

OKLAHOMA GEOLOGICAL SURVEY

Chas. N. Gould, Director

Bulletin 40-FF

OIL AND GAS IN OKLAHOMA

OIL AND GAS GEOLOGY OF MUSKOGEE COUNTY

By

Hale B. Soyster and Thos. G. Taylor

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OIL AND GAS IN OKLAHOMA

MUSKOGEE COUNTY

FOREWORD

In 1917 the Oklahoma Geological Survey issued Bulletin 19 part 2 entitled, "Petroleum and Natural Gas in Oklahoma." This volume was so popular that the supply was soon exhausted, and for several years copies have not been obtainable.

The present director has seen the need of a revision of this bulletin. On account of lack of appropriations he has not been able to employ sufficient help to compile the data, and has called on some twenty representative geologists throughout the state to aid in the preparation of reports on separate counties. These gentlemen, all busy men, have contributed freely of their time and information in the preparation of these reports.

It will be understood that the facts as set forth in the various reports represent the observation and opinion of the different men. The Oklahoma Geological Survey has every confidence in judgment of the various authors, but at the same time the Survey does not stand sponsor for all statements made or for all conclusions drawn. Reports of this kind are, at best, progress reports, representing the best information obtainable as of the date issued and doubtless new data will cause many changes in our present ideas.

This report on Muskogee County has been written by Hale B. Soyster and Thos. G. Taylor, of the U. S. Geological Survey. These men, located at the Federal Survey in Muskogee, have had wide experience in Muskogee County. Their data has been added to by the geologists of many oil companies operating in this area and by geologists of the U. S. G. S. at Washington. In its present form, the report represents a comprehensive discussion of the oil and gas conditions of Muskogee County. The report is printed with the permission of George Otis Smith, Director and Herman Stabler, Chief of the Conservation Branch, U. S. Geological Survey.

September, 1928

Chas. N. Gould,
Director.

By

Hale B. Soyster and Thos. G. Taylor*

ACKNOWLEDGMENTS

Many sources of information have been drawn upon in the writing of this report. Those which have been referred to most frequently are: Oklahoma Geological Survey Bulletin No. 19, Part II, Petroleum and Natural Gas in Oklahoma; Bulletin No. 35, Index to the Stratigraphy of Oklahoma by Chas. N. Gould; U. S. Geological Survey, Tahlequah and Muskogee folios by Joseph A. Taff; Notes on the Subsurface pre-Pennsylvanian stratigraphy of the north Mid-Centroid oil

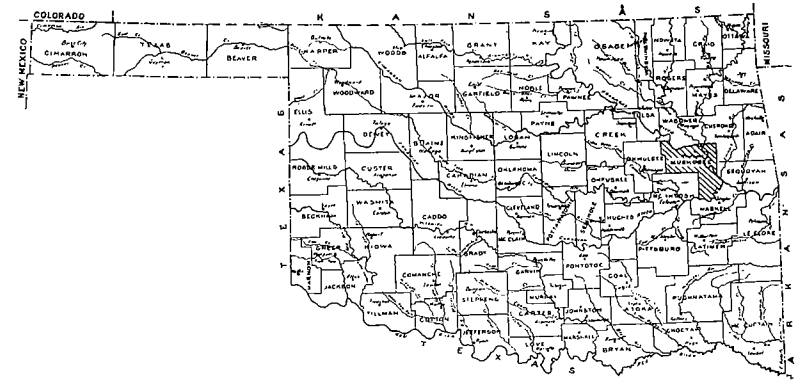


Figure 1. Index map of Oklahoma showing area covered by this report

fields by Aurin, Clark and Trager, published in the Bulletin of American Association of Petroleum Geologists, Vol. 5, No. 2, and an article with a map published in the Oil and Gas Journal, April 1, 1926, by Luther White, entitled "Oklahoma's Deep Horizons Correlated". Microscopic correlations were made by H. S. Thomas of the Tidal Oil Company, to whom the writers are gratefully indebted.

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Valuable assistance has been given by Luther White of the J. A. Hull Oil Company. Many thanks are also expressed for assistance to A. L. Beekly, Chief Geologist, and Robert H. Dott, Geologist, of the Mid-Continent Petroleum Corporation. The drafting was done by George I. Bystrom, Engineering Draftsman, U. S. Geological Survey, Muskogee, Oklahoma. We are indebted to the Carter Oil Company for a structure contour map of the Boynton field and to H. H. Atkins, Prairie Oil and Gas Company, for logs and information regarding the various fields. Many helpful suggestions were offered by H. J. Duncan, U. S. Geological Survey. Gratitude is also expressed to many others who have given freely of their knowledge of Muskogee County.

This chapter was written with the permission of George Otis Smith, Director of the United States Geological Survey, and Herman Stabler, Chief of the Conservation Branch, Washington, D. C. The report was reviewed and criticised by Hugh D. Miser of the United States Geological Survey, and many helpful suggestions offered by him for which the authors are indebted.

AREA COVERED BY THIS REPORT

Muskogee County is situated in the east-central section of the State of Oklahoma between 35° and 36° N. latitude and 95° and 96° W. longitude. The total area of the county amounts to approximately 826 square miles, of which probably 65 square miles are either proven or semi-proven oil or gas producing territory. The county is comprised of sixteen full townships and parts of fourteen townships, all within Tps. 9 to 16 N., Rs. 15 to 21 E., inclusive.

TOPOGRAPHY

The county may be divided into two physiographic areas; one east of the Arkansas River, the other west. The region west of the river is generally known as the prairie plains. This area, as described by Taff, is characterized by rolling or undulating land interspersed by hills and ridges, having a northeastern and southwestern trend, the ridges being characterized by table land and escarpment type of topography. The escarpments and terraces face eastward and the table lands and benches slope to the west. The general area east of the Arkansas River has been termed as the Ozark Highlands and is characterized by gently rolling hills with wide shallow valleys.

The relief throughout Muskogee County appears to have comparatively close relationship to structure, as the hills and ridges generally occupy the synclinal troughs while the anticlinal structures usually underlie the valleys. It has been found, generally, that the hills are capped with sandstone or sandy lime, which formations are usually quite resistant to erosion. The valleys are occupied by shale beds or alluvial deposits. Erosion in the valleys is comparatively negligible, as the streams are sluggish, due to low gradient.

SUBSURFACE GEOLOGY

The accompanying cross-sections of Muskogee County have been drawn from a study of the well logs in the county. Section "AA" extends from the NE.¼ sec. 22, T. 15 N., R. 19 E., southwest to the NW.¼ sec. 27, T. 14 N., R. 15 E. Section "BB" extends from the SW.¼ sec. 12, T. 15 N., R. 18 E., south to NW.¼ sec. 33, T. 14 N., R. 19 E. From data compiled by Luther White and others it appears that in the northwestern part of the county the St. Clair marble, and also the beds to which he and other Oklahoma geologists apply the names Sylvan shale and Viola limestone ("white lime"), disappear toward the northeast and the Chattanooga shale thus rests upon older and older formations in this direction. This is due to folding and a long erosional interval preceding the deposition of the Chattanooga.

Pre-Cambrian

GRANITE

In Muskogee County granite has been penetrated in two wells underneath the limestone of Cambro-Ordovician age. The definite age of the granite is more or less a matter of conjecture, although it is generally believed to be of pre-Cambrian age. It is a reddish brown, mottled, medium to fine grained granite and resembles the granite that crops out at Spavinaw, Oklahoma. The predominating constituents of this granite are; red orthoclase feldspar, quartz, hornblende, and biotite mica. One of the two wells above mentioned was drilled 320 feet into the granite.

Cambrian and Ordovician

UPPER CAMBRIAN

LIMESTONE

In Muskogee County there is a great thickness of limestone—(Arbuckle of some geologists) as much as 1,100 feet in the central part. A sandstone considered by some to be "Reagan" may underlie the lime locally although generally the limestone rests directly on granite of pre-Cambrian age, which the writers believe to be similar to that exposed near Spavinaw, Oklahoma.

"TURKEY MOUNTAIN" SAND

The "Turkey Mountain" sand is generally considered to be a porous zone in the top of the "Arbuckle limestone" which is dolomitic and siliceous. It has not been definitely worked out whether the "Turkey Mountain" is of the age of the Simpson formation of the Arbuckle Mountains or is of the age of the upper part of the Arbuckle limestone of those mountains. The thickness may be 25 feet or more, although due to its occurrences in lenses it is missing locally. The color is gray to white. Only a few wells have been drilled to this horizon and to date none have been productive of oil or gas in commercial quantities.

COLUMNAR SECTION

GENERALIZED SECTION OF MUSKOGEE COUNTY

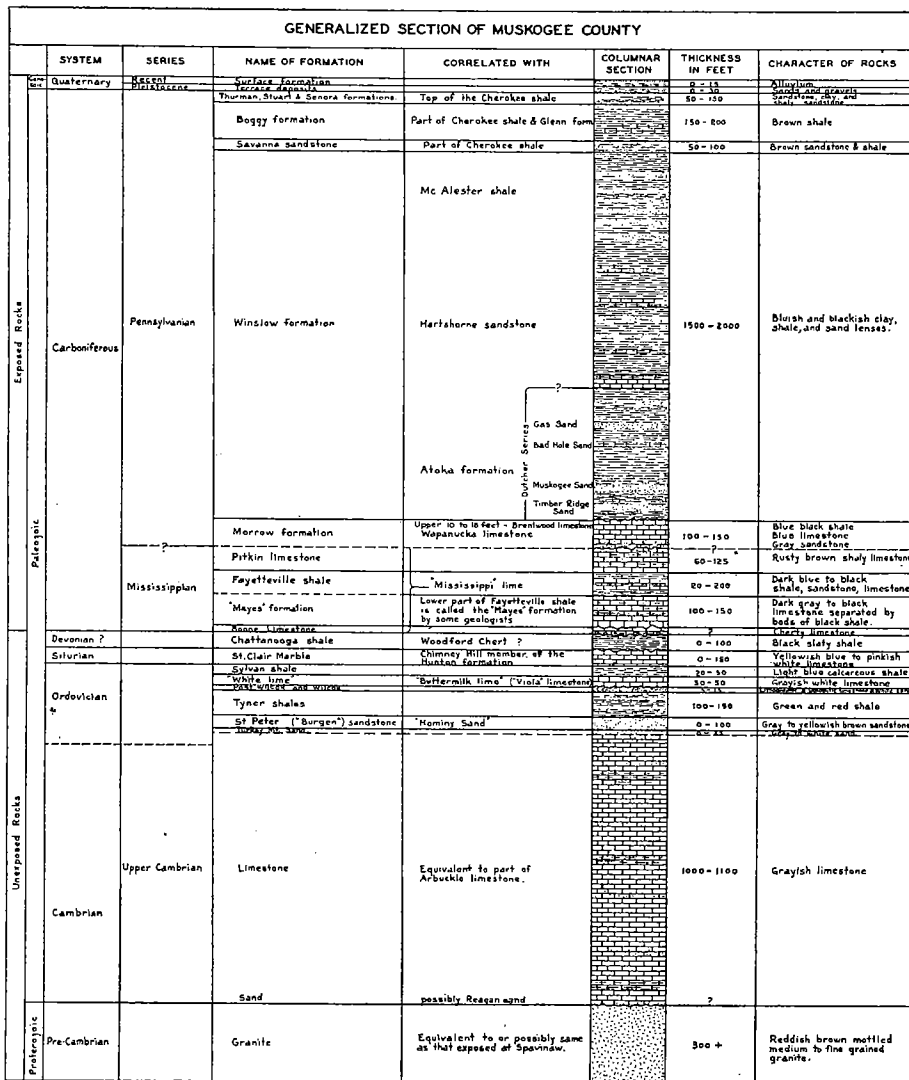


Figure 2

(ST. PETER SANDSTONE ("Bürgen"))

The St. Peter sandstone, also known as the "Bürgen sandstone", generally consists of well cemented quartz grains. This formation is usually massive, light gray to yellowish brown in color, fine-grained sandstone varying in thickness up to 100 feet and is generally so well cemented that it has not been productive.

Ordovician

TYNER FORMATION

Samples taken from wells drilled near Muskogee show the Tyner formation to be mainly green and red shale with some green sand. Near the top a small amount of green sand may be present while near the base the formation becomes more dolomitic. The thickness has been found to range from 100 to 150 feet.

"WILCOX SAND"

The "Wilcox sand" is believed to exist throughout the entire county. However, it thins to the east and in the NW. cor. SE. ¼ sec. 12, T. 15 N., R. 18 E., only two feet of "Wilcox" was found. It is probably not over 15 feet thick in any part of the county. Gas has been found in the "Wilcox" near Muskogee and in other parts of the county the "Wilcox" may be expected to be commercially productive of oil or gas wherever favorable sand or structural conditions exist. A period of erosion followed the deposition of the "Wilcox".

"POST-WILCOX"—(SIMPSON AGE)

In the York Oil and Gas Company's well located in the NW. cor. SE. ¼ sec. 12, T. 15 N., R. 18 E., 15 feet of lithographic and dolomitic limestone was found above the "Wilcox". The log of the well is as follows:

The York Oil Company's Gertrude Jobe Well No. 1.

Dry hole. NW. cor. SE. ¼ sec. 12, T. 15 N., R. 18 E. Elevation 534.5'.

Commenced January 23, 1927; Completed May 1, 1928.

C. F. Finefield, Contractor.

Formation	Top	Bottom	Formation	Top	Bottom
Surface (Blue Shale)	0	35	Black lime	555	560
Blue shale	35	45	Black shale	560	563
Black shale	45	250	Black lime	563	568
Brown shale	250	300	Black shale	568	585
Black shale	300	340	Black lime	585	596
Lime shell	340	343	White shale	596	610
Black shale	343	380	Brown shale	610	632
White shale	380	390	Black lime	632	636
Black shale	390	470	Brown shale	636	640
Black lime	470	473	Black lime	640	663
Black shale	473	478	Black shale	663	683
Brown shale	478	520	Black lime	683	696
Black shale	520	528	Black shale	696	701
Brown shale	528	555	Black lime	701	706

(Continued on page 12)

Formation	Top	Bottom	Formation	Top	Bottom
Black shale	706	736	Black shale	1010	1030
Sand (show oil)	736	756	Lime	1030	1031
Black lime	756	785	Blue shale	1031	1040
Brown shale	785	795	Black shale	1040	1050
Black lime	795	810	Sand and lime shells	1050	1055
Shale-lime	810	820	White sand	1055	1065
Sand (show oil)	820	835	Black shale	1065	1075
Brown shale	835	865	Lime and sand	1075	1083
Sand (free oil and gas)	865	890	Blue shale	1083	1092
Black shale	890	908	Lime	1092	1094
Sand (show oil)	908	920	Sand	1094	1097
Dry sand	920	953	Black shale	1097	1100
Black shale	953	974	Sand	1100	1110
Sand (Free oil and gas)	974	990	Black shale	1110	1125
Blue shale	990	1010	Lime	1125	1220
			Blue shale	1220	1230
			Lime	1230	1252

Note: The remainder of the log from sample determination by H. S. Thomas, Tidal Oil Company.

Formation	Top	Bottom	Formation	Top	Bottom
Pitkin lime	1252	1355	Rounded and frosted dolomitic sand and green shale	1717	1719
Fayetteville shale	1355	1450	Sand and limestone, dolomitic sand and green shale	1719	1723
"Mayes" lime	1450	1545	Green shale	1723	1735
Boone lime	1545	1569	Maroon shale and a little sandy green shale	1735	1745
Chattanooga shale	1569	1605	Maroon shale, some green shale, calcareous and arenaceous green shale	1745	1755
Sylvan shale	1605	1630	Calcareous argillaceous sand and arenaceous green shale	1755	1766
"Viola" crystalline lime	1630	1649	Same with arenaceous limestone	1766	1780
Simpson Lithographic lime	1649	1654	Green and maroon shale and calcareous sand	1780	1794
Dolomitic lime	1654	1664	Arenaceous limestone and green and maroon shale	1794	1803
Wilcox sand	1664	1666	Sandy limestone, shale and sand	1803	1812
Green sandy shale	1666	1669	St. Peter sand	1812	1826
Green shale	1669	1675	Total Depth		1826
Green shale and calcareous sandstone	1675	1681			
Green sandy shale	1681	1690			
Green and maroon shale	1690	1700			
Maroon shale, some green shale	1700	1705			
Sandy green shale	1705	1710			
Green shale and rounded and frosted sand	1710	1717			

"WHITE LIME"

The "White lime", also known to the driller as "Buttermilk", is of Richmond age and is the same as the upper part of the Viola limestone of the Arbuckle area and probably equivalent to the Ferndale of Arkansas. There is no unconformity between the "White lime" and the Sylvan shale although a distinct unconformity exists below the "White lime". The limestone is grayish white in color and coarsely crystalline. The thickness ranges from 30 to 50 feet.

SYLVAN SHALE

The Sylvan shale, so recognized by various Oklahoma geologists, is a light blue calcareous shale which may have a greenish tinge. The maximum thickness in Muskogee County is probably not over 50 feet with an average thickness of approximately 30 feet. It is not present in the northwestern part of the county; the Chattanooga there rests directly on older formations. It is generally agreed that the Sylvan is of Richmond age. Some geologists place the Ordovician-Silurian boundary at the base of the Richmond but others place it at the top of the Richmond.

Silurian

ST. CLAIR MARBLE

The St. Clair marble varies from yellowish blue to pinkish white in color and varies in thickness up to 150 feet. It reaches its greatest thickness in the southern part of the county and as previously stated has been eroded away in the northern part or may be locally absent due to original non-deposition. According to Luther White, the St. Clair marble is equivalent to the Chimneyhill limestone member of the Hunton formation. His reasons for correlating the St. Clair marble with the base of the Hunton are set forth in Bulletin 40-B of the Oklahoma Geological Survey.

Devonian (?)

CHATTANOOGA SHALE

The Chattanooga shale is a black, slaty shale which is generally bituminous, non-calcareous and of even texture. It varies in thickness up to 100 feet. The Chattanooga shale is here doubtfully placed in the late Devonian as there is an unconformity above as well as below.

The majority of the students of stratigraphy of Oklahoma, Missouri, and Arkansas, classify the Chattanooga shale as Mississippian in age ("Kinderhookian"). Gould states, "In former years it has usually been classified as upper Devonian, although the upper portion of the black shale in Kentucky and elsewhere is known to contain Mississippian fossils. It therefore appears to be transitional and represents upper Devonian and early Mississippian time."

CARBONIFEROUS

Mississippian

BOONE LIMESTONE

The Boone limestone, also called the Boone chert, constitutes the oldest rocks which crop out in Muskogee County. The exposures are very limited and are to be found in the N.½ sec. 13, T. 15 N., R. 20 E. The Boone varies in thickness up to 450 feet in the type locality and is composed of interstratified chert and cherty limestone. The basal member of the Boone is known as the St. Joe limestone. The extent of the Boone formation in Muskogee County is not known.

In the SE.¼ sec. 2, T. 14 N., R. 18 E., 15 feet of white cherty limestone was logged, and in the York Oil and Gas Company's well, Jobe No. 1, in the NW. cor SE.¼ sec. 12, T. 15 N., R. 18 E., the Boone was found from 1,545 to 1,569; the determination having been made by H. S. Thomas of the Tidal Oil Company. The thickness of the formation in this county is probably not over a few feet in any section. The Boone lies unconformably on the Chattanooga shale.

SURFACE GEOLOGY

The only rocks exposed on the surface in Muskogee County are of Quaternary and Carboniferous age. (See columnar section—Fig. 2).

Mississippian "MAYES FORMATION"

The beds constituting the "Mayes formation", so named by L. C. Snider, comprise a group of beds which have been widely recognized by geologists from well logs and cuttings in Oklahoma. This formation, according to Gould, is dark gray to black limestone separated by beds of black shale. The "Mayes" lies disconformably on the Boone limestone.

These beds are correlated by some geologists with the lower part of the Fayetteville shale, the Batesville sandstone, and the Moorefield shale. On Miser's map, (see Areal Geologic Map, Plate I), the "Mayes" is not shown separately from the other Mississippian rocks. From the study of well logs the thickness has been found to range from 100 to 150 feet, thickening to the southwest.

FAYETTEVILLE SHALE

The Fayetteville shale is dark blue to black, bituminous shale with a few thick strata of sandstone and limestone interbedded. According to Taff, in the Muskogee folio, and, also, according to Bulletin 19 of the Oklahoma Geological Survey, the Fayetteville shale crops out in the northeastern section of Muskogee County. The Fayetteville shale varies in thickness from 20 to 200 feet, according to data compiled by the U. S. Geological Survey. The Pitkin limestone, the Fayetteville shale, and the underlying "Mayes lime" are of Chester age, according to Aurin, Clark, and Trager and other Oklahoma Geologists.

PITKIN LIMESTONE

The Pitkin limestone is described by Taff as varying "from rusty-brown, granular, earthy, and shaly strata at one extreme to fine-textured, massive bluish beds at the other". The Pitkin limestone crops out over an area of approximately 6 square miles in the east-central and northeast sections of the county and varies in thickness up to approximately 125 feet. Aurin, Clark, and Trager state: "Above the Pitkin there is an unconformity, slight, in the southern part of the area, but representing a greater time interval in the northern part." In the accompanying columnar section and in the two cross-sections, the Pitkin and Morrow have been mapped together because at this time the contact has not been definitely determined.

Pennsylvanian

MORROW FORMATION

The Morrow formation crops out over an area of approximately 13 square miles in the east-central and northeast section of Muskogee County. This formation consists of sandstone, fossiliferous limestone, and blue-black shale, the limestone greatly predominating. The upper 10 to 18 feet is an oolitic brown limestone, which from sample determination has been correlated with the Brentwood lime and represents in this area the uppermost part of the Morrow formation. The middle of the section is composed of hard dark blue lime. The extreme lower part in the type section is sandy with local beds of fossiliferous limestone; this part is commonly known as the Hale sandstone member of the Morrow formation. The thickness of the Morrow formation in Muskogee County probably ranges from 100 to 150 feet. An unconformity has been reported at the top of the Morrow by Aurin, Clark, and Trager.

WINSLOW FORMATION

The Winslow formation crops out over a larger area of Muskogee County than any other formation and occupies approximately 35 square miles. It is composed of bluish to blackish clay shale and sand lenses. The Dutcher sands occurring in the lower part of the formation are locally known as the Muskogee, Gas Sand, Timber Ridge, Boynton, Leidecker, etc., and are productive of oil and gas in commercial quantities where sand and structural conditions are favorable.

The Booch sand and Salt sand (Bartlesville) are found in the upper part of the formation and crop out near Muskogee. A bed of limestone which ranges from 40 to 90 feet in thickness has been logged by drillers above the Dutcher series of sands. The base of this lime is approximately 100 feet above the uppermost sand in the series.

McALESTER SHALE

According to Taff, the McAlester shale may be divided into three parts; upper, middle, and lower. The upper member consists almost wholly of shale which also contains the McAlester coal; the middle section is composed of several strata of sandstone interbedded with shale; the lower consists of shale with sandstone and contains the Hartshorne coal.

On Miser's geologic map of Oklahoma, the McAlester shale is shown to crop out over a considerable area of the southern part of the county. Gould in Bulletin 35 of the Oklahoma Geological Survey correlates the McAlester with the upper part of the Winslow formation and states that in the vicinity of the Arkansas River the McAlester merges with the Winslow.

SAVANNA SANDSTONE

The Savanna formation is made up of interbedded brown to gray sandstone and shale, which crops out over an area of approximately

15 square miles in the southwestern part of the county in the vicinity of Forum, Oklahoma.

BOGGY SHALE

This formation consists almost wholly of shale but includes some thick bedded sandstones and limestones, usually occurring in the upper part of the formation. The Boggy shale covers an area of approximately 190 square miles in the southwestern part of Muskogee County. According to Aurin, Clark, and Trager, there is an unconformity at the base of the Boggy. The unconformity is also shown by Taff in the Muskogee folio.

THURMAN SANDSTONE, STUART SHALE, AND SENORA FORMATION

These formations are found only in the extreme northwestern part of the county where they occupy an area of approximately 28 square miles. The Thurman sandstone varies in texture from coarse conglomeratic to shaly sandstone beds with some interbedded lime. The Stuart shale is blue to black in color and is found interbedded with thin sandstone strata.

The Senora formation is brown sandstone which in some localities is thin and shaly, while in others it is thick bedded. Inasmuch as the Thurman sandstone and Stuart shale are the oldest formations of this group it is possible that they are the only ones which crop out in the county.

Quaternary

PLEISTOCENE

The terrace deposits and wind-blown dune sand which constitute the Pleistocene consist of unconsolidated sands and gravels. The terrace deposits were probably laid down during a period of time when the elevation of the Arkansas River was considerably higher than its present elevation. These deposits occur as a thin covering overlying the Winslow formation in the SW. $\frac{1}{4}$ T. 14 N., R. 20 E., NE. $\frac{1}{4}$ T. 13 N., R. 20 E., NE. $\frac{1}{4}$ T. 13 N., R. 19 E., and SE. $\frac{1}{4}$ T. 14 N., R. 19 E. They are also found in the southern part of Muskogee County between Briartown and Forum in T. 10 N., R. 19 E. Here the Pleistocene overlies the Boggy shale, Savanna sandstone, and the McAlester shale, which is probably equivalent to the upper portion of the Winslow formation which occupies a large part of northeastern Muskogee County. (Taff, Muskogee folio No. 132).

RECENT

The youngest and most recent deposits are alluvial and are found in the Arkansas River drainage channel. These deposits consist almost wholly of fine sand and silt.

STRUCTURE

Muskogee County can be divided into two parts structurally as well as topographically. The Arkansas River in the county follows approximately the western limit of the Ozark uplift and the eastern edge of the Prairie Plains monocline. In general, it may be said that the formations in Muskogee County dip west and southwestward; however, the prevailing dip may vary locally. In the Ozark uplift area the average dip of the formations is less than 20 feet per mile to the southwest while immediately west of the Ozark uplift the inclination of the beds of the Prairie Plains monocline amounts to 125 feet per mile or more. Farther to the west this dip gradually diminishes.

A fault enters Muskogee County near the NE. cor. sec. 6, T. 15 N., R. 20 E., and extends in a southwest direction. It appears to die out a short distance south of the town of Muskogee. This fault has brought the Winslow formation in contact with the Pitkin limestone and Fayetteville shale. Other faults are known to exist in the southern and northwestern parts of the county. The Seneca fault zone cuts across the northwestern part of the county. These faults have created a very broken structural condition which causes the producing horizons to be found at irregular depths.

Accompanying this report are two cross-sections, one a north and south section "BB"; the other section "AA" extends from the northeast part of the county in a southwesterly direction through the major producing fields to the western edge of the county. These sections, of course, do not reveal the actual structural and sand conditions existing throughout the county. From the study of numerous well logs and formation samples examined, it appears that local sand conditions such as lensing, porosity, thickness, etc., are probably as important a factor in the accumulation of commercial deposits of oil and gas as local structural conditions.

DEVELOPMENT

Muskogee County, prior to 1914, held the foremost place among the light oil producing areas of the State. There are only two large fields in Muskogee County, Boynton and Muskogee. Other producing fields are the Beland, Booch Sand, Brushy Mountain, Butler, Boyle, Cole, Coody, Haskell, Jolly-Patton, Keefeton, Link, Peterson, Robinson, Sheppard, Sommerville, Summers, Terra-Okla., Timber Ridge, Transcontinental, Wainwright, and Yahola. The production map accompanying this report shows the location and extent of these fields. The older fields are now making considerable water with the oil.

BOYNTON FIELD

The Boynton field is one of the largest producing areas in Muskogee County. It was opened in May, 1914. The first well was completed by Cameron, et al., in the NE. $\frac{1}{4}$ section 21. A good gas well was completed a short time later by H. H. Galbraith at a depth of about

1,800 feet in section 19. June 12, 1914, the Merit Oil and Gas Company completed a well in the SE. $\frac{1}{4}$ SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ section 15; the oil sand was found from 1,530 to 1,536 feet which after a 40-quart shot produced 6 barrels. The well was then deepened and 3 million cubic feet of gas was found from 1,570 to 1,590 feet. The Carter Oil Company completed its Simon Morrison in the SW. $\frac{1}{4}$ section 15, on August 14, 1914. The Boynton sand, found from 1,520 to 1,560 feet, was shot with 200 quarts and the Leidecker sand, found from 1,394 to 1,409 feet, was shot with 50 quarts. The initial production was 90 barrels per day. A rig was built on the Cherry lease in June, 1915, by Neely, et al., of the Ma Lou Oil Company in the SW. cor. SE. $\frac{1}{4}$ NW. $\frac{1}{4}$ section 14, one-half mile north of the discovery well. The hole was not started at once as the location did not look very good, but on September 17, 1915, the well was completed as the largest well in the field. After drilling 7 feet of sand, from 1,432 to 1,439 feet the well flowed 85 barrels an hour. It was then deepened to 1,445 feet and flowed 144 barrels the first hour. Cherry No. 2 was completed October 8, 1915, with sand from 1,478 to 1,491 feet and made 600 barrels the first 24 hours. The offset in the SE. $\frac{1}{4}$ SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ section 14 was completed the same day and produced 1,500 barrels from a sand found at 1,441 to 1,464 feet. The Cameron Oil Company, George McIntosh No. 1, in the NW. $\frac{1}{4}$ NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ section 14, a direct offset south of the Neely well, made 70 barrels from 1,458 to 1,478 feet. The offset north of this well was dry in all sands to a depth of 1,765 feet. The last good well drilled in this field was completed in July, 1927.

The structure contour map of the Boynton sand was drawn after the Carter Oil Company map furnished through the courtesy of L. Murray Neumann, Chief Geologist. The Boynton sand is the chief producing horizon although the Leidecker sand above it has also been very prolific. These sands correlate with the Dutcher series and are found to vary considerably in porosity and productivity. The average thickness is 25 feet. Through the middle of the field the approximate depths of the sands are as follows: The salt sand 300 feet, Booch sand 700 feet, Leidecker sand at 1,385 feet, and the Boynton sand at 1,530 feet. The Wilcox sand should be found at approximately 2,100 feet and the Turkey Mountain at 2,300 feet in this area.

The average initial production from wells in the Boynton field was from 50 to 150 barrels. Some dry holes and some large producers were drilled as noted above. In 1915 about 7,500 barrels of oil were produced daily but at present the production from this field is about 275 barrels. The gravity of the oil is about 36° and has held fairly constant. There are approximately 150 wells producing and there are 25 to 50 depleted wells which have been plugged. Very little gas has been found in this field. The wells also make a considerable amount of water.

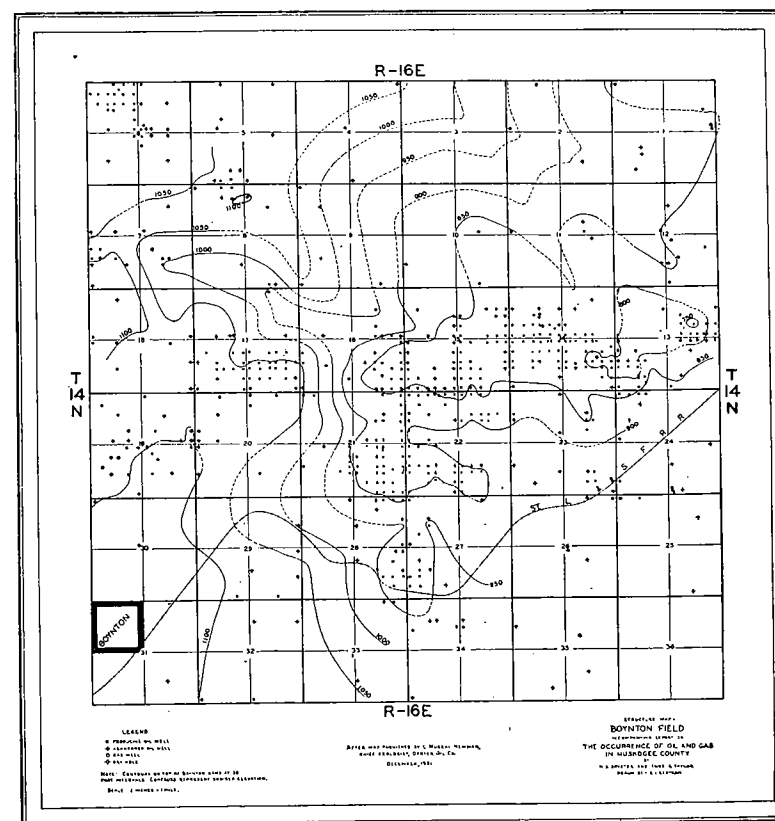


Figure 3

The chief operators in the field are the Carter Oil Company and the Pure Oil Company. Other operators are; the Halcyon Oil Company, Volger and Lightner Petroleum Company, Aiken Oil Company, Gypsy-Margay and Gilberston and Decius.

BELAND FIELD

The Beland field comprises sections 16, 17, and 18. The first well was drilled by Vin Truman, et al., on the Newbold farm in the SE. $\frac{1}{4}$ NW. $\frac{1}{4}$ section 16. It was started in August, 1913, and completed October 18, 1913, to a depth of 1,400 feet. After being shot it produced 10 barrels a day.

Wells in this field have been small although they have held up well. The average initial production was about 20 barrels. However, at present the production from this small area amounts to only about 5 barrels daily. Very few wells have been drilled in recent years. Gas wells are now being drilled to the 500-foot sand; the gas is to be used to repressure the oil sand in the depleted area.

In this field the productive sands are the Boynton, found at about 1,360 to 1,400 feet, and a sand found at 1,530 feet; below this, sands found at 1,650 and 1,770 feet were not productive.

Operators in this area are W. B. Pine, Haskogee Oil Company, and W. A. Peterson.

BOOCH SAND FIELD

The few wells in the SW. $\frac{1}{4}$ section 31 are referred to as the Booch Sand field of Muskogee County, and is considered to be the northeast extension of the real Booch Sand field in sec. 1, T. 13 N., R. 14 E., Okmulgee County, and production is obtained by shooting after the wells have been drilled into the sand. The Booch sand is found at about 1,075 feet. At present this area produces about 6 barrels a day.

BOYLE FIELD

This field was opened by Philip Boyle, October 25, 1927, when he completed a well in the NE. $\frac{1}{4}$ SE. $\frac{1}{4}$ section 8. The productive sand which is believed to be one of the Dutcher sands was found at a depth of 1,617 feet and the well flowed 165 barrels the first 24 hours. The east offset has been completed making some oil and water from the same sand, and the west offset produced 150 barrels initially. Several new locations have been made.

BRUSHY MOUNTAIN FIELD

The Brushy Mountain field, located in sections 32 and 33, is chiefly a gas field. The first well was commenced November 27, 1915, and completed February 8, 1916 by M. S. Mussellem in the SE. cor. section 33 with an initial production of 7 million cubic feet of gas and a rock pressure of 590 pounds. The log of this well is as follows:

DEVELOPMENT

Log of M. S. Mussellem well, sec. 33, T. 14 N., R. 19 E.

Formation	Top	Bottom	Formation	Top	Bottom
Soil	0	7	Slate	968	974
Sand	7	32	Lime	974	982
Slate	32	42	Slate	982	994
Sand	42	47	Shell	994	996
Blue mud	47	72	Sand	996	1008
Black shale	72	195	Slate	1008	1063
Shell	195	200	Sand	1063	1065
Black slate	200	265	Shell	1065	1071
Light slate	265	315	Sandy lime	1071	1083
Black slate	315	435	Slate	1083	1160
Lime	435	447	Shell	1160	1166
Black slate	447	485	Black shale	1166	1240
White slate	485	515	Shell	1240	1242
Black slate	515	555	Black shale	1242	1312
White sand	555	580	Very hard shell	1312	1318
Black slate	580	685	White sand	1318	1350
Lime	685	705	(Showing water)		
Brown shale	705	730	Black shale	1350	1377
Lime	730	820	Shell	1377	1378
Shale	820	846	Sand	1378	1388
Lime, hard	846	915	Shale, black	1388	1403
Shale	915	935	Shell	1403	1409
White lime	935	940	Shale, black	1409	1430
Shale	940	954	Sand	1430	1448
Sand	954	960	Shale, black	1448	1462
Shale	960	966	Sand-gas	1462	1477
Shell	966	968	Stopped in sand.		

Wells in this field lasted about a year as they were pulled too hard which resulted in rapid water encroachment. Some of the wells made from 3 to 5 barrels of oil but there being no pipe line to this field they have never been produced.

BUTLER FIELD

The Caney River Gas Company drilled several gas wells in this area before L. C. Butler drilled the first oil well. Some of the gas wells were later deepened to the oil sand.

The discovery well was L. C. Butler, Ross Franklin No. 3, located in the NW. $\frac{1}{4}$ NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ section 30, completed August 15, 1918, producing 100 barrels from a sand found from 1,213 to 1,250 feet. On August 15, 1918, B. G. Goble, Ross Franklin No. 1, was completed in the NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ NW. $\frac{1}{4}$ section 30 as a 20 barrel well. The sand was found from 1,244 to 1,268 feet but was drilled to 1,300 feet. September 27, 1918, L. C. Butler, Ross Franklin No. 4, located in the NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ section 30, was completed and produced 100 barrels initially. There was 500,000 cubic feet of gas in a sand found from 860 to 960 feet. B. G. Goble, Ross Franklin No. 3, located in the NW. $\frac{1}{4}$ SE. $\frac{1}{4}$ NW. $\frac{1}{4}$ section 30, was completed October 10, 1918, as a 10 barrel well. The sand was found from 1,255 to 1,263 feet but the well was drilled to a total depth of 1,435 feet.

Other operators in this field, besides L. C. Butler, are Dame-Pringle and the Devonian Oil Company. The present production from this area is about 20 barrels a day.

COLE FIELD

The first wells drilled in the Cole field were gas wells. M. J. Sullivan, et al., completed their H. Smith No. 1 well in the NW. $\frac{1}{4}$ NE. $\frac{1}{4}$ section 10, August 7, 1914, for a big gas well. The sand was found from 1,475 to 1,485 feet. On August 14, 1914, the same company brought in a 20-million cubic foot gas well in the center of the NW. $\frac{1}{4}$ section 10.

M. J. Sullivan and Litchfield brought in the discovery oil well on the Charles Davis farm in the SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ section 11 in the early summer of 1914. The sand was found at 1,610 to 1,630 feet and the initial production was about 300 barrels. The gravity of the oil was 35.4°. Charles Davis No. 2 produced 700 barrels natural from a sand found at 1,593 to 1,621 feet.

The initial production from wells in this area ranged from 40 to 125 barrels. The present production from the pool is about 70 barrels daily.

COODY FIELD

This field, located in section 19, was largely drilled by the Coody Oil Company in 1909 and 1910. The first well drilled was a rank wild-cat and few people even knew about it until long after it was completed. There are no records available regarding the history of the development of this field. The production from this area is about 10 barrels a day at present. A large part of the production is now owned by the Tidal Oil Company.

HASKELL FIELD

The Haskell field is located in sections 29, 30, and 31. The discovery well was drilled by the Fay Drilling Company, contractors for Brown, et al., on the Aggie Lees farm in section 29. The well was completed December 3, 1915, from a sand found from 1,393 to 1,410 feet. The present production from this pool is about 15 barrels a day.

JOLLY-PATTON FIELD

This field was discovered in August, 1920, by H. L. Jolly and John Patton. The first well was drilled on the J. L. Compton farm in the NW. cor. of section 8. The sand was found from 662 to 674 feet and produced 150 barrels initially. Following the discovery, 14 wells were completed as producers. Most of the development came in the fall of 1920 as several dry holes were drilled which caused operations to be shut down.

Interest was renewed in April, 1926, when C. M. Bradley and John Heinigman brought in a 150 barrel well on the Riley farm in the SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ SW. $\frac{1}{4}$ section 5. It was drilled to a total depth of 718 feet with 16 feet of Timber Ridge sand. The Muskogee sand

overlying the Timber Ridge sand had only a showing of oil in this well while other wells in this area produce from both the Muskogee and Timber Ridge sands. This part of the field is an extension of the original Jolly-Patton field and is locally called the Bradley pool. The Muskogee sand is found at about 675 feet; its average thickness is 12 feet and after a 20 foot break, 10 feet of Timber Ridge sand is found. Riley No. 3 and No. 12 were drilled through the Wilcox sand which showed water. In September, 1927, 16 wells had been drilled but the maximum production was obtained in August, 1927, when 280 barrels of oil were produced daily.

The field was recently extended into section 6 by the discovery of oil in the 500 foot sand. The Hale-Ford Oil Company drilled the discovery well in the SE. $\frac{1}{4}$ SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ section 6 on the N. I. Clark farm. The well was commenced January 30 and completed February 4, 1928, and flowed 150 barrels a day natural of 43° gravity oil. A log of the well follows:

Hale-Ford Oil Company, N. I. Clark No. 2.

Elevation 550 feet.

Formation	Top	Bottom	
Soil	0	20	10" casing at 20'
Sand	20	30	
Shale	30	40	
Sand	40	43	
Shale	43	320	8 1/4" casing at 851'
Lime	320	325	
Shale	325	375	
Lime	375	380	
Slate	380	438	
Lime	438	475	
Sand	475	489	
Shale	489	512	
Oil sand	512	532	Total depth

Throughout Muskogee County there appears to be a limestone in the Winslow formation which is used as a marker by drillers, and is found locally at a depth of approximately 400 feet. The producing sand in this area has been found about 100 feet below the top of this lime.

This area has been called "Little Seminole" locally although there is nothing analogous between it and the Seminole fields.

KEEFETON FIELD

The Keefeton field is located in section 14, about a mile northwest of the town of Keefeton, and is a gas area. The Herbert Oil Company drilled the discovery well on the Charlie Jordan farm, the well being completed December 24, 1925. The producing sand was found from 748 to 759 feet, and it is estimated that the well produced 12 million cubic feet of gas initially.

LINK FIELD

This field consists of a few wells in sections 32 and 33. The discovery well, located in the SE. $\frac{1}{4}$ SE. $\frac{1}{4}$ section 32, was completed June 1, 1927, by the Link Oil Company. The initial production was 90 barrels a day from a sand found from 2,044 to 2,052 feet. The north offset to this well was dry, while the offset east was completed by the Future Oil Company as a 100 barrel well. A well southeast of the discovery well in the NW. $\frac{1}{4}$ SW. $\frac{1}{4}$ section 33, is a dry hole. The present production from the area is about 25 barrels a day.

MUSKOGEE FIELD

The accompanying production map will show the approximate area of the Muskogee field which is the oldest and one of the largest in the county. Muskogee townsite was first developed in 1894 by a company drilling for the Cudahy Oil Company at which time small production of light oil resulted but the discovery was not followed up until 1904 because of the difficulty of securing good titles. During that year between 30 and 40 wells were drilled in the southern part of the present townsite, near the Missouri, Kansas, and Texas Railroad tracks. The wells were all small producers of high grade, amber colored oil of 42° gravity. The Muskogee sand was found in these wells at about 1,050 feet. By 1905 the pool had been fairly well tested out and operations began to slacken.

About 1906 the field was extended to the southwest and drilling continued for several years in spite of the spottedness of the production. Practically one-third of all the wells drilled were gas producers; these were irregularly distributed over the field.

During 1913 the Muskogee field produced almost one-half million barrels of oil; now the field is producing about 225 barrels a day. In 1913 the Prairie Pipe Line Company ran 1,500 to 1,600 barrels a day from their leases; now they are running about 21 barrels a day.

The depth of the Muskogee sand, which is the main source of production, varies from about 1,000 feet on the top of the structure to 1,750 on the south side of the field. The Timber Ridge sand is found below the Muskogee with an interval of only a few feet of shale between them. The Wilcox sand should be found from 625 to 675 feet below the top of the Muskogee sand and the Turkey Mountain sand about 200 feet below the Wilcox. The Wilcox in the Gypsy Oil Company Maud Sanders No. 27, located in the NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 34, T. 15 N., R. 18 E., was found at approximately 1,655 feet, and initially produced 4,552,860 cubic feet of gas with a rock pressure of 750 pounds. Discovery of Wilcox production in this area opens up future possibilities.

The principal operators in this field are: Arthur Oil Company, Gypsy Oil Company, Prairie Oil and Gas Company, Paraffin Oil Company, the Tidal Oil Company, and the Jolly-Ogg Oil Company.

PETERSON FIELD

The first well in this pool was a gas well drilled by the Caney River Gas Company. It was brought in July 7, 1916, with an initial production of 30 million cubic feet of gas and a rock pressure of 380 pounds, on the John Howard farm in the NW. $\frac{1}{4}$ SW. $\frac{1}{4}$ section 19.

The north offset to the discovery well was the C. L. McMahon Harrison No. 3, located in the SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ section 19. It was completed with an initial production of 11 million cubic feet of gas per day from a sand found from 680 to 692 feet. C. L. McMahon well No. 4 in the SE. $\frac{1}{4}$ NW. $\frac{1}{4}$ section 19, made 12 million cubic feet of gas from a sand found from 705 to 710 feet and C. L. McMahon No. 6 made 13 million cubic feet of gas from a formation found from 660 to 672 feet.

The first oil well was the C. L. McMahon Nellie Harrison No. 5 located in the center of the NW. $\frac{1}{4}$ NW. $\frac{1}{4}$ section 19, in which the sand was found from 1,208 to 1,218 feet and initially produced 10 barrels of oil on February 16, 1917. A 50 barrel well was brought in September 20, 1917, by the Terra-Okla Oil Company in the cen. SW. $\frac{1}{4}$ section 16. The sand was found from 1,302 to 1,312 feet. The Terra-Okla Oil Company No. 2 in the SW. $\frac{1}{4}$ SW. $\frac{1}{4}$ section 16 was completed November 13, 1917, and produced 25 barrels initial production from a sand at 1,307 to 1,315 feet. The largest well in the field was John Harrison No. 3, drilled by Carr Peterson and others in the NE. $\frac{1}{4}$ SE. $\frac{1}{4}$ SE. $\frac{1}{4}$ section 17, which was completed for 950 barrels on March 7, 1918. The sand was found from 1,212 to 1,214 feet.

The present production from this pool is about 50 barrels daily. The operators are; Roxana Petroleum Corporation, Devonian Oil Company, and Carr Peterson.

ROBINSON FIELD

Eddie Robinson in the fall of 1914 opened this field by completing a well on the June Jackson farm with an initial production of 750 barrels. This well was located in the cen. SE. $\frac{1}{4}$ SE. $\frac{1}{4}$ section 13. At the end of two years this well was still producing 150 barrels a day natural but later deepening brought water into the hole which drowned out the oil. The sand was found from 1,325 to 1,343 feet. In a sand from 1,080 to 1,108 feet, 2 million cubic feet of gas was found. Quite a number of wells were drilled around the discovery well but no wells were completed as producers; however, in section 18 the Commercial Land Company drilled two wells which made about 12 barrels each initially from the Muskogee sand found from 1,310 to 1,328 feet. These wells have held up very well. In 1915 Dr. Clark drilled a well in the NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ section 19 which was completed for 800 barrels from 1,256 to 1,274 feet. Several other wells have been drilled in this area, the last one being completed in the spring of 1922.

These wells produce 41° to 42° gravity oil with a small amount of water. Sufficient gas is produced with the oil for lease purposes. The Muskogee Oil Corporation is the only operator and is now producing about 5 barrels a day.

SHEPPARD FIELD

The Sheppard field found in sections 11, 12, and 15 was discovered by the Penn-Wyoming Oil Company. This company completed a well on June 7, 1917, in the NW. cor. NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ section 14 on the Si Dan farm. The initial production was 600 barrels of 34.9° gravity oil from a sand found from 1,968 to 1,989 feet. Si Dan No. 3 in the NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ NW. $\frac{1}{4}$ section 14, a direct offset west of the discovery well, made 250 barrels from a sand from 1,940 to 1,960 feet on July 26, 1917. Penn-Wyoming, Si Dan No. 6 produced 100 barrels from a sand found from 1,954 to 1,985 feet. This well was completed December 13, 1918. In the Penn-Wyoming, H. Sandy No. 1, SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ NE. $\frac{1}{4}$ section 15, the sand was found from 1,961 to 1,982 feet, and the well produced 50 barrels the first day.

SOMMERVILLE FIELD

The discovery well was the only oil well in the field. It was drilled by W. R. Sommerville on the E. Warrior farm in the NE. cor. section 17. This well produced 375 barrels, September 9, 1926, but was plugged by January 1, 1928. The sand was found from 1,439 to 1,450 feet. A well completed January 13, 1927, in the SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ NE. $\frac{1}{4}$ section 17, by Sommerville made 2 million cubic feet of gas from a formation found from 1,260 to 1,278 feet and made 50 million cubic feet of gas with a rock pressure of 545 pounds from a sand at 1,433 to 1,434 feet. Jolly-Ogg, Lewis No. 2 in the NW. $\frac{1}{4}$ SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ section 17 was completed February 17, 1927, producing 28.8 million cubic feet of gas with a rock pressure of 450 pounds from a sand found from 1,382 to 1,393 feet. These two wells were the largest in the field. The maximum production of the field reached approximately 100 million cubic feet of gas daily. The operators are; W. R. Sommerville, et al., Jolly-Ogg Oil Company, and H. E. Williams.

SUMMERS FIELD

In the latter part of 1914, W. B. Pine drilled the discovery well in the NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ SW. $\frac{1}{4}$ section 36. The east offset was dry. February 11, 1916, W. B. Pine brought in his Glen Franklin No. 2, a short location south from the discovery well. The sand was found from 1,443 to 1,445 feet and the initial production was 300 barrels. The Pine well in the center of the W. $\frac{1}{2}$ SE. $\frac{1}{4}$ section 35, produced 50 barrels a day for a long time. W. B. Pine, G. Franklin No. 4, located in the NW. $\frac{1}{4}$ SW. $\frac{1}{4}$ section 36 made 400 barrels. W. B. Pine on the Z. Franklin in the SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ section 36 produced 580 barrels from a sand found from 1,456 to 1,477 feet. D. Canada No. 2 in the NE. $\frac{1}{4}$ section 35 was brought in September 6, 1917, with an initial production of 800 barrels. The sand was found from 1,441 to 1,464 feet. This field now produces about 75 barrels a day.

TERRA-OKLA FIELD

The Terra-Okla Oil Company completed its V. Sango No. 1 in the NE. $\frac{1}{4}$ SE. $\frac{1}{4}$ section 29 on June 26, 1919; the sand was found from 1,774 to 1,786 feet with an initial production of 200 barrels. The next well to be completed was the Transcontinental Oil Company, E. Sango No. 3 in the NW. $\frac{1}{4}$ NW. $\frac{1}{4}$ section 28, producing 250 barrels on August 9, 1919, from a sand found from 1,744 to 1,754 feet. On the same date the Oklahoma Producers and Refiners Corporation completed its E. Sango No. 1 in the NE. $\frac{1}{4}$ SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ section 29, with an initial production of 75 barrels. The sand was found from 1,747 to 1,756 feet. M. M. Brown drilled a 600 barrel well in the NW. $\frac{1}{4}$ SW. $\frac{1}{4}$ section 28 on the S. Sango farm. This well was completed on September 27, 1919. Link Oil Company, E. Sango No. 4 was a direct offset to this well, being located in the SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ section 28, and was completed October 18, 1919, with an initial production of 1,400 barrels and was the largest well in the field. The sand was found from 1,789 to 1,807 feet. Link Oil Company, E. Sango No. 3, located in the NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ section 28, was completed the same date as a 500 barrel well with the producing sand from 1,773 to 1,795 feet. At 1,768 feet 2 million cubic feet of gas was found.

Most of the development had been completed by the summer of 1920. The gravity of the oil was about 39° A. P. I. The present production from this area is approximately 80 barrels a day. The main operators are the Link Oil Company, Fay Drilling Company, and Culp, et al.

TIMBER RIDGE FIELD

J. B. Schoenfelt drilled the discovery well about January, 1910, on the W. Harjo farm in the SE. $\frac{1}{4}$ section 11. The second well was a gas well drilled by H. Van Smith in the NW. $\frac{1}{4}$ section 13. Development of this field was practically completed by 1912. The initial production of the field was approximately 800 barrels a day but has since declined to about 20 barrels a day. Individual wells produced from 50 to 250 barrels when first completed.

The Bad Hole sand is found from approximately 1,385 to 1,407 feet, the Muskogee sand from about 1,480 to 1,510 feet, and the Timber Ridge sand from about 1,540 to 1,560 feet. A good gas sand is also found from 1,050 to 1,100 feet.

The principal operators in this field are the Prairie Oil and Gas Company and the Tidal Oil Company.

TRANSCONTINENTAL FIELD

This area was discovered by J. S. McCutcheon, who completed B. Fulsom No. 1, located in the SE. $\frac{1}{4}$ NE. $\frac{1}{4}$ NE. $\frac{1}{4}$ section 7 for a 75 barrel well October 3, 1918. The sand was found from 1,863 to 1,878 feet. Other good wells were drilled in this pool with an initial production of 50 to 100 barrels each.

WAINWRIGHT FIELD

The discovery well in this area was a gas well. The first oil well was drilled in the SE. $\frac{1}{4}$ SE. $\frac{1}{4}$ section 16 by the Bell Oil Company. The sand was found from 1,910 to 1,930 feet and produced 500 to 600 barrels natural. This well was drilled in 1910. Development of the pool immediately followed; three good wells were completed, all of which made over a hundred barrels each. However, present production is very small.

YAHOLA FIELD

April 4, 1918, the Lucky Star completed its Doyle No. 2 in the SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ NW. $\frac{1}{4}$ section 27. This well made 20 barrels from a sand found from 1,605 to 1,675 feet. About 25 producing wells have been drilled in this field, of which approximately half were gas wells. The gas wells produced from 4 to 10 million cubic feet of gas per day when first completed and the oil wells each initially produced 25 to 30 barrels a day.

FUTURE POSSIBILITIES

In the writing of this report very little detailed work has been done in the field or on the correlation of the producing sands. For this reason it is not definitely known how many wells have been drilled to the Wilcox or Turkey Mountain sands, but it is quite certain that these sands have not been thoroughly tested in all parts of the county. There are also several shallow sands which were drilled through hurriedly which had a show of oil but were not shot or thoroughly tested.

It is possible that production throughout the county might be stimulated by repressuring some of the older producing sands or by other methods used for increasing the percentage of recovery from producing formations. It is believed that at least some of the fields herein described are suitable for the installation of such methods, although local sand conditions may be found unsuitable.