position of the Montana-Wyoming state line, a more restricted basin was the site of nearly simultaneous deposition of the Sacajawea formation of Wyoming.

Sediments of the Big Snowy group in eastern Montana differ from those of the type (surface) section in the diminution of coarse sandstone and green shale and the notable increase in red shale and anhydrite. The ease of divisibility of the Big Snowy group into its component formations rapidly decreases eastward, and, moreover, there appears to be a gradational transition from Madison into Big Snowy deposition in contrast to the presence of a hiatus between the two groups in central Montana.

51. W. NORVAL BALLARD, Consulting Geologist, Oklahoma City, Oklahoma
Notes on the Structural History and Oil Possibilities of the Dakota Basin

This article contains a structure map contoured on the top of the Dakota sandstone. The periods of tilting and folding are discussed along with the evidence for these structural deformations. Three cross sections are included to explain the structure and geologic history. Paleogeologic maps for the pre-Cretaceous and pre-Pennsylvanian surfaces are shown. The possible oil- and gas-producing zones of the Dakotas are discussed and compared with sands that are producing oil or gas in the surrounding states.

52. PAUL H. PRICE, West Virginia Geological Survey, Morgantown, West Virginia
A. J. W. HEADLEE, West Virginia Geological Survey, Morgantown, West Virginia
Natural Coal Gas in West Virginia

A quantity of methane approximately equal to the state's production of natural gas escapes to the air from West Virginia coal mines. It is very important that a technology of production of this gas be developed.

Natural coal gas occurs sorbed in the coal except where there are feeders, squeezes and drainage belts due to mining operations. The gas consists of 90 per cent methane, most of the remainder being nitrogen and carbon dioxide.

Methane was produced by biochemical processes during coal formation. In some instances, a considerable quantity of methane is now being formed by bacterial action in mine waters.

53. ROBERT C. LAFFERTY, The Owens, Libbey-Owens Gas Department, Charleston, West Virginia
RALPH N. THOMAS, Inland Gas Corporation, Ashland, Kentucky
"Corniferous" in Eastern Kentucky and Western West Virginia

In this paper the limestones of Devonian and Silurian ages, occupying a stratigraphic position between the Devonian Shales above and the Silurian Shales below, are considered the "Corniferous." Three more or less persistent zones of porosity are recognized in these rocks.

With the increasing demand for natural gas in the eastern industrial area and the rapid drilling of the shale-gas territory, interest in the producing possibilities of the "Corniferous" has once more been revived.

Localized thinning over known fields in the regionally converging "Corniferous" suggests that production is controlled by porous zones of shoreline deposition, and unconformities, that are the result of movements and oscillation of shallow seas on the epi-continental shelf during deposition of the sediments.

54. F. B. PLUMMER, University of Texas, Austin, Texas
Contributions of Petroleum Engineering Research to the Problem of the Migration and Accumulation of Oil

The anticlincal theory of the origin of oil pools has dominated petroleum geology since first mentioned by T. Sterry Hunt in 1860. In spite of the importance and wide acceptance of this theory, the exact mode of oil migration and its accumulation to produce an oil pool is still a controversial problem and one concerning which quite divergent views are held by geologists at present. Recent investigations by chemical and petroleum engineers on the flow of fluids, fluid mixtures, and gas through sands have contributed some data toward the solution of this important. In this paper some of the results of recent work is reviewed briefly, and their application to the explanation of the migration of hydrocarbons through water-bearing sands is pointed out.

55. URBAN B. HUGHES, Consulting Geologist, Jackson, Mississippi
Developments in Southeastern United States in 1941

Outstanding development trends in the Southeastern United States during 1941 were the following.

1. A decided decrease in wildcat activity with only approximately one half the number of wells completed as during 1940.
2. The continuation of a curtailed geophysical program comparable to the last months of 1940 with a slight upturn toward the end of the year.
3. The inception of core drilling programs by eight major companies with more emphasis placed on this type of explorarion, as well as on surface geology.
4. A continuation of the leasing program in south Mississippi and its extension into Alabama and Florida.
5. The review and revision of geological and geophysical data with an attempt to eliminate the sources of error as revealed by negative results of exploration in 1940.

There were several additional events of importance in the area. Development in the Tinsley field seemingly outlined the limits of production from the shallow sands. A new sand, the McGraw, was discovered on the north edge of the field in the basal part of the Eutaw formation.

Two new fields were discovered in Mississippi, the Sharpsburg field in T. 11 N., R. 3 E., Madison County, and the Cary field in T. 11 N., R. 7 W., Sharkey County. The Sharpsburg field, which may be an extension of the near-by Pickens field, was discovered by C. L. Morgan's Johnny No. 1 in Sec. 4, T. 11 N., R. 3 E. The producing sand is known as the Wilburn sand and is the first sand in the Eutaw formation. The Cary field was opened by the British-American Oil Co. Houston No. 1 and the production is from Selma gas rock of Navarro age. Neither area has had sufficient exploration to evaluate its future.

Of geological importance was the limiting of the Mississippi salt basin on its northeast side by the Union Producing Co. Waite No. 1 in Clarke County, Alabama, and the Magnolia Petroleum Co. Culpepper No. 1 in Lauderdale County, Mississippi. The Union Producing well drilled to a total depth of 12,399 feet and near the bottom penetrated formations which are correlated with the Buckner, Smackover, and Eagle Mills formations of Louisiana and Arkansas. In the Eagle Mills formation, interbedded shale and salt was cored suggesting proximity to the edge of the salt deposit. The Magnolia well in Lauderdale County encountered rocks of Paleozoic age at a depth of 6,060 feet so that the limit of the salt deposit is between these two wells. Of first importance geologically is the presence of the Smackover limestone indicating its presence across the Mississippi basin into Alabama. This suggests the possibility of production in porous horizons comparable to producing areas in Arkansas and Louisiana.

In Alabama and Florida there was extensive geophysical and leasing activity. In the latter state many of the large tracts were taken under geophysical option or otherwise leased. The same was true of southern Alabama and to a less degree, southern Mississippi. Nothing of importance occurred in Georgia.

Two new salt domes were discovered in Mississippi. Kings dome was found by the Magnolia Petroleum Co. Hall No. 1 in T. 7 N., R. 4 E., Warren County. The Halifax dome was discovered by the Plains Producing Co. in T. 7 N., R. 4 W., Hinds County.

The Magnolia Petroleum Co. Hall No. 1 encountered a saturated section in the top of the Wilcox formation. A test resulted in showing the presence of low-gravity asphaltic oil and water. Although this had no commercial value, the presence of oil in the top of the Wilcox formation was indicative of its productive possibilities elsewhere.

56. BERNERD A. RAY, Tide Water Associated Oil Company, Midland, Texas
WILLIAM T. SCHNEIDER, Honolulu Oil Corporation, Midland, Texas
CHARLES TAYLOR COLE, University Lands, Midland, Texas
EDGAR KRAUS, The Atlantic Refining Company, Carlsbad, New Mexico
RONALD K. DEFORD, Argo Oil Corporation, Midland, Texas

West Texas and Southeastern New Mexico Development in 1941

Development in West Texas was greater than in any year since 1937. A total of 2,325 wells were drilled, including those deepened and recompleted. Of these 2,190 or 94 per cent were producers. The most active field was the Slaughter field which accounted for 678 wells or more than $\frac{1}{4}$ of the producers drilled. A total of 135 wildcat wells (i.e., wells over one mile from production) were drilled, of which 27 were producers and 108 were dry holes. Nine of the wildcat wells established new areas of production; the remainder were produced from new levels in established areas or were considered extensions. Fifteen of the wildcats were completed from the various known Permian levels while two new levels, both in the lower Permian, were disclosed. Permian exploration was scattered over 43 counties and was more inclusive in the number of zones tested than in previous years.