AAPG EXPLORER

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Innovations at North Rankin

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AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS AN INTERNATIONAL ORGANIZATION

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AAPG EXPLORER

PRESIDENT'S COLUMN

Strategic Planning

By PAUL WEIMER

My co-author for this month's column is John Hogg, former chairman of the House of Delegates (1998-1999), former vice president of Regions (2007-2009), and Honorary Member (2011). John (with Steve Sonnenberg) recently updated the Strategic Plan for the Advisory Council and presented it to AAPG membership at Leadership Days.

The Strategic Plan, and this column, both address ongoing long-term, thorny issues facing AAPG; issues that will require difficult decisions to be made.


WEIMER

"The AAPG has some difficult decisions and challenges to address, just as the Southwest Association of Petroleum Geologists did nearly one hundred years ago."

As you know, our industry's rapid changes during the past five years have created an entire new way for geoscientists to work. One of the many charges of the Executive Committee and Advisory Council is to monitor these broad changes, continuously evaluate how our Association should react, and to develop a Strategic Plan that prioritizes our objectives.

The Strategic Plan was discussed during Leadership Days, an annual event that's usually held in Tulsa but met in Boulder this past August. Specifically, two break-out sessions were convened, chaired by Don Clarke and Lee Krystinik (candidates for president-elect), Ted Beaumont (AAPG president-elect), and Marv Brittenham (vice president-Sections). The results of their discussion sessions are posted in two presentations, and the latest Strategic Plan can be viewed at www.aapg.org/StrategicPlan/.

The Strategic Plan has five main parts. Although many of the issues in the Plan are inextricably linked, we'd like to brief y review some of the critical issues in two areas: long-term goals and challenging our paradigms.

Long-Term Goals (1- 10 years)

▸ *Advance the Science*:
AAPG is at its best when it disseminates knowledge about science of petroleum geology. There are really two issues here: how best to capture the abrupt ongoing changes and acceleration in our knowledge base, and how to best disseminate this information to members. Both of these, but especially the latter, are especially challenging because online media are changing so rapidly.

▸ *Public Awareness and Understanding*:
Public outreach always has been an ongoing major challenge for our Association. How do we educate the public and policy makers regarding the realities of energy, especially given the miniscule attention span of most media outlets? This issue varies considerably among our different regions and individual countries. In fact, as I've traveled for AAPG these past months, one key lesson is that many countries in the world are looking to the United States and Canada to see how unconventional resources are evaluated and developed, both scientifically and with respect to policy and economics.

▸ *Membership and Member Services*:
The September President's Column included a graph that showed the distribution of AAPG membership by age – a bimodal distribution showing peaks in the mid 50s and early 20s. In the final analysis, if we want to continue as the world's premier applied geoscience organization, we need more members and younger members.

▸ *Global Presence*:
About 35 percent of AAPG membership is international, and this relative percentage will likely grow in the coming decade. Historically, AAPG evolved as a bottom-up organization; in 1999, however, the six international regions were established and offered immediate challenges that all global organizations must face. Organizationally, the international regions require a different approach. For us to continue to grow, we will need to offer a number of services that are specifically tailored to each region. For example, one new program that will be offered in 2012-13 is a series of regional Distinguished Lectures sponsored by Shell. Plans for increasing regional meetings and for more Geoscience Technology Workshops designed for specific regions are moving forward quickly.

▸ *Financial Strength*:
In the October column, Jim McGhay and I discussed the immediate short-term and longer-term challenges with budgets, and the immediate steps that we are taking to address our budget shortfalls of the next two-three years. Our abilities to provide new services are constrained by our budget. In the next few issues of the EXPLORER, we will discuss some proposed new programs whose financial success is critical for the future of the AAPG.

Challenging Our Paradigms

Based on the many discussions at Leadership Days, and my travels in different Regions and Sections, many members consider two issues critical to our path forward: membership requirements and possible name changes. These challenge many of the prevailing paradigms and assumptions in our business.

See **President**, next page

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Australia's North Rankin-1

ON THE COVER:

New ideas and innovative uses of technology were big reasons why the North Rankin-1 became such a big exploration success – and helped it to become the first of many discoveries on Australia's North West Shelf, one of the world's giant gas provinces. Its remarkable tale is the subject of this month's Historical Highlights column on page 38 – and the theme of exploration innovations is one that can be found throughout this EXPLORER. Photos courtesy of Peter Purcell.

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Candidate Bios Online

Biographies and individual information for all AAPG candidates for the 2012-13 Executive Committee are available online at www.aapg.org.

The material includes each candidate's written response to the question of why they accepted the invitation to stand for public office, plus a brief video statement by each candidate that was filmed at the recent AAPG Leadership Days event in Boulder, Colo.

The president-elect winner will serve in that capacity for one year and will be AAPG president in 2013-14. The vice president-Sections and secretary will serve two-year terms, beginning July 1.

Ballots will be mailed in spring 2012.

The slate is:

President-Elect

❒ **Donald D., Clarke**, geological consultant, Lakewood, Calif.

❒ **Lee Krystinik**, Fossil Creek Resources, Arlington, Texas.

Vice President-Sections

❒ **Thomas E. Ewing**, Frontera Exploration Consultants, San Antonio.

❒ **Kenneth E. Nemeth**, Schlumberger Seismic Reservoir Characterization, Houston.

Treasurer

❒ **Rebecca L. Dodge**, Midwestern State University, Wichita Falls, Texas.

❒ **Deborah K. Sacrey**, Auburn Energy, Houston.

President
from previous page

Membership

Over the years, AAPG has continued to modify and redefine our membership categories with mostly positive results for current and prospective members. Today, we still face some key issues around the professionals within the membership, many of who are still in the Associate category due to the way they came into the Association as "Junior" members. We long ago eliminated the Junior class of membership, but at that time decided to put those members into the Associate category instead of the Active category (because of the requirements for full membership). These days, many (but not all) AAPG leaders feel that degreed geoscientists belong in the Active member category. We need to change the membership system to create a solution for those Associates such that Delegates are allowed to sponsor applications.

Another important membership change that we need to review is the need for three sponsors to join the AAPG. Our heritage is that AAPG membership required other AAPG members to sponsor and support a new member. In the International arena, however, it is sometimes difficult to impossible to find three sponsors, and this stops many new members from joining the AAPG. It also affects the new graduates who do not know many members and thus may not join our Association. We are falling behind the other international learned Associations and Societies in our membership growth and, in part, this is related to our current membership procedures, which can and should be streamlined.

American Association of Petroleum Geologists (AAPG)

At the inception of our Association in 1917, we formed as the Southwest Association of Petroleum Geologists, centered in Tulsa and focused on the petroleum geology of Oklahoma and Texas. Today, almost a hundred years later, we have 36,000 members in 125 countries. Many members believe it is time to be seen, as past AAPG president Bruno Hansen stated, as "*an International Geological Organization*." Many of our international Regions' leadership have stated that the changing of our name will not only increase our membership, but also make us an international Association in name as well as in deed.

So, has the time come for a debate on the first "A" in AAPG? Should we continue to hold fast to heritage, or should we embrace the international reality of our present and our future? Two options discussed at Leadership Days include *Association for the Advancement of Petroleum Geoscience* (AAPG) and the *Association of Petroleum Geologists* (APG). Renaming is a contentious topic for some because it strikes at the very core of our identity. Renaming our Association will require broad support from both leaders and members to change the AAPG's Constitution; thus, we all have a role to play in this discussion as we move forward.

To grow and prosper in the new millennium, AAPG has some difficult decisions and challenges to address, just as the Southwest Association of Petroleum Geologists did nearly one hundred years ago when the 167 members decided to change the name to the American Association of Petroleum Geologists.

In summary, our Advisory Council continues to review the Long Range Plan to keep AAPG relevant to its membership. We are confident that we will move forward with the spirit of professionalism, just as our founders did in 1917.

Paul Weimer

Photos courtesy of Fairfield Industries

Marine node units were deployed at the lowest tide, following the tide in until they met up with the land nodes above the tide line.

New assessment includes unconventionals

Technology, Incentives Revive Cook Inlet

By LOUISE S. DURHAM, EXPLORER Correspondent

Armed with modern, sophisticated oil patch technology, it's not at all unusual to see operators re-entering fields either long abandoned, ignored or on their last producing legs, so to speak.

These folks begin drilling new wells from the get-go and/or revving up production using existing boreholes – most commonly via new gee-whiz technology applications either in known producing horizons or zones not yet identified as producers. Think unconventional, in some instances.

Voila.

The good times begin rolling once again in areas only recently considered to be essentially dried up and near death.

The natural gas estimate is roughly nine times as much as the agency's last assessment done in 1995, and includes unconventional natural gas, which was not a part of the earlier study.

One of the best-known examples of this kind of near-magical turnaround is the giant old Permian Basin in Texas. The longtime red-hot producing basin lost its luster for some time, never quite recovering from the disastrous crude oil price plunge in the 1980s. Today, the multi-field basin is rife with new activity, including both conventional and unconventional plays (see related story, page 18).

But far away from this region – and less familiar overall – the Cook Inlet, which extends about 180 miles from Anchorage to the Gulf of Alaska on Alaska's southern coast, is a whole different environment currently attracting renewed attention.

The general water depth in the offshore portion of the Cook Inlet area ranges from 20 feet to as much as 300 feet.

Considered to be the birthplace of Alaska's modern-day hydrocarbon exploration industry, the Cook Inlet initially

See **Cook Inlet**, page 10

The marine section was deployed by vessel once the ice pack had moved away on the tide.

Cook Inlet
from page 8

became a big deal when the state's first commercial oil discovery occurred there in 1957.

About 23 gas fields and six oil fields have been discovered since 1957. Nearly all of the petroleum production has been obtained from conventional sandstone and conglomerate reservoirs of Tertiary age in structural traps on anticlines and faulted anticlines, according to the U.S. Geological Survey.

After a number of years, Cook Inlet production began declining, along with the operators' interest.

This was understandable given that the North Slope, home to the giant Prudhoe Bay oil field, discovered in 1968, was beckoning. The oil finders and their money quickly headed north with the goal to latch on to some of the giant reserves in this largest oil field in the nation.

But nothing lasts forever – and the Cook Inlet basin today is becoming a new old hot spot.

Referring to Cook Inlet, Joe Balash, deputy commissioner of Alaska's Natural Resources division, noted "we're sitting on what, by any other measure, is a world-class basin."

Small Players in a Big Place

In a new assessment of undiscovered, technically recoverable oil and gas resources in the Cook Inlet region of south-central Alaska, the USGS estimates that mean undiscovered volumes of nearly 600 million barrels of oil, about 19 trillion cubic feet of natural gas, and 46 million barrels of natural gas liquids await discovery in this area. The agency used a geology-based assessment methodology.

The natural gas estimate is roughly nine times as much as the agency's last assessment done in 1995, and includes unconventional natural gas, which was not a part of the earlier study.

This has great significance for the more highly populated southern part of Alaska. The region has morphed from its gas-rich supply status when the exodus to the North Slope occurred, to being dramatically gas short, according to Curtis Burton, CEO at Buccaneer Resources, which trades on the Australian Stock Exchange and has a U.S. base with activity/production in disparate regions of the country, including Alaska.

"Today, utilities in lower Alaska are warning of brownouts by 2012 because of an inadequate gas supply," Burton emphasized.

Combine this situation with the USGS numbers and significant tax incentives from the state, and it's no surprise that operators are scrambling to get back to the Cook Inlet. In fact, in 2007, then-governor Sarah Palin authored legislation to up the tax on North Slope production to create an incentive for operators to return to the Cook Inlet, according to Burton.

An added appeal here is that producers reportedly can sell the natural gas at a premium compared to that in the "Lower 48," where the price of the commodity has essentially been on life support for some time, struggling to cling to $4/Mcf or thereabouts.

Buccaneer's modus operandi is to look for hydrocarbons where the majors have departed, on the premise that there are prizes remaining in these areas that can turn small independents into large ones, if done right. For example, they never go into a basin without regional expertise from the people there.

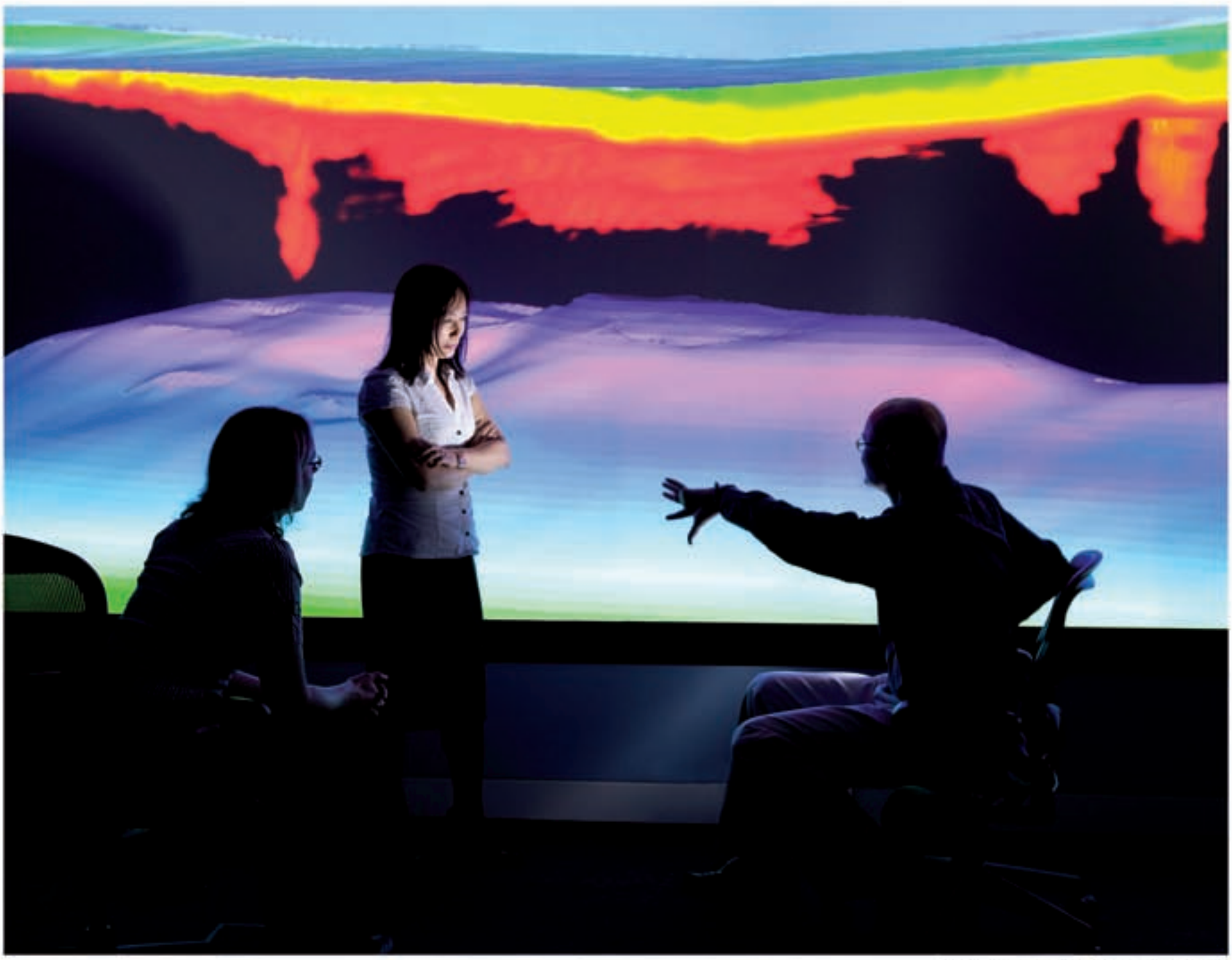
"What's not a meal for an 800 pound gorilla is a pretty tasty feast for companies like us," Burton noted.

Buccaneer is completing its second onshore well in Alaska and has completed permitting two well sites offshore in the Cook Inlet. Four onshore wells reportedly were drilled along the Inlet's banks in the past year.

There are challenges in the offshore environment of the Inlet, but they are surmountable.

"There are high currents – up to five or six knots – and significant tides," Burton said. "From late November to April, you can have ice floes from broken sheet ice in the northern part of the Inlet, but it's a manageable process."

See **Nodes**, page 12



Highly Immersive Visualization Environment at our technology centre in the UK

Nodes

from page 10

Burton emphasized the big reason for no drillbit action in the offshore here since 1993 can be attributed to the lack of a jackup rig that could move around in the Inlet and drill the wells.

This entails major money, and it makes a big difference when the Big Guns offer their help.

The Alaska Industrial Development and Export Authority has stepped up to the plate to lend Buccaneer and rig-operator cohort Ezion Holdings Ltd. between 24 and 30 million dollars to purchase a rig and bring it to Alaska.

The plan is to have the rig in place by next April for the new drilling season.

"It's an exciting basin to be in," Burton exclaimed. "There's been so much change in technology and capabilities since 1993."

New Horizons?

The region also has caught the eye of large independent Apache Corp., which has an established reputation for going into older near-worn-out fields worldwide and bringing them soaring back to life, principally via applying technology not used there earlier.

The company currently holds about 800,000 acres in the Cook Inlet region, which makes it the basin's largest leaseholder.

During an August conference call, Apache CEO Steven Farris said, "It's an exploration play, but the guys have wowed me enough for me to believe it's a real opportunity."

Considering the patchy yet successful drilling history – in combo with the USGS numbers – the opinion of many geologists that the region hasn't been adequately explored carries considerable weight.

"Our interest in Cook Inlet stems from the fact that several large fields have been discovered, but very few wells have been drilled that test all of the horizons," said AAPG member Dave Allard, new ventures exploration manager for North America and Caribbean at Apache.

The company is said to be interested principally in oil – but recognizes the ready local market for natural gas.

High quality seismic data is key to exploration in new plays in the Cook Inlet basin, and Apache is on board with that.

"We believe this is a play that is just ripe for exploitation utilizing modern seismic technology," said Apache CEO and AAPG member Rod Eichler during investor day in New York May 17.

Nodal Technology's Impact

Apache clearly walks the walk, beginning with a 2-D seismic test survey in Cook Inlet last spring.

Apache contracted NES LLC (now SA Exploration, or SAE) to test a variety of seismic recording and source systems to identify the premier equipment and acquisition parameters to best enable future exploration across their area lease holdings.

Node recording equipment was employed, as well as traditional cable digital telemetry seismic technology.

The node technology recording equipment used in the test project included FairfieldNodal's ZLand and Z700 cable-free systems. The Z700 marine system is designed for use in water depths as much as 700 meters.

Owing to restrictive state and federal permits, the test occurred within a condensed time frame from mid-March to early April. Unpredictable ice and ground conditions placed added demands on the equipment, according to Keith Matthews, sales director of systems division at FairfieldNodal.

For the limited test, the company supplied 725 ZLand nodes and 200 Z700 nodes, including support and operations personnel. The Z700 deployment/retrieval system was installed on a local vessel.

"Operationally, our components and support performed nearly flawlessly, which is a tribute to the suitability of these two node systems for work in harsh environments," Matthews said. "In this case, it was one of the world's most challenging regions for seismic operations.

"For instance, the temperature was -29 degrees centigrade, with seven-knot tidal currents and a 24-foot tidal range," he noted.

Despite harsh conditions, the crew was able to distribute 500 nodes in just a few hours.

When all was said and done, the totally cable-free, self-contained nodes proved to be the system of choice for the multi-year 3-D seismic program Apache plans to implement in the difficult Cook Inlet once it completes acquiring all of the necessary federal permits.

The planned acquisition includes marine, transition zone and land environments.

Marine offshore operations reportedly will occur from April to November, with transition zone activities spanning September to December and March to May, depending on sea ice. Onshore activity generally will take place from September to April.

"To have Apache specify our nodes for such a difficult and important project shows how confident they are that our cable-free systems are up to the task," said AAPG member Gary Bartlett, regional sales manager for FairfieldNodal in North America.

The lightweight, flexible, easy-to-deploy autonomous nodes with their minimal footprint record continuously and are a high profile example of how new innovative technology is spurring new exploration.

For the 3-D program, FairfieldNodal sold $30 million worth of node seismic equipment to SAE on behalf of Apache Corp.

"This thirty million dollar purchase of recording nodes marks the first time both offshore and onshore versions of the equipment will be used in combination," said Steve Mitchell, vice-president of the systems division at FairfieldNodal.

Oh, and some gas, too

Brine, High Pressure, High Temps: Perfect

By DAVID BROWN, EXPLORER Correspondent

High pressure. High temperature. Lots of brine.

Challenges in the eyes of oil and gas producers.

Music to the ears of Steve Munson.

Munson, an AAPG member, plans to start drilling wells along the Texas Gulf Coast next year, and he fully expects to produce gas.


MUNSON

As an afterthought.

The heat, pressure and brine are what he's been looking for.

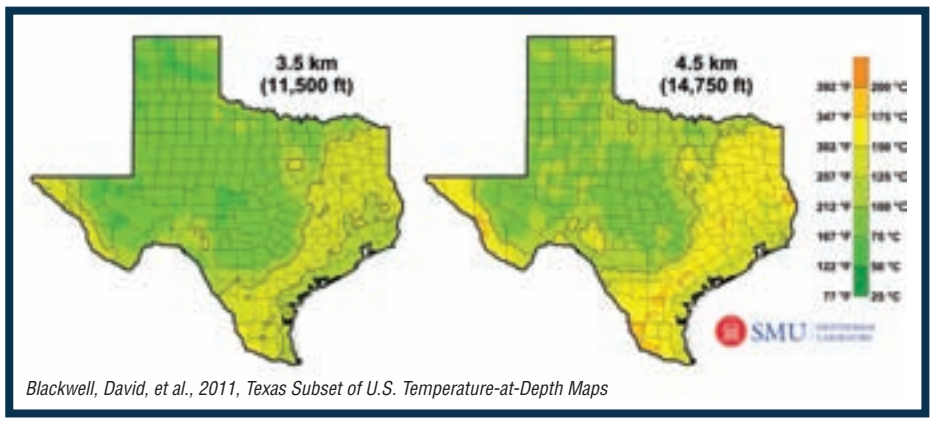
Munson's company, GeoPower Texas Co. of Austin, wants to develop geothermal-driven electrical power plants using the energy from the hot-brine wells.

And the over-pressured Texas Gulf Coast geothermal area is just about perfect for that purpose, he said.

"Some people," he noted, "have called Texas geopressure 'geothermal on steroids.'"

Right now GeoPower Texas is eyeing two main operating locales, including a primary location in the Brazoria-Galveston counties area, according to Munson.

"We have a 60-square-mile lease there," Munson said. "Down the coast, we have 90 square miles leased in the Matagorda area – we've leased them because they sit over the Frio formation's proved, hot-brine reservoirs at depths of 10,000 to 11,000 feet down to the top of the formation."



Blackwell, David, et al., 2011, Texas Subset of U.S. Temperature-at-Depth Maps

A Big Difference

The project can be seen as part of a resurgence of interest in geothermal power in Texas.

In 1989, a project funded by the U.S. Department of Energy began successful operation of a geothermal energy demonstration power plant at Pleasant Bayou in Brazoria County. It used a high-pressure brine and methane flow from the Frio Formation, coming from a depth of about 14,700 feet.

After the demonstration plant closed, interest in Texas geothermal waned. But it came back as interest in green power increased and more people became aware of the state's geothermal resources, said Maria Richards, coordinator of the Southern Methodist University Geothermal Lab in Dallas.

"In a way, geothermal can be compared to the way wind energy developed. Geothermal can go into an existing field, where wells have been drilled, and go in with smaller units and a smaller footprint," Richards said.

"The wind (power development) was hugely successful," she noted. "I think people have seen that, and they're entrepreneurs, and they see that the next big renewable resource will be geothermal."

According to Richards, much of the shallow Texas co-produced fluids have a relatively small differential with the surface temperature. A difference of about 100 degrees Fahrenheit is needed as a minimum for geothermal power production.

"If you want to get started and be strong, you really need to have at least a 250-degree differential," she said.

Because of the lower heat differential, Texas geothermal power typically involves a binary system using a heated working fluid to drive electrical-power turbines, instead of a direct-drive system.

The bigger the differential and the higher the pressure the better, and Munson projected that his wells will produce 300-350-degree brine at a wellhead pressure of 3,000 psi. He said the fluid also is likely to have entrained noncommercial gas.

"It can be burned and it raises the temperature of the working fluid, which makes the system more efficient," he said.

Room to Grow

Geothermal power isn't a new concept in Texas. Richards said the SMU Geothermal Lab has been in existence for more than 40 years, under the leadership of David Blackwell.

But the development of commercial-scale, geothermal-driven power in Texas is still in the early stages. GeoPower Texas hopes to be online with a commercial-scale power plant within 24 months, Munson said.

Another Texas geothermal company, GeoTek Energy LLC of Midland, recently received a DOE award to research and develop an innovative geothermal power technology.

Still unknown at this point is what amount

See **Geothermal**, page 16

Photo courtesy of Maria Richards.

SMU team visit to oil field near Corpus Christi, Texas.

Geothermal
from page 14

of geothermal-driven power might be possible and might develop in Texas.

For a high-pressure and high-temperature well along the Texas Gulf Coast, Munson sees a 10-megawatt production facility as a real possibility.

"The average well output will likely range from five to 10 megawatts per production well, subject to final engineering results," he said.

To put that number in perspective, one megawatt of power production is usually considered enough electricity for 1,000 homes.

Richards said the state's geothermal resource allows Texas to have power projects scaled to many different usage levels, from a 50-kilowatt power production unit that might power an individual ranch or small neighborhood, up to 20-megawatt power plants.

"These geopressured areas are where you can get into the five megawatt to 20 megawatt plants," she said.

GeoPower Texas wants to develop clusters of five-10 megawatt plants along the geopressured Gulf Coast province, Munson said.

"There's a preliminary estimate that the Brazoria leases may produce 500 megawatts, subject to final drilling results," he added.

As early as 1999, Texas required utilities to begin utilizing some renewable energy sources. The state now has a target of 10,000 megawatts of renewable energy capacity by 2025.

Munson doesn't doubt demand will be high for geothermal-driven power production.

"Our estimate is that there is a tremendous market in Texas for green, renewable power that probably exceeds 4,500 megawatts," he said. "There appears to be a 2,000 megawatt mandate for renewable power at just two municipal utilities."

He referred to electricity produced from geothermal as "baseload renewable power."

"We call it that because it's very low emissions, low surface impact, reliable, 24-7 power." Munson said "Geothermal power plants get 97 percent capacity, which is as good as a new gas plant, or better."

A 'Perfect Fit'

Texas has a couple of key advantages for geothermal-driven power. Richards noted the most promising geothermal resources are along the Gulf Coast and in east Texas, so many of the state's largest cities and much of its population are near potential geothermal power development.

Also, the long history of oil and gas drilling in the state provides a wealth of information for the geothermal industry.

"We have massive amounts of well data and seismic data, and there's a lot more seismic data available," Munson said.

That information has helped GeoPower Texas find the best locations for leasing and drilling as it plans geothermal power operations, he observed.

"Along the Gulf Coast the sweet spots are the high-porosity, deltaic systems. You're looking for the most continuous, stacked sandstone reservoirs," he said.

In the United States, the leading developed geothermal resources are in the far west, mainly in California, Nevada and Oregon.

Munson thinks the geopressured, hot-brine Gulf Coast resource, with its abundance of existing well information, is a better bet.

"In our opinion, this is much lower risk drilling than the fracture systems in the Basin and Range province," he said.

Ironically, Munson grew up in Oregon and Nevada, in the heart of the Western geothermal area. His home is still in Oregon.

"About 20 to 25 years ago I was interested in these alleged 'renewable energy' sources in California and I decided geothermal was most interesting," he said.

Then, after becoming a self-described "geothermal pioneer" in Nevada, he began exploring opportunities in other parts of the country.

Munson said drilling for geothermal resources is similar to petroleum industry drilling, often using the same rigs and crews, something else that attracted him to the GeoPower Texas project.

"This is kind of a perfect fit with the oil and gas culture of the Texas Gulf Coast," he said.


Photo courtesy of Kinder Morgan

Still going strong: A Yates field gas plant in the prolific – don't call it old hat! – Permian Basin.

The present and future seem OK, too

Permian Has Productive, Colorful Past

By LOUISE S. DURHAM, EXPLORER Correspondent

Despite its many productive years, the petroleum-rich Permian Basin is still going strong.

The prolific province in southeastern New Mexico and West Texas exists for the most part in desolate areas rife with cacti, gnarled mesquite trees and tumbleweeds.

There's a story among the locals that God felt so bad about what He did to the land there that He gave it oil.

A lot of it.

The basin has accounted for 17 percent, or 327 MMbbl, of U.S. oil production as recently as 2002, primarily from formations that range in age from Ordovician through Permian.

Given the many boom and bust cycles the region has endured, this might best be called amazing.

A study funded by the Department of Energy in 2004 estimated original oil in place in the basin to be 106 Bbbl, with 30 Bbbl of remaining unrecovered oil as of 2002.

About 80 percent of significant size oil reservoirs in the Permian Basin produce at depths shallower than 10,000 feet, the study continued, and carbonates reservoirs account for 75 percent of total oil production.

In assigning identified reservoirs to a play, the study noted that a hydrocarbon reservoir is not an isolated occurrence. Reservoirs group together naturally into larger assemblages, or plays, where individual yet similar reservoirs are related geologically, demonstrating same source and trap characteristics – and, in turn, similar production characteristics.

The DOE study was a collaboration between scientists at the Bureau of Economic Geology (BEG) at the Jackson School of Geosciences-UT at Austin, and the New Mexico Bureau of Geology and Mineral Resources.

AAPG member Shirley Dutton, senior research scientist at the BEG, was principal investigator for the project.

The original commercial oil well in the Permian Basin reportedly was completed in 1921. This marked the discovery of Westbrook, the basin's first large oil field.

Westbrook was followed by a series of now-well-known discoveries, including the Yates field (1926) and the Wasson and Slaughter fields (1937).

A Little Old, A Little New

Despite the cyclical downturns and the significant production decline of some of the larger plays, e.g., the Northwest Shelf San Andres platform carbonate play, there's obvious renewed interest in the Permian Basin, along with both old and new activity.

Pumpjacks, aka "nodding donkeys," dot the landscape as they pump oil from old fields. Concurrently, drilling rigs make vertical as well as horizontal boreholes in order to rev up production from older producing zones as well as tap into newer targets.

Waterf oods have been commonplace here for many years, along with carbon dioxide injection programs to enhance oil recovery.

Just don't call this basin old hat; it's very much in step with the times.

Tired reservoirs are responding to new applications of advanced technology, e.g., horizontal drilling and multi-stage hydraulic fracturing. Unconventional resource plays such as the Wolfberry play surrounding the city of Midland, and the Avalon-Bone Spring play in southeastern New Mexico and far west Texas are attracting much attention.

The nomenclature can get a bit bizarre.

The Wolfberry gets its name from co-mingling of oil from the long-productive

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Permian
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Spraberry sandstone with the deeper packed-limestone Wolfcamp. There's even a so-called "Strawberry" play, a combo of the Spraberry and the Strawn that occurs above the deeper Atoka formation drilling target.

The Spraberry Trend field was discovered in 1949, and the Spraberry has acquired a reputation for producing from darn near any location drilled to tap into it.

Pioneer Natural Resources is the largest acreage holder in the field, with about 900,000 acres. Its net production is expected to average as much as 46,000 boe/d in 2011.

"We cored the entire Spraberry and found out there are shale zones with hydrocarbons in them, so we started opening those zones up in addition to the traditional silty sandstones," said Pioneer chairman and chief executive officer Scott Sheffield, an AAPG member. "As a result, we increased the number of frack stages, so we're getting more oil out of the Spraberry and (underlying) Dean than before.

"Then we started going deeper and picking up Wolfcamp and Strawn," he said. "So a combination of opening up non-traditional pay and also new pay zones deeper, and increasing fracture stimulation, has allowed us to get much better economics."

Horizontal Operations

Further to the west, away from the heart of the basin, operators are having a heyday with the Avalon-Bone Spring play, where they're implementing horizontal drilling for the first time.

The Bone Spring members are said to include first, second and third Bone Spring sands and corresponding carbonates, and the shallower Avalon shale (sometimes called Leonard).

Apparently, it's the liquids-rich feature of this play that the operators find especially alluring. In fact, the Avalon shale and the Bone Spring appear separately on at least one roster of the top 20 liquids-rich unconventional plays in North America.

Bone Spring player Anadarko has noted that wells testing 1,000 bopd IP are not that unusual, according to John Christiansen, communications director of corporate public affairs at the company. Even so, they're expensive and technically demanding, as they can require going down a couple of miles and then out laterally for perhaps a mile. The price tag hovers north of $6 million.

Other high profile players in the new/old Permian Basin include Devon Energy, Chevron Corp., Concho Resources, Linn Energy, Occidental Petroleum, Apache Corp. and ExxonMobil.

Yates Activity

To the south of Midland, pipeline guru Kinder Morgan, which owns a 50 percent working interest in the old Yates field in Pecos County, is hard at work to wrest more oil from this mature giant.

One of the largest oil fields ever found in the United States, Yates has produced about 1.5 billion barrels of the estimated five billion barrels OOIP since its discovery about 85 years ago.

It has produced continuously all these years, albeit at declining rates.

"We increased production at the field with CO_2 injection, and we're currently working to offset a slight decline," said Russ Roemer, director of operations for Kinder Morgan CO_2. "Current production is 21,000 barrels per day."

Even though used successfully in numerous fields in the basin, this type of enhanced recovery can be a bit tricky at Yates. The producing San Andres reservoir is highly fractured, shallow and low pressured – less than ideal conditions for effective response to CO_2.

Then there's the price. Once you get into enhanced recovery technologies such as gas injection, thermal, steam and others, the costs escalate – especially up front. But capturing even a small percentage of remaining oil at Yates is too big a prize to bypass.

And there are others.

"At Katz field (in the eastern Permian Basin), Kinder Morgan has invested about $230 million in a project expected to unlock an incremental 25 million barrels of oil to be produced over the next 15 to 20 years," Roemer noted.

"In addition to delivering CO_2 to the Katz field, KMP's recently completed Eastern Shelf Pipeline provides third party customers in the region with access to a steady supply of CO_2 for enhanced oil recovery," he added.

Operational costs continue rising overall in the Permian Basin, no matter the type of project. Much of the current action kicked off when oil prices were in the mighty attractive $100/bbl range versus the high $70s, seen most recently in early October 2011.

Although the industry prefers to avoid calling anything a "boom" nowadays, the "B" word is tossed around freely in places such as Midland, the unofficial capital of the Permian, as well as the hyper-active Eagle Ford play in south Texas.

Unemployment is essentially a foreign word, but the trade-off is traffic congestion, overwhelmed restaurants, access to basic services and housing shortages.

It's so bad in the Eagle Ford area that some of the locals joke that big cardboard cartons soon may be turned into rentals.

For those industry folks who have experienced the cyclicity of the industry, especially in this particular part of the world, this all sounds eerily familiar.

A productive group

Strippers Get Respect

By BARRY FRIEDMAN, EXPLORER Correspondent

A little well here, a little well there, some more little wells over yonder …

With apologies to the late Sen. Everett Dirksen (see box below), you put enough small oil and gas wells together and pretty soon you're talking about real energy, too.

Actually, when it comes to stripper wells – those that produce fewer than 10 barrels of oil or 60,000 standard cubic feet of natural gas – their quantity isn't as important as their quality.

And that's where the Stripper Well Consortium (SWC), a loose affiliation comprising facets of private industry, academia and the Department of Energy, comes into play.

John Duda, project manager for the Natural Gas and Oil Project Management Division of the National Energy Technology Laboratory, which coordinates the program for DOE, says, somewhat surprisingly, "the goal of the Stripper Well Consortium is not to increase the number of stripper wells," but to maintain or enhance the wells already in existence.

"The SWC has developed technologies that have helped and will continue to help small operators produce domestic oil and natural gas reserves," he said.

That, he adds, provides more benefits to the country's energy picture than drilling for new ones.

To that end, SWC tries to restore production to a level so that wells are no longer categorized as stripper wells, while also sustaining production costs so as to recover the maximum amount of reserves before the well becomes uneconomical.

To put the numbers in perspective, as of Jan 1, 2009, there were approximately 375,589 stripper oil wells and 322,507 stripper gas wells operating in the lower 48 states, representing 20 percent of all the oil and 19 percent of all the gas produced onshore.

Here's why that's important: These wells currently produce 4 percent of the daily U.S. oil consumption and 10 percent of daily U.S. gas consumption.

And they don't just provide energy.

"Nearly 10 jobs, Duda says, "are dependent upon every one million dollars of stripper oil and gas production."

Without these wells, the United States would have to increase imports by 7 percent.

It would make sense, then, for some entity to be in place to make sure these wells stay healthy.

Program Goals

Enter SWC. Founded in 2000, the organization was charged with three main goals:

- Maximizing the recovery of domestic hydrocarbon resources by helping small, independent oil and natural gas operators.
- Minimize environmental impacts.
- Strengthen the nation's energy security.

SWC is managed and administered by the Pennsylvania State University with an assist from the Department of Energy's National Energy Technology Laboratory and the New York State Energy Research and Development Authority.

> **Without these wells, the United States would have to increase imports by 7 percent.**

Since its inception, SWC has engaged with more than 100 different organizations. Currently there are 70 members, the majority of which are small operators that have limited budgets for manpower and research and development.

SWC includes not just oil and gas producers and service and equipment suppliers, but also universities, technology developers and government organizations from over 20 states and two foreign countries.

The reason so many are involved, so many want to work together with SWC is obvious: the health, literally and figuratively, of these smaller wells.

These wells, though, have a small margin for error – and there's no guarantee that what we can get today from these wells, we will get tomorrow. Hence, the emphasis on finding – and

See **Strippers**, page 26

Talking Real Money

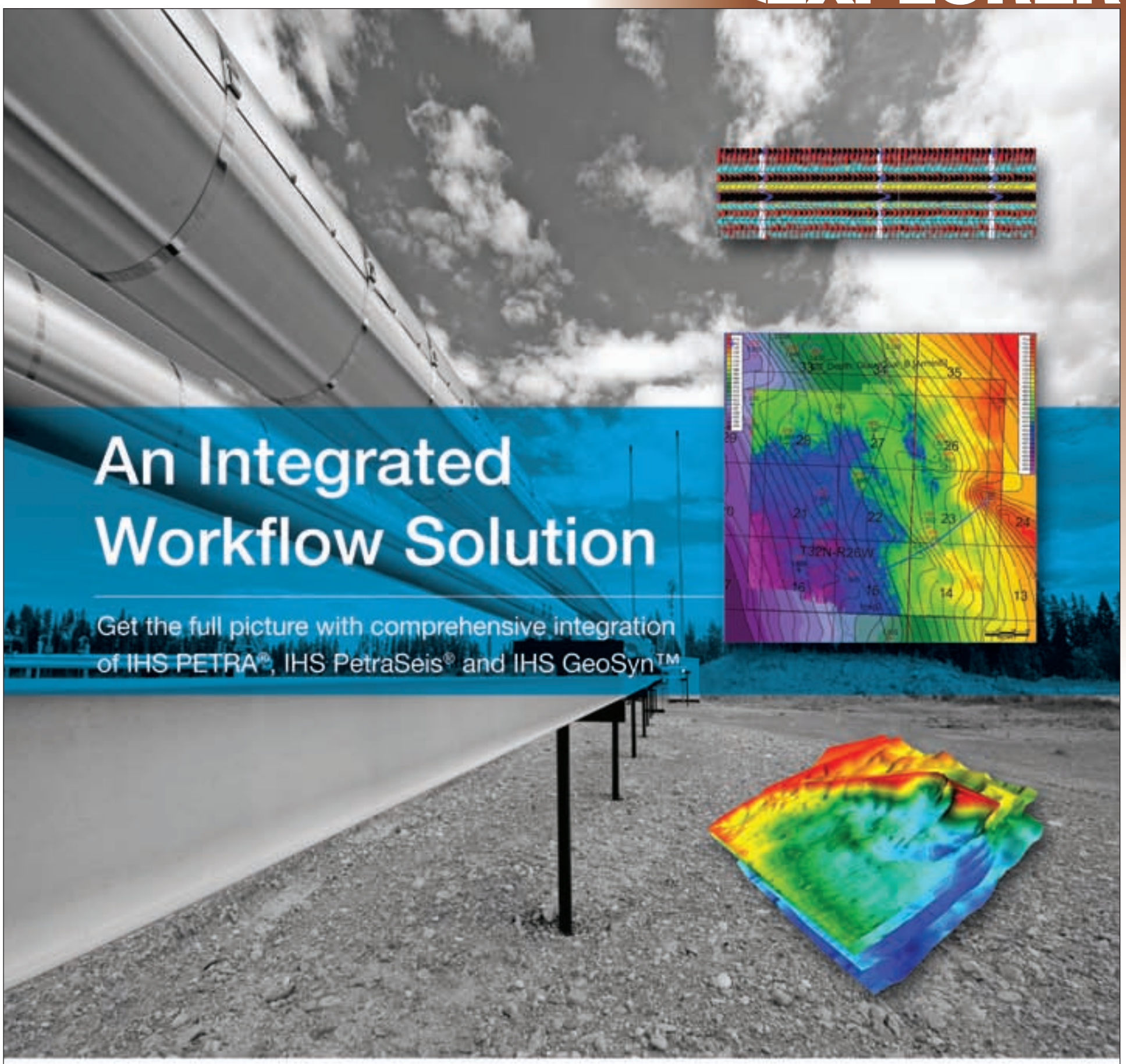
Everett Dirksen (1896-1969), U.S. Senator from Illinois, served in the U.S. House from 1933-1948, the U.S. Senate from 1951-69 and as minority leader of the Senate from 1959 until 1969. He was known for his witty speeches delivered in a deep, cello-like voice and his down home demeanor.

The quote for which he is most famous is: "A billion here, a billion there, and pretty soon you're talking real money."

However, according to the Dirksen Congressional Center, checks of multiple sources – including the Library of Congress and the Congressional Record, as well as tapes of television news and talk shows on which he appeared – cannot confirm he actually uttered the quote.

The Center also said a fellow airplane passenger sat by Dirksen and asked him about the famous quote. Dirksen replied, "Oh, I never said that. A newspaper fella misquoted me once, and I thought it sounded so good that I never bothered to deny it."

According to the Center: "Bottom line: The late Senate minority leader certainly would have endorsed the meaning behind the phrase, but it is questionable that he ever coined it."



When these three solutions seamlessly connect, geological and seismic workflows are streamlined with easy-to-interpret data and modeling tools. This integrated bundle allows you to access, view and manipulate information within the same project; create multidimensional seismic models and synthetics; improve workflow collaboration; and deliver comprehensive proposals for new prospects. Get to the field faster with seismic, well, production, log and economic data at your fingertips.

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Field Work Required

Microseeps Can Indicate Mega-Secrets

By KEN MILAM, EXPLORER Correspondent

Containing costs and reducing risks are good basics for any project, but for smaller exploration companies – like many in the U.S. mid-continent region – they can be go-or-no factors.

Data often is abundant, but often, too, it is old or spotty – and at those times, oil-seekers might find better searching with geochemistry, according to AAPG member Daniel Hitzman of Geo-Microbial Technologies of Ochelata, Okla.


HITZMAN

> **"I'd say it has about a 90 percent accuracy rate in saying where not to drill."**

In other words, mid-continent operators typically comb through old 2-D seismic and well data for overlooked or under-explored trends – a venture's size, location and budget can easily take a new 3-D seismic survey off the table.

But adding microseepage data to the mix can be a quick way to narrow the search at a fraction of the cost, Hitzman said.

Microseeps occur over oil and gas deposits as light hydrocarbon gas molecules leak through reservoir seals and percolate up through a "gas chimney" to the surface, creating a signature detectable in soil and rock samples.

Microseeps differ from "Jed Clampett-type" macroseeps, which can be great confidence builders in some areas, Hitzman acknowledged. Because the larger, heavier, macroseep molecules can't pass through the seal rock, they may travel along gross faults to the surface far from the source, he said.

In microseeps, the lighter gases move vertically to create not a halo, but an apical signature, Hitzman said.

An Effective Approach

Hitzman and co-author Brooks Rountree presented the paper "When Seismic is Not Available: Hydrocarbon Microseepage Surveys Focus Drilling Strategies for Mid-Continent Operators" at the recent AAPG Mid-Continent Section annual meeting in Oklahoma City.

Hitzman said he and his colleagues use two methods to evaluate microseeps:

- Sorbed soil gas tests, which requires collecting free gas molecules trapped in the surface soil or rock, digesting the samples in a lab and measuring with a gas chromatograph.
- Microbial Oil Survey Technique, or MOST, in which soil samples are tested for the presence of specific hydrocarbon-munching microbes.

(Both techniques were developed by Phillips Petroleum scientists, including Hitzman's father, Donald Hitzman, who held over 40 patents with the company.)

Compared to modern seismic, both methods are cheap, simple and quick – but Hitzman said the MOST method is less expensive and has become their primary tool.

A well-equipped microseepage expedition, he said, typically requires a vehicle and two people with GPS, shovels and cans.

"It's about as green as you can get," he said.

"Samples are a handful of soil at shovel depth – six to eight inches, typically about a tenth of a mile apart," he continued. "There are no damages to be paid because there's no damage to fences or land or anything."

In "reconnaissance mode," surveyors can drive section roads, sampling on public rights-of-way up to the fence lines. A vehicle and two-man crew might cover 30-40 linear miles in a day.

"We can narrow down areas for further examination," he said. "That may mean geochemistry, seismic or looking at the wells logs again."

An "exploration mode" survey is more detailed – two crew members on foot with the same gear sample a given area in a grid pattern, covering up to two square miles a day, he said.

The low-tech collection methods means surveys can be made in just about any terrain the surveyors can tramp through.

"In a virgin reservoir, the lighter molecules move up to form an apical

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then using – new technology to keep the system working.

"Typically," Duda said, "once they're plugged, the reserves that the wells accessed will no longer be economically accessible, as the cost to drill new wells will never be paid back."

An Economic Boost

SWC is not just interested in the business of squeezing out the last drop, though. In keeping with one of its charges, SWC is making a concerted environmental effort, as well.

Duda points to a project from Clean Tech Innovations in Bartlesville, Okla., called Soil Amendment Product for Oil Brine Contaminated Soil, where a proprietary process, consisting of highly soluble calcium source and fertilizer, is used to till the soil.

"Grass grows in treated soil in two-six weeks instead of years," he said.

Equally impressive, Duda adds, the product can be applied by the customer, is lower cost than currently available technologies and has been successfully demonstrated at multiple sites across the United States.

Other companies, like Systems of Merritt, have introduced an iPhone app, making it easier and more efficient for companies to gather and transmit field data.

SWC projects range from $25,000 to $400,000, but usually cost between $100,000-$200,000. To receive the government funding, companies must be prepared to cover a minimum of 30 percent of the cost.

As for this funding, while Duda didn't want to get into the nature and commitment of the two administrations that have controlled its purse strings, the SWC budget has decreased under President Obama, even if its 2010 budget represents a 50 percent increase over the previous year. There were fluctuations of around 40 percent under the Bush Administration.

At the moment, the government funds the program to the tune of $675,000.

"It's not, though, just the thousands of small operators who benefit from a healthy industry," Duda said of the consortium and the government involvement, "it's the U.S. economy."

Microseepage
from page 24

anomaly ... and generally don't drift beyond the structural limits of the feature," Hitzman said.

"Once you start drilling, you get a reduction in pressure," he said. "It no longer goes through the gas chimney, but migrates to the wellbore ... we see a depletion in our seepage figures."

Surveys might range for "400 square miles in Yucatan down to quarter-section operations in Osage County (Okla.)," he said.

Seeps can be identified with the type of source material by specific microbes "attacking" the gas chimney.

"I've been asked, 'How specific?' In one case study we identify a thermogenic butane map based on microbial populations.

"We can't tell you how deep," he continued, "or whether its a structure or a trap, but we know there's gas there."

Seepage surveys may spot anomalies that escaped structure-focused seismic interpretations.

"A geoscience team may see our anomalies and send up a 'doubt flag,'" he said. "We all hate to throw out prospects, but seepage is a very strong discrimination tool for risk reduction. I'd say it has about a 90 percent accuracy rate in saying where not to drill," he said.

A Little Respect?

Microbial analysis is a helpful location tool while soil gas tests allow geochemists to characterize the findings as oil-, gas- or condensate-prone, Hitzman said.

"Seismic is very good at finding traps and structures, but they don't all hold hydrocarbons ... or we wouldn't have dry holes."

And at about $700 to $800 per linear mile, a seepage survey can be an efficient way to narrow choices, he said.

Hitzman said about a half-dozen U.S. companies, operating mostly in the mid-continent, provide microseepage surveys.

Admittedly, the method can have drawbacks.

A quick survey with too few data points might tend to "over-promise" results, he said – a single-line survey compared to a grid sampling is like 2-D seismic vs. 3-D.

Also, a geo-team comparing seepage data to a 3-D seismic set may resist findings that don't confirm all their prospects, he said.

"Or we may have an anomaly not seen in the seismic that puts other parts of the set in doubt – even though its a perfectly good stratigraphic feature," he said.

Raw microseepage data is "noisy," and soil gas collection can be something of an art, affected by such things as low- or high-pressure weather systems, he said.

The needed expertise can be developed, however.

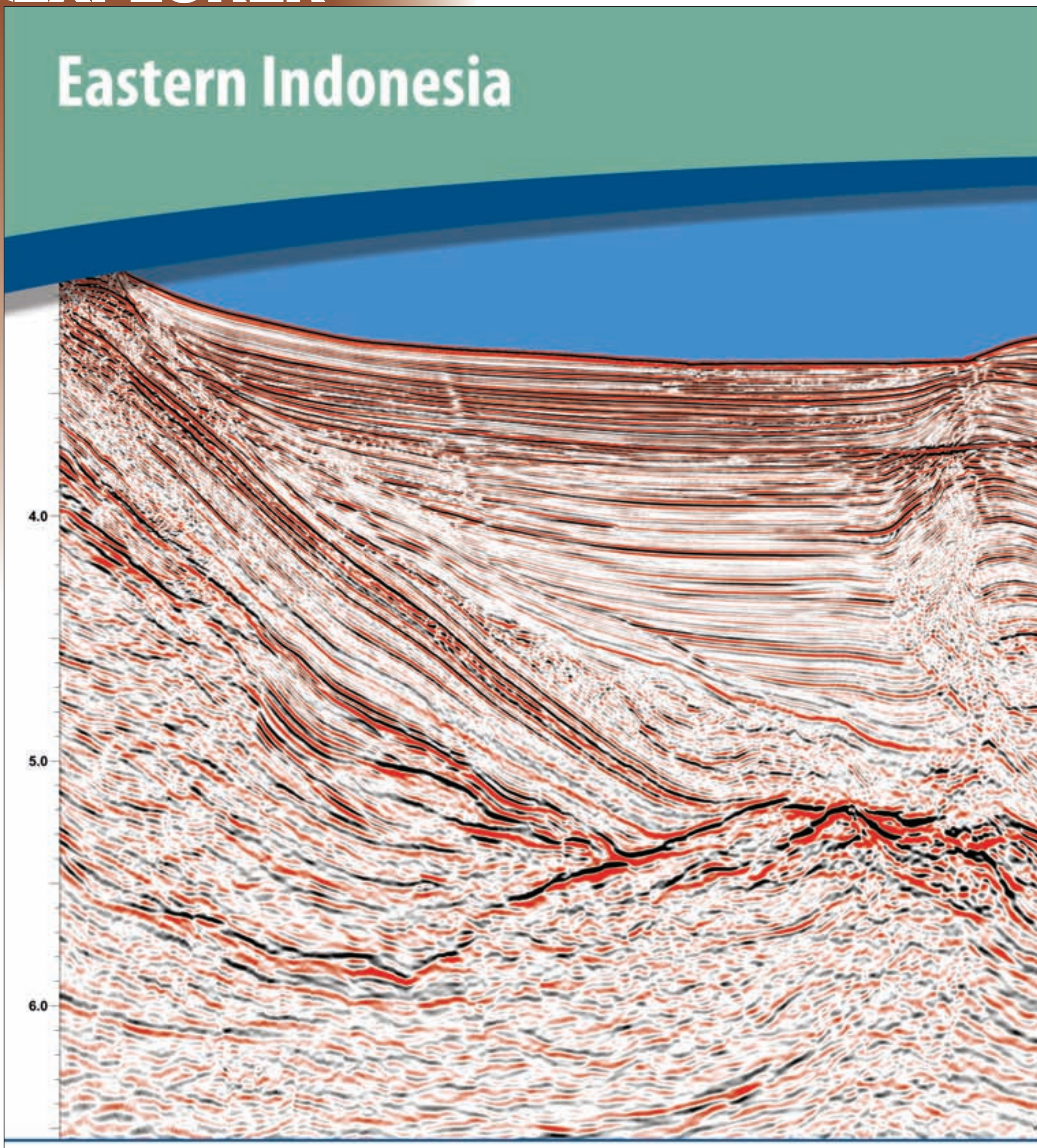
Hitzman and Brooks, for example, are both geologists who "hung out" with geochemists, he said, and who also work with well-known experts in the field.

In an industry that prides itself on integrating data and disciplines, geochemistry occasionally suffers from something like a Rodney Dangerfield syndrome, he suggested.

Geochemical analyses may be seen as icing on the cake, and many managers do not require them.

"It's not so much rivalry among disciplines," Hitzman said with a chuckle, "it's just that we get ignored."

Eastern Indonesia



TGS has the largest multi-client 2D seismic data library with over 30,000 km of 2D seismic in Eastern Indonesia, which includes both multibeam and geochemical analysis deliverables. Data in the area ranges in vintage from the 1998 and 1999 Eastern Indonesia Regional (EIR98R08 and EIR99R08) data sets, both reprocessed in 2008, to the 1,495 km of recently acquired EAM11 multi-client 2D data.

Are we beyond the Holocene

Anthropocene: An Epoch Debate

By DAVID BROWN, EXPLORER Correspondent

Today it seems like everyone's talking about the Anthropocene, the proposed new geological Epoch of Humans.

For its 2011 annual meeting in October, for example, the Geological Society of America chose the theme "Archean to Anthropocene: The Past Is the Key to the Future."

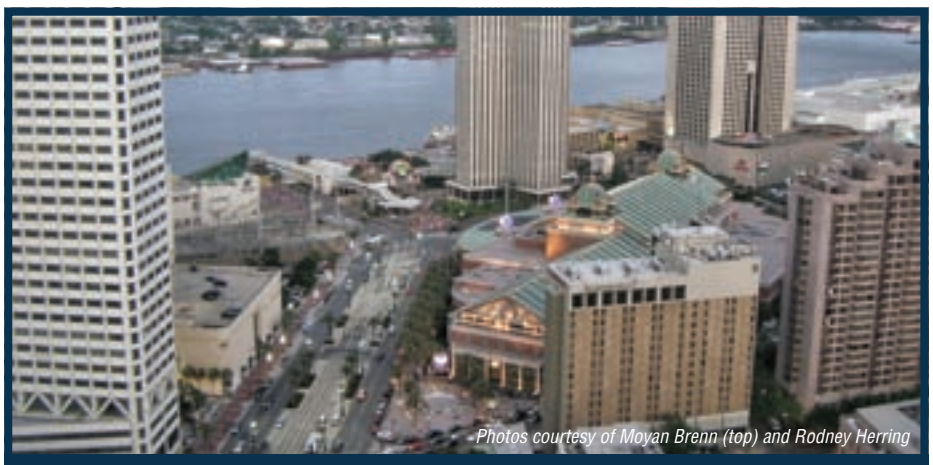
In England, The Geological Society held a special conference in May titled "The Anthropocene: A New Epoch of Geological Time?"

Some geologists have embraced the idea of the Anthropocene. Others remain skeptical. The final call on establishing a new epoch rests with the International Committee on Stratigraphy (ICS).

In gathering evidence for the Anthropocene, "one would look at different types of signal we have made, we are making or that we are likely to make," said Jan Zalasiewicz, senior lecturer in geology at the University of Leicester in England.

Zalasiewicz is chair of the ICS Subcommittee on Quaternary Stratigraphy's Working Group on the Anthropocene, and also served as a convener for the Geological Society's conference in London.

Several types of signal in the geological record might characterize the Anthropocene, he said. For instance, people are physically altering sedimentary pathways and have substantially affected biostratigraphy.



Photos courtesy of Moyan Brenn (top) and Rodney Herring

Preservation hauls: The cities of Amsterdam (above) and New Orleans one day could be well-preserved cities – and therefore, well studied – that define the current geologic era.

"Humans have already changed the biology of the planet. One of the most striking things is the way we have transported species all across the world," Zalasiewicz noted.

The worldwide spread of invasive or non-native species "will undoubtedly leave a signal in the fossil records," he said. "It's hard to scramble that omelet."

And he said conversion of much of the planet's dry land to agricultural or industrial use should also leave a marker in the record, an effect for study by future palynologists.

"You are replacing the pollen of a woodland with the pollen of a mixed agricultural landscape," he said. "One can find even now a noticeable, palynological signal."

Fossilized Cities

Zalasiewicz also raised the intriguing possibility of "fossilized cities" whose remains will be preserved well enough for study millions of years in the future.

Not every city will attain that status, however.

Denver and Manchester and other cities on rising land subject to inevitable erosion are out of luck and probably doomed to erasure, he said.

See **Epoch**, page 32

Epoch
from page 30

But for cities like Amsterdam and New Orleans, welcome to posterity.

"It's really hard to see those not being preserved. You'd have to have a very substantial sea level drop and then erosion," he said.

The case for a new Anthropocene epoch depends on humanity leaving behind clear evidence of planetary change, and not just any kind of evidence. It should be readily distinguished from the effects of natural occurrence.

People who see man-made climate change as a devastating global transformation support the Anthropocene idea enthusiastically, but that turns out to be not-so-good as a human signal.

If the aliens begin to study the history of the Earth, what evidence of mankind's global effect would be apparent to them?

Suppose that alien scientists land on this planet 50 million or 100 million years from now, and humans have long since disappeared. If the aliens begin to study the history of the Earth, what evidence of mankind's global effect would be apparent to them?

Climate change?

Climate changes all the time, and changed long before humans appeared.

Extinctions caused by humans?

Extinctions occur throughout the geological record – and are, in fact, key to chronostratigraphy.

It's easy to say that human beings are making catastrophic, observable, long-lasting changes to the planet.

It's much harder to name one of those changes.

Here are a few signals that might remain for the alien scientists to ponder:

▸ Radioactive remains.

Dave Morrissey is university distinguished lecturer of chemistry at Michigan State University in East Lansing, Mich., and one of the leading experts in nuclear chemistry in the United States. He wrote the text "Modern Nuclear Chemistry" with co-authors Walter Loveland and the late Glenn Seaborg.

Morrissey acknowledged that humans have created a long-lasting signal with the radionuclides from nuclear weapons testing, and that a substantial amount of upgraded radioactive material now exists on the planet, primarily in nuclear reactors.

"The problem with nuclear power is the dispersal aspect. That material is sequestered and short lived," he noted.

"The radioactivity from nuclear weapons sprinkled out all around the world. I think that would be pretty important from the aspect of finding it everywhere," he said.

One possible remnant signal from nuclear power might come from people gathering up materials contaminated by radioactivity and disposing of them in one place, according to Morrissey.

If the alien scientists land so far in the future that all the isotopes have become stable, they are going to discover some bizarre isotopic ratios.

"You will find that it has a different distribution of isotopes than anything else. And that would be there for all time," Morrissey said.

▸ Damming evidence.

Humans are manipulating the planet's surface in all sorts of noticeable ways, from terracing slopes for agriculture to creating huge mines to trawling the seaf oor, said James Syvitski.

"We fish the world's continental shelves, and in this bottom trawling we're plowing the seaf oor. And that would show up in the geological record," he said.

Syvitski is a professor at the University of Colorado at Boulder and director of the university's Community Surface Dynamics Modeling System facility. His work on contemporary sediment f ux speaks directly to the Anthropocene concept, notably regarding rivers and sediment transport.

"We certainly have stirred the landscape, and the rivers carried the sediment. In some cases that created deltas where there were never deltas before," Syvitski said.

Activities like deforestation and agriculture and mining filled the rivers with sediment, which emptied into gulfs and oceans. Then about 1950 that signal reversed, he said.

For an idea of what happened, China before 1950 had eight dams, as Syvitski noted in a paper on sediment f ux. By the 1980s, China had more than 13,000 dams.

Not only do dams control f ow and create sediment-trapping reservoirs, they also alter river movement.

"Rivers migrate, and because of this migration they would form a fairly good, fairly thick sediment layer. But now we don't allow rivers to move," he said.

Syvitski predicted the dominant signal in the future will be more and more dams. And that pattern occurs all over the world.

See **Anthropocene?** page 50

Photos courtesy of David Pulling

Lance Ruffel (left) and David Pulling, by the Wewoka field's Bluff 1-30 horizontal well.

Water disposal an issue

Re-Winning in Wewoka

By KEN MILAM, EXPLORER Correspondent

It reads a little like a story from the Roaring '20s.

Two young men – a New Yorker and a Californian – meet, go their own ways but eventually meet up again. They pool their talents and resources, take a gamble on an old, worn-out piece of property – and become Oklahoma oil barons.

OK, not oil barons exactly. But Lance Ruffel's and David Pulling's ventures helped make "a lot of good livings for a lot of people," Ruffel said.

AAPG members Pulling and Ruffel (the New Yorker) met in the 1970s as geology students at the University of Oklahoma. Each went on to some success as an oil finder. Then in 1998 they teamed up and went into the Wewoka oil field, an Oklahoma reservoir that bloomed in the 1920s but wilted over ensuing decades.

With new technology and old-fashioned perseverance, Ruffel Oil Co. today has more than 100 wells that together are producing over 1,000 BOPD, plus an extensive planned drilling program in the region.

Rising oil prices sparked renewed interest in fields like Wewoka, which was considered depleted and abandoned in the 1950s.

The geologists both saw potential in the area – but one challenge, Pulling said, was "getting out in front of the play."

They looked along the pinch-out and

See **Wewoka**, page 36

AAPG members Lance Ruffel and David Pulling presented their paper, "Rejuvenation of the Wewoka Oil Field – If You Want to Look for Oil, Look In An Oily Area," at the recent Mid-Continent Section meeting in Oklahoma City.

It was part of a technical session on "New Ideas in Old Areas."

Former Boom Towns Feel New Boost

By KEN MILAM, EXPLORER Correspondent

A lot of folks still refer to being "caught in a Wewoka Switch," meaning stuck or lost in a situation with no easy way out.

The phrase comes from the oil boom days of the 1920s and '30s. Trains overloaded with drilling equipment and other freight often got backed up at the Wewoka switch.

One railroad company reportedly went so far as to make a rubber stamp saying "Check Wewoka First" when freight went missing.

Today, the booming conditions that sparked the first Wewoka Switch seem to have returned.

"It's not like the '30s ... but the town's really glad to see us," AAPG member David Pulling says of Ruffel Oil Co.'s activities in the Wewoka oil field.

Stu Phillips publishes Seminole County's three newspapers – the weekly Wewoka Times and Konawa Leader and daily Seminole Producer (a name from boom days).

He agrees that companies like Ruffel have "immunized" the county from the worst of the current economic downturn.

One edition of The Producer in June listed 260 job openings, Phillips said, much more than in past years and notable in a county with a population of 27,000.

"One oil field company has been placing half-page ads trying to recruit people," Phillips said.

"We hear regularly from oil field companies offering full benefits, paid insurance, 401(k) with 6 percent match, per diem cash just for showing up plus an hourly wage," he said.

"We have a much greater need for workers than the 'unemployment service' figures seem to report," he said.

The county's June jobless rate of 6.3 percent reflects people whose skills aren't suited to oil work, or who can't qualify for some jobs because of medical or legal reasons, he said.

Companies may hire locals to check records, help with Indian sales, dirt work, rights-of-way, pipelining, tank batteries and trucking, Pulling said.

Ruffle donates to area volunteer fire departments and other causes, performing as a "good corporate citizen," he said.

While booms come and go, Pulling said, "I predict that in 10 years I'll still be messing around here, correlating logs and whatever it takes."

Old field, new activity: Wewoka 2-30 pump jack (left), and tank batteries for Wewoka 1-30 and 2-30 and Bluff 1-30H.

Wewoka

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drilled into the Hunton Limestone, first tested by the Dixie Oil Co. in 1925 – and their initial efforts were not economical. The first try "bombed," and competitors snapped up another while they were researching it, Pulling said.

Drawing on their experiences in different parts of the state, they shifted their completion practices. Instead of sand and acid fracturing, they tried high-velocity water fracking with limited entry.

"It seemed to work," Ruffel said.

Indeed. One-hundred twenty wells later, Ruffel Oil is drilling its second horizontal well – and the dusty little town of Wewoka and the rest of Seminole County are experiencing new vigor.

"It's not like the '30s," Pulling said, "but it affects a lot of people."

Improved Approaches – and Technology

The Wewoka reservoir is unconventional, with water throughout the 200-foot hydrocarbon column, Pulling said, adding that early day oilers used perforation techniques and skipped the wet zones.

"We get the whole zone," he said, with oil cut averaging 15 percent.

Secondary objectives like the Gilcrease, Wilcox and Bartlesville formations also have been productive targets, he said.

Wewoka, like other historic fields, has pros and cons.

"You know there's oil in place – the challenge is how to get it out," Pulling said.

Ruffel said the early efforts "were intelligent," but some things were overlooked or bypassed as unprofitable.

Data is abundant, but mostly on paper.

"Dave and I both went over old completion records, well logs, scout tickets, survey reports ..." he said. "You have to be willing to look at a lot of information and organize a lot of information."

Wells are fairly shallow – about 4,000 feet, he said – with low permeability.

Decline rates vary from well to well, Ruffel added. Some actually improve. Most average about 80 percent decline in the first year, then flatten out, making a quick payout (less than one year) important.

Despite steep decline, wells in the Wewoka have long lives. Some wells owned by Ruffel have been producing since 1935.

Estimated recovery per well is 50,000 to 70,000 BO and equivalents. Since 2000, Ruffel Oil has produced 1.9 million barrels of oil and eight BCF gas – or 3.2 million barrels of oil and gas equivalents.

"It's not the sort of prospect for a major to come in and just buy up the countryside," he said.

Modern efforts also come with modern baggage.

"We bought 15 wells to rework," Pulling said. "Plus, you have to drill disposal wells at $1 million per well."

But new technology makes their approach more surgical.

New 3-D seismic data, for example, revealed more complexity in what once was seen as a simple structure, Ruffel said.

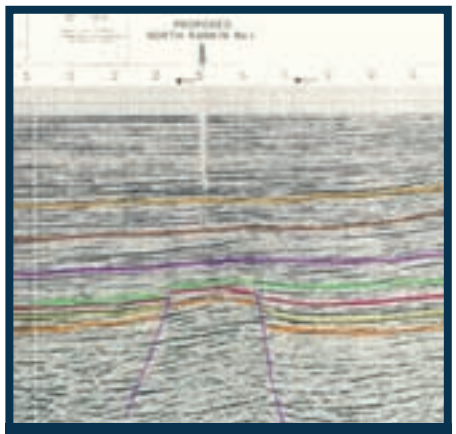
Their approach today is "more stratigraphic than structural," he said.

Pulling said working mature fields requires being flexible and adaptable, but quips: "I'm 62 – I didn't want to learn a lot of new stuff."

The two geologists sometimes have different interpretations, but have mutual respect and a common goal.

"This is our living," Pulling said. "We're not promoters – we're spending our own money."

Historical Highlights is an ongoing EXPLORER series that celebrates the "eureka" moments of petroleum geology, the rise of key concepts, the discoveries that made a difference, the perseverance and ingenuity of our colleagues – and/or their luck! – through stories that emphasize the anecdotes, the good yarns and the human interest side of our E&P profession. If you have such a story – and who doesn't? – and you'd like to share it with your fellow AAPG members, contact Hans Krause at historical.highlights@yahoo.com.



BOCAL's seismic interpretation across the North Rankin structure, 1971. Green = base Tertiary; red = Calcilutite objective; orange = Barrow Beds.

Wake-up call worked out OK

Aussie North Rankin Discovery Was Game-Changer

By PETER PURCELL

It was nearly midnight on a Saturday late in June 1971 when BOCAL's new palynologist Barry Ingram telephoned chief geologist Peter Kaye to tell him the gas discovery in North Rankin-1 were in Triassic sediments.

"I still remember the sound of him waking up," Ingram says today from his home in Perth, Western Australia.

"I'd already done this a month earlier at another well," he continued. "He'd been pretty annoyed with me then, but this time he was okay. Maybe he was getting used to me waking him up and telling him it was Triassic!"

BOCAL is the Burmah Oil Company of Australia Ltd., operator for the Woodside/Shell/Chevron/BP/Burmah joint venture on Australia's North West Shelf that had just discovered the North Rankin gas field.

PURCELL

AAPG member Peter Purcell is a consultant in Perth, Western Australia, working mainly on Australia's North West Shelf and East Africa. He and wife Robyn were vice chairs of the very successful 2006 International Conference and Exhibition in Perth, which remains the largest ICE in AAPG history.

It was to prove the first of many discoveries on what is now one of the world's giant gas provinces.

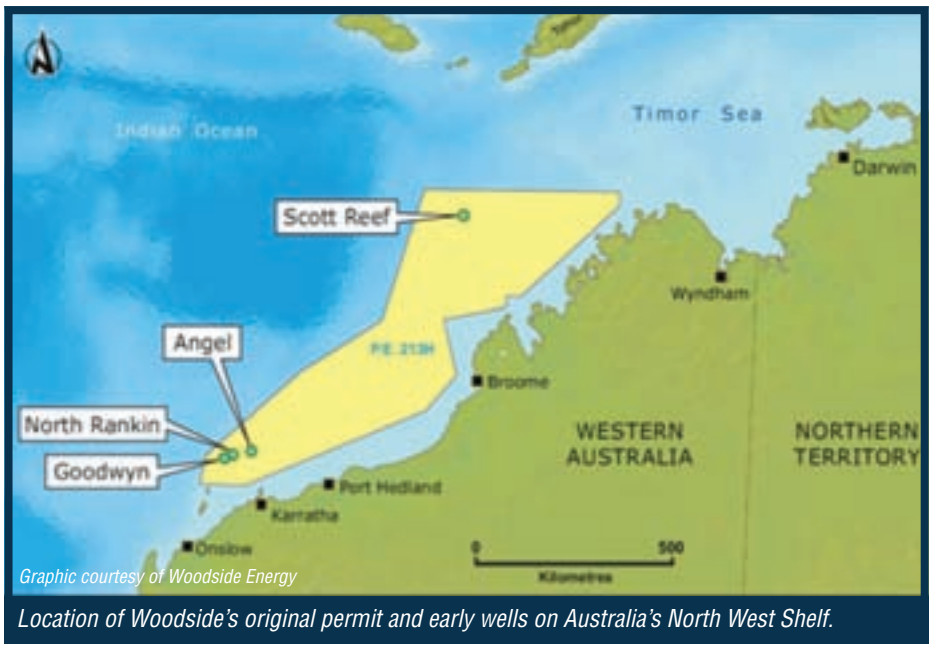
Excitement Begins to Build

The adventure had begun 17 years earlier when Rees Withers and business associates in Melbourne floated Woodside (Lakes Entrance) Oil Co. NL, mainly to explore Victoria's onshore Gippsland Basin. Geoff Macdonald took over as chairman in 1956.

Early exploration efforts were unsuccessful, but the company's fortunes changed in 1961 when experienced oil explorer Nicholas Boutakoff, then working for the Victorian government, was hired as chief geologist.

Boutakoff took with him his ideas about the oil potential of the vast offshore region between Australia's northwest coast and the island of Timor far to the north. Ownership of those ideas would later prove a major point of conflict, but they led to Woodside's successful application for a large region of the North West Shelf, granted as Permit to

See **Rankin**, page 40



Location of Woodside's original permit and early wells on Australia's North West Shelf.

Rankin

from page 38

Explore 213H on June 25, 1963.

Burmah and Shell farmed-in immediately for 33.33 percent interest each, and soon after California Asiatic (later Chevron) acquired half Shell's interest and BP purchased half Woodside's interest. Burmah became the operator.

It was a vast permit, covering over 400,000 square kilometers. To remind the head office of this scale, BOCAL location maps from those early years showed the British Isles within the permit outline.

Aeromagnetic surveys confirmed a deep basin, and seismic surveys commenced.

Boutakoff's idea was simple, albeit couched in terms from an era before plate tectonics. Bathymetric maps of the Australian continental shelf showed a series of submarine ridges, which he interpreted as large geanticlinal folds. Located between the "alpine nappes" of Timor, where oil seeps were known, and the gently warped sediments onshore Australia, they were deemed ideally "suitable for considerable accumulation of petroleum."

Less than a year later, Wapet's Barrow Island-1, located immediately south of the Burmah permit, discovered a major oil field in previously unknown deltaic Upper Jurassic/Lower Cretaceous sediments. The potential of the North West Shelf permit seemed assured, and the BOCAL wells were watched with great expectation and excitement.

Where Are the Beds?

The first well, at Ashmore Reef in the far north, was dry. The second well, Legendre-1, drilled closer to Barrow Island in the south, discovered oil in the "Barrow Beds," but the flow rates were low and a follow-up well was dry.

BOCAL's attention shifted to a major anticline mapped by seismic surveys west of Legendre and seemingly analogous to the Barrow Island structure. But the two wells drilled on that anticline yielded only minor oil shows and a small gas flow and, of more concern, did not encounter the porous Barrow Beds.

This was a major issue. Gravity and seismic surveys had identified a major platform even further west, dubbed the Rankin Trend or, more elaborately, the Ancient Rankin Bank Gravity Positive. If there was no sand at Madeleine and Dampier, there was even less chance in the more distal setting of the Rankin structures.

The BOCAL team did what good explorers always have done in such circumstances: they envisaged a new objective.

A thin, Upper Cretaceous section mapped on seismic above a small fault block at the North Rankin Prospect was correlated with the Senonian Toolonga Calcilutite seen in nearby wells. This "friable calcaranite, composed of shell fragments and microgranular lime mudstone" became the main objective. Sandstones in the Lower Tertiary and Lower Cretaceous section were deemed secondary objectives, but were not considered to have much potential.

"Not everybody was keen on drilling it," recalls Ed Kopsen, then a junior geologist with BOCAL, "but Tony Challinor was the Dampier team leader and he really pushed it."

North Rankin-1 was spudded on May 3, 1971. The mood at BOCAL was mixed. Their Scott Reef-1, drilled on a large faulted anticline far to the north, had tested eight MMcfd of gas, with high condensate levels. The objective sands turned out to be Triassic – the reason for Ingram's first late-night call to his boss – but it was far offshore and remote, in relatively deep water.

Kopsen was on wellsite duty later that month when North Rankin-1 drilled through the Toolonga with minor shows, hit a thin shale section and broke suddenly into high porosity sandstones with high gas readings.

"It happened at nighttime and I've always remembered the depth – and in feet: 8,818," he said. "We had no idea what it was. It was supposed to be distal Barrow Beds."

Samples were rushed to Perth for dating – and Barry made that second midnight call.

"We were dumbfounded when he said it

See **Discovery**, page 43

AAPG EXPLORER

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 a comparison of structural and amplitude curvatures.

GEOPHYSICALCORNER

Curvature Computations Enhance Exploration

By SATINDER CHOPRA and KURT J. MARFURT

Curvature attributes have become popular with seismic interpreters and have found their way into most commercial seismic-interpretation software packages.

Curvature estimates were introduced as computations performed on interpreted 2-D seismic surfaces, and 3-D computations based on volumetric estimates of inline and crossline dip soon followed.

CHOPRA

MARFURT

A 3-D volume of curvature values is produced by estimating ref ector dip and azimuth at each data sample in a seismic volume.

We denote the output of such calculations as structural curvature because the calculations are performed on time-based or depth-based seismic data that define the geometrical configurations of subsurface structure.

A second type of curvature attribute can be calculated by using seismic ref ection amplitudes rather than geometrical shapes of structure. When an interpreter creates a 3-D horizon through a seismic amplitude volume, inline and crossline derivatives of amplitude-magnitude variations can be calculated across this horizon.

Attributes that define the gradient behavior of ref ection amplitude in X-Y space across a horizon are called amplitude curvature and are valuable for delineating the edges of bright spots, channels and other stratigraphic features that produce lateral variations in ref ection magnitudes.

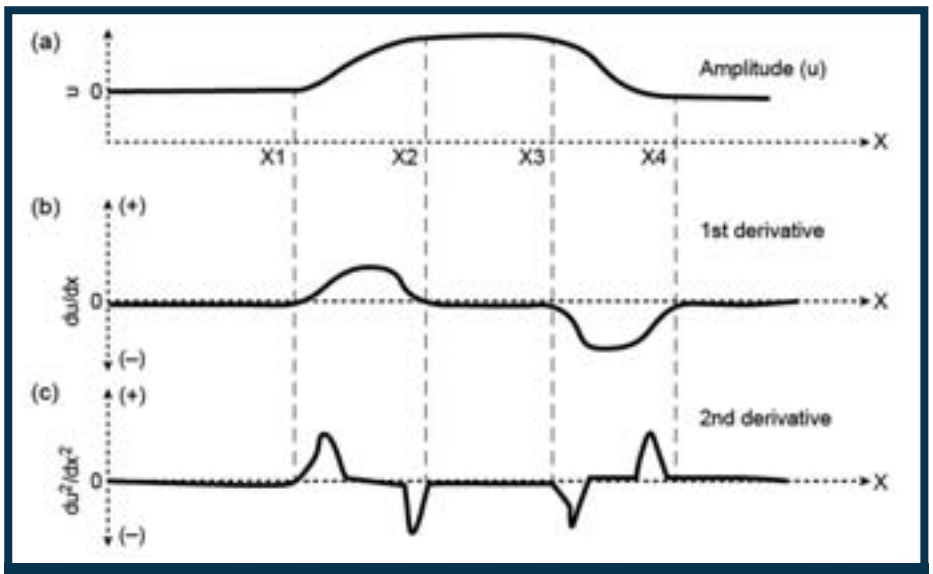


Figure 1 – (a) Absolute magnitude of seismic amplitude along image coordinate X. A seismic bright spot occurs between coordinates X1 and X4. Absolute magnitude is always a positive quantity. (b) First derivative of the amplitude function, which has positive and negative values. (c) Second derivative of the amplitude function, which also has positive and negative values. Note how the extrema in (c) define the edges of the amplitude anomaly.

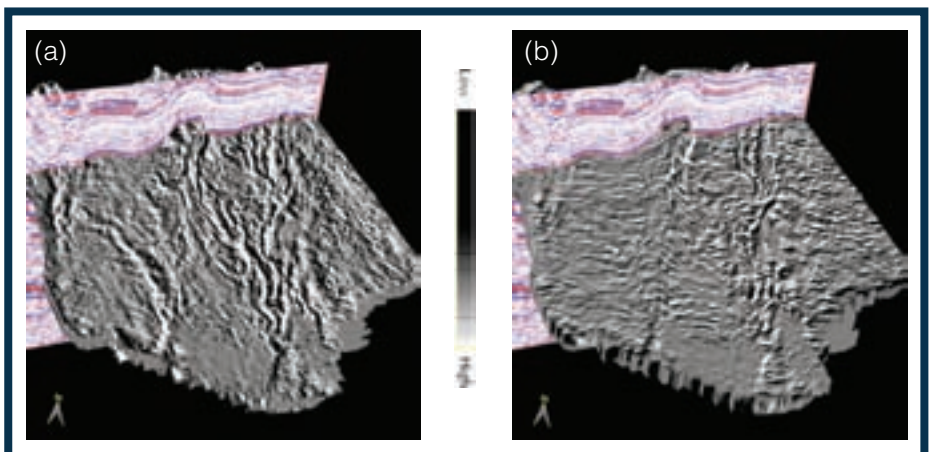


Figure 2 – Three-D chair views showing a seismic inline correlated with (a) inline energy gradient and (b) crossline energy gradient. Each strat-cube shows information that may not be easily seen in the companion display.

* * *

In figure 1a we show a schematic diagram of the magnitude of a hypothetical seismic amplitude anomaly along image coordinate X. This curve shows an increase in ref ection amplitude between image coordinates X1 and X4, with maximum amplitudes occurring between X2 and X3.

Next, we compute the first and second spatial derivatives of this amplitude behavior with respect to X, and show the results in figures 1b and 1c.

Note how the extrema of the second derivative in figure 1c define where the amplitude anomaly undergoes a change in magnitude.

In a 3-D seismic volume, amplitude gradients are computed along structural dip by taking derivatives in inline and crossline directions. Figure 2 shows 3-D chair views of an inline vertical slice through a seismic amplitude volume and the correlation of that profile with energy-weighted amplitude gradients calculated in the inline direction (figure 2a) and in the crossline direction (figure 2b). Both images show independent views of north-south oriented main faults and features related to those faults.

A geological structure has curvature of different spatial wavelengths at various locations across the structure. Thus structural curvature computed at different wavelengths provides different perspectives of the same geology.

Short-wavelength curvature tends to delineate details showing intense, highly localized faulting. In contrast, long-wavelength curvature enhances subtle f exures on a scale of 100, 200 or more image traces that are difficult to see on conventional seismic data.

These long-wavelength features often correlate to fault-generated patterns that

Continued on next page

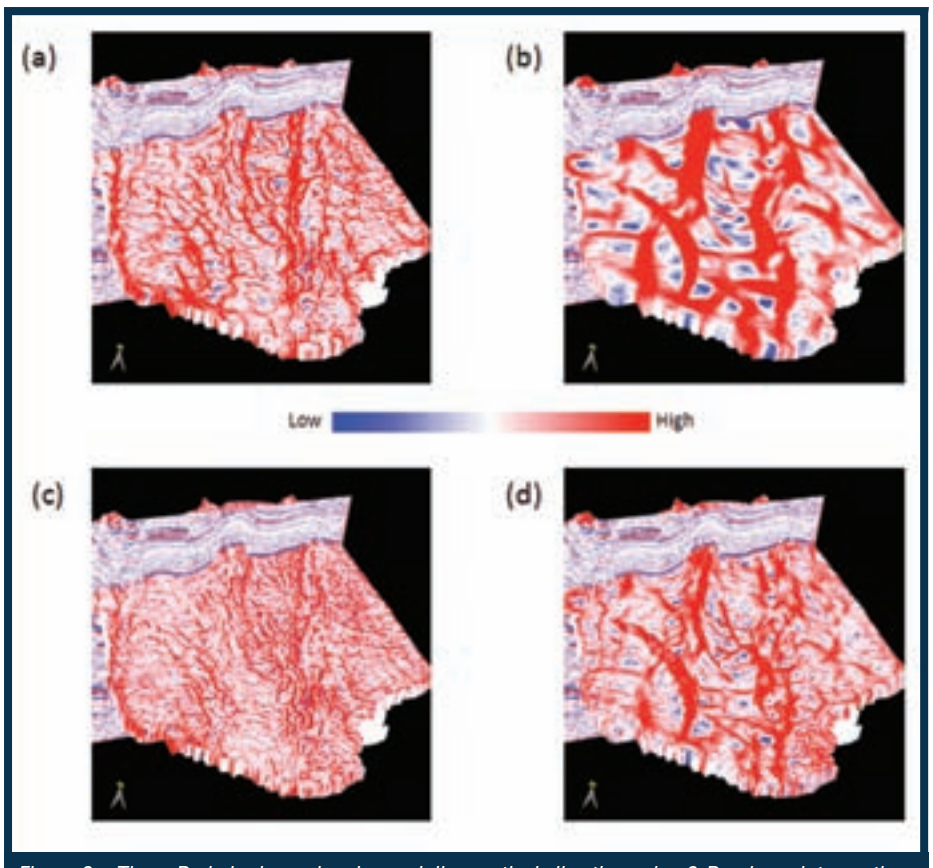


Figure 3 – Three-D chair views showing an inline vertical slice through a 3-D volume intersecting (a) most-positive amplitude curvature (long-wavelength), (b) most-positive structural curvature (long-wavelength), (c) most-positive amplitude curvature (short-wavelength) and (d) most-positive structural curvature (short-wavelength). Notice the higher level of detail on amplitude-curvature displays (a and c) compared with that on structural-curvature displays (b and d).

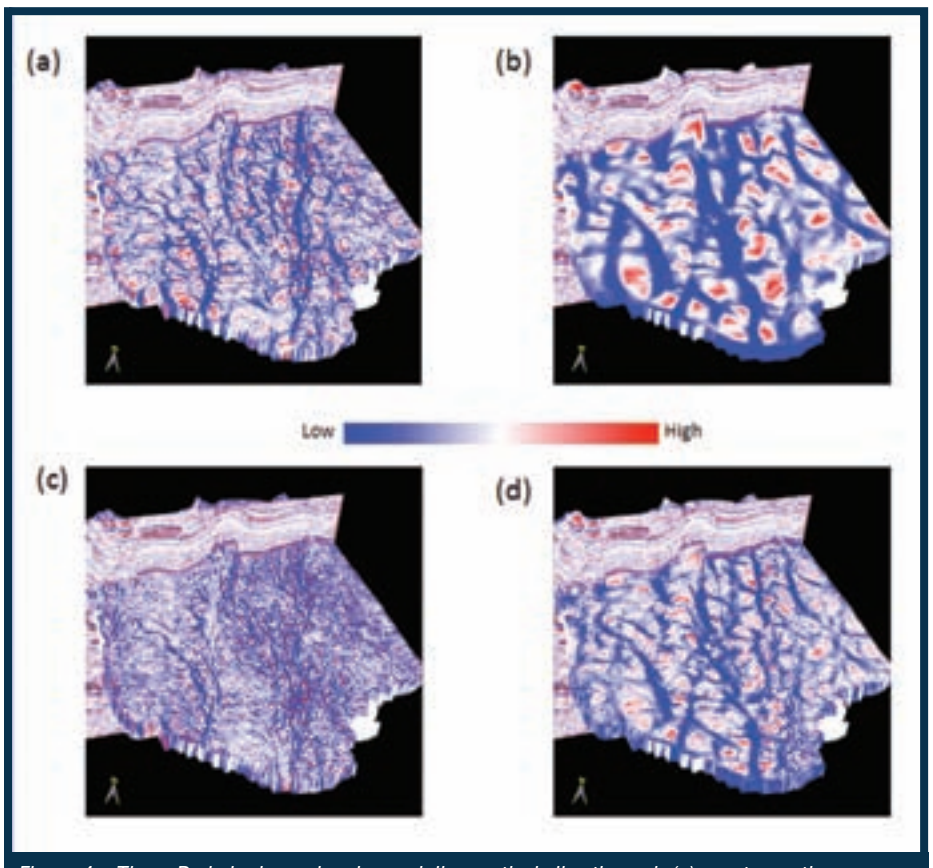


Figure 4 – Three-D chair views showing an inline vertical slice through (a) most-negative amplitude curvature (long-wavelength), (b) most-negative structural curvature (long-wavelength), (c) most-negative amplitude curvature (short-wavelength) and (d) most-negative structural curvature (short-wavelength). Notice the higher level of detail on amplitude-curvature displays (a and c) compared with that on structural-curvature displays (b and d).

Continued from previous page

are below seismic resolution, shallow bowl-shaped collapse features or modest dome-shaped carbonate buildups.

* * *

Figures 3 and 4 compare long-wavelength and short-wavelength computations of most-positive and most-negative amplitude curvatures and structural curvatures.

In figure 3, note that for both long and short wavelengths, most-positive estimates of amplitude-curvature (figures 3a and 3c) provide considerable detail, whereas most-positive structure-curvature displays (figures 3b and 3d) show larger-scale features.

The same physics occurs for estimates of most-negative curvature – amplitude curvature (figures 4a and 4c) depicts fine detail, but structural curvature (figures 4b and 4d) shows larger features.

Amplitude curvature is not a better seismic attribute than structural curvature; it is simply a different attribute. Although structural highs and reflection amplitude anomalies are mathematically independent, they may be coupled by geology.

For example, gas trapped by structure may create a bright spot. In such a case, the second derivatives of structure curvature and reflection amplitude curvature may be related.

Conclusions

When seismic data are processed with amplitude-preserving procedures, amplitude variations can be diagnostic of geologic information – such as changes in porosity, thickness or lithology.

Computing curvature of reflection-amplitude gradients enhances the detection of gas-charged fractures, mineralized cleats in coal seams and other subtle features.

We hope to extend the work shown here to generate rose diagrams of lineaments observed on amplitude-curvature maps and compare these with rose diagrams obtained from image logs.

Acknowledgments

We thank Arcis Corporation for permission to show the data examples, as well as for the permission to publish this work.

(Editor's note: AAPG member Satinder Chopra is with Arcis Corp., Calgary, Canada, and AAPG member Kurt J. Marfurt is with the University of Oklahoma, Norman, Okla.)

Discovery
from page 40

was Triassic," exploration manager Dave McDonald recalled years later.

Kopsen, now a veteran North West Shelf consultant in Perth, described it recently as 'the experience of a lifetime.'

"I was there for the discovery, had a week off, and was back for the final logging run," he recalled. "I was the first geologist to see the logs. It was unbelievable. I still remember the gas-water contact, too: 10,667 feet."

Discovery Channels

The first test flowed 12.8 MMcfd, with 25 bbl/Mcf of condensate: North Rankin was declared a gas discovery. Original reserves were about 11.5 Tcf and 200 MMbbl of condensate.

Rankin-1, Angel-1 and Goodwyn-1 followed consecutively. All were major gas discoveries, with large condensate reserves, cumulatively about 7 Tcf of gas and 400 MMbbl of liquids.

The Rankin Trend is now seen to be the uplifted and eroded shoulder of the Jurassic rift system that formed the Barrow and Dampier sub-basins. The gas in the thick fluvial Triassic sandstones are sourced mainly by interbedded and underlying coals and shales, and sealed by Cretaceous shales deposited on the subsiding Australian margin.

Boutakoff's "highs" turned out to be horst blocks formed in the extensional regime associated with break-up of eastern Gondwana – not folds within a compressive geosyncline province, but he was certainly right about them being "suitable for considerable accumulation of petroleum," albeit mainly gas.

Exploration manager McDonald recalled years later in an interview, 'Every day it was almost ho-hum. We would drill another 100 feet of pay."

Woodside and BOCAL merged soon after the discovery and Woodside Burmah Oil NL became the new operator. Turbulent years lay ahead – first, a nationalistic Federal Labour government opposed export of gas and threatened nationalization, and then Burmah's financial troubles forced it to sell its interests to Shell and BHP and Shell became the dominant force in guiding and staffing the Woodside operating office.

Much to Celebrate

In 1977, with strong support from Western Australian State Premier Sir Charles Court and the new federal government, Woodside commenced the project planning stage.

Two decisions in subsequent years were critical:

- First, the decision to complete a domestic gas development before the LNG phase.
- Second, Court's decision to contract gas for domestic power generation on a take-or-pay basis.

The decision to proceed with the Domgas project was announced in September 1980. The hub of the North West Shelf Venture, as it became known, was the platform on the North Rankin field, very close to that first well site.

First gas flowed ashore in July 1984 and onto domestic customers the following month.

Geoff Donaldson retired later that year, having guided the company for nearly three decades.

The size and costs of the LNG project forced Woodside and partners to rearrange their JV interests: Japanese companies Mitsubishi and Mitsui, purchased one-third of Woodside's 50 percent interest, with BHP and Shell acquiring one-sixth each. The first LNG shipment left for Japan in July 1989.

To celebrate the 40th anniversary of the North Rankin-1 gas discovery, BOCAL veterans are planning celebrations later this year in Perth and London. They have a lot to celebrate: The Rankin Trend fields have produced about 15.8 MMcfd of gas and 630 MMbbl of condensate to end 2010, with vast reserves remaining, and are an important part of the Australian economy.

No doubt there will be a toast or two to BOCAL/Woodside's many exploration successes and surprises, but none more so than this first well where it all started.

WASHINGTONWATCH

Reserves, Resources Reporting Examined

By CRETIES JENKINS


JENKINS

A multidisciplinary symposium focused on providing clarity to the estimation and reporting of petroleum reserves and resources was held in July in Houston. The symposium brought together a diverse group of stakeholders represented by 200 people from more than 100 organizations in 17 countries.

The event – jointly organized and sponsored by AAPG, the Society of Petroleum Engineers and the Society of Petroleum Evaluation Engineers – was a follow-up to a 2007 conference held in Washington, D.C., soon after the release of the Petroleum Resources Management System (PRMS) document.

Following a keynote presentation by AAPG member **Peter Gaffney**, the opening technical session speakers – AAPG members **John Etherington** of PRA International and **David MacDonald** of BP Exploration, and **Jim Ross** of Ross Petroleum – explored opportunities for converging existing reserves/resources classification systems.

The presentations demonstrated the relationship of the broadly accepted PRMS to the Canadian Oil and Gas Evaluation Handbook and the United Nations Framework Classification – there is a great deal of similarity in these systems, and programs are under way to test the desirability of converging them.

The second session focused on the uses of reserves and resources numbers in the policy, regulatory and economic sectors:

- **Jan Bygdvoll** from the Norwegian Petroleum Directorate described the types of information they require from operators and how these compare with international standards.
- AAPG member **Brenda Pierce** of the U.S. Geological Survey gave an overview of how the survey, as a science agency without regulatory responsibility, approaches its resources assessments.
- **Michelle Foss** from the Bureau of Economic Geology at the University of Texas emphasized the role of public trust and the need for reporting companies to engage the news media.

Session three dealt with the use of information about reserves and resources by equity investors and lenders:

- **Dale Nojika** from Ernst and Young highlighted the importance of reserves data in the preparation of financial statements.
- **Kathryn Campbell** of Sullivan and Cromwell discussed data showing that very few companies disclosed probable reserves – and none disclosed possible reserves under the revised SEC rules, even though this is often provided in other investor communications.
- **Jon Rigby** with UBS stressed that financial statement users want to understand the uncertainty in reported reserves and resources numbers.

The fourth session focused on mergers and acquisitions:

- **Tom Petrie** of Bank of America Merrill Lynch reviewed the geopolitical and non-reserve drivers of value in oil and gas transactions including prices, unconventionals and geopolitical considerations.
- **Randy King**, also of Bank of America Merrill Lynch, emphasized that reserve categories are becoming less meaningful to buyers who want to do their own

See **Washington**, page 49

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An invaluable method

Michael A. Cooley, Raymond A. Price, John M. Dixon, and T. Kurtis Kyser

The Livingstone Range anticlinorium is a well-exposed analog to hydrocarbon-bearing buried hanging-wall ramp anticlines. Such thrust-propagation anticlines form important traps but the steeply-dipping limbs are difficult to study. Analogous structures provide good opportunities.

Characterizing fracture networks

Christopher E. Wilson, Atilla Aydin, Mohammad Karimi-Fard, Louis J. Durlofsky, Amir Sagy, Emily E. Brodsky, Oliver Kreylos, and Louise H. Kellogg

Two methods to extract the three-dimensional positions of natural fractures from a LIDAR survey are evaluated. The results indicate that, for this particular fracture network in the Austin chalk, secondary fracture sets marginally impact the breakthrough time of water injected into an oil-filled reservoir.

Investigating reservoir quality

Tom Erik Maast, Jens Jahren, and Knut Bjørlykke

Quartz cementation exerts the main control on the highly variable reservoir quality in the deeply buried sandstones of the South Viking Graben, North Sea. This integrated approach presents a regional and stratigraphic framework that may be incorporated into play models in the area.

Gulf of Thailand continental shelf investigated

Hernán M. Reijenstein, Henry W. Posamentier, and Janok P. Bhattacharya

This paper integrates plan-view geomorphic images of shelf depositional systems from three-dimensional seismic data with detailed facies architecture derived from high-resolution two-dimensional seismic lines. Depositional systems were identified and described in the Gulf of Thailand continental shelf.

PROTRACKS

Involvement reveals opportunities

Young Pro Takes Seat As Youngest Delegate

By COURTNEY CHADNEY, EXPLORER Correspondent


LEMISKI

It wasn't all that long ago that Ryan Lemiski was a Student member of AAPG, nervously attending his first Leadership Conference.

Three years ago, to be exact.

Fast forward – just a blink, really – to today and you'll find the then-Student is now an Active AAPG member who has become the youngest member ever of the AAPG House of Delegates.

For any AAPG young professional looking for a role model on how to become involved in your Association and make a difference in your profession, Ryan Lemiski may be a pretty good place to start.

Lemiski joined AAPG in 2008, during his graduate studies – and later that year he attended his first AAPG Leadership Conference.

Attending was just a first step. Indeed, his active involvement started almost immediately on the Student Chapters Committee.

Three short years later – and after serving in many leadership roles for AAPG's Young Professionals Committee – Lemiski's work and volunteering seems to have paid off. Earlier this year Lemiski, an exploration geologist for Talisman Energy in Calgary, was elected an AAPG delegate, representing Canada.

"It is truly an honor to have been elected to represent all AAPG's members in the Canada region," Lemiski said, admitting that when he first applied he thought his chances – due to his age – were slim.

Now, he strongly believes his election shows the great future AAPG is heading toward.

"The selection of a Young Professional to the House of Delegates is a positive step," Lemiski said. "To me, it suggests that AAPG membership realizes how important Young Professionals are to the future of the Association."

'Tremendous Opportunities'

Lemiski is very excited about his new role, because he feels he has been given a great opportunity to bring the views, opinions and vision of the AAPG Young Professionals to the floor of the House of Delegates.

"Being the youngest in the House of Delegates brings much needed visibility to a membership demographic that to date lacks representation in the House," he said.

Lemiski hopes bringing a new demographic voice will spark new ideas on how AAPG can retain young professional membership – and how they can make young professionals understand and feel they are an integral part of AAPG's future success.

From his experiences, for example, Lemiski has recognized there are far too many young people in the Canada region who know very little about the opportunities and benefits AAPG can provide for them.

"AAPG presents tremendous opportunities for young professionals," Lemiski said. "Knowing this, I've made it a priority to promote AAPG to students and young professionals whenever I can."

Lemiski, like other young geoscientists, attributes much of his professional success thus far to AAPG.

"I've built a global professional network, and made life-long friendships simply by being a member of this great organization," he said. "In many respects, my employment with Talisman Energy resulted from the skills I developed by being an active AAPG member."

Giving Voice

Younger members, whether Students or Young Professionals, have become a top priority for AAPG – and the initiative seems to be working.

Lemiski referenced programs like the Young Professional Leadership Summit and the opportunity of Young Professionals to serve on AAPG committees, as examples of this – and he feels confident that AAPG leadership is very interested in incorporating the vision of Young Professionals into the Long-Term Strategic Plan.

"In many ways Young Professionals are helping steer AAPG and our profession into the future," he said.

As a Delegate, Lemiski is looking forward to interacting with senior AAPG members – and bridging the gap between the older and younger AAPG generations.

"These (older) individuals contain a wealth of knowledge and experience, and it's critical that Young Professionals get involved now while these mentors are still prolific," he said.

The public tends to view this industry as an "Old Boys Club," Lemiski said, when in reality it has evolved into something much more diverse.

He feels there is endless potential for the Young Professionals to be a very powerful public outreach tool.

"It's important for Young Professionals to become vocal leaders, so that we can showcase the younger side of our industry," he said. "By doing so we can convey information to the public from a very different perspective."

Lemiski has big plans for himself and those surrounding him:

- He hopes to encourage more Young Professionals to run as Delegate candidates, with his ultimate goal being for every Section and Region to have Young Professional representation in the House of Delegates.
- He aspires to have a support network for Young Professionals established for the Canada region by the

See **ProTracks**, page 49

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FOUNDATION UPDATE

By NATALIE ADAMS, AAPG Foundation Manager

The AAPG Foundation welcomes **Larry** and **Barbara Meckel** to the Trustee Associates – It's exciting to have a geology couple included in the Trustee Associates membership!

The Meckels reside in Colorado, and you can read more about Larry's career and his love of teaching in the "Spotlight On" column in the October EXPLORER.

* * *

Exciting things involving the Foundation are always happening around the world. Listed here is a brief summary of how some recent gifts are impacting their designated programs.

▸ Donors such as **Jon R. Withrow**, **Larry** and **Barbara Meckel**, **Harry** and **Joy Jamison**, **Ron Riley** and **Dick Baile** all have recently either generously contributed to an existing Named Grant or created a new one.

Would you like to ensure your legacy? Consider contributing to a Named Grant! A one-time gift of $25,000 will endow an annual grant of approximately $1,000. Endowments can come from an institution, an individual or even a group of individuals.

▸ AAPG's Imperial Barrel Award program is an annual basin/prospect evaluation competition for geoscience graduate students from universities around the world where as university teams compete to win scholarship funds dedicated to graduate student petroleum geoscience education. The program is rigorous and contributes to AAPG's mission of promoting petroleum geoscience training and advancing the careers of geoscience students.

The Foundation would like to express heartfelt thanks to Shell Exploration and Production Company for its generous gift to support this program.

▸ Many thanks to **Lyle Baie** for his generous contribution to support presentations at the 2011 Conference for the Advancement of Science Teaching of the Science Teachers Association of Texas. Heartfelt appreciation also goes out to John Bookout for his continued support of K-12 education. To read the progress reports on his initiative, go to foundation.aapg.org/ProgramsBookoutBio.cfm.

The Foundation is a proud supporter of K-12 education.

▸ Congratulations to the University of Minnesota for its new University Subscription – and thanks to **Dave Rensink** for his generous donation to sponsor this school.

Call the Foundation today to inquire about your alma mater's university subscription to Datapages.

▸ The AAPG Foundation GIS-UDRIL University Subscription is a special endowed segment that provides alumni the opportunity to give a generous gift directed

Continued on next page

The monthly list of AAPG Foundation contributions is based on information provided by the AAPG Foundation office.

Foundation (General)
Charles R. Ardoin
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M.A. Custer
Chris C. Curry
Harold L. Holt
Margaret A. Keller
Joy M. Roth

Public Service Fund
Hugh Looney Excellence Fund
Walter A. Laufer

Washington
from page 44

assessment of the development risk and economic return thresholds, and who are willing to pay for significant reserves outside the proved category.

Session five was a panel discussion regarding the modified SEC regulations. Panel members included **James Prince** of Vinson & Elkins, **Paul Horak** with Deloitte & Touche, **Don Roesle** of Ryder Scott and **Kerry Scott** with Pioneer Natural Resources.

As a starting point for discussion, AAPG member **John Hodgin** of Ryder Scott provided an analysis of industry responses to publicly released SEC letters. The most frequently asked question by the SEC in these letters related to the timeframe and commitment to convert reserves from an undeveloped to a developed status.

The panel discussed this issue and several others – including the supporting documentation for development plans and the disclosure of supplemental reserves and resources information.

Session six dealt with issues specific to estimating unconventional resources and reserves:

- AAPG member **David Elliott** of the Alberta Securities Commission noted that guidelines and practices for estimating resources in unconventional reservoirs are not well developed and that additional guidance is needed.
- AAPG member **Jeff Brown** of ExplAnalysis discussed several techniques that can be used to estimate undeveloped resources in unconventional gas plays.
- **Russell Hall** of Russell Hall and Associates completed the session with a presentation focused on the evaluation of resource plays using practical statistics as detailed in the recent SPEE Monograph 3.

The seventh session focused on the differences between deterministic and probabilistic methods and their application to resource estimation:

- **Rod Sidle** of Texas A&M University argued that deterministic assessments are easy to conduct and audit, and that they provide internally consistent outcomes that are physically possible.
- AAPG member **Bill Haskett** with Decision Strategies countered that deterministic cases should only be used to frame the discussion, and that probabilistic methods are needed to capture the full range of possible outcomes and quantify those uncertainties with the greatest impact.
- AAPG member **Mark McLane** of Rose and Associates reviewed methods for probabilistically aggregating reserves, which reduces uncertainty and favors companies with lots of wells and/or large portfolios.

In the final session, **Rusty Riese**, AAPG Distinguished Ethics Lecturer, emphasized that industry must work together to make the best-informed decisions on technical and professional matters. **Ron Harrell** then discussed steps to engage the worldwide reserves community through the nearly completed PRMS applications document and reserves evaluation training.

The symposium wrap-up included comments from past AAPG president **Dave Rensink** on the role professional societies should play in the resources and reserves estimation process.

ProTracks
from page 46

end of this year.

- Now in the position to be a mentor, Lemiski would like to give some helpful advice to AAPG Young Professional readers, starting with this:

"Become an active member in a professional society, and learn what these societies can do for you and your career. There's no doubt in my mind that those who take the time to volunteer will be surprised at the numerous opportunities that exist for professional advancement."

He also added for Young Professionals to not be afraid to ask their employees for support.

"AAPG can only grow through volunteer activity," he said, "and that requires the support of companies."

Finally, when asked if he sees his age as a disadvantage in the House of Delegates, Lemiski humbly replied, "I can't really think of many disadvantages other than maybe having to work a tad harder to be heard in the House.

"I've never been one to back down from a challenge," he said, "especially when an entire membership demographic is counting on me to bring their voice to the f oor."

Continued from previous page

to benefit their university alma mater. Through it, students get online access to thousands of maps – and the university has access to the information for as long as it has a geology department.

The name of the endowment honoree and/or the donor can be prominently mentioned on the university's log-in page.

The Foundation is pleased to recognize **Mark Shuster** for his contribution that opened the GIS-UDRIL subscription for the University of Wyoming.

- A reminder: The General Fund exists for the discretionary use of Trustees to support any activity that they deem worthy and is in accord with the purposes for which the Foundation was established; i.e., education, charitable and scientific activities related to or allied with the field of geology. The Foundation's General Fund enables the Trustees to allocate funds to projects not designated by individual donors.

Thanks to all who contribute to the general fund.

* * *

In other news:

- Trustee Associate **John Alan Masters**, from Castle Rock, Colo., passed away on Sept. 21. He was a Trustee Associate since 1988. Our prayers and thoughts go out to his family. (See page 50.)

- Student Chapters should be busy now, because the deadline for the L. Austin Weeks Undergraduate Grant is Dec. 15.

The L. Austin Weeks Undergraduate Grant supports educational expenses of undergraduate geoscience students and their departments. Each student recipient will receive $500 and the department will receive $500. Awards will be made in the spring.

Anthropocene?

from page 32

"It's actually shocking," he said. "We had a project going to find pristine rivers for study, and we had a heck of a time finding pristine rivers on Earth."

Ecological change.

Humans began changing the surface of the planet long before the past century, said Erle Ellis, associate professor of geography and environmental systems at the University of Maryland, Baltimore County, in Baltimore.

"I came at this looking at long-term ecological change," Ellis said. "That gave me the perspective that people have been around and have been changing the Earth for a long time."

His academic work includes studying the long-term changes in landscape structure and biogeochemistry across China's densely populated agricultural areas.

"There have been unambiguous signals," Ellis noted. "Rice paddy soil is completely different from the natural soil horizon after they've been farmed for hundreds of years."

Also, "there's no good explanation for domesticated species, other than other species domesticating them," he said.

As humans spread across the planet, they transplanted species far from native habitats. The resulting mixture would seem to be a sure signal of the Anthropocene, Ellis noted.

"There are more species that are in one place today than there have ever been before. If you are looking at one rock, you would see evidence of more species than you've ever seen before," he said.

He thinks those kinds of changes already are enough to prove a global, human effect.

"It's profound," he said. "It's long term. If we stopped affecting the biosphere today, there would be obvious signs of it."

Signal strength.

One problem for supporters of an Anthropocene epoch is the strength of the unique signals humans are leaving on the planet, especially seen from a perspective of 50 million years in the future. The Earth is a big place, and not that easy to change.

"When you start thinking about things the way a stratigrapher has to think, it gets much tougher to think what the signals might be," Ellis observed.

"There are a lot of things, looking back, that are going to be hard to see," he said.

But there's still hope for a strongly demarcated Anthropocene.

If humanity manages to destroy itself in an all-out nuclear war, that should leave a nice, clear signal in the record.

And in the end, the best evidence for human life on Earth could be – human life on Earth.

An alien scientist looking back at humans in this period might think, "Good gosh. There were billions of these things. And they were everywhere!"

Because the Holocene epoch began about 11,700 years ago and the human population began its mastery of agriculture and modern expansion more than 9,000 years ago, the two roughly overlap. The smart money might be on a Holocene-Anthropocene.

"A more conservative approach would be to call the Anthropocene a subdivision of the Holocene. That would certainly be less controversial," Zalasiewicz noted.

With scientists from many disciplines working to develop supporting evidence, a formal proposal for an Anthropocene epoch might be ready in time for the 35th International Geological Congress in South Africa in 2016, he said.

Until the issue is settled, debate over the Anthropocene continues.

"I can't predict what the outcome will be," Zalasiewicz said, then added:

"I suspect the term will not go away. In a remarkably short time, it has become embedded in people's minds and in the literature."

IN MEMORY


MASTERS

Famed oil finder and AAPG Honorary Member John A. Masters, of Castle Rock, Colo., died September 21. He was 84.

The 1976 discovery of the Elmworth Field, Canada's largest field, by Masters' Canadian Hunter Exploration was chronicled by the book he edited – *AAPG Memoir 38, Elmworth – Case Study of a Deep Basin Gas Field* – and vaulted Masters to be considered among the legendary geologists.

Always a visionary, Masters said in a 2003 interview that the key to the Elmworth discovery was "the rocks were more important than the electric logs." He also predicted that tight gas sands, basin-centered gas, coalbed methane, oil shales and oil sands represent the future of exploration in North America.

He graduated from Yale University in 1948 and received a master's in geology from the University of Colorado in 1951. He worked two years with the U.S. Atomic Energy Commission and 20 years with Kerr-McGee, leaving to form Canadian Hunter.

In 1955, Masters was credited with the Ambrosia Lake discovery, which at the time was the largest known uranium deposit in the world. He also was responsible for the discovery of important oil fields in Arizona and the Gulf of Mexico.

He received Honorary Membership in 1996 and the Distinguished Service Award in 1988, and also was a Distinguished Lecturer and an AAPG Foundation Trustee.

* * *

Fred H. Carr, 90
Casper, Wyo., Aug. 16, 2011
Archie Gordon, 94
Wilkesboro, N.C., Nov. 6, 2010
Carl Edward Grieshaber, 86
Metairie, La., June 5, 2011
George Waverly-Briggs Hall, 84
Diamondhead, Miss.
Aug. 12, 2011
Sidney Winnard Kothmann, 73
Kingwood, Texas, Aug. 20, 2011
*** John Alan Masters**, 84
Castle Rock, Colo., Sept. 21, 2011
John R. Raiga-Clemenceau, 81
Versailles, France, September 2011
James Marston Smith Jr., 64
Southfield, Mich., Oct. 17, 2010

(Editor's note: "In Memory" listings are based on information received from the AAPG membership department. Asterisk denotes AAPG Honorary Member.)

WWWUPDATE

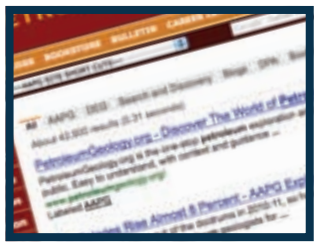
Web Search Upgraded

By JANET BRISTER, AAPG Web Editor

Had trouble finding what you are looking for on our website?

We've upgraded the AAPG search engine to do a better job.

It looks different and is more robust.



First, it searches all AAPG resources outside of AAPG Members Only data at once.

These results are consolidated into one set. However, in the search results window you will now see a set of tabs that sorts your results.

The "All" tab is your complete set.

The AAPG tab is for the aapg.org domains petroleumgeology.org, and the sites for AAPG's global offices.

Each division's website is represented with its own tab along with the Bookstore, Search and Discovery, the Foundation and the AAPG blogs.

(In fact, for more information on this you can go to my blog on the website.)

This is a direct result of the online survey site visitors have been asked to take for the last four weeks.

To those who participated we say "thanks for the feedback!"

Good browsing!

MEMBERSHIP&CERTIFICATION

Applicant List Online

By VICKI BEIGHLE, AAPG Membership Manager

Looking for the list of AAPG membership applicants?

In the past you'd find them right here – but no more.

Applicant information is now found only online – easily accessible via the AAPG website – in an effort to shorten the application process time.

To see the list of applicants (and their sponsors), simply look for the "applicant" button on the bottom right of our home page.

Click on the button and you'll go to information for each Active applicant – whether they are applying as a new member, transferring from Associate or applying for reinstatement.

The new system is the result of recent Executive Committee approval of a proposal submitted by the AAPG Membership Communication and Coordination Committee, chaired by Andrea Reynolds, to streamline the AAPG membership application process.

"The new approach will significantly shorten the application processing period for most applicants, because it will allow the 60-day review by membership to commence immediately after the application is deemed complete and sponsors pass check by headquarters staff," said EC member Jeff Lund, chair of the AAPG House of Delegates.

"This makes the AAPG Active membership application experience more welcoming to all qualified geoscientists," he said.

Previously, the print publishing in the EXPLORER added 30-60 days to the process because of logistics and various deadlines.

Provided all necessary documentation is received, the online availability should shorten the overall application review time by 60 to 90 days from approval to acceptance.

Certification

The following are **candidates** for certification by the Division of Professional Affairs:

Petroleum Geologist

Texas

Peter Buckley, consultant, Houston (The Geological Society of London);
Stephen P. Stagoski, Collarini Associates, Houston (Society of Independent Professional Earth Scientists)

Nigeria

Theobald Musa Duze, Double M Saphire Consults, Lagos (reinstatement)

REQUESTS FOR FOUNDATION FUNDING

If you have a funding need that matches the priorities of the AAPG Foundation, please submit to Natalie Adams at nadams@aapg.org. For more information, go to foundation.aapg.org and click on the "Funding" tab.

All of the AAPG Foundation's funding decisions are made by a Board of Trustees that meets three times annually to review proposals. Applications for grants to projects and programs which fulfill its mission are welcome. Decisions are based on available funds.

TO CONTRIBUTE

If you would like to establish a fund or contribute to an existing fund, please go online (https://www.aapg.org/eDonation/Core/eDonation.aspx) or contact the Foundation staff by email (foundation@aapg.org), phone (888-945-2274, ext. 274) or mail to P.O. Box 979, Tulsa, OK 74101.

AAPG FOUNDATION

Shannon LeBlanc, a geophysicist at Marathon Oil in Houston, is a member of the AAPG-SEG Student Expo Committee.

28 companies interview

Expo Draws 469

By SHANNON LeBLANC

The recent AAPG-SEG Student Expo proved to be the largest gathering ever for the annual event, drawing 469 attendees and representatives from 28 companies to the George R. Brown Convention Center in Houston.

These students came from all over the country, eagerly seeking career opportunities in the oil and gas industry and taking advantage of the many short courses, field trips, industry interviews and, most importantly, the chance to learn/practice their networking skills.

The annual Expo was "an excellent gateway into the oil and gas industry for graduate students," said AAPG Student member Kimberly Mead, a recent graduate from Vanderbilt University who attended last year and is now attending the University of Houston for her master's in geology.


LeBLANC

"I signed up to present a poster, and submitted my resumé, not really knowing what to expect," she said. "The week prior to the Expo my voicemail was flooded with interview requests – I had six interviews throughout the day, with companies ranging in size.

"I left as a more experienced interviewee, but also a more confident applicant," Mead said. "I cannot imagine any other venue offering as much opportunity into the oil and gas industry as the AAPG Student Expo.

"My main piece of advice is to give a poster, even if it is not oil related," she added. "Most of my interviews were based on my abstract, and my ability to talk through my research when standing by my poster."

This year's program included:

- A Recruiter Panel Discussion, in which recruiters from several companies answered questions about what an interviewee might want to know before their interview session.

Some of the questions included, "What job opportunities do I have with just a bachelor's degree?" and "Is it still possible for me to get a job as an international student?"

The panel also presented students with a clearer idea of what most companies are seeking in their new hires.

- Several field trips, such as the Anadarko Drilling rig tour, the Weatherford Labs tour, the Gulf Coast tour and the Core Laboratories tour.
- Several short courses, including: Schlumberger/WesternGeco Technology Day, plus courses from Shell, ExxonMobil and MicroSeismic.
- Industry exhibits and interviews, plus the Kelly Scientific Resources Resumé Review, providing some tips on offering more effective resumés.
- This year's Student Expo poster session, sponsored by Chevron, which featured works that were academically "mind blowing!"

The winning posters were:

✓ First place ($750 prize) – **Ezgi Cinar**, Memorial University of Newfoundland, Canada.

✓ Second place ($500) – AAPG Student member **Steve Sesack**, West Virginia University, Star City, W.Va.

✓ Third place ($300) – **Kristie McLin**, University of Utah.

The universities also received a matching amount to their respective geoscience departments.

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 website, www.aapg.org/explorer/pnb_forms.cfm.

PROFESSIONAL newsBRIEFS

Jeffrey B. Aldrich, to head of exploration, Dart Energy, Singapore. Previously vice president-exploration, Greenpark Energy, Chesterfield, England.

John Cowan has been appointed to board of directors for Dundee Energy, Toronto, Canada. He is the owner of Xtivity Inc., London, Canada.

Leanne French, to staff production geologist, Shell, New Orleans. Previously senior reservoir geologist, Eni Petroleum, Houston.

James E. Geitgey has received the Reservoir Description and Dynamics Award from the Society of Petroleum Engineers. He is president, Terra Nova Energy, Midland, Texas.

Brian Harry, to consultant, Egon Zehnder International, Houston. Previously head of upstream energy, Wood Mackenzie Consulting, Houston.

Rick Ippolito, to vice president-exploration, PetroSands Resources, Calgary, Canada. Previously exploration manager, Bronco Energy, Calgary, Canada.

Mike Kuykendall, to exploration lead, Newfield Exploration Mid-Continent, Tulsa. Previously senior staff geologist, Apache Corp., Tulsa.

Alexei Milkov is the recipient of the Pieter Schenck Award by the European Association of Organic Geochemists, Moscow, Russia. Milkov is manager of exploration assurance, BP Russia, Moscow, Russia

Sharon Mosher has been elected president-elect, American Geosciences Institute. Mosher is the dean of Jackson School of Geosciences, The University Texas at Austin, Austin, Texas.

John G. Parrish will serve as Member-at-Large on the American Geosciences Institute executive committee. Parrish is state geologist, California Geological Survey, Sacramento, Calif.

Robert W. Richardson, to land manager, Dejour Energy Corp. (USA), Denver. Previously senior staff landman, Rosetta Resources, Denver.

Patrick Rutty, to vice president-exploration, Fidelity Exploration and Production, Denver. Previously geophysical adviser, Anschutz Exploration Corp., Denver.

Harrison H. Schmitt has been named recipient of the Ian Campbell Medal for Superlative Service to the Geosciences by the American Geosciences Institute. Schmitt, an AAPG Honorary Member who was a member of the Apollo 17 mission to the moon, resides in Albuquerque, N.M.

Ken Webb, to senior geologist, McMoRan Oil and Gas, Houston. Previously consulting geologist, McMoRan Oil and Gas, Houston.

Henry M. Wise has been commissioned as an admiral in the Texas Navy by the governor's office, Austin, Texas. Wise is remedial services senior specialist, SWS Environmental Services, La Porte, Texas.

HoD Candidates Named

The AAPG House of Delegates has announced its candidate slate for the 2012-13 term. Candidates are:

Chair-Elect

❒ Steven M. Goolsby, Goolsby Brothers & Associates, Lakewood, Colo.

❒ Lawrence H. "Larry" Wickstrom; division chief and state geologist, Ohio Geological Survey, Columbus, Ohio.

Secretary/Editor

❒ Karen S. Glaser, geoscience adviser and director of curriculum for Geoscience DGS, Houston.

❒ John R. "Rusty" Gilbert, earth science mentor, Chevron-Cabinda Gulf Oil Corp., Cabinda, Angola

HoD balloting will be held on Sunday, April 22, at the AAPG Annual Convention and Exhibition in Long Beach, Calif., for the term that will begin on July 1.

EMD
from page 55

by the geothermal operations there.

In December 2009, immediately following the shutdown of the project in Switzerland, AltaRock Energy removed its drill rig and informed the government that the project would be abandoned.

The liabilities associated with the subsurface fracturing of rock present a significant setback in our search for renewable energy – thus the efforts for more renewable energy obviously will be hampered and derailed with these legal setbacks.

* * *

Geothermal isn't the only form of energy under attack. Another recent case centers on whether drilling a natural gas well caused four small earthquakes – none above magnitude 2.8 – in the vicinity of Cleburne, Texas, near Dallas-Fort Worth. It did not help that one of the earthquakes occurred during the meeting of the city council while holding an emergency session to discuss this very topic.

The alleged culprit is either fracking or reinjecting wastewater back into a depleted well, which is what one study found.

What happened in Texas did not stay in Texas, as similar episodes are found in Pennsylvania, New York and other parts of the Northeast, as well as California. Fracking was deemed exempt from federal regulation under the Safe Drinking Water Act, but renewed interest on the impact of fracking on water quality is being re-evaluated by the Environmental Protection Agency and at the state level as well.

* * *

Following the Deepwater Horizon incident, the "Ragin' Cajun" was expounding:

"And it just looks like he's not involved in this! Man, you have got to get down here and take control of this! ... Put somebody in charge of this and get this thing moving! We're about to die down here!"

Environmental concerns drive energy policy, and policy drives the conventional, unconventional and alternative energy resources, regardless of the merits. How successful we geoscientists will be in developing a national energy strategy that is reasonable and sound depends on how well we communicate with the public, policy makers and the environmental community at large.

Thus, we have a fundamental decision before us, and in the words of Carville, "Change versus more of the same."

New AGI Name Reflects Diversity

The American Geological Institute, of which AAPG is member, changed its name to the American Geosciences Institute effective Oct. 1.

AGI, founded in 1948, is a non-profit federation that has grown to 50 geoscientific and professional associations that represents more than 250,000 geologists, geophysicists and other earth scientists.

AGI Executive Director P. Patrick Leahy, an AAPG member, said the disciplinary diversity of these societies has broadened as well, including space scientists, geographers, geophysicists, soil scientists, hydrogeologists, paleobotanists, educators, geobiologists, information specialists and geoscientists involved in human health.

CLASSIFIEDADS

POSITION AVAILABLE

Petroleum Exploration Geologist
Newfield Exploration
Tulsa, OK

Seeking Geologist, responsible for conducting detailed prospect analysis and play fairway assessments within the Mid-Continent Region plus the generation and presentation of prospect ideas and leads to management. This position would be located in Tulsa, OK.

The successful applicant will generate and update maps, logs, cross-sections and corporate databases with new tops, correlations, shows and other pertinent geological data. Develop regional, multi-county stratigraphic framework and subsurface correlations.

Minimum qualifications, ten years of experience, knowledge of Mid-Continent upstream oil and gas, experience with conventional and un-conventional plays, experience doing play-fairway analysis assessments. Send resume to klef er@newfield.com.

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Tenure-track Assistant Professor
Applied Geophysics

The Department of Geology at Baylor University invites applications for a tenure-track Assistant Professor in Applied Geophysics beginning August 2012. Further information is available at http://www.baylor.edu/hr/index.php?id=84120.

Applications will be reviewed beginning December 15, 2011 and will be accepted until the position is filled. To ensure full consideration, complete applications must be submitted by **January 15, 2012**.

Baylor is a Baptist University affiliated with the Baptist General Convention of Texas. As an Affirmative Action/Equal Employment Opportunity employer, Baylor encourages minorities, women, veterans, and persons with disabilities to apply.

MISCELLANEOUS

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Ads are at the rate of $2.90 per word, minimum charge of $60. And, for an additional $50, your ad can appear on the classified section on the AAPG web site. Your ad can reach more people than ever before.

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.

See employent and other classified Ads at www.aapg.org/explorer/classifieds.cfm

DIRECTOR'S CORNER

Membership Has Its Privileges – and Benefits

By DAVID K. CURTISS, AAPG Executive Director

I recently had someone ask me why geologists engaged in oil and natural gas exploration and production should be members of AAPG.

It's a very good question – and frankly, something that we should spend more time talking about.

Why become an AAPG member?

* * *

The first reason why practicing petroleum geologists should be AAPG members is to **stay current with the science**.

Our members' career paths include industry, academia and government. Some are directly engaged in finding and producing hydrocarbons. Others focus on understanding fundamental earth processes or developing new technologies to improve E&P success. Still others teach and train the next generation of oil and gas professionals. And some of our members work to ensure that these natural resources, which underpin modern society, are developed and delivered to consumers in a responsible manner.

The common element of each of these groups is a need to understand the science of petroleum geology.

That is an essential member benefit provided by AAPG through the BULLETIN and Environmental Geosciences, our two peer-reviewed journals. The many other publications and products – both paper and digital – available through the AAPG bookstore, Datapages and GIS-UDRIL also fill this need.

AAPG meetings are another great source of science information. This fall I had the opportunity to visit the Eastern Section meeting in Washington, D.C., and the Mid-Continent Section meeting in Oklahoma City. Both were well organized, well attended and provided attendees with a first-look at both emerging plays and well-established plays experiencing a renaissance thanks to new ideas and technologies.


CURTISS

As a working professional it's the reputation and personal brand you develop over the course of a career, combined with the contacts in your network that will determine your response to any future industry volatility.

If you want evidence that finding petroleum is a blend of science, technology and creativity, I urge you to attend an AAPG Section meeting.

As an Association we also recognize just how multidisciplinary the process of finding oil and natural gas is. That is why we cooperate with other societies on meetings that bring geologists, geophysicists and engineers together to explore how these disciplines intersect.

One example of this is the International Petroleum Technology Conference, coming up in just a few weeks in Bangkok, Thailand. IPTC, an annual event that rotates between the Middle East and Asia, is sponsored by AAPG, the European Association of Geoscientists and Engineers, the Society for Exploration Geophysicists and the Society of Petroleum Engineers. The goal of its technical program is to communicate technological advances and best practices throughout the exploration and production process.

In short, it's about helping attendees do their jobs better.

* * *

And that brings me to the second reason I gave for being a member of AAPG – namely, **opportunities for professional development**.

Ask a geologist active in resource plays, such as shale gas, how they stay on top of advances and they'll tell you it takes effort. Technological changes and scientific advances are accelerating, and what was best practice in the basin you're working in six months ago has likely been replaced by a new approach or tool.

That's where AAPG's education programs, particularly the Geoscience Technology Workshops, deliver significant value. These focused technical programs not only disseminate current science and technology, but also provide a forum for networking with fellow members.

It is this exchange between instructors and attendees that make GTWs such a valuable learning experience – and what drew a sell-out crowd to the International Shale Plays GTW in Houston last month.

AAPG membership also provides opportunity for recognition by your peers and to build a professional network. Both are valuable in an industry as subject to boom and bust cycles as ours.

As a working professional it's the reputation and personal brand you develop over the course of a career, combined with the contacts in your network that will determine your response to any future industry volatility. AAPG membership helps do both.

* * *

So those were my answers: Science and professional development opportunities are the two main reasons why a practicing petroleum geologist should be an AAPG member.

What would you say?

Drop me an email at dcurtiss@aapg.org and give me a few sentences describing why you became a member of AAPG and what benefits you receive.

How do *you* maximize the return on your AAPG membership investment?

We'll take a look at some of your responses and discuss how to take your membership to the next level in a future column.

Until then, keep exploring!

DIVISIONS' REPORT

Change – or more of the same?

It's the Environment, Stupid

By STEPHEN M. TESTA, EMD President

The phrase "It's the economy, stupid," was made popular by former President Clinton's campaign strategist James Carville during Clinton's successful 1992 presidential campaign against George H.W. Bush, and referred to the notion that Clinton was a better choice because Bush had not adequately addressed the economy, which had recently undergone a recession.

Currently, everyone in Washington, D.C., and across the nation is gearing up for the 2012 election cycle. It's a green energy world we currently live and work in, and regardless of the merits of coal, uranium, geothermal, gas shales – and the list goes on – what we have learned over the years, and notably over the past few years, is that environmental concerns can determine, more often than not, whether our profession and industry is successful or not.

On a large scale, one simply has to refer back to the Deepwater Horizon spill and aftermath, whose repercussions continue to adversely impact the industry, the environment and the economy.

However, it does not take a large spill to make the point that we live in an environmentally conscious world.


TESTA

How successful we geoscientists will be in developing a national energy strategy that is reasonable and sound depends on how well we communicate.

* * *

In the pursuit of energy, the unconventional and alternative energy resources arena is especially susceptible to what I commonly refer to as environmental drivers.

You may recall a case of enhanced geothermal development in Switzerland in December 2009. Enhanced geothermal essentially relies on hydraulic fracturing, or fracking, to fracture bedrock and then circulates water through the cracks to produce steam, which in turn is utilized to produce electricity. However, by its very nature, fracking can create earthquakes, albeit mostly of small magnitude.

In 2010, litigation was brought against a geologist involved with an enhanced geothermal project for inducing some 30 earthquakes – the largest a magnitude 3.4 – through drilling and injecting pressurized water into rocks five kilometers below the surface. Damage to buildings in the region was estimated at $9 million.

Although acquitted, the enhanced geothermal project was terminated. The Swiss case had significant ramifications, and sent a shot over the bow to those in favor of enhanced geothermal, previously considered a clean and virtually limitless energy source.

In the United States, the Department of Energy had provided more than $100 million for enhanced geothermal. One of the big projects was the AltaRock Energy project in my large backyard called The Geysers, about 160 kilometers north of San Francisco.

The Geysers comprise the largest complex of geothermal power plants in the world, and supply one-fifth of the renewable energy produced in California.

The AltaRock project is – in hindsight, was – President Obama's first major test to advance geothermal energy generation. The Geysers' geothermal fields are lined with active faults, and minor earthquakes have been induced

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