O'CONNELL, SUZANNE, Lamont Doherty Geol. Observatory of Columbia Univ., Palisades, NY, JOHN B. ANDERSON, Rice Univ., Houston, TX, and LEG 96 SCIENTIFIC PARTY

Channel Sand Bodies in Lower Mississippi Fan

More than 20 terrigenous sand beds, 1-9 m thick, were cored at 2 DSDP sites in the lower Mississippi Fan, in 3,300 m of water, 600 km from the shelf edge. The shallowest sand beds occur 15 and 23 m below the sea floor, and constitute 50% of the recovered cores.

These beds were sampled at 20-30 cm intervals for size analysis. Sand content averages 80% with 10-15% variation within a bed. Mean and modal sand is fine grained and averages 2.75-3.0 phi. Maximum sand size ranges up to coarse sand, and within some beds, it varies between 0.5 and 2.0 phi. Grading is poorly developed on the scale of 1 m and larger. There is no consistent grading trend, and in some intervals, mean and maximum sand size show opposite trends. These data confirm that, like many ancient fans, the lower Mississippi Fan was a major site of sand deposition, but unlike them, consistent coarsening-upward sequences are not defined.

The poorly developed grading, variations in grading trends, and changes in sand percentages result from sand deposition within a broad, shallow, meandering or braided channel in which sands are reworked. The many separate beds are probably the result of changes in channel position that occurred on the average of once every 7,000 yr. Sand transport to the lower fan ended at least 2,000 yr before Holocene time. These newly discovered sand bodies, interlayered with finer clastic, potentially organic-rich material, suggest that stratigraphic reservoirs may be present in deep water, lower fan environments.

O'CONNOR, THOMAS E., Aminoil Inc., Houston, TX, and W. H. KANES, Univ. South Carolina, Columbia, SC

North African Petroleum Geology: Regional Structure and Stratigraphic Overview of a Hydrocarbon-Rich Cratonic Area

North Africa, including Sinai, contains some of the most important hydrocarbon-producing basins in the world. The North African Symposium is devoted to examining the exploration potential of the North African margin in light of the most recent and promising exploration discoveries. The geologic variety of the region is extraordinary and can challenge any exploration philosophy.

Of primary interest are the Sirte basin of Libya, which has produced several billion barrels of oil, and the Gulf of Suez, a narrow, evaporite-capped trough with five fields that will produce more than 5 billion bbl. Both are extensional basins with minimal lateral movement and with good source rocks in direct proximity to reservoirs. Structural models of these basins give firm leads for future exploration.

More difficult to evaluate are the "Tethyan realm" basins of the northern Sinai, the Western Desert of Egypt, the Cyrenaican Platform of Libya, and the Tunisia-Sicily shelf area, where there are only limited subsurface data. These basins are extensional in origin also, but have been influenced by lateral tectonics. Favorable reservoirs exist, but source rocks have been a problem locally. Structural models with strong stratigraphic response offer several favorable play concepts.

The Paleozoic Ghadames basin in Libya, Tunisia, and Algeria has the least complex structural history, and production appears to be limited to small structures. A series of stratigraphic models indicates additional areas with exploration potential. The Paleozoic megabasin of Morocco, with its downfaulted Triassic grabens, remains an untested but attractive area.

O'HEARN, TERRENCE C., Texaco U.S.A., New Orleans, LA, and CLYDE H. MOORE, Louisiana State Univ., Baton Rouge, LA

Fluid Inclusion Study of Diagenetic Mineral Phases, Upper Jurassic Smackover Formation, Southwest Arkansas and Northeast Texas

Homogenization and final melting temperature data from primary and secondary two-phase fluid inclusions within carbonate and sulfate mineral phases reflect the physical re-equilibration of pre-burial calcites and the precipitation of late diagenetic mineral phases during the burial of the upper Smackover (Upper Jurassic, Oxfordian) lime-grainstones in southwestern Arkansas and northeastern Texas. Homogenization temperatures range from 83.0°C to 153.8°C (uncorrected for excess ambient formation pressures at time of trapping). Final melting points range from −33.4°C to −13.5°C.

Statistically distinct temperature populations reveal the re-equilibration of pre-burial bladed calcite cements and parallel the subsequent paragenesis during burial of nonfabric-selective dolomite, zoned equant mosaic calcite, anhydrite, celestite, unzoned poikilitic calcite cement, and baroque dolomite cement under conditions of increasing temperature and salinity.

Re-equilibration/precipitation began after a minimum depth of burial in the range of 0.95 to 1.75 km. Re-equilibration/precipitation resulted, in part, in response to the original connate meteoric to marine pore water system being mixed with, and subsequently replaced by, basinal brines that migrated into the upper Smackover grainstones from the Louann Salt.

Melting temperature data indicate that fluids trapped within the two-phase fluid inclusions are highly saline, varying from 17 to 27 wt. % NaCl. Melting temperature data also indicate that the fluids are $CaCl_2$-rich brines with NaCl and probably $MgCl_2$ and $FeCl_2$ as additional chloride components.

OLANDER, A. M., Exxon Co., USA, Houston, TX

Wilcox Depth Prediction at Katy Field, Waller County, Texas: Problem and Solution

Velocity anomalies large enough to cause severe errors in depth maps may not be recognized from prior drilling experience, from regional velocity control, or from seismic reflection configurations. A chastening example of one such anomaly is an outpost well near the Katy field in Waller County, Texas. This outpost well, the Exxon 1 Sparks, tested Wilcox sands, which were both dry and 500 ft low to seismic prediction from Vibroseis data. The well came in structurally low as a result of incorrect predictions of both near-surface and post-Wilcox velocities. Additional studies indicated that the Sparks well was drilled on the flank of a structure that was later drilled and proved to be the discovery of a new Wilcox field.

Accurate velocities are becoming increasingly important in all phases of oil and gas exploration, particularly in mature exploration areas where prospects are subtle and difficult to find.

OSSIAN, C. R., ARCO Oil and Gas Co., Plano, TX

Exhumed Shoreface and Tidal-Delta Complexes in Lower Cretaceous Ferron Delta (Central Utah)

Numerous studies of modern shoreface and tidal-delta complexes have appeared in the literature, but few well-documented ancient examples are known. In the Lower Cretaceous (Turonian) Ferron delta complex of the Mancos Shale in central Utah, such a system has been recognized in outcrop. This complex is part of the transgressive destructional phase of the Ferron delta and represents a shoreface setting overstepped by rapid transgression, buried and preserved within fine-grained, shallow shelf sediments. The facies tract is now exposed by erosion and the exhumed surface has been examined in detail.

The exposed parts of the shoreface complex consist of 9 km of upper-shoreface and foreshore settings, tidal inlets with recurved accretionary spits, ebb-tidal delta bodies, and extensive washover fans. Within the outcrop belt, two inlet complexes have been positively recognized and parts of a third complex may be present. Behind the shoreface complex are shallow and restricted lagoons with locally extensive tidal channels.

Geometry of the ebb-tidal delta bodies and their suites of preserved sedimentary features support a model of strong longshore current systems from south to north along the edge of a large embayment. Studies of basin geometry, shelf width, probable nature of the adjacent land surface, and paleocirculation patterns have all combined to provide data for this model of a mesotidal setting with associated shoreface, lagoonal, and tidal-facies tracts.

OWEN, DOUGLASS E., and JOHN C. WEST, U.S. Dept. of Interior, Corpus Christi, TX

Late Quaternary Seismic Stratigraphy of a Shallow Marine Estuary, Corpus Christi Bay, Texas