

# HGS Bulletin

Volume 49 Number 3

Houston Geological Society

November 2006

**OPENING NOV. 17, 2006,  
THE LESTER AND SUE SMITH GEM VAULT,  
HOUSTON MUSEUM OF NATURAL SCIENCE.  
PAGE 57**



**ROBERT E. SHERIFF LECTURE SERIES:  
SEISMIC GEOMORPHOLOGY AND SEISMIC  
STRATIGRAPHY FROM SHELF TO  
DEEPWATER: IMPLICATIONS FOR  
EXPLORATION AND DEVELOPMENT  
PAGE 9**



25 months and 30 days ago this well hit TD  
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KNOW WHAT THEY KNOW.**



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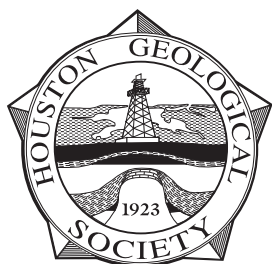
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# The Bulletin

## Houston Geological Society

Volume 49, Number 3

November 2006

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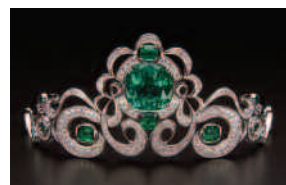
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**About the Cover:** Emerald, platinum and diamond tiara from the Lester and Sue Smith Gem Vault Exhibit, Houston Museum of Natural Science. The tiara and other jeweled masterpieces will be on display beginning November 17, 2006. *Photo by Tom DuBrock*

see **clearly**

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Continuing Education Committee  
PRESENTS



## Introduction to Reservoir Fluids Analysis for Geologists

by  
*Toddy Guidry,*  
*PENCOR Division of Core Laboratories*

Understanding reservoir fluids is critical to the effective design and operation of any development project. Fluids analysis provides data critical to predicting well & reservoir performance and fluid quality assessment for determining market price. In addition, these data are vital to hardware requirements, including metallurgy for wells & production facilities, valve sizes & type, maximum flow line length and optimum diameters for subsea tiebacks. In this ½-day course, participants will learn:

- What a PVT analysis is, what data is provided and who uses it
- Fluid sample sources and the pros and cons of each
- Design for a complete fluids program
- How the data are used, including decreasing F&D costs
- A little phase behavior, a little flow assurance and a little about what affects oil quality

Course includes a tour of the Core Lab fluid analysis laboratories.

**Tuesday, November 14, 2006**  
**9 am – 1 pm (Registration opens at 8:30 am)**

**Core Laboratories**  
**6316 Windfern**  
**Houston, TX 77040**

### Registration Form

#### Introduction to Reservoir Fluids Analysis for Geologists

Visit [www.hgs.org](http://www.hgs.org) for details and on-line registration. Registration Deadline is November 10, 4pm.

Registration form can be faxed or mailed to the HGS office.

10575 Katy Freeway, Suite 290  
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Members:	\$45, before the registration deadline	\$60, thereafter
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Students:	\$23, before the registration deadline	\$30, thereafter

**Price includes morning coffee, lunch, and laboratory tour**

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by Steve Brachman

From the  
President

## A Feeding Frenzy?

Having been chained to a booth for two days, I did not get a clear, first-hand impression of the size or activity level at Summer NAPE (North American Prospect Expo), held at the George R Brown Convention Center in late August. After the event concluded, I tried to gauge the prevailing mood of the EXPO from several of my colleagues with other companies. Reviews were mixed, with some thinking activity level and interest in prospects was very high, some thinking it was low, and some in the middle. Regardless, everyone's mood appeared to be upbeat. Reasoning: regardless of whether the apparent interest in prospects or properties was viewed as high or low, interest in PEOPLE was perceived to be very high. In fact, I heard the term "feeding-frenzy" numerous times.

Thinking back on the last "feeding-frenzy," I distinctly remember how, in 1981, my geologist cohorts at Gulf Oil were considered to have sufficient know-how to be attractive to independents, both large and small, with only two years experience. I know two geologists who left Gulf with that level of expertise to be the sole generators at different startup companies, not supervised by any

more senior geologists. I also recall one geologist who was lured to a small independent with only six months industry experience.

Clearly, industry demographics have changed since then. Now the predominant question seems not to be how little experience is necessary to be an effective contributor, but how to retain, or even attract, individuals at or near retirement age. Since I can recall at least one company laying-off geologists as recently as 2003, I am still amazed at how fickle our industry is, and how rapidly the status of geologists can change. My crystal ball is blank as to where the present high employment demand may lead, but I hope most of us have learned to put a little more thought into the future than we may have during the last "feeding-frenzy."

*The focus now seems to  
be how to retain,  
or even attract,  
individuals at or  
near retirement age.*

Upcoming events of note in November include a joint HGS/International dinner, an HGS class on Reservoir Fluids, and, of course, the world renowned HGS Shrimp Peel! Check the Calendar of Events in the *Bulletin* for dates and details on those, and other activities. ■

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## 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, Freehand, Canvas or CorelDraw. Files should be saved and submitted in .eps (Adobe Illustrator) format. Send them as separate attachments via email or on a diskette 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](mailto: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.**

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We also offer a Banner ad across the top of our monthly Newsletters sent to registered users of the Website. Job postings are available for \$100 for 30 days on the Website but they must be geoscience jobs of interest to our members. Current HGS members may post their resumes at no charge. If you have a product or service available at no charge, you can post it in the Business Directory at no charge. Geo-related Business Cards and job openings may be posted directly by any registered user and members may post their own resumes. They will be activated as soon as practical.

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1 month	NA	\$250.00	NA		\$250.00	Free	\$100.00





by **Bill Rizer**  
editor@hgs.org

## The Art of Writing Science

Over the last twenty or so years we have witnessed a revolution in the way we communicate. This is the age of instant messaging, email and text messages on our cell phones. Electronic mail has all but replaced what we now derisively call snail mail. PowerPoint presentations and montages have all but replaced written reports. Communication is virtually instant with essentially anyone anywhere in the world. Like all revolutions this one is not without cost, and for all too many of us that cost has been the written word.

By now the readers probably have figured out that writing is the topic of this month's "Letter from the Editor." In fact, the primary purpose of this column is to encourage you to write, more specifically to write letters to the editor and articles for publication in the *Bulletin* and on the Web site. While technology now provides us vastly improved abilities to transmit and find information, it is how well that information is organized and presented that determines its effectiveness and value. It still all comes down to the written word.

In our profession there are few things more necessary yet more difficult than writing. Physicists have the beauty of mathematics to describe their theories and communicate with their colleagues. But geologists must rely on verbal explanations and the written word to explain the complex systems with which we work. Success in our field of science and in our industry depends heavily on our ability to persuade and convince others that our perspective is the most correct and our ideas are the most viable. To be successful, we must speak well and we must be able to write.

Effective writing is not easy; it can be frustrating, time consuming and ego smashing. In fact it can be downright embarrassing to see your brilliant ideas and theories suddenly become lacking in rigor or even sophomoric when laid out in words before your eyes, or worse, before the eyes of others. Somehow all the limitations, all

the warts become obvious when our ideas are committed to paper or monitor screen. But, if we can get past that shame, something wondrous happens—we begin to learn, to understand, to mature and grow as scientists. Recognition and acceptance of what we do not know is the very beginning of true knowledge and understanding, an important first step in solving a scientific problem or a difficult play. This all happens when we write.

The rules for writing in the HGS *Bulletin* are essentially the same as those for the AAPG *Bulletin* and are easily found at the AAPG Web site. These basic requirements include such things as careful and full referencing of ideas, data or images obtained from others or from the published literature; written permission to use all material previously published from the copyright owner, usually the journal or source of the information; simple and well-designed figures with captions that have sufficient information that the figure can stand alone; organization that clearly and concisely presents the data,

interpretations and conclusions in a style that is easily understandable by the membership; and avoidance of any text, ideas, figures or data that are not central to the paper's primary arguments. These requirements, while necessary, are not particularly onerous, once you get the hang of it.

So, what do you say? Give it a try. Take a chance and commit your work and ideas to paper or file and share them with the rest of the HGS membership. Each and every one of you have a potential paper living in the work you do. Send that story in to the HGS; the editor and reviewers will do our best to give it an honest review. Give writing a try; you may be pleasantly surprised at what happens when you do. ■

*Readers are encouraged to read the article by John Lorenz, "Writing for the AAPG Bulletin: We're not literary giants, but we can try to be," AAPG Bulletin, V. 87, No. 4 (April 2003), p. 529–533.*



# H G S / G S H Shrimp Peel



**Saturday, November 18, 2006**

**6pm - 10pm**

**Sam Houston Race Park**

**7275 N. Sam Houston Pkwy. West**

**281.807.8700**

Boiled Shrimp - Beer & Beverages - Horse Races - Music - Door Prizes - Boiled Shrimp - Beer & Beverages - Horse Races - Music - Door Prizes - Boiled Shrimp

**Tickets \$25 Advance / \$35 at the Door**

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# HGS Joint General and International Dinner Meeting

by Henry W. Posamentier

HGS Joint General and International Dinner Meeting

*The Robert E. Sheriff Lecture Series and Dinner Meeting  
Sponsored by the University of Houston Department of Geosciences and UH Geosciences Alumni  
Association in association with the Houston Geologic Society International Group*

## Seismic Geomorphology and Seismic Stratigraphy from Shelf to Deepwater: Implications for Exploration and Development

3D seismic data can play a vital role in hydrocarbon exploration and development especially with regard to mitigating risk associated with the presence/absence of reservoir, source and seal facies. Such data can afford direct imaging of depositional elements, which can then be analyzed by applying seismic stratigraphic and seismic geomorphologic principles to yield predictions of lithologic distribution, insights to compartmentalization and identification of stratigraphic trapping possibilities. Benefits can be direct, whereby depositional elements at exploration depths can be identified and interpreted, or they can be indirect,

whereby shallow-buried depositional systems can be clearly imaged and provide analogs to deeper exploration or development targets. Examples of imaged depositional elements from both shallowly and deeply buried sections are presented. Deep-water deposits, in particular, have benefited greatly from analyses of 3D seismic data. The understanding of the stratigraphic and geomorphologic evolution of these deposits has increased by orders of magnitude since the advent of 3D seismic-based analyses. In high-cost deep-water exploration settings, insights derived from such analyses are critical to reduce risk with regard to reservoir presence and reservoir compartmentalization to ensure economic success. Depositional elements in settings such as shelf, estuarine and fluvial, as well as in carbonate environments, also benefit greatly from 3D seismic analyses. Common techniques for geologic visualization include 1) visualizing and illuminating stratigraphic horizons, 2) time slicing and

flattened time slicing, 3) interval attribute analysis (including seismic waveform analysis), 4) voxbody interpretation and mapping, 5) 3D perspective rendering and 6) opacity rendering. The key to successful application of this approach lies in the correct interpretation of geologically significant patterns revealed by these techniques. Workflows in conjunction with numerous examples from a variety of geologic settings will be shown. ■

*The key to the successful  
application of this approach  
lies in the correct  
interpretation of geologically  
significant patterns revealed  
by these techniques.*

### Biographical Sketch

HENRY W. POSAMENTIER is the Chief Geologist for Anadarko Petroleum Corporation as well as Distinguished

Advisor. Prior to joining Anadarko in 2001, he was with Veritas Exploration Services (2000–2001), Atlantic Richfield Co. (1991–2000), Exxon Production Research Co. and Esso Resources Canada, Ltd. (1979–1991), and Rider University, where he was Assistant Professor of Geology (1974–1979). Dr. Posamentier earned his PhD and MS from Syracuse University (1973 and 1976) and his BS from the City College of New York (1970).



Dr. Posamentier's research interests have been in the fields of sequence stratigraphy and depositional systems analysis, where

**Joint General and International Dinner** continued on page 13



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# Student Posters—R.E. Sheriff Lecture

<b>Tier I New Graduate Students</b>	<b>Author</b>
AVO Modeling for Gas Hydrate	Rui Zhang
Multiple Attenuation and the Purposeful Perturbation Concept	J. Eduardo Lira
Subsalt Illumination Pitfalls a 2D Ray Tracing Approach	Scott Falconer
Facies Distributions, Vertical and Lateral Stacking Patterns, and Controls on Deposition of the Productive Series of the Azeri Chirag Gunashli Field, Offshore Azerbaijan	Eldar Bagirov
Quaternary Biogenic Gas System in the Qaidam Basin, NW China	Tianguang Xu
Ray Tracing in 2D Titled Transversely Isotropic Media	Fan Jiang
Structural Evolution of the Abiquiu embayment, Rio Grande Rift: Implications for the Development of Transfer Zones	Raquel Hicks
Direct Estimation of Velocity and Density in a 1D Earth Using Wave Equation	Cesar Ricardez
Surface Wave Phase Velocities in the Central Tien Shan	Arianna Lisi
Role of Metamorphic Strain in Crystallinity of Carbonaceous Material from Schela Formation	Carmen A Barzoi
Paleo-Environmental Evolution of a Cretaceous Continental Sequence—Intermontane Semi-graben Basin, West-Northwest Argentina	Hernan Reijenstein
<b>Tier II Experienced Graduate Students</b>	<b>Author</b>
Fracture Imaging with SOI Migration	Mingya Chen
Detachment and the Extent of Shortening Across the Parras Basin, Coahuila Mexico	Kamran Zahid
Sequence Stratigraphy of the Notom Delta, Southeast Utah: A New Perspective on the Regional Stratigraphy of the Cretaceous Seaway Deltas	Weigou Li
Numerical Modeling of Layered Rocks	Maria Rojas
Modeling and Application of Spectral Inversion for Determination of Layer Properties	Charles Puryear
Alpha Thermochronology of Calcite from the Ellenburger Group of West Texas	Mary Canino
2D Model Inversion for Porosity and Shale Volume	Zijian Zhang
Architecture of the Gar Pull-apart Basin, Western Tibet: Assessing Pull-Apart Development	Veronica Sanchez
Sequence Stratigraphic Architecture of the Cretaceous Ferron Notom Delta, Caneville, Utah	Yijie Zhu
An Investigation into the Use of Calcite Fossils as Alpha Thermochronometers	Katrina Cox
DHI vs AVO	Duan Li
Stable Wavefield Extrapolation Using Recursive Filter	Thang Nguyen
Seismic Based Analysis of the Structure, Stratigraphy and Depositional Environment of the Upper Frio Formation of the Liberty Dome Area	Tayo Akintokunbo
Image Processing Techniques Applied to 3-D Attribute Volumes for Lithology Distribution	Rapheal Sanguinetti
Remote Detection and Geochemical Studies for Finding Hydrocarbon-induced Alterations in Lisbon Valley, Utah	Ana Petrovic
Analyzing the Resolvability of Crustal and Mantle Velocity Anomalies beneath Tibet	Ching Wen Chen
<b>Tier III Experienced PhD Students</b>	<b>Author</b>
Heeding Head Waves: The Effects of Fractures on Seismic Wavefields at the Critical Region	Julius Doruelo
Fluid Flow Pattern Around the S. Liberty Salt Dome, Texas: An Integrated Approach	Tat Banga
3D Marine Seismic Data Processing in South Marsh Island for AVO Application	Zhengyun Zhou
Discriminating Fizz and Gas Reservoir with Attributes Classification, Saturation Estimation, and Attenuation Analysis	Bo Zhao
All Internal Multiple	Shenghong Tai
Structural Evolution of the Ayishan Detachment: Implications for the Deformation of the Indus-Yalu Suture Zone	Ran Zhang
Fluid Property Discrimination by AVO Inversion	Xingang Chi
AVO Without Velocity and Density: Seismic Rock-Property Transforms for Estimating Lithology and Pore-Fluid Content	Haitao Ren
Deformable-Layer Tomography versus Cell Tomography: A Comparison between Crustal Velocity Solutions along the LARSE Line 2 Profile	Li Li
A Study of Reverse Time Migration of a Converted Wave	Edwin Dele Obune
Seismic Amplitude Decomposition in Thickness-Varying Layers	Hongmei Cao
The Genesis of Later Quaternary Caliche Nodules in Mission Bay, Texas, and its Paleoenvironmental Implications	Jie Zhou
Microbial Sedimentary Structures in Siliciclastics: Examples from Texas	Sushanta Bose
Dominant Right-Lateral Transform Motion Model within the CARIB-SOAM PBZ: Evidence from 40Ar/39Ar Ages	Armando Altamira
Calibration of Collapse Features in Fort Worth Basin, North Central Texas	Na Li
Principle Components Analysis of Spectral Components	Hao Guo

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he has published widely. Most recently, he has employed an interdisciplinary approach to geologic prediction using 3D seismic visualization integrated with borehole data to interpret depositional systems and develop basin fill histories, in particular with reference to deep-water depositional settings. His current responsibilities involve ensuring technical excellence as well as integration of appropriate technologies into the exploration process. In 1971–1972, Dr. Posamentier was a Fulbright Fellow to Austria. In addition to numerous awards for excellence of presentations, he has served as an AAPG Distinguished Lecturer to the United States (1991–1992), former Soviet Union (1996–1997) and Middle East (1998–1999).

## AGI Announces New Executive Committee Officers

The American Geological Institute (AGI) welcomes three new officers to the positions of

President-Elect: Peter J. McCabe,  
Secretary: Mary M. Poulton, and  
Member-at-large: Lucy E. Edwards.

**DR. PETER MCCABE** of the U.S. Geological Survey in Denver, Colorado will join the AGI Executive Committee as President-Elect. He is currently leading research studies on Deltaic Petroleum Systems of the World and Mesozoic-Cenozoic Arctic Depositional History. McCabe has also served in leadership roles for SEPM and AAPG and has been editor for several publications.

**DR. MARY POULTON** will be serving as Secretary of the AGI Executive Committee. She has been Chair of the Department of Mining and Geological engineering at the University of Arizona since 2000. Poulton has substantial consulting experience and has been an active contributor to many diverse professional and citizen-based initiatives.

**DR. LUCY EDWARDS** will be joining the AGI Executive Committee as one of the Members-at-Large. She currently works at the U.S. Geological Survey at Reston, Virginia. Edwards has diverse experience in the geosciences having worked in industry, academia and government. She is active in a number of professional societies and organizations.

The new members of the AGI Executive Committee will be installed during the annual Geological Society of America convention in Philadelphia, Pennsylvania on October 24, 2006. ■

## Thanks to Swift Energy and ConocoPhillips

HGS would like to thank **Swift Energy Company** for generously sponsoring twenty students and professors to attend the *Sheriff Lecture* this month. In addition, **Swift** will sponsor up to four students each month at subsequent International dinner meetings this year.

This augments the outstanding student program being funded again by **ConocoPhillips**. Students can call the HGS office for details.

With the fine lectures and courses available through HGS, **ConocoPhillips** and **Swift Energy Company** have provided a tremendous opportunity for geoscience students to gain practical knowledge in their field and to network with professionals. ■

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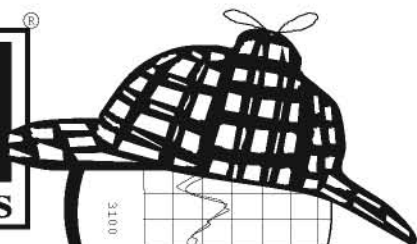
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by Lee Gill

## Preventing Agreement Failure

Oil and gas professionals enter into various agreements to protect themselves and their property rights and ideas. These may take many different forms such as consulting agreements, exploration agreements and other forms. Agreements can fail to accomplish their purpose when they are unclear and imprecise and when they fail to conform to legal requirements. How enforceable are your agreements? Do you understand what you have agreed to? Houston oil and gas lawyer Lee Gill discusses prospecting and development agreements and how to prevent agreement failure. Mr. Gill will offer practical solutions that can be used to prevent agreement failure, including sample clauses for areas of mutual interest, confidentiality and noncircumvention. ■

### Biographical Sketch

LEE GILL was born and grew up in the oilfield in Mont Belvieu, Texas. He graduated from Barbers Hill High School and then earned a degree in economics in 1974 and a degree in law in 1977, both at the University of Texas at Austin. In law school he developed an interest in litigation. He worked in the abstract plant and courthouse in

Rusk County, examining title and building abstracts on land that included the drill site for the Daisy Bradford No. 3, the discovery well for the East Texas field. Growing out of those experiences, he decided to focus his studies on and

*Agreements can fail to  
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fail to conform to legal  
requirements.*



to seek a career in oil and gas law and litigation. Upon graduation, he took and passed both the Texas and Louisiana Bar Exams. He has been in private practice in Houston since 1977. He started a firm in 1981 and was a partner in two other firms before co-founding his current firm, Kilburn Jones Gill & Campbell LLP, in 1998. He is board certified in Oil, Gas and Mineral Law by the Texas Board of Legal Specialization.

His practice specializes in oil and gas and handles essentially all the legal issues that confront firms or individual geoscientists and engineers. He has first-chair jury trial experience, but prefers helping his clients get what they are entitled to without litigation.

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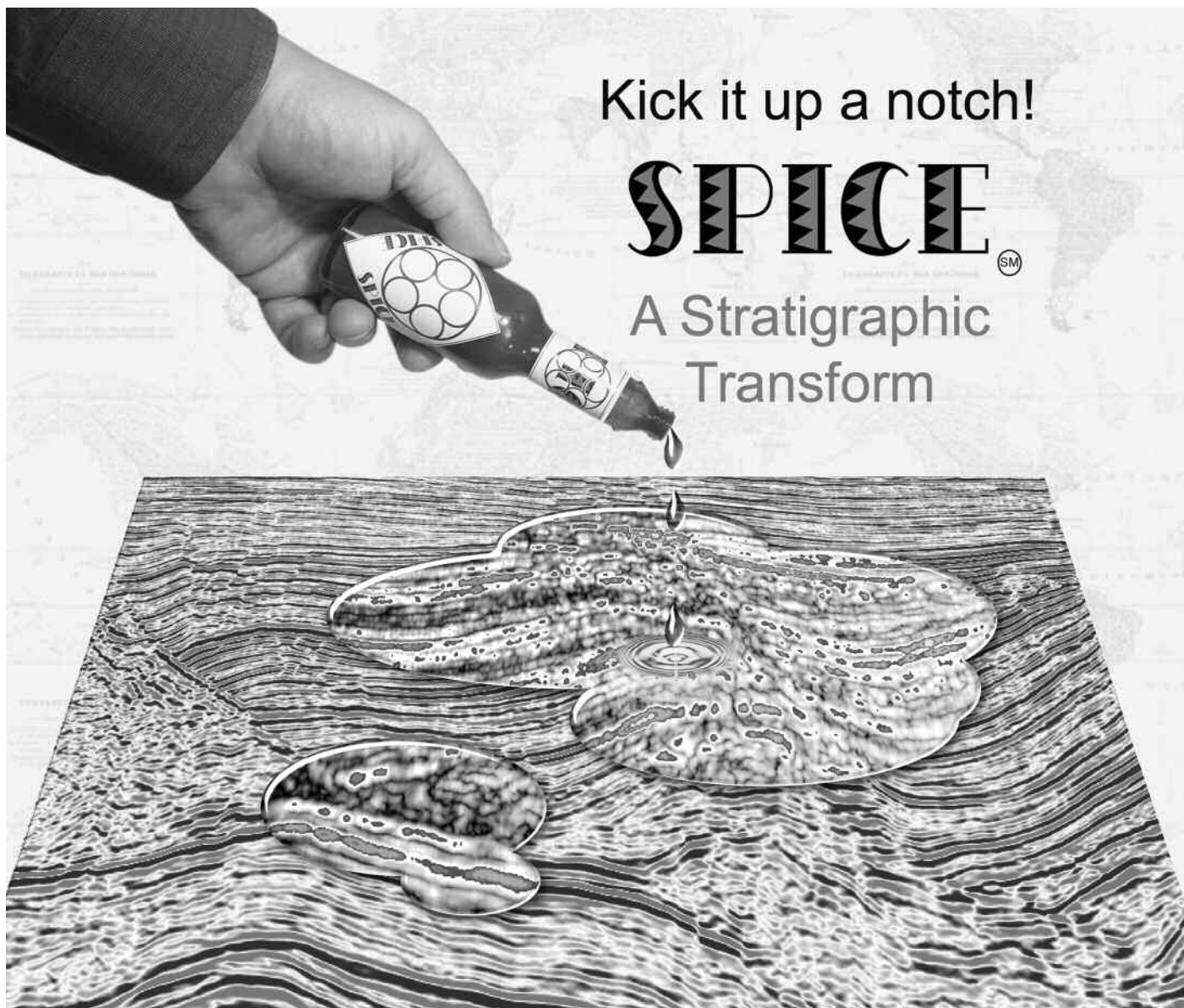
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# Mapping Aquifer Sensitivity by Combining 3-D Geologic Analysis and Groundwater Hydrology—An Application of GIS for Preemptive Protection of Groundwater Underlying Oil Production and Processing Facilities

If groundwater resources underlying areas of petroleum production and processing are “preemptively” protected, the high costs of remediation could be avoided or significantly reduced. This talk describes two case studies that tested aquifer sensitivity maps produced by combining stack-unit geologic mapping with groundwater hydrology. These maps can be used to locate hazardous facilities in less vulnerable areas or help direct assessment and remediation efforts in the event of a spill. One case study compared aquifer sensitivity maps with documented plumes of the contaminant tetrachloroethylene (PCE) found at the Department of Energy’s (DOE’s) Savannah River (SRS) site, SC. In this study, deconstruction of the sensitivity map combined with the groundwater hydrology explain the placement and geometries of the PCE plumes as they progress from the ground surface through multiple aquifers and confining units of the study area at SRS. In the second study at the Marine Corps Air Station (MCAS) in Beaufort, SC, the analysis determined aquifer sensitivity throughout the 22 km<sup>2</sup> airbase using a GIS-based stack-unit mapping methodology that integrated historic hydrogeology data, new high-resolution reflection seismic profiles, core analysis from over 40 boreholes and wells, and hydrologic models based on multi-seasonal water level monitoring. The resulting combined hydrologic and geologic models show that within the study area at MCAS, including areas overlying low permeability

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reduced.*

strata, contaminants released on the ground surface could reach critical underlying aquifers within tens of years due to rapid groundwater flow. These studies demonstrate that both geologic mapping and groundwater modeling are necessary to accurately

delineate areas of high and low aquifer sensitivity. The studies also demonstrate an effective tool for avoiding costly groundwater contamination and cleanup. ■

## **Biographical Sketch**

**JIM RINE**, a Senior Geologist at OMNI Laboratories, Inc., has over 25 years experience in sedimentologic and petrologic studies and is a recognized researcher in the fields of clastic sedimentology, hydrogeology and marine science. He received a doctorate in Marine Geology & Geophysics in 1980 from the Rosenstiel School of Marine and Atmospheric Science, University of Miami. Jim and

co-author H. R. Wanless were awarded Best Poster at the 1976 AAPG annual meeting. Jim was awarded Outstanding Paper for 1985 in the Journal of Sedimentary Petrology with R.N. Ginsburg. Dr. Rine worked for Cities Service Research, Inc., State University of New York at Stony Brook, and the University of South Carolina (USC) prior to joining OMNI Laboratories in 2004. The research he is presenting was performed during his 14 years as a research professor at the Earth Sciences and Resources Institute at USC.

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by *Edward Feragen (speaker),  
Douglas Millman, Robert Bierley,  
Howard Feldman, Manuel  
Berumen and Shirley Perkins*

## South Texas Sub-Regional Evaluation: Area-Wide Integrated Structural and Stratigraphic Framework of the Frio and Vicksburg Yields New Plays and Leads

**NOTE:** *(Some of this material was first presented at the 2006 AAPG convention in Houston)*

ExxonMobil recently completed an area-wide evaluation of the South Texas Oligocene Frio and Vicksburg Formations. This evaluation resulted in the identification of new plays and leads within this mature gas-producing region. The foundation of the evaluation was the development of an integrated structural and stratigraphic framework. This framework was developed through integrated interpretation of extensive well, 2D and 3D seismic, and biostratigraphic data.

Due to the influence of growth faults during a time of high sedimentation rates, the Frio and Vicksburg stacking patterns generally do not reflect the global sea level curves for most 3rd-order assemblages. The extensive use of biostratigraphic data, integrated with well and

seismic interpretations, led to this paradigm change in the approach to framework development here.

*The extensive use of  
biostratigraphic data,  
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to this paradigm change in  
the approach to framework  
development here.*

Growth faults in the early Oligocene (Lower Vicksburg) were initiated by loading and subsequent failure of the Eocene (Jackson) shelf margin. The growth fault systems continued to be a primary control on sedimentation through the Vicksburg and Frio. Mapping indicates that throughout the Frio and Vicksburg sand-prone delta systems are spatially related to active, age-equivalent fault systems. Additional prospectivity was identified through recognition of sand-prone deltaic assemblages associated with growth faults down-dip of shaled-out packages, emplaced via bypass over portions of the shelf.

Detailed EOD evaluations led to the identification of Frio upper slope sands, which may offer a new play type in South Texas. These fan deposits appear to be fed by large (>500 ft. deep), up-dip submarine canyons. ■

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### Biographical Sketch

ED FERAGEN supervises ExxonMobil's exploration efforts in South Texas. Ed received his BS and MS in geology from San Diego State University. Since 1987, Ed has worked for ExxonMobil in various prospect generation, planning and supervisory roles. His experience includes East Texas, South Texas, California, Germany and Brazil.





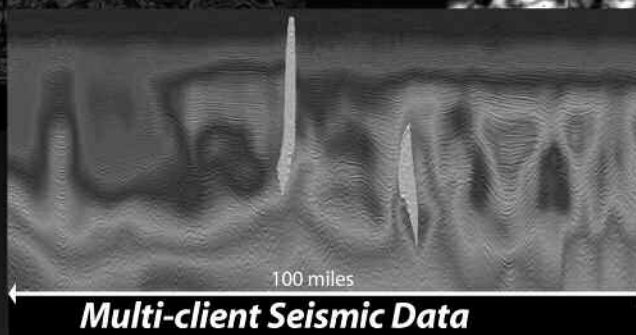
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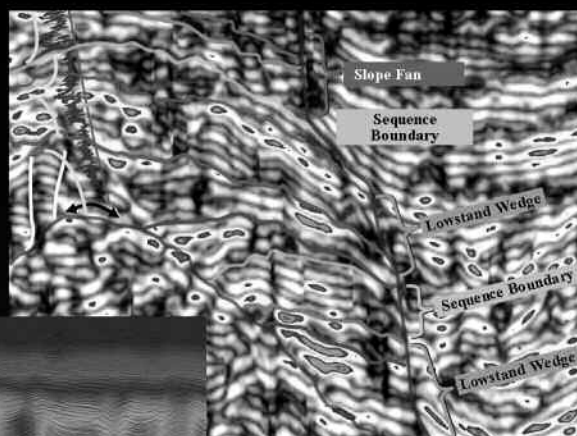
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by Larry Zarra,  
David Rains,  
and Dave Meyer  
Chevron

## Emergence of the Lower Tertiary Wilcox Trend in the Deepwater Gulf of Mexico

The Wilcox has long been recognized as an important petroleum resource, producing from deltaic, fluvial and shallow marine sandstone reservoirs since the 1930s. Recent drilling in the Perdido Fold Belt (PFB), Alaminos Canyon, Offshore Continental Shelf (OCS) area, Keathley Canyon and Walker Ridge has confirmed a new exploration play in the deep basin component of the Wilcox petroleum system, with significant discoveries in distal turbidite systems.

The Wilcox Group in the Gulf of Mexico Basin spans much of the Upper Paleocene and Lower Eocene. In outcrop the Wilcox is characterized by a variety of paralic and very shallow marine depositional settings, and is represented by interbedded sandstone and shale plus locally abundant lignite. Updip of the Lower Cretaceous shelf edge, relatively dense shallow subsurface well control allows documentation of fluvial and deltaic depositional systems. Downdip from the Lower Cretaceous shelf edge, the Wilcox consists of delta front, open shelf, estuarine and widespread prodelta depositional facies. Relatively sparse well control shows mostly sand-poor sections for the prodelta and shelf depositional systems. Downdip from the shelf and prodelta, the next Wilcox well penetrations are 250 miles farther in the basin, in the southern Alaminos Canyon OCS area referred to as the PFB in the deepwater Gulf of Mexico.

Recently released drilling and test data shed new light on play concepts and the hydrocarbon potential of the trend. To date the distribution and quality of the reservoir is considered the most significant risk element for the trend. Key results of the BAHA wells (AC 600 #1 and AC 557 #1) document a thick (>4000 ft) progression of Lower Tertiary deepwater facies and establish the presence of extensive Wilcox equivalent turbidite sands located more than 250 miles downdip from their fluvial and deltaic equivalents. Similar thick turbidites have also been discovered 200 miles to the east, in new exploration wells in this emerging trend. Sand character and distribution interpreted from wireline

logs, core, paleo and seismic data indicate a systematic progression from lower slope to regionally extensive basin-floor fan systems to sediment-starved distal basin plain.

Since the deep test at BAHA in 2001, 20 additional deep wildcats have been drilled in the Lower Tertiary Trend, all encountering thick, low-permeability turbidite sands. Recognizing the uncertainty in deliverability from this new trend, Chevron, Statoil and Devon embarked on an extended well test at their Jack discovery. Leveraging technical work for the much shorter duration Tahiti well test (2004), Chevron planned a more complex and extensive well test at Jack. This test exceeded expectations and delivered more than 6000 barrels a day from a portion of the overall Jack reservoir. Currently, Chevron and other operators are examining various development scenarios, including utilizing a floating production, storage and offloading (FPSO) system to develop 3–4 wells in

a field to mitigate the risk of the reservoir deliverability. With continued exploration and appraisal success, the entire Wilcox trend has become an increasingly important exploration and development play in the deepwater Gulf of Mexico. This emerging trend has the potential of delivering 3–15 billion barrels of oil equivalent from many structures located throughout the deepwater turbidite Wilcox depositional basin, and individual prospects have a resource potential of 50–500 million barrels of oil equivalent. ■

*The emerging Wilcox trend has  
the potential of delivering 3–15  
billion barrels of oil equivalent  
from many structures throughout  
the depositional basin, and  
individual prospects have a  
resource potential of 50–500  
million barrels of oil equivalent.*

This presentation is an update to one given at a Northsiders Luncheon on May 17, 2005, titled “The Wilcox—Outcrop to Deep Water,” by Larry Zarra, David Meyer and Scott Neal.

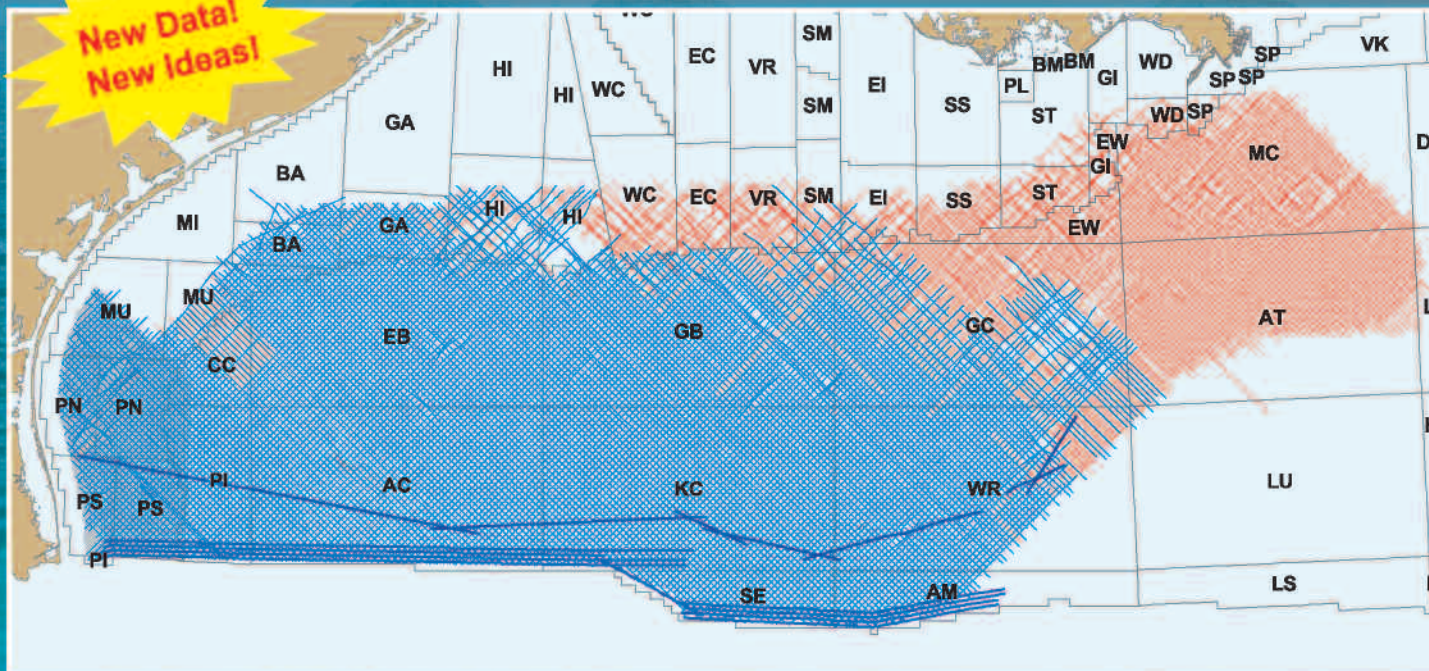
*This presentation is an update to one given at a Northsiders Luncheon on May 17, 2005, titled “The Wilcox—Outcrop to Deep Water,” by Larry Zarra, David Meyer and Scott Neal.*

### Biographical Sketches

LARRY ZARRA has a BA from Rutgers College (1979) and an MS from the University of Delaware (1988), both in geology. He worked onshore Texas exploration at Exxon before joining Chevron in 1991. He is presently **General Luncheon** continued on page 23



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## HGS General Luncheon Meeting continued from page 21

a stratigrapher on the Deepwater GOM Regional Geology Team, integrating core interpretation, reservoir architecture and regional depositional systems for several exploration and appraisal projects. Larry has worked the Wilcox on and off for the last 22 years.

**DAVID RAINS** received his MS in geology in August 2001 from Texas A&M University and earned his BS in geology from Baylor University in December 1998. David's master's research was with Shell's research lab studying unconfined deepwater fans. David joined Chevron in 2001 where he was assigned to the GOM Deepwater Business Unit on the Western Trends Exploration Team. As an exploration geologist, Dave has worked on the ground floor of the emerging Lower Tertiary Trend, being associated with both

the St. Malo and Jack discoveries. Dave followed both discoveries into DWEF Appraisal as the project geologist. Since October 2004, Dave has served as the Jack Project Coordinator.

**DAVE MEYER** has an MS (marine geology, 1981) from Florida Institute of Technology and a BS (geology, 1977) from the University of Wisconsin - Eau Claire. Dave is presently the OCS Lease Sale team leader for the deepwater GO. He has 25 years of experience since joining Chevron in 1981, working various assignments throughout the Gulf of Mexico basin. The past 11 years have been spent as an exploration geologist working the deepwater GOM, developing exploration plays and building Chevron's deepwater portfolio.



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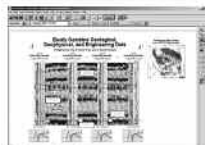
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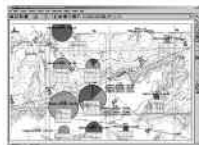
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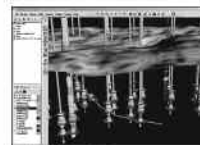
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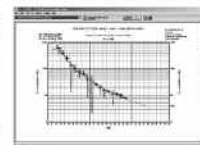
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# The Doors of Perception: Making Sense of Natural Gas Prices

by Arthur E. Berman

On September 29, 2006 spot natural gas prices at the Henry, Louisiana Hub reached a 5-year low, closing at \$3.46 per million British Thermal Units (MMBTU), down 75% from the all-time high price in October 2005 of \$13.44/MMBTU (Fig. 1). This abrupt departure from the steady increase in price over the past six years could bring about a crisis in the domestic gas and petroleum service industries.

Short-term volatility has characterized natural gas prices since the mid-1990s following a period of relative price stability. Prices rose from 2002 through 2005 but have fallen dramatically since the beginning of 2006. Industry experts are struggling to determine whether recent declines in the price of gas since November, 2005 reflect an adjustment or a longer-term trend toward lower natural gas prices.

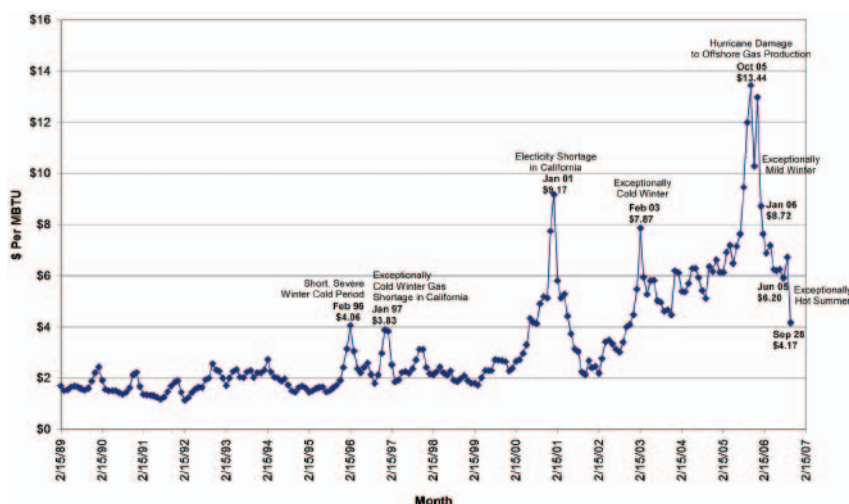


Figure 1. Henry hub spot gas prices, 1989-2007, Data from The Scotia Group Website: <http://www.scotia-group.com/downloads/gas.asp>.

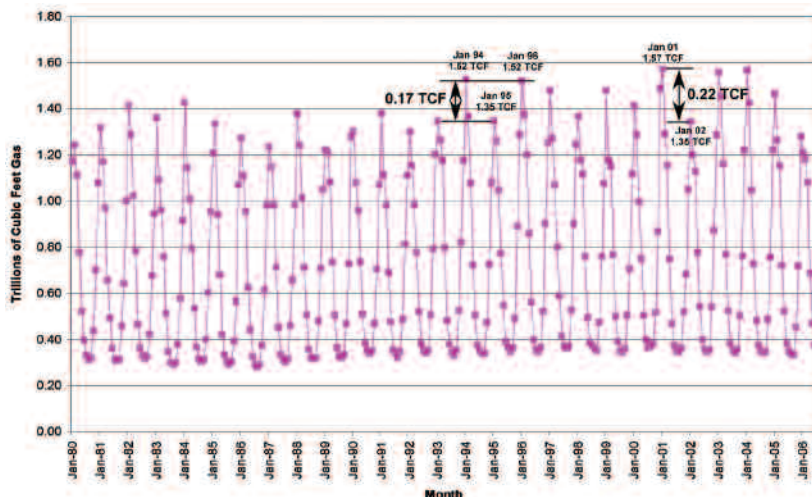


Figure 2. Total U.S. gas consumption, 1980-2006, Data from Energy Information Agency Website: [http://tonto.eia.doe.gov/dnav/ng/ng\\_cons\\_sum\\_dcu\\_nus\\_m.htm](http://tonto.eia.doe.gov/dnav/ng/ng_cons_sum_dcu_nus_m.htm).

The analysis that follows will show that gas prices show a stronger correlation with the number of months supply of natural gas in underground storage than with actual supply and demand relationships. Current gas price trends suggest that low gas prices should continue, perhaps for several years. This will result in drilling and production curtailments which, in turn, will cause concern about future gas supply. This, along with demand rebound because of lower price, will allow gas prices to rise once again over the next several years

## The Simple Explanation for Natural Gas Price Fluctuations

Natural gas price fluctuations are commonly explained by weather patterns or random events such as hurricanes or infrastructure malfunctions. For example, short-term price anomalies in the winters of 1996 and 1997 (Fig. 1) were explained by cold weather. The biggest historical natural gas price anomaly occurred in October, 2005 when spot gas prices rose above \$13/MMBTU. This was explained by hurricanes Katrina and Rita, which combined to disrupt 650 billion cubic feet (BCF) of gas production, 18% of annual production, in the Gulf of Mexico (Energy Assurance Daily, October, 2005).

The following winter of 2005-2006 was exceptionally mild and resulted in a decline in spot gas prices to \$8.72/MMBTU. This is the first clue that the simple weather pattern explanation for gas fluctuations may be misleading since weaker demand for heating energy did not begin to offset the lost gas supply that resulted from the hurricanes a few months earlier.

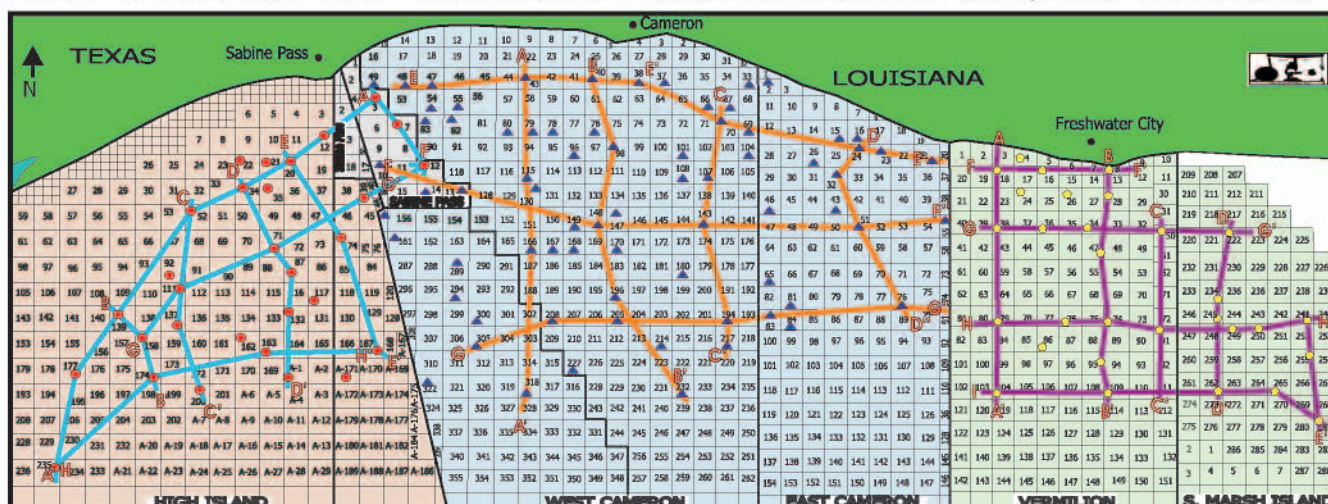
In order to evaluate the correlation between weather and gas price, it is necessary to calibrate temperature anomalies with gas consumption. Maximum seasonal variance in gas usage due to weather alone was the 0.17 TCF difference between January consumption during the cold winters of 1994 and 1996, and usage during the milder January of the intervening winter of 1995 (Fig. 2). The resulting difference in price was less than \$2/MMBTU.

In the case of the price drop in 2005-2006, it is interesting to note that the price of spot gas had already fallen from \$13.44 to \$8.72 by January,

The Doors of Perception continued on page 27



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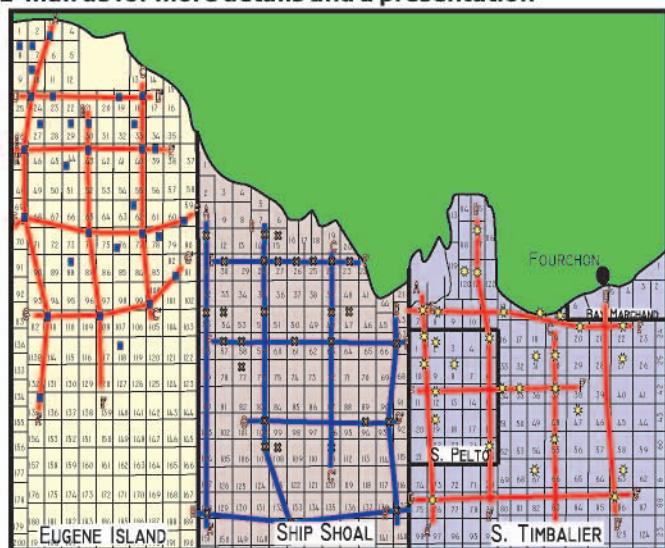
## PROJECT DELIVERABLES

- Single well plots for each well with mapable Genetic Sequences correlated with marker species, paleowater depth, well log and FAIRFIELD INDUSTRIES INC., Extracted 3-D PSTM seismic panels (one mile in length).
- Biostratigraphic and Sequence Stratigraphic table/well, with marker species, paleowater depth, and age dated MFS (Seals).
- Cross Sections (Dip and Strike) age dated MFS and well logs.
- Deliverables in two types of formats:
  - Hard copy binder (11"x 17") printed on premium paper and includes written report, single plots, etc.
  - Report and raw data is delivered in digital format.

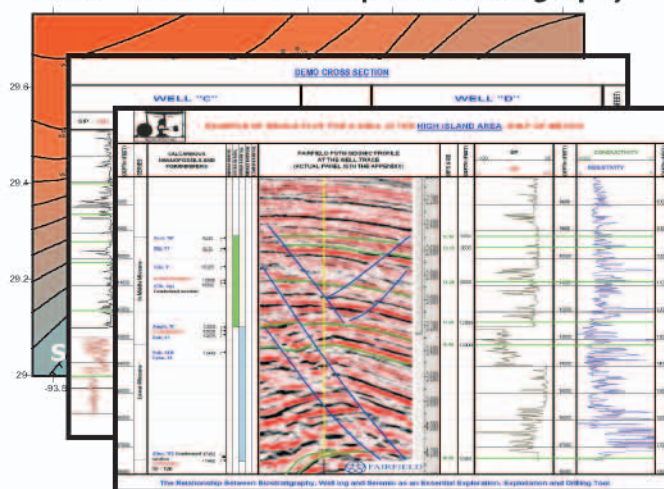
## PROJECT BENEFITS

- Show the relationship between Genetic Sequences (in time), seals, potential reservoir sands, paleowater depth, especially in the Miocene section.
- 7 to 12 Genetic Sequences associated with producing and potential deep gas targets.
- Identify MFS (seals) on well-logs and 3-D seismic to provide local and regional timelines.
- Use point of intersection of MFS and log to construct, isopach, sand %, structural and biofacies maps.
- Identify the type of reservoir sands in each Sequence, play concepts and facies' relationships within each Sequence.
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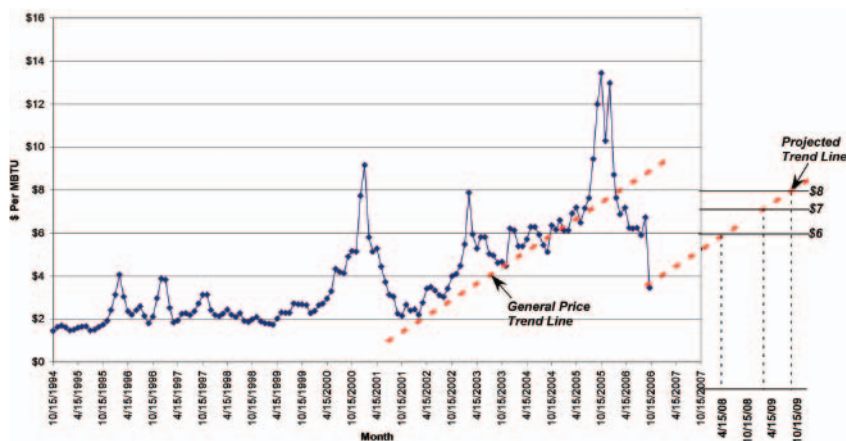


Figure 3. Predicting prices from Henry Hub spot gas prices, 1994-2007, Data from The Scotia Group Website: <http://www.scotia-group.com/downloads/gas.asp>.

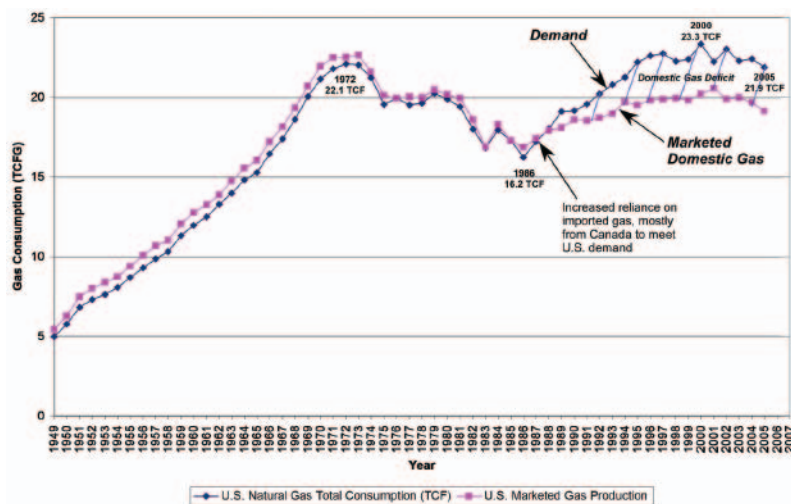


Figure 4. Annual U.S. gas consumption (demand) and volume of marketed natural gas (domestic production), 1949-2006, Data from Energy Information Agency Website: [http://tonto.eia.doe.gov/dnav/ng/ng\\_cons\\_sum\\_dc\\_u\\_nus\\_m.htm](http://tonto.eia.doe.gov/dnav/ng/ng_cons_sum_dc_u_nus_m.htm).

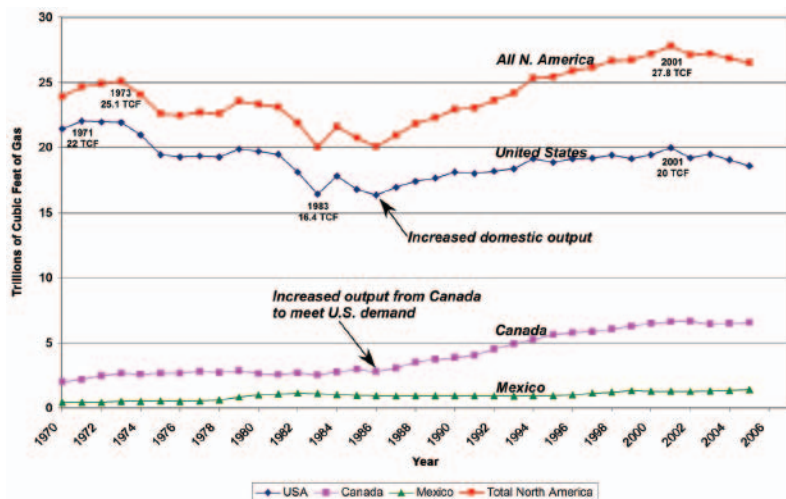


Figure 5. Annual North American natural gas production, Data from Energy Information Agency Website: [http://tonto.eia.doe.gov/dnav/ng/ng\\_prod\\_sum\\_dc\\_u\\_nus\\_m.htm](http://tonto.eia.doe.gov/dnav/ng/ng_prod_sum_dc_u_nus_m.htm).

2006, before the winter heating season had begun in earnest, and despite the loss of 0.65 TCF in gas production, an amount more than 3 times the magnitude of any seasonal variance in consumption.

Gas prices fell an additional \$2.00/MMBTU through the summer of 2006, which was the second-hottest summer on record, second only to the dustbowl summer of 1936 (NOAA Website, 2006). This should have been a time of increased gas consumption for cooling, probably comparable to an exceptionally cold winter.

Clearly, the simple explanation for natural gas price and usage fluctuations does not tell the entire story.

## Predicting Gas Prices From Recent Trends

There are many methods for predicting future gas prices which, despite their uncertainties, are useful for estimating how gas prices may behave in the near-term. A simple approach is to develop a general trend-line for the overall pattern of gas prices apart from events that produce anomalous spikes (Figure 3). This method predicts that overall gas prices will remain below \$6/MMBTU until the spring of 2008, will not get to \$7 until early 2009, and will not reach \$8 again until some time in the summer of 2009.

According to Simmons & Company, an overall gas price of \$6.60 is necessary to sustain profitable gas exploration in the U.S. at current drilling and equipment costs; both exploration drilling and production of gas will substantially decrease with prices below \$5.70 (Lyle, 2006). Based on that figure, favorable conditions for drilling and production may not return until at least the end of 2008.

## Supply and Demand Considerations

In order to objectively evaluate the meaning of gas price fluctuation, and to specifically understand the dramatic price decline that has taken place in the year since hurricanes Katrina and Rita, it is necessary to review the basics of supply and demand for natural gas in the United States.

U.S. gas consumption (demand) was in balance with domestic gas production until 1987. Consumption increased from 16.2 TCF in 1986 to a peak of 23.3 TCF in 2000 (Fig. 4). Since the mid-1990s, the United States has had an average 2 TCF disparity between domestically

# The Doors of Perception

continued from page 27

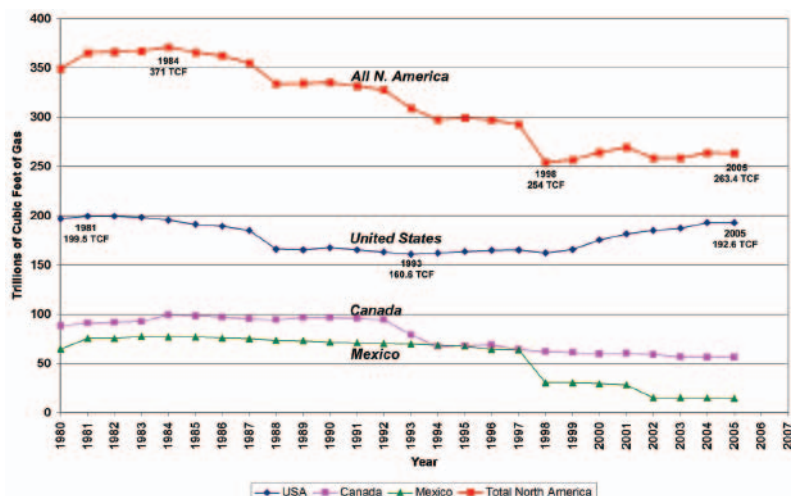


Figure 6. North American Proved Gas Reserves, Data from Energy Information Agency Website:

[http://tonto.eia.doe.gov/dnav/ng/ng\\_enr\\_sum\\_dcu\\_NUS\\_a.htm](http://tonto.eia.doe.gov/dnav/ng/ng_enr_sum_dcu_NUS_a.htm).

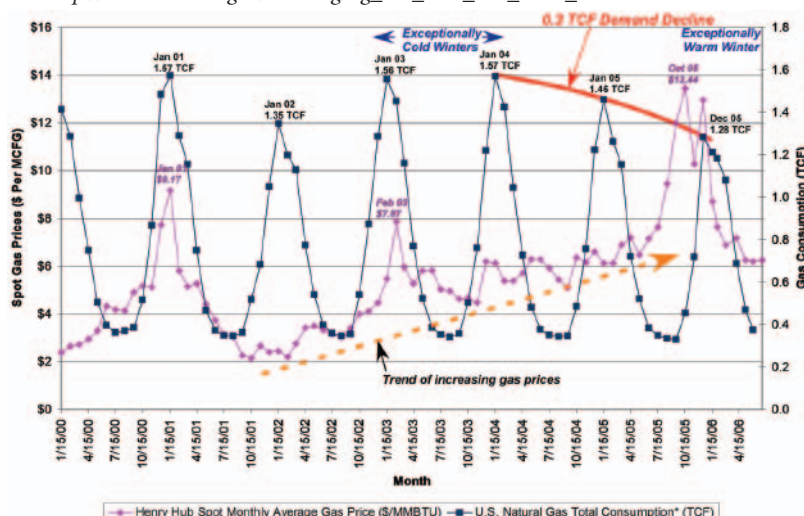


Figure 7. U.S. Natural Consumption and Spot Gas Prices, 2000-2006. Data from Energy Information Agency Website:

[http://tonto.eia.doe.gov/dnav/ng/ng\\_cons\\_sum\\_dcu\\_nus\\_m.htm](http://tonto.eia.doe.gov/dnav/ng/ng_cons_sum_dcu_nus_m.htm).

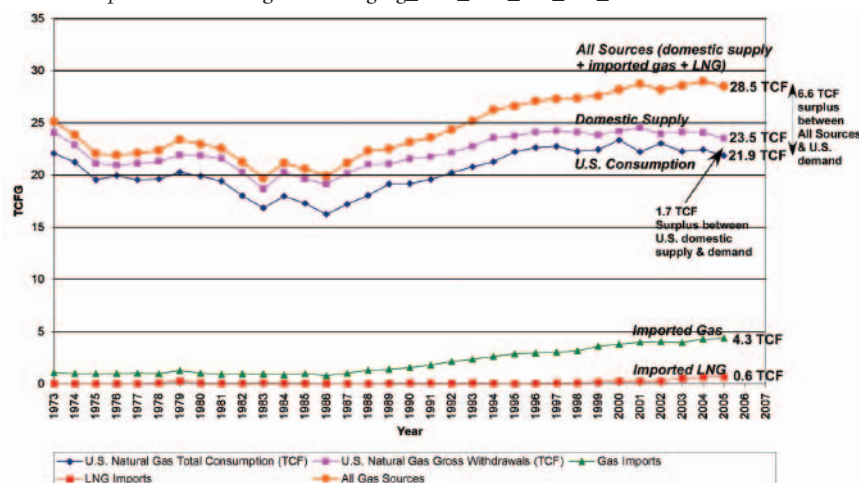


Figure 8. U.S. Total Natural Gas Supply and Demand, 1973-2005. Data from Energy Information Agency Website:

[http://tonto.eia.doe.gov/dnav/ng/ng\\_move\\_imp\\_s1\\_a.htm](http://tonto.eia.doe.gov/dnav/ng/ng_move_imp_s1_a.htm).

produced natural gas (marketed gas) and the amount of gas consumed. Most of this deficit has been filled from increased output in the United States and from imports from Canada (Fig. 5).

North American natural gas proved reserves have declined to around 236 TCF from their peak in 1984 of 371 TCF (Fig. 6). U.S. proved reserves were nearly 200 TCF in 1984, declined to about 160 TCF by 1988, but have since increased steadily, almost returning to the 1984 high in recent years. Canada's reserves decreased sharply between 1992 and 1994 from 94 to 67 TCF and have continued to decline more slowly to their present level of 56 TCF. Mexico's reserve decline is related to a 53% write-down of overstated reserves in 1998, and most Mexican gas is re-imported following processing in the U.S.

An important, and perhaps overlooked, aspect of supply and demand, is the effect of high gas prices on future demand for natural gas. The price increase to almost \$8/MMBTU in February, 2003 seems to have begun a longer-term destruction in gas demand (Fig.7). This, and steadily increasing gas prices that followed, correlate with a decline in gas demand of about 0.3 TCF over 2 years in the main heating season months. The unprecedented price peak of gas in October 2005 was perhaps a decisive blow to recent natural gas demand, accentuated by the mild winter that followed.

Overall, the United States had a supply surplus of over 6 TCF at year-end 2005 (Figure 8). This surplus consisted of a 1.7 TCF surplus in domestic supply, over 4 TCF from Canadian pipeline imports, and 0.6 TCF from liquefied natural gas (LNG) imports.

Based on supply and demand considerations alone, natural gas price should have been steadily decreasing since at least 1986. The factors that account for the price fluctuations in natural gas in the United States over the past decade, therefore, have little to do directly with supply and demand.

## Gas Storage in the United States

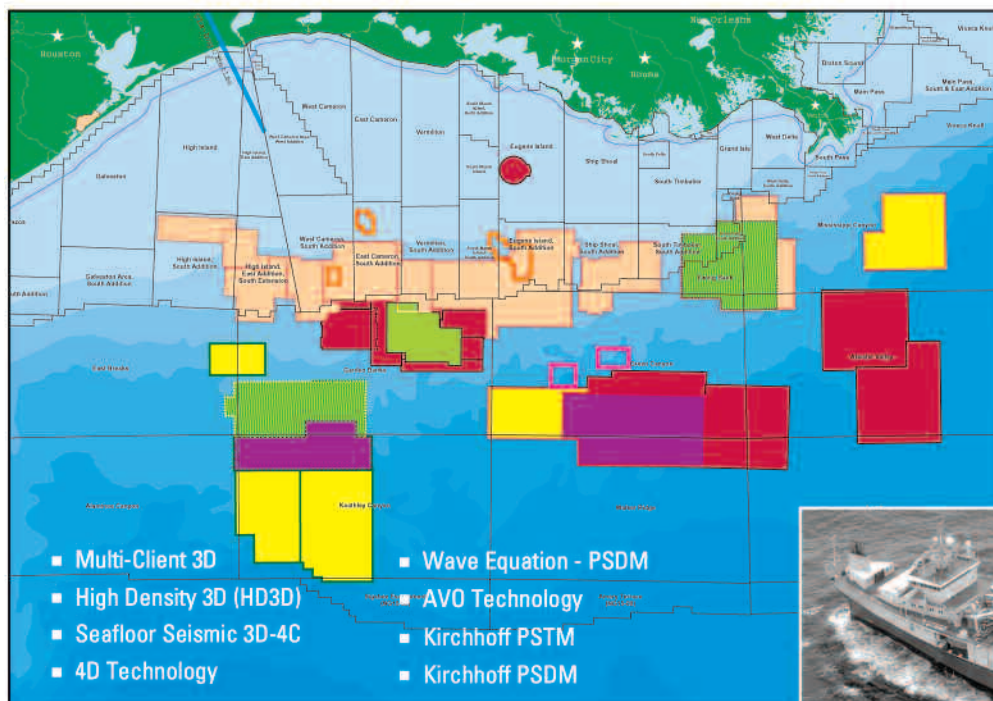
In addition to gas price, consumption, supply, and reserves, it is necessary to understand underground gas storage in order to make sense out of natural gas prices. Gas is stored for strategic purposes but also so producers can take advantage of gas futures contracts. In other words, **The Doors of Perception** continued on page 33



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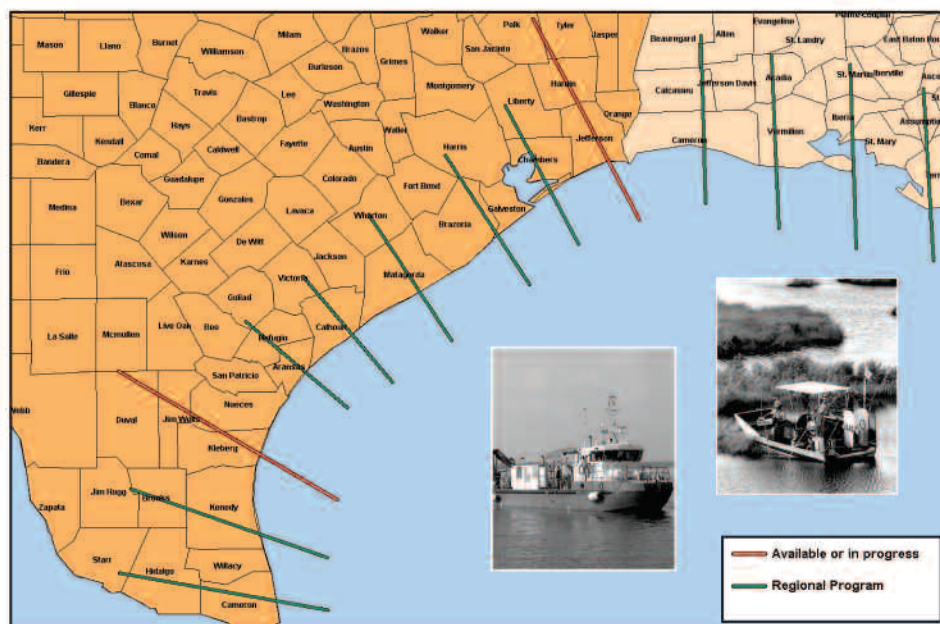


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5	<b>6 Sheriff Lecture: Joint International &amp; General Dinner Meeting</b> by Henry W. Posamentier <i>"Seismic Geomorphology &amp; Seismic Stratigraphy from Shelf to Deepwater: Implications for Exploration &amp; Development"</i> Page 9	<b>7 HGS Executive Board Meeting</b>	8
12	13	<b>14 HGS Continuing Education Short Course</b> by Toddy Guidry <i>"Introduction to Reservoir Fluids Analysis for Geologists"</i> Page 4 <b>A One Day Seminar and Core Workshop hosted by BEG</b> Barnett Shale Gas Play of Ft. Worth Basin Page 42	15
19	20	<b>21 HGS Environmental and Engineering Dinner Meeting</b> by Jim Rine <i>"Mapping Aquifer Sensitivity by Combining 3-D Geologic Analysis and Groundwater Hydrology - An Application of GIS for Preemptive Protection of Groundwater Underlying Oil Production and Processing Facilities"</i> Page 17	22
26	27	<b>28 HGS Northsiders Luncheon Meeting</b> by Edward Feragen, et.al. <i>"South Texas Sub-Regional Evaluation: Area-wide Integrated Structural and Stratigraphic Framework of the Frio and Vicksburg Yields New Plays and Leads"</i> Page 19	<b>29 HGS General Luncheon Meeting</b> by Larry Zarra, et.al. <i>"Emergence of the Lower Tertiary Wilcox Trend in the Deepwater Gulf of Mexico"</i> Page 21

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9	10	11
16 <b>SIPES Luncheon Meeting</b> by Lee Gill "Legal Matters Affecting Independents" Page 15 <b>East Texas Geologic Society Symposium</b> "The Gulf Coast Mesozoic Sandstone Province" Tyler, Texas Page 44	17	18 <b>HGS/GSH Shrimp Peel</b> Sam Houston Raceway Page 8
23 <i>Happy Thanksgiving</i> HGS office closed Thursday and Friday	24	25 <b>NOW</b> you can make your reservations on-line at <a href="http://www.hgs.org">www.hgs.org</a>
30	1 <b>HGA Meeting</b> Sugar Creek Country Club Sugarland, TX Page 56	<b>Members Pre-registered Prices:</b> General Dinner Meeting .....\$28 Nonmembers walk-ups. .... \$35 Env. & Eng. ....\$25 Luncheon Meeting .....\$30 Nonmembers walk-ups. .... \$33 International Explorationists .....\$25 North American Expl. ....\$25 Emerging Technology .....\$25



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HGA Meeting  
Sugar Creek Country Club  
Sugarland, TX

**December 3 - 6**  
GCSSEPM Bob F. Perkins Research Conference  
*Reservoir Characterization: Integrating Technology & Business Practices*

**Monday, December 11**  
HGS Joint General & North American Dinner  
by Brad Prather, Title TBA

**Tuesday, December 12**  
HGS Environmental & Engineering Dinner  
Tentative, details TBA

**Thursday, December 21**  
SIPES Luncheon Meeting  
*Fishing with Dynamite: 3D Tips and Trip-ups on the Gulf Coast*  
by Phil Martin  
Petroleum Club-Discovery Room



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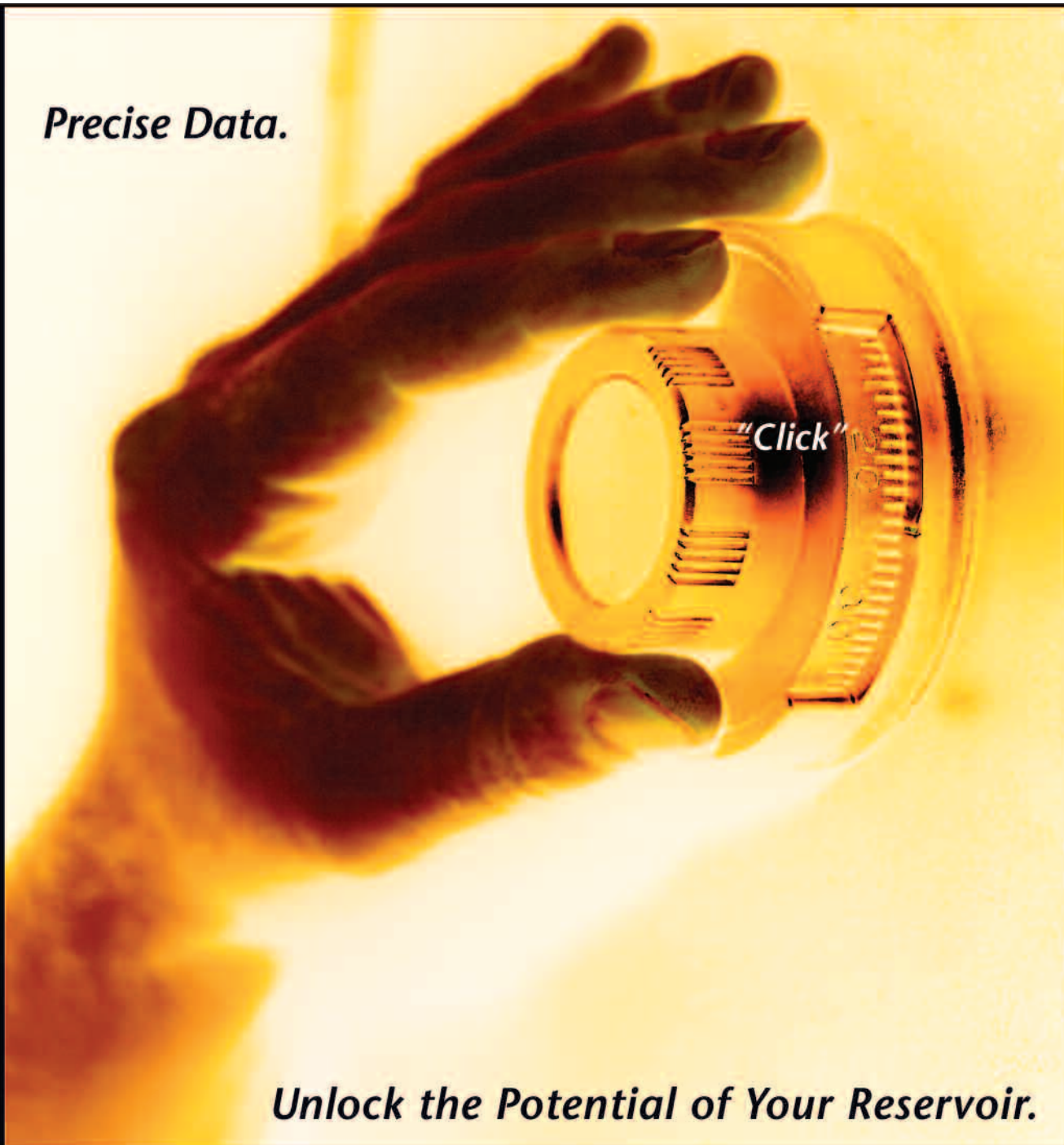
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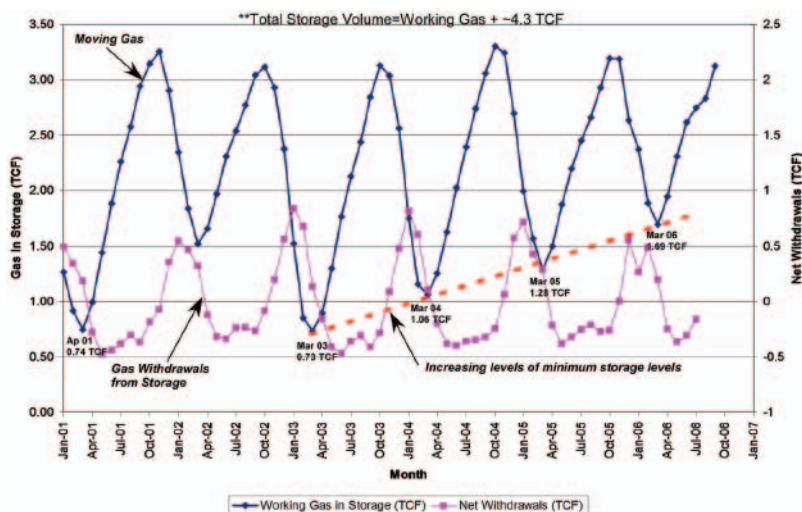


Figure 9. U.S. gas in underground storage and net withdrawals from storage, 2001-2006. Data from Energy Information Agency Website: [http://www.eia.doe.gov/oil\\_gas/natural\\_gas/info\\_glance/natural\\_gas.html](http://www.eia.doe.gov/oil_gas/natural_gas/info_glance/natural_gas.html).

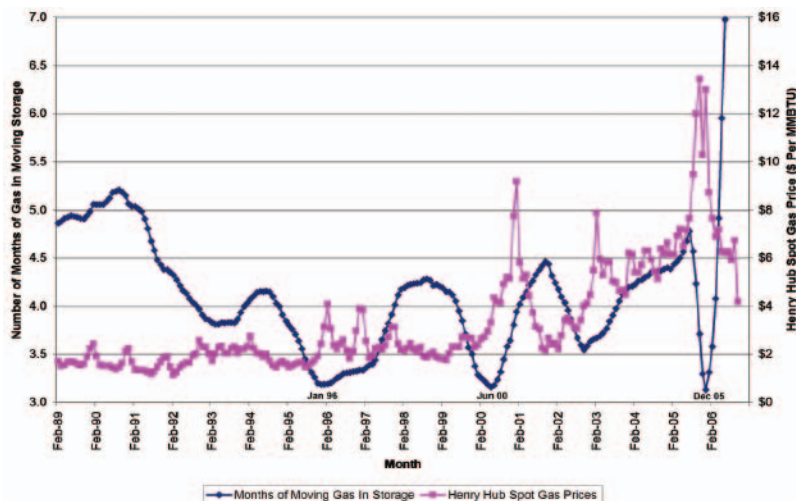


Figure 10. Months of gas in moving storage plotted against Henry Hub spot gas prices, 1989-2006. Data from Energy Information Agency Website: [http://www.eia.doe.gov/oil\\_gas/natural\\_gas/info\\_glance/natural\\_gas.html](http://www.eia.doe.gov/oil_gas/natural_gas/info_glance/natural_gas.html).

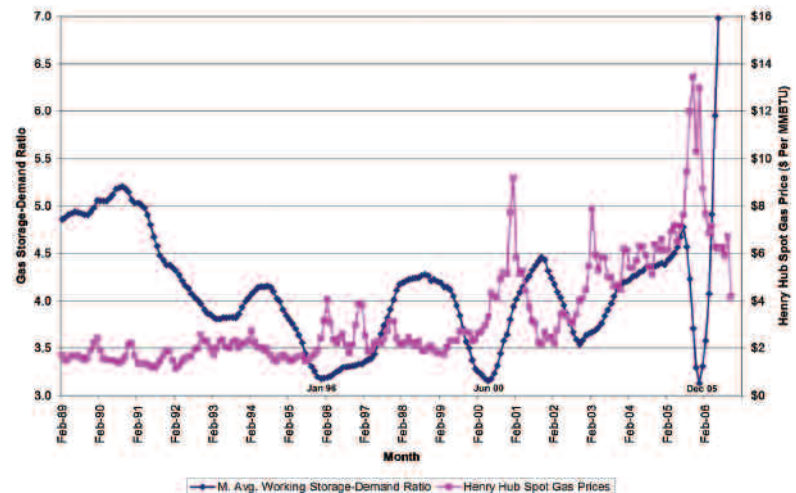


Figure 11. Ratio of gas in moving storage/consumption plotted against Henry Hub spot gas prices, 1989-2006. Data from Energy Information Agency Website: [http://www.eia.doe.gov/oil\\_gas/natural\\_gas/info\\_glance/natural\\_gas.html](http://www.eia.doe.gov/oil_gas/natural_gas/info_glance/natural_gas.html).

if a gas producer can get a future contract for a price above the current one, he must store the gas somewhere until the contract date arrives. Gas storage is, therefore, part of the way that gas prices are “hedged”.

In order to effectively withdraw gas from storage, a base volume of about 4.3 TCF must be maintained. This volume is not available for withdrawal. Gas volume in storage above the base amount is called the moving gas in storage. Moving gas fluctuates seasonally between around 3.25 and 0.75 TCF (Fig 9). Gas storage is refilled seasonally between the summer cooling and winter heating seasons.

In order to put gas storage in perspective, total average moving gas in storage could supply 100% of U.S. average consumption needs for 3-5 months (Fig 10).

Moving gas reached historic low levels in both April, 2001 and March, 2003 (Fig. 9) following winter heating crises and associated price increases in those years (Fig. 1). During subsequent years, increasingly higher minimum working gas storage levels have been maintained. It is unclear whether this pattern is related to concern by gas market analysts to maintain high storage levels, or simply because of increased hedging as prices increased.

What is clear is that the amount of moving gas in storage correlates with gas price (Fig. 10). This relationship was determined by calculating the 12-month moving average of the ratio of gas in working storage/U.S. consumption, and plotting this value against Henry Hub spot gas prices.

Months of gas in storage reached its lowest levels in January 1996, June 2000, and December 2005. These low values correspond directly with abrupt increases in spot gas prices. Recalling figure 7, the ratio value is affected by decreasing demand after 2004, as well as by storage volume considerations.

## Conclusions and Observations

The key conclusion is that, while supply and demand concerns have a pronounced effect on gas market analysts and traders, the number of months supply of moving gas in underground storage appears to have the greatest correlation to gas price.

A second conclusion is that high gas prices have a pronounced, if

**The Doors of Perception** continued on page 35



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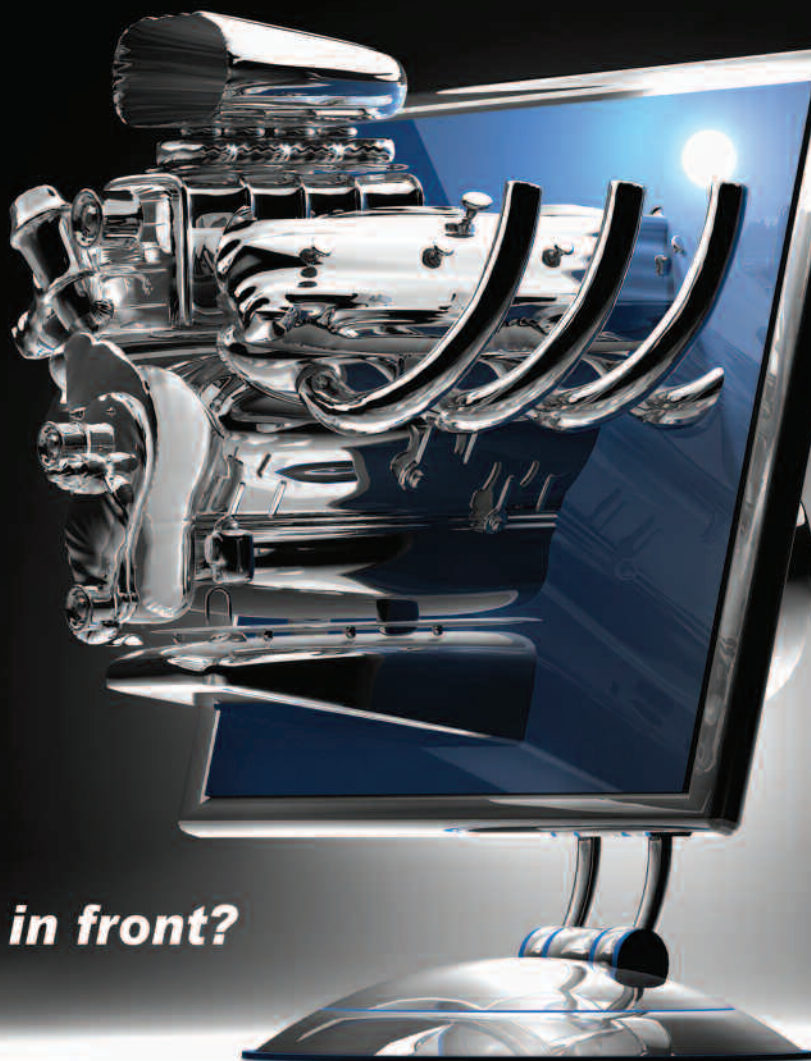
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somewhat delayed effect, on gas consumption, and that influences the storage-demand ratio in a way that also affects gas price.

A third conclusion is that after the 2005 hurricane season and its devastating effect on gas production, there was a re-adjustment in the dynamics of gas price response relationships. The mild winter immediately following Katrina and Rita compounded the trend toward lower consumption that was first noted after 2004. Concerns about supply were further alleviated because minimum gas storage volumes were the highest since 1991. Gas production

supplies remained more than comfortably above projected consumption levels for many years. Failure to add proved reserves remained a concern but, realistically, with supply and storage secure, and U.S. reserves rising over the past 8 years, this factor did not have short-term relevance.

The pattern of re-adjustment carried into the summer cooling season of 2006. Despite experiencing the second-hottest summer in recorded U.S. history, and the hottest since the advent of air conditioning, gas prices were little affected. Interestingly, the slight price reactions during the summer of 2006 came from announcements of storage withdrawals rather than true supply shortfalls, in a season when storage withdrawals are commonplace to begin with.

It appears that a new paradigm for domestic gas prices has emerged. Demand destruction combined with high volumes of gas in storage, as well as some realization of the great supply surplus, have resulted in lower gas prices. This trend will probably last for some time but will inevitably be reversed as low prices engender increased demand particularly from industrial consumers.

The correlation between months of gas in moving underground storage and gas spot prices suggests that there may be a kind of desperate realism built

**The Doors of Perception** *continued on page 37*

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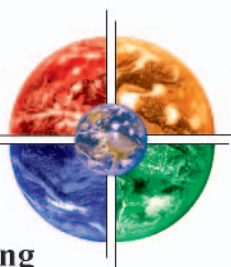
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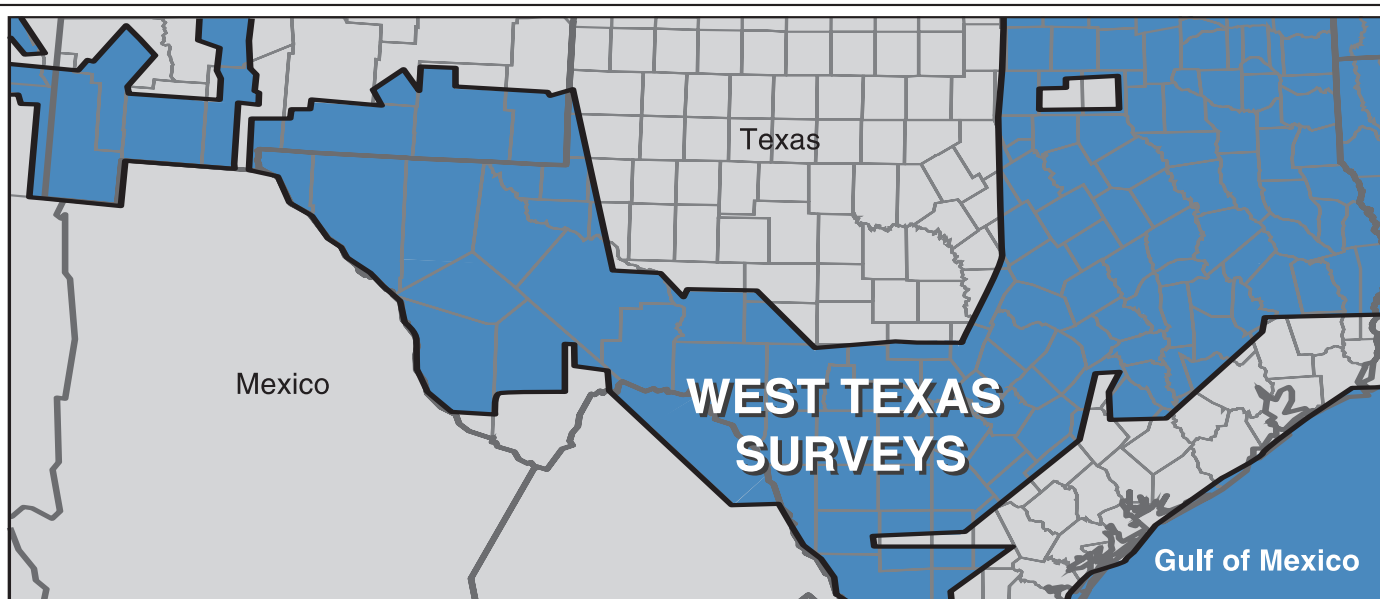
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into gas pricing that supercedes consideration of overall supply and demand factors. In other words, the volatility of natural gas prices has more to do with what can be bought, delivered, and put into a pipeline today than with how much total gas is available. This reflects the complex and often delaying factors involved with producing gas at the wellhead, obtaining pipeline access, and transporting the gas to markets.

Gas in storage is an index for natural gas availability in the same way that the Dow Jones Industrial Average is an index for the strength of the stock market. Neither reflects the full picture but both seem to reasonably indicate investor sentiment about the direction of their respective markets.

In the case of natural gas, sentiment guides what suppliers believe gas is worth and are willing to pay today, and a few months into the future. The fact that the United States is awash in natural gas supply, at least for the near-future of several years, is less important than the perception that sufficient gas is immediately available to be sent on its way to end users.

William Blake wrote, "If the doors of perception were cleansed every thing would appear to man as it is, infinite. For man has closed himself up, till he sees all things through' narrow chinks of his cavern." (Blake, 1793)

The caverns through which gas prices are viewed must be those in which our precious volumes of surplus natural gas are stored underground.

We are on new and unfamiliar ground in the U.S. gas market, although—after 20 years of volatility in the petroleum industry—this should surprise no one. ■

*Sincere thanks to Robert Gray for sharing his considerable experience about the natural gas market, for hours of discussion, and for countless useful suggestions about how to understand the data. Thanks also to Joshua Rosenfeld, Hugh Hay-Roe and Thomas Feldkamp for reviewing and editing the document prior to submission the Bulletin.*

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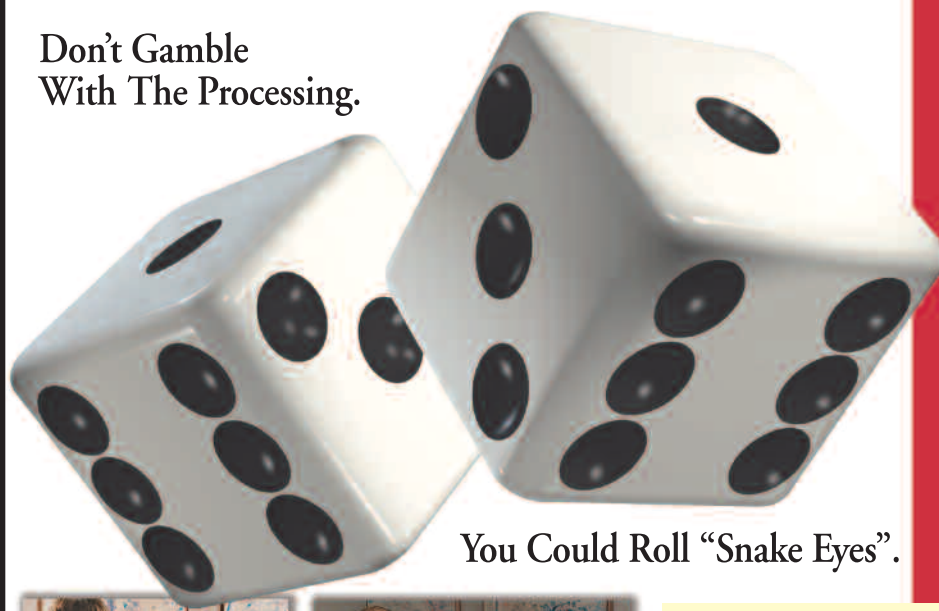
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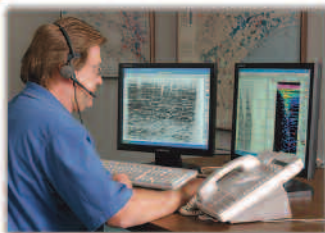
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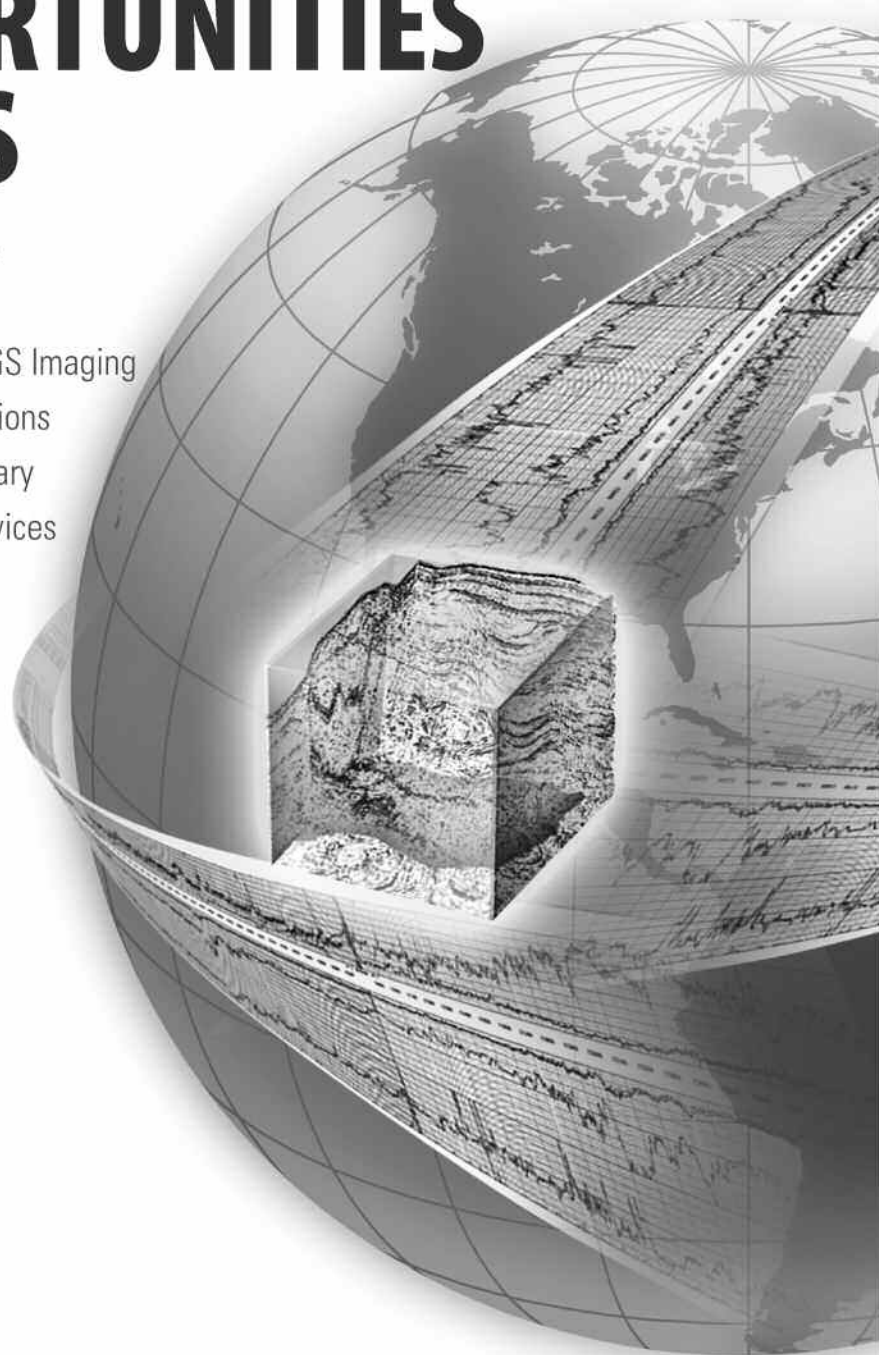
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# NeoGeos News

Welcome to the HGS NeoGeos column! Our new monthly feature will keep you updated on our upcoming events and provide insight into the petroleum industry from experienced geoscientists. The goal of NeoGeos is to help with the transition into the professional environment of Houston's geoscience community. This is accomplished by meeting regularly to socialize, network and volunteer with other professionals in the Houston area. Please contact our chairperson, **Dianna Phu**, at [neogeos\\_houston@yahoo.com](mailto:neogeos_houston@yahoo.com) to join NeoGeos ([www.neogeos.org](http://www.neogeos.org)).

As part of our continued mission to provide insight and transition into your new career as a professional geoscientist, NeoGeos is proud to present the first of many interview series with highly experienced geoscientists. The purpose of these interviews is to provide young geoscientists with the opportunity to gain critical knowledge about the path they have chosen and how to navigate through a successful and productive career. Below is the first of many future interviews. It is conducted by Nigel Hicks and features Dan Ebrom, geophysicist for BP America.

**Nigel: Dan, could you tell me a little about your background and education?** *Dan:* I am primarily interested in multicomponent (so-called "4C" when collected offshore) and time-lapse ("4D") seismic data. I have 20+ years in the seismic industry, having worked both for seismic contractors (CGG, Digicon) and oil companies (Cities Service, Texaco, BP), as well as a stint at the Allied Geophysical Laboratories of the University of Houston. I graduated from the University of Houston in 1990 with a PhD in geophysics. From 2000 to the present day I have been with BP.

**Nigel: What is your current position at BP and what are you working on?** *Dan:* I serve as the BP network leader for multicomponent seismic and have a research and development role in support of current projects, including using Vp/Vs ratios to predict pore pressure when drilling out of salt (look for this in Dan et al.'s article in the upcoming December *Leading Edge*).

**Nigel: Why did you join the oil and gas industry?** *Dan:* For me, it is the most exciting job in geoscience because one gets to apply theoretical knowledge and then test these theories by drilling wells. Also, the petroleum industry provides a high level of intellectual stimulation because of its fast pace (business needs) and integrated nature (geology, geophysics and engineering).

**Nigel: Could you give me your thoughts on the future of the**

**petroleum industry and the role of young folks just starting out?**

*Dan:* Well, a recent Houston Chronicle article stated that a barrel of oil will probably range from \$50 to \$60 for the next ten years. Whether that holds true or not, new hires need to understand that this industry is cyclical and there will be very good times and very bad times. Each young person will need to decide if this business is for them when the first round of massive layoffs occurs—and it will happen at some point. Today, I find similarities with the late 1970s, when there was an influx of young talent that later shaped

the future geoscience community demographics. There is a great deal of opportunity for training and development and new hires need to take advantage of that. Lastly, young geoscientists need to understand that volatility and insecurity will never go away and they need to learn how to tolerate this in order to maintain a long and successful career.

**Nigel: In your opinion, what are the steps new hires need to take to ensure a long and successful career?**

*Dan:* I think that success can be defined in various ways but I would say there are two different paths to success. The first path is becoming successful in your personal life as a result of providing stability and predictability in your professional life. Professionally, this is the more docile path, where an individual can become content within a certain job and not aggressively push for new challenges or roles, but rather master a specific and detailed approach or technique and settle into a long-term routine. The second path to success is the more gutsy approach,

where an individual is constantly seeking new challenges, new technologies and integration and wants to aggressively elevate his or her status within the organization. Both paths require you to learn and apply the fundamentals of basic geology and physics. Above all, new hires need to be seriously committed to communicating and interacting with others in a technical and informal setting. This includes attending internal and external conferences and social gatherings whenever possible.

**Nigel: Dan, what is your overall advice to young geoscientists?**

*Dan:* To constantly be connected by communicating with others in a technical setting or socially over a coffee or beer. To know that you will be constantly learning from your peers, and to embrace this environment with an open mind in order to maximize your potential.

We welcome your comments and suggestions. Please contact **Nigel Hicks** ([nigel.hicks@bp.com](mailto:nigel.hicks@bp.com)) or **Amanda Beardsley** ([amandagb@rice.edu](mailto:amandagb@rice.edu)) with your feedback. ■

*...new hires need to understand that this industry is cyclical and there will be very good times and very bad times. Networking is essential... new hires need to be seriously committed to communicating and interacting with others in a technical and informal setting.*



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## Barnett Shale-Gas Play of the Fort Worth Basin

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### Background

The State of Texas Advance Oil and Gas Resource Recovery Program (STARR) at the Bureau of Economic Geology and the Petroleum Technology Transfer Council (PTTC) Texas Region will sponsor a one-day seminar and core workshop in Houston and Midland to promote exploration and development in the Barnett Shale-Gas Play. The seminar will emphasize new research on the geology of the Barnett Shale as well as review other key aspects of the play. Several cores from the Fort Worth Basin will be displayed along with associated posters in a core workshop.

### Who Should Attend

Geologists, geophysicists, engineers, and managers interested in learning more about geological attributes of the Barnett Shale in the Ft. Worth Basin and the processes that affect hydrocarbon generation and production from the Barnett and analogous shale successions.

**Agenda (speakers are from The University of Texas at Austin Bureau of Economic Geology unless otherwise noted)**

#### Morning Technical Session: 8:30 a.m. – 11:30. am

Introduction and overview of the Barnett Shale-gas play—Eric Potter

Regional Barnett Shale stratigraphy and depositional setting—Dr. Stephen C. Ruppel

Geophysical insights into styles of Barnett depositional processes—Drs. Stephen C. Ruppel and Hongliu Zeng

Stratigraphic architecture of the Barnett Shale in the Fort Worth Basin—Dr. Wayne Wright

Depositional model, facies, and pore networks of the Barnett Shale—Dr. Robert Loucks

Geochemical Characteristics of Productive Unconventional Shales—Dan Jarvie, Humble Geochemical Services

#### Lunch and Core/Poster Viewing: 11:30 a.m. - 1:00 p.m.

#### Afternoon Technical Session: 1:00 p.m. – 4:30 p.m.

Nature and significance of natural fractures in the Barnett Shale—Dr. Julia Gale

Effects of collapse structures on Barnett Shale architecture and continuity—Dr. Angela McDonnell

Petrophysical characterization of the Barnett Shale—Jeff Kane

Review of Barnett Shale reservoir engineering issues—Dr. Fred Wang

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# PESGB/HGS Africa Conference Report

by *Al Danforth*, International Explorationists Group, Houston Geological Society

The 5th joint PESGB / HGS Africa Conference: "The Elephants of the Future", held in London 12–13 September, was another success for both societies as well as for participants and sponsors. The QE2 Convention Center was filled to capacity



with more than 300 attendees. Congratulations are due to the PESGB organizers and technical committee for again putting on an excellent event.

The two-day program of talks and posters covered the gamut of regions in Africa. Perhaps the highlight were the excellent, detailed reviews of the "play-opener" discoveries by Hardman Resources in Uganda, BP's Raven field in the Nile Delta, and ENCANA's discoveries in the Bongor Basin in Chad. In addition, there were provocative presentations on new regional studies, new ideas for plays, a new look at basind development methodology, and technologies that can enable a new look at established areas like the Niger Delta. The joint conference has alternated between London and Houston since 2002. The HGS role in the conference when it is in London continues to be to support the effort by assisting to line up contributions for the Technical program and sponsorship, and to advertise the event in Houston and in other energy centers in North America. About 30 of the more than 300

participants were from the USA and Canada. Traveling from Houston, HGS members presented 5 of the 28 talks and 3 of the 21 posters. Although most participants were from UK and Europe, many traveled from Africa and Australia to attend.

The BIG news is that the joint Africa Conference will next be held in Africa, at the International Conference Centre in Cape Town, South Africa on 11-12 September, 2007. PetroSA, the national oil Company of the Republic of South Africa, has joined the effort and will assist with on-site arrangements. The HGS International Group will arrange discounted airfares. The conference will return to Houston in 2008.

If you would like to contribute a talk or poster in Cape Town please contact [duncan.macgregor@neftex.com](mailto:duncan.macgregor@neftex.com). For information for Sponsors and for exhibit space, contact [Jennie@pesgb.org.uk](mailto:Jennie@pesgb.org.uk) or visit [www.pesgb.org.uk](http://www.pesgb.org.uk). The conference program is on the PESGB and HGS Website calendars. The excellent compilation of abstracts and extended abstracts is available from PESGB. Proceedings CDs from past conferences are also available from the hosting society, either PESGB or HGS. ■



## HGS Members Receive Awards from AAPG

The AAPG Executive Committee has selected several HGS members to receive awards at the annual meeting in 2007. The recipients and the awards are listed below.

**John J. Amoruso** will receive the *Michel T. Halbouty Outstanding Leadership Award*.

**Arnold H. Bouma** will receive the *Sidney Powers Memorial Award*.

**Steven H. Brachman** will receive the *George C. Matson Award*.

**Marlan W. Downey** will receive the *Honorary Member Award*.

**Richard D. Fritz** will receive the *Special Award*.

**Erik P. Mason** will receive the *Distinguished Service Award*.

**Marcus Milling** will receive the *Special Award*.

**Dan B. Steward** will receive the *Outstanding Explorer Award*.

**Daniel L. Smith** will receive the *Honorary Member Award*.

In addition the following award recipients have local connections.

**Janok Bhattacharya**, Professor, University of Houston, is one of three recipients of the *AAPG Grover E. Murray Memorial Distinguished Educator Award*.

**Michael J. Economides**, professor at the Cullen College of Engineering, University of Houston, will receive the *Geosciences in the Media Award*.

**Peter T. Flawn**, President Emeritus at the University of Texas at Austin, will receive the *Public Service Award*.

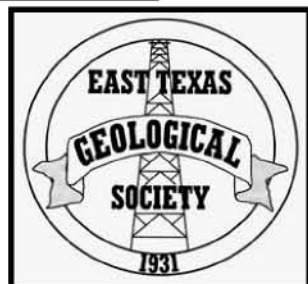
**John C. Lorenz**, author of the invited technical paper for the September, 2006, issue of the *HGS Bulletin*, will receive a *Distinguished Service Award*.

**Amos Salvador**, Emeritus professor at the University of Texas at Austin, will receive the *Robert H. Dott, Sr. Memorial Award*.

Congratulations to all from the *HGS Bulletin*!



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## Engineering and Completion

*Completion and Fracturing Methods for the Cotton Valley Bossier*  
Stephen Wolhart – Pinnacle Technology

*Evaluation of Travis Peak Gas Reservoirs, Western Margin of the East Texas Basin*  
Yamin Li – Texas A&M University

*Textural Petrophysics—Pore Size to Success*  
Dwayne Weaver – NuTech

## Woodbine and Eagleford

*Deep Downdip Woodbine Play, South Sabine Uplift*  
Fred Byther – Oracle Petroleum

*BSR Field Environment of Deposition and Reservoir Character*  
Bo Henk – Matador Resources

*Maness, Woodbine, and Eagleford South of the Sabine Arch, Tyler County, Texas*  
Mary Barrett – Centenary College of Louisiana

## Cotton Valley Stratigraphy

*Petroleum Systems in the North Central and Northeastern Onshore GOM*  
Ernie Mancini – University of Alabama

*Modeling the Burial and Thermal History, Organic Maturation and Hydrocarbon  
Expulsion of the Mesozoic Strata in North Louisiana*  
Roger Barnaby – Louisiana Geological Survey

## East Texas Cotton Valley

*Overton Field: Is Horizontal Drilling an Option in the Cotton Valley?*  
Nick Pollard – CW Resources

*Reservoir Characterization of the Cotton Valley – East Texas Basin*  
Bo Henk – Matador Resources

*Image Log interpretation of the Cotton Valley – Overton Field*  
Hermann Homann – Fronterra Integrated Geosciences

*Source Rock Stratigraphy – Bossier Shale*  
Jennie Ridgely – United States Geological Survey

*Troup and Overton Cotton Valley Fields*  
Matt Williams & Bob Hulse – Southwestern Energy Production

*Origin of the Sabine Uplift and it's Role During Cotton Valley Deposition*  
Rich Adams – Carr Resources Company



# HGS Welcomes New Members

Effective October 3, 2006

## ACTIVE MEMBERS

James Bikun  
Benjamin Burke  
David Derbecker  
Gaylon Freeman  
Henry Gardner  
Matthew Gentry  
Laurie Green  
Richard Hibbard  
Pamala Jackson  
Ravi Kommatjosyula  
Tony LaPierre  
Yardenia Martinez  
Joseph Mendenhall

Fausto Mosca  
Daniel O'Dell  
Andrew Palfrey  
Pradeep Patel  
Sue Pritchett  
Megan Potter  
Jim Raisanen  
Doug Rofheart  
Wendy Russell  
Allan Schlosser  
William Skillman  
Catherine Stahn  
Trish Sullivan  
Tom Talley

Brian Velardo  
David Walsh  
Becky Watson  
William Whaling  
Thomas Wingate

## ASSOCIATE MEMBERS

Avijit Ghosh  
John Springman  
William Yow

## STUDENT MEMBERS

Erin Eastwood  
Amy Noack

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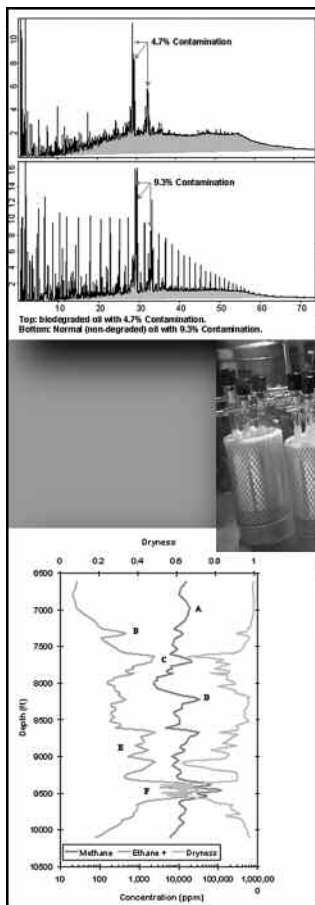
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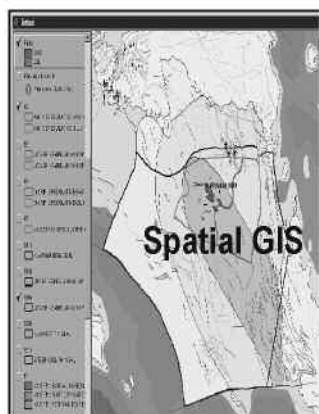
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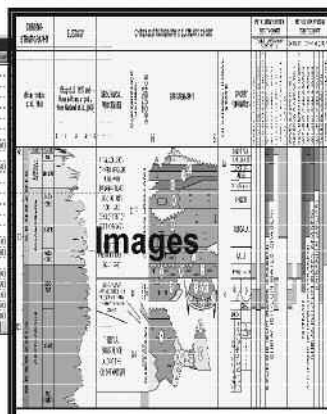


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Course Number	Start Date – Semester	Course Title and Instructor(s)
1	8-Jan-07 – Spring	<b>4382 Introduction to Petroleum Geology</b> Drs. Van Nieuwenhuise and Bhattacharya
2	5-Feb-07 – Spring	<b>6358 Terrigenous Depositional Systems</b> Dr. William Dupre'
3	5-Mar-07 – Spring	<b>6363 Carbonate Depositional Systems</b> Dr. Chafetz
4	2-Apr-07 – Spring	<b>6380 Sequence Stratigraphy</b> Dr. Janok Bhattacharya
5	7-May-07 – Summer	<b>6355 Applied Biostratigraphy</b> Dr. Don Van Nieuwenhuise
6	9-Sep-07 – Summer	<b>6350 Advanced Structural Geology</b> Dr. Mike Murphy
7	9-Jul-07 – Summer	<b>4378 The Seismic Exploration Method</b> Dr. Zhou
8	6-Aug-07 – Summer	<b>6390 3D Seismic Interpretation: Mapping Structure and Stratigraphy</b> Dr. Kurt Marfurt
9	9-Sep-07 – Fall	<b>6393 3D Seismic Interpretation II: Estimating Lithology and Hydrocarbons</b> Dr. Fred Hiltebert
10	1-Oct-07 – Fall	<b>6397 Petrophysics and Formation Evaluation</b> Mr. Mark Holz and Dr. Kurt Strack
11	5-Nov-07 – Fall	<b>Tectonics and Sedimentary Basins</b> Dr. John Dewey
12	3-Dec-07 – Fall	<b>6397 Principles and Practices of Petroleum Geochemistry</b> Dr. Adry Bissada
13	7-Jan-07 – Spring	<b>Capstone Preparation and Presentation</b> Faculty
	2-Feb-08 – Spring	<b>Graduation</b> Faculty and Administration

## *On the Lighter Side*

by *Charles Rivella*

### The Pterosaur of Ptexas

Of all the saurians that made the Mesozoic scene,  
Like *Stegosaurus* (stupid) and *Tyrannosaurus* (mean),  
*Brontosaurus* (greedy, and the no. 1 in size),  
My favorite is the *Pterosaur*, of friendly Ptexas skies.

Some 60 million years ago, above the bleak pterrains,  
This monstrous creature glided like a strange unearthly plane.  
He had a prickly ptake-off when departing on a ptrip,  
For his wingspan measured 47 feet from ptip to ptip.

Out in front he had a set of quite unbirdlike pteeth,  
No feathers had this proto-bird, above or underneath.  
His wings were merely skinny flaps, much like a leather sail.  
The landing gear was primitive—the creature had no ptail.

His head was ornamented with a pointed bony crest,  
His scrawny neck was hardly more than functional, at best.  
In fact, his whole construction was dynamically wrong,  
But this he didn't notice as he Ptero-soared along.

Oh, the eagle is a might bird, he is our symbol bold,  
The condor wheels majestically above the mountain's fold,  
The albatross can cruise a thousand miles across the sea —  
But the Pterosaur of Ptexas is the only bird for me!\*

\*\*\*\*\*

\*If you are really depraved and can carry a tune, you can sing this to "The Yellow Rose of Texas" Permission to reprint the poem in a newsletter was also given to a group of sailplane pilots. It seemed appropriate; they were planning a national soaring contest—in Texas.

From *Pandora's Bauxite: The Best of Bates, Selections from The Geologic Column 1966-1985*, by Robert C. Bates.

Submitted by Charles Rivella with permission from the American Geological Institute.

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37 years  
2005

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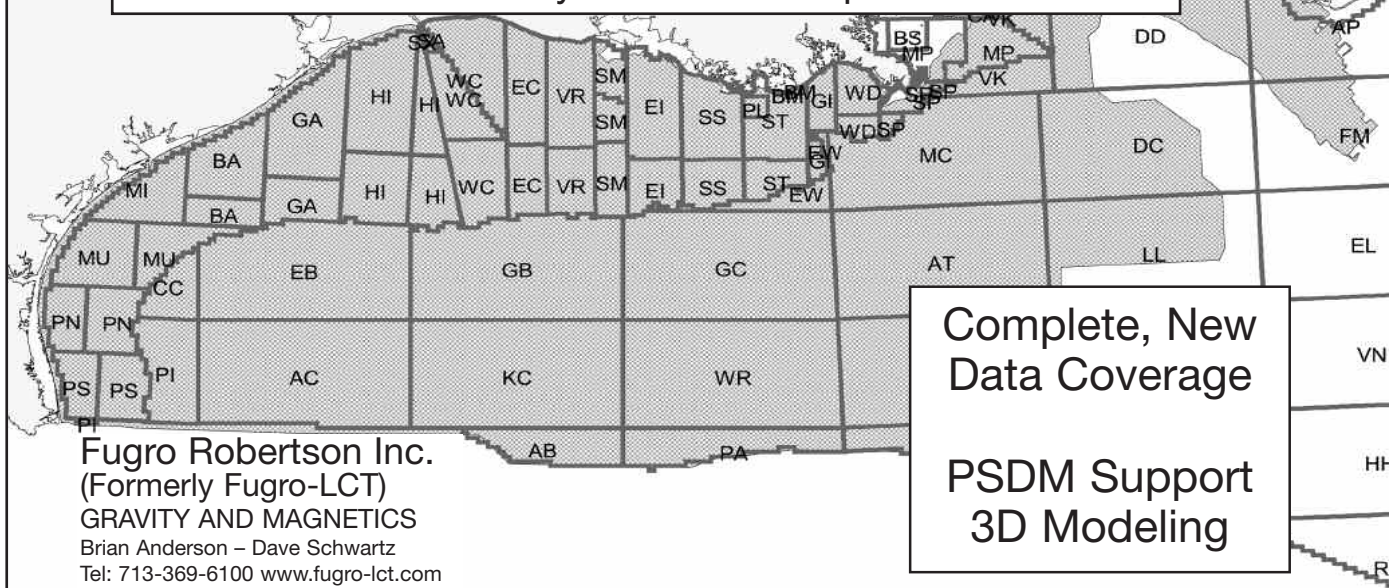
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# Government Update

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

## TBPG News

### Firm Registration and Continuing Education

The Texas Board of Professional Geoscientists (TBPG) firm registration and continuing education program began on September 1, 2006. You can find information on firm registration, including the registration form at: <http://www.tbpg.state.tx.us/firm20registration.html>. You can find information on the continuing education program at: <http://www.tbpg.state.tx.us/continuing20education.html>

### New Vice-Chairman

The TBPG voted and approved a new Vice-Chairman. Y. Lynn Clark, who has been a TBPG Board member since April 4, 2005, was voted in as Vice-Chairman at the August 18, 2006 Board Meeting.

## TCEQ News

### New TRRP Rules Proposed

The Texas Commission on Environmental Quality (TCEQ) has proposed changes to the Texas Risk Reduction Program (TRRP). The TCEQ has noticed errors (misspellings, typographical,


mathematical) in the rule that need to be corrected, as well as provisions that either need clarification or modification to facilitate consistent and effective rule application. Additionally, the TCEQ has reevaluated some policy positions reflected in the current rules and desires to modify the rules in light of that, or has developed new positions and procedures in guidance that were previously unaddressed by the rules, but are now ripe for inclusion in the rules. Finally, the TCEQ is proposing new rule provisions in support of a new electronic data management system initiative and expanded use of geographical information system technology to increase agency effectiveness and institutional memory as well as to improve the public availability of technical information stored at the agency. For all of these reasons, these amendments are proposed and can be found at: <http://www.sos.state.tx.us/texreg/sos/PROPOSED/30.ENVIRONMENTAL20QUALITY.html#159>

### New MSW Landfill Rules Adopted

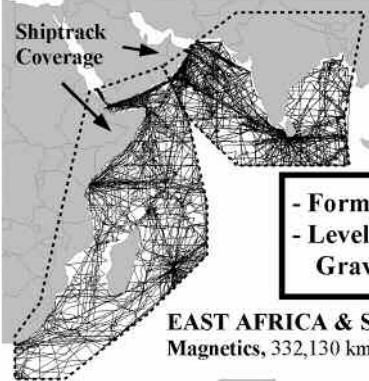
House Bill (HB) 2131, 79th Legislature, 2005, amended Texas Health and Safety Code (THSC), Chapter 361, Subchapter C, by adding §361.0855 to allow

**Government Update** continued on page 51

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political subdivisions or quasi governmental entities to rely on their own financial strength to demonstrate financial assurance. Under prior law, a municipality that owned a municipal solid waste (MSW) landfill could satisfy the requirements to demonstrate financial assurance by using a local government financial test; however, other political subdivisions, such as local government corporations and conservation and reclamation districts, could not. Administrative changes have been made throughout the rules to be consistent with Texas Register requirements and agency guidelines. The adopted rule changes are located at: <http://www.sos.state.tx.us/texreg/sos/adopted/30.ENVIRONMENTAL 20QUALITY.html#357>

### Texas One Call Number

The FCC's implementation of 811 as a nationwide number for "call before you dig" is scheduled for April 13, 2007. However, this deadline may be extended for Texas. In addition, you can now order line locations over the internet at [www.digtess.org](http://www.digtess.org). DIG TESS has two services available, ELocate and GeoRemote.

ELocate allows you to enter the locates without spending time writing or typing out faxes. You can also enter multiple locations.

GeoRemote allows you to enter locate requests using the same program as those at DIG TESS. You will be able to use the same maps the DIG TESS Center uses, reducing confusion about locations.

Both of these services are free.

### Brownfields Redevelopment Act Reauthorized

The U.S. House of Representatives Transportation and Infrastructure Committee reauthorized the Small Business Liability and Brownfields Redevelopment Act on July 19, 2006. The brownfields law originally signed by President George W. Bush in 2002 is set to expire at the end of this year. The act has been reauthorized for \$200 million over the next six years for brownfields assessment and cleanup funds along with money for state programs. One major change proposed in the bill from the existing program is the elimination of the set aside for addressing petroleum contamination. The measure has also been referred to the House Energy and Commerce Committee.

Government Update continued on page 53

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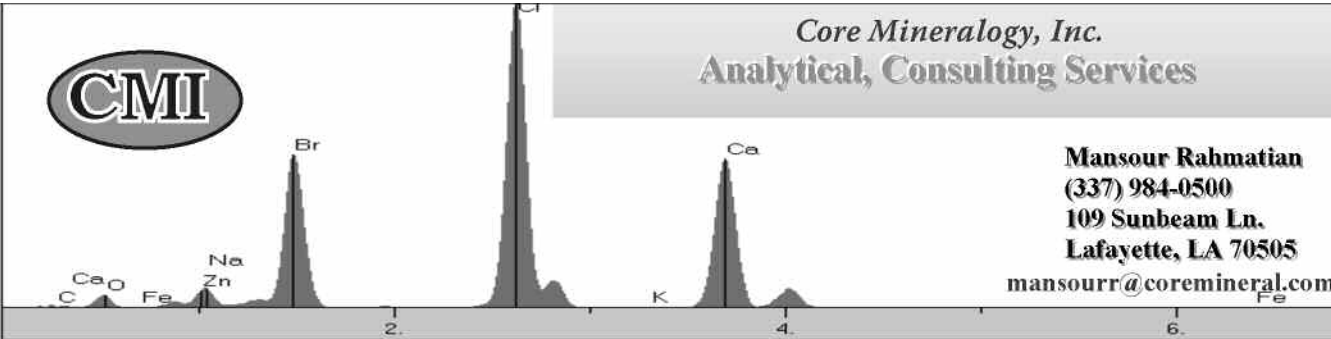
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Photo courtesy Parker Drilling

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### AGI Government Affairs Monthly Review (August 2006)

U.S. Department of Energy Will Fund Two New Bioenergy Research Centers. The Department of Energy's Office of Science is accepting applications from universities, national laboratories, nonprofit agencies and private firms to develop up to two new Bioenergy Research Centers as part of the Office's Genomics: GTL Program. The centers will direct research towards developing the science of biofuels in order to create cost-effective alternatives to gasoline. Each Center will receive \$125 million over five years and will have access to DOE scientific instruments and facilities as needed. Potential applicants should submit a letter of intent by December 5, 2006. Full applications should be received by February 1, 2007. For more information, visit DOE's Office of Science at: [www.science.doe.gov](http://www.science.doe.gov).

### From the Federal Register:

DOE: The Office of Energy Efficiency and Renewable Energy has issued a final rule for the Renewable Energy Production Incentives (REPI) program. The rule incorporates minor statutory changes, including expansion of applicable renewable energy technologies. For further information, contact Daniel Beckley at 202-586-7691. [Federal Register: August 14, 2006 (Volume 71, Number 156)]

DOI: The Minerals Management Service has issued a request for comment on the 2007 – 2012 Oil and Gas Leasing Program proposal. The proposal outlines a total of 21 outer-continental shelf lease sales in Alaska, the Gulf of Mexico and off the Atlantic Coast. The proposal may be downloaded and viewed at <http://www.mms.gov>. Send comments electronically to: <http://www.mms.gov/5-year/2007-2012main.htm> no later than November 24, 2006. For further information contact Renee Orr at (703) 787-1215. [Federal Register: August 25, 2006 (Volume 71, Number 165)]. ■

### Check out the New HGS Message Board

<http://www.neogeos.org>

- Online discussions
- Event information and announcements
- Virtual networking
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Sponsored by Houston Geological Auxiliary Committee  
Friday December 1, 2006 12:00 PM to 5:30 PM

## Sugar Creek Country Club

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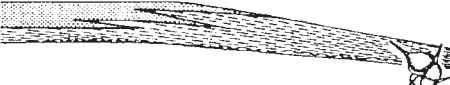













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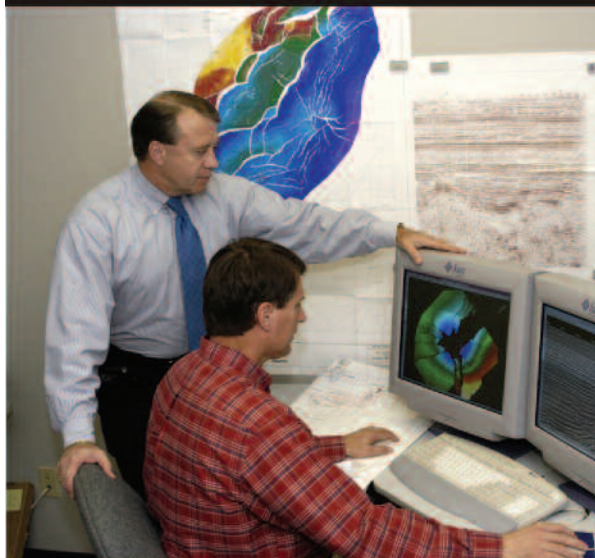
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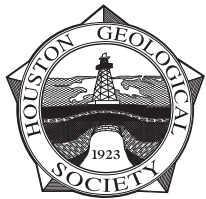
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