

km) of lower Miocene strata. The present lower Miocene producing trend covers 21,000 sq mi (54,499 sq km) and contains 18,400 cu mi (76,700 cu km) of sedimentary rock. In Louisiana, the probable area extends downdip from present productive limits to an estimated depth of -15,000 ft (4,600 m) at the top of the lower Miocene. Drilling depths of 20,000 ft (6,100 m) may be required to test this sequence, which should be composed of 5-15% sandstone. Thus defined, this area is largely offshore from central and western Louisiana.

In western Louisiana, the possible producing area extends downdip from the southern limits of the probable area to a projected depth of -17,000 ft (5,200 m) on top of the lower Miocene. Eastward, this area continues on land. It ranges from the present producing area on the north to where the top of the lower Miocene is at an estimated depth of -17,000 ft (5,200 m) on the south; the eastern limit is defined by the change from a clastic to a carbonate section. Depths of 23,000 ft (7,600 m) or more will be necessary to test the section, which should be less than 10% sandstone. None of the wells drilled in the probable or possible prospective areas in Louisiana have penetrated completely the lower Miocene section. Projection of updip well data indicates that lower Miocene beds have a minimum thickness of 8,000 ft (2,400 m) throughout the potential Louisiana area. In Texas, the probable area was determined by the presence of a favorable sandstone section downdip or along strike from the lower Miocene productive trend. The possible area was outlined by projecting favorable conditions downdip to where estimated sandstone occurrence appears to be in the 5-10% range.

On a trend basis, future Oligocene production probably will not extend appreciably beyond presently defined limits. Depositional environment is the key factor, as blanket sandstones are unlikely to extend seaward much beyond present control. It is likely, however, that deeper untested Frio sandstones may be present on features downdip from known production, but such occurrences will probably be limited and of local, rather than regional, extent. The Anahuac and Vicksburg sections contain much less sandstone than the Frio in the present producing trend. Thus, the possibility for production outside the present trends in these beds is less than in the Frio.

The lower Miocene-Oligocene section of Alabama and Florida consists mainly of thin, shallow-water carbonates which apparently have little potential for oil and gas production either onshore or offshore. A thicker section of lower Miocene-Oligocene beds is present at greater depths just east of the Mississippi delta in the offshore Chandeaur Sound, Chandeaur, and Main Pass areas south of Mississippi. There, carbonates are present in the lower Miocene section and there is a possibility that oil and gas might be found in limestone reefs. Well information in this area has not been encouraging to date, as production is limited to younger Miocene sandstone beds that overlie the lower Miocene-Oligocene carbonates. Although not ruled out completely, reef production possibilities in the eastern area are too remote to postulate a future trend.

Other than any production from new provinces, additional reserves will be found in the present lower Miocene and Oligocene producing trends as additional subsurface control and improved drilling and geophysical technology become available. Though the total additional reserves from the present producing trend may be quite substantial, individual fields will generally be smaller and deeper than existing production. Most fu-

ture discoveries should be made on subtler, smaller, deeper traps, such as on the flanks of salt domes and faults. In the future, as in the past, the middle Oligocene Frio Formation will yield appreciable hydrocarbons within the trend in both Texas and Louisiana. Lower Miocene beds will continue to be the most significant source of additional reserves within the present producing trends in Louisiana. Additional production, but in lesser quantities, also will be found in the upper Oligocene Anahuac of both Texas and Louisiana. Future discoveries in the lower Oligocene Vicksburg should be minor and confined mostly to Texas.

ROGER C. VERNON, Shell Oil Co., New Orleans, La.

#### POSSIBLE FUTURE PETROLEUM PROVINCES OF UNITED STATES WESTERN GULF BASIN—PRE-JURASSIC

In the western Gulf basin, the pre-Jurassic section can be subdivided into (1) foreland Paleozoic strata (Black Warrior basin), (2) orogenic geosynclinal facies (Ouachita tectonic belt), (3) late-orogenic, late Paleozoic rocks, and (4) post-orogenic, Late Triassic strata.

A good potential for future petroleum provinces of economic interest can be recognized in the Black Warrior basin, and on the Gulf of Mexico side of the Ouachita tectonic belt, in late-orogenic, late Paleozoic strata. A remote possibility is recognized for the presence of commercial accumulations of hydrocarbon in sub-thrust lower Paleozoic foreland carbonates beneath the interior part of the Ouachita fold belt. The hydrocarbon potential of geosynclinal sediments of the Ouachita tectonic belt, and of the post-orogenic Triassic section, is considered to be negligible.

The Black Warrior basin of Mississippi and Alabama contains a thick section of Paleozoic foreland rock. Although production dates back to 1909 and hydrocarbon shows have been numerous, the proved reserves are insignificant.

The deep structural configuration has been difficult to map, and this has deterred deep drilling. The basin tectonics should be comparable to those of other foreland basins, in which large, buried, normal faults are characteristic. Improved seismic techniques should reveal similar anomalies in the Black Warrior basin. Large hydrocarbon accumulations may ultimately be found in deep fault traps in lower Paleozoic carbonates, and such prospects are sparsely tested.

There is no production from pre-Jurassic rocks gulfward from the Ouachita front. However, exploration of this section has been quite limited, mainly because of the absence of attractive objectives. Most wells drilled below the Jurassic have found either tight, highly deformed, geosynclinal facies of the Paleozoic Ouachita system, or redbeds and igneous rocks of the Late Triassic Eagle Mills Formation.

Since 1960 a few highly significant, but unpublicized, wildcats have penetrated relatively undeformed, very fossiliferous, shallow-water shelf carbonates and clastics of Pennsylvanian age beneath the coastal plain. These strata, identified from fusulinids as Desmoinesian, are present on the Gulf of Mexico side of the Ouachita fold belt in wells drilled in northeast Texas and southwest Arkansas. Commercial porosities have been found in both sandstones and carbonates. Only fragmentary data are available, but the mere presence of these strata suggests that a potentially large, virtually unexplored, petroleum province may be present in late Paleozoic rocks of the Gulf coastal plain.

A recent 20,000-ft test in Texas penetrated thick lower Paleozoic shelf carbonates on a large seismic anomaly beneath the interior zone of the Ouachita system. Although the objective carbonates were metamorphosed there, the possibility of finding favorable reservoir rock elsewhere in this trend is not necessarily eliminated.

J. L. WILSON, Atlantic Richfield Co., Dallas, Tex.

#### NORTH SLOPE POTENTIAL AND EFFECT ON DOMESTIC EXPLORATION IN THE SEVENTIES

Early exploration of the North Slope yielded information that led to an intensive effort in Naval Petroleum Reserve No. 4. This, in turn, led to industry exploration which resulted in the discovery of Prudhoe Bay in 1968.

Special methods are utilized in exploration, production, and transportation operations in the North Slope province.

Economics of producing and transporting crude oil to markets, compared with similar operations in the "Lower 48," indicate that exploration activity must continue in order to provide economic health and national security for the country.

The risks of tariffs and subsequently higher imports and the risks of curtailing domestic exploration and production are too severe for the United States to embark on such programs in the 70's.

JAMES LEE WILSON, Rice Univ., Houston, Tex.

#### DEPOSITIONAL FACIES ACROSS CARBONATE SHELF MARGINS

Nine depositional facies, in idealized sequence across a typical carbonate shelf margin, include basinal, tidal-shelf, basin-margin, platform-foreslope, organic-reef, platform-edge-sand, open-marine-platform, restricted-marine platform, and platform-evaporite facies. Each facies is characterized by sedimentologic parameters, prevailing rock types, color, microfacies, sedimentary structure, terrigenous content, and distinctive biota. Descriptions of this very widespread sequence should aid in location of reservoir rock.

### AAPG-SEPM ANNUAL MEETING HOUSTON, TEXAS, MARCH 29-31, 1971

#### ANNOUNCEMENT TO MEMBERS OUTSIDE NORTH AMERICA

AAPG-SEPM members residing outside the U.S.A., Canada, and Mexico, who are planning to attend the annual convention in Houston, Texas, March 29-31, 1971, may request the convention announcement and required official housing application form to be sent to them *by airmail*. Such requests should be addressed to: AAPG Convention Department, P.O. Box 979, Tulsa, Oklahoma 74101.

The mailing of the convention announcement on December 11 to all AAPG and SEPM members residing outside the U.S.A., Canada, and Mexico will be by first class mail, which may not allow enough time for some members to be assured of accommodations of their choice. The announcement will be mailed to all other members on January 15.

The 1971 annual meeting will emphasize the new and magnificent economic successes that have resulted from the considerations of "total geology" by the petroleum geologist. "Geologic Explosions" have occur-

red simultaneously both in concepts of how to reconstruct geologic history and in the tools with which this can be done. New oil and gas fields and their "why" as unraveled from basic sedimentary petrography and the resulting environmental interpretations, the analysis of physical rock properties, particularly sound wave velocity analysis, the practical considerations of continental drift and its relation to petroleum accumulation, structural geology in four dimensions as it should be—these will be the "bedrock" of the 1971 AAPG convention. The subject of the AAPG research symposium is "New Global Tectonics."

The SEPM program is open to a variety of subjects including geochemistry, paleontology, physical stratigraphy, applied mineralogy, and sedimentology. Papers on new techniques will be given prime consideration in connection with our theme emphasizing an explosive revolution in geologic approaches. As a complement to the AAPG symposium, the SEPM symposium on "Geologic History of Oceans" will be concerned with the biologic, sedimentologic, chemical, and physical history of the oceans.

Daily guided tours of the nearby massive complex of the National Aeronautics and Space Administration (NASA) offer a special appeal to geologists, both from the standpoint of their operational procedure and geology.

ALVIN R. WINZELER, *Chairman*  
Hotels and Housing Committee

### OFFSHORE TECHNOLOGY CONFERENCE, 1971

The 1971 Offshore Technology Conference, co-sponsored by AAPG, will be held in Houston's Astrohall on April 18-21, 1971. ALAN LOHSE, AAPG's member on the Program Committee, is soliciting papers for three half-day sessions on any aspect of marine geology. The Conference will be attended by thousands of persons including scientists, politicians, journalists, service and supply men, and oil and mineral company management from all over the world. The Conference represents an outstanding opportunity to tell the story of geology to an audience that needs to have counsel in matters of exploration. The Association shares in the proceeds of the conference in proportion to the number of members registering.

If you have a paper on a project that would interest this diverse international group, contact ALAN LOHSE, Department of Geology, University of Houston, Houston, Texas 77004, for information and a "Data Reporting Form." Abstracts must be submitted prior to October 15, 1970.

#### SOUTHWEST SECTION NOMINEES

The Nominations Committee, Southwest Section, AAPG, respectfully transmits the names of nominees for office as follows:

##### *President*

HUGH N. FRENZEL, Ralph Lowe Estate, Midland  
CHARLES R. TIERCE, Texas Oil & Gas Corp., Midland

##### *Vice President*

ROBERT DE M. GUNN, Consultant, Wichita Falls  
EDWARD L. HAZLEWOOD, Bond Operating Co., Dallas

##### *Secretary*

ROBERT H. CRESS, Consultant, Roswell  
DAVID A. SIX, Midwest Oil Corp., Fort Worth