# SPWLA
## ——*Houston Chapter News*

February 2009 LUNCHEON MEETINGS


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| **Westside**<br>BP Plaza<br>Wednesday, Feb. 11 | Analysis of Density Image Dip Angle Calculations<br>by Kevin S. McKinny |
| **Northside**<br>Baker Atlas Auditorium<br>Wednesday, Feb. 18 | Seismic Petrophysics - Integration to Enable Geologically-Sensible Rock Physics: A Gulf of Mexico Demonstration<br>by Mark G. Kittridge |
| **Downtown**<br>Hess Office<br>Wednesday, Feb. 25 | Lithologic Controls on Microseismic Monitoring<br>by Norm Warpinski |

## President's Corner

**January 2009**

We are starting out very well in 2009 in the Houston Chapter. All the meeting locations have been reporting very good attendance and we hope you are finding this year's set of talks informative.

As has been mentioned several times before, our Chapter is actively involved with planning for the 2009 Symposium. Although many of our members are working on Symposium Committee, the Chapter Board specifically has a role in planning events for the many students that are expected this year given the location and timing. We are pleased to announce that the Chapter will be hosting a student poster competition that will take place on Tues, June 23rd. More information on that in the coming weeks.

The other big event we typically start planning this time of year is the Annual Spring Topical Conference. This year's topic is "Shale Gas Evaluation and Completions". Our Downtown VP Andy May has been lining up a wide variety of speakers on this topic and we are looking forward to presenting to you the final agenda in a few weeks. The event will take place beginning at 8:30 am on Wednesday, May 13 at the Chevron auditorium.

And don't forget to check our homepage at http://www.spwla-houston.org for more information.

**Joe Comisky**
**Houston Chapter President**

## Westside Luncheon Meeting

*Analysis of Density Image Dip Angle Calculations*

*by*

*Kevin S. McKinny*

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| Date: | Wednesday, Feb. 11 | Place: | BP Plaza Conference room on 3rd floor. Westlake 4<br>200 Westlake Park Blvd. | Reservations: | Email: jose.silva@techsia.com |
| Time | Lunch: 11:30 am<br>Talk: 12:00 Noon | Price: | Purchase lunch in cafeteria and bring to conference room. | Parking | BP Plaza Garage |
| Special Instructions | | Everyone MUST sign in AND out at the Lobby Security desk!<br>After receiving security badge, get your lunch and come to the 3rd floor. Follow the SPWLA signs to the conference room. | | | |

**Abstract**

Logging While Drilling (LWD) density images have been shown to be useful in determining the relative dip angle of beds intersecting the borehole. In a typical calculation, the dip angle alpha is given by the equation alpha = atan((A-B)/(D+2DeltaR)), where A and B are the peak and trough, respectively, of a sinusoidal fit to the image of the bed boundary, D is the borehole (or tool) size, and DeltaR is the depth of investigation of the tool. Traditionally, DeltaR is considered constant for a given tool geometry; however, for an LWD density tool, DeltaR is a function of the formation density, mud weight and tool standoff, while the accuracy of the values assigned to A and B are related to such factors as logging speed and the depth resolution of the density measurement. In this study, we present an in-depth analysis of the computation of relative dip angle from density images based on numerical simulation as well as laboratory tests and field data. It includes the computation of DeltaR and the effects of the borehole environment on DeltaR. The effect of errors in the values of A and B in the dip angle equation are also investigated. We discuss the accuracy of the calculated dip angle as a function of the dip angle and demonstrate that accurate (relative) dip angles can be obtained with an LWD density tool.

**Biography**

**Kevin S. McKinny** obtained his Ph.D. in Experimental High-Energy Particle Physics from the University of Alabama in 2003. From 2003 to 2006, he worked in the development of neutron-gamma techniques for bomb detection. Since June of 2006, he has been involved in development of natural gamma and density tools, as well as imaging algorithms, with PathFinder Energy Services, Inc.

Co-Authors: Paul Boonen, and Cornelis Huiszoon, PathFinder Energy Services, Inc.

## Northside Luncheon Meeting

*Seismic Petrophysics - Integration to Enable Geologically-Sensible Rock Physics: A Gulf of Mexico Demonstration*

*by*

*Mark G. Kittridge*

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| Date: | Wednesday, Feb. 18 | Place: | Baker Atlas Auditorium<br>2001 Rankin Rd. | Reservations Required: | dean.jackson@bakeratlas.com - must be received NO LATER than Monday Feb 16 |
| Time | Lunch: 11:30 am<br>Talk: 12:00 Noon | Price: | Selection of box lunches we/drink $10. Cash only, no credit cards. Correct change is greatly appreciated. | Parking | |

**Abstract**

Rock physics relationships are an essential element in the evaluation and modeling of seismic attributes for hydrocarbon exploration. Calibration of seismic amplitude response requires accurate prediction of the expected acoustic properties for reservoir rocks, non-reservoir lithologies (e.g. mudrocks), and pore fluids at varying conditions. The estimation of seismic amplitude variation with offset (AVO) and time-lapse (4D) response is similarly dependent on reliable rock and fluid property information. Our recent experience in a number of global basins has demonstrated the value of an integrated approach to developing rock and fluid acoustic properties for the quantitative interpretation of seismic data.

Seismic petrophysics is the work process that integrates lab- and well-derived rock and fluid properties data, ensuring the development of rock physics models with predictive capability. Additional interpretive synergies are realized when the rock properties work is done within a collaborative workflow, leveraging petrographic observations and robust reservoir petrophysics to constrain the development of rock physics models. In this paper, we describe results from such an integrated well-based rock physics modeling study using data from a Gulf of Mexico discovery and offset dry hole.

Tremendous industry interest and speculation have followed the July 1999 announcement of the Thunder (Crazy) Horse (MC778) discovery by BP. Holistic evaluation of the Thunder Horse well data, integrated with existing petrophysical data and rock physics modeling from Metallica (MC 911) yielded numerous insights into sand, mudrock, and fluid acoustic properties. Additionally, pressure data and associated fluid properties inferences helped in the description of Miocene unconfined turbidite reservoir architecture, lateral variability, and aquifer support. Using an established seismic petrophysics workflow, we describe results from the integrated multi-well evaluation:

**Biography**

**Mark G. Kittridge** is Principal Technical Expert (Quantitative Interpretation) and Regional Discipline Lead (Petrophysics) with Shell International EP Inc. He joined Shell in 1988 after earning BSc. And Professional Degrees in Geological Engineering from The Colorado School of Mines and a MSc. in Petroleum Engineering from The University of Texas. With Shell, Mark has worked in a variety of well operations and study settings, including carbonates, EOR monitoring, HPHT clastics, and the offshore GoM. His previous assignment was in the Exploration and Deepwater group of EP's Technology R&D unit, working on the development and integration of rock physics models in seismic attribute studies. Mark is chairman of the 2008 SEG Summer Research Workshop, focusing on rock physics modeling.

Co-Authors: Neil R. Braunsdorf  L. Taras Bryndzia

## Downtown Luncheon Meeting

*Lithologic Controls on Microseismic Monitoring*

*by*

*Norm Warpinski*

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| Date: | Wednesday, Feb. 25 | Place: | Hess Office<br>One Allen Center<br>500 Dallas Street | Reservations: | Make reservations as early as possible. Call 713-609-5960 and leave a message for SPWLA Reservations or email at Kkemp@hess.com |
| Time | Lunch: 11:30 am<br>Talk: 12:00 Noon | Price: | $15 with reservation | Parking: | Regency Parking at 1100 Smith<br>Allen Center Visitor Garage<br>Various outdoor lots |
| Special Instructions: | | One Allen Center is at the corner of Smith and Dallas. The Hess lobby is on the second level adjacent to the Smith Street entrance. You will need to check in through Security. Please arrive prior to 11:30 am to allow time to check in and get to the meeting room. There are numerous parking places in the area, a few of which are listed above. | | | |

**Abstract**

Microseismic monitoring has become a valuable tool for assessing hydraulic fracturing behavior and optimizing field development in reservoirs that require such stimulation. Since this technology requires the detection and location of small micro-earthquakes generated by the propagation of the fracture, it is very dependent upon accurate information on the velocity structure and geology. The development of an acceptable velocity structure is typically a key part of the analysis process, and it requires the use of logs, surveys, and other information.

The talk will start with an overview of the basics of microseismic monitoring. The focus, however, will be on the methods used to obtain an accurate velocity structure and reasonable geologic model, as well as the impact of the geology on the monitoring position. It will conclude with some examples of microseismic results that highlight specific features that can be observed from the tests and how time-animations of the resultant microseismic data can provide valuable information for fracture optimization.

**Biography**

Norm Warpinski is the Chief Technology Officer for Pinnacle Technologies in Houston, Texas, where he is in charge of developing new tools and analyses for hydraulic fracture mapping, reservoir monitoring, hydraulic fracture design and analysis, and integrated solutions for reservoir development. He previously worked at Sandia National Laboratories from 1977 to 2005 on various projects in oil and gas, geothermal, carbon sequestration, waste repositories, and other geomechanics issues. Norm has extensive experience in various types of hydraulic fracture mapping and modeling and has been involved in large scale field experiments from both the hardware and software sides. He has also worked on formation evaluation, geomechanics, natural fractures, in situ stresses, rock behavior and rock testing. He received his MS and PhD in Mechanical Engineering from the University of Illinois, Champaign/Urbana in 1973 and 1977, respectively, after receiving a BS in Mechanical Engineering from Illinois Institute of Technology in 1971.