

Many geological concepts of widespread application to petroleum exploration were either first, or early, observed and studied in the Mid-Continent region. Five are selected for discussion. These are: (1) pools reservoired in sandstone patches, lenses, channels and bars; (2) unconformities, truncations, and layers of geology—their influence on exploration; (3) tilted oil-water contacts, fluid pressure gradients; (4) changing structure with depth, converging strata, “bald-headed” structures, closed structures below terraces, and the hinge-line concept; and (5) one discovery leads to another—and another. These are typical of some of the simple geological phenomena that abound in this region, that seem to control much petroleum occurrence, and that are continually being used in the world-wide search for oil and gas.

3. J. G. WINGER, Chase Manhattan Bank, New York, New York

#### OUTLOOK FOR DOMESTIC PETROLEUM INDUSTRY TO 1975

The changing composition of population by age brackets is providing an impact upon U. S. energy markets. A similar impact is noticeably affecting the general economy. Each regional division of the U. S. energy market possesses a relative growth opportunity for oil and natural gas. The expanding Atlantic Coast gas market is providing a noticeable effect on the oil market.

Considerable new oil and gas reserve additions will be necessary to maintain production levels required to satisfy the increasing demand by major markets.

4. R. C. CLINTON, Clinton Oil Company, Wichita, Kansas

#### GEOLOGIST'S ROLE IN ECONOMICS OF FINDING OIL IN MID-CONTINENT AREA

The Mid-Continent geologist must become involved with the economics of oil-finding. Because the fields being found today are smaller, the development risk is greater. We must compensate by improving our technique of selecting exploratory drill-sites.

The costs of overhead, equipment, travel, promotion, geophysical work, *etc.* are increasing at a fairly steady rate. Drilling costs, however, are about the same because they have increased in certain areas and decreased in others. The price of oil remains the same, but the net price paid to the oil-finder is reduced by an increase in taxes and service fees for oil-gathering. The over-all cost of selecting and preparing an exploratory prospect for drilling has nearly doubled in the last 5 years.

The tax burden has now become so great that it seems necessary to incorporate tax savings in drilling and development programs to realize a profit comparable with other businesses. A larger number of geologists may be required to represent oil “deals” for sale to the general public, particularly to those in high tax brackets. Therefore, the geologist must be completely familiar with the Securities Act of 1933.

5. L. L. WYNN, Apache Corporation, Tulsa, Oklahoma

#### GAS FIELDS FROM HARTSHORNE SAND OF ARKOMA BASIN

The Arkoma basin of southeastern Oklahoma is characterized by long, steeply folded anticlines, dry gas production, and no oil. One of the most prolific gas reservoirs in the area is the Hartshorne Sand, of early Desmoinesian age, productive at 1,000–4,000 ft. This

sandstone produces gas in the Poteau-Gilmore field on the Gilmore anticline, at Cameron field on the Midland anticline, at Red Oak-Norris on the Brazil anticline, and at Quinton-Carney-Featherston and Kinta fields on the Kinta anticline.

The first commercial gas well in the Quinton field was completed in September, 1915, with an open-flow potential of 25 million cu. ft. of gas daily from the Hartshorne Sand. Subsequent drilling along the structural axis of the anticline found the Blocker-Featherston, Carney, and Kinta fields. The significance of the “structural” accumulation of gas on the Kinta anticline was not fully understood until Pine Hollow gas field was discovered and developed nearly 50 years after the completion of the discovery well at Quinton. It now appears that the Hartshorne Sand is producing from stratigraphic traps in a series of off-shore bar deposits that extend from Pine Hollow to Kinta.

6. W. E. RICHARDSON, Consultant, Oklahoma City, Oklahoma

#### OSWEGO LIMESTONE FACIES CHANGE IN MID-CONTINENT REGION

The Oswego is the oldest and most widespread limestone unit of the Marmaton Group. The Marmaton is the oldest succession of Pennsylvanian carbonates that are indigenous to the shelf area of the western Mid-Continent.

The Oswego Limestone occurs over most of northern Oklahoma and southeastern Kansas, where it sometimes attains a thickness in excess of 100 ft. The Oswego is developed as a shelf limestone unit. Southward, it grades into a basin shale. The gradation from shelf limestone to basin shale occurs in a zone that is usually from 2–4 mi. wide. Within this transitional band, “reef-like” limestone banks occur. Some of the limestone banks have become reservoirs for large oil and gas accumulations.

A regional facies change of the Oswego can be traced from its outcrop east of Tulsa into the subsurface west to the Oklahoma panhandle. This facies change in eastern Oklahoma parallels the Arkoma basin. It intersects the Nemaha ridge south of Oklahoma City and west of Oklahoma City, it parallels the Anadarko basin. In Ellis County, it swings abruptly northward.

A regional study of the transitional zone explains the location of such fields as Putnam and Kendrick, and may point the way to future oil and gas production.

7. J. E. BREWER, Consultant, Wichita, Kansas

#### SEDGWICK BASIN

The Sedgwick basin is a moderate-size basinal structure, approximately 10–12,000 sq. mi. located in south-central Kansas. The basin is bounded on the east by the Nemaha anticline and on the west by the Pratt anticline. It is actually an embayment connected to a major Oklahoma structural basin. The northern boundary is poorly defined. It is separated from the Salina basin by lithologic changes within the rock section. These changes are the primary causes of a large number of producing zones.

This paper deals with past and future prospects of the area with respect to these changes in lithologic types.

8. ORVIE HOWELL, Hinkle Oil Company, Wichita, Kansas

#### O.S.A. AND GILLIAN POOLS, SEDGWICK COUNTY, KANSAS

Regionally the O.S.A. and Gillian pools, producing