AAPG EXPLORER

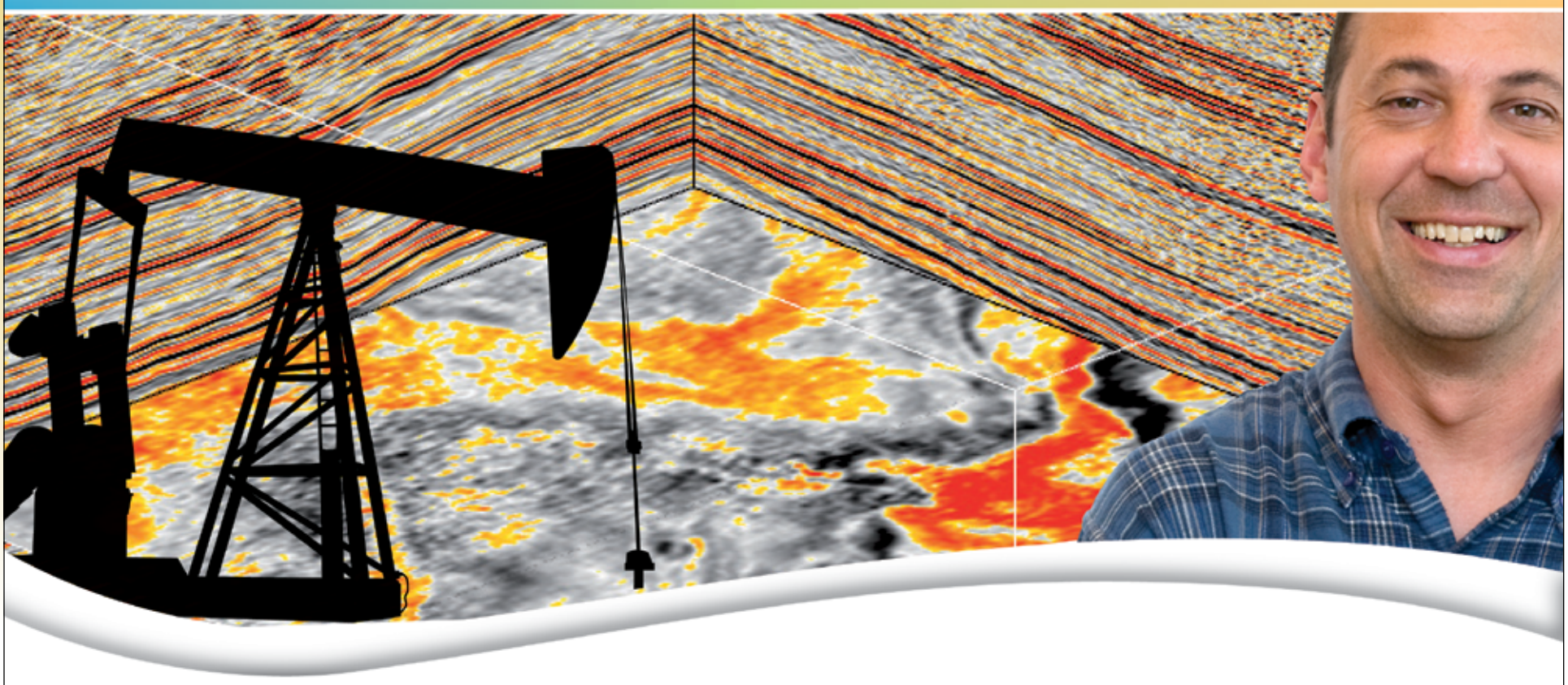
AUGUST 2011

Solid Rock

Putting a new perspective on Red Sea potential

See page 24

AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS
AN INTERNATIONAL ORGANIZATION



Vol. 32, No. 8
AUGUST 2011

AAPG EXPLORER

PRESIDENT'S COLUMN

AAPG Centennial and Janus

By PAUL WEIMER

The AAPG will celebrate its Centennial (100th) Anniversary in 2017. We aren't the oldest professional group for geologists – that honor belongs to The Geological Society of London. But we can claim the largest number of members – more than 39,000 worldwide.

The 100th Anniversary Committee already has started planning a number of special events to honor this momentous occasion. Several events at AAPG headquarters in Tulsa are planned during the anniversary year, but the big gala celebration will be held in Houston at the 2017 Annual Convention and Exibition.

There will be special projects as well, befitting this milestone and the questions that come with it, such as:

✓ In this time of rapid change in our industry, how can we look back to prepare us for the journey forward?

✓ What can AAPG provide to help all members in our jobs right now?

The 100th Anniversary Committee, chaired first by Charles Sternbach and currently by Ed Dolly, ruminated on these issues for a considerable amount of time. We would like to introduce you to five projects that are under way.

Many of the results will be located on a website to be ready soon.

Discovery Thinking Forums – We all know about geoscientists who have made great oil and gas discoveries, but how did they do it?

How did they combine science and intuition?

What did they notice that nobody else saw?


WEIMER

> We are taking the best from our past to help shape our own future.

Note: Ed Dolly is my co-author for this month's column. We have been working closely on the 100th Anniversary Committee since April 2007, and our work and words have been largely interchangeable since that time.

To answer these questions, Charles, Ed, and Ted Beaumont have organized a well-attended forum at the AAPG Annual Convention and Exhibition since 2008, showcasing famous and not-so-famous discoverers. Twenty-four of these presentations have been posted on the AAPG Search and Discovery site, with more to follow.

To learn the story behind the E&P headlines, browse the videos now that can be found at www.searchanddiscovery.com/specialcollections/discoverythinking.html.

Geo-Legend Interviews – These interviews have a similar purpose to the Discovery Thinking Forums, but have been collected in a one-on-one format with some of our industry's pioneers – top explorers, research geologists and professors.

It's incredibly inspiring to hear about not just their successes, but their struggles as well, as the personalities of these geo-legends shine through.

We currently are editing the first set of videos, featuring Mike Johnson and John Amoruso, which are scheduled to be placed on the AAPG website by the end of this year. Additional videos will be posted later, featuring pioneers from all over the world.

The project includes the efforts of many, including Charles Sternbach, Daniel Minisini, Will Green, Mike Party, Steve Sonnenberg, and us.

Landmark Papers Project – The 100-plus most significant papers on foundational principles and discovery thinking will be compiled in one place. This collection is intended to form a "body of knowledge" for our field, a key reference for students, educators and practitioners as well.

Randi Martinsen, Jim Steidtmann, and Jim Lowell are leading this project. The collection is planned to be ready by 2015.

See **President**, next page

Candidate Data Set for Website

Biographies and individual information for all AAPG candidates for the 2012-13 Executive Committee will be available online in mid-August at www.aapg.org.

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.

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.

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REGULAR DEPARTMENTS

Scan this for the mobile version of the current web Explorer.

ON THE COVER:

Gebel Duwi is a 758-foot tall mountain peak near Al Qusayr, Al Bahr al Ahmar, Egypt – and pre-rift section that is the landmark in a region studied by Hess geoscientists (left) who were looking for clues to the area's geoloic framework and hydrocarbon potential. What they found regarding this north Red Sea region led to an AAPG award-winning paper. See story, page 24. Photo by AAPG member (and part of the Hess team) Paul Whitehouse.

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President
from previous page

Outcrop Field Guides Project – As petroleum geologists, we need to study certain outcrops. But few of us are fortunate enough to visit all of the world's illustrative outcrops in person – and if we do, the nuances of interpretation may be unclear.

Andrew Hurst (project leader), Stephan Graham, and John Lorenz are leading a project to address this problem, titled "Outcrops That Have Changed the Way We Practice Petroleum Geology: A Field Guide to Classic Localities."

The deliverable will be a richly illustrated and annotated "coffee-table" book, supplemented by a searchable digital version for each outcrop study, containing maps, photographs, GPS data coordinates, and interpretations to be used by the lucky geologist in the field.

The book and digital guides are slated for release during late 2016.

AAPG: The First Hundred Years – This history of our group, compiled by Rick Fritz, will significantly update and supplement the existing books commemorating AAPG's 50th and 75th Anniversaries.

* * *

Janus was the two-headed Roman god of transition and beginnings, with one head looking to the past and one looking to the future – an appropriate symbol for the goals of this Committee.

For a professional group as large as AAPG, there are many committees and staffers working toward providing products and services for members. We wanted to highlight the Anniversary Committee this month, though, because its activities will give us tools that impact the way we do our jobs.

With the continuing evolution of concepts and technology in our profession, we are taking the best from our past to help shape our own future.

Paul Weimer

Election Results Final; Officers Announced For AAPG Divisions

Election results have been announced for all three AAPG divisions, and the new executive committees are now in place for the 2011-12 term.

The newly elected presidents-elect will serve in that role for one year and then assume their respective division presidency for the 2012-13 term.

Election results and division executive committees are:

Division of Environmental Geosciences

❒ President-elect – **Tom J. Temples**, consultant, Clemson, S.C.

❒ Vice president (one-year term) – **Nancy "Anne" Fix**, Pacific Northwest National Laboratory, Richland, Wash.

❒ Secretary-Treasurer (two-year term) – **M. Jane Ellis-McNaboe**, PG, EnviroTech Consultants Inc., Bakersfield, Calif.

Joining them on the DEG committee are:

❒ President – **Douglas C. Peters**, Peters Geosciences, Golden, Colo.

❒ Editor – **Kristin Carter**, Pennsylvania Department of Conservation and Natural Resources, Bureau of Topographic and Geologic Survey, Pittsburgh.

❒ Past President – **Mary K. Harris**, Savannah River National Laboratory, Aiken, S.C.

Division of Professional Affairs

❒ President-elect – **Charles A. Sternbach**, Star Creek Energy, Houston.

❒ Vice president – **Rick L. Nagy**, consultant, Houston.

❒ Secretary – **Mark J. Gallagher**, Encana, Dallas.

Joining them on the DPA committee are:

❒ President – **Martin D. Hewitt**, Nexen Petroleum, Plano, Texas.

❒ Treasurer – **Dan A. Billman**, Billman Geologic Consultants Inc., Mars, Pa.

❒ Past President – **Daniel J. Tearpock**, Subsurface Consultants and Associates, Houston.

Energy Minerals Division

❒ President-elect – **Andrea Reynolds**, Shell, Pittsburgh.

❒ Vice president (one-year term) – **Dale A. Fritz**, Devon Energy, Oklahoma City, Okla.

❒ Treasurer (two-year term) – **David Tabet**, Utah Geological Survey, Salt Lake City.

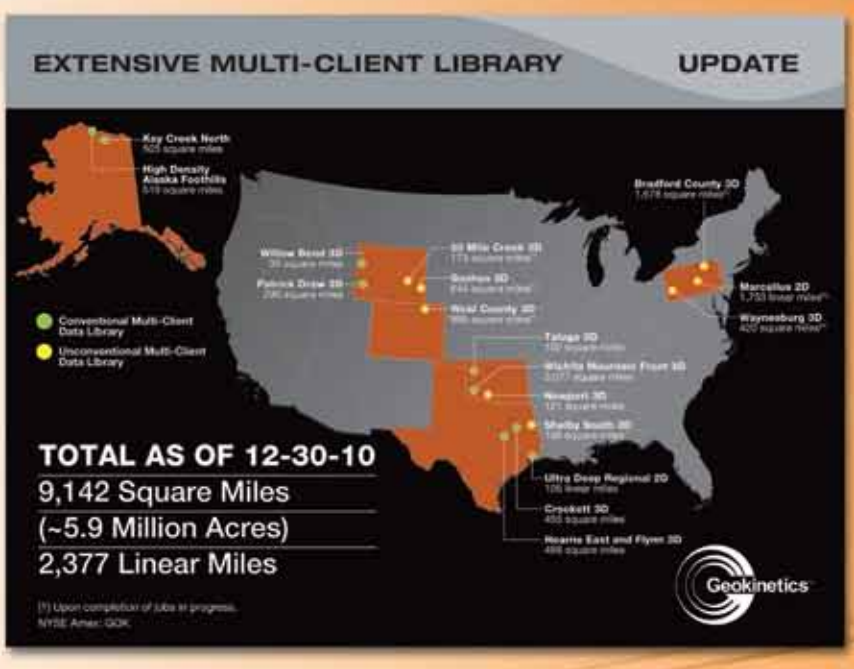
Joining them on the EMD committee are:

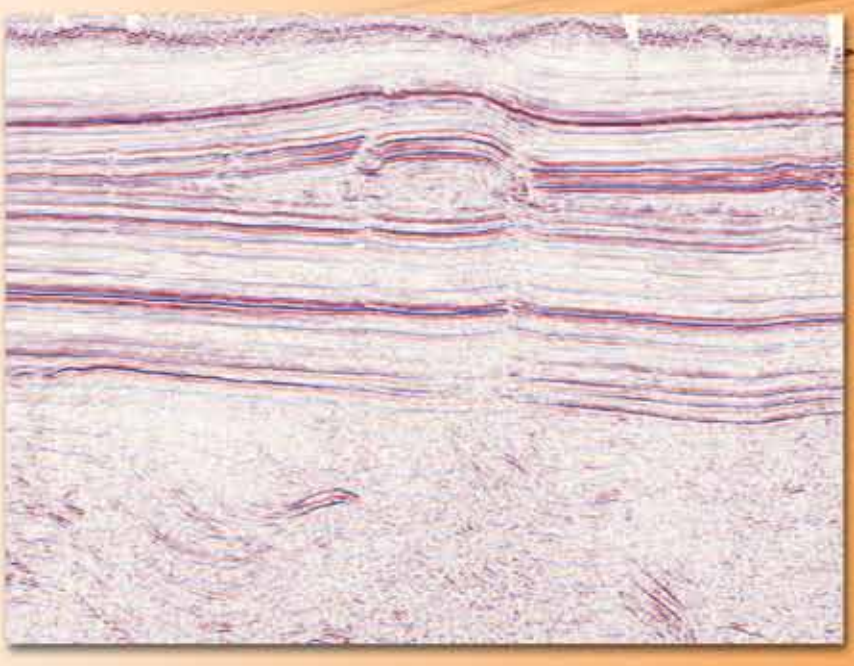
❒ President – **Stephen M. Testa**, State Mining and Geology Board, Sacramento, Calif.

❒ Secretary – **Frances J. Hein**, Alberta Energy Research Conservation Board, Calgary, Canada.

❒ Past President – **Michael D. Campbell**, I2M Associates LLC, Houston.

KNOWLEDGE





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A little sign of life

A Couple of Deep GOM Projects Get Go-Ahead

By LOUISE S. DURHAM, EXPLORER Correspondent

It's been little more than a year since the infamous Macondo oil spill in the Gulf of Mexico brought industry activity there to a screeching halt for the most part.

For the Gulf operators, it likely feels more like several years – for good reason.

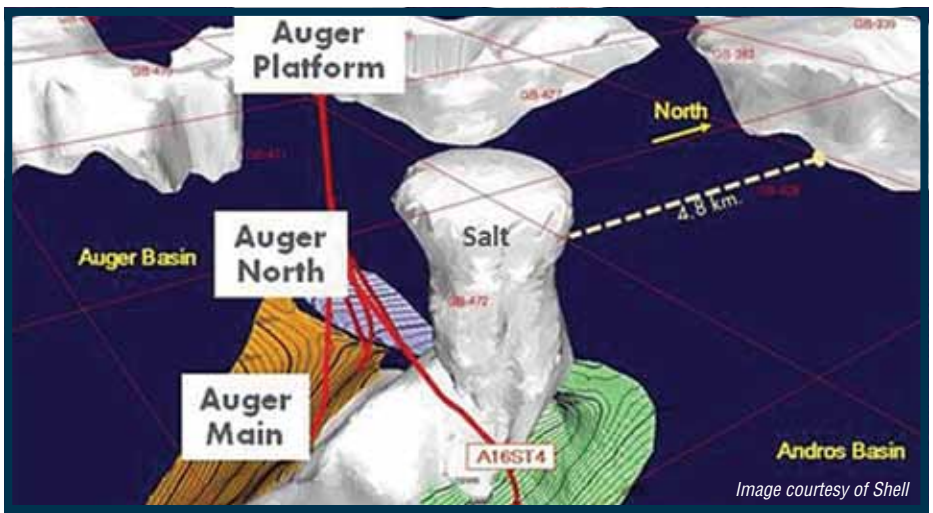
The event essentially turned the world upside down for players in this offshore arena, which provides about 30 percent of the domestic crude oil supply.

While government agency personnel plodded along devising innumerable new requirements and restrictions, especially for new deepwater permits, some rigs exited the Gulf while many field personnel endured a job hiatus or were kept busy with menial tasks.

It would be unthinkable to abandon this hydrocarbon-rich area, and the good news is that progress is being made for work to resume, albeit at the proverbial snail's pace.

Among the few permits issued since the moratorium, mainly in the shallow water, two major deepwater projects received the green light to proceed despite the dark cloud of regulatory uncertainty that continues to hover over the region.

Given the deepwater fields' reputation for major hydrocarbon resources, these particular projects likely will make the statement that the Gulf is back in business.



The Cardamom field is located 6.4 kilometers (four miles) below the seafloor on the other side of a salt column from the main Auger fields.

Keathley Canyon

ExxonMobil received a permit to resume drilling a deepwater exploration well that had been put on hold by the moratorium.

Located 250 miles southwest of New Orleans in about 7,000 feet of water, the KC919-3 wildcat well drilled into more than 475 feet of net oil pay and minor gas in predominantly Pliocene sandstone reservoirs of high quality. The well confirmed a second oil accumulation in Keathley Canyon Block 919.

As of early June, the well had reached 16,000 feet and the plan was to continue drilling.

Additional pay intervals at Keathley Canyon were encountered in 2009 and early 2010.

"We estimate a recoverable resource of more than 700 million barrels of oil equivalent combined in our Keathley Canyon blocks," said AAPG member Steve Greenlee, president of ExxonMobil Exploration Company.

"This is one of the largest discoveries in the Gulf of Mexico in the last decade," he added. "More than 85 percent of the resource is oil with additional upside potential."

Cardamom

Not far away another major project is gearing up for big things.

Shell is set to implement a multi-billion dollar investment to develop its significant Cardamom oil and gas field at Garden Banks block 427 in more than 2,720 feet of water 225 miles southwest of New Orleans. The Cardamom reservoir was discovered in 2010.

Further development drilling is on the agenda along with installation of undersea equipment.

Shell announced that the 100 percent Shell-owned project is expected to produce 50,000 boe per day at peak production and more than 140 million boe during its lifespan.

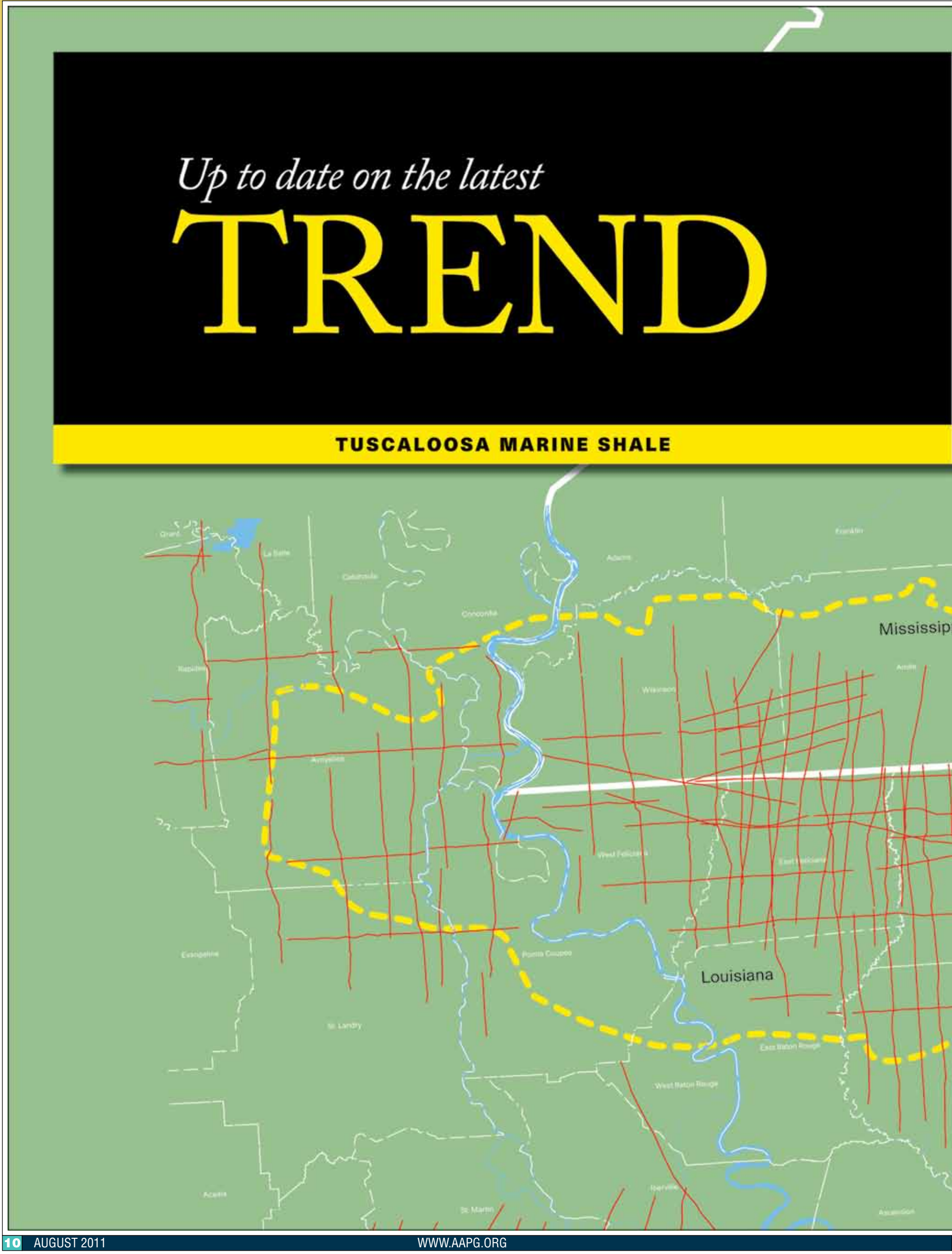
The company said its exploration plan for the field was the first to receive approval since the federal government's moratorium for drilling was lifted.

The Cardamom discovery well was drilled from Shell's Auger platform, and production from the field will flow through the Auger facility. Using existing infrastructure for production will diminish the offshore footprint.

The initial exploration well has been producing from Auger since December, 2010, and 2014 is the target date for first oil from the full project.

According to Shell, modifications to the Auger platform will include additional subsea receiving equipment, a new production train and weight mitigation. This is expected to significantly increase the

See **Activities**, page 14


Up to date on the latest
TREND
TUSCALOOSA MARINE SHALE
Louisiana
Mississip

Alteration, charging history play role

All Crudes Are Not Created Equally

By LOUISE S. DURHAM, EXPLORER Correspondent

KATZ

Scientific knowledge about the origins of oil in the Gulf of Mexico Basin and the resulting impact on oil quality has evolved over a long period of time.

The biggest changes probably took place 20 to 25 years ago, according to AAPG member Barry Katz, Chevron Fellow and team leader for hydrocarbon charge at Chevron.

Katz Talk Set for GCAGS Meeting

AAPG Honorary Member Barry Katz will present his paper "Evolving Thoughts on the Origin of Oil in the Gulf of Mexico Basin and Its Impact on Oil Quality," at the next Gulf Coast Association of Geological Societies annual meeting, set Oct. 16-19 in Veracruz, Mexico.

The meeting's theme is "Sharing Knowledge to Add Value," and the event marks the first time a GCAGS annual meeting has been held in Mexico.

Katz' talk will be offered at 1:30 p.m. Tuesday, Oct. 18, as part of an oral session on Petroleum Systems and Oil Quality Controls in the Gulf of Mexico.

Information and registration details for the GCAGS meeting can be found online at gcags2011.com.

He noted that's when a step-change occurred.

"Before that, people thought every sand had its own source," he said. "It's a very different working model that we have today; it has been a gradual evolution."

And it's one that continues today – something Katz will talk about during a presentation at the upcoming GCAGS meeting in Veracruz, Mexico.

He attributes the evolution of understanding of the origins of the oils in the Gulf basin to evolving thoughts on petroleum geochemistry and the significant expansion of the available geochemical database.

Katz works the deepwater, although not the GOM. He has a particular interest in oil quality.

He emphasized that oil quality is of increasing economic importance as exploration shifts to deeper water and as reservoirs become more challenging, owing to the impact of the quality of the oil on producibility and price.

Unlocking GOM Origins

Years of study established that multiple petroleum systems ranging in age from the Jurassic to the Eocene occur in the GOM and are geographically limited. These systems produce oils of differing initial quality, depending on their lithology and depositional setting.

Source rock attributes of these systems have largely been inferred via hydrocarbon geochemistry instead of detailed source rock characterization and definitive correlations.

Katz noted there were three keys to unlocking current understanding of the GOM's oil origins:

- Acceptance of the disassociated nature of the Gulf's petroleum systems.

It's now recognized that instead of being source-related, variances in oil character are caused by either post-charging alteration, level of maturation and/or charge timing differences.

- Agreement that source rock volume was not an effective substitute for source rock quality.

General acceptance that low concentrations of organic matter do not allow efficient expulsion.

- Overall acceptance of the importance of vertical migration in deltaic systems and where halokinesis has occurred.

Katz emphasized that the nature of the source rock is a very strong component of what is controlling oil quality in the Gulf, just like anywhere else.

"In addition to the nature of the source rock, the alteration and charging history play an important role in establishing oil quality," he noted. "Alteration processes include biodegradation, water washing, phase segregation and de-asphalting.

"The charging history includes both the actual time of emplacement, late versus early generation, as well as whether multiple charging events might have occurred, introducing the potential for oil mixing," Katz added.

"Although most oil quality discussions focus on the degradation of oil quality," he said, "increasing thermal maturity of the source or thermal stress on the oil-bearing

See **Gulf Evolution**, page 14

‘Early Bird’ Savings Available Via Online Registration for Milan ICE

Online registration is available for this year’s AAPG International Conference and Exhibition – and registering now can help you save hundreds of dollars in fees.

This year’s conference will be held Oct. 23-26 in Milan, Italy.

Members who register before either of the “early bird” deadlines (Aug. 3 and Sept. 21) can save hundreds of dollars off registration fees.

Also available online are housing details and complete information on this year’s technical program, which is built on the theme “Following Da Vinci’s Footsteps to Future Energy Resources: Innovations From Outcrops to Assets.”

General chair Jonathan Craig said the meeting will celebrate and aspire to the creative vision and spirit of innovation historically associated with Milan and the region.

The technical program focuses on seven specific technical themes:

- Carbonate Reservoirs: From Pores to Production – Aspects covered will include the stratigraphic analysis and sedimentology of carbonate sequences, plus the latest developments in the seismic imaging and modeling of carbonate reservoirs and sequences.
- Where Africa Meets Eurasia: Exploration and Production in the Alpine-Himalaya Fold Belt and Foreland Basins – The tectonic evolution of the Alpine-Himalayan chain and its influence on sedimentation, discussed using a variety of technologies, outcrop analogs and case studies.
- Rifts and Deltas – Focus will be on rift to drift tectonics, crustal stretching and heat flow, pre-salt plays, continental and lacustrine reservoirs and delta systems from shelf to basin floor.
- Advances in Integrated Geoscience Applications – A session on all aspects of geoscience and reservoir engineering as applied to conventional and unconventional resource plays with emphasis on the value of integration of disciplines.
- Reservoir Management: From Outcrops to Assets – A look at new technologies, work models and world-class reservoirs.
- Dynamic World of Uncooperative Reservoirs: The Geoscience of Unconventional Resources – What makes these reservoirs special? (See page 42.)
- Leading-Edge Technologies and the Future of E&P – The challenges of carbon management, new and leading-edge technologies in geoscience and reservoir engineering and future technological developments in the E&P industry.

To register or for more ICE details go online to aapg.org/milan2011.

Activities

from page 8

Cardamom liquid handling, cooling and production capacities.

Cardamom presents a meaningful example of the myriad opportunities awaiting GOM explorers using the latest technology.

Shell noted the discovery was a result of advances in seismic imaging and extended reach drilling. Its potential was initially recognized in the early stage of the Auger development, but it couldn’t be fully assessed owing to a layer of salt in close proximity, which affected the quality of traditional seismic images.

Noteworthy improvements came about via seismic imaging advances.

Gulf Evolution

from page 12

reservoir results in higher quality crude oils.

“Another means of improving oil quality is through hydrocarbon recharge and the introduction of fresh hydrocarbons into a biodegraded pool,” he added.

The Value of Quality

Oil quality is a key component in establishing flow rates, flow assurance, producibility and the character of refined products. This is of particular importance in reservoirs where permeability is low and oil quality might limit flow, such as the Wilcox in the deepwater Gulf.

When queried as to the impact of this knowledge on the leasing process, Katz noted that identification of which systems are working in different parts of the Gulf is taken into consideration, because this drives the nature of crude being generated.

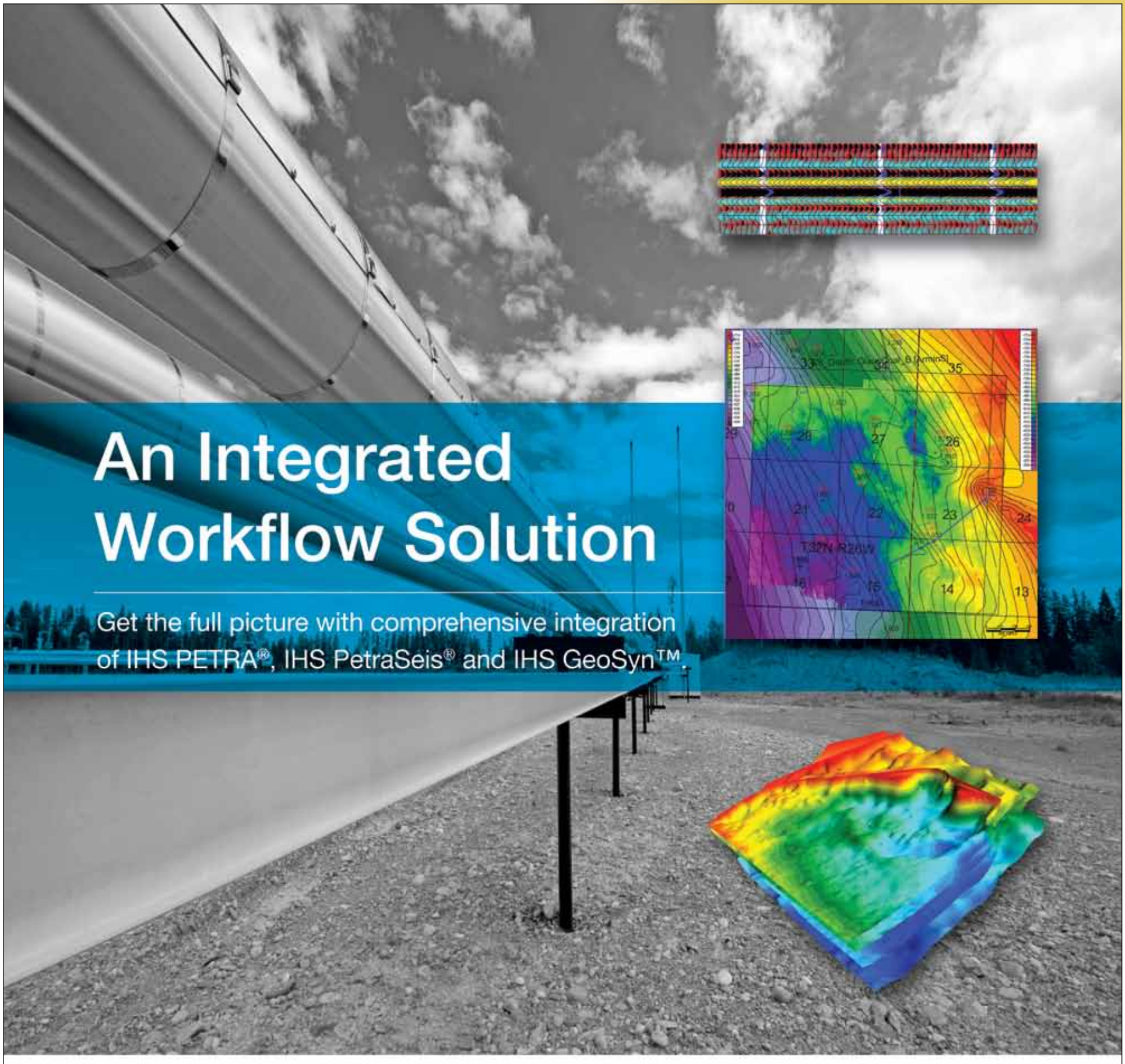
That, in turn, controls price at the wellhead, API gravity and how well it will flow.

“You take what you know and put it into the framework,” he said. “You want to come up with a reasonable economic model, and part of that is oil quality.

“We all see Brent and WTI quoted daily,” Katz noted. “But there’s a big range of values daily in the crude oil market as things are being discounted because of sulfur presence, lower API or higher metals.

“You like to know as close to upfront as you can what you’re going to get,” he emphasized. “You don’t want to wind up with high sulfur content you’re not prepared for, because there won’t be any space on the platform to deal with it.

“But you don’t overbuild to deal with something that doesn’t exist.”



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.

See more solutions at www.ihs.com/aapg

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Photo courtesy of Indigo Minerals

A flare from the vertical "test" well that Indigo drilled recently in Vernon Parish, which established production in the Louisiana Eagle Ford.

Similar in age and lithology to Eagle Ford

Tuscaloosa Another Shale Playground

By LOUISE S. DURHAM, EXPLORER Correspondent

The word on the street indicates the next potentially big U.S. shale oil play is … drumroll, please:

The Tuscaloosa Marine Shale (TMS).

Covering about 2.7 million acres and quite possibly more (depending on where one draws the boundary) across central Louisiana and reaching into southwestern Mississippi, this Cretaceous-age shale play is creating quite a stir, with early participants scurrying to prove the evolving play has legs.

The Marine shale zone is sandwiched between the upper and lower units of the Tuscaloosa formation, which has long produced enormous volumes of hydrocarbons from the fields drilled along the famed Tuscaloosa Trend.

The consensus among many geologists is the deep, high pressure Marine shale has sourced the amazingly productive sands in the Tuscaloosa Trend.

In west-central Louisiana, the target shale in this new play is referred to as the Louisiana Eagle Ford by some industry folks, who note that it is similar in age and lithology to the highly productive, liquids-rich Cretaceous-age Eagle Ford interval in Texas.

The Eagle Ford in Louisiana actually is dubbed the Eutaw. It lies atop the age-equivalent Tuscaloosa formation in the east, which is the locus of most of the current new action as well as earlier activity.

Similarities in lithology make it difficult to distinguish the Eagle Ford from the upper Tuscaloosa sands and clays.

Players in this new hot spot include Devon Energy, Amelia Resources, Indigo II Louisiana Operating LLC, Encana Oil & Gas (via a partnership with Denbury Resources) and Goodrich Petroleum.

The carrot luring operators and others to pursue the Tuscaloosa Marine shale occurs in the form of perhaps seven billion barrels of oil awaiting recovery. This is the estimated volume noted in a study published in 1997, "An Unproven Unconventional Seven Billion Barrel Oil Resource – The Tuscaloosa Marine Shale."

The study and resulting publication are a product of what at that time was Louisiana State University's Basin Research Institute, which is now the Basin Research Energy Section of the Louisiana Geological Survey, noted AAPG member Chacko John, LGS director in addition to state geologist and research professor at LSU.

"We did the study based strictly on logs, because we didn't have access to any cores," John said.

"We're getting calls all the time now about the play, mostly from landowners who want detailed information," he added, "particularly about how much their land is worth."

The Tuscaloosa Marine Shale once was viewed as no more than a nuisance zone.

Devon's Presence

A lot of eyes currently are focused on Devon, which has acquired a leasehold of 250,000 acres across the shale in several Louisiana parishes and plans to drill two horizontal wells in the eastern area of the play this year.

The wells reportedly may undergo as many as 15 frack stages.

The shale is about 200 to 400 feet thick at depths of 11,000 to 14,000 feet across Devon's acreage position.

Devon reportedly is anticipating a decision from the Louisiana Department of Natural Resources Office of Conservation regarding its requested approval for a drilling production unit in the Ethel Field in East Feliciana Parish, where it drilled a vertical well to greater than 15,000 feet in depth.

AAPG member M.B. Kumar, chief geologist of the Conservation Office's geological oil and gas division, reportedly commented that Devon's application for a production unit shows the company believes the area around the well contains multiple leases.

Indigo, running neck and neck acreage-wise with Devon, has scooped up over 240,000 net acres of leasehold and mineral fees in central Louisiana in the western part of the play, according to Indigo chairman and CEO Bill Pritchard.

See **Marine Shale**, page 20

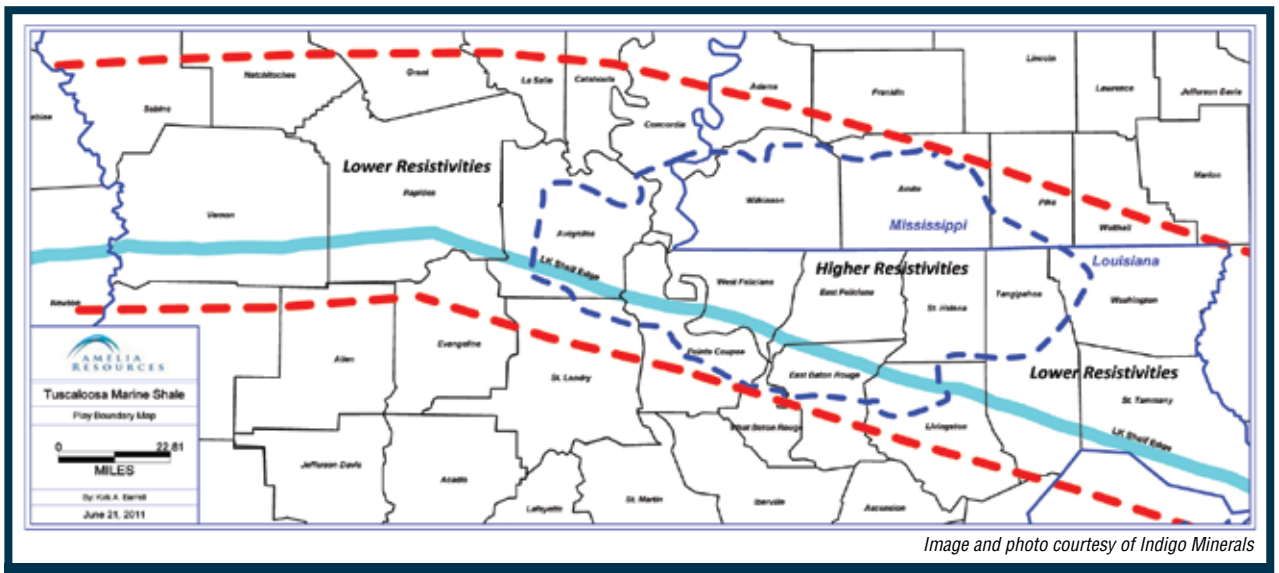

Image and photo courtesy of Indigo Minerals

The Cretaceous-age Tuscaloosa Marine Shale covers about 2.7 million acres and quite possibly more (depending on where one draws the boundary) across central Louisiana and reaching into southwestern Mississippi.

Indigo's test well in Vernon Parish, where the "Louisiana Eagle Ford" is underlain by the Edwards limestone rather than the main body of Tuscaloosa sand.

3-D Survey Eyed For Marine Shale

By LOUISE S. DURHAM
EXPLORER Correspondent

The deep, high-pressured Tuscaloosa Marine shale in central Louisiana has long toyed with many industry explorers, spitting out just enough oil to tease even the most sophisticated geoscientists as operators drilled through it toward other zones.

As a result, there have been on-again, off-again attempts over the years to kick off a Tuscaloosa Marine shale play in central Louisiana.

The current effort involves a number of operators and is in high gear – and it may finally prove or disprove the economic recoverability of the estimated seven billion barrels of oil residing in this rock.

It no doubt will be a challenging task, but some high tech help is in the making in the form of brand new 3-D seismic data, according to AAPG member Clint Moore, vice president of corporate development at ION Geophysical Corp.

"Here at ION, we've developed a plan and are evaluating the technical and commercial scope for what could potentially be a large, multi-thousand-square-mile 3-D multi-component seismic survey," Moore said. "It would be the most advanced and extensive ever acquired across central Louisiana.

"Incorporating an image-based survey design and using INOVA's cableless FireFly seismic acquisition system, we would minimize the environmental impact in the valuable densely-wooded southern pine forests in the region," he noted, "and we would meet the structural imaging and reservoir characterization needs of operators with acreage positions in the Tuscaloosa Marine Shale play and the (overlying) Austin Chalk play."

Moore said the seismic data would be processed using ION's GXT data processing toolkit, which will allow maximum resolution of the sweet spots in both the shale and the chalk.

"Explorationists would be able to technically high grade their acreage and drill the most geologically optimal locations earlier in the drilling program," he said.

"With the rock property insight gained from our program," Moore added "the frack engineering teams will be able to optimize completion strategies in these tight, fractured resources."

Resistivity Varies

By LOUISE S. DURHAM, EXPLORER Correspondent

It remains to be determined just how brittle or ductile the Marine shale is. This characteristic undoubtedly will fluctuate across the play and impact the rock's susceptibility to successful hydraulic fracturing.

Where the rock may be too soft to hold the fractures open, then it's back to the drawing board – or onward to other plays.

Based on well log analysis, resistivity varies across the play. Higher resistivities of 7 ohm-m on average occur consistently across the area of the Louisiana/Mississippi state line in Wilkinson and Amite counties, West and East Feliciana, St. Helena and Tangipahoa parishes, according to AAPG member Kirk Barrell, president of Amelia Resources. In Washington Parish to the east, they drop to the 2.5 ohm-m range, whereas they average 3-5 ohm-m Rapides and Vernon parishes to the west.

A Scout Report dated June 22, 2011 detailed the TMS activity in:

- Devon Energy vertical well: 15,500´ TD; E. Feliciana Parish; setting casing.
- Devon Energy horizontal well: 18,950´ MD; E. Feliciana Parish; permitted.
- Indigo II vertical well: 12,020´ TD; Vernon Parish; post-frack; waiting on state potential.
- Indigo II horizontal well: 15,500´ MD; Rapides Parish; permitted.
- Encana Oil & Gas (USA) Inc., horizontal well: 15,230´ MD; Amite County; re-entry; post frack; frack results not known.

Marine Shale

from page 16

A vertical "test" well that Indigo drilled recently in Vernon Parish established production in the Louisiana Eagle Ford, as Indigo references the target interval on its leasehold. In this locale, the zone is underlain by the Edwards limestone rather than the main body of Tuscaloosa sand.

"We call it the Louisiana Eagle Ford, because it's more like the Eagle Ford than what's going on to the east," Pritchard noted. "We have better calcite percentage, which means a better ability to frack."

Pritchard emphasized that they're cheering for the success of the companies to the east, e.g., Devon, noting that "a rising tide lifts all boats."

Indigo will spud a horizontal well in the play in Rapides Parish in July.

'Father' Moore

The Tuscaloosa Marine Shale once was viewed as no more than a nuisance zone. Yet it was known to throw oil on occasion when the drill bit passed through, causing it to pique the interest and imagination of many geoscientists over the years.

"I don't think it's a stretch to call my dad, the late wildcatter/geophysical engineer Alfred C. Moore, the 'Father of the Tuscaloosa Marine Shale play,'" said AAPG member Clint Moore, vice president of corporate development at ION Geophysical.

"He was responsible for the initial focused effort to produce the shale in 1970, when he sold a Marine shale project to his former employer, Sun Oil," Moore noted. "He also had partnered with Sun in Tuscaloosa sand wells, all the while documenting oil shows from the shale just above the Lower Tuscaloosa sands."

Based on the elder Moore's project, Sun drilled a Marine shale well in Pike County, Mississippi, in 1971. The well had shows and was fracked, but was plugged.

Undaunted, Moore persevered, selling his project to Callon, which put down two wells – with the second giving up a total of 3,500 barrels.

He then took the project to Texas Pacific, which drilled the #1 Blades well in northern Tangipahoa Parish in 1977. The non-commercial well has produced 24 Mbo over the past 30 years from 134 feet of perfs and continues to give up a few bopd.

Alas, Alfred Moore's hopes to spur a major Marine shale development were dashed when the partnership's leaseblock of 10-year leases expired.

Current Activity

It's a whole different world today where sophisticated horizontal drilling technology along with high-tech multi-stage fracking procedures can create barn-burners out of wells that likely would be dusters otherwise.

Still, each shale is different; in fact, properties within the same shale zone can vary from well to well, meaning these babies can require some high level customized care.

Prior to Denbury's purchase of Encore Acquisition, Encore took on a large leasehold in the Marine shale, acquiring acreage on the state line in the northeast end of East Feliciana Parish and going into Amite County, Mississippi.

Encore drilled four horizontal wells in 2008. The initial three holes were plagued with myriad problems, and completions reportedly were not state-of-the-art, which can be a death knell of sorts for a shale well.

Each well reportedly underwent only three frack stages, yet they're still producing, albeit at miniscule rates, according to Zach Hart, reservoir engineering manager at Indigo. He quoted public data listing current production at 10 bopd for two of the wells and four to five bopd for the other.

Encana recently took over as operator of the fourth Encore horizontal well in Amite County; it was not completed earlier.

(At press time, Encana informed Clint Moore that it had filed a completion report on the Board of Education 1-H horizontal well; the find has been dubbed the Alfred Moore field – a fitting posthumous tribute.)

It's said that where there's a will there's a way, and some serious will can be generated by an estimated seven billion barrels of oil waiting to be tapped.

Significant risk is a given, but it doesn't require big bucks to stake a claim – for now.

"About five months ago, the leasing price per acre was about $75 for a three-

See **Shale**, page 22

Jordan

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Drastic budget cuts spell doom

What? No Geological Survey in Louisiana?

By LOUISE S. DURHAM, EXPLORER Correspondent

The attention-grabbing antics of rapscallion Louisiana politicians who often rule the roost, so to speak, have long overshadowed the state's considerable importance to the United States, particularly in the energy milieu.

The region is rife with oil and gas fields, both on- and offshore, which have contributed significantly to the domestic energy supply for many years. Top this off with the many petrochemical complexes and refineries, and it's an impressive mix.

For the past couple of years, the E&P spotlight has focused on the relatively new high-profile Haynesville Shale gas play, concentrated mainly in northwestern Louisiana.

The new, new play on the unconventional shale scene is the Tuscaloosa Marine Shale spreading across central Louisiana and into southwestern Mississippi. It has evaded commercial production for years but may be on the cusp of a successful run given the newly initiated ongoing activity there. (See related stories, page 16.)

Together, the two plays have the potential to create jobs, jobs and more jobs.

But not at the Louisiana Geological Survey (LGS), whose days appear to be numbered.

Given the notable evolving plays in the state's oil patch, it's ironic, indeed, that the LGS may soon be rendered extinct owing to lack of funds.

Created legislatively in 1934, the agency was moved out of the Department of Natural Resources in 1997 to Louisiana State University (LSU), where it has been physically housed since its creation.

For the fiscal year that ended June 30, the 17-staff-member LGS had a budget of $980,948 funded from the state appropriation to LSU. This followed a cut of about 13 percent during the previous three years.

It gets worse.

"Our budget will be cut 34 percent this year and maybe more," said LGS director and state geologist Chacko John, an AAPG member. "The budget is set to be phased-out within three years.

"LSU expects LGS to totally fund itself from grants and contracts from external sources during this three-year time span," he added. "This is virtually impossible, especially in today's economic climate."

The situation brings to mind the adage "cutting off your nose to spite your face."

"The Survey has attracted millions of dollars in external research funding to LSU while associated with the university," John remarked. "Our research projects, contracts, grants and publications are extremely valuable to explore Louisiana's oil, gas, water and mineral resources."


JOHN

Key Contributions

Another bit of irony comes into play when considering the LGS folks were way ahead of the game when it comes to the Tuscaloosa Marine shale.

In 1997, under the aegis of the then LSU Basin Research Institute, they first researched and published a report that tagged the TMS as an unproven unconventional seven billion barrel oil resource.

"With all of the Marine shale activity today, people are wanting more detail," John said, "but we can't do anything now because of the budget cuts."

The LGS has long had a full plate in addition to oil and gas. A look at only a few of its numerous other key contributions is revealing:

- Faculty and staff often have taken on crucial roles during hurricanes, assisting agencies ranging from federal to local to accomplish rescue and other efforts, in large part via specific map creation.

- The agency has been modeling freshwater aquifers and has a two-year grant from three parishes to analyze data from hundreds of wells to acquire information critical for continued development of the Haynesville shale play.

- Given the LGS staff's recognized expertise in developing the geopressured-geothermal resources of the Gulf Coast, LGS is among the state geological surveys assisting the DOE in a $21 million program to establish a national data base of geothermal information.

In the oil and gas arena, it's no small matter that the Basin Research Energy Section of the agency fills the role of a geological research group catering to the requests and needs of independent oil and gas companies, who have no in-house research staff (in most cases). These companies have long been the backbone of Louisiana's success in oil and gas E&P.

Should the LGS actually be dismantled, Louisiana will be the only state in the continental United States without a state geological survey.

Shale
from page 20

year paid-up lease," said AAPG member Kirk Barrell, president of The Woodlands, Texas-based Amelia Resources, which generates prospects and then seeks out partners. "They're now getting $200 an acre for three years paid-up, and most are getting two-year extensions for another $200.

"Well costs of about $9 to $15 million each is my guess, with vertical depth of about 10,000 feet to 15,500 feet, depending on where you are in the play," Barrell noted.

Amelia has transacted a deal covering about 55,000 acres with a partner and is marketing additional acreage across the play.

Photo courtesy of Paul Whitehouse

A team of Hess geoscientists studied the rugged terrain surrounding Gebel Duwi in the north Red Sea region, looking for clues that could help answer questions about the area's potential.

Team gains in understanding deposition

Red Sea an Intriguing Frontier

By DAVID BROWN, EXPLORER Correspondent

Does the north Red Sea area hold more energy resources than we ever realized?

That might seem like a strange question, because both Saudi Arabia and Egypt border the north Red Sea – and, yes, those countries are known to have some hydrocarbon resources.

What's surprising is the possible extent of additional resources in the area:

- Hess Corp. has evaluated Red Sea geology for a drilling program on its exploration block there. The studies found "all the key elements of the Gulf of Suez petroleum system exist in the north Red Sea."
- Recent years have brought a flurry of gas discoveries in the Nile Delta. In November, BP Egypt reported an Oligocene deepwater discovery on its Hodoa prospect in the West Nile Delta area.
- Apache Corp. continues an active program in northern Egypt, stretching as far east as Beni Suef in the Nile Valley. Somewhat under the radar, Apache completed 177 wells in Egyptian Middle-to-Late Cretaceous targets during 2010 and planned to complete another 171 this year.

Most of Apache's attention in Egypt has shifted to its western concessions, including the Faghur Basin, where it recently reported results of a discovery that flowed 7,150 barrels of oil and 11.4 million cubic feet of gas per day.

- Israel, with a small patch of shoreline on the Gulf of Aqaba, could have 250 billion barrels of oil in oil-shale deposits. The country is starting an initiative aimed at commercial production.
- China-based seismic company BGP recently completed an acquisition project for Saudi Aramco. It also began conducting a large-scale, complex 2-D survey around the Red Sea, including both onshore and offshore areas.
- And some of the most intriguing frontier exploration possibilities lie in the Red Sea itself.

Hess is evaluating chances on its North Red Sea Block 1 concession, where a well drilled in 1,700 meters of water on the Cherry prospect earlier this year failed to find commercial production. Hess had an 80 percent interest in the well and Premier Oil 20 percent.

"This has been a block where four wells had been drilled, and they found shows but no large hydrocarbon accumulations," said AAPG member Jennifer Scott, a geologist for Hess in London.

"What Hess has been looking at is whether the Gulf of Suez play can be extended south," she said.

Scott's credentials to speak to the subject are strong; she presented an overview of the petroleum systems of the north Red Sea and evaluation work done by Hess scientists at the 2010 AAPG International Conference and Exhibition in Calgary.

The paper was so well received that it won last year's Gabriel Dengo Memorial Award, presented to honor the best oral presentation at the conference.

Her co-authors were AAPG members Benn Hansen, Niall McCormack and Laura Lawton, all with Hess in London, and AAPG members John Guthrie, Steve Crews, Andy Pepper and Caroline Burke, all with Hess in Houston.

Other co-authors were Graeme Gordon, Dean Griffin, Rod Graham and Tim Grow.

Two Were Better Than One

Scott said a key to their analysis was evaluating the potential presence of two source rocks – and first and most important was a marine, pre-rift source rock found in other parts of the region.

"We were looking to see if that prolific source rock could be extended to the north Red Sea," she said.

The other was a secondary source rock intermittently present. She described it as "not as dependable, but it is thought source some fields in Saudi Arabia."

"One thing that was a game-changer was the onshore bore holes that Hess was involved in," Scott said. "The holes went through these pre-rift rocks, and we were hoping we'd find the source rock there."

Although some samples and data were available from older drilling in the 1970s, Hess went to Cairo for permission to get more samples for study, she said.

Testing of shallow boreholes showed a thick, oil-prone section within 50 kilometers of where Hess wanted to drill.

The secondary source rock also appeared to be present.

"I went back and looked at the geochemistry of the oil from the wells that had been drilled before. When we plotted out the oil shows, it was actually a mixture of the sources," she noted.

Scott primarily used two biomarkers to evaluate the oil shows – one a marker based on carbonate content, the other an anoxia indicator.

"You could separate out the oil families based on these facies indicators," she said. "The overall trend of the biostratigraphy matched what we were seeing in these oil families."

A New Framework

A multi-disciplinary team at Hess developed a new framework for the region. Onshore fieldwork and mapping of sediments and faults led to a better understanding of sandstone and carbonate deposition offshore.

A special difficulty in identifying prospects on the offshore Hess block is the need for subsalt imaging.

"Imaging subsalt is quite a challenge, but at Hess we have an internal expertise," Scott said.

According to Scott and the Hess team, reprocessing and new seismic data acquisition have "produced a step-change improvement in imaging of the prospective pre-rift section."

Hess scientists have used several approaches in evaluating the north Red Sea's prospectivity, "trying to think of new ways to solve the problem," Scott said.

In her work, "I had a load of meetings by teleconference with our global experts in Houston who were sort of mentoring me on the process," she noted.

"In doing the geochemistry, I actually used a piece of software used by our planners. It was a novel use that allowed me to analyze a large amount of data in a short time," Scott said.

The Red Sea exploration block held by Hess covers a 100-kilometer by 250-kilometer area, Scott said. She called it a "completely frontier exploration area."

"The size of the block is really large – it's humongous," she said. "And there are only five wells there now."

SPOTLIGHTON ...

'Team' Internship Changes Career Course

By DAVID BROWN, EXPLORER Correspondent

Petroleum geology has always attracted bright young people.

Thankfully, diversity is now entering the profession, as evidenced by an increasing number of them today are women.

AAPG member Jennifer Scott, who goes by "Jenni," is a petroleum geologist for the Regional New Ventures Team at Hess Corp. in London, England.

Geology was a natural choice for Scott, if not an obvious one.

"I wasn't sure when I was at college what I wanted to do – I actually thought for a long time that I wanted to be a lawyer," she recalled.

Scott is from Northern Ireland. Her uncle, a minister in Dublin, once allowed a fledgling rock band to practice in his church hall, she said.

That Irish band was U2.

Ireland's relatively small size and social closeness mean such coincidences are not uncommon, according to Scott.

"In the rest of the world, they say there are six degrees of separation," she said. "In Ireland, there are about two."

SCOTT

Scott attended Cambridge University in England, where she joined and was president of the Cambridge Union debating society and contemplated life as an attorney.

That changed after she took a summer internship at Shell Exploration in Rijswijk, the Netherlands.

"The internship was a real project," she said. "You were part of a team."

At Shell she witnessed first-hand the arguments over a drilling prospect.

"With the debating and the thinking and also the science, I found that working at an oil company really pushed my buttons," she said.

After graduating from Cambridge, she went into a master's program at Imperial College in London.

"I ended up specializing in geology at Cambridge. I'd say my focus at that time was structural. At Imperial I broadened and did quite a bit of work in sequence stratigraphy, biostratigraphy," she recalled.

Involvement with AAPG contributed to her development as a geologist. She was on the Imperial College Imperial Barrel Award team that captured second place at the 2008 AAPG annual meeting in San Antonio. Also helping was experience gained on field trips as a graduate student to Utah and the Wessex Basin in England.

The highlight of her AAPG experience so far might be winning the 2010 Gabriel Dengo Memorial Award, presented for giving the best oral presentation at the AAPG International Conference in Calgary.

"I absolutely couldn't believe it when I got the email. I have the award on my desk and I still look at it and think, 'How did that happen?'" she said.

Closing in on three years as a geologist at Hess, Scott said she couldn't be happier with her choice of careers:

"I am so grateful, because for years I could have been a lawyer. Oh, dear!"

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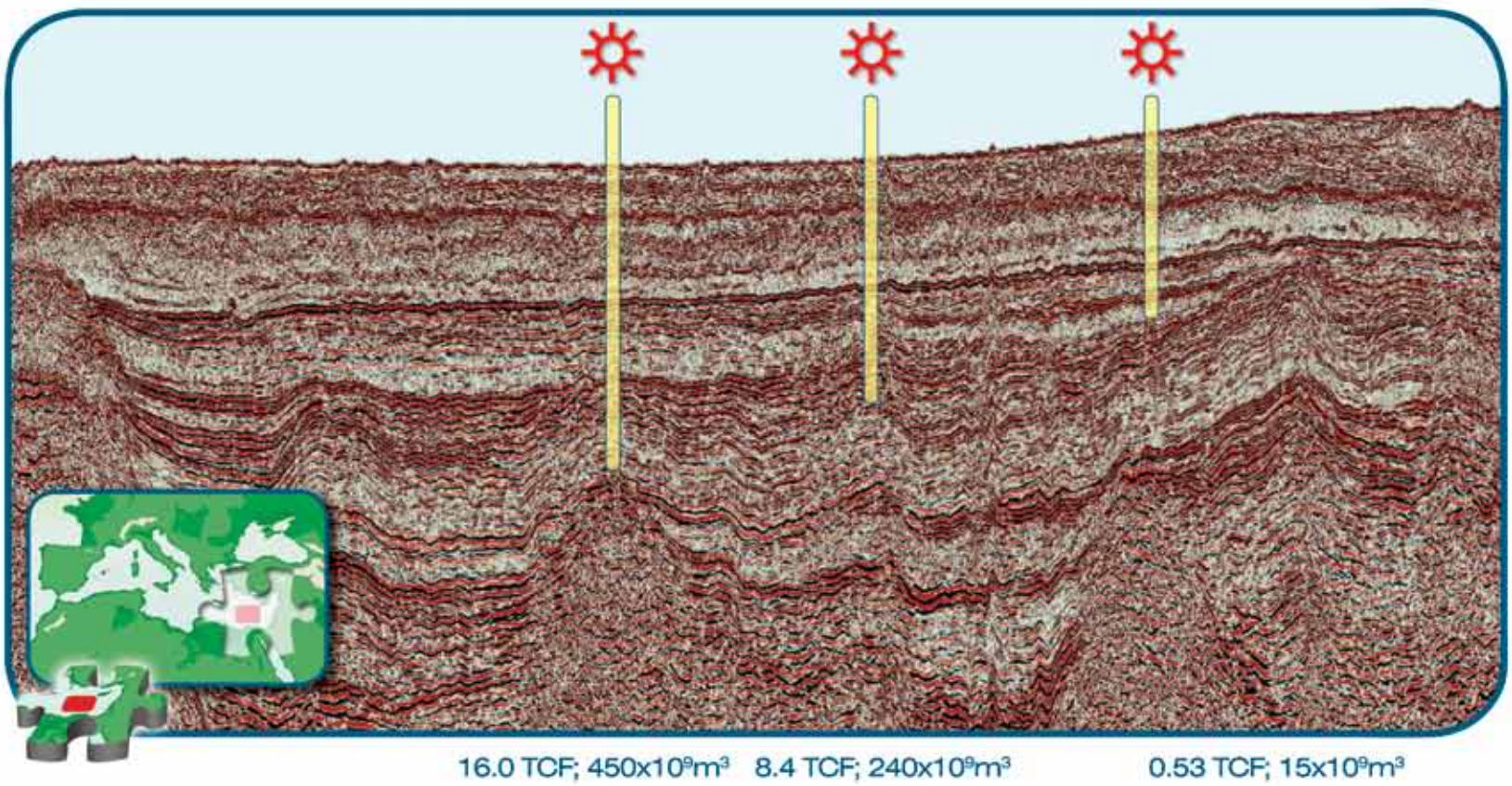

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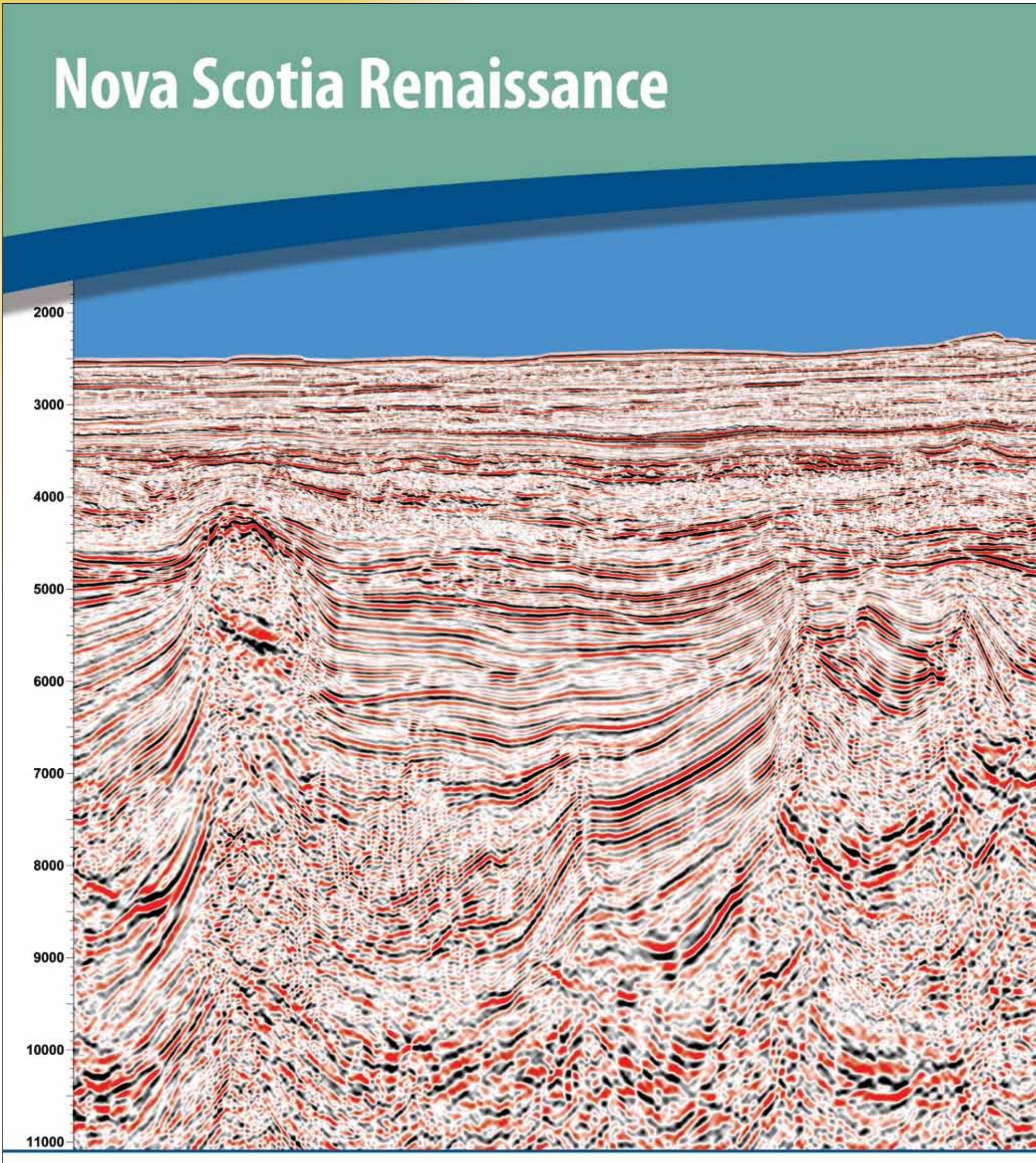
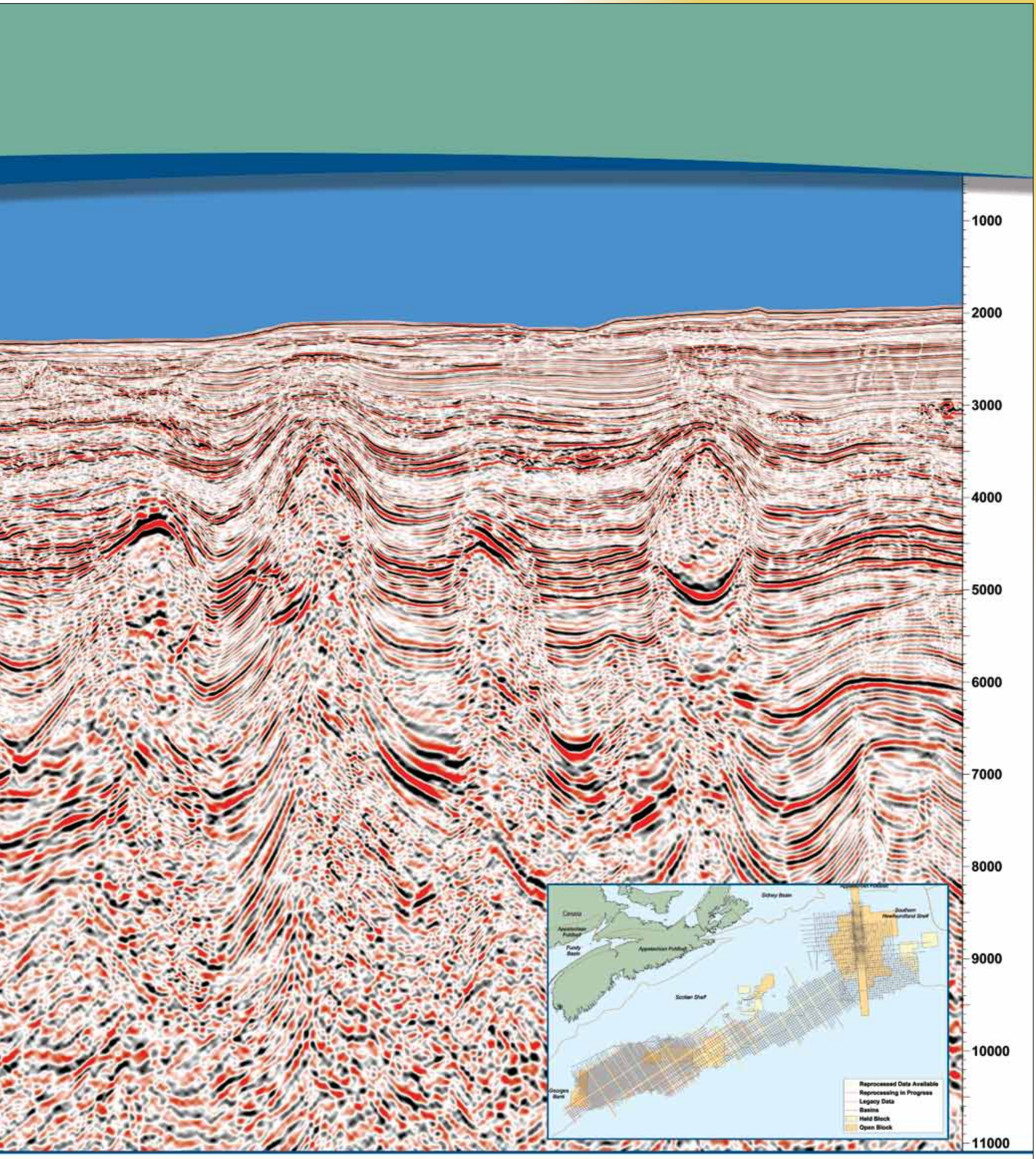




Naomoto Komatsu, former executive vice president of Teikoku Oil Co. Ltd. (currently INPEX Corp.) and former vice president of the Geological Society of Japan, discovered the Minami Nagaoka gas field as Teikoku's as exploration manager in 1979. His achievement was published as the special paper of World Petroleum Congress in 1983. In 1960 he worked with the discovery well of the Khafji oil field in the Persian Gulf.

Pioneer Map Charted Anticlinal Structures

BY NAOMOTO KOMATSU

At first glance the structural contour map and the cross section shown here look as if they had been published in the late 1920s by AAPG in the "Structure of Typical American Oil Fields" memoir.

But look closer: These maps are much older – they were prepared and published in Japan in the 1880s, long before the petroleum mining industry started to hire geologists and also before Israel C. White proposed the anticlinal theory.

The authors of those maps and cross section were the American geologist Benjamin Smith Lyman (1835-1920) and his 13 young Japanese colleagues.

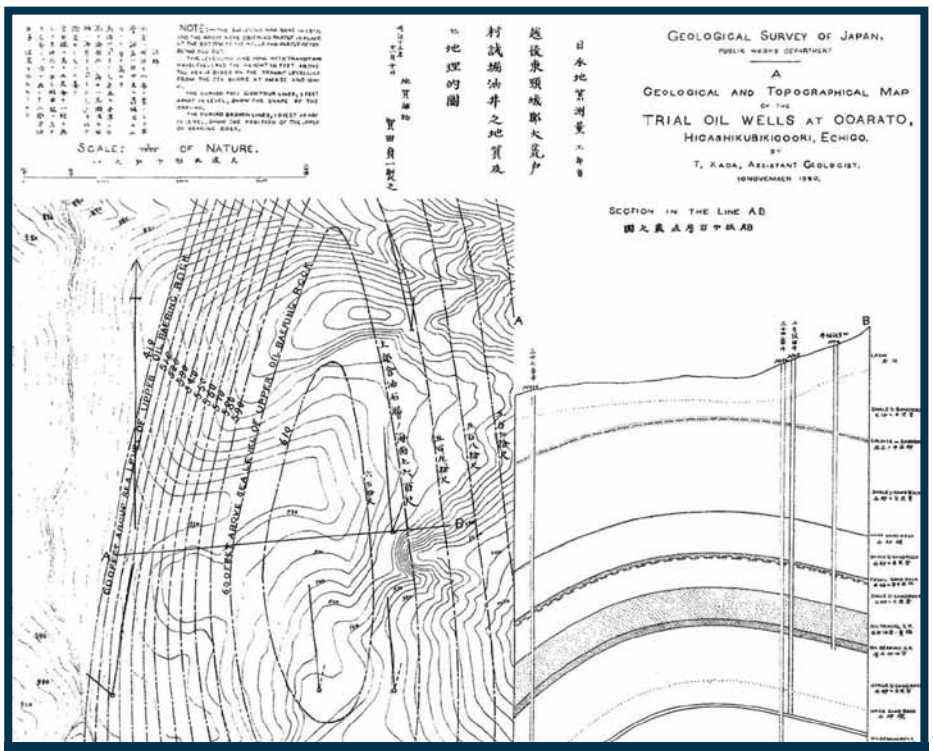
At the request of the India government in 1870, Lyman worked for a year as a pioneer field geologist for petroleum mining in the Punjab district, and published a map that probably is the first structural contour map in the world (after E.W. Owen, 1975).

In 1872, immediately after his return from India, Lyman received an invitation from the Japanese government to work for three years in Japan as a geologist surveying coal and oil deposits of the island of Hokkaido.

His first task upon arriving in Japan the following January, before starting survey work, was to select appropriate assistants. The assistants he selected were 13 brilliant Japanese students from a new school established by the Japanese government, and Lyman began by training them extensively in the basics of geology and surveying.

A few months later Lyman and the students departed to begin a field survey in the Hokkaido region in the undeveloped northernmost portion of the Japanese Islands.

KOMATSU



Top – B.S. Lyman (1835-1920) and Japanese colleagues, at his office in Tokyo. Bottom – geological structure map and well correlation section in the Niigata area, published in 1880s.

During the job and training, the students learned how to use the transit, prismatic compass and barometer, which Lyman had brought from the United States. In their spare time he taught them physics, mathematics and chemistry.

After he completed three years of survey work in the Hokkaido region, Lyman agreed to extend the contract with the Japanese government for an additional three years. On this occasion they studied main island areas, where oil was being produced from hand-dug wells near oil seepages along the western coast of Japan.

They also drew topographic maps at 1/6,000 scale, on which they described the results of their geological survey. Until then such highly precise maps had not been available in Japan.

Map Publication

When his contract expired in July of 1879, Lyman decided to remain in Japan until he could prepare an initial draft of his reports and maps.

After submitting his reports to the Japanese government, Lyman bade farewell to his Japanese disciples and friends and left Japan in December 1880. He arrived at his hometown, Northampton, Mass., May 19, 1881, via Singapore, Calcutta and Paris.

In February 1882, Teiichi Kada, one of Lyman's Japanese disciples, visited

See **Lyman**, page 30

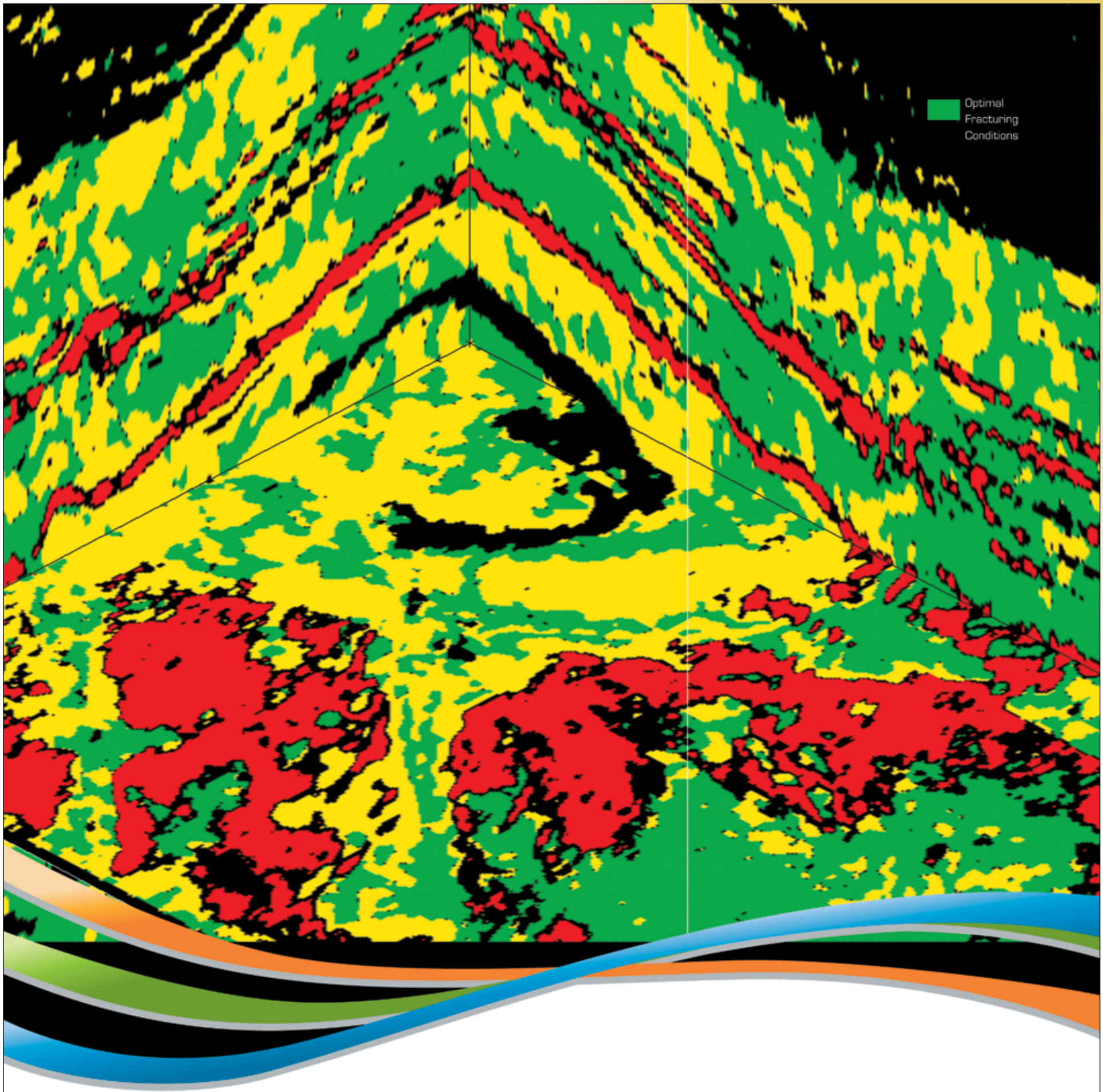


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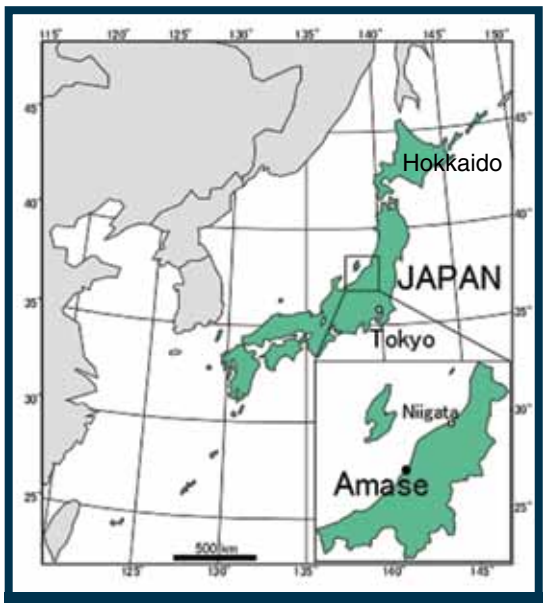
Photo courtesy of JX Nippon Oil & Energy

The first well in Amase field.



Location map for Amase Field in Japan.

Lyman

from page 28

his former teacher with their completed geological contour maps. For this long trip to Massachusetts, Kada gave up his position at the Department of Engineering of Japan.

Though the oil field maps were refined with Lyman's guidance by the summer, Lyman was aware the Japanese government had no budget to publish their maps. He printed 200 sheets of those maps at his expense and let Kada take them back to Japan. (The figure on page 28 is part of those heartfelt maps.)

The maps show beautiful anticlinal structures drawn at 100 Japanese shaku (approximately 100 feet) contour intervals superimposed on the topographic maps at 10 shaku contour intervals. This method of expression is almost the same as the prospect maps we make today.

It is amazing that such maps were published five years prior to I.C. White's "Anticlinal Theory;" those oil field structural maps were probably the second most important work of Lyman after his assignment in the Punjab district in India, and are some of the oldest subsurface structural contour maps in the world.

They were the fruit of Lyman's and his disciples' ardor, commitment and strong sense of responsibility.

The Anticlinal Theory

After Lyman's departure from Japan, most of his disciples held positions in the coal mining industry and continued to apply the subsurface contouring methodology they had learned with Lyman in their coal work. Several years passed, and nobody took any notice of Lyman's oil field maps.

In 1888 an oil corporation was established in Japan, and that company acquired a petroleum lease at offshore Amase area in Niigata Prefecture (approximately 250 kilometers northwest of Tokyo, along the Sea of Japan coast). A wildcat was drilled in 1890 from an artificial island built on an oil-seeped inter-tidal zone using a cable tool rig imported from the United States.

This first well was successfully completed and confirmed oil production in the Amase oil field.

This tale of success is the origin for Nippon Oil, the first Japanese petroleum company.

Unfortunately, the still-primitive Japanese petroleum industry hired few of Lyman's disciples, who might have led basic methodology for petroleum exploration. This means that Nippon Oil's success had not been done directly using Lyman team's advanced techniques.

However, we recognize that the luckily successful wildcat was located on the axis of the anticline on Lyman's contour map – and unexpectedly proved the anticlinal theory.

Nevertheless, Lyman criticized the anticlinal theory all in his life. Perhaps he was strongly affected by J.P. Lesly, who not only was Lyman's uncle but also his teacher. Lyman wrote to Eijiro Sagawa, a Japanese geologist who visited him in 1911:

"It appears evident that the anticlinal theory is yet very far from having become thoroughly established as the simple and principal guide of the position of the oil pools."

However, Lyman's petroleum exploration methodology, which incorporates surface and subsurface structural elements, is still widely applied.

Today a tiny and forsaken petroleum memorial is all that rests on the location of the Amase discovery, Japan's first oil-producing area.

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The Geophysical Corner is a regular column in the EXPLORER, edited by Bob A. Hardage, senior research scientist at the Bureau of Economic Geology, the University of Texas at Austin. This month's column is the final in a five-part series dealing with S waves and fractures.

GEOPHYSICALCORNER

For Fractures, P + S = Maximum Efficiency

By BOB HARDAGE

In areas where fracture-producing stress fields have been oriented at different azimuths over geologic time, there can be fracture sets of varying intensities and different orientations across a stratigraphic interval.

This month, in the last part of our five-part series, we consider here how to use shear (S) seismic data to locate a fracture set oriented at a specific azimuth in a target interval that is embedded in a thick section dominated by a younger and more dominant fracture set oriented in a different azimuth.


HARDAGE

* * *

The fracture orientations and two crooked-line surface profiles where compressional (P) and S-wave seismic data were acquired are illustrated on figure 1.

Two fracture trends are present:

- An older, pre-fold fracture set oriented approximately north-south.
- A younger, more dominant set, oriented approximately east-west, produced during a regional orogeny that fractured massive intervals of rock.

The older fractures can be open and gas-filled in a targeted unit at a depth of approximately 10,000 feet (3,000 meters).

The objective is to find this relatively thin interval with a north-south fracture set embedded in a thick section of more dominant, fold-related, and non-productive east-west fractures.

* * *

P-wave and SH-wave seismic data acquired along the two crooked-line profiles are shown as figure 2. The P-wave profiles tie at their intersection point, showing that P waves exhibit minor difference in velocity when they propagate parallel to and orthogonal to the east-west fractures that extend across a large part of the geological section.

This weak reaction of P-wave velocity to fracture orientation is one reason why P-waves have limited value for analyzing fracture systems.

A different behavior is observed for the SH data. SH reflections on Line 2, where the SH particle-displacement is aligned with the dominant east-west fractures (figure 1), arrive earlier than do their corresponding reflections on Line 1, where the SH particle-displacement vector is orthogonal to the extensive east-west fractures.

As has been described in the preceding articles of this series, the SH polarization along Line 2 is the fast-S mode for the east-west fractures, and the SH polarization along Line 1 is the slow-S mode for east-west fractures.

By comparing these P and SH images, we see hard evidence that S-wave velocity reacts more strongly to fractures than does P-wave velocity.

* * *

A valuable interpretation procedure is illustrated on figure 3, where the two SH

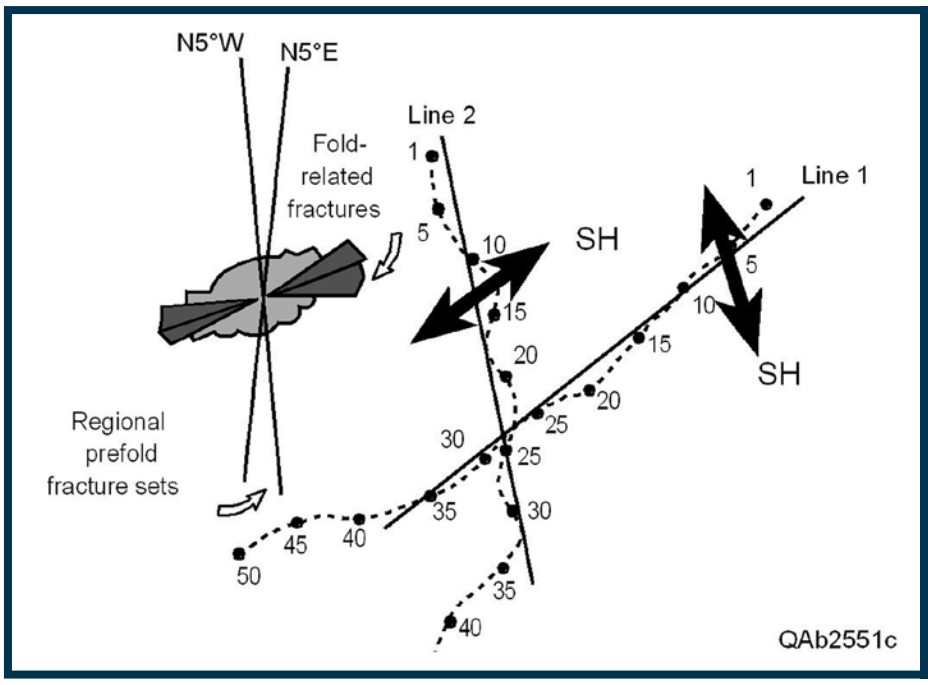


Figure 1 – Fracture orientation across a prospect area and two crooked-line profiles (the dotted lines) used to evaluate fracture attributes. The solid lines show the position of the images created by crooked-line processing. Arrows labeled SH define the polarization of the SH particle-displacement vector on each seismic line. An older, pre-fold fracture set is oriented north-south; a younger and more-dominant fold-related fracture set is oriented east-west. Line 1 follows the orientation of the dominant younger fractures. The SH displacement vector along Line 1 is the slow-S mode for the younger fractures. Line 2 follows the trend of any north-south fractures that may be present. The SH displacement vector along Line 2 will be the fast-S mode for the younger, dominant, pre-fold fractures. Modified from Alford and others (1989).

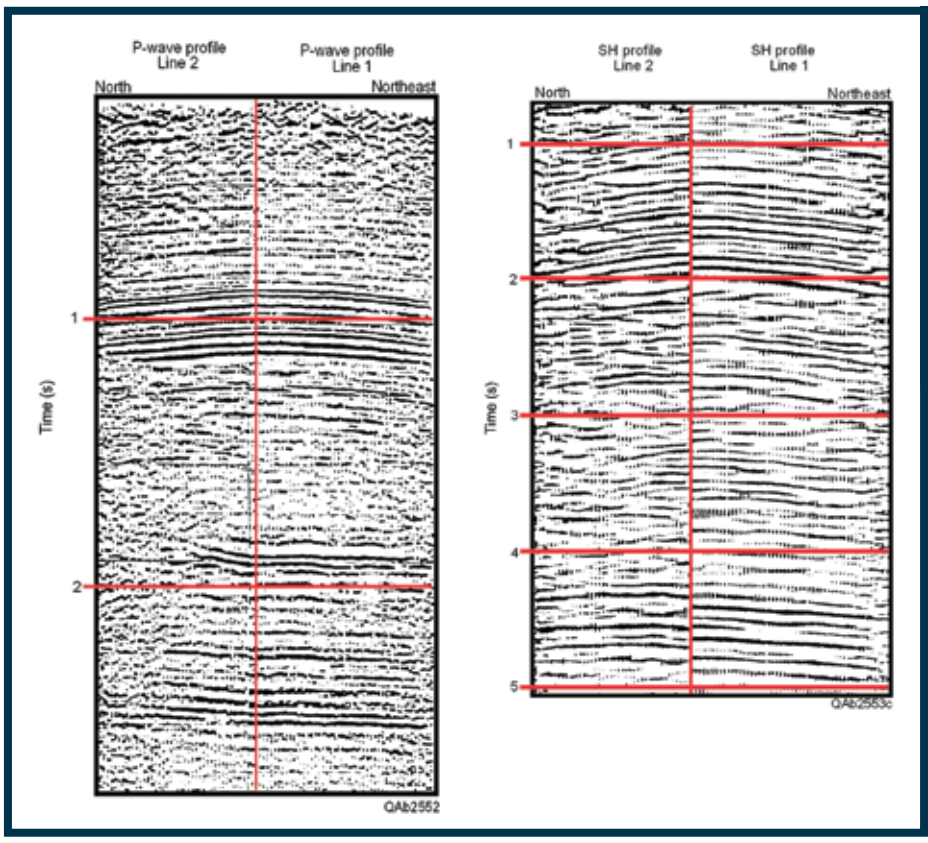


Figure 2 – (a) Comparison of P-wave images. All events are time aligned at the tie point, showing that, at this location, P-wave velocity is invariant perpendicular and parallel to fractures. (b) Comparison of SH images. Reflections on Line 1 occur at later times than do corresponding reflections on Line 2 because of the wave-propagation physics of fast-S and slow-S modes through the dominant, younger fracture set that extends across most of the overburden above the fracture target. Modified from Alford and others (1989).

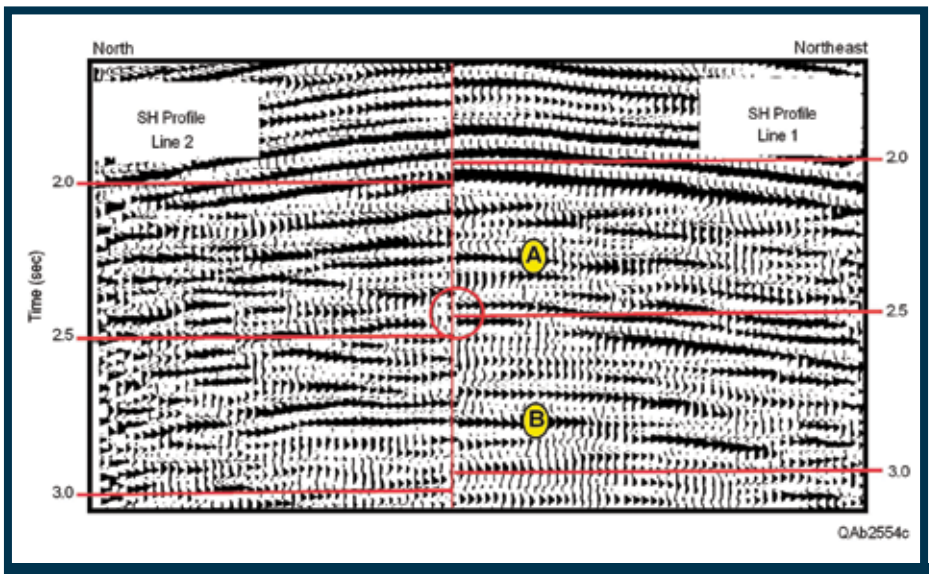


Figure 3 – Comparison of event-aligned SH images across the targeted sandstone reservoir. The SH image on Line 1 is advanced in time so that there is a reasonable alignment of events A and B that span the reservoir interval, the interval circled at 2.5 s. Within this circled data window, the dimming on Line 2 means that the SH polarization on Line 2 is the slow-S mode for the fracture target. Because the SH polarization on Line 2 is east-west (figure 1), then north-south fractures must be present within the reservoir interval for SH motion on Line 2 to be a slow-S mode. Modified from Alford and others (1989).

profiles are depth registered across the reservoir target interval.

Here, the image on Line 1 is advanced in time to align key reflection events A and B above and below the targeted reservoir, the circled event at the tie point. If the desired north-south fractures are present within the reservoir interval, the reflection event will dim on Line 2, because the SH polarization on that profile would be the slow-S mode for a north-south fracture set.

As shown in parts three and four of this series (June and July EXPLORERs), slow-S velocity S_2 decreases when fracture density increases, and thus S_2 reflectivity weakens as shown in this example. In contrast, the reflection would remain bright on Line 1, where the SH polarization is the fast-S mode for north-south fractures.

That reflectivity behavior is what is demonstrated inside the circled target interval.

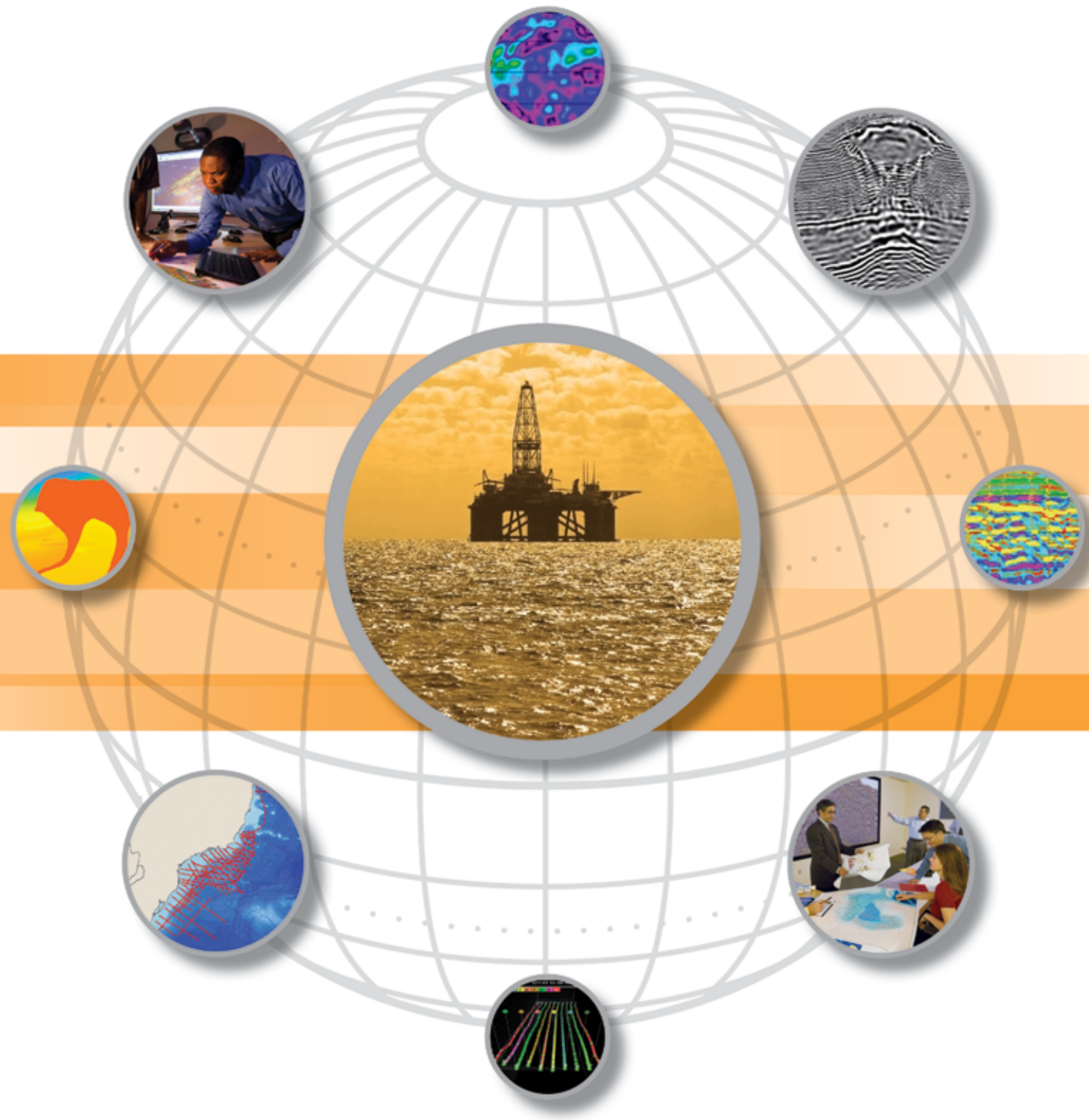
* * *

The exploration problem described here of locating a subtle fracture set hidden by a more dominant fracture set is one of the most challenging that can be encountered in interpreting fracture attributes from seismic data.

The fundamental principle illustrated by this case history is that multicomponent seismic data that provide both P and S data are far more valuable for fracture analysis than are single-component P-wave data alone.

Incidentally, this story and its illustrations are taken from a 20-year old U.S. patent (#4,817,061) – showing that good technology can be found in places other than technical journals.

Real World Collaboration



Real World Results

ION solves subsalt challenges in the Gulf of Mexico, reducing exploration risks.

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ion

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

WASHINGTONWATCH

Lack of Energy Policy Affects Jobs

By DAVID CURTISS, GEO-DC Director

Persistently high employment by U.S. standards – upward of 9 percent – figures as a prominent issue for politicians of every stripe seeking to gain or hold political office in the 2012 election.

Perhaps you've had the good fortune of avoiding the campaign advertisements thus far. Enjoy the quiet. They are coming, and the mantra is jobs, jobs, jobs.

"Energy, Jobs & the Economy: Powering America's Future," a report issued in June by the Consumer Energy Alliance highlights the vital role that the energy sector plays in the economy and job creation.


CURTISS

> "Hurdles to domestic energy production could result in the loss of over 500,000 existing or potential jobs."

"[T]he lack of a national energy policy has severe consequences for the economy now and in the future – costing hundreds of thousands of jobs and billions in lost revenues … hurdles to domestic energy production could result in the loss of over 500,000 existing or potential jobs," CEA writes.

Better understanding the opportunities and challenges to creating and filling these jobs is the subject of a new study under way at the National Research Council (NRC), the operating arm of the U.S. National Academies, titled "Emerging Work Force Trends in the U.S. Energy and Mining Industries."

The study was made possible thanks to strong congressional support led by Senate Energy and Natural Resources Committee chairman Jeff Bingaman (D-New Mexico) and funding provided by the Department of Energy's National Energy Technology Laboratory.

It will analyze:

- The need for and availability of workers for the oil, natural gas, coal, geologic carbon sequestration, nuclear, geothermal, solar, wind and non-fuel minerals industries.
- The availability of skilled labor at both entry level and more senior levels.
- Recommendations for actions needed to meet future labor requirements.

AAPG members Sally Benson, Joel Renner and Reginal Spiller all are members of the study committee.

One of the information sources the NRC committee undoubtedly will be reviewing is the recently issued "Status of the Geoscience Workforce 2011," authored by Leila Gonzalez and AAPG member Chris Keane of the American Geological Institute's (AGI) work force program. Using data collected independently – along with available federal, industry and professional society sources – the report provides a broad survey of trends, education and jobs across the geosciences.

* * *

Earth science education in primary and secondary schools (kindergarten through high school) remains a challenge: In high school only three states – Kansas, Kentucky and North Carolina – require earth science coursework for graduation, and in 12 other states earth science credit counts toward graduation.

The lack of an Advanced Placement (AP) or honors course in geology further restricts the exposure students have to the geosciences as a possible course of study in college.

In response, university geoscience departments have developed targeted outreach programs to high school students. As a result, the study finds, these departments are "making progress in filling the gap caused by the lack of an AP geology course, increasing geosciences enrollments at the undergraduate level, and building community awareness of the importance of the geosciences."

This is having a positive impact on the number of geosciences degrees conferred in the United States – bachelor's degrees were up 7 percent in 2009-10 over the previous year, and master's and doctoral degrees were up 3 percent and 6 percent, respectively.

That is good news, but it's not enough.

The Bureau of Labor Statistics reports there were more than 260,000 geoscience jobs in 2008. The demand for geoscience jobs will grow 35 percent by 2018, according to AGI estimates, when they factor both job growth and normal work force attrition.

That's more than 350,000 geoscience

Continued on next page

3P Starts Aug. 30

Online registration remains open for AAPG's second Polar Petroleum Potential conference and exhibition – popularly known as the 3P Arctic meeting – which will be held Aug. 30-Sept. 2 at the World Trade and Convention Centre, Halifax, Nova Scotia.

3P Arctic offers papers, posters, short courses and field trips, all focused on the latest data, perspectives and experiences involved in Arctic exploration and potential.

The technical session themes include:

- Baffin Bay-West Greenland.
- Barents Sea and Northeast Greenland.
- Cenozoic Uplift of Arctic Margins and Implications for Petroleum Potential.
- North Atlantic Conjugate Margins and the Arctic Connection.
- Arctic Petroleum Systems.
- Canadian Arctic Basins.
- Alaska and Beaufort-Mackenzie Basins and Fold-Thrust Belts of the Western Arctic.
- ECORD – European Consortium for Ocean Research Drilling.
- Siberian Arctic: Laptev, East Siberian and Russian Chukchi Seas.
- Evolving Tectonic Interpretations and Models – Including Insights from New Seismic and Potential Fields Data.
- Appraisal of Arctic Petroleum Resources.
- Geophysical Innovations and Evolving Technologies for Arctic Data Collection, Processing & Interpretation.

To register or for more information go online to www.3parctic.com.

Continued from previous page

jobs in 2018 – yet, only 1,500 geoscience graduate degrees are conferred each year in the United States, leaving a significant shortfall in the available domestic labor pool.

This shortage is evident in the oil and gas sector, despite the typically higher salaries than in other geoscience sectors. For oil and gas, "the number of younger geoscientists in their early 30s is approximately half the number of those nearing retirement age."

The situation is even worse in the government sector.

"The demographic wave that the oil and gas industry sees looming on the horizon is already crashing over the federal scientific work force," said Chris Keane, who is AGI's technology and communications director.

There is no shortage of societal needs requiring geoscience professionals, the study notes. But there has been a consistent shortage of skilled workers to meet these needs – and this shortage undermines both "public awareness of the profession as well as [in] investment in geoscience education."

One essential ingredient to maintaining a strong geoscience work force is investment in research and development, which is a principal driver of science and technology employment. The federal geoscience R&D investment has shrunk since 2004, the study finds.

That is yet another compelling reason for us to highlight the need for geoscience R&D, and especially a robust federal oil and natural gas R&D program.

AAPG Delegation Visits Capital

GEO-DC welcomed eight AAPG members to Washington, D.C., in May for AAPG Congressional Visits Day 2011.

This annual event is an opportunity for AAPG members to meet with legislators and their staff – as well as regulators and policy makers in the Executive Branch – to talk about energy issues facing the nation.

Our conversations in May centered on the interrelationships of energy, gas prices, the economy and the environment. We also discussed the need for a federal role for research and development in the petroleum geosciences, and talked about hydraulic fracturing technology.

Past AAPG President Will Green (left) and AAPG member Clint Moore (right), part of the 2011 Congressional Visits Day delegation, with U.S. Rep. Bill Flores (R-Tx).

Sincere thanks to all of our participants: Paul Britt, Ross Clark, Cheryl Desforges, Mike Fogarty, Pete MacKenzie, Clint Moore and AAPG past presidents Will Green and Dan Smith. Thank you for helping bring science to our nation's policy makers.

If you'd like to join us for a future CVD please email dcurtiss@aapg.org to be added to the invitation list.

We'll publish dates for our next CVD as soon as they're available.

– DAVID CURTISS

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

Ideas Shared on South America Tour

By CAROL McGOWEN, Regions and Sections Manager

With expertise as both a professor and consulting geologist, AAPG President Paul Weimer's background is well-aligned with the energy industry renaissance currently under way in Latin America.

Weimer's full title is "Professor, Bruce D. Benson Endowed Chair, University of Colorado Director of Energy and Minerals Applied Research Center, consulting geologist," and during a recent AAPG visit to Latin America, Weimer captured the attention of university students, faculty and professionals alike with a half-day seminar on the future of conventional and unconventional resource plays.

Weimer's tour – the third in a recent series of annual AAPG presidential visits to Latin America – spanned four countries in 11 days, with stops in Buenos Aires, Rio de Janeiro, Lima and Bogota.

Latin America Region Vice President Victor Vega accompanied Weimer to Argentina, Brazil and Colombia, and then-AAPG vice president-Regions Alfredo Guzmán joined Weimer in Peru for his second visit to the country.

In each country, local affiliated societies hosted AAPG, coordinated logistics with universities and assisted with business appointments.

Thanks go to the leaders and members of Asociación Argentina de Geólogos y Geofísicos Petroleros, Asociacao Brasileira de Geologos de Petroleo, Sociedad Geologica del Peru, and Asociacion Colombiana de Geologos y Geofisicos del Petroleo for their hospitality. Meetings with these societies and leading companies helped define local education and training needs, along with future opportunities for industry-society-AAPG collaboration.

AAPG President Paul Weimer presents his seminar before a full house in the Margarita Gonzalez Auditorium at the Universidad Nacional de Colombia-Bogotá.

Among Weimer's goals for his visit was outreach to universities and AAPG student chapters by teaching a seminar designed to give students a strong sense of the spectacular technology used by the petroleum industry, the future of their profession and what they can expect in their petroleum industry careers.

The seminar, titled "The Petroleum Industry in the Next Decade: An Overview of the Science, Technology and AAPG," is intended for graduate students, upper-level undergraduate students and local professionals.

Weimer understood that the concepts of shale oil, shale gas and unconventional resource plays were new and not traditionally taught in Latin American universities.

"A slide showing a dramatic increase in Williston Basin oil production since 2005 really got the students' attention and illustrated how the application of new technologies to unconventional resource plays has transformed the production of oil from just one formation," Weimer said. "The Williston Basin was ranked 98th oil province in the world in terms of daily production – now, in just five years, it is ranked 13th in daily production, due to the Bakken resource play.

"I wanted students and professors to realize the major change that has occurred in petroleum systems concepts which enable exploration for unconventional resources," he said. "These changes, now applied to exploration and production in North America, are coming to Latin America but will require training, new skills, new technologies, new ways of thinking."

By the end of the trip Weimer had captured the attention of nearly 250 university students from 10 universities. In Bogota, six AAPG student chapters participated in the seminar.

In Lima, Weimer gave the presentation to Universidad de San Marcos students

Continued on next page

Long Beach Abstracts Are Invited

Abstracts continue to be accepted online for the 2012 AAPG Annual Convention and Exhibition (ACE), which will be held April 22-25 in Long Beach, Calif.

The ACE theme is "Directing the Future of E&P – Starring Creative Ideas and New Technology," and the technical program will comprise 11 themes:

- Active Oil and Gas Fields: Development and Production – A look at state-of-the-art production, development geoscience and multidisciplinary studies applied to both mature and new fields worldwide. (Theme chair: Tony Reid)
- Emerging Frontiers – Recent discoveries, emerging exploration plays and breakthroughs in geoscience technology. (Carlos Marcellari)
- Siliciclastics Reservoirs: Exploration and Characterization – Current trends and concepts of siliciclastic reservoir deposition and characterization. (Andrea Fildani)
- Carbonates and Evaporites: Exploration and Characterization – Current knowledge and research into carbonate reservoirs and evaporates. (Sean Guidry)
- Unconventional Resources – Where we are and what's ahead for unconventional resources, including predictive geologic controls on unconventional reservoir performance. (Steve Sonnenberg)
- Basin Analysis and Petroleum Systems – Concepts and ideas that cover the broader aspects of basin-scale petroleum systems and geo-histories. (Barry Katz)
- Alternative Energy – Exploration and use of energy outside conventional and unconventional oil and gas resources. (W.C. "Rusty" Riese)
- Environmental and Energy Research – The relationship between environment and energy, safety and oil spill response to CO_2 capture and sequestration. (Chris Smart)
- Structural Geology and Neotectonics – State-of-the-art thinking and research into structural geology and tectonics. (David Ferrill)
- Geophysics and Seismology – Technology and recent advances in geophysics, with special emphasis on integrating geology and geophysics in exploration and production. (Steven Getz)
- Geoscience Principles and Applications – A broad range of geological topics, focusing on the application of various principles and technologies in natural resource exploration and production. (Hilario Camacho)
- AAPG and SEPM Student Poster sessions. (Sean O'Connor)

Abstracts must be received by Sept. 22.

To submit an abstract, or for more information, go to aapg.org/longbeach2012.

Exhibition and sposorship opportunities also are available online – or contact convene@aapg.org for more information.

Continued from previous page

and then gave the same presentation to interested scientists from industry.

The seminar slides and exercise materials were donated to each university with the intent to motivate students to explore deeper in pursuit of energy industry careers.

Industry, Affiliates Meetings

At this time of intense industry activity in Latin America, leaders from 15 companies plus members of the local societies met with the AAPG delegation of Weimer, Vega and Guzmán.

The companies and societies consistently indicated strong interest in expanding their interaction with AAPG, hosting Geosciences Technology Workshops and regional AAPG lecturers.

Companies in turn were asked to encourage their young professionals to be an active part of AAPG programs. And ideas were discussed for company support of neighboring universities, such as regular interaction with student chapters, providing internships and serving as industry mentors for the Latin America Region Imperial Barrel Award Program.

In Brazil, Petrobras hosted the AAPG delegation at the newly expanded CENPES research center and laboratories dedicated to Petrobras pre-salt projects. While there, geoscientists from Petrobras discussed supporting the AAPG student chapter at nearby Federal University of Rio de Janeiro.

ICE 2013 Kick Off

Highlighting the stop in Bogota was a reception hosted by the Colombian National Hydrocarbon Agency (ANH) to celebrate and launch the AAPG 2013 International Conference and Exhibition in Cartagena.

ANH director Armando Zamora confirmed support of the 2013 ICE by the Colombian agency, and Enrique Velasquez, AAPG Latin American Region president and exploration vice president for Ecopetrol, pledged his company's support for the conference.

Victor Vega, who will serve as the Bogota ICE general chair, explained the approach he plans for building the ICE technical program.

"Having the ICE in Colombia is a great opportunity for integration of the Latin America Region," Vega said.

"The idea is that local associations from Argentina, Brazil, Colombia, Mexico and Peru will help in putting together country-specific themes to discuss the most relevant topics related to exploration in their countries," he added.

During meetings with leading upstream sector companies, the AAPG delegation personally invited companies from each country to participate in the Cartagena ICE and exchanged ideas for the program.

In Lima, for example, AAPG met with Pluspetrol, Savia, Petrobras and Compañía Española de Petróleos, Sociedad Anónima.

Ideas were discussed for fieldtrips to outcrops where the producing section of the Camisea gas field is fully exposed.

Foundation Donors

The names that appear here are of those who have made donations to the AAPG Foundation in the past month – predominately through adding some additional monies on their annual dues statement.

To these people, and to those who have generously made donations in the past, we sincerely thank you.

With your gifts, the AAPG Foundation will continue its stewardship for the betterment of the science and the profession of petroleum geology.

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The Foundation's "Meeting Challenges … Assuring Success" campaign has raised $34,334,961 as of June 30, and will continue through 2011 with a goal of raising $35 million.

FOUNDATIONUPDATE

1,529 Members Donated to AAPG Foundation

BY NATALIE ADAMS, AAPG Foundation Manager

The AAPG Foundation closed-out the 2010-11 fiscal year on June 30 with 1,529 contributions that totaled $2,180,648.

This enables the Foundation to support dozens of programs and provide many more scholarships and awards to deserving students – so thanks to all who have contributed this year!

The Foundation's annual report is available online at the Foundation website.

* * *

The **Foundation Trustees** met in June and took action on several proposals, including:

▸ Approved using $62,500 from the **Visiting Geoscientists Fund** for travel expenses related to an extended AAPG outreach trip of AAPG President Paul Weimer.

Weimer is presenting a half-day short course, free of charge for students and professionals, titled, "The Petroleum Industry in the Next Decade: An Overview to the Science, Technology and AAPG" (see related story, page 36). His travels will take him to more than 34 locations around the world during his term.

▸ Approved a proposal from AAPG's **Search and Discovery** for $50,000. Search and Discovery is a free, digital online geoscience database and is available to geoscientists, academia and members of the general public.

▸ Changed the name of the former Special Publications Fund to the **Amoruso Special Publications Fund**, in honor of the service and the financial commitment that John J. Amoruso has made to the Foundation.

Amoruso, a member of the Foundation Board of Trustees, also is a past AAPG president, a winner of the Michel T. Halbouty Outstanding Leadership Award and an AAPG Honorary Member.

* * *

In other Foundation news:

▸ The Mansfield Library at the University of Montana Missoula is looking for a donor to establish a University Subscription for its library.

The University of Montana has its main campus in Missoula, as well as branch campuses in three other locations: Montana Tech in Butte, UM-Western in Dillon and the Helena College of Technology in Helena.

Those interested should contact the Foundation office at 918-560-2674.

▸ The Foundation also is seeking donations specifically for two funds in its Grants-in-Aid program – the **Gretchen Nakayama Memorial Grant** and the **Kenneth O. Stanley Memorial Grant**.

Nakayama was a researcher for ExxonMobil Upstream Research Company. She was a graduate of University of Rochester and University of California-Davis.

Stanley, a geological adviser for ExxonMobil Exploration, was a graduate of UCLA and the University of Wisconsin.

Recipients can be from any university with a geology department.

▸ Attention Texas Tech alumni and friends – the **Eddie David Challenge Grant** needs only $28,980 to establish an endowment for the Texas Tech University.

David, a Trustee Associate, has agreed to match gifts for two new grants up to $100,000. The new Eddie David Named Grant is restricted to graduate students at Texas Tech University as part of the AAPG Foundation Grants-in-Aid program.

The new **George B. Asquith Scholarship for Excellence in Petroleum Geology** will be selected annually by the Texas Tech Foundation and will be based on research achievement and academic merit for a graduate student studying exploration of hydrocarbon resources.

To contribute to this initiative, contact the Foundation office.

▸ In June we published a list of 22 people who have contributed to the Foundation for 10 or more consecutive years – but there is a 23rd person whose name was inadvertently omitted. That would be **Jack Martin**, who has contributed to the Foundation for 20 consecutive years.

* * *

The 34th annual **Trustee Associates** meeting will be held Sept. 7-11 at Lake Tahoe, Calif., with the theme "Reaching New Heights."

Sponsorships are being requested for the business meetings, field trip and table sponsors.

The Trustee Associates would like to welcome **Martin Shields** as a new member. He has been a member of AAPG since 1980 and lives in The Woodlands, Texas.

For information on the TA's upcoming meeting, or on joining the group, go online to foundation.aapg.org/trusteeassociates.cfm.

* * *

When paying your AAPG dues, here's something to consider: Add a contribution to the AAPG Foundation in your payment.

By doing so you can help the AAPG Foundation reach the next generation.

Give online at foundation.aapg.org/donate.cfm, or mail to AAPG Foundation, P.O. Box 979, Tulsa, Okla. 74101.

Credit card donations can be made by calling 1-888-945-2274, ext. 644.

You also can contact the office for information on supporting the Foundation's mission through a bequest or other planned gift.

* * *

Three AAPG Foundation Trustee Associates have recently died: **Virginia Monaghan**, **Thomas Edwards Matson** and past AAPG President **Don Freeman Tobin** (see related story, page 47).

Their obituaries can be found at www.foundation.aapg.org under the "Trustee Associates" tab.

"ProTracks" is a new ongoing feature of the EXPLORER, offering news and information pertinent to getting started or getting better in your career.

PROTRACKS

Having the 'Write' Stuff Essential for Geologists

By SUSAN R. EATON, EXPLORER Correspondent

AAPG member Matt Hall is inspiring geologists and geophysicists to write about what makes them tick: earth sciences.

Whether it's discussing the recent earthquake and tsunami in Japan, the eruption of the Grimsvotn volcano in Iceland or innovative presentations at oil and gas conferences, Hall wants to "democratize" earth science writing, expanding it beyond the formal realm of academic and peer reviewed journals and into the public domain.

"I can't stand the fact that writing should be left to the so-called 'experts,'" said 40-something Hall, a Ph.d geologist, geophysicist and former copy editor of math texts for the Reed Elsevier Scientific Group.

"We've all got something to contribute, and there are almost no boundaries," he said. "Writing is a way to reflect one's own work as a geoscientist."

Further encouraging his peers to get creative, Hall says, "Dive in. Be bold. That's what the Wikipedia editors say."

Hall, a principal consultant with Agile Geoscience Ltd., is at the forefront of a current paradigm shift that's re-evaluating how the general public (and geoscientists) views the act of writing itself.

Most readers, according to Hall, view themselves as passive consumers of information, and not as writers.

"The audience is important," Hall said, "but it's also about the writer being engaged – the process of writing and publishing (blogs, magazine articles or conference papers) engages the individual.

"Engagement is going to drive excellence in what we do," he continued. "And it will inspire kids to get involved in earth sciences."

Write, Right?

Hall has designed a writer's tool kit and short course for geoscientists, laying the foundation for his peers to contribute – write, email, blog or tweet – their ideas and opinions on geoscience issues, taking advantage of all available platforms, including the new social media.

It is, for him, a new career opportunity.

In May Hall taught his inaugural course, "Writing for Earth Scientists," at the CSPG-CSEG-CWLS joint annual convention in Calgary, Canada, attracting nine students.

His one-day course focuses on the principles of clear, accurate writing, and provides students with practical, down-to-earth writing skills.

The course acknowledges how geoscientists view the world, and capitalizes the power of combining written text with various types of figures – maps, cross-sections, tables, bar graphs, mathematics, units of measurement, signs and symbols – to produce maximum impact.

Students are encouraged to bring samples of their past or present work for classroom discussions and feedback, and at the end of the course they depart with homework.

To Hall's surprise, many of his Calgary students – all geologists and geophysicists – weren't just interested in technical writing; they were also curious about writing fiction, blogs and "fun-to-read" articles.

"A couple of years ago, this course would have been about writing for technical journals," he said. "Writing doesn't have to be that big a deal; it can actually be fun. People generally read for fun or for entertainment."

Continued on next page

Continued from previous page

An 'Invaluable Tool'

But are writing skills becoming obsolete in the age of the new social media?

Just the opposite is true, according to AAPG member Mark Dahl, a geologist with ConocoPhillips Canada in Calgary who attended Hall's course.

"Writing skills have become more important, especially with the advent of tweeting and blogging," Dahl said. "And I want to be part of that community."

Dahl regularly contributes to ConocoPhillips' in-house Wikipedia site, which is extensively peer reviewed throughout the company, from its upstream and downstream divisions. In the course of performing his daily job, Dahl regularly posts informal reports, posters and dynamic maps, soliciting peer reviews within the ConocoPhillips' global family of experts.

"There is a shift going on in the company toward rewarding people for their sharing of knowledge and not just for their technical knowledge," Dahl said. "And there's no better way to show your performance than to write about it.

"Some managers who don't want to participate in this new form of communication become isolated within their own teams and companies," he added.

Dahl's comments are echoed by Evan Bianco, another course participant.

"A lot of oil and gas geoscientists may think that writing is not important, because in a meeting the loudest voice wins," said Bianco, a geophysicist and

Matt Hall, geologist and writer.

Hall's colleague at Agile Geosciences. "But writing creates a level playing field; it's a more thoughtful way to communicate."

Hall is based in Mahone Bay, Nova Scotia, a sleepy town in Nova Scotia where the steeples of its three waterfront churches used to serve as beacons to sailors. Yet, Hall's geoscience blog (www.agilegeoscience.com) – which is gaining quite a global following – connects him to the oil and gas industry.

One of Agile's pet projects is open software, providing free source code and applications ("apps") to geologists and geophysicists, complete with videos on how to use the apps.

"You have to have a tough skin to blog," Bianco said. "With blog publishing, you go through hundreds of peer reviews, and it happens after you publish."

Unconventionals Will Get Global Showcase at Milan ICE

By JEFF ALDRICH

The fast-approaching AAPG International Conference and Exhibition in Milan will showcase – in association with EMD – a comprehensive unconventional resources program with global scope, ranging in scale from the nanopore to the petroleum system, exploring the latest in applied geoscience and engineering.

The Milan ICE will be held Oct. 23-26, under the general theme "Following Da Vinci's Footsteps to Future Resources: Innovations from Outcrops to Assets."

The unconventional program is the emphasis of ICE Theme VI: "Dynamic World of Uncooperative Reservoirs – The Geoscience of Unconventional Resources," which will feature a topical, integrated and multidisciplinary treatment of oil and gas shale, tight reservoirs and coal bed methane.

The program will kick-off with an update on coal bed methane exploration and breaking developments in Australia, India, UK and Germany; move on to high-potential tight rock plays in China and Germany; and then introduce an exciting "super-mature" gas play concept in South Africa.

Shales will then increasingly become the oral session focus and start with an examination of rock properties, geomechanics, impact of regional stresses and hydrocarbon maturation on fracturing, the prediction of reservoir pressure from fracture types, and gas generation at very high "can not happen" maturities.

Theme VI co-leaders for the upcoming AAPG ICE in Milan are Paul Basinski, with Ardent Exploration and the EMD ICE co-chair, and Vlastimila Dvorakova, with the Czech Geological Survey and also the AAPG European Region president-elect.

Their organizing team included Neil Fishman, with the U.S. Geological Survey and also the EMD ICE co-chair and EMD Gas Shales Committee chair; Erdem Idiz, Shell; Jeff Aldrich, Greenpark Energy; and Ravi Misra, ONGC – all of whom help solicit, thoroughly screen and organize submissions from around the world.

Geophysics is used to improve petrophysical reservoir characterization – which, in turn, is input as a primary driver in the modeling of optimized massive hydraulic fracture stimulations.

Subsurface challenges faced in the development of shale gas reservoirs also will be described, and insights will be shared regarding:

- The impact of mudstone facies variation on reservoir parameters.
- The origin and classification of pores.
- Effect of stress on permeability.
- The prediction of fluid phases and properties – citing examples from plays including the U.S. Eagle Ford shale, and those in Poland and China.

The unconventional oral sessions will conclude with "Shale Oil and Gas Case Studies: The Toolbox to Assets (I & II)", in which 16 papers will cover lessons learned, risk assessment techniques and results, and practical exploration and development tips from shale plays across Europe as well as the United States' Bakken and Niobrara; Canada's Horn River Basin; Russia's Bazhenov; and China's Ordos Basin.

The Theme VI organizing committee set criteria that demanded authors to demonstrate that the paper or poster would be geoscience- or engineering-focused, current in either the research or the concepts being presented, would add to the specific session assigned and, critically, be relevant to industry geoscientists.

"We ended-up with a killer program," said Paul Basinski, with Ardent Exploration and the EMD ICE co-chair, "with examples from Europe, Asia, Africa, Australia and

See **Milan ICE**, page 46

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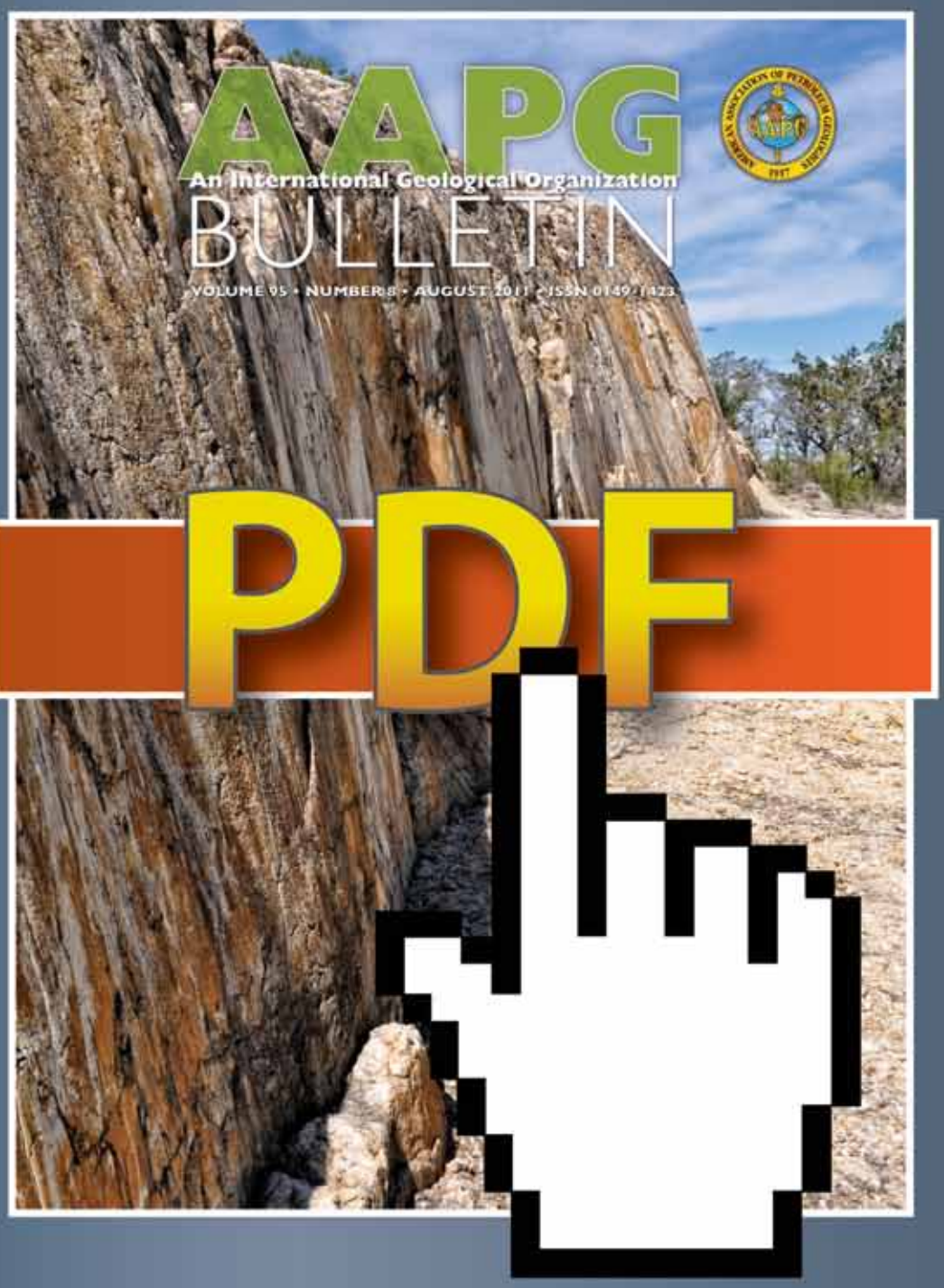

The AAPG Bulletin is a technical journal that is recognized in the industry as the leading peer-reviewed publication for information on geoscience and the associated technology of the energy industry.

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

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

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

Article highlights include:

A poorly explored basin

Wenxiu Yang and Alejandro Escalona

This study incorporates a better understanding of the structure and depositional history of the Guyana Basin into a regional context. The impact on its petroleum system and the oblique collision of the South American-Caribbean plates since the Cretaceous are also evaluated.

Faulted carbonates

David A. Ferrill, Alan P. Morris, Ronald N. McGinnis, Kevin J. Smart, and William C. Ward

While there are commonalities between fault systems in sandstones and carbonates, carbonates behave differently under defomation, resulting in a unique permeability structure. The Hidden Valley fault of central Texas allows these carbonate deformation mechanisms to be studied.

Understanding isotopic reversals

Barbara Tilley, Scott McLellan, Stephen Hiebert, Bob Quartero, Byron Veilleux, and Karlis Muehlenbachs

Isotopically reversed gases are restricted to closed system maturation, and their magnitude may be related to the relative volume of gas retained in shales. Along the tectonically disturbed western edge of the Western Canadian Sedimentary Basin they are interpreted as mature shale gases.

Statistical modeling and prospect dependencies

Gabriele Martinelli, Jo Eidsvik, Ragnar Hauge, and Maren Drange Førland

Bayesian networks—models for encoding qualitative and quantitative information—are used for dependencies in oil and gas exploration. They provide a realistic graphical model for capturing the underlying causal geological process and statistical computations of marginal and conditional probabilities.

"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.

Communications Garners Award

The AAPG Communications Department has been awarded the APEX 2011 Award of Excellence in the Member & Customer Communications category for its work on the multi-media "We Are AAPG" project.

APEX 2011 – the 23rd Annual Awards for Publication Excellence – is an international competition that recognizes outstanding publications from newsletters and magazines to annual reports, brochures and websites.

According to the APEX 2011 judges, "The awards were based on excellence in graphic design, quality of editorial content and the success of the entry in conveying the message and achieving overall communications effectiveness."

The "We Are AAPG" project included a 32-page, four-color hard-bound book with a credit card-shaped USB that included a downloadable PowerPoint and video presentations about the Association. Also created was an attractive key-shaped USB presented in a small pouch that contained the multi-media presentations.

The AAPG-branded USBs were intended for continued use by the recipients to provide a lasting reminder of the services the Association provides.

The 2011 APEX Awards drew over 3,300 entries, with awards given in 11 main categories. Other award winners included Lockheed Martin, FedEx, Merrill Lynch, Bank of America and Toyota.

PROFESSIONAL newsBRIEFS

Terry Axtmann, to senior geological adviser, Samson, Tulsa. Previously senior geological adviser, Pioneer Natural Resources, Woking, England.

Paul M. Basinski, to vice president-geology and geophysics, Ardent Exploration, Houston. Previously senior geologic fellow-global unconventional resources new ventures, ConocoPhillips, Houston.

Lindell Bridges, to vice president-exploration, Realm Energy International Corp., Vancouver, Canada. Previously senior vice president-geoscience, EQT Corporation, Pittsburgh.

Edward Fenk, to senior energy leader, Mutual of Omaha Bank, Houston. Previously vice president-corporate banking energy industry team, Allied Irish Bank, Houston.

Stephen A. Hermeston, to president and CEO, CGX Energy, Toronto, Canada. Previously new ventures manger, Remora Energy, Houston.

Bonnie Milne-Andrews, to manager-geological operations, Hyperdynamics, Houston. Previously manager-development South Texas, Swift Energy, Houston.

Tim Parker, to president and CEO, Ardent Exploration, Houston. Previously president and CEO, HighMount E&P, Houston.

Petros Papazis, to shale gas team lead-tech services, Chevron Energy Technology, Houston. Previously integrated interpreter, Chevron Canada Resources, Calgary, Canada.

Kermit Witherbee, to geothermal energy geologist/analyst, National Renewable Energy Laboratory, Golden, Colo. Previously national geothermal program manager, Bureau of Land Management, Washington, D.C.

Ian Woollen, to independent consultant, Woollen Consulting, Edinburgh, Scotland. Previously senior geotechnical adviser, PKN Orlen, Warsaw, Poland.

Student Expo Starts Sept. 8

The 14th annual AAPG-SEG Student Expo is set for Sept. 8-9 at the George R. Brown Convention Center in Houston.

The Student Expo is designed to link geosciences students with industry recruiters. Students benefit from networking, sharing their résumé, presenting their research and having the opportunity to meet with several potential employers.

Companies get a cost-effective way to recruit from a diverse and talented student population.

Activities include:

- Job interviews.
- Open poster sessions.
- Icebreaker reception.
- Field trip and short course option.

Students should submit their résumés and poster abstracts by Aug. 29.

To register or for more information on the program and travel grants that are available, go to www.studentexpo.info.

6TH ANNUAL

FALL EDUCATION CONFERENCE

HOUSTON, TX • SEPTEMBER 12-16, 2011

AAPG EDUCATION CONFERENCE

Theme: Unconventional Resources – Focus on Shales

Five Great Days of the Finest Geoscience Training for One Low Price

Courses will include:

- Reservoir Characterization & Production Properties of Gas Shales—Miller
- Understanding Heterogeneity in US Shale Plays—Salter and Lewis
- Shale Gas Geophysics for Non-Geophysicists —Close and Perez
- Seismic Attributes for Shale Plays - Focus on the Niobrara Shale—Ouenes
- Log Analysis of Shaly Sands—Asquith
- Recognizing Unconventional Pay from Wireline Logs: Case Studies—Stambaugh
- Introductory Geochemistry for Shale-Gas and Tight Oil—Laughrey
- Basic Tools for Shale Exploration—Bridges
- The Bakken Petroleum System of the Williston Basin—Sonnenberg
- Exploration in the Niobrara Shale—Sonnenberg
- Risk, Uncertainty and Decision-Making in Unconventional Resource Plays—Haskett

(Three concurrent sessions each day – mix and match according to your interests and training needs. Buffet Lunch and refreshments included each day.)

Hosted by the Norris Conference Center
803 Town & Country Lane
Houston, TX 77024
Phone: 713-590-0950
Fax: 713-590-0961
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Registration and information:
Toll-free (U.S. and Canada)
888-338-3387, or 918-560-2650
Fax: 918-560-2678
E-mail: educate@aapg.org
Download a registration form at:
www.aapg.org/education/fec.cfm

Tuition for the week:

	Price through 8/15/2011	Price increase after 8/15/2011
AAPG Members	$1695	$1795
Non Members	$1795	$1895
Individual Courses	$450/day	$500/day

(Your five-day badge can be transferred to a friend or colleague if you can't attend all five days.)

SAVE $200 BY BECOMING AN AAPG MEMBER AND REGISTERING BEFORE AUGUST 15TH

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.

MEMBERSHIP&CERTIFICATIONt

The following **candidates** have submitted applications for membership in the Association. This does not constitute election, but places the names before the membership at large.

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

Information included here comes from the AAPG membership department.

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

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

For Active Membership

Arkansas
Fears, Paul Cordry, Southwestern Energy, Conway (K.L. Martin, M.L. Justus, R.T. Dupree)

Louisiana
Chumley, Matthew Carmody, Nadel & Gussman, Shreveport (T.G. Carmody, D. Sevier, S.C. Cowgill); **Stuart, Christopher "Joe" N.**, C&C Technologies, Lafayette (R.A. George, G.K.P. Munson Jr., F.W. Harrison Jr.)

Ohio
Griffith, Elizabeth Morris, Kent State University, Kent (D.K. Holm, R.C. Laudon, I.D. Sasowsky)

Oklahoma
Currie, Jason Wellington, Devon Energy, Oklahoma City (S.A. Stirling, C.D. McKinney, O.L. Broyles); **Dombroski, Brian**, Chesapeake Energy, Oklahoma City (A.A. Middleman, D.W. Combs, T.P. Seeley); **Hoaglund, Steven**, Chesapeake Energy, Oklahoma City (F.W. Gagliardi, L.W. Holman II, R.W. Pope); **Renfrow, Russell D.**, Mid-Con Energy, Tulsa (B.S. Huntsman, H.L. Townes, J.S. McGhay); **Rich, Andrew John**, Samson Resources, Tulsa (W.A. Keller, J.D. Pigott, S.J. Tolbert); **Robinson, Danielle D.**, Newfield Exploration, Tulsa (W.A. Donaldson, L.M. Knox, G.W. Van Swearingen)

Pennsylvania
Malizia, Thomas R., Chevron, Moon Township (C.J. Jump, S.S. Lutz, W.G. Zempolich)

Texas
Berg, Landon Oliver, Cabot Oil & Gas, Graham (A.S. Wylie Jr., J.W. Abshire, J.C. Hickman); **de Wynter, Allison**, Mid-Con Energy, Houston (reinstate); **Didericksen, Brad**, Chevron, Houston (L.C. Knauer, T.D. Elam, S.M. Decker); **Numelin, Tye**, ExxonMobil, Houston (J. Sitchler, R.F. Ruppert, G.M. Gaskins); **Weems, Ian A.**, Technical Drilling Services, Amarillo (A.J. Kolodziej, J.R. Murlin, J.V. Miesse)

Argentina
Carstens, Gustavo Jose, independent consultant, La Plata (P.A. Marshall, V.H. Vega, P. Weimer); **Melli, Angela Teresa**, Pluspetrol S.A, Capital Federal (G.C. Rossi, P.A. Malone, M. Arteaga)

Australia
Arian, Natt, Arian Petroleum, South Morang (R.R. Hillis, R.B. Ainsworth, J.G. Kaldi); **Hand, Nicolas**, AWE, Sydney (B. Kunjan, E.R. Matthews, G.M. Bradley)

Colombia
Bayona, German, ARES, Bogota (V.O. Ramirez, E.J. Jaimes, I.D. Olaya-Lopez); **Mosquera Ramirez**, Juan Carlos, Petrobras Colombia, Bogota (E.J. Jaimes, A.D. Hurtado Artunduaga, V.O. Ramirez)

Indonesia
Sapiie, Benyamin, Institut Teknologi Bandung, Bandung (Y.H. Setiawan, N. Guritno, H. Darman)

Italy
D'Argenio, Bruno, IAMC-CNR, Naples (reinstate)

Malaysia
Oruganti, Bhargava Ram, Petronas Carigali Sdn, Kuala Lumpur (A. Garg, N. Pendkar, J.A. Plata Torres)

Netherlands
Roberts, Jason James, Shell International B.V., Den Haag (K.D. Gerdes, M.J. Foley, J. Spinnler)

New Zealand
Jackson, Nick, The Jackson Group, Wellington (W.L. Leask, R.P. Brand, B. Ricketts)

Nigeria
Adedosu, Taofik Adewale, Ladoke Akintola University of Technology, Ogbomoso (A.O. Esan, A.R. Ojelabi, A.O. Ekun); **Igbanor, Temitope Michael**, Earthsource Hydrocarbon, Lagos (B. Pindar, I.J. Ayodele, O.S. Matthew); **Ogbekene, Ivy Eseoghene**, Degeconek Nigeria, Lagos (O.A. Aboaba, I.J. Ayodele, T. Sindiku); **Oriade, Olabiyi Foluso**, Degeconek Nigeria Ltd, Lagos (I.J. Ayodele, K. Kanu, I.T. Sindiku); **Osuagwu, Hyacinth Maduakolam**, Nigerian Agip Oil Co., Abuja (D.A. Orubiri-Bokolo, D. McPherson, K.O. Ladipo); **Owoyemi, Ajibola Olaoluwa**, Chevron Nigeria, Lagos (O. Bakare, A.O. Ekun, O.O. Esan); **Udofia, Grace Godwin**, EarthSource Hydrocarbon, Lekki (E.I. Enu, I.M. Akaegbobi, O.K. Ulu)

Norway
Kido, Machiko, Norske AEDC AS, Stavanger (K. Miyazawa, T. Tsuji, F.T. Lysell)

Peru
Lajo Yanez, Jorge Anibal, Savia Peru S.A., San Isidro (P.A. Alarcon Medina, Kiko H. Valencia, Mario Eudoro Chavez-Cerna)

Qatar
Ahmad Zamri, Ahmad Fairus, ExxonMobil/ RasGas Co., Doha (J.G. Kaldi, D.G. Rensink, C.J. Strohmenger)

Saudi Arabia
Garner, Nicoli, Saudi Aramco, Dhahran (B.P. Wallick, J.J. Faulhaber, R.G. Hart)

South Africa
Davids, Sean, Petroleum Agency SA, Cape Town (C.A. Caughey, K. Latter, J. Roux); **Salomo, Jonathan Peter**, Petroleum Agency SA, Cape Town (C.A. Caughey, K. Latter, J. Roux)

Milan ICE
from page 42

North America, including 40 oral and 24 poster submissions, featuring an outstanding field of industry-leading experts, where cutting-edge insights will be shared that can help unlock these vast but very challenging resources."

Basinki, who was the driving force behind the three EMD-oriented themes for the 2011 Houston AAPG ACE, observed that the shale-related sessions there had record attendance.

Given the terrific authors, depth and breadth of fresh insights, and differential program that the ICE Theme VI team has worked so hard to create, he believes Milan will represent another "must-attend" event – especially for those focused on the white-hot world of global unconventionals.

Theme VI is just one of the seven technical themes set for Milan (see story, pager 14) – but it definitely will hold its own by bringing in some of the top researchers in the field with the most up-to-date results of their research and field investigations.

That, combined with the committed service providers on the exhibition floor, will give everyone a great opportunity to better acquaint themselves with the leading-edge of these complex and challenging reservoirs.

We know this is a program that will challenge some concepts of unconventional reservoirs, and we look forward to sparking discussions that even Da Vinci would approve of.

We hope to see you in Milano!

"In Memory" listings are based on information received from the AAPG membership department. Asterisk denotes AAPG Honorary Member.

IN MEMORY


TOBIN

Past AAPG President Don F. Tobin died June 28 at his ranch in Bandera County, Texas. He was 95.

The son of an Irish immigrant and pioneer ranching family, Tobin was raised in Wyoming and graduated with a degree in geology from the University of Colorado and entered the oil industry. He then served in the U.S. Army Air Corps training pilots in meteorology and navigation. He graduated from St. Mary's Law School in San Antonio in 1944.

An independent geologist who explored and produced in Texas, Louisiana and Oklahoma, Tobin served as AAPG president in 1993-94 and received the AAPG Distinguished Service Award in 1991 and Honorary Membership in 1998.

He also was a Trustee Associate of the AAPG Foundation.

* * *

Karl Henry Alt, 87
Oklahoma City, May 8, 2010
Richard Clarence Bell, 82
Flat Rock, Ohio, March 29, 2011
Charles Edward Bondurant, 71
Fredericksburg, Texas
Sept. 6, 2010
Hal Stone Dean, 88
Midland, Texas, Feb. 12, 2011
William Blake Fox, 82
Casper, Wyo., May 5, 2011
Donald Dean Geil, 80
Liberty, Mo., Sept. 11, 2010
William R. Gerber, 54
Woodward, Okla., March 10, 2011
Jack Webster Grigsby, 89
Shreveport, La., April 27, 2011
Curry Walker Hall, 78
Houston, Oct. 8, 2010
Alan Ray Hansen, 82
Lakewood, Colo. March 25, 2009
George Richardson Harlow, 83
Paoli, Pa., April 27, 2011
John Hardin Hefner, 82
Houston, April 6, 2011
Chesley Coleman Herndon Jr., 83
Oklahoma City, April 6, 2010
Harley Norman Hotchkiss, 83
Calgary, Canada, June 22, 2011
William J. Hunter, 80
Lodi, Calif., Oct. 7, 2010
Charles T. Jenkins, 87
Duncan, Okla., June 8, 2011
Nestor Nicholeris, 86
Ventura, Calif., Jan. 17, 2011
Charles Louis Runnels, 80
Fairhope, Ala., May 21, 2011
Roy Gene Sharrock, 77
Houston, Oct. 18, 2010
William Parker Slater, 82
Canyon Lake, Texas, Feb. 5, 2011
Robert Russell Smart, 91
San Clemente, Calif., May 14, 2010
Wayne Foster Stanford, 89
Richardson, Texas, May 5, 2011
William R. Thurston, 90
Durango, Colo., June 6, 2011
*** Don F. Tobin**, 95
Bandera, Texas, June 28, 2011
Kenneth Watts Jr., 84
Winnfield, La., Aug. 5, 2010
Eugene Anthony Ziemba, 79
Arvada, Colo., Dec. 21, 2010

Mid-Con Set For OKC

"Exploiting Known Reserves as a Bridge to the Future" is the theme for this year's annual Mid-Continent Section meeting, set Oct. 1-4 in Oklahoma City.

The meeting will offer a special symposium on "A Characterization of the Mississippian Strata – From the Surface to the Subsurface." Technical session topics include:

- Shale Plays and Unconventional Reservoirs.
- Seismic Techniques and Borehole Evaluations.
- New Ideas In Old Areas.
- Exploration Technologies – Old and New.

Information and registration can be found online at 2011aapgmcsectionmeeting.org.

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CLASSIFIEDADS

POSITION AVAILABLE

Petroleum Exploration Geologist
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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 klefler@newfield.com.

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Postdoctoral Research Associate in Stratigraphy/
Sedimentology
Reservoir Characterization and
Modeling Laboratory
Department of Geological Sciences
University of Colorado at Boulder

The Reservoir Characterization and Modeling Laboratory (RCML) at the University of Colorado at Boulder invites applications for a research associate (postdoctoral) in clastic stratigraphy and sedimentology. This is a 1-yr. position, to begin summer or fall 2011, with the possibility for extension. The individual will primarily conduct reservoir-scale, outcrop-based research on the stratigraphic characteristics and variability of fluvial systems of the Williams Fork Formation (Colorado), and evaluate the controls on reservoir architecture, heterogeneity, and connectivity. Research opportunities will exist for the individual to conduct detailed outcrop and subsurface 3-D "reservoir" modeling of the fluvial deposits. Refer to www.jobsatcu.com, posting # 814089. Applicants must have a Ph.D. at the time of appointment. Experience with outcrop characterization is required, and some experience or interest in 3-D geological (reservoir) modeling is desirable. Candidates should send the following documents: a CV, statement of professional goals and research interests, and contact information for three professional references to: Dr. Matthew Pranter, Associate Professor and director, Reservoir Characterization and Modeling Laboratory, Department of Geological Sciences, University of Colorado at Boulder, 399 UCB, Boulder, CO 80309-0399, or matthew.pranter@colorado.edu.

The University of Colorado is committed to diversity and equality in education and employment; and conducts background checks on all final applicants being considered for employment.

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DEVON ENERGY CORPORATION
CHAIR OF BASIN RESEARCH

The Boone Pickens School of Geology at Oklahoma State University (OSU) is extending its search for the endowed Devon Energy Corporation Chair of Basin Research. This Chair will be filled at the level of Professor, will carry tenure in the School of Geology, and will be filled by January or August 2012. Applicants must have a Ph.D. degree in geology or related field and have an outstanding record of research, commensurate with the rank of tenured full professor and a demonstrated record of funding. The specific field of study is open but special consideration will be given to geoscientists with interests in reservoir characterization and modeling, unconventional petroleum reservoirs, depositional and/or diagenetic systems, geochemistry of petroleum systems, and/or origin and migration of basinal fluids. Preference will be given to candidates with a close working relationship with the petroleum industry. The applicant must be committed to excellence in teaching both undergraduate and graduate students, will be expected to supervise M.S.- and Ph.D.-level graduate students and develop courses in his/her specialty.

The successful candidate will join a faculty of twelve geoscientists and will take a leadership role as part of campus and industry research groups in a department that has close ties to the petroleum industry. The school's teaching and research facilities include state-of-the-art geophysical field and laboratory equipment and software, the Devon Visualization Laboratory, and a wide range of petrographic and geochemical instrumentation. The School also maintains a field camp in Canon City, Colorado.

Candidates should submit a letter of application, including 1) a discussion of research interests, 2) approach to teaching, 3) curriculum vitae, and 4) the names, addresses, e-mail addresses, and phone numbers of three references to: Devon Chair Search, Boone Pickens School of Geology, 105 Noble Research Center, Oklahoma State University, Stillwater, Oklahoma 74078-3031, Phone: (405)-744-6358, Fax: (405) 744-7841. Screening of candidates will begin on October 17, 2011 and continue until the position is filled.

More information on OSU and the Boone Pickens School of Geology can be found on the web http://osu.okstate.edu and http://geology.okstate.edu respectively. Inquiries about this position may be directed to Dr. Todd Halihan (todd.halihan at okstate.edu) or Dr. Jay Gregg (jaygregg at okstate.edu). Committed to health and safety, Oklahoma State University maintains a tobacco free work environment. Oklahoma State University is an Affirmative Action/Equal Opportunity/E-Verify employer committed to diversity.

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Petroleum Geologists
Sr. Petroleum Geologists
Coal Geologists
LINC ENERGY OPERATIONS
CASPER, WY–ANCHORAGE, AK–HOUSTON, TX

Petroleum Geologists should provide expert interpretation of petroleum related geological data. Timely reports and recommendations are generated pertinent to acquisitions, evaluations, reserve estimating and field development. Must work well with multi-disciplinary teams.

Qualifications: Post graduate qualifications preferred; working experience in petroleum geology and field development are essential. Must be experienced with exploration, oil field, land drilling and production terminology and methods.

Duties: Work closely with stakeholders to ensure best practice in O&G operations utilizing geologic knowledge. Develop, scope and execute development programs for field optimization and EOR suitability. Interpret geologic data to fully optimize producing assets. Manage drill rig programs including site based drilling activities. Manage and supervise a team of drillers, geologists, and other support employees. Structural and geophysical interpretation including seismic analysis and interpretation. Develop computer models (PETRA), rollout plans, budgets, scope of work, drilling programs in relation to exploration sites and producing assets.

Coal Geologist positions for Linc Energy will be responsible for analyzing, reporting and advising on the geology of the coal deposits within Linc Energy's areas of interest. Provide expert interpretation, evaluation, resource calculations and advice based on exploration results and pre-existing data. Work with the UCG Technical Team. Emphasis will be in exploration, database management, computer modeling, geotechnical analysis, subsidence and estimation of resource quantity and quality. Some field activity and drill site work possible.

Qualifications: 5+ years experience in coal geology (CBM or mining); demonstrated field experience; computer modeling in Petra preferred; geotechnical experience particularly in subsidence preferred. Demonstrated ability to correlate seams and assess seam geometry, associated strata, quality, geohydrology and geotechnical aspects of a coal deposit..

For more information on LINC ENERGY, and for a complete listing of open positions, please visit our website at www.lincenergy.com. **Please send resumes to: mike.simard@lincenergy.co**

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Jason Strickland
(405) 228-8539
(405) 209-9079
jason_d_strickland@hotmail.com

MISCELLANEOUS

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

READERS' FORUM

An Important Addition

After reading the article on clean coal technology in the July EXPLORER, I realized a crucial part of the article – CO_2 EOR – was entirely omitted.

For example, Texas, ranking sixth in U.S. coal production, has abundant coal and lignite resources that could produce CO_2 for EOR. Fortunately, Texas and neighboring states contain a variety of oil reservoirs having EOR potential from injection of CO_2. CO_2 flooding in the Permian Basin in Texas and New Mexico has produced >1 billion barrels (Bbbl) of oil since 1971. Advanced Resources International, in a 2006 study, finds that an additional 5.6 Bbbl of oil from 127 reservoirs can be technically recovered in the Permian Basin from miscible-CO_2 flooding.

The Gulf Coast also has a considerable CO_2 EOR potential. A 2005 study by the Bureau of Economic Geology (BEG) suggests that CO_2 EOR can recover >4.7 Bbbl of oil the Gulf Coast in Texas, Louisiana, Alabama and Florida.

To date, the U.S. oil industry has injected over 600 million tons of CO_2 and is currently producing ~250,000 barrels of oil per day with CO_2 EOR. According to economic analysis by the Center for Energy Economics at the BEG, onshore CO_2 EOR projects break even at $60-$80/barrel for $100-$200 per ton of CO_2.

Although, as stated in the article, it is important to be in compliance with federal guidelines on air quality, it only makes sense to produce clean coal if it is economically sustainable. All of the examples of clean-coal sites cited in the article, particularly Weyburn, are relevant to CO_2 EOR, and illustrate the need for economic sustainability if clean coal is to ultimately be a viable process.

William A. Ambrose
Austin, Texas

(Editor's note: The entire Q&A session with Ambrose, who is the chair of EMD's Coal Committee, can be found online at www.aapg.org/explorer/2011/07jul/clean_coal0711.cfm.)

Frac vs. Frack

This is a comment on the spelling of contractions or shortenings of the term hydraulic fracturing in which the letter k is used, (e.g., frack, fracking.)

People involved in the application of hydraulic fracturing have never routinely used spellings with the letter k. This is because the letter k is not present in the spelling of the root word, fracturing.

Terms such as frack or fracking have appeared relatively recently in print, and are associated with adversaries of the hydraulic fracturing industry. Often, these adversaries are poorly informed and have disseminated incorrect or misleading information to the public regarding the hydraulic fracturing process and its environmental risks.

As such, seeing the persistent use of the terms frack and fracking in AAPG literature is irritating to AAPG members that are involved in the application of hydraulic fracturing.

Please consider eliminating the "k" words from your editorial pieces.

Dave Cramer
Houston

Editor's note: Mr. Cramer's letter was one of five we received this month that were critical of our use of the word "frack" as a term for hydraulic fracturing. We suspect there are many other members who share this view, and we appreciate receiving all comments.

We can assure you, however, the decision to change from "frac" to "frack" was not done casually – nor is it our experience that only those with anti-industry bias are using the word.

As AAPG members know, industry publications such as the EXPLORER routinely used the word "frac" for years when writing about hydraulic fracturing – even though, to the public, there was no such word at the time. It was industry shorthand, but since for all of those years only the industry read such stories there were no complaints that industry publications had essentially created a word to reflect the way our sources talked about the process.

For the past 18 months or so, however, the word (and awareness of the practice, thanks largely to non-industry news coverage of the Marcellus Shale play) has entered the public lexicon, and non-industry publications and editorial styles – especially the Associated Press, which is the style used by the EXPLORER and other industry publications – decided that "frack" is a word the public more readily recognizes.

Hence, when the public uses Internet search engines (such as Google) to find out more about the practice, "fracking" often links to a lot more news stories than does the industry-preferred "fracing."

Since one of our missions at AAPG is to communicate our members' story with the public at large – to provide the opportunity for the public to get all sides of the story – we want to do all we can to ensure that EXPLORER stories about hydraulic fracturing are the ones that people read.

While some may disagree with our decision, please understand that we debated the matter for several months before officially declaring (in January) the style change.

Perhaps it's like the classic Beta vs. VHS conflict; in the early days of video, industry experts KNEW Beta was the superior technology, but the public CHOSE VHS. In the case of frac vs. frack, the public has once again voted. We don't want to lose the chance to communicate with them because of a controversial "k."

DIVISIONS' REPORT

It's an unconventional world

Remaining Relevant – Not a Problem!

By STEPHEN M. TESTA, EMD President

EMD members live in an unconventional and alternative world.

Now that may not sound like a positive thing, but I beg to differ.

It's a new year, with a new EMD Executive Committee and president, and there is renewed interest in unconventional and alternative energy resources. This sounds somewhat like an oxymoron (think tight sands, heavy gas or synthetic natural gas) in the sense that what we refer to as unconventional and alternative implies that in an EMD world what we do is out of the ordinary and maybe not even relevant.

Several things have happened over the past several years that are causing EMD to be of more value – or as I would say, "relevant" – as we look ahead.

A national political push away from the conventional to the unconventional and alternative energy resources is a primary factor.

In review of the Annual Energy Outlook 2011 with Projections to 2035 published by the U.S. Energy Information Administration, it is stated that:

- Shale gas production will continue to increase strongly, almost four-fold from 2009 to 2035.
- The United States continues as the world's leader in coalbed gas exploration, booked reserves and production. With a major increase of shale gas production, coalbed methane production is anticipated to remain steady to 2035.
- Tight gas sands currently represent about 25 percent of the U.S. annual gas production.
- Oil sand (bitumen) commercial production more than doubled during the last decade, and is expected to steadily increase over the next decade.
- Although not expected to play a significant role in global production for another decade, oil shale is projected to increase two to potentially five-fold over the next five years.


TESTA

EMD will continue to play a significant and increasing role as interest grows in unconventional and alternative energy resources.

* * *

Looking toward the future in regard to the alternatives, coal remains a significant component of the world's production and energy consumption, albeit recently dropping slightly from supplying about 50 percent of the U.S. electrical generation down to 47 percent.

Recent technological developments and advances in clean coal, underground gasification and coal-to-liquids technology are anticipated to expand our reliability and dependency on coal's role in the energy mix.

Coal production and consumption are anticipated to rise, and currently coal accounts for over half of the total energy use in the United States – and coal production is projected to increase by 21 percent to as high as 41 percent from 2009 to 2035.

Field tests continue in regards to gas hydrates with the goal of evaluating whether CO_2 can be injected in a gas hydrates reservoir resulting in the production of methane while permanently sequestering CO_2.

Industry interest should increase as sustained commercial production is achieved.

Nuclear power has re-emerged over the past decade and accounts for about 20 percent of our electricity – increased from 2003 to 2007 and decreased until mid-2010. Even with events following the March 11 Tohoku earthquake and tsunami, and resultant Fukushima incident, future trends are certainly upward, at coal's expense, over the next 25 years.

Geothermal funding continues at the federal level with increases in funding anticipated.

Did I forget to mention that energy consumption is anticipated to go up across the board? You probably already knew that.

* * *

In summary, I am far from convinced that EMD is all about being out of the ordinary. In fact, EMD-related interests are becoming more mainstream in our daily dialogue – just look at the current interest among our colleagues and public in gas shale.

I am hopelessly optimistic for political leadership that will move us toward a national energy policy that is reasonable and economically and environmentally sound.

EMD will continue to play a significant and increasing role as interest grows in unconventional and alternative energy resources. This is clearly demonstrated by the increase in EMD membership (160 percent since March 2010), increasing numbers of individuals tapping into EMD's website resources (EMD web portal activity up 100 percent in page views and 900 percent in visitors), and an increase in ballots cast in the recent election (up 145 percent from last year). There is no enthusiastic indifference here.

I am both excited and honored to have the opportunity to serve as the 2011-12 EMD president. As the new EMD Executive Committee develops and moves forward with our agenda for the upcoming year, our primary purpose is to continue to demonstrate and maintain our relevancy – and how we communicate not only to the choir but to all of our stakeholders.

These are exciting times for EMD and those involved in energy resources. The out of the ordinary is increasingly becoming the ordinary – extraordinary ordinary.

I invite you all to participate in this innovative and challenging venture.

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