increased oil production in 1941 as compared to 1940. Montana's production figure was an all-time high for the state and Wyoming's production reached a new high since 1924.

11. JOSEPH L. BORDEN, Pure Oil Company, Tulsa, Oklahoma
Developments in Oklahoma during 1941

Oklahoma's position improved during 1941 by increasing production about $2\frac{1}{4}$ million barrels to total 152,013, 942 barrels. Estimated reserves at the close of 1941 were 1,035,820,000 barrels, an increase of 34,000,000 barrels over 1940. The Oklahoma production curve paralleled the national production curve from 1930 through 1937. The drop in national production in 1938 was corrected in 1939 and national production has continued to rise since that year. Oklahoma on the other hand steadily declined through 1938, 1939, and 1940. The small gain in production and reserves in 1941 is the first hopeful sign in several years. Production increase is due largely to development of pools discovered prior to 1941. However, 43 new pool discoveries are listed for the year. Of these, Apache is the most important, but its discovery came too late in the year materially to affect production. An encouraging sign is the continued successful search for oil in the older areas, such as the Seminole region and Okfuskee County.

Geophysical activity was widespread and included all the present-day methods. There was an average of 25 seismograph parties operating in the state, totaling $281\frac{1}{2}$ crew months of work, an increase of 36 crew months for the year. Nearly three-fourths of all the new discoveries are credited to seismograph surveys. Gravimeters and magnetometers continued in use and the stratigraphic drill was used more than in previous years.

There were 2,162 wells drilled during the year, of which 1,489 produced oil or gas. Of these, 271 were exploratory wells drilled following the exploratory surveys. Seventy of these wells were completed as producers, and 43 are classed as new pool openers.

12. WALTER B. LANG, U. S. Geological Survey, Washington, D. C.
The Carlsbad Dolomite and the Pisolites of the Guadalupe Mountains of New Mexico

Analyses show that the Permian Carlsbad formation of New Mexico is dolomite. The stratigraphic relation of the Carlsbad to other contemporaneous and contiguous deposits suggests that all ions in sea water transgressing the reef area available to form calcium carbonate precipitated to make the Capitan and Carlsbad formations. The flat-lying Carlsbad deposits were converted before burial into dolomite through contact with strong magnesian brines from the back-reef. Most of the Capitan remained unaffected. The relative position of these limestones and dolomites to contemporaneous deposits indicates a chemical sequence of deposits caused by evaporation of sea water and that organisms flourished only in congenial environments. The pisolites are of physio-chemical origin with little positive evidence for organic associations. The pisolites are compared with the Carlsbad Cavern cave marbles.

13. LUNA B. LEOPOLD, U. S. Soil Conservation Service, Albuquerque, New Mexico
Climatic Character of the Interval between the Jurassic and Cretaceous New Mexico and Arizona

In many places in New Mexico and Arizona a kaolinized, white horizon has been noted at the top of the Morrison formation (Jurassic) immediately under the Dakota (Cretaceous), as well as a kaolin-cemented, white sandstone which is the more prevalent form of the distinctive feature. In Rio Arriba County, New Mexico, there occurs a nearly pure white, massive kaolinite in small lenses at the contact between the formations.

The kaolinization is of such widespread distribution that it may be useful as a marker horizon in drilling operations, and it provides some additional data on the probability of a moist climate prevailing during the period separating the Jurassic and Cretaceous in this area.

14. B. W. BLANPIED, Gulf Refining Company, Shreveport, Louisiana
ROY T. HAZZARD, Gulf Refining Company, Shreveport, Louisiana
Summary of Development in South Arkansas and North Louisiana during 1941

During the year 1941, 26,183,478 barrels of oil and distillate were produced in Arkansas and 26,770,512 barrels in North Louisiana. During December, 1941, there were 2,936 oil- and distillate-producing wells in South Arkansas and 4,153 wells in North Louisiana.

A total of 207 wells were drilled in South Arkansas during 1941 with total footage

of 853,032 feet. In North Louisiana 798 wells were drilled with total footage of 2,355,514 feet. Of the total of 1,005 wells drilled in South Arkansas and North Louisiana, 564 were oil wells; 123 were gas and gas-distillate wells, 187 were dry holes in fields and 131 were wildcat dry holes.

In South Arkansas, during 1941 "Travis Peak" production was discovered in the Smart sand area of the Stephens field of Columbia County. Cotton Valley production was discovered in the East Schuler field in Union County, and Smackover lime gas-distillate production in the Macedonia field, in Columbia County. Smackover lime oil production was discovered in the Mt. Holly field, Union County and in the Patton field, Lafayette County.

In North Louisiana during 1941 six Eocene Wilcox sand oil fields were discovered in La Salle Parish and two in Catahoula Parish, with one gas-producing area in Caldwell Parish.

Lower Cretaceous Pettit limestone oil production was discovered in the Haynesville field, Claiborne Parish, during 1941. Other Claiborne Parish discoveries are the Athens and North Lisbon fields where gas-distillate production was found in the "Travis Peak." Smackover lime gas-distillate production also was developed in the North Lisbon field, the only Smackover production to date in North Louisiana.

15. LOUISE BARTON FREEMAN, Department of Mines and Minerals, Lexington, Kentucky

Silurian and Devonian Stratigraphy in the Area South and East of the Western Kentucky Coal Basin

The area under discussion is practically coincident with that underlain by Chester and Lower Mississippian south and east of the Western Kentucky coal basin, and includes Breckinridge, Meade, Hardin, Grayson, Larue, Hart, Warren, Barren, Allen, Logan, and Todd counties. Numerous wells have been drilled in these counties to test the so-called "Corniferous," or limestone beneath the Chattanooga shale.

The study of such samples as are available demonstrates the enormity of the erosional unconformity between the Beechwood (Hamilton) and the directly underlying formation, which may be Silver Creek (Hamilton), Jeffersonville (Onondaga), a member of the Silurian or Upper Ordovician. This thin limestone rests on older and older strata as the crest of the Cincinnati arch is approached on the east and has been entirely removed in many places close to the present outcrop.

The Jeffersonville with its basal sand also overlaps from Clear Creek onto the Louisville (Silurian) limestone. At the south end of the basin the pre-Jeffersonville unconformity is less striking than on the east, but the Chattanooga shale rests on strata ranging in age from Hamilton through Jeffersonville and Clear Creek to the Bailey (Helderberg), and in northern Tennessee the shale directly overlies the Upper Silurian.

16. E. E. REHN, The Ohio State University, Columbus, Ohio

Onondaga Group of Parts of West Virginia and Virginia

The Onondaga group discussed in this paper includes all rock units between the top of the Oriskany (Ridgeley) sandstone and the base of the Marcellus formation of the Hamilton group. It corresponds in part to the "Corniferous" of older reports and drillers' records. Within the area described it contains two separable lithologic members, an upper shale and a lower chert.

In southeastern West Virginia the group is represented mainly by the Huntersville chert, which crops out in a belt about 120 miles long in Pocahontas, Greenbrier, Monroe, and Mercer counties. In Pocahontas and Greenbrier counties it is exposed on both flanks of the Browns Mountain anticline which lies west of the Allegheny Front. In Virginia and elsewhere in West Virginia it is confined to the Valley and Ridge physiographic province, where it has been traced as far south as Saltville, Virginia. The formation contains impure chert, highly silicified shale, silicified mudrock, and, commonly, one or more prominent glauconitic sandstones. In general the Huntersville has few fossils, but at some localities there occur numerous species which the author has identified and recorded. The Huntersville chert occupies a stratigraphic position held in northeastern West Virginia and northwestern Virginia by a shale of Onondaga age which is believed to correspond with the Needmore shale of southern Pennsylvania. The chert appears to grade laterally into this shale, although where both units are represented, the shale invariably overlies the chert. Thus, the shale is partly younger than the chert. The upper Onondaga contact is apparently conformable, but an unconformity at the base reaches great magnitude at several localities in Virginia.