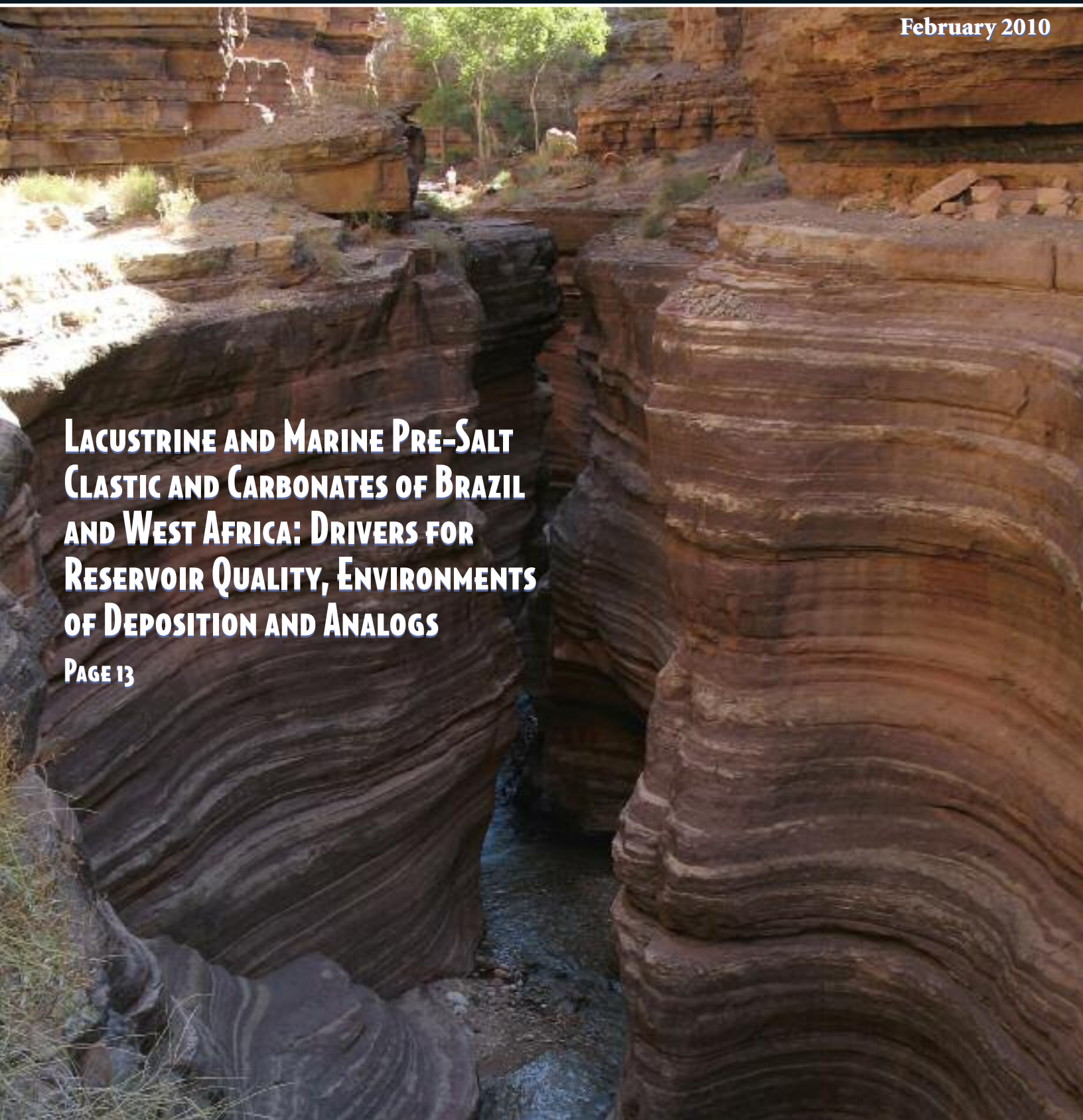
HGS Bulletin
Houston Geological Society
Volume 52 Number 6
February 2010



Lacustrine and Marine Pre-Salt Clastic and Carbonates of Brazil and West Africa: Drivers for Reservoir Quality, Environments of Deposition and Analogs

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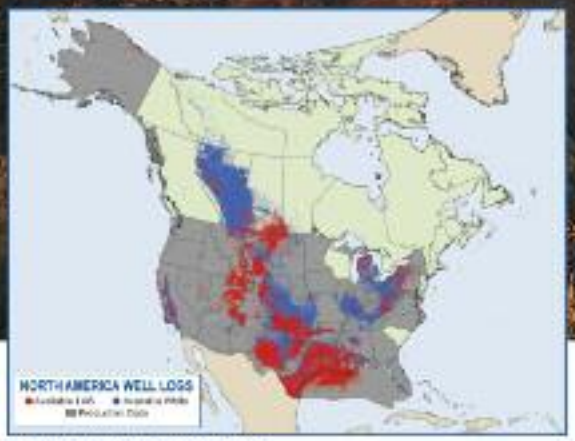

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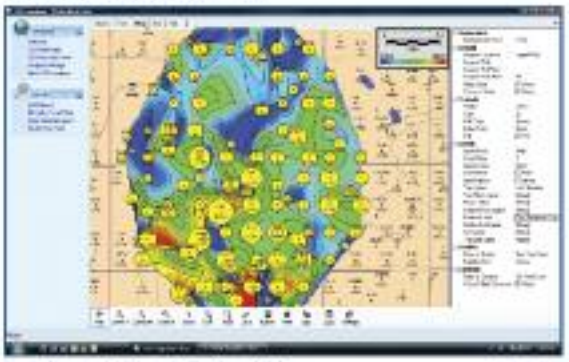

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Houston Geological Society

Volume 52, Number 6 February 2010

In Every Issue

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Technical Meetings

Other Features

Constitution and Bylaws Amendments Ballot inserted between pages 38-39

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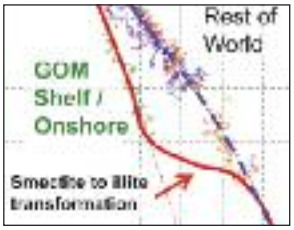

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About the Cover: Deer Creek Narrows, Grand Canyon National Park: View where Deer Creek has cut into the upper Cambrian Tapeats Sandstone; bench with tree is contact between Tapeats and overlying Bright Angel Shale which was deposited by a marine transgression. There are trilobite trails visible at this location in the Cambrian mudstones of the Bright Angel. *Photo taken by Steve Earle on day 6 of HGS Grand Canyon Field Trip.*

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APRIL 10-11 — Assessment of Unconventional Shale Resources Using Geochemistry, New Orleans, LA (with AAPG Annual Meeting)

APRIL 27-30 — Basic Well Log Analysis, Austin, TX

Online Courses:

LAUNCH DATE FEB 1 — Solar Energy Basics – A Renewable Energy Certificate Course

LAUNCH DATE APR 1 — Biomass Energy Basics – A Renewable Energy Certificate Course

E-Symposium Series:

JAN 28 — Horizontal Drilling for Geologists

FEB 11 — Ultra Deepwater: Structure and Methane Hydrates

FEB 25 — Creativity in Exploration

Field Seminars:

APRIL 1-2 — Field Safety Course for Field Trip Leaders, April 1-2, Houston, TX

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Gary Coburn
garycoburn.hgs@gmail.com

Statistics and the Box—Inside or Out

"Think outside the box." This is a catch-all phrase that has been around for generations. It is meant to inspire one to look outside traditional methods for solutions. Management uses the phrase to excess. The trouble is, they rarely mean it. Thinking outside the box is, after all, risky. Things that have not been tried before often fail. Failure is not something that is advantageous to anyone's career goals. This, of course, makes implementing anything conceived "outside the box" a very risky career move. Think Charlie Brown. If it works you're the hero. If it doesn't you're the goat. These types of projects will not move forward in most companies without a champion, someone willing to risk it all to make the project a reality. The modern equivalent of "Who will bell the cat"? I heard recently of a company that instructed its exploration staff to use new innovative ideas to find large oil prospects in new areas. Oh, and make them low-risk please! High-risk projects would not be considered in this "think outside the box" strategy. Good luck with that.

…exploration IS risky. If you want to play it safe, you're in the wrong business…

Managements that are more grounded in reality also wrestle with new ideas and lower appetites for risk. I read an article about a high school football team in Arkansas whose coach did not believe in punting away the ball…ever. They go for it on every 4th down. They do not kick field goals or extra points. They always do onside kicks. They do not even list a punter or kicker on the roster. Sounds like total madness doesn't it? Well, the team has won 100 games in the last decade including the 2008 Arkansas 5A State Championship. (This is going somewhere, I promise) The secret behind the coach's strategy? Statistics. The coach's research led him to realize that the average high school punt nets 30 yards while 50% of 4th down efforts succeed. Since controlling the ball is the name of the game it makes more sense to work the statistics and try to keep possession. As for the kickoffs, the statistics place the ball after a kick off on the 35-yard line while an unsuccessful onside kick ends up on the kicking team's 48-yard line. There is a one in four chance the onside kick will work. That means he is risking 15 yards for a one in four shot at keeping the ball. All the statistics quoted are the coach's, and I have certainly not checked any of them. But the point is that he developed an "outside of the box" system and implemented it successfully. The real secret is developing a system you believe in and having the fortitude to stick with it.

Managements use statistics extensively. They sometimes even use them correctly. The main problem is that everyone is always looking for that one thing that will solve the issue of risk for them. The one magic number, the one constant that can be plugged into the formula and voila! One instantly knows whether to proceed with the project or not. For instance, some companies will not drill a prospect that does not have amplitude. Of course most amplitudes are not hydrocarbon indicators, but why worry about that? There is also the question whether or not you should expect to see an HCI in a particular prospect, but no sense in worrying about that, either. Just drill amplitudes is the company line. The result is that in order to get a prospect drilled there are some very odd "amplitude" maps running around out there. The company has latched onto something that it thinks will mitigate risk. The reality is usually not that cut-and-dry. The real trouble with drilling the statistics is that you will never drill anything that hasn't been drilled before.

The fact is that exploration IS risky. If you want to play it safe, you're in the wrong business. We must do everything we can to keep the risk down but if you are truly exploring there will be risk, and plenty of it. I once saw one of those corporate motivational posters which actually stuck. I believe most exploration geologists already follow the philosophy it enthused. If only we can get management to believe in our prospects as much as we do, perhaps they would believe it as well. It read, "You will never discover new lands if you won't lose sight of the shore". We must lose sight of the shore, career or not, to make the discovery of a lifetime. ■

Happy hunting!

Barry Katz
BJKatz.HGS@gmail.com

Integrity Mightier than the Pen

A Harris poll in 2006 indicated that scientists were among the most trusted individuals in the nation, with 77% of those polled reporting that they consider scientists trustworthy. In December 2009, however, our rating in the polls dropped. The *Washington Post* reports that only about 60% of those polled now believe that scientists can be trusted. What has caused the change in our polling numbers? Some of our loss in stature may be related to the recent, highly publicized, incident at the Climate Research Unit at the University of East Anglia in Norwich, where the computer system was hacked and correspondence and documents were obtained and posted online. The tone and content of some of the e-mails appears to have suggested that rather than being an unbiased reporter and interpreter of facts, there is a sense that some scientists may have been tweaking or playing with the data to support a political agenda or to prevent others from having access to the data. Such access is a key to the peer-review process and the ability to test and independently confirm published work. Another factor may be the higher visibility given to some incidents of plagiarism. The work by Harold Garner and his colleagues at the University of Texas Southwestern Medical Center published in *Science* dealt with plagiarism and has been reported in the general media. This hasn't helped the standing of scientists, although it has raised a curtain revealing a major issue of concern among the scientific community, with journal editors issuing retractions for a number of papers that had been substantially copied. It has been suggested by members of the *Nature* editorial staff that this increase in plagiarism may be a result of the need for higher visibility in an environment where research dollars may be limited as well as pressures in the developing world where academic credentials are key to advancement in both academia and society. There are also those highly publicized hoaxes where data were fabricated such as the "Piltdown man" which was assembled though a collection of animal bones or "cold fusion", which actually was poor science rather than an intentional hoax.

This shadow being cast over the reputations of scientists, in general, provides a framework for a discussion on professional ethics and integrity. Although none of us are directly involved in any of the "scandals" noted above, as geologists and scientists, they do tarnish us all. Whether attempting to sell a prospect to management or a prospective investor, testifying as an expert witness, or simply presenting an idea at a conference or convention our professional success and standing is based on our ability to persuade. The strength of our arguments may be found in the words we select, the manner in which we present them, or the technical background that supports them. Commonly we assume that our knowledge and understanding is the key to our success. Samuel Johnson, stated, however, that"…knowledge without integrity is dangerous and dreadful" and Zig Ziglar reminded us that "the most important persuasion tool you have in your entire arsenal is integrity." We must, therefore, do all that we can do to maintain our personal ethics and to reestablish the ethics of our community at large.

It is incumbent on us all to ensure that we clearly differentiate between fact and interpretation…

As a first step, although I believe that we all attempt to act ethically and with integrity, a gentle reminder of some guiding principles is always useful, possibly the reason that the State of Texas requires at least one hour of training in professional ethics each year in order to maintain a professional geologist license. It is useful for all, even those without a state license, to occasionally review the codes of conduct of our various professional organizations, certification boards, and licensing authorities. Although the details vary among these different groups, common to these codes are:

- a requirement to be honest with regard to our reporting and interpretations and not to make unsupported claims,
- insuring that our works are not used for any illegitimate acts,
- providing professional opinions only in those areas where we have knowledge,
- avoiding any conflicts of interest, and
- not divulging confidential information without gaining necessary approvals.

All are simple to remember and generally not to difficult to follow. However, our science is often based on limited sampling and indirect observations that may be interpreted in a number of different ways leading to alternative and possibly contradictory interpretations. In order to support an argument, there are times when references are selectively cited and datasets are culled.

From the Editor *continued on page 9*

HGS Shrimp Peel

Saturday, May 15, 2010
6pm - 10pm
Sam Houston Race Park
7275 N. Sam Houston Pkwy. West
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* Enter through North gates
* Valet parking available
* Purchase tickets online at hgs.org
* Or use form with check or credit card
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From the Editor continued from page 7

During the peer review process, problems with references and data are often raised and questioned. The problems brought to light through this process are hopefully corrected. However, the peer-review process itself may have problems; the reviewer may have a personal agenda or a conflict of interest, be it academic or business. But even if we are to assume that review process eliminates some of the issues discussed, not all work undergoes the scrutiny of the review process. It may, therefore, not always be clear to those outside of the world of geology what is fact, what is interpretation, what we really don't know, and why. It is incumbent on us all to ensure that we clearly differentiate between fact and interpretation as well as what other interpretations exist and why we have selected our preferred interpretation. In simplest terms we should remember C. P. Snow's thought "…the only ethical principle which has made science possible is that the truth shall be told all the time…" By acting in an ethical manner whether it is convenient or not and revealing our biases and conflicts we not only capture the high ground for our selves but will move our profession forward, gaining the lost respect from the lay community. ■

Until next month…

Maps in Schools

On Thursday Dec 17th Gary Coburn, HGS President, presented on behalf of the society a framed geologic map of the United States to James Williams Elementary School in Cinco Ranch. Receiving the map for J Williams was Principal Ronnie Lee and 3rd Grade Science Teacher Ms. Nicole Walker.

HOUSTON GEOLOGICAL SOCIETY

Explore Our Connections

Applied Geoscience Conference (AGC)

2010 AGC of US Gulf Region Mudstones as Unconventional Shale Gas/Oil Reservoirs

February 8-9, 2010

Hilton Houston North, Houston, TX
INDUSTRY/GOVERNMENT/UNIVERSITY PERSPECTIVES FOR GULF COAST REGION MUDSTONE / SHALE GAS/OIL RESERVOIRS

- Learn Mudstone System Characterization,
- See Practical Applied Methods for Mudstone Shale Reservoir Characterization,
- Hear new technical perspectives of the Haynesville, Bossier & Eagle Ford Shales,
- Apply these reservoir characterizations to Effectively Complete These Targets
- Focus with Shale Gas/Oil experts within the characterization fields of exploration geology, exploitation geology, geochemistry, nanno scale petrology, geomechanics, log analysis, & completions engineering

COMPREHENSIVE TECHNICAL PROGRAM

SHALE HC CHARACTERIZATION EXPERTS:

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Kevin Bohacs — **EXXONMOBIL**
Gary Lash — **SUNY Fredonia**
Nicholas Harris, — **COLORADO SCHOOL OF MINES**
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Sold out in 2009

We will see you there!

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Thursday, February 11, 2010

Westchase Hilton • 9999 Westheimer
Social Hour 5:30–6:30 p.m.
Dinner 6:30–7:30 p.m.

Cost: $28 Preregistered members; $35 non-members & walk-ups

To guarantee a seat, you must pre-register on the HGS website and pre-pay with a credit card.
Pre-registration without payment will not be accepted.
You may still walk up and pay at the door, if extra seats are available.

Bruce Hart
ConocoPhillips

Reservoir-Scale Seismic Stratigraphy: A Call to Integration

The introduction of seismic-stratigraphic techniques in the 1970s gave sedimentary geologists in the petroleum industry and academia new tools for predicting lithology and analyzing the depositional history of sedimentary basins. Seismic stratigraphy originally focused on large-scale exploration problems and was based on analyses of 2-D seismic data in areas that were relatively "data-poor" (i.e., few logs, core, or production data). Although these conventional seismic-stratigraphic analyses are still used fruitfully, new challenges and opportunities confront the petroleum industry as it faces the need to improve recoveries from mature fields. These areas are commonly data-rich (lots of log, core, and production data), and covered by relatively small 3-D seismic surveys that do not image all of the sequences or systems tracts that include the reservoir rocks. As such, a new mindset is needed, here termed reservoir-scale seismic stratigraphy, to help geoscientists maximize the stratigraphic information they can extract from seismic data. Integration of geological and geophysical concepts and data is critical. Techniques employed by geophysicists for at least the past decade (inversion, seismic attribute studies, seismic facies analysis, etc.) need to become routine parts of the sedimentary geologist's toolkit, whereas seismic interpreters need to study outcrops, cores, and modern analogs in order to anticipate the presence of depositional features that cannot be resolved seismically. This cross-disciplinary interaction will undoubtedly spawn new breakthroughs in sedimentary geology, reflection seismology, petroleum geology, and related fields (e.g., hydrogeology). These are exciting times. ■

…cross-disciplinary interaction will undoubtedly spawn new breakthroughs in sedimentary geology, reflection seismology, petroleum geology…

Biographical Sketch

Bruce Hart is currently Director of the Shale, Seal and Pressure Systems Group at ConocoPhillips in Houston. He has a bachelor's degree from McMaster University, a master's degree from the Université du Québec à Rimouski, and a Ph.D. from the University of Western Ontario. He pursued a career in research at the Geological Survey of Canada, Penn State, The New Mexico Bureau of Mines and Mineral Resources, and McGill University prior to joining ConocoPhillips in August 2008.

Mr. Hart began his geoscience career as a clastic sedimentologist, but eventually found himself examining stratigraphy with 3-D seismic data. Subsequently, he and his students integrated 3-D seismic, log, outcrop, core, production, and other data types to address a range of structural and stratigraphic problems from Paleozoic, Mesozoic, and Cenozoic clastic and carbonate reservoirs from various parts of the globe. Much of that work has been documented in over 50 peer-reviewed publications that cover topics such as seismic attribute analyses, hydrothermal dolomites, fractured tight-gas sandstones, sequence stratigraphy, pore-pressure prediction, and the sedimentology of shoreface conglomerates.

He has taught courses and workshops on 3-D seismic interpretation for industry professionals in Cairo, Calgary, Copenhagen, Houston, Kuala Lumpur, London, New Orleans, The Hague, Vienna, and elsewhere. His current work focuses on the relationships between shale depositional processes and hydrocarbon seals, source rocks, and pressure systems.

Houston Geological Society
Applied Geoscience Conference (AGC)

The Hilton Houston North Hotel, Houston, Texas

Monday February 8, 2010 Agenda

US Gulf Region Mudstones As Unconventional Gas/Oil Reservoirs

MONDAY TECHNICAL PROGRAM CHAIRPERSONS:

Frank Walles, AAPG Energy Minerals Division President
Sr. Geol. Advisor Unconventional Resources
DEVON ENERGY CORPORATION

Michael Van Horn
Vice President-Geoscience
NEWFIELD EXPLORATION COMPANY

7:00 - 8:00 AM Registration - Atrium Hilton Houston North (with Breakfast Items: Juice/Coffee/Rolls)

8:00 AM	**"Approaches to Mudstone Characteristics Leading to HC Productivity"**
8:15 AM	"Sequence stratigraphy in fine-grained rocks at the field to flow-unit scale: insights for correlation, mapping, and genetic controls " **Kevin Bohacs,** Sr Hydrocarbon Systems Consultant, *ExxonMobil Upstream Research*
9:00 AM	"Mud dispersal on continental shelves and predicting shale gas reservoirs " **Joe H.S. Macquaker,** *Professor, Memorial University, Newfoundland, Canada*
9:45 AM	*Break*
10:05 AM	"An Integrated Geological and Petrophysical Study of a Shale Gas Play: Woodford Shale Permian Basin, West Texas" **Nick Harris,** *Professor, University of Alberta, Edmonton CA / Colorado School of Mines*
10:50 AM	"Processes and Controls on Shale-Oil/Condensate Production" **Daniel Jarvie,** *President, Worldwide Geochemistry / Institut Francais du Pétrole*
11:40 AM	*Buffet Luncheon - Atrium*
1:00 PM	**" Practical Applied Methods for Shale Reservoir Characterization"**
1:10 PM	"Stratigraphic analyses of Shale Systems - The Marcellus Shale Example and how those analytical techniques may be useful for characterizing Gulf Coast Shale Systems" **Gary Lash,** *Professor of Geosciences, SUNY Fredonia*
1:55 PM	"A Best Practices Approach for Improved Shale Gas Characterization " **Jackie Reed,** *Reed Geochemical,* **Stephen Brown, John Zumberge,** *Geomark Research*
2:40 PM	*Break*
3:00 PM	"Integrated Imaging and Analysis of Sedimentary Materials: the Mudrocks" **Kitty Milliken,** *Jackson School of Geosciences, U. of Texas, Bureau of Economic Geology*
3:45 PM	"Advanced porosity and permeability characterization in Gulf Coast Shales" **Richard Vessell,** *Vice President Geology/Petrophysics, GEOsystems LLP*
4:30 PM	*Day 1 Summary Analysis - Technical Program Chairs*

Monday, February 15, 2010

Westchase Hilton • 9999 Westheimer
Social Hour 5:30–6:30 p.m.
Dinner 6:30–7:30 p.m.

Cost: $28 Preregistered members; $35 non-members & walk-ups

To guarantee a seat, you must pre-register on the HGS website and pre-pay with a credit card.
Pre-registration without payment will not be accepted.
You may still walk up and pay at the door, if extra seats are available.

Scott E Thornton, *Department of Geology and Geophysics, The University of Sydney and DI International*
Nicholas B. Harris, *Department of Geology, University of Alberta, Edmonton*
Ann-Marie Scott, *Roc Oil Company Limited; and*
Michael Dyer, *DI International*

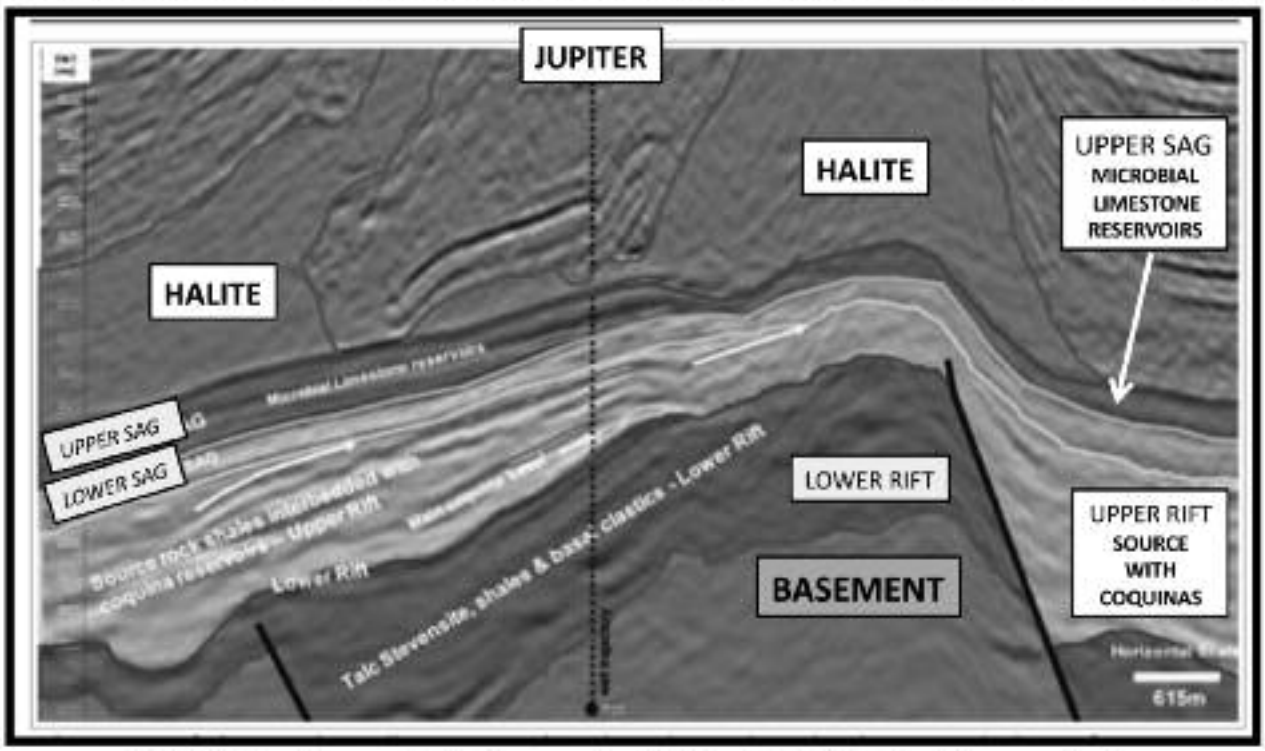
Lacustrine and Marine Pre-Salt Clastic and Carbonates Of Brazil and West Africa: Drivers for Reservoir Quality, Environments of Deposition and Analogs

Recent discoveries, past exploration and ongoing exploration in pre-salt, lacustrine and marine reservoirs in Brazil and Angola have often encountered mindboggling complexity in both carbonates and clastics. The key to reaching an enlightened understanding of this complexity relies more on creative right brain thinking than left brain logic and data collecting. Discoveries made in the last several years have challenged our depositional models and the dogma that the carbonates and clastics in the pre-salt of Brazil and Angola are plagued by poor reservoir continuity and quality. In fact, the reservoir quality of the pre-salt, microbial limestone reservoirs in the Tupi-Jupiter cluster of fields displays outstanding reservoir quality. The reservoir distribution and reservoir properties are a function of the depositional environment in large and small rift lakes as well as broad, apparently marine transgressive systems in the early Cretaceous. Carbonate and clastic reservoir distribution and quality in lakes and marine sag basins pre-salt are controlled by rift geometry and orientation, lake or ocean depth and cross-section

Discoveries made in the last several years have challenged our depositional models

HGS International Dinner *continued on page 15*

JUPITER DISCOVERY IN SANTOS BASIN, BRAZIL WITH PRE-SALT SEQUENCES



(AFTER Geo Expro, 2008, Image after HRT and CGG/Veritas time section)

Houston Geological Society
Applied Geoscience Conference (AGC)

The Hilton Houston North Hotel, Houston, Texas

Tuesday February 9, 2010 Agenda

US Gulf Region Mudstones As Unconventional Gas/Oil Reservoirs

TUESDAY TECHNICAL PROGRAM CHAIRPERSONS:

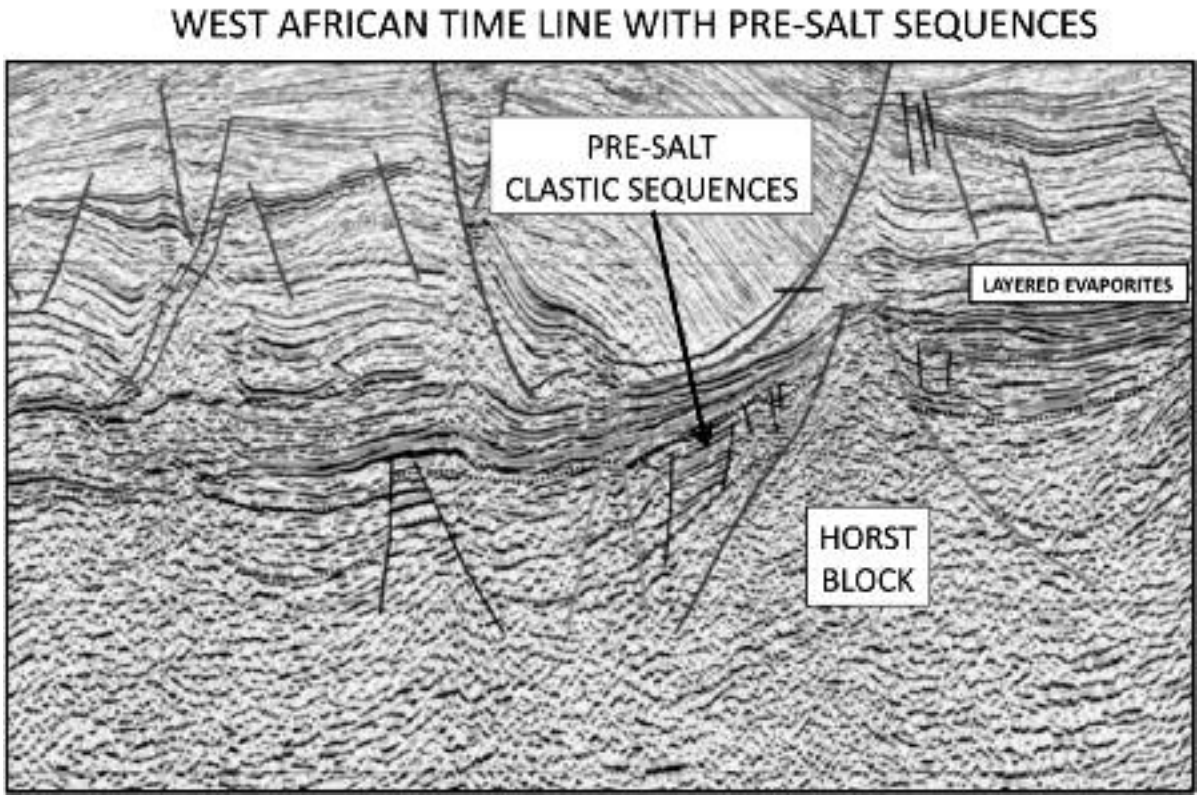
Mike Cameron
Corporate New Ventures
NEWFIELD EXPLORATION COMPANY

Bruce Martin
Senior Staff Geologist
SOUTHWESTERN ENERGY COMPANY

7:00 - 8:00 AM Registration - Atrium Hilton Houston North (with Breakfast Items: Juice/Coffee/Rolls)

8:00 AM	**"US Gulf Region Mudstone Reservoir Characterization: Haynesville, Bossier, & Eagle Ford Shale Systems"**
8:15 AM	"New insights into facies, depositional environments, sequence stratigraphy, and regional extent of the Haynesville Shale of East Texas and Louisiana " **Ursula Hammes, Scott Hamlin,** *Jackson School of Geosciences, U. of Texas, BEG*
9:00 AM	"An industry perspective on the Haynesville Shale Gas Play " **Phil Martin** *President, New Century Exploration*
9:45 AM	*Break*
10:05 AM	"A comparison of pore types of the Eagle Ford, Haynesville, Pearsall, & Austin Chalk - Mesozoic Resources Plays of the Gulf Coast." **Randall Miller** *President , Integrated Reservoir Solutions Division, CORE LABORATORIES*
10:50 AM	"Imaging and Computing the Physical Properties of Gulf Coast Shales" **Elizabeth Diaz,** *Chief Geoscientist, Ingrain*
11:40 AM	*Buffet Luncheon - Atrium*
1:00 PM	**"US Gulf Region Mudstone Systems: Based upon reservoir characterization - How do we complete effectively"**
1:10 PM	"Reservoir characterization in mudstone-dominated sequences: implications for successful completions" **Bob Bereskin,** *Bereskin and Associates,* **Mary K Milner,** *Terra Tek - Schlumberger*
1:55 PM	"Taking advantage of Heterogeneity in Shale Gas completions" **Roberto Suarez Rivera,** *Rock Mechanics Specialist, Terra Tek - Schlumberger*
2:40 PM	*Break*
3:00 PM	"Utilizing Log Integration methodology for understanding Shale Mechanical Attributes **Rick Lewis,** *Technical Projects Leader, Schlumberger Oilfield Services, Oklahoma City*
3:45 PM	"How to design better completions within the softer shales of the Gulf Coast" **Mike Conway,** *President Stim-Lab, a Division of CORE LABORATORIES*
4:30 PM	***Conference Summary Analysis*** - Technical Program Chairs

HGS International Dinner continued from page 13



profile, wave climate and fetch, drainage patterns in the hinterland, entry points of clastics, lake salinity, local climate and cycles of lake level fluctuation. These drivers for understanding reservoir quality and continuity will be reviewed on first principles from our knowledge of recent and ancient deposits, as well as theoretical framing. Field analogs and regional data will be reviewed for the Santos and Campos basins of Brazil as well as the Kwanza and Cabinda basins of Angola. Our global analog set for clastic and carbonate reservoirs is really diverse in the aforementioned drivers, so that no two lacustrine, pore-salt basins are really alike. Our analog set for both Recent and ancient lakes is also not as statistically significant as sets for other reservoirs. Indeed, the microbial carbonate reservoirs being discovered in the pre-salt of the Santos Basin are likely marine, not lacustrine carbonates, deposited like other stromatolites. Computer-driven global climate models for lakes in the present and past are much more difficult than those for marine and deltaic depositional environments and have had limited success. An enlightened and more successful exploration campaign in these high-potential reservoirs will result from the understanding of these first principles. Exploration campaigns driven by only seismic interpretation and structural modeling may be prone to a lower rate of success if not tempered by a more sophisticated understanding of the drivers for these complex and often excellent reservoirs. ■

Biographical Sketch

Scott E. Thornton is currently Manager, West Africa for DI International in Houston. Scott has worked 25 years in international exploration for several companies and clients, with most of his experience at Unocal and Shell, including a 10 year consulting career predominantly working on pre-salt and post-salt basins of Brazil and West Africa. The last two years of that consulting career were with Devon Energy mapping the pre-salt of the offshore Kwanza basin, as well as regional and prospect-specific post-salt mapping of turbidites and marine carbonates in the Campos, Santos and Espirito Santo basins. After Devon, Scott moved to Sydney, Australia with Roc Oil Company Limited. One of his projects was seismic facies mapping of potential Toca lacustrine carbonate reservoirs in onshore Cabinda, which resulted in a well. Scott worked in a team that tried to leverage Roc's previous light oil discovery in the pre-salt Toca and Lakula sandstone. Scott has been responsible for acquiring or applying for acreage in Burma, Pakistan, NW China, Ecuador, Peru, Brazil, California and North Alaska. Scott received his BA in Geology and Geophysics at the University of Wisconsin, Madison, his MS in Geological Sciences at Duke University and his PhD in Geology and Geophysics at the University of Southern California. He currently is also an Adjunct Professor at The University of Sydney. Scott taught 2 short courses while in Sydney on Introduction to Petroleum Systems as well as Lacustrine Petroleum Systems at the Petroleum Society of Australia, where many of his students were from the local universities as well as the industry.

Applied Geoscience Conference (AGC)

US Gulf Region Mudstones as Unconventional Shale Gas/Oil Reservoirs

The Houston Geological Society presents an Applied Geoscience Conference focusing upon mudstone system characterization to improve exploitation of US Gulf Region Mudstone "Shale Gas/Oil" Reservoirs

This Applied Geoscience Conference (AGC) has four half day sessions :

Monday, February 8

AM Session: Understanding Mudstone Characteristics leading to HC Productivity

PM Session: Practical Applied Methods for Shale Characterization

Tuesday, February 9

AM Session: US Gulf Region Mudstones: Reservoir Characterization of Haynesville, Bossier, & Eagleford Shales

PM Session: US Gulf Region Mudstone Systems Based upon reservoir characterization, how do we complete effectively?

15 Credit Hour Certificate (1.5 C.E.U.) will be earned with attendance
Limited seating - so register early!

Registration Deadline of February 2, 2010

February 8-9, 2010

Hilton Houston North

Register http:/www.hgs.org/en/cev/1056 /
or call (713) 463-9476
Attendance is limited -
Register early to obtain a seat!

Two (2) Day Conference Fee
HGS Members
U.S. $ 550.00 by Jan 15, 2010
U.S. $580.00 Jan 15, 2010 - Feb. 2, 2010
Non - HGS Members
U.S. $ 600.00 by Jan 15,2010
U.S. $630.00 Jan. 15, 2010 - Feb 2, 2010
Cancellations are subject to $100.00 cancelation fee
No Refund after January 15, 2010

Special Hotel Rate of $ 129 per night

Hilton Houston North
12400 Greenspoint Drive.
Houston, Texas, USA 77060
Tel: +1-281-875-2222

Weatherford

GeoMark Research, Ltd.
Leaders in Petroleum Fluid Analyses

Apache Corporation

devon

SWN Southwestern Energy

NEWFIELD

INGRAIN Digital Rock Physics Lab

Core Lab Reservoir Optimization

Tuesday, February 16, 2010

Black Lab Pub, Churchill Room • 4100 Montrose Blvd.

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#).

Integrating Environmental Considerations into Wind Power Project Siting

Todd H. Hall, P.E.

Wind power has experienced tremendous growth in the U.S. over the past few years. Along with this dramatic increase in project development, competition for the "best" spots has locations. Wind power development companies must make strategic decisions regarding the sites in which they will invest. These decisions are driven by a number of technical and commercial factors. The industry is constantly improving its practices regarding pre-development siting, with the intent of identifying "fatal flaws" or comparing sites in order to prioritize them for investment. The presentation will discuss some of the approaches being taken for this pre-development siting, with a specific focus on the integration of environmental considerations into siting analysis. ■

Biographical Sketch

Mr. Hall is a Principal with Environmental Resources Management (ERM) in Houston, Texas, serving in the role of Managing Partner of ERM's Texas-Oklahoma business and Branch Manager for the Houston office. Todd has over 14-years experience in environmental consulting, focusing on environmental impact assessment, multi-media permitting, site planning and licensing, remediation and risk assessment. His primary expertise is in the energy sector, both domestically and internationally. Todd has provided strategic planning and prepared permit applications, license applications and Environmental Impact Assessments for petroleum refineries, petrochemical complexes, upstream oil and gas exploration and development projects, LNG terminals, gas pipelines, and wind power facilities. He is experienced in NEPA and International Best Practice impact assessment projects and has served as project engineer, project manager and program manager for refinery, chemical plant, and abandoned site investigation, risk assessment and remediation projects.

2009 HGS Golf Tournament

by ***Mark Dennis***

For the second year in a row, the HGS Golf tournament was rained out and had to be rescheduled in November. On our rescheduled date, the weather cooperated and we played golf on one of the most beautiful days of the year. Participant feedback was great and everyone especially liked the earlier start time, so look for an earlier start again in 2010. Thanks to the support of our generous sponsors, we were able to put on a very nice event while also raising over $6,000 for the Houston Geological Society. The 2010 HGS Golf Tournament has been scheduled for October 25th, so mark your calendars now and we'll look forward to a great outing next year at Kingwood Country Club. ■

The Houston Geological Society Continuing Education Committee Presents

Risk and Uncertainty Analysis for Unconventional Plays

Sponsored by Hamilton Engineering, Inc.

Tuesday 2-Feb-10 9:00 AM to 4:00 PM CST

Speaker: Gary P. Citron, PhD, Managing Partner, Rose & Associates, LLP

This course, designed for geoscientists and engineers, provides a comprehensive treatment on the description, characterization and valuation of tight gas, shale and coal bed methane plays.

Beginning with practical definitions and formational processes, this course describes the techniques to probabilistically estimate the resource potential, risk and value of staged investment programs to profit from unconventional resource plays. The first part of the course deals largely with the main types of resource plays, and the main geologic attributes as concerns to grade the potential to be commercially successful.

Pricing	Before 22-Jan-10	After 22-Jan-10
Member:	$90.00	$100.00
Non-Member:	$100.00	$110.00
Student:	$10.00	$25.00
GSH Member:	$90.00	$100.00

The second part of the course continues with the flow regimes of these reservoirs; how to model their performance with type curves associated with the geological heterogeneity; major assessment processes and valuation techniques to best achieve your strategies.

Course Outline

- **Part I: Introduction**
  1. What are Unconventional accumulations?
     a. Types: Tight gas, CBM, Shale gas,
     b. Characteristics and Locations of major areas of interest in NA
  2. Consequences of differences in unconventional plays
  3. Primer/refresher on Statistics, the language of Uncertainty
- **Part II: Tight Gas Characteristics and Assessment**
  1. Historical perspective
  2. Paradigm shift of understanding
  3. Requirements for a Tight Gas accumulation
  4. Volumetric and Chance Assessment
  5. Exercise
- **Part III: CMB Characteristics and Assessment**
  1. Definition of Coal, formation and description
  2. How it is different
  3. Langmuir equation: elements of uncertainty
  4. Volumetric and Chance Assessment
  5. Exercise
- **Part IV: Shale Gas Characteristics and Assessment**
  1. Mechanisms of Formation and Exploitation history
  2. Volumetric and Chance Assessment
  3. Exercise
- **Part V: Reservoir Flow in Coals and Shales**
  1. Multiple Flow regimes
     a. Desorption
     b. Ficke's Law
     c. Diffusion
     d. Darcy flow
  2. Impact of permeability
- **Part VIII: Play Assessment**
  1. Play definition and Framing
  2. Planning the Work and Pilot Designs
  3. Assess future potential
  4. Analogs and type curves
  5. Economic modeling highlights

Speaker Gary P. Citron, PhD (BS, Geology, State University of New York at Buffalo; MS & PhD in Geology, Cornell University). After a twenty year career as a geoscientist, manager, and internal consultant for Amoco exploration business, Gary joined Pete Rose's consulting firm in February 1999, which focuses on the field of prospect and play risk analysis. Gary became Pete's first Partner in Rose & Associates, LLP in 2001 and assumed the role of Managing Partner in 2003.

In his last assignment at Amoco, he worked with exploration teams worldwide for four years, helping them assess prospect component ranges and associated chance factors. Dr. Citron has developed expertise in consensus building in risk assessments and performance tracking. He also coordinated the yearly post appraisal of the drilling program which helped institutionalize learning throughout the exploration business. In 1999 he was selected by the AAPG to serve in their Visiting Geologist Program. While at Amoco, Dr. Citron actively mentored younger geoscientists on prospect measurement.

In 2001, he received the best paper award from the AAPG's Division of Professional Affairs, and again in 2007 he was honored for delivering a 'Top Ten Oral Presentation' at the AAPG annual convention in Long Beach. Gary remains active in the AAPG House of Delegates, and continues to serve on committees for the AAPG and the SPE. He is a Texas State certified and licensed Geologist who has authored or co-authored more than a dozen publications, and has been an invited and honored speaker for the SIPES, Geological Society of London, AAPG, SPE and SEG.

For more information about this event, contact HGS Office
713-463-9476 • office @hgs.org

Date: Tuesday, February 2, 2010 • **Time:** 9:00am – 4:00pm

Location: Houston Research Center • 11611 West Little York Road • Houston Texas 77041 USA

Please make your reservations on-line through the Houston Geological Society website at www.hgs.org

Monday, February 22, 2010

Westchase Hilton • 9999 Westheimer
Social Hour 5:30–6:30 p.m.
Dinner 6:30–7:30 p.m.

Cost: $28 Preregistered members; $35 non-members & walk-ups

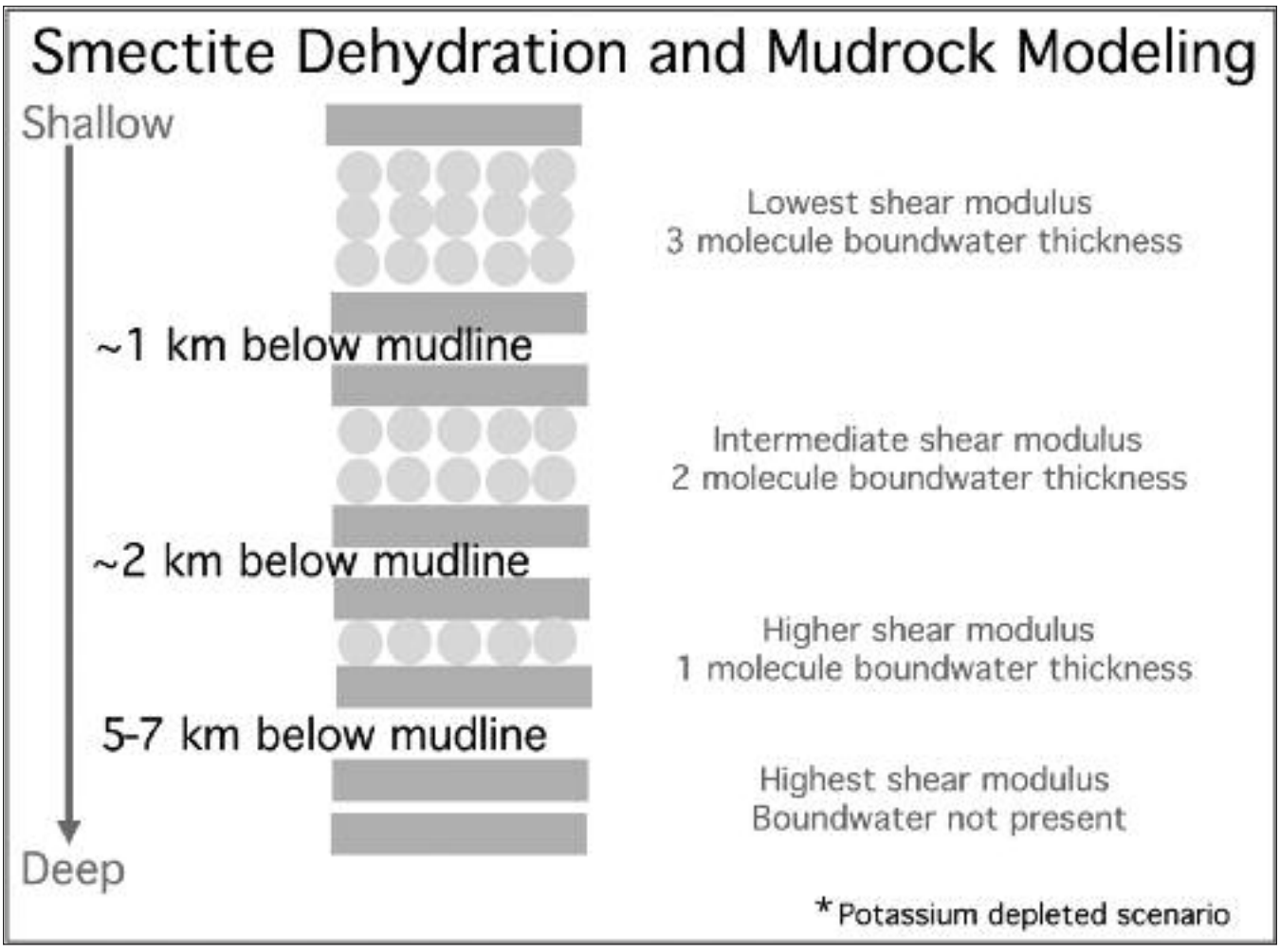
To guarantee a seat, you must pre-register on the HGS website and pre-pay with a credit card.
Pre-registration without payment will not be accepted.
You may still walk up and pay at the door, if extra seats are available.

Phil Heppard** and **Dan Ebrom

Compaction and Overpressure in Shales: Practice and Theory

Pressures in the subsurface control the migration of fluids, including hydrocarbons, and hence are of interest not only to drillers (whose wells must deal with these pressures) but also to explorationists generally. Away from well control, the most common source of pressure information is P-wave seismic velocities. Converting shale velocities to pressures requires an understanding of the normal (hydrostatic) compaction curve for shales in a given region. Absent a normal compaction curve, it is impossible to state whether a given shale velocity represents normal pressure, overpressure, or underpressure. We will show the expected range of normal compaction curves and discuss the driving factors that influence compaction. A quantitative model of shale compaction has been developed that accounts for many of the features of shale porosity evolution with depth, including predictions of P-wave and S-wave velocities. We conclude with a big picture review of the place of pressure analysis in hydrocarbon exploration. ■

HGS North American Dinner *continued on page 21*



HGS/PESGB
9th International Conference on African E&P
Africa: A Multi-faceted Promise
Houston, 2010
September 8-9, 2010

Marriott Houston Westchase Hotel • 2900 Briarpark Drive, Houston, Texas

Note change of dates from previous announcement!

Plan to attend this event during the week before the AAPG Int'l Convention in Calgary.

This annual conference has become established as the primary technical E & P conference on Africa. Scheduled for 8-9 September 2010 in Houston, a two-day program of talks is planned along with technical posters and exhibits from sponsoring companies. Opening reception will be Tuesday evening September 7th.

The conference series, organized by members of the International Group of Houston Geological Society (HGS) and Petroleum Exploration Society of Great Britain (PESGB) covers all aspects of African E&P, with particular emphasis on new ideas for plays and prospects, the geology of the continent and its conjugate margins, and application of emerging technologies.

Technical Contributions and Sponsorships are welcomed now.

Submit topics as soon as possible for consideration of the Technical Committee to Africa2010@att.net. Abstracts (~200 words) are due no later than 31 March. The program will be finalized by end April.

For sponsorship opportunities or exhibit space, please contact David Schwartz DSchwartz@fugro.com .

Special thanks to Fugro Gravity & Magnetic Services for again sponsoring the CD of Proceedings.

Pre-registration will be available from April, further details will be appear in the HGS *Bulletin*, PESGB newsletter and websites.

Conference Committee for 2010 includes Al Danforth, Ian Poyntz, Martin Cassidy, Dave Schwartz, Justin Vanden Brink, Tarek Ghazi and Claudia Lopez (Houston), Ray Bate and Duncan Macgregor (London).

HGS North American Dinner continued from page 19

References

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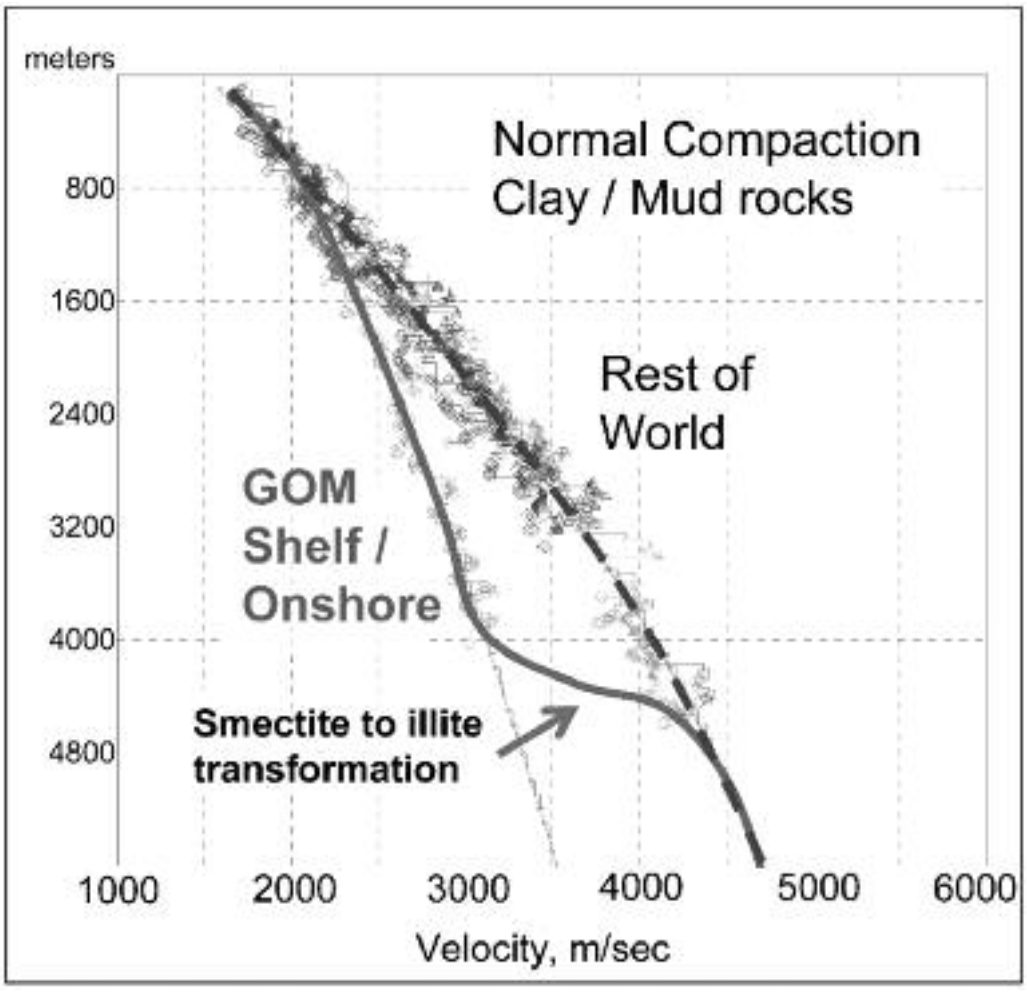
Lahann, R. W., 2002, Impact of smectite diagenesis on compaction modeling and compaction equilibrium: in, eds. A. R. Huffman and G. L. Bowers: AAPG Memoir 76, Pressure Regimes in Sedimentary Basins and Their Prediction, p. 61-72

Lahann, R. W., 2004, A broader view of framework weakening: AAPG Annual Meeting, April 18-21, 2004 [expanded abstract]

Biographical Sketch

Philip D. Heppard is a principal geologist with ConocoPhillips in Houston, Texas. Since 1988 Philip has been a pore-pressure expert supporting worldwide exploration and development efforts encompassing most known petroleum basins and has been a lecturer on pore pressure for AAPG and related professional organizations. In 2003 he won the AAPG best international poster award for "Using shear and Vp/Vs to predict overpressure in petroleum basins" with his four co-authors. His interest has been the integration of well and seismic data to predict overpressure in the subsurface for well planning and the evaluation of seal quality, as well as operational support for drilling wells. He has worked as a development geologist in the Permian Basin of Texas, and Trinidad, West Indies. Mr. Heppard received his B.S. in geology from Juniata College, Pennsylvania, in 1977 and his M.S. in geology from the University of Akron, Ohio, in 1984. He joined Amoco Production Co. in 1979 and then BP after the merger of the two in 1999. He joined ConocoPhillips Company in February 2006 to become a leading member of their GeoPressure network within the Subsurface Technology group in Houston.



A depth versus velocity plot of normally compacting clay rocks (shale) normalized to the sea floor from seven basins including Beaufort-McKenzie, eastern offshore Canada, USA Gulf of Mexico, offshore Trinidad, offshore Nigeria, offshore Indonesia, and NW Australia from Recent to Jurassic age rocks. The normally pressured clay rock from Gulf of Mexico shown in green are smectite-rich and noticeably slower than the other, mixed-clay mineral shales. Previous authors who have discussed clay diagenesis, log response and compaction are Lahann (2002, 2004), Alberty and McLean (2003), and Katahara (2003, 2006).

Wednesday, February 24, 2010

Petroleum Club • 800 Bell (downtown)
Social 11:15 AM, Luncheon 11:30 AM

Cost: $30 pre-registered members; $35 for non-members & walk-ups; Emeritus/Life/Honorary: $15; Students: FREE

To guarantee a seat, you must pre-register on the HGS website (www.hgs.org) and pre-pay with a credit card.
Pre-registration without payment will not be accepted.
You may still walk up and pay at the door, if extra seats are available.

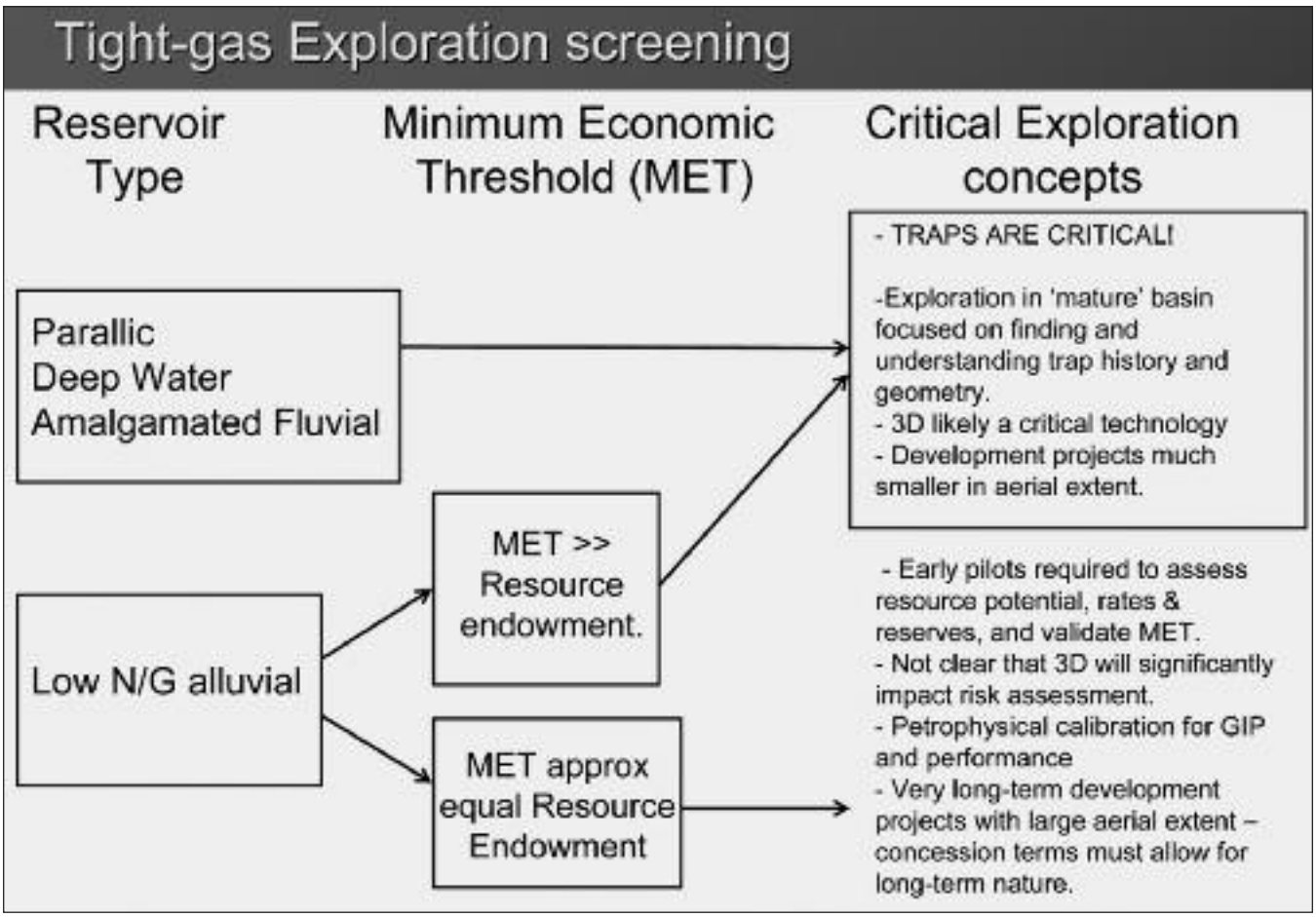
HGS General Luncheon Meeting

Keith W. Shanley
The Discovery Group, Denver, CO

Appropriate Exploration Strategies in Tight-gas Sandstone Plays.

The role of unconventional resources in the nation's energy portfolio has been steadily increasing since the early 1900's! Once the ugly duckling desperately seeking recognition, unconventional resources now make up more than 45% of total domestic production and that proportion is expected to grow. Within the suite of unconventional plays, tight-gas sandstones now account for between 35% and 40% of total unconventional production, and exploration firms both large and small seek unconventional targets as part of their portfolio. For years, discussion of unconventional gas plays was restricted to sedimentary basins in North America, but as worldwide demand for natural gas increases, petroleum provinces throughout the world are being reexamined for their tight-gas potential. These international ventures reference North American analogs where subsurface and performance datasets are voluminous. To many, a discussion of tight-gas sandstone plays conjures an image of limited exploration risk and widespread drilling programs, where field boundaries are diffuse and where the predominant risk-element is assigned to the cost or efficacy of extraction technologies (drilling, completion, and transportation). To be sure, there are tight-gas plays that approach these characteristics, however, there

HGS General Luncheon *continued on page 24*



HGS General Luncheon continued from page 23

are equally large and profitable tight-gas plays that carry all the subsurface risks commonly associated with more conventional petroleum systems in which fields are more aerially restricted and where exploration must be more surgical. Both types of tight-gas opportunities are capable of delivering large numbers of very long-lived producing wells providing an almost annuity-like financial profile. Cleary, appropriate exploration strategies must distinguish between these two very different types of investment categories if sound decisions are to be consistently made.

The petrophysical challenges that accompany may of these plays often makes the evaluation of tight-gas plays fundamentally different…

Examination of tight-gas plays in the Rocky Mtn. region of the United States suggests that two broad play types can be identified. In basins with favorable petroleum-system elements, those plays involving more laterally persistent deep-water, paralic, or high net/gross alluvial reservoirs must have a strong focus on trap identification, trap timing and evolution. In these settings, exploration for tight-gas opportunities is similar to more traditional exploration with the added complications induced by fluid flow in very low permeability reservoirs. In low net/gross alluvial reservoirs, however, where traps can also occur at the scale of individual sandbodies, the initial analysis must first compare 'minimum economic thresholds' (MET) and resource endowments associated with the play opportunity. In cases where the MET is much greater than the resource endowment, the need (and hence search) for traps at a much larger scale than the individual sandbody is of paramount importance. In other low net/gross alluvial reservoir systems where the MET and resource endowment are more similar, traps at a scale larger than individual sandbodies may enable optimization, however, identification of these traps may not be required for economic success. In these cases early exploration efforts should be on pilot projects designed to validate that the MET and resource endowment are indeed similar. In low net/gross alluvial plays where there is considerable disparity between the MET and resource endowment, early exploration efforts must be more traditional and have a strong focus on trap identification at a scale much larger than individual sandbodies.

New venture exploration for tight-gas plays is only likely to occur in mature petroleum provinces where the efficacy of the petroleum system has already been established: It is highly unlikely that new venture exploration for tight-gas resources will initially occur in a frontier basin setting (CBM may be an exception). The petrophysical challenges that accompany many of these plays often makes the evaluation of tight-gas plays fundamentally different from more traditional plays. The time and tasks required to adequately appraise a tight-gas play may be substantially longer than in more traditional plays. Because reservoirs are low-permeability, these plays often require drilling 100's to 1000's of wells over a time period that may span decades, requiring an organizational competency (not to mention persistence) generally not needed in more traditional plays. The operational demands associated with such plays and the high degree of subsurface complexity at the reservoir scale often makes manpower and capital requirements on a BOE basis in these types of plays much higher than more traditional plays. ■

Biographical Sketch

Keith W. Shanley is a consulting geologist aligned with the Discovery Group in Denver, Colorado with more than 25 years of experience in petroleum exploration, development, and research. He has worked in a variety of basins around the world for both major and independent oil and gas companies in positions ranging from upstream geosciences research and technology development to exploration, production, and appraisal. Keith has published numerous papers, edited volumes, and organized conferences and seminars dealing with sequence stratigraphy, it's application to reservoir characterization and prediction, non-marine sedimentology and stratigraphy, and tight-gas resources. Keith's work on tight-gas resources has been well recognized by the American Association of Petroleum Geologiststs which awarded him and his co-authors the 2006 Pratt Award for best paper, and by the Canadian Society of Petroleum Geologists which awarded them the 2005 Medal of Merit for the most significant paper pertaining to the petroleum geology of Canada. In 2005 Keith was a co-convenor of the Vail Tight Gas Hedberg Conference. The resulting volume – AAPG Hedberg Series #3 was recently awarded the 2010 Robert H. Dott Award by the AAPG for the best special publication. Keith Shanley was born in The Hague, The Netherlands and moved to the United States

A Case Study of Ground-Penetrating Radar for Concrete Moisture Mapping and Void Detection in the Saturated Soil Beneath the Concrete Residential Foundation, Houston

*By **Mustafa Saribudak,** Environmental Geophysics Associates*

Introduction

Texas has large areas, including Houston, with clayey soils that shrink and swell with changes in soil moisture content. This shrinking and swelling may cause movement of a residential foundation that adversely affects the residence. Houston soil contains varying levels of a clay material called montmorillonite. Due to the presence of this clay, water may cause the soil to expand by as much as 30%, up to six or more inches in some areas of Houston. Different levels of moisture around the perimeter and under the house create voids, upheaval, slumping, and other foundation problems.

Different levels of moisture around the perimeter and under the house create voids, upheaval, slumping, and other foundation problems.

Site Background

The subject residence is located in the northwest part of Houston, Texas. The house is eight years old. The homeowner replaced the carpets in the living room with wood one year after they moved in. The wood floor started showing discoloring within three months right after it was installed (Figure 1).

A plumbing inspection revealed no leak at the house. A flooring company visited the living room and took some moisture readings for reconnaissance purposes. Approximate locations of the

Technology Note *continued on page 29*

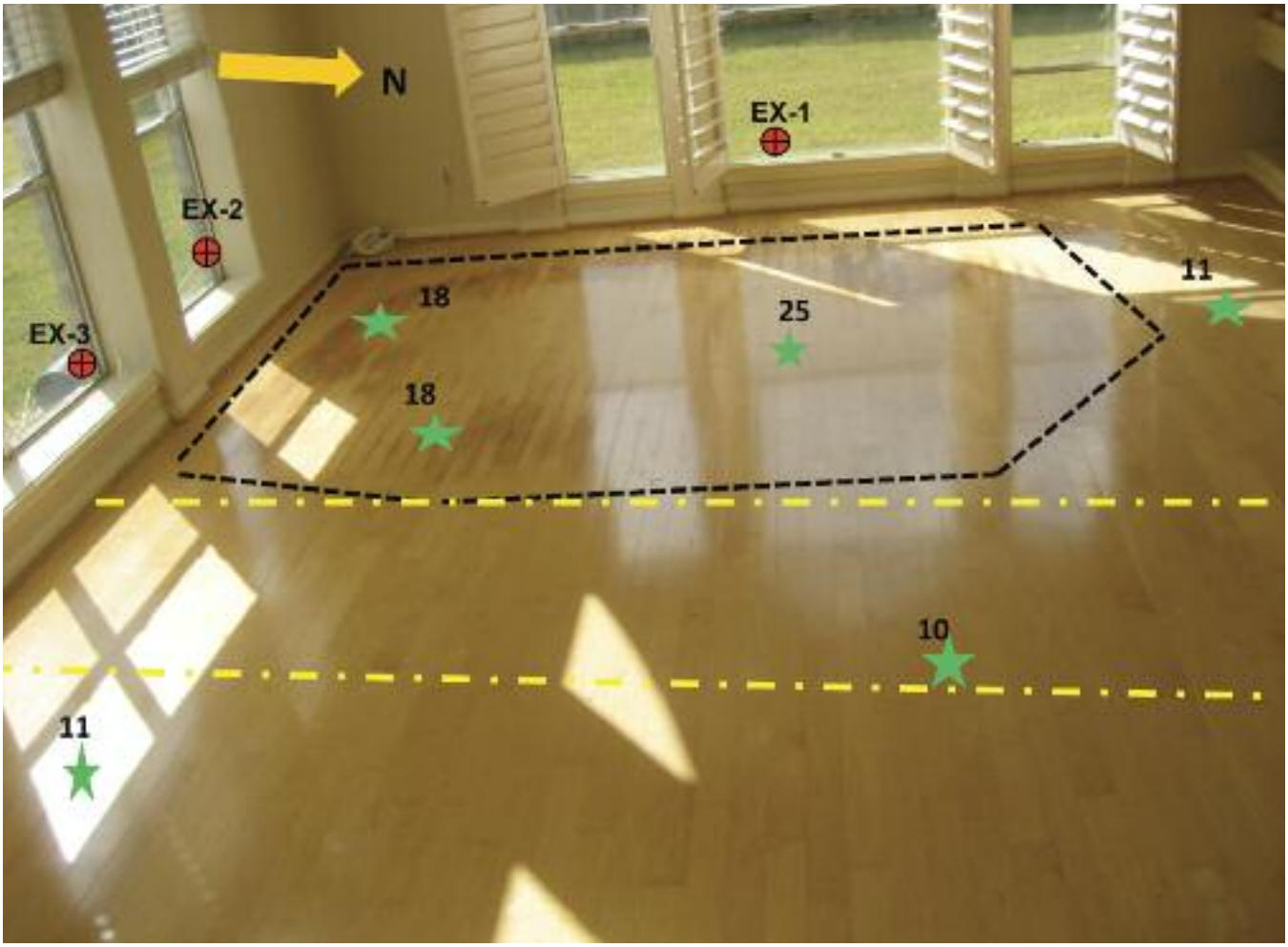


Figure 1. GPR study area showing the discolored portion of the wood floor with dashed black lines. Location of moisture readings are shown with green stars. Moisture readings 10 and 11 are background whereas 18 and 25 are high moisture areas. Dashed yellow lines show two post tension cables embedded into the concrete at about 3 inch. Red circles are excavation points.

Technology Note continued from page 27

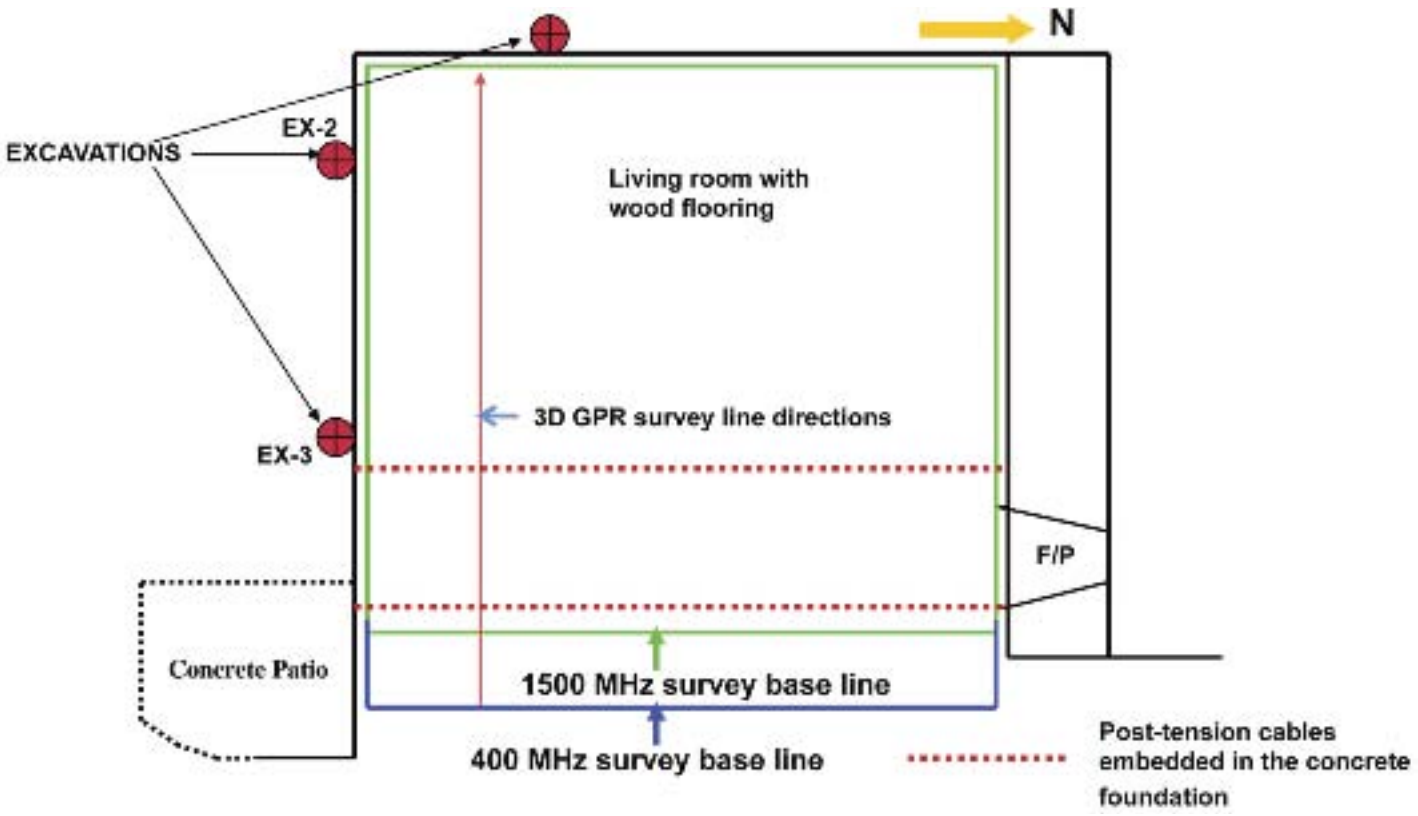


Figure 2. Schematic site map showing 3D GPR survey design.

Technology Note *continued on page 31*

Technology Note *continued from page 29*

Figure 3. Picture showing the 1500 MHz GPR survey in the living room. The GPR data was collected at every 6 inch.

readings and values are shown in Figure 1. An engineering company was contracted to evaluate the moisture problem in the living room. However, results from the plumbing and engineering studies neither pinpoint the source of the moisture specifically nor the conditions of the concrete slab and the soil beneath it. To address the problem, the homeowner hired his own geophysical company to perform ground-penetrating radar surveys in the living room.

Clayey soil is present throughout the area where the subject residence is located. This type of soil expands when it gets wet, and shrinks as it dries.

Purpose of Ground-Penetrating Radar (GPR) Surveys

The purpose of the GPR study was three-fold: 1) to determine whether there were water and/or sewer pipes crossing the living room; 2) to locate potential leaks and/or moisture distribution in the slab due to leaking; 3) to locate voids within the concrete foundation and/or soils underlying the concrete.

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GPR Instrumentation and Survey Design

A GSSI SIR-2000 GPR system was used during the surveys with antennas of 1500 and 400 MHz, whose ranges have depth penetration of up to 1 foot and 8 feet, respectively, depending on the conductivity of the concrete slab and the underlying soil. A schematic map of the living room is shown in Figure 2.

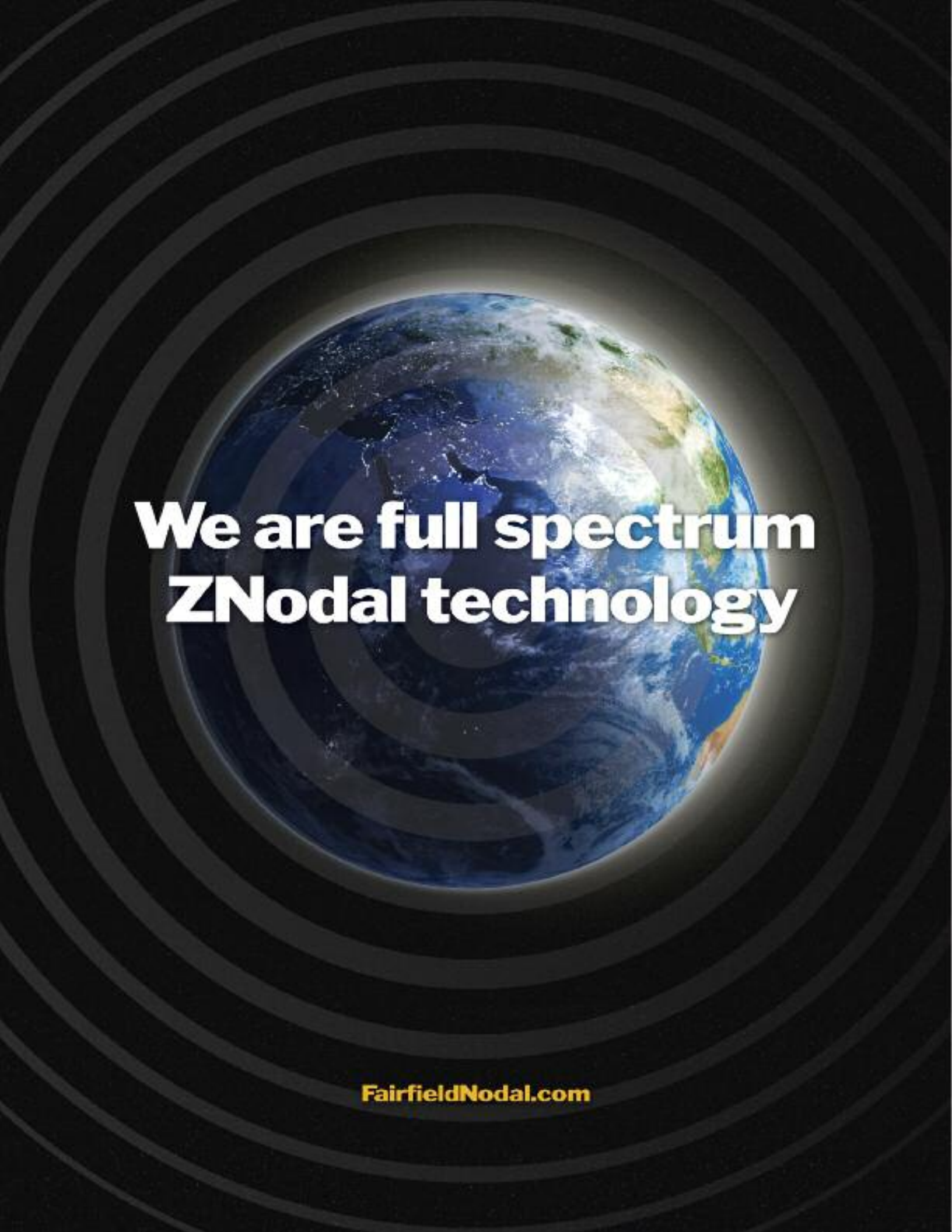
The 1500-MHz antenna was used with a hand-held cart system to collect three-dimensional (3D) GPR data (Figure 3). 26 profiles of GPR data with six (6) inch spacing were collected.

The 400-MHz antenna was used with a cart system to collect 3D GPR data (Figure 4). 15 profiles of GPR data with one (1)-foot spacing were collected. It should be noted that this survey's baseline (X =0, Y=0) starts 3 feet to the east of the 1500 MHz surveys.

GPR is the general term applied to techniques that employ radio waves in the 1 to 1000 megahertz (MHz) frequency range to map near-surface structures and man-made features. The GPR system consists of transmitter and receiver antennas and a color-display unit. Depth penetration of the radio waves is limited by the antenna chosen (larger antennas generate

Technology Note continued on page 39

Figure 4. Picture showing the 400 MHz GPR survey in the living room. The GPR data was collected at every one foot.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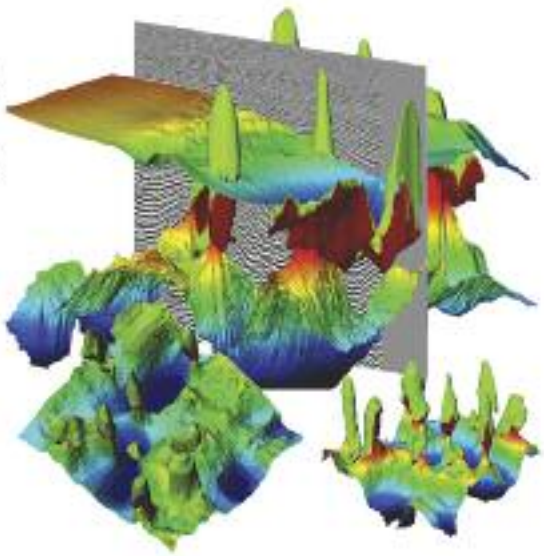

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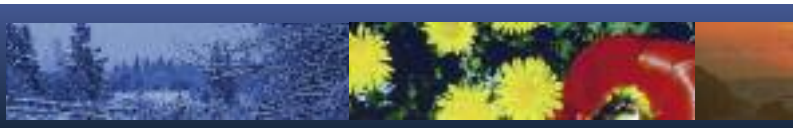
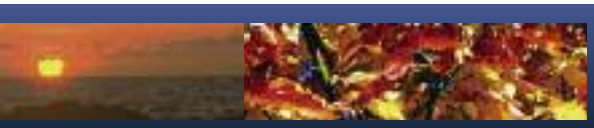
SYSTEMS ACQUISITION LICENSING PROCESSING IMAGING

February 2010



Sunday	Monday	Tuesday	Wednesday
	1	2 **HGS Board Meeting** *6 p.m. HGS Office*	3
7	8 **Applied Geoscience Conference** *US Gulf Region Mudstones as Unconventional Shale Gas/Oil Reservoirs Houston, TX* Page 12	9	10
14	15 **HGS International Dinner Meeting** *"Lacustrine and Marine Pre-Salt Clastic and Carbonates of Brazil and West Africa: Drivers for Reservoir Quality, Environments of Deposition and Analogs" Scott E Thornton, Westchase Hilton* Page 13 **Deadline for Submission to the April *Bulletin***	16 **HGS Environmental & Engineering Dinner Meeting** *"Integrating Environmental Considerations into Wind Power Project Siting" Todd H. Hall, Black Lab Pub* Page 17	17
21	22 **HGS North American Dinner Meeting** *"Compaction and Overpressure in Shales: Practice and Theory" Phil Heppard and Dan Ebrom, Westchase Hilton* Page 19	23	24 **HGS General Luncheon Meeting** *"Appropriate Exploration Strategies in Tight-gas Sandstone Plays" Keith W. Shanley, Petroleum Club* Page 23
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.**		



GeoEvents

Thursday	Friday	Saturday
4	5	6
11 **HGS General Dinner Meeting** *"Reservoir-Scale Seismic Stratigraphy: A Call to Integration"* *Bruce Hart, Westchase Hilton* Page 11	12	13
18 **SIPES Luncheon Meeting** *"Going Deep: McMoRan's High Impact Deep Exploration Play"* *James R. Moffett, Petroleum Club* Page 51	19	20
25	26	27
	Members Pre-registered Prices: General Dinner Meeting..... $28 Nonmembers & walk-ups ..... $35 Env. & Eng. ..... $25 Luncheon Meeting ..... $30 Nonmembers & walk-ups ..... $35 International Explorationists ..... $28 North American Explorationists $28	**NOW you can make your reservations on-line at www.hgs.org**

Upcoming GeoEvents

March 2-4, 2010
APPEX 2010 *London, England*

April 11-14, 2010
AAPG Annual Convention & Exhibition *New Orleans, Louisiana*

April 22-23, 2010
Modeling Sedimentary Basins and Their Petroleum Systems
Geological Society London, England

May 3-6, 2010
Offshore Technology Conference
Houston, TX

May 16-18, 2010
AAPG Southwestern Section Meeting *Dallas, TX*

May 22, 2010
HGS Guest Night – *Houston Science Museum Houston, TX*

June 8-10, 2010
Applications of Reservoir Fluid Geochemistry *AAPG Hedberg Research Conference Vail, CO*

June 13-16, 2010
AAPG Rocky Mountain Section Meeting *Durango, CO*

July 4-8, 2010
Australian Earth Sciences Convention *Canberra, Australia*

September 8-9, 2010
9th African Conference – Africa: A Multi-faceted Promise *Houston, TX*

September 12-15, 2010
AAPG International Conference & Exhibition *Calgary, Canada*

October 31 – November, 2010
Geological Society of America Annual Meeting *Denver, CO*

November 4-5, 2010
Advances in Carbonate Exploration and Reservoir Analysis
Geological Society London, England

April 10-13, 2011
AAPG Annual Convention & Exhibition *Houston, Texas*

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lower frequencies which offer greater penetration) and the conductivity of the soil.

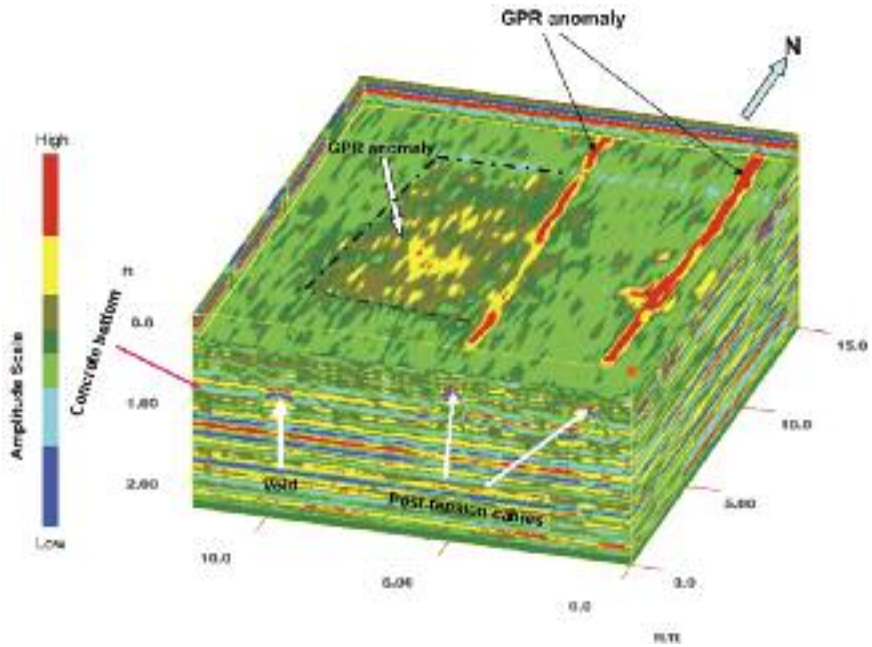

Figure 5. 3D GPR data for 1500 MHz survey showing a depth-slice view at 3 inch into the concrete foundation.

The ability of a GPR system to work successfully depends upon two electrical properties of the subsurface, electrical conductivity and relative dielectric permittivity (i.e., the dielectric constant, which is a dimensionless measure of the capacity of a material to store charge when an electric field is applied). The value of the dielectric constant ranges between 1 (for air), and 81 (for water). The dielectric constant for concrete varies from about 5 when dry to 10 when saturated.

Differences in dielectric constants of subsurface materials along distinct boundaries, such as moist and dry concrete and pipes embedded within the concrete slab, can cause highly significant reflections in the radar signal, which are recorded and displayed by the system.

In summary, GPR radar reflections occur when GPR waves encounter a change in velocity due to dielectric contrast. The bigger the change in concrete and/or soil properties the stronger the signal that is reflected.

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Data Preparation and Processing

GPR surveys with 1500 and 400 MHz antennas were completed on August 7, 2008 and October 12, 2008, respectively. Two different baselines for the surveys were established due to different sizes of the antennas and their logistics. The direction of the profiles was from east to west. The length of the GPR profiles for the 1500-MHz survey was about 12 feet with 6-inch profile spacing. The length of the GPR profiles for the 400-MHz survey was about 15 feet with one-foot profile spacing. Both surveys included the moisture-free and moisture-affected areas of the living room site.

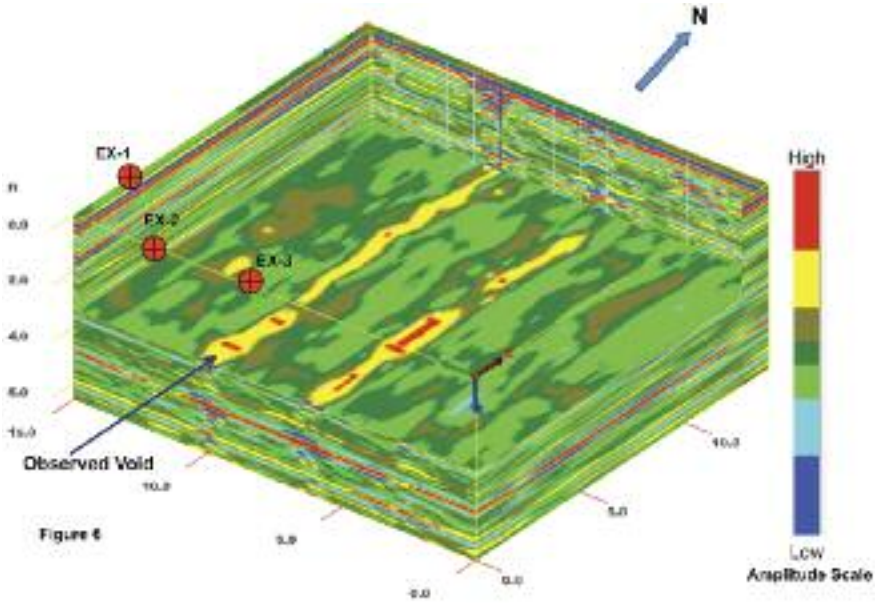

Figure 6. 3D GPR data for 400 MHz survey showing a depth-slice view at 2.5 feet. EX-1, 2 and 3 are excavation locations along the foundation.

Upon completion of the survey, the data were transferred into a laptop computer and the x and y coordinates of each data point were determined. The data were then processed using GSSI's RADAN software.

The presentation of the 1500 and 400 MHz GPR data is in color to provide rapid visual recognition of the GPR anomalies. In the color mode the GPR data are displayed in a color-amplitude format, and a color is assigned to a specific positive or negative value of the recorded signal. In this study, red and yellow colors on the GPR profiles

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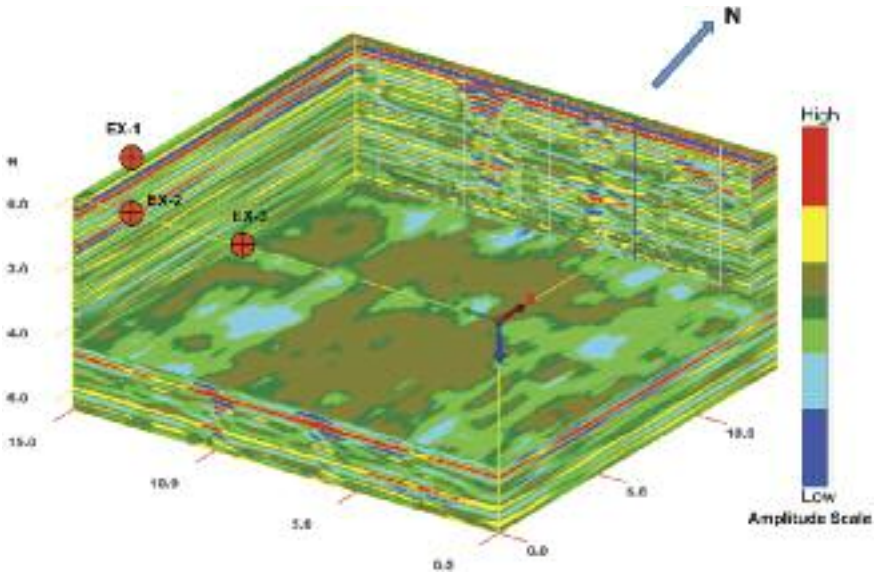

Figure 7. 3D GPR data for 400 MHz survey showing a depth-slice view at 4 feet.

correspond to the highest amplitude positive pulse. Therefore, when it appears on the radar record, it means that there is a strong reflection where yellow and red colors are observed due to a high dielectric contrast. Dark blue could also represent a "strong" negative reflection and similar high dielectric contrast.

Dielectric constants of 6 and 20 were used for the concrete pad and the underlying soil, respectively, and these numbers were calibrated with known subsurface targets, i.e., the concrete thickness (6 inch) and soil depth (2 feet).

Discussion of 1500 and 400 MHz GPR Data

The 3D GPR results for the1500-MHz surveys are given in Figure 5, which shows a 3-inch depth-slice view of the entire study area. The map view displays two significant linear GPR anomalies shown with red and yellow colors. These anomalies trend in the north-south direction and are labeled as PTC-1 and PTC-2, whose sources are caused by ferrous materials within the concrete. In fact, a ¾-inch post-tension cable was observed on the concrete foundation outside the study area. PTC-1 anomaly appears to lose its high-amplitude strength in the

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middle of the study area. In other words, the integrity of the post-tension cable appears to be compromised. A very significant anomaly is also shown with light brown and yellow colors to the west of PTC-1 anomaly. This anomaly is outlined with a dashed-black line on the map (top) view of Figure 5. The geometry of this anomaly is quite correlative with the observed moisture- affected areas of the wood floor (see Figures 1 and 5). A void anomaly immediately beneath the concrete slab is also located in the 2-D section of Figure 5.

Figure 8. Picture showing the EX-3 excavation in the south wall of the foundation.

The 3D GPR results for the 400-MHz surveys are given in Figure 6, which shows a 2.5-foot depth-slice (top view) of the entire study area. The map view displays two linear moderate-to-high amplitude anomalies in north-south directions. The majority of these anomalies are shown with the yellow color, which is caused by dielectric contrast (low dielectric vs. high dielectric values) within the soil underlying the concrete foundation. The sources of these anomalies are not known, but they could be caused by voids partly filled in part with water. However, there are high-amplitude zones (red color) within the anomalies shown with the yellow color. The red areas are probably caused by voids filled with air. It should be noted that two linear anomalous features are located approximately beneath the post-tension

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Figure 9. The void in the soil underlying the foundation at EX-3 location. Pictures are taken in October 8 and 27, 2008, respectively. Decrease in water height could be tied up to local monthly precipitation (see Figure 10). The top of the void is about 2 feet below the concrete pad. The material above the soil appears to be hardened clay or grade materials.

cables embedded within the concrete. This correlation between the linear anomalies in the soil and the location of linear PTC anomalies within the concrete is either coincidental or they are somehow related. A deeper 4-foot depth-slice does not indicate the presence of the two linear GPR anomalies or any other significant subsurface targets within the soil underlying the concrete foundation (Figure 7).

Three locations (EX-1, EX-2 and EX-3) were excavated next to the foundation on October 8, 2008. These locations are along the foundation next to the southern and western walls of the living room (see Figures 1, 2 and 6) The EX-1 and EX-2 locations did not reveal any void or wet zone beneath the foundation; however, the EX-3 location revealed a void beneath the foundation (Figure 8). As soon as a 2.5 foot depth was reached, the excavation hole filled with ground water flowing from the soil underlying the foundation. The height of the water reached to 4 inches on October 8, 2008. A 3-foot-long stick was pushed into the void with little resistance from the soil. This observation correlates well with the presence of the high-amplitude GPR void anomaly at EX-3 location. The hole was filled with dirt and covered, and the location was visited back on October 27, 2008. The water height in the hole reached to one inch on this visit (Figure 9).

The fluctuations of the water height beneath the foundation could be explained by the local monthly precipitation (Houston: Bush Intercontinental Airport Precipitation Data, 2008) which is

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Houston: Bush Intercontinental Airport				
	Average Temp	Departure	Precipitation	Departure
January	52.2°	+0.4°	4.62"	+0.94"
February	60.1°	+4.7°	4.00"	+1.02"
March	63.6°	+1.3°	2.41"	-0.95"
April	69.4°	+0.9°	1.46"	-2.14"
May	77.8°	+2.0°	4.57"	-0.58"
June	84.5°	+3.2°	2.06"	-3.29"
July	84.9°	+1.3°	1.09"	-2.09"
August	84.0°	+0.7°	7.45"	+3.62"
September	78.2°	-0.7°	12.07"	+7.74"
October	69.5°	-0.9°	8.67"	+4.17"
November	62.4°	+1.5°	2.92"	-1.27"
December	55.6°	+1.9°	1.68"	-2.01"
ANNUAL	71.5°	+2.7°	53.00"	+5.16"

Figure 10. 2008 Annual Precipitation at northwest Houston.

located near the subject residence (Figure 10). According to these data, the area received 12.07-inches of rain during the month of September (Hurricane Ike visited Houston on September 12, 2008). The water height on the excavation measured about 4 inches on October 8, 2008. The area received 8.67 inches of rain during the month of October. The water height on the excavation was about one inch on October 27, 2008.

Conclusions

1500-MHz GPR results revealed significant anomalies within the concrete:

- Two post-tension cables were located, which were embedded in the concrete at a depth of 3 inches;
- One of the post-tension cables did not have as strong an amplitude anomaly as the other. This may indicate that the integrity of the former PTC is somewhat compromised;
- A low-to-moderate amplitude anomaly is observed to the west of the compromised PTC. The shape of this anomaly is quite correlative with the discolored, moisture-affected areas of the wood floor. This correlation suggests that the cause for the anomaly could be the moisture leaks through the concrete foundation from the disintegrated PTC (see Figure 5);
- A void was also detected at the bottom of the concrete foundation.

400-MHz results located significant anomalies within the soil underlying the concrete foundation:

- Two linear GPR anomalies were detected at a depth of 2.5 feet from the surface of the concrete foundation. These anomalies are mostly moderate in amplitude. However, they show areas of high amplitude as well. These anomalies trend in the north-south direction, and are located approximately beneath the PTCs;
- The GPR data do not show any significant anomaly at a depth of 4 feet;
- Three locations (EX-1, EX-2, and EX-3) were excavated along the foundation outside the living room. The EX-1 and EX2 locations did not reveal any wet soil or water, as expected, because there were no GPR anomalies beneath the concrete foundation; however, the EX-3 excavation was chosen to be next to one of the linear GPR anomalies, and it did show a significant void beneath the foundation. The other linear anomaly was not tested because the location was covered with a concrete patio.

Visual inspection of the surface conditions next to the foundation in the vicinity of the void indicated ponding conditions, which may have resulted over the years, in saturated soil conditions along the faulted foundation and the water being forced under the slab through a created void.

A French Drainage system was installed along the foundation in order to decrease the saturated soil conditions, and the wood floor was replaced with ceramic tile. ■

Acknowledgment

I thank Brian Jones of GSSI for his thorough review of the manuscript.

Biographical Sketch

Mustafa Saribudak was born in Eregli, Turkey. He went to Istanbul University for his geological engineering degree. Dr.Saribudak received his Ph.D. from the Geophysical Department of Istanbul Technical University. He came to the United States to work on a National Science Foundation project at the Geosciences Department of University of Houston. After this project, he decided to stay in the USA and started working for Tierra Environmental in The Woodlands, Texas. He founded Environmental Geophysics Associates in 1994 to provide near-surface geophysical services for engineering, environmental, oil and gas industries. During the last 15 years he has conducted more than 250 geophysical surveys in the USA, Central America and Canada. He has published numerous papers and short notes in geophysical and environmental journals.

SIPES Luncheon Meeting
Going Deep: McMoRan's High Impact Deep Exploration Play

James R. Moffett

For the last six years, McMoRan Exploration Company has been the leader in the Gulf of Mexico's deep shelf exploration play, drilling numerous discoveries targeting deep Miocene structures at depths of 15,000'-25,000'. McMoRan's continued success with its deep shelf program includes the Flatrock discovery on OCS 310 in South Marsh Island Blocks 212 and 217. During 2008 McMoRan expanded its exploration program to include the "Ultra Deep" play at depths of 25,000' – 35,000', targeting giant structures below the listric detachments of the Miocene shelf. The unprecedented deepening of the South Timbalier Block 168 "Blackbeard" prospect was a significant accomplishment for McMoRan's drilling and geotechnical teams, an achievement that has profound implications for the future of this game-changing exploration play.

Flatrock Field was discovered in 2007 beneath the Tiger Shoal Field. It is a prime example of the "deeper pool" concept which is a fundamental aspect of the McMoRan exploration strategy. The shallower Tiger Shoal Field, discovered in 1958, is in normal pressured reservoirs with 110 wells that have produced 3.3 TCFE. Flatrock Field has six wells producing from the geopressured Rob L and Operc (14,800' MD to 17,200' MD) reservoirs. Production from the Flatrock Field averaged a gross rate of approximately 280 MMcfg/d in the third quarter of 2009. Production from the field is expected to increase in early 2010 following planned recompletions and remedial activities. These high production rates are evidence of excellent porosity and permeability at these depths. The recent announcement of positive drilling results at the Blueberry Hill Sidetrack prospect on SL 340 at depths of over 20,000' highlights the continuing potential of the deep shelf play.

ultra deep prospects are similar to deep, large sub-salt structural traps in the deep water Gulf of Mexico with reservoirs of Middle Miocene to Lower Paleocene

McMoRan Exploration's ultra deep drilling program has identified multiple deep, large structural traps below the regional listric fault/salt weld with reservoir targets of Miocene, Paleogene, and possible Cretaceous age. McMoRan has drilled two ultra deep wells in the play. In 2008, McMoRan re-entered and deepened the Blackbeard well in South Timbalier Block 168 from 30,067' MD to total depth of 32,997' MD. This exploration well discovered four hydrocarbon-bearing intervals within the Miocene section. In 2009, McMoRan evaluated the Davy Jones prospect, re-entering the South Marsh Island Block 230 #1 well and deepening it from original total depth of 19,958' MD to total depth of more than 28,000' MD as of December 2009, and as of this date, the well continues to be drilled to a planned total depth of 29,000'.

The large ultra-deep structures were interpreted on regional 2D seismic data, on pre-stack time-migrated (PSTM) 3D seismic data, and on proprietary reprocessed pre-stack depth-migrated (PSDM) 3D seismic data. Available deep well data were utilized to calibrate the geologic model for the section above the salt weld. The ultra deep prospects are similar to deep, large sub-salt structural traps in the deep water Gulf of Mexico with reservoirs of Middle Miocene to Lower Paleocene age at depths below 20,000 feet subsea. The Middle Miocene to Lower Paleocene sandstone reservoirs in both deep water and below the deep shelf were deposited in deep water depositional environments. Preservation of porosity and permeability with depth of burial is a major risk factor for deep sandstone reservoirs in the shallow water areas of the Gulf of Mexico shelf.

McMoRan has generated an impressive inventory of high-potential prospects and will continue to pursue its deep shelf and ultra deep exploration opportunities on the Gulf of Mexico shelf in 2010.

SIPES Luncheon Meeting *continued on page 53*

Thursday, February 18, 2010

Houston Petroleum Club in the Discovery Room, 800 Bell St. (downtown Houston). Social 11:15 AM, Luncheon 11:45 AM

Reservations Required: *Make reservations by telephone (713-651-1639), fax (713-951-9659), website (www.sipes-houston.org), or e-mail bkspee@aol.com to B. K. Starbuck-Buongiorno by 12:00 noon on Tuesday preceding the meeting. You can now sign up for the meeting online at www.sipes-houston.org, but payment is still required by regular mail or at the door.*

Cost: *$30 for SIPES Members and Chapter Affiliates who register by 12:00 Noon Tuesday; $35 for new registrations at the door. The price for guests, non-members and walk-ins is $35. No-shows will be billed.*

SIPES Luncheon Meeting continued from page 51

Biographical Sketch

James R. Moffett is Co-Chairman of the Board of McMoRan Exploration Co. (NYSE: MMR). MMR is engaged in the exploration, development, and production of oil and natural gas reserves offshore in the Gulf of Mexico and onshore in the Gulf Coast area. McMoRan has a diversified portfolio of oil and gas properties with significant production and cash flow generating capacity and a large exploration acreage position to pursue opportunities on the continental shelf of the Gulf of Mexico.

Mr. Moffett is Chairman of the Board of Directors of Freeport-McMoRan Copper & Gold Inc. (NYSE: FCX). FCX is one of the world's leading international mining companies. FCX is engaged in minerals exploration, mining, smelting, refining, and related operations around the globe. Under Mr. Moffett's leadership, in 1988 FCX discovered the Grasberg ore complex in Papua, Indonesia, which contains the world's largest reserves of copper and gold. In 2007, FCX acquired the Phelps Dodge Corporation in a $26 billion transaction that created the world's largest publicly traded copper company. With 25,000 employees, FCX operates large, long-lived, geographically diverse assets with significant proven and probable reserves of copper, gold, and molybdenum.

Born in 1938 in Houma, Louisiana, and raised in Houston, Texas, Mr. Moffett has a B.S. degree in geology from The University of Texas (1961) and an M.S. degree in geology from Tulane University (1963).

HGS Welcomes New Members

Effective January 2010

ACTIVE MEMBERS
Abhaya Badachhape
William Beck
David Billingsley Jr
Clifford Budd
Jennie Caley
Adam Carter
Geoffrey Chambers
Brian Driskill
Tracey Fleming-Reese
Edward (Jon) Graham
Lane Hammons
Eldar Hasanov
William House
Igor Jaramillo
Aaron Leavitt
David Moravec
Ray Nelson
Emmanuel Njumbe
Alejandro Sanchez
Jennifer Schulz
Eric Vosburgh

ASSOCIATE MEMBERS
Tim Pawlik
Mary Beth Pieri
Anne Terburgh
Kay Ward

STUDENT MEMBERS
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Heather Dalton
Sarah Dean
Morgan Gallagher
Jaydip Ghosh
Debra Jennings
Alexandra Kirschner
Amy Lasseigne
Kaijian Liu
Jennifer Mackenzie
Kelsey Schultz
Jacob Siegel
Davin Wallace
XinLing Wang
Jie Zhang

Emeritus Memberships
Emeritus Membership status has been granted to **John Tubb** an Active Member of HGS since 1975 and **William Owens** an Active Member HGS since 1986.

Welcome New Members

Book Review *by* George O. Chandlee

Ward P. D., 2006, *Out of Thin Air: Dinosaurs, Birds, and Earth's Ancient Atmosphere*, with Illustrations, appendices, and references, 282 pp. John Henry Press. $27.95.

Everyday experience provides our perspective on Earth as a planet. This experience forms a sense of the permanence and durability of the earth, and that major fundamental characteristics are unchanging. These perceptions are deceiving however; if our perspective were a little less limited, we would see the impermanence of the Earth, its terrain, the organisms that inhabit it, and its atmosphere.

This is the keystone of *Out of Thin Air: Dinosaurs, Birds, and Earth's Ancient Atmosphere* by P. D. Ward. Ward is a professor of biology and earth and space sciences at the University of Washington. His credentials include being co-founder of the Institute for Astrobiology at the university and principal investigator at the NASA Astrobiology Institute. He is the author of several books on popular science. This book is an exploration into the "why" of the history of life on earth and provides a detailed explanation of the motivating and propelling physical environmental forces that directed the adaptively meandering trajectory of evolution.

The book begins with the basic questions asked about Earth history. These questions are: what, when, how, and why recorded and observed events in Earth history occurred. The "what" and "when" are fairly easy; in the geological record, "what" constitutes the data recorded in rocks, "when" is placed in either a relative or absolute chronological framework. The "how" is more difficult to answer, and it "is the actual mechanism or motive that drove the historical record" (from the book, page 4). The most difficult question to answer is "why": debate, new discoveries, new interpretations, and new technologies often overturn (or at least alter and refine) previous explanations. As Ward emphasizes, it is the most interesting question.

…suited for the educated reader who will find it enlightening.

During the last 150 years, significant advancements in biology, genetics, geology, molecular biochemistry, and physics have added important data explaining the "how," specifically the mechanisms driving the history of life on Earth. Life on Earth is the result of the history of changes in the physical and biological conditions on Earth. Acknowledgement of this leads to shedding light on the "why" of Earth history. Ward's main idea is that the "why" is due to the adaptation of organisms to fluctuating levels of atmospheric oxygen.

Complex life is a set of chemical reactions that generate energy for growth, action, and reproduction. Two forms of these chemical reactions are anaerobic and aerobic respiration. Aerobic respiration generates up to 10X more energy than anaerobic respiration. Simply, it is more efficient in generating the high levels of metabolic energy required to sustain complex life. Adaptive advantages are conferred on animals and plants because of this greater efficiency.

The present day atmosphere of Earth consists of 78 percent nitrogen, 21 percent oxygen, and another 1 percent consisting of a variety of gases from carbon dioxide to water vapor. This composition is not typical of Earth's atmosphere through past eras. Early in the book, a graph is presented (and acknowledgement is given to R.A. Berner, developer of the graph) (see page 30 of the book). The graph plots percent atmospheric oxygen (O_2) vs. geologic time (millions of years ago). It is based on limited real-world data substantially augmented by computer models that take into account factors widely accepted to affect atmospheric oxygen and carbon dioxide concentrations. Also shown with the graph are the geologic time scale and the dominant climate types during the corresponding time interval.

The data presented in the graph and the geologic record leads Ward to infer the following: reduced levels of oxygen result in greater disparity (number of types of body plans) in life-forms; and a greater diversity (number of animal and plant species) of organisms is present during periods of high atmospheric oxygen concentrations. These ideas are presented early in the book, as are the general supporting data and arguments supporting the

Book Review *continued on page 57*

Foundation Fund Receives Maby Funds

The HGS recently received $60,000 from the estate of Robert Maby, a deceased member of the Society. This money was given to the Foundation Fund to establish a scholarship in Mr. Maby's name. The Foundation currently attempts to give out scholarships each year to undergraduate students from seven local universities. The universities in the program are: the University of Houston, Rice University, Texas A&M University, the University of Texas at Austin, Stephen F. Austin State University, Sam Houston State University, and Lamar University. The Robert Maby, Jr. Scholarship would go to the best scholarship applicant each year from the program, irrespective of the university. ■

Foundation Fund Board - Front Row, left to right; Shannon Lemke, Evelyn Medvin, David Fontaine. Top Row, left to right; Susan Black, James Ragsdale, Paul Hoffman and John Adamick

John Adamick, Chairman of the Foundation Fund and John Tubb, President Elect of the HGS.

Gulf Coast Association of Geological Societies and the Gulf Coast Section of SEPM

MEETING NOTICE

60th Annual Convention
October 10-12, 2010
San Antonio, Texas

Hosted by the South Texas Geological Society

GCAGS 2010
WEATHERING THE CYCLES

Welcome back to San Antonio! Our theme this year is ***"Weathering the Cycles"*** – a challenge that resource geologists certainly have faced and overcome in the past! How do we weather the economic cycles? We…

- ✓ Network with our community
- ✓ Experience the latest technology in the technical exhibition
- ✓ Take a course or a trip and grow new and diverse skills
- ✓ Listen to special presentations on strategies to endure and prosper during an economic downtime and prepare for the inevitable rebound.

By celebrating our successes, facing our challenges, and learning from the research results of our peers, we are paid back many fold by sharing ideas and experiences among our professional community. So come and share your experiences! Suggest a session topic, present an oral paper or a poster, learn about the latest ideas and technologies in our field. Come to San Antonio and enjoy the Gulf's own geoscience convention!

Book Review continued from page 55

hypothesis. The remaining ninety percent or so of the book presents specific details supporting the hypothesis.

The time period covered by the book includes the Cambrian through the Cretaceous extinction event, with less devoted to the Cenozoic (the last major era in Earth history). Ward adopts a parallel narrative style with "time-travel" to each era and describes how the land and oceans may have appeared to the "time traveler." The chapters covering these time periods follow a basically similar pattern and start with an imaginary trip in time to the period being discussed. These "trips" describe "snapshots" of what the Earth may have looked like at a moment in time.

Ward embraces a style of presenting a series of hypotheses corresponding to observation. For example, an abundance of insects (as found in the Rhynie Chert, a rich assemblage of arthropods from the Silurian-Devonian transition in Aberdeenshire in the north of Scotland) corresponds to an oxygen peak (that exceeded all other atmospheric concentrations prior to that time) in the Devonian. This corresponds nicely with high oxygen level. This, in concert with other observations, leads to the development of the hypothesis that terrestrialization by arthropods (and vertebrates) was a direct consequence of a rise in atmospheric oxygen concentrations.

One theme of the book is explaining the "why" of the five mass extinctions (in chronological order, Ordovician, Devonian, Permian, Triassic, and Cretaceous) in Earth history. All occurred at a time of decreasing or lowered atmospheric oxygen concentrations. The greatest of these is the Permian mass extinction, at a time of continental coalescence (into one supercontinent, Pangaea). It is generally accepted that 90 percent of the plant and animal species on Earth disappeared at this time. The cause of the extinction has not been generally agreed upon. Numerous causes for the extinction are listed here (along with the degree of general acceptance): a large-body impact (mostly discounted); carbon dioxide impact (discounted), methane catastrophe (discounted), heat spike/low oxygen resulting from extensive volcanic eruption (explains long-term extinction but not short-term elevated extinction rates), and hydrogen sulfide poisoning (successfully explains the Permian extinction as well as long-term extinction, but needs additional supporting evidence). The increase in hydrogen sulfide was a result of anaerobic bacterial respiration, low oxygen, and high atmospheric carbon dioxide concentrations.

A considerable portion of the book is devoted to an analysis of the evolution of warm-bloodedness and how it is connected to the respiratory systems of mammals and birds. The mammalian system is an alveolar lung system while the bird system is an air-sac lung system. The alveolar system consists of spherical sacs and air flows in and out of these flexible, highly vascularized sacs. The air-sac system consists of somewhat rigid lungs with attached appendages known as air sacs. For reasons detailed in Wards book, the avian respiratory system is more efficient than the alveolar lung system (Ward points out that estimates indicate that at sea level, birds are 33 percent more efficient at extracting atmospheric oxygen that mammals). As it turns out (and Ward describes how) this has an impact on whether or not dinosaurs were warm-blooded or cold-blooded, why some were so large, and why they existed as dominant life-forms for hundreds of millions of years.

This book is meant primarily for technical readers because it presents some concepts that require a certain level of technical knowledge. This should not dismay readers, however. The overall general ideas can be understood by readers having an understanding of a few scientific concepts and a desire to know more about the topic. The book should not be approached as light reading, if for nothing else but the array of concepts and explanations discussed. Therefore, it is better suited for the educated reader who will find it enlightening.

There is a lengthy "Appendix of Respiratory Systems among Various Animal Groups" and an extensive reference list of 23 pages appended to the book. These are for more advanced readers and for those interested in looking into the topic in more detail.

Ward concludes with a look forward, speculating on the impacts of continental motion and implications for atmospheric oxygen levels. In the next 100 million years, continental movement will alter the Earth as we see it today. Antarctica will drift northward, its ice sheets will melt, and sea level will rise. As part of the change, the Mediterranean will disappear and a mountain range will stretch from what is known as Europe to the Persian Gulf. Baja California will shift north along the Pacific Coast of the U.S. New mountains may arise along the east coast of North and South America, accompanied by active volcanoes. Judging from the past, these events will have implications for atmospheric oxygen and carbon dioxide levels, will impact the availability of land for organisms, and ultimately will have a direct influence on the composition of the atmosphere.

On one level, simply because it makes sense to follow Earth history in strictly chronological order, the book follows a linear path, discussing one geologic period and then the next, oldest to youngest. On another level, the facts are presented in a non-linear multidisciplinary way: Ward draws facts and inferences from biology, chemistry, and geology to construct an overall synthesis to describe the "why" of Earth history. Supported by a wealth of scientific discoveries in the past 30 years, the proposals seem well-founded. Refinement is sure to come in the next 30 years, and along with this refinement, additional questions as well. ■

A Natural Gas Discovery in Chicago

*By **Steve Thornhill***

The story begins in the late 1800's; the Chicago River had become an open sewer. The water was so bad that in 1900 engineers placed a lock between it and Lake Michigan and created the Sanitary & Ship Canal, reversing the river's flow and sending it and its sewage southwest to Joliet and the Illinois River. The newly excavated canal paralleled the former river channel. The abandoned river channel was later filled with cinders and construction debris.

In 1994 I got the job of installing groundwater monitoring wells in the former river channel to monitor groundwater contamination that was migrating through the channel fill.

We used a hollow stem auger rig to drill the wells. Hollow stem augers consist of a ribbon of steel plate welded to a steel tube in such a way that it resembles a huge screw. Augers are typically coupled in 5 foot sections called flights. When drilling, the center of the lead auger's cutter head is blocked with a steel plug to keep cuttings from filling the hollow stem. The plug is attached to a series of steel rods extending to the top of the augers. To sample soils, drilling is stopped and the plug pulled and replaced with a 2.5 foot sample tube. The sample tube is then driven into the soil in advance of the auger using a rig-driven slide hammer.

We knew the former river bed depth was approximately 28 feet below the surface. After drilling to 27 feet we were sampling ahead with the sample tube when the discovery blowout occurred. While drilling, the auger stem became full of groundwater which leaked in through the joints between auger flights; this groundwater came gushing out the auger top to several inches in height. After the water cleared, the ghostlike diffractive image of gas poured from the top of the augers. We shut the rig down and cleared the area. For 15 minutes we watched from a safe upwind distance until the flow finally dissipated.

Upon opening the sample tube, the contents revealed that it had been driven through the confining clay layer into a thin gas-charged coarse brown sand lens.

I don't know whether the gas was methane, CO_2 or some other gas. I never obtained a sample and flaring the gas was out of the question. Being the consummate scientist that I am, I prefer to think that, while uneconomic, I'd just made a natural gas discovery in Chicago! ■

Looking down the Sanitary and Ship Canal near Lockport, Illinois (1896). Courtesy The Field Museum

A column of muddy water rising about 2' out of the top of the augers.

Excavating the Sanitary and Ship Canal (1896). Courtesty The Field Museum

The driller holding the auger plug and rods away from the top of the augers while muddy water continues to shoot out of the augers..

June 2010 Grand Canyon Geology Field Trip

Experience the majestic beauty of the Grand Canyon as we raft the mighty Colorado River and examine some of the finest classical geology exposures in the world. Reservations are now being taken for the 2010 Grand Canyon Geology Field Trip through the HGS website. Trip runs June 13-21, beginning and ending in Las Vegas. Estimated cost is $3000. A $300 deposit will secure your spot on this popular field trip. Reservations due by March 15. Please contact Steve Earle at 713-328-1069 with any questions, or email him at steve.hgseditor@gmail.com

Countdown to AAPG

Four representatives from the AAPG Tulsa convention staff visited Houston in December and provided helpful insights on timetables, event planning, and previous convention results. The Houston 2011 Technical Program Committee is continuing the planning process in coordination with the divisions (DEG, DPA, and EMD) and SEPM. Ten technical program theme concepts will be defined and theme chairpersons will soon be appointed. This will be a new approach for a North American convention but the concept has been undertaken at several AAPG international conventions. Additions to the AAPG 2010 leadership committee include Short Course Chair Denise Stone (Consultant), Field Trip Chair Michael Sweet (ExxonMobil), EMD Vice Chair Paul Basinski (ConocoPhillips), Oral Sessions Chair Andrea Reynolds (Shell), Poster Sessions Chair Tom Bulling (BP America), and Braunstein and Matson Awards Chair Michael Jobe (Walter Oil). Additional members include Sponsor Committee Evelyn Medvin (Core Laboratories) and Short Course Committee Gretchen Gillis (Schlumberger). If you are interested in volunteering for the convention, please contact Steve Levine steve.d.levine@conocophillips.com or Linda Sternbach linda.sternbach@gmail.com. The AAPG Convention in Houston will be on April 10-13, 2011. ■

Government Update

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

If you'd like the most up-to-date Texas rules, regulations, and governmental meeting information we direct you to the HGS website to review The Wise Report. *This report, which comes out as needed, but not more often than once a week, offers the most up-to-date information that may be of interest to Texas geologists.*

AGI Government Affairs Monthly Review (November 2009)

Climate Change Legislation on Hold Until Spring

The Senate has been unable to approve a climate change bill within a very crowded legislative schedule and now plans to schedule floor debate on a climate change bill after it completes work on health care and financial regulatory reform. The schedule roughly coincides with the revised United Nations plan to hold negotiations on a new treaty to replace the Kyoto Protocol in the spring of 2010. The international community thinks, and the Obama Administration agrees, that binding international agreements are unlikely if the U.S. Congress does not approve of climate change legislation in advance.

Senators John Kerry (D-MA), Joe Lieberman (I-CT) and Lindsey Graham (R-SC) are now working on legislation that could garner greater bi-partisan support and secure at least 60 votes in the Senate. Expect Finance Chairman Max Baucus (D-MT), Agriculture Chairwoman Blanche Lincoln (D-AR), Energy Chairman Jeff Bingaman (D-NM), Energy Ranking Member Lisa Murkowski (R-AK), Republican Conference Chairman Lamar Alexander (R-TN), and Budget Committee Ranking Member Judd Gregg (R-NH) to play a major role in crafting climate change legislation. Watch for fence-sitters from key states (for example, both senators from AR, IN, OH, ME, MI, MT, ND and WV) with regional concerns about the effects of climate change legislation to drive any late-breaking compromises in order to bring small but significant blocks of "yes" votes on the Senate floor.

More Nuclear Bills Amid Concerns About Reactor Designs

Senators Jeff Bingaman (D-NM), Lisa Murkowski (R-AK) and Mark Udall (D-CO) introduced a bill to stimulate the development of new, cost-effective nuclear reactors on November 20, 2009. The bill, The Nuclear Power 2021 Act (S.2812), would authorize the Department of Energy (DOE) to work in a public-private partnership to develop a standard design for two small (< 300 megawatts) modular reactors, obtain a design certification from the Nuclear Regulatory Commission by 2018 and obtain an operating license by 2021. The bill would amend the Energy Policy Act of 2005, which provides loan guarantees and other incentives for the development of large nuclear reactors (> 1000 megawatts).

The bill comes on the heels of media reports about problems with the designs of new large nuclear reactors and related concerns from Members of Congress about giving out loan guarantees from the DOE for potentially troubled projects. In addition the Office of Management and Budget (OMB) is at odds with DOE over risk assessments for the loans.

The Nuclear Regulatory Commission (NRC) halted review of the Toshiba-Westinghouse Electric Co.'s AP1000 nuclear reactor over design flaws in the shielding building in mid-October. In early November, regulators in the United Kingdom, France and Finland questioned some of the designs for Areva's EPR nuclear reactor. These problems have prompted Representative Edward Markey (D-MA) to request DOE to require any new nuclear energy project to complete its regulatory review before the designer is granted any loan guarantees.

The DOE will be offering four finalists loan guarantees to build new nuclear energy plants, with a total loan guarantee authority of $18.5 billion. The loan guarantee program was authorized in the Energy Policy Act of 2005 and would cover up to 80 percent of the cost of construction. Although DOE has stated that they will give out the loan guarantees soon, there has been no final action. The AP1000 and EPR reactor designs are purportedly being considered among the potential finalists and thus the news of the possible design flaws has prompted legislators to ask about the designs, the regulatory process and the loan guarantees.

In a letter submitted to Energy Secretary Steven Chu on November 6, 2009, Markey provides further details about the loan guarantee program and six questions about how DOE intends to move forward given the recent news about design flaws. A copy of the letter is available as a PDF from Markey's website. The default risk fee that a company would have to pay up front ranges from 1 percent to 10 percent of the total estimated cost—a large and uncertain difference for all to consider.

A PDF of Markey's letter is available:
http://markey.house.gov/docs/chu_loan_guarantees_11-06-09.pdf
The full text of S. 2812 is available from Thomas:
http://thomas.loc.gov/cgi-bin/bdquery/z?d111:SN2812:

Oceans Policy Task Force Provides Update to Congress

The President's Interagency Ocean Policy Task Force (IOPTF) updated the Senate Commerce Committee on its progress in developing recommendations for a national ocean policy at a hearing in November. Much of the discussion centered

Government Update *continued on page 62*

Government Update continued from page 61

on the recommendations of the interim report released in September.

The IOPTF recommends an ocean council to coordinate federal policy initiatives. The report suggests a council chaired jointly by the Council for Environmental Quality and the Office of Science and Technology Policy. Numerous concerns were raised about the presumably insufficient role of the National Oceanic and Atmospheric Administration on the council.

Featuring testimony from high level administrators across various agencies with ocean jurisdiction, the major topics of the hearing included marine spatial planning, ecosystem based resource management, ratification of the Law of the Sea, and leadership of a prescribed ocean council.

Marine spatial planning has been described as "zoning for oceans", and plays a large role in the recommendations of the task force. Zones are to be set out according to ecosystem based management, which would allow for ocean resource use to have minimal impact on sea life.

More information on the IOPTF and a link to the interim report can be found here:
http://www.whitehouse.gov/administration/eop/ceq/initiatives/oceans
A more detailed AGI summary of the hearing is available at:
http://www.agiweb.org/gap/legis111/wateroceans_hearings.html#nov04

Army Corps Liable For Worst Flooding During Katrina

A U.S. district court judge ruled that the U.S. Army Corps of Engineers (USACE) was liable for some of the worst flooding after Hurricane Katrina, marking the first ruling to hold the USACE liable for damage from a natural disaster. The judge found the USACE did not properly maintain a shipping channel, the Mississippi River Gulf Outlet (MRGO), which in 1988 had been deemed a threat to human life. The MRGO is called a "hurricane highway" that focused floodwater into eastern New Orleans and St. Bernard Parish

The ruling gives six individuals and one business a total of $720,000 in compensation and more claims are likely. As it is, 490,000 claims, amounting to about $500 billion in damages, have been filed against the government already. The actual government liability will remain in limbo for some time though as the USACE appeals the ruling and the whole process remains tied up in the courts.

There appear to be no real winners in this situation. Members of Congress do hope this ruling will lead to better planning, design, and maintenance of projects by the USACE.

Read the NY Times story about the ruling online:
http://www.nytimes.com/aponline/2009/11/18/us/AP-US-Katrina-Flood-Lawsuit.html

Science Stimulus Money Tracking Site Launched

ScienceWorksForUS.org is a new website launched this month to track the stimulus-funded research activities and their impacts for the National Science Foundation, the Department of Energy (Office of Science and ARPA-E) and the National Institutes of Health. Of the $787 billion in stimulus funds from the American Recovery and Reinvestment Act of 2009 (H.R. 1), $21 billion went towards scientific research and development, new scientific equipment, and science-related construction within these agencies. This new site separates the stimulus-sponsored research by each state, tracks how much money each state received, and the number of grants awarded. ScienceWorksForUs is a joint effort of the Association of Public and Land-grant Universities (APLU), the Association of American Universities (AAU), and The Science Coalition (TSC), which together represent over 200 of the country's leading academic research institutions.

To learn more about where the science stimulus money is going and the groups involved, visit:
http://www.scienceworksforus.org

International Report On Energy Outlook

The International Energy Agency's (IEA) World Energy Outlook report gives projections concerning the world's energy needs and the changing climate. The report estimates that from 2010 to 2030 about $26 trillion will be needed for energy development globally and an additional $10.5 trillion will be needed for energy technologies and efficiency in order to reduce greenhouse gas (GHG) emissions to about 450 parts per million (ppm) and avoid catastrophic climate change. More than half of the emissions reductions by 2030 will be from improved energy efficiency, with the rest from renewables and biofuels, nuclear power, hybrid and electric vehicles, and carbon capture and sequestration. Efficiency will lead to global savings of about $8.6 trillion in transport, buildings, and industry costs.

Within the IEA scenario, demand for fossil fuels is projected to peak in 2020 - however, fossil fuels will still contribute about 70 percent of global energy in 2030. The financial crisis reduced oil demand in 2009, but also led to a $90 billion cut in investments in oil and gas exploration and development. This may lead to fewer supplies to meet growing demand and thus higher prices in the future. Natural gas is predicted to play a significant role in transitioning to a low-carbon energy economy. The huge boost in North American unconventional gas discoveries and production

(primarily from gas-bearing shale) makes natural gas a "transition fuel" to a clean energy economy in this world outlook.

For more information on the World Energy Outlook report, go to: http://www.worldenergyoutlook.org/

Study Shows Dam Contributed to Wenchuan Earthquake

A recent scientific study suggests that a Chinese dam built less than a mile from a well-known major fault may have triggered the 7.9 magnitude Wenchuan earthquake in May 2008, killing more than 69,000 people and leaving almost 18,000 missing. The authors of the study "Did the Zipingpu Reservoir Trigger the 2008 Wenchuan Earthquake?" created a two-dimensional model to evaluate how the Zipingpu Reservoir, holding 320 million tons of water, changed the stresses on several nearby faults. The authors of the study state that there is a lack of data from before the dam was built in 2005 to make a definite link between the dam and the earthquake, but estimate that the increased stress created by the reservoir was enough to hasten the occurrence of the earthquake by tens to hundreds of years. Chinese officials insist that the reservoir had nothing to do with the Wenchuan earthquake.

To read the full research article (requires a subscription), go to: http://www.agu.org/journals/gl/gl0920/2009GL040349/

Geologist Averts Rockslide Catastrophe

A small, early morning rockfall in the Ocoee Gorge in Polk County, Tennessee had repair crews out working to clear the roads at the beginning of November. Tennessee Department of Transportation (TDOT) geologist Vanessa Bateman drove to the site from Nashville to investigate. She heard noises coming from the hillside and immediately ordered an evacuation of people and heavy equipment away from the site. Within a half hour of her warnings, a large rockslide occurred right where the crew had been working and was videotaped by a local news crew.

The rare videotape of a rockslide shows the power and damage they can cause. The slide essentially split Polk County in half, making the distance by road from one side of the slide to the other over 120 miles. The slide is expected to take months to clean up. This recent event has highlighted the importance of the TDOT Rockfall Mitigation Program that identifies sites of potential slides, assigns a hazard rating, and works to prevent them from occurring. Although the slide resulted in major transportation difficulties and a hefty clean-up, the residents of Polk County can be grateful to Bateman for preventing this inconvenience from being a tragedy.

The video of the rockslide is available through YouTube at: http://www.youtube.com/watch?v=39LCzBS8yOM

Congressional Fellowships for Geoscientists in Washington DC

The American Geological Institute is accepting applications for the 2010-2011 William L. Fisher Congressional Geoscience Fellowship. The successful candidate will spend 12 months (starting September 2010) in Washington working as a staff member in the office of a member of Congress or on a congressional committee. The fellowship represents a unique opportunity to gain first-hand experience with the federal legislative process and make practical contributions to the effective and timely use of geoscientific knowledge on issues relating to the environment, resources, natural hazards, and federal science policy. Applications are due February 1, 2010.

For more information visit:
http://www.agiweb.org/gap/csf/index.html

Key Reports And Publications

Congressional Research Service (CRS

Climate Change: Comparison of the Cap-and-Trade Provisions in H.R. 2454 and S. 1733

http://opencrs.com/document/R40896/

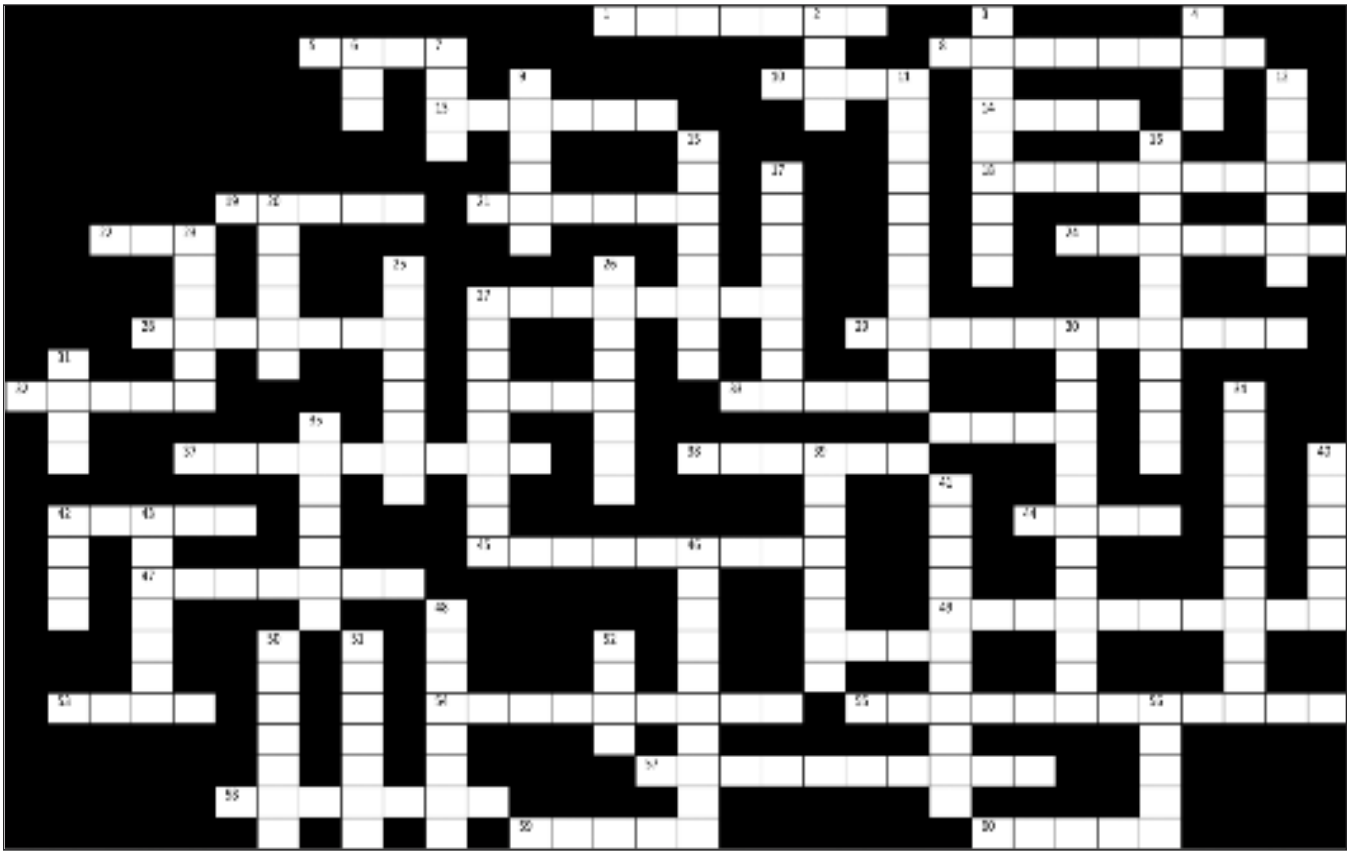
Released November 5, 2009. This report provides a comparison of the cap and trade provisions of the American Clean Energy and Security Act of 2009 (H.R. 2454) and the Clean Energy Jobs and American Power Act (S. 1733). Both bills aim to reduce U.S. greenhouse gas emissions to 20% below 2005 levels by 2020 and 83% below 2005 levels by 2050.

Unconventional Gas Shales: Development, Technology, and Policy Issues

http://opencrs.com/document/R40894/

Released October 30, 2009. This report discusses how technological advances have dramatically increased gas production from unconventional shales and environmental concerns with hydraulic fracturing treatments used to stimulate shale gas production, as well as land ownership and mineral resource owners' rights to surface access.

February Crossword of Geologic Terms



The HGS Board is offering a $50 gift card to the first correct and completed crossword received by the HGS Business Office prior to the mailing of the March issue.

Across

1 Sea-level fluctuations caused by changes in the quantity of seawater

5 Said of a gemstone having a natural luster when uncut

8 Between high and low water

10 A mountain pass, with a long nearly level summit

13 Color of mineral in powdered form

14 A resting spore

18 Denser than calcite

19 Product of rapid cooling

21 A series of elongate, sausage-shaped segments

22 A long, narrow, often wedge-shaped arm of the sea

24 Aromatic hydrocarbon

27 Brown to black mineral of the olivine group

28 A welded tuff

29 Drying-out

32 A coastal sand dune

33 A "dirty" sandstone

36 A thin film of acetate

37 Copper, silver, arsenic mineral

38 Metamorphic rock

42 Mineral introduced into a pre-existing mineral or rock

44 Material transitional between snow and glacial ice

45 Igneous rock erupted onto the surface

47 A relatively short interruption in sedimentation

49 Shaped like a lens

53 A surge during drilling

54 Where streams combine to form another feature

55 Sediment rich in carbon

57 Measurements of ocean depths

58 Deformation before fracturing or faulting

59 Small stream

60 Individual grain or fragment of a sedimentary rock

Down

2 A trace of oil or gas

3 Star-or rosette-shaped calcareous plate

4 Long, rounded glacial ridge

6 British term for small island

7 Stream channel without significant banks

9 Part of the crust that has obtained stability

11 The waters of the Earth

12 A departure measured to the east

15 An impure gray or brown form of opal

16 Stream erosion cutting downward

17 Part of the delta below the base of wave erosion

20 A big nodule

23 Above Barremian, below Albian

25 Pertaining to rock feature that indicates top or bottom at time of formation

26 Resistance of a mineral to scratching

27 Mineral deposit formed by flowing water on walls or floor of cave

30 Alteration of organic matter into coal

31 Pelagic sediment consisting of at least 30% pelagic remains and the remainder being clay minerals

34 A group of numerous islands

35 Dark brown, black, or green mica mineral

39 Undifferentiated complex of rocks that underlies rocks of interest

40 Drilling tool to enlarge or smooth a hole

41 Action by which fluid is drawn in small interstices by fluid tension

42 An entrance to bay, located behind promontories

43 An organism restricted to a particular environment or region

46 Ridge having a concave outline along the crest

48 Two or more phases that have the ability to mix and form a single phase

50 A narrow strip of land bordered on both sides by water

51 Water vapor content in the atmosphere

52 A liquid, fused rock

56 Dense microcrystalline sedimentary rock composed largely of quartz

36 Feldspar-rich sandstone

39 Long, narrow beach ridge

40 Small-scale cyclone

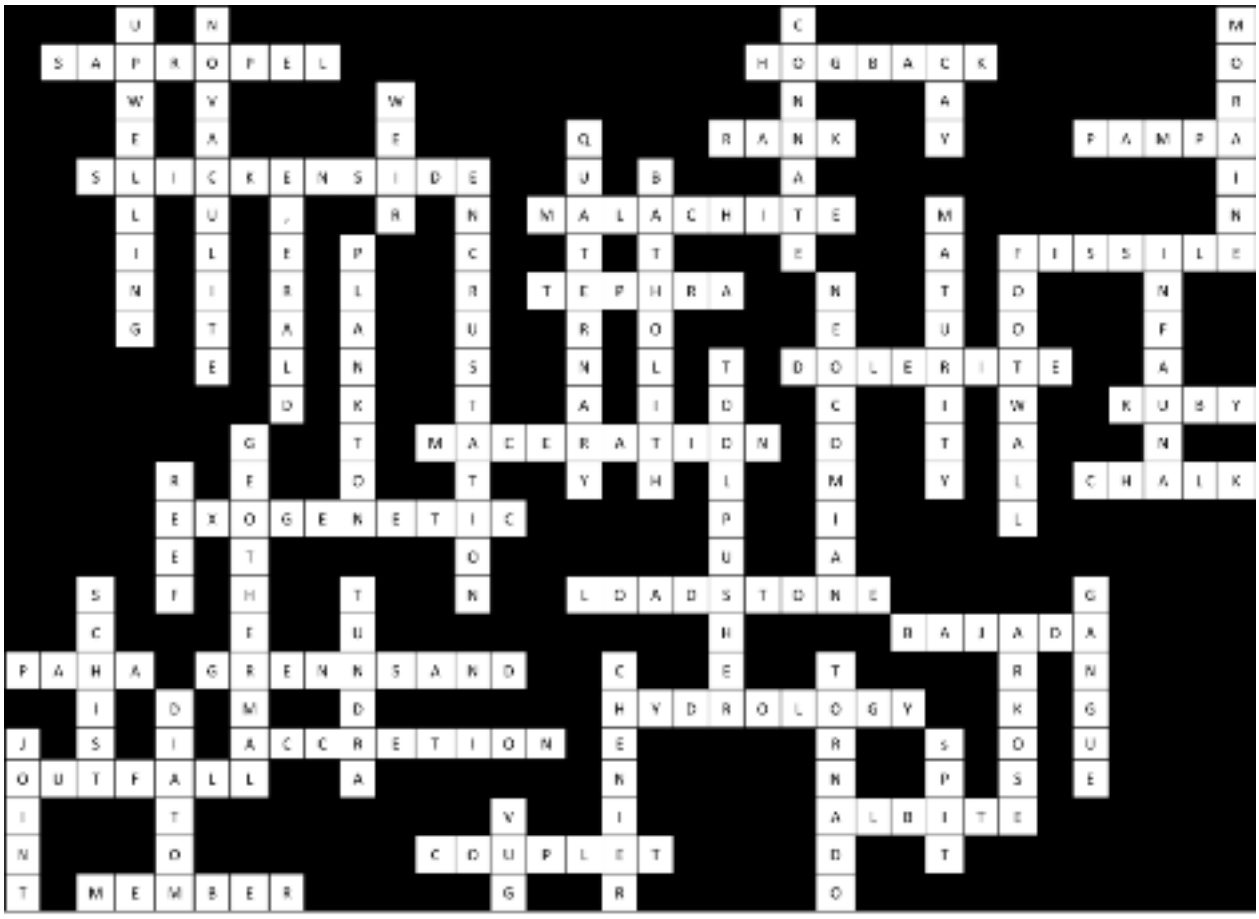
41 Single-celled plant with silica frustules

43 A surface or fracture or parting in a rock

45 Small point of land attached to the mainland

47 Small cavity in rock, usually lined with crystals of a different composition

January Crossword Puzzle Answers



Full Color Ads Now Available!

HGS *Bulletin* Instructions to Authors

All materials are due by the 15th of the month, 6 weeks before issue publication. Abstracts should be 500 words or less; extended abstracts up to 1000 words; articles can be any length but brevity is preferred as we have a physical page limit within our current publishing contract. All submissions are subject to editorial review and revision.

Text should be submitted by email as an attached text or Word file or on a clearly labeled diskette in Word format with a hardcopy printout to the Editor.

Figures, maps, diagrams, etc., should be digital files using Adobe Illustrator, Canvas or CorelDraw. Files should be saved and submitted in .eps (Adobe Illustrator) format. Send them as separate attachments via email or CD if they are larger than 1 MEG each, accompanied by figure captions that include the file name of the desired image. DO NOT EMBED them into your text document; they must be sent as separate files from the text. DO NOT USE POWERPOINT, CLIP ART or Internet images (72-DPI resolution) as these do not have adequate resolution for the printed page and cannot be accepted. All digital files must have 300-DPI resolution or greater at the approximate size the figure will be printed.

Photographs may be digital or hard copy. Hard copies must be printed on glossy paper with the author's name, photo or figure number and caption on the back. Digital files must be submitted in .jpg or .eps format with 300-DPI or greater resolution at the printing size and be accompanied by figure captions that are linked by the file name of the image. The images should be submitted as individual email attachments (if less than 1 MB) or on CD or zip disk.

Advertising

The *Bulletin* is printed digitally using QuarkXPress. We no longer use negatives or camera-ready advertising material. Call the HGS office for availability of ad space and for digital guidelines and necessary forms or email to ads@hgs.org. Advertising is accepted on a space-available basis. **Deadline for submitting material is 6 weeks prior to the first of the month in which the ad appears.**

Random Inside (Black & White)					Page 2 (B&W)	Inside Front Cover (Full Color)	Inside Back Cover (Full Color)	Outside Back Cover (Full Color)	Calendar Back (Full Color)	Calendar Page (Full Color)
No. of Issues	Random* Eighth	Random* Quarter	Random* Half	Random* Full	Full	Full	Full	Half	Full	Quarter
10	$823	$1,387	$2,488	$4,734	$5,680	$7,830	$7,560	$6,858	$6,750	$2,700
9	$823	$1,387	$2,488	$4,734	$5,680					
8	$750	$1,260	$2,242	$4,307	$5,169					
7	$665	$1,123	$2,014	$3,834	$4,600					
6	$590	$990	$1,782	$3,392	$4,069					$1,890
5	$497	$837	$1,503	$2,860	$3,432	$4,698	$4,536	$4,104		
4	$405	$683	$1,223	$2,326	$2,792					
3	$327	$550	$990	$1,886	$2,262					$1,080
2	$232	$392	$704	$1,339	$1,607					
1	$146	$246	$443	$842	$1,010	$1,404	$1,296	$1,080		$810

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Effective June 1, 2009 you can now have your company logo picture posted on the Website. To have an ad posted, you must provide us with the graphic and give us the URL it should link to when clicked.

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All Sponsor logo images must be 120 W x 90 H pixels and be no more than 8 bits per pixel with a maximum of 256 colors. The format can be either GIF or JPG, preferably interlaced or progressive. It is important to make the image file size as small as possible so that it will transfer to the users' browser quickly.

To arrange to become a web page Sponsor, contact the webmaster@hgs.org

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.

Apply online at www.hgs.org and click on Join HGS

Annual Dues Expire Each June 30. (Late renewals – $5 re-instatement fee)
Annual dues are $24.00; full-time students and emeritus members pay $12.00.

Mail this application and payment to:
Houston Geological Society
14811 St. Mary's Lane, Suite 250 • Houston, TX 77079-2916
Telephone: 713-463-9476 Fax: 281-679-5504

Payment method:

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

Card # _____

Expiration Date: _____ Card I.D. _____

(Card I.D. – 3 or 4 digit number on front or back of card)

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: _____

❑ AAPG member No.: _____

Professional Interest:

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

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.08/11/2008

Houston Petroleum Auxiliary Council News

Winona LaBrant Smith, HGS Liaison

HPAC has set a standard of excellence in the two functions they have hosted in 2009: Reminiscenses at Braeburn Country Club and King's Men Chorus at Lakeside Country Club. See picture below:

Norma Jean Jones, Larry Jones, Edie Bishop, Dick Bishop, Marvin Smith – Christmas Luncheon.

Our next event will be on Monday, February 13, 2010. The Game Day Luncheon is always a function you will regret if you do not attend. It is to be held at the Junior League Tea Room, 1811 Briar Oaks from 10:00am - 2:00pm. Our incredible Daisy Wood, chair, (featured in the paragraph below) with her committee, Linda Dobbins, Kathy Duncan, Linnie Edwards, June Harrison, Suzanne Howell, Kathi Hilterman, NormaJean Jones, Georgeann Massell, Lois Matuszak, and Suzy Stepanek will host this event. SaraNan Grubb will coordinate an informal style show for the upcoming rodeo.

The HPAC cultural garden is continuing to bloom as we introduce you to our stimulating and diversified members. Daisy Mallia Wood is the feature member for the month of February. She was born in Tripoli and is of Italian/Maltese lineage. Daisy lived and studied in Don Bosco Nuns, Montecatini Terme (Florence), Italy, and Dante Alighieri and Guglielmo Marconi, Tripoli. Daisy is now proud to be an American Citizen! Her background is so varied and exciting that it would take a book to explain. It includes an Accounting Certificate, being an interpreter and shopping guide in Italy and Switzerland for the Libyan royal family, and working for of the Italian Consulate in Houston. After Daisy married P.W.J. Wood, who always referred to her as his Sophia Loren (Daisy is not only beautiful in appearance, but has a soul as gracious and charming as she is pretty.) Her accomplishments are so varied that you wonder how one person could possibly have so many talents. She chaired and was associated with the following organizations: the International Student Services, Tulsa, Philarmonic Women's Association, Oklahoma, Young Artists, Philbrook Museum, Houston Geological Auxiliary and GeoWives to name only a few. She has produced dramatic plays, served as president of innumerable dance clubs, and coordinated bridge events. Daisy has very successfully organized the Game Day activities for HGA and HPAC for years. She was the recipient of the Member of the Year Award for the Petroleum Club of Houston. As a wife of an executive, she attended and organized many functions and dinners and travelled extensively with Jim. What an incredible life. Again, please plan to attend some of the HPAC events where you will have the opportunity to meet members like Daisy Mallia Wood!

Geologists, please encourage your spouses to join HPAC, where they will have the opportunity to meet other wives whose husbands are geologists, geophysicists, engineers and landmen. They will participate in stimulating programs, delicious lunches, and friendly fellowship.

For your convenience, an HPAC membership form is included below. If you have any questions, please contact Winona LaBrant Smith at 713-952-2007.

News from Geo-Wives

By Lois Matuszak, Geo-Wives President

On Monday, February 15, 2010, Geo-Wives will attend the HPAC Game Day Luncheon at The Junior League of Houston at 1811 Briar Oaks. ■

You are invited to become a member of

HPAC

2009–2010 dues are $20.00 Mail dues payment along with the completed yearbook information to **Carol Gafford,** 13323 Misty Hills Drive, Cypress, TX 77429

YEARBOOK INFORMATION

Last Name	First Name	Name Tag
Spouse Name	Name Tag	HGS Member's Company
Home Phone	Business Phone	Business Fax
Street Address	City	Zip
Email Address	Home Fax	

Please choose a committee assignment if you are interested.

☐ Fall Event	☐ Yearbook	☐ SOS	☐ Membership
☐ Christmas Event	☐ Spring Event	☐ Notification	☐ Game Day
	☐ May Luncheon	☐ Courtesy	

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