

1941, commercial amounts of oil were first found in the Sundance formation (Upper Jurassic) in the Wilson Creek field, Rio Blanco County, Colorado.

In Wyoming the Frannie field, Park County, was extended almost one-half mile northwestward into Carbon County, Montana; Sundance production was extended eastward and southeastward about one location in the Lance Creek oil field, Niobrara County; the Labarge oil field was extended westward by relatively active drilling; and Tensleep sandstone production was extended about $\frac{1}{4}$ mile northeast in the Wertz oil field, Carbon County. Gas production in the Frontier sandstone (Upper Cretaceous) was extended about $\frac{1}{2}$ mile northwestward in the Muskrat field, Fremont County, and less than $\frac{1}{2}$ mile southeastward in the near-by Big Sand Draw field. In the Hiawatha field, Sweetwater County, commercial gas was found in the Wasatch formation (Eocene) about a mile north of the nearest producer.

In Colorado, a good Morrison (Upper Jurassic) sand well was found in the Wilson Creek oil field, Rio Blanco County, $\frac{3}{4}$ mile southwest of the nearest producer; and on the east side of the Hiawatha oil and gas field, Moffat County, one relatively large oil well and one relatively small one were found in sandstones of the Wasatch formation.

During the year, very few important wildcat wells were drilled in the district. In Montana, a 7,116-foot dry hole was drilled through the Sundance sand on the Absarokee structure, Stillwater County. In Wyoming, a 6,302-foot dry hole was drilled to Pennsylvanian beds in the Middle Baxter Basin area, being the first well to test certain lower zones in the Baxter Basin fields; a 4,243-foot dry hole was completed in the Deadwood formation (Cambrian) on the Bull Creek structure, Crook County; and an 8,343-foot dry hole was completed in the Tensleep sandstone on North Geary dome, Natrona County.

A new depth record for drilling in Wyoming was established at 10,121 feet in the Badger Basin field, Park County.

Several relatively short pipe lines were built in the district during 1940, one of the larger ones being the 100-mile line between the Billy Creek gas field, Johnson County, Wyoming, and the Big Sand Draw gas line at Casper.

39. HARRY OBORNE, consulting geologist, Colorado Springs, Colorado

Paleozoic Correlations from Southern Rocky Mountain Front Range to Oklahoma-Texas Panhandles

By means of measured sections and well logs tentative correlations are made from Colorado Springs to the Amarillo Arch. While these correlations are not absolute they are presented in the hope that they may be of use to geologists working in the areas or with the formations involved. The "crinkly limestones" of the Front Range are believed to represent a zone, rather than definite beds which may be followed continuously. This zone is believed to correlate, at least in part, with the Blaine gypsum, and San Andres and Kaibab limestones. The Lyons sandstone, the age of which has been a serious problem because of lack of fossils, is provisionally correlated with the Glorietta of New Mexico and the Duncan sandstone of the Panhandles. By means of well logs and cuttings the Stone Corral anhydrite and dolomite is carried from the Texas Panhandle into Baca and Las Animas counties in Colorado. Its probable equivalent is shown in well logs to extend into the area between Pueblo and Colorado Springs, where its identity is lost in the upper part of the Fountain arkose. According to this interpretation the Fountain formation would range in age from Cherokee, or perhaps even pre-Pottsville, to Permian. Evidence presented tends to indicate that the Amarillo Mountains may have been uplifted beginning in early Pennsylvanian time and continuing until late Pennsylvania time and that the Marmaton was a period during which great sheets of arkose were deposited in widely scattered areas in central Kansas, along the ancestral Rocky Mountains in Colorado and northeastern New Mexico, and along the flanks of the Amarillo Mountains in the Texas and Oklahoma Panhandles, their distribution being controlled by streams rather than offshore currents. The arkoses of the Oklahoma Panhandle may be the attenuate edges of the arkose sheets of the Texas Panhandle or they may have had a more proximate source.

40. W. A. WALDSCHMIDT, Colorado School of Mines, Golden, Colorado

Results of Petrographic Studies of Sandstone Cores from Rocky Mountain Structures

Detailed petrographic studies of sandstone cores from productive and non-productive structures in the Rocky Mountain region were made to determine not only the

physical characteristics of the sandstones but also the nature and distribution of the cementing materials. The sandstones have been divided into two general groups on the basis of the cementing or binding materials: first, those in which the grains are bound together by clay products; and second, those in which crystalline minerals form the cementing material. In the first group effects of compaction were noted. In the second group, sequence of deposition of cementing minerals was observed. The deposition of quartz, dolomite, and anhydrite in the order given is common in some sandstones. In others, quartz and calcite are the only cementing minerals, and of these calcite is the last mineral deposited. Other combinations of these four minerals were observed. Furthermore, sequence of deposition of the same minerals has been established tentatively for the geologic section from the Bell sandstone upward through the Mesaverde sandstone.

Also presented are some probable effects of crystalline cementing materials upon migration and accumulation of oil and gas, upon acid treatment of wells, and upon pressures existing in oil and gas fields.

41. W. C. TOPELMAN, University of Colorado, Boulder, Colorado
Microfaunas of Niobrara and Benton in Foothills of Northern Colorado

This paper is a preliminary report on the first of a series of studies which will attempt to establish recognizable foraminiferal zones in the Cretaceous sequence of eastern Colorado. Because previous reports on the Niobrara and Benton horizons of Nebraska, Kansas, and Wyoming have shown abundant faunas, these horizons in the foothills of the Front Range of northern Colorado were chosen as the most promising for this investigation. Progress thus far reveals a fauna of upwards of thirty species from the Niobrara. Indications are that this fauna is most prolific in the lower 300 to 400 feet of the formation and that this zone should be rather easily recognizable in well cuttings. The upper member of the Benton, which is a sandstone of variable thickness, seems to be entirely barren of fossils. About 125 to 200 feet below this is a zone of limy shale which yields a fair fauna of Foraminifera. This fauna is apparently very similar to, but less abundant than, that of the overlying Niobrara, and can not be readily separated from the latter in northern Colorado.

It is planned to extend this study of the Benton and Niobrara south to beyond Trinidad, Colorado, and also eastward along the Arkansas River to the Kansas boundary. Scattered samples from Benton outcrops north and east of Trinidad indicate a more abundant fauna of Benton age will be found; also that the barren zone of the top of that formation in northern Colorado is not present to the south.

SOUTH MID-CONTINENT

42. H. F. SMILEY, for committee of North Texas Geological Society, Wichita Falls, Texas
New Developments in North and West Central Texas, 1940

The most important development in the North and West-Central Texas area during the year was the remarkable number of new producing horizons discovered. In the K. M. A. field the Ellenburger (Ordovician) was found productive in the western part; two pools on the Bend arch in Young County and one pool on the eastern edge of the Permian Basin in Stonewall County found production in the Chappel limestone (Mississippian); in the Fort Worth syncline, a pool in Clay County and another in Montague County found production in the lower Bend conglomerate; the Caddo (Bend) was found productive in two pools on the Bend arch in Archer County, in two pools in the Fort Worth syncline in Clay County, and in one pool in Montague County; the Strawn series (Pennsylvanian) yielded production in two pools on the Bend Arch in Archer County and in one pool on the east flank of the arch in Clay County; the Canyon series yielded production in two pools on the west flank of the Bend arch in Baylor County, in one pool in Jones County, in one pool in Foard County on the Electra arch, and in one pool in Wilbarger County in the Red River syncline. New production was also found in the Cisco series in practically every producing county in the area, the most significant of which was probably in the Fargo pool in the Red River syncline in Wilbarger County.

Probably the only new stratigraphic discovery in the area was the tentative identification of Viola limestone (Ordovician) in two of the deeper wells in Clay County and two in Montague County and one in Wise County, all in the Fort Worth syncline.

Total production for North and West-Central Texas for 1940 was 49,221,213 barrels.