

Instead, these wells, under the normal thickness and facies of Mesozoic formations, found Paleozoic beds that showed no evidence of metamorphism, and that exhibited flat dips in cores.

It is proposed to describe these occurrences in some detail and to assess the effect they have on presently held theories concerning Llano and the Ouachita Folded Belt.

BEVERLY McMAHON, Shell Oil Company, Wichita Falls, Texas. Atoka Series in North Central Texas.

During the Mississippian and Pennsylvanian periods in North Texas, the area of thickest accumulation shifted westward and the tectonic activity, as shown by the character of the sediments and their rate of thickening, decreased. In the sequence of gradually changing depositional environments from linear geosynclinal type to continental basin type, the Atoka and Des Moines epochs are transitional. The depositional pattern of Atoka sedimentation suggests a modified geosynclinal environment.

Sediments of early Atoka time indicate that the Atoka basin formed under conditions of considerable crustal mobility. Thousands of feet of interspersed shale and "dirty" sandstones attest the rapid burial of the geosynclinal sediments. The Atoka series thins rapidly across a hinge area, where the sediments are predominantly shales with some interbedded sandstones, to the shelf area, where limestones and dark shale were deposited. The different sedimentary types, controlled by environment, were deposited contemporaneously. The marked divergence of time and lithologic units makes it advisable to apply terminology only to facies types.

The Marble Falls formation in North Central Texas, as generally considered, includes the Pennsylvanian-Mississippian unconformity.

Although the Muenster Arch was not uplifted until post-Atoka-pre-Des Moines time, conditions existed in the general area which inhibited the rate of downwarping relative to the surrounding area. The thinner Atoka sediments, which were deposited over the Arch, were later removed by erosion.

HERBERT D. HADLEY, Billings Geological Service, Billings, Montana. Development in the Williston Basin.

Modern exploration for oil and gas possibilities in the Williston Basin began with the drilling of the California Kamp No. 1 well during 1937-38. Some attempt to further evaluate this huge area was made in 1940, '41 and '42.

The present activity was initiated by discovery of oil in the C. Iverson well on Nesson anticline by the Amerada Petroleum Corporation in 1951. This was followed by the Shell-Richey discovery in Dawson County, Montana. At least seven new fields have been discovered to date, and it is becoming increasingly apparent that the Cedar Creek and Nesson anticlines may be the location for very large oil reserves.

Commercial oil has been found in rock of at least four different ages with several potential horizons believed present in the Mississippian, Devonian and Ordovician. While the Paleozoic rocks, to date, have proved the most fruitful, there is much yet to be learned concerning the age of portions of the thick Paleozoic section.

Cost of wildcat drilling varies from \$50,000.00 to as much as \$750,000.00 per well.

Estimates of the number of wildcat tests to be drilled during 1952 run as high as 250.

The discoveries to date have been located where structural closure is thought to exist, but as additional information is secured many tests will be drilled to evaluate stratigraphic variations.

HARRY L. THOMSEN, Shell Oil Company, Tulsa, Oklahoma. Oil and Gas Development in the Denver-Julesburg Basin.

Close to 50 new producing areas have been discovered on the east flank of the Denver-Julesburg Basin since the discovery of oil in Cheyenne County, Nebraska, by the Ohio Oil Company in June, 1949. All of these fields produce from Dakota group sandstones of Cretaceous age, at depths ranging from 3,300 feet to 7,350 feet. Deeper objectives appear to be present but as yet are relatively untested in the central part of the basin.

Most of the new fields have been found by use of the seismic method. They appear to be located on structural anomalies of minor relief, but it is apparent from subsurface information that stratigraphic changes within the Dakota group often aid in controlling accumulation.

More than half of the undeveloped acreage in the basin is now under lease. Exploration and development work is proceeding at a high level particularly in the area outlined by recent discoveries, which covers over one-tenth of the total basin area.

P. R. SCHULTZ, Stanolind Oil and Gas Company, Tulsa, Oklahoma. Oil Discovery—Past, Present, and Future.

Current alarm concerning the ability of the petroleum industry to satisfy the liquid fuel requirements of the United States is unwarranted. Unfortunately, information released by the industry in the past has been misinterpreted so as to indicate that the potentiality of the nation is reaching a criti-