

processes of lower delta plain deposition. Thin, discontinuous lignite seams apparently formed in small interdistributary areas, which were commonly inundated by sediment during overbank flooding and crevassing. Thick coal seams, deposited on sand platforms, are laterally continuous and represent lignite deposition during periods of delta lobe abandonment. A change in position on the delta plain from stratigraphically older to younger seams is reflected in both seam characteristics and comparisons of average heating values.

A Wilcox deposit in east Texas shows most of the characteristics of an alluvial plain setting. The individual seams are lenticular; the thickest lignite occurs in the center of the lignite bodies but decreases abruptly along the margins. Adjacent to the lignite bodies are channellike barren areas that are filled with either mud or sand. Channels are normally parallel to the individual lignite bodies. Large, irregular and circular mud-filled areas completely surround some of the lignite seams. Overall quality of the lignites in this environment is found to be variable, but generally low in ash and high in heating value.

TURNER, JAMES R., Braddock Exploration, Ltd., Shreveport, LA, and SUSAN J. CONGER, Gulf Exploration and Production Co., Houston, TX

Environment of Deposition and Reservoir Properties of Woodbine Sandstone at Kurten Field, Brazos County, Texas

A combination of stratigraphic and diagenetic events has trapped oil in thin-bedded, clayey sandstones of the Upper Cretaceous Woodbine-Eagle Ford Formations. Five sandstone units occur in Kurten field and are designated from top to bottom as "A" through "E." Foraminifera and nanofossils indicate these units to be late Turonian. The "C" and "D" units are elongate north to south, 4.5 mi (7.2 km) wide, over 10 mi (16 km) long, and 40 ft (12 m) thick. The "B" and "E" units are thinner and trend northeast to southwest. Grain size coarsens upward in the "B," "C," and "D" units, averaging 0.14 mm and ranging from 0.09 to 0.18 mm. Grain size fines upward in the "E" unit. The sandstone's average composition is 66% quartz, 1% feldspar, 2% rock fragments, and 28% matrix. Sedimentary structures in the "B," "C," and "D" units grade upward from laminated and bioturbated siltstones to clean sandstones with flaser cross-beds. The "E" unit consists of repeated bedsets similar to "cde" turbidite divisions. Sedimentary structures and bioturbation indicate that the units are offshore bars which have been formed by a combination of river mouth bypassing, storm-surge turbidity flows, and longshore currents.

The porosity is largely diagenetic and occurs in the clayey beds. It appears to have been formed by freshwater leaching along an erosional unconformity overlain by the Austin Chalk. Permeability becomes progressively poorer away from the unconformity and a permeability barrier ultimately forms a poorly defined updip limit for the field, making Kurten a combination diagenetic and stratigraphic trap. Relatively widespread occurrences of offshore bars suggest that similar traps may be fairly common in ancient shelf sediments.

SEPM Abstracts

BENSON, D. JOE, Univ. Alabama, University, AL

Porosity Reduction Through Ductile Grain Deformation: An Experimental Assessment

At the time of deposition, sands in high energy environments commonly have porosities of 40 to 55%. This depositional porosity is reduced following burial by cementation and compactional processes. In sands with a high percentage of ductile grains, ductile grain deformation can be a major compactional process and can have an appreciable effect on porosity and reservoir characteristics. To test the significance of this process, a series of sands were manufactured containing variable percentages (5 to 50%) of ductile grains mixed with equal-sized quartz. These mixtures were compressed in a biaxial compression system at pressures of from 4,000 to 20,000 psi (27,580 to 137,900 kPa), simulating burial to depths of up to 20,000 ft (6,096 m). As expected the results showed a negative correlation between porosity and pressure for samples with the same ductile content. A strong negative correlation was also apparent, however, between porosity and ductile grain content in samples compressed at the same pressure. Porosity values of medium-grained sands compressed to 10,000 psi (68,950 kPa) ranged from 24% in sands with 20% ductile grains to 9% in sands with 50% ductile grains. In samples compressed to 20,000 psi (137,900 kPa), porosity values ranged from 9% in sands with 10% ductile grains to 1% in sands with 50% ductile grains. Experimentation with other types of ductile grains and grain sizes indicates these variables are also significant but do not alter the basic relation between ductile grain content and porosity. These data suggest it may be possible, with knowledge of ductile grain content from outcrop or shallow well samples, to predict porosity reduction due to ductile grain deformation in deeper, downdip reservoirs. The data may also have application in determining depth at which cementation occurred.

BOND, PAULETTE, LEAH SMITH, and W. F. TANNER, Florida State Univ., Tallahassee, FL

Structural Patterns in South Florida

Analysis of surface features in south Florida indicates a clear pattern of structural control (faulting, fracturing, or bending). This control is visible in lake outlines, stream channel directions, stream patterns, stream occupation of a non-stream trough, drainage pattern discontinuities, ground surface offsets, coastal offsets, confluence geometries, and ground slopes. The two dominant linear orientations are N50°E and N65°W; these form acute angles, facing east and west, of about 65°, and are taken to be the shears in a first-order strain ellipse. The intersection of two of these trends, immediately west of Lake Okeechobee, provides five or more meters of relief, shapes the western shores of that lake, distorts drainage patterns to the east, north, and west, and produced the basin which the lake occupies.

The long trough, through which the Caloosahatchee River flows, is parallel with one of these first-order alignments, and is marked by a down-to-the-southeast asymmetry. An extension of the northern boundary of the trough is thought to account for the coastal offset in the vicinity of Sanibel Island.

The fault-and-fracture pattern deduced here indicates north-south tension, in accord with the known northward migration of the continental block. Subsurface data indicate that the tectonic pattern is an old one, but the surface features which can be seen today date from Pliocene-Pleistocene time. The maximum rate of deformation in the last few million years has been calculated to be about one millimeter per millenium, and the actual rate has probably been somewhat less.

Second- and third-order orientations, predicted by use of the Moody-Hill hierarchy, have been observed in several stream patterns.