AAPG AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS, AN INTERNATIONAL ORGANIZATION

EXPLORER

MAY 2005

Still Going Strong

The Boom Continues For the Barnett Shale

See page 4

Vol. 26, No. 5
May 2005

AAPG EXPLORER

On the cover: Looks inviting, doesn't it? This is one of 15 drilling rigs that are working the Barnett shale play this year for Devon Energy – almost all near Fort Worth in north Texas. Devon has the largest presence in the wildly successful Barnett play (with more than a half million acres under lease), and the play is proving to be successful for lots of others, too. But don't be fooled: As any Barnett shale operator can tell you, challenges remain. See story, page 4. Photo courtesy of Devon Energy.

CONTENTS

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PRESIDENT'S COLUMN

Washington Office Dividends Expected

By PATRICK J.F. GRATTON

Our Geoscience and Energy Office in Washington, D.C. (GEO-DC), is being formed in direct response to the 2003 All-Member Survey conducted by Anderson Marketing Services (November 2004 President's Column).

Recapping that column, the survey gave Government Affairs (GA) a rank of No. 5 out of 17 choices by members. On repeated inquiries, members supported more informing of government (U.S. and non-U.S.) with good encouragement in non-technical issues and even stronger positives for technical issues.

After my column went to press, DPA conducted an electronic survey. Responses by 462 members were:

✓ 74.9 percent in favor of AAPG being more involved in GA.

✓ 74.5 percent in favor of DPA's GA Committee becoming more proactive.

✓ 52.6 percent in favor of AAPG considering opening a GA (GEO-DC) office in Washington, D.C. (32.7 percent opposed, 14.7 percent don't know/no opinion).

✓ Regarding DPA participating with AAPG in opening such office, 47 percent were in favor, 30.7 percent were opposed and 27.3 percent marked "don't know/no opinion."

✓ DPA monetary support response was 68.4 percent in favor, but at widely ranging levels ($1,000 to $100,000 per year).

✓ Strong support indicated for GA (GEO-DC) office focused on education and on petroleum geoscience (71.5 percent combined for "value" levels – 4 and 5, with 5 being the highest), while support for non-technical focus was 64.3 percent, and ranged widely from value level 1 to value level 5.

Topics for the GA (GEO-DC) office focus included a wide-range, with greatest support for national energy policy and onshore land access. For more information on this please view the DPA part of AAPG Web site, at dpa.aapg.org/gac.

* * *

Article II of the Association's Constitution includes under "Purposes," "to advance the professional well-being of its members." We recognize that interfacing with governments substantially affects members' livelihoods.

Based on survey results, your leadership has an obligation to respond. Accordingly, we have developed a detailed business plan with major staff assistance, and have placed ads for employing a GEO-DC director.

Arrangements are progressing for leasing office space from AGI, and we expect close cooperation with their GA coordinator. (AGI is restricted in advocacy because of the different interests of their constituent societies. However, AGI gathers much information in Washington that impacts the 43 member societies.)

From our business plan the Association objectives include:

✓ Increase the awareness and perception of Congress on the energy needs of the global community.

✓ Support a viable U.S. National Energy Supply Policy.

✓ Actively promote AAPG/DPA policy positions to Congress and federal agencies.

✓ Educate congressional staffers about the scientific aspects of petroleum geoscience, especially in relation to resource assessment.

✓ Solicit grants for petroleum and coal research from government agencies such as the U.S. Department of Energy, Department of Defense, Department of the Interior and the National Science Foundation.


Gratton

✓ Encourage Congress to increase funding of petroleum research through government agencies such as DOE.

✓ Inform Congress regarding legislation on petroleum and energy minerals related tax matters.

✓ Educate government agencies on the effects of regulation of petroleum and energy minerals.

✓ Establish and build a science-based coalition of energy professionals.

✓ Establish and develop a grass roots effort to develop private funding of an organization to compete with non-governmental organizations that are against resource development.

✓ Develop a Washington identity for AAPG through regular contact with congressional staffers and the Washington bureau establishment.

The office's annual budget is $150,000 to $200,000 per year, depending on staffing, which is in the middle of the range of nine other 501 (c)(3) and (c)(6) organizations' Washington offices. At $200,000 the office would constitute a little less than 2 percent of our total budget – or about the same as the Distinguished Lecture program.

It is time for AAPG to have a Geosciences and Energy office in Washington, D.C.

While it is a relatively modest economic outlay, we expect substantial dividends in expanding the Association's role in geoscience policy. And, we hope to recover funds advanced by qualifying for grants from agencies and non-governmental organizations.

A group of "Founding Folks" has pledged non-deductible (for income tax purposes) monetary support for GEO-DC, and the dues statement carries an optional contribution election.

If you would like to join the "Founding Folks" (pending a better name!) please call me at (214) 744-3869 and add your name and support to an important initiative.

The 17-Year Overnight Sensation

Barnett Shale Play Going Strong

By LOUISE S. DURHAM
EXPLORER Correspondent

Production just keeps going gangbusters in the Barnett shale play in the Fort Worth Basin in north-central Texas.

In fact, the buzz in the oil patch likens the play's huge production volumes to printing money in the field.

The current frenetic leasing and drilling activity is a world removed from the early 1980s when Mitchell Energy – intrigued by widespread gas shows and a trickle of unexpected production while drilling other targets – kicked off the initial effort to unlock the secrets of the Barnett and determine its potential.

Close to two decades elapsed before the play proved to be solidly economical for Mitchell, prompting many of today's veteran players to dub it the "17-year overnight sensation."

The current undisputed kingpin of the Barnett is Devon Energy, which snapped up Mitchell Energy in 2001, laying claim to Mitchell's already-substantial holdings in the shale.

"There are more than 100 companies and a lot more individuals currently active," said Patrick J.F. Gratton, independent geologist and AAPG president, "and there are well more than 60 operators."

Gratton, who has been an active participant in the play for several years, is on the lecture circuit with his presentation "Barnett Shale Play: Big and Getting Bigger," which has drawn audiences at numerous domestic geological society gatherings as well as the University of Scotland at Aberdeen.

Not surprisingly, there's no dearth of folks wanting to gain entry into this unconventional shale gas bonanza.

AAPG member Kent Bowker, consulting geologist and a seasoned Barnett player and alumnus of Mitchell Energy, agrees with Gratton's assessment and says "the number grows daily."

"I get at least two calls each week from people wanting to meet with me to talk about getting into the Barnett," Bowker said. "Both small and mid-size independents are interested, and even the majors are starting to look now.

"It's like a shale revolution going on – everyone's gotta have some."

It's easy to understand why when you look at the numbers he ticked off:

✓ More than one Tcf already produced.

✓ Field producing more than one Bcf/day and growing.

✓ Well completions at a rate of 1.5/day.

✓ Likely several Tcf of booked reserves.

The Barnett, in fact, kicks out more than one-half of the total shale gas produced in the United States, Gratton noted.

"All other Texas gas fields are either flat or declining," Bowker said, "but the Barnett shale is like a perpetual motion machine – and there's no prospect of the end."

Photo courtesy of Jon Huggins

Looking for black gold, deep in the heart of Texas: A vibroseis crew prepares to acquire data in eastern Wise County, one of several Texas counties where Barnett production is plentiful. Two producing Barnett wells can be seen in the background.

Get Ready ...

The heart of the play is the Newark East Field with more than 2,340 wells producing from the Barnett at depths as shallow as 6,500 feet. The consensus among many of the veteran players is the field could ultimately surpass the giant Hugoton Field to become the largest gas field in the United States.

The core area of the Newark East lies in southeast Wise, southwest Denton and north-central Tarrant counties. Production continues to expand geographically, however, with the best well in the field currently to the south in Johnson County.

"Best well" is a record that usually falls every two months as operators refine their completion techniques, Bowker noted.

"At Mitchell, we did some estimates of the extent of the gas-prone area of the Barnett (some areas of the shale are still oily), and I've done a couple since then," said Mitchell alum and consulting geologist Dan Steward, who works with Republic Energy, one of the play's earliest operators. "I believe the gas-prone area occupies between 6,000 and 7,000 square miles, which includes areas underneath the Ouachita overthrust."

Before you rush out the door to stake a claim in this amazing play, gather up a bushel basket of money. Also, be aware there are reasons why the Barnett caused years of frustration and sleepless nights for the pioneering Mitchell crew before they turned it into the next big thing.

There's a host of complex geological and engineering issues standing between the operator and first production.

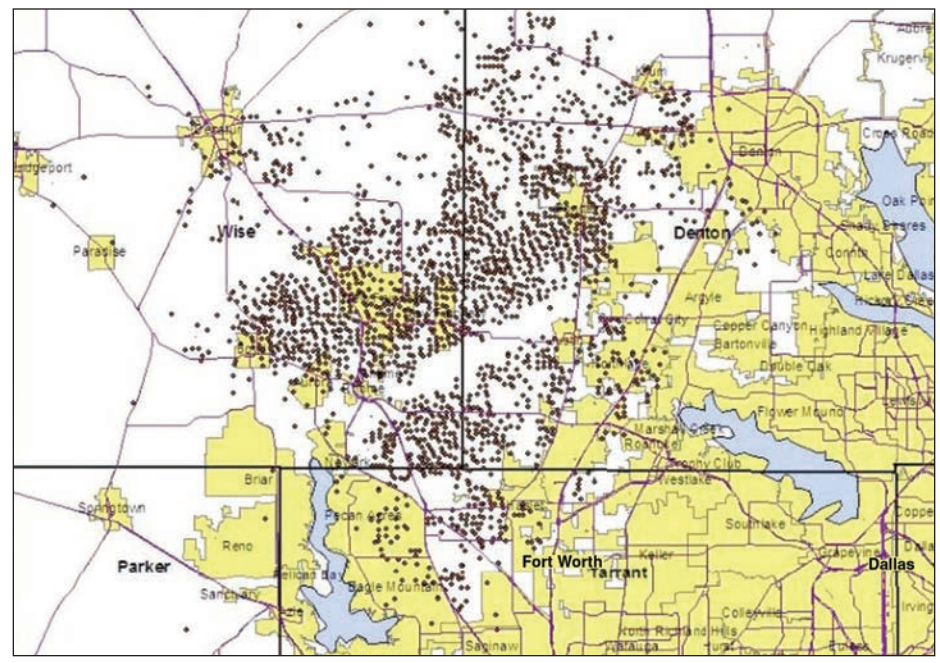
For starters, shale is not supposed to be a reservoir rock, according to Bowker.

"It's astounding the most prolific reservoir rock in Texas is a shale," he noted. "You know it's working, but you look at the rock and it just doesn't make any sense how all that gas is coming out of that rock that's tight as a tabletop.

"It sounds like a gas factory," Bowker noted. "But there are geologic reasons why some parts of the basin are more prospective than others, and there's science and engineering behind all this – you don't just drill a hole like Jed Clampett and have gas come out of the ground.

"Prices are up and everyone hears great things about the Barnett," he continued. "They don't understand it took a long time to figure out, and we're still trying to figure it out – and not all are making money while they're doing it. At least 20 companies have drilled dry holes because they don't understand it.

"We're still writing the book on shale."



Map courtesy of Rick Gonzales/Search and Discovery

Map showing Barnett shale wells in the greater Dallas/Fort Worth metroplex area.

Get Set ...

If you're still determined to get in on the action, it's fairly easy to establish a presence – if you're willing to pay the price.

Late last year, a lease sale in a part of the play's core area in northern Tarrant County, where the federal government holds mineral rights from a former Air Force base, captured a fee of $10,200 per acre, Bowker said.

If this makes you feel faint, go shopping in Bosque County to the south of the big action, where prices recently were in the $300 per acre range – still up considerably from a couple of years ago when owners couldn't give leases away, according to Steward.

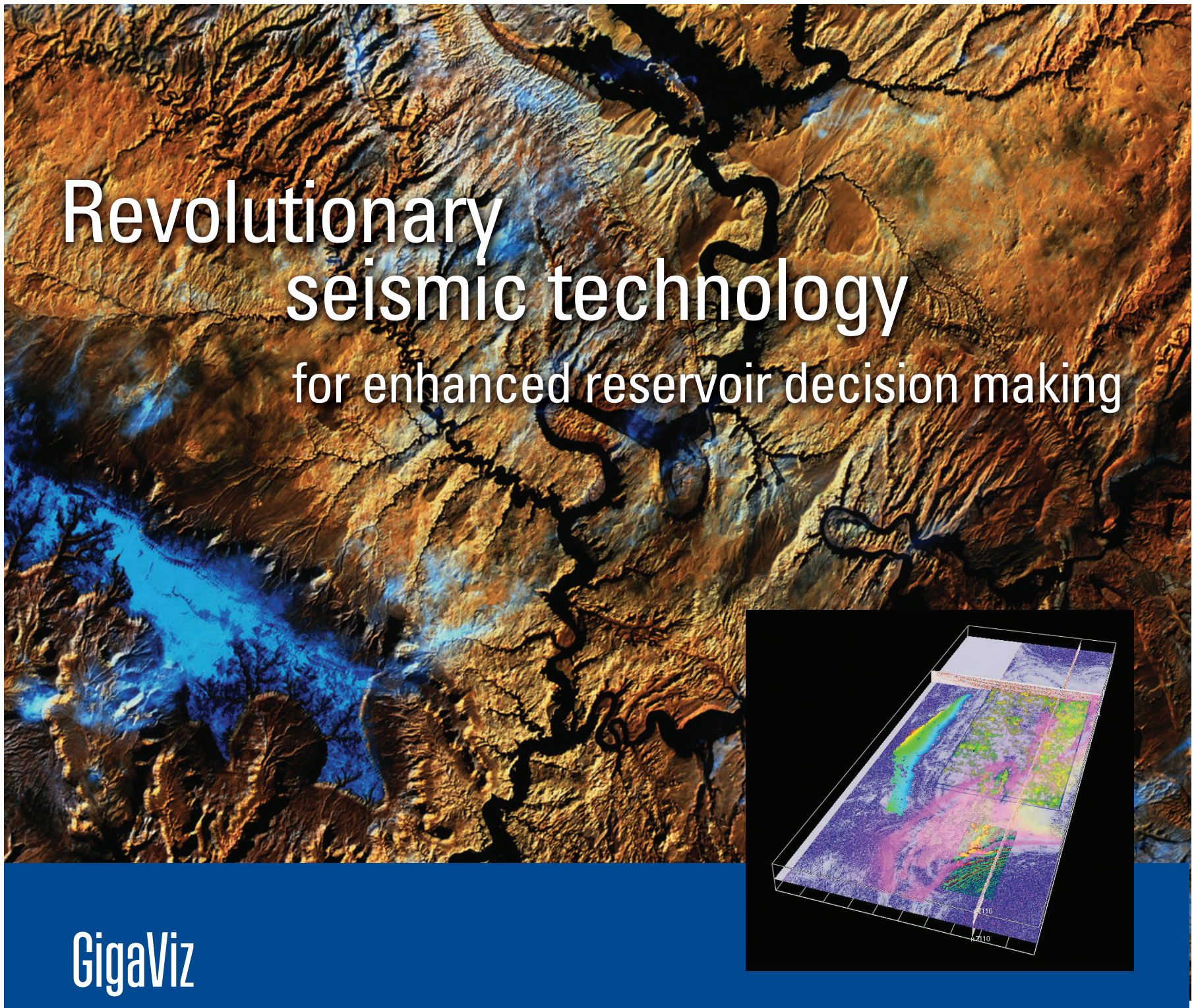
"There's essentially been no drilling yet," Steward said, "but the Barnett is gas-prone here with a thickness of 150 to 200 feet. People are taking leases with the idea the technology will catch up."

"People are also taking leases in areas where I question it will work," Bowker said. "But I don't say no, because there are very few places where I would guarantee the Barnett shale won't work."

Where it doesn't work, there can still be an upside in some instances, according to Gratton.

"In the westerly part of the play such as Parker County, there are shallower Pennsylvanian objectives – fluvial deltaic sandstones, which come and go and are

See **Barnett Shale**, page 6



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Schlumberger

Barnett Shale

from page 4

hard to predict – which frequently are bail-out zones," Gratton said. "From an investor standpoint, if you're in one of the treacherous areas of the Barnett where it's difficult to make good completions, these overlying zones take away a lot of the financial risk.

"This adds a plus to where the play gets shallower and weaker to the southwest of the core area."

Fracture treatments and their containment within the formation have always been key to producing this tight low-permeability shale.

"In some places, if you don't have a relatively accommodating limestone bounding the Barnett to stop the artificial fracture from going on, then the fractures will continue in a way to lead you into a water-bearing formation or aquifer," Gratton said. "This has been a big problem."

The original gel fracs were highly expensive and a major drag on the economics of the play, even though Mitchell had extensive existing infrastructure in the area for its shallower production. In the late 1990s engineers began experimenting with water fracs, which proved to be comparable to gel fracs in performance while lowering stimulation costs dramatically.

Horizontal drilling provided another leap forward for the Barnett.

"You get much more efficient fracture stimulation with horizontals than with verticals," Bowker noted. "The hydraulics are more efficient in contacting more of the reservoir rock, and the more reservoir rock you can contact with the well and with the fracture stimulation, the better the well.

"You can get about three times the well for two times the cost of a vertical," he said, "maybe better."

Whoa! Uh ... Go!

A note of caution to newcomers: "A year-and-a-half ago, we saw a lot of unknowns, or mom 'n' pops, picking up acreage and drilling vertical wells," Steward said. "They basically found the probability of success was not high enough with vertical wells."

Steward and many of his peers predict major longevity for the Barnett.

"It's going to be producing for more than a hundred years, maybe several hundred," he predicted. "Technology will let us do a lot of things, and I have no idea what that technology will be.

"No one recognized way back that water frac technology would cause the Barnett to take off," Steward said, "and then horizontal drilling kicked it into another high gear. Some other technology will surpass that.

"The majority of the gas we're getting out is free gas," he added, "and until we start doing things to enhance the ability to get all the sorbed gas out, there's a tremendous amount of gas still down there locked up."

Steward anticipates one breakthrough will be the use of dual gathering systems, i.e., a low pressure system parallel to a high pressure one. The state of the well determines which gathering system it enters. For example, it's common to re-frac a well and get back into a high pressure regime, meaning the well must be switched to a corresponding gathering system.

Like so many oil and gas plays, the importance of 3-D seismic is not to be underestimated in the Barnett.

"Most companies who know what they're doing would not drill a well without a 3-D survey over it if they're smart," Bowker said. "It's not necessarily to tell where to drill but where *not* to drill. There are geologic hazards that can be imaged through seismic geophysics."

Jon Huggins, consulting geophysicist and another Mitchell alum, concurs.

"The purpose is to locate such things as faults and karst collapse features, and there are some large regional faults to be aware of, too," Huggins said. "History has shown when you get close to faults, you start having problems with fracs, or get underlying Ellenburger water, or any number of bad things happen to you."

It's particularly noteworthy that without geologist and now-legendary oilman George Mitchell's boundless optimism and undying belief early on in the unproven, perplexing Barnett shale the play likely would have never happened.

"We would not be talking about the Barnett shale if not for George Mitchell," Bowker said. "No other manager or owner of an independent or major company would have let his people work on something so marginally – and sometimes sub-economic. He put his money into a play for 17 years that was barely economic, never backing down even when his managers said they didn't believe it.

"He's a wildcatter, and he knew there was something there," Bowker continued. "He knew the potential without really knowing why, and he kept pushing his people until they figured it out.

"This field is making billions of dollars for lots of people; they should erect a statue of George Mitchell and pay homage to it every day." ❑

Why Is It the 'Barnett' Shale?

What's in a name?

In other words, who was Barnett, and why is the hottest onshore play in the United States named after him?

"He" was John W. Barnett, and in the 1870s he and his family settled in San Saba County, Texas, near a creek he named, proudly, the Barnett Springs Creek.

According to a Geological Note in Volume 6 of the AAPG BULLETIN by the geologic/paleontologic legend R.C. Moore, a soft, yellowish gray to black, clayey, bituminous shale outcropped there. Geologists who studied its occurrence included it under the name "Lower Bend shale" with the Bend series.

A more recent paper (Plummer and Moore) reported that the Lower Bend shale was given the name "Barnett" shale because of its proximity to the Barnett family's homestead, where the shale is well exposed.

According to a paper read before the Association in 1919, the Barnett shale was tentatively referred to as Pennsylvanian, though a later account (Girty) determined that because the Lower Bend shale is really Mississippian, the division is placed under the heading "Beds of Uncertain Age."

Today the Barnett Springs Ranch is on the original family settlement.

Fear Still a Factor

‘Nuclear’ Re-enters Energy Picture

By LOUISE S. DURHAM
EXPLORER Correspondent

The oil and gas industry is a pretty amazing scene these days:

✓ Crude oil prices may retreat one day only to come back up to hit a new high the next.

✓ Companies are darting all over the place to find and produce increasingly-elusive new natural gas deposits to meet growing demand.

✓ LNG terminals are in vogue.

✓ There are wait-lists for drilling rigs in some locales – both land and water.

Given this scenario, it’s no surprise that rhetoric abounds about the need for the United States to move away from a fossil fuel-based economy.

Plenty of folks envision cars powered by fuel cells to be the solution, even though current fuel cell technology depends on hydrogen derived from natural gas. And even with adequate supplies, the nature of hydrogen itself presents other hindrances to its use as a replacement for oil and gas.

Alternative power sources such as solar systems and wind turbines have their champions, too, although others suggest their application would be successful only on a small regional scale. These sources also depend on substantial amounts of fossil fuel-based energy, e.g., to manufacture the equipment.

There’s a growing number of experts and others who think nuclear energy is the only real solution to the much-talked-about coming power squeeze.

“For the overall plan to keep the lights burning brightly, it’s clearly nuclear,” said Michael Campbell, who heads up his own environmental and mining consultancy and also serves as chairman of the Uranium Committee for the AAPG’s Energy Minerals Division (EMD). “It’s not frontier technology anymore; it’s been used over and over, and it works.”

The Uranium Committee members recently completed a comprehensive report focused on nuclear power, “Recent Uranium Industry Developments, Exploration, Mining and Environmental Programs in the U.S. and Overseas.” The report is posted on the EMD section of the AAPG Web site.

Campbell explained the concept behind this effort:

“When you talk about a resurgence of nuclear power, you have to deal with all those people who are still scared,” he said, “so we went into detail to write a piece aimed at those people who might likely come out of the woodwork in opposition.

“But it’s also for people like ourselves – the industry in general – to get a good heads up on what’s happening now,” he said.

“The nice thing is I think the ‘liberals’ are coming around, saying things like ‘nuclear power is a helluva lot better than coal’ with respect to the environment,” Campbell added. “I get the feeling more people are concerned about drilling sensitive areas than about nuclear plants.”

Times Change?

A firm believer that the country is headed toward a hydrogen economy in the automotive area, Campbell pointed out that nuclear plants with certain special design features offer the added benefit of producing “incredible” amounts of hydrogen – and producing it cheaply.

The mention of nuclear power often conjures up thoughts of the Chernobyl disaster. Yet the international community had warned the Soviet nuclear industry the reactors were poorly designed and accidents were likely, according to the EMD report.

In the United States, failure occurred at the Three Mile Island plant despite the superior design. However, even given the technology at that time, the incident was brought under control with no casualties and no harmful radiation exposure to the population.

Today, more knowledgeable, highly trained personnel are in place in the industry to take on the level of professional responsibility appropriate to manage and operate the technology.

There are adequate domestic supplies of uranium in both known and frontier areas to accommodate a resurgence of nuclear power in the United States, according to Campbell.

“We spent a lot of money getting after it in the late ‘70s, and all the new techniques to find additional ore were put into place,” he said. “We were finding ore bodies hand over fist.

“When Three Mile Island went down, everything in the entire field froze,” Campbell said. “Everyone committed to uranium exploration had no life. Things are sitting there now, ready to start up again.”

In-situ leaching (ISL) is the method-of-choice to mine the uranium versus open pit mining.

“In-situ mining procedures have little environmental footprint,” Campbell said, “and a lot of controls to prevent groundwater contamination.”

While the jury’s still out regarding the hoped-for impact the committee’s report might have on the general populace, Campbell noted it’s getting a good reception thus far.

He thinks it’s imperative to come together to support nuclear power.

“If we don’t bring these people in by encouraging them to look at this a little differently this time,” he said, “the lights will go out.” ❑

'Clean Coal' an Oxymoron?

Expanded Energy Mix Urged

By SUSAN EATON
EXPLORER Correspondent

Big news: In March, the government of Alberta announced that – for the first time in it's 100-year history – the province was home to more than $100 billion worth of major projects that have been recently completed, are currently under construction or are scheduled to begin within two years.

Bigger news: Energy investment leads the pack, with $69 billion allocated for projects in oil sands, $6 billion in oil and gas, $2 billion in pipelines and $4 billion in power projects.

Biggest question: What happens next?

Jim Dinning, a top energy executive and a well-known public figure in Alberta, has some suggestions for Alberta's future prosperity, and it involves moving beyond a simple oil and gas economy to integrating less attractive or marginalized carbon fuels like coal, coke, asphaltenes and biomass into the energy pyramid.

According to Dinning, the Alberta government must invest more of its windfall profits from oil and gas royalties into research and development that will transform the province into "the clean energy powerhouse of the world."

Dinning is the former executive vice-president of TransAlta Corp., a power company and Canada's largest producer of wind energy and, until recently, chairman of the Canadian Clean Power Coalition. He envisions the construction of a multi-billion dollar, clean-burning coal facility that will reduce the province's reliance upon natural gas, a commodity that is subject to price volatility and increasingly constrained by supply in North America.

Photo courtesy of Suncor Energy

Oil sands from Alberta, Canada.

He wants to "put the margin back into marginal carbons.

"If you put all your eggs into another basket, especially one like natural gas, you can get hooked," Dinning said. "The last thing that we want to do is to shut down those carbons that are marginal."

Jim Dinning, former chairman of the Canadian Clean Power Coalition, will speak about "Marginal Carbon Fuels: The Key to Prosperity" at the joint Division of Environmental Geosciences-Energy Minerals Division luncheon in Calgary during the AAPG Annual Convention.

The luncheon will begin at 11:30 a.m. Wednesday, June 22, at the Big Four Building at Stampede Park.

Dinning

Dinning also is chairman of the Western Financial Group, and is a former 11-year member of the Legislative Assembly of Alberta, where he held the positions of provincial treasurer, minister of education and minister of community and occupational health.

Dinning – the provincial government treasurer from 1992-97 who's preparing to take a run at Alberta's top political job – said the gasification of marginalized carbons to produce energy will enable Alberta to meet its expanding energy needs and exceed emissions reductions under the Kyoto Protocol by up to five times.

"We want to be on the leading edge of design technology and eliminate emissions through the technologies that we develop, rather than through regulation," he said. "An international protocol (Kyoto) shouldn't dictate what should happen in Canada and, in so doing, hobble a carbon asset. Kyoto can't match a made-in-Canada solution."

Dinning called for Alberta to increase R&D spending to levels enjoyed during the hey-day of AOSTRA (Alberta Oil Sands Technology and Research Authority). Then, during a 20-year period, AOSTRA received nearly $1 billion in government support for R&D studies that are widely credited in the development of a commercial oil sands industry.

"In energy research, the Alberta government is doing more than any other province," Dinning said. "Is it enough? The answer is no."

Kicking the (Natural Gas) Habit

According to Dinning, "injecting natural gas into the oil sands to produce oil is like turning gold into lead."

See **Dinning**, page 12

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Dinning

from page 10

In a 2004 report on Canada's oil sands, the National Energy Board stated that natural gas costs can comprise up to 50 percent or more of total operating costs in a thermal – or steam assisted – in situ project.

Dinning described gasification technology that offers an elegant solution to the natural gas crunch that Alberta's heavy oil producers will face during the next decade. According to a 2004 Canadian Energy Research Institute (CERI) report, natural gas consumption for oil sands extraction and refining – currently sitting just below a billion cubic feet per day – could skyrocket to between 2.2 and 3.7 billion cubic feet per day by 2017, leaving many wondering where the gas will come from to fuel future expansions.

Even the proposed Mackenzie Valley pipeline – scheduled to ship 1.8 billion cubic feet per day from the Canadian Arctic to Alberta – would not feed the oil sands producers' growing appetite for natural gas.

However, CERI's study predicted a "very robust future" for Alberta's oil sands industry during the next 13 years – given a "reasonable" outlook for oil prices. The study was based upon conservative commodity prices – US$25 per barrel for West Texas Intermediate and US$4 per million British thermal units for natural gas.

The stakes are huge. With 2.5 trillion barrels of crude bitumen in place, and remaining established reserves of 178 billion barrels, Alberta's oil sands are second only to Saudi Arabia's total reserves. In 2004, Alberta's oil sands industry produced about a million barrels per day, or close to 50 percent of Canada's total daily oil production. Based on CERI's most likely growth scenario, daily production from Alberta's oil sands could hit 2.2 million barrels of synthetic crude and unprocessed crude bitumen by 2017.

Derivatives of the gasification process include value-added products for Alberta's energy economy:

✓ Hydrogen, needed to upgrade heavy oil.

✓ Synthesis or "syngas," to generate electrical power and steam.

✓ Carbon dioxide to inject into subsurface reservoirs for enhanced oil recovery projects.

✓ Ammonia and urea, feedstocks of the petrochemical industry.

"Alberta is the sweet spot where geology meets geography," Dinning said of the plans for a clean coal facility near Edmonton. "Virtually no other place in the world has all of the elements where they come together in such an integrated fashion."

Bridge to the Hydrogen Economy

According to the Canadian Clean Power Coalition (CCPC), a national association of coal and coal-fired electricity producers, North America's hydrocarbon reserves are skewed by coal, which comprises 92 percent of the reserves; oil and gas total the remaining 8 percent.

Alberta's coal reserves – often described as infinite – are immune to the price fluctuations seen in natural gas.

"Coal is not a carbon that should be shelved," Dinning said. "Coal is not only cheap, it's not volatile."

According to Dinning, 70 percent of Alberta's electricity is generated through conventional coal-fired facilities.

In 2004, the CCPC released the results of a two-year study on clean coal. "Gasification is the right technology for coal in the future," explained Dinning. The study contemplates the construction of a $2 billion to $3 billion demonstration plant, most likely in Alberta, by 2010.

Dinning's comments were echoed by Duke du Plessis, a senior adviser with Alberta Economic Development and the Alberta Energy Research Institute (AERI). AERI is one of three Canadian government participants in the CCPC.

"I think the conditions are right for this technology to come into commercial use," du Plessis said. "Coal is the bridge to the hydrogen economy that everyone talks about. Hydrogen is a clean fuel, and is increasingly being viewed as a fuel of the future."

However, it is unclear who will pay for the demonstration plant.

"The barrier is going to be getting the funding in place," du Plessis said.

"Why hasn't the coal utility business done this before? Because we haven't had to," Dinning said.

Market forces and the need to reduce greenhouse gas emissions under the Kyoto Protocol, he added, are powerful agents of change and energy integration.

Poster Child Project

While environmentalists often describe "clean coal" as an oxymoron, proponents point out that the gasification process generates emissions comparable to those produced by natural gas power plants. The ability to "fix" carbon dioxide, nitrogen and sulfur into feed stocks for the petrochemical industry means that emissions can be further reduced.

Gasification technology has been successfully used in the refining, petrochemical and power industries since the late 1940s. The leaders are the Royal Dutch/Shell Group of Companies and the General Electric Company. GE Energy currently operates 16 facilities in the United States, 22 in Europe and 27 in Asia. Globally, it produces more than five billion cubic feet per day of syngas. According to a GE spokesperson, the company is targeting China, the United States and Alberta for new business opportunities.

OPTI Canada Inc.'s Long Lake project, 40 kilometers southeast of Fort McMurray, will employ Shell's gasification technology to produce syngas, power and hydrogen from asphaltenes.

OPTI's project represents the first commercial gasification project in Canada. OPTI's unique combination of extraction and upgrading technology makes it the poster child for the new wave of energy efficient oil sands mega-projects. ❑

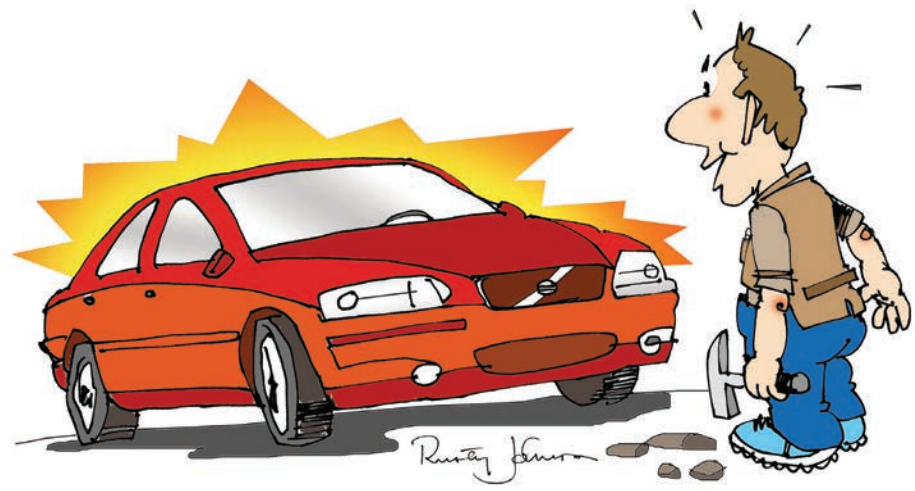
For more information on this subject, visit the AAPG Web site. www.aapg.org

Plans Aim to Attract, Retain the Best

Incentives: Catch and Keep Ideas

By LOUISE S. DURHAM
EXPLORER Correspondent

NEWS ITEM: Geoscientists are included among the top 25 jobs for 2005, according to Fast Company, which draws on the work of the Bureau of Labor Statistics and an innovative expert to tap the top jobs. Salary prospects are rated "above average."



Industry newcomers will find the welcome mat in place at the door to many oil and gas companies. In fact, some of the more aggressive firms are going to unusual lengths not just to attract new hires but to hold on to the current crop of valued employees – while simultaneously growing the value of the business.

To accomplish this, they are coming up with some creative incentives – some of which venture a little more out of the mainstream than others.

Perhaps none is more unusual than the 2005 Employee Volvo Challenge announced by ATP Oil & Gas Corp. via a press release late last year.

The program itself is pretty straightforward: Hit specified reserves replacement and production targets, and all 50 or so employees – that's right, every one – will receive a 2006 Volvo S60.

As if the car isn't enough, there's an added carrot: Each employee will accept vehicle delivery in Sweden under the Volvo Overseas Delivery Plan, provided measurable group goals relating to performance of the U.S. arm of the company and its U.K. and Netherlands subsidiaries are attained.

Not surprisingly, the powers-that-be have defined some formidable targets:

✓ Complete a number of projects in the North Sea and the Gulf of Mexico's OCS and Mississippi Canyon.

✓ Acquisition of reserves to replace production by 200 percent.

✓ Achieve (despite well decline rates) a 2005 overall company production "exit rate" of 160 MMcf per day – about double 2004 numbers.

"The goals are ambitious, but they are achievable, and all the employees recognize this," said Paul Bulmahn, chairman and president of ATP. "There's great morale and a lot of energy and enthusiasm inside the company for meeting these targets, and we're on track at this point.

"If we meet the targets, we will have doubled our company's production – production it took 14 years to build," Bulmahn said. "That's huge, and that's where we expect to be in the spring of 2006.

"Our company will have been transformed, and I wanted every employee to personally realize something they could bite, something they could taste – I wanted everyone to feel a part of that big jump."

Stock Motivations

Apache Corp. is another devotee of employee incentives/initiatives. The company has been rewarding its employees for growth of the company's stock via a plan set in place about 10 years ago.

The rewards are in the form of stock grants, making each employee a part-owner of the company.

The program kicked off in 1996 with a "60 by '99" program, according to Tony Lentini, vice president of public and international affairs at Apache. Then trading at $30, the goal at the time was to elevate the stock price to $60 by 1999.

They missed it by a tad when the shares failed to hit $60 until early in 2000, but all was not lost. Although the executives received nothing, Lentini noted middle managers and their subordinates received options ranging from 450 shares to several thousands of shares.

The company next launched a three-pronged "120 by 2004" program in 2000. When adjusted for stock dividends and a 2-for-1 stock split, the three target stock prices broke out to $43.29, $51.95 and $77.92 – the deal was the shares had to trade at the target level for 10 out of 30 consecutive market days.

The first target was reached in April 2004, with 90 percent of the awards going out to non-executive employees. Upon reaching the second target in October, executives received 3x their salary, the second tier 1.5x salary and the third tier 3/4x salary.

Lentini noted the program doubled Apache's market capitalization, which

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soared to $18 billion, up from $9 billion. Shareholders will vote on the newest proposed plan – "108 by 2008" – during the upcoming annual company meeting this month (May).

Lentini is in sync with Bulmahn with the notion that it's important that every employee realizes he or she is part of the team, and it's the team that performs.

"If a job isn't important enough to incentivize, you shouldn't have that job," Lentini said. "Every job is important to the overall mix, and if everyone pulls together you can accomplish big things.

"You can walk around the company any day and ask any employee what the stock price is and they know – it's in alignment with shareholders, and that's the big thing."

Besides the incentives, Apache has had an internship program in place for several years, which includes a mentoring program.

"It has benefits both attracting and keeping young people," Lentini said, "and also teaching us how to better delegate, which is always good. This program in combination with the incentives is really good not just as a retention tool, but they're both motivational tools."

Where Are the Students?

While incentives and motivational programs can go far to retain current employees and attract newcomers, i.e., the student fresh out of academia armed with a brand new degree, they can't attract what's not there – and the numbers in the geosciences are not encouraging.

For instance, the Louisiana State University (LSU) geology department – where companies used to scramble to be first in line to interview hordes of graduating students – doesn't have a host of new students knocking on the entry door.

"We see a slight increase in undergraduate enrollment, and the graduate level has held steady over the last few years," said Laurie Anderson, geology department chairman. "A pattern we have seen at the graduate level is an increase in the quality of applicants."

Meanwhile, the department has put some initiatives in place to work at recruitment of more students into the geosciences, both undergraduate and graduate level.

One of these is the Opportunity to Enhance Diversity in Geosciences, sponsored by the National Science Foundation.

"We have a consortium with nine schools in the region that are minority-serving institutions," Anderson said. "We're trying to tap the student population there where there are some very good science programs, and we're working to introduce students to geosciences through a junior level summer course that's partially a field experience.

"That's coupled with the opportunity to spend time in their college senior year working either with LSU folks or faculty at their home institutions on a geology-related senior project," Anderson said. "And we have some money for stipends for some masters and Ph.D students.

"We try to recruit at the undergrad level in order for them to complete degrees at their home institutions and recruit them into graduate programs in geology."

Another effort currently under way in the LSU department is the Applied Depositional Geosystems, which is targeted toward M.S. degree candidates.

The participating students are in a regular M.S. program, but they take a concentrated curriculum and conduct a thesis research effort focused on the oil and gas industry. Funding for the program currently originates from Unocal, Dominion, Shell, ChevronTexaco and LSU alumnus Clarence Cazelot, according to Anderson.

The funding provides fellowships for highly qualified M.S. students. It also provides funds for program development, including short courses, travel support and research support for students in the program.

Work also has started to develop a third program more focused at the Ph.D level, looking at alluvial deltaic systems.

"We're trying to take advantage of what we're seeing in the demographics to try to get more students into the geosciences," Anderson said. "Ultimately, it benefits both us and future employers."

Efforts to attract new geoscience majors also are in place at the Jackson School of Geosciences at the University of Texas, where enrollment has remained fairly steady over the last several years,

"If a job isn't important enough to incentivize, you shouldn't have that job."

according to Clark Wilson, chairman of the geological sciences department.

A new program called Geoforce – with company sponsorship – is designed to attract prospective majors. It's structured to reach them early on, targeting middle school students at the eighth grade level.

"We bring them in for a summer camp type experience for a week," Wilson said. "We'll follow this group for three-four years through high school, each summer having a different earth science experience with field trips and other things."

Wilson noted they will focus their immediate concern about raising the number of majors by looking at students already enrolled at UT. "We want to make sure they're aware of what the opportunities are," he said.

Endowed Chairs, which are occupied by noted experts, are a powerful tool to attract top students.

LSU recently received private donations toward establishing two new endowed Chairs in addition to the existing McCord Chair, which is petroleum geology.

"We'll likely try to concentrate these chairs in an area where we can build strength in a core area," Anderson said. "For LSU, that's been in a soft rock kind of applied area – petroleum related." ❑

Photo by: Marjorie A. Chan, University of Utah

Vivid sandstone coloration and numerous iron-oxide concretion “marbles” (foreground) averaging 2-4 cm in diameter, Jurassic Navajo Sandstone of southwestern Utah.

Utah Marbles and Mars Blueberries

A Tasty Possibility: Did Fluid Migration Form Both?

By DAVID BROWN
EXPLORER Correspondent

The Navajo Sandstone is a hot new reservoir target in Utah, so you’ll want to know about the blueberries on Mars.

Didn’t expect to read THAT sentence, did you?

But there’s a direct connection, according to professor Marjorie Chan, chair of the Department of Geology and Geophysics at the University of Utah in Salt Lake City.

During the astrogeology theme session at the AAPG Annual Convention in Calgary, Chan will discuss “Analogs of Earth Marbles to Mars Blueberries.”

Okay, that requires some explanation.

Concretion = Chemistry

It all started eight years ago, as Chan took a sabbatical to do field work in the spectacular national and state parks of the Colorado Plateau in the western United States, where water, wind and time have sculpted sandstone into fantastic shapes.

Canyonlands, Arches, Capitol Reef and Bryce Canyon national parks and the Grand Staircase-Escalante National Monument were all within easy reach.

“I was doing work in Moab, and a friend there who’d done a lot of geology on a lay basis started showing me some things in the field,” Chan said.

He took her to see some odd hematite-cemented “pipes” – rock columns sticking up from the ground.

Next Chan examined iron-oxide concretion “marbles,” which were scattered across the Navajo Sandstone in parts of the Grand Staircase-Escalante National Monument.

The marbles ranged from golf ball- to pea-size, and were usually round but sometimes irregular.

“One feature that interested me was their variability,” Chan said.

The origin of the marbles and the geologic mechanism for forming them, however, remained a puzzle.

Chan knew that to unravel the mystery of the marbles she would need to understand their geochemistry, so she called in help from Bill Parry, a geochemist on the university faculty.

“Right away, I knew the “C” word (chemistry) was going to be involved,” she said.

“An important clue came from the sandstone’s rich coloration,” Chan said. “Pink Navajo Sandstone contains 1 to 2 percent hematite (Fe_2O_3).

“When there is a higher concentration of iron oxide cement (5 to 25 percent), the sandstone often looks deep brownish-red,” she continued. “Different cement minerals can impart a rainbow of colors to the sandstone. But where the marbles formed, the rock was usually bleached to near white color.”

The grains of sand that make up the sandstone are mostly colorless quartz.

Chan and Parry knew the sandstone’s reddish color came from thin hematite films coating the quartz grains.

“The Navajo Sandstone was deposited by wind as dunes migrated across a desert,” she said. “Weathered silicates release iron that ends up in the thin grain coatings at the time of deposition or soon after burial.

“We formed a hypothesis that reducing waters moving through the rock later removed and remobilized the hematite coatings to bleach the sandstone white,” she added. “Whenever the reducing waters carrying the mobilized iron met oxidizing waters, the iron immediately precipitated out.”

The iron oxides (e.g., hematite and geothite) formed concretions in the sandstone, producing the buried marbles and other shapes, Chan believes. Erosion of the Navajo Sandstone has exposed, and often releases, the hard cemented marbles.

Why such round shapes?

That’s not completely understood, though Chan noted that spheres “are the easiest form to produce in nature – especially in

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Image courtesy of NASA/JPL/Cornell

NASA Mars exploration rover Opportunity’s image of hematite “blueberries” (<0.5 cm diameter) from Meridiani Planum, Mars.

Marjorie Chan will present the paper “Analogs of Earth Marbles to Mars Blueberries: Records of Groundwater History from Red Rock to Red Planet,” at 2:40 on Monday, June 20, at the AAPG Annual Convention in Calgary.

Chan’s talk is part of a four-paper session on “Sedimentation on Mars” that begins at 1:15 p.m. in the Jack Browning Room at the Roundup Centre, Calgary Stampede Park. The session co-chairs are Lee Allison and former NASA astronaut and AAPG member Harrison H. Schmitt.

Chan’s co-authors are Brenda Beitler and William T. Parry, both with the Department of Geology and Geophysics at the University of Utah, Salt Lake City; Jens Ormö, with the Instituto Nacional de Técnica Aeroespacial, Madrid, Spain; and Goro Komatsu, with the International Research School of Planetary Sciences, Universitá d’ Annunzio, Pescara, Italy.

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eolian sands, where the deposits are highly porous and permeable."

They Found Their Thrill ...

Now jump ahead a couple of years, from the red sandstones of Utah to the red planet of Mars, when analysis of spectrographic data revealed a large area of hematite on the Martian surface.

That finding intrigued Jens Ormö, one of Chan's research collaborators.

"He told me, 'I think we should look at this to help explain the hematite on Mars,'" she said.

So a team of researchers already was studying concretions as a possible source of Martian hematite when the first photographs arrived from the Opportunity and Spirit Mars rovers (see March EXPLORER).

Opportunity sent back photos showing spheroids embedded in bedrock on the eroded surface of Mars. NASA scientists quickly dubbed them "blueberries" because of their spacing, like blueberries in a muffin.

"As soon as we saw those, we said, 'Oh, there's been groundwater on Mars.' We can even tell certain things about the properties of the rocks," Chan said.

In fact, Chan said the Martian spherules were "somewhat expected," given the model of marbles in Utah – but they were still thrilled by the rover discoveries.

"Some people say it just kind of blows your socks off when you see the similarities," she said.

"Blueberries" photographed by the Opportunity rover were about half a centimeter or less in diameter, smaller than many Earth marbles, she said.

The Spirit rover later sent photos of more hematite nodules from the other side of Mars.

Spacing shown in the Opportunity photos, like berries embedded in a muffin, could be a key indicator of origin, according to Chan.

"The in situ distribution having some self-organizing spacing is important, because depositional mechanisms typically place grains or nodules in a bed touching each other," Chan said.

"This spaced-out distribution is characteristic of concretions formed by the secondary, diagenetic movement of fluids through the porous host rock," she added.

Wonderful World of Color(ation)

Now back to Utah – but 200 million years ago.

During the Jurassic, a giant erg – a sea of sand dunes – larger than today's Sahara Desert formed in what is now the western United States.

That sea of sand eventually became the Navajo Sandstone, the most porous formation on the Colorado Plateau, up to 2,500 feet thick in places.

And an excellent reservoir rock.

Bleached-out bands in the Navajo sands show past movement of reducing fluid through the rock, according to Chan.

In this case, reducing fluids are hydrocarbons.

For petroleum geologists, the processes that formed marbles in the Navajo Sandstone can help reveal the pattern of petroleum migration from source to reservoir.

"One of the exciting things about all this is that these spherical concretions accrue from hydrocarbons that flush through porous sandstone and mobilize iron," Chan said.

"This model of sandstone coloration and concretions on the Colorado Plateau is a product of hydrocarbon movements, some probably along blind faults of Laramide structures," she added.

Even without its application to Mars, this model holds significant value for petroleum geology on Earth, Chan noted.

"Understanding of the coloration, from the micro-scale of deformation bands up to reservoir scale, can yield important information about fluid migration," she explained.

Mineral age-dating, including potassium-argon analysis and field relationships, suggests that bleaching in the Navajo Sandstone probably began 50-65 million years ago.

Precipitation of the iron concretions may have happened as recently as six to 25 million years ago.

Flow patterns can vary even on a scale of inches, with thin red layers of sandstone alternating with bleached white layers. This coloration points to microscopic variations in rock texture.

Geologists already have asked about the possibility of using sandstone coloration patterns as an exploration tool, according to Chan.

But for her, the hydrocarbon model has special meaning in its application to those blueberries on Mars.

"The hydrocarbon story helped us understand the relationships to develop a model that we can compare to Mars," she said.

"Even though the host rock, chemistry and mobilizing fluid may be a bit different, we've learned some of the process lessons from the terrestrial hydrocarbon model."

Mystery and Methane

Without samples to examine in the lab, the origin of Mars blueberries remains an unproven theory.

Other scientists have put forward competing theories to account for the formation of rock spherules on Mars, Chan acknowledged.

But if true, the Utah analog provides one more compelling piece of evidence that fluid flowed on Mars in the past.

And there might be more.

Large-scale bleaching patterns and apparent "rings" in the Colorado Plateau show similarities to high-albedo rings on Mars, Chan said.

Planetary scientists already are thinking about the possibility that large amounts of methane existed on Mars, she noted.

"It's possible that either precipitation of certain minerals or bleaching from methane can produce these types of high-albedo patterns on Mars, but at this point we cannot say anything conclusive about biogenic methane on Mars, even though the idea captures our imagination," she said.

For now, Chan is content with the link that ties planetary geology to a terrestrial example.

"For me, it was just serendipitous," Chan said. "As geologists, we always are excited when predictive models work." ❑

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Tinker Takes Common Sense Approach

Ethics: 'It's About You and Me'

By DAVID BROWN
EXPLORER Correspondent

Scott W. Tinker has a broad background in the oil and gas business, and more than a few things to say about professional ethics.

That's helpful, because AAPG recently named Tinker as its latest Distinguished Ethics Lecturer, the second in its specially focused series.

He began his series of presentations on ethics in April.

"It's been fascinating putting this whole thing together, to be candid. It's been an interesting thought exercise," Tinker said.

"I got to thinking about the complex global situation we're in. With business crossing national, social, cultural and religious boundaries, ethics vary by country and society," he noted.

For Tinker, the bottom line in ethics is individual conscience and behavior.

He calls his lecture "The '**I**' in Business Eth**I**cs."

That applies outside the business world, too.

"A professional organization like AAPG is only as good as its members," he said. "It's critical for all of us as individuals to represent our profession very well, and to adhere to the highest ethical standards out there."

According to Tinker, petroleum geologists must make a special effort to act and appear ethical, because so many people are quick to criticize and question the activities of the industry.

"No one owns the ethical high ground. Everybody thinks what they were raised with is the right way to go."

As he observed, society often views the petroleum industry on a "guilty until proven innocent" basis.

Unfortunately, that same skepticism can extend to individuals working in the industry, who may be seen as uncaring about ethical and social issues, Tinker noted.

"That's so far from the reality of the individuals I've been privileged to work with over the years," he said.

A Personal Choice

Tinker is director of the Bureau of Economic Geology at the University of Texas at Austin. He's also a professor in the school's Department of Geological Sciences and serves as state geologist of Texas.

He received a degree in geology and business administration from Trinity University in San Antonio, and later earned his doctorate in geological sciences at the University of Colorado.

After holding several jobs in the oil industry, Tinker became advanced senior geologist at Marathon Oil's research facility in Littleton, Colo.

Today, Tinker continues to promote petroleum research and has testified before Congress in support of federal funding for oil and gas research programs.

Active in numerous professional and educational groups, Tinker previously served as an AAPG Distinguished Lecturer on the topic "Three-Dimensional Reservoir Characterization." He also was a Society of Petroleum Engineers Distinguished Lecturer on "The Role of Natural Gas in the Future of Global Energy."

The role of ethics lecturer differs from his other DL experiences, Tinker noted. It's a two-year appointment, and it's "more of a targeted approach" to a non-scientific subject, he said.

"I'm not trained as an ethicist, and I have not taken an immersion course in ethics," Tinker said.

Tinker

Instead, he relies on a personal and common-sense approach to finding common ethical ground for all geologists.

Tinker's basic presentation includes a case-and-example look at ethics, focused on the oil and gas industry.

"There are also some cases outside of our industry that make a dramatic point," he added.

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Geologists need a proactive and inclusive approach to ethics, Tinker believes.

In dealing with geological uncertainties, doubts can be as important as definitives. No one should omit vital information because it doesn't happen to fit a particular story or viewpoint, he said.

"It's important for us to represent everything we know, so things aren't left out of the decision-making process because of omission," he explained.

Creating ethical guidelines, like AAPG's Code of Ethics, can be a "healthy process," Tinker said. But ethical conduct remains a personal choice, he noted.

"As I got to looking at the problem, it was obvious that it wasn't going to be determined by laws or legislated in some way," he said.

The Gray Zone

Social norms and definitions of ethics vary by nation and culture, Tinker observed. What might be considered bribery in one culture may be an accepted business practice in another.

"No one owns the ethical high ground," he said. "Everybody thinks what they were raised with is the right way to go."

Tinker cited his own experiences in business and at the Bureau of Economic Geology in finding ethical ambiguities.

"We've been faced with situations where it's not black-and-white, where there's nothing totally right or totally wrong," he said.

That ethics "gray zone" is complicated by the intricate, interwoven, international world of business, where laws vary by country and ethics vary by culture and region, according to Tinker.

Still, it may be possible to create an ethical framework for individual decision-making, he said.

He proposed three general guidelines:

✓ Consider transparency, impact and fairness in decision-making.

"When you look at those three things, the decision-making process becomes a little easier," he said.

✓ Follow the spirit of the law.

"We quite often follow the letter of the law and think, 'As long as we can get a lawyer to say it's OK, we're all right,'" he noted.

✓ Don't compromise beyond the point of your own personal reason.

"We all face these shades of gray, and we all have the power to say, 'That's something I just don't want to do,'" he said.

Ethical Leadership

Ethics have dominated the business headlines recently – but most stories about business ethics have been negative, reflecting the tribulations of companies like Enron, WorldCom and Tyco, Tinker noted.

That reveals the importance of ethical leaders, he said.

Companies in trouble may have been guided by formal ethics policies, but not by ethical leadership. Ethical businesses are always dependent on ethical individuals as leaders, he said.

Enron and WorldCom didn't survive unethical leadership, but many organizations are able to move beyond ethical lapses at the top, Tinker noted.

"Although the leaders of business are important, in the end a well-functioning business or country will survive through even the worst leadership," he said.

In business, ethics ultimately concern the choices and actions of a group of individuals. Business ethics "is not about business," Tinker observed, "it's about you and me."

Ethics inherent to a business operation reflect the ethical choices made by all the individuals in that business.

The harder the struggle with ethics, the closer we may be to ethical behavior, Tinker said.

Correct choices are rarely simple, and ethical actions are often difficult, he noted:

"It's tough to look your boss – or your boss's boss – in the eye and say, 'I just don't think that's ethical.'" ❑

New Ways to Prospect

Digits Replacing Paper Maps

By LOUISE S. DURHAM
EXPLORER Correspondent

Blue-line paper structure maps have long been an invaluable tool for oil and gas prospecting.

But there's a downside: They're cumbersome and cluttered with various data, and what you see is what you get – until the supplier issues updated versions.

And they're *so* yesterday.

Today, it's possible to boot up the computer wherever you happen to be, enter a password and point and click your way to a raft of digitized electronic structure maps and a virtual storehouse of underlying data that would thrill even the most curmudgeonly prospector.

For example, one type of tool is StructureMaps.com. The only technology the user needs to provide is a high speed Internet connection.

This online boost to prospecting was created by Geological Consulting Services (GCS) as the logical follow-up to churning out paper maps for the Mesozoic trend of the Gulf Coast for 30 years.

"The old paper maps were as intelligent as they were going to get," said Carl Dillistone, president of GCS. "Now you can click on data elements and there are databases there. We've scanned all the data in-house that we can make available and linked it to the wells.

"A geologist can work an area without spending time running around looking for data," Dillistone said. "They can get everything without being a data clerk."

For instance, users can click on a well symbol and bring up a log to download and display in their own software. Or they can bring up areal photos, topographic quads, scout tickets (where available from state agencies) and more.

The maps can't be altered, but the layers can be turned on and off. For those who want the flexibility to manipulate the data, a licensing program allows the licensee to "rent" an array of data, including a digital land grid and well location files and the GCS formation tops data file.

The program requires certain software and the expertise to use it. Prospectors can download the data into their own software and exploit them however needed.

Quick Time

Veteran geologist and AAPG member John Griffiths, president of Calvin Resources, is a devotee of online prospecting.

"It's amazing the amount of information you can pull together," Griffiths said. "For someone like me who does it all, the amount of time you save and the amount of data you get is just phenomenal."

He cited a recent effort to investigate a well that had been staked to drill to 25,000 feet.

"I knew of a couple of old deep wells that were drilled, so I pulled up the online stuff and found where the company was offsetting one of those," Griffiths said. "I looked at a map and looked at 10-15 wells that would have seen the same interval or something near it, and I pulled log raster images straight off the Web site and had a deep map built in an hour. Then, using the tops picks, I isopached an interval covering most of the basin, which took another 15 minutes.

"Within two hours I had an isopach showing basically the axis of the basin and what might have been the channel that fed the sands coming from the source," Griffiths continued, "and had a cross section built showing what the sands looked like at depth in that area covering about four counties."

In the not-so-old days, this endeavor would have taken weeks.

"Even five years ago this sort of thing was out of reach of most of us," Griffiths said. "Now the technology has come forward and the cost of the data has come down."

Understanding the Areas

Given the ongoing concern in the industry about the tendency of some geoscientists to depend more on the computer than on science to search for hydrocarbons, it's noteworthy to point out there's more to this online digital prospecting game than pointing and clicking your way to a drilling target.

"As with most anything in the oil and gas business, a big part of the process is understanding the area," Griffiths said. "Having worked east Texas close to 30 years, I've looked at a lot of the basin and have a good idea of the productive trends – what produces where and why. You're filtering all you see through that process and experience.

"For instance, while looking for a particular log, I noticed a show well that wasn't offset and right away wondered if it should be, because I know the trend of the producing interval in that particular area," he said. "And I know you can go from a show well to one that produces maybe five Bcf in one location.

"The online data help generate leads like this quickly," he noted. "Then you can rapidly put together the additional information to see if it's a prospect or not. In fact, I can generate a map on top of the interval of interest covering the entire East Texas Basin in a few minutes and do a quick appraisal."

Despite the growing buzz over the advantages of this futuristic-type online prospecting, old habits die hard, and there are folks out there who still work up deals the old way – and it's still a good thing.

"Sometimes the time it takes to stop and learn the computer world can be a detriment to success," Dillistone said. "With oil and gas prices where they are today, people need to be out selling prospects, so there's no time to learn the computer if they haven't already."

Even so, the prospectors appear to be embracing the digital age in increasing numbers, which has the potential to open up unprecedented opportunities.

The ability to open up a laptop computer wherever you are and pull up the complete prospect including maps, logs, cross sections – indeed, the whole enchilada – has profound implications for the way business is conducted. ❑

PROFESSIONAL NEWS BRIEFS

Bob Blackmur, to geologist, Stone Energy, Houston. Previously geologist, El Paso Production, Houston.

Bradley R. Broekstra, to vice president-exploration and development, Midstates Petroleum, Houston. Previously geological adviser, Burlington Resources, Houston.

James C. Burns, to chief operating officer-energy, Avenir Diversified Income Trust, Calgary, Canada. Previously vice president-exploration, Dominion Exploration Canada, Calgary.

Paul A. Doré, chief geologist-new ventures, Murphy Exploration & Production International, Houston. Previously senior staff geologist-new ventures, Murphy Exploration & Production International, Houston.

Pablo N. Eisner, to senior geologist, BHP Billiton Petroleum (Americas), Houston. Prevously project coordinator-Latin America, GX Technology, Houston.

Stuart D. Harker, to adviser-geology, PGS Reservoir, Aberdeen, Scotland. Previously manager petroleum geology, RPS Troy Ikoda, Aberdeen, Scotland.

William E. Hottman, to director-marketing and sales, 4th Wave Imaging, Houston. Previously managing consultant, Landmark Graphics, Houston.

William S. Houston, to geologist, Samson Resources, Denver. Previously geologist, EnCana Oil & Gas (U.S.), Denver.

Julie Kupecz, to manager-geology and geophysics, corporate geosciences, Anadarko Petroleum, The Woodlands, Texas. Previously project geologist, Anadarko Petroleum, The Woodlands, Texas.

Leonard M. Lind, to geophysical adviser, Oxy USA, Houston. Previously geophysical consultant, LML Consulting, Houston.

Ernest A. Mancini has been named a University of Alabama Distinguished Research Professor by the University of Alabama Board of Trustees, the highest honor given to a faculty member. Mancini, AAPG's elected editor, is director of the Center for Sedimentary Basin Studies at the University of Alabama, Tuscaloosa, Ala.

David O. Martens, to chief geologist-Gulf of Mexico exploration and appraisal, Unocal, Sugar Land, Texas. Previously deputy asset director-Satun asset, Unocal Thailand, Bangkok, Thailand.

Marcus Milling has been awarded the Pick and Gavel Award by the Association of American State Geologists (AASG) for his contributions to advance the role of geosciences in public policy and support for AASG's mission in government affairs. Milling is executive director of American Geological Institute, Alexandria, Va.

Mark A. Norville, to vice president-exploration and development, BlackBrush Energy, San Antonio. Previously vice president-exploration and partner, Kerns Oil & Gas, San Antonio.

Lee M. Petersen, to Palo Pinto Exploration, Weatherford, Texas. Previously geoscience manager, Encore Acquisition Co., Forth Worth.

Michael B. Rogers, to vice president exploration, Dolomite Energy, Calgary, Canada. Previously senior exploration geologist, Dominion Exploration Canada, Calgary.

Scott E. Sabatka, to southern division geoscience manager, Encore Acquisition Co., Fort Worth. Previously senior geologist, Encore Acquisition, Fort Worth.

Phillip R. Shelby has formed Shelby Geological Consulting, Fayetteville, Ark. Previously staff geologist, Southwestern Energy, Fayetteville, Ark.

Robert S. (Bo) Tye, to senior consulting geologist, DeGolyer and MacNaughton, Dallas. Previously with PetroTel, Plano, Texas.

Jonathan E. Verlander, to associate director-oil & gas structured finance, The Royal Bank of Scotland, London, England. Previously senior asset planner, Shell, Aberdeen, Scotland.

Ralph Worthington, to district geological manager, Cimarex Energy, Midland, Texas. Previously district geologist, Samson Resources, Midland.

Christopher J. Zirkelbach, to president, Environmental and Safety Solutions Inc., Evansville, Ind. Previously vice president, Elite Environmental Services, Evansville, Ind.

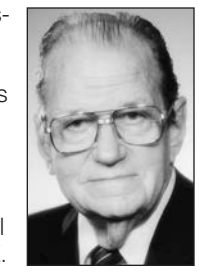
(Editor's note: "Professional News Briefs" includes items about members' career moves and the honors they receive. To be included, please send information in the above format to Professional News Briefs, c/o AAPG EXPLORER, P.O. Box 979, Tulsa, Okla. 74101; or fax, 918-560-2636; or e-mail, smoore@aapg.org;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

FOUNDATION UPDATE

New Grants Honor Two AAPG Legends

New memorial grants-in-aid for the AAPG Foundation have been established in the names of two giants of the profession, the science and the Association.

The grants are the J. Ben Carsey Sr. Memorial Grant and the Wallace E. Pratt Memorial Grant, established through recent donations by Dorothy Carsey Sumner, Carsey's daughter.


Carsey


Pratt

Sumner's gift to the Foundation's Named Grants-in-Aid program will endow two annual grants of $500 in their names, to be used to support graduate and post-graduate geoscience students.

At the same time, Sumner also gave money to increase the endowment to the Bernold M. "Bruno" Hanson Memorial Environmental Grant.

Both Carsey and Pratt, in addition to having lifetimes of success as exploration geologists, were former presidents of AAPG and recipients of the Association's highest honor, the Sidney Powers Memorial Award.

Carsey was a longtime geologist for Humble Oil (later Exxon) who was responsible for numerous discoveries and exploration concepts in Texas, Louisiana, California and Alaska. When he retired from Exxon (in 1961) he became a consultant in the Houston area with his son, J. Ben Carsey Jr.

Carsey was active in AAPG affairs in a variety of ways, including as vice president in 1960-62; president in 1967-68; and was the Sidney Powers medalist in 1985.

Pratt, one of the original founders of AAPG, was not only considered by all to be among the all-time greatest geologists, he also was praised as a businessman, a scientist, a humanist, a philosopher and, in the words of his BULLETIN memorial (September 1982), "a magnificent human being."

His geologic accomplishments would fill a large book. Pratt started his career working in the Philippines for the U.S. Bureau of Insular Affairs, and later did geological reconnaissances in Costa Rica and Mexico. He became the first chief geologist for Humble Oil in 1918 – the start of a "brilliant career" in which he would eventually become a vice president and member of the Executive Committee of the Standard Oil Co. (N.J.), which would become the Exxon Corp.

Among Pratt's myriad achievements for and with AAPG, in addition to being an honorary member, included being the Association's fourth president in 1920; the first recipient of the Sidney Powers medal (1945); the first recipient of the Human Needs Award (1972); and, as such, was the first to have received AAPG's top two awards.

The Pratt Tower at AAPG headquarters in Tulsa is named in his honor.

To donate to the funds established in the names of Carsey and Pratt, or for information about the Foundation's Grants-in-Aid program, contact Rebecca Griffin in the Foundation office, (918) 560-2644; e-mail to rgriffin@aapg.org; or through the Web site at foundation.aapg.org. ❑

Foundation General
Mia Alexander
In memory of Harry Nagle
John J. Amoruso
In memory of Thomas D. Barber
Walter Paul Buckthal
Gregory Lionel Cane
Graham Dudley
Chekwube Enunwa
Herandez Edilberto Flores
James G. Floyd
Melvyn Richard Giles
Bitoun Gilles
John J. Girgis
Hugo Harstad
William Kurt Hilarides
Kevin Charles Hill
Jan E. Horton
In memory of Marvin D. Horton
Crandall Davis Jones
In memory of William B. Oliver
Vytautas Juodkazis
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L. Austin Weeks Memorial Undergraduate Grant Fund
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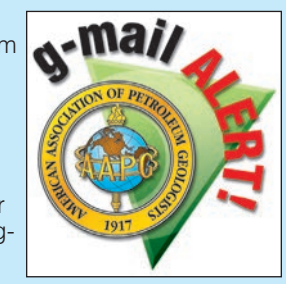
www.UPDATE

AAPG's g-mail ALERT! has been activated.

This is a new optional service of the Datapages online archives that allows subscribers to create personal "agents" to notify them when content of personal interest is added to Datapages' archives.

Any member can now complete an online form that specifies "keywords" for their agent to monitor. When one or more are detected an e-mail is sent alerting the member about the new posting.

Users can control these agents by enabling or disabling them to maximize their use of AAPG data collections.



For more information or to request a g-mail ALERT! form, contact Gerald Buckley, 918-560-9430; his e-mail is gbuckley@aapg.org.

The url for g-mail ALERT! access is: http://www.aapg-gmail.org/. ❑

REGIONS AND SECTIONS

Sections Set Meeting Calendars

(Editor's note: This is the first of a new regular column in the EXPLORER offering news for and about AAPG's six domestic Sections and six international Regions.

News items, press releases and other information should be submitted to the EXPLORER/Regions and Sections, P.O. Box 979, Tulsa, Okla. 74101; telephone – 918-560-2616 for domestic items, 918-560-2618 for international items; fax – 918-560-2684; or e-mail – dfree@aapg.org for international items, and mmayfiel@aapg.org for domestic items.)

AAPG's six domestic Sections each hold annual meetings, offering technical programs, keynote speakers, award presentations and social-business activities that cater to regional interests.

Information on all meetings and contacts for all Sections can be found online via links from the AAPG Web site, www.aapg.org.

Upcoming Section meetings for 2005-06 in chronological order, and their themes, are:

❒ Mid-Continent Section – "Target the Hidden Potential," Sept. 10-13, Oklahoma City Renaissance Hotel and Cox Business Service Center. The host is the Oklahoma City Geological Survey. The general chair is Michael Root, TerraQuest Corp., (405) 235-3648; ocgs@oklahoma.net; www.ocgs.org.

❒ Eastern Section – "Mountains of Opportunity," Sept. 18-20, Morgantown, W. Va., Radisson Waterfront Hotel and Conference Center. Hosts are the Appalachian Geological Society and West Virginia Geological and Economic Survey. The general chair is K. Lee Avary, West Virginia Geological Survey, (304) 594-2331; avary@geosrv.wvnet.edu; www.wvgs.wvnet.edu/www/esaapg05/.

❒ Rocky Mountain Section – "Rocky Mountain Rendezvous: Rising to the Challenge," Sept. 24-26, Snow King Resort, Jackson, Wyo. The hosts are the Wyoming Geological Association, Nevada Petroleum Society and the Idaho Association of Professional Geologists. The general co-chairs are Jerry Walker PTTC, and Sandra Mark, Colorado School of Mines. Contacts for Walker are (775) 348-0650; jerry@petrol-geol.reno.nv.us. Contacts for Mark are (303) 273-3107; smark@wispertel.net. The online contact for the WGA is www.wyogeo.org.

❒ Gulf Coast Association of Geological Societies – "Geological Gumbo – A Recipe for Success," Sept. 25-27, New Orleans Hyatt Regency. The host is the New Orleans Geological Society. The general chair is Jim Zotkiewicz, (504) 831-0603; jimz@zotoil.com; http://gcags2005.homestead.com.

❒ Southwest Section – The annual meeting will be held in early 2006 on a date to be announced, in San Angelo, Texas. The general chair is Bruce Schwartz, Swartz Oil Co., (325) 949-8400; swartz.oil@verizon.net.

❒ Pacific Section – May 7-11, 2006, Anchorage, Alaska, Hilton Alaska. The host is the Alaska Geological Society. The general chair is Greg Wilson, ConocoPhillips, (907) 263-4748; gregory.c.wilson@conocophillips.com; http://psaapg.org. ❑

$ign Up Now for Calgary, $ave Money

This year's AAPG Annual Convention is shaping up to be one of the largest and most exciting meetings in years – and there's still time to realize big savings through early registration.

The meeting will be held June 19-22 in Calgary, Canada, a location famous for its Western hospitality and nearby geologic splendor. The hosts are the Canadian Society of Petroleum Geologists.

Members of AAPG and its affiliated societies can register for the convention by June 1 and save $70 off the registration rate.

AAPG convention department officials said the number of people who already have pre-registered for the meeting is unusually large – the highest number in 12 years – and that hotel rooms in the AAPG housing block are going fast.

(Another important date to remember is May 18, the deadline for all cancellations and changes to existing reservations.)

Also going fast are reservations in field trips and short courses – several already are sold-out.

The meeting theme is "Global Round-Up, Exploring Energy Systems," and the technical program, in addition to being planned around 11 varied themes, features five special forums and, on Monday, June 20, the Michel T. Halbouty Lecture.

This year's Halbouty Lecture will be given by Graham Doré of Nexen Petroleum UK, on "The Buzzard Field, Outer Moray Firth, Central North Sea," one of the region's top discovery and development success stories.

Detailed meeting information can be found online at www.aapg.org. Online registration is there, too – use it to beat the June 1 deadline and save money. ❑

GEOPHYSICAL CORNER

Something Old, Something New

(The Geophysical Corner is a regular column in the EXPLORER, edited by Dallas consulting reservoir geophysicist Alistair R. Brown. This month's column is titled "Passive Seismic: Something Old, Something New.")

By PETER M. DUNCAN

Seismic imaging has changed radically over the last 80 years and has become a billion dollar business. Recording systems with thousands of channels and fleets of vibrators operating in tandem and helicopter-supported field operations are commonplace.

But there are environments where such modern systems are too expensive to operate, or where environmental or community concerns prevent the use of heavy machinery.

There also are problems in today's oilfield that reflection seismic cannot address.

Enter passive seismic, which is seismic imaging without sources!

Wait a moment. Surely, one has to have some sort of energy source. Right?

Let us say that it is seismic imaging using sources of opportunity rather than the standard airguns, vibrators or dynamite. A passive seismic crew merely lays out an array of receivers and ... listens. They are listening for earthquakes and microseisms – some naturally produced and some the result of production activity, but all useful to create an image of what's going on in the subsurface.

* * *

There are two distinct branches of passive seismic.

❒ **Passive seismic transmission tomography** creates 3-D images using the observed travel time of seismic signals originating from micro-earthquakes occurring below the target.

The field setup is illustrated in figure 1. A sparse array of independent seismographs is established above the target. The array usually consists of 20 to 100 stations, each recording the output of a three-component geophone. Typical imaging areas for such an array are 300 to 1,500 square kilometers.

The three-component phones are placed 10 to 30 meters below the surface to get away from the noisy surface environment. The stations may store their data locally, but often are linked to the processing center by some form of telemetry.

With the array in place, the survey proceeds by simply listening.

Assuming an initial velocity model, the observed micro-earthquakes are located in time and space using long-standing location algorithms based upon picks of the P and S arrival times at each observation station. Once a number of events has been located one flips the process, assumes the origin time and hypo-centers of the events are known and uses some form of travel time inversion to estimate a new velocity model.

The three-component nature of the observations allows for estimation of the Vp and the Vs velocity structures. As more events are added to the dataset, finer estimates of the velocity structure can be achieved.

Most of us are surprised to find that there are enough micro-earthquakes occurring to make this a viable tool. We are conditioned to think of earthquakes in terms of life-threatening, concrete-crushing events that happen only rarely. Such events have a local magnitude of 3 or greater. Earthquakes are observed to be log-normally distributed to their magnitude. This means that there will be, on a statistical basis, 10 times as many magnitude 2 earthquakes as magnitude 3, and 10 times as many magnitude 1 as 2, and so on. The micro-earthquakes used for passive seismic transmission tomography are typically all those down to magnitude 0, or even smaller.

Since the processing of the data proceeds in near real time, it is possible to monitor the effectiveness of the survey and cease field operations when the particular needs and resolution of the survey have been met. Survey times of six to 12 months are to be expected.

Where and when does such an approach to imaging become cost effective?

Certainly in flat, open country a more conventional reflection survey is probably a better solution. But in mountainous terrain, passive can be as much as an order of magnitude less expensive. In environmentally sensitive areas the benign environmental impact of passive means that a survey that might otherwise never get permitted becomes possible.

In highly cultured areas, the low impact of passive seismic again makes the likelihood of obtaining permits much higher.

❒ With **passive seismic emission tomography** the micro-seismic activity itself becomes the imaging target. The most straight-forward approach is to observe and record the direct arrivals of the seismic waves from these events and to map the distribution of hypocenter locations.

For the most part the events being considered here are small, with local magnitudes in the range -1 to -3, and rarely discernable as clean first breaks on surface recordings. Consequently, much of the work in this domain uses borehole receivers.

One of the more common applications of emission tomography is hydraulic fracture monitoring. Typically an array of eight to 12 three-component geophones is clamped at or just above the reservoir level in a wellbore near the well where the fracturing will occur. First break picks are made of the observed events. A mapping of the event locations over time mirrors the development of fracturing. Often these results are presented as movies that nicely reflect the process' dynamic nature.

The availability of observation wells and the limitations on observation distance (usually 1,000 meters or less) are serious impediments to the widespread usefulness of this downhole methodology.

A different approach to emission tomography is illustrated in figure 2. Here an array of geophones is deployed on the surface, typically with 40 to 100 stations distributed over a few square kilometers.

The array is sequentially beam-steered at all points in the subsurface and a 3-D map of emission energy is made, which reflects much of the same information as the hypocenter location map obtained with the downhole array.

* * *

The ability to monitor dynamic processes in real time presents many opportunities. These include fracture monitoring, mapping of fault creep and compaction and tracking of injected fluids. In a very real way we are putting a stethoscope on the chest of the earth and listening.

The challenge is that we don't have a lot of experience to draw upon with which to interpret these sounds.

(Editor's note: Peter Duncan, an AAPG member, is with MicroSeismic Inc. in Houston.)

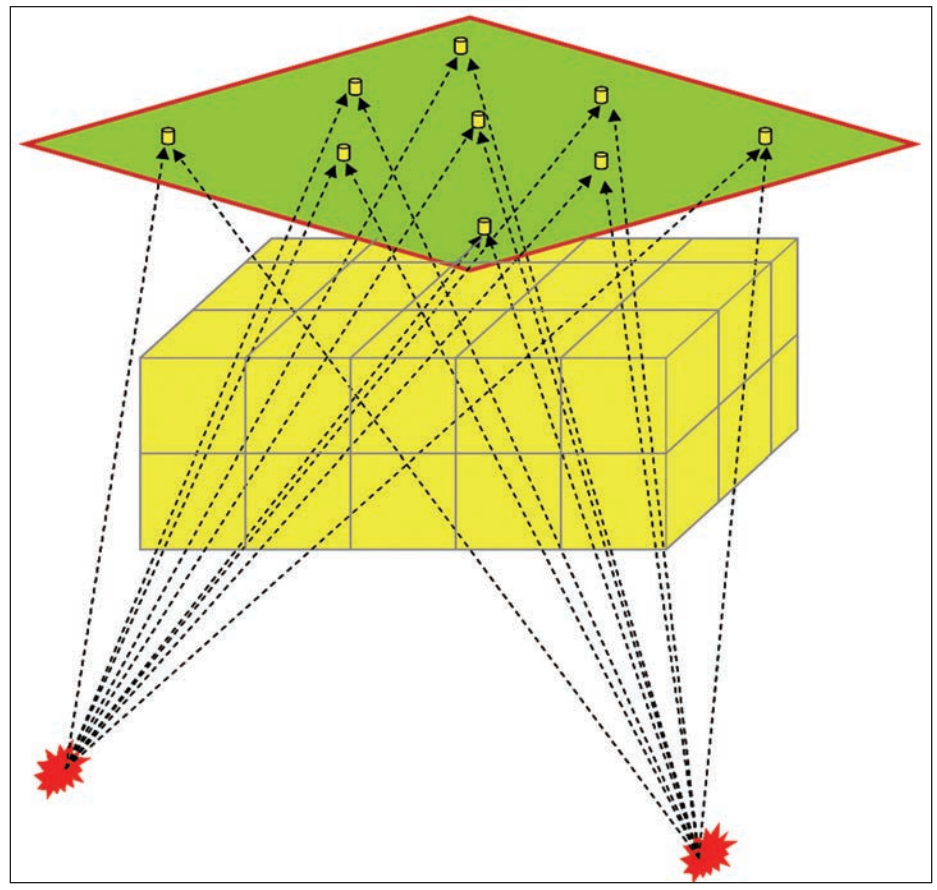


Figure 1 – In passive seismic transmission tomography, micro-earthquakes occurring below the target, illustrated here as the yellow cube, serve as the seismic source. Three-component geophones on the surface record the arrival time of P and S waves from these tremors.

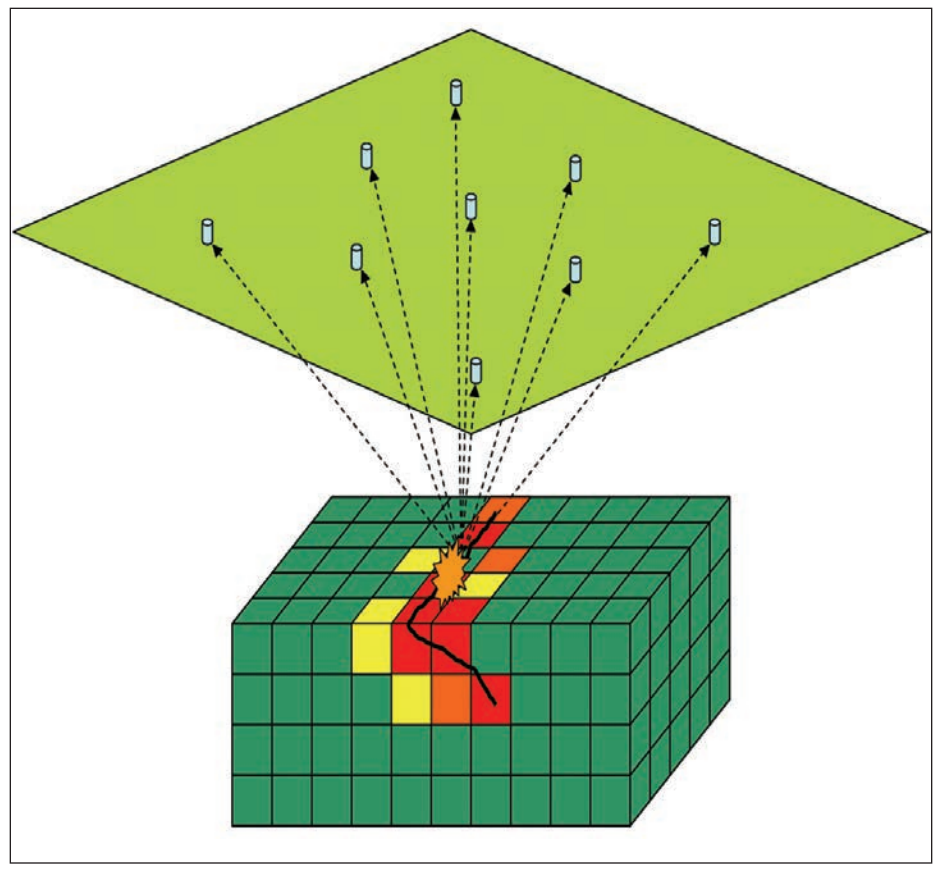


Figure 2 – Illustration of the surface method of emission tomography. Movement on the fault causes a seismic signal that is recorded on the surface array. The array is beam-steered sequentially at each cell in the subsurface. The seismic energy recorded by the array over a period of observation time is displayed as colors in the cube, hotter colors representing higher energy levels. The areas of high energy will delineate where dynamic activity is taking place.

Spring Expo Draws Large Participation

A record participation by both students and companies was recorded at the fifth annual AAPG-SEG Spring Student Expo, held at the University of Oklahoma in March.

A total of 166 students from 42 colleges and universities in 22 states were able to meet, greet and even talk some geology with representatives from 24 companies.

Mike Mlynek, AAPG student activities coordinator, said the Expo brought energy-oriented geology and geophysics students from around the country together with energy companies in both formal interview and informal venues. Companies were looking for graduates and undergraduates for internships and graduates for full-time employment.

There were ample opportunities for the students and companies to get to know each other. An Icebreaker, luncheon, two short courses, a field trip and campus tours also were part of the program.

Fourteen companies began interviews on a Saturday morning, recording 194 formal meetings.

Some of the students took the opportunity to present posters, with 41 presentations dealing with geology and 27 geophysics. Geology poster winners were **Kathleen Baker**, of the Colorado School of Mines; **Nicholas Terech**, University of Buffalo (N.Y.); and **Sophia Rodriguez**, University of Tulsa. Geophysics poster winners were **Aaron Rothfolk** and **Tomieka Searcy**, both of the University of Oklahoma; and **Upendra Kumar Tiwari**, the University of Texas at Dallas.

There were several levels of Expo sponsorship:

✓ **Major Sponsors** were Chesapeake Energy and Pioneer Natural Resources.

✓ **Platinum Sponsors** were ChevronTexaco, Chuck Noll, ConocoPhillips, Devon Energy, Dominion Exploration and Production, Kerr-McGee, Potts Exploration, Samson, and Vintage Petroleum.

✓ **Gold Sponsors** were Core Laboratories, Crawley Petroleum, EOG Resources, geoPLUS, MAP Exploration, Mewbourne Oil, Minerals Management Services, Oklahoma Geological Survey/South Mid-Continent Region PTTC, Omnilabs, Panhandle Royalty, Questar, Schlumberger, Shell Oil, and Wagner and Brown.

✓ **Silver Sponsors** were Robert Allen, Dave Campbell, Indian Exploration, McKenny Energy and Jon Withrow. ❑

Reminder: Election Deadline Draws Near

Attention Active AAPG members: You have until May 15 to participate in the election of this year's officer candidate slate.

And, you can do it online. Go to www.aapg.org; on the front page there is an AAPG Officer Election area to click, which will take you to the ballot.

Paper ballots also were mailed this year, so members have a choice in their manner of balloting.

E-voting's debut last year is credited as a possible reason a higher percentage of members participated in the process than in recent years.

Ballots are being tallied by a private company. The system prevents double votes and ensures anonymity.

All ballots should be cast and paper ballots RECEIVED at the address provided on the paper ballots by May 15.

Election results will be announced on the AAPG Web site and in the June EXPLORER.

LOOKINGBACK

Overturning Theory Overturned

By MARLAN DOWNEY

Perhaps a review – and awareness – of the past may make us better geologists in the future.

* * *

In 1955, the AAPG President's Award (now called the Robert H. Dott Sr. Memorial Award) was given to Paul V. Smith Jr., for his AAPG article titled "Studies on Origin of Petroleum: Occurrences of Hydrocarbons in Recent Sediments."

The editor of the *Science* newsletter cited Smith's study as one of the most significant science stories of the year. It pointed out that Smith's discovery of hydrocarbons deposited in recent sediments provided an important quantitative study by a chemist that overturned the general geologic opinion that oil was generated in the subsurface.

At least one major oil company spent many years trying to create a useful hypothesis of petroleum generation that could start with flushing sediment hydrocarbons into traps.

The measurements of hydrocarbons in recent sediments was correct, but ... further work demonstrated that these hydrocarbons were biomass and detritus of once-living organisms, and were not petroleum-like.

We now understand that petroleum hydrocarbons are the result of the transformation of organic matter under subsurface conditions of elevated pressure and temperature, often retaining fragments of the original organic molecules. The preserved fragments, called biomarkers, allow petroleum accumulations to be traced to a particular subsurface layer and to specific organisms abundant in that source layer.

We've come a long way in 50 years. ❑

Abilene Geological Society

Monthly meeting held 3rd Thursday, September-May (excluding December) 12:00 p.m. at the Abilene Country Club

P. O. Box 701, Abilene, TX 79604

President:
Darrell Mauldin 325-627-7123
e-mail dmauldin@fftam.com

MEMBERSHIP AND CERTIFICATION

The following **candidates** have submitted applications for membership in the Association and, below, certification by the Division of Professional Affairs. This does not constitute election, 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. (Names of sponsors are placed in parentheses. Reinstatements indicated do not require sponsors.)

For Active Membership

Colorado
Downey, Robert A., Encana Oil & Gas (USA), Denver (G.D. Carlson, T.M. Smagala, A.S. Steinle)

New York
Bossard, Jason Daniel, Columbia Natural Resources, Hammondsport (E.M. Rothman, J.P. Lemon, R.C. Campbell)

Pennsylvania
Coyle, Paul R., self-employed, Pittsburgh (T.H. Anderson, W.A. Zagorski, J.A. Harper)

Texas
Blumstein, Raleigh David, Baker Atlas, Houston (A.W. Blair, M.J. Quinn, L.W. Holman II); **Blumstein, Angela Marie**, ChevronTexaco, Houston (G.W. Snell, D.L. Carpenter, A.W. Blair); **Bowdon, Kenneth Steven**, Bowdon Energy Corp., Carrollton (reinstate); **Elger, Jerry B.**, independent, Midland (J.E. Geitgey, W.A. Siruta, M.T. Owen); **Foster, Thomas Franklin**, Baker Hughes, Houston (M.M. Reese, F.P. Hearn, M.S. Milliken); **Kessinger, Walter Paul**, Fusion Petroleum Technologies, Houston (W.F. Massell, G.W. Sparkman, J.P. Castagna); **Lu, Catherine Rong**, Shell International E&P, Houston (F.H. Becker, M. Martin, M.K. El Toukhy); **Otiocha, James Okey**, Shell International E&P, Houston (A.A. Akinkunmi, D.A. Omene, E. Enu); **Rine, James Marshall**, OMNI Laboratories, Houston (reinstate); **Smithard, Mark Ian**, ChevronTexaco, Houston (R.J. Minck, M.W. Quearry, E.J. Graham); **Warren, Thomas Andrew**, self-employed, Troup (A.K. Jasper, R.H. Forgey, M.E. Brennan)

Canada
Pitcher, Grant Grow, Rosetta Exploration, Calgary (reinstate)

India
Purkayastha, Subhash Chandra, Oil & Natural Gas Corp., Gujarat (A. Garg, A.K. Dey, A.K. Jena)

Nigeria
Oaiya, Lenin, South Atlantic Petroleum, Victoria Island (A.O. Ekun, N. Omorodion, O.T. Odusote)

Romania
Saramet, Remus Mihai, Al.I.Cuza University, Iasi (C. Cranganu, G.M. Friedman, R.G. Constantin)

Saudi Arabia
Al-Qassab, Hesham M., Saudi Aramco, Dhahran (E.A. Clarke, I.A. Al-Ghamdi, B. Rahmah)

Certification

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

Petroleum Geologist

Pennsylvania
Hatgelakas, Peter, Power Gas M&T, Pittsburgh (reinstatement)

SPOTLIGHTonEDUCATION

Summertime is fast approaching, so we invite you to "Go to Summer School with AAPG!" We have a variety of short courses and field seminars to help you brush up on your skills in the next several months.

First, several courses are set for May, including:

✓ John Balsley's trip on "Foreland Basin Clastic Reservoirs, Book Cliffs, Utah," which will take place May 16-24.

✓ Two international trips on carbonates are slated: "Equatorial Carbonate Systems" in Indonesia, May 22-28, and "Complex Carbonate Reservoirs" in Italy, May 22-27.

✓ "Depositional Sequence Stratigraphy of Fluvial-Deltaic Deposits" will be offered May 29-June 4, in Utah.

✓ A new course on "Overview of the Subsurface Petroleum Geology of Northern South America," scheduled in Houston for May 23-24.

Also there is still time to register for several offerings that will be held before and after the AAPG Annual Convention in Calgary, including:

✓ The popular short course on "Risk Analysis for Development Applications," June 18-19, taught by Rose & Associates.

✓ Two exciting field seminars: The pre-convention trip is "Carbonate Reservoir Characterization: From Rocks to Fluid Flow Simulation Using Sequence Stratigraphy, Paradox Basin, Utah," offered June 14-18 and beginning and ending in Durango, Colo.; the post-convention trip is the top-rated GeoTour on "Grand Canyon Geology via the Colorado River, Arizona", offered June 23-30.

Seats in this one are going fast, so if you want to sign up for this once-in-a-lifetime experience, you need to act quickly.

Other summer short course offerings are:

✓ A new short course, "Rock Properties of Tight Gas Sandstones," being offered in Denver July 21. Understanding and developing tight gas sands seem to be in high demand these days, so be the first in your office to get a handle on this exciting area of exploration.

✓ Our always-in-demand course on "Basic Well Log Analysis" returns Aug. 9-12, in Austin, Texas, taught by well logging experts George Asquith and Dan Krygowski. The course is a necessity for entry-level geologists, and mid-level professionals who may find their job skill needs shifting or need a refresher.

Finally, the summer lineup of field seminars is designed to get you out on the rocks and back to nature. They include:

✓ In July, "Lewis & Clark GeoTour" (Montana), "Predicting Clastic Reservoirs Using Applied Sequence Stratigraphy" (Utah and Wyoming) and "Deltaic and Turbidite Reservoir Systems of Southeast Asia"(Malaysia).

✓ In August, "Fundamentals of Coalbed Methane E&P" (Utah).

Watch your mail shortly for our complete 2005 AAPG Field Seminar Catalog – and as always, you can get information on all our courses by going to the AAPG Web site at www.aapg.org/education. ❑

READERS' FORUM

Commenting on the Commentary

What appalls me is not that AAPG reviewed Michael Crichton's book but rather the nature of Steven Boyer's criticism of Michael Crichton (April EXPLORER), and why the EXPLORER gave Boyer all that space.

Boyer's complaints are that Crichton as a non-geologist has no right to criticize global warming – for shame, he actually footnotes where his information comes from – and that peer review is the only way that true science can be published.

Despite this viewpoint, Boyer quotes as support comments by a *New York Times* reviewer (obviously a man of science and better equipped to comment on global warming than Crichton) who states, "Citing real studies to support the idea of a hoax is ludicrous." Of course! When the facts do not support your viewpoint, do not quote them, have the article peer reviewed, and then have the *New York Times* review the book.

If Crichton is a non-geologist and should not write about global warming, then actor Ted Danson (aka Sam Malone on the TV show "Cheers") has no right to give congressional testimony about saving the whales.

Rather than stating that he disagrees with the message, Boyer attacks the messenger. He also ignores that the AAPG and other journals have published a considerable body of research that contradicts his apparent view of global warming. Crichton is a highly intelligent person; anyone who has heard or read his interviews should be able to discern that he is a careful researcher.

Sorry, Steven; your article reminds me of everything that is wrong with Big Science. By the way, do you seriously believe that every peer reviewer checks and reads every citation?

Norman C. Rosen
Houston

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

A Handshake

As one who your "Geo Generations" article (March EXPLORER) would categorize as a traditionalist, at least by age, I had to smile as I read about the attributes that identify the younger scientists. After more than 50 years in the industry, and still involved on a very small scale, the only difference I notice is that verbal or handshake agreements can no longer be relied on.

M.J. Castro
Pleasanton, Calif.

Evolution a Fact? Not!

Andrew Miall states in his letter ("End of Enlightenment?" March EXPLORER) "Evolution is a fact. You all know it." I'm sorry, but perhaps I am the only geologist who considers evolution a theory, and an unproven one at that.

For something to be established as a scientific fact one must be able to run a repeatable experiment to demonstrate it. This, of course, is impossible in geology when we are speaking about the origin of life and explaining the many species we observe today and in the fossil record. All theories regarding origins are necessarily inferences and extrapolations based on incomplete and fragmentary physical evidence.

One of the most important concepts in geology is multiple working hypotheses. Rational and competent geologists can come up with numerous alternate hypotheses to evolution that fit the available scientific data. I think that the theory of evolution has taken the form of religious dogma such that if anyone dares to question it, they will be excommunicated from the fold of "enlightened" geologists.

Miall insulted Texas and Oklahoma as being backward as far as integrating the knowledge that arises from earth science into their daily lives. My daughter attended a public high school in the Houston area, and I can assure you that evolution was taught in her biology class as a scientific fact. I guess I was one of those conservative parents mentioned in Miall's letter, because I had some discussions with the teacher regarding some of her statements that were not scientifically valid.

Many scientists assert that it is not scientifically permissible to consider the possibility of a supreme being. This is being closed-minded, because this excludes a viable alternative for how life came about on planet earth.

I prefer to believe the Bible over Charles Darwin.

Grant Zimbrick
Houston

Fact to Theory, And Vice Versa

Andrew Miall's letter raises many questions of the role and obligation petroleum geoscientists play in educating their communities and society at large. The perception, ostensibly held north of the border, is that: Evolution is no longer part of the U.S. educational curriculum, and a cabal of conservative parents and dogmatic religious evangelists are shutting down free inquiry.

It is further opined that the best and the brightest of the United States will soon purchase one-way tickets to more intellectually hospitable countries.

To paraphrase Mark Twain, reports of the death of the teaching of evolution in the United States may be a little exaggerated. I can vouch that the teaching of evolution continues unabated at the public schools in northern Virginia.

In contrast, several years ago I wrote the dean of the public research university where I earned my undergraduate degree, objecting to the lack of skepticism concerning global warming theory in department news letters and research focus. In response, an assistant to the dean wrote back telling me to go elsewhere with my concerns.

But Miall's perceptions raise interesting parallels. Miall is certainly correct in saying that most every petroleum geoscientist embraces evolution as fact. I would posit that most every petroleum geoscientist embraces climate change as fact. On the other hand, on an anecdotal level, most industry based geoscientists view global warming as a plausible theory, but with significant flaws – such as its failure to link atmospheric CO_2 levels to the climatic perturbations recognized as the Medieval Maxima and the Little Ice Age, which occurred over the past 1,000 years.

Unlike evolution and climate change, which are based on careful examination of past events, global warming theory is

continued on next page

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based on computer model extrapolations into the future. Since the future has not happened, global warming theory is, necessarily, a faith-based exercise.

The parallel between the teaching of evolution in the United States and global warming theory is the irony of one group of dogmatists trying to de-elevate evolution from undisputed fact to theory status, and another group of dogmatists trying to elevate global warming from theory to undisputed fact status. As we all know, these groups will brook no dissent, absolutely confident in the righteousness of their faith-based point of view.

The richer irony is that the United States is able to absorb the shrill arguments of these dogmatists and muddle to the "least worst" position, which may be a characteristic of a healthy and functioning democracy.

Ramsay A. Barrett
Marshall, Va.

The Media Made Him Do It

Andrew D. Miall's central issue appears to be based on recent, highly-publicized mania here in the United States involving education, evolution and "... stifling oversight of the religious evangelist." Apparently, " ... (oil states) which have benefited the most from the full expression of the earth-science enterprise, are the most backward when it comes to integrating the knowledge that arises from the earth sciences [evolution] into their daily lives."

Miall calls on our industry, Americans in particular, to take up this cause as our own before " ... the conservative trends sweeping the U.S. increase the grip on teaching and research," thereby presumably throwing America back into the scientific Dark Ages.

How utterly absurd.

I suppose one can forgive Miall's perspective because of the pervasive liberal media warp typically applied to hot button issues such as evolution, religion and education, particularly when there is legal funding from liberal special interest groups, as is almost always the case. Welcome to America, Mr. Miall.

The recent Dover, Pa., school board case is typical. The Nov. 30, 2004, headline in the San Francisco Chronicle read "Anti-Evolution Teachings Gain Foothold in U.S. Schools – Evangelicals See Flaws in Darwinism." The school board voted late last year 6-3 to allow the so-called "Intelligent Design" version of evolution to be incorporated into the science curriculum, thereby threatening liberals who fear some creeping national "evangelical" agenda to teach religion in public schools. The media then proceeds to make a huge issue of it all, further distorting reality.

"Intelligent Design" is described on the Web as "a scientific disagreement with the claim of evolutionary theory that natural phenomena are not designed." Is this really such a big deal?

The relevant mainstream issue here has to do more generally with science versus religion. On March 9, 2005, Charles H. Townes, a 1964 Nobel laureate in physics and inventor of the laser, received the 2005 Templeton Prize for his study of the relationship between science and religion. A recent Op-Ed piece in *The Wall Street Journal* by Townes states "the most basic of sciences, which is physics, has been increasingly concentrating on problems which are pertinent to the interaction of our ideas in science and religion, such as the origins of the universe, cosmology, the nature of matter and of the physical laws. This has recently focused attention on what a special universe is ours, and the strikingly special laws of science required for the existence of life. Why does such an improbable universe exist?"

Why, indeed.

Paleontologist Stephen J. Gould's *Wonderful Life* (1989) studies the initial explosion and diversity of life in Canada's Burgess Shale and the subsequent extinctions and evolution of life. While an unintended consequence of the author, one can not help but close the book, absolutely convinced of his Creator's hand in it all. In 1989, it didn't have to be called "Intelligent Design," or require a school board vote to teach, it was simply great science and a best seller.

Similar opportunities to recognize God's hand abound in other fields such as astronomy, biology and oceanography; one has only to look.

One has to wonder why there is such a divide between science and religion in the first place. Let's hope other leading scientists will seek to bridge this void, guided both by their scientific skills as well as their faith as we struggle to understand just how special and complex our universe really is.

The presumption that American scientific enlightenment is being crushed by "religious evangelism" simply highlights how effective liberal media spin can be and the consequences of buying into it.

Douglas P. Heller
Malvern, Pa.

John H. Hoke

It is sadly ironic that the passing of John H. Hoke, briefly noted in the January EXPLORER, went otherwise unremarked in an issue that contained two memorable articles on Saudi Arabia.

John Hoke graduated as a chemical engineer and served in the U.S. Navy before joining Aramco, where he was appointed chief geophysicist in the early 1960s; he was to become a legend in the position, which he held for around 20 years.

Partly because of the location, partly the fact that the difficulties faced were geophysical as opposed to geological, and not least due to his intuitive rather than analytical approach to solving technical problems, John arguably presided over the discovery of more oil, as an explorer, than anyone in the history of the industry.

A pleasant, friendly, somewhat unusual person, John both imparted his ideas and knowledge freely to all, and listened to all, regardless of status and experience. As a young contract geophysicist at the bottom of the professional ladder, I benefited from his interest and accessibility; for much of my career, his was the job to which I aspired.

There are many in our business who knew John Hoke far better and for much longer than I. It is to be hoped that some will publicly record their thoughts and memories of a truly individual man, someone whose talents really made a difference.

Robin French
Cairo, Egypt

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To learn more about this position please visit http://www.chevrontexaco.com/about/careers/ then look for "We're Hiring! Click to view available job" to view job opportunities currently available or to establish a profile. Each job you are interested in applying for must be posted to individually.

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Carbonate Stratigrapher/Sedimentologist
Houston, Texas
Focus: Carbonates and Diagenesis
- 0-15 years industry experience with MS/PhD in Carbonate Sedimentology/Stratigraphy required
- Demonstrated competence in understanding carbonate deposition and diagenesis in a sequence stratigraphic context.

Petrographer/Petrologist
Houston, Texas
Focus: Sedimentology, diagenesis and stratigraphy of carbonate and siliciclastic rocks
- 0-15 years industry experience with MS/PhD in Sedimentology/Stratigraphy required
- Knowledge of thin-section petrography, UV and cathodoluminescent microscopy, XRD, SEM, electron probe microanalysis, fluid inclusion analysis, stable isotope analysis and trace element analysis
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The Bureau of Economic Geology, Jackson School of Geosciences, at The University of Texas at Austin seeks a **structural geologist, petrologist, or research engineer** to work on the Jackson School Research Initiative in Characterization and Modeling of Mechanical and Chemical Processes from Pore to Regional Scale. Fundamental is the ability to establish a vigorous research program and the desire and ability to interact with the already strong fracture and structural diagenesis program and to supervise graduate student research within the Jackson School of Geosciences. A Ph.D. in geology, geological sciences, geochemistry, earth science, or engineering is required. The position is an appointment to the research staff that is expected to continue. Please visit our Web site at www.beg.utexas.edu. Send statement of research interests, resume, reprints, letters from at least three references, plus any job-related supplemental information to Dr. Stephen Laubach, Chair, Search Committee, Bureau of Economic Geology, Jackson School of Geosciences, University Station Box X, The University of Texas at Austin, Austin, TX 78713-8924. The Search Committee will begin reviewing applications on March 15, 2005, and will continue until the position is closed.

Go to http://utdirect.utexas.edu/pnjobs/ for complete description and follow instructions to apply for job number #050304010702 using your on-line resume. Women and minority applicants are encouraged to apply. Security-sensitive position; conviction verification conducted on applicant selected. Equal Opportunity/Affirmative Action Employer.

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Director/State Geologist
Kansas Geological Survey

The University of Kansas (KU) Office of the Vice Provost for Research in conjunction with the State of Kansas is searching for a Director/State Geologist to lead the Kansas Geological Survey (KGS) a non-regulatory, multidisciplinary research and service division of KU. The KGS is among the premier earth-science research and service institutions in the U.S. with a reputation for research excellence, scientific leadership, and service to the State. Required qualifications include a doctorate in the geosciences or related field and a minimum of 10 years of professional experience in the geosciences; a minimum of 3 years of administrative experience including budgeting, personnel evaluation, and program development; national/international recognition in a chosen field of geoscience research; demonstrated ability to work with a wide constituency of personnel and deal effectively with public policy issues; experience in obtaining financial support through a competitive, merit-based process; and knowledge of natural resources and environmental aspects of their use. Reviews begin July 1, 2005. A full description and application is available at https://jobs.ku.edu. EO/AA

* *

Faculty Position in Energy Exploration, West Virginia University. Appointment will be at the Associate or Full Professor rank. A Ph.D. degree is required. The successful candidate will focus on energy exploration and development of fossil fuels (oil, gas, coal, coal-bed methane) in research and teaching,

continued on next page

IN MEMORY

Donald W. Axford, a former AAPG vice president who was the first Canadian to hold that title, died March 3. He was 84.

Axford, head of D.W. Axford & Associates in Calgary, Canada, was AAPG vice president in 1991-92. He also was an AAPG Foundation Trustee Associate and a founding member of the Division of Environmental Geosciences. In 1982 he received the AAPG Distinguished Service Award.

Fred J. Agnich, 91
Dallas, October 2004
Donald W. Axford, 84
Calgary, Canada, March 3, 2005
William Francis Hermen, 79
Oklahoma City, February 2005
Paul Herbert Horn, 84
Dallas, Oct. 17, 2004
Charles Bedford John, 82
Tulsa, March 12, 2005
Harry Charles Lee (EM '59)
The Woodlands, Texas
Leonard Lee Limes, 78
Madisonville, La., Feb. 24, 2005
Leon Vernon Manry Jr., 80
Spring Branch, Texas, Nov. 6, 2004
James Edward McCormick (AC '61)
Dallas
Jim Frank Reid (AC '57)
Wichita Falls, Texas
Nathaniel McLean Sage Jr., 86
Peace Dale, R.I., Jan. 15, 2005
Stephen Garrett Starr, 71
Houston, Feb. 14, 2005
Ellsworth Vedalle Vachon (AC '57)
Houston
Albert L. Weismeyer Jr., 61
Englewood, Colo., Dec. 17, 2004
Louis H. Weltman, 90
Corpus Christi, Texas, Feb. 17, 2005
Milton Zeni, 78
Norman, Okla., June 2004

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

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and will establish a vigorous externally-funded research program. We seek an individual with substantial energy industry experience. Details on how to apply can be found at www.geo.wvu.edu/energy_position.htm. Questions: energy@geo.wvu.edu or 304-293-5603. WVU is an EO/AA employer.

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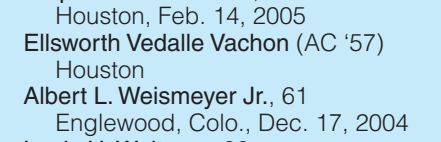

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DIRECTOR'S CORNER

Explanations Sometimes Needed

By RICK FRITZ

I was shopping with Zoe, my little girl, and we both decided that we needed to go to the "facilities." It was a secure store and she's big enough to go into the women's restroom by herself, but as she entered she handed me her big Cabbage Patch doll to hold for her.

I'm always holding things for Zoe, so I didn't think much about it – and proceeded into the men's restroom.

I did not realize the awkwardness of holding a large doll in that situation until several other men walked in giving me funny looks and smiles.

I wanted to give a simple explanation, but I decided to keep my mouth shut and act like it was normal and I felt secure about my masculinity.

* * *

We have received several questions about the new BULLETIN format and the dues statements this month, so I would like to open my mouth now and give a few "simple explanations" to the three most typical questions we are receiving from members:

❒ *Do I have to pay extra on my dues statement for a paper copy of the BULLETIN?*

No. If you want a paper copy of the BULLETIN (instead of the semi-annual CD-ROMS) all you have to do is check the box on the dues statement, or contact the membership department at 888-945-2274 ext. 412 or 643; or by e-mail at postmaster@aapg.org. Members only pay extra if you want to receive **both** the hardcopy and the semi-annual CD-ROMS (an annual charge of US$39).

As Pat Gratton mentioned in his letter included with the dues statement and his March President's Column, AAPG is laying the foundation for the future by easing the membership into the new world of electronic publications. Although this allows us to keep dues as low as possible in the face of rising costs, it is also the right thing to do for future development of the BULLETIN.

Most societies provide digital access to their flagship publications but charge extra for paper copies. As a transitional measure, AAPG's Executive Committee has decided not to charge for paper copies this year.

❒ *Why do we have a suggested donation to the Foundation on the dues statement?*

Many AAPG members use this mechanism as a reminder to donate to the many successful AAPG Foundation programs. Also, the AAPG needs broad-based support to maintain its tax status. Most societies use this mechanism to maintain that broad-based support.

The AAPG Foundation supports many worthwhile educational programs, grants-in-aid to students and outreach programs such as the AAPG Distinguished Lecturer. Each year, we have a very positive response from AAPG members to this dues reminder. Please note that it is only a suggested amount and is not required.

❒ *How easy is it to pay my dues online?*

AAPG installed new software this year that is designed for easy use. You can logon by using the "Pay your dues online" hot link on AAPG's homepage, or use www.aapg.org/dues/ as the address.

Please note that you will need your membership number for the "Login" and your member password. If you need to request a password or have forgotten it, just click on the "need password" link and you will be sent one via e-mail, or your can make up your own.

If you have any questions about paying online, please contact us at 888-945-2274 ext. 412 or 643; or by e-mail at postmaster@aapg.org.

Please remember you also can register for the annual convention online – and if you register before June 1 you'll save $70 on the registration cost. See www.aapg.org/calgary/ for details.

We are experiencing the highest pre-registration in the last 12 years for an annual meeting, so make your plans early and register now.

* * *

If you have any comments on the dues process or would like more simple explanations, please contact me at rfritz@aapg.org.

We appreciate your support.

EMD Ready for Calgary Meeting

Program Includes Member Discounts

By RICK RICHARDSON
EMD Vice Chair

Energy Minerals Division members will find much of interest within the 11 themes that form the technical program at the 2005 AAPG Annual Convention in Calgary.

In particular, theme 7 on "Unconventional Resources and Innovative Techniques" has EMD sponsoring or co-sponsoring sessions on:

✓ Oil Sands and Heavy Oil (posters Monday afternoon; oral sessions both Tuesday morning and afternoon).

✓ Natural Gas from Coal and Shale (posters Monday afternoon; oral sessions both Tuesday morning and afternoon).

✓ Gas Hydrates (two poster sessions Monday afternoon).

✓ Advances and Applications in Non-Seismic Methods: Remote Sensing, GIS, GPS and GPR (posters Monday morning).

Within theme 10 (Hydrocarbons, Environment and Society), the EMD and DEG are co-sponsoring three sessions. They are:

✓ Carbon Management and Acid Gas Sequestration (posters Tuesday morning and oral sessions Wednesday morning).

✓ Environmental Issues Related to Unconventional Resources (oral session Wednesday afternoon).

A joint DEG-EMD luncheon on Wednesday will feature EMD and DEG division awards and a talk by Jim Dinning, chairman of the Canadian Clean Power Coalition, on "Marginal Carbon Fuels: The Key to Prosperity." Dinning will speak about clean coal technology, particularly as it applies to providing energy and feedstock to Alberta's expanding oil sands and petrochemical industries. (See related story, page 10.)

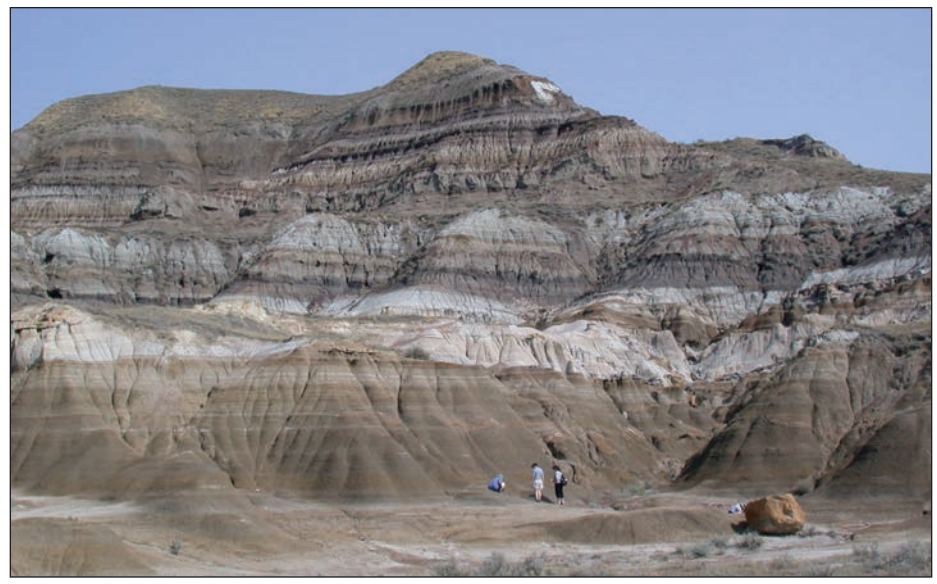


Photo courtesy of the Alberta Geological Survey

Well-exposed Horseshoe Canyon Formation sediments and coal await EMD field trippers (field trip #8) at the Calgary meeting.

The luncheon is sponsored by the Association of Professional Engineers, Geologists and Geophysicists of Alberta.

EMD offers two pre-meeting field trips. Trip 8 is on "Coalbed Methane Potential of the Horseshoe Canyon Formation in Southern Alberta." The Horseshoe Canyon Formation hosts Canada's first commercial coalbed methane play with in excess of 1,500 wells each producing on average 75-125 mcf/d.

As a special feature of this trip, participants also will have an opportunity to "go behind the scenes" at the Royal Tyrrell Museum in Drumheller – and EMD members receive a benefit of reduced trip fees.

The field trip is being co-organized with the Canadian Society for Unconventional Gas (CSUG), which supports the exploration and development of Canadian unconventional gas resources. Their field trips have been a must for anyone interested in unconventional resources in Canada.

Also pre-meeting is a joint DEG/EMD field trip (trip 6) on "Sour Gas Production and Acid Gas Injection in the Rocky Mountain Foothills and Alberta Plains – Source to Sink." Of interest to EMD members, participants will study outcrops of coals in the Rocky Mountain Foothills, which are the subject of current research in both coalbed methane exploration and CO_2 injection.

This field trip is an excellent opportunity to learn of the geology of Alberta in the plains, foothills and Canadian Rocky Mountains settings.

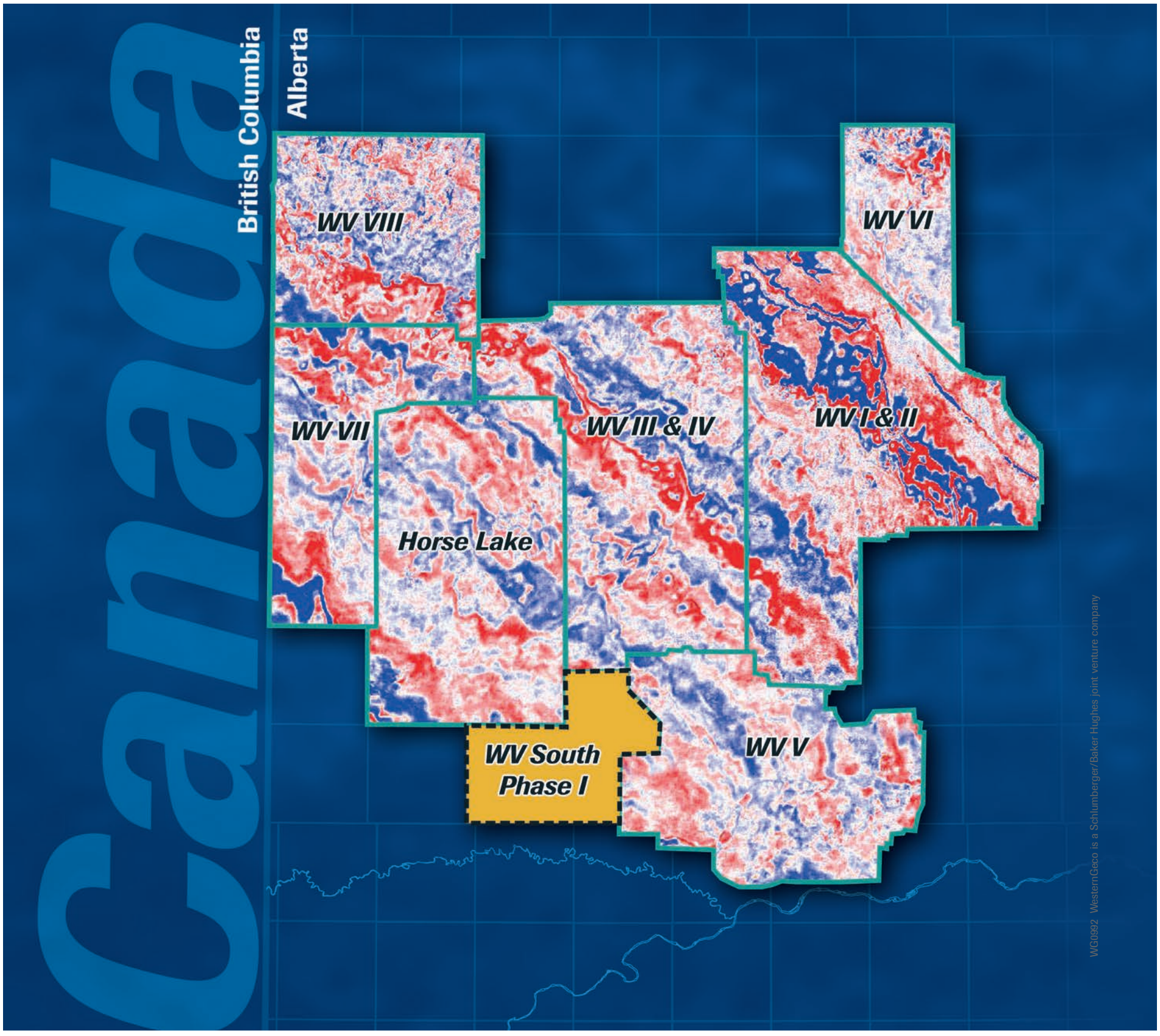
The EMD leadership/business meeting will be held from 1-5 p.m. on Saturday, June 18, at the Hyatt Regency Calgary Hotel.

Finally, EMD is offering a post-meeting short course (course 14) on "Application of an Integrated Coalbed Methane Exploration Model to Delineate Coalbed Methane Opportunities in Canada: Overview of an Emerging Coalbed Methane Play." This course provides an opportunity to learn about CBM exploration and development in general and aspects specific to the Canadian scene.

EMD members receive a benefit of reduced course fees.

The 2005 AAPG Annual Convention in Calgary is positioned to become one of the largest and more significant geoscience meetings ever held in Canada. I encourage all EMD members to attend and participate in an excellent program.

See you in Calgary. ❑



Wembley Valhalla Merge

WesternGeco

Our Wembley Valhalla survey encompasses numerous geological formations that are capable of hydrocarbon production.

- Deeper targets (Devonian Leduc, the top of which varies from 2,800 meters to 3,600 meters)
  - A southwestern extension of the Leduc Fringing Reef play, this play is set up by reefal development along the margins of the Peace river Arch.
- Shallower targets (Triassic to Cretaceous, 1,000 to 2,000 meters)
  - Stratigraphic traps with updip seal provided by tightly cemented shoreline facies

For more information visit **www.multiclient.westerngeco.com**

Please visit us at AAPG Calgary booth #729

Reprocessing in progress

Available time surveys