HGS Bulletin
Houston Geological Society
Volume 48 Number 5
January 2006

Geo-Legends 2006


Albert Bally


Arnold Bouma


Peter Rose


Peter Vail

January 9, 2006
see page 24

The Bulletin
Houston Geological Society

Volume 48, Number 5 January 2006

In Every Issue

The Houston Geological Society Bulletin (ISSN-018-6686) is published monthly except for July and August by the Houston Geological Society, 10575 Katy Freeway, Suite 290, Houston, TX 77024. Phone: 713-463-9476, fax: 713-463-9160
Editorial correspondence and material submitted for publication should be addressed to the Editor, Houston Geological Society Bulletin, 10575 Katy Freeway, Suite 290, Houston, TX 77024 or to Editor@hgs.org
Subscriptions: Subscription to this publication is included in the membership dues ($24.00 annually). Subscription price for nonmembers within the contiguous U.S. is $30.00 per year. For those outside the contiguous U.S. the subscription price is $46.00 per year. Single-copy price is $3.00. Periodicals postage paid in Houston, Texas.
POSTMASTER: Send address changes to Houston Geological Society Bulletin, 10575 Katy Freeway, Suite 290, Houston, TX 77024

Technical Meetings

Other Features

page 15

Geo-Legends 2006

page 23

page 27

page 53

About the Cover: Geo-Legends on a Sandstone backdrop.
Background photo by Howard White

Board of Directors 2004–05

http://www.hgs.org/about_hgs/leadership.asp

President (P)	Dave Rensink	Apache Corp.	713-296-6332	dave.rensink@apachecorp.com
President-Elect (PE)	Steve Brachman	Pogo Producing	713-297-5088	brachman@pogoproducing.com
Vice-President (VP)	Linda Sternbach	Kerr-McGee Corp.	281-673-6839	LSternbach@kmg.com
Secretary (S)	Susan Black	Newfield Exploration Company	281-847-6170	sblack@newfld.com
Treasurer (T)	Ken Nemeth	Schlumberger	713-513-2327	knemeth@houston.oilfield.slb.com
Treasurer -Elect (TE)	Cheryl Desforges	Ryder Scott Company	713-816-9202	Cheryl_Desforges@ryderscott.com
Editor (E)	Paul Britt	Texplore, Inc.	281-494-3155	pbritt@texplore.com
Editor-Elect (EE)	Bill Rizer	W. D. Rizer Consulting	281-392-0613	rizerwd@consolidated.net
Director 04-06 (D1)	Bill Dupré	University of Houston	713-743-3425	wdupre@uh.edu
Director 04-06 (D2)	Elizabeth Fisher	Fugro-Jason	281-859-5377	eafisher@jasongeo.com
Director 05-07 (D3)	Jim Doyle	ENI Petroleum	713-393-6189	jim.doyle@enipetroleum.com
Director 05-07 (D4)	Erik Mason	Shell	281-544-2924	erik.mason@shell.com

Committee	Chairperson	Phone	Email	Board Rep.
AAPG Delegate Foreman	Paul Hoffman	832-366-1623	tom_mccarroll@yahoo.com	D3
AAPG Convention Chairman	Charles Sternbach	281-679-7333	carbodude@pdq.net	P
Academic Liaison	Alison Henning	832-203-5016	Alison@henning.com	D3
Advertising	Lilly Hargrave	713-463-9476	ads@hgs.org	E
Advisory	Open			P
Arrangements	Lee Boatner	713-586-5728	Lboatner@houston.rr.com	VP
	Gordon Marney	281-381-5257	gmarney@sbcglobal.net	VP
Awards	Mike Deming	281-589-6093	demingy2k@aol.com	D3
Ballot	Don Scherer	713-723-8484	donnfransch@houston.rr.com	P
Calvert Memorial Fund (Graduate Students)	Carl Norman	713-461-7420	dod895@aol.com	PE
Community Outreach Committee	Walter Light, Jr.	713-823-8288	wthunderx@aol.com	P
	Cindy Gillespie	832-969-4385	clgillespie1@sprintpcs.com	P
Continuing Education	Leta Smith	713-369-0253	leta.smith@ihsenergy.com	D2
Directory	Michael S. Benrud	713-785-8700	mbenrud@houston.rr.com	TE
Earth Science Week–ESW Gen.	Martha McRae	713-869-2045	mmcrae1@houston.rr.com	D2
Earth Science Week–Logistics	Jennifer Burton	832-636-8357	jennifer_burton@anadarko.com	D2
Engineering Council of Houston	Claudia Ludwig	713-723-2511	petra@hal-pc.org	D3
	Richard Howe	713-467-2900	rghowe@pdq.net	D3
Environmental & Engineeering Geology	Bruce Woodhouse	281-600-1095	Bruce.Woodhouse@erm.com	VP
Exhibits	Mac McKinney	281-353-0661	wmckinney@houston.rr.com	D4
Field Trips	Neal Immega	713-661-3494	n_immega@swbell.net	D2
Finance	Open			T
Fishing Tournament	Bobby Perez	281-240-1234	r_perez@seismicventures.com	D4
Foundation Fund (Undergraduate Students)	John Adamick	713-860-2114	jada@tgsgeo.com	PE
Fund Raising	Mike Jobe	713-659-1221	jmjobe@walteroil.com	P
	Bonnie Milne-Andrews	832-661-6666	bonnie.milne@swiftenergy.com	P
Global Climate Change	Jeffrey Lund	713-960-0971	jwl5127@aol.com	D3
Golf Tournament	Allan Filipov	281-275-7649	afilipov@fairfield.com	D1
Government Affairs	Arlin Howles	281-808-8629	tidenv@sbcglobal.net	D1
	Henry Wise	281-867-9131	hmwise@yahoo.com	D1
Guest Night	Bill Osten	281-293-3160	bill.w.osten@conocophillips.com	VP
Historical	Open			S
Houston Energy Council	Sandi Barber	281-552-2886	barbers@saic.com	PE
HGS Auxiliary	Norma Jean Jones	281-497-3857	normajjones@cs.com	S
	Eddie Bishop	713-467-8706	ewbishop@bishorb.com	S
International Explorationists	Steve Henry	281-380-1001	geolearn@aol.com	VP
	Al Danforth, Co-Chair	713-502-2766	al.danforth@att.net	VP
	Ian Poyntz, Tech Program	281-587-9985	poyntz@hal-pc.org	VP
Library	Bill Anderson	713-666-3831	wm.anderson@sbcglobal.net	D2
Membership	Andrea Reynolds	281-544-2481	andrea.reynolds@shell.com	S
	Marsha Bourque	713-723-8490	m22799@yahoo.com	S
Museum of Natural Science	Inda Immega	713-661-3494	immega@swbell.net	D2
NeoGeos	Natalie Uschner	713-513-2000 ext. 5923	nuschner@houston.oilfield.slb.com	D4
New Publications	Tom Fiorito	713-275-7711	tom.fiorito@anglosuisse.com	D1
	Bill Rizer	281-392-0613	rizerwd@consolidated.net	D1
Nominations	Steve Levine	281-293-3896	steve.d.levine@conocophillips.com	P
North American Explorationists	Steve Earle	713-840-1980	earle50@earthlink.net	VP
	Mike Jones	713-654-0080	mike@scoutpetroleum.com	VP
Northsiders	Frank Walles	713-410-9432	frank.walles@dvn.com	VP
	Gary Coburn	281-782-7021	gc944ts@aol.com	VP
Office Committee	Deborah Sacrey	713-468-3260	dsacrey@auburnenergy.com	PE
Personnel Placement	Mike Cline	713-665-5449	mikec@txresources.com	D4
Public Relations	Valdis Budrevics	281-543-6740	valdis@budrevics.com	D3
Publication Sales	Tom Mather	281-556-9539	geomather@aol.com	S
Remembrances	Bill Robbins	713-206-7362	wcrobbins@direcway.com	S
Scouting	George Krapfel	713-989-7433	ggkrapfel@panhandleenergy.com	D4
Shrimp Peel	Lee Shelton	713- 595-5116	lshelton@knowledge-reservoir.com	D1
Skeet Shoot	Tom McCarroll	832-366-1623	tom_mccarroll@yahoo.com	D1
TechnoFest (Formerly Emerging Technologies)	Mike Allison	832-594-4079	mike.allison@dvn.com	S
Tennis Tournament	Ross Davis	713-659-3131	rossdavis@davisbros.com	D2
Vendor's Corner	Paul Babcock	713-890-3603	pbabcock@pecorp.com	TE
Website	Art Berman	713-557-9076	aberman@houston.rr.com	D4

by ***Dave Rensink***

Tackling the Issues

One of the nice things about being president of the HGS is that you are periodically asked to participate in some of our finest programs. HGS co-hosted a conference on coastal subsidence in early November with the Engineering, Science and Technology Council of Houston (ECH). The co-chairs, Cheryl Desforge (HGS treasurer-elect) and Glen Carlson (ECH), and their steering committee deserve high praise for organizing and staging the conference. The purpose of the conference was to discuss the data included in a 2004 NOAA study by Kurt Shinkle and Roy Dokka, which documented the relatively rapid rate of subsidence of surveyed benchmarks in south Louisiana. This study has precipitated a considerable amount of discussion, both positive and negative. HGS and ECH felt this topic deserved a full and public airing because of the short- and long-term significance of the causes of the subsidence. As the loss of wetlands moves from an environmental issue to an economic issue, the public's demands for a solution will increase by an order of magnitude. This means the size of the projects and the resulting expenditure of public funds increase substantially. We believe project planners and decision makers need as broad an exposure as possible to all of the processes, both natural and manmade, that affect subsidence in order that they may make informed decisions on potential mitigation projects.

Conventional wisdom has once again obscured the pursuit of a solution.

If you heard Dr. Dokka's talk at our November 2004 lunch meeting or read Art Berman's article in the October 2005 HGS *Bulletin*, you are familiar with the issues of subsidence, and as a geologist, you are familiar with the causes. Although groundwater withdrawal may be a major cause of subsidence in the greater Houston area, it is certainly not the only cause. Groundwater withdrawal and shallow oil, gas and associated water production definitely contribute to subsidence in south Louisiana and southeast Texas, but they are most likely local in scope and are not the only causes. Yet, in the search for an easy solution to the problem, fluid withdrawal has become the only consideration in the minds of many. Conventional wisdom has once again obscured the pursuit of a solution. Man's activities may have accelerated the rate of subsidence in certain parts of the Gulf of Mexico basin, but they did not start it. Basin subsidence, sediment compaction, salt movement, gravity gliding and growth faulting started over 160 million years ago when the Gulf of Mexico began to open. There is no reason to think these processes have stopped in the last 50 years.

Speaking of man influence of long-term processes, let's consider global warming. In my opinion, it is difficult to refute the validity of global warming. In a general sense, the earth has been warming since the end of the last glacial epoch—10,000 to 12,000 years ago. I will agree that the earth's surface temperature has fluctuated during this period, but the earth is generally warmer today than it was 12,000 years ago. Continental glaciers have been retreating and sea level has been rising as a result of solar heating since long before the industrial revolution. Man's influence on natural processes, specifically the increase in the concentration of CO_2 and water vapor in the atmosphere, may have marginally increased the rate of the earth's heating, but man did not start it. At worst, we may have successfully accelerated climatic conditions that would have occurred at some point in the future.

We are not likely to stop global warming, even if it were possible to immediately stop all CO_2 emissions. The best that can be expected is to return to the previous rate of temperature change. It is also likely that it would take an extended period of time to return to the prior rate of change because of the inertia that has probably resulted from the warming of the oceans. It would be similar to expecting a loaded VLCC (very large crude carrier) to come to an immediate stop when the engines are stopped. There may be legitimate long-term reasons to reduce CO_2 emissions, but the hope of stopping global warming in the immediate future is not one of them. If that statement does not elicit some comment, either no one reads this column or no one cares. Before you write or call, remember your training. Natural processes tend to be cyclic. Why should the earth's climate be any different? Not long before global warming became a global environmental issue, the primary climatic concern was the possible return of a mini ice age similar to that which occurred in Europe between 1300 and 1800.

From the President *continued on page 7*

From the President continued from page 5

Another piece of conventional wisdom to consider is the reason for the increase in the amount of water vapor in the atmosphere. Water vapor is far more prevalent in the atmosphere and may be a more efficient "greenhouse gas" than CO_2. Yet, conventional wisdom says that the increase in water vapor in the atmosphere is a feedback effect of increasing air temperature (warm air is capable of holding more water vapor than cool air), and the amount of water vapor generated by burning fossil fuels is not a significant problem. Thus, conventional wisdom says that water vapor content is increasing only because air temperature is increasing, and the increasing air temperature is the result of increasing concentrations of CO_2. The premise that the amount of water vapor generated by human activity may not be significant in relation to the amount of water vapor that can enter the atmosphere as a result of evaporation from soils, lakes and oceans is possibly correct. However, my point is that conventional wisdom has dismissed a potentially significant contributor to climate change as largely a non-issue because any increase in the amount of water vapor in the atmosphere is a direct result of man's activities. Is that a true statement? Similarly, conventional wisdom seems to have dismissed earth's eccentric orbit, its proximity to the sun, and its axial inclination toward the sun as major contributors to climate change.

If you are looking for easy solutions, it is possible to make a good correlation between the increase of CO_2 in the atmosphere and the increase in coal consumption worldwide since the 1930s. It comes as no surprise that approximately 90% of the coal consumed has been used to generate electricity. Nuclear energy is a viable alternative to coal in electric power generation, but you seldom hear anyone advocating shutting down coal-fired plants and building nuclear plants. There is also a belief that people who live down-wind of a coal-fired plant may be exposed to more radiation through the release of uranium and thorium from the coal than those who live in proximity to a nuclear plant. For those of you who are interested in statistics, the top five energy sources used in electric power generation in the United States are coal (52%), nuclear (21%), natural gas (14%), hydro (7%) and petroleum (3%). If there truly is a compelling reason to significantly reduce CO_2 emissions, how do you want to do it and at what price?

HGS is hosting a Geo-Legends panel on January 9, 2006. This panel will feature giants on the technical side of the business, a change from the wildcatters and explorers that have composed the past Legends panels. If oil is indeed found in the minds of men, then these scientists have planted the seeds. Make your reservations today. It is always a popular event, and seating is limited.

John Amoruso recently received the Don Boyd medal from GCAGS. This is the highest honor GCAGS bestows. To be considered for this honor, the recipients must distinguish him- or herself in two of the following categories—research geology, professional leadership, and oil and gas exploration. John has certainly accomplished that. Congratulations, John, on a well-deserved award.

On a somber note, we note the passing of a first-rate geologist, Bob Sneider (page 52). Shell trained many of us in this business, and Bob was instrumental in that training. There is an adage that everything you need to know you learned in kindergarten. Everything I needed to know about production geology I learned from Bob, and he will be sorely missed. ■

Member News and Announcements

2006 HGS Grand Canyon Geology Field Trip

Vacanies exist for the JUNE 16-24, 2006 **HGS Grand Canyon Geology Field Trip** rafting on the Colorado River in the Grand Canyon. Meet and return to Las Vegas, NV. Cost estimated to be $2200 apiece (includes food & drinks while in canyon, lodging June 16, guide tips, guidebooks). Contact Dave Lazor at jdlazoroilngas@aol.com for more information.

Vendor's Corner chariman

Paul Babcock is the new Vendor's Corner chariman. Paul is with People's Energy.

From the **Editor**

by ***Paul Britt***
editor@hgs.org

Polar Flip-Flop

TOP TEN REASONS YOU MIGHT BE A GEOLOGIST: *
6. You consider a "recent event" to be anything that has happened in the last hundred thousand years.
next month, reason no. 5…

Global warming is the hot earth science issue in the news, followed by closely by the tsunami threat and lack of warning systems to populated coastal areas, then regionally by subsidence issues here in the Gulf Coast. Well down on the list of public awareness, below even the threat of an asteroid strike (a favorite of Hollywood), is magnetic polar reversal.

James Ross located the magnetic North Pole for the first time in 1831 after a lengthy arctic journey, during which his ship got stuck in the ice for four years. Roald Amundsen found the pole again in 1904 and discovered that it had moved—at least 30 miles since its discovery by Ross. The pole kept moving north at an average speed of 6 miles per year, accelerating lately to about 25 miles per year, according to Larry Newitt of the Geological Survey of Canada, whose job it is to keep track of the pole's movement. Every few years, Newitt goes north in search of the magnetic north pole. At the moment, it is located in northern Canada, about 375 miles from the nearest town, Resolute Bay, population 300. At its current rate of movement, it could leave North America in a few decades and reach Siberia.

Polar reversals take a few thousand years to complete, and contrary to popular belief, the magnetic field does not vanish.

Globally, the Earth's magnetic field has weakened since the 19th century by 10%. However, the dipole moment, a measure of the intensity of the magnetic field, is now 8×10^{22} amps $\times$ m^2, twice the million-year average of 4×10^{22} amps $\times$ m^2, according to University of California professor Gary Glatzmaier.

The Earth's magnetic poles have reversed, or swapped places, numerous times in the past, evidenced by magnetic "stripes" found parallel to mid-ocean ridges, magnetic evidence in lava flows and other paleomagnetic evidence. The reversals come at irregular intervals spaced 5,000 to 50 million years apart, averaging about 250,000 years. The last one was about 750,000 years ago.

The Earth's magnetic field comes from the rotation of the Earth's core. The solid iron inner core, about 70% the size of the Moon, spins at its own rate, about 0.2% faster than the surrounding Earth. This inner core is surrounded by a molten outer core, which behaves as its own ocean, with currents and "hurricanes" much like the Earth's surface oceans.

Glatzmaier and associates have developed a computer model based on the Earth's core to simulate the behavior of the magnetic poles. The strength of the magnetic field waxes and wanes, the poles drift, and occasionally flip. They have also learned what happens when the poles flip. Reversals take a few thousand years to complete, and contrary to popular belief, the magnetic field does not vanish. The field gets more complicated, with poles emerging in unaccustomed places, and multiple magnetic poles. According to Glatzmaier, it is still a planetary field, protecting the Earth's surface from radiation and solar storms.

Others who believe that the protective magnetic field will weaken sufficiently to allow additional radiation to reach the Earth's surface contrast with Glatzmaier's opinion on what happens during a pole reversal. And some tie the Earth's magnetic flip-flop to the Sun's pole reversals.

The South Atlantic Anomaly (SAA) is a region where the Earth's inner van Allen radiation belt makes its closest approach to the planet's surface. As a result, the radiation intensity is higher over this region. The SAA is produced by a dip in the Earth's magnetic field, caused by the fact that the center of the magnetic field is offset from its geographic center by 280 miles. In this region, satellites passing through it receive higher doses of radiation. The International Space Station had additional shielding installed for travel through this region, and the Hubble Space Telescope does not take observations while in the SAA. Some cite the SAA as evidence of a weakening magnetic field and imminent pole reversal.

From the Editor *continued on page 11*

From the Editor continued from page 9

The Sun underwent a polar reversal in 2001, according to NASA reports, an event that happens every 11 years, at the peak of the sunspot cycle, or solar maximum. The Ulysses spacecraft, launched in 1990, provided a unique view—from the top down. This solar observation will likely aid us in our interpretation of the Earth's magnetic field behavior. The next solar magnetic pole reversal is scheduled for 2012. Don't miss it!

Of course, the pole reversal issue receives casual press, at best. Perhaps it is because we should get ample warning as the magnetic field weakens over time. Or perhaps it is because human intervention can't be blamed for its occurrence. In any case, it is an example of the importance of studying the Earth on which we live. ■

Recommended reading:

http://science.nasa.gov/headlines/y2001/ast15feb_1.htm

science.nasa.gov/headlines/ y2003/29dec_magneticfield.htm

http://www.psc.edu/science/Glatzmaier/glatzmaier.html

HGS Welcomes New Members

Effective October 1, 2005

ACTIVE
Christian Bach
Ronald Barrow
Ronald Boese, Jr.
Gordon Bowers
James Burgess
Lee Buse
Phil Conway
Jeffrey Coryell
Robert Davis
Jan Douma
Peter Duncan
Ernie Easley
Laura Evins
Andrew Fair
Michael Fauquier
Jerry Ferguson
Thomas Fett
Daryl Gaumer
Xiaobin Ge
Mark Germinario
Bill Hogenson
Kenneth Huffman
Ronald Johnson
Rusty Kimball
Myron Korpan
Mike Lockhart
Jack Loocke
Joe Lott
Steve Mack
Leon Mandel
John McKeon
Ed Mellor
Charlton Miller
Roger Murray
Claire Naisbitt
Gregory Onstott
Marianne Parsons
Lawrence Perry
Carlos Puig
Bryan Sexton
Keith Sprague
Veronica Stevenson
Mark Swanson
Rachel Taylor
Gareth Taylor
J. Vargo
Robert Young, II
Stephen Zeboski
Ran Zhou
Erick Zubey

ASSOCIATE MEMBERS
Peter Bridge
Daryl Gaumer
John Hanby
Martha Klein
Harry Schultz
James Velasco

STUDENTS
Thereasa Jones
Rafael Zelaya

Effective November 1, 2005

ACTIVE
Michael Adams
Mark Charles
Howard Creasey
Suman Ghosh
Geoffrey Hadded
Clay Hargett
Mark Hollanders
Paul Jensen
Richard Jones
William McCarthy, III
Brian Moore
Matthew Oocherty
Amelia Rai
Mark Shuster
Matthew Tremblay
Robert Wentz
R. Keith Woidneck
Gilbert Wopara
Leifeng Zhou

ASSOCIATE MEMBERS
Laura Dinkjian
Alicia Hewlett
Melissa Lusk
Michael Schlagel

STUDENTS
Fernando Ziegler

Welcome New Members

Short Courses

E&P Methods and Technologies: Selection and Applications

Date: April 7-9, 2006
Location: Houston, Texas, with AAPG Annual Meeting
Tuition: $995 (increases to $1095 after 3/10/06), includes course notes and refreshments
Content: 2.3 CEU
Instructors: Alistair R. Brown, Rich Chambers, Fred Hilterman, Michael Hudec, John Johnson, James A. MacKay, Dave Marschall, Randall S. Miller, Henry Posamentier, Rawdon Seager, and David A. Wavrek

Who Should Attend

This is a broad spectrum course that targets members of integrated teams through middle managers, up to and including business unit leaders. Anyone who must design and select exploration and development teams will benefit from this course. The course will have value not only to geoscience professionals, but also to reservoir engineers and managers of all disciplines who supervise oil-finding teams.

Strategic Play Analysis

Date: April 8-9, 2006
Location: Houston, Texas, with AAPG Annual Meeting
Tuition: $600 (increases to $700 after 3/10/06), includes course notes and refreshments
Content: 1.5 CEU
Instructors: P. Jeffrey Brown, Decision Strategies, Inc., Houston, TX; Marshall W. Titus, Platte River Associates, Inc., Houston, TX

Who Should Attend

This course is designed to provide a succinct review of petroleum system and geologic play elements and processes, as well as all the information necessary to conduct a strategic play analysis, based upon an admixture of geologic and strategic variables. This course is suitable for geoscientists, engineers, planners, and managers. The math is algebraic and should pose no major hurdles to participation.

Field Seminars

Modern Terrigenous Clastic Depositional Systems

Leader: Walter J. Sexton, Athena Technologies, Inc., Columbia, South Carolina
Dates: April 23-30; May 22-29; September 18-25, 2006
Location: Begins in Columbia and ends in Charleston, South Carolina
Tuition: $2,400 (increases to $2500 one month prior to each start date), includes ground transportation to Charleston, water transportation, guidebook, beach cookout, modern core workshop, lunch on the fluvial day, and CD-ROM
Limit: 27
Content: 5.6 CEU

Who Should Attend

Geoscientists and engineers who need to understand the sedimentology, facies architecture, and sequence stratigraphy of modern terrigenous clastic depositional systems in tidal estuarine, incised valley, shelf, shoreface barrier island, fluvial and alluvial environments.

Clastic Reservoir Facies and Sequence Stratigraphic Analysis of Alluvial Plain, Shoreface, Deltaic, and Shelf Depositional Systems

Leader: Thomas A. Ryer, The ARIES Group, LLC, Katy, TX
Date: April 23-29, 2006
Location: Begins and ends in Salt Lake City, Utah
Tuition: $1,800 (increases to $1900 after 3/24/06), includes field transportation, lunches in the field, guidebook
Limit: 15
Content: 5.0 CEU

Who Should Attend

Exploration and development geologists, geophysicists, reservoir engineers, log analysts, and managers of exploration and development programs who want a better understanding of the facies variations that control the distribution of clastic reservoirs.

Plan Now for April Education with AAPG!!

NEW GeoTour!!

Geologic Field Trip to Trinidad & Tobago

Leader: Patrick J. Gooding, Kentucky Geologic Survey, University of Kentucky, Lexington, KY
Dates: April 26 – May 2, 2006
Location: Begins in Port of Spain, Trinidad on April 27th at 7:00am and ends in Scarborough, Tobago on May 1st
Tuition: $2,000 (increases to $2100 after 3/15/06), includes field trip transportation, 5 lunches, 1 dinner, entry fees, welcome reception, field trip guidebook and boat travel to Tobago for the group
Limit: 30

Who Should Attend

Like other AAPG GeoTours, the trip will integrate geology, culture, history, and social activities for the geologists, spouses/partners and children (12 years or older) interested in an overview rather than detailed learning. The trip will be entertaining, recreational as well as learning experience about the islands of Trinidad and Tobago.

AAPG GEOSCIENCE EDUCATION

For further information, please contact the AAPG Education Department
Phone: 918-560-2650; Fax: 918-560-2678; e-mail: educate@aapg.org
Or log on to www.aapg.org/education/index.cfm

Letters to the Editor

To the Editor:

Important and somewhat disturbing new information about the Great Sumatra-Andaman Earthquake of December 26, 2004, has recently come to light. In the current issue of *EOS, Transactions of the American Geophysical Union* (November 1, 2005), Kathryn Moran and James Austin report findings of the Sumatra Earthquake and Tsunami Offshore Survey (SEATOS).

SEATOS analyzed multi-beam bathymetric data recently acquired by the Royal Navy, UK Hydrologic Office and SEATOS high-resolution, single channel seismic reflection data in the vicinity of the 2004 Earthquake epicenter and along the Sunda Trench. SEATOS's international, interdisciplinary team of scientists concludes that there was probably very little displacement of the seafloor associated with the 9.3 magnitude earthquake. In other words, the 5–20 meters of slip assumed by all modeling work to-date cannot be substantiated.

An article published shortly after the Sumatra-Andaman Earthquake (The Indian Ocean Disaster: Tsunami Physics and Early Warning Dilemmas, 2005: EOS, Transactions, American Geophysical Union, vol. 86, no. 7, February 15, 2005) suggested that no plate boundary rupture could be noted on the seafloor. This article proposed that the Sumatra-Andaman Earthquake and tsunami may have been caused by free oscillation of the Earth: deep-seated rupture may have produced upheaval of a broad area of the seafloor without surface faulting. This hypothesis was quickly dismissed by workers who cited tilting and vertical movement of GPS stations throughout the Indian Ocean region.

In an article in the December HGS *Bulletin* (Berman, 2005) it was suggested that the quality and volume of digital data on the Sumatra-Andaman earthquake presented a picture of unprecedented rupture complexity that might raise questions about the capacity of the plate tectonic model to fully explain this event. While the SEATOS interpretation is preliminary, it now appears that there will be more discussion about the way we understand and explain plate boundary mechanics. We may be on the verge of another scientific revolution in Earth Science.

Sincerely,

Arthur E. Berman

———

To the Editor of the Houston Geological Society *Bulletin*;

I am a member of both the Houston Geological Society (HGS) as well as the Canadian Society of Petroleum Geologists (CSPG). I would like to point out an error in the article titled "Ideas Are Like Stars: The Current Oil Boom" which was published in the HGS *Bulletin* of June 2005 and reprinted in the CSPG Bulletin of October 2005. The USA oil production numbers are wrong in the chart titled "USA Average Annual Oil Production." I don't think that US production ever reached as high as 11.8 MMBOPD.

The chart shows production in 2003 to be averaging 8.9 MMBOPD. When I reference my *World Oil* magazine of October 2005, it mentions that USA oil production (including condensates) is averaging 5.2 MMBOPD in August 2005. My October 2005 issue of the SPE's *Journal of Petroleum Technology* states that in July, 2005, the USA oil production was 5.4 MMBOPD. If I am to believe the chart, then USA production has dropped off by 3.5 MMBOPD since 2003, which is impossible. Kindly explain the discrepancy.

Best regards,
Tako Koning, Technical Advisor
Tullow Oil (Angola)
Luanda, Angola

Reply:
Dear Mr. Koning,

I have had similar interchanges with the editors of the Oil and Gas Journal *about significant discrepancies in reporting of produced and refined volumes of oil. The* O&G Journal *said that they have their own method of calculating volumes. Apparently* World Oil *has yet another method.*

I clearly understand and appreciate your confusion since I have been down the same path. As referenced in my article, my source is the U.S. Department of Energy, Energy Information Administration: http://www.eia.doe.gov/emeu/international/petroleu.html. I cannot speak for World Oil *or other commercial journals and their methods but I believe the U.S. Government is a reputable source.*

All the best and thanks for your interest,

Art Berman

SAFOD—The San Andreas Fault Observatory at Depth and Its Relevance to Oil and Gas

by ***Bill Rizer***

Introduction

A long-standing dream of many geoscientists was realized on August 2, 2005, when a drill hole at the SAFOD site near the town of Parkfield, California, penetrated a seismically active segment of the San Andreas Fault (the Fault) at a depth of approximately 2 miles (Figure 1).

The ambitious **Earthscope** project (van der Vink *et al*, 2005) is a major national research effort designed to further understanding of the properties, the structure, and the forces and deformation processes operative in the crust of North America. A part of Earthscope, the San Andreas Fault Observatory at Depth (SAFOD) is itself a major research effort of the USGS and the State of California that is funded by the National Science Foundation (NSF). The primary objective of SAFOD is to "study the physical and chemical processes that control deformation and earthquake generation within an active plate-bounding fault zone" (Zoback *et al*, 1998). SAFOD will establish an observatory within a segment of the Fault to study the basic mechanical, fluid, and seismic properties and processes operative along the active San Andreas system. Principal investigators for the SAFOD project are Mark Zoback of Stanford University and Steve Hickman and Bill Ellsworth of the USGS at Menlo Park, California.

Figure 1.

The location of the SAFOD site was chosen near Parkfield for a number of reasons.

- The area is accessible.
- It is just north of the section of the Fault that slipped in the M 6.0 Parkfield earthquake in 1966 (Figure 1).
- Parkfield was already the site of a major research effort by the USGS in earthquake prediction and, therefore, was very well documented geologically and geophysically.

In this region, the Fault was slipping through a combination of small-to-moderate magnitude earthquakes and aseismic creep (Hickman *et al*, 2004). The Fault at the surface was creeping at about 2 cm/year, with most of the displacement occurring in a zone that was at most only 10 m wide. Numerous microearthquakes (less than M 2.0) had been detected along the Fault near SAFOD at depths of 2.5 to 12 km. This area had been the focus of repeated magnitude M ~6.0 earthquakes over the past 150 years—in 1857, 1881, 1901, 1922, 1934 and 1966 (Bakun and McEvilly, 1979). The first, in 1857, was a foreshock to the great Fort Tejon (M 7.9) earthquake that ruptured the Fault from Parkfield to the southeast for over 180 miles. When drilling started in 2002, another M 6.0 earthquake was overdue. The idea was to locate SAFOD at a position along the Fault just northwest of the segmented expected to rupture next.

The Pilot Hole

Prior to drilling the main borehole, a 2.2-km-deep vertical pilot hole was drilled about 2 km southwest of the surface trace of the Fault (Figure 2). Drilling of the pilot was funded by the International Continental Drilling Program (ICDP), with NSF and USGS support (Hickman *et al*, 2004). The location was chosen to be close enough to the Fault to help identify the most likely area of slip on the Fault and to guide the primary borehole to intersect that area. The pilot hole was logged for fractures, stress and temperature, and packer tests were run for stress, permeability and fluid sampling. A 40-level multicomponent seismic array was installed in the casing for monitoring microseisms and for serving as a part of 2-D and 3-D seismic surveys run to better define the structure of the site. The hole was instrumented for long-term monitoring of pore-pressure, strain, temperature and seismic activity. The well was completed in the summer of 2002.

Geologic data, microseismic monitoring and geophysical imaging from sensors in the pilot hole and on the surface were used to locate and guide drilling of the primary observation well at a sufficient accuracy to allow for drilling and coring deviated holes through the fault

SAFOD—The San Andreas Fault *continued on page 17*

SAFOD—The San Andreas Fault Observatory

continued from page 15

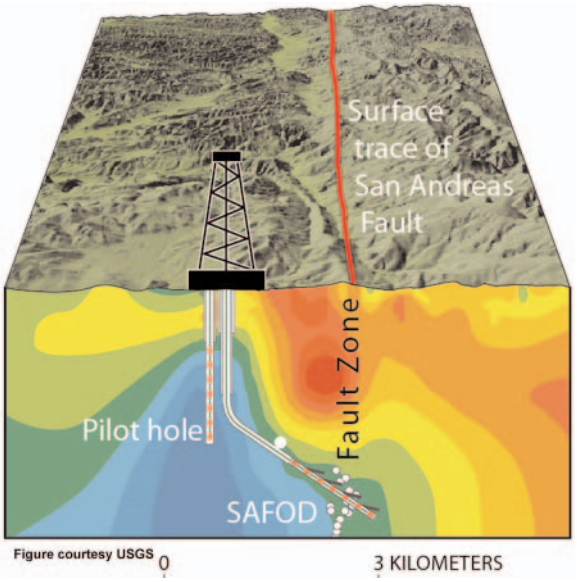


Figure 2.

zone. The plan for the lateral core and wellbores (Figure 2) called for starting "kickoff" at a vertical depth of about 2.5 to 3 km and continuing through the fault zone into the "intact" rock on the other side.

The main SAFOD observation well was spudded only 10 m from the surface location of the pilot. Drilling of the main observation well began in June 2004 on the Pacific Plate about 2 km west of the surface trace of the Fault (Figure 1) and continued to the middle of October. Drilling resumed in June 2005 with the wellbore penetrating the Fault in August 2005. The SAFOD observatory will be completed in 2007.

Somewhat ironically, the anticipated M 6.0 Parkfield earthquake occurred in September 2004, before drilling of the main observation well was completed. The quake ruptured roughly the same segment of the Fault that had ruptured in 1966, as predicted.

Fault Strength and Stress

While most of the research at SAFOD is geared toward fundamental questions related to earthquake prediction, many of the results could have very real impact on the oil and gas industry. One area being addressed has been the subject of considerable debate for many years: the strength of faults and the level of shear stress acting on them. Some of the data and analyses generated by SAFOD have already had an effect on this debate. Data from the pilot hole have provided important new information on the state of stress in the crust immediately adjacent to the Fault. Interpretation of well tests, image logs, shear wave logs and cores seem to bolster earlier arguments (e.g., Zoback et al, 1987) that suggest the San Andreas Fault may be very "weak," that is, it may have little frictional resistance to slip or, equivalently, can support only limited levels of shear stress.

The strength of faults like the San Andreas has been a contentious issue for quite some time. The debate involves what has been called the stress/heat flow paradox (Lachenbruch and Sass, 1988; Zoback *et al.*, 1998). A "weak" fault is one whose strength is on the order of the stress relieved by an earthquake on that fault (typically < 20 MPa), while a "strong" San Andreas would have a substantially greater strength, on the order of 50-100 MPa (e.g., Lachenbruch and McGarr, 1990; Fletcher and Mariagiovanna, 1999; Scholz, 2000). According to Zoback *et al* (1998) arguments in favor of the strong fault hypothesis (e.g., Scholz, 2000) are based largely on laboratory-scale experiments on frictional slip of rock surfaces in contact under confining stress (Byerlee, 1978).

Arguments for high shear stresses (the strong-fault argument) on the San Andreas and other active faults are based primarily on models for the frictional strength of faulted rock, using laboratory-determined coefficients of friction, μ, ranging from 0.6 to 0.85 according to the simple frictional law:

$$\tau = \mu\sigma_n \quad \text{(Byerlee's Law)}$$

where μ is the frictional coefficient, τ is the shear stress required to cause slip and σ_n is the normal stress acting on the slip surface (Byerlee, 1978). In laboratory tests on sliding rock surfaces of most rock, $0.6 \leq \mu \leq 0.85$, an exception being surfaces with clay gouge. This laboratory-based model is often termed the hydrostatic Byerlee's Law.

Scholz (2000) states that stress measurements in boreholes deeper than about a kilometer appear nearly universally to follow Coulomb behavior with friction coefficients, μ, similar to those obtained during laboratory experiments:

> "Stress measurements made in deep (>1 km) boreholes in a variety of tectonic settings have universally shown that stresses in the crust are in equilibrium with favorably oriented faults governed by friction coefficients in the range $0.6 < \mu < 0.7$ with nearly hydrostatic pore-pressure gradients"

This statement implies that faults are generally strong and levels of shear stress high in most areas of the upper crust, consistent with laboratory measurements of rock strength and frictional resistance. They are also consistent with inversions of wellbore data for the full stress tensor, σ_{ij} (Peska and Zoback, 1995).

Support for a weak San Andreas Fault came originally from the absence of measured frictionally-generated heat profiles in shallow boreholes along the Fault (e.g., Lachenbruch and Sass, 1973 and 1980). More detailed measurements in the pilot hole at SAFOD led Williams *et al* (2004) to conclude that there is no observable increase in heat flow as would be expected by frictional heating accompanying slip along a strong fault.

SAFOD—The San Andreas Fault *continued on page 19*

SAFOD—The San Andreas Fault Observatory continued from page 17

Arguments for a weak San Andreas Fault also involve the observation that the orientation of the regional maximum horizontal stress, σ_{Hmax}, appears to rotate from a basically N-S direction, as indicated by fault plane solutions (Zoback and Zoback, 1980), to a more NE-SW direction nearly normal to the Fault, within a roughly 50- to 100-km-wide zone on either side of the Fault, as determined from inversions of wellbore data (Mount and Suppe, 1987). That observation may resolve much of the difficulty of rationalizing a weak fault supporting otherwise high levels of regional stress, because only low shear stress (< 20 MPa) would be resolved on the fault plane by a nearly normal maximum stress.

One interesting aspect of this debate is that both sides seem to be arguing from observations of the same data. That is not unusual for debates of this type, in general. In some cases, additional observational data resolve the issue one way or another. That may happen with the information SAFOD generates in the next few years. There are other cases, however, where a more thorough examination of the underlying assumptions and/or theory involved is required. For example, both sides of the fault strength argument base their conclusions in part on inversions of wellbore failure for σ_{ij}. Those inversions involve basic assumptions about extrapolating measurements of the strength of rock determined by laboratory testing of intact rock samples under boundary conditions and stress paths that may or may not be directly applicable to borehole situations and scales. Perhaps the information we get from SAFOD will provide deeper insights into those questions. The next few years should prove very interesting for all those interested in such discussions.

The issues of strong and weak faults, of stress magnitude and direction and of the variation of σ_{ij} and pressure with position in reservoirs and with drilling and production operations have direct relevance to many aspects of oil and gas operations. In recent years, the in situ stress field has emerged as a critical uncertainty in reservoir characterization (e.g., Rizer, 2004).

Relevance to Oil and Gas

In a study of stress, pore pressure and their control of hydrocarbon columns in a field in the northern Gulf of Mexico, Finkbeiner *et al* (2001) determined that hydrocarbon columns in two overpressured reservoirs are "dynamically constrained" by the stress field. The lateral seals could fail either by slip on bounding faults or by hydraulic fracture of the top seal if the pore pressure increased or the stress field was modified by drilling and production operations. The faults in this case are in a "critical state" with respect to the stress field in the reservoir; small changes in stress could have serious consequences for hydrocarbon production operations. Similar observations have been made in other reservoirs. All of this points to a need for better understanding of the current in situ stress state and methods for estimating the full stress tensor. The research efforts underway at SAFOD and elsewhere hold considerable promise for furthering that understanding, There are exciting things happening at SAFOD and elsewhere that will change the way we look for and produce hydrocarbons. ■

References

Bakun, W.H. and T.V. McEvilly, 1979: Earthquakes near Parkfield, California, *Science*, Vol. 205, 1375-1377.

Byerlee, J.D., 1978: Friction of rocks, *Pure Appl. Geoph.*, Vol. 116, p. 615-629.

EarthScope Web site: http://www.earthscope.org/overview/index.shtml

Finkbeiner, Thomas, Mark Zoback, Peter Flemings and Beth Stump, 2001: Stress, pore pressure and dynamically constrained hydrocarbon columns in the South Eugene Island 330 Field, northern Gulf of Mexico, *AAPG Bulletin*, Vol. 85, No. 6, pp. 1007-1031.

Fletcher, J. B. and G. Mariagiovanna, 1999: Stress drop for three M~4.3-4.7 (1992-1994) Parkfield, CA, earthquakes, *Geophysical Research Letters*, Vol. 26, No. 15, p. 2295-2298, Paper number 1999GL900392.

Hickman, Stephen and Mark Zoback, 2004: Stress orientations and magnitudes in the SAFOD pilot hole, *Geophysical Research Letters*, Vol. 31, L15S12, doi:10.1029/2004GL020043.

Hickman, Steven, Mark Zoback and William Ellsworth, 2004: Introduction to special section: Preparing for the San Andreas Fault Observatory at Depth, *Geophysical Research Letters*, Vol. 31, L12S01, doi:10.1029/2004GL020688, 2004

Lachenbruch, A.H., and J.H. Sass, Thermo-mechanical aspects of the San Andreas fault system, in *Proceedings of the Conference on Tectonic Problems of the San Andreas Fault System,* edited by R.L. Kovach and A. Nur, 192-205, Stanford University Press, Palo Alto, 1973.

Lachenbruch, A.H. and J.H. Sass, Heat flow and energetics of the San Andreas fault zone, *J. Geophys. Res.*, 85, 6185-6223, 1980.

Lachenbruch, Arthur H. and John H. Sass, 1988: The stress heat-flow paradox and thermal results from Cajon Pass, *Geophysical Research Letters*, Vol. 15, No. 9, p. 981-984.

Lachenbruch, A. H., and A. McGarr, Stress and heat flow, in *The San Andreas Fault System, California,* R. E. Wallace (ed.), pp. 261-277, U.S. Geol. Surv. Prof. Paper 1515, 1990

Lachenbruch, A. and Sass, J., 1992, Heat flow from Cajon Pass, fault strength and tectonic implications: *Journal of Geophysical Research*, v. 97, p. 4995-5015.

SAFOD—The San Andreas Fault *continued on page 21*

SAFOD—The San Andreas Fault Observatory continued from page 19

Mount, V.S. and J. Suppe, State of stress near the San Andreas fault: Implications for wrench tectonics, *Geology,* 15, 1143-1146, 1987

Peska, P. and M. D. Zoback, 1995:Compressive and tensile failure of inclined well bores and determination of in situ stress and rock strength, *Journal Of Geophysical Research*, Vol. 100, No. B7, p. 12,791-12,812.

Rizer, W. D., 2004: : New methods for detecting and characterizing primary flow paths; the coupling among stress, fracturing, seismic anisotropy and reservoir flow, AAPG Hedberg Conference, *Structural Diagenesis: Fundamental Advances and New Applications from a Holistic View of Mechanical and Chemical Processes* February 8-11, 2004, Austin, Texas.

SAFOD Web site: http://www.earthscope.org/safod/index.shtml

Scholz, Christopher H., 2000: Evidence for a strong San Andreas Fault, Geology: Vol. 28, No. 2, pp. 163-166, doi: 10.1130/0091-7613 (2000)28<163:EFASSA>2.0.CO;2.

Unsworth, Martyn and Paul A. Bedrosian, 2004: Electrical resistivity structure at the SAFOD site from magnetotelluric exploration, *Geophysical Research Letters*, Vol. 31, L12S05, doi:10.1029/2003GL019405

van der Vink, Gregory E., Stephen H. Hickman, Thorne Lay, William H. Prescott, Paul Silver, David W. Simpson and Mark D. Zoback, 2005: A Collaborative Proposal Submitted to the National Science Foundation, January 2005, By the Project Director and the members of the EarthScope Facilities Executive Committee, http://www.earthscope.org/links_pubs/O&M/nsfproposal-lo-res.pdf

Williams, Colin F., Frederick V. Grubb and S. Peter Galanis Jr., 2004: Heat flow in the SAFOD pilot hole and implications for the strength of the San Andreas Fault, *Geophysical Research Letters*, Vol. 31, L15S14, doi:10.1029/2003GL019352, 2004.

Zoback, M. D. and M. Zoback, 1980: State of stress in the conterminous United States, *Journal of Geophysical Research*, Vol. 85, p. 6113-6156.

Zoback, M.D., M.L. Zoback, V.S. Mount, J. Suppe, J.P. Eaton, J.H. Healy, D. Oppenheimer, P. Reasenberg, L. Jones, C.B. Raleigh, I.G. Wong, O. Scotti and C. Wentworth, 1987: New evidence on the state of stress of the San Andreas fault system, *Science,* 238, 1105-1111.

Zoback, Mark D., Stephen H. Hickman and William L. Ellsworth , 1998: San Andreas Fault Observatory at Depth - Proposal, Scientific Drilling into the San Andreas Fault at Parkfield, CA, Project Overview and Operational Plan, http://www.icdp-online.de/sites/sanandreas/objectives/proposal.html.

Geo-Legends 2006

Monday, January 9, 2006

Special HGS Dinner Meeting Program

A memorable evening featuring:

Albert Bally

Arnold Bouma

Peter Rose

Peter Vail

Join us for a memorable evening to include a social hour and elegant dinner at the Westchase Hilton Hotel. Our invited Geo-Legend panelists will tell their own life stories, followed by a panel discussion and audience participation.

Westchase Hilton, 9999 Westheimer (east of Beltway 8)
Social hour starts at 5:30 pm
This special HGS Dinner Meeting has limited seating.
Please make your reservations online at www.hgs.org ,
or by mailing in this reservation form with payment before noon Friday, January 6.

Registration Form — Geo-Legends 2006

Reservations and prepayment encouraged by online reservation or mailing checks to:
Houston Geological Society, 10575 Katy Freeway Suite 290, Houston Texas 77024

Name: _____

Company: _____

Work Phone: _____ Email: _____

No. of tickets desired: _____ Pre-registered Members & Spouses $25_____ Walk-ups/Non-members $30_____

Total amount enclosed:_____ Membership No. _____

(Please include names of all attendees, for registration badges): _____

_____

Monday, January 9, 2006

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

Cost: $25 Preregistered members; $30 non-members & 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#).

Geo-Legends 2006
A Tribute to Four "All-Star" Geologists

*by **Linda Sternbach***
HGS Vice President

Are you making up a list of important goals or New Year's resolutions that are "must do" in 2006? Then make plans to go the first HGS meeting of 2006: Monday, January 9! This historic HGS general dinner will be a special evening called "Geo-Legends." The program will feature the inspirational life stories of four great names in geology: Drs. Albert Bally, Arnold Bouma, Peter Rose (current AAPG president) and Peter Vail. This program follows in the theme of past "Legends in Wildcatting" programs of 2000 and 2003. This time the "Legends" theme will recognize that behind great oil businessmen are great geologists working to create the scientific technical work that ultimately results in discovery of oil and gas.

It will be an evening of ideas and stories that all geologists will enjoy

Each panelist will speak at length about the challenges and successes throughout their distinguished careers and share their individual perspectives on the past, present and future applications of geology and oil exploration. As you read their biographies, note that each of the four Geo-Legends worked for major oil companies and then changed careers to be outspoken teachers and communicators. Each panelist has an individual point of view on geology and geophysics as professions, based on his unique career.

It will be an evening of ideas and stories that all geologists will enjoy, and the HGS is excited for the opportunity to honor these four distinguished careers. The January 9 HGS dinner program will provide inspiration and personal perspective on the energy business to carry everybody forward during 2006. The program will start with a social hour at 5:30 p.m. at the Westchase Hilton. Following dinner, each Geo-Legend will talk to the audience and take questions. The night's program will last until 9:30 p.m. Interested guests and spouses are welcome to attend with HGS members. Students, alumni and associates of our panelists are also encouraged to attend. Because this event has limited seating and could sell out, please preregister online at http://www.hgs.org before Friday, January 6. ■

Biographical Sketches

Albert W. Bally

Geo-Legend: Seismic Interpretation of Complex Structure

Dr. Bally has dedicated his career to geophysical interpretation and analysis of complex subsurface structures. He realized that seismic reflection data was key to unraveling the geology of highly deformed rocks. His research on fold-thrust belts and basin analysis has provided excellent guidance to geologists drilling for oil in deformed tectonic provinces. Upon retirement from Shell after 27 years, he became Harry Carothers Weiss Professor of geology at Rice University in Houston, Texas. He was department chairman at Rice early in his career and established the department's geophysics program.

His insight in melding geology and geophysics has been the hallmark of his research and teaching. A major focus of investigation has been on reconciliation of the complex structural geology of the earth's upper crust with lower crust and mantle. Bally is now Rice emeritus professor, yet very active in current research. He has received many prestigious awards including the Sidney Powers Medal from the AAPG (1998). We are honored that Albert Bally is a Geo-Legends panelist because he has helped geoscientists explain the deformation history of complex subsurface structures.

Arnold Bouma
Geo-Legend: Deepwater Sands and Depositional Processes

Dr. Bouma made a name in his career when he published his 1962 groundbreaking research on turbidites, resulting in a stratal pattern named after him called the "Bouma sequence." The Bouma sequence divides deepwater turbidite deposits into A-E intervals, based upon grain size and sedimentary structures and as a reflection of proximity to channels in submarine fans. This research has led to better drilling locations and reservoir prediction. Between 1981 and 1985, Bouma worked for Gulf Oil, first as a senior scientist, then manager, chief scientist and acting vice president for Gulf Research and Development Company. He left Chevron in 1988 to become the Charles T. McCord chaired professor of petroleum-related geology at Louisiana State University in Baton Rouge, where he taught for many years, until recently, now being associated with Texas A&M.

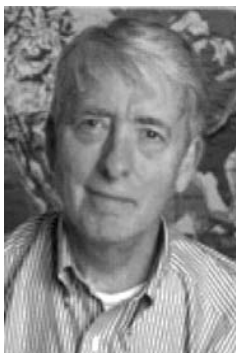
As a master teacher and researcher, Bouma has documented transportation and deposition processes responsible for deepwater sand deposits and revealed their influencing factors. His classic studies include the Delaware Basin in West Texas, Jackfork Group in Arkansas, Annot-Peria Cava area in France and Permian Tanqua Karoo formation in South Africa. Dr. Bouma has been successful in achieving his long-term goal of making research of deepwater sands beneficial to the oil and gas exploration community.

Peter Rose
Geo-Legend: Prospect and Risk Analysis

Peter Rose taught the oil and gas industry that risk analysis can maximize exploration success by analyzing potential gain, potential loss, chance of success and money exposure of a portfolio of prospects. He teaches the working geologist how to assess project risk vs. reward. Pete Rose is currently the 89th president of AAPG, the culmination of many years of service to AAPG and local geological societies, including being GCAGS president 2001–02. He has received the AAPG Distinguished Service Award (1996), AAPG Honorary Membership (2002), AAPG Best International Paper Award (1997) and the DPA Distinguished Service Award (2000) as well.

Rose started his career at Shell Oil and worked in Houston, Corpus Christi and New Orleans as an exploration geologist. In 1973, Rose joined the USGS in Denver as chief of the Branch of Oil and Gas Resources. During his tenure, the USGS established its first continuously functioning petroleum resource assessment group, a function that has expanded greatly since 1975. In 1980, Rose established his own independent oil and gas consulting firm, Telegraph Exploration, Inc. In 2000, he founded and became managing partner of Rose and Associates. The HGS is honored to have Pete Rose, current president of AAPG, on the Geo-Legends panel because of his dedication to teaching the business side of geology to geoscientists.

Peter R. Vail
Geo-Legend: Sequence Stratigraphy



Before Peter Vail's work, geologists used well logs and biostratigraphy to correlate rocks and geophysicists used seismic interpretation, but the two disciplines didn't work together in exploration. It seemed inconceivable that well log correlations and seismic interpretation could fit into a larger picture. Vail determined, while working at Exxon's research lab, that seismic reflections follow the detailed bedding patterns on the real physical surfaces in the rocks. It marked the discovery of the major underlying principle of seismic stratigraphy. Seismic reflections follow geologic time lines of detailed physical bedding surfaces. Seismic data could be used for putting stratigraphy into a geologic time framework for mapping.

With determination and conviction in their new ideas, Dr. Vail and his Exxon coworkers worked out a terminology for identifying the relationship of seismic reflection patterns to worldwide chronostratigraphy and took steps to both publish and teach "sequence stratigraphy" to geoscientists all over the world, starting with the classic AAPG Memoir 26, published in 1977. After retiring from Exxon in 1986 with 30 years of service, Dr. Vail started a distinguished academic career as W. Maurice Ewing Professor of Oceanography at Rice University, until he became emeritus faculty member in 2001. We are honored to have Dr. Peter Vail as a member of our HGS Geo-Legends panel. He saw seismic reflections in a new way—as part of a worldwide record.

The 5th PESGB/HGS African Conference
First Announcement & Call for Papers

Africa: Elephants of the Future

QE2 Conference Centre, London
September 12th-13th, 2006

Africa continues to be an 'elephant' of the upstream oil & gas industry, contributing nearly a third of new reserves in the last 5 years and being the only continent to replace its produced reserves. Future 'elephant' and 'rhino' sized fields will emerge from frontier exploration, continued development of proven/producing areas and reserves growth in established fields. The full spectrum will be addressed in the next PESGB/HGS 5th annual conference, which has established itself as the primary technical E & P conference on Africa. Attendance is expected to exceed 300+ and include operators, consultants, governments and academia.

The event will include a large poster programme in addition to a comprehensive oral programme of about 25 high quality talks covering E & P in all regions of Africa.

Call for Papers: Abstracts (circa 200 words) should be sent as soon as possible, and no later than 13 March 2006, to Duncan Macgregor at **duncan.macgregor@neftex.com** or **duncan.macgregor2@ntlworld.com**. Extended abstracts are normally written once your paper is accepted and are issued on a conference CD, which is again being kindly sponsored by ECL – RPS Energy.

The conference committee for the 2006 London event includes in London: Ray Bate (Chairman), Duncan Macgregor (Technical Co-ordinator), Val Clure, Enzo Zappaterra, and Mike Lakin (sponsorship), and for the HGS in Houston: Al Danforth, Ian Poyntz, Steve Henry and Gabor Tari.

Details of sponsorship opportunities and associated exhibition space are available from the PESGB office 'Africa Conference 06' at 5th Floor, 9 Berkeley St, London W1J 8DW, on the PESGB website **www.pesgb.org.uk** or directly from **jennie@pesgb.org.uk**

PESGB

Monday, January 16, 2006

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

Cost: $25 Preregistered members; $30 non-members & 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#).

International Explorationists Dinner Meeting

by ***Gabor Tari***
Vanco Energy Company

Traditional and New Play Types of the Offshore Tano Basin of Côte d'Ivoire and Ghana, West Africa

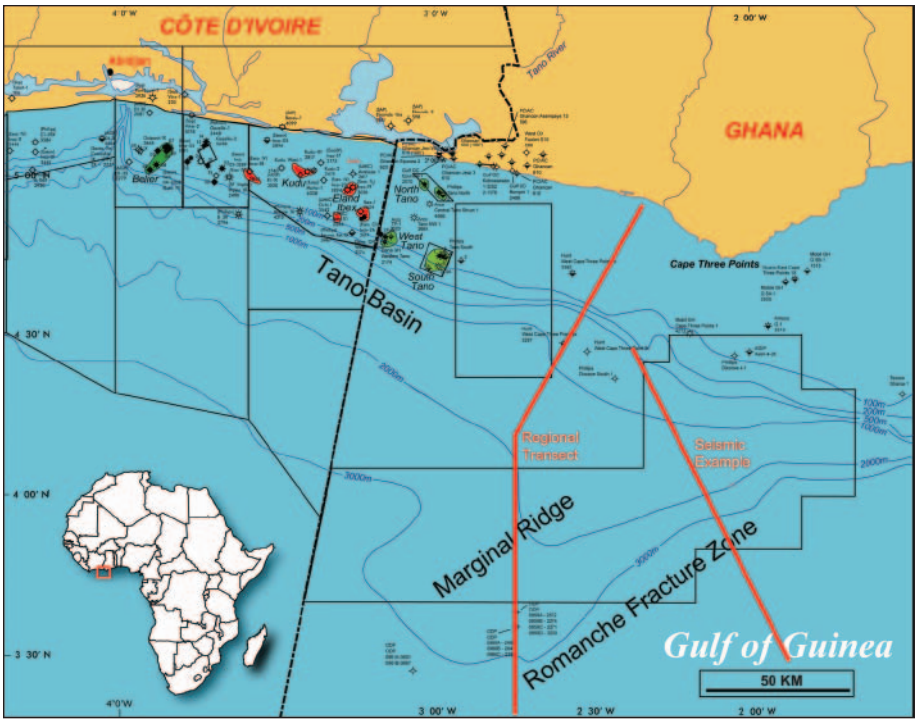


Figure 1. Index map of the Tano Basin of eastern Côte d'Ivoire and western Ghana.

The onshore Tano Basin (named after the border river between Côte d'Ivoire and Ghana) includes a small area between the coastline and the outcrops of the metamorphic Pan-African basement. The Marginal Ridge and the Deep Ivorian basin can be considered as the broader offshore Tano Basin, forming a large deepwater basin with present-day water depths from 200 m to 4,000 m (Fig. 1). To illustrate the basin-scale structure and stratigraphy of the Tano Basin downdip from Cape Three Points, a regional seismic transect is shown as a line drawing in Fig. 2.

The Marginal Ridge is a prominent structural and bathymetric feature separating the deep-water Tano Basin from the East Atlantic abyssal plain. As to its origin, traditionally, ridge development was subdivided into four major periods of structural evolution. These periods are a) early rifting and shearing of the southern border along the Romanche Fracture Zone during the Albo-Aptian, b) end of rifting and intracontinental transform faulting during the Late Albian, c) continent to ocean transform faulting from the Cenomanian until the Late Cretaceous(?) and d) passive margin evolution since the Late Cretaceous.

A different look on the existing data along strike, however, suggests a more specific structural scenario that has important implications for the exploration potential of the basin. Whereas the internal structure of the Marginal Ridge is very poorly imaged on the regional

International Meeting *continued on page 29*

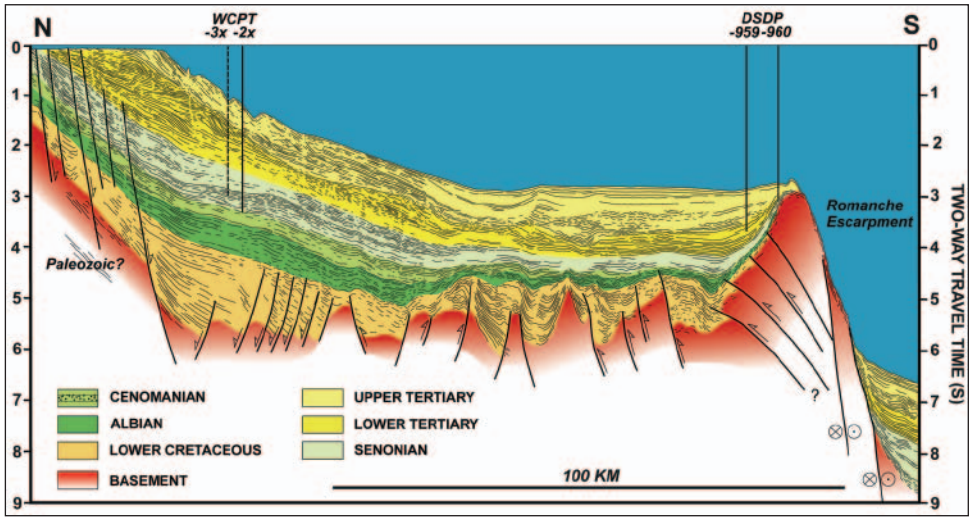


Figure 2. Line drawing interpretation of a composite regional seismic transect; for location see Fig. 1.

International Meeting continued from page 27

seismic transect, a reprocessed subregional seismic section some 50 km to the east reveals the nature of this significant feature (Fig. 3). Both the reprocessed and new 2D seismic data clearly image a large landward-verging overthrust system in the Cape Three Points Deep area.

On closer inspection (see inset), the seismic reflectors associated with the individual thrust imbrications within this "nappe" were attributed to southward-prograding sediments by previous interpretations. However, the internal geometry of the allochthonous nappe system is identical to that observed at the leading edge of classic fold belts.

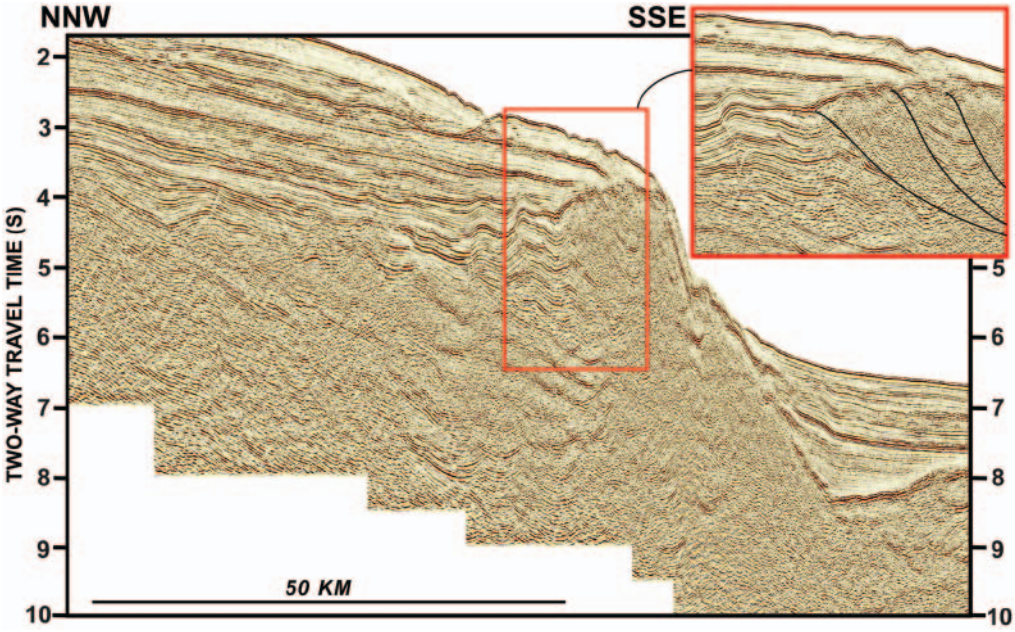


Figure 3. Subregional seismic transect across the Marginal Ridge of Ghana; for location see Fig. 1. This reprocessed 2D seismic profile shows the reflection geometry north of the Romanche Escarpment. Packages of south-dipping reflectors were previously interpreted as prograding clinoforms; however, closer inspection reveals the presence of imbricates in a north-vergent overthrust system.

Other evidence for compressional deformation is provided by the series of inverted syn-rift half-grabens and a well-developed "foredeep basin" that formed due to the load of the incoming fold belt. The map-view isopach of this sedimentary sequence shows a triangular basin with a maximum thickness of more than 4,000 m just in front of the north-verging nappe system. Note that the regional transect shown in Fig. 2 runs at the perimeter of the foredeep basin, and therefore it fails to document the foredeep basin as the key to understanding the Marginal Ridge.

The exploration history of the onshore Tano Basin began with initial drilling in the late 1890s immediately adjacent to the extensive oil seepages in both Ghana and eastern Côte d'Ivoire. By the l970s exploration efforts had moved to the offshore shelf, resulting in a number of oil and gas discoveries in Lower Cretaceous reservoirs charged from lacustrine and deltaic syn-rift as well as earliest marine source rocks. More recent drilling has occurred at and beyond the shelf break and has resulted in oil discoveries in Senonian reservoirs charged from Turonian-Cenomanian marine source rocks, a situation analogous to many discoveries made in Côte d'Ivoire.

Therefore, the traditional play types of the Tano Basin include syn-rift Albian fault blocks with en échelon map-view geometry and Senonian fan complexes beneath the present-day slope (Fig. 4). The Albian syn-rift fault blocks can be traced from the shelf area into the deep-water along subregional hinge zones. The Senonian fan complexes cover a fairly large area in the center of the Tano Basin.

Recently acquired 2D and 3D seismic data reveal unexpected new play types associated with the unusual structural evolution of the Marginal Ridge of Côte d'Ivoire and Ghana (Fig. 4). Because the structural geometries are analogous to those found in classic fold belts and foredeep basins, the same play types can be defined, such as transpressional en échelon anticlines, stratigraphic updip pinch-outs within the foredeep basin and sub-thrust traps beneath the north-verging nappe system. The Cape Three Points Deep area provides the very first case for this set of play types in the hydrocarbon exploration history of offshore Africa. ■

International Meeting *continued on page 30*

International Meeting continued from page 29

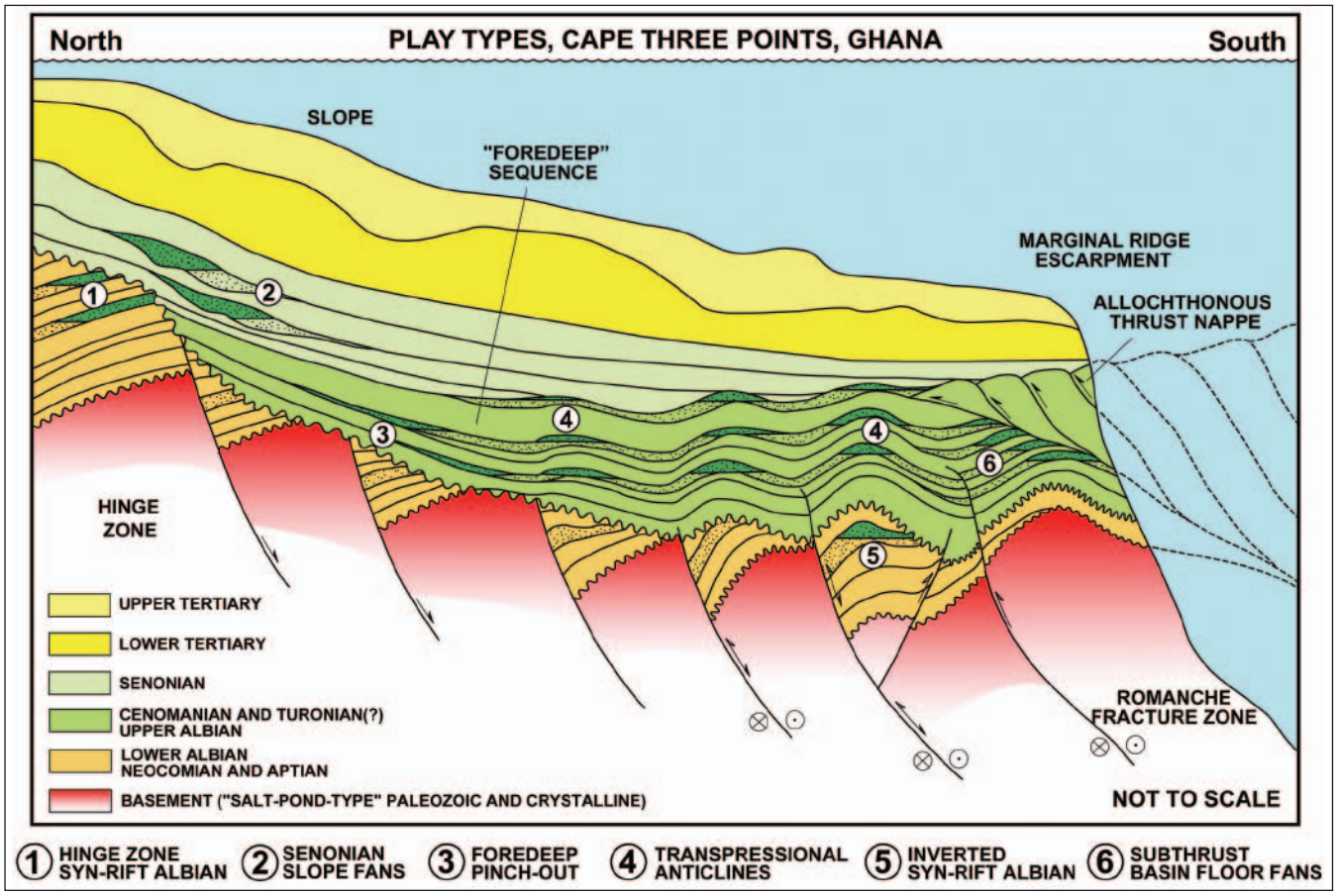


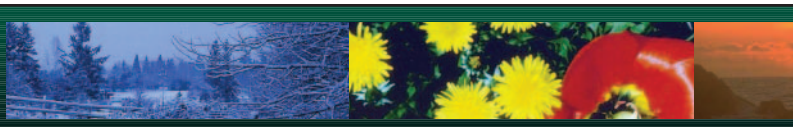
Figure 4. Summary of traditional and new play types in the Cape Three Points segment of the Tano Basin, Ghana.

Biographical Sketch

Dr. Gabor C. Tari holds Masters degrees in geophysics and in geology from Eötvös University of Budapest, Hungary. He graduated from Rice University with a PhD in geology and geophysics in 1994. After working for Amoco on several exploration projects focusing on the Romanian Carpathians and the Moesian Platform, he transferred to the Amoco Angola Team in 1996. At first he did regional evaluations for several Angolan bid-rounds, but later joined the Block 18 project, where several discoveries have since been made. Following the merger between BP and Amoco, he continued to work for the new organization.

Gabor joined Vanco Energy Company in 1999 and currently, he is Vice President of Geosciences working on several projects offshore Morocco, Ivory Coast, Ghana, Equatorial Guinea, Gabon and Madagascar. Gabor is also an Adjunct Professor at the Department of Geology and Geophysics at Rice University in Houston, teaching seismic reflection interpretation to undergraduate and graduate students.

January 2006



Sunday	Monday	Tuesday	Wednesday
1 *New Year's Day*	2	3 **HGS Executive Board Meeting**	4
8	9 **HGS General Dinner Meeting** by L. Sternbach *"Geo-Legends A Trbute to Four 'All-Star' Geologists"* Page 24	10	11
15	16 **HGS International Explorationists Dinner Meeting** by G. Tari *"Traditional and New Play Types of the Offshore Tano Basin of Côte d'Ivoire and Ghana, West Africa"* Page 27	17 **HGS Northsiders Luncheon Meeting** *"Deep Woodbine Exploration Models and Concepts and Status of Current Activity"* Page 35 **HGS Engineering and Environmental Dinner Meeting** *"Environmental Considerations for Tight Gas Sands Development on Private Lands"* Page 39	18
22	23 **HGS North American Explorationists Dinner Meeting** by E. Heydari and L. Baria *"A Microbial Smackover Formation and the Dual Reservoir-Seal Sysytem at the Little Cedar Creek Field in Conecuh County, Alabama"* Page 45	24	25 **HGS General Luncheon Meeting** by J. Pan (speaker) and J. Fulcher *"The Gunnison Field Discovery Story– Garden Banks Block 668, Gulf of Mexico"* Page 49
29	30	31	**Members Pre-registered Prices:** General Dinner Meeting . . . . . .$25 Nonmembers walk-ups. . . . . $33 Env. & Eng. . . . . .$25 Luncheon Meeting . . . . . .$30 Nonmembers walk-ups. . . . . $33 International Explorationists . . . . . .$25 North American Expl. . . . . .$25 Emerging Technology $25

GeoEvents

Thursday	Friday	Saturday
5	6	7
12	13	14
19 **SIPES Luncheon Meeting** *"Unconventional Drilling Methods for Unconventioanl Reservoirs"* Page 41 **GSH Potential Fields Group Dinner Meeting** *"Analysis of Magnetic Anomalies from the South-Central Alberta Foothills, Canada"* Page 43	20	21
26	27	28

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.**

NOW you can make your reservations on-line at www.hgs.org

Upcoming GeoEvents

February 1–3
North American Prospect Expo
George R. Brown Convention Center, Houston, TX

February 6–10
3rd Annual AAPG Winter Education Conference
Hilton Houston Westchase Hotel
Houston, TX *Page 12*

Feb 13
HGS General Dinner Meeting
Structural styles and processes of the deep shelf province, northern Gulf of Mexico

February 22
HGS Joint Luncheon with HAPL (Houston Area Petroleum Landmen)
The MMS plan for Deep and Ultra-Deepwater Leasing in the Gulf Of Mexico and assessing 2005 Hurricane Damage to the Outer Continental Shelf

March 5–9
2006 APPEX London *Page 48*

March 13
HGS General Dinner Meeting
Challenges in structure prediction when devleoping remainng field reserves using 3D seismic, shelf GOM

March 29
HGS General LuncheonMeeting
The Princess Discovery - Sub Salt Gulf of Mexico: Challenges of Sub-Salt Imaging in a Fast-Paced Sub-Sea Development

April 9–12
2006 AAPG Annual Convention
George R. Brown Convention Center, Houston, TX *Page 8*

Tuesday, January 17, 2006

The Sofitel Hotel • 425 Sam Houston Pkwy. North
Social 11:15 a.m., Luncheon 11:30 a.m.

Cost: $31 Preregistered members; $35 non-members & 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 Luncheon Meeting

by ***Fred V. Byther***
Oracle Resources, LC

Deep Woodbine Exploration Models and Concepts and Status of Current Activity

The Woodbine depositional model that Oracle Resources uses for exploration and development in Polk and Tyler Counties, Texas, has significantly changed from depositional models used in the 1970s through the late 1990s. As a result of this reevaluation, we have initiated a new round of Deep Woodbine drilling activity. Early results from this drilling activity suggest that tremendous reserves may be found with the application of 3-D seismic data.

The existing Woodbine fields of Polk and Tyler Counties are significant—they may ultimately produce 1 TCFG and 30 million barrels of condensate. Yet efforts to find new fields since the discovery of Double A Wells in 1985 have been largely unsuccessful. Intense drilling activity along strike to fields discovered in the 1970s and 1980s has yielded no discoveries of consequence. It is our opinion that the reason for this lack of success is that the reservoir sands are not distributed in a diffuse system but rather area highly focused in relatively few feeders, with most of the sands in Polk County within the bounds of a north-south axis of deposition.

The reservoir sands are not distributed in a diffuse system but rather area highly focused in relatively few feeders

Original work by Charles Seimers (University of Wyoming, 1978, 1981) and Deane C. Foss (Chevron, 1980) suggested that the Woodbine sands of Polk and Tyler Counties were turbidites deposited in deep water on the Outer Cretaceous Shelf. More recent data, primarily from newer cores, has cast doubts on this interpretation. Howard White (Oryx Energy Co., 1998) proposed that these fields were deposited in a shallow marine environment as shelf edge deltas. Subsequent paleo and well log data has support this newer interpretation, and the implications of the shelf edge model have encouraged exploration downdip to the Cretaceous Shelf Edge, particularly in the known sandy fairways.

As a result of these two ideas relating to the hunt for Deep Woodbine sands, a series of large 3-D seismic surveys are in progress. The first 3-D has been completed and appears to verify the proposed models, complete with the identification of several small minibasins that appear to contain thick aggradational packages of sediments that may contain reservoir-quality sands. Drilling activity by Comstock Oil & Gas and Anadarko has encountered high-quality sandstone reservoirs in these settings, reservoirs that may be superior to those of any Woodbine gas wells drilled to date.

In the coming years there will be continuation of drilling activity for Deep Woodbine sands at depths ranging from 15,000 feet to greater than 20,000 feet. These deep reservoirs are once again being targeted for drilling more than 20 years after the first wells attempted to find production from the Texas counterpart of the Deep Tuscaloosa. The excellent, highly overpressured reservoirs have the potential to make the Deep Woodbine one of the most exciting exploration plays in the onshore United States in the coming years. ■

Biographical Sketch

Fred V. Byther attended The University of Texas at Arlington (UTA) from 1964 to 1967. After serving in the US Navy, he returned to UTA from 1974 to 1977, and received a BS in geology in 1977.

Fred began his career in 1977 with J.D. (Jack) Sistrunk Jr. He joined Sunmark Exploration

HGS Northsiders Luncheon Meeting *continued on page 37*

HGS Northsiders Luncheon Meeting continued from page 35

in Dallas in 1980 as a Deep Anadarko Basin exploration geologist and he developed depositional models and exploration methodologies for Pennsylvanian clastics in the western Anadarko Basin.

Reassigned to Sun Exploration in Denver as geological supervisor of the Williston District in 1985, he then assumed a position as regional planner in 1986. Fred returned to Mid-continent District in Dallas in 1987 as senior exploration geologist and served as project leader on a multidisiplinary Hunton exploration team.

With Oryx Energy Company, Fred moved to the Texas Gulf Coast, where he was assigned a seemingly insignificant field in Polk County, Texas, in 1992. In a few years the field, Double A Wells, had become Oryx's most prolific producing asset onshore. He served as team leader in a multidisciplinary study of the Woodbine along the Texas Outer Cretaceous Shelf. Fred retired from Oryx in 1998 and then went to work for Snyder Oil in Fort Worth, from 1998 to 1999.

In 1999, he formed Oracle Resources, LC with Bryan Pershern and George Ainsworth. Fred presented Woodbine ideas at Black Stone's Woodbine Symposium in Houston in September 2001. Currently, Fred is engaged in exploration for Deep Woodbine targets from 15,000 to 22,000 feet, supported by a large 3-D seismic survey south of Double A Wells field and elsewhere along the Texas Outer Cretaceous Shelf.

Tuesday, January 17, 2006

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 non-members & 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 ***Anthony W. Gorody, PhD, CPG-9798***
Universal Geoscience Consulting, Inc.
Houston, TX

Environmental Considerations for Tight Gas Sands Development on Private Lands

Environmental concerns related to gas development are significantly extending unconventional resource drilling and development project life cycles. This is particularly evident in Rocky Mountain regions where private surface and mineral ownership is split. Both accelerated population growth and accelerated gas development programs are encroaching upon one another, thereby creating the greatest potential for conflict in urban areas. We will review and discuss approaches that various operators are implementing in the Piceance Basin to reduce conflict with surface use agreements, water well agreements, and baseline air and water sampling and monitoring agreements.

Surface owners are increasingly requesting water well agreements

Surface owners and nongovernmental organizations (NGOs) have extrapolated their concerns regarding coalbed natural gas resource development to the tight gas sand resource. Both resources share potentially negative impacts associated with ground surface disturbances. These arise from the need to develop a relatively dense development infrastructure. As a result, surface use agreements are being increasingly used. In Colorado, surface owners without a surface use agreement can now request on-site inspections from Colorado Oil and Gas Conservation Commission (COGCC). A recent landmark memorandum of understanding between BP and LaPlata County Commissioners proactively establishes terms to voluntarily regulate land use for infill drilling development of the Ignacio Blanco coalbed natural gas field. Similar proactive agreements are being drafted among tight gas producers and city development planners in the Piceance Basin.

Although surface water disposal issues and concerns regarding shallow groundwater withdrawal are not relevant to tight gas sand development, surface owners are increasingly requesting water well agreements. Because many water wells in Colorado are susceptible to drought and have poor yields and poor water quality, many operators are voluntarily conducting baseline sampling and monitoring surveys to document water well conditions. Their sampling and analysis protocols are similar to those required by the COGCC under the permitting requirements for infill drilling of the Fruitland Formation (Orders 112–156 and 112–157). ■

Biographical Sketch

Dr. Gorody received his Master's and Doctorate degrees in geology and geochemistry as a Weiss Fellow at Rice University. He is a consulting geoscientist with 26 years of diverse international and domestic industry experience. An advisor to oil and gas producers and state and federal regulators, he provides training and consulting services to address technical and environmental risk related to natural gas development and associated groundwater resources.

Thursday, January 19, 2006

SIPES
Luncheon Meeting

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

Register online, call, fax or e-mail your reservation to Mrs. B.K. Buongiorno at Tel: 713-651-1639, Fax: 713-951-9659, e-mail: bkspee@aol.com by 12:00 Noon, Tuesday Jan 17, 2005. **Members and Affiliates who register by Jan 17 pay $30. The cost is $35 for guests, non-members, and new registrations at the door.** No-shows will be billed. You can now sign up for SIPES Meetings online at www.sipeshouston.org, but payment is still required by regular mail or at the door.

*by **Mr. Doug Wight***
Vice President
Corporate Development
CDX-Gas, LLC.
Dallas, Texas

Unconventional Drilling Methods for Unconventional Reservoirs

Traditional surface drilling methods used to extract methane gas from coal and shale reservoirs have historically had low production rates, low recovery factors, do not drain the reservoir uniformly, require considerable surface disturbance to drill and encounter extended dewatering periods.

In recent years, advances in drilling technologies have allowed some operators to re-evaluate the economic viability of developing some unconventional reservoirs that had been previously discounted due to poor production performance. CDX Gas, LLC of Dallas has developed a patented drilling system that has dramatically enhanced production recoveries from low permeability coals and shales. The Z-PINNATE, Horizontal Drilling and Completion System employs horizontal drilling techniques in a multi-well pattern that creates an efficient and environmentally friendly recovery method.

A Z-PINNATE well drilled in a coal seam can deplete 1200 acres from a single small wellsite and typically recover 85 to 90 percent of the gas in place within 30 months. A pinnate pattern allows wells to reach maximum production rates in a matter of days by minimizing the dewatering period. Production profiles show that nearly 75% of cumulative production is recovered in the first 24 months along with a dramatic increase in recoverable reserves.

By reducing the number of wells needed to deplete a project area, the Z-PINNATE Horizontal Drilling and Completion System reduces the surface disturbance caused by well locations, gathering systems and production facilities. This technique also reduces project development costs, improving project economics and while minimizing the effects on the environment. ■

Biographical Sketch

Mr. Wight is a senior exploration geologist with 28 years of oil and gas experience in the energy industry. He has global conventional exploration and CBM experience. He attended the United States Naval Academy as an ocean engineer and graduated from the University of Oklahoma with a BS in geology. He was VP of Exploration for Woods Petroleum, Durham Inc., Lynx Exploration, B&G Petroleum and President of Anderra Energy Corporation. His duties as head of Corporate Development for CDX Gas include responsibility for the formation of joint ventures and coordination of new acquisitions and divestitures. This included CDX's ventures with Talisman Energy, Penn Virginia Oil and Gas and Magnum Hunter Resources. Mr. Wight helps direct CDX's unconventional reservoir exploration and capitalization efforts. He joined CDX in October 1999.

Thursday, January 19, 2006

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

Cost: $25
Reservations: Call or email Dale Bird, by noon Tuesday, January 17, 2006
281-463-3816 or dale@birdgeo.com (email is preferred)

GSH Potential Fields Group
Dinner Meeting

by ***Christian Abaco***
EnCana

Analysis of Magnetic Anomalies from the South-Central Alberta Foothills, Canada

Interpretation of airborne and ground magnetic data from the south-central Alberta Foothills shows a remarkable correlation between surface geology and residual magnetic anomalies. The near-surface magnetic anomalies are not related to the topography and are induced by the magnetic properties of the rock units underlying the survey area.

Siliciclastic strata dominate the surface geology; they have low magnetic susceptibility (10^{-5} to 10^{-2} SI) and therefore induce small magnetic anomalies ranging between 9.8 and −10.8 nano Telsa. Most of the magnetic anomalies occur in uppermost Cretaceous sandstones (Brazeau and Lower Coalspur strata) and appear to increase in intensity at the contact with the Tertiary Upper Coalspur Formation and with the underlying marine shale of Alberta Group strata. The Albian Beaver Mines sandstone also exhibits higher magnetic anomalies, contrasting with the underlying lower Blairmore strata and the overlying shale of the Blackstone Formation.

Ground magnetic data show good correlation with high-resolution aeromagnetic (HRAM) anomalies and the magnetic susceptibilities measured from the surface geology. The depth estimates to the magnetic sources that generate the magnetic anomalies indicate values ranging from 20 to 800 meters.

The occurrence of HRAM anomalies in the Beaver Mines, Brazeau and Lower Coalspur strata appears be related to their depositional history and petrographic compositional stages of the Middle and Upper Cretaceous sandstones from the southern and central Alberta Foothills. Cretaceous nonmarine sandstone from the study area contains up to 17% detrital opaque heavy minerals, which consist of magnetite, ilmenite and rare grains of chromite and pyrite.

The magnetization models constructed to reproduce the magnetic anomalies closely match both ground and airborne observed values. Seismic data interpretation constrains the magnetic mapping results and suggests that HRAM data may be used in the early stages of exploration to assist in mapping lithology and structure between 2D seismic lines. ■

Biographical Sketch

Christian Abaco received his BSc (Hons.) in geological engineering from the University "Alexandru Ioan Cuza" of Iasi, Romania, in 1985 and a degree in economics in 1992 from the Academy of Economic Sciences, Bucharest, Romania. In 2003 he completed his MSc in geophysics with the Fold-Fault Research Project at the University of Calgary.

Before completing his degree in geophysics, Christian worked as an exploration geologist for 16 years in Canada and Romania. He worked in both sedimentary and igneous/metamorphic rock projects exploring for oil and gas, coal, base metals, gold and diamonds. In 2002 Christian started working with PanCanadian Energy/EnCana, as geophysicist in the International & New Venture Group, and currently he is part of a development team working in Western Canada.

Christian's academic interests include integrated geophysical and geological analysis of fold and thrust belts and offshore frontier areas using seismic, gravity and magnetic data and AVO/LMR analysis and fracture detection in tight reservoirs. He is a member of SEG, CSEG and APEGGA (P. Geol).

Monday, January 23, 2006

HGS North American Explorationists Dinner Meeting

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

Cost: $25 Preregistered members; $30 non-members & 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#).

by ***Ezat Heydari***
Department of Physics, Jackson State University, Jackson, MS
Lawrence Baria
Jura-Search Inc., Jackson, MS

A Microbial Smackover Formation and the Dual Reservoir-Seal System at the Little Cedar Creek Field in Conecuh County, Alabama

Little Cedar Creek Field appears to be the largest Smackover field discovered in the Northern Gulf Coast Province in the last three decades. At this time, the field demonstrates an oil column of at least 700 feet and extends along strike over 7 miles. Development drilling is ongoing.

From nearly 20 conventional cores taken throughout the field, it is apparent that two separate reservoirs exist in the Smackover: an upper ooid/peloid grainstone shoal facies and a lower microbiolite/thrombolite bindstone reef facies. These two reservoirs are underlain, separated and overlain by tight mid-ramp, lagoonal and tidal flat limestones, respectively.

Little Cedar Creek Field is also unique because both of its reservoirs are composed predominately of limestone, not dolomite

The lower, reefal reservoir is only partially dolomitized and characterized by porosities of 6% to 25% with permeabilities in excess of 1 Darcy. The thickness of this lower reservoir varies from 2 to 50 feet. The upper ooid shoal reservoir varies from 0 to 30 feet in thickness and is somewhat tighter, less permeable and only partially dolomitized. Each reservoir possesses its own distinct oil/water level and each reservoir pinches out in an updip direction.

Unlike virtually all other Smackover fields in the Eastern Gulf, Little Cedar Creek Field does not possess a Buckner anhydrite top seal immediately overlying the Smackover reservoir. Furthermore, Little Cedar Creek Field is also unique because both of its reservoirs are composed predominately of limestone, not dolomite, as is the case in most Smackover fields in the region.

The Smackover Formation is only 80 to 100 feet (24 to 30 m) thick and consists of seven distinct lithofacies at Little Cedar Creek Field. From the base to the top, the following lithofacies are recognized: (1) a laminated peloid wackestone (mid-ramp) which overlies the red conglomerates (alluvial fan) of the Norphlet Formation with a sharp contact; (2) a bioturbated, peloid packstone (mid-ramp); (3) a microbial bindstone (inner ramp); (4) a laminated peloid wackestone-packstone (inner ramp); (5) a bioturbated peloid packstone (lagoonal); and (6) a peloid-ooid grainstone (beach). These nearly pure carbonate lithofacies are overlain by a mixed regime of lime mudstones, red and green shales, sandstones and conglomerates (lithofacies 7) interpreted as Smackover mixed carbonate and siliciclastic tidal flat deposits. The sequence of lithofacies and their respective depositional environments indicate a shoaling-upward cycle that formed by southward progradation following the rapid transgression of the Smackover sea. Virtually every lithofacies of the Smackover Formation exhibits microbial features, making the entire thickness of the formation microbial in origin at this location. Such a situation was probably caused by harsh environmental conditions imposed by the geometry of the embayment and the ramp, low-energy conditions and poor seawater circulation.

The microbial bindstone and ooid grainstone lithofacies are highly porous and permeable, forming two distinct reservoirs at the Little Cedar Creek Field. The microbial bindstone reservoir consists primarily of pellets and peloids bound by microbially and abiotically precipitated cements. Framework and intergranular pores generate porosities of 6% to 25% and permeabilities as high as 1.5 Darcies. The microbial reef reservoir is overlain by the nonporous and nonpermeable bioturbated peloid packstone lithofacies (5 to 20 feet) forming the seal over this reservoir. The cause of the preservation of porosity in the microbial bindstone was marine cementation that prevented extensive burial compaction.

HGS North American Meeting *continued on page 47*

HGS North American Meeting continued from page 45

The ooid grainstone reservoir is cross-laminated and has intergranular, moldic, vuggy and intercrystalline porosity types. The abundance of microbially coated grains and composite particles suggests a low-energy beach where microbial activities were an integral part of the environment. The ooid grainstone reservoir grades upward into nonporous and nonpermeable wackestone and packstone facies, and eventually to green and red shale and sandstone layers. The reason for the preservation of porosity in the ooid grainstone reservoir was early meteoric diagenesis, which produced moldic and intercrystalline pore spaces.

The Little Cedar Creek Field was discovered in 1994 when Hunt Oil Company drilled the #1 Cedar Creek Land & Timber 30-1. The Smackover Formation was perforated at a depth of 11,870–11,883 feet and tested at the rate of 108 barrels of oil per day. The original bottom hole pressure was 4300 psi, producing 46 degree API gravity oil. The Hunt well produced for several years, flowing at an average rate of 43 BOPD.

Midroc Operating Company offset the Hunt discovery in 2001 with the drilling of the #1 Cedar Creek Land & Timber 19-15. The Midroc well was completed at a rate of 250 BOPD from the same stratigraphic interval in the upper Smackover Formation. Since that time Midroc Operating Company has drilled 22 additional successful wells in an east-northeast direction from the original discovery. The average completion on the last 22 wells is 270 BOPD and roughly 250 MCFPD.

Such an important and unique discovery prompted us to conduct a comprehensive study of the Smackover at Little Cedar Creek Field to evaluate the conditions that led to the formation of such a major dual-reservoir system. The purposes of this investigation are the following: (1) to provide a detailed description of lithofacies of the Smackover Formation in the field, with particular attention given to the reservoir and seal lithofacies characteristics; (2) to interpret the depositional environments of the Smackover Formation in order to decipher conditions that led to deposition of this dual reservoir setting; and (3) to speculate on future exploration strategies for similar Smackover reservoirs. ■

Biographical Sketches

Lawrence R. Baria After receiving his BS and MS degrees from Northeast Louisiana University, where he studied stratigraphy and sandstone petrology, Larry Baria attended LSU to work on PhD studies in stratigraphy, carbonate and sulfate diagenesis. Early in his career he worked with Getty Oil Company's E&P Research Lab, specializing in Cretaceous and Jurassic stratigraphy worldwide. Since 1980 he has been a consulting and exploration geologist active in the Central and Eastern Gulf Coast and the Middle East working primarily in the Smackover and other Mesozoic carbonates. His interests revolve around the relation between sedimentary petrology, the recognition of depositional environments and the interpretation of seismic stratigraphy as applied to oil and gas exploration.

Ezat Heydari finished his undergraduate studies in geology at the University of Tehran in Iran. His graduate education in geology includes a Master's degree from the Pennsylvanian State University and a PhD degree from Louisiana State University. He has worked as a research scientist at LSU and at the Mississippi Office of Geology. He is currently an Assistant Professor at Jackson State University. He has conducted research on sedimentology and diagenesis of Mesozoic formations of northern U.S. Gulf Coast and Permian and Triassic strata of Iran. His interests revolve around depositional environment, diagenesis and geochemistry of carbonate rocks to solve issues related to fluid-rock interactions and to the Earth's history.

Wednesday, January 25, 2006

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

Cost: $30 with advance reservations, $35 for walk-ins, space available ($15 for Emeritus and Honorary).

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 General Luncheon Meeting

*by **Jeff Pan** (speaker)*
Kerr-McGee Oil and Gas
Houston, Texas
Jim Fulcher
Nexen Petroleum
Dallas, Texas

The Gunnison Field Discovery Story—Garden Banks Block 668, Gulf of Mexico

In April 2000, Kerr-McGee Oil and Gas Corporation and its partners Nexen Inc. and Cal Dive International drilled the discovery well of the Gunnison field in Garden Banks block 668 (GB 688). GB 668 is located about 155 miles southeast of Galveston, Texas, in 3200 feet of water. The Gunnison field (2P) proven reserves are estimated to be up to 120 million barrels of oil. The field currently produces 18,000 barrels of oil and 140 million cubic feet of gas through a truss SPAR as of the end of 2004.

The Gunnison field is located on the south side of a ramped mini-basin created by the loading of allochthonous salt. The field spans Garden Banks blocks 667, 668 and 669 (GB 667, 668 and 669). GB 667 and 668 were acquired in the 1996 OCS western lease sale by ORYX (later merged with Kerr-McGee in 1998) and Mariner, each with 50% working interests. GB 669 was leased solely by Vastar (part of ARCO, later acquired by BP) in the same sale. Working interests of GB 667, 668 and 669 were equalized among Kerr-McGee, Mariner and Vastar in 1998.

The initial evaluation of the GPI speculative 3D data resulted in small-sized prospects, and the Gunnison project was almost terminated prematurely.

The original prospect generation and evaluation of the 3 "shallow" objectives in the Gunnison mini-basin were primarily based on the regional geological work and study of the 2-D seismic data prior to 1998. In mid-1998, 3-D seismic data became available. At the time, the general area of Gunnison was covered by two different 3-D seismic surveys. Unfortunately, the field is located in the south end of the north survey (Western data) and north end of the south survey (Geophysical Pursuit Inc. [GPI] data). The edge effects hinder the reduction of uncertainties and progress of the evaluation. The initial evaluation of the GPI speculative 3D data resulted in small-sized prospects, and the Gunnison project was almost terminated prematurely.

Mapping of the reprocessed GPI 3D data in 1999 produced five new levels of amplitude-supported targets in a deeper interval. The predrill age prognosis of the eight targets ranged from Early Pleistocene to Late Pliocene. Several of the amplitudes conformed to down-dip structural limits and exhibited positive AVO response in good trapping configurations. The features of amplitude conformance and positive AVO significantly reduced the risk of the prospect. Geopressure analysis further mitigated the seal risk factor of the shallow targets; however, because of the difficulty of seismic imaging near the salt flank, the trap element remained the primary risk for the deep targets.

Due to the risk of the deeper objectives, poor imaging, low oil price (average $12) and budget issues, the two original partners opted not to participate. Kerr-McGee, as the operator, presented the prospect 33 times to 16 different companies to subscribe new partners. The Gunnison discovery Well GB 668 #1 was spudded in April 2000, with Kerr-McGee 50%, CXY Canadian OXY (now Nexen) 30% and Cal Dive International 20%. The Gunnison field was discovered just before midnight on Easter Sunday as the drill bit penetrated the first of 12 field pays (5 in the "shallow" and 7 in the "deep").

After 10 well penetrations, the greater Gunnison field was sanctioned for development in October 2001. The ups and downs of field size, extent of area, column heights, thickness and fluid quality were all addressed by the exploration and development teams. Thirty-two months after the discovery, on December 11, 2003, Gunnison field achieved first production from the first of three subsea wells. The field is now ramping up to its projected peak daily production rate of approximately 30,000 barrels of oil and 180 million cubic feet of gas. ■

HGS General Luncheon Meeting *continued on page 51*

HGS General Luncheon Meeting continued from page 49

Biographical Sketches

Jeff (Gee-Shang) Pan is currently working as a senior exploration advisor in the GOM Deepwater Exploration Group, Kerr McGee Oil and Gas Corporation, Houston, Texas. Prior to joining Kerr McGee in 1998, he worked for Atlantic Richfield Company (ARCO) in Plano, TX, for 10 years. He received a BS degree in geology from National Taiwan University in 1979, an MA degree in geophysics from Princeton University in 1983 and a PhD in geophysics also from Princeton University in 1987. His interests are in prospect generation/evaluation, seismic processing, modeling and inversion, DHI/AVO analysis, predrill geopressure prediction and seal capacity analysis. He is a member of AAPG, EAGE and SEG and has served as an associate editor for SEG *Geophysics* between 2000 and 2003. He was the president of North America Chinese Earth Scientists Association in 2000 and 2001. He is currently serving as the president of Chinese American Petroleum Association (CAPA). His email is jpan@kmg.com.

Jim Fulcher, senior geologist, worked with Jeff Pan at Oryx and Kerr McGee. Fulcher earned a BS in geology at Texas A&M University in 1980 and an MS in geology at Texas A&M University in 1988. He joined Nexen in Dallas in 2005.

WebNotes continued from page 61 In addition, we have a new feature for the HGS Website called "GeoBLOG!". Most of you are familiar with the idea of a web log or "Blog." The idea behind GeoBLOG! is to have an area where the Web Team can highlight hot topics and breaking issues in geoscience. The first topic was the startling finding by SEATOS (Sumatra Earthquake and Tsunami Offshore Survey) that there was no apparent seafloor displacement near the epicenter and adjacent plate boundary of the 2004 Sumatra-Andaman Earthquake. This has significant implications for our models on how earthquakes and tsunamis occur and may raise questions about the plate tectonic model itself!

We are still looking for one or two additional Website Committee members to help with additional areas identified for improvement of the site. My own experience thus far is that the Tendenci software that we use makes Website news reporting, event announcements, and article publishing very easy for people with basic computer editing and graphics skills.

Don't be shy. Give me a call (713-557-9076) or send me an e-mail (aberman@houston.rr.com) and ask about how you can join the Web Team! ■

Art Berman, *HGS Website Committee Chair*

HGA and GeoWives continued from page 60 Petroleum Club Ladies Bridge, chaired by Daisy Wood. Daisy also continues to chair the ever popular Game Day in February. With a variety of games on the program, this is the Auxiliary's most popular and well attended event. What the heck is chicken foot anyway?? Get in the know and join us at the Junior League Tearoom on February 13, 2006!

The most recent event was December's well-received Christmas Luncheon at the Braeburn Country Club. Auxiliary member Pat Austin with her four-part harmonies presented a marvelous program, "Take Five." Many thanks go to Chairman Betty Alfred and her committee for their wonderful work.

This year's social program is expected to be one of the Auxiliary's most successful. Our current First Vice President, Winona Labrandt Smith, is a wonderfully talented individual whom the Auxiliary is lucky to have serving its members.

- **To assist the Houston Geological Society in any manner they shall request:** Examples of this assistance have been to work with the Society during AAPG conventions in Houston, assisting the Society during Guest Night, helping at the Society office, and the list goes on. In addition to social events, the HGA also has helped with various technical projects. For example, during Mary Harle's presidential term HGA members worked with the Houston Public Library filing drillers' logs donated to the library by the Society. Over 2,000 volunteer hours were given that year to complete the effort. And with oil and gas prices as high as they are now, those logs are getting a lot of renewed use!

Our most recent assistance was helping run the HGS Booth at the Conference for the Advancement of Science Teaching. Thanks to Society and Auxiliary members Jennifer Biancardi, Anne Rodgers, Betty Alfred and Annette and Tom Mather for giving so freely of their time. Also thanks to Janet Combes and Alison Henning for including us in this effort.

This article would not be complete without mentioning our current President, Norma Jean Jones. She is a grand leader, working many hours for the Auxiliary while still having time to work with her husband in their business, Spartan Petroleum, and traveling to AAPG meetings during Larry's tenure as Chairman-Elect of the House of Delegates. Her energy, creativity and spirit are an asset to the organization.

Please encourage your spouse to consider joining our organization. ■

Remembrance

Robert M. Sneider Memorial

by Arthur E. Berman and Thomas J. Feldkamp

Robert M. Sneider passed away on October 29, 2005. He was 76 years old and is survived by his daughter and two sons. Bob was a great petroleum geologist and a role model and mentor of the highest level of integrity and standards.

Bob lived a life above all of service to the profession of geology, science, his many friends and protégés, and the public. He likely learned that mindset of professional service and mentorship from his own mentor, Gus Archie. He had a long career of exploration successes and dedication to teaching, exemplified by receiving the AAPG's Sydney Powers Medal in 2001, the Association's highest award and honor.

I first met Bob on a recent-clastics sedimentation class he taught along with his colleague Larry Meckel in 1981. During the week, as we traveled from Houston to New Orleans, Bob shared not only his vast knowledge of clastic geology but also his unique and systematic approach to learning and living. While participants in that class learned much about the topic of sedimentation, I, for one, learned most about how to be an effective person and geologist.

The first stop on that field seminar was in the floodplain of the Brazos River near Sugar Land, Texas. Bob explained how the Brazos River had changed its course several times over the past 18,000 years and advised us to buy flood insurance if we ever bought a house anywhere near this area. He explained that the greatest danger to homeowners was not from flooding of the river but from slow-moving tropical storms that could produce large amounts of rain in low-lying areas. As it turned out, I bought a house in the exact area of that first field trip stop when I moved to Houston many years later. To the confusion of my Realtor and family, I bought flood insurance despite the fact that our house was outside the 500-year floodplain of the Brazos. I had learned what nearly everyone did: always pay attention to Bob Sneider's advice. Bob took his own advice when he purchased a condominium on Galveston Island some years ago: he made sure it was above the seventh floor (above the highest tidal surge reported from the 1900 hurricane) and that the building's foundation was anchored into the Pleistocene rather than just the Holocene sand.

Bob was generous with his time and always found a way to get together to talk. I once went to Bob for advice on a job change that I was considering. He said, "I understand why you want to make the change and I don't disagree with your reasons, but I ask you to take the weekend and think, is there is anything else that you can still learn from your present employer before you make the decision?"

I thought this was an odd request, but I took Bob's advice and thought about his question all weekend. I called him Monday morning and said, "Bob, I can still learn to run a workstation and the company will give me the opportunity to learn Spanish." I stayed in that job for 5 more satisfying and productive years. Knowing how to use a workstation and speak Spanish have defined my career since talking to Bob that afternoon.

Bob often reminded his many students and protégés, "Run your business like you plan to stay in business." In many ways, that characterized his life. He did everything with great thoroughness, thoughtfulness and enthusiasm. He believed in cataloging and updating information. Bob would commonly read or hear some piece of information about reservoir pressure or quality and he was soon adding it to a graph that he just happened to have with him and was continually updating.

He appreciated and understood complexity, but also believed that geology and life ultimately reduced to relatively straight-forward situations and decision. He taught his students that most reservoirs, in all their variety, generally could be thought of as either bars or channels. Like much of Bob's wisdom, his observations have stayed with those he taught and mentored because of their fundamental truth and usefulness.

Bob Sneider's 48-year career began in 1957 at Shell Oil Company, where he worked for nearly 18 years. During those years, Bob and his family moved often but settled in Houston in 1967. In 1974, Bob started Sneider and Meckel **Remembrance** *continued on page 54*

Coastal Subsidence Conference Attracts Diverse Forum

*by **Arthur E. Berman,** photos by **Matt Kolodney***

More than 120 people attended the "Coastal Subsidence, Sea Level and the Future of the Gulf Coast" conference November 3–5 to hear differing views on the risks of subsidence for coastal areas of Texas and Louisiana including Houston.

The Houston Geological Society and the Engineering, Science and Technology Council of Houston (ECH) joined together to organize and present the meeting at the Northwest Conference Center in Cypress, Texas. The goal of the conference was to provide a forum where differing parties could present their positions and potentially come to consensus on what action would be appropriate for Texas.

Keynote speaker, Dave Zilkoski of the NGS

The HGS and ECH organized the meeting to increase public and governmental awareness of the complex issues involved in subsidence and to provide a forum for discussion of all aspects of the subsidence issue. The hope was to open lines of communication so that policy makers, their technical advisors and the public might have a better understanding of coastal subsidence, how to quantify and predict it, as well as plan infrastructure around its effects.

These were perhaps idealistic expectations considering the fundamental differences dividing the various parties in the subsidence debate for the Gulf Coast. While everyone involved in the debate over subsidence agrees that there are many aspects and factors that contribute to subsidence, there clearly are also camps that favor a single cause as being the most significant.


Keynote speaker, Virginia Burkett, USGS

The Harris Galveston Subsidence District (HGSD) represents the strongest voice favoring ground water withdrawal as the chief cause of subsidence in the Houston area. Changes in ground water pumping directed by the HGSD have resulted in impressive reduction or elimination of subsidence in low-lying areas of Houston. There are, however, portions of the metropolitan area that are undergoing significant subsidence that is not easily explained or fully understood.

The other pole in the subsidence debate is represented by Dr. Roy Dokka, professor at Louisiana State University and co-author of the 2004 Technical Report NOS/NGS 50, "Rates of Vertical Displacement at Benchmarks in the Lower Mississippi Valley and the Northern Gulf Coast." Dokka's report concludes that rates of subsidence in southern Louisiana are significantly greater than previous estimates and that modern subsidence includes a tectonic component. HGS members may recall that Dr. Dokka addressed an HGS General Luncheon Meeting held jointly with the Society of Petroleum Engineers (SPE) in November 2004 on "Anatomy of a Silent Disaster: Ongoing Subsidence and Inundation of the Northern Margin of the Gulf of Mexico Basin."

The diverse array of participants at the Coastal Subsidence Conference included state and local government and regulatory officials from Texas and Louisiana, representatives from various federal agencies such as the National Oceanographic and Atmospheric Administration's (NOAA) National Geodetic Survey (NGS) and National Hurricane Center, and the United States Geological Survey (USGS). The conference was also attended by university researchers and faculty from the University of Texas, Texas A&M University, Rice University, University of Houston, Tulane University and Louisiana State University (LSU), along with representatives from a variety of geological, environmental, petroleum and engineering companies.


Confernece leadership team (left to right): Front: Glenn Carlson (ECH) and Cheryl Desforges (HGS). Rear: Dave Rensink (HGS) and Art Schroeder (ECH)

The first day of the three-day conference was devoted to understanding coastal subsidence, the methods used to measure subsidence and techniques used to evaluate the contribution of ground water withdrawal, oil and gas production, engineering projects and geological factors to the overall subsidence budget. The second day addressed the economic and cultural effects of subsidence and the results of mitigation efforts, options and consequences. A field trip on the third day visited sites of active faulting and subsidence within the Houston area.

Coastal Subsidence Conference *continued on page 54*

Coastal Subsidence Conference continued from page 53

HGS President Dave Rensink began the conference Wednesday morning and gave a keynote address that afternoon titled "An Introduction to the Origin of the Gulf of Mexico and Its Role in Subsidence." Other keynote addresses included Dave Zilkoski of the NGS on "The Importance of an Accurate Subsidence Network for the Establishment of Vertical Control and Subsidence Rates," and Virginia Burkett of the USGS on "Subsidence and Future Relative Sea Level Rise in the Gulf Coast."

Guest speakers included Sam Webb, Deputy Commissioner for Coastal Resources Program, Texas General Land Office, who discussed "Coastal Subsidence: Finding Common Ground"; John Anderson of Rice University, whose topic was "Long-Term Subsidence Along the West Louisiana and East Texas Coast"; and Ron Neighbors, HGSD, who spoke on "The Politics and Public Policy Issues of Subsidence."

HGS President Dave Rensink described the purpose of the conference. "The idea is to expose participants to as many of the cause and effect relationships of subsidence as we possibly can. We want to make sure that everyone who is involved in the decision-making process is considering as many aspects of the problem as there really are and not focusing on only one or two aspects of the problem."

Roy Dokka added to Rensink's comments. "I think society needs to understand what that risk is. It needs to be honest with people who live there saying, here's the potential. There is no guarantee in life. We can't guarantee anything. What we can do is to see what may happen. Public officials that have responsibility for these things need to understand them and then express them to the community so that the people who live there also understand. Geological insights are too important to be left just to geologists."

It is safe to say that most attendees were aware that subsidence is a problem for coastal regions of the Gulf of Mexico. Probably not all were equally aware of the complexity of the issue. Most participants agreed that the conference was successful in raising awareness that coastal subsidence cannot be easily explained in terms of one cause or factor.

Meeting organizers were encouraged to see state officials from Texas and Louisiana in the audience. Texas Governor Rick Perry contacted conference Chair Cheryl Desforges and asked for summary materials from the event.

Did the "Coastal Subsidence, Sea Level and the Future of the Gulf Coast" conference accomplish the creation of a consensus on what should be done about subsidence? Participants were hopeful that at least some movement was seen in this direction because of the conference.

One attendee said, "We can be hopeful. Realistically, the attitude of the Subsidence District appears to be shifting, which is encouraging. The startling and painful fact that NGS cannot attest to the vertical accuracy of any benchmark in the Harris/Galveston County area within several centimeters should encourage concrete action. It will take time, though, for the conflicting agencies maintaining and using benchmarks to cede territory and move toward a unified and cooperative policy of benchmark integrity—the establishment of a state geodetic survey."

The hope is that everyone went away with an uncertain and queasy feeling about how we quantify, mitigate and live with coastal subsidence; and that is the best inspiration for action and resolution. ■

Robert M. Sneider Memorial continued from page 52 Associates, Inc. with Larry Meckel. He formed Robert M. Sneider Exploration, Inc. in 1981. Bob was involved in worldwide exploration, production, property acquisition, research, training and management.

During Bob's career, he and his associates helped client companies by finding new opportunities through the application of integrated geological-geophysical-petrophysical and petroleum engineering techniques in both frontier and mature areas. He led the industry in cataloging geological, petrophysical and engineering properties of reservoir, seals and flow barrier rock types from around the world.

Bob actively participated in many professional societies, receiving numerous professional accolades, and was a mentor to countless professionals during his career. He was a distinguished lecturer for the AAPG, PESA and SPE. In 2000, he became a member of the National Academy of Engineering. He was an honorary member of the AAPG and named the 2001 recipient of the Sidney Powers Medal, AAPG's highest award.

Bob and his wife Ramona were full partners in life. Bob often acknowledged that his success was due to the steadfast support and assistance of his wife. They raised a family of three children. They were enthusiastic grandparents. After their children were grown, Bob and Ramona enjoyed time together, much of it traveling the world and seeing friends. Ramona passed away just two weeks before Bob and those who knew Bob and Ramona Sneider find no mere coincidence in this.

Bob will be greatly missed by the Houston Geological Society and by all who knew him. ■

Government Update

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

Texas Commission on Environmental Quality News

The **TCEQ Ecological Risk Assessment (ERA) Program** announced that its ERA web page is up and running at: http://www.tceq.state.tx.us/remediation/eco/eco.html .

Available through this web page is the September 2005 Update to the ecological screening benchmarks portion of the ERA guidance document. Also available is a staff position paper on problems commonly encountered during the review of ERAs. Both of these documents will be of use to anyone developing ERAs for submittal to TCEQ. Also included a link to a list of helpful websites for ERA development.

The **TCEQ aquatic life surface water Risk-Based Exposure Limit (RBEL) table** at http://www.tceq.state.tx.us/remediation/trrp/trrppcls.html has been updated to reflect minor changes to the federal criteria in 2004 and to reflect recent changes to the ecological risk assessment surface water benchmarks, which are the source of many of the chronic RBEL values. The surface water benchmarks were revised in September 2005 (see September 2005 update at http://www.tceq.state.tx.us/remediation/eco/eco.html). Many of the benchmarks changed if they had been derived using the LC50 approach (as provided in 30 TAC §307.6 (c)(7)), because of a change in the definition of persistence as provided in the TCEQ document, "Procedures to Implement the Texas Surface Water Quality Standards, RG-194 (revised)," which document is available at: http://www.tceq.state.tx.us/permitting/water_quality/wq_assessment/standards/WQ_standards_implementing.html.

Currently, a chemical is considered persistent if it has a surface water or sediment half-life of 4 days or greater. The previous threshold was 2 months or greater. Consequently, many of the surface water benchmarks (and the chronic RBEL values) have been adjusted down because this has an impact on the multiplier used for the derivation of the surrogate chronic aquatic life criteria. If a chemical is considered persistent and was not before, the multiplier is now more conservative. Additionally, acute RBEL values have been added based on values obtained from the TCEQ Water Quality Division (2003) that were derived using the LC50 approach in accordance with methodology defined in the TSWQS. Footnotes in the table were generally revised to accommodate this addition. References within the footnotes were updated.

The new surface water RBEL values must be used in any documents received by the Remediation Division after January 1, 2006.

The TCEQ is revising its **dry cleaner environmental response program** to bring it into compliance with House Bill (HB) 2376 and Senate Bill (SB) 444, both passed during the 79th Legislature, 2005. HB 2376 includes provisions regarding secondary containment requirements for chlorinated dry cleaning solvent; amended annual registration fees and assessment calculations; the involvement of the Texas Comptroller of Public Accounts to verify certain registration information; an extended deadline for the designation of nonparticipating dry cleaning facilities and drop stations; and solvent distributors retaining 1% of the fees collected if the distributor pays the fees on time to the commission. SB 444 extends the deadline for the designation of nonparticipating dry cleaning facilities and drop stations and allows registration fee credits for the owners of certain dry cleaning facilities that do not participate in the Dry Cleaning Facility Release Fund. The bill also specifies that for changes mandated by this bill, the commission shall adopt rules by February 28, 2006. For more information go to: http://www.sos.state.tx.us/texreg/archive/October142005/PROPOSED/30.ENVIRONMENTAL%20QUALITY.html#315

AGI Government Affairs Monthly Review (October 2005)

Hurricane Katrina Oversight: Federal Response and Gulf Recovery

During October, Congress continued to address the aftermath of Hurricane Katrina, holding hearings to oversee the federal government response and to discuss proposals for rebuilding the Gulf Coast. Some Democrats in Congress have criticized the congressional investigations for not determining the source of the federal government's failures.

Representative Tom Davis (R-VA) and Senator Susan Collins (R-ME), who chair the investigative panels in their respective chambers, say they are waiting to receive more documents from the Department of Homeland Security (DHS) before continuing their investigations.

As investigative panels wait to hear more from DHS, much of the focus on Katrina has shifted to recovery plans, particularly in New Orleans. In recent hearings, members of Congress have mixed an urgency to rebuild New Orleans and its economy with caution about the allocation of federal funds and the need to rebuild more wisely, slowly and safely. Federal and state officials, engineers and other scientists who testified before Congress repeatedly asserted the importance of an integrated recovery approach that emphasizes wetlands restoration and other non-structural techniques to improve storm protection. Flood managers and engineers also pressed for a national levee system and assessment plan.

Along with specific recommendations, witnesses and members acknowledged the complexity of the problem. At one hearing, two geoscientists, Denise Reed from the University of New Orleans and Roy Dokka, Director of the Louisiana State University Center for Geoinformatics, were cautious about wetlands restoration in **Government Update** *continued on page 56*

Government Update continued from page 55

New Orleans. Reed emphasized the need for robust ecological protections but was not optimistic about bringing back wetlands that have already been lost. Dokka meanwhile dismissed the importance of wetlands, saying that subsidence is the major concern in the region and levees are the city's best defense.

Representative Wayne Gilchrest (R-MD), a member of the House Transportation and Infrastructure Committee, stated the Republican leadership hoped to draft policy that incorporates witnesses' recommendations; however, no timeline has been set for this process.

Comprehensive summaries of congressional hearings on Hurricane Katrina are available at http://www.agiweb.org/gap/legis109/katrina_hearings.html.

Investigators Find Flaws in New Orleans Levee Design

The University of California at Berkeley, funded by the National Science Foundation (NSF), American Society of Civil Engineers (ASCE), and the state of Louisiana are each conducting independent investigations into the causes of the flooding in New Orleans after Hurricane Katrina.

Preliminary results indicate that design flaws related to soil strength caused at least two major floodwalls on the 17th Street and London Avenue canals adjacent to Lake Pontchartrain to catastrophically fail. The floodwalls were built into older earthen levees by the Army Corps of Engineers in the 1980s to provide greater protection for northern New Orleans. The concrete floodwalls were supported on steel pilings driven 20 feet into the relatively weak soil, which is composed of silty to sandy river deposits and peat layers. Just below the steel pilings is a layer of peat that investigators believe became a conduit for the water that was building up in the canals to seep through and undermine the base of the clay-rich earthen levee.

Once a line of weakness had formed along the base of the levee, the floodwalls could not counter the force of the water and the levee embankment slid more than 30 feet into the neighborhoods as the floodwalls collapsed. The water then rushed in, causing rapid and unexpected flooding that probably took more lives than the initial storm surge.

The Corps had tested the strength of the soils in the 1980s and designed the concrete and steel structures based on these analyses. Contractors then built the floodwalls to the Corps' design specifications. In 1994, a Corps contractor claimed in court documents that the floodwalls were not lining up properly because of the weak soils, suggesting a design flaw. A judge dismissed the complaint in 1998 on technical grounds without addressing the issue of possible design problems.

A second design flaw related to the building of the Mississippi River Gulf Outlet (MRGO) may have helped breach the Industrial canal floodwalls and flood the lower ninth ward of New Orleans. The Corps completed the 76-mile-long and 36-foot-deep MRGO in 1965 to provide a shortcut for ships and barges to the Port of New Orleans. The outlet funneled more water moving at a faster speed from storm surge into the Industrial canal. Computer modeling shows that the outlet increased the intensity of the surge by 20%, raising the water level an additional three feet and increasing the rate of water transfer from 3 feet per second in Lake Borgne to 6 to 8 feet per second at the mouth of the outlet. Some of the investigators suggest the funneling added to the intensity of the storm surge and caused the canal to be overtopped. The Corps counters that the storm surge was more than a few feet over the level of the floodwalls and the massive surge primarily overtopped the floodwalls to cause most of the flooding. Some of the investigators remain uncertain about whether design flaws, storm surge or both are primarily to blame.

The National Weather Service had identified a "breach" in the Industrial canal levee when it issued a flash flood warning for the ninth ward and Arabi at 8:14 a.m. on the morning that Hurricane Katrina made landfall (at 6:10 a.m., 63 miles from New Orleans).

Further complicating the levee investigations are at least a dozen allegations of shoddy construction by contractors that have been given to the independent investigators. Raymond Seed, an engineering professor and leader of the University of California team said in a Senate hearing, "What we have right now are stories of malfeasance and some field evidence that seems to correlate with those stories." The investigators plan to share these allegations with federal law enforcement, although Seed also indicated in his testimony that it is not clear how big a role the alleged shoddy construction may have played in the catastrophic failures of the floodwalls.

These investigations are preliminary and more work is needed to clarify the causes of the flooding. Besides these three independent investigations, the Corps continues to study the failures, and Defense Secretary Donald Rumsfeld has announced that the National Academies of Science and Engineering will lead a separate investigation.

The Corps is required by law to rebuild the levees to withstand a category 3 hurricane. They are considering driving the steel pilings to a deeper depth of 40 feet to avoid a repeat of the floodwall failures along the 17th Street and London Avenue canals. The Corps is also planning to build the levees to a height of 17 feet. The existing levees were built to 15 feet but have settled to about 12 or 13 feet over time. Besides the design flaws and alleged shoddy construction, the Corps must deal with the natural and man-made loss of wetlands and barrier islands and the natural and man-made subsidence that a bevy of geoscientists have been tracking for decades.

Evolution Roundup

Kansas: Criticisms over Science Standards

An external review board criticized parts of Kansas's revised science standards for being confusing and poorly written. The review board revision, released October 13, 2005, is part of the normal approval process, and the negative comments may cause the State Board of Education to make further changes to the standards. The sections of the standards that were singled out for criticism include changes made by a minority group of board members that cast doubt on theories that life arose from chemical processes and that humans and apes share a common ancestor.

On October 27, 2005 the National Academy of Sciences and the National Science Teachers Association refused to grant copyright permission to the Kansas State Board of Education to make use of publications by the two organizations in the state's science education standards. They cited a poor and misleading definition of science and an overemphasis on describing evolution as a theory with flaws as reasons for the copyright denial. Both groups have offered to work with the Kansas school board to remove these misconceptions about evolution and retain the approved definition of science from the majority report of the Kansas standards science committee. A joint statement and more details are available at: http://www.nationalacademies.org/morenews/

Pennsylvania: Dover Trial Continues

The trial about mentioning intelligent design as an alternative to evolution at the beginning of biology instruction in Dover, Pennsylvania continued this month featuring lengthy testimony from intelligent design proponents. Kitzmiller et al. v. Dover received the most attention in the press when the lead science witness for the defendants, Lehigh University biochemistry professor Michael Behe, took the stand for three days. Behe's arguments rested primarily on the idea of "irreducible complexity," which suggests that many biochemical structures are so complex that they could not have formed through natural selection. Behe also argued that intelligent design is based on physical evidence, even though the theory does not identify a physical mechanism for the assemblage of complex structures. Under cross-examination, Behe acknowledged that "astrology would fit as neatly as intelligent design," under his definition of science.

In another recent development, Judge John E. Jones, who is presiding over the trial, denied consideration of an amicus brief filed by the Discovery Institute. The judge said that the brief was a way for the Discovery Institute to enter testimony from intelligent design proponent Stephen Meyer into the court record "without opening themselves up to the scrutiny of cross-examination."

The trial is expected to run a few days longer than scheduled due to Behe's extended testimony. It will likely conclude within the first two weeks of November. For more details about the trial and transcripts from the court, see the National Center for Science Education website at: www.ncse.org.

Washington Think Tank Discusses Teaching Intelligent Design

On October 21, 2005, the American Enterprise Institute hosted a full-day conference about the merits of teaching intelligent design (ID) in science classrooms. The event was marked by two keynote addresses and three panels featuring one-on-one debates among well-known scientists, lawyers, ID advocates and other scholars. Two of the speakers, Barbara Forrest, a philosophy professor from Southeastern Louisiana University, and Kenneth Miller, a professor of biology at Brown University, served as expert witnesses for the plaintiffs in Kitzmiller et al. v. Dover. Another panelist, John Calvert from the Intelligent Design Network, had presented key testimony at the Kansas State Board of Education hearings earlier this year.

The debates explored several core philosophical questions inherent in the disputes over intelligent design, including the definition of science, and whether teaching science without theology is moral, or even possible. Those who opposed teaching ID were consistent in defining science as an intellectual pursuit involving testable evidence.

Proponents of intelligent design countered that the scientific method, or "methodological naturalism," is not objective but is simply another dogma that refuses to recognize certain other evidence.

On the practical topic of whether and how to teach the controversy, it was often unclear what intelligent design advocates wanted. Some speakers argued that the fight was over censorship, or the freedom of teachers to show evidence that challenges evolution, while others advocated for the possibility of a guiding hand (intelligent designer) that should be taught as a critical component of scientific inquiry. Others still, including the Discovery Institute's Paul Nelson, stated the opposite, that intelligent design should not be sanctioned in science classrooms until the scientific community comes to recognize the evidence in favor of it.

In the second keynote speech, Larry Krauss, an astrophysicist and cosmologist from Case Western Reserve University, tried to shift the focus from the philosophical questions to the overriding importance of improving the quality of science teaching in the United States. Krauss conceded that it is viable and important to ask such questions as whether science is incomplete or immoral without God; but these questions don't warrant changing high school science standards. **Government Update** *continued on page 58*

Government Update continued from page 57

"Why not teach both?" he asked, "Because it is not the job of education to validate different points of view but to overcome ignorance. We must talk about real scientific controversies."

Earthquake in Pakistan and Limited Global Response

A magnitude 7.6 earthquake occurred in Pakistan about 105 kilometers (65 miles) northeast of Islamabad on October 8, 2005. The earthquake occurred at a depth of about 26 kilometers (16 miles) along a system of thrust faults that take up some of the deformation caused by the continued northward motion of India (about 40 millimeters per year) into the Eurasian plate. The earthquake caused extreme devastation to tens of thousands of villages in Pakistan and India. Fatalities caused by building collapse and landslides are estimated to be greater than 79,000 in Pakistan and 1,360 in India. More than 70,000 people have been injured and about 4 million people are homeless. Aid has been very slow to reach the survivors because of the destruction of roads, the remoteness and ruggedness of the countryside, the geopolitical dispute over this region between Pakistan and India, the limited resources of both countries and the lack of a large response from countries outside of the area. The United Nations and many others have put out a plea for more help as soon as possible. Thousands are likely to perish because of a lack of medical help, a lack of clean water, a lack of food and a lack of shelter as winter approaches.

A more detailed description of the earthquake is available at the U.S. Geological Survey's Earthquake Hazards Program website: http://earthquake.usgs.gov/eqinthenews/2005/usdyae/.

More information about relief efforts is available from the International Committee of the Red Cross website and the United Nations Relief website: http://www.icrc.org/eng/south-asia-earthquake and http://www.reliefweb.int/rw/dbc.nsf/doc100?OpenForm.

Royal Astronomical Society Supports Humans in Space

After nine months of consultation, a Royal Astronomical Society (RAS) commission has recommended that the British government reevaluate its long-standing opposition to getting involved in human space exploration. As part of the explanation for the recommendation the commissioners reported, "We find that profound scientific questions relating to the history of the solar system and the existence of life beyond Earth can best — perhaps only — be achieved by human exploration on the Moon or Mars, supported by appropriate automated systems." The commission also pointed out that by not cooperating with space exploration efforts that include the U.S., Europe, Russia, Japan and possibly India and China, the U.K. would become increasingly isolated. Another stated benefit of space exploration is the potential to increase the recruitment of new scientists and engineers. To see the commission's report go to: www.ras.org.uk.

Hazards Caucus Holds Coastal Flooding Briefing

On November 1, 2005 the Congressional Hazards Caucus Alliance held a House briefing entitled "Coastal Flooding: Understanding the Hazard and Protecting Communities." The well-attended briefing featured speakers from the National Oceanic and Atmospheric Administration, the United States Geological Survey, FM Global Insurance, and the Maryland Department of Natural Resources. The speakers covered a wide range of topics, including the lessons that can be learned from storm surge modeling, the importance of natural hurricane barriers, how levees can provide a false sense of security, and the economic and environmental concerns that must be accounted for in coastal zone management. More information on the briefing and the speakers' presentations are available at: www.hazardscaucus.org.

From the *Federal Register*

Below is a summary of Federal Register announcements regarding federal regulations, agency meetings, and other notices of interest to the geosciences community. The Federal Register is available online at http://www.access.gpo.gov/su_docs/fedreg/frcont05.html.

The Bureau of Land Management (BLM) is issuing an interim final rule to amend regulations for the leasing of hydrocarbons in special tar sand areas. In this rule, the BLM amends its regulations to respond to provisions of the Energy Policy Act of 2005 that allow separate oil and gas leases and tar sand leases in special tar sand areas, specify several oil and gas leasing practices that apply to tar sand leases, increase the maximum size for combined hydrocarbon leases and tar sand leases, and set the minimum acceptable bid for tar sand leases at $2.00 per acre. Although the rule is effective upon publication, there is a 60-day comment period. After the comment period, the BLM will review the comments and may issue a further final rule making any necessary changes. An electronic version of this rule can be viewed at: http://www.blm.gov. [*Federal Register*: October 7, 2005 (Volume 70, Number 194)] ■

Application to Become a Member of the Houston Geological Society

Qualifications for Active Membership

1) Have a degree in geology or an allied geoscience from an accredited college or university; or
2) Have a degree in science or engineering from an accredited college or university and have been engaged in the professional study or practice of earth science for at least five (5) years.

Qualifications for Associate Membership (including students)

1) Be involved in the application of the earth or allied sciences.
2) Be a full-time student enrolled in geology or in the related sciences.

Annual Dues Expire Each June 30.

Annual dues are $24.00; full-time students and emeritus members pay $12.00.

Mail this application and payment to:

Houston Geological Society
10575 Katy Freeway, Suite 290
Houston, TX 77024
Telephone: 713-463-9476 Fax: 713-463-9160

Payment method:

☐ Check, ☐ VISA, ☐ MasterCard, ☐ American Express, ☐ Discover

Card # _____ Expiration Date: _____

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 **Edie Bishop**, HGS/HGA Liaison*

Begin at the beginning! With the start of this New Year, it seems a good time to examine the origin of our organization. First, of course, was the creation of the HGS. In the early 20s, at the request of Alexander Deussen and Wallace Pratt, AAPG agreed to hold its 1924 ninth annual meeting in Houston. As a result, the Houston Geological Society was formally chartered in 1923 to prepare for this meeting.

The HGA, however, was not formed for another few decades. During the 40s, Ralph Cantrell's wife Charlie had been spearheading a group of geologists' wives seeking seed money to form an auxiliary organization, but without much success. Finally, in 1950 while again anticipating an upcoming AAPG convention in Houston, the HGS gifted the wives with $25.00 to form such a group to help host the meeting. It probably was significant that husband Ralph Cantrell was the upcoming HGS President.

Money was always a consideration in these early days. Jerry Wheeler, wife of Jim Wheeler, recalled that at the end of her presidential term, money was so tight that they convinced the newly opened Vargo's to allow members to bring in their own sandwiches and have their meeting in that lovely upscale restaurant. What a wonderful, resourceful group of ladies!

In a recent report by Naomi Watson, Charlie described the founding of the Auxiliary. "We decided to charge $5.00 yearly dues and made everyone stand in line to sign the book and pay their money. The line circled the Ye Olde College Inn, with several hundred women signing up." Thus the Auxiliary Bylaws were drawn up stating "…purpose shall be to encourage social relations among its members and to assist the Houston Geological Society in any manner they shall request."

• **To encourage social relations:** Bylaws state that there shall be a minimum of four functions a year. Using this as a guideline, the Auxiliary continues to evolve to meet the changing times. Again, in the words of Charlie, "By 1958 there were 750 members, so that year we decided to start the newcomers committee to help people get acquainted." Originally, the committee was called the Quaternary group but later changed its name to GeoWives. Current President Dene Grove is the perfect leader for this group.

Among adaptations still active today is the inclusion of two monthly bridge groups: the Cinco-Mas, chaired by Audrey Tompkins, and the **HGA and GeoWives** *continued on page 51*

As a HGA member you are invited to join

GeoWives

2005–2006 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

2005–2006 dues are $20.00

make check payable to *Houston Geological Auxiliary* and mail to: Norma Jean Jones • 14302 Appletree • Houston, Texas 77079

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 ( )

After a month as HGS Website Committee Chair and Web Manager, I am pleased to report that, while we have many challenges ahead, I am positive about the present and future state of the Website.

Webmaster Lilly Hargrave and I are joined by Matt Tremblay as the newest member of the Website Committee. Matt is a geologist with 8 years of petroleum industry experience with both ExxonMobil and Ryder Scott. Many thanks to Cheryl Desforges for suggesting I contact Matt and for encouraging him to get involved. Matt has agreed to take responsibility for two key areas of the Website over the coming months: the Event Priority and Membership Application Modules. The Event Priority Module will replace the current "Upcoming Events" area of the Website's front page and will be more dynamic and interesting. The Membership Application Module will allow people to apply for HGS membership online and for members to renew their membership and pay dues online as well.

I have joined with Paul Britt to integrate the HGS *Bulletin* and Website. The December *Bulletin* was available in PDF format at the same time the print *Bulletin* arrived in the mail. The awesome new *Bulletin* cover was posted on the front page of the Website on the same day. Select articles from the new *Bulletin* were published as HTML documents complete with color graphics within the first week that the *Bulletin* was in members' hands.

WebNotes *continued on page 51*

Excellence That Runs Deep

SCA - The Upstream Petroleum Experts

We are pleased to announce that Subsurface Consultants & Associates, LLC (SCA) has moved into its new corporate office.

We outgrew our old premises and are looking forward to working with you at our new larger facility, designed with customer service in mind to even better serve your needs.

Please feel free to drop in anytime and see our new offices at the following location:

10255 Richmond Avenue., Suite 300W,
Houston, Texas 77042

Our telephone and fax information remain unchanged:
Phone: 713-789-2444 Fax: 713-789-4449

SCA Is Also A Leader In Providing Training Solutions For The Petroleum Industry

Check Out Our Upcoming Training Schedule

February, 2006		
20-24	Applied Subsurface Geological Mapping	(Houston, TX)
March, 2006		
13-17	Applied Subsurface Geological Mapping	(Dallas, TX)
13-17	Deepwater Sands and Petroleum Systems Analysis	(Houston, TX)
23-24	Quick Look Techniques From Prospect Evaluation to Reserves Estimation	(Houston, TX)
April, 2006		
3-7	Applied Subsurface Geological Mapping	(Calgary, Alberta)
3-7	Fundamentals of Applied Geophysics	(Houston, TX)
26-27	Logbust™ Computer Application of Multiple Bischke Plot Analysis (Seismic and Well Log Correlation Validation/Growth Analysis)	(Houston, TX)
May, 2006		
3-5	Basics of the Petroleum Industry	(Houston, TX)
7-13	Fluvial-Dominated Nearshore Depositional Processes and Systems	(Western US)
8-12	Seismic Survey Design, Acquisition and Processing	(Houston, TX)
10-12	Applied Compressional Structural Geology	(Calgary, Alberta)
11-12	Quick Look Techniques From Prospect Evaluation to Reserves Est.	(Dallas, TX)
15-19	Applied Subsurface Geological Mapping	(Houston, TX)
15-19	AVO and Seismic Attributes	(Houston, TX)
22-26	Principles of 3-D Seismic Interpretation	(Houston, TX)
22-26	Petroleum Geology of Deepwater (Turbidite) Depositional Systems	(Houston, TX)

SCA is authorized by IACET to award Continuing Education Units (CEUs).

IACET

Subsurface Consultants & Associates, LLC

www.scacompanies.com
General Inquiries: info@scacompanies.com
Training Course Registration & Information: training@scacompanies.com
Consultants & Direct Hire Recruitment Services: info@scacompanies.com
Global Upstream Projects & Studies: projectsandstudies@scacompanies.com

HOUSTON GEOLOGICAL SOCIETY
10575 Katy Freeway, Suite 290 • Houston, TX 77024

Periodicals
U.S. Postage
PAID
Houston, Texas