HGS Bulletin
Houston Geological Society
Volume 58, Number 3
November 2015

R.E. Sheriff Lecture Order From Chaos—Mudstones as Hydrocarbon Sources, Reservoirs, and Seals: Their Common Characteristics and Genetics, Essential Differences, and Recognition Criteria

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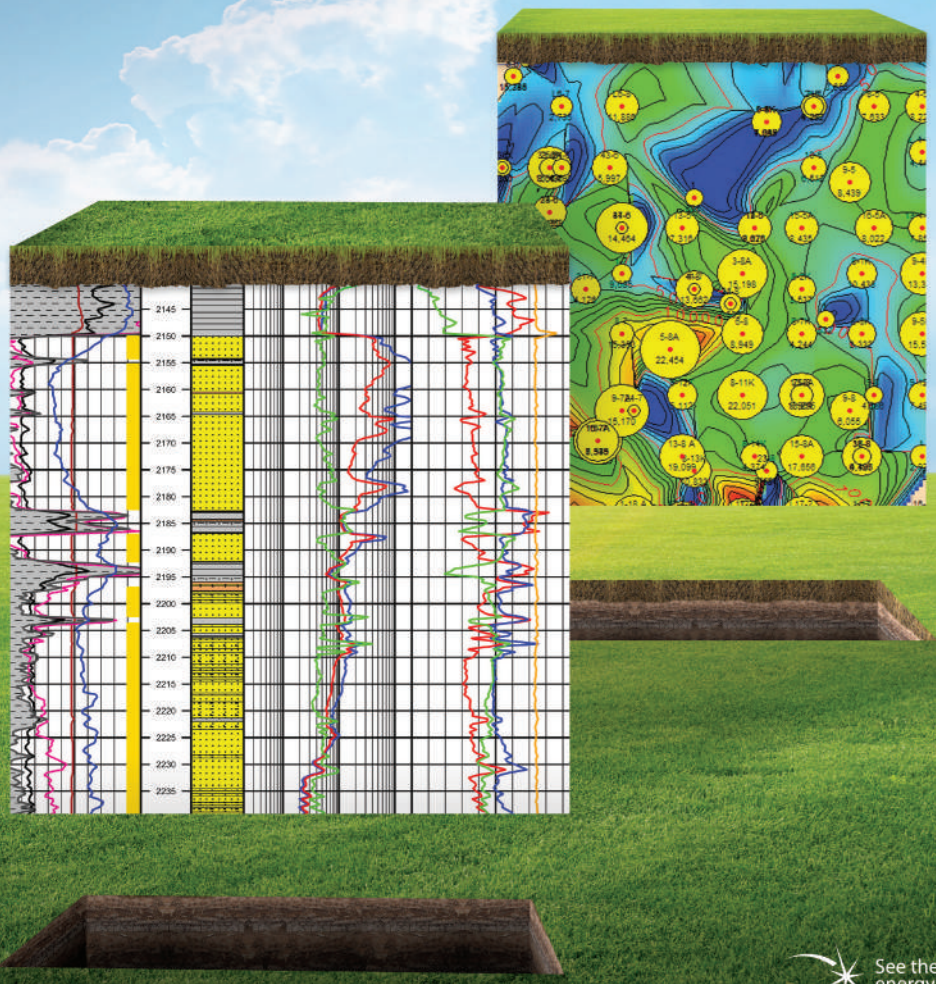

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Houston Geological Society

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In Every Issue

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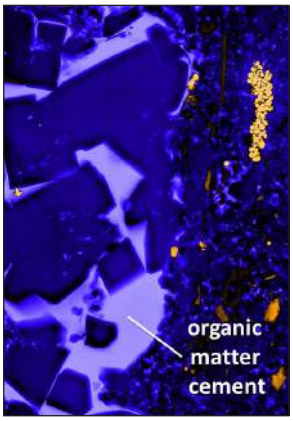

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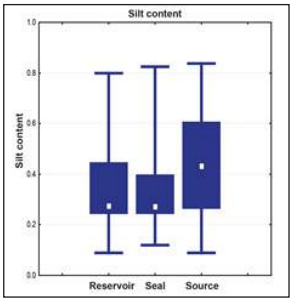

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About the Cover: Selenite (a.k.a. moonstone, a colorless form of the mineral gypsum) crystals in a cave discovered during development of the Naica Mine (lead/zinc/silver) in 2000, Saucillo Municipality, Chihuahua State, Mexico. The crystals are up to 4 feet (1.2 m) in diameter and 50 feet (15 m) long, the largest crystals ever found of any type of mineral. The caves at Naica were formed in Albian limestones by the circulation of hydrothermal fluids along major faults. For more information, see the Naica Project website: http://www.naica.com.mx/english/index.htm
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Don't Ignore Your Tax Deductions!

It's hard to believe that I am writing a column for November when the temperature is still in the mid-90's and the GCAGS Convention starts this coming weekend! Oh well, I guess the HGS Editorial Board needs to keep production on time.

Considering we'll be approaching the end of the year when this is read, now would be the time to address a couple of items of note. The first one is Legends Night 2016, which will be held on January 25th at the Norris Conference Center in the City Centre complex. More information will be forthcoming, but needless to say, Legends Night is important on many levels. We have world-class Legends this year with the theme being "Geophysicists Who Have Impacted Geologists." Alistair Brown, Peter Duncan and Tom Smith are the featured speakers, with each commenting on the successes in their careers and how they have made an impact on the careers of other geoscientists. I certainly know how they have made an impact on mine!

Legends Night is important for another reason. It is a key component to supporting both the Calvert and HGS Foundation Funds, which in turn are the sources for undergraduate and graduate scholarships given by HGS to students each year. …The HGS has a "Friends of the Foundation" group, which is looking for new members. Cost to get in is $100 (tax deductible, of course).

Legends Night is important for another reason. It is a key component to supporting both the Calvert and HGS Foundation Funds, which in turn are the sources for undergraduate and graduate scholarships given by HGS to students each year. Without the significant monies brought in by sponsorship and attendance, there would be far fewer students getting financial support for their education! I would encourage everyone to put January 25th, 2016 on their calendar and make a point to come to this great dinner. We moved the venue to support a larger audience and have an excellent meal. Sponsorship is always welcome, and you can contact me, **John Adamick**, **John Tubb, Jr.** or the HGS office to find out how to sponsor and at what levels.

The second point to this column is an appeal to help both scholarship funds. I know money is tight, but there are probably a few who could still use a year-end deduction and this is an excellent way to get one! The HGS has a "Friends of the Foundation" group, which is looking for new members. Cost to get in is $100 (tax deductible, of course). This list will be published in the *Bulletin* on a periodic basis to acknowledge those who contribute to the two foundations. We are also looking for Sponsors for Legends Night, proceeds from which go to fund both foundations. So if you are looking for a great tax deduction for 2015, or want to start early with tax deductions for 2016 – please consider the two scholarship funds to assist you. ■

Keep turning to the right.
Deborah

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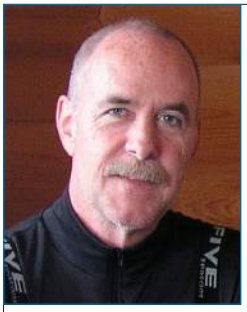


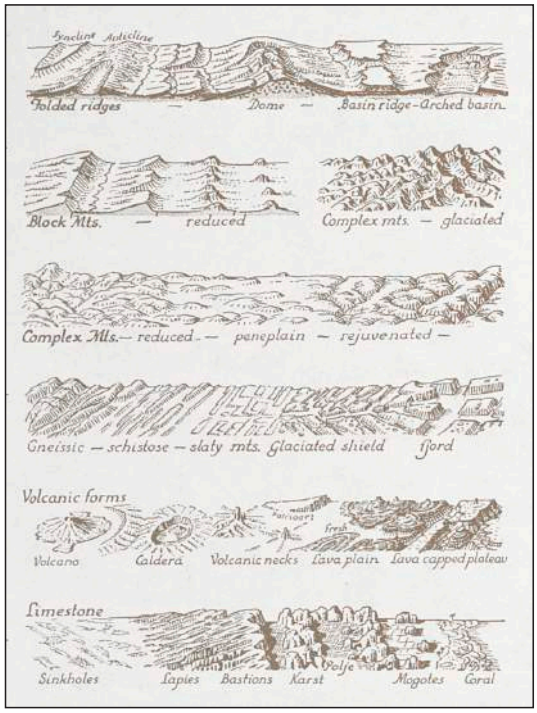
Jon Blickwede
jonblickwede.hgs@gmail.com

Erwin Raisz and His Wonderful Landform Maps

Most of us geologists have a love of maps — or at least we should, as we have to make and use them all the time. As an elementary school student in the northeast U.S., one of my favorite ways to spend a cold winter's eve was to lie on the floor of the living room with the family World Atlas, sheets of tracing paper, pencil and eraser, and proceed to sketch rivers, lakes, mountain ranges, etc. from faraway, exotic realms of the globe. I would imagine how these places really looked, and dreamt of traveling there. I guess that's the origin of my own affection for maps, and perhaps for geology.

Despite their potential as vehicles for the imagination, most maps that we create and use these days are rather mundane affairs. They are exclusively designed to convey dry, spatial information of some sort, be it the streets of Houston or the distribution of allochthonous salt canopy in the Gulf of Mexico. If they have any aesthetic appeal at all, it's probably unintended. It wasn't always that way.

Erwin Josephus Raisz (1893-1968) was born in Löcse, Hungary, the son of an engineer, and initially followed in his father's footsteps earning degrees in civil engineering and architecture from the Royal Polytechnicum in Budapest in 1914. After the Great War he emigrated to the United States, and worked at the Ohman Map Co. in New York City to support himself while he pursued a PhD in geology at Columbia University (Raisz, 1929). In a conversation I recently enjoyed with his grandson, Jonathan Raisz, he told me that the reason for Dr. Raisz's switch from engineering to geology is unclear, though Jonathan suspects it may have been related to another part-time job he had in New York, making drawings of fossils in the collection of the American Museum of Natural History.



Regardless of how it came to pass, in addition to a number of renowned cartographic inventions such as the cartogram and the "Armadillo" map projection (*Wired* magazine, 2014), Erwin Raisz produced in his lifetime some 5000 hand-drawn, pen-and-ink "landform" maps, which must have required the patience of Job: they are beautiful renditions of the Earth's surface that are fascinating to ponder. These maps could never have been automatically generated by a computer software application, but required the hand and sensibility of a human artist, convolved with the knowledge of a human geologist. Most of them were created during his 20 years at the former Institute of Geographical Exploration at Harvard University, where he taught, was curator of their map collection, and published the first comprehensive textbook in English on cartography (Raisz, 1938).

So what are these "landform" maps of Dr. Raisz? They are essentially physical relief maps, but use a set of realistic physiographic symbols that are derived from oblique views (excerpt copied here). The emphasis is on realistic symbols: "… the good symbol is that which can be read without an explanation… the [landform] map appeals immediately to the average man. It suggests actual country and enables him to see the land instead of reading an abstract location diagram. It works

From The Editor *continued on page 9*

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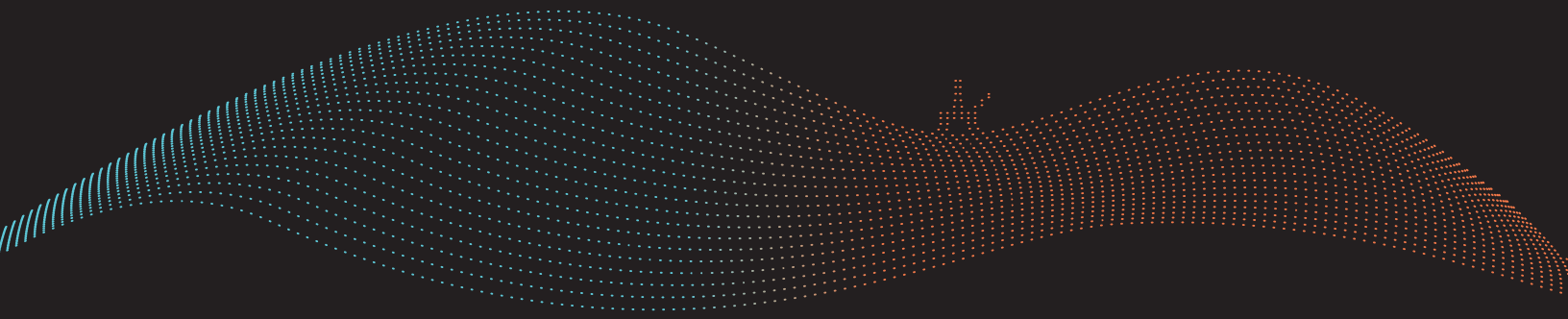

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From the Editor continued from page 7

on the imagination." (Raisz, 1931). According to Garver (2003), "He learned to know the land by its geological structure. Like a painter or sculptor who first approaches the human form by focusing on anatomy, Raisz instinctively read in a landscape the forces that molded it." Spend a moment and take a close look at the excerpt from his Landforms of Mexico map reproduced here. It doesn't take long before one is virtually transported to the Trans-Mexican Volcanic Belt, and sees with the mind's eye the majestic Pico de Orizaba, Popocatepetl and other stratovolcanoes of the region.

Jonathan told me that his grandfather was also an avid photographer, and indeed, one of the resources on which he based his landform maps were the many photos he took while on an airplane, always taking care to book a window seat. He also used aerial photos, and in his last years even began to use astronaut photos from NASA's Gemini program. So I suppose it can be said that Dr. Raisz was one of the fathers of geological remote sensing.

I've always been intrigued by the meeting of science (especially geology) and art, and Erwin Raisz's maps have for me been one of the most inspiring examples of this confluence. ■

Garver, J., 2003, Plainly visible patterns: the cartography of Erwin Josephus Raisz: http://web.archive.org/web/20030630222812/http://mercatorsworld.com/article.php3?i=66

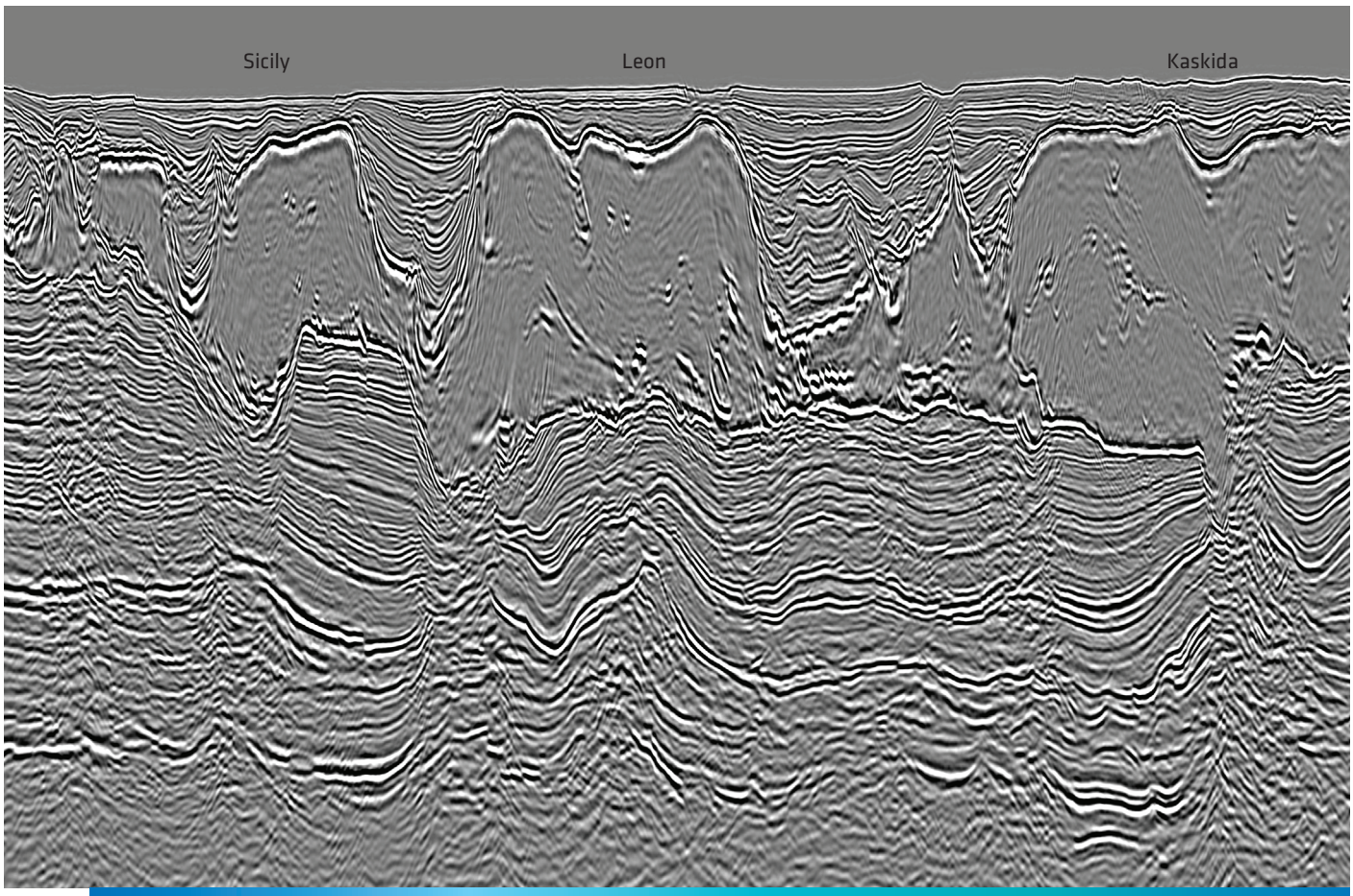
Raisz, E.J., 1929, The scenery of Mt. Desert Island: its origin and development: *Annals of the New York Academy of Sciences*, v. 31, p. 121–186

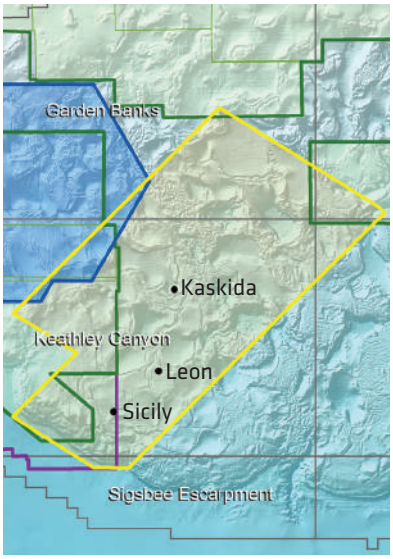
Raisz, E.J., 1931, The physiographic method of representing scenery on maps: *Geographical Review*, v. 21, n. 2, p. 297-304

Raisz, E.J., 1938, *General Cartography*: McGraw Hill, 370 pp.

Raisz Landform Maps: http://www.raiszmaps.com/

Wired magazine, http://www.wired.com/2014/01/projection-raisz-armadillo/





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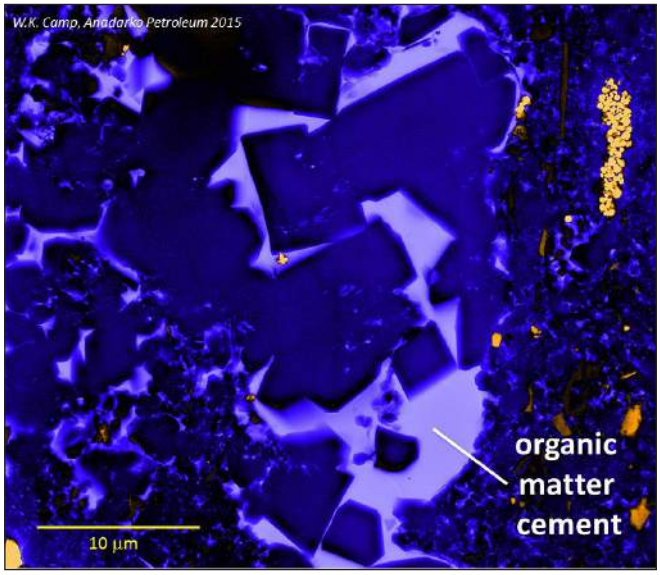
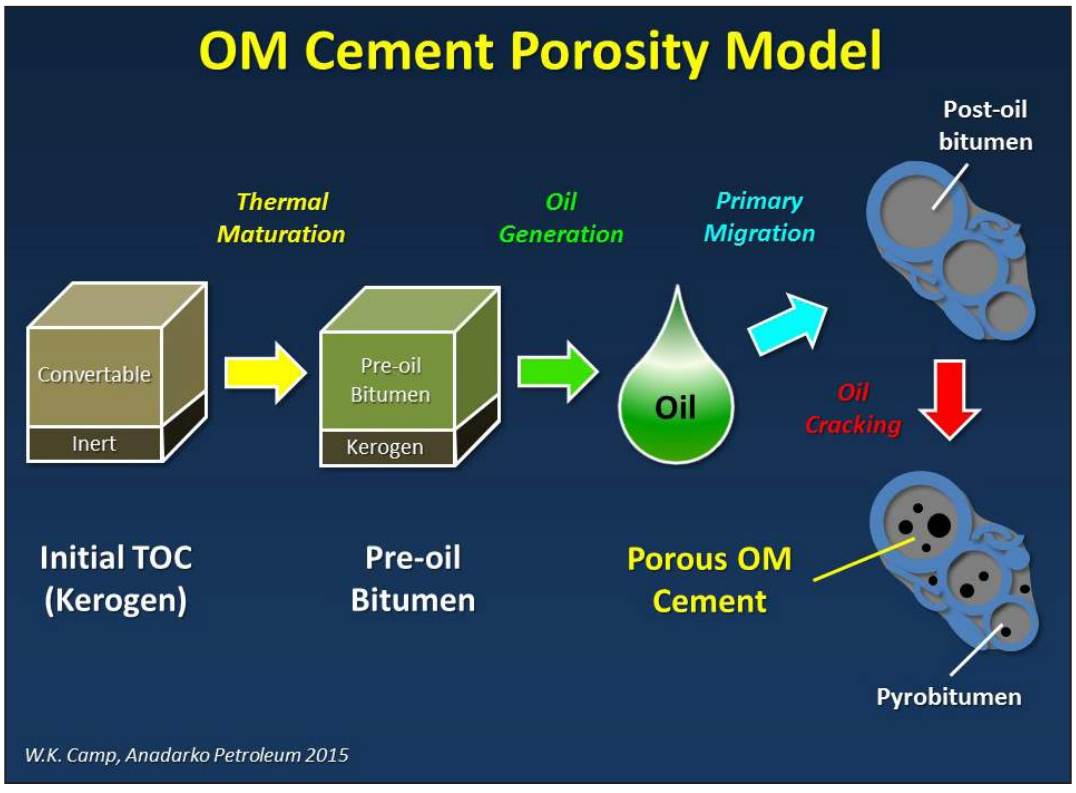
Diagenetic Evolution of Organic Matter Cements in Unconventional Shale Reservoirs

Organic matter cements in the form of bitumen and pyrobitumen are commonly observed in scanning electron microscopic images in many U.S. unconventional shale reservoirs that range in age from Ordovician to Cretaceous. Organic matter cements are distinguished from kerogen based on petrographic identification of cement as a void-filling material within matrix pores, microfossil internal voids, and microfractures. The character of organic matter cements and their impact on reservoir quality changes with increasing thermal maturity as illustrated by the organic-rich interval of the lower Eagle Ford Formation in south Texas.

In thermally immature (<0.50%Ro) outcrops of the Boquillas (Eagle Ford) Formation, meniscus-type organic matter cements partially fill interparticle pores within coccolith-rich lamina.

HGS North American Dinner *continued on page 13*





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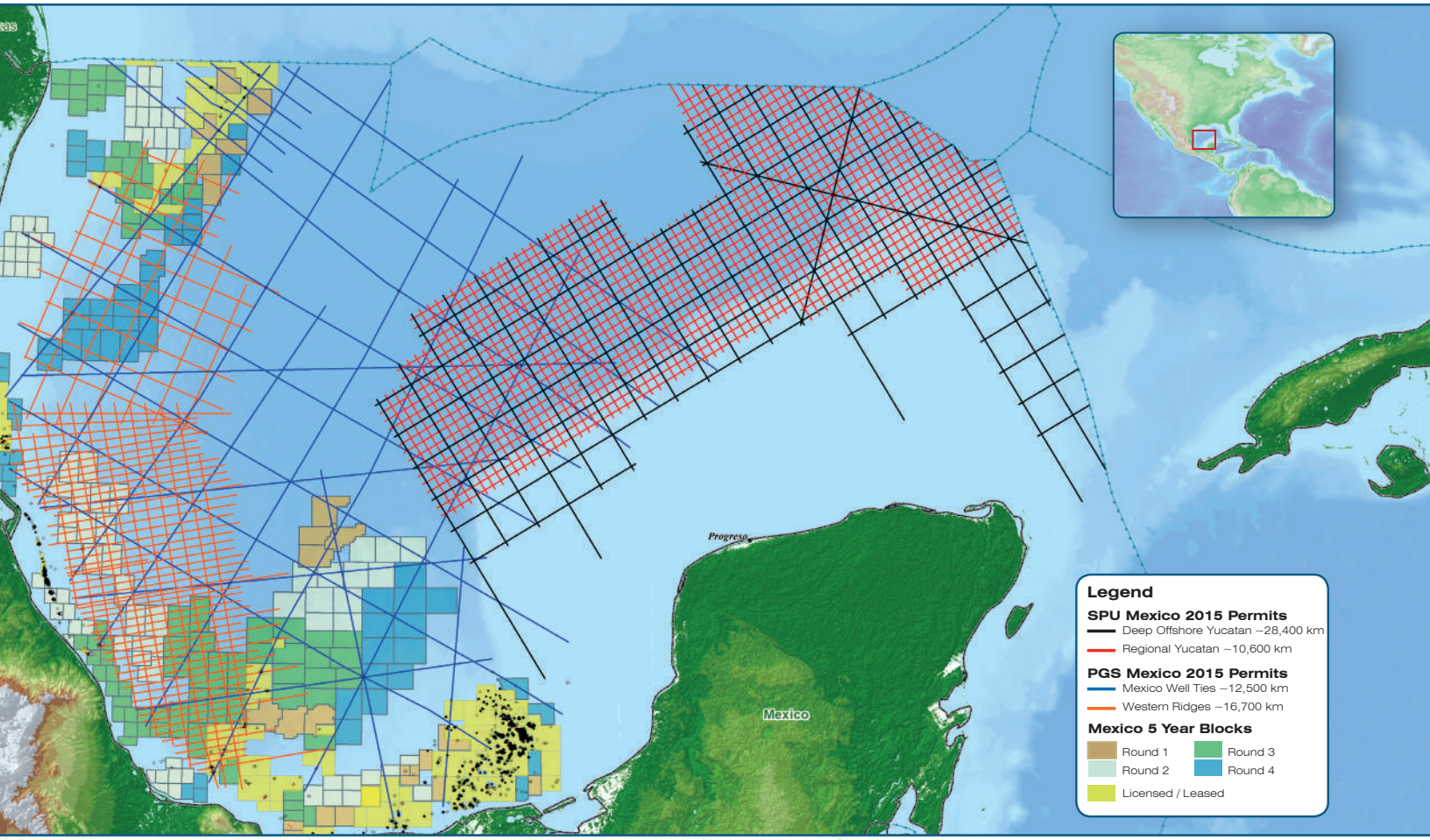
Newly Acquired Multi-Client 2D Seismic



Spectrum's latest long-offset 2D seismic survey offshore Mexico is a collaborative effort with PGS and Schlumberger, spanning approximately 80,000 km. The survey provides seamless broadband seismic coverage across the Gulf of Mexico from the Yucatan Platform in the southeast, to the Perdido Fold Belt in the northwest, tying key wells in producing hydrocarbon basins and sampling emerging pre-salt plays. These strategically placed surveys will help provide greater insight to clients preparing for subsequent licensing rounds.

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HGS North American Dinner continued from page 11

The origin of this organic matter cement is interpreted as pre-oil generation bitumen created at the initial stage during the conversion of kerogen to oil.

In the subsurface, migrated residual oil (migra-bitumen) fills matrix pores and foraminifera chambers forming solid organic matter plugs that may serve to form updip lateral seals along the updip edge of the oil window. This soluble bitumen may be partially removed by hot solvent (toluene) during Dean Stark extraction on crushed rock samples (GRI method), that could result in overly optimistic porosity measurements.

Down dip at higher thermal maturity (>1.0%Ro), organic matter cements in the form of pyrobitumen develop a well-connected secondary porosity network, often mistakenly described as "kerogen" porosity. The organic matter pores are interpreted to form as a result of gas generation during the thermal cracking of oil retained within primary matrix pores preserved prior to oil generation and migration.

Mineral cements observed within foraminifera chambers (e.g. calcite, quartz, kaolinite) predate the surrounding organic matter cement. This relationship suggests that mineral cementation may be terminated during primary oil migration as oil replaces water expelled from primary pores within the source rock.

Biographical Sketch

Wayne K. Camp is a Distinguished Geological Advisor with Anadarko Petroleum Corporation, where he has been employed since 1980, working various domestic and international exploration and development projects. Camp's expertise includes identifying and evaluating new exploration play opportunities, and unconventional play risk assessment. Camp supervised a number of geological and geophysical exploration and development teams at Anadarko from 1986 to 2004. His experience includes conventional and unconventional plays onshore U.S., subsalt and deepwater plays in the Gulf of Mexico, and offshore plays in Indonesia.

Prior to working with Anadarko, Camp was employed for two years by Phillips Petroleum Company. He received a BA degree in geology with honors from the State University College at Oneonta, New York, and a MS degree in geology from Colorado State University, Fort Collins, Colorado.

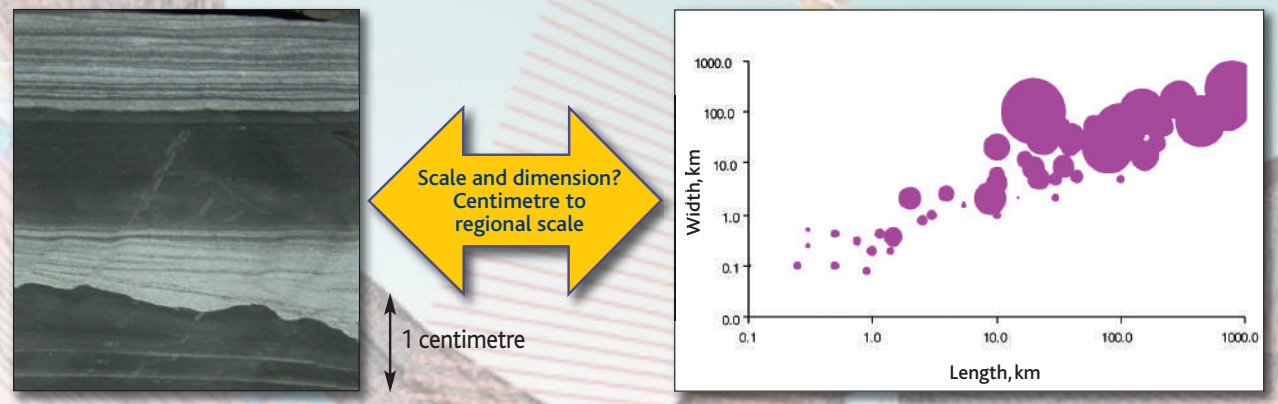
Camp is an active member of AAPG, the Geological Society of America, and the Houston Geological Society. He served as chairman for the AAPG Unconventional Reservoirs Research Group in 2004, and was co-chairman for the 2005 Hedberg Conference on tight-gas sands. Camp also served as an advisor for the U.S. Department of Energy Unconventional Resources Technology Advisory Committee from 2010 to 2013.

Camp was co-editor and contributor to AAPG Hedberg Series No. 3, "Understanding, Exploring and Developing Tight-gas Sands", which was awarded the Robert H. Dott Sr. Memorial Award for best AAPG Special Publication in 2010. He was also senior editor for AAPG Memoir 102, "Electron Microscopy of Shale Hydrocarbon Reservoirs" that was published in 2013, now in its second printing.

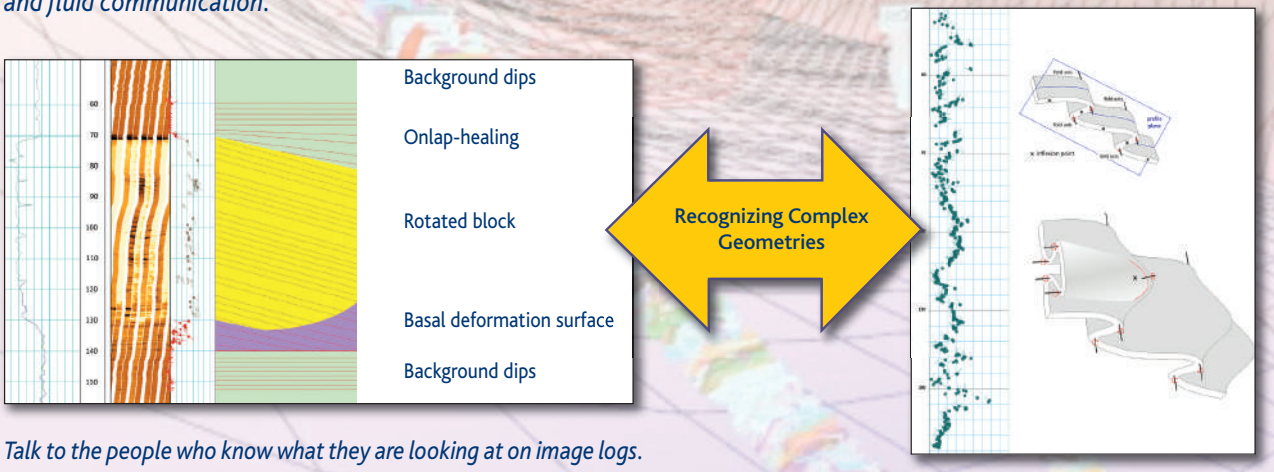
Camp lives in Montgomery, Texas with his wife Joanne, and has two daughters and two granddaughters.

Getting into **Deep Water**

RECOGNISING MASS TRANSPORT COMPLEXES (MTC) are part and parcel of any exploration or development in continental margin, abrupt margin and submarine canyon plays. Based on hundreds of kilometres of image and cores studies, **TASK FRONTERRA** has determined that at least 12% of deep marine deposits are deformed by creep, failure or rotational slumping. We have conducted numerous studies in the Gulf of Mexico, West Africa, Brazil, West of Shetlands, Nile Delta, Australia: North West Shelf and Malaysia.



Whether you are looking to sequester CO_2 in compartmentalized sediments, or looking at field development strategies – you want to be using the people who can measure and characterize these sediments in terms of geometry, scale, contacts and fluid communication.



Talk to the people who know what they are looking at on image logs.
Talk to the people who have worked on MTC compartmentalization in fields across the globe.

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Wednesday, November 11, 2015

Black Lab Pub, Churchill Room • 4100 Montrose Blvd.
Social 5:30 p.m., Dinner 6:30 p.m.

Cost: $30 Preregistered members; $35 non-members/walk-ups

To guarantee a seat, pre-register on the HGS website & pre-pay by credit card.
Pre-registration without payment will not be accepted.
Walk-ups may pay at the door if extra seats are available.

Stephen R. Schutter
Consultant

Lead-Zinc Mineralization as an Indicator of Downdip Unconventional Resources

While the geophysical evaluation of unconventional resources (organic-rich black mudstones/shales) has made great strides, understanding the geological aspects, particularly in respect to the greater depositional basin, has lagged. Exploration has been largely a matter of drilling wells and analyzing what turns up. There is a need for more efficient exploration.

In addition to organic material, which can mature into hydrocarbons with burial, organic-rich black shales are often enriched in metals, including Ag, Au, Ba, Cd, Cr, Cu, Hg, Mo, Ni, Pb, Re, Se, U, V, Zn and platinum group minerals, sometimes to the point of becoming ores. In the past, because the exploitation of conventional migrated hydrocarbons and mining ores were so different, the relationship was largely ignored. This was in spite of frequent traces of metals in hydrocarbons and the occurrence of hydrocarbons in mine workings. Beyond that, what we may learn about how the metals are concentrated, mobilized and move may permit better recognition of environmental hazards and economic opportunities.

Mississippi Valley type (MVT) base metal sulfide deposits are characterized by lead and zinc minerals, accompanied by pyrite and often copper and barium minerals and fluorite. They are also marked by the "ubiquitous" presence of hydrocarbons, often heavy oil or bitumen. They usually occur in carbonates; much of the mineralization appears to be void-filling (often associated with unconformities and/or karst). Dissolution and brecciation of host carbonates, precipitation of dolomite and calcite cements, and recrystallization of pre-existing dolomite are also characteristic. The ore deposits are commonly localized by faults or fractures.

Models of ore metallization have centered on metal-bearing fluids associated with igneous activity and/or derived from the basement. These produced vein-type deposits, pegmatites, or disseminated deposits in large intrusions. When ore minerals occurred in sedimentary deposits, they were still considered to have originated in unknown crystalline rocks, with hydrothermal fluids precipitating the minerals in favorable locations.

However, the occurrence of low-temperature lead-zinc mineralization over a very large area, co-extensive with metal-rich black shales, suggests that the shales themselves may be the source of the metals, which have been mobilized and reprecipitated in adjacent rocks. This phenomenon is widespread; locally the escaping fluids may be focused into MVT ore deposits. Mobilization and movement of these metals is analogous to, and possibly closely linked to, maturation and migration of hydrocarbons. In the case of the Midcontinent Pennsylvanian, there are no regional aquifers capable of long-distance transport or retaining elevated temperatures of basin-derived fluids; the sheer volume of zinc in the observed occurrences also becomes an issue. If this is a valid model, the occurrence of deposits is an indicator that somewhere downdip is a metal-rich, organic-rich black shale, possibly mature enough to generate recoverable hydrocarbons.

The nature and quantity of the metals in the shales may be a function of the organic matter type present, since different types have different affinities for specific metals. When and how those metals move provide evidence of the thermal and geochemical state of the source rocks.

If the metal ions in ground water systems are from metal-rich organic-rich shales, rather than unidentified igneous activity, then it should be possible to model the range of conditions where these metal ions are released. With knowledge of the fluid flow in a basin, it should be possible to generate at least a qualitative model of where metals in solution might be expected; sort of a BasinMod for ions in solution. Where the ions are present, their sources, and their possible precipitation points should all be part of the model. ■

Biographical Sketch

Steve Schutter received graduate degrees in geology from the University of Iowa, where he studied the depositional environments of Ordovician and Pennsylvanian shales. He went on to Exxon Production Research, where he worked on Paleozoic eustasy and the stratigraphic expression of salt tectonics, as well as on several regional studies. This was followed by work for Subsurface Consultants and at Murphy International E&P. In addition to writing on Paleozoic eustasy and the depositional environments of shales, he has also published on hydrocarbons associated with igneous rocks. He is currently working with geological models for unconventional resources, including a classification system for organic-rich shales and methods to recognize the stratigraphic parameters of sweet spots.

Monday, November 16, 2015

HGS Joint General and International Dinner Meeting

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

Cost: $45 Preregistered members; $50 non-members/walk-ups

To guarantee a seat, pre-register on the HGS website & pre-pay by credit card.
Pre-registration without payment will not be accepted.
Walk-ups may pay at the door if extra seats are available.

Kevin M. Bohacs, Sc.D., FGSA, FGS, FRGS
Senior Research Scientist
ExxonMobil Upstream Research Company
Spring, TX

The Robert E. Sheriff Lecture Series

Sponsored by the Department of Earth and Atmospheric Sciences at University of Houston and the U.H. Geoscience Alumni Association

In addition to the presentation by the guest speaker, Dr. Hua-wei Zhou, Chair of the Department of Earth and Atmospheric Sciences, will present an update of activities at U.H. as well as the departmental Outstanding Alumni Award. There will be a poster session on current thesis and dissertation research of U.H. students.

Come and meet the next generation of geoscientists from the University of Houston!

The Robert E. Sheriff Lecture Series was initiated in 1999 by the University of Houston Geoscience Alumni Association to honor Dr. Sheriff as an educator, scholar, and proponent for the geosciences. The series has recently been co-sponsored by the Houston Geological Society.

The Sheriff Lecture mission is to
bring some of the best known geologists and geophysicists in the world to the Houston community to share ideas relevant to exploration geology and geophysics, and to showcase geoscience activity at the University of Houston.

A full list of the Student Posters will be available on the HGS Website.

R.E. Sheriff Lecture: Order From Chaos — Mudstones as Hydrocarbon Sources, Reservoirs, and Seals: Their Common Characteristics and Genetics, Essential Differences, and Recognition Criteria

All 'shales' are not the same, but neither are they all unique. Finding common elements among the mudstone units that serve as hydrocarbon sources, reservoirs, and seals is essential for advancing our understanding of these complex rocks and making wise economic decisions.

Source, reservoir, and seal mudstones share many attributes from composition and depositional controls to stratigraphic distribution (**Figure 1**; e.g., Bohacs and Lazar, 2008; Lazar et al., 2015). Effective hydrocarbon source, reservoir, and seal mudstones all tend to have significant organic carbon and clay-

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HGS Joint General and International Dinner

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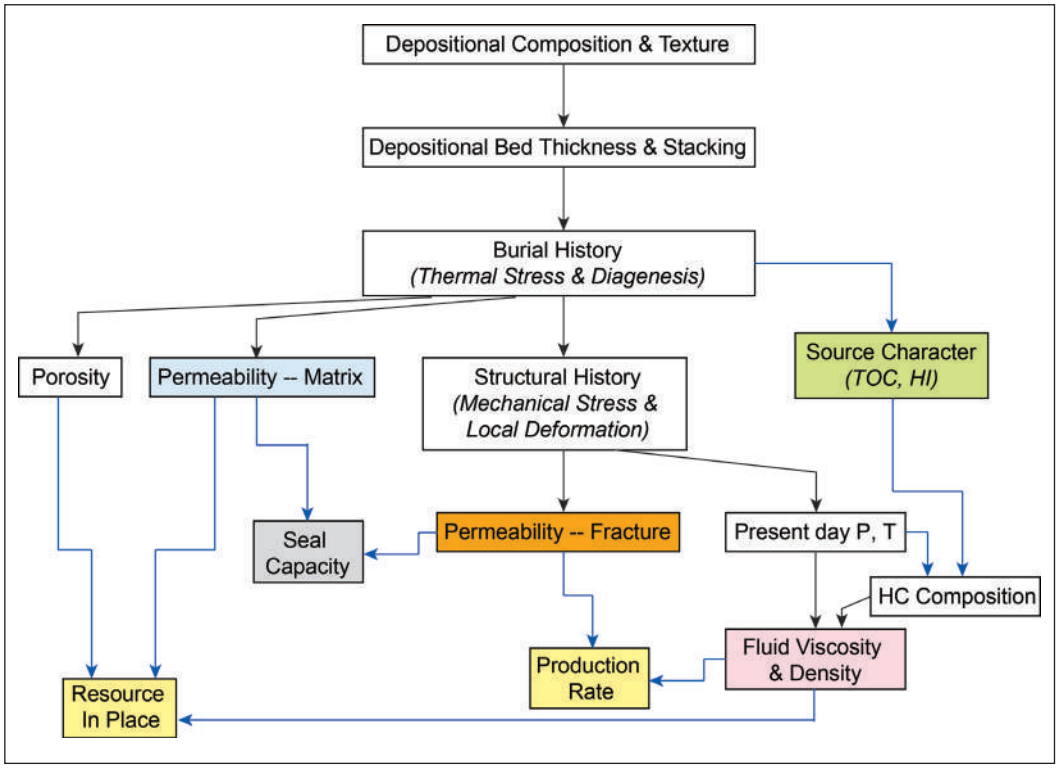

Figure 1: *Shared geologic controls that lead to current day rock and fluid properties and their combined relations to hydrocarbon play-element character, resource in place, and production rates. These include many common elements spanning depositional conditions, burial history, and structural history. Estimation of both rock and fluid properties require understanding of their shared geological history and benefit from an integrated approach.*

mineral content, well-preserved bedding, and early diagenetic cements (**Figure 2**; Bohacs, 2007; Bohacs et al., 2013). The organic matter in source rocks tends to be well preserved and enriched in hydrogen. In addition, good seals generally have less than 20% silt content and dominantly ductile components, whereas mudstone reservoirs are generally dominated by planktonic input of carbonate or silica that yields lithofacies amenable to induced stimulation (i.e., 'brittle' rocks; **Figure 2**; Bohacs, 2007). A significant thickness of each fine-grained facies and appropriate state of thermal maturity is required for economic effectiveness. These shared attributes allow us to leverage insights and models developed for source rocks to predict seal and reservoir facies.

Source Rocks: In terms of stratal stacking and architecture, source-prone biogenic-rich mudstones at the depositional sequence scale have been shown to occur in a limited number of physiographic settings, each with characteristic occurrence, stratal stacking, distribution, and character of TOC, HI, and fossil material (e.g., Bohacs, 1998). The term "physiographic setting" refers to an abbreviation for the complex of geomorphic and sedimentation processes that produce a given setting prone to accumulating biogenic-rich rocks. The utility of the physiographic setting factor is that it is portrays a fairly detailed picture of the mudstone depositional system that can be determined from typical exploration data (sequence-stratigraphic framework, facies, paleogeographic maps). The setting has direct implications for the vertical and lateral distribution of biogenic material within a depositional sequence, especially in the marine realm.

For example, in marine Constructional Shelf Margin (CSM) settings, organic carbon and biogenic content generally increases in each parasequence up to the maximum-flooding downlap surface (MF-DLS), then decreases step wise. In this setting, shoreline clastic dispersal systems are directly coupled to the basinal depositional areas. Thus parasequences generally decrease in thickness and increase in biogenic content towards the basin; organic matter type changes systematically from terrigenous, low-hydrogen content proximally to marine, high-hydrogen content distally. In contrast, the Platform-Ramp (P-R) setting contains parasequences that are relatively thick in basinward positions and thin (or lap on) toward basin margins. The distribution of organic matter differs significantly from the CSM: the P-R setting shows little or no organic facies changes towards the limit of fine-grained deposition. Maximum organic carbon content occurs in the basal TST and decreases stepwise to background levels at the MF-DLS.

Mudstone Reservoirs: Using the same approach, 'shale' reservoirs may be grouped into meaningful sets or families for analysis and comparison based on geological age, stratal stacking, and depositional setting, leveraging our long-standing approach to source rocks and carbonate reservoirs, thus enabling transfer of lessons appropriately among plays. Although they accumulate in a variety of settings (convergent and divergent margins; marine and lacustrine; wave- , river-, and tide-dominated shelves, slopes, and basin floors), prolific shale-reservoir-play strata have several essential attributes in common: they are all sensitively dependent on pre-existing and contemporaneous bathymetry, moderate clay-mineral content, parallel-bedded fabrics, early diagenetic

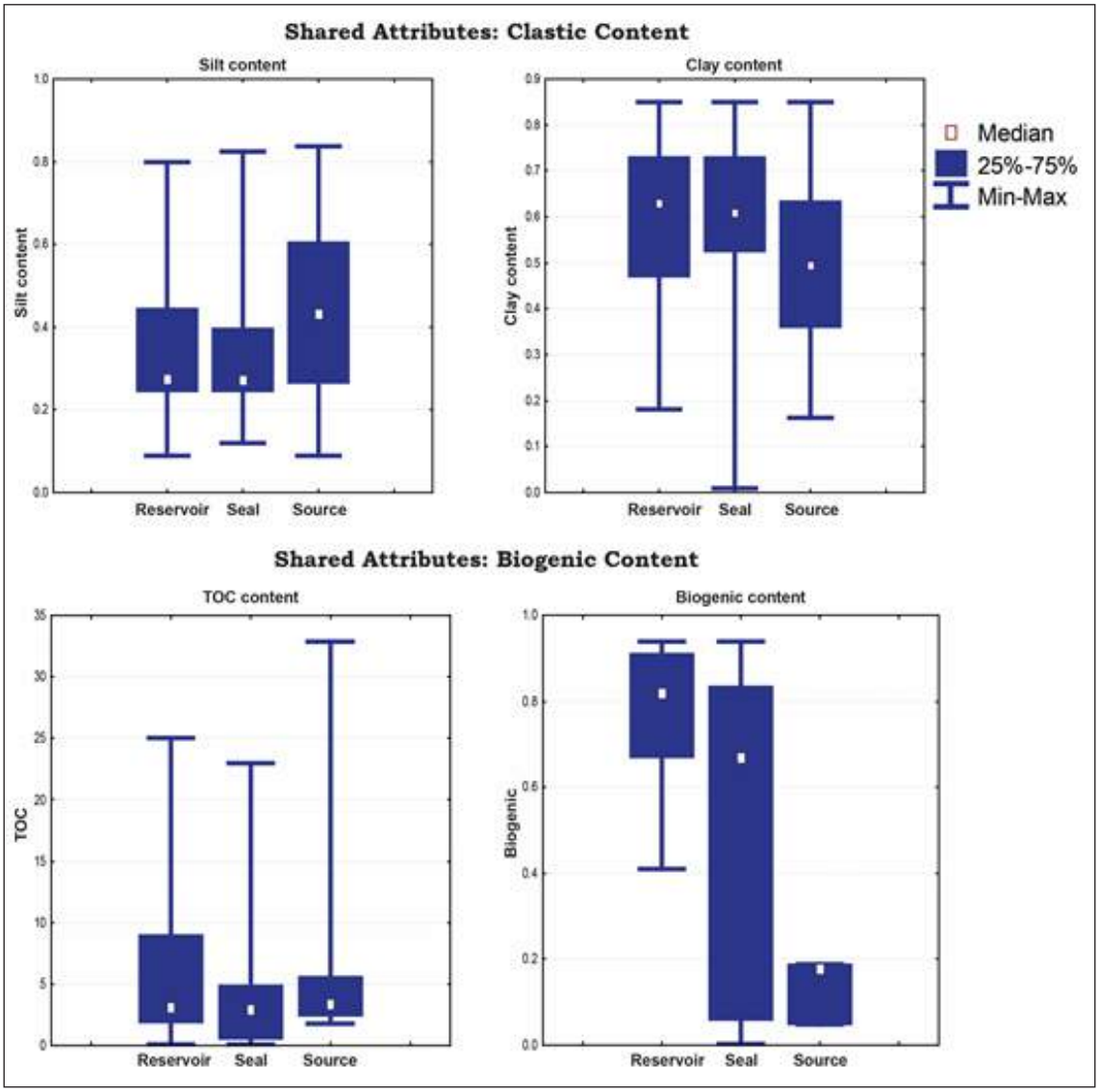

Figure 2: *Effective source, reservoir, seal mudstones share many attributes including significant clastic and biogenic content (after Bohacs, 2007). Source, reservoir, and seal tend to have about the same range of silt- and clay-sized material as well as total organic carbon (TOC) content. The major significant difference is that mudstone reservoirs tend to have large contents of "hard-part" biogenic material (biosilica, carbontate). Note that "clay content" refers to clay-sized material and not necessarily clay-mineral content.*

cements, and significant biogenic content of both source-prone organic matter and brittle lithofacies.

Recently, we recognized that all major shale-gas plays can be grouped into four main families, based on repeated patterns of stratal stacking of biogenic-rich physiographic settings at the sequence-set scale:

1. *Marine, Basal Platform-Ramp sequence overlain by one or more Distal Constructional Shelf Margin sequences* (transgressive to highstand sequence set); e.g., Utica (Pt Pleasant-Flat Creek-Indian Castle), Marcellus (Union Springs-Oatka Creek-Burket), Horn River (Evie-Otter Park-Muskwa), Antrim (Norwood-Lachine-u. Antrim), Woodford (lower-middle), Fayetteville (lower-middle-upper), Haynesville-Bossier, Eagle Ford (lower-upper) Shales
2. *Marine, Distal stacked Lowstand Systems Tracts* (LSTs) in intra-shelfal basins (lowstand sequence set); e.g., Barnett, Floyd Shales
3. *Marine, Individual Constructional Shelf Margin sequence* — upper Transgressive Systems Tract (TST) through lower Highstand Systems Tract (HST; distal downlap within sequence); e.g., Niobrara, Lewis, Mowry Shale, Gammon, Cody, Mancos, Pierre, Hilliard-Baxter-Mancos, Excello Shales
4. L*acustrine, Balanced-Filled sequences* — transgressive to

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highstand sequence set; e.g., Frederick Brook Formation

Mudstone Seals: Hydrocarbon seals are also amenable to this sequence-stratigraphic-based analysis. A good seal rock is typically fine-grained, with abundant clay-mineral content, less than 20% silt-sized particles, and more than 2 wt.% TOC (**Figure 2**). Thus, many good source rocks are also good seals—they typically have high capillary entry pressures, are laterally continuous with relatively slowly varying character, and are relatively ductile. Some organic matter-poor, clay-mineral-rich mudstones can also serve as seals. Seal and source rocks can accumulate in many of the same depositional settings, with seals also formed in areas of somewhat higher sedimentation rates with abundant clay minerals and in evaporative environments, both shallow/proximal and deep/distal. Sequence stratigraphy has been shown to provide the context within which seal potential and behavior can be predicted (e.g., Dawson and Almon, 1999, 2002, 2005; Jonk et al., 2009). A classic example from the Gulf of Mexico shows that for mudstones with the same clay-mineral content, those within transgressive systems tracts have significantly higher capillary entry pressures than those in highstand systems tracts (Dawson and Almon, 199).

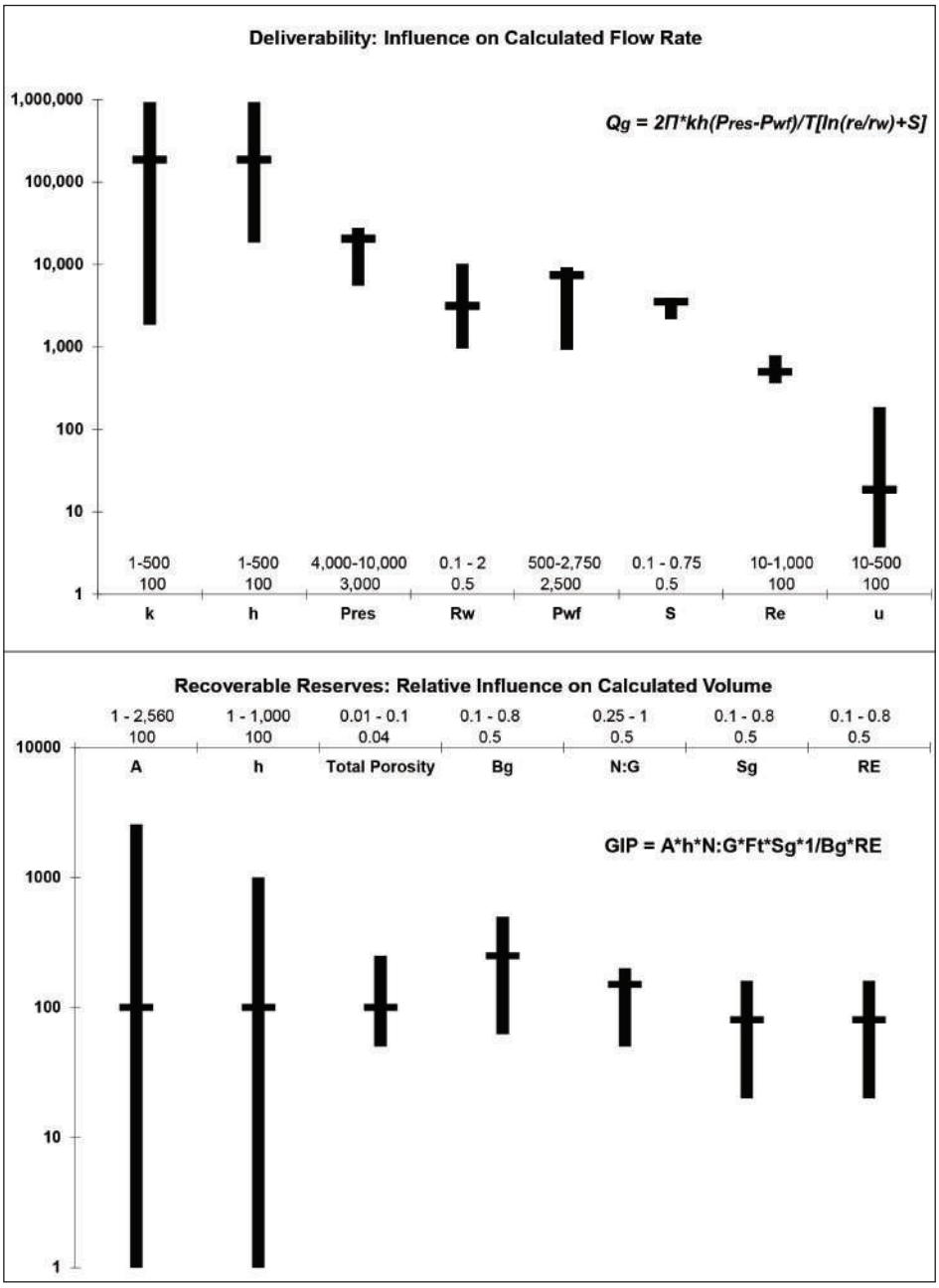


Figure 3: *Relative influence of geological versus engineering factors on deliverability and recoverable reserves. Vertical lines indicate range of influence of each variable (holding all other factors constant at baseline values and using the extremes of the typical range of values), horizontal cross line indicates baseline values used for sensitivity calculations, numbers above each line show the range of values used in calculations, based on commonly reported values for mudstone reservoirs.*

This approach enables early identification of the essential elements of a hydrocarbon play from regional context and stratal patterns that can be imaged on seismic and well-log data. And, this approach focuses further data acquisition on attributes critical for economic viability.

So what? But, you may wonder, why all this geology?— aren't these 'engineering' plays? As it turns out, the equations that govern volumetric source potential, resource in place, and fluid production rates are linear in almost all terms. Hence, it follows that each of the factors are of equal importance for the overall character of the mudstones in a hydrocarbon system. Some of the geological variables, however, have much wider ranges than others, and therefore can have a larger quantitative influence on calculations of source yield, resource in place, or producibility. Indeed, the net volume of reservoir rock (area x thickness x net:gross) is the dominant factor in the resource-in-place equation, by a factor of 600 or more (e.g., **Figure 3**).

For the mudstone reservoir portion of the hydrocarbon system, examination of the formulae used for both resource in place and producibility reveals that 35% of the variables are solely rock properties, and that an additional 53% are combinations of rock properties with geologically influenced factors (fluid, basin-history, reservoir pressure, or completions parameters). Essentially only one factor (wellbore radius) out of 14 variables is solely an 'engineering' factor.

These quantitative considerations are the motivation for the detailed treatment of geological factors in mudstone reservoir plays. These factors are the essential foundation upon which to build economic success, by convolving them with appropriate drilling, completions, and production practices. Similar attention to geological details is critical to understand from where the hydrocarbons come, what their composition will be, and where they will be trapped—the other two-thirds of the hydrocarbon system. ■

References Cited

Bohacs, K. M., 1998, Contrasting expressions of depositional sequences in mudrocks from marine to nonmarine environs, in Schieber, J., Zimmerle, W., and Sethi, P., eds., Shales and mudstones I.: E. Schweizerbart'sche Verlagsbuchhandlung (Nagele u. Obermiller), p. 33-78.

Bohacs, K. M., 2007, Towards a Unified Mudstone Model: Common Attributes and Controls on Hydrocarbon Source, Reservoir, and Seal Potential: AAPG Search and Discover Article #90063.

Bohacs, K.M., and Lazar, O.R., 2008, The role of sequence stratigraphy in unraveling and applying the complex controls from mudstone reservoir properties: AAPG Annual Convention and Exhibition, Program with Abstracts, v. 17, p. 21.

Bohacs, K.M., Passey, Q.R., Rudnicki, M, Esch, W.L., and Lazar, O.R., 2013, The spectrum of fine-grained reservoirs from 'shale gas' to 'shale oil'/ tight liquids: Essential attributes, key controls, practical characterization: IPTC 16676.

Dawson, W.C., and Almon, W.R., 2005, Shale facies variability and sequence stratigraphy: application to top seal prediction in deepwater depositional systems: Gulf Coast Association of Geological Societies Transactions, v. 55, p. 133-145.

Dawson, W.C., and Almon, W.R., 2002, Top seal potential of Tertiary deep-water Gulf of Mexico shales: Gulf Coast Association of Geological Societies Transactions, v. 52, p. 167-176.

Dawson, W.C., and Almon, W.R., 1999, Top seal character and sequence stratigraphy of selected marine shales in Gulf Coast-style basins: Gulf Coast Association of Geological Societies Transactions, v. 49, p. 190-197.

Jonk, R., Cassel, E., and Barboza, S., 2009, Modeling Hydrocarbon Migration and Retention in Fine-Grained Clastic Successions: Conventional Approaches to Evaluating Unconventional Resources: AAPG Hedberg Research Conference, May 3-7, 2009.

Lazar, O.R., Bohacs, K.M., Macquaker, J.H.S., and Schieber, J., and Demko, T.M., 2015, Mudstone Primer: Lithofacies variations, diagnostic criteria, and sedimentologic-stratigraphic implications at lamina to bedset scales: SEPM Concepts in Sedimentology and Paleontology 12.

Biographical Sketch

Kevin M. Bohacs, from Greenwich, Connecticut, received his BSc (Honors) in geology from the University of Connecticut in 1976 and his ScD in experimental sedimentology from M.I.T. in 1981(where he built and operated the world's largest flume). He joined Exxon Production Research Company in Houston, Texas in 1981, working with Peter Vail, Bob Mitchum, John Van Wagoner, and others on incorporating process-based facies modeling into the development of sequence stratigraphy at the outcrop, core, and well-log scale. He is presently Senior Research Scientist and works with the Hydrocarbon Systems and Stratigraphy and Reservoir Systems divisions.

At ExxonMobil Upstream Research Company, he leads the application of sequence stratigraphy and sedimentology to fine-grained rocks from deep sea to swamps and lakes, in basins around the world. His primary focus is to integrate field work, subsurface investigation, and laboratory analyses to inform business decisions. He works closely with exploration affiliates in evaluating the fine-grained portion of their hydrocarbon systems, teaches field schools in sequence stratigraphy, sedimentology, basin analysis, and field safety leadership, and conducts field work for research and exploration.

He has written more than 101 scientific contributions on the stratigraphy and sedimentology of mudstone, hydrocarbon source rocks, and lake systems, and received numerous best paper and career achievement awards and served as a distinguished lecturer for many societies around the world.

Tuesday, November 17, 2015

Southwestern Energy Conference Center, 10000 Energy Drive, Spring, TX 77389
Social 11:15 a.m., Luncheon 11:30 a.m.

Cost: Active/Associate Members - $30, Emeritus/Life/Honorary - $25
Students who are members of HGS - $10, Non-members - $40

To guarantee a seat, pre-register on the HGS website & pre-pay by credit card.
Pre-registration without payment will not be accepted.
Walk-ups may pay at the door if extra seats are available.

Joel D. Walls and Anyela Morcote
Ingrain Inc.
Houston, TX

Quantifying Variability of Reservoir Properties from a Wolfcamp Formation Core

The Wolfcamp Formation has emerged as a major unconventional resource play in the Permian Basin of West Texas and shows a wide range of oil and water production. The application of Digital Rock Physics (DRP) technology to a slabbed core can help to understand the wide variability in rock types, porosity, and permeability, all factors which greatly affect water cut and oil production.

Using a detailed workflow especially designed for shale characterization, it is possible to obtain direct information about rock properties such as mineral composition, pore volume, pore size distribution, and computed log properties. The first phase is a dual energy X-ray CT imaging at a resolution of about 0.25 mm/voxel. From this imaging, two continuous high resolution logs were computed: bulk density (RHOB), an indicator of porosity and organic matter, and photoelectric factor (PEF), an indicator of mineralogy. In the second phase, plugs are X-ray CT imaged at a resolution of 40 microns/voxel. Based on the CT volumes, subsamples are scanned with an electron microscope (SEM). The SEM high resolution images were digitally analyzed to quantify the amount of organic matter, porosity, and high density minerals present in the samples. In the third phase, 3D image volumes are obtained from FIB-SEM (focused ion beam combined with scanning electron microscopy) at a resolution of about 10-15 nanometers. Their segmentation and analysis allows us to quantify organic matter, total porosity, connected porosity, and porosity associated with organic matter (PA_OM). Also permeability is calculated using a Lattice-Boltzmann method.

The Wolfcamp Formation has not only a large variability in porosity and permeability, but organic porosity and inter-granular porosity are both commonly observed. If we assume that the porosity hosted by organic material is primarily filled with oil or gas and that water resides mainly in the inter-granular pores, then this data may help explain why some completions result in greater water cut than others. It also suggests that a good strategy might be to select landing zones for greater PA_OM, not just higher porosity in general. A standard petrophysical model is included in the study which is the result of the integration and upscaling of the dual-energy X-ray CT, plug scale mineralogical and SEM analysis, and the final porosity and permeability from the 3D FIB-SEM data. ■

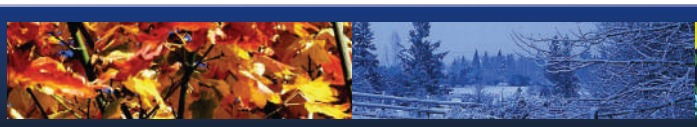
Biographical Sketch

Dr. Joel Walls is currently Director of Unconventional Technology at Ingrain, Inc. He is a geophysicist and entrepreneur with extensive experience in the research, development, launch and sale of advanced technology products and services for the upstream oil and gas industry. He joined Ingrain in 2010 with the responsibility for developing and commercializing services focused on shale and other unconventional reservoirs.

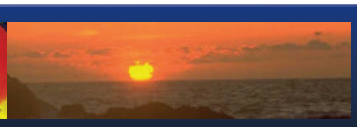
Dr. Walls was a co-founder and the first president of the Society of Core Analysts, and is a member of multiple additional professional associations. He is the author of many professional publications and holds four U.S. patents in the fields of digital rock properties and seismic reservoir characterization.

Dr. Walls holds an MS and PhD in geophysics from Stanford University, and a BS in physics from Texas A&M University, Commerce.

November 2015



Sunday	Monday	Tuesday	Wednesday
1	2	3 **HGS Board Meeting** *6 p.m.*	4
8	9 **HGS North American Dinner Meeting** *"Diagenetic Evolution of Organic Matter Cements in Unconventional Shale Reservoirs," Wayne K. Camp Page 11*	10	11 **HGS Environmental & Engineering Dinner Meeting** *"Lead-Zinc Mineralization as an Indicator of Downdip Unconventional Resources," Stephen R. Schutter, Page 15*
15	16 **HGS Joint General and International Dinner Meeting** **Robert E. Sheriff Lecture** *"Order From Chaos—Mudstones as Hydrocarbon Sources, Reservoirs, and Seals," Kevin M. Bohacs, Page 17*	17 **HGS Northsiders Luncheon Meeting** *"Quantifying Variability of Reservoir Properties from a Wolfcamp Formation Core," Joel D. Walls and Anyela Morcote, Page 23*	18
22	23	24	25
29	30		



GeoEvents

Thursday	Friday	Saturday
5	6	7
12	13	14
19	20	21
26 *Thanksgiving Day* HGS Office Closed	27 HGS Office Closed	28

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Emeritus/Honorary members	$40
Student members	$10
Nonmembers & walk-ups	$50
Except - Env. & Eng.	$30
Nonmembers & walk-ups	$35
Emeritus/Honorary members	$15

Reservations:

The HGS prefers that you make your reservations on-line through the HGS website at www.hgs.org. If you have no Internet access, you can e-mail reservations@hgs.org, or call the office at 713-463-9476. **Reservations for HGS meetings must be made or cancelled by the date shown on the HGS Website calendar, normally that is 24 hours before hand or on the last business day before the event.** If you make your reservation on the Website or by email, an email confirmation will be sent to you. If you do not receive a confirmation, check with the Webmaster@hgs.org. Once the meals are ordered and name tags and lists are prepared, no more reservations can be added even if they are sent. **No-shows will be billed.**

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GCSSEPM Perkins Conference
Omni Houston Hotel, Westside

January 25, 2016
HGS Legends Night

March 8-9, 2016
HGS Mudrocks Conference
The Woodlands, TX

April 3-6, 2016
AAPG/SEG ICE
Barcelona, Spain

May 8-16, 2016
HGS Grand Canyon Field Trip
Grand Canyon

June 19-22, 2016
AAPG ACE
Calgary, Alberta

Applied Geoscience Conference

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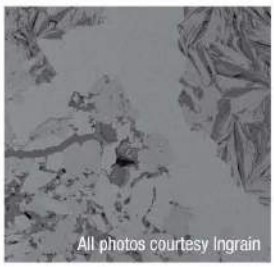

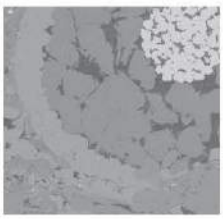

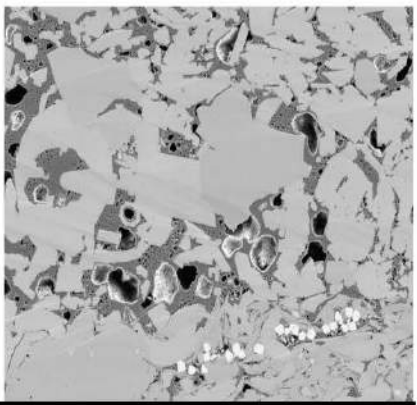

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Geophysicists Who Have Impacted Geologists

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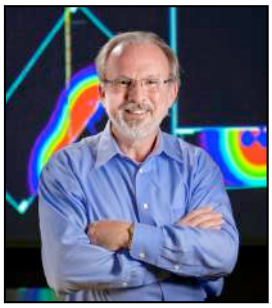
See their biographies on page 31.

Alistair Brown
Author of 'Interpretation of Three-Dimensional Seismic Data'

Tom Smith
Founder and former president of Seismic Micro-Technology (SMT)



Peter Duncan
Founder and Co-Chairman of MicroSeismic, Inc.

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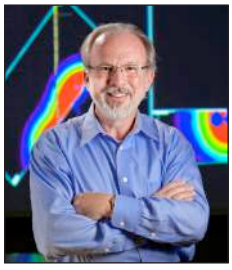
Geophysicists Who Have Impacted Geologists

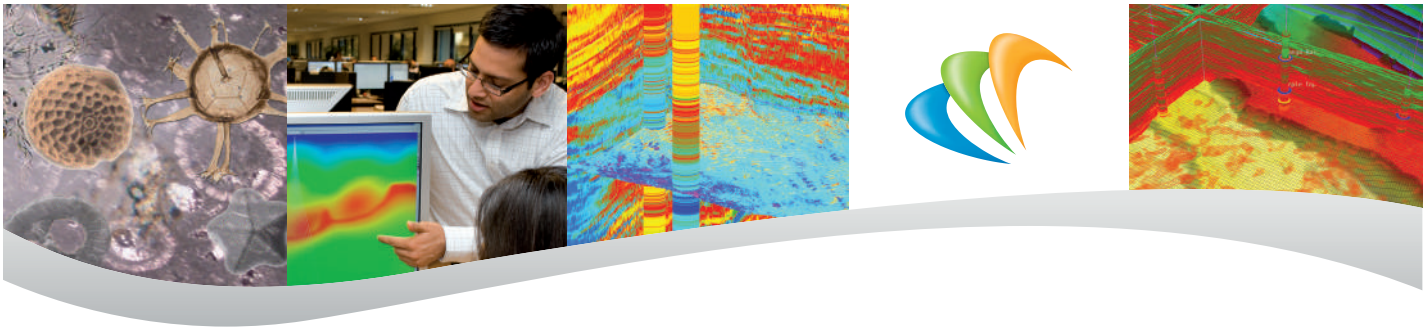
Alistair R. Brown is a Consulting Reservoir Geophysicist working out of Dallas, Texas. His specialties are interpretation of three-dimensional seismic data, stratigraphic interpretation, optimum use of interactive workstations, seismic reservoir identification and evaluation, and the meaning of seismic amplitude. He spends much of his time teaching interpretation methods and advising on interpretation problems worldwide. Alistair graduated from Oxford University in England, having attended The Queen's College, and has over 40 years of geophysical industry experience. He has been using 3D seismic data since 1975 and interactive workstations since 1980. He has developed many new interpretation methods and is a widely published author in his field. The making of the first horizon slice in 1979 was a particular accomplishment. The 7th Edition of his book *Interpretation of Three-Dimensional Seismic Data* (AAPG Memoir 42 / SEG Investigations no. 9) was published in 2011 following previous editions in 2004, 1999, 1997, 1992, 1989, and 1986. He won the SEG Best Presentation Award in 1975, was AAPG Distinguished Lecturer in 1988-89, SEG Distinguished Lecturer in 1991, and Petroleum Exploration Society of Australia Distinguished Lecturer in 1994. Furthermore in 1999-2000 he was the inaugural Joint AAPG/SEG Distinguished Lecturer. In 1998 Alistair was awarded SEG's Special Commendation Award for his work in developing and teaching 3D methods. In 2002 he was awarded Honorary Membership in the Geophysical Society of Houston, and in 2004 Honorary Membership in Dallas Geophysical Society. In 2006 he received his highest honor, namely Honorary Membership of the Society of Exploration Geophysicists. In 2009 AAPG awarded Alistair the Distinguished Service Award. He is also a member of EAGE. He was Chairman of *The Leading Edge* Editorial Board from 1986 to 1988 and editor of the Geophysical Corner in AAPG *Explorer* from 2004 to 2005.



Peter M. Duncan is Founder and Co-Chairman of MicroSeismic, Inc. a Houston based oil field service company specializing in hydraulic fracture stimulation surveillance and evaluation. He holds a PhD in Geophysics from the University of Toronto. His early career as an exploration geophysicist was with Shell Canada and then Digicon Geophysical, first in Calgary then in Houston. In 1992 he was one of three founders of 3DX Technologies Inc., a publicly traded independent oil and gas exploration company. Duncan was 2003-04 President of the Society of Exploration Geophysicists (SEG). Duncan was the Fall 2008 SEG/AAPG Distinguished Lecturer speaking on the subject of passive seismic at 45 venues around the world. He is an Honorary Member of SEG, the Canadian Society of Exploration Geophysicists (CSEG), the Geophysical Society of Houston (GSH) and the European Association of Geoscientists and Engineers (EAGE). He received the Enterprise Champion Award from the Houston Business Journal in 2010, the World Oil Innovative Thinker Award in 2011, and was the 2013 EY National Energy Entrepreneur of the Year. In 2014 he received the Virgil Kauffman Gold Medal from SEG.

Tom Smith studied geology, physics and a little geophysics at Iowa State University where he met his wife Evonne. They are recognized as geological pioneers who helped develop KINGDOM, one of the oil and gas industry's most intuitive and cost-effective software for seismic interpretation. At Iowa State, he earned a BS and MS in geology where he determined that the buried Manson meteorite impact structure was 20 miles wide with seismic refraction.

Tom began his career as a data processing geophysicist at Chevron Geophysical, but left that position in 1980. He received a doctorate in geophysics from the University of Houston in 1981. In 1984, the Smiths founded Seismic Micro-Technology to develop KINGDOM which grew into a full-featured integrated geophysical and geological interpretation package used today in more than 80 countries. It was one of the first personal computer-based geophysical software ever created, initiating a global renaissance in oil and gas exploration. The company staff of 150 worked from four international offices when it was sold in 2007. Since then, the Smiths have donated funds to revitalize the ISU Geology Field Camp in Shell, Wyoming. In the last several years, Tom and a small team have been working on neural networks to assist interpretation. He will share a few thoughts on his professional career, explain how KINGDOM evolved, discuss business principles and practices that helped it succeed, and finally, suggest that there are new ideas in interpretation practices that are more compelling than golf.



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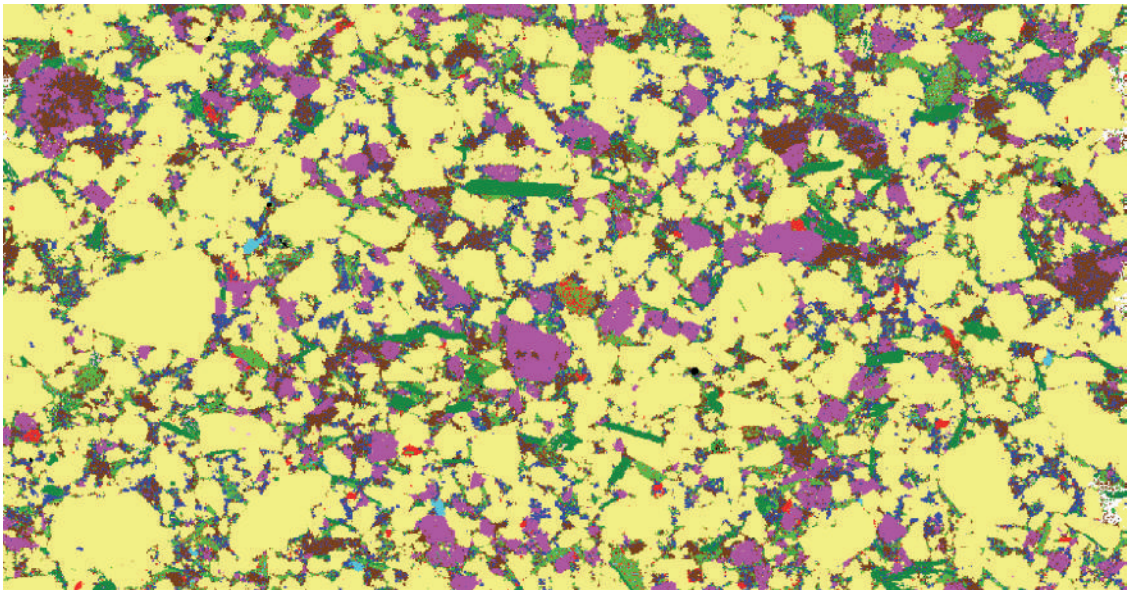

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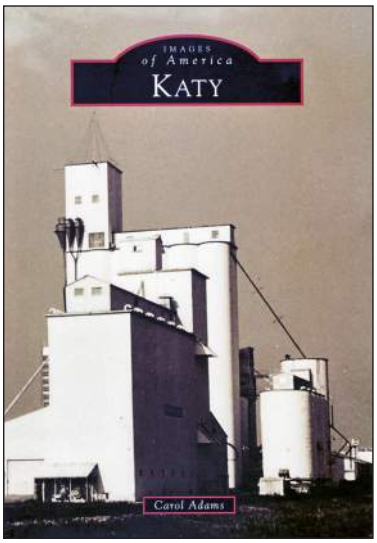
Short History of the Katy Field and Book Review of *Katy*, by Carol Adams

by Jeff A. Spencer, *spencerj320@gmail.com*

Many employees in Houston's oil and gas industry probably know that a gas field exists just west of the community of Katy, Texas, where a good number of them make their home. But many may not know the history of the Katy Field or have an idea of the great volumes of gas produced, its crucial impact on the Allied role in World War II, and the magnitude of the field's facilities that once were operated on the Katy Prairie.



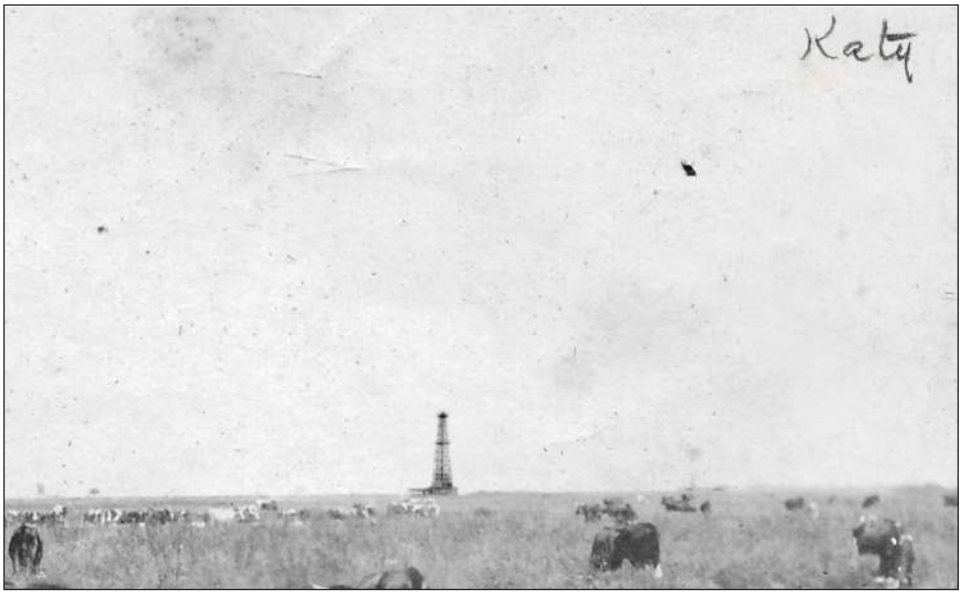
A new book, Katy, a part of Arcadia Publishing's *Images of America* series, contains many historical images and fascinating information about the legacy of Katy, Texas. Chapter 3, "Rice and Gas Capital of the World," includes sixteen images of Katy Field. These include a view of the 1935 Stanolind discovery well, as well as views of company offices, employee housing and the expansive Katy Gas Plant, which covered over 100 acres when first constructed. A recreation hall, bunkhouse, mess hall, and 158 homes were built for the Katy Gas Plant employees, and by the early 1950's, 700 employees and their families lived in the company-provided housing. By the early 1960's, the employee housing had been removed from the field. In 2002, the gas plant was closed and most of the equipment was moved.

The article "Gas Blowout at Katy, Texas" (*Fuel Oil Journal*, April 1916) reported on a March 1916 explosion followed by a 200-ft high column of smoke and debris in a rice field near Katy. The article also mentioned that for many years gas had been encountered in wells drilled to supply water to the area's rice fields, and gas seeps had been observed bubbling up in area creeks. As other early Gulf Coast oil and gas fields often exhibited surface oil and gas seeps, it was speculated that oil and gas existed below the Katy Prairie. Adams (2015) describes a similar fire that took place earlier, in 1909.

On the basis of reflection seismic, Stanolind Oil and Gas Company, as operator for a consortium of companies with leases in the area, drilled the No. 1 J.W. Thorp, or Thorpe, (later renamed the Katy Gas Field Unit I, No. 3) in late 1934 (Starkey, 1953). The well reached a total depth of 7,647 feet, logging 274 feet of net pay in Middle Eocene Cockfield/Yegua sands between 6,378 and 7,409 feet. In February 1935, the well tested 3.1 MMcfgd with "large quantities of colorless condensate." The Katy discovery followed earlier Cockfield/Yegua successes, at Conroe (1931), Tomball (1933), and Raccoon Bend (1934) (Spencer 2012).

Because of a lack of a market for the gas it was two years before a confirmation well, the No. 1 Hargraves, was drilled. The well, drilled over a mile southeast of the Thorpe discovery well, found the productive sands at a structurally higher position. *The Brookshire Times* (April 23, 1937) covered the renewed drilling and testing of wells in late 1937 through 1939 with great anticipation of jobs and prosperity for the area. Hoping for oil as the drilling resumed in 1937, the newspaper reported "The new interest in oil has done much to pep things up in this section, local hotels and rooming houses are crowded; and if the test proves a producer, there will have to be many more accommodations provided for hundreds who will follow in the wake of those already here. So don't fail to pay your preacher and pray that the field may come in and become a forest of derricks."

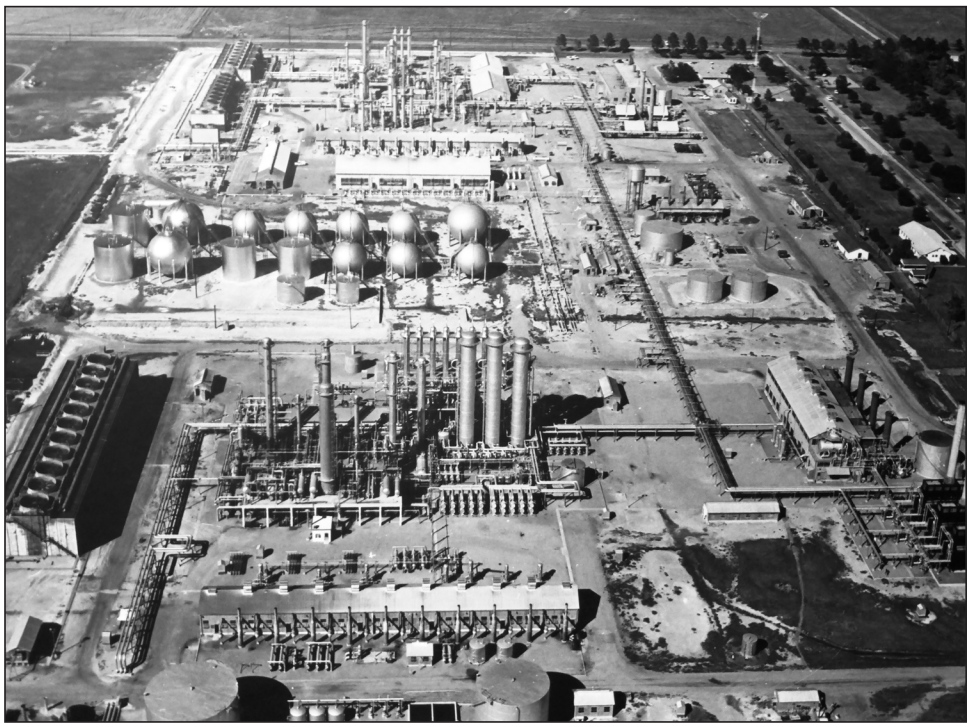
Short History of the Katy Field *continued on page 35*



The Stanolind #1 Thorpe, completed in 1935, was the discovery well for Katy Field.

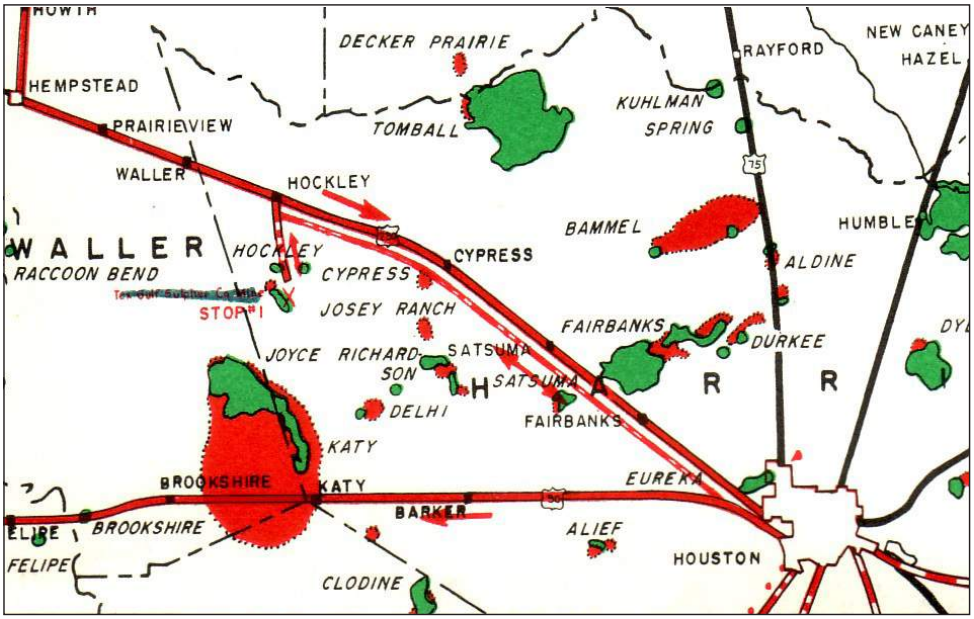
Short History of the Katy Field continued from page 33

A market for the Katy Field gas was finally established in late 1938. The productive area of the field was approximately 30,000 acres, associated with a "broad domal anticline unbroken by faulting" and in 1945 the field was "probably the most important gas-condensate field in the United States" (Allison et al., 1946). The field's structural closure at the Yegua is approximately 300 feet, trending elongate slightly northwest-southeast. Gas columns heights in six Yegua pay sands ranged from 110 to 250 feet (Starkey 1953).



The Katy gas plant began operations in 1943 and was enlarged a year later. The plant provided much of the aviation fuel for Allied Forces during World War II.

In 1941, ten operators and thirteen companies participated in a pooling agreement and unitization of 11,272 acres (Katy Gas Field Unit I, KGFU I). Construction of a gas cycling plant to recover the liquids began in early 1942 and the plant began operations on January 1, 1943. Initially, there were fourteen producing wells and four wells to inject the gas back into the formation. In 1944, 17,500 additional acres were unitized as KGFU II, the plant was enlarged, and Humble took over operatorship from Stanolind. Humble Pipe Line Company also constructed and operated two four-inch pipelines from the field to their Baytown refinery. Wartime peak production from the Katy plant was 13,000 barrels per day, approximately a third of which was 91-octane gasoline for the war effort (Larson and Porter 1959, p. 574-76). Humble ran an advertisement in several Texas newspapers on June 28, 1944 with the title, "Natural Gas Goes to War." The ad read, "One plant alone, at Katy, Texas (owned jointly by several companies and operated by Humble), processes 240 million cubic feet a day, producing 6,500 barrels of vital petroleum products. The capacity of this plant is being doubled. This is another example of how the resourcefulness of private business bridged the demands of war, and plans ahead for the needs of peace."

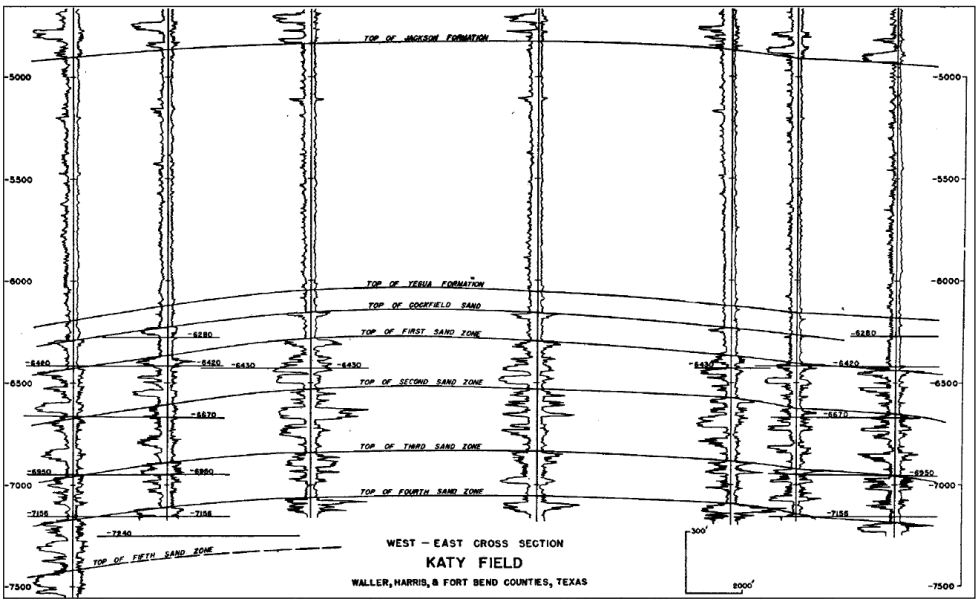


Oil and condensate (green) and gas (red) fields north and west of Houston (map excerpt from 1953 HGS field trip guidebook)

In 1943, oil was discovered in Yegua sands on the north flank of Katy Field with the completion of the Stanolind-Amerada No. 1 Pattison (154 bopd). Much later, in 1969, Humble (predecessor to ExxonMobil) drilled a deep (19,013 ft) Wilcox test in 1969; the W-31

continued on page 37

Short History of the Katy Field continued from page 35



well tested several Lower Wilcox sands and then was completed in the Upper Wilcox at an impressive rate of 16.4 MMcfgd (DePaul, 1980).

A 3D seismic survey was shot over the field in 2003. When Forest Oil Corporation replaced ExxonMobil as the field's operator in 2006, the field still contained 131 wells, 56 of which were producing. The field had produced over 10 TCFG at the time of the 2006 transaction (Oil and Gas Journal, August 22, 2006). Powers (2012) stated that the field had produced 5.9 TCFG and 7 MMBC (Cockfield/Yegua only?), from initiation of the gas blow-down in 1961 until early 2010. ■

References

Adams, C., 2015, *Katy*: Arcadia Publishing, Charleston, SC, 128 pp.

Allison, A.P., et al., 1946, Geology of Katy Field, Waller, Harris, and Fort Bend Counties, Texas: American Association of Petroleum Geologists Bulletin, v. 30, p. 157-180.

DePaul, G. J., 1980, Environment of deposition of Upper Wilcox sandstones, Katy gas field, Waller County, Texas: Gulf Coast Association of Geological Societies Transactions, v. 30, p. 61-70.

Larson, H.M., and K.W. Porter, 1959, History of Humble Oil & Refining Company: Harper Brothers Publishers, New York, 769 pp.

Forest Oil to operate Katy Field, expand Texas holding: Oil and Gas Journal, August 22, 2006

Powers, L.W., 2012, The World Energy Dilemma: PennWell Corp., Tulsa, OK, 306 pp.

Spencer, J.A., 2012, Personal recollections and a small town newspaper's coverage of a local oil boom: the Raccoon Bend oil field, Austin County, Texas, *Oil-Industry History*, v. 13, p. 13-26.

Starkey, C., 1953, Katy gas field – North Katy oil field, Waller, Harris, and Fort Bend Counties, Texas: Houston Geological Society Guidebook, p. 129-135.

Biographical Sketch

Jeff Spencer is the Historian for the Gulf Coast Association of Geological Societies (GCAGS), and President of the Petroleum History Institute. He is the author of *Texas Oil and Gas* (Arcadia Publishing Postcard History series) and co-author of *Ohio Oil and Gas* (Arcadia Publishing Images of America series). Jeff is currently Chief Geologic Advisor for Amromco Energy.

Remembrance

George A. Ball, Jr.

George A. Ball Jr., 84, of Galesburg, Illinois, and Galveston, Texas, died at 3:45 a.m. Monday, Aug. 24, 2015, at Unity Point Health-Methodist in Peoria, Illinois, with his loving family by his side. George will be remembered as a kind, gentle and loving person.

George was born December 25, 1930, in Detroit, Michigan, the son of George A. and Helen Ball Jr. He married Shirley K. Fowler on July 1, 1950. She preceded him in death in 2003. He married Sue Meyer on Feb. 28, 2014, in Galveston, Texas.

George received his B.S. from Michigan State University (MSU) in 1952 in Geology/Geophysics, and his M.S. from University of Toledo in Applied Math/Physics. While attending MSU, George played baseball and football and became a lifetime member of the Varsity 'S' Club.

George worked for Columbia Gas from 1952 until 1957. He worked for Mobil from 1957 until 1973 and again from 1984 until 1987. He worked as an independent consultant from 1973 until 1976, when he began working for The Superior Oil Company until 1984. George then worked for Burlington Resources from 1987 until retiring in 1997. He then returned to independent consulting and moved to a ranch near Brenham, Texas, where he enjoyed raising longhorn and Black Angus cattle. While working for the oil companies, George traveled extensively.

George was a member of the HGS, GSH, AAPG, and SEG. His peers and employees say George was a great mentor and friend and they couldn't have asked to work with a better person.

In his free time, George enjoyed playing golf, swimming and spending time with family and friends. In 2013, George and Sue began spending their summers in Galesburg and winters in Galveston, Texas.

George is survived by his wife, Sue; three daughters, Salli Blevins of Amarillo, Texas, Diana (Willie) Luna of Galveston, Texas, and Susan (Jim) Hall of Arlington, Texas; one granddaughter, Shannon (Chris) Young; and two great-grandsons, Christopher Jackson and Jonathan Merritt Young, all of Bend, Ore. He is also survived by his second family, Craig (Leslie) Johnson of Dahinda and Tasi (Mike) Mackie of Williamsfield; three step-grandsons, Drew Mackie, Jacob Johnson and Nate Mackie; three step-granddaughters, Emily (Nic) Deushane, Annie (Aaron) Henry and Whitney (Lucas) Leckrone; two step-great-grandchildren, Julius Deushane and Logan Leckrone; one sister-in-law, Jacqueline (Russell) Galbreath of Williamsfield; and one brother-in-law, Wayne Ott of Dahinda.

He was preceded in death by his parents; his first wife, Shirley; one son, Richard Ball; one daughter, Nancy Ball; and second wife, Linda Ball.

George's Celebration of Life will be held Saturday, November 7, 2015, from 2:00 - 5:00 pm at Mario's Italian Restaurant, 628 Seawall Blvd. Galveston, TX. Memorials may be made to the MSU Varsity 'S' Club, Spartan Way, 535 Chestnut Road, Room 276, East Lansing, MI 48824; or the Alzheimer's Association.

For more information or to send condolences:
http://www.legacy.com/obituaries/houstonchronicle/obituary.aspx?n=george-ball&pid=175830818&fhid=19032

Tami Shannon

Should you hear of a fellow HGS member's or contributor's passing, please send information to the Editor-Elect at tami.shannon.biz@gmail.com.

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Fractured Carbonate Reservoirs Outcrops (with Barcelona ICE mtg.)	April 7-9, 2016 Italy
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Past Presidents of HGS

by Ken Nemeth

The Houston Geological Society has existed since 1923, a little more than 92 years. Now in its 93rd year, the Society has had 92 presidents. John Suman served two terms, 1923 and 1924, as the Society's first president. Fifty-five past presidents are known to be deceased. Thirty-six past presidents are still alive. And of course we have our current serving president, Deborah Sacrey. The list of HGS presidents is impressive and many of them have also been active in AAPG and the GCAGS. Seventeen of the living past presidents are Honorary Life members of HGS. Another five are Emeritus members, one is no longer a HGS member and the remainder maintain their active membership in HGS. Two past presidents live in or near Austin while three others live out of state. A fourth past president is also planning on moving out of state before the end of the year. One thing that stands out when looking at the HGS past presidents is that these people have provided long-time service to the HGS. Many continue to do so, serving on committees long after their terms. Seven of the past presidents have been recognized with the highest award that HGS can bestow, the Gerald A. Cooley Award. Deborah Sacrey is the first Cooley Award winner to serve as HGS president after she received that award.

HGS presidents appear to have served a calendar-year term from inception to 1958. It would seem that A. H. Rabinsburg (1957) or Ralph E. Turner (1958-1959) had the pleasure of serving an extra 6 months. However, some articles on Past Presidents in the 1962 HGS Bulletins might suggest otherwise. That might be why John Suman served two terms, start in 1923 through June 1924 (??).

HGS has bestowed Honorary Life membership upon 79 of its members, 32 are still living, and, as mentioned, 18 of those have served (or are serving) as HGS president. Thirty-eight past presidents have been recognized with Honorary Life membership by HGS.

Peggy Rice (1982-1983) was the first female HGS president. Five others (counting the current HGS president) have also served as HGS president.

Robert L. Musslewhite (1970-1971) is the living (as of September, 2015) past president who served the furthest back in time. He is no longer a HGS member and is retired, living in Cedar Park, TX.

The HGS past presidents have been gathering every August to share lunch and discuss old and current times. This was started in 1973 by John Amoruso (1972–1973). This year's gathering took place at the new Houston Petroleum Club. It was emceed by past president Ken Nemeth (2014-2015) on August 14. Twenty-two of the living past presidents attended. Two were unable to attend because of prior plans, four could not attend for health reasons, and two who made reservations were unable to show at the last minute. Guests included current HGS president Deborah Sacrey and HGS member "Wayne" Xu who was the photographer. The pictures from the lunch can be found on the HGS web site. If your party needs some easy and humorous entertainment, you might invite Tony Reso (1972-1973) to read to you from his interesting facts list. Those members in attendance really enjoyed the humorous and unique facts that Tony presented to the group.

Past Presidents of HGS *continued on page 43*

Back Row, Left to Right: Dick Bishop, 1989-90; Martin Cassidy, 2012-13; Dan Smith, 1987-88; Ron Nelson, 1995-96; Charles Sternbach, 1999-2000; John Biancardi, 1993-94; Craig Moore, 2000-01; Denise Stone, 2002-03; John Tubb, 2010-11; Jeff Lund, 1997-98
Front Row, Left to Right: Barry Katz, 2013-14; John Amoruso, 1972-73; Ken Nemeth, 2014-15; Jeff Morris, 1978-79; Linda Sternbach, 2007-08; Tony Reso, 1975-76; Clint Moore, 1994-95; Paul Hoffman, 2001-02; Deborah Sacrey, 2015-16

Past Presidents of HGS continued from page 41

For the curious, Dean Grafton (1977-1978) reports that he does not get about much and limits his driving to his neighborhood. Sabin Marshall (1974–1975) reports that he does not get out much as his doctor does not want him to do much driving. Ron Harlan (1990-1991) and Cy strong (1991-1992) were recuperating from medical procedures when the lunch took place.

The author learned while writing this article that past president McInnis Newby (1971–1972) passed away last January (1/29/2015). Bill Bishop (1981-1982) also passed away this past year. Bill had retired and was living in North Carolina.

The author has contacted the living past presidents and asked them to respond to five questions. The answers will be tabulated and placed on the HGS web site. As of the writing of this article, 29 of the 36 living past presidents had responded to the questions.

1. What are you doing now?
2. What is your favorite memory from your term?
3. What event occurred during your term that impacted HGS?
4. What advice would you give to someone running for HGS President-Elect today?
5. How old were you when you served as HGS president?

Some of the results collected at the time this article was being written from those who participated include:

- Presidents do not stop counting words when they reach 20.
- There is some interesting history to be gleaned from the questions.
- Clint Moore was the youngest president at the time of his term. He was 37 (1994-95).
- Martin Cassidy was the oldest serving president, 80 (2012-2013).
- Dean Grafton is the oldest living past president, 90.
- The average age (of the respondents) of the presidents at the time they served was 51 years, 5.1 months.
- Their current average age is 70 years, 0 months.
- Charles Sternbach's Board (1999-2000) comprised six future HGS presidents (5 past and 1 to be).
- Dick Bishop (1989-1990) reports that his Board and committees provided 9 future HGS or GCAGS presidents!
- The most frequent words of advice given to people running for President centered on volunteers: find, encourage, and appreciate.
- The most frequent memory: Worked with a great Board. Second place goes to Legends Night.
- Gary Coburn (2009-2010) reported that one of his favorite memories was writing the monthly column. If others liked it, they didn't admit it.

When all the past presidents have responded the author will prepare the data for the HGS website so that members can glean encouragement and enrichment from the activities of people who have served HGS. ■

Term of Office	President	Member
2015-2016	Deborah Sacrey	L, C
2014-2015	Ken Nemeth	L
2013-2014	Barry Katz	A
2012-2013	Martin Cassidy	A
2011-2012	Steve Earle	A
2010-2011	John Tubb Jr.	E, C
2009-2010	Gary Coburn	A
2008-2009	Kara Bennett	A
2007-2008	Linda Sternbach	L, C
2006-2007	Steve Brachman	L
2005-2006	David Rensink	L
2004-2005	Stephen Levine	L
2003-2004	Craig Dingler	A
2002-2003	Denise Stone	A
2001-2002	Paul Hoffman	A
2000-2001	Craig Moore	A
1999-2000	Charles Sternbach	L, C
1998-1999	Sandi Barber	L
1997-1998	Jeffery Lund	L, C
1996-1997	James Ragsdale	L, C
1995-1996	Ron Nelson	E
1994-1995	Dwight (Clint) Moore	L
1993-1994	John Biancardi	A
1992-1993	Patrick (Pat) Gordon	A
1991-1992	Cryrus (Cy) Strong	A
1990-1991	Ronald (Ron) Harlan	A
1989-1990	Richard (Dick) Bishop	L
1988-1989	Dietmar (Deet) Schumacher	L
1987-1988	Daniel (Dan) Smith	L, C
1986-1987	C.R. (Chuck)Noll Jr.	L
1982-1983	Peggy Rice	L
1978-1979	Jeffery Morris	E
1977-1978	Dean Grafton	L, C
1975-1976	Anthony Reso	E
1974–1975	Sabin W. Marshall	E
1972–1973	John J. Amoruso	L
1970–1971	Robert L. Musslewhite	Nonmember

Membership: L = Honorary Life Member
E = Emeritus A = Active C = Cooley Award Honoree

A Simple Hello Can Lead to a Million Things

by Bonnie Milne

The Houston Geological Society has an astonishing 279 Emeritus, 3,296 Active and 165 Associate Members. Our HGS organization consists of geoscience professionals, educators, students, and interested industry parties throughout the Houston area and beyond. Members of HGS include a cross-section of many disciplines of geology, geophysics, and engineering, with members of all ages and all levels of experience.

An important function of The Houston Geological Society is to enable members to network and interact. Towards this objective, the HGS Membership Directory can be a powerful tool allowing members to find each other and connect. However, the Membership Directory requires updating and improvements to provide the best possible vehicle for networking.

The Directory Committee 2015-2016 is anchored by the following individuals: John Tubb Jr., Brittany Davis-Jones and Bonnie Milne. Together with cooperation from website chair Linda Sternbach and Membership Chair Sharie Sartain, the group will spearhead all aspects of the online **Directory Update Initiative** (otherwise known as DUI). The goal of the committee is to prepare a robust and searchable Membership Directory available as a link on the HGS Website as well as a downloadable PDF for those who prefer to do their networking with a printed medium.

Please be aware that members will receive an email blast in the near future with instructions to log on to the hgs.org website for the purpose of updating and augmenting your personal data.

Although the submission of personal data and information will be the personal choice of the Member, the Directory Committee will format the request to add the following updated information to your profile:

- Name and Title
- Company
- Address
- Phone Number
- Email address
- Status of Membership (Active, Associate, Emeritus) and date of joining HGS
- Degree- School- Year Degree Received
- Spouse/Partner Name
- Photo
- Resume (available only if submitted by member and available as a 'drop down' on the Website Directory. The resume will be available for review only online and will not be included in the printable version.

Again, **all personal information submitted will be at the discretion and choice of the member!**

HGS Welcomes New Members

New Members Effective September 2015

ACTIVE MEMBERS
Tate Allison
Kyle Bass
Kerryann Billman
Johnathan Bundren
Jiajie Chen
Liz Cramer-Lee
Diana Curry
Scott Douglas
Olusanmi Emmanuel
John Kachelmeyer
Brenden Keel
Katie Lehmann
Subho Mandal
Brittany Meagher
Stephen Morris
Forrest Roberts
Max Rohrman
Michel Sheahan
Cameron Stanley
Eric Swanson
Derek Taylor
Drew Thomas
Rachel Todkill
Joy Young

EMERITUS MEMBERS
David Burkett
Marc Croes
Robert Denehie
Robert Dunn
George Froming
Andrew Hampf
Richard Howe
John Leftwich
Louis Lemarie
Tim Moore
Manik Talwani
Robert Traylor
Kenneth Williams
David Willig

STUDENT MEMBERS
Patrick Baudoin
Marisa Connors
Jordan Dickinson
Colton Dudley
Wayne Holland
Desiree Hullaster
Pin Lin
Virginia Alonso de Linaje
Rafo Linan
Austin Luce
Duncan McIntosh
Lacey Pyle
Ben Regner
Abigail Ross
Lais Simon
Dan Sullivan
Nan Sun
Reece Thompson
Ethan VanHazebroeck

Welcome New Members

Government Update

*by **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 Geoscience Policy Monthly Review (July 2015)

House Committee hears Coast Guard Testimony on Arctic Icebreakers

The House Transportation and Infrastructure Subcommittee on Coast Guard and Maritime Transportation held a hearing on July 27, 2015 on the National Icebreaker Fund Act (H.R. 3214), which would fund construction and renovation of icebreakers as well as government leases on privately owned vessels. The Coast Guard currently has two active icebreakers, of which only one is classified as a heavy icebreaker.

Subcommittee Chairman Duncan Hunter (R-CA) and Ranking Member John Garamendi (D-CA) expressed concern that the scarcity of American icebreakers poses a threat to the nation's security and its energy market. "Mapping of the sea bottom in the Arctic is crucially important," said Rep. Don Young (R-AK), whose state is most closely tied to icebreaking activities. Gary Rasicot, the Coast Guard's Director of Marine Transportation Systems, agreed that the current inventory is insufficient and recommended "recapitalizing the icebreaker fleet."

Debate primarily focused on how to pay for the ships. Rep. Hunter contended that "the Coast Guard should not bear the burden of the full cost of building an icebreaker." Rep. Young criticized the Coast Guard for failing to maintain and expand its fleet, but also blamed Congress for failing to fund the Coast Guard sufficiently. Garamendi agreed, saying, "a lot of the problem lies here in Congress." Reps. Young and Hunter discussed the possibilities of starting a lease program or a public-private partnership, and Rep. Hunter suggested shifting ownership of new vessels from the Coast Guard, which is under the Department of Homeland Security but serves as ap art of the Navy in wartime, to a different federal agency such as the Department of Defense.

House Committee Hears Testimony on Administration's Proposed "Social Cost Of Carbon" Rule

The House Natural Resources Committee held a hearing on July 22, 2015 to assess a proposed standard from the Environmental Protection Agency known as the social cost of carbon (SCC or SC-CO2). The measure accounts for economic damages associated with changes in carbon dioxide (CO2) emissions by applying a dollar amount per ton of carbon emitted. However, Republicans have criticized the move for using, as Chairman Rob Bishop (R-UT) put it, "arbitrary inputs" and speculation in its calculation.

The SCC projects future impacts of carbon to 2300, analyzing the costs associated with rising sea levels, human health effects, and agricultural productivity changes. Dr. Kevin Dayaratna of the Heritage Foundation and Republicans on the committee criticized the scope of time considered in the analysis as "unreasonable" for present energy regulations. Scott Segal of the industry law firm Bracewell & Giuliani said that the models used for the SCC should be a "dispassionate economic assessment" without "ethical considerations" regarding future generations.

House Democrats, meanwhile, emphasized the need for the SCC to protect vulnerable and low income communities. Rep. Alan Lowenthal (D-CA) cited economic studies saying that not accounting for climate change has "created a market failure," meaning not enough goods and services have been allocated to mitigate global warming's effects. Minority witness Dr. Michael Dorsey of the Joint Center for Political and Economic Studies added that the SCC should in fact be higher since it does not account how different areas of the country will be affected.

The EPA intends to incorporate the SCC metric into current rules and regulations, including the National Environmental Protection Act and the proposed Clean Power Plan.

Energy and Natural Resources Committee Passes Comprehensive Energy Bill

On July 30, 2015 the Senate Energy and Natural Resources Committee passed its Energy Policy Modernization Act of 2015, which addresses energy efficiency, infrastructure, supply, and government funding and oversight. After three days of markup, the committee voted 18 to 4 to move the bill to the Senate floor for a vote. The Offshore Production and Energizing National Security Act of 2015, a separate bill that would lift the US ban on exporting crude oil, also passed the committee on the same day.

The wide-ranging energy legislation covers several topics. Title I addresses energy efficiency in buildings, appliances, and manufacturing. Title II sets administrative and judicial policy for reviewing applications to construct and operate natural gas export facilities. Title III designates hydroelectric power as a renewable resource, sets agendas for geothermal, marine hydrokinetic, and methane hydrate energy development, and prompts the Department of Energy (DOE) to research carbon capture technology; this section also authorizes a national assessment of critical mineral resources and a research and development program for critical minerals that was previously introduced as a separate bill. Title IV includes legislation on coordinating federal energy-water activities, funding for DOE research and for Advanced Research Projects Agency – Energy (ARPA-E), energy grid reliability, and federal land management.

Government Update *continued on page 48*

Government Update continued from page 47

The Committee also approved a series of amendments to the bill. Sen. Elizabeth Warren (D-MA) added an amendment that would require a government study of the "implications of exporting liquefied natural gas with respect to consumers and the economy." Sen. Shelley Moore Capito (R-WV) added an amendment to expedite the Federal Energy Regulatory Commission's licensing and permitting process for natural gas infrastructure projects. The bill's prospects in the Senate are uncertain, but the committee's bipartisan support will likely improve its chances.

Senate Committee Hears Testimony on America's Role in the UN Climate Conference

On July 8, 2015 the Senate Environment and Public Works Committee heard testimony on the Administration's plans for the 2015 United Nations Framework Convention on Climate Change (UNFCCC) in Paris. The Conference will gather UN members to establish measures to limit the global warming of the earth to 2°C. As part of the conference, the Obama Administration intends to commit America to reducing carbon emissions by 26 percent by 2025.

During the hearing, Senate Republicans raised concerns about the legitimacy of international agreements made by the President without the input of Congress. However, Professor Jeremy Rabkin of the George Mason University School of Law said the Administration has precedent to commit to these reductions, as many international agreements are entered into without permission of Congress. Rabkin continued to say, however, that compared to previous agreements the proposed UNFCCC measures would have a greater scope and impact on the American public. Rabkin further agreed with Senator Jeff Sessions (R-AL) that Congress's only hope to stop the Administration's agenda may lie in "the power of purse," or Congress's constitutional authority to authorize and oversee federal funding. Senator Jim Inhofe (R-OK) raised additional concerns that the 26 percent reductions commitment is unattainable by 2020, and unfair considering the emissions goals of global competitors like China. According to analyses provided by two of the witnesses, the Administration's plan would only reduce the nation's carbon pollution emissions by approximately 18 percent, leaving an additional 8 percent unaccounted for.

The Conference will run from November 30 to December 11, 2015.

House Hears Testimony on EPA Brownfields program

On July 22, 2015 the House Transportation and Infrastructure Subcommittee on Water Resources and Environment heard testimony on the Environmental Protection Agency's (EPA) Brownfields and Land Revitalization Program and discussed potential improvements to the initiative. Nearly every representative at the hearing praised the program, adopted in 2002, for helping to clean polluted sites and spur revitalization in economically depressed areas.

According to the EPA, brownfield cleanups return an average of almost 18 dollars for each federal dollar spent. Citing this strong return on investment, committee Democrats encouraged more funding for the program. Many applicants must be turned down due to the program's limited capacity, and those that do meet the EPA's criteria may still not receive funding. Mathy Stanislaus, testifying on behalf of the EPA, advised Congress not to set fixed funding levels for site assessments but rather to leave the allocation of funds to individual communities.

Witnesses also discussed the problems facing urban and rural communities. Vernice Miller-Travis, Vice Chair of the Maryland Commission on Environmental Justice and Sustainable Communities, said that urban revitalization can lead to higher property prices, which displace low-income communities. Paul Gruber of the National Ground Water Association urged heavier investment in protecting the groundwater resources of rural communities that become vulnerable to water contamination when businesses develop "greenfield" property instead of reusing brownfield parcels. Undeveloped greenfield land acts as a natural filter for surface water to drain into an aquifer. For this reason, pushing development onto new property can lead to well water contamination.

USGS Releases Five-Year Plan to Study Arctic

On July 28, 2015 the U.S. Geological Survey (USGS) released its 2015-2020 plan for the Arctic region, focusing on coastal erosion and its effect on coastal communities. The plan also prioritizes mapping the Arctic to better understand the distribution of minerals and energy resources in Alaska. The study comes on the heels of the Obama Administration's approval of offshore drilling in the region by the Royal Dutch Shell oil company.

Additionally, USGS will study the impacts of climate change on the spread of disease and environmental health. The plan identifies melting permafrost and overall warming trends as potential causes for environmental damage and further avenues of study.

The United States is chair of the intergovernmental Arctic Council from April 2015 through April 2017.

House Committee Reviews Success of Helium Stewardship Act

On July 8, 2015 the House Natural Resources subcommittee on Energy and Mineral Resources held a hearing reviewing the 2013 Helium Stewardship Act's (HSA) implementation. The Helium Stewardship Act charges the Bureau of Land Management (BLM) with auctioning off some of the helium held in storage by the federal government to raise money and provide stability in the helium market. The hearing reviewed the results of the first federal helium auction, which earned the federal government substantial revenue for the helium, but angered private sector consumers.

To enable private market competition, the Act allows refiners to buy raw helium from government storage, process it, and then sell it. It also allows helium merchants to buy the raw helium from the federal government and create "tolling" agreements with refiners

where refiners use excess capacity in their refineries to process helium. This mechanism, while allowing those without the refining ability to bid on raw helium, leads to tension between refiners and merchants. Tolling agreements are essential for allowing merchants to produce helium; without access to refineries, merchants cannot use the helium from the federal government.

At the auction, eleven of thirteen plots of helium were bought by two refiners, signaling a failure of the HSA to provide adequate competition. Everyone agreed that a steady supply of helium is vital to the science community. Dr. William Halperin stressed that fluctuations in the price of helium have the ability to disrupt scientific research by pricing researchers away from helium's unique cooling properties.

House Subcommittee Hears Testimony on BLM hydraulic Fracturing Regulations

At a July 15, 2015 hearing held by the House Natural Resources Subcommittee on Energy and Mineral Resources, Neil Kornze, Director of the Bureau of Land Management (BLM), testified on BLM's proposed regulations for hydraulic fracturing on federal and tribal lands.

Representatives inquired about granting variances, or partial exemptions from the BLM rule, to states that already have more stringent regulations than what the BLM rule would require. Rep. Cynthia Lummis (R-WY) defended Wyoming's disclosure and monitoring regulations and asked whether BLM could grant a wholesale exemption to Wyoming. Kornze said that BLM may grant variances to state regulators, but noted that BLM cannot move forward with rule implementation until a lawsuit in the U.S. District Court of Wyoming is resolved. Natural Resources Chairman Rob Bishop (R-UT) disputed the legality of granting variances on the grounds that "delegating regulatory authority to states without specific statutory approval" was not part of the BLM's authority.

According to Kornze, BLM estimates that implementing its regulations would cost about $11,000 for an average well; however, Lloyd Hetrick, testifying for Newfield Exploration Co., said that delays and well shutdowns would make this price much higher. Rep. Alan Lowenthal (D-CA) contended that current BLM regulations, adopted about thirty years ago, have not kept pace with technological advances in hydraulic fracturing, such as horizontal drilling and increased well depth.

OCS Seismic Surveying Hearing Underscores Differences in Scientific Opinion

The House Natural Resources Subcommittee on Energy and Mineral Resources heard testimony from industry representatives and academics on the permitting process for seismic surveys to prospect for oil and gas. These surveys help geologists determine the exact location and accessibility of oil and gas prospects by towing a specialized air gun that releases sound waves through water and collects data from the reflections. The data can also inform dredging and hazard assessments and help in research.

Industry witnesses called attention to congressional action and executive orders delaying a seismic survey of the Atlantic outer continental shelf (OCS) for more than thirty years, despite advances in hydrocarbon extraction techniques.

Republican House members pointed out the difference in permit approval times. An academic non-harassing permit, where surveys are not in the range of marine life, can take four months to approve, whereas permits that could disrupt or harm marine life can take up to a year or more.

Dr. Douglas Nowacek, a professor at Duke University, informed the committee that the sound waves in water that define seismic surveys disrupt marine life. Alternatively, Dr. Bob Gisner, Director of Marine Environment at the International Association of Geophysical Contractors, argued that the strength of the sound was overstated, and that low levels did not greatly affect marine life. Nowacek advocated constraining the seismic surveys to only those areas that showed potential for oil and gas extraction in order to limit damage; however, Gisner advocated complete surveying of the OCS to determine the potential for new deposits using 3D seismic imaging, a technology unavailable during the last survey. ■

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 or Adobe Photoshop. Files should be saved and submitted in .ai, .eps, .tif or .jpg format. Send them as separate attachments via email or CD if they are larger than 5 MEGs 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 5 MB) or on CD or DVD.

Advertising

The *Bulletin* is printed digitally using InDesign. Call the HGS office for availability of ad space and for digital guidelines and necessary forms or email jill@hgs.org. Advertising is accepted on a space-available basis. **Deadline for submitting material is 6 weeks prior to the first of the month in which the ad appears.**

Random Inside Ad Placement Black & White Prices Shown Color add 30% to prices shown below					Specific Page Color Ad Placement					
No. of Issues	Random Eighth Page	Random Quarter Page	Random Half Page	Random Full Page	Inside Front Cover Full Page	Inside Back Cover Full Page	Page 2 Full Page	Outside Back Cover Half Page	Back of Calendar Full Page	Calendar Quarter Page
10	$823	$1,387	$2,488	$4,734	$7,830	$7,560	$7,384	$6,858	$6,750	$2,700
9	$823	$1,387	$2,488	$4,734						
8	$750	$1,260	$2,242	$4,307						
7	$665	$1,123	$2,014	$3,834						
6	$590	$990	$1,782	$3,392						$1,890
5	$497	$837	$1,503	$2,860	$4,698	$4,536	$4,466	$4,104		
4	$405	$683	$1,223	$2,326						
3	$327	$550	$990	$1,886						$1,080
2	$232	$392	$704	$1,339						
1	$146	$246	$443	$842	$1,404	$1,296	$1,313	$1,080	$1,296	$810
Professional Directory Section Business Card Ad 10 Issues – $160 ($30 for each additional name on same card)										

Website Advertising Opportunities

HGS has multiple website advertising opportunities for your company! We've expanded our offerings to include a 275 x 800 pixel, rotating banner ad on the front page of the website. We have kept the popular Event Calendar and Geo-Job Postings advertisement locations!

	Home page Banner	Home Page (200 x 400 pixels)	Event Calendar (200 x 400 pixels)	Geo-Jobs (120 x 90 pixels)	Website Business Card (Members Only)	Personal Resumes (Members Only)
One year	$3,000.00	$2,800.00	$2,500.00	$1,400.00	Free	Free
6 months	$2,000.00	$1,800.00	$1,500.00	$750.00	Free	Free
3 months	$1,500.00	$1,300.00	$1,000.00	$450.00	Free	Free
Monthly	$ 700.00	$500.00	$ 400.00	$200.00	Free	Free

We still offer Geo-Jobs - where your company can post job openings for 14 days at $50.00 or 30 days at $100.00.

For more information regarding website advertising visit HGS.org or email jill@hgs.org.

Application to Become a Member of the Houston Geological Society

Qualifications for Active Membership

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

Qualifications for Associate Membership (including students)

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

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

Annual Dues Expire Each June 30. (Late renewals – $5 re-instatement fee)
Annual dues are $28.00; emeritus members pay $14.00; students are free.

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

Payment method:

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

Card # _____

Expiration Date: _____ Card I.D. _____

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

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

Name: _____

Address: _____

_____

Home Phone: _____ *Spouse's Name:* _____

Email: _____

Job Title: _____

Company: _____

Company Address: _____

_____

Work Phone: _____ *Fax Number:* _____

Circle Preferred Mailing Address: Home Office

Professional Affiliations: _____

❑ AAPG member No.: _____

Professional Interest:

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

❑ International E&P ❑ Gulf Coast E&P (onshore & offshore)

School _____

Degree _____ *Major* _____ *Year* _____

_____

School _____

Degree _____ *Major* _____ *Year* _____

Earth Science Work Experience _____

_____

_____

_____

Applicant's Signature _____ *Date* _____

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

Name: _____

Signature _____ *Date* _____

Membership Chairman _____ *HGS Secretary* _____

revised 7/30/14

Houston Petroleum Auxiliary Council News

by Shirley Gordon, *HPAC-HGS Liaison*

Members of the Houston Geological Society, please show this article to your spouse. Spouses of geologists, geophysicists, engineers, and landmen who are current members of their respective professional organizations are eligible for membership in the Houston Petroleum Auxiliary Council, better known as HPAC. HPAC is an organization designed to further friendships and common interests among spouses of HAPL, GSH, SPE and HGS.

On November 2nd, the Book Club will enjoy discussing *Lost in Shangri-La: A True Story of Survival Adventure and the Most Incredible Rescue Mission in World War II*. The discussion will be led by **Anita Weiner** and the hostess for the day will be **Marge Shea**. Upcoming on February 1st, 2016, the subject will be *Isabella, the Warrior Queen* with discussion led by **Sandra Pazzetta**. Hostess will be **Wanda Shaw**, with **Mickey Murrell** as co-hostess. May will feature the book *Dead Wake: The Last Crossing of the Lusitania*, and August's book is *A Spool of Blue Thread*. If any of these titles pique your interest, call **Mickey Murrell** at 281-469-2272 for more information.

The two bridge groups are going strong. Please consider joining them for a lively game, all levels are welcome. One meets at the Petroleum Club, 201 Louisiana, on the third Wednesday of each month with **Daisy Wood** as chairman. Her numbers are (H) 832-581-3132 or (cell) 713-825-7952. The other, known as the *Cinco Mas* group, is chaired by **Audrey Tompkins** and meets the second Thursday of each month; Audrey can be reached at 713-686-0005. Good cards help one to be a good bridge player, but some luck never hurts!

Kudos to all those who worked at the 65th annual GCAGS Convention during late September. Getting to the George R. Brown Convention Center downtown Houston by 7:00 am was no easy task for the suburbanite volunteers! This was truly a great team effort by the Houston Petroleum Auxiliary Council. For the first time ever, HPAC was asked to work the registration desk. **Norma Jean Jones**, our president, chaired the committee. It is with heartfelt gratitude that she acknowledges the following: **Edie Bishop, Mary Kae Dingler, Kathi Hilterman, Larry Jones, Sybil Jones, Sheri McQuinn, Sara Parr, Barbara Peck, Winona LaBrant Smith, Janet** and **Richard Steinmetz**, and **Daisy Wood**. **Sally Blackhall** chaired the Hospitality Room committee and wishes to thank her committee members; they'll be listed in next month's column.

Our next meeting will be on December 15th at the Racquet Club. Entertainment for this event will be the Uptown Dance Centre with "Highlights of the Nutcracker Ballet." Please call **Phyllis Carter** (281) 397-9888 for more information.

Below are some more pictures from our May Style Show and Installation Luncheon. Precious memories for the future of HPAC… ■

Bernadine Billard & daughter Bernadette Clark

HPAC Past-President Sally Blackhall

Janice Haye

Phyllis Carter & Martha Lou Broussard

Ruby Wagner & Winona LaBrant Smith

You are invited to become a member of

HPAC

2015–2016 dues are $20.00 Mail dues payment along with the completed information

to **Wanda Shaw** • 1506 Haven Lock Drive • Houston, Texas 77077

YEARBOOK INFORMATION

Last Name	First Name	Name Tag
Spouse Name	Company	
Street Address	City State	Zip
Email Address	Home Fax	
Home Phone	Cell Phone (Optional)	Home Email Address

Please choose a committee assignment if you are interested.

☐ Fall Event ☐ Yearbook ☐ Bridge ☐ Membership

☐ Christmas Event ☐ Spring Event ☐ Notification ☐ Book Club

☐ Exploring Houston ☐ Courtesy

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