

the midwestern to the eastern states.

On the west coast, Pacific Gas Transmission Company, a Pacific Gas & Electric subsidiary, will upgrade existing lines from the U.S.-Canadian border to northern California. Interstate Transmission Associates (Arctic) will construct a pipeline extending from the U.S.-Canadian border near Kingsgate, B.C., to the Nevada-California border which will transport Arctic natural gas to various markets in the western United States, including the Pacific northwest and southwest. Southern California Gas Co. will transport gas from the California border to serve markets in central and southern California.

WAYNE, C. J., Dept. of Geology, Florida State Univ., Tallahassee, Fla.

#### Effect of Artificial Sea Grass on Wave Energy and Nearshore Sand Transport

The emplacement of offshore, artificial sea-grass beds directly influences nearshore sand transport. Artificial sea grass will decrease wave energy because of bending of the fronds, increased bottom drag, internal deformation, and refraction. The latter three effects change as a result of the increased bottom slope caused by the sea grass beds. In turn, the mean longshore current and longshore component of wave power are reduced. Total wave power and incident angle to the beach specifies the longshore component of wave power ( $P_L$ ) which is equated to the quantity of sand moved per unit distance ( $dq/dx$ ).

The average bending moment per individual frond was calculated to be approximately 2.0 lb-in. A dense bed of sea grass has the potential to reduce wave energy by 20 percent, on the basis solely of energy lost to bending. The reduction of wave height, corresponding to the energy loss, results in decreased wave power per unit distance expended at the breaker zone.

Ginsburg and Lowenstam reported that *Thalassia testudinum* offers a suitable substrate for many benthic communities. Algae, foraminifers, bryozoans, etc., attach to the fronds, whereas mollusks, echinoderms, and crustaceans use the network of baffles for protection and food gathering. These organisms add substantially to the binding ability of the grass, and sediment will be accumulated readily within the bed. Variations in the type of community present will depend on wave energy (turbulence), temperature of the water, tidal range, and salinity. In areas of low-wave energy, embankments may grow forming a series of offshore bars which further will influence approaching orthogonals.

WILLIAMS, C. E., L. R. TRAVIS, and E. M. HOOVER, Exxon Co., Houston, Tex.

#### Depositional Environments Interpreted from Stratigraphic, Seismic, and Paleoenvironmental Analyses, Upper Wilcox, Katy Field, Texas

Upper Wilcox deposits at Katy field in southeastern Texas are composed of terrigenous clastic facies. These rocks are the uppermost beds of the Wilcox Formation (late Paleocene to early Eocene), which crops out in central Texas and extends basinward to a known total subsurface thickness of 9,100 ft at Katy field. The upper Wilcox is 1,800 ft thick at Katy; however, only the upper 800 ft were included in this study. Analyses of the regional stratigraphy, structural trends, and paleobathymetric relations indicate that beds were deposited by high-constructive and destructional delta systems marginal to the subsiding Gulf of Mexico basin; resultant deltaic and interdeltic facies ultimately were transgressed by open-shelf environments.

The depositional interpretation in vertical sequence begins with prodelta silty clay at the base and coarsens upward to very fine and fine-grained sands in a typical progradational delta-front sequence. Progradation was repeated after subsidence, yielding a second series of delta-front and overlying fluvial fa-

cies. The next vertical sequence consists of thinly laminated and burrowed silty clay and thin sand beds which locally are slumped and microfaulted, and sand units containing shale clasts. These thin units represent a period of minor sediment influx and consist mainly of interdeltic marsh to offshore silty clay and destructional delta-front sand; local distributary channels cut into the bay-marsh transition facies. The third vertical sequence is largely offshore silty clay, thin glauconite beds, and thin silty sand units which transgressed the area as a result of increased subsidence. Local relict shoreline sand beds were deposited during temporary stillstands as the shoreline shifted landward.

WIND, F. H., Dept. of Geology, Florida State Univ., Tallahassee, Fla.

#### Calcareous Nannoplankton of Salt Mountain Limestone (Jackson, Alabama)

A sample of the Salt Mountain Limestone (Paleocene) from Jackson, Alabama, has yielded a diverse nannoplankton flora. Preservation differs greatly between species. Some forms are well preserved whereas others have been subjected to extensive dissolution and/or recrystallization. Placoliths generally are well preserved, but the centers of many specimens are obscured by pelatoid overgrowths. Many specimens also bear sparry extensions of isolated shield elements.

The presence of *Discoaster gemmeus*, and the absence of recognizable specimens of *Discoaster nobilis* and *Heliolithus riedeli*, places the Salt Mountain Limestone within the *Discoaster gemmeus* Zone. This suggests that the Salt Mountain Limestone is older than the Nanafalia Formation which has been placed in the *Heliolithus riedeli* Zone. Toulmin suggested that the Salt Mountain Limestone was an offshore facies equivalent of the *Ostreuthirsae* beds of the Nanafalia Formation.

WOOD, M. L., Bass Enterprises Production Co., Fort Worth, Tex., and J. L. WALPER, Texas Christian Univ., Fort Worth, Tex.

#### Evolution of Interior Mesozoic Basin and Gulf of Mexico

The evolution of the Interior Mesozoic basin is presented in terms of an evolving Gulf of Mexico which had its origin with the rifting and breakup of Pangea, particularly with the separation of North and South America. This Mesozoic event was preceded by the formation of Pangea in the late Paleozoic when plate collision produced the Appalachian-Ouachita-Marathon orogeny. As a result of this orogenic episode of plate collision and accompanying crustal dislocation along three major transcurrent-fault systems, the Texas, Wichita, and Mississippi megashifts, a proto-Atlantic was closed and a distributive pattern of pre-Mesozoic rocks was created that was to have a lasting effect on the shape of the Interior Mesozoic basin.

Rifting in the Early Triassic created an incipient Gulf of Mexico with associated peripheral grabens that defined the shape of Mesozoic sedimentation. Crustal thinning and attenuation accompanied the divergent rifting of Pangea and early sedimentation in rift grabens are represented by the Eagle Mills Formation. Deltaic prisms are postulated, coincident with the three megashifts, and represent the positions of ancestral Rio Grande, Red, and Mississippi Rivers. They augment the continental redbeds of the grabens formed during early rifting and the succeeding marine-shelf sediments of a diverging plate margin and constitute exploratory objectives.

The thick evaporite deposition, represented by the Werner evaporite and Louann Salt, in a shallow basin on a subsiding-plate margin is the result of a unique combination of events. The updip rift margin of the trailing plate formed a restricting barrier that allowed the continued influx of sea water into the attenuated and rifted part of the plate that was subsiding to form the Interior Mesozoic basin. The sea water, on encountering the