



# HGS Bulletin

Volume 53 Number 7

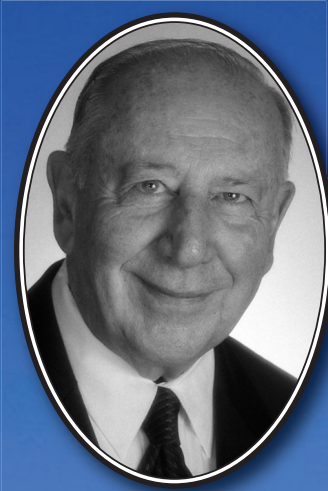
Houston Geological Society

March 2011

## HGS LEGENDS *Night*

An Evening with the Legends of HGS

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## ECONOMIC LIMITS TO OIL SUPPLY: A NON-HUBBERT CURVE VIEW

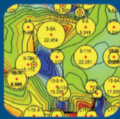
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# The Bulletin

## Houston Geological Society

Volume 53, Number 7

March 2011

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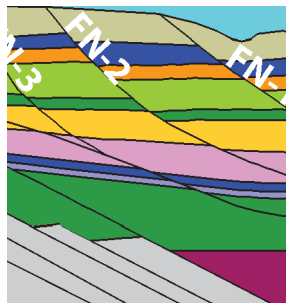
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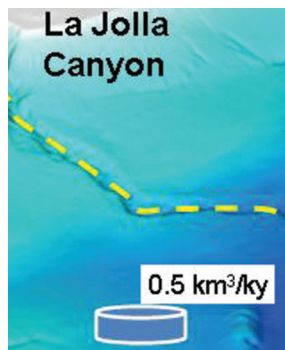
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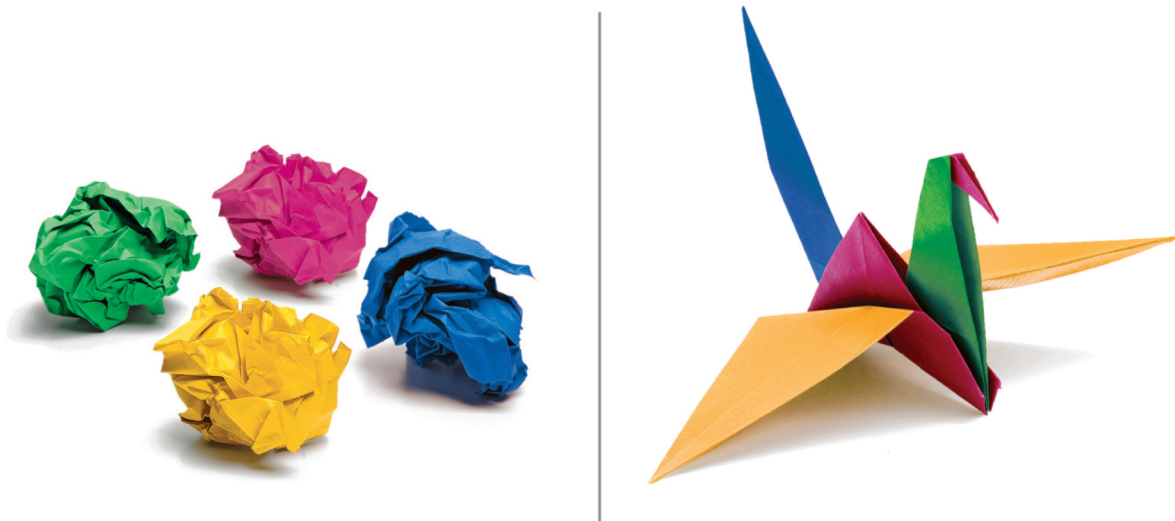


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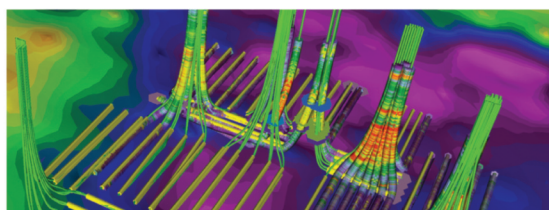
**About the Cover:** Vision Operating Company Rice University #1 well drilling Austin Chalk-Woodbine objectives in Tyler County, Texas, January 2009. *Photo by Arthur E. Berman.*



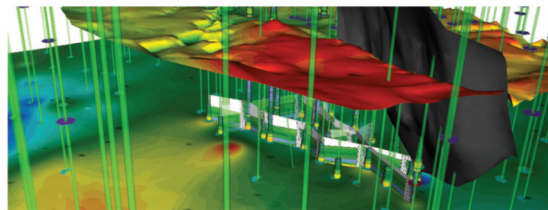
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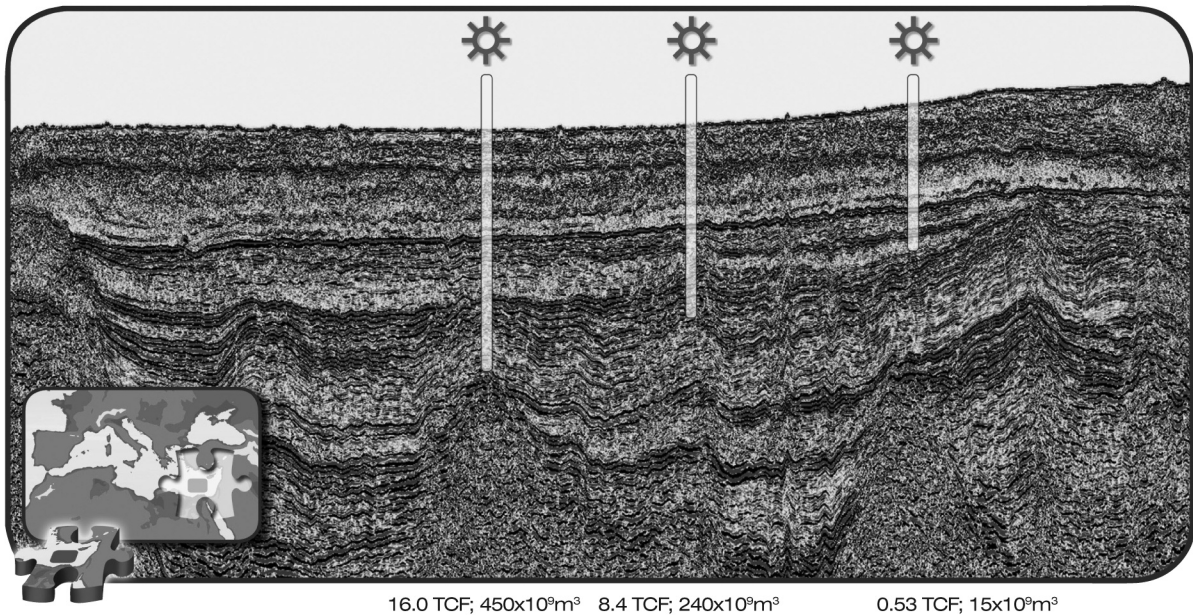
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# Solved: The exploration puzzle in the East Mediterranean...

...three world class gas discoveries.

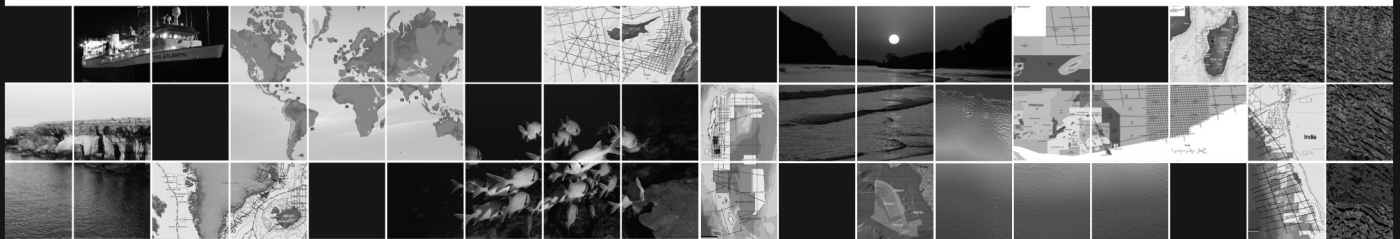


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**John Tubb, Jr.**  
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## Looking for Options to Grow

Last month's President's Letter dealt with a chart showing the number of members by year for the AAPG and HGS and the real and inflation-adjusted price of crude oil between 1982 and 2009. This month we will look at a chart showing energy companies in Houston with a breakdown of the number of HGS members versus the number of AAPG members who do not belong to HGS. Again, I am grateful to **Greg Murrie** of Inexs for providing the graphics work.

The chart shows there are 7 companies that have more HGS members than AAPG members and 16 companies with the reverse relationship. These numbers are based on 2008 membership. The chart shows a large number of AAPG members not in HGS for Chevron and Exxon. This may be due to employees who

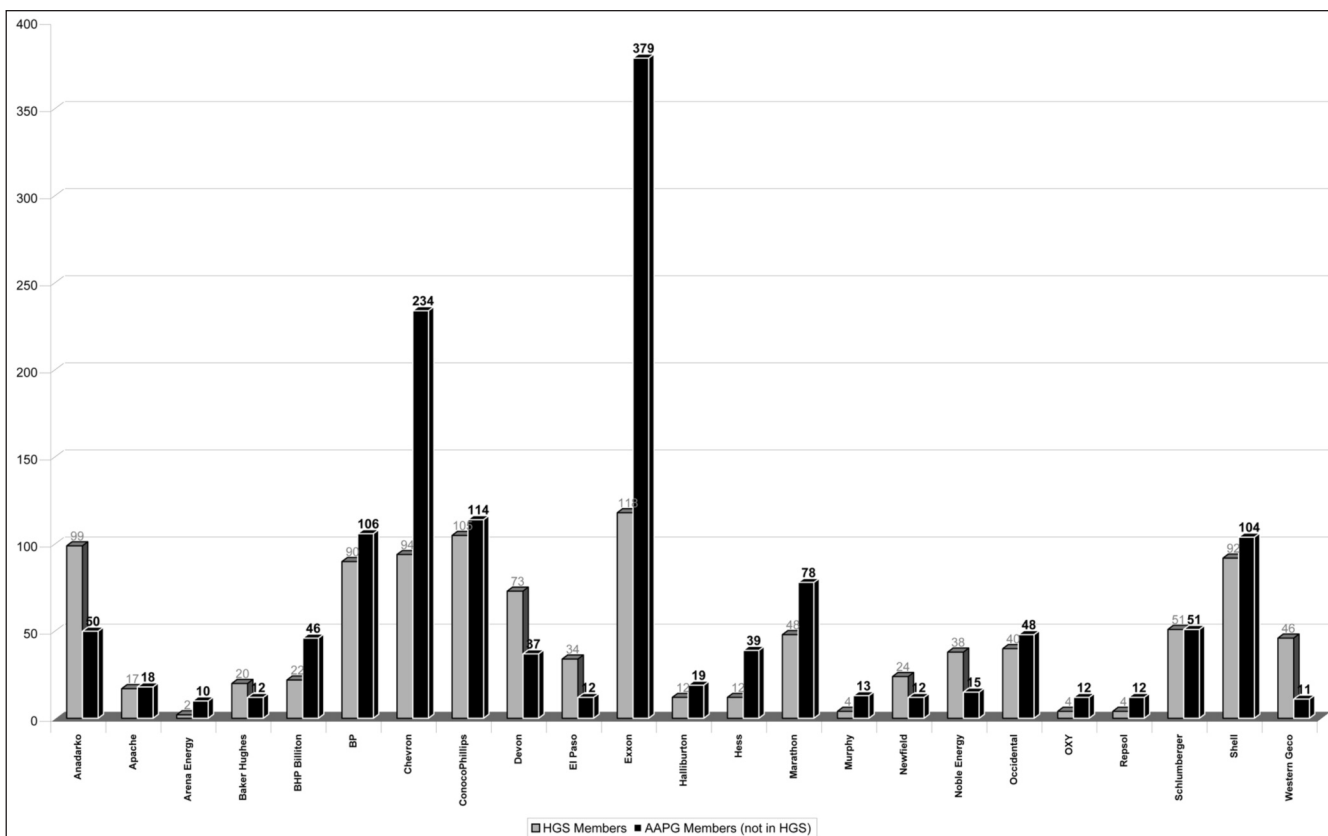
work internationally but have Houston as their mailing address. In an ideal world, there would be no AAPG members in Houston who are not HGS members. Why this happens is not readily apparent to me. As I wrote last month, our membership problems could be apathy of geoscientists today or lack of encouragement by oil companies' management, or both. When I first started working in the oil patch, we were encouraged by management to join both AAPG and the local geological society. At that time the companies paid for annual dues to both organizations as well as the monthly dinner meetings. Geoscientists were sent to national conventions on a rotating basis.

*The Board is in the process of evaluating what we have done and what we need to better.*

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Letter from the President continued on page 9



# UPCOMING EDUCATION SCHEDULE

## SHORT COURSES

Basic Well Log Analysis July 18 – 22  
**Denver, Colorado**

## FIELD SEMINARS

Seismic Interpretation of Compressive Structures July 16 – 22  
**Canada**

Fractures, Folds, and Faults in Thrusted Terrains July 18 – 23  
**Montana**

## LAST CHANCE

Field Safety Course for Field Trip Leaders March 31 – April 1  
**Houston**

The Applications of Geomechanics in Unconventional Resources April 9 – 10  
**Houston (With Annual Convention)**

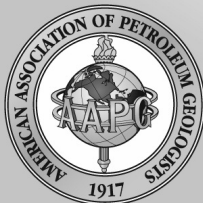
Decision-Making in E & P April 14 – 15  
**Houston (With Annual Convention)**

Natural Fractures in Hydrocarbon Reservoirs April 14 – 15  
**Houston (With Annual Convention)**

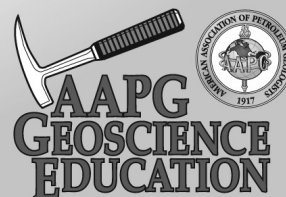
Deep-Water Siliciclastic Reservoirs April 14 – 19  
**California**

Modern Terrigenous Clastic Depositional Systems April 27-May 4  
**South Carolina**

Clastic Reservoir Facies and Sequence Stratigraphic Analysis of Alluvial-Systems  
 Plain, Shoreface, Deltaic, and Shelf Depositional April 30-May 6  
**Utah**



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Information:**



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 Download a registration form at <http://www.aapg.org/education/index.cfm>





**Barry Katz**  
BJKatz.HGS@gmail.com

## A Great and Unique Opportunity

The Annual AAPG Convention is a little more than a month away and I am proud to report that our HGS membership was heavily involved with the convention organization. Why do so many people become involved with the organization of such a meeting? In large part I believe that this volunteerism is a result of their shared interest in providing a broad range of opportunities to their fellow members of the profession. What are some of these opportunities? The annual convention provides the perfect environment for networking, a “one stop shop” for learning what’s new in our specialties, and expanding outside of our technical domains and specialties. The ability to expand our knowledge base, outside of our usual job responsibilities may be of the greatest value because it is often difficult to justify a class or conference to management which might not impact everyday activities. However a session or two at a major meeting is one way to accomplish this without that management pushback.

Now a little more thought on the opportunities available at the upcoming meeting, including how I plan the time I spend at AAPG.

In a world where virtual networks such as Facebook and Linked-In are growing exponentially, it is important to remember just how important face-to-face communication remains. The “social” part of the convention provides an opportunity for building one’s network. The value of a network does not rest simply with the number of connections, but rather in the interaction among the members of the network: obtaining and providing solutions to problems, and providing necessary contacts. Although a growing number of the interactions associated with professional networks may be virtual, the usefulness of a network is heavily dependent on trust, which is most often established through face-to-face interactions. What better time than at this year’s convention! Consider targeting some people to add to your network. Check the program. See where and when you might find them to make that important initial contact. Connections that you make this year may be important five years in the future, so value all of your contacts.

*the perfect environment for  
networking, a “one stop shop”  
for learning what’s new in  
our specialties, and expanding  
outside of our technical  
domains and specialties*

This year’s technical program provides many of those learning opportunities that I keep espousing. I spent some time over the last few days reviewing this year’s technical program. I must first compliment the committee. The program is diverse in content as well as format, with something for everyone. I developed a game plan to determine how I will be spending my three days at the George R. Brown Convention Center. I have decided to balance

my time between strengthening my core area, expanding my technical understanding of areas that I have recently begun working in, and gaining a basic understanding in a few areas that just seem to be interesting. The Convention is providing me with several ways to tackle my professional growth. You will most probably find me in a few of the forums where different perspectives will be debated amongst panel members, especially in those where I anticipate some very divergent opinions.

I am particularly interested in those dealing with unconventional resources. Some of the oral sessions in my areas of expertise are also in my plan. These sessions provide the opportunity to see what is new, what has changed, and meet those working in my field. I also generally volunteer to judge those sessions. I view judging as an opportunity to truly think about what is being said and how it is being said and provide some feedback. There are also some sessions where my interest is in specific talks and I will pop in and out of those sessions. These talks tend to fall into three categories: 1) something outside my technical specialty but related and may potentially impact how I do my job, 2) an interesting title or well known presenter irrespective of the topic, and 3) supporting friends and colleagues. I will also be wandering the poster sessions. Over the course of time I have come to believe the posters are more informative than the oral sessions largely because of the potential for interaction, not only with the author but with others that are interested in the presentation.

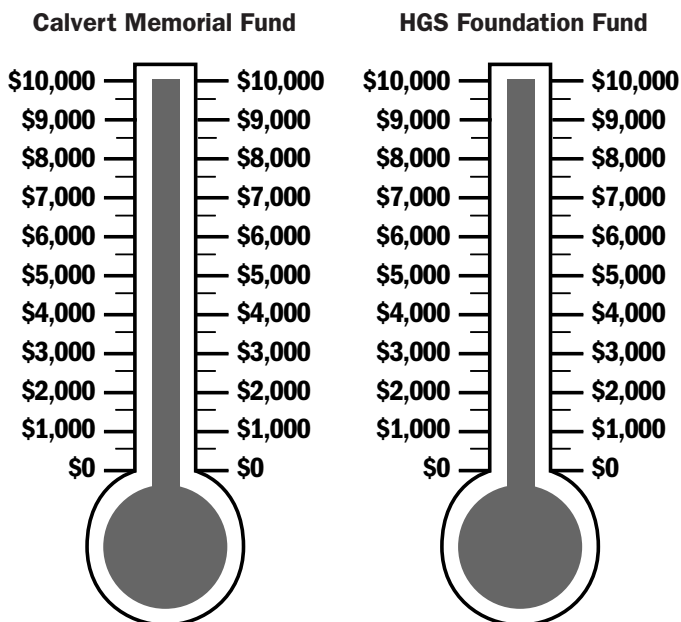
This is my plan for attending the conference. I offer my thoughts to encourage others to give consideration to the time they spend at the meeting. We will see how my plans workout this year. By the way, last year, I shared my thoughts on how I was going to approach the New Orleans meeting. I did

**Letter from the Editor** continued on page 9

# GCAGS and HGS Matching Scholarships Fund

In April, the GCAGS announced a program to match, dollar for dollar, any donations received for scholarship programs of member societies. The program runs from January 1, 2010 through June 30, 2011 and is subject to a cap of \$10,000. The HGS received two \$10,000 matching scholarship donations. The HGS Board voted in May to also match this program for funds raised for the Calvert Memorial Fund (scholarships to graduate students) and the HGS Foundation Fund (scholarships to undergraduate students). This means that for every \$1 received in direct donations during the program, our local scholarship funds will receive \$3. What a deal! Please consider making a donation to help our scholarship funds take maximum advantage of the match program. Just fill out the form below and mail to HGS along with your check. Or you can go to the HGS Webpage, clicking on *Donate to the HGS Scholarship Funds* and follow directions to donate. ■

**Send check and form to: HGS Office, HGS Matching Scholarship Fund, 14811 St. Mary's Lane, Suite 250, Houston, Texas 77079**  
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The Thermometer Chart above shows the relative amount of money (in \$1,000 increments) that each Fund has raised toward the GCAGS and HGS matching grants.

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## Letter from the President continued from page 5

It is apparent that our methods for recruiting and retaining members are not working. The Board is in the process of evaluating what we have done and what we need to better. This month (March) we will meet with a marketing professor from the University of Houston to get advice on ways to combat this problem.

On a different note, **Rosemary Laidacker** and her Continuing Education Committee have arranged to offer a “Quality Control

for Subsurface Maps” short course by **Dan Tearpock**, Chief Executive Officer of Subsurface Consultants & Associates, LLC (SCA), on March 9<sup>th</sup>, 2011, at the Marathon Building. This is an excellent short course, especially for younger geoscientists.

Remember to register for the AAPG Convention to be held in Houston on April 10-13. ■

*Laissez les bon temps rouler!*

## Letter from the Editor continued from page 7

follow through on ensuring that the meeting was a broadening opportunity.

I would like to offer a few more thoughts for you to consider. With this year’s AAPG meeting soon to be history, start considering how you may become involved with the next two AAPG Conventions scheduled for Houston, between now and 2017. These meetings just don’t happen by themselves; volunteers are needed at multiple levels.

I know that since becoming Editor I have asked you to consider becoming a volunteer and mentor, but I have at least one more selfish request. Please join us at the Opening Ceremony for this year’s convention. Yes there is an actual event before the Ice Breaker. Several HGS members will be recognized by the Association and it would be great to fill the hall.

I hope to see you at the George R. Brown! ■

*Until next month...*

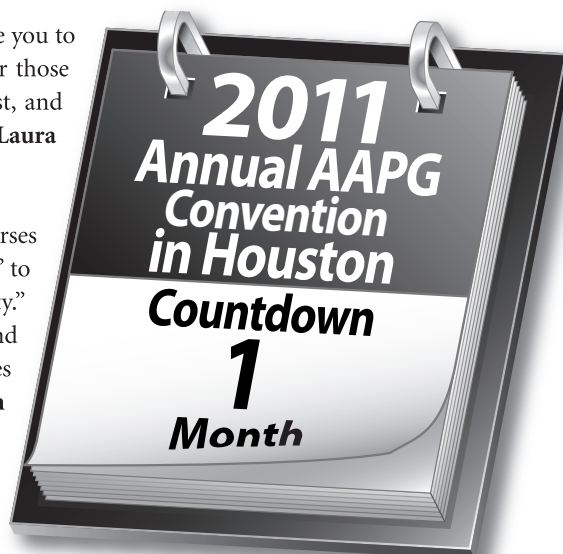
## Calling All Life-Long Learners! *Are you a Student? A Young Professional? Midcareer? Seasoned Professional? Perpetually Curious?*

If so, AAPG field trips and short courses await you at the Annual Convention & Exhibition in Houston in April. This year’s lineup has been put together by HGS members serving on the AAPG ACE Organizing Committee under the leadership of General Chair **Steve Levine** (ConocoPhillips) and General Vice Chair **Marsha Bourque** (Marsha Bourque and Associates).

An invigorating array of Pre- and Post-Convention Field Trips will take you to outer space and back if you like—just sign up for the NASA tour. For those who are more down to Earth, consider trips to Belize, the Gulf Coast, and Central Texas. Field Trip Co-Chairs are **Mike Sweet** (ExxonMobil) and **Laura Banfield** (BP) with SEPM Field Trip Chair **Kirt Campion** (Marathon).

If you prefer to learn in the classroom, 12 Pre-Convention Short Courses cover everything from “Seismic Interpretation for Young Professionals” to “Utilization of Conventional Core for Reducing Geologic Uncertainty.” Post-Convention Short Courses cover hydraulic fracturing, resources and reserves, decision making in E&P, and natural fractures. Short Courses Co-chairs are **Denise M. Stone** (Geological Consultant) and **Gretchen Gillis** (Aramco Services Company) with SEPM Short Courses Chair **Jeff Lonnee** (Shell).

There’s something for everyone. Space is limited, so register before 14 March! ■



The Houston Geological Society Continuing Education Committee Presents



## Quality Control for Subsurface Maps (QLTs)

Formerly Known as Quick Look Techniques

A one-day short course offered by Dan Tearpock, Chairman/CEO  
Subsurface Consultants & Associates, L.L.C.

**March 9, 2011 • 8 a.m. – 5 p.m. • Course CEUs: 0.8**

**Don't be too quick to drill that next dry hole. Success is not the result of serendipity, but is based on solid scientific work.** This course addresses the need for a systematic approach for quickly screening interpretations, maps, prospects, and potential resources or reserves and identifying fundamental interpretation, mapping, and estimating errors. The reverse application of methods and techniques as presented in our courses, such as Applied Subsurface Geological Mapping and Advances Structural Geology, is the core of this course. **The most common errors found on subsurface interpretations and maps are illustrated with numerous examples from around the world.**

The course begins with a review of examples of interpretation and mapping errors that led to poorly located wells that are uneconomic or dry, as well as inaccurate reserves or resources estimates. Methods used to address the risk factors that can cause dry holes are reviewed. The participants are then challenged with a series of real exploration and development prospects. The participants are to evaluate each project. After their evaluation, the projects are reviewed and the QC techniques that are applicable to evaluate each project are discussed. A course manual, including the challenging projects with solutions, is provided for this course.

### Learning Outcomes:

1. Develop an understanding of how to evaluate a variety of subsurface maps including fault, structure, and isochore maps.
2. Understand the types of questions to ask when reviewing interpretations, maps, and prospects.
3. Evaluate the 3-D viability of an interpretation, map, or prospect.
4. Evaluate whether the resources or reserves attributed to a completed interpretation or map are under- or over-estimated.
5. Determine whether an interpreter has applied sound, industry accepted, geoscience principles and methods to generate an interpretation, map, or prospect.

### Who should attend:

Prospect generators, exploration and development geoscientists, property and prospect evaluators, supervisors, managers, bankers, investors, and anyone involved in preparing, reviewing, or evaluating subsurface interpretations, prospects, fields, and reserves or resources.

### Course Info

- Quality Assurance/Quality Control overview with examples
- Philosophical doctrine of subsurface interpretation and mapping
- Dry hole analysis
- Effect of hand and computer contouring methods in generating maps
- **THE PROJECT CHALLENGES** — A series of projects are presented for the participants to evaluate the following aspects of geology dealing with interpretations, maps, and prospects.
  - Fault surface maps      - General structure maps      - Faulted structure maps
  - Directional wells      - Isochore maps used for resources or reserves estimates
  - An introduction to seismic and structural geology Quality Control      - Techniques
- Conclusions and wrap-up

**Location:** Marathon Oil Building • 5555 San Felipe Road • Houston TX 77056

**Please make your reservations on-line through the Houston Geological Society website at**  
**[www.hgs.org](http://www.hgs.org)**

For more information about this event, contact HGS Office • 713-463-9476 • [office@hgs.org](mailto:office@hgs.org)

**Pricing** Registration fee includes, as usual, a notebook, coffee breaks with pastries, and lunch.

	Prior to midnight Wed., March 2, 2011	After midnight Wed., March 2, 2011
HGS or GSH Member:	\$85.00	\$105.00
Emeritus/Honorary Member:	\$45.00	\$45.00
Non-Member:	\$105.00	\$125.00
Student Member*:	\$45.00	\$45.00
Student Non-Member*:	\$57.00	\$57.00

\*A valid, current university/college student ID will be required for admittance at the student price. There is a limit of 10 student enrollments at the reduced price.

**The registration cutoff is Midnight March 7, 2011**

**Speaker Biography**



**Daniel J. Tearpock, Subsurface Consultants & Associates, L.L.C.**

Chairman/CEO – Serves in the role of Chief Executive Officer of Subsurface Consultants & Associates, LLC (SCA), which is an international petroleum consultancy and training firm headquartered in Houston.

As a working geoscientist, Mr. Tearpock has generated numerous exploration and exploitation prospects, either as the sole generator or as part of an organized multidisciplinary team. He is the co-author of three textbooks: "Applied Subsurface Geological Mapping" (1991), "Quick Look Techniques For Prospect Evaluations" (1994), "Applied Subsurface Geological Mapping With Structural Methods" (2003), as well as numerous technical articles. Mr. Tearpock was a finalist in 1996 and 1998 for the Ernst & Young Entrepreneur of the Year program and in 1998 received the Distinguished Service Award from Bloomsburg University, Bloomsburg, PA. He holds a bachelors degree in geology from Bloomsburg University, 1970 and a masters in geology from Temple University, 1977. He is an AAPG/DPA Certified Petroleum Geologist No. 4114, State of Texas Licensed Geologist No.2660 and SIPES Certified Earth Scientist No. 3015.

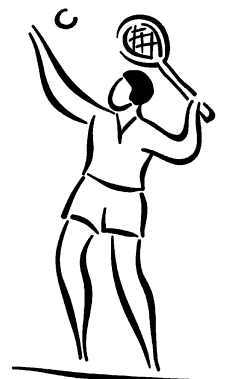
Mr. Tearpock is a member of numerous scientific associations including the AAPG, SPE, SIPES, SEG, GSA, HGS, EAGE, NOGS, LGS, IPA, SEAPEX and PESGB. He served as President of the AAPG's Division of Professional Affairs. He is a founding member and has served as Vice-Chairman of the intersociety "Joint Committee on Reserves Evaluator Training" (JCRET). The member societies represented on JCRET include the AAPG, SPE, SPEE and WPC.



## HGS Tennis Tournament

*Friday, April 15<sup>th</sup>, 2011*

Houston Racquet Club  
10709 Memorial Drive  
11:30 a.m. until 5:00 p.m.



**Registration Fee is \$50. Registration Deadline is April 8<sup>th</sup>.**

This will be a round-robin tournament. Prizes will be awarded for first and second place in each division. Divisions may be combined based upon number of players. Door prizes will be awarded by blind drawing. All competitors are automatically entered into the door prize drawing, but you must be present to win.

Lunch will be provided prior to the event. Refreshments will be available throughout the day.

**For more information, contact: Steve Brachman at 713-268-8810 or sbrachma@petrohunt.com**

### HGS TENNIS TOURNAMENT REGISTRATION FORM

Name: \_\_\_\_\_ Company: \_\_\_\_\_

Email: \_\_\_\_\_ Phone: \_\_\_\_\_

Division (Circle one):    **A**        **B**        **C**    USTA Rating (if known) \_\_\_\_\_

Registration Fee: **\$50** + Sponsor Contribution: \$ \_\_\_\_\_ = Total: \$ \_\_\_\_\_

**Make Checks Payable to: The Houston Geological Society.**

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Attn: Steve Brachman, HGS Tennis Tournament

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# *HGS Undergraduate Scholarship Foundation Presents Seven Scholarships*

The HGS Undergraduate Scholarship Foundation has been providing scholarships to deserving students since 1984. To date, over \$172,500 in scholarships has been awarded. This year the Foundation awarded scholarships totaling \$11,500 to students from all seven universities participating in our scholarship program. Ted Cross of the University of Texas was awarded the Maby Scholarship, presented each year to the Foundation's top applicant. Foundation Chairman John Adamick presented the scholarships to the recipients at the January 17<sup>th</sup> HGS dinner meeting.

Vitae for our scholarship winners are listed below. These students are to be commended for their accomplishments.



**Edward (Ted) Cross**  
*Maby Scholarship recipient*  
*University of Texas*

Ted Cross is a senior at the University of Texas at Austin majoring in geology and Plan II Honors. He is currently working on his senior honors thesis, studying metamorphic mineral nucleation. He has also done research on carbon dioxide sequestration. Last year, he served as president of UT's Undergraduate Geological Society. He plans to attend graduate school to study structural geology. Mr. Cross also competes on UT's Ultimate Frisbee team and enjoys cooking and traveling. ■



**Katie Mitchell**  
*Stephen F. Austin State University*

Katie Mitchell is a senior at Stephen F. Austin State University, double-majoring in geology and public administration with a minor in mathematics. After graduating from high school, Ms Mitchell joined the Army National Guard and served in multiple deployments, including Iraq (Iraqi Freedom) and New Orleans (Hurricane Katrina). She is an active member of the Geology Students Association and the SFASU student chapters of AAPG and Sigma Gamma Epsilon, while maintaining a spot on the Presidential Honor Roll and the Dean's List. Along with a fellow student, Sherri Dornak, Ms Mitchell is working with Dr. Stafford on two research projects concerning spring hydrogeology in Colorado Bend State Park in central Texas. These projects will be presented at the South Central Geological Society of America meeting this spring. After she graduates from Stephen F. Austin, she plans to attend graduate school and pursue a career in hydrogeology. ■



**Stephanie Wood**  
*Texas A&M University*

Stephanie Wood is a senior geology student at Texas A&M University. She was on the Dean's List and received a departmental scholarship in 2009. Her main activities include being treasurer of the Texas A&M Geology and Geophysics Society and working on her undergraduate research thesis under the supervision of Drs. Ethan Grossman and Mike Pope. This project is a petrographic and stable isotope study of Pennsylvanian (Desmoinesian) mixed-siliciclastic carbonates from east-central Idaho. Thin-section analysis combined with stable isotope analysis and cathodoluminescence techniques will reveal information on the section's diagenetic history. Learning about diagenesis has inspired Stephanie to specialize in carbonate reservoirs when she attends graduate school in fall 2011. Reservoir characterization interested Ms Wood after an internship with BJ Services in 2009, where she worked in the special core analysis lab performing permeability and porosity tests. Her goal is to learn to combine the dynamics of petrophysics with knowledge of carbonates in order to accurately predict reservoir behavior. This summer, she will intern with Occidental Petroleum Corporation, where she will work on a project characterizing a prospect in the Permian Basin. ■



**Therica Grosshans**  
*University of Houston*

Therica Grosshans is a senior at the University of Houston majoring in geology and geophysics. She has consistently received Dean's List honors and is a member of Phi Kappa Phi and Golden Key Honor Societies. Currently, she holds officer positions in two student organizations, as president

**Undergraduate Scholarships** continued on page 15

## 2011 Houston Open Enrollment Course Schedule

**Rose & Associates**

### DHI Interpretation and Prospect Risking

February 1 - 2  
November 7 - 8

### Play Based Exploration

March 21 - 23  
September 26 - 28

### Risk and Uncertainty Analysis for Unconventional Resource Plays

May 2 - 3  
November 29 - 30

### Risk Analysis, Prospect Evaluation & Exploration Economics

May 9 - 13  
October 24 - 28

### Project Risk, Uncertainty and Decision Analysis

November 14 - 17

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- *Elemental (XRF) Analysis*
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# Attributes

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online registration  
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of GeoSociety and treasurer of AAPG Wildcatters. In 2009, she participated in the pilot program of the National Math and Science Initiative's Young Leaders program, where she was partnered with a mentor from ExxonMobil and attended the Fortune's Most Powerful Women Summit as a junior delegate. In May 2010, the Earth and Atmospheric Sciences Department awarded her the outstanding junior scholarship for the 2009-2010 academic year. After she graduates, she plans to attend graduate school and pursue a career in the petroleum industry. ■



**Chris Capps**  
*Sam Houston State University*

Chris Capps is a senior at Sam Houston State University pursuing a degree in geology with a minor in geography, with plans to graduate next August. After a brief stint in the education field, he decided to switch his major to his favorite hobby, geology. He is very active in the Geology Department, instructing students in labs as a teaching assistant, volunteering as a tutor, and participating in the geology club. For his participation and service to the department, he was presented with the exceptional program support award. Chris has received academic recognition on both the Dean's and President's lists at Sam Houston. He plans to join the industry as a geologist after graduation and while pursuing a masters degree. ■



**Steven Boswell**  
*Rice University*

Steven Boswell is a junior at Rice University pursuing a degree in earth science. His focus is in geophysics. He has worked in Dr. Richard Gordon's global tectonics group since the end of his sophomore year. He is currently conducting research on marine magnetic anomalies due to seafloor spreading, the results of which he recently presented at his first AGU Fall Meeting. Mr. Boswell has a strong interest in worldly affairs and maintains balance in his life by studying Mandarin and training for triathlons. He is looking forward to life as a graduate student after graduation in May, 2012. ■



**Lauren Dugat**  
*Lamar University*

Lauren Dugat is a senior at Lamar University double majoring in geology and earth science with a minor in space science. She is active in the department as a lab instructor and is treasurer of the Lamar University Geological Society. Ms Dugat has gained research experience working in the STAIRSTEP program, in which she has worked with Dr. Joseph Kruger on a project measuring the subsidence of the Gulf Coast area. After graduation in August 2011, she plans on attending graduate school in fall, 2011. ■

**JUNE 23-25, 2011**  
**Oil History Symposium and Fieldtrip**  
**CALL FOR PAPERS**

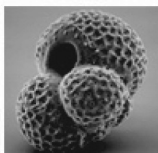
The Petroleum History Institute and its co-sponsors are seeking papers, both oral and poster presentations, for the Symposium and Fieldtrip meeting to be held at Marietta, Ohio, June 23-25, 2011. The Symposium will be held on Friday, June 24<sup>th</sup>, and authors can request either the morning or afternoon sessions. Unless otherwise requested, the oral presentations will be limited to 30 minutes, including a short Q & A. Poster presentations will be mounted on Thursday afternoon and will stay available to the participants until Friday afternoon.

We especially welcome papers about the history of the oil and gas industry in the Ohio-West Virginia regions, but also welcome papers on any subject related to the industry. Authors of accepted papers are strongly encouraged to submit their manuscripts for inclusion in the 2011 issue of *Oil-Industry History*, the only peer-reviewed professional journal devoted exclusively to the history of the international oil and gas industry. For more information, please contact: [wbrice@pitt.edu](mailto:wbrice@pitt.edu)

Please submit abstracts (600 words or fewer) to: W. R. Brice, Editor, *Oil-Industry History*, 116 Luna Lane, Johnstown, PA 15904; or electronically (MSWord file) to: [wbrice@pitt.edu](mailto:wbrice@pitt.edu).

**DEADLINE FOR ALL ABSTRACTS: MAY 1<sup>ST</sup>, 2011.**

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# HGS Welcomes New Members

## New Members Effective January 11, 2011

### ACTIVE MEMBERS

James Anderson	Benjamin Herber
David Armendariz	Matthew Heumann
John Austin	Charles Hooper
John Cravotta	Warren (Johan) Lall
James Davis, Jr	Timothy Lyons
Frederick Ewald	David Maldonado
Emily Foley	Elizabeth McGee
Rosemarie Geetan	Onoriode Okoro
Arijit Guin	Kyle Posey
Martin Hansen	Amanda Raddatz
Randall Hendrix	Bret Rowland

Daniel Sevier
Paul Smith
Barrett Summers
Christopher Thomas
Mark Thomas
Jeffrey Thompson
Tianguang Xu
Ramazan Yilmaz

### ASSOCIATE MEMBER

Lisa Qualls

### STUDENT MEMBERS

Hailey Dugan
Timothy McVey
Bruno Mvoula
Jacob Seigel

### EMERITUS MEMBER

Walter Pusey III

*Welcome New Members*

HGS Welcomes New Members

# *A Night at the Opera!*

**Back by popular demand, Houston Geological Society will gather for a post – AAPG social event in Houston’s Theater District. Mozart’s “Marriage of Figaro” will be presented at the Wortham Center by Houston Grand Opera on the following dates:**

- Friday, April 15, 7:30 pm
- Sunday, April 17, 2:00 pm
- Saturday, April 23, 7:30 pm
- Wednesday, April 27, 7:30 pm
- Saturday, April 30, 7:30 pm

Groups of ten or more receive a 10% discount. Groups of twenty or more enjoy a 15%. We will receive the following benefits and options, and we have time to plan.

- Priority Seating
- Pre-performance Gathering Space Available for Catering and/or Cocktails
- Restaurant Discounts
- Recommended Pre- or Post-performance Entertainment
- Pre-performance Lectures

So, let us know your preferred dates.

Contact: Marsha Bourque, at m22799@yahoo.com



## HoustonGrandOpera





# Save the Date! July 21<sup>st</sup>, 2011 Techno-Fest and Techno-Conference

Once again Techno-Fest and Techno-Conference is going to be held in the Westin Galleria on the 4<sup>th</sup> floor in the Woodway Room. We will have 26,000 square feet of NEW TECHNOLOGY at our fingertips!

This year the committee has been charged with making this summertime technology event a “world-class” happening in Houston! Set-up is going to be similar to last year’s ground-breaking event, with room for 43 vendors and up to 250 attendees at the Conference!

Sponsorship opportunities are available to help with food, beverage stations, advertising, and student attendance. Please contact **Deborah Sacrey** (dsacrey@auburnenergy.com) for vendor forms, sponsor forms and general information.

The theme for this year’s Techno-Conference is “Profits in any Environment”. **René Mott**, Chairman of Techno-Conference, is now soliciting papers in the following topics:

- 1) How best to drill deep-water, post-2010
- 2) Inversion in unconventional reservoirs
- 3) Fracturing technologies to maximize profits
- 4) Impacting the bottom-line through geology, geophysics, and engineering technologies

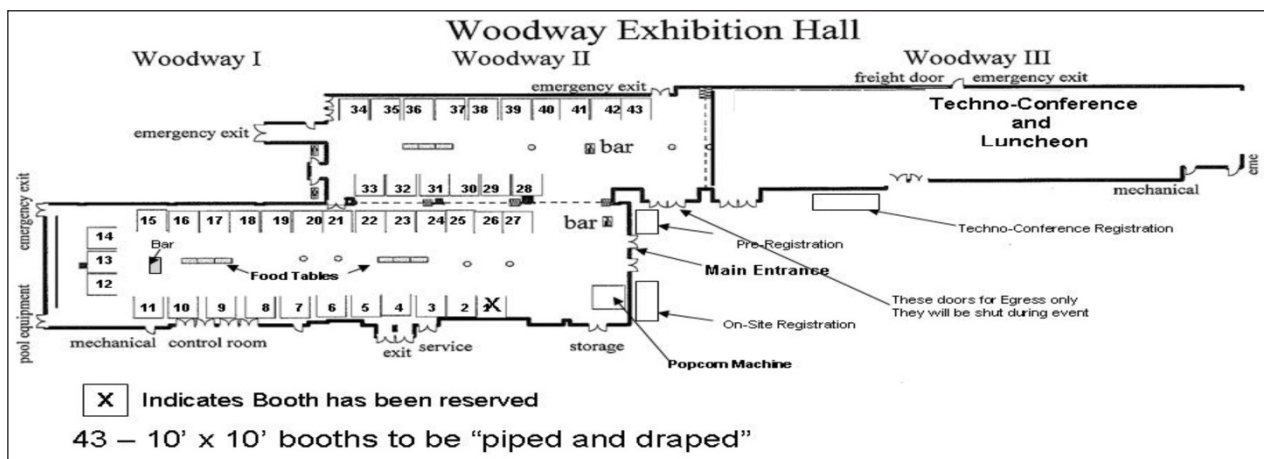
*A Call for Papers is being issued from interested parties that would like to share their case studies and proven new technology of the past year.*

A Call for Papers is being issued from interested parties that would like to share their case studies and proven new technology of the past year.

There are a limited number of speaking positions for this one-day event. Abstracts and speaker bios should be submitted by interested parties to René Mott (queenmio@att.net) or Deborah Sacrey (dsacrey@auburnenergy.com) by April 30<sup>th</sup>, 2011 in .doc format.

Final material will need to be in PowerPoint format (.ppt) for presentations and are due June 21, 2011. A public .pdf file will need to be delivered at the same time to post to a website for participants before the event for note taking. ■

*Please join us in making this year’s event a sell out!*



<b>Loyd Tuttle</b> ltuttle@hal-pc.org	<b>Bob Liska</b> liska.bob@gmail.com	<b>Jim Thorpe</b> jthorpe@hal-pc.org	<b>Paleo Control, Inc.</b> Houston, Tx 713-849-0044 paleocontrol.com
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# Tectonic, Depositional, and Thermal History of the Levantine Basin that Resulted in Numerous Potential Structural and Stratigraphic Plays

The Levantine basin, in the eastern Mediterranean Sea, has proven hydrocarbons, yet it is still considered to be a frontier basin. Oil and gas in multiple-aged strata have been documented in previously drilled wells close to the continental shelf. But two recent major discoveries by Noble Energy in the basin prove that there are hydrocarbons in the deeper water part (~1,700 m water depth). Tamar (>5 TCFG) and Leviathan (estimated 16 TCFG) are huge discoveries in a basin that not long ago was estimated to have zero undiscovered reserves by the USGS. The USGS have since changed their estimate to 1.7 billion barrels of oil and 122 TCF gas in this basin.

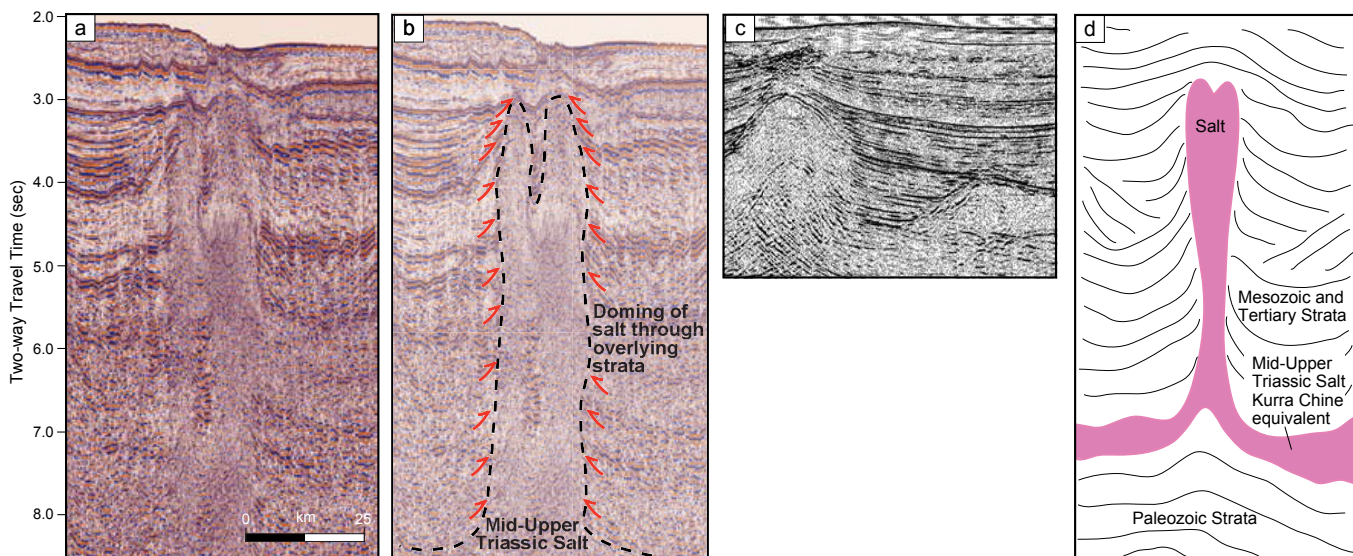
*Tectonics and deposition have led to the formation of numerous unexplored potential structural and stratigraphic traps*

The Levantine basin evolved on the southern Tethyan Sea margin alongside other African-Arabian plate segments. Tectonics in the Levantine basin went through a progression of events similar to that of the rest of the southern Tethyan margin: rift-extension followed by passive margin and then compression beginning in the Late Cretaceous with the collision of the African-Arabian Plate with the Eurasian Plate. Tectonics and deposition have led to the formation of numerous unexplored potential structural and stratigraphic traps including: anticlines, flower structures, reefs, talus deposits, turbidites, and stratal pinchouts adjacent to structures and to salt.

Tectono-stratigraphic interpretations using well and 2-D seismic data and 2-D petroleum systems modeling suggest that the tectonic, burial, and thermal history favor generation, migration, and accumulation of petroleum throughout the Levantine basin. The model suggests that accumulations in traps are ubiquitous in the 15-km-thick stratal package of the basin.

The stratigraphy of the Levantine basin is a mix of carbonate, siliciclastic, and evaporite facies. Triassic salt deposits (the Kurra Chine equivalent) likely extend well into the Levantine basin from the Arabian Plate. Seismic evidence indicates doming of the Triassic salt through overlying strata and development of

HGS General Dinner continued on page 23







# REGISTRATION IS OPEN

10-13 April 2011 • Houston, Texas  
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- Molecules to Marketplace: The Business of Energy
- Global Deepwater Reservoirs: Giant Leaps in E&P
- Worldwide E&P: Opportunities in the New Decade
- Challenged Resource Frontiers
- Mudstones and Shales: Unlocking the Promise

- Siliciclastics: Advancing Research to Resource
- Insight into Carbonates and Evaporites
- Breakthroughs: Tectonics, Salt and Basin Analysis
- Integrating New Technology, Geophysics and Subsurface Data
- Energy and Environmental Horizons
- The Next Geo-Generation: Who, What and Where

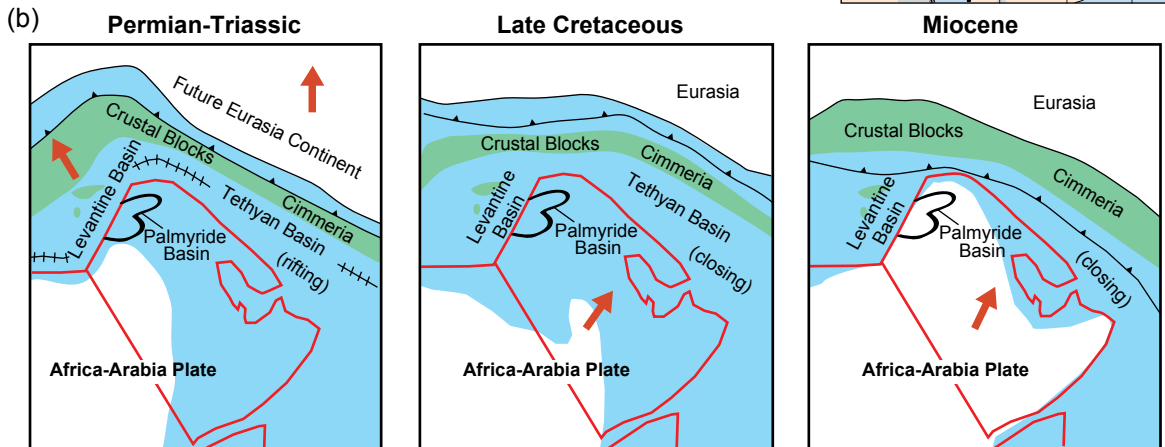
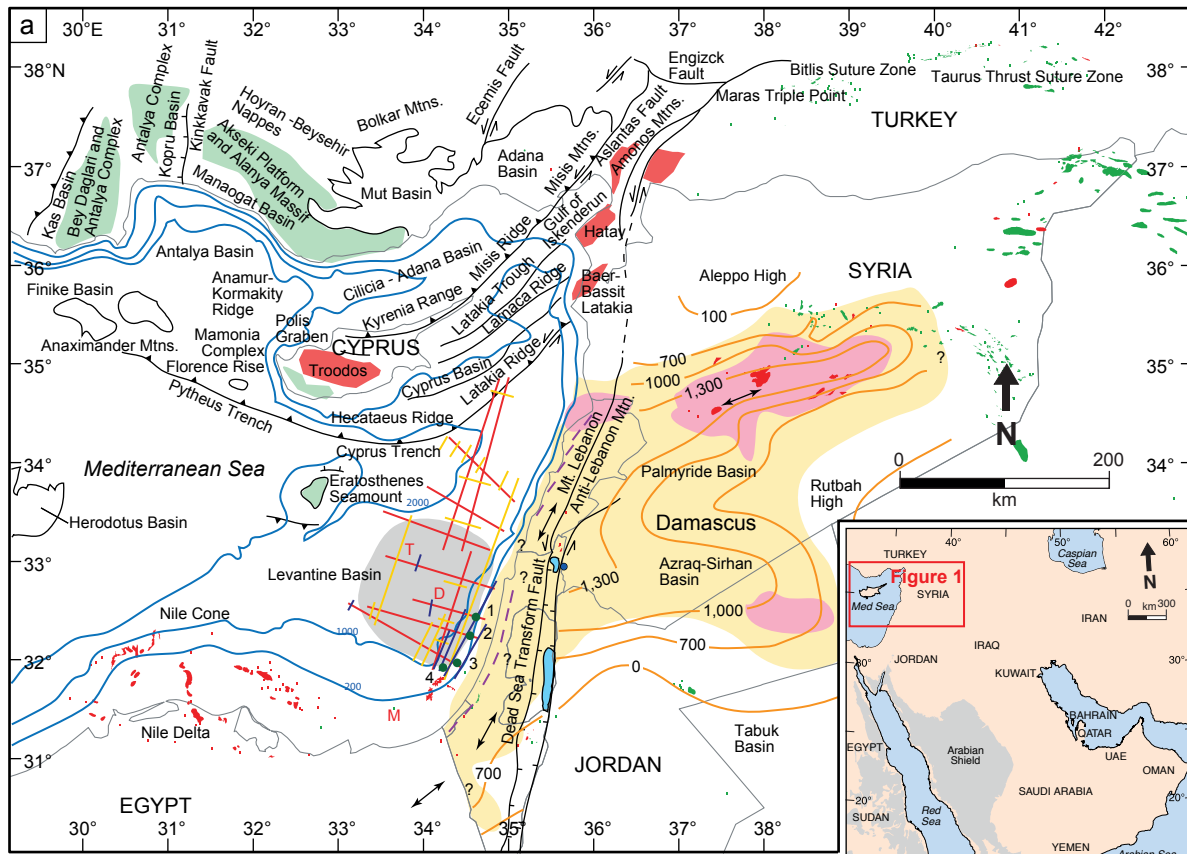
**Other highlights include:**

**All-Convention Luncheon** featuring four geoscientist-astronauts — Apollo astronaut Harrison H. "Jack" Schmitt, and space shuttle astronauts Kathryn D. Sullivan, James F. Reilly II and Andrew J. Feustel. These scientists together represent a near uninterrupted

timeline of the entire NASA manned space program, initiating in 1965 with Apollo training, to the latest space shuttle mission scheduled for 2011.

**Halbouty Lecturer** David Lawrence, Executive Vice President, Shell Upstream Americas Exploration and Commercial, speaking on The Next Era of Exploration.

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- Approximate limits of the Kurra Chine Salt (pink) and Anhydrite (yellow) and their equivalents distribution (Nader and Swennen, 2004)
- Selected continental blocks originating from the North African-Arabian plate (Cimmeria)
- Ophiolites
- Bathymetric depth (m)
- International border
- Triassic isopach contour lines (m)
- Levantine hingeline (Nader and Swennen, 2004)
- Trend of numerous regional folds -- "Syrian Arc Folds"
- Oil fields, undifferentiated
- Gas fields, undifferentiated
- T, D, M = Approximate location of Tamar (T), Dalit (D) and Mango (M) wells
- Data and Interpretations from this study**
- Wells used in this study (TGS NOPEC)
- 2-D seismic survey used in this study (TGS NOPEC)
- Region containing numerous Mesozoic carbonate platforms
- Compressional structures
- Strike-slip structures



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potential traps adjacent to the salt. Jurassic to Lower Cretaceous strata were deposited on carbonate platforms and in inter-platform basins; carbonate platforms extend over 200 km to the north of the present southern continental margin. The carbonate platforms contain several stratigraphic traps in the form of reefs atop the platforms and in the talus and turbidite deposits adjacent to the platform core. Other structural/stratigraphic traps occur in Upper Cretaceous chalk deposits that onlap structure and in Paleocene and Oligocene turbidites. ■

**Biographical Sketch**

LISA MARLOW is an exploration geologist at Shell and also a Ph.D. candidate at the University of Minnesota. Her Ph.D. work involves determining the tectonic and depositional history and petroleum potential of the Levantine basin using 2-D seismic and

well data (provided by TGS NOPEC) and analyzing the petroleum systems in the basin using 2-D modeling software (PetroMod2D from Schlumberger). Ms Marlow earned an M.Sc. from the University of Minnesota, where she specialized in glacial geology, including glacial lake sedimentation and post-glacial aeolian deposits. Prior to joining Shell, she worked as a consultant for local governments for the purpose of sand and gravel exploration, mapping, and assessment. She has also worked for USDA-Natural Resources Conservation Service as a physical scientist for the Soil Survey.



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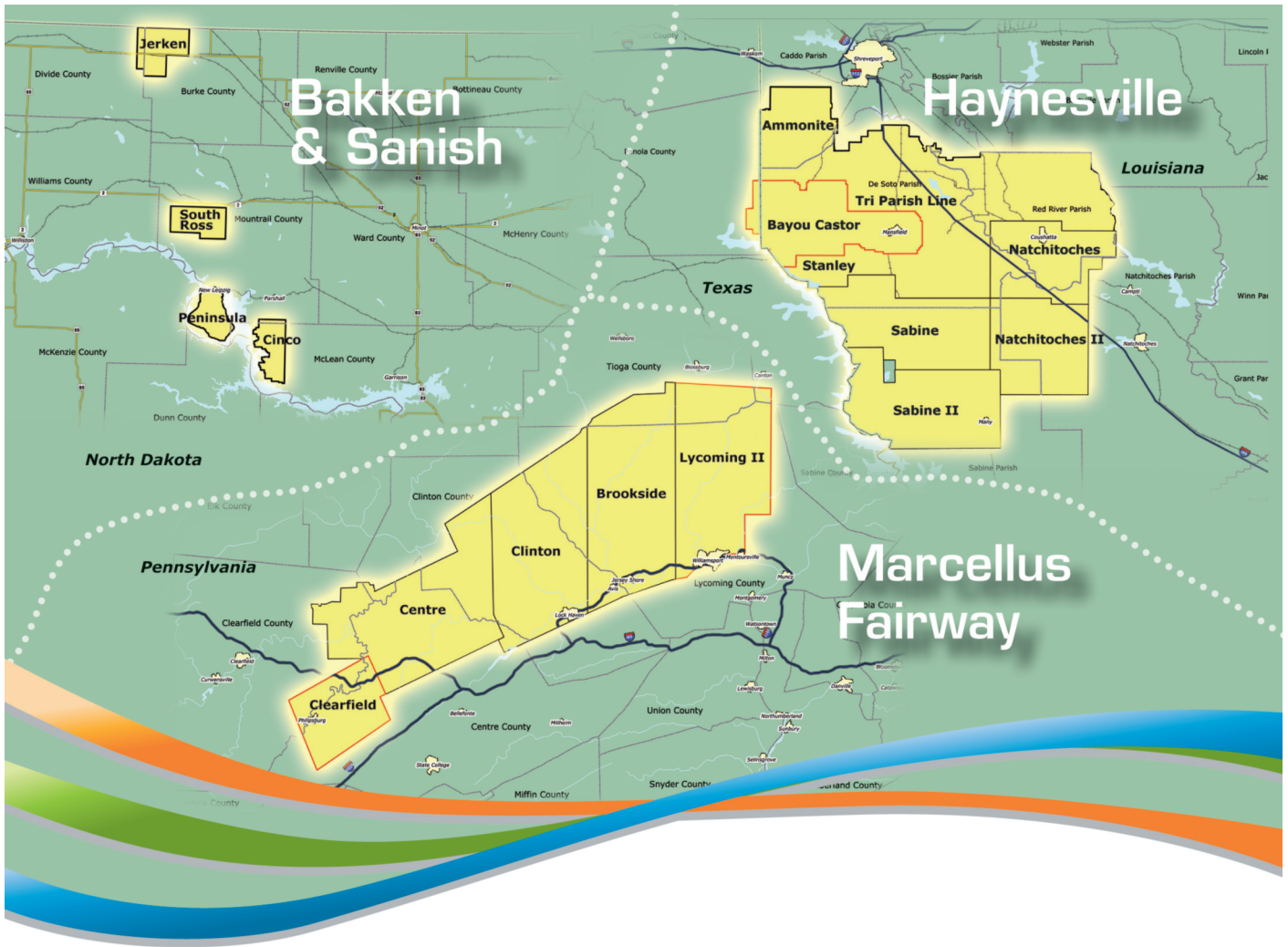


**Three generations of HGS members.**

Hank Hill is retired from Conoco and Huffco. He has been a HGS member since moving to Houston in 1969. Steve Hill is Exploration Manager for Decker Operating Company and has been

a member since 1976. Kyle Hill is the newest HGS member and is a geophysical tech for Z byte Data Services. Logan is too young to join, but the Hill's will see that he does when he grows up. ■





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Tuesday, March 15, 2011

Black Lab Pub, Churchill Room • 4100 Montrose Blvd.

Social 5:30 p.m., Dinner 6:30 p.m.

Cost: \$25 Preregistered members; \$30 non-members & walk-ups

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# HGS Environmental & Engineering Dinner Meeting

HGS Environmental & Engineering Dinner Meeting

**Sean R. Nash, RPA**

*Principal Investigator - Archaeology / Geoarchaeology*

**Tony Scott**

*Principal Investigator - Archaeology*

**Charles E. Bludau, Jr.**

*Field Director - Archaeology*

## The Role of Geoscience in Archaeology

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### Biographical Sketches

MR. NASH holds a masters degree in anthropology from The University of Texas at Austin. He has over 15 years of experience working in the cultural resources management industry, nine of these years as an historic and prehistoric principal investigator. Mr. Nash has completed large and complex projects in compliance with state and federal laws and regulations.



His work has included geoarchaeological assessments to identify landforms favorable for the preservation of historic and prehistoric archaeological sites. The bulk of his experience is in Texas, however, he has also completed projects in Florida, Ohio, Michigan,

Louisiana, Oklahoma, and Arkansas. He completed field research on the Mimbres and Mayan cultures in New Mexico and Belize, respectively.

MR. SCOTT holds a masters degree in anthropology from Wichita State University. He has over fifteen years of experience working on Phase I, II, and III archaeological surveys, testing, and mitigation projects relating to the pipeline, transportation, and construction industries. Projects that he has been involved with have included locations in



Nebraska, Kansas, Missouri, Illinois, Oklahoma, Texas, Arkansas, Louisiana, and Mississippi. He served as an archaeologist with the Department of the Interior Bureau of Reclamation, monitoring several reservoir, canal, and waterway modification projects. He has experience working with the Army Corps of Engineers in the Fort Worth and Galveston Districts. He is knowledgeable with state and federal regulations and requirements and has corresponded on a project-by-project basis with state historic preservation offices in multiple states. His employment and academic experience includes GIS services, graphics creations, prehistoric and historic site excavations, surveys, research, human burial and forensic cases, and laboratory analyses. His most recent work has highlighted the use of probability modeling to aid in the discovery of previously unrecorded prehistoric and historic sites.

MR. BLUDAU holds a Bachelor of Arts in anthropology from Texas State University, and has over five years of experience working on Phase I, II, and III archaeological surveys, testing, and mitigation projects relating to the pipeline, transportation, and construction industries, as well as research-based projects. He is familiar with state and federal regulations and requirements. His employment and academic experience includes



prehistoric and historic site excavations, surveys, research, forensic cases, and laboratory analyses.

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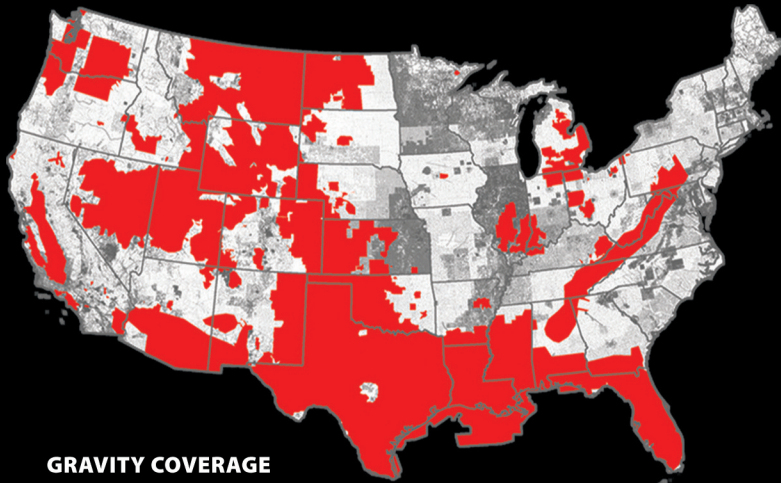
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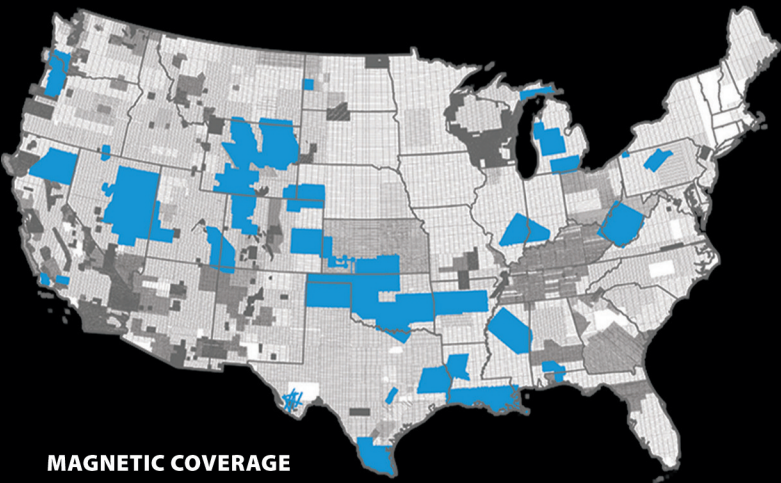
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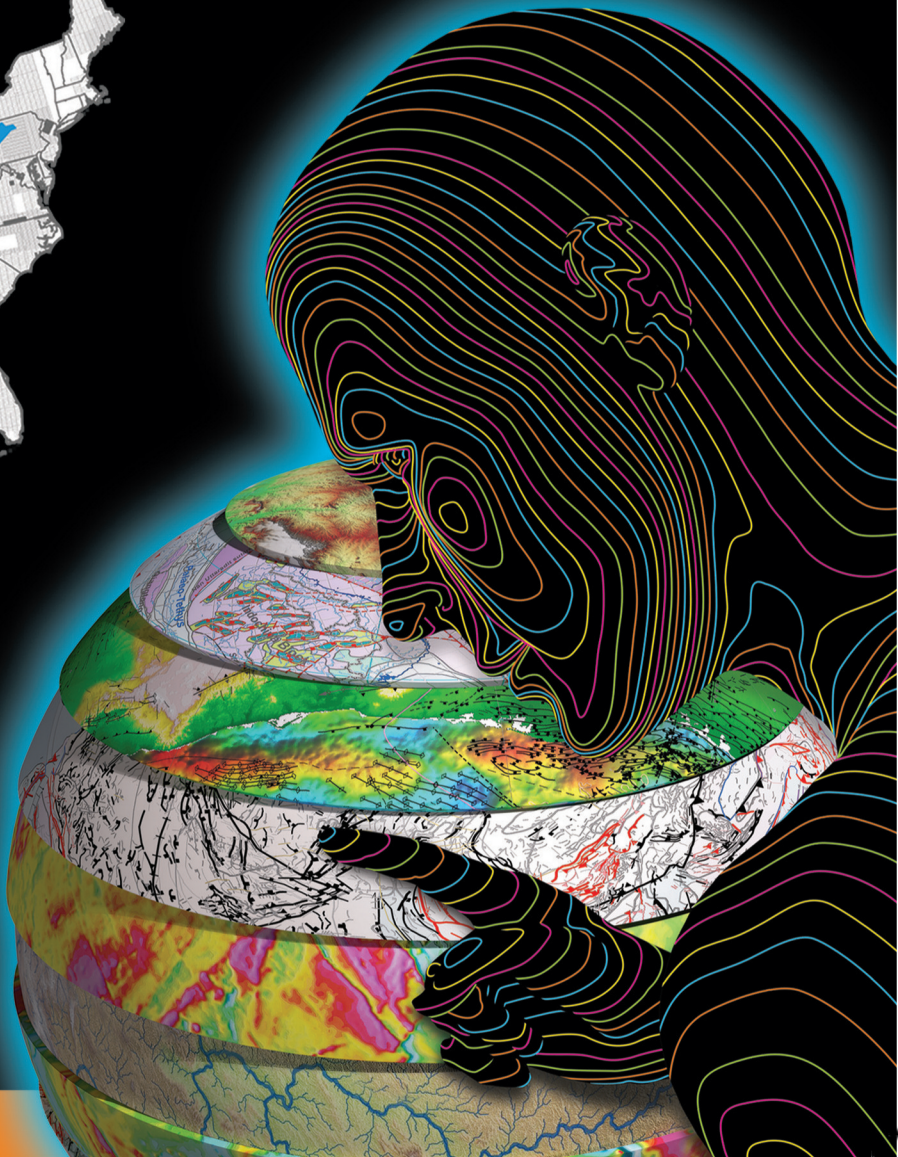
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## HGS International Dinner Meeting

Ed Gilbert, Consulting Geologist

Ana Krueger, Devon Energy, Houston TX

Mike Murphy, University of Houston

HGS International Dinner Meeting

# The Barreirinhas Basin, Equatorial Brazil: Pitfalls of “Structural Styles” Analysis in Frontier Basins

“Structural styles” – assemblages of structures thought to be diagnostic of specific stress regimes such as extension or compression – are commonly used as interpretation guidelines in petroleum exploration. However, “styles” represent simplistic end-members of the very broad spectrum of possible geological structures. Structural trap analysis should consider the entire spectrum of possible structures. Additional complexities are introduced by structural overprinting during multiple tectonic events. The interpreter should consider all structural geometries that are possible as the result not only of tectonic and gravitational stress, but stratigraphic anisotropy, basement anisotropy, prior deformation, and numerous other factors. Shelf-margin structures of the Barreirinhas basin in northern Brazil provide examples of both atypical structures that do not readily fit into a traditional structural “style”, and the complexities introduced by overprinting of multiple deformation events. Initially interpreted as strike-slip features because of their complexity and position near the landward extension of an oceanic fracture zone, the structures represent the overprinting of two differing types of gravity-driven thrusting, which Krueger and Gilbert (2008) termed Type III and Type IV deep-water fold belts. Both generations of structures developed along a passive shelf margin over-steepened by massive influx of fine clastics, likely during sea level falls. The initial Santonian (Type III) down-slope sliding occurred along a bed-parallel detachment that linked a shelfal extension zone (characterized by closely-spaced listric faults) with a down-dip zone of stacked

*“styles” represent simplistic end-members of the very broad spectrum of possible geological structures*

imbricate thrust sheets. The entire deformational event was geologically “instantaneous”, occurring during an interval in the latest Santonian. A second, Tertiary-age Type IV, cycle of deformation occurred above a non-bed parallel detachment that cut across stratigraphy both in the dip and strike directions to produce a three-dimensionally complex fault system linking listric normal faults up-dip with imbricate thrusts down-dip. This second fault system cut down through the older Santonian system, carrying the older deformed hanging wall and the footwall within the hanging wall of the Tertiary system. Though not as areally extensive, the latter type of structure was longer lived, with fault motion occurring through much of the Tertiary. Type IV structuration is not unique to the Brazilian Equatorial Margin, occurring along other passive margins, and may provide useful information on the potential collapse of other lithologically homogeneous rock masses such as the Canary and Hawaiian Islands submarine volcanoclastic piles. Despite sometimes lengthy prior exploration histories, intracratonic basins often represent “frontiers” for secondary or non-conventional resource exploration. Strike-slip or “wrench” structures are often erroneously identified in intracratonic basins, based on apparently anomalous variations in stratigraphic thicknesses across faults and what appear to be mixed compressional and extensional deformation across a single fault. In reality major intracratonic strike-slip deformation is relatively uncommon. Many “wrench” features prove to be either “Sunda

HGS International Dinner continued on page 31

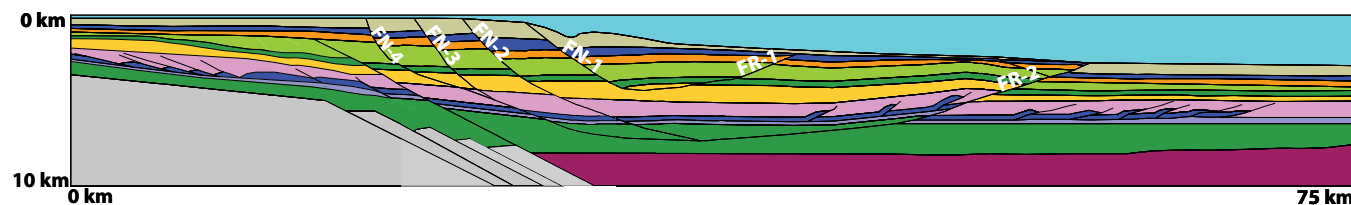


FIGURE 1: Present-day configuration of the Barreirinhas basin (Brazil) gravity detachment systems; no vertical exaggeration. Note the complex overprinting of (1) basement-involved normal faults, and (2) a thin Cretaceous-age bed-parallel detachment, cross cut by (3) long-lived Tertiary-age non-bed-parallel detachments.



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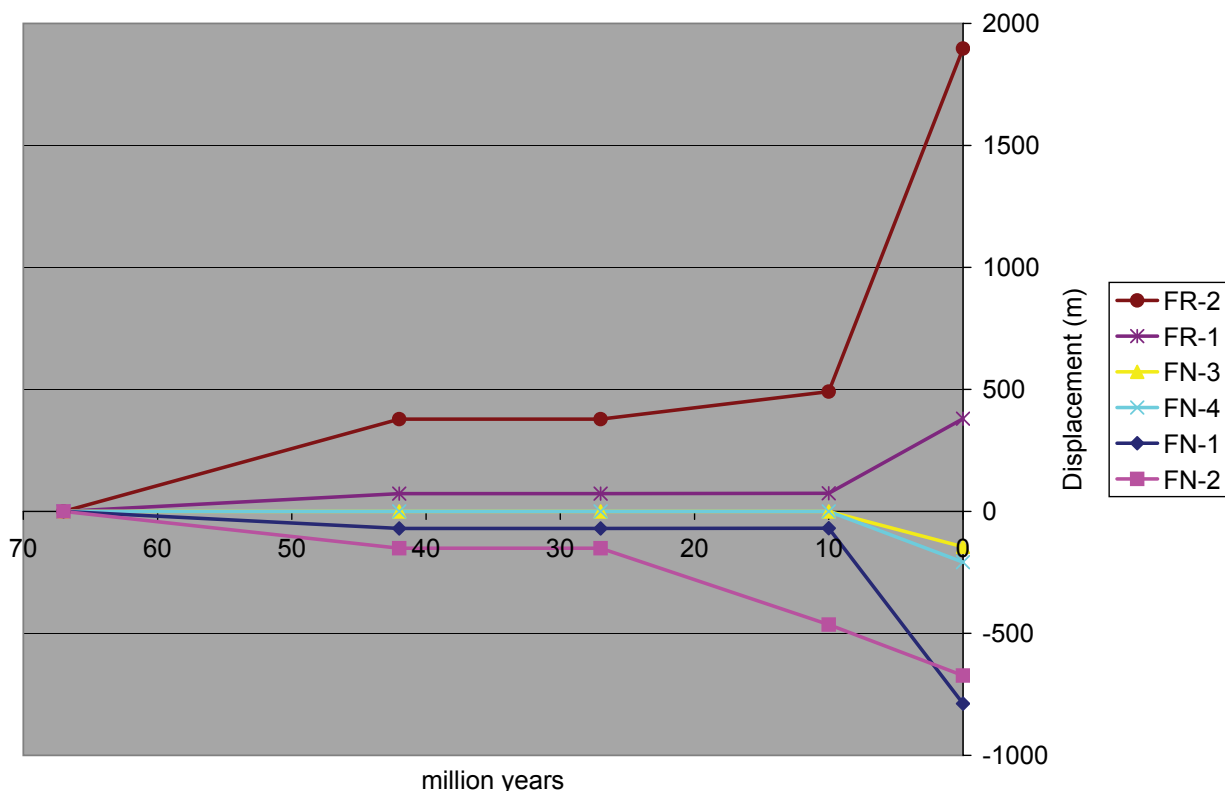


FIGURE 2: Total fault displacement of the Tertiary detachment system plotted as a function of time for linked normal faults (negative values) and reverse faults (positive values) in the Barreirinhas basin. Faults are identified in the cross-section. Most faults initiated early in the process of deformation, but some normal faults are younger (N-3 and N-4) formed as the detachment system propagated into its footwall. All faults remain active until near present time. Note the abrupt increase of displacement rate in the last ten million years.

folds” (inverted half-grabens), the margins of partially inverted grabens, or steepening-downward normal faults formed as the result of a strong contrast in mechanical strength between the basement and the sedimentary cover. In actual practice strike-slip deformation can be reliably identified only from map-view analysis, using either specific diagnostic fault map-pattern features or—less commonly—stratigraphic or other piercing points. ■

**Biographical Sketches**

ED GILBERT worked for the Geological Survey in Alabama, and taught at Auburn University. He worked for Exxon Production Research in seismic stratigraphy, software development, and in exploration and production research application projects primarily in Indonesia, the North Sea, West Africa, and Latin America. In addition he worked on Alaskan production and for Exxon Exploration in deep water exploration, structural geology, and visualization technology in the Gulf of Mexico and overseas. After joining Ocean Energy (later Devon Energy) he worked in exploration, production, and unconventional



resources in West Africa, Latin America, China, South Asia, and onshore and offshore US. Now retired, Ed and his wife Cathy divide their time between homes in Katy and on Lake Livingston. Ed is also a military historian, the author of twenty books, reports for the Marine Corps Museums and History Division, and articles for hobby, historical, and veteran’s periodicals.

ANA KRUEGER is currently a geophysicist with Devon Energy, Geoscience Technology Group. Ms Krueger earned a B.S. in oceanography from the State University of Rio de Janeiro and an M.S. in geophysics from the Brazilian National Observatory. She worked for Geomag (now Fugro Airborne) in Brazil, conducting airborne surveys in the Amazon basin. In 1998 she joined Schlumberger/WesternGeco in Argentina, moving to Houston in 1999. She joined Devon in 2005. The current work is part of her Ph.D. work in structural geology at The University of Houston. Her primary areas of interest are structure and tectonics. She has worked in unconventional resources and basin modeling.



Wednesday, March 23, 2011

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## HGS General Luncheon Meeting

Wayne L. Kelly  
Richard S. Bishop

# Economic Limits to Oil Supply: a Non-Hubbert Curve View

### Summary

Increases of oil price in the last decade have fueled a financial boom and contributed to the subsequent bust in ways that have largely been unrecognized. Due to the international nature of the oil trade, these economic impacts led directly to more competitive (and contentious) foreign relations.

The negative impact on the US of buying foreign oil now is significantly different from that of the earlier price increases of the 1970s and early '80s because of the context in which it occurs. Today the US has both substantially more sovereign debt (about twice as much as a percent of GDP) and a large negative balance of trade, of which the prime contributors are oil and trade with China. These factors inhibit the ability of the US economy to grow out of the downturn.

A second impact, unique to oil, is the rapid creation of a massive amount of liquid capital. The large amount of capital flowing to the Gulf States (around \$500 billion/year) is largely profit. This capital, when leveraged, produced the cheap and abundant credit which has encouraged excessive sovereign debt and private borrowing. We surmise the low cost of borrowing led to overvaluations (particularly in real estate) and when those investments faltered, the financial community became aware of their risk exposure; this ultimately led to the financial crisis.

This article summarizes global oil supply, the role of giant fields, cost of replacement, and physical limits to supply, and presents some implications for foreign policy. We conclude that the combined price and volume of imported oil pose an increasingly significant drag to the US and global economies.

Protecting foreign sources of US supply will also be an increasing drag on American national security, and the choice for America is clear. In short, should the US have an oil policy of "being the last man standing", or should the US transition to other sources such as natural gas for transportation? The answer to that question means our traditional discussions about volume of resources in

the ground must be expanded to include physical limitations of supply and cost of supply.

Whether global production rate is at its peak or not does not matter, and we emphasize that the world is not running out of oil.

*The world is nonetheless becoming limited in its physical ability and economic capacity to add production, particularly from the high-cost tier of oil resource.*

The world is nonetheless becoming limited in its physical ability and economic capacity to add production, particularly from the high-cost tier of oil resource. This situation will become acute as the 60% of the world's production, which is from the supergiant fields, starts to decline.

It is not a matter of when the oil runs out; rather, it's a matter of when the supply of money to buy imported oil is exhausted.

### Background

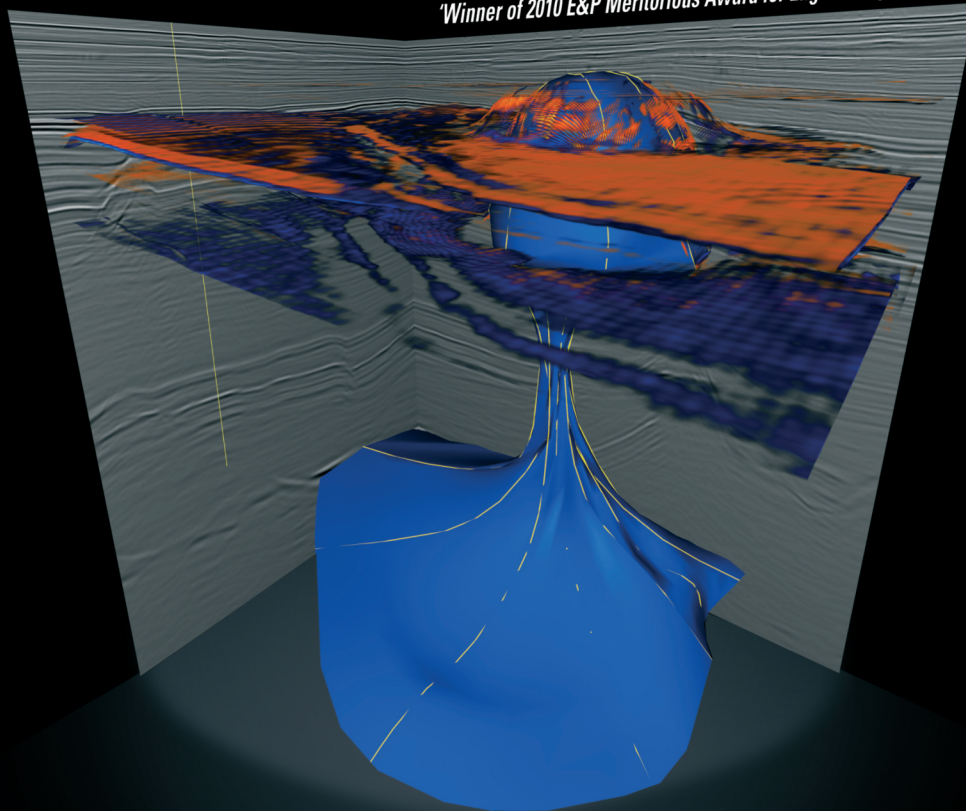
Physical characteristics of oil supply in terms of geopolitics and cost of development provide incentives in both economic and foreign policy for the US to reduce its reliance on foreign oil. The country is caught in a foreign policy vise. Due to the need to keep oil supply up and prices down, it is entangled with politically hostile and/or unstable foreign governments, leaving little maneuverability to pursue its self interest. Even less appreciated is the negative impact oil imports have on the American economy.

Current account surpluses and deficits go beyond trade balances to show the overall flow of capital in and out of countries are a leading indicator of economic health. Oil imports are the most pernicious contributor to US trade deficits, and trade deficits, together with our sovereign debt are responsible for most of the US current account deficits. No amount of government budget reduction, tax increase or dollar devaluation offsets the persistent erosion of the national economy and standard of living caused by the annual outgo of nearly 3% of US GDP that is spent for oil imports. This article considers (1) the probability that the cost of oil imports will grow dramatically in this decade and (2) the resulting risk to the United States economy.

HGS General Luncheon *continued on page 37*



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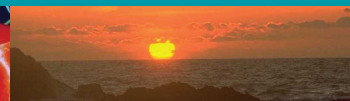
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# March 2011



Sunday


Monday

Tuesday

Wednesday

	<p><b>Members Pre-registered Prices:</b>                  General Dinner Meeting ..... \$28                  Nonmembers &amp; walk-ups ..... \$35                  Env. &amp; Eng. .... \$25                  Luncheon Meeting ..... \$30                  Nonmembers &amp; walk-ups ..... \$35                  International Explorationists ..... \$28                  North American Explorationists ..... \$28</p>	<p><b>1</b>   <b>AAPG Winter Education Conference</b>                  Houston, TX</p>	<p><b>2</b></p>
<p><b>6</b></p>	<p><b>7</b></p>	<p><b>8</b></p>	<p><b>9</b>   <b>HGS Continuing Ed</b>                  "Quality Control for Subsurface Maps (QLTs)", Dan Tearpock,                  Marathon Oil Building, Houston, TX                  Page 10</p>
<p><b>13</b></p>	<p><b>14</b>  <b>HGS General Dinner Meeting</b>                  "Tectonic, Depositional, and Thermal History of the Levantine Basin that Resulted in Numerous Potential Structural and Stratigraphic Plays", Lisa Marlow, Westchase Hilton, Page 21</p>	<p><b>15</b>  <b>HGS Environmental &amp; Engineering Dinner Meeting</b>                  "The Role of Geology in Archaeology", Sean R. Nash, RPA, Tony Scott and Charles E. Bludau, Jr., Black Lab Pub, Page 27</p>	<p><b>16</b>   <i>May Bulletin Submission Deadline</i></p>
<p><b>20</b></p>	<p><b>21</b>  <b>HGS International Dinner Meeting</b>                  "The Barreirinhas Basin, Equatorial Brazil: Pitfalls of "Structural Styles" Analysis in Frontier Basins," Ed Gilbert, Ana Krueger and Mike Murphy, Westchase Hilton, Page 29</p>	<p><b>22</b></p>	<p><b>23</b>  <b>HGS General Luncheon Meeting</b>                  "Economic Limits to Oil Supply: a Non-Hubbert Curve View", Wayne L. Kelly and Richard S. Bishop, Petroleum Club                  Page 32</p>
<p><b>27</b>   <b>South-Central Section Geological Society of America</b>                  New Orleans, LA</p>	<p><b>28</b>  <b>HGS North American Dinner Meeting</b>                  "Exceptional Turbidite Systems in High-latitude and Tectonically Active Settings and the Obsolescence of Ubiquitous Sequence Stratigraphic Models," Dominic A. Armitage and Jacob A. Covault, Westchase Hilton, Page 47</p>	<p><b>29</b></p>	<p><b>30</b></p>

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# GEOEVENTS

Thursday

Friday

Saturday

3	4	5
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17	18	19
24 <b>SIPES Luncheon Meeting</b> <i>"The Pickens Plan"</i> <i>T. Boone Pickens, Petroleum Club</i> Page 51	25	26
31 	<b>Reservations:</b> The HGS prefers that you make your reservations on-line through the HGS website at <a href="http://www.hgs.org">www.hgs.org</a> . If you have no Internet access, you can e-mail <a href="mailto:reservations@hgs.org">reservations@hgs.org</a> , or call the office at 713-463-9476. <b>Reservations for HGS meetings must be made or cancelled by the date shown on the HGS Website calendar, normally that is 24 hours before hand or on the last business day before the event.</b> If you make your reservation on the Website or by email, an email confirmation will be sent to you. If you do not receive a confirmation, check with the <a href="mailto:Webmaster@hgs.org">Webmaster@hgs.org</a> . Once the meals are ordered and name tags and lists are prepared, no more reservations can be added even if they are sent. <b>No shows will be billed.</b>	



## Upcoming GeoEvents

- April 10-13, 2011**  
AAPG Annual Convention & Exhibition *Houston, Texas*
- May 9-12, 2011**  
AAPG Hedberg Research Conference – Natural Gas Geochemistry: Recent Developments, Applications, and Technologies *Beijing, China*
- June 5-7, 2011**  
Southwest Section AAPG Annual Conference *Ruidoso, New Mexico*
- July 21, 2011**  
TechnoFest *Houston, Texas*
- July 31-August 4, 2011**  
TSOP-CSCOP Joint Meeting: Unconventional Resources, Clean Coal, and Offshore Resources *Halifax, NS, Canada*
- August 2-4, 2011**  
AAPG Geosciences Technology Workshop – US Shale Plays *Fort Worth, Texas*
- September 6-8, 2011**  
PESGB/HGS Conference on African E & P *London, England*
- September 25-27, 2011**  
Eastern Section AAPG Annual Meeting *Washington, D.C.*
- October 9-12, 2011**  
Geological Society of America Annual Meeting *Minneapolis, MN*
- October 16-18, 2011**  
61st Annual Convention - Gulf Coast Association of Geological Societies *Veracruz, México*
- October 23-26, 2011**  
AAPG International Conference & Exhibition *Milan, Italy*
- November 22-24, 2011**  
GSL – Conference on CO<sub>2</sub> Sequestration *London, England*
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GCSSEPM Foundation Bob F. Perkins Research Conference *Houston, Texas*



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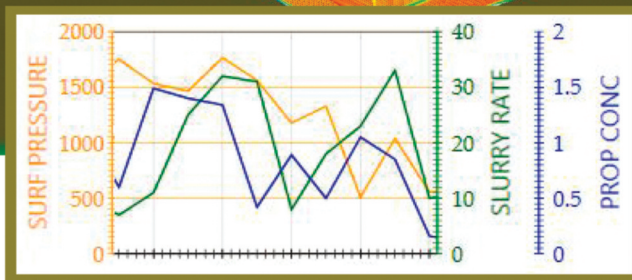
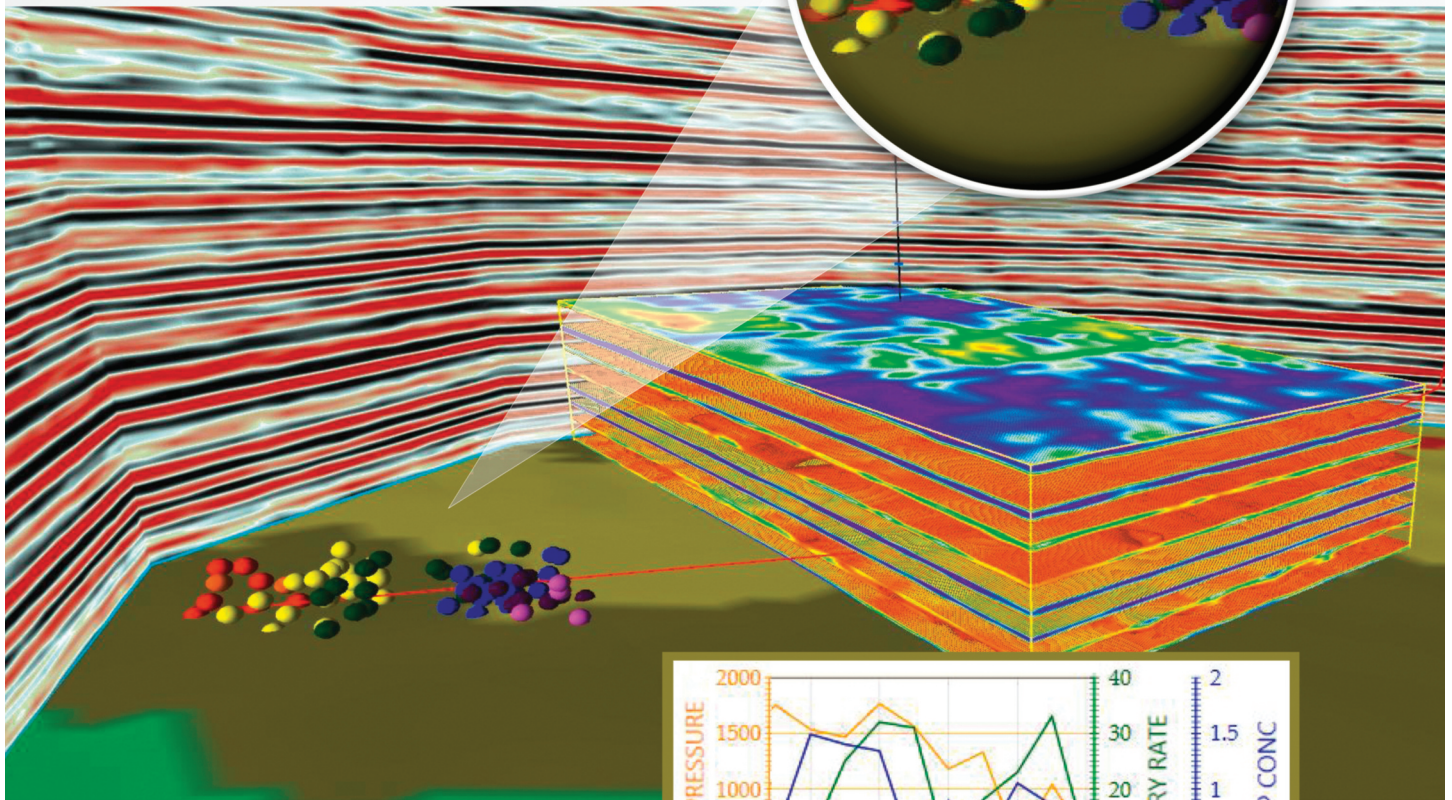
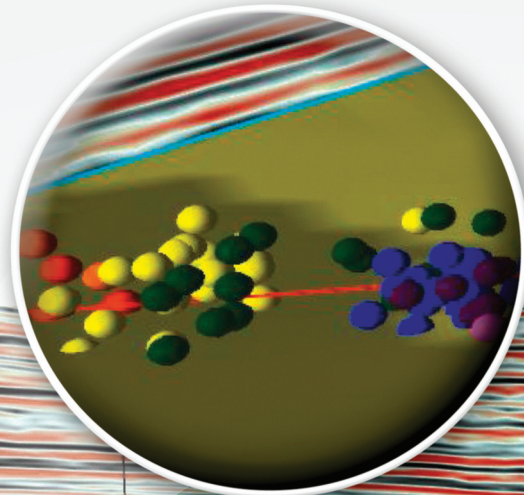
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The fix is not easy. Oil dominates the energy sector because of its comparatively low cost coupled with the difficulty in replacing it for transportation. Even at oil prices in excess of \$100 per barrel, green energy technologies are far from competitive. Investments in high-cost alternatives to conventional oil are risky as long as 60% or more of the world's oil is produced for much less than \$5 per barrel. Price forecasting is complicated by a "dual-tier" cost structure dominated by low-cost oil coming from the Middle East and by the additional need for much higher-cost oil to meet demand. The EIA estimates that the Gulf States earn over \$500 billion/year from their oil exports, an amount that will grow to nearly \$2 trillion in less than two decades. Almost unique to the Gulf States, most of their earnings are profit. Oil profits are the single source of current account surpluses for the Gulf States.

On the other side of the ledger, there must be a deficit to correspond to the surplus. Unfortunately, it is the US which is taking on about one half of the global current account deficit! Furthermore, analogous to the Great Depression of the 20<sup>th</sup> century, recovery will be hampered by these unusually large current account surpluses and deficits. Oil is the single largest cause of these excessive current account surpluses and deficits and it poses a peculiar challenge.

### Foreign Policy Incentives

For the past fifty years a major goal of US foreign policy has been securing access to cheap and limitless supplies of foreign oil. This policy no longer serves the economic nor strategic interests of the United States. Dependence upon foreign oil not only commits American involvement in intractable Middle Eastern politics; it also limits America's options in pursuing her national security interests. Furthermore, as oil inevitably becomes scarce, there is a significant chance of armed confrontation over a dwindling supply. In addition to the economic exigency to rid its trade deficits, America has reason to improve its foreign policy positions by becoming independent of oil imports.

As emerging economies become more dependent upon imported oil, the more compelled they will be to secure access to it by their own means. It is delusional to believe that emerging economies will indefinitely rely upon American power to make oil accessible just as it is absurd to believe the American taxpayer will gladly assume the burden.

Unless the US curbs its oil imports, our economic well-being will continue to depend upon a high-profile military presence in the Middle East while still being exposed to the behavioral risk of other oil exporters hostile to US interests, such as Iran, Venezuela and Russia. American military commitments and foreign policy in the Middle East place it on a potential collision course with Chinese interests. Not only does America's position in the Middle

East condemn it to an endless leading role in the fight against terror, the Chinese view America as a threat to their access to oil supply. Specifically, the Chinese feel increasingly threatened as the US increases its military commitments in the Middle East. The connection between China's rapid development of naval power and its determination to be unfettered in accessing foreign oil, especially in the Persian Gulf region, is obvious. Furthermore, as long as states that sponsor terror benefit from their oil exports and American forces remain central in propping up unpopular Middle Eastern governments, it is not likely that America and her allies can win the war on terror. Eliminating oil imports allows America to reduce exposure to foreign policy risk.

### Economic Incentives

The economic impact of massive wealth transfer for oil (Figure 1) is potentially just as ruinous, but much more certain than the foreign policy risk. America risks its prosperity as long as oil imports of 3% or more of its GDP are not offset by a more rapidly growing economy. Unfortunately, America is unlikely to generate sufficient trade surpluses to offset the 3% of GDP it spends on oil because our debt and trade deficits are both so high. Consequently, oil is the most malignant component of the current account deficit because it is the cause of both massive wealth transfer and the source of over-abundant liquidity for oil exporters. Oil generated abundant cheap capital which enabled the over-leverage and the ensuing overvaluation of investments and untenable government borrowing by the US and others during the past decade. The legacy of the explosive growth in the value of oil imports since 2000 is crushing levels of both private and public sector debt.

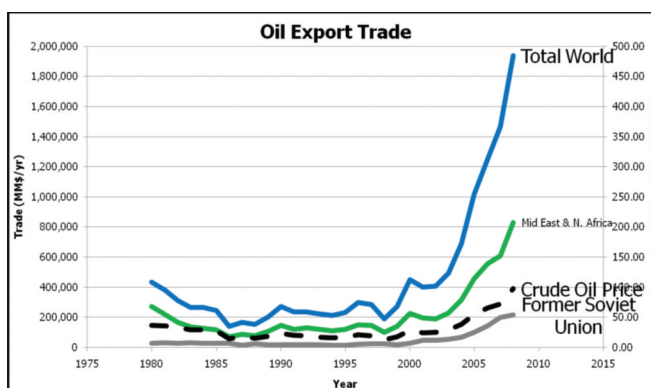


Figure 1 Value of the oil export trade. Note the magnitude of increase since 2000.

Generally, economists have hypothesized that national economic expansion can grow at 3.0%, or possibly more, as long as sovereign debt does not exceed 40 – 60% of GDP (Figure 2). Some economists suggest the US can manage sovereign debt as great as 80% without significant depression of growth rates because of its stable



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government and unique status as the world's largest economy. This status affords it benefits from being the world's reserve currency of lower borrowing cost. Whatever the limit, there is a point beyond which the amount of sovereign debt limits economic growth. America's sovereign debt, which is presently near 60% of GDP and growing, is pushing that limit. If all American public debt (local, state and federal) is considered to be sovereign debt, the ability of the American economy to experience healthy expansion may already have been exceeded and real GDP growth may stagnate around 1.0 – 2.0% until the sovereign debt and the current account deficit are reduced. The problem is that reducing sovereign debt increases in difficulty as current account deficits grow. The US trade deficits track neatly with the cost of oil imports. Oil price is the primary variable in the value of oil imports and the total trade deficit. Therefore, increases in the price of oil exacerbate the trade and current account deficits.

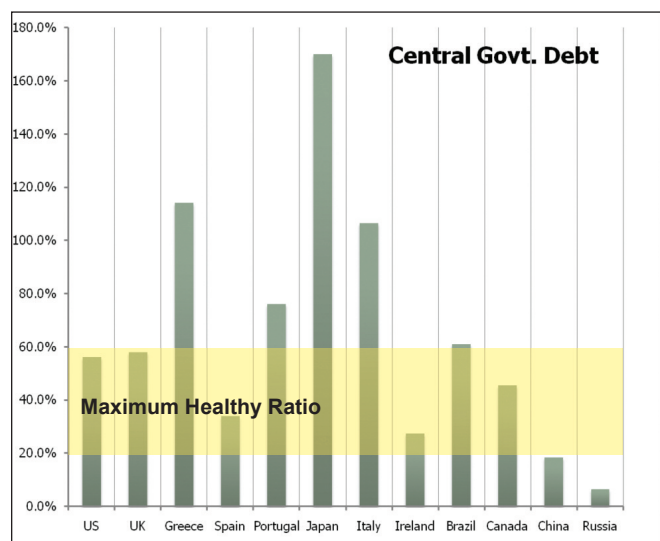


Figure 2 A sampling of sovereign debts around the world. The U.S. is expected to exceed 60 percent shortly.

Since the early 1960s, economists have treated oil imports as benign, believing the US economy is a net beneficiary from petrodollar capital inflows. This twist of the “Pitchford Thesis” is incorrect. In times of much cheaper oil that was imported in small quantities, the US economy showed no ill effects. However, during the 1970s and at present, the combined negative economic effects of oil imports approaching or exceeding 3.0% of GDP make it clear that oil importation is a major contributor to current account deficits and the consequent reduced economic growth.

A dollar the US spends on oil imports today has a more negative impact than a dollar spent in the 1970s in two ways. First, because American exports to the Gulf States have been replaced by cheaper competitors, dollars do not return to the US. Secondly, because money earned from exported low-cost oil, particularly those

earned in the Middle East, is almost entirely profit, which leads to these unprecedented concentrations of liquidity.

Furthermore, the large current account surpluses generated by oil profits are balanced by corresponding deficits. America's oil consumption is about one quarter of the world total, but the US has one half of the global current account deficit! The economic tools at the disposal of the Federal Reserve and Treasury are simply inadequate to correct the situation as long as US oil imports persist or grow from current levels. In other words, the American economy is facing a situation it has never faced before and oil imports are a key part of any solution.

### Physical Character

America's energy future is on the horns of a dilemma. If those are correct who contend there is adequate supply to meet growing demand over the next twenty-five years, oil, even at a significant premium to today's price, will remain the cheapest source of energy for transportation and alternatives to oil will remain economically disadvantaged. On the other hand, if the rate of supply hits a plateau or begins to decline, the price of oil is poised to increase dramatically. Obviously this would further exacerbate global current account imbalances. No matter what the future supply will be, the Middle East will increase its proportion of oil exports, which will further exacerbate imbalances in global current accounts.

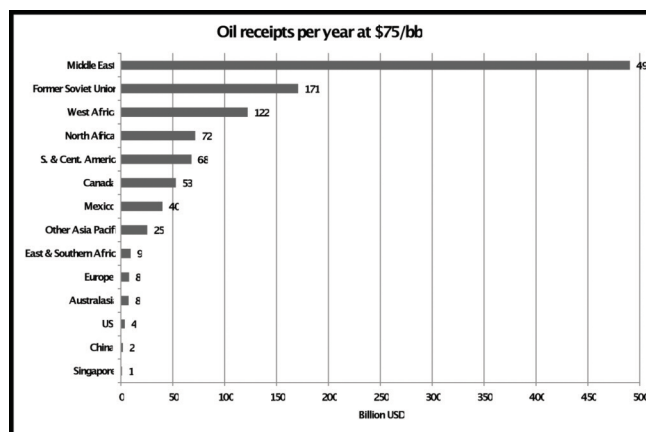
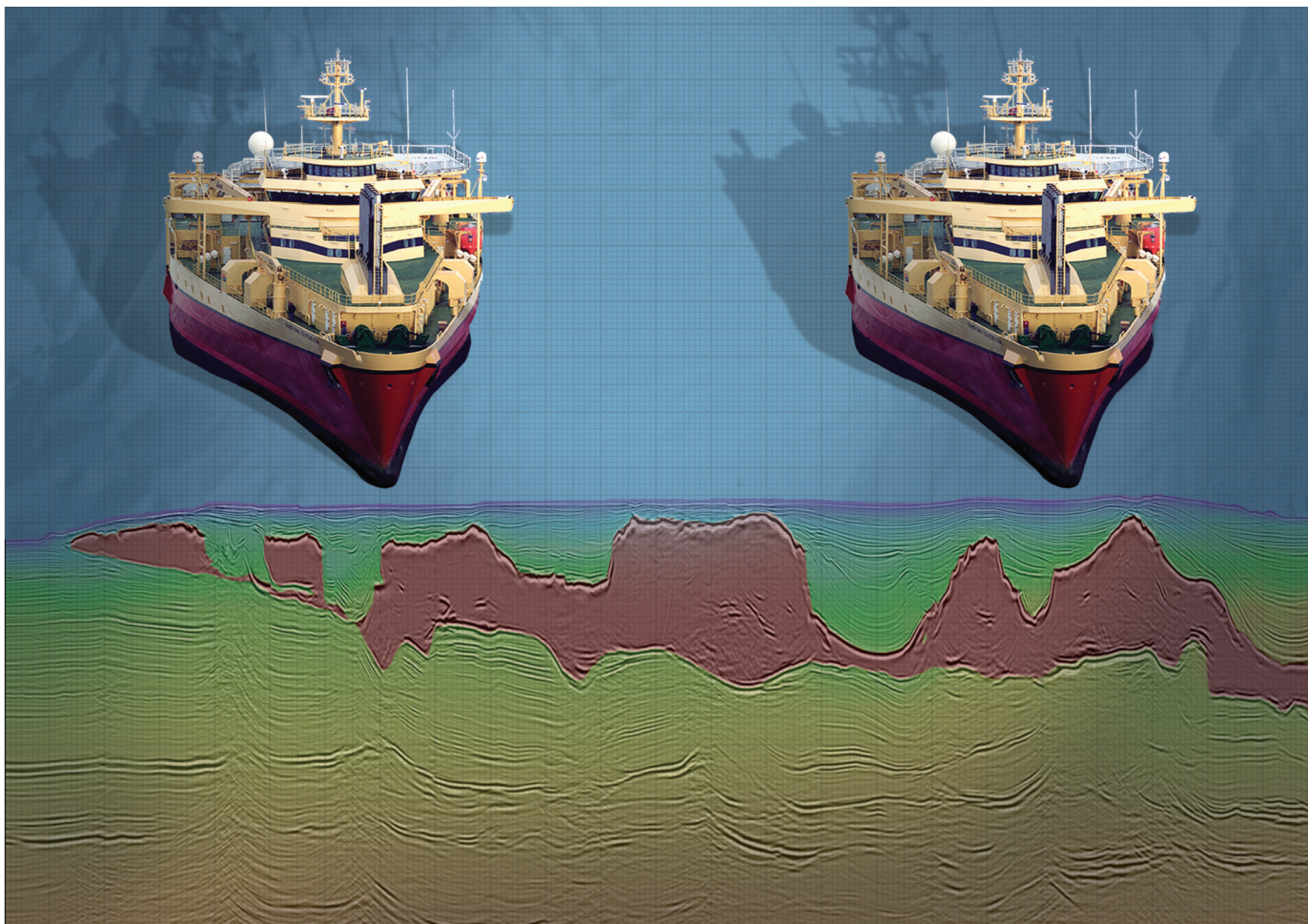


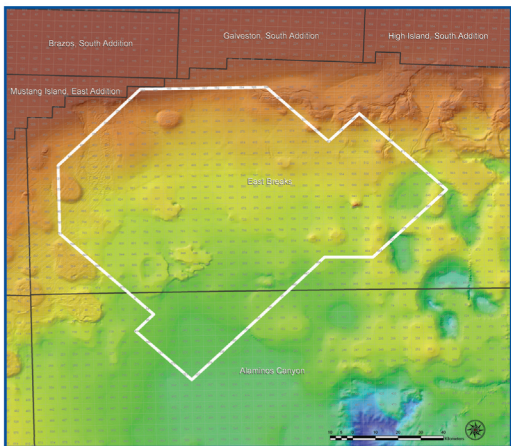
Figure 3 Gross cash receipts by region or country, 2008 at \$75 per bbl. (after BP, 2009)

The Middle East, with its concentration of giant fields, is not only the high-volume producer but also the low-cost producer and will continue to be so. Figure 3 illustrates the gross cash receipts by country or area. It is well known that concentrations of oil in large reservoirs, in giant fields, inherently can be recovered much more quickly than like volumes widely distributed over a much larger number of smaller accumulations. The most recent data



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(Robelius, 2007) show 60% of daily production is from only 320 of the world's 17,000+ large oil fields. The contribution of giant fields has been around 60% of global production since the mid-1960s (Figure 5). The combination of low costs and high volumes generates excess capital for the Middle East, significantly contributing to global current account imbalances.

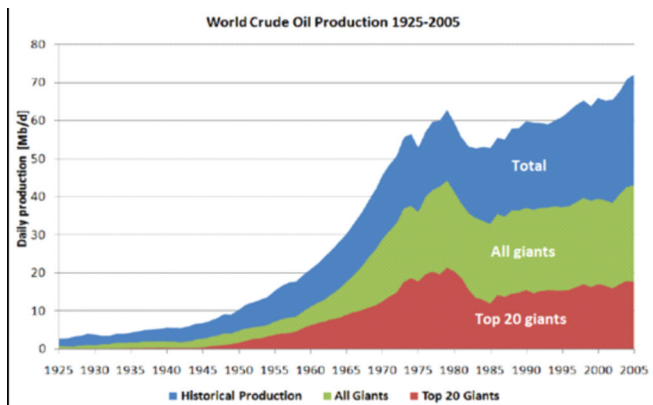


Figure 4 Contribution of 320 super giant oil fields to world production (Robelius, 2007)

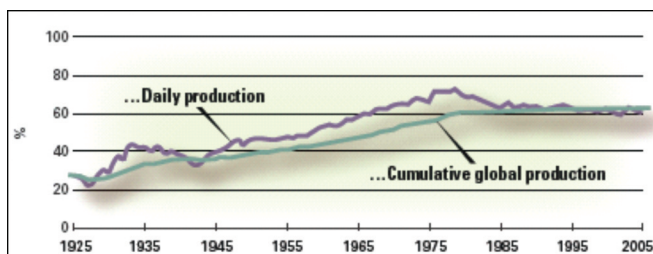


Figure 5 Percent of global production contributed by giant fields (Kelley et al 2009 after Robelius, 2007)

Heavy oil, because of its much higher production cost, is not as effective as giant conventional oil fields in generating current account surpluses. Though in theory, heavy oil is more benign to the global economy than low-cost conventional oil and has an inherent foreign policy advantage for America because of the large Canadian deposits, it does not appear to have a near-term potential to displace conventional Middle Eastern oil supply. Although heavy oil will become increasingly important in the future supply, development plans for heavy oil reserves do not create sufficient capacity to offset the decline of conventional giants when that starts. Massive government support is needed for heavy oil to be developed apace with conventional decline. The Canadian Association of Petroleum Producers (Anonymous) estimate that adding one million barrels a day by 2015 will cost about \$44 billion US. Recent announcements (Eni, 2010) regarding Venezuela say that about \$35 billion is needed to add 1 million bopd. Thus, adding 10 million bopd of heavy oil over 10 years presumably would cost \$350 to \$450 billion. Capital commitments to develop heavy oil are not even remotely close to

\$350 billion. Table 1 compares costs to develop a million barrels a day from different environments.

COST TO ADD 1 MILLION BOPD		
AREA	\$BILLION USD TO ADD 1 MILLION BOPD	COMMENT
Middle East	8	cost to drill wells and build pipeline
Deep Water	30-35	cost of topsides, not drilling
Onshore US	30-35	cost of drill wells, not transportation
Heavy oil (Canada and Venezuela)	35-45	Cost to extract and transport.

Table 1 Comparison of the approximate costs to add a million barrels a day capacity from different environments.

New discoveries are not likely to change the status quo. Removal of US regulatory obstacles to domestic drilling will not cause a miraculous increase in the rate of US oil production because undiscovered or unexploited oil resources in the US are insufficient. In 2000 the USGS published an assessment of undiscovered oil and gas expected from the world's most promising basins. Though 1,428 BB of undiscovered black oil is estimated, the finding effort associated with these volumes should also be considered. The concern for finding arises from the assessment of fields as small as 1 million barrels. The median field size of 22 mbo in 10,840 fields means that 5420 fields are between 1 and 22 mbo. Although fields in this size range have local economic value, they do not have a significant impact on global production rate. At current finding rates of 4-8 BB per year, it will take 178 years or more to find 1,428 Bbls. These 1428 Bbls are not evenly distributed. More than 60% of undiscovered oil is concentrated in only 10 basins. Importantly, all of these are outside of the US and the new discoveries will not relieve the US economy of its current account imbalances.

### Conclusion

Thus the oil trade has put America in an economic conundrum controlled by the low-cost producers in the Middle East. At today's prices, the US could begin conversion from conventional oil. However, the low-cost producers obviously seek to discourage such competition and can clearly drive down the price of oil. The foreign policy and economic interests of the United States, however, are clearly served by reducing dependence upon foreign oil. The physical evidence indicates that the Middle East will increase its share of the oil supply and its oil-derived current account surpluses. A combination of tariffs on imported oil, domestic production incentives, and use of natural gas for transportation (whether converted to electricity or as motor fuel) may well lead to conservation measures becoming mandatory for America to extract itself from this current predicament. ■

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HGS General Luncheon *continued on page 43*



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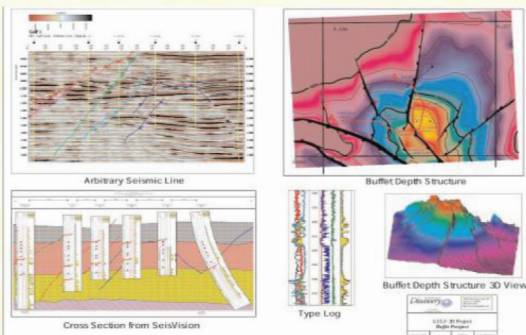
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**Biographical Sketches**

**WAYNE L. KELLEY** is the Managing Director and Chief Executive Officer of RSK [UK] LIMITED. Prior to co-founding RSK in 2003, he started his career in 1974 with Pennzoil. Since that time has worked in E&P in Alaska, Brazil, Canada, Mexico, North Sea and much of Africa. Kelley attended Trinity University and the Colorado School of Mines. (w.kelley@rskuklimited.com)



**RICHARD S. BISHOP, PH.D.** is a geologist who has worked the spectrum of research, exploration and production for ExxonMobil (29 years) and Unocal (2 years). During this time he has ‘seen the world’ both as an explorationist and as a synthesizer of global exploration opportunities. He is a Past President of both the HGS and AAPG. He has been recognized with the AAPG Sproule Award, is a Distinguished Alumnus of the University of Missouri, and an Honorary Member of both the AAPG and HGS.



Bishop earned a Ph.D. from Stanford University, a M.A. from the University of Missouri, and a B.S. from Texas Christian University. He is currently Executive Director and Chief Geologist of RSK. (r.bishop@rskuklimited.com)

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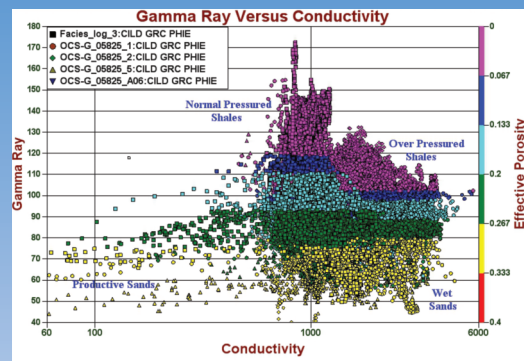
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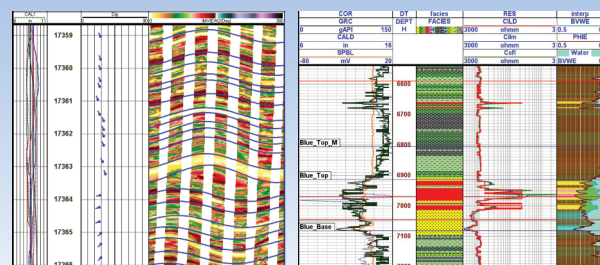
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11:30 a.m.-1:15 p.m.	All-Convention Luncheon
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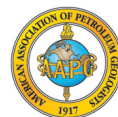
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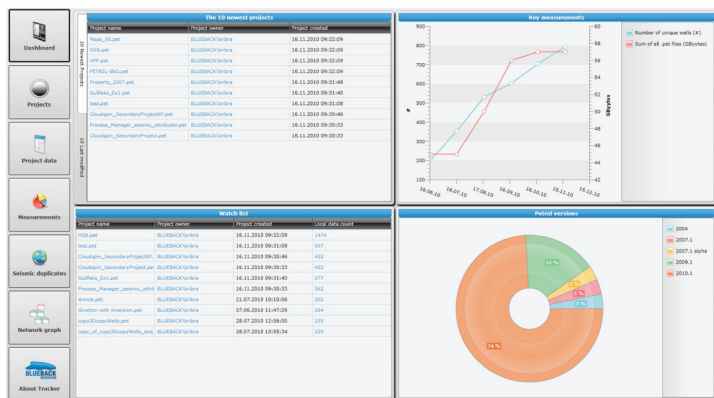
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*turbidite architectures can vary from those predicted by such widely used models*

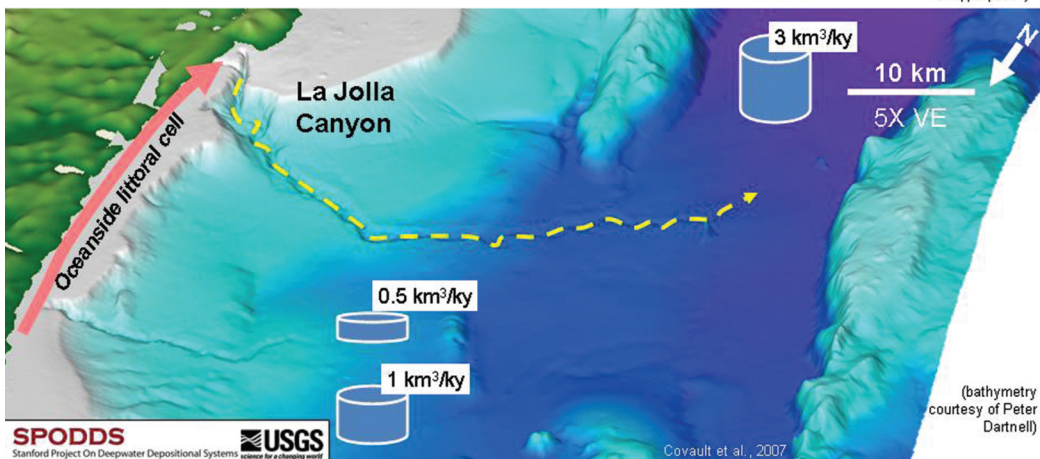
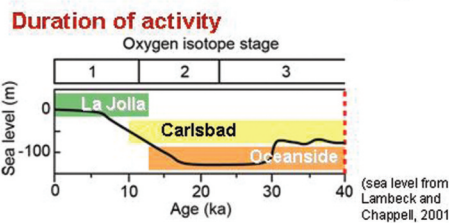
turbidite systems are compared from the high-latitude, passive Southwest Scotian Slope offshore southeastern Canada and the tectonically active California Borderland. The high-latitude Scotian Slope is sensitive to climatic variability associated with rising sea level during glacial-to-interglacial transitions; and, as a result, received voluminous coarse-grained sediment from subglacial outwash. Large subglacial pulses of sediment contemporaneously carved out a line of shelf-indenting canyons, which transitioned to straight, wide, and flat-based channels that coalesce near the base of slope. These contemporaneous canyons and channels provided sediment to submarine fans generally

characterized by coarse-grained, braidplain-plain-like turbidite architectures. Canyon-and-channel activity in the California Borderland is not as sensitive to sea-level fluctuations during glacial cycles. Rather, tectonic activity maintained a relatively narrow shelf, which facilitated canyon-head incision across the shelf nearly to the modern beach. During falling and lowstands of sea level, fluvial systems provided sediment to canyon-head point sources; however, during highstands of sea level, such as at present, littoral cells are important

### Deep-sea seismic-chrono-stratigraphy from the CA Borderland

- Relatively voluminous, coarse-grained turbidite deposition occurs during sea-level **highstands**

- Sediment volumes**
- La Jolla highstand fan (38 km<sup>3</sup>)
  - Carlsbad lowstand fan (12 km<sup>3</sup>)
  - Oceanside lowstand fan (25 km<sup>3</sup>)



HGS North American Dinner

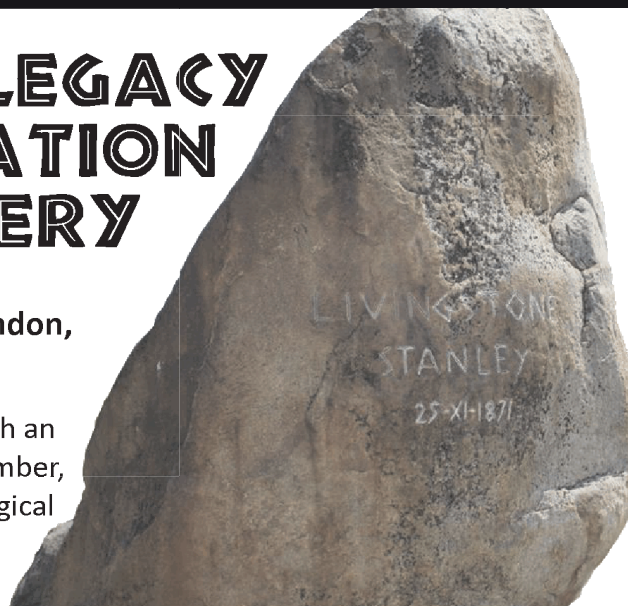
*continued on page 49*



# AFRICA: A LEGACY OF EXPLORATION AND DISCOVERY

QEII Conference Centre, London,  
 7 - 8 September 2011

The conference will be kicked off with an Evening Lecture on Tuesday 6 September, by Duncan MacGregor, at The Geological Society, Burlington House, Piccadilly, London, entitled 'African Rift Plays: Is the Present the Key to the Past?'

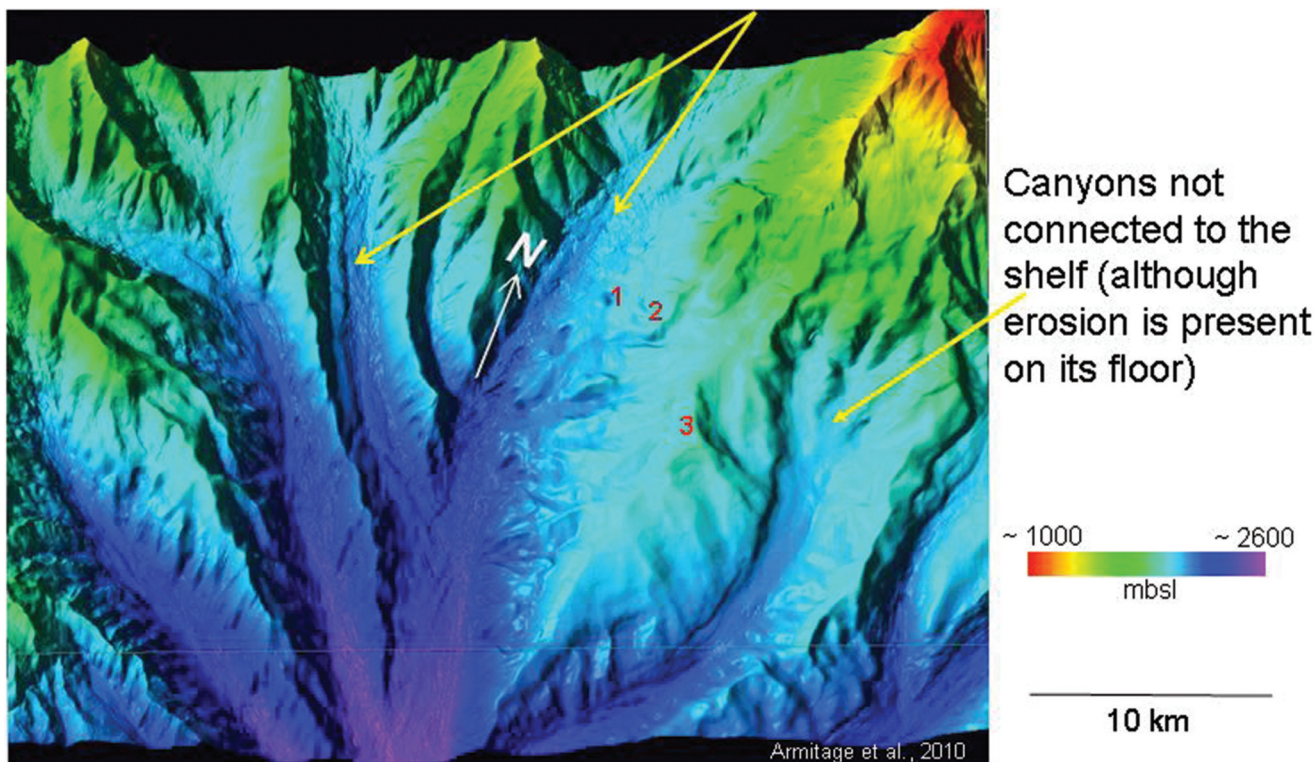


This annual conference, alternating between London and Houston, has established itself as the primary technical E & P conference on Africa, with an attendance regularly exceeding 300, including operators, consultants, governments and academia. There will be a large poster programme in addition to the oral programme of about 25 high quality talks covering all aspects of E & P in all regions of Africa. Special sessions are planned on rift systems, including the East African rift and the conjugate margin pre-salt plays of the South Atlantic. Papers have already been submitted/invited on: African Topography and Palaeoclimate; Lacustrine Carbonate Reservoirs; Turbidite Outcrop Analogues; Albertine Basin; Lake Malawi Drilling and Evolution; Moroccan Gas Discoveries; Jubilee Field, Ghana, post-first production; Red Sea Drilling; Onshore Cabinda Discovery; Campos Basin Exploration.

**ABSTRACTS:** (circa 200 words) should be sent as soon as possible and no later than 13 March 2011 to Duncan Macgregor at [dmacgregor@surestream-petroleum.com](mailto:dmacgregor@surestream-petroleum.com) and also to Richard Dixon at [dixonr2@bp.com](mailto:dixonr2@bp.com). Extended abstracts are normally written once your paper is accepted and are issued on a conference CD. Details of sponsorship opportunities and display booths are available from the PESGB - please contact [rebecca@pesgb.org.uk](mailto:rebecca@pesgb.org.uk) for more information.

## Canyon Morphologies – Southwest Grand Banks Slope

Canyons connected to shelf formed by turbidity currents sourced from subglacial outwash



contributors of longshore-drift-transported sediment to canyon-head point sources at narrow segments of the shelf. Turbidite architectures include predominantly erosional slope conduits and sand-rich base of slope fan lobes. Results of this study highlight exceptions to the general “rules” of deep-sea deposition. Furthermore, are such high-latitude and tectonically active margins and their turbidite systems really that “exceptional” in the first place? ■

### Biographical Sketches

**DOMINIC ARMITAGE** is a deep-water sedimentologist in the Subsurface Technology group at ConocoPhillips Company, Houston. He started at ConocoPhillips in 2009 after first earning his M.Sci. from University College, London, then his Ph.D. from Stanford University. His Ph.D. thesis focused on the evolution of deep-water depositional elements using outcrop and subsurface data from a broad range of geographic locations, including Patagonia (Chile), West Africa, and Southeast Canada. Current interests include the influence of mass-transport deposit topography on the subsequent distribution of turbidites, and the reservoir properties of hybrid



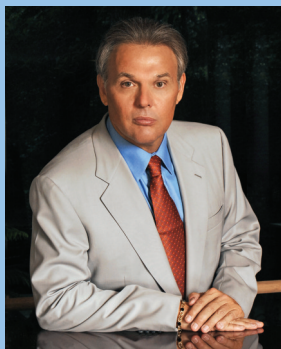
event beds. While at ConocoPhillips, Dominic has worked on stratigraphic analysis and prediction for a variety of Gulf of Mexico projects.

**JACOB COVAULT** is a research scientist at the US Geological Survey National Center in Reston, Virginia. He is the coordinator of carbon dioxide sequestration assessment efforts in the western region of the USA and Alaska. Prior to his experience with the USGS, he worked as a research geologist at Chevron Energy Technology Company and received Ph.D. and B.S. degrees in geological and environmental sciences at Stanford University. Dr. Covault has authored over 20 peer-reviewed journal articles and more than 50 conference abstracts. He received the 2005 and 2009 A.I. Levorsen awards of the AAPG Pacific Section and was a co-author of the 2009 AAPG Pacific Section H. Victor Church Memorial Award for best poster at the annual convention. Dr. Covault also received the 2008-2009 Stanford-USGS Fellowship. His research has focused on ocean sciences and sedimentary geology, including marine geology, geomorphology, sedimentary basin analysis, sequence stratigraphy and climate evolution.





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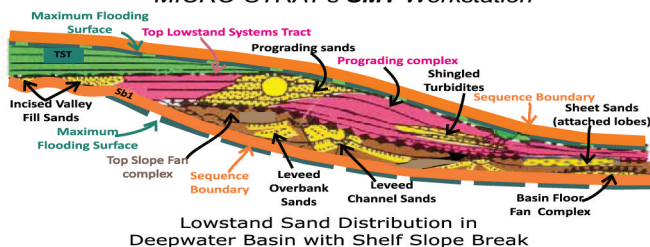
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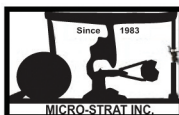
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# SIPES March Luncheon Meeting

## The Pickens Plan

T. Boone Pickens

America is addicted to foreign oil. It's an addiction that threatens our economy, our environment, and our national security. It touches every part of our daily lives and ties our hands as a nation and as a people. The addiction has worsened for decades and now it's reached a point of crisis. In 1970, we imported 24% of our oil. Today, it's more than 65% and growing. Oil prices have come down from the staggering highs of 2008, but lower prices have not reduced our dependence on foreign oil or lessened the risks to either our economy or our national security. If we are depending on foreign sources for nearly two-thirds of our oil, we are in a precarious position in an unpredictable world. In addition to putting our security in the hands of potentially unfriendly and unstable foreign nations, we spent \$475 billion on foreign oil in 2008 alone. That's money taken out of our economy and sent to foreign nations, and it will continue to drain the life from our economy for as long as we fail to stop the bleeding. Projected over the next 10 years the cost will be \$10 trillion—it will be the greatest transfer of wealth in the history of mankind.

### Can't we import more oil?

America uses a lot of oil. Every day 85 million barrels of oil are produced around the world. And 21 million of those are used here in the United States. That's 25% of the world's oil demand. Used by just 4% of the world's population.

### Can't we just produce more oil?

Consider this: America imports 12 million barrels a day, and Saudi Arabia only produces 9 million a day. Is there really more undiscovered oil here than in all of Saudi Arabia? World oil production peaked in 2005. Despite growing demand and an unprecedented increase in prices, oil production has fallen over the last three years. Oil is getting more expensive to produce, harder to find, and there just isn't enough of it to keep up with demand.

*dependence on foreign oil  
is a critical concern, it is  
not a problem that can be  
solved in isolation*

### The simple truth is that cheap and easy oil is gone.

But America is focused on another crisis: The economy. All Americans are feeling the effects of the recession. And addressing the economy is the top priority of our nation. This is more than bailing out a bank, an insurance firm, or a car company. The American economy is huge and has many facets. To make a real and lasting impact we must seek to do more than create new jobs and opportunities today: we must build the platform on which our economy can continue to grow for decades to come. There is nothing more important to the present and future of our economy than energy. Any effort to address our economic problems will require a thorough understanding of this issue and willingness to confront our dependence on foreign oil and what domestic resources we can use. It is a crisis too large to be addressed piecemeal. We need a plan of action on scale with the problems we face. That is the spirit in which the Pickens Plan was conceived. The Pickens Plan is a collection of coordinated steps that together form a comprehensive approach to addressing America's energy needs.

### The Pickens Plan.

#### There are several pillars to the Pickens Plan:

- Create millions of new jobs by building the capacity to generate up to 22% of our electricity from wind, and adding to that additional solar generation capacity;
- Building a 21<sup>st</sup> century backbone electrical transmission grid;
- Providing incentives for homeowners and the owners of commercial buildings to upgrade their insulation and other energy saving options; and
- Using America's natural gas to replace imported oil as a transportation fuel in addition to its other uses in power generation, chemicals, etc.

While dependence on foreign oil is a critical concern, it is not a problem that can be solved in isolation. We have to think about energy as a whole, and that begins by considering our energy alternatives and thinking about how we will fuel our world in the next 10 to 20 years and beyond.

### New jobs from renewable energy and conservation.

Any discussion of alternatives should begin with the 2007 Department of Energy study showing that building out our wind capacity in the Great Plains—from northern Texas to the Canadian border—

SIPES Luncheon Meeting *continued on page 53*



## SIPES Luncheon Meeting continued from page 51

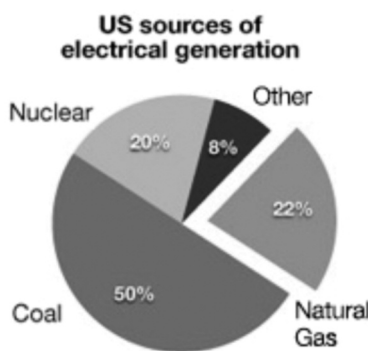
would produce 138,000 new jobs in the first year, and more than 3.4 million new jobs over a ten-year period, while also producing as much as 20% of our needed electricity. Building out solar energy in the Southwest from western Texas to California would add to the boom of new jobs and provide more of our growing electrical needs—doing so through economically viable, clean, renewable sources. To move that electricity from where it is being produced to where it is needed will require an upgrade to our national electric grid. A 21<sup>st</sup> century transmission grid which will, as technology continues to develop, deliver power where it is needed, when it is needed, in the direction that it is needed, will be the modern equivalent of building the Interstate Highway System in the 1950s. Beyond that, tremendous improvements in electricity use can be made by creating incentives for owners of homes and commercial buildings to retrofit their spaces with proper insulation. Studies show that a significant upgrading of insulation would save the equivalent of one million barrels of oil per day in energy by cutting down on both air conditioning costs in warm weather and heating costs in winter.

### **A domestic fuel to free us from foreign oil.**

Conserving and harnessing renewable forms of electricity not only has incredible economic benefits, but is also a crucial piece of the oil dependence puzzle. We should continue to pursue the promise of electric- or hydrogen-powered vehicles, but America needs to address transportation fuel today. Fortunately, we are blessed with an abundance of clean, cheap, domestic natural gas. Currently, domestic natural gas is primarily used to generate electricity. It has the advantage of being cheap and significantly cleaner than coal, but this is not the only use of our natural gas resources. By aggressively moving to shift America's car, light duty and heavy truck fleets from imported gasoline and diesel to domestic natural gas we can lower our need for foreign oil—helping President Obama reach his goal of zero oil imports from the Middle East within ten years. Nearly 33% of every barrel of oil we import is used by 18-wheelers moving goods around and across the country by burning imported diesel. An over-the-road truck cannot be moved using current battery technology. Fleet vehicles like buses, taxis, express delivery trucks, and municipal and utility vehicles (any vehicle which returns to the “barn” each night where refueling is a simple matter) should be replaced by vehicles running on clean, cheap, domestic natural gas rather than imported gasoline or diesel fuel.

### **A plan that brings it all together.**

Natural gas is not a permanent or complete solution to imported oil. It is a bridge fuel to slash our oil dependence while buying us time to develop new technologies that will ultimately replace fossil fuels transportation. Natural gas is the critical puzzle piece that will help us to keep at home more of the \$350 to \$450 billion we spend on imported oil every year, where it can power our economy and pay for our investments in wind energy, a smart grid, and energy efficiency. It is this connection that makes the Pickens Plan not just a collection of good ideas, but a plan. By investing in renewable energy and conservation, we can create millions of new jobs, developing new alternative energies while utilizing natural gas for transportation and energy generation, securing our economy by reducing our dependence on foreign oil, and keeping more money at home to pay for the whole thing.



### **How do we get it done?**

The Pickens Plan is a bridge to the future—a blueprint to reduce foreign oil dependence by harnessing domestic energy alternatives, and to buy us time to develop even greater new technologies. Building new wind generation facilities, conserving energy, and increasing the use of our natural gas resources can replace more than one-third of our foreign oil imports in 10 years. But it will take leadership. We're organizing behind the Pickens Plan now to ensure our voices will be heard. Together with President Obama and the Congress, we can take down the old barriers and provide energy security for generations to come, while helping to dig us out of the recession we are in today.

*As the President has said, "Yes, we can." And together, as never before, we will. ■*



### Biographical Sketch

**T. BOONE PICKENS** is the founder and chairman of BP Capital, which manages one of the nation's most successful energy-oriented investment funds. Since July of 2008, Mr. Pickens has been leading a grass-roots campaign aimed at reducing this country's dependence on imported oil. His 2008 New York Times bestseller, *The First Billion is the Hardest*, details what this country must do to win back its energy independence. He is also pursuing a wide range of other business interests, including water marketing, alternative wind power, ranch development initiatives, and a clean transportation-fuels company. Mr. Pickens was founder in 1956 of Mesa Petroleum, which became one of the largest independent exploration and production companies in the United States. His career at Mesa spanned four decades, until 1996. Mr. Pickens earned a degree in geology from Oklahoma A&M (now Oklahoma State University) in 1951. He has received many honorary degrees from various American universities, and has served on numerous boards and industry associations. Throughout his professional life, Mr. Pickens has been a generous philanthropist, giving away nearly \$1 billion.

### Thursday, March 24, 2011

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

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

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



## 2011 WTGS Fall Symposium September 28-30, 2011 Midland, Texas

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# HGS Legends Night 2011

## An Evening with the Legends of HGS

by Ashley Harris



Photography by Jack Landers Digital Photography (jlriron@yahoo.com)



Houston Geological Society's annual Legends Night dinner event was held on Monday, January 17 honoring four of Houston's great industry legends: **John Amoruso, Dan Smith, Dick Bishop** and **Dave Rensink**. The event brought in 21 sponsors and a sell-out crowd of 300 and raised a total of \$14,000 in profits for the Calvert Memorial and HGS Foundation scholarship funds.



The guest speaker, AAPG Executive Director, **Rick Fritz**, kicked off the presentations, discussing the globalization and expansion of AAPG within the last ten years and its latest fundraising efforts. According to Mr. Fritz, AAPG is doing twice as much as they were 10 years ago in an effort to build better science, and as of today has raised more than \$29M during their recent fundraising campaign from members who donate their time and money to promote education and public outreach and awareness.



The four honorees of the night, all of whom were at one point presidents of both HGS and AAPG, then presented their presidential perspectives of the cornerstone societies. **John Amoruso** reminisced about his early days as a student and new geologist to the industry. He shared drilling stories of past jobs and booms and busts during his career, touching on his most famous discovery: the Amoruso Field. "If you think it's going to produce, don't worry too much about the numbers," said Mr. Amoruso when asked about how he found and funded the development of the field.

**Dick Bishop** focused on the value of intellectual insights and the differences between new data versus more accurate data and finders versus explorers. “Like John Amoroso, explorers of the year see something that others don’t and change the way we view geology.” He stressed the importance of questions rather than answers in shaping the industry today and the value that societies and their resources can bring to growing new ideas. “If you’re not making mistakes, you’re not doing enough.”



In another promotion of society involvement, **Dan Smith** paid thanks to HGS and AAPG for his more than 53 years as an explorationist. He recalled several events in his career, including the 1980s depression that cut 50% of the industry’s work force and the introduction of 3D seismic that further lowered the risk of drilling. His response: Get involved! Mr. Smith took advantage of HGS talks and short courses to implement 3D seismic in his prospects and establish key relationships. Now, looking back on his career...”What made the difference?” According to Mr. Smith, it was his involvement in the two societies that allowed him to network and keep up with key technology. He closed with strong advice to the younger professionals: “Get active in a society and get active right now!”



**Dave Rensink**, the current president of AAPG, focused more on the future of the two societies and provided a long range view of what he thinks AAPG will look like in 25 years. According to Mr. Rensink’s statistics, 50% of current members are over the age of 50, 60% live within the US and only 15% of the members are female. His predictions for years to come are: an age and gender shift in membership averages, an increase in the number of AAPG offices worldwide and the globalization of the AAPG ACE conference. He also predicts that as eBook sales continue to grow, more and more publications will become purely digital, China will become the seventh region, producing hundreds of thousands of new geologists, national oil companies will continue to gain more control over their resources and plays will be developed that we haven’t even thought of yet. “Change is unavoidable...and accelerating,” said Mr. Rensink. “We need to think long-term.”



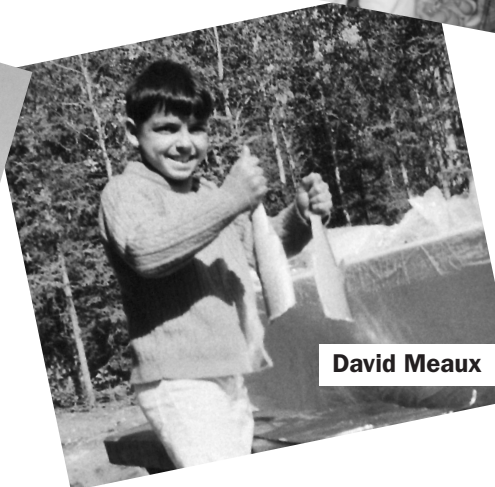
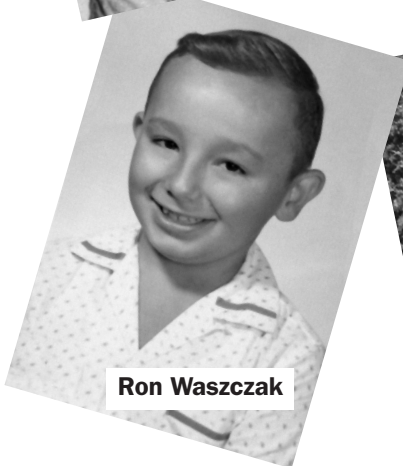
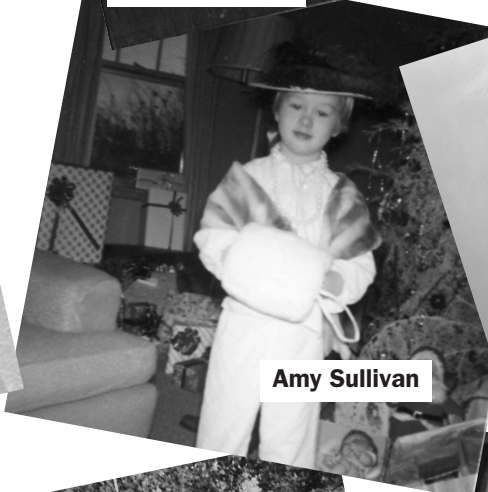
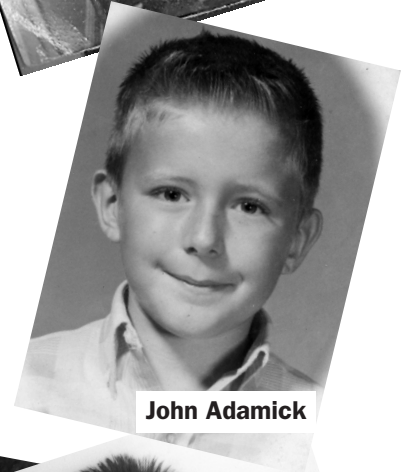
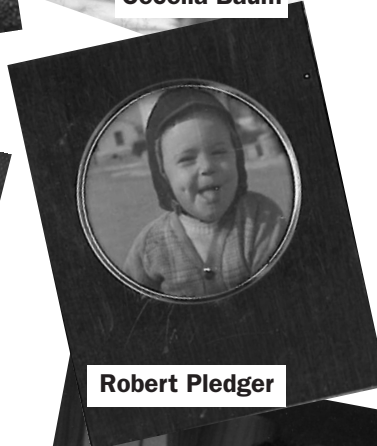
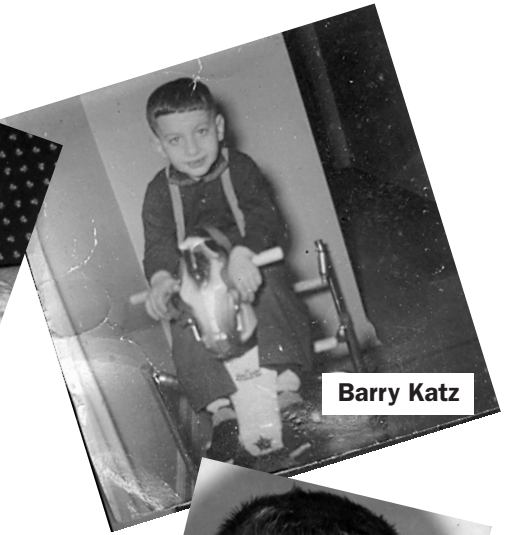
Membership and involvement in industry societies seemed to be the twofold over-arching message of the evening. If you would like more information, please visit [www.hgs.org](http://www.hgs.org). Thanks to our sponsors for making an extraordinary evening possible and thank you to all who attended for participating in such a legendary event. We’ll see you next year! ■

**Thank You to Our Sponsors**





# Your HGS Board in Earlier Times







## Government Update

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

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

### **AGI Government Affairs Monthly Review (December 2010)**

#### **Research and Development Tax Credits Extended by Congress Lead Reduction Act Passes Congress and Becomes Law**

The Reduction of Lead in Drinking Water Act (S.3874) passed Congress in late December and was signed into law by President Obama on January 4, 2011. The law amends the Safe Drinking Water Act to prohibit the sale of lead pipes, solder and fixtures used for drinking water and redefines "lead-free" to reduce the fraction of lead that may be used in any drinking water fittings and fixtures. The goal is to further reduce potential lead contamination in drinking water; however, the new requirements of the law will not take affect until 3 years after enactment. Details of the Act can be found at: <http://thomas.loc.gov/cgi-bin/bdquery/z?d111:s.03874>:

#### **REE Bill Introduced in Waning Days of 111<sup>th</sup> Congress**

Senator Bayh introduced the Rare Earths Supply-Chain Technology and Resources Transformation Act of 2010 on December 15, 2010. The bill would establish a rare earth element (REE) materials research and development (R&D) program in the Department of Energy, authorize loan guarantees for REE mining, refining, and production, initiate an interagency task force on REE, initiate an assessment of REE resources, consider a REE national stockpile, and direct the secretaries of Energy and Interior to conduct a study on the feasibility of a REE supply chain and production cooperative among those involved in REE mining and production in the United States.

The measure builds upon two previous measures, the Rare Earths and Critical Materials Revitalization Act of 2010 and the Rare Earths Supply Technology and Resources Transformation Act of 2010. Look for the 112<sup>th</sup> Congress to consider critical minerals and materials in 2011, with these measures providing a blueprint for future legislation.

#### **Brief Overview of the New 112<sup>th</sup> Congress**

The 112<sup>th</sup> Congress will convene on January 5, 2011 and there are significant changes based on the elections in November. In the House, Republicans won 63 seats that were held by Democrats in the 111<sup>th</sup> Congress, gaining a majority of 242 of the 435 total seats. There will be 96 new members in the House (9 are Democrats, 87 Republicans) and 37 new members in the Senate (13 are Democrats, 24 Republicans). On the Senate side,

Republicans gained 6 seats, leaving the Democrats in control, with a 53-seat majority (including two independents who caucus with the Democrats), but the majority will be smaller than the 60 votes needed to fulfill cloture.

On December 7, 2010 the incoming House Republican leaders announced their committee chairmanships. The House Appropriations Committee will be led by new Chairman Hal Rogers (R-KY) while Norm Dicks (D-WA) will likely serve as the ranking member. Key subcommittee positions for appropriations have not yet been announced.

The renamed House Science, Space, and Technology Committee will be chaired by Ralph Hall (R-TX). The committee name was lengthened to reflect the chair's commitment to NASA and the aerospace industry. Doc Hastings (R-WA) will take the gavel for the Natural Resources Committee; the highly-contested chairmanship for the Energy and Commerce committee will go to Fred Upton (R-MI). Joe Barton (R-TX) campaigned aggressively to remain the top Republican on the Energy and Commerce committee, but Barton needed a waiver to serve a fourth term in the spot, and the Steering Committee declined to make the required exception. The Committee on Education and Labor will be renamed Education and Workforce and the new chair will be John Kline (R-MN). An AFL-CIO blog called the change "petty" and suggested the Republicans dislike the word "labor", especially when it is followed by "union".

Republican chairmen are expected to tighten their oversight of agencies, including the Environmental Protection Agency (EPA), the Department of Energy (DOE) and the Department of the Interior (DOI), and to demand justification for all spending and budgets. Hastings has already asked Secretary of the Interior Ken Salazar to appear before the Natural Resources Committee to explain how DOI plans to address hydraulic fracturing for natural gas extraction.

On December 22, 2010 the incoming House Republican leadership announced new rules to be voted on when the 112<sup>th</sup> Congress convenes. Leadership will retain the independent Office of Congressional Ethics, will institute a "72-hour" rule that mandates the online posting of bills at least three calendar days before a vote, and will institute a "cut as you go" rule that requires

**Government Update** *continued on page 58*

## Government Update continued from page 57

offsets for any new spending. In addition, committees must post their rules online, provide three-day notice of markups, post votes within 48 hours, make the text of amendments available and post a “truth in testimony” statement online detailing any conflicts of interest of a hearing witness. The new leadership hopes to repeal the “Gephardt Rule” that automatically increased the debt limit when a budget resolution was adopted in the past.

Leadership on key Senate committees is expected to be similar to that in the 111<sup>th</sup> Congress. On the Environment and Public Works Committee, Senators Barbara Boxer (D-CA) and James Inhofe (R-OK) will likely retain their positions as chair and ranking member, respectively; John D. Rockefeller (D-WV) and Kay Bailey Hutchison (R-TX), are slotted to keep their leadership on the Commerce, Science, and Transportation Committee.

On the Energy and Natural Resources Committee, Jeff Bingaman (D-NM) and Lisa Murkowski (R-AK) will likely retain their positions as chair and ranking member, respectively. Senator Murkowski was certified by the state of Alaska as the winner of the November election as a write-in candidate after a long and drawn out challenge. Murkowski will continue as a member of the Republican party and will likely continue to serve on the Appropriations Committee.

### EPA Starts and Stalls on Climate Change Regulations


On January 2, 2011, rules of the Environmental Protection Agency (EPA) for regulating greenhouse gas emissions from cars, light trucks, and large industrial facilities take effect. The regulations are only for new facilities, significant modifications to existing facilities and new vehicles; however, opposition is mounting. Seven states (Arizona, Arkansas, Florida, Idaho, Kansas, Oregon and Wyoming) are not ready to implement the regulations and the EPA has taken over oversight in those states. Texas also has refused to implement the regulations and EPA has taken over permitting and oversight in that state. Incoming House Energy and Natural Resources Chairman, Representative

Fred Upton (R-MI), has suggested he may use a rare congressional tool, a resolution of disapproval, to attempt to overturn the regulations. President Obama would have to sign the resolution if Congress considered and passed it. Upton acknowledged that the President is unlikely to approve of such a measure.

The EPA will also begin to formulate rules for regulating greenhouse gas emissions from existing power plants and refineries. The rules would be “modest” and their formulation and implementation would be delayed. The rules for power plants should be finalized by May 26, 2011 and the rules for refineries should be finalized by November 10, 2012. This plan is part of an agreement between EPA, the States and environmental groups. EPA faces potential lawsuits from environmental groups over its failure to follow the Clean Air Act and intense opposition from industry over costs and the burdens of regulations.

### EPA Considers Hexavalent Chromium in Water Supplies

In mid-December, the Environmental Work Group released a report showing that 25 of 35 cities had hexavalent chromium, a carcinogen, in tap water supplies above the level proposed by California to protect human health. The problem of hexavalent chromium in drinking water was dramatically brought to public



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attention by the efforts of Erin Brockovich, who won a multimillion-dollar settlement for Hinkley, California. The story was further popularized by a movie, "Erin Brockovich".

The environmental group's water testing results received immediate reaction from the public, the media and policymakers. Senators Dick Durbin (D-IL) and Mark Kirk (R-IL) sent a letter to EPA Administrator Lisa Jackson asking for information about EPA's water testing and EPA's ongoing review of hexavalent chromium. A day after the letter was sent, Jackson met with Durbin, Kirk, Dianne Feinstein (D-CA), Jeff Bingaman (D-NM), Daniel Akaka (D-HI), Bob Casey (D-PA), Ben Nelson (D-NE), Jeff Merkley (D-OR), Bill Nelson (D-FL) and Debbie Stabenow (D-MI). Senators Feinstein and Barbara Boxer (D-CA) wrote a separate letter to Jackson and requested a decision within two weeks about a possible health advisory regarding hexavalent chromium. The senators suggested they might propose legislation to address the issue.

EPA released a statement indicating the agency would carefully review all data before making a final decision about any new standards or testing for hexavalent chromium. The federal government through the EPA has a federal standard for total chromium that is much higher than the proposed California

standard for just hexavalent chromium. EPA does not require utilities to test for hexavalent chromium, so the potential scope of the concern is not really understood. The National Toxicology Program is studying hexavalent chromium and noted in a 2007 factsheet that the compound is a human carcinogen when inhaled and may be carcinogenic when ingested. The factsheet also states that the US is a leading producer of chromium compounds, used in electroplating, steelmaking, leather tanning, textile manufacturing and wood preservation.

#### United Nations Climate Change Meeting in Cancun

Negotiators from 194 countries met in Cancun Mexico for the 16<sup>th</sup> session of the Conference of the Parties (COP 16) to the United Nations Framework Convention on Climate Change (UNFCCC) from November 29 to December 10, 2010. The parties reached two major agreements (called the Cancun Agreements). First, nations agreed to keep the average global temperature rise below 2° Celsius above pre-industrial levels and acknowledged that this effort requires more than the emissions reduction pledges by the US, China and others at the Copenhagen meeting (COP 15). Second, nations pledge to establish a \$100 billion annual fund to promote adaptation and clean energy in developing nations. A few details of particular interest to the geosciences include an agreement to establish a program to preserve forests (i.e., reducing emissions from deforestation and forest degradation, REDD) and to establish guidelines for carbon capture and geological sequestration.

#### Key Federal Register Notices

**EPA**—The EPA has released a rule making for mandatory reporting of greenhouse gases from facilities that conduct geologic sequestration of carbon dioxide. [<http://edocket.access.gpo.gov/2010/2010-29934.htm>]

**EPA**—The EPA has renewed the Gulf of Mexico Executive Council Charter for an additional 2 years. [[http://www.access.gpo.gov/su\\_docs/fedreg/a101202c.html](http://www.access.gpo.gov/su_docs/fedreg/a101202c.html)] ■

## Drilling for Geoscientists

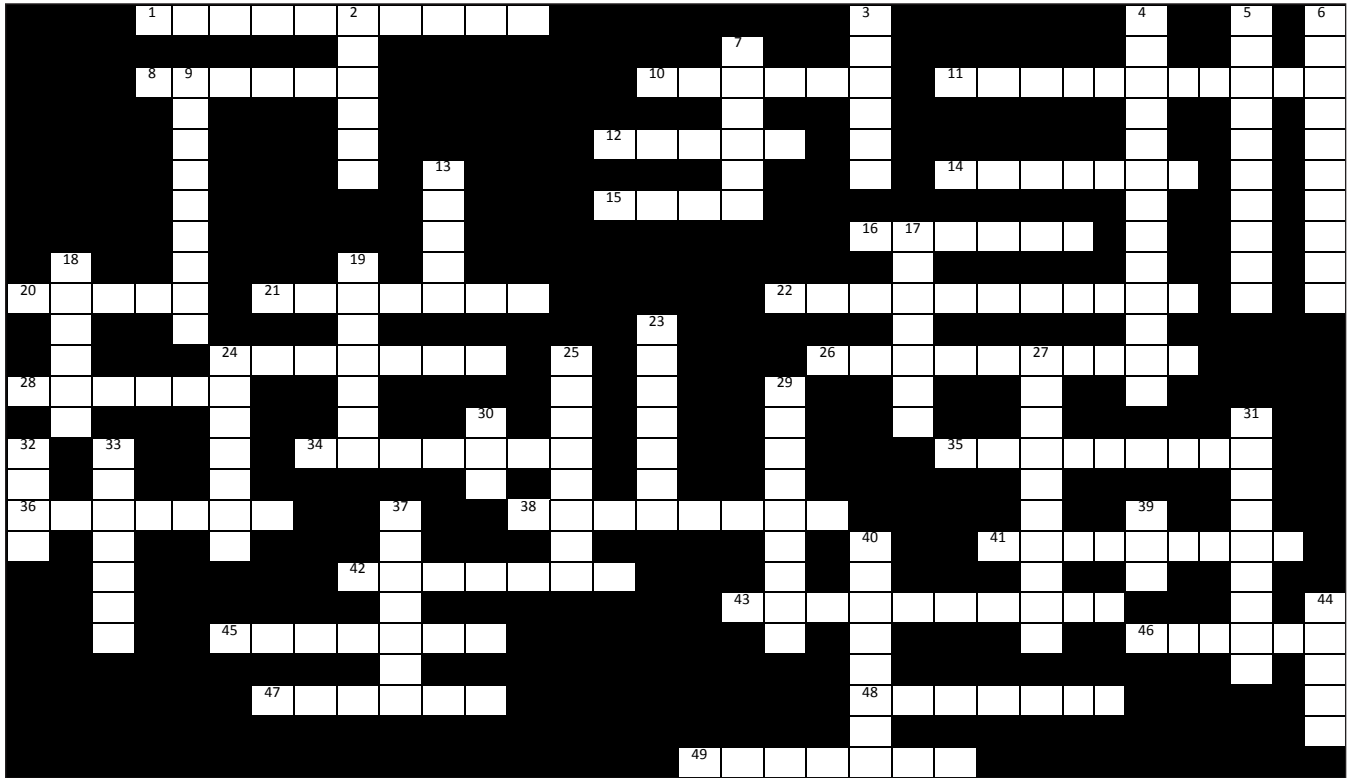
- Covers Basic Drilling, Floating Drlg, Directional Drlg, Cementing, Fishing, Well Control, some completion
- Terms, equipment and procedures explained.
- Instructor: John Shaughnessy, retired drilling engineer after 32 years with BP and Amoco
- Cost: \$650 (includes light breakfast and lunch)
- Friday, March 4th and 18th starting @ 7:30.
- Location Signa Engineering Office (I-45 north @ Beltway 8. For information on registering, call Heather Baldwin: (281) 774-1000, [hbaldwin@signa.net](mailto:hbaldwin@signa.net)
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# March Crossword of Geologic Terms



**ACROSS**

- 1 Oil or gas accumulation that has matured to a production plateau or even progressed to a stage of declining production
- 8 Overall characteristics of a rock unit that reflect its origin and differentiate the unit from others around it
- 10 Lead sulfide
- 11 Pertaining to a type of metamorphic rock with shearing and granulation of minerals caused by high mechanical stress
- 12 Depression in the crust of the Earth
- 14 Crust of weathered soil rich in calcium carbonate
- 15 Intrusive rock that invades preexisting rocks
- 16 Pertaining to the environment of deposition of sediments by wind
- 20 Deposit formed by a flowing sediment-laden current as it enters an open or standing body of water
- 21 Describing the environment and conditions of the marine zone between low tide and the edge of the continental shelf
- 22 Fault surface parallel to a mechanically weak horizon, or parallel to bedding, that detaches or separates deformed rocks above from undeformed rocks below
- 24 Pertaining to the environment of deposition by glaciers
- 26 Sandy-textured rock or sediment
- 28 Mobile mass that intrudes into preexisting rocks
- 34 Uncontrolled flow of reservoir fluids into the wellbore, and sometimes catastrophically to the surface

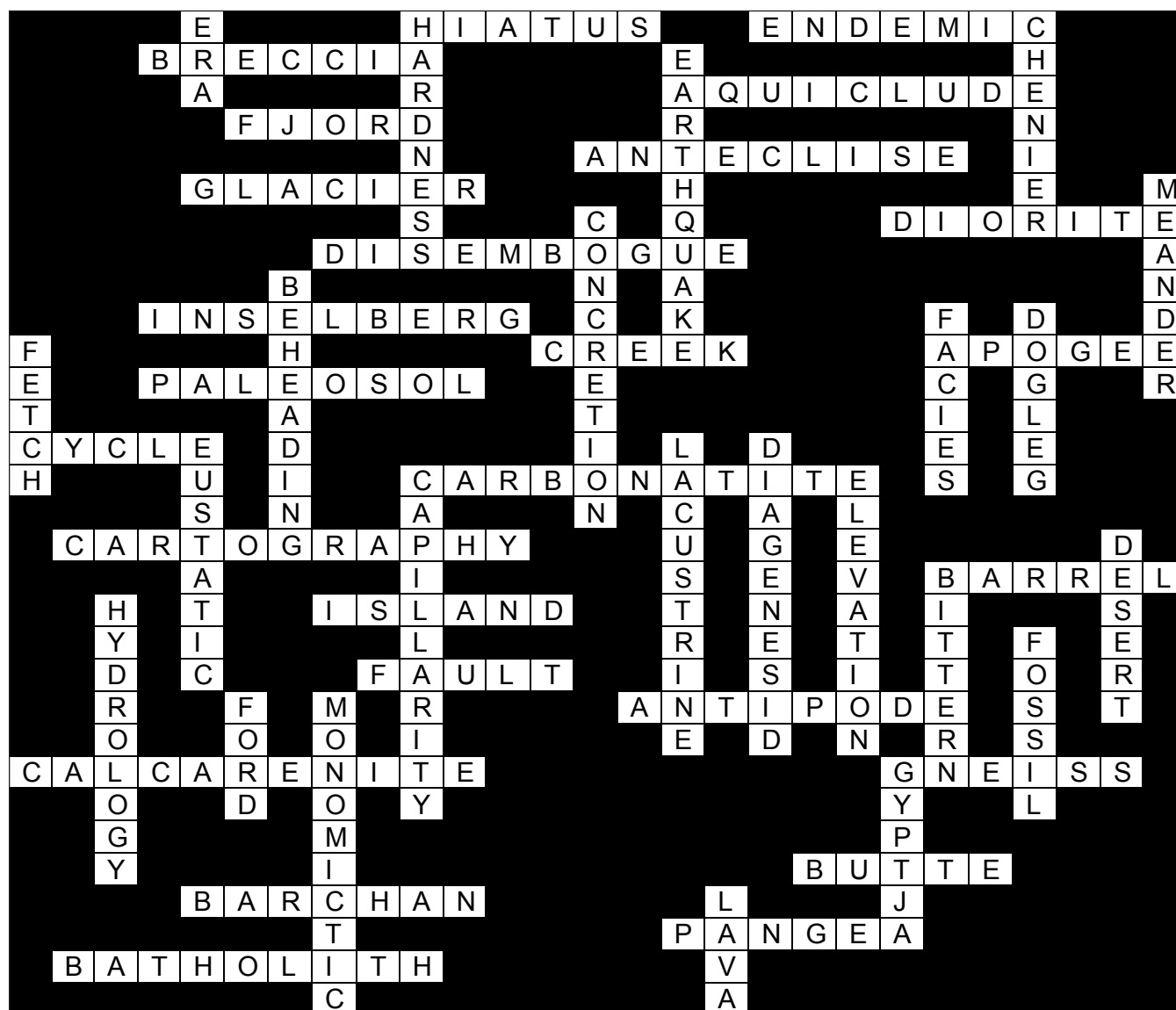
- 35 Movement of ions or molecules from regions of high concentration to low concentration within a solution
- 36 Molecules of natural gas trapped in ice
- 38 Line joining points of equal time or age
- 41 Difference between the maximum displacement of a wave and the point of no displacement
- 42 Global sea level and its variations
- 43 Area of thickest deposition in a basin
- 45 Coarse-grained, intrusive igneous rock of felsic composition having large crystals of quartz, feldspar and mica
- 46 Stable area of continental crust
- 47 Abrupt turn, bend or change of direction
- 48 Pertaining to the depositional environment of the deepest area of the ocean basins
- 49 Environment of deposition between 200m and 2000m

**DOWN**

- 2 Preserved remnants of plants or animals
- 3 Microscopic, single-celled, freshwater or saltwater algae that has a silica-rich cell wall
- 4 Formed somewhere other than their present location
- 5 Pertaining to minerals or materials that grow in place
- 6 Pertaining to an environment of deposition in lakes
- 7 Group of clay minerals formed during the alteration of silicate minerals such as mica and feldspar

- 9 Phase of petroleum operations that immediately follows successful exploratory drilling
- 13 High-standing area formed by the movement of normal faults
- 17 Major episode of plate tectonic activity in which lithospheric plates collide and produce mountain belts
- 18 Pertaining to minerals or igneous rocks composed of minerals such as quartz and feldspar that are relatively light in color or density
- 19 Special mathematical geometry with properties that reproduce a pattern over a range of scales
- 23 Situation in which free oxygen exists in an environment
- 24 Attractive force produced by the mass of the Earth
- 25 Measure of a curve describing the statistical frequency distribution in the region about its mode
- 27 Bedding surface separating younger from older strata, along which there is no evidence of erosion or nondeposition
- 29 Succession of strata deposited during a single cycle of deposition
- 30 Production enhancement
- 31 Member of the evaporite group of minerals
- 32 Boundary between the crust and the mantle of the Earth
- 33 Fine-grained detrital sedimentary rock formed by consolidation of clay- and silt-sized particles
- 37 Pertaining to an environment of deposition by a river
- 39 Magnitude of the inclination of a plane from horizontal
- 40 State of gravitational equilibrium between the lithosphere and the asthenosphere of the Earth
- 44 Termination of shallowly dipping, younger strata against more steeply dipping older strata

### February Crossword Puzzle Answers







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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 CD in Word format with a hardcopy printout to the Editor.

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

**Photographs** may be digital or hard copy. Hard copies must be printed on glossy paper with the author's name, photo or figure number and caption on the back. Digital files must be submitted in .tif, .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 DVD.

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# Houston Petroleum Auxiliary Council News

Winona LaBrant Smith, HGS Liaison



Winter ends and Spring begins in the month of March. In the northern half of the world, March 19, 20, or 21, is the day when the sun is directly over the equator and is the first day of Spring. March can either feel wintry or springy, with as many blustery, windy days as there are mild, sunny days. What an exciting time each year and HPAC

responds with “must attend” events.

HPAC had its traditional Annual Game Day at the Junior League Tea Room, 1811 Briar Oaks in celebration of Valentine’s Day. This event was held on February 14, and **Daisy Wood** performed her usual enjoyable activities. We appreciate all Daisy does for our organization and look forward to attending this event each year. Our next happening will be held on Friday, May 6, with a Style Show and Installation of Officers at Braeburn Country Club, 8101 Bissonnet. Fashions will be presented by Excessories, Katy, Texas, and our own members will model. The show Coordinator, **Marty Pearson**, will MC. Chairpersons are **Mickey Murrell** and **Wanda Shaw**, with **Connie Griffith**, **Marion Hawkins**, **Katherine McKinney**, and **Sheri McQuinn** helping to coordinate this social.

Exploring Houston, led by **Martha Lou Broussard** is continuing to be a smashing success. The Spring Road Trip will be on March 31. We are going to one of the oldest towns in Texas—Goliad. It was founded in 1749 when the Presidio La Bahia and the Mission Espirito Santo were established. It is also where in 1836 Col. James Fannin and 350 of his men were massacred following their surrender to Mexican forces after the battle of Coleto Creek. Not all the arrangements have been made yet, but our bus will leave from Memorial Drive Presbyterian Church at 8:00 a.m. and return about 6:00 p.m. If you and any guests are interested in joining us to learn more Texas history, contact **Martha Lou Broussard** at mlbrou@rice.edu 713-348-4492 or **Linnie Edwards** at linnieedwards@sbcglobal.net 713-785-7115.

HPAC has an inexhaustable number of members who have lived exciting and valuable lives. **Mary Harle** has been chosen from our virtual garden of HPAC ladies to be highlighted for the month of March. Mary was born in Bellville, Texas, in her family home that is now one of the historical homes of Bellville. After graduating from Bellville High School, she attended Blinn College in Brenham where she and **Millie Tonn** (HPAC’s immediate Past President) and **Elsworth Tonn** were classmates. Mary began her career with Humble Oil & Refining Company, where she and **Shirley Gordon** (another HPAC member) were in the Marketing Department. After her marriage to **Wiley Harle**, a young geologist for Natural Gas Pipeline, she retired and began a family.

They had two boys and one girl, Bascom, James Wiley and Anne Elizabeth. After a long illness they lost Anne Elizabeth at the age of nineteen. After 45 years of marriage, Mary lost Wiley. She has two grandsons and one granddaughter who are involved in Boy Scouts, debate, band and volleyball. Sally, Mary’s daughter-in-law, is the daughter of **Sylvia** and **Jeff Morris**. (Her life seems to be intertwined with many members of the Oil Industry.) Mary spends so much time in Katy where her family is located that she says “I vacation in Katy” !!!

Mary has been an active member of Grace Presbyterian Church since 1971. Together, Mary and Wiley were active toward the growth of this church. Wiley once made all the crosses for each baptism; what an achievement. “Wiley Harle Day” was proclaimed by Grace Presbyterian School, as recognition of all he and Mary had contributed to the school. She and Wiley were made honorary Life members of the Presbyterian Women’s Association (Wiley is the only man who has received this honor). Mary has served as both an Elder and Deacon. What a contribution!

Mary Harle was honored with the HGS-HGA Distinguished Service Award in 2005-2006. She had joined HGA and Geowives in 1968. She held all offices (some more than once) and committee chairs in HGA, and after being asked multiple times, she agreed to serve as President of HGA in 1982-83. She has been a member of numerous committees for GCAGS and AAPG conventions through the years. The HGS Office (SOS) was fortunate to have Mary serve as a volunteer for several years. This incredible lady has been a member of HPAC since its inception. She served on the first HPAC Nominating Committee and has been Courtesy Chairperson for the last two years. She is devoted to our organization and serves with a smile for everyone. She is a member to be emulated.

Remember that HPAC has several Interest Groups: *Bridge* (contacts: **Audrey Thompkins**, 713-686-0005 or **Daisy Wood**, 713-977-7319); *Book Club* (contacts: **Martha Lou Broussard**, 713-665-4428 or **Phyllis Carter**, 281-397-9888); and *Exploring Houston* (contact: **Martha Lou Broussard**, 713-665-4428 or mlbrou@rice.edu).

Geologists, please encourage your spouses to join HPAC, where they will have the opportunity to meet other spouses of Geologists, Geophysicists, Engineers and Landmen. They will participate in informative and entertaining programs, delicious lunches and welcoming fellowship.

A HPAC membership form is included on the next page. (Contact: **Winona LaBrant Smith** at 713-952-2007) ■



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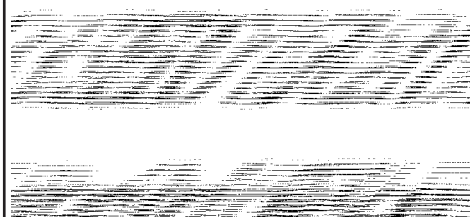
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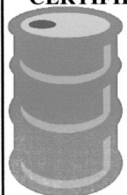
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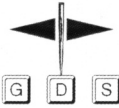


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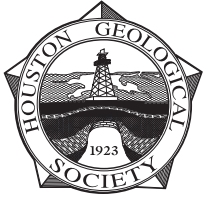


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