. Excellent benefits package. Please submit resume and salary history to:

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CLASSIFIED ADS

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THE UNIVERSITY OF TEXAS AT AUSTIN**

PETROPHYSICAL ENGINEER POSITION OPEN

The Bureau of Economic Geology, The University of Texas at Austin, is seeking an experienced petrophysical engineer to work with an integrated research team of geologists, geophysicists, and reservoir engineers conducting studies ranging from reservoir characterization to basin analysis. Activities include gathering petrophysical data and developing methods of integrating petrophysical data into reservoir models. The results of these studies will be used in technology transfer activities including publications and oral presentations.

Qualifications: (1) A graduate degree in Petroleum Engineering, Geology, or Geophysics and five or more years of postgraduate experience in petrophysics to include well-site experience. (2) Demonstrated expertise in petrophysical characterization and modeling of reservoirs, plays, and basins, preferably demonstrated by publications. (3) Work station experience and familiarity with standard software packages for petrophysical analysis. (4) A desire to work in a research environment. (5) Proven record as a team player. (6) Class "C" operator's driver's license.

To apply, please send your resume and three references to the following address. Additional information can be found on the UT Web site, job posting #01-02-07-12-0708.
(<http://www.utexas.edu/employment/>)

The University of Texas at Austin is an Equal Opportunity/Affirmative Action Employer.

Ms. Jenny Turner
Bureau of Economic Geology
The University of Texas at Austin
University Station Box X
Austin Texas, 78713-8924
E-mail: Jenny.Turner@beg.utexas.edu

**Petroleum Geologist/Engineer
Oregon Department of Geology
and Mineral Industries**

The Oregon Department of Geology and Mineral Industries is recruiting for an experienced oil and gas regulatory geologist or engineer to work in the Department's headquarters office in Portland. Successful candidate must be able to manage the

statewide oil, gas and geothermal regulatory program, to oversee drilling activities in the state, including permitting wells, performing field inspections, maintaining records and samples, and to respond to questions and energy mineral issues that arise. Functions include well spacing, monitoring production, bonding, correlative rights, unit agreements, writing rules, making technical presentations, and coordination with oil and gas commissions in other states.

The person also works on interagency activities including hydroelectric project relicensing and reviewing geotechnical reports for energy facility siting. Preference will be given to additional expertise in mineral commodities other than oil and gas, and in use of geographic information system software.

Salary range is \$3482-4872 per month. Agency has discretion of paying chosen candidate any amount within this range.

Send *resume*, list of *three references* and request for job announcement forms to: Petroleum Geologist Recruitment, Oregon Department of Geology and Mineral Industries, 800 NE Oregon St., #28, Portland, Oregon 97232 or email to request forms at geneva.beck@state.or.us

When you receive the announcement forms, follow the instructions. Your completed pd100 application and all supplemental documents must be received in Salem, Oregon at the address indicated by the close date listed on the job announcement. Your application will not be considered unless it arrives completed in Salem by the close date.

**Memorial University of Newfoundland
Petroleum Reservoir Engineering and
Characterization
Tier I (Senior Chair)**

The Faculty of Engineering and Applied Science and the Department of Earth Sciences invite applications for a Tier I Canada Research Chair in petroleum reservoir engineering and characterization. The successful applicant will provide leadership in the development of a new interdisciplinary team in petroleum reservoir studies to be established as a component in Memorial's Oil and Gas Development Partnership. The focus of the Chair may be in any relevant sub-discipline of engineering or geoscience, but applications are especially encouraged in reservoir flow modelling and simulation, reservoir production and

See **Classifieds**, next page

**CANADA RESEARCH CHAIR
IN PETROLEUM GEOSCIENCE**

The Department of Earth Sciences at Memorial University of Newfoundland invites applications for a Tier II Canada Research Chair in Petroleum Geoscience. The successful candidate will undertake research, and undergraduate and graduate teaching in the field of petroleum geoscience. Applicants will normally hold a PhD in Petroleum Geoscience or a closely related field and have a demonstrated record of research and publications in their area of expertise. A proven record of effective research or work involvement with the Petroleum Industry would be a significant asset.

Memorial University is the largest university in Atlantic Canada. As the province's only university, Memorial plays an integral role in the educational and cultural life of Newfoundland and Labrador. Offering diverse undergraduate and graduate programs to almost 16,000 students, Memorial provides a distinctive and stimulating environment for learning in St. John's, a very safe, friendly city with great historic charm, a vibrant cultural life, and easy access to a wide range of outdoor activities.

The successful candidate will join an active department of 25 faculty members (<http://www.esd.mun.ca>) including a growing team of petroleum geoscientists with special focus on research relevant to the east coast of Canada. A number of faculty members have well established basic and applied research track records in various aspects of petroleum geoscience that are supported by extensive laboratory and computing facilities. The department has close collaborative ties with industry and geological surveys, locally, nationally and worldwide.

Memorial University is developing a new broadly-based strategic petroleum initiative, called the Oil and Gas Development Partnership (www.mun.ca/OGDP) to recognize the rapid expansion in exploration and production in offshore Newfoundland, and the appointment of a Canada Research Chair in Petroleum Geoscience is part of this initiative. Significant new investments in the petroleum geoscience research infrastructure in the University are also being sought from industry, especially in the areas of reservoir exploitation, and geophysical and geological data analysis, interpretation and display.

Memorial University is part of a vibrant, local scientific and engineering community which maintains an inventory of available positions for qualified partners. Partners of candidates for positions are invited to include their resume for possible matching with other job opportunities.

Details of Canadian Research Chairs can be found at www.chairs.gc.ca. Interested persons should send a resume and the names and addresses of three academic referees to:

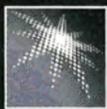
Dr. Jim Wright, PhD, P.Geo.
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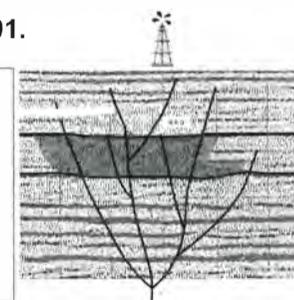
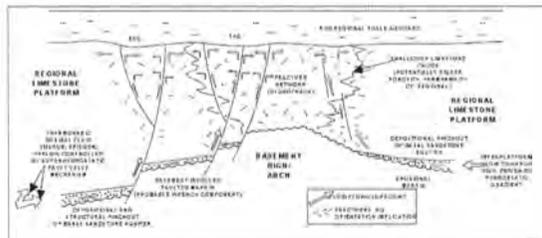
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Classifieds

from previous page

management, reservoir petrophysical properties or 4D seismic reservoir characterization.

Salary and infrastructure support will be commensurate with the qualifications and experience of the chair appointee. Support for research infrastructure for an appointee may also be available from the Canada Foundation for Innovation. Start-up funds would be negotiated with the faculties.

A Tier I candidate must be acknowledged by his/her peers as a world leader in his/her research field. Appointment of a Tier I Chair may be made at the rank of professor with tenure. The successful candidate should be eligible to register as a Professional Engineer or Professional Geoscientist in the Province of Newfoundland and Labrador. Applicants are encouraged to review Memorial's CRC Strategic Research Plan on our website <http://www.mun.ca/research/activities/strategic.html>.

For further information about the Faculty of Engineering and Applied Science and the Department of Earth Sciences at Memorial University, please visit our web sites at

www.engr.mun.ca and www.esd.mun.ca. For further information on Memorial's Oil and Gas Development Partnership, please visit the web site at www.mun.ca/OGDP/.

Memorial University is home to a vibrant and innovative research community. St. John's is the hub of a growing offshore oil and gas industry providing the successful applicant with opportunities locally for research collaboration.

Our Strategic Research Plan for the Canada Research Chairs program focuses on internationally recognized research in:

Industrial development and environmental sustainability
Ocean and coastal studies
Health
North Atlantic/Newfoundland studies

Memorial is Atlantic Canada's largest comprehensive university, offering 16,000 students degree programs in 15 faculties and schools, with first-rate facilities and services. The university's main campus is located in St. John's, capital of Newfoundland and Labrador. The oldest city in North America, St. John's, has a vibrant history and culture. It has a population of 174,051 in the metro area and is the site of many world class research and development facilities including an international centre of excellence in marine science and technology. The city is also an active centre for investment and business activity. We have nearly

1,000 faculty members who are committed to excellence in the advancement of their fields and to the economic wealth and social well-being of Newfoundland and Labrador -- and the world beyond.

Applicants should submit a curriculum vitae and the names and addresses of three references to:

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Consideration of applicants began on February 1, 2001. MUN is an equal opportunity employer. There is no restriction with regard to nationality or residence.

U.S. Geological Survey Mendenhall Postdoctoral Research Fellowship Program

The U.S. Geological Survey (USGS) invites applications for the Mendenhall Postdoctoral Research Fellowship Program for Fiscal Year 2002. The Mendenhall Program is envisioned to bring current expertise in the earth sciences to assist in the implementation of the strategic plan of the USGS

and the science strategy of its programs. It is also intended to provide postdoctoral fellows a research experience that enhances their personal scientific stature and credentials. Fiscal Year 2002 begins in October 2001.

Opportunities for research are available in a wide range of areas including: coastal erosion processes and modeling coastal change; interdisciplinary application of remote sensing; noble gas geochemistry; microbes and geologic substrates in estuaries; climate change, geologic processes, land use and land-surface feedbacks; estimating future strong ground motions; high-resolution imaging of earthquake rupture processes and fault structure; controls on magma ascent, stagnation and eruption; economic modeling of geologic energy resources; and environmental biogeochemistry.

The postdoctoral fellowships are 2-year USGS appointments with full benefits and salaries. Applications are being accepted through May 18, 2001, with appointments starting between October 1, 2001 and April 1, 2002, depending on availability of funds. A complete description of the program, research opportunities, and the application process are available via the WWW at <http://geology.usgs.gov/postdoc>. Applicants must be U.S. citizens. The U.S. Geological Survey is an equal opportunity employer.

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DIRECTOR'S CORNER

A Little 'Sniff' Worth Your Time

By RICK FRITZ

Last year we emphasized membership development through enhanced products and services. This year we are continuing that emphasis by focusing on marketing.

The late Norm Foster, a former president of AAPG, was one of the best I knew at marketing prospects. One of the things I remember most was that he always carried some of the "product" with him at a prospect presentation.

I helped him sell one of his last prospects. As usual, he carried a small sample of oil from the prospect area. At the end of the meeting he opened the bottle and passed it around for everyone to sniff.

It was very effective – we sold the deal.

As I talk to members, I realize that there are still a large number of AAPG members who are not aware of AAPG's products and services. Well, just as Norm always gave clients a "sniff" of the product, we plan to do the same.

I remember most that he always carried some of the "product" with him at a prospect presentation.

* * *

We are reorganizing headquarters to emphasize marketing. We have a new marketing coordinator, and we are currently searching for a member to make sales contacts in Houston and our other large markets on AAPG's behalf on a part-time basis.

A program is already underway to visit companies on a regular basis to personally listen to member needs and show what services AAPG can provide. I already have visited several companies and am excited about the interest in AAPG and what we can do for them. We plan to provide

packages to companies whereby they can purchase schools, advertising, data, and other services at discounted cost.

In addition, AAPG President Marlan Downey has asked several members of the Executive Committee and me to give talks to local societies and universities. We already have made many of these talks, providing information on AAPG and asking what AAPG can provide to further the professional careers of our members.

Again, the response has been good.

Also, we are starting a new Web-based program of marketing whereby we will send a monthly update on

AAPG's newest products and services. Notices will include information on new books, school updates, digital releases and related discounts.

* * *

Our plan is to make AAPG more visible – and to make it easier to access and use AAPG's products and services. Our intent is to make AAPG an integral part of your professional career.

We're hoping a "sniff" will do it.

(Editor's note: For more information on AAPG's marketing program or its products and services, please contact Tamara Haring at 1-888-945-2274, x637; or, by e-mail, to tharing@aapg.org)



DPA Providing Testimony, Data

Licensure, U.S. Policy Tops Agenda

By G. WARFIELD "Skip" HOBBS
DPA President

The Division of Professional Affairs (DPA) is the arm of the AAPG that handles issues concerning geoscience professional matters and energy policy. We are hard at work. Here is the latest update.

Professional Licensure

Professional licensure of geologists is now a requirement in 24 states. Seventeen other states regulate the practice of geology through statutory definition, title regulation or certification requirements.

In this age of liability litigation, the public demands standards for professional qualifications and personal accountability. There is no turning back the tide.

AAPG is dedicated to the principal that only properly qualified individuals with the highest professional and ethical standards should conduct the practice of geology. To this end, AAPG instituted the DPA in 1965. In recognition that geological work conducted by many of its members extends beyond petroleum exploration and development, AAPG established its Division of Environmental Geosciences (DEG) in 1992. AAPG supports the professional practice of geology in its environmental, ground water and engineering applications, as well as in oil and gas exploration and development.

DPA's Committee on State Registration and Licensure closely monitors state regulatory matters concerning geologists. We have been instrumental in obtaining statutory licensure exemptions for petroleum geologists in states where bills for the licensure of geologists have been introduced. This has been granted in nearly all states on the grounds that the professional work of a petroleum

"Energy policy is now center stage nationally..."

geologist does not directly impact the health, safety and welfare of the public.

DPA also has taken a leadership role in promoting uniform testing and licensure requirements, and inter-state reciprocity.

The DPA State Registration and Licensure Committee is chaired by Rick Ericksen, executive director of the Mississippi State Board of Registered Professional Geologists in Jackson, Miss. Rick also serves as the AAPG representative on the Examination Board of the Association of State Boards of Geology. This body sets and administers the now (almost) nationally standardized written examination and practical for professional licensure.

Since 1993, legislation providing for the licensure of geologists has been introduced in Texas, home to over 10,000 AAPG members (approximately one-third of the AAPG membership). The issue has been highly controversial between engineers and geoscientists, and among geologists, and was never able to get out of committee.

Last autumn, however, a new licensure effort was initiated. Language was added to the previous bills that explicitly addressed the concerns of engineers and of geologists whose work is not related to matters of public health, safety and welfare.

These additions ensure that:

☐ Geologists are not authorized to practice engineering (except in cases in which geologists are licensed engineers).

☐ The field of engineering is not

regulated by a licensure act for geologists.

☐ Geologists involved in the exploration for and development of fuel and/or non-fuel minerals are exempt from the requirement for licensure.

In October, the AAPG Executive Committee adopted a resolution prepared by the DPA, DEG and the Energy Minerals Division (EMD), which states that "the American Association of Petroleum Geologists hereby endorses and encourages the ongoing efforts for the licensure of professional geologists in the State of Texas whose practice affects the health, safety and welfare of the citizens of Texas."

On Feb. 12, Ericksen testified before the Texas Senate State Affairs Committee in support of the Geoscientist Licensure Bill (SB 405). His testimony – that AAPG now endorsed licensure in Texas – was the necessary impetus to convince the committee that there was now a consensus among the majority of geoscientists. By an 8 – 1 vote, the bill was passed by the Senate State Affairs Committee and sent to the full Senate for its consideration.

On Feb. 22, the Texas Senate passed the Texas Geoscience Practice Act (SB 405) with only two dissenting votes. The bill now goes to the Texas House.

Public Energy Policy

Energy policy is now center stage nationally, propelled by high fuel prices, power outages in California and



proposals to drill in the Arctic National Wildlife Refuge.

DPA's Government Affairs Committee is actively working on energy policy initiatives:

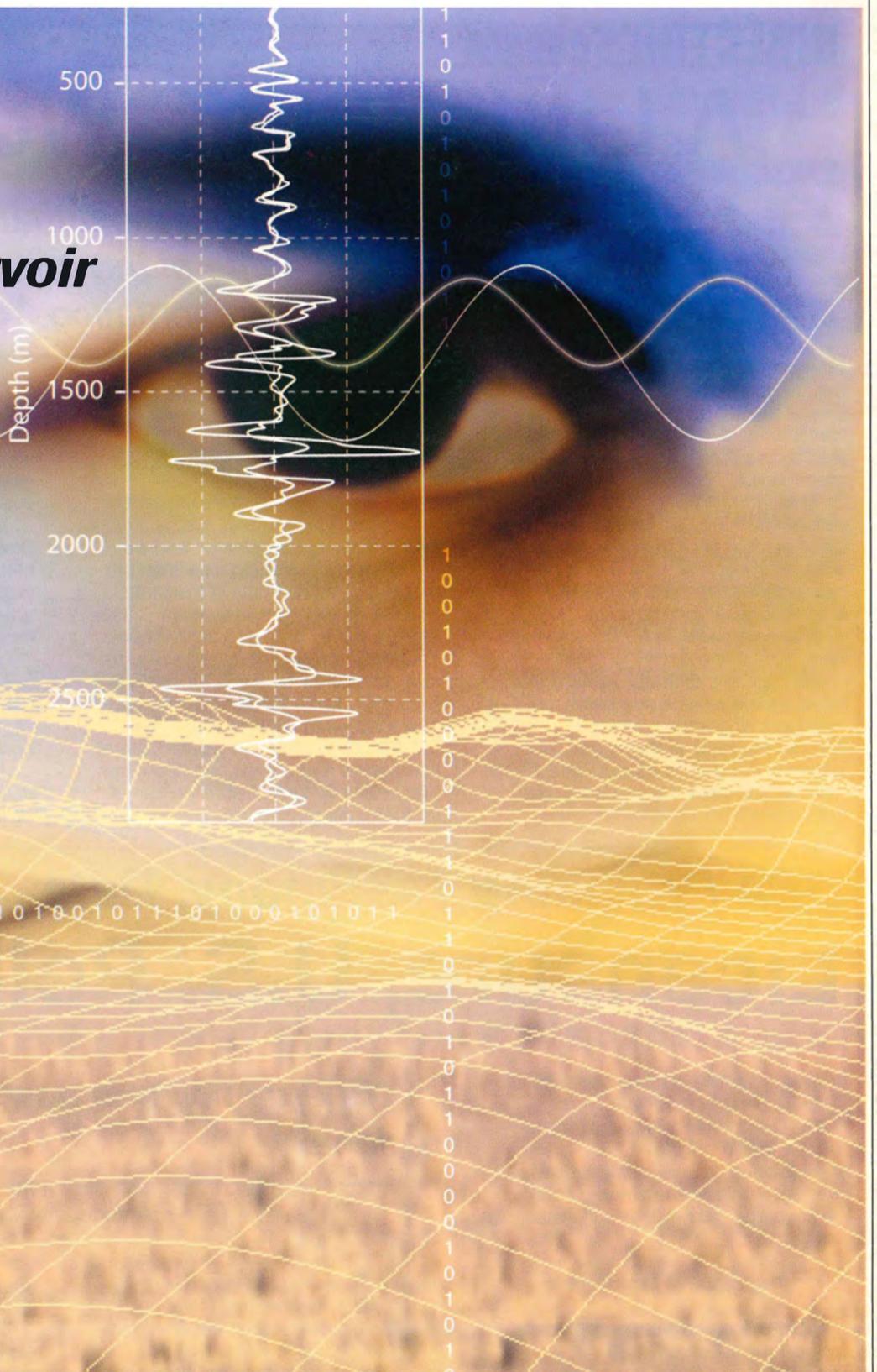
☐ Its energy policy position papers have been sent to President Bush's Energy Task Force.

☐ We provided assistance for the testimony of AAPG President Marlan W. Downey in mid-March before the U.S. House of Representatives Sub-Committee on Energy and Mineral Resources (see page 31).

☐ Yours truly, as DPA president, presented a speech titled "Energy Policy: Should the Public Care?" at the Kentucky Geological Survey's Geology and Public Policy Forum in Lexington, Ky., on March 8, and is scheduled to present the same speech at the AAPG Pacific Section meeting in Universal City, Calif., on April 9.

☐ DPA assisted in organizing the Energy Summit on energy policy that will be held in April in Washington, D.C. This meeting will provide an opportunity for representatives of the nation's geoscience professional societies, officials of government agencies involved with energy matters and members of Congress to meet and discuss energy policy. ☐

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