24. Late Quaternary Geology of Sabine Lake and Vicinity, Henry E. Kane
25. Chenier Plain and Its Stratigraphy, Southwestern Louisiana, J. V. Byrne, D. O. LeRoy, and Charles M. Riley
26. Geologic History of Chenier Plain, Southwestern Louisiana, H. R. Gould and E. McFarlan, Jr.
27. Size, Sorting, Mineralogy, and Chemical Composition of Recent Sands of Northern Gulf Coast, K. Jinghwa Hsu
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ABSTRACTS

1. Gulf Coast Cenozoic History, J. D. M. Williamson, Trunkline Gas Company, Houston, Texas.

Isopach maps of the Wilcox, Claiborne, Jackson, and total Eocene; of the Vicksburg, Frio-Anahuac, and total Oligocene; and of the Miocene-to-Recent; projected speculatively beyond well control, indicate that the Cenozoic sediments reach thicknesses of 45,000 feet off the South Texas Coast and 35,000 feet just west of the Mississippi River delta in Louisiana. Thickest deposition took place in Texas during the Paleogene, shifting to Louisiana in the Neogene. Cross sections, projected beyond well data into the Gulf of Mexico by the isopachs, show the form of the Gulf Coast geosyncline.

The Cenozoic history of the Gulf Coast is essentially a conflict between land and sea for possession of the area of the present Coastal Plain. Along the northern and western sides of the Gulf of Mexico, with which this paper is principally concerned, ample supplies of mud and sand have been available to build out the continent, with many interruptions by invasions of marine waters. The character of the sedimentary units which have been isopached are controlled in large part by the sequence of marine transgressions and regressions. The intricate sedimentary patterns produced by these repeated oscillations have provided unlimited variations in stratigraphic conditions for trapping oil and gas.

The contact of Neogene on Paleogene is placed *in* the Oligocene at the base of the *Nodosaria blanpiedi* zone because an unconformity here appears to be the most centrally located and extensive in the transitional wedge of Frio sediments.

2. Occurrence of Miocene Oil in South Louisiana, Leonard L. Limes and Jack C. Stipe, Kerr-McGee Oil Industries, New Orleans, Louisiana.

Miocene sediments have yielded more than 3 billion barrels of oil from approximately 380 fields along the Louisiana Gulf Coast. Favorable sedimentary circumstances combine with a variety of structures to provide excellent conditions for accumulation.

The Miocene section is divisible into biostratigraphic units. Each unit possesses three distinct facies: updip a continental and near-shore massive sand facies, farther south an intermediate facies of alternating sands and marine shales, and downdip a deep-water facies of predominantly dark marine shales. Each biostratigraphic unit thickens downdip, the most pronounced thickening taking place seaward of the "hinge line" which separated the continental shelf and the continental slope at the time of deposition.

The Miocene strata dip regionally southward into the Gulf Coast geosyncline. Regional dip increases with depth to more than 800 feet per mile. It is interrupted by piercement salt domes, nonpiercement or deep-seated salt domes, residual highs, and normal faults, all of which are related directly or indirectly to the plastic flow of sediments under gravity forces.

The Miocene sediments produce oil and gas in a belt basinward from the older Eocene and Oligocene producing trends. Within the subdivisions of the Miocene the production shifts to the south and east as the producing unit becomes younger. Most of the reservoirs are in the intermediate facies of alternating sand and marine shale. The stage of development of Miocene production becomes increasingly youthful toward the coast line and into the offshore province, which represents one of the largest concentrations of undrilled reserves in the world.

3. Frio Formation of Upper Texas Gulf Coast, Houston Geological Society Study Group Report, L. Bruce Forney, Chairman, P. R. Rutherford Company, Houston, Texas.

A study group of the Houston Geological Society has concerned itself with the Tertiary Frio formation as it exists in the subsurface in the area from Jackson County, Texas, to Louisiana. To facilitate study, the formation was divided into upper and lower units and each was traced over the area of interest by means of electrical log characteristics. An electrical log correlation point in the *Marginulina* zone of the overlying Anahuac formation was used as a practical expedient for the "top" of the Frio. A horizon near the *Nodosaria blanpiedi* faunal zone in the middle of the Frio served as the top of the lower Frio unit. No specific electrical log datum was used for the base of the Frio.

The number of feet of porous and permeable sand within each unit was counted from the electrical

logs. From these data, sand percentage and net sand maps were constructed for the upper and lower Frio units.

Lower Frio sand values range from 2 feet to 1,600 feet. Maps tend to indicate that the center of deposition of the lower Frio unit is in Matagorda and Brazoria counties. Thick sequences of sand and shale occur in this area, particularly in the *Textularia seligi* (*mississippiensis*) and *Anomalina bilateralis* faunal zones. Wells here indicate as much as 1,600 feet of sand in a total interval of more than 2,600 feet.

The center of deposition of the upper Frio unit appears to be in Jefferson and Orange counties. This is accentuated by the occurrence of thick sands in the Hackberry zone, which results in more than 1,200 feet of sand in an interval exceeding 3,600 feet. Sand values range from 16 feet to 1,289 feet and sand percentages from 3% to 62%.

Efforts were made to minimize the effects of local structure and local lithologic variations. Nevertheless, such large subregional features as the western Jefferson County graben; the Red Fish Reef-South Mayes complex of Chambers County; the Chocolate Bayou complex, Danbury dome, and the Chenango complex of Brazoria County; and the Old Ocean complex of Matagorda County exhibit lithologic anomalies coincident with the area of their structural influence. These anomalies indicate that structural movement was taking place during deposition.

4. Upper Frio Lithofacies in Eastern Counties of Texas Gulf Coast, Thomas Branham, Socony-Vacuum, Bogota, Colombia, John Grayshon, Trunkline Gas Company, Houston, and Robert Johnson, Dahran, Saudi Arabia.

Maps showing the percentage and number of sands in several intervals of the upper Frio (Oligocene) were prepared from electric well logs to see how clearly such an analysis would reflect the depositional environments. Interpretations were based on a comparison with the sand-clay distribution occurring today in the eastern Texas Gulf Coast counties.

The position of the shore line during late Frio time was remarkably constant, as shown by the similarity in trend of the contours and in position of the maxima and minima on the sand percentage maps of all intervals. Subsidence and deposition must have been very evenly balanced throughout this time. Interfingering of sands and shales in the vertical section indicates numerous minor oscillations of sea-level which had only a transient effect on the position of the shore line.

A barrier island extended from northern Brazoria County northeastward to northern Orange County. North of the barrier island, in the barrier flat and lagoonal environments, evidence of ancient river channels is found. The Frio "hingeline," south of the barrier island, is marked by a pronounced thickening of section, particularly the shales.

5. *Nodosaria* Sand Environments in Eastern Counties of Texas Gulf Coast, James A. Mallory, University of Houston, Houston, Texas.

Lithofacies maps of the *Nodosaria blanpiedi* sand in the middle part of the Frio formation (Oligocene) in the eastern counties of the Upper Texas Gulf Coast were prepared from principally electric well-log correlations. These show a belt of maximum sand concentration extending from central Galveston County northeastward to northern Orange County, approximately paralleling the present coast line. This is interpreted to be a barrier island by comparison with present-day sand distribution along the Texas coast. Downdip from the belt of maximum sand concentration a marked increase in percentage of shale in the *Nodosaria* zone and in thickness of post-*Nodosaria* beds suggests the presence of a flexure or "hinge line."

Although the *Nodosaria* sand was deposited principally during a regression of the sea, local areas of thick sand occurring updip from the inferred barrier island indicate deposition in stream channels early in the subsequent transgression.

6. Effect of Structural Movement of Sedimentation in Pheasant-Francitas Area, Matagorda and Jackson Counties, Texas, John E. Walters, c/o Michel T. Halbouty, Houston, Texas.

The Pheasant-Francitas area of southwestern Matagorda County and southeastern Jackson County, in the central part of the Texas Gulf Coast, is typical of that part of the Frio trend in which deposition of the lower and middle Frio strata was controlled largely by faults along which movement was contemporaneous with sedimentation. Widespread structural movement beginning near the end of Vicksburg time resulted in regional down-to-the-coast faults in relatively shallow water near the ancient shore line. Both the alignment and displacement of these faults seem to have been affected by deep-seated structures which predate the faulting. These faults were active during deposition of the lower and middle Frio sediments, so that thick sections of mud and sand were deposited on the downthrown sides, while comparatively thin sections were being deposited on the upthrown sides of the faults. During early Frio time the fault movement formed miniature depositional basins on the downthrown blocks, centering in the areas of maximum displacement. These miniature basins are characterized by dip and thickening of the middle and lower Frio sediments toward the northwest into the controlling fault. Movement along the faults had diminished by late Frio time and its in-