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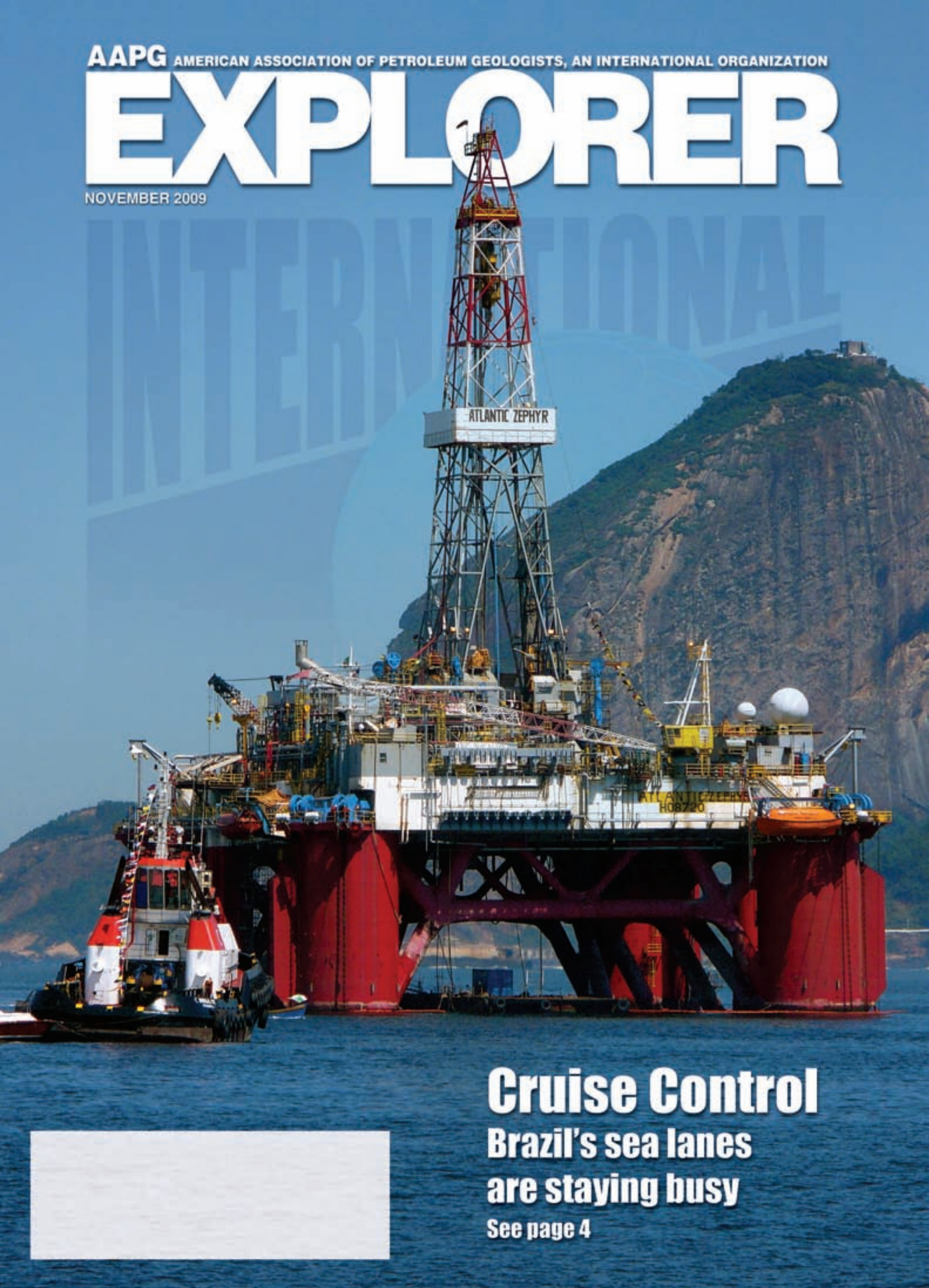

Cruise Control

Brazil's sea lanes are staying busy

See page 4

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AAPG EXPLORER

On the cover: Brazil's deep offshore pre-salt, or sub-salt, play has been the oil industry's story of the century, and with good reason. The huge deepwater discoveries have dominated media reports – and have kept the shipyards at Rio de Janeiro really busy. The cover of our annual "International" issue features the Atlantic Zephyr semi-submersible oil rig, under contract from Petrobras, being towed from the shipyards at the Praia Vermelha in nearby Niteroi. Photo courtesy of Rafael Rigues.

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Brazil may be best known for the Amazon and exotic coastal regions, but its onshore geology can be spectacular, too – including the Chapada Diamantina area, shown here, featuring siliciclastic rocks of Middle Proterozoic age. This month the country plays host to the AAPG International Conference and Exhibition (see page 6).

PRESIDENT'Scolumn

Industry, Governments And AAPG Members

By JOHN C. LORENZ

The *New York Times* ran an article back in April* noting that the world's major commercial oil companies are reluctant to invest in research into alternative energy, implying that somehow this constituted a moral failure. Hooey. First, these are oil and gas companies, not alternative energy companies, and second, there is no reason for any commercial enterprise to invest in anything unless the potential exists for a return on that investment. That can be perceived as either good or bad, but truthfully it's neither; it's just the way the business works.

Let's not confuse capitalism with government: Any business that doesn't make a profit is a failure and does not stay in business long. Taxes on those profits fund government programs, and it's the government's role to use tax money to look after its citizens without an expectation of profit. It's a bit different where the government runs a national oil company, but in either case, society benefits from the resulting abundant, inexpensive supply of energy.

Private companies may spend a certain amount of speculative money on research not associated with their core business, but only after enough money has been salted away to pay taxes and salaries, maintain equipment, comply with regulations, provide for the immediate future and provide a return to the investors who fronted the heavy up-front costs of the industry. But commercial companies are only going to put earnest money into alternative energy research if and when there is a potential profit in it, and if and when they feel their company should expand the scope of work beyond their oil and gas core competency.

About 80 percent of AAPG members are employed by industry. Some of our members manage or work for companies large and small, some own small companies, many consult to the industry. The AAPG-fostered science that helps our members do their jobs ultimately benefits industry. Thus there is overlap and a definite synergism between AAPG and industry. Regulations that help or at least do not hurt industry allow it to continue to provide livelihoods for some 20,000 AAPG members and millions of other workers and professionals, from roughnecks to engineers to bankers.** No wonder that AAPG members tend to be both thoughtful and vocal about the politics that affect the industry.

But AAPG is not the mouthpiece for the oil and gas industry; that's the job of the American Petroleum Institute. At the same time, a discouraging amount of nonsense, ignorance and misinformation about geology and the oil and gas industry float around in the public and political domain, and it's a fine line we walk. AAPG is a scientific organization and its external credibility is based on a history of objective studies in geoscience. Policy-makers have come to AAPG for information, and we have a reasonably wide audience among them in large part because we have not tried to be other than objective.

Lorenz

AAPG has an active Public Outreach Committee, and AAPG's Division of Professional Affairs has assembled a number of statements that outline the geologic issues that affect our members, present the geoscience and give the member perspective on those issues. Many of these are U.S. issues, in part because that's where such issues were initially raised, in part because two-thirds of AAPG members reside in the United States. AAPG also supports an information and communication effort in Washington, D.C., where David Curtiss makes our science available to legislators.

The oil and gas industry is unlikely to be pushed entirely out of business by governments or regulations any time soon because the world needs, in both the dire and absolute sense of that word, the energy that this industry supplies. But neither business nor AAPG members should be expected to invest in alternative energy research when there is as yet no reasonable expectation for a financial return on that investment. You can't draw water from a well for very long if no water seeps back in.

*"Oil giants loath to follow Obama's green lead," by Jad Mouawad, *New York Times*, April 8, 2009.

**"Oil and Gas Industry Supports 9 MM American Jobs, 7.5 percent of GDP," Rigzone, American Petroleum Institute, Sept. 9, 2009.

Discoveries of 'Olympian' size

Brazil Dancing the 'Pre-Salt Salsa'

By LOUISE S. DURHAM
EXPLORER Correspondent

Brazilians have good reason to be in a celebratory mood these days – and not just because Rio de Janeiro was selected to host the 2016 Summer Olympics.

That selection provided just one more occasion to bask in the glow of a spotlight of sorts, which has been focused on the country for the last few years.

The world is watching as Brazil begins to tap into huge oil depostis in the deep offshore pre-salt, or sub-salt, horizons.

It's all about oil.

Some folks have gotten so carried away in their exuberance over the vast potential for new oil production they're calling Brazil the next Saudi Arabia.

Pre-salt excitement kicked off in 2007, when the country's state-owned Petrobras and partners BG Group of Britain and Portugal's Galp Energy announced results for the second well at the Tupi Field offshore southeastern Brazil in the Santos Basin.

Test results for the Petrobras-operated well at Tupi indicated estimated reserves of as much as eight billion barrels of oil equivalent for the field.

To put this into perspective, the entire country's reserves tallied 12 billion barrels at the time of the discovery.

Unlocking offshore secrets: Brazil's Sergipe-Alagoas Basin outcrops offer the sedimentary records of Paleozoic, pre-rift Jurassic, Lower Cretaceous rift rocks and younger drift successions – an excellent place to study the South Atlantic Margin.

Sweet Smell of Success

Tupi was a particular stunner in that it represented the largest find worldwide since the discovery of the 13 billion barrel Kashagan Field in 2000 in Kazakhstan.

The Tupi find was sweet for many reasons, including the type of crude.

"The sub-salt crude is higher quality, about 30-degree API," said Caio Carvalhal, research associate at Cambridge Energy Research Associates in Brazil. "Brazil has very heavy oil on average, about 16-degree to 17-degree."

This is quite meaningful given that the light oil needs less processing and, therefore, is less expensive to produce, noted AAPG member Bob Fryklund, vice president at Houston-based IHS Energy.

Petrobras is reported to have recently begun refining its first crude oil supply from Tupi, located about 500 kilometers off Brazil's southeast coast.

Shortly after the Tupi discovery announcement, Carvalhal noted there could be huge reserves in the sub-salt offshore Brazil under the Campos, Santos and Espirito Santo basins.

"The sub-salt could be a whole new play beneath the most prolific basins in the Brazil region," he said, "and one with better quality oil."

In the bustling southeastern offshore area of the play, it's the Santos Basin that appears to rein as the hot spot. The basin was the site of the top three discoveries worldwide in 2008 – Iara, Jupiter and Guara.

Deep Targets, Big Bucks

The trinity of Campos, Santos and Espirito Santo is where most everyone has been playing so far, Fryklund said, but other areas are ripe for exploration.

Geologists have said the pre-salt environment could extend the length of Brazil's Atlantic coast.

This may be proven out sooner rather than later given that Petrobras announced it is researching possible ultra-deepwater oil prospects off the coast of northeastern Brazil. Although the company recently said it would postpone drilling to the pre-salt in the Jequitinhonha Basin offshore Bahia

See **Brazil**, page 8

RIO meeting starts Nov. 15

Offshore Successes Spice ICE 2009

By VERN STEFANIC
EXPLORER Managing Editor

When AAPG first held an international conference in Rio de Janeiro, the resulting meeting was loudly proclaimed by just about everyone as "the best ever."

Indeed, that 1998 meeting was the Association's largest international conference to date – it remains AAPG's second-largest such event – and many believe Brazil's exploration potential and the meeting's technical content were big reasons for the success.

Mello

A tough bar to top, you might think.

Think again, says one of the meeting's organizers and most passionate supporters.

"This will be – again – the best-ever international meeting of AAPG," said Marcio Mello, vice chair of the International Conference and Exhibition, set Nov. 15-18 in Rio.

"Brazil is the country that today presents the highest hydrocarbon potential in the whole world," Mello said. "This will be discussed in front of the whole international petroleum community."

Brazil's recent exploration successes (see related story, page 4) are well-documented and known not just by the industry but by people in all parts of the energy-needing world. Whereas the 1998 meeting was flavored with the country's potential, the 2009 version will have the perspective of accomplishment.

AAPG returns to Rio this month for the 2009 International Conference and Exhibition.

"Brazil is becoming one of the most promising oil producers in the whole world," Mello said. "The Rio 2009 meeting will allow the widespread of the pre-salt potential for the whole international petroleum community, as well as for Latin America academic and industry groups.

"The Brazilian petroleum industry is much more mature and developed," Mello continued. "Also, there is a strong Brazilian industry that will participate very actively in the meeting."

And that means a good chance to dive deeper in Brazil's pre-salt petroleum geology – a hot topic for geoscientists throughout the world.

"The model will be discussed in detail," Mello said.

Broader, Further, Deeper

There are other reasons why Rio may become one of AAPG's more memorable meetings.

The technical program is built on the theme "Broader, Further, Deeper," with the Associaçao Brasileira de Geólogos de Petróleo serving as the host society, and Haroldo Lima, director general of Brazil's ANP (National Petroleum Agency) the general chair.

Organizers have prepared a program that includes more than 300 oral and poster presentations, 13 short courses and core workshops, and four field trips.

Appropriately, the conference will focus largely on offshore activities while also including sessions that cover upstream areas.

The conference also offers two special sessions:

❒ A plenary session on "Opportunities in a High-Stakes Environment."

A panel of top industry executives will address different aspects of issues facing the industry. Speakers will include:

✓ **Jose Sergio Gabrielli de Azevedo**, chairman, Petrobras.

✓ **Mark A. Albers**, senior vice president, ExxonMobil Corp.

✓ **Amin Nasser**, senior vice president E&P, Saudi Aramco.

✓ **Yves-Louis Darricarrere**, president E&P, Total.

✓ **Andrew Gould**, chairman, Schlumberger.

❒ A panel on "Giant Fields of the Decade – E&P Challenges."

Industry experts will discuss recent giant field discoveries and the technological innovations that played a role in the success. Speakers will include:

✓ **Solange Guedes**, executive director, Petrobras.

✓ **Pete Carragher**, vice president-geoscience and exploration, BP Access and Exploration Unit.

✓ **Yves Grosjean**, vice president-exploration coordination and portfolio management, Total E&P.

✓ **Paul Haryott**, general manager of exploration, Chevron Africa and Latin America.

✓ **Malcolm Brown**, exploration manager, BG Brazil.

To register or for more information go to www.aapg.org/rio. ❑

Brazil

from page 4

State, there are reports a well will penetrate this horizon by year end. Petrobras made a prior discovery there, but it didn't go deep enough to reach pre-salt, Fryklund said.

Anadarko Petroleum Corp. was the first independent operator to hit pre-salt oil in the burgeoning play when it made a discovery in 2008 in the Campos Basin. The company had been honing its expertise in this type of environment in various areas for a number of years, including 15 years in the Gulf of Mexico.

The Campos discovery included pre-salt-experienced Devon Energy and other partners.

Brazil's overall pre-salt resource reportedly may hold as much as 80 billion barrels of oil equivalent. It's an impressive number, but tapping into the target reservoirs is fraught with hazards.

For starters, there's the challenge of drilling in the ultra-deepwater and taking the drill bit perhaps as much as a few miles beneath the seabed to penetrate a massive salt sheet, where extreme pressures and temperatures present major challenges for the operator and unwelcome surprises are not uncommon. Additionally, the salt presents a formidable deterrent to acquiring respectable quality seismic images.

It's dicey work overall, and it carries a big price tag.

Tupi provides a good example of what the operators face.

Water depth there is about 7,000 feet, and the field occurs another 17,000 feet subsea under a massive salt sheet. In addition to the daunting technological challenges, Carvalhal noted the initial well at Tupi cost about $240 million and required a year to drill.

Despite the potential for huge finds, they can be elusive.

> "The international companies and Brazilian independents are kind of in a timeout period because they're waiting for the rules."

ExxonMobil recently drilled a dry appraisal well on the Guarani prospect in the Santos Basin for a reported cost of $150 million. But it takes a bigger disappointment to scare off the big guys, so look for a third well to go down once the results of the drilling program are evaluated. Hess Corp. and Petrobras own a percentage of the block where the prospect is located.

Room to Grow

One downside of the pre-salt play is the considerable shadow it has cast over other quite promising hydrocarbon activity in Brazil, which is the least drilled country in the world, Fryklund noted.

There's considerable potential both in frontier basins onshore for gas as well as traditional turbidite systems all along the coast, he said.

This is fortuitous given that Brazil is South America's largest economy, and it's the scene of some highly industrial areas that require a lot of energy.

"There's a good bit of onshore activity, and some of the bigger companies are starting to look at some of the high-risk plays," said Tom Liskey, regional manager for Bolivia, Brazil and Paraguay at IHS. "For instance, BG, Shell and Petrobras are looking at gas potential."

An onshore natural gas discovery made by Petrobras and Starfish Oil & Gas SA in the Reconcavo Basin was announced recently. Also, the state-controlled oil company teamed with Galp to tap into an onshore oil deposit in the Potiguar Basin.

Petrobras recently met success drilling in the post-salt layer offshore in the Campos Basin where it discovered oil in carbonate reservoirs. Preliminary analyses reportedly indicate estimated recoverable volumes of 280 million barrels of light oil.

Brazilian company OGX accounced mid-October that a recent discovery in the offshore Campos Basin post-salt may hold as much as 1.5 billion barrels of oil.

Who Gets What?

Going forward, there are enormous challenges to developing the country's reserves, particularly in the relatively treacherous pre-salt environment. Yet if anyone can make it work, it should be Petrobras. Fryklund noted the company historically has done most of the deepwater drilling in the entire region.

Currently, there is an ongoing debate about changing the oil regulatory framework in Brazil. Instead of royalty payments, the government reportedly wants a minimum 50 percent share of profit oil, which is the oil produced after discounting expenses from development of a field.

Also, plans reportedly ensure Petrobras as sole operator of future concessions and the company has at least 30 percent of new concessions.

Whatever the outcome, it's unlikely to deter the IOCs and others who are knocking on the door with plenty of cash in their collective pockets, ready to make a go of it on their own or team with Petrobras, which could emerge from the regulatory hassle as the sole operator in the pre-salt play.

For now, it's a waiting game.

"The international companies and Brazilian independents are kind of in a timeout period because they're waiting for the rules," Fryklund said. "There are no bid rounds right now."

Relative to blocks outside the pre-salt, Fryklund noted the ANP – Brazil's national petroleum agency – probably will continue with bids the same as before, most likely with similar rules. ❑

‘Deliverables for direct application’

Database Gathers Europe Shale Data

By KEN MILAM
EXPLORER Correspondent

Inspired by gas shale successes in the United States, researchers hope to revitalize exploration in Europe.

A public-private effort launched officially earlier this year crosses political and scientific borders to accomplish this, according to AAPG member Brian Horsfield with GeoForschungsZentrum Potsdam (GFZ), the national laboratory for geosciences in Germany.

Horsfield and GFZ German Research Centre for Geosciences colleague Hans-Martin Schultz coordinate the international, interdisciplinary project from GFZ.

The project is conducted by a task force of experts drawn from geological surveys, consultants, research institutions and universities.

The goal is to build a European black shale database and use it to find and produce gas for regional and local needs.

An important facet of the project is that it integrates proven U.S. gas shales – for example, the Barnett Shale – for calibrating key variables, Horsfield said.

Most new findings will remain proprietary for at least the project’s first three-year phase, which allows project sponsors to act on their 160,000-euro per-year investment, he said.

Sponsors to date include Marathon, StatoilHydro, ExxonMobil, Gaz de France Suez, Vermillion and GFZ.

The GASH program, as it is called, “is applied but not ivory tower stuff,” Horsfield said. “We are talking about basin modeling, organic matter, petrophysics and rock physics, plus the database – in other words, with deliverables for direct application.”

The potential payoff could mean exploiting an estimated 510 Tcf shale gas resources in Western Europe alone, he said.

GASH researchers say that many parts of Europe, dead as far as conventional fossil fuel is concerned, contain prime targets for shale gas exploration. And Horsfield adds, Europe has a more complex and compartmentalized setting of geological units than North America.

Experience Counts

The need for evaluation is demonstrated by recent happenings in the European shale gas scene. For instance, in October 2007 Lane Energy Poland was granted licenses in Poland to explore shale gas from Silurian black shales; in Sweden, Shell reportedly has interest in the Skåne region.

The GASH team is mainly European, but with the right mixture of American-based experience and know-how, he said.

Working with Horsfield and the GFZ team are the Institut Français du Pétrole (France) and TNO (Netherlands). Universities include Newcastle (UK), Aachen, FU Berlin, Clausthal, Leipzig (all Germany), VU Amsterdam (Netherlands) and MU Leoben (Austria).

National and state geological surveys play a key central role not only in regional analysis and application, but also in basic research: GEUS (Denmark), BGR (Germany), BGS (England) are at the heart of the project, he said.

“Our team has 30 man-years experience within the industry (with Arco, Conoco, Saga, Hydro, BP, Preussag) and 50 man-years working with industry in joint research programs and projects,” Horsfield said. “GFZ currently has 13 companies supporting its research, and cumulatively we’ve worked with twice that number.

“Research is performed with sample material and seismics from our industrial and academic partners,” he continued. Labs selected for this work are the Alum Shale, Posidonia Shale and Carboniferous Shales of Europe.

Others may be added.

Additionally, the Barnett and Marcellus are included “because known gas shales from the United States are needed to supplement the potential gas shales of Europe, thereby providing a link to producibility,” Horsfield said.

Much of the information going into the black shale database exists in rudimentary form: “We have well logs and data on fluids and gases, which we will compile,” he said.

Most of the information was collected in efforts to find suitable sites for projects like nuclear waste containment.

“We need seismic,” he said, noting that an October workshop was planned to address that need, review research progress and further discuss the database.

Researchers are “looking at a processing technique to directly detect gas-saturated shales from measured seismic profiles,” he said.

If Europe’s gas shale potential is so great, some may wonder, “Why don’t we have 50 sponsors?” Horsfield said.

When energy prices plunged in 2008, the number of expected sponsors for the project shrank from 10 or 12 to seven, he said – but Horsfield remains enthusiastic, saying interest in the work has taken off exponentially.

“We’re not keeping all the results under wraps,” he said. “Some information has to be used to promote the project.”

And as the effort progresses, Horsfield predicted it “will attract sponsors automatically.” ❑

Nigerian scholars embrace 'immersive' geology

Students 'Get Back to the Rocks'

By BARRY FRIEDMAN
EXPLORER Correspondent

If the university-sponsored geologic field camp is to survive and prosper, some believe it will only do with an infusion of international geoscience students.

Recently, AAPG, along with Indiana University, did just that.

Eight gifted geology majors from Nigeria were invited to the United States – specifically to the school's geologic field camp in Montana – to participate in a special kind of geologic experience.

AAPG's inaugural "Immersion Field Experience," as the name suggests, introduces students to an intensive program in the geosciences that are often not available in their native countries.

The challenge for many of these exceptional students is that while they have the intelligence and "book smarts" in geologic training, they do not have access to rigorous field learning opportunities.

And that's where the Immersion Field Experience comes in.

Photo courtesy of Afe Mayowa Lawrence

Nigerian geology students came to Montana to visit the rocks. The snow was a bonus.

AAPG's Vision

AAPG, in recognizing the need to help students to "get back to the rocks," worked with Indiana University to create the first Immersive experience, "Structure, Tectonics and Sedimentary Basin Analysis in the Northern Rocky Mountains," a 14-day field course for international students.

In the program, AAPG acts as a facilitator between national oil companies and universities in North America and Europe to establish a mechanism whereby students, summer interns or industry employees can enroll in intensive field courses to gain focused hands-on experience with rock properties.

The recently completed field course – one that involved the Nigerian students – is what AAPG sees as the first step toward an ongoing program of short courses, each with a different topical focus (see related story, page 14).

The estimated per student cost of the two-week program was approximately $5,000. This included all lodging, meals and field transportation (but not round-trip travel to Montana).

For that expense of time and money, instructors were hoping the Nigerian students would gain:

✓ A better appreciation of actual scale and geometry of a variety of reservoir architectures and products of rock deformation.

✓ An enhanced ability to make interpretations from a limited database.

✓ Increased self-confidence in integrating a variety of stratigraphic, sedimentological, structural and geophysical information in problem-solving.

✓ Improved skills in working as part of a team.

The setting couldn't have been more perfect for the course – Indiana University's Geologic Field Station, located in the Tobacco Root Mountain Range within the northern Rocky Mountain province, is considered by many to be among the premier facilities of its kind in North America, and at or near the forefront of teaching geosciences in the field.

Since its construction began in 1949, over 4,500 students from over 200 universities – nearly all in the United States – have enrolled in its undergraduate and graduate-level courses.

Now, the camp's assets are going global.

'Cream of the Cream'

When reached onsite to talk about the camp and the Nigerian experience, AAPG member Lee J. Suttner, former director of Indiana University's Judson Mead Geologic Field Station, is sitting in a cabin, exhausted and exhilarated by both the program and his Nigerian students.

"After just one day in the field," he said, taking the call in another office so his students could work, "albeit a long and physically as well intellectually challenging one, I can say with no hesitation that the Nigerian students are truly superb in every respect."

So impressed is Suttner, who is the Robert Shrock Emeritus Professor of Sedimentary Geology at Indiana University, that he says:

"As a teacher, it would be fun to have an academic competition between these eight and the top eight students from the top eight programs in the United States," Suttner said, visualizing a sort of international "geology bowl."

"What we're seeing here," he added, "is

See **Field Camp**, page 18

As AAPG president last year, Scott Tinker (front center) got to meet with Nigerian geology students – which helped open the door for their camp experience in Montana.

Preparing for a Job, But Also for Life

By BARRY FRIEDMAN
EXPLORER Correspondent

Scott Tinker, past president of AAPG, spends a lot of time traveling around the world thinking about the state of geology and the state of geologic field camps.

To him, they're related.

"Industries," Tinker says, "are beginning to worry that students don't understand rocks."

So to him, the solution seemed simple enough: bring students closer to the rocks by reinvesting and refocusing on the geological field experience.

Moreover, on one of his travels, he wondered: What if you could bring the top geology students from around the world to the United States for the same purpose – to provide an intensive program in the field?

And that was just part of the rationale for the Immersion Field Experience Program.

The other?

"It had all the elements of a neat opportunity," he said.

As important, Tinker believed that these international students would inject a new vitality into U.S. geologic field camps, something he believes has been sorely needed.

As luck would have it, Lee Suttner called around this time and asked Tinker to help Indiana University raise money for its facility in Montana, called Judson Meade, as well as discuss the overall state of geologic field work. (Tinker, too, attended the 2006 symposium on the health of such camps).

"This is one of if not the premier camps in country," Tinker said of Judson Meade. But like many in America, it had experienced reduced enrollment and funding throughout the past decade.

Tinker believes it is not only important to keep it open, but to have it thrive.

An international component could help.

"I promoted the idea to five or six countries," Tinker said. "The Nigerians got excited, Lee got excited, AAPG got excited."

Out of Africa

There were setbacks and funding snafus, but then in August a group of Nigerian students came to the United States and spent a week in Montana.

The raison d'être for these camps, at least domestically, is what it's always been, Tinker said: to expose geology students to more of those rocks.

But internationally, the reasons are more philosophical, more challenging.

Tinker says students who come here not only gain new experiences – experiences they wouldn't find, for instance, in downtown Lagos – but to return to their countries as emissaries.

"That's the thing about Immersion – it gives students the potential to grow," he said. "It gets petroleum companies in their countries involved. The model is each company in these countries funds students. The companies then feel a sense of return from the students; the students a sense of loyalty."

"And universities here," he says of the United States, "love diversity."

Like Suttner, AAPG Geoscience Director Jim Blankenship and others, Tinker is convinced the camps provide something for students that classroom work cannot.

"What happens in the field – observational, quantitative, interpretation – is scientific, but it's also artistic," he said. "At the end of the day, it is about problem solving in 4-D."

And, it's tough.

"You have the base camp, learning to live and work together. It can be grueling. There are rattle snakes everywhere."

Tinker knows what he's talking about. He studied at Judson Meade in 1981 – back when it was two eight-week sessions, with 70-80 students in each session.

"Lee was head of the program," he recalled fondly. "It was wonderful."

The Field Immersion program that the Nigerians experienced wasn't as intense as the program U.S. geology students undergo.

And that's by design.

"I wouldn't try to over-engineer it," Tinker said. "Originally, we're thinking of keeping kids of common language, culture – that's the thought," he says, citing cultural and religious concerns, especially those coming from Muslim countries.

Tinker, like Suttner, is passionate about the need for the field experience – for both domestic and international students.

"The field camp is a truly fundamental experience, a vital part of what we as geologists do," he said. "It's not just emotionally and intellectually challenging, but physically draining as well.

"That prepares you for life." ❑

Measurements, planning optimize production

Shale Completions Can Get Tricky

By LOUISE S. DURHAM
EXPLORER Correspondent

The enormous quantity of natural gas in storage is pressing the limits of storage facilities to the max.

The main driver of the current oversupply stems from the great successes operators have realized in the numerous shale gas plays.

But today's surplus has a way of becoming tomorrow's shortage.

If there's a better approach to wrest the gas from these wells, there's no time like the present to get with program – and that's what is happening in the United States, including the mid-continent.

The majority of shale gas wells are completed via horizontal laterals off the vertical wellbores. Early on, horizontals were deemed the way to go from an economic standpoint.

Operators drill the lateral legs into what is considered to be the best horizon as determined by well logs, core and seismic data. The lateral sections are placed and evaluated using relatively simplistic technologies, such as gamma ray and mud logs.

Shale beds are notoriously low permeability rocks, meaning they ordinarily need a hydraulic frac stimulation to be economic.

"With hydraulic fracture stimulation, you're providing a conduit to effectively increase the h of kh (horizontal permeability) and a method for the gas to escape," said AAPG member Camron Miller, senior geologist at Schlumberger.


Miller

"Fracture it and you'll get the free gas – and it's important ... because you get a lot of gas production immediately."

"The goal is to maximize reservoir contact through hyudraulic fracture stimulation, which should maximize gas drainage," he said. "The more free gas that exists, the higher the IP (initial production) will be."

Miller presented a paper on "Horizontal Well Planning for the Woodford Shale and Other Gas Shales in the Mid-Continent" at the recent Mid-Continent Section meeting in Tulsa.

This free gas is only part of the story.

Shales also harbor adsorbed gas attached to the surface of the organics in the shale, and sometimes to the shale grains themselves.

"It's important to have a truly strategic hydraulic fracture stimulation to contact as much reservoir as possible so you can produce the free gas, reduce the pore pressure and kick-start the production of desorbed gas," Miller said. "There may be a lot of adsorbed gas, and it requires lower pressure to release it from the organics."

Borehole Imaging

Operators naturally are attempting to stay in the better part of the reservoir rock with the drill bit. But reservoir characteristics can change significantly along a lateral of maybe 3,000 feet – and some changes may be virtually undetectable with the ordinary gamma ray and mud log tools.

"These changes need to be addressed in completion design," Miller said.

"You need to account for changes in reservoir characteristics, such as changes in mineralogy, natural fracture density and orientation, changes in stresses," he emphasized. "One of the most important things is to identify and avoid perforating near faults.

"Borehole images are an ideal measurement to run in these horizontal wells," Miller continued. "You can capture images while drilling to look at real time images and stay in the zone, or wait until right after drilling the well when you can convey the imaging tool on the drill pipe."

Miller noted that borehole imaging provides such high-resolution images that it's been said they create a core-like image – at a much-reduced price.

Borehole imaging in the horizontal leg allows the opportunity to take measurements along the length of the lateral to identify when/where the characteristics are changing – and to account for these changes in the completion design.

The images provide a qualitative indication of mineralogy and allow the interested party to identify, characterize and define the orientation of bedding, faults and fractures.

"The key point is to design strategic-type hydraulic fracture stimulation based on what the reservoir is telling us," Miller noted.

In planning the well, data acquired in the vertical hole can determine which layer has the better reservoir and mechanical properties for lateral placement. Drilling direction is determined based on the local stress regime.

In most shales, the target intervals will exhibit high silica and low clay content, according to Miller. Some shales have significant carbonate content where the target would be high silica and/or carbonate and low clay content.

"The zones with low clay content tend to have the better reservoir and mechanical characteristics we want," Miller said. "They have better porosity and permeability, and that's where the gas is stored.

See **Shale Targets**, page 18

Shale Targets

from page 16

"They are the rocks with the lower fracture closure stress and higher Young's modulus (a measure of the elasticity of a material), so we'll be able to break them during hydraulic fracture stimulation," he noted. "More importantly, these zones will stay open longer with less of a tendency to embed or crush proppant.

"That's huge," he exclaimed.

An Arsenal of Technology

Miller noted a geochemical tool being used in the vertical wellbore to help quantify mineralogy also is a highly popular application to evaluate the potential of gas shales and where to place the laterals.

There's actually a sort of arsenal of tools to attack these rocks.

"Recently we've been using advanced sonic tools to determine a more representative stress profile that accounts for laminations within the shale," Miller said.

"It also can be used along the laterals," he continued. "It can be run in cased hole so clients can obtain an advanced analysis and don't have to pay rig time."

The bottom line appears to be that measurements taken with technology more sophisticated than, say, the standard gamma ray or mud log are highly beneficial to plan completions in the shale wells.

Miller noted, for instance, that it's fairly typical if an operator with a 3,000-foot lateral decides to implement at least 10 frac stages and places them every 300 feet.

"Using borehole images you see that the reservoir characteristics change significantly in a short period of time," Miller said. "In fact, we've seen numberous examples where up to a third or more of the perfs were not contributing anything to production."

He emphasized, however, that operators are doing a really good job and making a lot of money right now using a low-tech approach.

"I'm just trying to ask could we be doing better – and how much better," he said.

His conclusion:

"I think the answer is yes – if we plan completions better by taking measurements along the length of the lateral." ❑

Field Camp

from page 12

the rigor with which these students were chosen."

The process began when 50 of the top geology students from the top schools in Nigeria were nominated to study in the U.S. program. Out of those 50, eight were selected to come to Montana.

"This is, in a very real sense, the cream of the cream," Suttner said. "They are very motivated, work very hard. And I want to emphasize this: They are very, very well prepared."

Suttner admittedly was unsure what to expect.

"I had no idea what kind of background they would have," he said. "Frankly, we were nervous ... I had no idea what the Nigerian students would know, or how much to review.

"Within a few hours, though, it was obvious they were as well prepared as any student coming from any of our top-notched universities," he said. "I am honored and touched to teach them."

Corporate Support

One of the aspects that made this experience so unique is that the students' involvement was sponsored by the Nigerian Association of Petroleum Explorationists, whose members are made up of some of the company's petroleum companies – not government money.

Another unique dynamic of the experience: The site in Montana is situated in an area of remarkable structural, tectonic and stratigraphic diversity – unlike anything the Nigerian students would find in their native land.

It is, in fact, the single site where the three major structural regimes that characterize interior western North America converge – basement-cored block up-lifting and supra-crustal fold-thrusting of Laramide age, and Cenozoic extensional (basin and range) faulting.

And, incidentally, while the camp is located in Montana, it is owned and operated by the state of Indiana.

"The state of Indiana owns a part of the state of Montana," Suttner laughed.

All joking aside, it is a part of the reason that Judson Mead is considered one of the premier stations in America – and one of the reasons it was just chosen by AAPG and the school for the Immersion Field Experience. The difference, Suttner suggests, between a station and a camp is that camps are moved year after year, where the station is fixed.

"We own the property, the facilities," he said. "Many schools move around. We are one of the few that has one with a permanent facility."

Suttner, like many associated with geologic field camps and stations, is worried about the future of such camps, citing both the high cost and liability of running them. As such he is trying to get corporate sponsorships.

First, though, he is working on a $3 million endowment campaign (called "Touching the Heart, Inspiring the Mind") that will help update the facilities and provide scholarship money.

He is convinced that what the camps and stations provide students is invaluable to their geosciences foundation.

"We have had five thousand graduates of this program since it started back in the '50s," he said. "My concern is how to preserve it. This is a really critical experience. You can ask geology students what course had the greatest impact on them and I'd venture to say 75 percent would say courses they had in the field."

You get the sense that one retired university professor would say the same thing. ❑

California onshore find largest in 35 years

Elk Hills 'Secrets' Being Revealed

By DAVID BROWN
EXPLORER Correspondent

When Occidental Petroleum announced a major new discovery in Kern County, California, it set off industry speculation about the nature and location of the find.

Specifics about the discovery initially were scant, but for industry participants anxious for good news it didn't take long to learn where it was.

Oxy said it wouldn't reveal the location of the discovery area, then immediately announced it was expanding its Elk Hills gas processing facility to handle the new production – which sort of took the mystery out of things.

"If you look at the state reports, you can see that their drilling is at the northwest end of Elk Hills, between there and Railroad Gap (Field) – possibly as a 10,000- to 12,000-foot deep sub-thrust structure," said AAPG member Glenn Gregory, who has a geological consulting firm Gregory Geological Services in Bakersfield.

The company also said it wouldn't give out details about the discovery, then released a slew of them:

✓ The new find holds an estimated 150 million to 250 million barrels of oil equivalent (BOE).

✓ About two-thirds of the discovery is believed to be natural gas.

✓ It includes multiple producing zones, "large pay zones of high permeabilities."

✓ It's a conventional, non-stimulation, non-shale play, although shales are present in the area and should be productive in the future.

✓ As of July, it was producing about 74 million cubic feet of gas and 5,000 barrels of liquids per day from six wells.

Oxy expected to drill an additional 17 wells in the discovery area by the end of 2009, at a drill-and-complete cost of $3.5 million to $4 million per well. Payoff periods are less than six months and the combined finding, development and lifting costs will be significantly less than $10/BOE, it said.

Additional reserves are likely to be found outside the area delineated by the first six wells, according to Oxy, which has a 1.1 million-net-acre position in California. The company thinks it will take five to 10 years of drilling to exploit the related opportunities.

Photo courtesy of Occidental Petroleum

Occidental Petroleum recently announced a major new discovery "somewhere" in Kern County, California. Above, pumping units at Oxy's Elk Hills field near Bakersfield.

Exploration Potential

Occidental Petroleum already is the largest natural gas producer in California and the third-largest oil producer. Its California assets include more than 7,500 active wells located in 90 fields, spanning 600 miles.

In announcing the discovery, Oxy called the new field the biggest onshore California reservoir found in the past 35 years.

But that might not be saying much in light of the industry's recent exploration record in the Kern County area.

"There's been exploration steadily throughout the years. Frankly, if you look at the history of new field discoveries, it's been less than stellar since the 1950s," said another AAPG member, Jack Grippi, a geologist for Aera Energy in Bakersfield and president-elect of the San Joaquin Geological Society.

Prior to this year, the last oilfield with over 100 million barrels discovered in Kern County was the giant Yowlumne Field, near the south end of the San Joaquin Valley, discovered by Texaco in 1974 on a farm-out from Tenneco.

"The subsequent thing was Landslide, which was discovered in 1985. That was about 18 million barrels," Grippi said.

So far, Oxy hasn't talked about the geology of its new field. Gregory said he has a guess about the producing formation, and why it might have been elusive.

He said the reservoir could have resulted from west side of the San Andreas fault sourced sand-rich deepwater marine gravity-flow deposits that followed tectonically changing bathymetric lows, forming great accommodation spaces for sediments.

"These turbidite thicks can be pretty narrow, a half-mile to a mile-and-a-half across, but there may be one thousand

See **Discovery**, page 22

Oxy Find Shines Spotlight on Kern

A recent analyst report from Howard Weil Inc. speculated that Oxy's discovery came in the Temblor Formation Carneros Sandstone. The report noted that the Carneros and older sands, found at shallower levels, can be highly productive in fields around Elk Hills.

It said the play possibly involves steeply dipping or near-vertical, sub-seismic, deepwater submarine fans.

The lack of deep penetrations at Elk Hills and the stratigraphic nature of the play would explain why it is just now coming to light.

Theorizing the play covers at least 23,000 productive acres, the report estimated its resource potential at over two billion BOE as Oxy continues expansion.

The future of exploration drilling in Kern County is now bright, if only because Oxy has committed to doing so much work in and around the play area, said AAPG member Bill Kempner, a geophysical consultant in Bakersfield, Calif.

"For Oxy it looks pretty interesting, because they're out there shooting 300 square miles of 3-D seismic, so they obviously think they're onto a promising trend," he said.

Kempner praised the company for its willingness to take risks in exploring the Elk Hills area. Oxy also has conducted a large-scale acreage acquisition program over the entire region.

"It's an area wide open for opportunities," he said.

"One of the problems is that Oxy has become a major land baron in California, particularly in Kern County and the San Joaquin Basin," he noted. "Anybody who comes out here is going to have to work with Oxy. It looks like they are here to stay and play."

Although it contains a number of mature fields, the extensive San Joaquin is "very workable for exploration," according to Kempner.

"This is an exciting basin with lots of opportunities and not a lot of exploration since the 1980s," he said, "and with not only conventional but also unconventional opportunity."

– DAVID BROWN

Discovery

from page 20

feet of sands," Gregory said.

"A lot of them just follow the marine bathymetry," he added. "They don't tend to build up beautiful overbank deposits on the flanks."

Gregory characterized them as similar to turbidite channels, although not to typical meandering channel sands, with the potential of being highly localized and later structurally uplifted but down plunge on the anticlinal nose or trapped under a thrust fault.

"You could have a spill point saddle across a slowly building nose and the sand ponds up between them," leaving 500 feet of oil pay sitting in a small space, Gregory noted.

"It could be something geographically that might be a mile square or half a mile square, or less."

Gregory

Something a Bit Different

The Upper Miocene sandstone productive at Yowlumne is thought to have been deposited as a turbidite complex, along a tectonically active margin.

It's a discontinuous reservoir in the Stevens Sandstone, a deep-marine clastic facies of the Monterey Formation. The Yowlumne Sandstone reservoir shows both channeling and erosion.

Gregory said the Oxy discovery is probably an older, lower sand. To date, the earliest productive sand identified at Elk Hills is the Lower Miocene Carneros Sandstone, part of the Temblor Formation beneath the Monterey.

Productive zones or pockets within the lower sands could have been difficult to identify.

"If you don't drill far enough down the nose or deep enough, you might not find them," Gregory said.

Oxy did make an intriguing statement about the new play, saying it was "most similar to a deepwater discovery and bears no relationship at all to so-called resource plays."

If that implies Lower Tertiary, especially a fine-grained sandstone in the Oligocene-Eocene component of the Paleogene, the company may have found something a bit different from other production around Elk Hills.

A 'Fabulous Diagenetic Process'

Kern County encompasses a significant oil-producing area of the United States, with a number of giant fields. Elk Hills, about 20 miles west of Bakersfield, is the fifth-largest oil field in California and the state's most productive gas field.

Production at Elk Hills was identified in 1911 and the field soon was set aside as the nation's first Naval Petroleum Reserve, to secure future fuel supplies for the U.S. Navy. It underwent little development for decades.

Federal sentiment to sell the field grew in the 1990s. In October 1997, Oxy won the bidding for the government's 78 percent share of the reserve – Chevron owns the remainder – by agreeing to pay $3.65 billion.

It outbid 22 other companies, including Chevron and Arco, and paid more than 50 percent above an official

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Elk Hills

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estimate of the field's value.

"When Elk Hills was acquired by Oxy in 1998 it had approximately 425 million BOE of proved reserves. Since then, it has produced more than 364 million BOE," said Ray Irani, Occidental chairman and CEO.

"Yet – as a result of the technology applied by Oxy over the past 11 years – we have actually been able to increase its proved reserves to more than 491 million BOE today. The total production and proved reserves since Oxy acquired the Elk Hills field is approaching one billion BOE," he added.

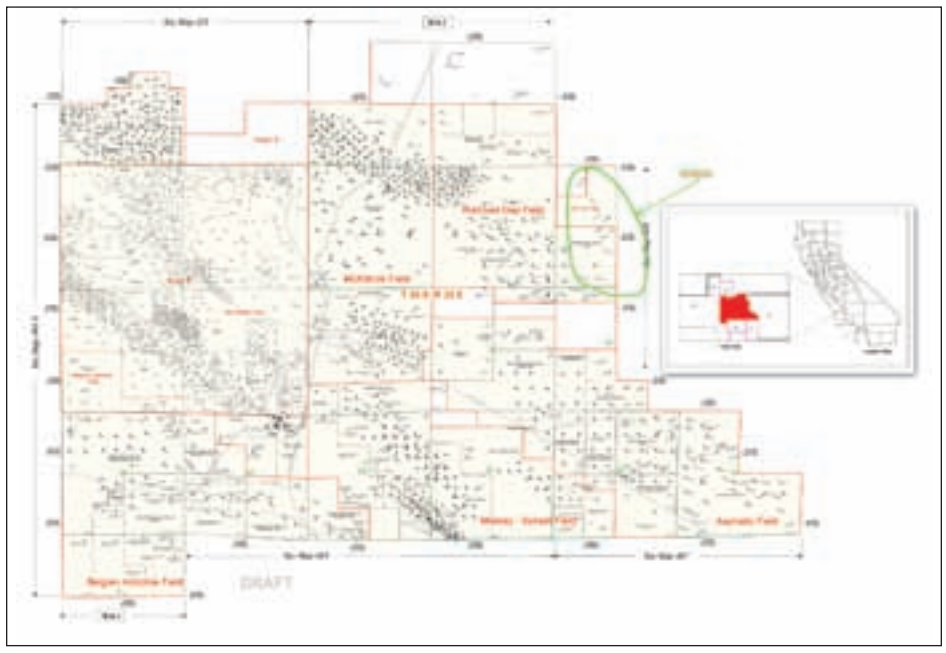
Elk Hills is in the western half of Kern County, which contains prolific oil and gas production.

"You have plenty of good source rocks and there are multiple deformation events resulting from slip across the San Andreas Transform which bounds the western margin of the basin," Grippi noted.

The source rock includes California's famed Monterey, principal sourcing for the large Kern County fields.

"What makes the Monterey so interesting in California is, where these other source rocks have to get heated up and over-pressured to reach frac stage where the kerogens produce hydrocarbons and migrate into reservoir rocks, the Monterey goes through this fabulous diagenetic process," Gregory explained.

"Here you're looking at a diatomaceous biogenic shale," he continued. "In the process of going through burial, diagenesis changes the diatomaceous shale to opal CT and then to a chert, which becomes brittle and naturally fractured. It very efficiently and quickly sources up and communicates the hydrocarbons with the Miocene Stevens sandstones as well as being it own fractured reservoir rock."



Graphic courtesy of the California Division of Oil, Gas and Geothermal Resources

An activity map for the Railroad Gap Field in Kern County, California, including the general location of Occidental Petroleum's recent discovery.

Early oil migration is an important factor in producing favorable reservoir conditions and preventing a collapse into low porosity and tight formations, according to Gregory.

Also, "the deep arkosic sandstones of the Miocene in the center part of the basin have been deposited so fast that they're overpressured, which tends to protect the permeability and porosity," he said.

The favorable conditions and pore preservation are important when drilling below 10,000 feet in Kern County.

"That 10,000 feet doesn't sound like much, but in California it can get pretty nasty, and pretty tight," Gregory said.

"As you get into the wet part of these deeper and older sands, they look terrible" he added. "Then when you get into the oil pay, it's a different world."

Opportunities Await

Based on Oxy's description of its discovery, Gregory said the reservoir sands are probably naturally fractured Carneros Sands sourced from the Eocene Kreyenhagen Shale.

"I would speculate that Carneros Sands might have porosities in the range of 10-to-14 percent, if the productive depths are from 10,000 to 12,000 feet and good gas producing rates can come from much lower permeable sands," Gregory said, "but natural fractures, if they exist, would be of great benefit, as well as sand frac stimulations, to increase production rates."

There are even deeper opportunities in the Agua and Phacoides Sands in the lower Temblor of Oligocene age and the Eocene-age Point of Rocks Sandstone interbedded within the Kreyenhagen Shale. All of these arkosic sands were deposited in a deep marine environment from a west side source.

In talking about expanding the play, "they're thinking in terms of other plunging noses, or other structures," he said. Gregory noted that California "is kind of late in getting large areas swathed in 3-D seismic."

As companies look at, interpret and evaluate 3-D information, it isn't impossible to think new exploration and production opportunities will appear.

Overall, Gregory praised Oxy for pursuing domestic exploration and continuing to build its portfolio of U.S. properties while improving and extending production.

But in Kern County, acreage holdings are dominated by Oxy, Chevron and Aera Energy, which is owned by Shell and ExxonMobil, making it nearly impossible to obtain favorable exploratory opportunities for consultants and small companies. Except for Oxy, the other majors are mainly developing their existing production.

"The exploration has been done mostly by the small guys," he said, "and the problem is the hurdles you have to go through to get something done here within your own industry, not counting the environmental issues." ❑

WASHINGTONwatch

Members Take Message to 'the Hill'

By DAVID CURTISS
GEO-DC Director

For the second consecutive year, earth scientists gathered in Washington, D.C., in September for geosciences Congressional Visits Day (geoCVD).

The event was developed and hosted by the Geoscience Working Group, a coalition of American Geological Institute (AGI) member societies with representatives in Washington, D.C. The group includes AGI, AAPG, the American Geophysical Union, the Geological Society of America, the Seismological Society of America and the soil science societies. It also includes the American Institute of Professional Geologists, the Association of Engineering Geologists and the Association of Women Geoscientists, which do not have DC representatives.

Fifty-six geoscientists attended this geoCVD, representing 23 states and Puerto Rico.

The AAPG delegation was coordinated by Deborah Sacrey, chair of the Washington Advocacy Group. It included many AAPG leaders: AAPG President John Lorenz, DPA President Paul Britt, AAPG Outreach Committee Manager Chuck Caughey, GEO-DC Governance Board members Bill Goff, David Hawk (also chair-elect of the House of Delegates) and Jim Hill, DEG President Mike Jacobs and GEO-DC Governance Board chair Dan Smith.

Don Juckett and I represented GEO-DC.

* * *

The AAPG group met together on the morning of Sept. 15 at the Army and Navy Club of Washington, D.C., for an overview of the two-day event, to prepare for our upcoming visits to Capitol Hill and for a briefing on current policy issues under consideration by lawmakers.

This year's geoCVD team: front row (from left), Paul Britt, Dan Smith, Deborah Sacrey, David Curtiss and John Lorenz; middle row, Bill Goff, Chuck Caughey and Mike Jacobs; back row, David Hawk, Don Juckett and Jim Hill.

After the briefing we joined other geoCVD participants at the American Geophysical Union headquarters building for an introductory workshop that included policy presentations by representatives from federal agencies and congressional offices. The workshop also included time to prepare and practice for the visits scheduled the following day.

The group spent all of Sept. 16 on Capitol Hill meeting with lawmakers and their staff. Our goal with these meetings is for each participant to meet with his/her representative and senators or their staff.

Because of the many groups on Capitol Hill on a given day, our meetings are typically with staff. That is just as effective – perhaps more so – than meeting with the legislators, because the work gets done at the staff level.

During our meetings on the Hill we carry two complementary messages: The first is the general geoCVD message, and the second is a specific AAPG message.

✓ The geoCVD message was about the need to support federal geosciences research and development programs. We discussed how steady federal investments in earth and space science R&D maintain competitiveness, enable the reliable delivery of energy resources, environmental protection and a skilled geoscience work force.

The handout specifically mentioned geoscience R&D programs at the National Science Foundation, U.S. Geological Survey, Department of Energy, National Atmospheric and Space Administration, National Oceanic and Atmospheric Administration and the National Institute of Standards and Technology.

✓ For AAPG's themes at geoCVD, Deborah Sacrey, Dan Smith and DPA Government Affairs chair Carl Smith decided to address two broad topics: the energy opportunities and challenges we face in the United States and globally, and global climate change. The intent was to help policy makers and staff better frame the issues of energy and climate change, attempting to get beyond sound bite responses to a more fundamental understanding of the issues.

The handout developed for these themes drew from AAPG statements on these and related issues, such as access and tax policy. The AAPG statements are reviewed and approved regularly by the AAPG Executive Committee and represent the Association's current views on a host of topics.

The AAPG delegation had a total of 20 meetings over the course of two days. Thanks to all who took the time to participate in geoCVD 2009.

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GEOPHYSICALcorner

Seismic Aids Heterogeneity Hunt

(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 deals with determining reservoir heterogeneity in Athabasca oil sands from surface seismic data.)

By SATINDER CHOPRA and YONG XU

Canada's Athabasca oil sands represent the biggest petroleum accumulation in the world and presently produce more than one million barrels of oil per day. These are the Lower Cretaceous bitumen sand reservoirs comprising the McMurray Formation that varies in thickness from 10 to 90 meters and occurs at depth of 0 to 400 meters.

While the shallow oil sands are exploited by open-pit mining, the deeper reservoirs are produced through some type of insitu bitumen production like SAGD (Steam-Assisted Gravity Drainage). SAGD operations require extensive, bitumen-saturated, homogeneous formations for optimum production.

The McMurray formation, however, is heterogeneous in terms of reservoir continuity, mineralogy, sedimentary facies and water-saturation, and is too complex to be understood from the sparse available core database.

Surface seismic data are one option for characterizing this reservoir heterogeneity, with a common approach being to use neural networks or statistical analysis at well locations to deduce relationships between seismic attributes and lithology. These relationships are then used to determine lateral lithology variations between wells.

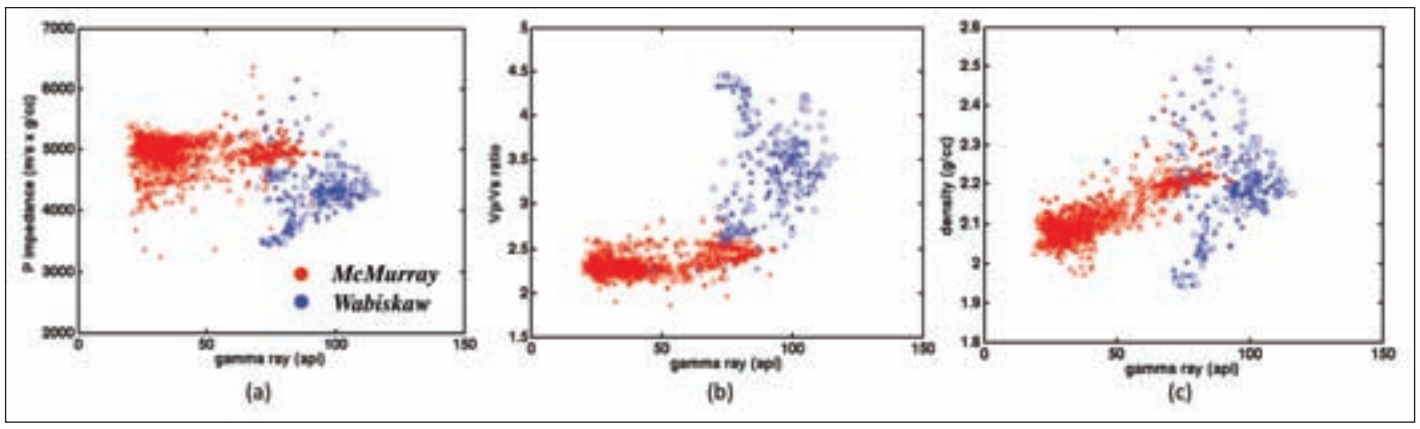

Figure 1 – Cross-plots of gamma-ray versus (a) P-impedance, (b) Vp/Vs velocity ratios and (c) density. Red samples are from the McMurray formation and blue samples are from the Wabiskaw formation. Note that bulk density and gamma-ray responses (c) increase in a quasi-linear manner.

* * *

We describe here a two-step approach to understand the heterogeneity of Athabasca oil-sand reservoirs.

✓ The first step involves a rock physics study to understand relationships between lithology and petrophysical parameters. From this effort, lithology-sensitive rock parameters are selected that can be detected seismically.

✓ The second step is to derive these lithology parameters from seismic data.

Chopra

Xu

The first step – rock physics analysis – is carried out for various rock physics parameters across the zone of interest. Parameters that exhibit the best sensitivity to lithology are selected. For example, on figure 1 (above) we show P-impedance, Vp/Vs velocity ratio and density cross-plotted against gamma ray using log samples from the study area.

For these study wells, P-impedance shows a limited ability to distinguish lithology; Vp/Vs ratio shows a gentle variation with lithology; and density appears to be the best indicator of clay content.

Now that the desired rock parameter – density – has been determined, step two is to do AVO analyses of prestack seismic data to estimate rock density along seismic profiles.

Normally, density determination is done using a three-term AVO analysis that requires prestack seismic data with long offsets. In our study we improved this conventional approach by adopting innovative ideas like using a windowed

continued on next page

continued from previous page

approach instead of a sample-by-sample computation for deriving AVO attributes, reducing distortion due to NMO stretch and offset-dependent tuning, using error-based weights and accounting for the strong reflections from the McMurray Devonian interface.

On figure 2 (right) we show a density section derived from seismic data. The lateral variation in seismic-based density shows the richest sand areas (in green color) within the mid-McMurray are around wells 5 and 6, with good shaley cap rocks in the upper-McMurray.

These predictions are verified by gamma ray logs acquired in both wells.

Recently drilled wells 3 and 7 served as blind well tests. Well 3 found mainly a shaley facies within the McMurray, and the seismic inversion for density agrees with these log calibration data. Well 7 was drilled at the edge of the richest sand zone, and its reservoir also matches the seismic-based density results.

In addition, the sandy cap rock within the upper-McMurray in well 7 is predicted by the seismic inversion.

* * *

This study demonstrates the application of rock physics analysis and the determination of rock density from seismic data can be used to characterize heterogeneity with the McMurray formation portion of the Athabasca oil sands. While other rock physics parameters can be used, density seems to be a good indicator of lithology at this study site.

This same methodology can be applied to other areas where the objective is to determine heterogeneity within any formation of interest.

(Editor's note: Satinder Chopra, an AAPG member, is with Arcis Corp., Calgary, Canada. Yong Xu was previously with Arcis Corp.) ❑

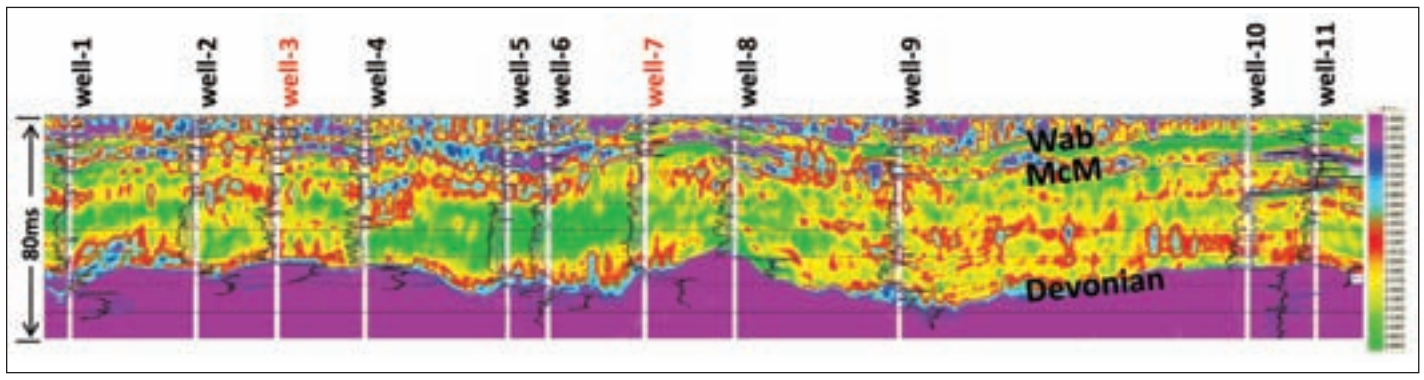

Figure 2 – Density section derived from seismic data. Overlain on the section are density logs (black curves), gamma ray logs (purple) and impedance logs (blue). Wab is the Wabiskaw formation; McM is the McMurray formation.

Washington

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Planning already is under way for the next AAPG Congressional Visits Day. If you have thought about attending, mark your calendar for May 10-12, 2010.

The event is reserved exclusively for AAPG members and will feature both visits with federal agencies and with legislators and staff. Over the course of two and a half days we will introduce you to the policy making process, talk about policy issues that affect you, and give you an opportunity to make your voice heard with lawmakers and their staff.

For information, please visit the GEO-DC Web page and click on the CVD link.

* * *

Finally, an update and word of thanks to all of you who took the time to provide the U.S. Minerals Management Service (MMS) with your views on the draft proposed 2010-2015 Five-Year Program (September 2009 Washington Watch).

On Sept. 22, the MMS reported that it had received more than 450,000 comments on the program. It is now tabulating and analyzing the comments.

Initial estimates suggest that up to 325,000 of those comments are supportive of OCS development. The Consumer Energy Alliance alone helped deliver 150,000 supportive comments.

If the estimates prove correct, these are impressive numbers.

This process is far from over, but it does demonstrate the importance of action by our members, acting as citizens to influence public policy. Creating opportunities for you to do that is a principal function of GEO-DC – so thank you to all who responded.

And if you wanted to respond but didn't, stay tuned: Our work here is not finished, and more opportunities for involvement are on the horizon.

(Editor's note: David Curtiss, head of AAPG's Geoscience and Energy Office in Washington, D.C., can be contacted at dcurtiss@aapg.org; or by telephone at 1-202-684-8225.) ❑

REGIONS&sections

Latin Region Typifies Potential

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


Guzman

AAPG's publications, training and educational programs, conferences, speakers and networking are providing just what the industry needs.

By ALFREDO E. GUZMAN
AAPG Vice President-Regions

As we enter the last quarter of this calendar year – one that saw the world economy shaken, global health challenged by a new flu strain and of oil and gas prices back at levels no one thought they would ever return to – we can be grateful that our Association is healthy and in good standing.

Under the leadership of President John Lorenz, AAPG membership has not only NOT diminished, but is increasing, albeit modestly. Most AAPG programs are growing, attendance at Section meetings has been good (thanks to strong technical programs) and AAPG's international presence has continued to expand.

Of the six Regions in which AAPG is organized internationally (Asia Pacific, Africa, Canada, Europe, Middle East and Latin America), the latter one has been the one getting off the ground slower – but there are strong signals that this is turning around.

An excellent indicator of AAPG's important presence in the international arena in general and in Latin America in particular is this month's International Conference and Exhibition being held in **Río de Janeiro** (see related story, page 6).

One of the world's most beautiful cities, Rio is destined to become the oil and gas capital of Latin America due to the exploration and development activity in the deep waters of Brazil's offshore basins. These exploration efforts were recently crowned with the discovery of supergiant accumulations in the subsalt play of Brazil's Atlantic coast.

Driving the advancement of AAPG's Latin America Region is **Colombia**, which under the leadership of some of the world´s top explorationists has recently had several exploratory successes, proving that an environment friendly to industry is the best incentive to attract investment and strong companies.

Here, AAPG's publications, training and educational programs, conferences, Distinguished Lecturers and networking are providing just what industry needs in order to continue its accomplishments in that Sub Andean nation.

Also, there is **Argentina,** with an important remnant potential in its traditional basins and with investment shares of part of the Atlantic basin, where it might someday soon make some interesting finds. And to the north of Argentina is **Uruguay**, which just had a successful round for exploration bids in its deep offshore.

In the rest of the Region:

✓ **Venezuela** continues to be a world-class producer, having in its best interest to continue benefiting from AAPG services for its geosciences professionals.

✓ **Trinidad and Tobago** has a thriving industry, also driven by an industry-friendly environment led by a very active, energetic and professional group of geologists who are very involved in AAPG activities.

✓ The rest of the south cone countries have basins either producing or with potential, such as **Ecuador**, **Bolivia**, **Perú** and even **Guatemala** and **Belize**, where there are good indications of having reserves in their carbonate rocks. These countries also are becoming more and more interested in what AAPG can offer them.

This recent burst of industry activity needs the active participation of large numbers of geoscientists who are requiring professional services that AAPG is well positioned to provide.

The organization in AAPG's Latin American Region also is gaining strength as elections are in process to fill the posts of Region president, president-elect, vice president, secretary/treasurer, with 10 candidates representing six countries vying for these positions. And through this leadership AAPG will provide services to a wide span of professionals working in Latin America, from those employed by the operators, be they majors or independents, NOCs, service companies and even to the national hydrocarbon agencies, where many of the policies ruling the local industries are established. ❑

AAPG's European Region will hold its annual conference Nov. 23-24 in Paris-Malmaison, France.

"European Resources: Current Status and Perspectives" is the meeting's general theme, with technical sessions focusing on:

✓ The Mediterranean.
✓ Central and Eastern Europe.
✓ Northern Europe and Atlantic margins.
✓ Unconventional resources and sustainable development.

For more information go to the meeting Web site at www.aapg.org/malmaison.

PROFESSIONALnewsbriefs

Ola K. Adisa, to geologist, Continental Resources, Enid, Okla. Previously student, Oklahoma State University, Stillwater, Okla.

David Ball, to geologist/fracture analysis specialist, Weatherford Laboratories, Houston. Previously formation evaluation engineer, Weatherford International, Houston.

Sage Betts, to carbonate geologist, Weatherford Laboratories, Houston. Previously graduate student, Colorado State University, Fort Collins, Colo.

Lauren Cassel, to geologist/fracture analysis specialist, Weatherford Laboratories, Houston. Previously MWD engineer, Weatherford International, Houston.

Mark Germinario, to exploration manager, Beacon E&P, Denver. Previously geologic adviser, EOG Resources-Denver division, Denver.

Brent Huntsman, to exploration manager, Primary Natural Resources III, Tulsa. Previously consultant, Tulsa.

Conrad McCarthy, to chief geologist, Shell Upstream Americas, Houston. Previously development leader-Bonga southwest and OPL245, Shell Nigeria E&P, Lagos, Nigeria.

Jeffrey E. Nunneley, to chief geoscientist-North America onshore, Marathon Oil, Houston. Previously advanced senior geologist, Marathon Oil, Houston.

Bill Parker, to senior exploration geologist, VAALCO Energy, Houston. Previously senior geologist, Nippon Oil Exploration USA, Houston.

J. Michael Party, to vice president-exploration, Reliance Energy Inc., Midland, Texas. Previously exploration manager, Wagner & Brown, Midland.

Brian Repke, to development geologist, Venoco, Houston. Previously staff geologist, ConocoPhillips (Caspian exploration), Houston.

Gregory P. Wahlman, to consulting carbonate sedimentologist/ biostratigrapher, Wahlman Geological Services, Houston. Previously carbonate sedimentologist, BP America, Houston.

Bradley Walls, to carbonate geologist, Weatherford Laboratories, Houston. Previously graduate student, Ohio University, Athens, Ohio.

Maggie Zborowski, to senior project geologist, Weatherford Laboratories, Houston. Previously project geologist, Weatherford Laboratories, Houston.

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

INmemory

John Anton Comet, 96
Oil City, Pa., Aug. 29, 2009
Bobby Sid DuBose, 82
San Antonio, Aug. 16, 2009
Adolphe G. Gueymard, 95
Houston, Dec. 8, 2008
Max Garland Hare, 88
Shreveport, La., Aug. 17, 2009
Wes M. Oathout, 49
Medford, Okla., Nov. 1, 2008
Allan H. Rak, 66
Calgary, Canada, Aug. 5, 2009
Peter Sciaky (AC '54)
Boulder, Colo.
Ann Waybright Whitehead, 59
Conifer, Colo., June 19, 2009

(Editor's note: "In Memory" listings are based on information received from the AAPG membership department. Age at time of death, when known, is listed. When the member's date of death is unavailable, the person's membership classification and anniversary date are listed.)

MEMBERSHIP&certification

The following **candidates** have submitted applications for membership in the Association and, below, certification by the Division of Professional Affairs. This does not constitute election 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.

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

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

For Active Membership

Arkansas
Elias, Brian P., Southwestern Energy, Fayetteville (C.L. Reed, T.B. Beserra, R.L. Brogdon)

California
Dahl, Jeremy Eliot, Stanford University, Stanford (S.W. Tinker, M.A. McCaffrey, J.M. Moldowan)

Kansas
Isern, Beth A., Trans Pacific Oil Corp., Valley Center (W.I. Phillips, G.D. Honas, W.B. Bidleman)

Louisiana
Smith, Robert R., McMoRan Exploration, New Orleans (reinstate)

Michigan
Peterson, Jonathan W., Hope College, Holland (J.H. Barwis, T.J. Feldkamp, C.S. Alexander)

Missouri
Kirschner, David L., Saint Louis University, St. Louis (J.G. Solum, J.P. Encarnacion, J.S. Chester)

Oklahoma
Byrnes, Jeffrey M., Oklahoma State University, Stillwater (J.M. Gregg, J.O. Puckette, A.R. Simms); **Hileman, Mary Esther**, Oklahoma State University, Stillwater (reinstate); **Jones, Donald V.**, consultant, Edmond (W.J. Lamle, A.T. Verhulst, J.F. Hamilton)

Texas
Bellamy, Justin Beau, Pioneer Natural Resources, Irving (D.E. Sanders, L.L. Brooks, J.A. Breyer); **Howari, Fares M.**, University of Texas, Odessa (P.C. Goodell, C.G. Groat, E. Mutis-Duplat); **Johnson, Luke Cameron**, Chevron, Houston (M.D. Johnson, G.M. Brown, G.H. Schmit); **Lee, William John**, Texas A&M University, College Station (C.D. Jenkins, P.R. Rose, J.S. Sneider); **McCullough, David A.**, Breitburn Energy, Houston (J.D. Chatellier, D.A. Walker, J.R. De Dominic); **Raddatz, Amanda**, Shell, Houston (L. Li, P.G. Gregory, C.L. Beck-Brake); **Reynolds, Santiago M.**, Sylvan Energy, Houston (reinstate); **Roy, Prasenjit**, Chevron, Houston (R.V. Hall, M.A. Person, R.M. Slatt)

West Virginia
Dickins, Andrew C., Chesapeake Energy, Charleston (J.P. Lemon, B.J. Carney, M.A. Horn); **Farmer, Christopher A.**, Berry Energy, Clarksburg (D.H. Bucher, G.R. Wrightstone, E.M. Rothman)

Australia
Thrane, Lena, Baker Hughes, Perth (A.A. Bal, T.S. Nygaard, P. Zarian)

Bangladesh
Akhlaqur, Rahman Mohammed, consultant, Dhaka (A.M. Shamsuddin, P.M. Lloyd, A.O. Akinpelu); **Chowdhury, Shahid Hossain**, Schlumberger SEACO Inc., Dhaka (A.M. Shamsuddin, P.M. Lloyd, A.O. Akinpelu); **Shaon, Farhana**, Bangladesh Oil, Gas & Mineral Corp., Dhaka (G.R. Taylor, M. Akhtaruzzaman, E. Mirza)

Brazil
Reis, Claudio Couto, Petrobras S.A., Rio De Janeiro (F.J. Feijo, C.D. Pereira, P.V. Zalan)

India
Vairavan, Vellayan, Oil & Natural Gas Corp., Mumbai (G. Lahiri, R.S. Dirghangi, S.K. Majumdar)

Netherlands
Alt-Epping, Ulrich, Shell International E&P, Rijswijk (H. Lauferts, T. Rudolph, J.F. Boels)

Nigeria
Ajayi, Olajumoke Cecilia, Centrica Resources Nigeria, Lagos (M.L. Afe, A.A. Adesida, E.G. Odior); **Akpan, Namso Peter**, South Atlantic Petroleum, Lagos (C.O. Iwobi, L. Oaiya, M.L. Afe); **Benard, Ebere Bennison**, Lagos (J.I. Nwachukwu, J.E. Ogala, N.F. Ukaigwe)

Saudi Arabia
Al-Qattan, Mohammed, Saudi Aramco, Dhahran (M.O. Al-Amoudi, U. Khan, D.E. Noller); **Andegeorgs, Zerai Tecle**, Saudi Aramco, Dhahran (B.E. Gratto, A.G.S. Ahmed, R. Hached)

Wales
Gote, Chandrashekhar Sadanand, Fugro Robertson, Llandudno (C.K. Peter, J.P. Harris, O.C. Iwobi)

Certification

The following is a **candidate** for certification by the Division of Professional Affairs.

Petroleum Geophysicist

Nigeria
Adeniyi T. Adelaja (A. Akinpelu, O. Ojo, A. Adekunle)

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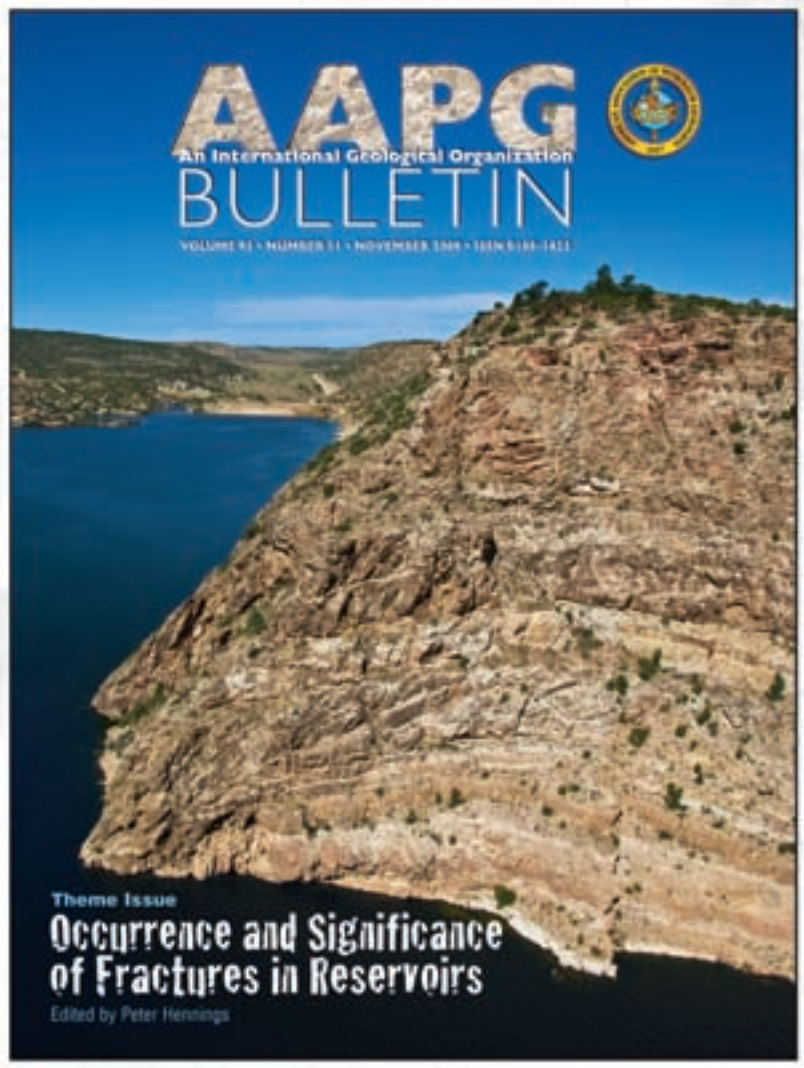

This Special Issue of the Bulletin is a compilation of material presented at a 2008 Hedberg research conference entitled "The Geologic Occurrence and Hydraulic Significance of Fractures in Reservoirs." The scientific justification for conducting the conference was the rapidly growing recognition by industry and academia that natural fractures and their geomechanical framework often play a dominant role in controlling the hydraulic behavior of reservoirs. The sciences of fracture detection, characterization, and hydraulic modeling must technically advance if we are to maximize recovery from existing reservoirs and optimize our exploitation of emerging resources, especially in the non-conventional realm. Success in these areas requires interdisciplinary integration in the extreme spanning geophysical analysis, petrophysical characterization, geological interpretation, geomechanics, and reservoir engineering at scales from pores to fields. The four themes covered in this issue are Geologic Controls on Fracture and Fault Development; Detecting and Characterizing Fractures; Controls on Fracture and Fault Permeability; and Capturing Appropriate Complexity in Reservoir and Simulation Models.

Members may access the AAPG Bulletin online at:
www.aapg.org/november_bulletin

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

FOUNDATIONupdate

Consortium Seeks Grant Proposals

By REBECCA GRIFFIN
AAPG Foundation Manager

The funds are waiting to be tapped, and now the AAPG Foundation is seeking proposals from industry professionals for research funding through the AAPG/OSU Geoscience and GIS Consortium.

The consortium, announced last year after a generous donation from Boone Pickens, is designed to create, accelerate and sustain digital peer-reviewed GIS products, carried out through OSU's geology and geography departments and the AAPG Spatial Publications Standing Committee.

The products are expected to have direct application to the search for and development of petroleum and energy-related mineral resources, and/or related to environmental geology or related economic issues.

Annual funding for the consortium is provided through Pickens' pledge totaling $240,000 per year for 10 years, plus a gift of $7 million bequeathed to the AAPG Foundation.

Applicants should submit letters of inquiry, which will be reviewed by the Consortia Advisory Committee, consisting of AAPG staff, AAPG GIS Committee and Oklahoma State University geology and geography departments (Jim Blankenship, Jeff Byrnes, Bret Fossum, Jiangyao Gong, Dale Lightfoot, Sam Limerick and Thomas A. Wikle).

LOI guidelines, as well as examples of projects for funding consideration, are provided online at *foundation.aapg.org/gia/osugisindustry.cfm*.

LOIs should be sent to Rebecca Griffin, at rgriffin@aapg.org.

* * *

In other Foundation news:

✓ AAPG past president and Trustee Associate **Eddie David** recently hosted the Eddie David Challenge Grant Dinner in Roswell, N.M.

Over 40 Roswell-Artesia area members and guests attended as David and AAPG Foundation Executive Director **Rick Fritz** announced the "Texas Tech George B. Asquith Scholarship for Excellence in Petroleum Geology" and the Eddie David Challenge Grant Opportunity, in which Eddie and Jamie David will match gifts made to the AAPG Foundation in support of the "Eddie David Named Grant" up to $100,000.

Fritz also presented an update on Association activities and the Foundation's campaign progress and program development.

✓ Additional support for the Named Grants-in-Aid Program continues to expand, thanks most recently to a generous donation from **Rosann F. Hooks** and **Jon R. Withrow**.

Hooks provided additional funds to the James E. Hooks Memorial Grant as a tribute to her husband. The James E. Hooks Memorial will provide $3,000 annually to a deserving geosciences student at Florida State or Texas A&M University.

Trustee Associate Withrow provided additional funds to the Jon R. Withrow Named Grant, which will provide $750 annually beginning in 2010 to a student at the University of Oklahoma.

The Grants-in-Aid Program awarded over 206,000 grants last year to 88 graduate students. The Named Grants Program includes special grants named in recognition of individuals and institutions that have made substantial contributions to the Foundation, petroleum and energy-mineral sciences, teaching or research.

Students can apply to the 2010 program at aapg.gia.confex.com/aapg_gia/2010/index.html.

✓ A $50,000 contribution was made by NGP Energy Capital Management to the Foundation's Bridge Fund in support of the feature length educational documentary, "The Bridge."

The documentary will include conversations with CEOs of the world's leading energy companies, top government officials and cutting edge energy scientists who provide their perspectives on what's happening in energy. The documentary is scheduled for release in the summer of 2010.

✓ The AAPG Foundation recently provided $30,000 to the Kansas State University Foundation in support of the Paul and Deana Strunk Geology Fellowship, made possible by a donation from Trustee Associate **Paul Strunk**.

✓ **Arthur R. Green**, Gig Harbor, Wash., recently accepted an invitation to join the Trustee Associates. His membership brings the group's total to 270.

To join the Foundation's campaign, "Meeting Challenges…Assuring Success," or to support the Eddie David Challenge Grant, Bridge Fund, Grants-in-Aid or other Foundation programs, contact Rebecca at (918) 560-2644 or Alison Robbins at (918) 560-2674.

Foundation Donations (General)

Manuel Aragon
Seymour R. Baker
Bruce J. Bilodeau
BP Foundation
Matching gift from Michelle Judson
James C. Brenneke
Martha Lou Broussard
In memory of Bede Leblanc
Edward K. David
In honor of Bob Cowdery
Rodger Espy Denison
Melinda J. Doss
Gordon Earle Duffy
Subhasis Dutta
Richard E. Faggioli
Jennifer N. Flight
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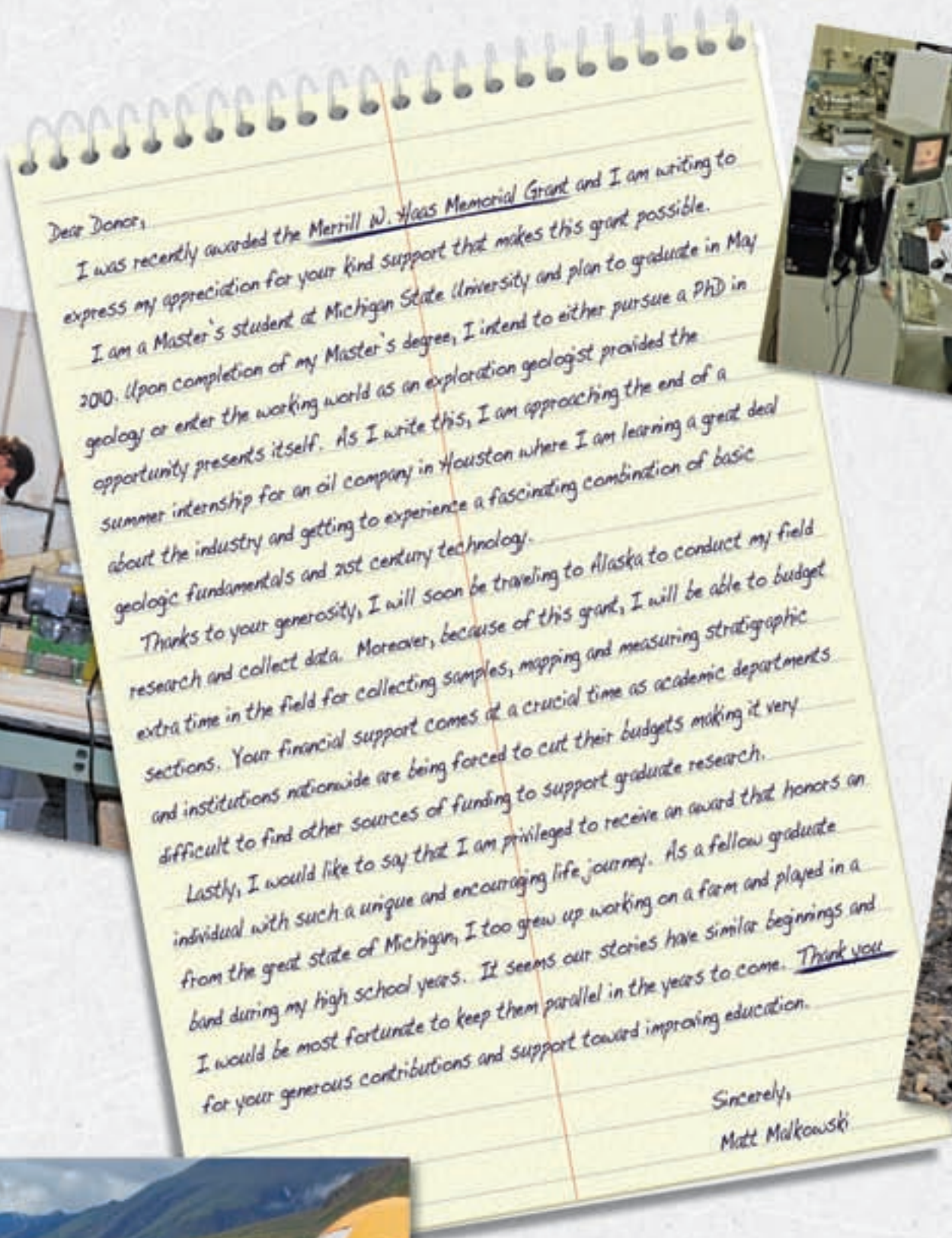
Gerard Julian Genik
Hans-Juergen Goetze
Edward Jon Graham
Arthur Randolph Green
Paul John Gribas
Edward Wyman Heath
Rhonda L. Jacobs
Tony Jolly
An Kang
David F. Kluesner
Jonathan L. Konkler
Connie Lynn Mongold
Jeffrey A. Nunn
Robert Anselm Ortalda
In memory of Craig Lyon
Ajibola Calvin Osho
Ira Pasternack
Prasenjit Roy
Jose Abelardo Sanchez Araiza
Luther W. Sappenfield
In memory of Robert Schroeder
Francis X. Schloeder III
Thomas J. Schull
William James Scriven
John Philip Shannon Jr.

See **Foundation**, page 40

A A P G F O U N D A T I O N

"Thank You Grants-in-Aid Supporters!"

- Grants-in-Aid Recipients



Dear Donor,

I was recently awarded the Merrill W. Haas Memorial Grant and I am writing to express my appreciation for your kind support that makes this grant possible.

I am a Master's student at Michigan State University and plan to graduate in May 2010. Upon completion of my Master's degree, I intend to either pursue a PhD in geology or enter the working world as an exploration geologist provided the opportunity presents itself. As I write this, I am approaching the end of a summer internship for an oil company in Houston where I am learning a great deal about the industry and getting to experience a fascinating combination of basic geologic fundamentals and 21st century technology.

Thanks to your generosity, I will soon be traveling to Alaska to conduct my field research and collect data. Moreover, because of this grant, I will be able to budget extra time in the field for collecting samples, mapping and measuring stratigraphic sections. Your financial support comes at a crucial time as academic departments and institutions nationwide are being forced to cut their budgets making it very difficult to find other sources of funding to support graduate research.

Lastly, I would like to say that I am privileged to receive an award that honors an individual with such a unique and encouraging life journey. As a fellow graduate from the great state of Michigan, I too grew up working on a farm and played in a band during my high school years. It seems our stories have similar beginnings and I would be most fortunate to keep them parallel in the years to come. Thank you for your generous contributions and support toward improving education.

Sincerely,

Matt Malkowski

In spring 2009, the AAPG Foundation was able to award $206,120 to 88 geoscience graduate students.

Help increase the number of grant recipients with your gift to the AAPG Foundation—Grants-in-Aid Program Fund.

Students: Apply Online NOW! January 31, 2010 is the application deadline!!

Visit our website: foundation.aapg.org or contact Rebecca Griffin, Foundation Manager at 918-560-2644 or rgriffin@aapg.org or Alison Robbins, Corporate Relations Development Coordinator at 918-560-2674 or arobbins@aapg.org

Foundation

from page 38

William C. Stephens Jr.
Trevor M. Stroker
Paul M. Strunk
KSU – Paul and Deana Strunk Geology Scholarship
Johannes T. Van Gorsel
Steven Loring Veal
Peter George Wilson
Michal M. Zywiecki

Awards Fund
Robert Berg Outstanding Research Award
John Morgan Layman II

Ziad Beydoun Memorial Award
Hideki Kitagawa

Foundation Chairman Award
Jose Abelardo Sanchez Araiza

Teacher of the Year Award
Margaret Allen Keller

The Bridge Fund
NGP Energy Capital Management
Tim and Libby Brown Foundation

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Jack Leonard Ahlen
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John Harris Marshall Jr.
Michael S. Shearn

Robert K. Goldhammer Memorial Grant
Janok P. Bhattacharya
Kevin J. Wallace

Bernold M. "Bruno" Hanson Memorial Environmental Grant
Steven Loring Veal

James E. Hooks Memorial Grant
Rosann F. Hooks

Frank E. Kottlowski Memorial Grant
Borden Roger Putnam III

The Institut Francais du Petrole Named Grant
Trevor M. Stoker

Weimer Family Named Grant
Ira Pasternack

Jon R. Withrow Named Grant
Jon Richard Withrow Charitable Foundation

James A. Hartman Student Fund
Borden Roger Putnam III

Imperial Barrel Award Fund
Gretchen M. Gillis
In honor of John Lorenz
Kay L. Pitts

K-12 Education Fund
Chris Charles Curry
Gordon Earle Duffy
Mitchell Frederic Nielsen
Serge Rueff
David William Stangl
In memory of John Kershner
Victor J. Veroda

PetroGrant Fund
Ajibola Calvin Osho

Boone Pickens Digital Geology Fund
Borden Roger Putnam III

Pratt BULLETIN Fund
Emmanuelle Piron

E.F. Reid Scouting Fund
Jeffrey M. Rayner

Eugene F. Reid Dibblee Fund
Robert L. Countryman
Jeffrey M. Rayner

Special Publications Fund
Emmanuelle Piron

Visiting Geoscientist Fund
Connie Lynn Mongold
Serge Rueff

HoD Candidate Slate Announced

The next slate of candidates for the House of Delegates has been announced by HoD Chairman Steve Sonnenberg.

Delegates will vote for the officers for the 2010-11 year during its meeting at the AAPG Annual Convention and Exhibition, to be held April 11-14 in New Orleans.

Candidates are:


Lloyd


Lund

Chairman-elect

❒ **Peter M. Lloyd**, Honorary Professor, Postgraduate Institute of Petroleum Engineering, Heriot Watt University, Falicon, France

❒ **Jeffrey W. Lund**, Corridor and Associates, Houston.

Secretary/Editor

❒ **H.W. "Dub" Peace**, Panhandle Oil and Gas, Oklahoma City.

❒ **Patrick Gooding**, Kentucky Geological Survey/University of Kentucky.

Candidates were submitted by the HoD Nominations and Elections Committee chaired by Larry Wickstrom. The new officers will assume duties on July 1.

PTTC Receives $4 Million DOE Grant

The Petroleum Technology Transfer Council has been awarded a $4 million grant by the U.S. Department of Energy to provide training opportunities focused for U.S. independent producers.

AAPG Education Director Susan Nash said the grant awarded in October runs over a five-year period and will provide for a number of activities, including 85 workshops annually. Many of the workshops will be in a traditional face-to-face format while others will be webinars available "live" and in recorded form, Nash said.

"There will be new programs and some new staffing through contract work," Nash said, "and PTTC's Regional Lead Organizations will implement many of the local workshops, which will mean that members will have access in locations close to them.

"Members will benefit by having access to applied technology, which complements what has been offered by AAPG," she added.

Course offerings will include methane hydrates, environmental, oil technology, ultra-deepwater and unconventional gas.

Initiated in 1994 and funded primarily by the DOE with funds matched by the states and industry, PTTC has been a recognized force for transferring exploration and production technology to the domestic U.S. producer.

Recognizing the value of PTTC activities to the industry and profession, AAPG assumed management responsibilities in October 2007. Several of the PTTC activities will be held in collaboration with AAPG education department opportunities.

wwwUpdate

Social Media Poses Questions

By JANET BRISTER
Web Site Editor

Who is it you want to converse with today?

How about the person who needs someone with knowledge about mineral rights on their land? Or maybe someone who is looking for help on a special project within your field of expertise?

Is there any chance you might find them through this social media stuff? Maybe. Or maybe you'll be remembered by someone who read your information there – and in turn share it with that potential client.

Lately on Twitter and Facebook I've seen a lot of people commenting on articles they have read. I assume these are articles on the Internet because they are usually accompanied by a link to the story. Sometimes that story, however, is their blog.

In fact, the impression is that between the blog and the social media posts people are establishing themselves as experts – or at least establishing their level of expertise.

Take note of this, because by first watching what's being stated in these different areas you may find who is talking about something important – and learn that it may be significant for you and your career.

Talk to Me

Are social media outlets, such as Twitter, Facebook and LinkedIn legitimate places for you to post a professional opinion?

Let's take that question one step further: Are these self-proclaimed experts legitimate?

Join me at blog.aapg.org/web/ and talk about a couple of questions:

Is social media a place you can present yourself professionally?

Do you consider the self-proclaimed experts on the Internet to be legitimate, professional sources of information for your industry?

I keep hearing the public wants to be informed. I keep seeing information that seems to inform – but is it? What is happening in this social media melange?

So, again I ask, who do you want to converse with today?

Good browsing! ❑

'Video Vault' Offers Denver Interviews

By BOGDAN MICHKA
AAPG Web Producer

AAPG's new Video Vault – featuring a variety of clips taken at the recent annual convention in Denver – is operational and accessible through the AAPG Web site.

The video material that you will find there exists thanks to the volunteer efforts of graduate students and AAPG members Lauren Michel, Stephanie Thomas and Meredith Faber, who did a wonderful job tracking down and interviewing people such as past AAPG president Scott Tinker, major oil company executive Bobby Ryan and many others, as the interviewees:

✓ Answered questions about their education and job experiences.

✓ Offered practical career advice for students and young professionals.

✓ Shared their visions of the future of the oil and gas industry.

Specifically, the first series of videos deal with the interviewees' first involvement in AAPG. More segments are due, and their availability will be announced in the wwwUpdate blog (blog.aapg.org/web/).

Given the ubiquity of YouTube coupled with the technological benefits it offers to webmasters, it was only logical to publish the videos on AAPG's YouTube channel, at www.youtube.com/aapgweb.

The YouTube videos also are present in AAPG's Video Vault (www.aapg.org/videos/), together with downloadable versions of the same videos in smaller sizes for both Windows and Macintosh platforms.

The Video Vault page recently was updated with a new collapsible panel design to reduce scrolling while showcasing the active video and hiding others. To use the new Video Vault you need to have a new-ish Web browser, Internet Explorer 7 or later (version 6 is no longer supported).

In other words, those still stuck in the software past need to upgrade! After all, AAPG is evolving and embracing the future.

Strong support for hard copies

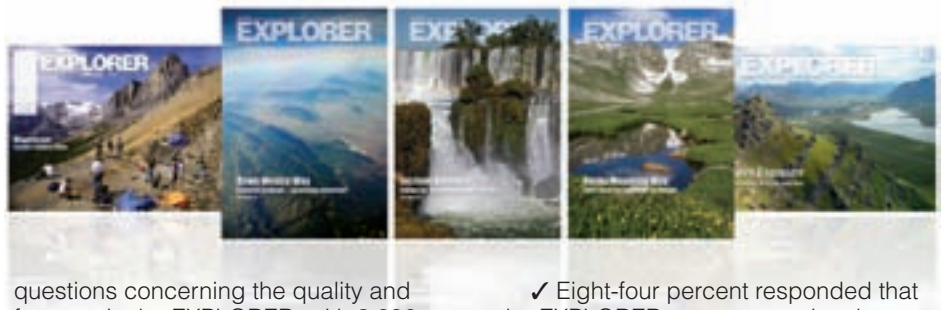
EXPLORER Scores High With Readers

Results from a readership survey of the AAPG EXPLORER taken in late August/early September actually improved over previously stellar findings from a 2007 survey.

Eighty-seven percent gave a very good to excellent "overall" rating to the EXPLORER, compared to 74 percent in '07.

The survey is conducted every two years to gauge the thoughts of the membership about the EXPLORER editorial quality, layout, production and other member general opinions of the publication.

All 27,827 members with an e-mail address were invited to answer 20 questions concerning the quality and features in the EXPLORER, with 3,896 responding. Interestingly, 14 percent also responded to a hard-copy random survey mailed in 2007.



Included in the findings were:

✓ Eight-four percent responded that the EXPLORER was a magazine they actually read instead of just received. The AAPG BULLETIN was second with 67 percent, followed by the *Oil & Gas Journal* at 36 percent, and seven other publications trailing.

The EXPLORER percentage was up from 78 percent in 2007.

✓ Eighty-three percent rated the EXPLORER a "4" or "5" on the question "Does the EXPLORER properly represent AAPG?"

✓ Eighty-seven percent responded the EXPLORER as very good to excellent in appearance.

✓ Articles dealing with the business side of geology are of most overall interest of the items appearing in the EXPLORER on a regular basis, with seventy-eight percent of the members responding positively. Other favorites were (listed in order):

Professional News Briefs – 75 percent.
President's Column – 70 percent.
Geophysical Corner – 59 percent.
Director's Corner – 55 percent.

An interesting demographic note is that while 70 percent of the EXPLORERs are mailed to U.S. addresses, 40 percent said their predominant responsibilities are international, showing there are a number of U.S. residents who are predominately responsible for international projects.

It also notes there are those working abroad that have U.S. "drop box" delivery. There was also strong support for printed EXPLORERs over going all digital

Always interesting are the comments, which were again overwhelmingly positive, but some were explicit in their "constructive criticism."

Here is a sampling:

✓ "Too much advertising!"

✓ "Comes too often – can't keep up with reading them, then it's a big chore to get caught up."

✓ "I really like having the EXPLORER in the house – people who visit see the great photos and begin to ask questions and read the articles … a fine sales pitch to the industry we work in!"

✓ "Regularly when I read the EXPLORER on a plane the person next to me asked about a picture or about what I am doing."

✓ "Greetings to all the staff. More grease to your elbows!"

Among the comments concerning coverage, there were a notable number of comments that called for more non-U.S. articles.

A number of comments dealt with climate change – with both sides of the discussion wanting the EXPLORER to be an advocate – on their side.

One of the comments shook us up: "Seismic is not a noun."

Several comments concerned the size of the EXPLORER, preferring a standard magazine size.

(Editor's note: The tabloid size reflects the newspaper values of the publication; is more economical to print and mail; provides additional editorial space; allows for a larger variety of advertising sizes; allows larger ads for the display of seismic and other

continued on next page

WPC Forum Set in Paris

A three-day event designed to bring together young professionals and students with current industry experts and leaders will be held this month in Paris, France.

"EnergiseYourFuture" is the theme for this year's World Petroleum Council's Youth Forum, set Nov. 18-20 at Les Pyramides de Port Marly. More than 800 are expected to attend.

The forum is designed to bring together younger geologists with industry experts "to engage in dialogue … on the key issues that affect a sustainable and ethical energy future."

The program includes keynote plenary sessions "for strategic thinking," workshops and "knowledge cafes" for networking, all built around three themes:

✓ A reality check on tomorrow's energy landscape.

✓ An ethical and sustainable industry: Making it happen.

✓ Tomorrow's leadership, matching our skills to the challenges.

AAPG will have a presence at the meeting. Major sponsors include Total, Schlumberger, GDF Suez and CGG Veritas.

For more information go to www.energiseyourfuture.com.

Candidate Data Available Online

Biographies and individual information for all AAPG officer candidates for the 2010-11 term continue to be available online at *www.aapg.org/business/candidates/index.cfm*.

The president-elect winner will be AAPG president in 2011-12. The vice president-Sections and treasurer winners serve two-year terms, and the elected-editor serves a three-year term.

Ballots will be mailed in spring 2010.

The slate is:

President-Elect

❒ **Ernest A. Mancini**, University of Alabama, Tuscaloosa, Ala.

❒ **Paul Weimer**, University of Colorado, Boulder, Colo.

Vice President-Sections

❒ **Marvin D. Brittenham**, EnCana Oil & Gas (USA), Denver.

❒ **Charles A. Sternbach**, Star Creek Energy, Houston.

Treasurer

❒ **James S. McGhay**, Mid-Con Energy, Tulsa.

❒ **James W. Tucker**, Saudi Aramco, Dhahran, Saudi Arabia.

Editor

❒ **Ashton F. Embry**, GSC, Calgary, Canada.

❒ **Stephen E. Laubach**, Bureau of Economic Geology, University of Texas at Austin.

continued from previous page

technical illustrations; and differentiates us from the ordinary.)

Responses from the survey will be analyzed and appropriate changes and suggestions incorporated into the editorial planning and also used for demographic analysis.

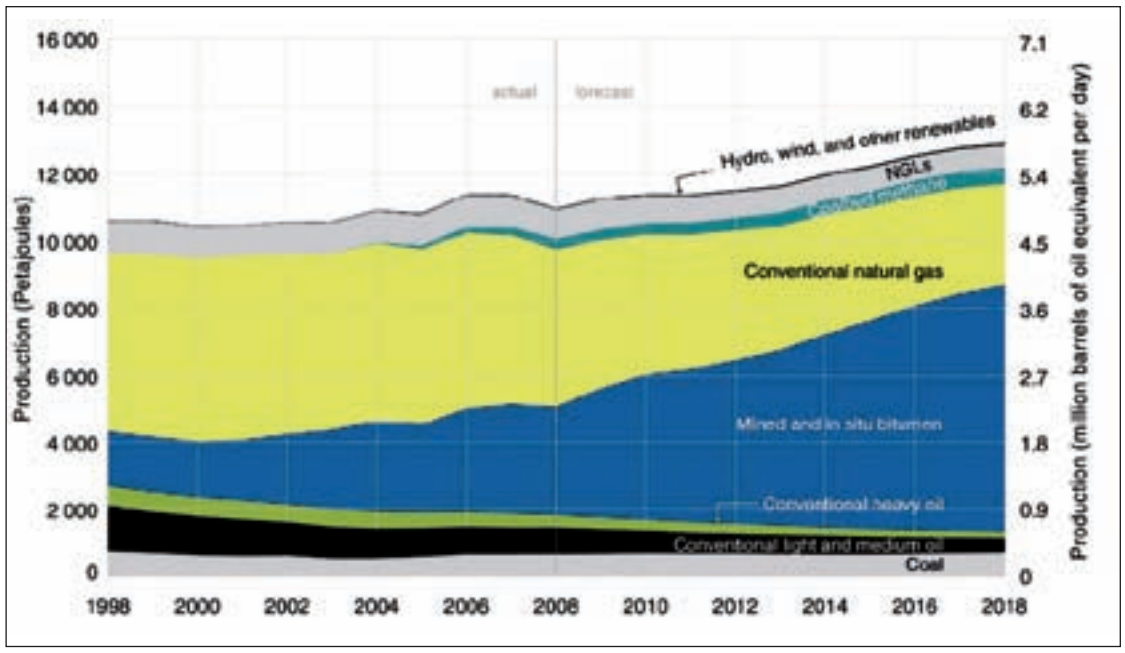
While all the results are important and will figure into the considerations, there is one question that stands out from the rest:

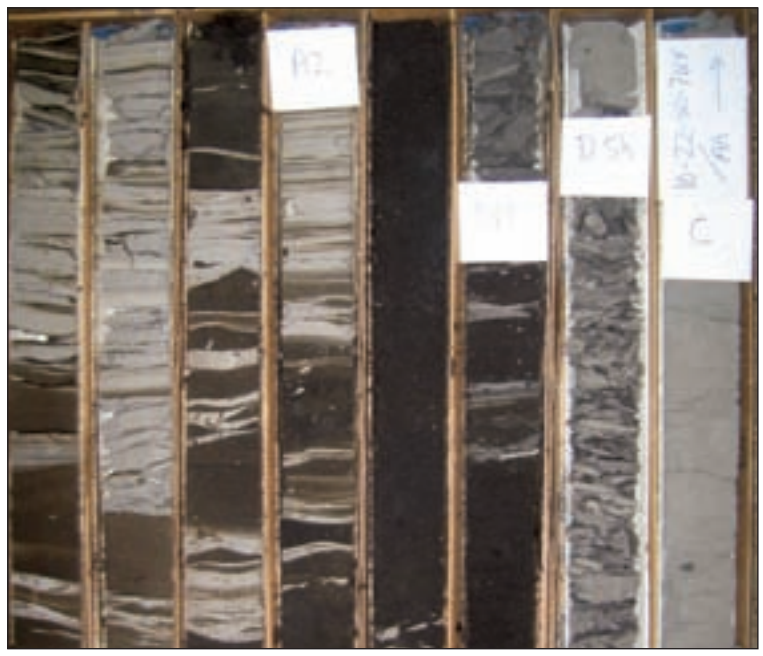
Do you trust the information you receive in the EXPLORER as factual?

5 (yes) – 44.9 percent.
4 – 42.2 percent.
3 – 11 percent.
2 – 1.7 percent.
1 (no) – 0.2 percent.

Thank you.

– LARRY NATION





Above left: Chart showing total energy production in Alberta since 1998 and a forecast of things to come. Above right: Core box slats, each about 3.5 inches across. Dark black and brown is oil sand; light colored zones are barren mudclasts, mud beds or locally cemented zones.

EMD

from page 46

* * *

Future critical technology needs mainly concern the development of more environmentally friendly methods of extraction, production and upgrading of oil sands.

Most of the future bitumen resources will be extracted by in situ technologies. Because there is significant production of greenhouse gases with bitumen production and upgrading, critical technology needs involve research into:

✓ Alternative sources of heat for generation of steam (i.e. geothermal, nuclear, burning of slag).

✓ Use of other methods to reduce the viscosity of the bitumen so it will flow to the well bore or through pipelines more easily (i.e. diluents, catalysts, microbial and nanotechnology).

✓ Underground in-situ extraction, refining and upgrading.

✓ Co-sequestration of greenhouse gases by injection into abandoned reservoirs or other geologic media.

* * *

Beginning in the mid-1970s, the North American energy crises have made the Canadian oil sands a more strategic unconventional energy resource for North American interests.

With increased energy demand switching to unconventional, other areas most likely for future oil sands growth include the northwestern portion of Saskatchewan in the Western Canada Sedimentary Basin; the Colorado Plateau, Uinta and Paradox basins of Utah; the North Slope of Alaska; the Black Warrior Basin, Alabama; the Maverick Basin, southwest Texas; the Borderland Basins of California; the Eastern Interior and Appalachian basins of Kentucky and Illinois; and the Tri-State, Mid-Continent region of Kansas, Missouri and Oklahoma.

As with development of these vast resources in Canada, oil sands development in the United States will have to address the critical environmental issues as related to the balance between greenhouse gas emissions and water/energy usage and the recovery, production and upgrading of bitumen. ❑

Two DL Speakers Set November Tours

AAPG's prestigious Distinguished Lecture program will have two speakers on tour in November.

❒ Martin Perlmutter, team leader and research scientist, Chevron, Houston, will conclude his first tour of western North American sites by offering two talks:

✓ "High Frequency Paleoclimate Change: Impact on Exploration Strategy and Climate Research."

✓ "The Influence of High Frequency Climate Variability on Paleoclimate Interpretation."

His speaking schedule includes:

✓ Nov. 2 – San Joaquin Geological Society, Bakersfield, Calif.

✓ Nov. 3 – University of Nevada, Reno, Nev.

✓ Nov. 4 – Montana Geological Society, Billings, Mont.

✓ Nov. 6 – University of Wyoming, Laramie, Wyo.

❒ Bruce Hart, this year's AAPG-SEG Intersociety Lecturer, will be speaking to groups in Canada and the eastern United States during November. He is the director of the Shale, Seal and Pressure Group at ConocoPhillips in Houston, and he is offering two talks:

✓ "Reservoir-Scale Seismic Stratigraphy: A Call to Integration."

Perlmutter

Hart

✓ "Basin-Centered Gas Accumulations: Revisiting the Type Areas with Integrated Datasets."

His speaking schedule includes:

✓ Nov. 9 – Ecole Polytechnique Geophysical Society, Montreal, Canada.

✓ Nov. 10 – Dalhousie University, Halifax, Canada.

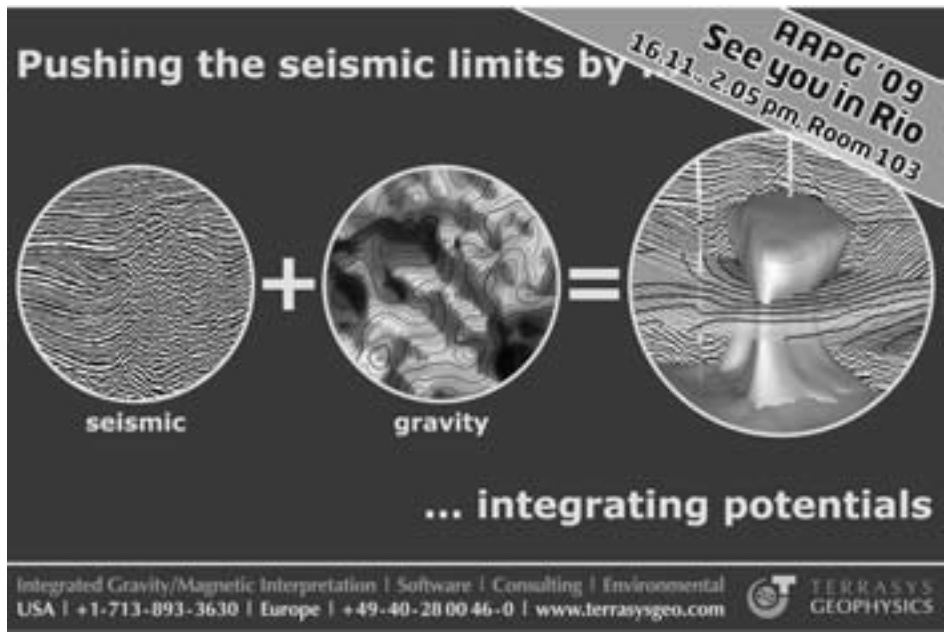
✓ Nov. 12 – University of Alabama, Tuscaloosa, Ala.

✓ Nov. 16 – University of Texas-Dallas, Dallas.

✓ Nov. 17 – Texas A&M University, College Station, Texas.

✓ Nov. 18 – University of Houston, Houston.

For information on these and other DL speakers go to the AAPG Web site at www.aapg.org.



CLASSIFIEDads

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.

* * * * * * * * * * * * * * * * * * * *

POST-DOC IN STRATIGRAPHY RESERVOIR CHARACTERIZATION

The University of Wyoming, Department of Geology & Geophysics seeks to fill a post-doctoral position as part of a large study of carbon sequestration in the Powder River Basin, Wyoming. The ideal candidate would have familiarity with surface and subsurface stratigraphic techniques, petrography and fission-track applications. Position must be filled during spring semester of 2010. Provide a letter of interest, and contact information for at least two references to: Dr. Paul Heller (heller@uwyo.edu), Department of Geology and Geophysics, University of Wyoming, Laramie, WY 82070, by Dec 1, 2009.

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Just write out your ad and send it to us. We will call you with the word count and cost. You can then arrange prepayment. Ads received by the first of the month will appear in the subsequent edition.

DIRECTOR'S corner

Sampling the Meetings a Tasty Treat

By RICK FRITZ

Every year I take the kids and a few of their friends to the Tulsa State Fair. I don't ride the rides much any more – I mainly act as the automatic teller and security. I also hold a lot of funny things for the kids while they ride the rides.

Personally, I go to see the horses and to discover the newest fried flavor on the "stick."

Of course, you can't go wrong with the standard corn dog. However, I noticed this year instead of a foot-long corn dog they now have a foot-and-one-half-long corn dog. I assume this came from a research and development department – after 50 years someone said, "Let's add an extra half a foot of dog and charge twice as much!"

Fritz

It was working.

Last year they actually had deep-fried garlic mashed potatoes on a stick. This year the new flavor was chicken fried bacon on a stick!

I felt like I should just bring my cardiologist with me.

* * *

This fall I've enjoyed tasting the various flavors of the AAPG Section meetings. In September the Eastern Section held its annual meeting in Evansville, Ind., and the Gulf Coast Association of Geological Societies held its annual meeting in Shreveport, La.

> The great news is that all of the conference committees provided an excellent slate of science for the attendees.

In Tulsa, we just completed the Mid-Continent Section meeting, hosted by the Tulsa Geological Society.

The good news is that all the meetings were well attended. The Eastern Section meeting had over 400 attendees and the GCAGS had nearly 1,000 attendees.

The Mid-Continent Section may have set a Tulsa record with over 900 attendees. Plus on the meeting's last day they held a public forum called "America's Energy Heartland, America's Energy Future." It featured several speakers who are top scientists and executives, and it was well attended – many students from the local schools were in the audience.

The great news is that all of the conference committees provided an excellent slate of science for the attendees.

Of course, each Section provided its flavor of the "shale talks" – the Marcellus in Evansville, the Haynesville in Shreveport and the Woodford in Tulsa. There also were numerous good talks on other subjects such as 3-D seismic stratigraphy applications and new uses of horizontal drilling to develop old plays (see page 16 for an example of what was presented in Tulsa).

Attendees were cautiously optimistic about the future and many were planning for new drilling next year. Also, there was widespread concern over potential government changes to tax laws and regulations. I encouraged them to join AAPG's Division of Professional Affairs, as they are working through the GEO-DC office to actively educate the U.S. Congress and their staff on the impact of tax changes and aggressive regulation on our industry.

Of course, the students are always great at the Section meetings. They are energetic, mature and actively working on their professional development. Many have jobs but there were a lot of questions about future employment opportunities.

AAPG is doing everything possible to support the students and encourage the companies to continue to engage.

* * *

My next two meetings are the International Conference and Exhibition in Rio on Nov. 15-18, followed by the European Region meeting in Paris on Nov. 23-24.

It's not too late to go to Rio – please contact us if you need to know how to obtain an expedited visa. Rio has a great technical program and promises to be a great event (see related story, page 6).

At each of these events I am always amazed and appreciative of the energy and efforts of the volunteers who build the meetings and develop the technical programs. We appreciate their dedication to the science and our profession.

And as a result I can't wait to attend the Section meetings this next spring and enjoy their technical flavors.

* * *

I can't wait until the next state fair, either. The last thing we saw on the way out was "chocolate covered bacon."

At least it wasn't on a stick.

Rick

Needed: Resourceful technology

Lots of Potential, Lots of Hurdles

By FRAN HEIN
EMD Vice President

As North America tries to obtain energy security it will have to rely on more unconventional resources to fulfill its energy needs over the next decades – and balanced with that is the need for stewardship of the environment and the need to develop more sustainable strategies.

One of the largest unconventional resources in North America is the oil sands of northeastern Alberta.

Hein

Most of the world's oil sands are found in Venezuela and Canada – and in Canada, the oil sands occur in Cretaceous fluvial-estuarine deposits of northeastern Alberta, covering an area of more than140,000 square kilometers.

Bitumen also is hosted in carbonates in Alberta, but to date these have not been commercially produced. In 2008, Alberta's reserves estimates of remaining established bitumen reserves is 170.4 billion barrels (Gb), making it one of the world's largest hydrocarbon accumulations.

In North America all of the bitumen currently being produced is from Alberta. In 2008 Alberta's crude bitumen production totaled 477 million barrels (75.9 million cubic-meters). This total production is equivalent to 1.31 million barrels per day (207.4 thousand cubic-meters per day).

To put these numbers in perspective, in total only about 3.6 percent of the initial established crude bitumen reserves have been produced since 1967 when commercial production began in the province.

Only about 22 percent of the established oil sands reserves in Alberta can be recovered through surface mining, with the remaining 78 percent recoverable using in-situ, mainly thermal technologies. The most common in-situ technologies are cyclic steam stimulation and steam assisted gravity drainage (SAGD).

Recent research interests related to SAGD-development strategies include:

✓ Mapping thin overburden, karst and glacial deposits.

✓ Prediction of steam migration with permanently installed fiber-optic monitoring.

✓ Experimental in-situ thermal coil heating of bitumen.

✓ Use of developing technologies to reduce greenhouse gas emissions and tailings disposal.

✓ Remediation of the landscape to return the sites to a biodiversity at least equal to the prior biodiversity index.

✓ Transportation alternatives using new and existing infrastructure of pipelines and railways.

Earlier this year the Canada's Energy Resources Conservation Board issued a directive that outlines new cleanup rules and penalties for non-compliance regarding tailings ponds regulations for the oil sands areas.

See **EMD**, page 44