Tuesday, November 16, 2010

Crowne Plaza Hotel - Greenspoint (former Sofitel)
425 North Sam Houston Pkwy E

Social 11:15 AM, Luncheon 11:30 AM

Cost: $31 pre-registered members; $35 for non-members & walk-ups.

To guarantee a seat, you must pre-register on the HGS website and pre-pay with a credit card.
Pre-registration without payment will not be accepted.
You may still walk up and pay at the door, if extra seats are available.

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Depositional Environment, Stratigraphy, and Petrophysical and Reservoir Characteristics of the Haynesville and Bossier Shale-Gas Plays of East Texas and Northwest Louisiana

The Upper Jurassic (Kimmeridgian to Lower Tithonian) Haynesville and overlying Bossier shales of East Texas and northwest Louisiana is currently one of the most important shale-gas plays in North America, exhibiting overpressure and high temperature, steep decline rates, EURs estimated at 3 to 7 Bcfg per completion in each formation, and total play resources estimated together in the hundreds of trillions of cubic feet. These shale-gas plays have been studied extensively by companies and academic institutions within the last year, but to-date the depositional setting, facies, diagenesis, pore evolution, petrophysics, best completion techniques, and geochemical characteristics of the Haynesville and Bossier shales are still poorly understood. Our work represents new insights into Haynesville and Bossier shale facies, deposition, geochemistry, petrophysics, reservoir quality, and stratigraphy in-light of paleographic setting and regional tectonics.

favorable conditions for shale-gas production extend beyond established producing areas

Haynesville and Bossier shale deposition was influenced by basement structures, local carbonate platforms, and salt movement associated with the opening of the Gulf of Mexico Basin. The deep basin was surrounded by carbonate shelves of the Smackover-Haynesville Lime sequence (Louark Group) to the north and east and local platforms within the basin. The basin periodically exhibited restricted environment and reducing anoxic conditions, as indicated by variably increased molybdenum content, presence of framboidal pyrite, and TOC-S-Fe relationships. These organic-rich intervals are concentrated along and between platforms and islands that provided restrictive and anoxic conditions during deposition of the Haynesville Shale and part of the Bossier.

The mudrock facies range from calcareous-dominated near the carbonate platforms and islands to siliceous-dominated lithologies in areas where deltas prograded into the basin and diluted organic matter (e.g., northern Louisiana and northeast Texas). These facies are a direct response to a second-order transgression that lasted from the early Kimmeridgian to the Berriasian. Haynesville and Bossier shales each compose three upward-coarsening cycles that probably represent third-order sequences within the larger second-order transgressive systems and early highstand systems tracts, respectively. Each Haynesville third-order cycle is characterized by unlaminated mudstone grading into laminated and bioturbated mudstone. Most of the three Bossier third-order cycles are dominated by varying amounts of siliciclastic mudstones and siltstones. However, the third Bossier cycle exhibits higher carbonate content and an increase in organic productivity in a southern restricted area (beyond the basinward limits of Cotton Valley progradation), creating another productive gas-shale opportunity. This organic-rich Bossier cycle extends across the Sabine Island complex and the Mt. Enterprise Fault Zone in a narrow trough from Nacogdoches County, Texas, to Red River Parish, Louisiana. Similar to the organic-rich Haynesville cycles, each third-order cycle grades from unlaminated into laminated mudstone and is capped by bioturbated, carbonate-rich mudstone facies. Best reservoir properties are commonly found in facies with the highest TOC, lowest siliciclastics, highest level of maturity, and highest porosity. Most porosity in the Haynesville and Bossier is related to interparticle nano- and micropores and, to a minor degree, by porosity in organic matter.

Haynesville and Bossier gas shales are distinctive on wireline logs—high gamma ray, low density, low neutron porosity, high sonic travel-time, moderately high resistivity. A multimin log

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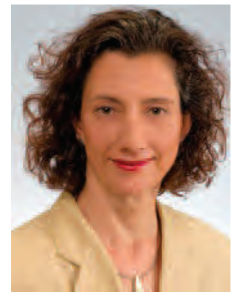
model seems to predict the TOC content from logs. Persistence of distinctive log signatures is similar for the organic-rich Bossier Shale and the Haynesville Shale across the study area, suggesting that favorable conditions for shale-gas production extend beyond established producing areas. ■

Biographical Sketch



Ursula Hammes obtained her Diploma in Geology from the University of Erlangen in Germany in 1987 and her Ph.D. from the University of Colorado at Boulder in 1992. She spent 10 years working as consultant, performing post-doctoral research at the Bureau of Economic Geology, and as exploration geologist in industry. Dr. Hammes joined the Bureau of Economic Geology in 2001 as Research Associate. Her main research focus is in clastic and carbonate sequence stratigraphy, depositional systems, and carbonate and clastic diagenesis. Her recent research focus is in shale-gas systems. She is currently project manager of the State of Texas Advanced Resource Recovery project (STARR).