CONTRASTS IN CEMENTATION, DISSOLUTION, AND POROSITY DEVELOPMENT BETWEEN TWO LOWER CRETACEOUS REEFS OF TEXAS

C. W. Achauer[1]

ABSTRACT

The influence of cementation and dissolution on porosity is investigated by comparing two reefs with significantly different diagenetic histories. Reefs of the subsurface Sligo Formation in South Texas are buried to depths of 15,000 to 20,000 ft in a narrow belt along a shelf edge of regional extent. Cores from five wells distributed along 225 miles of the shelf edge show that porosity in the reef and backreef facies is persistently occluded by (1) radiaxial fibrous calcite, a cement whose origin appears to be related to the replacement of a synsedimentary marine cement, and/or (2) coarse calcite mosaic, a cement introduced later in the diagenetic sequence during a time of basin subsidence. Calcite cements of this type and sequence have also been reported to be detrimental to porosity in other ancient shelf-margin reefs. Therefore, the creation of porosity in shelf-margin reefs may depend on processes (dolomitization, fracturing, dissolution) which can offset the influence of cementation.

In contrast to the Sligo, large patch reefs in the outcropping lower Glen Rose Formation in south-central Texas record a simpler diagenetic history which preserved porosity. One reef, selected for detailed study, has experienced only one phase of diagenesis—namely, early subaerial exposure which created moldic porosity and precipitated a single generation of calcite cement. After this exposure, no additional cements were introduced, despite burial beneath a few thousand feet of younger Cretaceous marine sediments and reexposure of the reef to subaerial weathering from Miocene to Recent time. Thus, the key to understanding porosity preservation in the Glen Rose reef lies in the role of paleohydrologic and geochemical conditions during burial and reexposure of the reef. Whether this can be predicted is a matter for future research.

[1]Atlantic Richfield Company, Dallas, Texas

LOWER CRETACEOUS STRATIGRAPHIC MODELS FROM TEXAS AND MEXICO

T. A. Bay, Jr[1]

ABSTRACT

Carbonate ramp and carbonate shelf depositional models are utilized in interpreting Lower Cretaceous carbonate stratigraphy in the Gulf of Mexico province. The lower Glen Rose (upper Trinity) high-energy, rudist reef and grainstone complex began on a low-relief carbonate ramp profile and prograded seaward over slightly deeper water, low-energy, lime mudstones and wackestones with a resultant growth of some 1,250 ft vertically over a horizontal distance of 30 miles. During late Glen Rose, Fredericksburg, and Washita time, this same high-energy facies complex built about 1,300 ft vertically in a horizontal distance of 6 miles, creating a marked break in slope between the shallow water of the shelf and a shelf margin and the adjacent deeper water of the ancestral Gulf of Mexico. This topographic break in slope changed a carbonate ramp to a carbonate shelf profile of deposition. A faster rising sea level, perhaps a result of a more rapid rate of sea-floor spreading, probably accounts for the pronounced vertical buildup.

Regional cross sections of Fredericksburg and Washita strata show the shallow-water depositional attributes of carbonates on the Central Texas platform. High-energy grainstone and rudist reef complexes separate these shallow-water carbonates and evaporites from deeper water strata in the East Texas basin and, during Washita time, in the McKnight basin.

Density and acoustical contrasts present within the prograding lower Glen Rose strata deposited on a ramp profile and in the upper Glen Rose, Fredericksburg, and Washita strata deposited at the shelf margin are sufficient to recognize the character of these buildups on reflection seismic profiles.

[1]Shell Development Company, Houston, Texas