est). Each formation is a lithologic unit which consists of a basal sand member, a middle lignitic shale member, and an upper calcareous member. The surface lithologic units can be traced locally into the subsurface by use of driller's logs and electrical logs. The practicability of employing these units for mapping is shown by the fact that detailed mapping of formations delimits the various oil fields of this area and shows the highest structural portion of the Sabine uplift to be in the DeSoto-Red River field.

CENTRAL AND EASTERN STATES

48. ALFRED H. BELL, Illinois Geological Survey, Urbana, Illinois
Oil and Gas Development in Eastern Interior Basin in 1940

Oil production in the Eastern Interior basin reached a new high in 1940, about 54 per cent above 1939. Most of this increase was due to the drilling of wells in the Devonian limestone in the Salem and Centralia pools, Illinois. Thirty new oil pools were discovered in Illinois, and several in southwestern Indiana and western Kentucky. The Indiana discoveries were within about 10 miles of the Wabash River which is the Illinois-Indiana state boundary in this area. Twelve of the 30 new pools discovered in Illinois are in counties bordering the Wabash River. Geological conditions revealed by the new drilling are discussed.

49. PAUL H. PRICE, State geologist, West Virginia Geological Survey, Morgantown, West Virginia
A. J. W. HEADLEE, chemist, West Virginia Geological Survey, Morgantown, West Virginia
Geochemistry of Natural Gas in Appalachian Province

This paper contains the results of further studies on the variations in the composition and properties of natural gas by geologic and geographic distribution.

New data corroborate the composite regional variations previously published. The regional map has been extended to include the gas and oil fields in Canada which lie in the Appalachian Province north of Lake Erie.

Well to well variations in the composition of the gas in several individual reservoirs are given. Definite relationships exist between the composition of natural gas and associated oil both areal and quantitative.

Numerous samples of near-surface gases and gases from coal seems have been analyzed.

A résumé of the geologic occurrence of methane, ethane and higher boiling saturated compounds, nitrogen, carbon dioxide, and hydrogen sulphide is given. Also the relationship of these gases to their associated constituents, i.e., sand, shale, limestone, coal, water, brine, calcium sulphate, are discussed.

The origin, migration, and natural storage of gas and oil are discussed in the light of these data.

50. E. T. HECK, West Virginia Geological Survey, Morgantown, West Virginia
Gay-Spencer-Richardson Oil and Gas Trend in West Virginia

An outstanding example of the control of oil and gas production by sand distribution is provided by the Berea sand trend extending from Gay in Jackson County, northeastward through Spencer, Roane County, and Richardson, Calhoun County. With the exception of a few undeveloped edge areas, the producing area closely follows the extent of the sand. The producing area varies in width from less than one mile to about three miles. Cross sections show that the sand pinches out in both directions at right angles to the trend and the linear shape strongly suggests a buried beach. Although only the southwestern part of the trend is considered in the paper, the trend is known to continue northeastward to Fink Creek, Lewis County. A total length of over 55 miles.

Within the sand body the adjustment of oil and gas to structure is very good, with oil in the synclines and gas on the intervening anticlines. No areas containing only water in the Berea sand are known along the trend.

Secondary recovery of oil by means of gas drive is being tried near Spencer, on an experimental basis, with encouraging results.

51. MAX W. BALL, consulting geologist, Edmonton, Alberta, Canada
T. J. WEAVER, American Production Company, Grand Rapids, Michigan
DOUGLAS S. BALL, student, Colorado School of Mines, Golden, Colorado
Shoestring Sand Gas Fields of Michigan