



# ***Society of Independent Professional Earth Scientists***

## ***Houston Chapter Newsletter***

• February 2008 •

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## **February SIPES Luncheon Meeting**

### **New Interpretation Techniques for Predicting Pore Fluid, Lithology and $S_w$ from Seismic AVO**

**Speaker: Fred Hilterman\*, Geokinetics**

\* Co-author: Zhengyun (Jenny) Zhou, Geokinetics



**Date: Thurs, Feb. 21**  
**Time: Social 11:15 am**  
**Lunch 11:45 am**  
**Place: Petroleum Club**  
**800 Bell St.**  
**Houston, TX**

**Texas Licensed Geoscientists,**  
a SIPES Lunch talk counts toward the 15  
Professional Development Hours required  
each year to maintain your license.

### **Hospitality Sponsor**

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#### **Abstract**

The prediction of lithology and pore-fluid properties using only seismic amplitudes across a prospect is highly questionable, even if the seismic amplitudes are calibrated at an available well location. In addition, if an amplitude-versus-offset (AVO) interpretation across the prospect is conducted, the same uncertainty remains. Many interpreters will offer various explanations for the failures ... the ones drilled in the past. The prospect may have a different porosity or shale content than at the calibration well, or the encasing shale properties may have changed. However, by comparing certain amplitude properties on the prospect to the same amplitude properties at the reservoir's down-dip brine-saturated location, predictions of lithology and pore-content are highly enhanced.

In order to reduce interpretation ambiguity, two reflection-coefficient transforms, Lithology and Pore Fluid, are derived from well-log curves in the prospect area. It is shown that the AVO response (comparing the near-angle amplitude to the far-angle amplitude) is dominated by lithologic properties, thus the name, *Lithology Transform*. Basically, the far-angle amplitude is linearly related to the near-angle normal-incident (NI) response. This linear relationship holds for high- to low-porosity sands. Meanwhile, the pore-fluid

*Feb. meeting cont'd on page 2*

Members and Affiliates who register by **12:00 Noon, Tuesday Feb. 19, 2007** pay only \$30. Guests, non-members, late registrations, or at-the-door pay \$35. **No-shows will be billed.** Call, fax, or e-mail your reservation to Mrs. B.K. Buongiorno at the SIPES address above. You can sign up for SIPES Meetings online at www.sipes-houston.org, but payment is still required by regular mail or at the door.



## February Meeting Cont'd

**"By comparing NI values at the prospect to down-dip locations, estimates of  $S_w$  (from seismic) are possible.**

interpretation is contained in a linear relationship of the NI for a hydrocarbon-charged sand, to the NI for its equivalent brine-saturated state. This linear relationship is called the Pore-Fluid Transform. As an example, gas sands with a water saturation ( $S_w$ )=0.3 have a linear NI relationship to their brine-saturated NI regardless of the sand porosity.

Both the lithology and pore-fluid interpretations depend on NI values. What was lacking for many years was a method to determine the NI values from the seismic amplitudes observed on the workstation. To solve for the NI values, a seismic interpretation technique is introduced that combines near- and far-angle horizon maps to yield a map whose values are estimates of normal incidence. The NI difference between the prospect and its equivalent down-dip wet reservoir leads to the prediction of pore fluid and  $S_w$ . To accomplish this task, the Lithology and Pore-Fluid Transforms are combined with the AVO thin-bed response. The NI value of the upper interface of a thin-bed reservoir is predicted regardless of the thickness, porosity, cementation, encasing shale properties, etc. By comparing NI values at the prospect to NI values at down-dip brine-saturated locations, estimates of  $S_w$  are possible. As an added bonus, by comparing the far-angle amplitudes to the near-angle amplitudes, estimates of porosity are possible.

A field example across a Tertiary reservoir in the Gulf of Mexico will be presented to illustrate the technique. ♦

### Professional Biography

Fred J. Hilterman received a geophysical engineering degree and PhD in geophysics from Colorado School of Mines. He worked with Mobil from 1963-1973. In 1973, he joined the University of Houston as a Professor of Geophysics. At UH, Fred co-founded the Seismic Acoustics Laboratory (SAL). In 1981, he co-founded GDC, now a subsidiary of Geokinetics where he is Chief Scientist. Fred also lectures at UH where he is a Distinguished Research Professor.

Fred is a longstanding member of GSH, SEG, EAGE and AAPG. His services to the societies include: associate editor for GEOPHYSICS; SEG and AAPG Distinguished Lecturer; 2001 DISC Instructor; Chairman of TLE editorial board; SEG Vice-President; and, both Technical and General Chairman of SEG Annual Meetings. Fred was the 1996-97 SEG President.

He has received the SEG Best Paper Award and Best Presentation Award, the CSM VanDiest Gold Medal and Distinguished Alumni Medal, the SEG Virgil Kauffman Gold Medal, Cecil Green Enterprise Award, Maurice Ewing Award and Honorary Memberships in SEG and GSH. ♦

## January Chapter Board of Directors Meeting

Discussions at the January 17 Chapter Board Meeting including the following:

- Jim Norris presented to the Board the 2008 Goals and Objectives which included increasing Chapter membership to 275 by yearend, providing funding for the continuation of the Maps In School Project through selling of the Maps at NAPE, and offering reduced luncheon prices for young geoscientists to encourage their potential SIPES membership.

- Acknowledgement was received from the SIPES Foundation for the Houston Chapter donations in memory of Dr. Fred Stricklin and Lucius Geer. A letter of gratitude to the Houston Chapter was also received from Mrs. Geer.

- The new 2008 Board members and Committee Chairmen were introduced and began their duties.

**A reminder** – Houston Chapter dues are due March 1<sup>st</sup>, while National dues are due March 31<sup>st</sup>.



## Moving or Other News?

*Let everyone know about it in the Newsletter.*

Please contact BK Buongiorno at (713) 651-1739 or [bkspee@aol.com](mailto:bkspee@aol.com) with any address changes or announcements.

## January Luncheon Meeting

by Glen Pankonian

The first SIPES Houston Chapter luncheon of 2008 was held at the Petroleum Club on Thursday, January 17, with Frank Cornish of Imagine Resources LLC as the guest speaker. His discussion was titled *"Discovery and Development of the Lower Wilcox Southwest Speaks Field; Lavaca County, Texas"*.

Mr. Cornish reviewed the prospect/field development history of the Southwest Speaks field beginning with the initial Lower Wilcox discovery in January, 1996. The Lower Wilcox play concept was propagated on undrilled Lower Wilcox sands beneath Upper Wilcox dip-trending structural features. Previous Lower Wilcox tests in the area had encountered gas in non-commercial quantities.

Five wells were drilled on the original prospect model before 3D seismic was shot over the field in 1997. The main pay sands discovered were the Roeder, Rainbow and Magnolia sands. All of the sands in the field require fracture stimulation and had varying levels of H<sub>2</sub>S and CO<sub>2</sub>. Generally speaking, the best wells in the field are located on structural highs but there are some high porosity/permeability zones off-structure.

not 0.01 as shown. This R<sub>w</sub> was based upon several data points:

- Pilgreen #2 tested in the "Rainbow" sand 15,000-16,000 ppm Cl<sup>-</sup>.
- Pilgreen #3 the logs in the "S" sand calculated the same R<sub>w</sub>.
- Samedan #1 Freeman tested the "Rainbow" sand with 13,100 ppm Cl<sup>-</sup> (R<sub>w</sub> = 0.11) ♦



*Steve Earle, Mike Jones and Sara Davis*



*Randy Schott and Jim Bennett on top of Houston*

Production from the Southwest Speaks field Lower Wilcox sands is expected to exceed 230 BCF with the best well, the Eaves #1, producing over 16 BCF from the Rainbow Sand. The Rainbow Sand has produced over 84 BCF through October, 2006.

During the question and answer period after the presentation, a question was raised about the water saturation (R<sub>w</sub>) assumed for the field. The R<sub>w</sub> on slides in the presentation was incorrect. The correct R<sub>w</sub> for the Southwest Speaks field for the Lower Wilcox was 0.10,

## New Members

One new SIPES member received his certificate at the January Luncheon.



New member Gary Weir



## Letter from the Chairman

by Jim Norris

We are now well into 2008, and the oil industry looks poised to have another good year. There are some unknowns looming on the horizon now that may influence our business before the end of the year, most notably the upcoming presidential elections, the possible slowing of the American economy, the timing of the implementation of production of recent exploratory discoveries around the world, and, thankfully, the apparent improvement in the Iraq situation. I can't help but wonder what the oil price would be if a large drop in the current price actually does occur; would it be \$60.00 a barrel, or as low as \$40.00 a barrel? After the experiences of the period of time between 1985 and 2003, however, when oil prices actually got below \$10.00 a barrel in some instances, these lower price possibilities still seem quite high to me.

I have never failed to be impressed by the resilience and optimism of the earth scientists who never gave up during that period of difficulty in our industry. It may seem hard to believe now, but none of us really knew what the future would hold, and many of us didn't know if we would be able to continue to make a living in our chosen profession. Most of the members of SIPES are survivors of that period; our situations varied, but we managed to "hang in there" until the industry finally

began to improve. The SIPES members who had the experience of enduring and surviving as independents during that time of depression in our industry have, in my opinion, managed to attain the highest level of expertise and competence in our profession; there is much they can teach to the others in our earth science community who did not share our unique perspective of that period of time.

If there is ever another slow down in our industry, our past experiences have shown me that, no matter how hard things may get, the members of SIPES will continue to apply themselves to their profession. I have no doubt that the entrepreneurial spirit of the oil business in Houston and in the state of Texas will continue to thrive no matter what the future may bring. ♦

## Member Announcements

**Paul Britt moved** his office to 1001 McKinney, Suite 802, Houston 77002. His new office phone is 713-651-0004.

### Upcoming SIPES Events

**Thu-Fri, Feb 7-8 North American Prospect Expo**, George R. Brown Convention Center

**Thu, Mar 20 SIPES Luncheon at Petroleum Club**, "Selling Your Prospect in Our Risk Adverse Environment", Speakers Tim Brittain and Jeff Roberts

**Mar 15-25 SIPES Southern Caribbean Cruise & Carbonate Trip** aboard the M.S. Maasdam (Holland America). Depart Fort Lauderdale with stops in St. Maarten, St. Lucia, Barbados, Martinique, Tortola and Bahamas

**May 12-15 SIPES 45th Annual Meeting**: "Oil & Gas Prospecting - The Good, the Bad, and the Possible". Omni Royal Orleans, New Orleans, Louisiana.

### Upcoming HGS Events \*

**Mon, Feb 11 General Dinner**; "Professionalism as it Applies to Petroleum Geoscience"

**Mon, Feb 18 International Exploration Dinner**; "Current Exploration Trends – Prudent Investments or Irrational Exuberance?"

**Tue, Feb 19 Northsiders Luncheon**; "Exploration History of the Northern Mustang Island Gulf of Mexico, Texas State Waters"

**Mon, Feb 25 North American Exploration Dinner**; "Controls on Hydrocarbon Entrapment and Reservoir Distribution: The Pennsylvanian Oswego Limestone and Big Lime Limestone in the Putnam Field Area, Anadarko Basin, OK"

**Wed, Feb 27 HGS General Luncheon**; "Pinon Field Study with Implications for Texas Overthrust Natural Gas Exploration"

\* See HGS Bulletin or go to [www.hgs.org](http://www.hgs.org) for meeting details, times and location