BARTON, ROBERT A., Texas A&M Univ., College Station, TX (now with Ensearch Exploration, Dallas, TX)

Contrasting Depositional Processes of Sub-Clarksville and Woodbine Reservoir Sandstones

The sub-Clarksville and Woodbine sandstones are newly discovered gas reservoirs in Grimes County, Texas. Although the sandstone accumulated in a dominantly shallow marine environment, depositional processes and transport mechanisms were different for each sand body. The sub-Clarksville represents rapid deposition by storm-generated bottom currents. Sand accumulations are lens shaped and were restricted to lows by shelf topography. Sedimentary structures grade from laminated to massive sandstone above a sharp basal contact, to churned shaly sandstone at the top, overlain by Austin micrite. Mean grain size decreases upward with an average composition of 83% quartz, 6% rock fragments, 9% matrix, and abundant carbonate cement. Quartz content decreases and matrix increases upward. Bedding sequence and textural gradation suggest that sand was eroded from preexisting Woodbine sediments to the east and transported to the shelf during passage of a major storm.

In contrast, Woodbine sandstones represent a prograding deltaic environment. The sandstones are highly quartzose (80 to 94%) and show an increasing grain size upward. The "C" sandstone at Hill field is directly overlain by the Austin, and grades from bioturbated mudstone at the base to massive or faintly laminated sandstone near the top. Woodbine sandstones "C" and "D" thicken significantly eastward as an extension of a giant prograding deltaic system to the northeast. Conversely, Woodbine "A" and "B" sandstones were deposited as offshore bars farther west at Kurten field. Distribution of both the sub-Clarksville and Woodbine sandstones was affected by deep-seated salt movement at Hill field and the unconformity associated with this local high. Future exploration will depend on a detailed knowledge of the depositional framework in these downdip areas.

BAY, ANNELL R., Univ. Texas at Austin, Austin, TX (now with Chevron Oil Field Research Co., La Habra, CA)

Evolution and Porosity of Carbonate Shoaling Cycles, Lower Glen Rose (Lower Cretaceous), South Texas

The lower Glen Rose Formation in the subsurface of south Texas exhibits three cycles of shoal-water complexes, consisting of high-energy bank, bar, and biogenic reef deposits that developed on the Pearsall arch. Facies distribution shows that these elongate complexes trend northeast-southwest for at least 78 mi (125 km) and are located 44 mi (70 km) seaward of the Lower Cretaceous shoreline. Although barren of oil and gas, these vertically stacked cycles contain facies development and porosity preservation essential for attractive exploration targets.

Each cycle represents three major depositional facies: open-marine shelf, shoal-water complex, and protected lagoon. The open-shelf facies is characterized by terrigenous mudstone to wackestone. The shoal-water complex consists of skeletal and oolitic grainstone surrounded by lower energy packstone deposits. High-energy patch reefs of coral, stromatoporoid, and caprinid boundstone cap the grainstones. Lagoonal deposits of low-energy wackestone and laminated mudstone overlie each of the shoal-water sequences and indicate seaward progradations, which were interrupted by transgressions of open-marine shelf deposits of the succeeding cycle. The high-energy patch reefs may have prograded seaward across the shelf as the initial build-up of the Stuart City shelf margin.

Diagenesis during burial has resulted in loss of porosity in the rocks. The greatest remaining porosity occurs in the grainstone facies. There are two major porosity types: primary interparticle and secondary moldic. The primary porosity resulted from early meteoric cementation and preservation of high initial interparticle pore space prior to extensive grain compaction. The secondary porosity is the result of aragonite allochem dissolution.

BECK, CANDYCE L., Rice Univ., Houston, TX (now with Shell Development Co., Houston, TX), and JOHN A. S. ADAMS, Rice Univ., Houston, TX

Potassium-Argon Age Dating of Interlayered Glauconites from Eocene Queen City Formation, East Texas

X-ray characterization of green pellets from the Eocene Queen City Formation near Jacksonville, Texas, reveals that these pellets are interlayered glauconite and chlorite. Because chlorite contains no potassium, it would dilute the potassium and argon concentrations in the whole rock with respect to the glauconite. These pellets were dated using the K-Ar age method. The results give an average age of approximately 50 ± 3 m.y. for the Queen City Formation. This age may reflect the time-transgressive nature of the beds as the ages slightly south of this location are younger—45 m.y. for the overlying Weches Formation.

BENSON, D. JOE, Univ. Alabama, University, AL, and ERNEST A. MANCINI, Alabama Geol. Survey and Univ. Alabama, University, AL

Petrology and Reservoir Characteristics of Smackover Formation, Hatter's Pond Field—Implications for Smackover Exploration in Southwestern Alabama

Hatter's Pond field in northern Mobile County, Alabama, has produced 11 million barrels of condensate and 43 bcf of gas since its discovery in 1974. Production is from multiple-pay zones in the Upper Jurassic Norphlet and Smackover Formations. The trapping mechanism in the field is a highly complex, combination structural and stratigraphic trap involving salt movement in association with normal faulting.

The Smackover in the Hatter's Pond field area is enigmatic for the Smackover in Alabama for two principal reasons. First, the Smackover is very thin, less than 200 ft (60 m), in comparison to thicknesses on the northwest and southeast. Second, the Smackover does not show the characteristic lower Smackover-upper Smackover lithologic subdivision so apparent throughout southern Alabama and the Gulf Coast.

These unique features are a product of the field's position on the northwest flank of the Wiggins uplift. Smackover deposition was significantly affected by the uplift which maintained the Hatter's Pond area as a subaerial high while lower Smackover carbonates were being deposited in the deeper areas of the Mississippi Interior Salt basin and Conecuh embayment. It was not until near maximum transgression that the seas covered the Hatter's Pond area and deposited shallow-water upper Smackover lithologies. These lithologies were later massively dolomitized by mixing-zone dolomitization during the subsequent Buckner regression. This dolomitization almost completely masked depositional textures, but was largely responsible for the development of reservoir-grade porosity in the Hatter's Pond area.

Six major lithofacies can be identified in the Smackover in