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about the cover: Cross-bedded sandstones near Zion National Park, Utah. *Photo by C. E. Revilla.*

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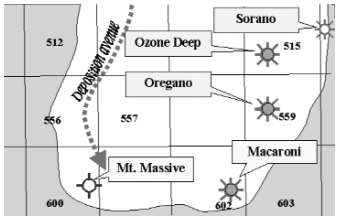

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by Steve Levine

President's Letter

Michel T. Halbouty—A Legendary Life Lived

Michel T. Halbouty, a gentleman who epitomized the vitality and compassion of the independent geologist, died on November 6, 2005, at the age of 95. His life's experiences, the people relationships he established and his "high octane" zest for science were so incredible and exciting that one must call them legendary.

I met Mr. Halbouty only on a few occasions. He was in his early 70s when he spoke at my commencement at Texas A&M in 1980. He was an incredibly powerful speaker and was delighted to have the opportunity to encourage young people to pursue the sciences and accomplish great things. He spoke from his own experiences and from his heart. I met him again at a prospect presentation in the early 1990s. He had bought into a prospect in Nevada that had significant residual oil shows and was on a promotional to add more partners. Faced with his convinction that this prospect was an "must" to drill and his commanding voice and dapper suit, each of us was hesitant to raise any concerns about the prospect. When one of our geologists spoke up, raising issues about reservoir and seal risk, Mr. Halbouty piped up and said, "Where are YOU from, and where did YOU go to school?" After this we knew who was going to win this argument. In hindsight, Mr. Halbouty was simply fighting for the cause of rank exploration in underexplored basins, a lifelong passion of his.

In hindsight, Mr. Halbouty was simply fighting for the cause of rank exploration in underexplored basins, a lifelong passion of his.

Michel T. Halbouty was one hard worker.

As a boy at age 5, he was hard-selling newspapers on the best corner street in Beaumont, and would whip any other boy that coveted it. As a youth he profited with summer jobs as a waterboy and truck swamper at the Spindletop Field, or as a laborer at the Magnolia refinery. When he found himself $50 short of the necessary enrollment fee for Texas A&M College, he marched down to President T.O. Walton and asked him for a loan. He paid back every bit by the semester's end by mowing yards at 25 cents per hour. After graduating at the age of 21with BS degrees in geology and petroleum engineering in 1930 and then an MS in geology in 1931, he took the only oilfield job available during those depressed times, as a lowly chain-puller with a surveying crew for the Yount-Lee Co. in the hot, muddy, mosquito-infested area of High Island near Galveston for a salary of $80 per month.

Michel T. Halbouty was driven.

Moonlighting after hours on the Yount-Lee surveying crew, he spent his nights building geologic cross sections from borrowed lithology logs, which led to the determination that the oil sands were trapped beneath an overhang on the High Island salt diapir. This led in turn to the discovery of 150 mmbo after only six weeks of employment at the age of 22!

He addressed the issue of "heaving shales," which often caused Yount-Lee wells to double costs when the shales swelled and rushed up the borehole. Halbouty set up shop in an abandoned lumberyard, worked day and night mixing chemicals with the clay for weeks and found an answer. He discovered hexametaphosphate as the solution, and this chemical became a widely accepted drilling mud component for the Gulf Coast.

Michel T. Halbouty was fearless.

Not always welcome on the rigs because of his status as a geologist, roughnecks often ridiculed Halbouty for his stoic business focus and his method of examining core samples by taste and smell. Following a practical joke in which the drilling crew had applied dried dog excrement to the core, and after further taunting, a 30-minute bloody brawl between Halbouty and a roughneck ensued. Knowing that Halbouty wasn't about to back down, the roughneck grabbed a 24-inch Stilson pipe wrench and swung it across Halbouty's forehead,

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resulting in an 8-day hospital stay for Halbouty with a hairline skull fracture. His toughness defined, few crew-especially alone-continued pulling tricks on him.

At the age of 26, Halbouty was asked to appraise the entire portfolio of Yount-Lee company properties in preparation for a possible acqusition by Standard Oil of Indiana (Stanolind). Halbouty's derived value was $135 million; Stanolind's evaluation by nationally known geologist D'Arcy Cashin was a mere $48 million, which resulted in a shouting match between the Standard President Prior, Cashin, and Halbouty. Halbouty was asked to leave by the Stanolind president, and eventually the Yount-Lee partners relented, selling the properties for the $48 million. Later results showed that these properties were seriously undervalued and would eventually generate billions of dollars in revenue.

The High Island Cade #30 well had blown out belching oil, gas, saltwater, mud and rock. Halbouty volunteered to inspect the damage to identify how to shut the well in. He emerged from beneath the rig floor after a long while, gasping for air after breathing so much gas. Miles Frank Yount was stunned to see that he had actually taken the time to draw a picture of the damage!

Michel T. Halbouty was a conservationist.
Mr. Yount in the early 1930s often lectured to the then-young Halbouty about the importance of preserving the environment and practicing conservation, saying, "Remember, some day we'll regret every drop we've wasted." Halbouty continually fought for and spoke on behalf of conservation, field pressure maintenance, compulsory pooling, and unitization.

Michel T. Halbouty was a philanthropist.
Halbouty established an annual postgraduate scholarship in geology at Texas A&M in 1947. Over 100 scholarships have been given since. He endowed two chairs in Texas A&M's College of Geosciences: the Michel T. Halbouty Chair and the Michel T. Halbouty Visiting Chair. He served as a Visiting Centennial Professor and was a founding member of the President's Endowed Scholars Program. In 1977, the university's geoscience building was named in his honor. As recently as May 2004, the Geosciences and Earth Resources Medal for Distinguished Achievement at Texas A&M was renamed the Michel T. Halbouty Geosciences Medal., It is awarded annually to recognize outstanding achievements in the application of geosciences to the discovery, use and conservation of earth resources.

Michel T. Halbouty was a patriot.
As a cadet at Texas A&M, Halbouty had received a 2nd lt. commission upon graduation and attained the rank of captain in the Army Reserve by 1940. He was called to active duty immediately after Pearl Harbor in 1941. He was assigned to the Battalion Commanders and Staff Officers course at the infantry school in Fort Benning, Georgia, and graduated number one in his class. He was promoted to major and hoped to ship out to an infantry regiment, but instead was assigned to the infantry school as an instructor in military science and tactics. Hoping to be assigned as a battalion commander, he instead was called to Washington, DC, in 1943 to serve on the Army-Navy Petroleum Board under the Joint Chiefs of Staff. His service earned him a promotion to lt. colonel. His duties were to find and obtain the necessary oil to fight the war effort for the Allies. He became chief of the petroleum production section of the Army-Navy Petroleum Board in 1945.

He also chaired President Reagan's Energy Policy Advisory Task Force during the 1980 presidential campaign and then served as leader of the Transition Team on Energy.

Michel T. Halbouty received the Honorary Membership award from the AAPG and the Honorary Life award by the HGS in 1970. His legend and spirit live on. Thank you for your contributions, Mr. Halbouty. We will miss you. ■

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Article and Photos
by ***Arthur E. Berman,***
editor@hgs.org

Editor's **Letter**

Technology in the Post-Modern Age: A Conversation with John Lienhard

I have listened to John Lienhard's *Engines of Our Ingenuity* on National Public Radio for at least as long as I have lived in Houston. *Engines* is a daily radio magazine produced by KUHF-FM in Houston and is carried on 30 NPR affiliate stations. The program is about the creativity of people who invented the technology that underlies our civilization. The program uses the record of history to reveal the way art, technology and ideas have shaped us. Episode topics range from cable cars to Civil War submarines, from the connection between Romantic poets and Victorian science to the invention of the bar code. The emphasis is on the personal stories of inventors, from the well-known to the obscure, and how their unique vision, ingenuity and persistence, in the face of a sometimes doubting world, resulted in the technology that we now depend on. Lienhard stresses in *Engines* that it is generally a collective effort over a period of time that produces the breakthroughs that have advanced our technological society.

technology is not really a choice but part of who we are as humans and something we cannot function without

I wanted to talk to Dr. Lienhard about his thoughts on the technological age we live in, how we got here and where we might be going. I sent him an e-mail message to ask if he would be willing to give me an interview for the HGS *Bulletin*. He replied almost immediately that it sounded like a good idea and that I should call him. I did and we talked for nearly an hour about a wide range of topics that might form the basis for an interview. Lienhard's expertise is the development of technology and culture and there is a definite message for those in the geosciences today.

Technology is Incomplete

With that understanding I met with John Lienhard in his office in the College of Engineering at the University of Houston in late September. When I arrived, I explained that my digital voice recorder was not working properly so I would have to do this interview the old-fashioned way, with a pencil and paper. I asked him why technology often seems to be so hard to use and can be so unreliable.

"Technology is incomplete until the user has explained it to the inventor," he quickly replied.

He asked if I had any doubts when I replaced a light bulb that it would work or that electricity was available. In the early 20th century, he explained, when light bulbs and publicly available electricity were new, this was a tentative technology that failed, more often than not. Over time the complaints and suggestions of the everyday people who used this technology forced the inventors to develop ways of making both the light bulb and electricity the dependable, virtually fool-proof technologies that they are today.

As I took notes, I was thinking of my grandfather's stories about the early days of automobiles. He told me about how he had to change flat tires every few miles in the course of a routine journey, not to mention having to make constant adjustments to the car's engine. We, of course, still have these issues with our automobiles, but expect them to work most, if not all, of the time and, for the most part, they do.

I was also thinking about Diffusion Theory (Berman, 2004). The inventor develops some new technology based upon his concepts and vision but it is the Innovator and Early Adopter groups who must determine how to use the invention and exploit it for practical purposes. They must explain their needs to the inventor and render the invention more reliable before later adopter groups will consider using the new technology.

"A PC used to be very difficult, " Lienhard went on, "but now it's as easy as the phone."

I'm not sure everyone would agree with him on personal computers but his point is well-taken: they have become much more reliable and easier to use since the early PCs in the 1980s.

The way we evaluate and judge technology, then, is a matter of perspective based on time. Recent technologies are difficult and inconsistent. We hesitate and resist using them because we know it will be an adventure with an uncertain outcome and may be a waste of time and effort. Some of us do it anyway because we appreciate the benefit, if we can **Editor's Letter** *continued on page 10*

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only get it to work. Usually we have to get some help. Others strongly avoid new technology.

Mechanics of Technology

I asked why many people complain about and strongly resist technology.

"We are not homo sapiens but homo technologicus. We are the only species that has to live by technology. Technology really means the lore of making things."

Our species and culture, he explained, was from the beginning defined by our need and ability to invent and use tools to survive. Whether making fire from primitive tools or reading e-mail, we need technology to live and participate in society. Because technology is invented, we must learn. In order to learn, someone must teach.

"Sharing technology defines us as human. Everything looks like fun and machines do the work, but without community we are helpless. Sharing and generosity are a quality of life and a primal survival attribute. Technology is a binding, sharing action that makes one species out of humankind. There is an instinctive sharing of technique. All our metaphors are technological."

In other words, technology is not really a choice but part of who we are as humans and something we cannot function without. Thinking about Diffusion Theory again, even the laggards eventually get on board!

I think about the many technologies we use in the geosciences. We are constantly required to learn new software in order to do our jobs or just to open attachments to our e-mail. It is sometimes overwhelming that we must always be learning new software to do what we used to do quite comfortably by hand or with an older, more comfortable computer application.

At work it is obvious who are the people that are moving ahead with new technologies and methods and those that are standing still. Good geologists now find themselves increasingly ineffective and unable to compete if they have not been able to learn many workstation applications for mapping, modeling and analysis on both the PC and UNIX side of the computer world. Younger employees are fearless with the new software and technology, but lack the experience to use them appropriately at times.

Resistance to Technology

Those who object or refuse to embrace the new ways are eloquent in their rationalizations of why they choose to continue doing things the same way they have always done them. They complain about "bad software" and sometimes expend tremendous energy and time searching for and learning alternative, easier software, while others move ahead making maps, cross sections and interpretations with the available software, bad or not.

Dr. John Lienhard in his office, University of Houston, September, 2004

"There has long been the fear that distinct groups of technology 'haves' and 'have-nots' will develop," Lienhard observes.

"We thought this might be the case with the telephone and later the computer, but we were wrong. It seems everyone has a telephone and, now, a cell phone as well. While computers are still evolving it is clear that they have come into the center of our lives and consciousness already.

"The speed of penetration is now the issue and the question."

Those who choose to avoid or opt out of new technology are, in some way, denying and abdicating their nature as humans. On a practical level, those who resist technology allow ineffectiveness or status quo to be acceptable. Whether right or wrong in their justifications and criticism, they will disappear from the workplace.

Invention and Its Messengers

Technological change is necessary and it is also threatening to those who don't want to change and, on some level, most people would rather not. Those who invent technology, therefore, are simultaneously essential and dangerous: the classic "mad scientist" of film and novels.

"Invention is a trip into an uncharted land. Invention is eccentricity. It can be no other," Lienhard states with some experience, no doubt, in this area.

He defines invention as cognitive tension, a conscious excursion into something that will cause stress and disturbance along with benefit. Invention and risk are inseparable. Popular wisdom and expressions are full of admonishments against invention: if it isn't broken, don't fix it; don't open that can of worms; be careful of what you ask for because you might get it.

Lienhard tells a story about a person who approached him after a lecture he gave on inventiveness and the sometimes eccentric people behind the inventions that make our civilization run.

"A bright young man asked, Do you mean I can't be inventive and still live a normal life?

"It was an ingenuous question, but one I couldn't take lightly. It was one of those questions that someone asks when he isn't looking for information. This fellow saw the issues with perfect clarity. I felt in my bones that he'd voiced the question because he hoped he could get a new answer. He was like the person who goes back again and again to the opera hoping that, just once, Don José will have the sense to walk away from Carmen.

"All that made the man's question difficult and dangerous. He so clearly wanted to be let off the hook. He wanted the brass ring without reaching into space to get it. He didn't want to risk humiliation. He didn't want to step off into the void.

"I took a deep breath and answered. I said, 'You cannot be inventive and live a normal life.' Oh, I knew that you can live a normal life, at least in the outward markers of normalcy. But at some point you have to go where others haven't gone.

"For some time Coleridge's *Kubla Khan* poem has been bouncing around in my mind…

I would build a dome in air,
And all should cry, Beware! Beware!
His flashing eyes, his floating hair.
Weave a circle round him thrice,
And close your eyes with holy dread,
For he on honeydew hath fed,
And drunk the milk of paradise.

"That man in the audience saw what other people in the audience didn't see. He understood why he should 'close his eyes with holy dread' at the idea of drinking the creative milk of paradise. He knew what the inventive genie could do for him once it got out of the bottle. But he'd also caught a glimpse of the size and power of the beast.

"He asked the question again on the way out of the building. He knew what was at stake. It bothered him. Now…it is I who am bothered. He reminded me that creativity is too large a thing to be taken lightly." (Lienhard, "Measuring a Genie", Episode 408).

I often think about the interchange in the movie *Amadeus* in which Mozart asks the Austrian emperor what he thinks of the new, inventive piece that Mozart has just preformed. The emperor, not knowing what he thinks, asks the court composer what "we" think of the new work.

"Too many notes," was the court composer's response.

Mozart protested that the music had just the right number of notes and that they were all in the right place.

The Emperor Joseph II says, "Your work is ingenious. It's quality work. And there are simply too many notes, that's all. Just cut a few and it will be perfect."

Mozart quipped, "Which few did you have in mind, Majesty?" (*Amadeus*, 1984)

Inventors and inventions are dangerous. The creative person is both admired and feared as a threat to the status quo. Early adopters of new ideas and technologies are likewise often viewed as dangerous, threatening risk-takers. As geologists and geophysicists, we are expected to present new ideas and interpretations often using new technology. Too often I hear people complain that their management does not appreciate or act on interpretations that arise from creative geology.

Too many notes!

The Historical Context of Technology Since The Late Middle Ages

The modern age of technology began with the medieval Renaissance in the 12th and 13th centuries. This was a period in Europe of climate warming and many improvements in the quality of life.

"By 1098 the waterwheel had just revolutionized Western Europe by providing a cheap and convenient power source. By the middle of the 12th century the Cistercian monasteries of Europe had reached the cutting edge of hydro-power and agricultural technology."

Then from the end of the 13th to the early 15th century, Europe experienced a combination of plague, famine and war that resulted in the death of nearly half of its inhabitants. Depopulation produced a demand for labor and, in particular, skilled, highly-productive labor, to compensate for the low numbers of workers. A sort of high technology was born in the form of craft and building guilds. The rise of a highly skilled, technology-based workforce created the conditions for the birth of a middle class of businessmen and traders and of a capital-intensive commercial environment. Combined with the expansion of both trade and knowledge that resulted from the excursion of the Crusades into the Middle East, the Renaissance began in Europe. The printing press, not surprisingly, coincided with the end of the Middle Ages. Gutenberg began experimenting with the printing press in 1436 and by 1455 he was printing books with movable, metal type.

In the 17th century modern science was formulated and science became the servant of technology. This period saw widespread use of the printing press. **Editor's Letter** *continued on page 12*

Editor's Letter continued from page 11

"Success breeds failure and failure breeds success. It is a rhythm repeated throughout the history of technology," says Lienhard.

The disasters of the 1300s bred the Renaissance. The Black Death in England of 1664–65 was followed by the so-called Age of Science Shortly afterward, the Industrial Revolution was upon Europe and the New World.

The Modern Age of Technology: the Late 19th and Early 20th Centuries

John Lienhard believes that the period of the late 19th and early 20th centuries was the golden age of technology. This was a time of broad, popular acceptance of technology as the driving force behind civilization, at least in the West. He has recently published a new book, *Inventing Modern*, that describes what follows in great detail.

"We seemed to have classical physics, impressionist art, steam and electric power all under control...Impressionism held seeds of modern art. Electricity held seeds of quantum mechanics. What lay ahead in the early 20th century was greater change than the Medieval Renaissance of the 12th century, or the Italian Renaissance of the 15th. It was a huge intellectual and technological upheaval".

The American Civil War had been an internationally financed exercise in application of military technology on a scale never before realized. This conflict saw the use of ironclad steamships, submarines, the Colt revolving pistol and automatic weapons for the first time in history. Just after the war in 1869, a transcontinental railway was completed and its outposts linked by telegraph. By the end of the century the American frontier was history. The globalization of the world economy in the first decade of the 20th century has only been equaled in our own time (Gopnik, 2004).

World fairs that showcased technology had become tremendously popular in the West beginning with the Crystal Palace Exhibition in London in 1851. The 1889 Exhibition in Paris with the Eiffel Tower drew 32 million visitors. The Columbia Exhibition in Chicago in 1893 with its Ferris Wheel centerpiece reflected the great strength and confidence of the United States in the new age of technology.

Big technological ideas were everywhere. The automobile, airplane, telephone and electric light were all invented in the years immediately following the Chicago World Fair. A popular culture of risk-taking had taken hold in the United States based on technology. Pre-railway exploration and settlement of the American frontier saw a proliferation of steamship technology on a grand scale. As many as 5000 wrecked steamships littered the Mississippi-Missouri-Monongahela drainage.

"In spite of the danger, technology was flung into the American West," notes Lienhard.

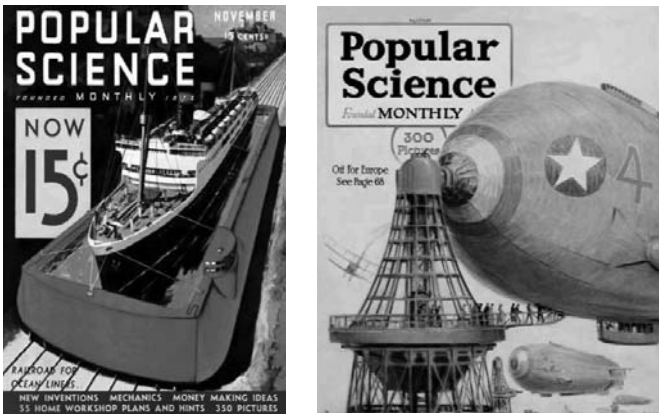
"The Boy Scouts were an outgrowth of that. So, too, were the many books telling young boys that it was manly to take risks, to hunt, and to build their own world in the forest. It was only a short step from building a forest lean-to to building one's own X-ray machine or airplane. What began as an escape from modern technology soon spawned the greatest technological revolution the world had seen. A mentality of reckless invention underlay our careening development of the new airplanes, radio, automobiles, and everything else that made the twentieth century." (Lienhard, "Camp Cooking", Episode 1762).

The early 20th century American experience with flight followed much the same pattern. No sooner was the airplane invented than Americans were taking great risks with the new invention. By 1910 barn-stormers became a symbol in American popular culture with people doing stunts in the new vehicles, walking and dancing on wings and undertaking new long-distance challenges at every turn.

"Flight was a killing business," says Lienhard. "America's aerial visionaries had all been cut from the fabric of the daredevil entrepreneur. Even the staid Wilbur Wright, when asked what his new airplanes would be good for, replied, 'Sport, first of all'." (Lienhard, "Flying Down to Rio", Episode 1727).

In some ways Popular Science and Popular Mechanics magazines epitomized this age of technology. In every issue there were descriptions of sometimes crazy inventions that the reader could marvel at and build for his own use. Old feature stories include - "Flying to your Office," - "Railroad for Ocean Liners," and "Look, I Can Fly: Jet Packs and Air Scooters".

Popular Science reflected a time when society fully and fearlessly embraced the age of technology, believed that almost anything was possible, and thought that all problems could be solved by science. We imagined an end to disease through modern medicine. It was a time when most expected that we would soon be strapping on jet



Popular Science *magazine covers from the late 19th and early 20th century*

packs to fly around town or get into our family flying car to visit friends. It was an era of fascination with rocketry and dreams of space travel. In the early 20th century few doubted that we would soon be colonizing other planets and finding strange life there. It was the era of the Dick Tracy watch-communicator for both talking to and seeing people on a wrist watch. We imagined huge, centralized cities with people living in densely populated, high-rise structures and commuting on monorails and flying vehicles. The famous architect Frank Lloyd Wright once designed a skyscraper a mile high.

The technological age of the early 20th century was expansive, materialistic and external in its focus and scope. It represented an expansion outward of consciousness through technology even into outer space and its emphasis was on acceleration.

Before the First World War, warfare generally followed economic and political motives and objectives and could, for the most part, be viewed and dealt with as an extension of politics. Karl von Clauswitz articulated the notion that war is politics carried out by other means. According to the Clauswitzian model, war is rational and attempts to bring about a new state of affairs through the artful combination of violence and the promise to cease violence if certain political objectives are met. World War I did not fit the Clauswitzian model but the system of international diplomacy was, and remains, based on the notion that warfare is rational. This is part of the difficulty we now face in the so-called War on Terror.

While warfare has always advanced hand-in-hand with technology, the weapons that emerged in the 19th and early 20th century introduced a new level of destruction and horror into war. The political systems and ideologies that emerged at the same time—fascism and communism, in particular—brought with them a technological view of people and states according to the model of the factory and the assembly line.

World War I should have sounded the alarm that technology had created a nightmare beyond even the extremes of the American Civil War or the carnage of Napoleonic Europe in the 19th century. In the first three weeks of the war, over 250,000 French soldiers perished, and over three million men would die on the Western front before the end of fighting. The Great War saw the introduction of the machine gun, tank, poison gas, trench warfare and first military use of the airplane. The machine gun alone dramatically changed the face of war and the threshold of death. On a single day in 1916, for instance, during the Battle of the Somme, over 50,000 British infantry died from walking directly into machine gun fire (Gopnik, 2004).

A technological model for states and war had emerged in the 20th century. The mechanistic calculation of the German leaders and their willingness to practice total war was something new. Slaughter was coldly anticipated and accepted as yet another entry in the ledger sheet of the new technological world view. For perhaps the first time in modern history, there was a major war that made no sense economically or politically for any of the belligerents.

"There arose a new level of ruthlessness, one that involved not merely the willingness to violate neutral territory, to shoot civilians and sink ocean liners, but a willingness to risk another great war. It was not possible to deal with this threat in terms of a model of the enemy upon which the League of Nations had been founded…Total War exposed the weakness of an international system set up to deal with the kind of small-scale wars that the liberal internationalist wanted so desperately to believe posed the only real threat to world peace. The same thing happened to Europe in the 1930s. Hitler grasped the enormous opportunity that the aftermath of the Great War gave to any power that could plausibly threaten to bring about another great war" (Harris, 2004).

What is clear is that World War I set into motion the conditions to produce the Second World War: a humiliated but not vanquished Germany, Britain and France demoralized and depleted, and Russia in the hands of a gang of remorseless fanatics. The aftermath of World War II has, in Lienhard's view, brought about a kind of dark, post-modern age.

"It always takes a while to look back and see on what point the significant lines of history converge—that's why they call it perspective. The Holocaust and the death camps did not come into focus as the uniquely diabolic invention of the Second World War until the 1960s. The First World War as meaningless horror was the experience of the participants, which became louder and clearer only after the first enforced chorus of regimented rhetoric faded" (Gopnik, 2004).

The Advent of the Post-Modern Age

The modern age of technology ended after World War II, according to John Lienhard.

"We entered the 20th century with no clue as to the so-called Modern world that awaited us. Now you and I advertise the fact that we don't know where we are by calling our times post-modern."

"World War II was a manifestation of the excesses of technology. We came out of the war afraid, wary of the bombs and the Russians," says Lienhard.

When the first atom bomb was detonated at White Sands in July 1945, no one understood the total effects of a nuclear blast. The bombing of Hiroshima and Nagasaki a few days later, however, not only showed the power of nuclear fission, but left no doubt in anyone's mind about the horrors of radiation poisoning.

Editor's Letter *continued on page 14*

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After the Soviets acquired nuclear capability in 1949, a kind of hysteria gripped America concerning the possibility of nuclear warfare. People built bomb shelters in their back yards and children endured air-raid drills in their schools. At any moment, America believed, Russian planes would drone overhead and World War III would start. Fear of nuclear war and the Communists allowed Joseph McCarthy to rise to national prominence with his House hearings on un-American activities in the early 1950s.

"We were in a kind of dark age," comments Lienhard.

As the nuclear programs proceeded, the United States entered a space race with the Russians and, for a while, it looked as though the Soviets were winning. The successful launch of the Sputnik satellite in 1957 marked a low point in American technological self-confidence. In 1960, Soviet leader Nikita Khrushchev defiantly cried, "We will bury you," as he banged his shoe on the podium table at the United Nations as a display of Soviet resolve to win the Cold War. The Cuban missile crisis of October 1962 took the world to the brink of nuclear Armageddon.

"Something shifted just after Sputnik. We became post-modern; we became circumspect," says Lienhard.

The American space program promised to be the highlight of the post-modern age. It soon degenerated though, as John Lienhard puts it, into "bad theater" and passed out of the consciousness of the post-modern era.

"On Christmas of 1968, a space ship was orbiting the moon while astronauts read from Genesis. It was wonderful. Then (a few months later) Neil Armstrong placed his foot upon the Moon, recited his pre-arranged words and left us looking at a footprint in the lunar dust. It was a moment of finality, terrible theater. Later moon missions brought even worse theater with astronauts bunny hopping and playing golf on the moon.

"The modern age collapsed in the 1950s and the space program effectively ended 15 years later. The space program was a creature of an earlier age."

While the space program has seen many successes since the 1960's, notably the Hubble Space Telescope (after an initial disaster) and the Mars Lander Mission, these projects were a very different sort from the earlier manned efforts. They left men on earth in control of computers and telemetry and were largely funded by the private sector and not NASA.

The Post-Modern Age

If during the age of technology the world was drunk on possibilities, the post-modern world of the second half of the 20th century was terrified by the horrors of technology. If the earlier Age of Technology was outward and expansive, post-modern technology is inward and compressed. Early 20th century people dreamed of flying cars and television phones. Now that we can build these devices, the interest is no longer there.

"I worked on the B-52-A in 1952, a prototype for the Boeing 707," recalls Lienhard. "Now we have a lot of computer devices in our airplanes, but the outward design and speed have not changed much. We have turned our backs on advanced transport. Our attention went inward to a smaller world of computers and nanotechnology. The NASA Crawler Transporter that moves the rocket ships is the largest land vehicle ever built but our attention is focused on the tiny capsule above it, the interior world. The development of the land component is not of interest. Imagine how disappointed a person from the 1950s would be to see our fleet of 2005 automobiles the basic appearance has changed little in over 50 years."

Several factors changed the future anticipated by the age of technology in addition to reaction against the excesses of the world wars and their nuclear aftermath. The automobile was integral to the golden age of technology and it also moved us away from it. The automobile provided society with great and unanticipated centrifugal momentum. Rather than concentrate in the great centralized cities anticipated by the technological age, the post-war generation expanded to the suburbs in a kind of metaphorical flight from the terrors that technology let loose. The destructive aspects of post-modern society were identified with the cities: racial strife, growth of crime, drugs, gangs and physical decay of the inner cities, to name a few. The automobile provided a way out of the city to a simpler, more peaceful way of life in the suburbs, where the illusion of traditional values could be preserved.

The interstate highway program began in 1956 in the United States and created a mobility never before imagined in the history of the world. This network of highways allowed us a new experience of reality, one that bypassed the cities and put the

Nikita Khrushchev at the United Nations, 1962

details of the country we sped through at an arm's length, almost as if we were watching a film. It was now necessary to stop and make contact with the real world only when we needed fuel or had reached our destination. The dream of time and space travel had come to us in an unexpected way. We no longer needed to travel the cosmos. We were the cosmos in our cars.

"Outwardly, the automobile had been the wild card that destroyed predictions this time. Just as we were converging like planets into a black hole of centralization, the automobile caught hold of us and flung us all outward. But the thread of mystery (or, at the very least, surprise) lurks within the influence of the automobile as well," notes Lienhard.

A series of events took place in the early 1950s that would compound the unanticipated outcomes produced by the automobile. The integrated circuit was developed in 1950 and would soon lead to the computer. Xerox invented the photocopy machine in the same year. In 1953 DNA was discovered. We are still in the midst of outcomes that these quiet events set loose upon post-modern society.

Instead of exploring the solar system and beyond we are exploring the constellations of our genetic structure and re-designing anatomy. We are absorbed in traveling to destinations of information and experience that our personal computers allow us to visit. We have stumbled into an inner "cyber" world of instantaneous and infinite information through the World Wide Web. We have transcended the barriers of time and space through the Internet. The galaxies will have to wait until we equilibrate to our newly discovered inner universes and the extension of consciousness that the computer has unexpectedly provided.

Where the Post-Modern Leads

"We always get it wrong because we extrapolate technologies. We think we are heading in one direction, but we're wrong," says Lienhard.

There is the flaw in predictions: they assume a fixed, linear progression into the future and fail to acknowledge the human elements of creativity, invention and collective sentiment in shaping outcomes.

"Predictions are extrapolations that cannot take account of inventive intervention. Invention that doesn't send us off in new directions is no invention at all. If we could predict the future, it'd be because we lived without the wonderful wildcard of human creativity. And that'd be a terrible thing," says John Lienhard.

Our world is frightening. The Cold War is over but now we live with fear of the faceless terrorist who uses technology to put danger anywhere and everywhere.

"Terrorism is a mode of war that works," observes Lienhard. "This is a good time to buy stock in our future because it has never looked worse. The future is going to be good because I haven't seen things this bad for a long time. What will the rollover be? There is too small a signal but it will have a butterfly effect.** Fundamentalism is the great evil: absolute certainty of the truth in any ideological quarter. The human race has always kicked itself loose and can't stay in a sea of despondency We are on the threshold of an era of hope and spiritual renewal."

Message for Geoscience

Today's geoscientist is overwhelmed by technology.

Geoscience technology is sophisticated and complex. We do complicated, non-parallel tasks in geology that were not simple when done by hand. While geological and geophysical technology is used for a multitude of purposes, there are core areas for interpretation: seismic interpretation, data analysis, well logs and mapping. In addition to software that focuses on core, traditional interpretation technologies, there are also many that use geographic information systems (GIS) to tie specific information to a spatial location as well as web-based software applications and data bases.

In the early- to mid-1990s it seemed that the future of geoscience interpretation software and technology was the integrated, UNIX-based workstation such as those developed by Landmark and GeoQuest. Spectacular advances in PC and LINUX technology and accompanying cost reductions have lead to a great number of both integrated and stand-alone software applications that both complement and compete with the integrated UNIX workstation. Now there are multiple software applications available for every specific geological and geophysical task. Connectivity, the ability to communicate and transfer interpretation and information from one software application to another, has become a critical skill requirement in order to function in the new world of geoscience interpretation software. File conversion and image capture have become increasingly important.

How should geoscientists cope with the explosion of technology in the context of John Lienhard's perspective on technology?

First, technology is incomplete and is often difficult or does not function properly. This should not be an obstacle to using technology or an excuse for inaction. Explain the technology's use to

***The Butterfly Effect is a term used in meteorology. The idea is that, while weather obeys certain physical laws, changes in the one part of the planet's atmosphere may have profound effects elsewhere on Earth. If a butterfly flaps its wings in Beijing, hurricane patterns in the Atlantic may be affected.*

Editor's Letter *continued on page 17*

FIRST ANNUAL

HGS SCHOLARSHIP ROCK DANCE

Saturday, February 5, 2005 ★ 6:30 PM – 11:00 PM

The Petroleum Club – ExxonMobil Building 800 Bell Street

Proceeds go towards the Undergraduate Scholarship Foundation & the W. L. Calvert Memorial Scholarship Fund

Silent Auction & Cocktails begin at 6:30 PM
Dancing 7:30 PM – 10:30 PM
Music by Ted Roddy & the King Conjure Kombo from Austin, Texas

Get your tickets now
$45.00 each

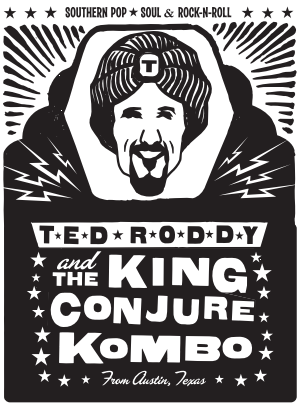
Numerous door prizes including Roundtrip Tickets for two on Continental Airlines anywhere in the Western Hemisphere courtesy of A2D & TGS-NOPEC

We Need Your Help!

There will be a silent auction during the party, where all the proceeds go to help both the Graduate and Undergraduate Scholarship Funds! Here is where YOU can help!

We need donations for the Silent Auction! Articles such as food/wine baskets, gift certificates, etc. (no White Elephants–PLEASE!), would be perfect! Also, sponsorship of this event would be really appreciated in order to help keep costs down. REMEMBER! SPONSORSHIP OR DONATIONS TO THE SILENT AUCTION ARE TAX DEDUCTIBLE!

For more information: contact a committee member Steve Levine, Mary Kae Dingler, Andrea Adams or Deborah Sacrey.



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the inventor. If you are using a software license provided by your employer, call the provider company and tell them what is not working and what you need. If you are using your own software, send e-mail to the software provider and tell them about your problems and frustrations. Attach examples of what you are working on so they can understand and directly address your concerns. My experience is that you will get answers and make valuable contacts that you can later call directly for more specific and immediate help.

Second, technology is a fundamental survival strategy and is, therefore, not optional. Time cannot be reversed and no amount of wishing will bring back the days when maps and cross sections were made with pencil and paper. Don't waste time rationalizing why you don't use certain software. Sharing technology is a fundamental aspect of being human. Don't get trapped by focusing on your technology shortcomings; identify what your special interpretation skills are and focus on learning technology that allows you to do what you are already good at. Spend your time and energy asking someone who is already using the technology effectively to help you. You are probably not alone in your lack of knowledge or experience. By sharing your need you will find that everyone is in basically the same situation as you are where new software applications are concerned.

Software training courses should be approached cautiously. Considerable time can be expended evaluating software by taking classes. Probably your company has already done the evaluation or you can ask colleagues about their opinion with specific applications. My experience is that training classes can be overwhelming and tend to focus mainly on the mechanics of using software. By the end of several days of technology training, I generally come away with little more than knowledge about the training manual. If I don't immediately use the software, the training is basically a waste of time. For me, a training class is more valuable after I have experimented with the software and understand the basic mechanics.

Finally, since we know the characteristics of the post-modern age, geoscientists should lead the way out of fear and mistrust by embracing technology with a spirit of confidence and hope. Predictions are usually wrong precisely because human ingenuity and creativity intervene to produce new outcomes and directions. Technology and its software applications are vehicles for expanding consciousness and effectiveness into areas where new possibilities may be found that confound the predictions of experts and result in great opportunity where none was thought to exist previously. Allow your own skill and ingenuity to manifest by fearlessly engaging in the wonderful technology we have on our desktops today. ■

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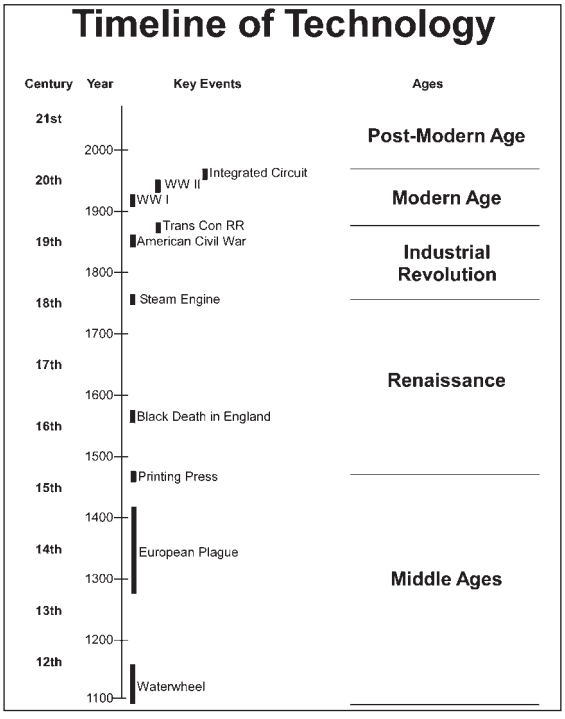
John Lienhard *is M.D. Anderson Professor of Technology and Culture, Emeritus in the University of Houston's Department of Mechanical Engineering. He did his doctoral work on heat transfer at the University of California-Berkeley and has published six books and hundreds of papers. At this writing, he has written 1954 episodes of* Engines of Our Ingenuity *and the* Engines *Website gets about 250,000 hits per week. His latest book is* Inventing Modern: Growing Up With X-rays, Skyscrapers, and Tailfins.



Monday, January 10, 2005

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Cost: $25 Preregistered members; $30 Nonmembers & Walk-ups

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HGS General
Dinner Meeting

by ***A.D. Donovan***
bp, Houston, Texas

Taking the Scenic Route and Avoiding the Interstates: Understanding and Predicting the Distribution and Type of Slope Reservoirs

Two fundamental first-order controls (delta position and slope terrain) can be used to better explain and predict both the type and distribution of slope reservoir systems (leveed vs. confined vs. sheet). Delta position (on-axis vs. off-axis) controls the dominance of Mass Transport Complex vs. Turbidites that are delivered to the slope. Slope terrains, which are herein termed Simple, Chute, Ponded and By-pass, are controlled by the gradient and rugosity of the slope, as well as the size of the slope channels (gullies vs. canyons). These terrains determine the architectures of dominant turbidite reservoir types deposited on the slope.

terrains determine the architectures of dominant turbidite reservoir types deposited on the slope

Simple Slope Terrains have little or no structural controls. Slope channels are free to move laterally across slopes of higher relief as Leveed Channel Complexes. Chute Terrains form as a result of two-dimensional confinement between salt and shale structures. The structural movement in these areas leads to more moderate relief slopes and the development of confined channel complexes in structural lows. Ponded Terrains form in response to three-dimensional confinement between salt and shale structures. The structural movement in these areas leads to localized low-relief areas and the development from time to time of sheet complexes in the ponded lows. By-pass Terrains form when a large canyon develops across the slope. These canyons form efficient by-pass systems that move turbidites from the shelf margin to basin floor, drastically reducing the reservoir potential of the slope. Clearly when all is said and done, slope reservoir nirvana can best be attained by taking the scenic route and avoiding the interstates. ■

Biographical Sketch

Dr. Art Donovan received his PhD from the Colorado School of Mines in 1984. From 1984 to 2000, he worked for Exxon Production Research Company where he had the opportunity to work numerous basins around the world and hone his skills in the fields of clastic facies, stratigraphy and seismic stratigraphy. Since December 2000, Art has been in charge of stratigraphy and sedimentology for bp. He is also a member of bp's technical assurance team for global exploration and a Senior Technical Advisor for the corporation. The author of many papers and abstracts on sequence stratigraphy, Art's primary interest is basin-scale stratigraphic analysis, especially explaining and predicting the distribution of clastic reservoirs.

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Direct all inquiries by e-mail to Thomas Demchuk (Thomas.D.Demchuk@conocophillips.com)

Microfossil images courtesy of The Natural History Museum (London), Mitch Covington, and Gulf Coast Section SEPM

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International Explorationists Dinner Meeting

by ***John Ardill, Rick Jensen, Michael Whitsett, Bret Dixon, Stan Evans***
ExxonMobil Production Company, Houston, Texas, USA
Tim Garfield, Rick Beaubouef
ExxonMobil Exploration Company, Houston, Texas, USA
Anthony Sprague
ExxonMobil Production Company, Houston, Texas, USA

Deepwater Reservoir Learnings from the Zafiro Field, Equatorial Guinea

Deepwater reservoirs continue to provide many new technical challenges for hydrocarbon development and production, where complex environments of deposition and reservoir architectures must be understood to ensure optimal resource development and hydrocarbon recovery.

Recent technology advances including higher resolution 4D seismic data coupled with the application of sequence stratigraphic concepts in deepwater reservoir settings has resulted in breakthrough improvement in the understanding of deepwater reservoirs. In the Zafiro Field, such technology-driven learnings have provided a greatly improved understanding of deepwater slope channel systems that can be applied as a production analogue.

technology-driven learnings have provided a greatly improved understanding of deepwater slope channel systems that can be applied as a production analogue

The Zafiro Field, Equatorial Guinea, was discovered in 1995 and is composed of stacked Pliocene deepwater slope channel deposits that record large-scale clastic input into the Gulf of Guinea following partial collapse of the paleo-Niger delta. High-resolution 3D and 4D seismic datasets are calibrated by over 70 well penetrations, with >3500 ft of conventional core and 8 years of production data. In this paper we explore the linkage between physical stratigraphy, environments of deposition, reservoir architecture and resulting production performance found in the deepwater slope channel systems of the Zafiro Field. The Pliocene canyon fill is organized into three compensationally stacked fining-upward successions (composite sequences) that each of which show a succession from traction-dominated to suspension-dominated deposits. Each fining-upward succession contains a predictable stacking pattern from confined, sinuous, amalgamated to semi-amalgamated channel systems to weakly confined, highly sinuous, non-amalgamated and leveed channel systems.

A detailed stratigraphic understanding of such slope channel systems is critical to successfully explore, develop and produce these resources. ■

Biographical Sketch

John Ardill currently works for ExxonMobil Production Company in Houston as the Geoscience supervisor responsible for the ExxonMobil-operated Zafiro Field in Equatorial Guinea. Over the past 8 years with ExxonMobil, John has worked in Exploration, Development, Production and Research with the last 6 years focused on deepwater reservoirs in West Africa. John joined ExxonMobil in 1996 after completing a PhD at the University of Liverpool in England under the guidance of Dr. Stephen Flint and a Bachelor of Science at the University of Edinburgh in Scotland under the guidance of Dr. John Underhill.

Tuesday, January 18, 2005

The Sofitel Hotel • 425 Sam Houston Pkwy. North
Social 11:30 a.m., Lunch 11:45 a.m.

Cost: $30 Preregistered members; $35 Nonmembers & Walk-ups

The HGS prefers that you make your reservations on-line through the HGS website at www.hgs.org. If you have no Internet access, you can e-mail reservations@hgs.org, or call the office at 713-463-9476. (include your name, e-mail address, meeting you are attending, phone number and membership ID#).

HGS Northsiders Lunch Meeting

*by **Jeffrey S. Ogilvie***
Noble Energy Inc
Houston, Texas

Seismic Considerations for Classifying Proven Resources

It is important for planning and reporting that corporations have a clear assessment of the volumetric quantities of hydrocarbons as both OGIP/STOOIP and recoverable resource/reserves. Recently developed and approved by the SPE, AAPG and World Petroleum Congress is the "Resource Classification System" adopted by numerous oil and gas companies. Geophysical technology and its application, often referred to as "seismic considerations," can have significant impact on reserve/resource classification and available bookings under this system. The purpose of this talk is to stimulate discussion and recommend a set of clear yet stringent guidelines for the proper application of such geophysical technology when classifying resources/reserves. Some examples will be shown for how geophysical tools such as optical stacks, rock property analysis, fluid substitution, seismic synthetics and 3D amplitude extractions can be integrated with well log data to aid reserve/resource classification. This pertains specifically to extrapolation away from the well bore(s) as well as both below the LKH (lowest know hydrocarbon) and above the HKH (highest known hydrocarbon). An appropriate level of sophistication and redundancy is suggested as necessary to meet SEC guidelines of "reasonable certainty" to book proved resources/reserves using seismic data and analysis. ■

Geophysical technology and its application, often referred to as "seismic considerations," can have significant impact on reserve/resource classification and available bookings

Biographical Sketch

Jeffrey S. Ogilvie is a Geophysical Advisor for Noble Energy in Houston. He is a member of SEG/SPE and author of papers in *Geophysics* and *The Leading Edge*. He began his career with Western Geophysical in 1984 and joined ChevronTexaco in 1988, where he held numerous earth science assignments in exploration and exploitation both domestic and international (GOM, UK, West Africa). Jeff received his BS geology-geophysics from Boston College (1983), and MS geophysical sciences from Georgia Institute of Technology (1988). Career highlights include Best Paper in *Geophysics* (1996), Texaco's President's Award (1997) and ChevronTexaco's Chairman's Award (2003). His current interests are activities related to domestic/international reserve determination and reporting, rock properties/DHI and seismic attribute analysis.

Tuesday, January 18, 2005

Environmental and Engineering Group
Dinner Meeting

Guadalajara Hacienda Restaurant • 9799 Katy Freeway (south side of Katy Freeway between Bunker Hill and Gessner)
Social 5:30 p.m., Dinner 6:30 p.m.

Cost: $25 Preregistered members; $30 Nonmembers & Walk-ups

Make your reservations now on-line through the HGS website at www.hgs.org; or, by calling 713-463-9476 or by e-mail to Joan@hgs.org (include your name, meeting you are attending, phone number and membership ID#).

by ***John R. Larson***
TRC Environmental Corporation
Kansas City, Missouri

Depositional Environment Characterization for Effective Remediation

This presentation focuses on the use of a depositional model for demonstration and prediction of contributing factors for effective groundwater remediation of a chemically impacted site. Through several years of data collection, a subsurface geologic depositional model was developed to portray source area limiting factors for site restoration. The development of the model was needed to support remediation efforts that proved difficult due to complex site stratigraphy. Initial physio-chemical data and aquifer fate and transport characteristics provided clues for groundwater restoration, however, discovery of unique stratigraphic variations across the site were more significant for effecting cleanup. A common approach for environmental remediation projects is the use of simple models to describe subsurface stratigraphy largely due to limited databases and lack of understanding the regional depositional history. This study demonstrates the importance of incorporating a regional geologic stratigraphic model with site hydrogeologic factors to drive successful remediation. The site-specific depositional environment model was the key tool to enhance cleanup of this chemically impacted site.

Consider Running for AAPG Delegate

Houston candidates are now needed to run for the office of AAPG Delegate in the election to be held early 2005. If you are interested in having a leadership position as the elected voice of Houston-area members to the AAPG and being a link between the AAPG and the HGS—its local affiliated society—this role is for you.

The House of Delegates (HOD) is the legislative body of AAPG. It consists of one delegate per 70 active AAPG members. The Houston area has 61 representatives in the HOD and is the largest local delegation to AAPG. Delegates participate in the legislative process during the annual meeting of the entire HOD, which takes place at the AAPG Annual Convention. During their three-year term, Houston Delegates meet during lunch monthly September through June (except December) to process new AAPG member applications, network and manage other HOD business. The group is fun and energetic, representing many companies, geoscience roles and practices.

New members with fresh viewpoints are welcome to run. If you are interested please contact Craig M. Dingler (cdingler@sprintmail.com, 281-930-2394) or Martha Lou Broussard (mlbrou@rice.edu, 713-665-4428) for further information or to register as a candidate. ■

Environmental geologists should use a depositional model to enhance subsurface predictions for remediation sites, especially for studies that include limited local databases. As embodied in Walther's 1893 studies, "the most satisfying genetic explanations of ancient phenomena were by analogy with modern geologic processes." This study demonstrates the value of using a regional geologic analog to a site-specific depositional model to accurately portray stratigraphic factors that resulted in successful remediation. ■

This study demonstrates the importance of incorporating a regional geologic stratigraphic model with site hydrogeologic factors to drive successful remediation.

Biographical Sketch

John R. Larson is a licensed professional geologist with a Bachelor of Science in geology from Southern Methodist University and a Masters of Public Health in environmental health sciences from the University of Texas-Houston. He has published on topics that range from health effects associated with community water supplies impacts of effluent loadings on estuarine environments, in-situ bioremediation, and most recently, environmental justice. His expertise is providing cradle-to-grave risk management for environmental projects. Mr. Larson has delivered cost-effective risk-based closures for a diverse range of clients, including electronics manufacturers, oil and gas producers and shippers, transportation carriers and real estate developers in 21 states. Larson has also directed projects that include significant public involvement, regulatory agency interface and legal aspects for complex development projects involving issues of the National Environmental Policy Act.

Prior to joining TRC in January 2004, John's career spans both industry and consulting. His previous positions are listed below:

- Assistant Vice President and Environmental Group Manager, TranSystems Corp., Kansas City, Missouri, 1999–2003
- Senior Risk Assessor, Dames & Moore, Houston, Texas, 1993–1994 and 1996-1999
- Project Manager, DuPont Environmental Remediation Services (DERS), Houston, Texas, 1994–1996
- Exploration Geologist, Marathon Oil Co. and Texas Oil and Gas Corp. (TXO), Houston, Texas, Shreveport, Louisiana, and Oklahoma City, Oklahoma, 1984–1992

HGS CONTINUING EDUCATION COMMITTEE PRESENTS

Part Two of the Mini-series

Petroleum Reserves—Avoiding Write-downs

An Overview of Recommended Geological Practices

by

Daniel J. Tearpock

Subsurface Consultants & Associates, L.L.C.

Thursday, January 20, 2005
8 am–4 pm
Registration table opens at 7:30 a.m.

Shell Exploration & Production
Auditorium
910 Louisiana Street
Houston, TX 77002

Reserve write-downs in 2003 and 2004 have increased the attention of financial analysts, investors, rating agencies, banks, the U.S. SEC and corporate boards to the process of estimating and reporting reserves. Both geologic and engineering technical errors can contribute to erroneous reserve estimates.

• Learn what common geologic errors contribute to the inaccuracy of reserves estimates.

• Learn the geologic practices recommended to avoid these reserve pitfalls.

REGISTRATION FORM

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An Overview of Recommended Geological Practices

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Recommended Geoscience Practices For Reserves Estimates

by ***Daniel J. Tearpock***

For nearly two years now there has been a lot of publicity regarding internal problems in energy companies, reserves write-down and concerns about the reliability of reserves disclosures. From the view of oil and gas companies and their investors, to Wall Street and the SEC, reserves are a major factor in the valuation of energy companies. From evaluating fields to buy to determining whether or not to participate in a certain prospect and from estimating reserves of a new discovery to determining the proved reserves for a company, the bottom line is how much oil or gas can be placed on the books and produced with an acceptable return on investment.

There are many challenges in estimating reserves as well as reporting reserves. Our challenge relates to the fact that reserves determinations require a multidisciplinary approach including both geoscience and engineering. In December, HGS offered the first of a three part series on "Petroleum Reserves—Avoiding Write-downs." On January 20, 2005, HGS offers the second part of this three-part series "The Recommended Geoscience Practices for Reserves Estimates," including methods and techniques. The starting point of most reserves estimates is the estimate of the size of the container and the volume of hydrocarbons in place. This second part of the three-part series covers a variety of important recommended geoscience methods and techniques:

a. General introduction—Reserves vs. resources
b. Mapping surfaces—Structure maps, reservoir top and base of porosity
c. Mapping of trapping faults (geology/geophysics)
d. Down-dip limits in vertically stratified reservoir(s)
e. Net sand and net pay
f. Wedge zones (water, hydrocarbon and fault)
g. Thickness determinations in deviated wells and dipping beds
h. Net-to-gross ratios
i. Porosity, permeability and saturation cut-offs
j. Isochore maps (volume determinations)

The accuracy of reserves estimates is important for public companies and the SEC, financial analysts and banks, as well as investors, all of whom want the assurance of accurate reserves estimates. Whether someone wishes to invest in an exploratory prospect, purchase a producing field or determine the value of a company, the proved reserves is one of the single most important factors in the decision. ■

Biographical Sketch

Daniel J. Tearpock, Chairman/CEO—Serves in the role of Chief Executive Officer of Subsurface Consultants & Associates, LLC (SCA), which is an international petroleum consultancy and training firm. SCA is a client-focused firm that offers specialized solutions in consulting, recruiting and training. Our experienced, well-trained staff has worked in over 40 countries. From our headquarters in Houston, Texas, SCA's expertise reaches around the world from Kazakhstan to Indonesia, from the Canadian Rockies to the southern regions of South America.

As a working geoscientist, Mr. Tearpock has generated numerous exploration and exploitation prospects, either as the sole generator or as part of an organized multidisciplinary team. He is the co-author of three textbooks, *Applied Subsurface Geological Mapping* (©1991), *Quick Look Techniques For Prospect Evaluations* (©1994) and *Applied Subsurface Geological Mapping With Structural Methods* (©2002) and numerous technical articles. Mr. Tearpock was a finalist in 1996 and 1998 for the Ernst & Young Entrepreneur of the Year program and in 1998 received the Distinguished Service Award from Bloomsburg University, Bloomsburg, PA. He holds a bachelors degree in geology from Bloomsburg University, 1970, and a masters in geology from Temple University, 1977. He is a member of numerous societies and is Certified Petroleum Geologist No. 4114 and State of Texas Licensed Geologist No. 2660.

Member of AAPG, Vice President of the DPA, Trustee of AGI Foundation, member of SPE, SIPES, GSA, HGS, NOGS, LGS, IPA & PESGB.

Thursday, January 20, 2004

Petroleum Club • 800 Bell (downtown)
Social 11:30 a.m., Lunch 11:45 a.m.

Cost: $30 for members and affiliates pre-registered by 12 noon Tuesday 18th January (No-shows will be billed.). $35 for non-members, guests, and walk-ups.

Make reservations by telephone (713-651-1639), Fax (713-951-9659), Web-site (www.sipes-houston.org), or e-mail (bkspee@aol.com) to B. K. Starbuck-Buongiorno by 12 noon Tuesday before the meeting.

Joint SPEE / SIPES Luncheon Meeting

*by **Lynne Goodoff** and **Gene Wiggins***
The Scotia Group, Inc.

Burgos Basin Update

South Texas is geologically and geographically contiguous with the Burgos Basin in northeastern Mexico and, because of its maturity of hydrocarbon exploration and development, offers a unique opportunity for providing insight into the future potential of the Burgos Basin. In the simplest comparison, significantly more wells had been drilled in Texas than in the Burgos basin through late 2002, with over 83,000 wells in RRD4, some 28 times more than the 2,900 wells drilled in the Burgos basin. Similarly, there were 9,299 producing wells in RRD4 at the time, compared with 800 in the Burgos basin.

In the simplest comparison, significantly more wells had been drilled in Texas than in the Burgos basin through late 2002, with … some 28 times more than the 2,900 wells drilled in the Burgos basin.

Although the Burgos Basin is often perceived as an extension of South Texas, there is a great diversity of fault styles, structures and associated tectonic events. Structural features across the Burgos Basin are not uniform, but complex. Interpretation of 2D and 3D seismic data, on both regional and field development scales, has revealed faults and structures that result not only from extensional forces, but also from compressional or transverse forces. This presentation will give an overview of many of the structural styles observed in the Burgos Basin. A common perception that structuring in Burgos is similar to South Texas may limit a more complete understanding of the basin's true potential. In addition, structural trends that extend to the Rio Grand River, may easily cross the river into the United States.

In addition to the above, an update of developments in the oil and gas sector of Mexico will be presented. ■

Biographical Sketch

Lynne Goodoff is Principal Geophysicist with The Scotia Group, Inc. in Houston and has over 25 years experience. She was associated with Exxon as exploration and production geophysicist and with Pennzoil as geophysical advisor before joining Scotia. Her responsibilities have included 2D and 3D interpretation, prospect mapping, new venture assessment, and field development studies in South Texas and the Burgos Basin. She has worked extensively on the Gulf of Mexico and internationally.

Gene B. Wiggins III is Executive Vice President for Scotia. He has over 27 years of experience in the upstream oil and gas business as a consultant and in business development capacities for several companies. His primary focus has been on all phases of the evaluation of oil and gas properties with emphasis on reserves determination, production forecasts, well performance, economics and market valuation. He has an MBA degree from Tulane University and a BS degree in mechanical engineering from the University of Houston. Mr. Wiggins was SPEE National President in 1998.

The Scotia Group, Inc. is a full service international oil and gas advisory firm which specializes in reservoir studies and simulation, exploration analysis, strategic planning and risk analysis, reserves analysis and property valuation, acquisition valuation, opinion reports, and research and technology applications.

Thursday, January 20, 2005

HESS Building • 5430 Westheimer, Houston
Social 5:30 p.m.

Cost: $25
Call or email Dale Bird, by noon Tuesday, January 18
281-463-3816 or dale@birdgeo.com

GSH Potential Fields Group
Dinner Meeting

*by **G. Randy Keller***
Department of Geological Sciences,
University of Texas at El Paso

Gravity and Magnetic Studies of the Southern Rocky Mountain Crust: Basins to Basement

The Rocky Mountains have intrigued researchers and explorationists ever since the gold rush days. These mountains are a tectonic puzzle because of their complex history and their distance from plate margins that usually make driving mechanisms evident. From a petroleum exploration point of view, the formation of the ancestral Rocky Mountains, the Laramide orogeny, and late Cenozoic extension and uplift are of primary interest. There has been an increasing emphasis on gravity and magnetic data in studies of this region, and these data have been particularly effective when used in an integrated fashion with seismic and drilling data. Rifting during the late Precambrian and Cambrian affected large areas of the southwest and created sedimentary basins that have in many cases survived to the present. In at least some cases, these strata contain both source and reservoir rocks. Thus, there is frontier defined by stratigraphic depth. In addition, younger structures such as those associated with the ancestral Rocky Mountains have often been affected by older rift structures preserving Cambrian and older strata. Gravity and magnetic data have played a major role in studies that reveal the deep manifestation of ancestral Rocky Mountain structures, including the deep basin structure and anomalies structure of the uplifts, and these data show that the scale of these structures is impressive in a global context. The structures extending across Oklahoma and the Texas panhandle into New Mexico have been referred to as the Southern Oklahoma or Wichita aulacogen, which can be interpreted to extend along this trend as far northwest as the Uncompahgre uplift in Utah. The deformation that formed the Ancestral Rocky Mountains is a massive inversion of these rift structures and is due to a plate collision in the late Paleozoic. These structures form one of North America's major petroleum provinces. The Laramide orogeny also produced considerable crustal scale deformation in the form of large basement uplifts and deep productive basins. Finally, late Cenozoic uplift and extension formed a series of basins that gravity and magnetic data show are deep and complex. ■

data show that the scale of these structures is impressive in a global context

Biographical Sketch

G. Randy Keller holds the L.A. Nelson Professorship in the Department of Geological Sciences at the University of Texas at El Paso. He is also Chief Scientist and Co-Principal Investigator at UTEP's large NASA Earth Science research center. His research interests stress the geological applications of geophysics and span a variety of techniques at a variety of scales. He has conducted many studies of the structure and evolution of the lithosphere using gravity, magnetic and seismological measurements integrated with geological data. He has also regularly used geophysical methods to study issues such as ground water resources, earthquake hazards and site characterization. He has been very involved in the Geoinformatics initiative and is interested in the development of databases, techniques that foster data integration, software tools and Web services. In addition, he has helped organize numerous large cooperative research efforts and has regularly received funding from sources that include NSF, NASA, Department of Energy, U.S. Geological Survey, Department of Defense and industry. Dr. Keller has published over 200 scientific papers, reports and book chapters as well as many maps. He also has directed 22 doctoral dissertations and 62 master's theses and has mentored and advised many undergraduate students. He is a long-time member of the GSA, AGU, SEG, AAPG, RAS and EGU and has served numerous governmental agencies, professional societies and scientific bodies as an officer and committee member. In addition to his research interests he is particularly concerned with issues such as those involving information technology and data sharing, diversity, science education and professional development of students and those already in the work force.

Put It Back—An Experiment in Returning Carbon from Burning of Fossil Fuel to the Subsurface as Carbon Dioxide

by ***Sue Hovorka,*** *Bureau of Economic Geology*

CO_2: The Issue

Combustion of fossil fuel in air moves 7 billion tons of carbon annually from storage in the crust, in the form of oil, gas, and coal, into the atmosphere in the form of carbon dioxide [1]. Observed atmospheric concentrations have been increasing [2] consistent with rates of CO_2 production exceeding the assimilative capacity of the terrestrial-ocean system. Although the resultant atmospheric CO_2 concentrations are not thought to be directly harmful to life, climate scientists are increasingly agreeing that this sudden increase can have potentially negative effects, ranging from direct damage to habitat (as a result of ocean acidification) to contributing to climate perturbations and global climate change [3]. In recognition of the significance of these risks, 126 countries have ratified the Kyoto Protocol [4], by which they have agreed to implement policies that limit greenhouse gas emissions.

The Gulf Coast faces carbon issues in several contexts: as producers and refiners of fossil fuels, as consumers of fossil fuels and as inhabitants of a low-lying warm-climate region

The Gulf Coast faces carbon issues in several contexts: as producers and refiners of fossil fuels, as consumers of fossil fuels and as inhabitants of a low-lying warm-climate region for which risks such as increased tropicalization, higher sea level, and increased severity of storms have significance. A number of options have been suggested to reduce the transfer of carbon to the atmosphere, including increased use of presently available technologies to provide such increased efficiency, increased use of non-fossil energy sources, and capture and storage of CO2 either from the atmosphere by vegetation or by engineered processes from large combustion sources.

Geologic Storage in the Gulf Coast

One option to reduce atmospheric release of CO_2 that is particularly attractive to the Gulf Coast is long-term disposal of CO_2 in geologic formations, so-called geologic sequestration. This mitigates the impact of use of fossil fuels on the atmosphere by closing the loop, and putting the carbon back underground as compressed CO_2. In this mechanism the CO_2 is separated from fuels before combustion or from flue gases after combustion, then compressed and injected underground below and isolated from potable water resources. These processes are known collectively as carbon capture and storage (CCS).

Geologic storage is especially suitable for use in the Gulf Coast because it builds on existing expertise in the region in characterizing the subsurface and predicting the subsurface behaviors of buoyant fluids. Geologic storage relies on knowledge derived from nearly a century of oil and gas exploration and production experience and decades of experience in the Permian basin and elsewhere for pipeline transport and injection of CO_2 for enhanced oil recovery (EOR). Last but not least, the implementation of CCS as a method for reducing atmospheric release of CO_2 would create a significant opportunity for development of much more widespread use of the CO_2 for EOR. Use of CO_2 in the subsurface for EOR would increase domestic oil supply and provide revenues in the form of taxes and jobs that could offset some of the costs of CCS. It would also provide career options for geoscientists and engineers in support of this potential growth area.

Underground storage of fluids is not widely understood outside of the geologic community. Most non-geologists express preferences for methods of reducing atmospheric releases that they are more familiar with, even though some of those methods are more expensive or less effective than geologic storage. Therefore education and dialog between the geoscience community and the public is needed if the opportunities are to be realized.

The Frio Brine Pilot

As one of the first steps toward developing knowledge about and interest in CCS, an international team of 16 research organizations led by the Texas Bureau of Economic Geology (BEG) undertook a field experiment to document the performance of the subsurface in storing CO_2. This experiment was designed to be transparent, rigorous and focused on monitoring the subsurface behavior of CO_2 during and after injection. Another mission is to educate both the researchers on critical technical issues and the public on the potential of the geologic storage option and to supply information in a timely manner to the CCS research community. The U.S. Department of Energy National Energy's Technology Laboratory (NETL) provided $4.1 million to support the project, and additional support of about $2 million was supplied by research **Put it Back** *continued on page 35*

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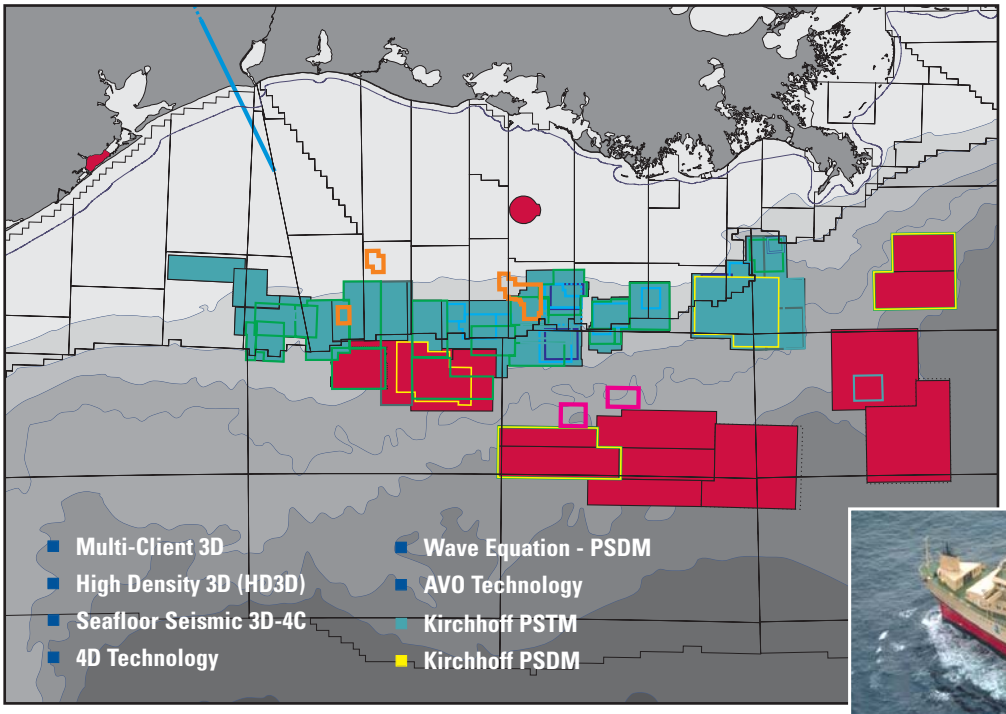

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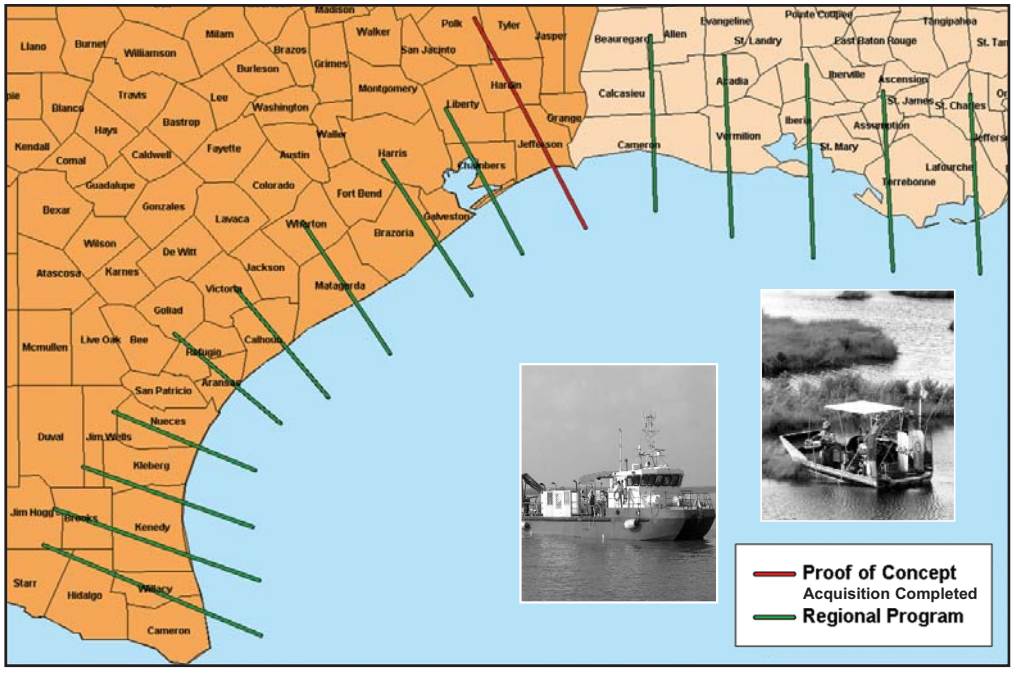

For more information contact James Bogardus at 281-679-2209 or Chuck Ward at 281-679-2220

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Put it Back—An Experiment

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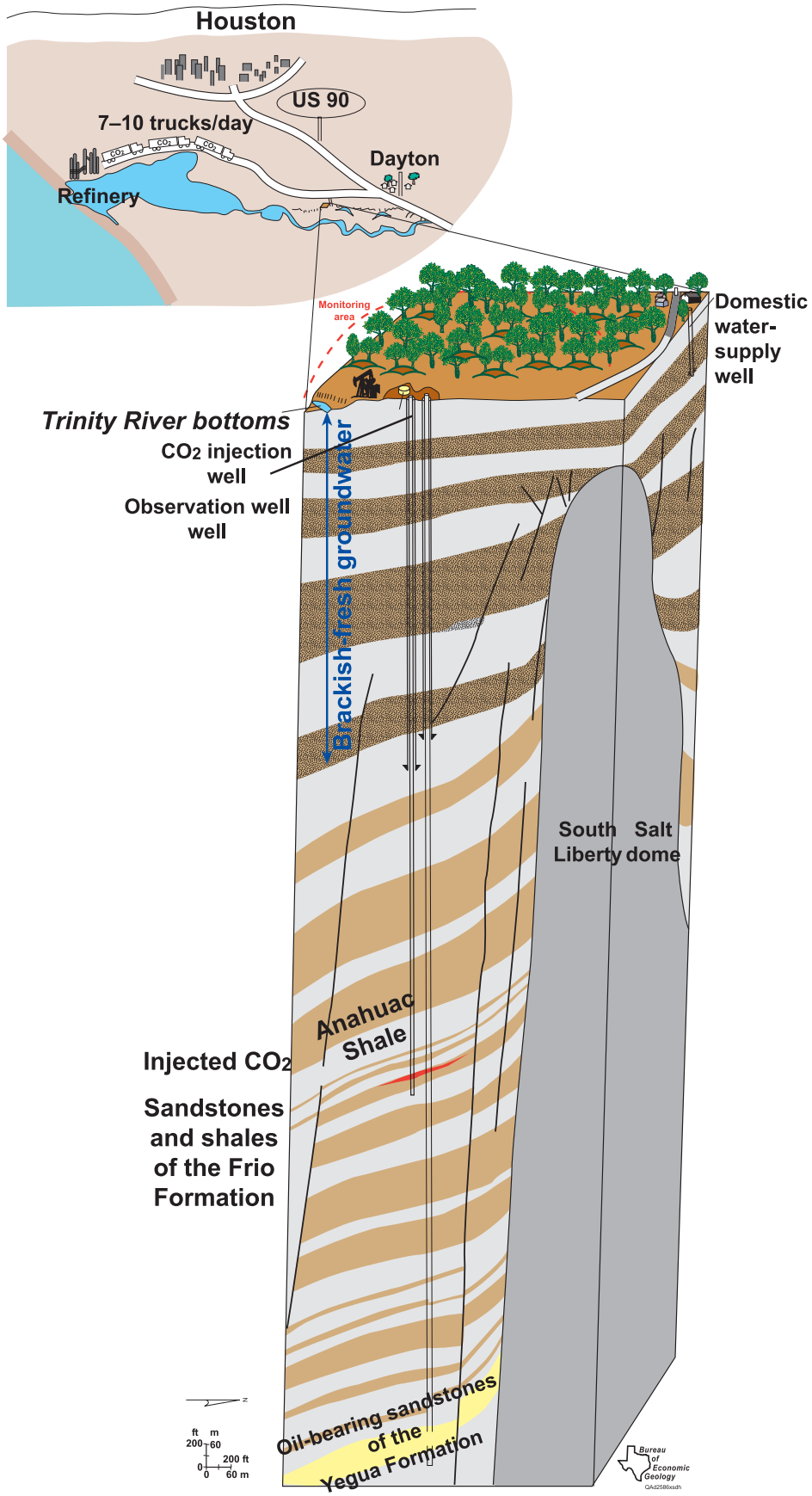


Figure 1. Setting of the Frio Brine Pilot. True scale shows the scale of the injection.

collaborators from federal and private sources.

The experiment site, known as the Frio Brine Pilot, is 4 mi south of Dayton, Texas, in the South Liberty oil field (Figure 1). The oil field was developed in the 1950s on the lower coastal plain in marginal wetlands on a Trinity River terrace and remains in production. However, the selected test interval in the upper Frio Formation "C" sandstone at depths of 5,053 to 5,073 ft below surface is a brine-rock system with no hydrocarbon accumulation. Selection of a zone above the reservoir optimizes the focus of the study on modeling and monitoring, because the complex interactions of CO_2 with oil do not dominate the system. Pressure at this depth is 2,211 psi, salinity is 125,000 ppm and temperature 134.5° F. The injection interval is the mineralogically complex, reworked fluvial sandstone of the Oligocene upper Frio Formation. Average porosity in the injection sandstone is 32%, and measured permeability is 2.5 Darcys. The sandstone test interval is isolated by numerous thick shales above and below the interval, and it has fault compartmentalization on the sides (Figure 2). Dip in the injection sandstone is relatively steep, about 16° toward the south. The site is representative of a broad area of the Gulf Coast that is an ultimate target for large-volume storage because it is part of a thick, regionally extensive, sandstone trend that underlies a concentration of industrial sources and power plants. Development of geologic storage in this region has excellent potential to upscale to have a significantly impact on U.S. releases.

Experiment Objectives

- Demonstrate that CO_2 can be injected into a brine formation without

Put it Back *continued on page 36*

Put it Back—An Experiment

continued from page 35

adverse health, safety, or environmental effects.
- Determine the subsurface distribution of injected CO_2 using diverse monitoring technologies.
- Demonstrate validity of conceptual models.
- Develop experience necessary for success of large-scale CO_2 injection experiments.

Experiment Progress

Early in 2004, injection well construction was approved by the Texas Commission on Environmental Quality (TCEQ) as a class 5 experimental well. Field services operator Sandia Technologies, LLC, completed workover of an existing well as an observation well May 13, followed by drilling of a new injection test well 100 ft downdip of the observation well, which was completed June 4, 2004, at a total depth of 5,753 ft. Texas American Resources Company donated well access and the preinjection well log and 3-D seismic survey used for characterization. Local property owners donated land access for the experiment. BP provided project review and advice. The Australian CO2CRC and Alberta Research Council contributed substantial expertise to the project team. Research team members from the BEG, USGS, Corelabs, Schlumberger, Paulslon Geophysics, Lawrence Berkeley National Labs (LBNL), Lawrence Livermore National Lab (LLNL) and Oak Ridge National Lab (ORNL) completed preinjection baseline core sampling, wireline logging, aqueous geochemistry, crosswell seismic, cased hole cross-well electromagnetic imaging, vertical seismic profiling, two-well hydrologic testing, and surface water and gas monitoring during July–September of 2004.

From October 4 to 13, 1,600 tons of CO_2 from a Baytown refinery and a Louisiana ammonia plant were injected into the test zone. Four types of tracers (noble gasses, perfluorocarbon, and SF6 tracers and the natural stable isotopic composition of carbon and oxygen) were used by the national lab researchers to tag the CO_2 so that it can be distinguished from other CO_2 in the subsurface, soil and atmosphere. CO_2 transport in the Frio "C" sandstone from the injection well to the observation well 100 ft away took 51 hours, and tracers were detected and sampled for more detailed analyses. A "U-tube" sampling device designed and operated by LBNL was instrumental in obtaining high-quality, high-frequency fluid samples (Figure 3). Gas composition was measured on site with a mass spectrometer. Downhole pressure and temperature proved to be sensitive indicators of plume behavior, showing the evolution of the plume as CO_2 saturation changed before and after breakthough. The hydrologic performance of the two-phase (brine + CO_2) system was assessed using transient pressure testing.

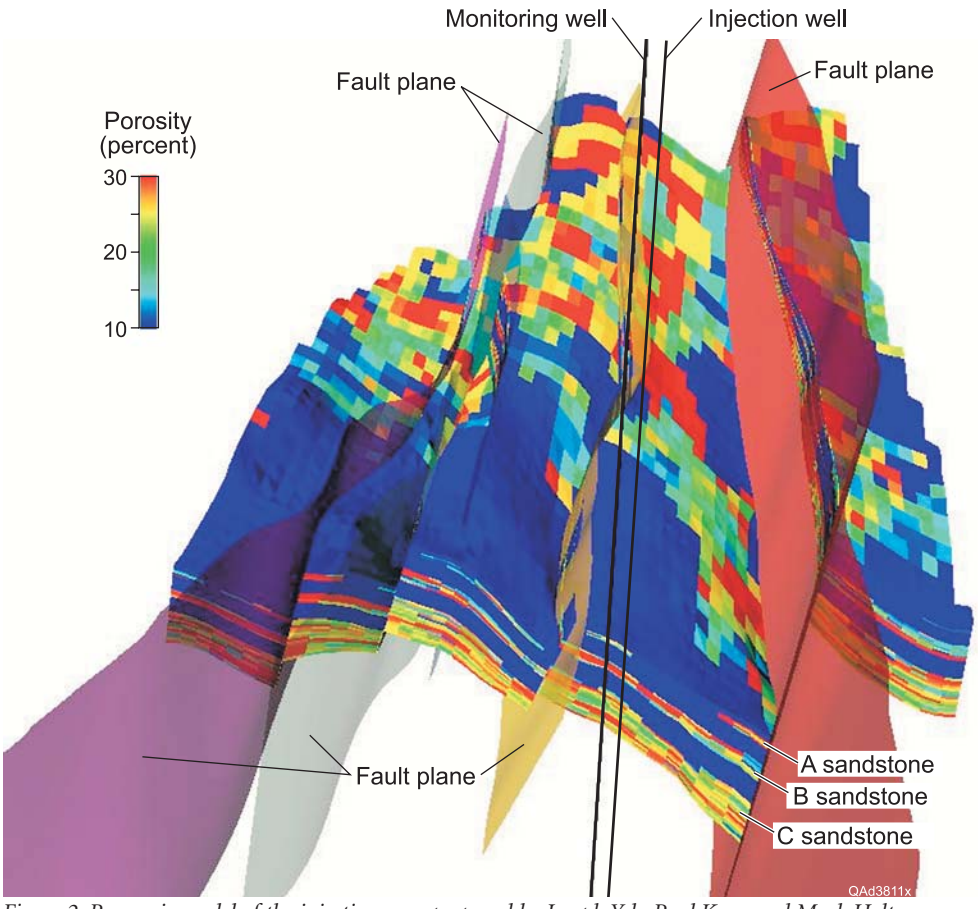


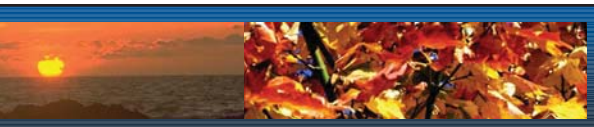
Figure 2. Reservoir model of the injection zone prepared by Joseph Yeh, Paul Knox and Mark Holtz.

Modeling by LBNL (using the TOUGH2 code) and by UT Department of Petroleum Engineering, both using parameters based on detailed study of petrophysics, predicted that breakthrough of CO_2 to the observation well would occur in 2.5 to 6 days (Figure 4). Breakthrough of CO_2 occurred 30 percent earlier than predicted. Logging using the Schlumberger (RST) Reservoir Saturation Tool determined that by the fourth day after the initiation of injection, the plume thickness was half of the predicted value and that saturation in preferred flow zones was higher than had been predicted by the model. These observations have been interpreted as reflecting factors

Put it Back *continued on page 41*

January 2005

Sunday	Monday	Tuesday	Wednesday
NOW you can make your reservations on-line at www.hgs.org	**Reservations:** The HGS prefers that you make your reservations on-line through the HGS website at www.hgs.org. If you have no Internet access, you can e-mail reservations@hgs.org, or call the office at 713-463-9476. Reservations for HGS meetings must be made or cancelled by the date shown on the HGS Website calendar, normally that is 24 hours before hand or on the last business day before the event. If you make your reservation on the Website or by email, an email confirmation will be sent to you. If you do not receive a confirmation, check with the Webmaster@hgs.org. Once the meals are ordered and name tags and lists are prepared, no more reservations can be added even if they are sent. **No shows will be billed.**		
2	3	4 **HGS Executive Board Meeting**	5
9	10 **HGS General Dinner Meeting** by A. D. Donovan, *"Taking the Scenic Route and Avoiding the Interstates: Understanding and Predicting the Distribution and Type of Slope Reservoirs"* See page 19	11	12
16	17 **International Explorationists Dinner Meeting** by John Ardill, *"Deepwater Reservoir Learnings from the Zafiro Field, Equatorial Guinea"* See page 21	18 **Northsiders Luncheon Meeting** *"Seismic Considerations for Classifying Proven Resources"* See page 23 **Environmental and Engineering Group Dinner Meeting** *"Depositional Environment Characterization for Effective Remediation"* See page 24	19
23 30	24 31	25 **North American Explorationists Dinner Meeting** *"The Bakken Play of Montana and North Dakota"* See page 45	26 **HGS General Luncheon Meeting** by Selim Shaker, *"Trapping Vs. Breaching Seals in Salt Basins: A Case History of Macaroni field and Mt. Massive, Auger Basin, Gulf of Mexico"* See page 47



GeoEvents

Thursday	Friday	Saturday
	Members Pre-registered Prices: General Dinner Meeting . . . . . .$25 Env. & Eng. . . . . .$25 Luncheon Meeting . . . . . .$28 International Explorationists . . . . . .$25 North American Expl. . . . . .$25 Emerging Technology . . . . . .$25 Nonmembers and walk-ups. $30	1 *New Year's Day*
6	7	8
13 **SEG/EAGE DISC 2005** by Paul Weimer, *"Petroleum Systems of Deepwater Settings"*	14	15
20 **HGS Short Course** *"Petroleum Reserves–Avoiding Write-downs"* See page 26 **SIPES Luncheon Meeting** *"Burgos Basin Update"* See page 29 **GSH Dinner Meeting** *"Gravity and Magnetic Studies of the Southern Rockies: Basins to Basement"* See page 31	21	22
27	28	29

Upcoming GeoEvents

February 17
HGS Rock-Based Integration
Page 58

Put it Back—An Experiment

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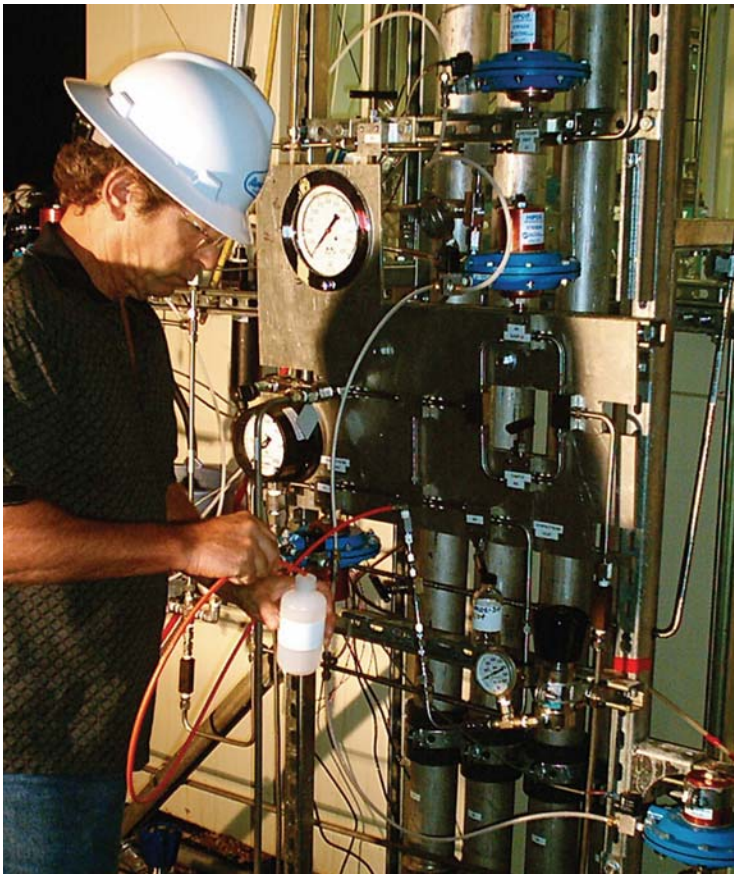


Figure 3. Surface installation of the U-tube sampler, which produced 102 L of fluids at near-reservoir conditions every hour.

favoring rapid flow such as high-permeability zones or a larger than predicted gravity override. As injection continued for 9 days, the plume thickness increased with the addition of CO_2 in the lower part of the plume. This culminated in an observed saturation profile similar to that predicted by the model. CO_2 saturation was variable but maximum saturation was estimated to be in excess of 50% of porosity.

Post-injection saturation changes observed as CO_2 migrated through the steeply dipping sandstone under gravitational forces appear to reverse the trend observed during injection. Continued observation will yield information about saturation history significant to understanding CO_2 trapping mechanisms. VSP and crosswell seismic and EM will be repeated in December, and wireline logging, aqueous and gas geochemistry, and surface monitoring have been repeated at intervals and will be repeated for several months into 2005 to document conditions returning toward baseline.

The project has contributed unique data sets to help us document the viability of using geologic storage as a mechanism for reducing atmospheric emissions of greenhouse gases. The small-volume and short-term injection with closely spaced wells allowed intensive monitoring using multiple methodologies, **Put it Back** continued on page 43

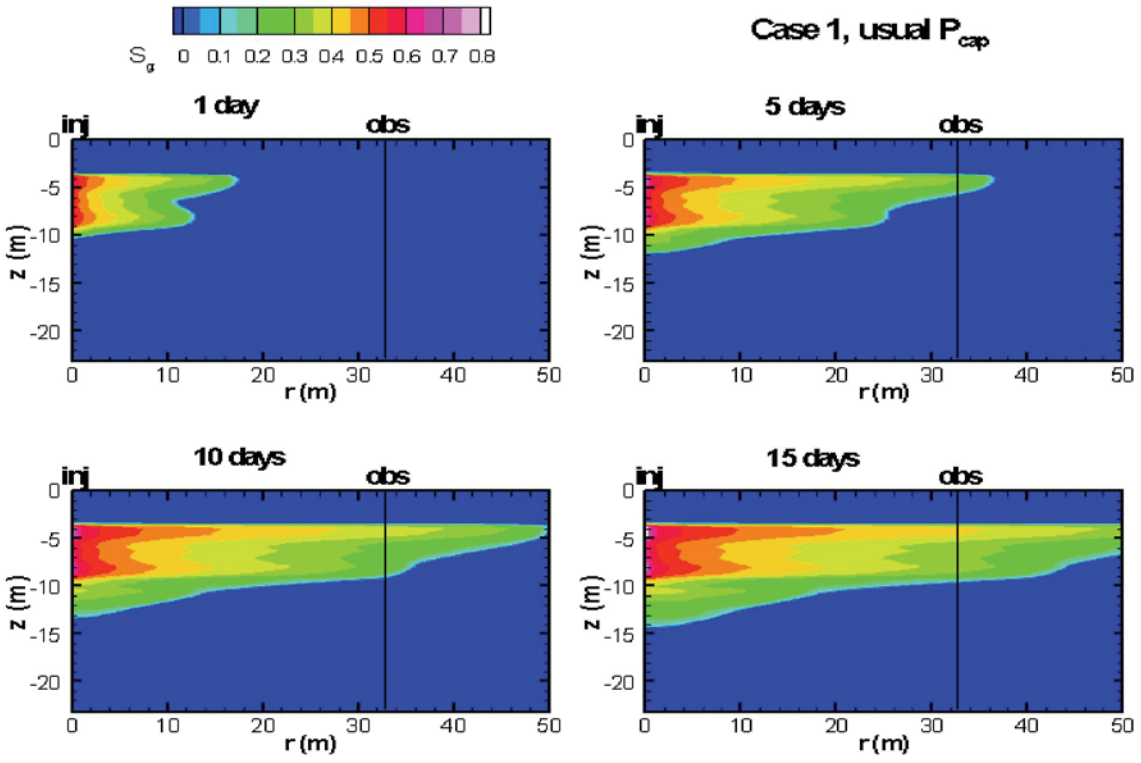


Figure 4. Simulated plume behaviour with TOUGH2 prepared by Christine Doughty, LBNL.

Put it Back—An Experiment

continued from page 41

(Figure 5) and the early results are useful in developing the next stage of experiments and field demonstrations. Some of the key variables that control CO_2 injection and post-injection migration include the thickness and heterogeneity of the injection interval, residual brine saturation during injection and residual CO_2 saturation during gravity drainage. Measurements made over a short time frame and small distance during the Frio Brine Pilot experiment help define the correct value of these variables. This will result in better conceptualized and calibrated models that will then be available for developing larger scale, longer time-frame injections.

To move toward a larger scale, longer time CO_2 storage experiment, an industry-academic partnership, the Gulf Coast Carbon Center (www.gulfcoastcarbon.org), an initiative of the Jackson School of Geosciences, is working to develop economically viable, environmentally effective options for reducing carbon emissions in the region. Goals include developing a vision and technical information for how sources and sinks can be aggregated to form a network for capture and storage and to develop a first project that is likely to match a large CO_2 source at a power plant or refinery with a reservoir that will be used for CO_2-enhanced oil production plus storage. ■

References Cited

[1] Pacala, S and Socolow, R., 2004, Stabilization wedges: solving the current climate problem for the next 50 years with current technologies: Science, v. 305, p. 968-972

[2] Keeling, C. D. and Whorf, T. P., 2003, Atmospheric CO2 Concentrations—Mauna Loa Observatory, Hawaii, 1958–2002 (revised July 2003), http://cdiac.esd.ornl.gov/ndps/ndp001.html

[3] Duncan, K., Gregorich, E., Groffman P., Kovacs, P., Magaña, V., McKnight, D., Mills, E., Schimel, D., 2001, Climate Change 2001: Working Group II: Impacts, Adaptation and Vulnerability, Chapter 15, North America

[4] The United Nations Framework Convention on Climate Change, 2004, The Kyoto Protocol, and The United Nations Framework Convention on Climate Change status of ratification, http://unfccc.int/resource/convkp.html

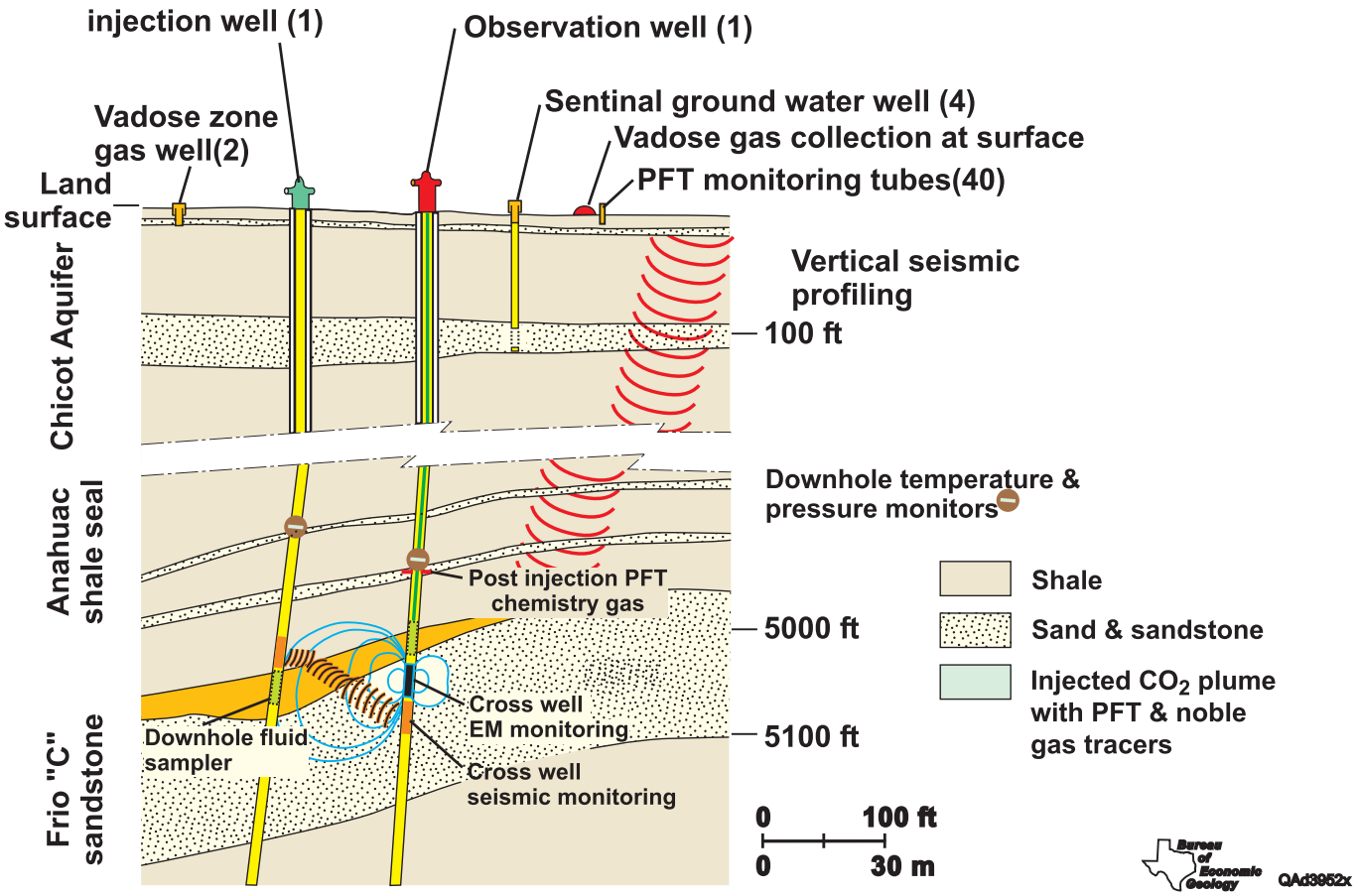


Figure 5. Overview of monitoring technologies used at Frio Brine pilot.

Tuesday, January 25, 2005

Westchase Hilton • 9999 Westheimer
Social 5:30 p.m., Dinner 6:30 p.m.

Cost: $25 Preregistered members; $30 Nonmembers & Walk-ups

The HGS prefers that you make your reservations on-line through the HGS website at www.hgs.org. If you have no Internet access, you can e-mail reservations@hgs.org, or call the office at 713-463-9476. (include your name, e-mail address, meeting you are attending, phone number and membership ID#).

North American Explorationists
Dinner Meeting

by ***Julie A. LeFever***
North Dakota Geological Survey

The Bakken Play of Montana and North Dakota

The Bakken Formation has once again become the center of attention in the Williston Basin. Unlike the shale play of the early 90s, the focus is directed toward the middle member of the formation. Horizontal drilling of the middle member began in 2001 and until recently has been restricted to Richland County, Montana. As the success rate increased in Montana, leasing increased in North Dakota in an attempt to bring the play across the state line. To date, there is one reportable well drilled in North Dakota with numerous permits for additional wells.

Three years of drilling activity have defined the Bakken play in Montana. The stratigraphy is relatively simple and similar to the area played in the 90s. It consists of each successively higher member of the Bakken Formation onlapping the Devonian Three Forks Formation. As the play area is reached in Richland County, only the middle member and the upper shale remain. These units pinch out farther to the south. A bottom seal is formed by the impermeable Three Forks Formation and the Mississippian Lodgepole Formation forms the top seal. A well-developed, mappable trend is readily apparent in the middle member on wireline logs over this area.

Technology has finally caught up to the Bakken Formation.

Technology has finally caught up to the Bakken Formation. The ability to fracture-stimulate these horizontal wells is what makes this play work. In the late 80s–early 90s, wells had to rely on encountering natural fractures to supply the oil; wells in the current play create their own fractures.

Wells generally consist of two 4000 to 5000 ft laterals drilled on a 1280-acre spacing unit. The middle member is now drilled with saturated brine instead of inverted mud. The zone generally has between 7% to 12% porosity, permeability of 0.01 to 0.02 md, and 70% to 80% oil saturation. Once drilled, the well is then treated with a 650,000 to 1 million pound gelled water sand frac. The cost per well is approximately $2.2 million with potential production rate of 500 to 700 BOPD initially, leveling off at 250 BOPD with virtually no water.

Statistics from the Montana Board of Oil & Gas demonstrate the success of this play. Production for the Richland County has doubled each year as new wells come on line. There is no evidence that this production trend will slow in the near future.

The same facies that produce in Montana are present and potentially productive in North Dakota. Additional potential within the middle member occurs as the Bakken thickens toward its depositional center in Mountrail County, North Dakota. This is further substantiated by production from another higher lithofacies that is present in the northwestern corner of North Dakota and in the Canadian provinces.

Additional pay section may also be present locally in North Dakota. The "Sanish Sand" occurs at the base of the Bakken Formation. Already a significant producer at Antelope Field, this interval is untested and occurs throughout the "Bakken Fairway" (depositional edge of the Bakken). Another potential target is the lower Lodgepole Limestone between the upper Bakken shale and the "False Bakken." Detailed mapping of all of the zones will be required to determine the best location to tap into the oil resources of the Bakken Formation. ■

Biographical Sketch

Julie A. LeFever has been employed by the North Dakota Geological Survey since 1980 working on petroleum-related studies in the Williston Basin. She is currently Director of the NDGS Wilson M. Laird Core and Sample Library. She has presented several papers and core workshops on the Bakken. Julie received her MS from California State University Northridge in 1982.

Wednesday, January 26, 2005

Petroleum Club • 800 Bell (downtown)
Social 11:15 a.m., Lunch 11:45 a.m.

Cost: $25 with advance reservations, $30 for walk-ins, space available

Make your reservations now on-line through the HGS website at www.hgs.org; or, by calling 713-463-9476 or by e-mail to Joan@hgs.org (include your name, meeting you are attending, phone number and membership ID#).

HGS General
Luncheon Meeting

by ***Selim S. Shaker***
Geopressure Analysis Services (G.A.S.)
Houston, Texas

Trapping Vs. Breaching Seals in Salt Basins: A Case History of Macaroni and Mt. Massive, Auger Basin, Gulf of Mexico

The complex interaction between salt and surrounding sediments makes risk assessment of any prospect or play concept a challenge. In the Tertiary-Quaternary salt basins of the Gulf of Mexico, compartmentalization is the primary factor in setting up traps capable of retaining hydrocarbons. Compartmentalization of geopressured units is created mainly by the stresses resulting from interaction between sediment load and salt tectonics. Examination of salt emplacement and displacement history as they relate to the surrounding sediments may shed light on sealing integrity of potential hydrocarbon traps.

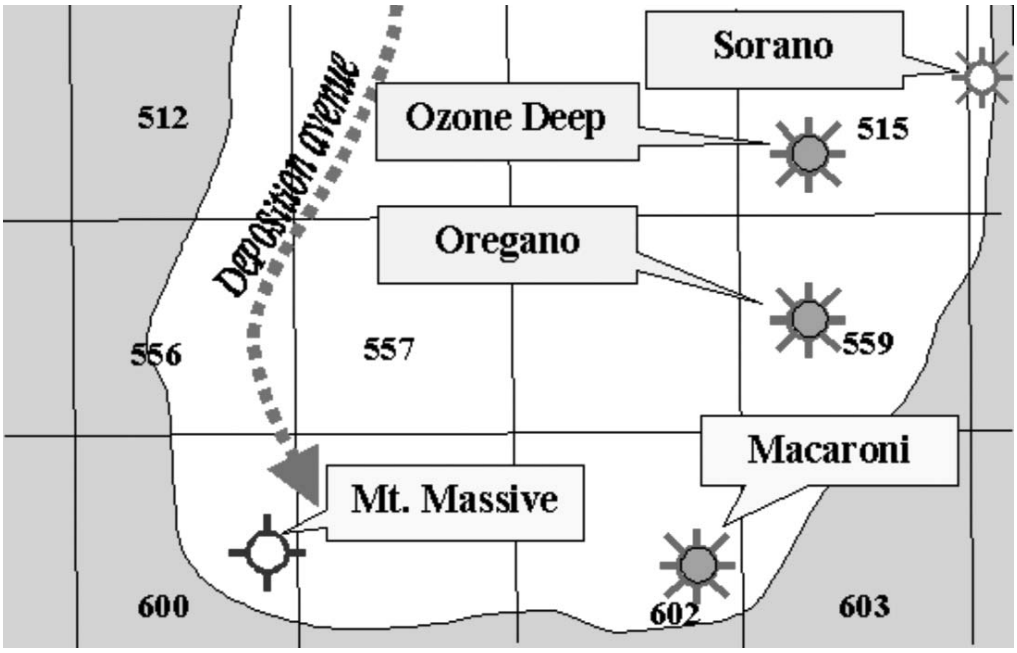
The back-bone of assessing entrapment and sealing capacity is predicting pore pressure in the shale beds with respect to the measurable pressure in the reservoir sand facies.

The back-bone of assessing entrapment and sealing capacity is predicting pore pressure in the shale beds with respect to the measurable pressure in the reservoir sand facies. Moreover, defining the fracture pressure envelope in relationship to the effective stress window of that reservoir allows one to estimate hydrocarbon column height in a trap (its retention capacity).

This paper presents a case study comparing two play prospects on the southern flank of the Auger Basin, a highly prolific salt-withdrawal mini-basin in the deepwater of offshore Louisiana.

The Mt. Massive prospect (Garden Banks Block 600), located on the southwest side of Auger Basin, is separated from Macaroni Field (Garden Banks Block 602) by a trough. The plays share the same stratigraphic column, which thickens on the west side. Sediment feeder avenues for Mt. Massive on the southern tier of Auger Basin were predicted to be in proximity to the western side of the

HGS General Luncheon *continued on page 49*



A sketch map shows the salt boundary, depositional avenue, fields, and the location of Mt. Massive in relation to Macaroni Field.

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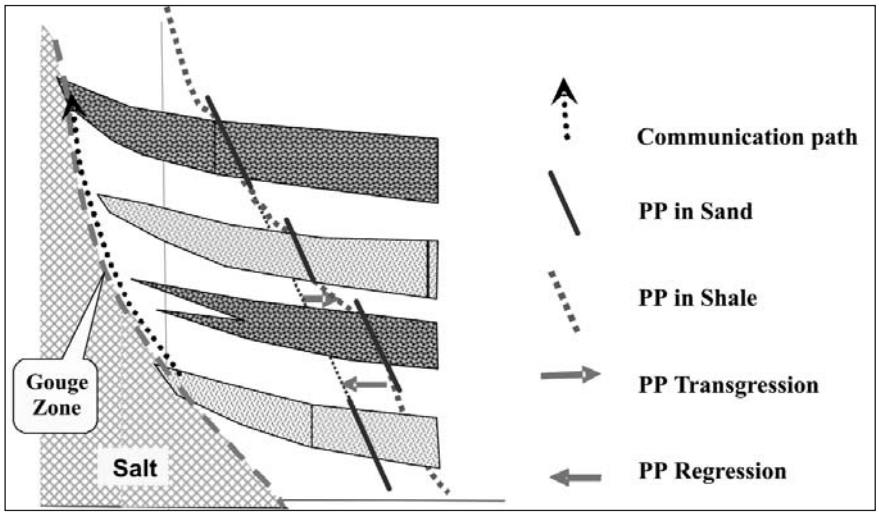
basin prior to salt piercing. Prior to testing the Mt. Massive prospect, it was compared with Macaroni Field and deemed a low-risk prospect. Once drilled, however, the results of the Garden Banks 600 #1 well were disappointing, as most of the target objectives were revealed to be wet sands, and the well was plugged and abandoned.

A post-drilling comparison of geopressure and sealing capacity shows that the Macaroni Field is in a different pressure compartment system than Mt. Massive. A ridge of salt at the flank of the field may offer an explanation for the effective seals at the targeted strata and resulting entrapment of commercial hydrocarbons at Macaroni Field. On the other hand, at the Mt. Massive prospect, a salt wall that bounds the southwestern flank of the Auger Basin is responsible for the breached seal. ■



A geopressure model shows PP transgression where reservoir type beds (sand) pinch out before they reach the salt gouge zone. On the other hand, regression (breach) takes place where salt pierces the reservoir section.

Biographical sketch

Dr. Selim Shaker earned his PhD in geology in 1973 at Assuit University in Egypt. He retired from Phillips in 2000 after 20 years of service and established Geopressure Analysis Services (G.A.S.). In his 30+ years of worldwide experience in the oil industry, his primary focus has been on the shelf and deepwater in the Gulf of Mexico. He has conducted several regional studies and written numerous papers on the importance of geopressure compartmentalization with regard to play concepts, leads and prospect assessments.

HGS CONTINUING EDUCATION COMMITTEE PRESENTS

Rock-Based Integration:

Geologic Interpretation of the Integration of Seismic and Petrophysical Data

by

Roger Young and Gordon Van Swearingen,

eSeis, Inc.

Thursday, February 17, 2005
8 am–5 pm
Registration table opens at 7:30 a.m.

BEG Houston Research Center
11611 West Little York
Houston, TX 77441
(Use Cunningham St. entrance)

Workstations allow us to display the seismic wiggle in a variety of ways. The geologist's thoughts, however, may relate more to outcrops or rock samples than to strange formulations of acoustic impedance. As a result, the relationships between the physical properties (rock type, porosity and fluids) and seismic attributes can be ambiguous, counter-intuitive and difficult to interpret geologically.

This one-day short course demonstrates the effectiveness of "Seismic Petrophysics," a unique method that focuses on integrating ***rock-based*** information from

well logs,

seismic inversion,

AVO analysis and

seismic velocity analysis

to yield the physical properties of **rock type, porosity and reservoir fluids**.

Registration Form

Rock-Based Integration:

Geologic Interpretation of the Integration of Seismic and Petrophysical Data

Name: _____ Company: _____

Address: _____ City: _____ State: _____ Zip: _____

Phones: _____ E-mail: _____

Payment (USD$): _____
Credit Card type (circle one): VISA MASTERCARD AMERICAN EXPRESS DISCOVER

Name on Card: _____ Billing Address: _____

Card Number: _____ Expiration Date: _____

Signature: _____ Date: _____ Card Holder Phone: _____

***Members: $80, if registered by Feb 11; $95 thereafter. Non-Members: $105, if registered by Feb 11; $120 thereafter**

Price includes continental breakfast, lunch, and afternoon snack.

Visit www.hgs.org for details.

* Membership prices are extended to any member of (circle one): Member Number: _____

HGS GSH API Houston HAPL SIPES Houston SPE Gulf Coast SPEE Houston SPWLA Gulf Coast

Consider $20 annual dues to join HGS and save $5 off non-member prices:

http://www.hgs.org/join_hgs/join_hgs.asp

Michel T. Halbouty—A Tribute and Remembrance

by ***C.A. Sternbach***

Michel T. Halbouty passed away on November 6, 2004. He was 95 years old and had celebrated his last birthday in June of this year. In the words that follow we pause to remember a great man, a great geologist and a great friend. Portions of the following were spoken at Halbouty's funeral.

All geoscientists have come to know Michel T. Halbouty. We knew him personally or by reputation as a famous and colorful geologist. Thousands of well symbols on exploration maps all across North America bear the name Halbouty Energy. Some of these wells were drilled where others feared to tread. His was a "Wonderful Life." Because he lived such a long and productive life, 370 scientific papers entered the literature, AAPG became a stronger society of petroleum scientists, and 50 oil and gas fields were discovered that benefited the energy needs of our nation. Each of us is better for having known him.

By shaking his hand, I always felt I was shaking the hand of every geologist and wildcatter.

By shaking his hand, I always felt I was shaking the hand of every geologist and wildcatter. Halbouty knew them all. When you shook his hand, you were connected through him to the hand of Dad Joiner (the man who found the East Texas field in the 1930s) and Wallace Pratt (Humble Oil legend and founding member of AAPG), among countless others.

Mike Halbouty (second from left, standing)in 1935. "Diamond Glenn" McCarthy, the king of wildcatters, is seated. From left to right standing: Unnamed Scout, Mike Halbouty, Glenn McCarthy's brother and an unnamed landman (in suspenders).

His energy level and generous spirit were inspiring for anyone at any age. His ability to make profound contributions on many subjects was remarkable. Many presidents of AAPG "retire" after their presidential years, but Halbouty was still working hard for the geological societies 37 years after his presidency of AAPG (1967). In the field of geology no one gave so much, for so long.

Halbouty enthusiastically encouraged all petroleum geologists in their careers, especially young professionals. When the HGS group, the NeoGeos, held its first meeting, Halbouty was the speaker. The room was packed. He told how he had been the first oil independent to explore in Alaska. He told the NeoGeos that after he drilled a dry hole in Alaska he flew back to his hotel in Los Angeles and broke down in tears. But, "I did it," he said proudly. He considered overcoming overwhelming adversity in Alaska among his finest hours.

The first time I met Mike Halbouty was at an AAPG Convention. Mike's gentlemanly demeanor impressed me greatly. Years later, I sat in the front row of the AAPG Dallas Convention Legend's panel (1997). I had just joined a small independent oil company as a petroleum geologist. Mike spoke first. On the subject of stratigraphic traps, Mike was "in the zone." Halbouty had such an air of passionate conviction about the importance of finding stratigraphic traps that the whole audience was inspired and energized. Mike suffered failures, and went broke twice. Somehow he always managed to come back. This is the classic American struggle—the wildcatter story. I realized that day that by honoring wildcatter legends we celebrate the potential in all of us. His story is our story.

The discovery of Spindletop field in Beaumont, Texas, in 1901, and the years it flourished always fascinated Mike. He loved to tell stories about how geologists figured out the oil potential. I was fortunate to visit the Spindletop site with Halbouty twice. In 2001 "a busload" of more than 250 HGS and AAPG members celebrated the 100th Anniversary of Spindletop. I remember as Halbouty slowly raised his

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Michel T. Halbouty continued from page 51

outstretched arms he lowered his voice in reverence to the secret he was about to reveal: "Spindletop grew slowly—created a big fetch area."

When the HGS organized a 90th birthday celebration for Mike in 1999, hundreds of HGS and AAPG members attended. His energy appeared boundless. One of his many friends said, "you know he's 90—but he sure doesn't act like it!" On another birthday a group of us took Halbouty on a field trip to the base of the Hockley salt mine. For the world-renowned salt dome expert, it was his first trip inside a salt dome. We descended 1,500 feet below the surface in a rickety basket into a hot and sweaty underworld—for a geologist, what could be better?

Two years ago I visited Mike to ask him to participate in a panel discussion on wildcatting for the Houston Geological Society. Halbouty looked over the list of notable speakers. One panelist found more than 15 trillion cubic feet of gas. Another panelist had participated in 10,000 wells. Then Halbouty grinned at me: "These guys are pretty good, but you need a REAL wildcatter!" Mike moved heaven and earth to re-arrange a conflict with his schedule so he could help assure success for the HGS Legends program. I learned an important lesson about friendship that day. Little did we realize then that this would be his last public appearance before the HGS. Fortunately, the HGS preserved the 2003 Legends panel on video, and if you can get a copy, I encourage you to listen to Mike's speech.*

In recent years, I treasured regular discussions with Mike on wildcatting, geology and professional societies. Two days before he died, he offered me counsel on all three. On the subject of wildcatting, he stayed on message. He reminded me as he reminds all of us to "never give up, never lose hope!"

I will always remember him personally telling the story about his first job.** Halbouty was 22 years old, and he came to the conclusion that a well about to be abandoned in salt was really just a salt overhang inches above big oil pay. After getting thrown off the rig floor by a drilling superintendent who refused to take another core, Halbouty drove in muddy coveralls to the mansion of Miles Frank Yount, crashed an elegant dinner party, and convinced Mr. Yount to drill deeper. The deeper zone was penetrated the next day and eventually led to production of 150 million barrels of oil at High Island field.

On retelling the story, Halbouty was full of admiration and affection for Mr. Yount. All his life, Halbouty had that rare combination of brains and guts: parents of success. Every time a geologist stands up to criticism about new exploration ideas, Mike Halbouty is with him in spirit.

C.A. Sternbach and M.T. Halbouty at HGS Legends *Panel, January 2003*

A remembrance of Mike Halbouty would not be complete without mention of his 1967 landmark paper "Heritage of the Petroleum Geologist."*** In his Heritage paper, Halbouty concludes that the petroleum geologist needs to "learn to be a good steward, not to hide his knowledge, but to expose it and let it grow so that the heritage he leaves to his successors may be even finer than that which he received himself." No single petroleum geologist advanced the role of geologists in the oil business more than Michel T. Halbouty. When AAPG adopted a Heritage theme for the 2002 Convention, attendance hit a 20-year high. During that convention Mike delivered the keynote address for the AAPG Heritage convention luncheon. As a tribute to Mike, the AAPG Houston convention 2006 has adopted another Halbouty theme: "Perfecting the Search."

Mike, we know you are in Heaven. By now you have gotten hold of St. Peter's maps of all the undiscovered oil and gas fields in the world. Please remember your friends down here who still struggle and send us some clues!

Wherever we go, whatever we do, Michel T. Halbouty's spirit will be with us and guide us, and he will live forever in our hearts. ■

Footnotes:

**Legends in Wildcatting 2003* videos are available through the HGS office.

***Wildcatter: the Story of Michel T. Halbouty and the Search for Oil*, by Jack Donahue (McGraw-Hill, 1979).

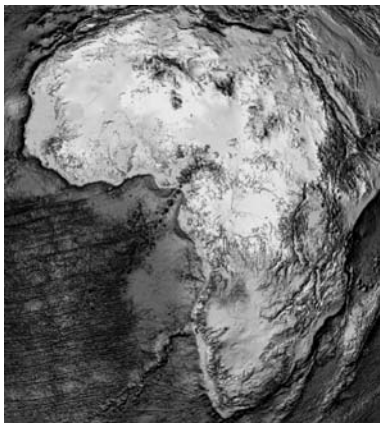
****Halbouty, Michel T., 1967, Heritage of the Petroleum Geologist, *AAPG Bulletin*, v. 51, no. 7, p. 1179–1184

FIRST ANNOUNCEMENT AND CALL FOR PAPERS

The 4th HGS/PESGB International Conference on African E&P

Houston, 7–8 September 2005

This annual conference, which alternates between London and Houston, has become established as the primary technical E&P conference on Africa. Scheduled for 7-8 September 2005 in Houston, a two-day program of talks is planned along with poster presentations and exhibits from sponsoring companies.



The conference covers all aspects of African E&P, with particular emphasis on new ideas for exploration, the geology of the continent, and application of emerging technologies.

The conference series is organised jointly by members of the International Explorationists Group of the Houston Geological Society (HGS) and the Petroleum Exploration Society of Great Britain (PESGB). The intention this year is to limit the program to two days by selecting the very best talks.

Technical contributions and sponsorships are welcomed now. Although the program will not be finalized until May, please submit topics or abstracts as soon as possible for consideration of the Technical Program Committee by email to africa05@sbcglobal.net

Inspiring Today's Fresh Faces

Where Are They? Who Are They? How Can We Meet Them?

by ***Natalie Uschner***

Remember the early eighties boom, with the excitement of being hired as a young geoscientist into the petroleum industry, looking for networking opportunities to meet other geoscientists in various companies? At that point in time, the HGS was constantly replenished with young new hires and "fresh outs" ready to enter the workforce. There were ample opportunities to meet "newbies" and glean interesting information about their thoughts on the inner workings of the industry.

Today, new professionals are less common in our workplace, a result of fewer geoscience students and a slow return to hiring by the companies. Even so, smart and talented young geoscientists are still entering the industry and joining the HGS, but where are they and what have they been doing lately?

Did you know that there is an active group within the HGS where the interests of the "young geoscientist" are highlighted? It's called the NeoGeos!

The NeoGeos is a group of young professional geoscientists in the HGS who meet regularly to learn about the industry, socialize and network in the Houston area. Two ambitious young professionals in the HGS started this group of approximately 200 members in 1999 to provide an outlet to enable networking with other "new hires."

NeoGeos is also open to HGS members who would like to meet (and mentor) the younger generation of geoscientists!

Though the guidelines of our group state that members should have less than five years' experience, the group is open to all, including interns, graduates and those searching for employment. An especially important note is that the NeoGeos is also open to HGS members who would like to meet (and mentor) the younger generation of geoscientists! It is our hope that all members of the NeoGeos will become active members of the HGS.

So What Have the NeoGeos Been Doing Lately?

2004 was such an exciting year for the NeoGeos. We participated in monthly networking socials, and in the process tried out various bars and restaurants around town. Bimonthly events included field trip tours, dinner meetings, workshops and community service events.

BakerHughes facility tour participants: pictured from left Jared Haight, Kristi Stepien-Wees, Jerry Comeaux, Chris Chaffin, Ken Hedrick, John Layman, Ianthe Sarrazin, Vernon Moore, and Qunling Liu.

Our field trips allow members to get a first-hand view of interesting tools and procedures that they may not otherwise have a chance to see. For example, in January, NeoGeos member Jared Haight arranged a BakerHughes facility tour where we learned about down-hole tools, fishing tools and packers used at the wellsite.

Core Laboratories hosted a facility tour in October, and members learned about techniques for analyzing cores.

In 2004, the focus for our dinner meetings was career management. In April, we conducted a resume writing talk and workshop with Kelly Scientific Resources. Members brought their resumes to gain insight on how they

Inspiring Today's Fresh Faces *continued on page 57*

Inspiring Today's Fresh Faces

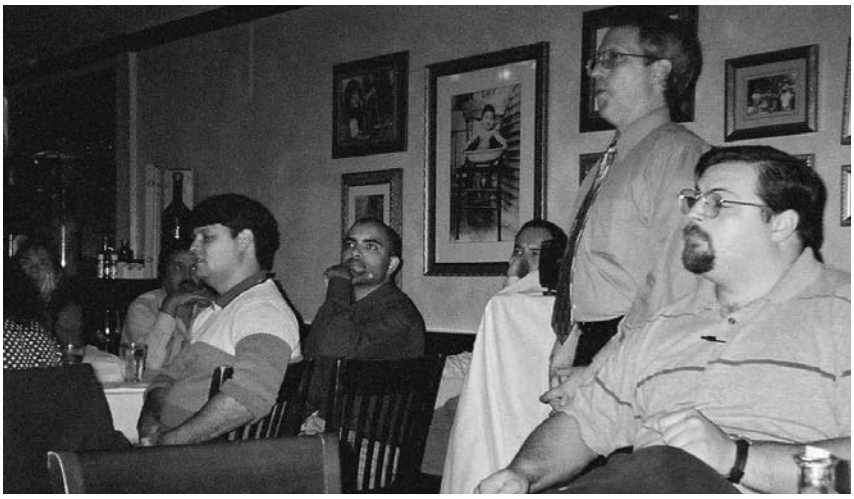
continued from page 55

could be improved. Glen Pankonien of Collarini Energy Staffing, Inc. gave a presentation on career management in November. This talk focused on how to plan your career at different stages of your life, and included a discussion on trends in the geoscience industry.

Community outreach is also important to the NeoGeos, and this year we participated in the Adopt-a-Beach Cleanup at Galveston Island in September. We picked up a total of 200 pounds of trash in just a four-block stretch.

NeoGeos 5th Anniversary Birthday Bash

The highlight of 2004 was the NeoGeos 5th Anniversary Birthday Bash at St. Arnold's Brewery. To celebrate our 5th anniversary, all previous NeoGeos chairpersons were in attendance, which allowed us to revisit some of the past accomplishments of the NeoGeos group. We had a great turnout and everyone had an excellent time sampling the brews and eating BBQ. We finished the night with an interesting brewery tour.



Glen Pankonien (standing) speaks about career management as Alex Filguersas, Kenneth Arroya and Andrew Silver look on.

And finally, our socials are a great outlet to mingle with others in the industry, and our members have always enjoyed this pastime. In April, the NeoGeos sponsored a very successful joint social with the SPE Emerging Leaders group to enable more dialog and foster a relationship between geoscientists and engineers in our industry. In the future, we would like to see more members of the greater HGS membership attend. The socials are listed on the HGS calendar, and we welcome you to join us.

Now that you've seen what we do, come join us. Please check out the HGS Website at www.hgs.org for information on past and future NeoGeos events. In addition, for information on how to subscribe to the NeoGeos monthly email newsletter, follow the instructions on the NeoGeos committee page at www.hgs.org. ■

Former and current NeoGeos chairpersons: from left, Andrea Reynolds, Tom Miskelly, Helena Griffiths and Natalie Uschner.

Remembrances

Since the last report from the Remembrances Committee (10/5/04), our geological community has lost the following members:

Clyde David Martin of Houston, Texas

"I'm a Texan, first;
a Southwesterner, second;
an American, third."

Always an Aggie!

Beloved father of three and grandfather of four Clyde passed away on November 9, 2004, in the company of daughters and friends at Memorial Hermann Memorial City Hospital.

C. David, as he was widely known, was born in Lamesa, Texas on March 24, 1926, the son of Clyde Dixon and Anzora Jones Martin. He graduated from Hamilton High School in Hamilton, Texas, and attended Texas A&M, from which he graduated in 1950 with a degree in geological engineering. He interrupted his college studies to serve in the Army Air Corps in the Pacific Theater during World War II. He married to Joyce Chandler, also of Hamilton, on June 2, 1951.

David worked as a petroleum geologist, specialized in offshore Louisiana. He started his career with Sunray Oil Company, spent 19 years at General Crude Oil company and worked later for SOHIO and British Petroleum, among others. He was a member of the Houston Geological Society and the American Association of Petroleum Geologists.

David was a man of strong opinions and unyielding integrity. He always tried to do the right thing and to instill his values in his daughters. He was committed to recycling. In addition, he was an avid coin collector and, after retirement, a collector of American Oak furniture. He loved all things Texan, and he liked to sign his letters, "Texas is the greatest and its people the finest." He was an ardent Aggie, and he endowed a scholarship at his alma mater for a member of the corps and band.

He is survived by his three daughters, Julie Martin (Bruce Fitzgerald) of Washington, DC, Leslie Martin of Winston-Salem, North Carolina, and Mary Martin-Smith (Martin Smith) of Wake Forest, North Carolina, and his four grandchildren, Katie and Kyle Fitzgerald and Alex and Andrew Martin-Smith. He was predeceased by his parents, his sister Melissa Martin and his wife, Joyce Chandler Martin. In his later years, he was often in the company of his valued friend, Shirley Porter.

The family wishes to thank Dr. Akram Shakashiro and the MICU staff at Memorial Hermann Memorial City Hospital for their kindness and support.

Government Update

*by **Henry M. Wise, P.G.** and **Arlin Howles, P.G.***

From the *Texas Register*

The purposed dry cleaner remediation rules are out. These rules establish: 1) performance standards for dry cleaning facilities, 2) requirements for the removal of dry cleaning solvents and waste from dry cleaning facilities, 3) criteria to be used in setting priorities for the expenditure of money from the dry cleaning fund, and 4) criteria under which the agency may determine the level at which corrective action is considered complete. These rules are found at http://www.sos.state.tx.us/texreg/sos/PROPOSED/30.ENVIRONMENTAL%20QUALITY.html#319.

Corresponding changes to 30 TAC Chapter 37, Financial Assurance for dry cleaners, are also proposed in this issue of the *Texas Register*. They are found at http://www.sos.state.tx.us/texreg/sos/PROPOSED/30.ENVIRONMENTAL%20QUALITY.html#311.

To better ensure that all payable reimbursement claims can be paid before the Petroleum Storage Tank Remediation (PSTR) Account sunsets in 2006, given limited agency resources, the standard for the reimbursement of eligible cleanup expenses related to leaking petroleum storage tank (LPST) sites has been revised to move away from an "actual cost"-based system. Reimbursement will instead be based on the lower of either line-item amounts listed in Subchapter M of this chapter or line-item amounts listed in invoices submitted with the claim, with limited updates to those Subchapter M line-item amounts proposed in this rulemaking. In addition, better accountability provisions are proposed to be added in the reimbursement rules as a result of the agency's experiences with petroleum storage tank (PST) audit cases over the last few years. These new regulations can be found at http://www.sos.state.tx.us/texreg/sos/adopted/30.ENVIRONMENTAL%20QUALITY.html#545.

Texas Commission on Environmental Quality Update

The TCEQ is in the process of revising the Affected Property Assessment Report (APAR) form. At this time the new version is in draft form and is not yet available for use as the "official" form. You can view or download the revised draft form on the Web at www.tnrcc.state.tx.us/permitting/trrp.htm.

Groundwater Availability Models Now Available from TWDB

In 2001, the 77th Texas Legislature gave the Texas Water Development Board (TWDB) a challenging task: develop or obtain groundwater availability models (GAMs) for all of the major aquifers of Texas by October 1, 2004. The TDWB has announced that that goal has been accomplished. The Texas Legislature funded the GAM program to develop numerical groundwater flow models to help groundwater conservation districts, regional water planning groups and others assess current groundwater availability and the effect of pumping and drought on the state's groundwater resources. Unlike previous modeling efforts, new models developed under the GAM program had substantial stakeholder involvement. In some cases, the GAM represented the first modeling work for the area. All of the models, reports and support data are available at www.twdb.state.tx.us/gam.

Fiscal Year 2005 Funding Incomplete; Congress to Convene Lame-duck Session

Congress passed its first continuing resolution (CR) before leaving Capitol Hill to head home for the upcoming elections. The CR will keep the federal government operating at the fiscal year (FY) 2004 levels through November 20, 2004, after which Congress will return to continue to debate the funding levels for various agencies for FY05, which began on October 1, 2004. Federal agencies with budgets that have been approved by Congress, such as the Department of Defense, will not be affected by the CR. Members were expected back in Washington on November 16 for a lame duck session to finish the appropriations bills. Some congressional observers believe Congress will pass another CR that will extend through Thanksgiving while others think this fight will drag into the New Year. Another school of thought suggests that the House and Senate are simply too divided and too far apart on these spending measures to resolve their differences. This divide is unlikely to change after the election, thus some believe Congress will leave their work on the FY05 budget incomplete and instead fund the government for an entire year at FY04 levels—a move that would stymie new research and initiatives at our nation's science agencies as well as introduce additional confusion into next year's budget process.

Renewable Energy, Brownfields, Bio-diesel Approved

Late on October 7, Congress passed H.R. 4520, the corporate tax bill that contains several tax breaks for the energy industry. Although the bill's primary purpose is to eliminate the now 12% tariff on American goods in Europe from a World Trade Organizaton (WTO) injunction against American trade policies, it carries along hundreds of coattail tax breaks and subsidies for a myriad of industries. Twenty-six oil companies would receive over $60 billion under the tax break. The bill did not include incentives to **Government Update** *continued on page 63*

HGS Welcomes New Members

Effective November 1, 2004

ACTIVE MEMBERS

Richard Aurisano
Hal Bertram
Lee Billingsley
Kenneth Blondeau
Michael Burnaman
John Carr
Wesley Combs
Carris Covarrubias
Edgardo Covarrubias
Donald Crider
Kevin Eastham
William Gibbs, Jr.
Ian Gordon
Robert Hough
Mark Jones
Joseph Kruger
Michael Ledet
Rachel Masters
Brenda McCaleb
Mo Meghani
Norbert Ndofor
Ashipa Oluwaseun
S. Parker
Krishna Pokhriyal
Joseph Ponder
Brian Pregger
Thomas Zimmerman
Chris Hill
Dennis Jordan
John Killinger
James Rine

ASSOCIATE MEMBERS

Mike Cunningham, Jr.

STUDENTS

Joshua Kull

Welcome New Members

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improve energy efficiency; however, it did include incentives for bio-diesel technologies. Also included in the bills were provisions related to refiners who blend gasoline with ethanol and to the Highway Trust Fund. Congress included a tax break for not-for-profit corporations that clean up brownfields. More information on the corporate tax bill is available at http://www.agiweb.org/gap/legis108/energy.html.

Alaska Natural Gas Pipeline Passes House, Senate

After years of hearings and congressional debate, Congress included authorizing language for the Alaska natural gas pipeline to the fiscal year 2005 Military Construction Appropriations bill that was passed shortly before Congress adjourned for the upcoming election. According to Environment and Energy Daily, the language includes "a ban on a northern route for the line that would bypass Alaska markets, provisions that allow Alaska to control in-state use of the gas to promote its use for heating or enhancement of a gas industry in Alaska, and a streamlined permitting and expedited court review process to speed construction and limit judicial or regulatory delays...The bill also includes $20 million for a worker job training program in Alaska, including $3 million for construction of a Fairbanks training facility." This language, which effectively provides all the necessary prerequisites for the $20 billion project to get under way, was welcomed by the Alaska congressional delegation. For more information on the Alaska natural gas pipeline, go to http://www.agiweb.org/gap/legis108/energy.html.

President Bush Signs Earthquake and Wind Hazards

On October 8, the House of Representatives approved the National Earthquake Hazards Reduction Program (NEHRP) Reauthorization Act of 2004. The President signed the bill into law on Monday, October 25. H.R. 2608 reauthorizes the NEHRP program for five years, moving it from the jurisdiction of the Federal Emergency Management Agency (FEMA) to the National Institute of Standards and Technology (NIST). The bill authorizes $900 million to be spent over the next five years on implementing earthquake hazard reduction measures as well as funding earthquake research activities, such as the Advanced National Seismic System. A pleased Representative Nick Smith (R-MI) said: "Over the past two weeks, significant earthquake events in California and Washington have garnered our attention and concern. Thanks to NEHRP-supported monitoring equipment managed by the U.S. Geological Survey and the National Science Foundation, scientists have been able to collect an unprecedented harvest of data from both of these geologic events." The bill also included authorization for a new National Windstorm Impact Reduction Program for three years. According to the American Society of Civil Engineers: "If funded, the new wind hazards program would promote research and other activities at FEMA, NIST, the National Oceanic and Atmospheric Administration (NOAA) and NSF. The program is modeled after NEHRP and is aimed at studying the impact of wind on structures and on developing cost-effective ways to mitigate those impacts. The legislation authorizes $72.5 million over three years for this program." Rapid population growth and development in high wind risk coastal areas and an estimated $4.5 billion in windstorm damage each year between 1995 and 2002 have provided great impetus for the passage of this bill. For more information on this new law, go to: http://www.agiweb.org/gap/legis108/NEHRP.html.

Climate Change Modeling: Senate Bill Would Invest in Computing

On October 10, in a rare Sunday session, the Senate passed H.R. 4516, Department of Energy (DOE) High-End Computing Revitalization Act. This bill will invest $165 million over two years in an advanced computer research and development program within the DOE. The bill's sponsor, Representative Judy Biggert (R-IL), said that it would help the United States develop computers that rival the Earth System Simulator supercomputer in Japan that is used for climate modeling and other environmental applications. According to an auxiliary House Committee report, the United States fell behind in supercomputing because of a complete reliance on private investment rather than direct government development. This bill, which was expected to pass in the House during the lame-duck session in November, attempts to reinstate the US as the supercomputing leader. For more information on climate change, go to http://www.agiweb.org/gap/legis108/climate.html.

Natural Gas Hearings

On October 7, the Senate Joint Economic Committee, chaired by Senator Bennett (R-UT), held a hearing on the long-term economics of natural gas. Senators Reed (D-RI) and Bingaman (D-NM) were also in attendance. In his opening statement, Bennett noted that the domestic industry is being negatively affected by the high cost of natural gas. Reed also voiced concern over gas prices; however, he said, "I myself believe very strongly that the best strategy we have for dealing with these conditions in the natural gas market is to put a much greater emphasis on energy efficiency and conservation."

Dr. Danice Yergin, Chairman of Cambridge Energy Research Associates, attributes the volatile gas prices to a simple rise in demand without a concurrent rise in domestic production, resulting in an increased dependence on foreign Government Update continued on page 65

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HOUSTON Feb. 14-18, 2005

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- Giant Oil and Gas Fields
- Well Log Analysis
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- Practical Salt Tectonics
- Essentials of Subsurface Mapping
- Permeability in Carbonate Rocks

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liquid natural gas (LNG) imports. Paul Sankey, the senior energy analyst for the Deutsche Bank, emphasized the potential role of LNG in America's energy future. He said, "abundant global gas is the overpoweringly logical solution to the increasing shortage of energy in the US." Mr. Magruder, a representative from the Independent Petroleum Association of Mountain States, focused his testimony on increased drilling for natural gas. He said that more than 25% of the nation's natural gas comes from the Inter-mountain West, an area where half of the land is owned by the federal government. Magruder criticized the federal land leasing process, which he thinks is abused by environmentalists who make legal appeals. William Prindle, speaking on behalf of the American Council for an Energy-Efficient Economy (ACEEE), emphasized the importance and near term feasibility of energy efficiency standards. According to a study by the ACEEE, if the United States could reduce gas demand by 4% over the next five years, the wholesale natural gas prices would be reduced by 20%, "a savings which would put over $100 billion back into the US economy at a cost of $30 billion in new investment, of which $7 billion would be public funds." Because of the limits of the supply side of the gas equation, Prindle suggested that in the short term, the federal government should move towards increased funding for efficiency deployment programs, expanded public benefits funds for efficiency, tax incentives for high-efficiency technologies and a national efficiency and conservation campaign. For a full wrap up of this hearing, see http://www.agiweb.org/gap/legis108/naturalgas_hearings.html.

In related news, Senator Stevens (R-AK) held a Senate Competition, Foreign Commerce, and Infrastructure Subcommittee hearing on the domestic supply and cost of natural gas. In his opening remarks, Senator Stevens expressed his support for the proposed Alaskan natural gas pipeline. Senator Lautenberg (D-NJ) expressed his concern that natural gas prices on the east coast, specifically in his home state of New Jersey, were the highest in the country. He remains interested in improving distribution infrastructure while taking extra caution to minimize environmental risks.

Mr. Caruso discussed the findings of the Energy Information Administration's new report discussing the spike in natural gas prices since 2000. Since then, American companies have increasingly turned to natural gas to satisfy their energy needs, thereby moving from a natural gas surplus to a deficit. Because of this change, the prices of propane, natural gas and heating oil have gone up 22%, 15.3%, and 28.4%, respectively. Mr. Wilkinson, who represents the gas industry, testified that since natural gas demand has been increasing more rapidly than supply, resulting in a tight energy market and volatile gas prices, the federal government and private industry should take aggressive action to increase supply. Gary Huss, the president of Hudapack Metal Treating, spoke on behalf of the National Association of Manufacturers. He emphasized that since the manufacturing industry is reliant upon the supply of natural gas to meet its energy needs, the recent spike in gas prices has had a significant negative effect. Finally, Ms. Hauter weighed in on the importance of regulating industry and improving the efficiency of our economy to lower the demand side of the equation. She said that deregulation of the energy markets in the 1990s has led to massive market manipulation by corporations such as Enron. For a full committee hearing summary, see http://www.agiweb.org/gap/legis108/naturalgas_hearings.html.

Grand Canyon Bookstore Moves Book to "Inspirational" Section

According to an October 15 article in the *Washington Post*, the controversial book *Grand Canyon: A Different View*, Tom Vail's biblical explanation for the formation of the Grand Canyon, has been moved from the natural science section to the inspirational section in the Grand Canyon National Park bookstore. This move complies with a letter signed by the presidents of American Geological Institute, American Geophysical Union, Association of American State Geologists, Geological Society of America, National Association of Geoscience Teachers, Paleontological Society and the Society for Vertebrate Paleontology sent to the National Park Service last December, which states: "*The Grand Canyon: A Different View* is not about science and we strongly urge that, if it remains available in Grand Canyon bookstores, it be clearly separated from books and materials that do discuss our scientific understanding of Grand Canyon geology. As you know, the Grand Canyon provides a remarkable and unique opportunity to educate the public about Earth science. In fairness to the millions of park visitors, we must clearly distinguish religious tenets from scientific knowledge."

Evolution/Creationist Battles Ensue Maryland, Pennsylvania, and Wisconsin

In October 2004, the Charles County Board of Education in Maryland ignited a firestorm of criticism when it published a proposal to 1) censor reading lists for "immorality" or "foul language," 2) to invite an outside organization to hand out Bibles in schools and 3) to teach the theory of creationism in science classes. At a public forum, more than 200 people passionately expressed their views, and according to the *Washington Post*, their resounding sentiment was that the board should not focus on religious and moral lessons in the public schools. No action has been taken on the proposals. The seven board members have split into small groups to decide which items should come back before the full board for more discussion. They said the meeting was a chance for the public to weigh in on the issues before anything is decided. For more information on the recent surge of evolution vs. creation activity go to http://www.agiweb.org/gap/legis108/evolution.html.

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In a surprise move, a Pennsylvania school board recently voted to include "intelligent design" in the district's science curriculum. At its meeting on October 18, the Dover Area School Board revised the science curriculum to include the following: "Students will be made aware of gaps/problems in Darwin's Theory and of other theories of evolution including, but not limited to, intelligent design. Note: Origins of life will not be taught." The district is now apparently the first school district in the country to require the teaching of "intelligent design"—a move that prompted two school board members to resign and that is likely, locals fear, to result in a lawsuit.

Casey Brown, a ten-year veteran of the school board who resigned over the vote, commented, "There seems to be a determination among some board members to have our district serve as an example; to flout the legal rulings of the Supreme Court, to flout the law of the land. They don't seem to care. I think they need to ask the taxpayers if they want to be guinea pigs," adding that the board has already spent almost one thousand dollars in legal expenses. The National Center for Science Education's (NCSE) Executive Director Eugenie C. Scott told the *York Daily Record*, "Intelligent design is just a sham to get creationism into the curriculum," explaining that "even if [its advocates] haven't convinced the scientific community, they have been able to convince the politicians … And that's too bad for the students in Dover."

In October 2004, the Grantsburg School board in Wisconsin adopted a new science policy that requires teachers to include "intelligent design" in their curriculum. Intelligent design will be taught under the guise of improving students' critical thinking skills through balanced instruction as, according to board chairman Dave Ahlquist, the policy is "opening the door that was closed before and was too narrow." However, the Deans of the University of Wisconsin expressed their stern disagreement with the policy in a letter sent to the school board, which lambastes the teaching of religious non-scientific principles in science classes. Wisconsin residents who wish to become involved in this issue should contact the National Center for Science Education at www.ncseweb.org. ■

Volunteer of the Month: Natalie Uschner

Natalie Uschner receives the Volunteer of the Month Award for January 2005 for her dynamic role as the chairperson of the NeoGeos. Natalie stepped into this position in 2003 and has invigorated the members by holding exciting events for the young professional group, such as the NeoGeos 5th Anniversary Birthday Bash at St. Arnold's Brewery, and field trips and dinner meetings such as October's tour of the Core Laboratories and November's Career Management dinner meeting with Glen Pankonien.

She has had an active role in keeping the group true to its roots and for infusing the group with her enthusiasm and charisma, and planning so many varied and interesting opportunities. Her goal is to raise awareness of this interesting group and to create closer ties between the NeoGeos and the greater HGS organization to foster future participation in the HGS by young geoscientists.

Natalie received her Bachelor's degree in geology from the College of William and Mary in 1998 and is currently working on her MS degree in geology-paleontology from Indiana University. She began working at Schlumberger in 2001 as a geoscientist in the Information Solutions group, where she provides support and training for geologic, petrophysical, and mapping/modeling GeoFrame applications. Her current focus is on the petrophysical software, Interactive Petrophysics.

Natalie also serves as the secretary for the WISE group (Women in Schlumberger Everywhere), and has been an active member of the HGS and NeoGeos since 2001.

Geologic Miscellany

Edited by ***Charles Revilla***

From *Pandora's Bauxite* by R. L. Bates, AGI, 1986, pp. 28–29, published by permission of the American Geological Institute:

The Lulu Mine

You're in the mining business in a modest way, at a property called the Lulu. Though six feet tall, you are known as a small mine operator. On your payroll you have a vibrating equipment manager, a destructive lab technician, an unexploded dynamite expert, a fluid agitation engineer, and a combustible gas monitor. Underground there's a nice old boy who used to be a sweet potato grower, and a tough character who was once a grizzly bear hunter (always needed a shave). Inasmuch as you keep your bills paid, you aren't visited by the delinquent tax assessor. For clean professional relaxation, you read a sanitary landfill publication. You threaten to fire your secretary when she says she's a comic strip artist, as you conclude she must be spending her evenings down at Tony's joint, peeling and telling jokes; but it turns out she just draws an occasional cartoon panel for the church paper.

All this was precipitated when I learned that at a neighboring university, which has been having a lot of checks bounce lately, there's a girl in the business office whose official title is Dishonored Check Collector. The miserable cur who dishonored her has not yet been apprehended. When last seen, he was reported to be heading for the Lulu mine.

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Stanley Baron, in his book BREWED IN AMERICA, says an oil test near Franklin, PA in 1881 inadvertently drilled into the storage vaults of Grossman's brewery and thus became the nation's first beer well. P. V. Fickett says he will enroll you in the Society for the Preservation & Encouragement of Beer Well Drilling if you'll send him a sixpack.

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A letter in *Geotimes* says that the Greenland caribou and the northern bog lemming "have published fossil records from eastern Tennessee." Peter Lessing says they must have a lot of pull with the editor, and what are fossil records, anyhow—old data? Good thinking there, and by three other readers too.

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I hardly enjoyed a minute of my vacation, what with worrying about whether California had decided on a state fossil. Well, at last I can relax, because Section 425.7 of the state code gives the official nod to Smilodon californicus, the sabre-tooth cat. Although I sympathize with Napa County's incorporated Rockhounds, who were strong for Fremontia the trilobite, I can't help feeling that the right decision has been made.

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Be first on your block to own a wok! Two or more in your wumpus woom would constitute basement woks, and -- OK, OK! But show me a person who gets hooked on this stuff and I'll show you a wokhound.

>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>> • <<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<

A paper in *Pennsylvania Geology* says certain limestones "were lithified by the solutioning of the invertebrate shells." Nonsense. Any lithificationing would result from depositioning, not solutioning.

Departmental Evolution

(Ed. note: being a 1969 commentary on the ever-changing academic world of departments of Geology)
Pp. 4–5 of *Pandora's Bauxite*, by R. L. Bates, publ. by permission of the American Geological Institute
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"What's wrong with this address, which was OK less than a decade ago?*
Professor Sigmoid Frump
Department of Geology
Backwater College
Zenith, North Dakansas

Plenty. In the first place, Professor Frump has been promoted to Dean. Second, Backwater College is now Backwater University. Third, Zenith has a zip code, without which the post office will not deliver that ceramic ashtray that you made for Dean Frump as a memento from a former student.

The address is out of date in still another respect, and here a bit of background is necessary. Some time ago, when it became apparent that Professor Frump was destined for higher things, a second man in geology was imported, and he is now in charge. As the Dean is favorably disposed toward his old department, and as the department has several loyal graduates who have done well in industry, the new man doesn't lack for support. In fact, he has added three recent Ph. D.s to the staff. The four-man department now includes an oxygen-isotope geochemist (the chairman), a theoretical petrologist, an astrogeophysicist, and a biometrical micropaleontologist. Three floors of the brand-new Aolph Sluschpitt Hall bulge with over $1.4 million worth of electronic equipment, computers, and other esoteric gear. Among them, the members of the staff hold $780,000 in research grants from the National Science Foundation and industry. A dusty, unused geology hammer has been tossed into a corner of one of the labs. The word stratigraphy is mentioned seldom, and economic geology never. Only a very few students, who mastered physical chemistry and calculus in the ninth grade, are considered undergraduate majors.

All of which brings us to the fourth thing wrong with the address. The Department of Geology is now the Department of Geochemical & Geophysical Sciences.

So much for fantasy. Of course the facts are different. A tabulation of 304 departments listed in the AGI Directory of Geoscience Departments yields this informatioin about what departments call themselves.* The traditional Department of Geology (or Geology Department) applies to 206, or 68%. Another 43, or 14%, are in the time-honored joint department with geography. Thus 82% of departments retain an orthodox name. The rest range widely. Eighteen, or 6 %, are now Department of Earth Science (or Sciences). Almost the same number have opted for Geological Sciences (15) or Geosciences (2). Ten are variants of Geology & Engineering, and 7 of Geophysics. In a class by themselves are Earth & Atmospheric Sciences (SUNY, Albany), Earth & Space Sciences (SUNY, Stony Brook), and Earth l& Planetary Sciences (Pittsburgh). In such a cosmic context, how quaint and antiquated the word geology seems (bold print and italics added for emphasis)."

**Ed. note: the year now being 2005, there would seem to be a place for some research into how much further change has occurred in the categories and names dealt with by Mr. Bates in 1969.*

CALL FOR PAPERS

BUDDING NEW TECHNOLOGIES

Southwest Section AAPG 2005 Convention

April 10-13, 2005

Fredericksburg, Texas

The Southwest Section is seeking paper and poster presentations for the 2005 Southwest Section Convention to be held April 10-13, 2005 in Fredericksburg, Texas. There will be Technical Sessions on Monday, April 11th in the morning and afternoon, and only morning sessions on Tuesday, April 12th and Wednesday, April 13th. We are soliciting papers covering topics from field studies to emerging technologies.

With historical Fredericksburg as the backdrop for the convention, we anticipate a rather sizeable turn out. This would be a great opportunity for you, as an author, to present your work before a large and appreciative audience.

The planned attractions for the convention include a German Festival with an Oompah Band, a Wine and Wildflower Tour, shopping for the spouses and, of course, the ice breaker which will be held at a local brewery. Mark your calendars and watch for coming announcements. If you have any questions about the convention, contact Mike Party (Convention Chairman) at (432) 686-5971 or by email at mparty@wbltd.com. We hope to see you in Fredericksburg!

Deadline for submittal of papers is December 15th 2004.
If you would like to present a paper or poster, please contact:

David J. Sivils, Tom Brown, Inc., dsivils@tombrown.com
(432) 688-9642 (Office) or (432) 682-5034 (Fax)

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Qualifications for Active Membership

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To the Executive Board: I hereby apply for ❑ Active or ❑ Associate membership in the Houston Geological Society and pledge to abide by its Constitution and Bylaws. ❑ Check here if a full-time student.

Name: _____
Address: _____

_____

Home Phone: _____ Spouse's Name: _____
Email: _____
Job Title: _____
Company: _____
Company Address: _____

_____

Work Phone: _____ Fax Number: _____
Circle Preferred Mailing Address: Home Office
Professional Affiliations:
❑ Active AAPG Others: _____

Professional Interest:
❑ Environmental Geology
❑ International E&P
❑ North American E&P (other than Gulf Coast)
❑ Gulf Coast E&P (onshore & offshore)

Membership Directory Preference
❑ CD Rom
❑ Printed

School _____
Degree _____ Major _____ Year _____

School _____
Degree _____ Major _____ Year _____

School _____
Degree _____ Major _____ Year _____

Earth Science Work Experience _____

_____

_____

Applicant's Signature _____ Date _____

Endorsement by HGS member (not required if active AAPG member)

Name: _____

Signature _____ Date _____

Membership Chairman _____ HGS Secretary _____

rev. 5/5/2003

HGA *and* GeoWives **News**

HGA

by Vicky Pickering, Third Vice President

The HGA members enjoyed the Holiday Luncheon and Musical Show in December. Many thanks are sent to Sally Blackhall and Norma Jean Jones and their committee for the fun party.

The New Year will bring exciting things to do. Monday, February 14, 2005 will be Bridge/Game Day Luncheon at the Junior League Tea Room. Daisy Wood and her committee will make this a day you should not miss.

If you would like to join HGA please fill out the form in the *Bulletin* and mail it as directed.

Two bridge groups are available each month. One meets on second Thursday. Call Audrey Tompkins at 713-686-0005 for reservations. The second group meets on third Wednesday. Call Daisy Wood at 713-977-7319 for reservations and information.

Geo-Wives

Geo-Wives enjoyed a Safari to Downtown Houston in November including a ride on the MetroRail and a visit to Christ Cathedral Church. Lunch followed at Treebeards.

In December they serenaded the residents at Treemont retirement community with the singing of Christmas carols.

You are invited to join Geo-Wives using the form in the *Bulletin*.

Happy New Year to all.

As a member you are invited to join

GeoWives

2004–2005 dues are $7.50

make check payable to *GeoWives* and mail to:

Dene Grove
12715 Pebblebrook
Houston, Texas 77024

Please provide the following

Name: _____

Sreet Address: _____

_____

City/State/Zip: _____

Telephone: _____

email: _____

I will help plan a GeoWives activity ☐
I will serve on a committee ☐
Notification / Phone Committee ☐
Courtesy / Hostess ☐
My home is available for a meeting ☐

You are invited to become a member of

Houston Geological Auxiliary

2004–2005 dues are $20.00

make check payable to *Houston Geological Auxiliary* and mail to: Margaret Jones • 1407 Lakecliff Dr • Houston, Texas 77077

HGA YEARBOOK INFORMATION

Last Name	First Name	Name Tag
Spouse Name	Name Tag	HGS Members Company
Home Phone ( )	Business Phone ( )	Business Fax ( )
Street Address	City	Zip
Birthday, Month, Day ONLY	Email Address	Home Fax ( )

Professional **Directory**

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