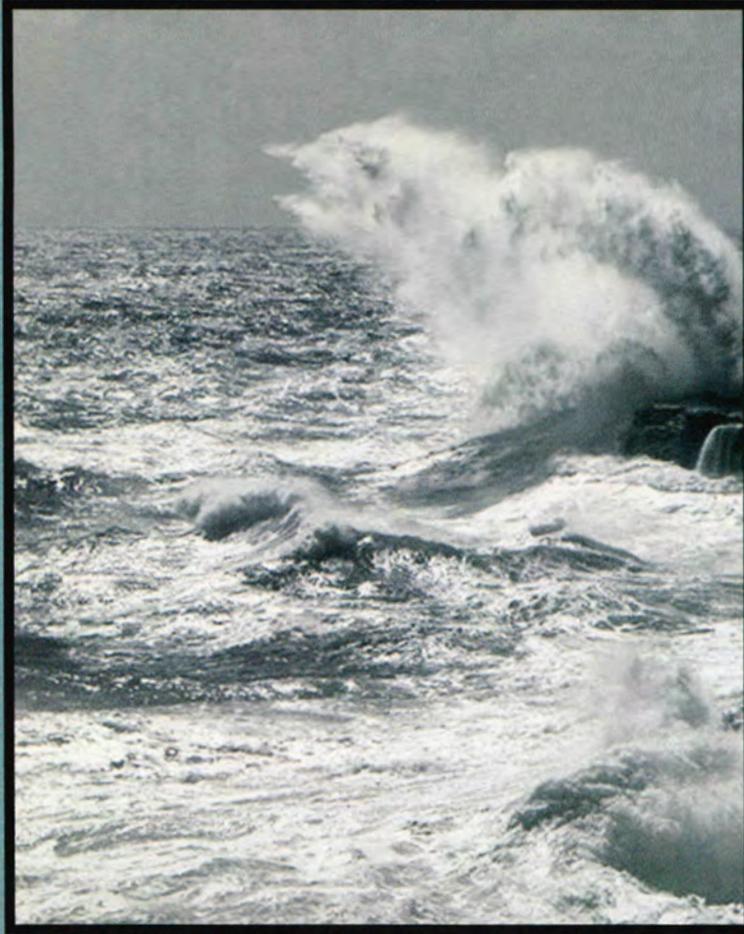


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JULY 2001



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**See page 12**

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**On the cover:** To lease or not to lease? That's going to be the next big question in the eastern Gulf of Mexico, an area that is getting considerable interest from both oil industry officials who say the region may contain significant hydrocarbon reserves, and from Floridians who oppose exploration activity off their beaches. See page 12. The cover beach scene is from Santa Rosa Island, a Florida site that is part of the Gulf Island National Seashore. Photo courtesy of the U.S. Geological Survey.

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## PRESIDENT'S COLUMN

# Leadership is Born In Committee Work

By ROBBIE GRIES

AAPG leadership is born in committee work. Our committees provide the arms, legs, "guts" and creative minds of AAPG – advancing our science, our membership and our missions.

The first of this month brought a 65 percent turnover for the chairs of our standing committees. This is because AAPG decided to implement a long-standing rule to rotate chairs every three years. We have been sometimes reluctant to do this in the past because we have benefited from so much dedication from various members who, as chair, have gone the extra mile and greatly advanced the mission of their committee.

We are timorous about changing these chairs – we might not choose a replacement that is as good!

However, we develop and select new leadership from our observations of a member's accomplishments and abilities on standing committees. Therefore, it is imperative to give other members a chance to "show their stuff."

We have to be willing to take a risk with new leadership – but then, in the energy business, we are used to taking such measured risks!

Because I happened to be burdened with the "year of implementation," I teased people at Leadership Days who know my formal name is "Ruth Roberta" that I might be better known as "Ruthless" about making new appointments to chairs. But this has been my explicit instruction and obligation upon assuming office. (I expect that many of our members do not realize that every July 1, the first task of the new AAPG president is to appoint or re-appoint EVERY chair to EVERY Committee!)

Lucky for me – and lucky for AAPG – our committee chairs have made the job easier. Most current chairs have "brought along" some excellent vice-chairs from whom I could pick and choose, and about whom I had excellent recommendations.

\* \* \*

I want to take time in this, my first column, to thank the standing committee chairs who have served so well and are now turning over the reins to new leadership:

□ **Ted Bence**, whose Astrogeology Committee has provided a wider dimension to our technical programs.  
□ **George Bole**, attentive and organized, as chair of the Committee on Committees he has set a standard for effectiveness.

□ **Dan Finnefrock**, whose discretion and organization on the Ballot

Committee promoted trust and confidence in our process.

□ **Mark Rainer**, whose hands-on experience has evolved the Committee on Conventions.

□ **Dan Nedland**, whose passion for continuing education has served the Education Committee well.

□ **Denise Cox**, an energetic enthusiast on any committee, she has further strengthened an already strong Grants-in-Aid effort.

□ **John Kerns**, the most knowledgeable person in our organization about our insurance programs, leaves the Insurance Committee in excellent shape.

□ **Pinar Yilmaz**, who has worn many valuable hats as chair of the International Liaison Committee, especially toward developing our international meetings and toward recognizing our presenters in these meetings.

□ **Jim Gibbs**, who has been unfaltering and totally committed to the financial health of our organization as chair of the Investments Committee.

□ **Steve Sonnenberg** successfully fulfilled the task of getting our new Mentoring Committee off the ground.

□ **Barry Katz** has been an institution with our Research Committee, maintaining our high standards and scientific aims.

□ **Tim Carr** has continued to develop a strong Reservoir Development committee with energetic goals.

□ **Ben Hare** has provided the backbone for AAPG's projections and public statements on Resource Evaluation worldwide.

□ **Henry LeGarre** has developed new Student Chapters at record rates and record numbers worldwide.

□ **Nahum Schneidermann** has provided necessary assistance to our conventions and international meetings as technical program chair.

□ **Norb Cygan** has been indefatigable as chair of the Youth Education Activities Committee, where he has enhanced and further developed all of our programs.

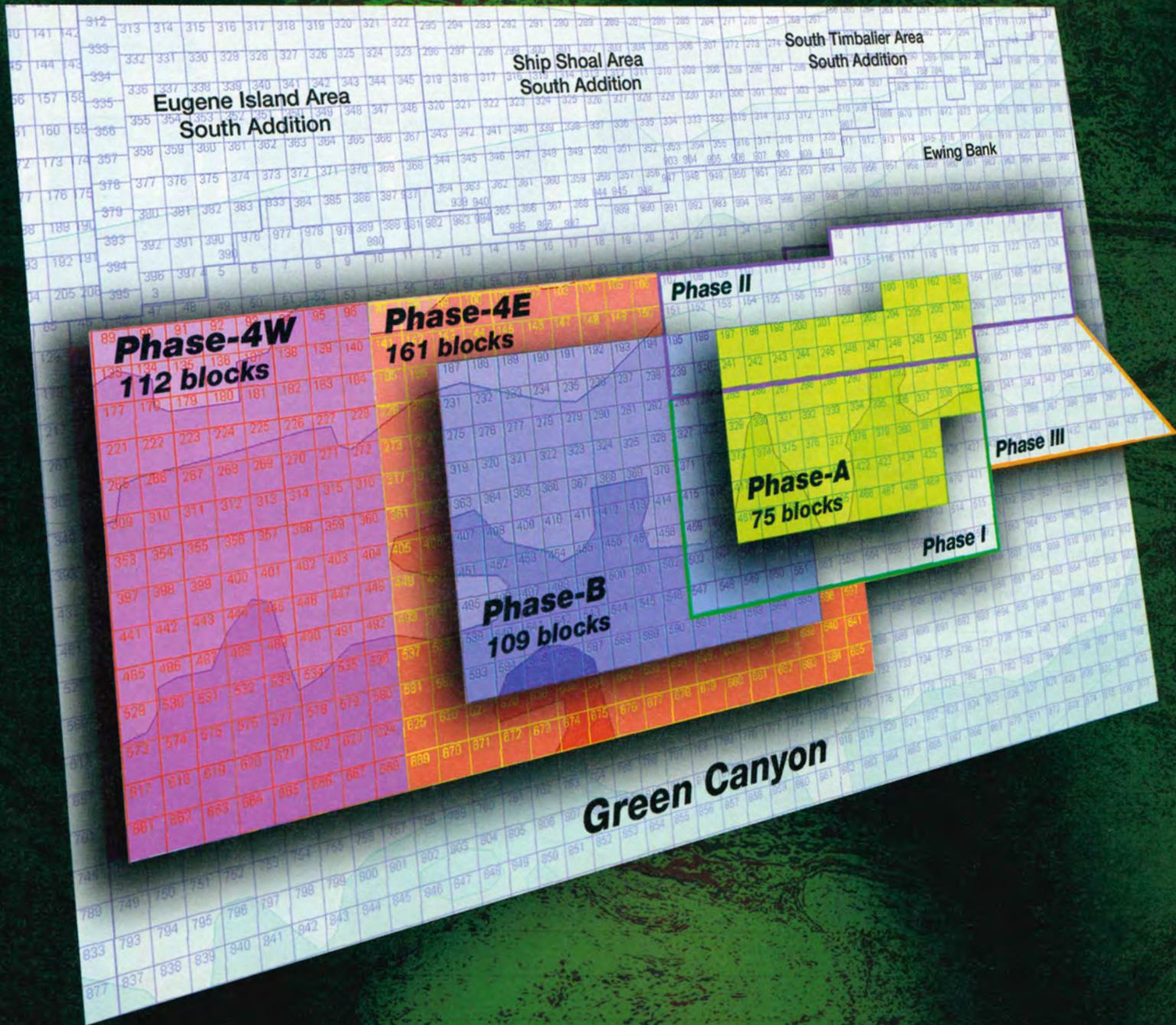
□ **Peter Trabant** is an unsung hero for the excellent AAPG technical program contributions to the OTC.

Thank you all for your commitment, hard work, selflessness and many accomplishments! And, please let me know where your next committee passion lies, as there are many other committees that could enjoy and benefit from your participation, new blood, new ideas and, especially, your proven leadership.

*Robbie Gries*

The AAPG Foundation has announced the recipients of 2001-2002 AAPG Grants-in Aid. For a complete list of recipients – plus all news regarding AAPG and links to related Internet sites – visit our Web site at [www.aapg.org](http://www.aapg.org).

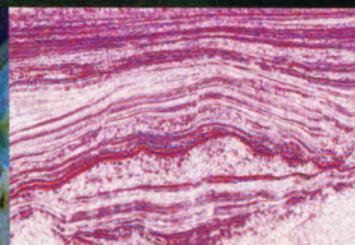
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*Gries Assumes Presidency*

# 2001-02 AAPG Leaders Seated

Denver independent geologist Robbie Rice Gries has assumed the leadership of the association's Executive Committee for 2001-2002.

Gries, who served as AAPG president-elect for 2000-2001, becomes the first female president of AAPG.

A native of Ingleside, Texas, she received her bachelor's degree in geology from Colorado State University and a master's from the University of Texas at Austin.

Gries began her career teaching geology at Wichita State University and in 1973 joined Texaco in Denver. In 1976 she became a staff geologist for Reserve Oil in Denver. In 1980, when Reserve was acquired by Getty, Gries began her career as a consultant and independent, opening an office in Denver.

Gries formed Priority Oil & Gas in 1992. She orchestrated the merger of two Colorado companies in 1993 and was a director and vice president for a year.

Since 1995 she has been president and CEO of Priority, with operations primarily in the Mid-continent and Rockies, with other onshore gas exploration projects in the UK/Northern Ireland and Ireland.

Joining Gries on the Executive Committee will be Daniel L. Smith, a Houston independent geologist who was recently voted president-elect by the AAPG membership. He will serve as president 2002-2003.

Smith began his career with Pan American Petroleum (now BP Amoco),



Gries

## AAPG 2001-2002 Executive Committee



Lewis



Smith



Mankin



Lorenz



Picou



Dolly

and later also worked with Roberts and Whitson and Texoil, where he was vice president and exploration manager.

In 1992 he joined Texas Meridian (now The Meridian Resource Corp.) as a consultant and later joined the company as vice president of exploration, retiring in 1999 as vice president-new ventures.

Also recently elected to the 2001-2002 Executive Committee are:

□ Vice president – Donald W. Lewis, a consultant in Lafayette, Calif. He will serve a one-year term.

□ Secretary – Charles J. Mankin, director of Sarkeys Energy Center at the University of Oklahoma and director of the Oklahoma Geological Survey. He will serve a two-year term.

□ Editor – John C. Lorenz, distinguished member-technical staff with

Sandia Laboratories in Albuquerque, N.M. He will serve a three-year term.

□ Chairman of the House of Delegates – Edward W. Dolly, of Anschutz Exploration, Denver.

Remaining on the committee is Edward B. Picou Jr., a consultant in New Orleans who is serving the second of a two-year term. □

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*Booms-Busts Strangle Funding***Industry R&D in a Depression**

By DAVID BROWN  
*EXPLORER Correspondent*

Scott W. Tinker could be the industry's leading forward-thinker on oil and gas research.

Unfortunately, his vision is disturbing.

Why? Because Tinker sees petroleum research and development getting too little attention, too little funding.

Spending on R&D has been slashed almost everywhere. And when research isn't developed to come on-line, sooner or later the innovation pipeline runs dry.

Still, he remains optimistic about the outlook for new developments.

"Research and technology have played a fundamental role in the oil and gas business for well over a century, and will continue to do so well into the 21st century," Tinker said.

"The exciting challenge we face in the U.S. today is developing a business model to fund energy research for the long haul."

He should know. Research is his life.

Tinker is director of the Bureau of Economic Geology at the University of Texas at Austin. A major oil and gas research center, the BEG pursues multi-year projects funded by industry consortia groups, the U.S. Departments of Energy and the Interior, the Minerals Management Service and the state of Texas.

Earlier, he served as an advanced senior geologist at Marathon Oil's Petroleum Technology Center in Littleton, Colo.

A former AAPG Distinguished Lecturer and recipient of the association's J.C. Sproule Memorial Award, Tinker has been a member of numerous national and international professional committees, including the DOE's Strategic Initiatives Task Force.

He earned a bachelor's degree *magna cum laude* in geology and business administration at Trinity University in San Antonio, his master's degree at the University of Michigan-Ann Arbor and his doctorate in geological sciences at the University of Colorado, Boulder.

Because of his background, he's had a close-up view of upstream research and its long slide. Funding for R&D has dropped from \$5 billion to \$2 billion over the past decade, Tinker said, "and is on a strongly decreasing trend."

**'Moments of Brilliance'**

The DOE allocates only 4 percent of its \$19 billion budget to energy research, and only 7 percent of that 4 percent goes to oil and gas research, he noted. Nuclear, coal and renewable energy share equal claim to the other 93 percent of the research funding.

Federal spending has remained close to \$100 million per year for true oil and gas research, Tinker said, but the initial 2002 budget proposal from President George W. Bush would cut that amount in half.

Money has dried up, or is drying up, for other research as well. Tinker said the Gas Research Institute (GRI) at one time funded close to \$200 million per year in gas-related research. GRI's support came from a Federal Energy Regulatory Commission-mandated surcharge on interstate gas sales. The surcharge will be phased out, however, producing an estimated \$70 million this

*"The problem they're facing is a very significant decrease in funding from the private sector."*

year, \$60 million in 2002-2004, and nothing after that.

To regroup, GRI combined with another organization and now operates as the Gas Technology Institute.

Other research centers affiliated with

universities or state geological surveys fight their own rounds to cope with reduced industry R&D spending, according to Tinker.

"There are still several centers that do oil and gas research," he said. "The

problem they're facing is a very significant decrease in funding from the private sector."

At one time, Tinker noted, the largest U.S. oil companies supported their own, independent research operations.

"They weren't asked to justify themselves on an hourly or daily or even a weekly basis," he said. "Their return on investment and that sort of quarterly profit picture wasn't part of the

continued on next page

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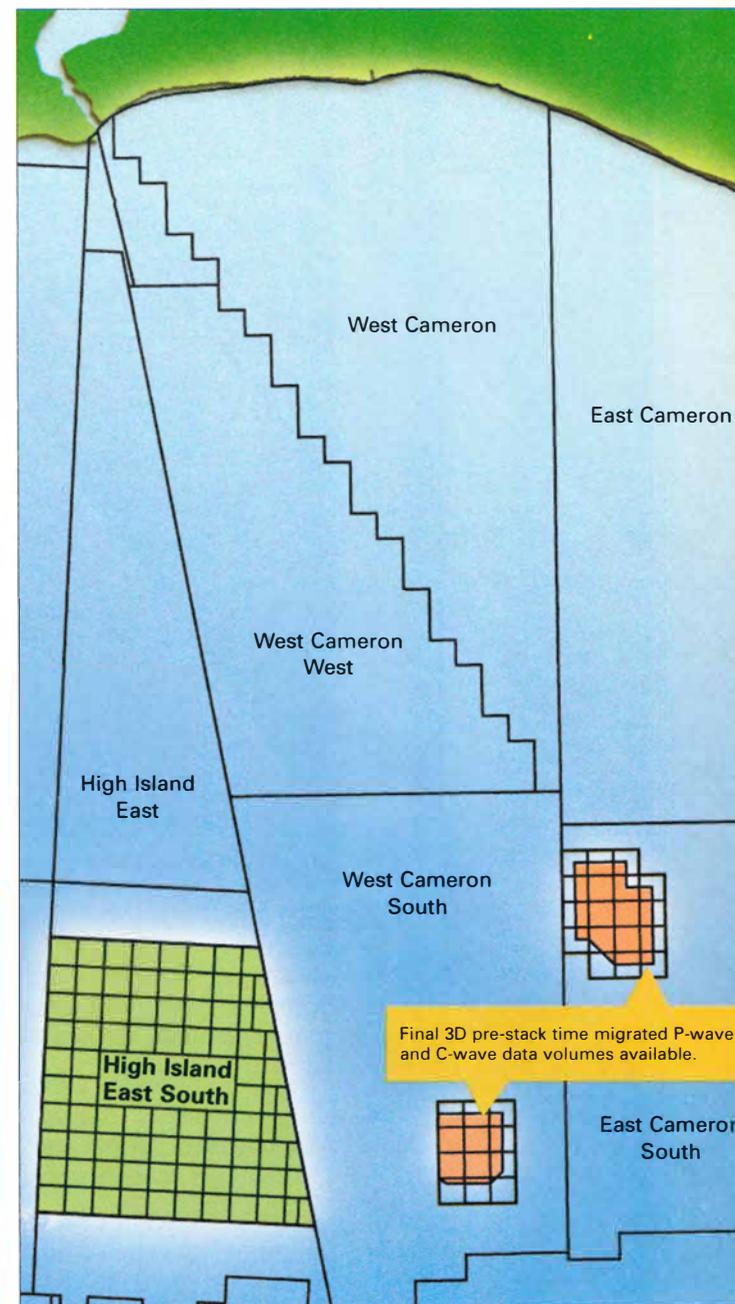


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continued from previous page

equation.

"That's what research is. It has a long payout time – sometimes – if ever," he said. "It's a creative process with a lot of dead-ends and some things that are home runs."

As those companies struggled to justify their internal expenditures, research labs came under more scrutiny. A profit-center model evolved with non-operating departments required to bill back their services, but Tinker said "that's not the way research works."

"Research is long periods of normalcy punctuated by moments of brilliance. I think it was the wrong business model. It wasn't a failure on the part of the research labs."

At the same time, beginning in the

early 1970s, the industry began to see dramatic product price swings, he said.

Now oil and gas both are subject to three-to-four-year major price cycles.

"It's kind of unpalatable for a company to say, we're going to go through two or three of these price cycles before we see a payout on this research investment. They can't afford to do that," Tinker explained.

Competition for capital investment during the 1990s also reduced companies' ability to support long-payout R&D, he said.

As a result, private industry in the United States shuttered almost all of its large, self-funded research labs.

While that was going on, about 80 percent of all energy produced in the United States came from fossil fuels – oil, natural gas and coal, Tinker said. About 85 percent of Btu consumption relied on those sources.

"Over the past 50 years those percentages have not changed dramatically," he said. "The U.S. production of oil has decreased, but I think it's more important to look at consumption."

Today the United States imports about 57 percent of its oil consumption and about 15 percent of its natural gas consumption, with oil imports certain to rise, Tinker said.

"Natural gas is a little different story," he said. "We can certainly increase natural gas production. That's going to require a commitment to infrastructure and a huge commitment to exploration."

**He'd PREFER This**

With more than half of U.S. Lower 48 oil production and almost two-thirds of gas production coming from independents, Tinker sees a real need for both continuing research and technology transfer. That's why he thinks the slowdown in R&D is such a mistake.

"I don't think we've solved it all," he said. "If we decrease the funding and go toward pure application of technology, we certainly have a good 10-year or 15-year future ahead of us."

But in the years after that, the industry will suffer from a lack of new technologies and new concepts, Tinker predicted.

The long payoffs from long-term research simply won't come.

Exploration companies expect the service-and-supply sector to gallop into battle in technology and equipment research, he said. But that won't happen, because the same economic pressures that affect producers also hit service firms.

"In fact, quite often it's more dramatic," he observed. "Services tend to be cut heavily by the private sector oil and gas companies in low product-price times."

Tinker believes the need for upstream R&D funding has grown so acute that the industry needs to undertake a consolidated research effort.

"I'd like to see the private sector become proactive and create a foundation," he said. "In fact, I've proposed this in a couple of talks over the past year. I call it PREFER, the Private Research Energy Foundation."

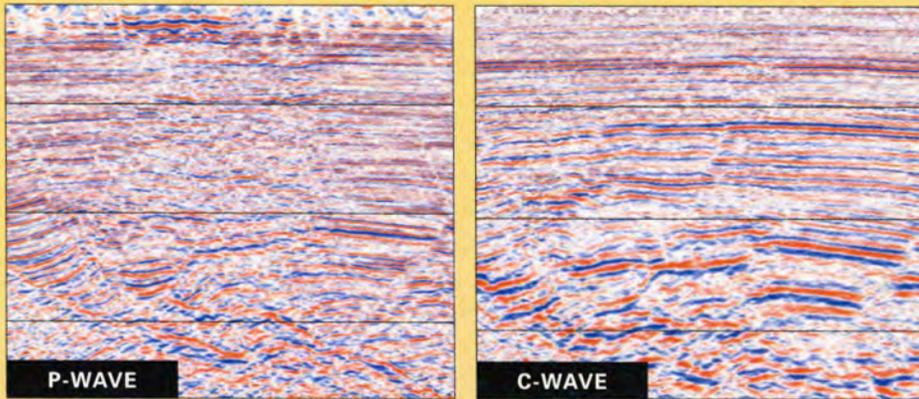
Companies would set aside a small percentage of revenues from U.S. oil and gas production, in Tinker's plan, taking on a voluntary tax to fund a national foundation for E&P research.

Contributing just two-tenths of 1 percent of half of U.S. production revenues would provide \$150 million per year in research funding, he



Figure 1: Federal research and development outlays by program, 1980-2001  
Source: Office of Management and Budget

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See **Research**, page 19

*Testimony Supports OCS***AAPG Takes Witness Stand Again**

By LARRY NATION

AAPG Communications Director

For the third time in two months, AAPG representatives testified before a U.S. congressional committee, this time focusing on access to Outer Continental Shelf areas.

Ben Hare, speaking as chairman of the AAPG Committee on Resource Evaluation, told the U.S. House Subcommittee on Energy and Mineral Resources in mid-May in New Orleans that "... OCS policy has forced the country to rely solely on the central and western Gulf of Mexico for offshore gas production. This reliance cannot last indefinitely."

Hare was accompanied by Naresh Kumar, of the AAPG CORE committee, and Dwight "Clint" Moore, of the Division of Professional Affairs.

Kumar testified in March before the U.S. House Resources Committee concerning the U.S. Geological Survey's resource evaluations. AAPG President Marlan W. Downey also testified before the House committee in March, urging access to OCS areas as well as tax relief for independent producers.

Hare's testimony was part of a day-long series of presentations before the panel chaired by Rep. Barbara Cubin, (R-Wyo.), who was joined by Jim Gibbon (R-Nev.) and

*"Sources alternative to hydrocarbons are not sufficient to meet demand."*

David Vitter (R-La.) in hearing testimony.

Several AAPG members contributed in the preparation of Hare's testimony, including Kumar, G. Warfield "Skip" Hobbs, Lee Gerhard, John R. Ritter and Earl Ritchie, all affiliated with the DPA.

Hare's testimony stated "Resource assessments indicate a sizable resource is present in currently restricted areas of the OCS. For those resources to be delineated and converted to reserves ultimately to 'supply,' exploration must take place. Both the eastern Gulf and the Atlantic OCS are known to have generated and trapped natural gas.

"AAPG believes all potential sources of energy and increased conservation of hydrocarbons should be mainstays of the national energy policy. AAPG believes full exploration of the OCS, while safeguarding the environment, must also be an important piece of that policy."

Hare also said conservation and enhanced efficiency are only part of

the answer to supplying the energy to maintain a quality lifestyle.

"Sources alternative to hydrocarbons are not sufficient to meet demand," he said.

In making his case, Hare's testimony pointed to the gas potential of the OCS of 75 billion barrels of oil and 362 TCF of natural gas, including Alaska, as estimated by the MMS.

"Yet, by a 1998 presidential directive, there is presently a federal moratorium on any exploration of the Lower 48 OCS outside of the Central and Western Gulf of Mexico until 2012."

Meanwhile, Hare told the committee that "almost every country with marine waters is promoting exploration in (their) OCS and attempting to attract investment in their offshore, including the deep and ultra-deep waters.

"We believe that Canada, Great Britain, Norway, Brazil, India and numerous other nations all rightly understand that oil and gas

development is vital to their economic well being and can be done with minimal environmental impact," he said. "That is why all of these countries are not only trying to explore the deep-water arena, they are competing in the world market for investment dollars for deep-water projects.

"Given the right environment, a lot of these investment dollars could be spent in U.S. waters," he continued, "providing jobs, helping the balance of trade and enhancing domestic supplies."

Hare also pointed out the success of exploration in the Canadian Atlantic – both economically and environmentally – and how the geology indicates the same potential extending south along the U.S. Atlantic Coast from George's Banks to the Carolina Trough, a distance of almost 1,000 miles.

In a statement to the panel, Hare pointed out that there have been indications of sizeable reserves found in the Destin Dome area of the Florida Panhandle, and a discovery at Hudson Canyon off the New Jersey coast.

"For those resources to be converted to reserves and ultimately supply to meet the nation's energy needs," he said, "exploration and production must occur." □

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*Bush Brothers Face Off*

# Florida's 'Back Yard' on Front Burner

By LOUISE S. DURHAM  
*EXPLORER Correspondent*

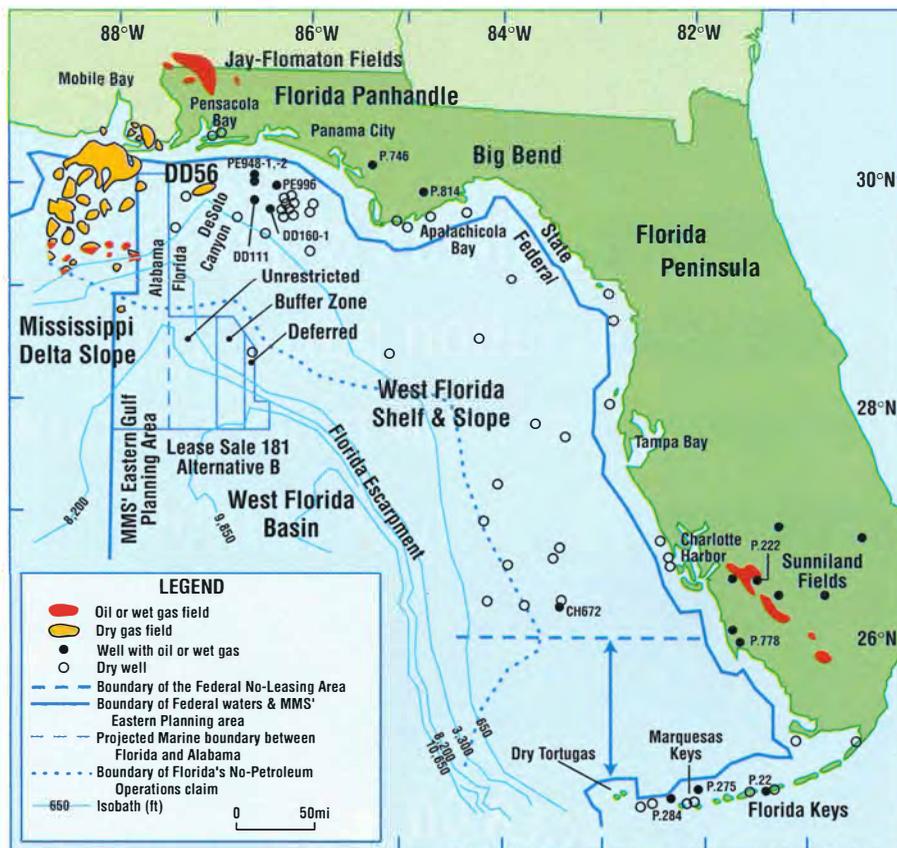
The handwriting was on the wall when a leading U.S. auto manufacturer announced production of a 10-mile-to-the-gallon behemoth to make the suburban trek between home and the ubiquitous coffee emporia. It was a sure sign the nation's latest energy-guzzling bender had spun out of control.

The aftermath of the longtime party: A national "energy crisis" that's shaping up to be one doozy of a hangover.

There's the expected hue and cry from that segment of the citizenry that considers cheap gasoline to be its birthright; the governor of California threatening to seize a major energy supplier's power plants; and the chant of "NIMBY" – or Not In My Back Yard – resonating throughout the petroleum-gorging state of Florida.

The upside to this mess: It appears the United States might finally get a viable energy policy, provided its planners and supporters can hold their ground once the draft of the policy goes before the recently-rebalanced Congress.

Total national energy self-sufficiency may be only a pipe dream. Yet, there are some vast, previously-untapped hydrocarbon resources that could do much to stem the tide of dwindling domestic production, such as the Arctic National Wildlife Refuge (ANWR), Rocky Mountain federal lands and certain offshore Gulf of Mexico



EXPLORER Graphic: data courtesy of Klaus Gohrbandt

lately is the rising rage within Florida over the proposed Outer Continental Shelf (OCS) lease sale under the aegis of the Minerals Management Service (MMS) in the eastern GOM, where some impressive accumulations of hydrocarbons are projected to exist (see related story, page 13).

Adding intrigue to the hot issue is the sibling tug-of-war it's triggered between Sunshine State Governor Jeb Bush, who opposes the sale, and proponent George W. Bush.

### Defining the Need

The proposed Lease Sale 181 would be the first in the eastern GOM since 1988.

The sale area encompasses about 5.9 million acres, or roughly 8 percent of the total Eastern Planning Area. It includes 120 blocks in a narrow band offshore Alabama, along with 913 blocks in deeper water closer to Louisiana than Florida and adjacent to the prolifically productive Mississippi Canyon area in the Central GOM.

The program boundaries were carefully drawn to accommodate Florida's long-standing demand for a 100-mile buffer zone from its coastline, as well as a more recent request by the state of Alabama for a 15-mile buffer offshore Baldwin County.

Hydrocarbon resource numbers for the largely unexplored acreage

(GOM) areas.

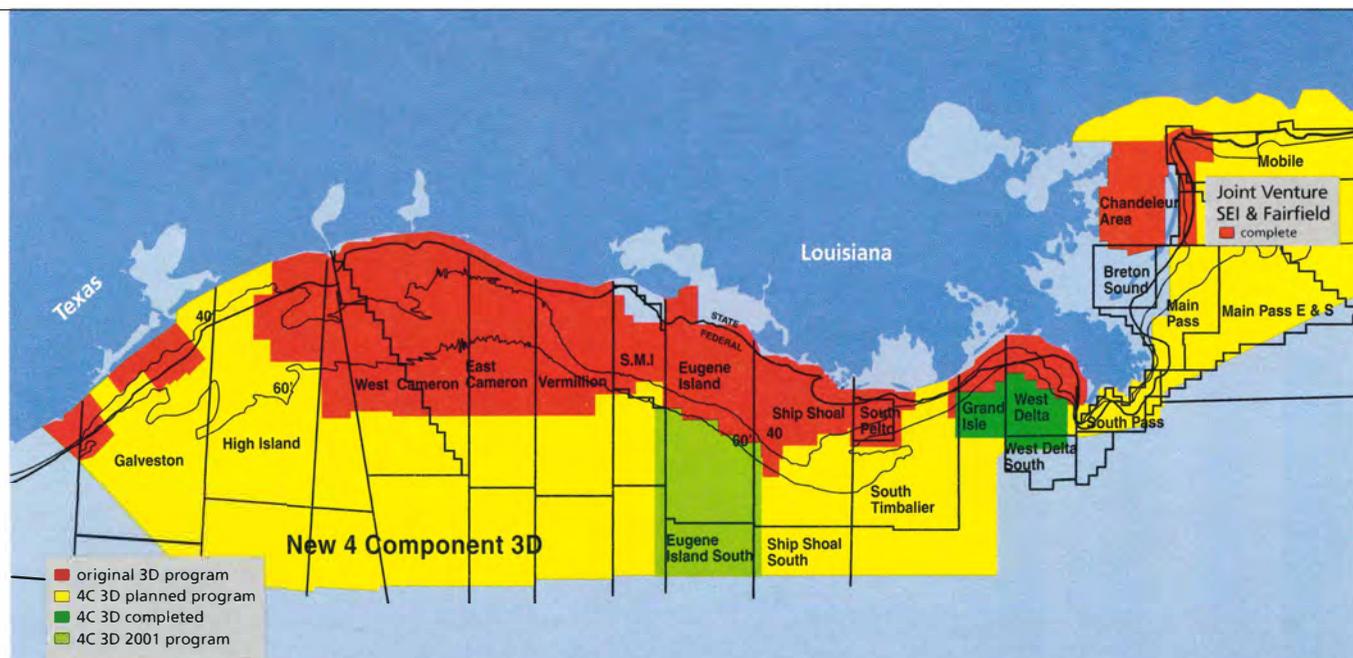
While opposition by environmental activists and politicians to ANWR development has been some of the most vocal, the mayor of Anchorage, Alaska, publicly cites the successful,

non-invasive 25-year production history from Alaska's Prudhoe Bay as proof positive that the coastal plain of ANWR can be explored and developed without harming the environment.

Edging ANWR off the front pages

See **Florida Activity**, page 14

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# East Gulf Potential Attractive

*Past Successes Suggest Big Pay Days*

Few wells have been drilled in the proposed OCS Lease Sale 181 area in the eastern Gulf of Mexico. Still, the largely unexplored area is projected to harbor some significant hydrocarbon reserves, with a possible development potential of several Tcf of natural gas and a billion or so barrels of oil.

There are two distinct hydrocarbon provinces in the sale area that are geographically separated by the Florida Escarpment. Gently sloping Mesozoic and Cenozoic sediments occur north of the escarpment, while Tertiary clastic submarine fan deposits and Mesozoic sediments untested offshore are found to the south.

Three significant geologic plays occur north of the escarpment. These plays are producing gas in fields offshore Alabama, according to MMS deputy regional supervisor for resource evaluation David Marin.

More than 30 fields have been discovered in the shallow Miocene sedimentary deposits between 2,000 and 4,000 feet subsea. These are all gas fields and include two field discoveries in the proposed Sale 181 area.

Four field discoveries have occurred on the shelf offshore Alabama at intermediate depths of 12,000 to 15,000 feet subsea within the Lower Cretaceous James Limestone. Initial production from the James carbonates occurred here in 1998 in Chevron's Viosca Knoll Block 69 field. This play runs across the sale area north of the escarpment.

The Norphlet formation of Jurassic age is found at depths greater than 20,000 feet in the OCS offshore Alabama. Any hydrocarbons at these depths will be gas.

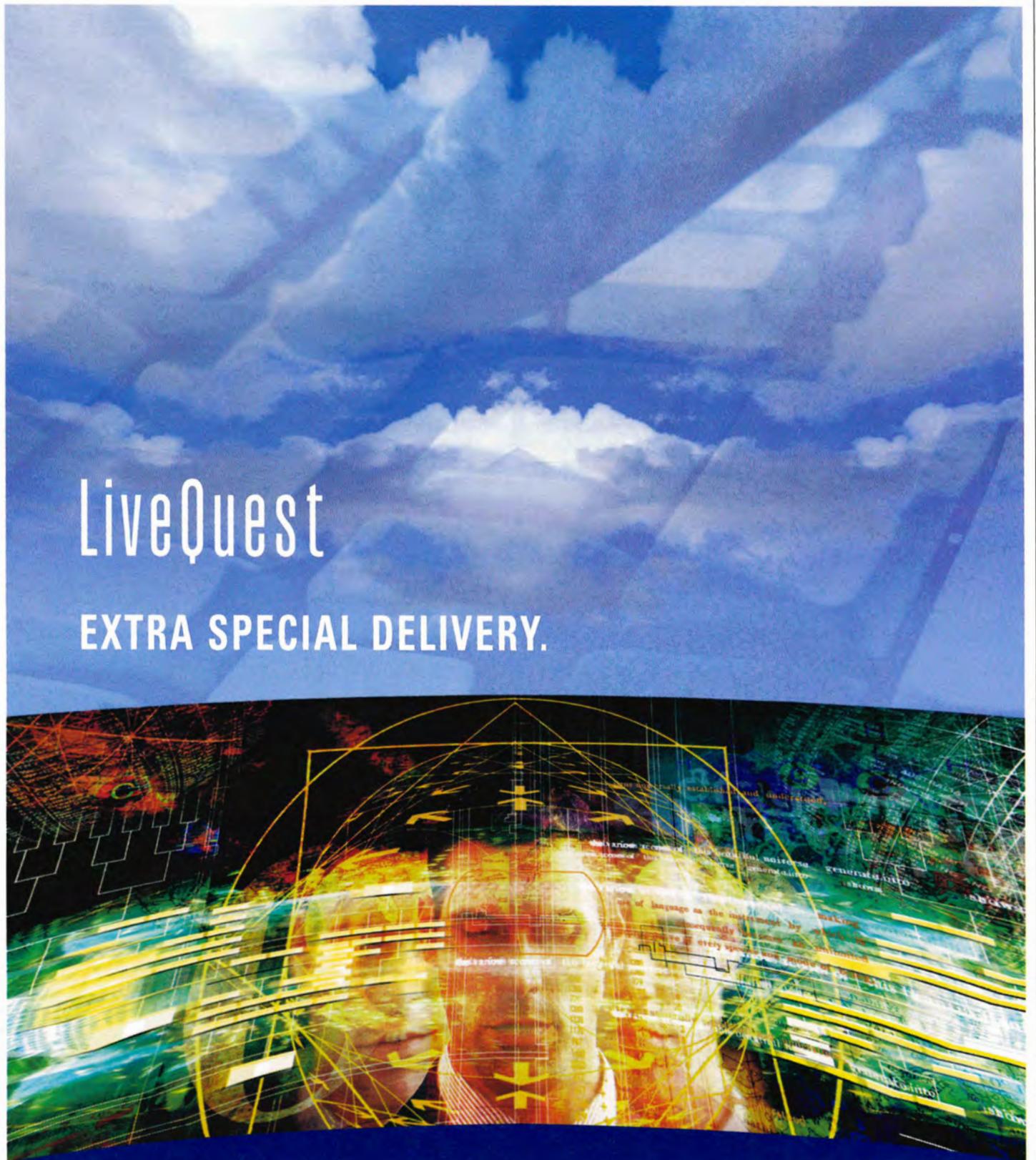
On the OCS, there are 13 discovered fields in the Norphlet, Marin said, including one in the MMS Eastern Gulf Planning Area. This is the Destin Dome Block 56 field, which is estimated to contain as much as 3 Tcf of dry, natural gas, according to the Department of Energy's (January 1997) Florida Energy Profile, and MMS Lease Sale 181 Draft EIS.

Development of this late '80s discovery awaits a decision from the U.S. Commerce Department. Where the Norphlet occurs at depths less than 19,000 to the east, notable oil shows have been found.

Some significant fields have been discovered in the Mississippi Canyon and Viosca Knoll areas near the Eastern Gulf Planning Area. These include the Ram Powell VK 956 field, Petronius VK 786 field, King MC 84 field and the King's Peak DeSoto Canyon 133 in the Eastern Gulf of Mexico. The plays found within these deep-water fields represent the important plays expected to be found south of the Florida Escarpment in the sale 181 area.

Buried salt features define a second hydrocarbon play in the area below the escarpment, Marin said. The Salt Roller Play, with hydrocarbon traps formed by movement of the salt, has not been tested.

— LOUISE S. DURHAM



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**Schlumberger**

**Florida Activity**  
from page 12

included in the Sale 181 program vary depending on the source.

MMS numbers for the undiscovered, conventionally recoverable resources of the area, said deputy regional supervisor for resource evaluation David Marin, are:

✓ Oil: 0.650-1.446 Bbo (Mean = 0.843 Bbo).

✓ Gas: 3.233-5.193 Tcf (Mean = 3.8555 Tcf).

The National Petroleum Council's 1999 study on natural gas attributes the lease area with the potential to produce a hefty 7.8 Tcf and 1.9 Bbo, according to C. Stedman Garber Jr., current vice-

As the EXPLORER was going to press, the U.S. House of Representatives voted to temporarily block drilling for oil and natural gas in Florida's offshore Gulf waters.

The action prevents drilling to April 2002 in an area that lies mostly about 100 miles from the state's coastline. Lawmakers approved the amendment (June 21) in a 247-164 vote as part of the overall Interior Department spending bill.

The Senate must still act on the measure, and President Bush would then have to sign the legislation to block any drilling.

chairman of the IADC and president and CEO of Santa Fe International Corp.

These volumes take on added meaning when placed in the context of Florida's voracious energy appetite. Indeed, the state ranks as the nation's third largest consumer of petroleum products, and yet it produces only 2 percent of the petroleum it consumes, according to Florida Energy Information data derived from the Department of Energy's Florida Energy Profile (1997) and the MMS Lease Sale 181 Draft

Environmental Impact Statement (EIS).

Moreover, South Florida's population is expected to double to eight million by 2010, and its electricity demand is expected to double from 1.5 Bcf/day in 2000 to 3.0 Bcf/day in 2008. Twenty-four new electrical generating plants will have been or will be added to the Florida power grid from 1995 to 2004, with 21 of these designed to be gas-fired.

Stedman noted the natural gas from the lease sale region alone could satisfy the current natural gas needs of

Florida's 5.9 million households for the next 16 years.

**NIMBY Fever**

Still, the anti-drilling folks talk of dire consequences should Lease Sale 181 occur. They predict massive oil spills – from natural gas wells – that will defile the perennially tourist-packed, white-sand beaches and destroy fish habitats, among other frightening scenarios.

Ironically, Gulf Breeze-based pro-drilling activist Klaus Gohrbandt, a retired Chevron petroleum geologist, noted, "I'm an avid fisherman, and when we want to fish we head to Alabama, because the good catches are around the rigs."

The state's official NIMBY stance on oil and gas production is well-documented in its long-standing battle with Chevron over development of Destin Dome Block 56. The field lies 25 miles south of Pensacola and 20 miles east of the so-called "stovepipe" section of the Lease Sale 181 area. Block 56 is projected to harbor from 1 to 3 Tcf of dry, natural gas, according to the Florida Energy Information data.

Destin Dome is part of the Jurassic Norphlet Trend – a major producing natural gas trend that extends westward in the GOM from the Destin Dome blocks to offshore blocks south of Pascagoula, Miss.

Chevron acquired leases there in 1984, prior to leasing moratoria off much of the Florida coast, imposed during the elder Bush's White House tenure, said MMS spokesperson A.B. Wade.

The company submitted an exploration plan to both the MMS and the state of Florida, in accordance with the Coastal Zone Management Act, to seek approval to proceed with drilling operations.

Florida rejected the plan, but the U.S. Commerce Department overruled the denial, and Chevron proceeded to drill to delineate the lease. A development plan submitted in 1996 was again rejected by Florida and now awaits a decision from Commerce.

Despite the prevalent political and environmental-activist NIMBY rhetoric regarding Lease Sale 181, Gohrbandt is far from alone in recognizing the state's tenuous energy situation and the need to attain some degree of self-sufficiency.

"I'm tired of Florida being a politically-created energy welfare state," said Bill Boe, a retired Gainesville history teacher and native Floridian.

"Florida is part of the energy problem," he said, "and we just expect other people to send their energy to us."

"There's a huge number of us vets living here," Boe continued, "and we all agree we'd rather risk some millimeter of something on our beaches than see more buckets of American blood spilled defending oil wells in the Middle East."

Scoffing at predictions of environmental damage from drilling, Boe asserts the greatest environmental disaster in Florida's history is the overpopulation of its coastal wetlands, with 13 million people living within 30 miles of the coast.

Boe doesn't just talk the talk. His pro-drilling campaign agenda includes an upcoming visit to the nation's capitol at his expense to lobby members of Florida's congressional delegation to ditch "a political strategy of fear and help the state become more energy independent."

continued on next page

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# APPEX Sign-up Deadline Looming

An important deadline looms this month for the inaugural AAPG Property and Prospect Exposition in Houston.

APPEX, a new event that will provide sales opportunities for both domestic and international prospects and properties, will be held Aug. 27-29 in Houston at the Adam's Mark Hotel.

APPEX is a cooperative effort involving AAPG, the Society of Independent Professional Earth Sciences and the Houston Geological Society.

The deadline to remember is **July 25**: That's the cut-off date for reduced pre-registration fees for both

exhibitors and attendees of both the expo and the conference that will be held in conjunction with the event.

APPEX is designed as a showcase for those who have prospects and properties to show, similar to the successful North American Prospect Expo, which is held annually in the early part of the year by the American Association of Petroleum Landmen.

The expo's goals are "to expose as many new geological and geophysical prospects and ideas to the widest market possible," said APPEX general chairman Charles "Chuck" Noll.

Torch Energy/PLS, Houston, which

formerly sponsored a fall prospect and property exposition was purchased by AAPG. Torch/PLS has agreed to accept a marketing role in APPEX, which will be held in lieu of the previous PLS Dealmakers meeting.

Last fall, the Dealmakers meeting drew about 1,200 attendees and 135 booths. By comparison NAPE attracted over 8,000 attendees and over 1,000 booths at the 2001 meeting.

APPEX' conference, which will be held over the first two days of the three-day event, will include talks and educational workshops. Topics for

past workshops included acquisitions and divestitures, exploration, sourcing capital, Internet services, marketing and hedging.

For information on exhibiting or attending, contact Michelle Mayfield Gentzen at (918)560-2618 or [mmayfiel@aapg.org](mailto:mmayfiel@aapg.org). For general APPEX information and registration forms, go to the AAPG Web site at [www.aapg.org](http://www.aapg.org).

Don't forget: the pre-registration deadline, ensuring reduced rates for both exhibitors and attendees, is July 25. □

continued from previous page

## Other Sources

The Sunshine State doesn't have far to go to acquire other people's energy.

The Central Gulf is a veritable hotbed of drilling activity, and the governors of Alabama, Mississippi and Louisiana are on record in favor of the proposed lease sale. They cite the jobs it will create, the dollars to be spent on products and services by the industry and the need for the additional energy supply.

Indeed, the MMS expects the central Gulf Coast region to benefit from as many as 5,534 jobs during peak activity, most likely in the year 2019. There would be 1,691 jobs created indirectly, with 2,202 additional jobs in the private sector.

When preparing the initial EIS for the proposed lease sale, the federal agency analyzed numerous factors and what the potential environmental effects might be. These include:

- ✓ Air and water quality.
- ✓ Oil spill risk.
- ✓ Sea-bottom habitats for marine life.
- ✓ Military operations in this area of the GOM.

The agency reviewed three alternatives relative to the proposed sale:

- All unleased blocks within Lease Sale 181 area would be offered for lease.
- Defer 126 blocks in the eastern area due to possible conflicts between oil and gas operations and military operations.
- No Action, which is equivalent to canceling the sale.

Once the Final EIS is complete sometime early in July, the agency will select one of these alternatives.

For now, the sale is planned to occur in December, with October being the "drop dead" date for a final decision, according to Wade at the MMS.

"This is because industry needs to know," she said, "and, by law, we must have time to issue the final notice and then have a public comment period."

"I think they'll definitely hold the sale," Gohrbandt said, "and we need this gas badly."

Still, his congressional representative, Joe Scarborough, R-Pensacola, said it's not going to come from Lease Sale 181, because "my back yard depends on a clean environment."

He doesn't specify where, in fact it will come from. □

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*Ex-Raider Eyes High Quality H<sub>2</sub>O Deal*

# Pickens Jumps Into Water Market

By KATHY SHIRLEY  
*EXPLORER Correspondent*

Don't look now, but T. Boone Pickens is in the news again.

Before, that often meant bad news in some quarters. Pickens, an AAPG member since 1954, was branded a corporate raider by newspapers, magazines, networks and opposing managements back in the 1980s when his firm, Mesa Petroleum, made hostile takeover bids for companies he felt were undervalued and mismanaged.

It's not a stretch to suggest that Pickens, as much as any person connected to the oil industry, is largely responsible for the look and structure of today's corporate America – and of the world.

But today Pickens is dealing with something other than undervalued companies.

Or oil, for that matter.

Today, Boone Pickens is dealing with water.

Ironically, Pickens Mesa Vista Ranch on the high plains of the Texas Panhandle is in danger of being raided – raided of the water that lies beneath the rugged land.

And Pickens knows all too well that in today's Texas, water is as potentially valuable as oil.

## Rules of Capture

In 1997 the Canadian River Municipal Water Authority announced it had purchased 43,000 acres of water rights

in the area just south of Pickens' ranch in Roberts County, Texas, and planned to develop the water field. Then, the city of Amarillo bought 71,000 acres of water adjacent to Pickens' ranch, with plans to develop the resource in 25 years.

"These developments got my attention," Pickens recently told the EXPLORER. "The CRMWA and Amarillo basically put other landowners on notice they were going to start draining us. I felt we had no choice but to start selling our surplus water or lose it to drainage.

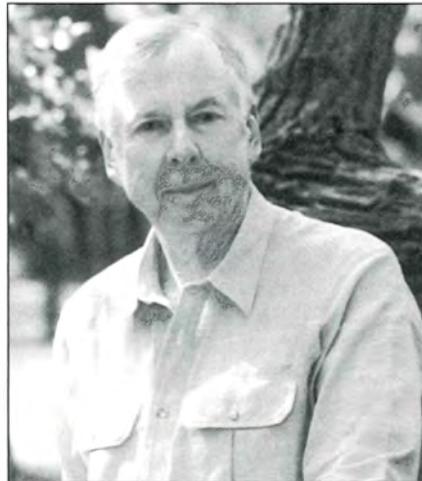
"Under the rule of capture we would have no recourse to prevent CRMWA and Amarillo from draining the reservoir under our land."

In Texas all surface water is considered public, but groundwater is privately owned. Under the rule of capture a landowner can pump water without regard for his neighbors.

The region of the Texas Panhandle that encompasses Roberts, Lipscomb, Hemphill and Ochiltree counties is one of the last remaining untapped portions of the Ogallala Aquifer, the largest aquifer in the United States. In other regions – from just south of Lubbock all the way to the South Dakota border – the aquifer has been tapped for over 50 years, primarily for irrigation.

This four-county section of the Texas Panhandle, however, is too rough to farm, and the aquifer has remained untouched. Of the total 2.22 million acres in the four counties, only about 100,000 acres have been irrigated.

Initially, Pickens approached



Pickens

CRMWA, which provides water to 11 communities in the Texas Panhandle and south plains, and the city of Amarillo, and offered his water rights for sale as well. They declined, however, so Pickens then went to his neighbors to ask if they would join in his efforts to market and sell the water rights under their land.

He formed Mesa Water Inc., and currently has about 150,000 acres with 3.3 million acre-feet of usable groundwater under lease – twice as much water as CRMWA and Amarillo.

In addition to banning together with neighboring ranchers, Pickens has purchased an agency agreement covering 65,000 acres of land from Quixx, a subsidiary of Southwestern Public Service Company – the same firm

that sold 43,000 acres of water rights to CRMWA.

Under the agreement Pickens' group will market water from the Quixx land.

## Establishing Guidelines

Although several months ago it looked as though Mesa Water would run into some problems with the area's governing Panhandle Groundwater Conservation District (permit applications were tabled earlier this year), Pickens' group and the district reached an agreement in early April that allows Mesa Water the same deal as CRMWA.

According to reports, the permits issued to CRMWA and Amarillo allowed those operators to pump one-acre foot of water annually per acre owned.

At the time of Pickens' application, a study based on a hydrologist's report was used regarding regional conditions and ramifications of the proposed activity. A subsequent study, however, indicated that the increased projected pumping would deplete the aquifer faster than the water district's original study indicated.

Pickens then insisted that all parties be treated equitably, and after weeks of negotiations the two sides reached an agreement. Now the permits allow one acre-foot of water for each acre owned – with provisions that pumping rates can be adjusted if depletion proves to be at a

continued on next page

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higher rate than initially estimated.

Under the water district rules, half the water that was stored in the aquifer in 1998 must still be available in the aquifer in the year 2050.

Pickens has indicated he is in full agreement with those guidelines, and that his project will not endanger the aquifer.

He said his proposal represents only a fraction of the amount of water already pumped by farmers for irrigation in the Panhandle.

**Is It Competitive?**

Pickens isn't the only Panhandle resident trying to cash in on the untapped water. An Amarillo attorney has reportedly compiled water rights on a 190,000-acre block in Roberts County and plans to sell the water.

"Today I have the volume I need for this project to make sense," Pickens said. "I'm currently not leasing additional land until we determine if we can economically sell water to one of the larger cities of Texas."

"I already have \$2 million invested in this deal in land costs, engineering studies, legal costs and lobbying efforts," he added. "Now we need to make a sale for the water."

Pickens said several cities are looking at the situation, but no municipalities have actually made an offer.

Pickens has commissioned a study, now under way, to compare his project's water costs to about 10 other water sources around the state.

"We have to find out if this project is competitive," Pickens said. "If it's not, then we can forget it."

However, he did say he thinks there is a better than 50 percent chance that he will be successful in selling the water – the odds of a wildcatter's dreams.

"This is a sizable supply of water for some city," he said. "We have 200,000 acre feet of water per year to sell, and while it won't meet all the needs of a major city, it can service about one million people. The water meets all drinking water standards, and treatment costs for the water are very low."

"Studies looking at the water situation in Texas for the next 50 years shows that everything west of I-35, which is about two-thirds of the state, will have some water supply problems to varying degrees," he continued. "Water is becoming a huge issue in this state."

"The legislature is mandated to develop a 50-year water plan for the state by January, so important decisions are going to be made in the next year – and we need to be in a position to profit from those decisions."

**Finding the Markets**

Texas' population is about 20.8 million, second only to California, and studies indicate that it could double in 50 years. El Paso is already looking for new water sources. The Rio Grande, a primary source of water for the city, is so dry after several years of drought that earlier this spring the river failed to reach the Gulf of Mexico for the first time in 50 years.

Pickens said he was told El Paso is studying a desalination project to provide water at about \$1,400 per acre-foot.

Mesa Water currently is focusing on Dallas-Fort Worth, San Antonio and El Paso as potential buyers. Engineering studies conducted by the company indicate that water can be piped from

See **Pickens**, next page



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# Pickens

from previous page

Roberts County to the Dallas-Fort Worth area in a 108-inch, 385-mile long pipeline for less than \$800 an acre-foot.

After selling water to smaller communities along the way, about 150,000 acre-feet would reach the metropolitan area.

Delivering the water to San Antonio would run about \$1,170 an acre-foot through a 614-mile line, and to El Paso – the least likely alternative – the costs would be about \$1,773 an acre-foot.

Pickens recognizes it will be up to Mesa Water to build the pipeline to market the water.

"Nobody's going to buy my water up here and lay a pipeline from Roberts County," he said. "I'm going to have to get a price on the other end and a contract, and I'm going to have to arrange for the financing and build a pipeline."

Pickens points out that CRMWA has a 325-mile pipeline that takes water away from Lake Meredith just north of Amarillo down to Lubbock and Lamesa, Texas. That pipeline is 96 inches in diameter – not much different than the proposed line to Dallas-Fort Worth – and it was built 30 years ago.

"Whatever the outcome of this project in the short-term, reliable water sources will continue to be a growing issue for expanding cities, and eventually surplus water from these Panhandle counties will become a valuable commodity," he said.

"I think that over a long period of time water will be continually bought, in Roberts and continuing east to Lipscomb, Hemphill and north to Ochiltree counties, and brought into the infrastructure that goes south."

## Minimal Long-Term Effects

Of course, there are concerns in the area about the long-term effects of the proposed groundwater projects.

According to state statistics, the Ogallala aquifer beneath the entire Texas Panhandle is stressed and with dry conditions and the current consumption rate the aquifer could be depleted in 70 years. That's a more dire prediction than the Panhandle Groundwater Conservation District's estimates, which indicate that these projects would reduce the water in the aquifer beneath Roberts, Hemphill, Lipscomb and Ochiltree counties by 50 percent over the next 100 years.

At a recent meeting of area ranchers Pickens told the group, "When you hear people say Boone Pickens is going to turn Roberts County into a Dust Bowl, well, that's wrong. We're never going to be without water."

The EXPLORER told Pickens that "in the overall scheme of things we aren't impacting the reservoir dramatically."

The Ogallala aquifer, he said, "has been mined for years," adding that the upper 21 counties of the Texas Panhandle extracted 1.8 million-acre feet of water in the year 2000 – and 90 percent of that was for irrigation.

"We're going to take out 200,000 acre-feet of water, or about 10 percent of the total," Pickens said. "These four counties that have been relatively untouched in the past represent a 100-year supply of water with 20 million-acre feet. The regulations dictate that you can only draw down to 50 percent of the saturated thickness of the reservoir, and that leaves plenty of water for ever after

for all generations.

"All we're doing is selling our surplus water to realize additional value from our land."

Pickens said landowners in the four county region could realize additional revenue of about a billion dollars over the 100-year life of the surplus water supply.

"This is a very important issue to ranchers in these four counties," he said. "If we don't sell our water, it's going to be drained out from under us. That's a sizeable asset to just give away. Land in these northeast Panhandle counties is only worth about \$250 per acre. Irrigated land just 50 miles west is worth \$600 to \$800 per acre.

"Selling the surplus water is our only chance to upgrade the value of our land. It's imperative that we do it." □

# Officer Candidates Named For 2002-2003

Candidates for AAPG office for the 2002-2003 term have been announced by the Advisory Council Nominating Committee, chaired by Edward K. David.

Candidates are:

### President-Elect

- Susan M. Landon, an independent geologist, Denver.
- Stephen A. Sonnenberg, of North American Resources, Denver.

### Vice President

- Christopher P.M. Heath, retired from Amoco, Vancouver, Canada.

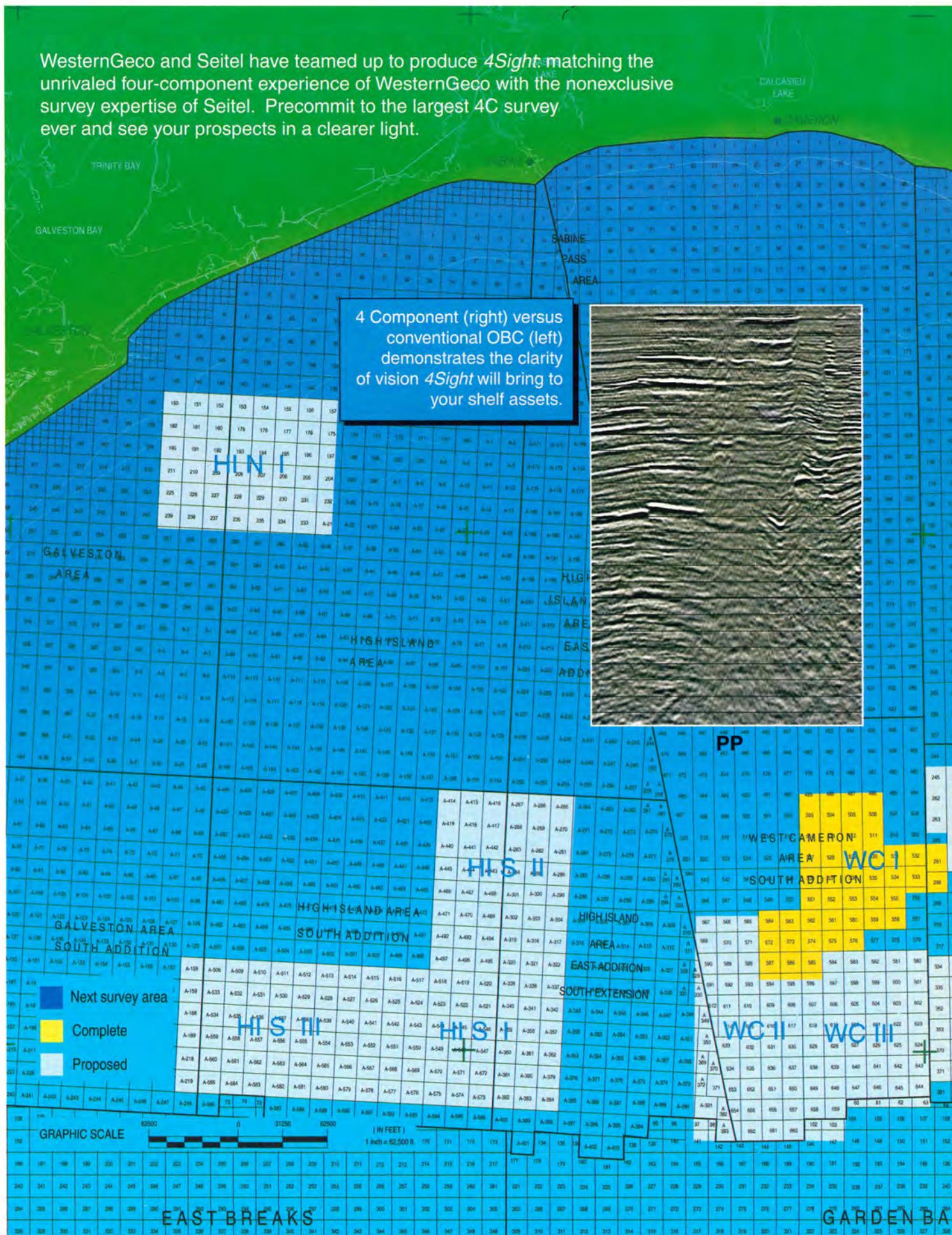
- Peter M. Lloyd, of NExT Technology, Kuala Lumpur, Malaysia.

### Treasurer

- Larry C. Knauer, of Texaco, Bakersfield, Calif.
- Paul Weimer, University of Colorado, Boulder.

Biographies of the candidates will appear in the future issues of the BULLETIN and EXPLORER, with candidate statements beginning in the September EXPLORER.

Ballots will be mailed in the spring, with results announced May 15, 2002.



**Research**

from page 9

reckoned.

"I really believe government matching of that proactive step would follow," Tinker said. "We could leverage that investment and get a good, significant match."

An added benefit would be sending a signal to students that the industry had made a 20- or 30-year commitment to ongoing research activities, an investment in its own future.

"You'd see students return to the earth sciences, because it's a fun discipline," he said. "Kids enjoy it, they really do, but they have to see some future in it."

**For the Record**

To emphasize the importance of continued R&D, Tinker mentioned a few areas with what he calls research roots:

- ✓ Reservoir characterization.
- ✓ Visualization techniques.
- ✓ Geostatistics.
- ✓ Geocellular modeling.
- ✓ Unconventional-gas play concepts in tight gas, shale gas and coalbed methane.
- ✓ New research in basin-center gas and gas hydrates.

"If you look at the production curves of unconventional gas types, they've all had an infusion of research investment from the federal level and private industry. There's a 5- to 10-year lag, and then the production curve was built," he said. "Concepts *mattered*."

- Also, there's:
- ✓ 3-D and 4-D seismic.

*"You'd see students return to the earth sciences, because it's a fun discipline. Kids enjoy it, they really do, but they have to see some future in it."*

- ✓ Four-component and nine-component seismic.
- ✓ Acoustic and elastic impedance.
- ✓ AVO.
- ✓ High-frequency seismic.
- ✓ Attribute analysis.
- ✓ Cross-well tomography.
- ✓ Geochemical fingerprinting.
- ✓ Maturity modeling.
- ✓ Migration timing.
- ✓ Petrophysical analysis.
- ✓ NMR.
- ✓ Image logs.

- ✓ MWD.
- ✓ Forward and inverse modeling.
- ✓ Fracture prediction.
- ✓ Salt tectonics.
- ✓ Seal analysis.

"And the list goes on," Tinker said, "You can make plots of oil-producing reservoirs that have these technologies applied to them and you can plot the increase in incremental oil production, almost without fail."

**Hey, This Is Fun**

Benefits will continue to accrue from research results, as innovations like new reservoir-characterization technology spread throughout the industry, he said.

"The independent producers do not have that technology in their shops. I'm talking about hardware, software and even to some extent the expertise. An infusion of research dollars that could transfer that technology to the independents would show a remarkable return," he predicted.

If upstream research continues, Tinker expects big payoffs to come from the following areas:

- Multicomponent seismic.
- Live wells.
- New visualization technology.
- Technology transfer.

"In natural gas, there are tremendous opportunities in the unconventional, the deep water and subsalt," he said. "Those are going to have to become half of U.S. production in less than 15 years."

Future research could help the industry identify, drill and produce gas hydrates in a world-altering shift of energy resources, according to Tinker.

"There's a resource base there that could potentially change the whole balance of the global economy," he said, "and would make us a methane economy for many years."

Environmental research is also important, Tinker emphasized, and wouldn't be seen as conflicting with E&P interests.

"I strongly believe that energy and environmental research can go hand in hand," he said. "There's no reason that those have to be mutually exclusive and competing topics."

In both environment and safety, the industry needs to celebrate its current successes and communicate its efforts to the public, in addition to developing new technologies, Tinker said.

"When you think about what goes on with a deep-water offshore platform and the technology there to target, drill for and produce safely through water, it's like a Mars landing every time," he said.

Tinker presented a paper on "The Value of Upstream Technology and the Future of Energy Research" at the recent AAPG annual meeting in Denver. He knows that winning renewed support for upstream R&D will take speeches, articles, presentations, Congressional testimony and more.

"Solving some of the technological challenges the energy industry will face in the next 50 years will require great minds and the highest-end software and hardware, all poring over massive amounts of data," he said.

"Scientists will have the opportunity to tackle energy and environmental issues head-on. Nothing could be more important - or more fun." □

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GREEN CANYON

**BUSINESS SIDE OF GEOLOGY**

# It's What You *Inspect*, Not Expect

*This month's column features the thoughts and observations of Gary P. Citron, a 20-year geophysicist who specializes in the business side of geology. Before joining Rose & Associates in 1999, Gary worked with Amoco's International Risk Implementation Team for four years.*

— Pete Rose

By GARY P. CITRON

Many companies now recognize the need for a consistent, systematic process for evaluating all their E&P opportunities.

Often, implementing such a process represents significant organizational change. It represents management's tacit recognition that such a process can improve geotechnical performance, make E&P more efficient, and benefit the stockholder.

But such change can be threatening to both technical staff and management, who may have relied in the past on their intuition, salesmanship or command and control decision-making styles. They may see all kinds of "shadows" — change is painful!

This column summarizes key steps

necessary to bring about progressive change through sound portfolio management, which requires the consistent, unbiased and systematic (i.e. unbiased) characterization of all E&P opportunities competing for corporate funds, i.e., optimized allocation of capital.

The performance of the E&P portfolio becomes the overriding concern, rather than whether "your prospect" gets drilled!

**Leadership.**  
Sound leadership facilitates

progressive change, helping organizations compete more effectively.

Leaders give meaning to implementing risk assessment by stating their determination that their company will pursue this path. They reinforce those statements with behaviors that implement changes to the organization and the capital allocation process, so all projects compete for funds on an equal basis.

*Without clear leadership commitment, the project evaluation process can be easily subverted or even avoided without consequence.*

**Professional Staff, Champions and Process Ownership.**

Systematic assessment of investment opportunities requires functional linkage among the company's leadership, information systems and, of course, business results.

With such profound linkages, organizations that charge individuals with clear accountability to implement and sustain this key work process generate more informed decision making, more predictable results and, typically, greater profits.

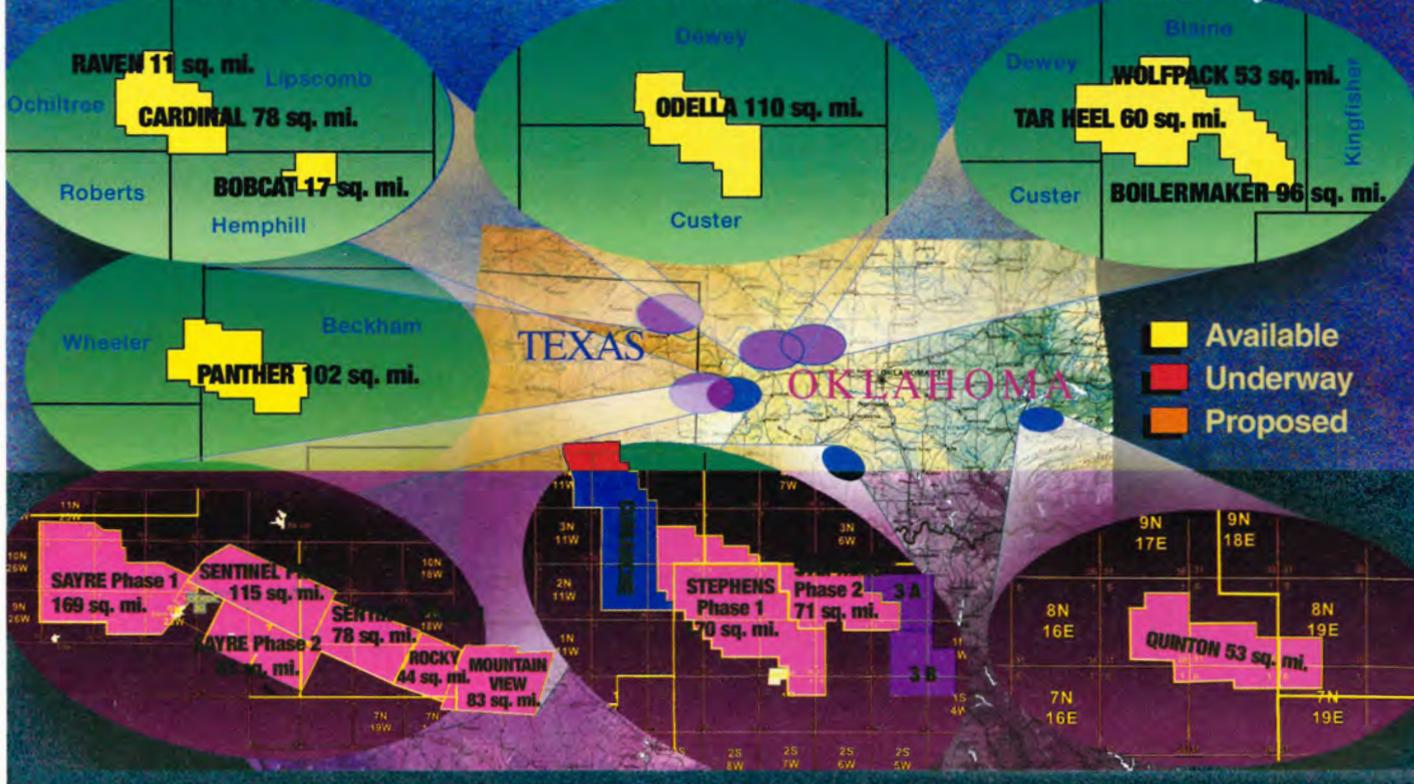
Champions are people who,

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**New Ideas for New Frontiers**

## Richey Wins Pacific Levorsen

Michael J. Richey, with Texaco in Bakersfield, Calif., has been named the winner of this year's Pacific Section A.I. Levorsen Award, given for the best paper presentation at a Section meeting.

Richey's paper, presented at the Pacific Section's meeting in April in University City, Calif., was titled "3-D Modeling of a Multi-Staged Turbidite System Within a Structurally Complex Basin: The Republic Sandstone Member, San Joaquin Valley, California."

Richey will be honored at the Pacific Section's 2002 meeting, to be held at a date to be announced in Anchorage, Alaska.

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continued from previous page

whether delegated or not, help implement such changes in a positive way. As change agents, they demonstrate the behaviors necessary to maintain process integrity. They facilitate the process on a local level.

They embody professionalism and become role models.

**Standards and Consistency.**

Systematic assessment demands standards for measurement, chance estimation, valuation methods and communication.

Definitions and conventions are often established in writing – based on statistics and probability – that cover estimating prospect reserves distributions and chance factors under uncertainty. Once these systems (typically for chance factor assignment and economic evaluations) are established, professional staff can develop and communicate their understanding of various potential size outcomes and their respective likelihoods, from whatever geologic province the drilling opportunity derives.

Training of both staff and management, however, is essential to develop the necessary standards. Peer reviews, risk normalization teams and company-consistent software tools often help maintain and test for consistency in everyday usage.

So the relevance of the risk assessment process becomes clear in a broader perspective: *To quantify and communicate the results of geotechnical staff's primary role – generation and selection of E&P opportunities that create the best chance for enhancing corporate value.*

**Central Coordination for Portfolio Management.**

As the systematic process of prospect assessment proceeds, clear, consistent outputs emerge that form the building blocks of the E&P inventory. Management can then apply the appropriate economic hurdles to pick from the inventory those prospects for a portfolio that best implements their strategy. With consistency and later calibration, the inventory then becomes a useful predictor of future portfolio performance.

Portfolio management requires choices and actions that best execute company strategy.

**Performance Tracking.**

As companies take the time (or build the courage) to compare their geotechnical predictions against actual results, future estimates become

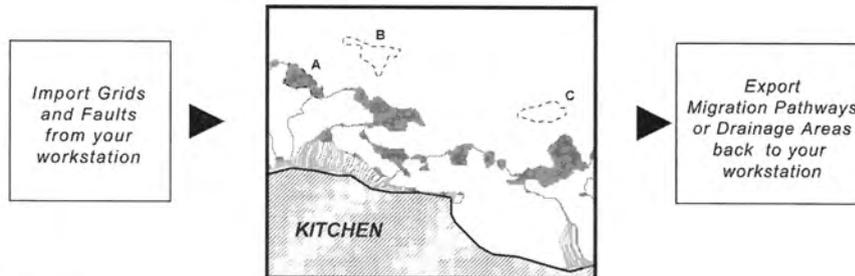
calibrated – and usually, with proper feedback and communication, improve.

Considering that most exploration programs contain more dry holes than discoveries, there is a vast amount of information that can be gleaned from studying failure patterns. Sharing these patterns among corporate staff, and comparing forecast versus actual results, reveals the degree of estimation bias and helps focus future exploration technology spending.

Note that adult learning is often predicated on feedback from mistakes: *"We are what we inspect, not what we expect."*

Our experience has been that firm, comprehensive implementation of systematic procedures for measuring projects is the key to real, permanent improvement in E&P performance. □

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**GEOPHYSICALCORNER**

# Borehole Data: Closer to the Rocks

The Geophysical Corner is a regular column in the EXPLORER, edited by R. Randy Ray. This month's column is titled "New 3-D/3-C High Resolution VSP Technology."

By BJÖRN PAULSSON  
BRIAN FULLER  
MARTIN KARRENBACH  
PAUL HEUERMANN

Borehole seismic methods have been used since the beginning of exploration seismology. Check shot surveys were used to obtain travel times and interval velocities, and 2-D VSPs (Vertical Seismic Profiles) and 2-D high-resolution crosswell data also have been recorded.

Until recently however, borehole seismology has been relegated to a secondary role in seismology because it generated only 1-D or 2-D images – and they were obtained at a high cost relative to the amount of information they provided.

The limiting factor in borehole seismic methods was that the fundamental designs of borehole seismic systems only allowed a small number of geophones to be deployed in the borehole. Until about two years ago the maximum number of three-component (3-C) clamped geophones that could be deployed in a borehole was around 12. Thus it was expensive to record enough data to make large surveys economically feasible.

A few experimental 3-D VSPs were recorded with a small number of geophones in the borehole. The surveys were expensive and the seismic images were of limited quality because of the small amount of data recorded per shot.

**Leaps in Data Acquisition Technology**

In the past 18 months a new type of borehole seismic receiver array has been introduced that currently has 80 3-C geophone levels in a single borehole. The design can be modified to allow as many as 400 to 1,000 three-component geophone levels when fully deployed.

The fundamental difference between the new and the old borehole arrays is that the

new array is deployed on production tubing where the old style of receiver arrays are deployed using wireline technology.

The newly developed borehole array currently has a geophone spacing of 50 feet, but can be tailored to any desired spacing. Using a geophone spacing of 50 feet, the length of the 80-level array is 4,000 feet and the length of a 400-level array is 20,000 feet.

Thus, most boreholes can now be filled from top to bottom with clamped three-component geophones. Geophones can easily be deployed in horizontal wells because they are conveyed on standard production tubing using the same method used to deploy electric submersible pumps.

**3-D Borehole Seismic Coverage**

The advantage of deploying a large number of borehole seismic receivers is that a large amount of reflection coverage can be obtained per seismic shot, thus making borehole seismic method commercially feasible.

Figure 1 compares the amount of data recorded with a small borehole seismic array as compared to a large 80 level borehole seismic array. The large increase in reflection coverage per shot that is gained with large borehole receiver arrays quickly translates to an improved image quality, because rig time and shot effort are reduced to a minimum and datasets large enough for a 3-D image can be economically recorded.

The size and shape of the seismic image provided by 3-D VSP data is controlled by the source locations and path of the borehole.

In a vertical well with shots around the borehole the image is usually cone-shaped and the diameter of the cone in map view is roughly equal to the depth of the image (Figure 2).

By combining data from several wells extensive 3-D images can be generated.

**3-D VSP Examples**

Using an 80-level 3-C array, our company has recorded the four largest 3-D VSPs in the

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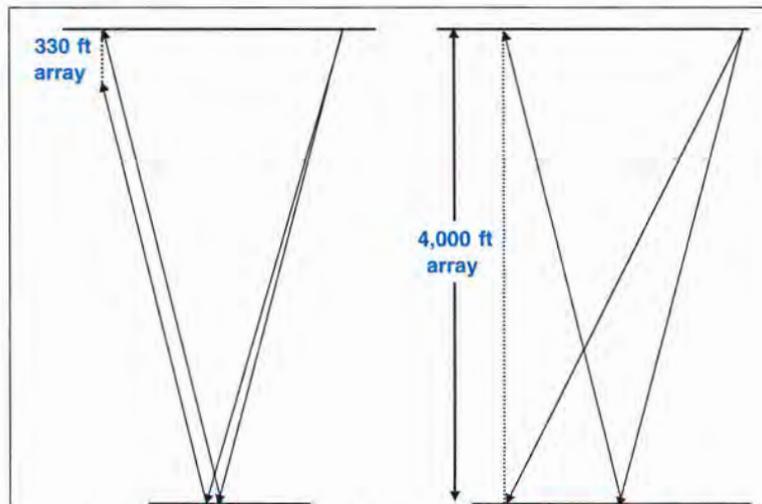


Figure 1. The diagram on the left shows the reflection coverage (red line) obtained from a single shot location using an older style wireline based receiver array that is 330 ft long. The diagram on the right shows that a much larger reflection coverage area is obtained with a single source point when a tubing deployed long receiver array is used to record data in the borehole. The increasing reflection coverage per shot provided by an 80 level 3C receiver array allows 3D/3C VSP imaging to be an economically feasible approach to high resolution reservoir imaging.

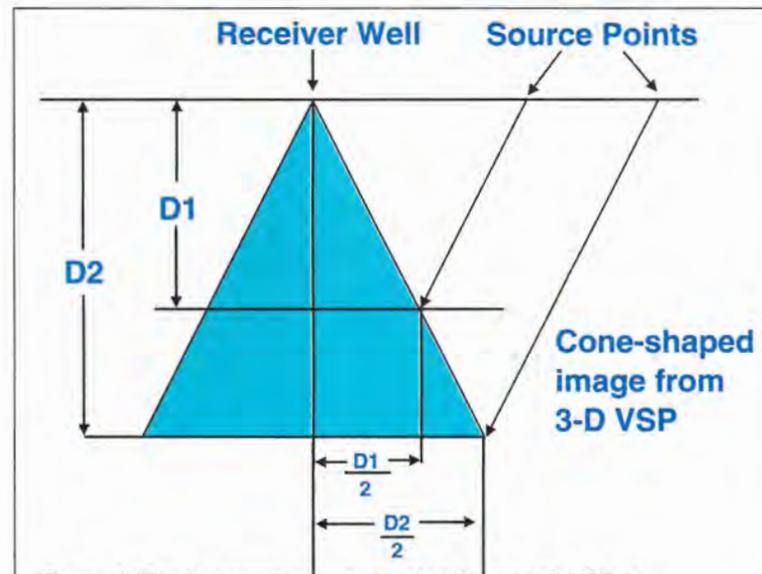


Figure 2. The image volume generated from a 3D VSP is approximately cone shaped. The diameter of the image for a vertical well is approximately equal to the depth of the image. By using several wells the data from several image cones can be combined into one 3D volume as shown in Figure 3.

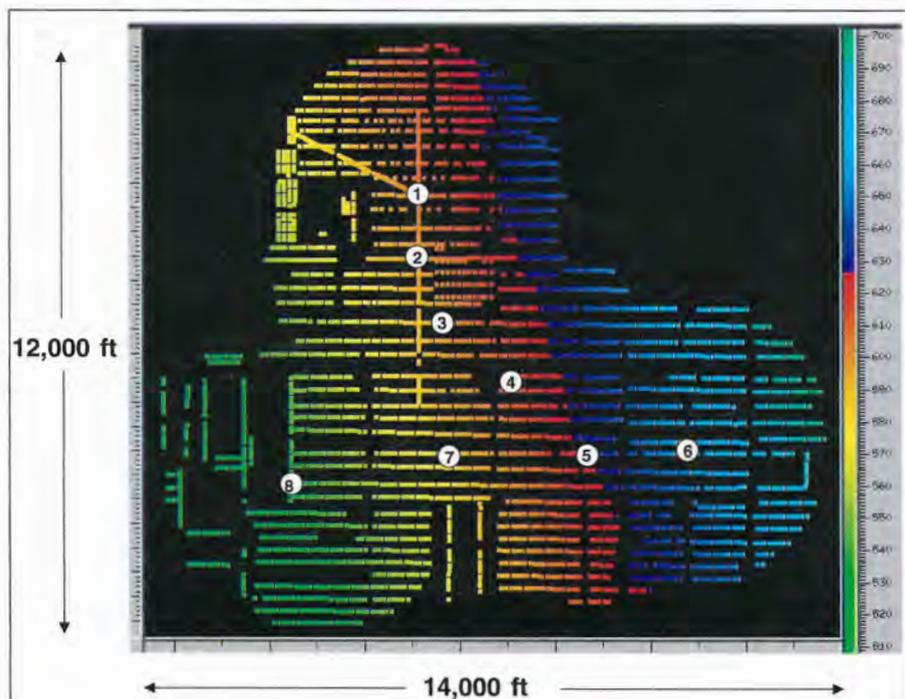


Figure 3. This source point map shows the location of over 5,000 vibrator points that were used to record over 1,040,000 traces in eight receiver wells. Color indicates the source point elevations. This 3D/3C VSP recorded near Bakersfield, California in September, 2000 is the largest 3D VSP ever recorded.

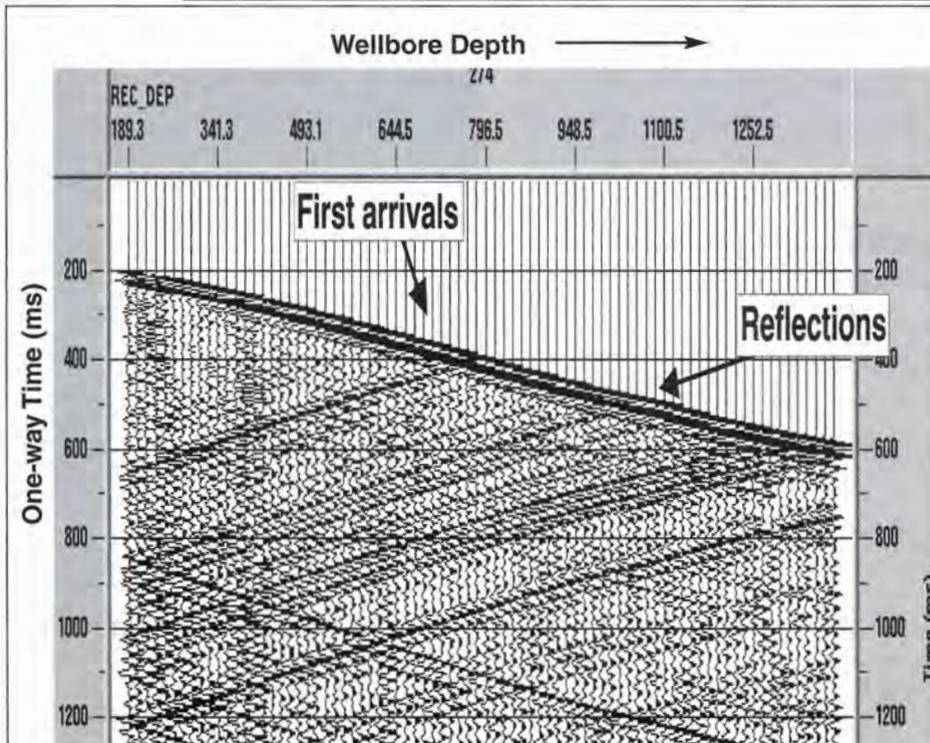


Figure 4. Raw data recorded with a 4,000 ft long 80 level 3C down hole receiver array. The data is not filtered or muted and is displayed with trace-by-trace scaling. The scale across the top is depth in m.

continued from previous page

oil and gas industry. The most recent examples include:

- A 372,000 trace 3-D VSP survey recorded in four days in West Texas in February 2001.
- A 1,040,000 trace, eight-well 3-D VSP recorded south of Bakersfield, Calif., in September 2000 (Figure 3).
- A 350,000 trace 3-D VSP in Alberta, Canada in October 2000.
- A 152,000 trace 3-D VSP recorded for PanCanadian Petroleum in the Weyburn Field in Saskatchewan, Canada, in December 1999.

An example shot record from the Weyburn Survey is shown in Figure 4. It illustrates the strong, high frequency reflections that can be recovered in the quiet, downhole environment.

In these surveys much smaller scale reservoir features, including faults and pinch outs, were mapped with higher resolution than had been possible to map using surface seismic methods.

Using the recorded bandwidth of 10-220 Hz in the Weyburn 3-D VSP survey a resolution of better than five meters (15 feet) was evident in the final images (Figure 5). In the Edison field survey in California, 150 Hz 3-D VSP data was recorded in the same area in which surface seismic data did not exceed 25 Hz, and the borehole seismic image contained much higher signal to noise ratio features corresponding to a maximum image frequency well over 100 Hz.

It has been demonstrated that 3-D VSP data recorded with the 80 level array can be used to image the entire drainage volume around the well at more than twice the resolution that can be obtained from a surface seismic survey.

In order to maximize the use of subsurface 3-D imaging using borehole seismic measurements for development and production application, the data can be processed in the field – and an initial image delivered within one to two days.

The improved borehole seismic instrumentation is now driving the development of new, innovative and high resolution processing technologies for borehole seismic data.

#### Advantages

The principle advantage of borehole seismic data is that the frequency content is consistently much higher than surface seismic data recorded over the same location.

A good rule of thumb is that a borehole seismic image has twice the frequency content of the surface seismic data. Higher frequency means higher resolution and less uncertainty in drilling decisions.

The frequency content of borehole seismic data is higher than surface seismic data because the wave field only passes through the attenuating near-surface layer one time rather than twice when both the sources and receivers are at the surface of the earth.

Additionally, the geophones are strongly coupled to the earth via the geophone clamping mechanism.

Images from 3-D borehole surveys are typically generated directly in depth through prestack depth migration. This allows for an exact tie to depth since the time-depth relationship is precisely known at the receiver boreholes. Interpreters can directly tie seismic data to log properties since logs are always in depth.

A perfect tie to depth minimizes uncertainty in extrapolating reservoir properties derived from well logs into the seismic volume.

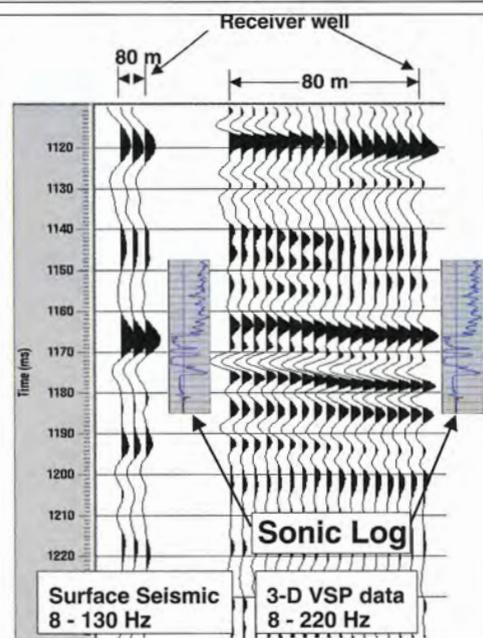
#### Conclusions

Borehole seismic methods now provide commercially feasible 3-D/3-C high-resolution images for reservoir characterization.

New designs in borehole geophone deployment equipment allows hundreds of three-component clamped geophones to be deployed in boreholes instead of the old five and 20 three-component phones that were deployed using older conventional wire line technology.

*(Editor's note: The authors are with Paulsson Geophysical Services Inc., La Habra, Calif. The Web site is [www.paulsson.com](http://www.paulsson.com).)* □

Figure 5. This is a comparison of the image obtained from surface seismic data and borehole seismic data. The surface data was recorded simultaneously with the borehole data using the same dynamite shots. The image on the left is from the surface seismic data at the receiver well. The data has a 40 m CDP spacing. The image on the right was generated from the borehole seismic data and covers exactly the same time range and location as the surface seismic image. The frequency content of the borehole seismic is about twice that of the surface seismic and the spatial sampling of the borehole seismic is 5 times greater than the surface seismic which allows for detailed imaging of lateral changes in the reservoir properties.



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## INTERNATIONAL BULLETIN BOARD

(Editor's note: This column is devoted to international items of note to the AAPG.)

News items, press releases and other information should be submitted to the EXPLORER/International Bulletin Board, P.O. Box 979, Tulsa, Okla. 74101; telephone – 918-560-2616; fax – 918-560-2685; or e-mail – [vstefan@aapg.org](mailto:vstefan@aapg.org).

This month's column was written by Pinar Oya Yilmaz, outgoing chair of the International Liaison Committee.)

The International Liaison Committee (ILC) has been a communication channel for the international membership since its establishment by the AAPG Executive Committee 15 years ago.

The committee's mission is:

□ To promote international participation in AAPG by providing a forum for international members and affiliated societies to communicate with the Executive Committee.

□ To provide support and counsel to AAPG committees and international regions and their associated service teams regarding international education, conferences, research and membership.

□ To help identify candidates for AAPG awards and honors.

In addition, the ILC liaises between 17 AAPG standing committees involved in international activities and the Executive Committee.

Nahum Schneidemann chaired this committee until 1998, bringing his

expertise in international affairs, contacts and global network to AAPG. Pinar Yilmaz has been the chair since 1998, with George Kronman (1998-1999), Dan Shaughnessy (1999) and Maria Antonietta Lorente (1999-2001) as vice chairs.

ILC membership started with a few who were interested in networking and has grown to involve many around the world. The ILC has become a focal point in bringing issues and solutions to AAPG expansion in international arenas.

Some of the challenges facing AAPG internationally include:

- ✓ "Value for money" of dues.
- ✓ Barriers to international membership (cost and approval process).
- ✓ Competition from other societies

(SEG, SPE, EAGE).

The ILC report on "barriers to membership" helped in addressing some of the issues common to international areas. Those issues include:

✓ How to make AAPG membership a "guild" that is perceived as something prestigious.

✓ Increasing student chapters and student memberships.

✓ Finding sponsors for Active membership applicants.

✓ Cost issues.

✓ Timely delivery of the EXPLORER and BULLETIN.

One of the outcomes from this study is a pilot program for "group membership," where eight people can share a membership to receive one set of the EXPLORER and the BULLETIN, and be included in all of the mailings.

Several countries have been selected for this pilot program, which will start later this year in Asia, Africa and the Middle East.

In 1999, AAPG established six international regions (Canada, Europe, Middle East, Africa, Latin America and Asia) in order to deliver AAPG services faster, cheaper and more effectively. Since these regions cover very large areas with multi-cultures, languages and petroleum provinces, timely and effective delivery of services remains a challenge.

Although Canada, Asia and Europe are well established in their regional organization and steering committees, the other regions are lagging behind in their organizational structure.

In the interim, the ILC and AAPG service teams are liaison to these regions for AAPG services (Distinguished Lecture tours, short courses, finding regional nominees for AAPG awards and honors, international meeting site selection).

By the end of 2001, all of these regions are expected to be in place.

\* \* \*

An ILC initiative also helped win approval by the EC to make AAPG awards same or in-kind for both international and domestic meetings.

First, "international" designation for awards has been eliminated. There now are simply AAPG awards and honors, and any member, anywhere can be nominated by the AAPG Advisory Council.

Second, there are two named awards for technical excellence in international conferences – for best paper (Gabriel Dengo Memorial Award, or the Dengo Cup), and for best poster (Ziad Beydoun Memorial Award). These awards are equivalent to the Matson Cup and Jules Braunstein Award, which are presented for the best technical paper and poster at the AAPG annual meeting.

There also are two named awards for students at international conferences – the Carlos Walter Campos Memorial Award for best student paper, and the Ozan Sungurlu Memorial Award, for best student poster.

Both awards carry a \$500 cash prize.

\* \* \*

Another issue is the future of international meetings (focus and proliferation of meetings competing for the same sponsorship dollars, technical papers and volunteers for organization).

Most ILC members have been

continued on next page



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# 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

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Campbell, Michael John, Texaco, Bakersfield (Reinstate); Davidsen, Erik Kennedy, Chevron Overseas Petroleum, San Ramon (Reinstate); Kim, Joon Yol, Chevron Overseas Petroleum, San Ramon (Reinstate)

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Biewick, Laura R. H., U.S. Geological Survey, Denver (G.M. Gaskins, M.D. Lewan, A.C. Huffman Jr.); Cornelius, Christopher, Evergreen Resources, Denver (D.R. Carlton, R.R. Gries, S.M. Morrice); Jackson, Patrick A., Stone Energy, Denver (C.E. Bartberger, K.W. Shanley, P.G. Moreland); Odegard, Mark Kevin, Whiting Petroleum, Denver (M.R. Williams, E.J. Lo Cricchio, M.W. Longman); Sawyer, Kenneth C., Western Gas Resources, Denver (Reinstate); Smith, Gregory P., Pason Systems USA Corp., Golden (A.H. Curtis III, W.R. Nagel, D.J. McKenna); Sturdavant, Janine Mary, consultant, Golden (Reinstate)

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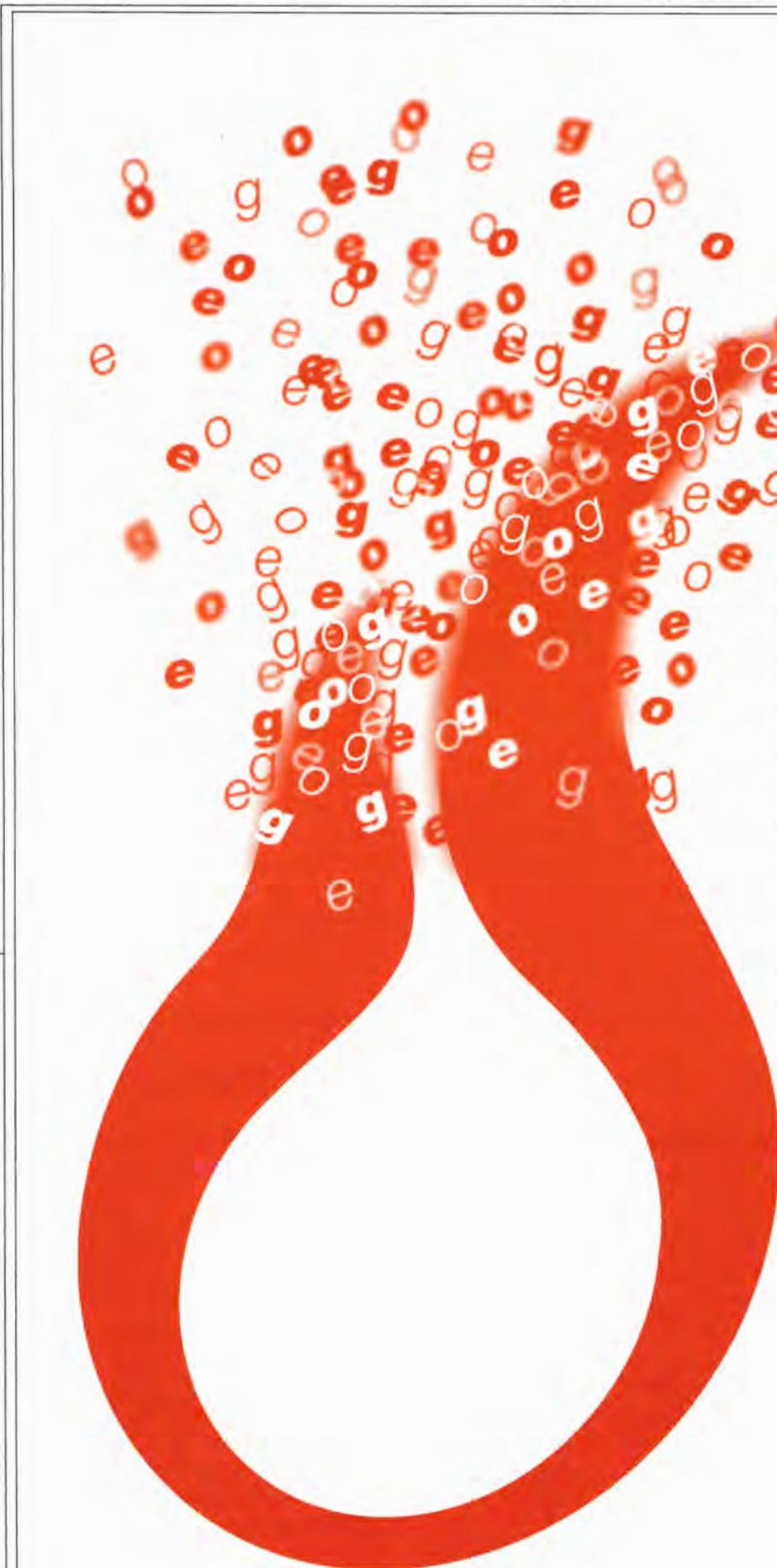
involved in some way in AAPG's international meetings. One of the most important aspects of these meetings is the site selection, and an ILC proposal to streamline requests to hold international meetings in different locales resulted in a form that must be completed by those seeking a meeting.

The purpose of this effort is to have a plan for international conferences where the local society or national oil company partnerships can lead to collaborations for a timely technical program content, and business drivers to better serve the membership needs.

This effort was recently given to the Committee on Conventions for action.

The ILC is the center of international events at AAPG as well as providing global network opportunities to its members. Anyone interested in learning more about the international events as well as ensuring faster, better and cheaper AAPG services should become a member.

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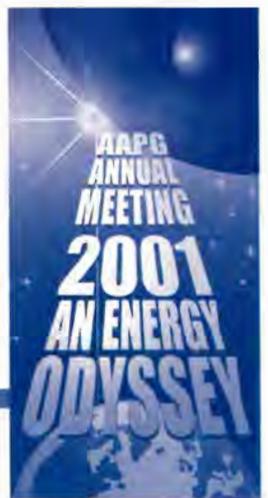
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Michael Aaron Rosen  
Bruno Saftic  
Howard William  
Schwartz  
Kenneth Lee Shaw  
William Mathais Spindler  
Eric J.W. Standen  
Herbert Mark Stanley Jr.  
*In memory of Anna  
Marie Stanley*  
Peter Robbins Vail  
John Joseph Viveiros  
Paula Lydia Wigley  
John Stuart Williams

### Gus Archie Development Geology Fund

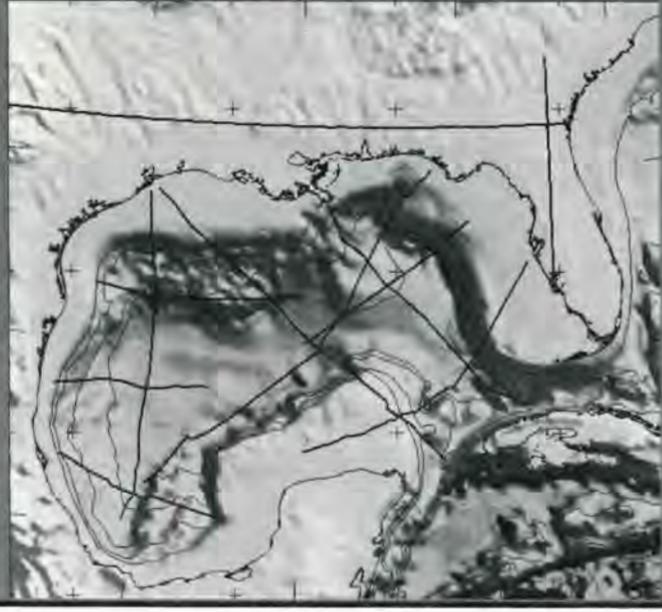
Ovidio Suarez  
*For the Gus Archie  
Named Grant*  
Robert James Weeden  
*For the Gus Archie  
Named Grant*

## GoMES

### Gulf of Mexico Evolution & Structure

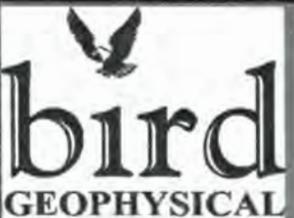
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# AAPG Education Offerings August/September 2001

## Probability and Statistics for Exploration and Exploitation

Instructor: Cynthia T. Kalkomey

This three-day course gives students an understanding of the fundamental concepts required for the application of probability and statistics to exploration, development and producing problems. Familiarity with MS Excel is recommended. Work will be done on PC's with two individuals to a PC. Class size will be limited to 20. Participants completing the course will understand how to use concepts to plan an exploration program, assess the uncertainty of reserve estimates, set up quality control procedures, use seismic data to aid in predicting reservoir properties, assess uncertainty in production forecasts and manage risk in decision-making.  
August 20-22  
See Education Calendar page 4 for details.

## Modern Deltas

Field Seminar Leader: Harry H. Roberts

Formative processes, geometry, and internal architecture of sand bodies within modern deltas is stressed with special treatment given to the Mississippi River Delta complex.  
September 10-14  
See Education Calendar page 7 for details.

## Introduction to the Petroleum Geology of Deep-Water Clastic Depositional Systems

Instructors: Roger Slatt, Paul Weimer

The diversities involved in the concepts of turbidite systems and their reservoir architecture will be integrated to present optimal methods of exploring for and producing from deep-water clastic deposits. Special attention will be paid to the deep Gulf of Mexico.

September 8-9, with the SEG Annual Meeting  
See Education Calendar page 4 for details.

## Submarine Fan and Canyon Reservoirs, California

Field Seminar Leader: Tor H. Nilsen

This five-day field seminar will examine outstanding outcrop examples and discuss in detail adjacent subsurface examples of submarine-canyon and submarine-fan systems in convergent margins and strike-slip basins of California. The sequence stratigraphy of lowstand and highstand systems tracts and its application to reservoir prediction and geometry will receive emphasis.  
September 17-21  
See Education Calendar page 10 for details.

### For complete details contact:

AAPG Education Department,  
P.O. Box 979,  
Tulsa, OK 74101-0979 USA

Phone: 918-560-2650  
Fax: 918-560-2678  
E-Mail: educate@aapg.org

### AAPG Home Page <http://www.aapg.org>

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## Optimism, Numbers Dominate in Denver

Preliminary attendance figures for last month's AAPG annual meeting in Denver are confirming what those who crowded into and through the Denver Convention Center may have already suspected: The meeting was a big draw.

Final attendance totals weren't available as the EXPLORER was going to press, but preliminary figures were well over the 7,100 mark for the four-day event.

That number would make the meeting the ninth largest in AAPG history, and the largest annual meeting since the 1988 convention in Houston, which attracted 7,645 participants. The figure also would mark only the second time since 1988 that the 7,000 attendance mark was surpassed (1997 Dallas - 7,073).

The meeting also was marked by an overall feeling of optimism - brought on, in large measure, by the industry's current upswing - and technical session rooms that were often jammed past capacity by those eager to hear talks.

A complete report on the Denver meeting will be featured in the August EXPLORER. Stories will include:

- ✓ Marlan Downey's presidential address before a standing room only crowd at the opening session.
- ✓ Luncheon speakers and special forums.
- ✓ Various technical sessions and talks, including a Michel T. Halbouty presentation that brought a standing ovation.

## Delegates Tackle Lengthy Agenda

A long and busy House of Delegates meeting in Denver saw passage of one constitutional amendment, eight bylaws amendments and two resolutions for delegate consideration. Two additional Rules and Procedures were presented by committee report.

House Chairman Lowell Lischer led the 197 credentialed delegates through the lengthy agenda, with the meeting adjourning six and a half hours after being gavelled to order.

As Lischer reported in the June EXPLORER, the items considered by delegates covered a wide range of issues, including:

- Matters concerning the cooperative efforts of the Executive Committee, Advisory Council and the House of Delegates.
- Limitations for holding multiple key offices in AAPG.
- Modification of the method of submitting amendments for consideration.

One resolution that was approved replaced the Constitution and Bylaws Amendment Procedure (COCBAP3), which was urged for defeat by the Executive Committee, the Advisory Council and the House itself.

As noted in the House Newsletter insert in the April EXPLORER, the second COCBAP resolution was prepared. If the COCBAP2 resolution is

adopted next year, the AAPG Bylaws will be amended to provide a mechanism to obtain comment from each of the three governing bodies on amendments that affect them.

The House, Executive Committee and the Advisory Council had previously endorsed the second resolution.

Delegates also voted to allow the release of numerical election results to candidates for AAPG office, provided both persons agree in writing.

Numerical results of AAPG elections have heretofore been held confidential.

Also, the India Association of Petroleum Geologists and Japanese Association of Petroleum Technology were both affirmed as affiliated AAPG societies.

Soundly defeated was a resolution offered as "new business" that would adjust the seating structure of the AAPG Advisory Council by creating "multiple-seat representation" on the basis on the number of members in a Section or region, creating eight additional seats on the council, which presently seats 17.

Delegates also elected Oklahoma City independent geologist Terry Hollrah as chairman-elect and Martin D. "Marty" Hewitt, of Pan Canadian Gulf of Mexico, as secretary-editor. Both assumed office on July 1.

Hollrah will succeed Edward Dolly, who assumed the House chairmanship on July 1.

# GEO



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## OGCI Training Seminars - August 2001

<b>BANGKOK, THAILAND</b>	
Advanced Seismic Stratigraphy: A 2-D, 3-D Sequence and Wavelet Analysis Workshop	Aug. 6-10
<b>BOURNEMOUTH, ENGLAND</b>	
Structural Styles in Petroleum Exploration	Sep. 17-21
<b>CALGARY, CANADA</b>	
Log Analysis in Carbonates	Sep. 10-14
<b>COLORADO SPRINGS, COLORADO</b>	
Basic Well Log Interpretation	Aug. 6-10
Log Analysis in Carbonates	Aug. 13-17
Introduction to Exploration Geophysics	Aug. 13-17
Seismic Evaluation of Reservoirs	Aug. 13-17
Personnel Supervision in the Petroleum Industry	Aug. 20-24
Biostratigraphy: Production and Exploration Applications	Aug. 20-24
Management Practices for Petroleum Industry Executives	Aug. 27-29
Reservoir Monitoring and Production Log Evaluation	Aug. 27-31
<b>HOUSTON, TEXAS</b>	
Coring and Core Analysis	Sep. 17-21
Neural Network Synthetic Logs and Resistivity Inversion	Sep. 17-21
3-D Seismic Interpretation and Applications	Sep. 17-21
<b>KUALA LUMPUR, MALAYSIA</b>	
Mapping Subsurface Structures	Aug. 6-10
Basic Petroleum Technology	Sep. 3-7
Reservoir Characterization: A Multi-Disciplinary Team Approach	Sep. 17-21
Biostratigraphy: Production and Exploration Applications	Sep. 17-21
<b>LONDON, ENGLAND</b>	
Petroleum Financial Management	Aug. 6-10
Neural Network Synthetic Logs and Resistivity Inversion	Aug. 13-17
Preparation of Log Data for Digital Analysis	Aug. 20-24
Cranes, Planes, and Helicopters - Logistics for Remote Exploration Projects	Sep. 3-7
Environmental Technology for the Oil and Gas Industry	Sep. 3-7
International Petroleum Contracts and Negotiations	Sep. 10-14
Carbonate Reservoirs	Sep. 10-14
Modern Geochemical Tools for Efficient Exploitation and Development	Sep. 10-14
Basic Petroleum Economics	Sep. 17-21
Petroleum Project Management: Principles and Practices	Sep. 17-21
Sequence Stratigraphy: An Applied Workshop	Sep. 17-21

**Contact** Phone 1-918-828-2500 Fax 1-918-828-2580  
**OGCI Training, Inc.** E-mail [training@ogci.com](mailto:training@ogci.com)  
**for details.** Website [www.ogci.com](http://www.ogci.com)

**READERS' FORUM****Disappointed**

In May I received a flier from AAPG announcing that it has entered into a new venture of commercially marketing prospects and properties. AAPG is recognized worldwide as the premier scientific organization dedicated to the advancement of the science of geology, especially as it relates to petroleum. Frankly, I was appalled that it would diminish its credibility and prestige by becoming a public solicitor and seller.

Surely AAPG, with its dues, many educational programs and the Foundation, has the financial wherewithal to support the Association's various endeavors without resorting to the role of a street peddler and hawker.

I am saddened that the Association has placed itself in a flea-market environment.

Michel T. Halbouty  
Houston

**A National Asset**

How casually people dismiss ANWR's (Arctic National Wildlife Refuge) value. Using the U.S. Geological Survey estimate of 10 billion barrels for the mean recoverable oil at ANWR, the current value (@ \$30/barrel) is \$30 x 10 billion = \$300 billion. Hardly an insignificant amount.

This could fund U.S. Social Security and Medicare for all Americans, or provide money to fight foreign wars for other nations' oil fields. At least it would save the money rather than being spent for OPEC oil.

If we buy our oil from the Persian Gulf fields, we will be pushing poverty-stricken, oil-less and developing nations into starvation. We have no inalienable right to burn up other nation's oil – especially

*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.*

when our ANWR oil is so accessible.

No other country would shelve such a valuable national asset. Monies spent to recover the oil will go into the U.S. economy.

L.F. Ivanhoe  
Ojai, Calif.

**No Solution**

I am writing to object to the recent article by EMD president Ron Grubbs (May EXPLORER).

I am terribly disappointed that the EXPLORER would run such a one-sided, "make my own facts as I go" advertisement for the uranium industry. I have been associated with the AAPG for many years and am terribly disappointed this article made it to print. I am also embarrassed that fellow EMD members elected such short-sided views to office.

Mr. Grubbs ignores one critical point: Nuclear energy leaves one nasty side effect, radioactive waste, that once created is ours forever.

Oh, and Mr. Grubbs, burying it under a desert mountain is not a solution.

Mike Adkins  
St. Charles, Mo.

**Ignore the Morons**

I read your May issue with growing disgust and amazement. The article about global warming was especially poorly done. Your giving these lunatics three pages of free publicity serves the geological sciences as a very great

disservice.

One hundred years of meteorological data can no more be an accurate chronological prognosticator of future climate changes than one hundred years of micropaleontological data can serve to date the entire Plio-Pleistocene. Shame upon you! You are supposed to represent science – and the geological sciences at that!

Have you forgotten that glaciers existed in the 40 degree latitudes only scant years ago? Do you really believe that the internal combustion engine had anything at all to do with their disappearance?

These greenhouse gas people deserve nothing more than to be dismissed as being the morons that they truly are. Stupidity is always the fruit of ignorance.

Robert L. Maddox  
San Antonio

**The Salary Survey**

As a geologist who got his start in the petroleum industry during the last boom, when oil prices were projected to reach \$100/bbl by the 1990s, I find the article on current employment trends creepily familiar.

When I was hired by a medium-sized major oil company in January 1982, most of the more senior geologists had quit and gone to work for independents sometime in the previous 18 months. There were one or two old hands who had not jumped ship, but they took early retirement about a

year after I started, leaving an office where the average level of experience was about two years.

I didn't realize how unique those circumstances were, but it is unsettling to reflect on the number of dry holes that were drilled in the 1980s due to lack of experience, because more senior staff were no longer available to point out errors they themselves had made years earlier.

I recall a slender volume in circulation at that time about avoiding pitfalls in seismic interpretation. The book was written specifically because the author had observed inexperienced geophysicists recommending drillsites on the same sort of velocity pullups and other bogus structures that had been targeted during the previous industry boom.

To me, the most interesting aspect of this article was Mr. Ayling's comment that he sees no end to the current boom conditions in the near future. This attitude that the good times will never end was pervasive in the oil patch in 1981, and was the cause of serious demographic problems in the E&P departments of major oil companies:

✓ Overstaffing that ultimately led to massive layoffs; gross salary inequities.

✓ Chronic job-hopping and the resulting loss of corporate memory due to more experienced staff switching to work for independents.

✓ Entry level geoscientists missing out on the benefits of interacting with more experienced workers.

The price of oil can rise and fall in a spectacular manner, often in a very short time. The one thing that continues to amaze me, in my 20 years as a geologist,

continued on next page

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continued from previous page

is that when prices are high, forecasters consistently predict that they will remain high indefinitely. When prices are low, they are predicted to remain low for some time.

It is this short-sightedness that has led to most of the unfortunate employment practices in the oil industry in the past few decades.

Lewis Land  
Raleigh, N.C.

Every time I read the annual salary survey for geoscientists (May EXPLORER), I would like to remind you that you should include a remark that the survey is only valid for any geoscientists except those who come from the development countries such as Indonesia, Malaysia, Thailand, etc.

Typically, the geoscientists with six to seven years experience from the Third World countries do not even come close to receiving a salary as high as the low salary of a 0-2 years geoscientists listed on the table, unless you are on assignment abroad. For example, the average gross annual salary for geoscientists from Indonesia with 6-7 years experience is only about \$18,000.

Yusak H. Setiawan  
Sugar Land, Texas

*(Editor's note: As the article stated, the survey includes only U.S. geologists who are currently employed by major or independent oil companies.)*

Regarding this survey: It is really evident that private companies in the United States are in another league (salary- speaking) respective to the state companies in Third World countries. The salaries in these companies are no more than 40 percent of the salaries earned those colleagues in the United States.

Maybe that is why we do not feel so excited with high oil prices. They could affect our stability, but certainly not our incomes.

Victor Ramirez  
Bogotá, Colombia

Basically, this article reaches out to those in the oil sector and other practicing geologists. It brings to mind the need to acquire more knowledge and experience in our daily routine as geologists, and also gives hope to unemployed geologists who would love to practice the profession.

Frederick Idehen  
Bronx, N.Y.

While I have been employed as a groundwater professional in the environmental industry for the past 14

years, I have seven prior years' experience as a petroleum geologist. As a greater than 20 year practitioner in the geological sciences, I can't accept these survey results as realistic. These salaries are extremely inflated and are obviously skewed by a poor data set or general lack of responses.

To suggest that the average salary for a 20-year practitioner is greater than six digits is simply incorrect. By random survey of tens of peers and associates, I suggest a more realistic average in the range of \$75,000.

If our industry salaries are that out of line with the petroleum industry, it is clearly time for me to return. Do you have any positions available?

Kevin J. Brown  
Rancho Cordova, Calif.

#### Politics and the Big Picture

As a Canadian petroleum geologist with many friends in the United States (I was an AAPG Distinguished Lecturer some years ago) I was both interested and concerned to read about the congressional testimony of Marlan Downey and Naresh Kumar regarding future U.S. domestic oil and gas supplies (May EXPLORER).

AAPG members have a vested interest in increasing investments in exploration and production, but they also have a larger duty to tell the truth about their industry.

I found Downey's remarks about the flight of the majors from U.S. shores very revealing. Why have they left? Because in their best business judgement, there is much more money to be made overseas. In other words, the domestic supply is drying up. Yes, there are pockets left to tap into ... but the fact is the United States is running out of clean energy sources.

It is grossly dishonest for the administration to be able to pretend that the energy crisis can be solved if only we can sacrifice a few caribou in ANWR.

It seems to me that the American public is not being served well by its experts or its politicians with regard to energy. The Bush administration particularly troubles many Canadians, and energy is just one of the concerns ... Vice president Cheney's recent dismissal of conservation as an important component of the energy supply is very troubling.

If AAPG members could redefine themselves as global energy experts rather than as petroleum experts who were just looking for a short-term boost in their core business, they would accept that the United States will soon be facing a serious energy crisis ...

Why not start a serious debate about alternative energy sources, and serious investment in R&D now, while there is still time?

Andrew D. Miall  
Toronto, Canada



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Key responsibilities are for studies related to the assessment of formation damage due to drilling fluids, scaling, sulfate reducing bacteria, sanding/fines migration and other factors. Research will include studies to: formulate stimulation treatments to remove damage and restore well productivity; formulate chemical water shutoff techniques; utilize various combinations of acid systems depending on the lithology of the formation.

#### Computational Petrophysicist

Requires an MS or Ph.D. in Engineering or Physics and 15 years of relevant experience with automated data acquisition software, formation evaluation software, and reservoir black oil simulation software. Candidates must be familiar with data acquisition software such as LabTech, LabView, HPVee, UNIX and Windows operating systems, advanced imaging software provided by IDL and PV Wave, and with standard log processing software (Geolog). Must be capable of processing optimizing simulations of laboratory experiments using black oil simulators.

This key position models petrophysical measurements to infer rock properties, models rock-fluid interactions and chemical reactions, and generates predictive software. Additional duties include: supporting automated data acquisition software and final processing of experimental data; monitoring, programming and updating operational software in the Petrophysics Unit; processing and optimizing simulations of laboratory experiments.

For a detailed description of the above positions, please refer to our website [www.jobsataramco.com](http://www.jobsataramco.com). For consideration, please send a resume to Aramco Services Company, reference code 06B-EXPLR, in one of the following ways: E-mail: [resumes@aramcoservices.com](mailto:resumes@aramcoservices.com) (please cut and paste rather than send an attachment); Fax: (713) 432-4600; Mail P.O. Box 4530, Houston, TX 77210-4530.



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### Geologic Modeling

Candidates should have strong quantitative and numerical skills with training in applied reservoir characterization. Experience in 3D geologic modeling is preferred but not essential. Additional experience in the fields of seismic interpretation, stratigraphy and structural geology also would be beneficial.

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77252-2189

Fax: (713) 431-7026

## INMEMORY

Charles F. Dodge, an AAPG Honorary Member who was active in leadership roles on the national, local and regional level throughout his career, died May 28 – his birthday – in Midland, Texas, of an apparent heart attack. He was 77.

Dodge was an independent consultant in Midland, although he is most widely recognized as an educator who taught at North Texas Agricultural College, Southern Methodist University and Arlington State College (later the University of Texas at Arlington), where he also headed the geology department. He also was an elected senior fellow of the Institute for the Study of Earth and Man at SMU.

Dodge served on – and often chaired – dozens of AAPG committees, and was a long-time member of the House of Delegates. He was the general chairman of the 1991 AAPG annual meeting in Dallas, and he received an AAPG Distinguished Service Award in 1986 and honorary membership in 1999.

Dodge also was president of the Dallas Geological Society (1981-83) and of the Southwest Section (1986-87).

Aitken, F. Kenneth, 58  
Houston, April 19, 2001  
Bennett, Henry Stewart, 73  
Dallas, September 2000  
Brown, Glen Francis, 89  
Reston, Va., Feb., 22, 2001  
Dodge, Charles F., 77  
Midland, Texas, May 28, 2001  
Killian, Suzanne Simard, 45  
Houston, May 1, 2001  
Lee, Mingchou, 44  
Dallas, Jan., 26, 2001  
Lian, Ernest Bjarne, 79  
Portland, Ore., Jan., 14, 2001  
Miller, Horace Philip (EM '53)  
Tucson, Ariz.  
Off, Theodore, 73  
Ventura, Calif., May 10, 2001  
Scattolini, Richard, 54  
Dallas, April 27, 2001  
Squire, Anton Dale, 52  
Horsham, England, April 18, 2001  
Taylor, Waller Eugene, 74  
Brandon, Miss., Oct. 1, 2000

(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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• GeoTechnical Programmer GOCAD  
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The Department of Geology at Brigham Young University invites applications for a tenure-track position in geophysics with an emphasis in seismic interpretation and exploration geophysics. The successful candidate (Ph.D. required) will be expected to teach undergraduate and graduate geophysics along with general geology courses as needed. Further, the successful candidate will be expected to initiate and maintain a productive research program and mentor M.S. students. The position will be available as early as 1 January, 2002. Starting salary and rank will be commensurate with experience. BYU's supercomputing facility is available to faculty researchers.

Applicants should send a letter of application and curriculum vitae including names of three references to Dr. Scott M. Ritter, Faculty Search Committee, Department of Geology, Brigham Young University, Provo, UT 84602. Application materials must be received on or before September 1, 2002 to be considered.

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contact Dr Hairuo Qing for more information (Dr. Hairuo Qing, Department of Geology, University of Regina, Regina SK, Canada S4S 0A2, Tel: 306-585-4677; Fax: 306-585-5433; email: [Hairuo.Qing@uregina.ca](mailto:Hairuo.Qing@uregina.ca)).

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## DIRECTOR'S CORNER

## Firm Foundation Aids Profession

By RICK FRITZ

After the annual meeting in Denver I took some R&R with my family at Estes Park. We were in a cabin without TV, radio or garbage disposal. It was back to the good old days (?) without even an Internet connection.

After helping Mary wash dishes by hand (a few times) and seeing my nine-year-old having "cartoon withdrawal," I was amused about how we take for granted certain everyday conveniences that we didn't have when I was a kid.

At the convention I talked to several members about how the AAPG used to operate without the Foundation. Until the Foundation was formed the Association finances were hand-to-mouth, with no back-up in the event of a financial catastrophe.

I'm glad those days are over.

The AAPG Foundation was formed to help support science and education programs in times of need. It has performed its function well over its 34 years of existence – and this is especially true of our educational and training programs, where through full or partial Foundation funding we have reached thousands of our members, students and the general public

**Table 1: Major Projects Supported by the AAPG Foundation – 2000-2001**

- ☐ AAPG Grants-in-Aid and "Gus Archie" grants to graduate students – \$172,000.
- ☐ AAPG BULLETIN – \$160,000.
- ☐ AAPG Distinguished Lecture and Visiting Geologists program – \$268,000.
- ☐ Geotechnology Training Centers – \$25,000.
- ☐ Energy Resources Library – \$77,000.
- ☐ K-12 Programs – \$121,000.
- ☐ Weeks Undergraduate Grants – \$50,000.
- ☐ Other projects/programs – \$85,000.

through:

- ✓ AAPG's Foundation Library.
- ✓ Distinguished Lecture Program.
- ✓ Visiting Geologist Program.
- ✓ Mid-Career Training.
- ✓ K-12 Teacher's programs.
- ✓ The 1,806 Grants-in-Aid to students that have been awarded since the program's inception.

The Foundation has grown through the generosity of many of AAPG's members, and for that we are exceedingly grateful.

Several years ago we added a space for donations on AAPG's membership renewal form so that we could broaden our base of support. Please note that this is not mandatory – but due to this change in the form we now have over 20 percent member participation in annual Foundation giving. This helps with our tax status, and we thank all of the members that participate in this program.

The accompanying table is a summary of some of the major projects/programs being supported this year by the Foundation:

\* \* \*

The Foundation, led by its Trustees, also has grown through guidance by a group known as the Foundation Trustee Associates, which was founded in 1978.

The Foundation has had many excellent chairmen, and at the end of this year Larry Funkhouser will turn over the chairmanship to Jack Threet. We thank Larry for his 11 years of service

as chairman and we look forward to Jack's leadership in this new financial climate.

Currently, we have 251 Trustee Associates who represent some of the most active Foundation contributors. That number is capped at 300, and the cost to join will increase by \$2,500 next year. This year the cost is \$7,500 paid over five years, so if you are interested in joining please contact Sherry Hyer at (918) 560-2664.

The Foundation truly supports AAPG's outreach programs to members and the public. We thank you, again, for the past support and ask all of our members to consider giving to this worthwhile cause.

Your continued support will be sincerely appreciated – and it will ensure that the AAPG Foundation is able to provide even more support for these worthy programs in the future.



## A Practical Tip to Remember

## Protect Your Ethical Standing

By G. WARFIELD "SKIP" HOBBS  
DPA President

As a condition of AAPG membership, we all have agreed to conduct our business affairs according to the Code of Ethics of the AAPG. Unfortunately, some of the people with whom we do business, do not subscribe to any code of ethics.

They may, in fact, engage in practices that could be considered unethical or even illegal.

High oil and gas prices are again bringing unscrupulous promoters out of the woodwork. As a resident in a "high rent" suburb of New York City, who somehow got on a potential investor list, I am increasingly getting "cold calls" on the telephone from people trying to get me to invest in drilling prospects. Huge returns are usually promised by operating companies that neither I nor any of my oil patch colleagues have heard of.

One Powder River Basin coalbed methane promoter actually sent me a miniature Christmas stocking filled with coal. I usually pretend I know nothing about oil and gas, and would like to consider investing, and then ask the promoter to send me a brochure.

Most of the "cold call" prospect brochures contain minimal disclosure about the operator and his track record; have a very superficial geological summary and simplistic economics; and horribly promoted turnkey drilling costs and net revenue interests. There are often misrepresentations and omissions of material fact, which are illegal under the Securities Act of 1933 and Securities Exchange Act of 1934.

All too often, I also find that a well-meaning – and probably honest – geologist has written a report that is included in the brochure, unbeknownst to the geologist. Sometimes, as I have

*This clause in a contract will go a long way in making sure your work product is not misused or altered.*

seen in my work as an expert witness in securities litigation, the geologist's report has been edited and revised by the promoter.

The paragraph on exploration risks is usually the first to be deleted!

I also have seen examples where the geologist's reserve estimates have been significantly increased.

Since the professional reputation of a geologist is, in reality, one of his or her most important assets, how can we as geologists protect ourselves from the unethical conduct of a client or employer?

\* \* \*

The first step in safeguarding your professional reputation is to thoroughly check out the reputation and track record of a potential employer or client before you make any commitments.

Ask to see some representative examples of prior "deals," and talk with former partners and investors. Do not

work for anyone who is known to engage in unethical business practices. This could "tar" you for life.

Then, make sure you know how your work product is to be used. This is naturally easier for a consultant.

I include the following covenant in my consulting contracts.

*"Client may disclose to its investors and third parties, Consultant's written technical opinions together with Consultant's identity of authorship, provided the Client agrees to provide Consultant with the final text of any statements that refer to Consultant or Consultant's work product, prior to distribution of the document, for Consultant's review and written approval, which approval will not be unreasonably withheld. Consultant will be furnished a copy of the document in the form in which it is to be distributed."*

This clause in a contract will go a long way in making sure your work



product is not misused or altered. Be advised, if it is misused, you may very well find yourself as a defendant in an unhappy investor lawsuit. An indemnity clause in your consulting agreement is also a good idea!

\* \* \*

As the fiscal year 2000-2001 draws to a close, I am pleased to report that the AAPG Division of Professional Affairs remains a very dynamic organization with numerous professional initiatives in progress, a growing membership and a very strong balance sheet. I am particularly proud of the DPA's involvement in national energy policy matters.

It has been hard work, but a pleasure and honor to serve the DPA this past year as its president. My thanks to the DPA Advisory Board, Executive Committee and committee chairs and members, and especially Divisions manager Norma Newby and the AAPG headquarters staff, who have all helped make my executive tasks a lot easier and more productive.

DPA can look forward to a great future under the strong leadership of incoming president Royce Carr and the newly elected Executive Committee members (see accompanying story). Sue Cluff will continue as treasurer, and I shall serve as past-president. ☐

## DPA Elects Officers

Dallas consultant Tom Mairs has been voted president-elect by Division of Professional Affairs members and will serve as DPA president for 2002-2003.

Also elected were Deborah King Sacrey, Auburn Energy, Houston, vice president; and Brenda K. Cunningham, of West Texas Digital Inc., Midland, Texas, secretary.

Royce P. Carr, consultant from Mt. Pleasant, Texas, begins his term as DPA president on July 1. Others on the DPA Executive Committee are:

- ☐ Suzanne Cluff, The Discovery Group Inc., Denver, treasurer.
- ☐ G.W. "Skip" Hobbs, Ammonite Resources, New Canaan, Conn., past president.



# Colombia: New Exploration Plays

Despite its extended exploratory history, some plays in Colombia remain either in their early stages of exploration or unexplored. Simple surface structural features of considerable size remain undrilled because they are located outside of traditional basin geographic and topographic boundaries and because explorers have focussed ourselves on rigid and traditional models. The perception of technical exploratory risk is generally higher outside of productive basin outlines and this detracts explorers from deep evaluations of potential frontier areas and from strongly promoting these ideas to management. Although the risk perception is higher the potential for opening and capturing a new play is significant, it is well-known that in the early stages of basin or play exploration most of the reserves are encountered rapidly by drilling the best and least complicated structures. Some of these Colombian plays have large reserve potential but targets might be at considerable depths; others have less reserve potential but targets are shallower and seismic imaging is more reliable. All, however, require a considerable amount of exploratory effort and risk money expenditure. The new association contract in place today presents favorable economics, IRR and NPV, that covers the risk involved in exploration.

## Why is There Oil in Colombia?

The La Luna source rock is the primary component of the exploration puzzle in Colombia and is shared with other countries such as Venezuela, Trinidad and Ecuador. The deposition of the La Luna Formation (and many other names for similar coeval facies) was caused by above-average submarine volcanism that led to the formation of a Large Igneous Province (LIP). The LIP volume raised sea level and its formation process injected tons of CO<sub>2</sub> into the atmosphere heating the Earth. The rise in temperature and sea level led to a marine oceanic anoxic event that is exceptionally expressed in the Cretaceous of northern South America. This source rock has generated more oil than any other and is the main reason for the occurrence of oil in Colombia.

## The Llanos Foothills Play

Although in Colombia the Llanos foothills play is considered proven and working, primarily because Cusiana and Cupiagua are amongst the major fields of the country, there are large trends or structural bands that remain untouched. One of such bands is the subthrust environment immediately below the frontal thrusts that bring Eastern Cordillera Cretaceous and Paleogene to surface. This structural domain has exploratory potential on a play area

that is more than 1000 km long, structures of considerable size have been identified and one of them is currently being drilled. Canadian Rockies analogues to these structures and play concept are abundant and represented by many productive fields.

The frontal structures of the Llanos foothills with targets underneath faults that involve the reservoirs and expose Neogene strata to surface; e.g., Cusiana and Cupiagua fields, form part of an underexplored play. There are very few true exploratory wells along this trend, approximately 12,

system in general is fully proven with fields such as the La Cira Infantas (900 mmbo). Areas within traditional basin boundaries might be considered as mature using Colombian standards. Explorers have focused on subtle features on these obvious places and on the utilization of new technology for imaging deeper and seismically-complicated zones. Explorers have recently extended the boundaries of the mentioned basins with ideas that have turned into plays, into prospects and recently into a field. The Guando field, approximately 200 mmbo,

the target. South of Guando, in the Southern Upper Magdalena Valley, there is a large structural band in which lower Cretaceous reservoirs, proven in flat regions, are present underneath faults that bring basement to surface. This play is currently being drilled and tested for the first time at the end of this year by Total Fina ELF-Hocol.

## The Fractured Cretaceous Play

The La Luna Formation and the rest of the Cretaceous system in the Middle Magdalena Valley and along the western foothills of the Eastern Cordillera adjacent to the Valley is susceptible to fracturing. The Eocene or Pre-Andean Orogeny has structurally affected in a significant manner the pre-existing Cretaceous rocks. Additionally, the Miocene or Andean orogeny has affected post Paleogene strata and "re-affected" pre-unconformity Cretaceous. These two major events affected calcareous and siliceous units that are potential fractured reservoirs. The play produces but is in the earliest stages of exploration.

## Offshore Tertiary Petroleum System (Multiple Plays Unexplored and Underexplored)

The Colombian Caribbean offshore can be divided into two large regions with geological differences as well as differences in their exploratory history. The south-western region is approximately 12.5 million acres, it contains one of the largest deltas and submarine fans of South America and a cumbersome and poor exploration history. The last wells were drilled in 1980 and 1984 prior to acquisition of large seismic programs. 4,000 km of 2D seismic were shot in 1983 and 11,000 km were shot after drilling the last well. This area remains unexplored with recent technological advances. bp's study calculated a potential of 13 billion boe with possibilities of encountering 30% liquids and 70% thermo and biogenic gas. This study is based on seismic interpretation and on a significant sea bottom coring program in which samples of oil and gas were recovered. North-eastern Caribbean regions are approximately 12.5 million acres in size. 30,000 km of 2D seismic data have been acquired. The area has an unrisksed gas potential of 50 TCF to be discovered and Chuchupa and Ballena gas fields with a total of 5+TCF recoverable. The Caribbean offshore has been in an exploration lag because of restrictions in market and a contract that did not cover all the risks of exploring in these areas. Currently, however, Ecopetrol has a new contract in place and is working towards improving the risk-reward ratio of exploring for gas in offshore Colombia, this includes generating potential markets and decreasing the price risk.



The eastern and western foothills of the Eastern Cordillera of Colombia comprise one of the most prospective regions of the country. The photo shows the location of Gibraltar 1 operated by OXY.

and the length of the prospective structural band is 1000 km. A play area such as this one in Canadian or US Rockies would have many more wells than these.

## The Western Foothills of the Eastern Cordillera and the Eastern Foothills of the Central Cordillera Plays

The La Luna source rock of the Middle and Upper Magdalena valleys is excellent in character; TOC average values are very high and HI numbers more than appropriate. Reservoirs have been producing for a long time within the Valley and the petroleum

discovered by Petrobras and Nexen proves that the boundaries of the petroleum province can be extended up towards the western foothills of the Eastern Cordillera. Only three wells in that 75 km-long trend are producing in Guando which is a large surface feature that can be readily observed in aerial photographs. Along the western foothills of the Eastern Cordillera but in regions to the North of Guando there is a 100 km-long structural band in which Tertiary reservoirs could be encountered in the subthrust environment below the La Luna Formation and equivalent units. This structural domain has only one well and the well did not reach



Snake



Jar



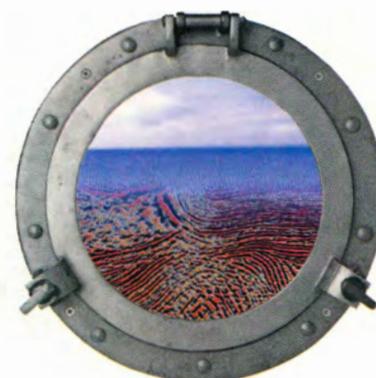
Ocean view



16 foot-long adult male red-tailed  
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