**Monday, October 24, 2005**

Westchase Hilton • 9999 Westheimer
Social 5:30 p.m., Dinner 6:30 p.m.

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

**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.** (include your name, e-mail address, meeting you are attending, phone number and membership ID#).

*by* ***W.C. Riese*** *(speaker)* ***and W.L. Pelzmann***
*BP America Production Co., Houston, TX*
***Glen T. Snyder***
*Rice University, Earth Science Department*
*Houston, TX*
***G.K. Arp***
*Booze Allen Hamilton, Las Cruces, NM*

# New Insights on the Hydrocarbon System of the Fruitland Formation Coalbeds, San Juan Basin

The Fruitland Formation is the world's largest known and most productive coalbed methane deposit, with 45 TCF of gas. This important hydrocarbon system originates from a unique combination of depositional environments, tectonic framework, and structural and landscape evolution. This system is more complex than recognized by previous workers. The presence of biogenic gas in the formation is recognized, and is thought to indicate contemporary meteoric recharge of the formation. We conclude recharge of the regolith is taking place, but that biogenic methane is probably sourced by microbes introduced to the formation 35 to 40 million years (Ma) ago.

*Our work finds that seep activity varies on a thirty-year cycle. We attribute this cyclicity to variations in the frequency of magnitude-3 or greater earthquakes*

Methane seeps at the coal outcrop have been active for decades. The presence of these seeps is due in part to continued weathering and breaching of biosome-scale reservoir compartments, a process which is more rapid along fracture systems. Our work finds that seep activity varies on a thirty-year cycle. We attribute this cyclicity to variations in the frequency of magnitude-3 or greater earthquakes, which also varies on a thirty-year cycle. The epicenters of these quakes closely correspond with the areas of most active seepage. As such, pulses in seep activity are due to the result of releases from deeper reservoirs whose seals are periodically breached. ■

Previous discussions of the coal hydrology focused on meteoric waters thought to be recharging the coals today. Our work indicates that four distinct waters are present in the coals. Connate waters fill the formation in the center of the basin. Meteoric recharge is restricted to coal and regolith no more than a few kilometers from the outcrop. Meteoric water found farther down dip is fossil meteoric water and reflects recharge between 35 and 40 Ma. Waters from deeper formations also locally recharge fractures in the coals.

The Paleozoic architecture of the basin continues to influence fluid flow in the coals. Fractures or faults in the coals may be contributory to the high permeabilities found in the high-rate fairway, a cluster of wells with larger recoverable reserves that produce at rates of up to 10,000 MCFPD; the structure could also explain the fairway's abrupt southern boundary. The Cenozoic Rio Grande rift event imposed a second fracture set. Intersection of these fracture sets with the outcrop provides the locus for most methane seeps.

### Biographical Sketch

**Rusty Riese** has a BS in geology from the New Mexico Institute of Mining and Technology, and MS and PhD degrees from the University of New Mexico. He has approximately 35 years of experience in the petroleum and minerals industry as well as in government having worked for the New Mexico Bureau of Mines, Gulf, Anaconda, ARCO, Vastar and BP. Through his career he has worked in exploration geology and geochemistry in both management and line positions. He also holds faculty positions at several universities, including Rice University, where he has taught petroleum industry economics and petroleum geology for more than 20 years. He is presently employed as a Geoscience Advisor with BP America.