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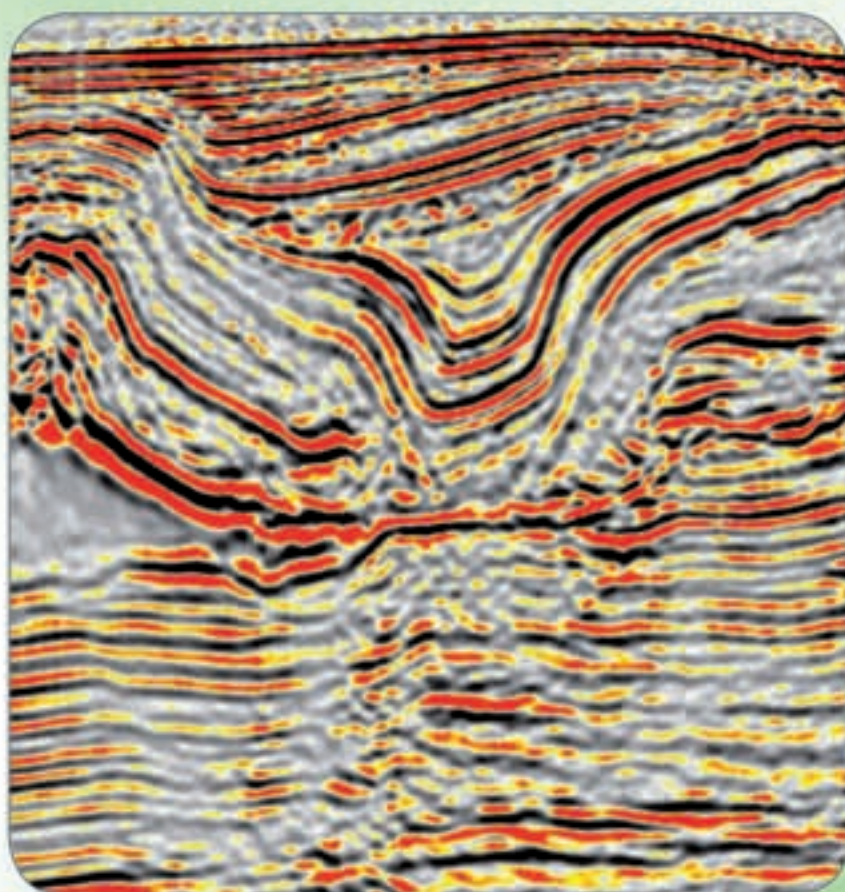
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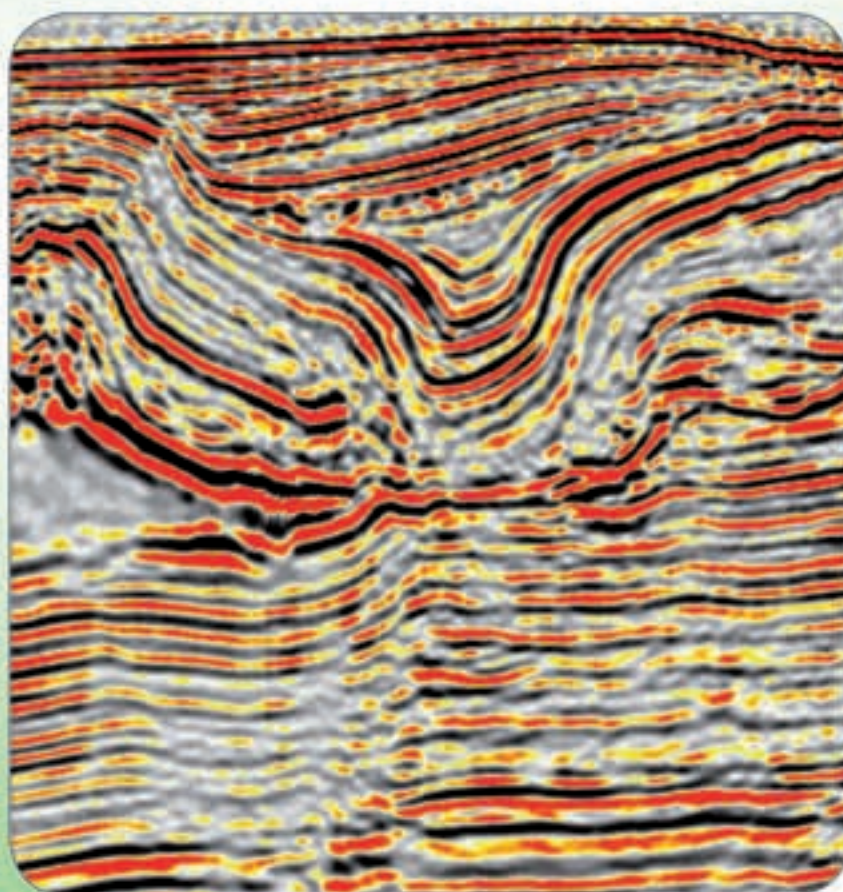
Rock Steady

Geologic insights take hold
when the goal is at hand

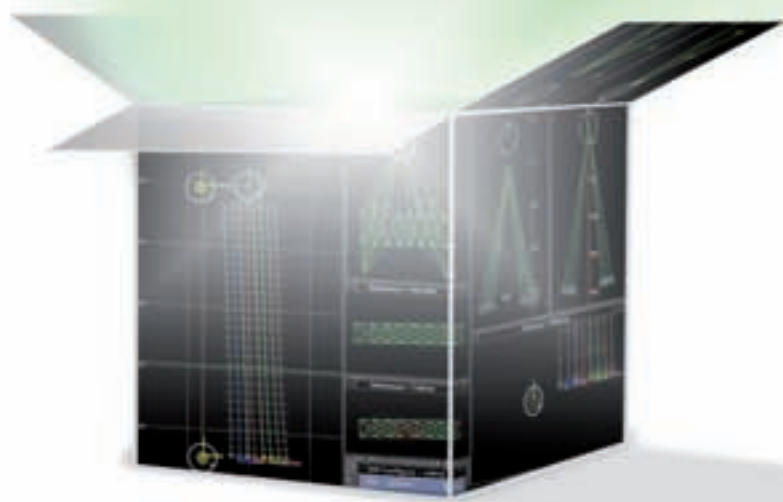
The Power of Creativity



Isotropic RTM from the Walker Ridge WAZ multi-client survey, Gulf of Mexico



TTI-RTM from the Walker Ridge WAZ multi-client survey, Gulf of Mexico



TTI-RTM WIDE-AZIMUTH IMAGING

CHALLENGE

- To enhance subsalt seismic images in the deepwater Gulf of Mexico to help geoscientists generate a more accurate understanding of the subsurface for improved exploration, production and development.

SOLUTION

- Wide-azimuth data acquisition coupled with the CGGVeritas proprietary TTI-RTM (Tilted Transverse Isotropic – Reverse Time Migration) imaging technology provides enhanced illumination of subsalt reservoirs and produces more coherent and focused subsalt images.

RESULTS

- Consistently, TTI-RTM produces more coherent and focused subsalt images based on a high-fidelity velocity model and clearly defined salt geometry, which incorporate the TTI wave propagation effect.



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On the cover: AAPG member Matt Malkowski, a Michigan State University graduate student, at the Mystic Pass, Alaska Range, conducting research for his graduate project – and starting his career, like so many geologists before him, on the rocks. His project is “Late Paleozoic Stratigraphic History, Provenance and Structural Evolution of the Farewell Terrane, Southwestern Alaska.” Malkowski is this year’s recipient of the AAPG Foundation’s Merrill W. Haas Memorial Grant, which made his Alaskan travel experience possible. For more information on the AAPG Foundation and its Grants-in-Aid Program, see page 20. Photo courtesy of Brian Hampton.

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PRESIDENT’S column

Geoscience: Now More Than Ever

By JOHN C. LORENZ

I recently had the pleasure of participating in an E&P company’s internal reservoir characterization technology forum. The eclectic meeting covered topics ranging from the implications of peak oil to ways to improve recovery factors.

In the course of discussion AAPG member Kirt Campion made an insightful remark to the effect that when times get tough there is less margin for error, therefore we should be putting more geoscience into understanding plays, not less, i.e., if you’re going to develop a play in tough economic times, it’s best to know as much as possible about it in order to minimize the amount of money spent unproductively. Although the initial cost can be higher, good geoscience properly applied leads to more efficient exploration and recovery. The up-front cost is higher because data aren’t cheap, plus there is a time-and-effort cost associated with assessing that data, but the returns justify the investment.

The value of good geoscience is illustrated by the situation immediately after World War II. At that time oil reserves had been severely depleted by the war effort because emphasis had understandably been placed on maximum production from known fields rather than on finding new ones. In the effort to rebuild reserves, U.S. companies independently set up 22 geological research laboratories and hired numerous new Ph.D geology graduates to staff them. Staff members were provided with generous budgets and encouraged to do research on a wide range of topics.

As chronicled* by James Parks, who had himself been hired by the Shell lab in the early 1950s, these company laboratories contributed significantly to the advancement of hydrocarbon-related geology, discovering new traps and methods, and developing new concepts. Significantly, laboratory staff members were encouraged to publish their research, thus much of this research got into the public domain.

Most of these research laboratories are much smaller than they once were, and some have been phased out entirely. Industry is still spending many millions of dollars on research, but typically it is geared more toward specific applications, and publication is not a priority. As the company laboratories were decimated by mergers and downsizing many of the laboratory-staff geologists went on to academia, where they helped teach the next generation of geologists. Thus the benefits from this system accrued to both the industry and the science of geology.

At about the same time the industry research laboratories began to fade, and largely in response to the oil embargo of 1973-74, government-sponsored energy research programs began to investigate unconventional fossil-energy sources. These programs were administered by entities such as the Gas Research Institute and the U.S. Department of Energy. The government funded research into low-permeability sandstone reservoirs, in situ coal gasification, oil shale, etc., and, as with the industry laboratory staff, researchers were encouraged to publish their results. Many of the concepts and techniques that are



Lorenz

currently being used by industry, such as those used to exploit tight gas reservoirs, were developed by DOE-funded research at universities, national laboratories and other research institutions.

Funding levels for these government-sponsored programs have varied widely with shifts in the political climate, but overall they have diminished steadily as memories of the unavailability of gasoline at any price and long lines at the gas pumps have faded. Some money is still being allocated to entities such as the Research Partnership to Secure Energy for America for fossil-energy research, but by far most of the current U.S. DOE funding is being directed toward CO₂ sequestration, even though we are now more than ever dependent on hydrocarbons.

AAPG fosters and disseminates research: “In effect, AAPG has become a corporate research memory for the industry...”

AAPG can’t and doesn’t try to fill this research gap, but it does foster and disseminate the research that is still being done, securing the legacy of geoscience research past and present. We are building small research programs such as PetroGrants, whereby industry research dollars would be directed through the National Science Foundation to universities, and we help fund student research through the Grants-in-Aid program. The U.S. DOE helps fund the Petroleum Technology Transfer Council that AAPG administers and which disseminates research results locally. More importantly, AAPG still publishes hydrocarbon-related geoscience and holds research and technology forums on cutting-edge topics. In effect, AAPG has become a corporate research memory for the industry, and the value of belonging to AAPG and contributing time and effort toward building the AAPG geoscience programs has never been higher.

*Parks, J.M., 2003, Unintended consequences of oil company research laboratories, Oil-Industry History, v. 4, p. 32-41.

*Seismic provides same results as well data***Getting to the Source – Differently**

By LOUISE S. DURHAM
EXPLORER Correspondent

That prospect you're all set to drill may appear to have all the requisite attributes needed to be the real deal.

Beware.

There may be a crucial missing ingredient.

Think source rocks.

They not only must be present, they must be capable of adequately "feeding" any targeted conventional reservoir rock.

Traditionally, the approach to identify and qualify these rocks has been to use well data. But well data can be sparse or nonexistent in deep basins/frontier areas.

"There are a lot of challenges to getting well data, and the ability to use other types of data, like seismic – which you need anyway – is very important," said AAPG member Ole J. Martinsen, vice president and head of exploration research, Technology and New Energy at Statoil Research Center in Bergen, Norway.

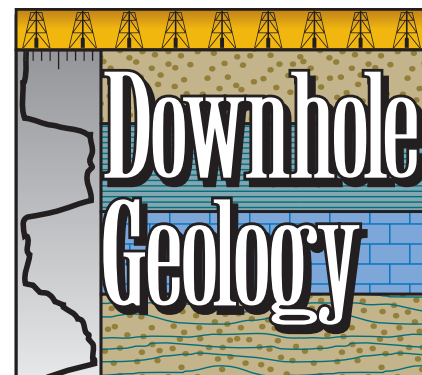
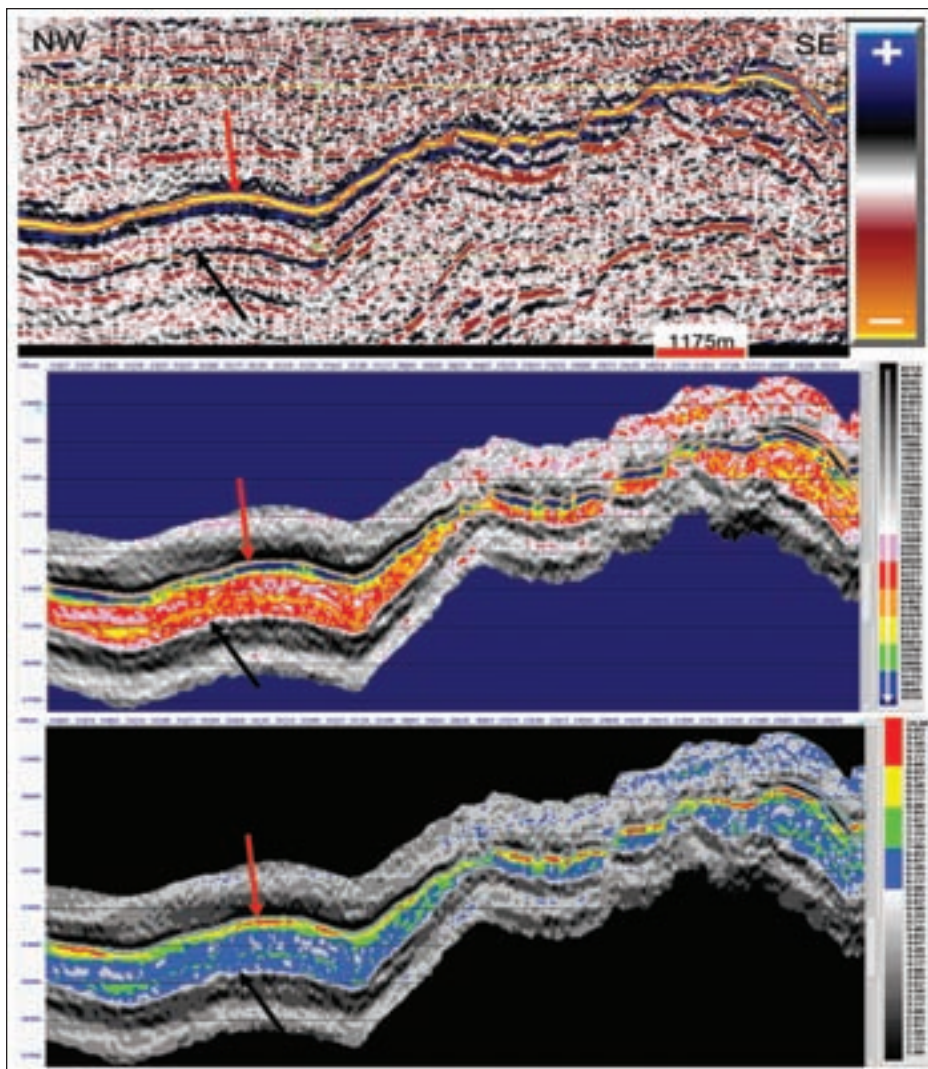
In Martinsen's words: "You can extract information from the seismic that you could not do before."

This is the basis for some innovative doings at Statoil.

A group of researchers at the company have labored for several years to develop a now-proven technology to identify



Martinsen

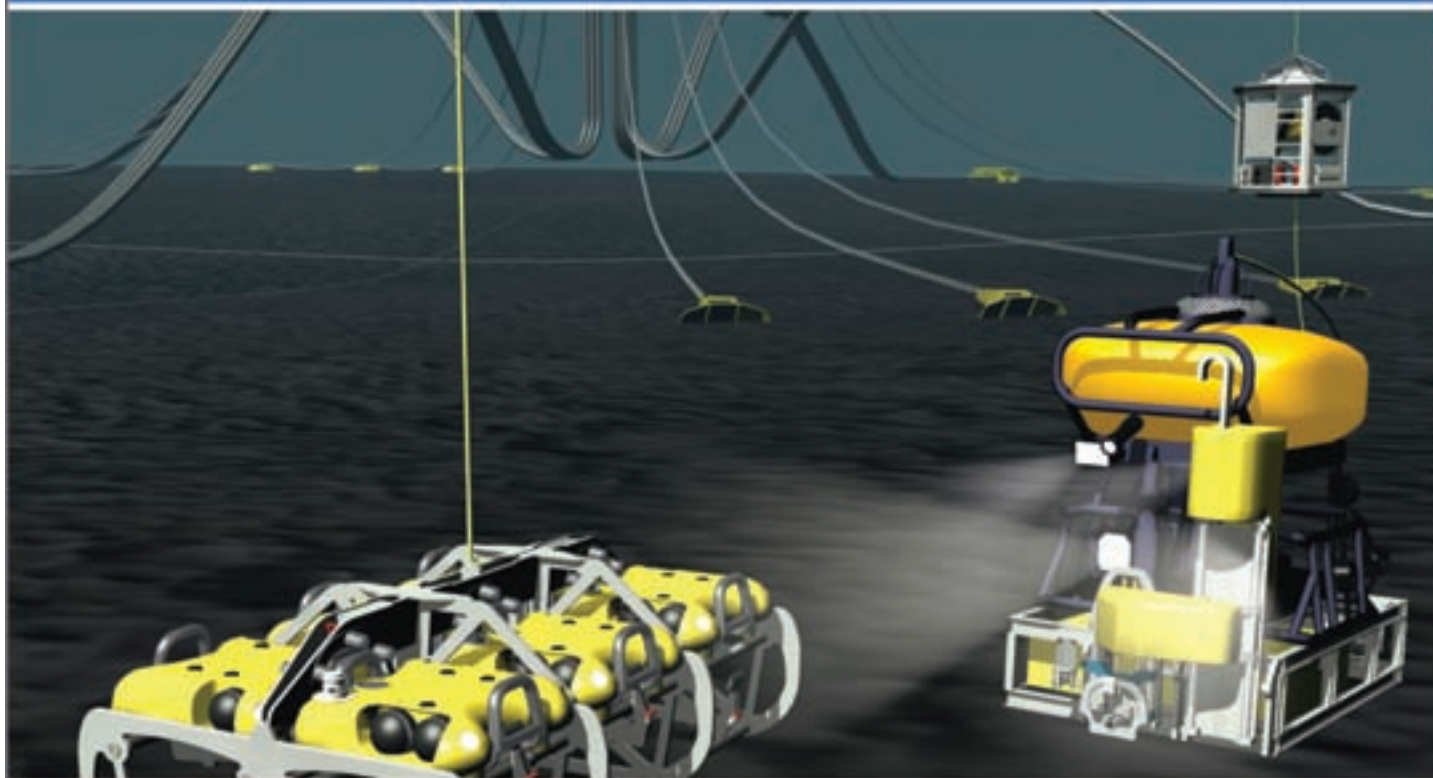


Pictured here (from top), near stack seismic section, Acoustic Impedance section and TOC section through the northern calibration well. The red arrows point at the top of the Spekk Formation and the black arrows point at the base. In the middle Acoustic Impedance section, the acoustic impedance is lower within the Spekk Formation than in adjacent strata, apart from in the shallowest part where the low impedances are due to the shallow depth and not due to organic content. A trend from very low acoustic impedances in the upper part (blue colors) to higher acoustic impedances further down (red and pink colors) is clearly seen within the Spekk Formation. TOC content greater than 6 percent TOC is highlighted in bright colors in the lower figure.

Graphics courtesy of Statoil Research Center

See **SRIS**, page 6

Finally - An answer for getting reservoir seismic **OVER THE RESERVOIR!**



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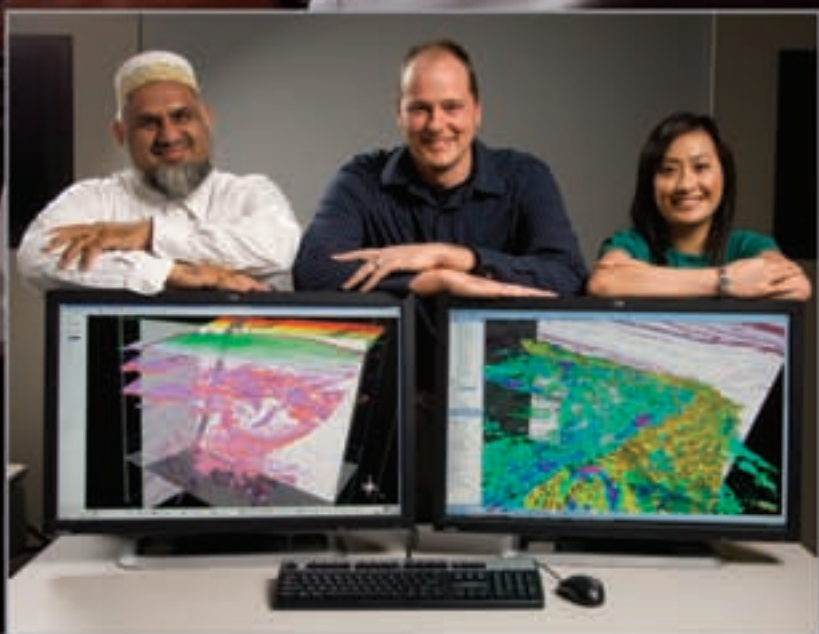
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*Lights, camera, action – downhole***Now Showing at a Well Not Near You**

By LOUISE S. DURHAM
EXPLORER Correspondent

Ouch!

It's so brutally painful in the oil patch when commodity prices plunge dramatically from eye-popping high levels, as witnessed over the past year-plus.

Perhaps bruised yet undaunted, the eternally optimistic E&P folks and their service company cohorts continue working diligently to develop and adopt new technologies and services to advance their business operations.

The new applications often incorporate what has become the most pervasive technology of all – the Internet.

Besides such offerings as Web casts, webinars and the like, there's "Well Cast."

The relatively new Well Cast essentially is a real time movie of a downhole video survey. It can be transmitted to all interested parties.

The application is becoming fairly routine in the Gulf of Mexico to assist operators to resolve existing problems in the wellbore and to prevent problems from occurring in the first place.

Expro, a U.K.-based well flow management company with offices in Houston and around the world, implemented the first Well Cast to successfully guide a client through a high profile fishing job at one of the largest producing wells in the Gulf.

Seeing Is Believing

A host of various specialists in different locations simultaneously viewed the Well Cast, which was conducted in conjunction with Expro's recently developed ViewMax

sideview camera.

The downhole camera can be changed from the conventional down-view mode to side view merely by flicking a switch. It also can be rotated 360 degrees to investigate fully in any direction. ViewMax was awarded a Spotlight on New Technology Award at OTC 2008.

"Camera services are still emerging in terms of applications around the world," said Brett Lestrangle, senior vice-president North America-Offshore at Expro. "With any new technology you get early adopters and clients who now see this as a routine part of their tool box. To others, it's relatively new."

The company recently engaged in a campaign involving wells suspected of having scale problems.

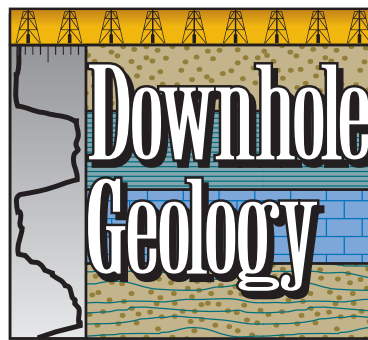
"You can infer scale, but it's amazing when you go in and see it," Lestrangle said. "You run the camera, and it's, 'Wow, this is what it is.' After treatment, you can go back in and verify it worked."

"The cameras add a lot of value," he continued, "and when you hook up with Well Cast, it gives real time satellite data transmission so the data can be shared in real time."

Anyone with Internet access (given proper security) can be given permission to log in and see the job as it's happening.

During the scale campaign, the client's engineers in Lafayette and Houston, an Expro technical support person in Houston and the operations manager in Broussard, La., simultaneously viewed the job via Well Cast, communicating directly with the operator running the real time video log.

"The clients can talk – can say what's that, go up, go down, check that again,"



Lestrangle said. "It has a bit of a wow factor in that respect – it's just very efficient when it all works like that."

'Sticking Your Head In It'

Lestrangle also noted the growth of the Internet and access speeds not only make such things possible, they're also relatively simple to implement.

Any of the Well Cast/video applications have a commonality in that once the viewers witness what is happening downhole, they have the ability to know what to do instantly, rather than trying to infer something from production logs, caliper logs, etc.

With a subsea BOP stack inspection, for instance, the viewer(s) basically gets down there and looks at it, Lestrangle noted.

"It's as good as sticking your head in it," he commented.

The bulk of the Well Cast efforts in the past were directed toward fishing operations. Today, the trend is to use the technology more for preventive measures rather than waiting for problems to develop.

In a field where the wells may have scaling tendencies, viewing only a handful of the boreholes can reveal if problems are in the making and need to be addressed before a field-wide dilemma occurs. Likewise, after dosing water injectors with expensive chemicals to prevent scaling, it's good business to take a look at a sampling of targeted boreholes to determine if all is still okay rather than waiting until a major remedial operation is needed.

Implementing Well Cast with camera surveillance is not limited to offshore such as the GOM.

Lestrangle noted they performed a job recently at an onshore field using a truck unit out of Lafayette, which runs the same cameras.

It's possible to deploy cameras that only take memory pictures or go all the way to real time video fiber optic Well Cast.

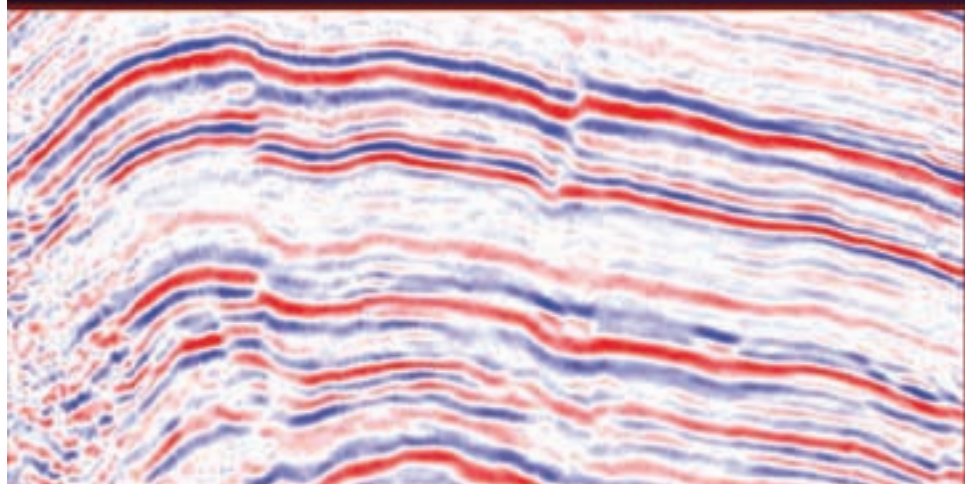
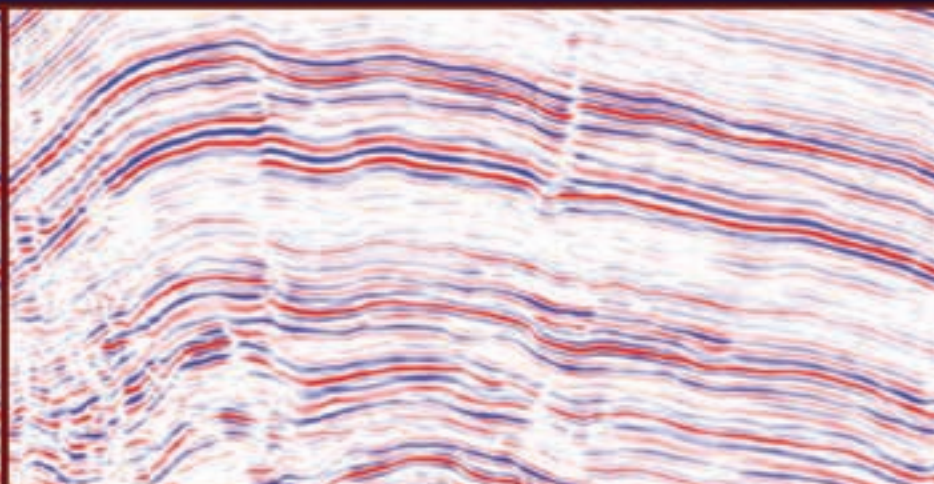
"The ones who use fiber optic with Well Cast tend to do it again," Lestrangle said. "Real time access can quickly become the norm."

"You see the images and within seconds you have an idea of what needs to be done and collaborate effectively," he added.

Lestrangle noted that not all clients need Well Cast, and some of them have their own networks.

"Well Cast is not proprietary," he emphasized. "It's a clever implementation that makes use of the Internet today – that makes it more accessible to a lot of operators."

"There's no huge cost or lead time to set this up," he noted. "We can be very quickly streaming data either the same day or the next day." □

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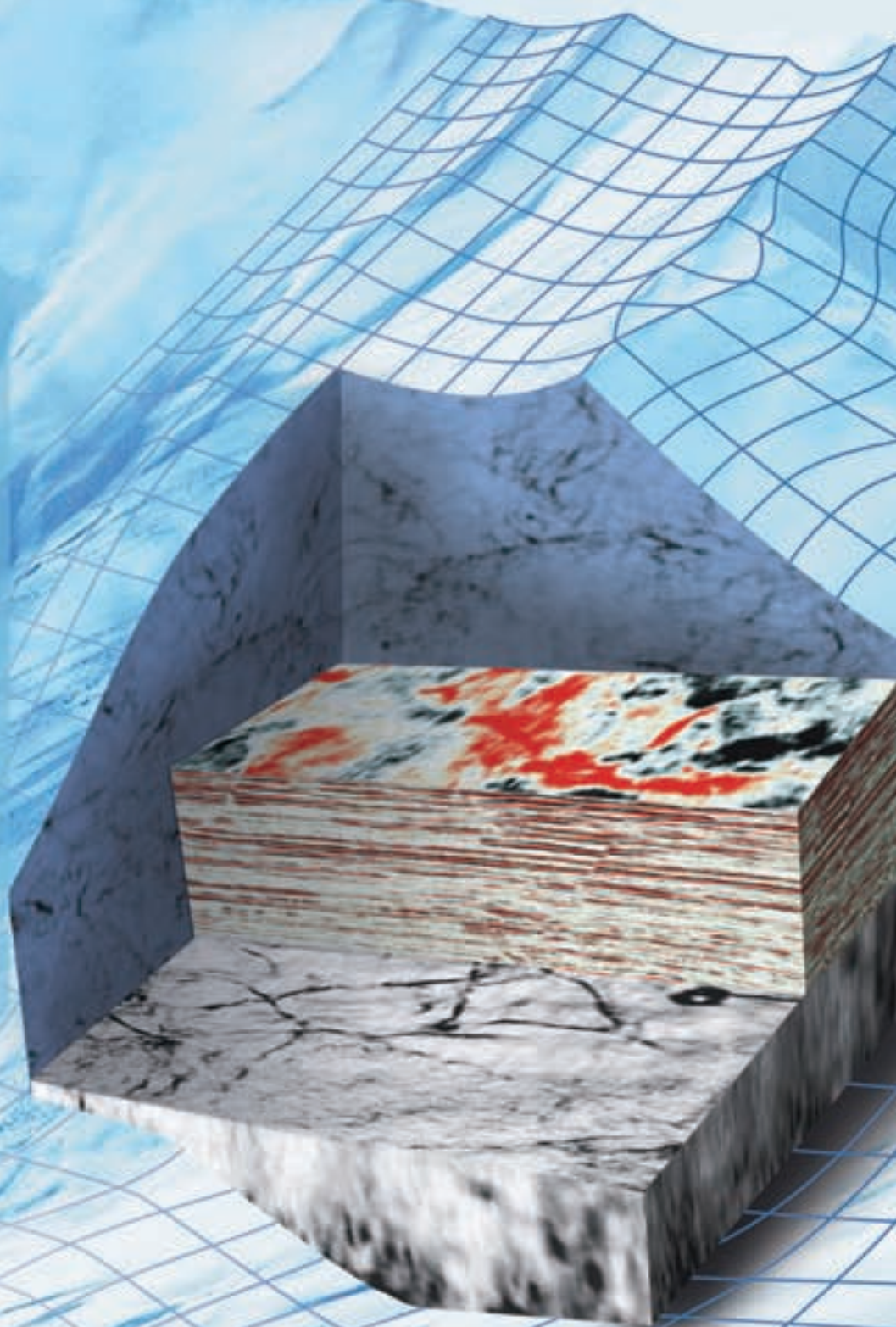
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*Seismic used to shake up reservoir***Shockwaves Loosen Stuck Oil**

By LOUISE S. DURHAM
EXPLORER Correspondent

Feeling a tad glum 'cause you're saddled with an old field that's on its last legs production-wise?

You just know there's lots of grease still there, but you can't afford the big bucks required for conventional EOR methods?

Maybe all you need to do is shake it up, baby – the reservoir, that is.

We're talking "hydro-impact technology," which uses seismic wave stimulation technology to shake loose the residual oil trapped in the reservoir around existing wells.

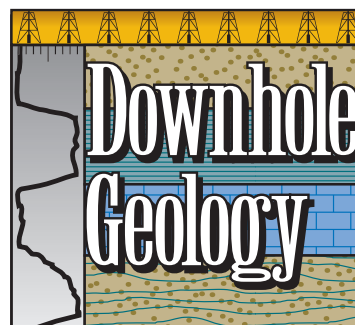
It's simple to apply, and it's easy

on the checkbook.

The low cost, field-proven technology was developed by Plano, Texas-based Applied Seismic Research (ASR) to enhance oil recovery in mature oil fields by increasing the yield from producing wells, according to Bill Wooden, vice president of ASR.

The Texas Railroad Commission certified the technology in 2007 as an official EOR process – the first new EOR certification in more than 30 years.

The user of the technology receives a 50 percent reduction in severance tax on total production for a 10-year period. The operator is required to show only a positive



response to the technology to qualify.

Russian scientists were the first to recognize that high-energy elastic waves

could mobilize immobile oil – but the tool they designed for field application had significant drawbacks, according to Wooden.

He noted ASR decided to go straight to its own drawing board to develop their in-situ seismic stimulation technology.

All Shook Up

Here's the way it works:

✓ The seismic stimulation tool is installed similar to a tubing pump at the depth of the producing horizon in the wellbore.

✓ The pumping unit provides power for the tool's plungers to compress fluid drawn into a barrel.

✓ The compressed fluid is released upon the upstroke, creating a high-energy seismic shock wave.

"These high energy elastic waves travel into the reservoir to dislodge and mobilize bypassed oil," Wooden said. "Seismic stimulation appears to work primarily on a mechanical level, shaking droplets from an immobile state so they migrate in the flow stream."

He noted the seismic waves encourage oil production via a couple of mechanisms:

✓ The force of the wave pushes trapped oil droplets through constricted pore throats that blocked their movement through the reservoir.

✓ Individual oil droplets combine into extended droplets that can more easily surmount the pore throat constrictions.

It's long been recognized that earthquakes can stimulate field production that ordinarily trails off the day following the event. In comparison, the ASR tool pounds the reservoir continuously with earthquake-like events.

"It creates seismic waves every 10 seconds," Wooden said. "These subsurface shockwaves mimic primary waves generated by earthquakes, and that's why they shake the oil loose. The operating lifespan of the tool is eight to 12 months, after which it is pulled and replaced."

"The waves produce power in the range of one to 10 million watts, and pressure at the wave front can exceed 4,000 psi," he said. "Los Alamos studies showed a pressure disturbance as low as 0.01 psi dislodged oil droplets."

"The seismic wave travels about one-and-a-half miles per second," Wooden noted. "Because it travels through the wellbore casing and cement within microseconds, it doesn't damage the wellbore or formation."

"Typically the area stimulated is three-quarters of a mile out to a one-mile radius (both horizontal and vertical)," he said. "It can extend beyond a mile in some cases, such as carbonates like the Permian Basin."

"Producers within the radius of stimulation on average increase oil production and oil cut by 10 to 20 percent," Wooden added.

He noted the unique thing about the seismic wave is that it stimulates through fault blocks, through subsurface horizons and can dislodge oil in separate producing blocks. In fact, the tool can be placed in the middle of a highly faulted field and it won't matter because the wave goes everywhere. □

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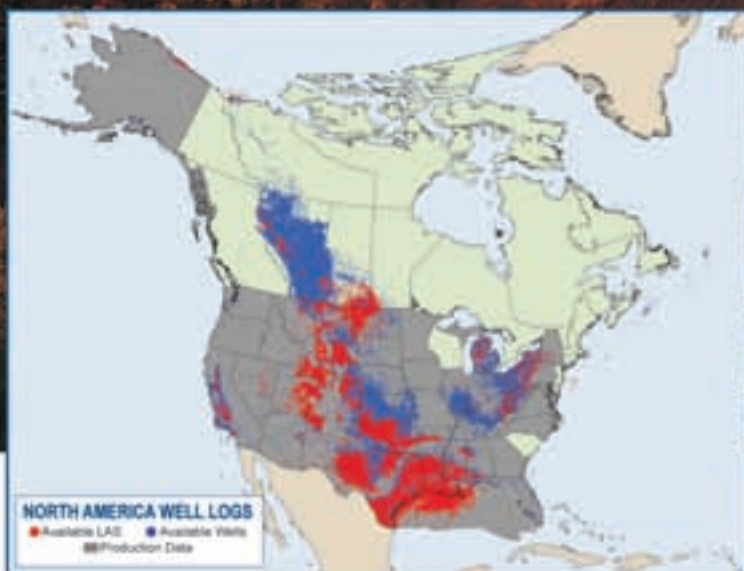
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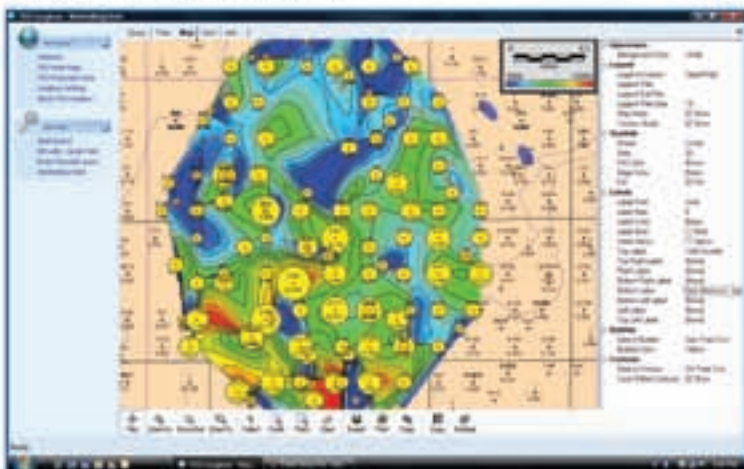
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Basin studied amid renewed attention

New Plays Look to Boost Arkoma

By DAVID BROWN
EXPLORER Correspondent

Can the United States expect to add another big resource to future natural gas supply?

The U.S. Geological Survey has launched a new assessment of technically recoverable hydrocarbon resources in the Arkoma Basin of Arkansas and Oklahoma.

The overall numbers are likely to move upward with the addition of unconventional prospects. That's no surprise.

But when the final assessment results are released, probably late next year, will the total size of the available resource lift some eyebrows?

The Arkoma Basin – long known for its large conventional gas accumulations – has become a hot spot for unconventional drilling in recent years.

"When the USGS last assessed the Arkoma region in 1995, coalbed gas was the only continuous resource assessed because shale gas was not yet on the radar screen," said AAPG member Dave Houseknecht, task chief for the Arkoma assessment and geologist for the USGS in Reston, Va.

"Today, the Fayetteville play in Arkansas and the Woodford play in Oklahoma are among the most active shale-gas plays in the U.S.," he noted.

Now the USGS is contemplating another major, unconventional, tight-sands gas play in the foreland basin of the Arkoma.

"There is growing evidence that the deep part of the basin, the Arkoma-Ouachita foredeep, may be a continuous, basin-centered gas accumulation with tight



Photo courtesy of Stan Paxton

Above, a portion of the informal upper member of the Woodford Shale (Upper Mississippian-Lower Devonian) in the Arbuckle Mountains, Oklahoma. The exposure – 230 feet in composite vertical thickness – represents a continuous, complete section.

sandstone reservoirs," Houseknecht said.

"So, the USGS is proposing to assess the deep basin as a continuous resource, rather than a set of conventional accumulations," he added.

Bottom line: That should mean an assessment result of more mid-continent natural gas available using today's technologies.

The independent Potential Gas Committee acknowledged growth in the nation's available gas resource last summer, when it issued a resource-base estimate of 1,836 trillion cubic feet – highest in the committee's 44-year history.

Three years from now, will that evaluation look strangely conservative? It might: Mid-continent gas chances should get another upgrade when the USGS issues results for a new Anadarko Basin assessment, which will follow the

Arkoma evaluation.

Like the Arkoma, the Anadarko Basin has its own range of unconventional prospects, including the emerging Cana-Woodford shale play.

Thermal Maturity

Houseknecht has an extensive background in the Arkoma. He was a professor at the University of Missouri for 14 years and worked the area heavily.

During much of the Paleozoic, the Arkoma region was a passive, south-facing margin, he noted. However, as the Ouachita orogenic belt loaded that margin during the Late Mississippian through Atokan, the shelf was broken down progressively northward, forming a foredeep.

"This foredeep was truly a basin that

was being filled by sediment off the Ouachita Orogeny Belt," he said.

An intriguing aspect of the Arkoma is its high level of thermal maturity. Existing, high-quality reservoir petrography gives an insight into the basin's history and its current state, Houseknecht said.

"We knew from that there had been conventional accumulations with their water legs destroyed by thermal maturation," he noted.

"The data verified that, in this deep area, wells never encounter water and you either have porosity filled with gas or no porosity," he said.

A long history of drilling in the Arkoma also helped to define the nature of the foredeep, which contains channelized turbidites at depth.

See **Arkoma**, page 14

Deep East - Offshore Florida



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Seven AAPG Members Lead In Newest Arkoma Assessment

The U.S. Geological Survey is mandated by Congress to assess and regularly update the oil and gas potential of the entire nation, and the Arkoma Basin region hasn't been assessed by the USGS in almost 15 years.

"The USGS now conducts domestic assessments on a 'rolling' schedule. That is, we focus resources – people and funds – on a handful of basins at a time, and as assessments are completed we then migrate our resources to other basins," according to AAPG member David Houseknecht.

"From a nationwide perspective, the Arkoma region is of high interest because of the continued growth of

known gas resources – cumulative production plus proved reserves – in a basin with nearly a century of production history," he added.

Personnel for the Arkoma Basin assessment task force include:

- ✓ Jim Coleman, geologist (AAPG member).
- ✓ Bob Milici, geologist (AAPG member).
- ✓ Stan Paxton, geologist (AAPG member).
- ✓ Lyle Mars, geologist.
- ✓ Marvin Abbott, geologist (AAPG member).
- ✓ Chris Garrity, GIS cartographer.
- ✓ Bryant Fulk, summer geologist (AAPG member).

Arkoma from page 12

"As long as you hit these channel sands you still encounter gas very low on the structure, with no water. And almost all of these structural accumulations were tested decades ago," he said.

If these indications do represent a basin-centered, continuous gas play, future drilling in the Arkoma's known productive area is more likely to be successful.

"Assessing the foreland basin as a continuous accumulation with tight reservoirs provides the potential for a much greater possibility of development," Houseknecht observed.

Sharing Information

Interest in the Arkoma has waxed and

waned over the past decades, but has never fallen off the exploration map. The basin is drawing renewed attention today.

"This is due to aggressive development of continuous or unconventional resources, including shale gas and coalbed gas and innovative approaches to enhanced development of gas resources in tight sandstone reservoirs," Houseknecht said.

"It also reflects continued success in finding new, though generally small, gas fields in the frontal thrustbelt of the Ouachita Mountains and in the old fairway along the northern margin of the basin," he added.

Many mid-continent operators have a good understanding of the Arkoma and the Ouachita belt area. The USGS has invited companies to share their knowledge and to comment on the resource evaluation.

"We have visited with the Arkansas and Oklahoma geological surveys and with several production companies active in the basin to seek feedback," Houseknecht said.

It also conducted a one-day presentation in Norman, Okla., about the Arkoma assessment, hosted by the Oklahoma Geological Survey in early November.

"That was really an important part of this whole process," noted AAPG member Stan Paxton, hydrologic studies chief for the USGS in Oklahoma City and a member of the assessment team.

"It was free, open to the public, and we had 175 people," he said. "The OGS did a great job of running that workshop and we got a lot of feedback."

Paxton adds to the team his regional understanding and helps evaluate the resource potential of the Arkoma's shale-gas plays. He said the approach begins with analyzing shale outcrops.

"We've got one location where we have 230 feet of the Woodford Shale – it's probably the only place where you get to see the whole Woodford at once," he said.

That analysis will include spectral gamma-ray readings, vitrinite reflectivity, mineralogical studies and X-ray diffraction, assisted by the USGS lab in Denver.

"We've been trying to put together a database that represents the properties of the shales found in the Arkoma Basin," Paxton explained.

"There are only a couple of companies that are putting a big effort into understanding the nature of these shales," he said, "at least publicly."

Across the Border

Key to the results is a grasp of the Woodford Shale in Oklahoma and the Fayetteville Shale in Arkansas, and their equivalents. Comparisons can be tricky.

"The mineralogy of the two shales is really quite different. Everybody in the industry knows this: A shale is not just 'a shale,'" Paxton said.

"It's difficult with the stratigraphic complexities to equate the Fayetteville Shale in Arkansas to the Caney (Shale in Oklahoma) as well as you'd like," he added.

Houseknecht noted the importance of, and the difficulties involved in, understanding the nature of these shales in both sides of the Arkoma.

How much recoverable natural gas does the Arkoma Basin hold? Inevitably, today's assessment will give way to the capabilities of tomorrow.

"As technology improves," Paxton noted, "there's always more out there." □



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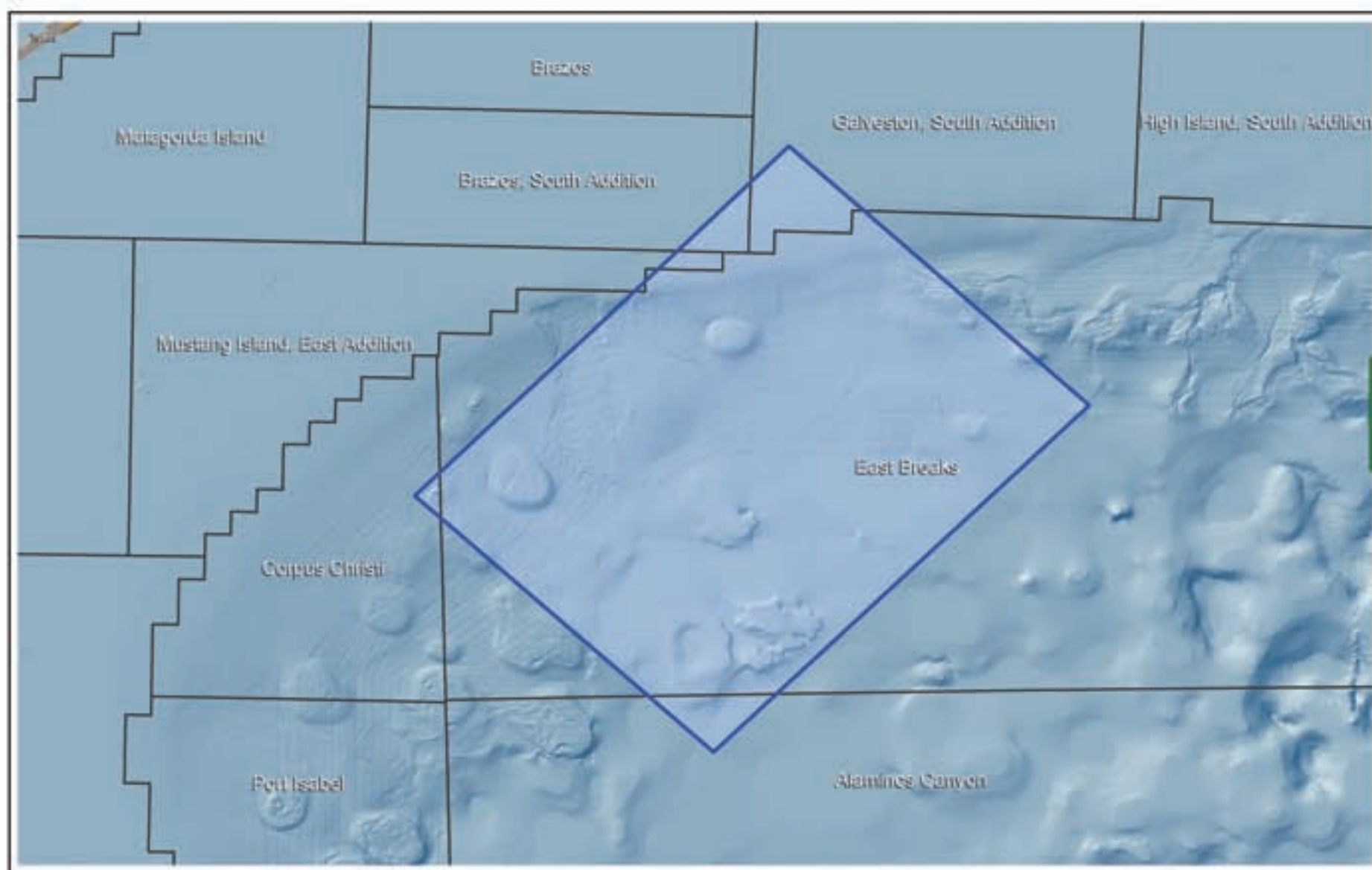
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\$400 million headed for RD&D

Geothermal Projects Gather \$steam

By MOLLIE M. PETTIT

The threat of climate change is driving government action. The Administration has called for "10 percent of U.S. electricity to be derived from renewable resources by 2012 and 25 percent by 2025."

Geothermal energy, which is produced by taking heat stored in the Earth and converting it into energy, offers one option.

In 2005, the Massachusetts Institute of Technology used funding from the U.S. Department of Energy (DOE) to generate a comprehensive assessment of available geothermal resources. The report, "The Future of Geothermal Energy: Impact of Enhanced Geothermal Systems," says geothermal energy is often ignored even though it is "desirable for reaching a sustainable energy future for the United States."

Congress responded with The American Recovery and Reinvestment Act (the "stimulus"), which authorized \$400 million for the research, development and demonstration (RD&D) of geothermal energy technologies.

Soon after, the DOE issued its own report from its Geothermal Technologies Program. The "National Geothermal Action Plan" gives details on how geothermal programs will be implemented.

Geothermal energy produces near-zero emissions and has minimal impact on the environment. Geothermal also:

- ✓ Lacks the intermittency issues



Pettit

Geothermal energy produces near-zero emissions and has minimal impact on the environment.

associated with solar and wind.

- ✓ Requires no storage.
- ✓ Has high base-load potential.

According to DOE's action plan, "even if only 1 percent of the thermal energy contained within the Earth's uppermost crust ... were tapped for use, that output would be equivalent to 500 times the energy contained in all the oil and gas resources known in the world."

DOE also cited a 2004 survey predicting that geothermal energy is expected to create 1.7 full-time jobs per each megawatt equivalent of capacity installed.

Initially, the MIT study group had significant technical concerns about geothermal energy – including induced seismicity, geochemical impacts and water issues. Their findings, however, indicate these problems can be resolved or managed with proper monitoring.

Although geothermal energy offers promise, there is one main problem – money. Large investments are required to identify and characterize a resource – and attracting project capital is difficult in the current economic climate.

New technologies to reduce up-front risk are needed. That is why the federal government is investing in geothermal RD&D to develop those new technologies and stimulate exploration.

The DOE report outlines five areas in which the money is being invested. They are:

✓ **Geothermal demonstration projects** get the largest piece of the pie with \$140 million. This money will further the investigation of stimulation techniques and will "select up to 10 regional demonstration projects, including green fields."

Projects also can include geothermal energy production from oil and natural gas operations, geothermal resources with low to moderate temperatures and geopressured fields.

✓ **Geothermal research and development (R&D)** gets \$80 million. Together, the demonstration projects and R&D have the potential to spread geothermal beyond the Western states where geothermal resources and power production are greatest.

✓ The exploration activities associated with geothermal are expensive. To reduce the risk, \$100 million was invested in the development of "innovative exploration and characterization technologies." These projects also will help to identify undiscovered resources.

✓ According to DOE's action plan, there is no national database with information on geothermal reservoirs, which is needed by project managers to lower the risk of development. Because of this need, \$30

million is being invested in the creation of a **national geothermal data system**. Funding also will support teams across the United States that will populate the system.

✓ The last \$50 million was invested in the implementation of **ground source heat pumps**, which will be used to improve the energy efficiency of new buildings.

The government's \$400 million investment in geothermal energy through the stimulus is on the scale that the MIT report suggested be invested over 15 years. In addition, the geothermal program receives annual appropriations, including \$44 million for next year.

Although the costs for geothermal energy will remain high in the short term, MIT projects that the price will decline and will become competitive with other energy resources.

As of March there were 126 geothermal projects at various stages of development in the United States. With so much money invested in geothermal energy, scientists and policymakers must not overlook its potential when making projections of future energy sources.

Only time will tell if geothermal energy production will reach its full potential. □

(Editor's note: Mollie Pettit recently graduated from West Virginia University with bachelor degrees in both geology and mathematics. She was the fall 2009 AGI/AAPG Government Affairs Program intern and plans to pursue a master's degree in the geosciences upon completion of her internship.)

WHERE ARE THE REGIONAL COMPOSITES OF MAP IMPLICATIONS DERIVED FROM STANDARD MUDGAS DATA?

There are countless thousands of mudgas data sets out there currently. Much of this data from recent years is available in LAS or other digital format. Technology to convert the older curve data to digital format is in common use at nearly every exploration company. If standard mudlog gas data were technically useful then someone would have mapped useful implications **and you would be using that map**. Total Gas, Infrared, Hydrogen Flame, Chromatograph? They are all the same when it comes to apparent utility of the data. We don't trust this old-fashioned data for the very simple reason that it virtually never indicates while drilling for what we find in production.

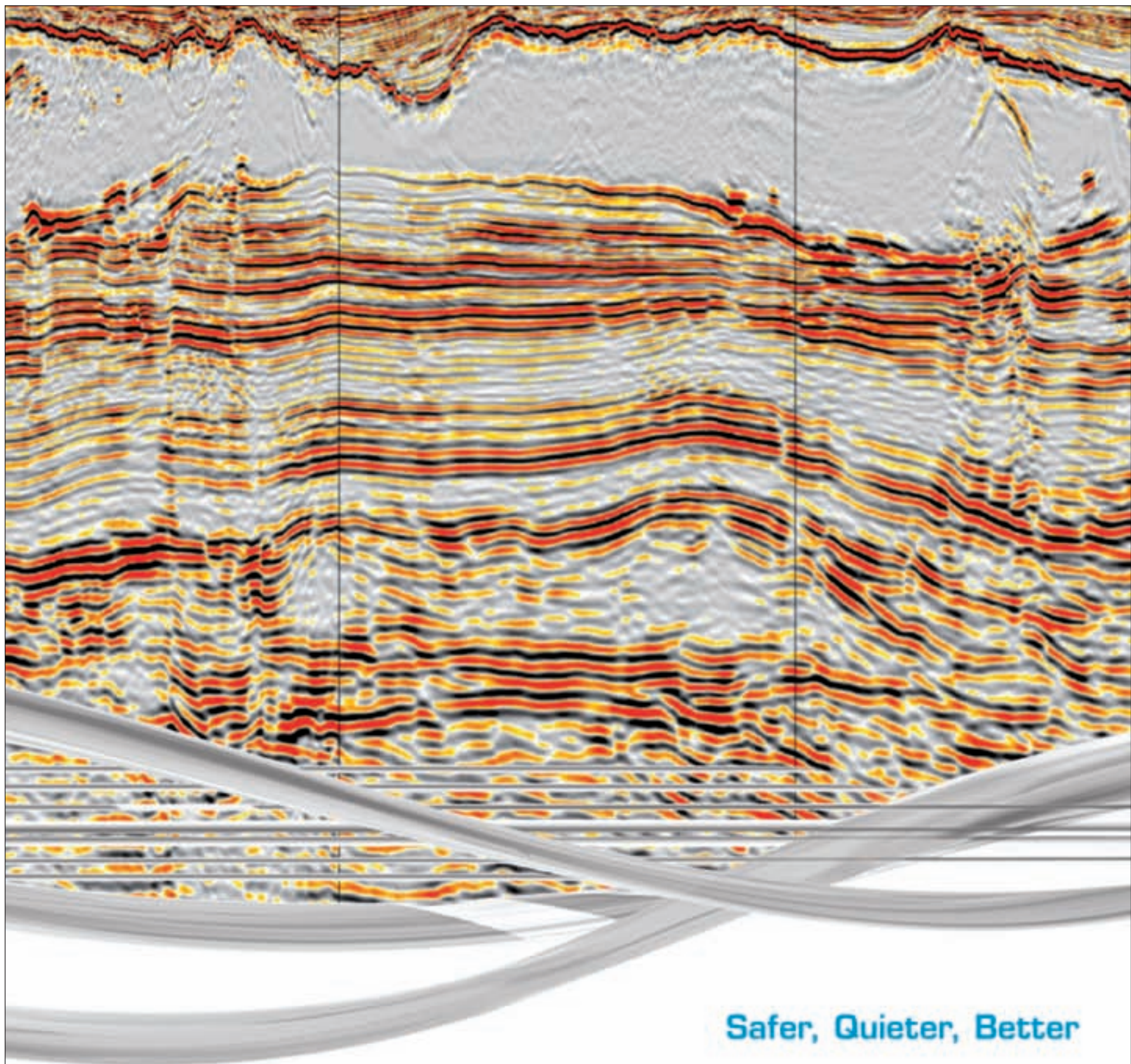
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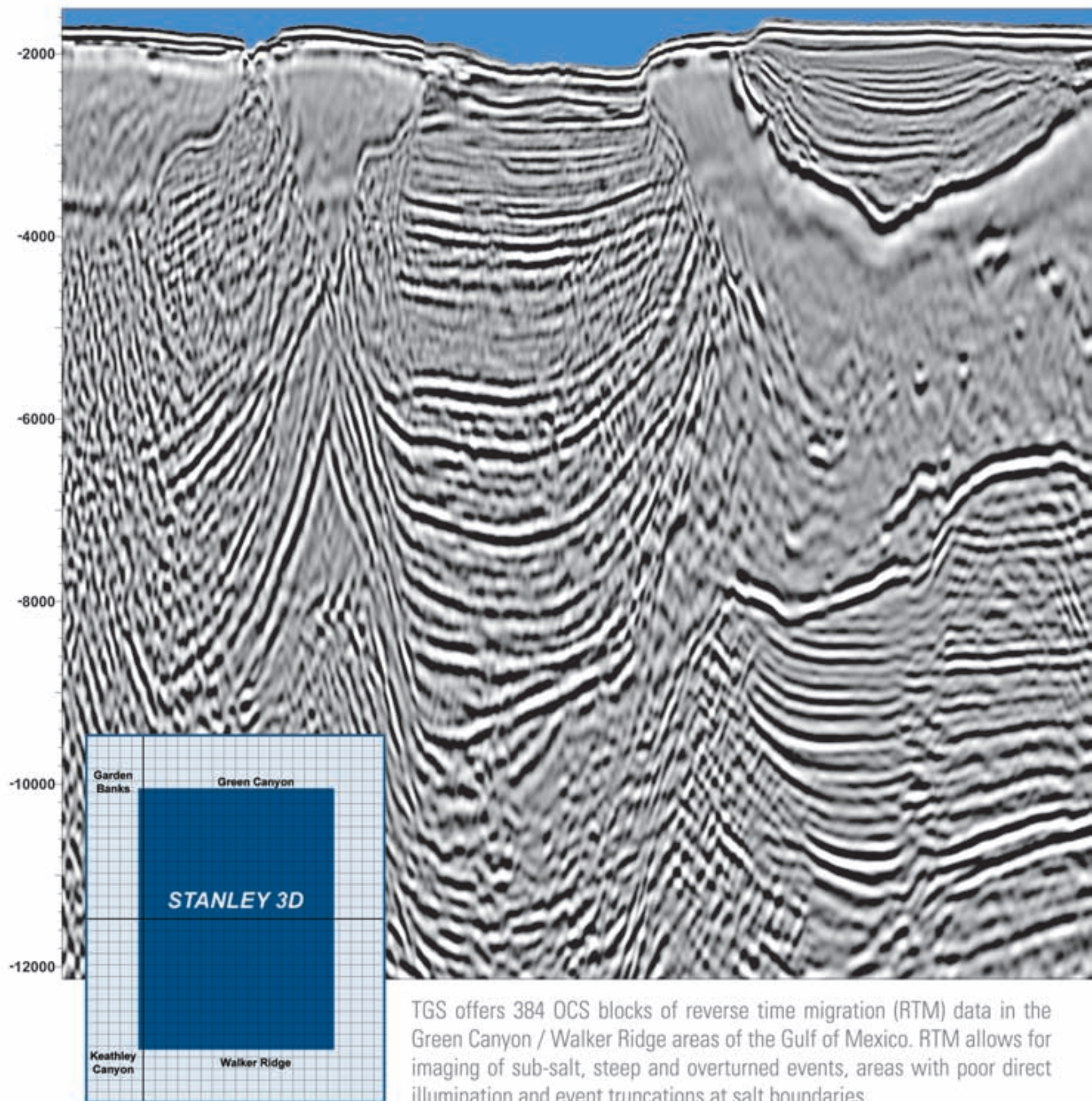
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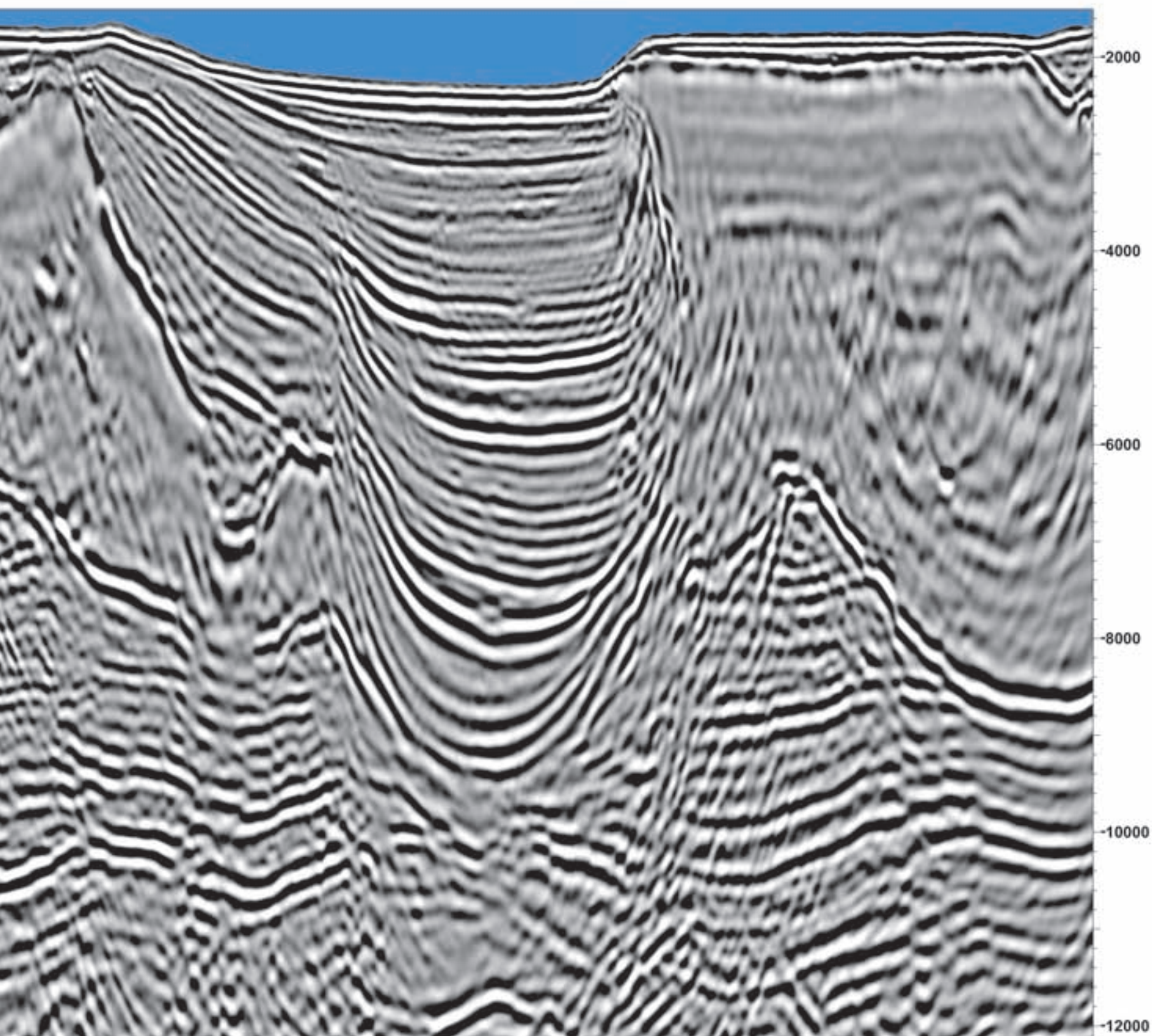
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FOUNDATIONupdate

Trustee Associates Elect New Officers

By REBECCA GRIFFIN
AAPG Foundation Manager

The AAPG Foundation Trustee Associates elected new officers during the group's recently held 32nd annual meeting in Ponte Vedra Beach, Fla.

Those elected are:

☐ Chairman – **Ed W. Heath**, Durango, N.M. (one-year term).

☐ Vice chairman – **Richard S. Bishop**, Houston (one-year term).

☐ Secretary-Treasurer – **Stewart L. Henry**, Fort Worth (two-year term).

Other business during the meeting included:

✓ Reports by Foundation Chairman **Bill Fisher**, Campaign co-Chairman **Jack C. Threet** and Foundation Executive Director **Rick Fritz**.

✓ A brief presentation on behalf of the Society of Exploration Geophysicists by **Mike Forrest**.

✓ A special talk on "The Oversupplied U.S. Natural Gas Market: Can it Revive – and When?" presented by Trustee Associate **Bob Esser**.

Next year's Trustee Associate meeting will be held Oct. 17-21, at the Ritz-Carlton Reynolds Plantation in Greensboro, Ga.

* * *

Now is the time to apply to the 2010 Grants-in-Aid program, which is nearing the Jan. 31 deadline.

Geoscience graduate students whose thesis research has application to the search for and development of petroleum and energy-mineral resources, and/or to related environmental geology issues are encouraged to apply for more than



Heath

\$200,000 in available funding. Several of the named grants to be awarded are subject specific restrictions such as uranium, nuclear fuel energy, stratigraphy, regional or global tectonics, petrology/petrography, oceanography, carbonates,

paleontology, petrophysics and development geology. In addition, several named grants are restricted to specific universities. Students do not need to be members of AAPG to apply for funding. Complete details are available on our Web site at foundation.aapg.org/gia/. Specific

questions regarding the Grants-in-Aid program should be directed to Angela Taylor-Shepherd at (918) 560-2664.

* * *

The AAPG Foundation's "Meeting Challenges ... Assuring Success" campaign, co-chaired by **Larry Funkhouser** and **Jack Threet**, has received over \$25 million to date – funds that through the Foundation will be used to support the science of geology through education and research, offering opportunities for students from elementary school through Ph.D. degree, for teachers and professors, for professional geoscientists throughout their careers and for the general public.

If you haven't made your 2009

contribution in support of the Foundation's programs, it is a good time to acknowledge the many benefits derived from involvement in the earth sciences – and you can maximize tax savings* (U.S.) by acting before Dec. 31.

Cash gifts are appreciated, but there are many other ways to give and realize even greater tax savings. Contact Rebecca (918) 560-2644 or Alison Robbins (918) 560-2674 in the Foundation office for other giving options, or to learn about the Foundation's many programs.

*The AAPG Foundation is a 501-c (3) tax-exempt charitable organization. Contact your attorney or financial adviser for specific tax-related benefits applicable to your situation. ☐

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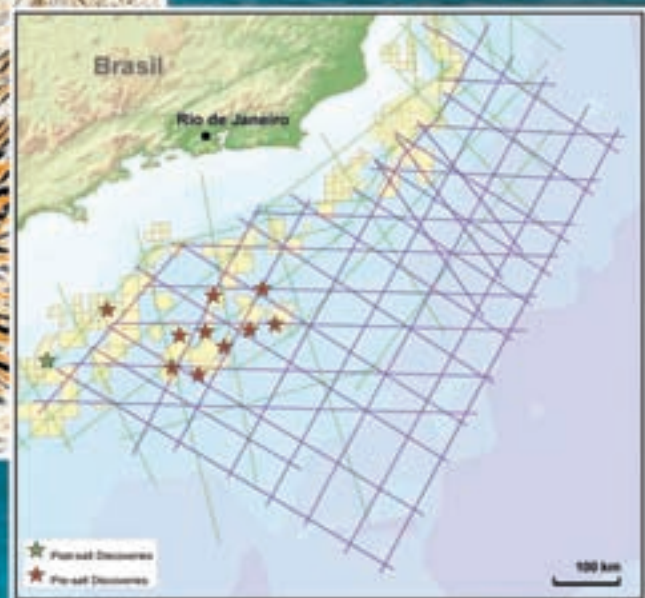
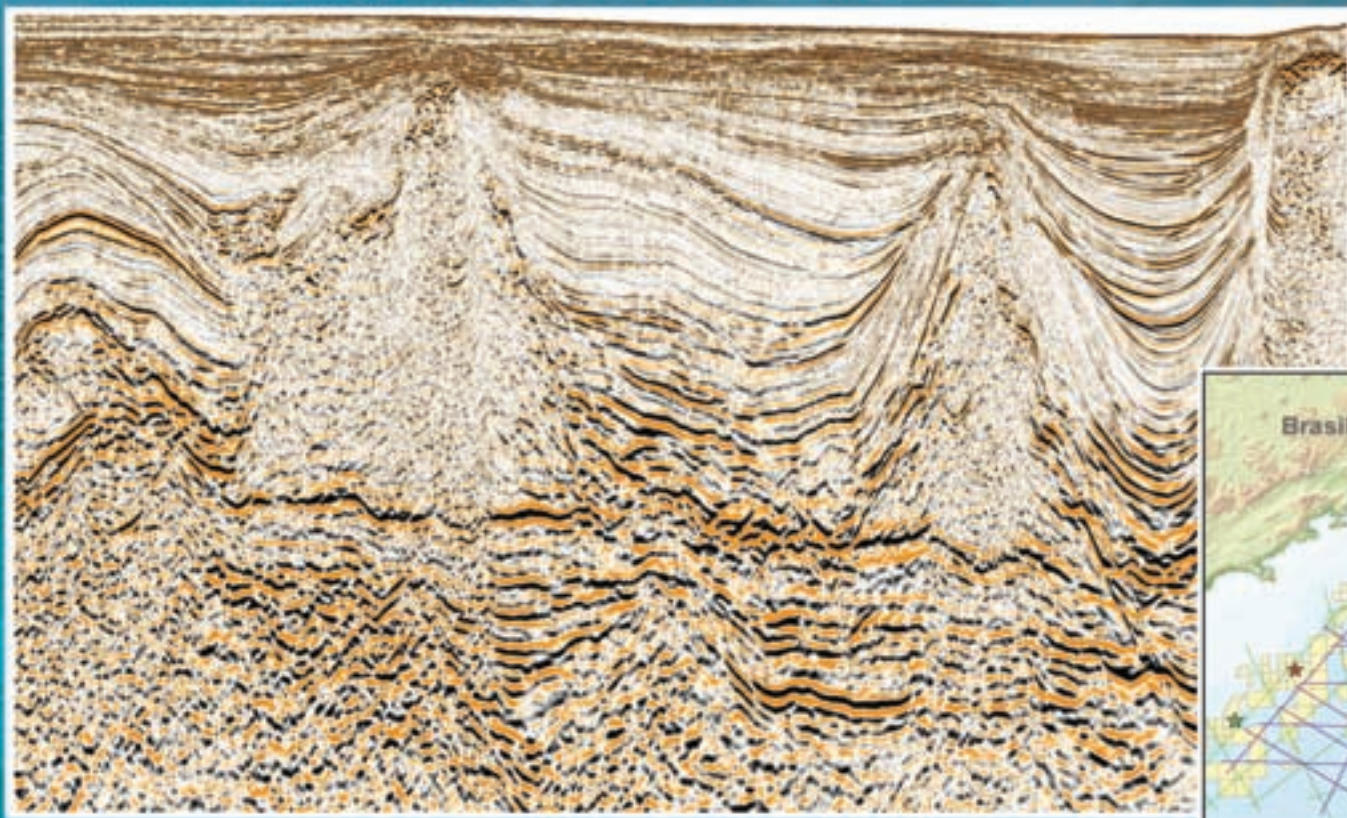
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Harris Wins Inaugural Shelton Award

Paul M. "Mitch" Harris, a prolific and award-winning author and geoscientist, has been named recipient of the inaugural AAPG John W. Shelton Search and Discovery Award, presented in recognition of the best contribution to the Search and Discovery Web site.

Harris, with Chevron Energy Technology, San Ramon, Calif., will receive his award along with other AAPG honorees during the opening session of the next AAPG Annual Convention and Exhibition, set April 11-14 in New Orleans.

The Shelton Search and Discovery Award, named in honor of AAPG Honorary Member and Search and Discovery creator John Shelton, will be presented annually to the author(s) of the year's best contribution to the site.

Harris, however, is not being honored

for just one work, but for the excellence of his total contribution of 53 papers to the site.

Harris previously won the 2000 AAPG Wallace E. Pratt Memorial Award as a co-author of the BULLETIN article, "Geologic Investigation of Cross-Well Seismic Response in a Carbonate Reservoir, McElroy Field, West Texas."

He also is a two-time winner of the Robert H. Dott Memorial Award, presented annually to authors and editors of the best AAPG publication, sharing honors with his co-authors in 2008 for Memoir 88, "Giant Hydrocarbon Reservoirs of the World: From Rocks to Reservoir Characterization and Modeling," and in 2006 for AAPG Memoir 80, "Integration of Outcrop and Modern Analogs in Reservoir Modeling."

REGIONS§ions

Directors Named For New Offices

(Editor's note: Regions and Sections is a regular column offering news for and about AAPG's six international Regions and six domestic Sections. Contact: Carol McGowen, AAPG's Regions and Sections manager, at 1-918-560-9403; or e-mail to cmcgowen@aapg.org.)

By CAROL MCGOWEN

Regions and Sections Manager

The third quarter of 2009 brought several staffing transitions as AAPG

continues its global outreach. We say farewell to Steve Veal and welcome to Adrienne Pereira and Jeremy Richardson.

Richardson and Pereira both traveled to AAPG headquarters in Tulsa in early November for non-stop orientation and training – and they emerged from the training newly equipped and knowledgeable in AAPG's education and training programs, member services and global marketing capacity.

"Please join me in welcoming Adrienne and Jeremy to AAPG," said AAPG President John Lorenz. "I ask that you extend them both all courtesies in their efforts to support and grow our organization and share any ideas you may have for AAPG's development in the Regions."

Welcome Adrienne Pereira

AAPG engaged Adrienne Pereira in September to work with the Association in the Asia Pacific Region as an independent contractor. She will continue in this capacity while AAPG incorporates as a charitable organization in Singapore.

Pereira brings a wealth of experiences from conference marketing, logistics and management to government protocol and staff development.

Alan Wegener, AAPG Global Development and Conventions director, views Adrienne's position strategically.

"With Asia's robust growth and a diverse and motivated Region leadership, AAPG has incredible opportunities in Asia," Wegener said. "Adrienne has the drive and expertise to help cultivate the contacts and relationships we'll need to build membership and develop new programs."

"With more than 24 years experience building and planning events in Singapore, she's traveled and worked with professionals from most countries," he said. "That's extremely important, because she understands the cultural nuances and how business gets done."

Working closely with Asia Pacific Region officers, AAPG Regions management, AAPG affiliated societies and other interested parties, Pereira will help develop and deliver new programs and services to members and other geosciences professionals of the Region. Plans already are under way for offering Geosciences Technology Workshops (GTWs), short courses, topical conferences and symposia in the coming year.

Based in Singapore, Pereira also will enable AAPG to build closer relationships with the area's key NOCs, IOCs and services companies.

Joe Lambiase, Asia Pacific Region president, sees Pereira as a welcome addition to the regional team.

"AAPG membership has been expanding rapidly in our geographically and culturally diverse



Pereira

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December 2009

Midland Valley Structure World

In the last structure world column of 2009 we would like to thank you for your continued support throughout the year. It has been a difficult year for many, but it reminds us that in downturns as well as upturns better, more thoughtful geology does make a difference. Much of our forward planning this year has focused on the challenge of providing the best toolset in structural geology to enable our clients to meet the evolving challenges of finding and producing reserves more effectively and to reduce both the commercial overhead and environmental footprint of our industry. We have been pleased to see our business continue to grow and to have the support of the broad alliance of our clients and academic users. We're looking forward to continuing the journey with you in 2010.

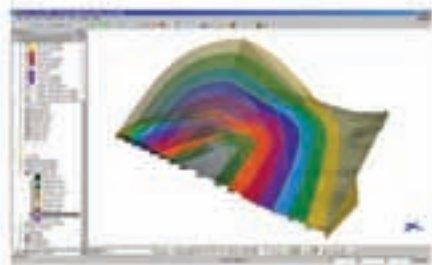
The recent AAPG ICE, Rio de Janeiro

A big thanks to everyone who came by our Upstream Technology Alliance booth at last month's AAPG ICE in Rio de Janeiro. It is always a joy to visit Rio and to share in the enthusiasm of the AAPG membership.

Move2010 Released 30th November

This month our maintained clients will receive the release of Move2010. Users will see the significant work we're delivering to provide new workflows and address evolving needs. These include:

- Toolbox development and an updated user interface
- Component integration
- Model building tools are faster in 2D Move and have become more flexible in 3D Move
- Multi-threaded algorithms in 3D Move's flexural slip unfold and fault parallel flow to handle larger models
- New forward modelling algorithms in 2D Move
- Updated MovePetrel* link
- Improved GIS integration with Google Maps
- Eclipse grid and shapefile exports in 4D Move



Teaching model of parallel plunging anticline in 4D Move

4D Restore

Our engineering team have been showing the next steps in the development of 4D Restore. This responds to the need to be able to restore non-plane strain systems with complex hard and soft-linked fault networks quickly.

Many Move users need to quickly restore volumes with tens of faults to create either palinspastic models for petroleum systems work or deformation maps for fracture modelling. 4D Restore enables this to be done in a fraction of the

time of traditional 3d geometric methods and to vary rock properties to provide better restoration models. The current work has been on improving the stability of the algorithms while offering better control for the user.

To receive an evaluation of Move2010 including the 4D Restore module contact us, move@mve.com.

Public Training: Structural Modelling and Analysis using Move

Our last Public Training course of 2009 takes place this month in our Glasgow office. We will be running courses throughout 2010, visit our website or contact events@mve.com for details.

Student Structural Prize closes this month

Our annual student structural prize closes on the 11th of this month. The Prize seeks to award the best structural geology paper in both under and post graduate categories with first and second place in each category picking up a cash prize. The Structure Prize is now in its 5th year and every year the submissions continue to impress us. We know that former prize winners go on to key careers as structural specialists across the industry. We can't wait to see what this year brings.



Silver Sponsors at the GRSG Meeting - 15th - 17th December, Burlington House

Dr John Grocott and Dr Armelle Kloppenburg, will be presenting 'Linking Remote Sensing Imaging to Mineral and Petroleum Systems through Structural Geology Modelling'.

During the morning and afternoon refreshment breaks there will be a short demonstration entitled 'Digital Field Mapping using Move' highlighting the digital mapping features within Move using a tablet PC. During lunch breaks they will also be available for one-to-one discussions.

Tectonics Studies Group (TSG) AGM, Birmingham, 6th - 9th January 2010

As part of the TSG AGM we are running a workshop on 9th January for users of Move, run by our Structural Geologist Dr Matthias Auer. For further details and to register your interest in attending email Sarah, events@mve.com.

Finding Petroleum Conference, 20th - 21st January 2010, London.

Director Dr Alan Gibbs is presenting 'Innovation in thinking or more technology - which makes the difference?' on Day 2, 14:00 at the Exploration, Technology and Business, Finding Petroleum conference.



For further information contact us: +44 (0)141 332 2681 or email help@mve.com.

www.mve.com

The structural geology experts

WASHINGTONwatch

Forum Included Q&A From Public

By DAVID CURTISS
GEO-DC Director

Shortly after lunch on Oct. 14 people began filing into the ballroom of the Tulsa Marriott Southern Hills Hotel. They included attendees of the 2009 AAPG Mid-Continent Section meeting, members of the general public and two busloads of students from local high schools.

They were there to participate in a conversation about energy - its past and its future.

At 1 p.m. the panelists were on the rostrum, I was at the podium, and the microphones went live.

It was in April 2008 at the AAPG convention in San Antonio when Edith Wilson first told me about the idea to host a public forum on energy as part of the Mid-Continent Section meeting. In a follow-up phone conversation later that month, she asked if I would be willing to assist her and the committee in developing the event and moderate the forum.

The forum's purpose was to engage "business professionals, scientists, students and members of the general public in a discussion of energy challenges and opportunities facing the mid-continent region."

Tulsa is widely considered the first oil capital, and therefore perhaps an odd place to hold a public event on energy. Doesn't everyone in Tulsa already understand the energy business?

Well, no, they really don't. And the energy business is changing. New oil and natural gas plays, such as shale gas, demonstrate the continued vitality of the petroleum industry.

At the same time, society is pushing the advancement of alternative energy sources. Meanwhile, much of the discussion about energy is framed in an "either-or" context - fossil fuels or alternatives - which is a false choice. We need fossil fuels *and* alternatives.

The theme for the forum, "America's Energy Heartland, America's Energy Future", expresses the fact that energy has historically played a critical role in the economic development of the midcontinent, and will remain vital to the region long into the future.

* * *

We wanted to present useful information to the approximately 350 attendees at a level that would be informative and stimulate questions from the audience.

Getting the right panelists to participate - individuals who could deliver the necessary technical information in an engaging manner - was paramount. And we were fortunate to find four individuals who met the criteria: James Smith, an economist and the Carey M. Maguire Chair in Oil and Gas Management at Southern Methodist University's Cox School of Business; AAPG member Rod Nelson, vice president of communications and vice president of innovation and collaboration for Schlumberger; AAPG member Art



Curtiss

Green, retired chief geoscientist for ExxonMobil Exploration Company; and AAPG member Pete Stark, vice president of industry relations for IHS.

We divided the forum into a first session, "Energy From the Heartland," where

we focused on the role energy plays historically and today with these presentations:

- ✓ World Oil: Market or Mayhem (Smith).
- ✓ Not Your Father's Oil Patch - How Technology Changes the Industry (Nelson).
- ✓ A Look at Global Supply and Demand (Green).
- ✓ The Mid-Continent Shale Gas Boom (Stark).

The first session concluded with a question and answer period, and audience members were able to ask their questions in person or text them to a phone number provided.

After a brief intermission, the second session considered energy for the future and where the energy business is heading:

- ✓ The Portents of Peak Oil (Smith).
- ✓ Natural Gas - Key to Our Energy Future (Stark).
- ✓ A Future With Fewer Greenhouse Gas Emissions (Nelson).
- ✓ Tomorrow's Energy Explorers (Green).

The forum concluded with a 40-minute conversation between the panelists and the audience - and we had more questions than time to address them all.

The presentations made by the panelists in both sessions will be posted at AAPG's online e-magazine *Search and Discovery* as they become available from the authors.

* * *

It is always difficult to tell the impact of a public event such as this forum. But the substantive nature of the questions suggests that the audience did engage on the topic of energy during the course of the afternoon. And such conversations, informing the public about the energy geosciences and the environment, are an important task for AAPG.

Thanks to our sponsors for making the event possible: IHS, Tulco Oils Inc., Tallgrass Energy, AAPG, Schlumberger, OERB - Oklahoma's Oil and Natural Gas Producers and Royalty Owners, and the Friends of Finance.

A special thanks also is due to our four panelists for their time and effort that made the forum a success.

Finally, this event would have merely been a "nice idea" without the steering committee, which had the vision to develop it and the tenacity to pull it off. Thanks to Edith Wilson, Shane Matson, Mike Thompson and Rick Fritz for their commitment and leadership. □

Matson Wins Mid-Continent Levorsen

Shane Matson has won the A.I. Levorsen Award for the best paper presented at the Mid-Continent Section meeting held in October in Tulsa.

Matson's winning paper was titled "Exploitation of Mississippi Chat

Using Horizontal Wellbores in Osage County, Oklahoma."

Matson is with Spyglass Energy Group in Tulsa.

The next Mid-Continent Section meeting will be held in 2011 in Oklahoma City.

Presentations available online

Reserves Reporting Rules Explored

A recent Geoscience Technology Workshop (GTW) in Houston, "Geological Aspects of Estimating Petroleum Resources and Reserves," examined the contributions, challenges and responsibilities of geoscientists in estimating resources and reserves.

The 2½-day session, chaired by AAPG members John Sneider and Creties Jenkins, addressed practical issues regarding the application of definitions, guidelines and rules provided by the Petroleum Resources Management System (PRMS) and the U.S. Securities and Exchange Commission (SEC) for the reporting of resources and reserves.

Ten different technical sessions focused on the geologists' role, work process and interactions with other disciplines, highlighted by John Lee's keynote address ("Where Are We Headed in Reserves Reporting?"), which encouraged AAPG members to take an active role in developing guidance for the application of SEC and PRMS standards (See commentary on page 32).

The GTW concluded with eight breakout sessions that addressed key issues raised during the technical sessions.

What are the unique aspects of unconventional reservoirs that need to be considered?

The 10 technical sessions were:

- ✓ Reporting Standards (chaired by John Etherington), which focused on the three standards widely applied in estimating resources and reserves: the PRMS classification, SEC disclosure requirements and the SPE auditing process.

- ✓ Ethical Issues (Pete Rose) reviewed ethical principles, considered the consequences of ethical failures, discussed the influence of bias on decision-making and concluded with an examination of ethical conflicts in organizations.

- ✓ Role of the Geoscientist (John Ritter) concentrated on the geologists' responsibility to understand risk and uncertainty, provide input to the estimation process, quantify upside potential and set appropriate policy direction for assessments conducted by governmental organizations.

- ✓ Quantifying Uncertainty (Gary Citron) focused on incorporating risk and uncertainty in valuing acquisitions, and examining the results of probabilistic aggregation versus arithmetic summation for various projects.

- ✓ Petrophysical Aspects (William Price) explored the use of net pay cutoffs, the application of well test data, the impact of new technologies and the role of uncertainty and ethics in making assumptions and calculations.

- ✓ Geophysical Aspects (Bob Hardage) addressed questions regarding the value and limitations of seismic data, the constraints that should

be applied during interpretation, and practices and pitfalls in the use of attributes.

- ✓ Geological Mapping (Dan Tearpock) presented three ways to contour the same net isochore data (by hand, computer mapping, geocellular modeling) and discussed the impact of the differences between the resulting maps.

- ✓ Geocellular Modeling (Jeffrey

See **GTW**, page 27

Training Class:

"Building an Integrated Static Reservoir Model"

Goal

To provide asset teams with modeling background, data preparation requirements, decision tools, mentoring, and problem-solving opportunities.

The class will guide team members through the process of building a fit-for-purpose geocellular model for visualization, field development, and/or simulation

Who should attend

Any members of a reservoir characterization team; geologists, geophysicist, petrophysicists, reservoir engineers and managers

Location & Timing

IRT's office in Denver, Colorado

January 25-29, 2010

As an in-house course beginning March 2010

For more information contact

(303) 279-0877 or information@irt-inc.com



*Gulf Coast Association of Geological Societies
and the Gulf Coast Section of SEPM*

CALL FOR PAPERS

60th Annual Convention
October 10-12, 2010
San Antonio, Texas

Hosted by the South Texas Geological Society



Welcome back to San Antonio! Our theme this year is **"Weathering the Cycles"** – a challenge that resource geologists certainly have faced and overcome in the past! How do we weather the economic cycles? We...

- ✓ Network with our community
- ✓ Experience the latest technology in the technical exhibition
- ✓ Take a course or a trip and grow new and diverse skills
- ✓ Listen to special presentations on strategies to endure and prosper during an economic downtime and prepare for the inevitable rebound.

By celebrating our successes, facing our challenges, and learning from the research results of our peers, we are paid back many fold by sharing ideas and experiences among our professional community. So come and share your experiences! Suggest a session topic, present an oral paper or a poster, learn about the latest ideas and technologies in our field. Come to San Antonio and enjoy the Gulf's own geoscience convention!

PROPOSED TECHNICAL SESSIONS INCLUDE...

- ✓ Organic 'Shales' of the Gulf Coast – Controls on Reservoir Quality and Producibility
- ✓ Gulf of Mexico Paleogene – Reservoirs, Events and Controversies
- ✓ Eastern Gulf of Mexico – Exploration Potential and Environmental Challenges
- ✓ Texas/Mexico Borderlands – Structures, Resources, and Lessons Learned
- ✓ Unconventional Resources – Exploration Decisions and Production Issues
- ✓ Integration of Seismic Geomorphology and Wellbore Data – Case Studies
- ✓ New and Evolving Technologies – Impact on Commerciality
- ✓ Horizontal Drilling and Formation Stimulation – Edwards, Wilcox, and elsewhere
- ✓ Carbon Sequestration – Risks, Opportunities, and Implications for EOR
- ✓ Alternative Energy Solutions – The Role of Geoscience
- ✓ Water for a Growing Region – Geology, Water Quality and Resource Management
- ✓ Geologic Training and Education – Preparing for the Crew Change

HOW TO SUBMIT:

Abstracts (not more than 250 words) should be submitted for review online or via email to the technical program chair. Papers should have application to Gulf Coast and Gulf of Mexico geology. Include your full mailing address, telephone and FAX numbers, email address, and whether you are submitting for **oral** or **poster** or **either** (preferred).

Submit abstracts by February 1, 2010 as instructed on the website www.gcags2010.com

Notification of acceptance by March 1, 2010. All presenters, both oral or poster, must submit either a paper (10-12 pages) or an extended abstract with key figures for review by **April 16, 2010** for inclusion in the *Transactions*. Full instructions for authors will be posted at www.gcags2010.com.



ABSTRACT DEADLINE: FEBRUARY 1, 2010!

Questions or ideas for the technical program should be directed to:

Dr. Mary Feeley
Technical Program Chair
281-654-3588

missy.feeley@exxonmobil.com

Dr. Alan Dutton
GCSSEPM Co-Chair
210-458-5746

alan.dutton@utsa.edu



GEOPHYSICALcorner

Horizontal Wave Testing Helps

(The Geophysical Corner is a regular column in the EXPLORER, edited by Bob A. Hardage, senior research scientist at the Bureau of Economic Geology, the University of Texas at Austin. This month's column is the first of a two-part series dealing with seismic wave tests – horizontal wave testing.)

By BOB HARDAGE



Hardage

Collecting optimal-quality seismic data across some onshore prospects can be a challenge for numerous reasons:

- ✓ Near-surface conditions may produce strong refraction noise.
- ✓ Ambient noise may exist because of

local culture.

- ✓ Different energy sources, such as shot hole explosives, vibrators and impulsive impactors, need to be considered.

- ✓ Several receiver-patch dimensions should be evaluated for effectiveness.

Because of these factors, a source that produces good-quality data across a sandy-soil grassland may produce poor data across an area of hard rock outcrops, and a receiver dimension that cancels ground-roll noise at prospect A may fail to do so at prospect B.

Before a seismic data-acquisition effort is launched across a prospect, seismic test data need to be acquired to determine:

- ✓ The type of energy source.

- ✓ The dimension of the receiver patch.
- ✓ The specific source-receiver geometry that will yield data with appropriate signal bandwidth and signal-to-noise character.

The effort expended in acquiring this basic planning information is commonly referred to as wave testing or noise testing.

* * *

Seismic wave-test data are usually acquired using a "walkaway," or moving

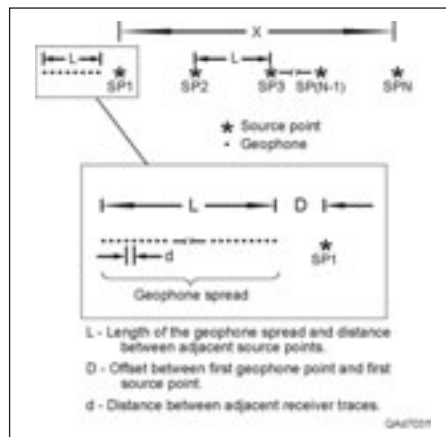


Figure 1 – Source-receiver geometry employed when recording seismic wave-test data. The distance "X" from source point SP1 to source point SPN should equal or exceed the depth to the deepest target that needs to be imaged. Distance "L" between successive source stations is the same as the length of the stationary geophone spread. The separation "d" between successive geophones stations should be small (two to three meters), and the receiver-patch length L needs to be reasonably long (200 to 400 meters).

source geometry, such as illustrated on figure 1.

When recording the data, the receiver spread remains stationary and source stations are moved away from the receiver patch at distance increments L that equal the receiver spread length. The maximum source-to-receiver offset distance X should equal or exceed the depth to the deepest target that needs to be imaged with the surface-recorded seismic data.

Each receiver station within the receiver patch should be occupied by a single geophone – not by a string of geophones that extend over an appreciable distance – which prevents the cancellation of short-wavelength energy modes that need to be analyzed.

There should be no skipped source stations along the line of profile. If a source station is inaccessible for any

continued on next page

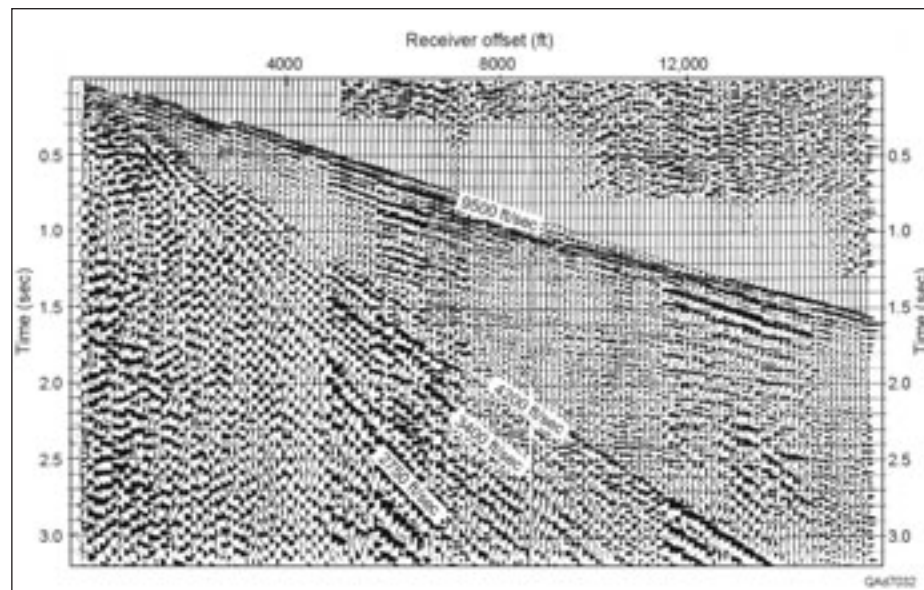


Figure 2 – Wave-test data recorded for the purpose of analyzing signal frequency bandwidth, identifying coherent and ambient noise modes and quantifying signal-to-noise character of seismic data across a prospect area. In this example, closely spaced test-data traces have been summed to represent data acquired with a geophone array length of 110 feet (33.5 meters). The apparent velocities of several modes embedded in the test data are labeled in units of feet/second.

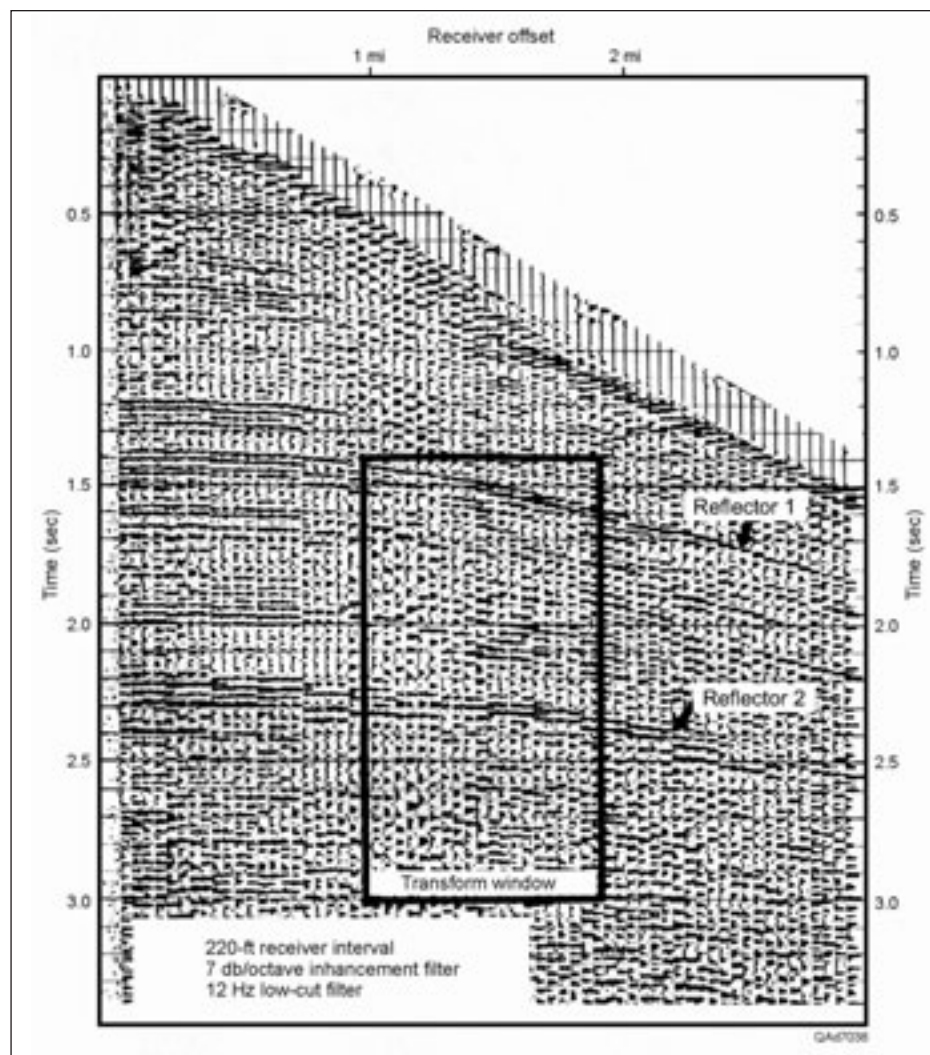


Figure 3 – Wave-test data acquired with $d = 20$ feet (six meters) after a 12-Hz low-cut filter is applied and a running sum of 11 adjacent traces is calculated to simulate data that would be acquired with an inline receiver array spanning 220 feet (67 meters). Hard evidence now has been produced that defines the receiver patch dimension (220 feet) that should be used at each receiver station to optimize data quality.

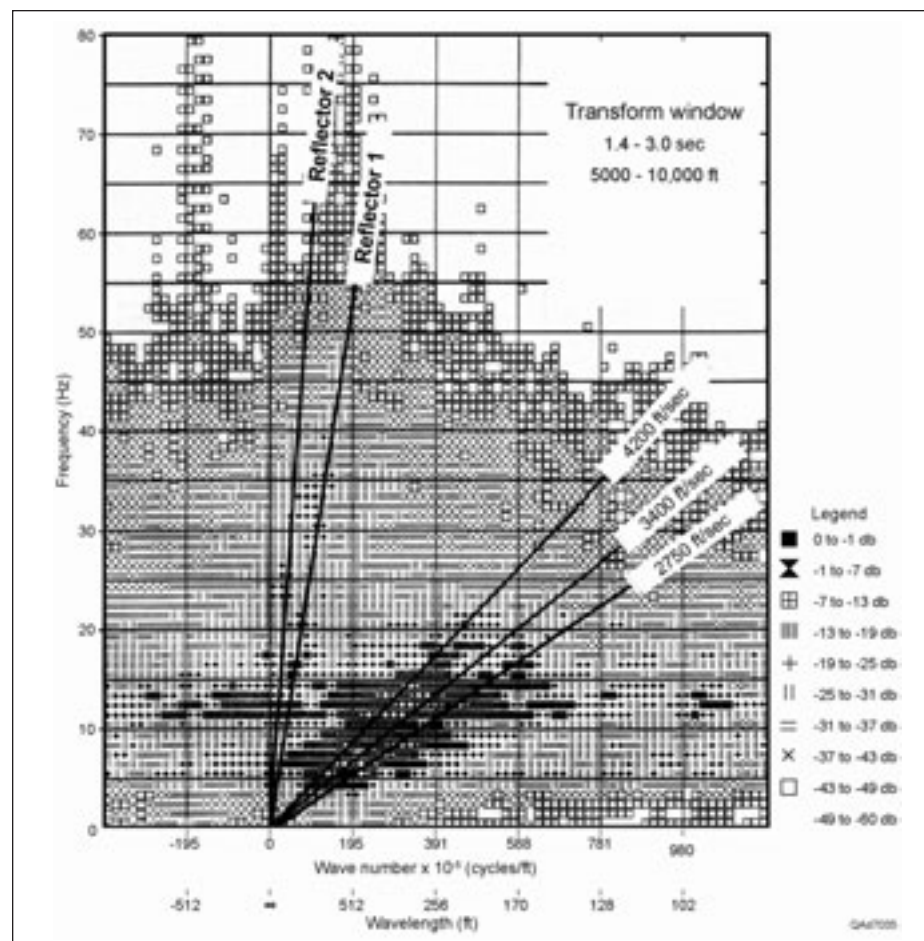


Figure 4 – Seismic frequency (vertical axis) and wavelength (horizontal axis) information embedded in the data window labeled Transform window on figure 3. This data analysis shows that if production seismic data are acquired at this test site with a 220-foot receiver array (figure 3), the frequency bandwidth should span approximately 80 Hz and each field record should be dominated by high-velocity reflection signals (events labeled Reflector 1 and Reflector 2). The format used to exhibit this frequency-wavelength information on a black/white printer shows how geophysicists had to display data analyses in the field in olden days before color plotters were field portable.

continued from previous page

reason, that source point should be moved closer to the receiver spread to prevent gaps in the offset profile.

Successive source stations should then be moved forward by the same distance to preserve a uniform spacing L between the remaining source-station positions.

* * *

Site selection is important when recording wave-test data because the data sample only a small portion of a prospect.

A wave-test site should be representative of the entire prospect. If surface conditions change over a prospect, more than one wave-test site should be considered.

Wave-test data acquired across one

prospect area circa 1975, using a recording geometry such as described on figure 1, are illustrated on figure 2.

These data illustrate several coherent noise modes. The dominant noises are a refraction event that has an apparent velocity of 9,500 feet/second (2,900 meters/second) and a band of surface waves with apparent velocities ranging from 2,750 to 4,200 ft/s (825 to 1,280 m/s). Several reflection events can be seen between 1.5 and 2.5 s at large offset distances beyond the surface-wave noise cone.

Because wave-test data are acquired using a small trace spacing d , any arbitrary-length inline receiver array can be simulated by summing an appropriate number of adjacent traces.

For example, the data on figure 3 show the effect of adding 11 consecutive traces of wave-test data acquired with a geophone spacing $d = 20$ feet (figure 1)

to simulate data that would be acquired with a string of geophones spanning 220 feet (67 meters) at each offset station. A 12-Hz low-cut filter has been applied to these data to aid in reducing low-frequency noise.

The frequency and wavelength content of the data inside the indicated Transform window is illustrated on figure 4 and confirms that the data are dominated by high-velocity reflection signals.

Running sums can be made using different numbers of test-data traces to simulate how receiver groups spanning any desired distance affect the frequency content and signal-to-noise ratio of prospect data. With this knowledge, seismic contractors can deploy receiver groups that have dimensions that will produce optimal quality data when production data recording is done.

Similarly, different sources can be deployed at each source station SP1 to SPN (figure 1) to compare data quality produced by vibrators versus impactors or by small explosive charges deployed at shallow depth versus large explosive charges placed at deep depths.

By comparing data quality generated by each source option, a contractor will know the best source to use across a specific prospect.

* * *

The concept described here should really be called horizontal wave testing, meaning geophones are deployed horizontally across the Earth surface when acquiring the test data.

Next month, we will consider the concept of vertical wave testing, where geophones are deployed vertically in a deep well as test data are acquired. □

GTW

from page 25

Yarus) presented the key uncertainties in the model building process, the mechanics of model building and its effect on recovery factors, and a case study showing how combining stochastic and deterministic techniques can improve reserves estimates.

✓ Engineering Perspectives (Ron Harrell) included three reservoir engineers who discussed best practices in reserves evaluation and reporting, common geological issues that affect reserves assessments and a technique that combines well performance and pressure data to quantify reserves.

✓ Unconventional Reservoirs (Creties Jenkins) focused on evaluation issues unique to tight gas sands, shale gas, heavy oil, oil shale and the quantification of risk versus reward in these types of reservoirs.

* * *

The breakout sessions that followed concentrated on eight key questions raised during the technical sessions:

- What recommendations can be made regarding clarifications/updates to the 2007 PRMS definitions and the 2009 SEC modernized rules?
- How do we establish reliable technology for estimating SEC proven undeveloped reserves?
- How do we conduct credible look-backs of project performance?
- How can we reconcile deterministic and probabilistic methods?
- What are the unique aspects of unconventional reservoirs that need to be considered?
- What are the ethical implications of reporting under the modernized SEC rules?
- How do we achieve full integration of engineering and geoscience technologies?
- Should the AAPG consider developing geological reserves and resources estimating and auditing standards?

Presentations from both the technical and breakout sessions are available on the AAPG Search and Discovery Web site at www.searchanddiscovery.net.

Based on GTW's popularity and the many ideas that were generated, additional GTWs focused on similar topics are being planned. □

(Editor's note: This report was provided by John Sneider and Creties Jenkins.)

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UPCOMING REGIONAL WORKSHOPS

December 2009

12/8 Eastern: Applied Petroleum Geology and Geochemistry for Thermogenic Shale-Gas Evaluation - A Primer Focused on Marcellus Exploration and Development in the Appalachian Basin (Pittsburgh Association of Petroleum Geologists, Pittsburgh Geological Society) - Pittsburgh, PA.
Contact: 304-293-2867 x 5443

January 2010

1/14-15 Rocky Mountain: Fluvial Stratigraphy - Golden, CO.
Contact: 303-273-3107

1/20-21 Rocky Mountain: Applied Hydrodynamics in Petroleum Exploration & Production - Golden, CO. Contact: 303-273-3107

February 2010

2/1 Rocky Mountain: Petra Basics - Golden, CO. Contact: 303-273-3107

March 2010

3/16-17 AAPG: Deepwater - Ultra Deepwater Reservoirs Geosciences Technology Workshop: Deepwater and Ultra Deepwater Reservoirs in the Gulf of Mexico - Houston, TX. www.aapg.org/gtw

For further information, view PTTC's online calendar at www.pttc.org/national_calendar.htm

R&S

from page 22

region, and we feel fortunate to have someone as capable as Adrienne to maintain effective communication, coordinate activities and organize events," he said. "The expertise and experience that Adrienne brings to the new Regional Office in Singapore will be a catalyst for accelerating AAPG's already strong growth rate in Asia-Pacific."

Welcome Jeremy Richardson

Jeremy Richardson joined AAPG as full-time London office director in October. He brings years of experience from Pennwell Corporation, where he ran the UK-based international office and was responsible for various events in Europe.

"Jeremy is a tremendous addition to the London office and our global



Richardson

development team," Wegener said. "His extensive experience running energy-related events and publications, coupled with proven entrepreneurial skills, fits well with our strategic plans and initiatives in Europe."

"He's going to complement our strong group of Region leaders and existing staff and quickly bring new ideas and programs for members," he added.

European Region President Dave Cook agreed.

"Jeremy brings to the organization strong skills in office management, publication sales, marketing, communication and events," Cook said. "One of his first tasks will be to improve Web-based communications between the European Region and the membership." □

Veal Passes Reins of London Office

It takes a certain kind of person to take the first step to prove a new idea. That kind of entrepreneur is Steve Veal, who in 2006 became the director of AAPG's first international office in London.

Now, after three-and-one-half years of firmly establishing AAPG's presence in the European Region, Veal is moving on to focus full time on his own company, DCX Resources.

We thank Steve for his contribution



Veal

to the globalization of AAPG.

Heading the first international office meant Veal carried responsibility for many "firsts," such as securing office space, hiring office staff, building relationships in the UK and with AAPG's affiliated societies and international sister organizations. During his tenure Veal initiated local events, providing essential services to European Region geoscientists. "The Region has benefited enormously from Steve's creativity and enthusiasm in his position over the past few years," said European Region President David Cook.

— CAROL McGOWEN

Geoscience Technology Workshops

Deepwater and Ultra Deepwater Reservoirs in the Gulf of Mexico

Overview

Consisting of presentations, dynamic discussions, exciting cross-disciplinary perspectives on deepwater and ultra deepwater reservoirs in the Gulf of Mexico reservoirs, the event will be a great place for experienced geoscientists to discuss published papers, and for young geologists to become familiar with the key issues.

The event focuses on integrating geological, geophysical, and engineering information. Presenters may also discuss the impact of technology on economics.

This event is envisioned first in an annual series and unique in that it offers an opportunity for discussion of wide-ranging topics.

To learn more about the available sessions please visit: www.aapg.org/gtw

Call for Abstracts

Send to: educate@AAPG.org
Deadline: December 21, 2009

March 16-17 • Houston, TX • Norris Conference Center / CityCentre

This event is a cooperative endeavor between AAPG, Houston Geological Society and PTTC.

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The AAPG Bulletin is a technical journal that is recognized in the industry as the leading peer-reviewed publication for information on geoscience and the associated technology of the energy industry.

The link below takes you to the Members Only login page where, with a few key strokes, you can click on a link for the Bulletin Online, the current issue, or for the Bulletin Archives, all issues of the Bulletin to date. Online as searchable html and .pdf files, the current issue is always available by the first of every month.



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Also, submit your next paper for consideration via www.aapg.org/bulletin.

Article highlights include:

A Unique Petroleum Reservoir

S. J. Mazzulla, Brian W. Wilhite, and I. Wayne Woolsey



The Cowley Formation of southern Kansas contains oil and gas in spiculite-dominated reservoirs. Controls on reservoir development and heterogeneity in the spiculites are described in this paper. Depositional and diagenetic models serve as templates for future exploration in similar reservoirs.

3-D Basin Modeling In Complex Settings

Natacha Gibergues, Muriel Thibaut, and Jean-Pierre Gratier



Explorations in deeper and structurally complex formations are problematic because they stretch the capabilities of existing 3-D software. This paper focuses on a possible solution – a reversible kinematic approach to deform and restore faulted and folded structures.

Ross Sandstone: Lake Or Marine

Discussion: Roger Higgs Reply: D.R. Pyles



The Ross Sandstone was deposited in a large, shallow freshwater, equatorial lake located in a broad foreland basin, according to Higgs, and is a poor outcrop analog for structurally confined submarine fans. Pyles examines Higgs' criticisms and shows that this reinterpretation is not justified.

2009 Annual Report

The 2009 Annual Report includes reports from the president, treasurer, editor, Advisory Council, House of Delegates, Foundation, and AAPG divisions, sections, and committees.

MEMBERSHIP&certification

The following **candidates** have submitted applications for membership in the Association. This does not constitute election nor certification, but places the names before the membership at large.

Any information bearing on the qualifications of these candidates should be sent promptly to the Executive Committee, P.O. Box 979, Tulsa, Okla. 74101.

Information included here comes from the AAPG membership department. Membership applications are available at www.aapg.org, or by contacting headquarters in Tulsa.

(Names of sponsors are placed in parentheses. Reinstatements indicated do not require sponsors.)

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continued on next page

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continued from previous page

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2010 Open Enrollment Course Schedule

Risk Analysis, Prospect Evaluation & Expl. Economics

Houston, Texas	January 25 – 29, 2010
Calgary, Alberta	April 26 – 30, 2010
Houston, Texas	May 10 – 14, 2010
Denver, Colorado*	August 16 – 20, 2010
Calgary, Alberta	September 13 – 17, 2010
Aberdeen, Scotland	October 4 – 8, 2010
Houston, Texas	October 18 – 22, 2010

Risk and Uncertainty Analysis for Unconventional Resource Plays

Calgary, Alberta	March 30 – 31, 2010
Houston, Texas	June 8 – 9, 2010

* includes material on unconventional resource assessment

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Commentary

New SEC Rules Carry Responsibilities

By JOHN SNEIDER
and CRETIES JENKINS

For more than a decade petroleum geoscientists, engineers and E&P executives expressed concern that U.S. Securities and Exchange Commission (SEC) rules governing oil and gas reserves disclosures disallowed the use of technology recognized as industry best practice and were inconsistent with most company's internal planning processes.

In March 2007, members of SPE, SPEE, AAPG and WPC jointly released

Others contributing to this article were AAPG members Richard Nehring, John Ritter, Pete Rose and Dan Tearpock, and Delores Hinkle.

the Petroleum Resources Management System (PRMS). PRMS is a principles-based system for classifying and categorizing oil and gas reserve and resource estimates for purposes of managing a company's petroleum portfolio, which is distinctly different from the previous SEC rules.

At the end of 2008 – after input from industry and professional societies, including the AAPG – the SEC

announced its modernized rules incorporating much of PRMS, to be employed for all disclosure reports after Jan. 1, 2010. A significant change in the new SEC rules is the allowance of companies to report Probable and Possible Reserves at their discretion.

Many participants in the Houston GTW (see page 25) who were involved in the effort to encourage the SEC to adopt more modern procedures

expressed genuine concern about how the E&P Industry would employ the new guidelines. "Be careful of what you wish for, because you might get it!"

Acknowledging the financial consequences of public reserves disclosures, the potential for ethical malfeasance may be greater with the new system. The consequences of even a single, widely publicized reserves write-down has the potential to negatively impact the entire E&P Industry. By analogy, consider the lasting effects of the 1969 Santa Barbara Channel oil spill on companies still hoping to develop the petroleum potential of offshore California.

The new SEC rules necessitate that geoscientists play an increasingly important role in estimating oil and gas reserves. The SEC allowance of reporting Probable and Possible Reserves involves more uncertainty, elevating the importance of geologic insights relative to engineering data. Geologic input into reservoir characterization, integrated with petrophysical and engineering data, is critical to developing robust estimates of hydrocarbons-in-place, recovery factors and reserves.

Substantial questions exist on key elements of the new rules such as a) the definition and demonstration of "reliable technology"; b) the definition of "projects"; c) the assignment of proven undeveloped reserves (PUDs); and d) stringent checks for bias.

Recognizing these implications, the Steering Committee strongly urges all AAPG members engaged in professional work related to public disclosure of a company's oil and gas reserves and resources to:

- ✓ Ensure that the data used and assumptions made are both reasonable and tenable.
- ✓ Follow established guidelines and rules to the best of your ability, and ask probing questions where there is uncertainty or doubt.
- ✓ Carefully and consistently distinguish among various reserve categories.
- ✓ Synthesize and integrate work with other disciplines.
- ✓ Restrict judgments and opinions to your area of technical expertise.
- ✓ Maintain a paper-trail explaining the rationale and procedures followed in generating your work products, especially if new approaches or technologies are employed.
- ✓ Take steps to identify and support a defined organizational route for effective internal resolution of emerging ethical conflicts.
- ✓ Implore colleagues, managers and clients to practice sound ethical and technological conduct in the generation of reserves and resources estimates for public disclosures.

We will break new ground as we apply these revised rules, which offer the potential for more realistic estimates, and the possibility of increased malfeasance.

We asked for these new guidelines, and now it is up to us – all of us – to see that they are implemented responsibly. □

(Editor's note: Snider and Jenkins were co-chairs of the GTW on "Geological Aspects of Estimating Petroleum Resources and Reserves.")

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Call For Abstracts

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Industry professionals and students are invited to submit abstracts for the AAPG 2010 International Conference & Exhibition. The technical program committee encourages abstracts that relate to any of the topics listed below. Planned sessions and formats (oral or poster) may be modified depending on actual submittals. Visit www.AAPG.org/Calgary for abstract submittal updates and additional information.

Proposed themes for the AAPG 2010 ICE Technical Program include:

- Sedimentology — Depositional Models for High Latitude Systems
- Circum-Arctic Tectonics and Basin Formation — Arctic Basin Tectonics, Deepwater and Ultra-deepwater Arctic Basins, UNLOS Surveys
- Mixed Carbonate/Evaporite Successions — Depositional Models and Reservoirs
- Petroleum Systems — Source Rock, Migration, Trap, Seals
- Geophysics — Advances in Harsh Environment Acquisition and Processing, Advancements on Seismic Acquisition on Ice, Under Basalts
- Rift to Drift, Passive Margin, Transition Tectonics — Source Rocks, Reservoirs, Migration from Rift to Drift
- Exotic Reservoirs of the World — What Produces Where in the World? Chalks, Cherts, Phosphates, Granites, Hydrates
- Reservoir Management: From Discovery to Abandonment — Geological and Reservoir Modeling, Second, Tertiary Recovery, Multidisciplinary Teams of Professionals
- Risk Analysis and Assessment — Oil Sands, Shales and Tight Sands
- Environmental — Environmental Concerns of Unconventional Development
- North American Unconventional Oil — Oil Sands, Tight Oil Sands and Carbonates, Oil Shale, Heavy Oil
- North American Unconventional Gas — Coal Bed Methane, Tight Gas Sands and Carbonates, Shale Gas
- International Unconventional Oil — Oil Shales, Tight Oil Reservoirs
- International Unconventional Gas — Coal Bed Methane, Shale Gas
- Geoscience Investigations and Petroleum Search Beyond Traditional Exploration Confines — Remote Exploration, "First Ever" Basin Exploration; Ultra-deepwater Drilling and Development in Shallow Productive Basins

Abstracts site opens in early December 2009.
Deadline for submitting abstracts is 4 February 2010.



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POSITION AVAILABLE

ASSISTANT PROFESSOR STRUCTURAL GEOLOGY

The Boone Pickens School of Geology at Oklahoma State University (OSU) seeks applications for a tenure-track faculty position in the broad area of structural geology. We are particularly interested in someone with interest in one or more of the following research areas: structural analysis of petroleum reservoirs, basin evolution, continental tectonics, neotectonics. The appointment will be at the assistant professor level and effective August 2010. The applicant is required to have a Ph.D. degree in geology or related field at the time of appointment. The applicant must show promise of an outstanding research program and be committed to excellence in teaching. The successful candidate will be expected to supervise M.S. and Ph.D. level graduate students and develop courses in her or his specialty. In addition she/he will participate in teaching introductory geology courses and teach a core geology curriculum course in structural geology.

The successful candidate will join a faculty of eleven geoscientists and will be part of the sedimentary geology, petroleum geology, and tectonics research groups that include six other faculty and has close ties to the petroleum industry. In addition to other research facilities the School of Geology has the Devon Teaching and Research Laboratory, which contains state-of-the-art 3-D image processing facilities.

Candidates should submit a letter of application, including a discussion of research interests and approach to teaching, along with a curriculum vitae and the names, addresses, e-mail addresses, and phone numbers of three references to: Assistant Professor Position Search, Boone Pickens School of Geology, 105 Noble Research Center, Oklahoma State University, Stillwater, Oklahoma 74078-3031, Phone: (405) 744-6358, Fax: (405) 744-7841. Inquires about this position may be directed to Dr. Todd Halihan (todd.halihan@okstate.edu) or Dr. Jay Gregg (jay.gregg@okstate.edu) at the above address. Screening of candidates will begin December 31, 2009 and continue until the position is filled. Filling of this position will be dependant on the availability of funding.

More information on OSU and the Boone Pickens School of Geology can be found on the web <http://osu.okstate.edu> and <http://geology.okstate.edu> respectively. Committed to health and safety Oklahoma State University maintains a tobacco free work environment. Oklahoma State University is an Affirmative Action/Equal Opportunity/E-Verify employer committed to diversity.

Tenure Track Faculty Position (Seismology)

The Department of Geology & Geophysics at Texas A&M University invites applications for a tenure-track faculty position in reflection seismology beginning September 2010. The position is offered at the Assistant Professor level.

The successful applicant will establish an active, innovative research program while complementing current departmental strengths in petroleum geology and geophysics, sedimentology, stratigraphy, and structural geology and will participate actively in the newly established Berg-Hughes Center for Petroleum and Sedimentary Systems. Furthermore, opportunities exist to participate in and build on collaborative programs with colleagues in petroleum engineering, oceanography, and elsewhere at Texas A&M University. Applicants must have a Ph.D. in Geophysics, Geology or a related field at the time of appointment. Post-doctoral research and teaching experience are desirable.

The successful applicant will be expected to teach effectively at the undergraduate and graduate levels in geology and geophysics, including classes in the petroleum seismology curriculum; supervise undergraduate, M.Sc. and Ph.D. students; and initiate and maintain a vigorous externally funded research program.

Interested candidates should submit electronic versions of a curriculum vita, statement of research interests and teaching philosophy, the names and email addresses of at least three references, and up to four reprints by email attachments, to the Chair of the Sedimentary Geology Search Committee, seismosearch@geo.tamu.edu. Screening of applications will begin January 15, 2010 and will continue until the position is filled.

The Department of Geology and Geophysics (geoweb.tamu.edu) is part of the College of Geosciences, which also includes the Departments of Geography, Oceanography, and Atmospheric Sciences, Sea Grant, the Geochemical and Environmental Research Group (GERG), and the Integrated Ocean Drilling Program (IODP). Texas A&M University, a land-, sea-, and space-grant university, is located in a metropolitan area with a dynamic and international community of 152,000 people. Texas A&M University is an affirmative action/equal opportunity employer committed to excellence through the recruitment and retention of a diverse faculty and student body and compliance with the Americans with Disabilities Act. We encourage applications from minorities, women, veterans, and persons with disabilities. Texas A&M University also has a policy of being responsive to the needs of dual-career partners (hr.tamu.edu/employment/dual-career.html).

Geologist/Clastic Sedimentologist

Wisconsin Geological and Natural History Survey (WGNHS) is recruiting for a full-time, tenure-track faculty position available July 1, 2010. Duties include conducting fundamental and applied research in the areas of Clastic Sedimentology through field-based investigations, including geologic mapping, focusing on the stratigraphic and hydrostratigraphic framework of Quaternary and/or Paleozoic sediment and rocks of Wisconsin. Work will be performed in cooperation with other Survey staff, university personnel, and collaborating local, state, and federal agencies whose interests may include geology, geophysics, hydrogeology, and mineral/energy resources. This position also has a role in the leadership of related outreach and educational functions within the WGNHS.

Salary minimum: \$52,000, excellent benefits package. Office is located in Madison, Wisconsin. Applications will be reviewed beginning 12/29/2009. For a complete position description and how to apply, please visit: www.uwex.edu/ces/hr.

AA/EEO Employer

Petroleum Geologist

The North Dakota Geological Survey announces a permanent position opening for a geologist. Successful applicant will be responsible for conducting geologic studies and investigations to generate maps and reports on the oil-producing horizons in the Williston Basin of North Dakota.

Applicants must have a master's degree in geology with three years of petroleum industry experience or a bachelor's degree in geology with eight years of petroleum industry experience. Applicants should have strong written and verbal communication skills. Preference will be given to applicants with experience in reading, interpreting, and correlating petrophysical logs, describing oil well core, and generating contour maps.

The successful applicant will be hired as a Geologist III with a starting annual salary between \$52,000 and \$60,000 plus benefits, dependent upon the level of schooling and applicable experience. The State of North Dakota has a very competitive health insurance and retirement plan. Submit a completed State of ND Application for Employment (SFN10950), <http://www.nd.gov/hrms/jobs/apps/application.htm>, cover letter, resume, references, and college transcripts to: <http://www.nd.gov/hrms/jobs/apps/application.htm> Ms. Karen Gutenkunst, North Dakota Geological Survey, 600 East Boulevard Ave., Bismarck, ND 58505. Phone (701) 328-8000 for more information. Deadline for applications is January 15, 2010, but the position will remain open until it is filled.

If unable to fill at a Geologist III level, the job will be filled as a Geologist II which requires a master's degree in geology or a bachelor's degree in geology with three years of petroleum industry experience.

For more information about the North Dakota Geological Survey, see <http://www.state.nd.us/ndgs/>. The North Dakota Geological Survey is an Equal Opportunity Employer.

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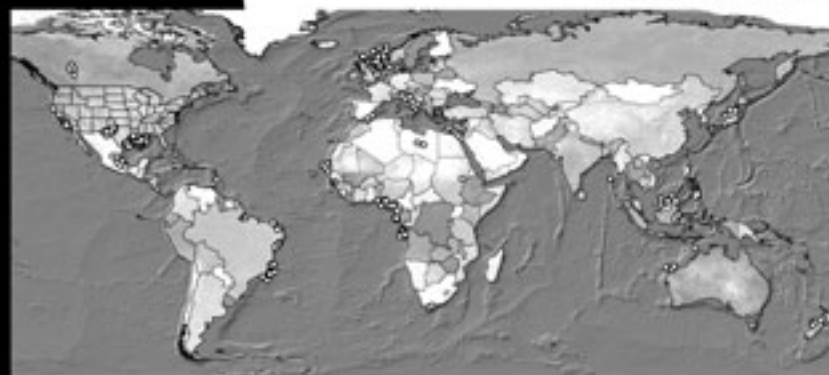
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Cooperation Counts, Step by Step

By RICK FRITZ

Over a year ago AAPG and SEG developed an ad hoc "joint cooperation committee" to review each society's respective programs and look for different ways to cooperate. Then-AAPG President Will Green initiated the ad hoc joint committee at the end of his term with his counterpart, Fred Aminzadeh at SEG. Scott Tinker and John Lorenz continued the committee along with their SEG counterparts Larry Lines and Stephen Hill.

The co-chairs for this ad hoc joint committee are Dick Baile and Lee Billingsley. Members of the committee include Tim Berge, Lee Lawyer, Randi Martinsen, Elwin Peacock, Randy Ray, Gary Servos and Jim Tucker.

Typically the committee meets at AAPG's and SEG's annual meetings with some e-mail and telephone discussion in between. Initial discussions involved the committee members getting comfortable with the various society programs and the ways each society operates.

During the last two meetings (Denver-AAPG; Houston-SEG) discussions focused on specific programs and related committees.

* * *

SEG and AAPG have a long history of cooperating on various projects and programs; however, most of these have been ad hoc and along natural lines of cooperation between the two societies. Some examples include joint



Fritz

publications, workshops, conferences and insurance.

As a result, one of the primary areas considered for cooperation is between the various society committees.

For example:

✓ Both AAPG and SEG have **Distinguished Lecturer** programs. SEG and AAPG have an informal arrangement to develop one joint Distinguished Lecturer on an annual basis. As a result of the "cooperation" discussions each society is contemplating a more formal arrangement with a regular series of joint AAPG-SEG Distinguished Lecturers.

Also, SEG has a very successful Distinguished Instructor Short Course, or DISC, which is similar to AAPG's Distinguished Instructor program. This also may be an area for cooperation.

✓ Another example is joint **publications**.

To date there are six joint AAPG-SEG

The discussions have been wide ranging – from small joint programs to merging foundations and even annual meetings.

publications. The most popular is "Interpretation of 3-D Seismic Data" by Alistair Brown. This is AAPG Memoir 42 and SEG Investigations in Geophysics No. 9 – and the seventh edition is currently in production.

✓ Of course, the most natural joint committees are AAPG's **Geophysical Integration Committee** and SEG's **Interpretation Committee**. These two committees plan to discuss various programs and opportunities for joint ventures in the near future.

An example of past cooperation between these two committees is the popular "Geophysical Corner," carried each month in the EXPLORER. Bob Hardage, the column's current editor and frequent writing contributor, is both an AAPG and SEG member.

✓ Another area under consideration by the joint cooperation committee is **joint membership**.

Roughly 20 percent of AAPG's and

SEG's members are members of both societies. The primary question in this case will be, "How much to charge for joint membership?"

The respective membership committees for each society have this under review and will make recommendations in time for consideration at AAPG's annual meeting in New Orleans.

✓ Finally, both societies are considering if it is prudent to build joint relationships on larger operations such as **global offices** and **regional conferences**. This will take more planning and will require a strategic decision by the leadership of each society.

* * *

The discussions within the committee have been wide ranging – from small joint programs to merging foundations and even annual meetings. The AAPG-SEG cooperation committee has made progress – if only in small steps.

It is hoped that these small steps will lead to more cooperation and a stronger alliance in the future.

There's a lot of work to do

CO₂ Sequestration in SpotlightBy MICHAEL A. JACOBS
DEG President

It seems like everywhere I go lately everyone wants to debate issues like global warming, climate change, greenhouse gas (GHG) emissions and cap-and-trade versus a revenue-neutral carbon tax system.

OK, before we go any further and you turn the page, you can relax because I am not going to get into a debate on any of these subjects – at least not in this article.

I will say this though: Geoscientists, whether employed by the oil and gas sector or not, all seem to have their own personal opinions on these subjects.

I, for one, agree with AAPG President John Lorenz, who in his column last month pointed out that the AAPG as a scientific organization has a long-standing history of conducting objective studies, and this attitude is reflected in the AAPG policy statement towards global warming and climate change.

When the subject of climate change came up during the recent Geo-CVD meetings in Washington, D.C. (see Washington Watch, November EXPLORER), we as geoscientists and as AAPG members encouraged our legislators to continue to support funding for those programs within the scientific community, universities and government agencies that are involved in doing research to help find the "true" scientific answers to this great debate.

I am, however, reminded of what James Hutton, the father of modern geology, said when he stated, "The past history of our



Jacobs

globe must be explained by what can be seen to be happening now. No powers are to be employed that are not natural to the globe, no action to be admitted except those of which we know the principle." We simply know this as the concept of

uniformitarianism, or "the present is the key to past," one of the great geological principles put forth by Hutton.

Of course, when Hutton said this (around 1780) the estimated world population was around 700 million people, none of whom were driving SUVs or staying up all night like me working on their laptops while watching football on TV. The world now has 6.8 billion inhabitants, largely deriving their energy and transportation sources from the burning of hydrocarbon fuels.

I am not sure the great geologist James Hutton ever envisioned the potential impact that we humans may have on future geological processes.

* * *

The recent focus on climate change and the effects of GHG, primarily CO₂, emissions from the consumption of

hydrocarbons underscores one of the largest challenges to the energy industry today, and that is how to strike a balance between meeting the growing demand for energy while also reducing emissions of GHG at the same time. Even with the current global financial crisis and the economic slowdown the world's nations will continue to become more developed, and hydrocarbons will continue to be the dominant source of energy for some time to come.

One of the key technologies being developed to help mitigate the effects of CO₂ emissions is that of carbon capture and geological carbon sequestration. Geoscientists will play a critical role in finding those sites with the right geological conditions that meet the criteria for long term storage of the CO₂.

If geological carbon sequestration is going to play an important role in mitigating GHG emissions, the world is going to have to ramp up in a serious way and have a huge number of active systems up and running by the middle of this century.

So, how daunting of a task will this be? Consider this: If you take all of the CO₂ that currently is being injected at a number of pilot projects throughout the world, and the new ones being proposed by the DOE, this technology will have to be replicated by a factor of 1,000 times in

order to be effective in mitigating the effects on climate change.

This is not lost on industry or our government, and one thing that was clear from our Geo-CVD visit is there is going to be a lot of funding allocated to conducting research on geological carbon sequestration. There also is pending legislation calling for the expedition of funds and permits for those working on identifying sequestration targets.

The challenge to geoscientists will be identifying and geologically characterizing these reservoirs so we can then begin working on the infrastructure needed to begin the implementation of large-scale carbon sequestration at these facilities.

The AAPG's Division of Environmental Geoscientists has a very active CO₂ Carbon Sequestration Committee, headed by Tip Meckel at the Texas Bureau of Economic Geology at the University of Texas at Austin. In addition, the DEG's Environment Geosciences journal, a peer reviewed journal edited by Jim Castle at Clemson University, is just finishing its second special publication dealing with the recognition, characterization and monitoring of geological carbon sequestration reservoirs.

We invite all geoscientists who are interested in being a part of this exciting new challenge, as well as other environmental issues particular to our industry and profession to join the DEG. We welcome your participation and contribution. □



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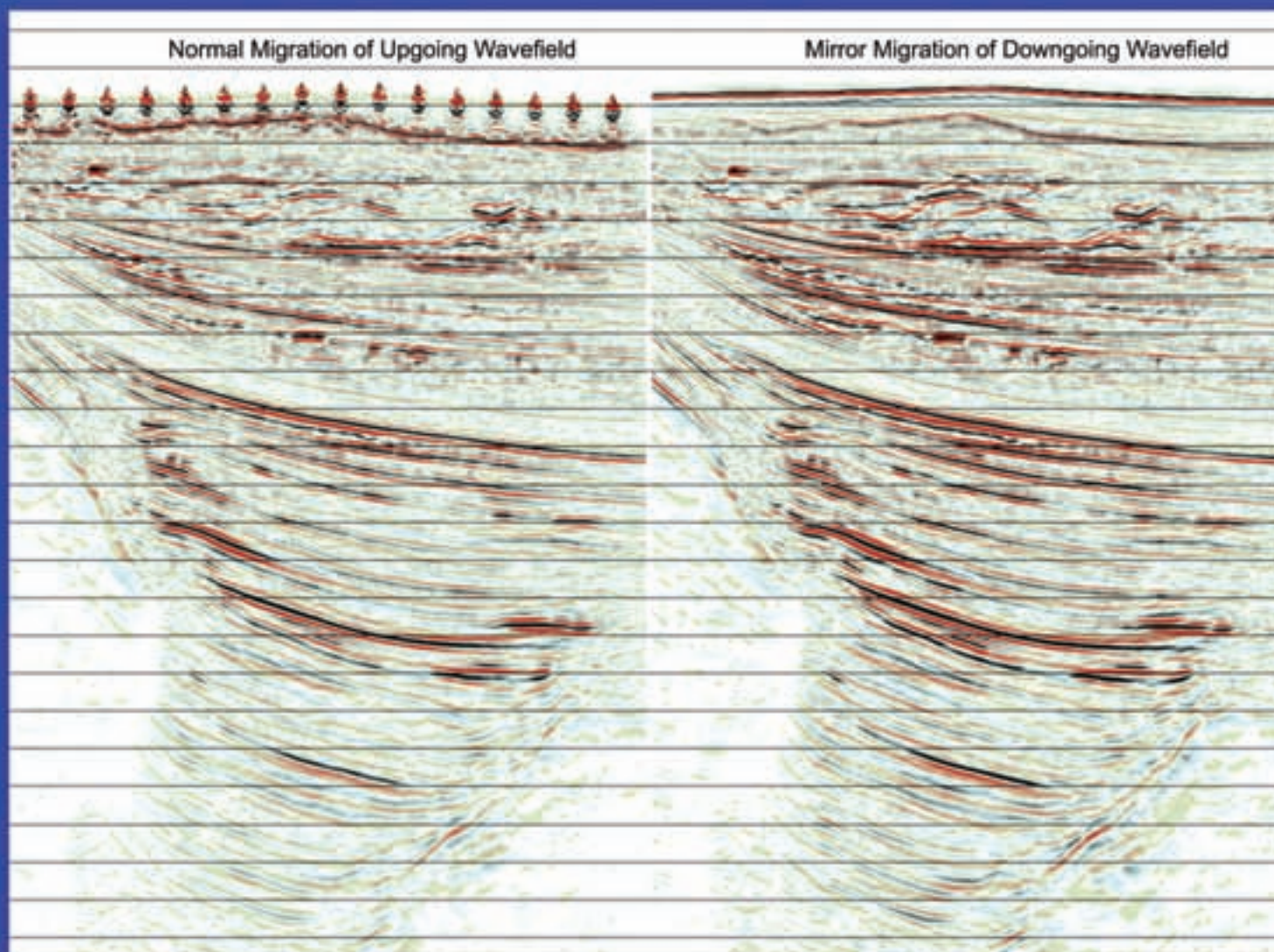
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