HAM, THOMAS L., and RANDAL J. LANDRY, Centenary College, Shreveport, LA

Suggested Nomenclature Change and New Reference Locality for DeQueen Formation, Pike County, Arkansas

The DeQueen Formation of the Trinity Group, Comanchean Cretaceous, crops out in southwestern Arkansas and southeastern Oklahoma. The outcrop, located in the Highland gypsum quarry of Pike County, southwestern Arkansas, is described in detail in this paper and presented as a reference locality. Data from the locality provide the basis for a nomenclature change from the DeQueen Limestone Member to the DeQueen Formation. The formation consists of 64.23% clastic sediments, 24.72% gypsum, and 11.05% limestone. Hopper salt casts, ripple marks, scattered pyrite and marcasite nodules, celestite, and chickenwire gypsum can also be found. The DeQueen Formation is underlain by clays and the Ultima Thule Gravel lentil, while the top is unconformably overlain by Upper Cretaceous Tokio gravels.

The general paleoenvironment represents a normally low-energy subtidal environment ranging from brackish to normal to hypersaline waters in a lagoonal setting that shallows upward.

HAMLIN, H. SCOTT, Univ. Texas at Austin, Austin, TX

Fluvial Depositional Systems of Carrizo–Upper Wilcox in South Texas

In the Rio Grande embayment of south Texas, the Carrizo-upper Wilcox interval (Eocene) consists of two sand-rich coastal plain fluvial depositional systems that grade basinward into several deltaic complexes. The bedload channel system is dominated by multi-story, multi-lateral, fluvial, channel-fill sandstones. This system is typically > 90% sandstone. Shales are thin and laterally discontinuous, the remnants of abandoned channel fills. Bedload channel sandstones dominate the major fluvial axes and form the depositional framework of the interval. The mixed alluvial system consists of a more typical suite of coastal plain facies. Mixed-load channel-fill sandstones tend to be isolated and surrounded by overbank shales and thin sandstones. Crevasse splay and lacustrine facies occur in the flood-plain area.

Total-interval isopach patterns, sandstone geometries, and depositional systems distributions indicate that fluvial sediment input was converging upon the embayment from the west, northwest, and north.

Economically, the Carrizo-upper Wilcox of south Texas has a threefold significance. The updip Carrizo sandstone is a major source of fresh groundwater, includes several large oil fields, and also contains deposits of uranium minerals. The downdip upper Wilcox trend is an area of active hydrocarbon exploration.

HANOR, JEFFREY S., Louisiana State Univ., Baton Rouge, LA, and JANET E. BAILEY, Texaco USA, New Orleans, LA

Use of Hydraulic Head and Hydraulic Gradient to Characterize Geopressured Sediments and Direction of Fluid Migration in Louisiana Gulf Coast

Characterization of geopressured sediments in the Gulf Coast is commonly made on the basis of increases in pressure gradient or geostatic ratio, i.e., in-situ fluid pressure divided by total depth. Fluids and sediments having geostatic ratios > 0.47 psi/ft are usually considered "geopressured;" those with geostatic ratios > 0.70 psi/ft are considered "hard-geopressured."

An alternative and more informative way of characterizing geopressured sediments is by use of the parameter *hydraulic head.* Hydraulic head can be used not only to distinguish between hydropressured and geopressured sediments, but also to provide potentially quantitative information on the direction and rate of subsurface fluid flow. Hydraulic head, h (ft), is defined as $h = z + Pg/\rho$, where z is depth below a reference datum, P is measured or calculated fluid pressure, g is acceleration due to gravity, and ρ is fluid density. In the absence of osmotic effects, the *hydraulic gradient*, dh/dl (dimensionless), where l is path length, can be used in conjunction with hydraulic conductivity in Darcy's Law to predict the direction and rate of fluid migration.

Variations in calculated hydraulic head have been correlated along several regional cross sections through the Tertiary sedimentary sequence of south Louisiana. Four distinct hydrodynamic zones can be distinguished with depth in the region studied.

(1) Near surface to 7,000 ft (2,100 m) in depth. Hydropressured fresh to saline waters having hydraulic heads near zero and vertical hydraulic gradients of 0.01 or less.

(2) 7,000 ft (2,100 m) to 10,000 to 14,000 ft (3,000 to 4,300 m) in depth. A transition zone of weakly geopressured sediments with hydraulic heads ranging from 0 to 3,000 ft (900 m) above sea level. Hydraulic gradients range from 0.1 to 4 and show many reversals with depth. Many commercially important hydrocarbon plays occur within this zone.

(3) 10,000 to 14,000 ft (3,000 to 4,300 m) to 12,000 to 18,000+ ft (3,600 to 5,500 m). The hard geopressured zone in which hydraulic head progressively increases with depth from values of 3,000 to 16,000+ ft (914 to 4,900 m) of head above sea level. Gradients of 4 to 5 are typical but locally can exceed 25. There are few reversals in gradient with depth.

(4) Depths below Zone 3. Suggestion, based on sparse data, that hydraulic gradients begin to decrease with depth.

In contrast to the hard geopressured zone, where hydraulic flow appears to consist of a broad, generally upward-moving front, hydraulic flow in the transition zone appears to be more strongly focused through preferred channels.

HARWOOD, GILL, The University, Newcastle-upon-Tyne, U.K., and CHRIS FONTANA, Phillips Petroleum Co., Aurora, CO

Controls on Hydrocarbon Production in Bryan's Mill Area, Cass and Bowie Counties, Texas

Production from the Bryan's Mill, Frost, and Carbondale fields in the Bryan's Mill area is from Jurassic upper Smackover dolomitized ooid grainstones. Within the upper Smackover, three coarsening upward sequences culminating in ooid grainstones have been recognized, and they extend across the area. Shortly after deposition, leaching by meteoric fluids resulted in oomoldic porosity in many of the ooid grainstones; other carbonate facies were affected very little. During early diagenesis, dolomitization both preserved existing porosities and generated an effective intercrystalline porosity, thereby enhancing permeability. After dolomitization, brittle compaction during burial increased permeability further by the interconnection of oomolds.

The center of the Bryan's Mill area was a positive feature during late Smackover deposition. Faulting during Buckner deposition resulted in a series of southeasterly tilted fault blocks, perhaps due to regeneration of basement structures. Later, post-Hosston faulting had an east-west trend and is possibly associated with doming of the sediments over two highs. There is little evidence of Jurassic or early Cretaceous movement on the east-west trending faults.

Production in the area is dependent on a combination of structural, stratigraphic, and diagenetic factors. Although the grainstones are continuous across the northernmost structural high, production is only from dolomitized areas. Thus diagenesis, and in particular dolomitization, is the ultimate control on production in the area.

HOWARD, PERRY C., Coastal Environments, Inc., Baton Rouge, LA

Development of Tidal Inlet on Mississippi River Deltaic Plain

Surface sampling and bathymetric surveying in 1981 and charts from 1853 to 1934 are used to formulate the history of Quatre Bayou Pass, a major inlet within the transgressive environment of the Mississippi River deltaic plain. Over this period, land loss processes caused marsh to give way to lakes and bays; therefore, tidal exchange intensified through a break in the coastal barrier. Beach sand was reworked into small tidal deltas. As lakes and bays enlarged further, the tidal prism increased; consequently, both the pass and the sandy tidal deltas increased in size. Over the last century, the increased tidal flow caused Quatre Bayou Pass to have an eight-fold cross-sectional area enlargement and a three-fold ebb-tidal delta volume increase. At present, the throat is 15 m (49 ft) deep and 1.2 km (0.7 mi) wide, while the ebb-tidal delta is comprised of 14.9 by $10^6 \pm 10\%$ m^3 of sediment.

Concurrent with these developments, recession of the barrier and much of the shoreface proceeded at a rapid rate. Because the ebb-tidal delta had a simultaneous increase in volume, the shoreface in front of the pass remained relatively stable. In other words, bathymetric expression of