

OKLAHOMA GEOLOGICAL SURVEY

Chas. N. Gould, Director

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OIL AND GAS IN OKLAHOMA

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FOREWORD

The present volume, Bulletin 40, Volume I, of the Oklahoma Geological Survey, includes seven papers which have been published during the years 1926, 1927, and 1928, as separate chapters.

Bulletin 40 of this Survey is a revision of Bulletin 19, part II, entitled, "Petroleum and Natural Gas in Oklahoma," which was issued in 1917. On account of the rapid development of the oil and gas industry in this State, it has been found necessary to revise this bulletin and bring it up to date. On account of the fact that appropriations for carrying on this work were lacking, the Director called to his aid a number of working geologists throughout the State and these individuals have contributed freely of their time and efforts to the preparation of the manuscripts, which when completed will include about fifty separate chapters in all.

The greater number of the chapters are concerned with the geology and oil conditions of a single county or group of counties in Oklahoma. These will be published as Volume II, and Volume III of Bulletin 40, Volume II dealing with the counties in western Oklahoma and Volume III dealing with the counties in the eastern part of the State.

The seven papers included in Volume I, published herein, are those of a general nature dealing with certain phases of geology and of the oil industry throughout the entire State. These papers with the dates of their publication were as follows:

Bulletin 40-B, Subsurface Distribution and Correlation of the Pre-Chattanooga ("Wilcox" sand) Series of Northeastern Oklahoma, by Luther H. White, June, 1926.

Bulletin 40-D, Subsurface Stratigraphy of Western Oklahoma, by Frank C. Green, September, 1926.

Bulletin 40-G, Petroleum Geology in Oklahoma, by Sidney Powers, December, 1926.

Bulletin 40-J, Pennsylvanian Paleography, by Robt. H. Dott, March, 1927.

Bulletin 40-P, Structural Trends in Southern Oklahoma, by LaVerene Decker, July, 1927.

Bulletin 40-AA, Oklahoma Petroleum—An Industrial Survey, by Charles E. Bowles, March, 1928.

Bulletin 40-Q, Digest of Oklahoma Oil Fields, by Mrs. Bess-Mills-Bullard, June, 1928.

Both the authors of the various papers and the staff of the Survey realize very keenly that these chapters do not represent the last word on the various subjects discussed. New data are constantly coming to light, necessitating the revision of former ideas. However, we believe that the facts as herein set forth represent our best information of the date of publication.

July 1, 1928

CHAS. N. GOULD
Director

Volume I

PETROLEUM GEOLOGY IN OKLAHOMA

By

Sidney Powers

INTRODUCTION

This paper traces the history and development of petroleum geology in the State of Oklahoma. The first portion discusses the geologists who came in order of their arrival and the second part traces the discovery and development of oil fields in the petroleum industry treated chronologically.

HISTORY

The first geologist to engage in commercial petroleum work in what is now Oklahoma was H. B. Goodrich who went from Houston to Ardmore in 1903 for the Santa Fe Railway Co. Mr. Goodrich commenced his petroleum work in a consulting capacity in New Brunswick in 1899 where he located the Stony Creek gas field and an oil well at Pre d' en Haut, St. Joseph's College. He has been engaged exclusively in commercial work ever since. He was attracted to Indian Territory by reported seepages and later read Eldridges's report¹ on oil seepages.

He located the first Santa Fe (now Coline Oil Co.) well at the prolific Wheeler oil seepages in May, 1904. This well encountered mechanical difficulties and did not strike gas until the fall of 1904. In other wells drilled during the next year oil was found at shallow depths before the discovery of Glenn Pool and the oil field still produces. A commercial supply of gas was developed and a pipe line to Ardmore was completed in 1907 before the piping of gas to Oklahoma City.

Mr. Goodrich remained with the Santa Fe until 1910 doing some consulting work for other clients. From 1910 to 1911 he was in Bolivia exploring for oil. He made a report on the Cushing field for the U. S. Bureau of Mines in 1913-14, which was not published, and was engaged with the Dundee Petroleum Co., during the development of the Healdton field in 1915, moving to Tulsa and re-entering consulting practice in 1915.

Scientific geological work in Indian Territory by the U. S. Geological Survey under the direction of J. A. Taff and others play-

1. Eldridge, G. H. The asphalt and bituminous rock deposits of the United States: U. S. Geol. Survey, 22nd An. Report, pt. 1, pp. 209-452, 1901.

(This report originally issued as Bulletin 40-G, December, 1926).

ed an important part in directing the attention of early commercial work to the southeastern portion of Oklahoma where a number of anticlines similar to the Appalachian folds of the Pennsylvanian and West Virginian oil fields were mapped. Oil sands crop out in the Ouachita Mountains near Redden in Atoka County and Jumbo in Pushmataha County; and gas seepages occur in the folded Pennsylvanian strata at Soda Springs in sec. 35, T. 12 N., R. 17 E., east of Checotah, and on Ash Creek 15 miles northeast of McAlester, yet only gas has been produced in this highly folded region.

The second important scientific contribution to Oklahoma geology was by the Oklahoma Geological Survey founded by Chas. N. Gould in 1908. Reports prepared by instructors and students of Oklahoma University and published by this Survey had a direct bearing on the development of Cushing, Newkirk, Ponca City, and other oil fields. Reports by the Federal Survey, also aided in the development of Glenn Pool, Healdton, Billings, Bristow, the Osage, and other fields. General descriptions of Oklahoma oil fields were published by the Oklahoma Geological Survey (Bull. 2, by L. L. Hutchison in 1911; Bull. 19, pt. 2, by C. W. Shannon et al, 1917), by the Federal Survey (Bull. 531 b, by R. H. Wood, 1913), and by L. C. Snider (Petroleum and Natural Gas in Oklahoma, Oklahoma City, 1913; Oil and Gas in the Mid-Continent Field, Oklahoma City, 1920).

Among the scientific workers in Oklahoma who later engaged in commercial work are M. J. Munn, Carl D. Smith, Robert H. Wood, and Everett Carpenter of the Federal Survey, and Chas. N. Gould, Pierce Larkin, L. L. Hutchison, D. W. Ohern, Frank Buttram, Irving Perrine, Chas. H. Taylor, L. C. Snider, and many others of the State Survey.

Mr. Gould commenced teaching at Oklahoma University in 1900 and engaged in consulting work during summer vacations, beginning in 1906 in the area between Muskogee and McAlester, part of which had been mapped previously by J. A. Taff for the Federal Survey. I. C. White checked this work for the Deming Investment Company the same summer. Mr. Gould resigned from the State Survey in October, 1911, and was employed by the Mid-Continent Co., detailing the Poteau gas field structure. During the summer of 1913 he was engaged in a consulting capacity by the Wichita Natural Gas Co., (now the Empire Gas and Fuel Co.) for one year, and on August 1st, he employed Everett Carpenter as Chief Geologist and several other geologists including J. Russell Crabtree. Mr. Gould and Mr. Carpenter visited a shallow gas well at Augusta, Kansas, in 1913, and outlined the Augusta anticline. They also saw the El Dorado anticline. Mr. Crabtree mapped in detail the latter anticline which had been discovered previously by Professor Erasmus Haworth of Kansas University. The dry hole drilled after the discovery was later offset by production.

L. L. Hutchison began his career as a petroleum geologist in the fall of 1906 when a senior at Oklahoma University and reported on the first oil well near Madill for the Deming Investment Company. He was engaged by them from time to time until the fall of 1907. In the summer of 1908 he assisted Dr. Gould in organizing the State Survey and was Assistant Director until the fall of 1910 when he moved to Tulsa. He opened an office as Consulting Geologist in the Robinson building, in the spring of 1911, and was the first geologist to locate in Tulsa. His first work there was for Grant Stebbins. He reported on the Cushing area for T. B. Slick when the discovery well was being started and his best known work was for the McMan Oil Co., in the Cushing field in February, 1913, locating the Drop-right dome. In 1912 he located the Haskell gas field. From July 1913 until 1915 he was an officer of the Kanola Oil Co., later the Kanola Oil & Refining Co.

Roswell H. Johnson was the second geologist to devote his time exclusively to petroleum exploration in Oklahoma. He maintained an office as consulting geologist in Bartlesville from the summer of 1908 until 1912. He was the first geologist to advertise in Oklahoma although Goodrich, Clapp, and others had advertised elsewhere. Among Mr. Johnson's clients were the Sagamore Oil Co. (owned by his father) and its successor, the Central Fuel Oil Co. He located the Red Oak, Latimer County, and Legal, Coal County, gas wells north of the Choctaw fault and in the area previously mapped by Taff.

Pierce Larkin, originally of the class of 1906, was one of the first students of Oklahoma University to enter petroleum geology. He started commercial work at Durant in October, 1908, and located the Ada gas field, now producing oil as well as gas, in June, 1909. He was engaged exclusively in consulting petroleum work from 1909 to 1912, with headquarters in Norman and since 1913, in Tulsa. Among his clients have been the McMan Oil Co. and the Prairie Oil and Gas Co. The extensive holdings of the McMan Oil Co. at El Dorado, Kansas, were secured on his recommendations. The Roberson field was located on his geology.

Hans Hirschi, then Chief Geologist for the Royal Dutch interests, came to Bartlesville in 1910 to report on the properties of the Barnsdall Oil Co., which were offered for sale. His report was not acted upon and the Royal Dutch did not enter the Mid-Continent field until 1912. Dr. Hirschi resigned in 1910 and returned to Bartlesville in the fall of 1911 as Chief Geologist for the Union des Pétroles d'Oklahoma (Oklahoma State Oil Co., Oklahoma Producing and Refining Corp.). He was in Oklahoma at various times from 1911 to 1913. Under his direction the first oil well south of Tiger Flats was drilled in sec. 1, T. 10 N., R. 11 E., finding a considerable volume of gas, but only about 10 barrels of oil.

Ed. Bloesch and Emil Kluth came to Bartlesville with Dr. Hirschi in 1911, and therefore the latter is entitled to the credit of estab-

lishing the first geological department for an oil company. Their principle work was between the Kansas line on the north and Stigler and Wewoka on the south and several oil fields were developed on the anticlines which they mapped. Dr. Bloesch became Chief Geologist in 1913 and resigned in 1915 to enter consulting work in Okmulgee and later in Tulsa. Mr. Kluth later became Chief Geologist of the Minnehoma Oil Co. in Tulsa and since 1922 has held a similar position with the Geo. F. Getty interests in Los Angeles. Dr. Otto Fischer came to Tulsa in 1913 for the Oklahoma State Oil Co. and was their Chief Geologist from 1915 until 1918. For the next five years he was associated with Dr. Bloesch in consulting work and then moved to West Virginia.

W. S. Vandruff and his son, Ross E. Vandruff, originally from Waynesburg, Penn., were associated in petroleum geology from 1903 until the death of the former in 1922. In 1910 they located the Limestone Run Oil Pool in Jefferson Co., Ohio, for Mr. Carnill, the founder of the Hill Oil and Gas Co., and in 1911, they came to Oklahoma for that company. After inspecting the country from trains they made more detailed sections from Kellyville through Olive to Cushing and in March, 1911, mapped the Shamrock dome of the Cushing field, prior to the location of the Shaffer and Smathers discovery well, using a five foot contour interval. The Hill Oil and Gas Co. sold their extensive holdings at Shamrock to Cosden and Co., in 1916. The Vandruffs later worked in the Yale area for B. B. Jones, discovered a dome northwest of Hominy (sec. 8, T. 23 N., R. 8 E.), and mapped the Blackwell anticline. Their subsequent work was done in California.

Early in 1912, Dr. J. Erb, then Chief Geologist for the Dutch Shell, inspected the Mid-Continent field and in July, 1912, A. W. Lauer was employed by Peter Kruisheer, the mechanical engineer in charge of their exploration. Mr. Lauer reported on properties in the shallow fields offered for sale. He returned to college in the fall and in 1913 went to Mexico for them. Their next geologist was R. A. Conkling, employed by them at the Hague in 1914, while Dr. Erb, G. D. Van Wyjk and E. Blumer made trips to Oklahoma. Mr. Conkling was Chief Geologist for the Roxana Petroleum Corp. for a number of years and is now engaged in consulting work.

J. H. Jenkins, who had been employed by W. T. Griswold, F. M. Flutehinson, and E. W. McCrary, Consulting Geologists in Marietta, Ohio, came to Tulsa in October, 1912, for W. T. Griswold, but soon began consulting work and checked the Billings dome for the Midco Petroleum Co. He was their Chief Geologist for many years and is now vice-president of the Tidal Oil Co., at Fort Worth, Texas.

F. G. Clapp, who had opened an office as Consulting Geologist in Pittsburgh, Pa., in 1908, came to Oklahoma in the fall of 1912

and spent the winter making a reconnaissance survey of the eastern Osage and of portions of Rogers, Washington, and Tulsa counties. This work was done for subsidiaries of the Bartlesville Zinc Co. In 1916 and 1917 he made an extensive survey of Grady, Garvin, and adjacent counties. He mapped the structure and predicted production of the Kilgore, Cement, and Two-Four (Stephens Co.) fields.

The year 1913 marked the permanent establishment and recognition of petroleum geology in the Mid-Continent field although many operators still retained their hostile attitude. E. W. McCrary, who arrived Jan. 1st, organized for Guffey & Gillespie the first geological department in Tulsa and introduced the method of plane-table mapping which was developed by W. T. Griswold and others of the U. S. Geological Survey in the Appalachian field. Mr. McCrary had been engaged in consulting work in Marietta, Ohio, since 1908, and did the first commercial plane-table mapping in West Virginia that year. In 1910 he mapped the Salt Creek, Wyoming, anticline. He mapped the Billings anticline and several other fields and mapped the domes which comprise the Cushing anticline. Besides being Chief Geologist for Guffey & Gillespie he also did consulting work until 1920, and was Chief Geologist for the Tidal Oil Co. from then until 1925, when he resigned to become an independent operator.

M. M. Valerius opened an office as Consulting Geologist at Sapulpa in January, 1913, and worked in the Cushing field. After spending a few months at the Missouri School of Mines, he joined V. H. McNutt in partnership in July, 1913, with offices in the Clinton Building, Tulsa. V. H. Hughes joined the partnership a year later. This partnership lasted several years and work was conducted in the Rocky Mountain states as well as in the Mid-Continent. Mr. McNutt came to Tulsa in May 1913. These three geologists are still engaged separately in consulting work and as independent operators.

F. Julius Fohs resigned from the Kentucky Geological Survey in 1912, and James H. Gardner resigned from the Pennsylvania Geological Survey the same year to engage in commercial petroleum geology at Lexington, Kentucky, but their engagements took them elsewhere and Mr. Fohs made a trip to Tulsa in the spring of 1913. He was so favorably impressed with the opportunities that he returned to Tulsa and the Lexington office was closed. Mr. Gardner joined him in Tulsa in the fall of 1913. This successful partnership of Fohs and Gardner lasted several years. One of the important developments which they instigated was the discovery of the Boynton oil field in 1914 for A. E. Humphreys. They also prepared the first correlation chart of Oklahoma oil sands, published by the Fuel Oil Journal, August, 1914. In 1917 the discovery well at Billings was drilled on the recommendation of Mr. Fohs.

Mowry Bates came to Tulsa late in 1913, and worked as a tool-dresser. He was employed by the Gypsy Oil Co. a year later and

was transferred to Shreveport early in 1915. He returned to Tulsa in partnership with Dorsey Hager in 1916. This partnership was dissolved in 1917. From then until his death in November, 1926, Mr. Bates was engaged in consulting work first in Tulsa and later in California.

D. W. Ohern and Frank Buttram resigned from the Oklahoma Geological Survey in the fall of 1913, and joined the Fortuna Oil Co., early in 1914. The conspicuous success of this company was based on geology and it opened the Yale, Cement, Morrison, Ripley and Ingalls oil fields and Cushing gas field. During the summer of 1912 Dr. Ohern had done consulting work, but most of his summers prior to 1914 were spent in mapping areal and structural geology for the Federal and State Surveys. His maps were a stimulus to the development of several oil fields. Mr. Buttram made a planetable survey of Cushing for the State in 1913. After the sale of the Fortuna Oil Co. to the Magnolia Petroleum Co., in 1920, Mr. Buttram organized the Buttram Petroleum Co., and Dr. Ohern the Borealis Oil Co.

Irving Perrine, then a professor at Oklahoma University, was employed part of the summer of 1913, by E. W. Marland and others and continued to do consulting work intermittently until he became Chief Geologist of the Pierce Oil Corp., in 1915. The geological department of the Marland interests, whose work has been influential in furthering the interests of petroleum geology, was subsequently headed by L. E. Trout, F. P. Geyer, Fritz L. Aurin, and Glenn C. Clark in succession. Mr. Perrine has been engaged in consulting work since 1917 and is now associated with W. C. Kite in Oklahoma City. Mr. Perrine discovered the Walters gas field.

Consulting geologists were in great demand in 1913, for at this time operators began to appreciate the value of structure mapping. In 1914 the word "structure" was used for the first time by oil operators. This was due partly to mapping of the Cushing anticline.

Dorsey Hager came to Tulsa from California in the fall of 1914 and later entered into partnership with Mowry Bates. Mr. Hager mapped the block of acreage owned by Bert Garber and others now occupied by the Garber field for the Chanute Refining Company. The Sinclair Oil & Gas Company drilled the discovery well. The detail work was done by Ben C. Belt and Huntsman Haworth. Dilworth S. Hager, in the employ of Hager and Bates, discovered the Virgil field, Kansas. Dorsey Hager's "Practical Oil Geology" was published in April, 1915, and has passed through several editions.

Carl D. Smith, one of the pioneers in Oklahoma geology, began commercial work for the Roma Oil Co., in the fall of 1914, and discovered the Josey field northeast of Cushing, detailed by W. Z. Miller. Subsequently the March, Mannford, and Masham fields were opened on his geology.

The most important events of 1913 for the furtherance of petroleum geology were the organization of geological departments on August 1st, by the Gypsy Oil Co., under M. J. Munn, and by the Empire Gas and Fuel Co., under Everett Carpenter. Mr. Munn had already engaged Jerry Newby and R. E. Garrett and soon had a large staff mapping surface structure. They ran elevations of section corners and important outcrops with planetables and mapped detailed structure with aneroid barometers. Mr. Munn had the good fortune to recognize the dome on the Boston lease in the Osage and to delimit the Cushing field where the Gypsy secured extensive leasehold in the south end of the Drumright district. Their purchases at the first "Osage sale" were on his recommendations. His department mapped many of the folds which have since become oil fields, including the Fox field. The department expanded to 30 men in the fall of 1914, and their work became the incentive for many Oklahoma oil companies to employ geologists in 1915. Among the earlier employees of the Gypsy were J. J. Victor, Frank Bryan, Harry F. Wright, and A. P. Wright.

The Empire Gas and Fuel Co. began planetable work in Kansas in 1913. Discovery of oil at Augusta in June, 1914, and at ElDorado in 1915, resulted from this mapping. The enormous holdings of the Empire Gas and Fuel Company on this anticline led to too great enthusiasm regarding the limitations of geology and the geological department grew by leaps and bounds to over 250 members, including 100 geologists, in 1917, scattered throughout the Mid-Continent region. This was the largest group of geologists ever brought together under one organization. Colleges and universities were combed of their graduating classes for geological students and planetable mapping was taught in training camps. Among the contributions to petroleum geology made by this department, as well as impressing oil operators with the importance of geology, were the establishment of a separate department for subsurface work with microscopic study of drill cuttings and research pertaining to petroleum largely under the direction of A. W. McCoy. Mr. McCoy is credited with the discovery of the South Duncan field in 1919. The sudden growth of this enormous organization with inexperienced and inadequately supervised men led to the completion of an enormous amount of reconnaissance mapping, much of which was done over again in later years. The hundreds of young men trained at the expense of the Empire were ultimately scattered in consulting work and throughout the many companies which now employ geologists.

Geologists came to Oklahoma in great numbers in 1914 and subsequent years, and it is impossible to mention individuals in the subsequent history. Of greater importance is their role in the discovery of oil, and this phase of geological work and the evolution of geological thought is taken up chronologically in the following pages.

RELATION OF GEOLOGY TO OIL PRODUCTION

Geology can be said to have been recognized by Mid-Continent operators as an aid to the discovery and development of new fields during the year 1913. At this time the principal oil fields were Glenn Pool and the "shallow" fields of Washington, Nowata, Tulsa, Muskogee and Okmulgee counties and along the eastern line of Osage County. This production was almost entirely from broad sand lenses—sheet sands—in which petroleum accumulation depended on the character and extent of the reservoir rock and not on geological structure either at the surface or underground; in fact, the productive sands near the base of the Pennsylvanian are locally absent from the summit of anticlines, especially where the sand rests almost directly in contact with the disconformable surface of the "Mississippi lime."

The Cushing field was discovered in March, 1912, without the aid of geology, on a very large surface and subsurface anticline embracing subsidiary domes and saddles. Development of the field was very active during 1913, and by August the producing area was nine miles long and three miles wide. The Boston pool in the Osage north of Cleveland was developed in the fall of the same year by the Gypsy Oil Company, and the discovery well was found to have been located by chance on a surface anticline. Geologists were able to predict the limits of production of Cushing, the Boston pool, and the Kennedy and Springer pool (discovered on geological work by W. S. and R. E. Vandruff) west of Hominy in the Osage and by so doing gained the confidence of the oil operators. The structure of these fields was taken as the type to be sought elsewhere, and as surface work was carried on from Cushing as a center many small domes and anticlines since productive were found in Osage County, a few were found west of Cushing, only one (Stroud) south of Cushing, and very few east of Cushing.

Production on the Newkirk anticline was opened in 1913 and this was the first oil field in the State discovered as the result of a published report and structure contour map. The Ponca City field was opened in 1910 without the knowledge that the discovery well was located on an anticline.

Healdton was discovered in August, 1913. Production is from thick sand lenses of Pennsylvanian age overlain by Permian red beds which gave very little clue from surface exposures to underlying structure.

The depth of producing wells had gradually increased from year to year. The Wheeler lime at Cushing, which was the deepest producing horizon in 1913, was found at a depth from 2,300 to 2,400 feet. The deepest dry hole in the State was the "California" well in the Wheeler field, drilled in 1909, to 3,612 feet.

During 1914 the development of deeper sands at Cushing which were discovered in December, 1913, and the proof by drilling that geological maps of surface outcrops delimited oil accumulation, gave further impetus to geological reconnaissance. This work was conducted largely by means of dips observed with the eye, or with hand levels, and aneroid barometers, but controlled in some cases by planetable elevations and even by planetable structure contour mapping. The Boynton field, a geological discovery, was the most active area outside of Cushing, but it was outstripped by Healdton late in the year. Oil was found at Bristow; a pumpjack at 3,467 feet, the record depth for Oklahoma, was completed at Blackwell as a result of geological work in the older, shallow gas field; the Ada gas field, a geological discovery, was extended; small wells were completed in the Allen pool of Pontotoc County (a sand lens) and in the Lawton pool (sand lenses on a very slight structure); Boston dome in the Osage was extended, and the Bixby field was opened by the Selby Oil & Gas Co.

In May, 1914, the Oklahoma Geological Survey published a structure contour map of the surface geology of the Cushing field prepared by Frank Buttram under the direction of D. W. Ohern and with the co-operation of M. J. Munn, J. R. Newby, and R. E. Garrett of the Gypsy Oil Co. This was the first published structure contour map of the field. The subsurface contours and the line separating oil from salt water paralleled the surface contours so closely that the operators were at once impressed with the value of geology and many of them employed geologists forthwith.

A flood of oil from Cushing, together with war conditions, reduced the price of oil to 40 cents a barrel in 1915. Healdton, with wells of 4,000 barrels initial production, helped to create the depression. Employment of geologists was always a barometer of the prosperity of the oil business. The discovery that geologists were not infallible in locating new fields together with the overproduction at Cushing, caused the first of many periodic reductions in the size of geological departments of large companies and in the amount of consulting work. After another ten years the operators became reconciled to these sudden changes from wonderful prosperity to slight profit and even loss, and stabilized their organization.

Cushing was extended over the Shamrock dome and Healdton to the southeast in 1916. The Fox field north of Healdton was opened by the Gypsy Oil Co., as a result of surface geological work; and as a result of geological mapping the Ingalls field west of Cushing was discovered by a well 3,485 feet deep, the deepest in the State. Garber structure was discovered, far in advance of production, by geological work done by Dorsey Hager, who came to Tulsa as a Consulting Geologist, in December, 1914. These developments gave another stimulus to surface geological work and structure contour

mapping with planetables and telescopic alidades became the accepted standard of work.

Until this time all of the oil produced in Oklahoma was supposed to have come from the Pennsylvanian rocks. Oil in the Permian at Garber dispelled the view held by some geologists that there was no oil in the Permian or west of a north-south line through Blackwell. The discovery of Ordovician² fossils at Healdton in November, 1916, when a producing well was "shot" in the oil sand, was the first proof of possible production from older rocks (although asphalt occurs in Ordovician strata in the Arbuckle Mountains) or of the complex underground structure now known as buried hills. The first use of microscopic fossils was made at this time to distinguish the Pennsylvanian from the Ordovician, and in 1917, a well at Healdton found oil several hundred feet below the stratum in which Ordovician fossils were found in this well.

Few wells in northeastern Oklahoma were carried below the "Mississippi lime" in the early days. The first producing well in what is now called the Wilcox sand (of Ordovician age) was drilled by the Eastern Oil Co., on their J. Berryhill lease in the SW. cor. NE. $\frac{1}{4}$ sec. 29, T. 17 N., R. 12 E., near the southwestern edge of Glenn Pool. It was completed Dec. 9, 1908, in sand from 2,331 to 2,369 feet, producing 120 barrels a day. For many years this sand was called "Sapulpa" or Mounds." The next Wilcox sand pool was opened by the Oklahoma Natural Gas Co., with their well No. 355, on Sept. 23, 1910, in SE. $\frac{1}{4}$ sec. 8, T. 20 N., R. 12 E., Osage County, producing 5 million cubic feet of gas a day. Oil was discovered on this lease in the Wilcox sand by the Sinclair Oil & Gas Co., on June 8, 1914.

The Tucker sand was found in the Cleveland pool by the Gypsy Oil Co., in their Brown 1, SE. cor. sec. 27., T. 21 N., R. 8 E., on April 15, 1912, and it is now known to be of Ordovician age, probably representing in part the Wilcox sand and in part the top of the underlying "Siliceous lime." Similar conditions are now known to exist in the Cushing pool where a small part of the Bartlesville sand is reworked Ordovician and where the Tucker sand is "Siliceous lime." The same is true in the Blackwell pool, discovered by Jones & Buell in the NE. cor. sec. 32, T. 29 N., R. 1 E., on Aug. 6, 1914.

A gas well, later deepened and made into an oil well, was completed by the Prairie Oil & Gas Co. in the Wilcox sand in sec. 35, T. 18 N., R. 12 E., in February, 1913. The Bixby field was opened by the Selby Oil & Gas Co. in the Wilcox sand on January 12, 1914, by an oil well in sec. 4, T. 16 N., R. 13 E., at a depth of about 2,000

2. The first man to discover the Ordovician fossils in the Healdton field was Dr. Powers, the author of this paper. It is my understanding that this was the first time that the occurrence of oil had been associated with Ordovician rocks in the State of Oklahoma.

feet. The name "Wilcox" was given to this sand from a well completed in this field in sec. 3, by H. F. Wilcox, on April 29, 1914.

Therefore, in the light of modern knowledge part of the Bartlesville sand which made Oklahoma famous throughout the world, and probably all of the Tucker is known to have been Ordovician. It is probable that over half of the ultimate production of Kansas and Oklahoma will come from Ordovician strata.

One of the milestones in the development of petroleum geology was the organization by Charles H. Taylor and E. L. DeGolyer then living at Norman, and J. Elmer Thomas then at Tulsa, of geologists into a group which later became the American Association of Petroleum Geologists. The first meeting was held at Norman in January, 1916. In 1926 the membership was about 1,700.

By 1917 the surface geology of northeastern Oklahoma had been investigated in more or less detail by a number of oil companies and consulting geologists. No more productive anticlines like Cushing were found and the history of the old fields, where accumulation of oil had little relation to the geological structure of rocks at the surface, had been forgotten. Geologists unfortunately decided that all the oil in Oklahoma should underlie surface anticlines; the supply of anticlines was rapidly giving out, hence a shortage of oil was imminent. The cry of "wolf, wolf" was raised all too soon. However, the estimation of petroleum reserves, both to conserve oil supplies and for taxation and valuation purposes became one of the fields into which geologists ventured. Estimation of natural reserves is a project which appeals to scientists who, in turn, are pessimists. Hence, the periodical warnings of the exhaustion of oil supplies in the United States, and especially in Oklahoma have proved a source of mirth to the oil operators who are necessarily gamblers in future hopes and therefore optimists.

Underground geology, already an important factor in oil development in California, became of increasing importance in Oklahoma about 1917, as an aid to both exploitation and exploration. Logs of wells in the days of Glenn Pool were principally sand records. With the advent of geology they became complete, but the drillers were inclined to make the logs of wildcat wells read like those of the oil field with which they were familiar. Samples of cuttings were not taken, preserved and studied until about 1924.

Logs of wells were plotted on a scale of 100 feet to 1 inch of graphic well log strips which were standardized by the U. S. Geological Survey prior to 1904. Correlations in northeastern Oklahoma were based in large part on the Oswego and "Pink" lime until the search for Ordovician production, about 1923, showed that these markers gave little clue to structure in the Ordovician except in a small area around Tulsa.

Booch sand production in the Okmulgee-Beggs district during this period was seldom related to surface structure and therefore the geologists were not notably successful there until 1919. The Youngstown pool, on an anticline, was discovered in 1917 in the Dutcher sand. Billings was opened in 1917 as a result of surface geological work and both Garber and Blackwell were extended. Drilling in the Osage progressed slowly owing to the nature of the leases. Although the first "Osage sale" was held Nov. 11, 1912, the third Osage sale, April 30, 1916, was the first to attract attention. Surface structure was found to reflect subsurface structure and oil accumulation in the Osage west of Range 11. Mississippian and Ordovician production were obtained in 1917 in northern Oklahoma, but not recognized as such and most wildcat wells stopped in the top of the "Mississippi lime."

In 1917 the U. S. Geological Survey published a structure contour map of the surface geology of the Bristow area in Creek County by A. E. Fath, which led to considerable drilling in the favorable areas and to the discovery of oil. In 1917 and 1918 the U. S. Geological Survey mapped the surface geology of Osage County, the maps being published in 1918 and in subsequent years. Until their publication the tracts offered for sale at "Osage sales" were re-examined by geologists for each oil company prior to the sale, but subsequently only the tracts which appeared to be located favorably with respect to structure were examined. The detailed structure contour maps of surface geology included in this bulletin (No. 686) cover the largest area yet published in any report.

Little commercial work was done in 1918 owing to the war. Attention was called to Stephens County, west of Healdton, by wildcat producers at Velma and at Walters (both on surface anticlines and geological discoveries) and the following year the South Duncan field was opened because of combined surface and subsurface geological work. Hewitt, the second largest field in southern Oklahoma, was opened early in 1919 as a result of geological mapping done in 1916 by Wm. J. Millard for the Producers Oil Co. (The Texas Co.). A new Skinner sand pool west of Cushing, the March pool, was also opened on a surface nose mapped by Carl D. Smith.

Discovery of the Wilcox sand, of Ordovician age, in 1918-19 in Okmulgee and Creek counties, was the greatest stimulus geology ever had in Oklahoma, because this production with the exception of a few pools in the southeastern Osage, is invariably on Ordovician anticlines, and conversely almost all anticlines within the area of Ordovician production yield oil. Subsequent developments, as summarized by Luther H. White in 1926, show that the Ordovician formations were uplifted on the northeast and truncated before the deposition of the Chattanooga shale and that production formerly called "Wilcox" may come from one of several formations or unconformi-

ties. Also, most of the producing areas (and anticlines) except Tonkawa, Depew, Wewoka, and Seminole are exceedingly small and seldom exceed 80 acres in extent. Subsurface work, based on records of wells which have reached the Ordovician, has now (1926) proved to be the only satisfactory method of discovering these fields. In this work the Riverland Company, with geology by J. L. Gartner, has been most successful.

Accidental discovery of Wilcox pools in 1919, especially by the Wilcox Oil & Gas Co., showed that some underlie gentle anticlinal folds called noses. It became evident that much of the surface mapping previously done in search of anticlines with closure was inadequate to locate noses and therefore the oil companies which employed geologists undertook to remap in great detail with planetable and telescopic alidades all that portion of northeastern Oklahoma which was considered favorable for Wilcox production (without regard to existing shallower production) or which was in advance of production. This detailed mapping was completed in 1925 by most of the large companies as far west as the outcrops were considered reliable. Since then surface work has practically ceased.

Geological work in 1919 and 1920 made a great impression with the operators. Hewitt, March pool, Phillipsville (and other Wilcox pools near Beggs), Ponca City field deep sand, and several Wilcox pools in the Osage were the centers of drilling activity in 1920. Also the Deaner pool, opened by random drilling, proved to be an a surface nose and subsurface anticline.

Burbank, however, proved to be the outstanding discovery of 1920. Up to this time several large anticlines in the western Osage had yielded little oil and the two faint anticlinal folds beneath which Burbank was developed did not attract operators or geologists when leases on them were sold at an Osage sale. The discovery well in the western part of the field, drilled by the Kay Co. Gas Co., (Marland interests), produced gas before striking oil, and later the Carter Oil Co. discovery, now in the eastern part of the field, was a small well. This field spread slowly because of leasing conditions until 1926 when it was practically defined. No one suspected in 1920 that accumulation depended on a sheet sand and that production would be poorest beneath the surface folds because they reflected subsurface folds, once hills, over which little sand was deposited. Burbank production is from a sand equivalent to the Bartlesville sand and is like the old fields, Chelsea, Delaware, Bird Creek and Glenn Pool, yet more prolific. At the close of 1921, 117 oil wells and not a dry hole had been drilled in Burbank. In 1926 there were about 1,700 oil wells.

Dutcher sand production was discovered near Bristow in 1920 and the Continental, Slick and other prolific fields were developed

in the two subsequent years. The Deaner field, near Henryetta, also produces oil from the Dutcher. This horizon is near the base of the Pennsylvanian. One or more lenticular sands are usually found at this horizon, and their distribution and thickness are comparable to the vagaries of the Glenn sand. Paleogeography at the time of deposition rather than subsequent structure is the controlling factor of accumulation in the Bristow district and the largest wells are found between rather than on the low anticlines (buried hills) mapped on the base of the sand. The failure of geologists to predict or to delimit Dutcher sand production detracted from the success which they achieved elsewhere.

Geology added laurels in 1921. The Lyons and Quinn pools, near the Deaner field and in the Lyons sand, proved to be on surface noses which could be discovered only on detailed mapping. They established that many, but not all surface noses, overlie anticlines at a depth of over 2,500 feet. Later it became evident that folds in the Ordovician gradually fade out in overlying strata roughly in proportion to the thickness of the overburden so that there may be no surface reflection. Many other factors complicate this problem.

The Lyons, or Lyons-Quinn sand was first thought to belong to the Dutcher series of the Morrow formation, but was later proved to underlie the Pitkin limestone and to be of Mississippian age and equivalent to the Papoose and Cromwell sands.

Tonkawa was discovered, partly on surface work and partly on subsurface work, largely at the instigation of the Marland interests. The Tonkawa (Stalnaker) sand proved the following year to be only one of about seven producing horizons and the discovery well was on the edge of the field. The big development came after 1922.

Oil was discovered in the Hunton limestone of Siluro-Devonian age near Beede and Maud in the fall of 1921, but no profitable production was found in this horizon until at Wewoka in 1924-25.

Robberson, the first field northwest of and close to the Arbuckle Mountains, was discovered by the Magnolia Petroleum Co., on geology by Pierce Larkin. Production in paying quantities from Permian red beds is known only here, at Garber, and at Wheeler, but in each of these fields the oil may have arisen from lower horizons. Deeper drilling in 1922 revealed a buried Ordovician hill beneath Robberson with oil in the limestone.

Developments in 1922 had no material effect on the relationship of geology to production. Dutcher sand gushers near Bristow in the Continental pool, Prue sand pools southwest of Bristow (Tps. 14-15 N., R. 8 E.), and Wilcox sand and "Siliceous lime" fields

scattered over several counties, were the new discoveries. Subsurface work gained steadily in importance, and attention began to be paid by means of distinguishing producing horizons: microfossils, heavy minerals, size and shape of grains and chemical composition of contained waters.

Diamond drilling to locate surface structure came into prominence in 1923 when the Marland interests delimited the northern and highest part of the Tonkawa field. Core drilling was first tried in the State on the Chilocco Indian Reservation in 1919. The remarkable financial reward at Tonkawa which followed structure drilling led to the introduction of many drills and to the discovery in 1924 of the Hubbard, Thomas, North and South Braman, and Mehan fields in Oklahoma and others in Kansas.

Bristow was again the center of new development in 1923 and the geologists did not play as important a part in this activity as in opening "Wilcox" domes. The Ordovician was found productive at Robberson and Hewitt but this buried geology proved as difficult of interpretation as that of the Healdton Ordovician.

Production spread southwestward from Okmulgee into the area considered to be devoid of recognized oil sands, but this activity was started in spite of rather than in accordance with geological advice. The Smith pool at Wewoka was discovered by random drilling on a bending of surface structure contours so faint that it can scarcely be found on the most detailed maps. Production ultimately spread westward to the well-known surface folds south of Wewoka, but the several low domes on the Smith sand of Mississippian age cannot be reconciled with structure at the surface, 3,200 feet above. The Wilcox sand discoveries in 1926 starting again by accident and in a local syncline on the Smith sands proved that there is a pronounced discordance of dip at the top of the Hunton and that the structure on the Wilcox sand at 4,100 feet is not closely related to that on the Smith sand.

The other development in 1923 toward the southwest was the Cromwell field, started by the Cosden Oil & Gas Co.'s. gas well located because of a broad, long anticlinal nose and by an oil well located on the same nose and drilled by J. I. Cromwell. This field was developed in 1924 and was outlined by drilling because predictions more than a quarter mile in advance of drilling could not be made by geological work with any assurance of success.

Burbank was another example of the impossibility of predicting the limits or the size of production even with the aid of complete records because of rapid changes of sand thickness.

In 1924 Papoose, opened without regard to faint bends in surface structure contour maps, was added to the list of fields south of

Okemah. The axis of this field, east-west, was also at odds with geological predictions.

The Wilcox sand again came to the rescue of geological prognostications. Stroud was opened on a well-known surface anticline and the discovery well reached the Wilcox sand only because of paleontological determination of the age of the cuttings at the time the well was to have been abandoned. Several other Wilcox fields were opened in the Osage and elsewhere. Wilcox sand was discovered at Tonkawa and this became the wonder field of the State with more producing sands and greater production per acre than any other field.

Micropaleontology became an integral part of the oil business in 1924. Determinations of the age of cuttings and the correlation of sands became a necessary adjunct to most oil companies during this and the following year. Lithology and heavy minerals are also used in coordination with fossil evidence. This work has brought about a reorganization of scouting activities whereby scouts furnish samples and logs of drilling wells each week instead of merely the depth. In 1926 samples were being collected from practically every wildcat well in Oklahoma, Kansas and Texas. Moreover, the drillers have been given more or less instruction by oil companies in the distinguishing characteristics of formations—some companies have even taken microscopes on the derrick floors to interest the drillers in making accurate well logs. As the search for oil becomes more intensive the systems for finding and recovering oil become more elaborate.

The decadence of surface geological work marked the year 1925. Development southwest of Okemah had shown very faint connection of subsurface with surface structure. Farther west the bendings in the surface structure contours were so faint that the absence of an anticlinal bend did not condemn the possibility of oil beneath, and the presence of such bends gave faint assurance that there might be an anticline beneath. West of Cushing and Stroud the Davenport field was brought in on a surface nose, but the surface geology gave no indication of the limits of production and some of the best wells were in the surface syncline. Surface geology is proportionally more difficult west of the present oil fields because of less and less satisfactory exposures.

Geophysical work, introduced in Texas in 1923, to find salt domes, was started in Oklahoma in 1921. While no drilling to the close of 1926 on geophysical evidence of anticlinal structure has been productive of oil it is certain that some of these methods, and probably the seismograph, will be an important adjunct to new discoveries in the future.

Garber was the outstanding field of 1925. Located by surface geology in 1916 this field produced from many sands in the Permian

and Pennsylvanian. The first deep test, by the Sinclair Oil & Gas Co., found a gusher in the Ordovician and led to re-drilling of the field.

Core-drill structure during the year led to the opening of the Mehan and Braman Townsite fields. About 25 diamond drills were in use and the entire area from Enid to Ponca City was so well covered by drilling on every section corner that it became a problem to find sufficient room in which to look for favorable structure. Core-drilling in 1926 averaged a depth of about 400 feet and new, heavier drills were being purchased to go over 750 feet in search of structure—a remarkable change from the days of surface anticlines in 1917.

Developments during 1926 have been largely in the Wewoka-Seminole-Shawnee area where a structural plateau in the Ordovician rocks has been discovered beneath Pennsylvanian strata which dip steeply (100 feet to the mile, or 1 degree) to the west. A pronounced unconformity has been found at the base of the Pennsylvanian and above the Cromwell sand horizon which is of Mississippian age, and this unconformity is difficult to detect except by microscopic examination of cuttings because of the almost continuous shale section. Another unconformity is marked by the truncated upper surface of the Hunton limestone (Devonian, in part) below the Mississippian.

Wewoka and Seminole were the most important fields of the year because of gushers in the Wilcox sand. Discovery of the former field in the Smith and later in the Wilcox sand was accidental as stated above, but Seminole was discovered as a result of surface geological work in an area of pronounced folding and faulting with local reverse dips. The detailed structure below the unconformity on the top of the Hunton is not reflected in the structures at the surface, but of the two highest domes first developed in the Ordovician, one underlies a pronounced nose and the other a faulted anticline at the surface. Subsurface work must accompany and follow the drill and the extent of Wilcox production in this general area can only be predicted now (October, 1926) as covering a far greater area than prophesied by most operators, and rivaling if not surpassing Cushing in productivity.

The depth of the Wilcox sand in the Wewoka, Seminole, Earlsboro, and nearby fields is about 4,100 feet, in the Tonkawa field about 4,000 feet. The deepest well in the state is over 5,700 feet and is being drilled for the Wilcox sand. This indicates the depth at which production will be sought during the next few years and also the fact that Wilcox sand, or preferably "Siliceous lime," tests are required to condemn an area.

Other developments have been the discovery of Wilcox production in the Ripley gas field and in the Braman fields. Faulting

and truncation of the older rocks in the Braman fields have been found to play a very important part in oil accumulation and to emphasize the magnitude and extent of deformation in the older Paleozoic rocks as revealed by drilling in the Seminole-Wewoka-Ada area.

Evolution of methods of finding oil and evolution of geologic thought has brought a closer cooperation in 1926 between land and geological departments, with local resident geologists and land men ready to take advantage of any new subsurface determination or changes in movements of diamond drills or geophysical parties. Even the New York Stock Exchange was affected in September 1926 by predictions of new wells in the Seminole field based on examination of well cuttings and subsurface correlations. Developments at Artesia, New Mexico; Amarillo, Big Lake, and McCamey, Texas, have shown the necessity of regional plays like those in the Oklahoma Panhandle. The lack of favorable structure and even of outcrops at the surface and the necessary generalization of underground information in advance of new fields are causing oil companies to resort to checkerboarding on "hunches" as in the days before geology, except that the geologists are now assigned to the task of making the "hunches." It seems but a step back to the "oil lines" which the Pennsylvania and West Virginia operators were following in the '80s. But this step will never come because geophysicists will soon come to the aid of subsurface work and will point to some of the buried hills and ridges which still retain untold stores of oil beneath the Oklahoma prairies.

SUMMARY

In recapitulation, Mr. Goodrich was the first petroleum geologist to settle in Oklahoma in 1903, when oil was unknown between Tulsa and Corsicana. Much of the subsequent work has resulted from the stimulus of a geological department at the State University and of a State Geological Survey following the footsteps of the Federal Survey. Most of the first work was done in the area of folded rocks shown on published geological and topographic maps of the Federal Survey and this area has up to the present time yielded gas only. The petroleum geologists did not recognize the significance of low folds in very gently dipping rocks until after the discovery of Cushing which was largely by accident. The successful delimitation of Cushing and the discovery of oil on other anticlines in northeastern Oklahoma brought recognition to geology as a means of locating oil, but this recognition had to await Cushing because the older fields were on sand lenses on homoclinal structure and the sands do not underlie the anticlines. Oil seepages had less to do with oil development than in almost any other part of the world, because oil seepages are practically confined to the outcrop

of the so-called Bartlesville sand in southwestern Missouri and to certain sandstones in southern Oklahoma.

Geological departments of oil companies multiplied rapidly in the wake of the success by the Gypsy and Empire companies and lease brokers soon learned the desirability of having "favorable structure" on their leasehold. Consulting geologists between the fall of 1913 and 1918 were in great demand. Personal visits of Chief Geologists to colleges and universities in search of new employees were the rule from 1915 to 1918, but since then the supply has equalled the demand except in 1919-1920 soon after the war. The greatest number engaged in strictly geological work in Oklahoma attained a maximum of about 200 in 1923-24.

Surface mapping has always predominated in Oklahoma and the planetable with telescopic alidade has been used since it was introduced by Mr. McCrary in 1913. Reconnaissance by means of observed dips has not been fruitful since 1916 because the conspicuous anticlines were already producing or solidly leased. Aneroids have always been used to some extent.

Subsurface mapping of oil fields was introduced by the U. S. Geological Survey in maps of Healdton in 1915. Usefulness of the geologist in developing oil fields was recognized by oil companies as early as 1914 but not fully appreciated until 1917 or later. The great impetus to subsurface work was the recognition of the Ordovician as a producing horizon, largely because of the work of Fritz Aurin, Frank C. Greene, Luther H. White, G. C. Clark, and E. A. Trager. The report of this work was published in 1921. Beginning in 1908 pools were discovered in and below the "Mississippi lime," but, with the exception of the deep sands at Healdton, all the production was thought, until 1920, to come from the Pennsylvanian or Mississippian. The Wilcox sand was proved in 1921 by fossil evidence in overlying strata to be Ordovician. This led to subsurface mapping of the entire producing area of Oklahoma and Kansas. This type of geological work has been very successful because Ordovician production is confined to anticlines and domes in contrast to Pennsylvanian and Mississippian production which in many areas is not controlled by anticlinal folding. The importance of subsurface relative to surface work has increased steadily because developments have spread past the limits of reliable outcrops. Structure core drilling with diamond drills and geophysical work now supplement, and even supplant, surface mapping in advance of wildcatting.

The number of petroleum geologists has increased fourfold since 1914. The enormous growth has been due to the increase in the number of individuals and companies giving steady employment to geologists, and also to the number of men trained as geologists

who are occupied in other branches of the petroleum industry. The rate of increase will be much slower in the future and the percentage of men not engaged strictly in geological work will mount rapidly. When Oklahoma production decreases the number engaged in strictly geological work in the state will decrease slowly, but surely, and statistics might show an actual decrease in the past year. There will be a marked increase in the number of geologists engaged in foreign work, but the heyday of petroleum geology in Oklahoma was in 1919-20 when the price of oil was \$3.50 and careful remapping of Mid-Continent surface geology in search for very faint and heretofore unrecognized favorable types of structure was in progress.

**SUBSURFACE DISTRIBUTION AND CORRELATION OF THE
PRE-CHATTANOOGA ("WILCOX" SAND) SERIES OF
NORTHEASTERN OKLAHOMA**

By

Luther H. White

INTRODUCTION

The subsurface phase of petroleum geology has been rapidly increasing in importance during the past decade. It was only about five years ago that the value of subsurface studies was recognized generally to be of sufficient importance to cause work of this nature to be undertaken by nearly all of the progressive oil companies maintaining geologic departments. The results of this work have been so gratifying from both the practical and scientific standpoints that unparalleled development of this branch of practical geology has been witnessed within the last two years. The extent to which more scientific work has come to be appreciated by both the layman and geologist is indicated by the fact that the number of oil companies which have added technical men and women to their geologic departments, employed for the express purpose of studying the mineralogy and micropaleontology of drill cuttings, has been larger during the past year than during any two previous years. In the past, petroleum geologists have been criticised by the more academic students, for their apparent mercenary and unscientific attitude toward the great science of geology. The developments of the last few years have operated to undermine any possible foundation for their unfair criticism. The work that is being done at this time by petroleum geologists is of a truly research nature. In every way the science is being applied in a more scientific manner.

Acquisition of the data upon which this paper is based is due to the large number of men in the Mid-Continent region who are doing scientific subsurface work. The first paper on this subject was written by Aurin, Clark and Trager in 1921.¹ Since this beginning many geologists in Oklahoma with the above work as a guide have been studying the lower oil producing horizons in great detail by means of microscopic and mineral analysis of drill cuttings from the deeper wells throughout the state. This intensive study has led to a more exact determination and correlation of the so-called "Wilcox" sand

1. Aurin, F. L., Clark, G. C., and Trager, Earl A. Notes on the subsurface pre-Pennsylvanian stratigraphy of the northern Mid-Continent oil fields. *Am. Assoc. Pet. Geol., Bull.* vol. 5, No. 2, 1921.

(This report originally issued as Bulletin 40-B, June, 1926).

series than has been possible before. This paper is a summing up of these later conclusions, and, of course, is based only upon the data available at this date, March, 1926.

Should an attempt be made to offer acknowledgment to all those who have been of assistance in the preparation of this paper it would be necessary to practically read the roster of the Tulsa Geological Society as well as the names of many men in Ponca City, Okmulgee, Bartlesville, and many other cities. So many friends have contributed materials, information, and a free exchange of ideas that to enumerate them would appear boastful. The author has called freely upon his best friends for their most secret bits of information and the results are published in this paper. Dr. E. O. Ulrich's "Revision of the Paleozoic System" has proved itself indispensable in checking the soundness of conclusions reached in this paper.

This paper will discuss primarily the pre-Chattanooga sections in two provinces of Oklahoma as outlined in Oklahoma Geological Survey Bulletin No. 35, entitled "Index to the Stratigraphy of Oklahoma," by Chas. N. Gould. This bulletin is, indeed, a much needed and creditable piece of work. In this small volume Dr. Gould has digested the more important publications dealing with the various formations in Oklahoma. He reports the consensus of opinion of all authors in a brief outline for each formation giving its nomenclator, type locality, character, thickness, occurrence, age, correlation, characteristic fossils and citations of the principal authors dealing with the formations. The bulletin was published to accompany the new colored geologic map of Oklahoma compiled by H. D. Miser, of the U. S. Geological Survey. Therefore, if the work contains errors, corrections should be made as early as possible and it is with that idea in mind that certain changes of correlation are suggested in this paper.

In the northeastern Oklahoma province the formations discussed include "Ordovician dolomite," "Bürgen" sandstone, Tyner formation, St. Clair marble, Sylamore sandstone, and Chattanooga shale. Sylamore sandstone is not shown in the Index, by oversight. In the Arbuckle mountain province the formations discussed include Arbuckle limestone, Simpson formation, Viola limestone, Sylvan shale, and Hunton formation. Some reference will be made to the Woodford formation which overlies the Hunton. The various producing horizons of the so-called "Wilcox" sand series of northeastern Oklahoma oil fields are carefully correlated with the formations of these two provinces. This has been accomplished by comparing drill cuttings with outcrop specimens. Samples from the many deep wells in this area furnish a connecting link between the northeastern and south central provinces. This has made possible a more accurate correlation of the formations of these two areas than that shown in the Index mentioned above. In addition to this, the map accompanying this report records the sub-

surface relations and extent of these formations over the northeastern quarter of the State. Control of formation boundaries has been established, in the main, by an examination of well cuttings at many points. Between these points the boundaries have been projected on a basis of well records and structural conditions. In some areas positive data are so meager that accurate mapping is not possible at this time. For this reason the detail of the map is much more accurate in its central portion than in the eastern and western extremities. In some places errors several miles in extent will doubtless be found in the location of a boundary. Great hesitancy is sometimes felt in the publication of such a piece of work for which more accurate data continues to be obtained.³ However, if this rough draft may be used as a guide for the future preparation of a more accurate map, for which data will be collected for many years to come, it will be a great step forward toward a better understanding of Oklahoma geology.

THE PROBLEM PRE-CHATTANOOGA ("WILCOX" SAND) SERIES.

For a description of the confusion which arose in connection with the earliest production from pre-Mississippian formations the reader is referred to the opening statements of Aurin, Clark, and Trager.⁴ In that paper the "Bürgen" sandstone was not differentiated from the Tyner formation and the "Wilcox" sand was correlated with the Tyner. Consequently they referred all pre-Mississippian production to the Tyner or to the underlying Ordovician "Siliceous Limestone." Since that time it has been possible to differentiate the "Bürgen" and Tyner over broad areas. It has also become apparent that the "Wilcox" sand rests upon the Tyner and should not be correlated with it. The "Bürgen," Tyner, and "Wilcox" are the northern equivalents of members of the Simpson formation. There are also members of the Simpson younger than the "Wilcox" which have recently yielded limited production. For lack of a more definite term these beds are referred to as the post-"Wilcox" Simpson. The latter group of rocks, "Bürgen" to post-"Wilcox" inclusive, may be referred to indiscriminately, therefore, as Simpson rocks but not as Tyner rocks.

The Hunton formation was first pointed out as a producing horizon by George D. Morgan.⁵ Since that time it has yielded greater production in other areas. The youngest member of the "Wilcox"

3. Note: Since the subsurface, areal, geologic map accompanying this report was prepared for publication the following changes should be made. In the vicinity of Collinsville the northern boundary of "Bürgen" sandstone has been shown to be about four miles too far north. This correction should apply doubtless for some distance to the northwest. In sec. 23, T. 20 N., R. 24 E., at the little town of Flint, the Chattanooga shale has been observed resting upon an unmapped exposure of "Bürgen" sandstone. The new geologic map of Oklahoma shows Chattanooga shale resting upon Ordovician dolomite (Arbuckle limestone) in sec. 12, T. 19 N., R. 20 E. However, a field examination by the author at the latter locality has shown that the Chattanooga at that place is resting upon a thin wedge of lower Tyner green shales probably about 10 feet thick. The Tyner rests upon an exposed thickness of about 25 feet of "Bürgen" sandstone. The Ordovician dolomite is probably not exposed.

4. Loc. op. Cit.

5. Morgan, George D., A Siluro-Devonian oil horizon in southern Oklahoma. Oklahoma Geol. Survey circ. 10, 1922.

group is the Sylamore sandstone known as the "Misener" sand. All of the formations mentioned above have been confused with the "Wilcox" sand. Geologists and operators have endeavored to untangle this complex situation and in doing so they have given the different producing horizons oil-field names which together with their formation equivalents and age may be outlined as follows:

Oil Field Name	Formation Equivalents	Age
"Misener" sand	Sylamore sandstone	Early Mississippian
"Hunton Lime"	Hunton formation	Siluro-Devonian
Post-"Wilcox"	UPPER and MIDDLE SIMPSON FORMA- TION	Ordovician
"Wilcox" sand		
Green Series or "Irish" sand		
"Hominy" sand		
"Siliceous Lime" or "Turkey Mountain" sand.	Eroded surface of Arbuckle limestone	Cambo-Ordovician

These producing horizons range in age from Cambro-Ordovician to early Mississippian. Several of them are in no way related to the "Wilcox" sand. Others are limestones and not sands at all. They vary greatly among themselves in their value as a source of oil production. The average production per acre from the "Wilcox" sand, for example, is several times greater than that of the others. For these reasons the term "Wilcox sand series" appears misleading. Some such group name is desirable, however, for the sake of convenience and therefore the name pre-Chattanooga series is suggested. This term appears fitting since each member of the series is at some place, in northeastern Oklahoma, overlain by the Chattanooga under normal conditions.

ARBUCKLE LIMESTONE

The Arbuckle limestone or its equivalent probably underlies most of Oklahoma as well as adjoining states. As revealed in well cuttings it consists of medium or fine crystalline dolomitic siliceous limestone. After boiling in acid the residue will consist largely of quartz fragments with an occasional quartz crystal. This suggests vein quartz or drusy cavities, such as may be observed at the Spavinaw outcrop. True sand

grains are seldom found in average well samples although the formation is known to contain some thin beds of sand. Samples of Arbuckle limestone from widely separated wells resemble each other so much that it is difficult to distinguish between them.

Thickness: In northeastern Oklahoma test wells have shown the absence of the Arbuckle in the case of a few very steep domes where granite is encountered below a very thin mantle of Tyner or "Bürgen" beds and it is expected that even Mississippian or Pennsylvanian beds may be found resting on these old granite cores. The local absence of the Arbuckle limestone is due to erosion. On other domes 400 or 500 feet of Arbuckle may be encountered before reaching granite. Wells drilled off structure may encounter 1,000 to 1,500 feet of Arbuckle limestone before reaching granite.

Depositional Overlaps: The Arbuckle limestone develops a thickness in excess of 5,000 feet in the Arbuckle Mountains where it is underlain by the Reagan sandstone of Cambrian age. The Reagan has a thickness of 300 feet or more and rests on the granite floor.

In south-central and southeastern Missouri there are deposits of sandy dolomitic limestones having a combined thickness of 2,000 feet or more. These beds range in age from Cambrian to Canadian. They are underlain by the Lamotte sandstone of Cambrian age. The Lamotte has an average thickness of 200 feet and rests upon the granite floor.

In northwestern Arkansas there is in excess of 2,000 feet of sandy, dolomitic limestone which is divided into several formations of Ordovician age. The base of this series is not exposed in Arkansas so that neither the total thickness or the nature of the formation which precedes the limestone series are known. Should a test well be drilled to

6. The logs and samples of Tidal Oil Company Wildhorse wells No. 18, No. 19, and No. 20 in sec. 32, T. 22 N., R. 10 E. show the following:

Formation	No. 18	No. 19	No. 20
Elevation	809	822	763
Chattanooga	Absent	2200-2220	2130-2160
Tyner and "Bürgen"	2138-2217	2200-2300	2160-2267
"Siliceous Lime"	Absent	2300-2387	Absent
Granite (samples)	2217-2222	2387-2434	2267-2290

Samples of Minnehoma Oil Company, Richards No. 1 in NE. cor. NW. 1-4, NW. 1-4, sec. 9, T. 20 N., R. 8 E., show the following:

Chattanooga	2850-2886
Tyner	2886-2930
"Bürgen"	2930-2982
"Siliceous Lime"	2982-3058
Granite	3058-3072

Samples from a well drilled in SW. cor. SE. 1-4 of NW. 1-4 of sec. 35, T. 20 N. R. 17 E. show the following:

Boone limestone (Cherty)	412-438
Chattanooga	Absent
Tyner and "Bürgen"	Absent
Granite Wash	438-482
Fresh Granite	482-520

The first sample from this well was obtained at a depth of 412 feet. The identification of the cherty limestone as Boone instead of "Siliceous Limestone" may be questioned.

sufficient depth, however, it seems reasonable to expect that it would encounter a sandstone similar in age and character to the Reagan of Oklahoma and the Lamotte of Missouri. In southeastern Kansas test wells have encountered the northward equivalent of the Arbuckle limestone. Little is known of its average thickness. The deep well at Iola, however, encountered over 2,200 feet of sandy dolomitic limestone and sandstone of Cambro-Ordovician age.⁷ From the early reports of this well it seems possible that there may be considerable sandstone at the base of the limestone series. The sandstone, if present, is probably closely related to the Reagan and Lamotte.

Drill cuttings from deep wells in northeastern Oklahoma show that on structural highs, at least, no sandstone is encountered at the base of the Arbuckle before granite is found. The author knows of no case where sand is known to occur at this horizon either on or off structure. It is reported in some wells but in the absence of samples this is considered very unreliable data.

From this data the author draws the conclusion that the southwestern Ozark region which included northeastern Oklahoma was a land area during the time of the deposition of the Cambrian sands represented by the Reagan and Lamotte in southern Oklahoma and eastern Missouri and possibly similar sands in Kansas and Arkansas. This old Ozark Island in the Cambrian sea was the first uplift which has affected the later deposits over this region. After the deposition of the basal sandstones, together with a few limestone beds of Cambrian age, the deposition of the Arbuckle limestone began in a sea which was advancing over the old granite land area to the northeast. In all probability the granite cores of many of the domes and anticlinal folds of northeastern Oklahoma were small islands in the early Arbuckle Sea and their later submergence resulted in considerable overlapping of the Arbuckle beds. The extent of this overlap is uncertain and awaits more careful paleontologic work.

Regarding the possibility of these granite islands representing the cores of the present folds, the following outline of events suggests itself after a study of the folds of this area. It seems to be the most plausible interpretation of the stratigraphic relations found on the structures which are being mapped at present. This statement may seem out of place at this point but it has a bearing on all of the formations to be discussed in this paper and the author has never found it possible to gain a clear conception of the history of any area without first outlining the mechanics of the problem.

Some of the granite islands mentioned above were due to structural uplift. They were, therefore, local positive areas. This meant that during the geologic history of the overlying sedimentaries these areas were the first to be subjected to erosion and the last to be sub-

merged. Moreover, even after submergence many of them were topographic highs on the sea floor with the result that deposition was less over their crests than on their flanks. This cycle of uplift, erosion, submergence, decreased deposition, uplift, etc., has been repeated several times in the history of most of the anticlines and domes of northeastern Oklahoma. In some cases very little erosion may have occurred but there is always the evidence of a decreased amount of deposition indicating the contemporaneity of deposition and uplift. Much space might be devoted to an enumeration of the variations of these events. Suffice it to say that it is everywhere evident that the uplifts of northeastern Oklahoma began in pre-Cambrian time and have continued with various fluctuations down to very recent time. This same outline of geologic history probably applies to broad areas throughout the Mississippi Valley and the Appalachian region. Regarding this point Ulrich⁸ says "Appalachian folding certainly was not all accomplished at one time or during a single period. It began in a pre-Cambrian era and probably is going on at present."

PERIOD OF EROSION AT CLOSE OF ARBUCKLE TIME

Following the deposition of the Arbuckle limestone and previous to or during early Simpson time the Ozark area was uplifted and subjected to erosion. The beds were truncated to much lower levels to the north than to the south. Dr. Sidney Pewers⁹ collected some fossils from the unnamed Ordovician dolomite at Spavinaw, Oklahoma, which were identified by Mr. R. D. Mesler, of the U. S. Geological Survey, as *Turritoma milaniformis* and *Orospira bigranosa*, *Liospira*. According to Mr. Mesler these belong to Ulrich's "Swan Creek zone" of the Cotter formation in Missouri of Canadian age. According to Ulrich this is older than the bulk of the Arbuckle limestone which is Ordovician. This would indicate considerable truncation of the Arbuckle in northern Oklahoma. Morgan¹⁰ discovered evidence of this period of erosion in his study of the Simpson in the Stonewall quadrangle. Referring to the thickness and character of the Simpson he states: "The absence of the lower portion of the Simpson formation to the north and the more clastic nature of subsequent portions of the formation in that direction, suggest an Ordovician land mass to the north of the Arbuckle area over which the Simpson sea gradually encroached."

It is uncertain whether the entire Ozark area was submerged beneath the sea represented in Missouri by deposits referred to by Dake (School of Mines and Metallurgy, Univ. of Missouri, Bulletin vol. 6, 1921), as the "St. Peter Group," and in Oklahoma by deposits of the Simpson "Bürgen" or Tyner formation. The fact that the present northern extremities of the "Bürgen," Tyner and higher members of Simpson in Oklahoma show no evidence of shoreward deposition, leads one to

8. Ulrich, E. O., Geol. soc. America, vol. 22, No. 3, p. 410, 1911.

9. Communication by letter to the author by Dr. Fowers, 1925.

10. Morgan, George D., Bureau of Geol. Bulletin No. 2, p. 26, 1924.

7. Moore, R. C., and Hayes, Winthrop P., State Geol. Survey of Kansas, Bull. No. 3, pp. 82 and 218, 1917.

suspect that these formations originally extended much farther north than at present. Also the entire mass of the Sylamore sandstone represents only that small portion of the erosion product, derived from these formations, which was preserved at the beginning of Mississippian time by the deposition of the Chattanooga shale. This indicates a tremendous amount of erosion quite sufficient to have removed any probable deposits of Simpson age that may have extended over this area.

In case the Simpson Sea did not submerge this area it is probable that the Arbuckle in this area suffered erosion from the close of its period of deposition until the beginning of Mississippian time. At any rate it is certain that the Arbuckle limestone suffered further truncation over northeastern Oklahoma during that period of time represented by the hiatus between the Hunton formation and the Chattanooga shale. Faunally this hiatus may not appear great but stratigraphically it does because it was during this period of time that all of the pre-Mississippian formations in Oklahoma, or as a matter of fact over practically the entire Mississippi Valley, were truncated and baseleveled.

In the light of these facts therefore it may be seen that much older beds of Arbuckle will be found in contact with the overlying formations to the north than to the south. The Ordovician dolomite at Spavinaw therefore would appear to be the equivalent of neither the upper or the lower Arbuckle of the type locality to the south but more comparable to some middle portion.

"TURKEY MOUNTAIN" SAND.

The truncated upper surface of the Arbuckle limestone is what has generally been referred to as the "Turkey Mountain" sand, or the "Siliceous Lime." The "Turkey Mountain" sand occurs immediately below the "Bürgen" sandstone which is equivalent to the St. Peter sandstone. The "Turkey Mountain" is a highly crystalline dolomite. The crystals are usually sub-megascopic in size but sometimes appear quite large. This dolomite is sometimes so porous that it has a spongy appearance. In drilling, it is generally very soft, while true Arbuckle limestone below is much harder.

The "Turkey Mountain" beds may be lower Simpson in age and therefore comparable to the Everton dolomite in Arkansas. The latter occurs immediately below the St. Peter with conformable contact, and rests upon the older beds unconformably. Because of an apparent lithologic difference between definite "Turkey Mountain" limestone and definite Arbuckle limestone below and for other reasons the classification of "Turkey Mountain" as lower Simpson is considered correct by some. This classification would make it easier to explain why the "Siliceous Lime" is practically non-productive over that part of north-

11. Purdue, A. H., and Miser, H. D. U. S. Geol. Survey Geol. Atlas, Eureka Springs-Harrison folio, (No. 202), p. 5, 1917.

eastern Oklahoma where it is in contact with the overlying Chattanooga shale because there the lower Simpson (or "Turkey Mountain" limestone) would normally be absent.

The question as to whether the "Turkey Mountain" horizon is Simpson or Arbuckle in age may be answered in eastern Oklahoma if some new exposure of "Bürgen" sandstone may be found which would disclose the nature of its contact with the underlying beds. If it should be found to rest conformably upon a dolomite which in turn should rest unconformably upon the Arbuckle limestone, it would indicate the Simpson age of the "Turkey Mountain" sand.

The term "Ordovician Siliceous Limestone" was first employed by Aurin, Clark and Trager in 1921.¹² It was applied to that thick deposit of limestone encountered in wells below the "Wilcox" sand series in northern Oklahoma and to the limestone resting upon the granite at Spavinaw. Since that time the term has been abbreviated to the "Siliceous Lime." These authors also suggested that this limestone was the equivalent of a part of the Arbuckle limestone of southern Oklahoma and a part of the Yellville of Arkansas. This correlation does not appear questionable any longer. For obvious reasons, therefore, this limestone when encountered in wells should be called Arbuckle limestone instead of "Siliceous Limestone." In case the "Turkey Mountain" horizon should be proved to be of Simpson age then "Turkey Mountain" and "Siliceous Lime" would not be equivalent terms.

However this may be, the truncated upper surface of the Arbuckle limestone, as stated above, is what has generally been considered the "Turkey Mountain" horizon. It can not consist of the same bed of Arbuckle at any two places except where production occurs along the strike of the Arbuckle beds. Drill cuttings show the Arbuckle to be quite as dolomitic as limestones of Simpson age. This fact together with the long period of weathering to which it was subjected would account for sufficient porosity to permit of the oil accumulation in case the "Turkey Mountain" really belongs to this formation. The fact that this horizon is really a very porous limestone accounts for the high initial production and quick recovery shown by wells producing from this zone. In fact, the performance of wells in this horizon is so pronounced in this respect that production from a new well is often accurately ascertained to be coming from the "Siliceous Lime" before samples can be obtained. Such wells seldom require much "drilling in." This horizon needs only to be punctured to obtain an unusual large production considering the depth at which it is encountered. In this respect it is similar to most other limestone production.

"BURGEN" ("HOMINY") SANDSTONE

Some students of this problem believe it is impractical to attempt the differentiation of "Bürgen" sandstone in well cuttings from the overly-

12. Aurin, Clark, and Trager, Am. Assoc. Pet. Geol. Bull. vol. 6, No. 2, 1921.

ing Tyner formation. The writer's observations in this respect are as follows: All complete sets of samples examined from wells drilled to the Arbuckle limestone in that territory south of the northern boundary of "Burgen" sandstone shown on the pre-Chattanooga map (Map No. II) and northeast of Okmulgee show various amounts of "Wilcox" sand beneath which occur about 100 to 150 feet of green sandy shales with red streaks. Below this formation a bed of sandstone averaging 50 feet or more in thickness is encountered before penetrating Arbuckle limestone. No "Wilcox" sand will be found north of its northern boundary of course and from this point the thickness of the green sandy shale decreases northward due to erosion. But in every case a bed of sand is found below the green series before Arbuckle is reached. Some of these wells are only a few miles west of the Tahlequah exposures of Tyner and "Burgen" and since a series of green sandy shales overlying a bed of white sandstone is such a remarkably close parallel to the aspect of Tyner overlying "Burgen" as observed at the outcrop, the differentiation and correlation suggested in well cuttings appear unquestionable.

The "Burgen" may be absent locally due to the fact that exceptionally high areas were not submerged below the northward advancing Ordovician Sea until after "Burgen" time.

In character the "Burgen" sand is often so well cemented and glassy that it approaches quartzite. When broken down its grains are found to be a heterogeneous mixture of very large and very small rounded grains with etched surfaces with enough angular grains of various sizes thrown in to make it a good mixture. For a better description and illustration of this feature the reader is referred to the excellent work of Messrs. Trowbridge and Mortimer.¹³

The "Burgen" sandstone was first called "Hominy"¹⁴ sand because it was thought to be the principal source of deep production around the town of Hominy in Osage County. Since that time however, it has developed that most of that production was probably coming from the underlying "Siliceous Limestone." Cementation prevents the "Burgen" from offering a suitable oil reservoir as evidenced in its superposition above the Arbuckle limestone in most of the many pools where the latter has been a prolific producer.

TYNER FORMATION

The Tyner formation, at the outcrop, is composed of green sandy shale interstratified with thin beds of sand and some sandy dolomitic limestone. The formation displays the same character in well cuttings with the addition of some thin beds of red shale near the middle portion

which have not been observed at the outcrop. The basal portion becomes more dolomitic to the northwest of Tulsa and the entire formation appears to carry more sand and less green shale to the south.

The Tyner is the source of production in a number of scattered wells and is the principal source of production in some small pools.

"WILCOX" SAND

For a description of the physical character and microscopic analysis of this sand the reader is again referred to Trowbridge and Mortimer.¹⁵ After making microscopic examination of complete sections of this sand from many wells the writer's observation is that the "Wilcox" sand is a much more uniform fine grained sand than the "Burgen." The characteristic of this sand, in the main, is a high percentage of fine angular grains accompanied by few large rounded, etched grains and more small rounded grains. It is questionable, however, if this difference in character between "Wilcox" and "Burgen" can be employed as suitable criteria for identification of single samples. Many individual samples of "Burgen" show a predominance of fine angular sand and conversely many individual samples of "Wilcox" show a predominance of large rounded grains. The "Wilcox" and "Burgen" may vary laterally in this respect. In general the author's observation has been that when large rounded grains are found in the "Wilcox" sand, they occur at the top of the sand as encountered in the well rather than farther into the sand body, where the sand is generally fine and angular.

The "Wilcox" sand thickens from a few feet at its northern limit to a maximum of 250 to 300 feet in the vicinity of Stroud and Henryetta. In its thickest portion it remains a remarkably pure sand of uniform character. This is the chief reason for differentiating this sand from the Tyner formation. Taff differentiated Tyner and "Burgen" on a basis of lithology. The author finds more abundant evidence for the differentiation of Tyner and "Wilcox" on a basis of lithology than Taff had for Tyner and "Burgen."

It is the author's hope that these three formations may be eventually identified with definite members of the Simpson formation in the Arbuckle Mountains. Surprisingly few detailed sections of this formation are to be found in the literature. It is to be hoped that more detailed work of this kind will be done at the various outcrops of Simpson. So far the best evidence indicates that the "Wilcox" sand is equivalent to the bed of glass sand in the quarry at Roff, Oklahoma.

The "Wilcox" sand is so well known as an oil producing horizon that it requires no further discussion here. The author's idea of the future production from this entire series of sands may be obtained by referring to a paper entitled "Remarks on the Possibilities of Future

15. Op. cit.

13. Trowbridge, A. C. and Mortimer, M. E., Correlation of oil sands by sedimentary analysis. *Econ. Geol.* Vol. 20, No. 5, August, 1925.
14. Informal paper by the author before the Tulsa Geological Society in the fall of 1924.

Production from the pre-Chattanooga Series of Northeastern Oklahoma," read before the February, 1926, meeting of A. I. M. E.¹⁶

POST-"WILCOX" SIMPSON

The group of rocks referred to as the post-"Wilcox" Simpson is a series of brown or gray sandy dolomitic limestones interstratified with some green shale and thin sandstone members. Wells in the vicinity of Holdenville, Okemah, Stroud and Cushing and all intervening territory encounter a series of this character having a maximum thickness near Stroud of 140 feet. At the latter point it is composed almost entirely of light brown dolomite with about 5 feet of sand at its upper contact. This group occurs between the Viola limestone above and the "Wilcox" sand below. It is referred to as the Simpson because the sand grains are rounded and etched, the shales present are green and the dolomite is more characteristic of the Simpson than the Viola limestone. It is desirable to differentiate it from the "Wilcox" sand since it produces oil and gas in small quantities, the oil generally being much lower in gravity than that found in the "Wilcox" sand. It is also possible that water may be encountered in this horizon before reaching the "Wilcox" sand. This would lead to the abandonment of a well before a thorough test had been made. Many wells have been abandoned in this horizon. It is a huge economic waste to spend \$50,000.00 to \$100,000.00 for the purpose of testing the "Wilcox" sand and fail by so small a margin.

From a study of the well records in the vicinity of Ada and northward it appears that the rocks referred to here as post-"Wilcox," belong to the upper Simpson and would comprise all the beds from the top of the Simpson formation down to the top of the bed of glass sand at Roff. However it is not certain that a full section of upper Simpson is present at Roff and for this reason some later classification may be necessary. This series of beds should be given a suitable name. The name should not be selected however until the Simpson formation is studied and mapped in more detail. At that time it will be more evident than now, into what units it is desirable to divide the Simpson and such units can then be more appropriately named. The term post-"Wilcox" is not used as a name but merely a descriptive term to indicate a certain portion of the Simpson formation, namely, that part above the "Wilcox" sand.

VIOLA LIMESTONE

The "White Limestone" mentioned by Aurin, Clark, and Trager as occurring above the "Wilcox" sand is now identified with the upper part of the Viola limestone. For a good many years it was known only as the "White Lime" by the geologists of Oklahoma. However,

16. American Institute Mining and Metallurgy, Special volume Petroleum Technology and Development in 1926, pp. 585-593.

since it has been shown to be the equivalent of the upper part of the Viola limestone, the term "White Lime" is rapidly being dropped in every day usage, in favor of the term Viola.

North of Holdenville this phase of the Viola averages 30 to 50 feet in thickness. It is composed of two beds principally. The upper bed is white or grayish-white in color and coarsely crystalline. The drill cuttings are generally coarse. For this reason the drillers in some parts of the country call it the "buttermilk" limestone.

The lower member of the Viola is dense and brownish-gray in color sometimes resembling lithographic stone. This difference is never reported in well records and is seldom noted by any one except by those making a careful study of the samples.

Taff¹⁷ describes two limestone beds of this character at the top of the Tyner formation northeast of Tahlequah. This exposure was visited by a number of geologists from Tulsa in the summer of 1925 and all agreed that it was exactly the same as what had been known as the "White Limestone" above the "Wilcox" sand. This identification meant that the Simpson formation had been uplifted and eroded to the northeast of the Arbuckle area previous to the deposition of the Viola limestone. This discovery at once made it possible to identify the dolomitic series of sandstones which had been recently discovered to underlie the Viola in the vicinity of Stroud and Okemah. Such occurrences had never before been noted in the "Wilcox" sand and the "Wilcox" was thought to have a conformable contact with the Viola. However, when this contact was shown to be an unconformity and the Viola limestone was seen resting on the Tyner (green series) which was known to occur below the "Wilcox", then the dolomitic sands, encountered at Stroud and elsewhere to the south and west, were at once seen to be members of the Simpson formation higher in the section than "Wilcox," and hence the term post-"Wilcox" Simpson.

It may be seen from the above discussion that the beds of limestone described by Taff as the upper portion of the Tyner formation were erroneously classified with the Tyner and should have received a separate formation name. For the sake of convenience it would be well for these beds to be given a formation name even at this late day. While they are certainly members of the Viola limestone they do not represent its entire thickness but only the upper members. These particular members are so wide-spread and show so little variation from an average thickness of 40 feet, while the full section of Viola limestone in the Arbuckle area exhibits a thickness of 500 to 600 feet, that it is evident they are to be distinguished from the main body of Viola. In this connection it may be pointed out that all authorities agree that the upper Viola is Richmond in age. The position of the Richmond in the time scale, however, has been questioned, some placing it at the top of the

17. Taff, J. A., U. S. Geol. Survey, Geol. Atlas, Tahlequah folio (No. 122.), 1905.

Ordovician while others place it in the lower Silurian. The upper part of the Viola limestone is so much more wide-spread than the lower and thicker portions of the formation and the fact that the Viola-Sylvan contact is conformable, indicates that, from a stratigraphic standpoint, the Ordovician-Silurian boundary should be placed below the Richmond.

A study of drill cuttings from wells in east-central Oklahoma indicates that the upper coarsely crystalline members, observed in the subsurface section over this area, is really the equivalent of the top of the Viola rather than some lower member, since no other member of Viola is ever found above the coarsely crystalline member, even to the south, where the formation as a whole shows a tendency to thicken. This is in agreement with Ulrich's idea, which, according to Morgan¹⁸, is that the Viola varies in thickness due to the absence of the lower beds.

The gray limestone above the Tyner formation northeast of Tahlequah appears to be identical in age, lithologic character, and position with the Ferndale limestone of the Harrison quadrangle in Arkansas.²⁰ The Sylvan shale which occurs above this limestone in wells drilled southwest of Muskogee and westward, is doubtless represented in the Harrison quadrangle by the Cason shale. The lithologic description of the Cason shows that it is very similar to the Sylvan with the exception that the Cason carries a thin (one foot) bed of conglomerate at the base which rests upon the Ferndale limestone, while no evidence of a depositional break is known at the Viola-Sylvan contact.

After a consideration of the above facts and ideas, therefore, the author suggests that the Richmond phase of upper Viola limestone, which occurs broadly throughout Oklahoma in the subsurface stratigraphy, be differentiated from the main body of the Viola by giving it the name, Ferndale limestone. It may be desirable that this problem receive more study by the paleontologists and stratigraphers before adopting this change. This suggestion was first made by Ulrich²¹, however, in 1911, and, in the author's opinion, a study of the subsurface stratigraphy reveals such abundant proof of the early conclusions of this peerless author of Paleozoic history that it is high time some of them be adopted. The surprising thing is that it has taken the geologists of Oklahoma fifteen years to comprehend and verify many of the most remarkable deductions contained in Dr. Ulrich's early work, notwithstanding the fact that they were being supplied continually with an abundance of subsurface data in support of these conclusions. However, the author desires to indict none more severely than himself. The only extenuating circumstance that may be offered in this connection is the fact that, unfortunately, Dr. Ulrich's valuable paper entitled "Revision of the Paleozoic System", has long been buried in an out-of-print issue of the Geological Society of America. The author

is informed (verbal communication by George Buchanan) that Dr. Ulrich is now preparing a revised issue of this work in which will be incorporated the results of his studies since 1911.

SYLVAN SHALE

Drill cuttings show the Sylvan shale to be a light blue calcareous shale averaging 75 to 125 feet in thickness. Where it is overlain by the Hunton formation, the upper 5 to 15 feet of the Sylvan is often greenish-blue or light olive green in color. North of the Hunton boundary this green phase seldom appears because of erosion. In some areas a greater thickness of the Sylvan exhibits this greenish tint, particularly in fresh, wet samples. The Sylvan is also composed of a very dark shale in certain other areas toward its base. This dark color appears to be of local extent.

Taken as a whole the Sylvan shale is remarkable in its lithologic uniformity over broad areas. A hand specimen taken as cavings from a well near Cushing can scarcely be distinguished from a hand specimen taken from the outcrop southwest of Ada. It had long been recognized as a distinct formation in well records before it was identified as Sylvan shale. Few, if any, thin beds of true limestone exists within it, notwithstanding the fact that many are reported in well records. Effervescence in dilute acid, however, indicates that the Sylvan is more or less calcareous throughout, some beds presenting highly argillaceous limestone characteristics. It is readily distinguished in drill cuttings due to its light color since it is everywhere overlain by the Chattanooga black shale or Hunton limestone and underlain by Ferndale (Viola) limestone.

Ulrich has given the age of the Sylvan as Richmond. Its correlation with the Cason shale of Arkansas is mentioned above. Ulrich²¹ also correlates the Sylvan with the Maquoketa shale of the Iowa section.

The Sylvan shale has not been noted in eastern Oklahoma. This is due to the fact that it has been eroded in the Tahlequah area and the horizon of the Sylvan at the base of the St. Clair marble is not exposed farther south in the vicinity of Marble City. However, a diamond drill hole at the latter locality reports about 15 feet of greenish-blue shale below the St. Clair which is taken to be the Sylvan. The author is inclined to the belief that a more diligent search of this area may yet discover an exposure of the base of the St. Clair in contact with the underlying Sylvan shale.

HUNTON FORMATION

Taff²² described the Hunton formation originally. Reeds²³ discarded the term, on a basis of paleontologic evidence, in favor of four sep-

18. Morgan, George D., Bureau of Geol. Bulletin No. 2, p. 33, 1924.
19. Purdue, A. H., and Miser, H. D., U. S. Geol. Survey Geol. Atlas, Eureka Springs-Harrison folio. (No. 202), 1916.
20. Ulrich, E. O., Geol. Soc. America vol. 22, No. 3, Plate No. 7, 1911.

21. Op. Cit.
22. Taff, J. A., U. S. Geol. Survey, Geol. Atlas, Atoka folio, (No. 79), 1902.
23. Reeds, Chester A., The Hunton formation of Oklahoma, Am. Jour. Sci., vol. 32, October 1911.

arate formations composed of the same group of rocks, namely Chimneyhill limestone, Henryhouse shale, Haragan shale, and Bois d'Arc limestone. He placed the Siluro-Devonian contact between the Henryhouse and Haragan. Morgan,²⁴ however, showed a tendency to revert to the former term and stated that the name Hunton should be retained as the name of a terrane which includes the same group of rocks designated by Taff as Hunton formation. The term Hunton formation is employed in this paper because of the fact that subsurface studies have so far failed to establish which of Reeds' units are represented in the Hunton beds of the northern subsurface section. Future studies may permit of the use of Reeds' terms. Moreover field studies by the author and many others indicate that the Haragan shale and Henryhouse shale are in reality so limey or marly that it is doubtful if they should be described as shales. They are in reality just softer members of limestone. They decay and weather when exposed at the surface much more rapidly than the beds of harder limestone above and below Reeds' established faunal breaks above and below the Henryhouse member of the Hunton. If these be unconformities they probably become more pronounced to the north of the Arbuckle area and result in the absence of the Haragan and Henryhouse shaly members. It is also possible that these members become less argillaceous in that direction which would account for failure to identify them readily. In the latter case, if these units should be penetrated by the drill some distance to the north of the outcrop, their cuttings would be limestone only less crystalline than the overlying Bois d'Arc and underlying Chimneyhill. Whether this be true or not it is a fact that no one has ever yet found any appreciable amount of shale in drill cuttings from the Hunton formation north of Ada.

At present the formation is really referred to as the Hunton limestone in well cuttings since it appears as a continuous white or gray dolomitic crystalline limestone with such a slight lithologic variation in its vertical section that a differentiation of separate units has so far been impossible. Such a differentiation may be possible later, on a basis of micropaleontology, or a more definite tie may eventually be made between the subsurface section to the north and the Arbuckle section to the south after more wells are drilled.

Samples of the Hunton formation were obtained recently from a well being drilled east of Ada, in the southeast corner of the northwest quarter of section 14, T. 4 N., R. 7 E., in Pontotoc County. Mr. George Buchanan, of the Carter Oil Company, at Tulsa, identified these samples as follows:

Dense, gray limestone	(Bois d'Arc)	3748-3804
Dark gray argillaceous limestone	(Henryhouse)	3804-3907
Coarse crystalline pinkish limestone		3907-3932
Glauconitic white limestone	(Chimneyhill)	3932-3948
White oolitic limestone	(Chimneyhill)	3948-3975

24. Morgan, George D., Bureau of Geology. Bulletin No. 2, p. 36, 1924.

This is the first case so far as the author is aware, that any student has been able to produce good evidence of an identification of so many members of Reeds' section of the Hunton. Also in this case the rock identified as Haragan shows that it is primarily a limestone somewhat argillaceous in character. The coarser character of drillings exhibited by these samples indicates also that this limestone is softer than those above and below. This is further evidence that the Haragan and Henryhouse members of the Hunton should not be classified as shales.

Economically, the identification of the Hunton is important because it produces oil in some areas, notably five miles northwest of Stroud and in two areas near the town of Seminole, with numerous scattered showings, but more particularly because of the fact that large volumes of salt water are generally encountered in this formation and since it is encountered at depths ranging from 3,500 feet or more, to over 4,500 feet, it is frequently confused with the "Wilcox" sand, which results in the abandonment of wells before the latter formation has been tested.

More than 150 wells have encountered the Hunton formation in north-central Oklahoma, many of which reported small showings of oil in this formation. The exact import of these widely scattered traces of oil from this formation is not understood at present.

The lithologic similarity of drill cuttings from the Hunton formation and the Ferndale (Viola) limestone is so strong that the two are not easily distinguished on this basis. Frequently such a determination is not possible until the Sylvan shale or the Simpson formation have been identified.

According to Oklahoma Geological Survey Bulletin No. 35, the St. Clair marble is equivalent to the Henryhouse shale. In this paper it is suggested that the St. Clair is equivalent to the lower portion of the Hunton formation. In other words the base of the St. Clair marble is equivalent to the base of the Hunton formation. It is not known how far below the top of the Hunton, the bed occurs, which is equivalent to the top of the St. Clair. The reasons for this are as follows: There is no unconformity at the base of the Hunton. The base of the St. Clair is not exposed. There is an enormous unconformity at the top of the St. Clair-Hunton which cuts more deeply into the beds to the northward.

This sort of correlation between the St. Clair marble and the Hunton formation seems to be in agreement with Ulrich's²⁵ idea.

SYLAMORE ("MISENER") SANDSTONE AND CHATTANOOGA SHALE

The close of the Devonian time in Oklahoma was followed by a long period of erosion which truncated all of the older formations

25. Ulrich, E. O., Geol. Soc. America, vol. 22, No. 3, p. 559 and Plate 28, 1911.

from the top of the Hunton, to the south, down to horizons well below the top of the Arbuckle, to the north. This period of erosion did not close until the land area over northeastern Oklahoma was practically base-leveled. A surprisingly small amount of erosion debris was left upon this old eroded surface. However, there were a few sand dunes composed of sand derived from the Simpson formation. In addition to a few well developed dunes a thin veil of wind-blown sand was scattered over broad areas. This sand was preserved by the deposition of the Chattanooga shale above it. Where it is exposed in eastern Oklahoma and Arkansas it is known as the Sylamore sandstone. By the drillers in the oil country, it is called the "Misener" sand. Because of its source of origin, therefore, samples of it from wells resemble samples from the "Wilcox" or "Burgen." It is extremely lenticular in extent. Wells drilled to this sand are often dry, even though higher structurally than offset wells producing from it, because of its absence. Where the "Misener" is sufficiently wide-spread for structure to affect the accumulation of oil, it produces on domes or anticlines. In most cases however it produces as a true lense without reference to structure.

The patterns of these sand bodies are generally subcircular in outline. They are never elongated similar to the shoe string sands of Kansas which would suggest shore line or stream valley deposition. For this reason the "Misener" (Sylamore) sand in Oklahoma is considered to be of aeolian origin. While this is the probable manner of deposition over north-central Oklahoma it need not have been true for the south flank of the Ozarks where the old land surface upon which the Sylamore was deposited may have been submerged much earlier than to the west. Dunes may have been forming in the latter area contemporaneously with shallow water and beach deposition elsewhere. Regarding this point Dr. Ulrich²⁶ writes as follows: "In northern Arkansas the Sylamore sandstone, evidently a beach deposit, presents the prevailing aspect of a sandy basal deposit. The sand stone resembles the much older St. Peter sandstone, and in fact consists chiefly of the more or less cleanly washed soil of areas in which bodies of the St. Peter were then exposed. Though usually less than 2 feet in thickness, the Sylamore expands to much greater thicknesses in places where it fills depressions in the preceding land surface."

The age of the Sylamore sandstone has been considered to be Devonian in most of the publications dealing with it in Oklahoma and Arkansas, this being due to the classification of Chattanooga as Devonian. The early publications of Missouri carried the same age classification for these formations, while the later publications place the Chattanooga in the lower Mississippian.²⁷ The author considers the Sylamore and Chattanooga in Oklahoma of lower Mississippian age. The latter conclusion is based solely upon the stratigraphic relations shown in the cross-section on Map No. I accompanying this paper. The Chattanooga shale follows the Mississippian everywhere in contrast to its relations

with the Devonian and older formations. There is no pronounced break between Chattanooga and Mississippian. This is a tremendous break between the Hunton (Devonian) and Chattanooga. Therefore, it seems reasonable that the Devonian-Mississippian time division should be marked by this tremendous stratigraphic hiatus at the base of the Chattanooga rather than by the near conformable contact between the Chattanooga and Mississippian limestone. This latter conclusion is arrived at solely from a study of the stratigraphic relations while the same classification in Missouri was based upon paleontologic evidence.

The Chattanooga shale has been correlated with the Woodford chert by all previous authors on Oklahoma geology. This correlation appears highly questionable. The Chattanooga shale has an average thickness of less than 50 feet and consists of black bituminous, fissil shale. The same identical character and approximate thickness is displayed throughout the many states in the Mississippi Valley where it generally occurs except where removed by erosion. In this respect it is the most distinctive formation in the post-Devonian geologic column. Subsurface studies in central Oklahoma show that the Chattanooga displays this same character and thickness in well cuttings as far south as the Wewoka area which is about 25 miles north of the northern exposures of the Woodford chert. In section 34, Township 3 North, Range 6 East, the Woodford chert has a thickness in excess of 200 feet and is composed of alternating layers of hard platy black shale and brown to black chert, each layer being more or less than 4 inches thick. Elsewhere in the Arbuckle Mountains the Woodford develops a thickness in excess of 600 feet and exhibits the same regular lithologic character. This is so different in thickness and character from all of the known occurrences of the Chattanooga shale elsewhere and since the Chattanooga is so constant in character over broad areas it seems altogether improbable that it should change so suddenly within such a short distance. It has been suggested that the Woodford is more analogous in character to the southward extension of what has been called the "Mississippi lime." This seems much more reasonable than the correlation between Chattanooga and Woodford. The latter correlation would probably indicate that the Chattanooga had been eroded from the Arbuckle area before the deposition of the Woodford.

EXPLANATION OF MAPS NOS. I AND II

The oil producing horizons below the Mississippi lime have been sought by hundreds of test wells in Oklahoma during the past few years and the search for the elusive so-called "Wilcox" sand series is constantly increasing. In some parts of the State many tests which were supposed to go to the "Wilcox" have been plugged and abandoned because they found water in what the driller thought to be the "Wilcox" sand but which later scientific investigation has shown to be a formation above the objective horizon. These tests, therefore, were not con-

26. Op. cit. p. 455.

27. Missouri Bureau of Geology and Mines, vol. XVI. 2nd Ser. p. 52, 1922.

clusive and the economic losses which have resulted from ignorance of the stratigraphy, or succession of formations below the Chattanooga black shale, have amounted to hundreds of thousands, probably millions of dollars.

The map, No. II, which accompanies this report shows in detail the areas where the various formations below the Chattanooga black shale are found in contact with that reliable marker. In other words, a well drilled in the vicinity of Sapulpa would pass from the Chattanooga into the "Wilcox" sand, while in the vicinity of Okmulgee the drill finds the Sylvan shale directly beneath the Chattanooga shale and must pass through the Sylvan, and the Viola limestone ("White Lime" or "butter-milk" lime) before reaching the "Wilcox" sand. Farther south, near Okemah, the map shows that the Hunton limestone lies directly beneath the Chattanooga and the Hunton is separated from the "Wilcox" by the Sylvan shale and Viola limestone.

This map may be considered as an areal geologic map with all the upper formations, including the Mississippi limestone and the Chattanooga shale, scraped off, leaving the base of the Chattanooga outcrop in the areas shaded by different symbols.

The map is of special value to the operator since it is sectionized. It enables one to tell at a glance just what formation to expect after drilling through the Chattanooga shale. Having identified that formation, the accompanying cross-section (Map No. I) shows the other strata to expect in order.

SUBSURFACE STRATIGRAPHY OF WESTERN OKLAHOMA

By

Frank C. Greene

INTRODUCTION

GENERAL STATEMENT

A study of the logs of holes drilled in western Oklahoma reveals the fact that certain rather definite conclusions can be drawn, and that in general the strata can be correlated with beds exposed at the surface. Several markers are found consistently over wide areas. Unfortunately, as central Oklahoma, and the Arbuckle Mountains are approached, all markers disappear and the driller or geologist finds himself in the midst of a succession of red beds from the surface down to 4,000 or 5,000 feet, perhaps even deeper.

The Blaine gypsums, the Wellington shale and the Panhandle "Big Lime" are replaced by red beds, and in the following discussion it should be understood that the thicknesses given apply only to formations west of Logan, Canadian and Caddo counties. East of an indefinite line through these counties the divisions of the section described lose their identity.

STRATIGRAPHY

PRE-CAMBRIAN ROCKS

The pre-Cambrian igneous rocks, upon which all the sedimentary strata have been deposited, undoubtedly underlie all of western Oklahoma, but the most important fact—their depth—remains unknown over the entire area with the exception of the Wichita Mountains and their buried extension to the northwest. In the Anadarko Basin along the north side of the Wichita Mountains¹ the depth to igneous rocks is probably very great. The presence of arkosic material in the hole near Canute in Washita County, as well as the regional structure leads to the belief that the depth will be somewhat less in the west-central counties of the western-half of the State. Between these counties and Barton County, Kansas, there is probably a deep trough in which the depth to igneous rocks is very great.

While granite is the predominating type of igneous rock, it is by no means the only one, as has been discussed in the chapter dealing with the general geology of the State, but as far as drilling for oil or gas is concerned, the exact type of igneous rock which is encount-

1. For the purpose of this discussion, the Wichita Mountains should be understood as including the buried extension to the northwest as well as the mountains themselves.

(This report originally issued as Bulletin 40-D, September, 1926).

ered is of little importance. What is of importance is to establish the fact that granite or some other type of true igneous rock, unweathered and in its original position, has been reached.

Three intergrading facies of igneous material have been found on the north flanks of the Wichita Mountains: (1) igneous rocks that have been weathered and broken down in place, resting upon and grading down into unweathered materials, (2) transported material in a weathered state, that is, arkose, and (3) more or less mixed with it, large boulders of igneous rocks, transported a greater or lesser distance from the original position, weathered on the exterior but fresh on the interior.

These conditions make it almost impossible to give a definite assertion that any certain well has reached true unweathered igneous rock and has therefore passed the point where production is impossible. However, when the cuttings indicate that a fresh material has been penetrated for 50 or 100 feet without a change, in general, it will be useless to drill farther.

PRE-PENNSYLVANIAN FORMATIONS

In the Wichita Mountains, flanking the uplift on the east end, are some rocks of Cambrian and Ordovician age. These have been described in other papers and will not be discussed further here. They do not appear farther west along either the north or south flanks of the mountains, the Permian resting directly on igneous rocks.

South of the Wichita Mountains along Red River and to the south in Texas, Ordovician rocks have been found in wells. In western Kay, eastern Grant, and eastern Garfield counties, Ordovician beds have been penetrated by the drill on buried uplifts. In the area north of the Wichita Mountains and west of the counties mentioned little is known of the pre-Pennsylvanian beds except that they extend, of course, beyond the farthest west points where they outcrop, but are probably absent over much of the area according to the interpretation of the few paleogeographic data available. It seems probable, however, that a more or less narrow basin extends slightly north of west from Grant and the adjacent counties. The deep well near Canute, Oklahoma, (sec. 21, T. 11 N., R. 19 W.) entered granite wash at 5,070 feet. The Clark County, Kansas, well (sec. 20, T. 32 S., R. 21 W.) was still in sedimentary rocks at 5,679 feet. The Cheyenne Bottoms well in Barton County, Kansas (sec. 22, T. 18 S., 13 W.) entered granite-schist at 3,602 feet. Wells near Syracuse, Kansas, and in eastern Colorado have penetrated a thick succession of sedimentary rocks, while in northwestern Kansas the few available data indicates a relatively thin Paleozoic section.

PENNSYLVANIAN AND PERMIAN FORMATIONS

The Red Beds in Central Oklahoma

Both the vertical and horizontal boundaries of this set of red beds are so indefinite that they can scarcely be described. In Grady, McLain,

Cleveland and the adjoining counties, the drill penetrates a great succession of red shale and sand, the base of which has not been reached so far as is known to the writer. There are, of course, some beds of light-colored shale and some thin limestones, but they are in the minority. The upper part of this mass of red material belongs to the Cimarron group, and as the light-colored material that normally occurs below that group farther west is absent in the counties mentioned, the dividing line can not be drawn between red beds of Cimarron age and older beds.

These older red beds are known to include material extending from the Kansas City formation into the Marion or Wellington formation.

From the center of this mass of red beds below the Cimarron, the individual beds change color to the east, north, and west, the red beds and accompanying sandstones give place to light-colored shales and limestones. The thinning to the east, however, is greatly accentuated by the regional rise of the strata to the east and the accompanying truncation by erosion.

From the Canadian River to the Arkansas River, through Seminole, Okfuskee and Creek counties, the eastern boundary of the red beds is nearly, but not quite, a true stratigraphic plane with a strike comparable to that of the beds below that outcrop to the east. The boundary approximately corresponds with the base of the Vamoosa formation of Morgan² and of the Tiger Creek sandstone of Fath³. It is also very close to the top of the Glenn formation.

South of the Canadian River, formations as low as the Boggy shale, and possibly older, contain beds of red material, although they are not mentioned in any descriptions of these formations that have been seen by the writer. This red material is not known to extend any considerable distance north of the Canadian River either on the outcrop or in well logs, and the beds below the stratigraphic plane mentioned, are mostly devoid of red material.

North of the Arkansas River the red color gives place to blue or gray with certain exceptions. Some red layers, as for example that below the Oread limestone, extend across Kansas and Missouri into Iowa and Nebraska. The higher red layers in general extend farther north and maintain their thickness for a greater distance than lower beds do. This gives rise to the condition well known to all who have colored and compared graphic logs from central Oklahoma and southern Kansas. The Oklahoma logs show a practically unbroken succession of red material and sandstones and those from Kansas, shales and limestones, with relatively few red layers and sandstones.

The base of the main mass of red material dips to the west at the same rate as the underlying formations, 40 to 100 feet per mile. In McLain, Cleveland, Oklahoma, and adjoining counties the base reaches its lowest point and the mass attains its greatest thickness. However,

2. Morgan, Geo. D., *Geology of the Stonewall Quadrangle, Oklahoma*: Bureau of Geology, Bull. 2, 1924.
3. Fath, A. E., *Structure of the northern part of the Bristow Quadrangle, Creek County, Oklahoma*: U. S. Geol. Survey, Bull. 661, pp. 69-99, 1917.

as the light-colored material of the Wellington is absent in most of this area, it is impossible to distinguish in well logs the Enid formation from the lower red beds.

The few deep wells that have been drilled through the red beds west of the deepest part of the basin indicate that the lens of red material terminates rather abruptly at a line extending from Anadarko to Medford. West of this line and below the base of the Enid formation, layers of red material more than 20 or 30 feet thick are rare and few wells log more than 2 or 3 red layers.

In western Oklahoma two zones of red material belonging to this terrane are found. The lower seems to be the western representative of the Chase formation and is found in the 600 foot sand-arkose-shale series below the "Big Lime" and above the Foraker limestone. The upper is the western extension of the Marion or Wellington formation. As already mentioned the amount of red material in either of them is small.

Because of the indefinite character of this terrane, there is little to be said about its thickness. Where the maximum thickness occurs, it can not be separated from the overlying Cimarron red beds. In the Grady-McClain-Cleveland County region, the thickness is believed to be in excess of 2,500 feet.

As has been mentioned, this series of red beds includes two groups of beds, separated in the Enid-Perry region by non-red material. The lower group is to be correlated with the beds between the Chanute shale of the Kansas City formation and the top of the Chase formation, both inclusive. The upper is the Marion or Wellington formation.

Gould⁴ gave the name Chandler (formation on map, district in discussion) to the lower part of these red beds.

They are approximately equivalent to the Vamoosa, Ada and Pontotoc of Morgan⁵ which have a combined thickness of 1,500 to 1,900 feet.

PONTOTOC (?) TERRANE

The oldest beds in western Oklahoma of which there is any extensive knowledge are assigned to the rather indefinite Pontotoc (?) terrane. It appears probable that the arkosic beds along the north side of the Wichita Mountains occupy a slightly higher position in the geologic column than those along the north side of the Arbuckle Mountains. This statement is based on the fact that the top of the arkosic beds of the Wichita Mountains correlates with younger beds more accurately than does the top of the Pontotoc beds of the Arbuckle Mountains. They are deposits of arkose, arkosic sands, sands, sandy shales and argillaceous shales, variable in color, representing the material eroded from the Wichita Mountains as they were gradually uplifted during late Pennsylvanian and early Permian times and carried off-

shore and deposited. Just as the Pontotoc beds north of the Arbuckle Mountains grade northward into non-arkosic sands, shales and limestones, so do the buried Pontotoc (?) beds north of the Wichita Mountains pass into the limestones and shales found in the trough between Canute, Oklahoma, and Barton County, Kansas.

Along the Wichita Mountains the arkosic beds rest upon the igneous rocks from which they were derived. Along the Arbuckle Mountains older Pennsylvanian and other Paleozoic beds have been found below the Pontotoc, but whether or not this condition prevails north of the Wichita Mountains is unknown.

The Pontotoc (?) beds are the principal oil sands of the Sayre, Oklahoma and Wheeler and Carson counties, Texas fields and are usually termed by the driller "granite wash."

LIMESTONES AND SHALES OF NORTHWESTERN OKLAHOMA

As already mentioned, the Pontotoc (?) grades northward into light-colored shales, limestones, sandstones and red beds, the proportion of the first two mentioned increasing to the north. It is almost certain that there are limestones and shales older than those that are the time equivalent of the Pontotoc (?) terrane, present in an increasing thickness toward the trough at or near the Kansas-Oklahoma State line. These older Pennsylvanian beds also increase in thickness from west to east and in Kay and Grant counties, wells can be correlated with beds older than the Pontotoc that outcrop in eastern Oklahoma.

In western Kay, Grant, Alfalfa, and Garfield counties, the 600 feet, more or less, of strata above the Foraker limestone, form a set of beds distinguished from those above and below. Included in these beds are sandstones, sandy limestones and red beds in far greater abundance than in the strata immediately over and under them. Resting on the Foraker limestone is a red bed marking the base of this zone, and while this is not the lowest red layer in the section, the other lower red beds are thin and scattered.

The correlation of the arkosic beds north of the Wichita Mountains with the 600 foot zone described above is made because of the red and arenaceous material. It is realized that the Pontotoc (?) of the Arbuckle Mountains region includes the southern representatives of much lower beds than the Foraker, but it is believed that the Pontotoc (?) of the Arbuckle region is much thicker than that of the Wichita Mountain region.

THE PANHANDLE "BIG LIME"

This name is used temporarily until a suitable geographic name is proposed for these beds. It is possible that the Panhandle "Big Lime" is represented by some part of the Marion, probably above the Herrington limestone. On the other hand it is possible that it has no surface outcrop in Kansas or Oklahoma. As far as Oklahoma is concerned, the term "limestone" is a misnomer because gypsum, anhydrite, dolomite, and salt constitute most of the formation.

4. Gould, Chas. N. Geology and water resources of Oklahoma: U. S. Geol. Survey, Water-Supply Paper 148, 1905.
5. Morgan, Geo. D.. Geology of the Stonewall Quadrangle, Oklahoma: Bureau of Geology, Bull. 2, 1924.

On the north flanks of the Wichita Mountains and throughout western Oklahoma, in every hole drilled sufficiently deep, the Panhandle "Big Lime" rests on the arkosic material or the 600 foot zone of material correlated with it, either directly or with a little intervening shale.

The thickness of the "Big Lime" is variable. It lenses out to the east and increases toward the center of the Anadarko Basin. In much of northwestern Oklahoma it averages about 300 feet and probably attains a maximum thickness of 500 or 600 feet. It is also probable that it is absent in the central and western parts of the Oklahoma Panhandle.

It is somewhat difficult to make generalizations on the thickness as the upper part of the "Big Lime" is shaly and frequently is logged as containing salt—a feature of the overlying shale. It is the principal oil-bearing formation in Hutchinson County, Texas.

WELLINGTON SHALE

Throughout western Oklahoma the Wellington shale constitutes one of the chief, if not the principal, marker in subsurface stratigraphy. Its gray, blue or black hue contrasts so strongly with the red of the overlying Enid that it is conspicuous in all carefully kept logs. It contains much salt in northwestern Oklahoma and southern Kansas. In the eastern part of the Wellington area, the salt beds are thin and near the base of the formation, interspersed with thin anhydrites (logged as limes) and a little red and brown shale. Farther west the salt beds are thicker and also higher in the formation.

It is a question whether these salt beds have been dissolved away along the eastern margin of the Wellington or whether they were not deposited there. If they were deposited and dissolved away, as seems probable, the reason is at hand for some of the irregularities in the stratigraphy.

In the Anadarko Basin very little salt is reported, but most logs show a great many thin lime shells, probably anhydrite in most cases. Salt is absent also in the central and western parts of the Oklahoma Panhandle.

The thickness of the Wellington ranges from 200 to 500 feet and averages about 300 feet. In general it thins to the east. Over the buried extension of the Wichita Mountains it seems to be absent in places.

ENID FORMATION

The Enid formation includes an almost unbroken succession of red material from the top of the Wellington non-red shale to the base of the Blaine gypsums. In well logs four divisions may be distinguished, although all the divisions are not recognizable in all areas. Where present in its entirety the thickness of the Enid ranges from 1,200 to 2,200 feet, the variation taking place in all the members.

The lowest member is a zone of red shale and sandstone 100 to 300 feet in thickness, probably the Harper sandstone member. Above this is 100 to 300 feet of blue shale, with minor amounts of red shale and in the Woods and Harper counties area large amounts of rock salt. From this occurrence it is believed that this is the Salt Plains shale member.

This blue shale member makes a good marker over all of western Oklahoma, and it is present in many logs in west-central Kansas. It is probably present even where not logged and has escaped notice through cavings of the other red material.

From the top of this member to the base of the Blaine gypsum there are one or two members, depending on the locality. In most of west-central Oklahoma the interval is nearly all red shale, but in the Harper and Woods counties area there is a second zone of rock salt, of which the writer has seen no mention in the literature, in the uppermost 100 to 300 feet of the Enid. The presence of this salt bed explains the occurrence of several salt plains just below the escarpment of the Blaine gypsum.

The upper one or two members of the Enid comprise two-thirds or three-fourths of the whole, and because of this fact they have a wide range in thickness, 800 to possibly 1,600 feet.

Aside from the rock salt, the upper part of the Enid is mostly logged as red shale (red rocks or red mud), but a few sandstones are reported, and it is often found that the sandy beds line up fairly well.

BLAINE FORMATION

The Blaine formation is a zone of anhydrites and red shales, with a few thin dolomites. In many cases the relatively hard anhydrite beds are logged as limestones. Upon exposure the anhydrite in places becomes gypsum. The formation is 100 to 200 feet in thickness and appears in the log of practically every well that has penetrated its horizon. As a rule, it marks the base of a series of thick sands, and, as already mentioned, very little sandy material is found for a long distance below it.

THE WOODWARD AND HIGHER FORMATIONS

As very few wells have been drilled in that part of Oklahoma where any considerable thickness of material is present above the Whitehorse sandstone, a study of well logs adds little information. Usually some red shale is logged immediately above the Blaine and the remainder of the log shows a succession of red rock and water sand which varies from well to well.

STRUCTURE

The outstanding structural features of western Oklahoma are the Anadarko Basin and the broad shallow syncline extending north from it. There is a steep northerly dip along the north side of the Wichita

EXPLANATION OF MAP NO. III

The base of the Permian red beds (Harper sandstone, a basal member of the Enid formation in northwestern Oklahoma) constitutes one of the best markers of western Oklahoma. The contouring on the map is necessarily preliminary for in some counties only one or two wells have been drilled sufficiently deep to penetrate the Wellington shale below the red beds.

The main structural feature shown on the map is the Anadarko Basin. The second structural feature in importance, is the broad shallow syncline trending northward from the Anadarko Basin, which is a result of the southwest dip in the north-central counties and the south-east dip in the northwestern counties.

When the surface elevation of a drilling well is known, the depth to the base of the Permian red beds can be computed by the use of this map. Note that the contours in the Anadarko Basin denote distance below sea level, and should read minus (—), and the contours in the Oklahoma and Texas Panhandles should read plus (+).

Notes on
PENNSYLVANIAN PALEOGEOGRAPHY

WITH SPECIAL REFERENCE TO SOUTH-CENTRAL OKLAHOMA

By

Robert H. Dott

INTRODUCTION

In this paper the writer will attempt to show the general distribution of seas which deposited Pennsylvanian sediments in Oklahoma, and to indicate the age and effect of mountain movements. The writer is more familiar with the area in the vicinity of what is generally called the Arbuckle Mountains, and a more detailed discussion will be given of that area.

The western limits of some of the seas were taken from some unpublished maps of Mr. Frank C. Greene, and those of others were determined from a series of cross-sections prepared by Richard Hughes and John E. Millar, Jr. The writer believes that the original eastern shore lines were not far from the present outcrops.

The writer's interest in this problem started while working under Mr. Alex W. McCoy, who contributed the first paper dealing with the paleogeography of the Mid-Continent region.¹ Buchanan² has shown the correlation of Mississippian formations and the distribution of Mississippian seas. Gould and Wilson³ have recently discussed the stratigraphy, areal geology and paleogeography of the upper Paleozoic rocks of Oklahoma.

ACKNOWLEDGMENTS

This opportunity is taken to thank Frank C. Greene, Richard Hughes and George S. Buchanan for valuable suggestions, Dr. Sidney Powers and Professor W. H. Twenhofel for valuable criticisms, and A. L. Beekly, Chief Geologist of the Mid-Continent Petroleum Corporation, for permission to publish this material.

PHYSIOGRAPHIC FEATURES

The area known as the Arbuckle uplift should be divided into two distinct parts, the Arbuckle anticline and the Hunton Arch. The Arbuckle anticline is a prominent topographic feature trending in a northwest-southeast direction in southwestern Murray County (See Fig. 1). To this topographic feature the term "Arbuckle Mountains"

1. McCoy, A. W. A short sketch of the Paleogeography and Historical Geology of the Mid-Continent oil district and its importance to petroleum Geology: Bull. Amer. Assoc. Pet. Geol., Vol. 5, 1921.
2. Buchanan, Geo. S., Unpublished manuscript.
3. Gould, Chas. N., and Wilson, Roy A., The Upper Paleozoic rocks of Oklahoma: Okla. Geol. Surv., Bull. 41, 1927.

(This report originally issued as Bulletin 40-J, March, 1927).

is restricted by the people of the region, and it is so designated on the topographic sheet of the Ardmore quadrangle.

The Hunton Arch is a northward plunging anticlinal nose with an axis slightly west of north-south, trending through western Pontotoc County, northward into the Seminole area. The greater part of this anticline is buried beneath Pennsylvanian strata.

In 1902 Taff⁴ applied the term "Hunton Anticline" to a small fault block in the northwest corner of the Atoka quadrangle. In 1904 the same author⁵ applied the same term to a northward plunging anticline occurring in the south-central part of Stonewall quadrangle, discernible at the surface in the outcrops of lower Paleozoic formations.

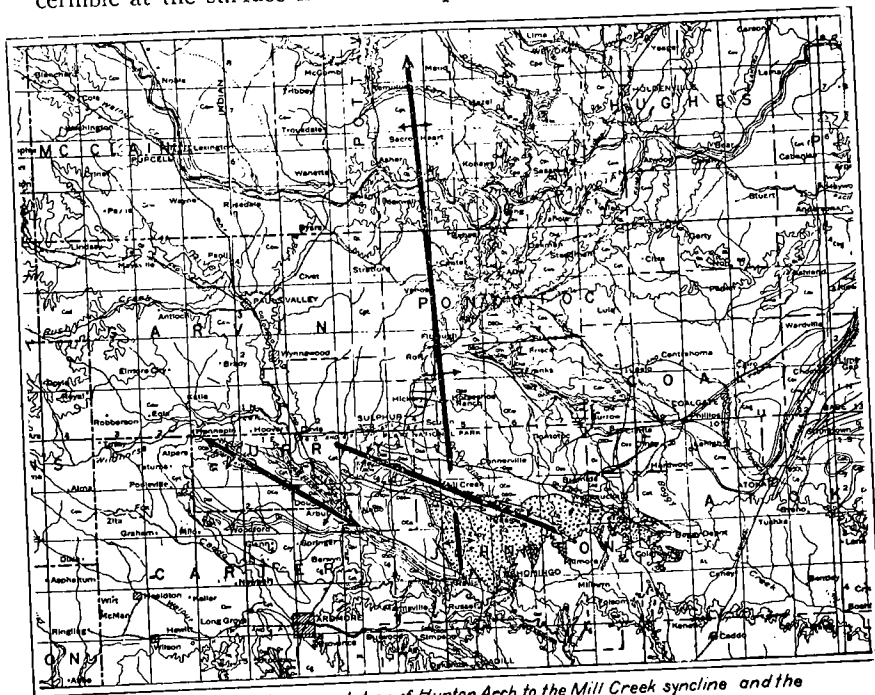


Figure 1. Geologic map showing relation of Hunton Arch to the Mill Creek syncline and the Arbuckle anticline

In recent years sub-surface mapping on the Hunton limestone has shown the northward continuation of this fold beneath the Pennsylvanian cover, at least into the Seminole area. Taff's "Hunton Anticline" has thus become known as the "Hunton Arch."

4. Taff, J. A. U. S. Geol. Survey Geol. Atlas, Atoka Folio (No. 79), p. 7, 1902.
5. Taff, J. A. Preliminary report on the Geology of the Arbuckle and Wichita Mountains in Indian Territory and Oklahoma: U. S. Geol. Survey Prof. Paper 31, p. 39, 1904.

To the east of the Hunton Arch, and extending thence northeastward into Arkansas, lies the Pennsylvanian coal basin which contains the maximum development of Pennsylvanian sediments in Oklahoma. East and south of the coal basin in Oklahoma and Arkansas lies the great area of intense folding known as the Ouachita Mountains.

To the north of the coal basin in Oklahoma and Arkansas is a southwestward plunging fold which may be regarded as a spur of the Ozark Mountains, and which, for lack of a better name, the writer will call the "Ozark Arch."* Like the Hunton Arch, the greater part of this structure is covered by Pennsylvanian sediments, but its southward extension seems to be definitely established by subsurface mapping.⁷ The Seminole area seems to lie in a large saddle between the north end of the Hunton Arch and the south end of the Ozark Arch.

STRATIGRAPHY

Before entering upon a discussion of Pennsylvanian paleogeography and the history of these structural features, it will be well to point out certain details of correlations as now understood. These correlations are shown in the accompanying table.

Powers⁸ states that the oldest Pennsylvanian rocks in Oklahoma are found in the Springer formation of the Ardmore basin. The lowest Pennsylvanian beds in the coal basin are found in the upper Caney shale, and are separable from the lower Caney on faunal evidence. These shales grade upward into the Wapanucka limestone, and with it form the equivalent of the Morrow formation of the Ozark area, and of the Dutcher sand in the central Oklahoma oil fields. The Morrow-Wapanucka group has been shown by Mather⁹ and others to carry a fauna of strong Mississippian affinity, though with sufficient Pennsylvanian invertebrates and plants to establish its lower Pottsville age.

In the coal basin the Wapanucka limestone is succeeded and apparently off-lapped by a series of coarse sandstones and shales, aggregating some 7,500 feet in thickness, designated the Atoka formation by Taff. This is in turn succeeded by the Hartshorne, McAlester, Savanna, Boggy, Thurman, Stuart, Senora and Calvin formations. These nine formations are usually referred to by authors as equivalent to the Cherokee formation of Kansas.

At present, but three definite statements relative to the stratigraphy and correlations of these various groups can be made:

*This arch should not be confused with the Ozark dome.

6. White, Luther H., Subsurface distribution and correlation of the pre-Chatanooga ("Wilcox" Sand) series of northeastern Oklahoma: Okla. Geol. Surv., Bull. 40-B, 1926.
7. Thom, W. T., Jr., Structure map of northeastern Oklahoma: U. S. Geol. Survey, 1925.
8. Powers, Sidney, Personal communication.
9. Mather, K. F., The Fauna of the Morrow Group of Arkansas and Oklahoma: Denison University Bulletin, Vol. XVIII, 1915.

1. David White and Girty¹⁰ have shown that the coal in the McAlester formation in Arkansas is older than the coal in the Cherokee formation in Kansas.

2. Some part of the Savanna formation is generally regarded as equivalent to the Bluejacket sandstone, which at Pryor lies 200 feet above the base of the Cherokee formation.

3. The Wetumka shale, which overlies the Calvin sandstone, is equivalent to the Fort Scott limestone, which occurs above the Cherokee formation.

In the Tahlequah and Muskogee quadrangles, all rocks below the Boggy formation, and above the Morrow group, have been in the past, grouped into one formation, the Winslow.¹¹ It is much thinner than its assigned equivalents to the south, being about 1,000 feet thick, while the combined maximum thickness of the Atoka, Hartshorne, McAlester and Savanna formations is 10,000 feet.

While formational thickening from north to south is not surprising, this amount is so great that in the writer's mind, the Atoka formation is distinctly older than the Winslow formation, and represents the oldest post-Wapanucka formation in the Mid-Continent region.

Overlying the Atoka formation in the coal basin, Taff mapped successively the Hartshorne sandstone and McAlester shale, which constitute a series of sandstones and shales aggregating some 3,500 feet in thickness. The McAlester shale contains coal beds. These formations are probably the ones which are contemporaneous with the Winslow formation.

Both in the outcrops and well logs it is rather difficult to draw any definite limits for these various groups, so the writer has assumed that the Booch sand is equivalent to the Hartshorne sandstone, and has arbitrarily drawn the base of the Winslow formation at the base of this sand. The subsurface distribution of this formation in Seminole, Okfuskee and Creek counties was determined from cross-sections prepared by Richard Hughes and John E. Millar, Jr.

In the Ozark area the Winslow formation is succeeded by the Cherokee formation, a series of gray to black shales 450 to 1,000 feet thick, containing some sandstone members notably the Bluejacket sandstone, in the Vinita quadrangle. This has been correlated with the widespread Bartlesville sand and with the Savanna sandstone of the coal basin.

The Winslow-Cherokee contact is rather difficult to determine. From the areal mapping shown on the new state map in Muskogee, Wagoner and Mayes counties, it would seem that the base of the Bluejacket sandstone is the top of the Winslow formation. This would

10. White, David and Girty, Geo. H., *The Arkansas Coal Field, Reports on Paleontology*; U. S. Geol. Survey, Bull. 326, 1907.

11. Taff, J. A., U. S. Geol. Survey, Geol. Atlas, Tahlequah Folio (No. 122), 1905.

make the upper part of the Winslow formation equivalent to that part of the Cherokee formation which lies below the Bluejacket sandstone. This is indicated in Bulletin 35, Oklahoma Geological Survey.

For the purposes of this paper, the base of the Cherokee formation is placed a short distance below the Bartlesville sand and at the base of the Savanna sandstone.

The upper limit of the Cherokee formation in northern Oklahoma and Kansas has been defined as the base of the Fort Scott limestone. There has been considerable uncertainty as to the exact equivalent of this limestone south of Arkansas River. In Bulletin 35, Oklahoma Geological Survey, the base of the Fort Scott limestone is placed somewhere in the Wetumka shale, thus making the Cherokee formation of Kansas and northern Oklahoma equivalent to the Savanna sandstone, Boggy shale, Thurman sandstone, Stuart shale, Senora formation and Calvin sandstone of the coal basin. These groups consist of alternating sandstones and shales aggregating some 4,000 feet in thickness.¹² The Senora formation in the vicinity of Henryetta contains considerable quantities of coal, which probably approximate the age of the coals of Kansas.

Because of the excellence of the early work on the Pennsylvanian stratigraphy of Kansas, and because of the uniform distribution and development of the formations in Kansas, Nebraska, Missouri and Iowa, the nomenclature as used in Kansas has become standard for the middle and upper Pennsylvanian of the lower Missouri Valley.

The Kansas units have never been recognized south of Arkansas River, due to abrupt and decided changes in lithology in northern Oklahoma. Recent work has shown that they can be identified in a broad way, and it seems advisable to the writer that an attempt be made to do so.

In the preceding discussion of the Cherokee formation, and in the following discussions, the writer's interpretation of equivalencies is set forth, and the Kansas formational names are used instead of the numerous unit names of the Oklahoma literature, many of which, in the light of these suggestions, should be regarded as members, rather than formations.

In the main, the correlations as shown in the tables accompanying the preliminary edition of the new Oklahoma Geological Map, and appearing in Bulletin 35, Oklahoma Geological Survey, have been followed.

In many collections from beds below the Francis formation (as defined by Morgan¹³) in the vicinity of Ada, the writer found the

12. Taff, J. A., U. S. Geol. Survey, Geol. Atlas, Coalgate Folio (No. 74), 1901.

13. Morgan, Geo. D., *Geology of the Stonewall Quadrangle*; Bureau of Geology, Bull. 2, 1924.

brachiopod *Chonetes mesolobus* to be the dominant form, and to be conspicuous by its absence from the Francis formation. Morgan's faunal chart¹⁵ indicates the same thing. Greene¹⁶ has shown that this species is limited to the Des Moines group (Cherokee and Marmaton formations) of the northern Mid-Continent area.

If the equivalency of the Cherokee formation be as indicated above, then Taff's Wetumka, Wewoka, Holdenville and Seminole formations belong to the Marmaton formation as recognized in Kansas, Missouri and Iowa.

Overlying the Cherokee formation in Kansas, the Marmaton formation begins at the base with the Fort Scott limestone, and this is succeeded by alternating shales and limestones. These same members have been recognized in northern Oklahoma, though they do not all carry the same nomenclature. About half way between the state line and Arkansas River, the Altamont and Pawnee limestones coalesce, forming the Oologah limestone, or the "Big lime" of drillers.

In the upper part of the Marmaton formation occurs a thin but persistent limestone known in northern Oklahoma as the Lenapah limestone. In Kansas this limestone is overlain by the La Cygne shale, which forms the upper member of the Marmaton formation, and in turn overlain by the Hertha limestone, the basal member of the succeeding Kansas City formation.

In southern Kansas the top of the Marmaton formation is the top of the La Cygne shale and the base of the Hertha limestone. In northern Oklahoma, the Checkerboard limestone lies at about the same horizon as the Hertha, and both it and the Lenapah can be recognized in well logs.

The Lenapah limestone lies near the horizon of the Cleveland sand and is approximately equivalent to the Seminole formation of the Hunton Arch area. The top of the Marmaton formation has been drawn below the Checkerboard limestone and above the Lenapah limestone and its equivalents.

Following the Marmaton formation in Kansas occurs the Kansas City formation, which from its good development over Kansas, Missouri and Iowa, and the excellence of the exposures in the type locality, has received more study and is probably better known than any other Pennsylvanian formation in the Mid-Continent area. In northern Oklahoma, because of lithologic changes, the various members, and in fact, the formation as a whole, have not been recognized. The nomenclature in present use is shown in the accompanying correlation table.

15. Greene, Frank C., Discussion of Morgan's paper: Bull. Amer. Assoc. Pet. Geol. Vol. 9, No. 2., p. 335, 1925.

14. Op. cit.

One detail is worthy of discussion. Above the middle of the Kansas City formation occurs the Drum limestone. At the State line this limestone splits into an upper and lower member, with a shale parting, the three known as the Hogshooter limestone, or lower Drum, the Nellie Bly formation, and the Dewey limestone, or upper Drum. The Hogshooter limestone is the same as the Lost City limestone near Tulsa, and the Dewey limestone has been correlated with the Belle City limestone of the Hunton Arch area. Some geologists regard the Hogshooter limestone as the equivalent of the Layton sand.

In the Hunton Arch area, the time equivalent of the lower part of the Kansas City formation seems to be present in the Francis formation and Belle City limestone. The overlying Vamoosa formation is considered equivalent to formations in Kansas overlying the Kansas City formation, indicating a break in deposition and an erosion interval above the Belle City limestone.

That part of the Kansas City formation above the Dewey limestone shows a decided change in lithology in Creek and Osage counties. Instead of the alternating shales, limestones and occasional sandstones of Kansas and northeastern Oklahoma, equivalent strata have sandstones more prominently developed, particularly in the Copan and lower Ochelata formations.

Fath¹⁶ suggests that the sediments as exposed in the Bristow quadrangle must have been derived from a land mass to the south.

The Vamoosa formation of the area of the Hunton Arch is considered the time equivalent of the three formations which in Kansas succeed the Kansas City formation, namely; the Lansing, Douglas and Shawnee formations. In northern Oklahoma the names Nelagoney, Elgin and Pawhuska have replaced the Kansas terms. Their total thickness is 1,300 feet.

According to Morgan, the Vamoosa formation in the Hunton Arch area is composed mainly of coarse chert conglomerate, with a small thickness of shale at the base. He found no fossils, so the age of this formation has not been definitely established. He gives a thickness of 260 feet as average for the formation in the Stonewall quadrangle. It seems likely that the Vamoosa formation of the Hunton Arch area is equivalent to only a small part of its ascribed equivalents, with a large unconformity either above or below. This unconformity represents the continuation of the break in the Hunton Arch area, which occurs above the Belle City limestone. In Creek and Osage counties this break is not present, and the coarse upper Kansas City beds are overlain by similarly coarse Bristow, upper Ochelata and Nelagoney sediments, all of which are succeeded by the similar Elgin sandstone, of lower Shawnee age, and it by the limestones and shales of the Pawhuska formation.

16. Fath, A. F., Geology of the Bristow Quadrangle, Creek County, Oklahoma: U. S. Geol. Survey, Bull. 759, pp. 9-10, 1925.

From the above, it will appear that the coarse Vamoosa conglomerate is equivalent to the deeper-water deposits of the Pawhuska (Shawnee) formation, while the underlying Douglas and Lansing formations are represented in the Hunton Arch area by an hiatus.

Overlying the Vamoosa formation, probably conformably and overlapping to the south, is the Ada formation, consisting of slightly fossiliferous shales, asphalt-impregnated sandstones and limestone conglomerates. These sandstones were probably derived from the Simpson formation, and the conglomerates from the Arbuckle, Viola and Hunton limestones. A thin fossiliferous Pennsylvanian shale has been found in wells in western Pontotoc, northern Murray and eastern Garvin counties, to overly unconformably, folded and faulted lower Paleozoic formations. This deposit may belong to the Ada formation.

Overlying the Ada formation, and overlapping still farther to the south is a series of red shales, sandstones, arkosic sandstones, limestones and near the outcrops of the lower Paleozoic formations, limestone conglomerates. The shales and limestones contain a few fossils.

All the above make up the Pontotoc terrane of Morgan and include his Vanoss, Stratford and Konawa formations. They are the first to show distinctive red beds conditions and form part of what have for years been termed red Pennsylvanian. The Ada and Pontotoc formations are considered to be equivalent to the Wabaunsee formation of Kansas.

GEOLOGIC HISTORY AND PALEOGEOGRAPHY

The Mississippian period in Oklahoma closed either with a complete emergence of the area, or more likely, a partial emergence with small relic seas, whose Mississippian faunas were mingled with those of the first Pennsylvanian invasion. The oldest Pennsylvanian sediments are found in the Springer formation in the Ardmore basin. In the coal basin the oldest Pennsylvanian strata are in the upper part of the Caney shale and the overlying Wapanucka limestone, and their northern equivalent, the Morrow formation. The approximate limits of the sea in which these beds were laid down are shown on the first paleogeographic map (Fig. 2).

The first stage of Pennsylvanian history was closed by an important uplift, that of the Ozark Arch and the Hunton Arch, probably along a common axis, with the resultant withdrawal of the sea to the southeast into the trough which later became the coal basin. In this retreating sea were deposited coarse, clastic sediments of Atoka age, the material having been derived from the Hunton Arch and from a land mass to the east which later developed into the Ouachita overthrust.

This shrinking of the sea into the coal basin is the second stage in the history (Fig. 3). The Mississippian element in the Wapanucka-

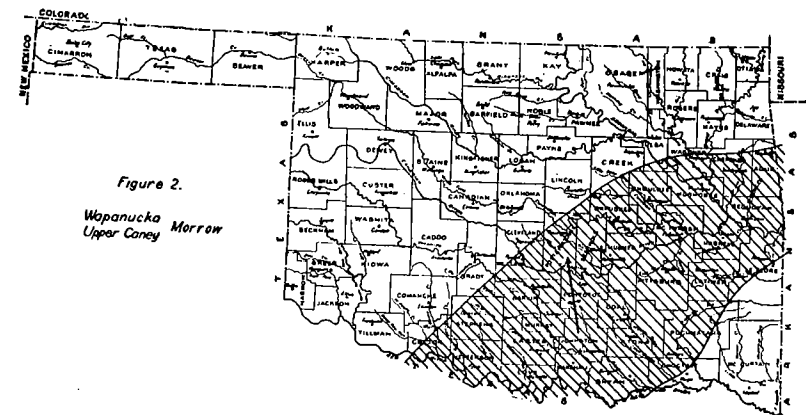


Figure 2.
Wapanucka
Upper Caney
Morrow

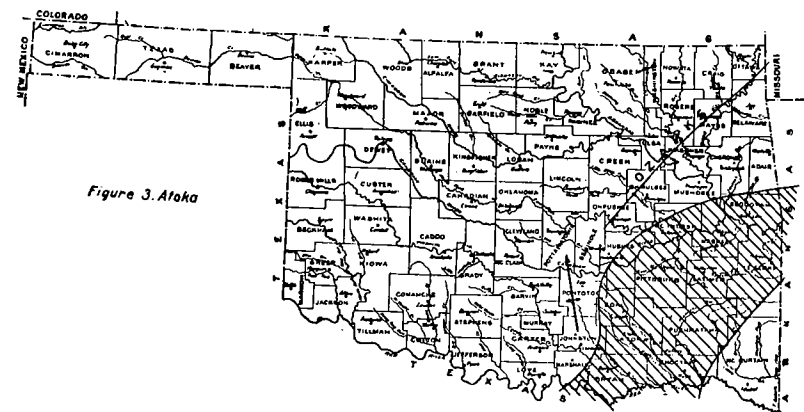


Figure 3. Atoka

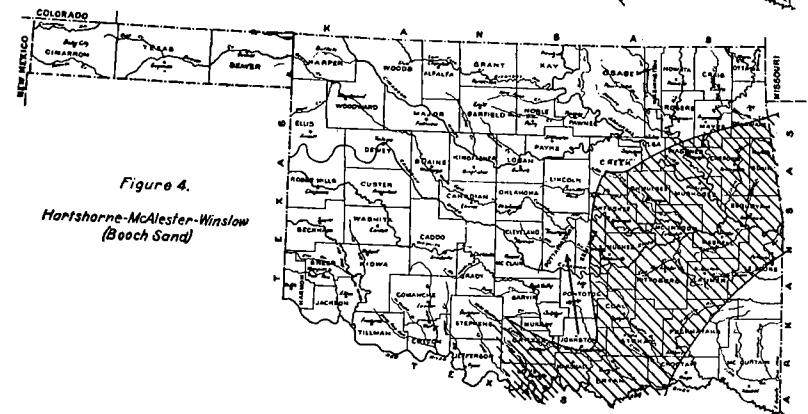


Figure 4.
Hartshorne-McAlester-Winslow
(Booth Sand)

Morrow fauna was completely extinguished, and does not appear in any of the succeeding faunas.

The third stage opened with a gradual transgression of the sea from the coal basin, with an overlapping northward and westward over the upturned edges of the Wapanucka limestone and associated beds, encroaching well up onto the east and southeast flanks of the Hunton Arch and Ozark Arch (Fig. 4). The offlap of the Atoka formation, and the succeeding overlap of the Hartshorne and McAlester beds are shown in Morgan's mapping in T. 1 N., R. 7 E.

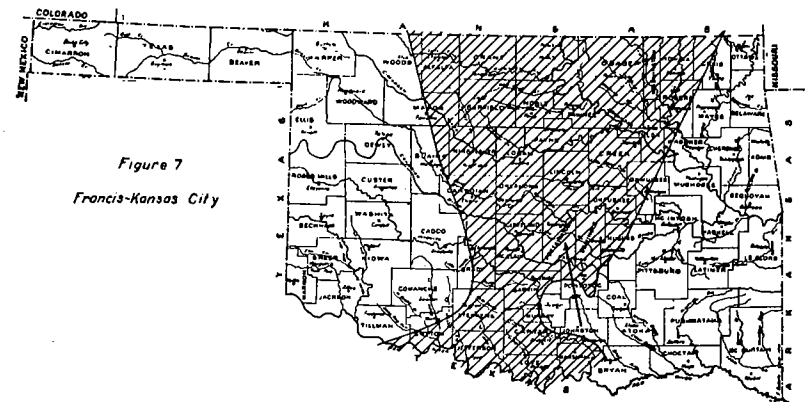
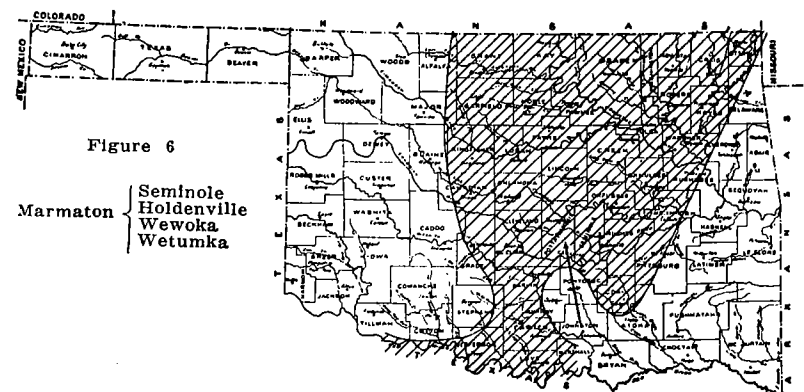
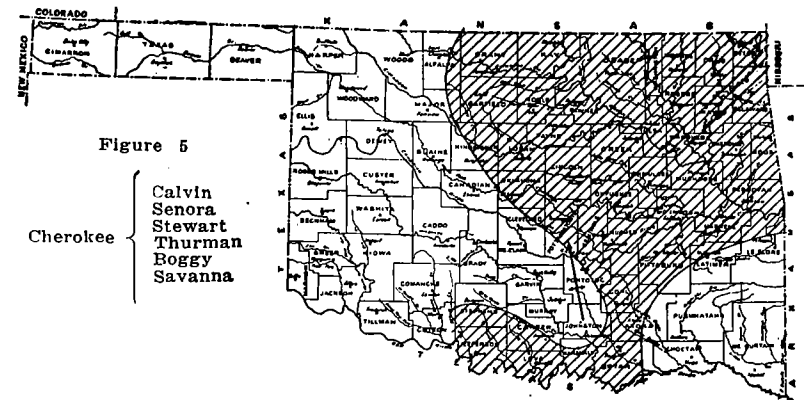
The fourth stage was marked by a complete submergence of the Ozark Arch during Cherokee time, and a spreading of the sea to the westward, as far as Grant and Garfield counties (Fig. 5). By virtue of this westward spreading of the sea, combined with the gradual encroachment of the overthrusting Ouachita sheet and filling of the coal basin, the southern connection on the east side of the Hunton Arch was gradually closed, this being accomplished in Marmaton time.

That a minor oscillation took place in the Hunton Arch area has been shown by Morgan in his discussion of the Boggy overlap.¹⁷ Not until Boggy time did the sea begin to cover this uplift, during which time a narrow arm of the sea advanced as far south as T. 3 N., R. 5 E., overlapping the eroded edges of the lower members of the Cherokee formation and the underlying McAlester, Hartshorne, Atoka, Wapanucka and Caney formations. A slight uplift caused a retreat of the sea into the coal basin, whence it slowly readvanced, depositing the coarse Thurman sandstone, and later the quiet-water deposits of the Stuart shale and Senora formation. Then followed another slight uplift, and the deposition of the Calvin sandstone, possibly as an overlapping deposit, bringing the Cherokee period to a close. It should be noted that up to this time, the axis of the Hunton Arch had never been submerged since its formation.

The fifth stage (Marmaton period) opened with a readvance of the sea. In the Hunton Arch area, this was marked by the closing of the southeast connection, and a progressive overlap southwestward toward the top of the Hunton Arch (Fig 6). By Holdenville time the farthest advance of the Boggy sea was reached, and Boggy deposits were overlapped by Holdenville deposits. Advance continued through the Marmaton and into the succeeding Kansas City time. A connection was probably established with the Texas sea on the west side of the Hunton Arch.

Toward the close of the Marmaton period, in the latter part of Wewoka time, occurred the second important mountain movement which had a widespread effect upon the structure of a large part of Oklahoma and Arkansas, though with only a minor effect upon deposition and the distribution of the seas.

17. Morgan, Geo. D., The Boggy Overlap: Bureau of Geology, Cir. No. 2, 1924.



This movement has been described by Dake¹⁸ as the Ouachita overthrust. According to his interpretation the mass of highly folded rocks known as the Ouachita Mountains in Oklahoma and Arkansas, with lithologic facies far different from that of the Hunton Arch-Arbuckle area, has been overthrust as a great sheet "scores of miles."

The advance of this overthrust deformed the great thickness of pre-Pennsylvanian and lower Pennsylvanian strata so that they now have the form of a great geosyncline. This now forms the coal basin of Oklahoma and the Arkansas Valley syncline of Arkansas. The front edge of the Ouachita overthrust sheet was named the Choctaw fault by Taff. The axis of the geosyncline forms a great arc, concentric with the Choctaw fault and its Arkansas extension, and with the Ouachita Mountains generally.

In the Boston Mountains, in northern Arkansas, is a system of east-west faulting, parallel to the east-west trend of the north edge of the Ouachita Mountains and with the intervening syncline. In the Ozark Arch area of northeastern Oklahoma occurs a similar fault system, here trending northeast-southwest, parallel to the axis of the Coal Basin syncline and the Ouachita Mountains at that point.

Approaching the Hunton Arch, these faults take a more nearly north-south trend, and are present at the surface in beds as young as middle or upper Wewoka. Examples are the Yeager fault in Tps. 6 to 8 N. R. 10 E., a small fault in T. 9 N., R. 11 E., and the Morris fault in Tps. 11 to 14 N., R. 14 E. In beds younger than middle Wewoka, long belts of en echelon faulting are shown on the new Oklahoma geological map. According to Hughes¹⁹ some of these belts of *en echelon* faulting overlie subsurface faults with a north-south or slightly northeast-southwest trend which have not affected beds younger than the upper part of the Wewoka formation.

On the areal map of the State it will be seen that a decided swing in the strike of all beds older than Wewoka has taken place in southern Hughes and eastern Pontotoc counties as though bent around locally by the force of westward thrusting. This probably was accompanied by slight local uplift in the area of the Hunton Arch as suggested by a coarse conglomerate composed of angular pebbles occurring in the upper part of the Wewoka formation, overlying a fossiliferous shale. This is exposed in sec. 4, T. 3 N., R. 7 E.

This suggested uplift was followed by a return to more quiet water conditions, and the deposition of fossiliferous shales, limestones and sandstones in upper Wewoka, Holdenville and Seminole time. Advance continued toward the top of the Hunton Arch, and a basal conglomerate was formed from fragments of lower Paleozoic limestones in Seminole time.

18. Dake, C. L. The Problem of the St. Peter Sandstone: Bull. Missouri School of Mines, Vol. 6, No. 1, p. 55, 1921.

19. Hughes, Richard, Personal Communication.

Little change occurred in the rest of Oklahoma other than a gradual westward migration of the limits of the sea incidental to the continued continental tilting.

The sixth stage, that of the deposition of the Kansas City formation, was marked in the Hunton Arch area by continued overlap and submergence of more of the Arch. This took place during the earlier part of the stage, the sediments consisting of very fossiliferous shale, some sandstones and limestone conglomerates of the Francis formation and the overlying Belle City limestone (Fig. 7).

Essentially similar conditions prevailed in northern Oklahoma and Kansas, during which time the limestone and shales of the lower Kansas City formation were deposited, namely: Hertha limestone, Ladore Shale, Bethany Falls limestone, Galesburg shale, Winterset limestone, Cherryvale shale and Drum limestone.

A little later than mid-Kansas City time occurred the third and last great mountain movement, the uplift of the Arbuckle anticline. This uplift is thought to be another case of thrusting, as suggested by the following facts:

STRATIGRAPHY

The Glenn formation (Cherokee and Marmaton) has a great thickness and high angle of dip on the south side of the Arbuckle anticline, and its equivalents are apparently absent due to non-deposition on top of the Hunton Arch only a few miles distant.

Where the equivalents of the Glenn formation overlap onto the Hunton Arch, they are found to be quite thin and in decided disconformity to the older, underlying formations. On the south side of the Arbuckle anticline, on the contrary, the thick series of Glenn formation has been folded up in entire conformity with the older (lower Paleozoic) beds.

The overlap on the Hunton Arch apparently came from the north and east, so obviously the Glenn formation of the south side of the Arbuckle anticline was not deposited in the same basin as were the equivalents in the Hunton Arch area. To the writer, such an abrupt change in thickness (15,000 feet in T. 3 S., R. 1 E., to nothing in T. 2 N., R. 3 E.) is as significant, and as indicative of deposition in widely separated provinces, as is the great difference in lithology between the lower Paleozoic limestones of the Hunton Arch-Arbuckle area and the equivalent clastic sediments of the Ouachita area, some 15 miles distant, a relationship which Drake²⁰ can explain only by over-thrusting.

STRUCTURE

That part of the Hunton Arch which lies near Mill Creek, in northern Johnston County, has been much crumpled and faulted, with a trend in the faulting parallel to the axis of the Arbuckle anticline.

20. Op. cit.

This system of crumpling, of which the Mill Creek syncline is the major feature, has very much the appearance, on the areal map, of a zone of buckling, resulting from pressure from the southwest. That the Mill Creek syncline is deep can be judged by the fact that the Wapanucka limestone and even part of the younger Glenn formation has been down-folded so as to lie in contact with beds of Ordovician age, and are not far distant from the outcrop of pre-Cambrian granite, a structural relief of some 10,000 feet. The great depth of the syncline, in proportion to its width is highly suggestive of intense buckling.

Apparently the Hunton Arch as it appears today has been buckled transversely, the part north of Mill Creek acting as a buttress, the part in the Tishomingo area having been pushed northward by the thrusting forces. If this interpretation is correct, and conditions are comparable to those in the Ouachita area, the counterpart of the Choctaw fault is to be found in the Washita River gorge in the vicinity of Crusher, between Berwyn and Dougherty.

It is hardly conceivable that the depth of the Mill Creek syncline could have resulted solely from downward movements, but that there would have been some upward movements in the Hunton Arch, both in the Tishomingo area and north of the Mill Creek syncline.

The axis of the Hunton Arch has been further broken by transverse faults into a number of large blocks, one of which was found by the writer to extend westward into Garvin County, under the Pontotoc terrane cover. The magnitude of the uplift is shown by the fact that fossiliferous Pennsylvanian shales rest directly upon the Simpson formation in T. 1 N., and T. 2 N., whereas in T. 3 N., this deposit rests upon Hunton limestone and younger beds. This is shown by the accompanying cross sections (Fig 11). The writer believes that all east-west faulting in this area is to be correlated with the Arbuckle movement.

Ignoring for the moment the down faulted and downfolded blocks on the east side of the Hunton Arch, it will be noted from the areal map that the outcrops of Wapanucka limestone on the east end of positive fault blocks at Clarita and Stonewall have an alignment parallel to that of the Ordovician rocks of the Hunton Arch, suggesting that these two blocks represent part of the original form of the Arch rather than decided and individual uplifts as has been suggested by other authors, and that the Franks graben and Wapanucka syncline are down-folded segments of this same arch. A thrust from the south conceivably could have produced this condition.

Assuming the formation of the Franks graben to have been caused by the Arbuckle movement, we can place its age as post-Francis, since beds of Francis age are the youngest found in this locality. If the writer correctly understands the discussion of Goldston's paper by

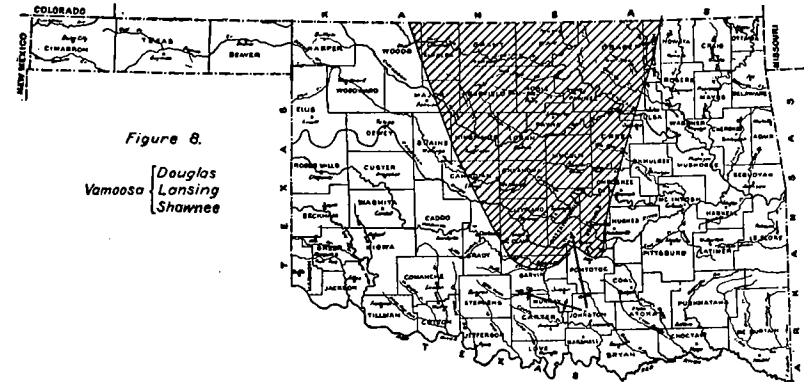


Figure 8.

Vamoosa
Douglas
Lansing
Shawnee

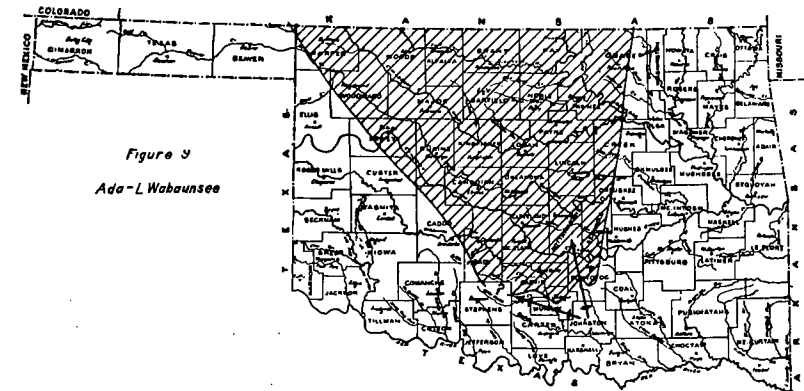


Figure 9

Ada-L Wabauunsee

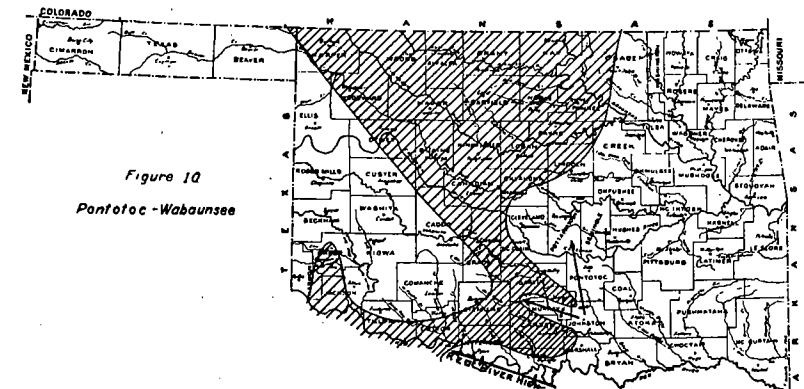


Figure 10

Pontotoc-Wabauunsee

Girty and Roundy²¹, Goldston's Hoxbar member is younger than Taff's original Glenn, which was limited at the top by the Seminole formation. From this it follows that the Hoxbar is equivalent to the Francis formation. Since the Hoxbar member is structurally conformable with the older Glenn formation, and was involved in the Arbuckle folding, it offers further evidence of the mid-Kansas City age of the Arbuckle movement.

This uplift marks the end of Kansas City deposition in the Hunton Arch-Arbuckle area, with its effect evident in the coarse and thick clastic material forming the Bristow and Ochelata formations of northern Oklahoma, deposited in upper Kansas City time, a period represented by emergence and erosion in the Hunton Arch-Arbuckle area.

The Arbuckle uplift probably drove the sea far to the north, so that it did not again encroach on the axis of the Hunton Arch until Shawnee time, when the coarse Vamoosa conglomerate was deposited. (Fig. 8).

During Lansing and Douglas time, while the Hunton Arch was emerged, coarse near-shore deposits were formed in Creek and Osage counties.

The seventh stage in Oklahoma's Pennsylvanian history represents an advancing sea, in which were deposited materials derived from the newly elevated Arbuckle Mountains, as well as from the Ouachitas and the Hunton Arch.

In northern Oklahoma, the limits of the seas were not greatly different from those of the preceding periods. In all probability the Texas connection which was closed by the Arbuckle uplift remained closed during this period.

The eighth and last stage of Pennsylvanian history opened with a continuous overlap and encroachment of the sea onto the Hunton Arch with the deposition of the Ada formation (Fig. 9), followed by that of the Pontotoc terrane (Fig. 10). The fossiliferous shales found resting upon the Simpson formation in a well in sec. 29, T. 2 N., R. 3 E., and upon the Hunton limestone in a well in sec. 5, T. 3 N., R. 3 E., may belong to the Ada formation.

During Pontotoc time the streams draining the Hunton Arch, particularly the Tishominon area had cut to the granite core, and arkosic sandstone resulted. Where the shore line lay in contact with the old limestones, massive conglomerates were formed.

The red shales of the Pontotoc terrane are suggestive of terrestrial conditions of deposition. The conglomerates are apparently marine, and the writer collected some undetermined gastropods from the Hart limestone in sec. 31, T. 3 N., R. 4 E. Morgan lists a few marine forms from the Pontotoc terrane. A possible explanation of apparent grading

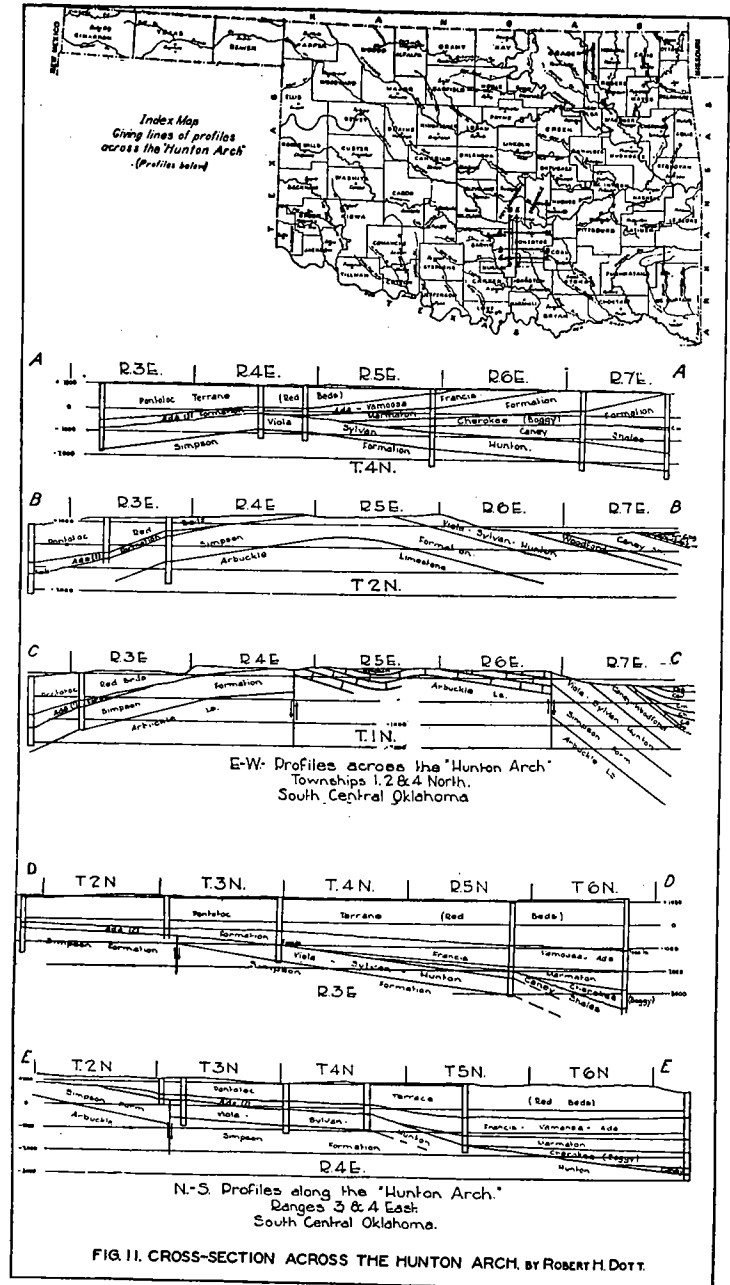


FIG. 11. CROSS-SECTION ACROSS THE HUNTON ARCH, BY ROBERT H. DOTT.

21. Girty, Geo. H., and Roundy, P. V., Notes on the Glenn formation of Oklahoma, with consideration of new Paleontologic evidence: Bull. Amer. Assoc. Pet. Geol., Vol. 7, p. 331, 1923.

from terrestrial to marine conditions so close to the mountains, and what seems most incongruous, mountainward rather than seaward, is that the Mill Creek syncline was of such magnitude that though narrow, was deep enough to permit a small re-entrant of the sea on the very flanks of the mountains. If so, this was the initiation of the Anadarko basin, which was of considerable importance during later deposition.

Sometime during Pontotoc time, a southern connection was established around the west end of the Arbuckle anticline, and shales, conglomerates, limestones and some arkosic sandstones were deposited south of this anticline, over the upturned edges of all formations from Ordovician to upper Pennsylvanian.

Final withdrawal of the sea from this area was effected at the end of Wabaunsee time, the sea gradually receding westward.

SUMMARY

The writer has endeavored to show that the first important Pennsylvanian uplift took place after Wapanucka time, and consisted in the uplift of the Ozark Arch and Hunton Arch, causing a withdrawal of the sea into a small area in southeastern Oklahoma.

Following this uplift, the sea spread gradually westward and northward, in progressive overlap, gradually submerging these uplifts, the Hunton Arch much more slowly than the Ozark Arch, with minor oscillations temporarily halting the advance.

A second important movement occurred in the upper part of Marmaton time, which resulted in the westward overthrusting of a great sheet of highly folded rocks, ranging in age from Cambrian to lower Pennsylvanian. This movement formed the Coal Basin and Arkansas Valley syncline, and set up a system of faulting in the Ozark Arch and possibly in the Hunton Arch, concentric with the Ouachita thrust. This movement had little effect on the position of the sea, as the center of the basin had shifted to the northwest. Overlap continued on the Hunton Arch until middle or late Kansas City time.

Then followed the third and last movement, the Arbuckle uplift, which the writer regards as another overthrust. This drove the sea far to the north, with a readvance in Shawnee (Vamoosa) time, and continued overlap and final submergence of all but the very top of the Hunton Arch in Ada time.

Continental tilting, which preceded the Appalachian revolution was effective in gradually forcing the Pennsylvanian seas to the westward. During Wabaunsee (Pontotoc) time complete and final emergence of the Arbuckle-Hunton Arch area occurred.

STRUCTURAL TRENDS IN SOUTHERN OKLAHOMA

By

LaVerne Decker

INTRODUCTION

AREA AND TREATMENT

The term "southern Oklahoma" as used in this paper is that part of the State lying south of the South Canadian River and between the ninety-sixth and one-hundredth meridians. The northern tier of Texas counties included between those meridians also will be treated.

This paper is neither analytical nor deductive. The effort here is to show the positions of structural trends and not to draw conclusions from their positions relative to each other and to the master structures of the area.

The complexity of structural conditions and the ambiguity of subsurface data renders confusion inevitable. No doubt my colleagues have in their offices map of trends which vary considerably from those on the map accompanying this paper. To further illustrate the point the writer has seen about eight structure contour maps of the Sholom Alechem field, all of them made by competent men and all differing rather strikingly in detail.

It is hoped that this paper will represent to the profession an interpretation of the available data reasonable enough to form the framework for further and more detailed research.

LITERATURE

The writer regrets that a shortage of time and an incomplete library prevented the compilation and careful examination of a complete bibliography and he accepts this opportunity to apologize for the resulting inaccuracies.

Some of the early opinions concerning certain trends have been disproven by the drill. That fact does not mean that the work was poor. On the contrary, early work in the district was uniformly good and the inaccuracies mentioned resulted from the intricacies of a problem which is by no means fully understood at present.

ACKNOWLEDGMENTS

The writer is especially indebted to C. W. Tomlinson for his kind assistance and advice. As a matter of fact the paper could not have been

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produced by the writer without that aid. To Chas. N. Gould, and C. L. Cooper of the Oklahoma Geological Survey, and to R. A. Birk credit is due for assistance and criticism.

It will be impossible to give credit where it is due in many cases and it is desired at this time to acknowledge indebtedness to the writer's good friends and fellow geologists who have contributed essential portions of the data included in the following pages.

REGIONAL GEOLOGY

Gould and Lewis,¹ McCoy,² Gouin,³ Dott,⁴ Moore,⁵ Taff⁶ and others have given the regional geology of the area such thorough and competent consideration as to render a comprehensive treatment of the subject neither necessary nor desirable for the purpose of this paper.

The correlation and description of the formations of this area have been given by Gould.⁷

TREATMENT

To facilitate reference from text to map the various trend structures have been numbered. An unsuccessful attempt was made to apply numbers to show relationship so the numbers as shown bear no essential relation to each other. (See Map No. IV).

Where possible the controlling structural features will be discussed as groups of smaller structures and as unit master structures. The major individual features will be treated separately. In all cases where it is possible to do so and avoid confusion the structures will be treated in groups.

When this paper was first discussed there was some idea of accompanying it with a contour map of the pre-Permian surface. There is a distinct relationship between that surface and the commercial production in the district, attention to which was drawn by Burton.⁸ The writer regrets that a lack of time prevents further work along that line.

1. Gould, C. N., and Lewis, Frank E., The Permian of western Oklahoma and the Panhandle of Texas: Oklahoma Geol. Survey, Cir. No. 13, 1926.
2. McCoy, A. W., Experimental petroleum geology: Bull. Amer. Assoc. Pet. Geol. Vol. V, No. 5, p. 466, 1921.
3. Gouin, Frank, Geology of the oil and gas fields of Stephens County, Oklahoma: Oklahoma Geol. Survey, Bull. No. 40-E, 1926.
4. Dott, Robert H., Pennsylvanian paleogeography; with special reference to south-central Oklahoma: Oklahoma Geol. Survey, Bull. No. 40-J, 1927.
5. Moore, R. C., The relation of mountain folding to the oil and gas fields of southern Oklahoma: Bull. Amer. Assoc. Pet. Geol., Vol. V, No. 1, p. 32, 1921.
6. Taff, Joseph A., U. S. Geol. Survey, Geologic Atlas, Tishomingo Folio (No. 98), 1903.
7. Gould, Chas. N., Oklahoma Geol. Survey Bull. No. 35, Correlation table, 1925.
8. Burton, George E., Relation of the base of the red beds to the oil pools in a portion of southern Oklahoma: Bull. Amer. Assoc. Pet. Geol., Vol. V, pp. 173-326, 1921.

STRUCTURAL TRENDS

MASTER STRUCTURES

The Wichita Mountains, the Arbuckle Mountains, the Criner Hills, the Anadarko basin, the Palo Duro basin, the Amarillo Mountains, the Red River basin and arch, and the Hunton arch are the master structures of the region. There is some evidence that the Ellenberger high plunging north from the Llano-Burnett uplift of central Texas may bear some relationship to the northern Texas structures and trends.

The Wichita Mountains and the Arbuckle Mountains are the most important of the master structures when considering the trend of the southern Oklahoma districts.

The Anadarko basin is reasonably assumed by Becker⁹ to be the result of the settling of Permian sediments off the edge of the Wichita Mountains. Thus it can be considered a part of the larger structural province.

Gould¹⁰ has done much toward a classification and correlation of the master structures of the Mid-Continent field. To him is attributed the names Amarillo Mountains and Palo Duro basin. The former feature he suggests may be an extension of the Wichita-Arbuckle axis or it may be *en echelon* and parallel to that axis.

His views relating to the Palo Duro basin are quoted verbatim:

As studies have been carried forward on the geology of the southern part of the Great Plains during the past few years, it has become evident that there is a great structural trough lying south of the Arbuckle-Wichita-Amarillo Mountain uplift. Neither the exact location nor the extent of this great syncline or basin is now definitely known.

In 1922 Howell¹¹ described a syncline which he called the Red River syncline, passing east and west in Jefferson, Cotton, and Tillman counties, Oklahoma. In 1925 Hoots¹² described a great basin in western Texas. This may or may not be a part of the same structural low as that described by Howell. On the colored geological map of Oklahoma, by Miser, a syncline is shown in western Harmon County at about the point indicated by Hoots on his map of Texas. In shape and outline this latter basin, as it occurs in the Panhandle of Texas, appears to differ from the Anadarko Basin in that it is probably shallower and more nearly circular in outline. The dips from the axes of the Wichita and Amarillo mountains northward to the axis of the Anadarko Basin at most places are relatively steep; while dips south from the mountains are more gentle.

9. Becker, Clyde M., Geology of Caddo and Grady counties, Oklahoma: Oklahoma Geol. Survey Bull. No. 40-1, 1927.
10. Op. cit.
11. Howell, J. V., Some structural factors in the accumulation of oil in south-western Oklahoma: Econ. Geol., Vol. 17, No. 1, pp. 15-33, 1922.
12. Hoots, H. W., Geology of a part of western Texas and southeastern New Mexico: U. S. Geol. Survey, Bull. 780-b, page 113, Pls. III and VIII, 1925.

For this structural low which lies south of the Amarillo Mountains, the authors propose the Palo Duro Basin. The name is from Palo Duro Canyon, the deepest gash cut by nature on the Great Plains, which is located in Briscoe, Armstrong and Randall counties, Texas, which are in the northern part of the basin.

Dott¹³ describes the Hunton arch as the initial movement in the Arbuckle System. He places its time of folding as the close of the first period in the Pennsylvanian.

The map (No. IV) shows the master structures conspicuously labeled.

WICHITA MOUNTAIN REGION

The numbered trends, 1 to 7 inclusive, are strictly within the Wichita Mountain area. They are based on the outcrops of the older rocks as indicated on the colored geological map by Miser.¹⁴ An attempt was made to about center the uplifts and the axes are established in that way.

The Wichita movement in the opinion of Gouin¹⁵ who cites Schuchert,¹⁶ Plummer,¹⁷ and Moore,¹⁸ began in early Mississippian time. The same reasoning might allow its being assigned to early Pennsylvanian.

Gouin¹⁹ further states that the Loco (14), Woolsey (13), Velma (22), Healdton (19), Hewitt (20), and probably Cruce (22) structures are of the same orogenic age.

The Wichita Mountains were again affected when the Arbuckle folding took place. That movement according to Moore²⁰ took place in mid-Pennsylvanian time. The Franks-Seminole conglomerate, representing a post-Arbuckle erosion period, bears out this position as well as does the angular unconformity of upper Pennsylvanian in contact with truncated Glenn beds to the north of the Arbuckle Mountains. Then too, he finds the Permian resting with apparent conformity on the upper Pennsylvanian to the north while the same beds rest unconformably on the Glenn to the south.

The Wichita Mountains were again subjected to orogenic movement during post-Permian times as evidenced by the surface folds in the region. Powers²¹ draws attention to the early surface work in the Permian from which production has resulted in the district.

The production in Comanche, Cotton, southwestern and central Stephens and Jefferson counties is coming from structures undoubtedly

13. Op. cit.
 14. Miser, Hugh D., U. S. Geol. Survey, Geologic Map of Oklahoma, 1926.
 15. Op. cit.
 16. Schuchert, Chas., and Prisson, L. V., Textbook of Geology, pt. 2, p. 343, 1924.
 17. and 18. Plummer, F. B., and Moore, R. C., Stratigraphy of the Pennsylvanian formations of north-central Texas; Univ. of Texas, Bull. 2132, 1921.
 19. Op. cit.
 20. Op. cit.
 21. Powers, Sidney, Petroleum Geology in Oklahoma: Oklahoma Geol. Survey Bull., No. 40-G, 1926.

trending with the axis of the Wichita Mountains. The 6-12 trend is considered the center of the mountain axis. The trend is productive on the Lawton, Nellie, North Duncan, Comanche, Baird, and Walters structures. The Addington terrace has been drilled, but no commercial production was encountered although some good shows were logged.

North of the Wichita trend and in reality a part of it, is the Nellie-north Duncan-Locho-Healdton trend. There is no absolute data which scientifically proves these structures to be *en echelon* folds on a controlling axis, however, their physical aspects suggest strongly that the assumption is justified as a theory upon which to base research.

There is not enough information at hand to suggest the relationship of axes in the Wichita Mountains with the Walters or Baird trends. To the southeast the Walters trend seems to align with the Addington terrace and the Grady anticline. The Baird trend seems to be in sub-alignment with the structure or structures at Clay pool.

The value of the axes shown in central Jefferson County (15) is a matter of doubt. The writer has no subsurface data to prove their existence and the surface work in the red beds at that particular point is of a doubtful nature. Nevertheless it is evident at the surface that there has been movement of some nature at that particular point.

Considered from another point of view, the Walters trend may include the Addington terrace, the Oscar anticline and from there to the Bulcher anticline. The Baird trend may include the Grady structure and extend from there to a position parallel to and bisecting the distance between the Marietta syncline and the Bulcher structure.

ARBUCKLE MOUNTAINS

Dott²² divides the Arbuckle uplift into the Arbuckle anticline and the Hunton arch. He also states that the first period in Pennsylvanian time was closed by the Hunton arch and the Ozark arch. Dake²³ described the second great movement as the Ouachita overthrust. Dott²⁴ refers the formation of the Ouachitas to late Marmaton time.

The folding of the Arbuckle anticline took place at the close of Glenn time if not later. The beds of the Glenn conform in the structure with the anticline.

Moore's²⁵ discussion of the relationship of the Franks or Seminole conglomerate to the underlying Glenn definitely establishes the time of Arbuckle folding as post-Glenn—pre-Franks.

22. Op. cit.
 23. Dake, C. L., Bull. Missouri Sch. Mines, Vol. VI, No. 1, 1921.
 24. Op. cit.
 25. Op. cit.

Some rather outstanding structures were developed as a part of the Arbuckle uplift and the more imposing ones will be discussed separately.

During the early work on the area the Criner Hills were considered a part of the Arbuckle orogeny. Tomlinson's²⁶ work on the stratigraphy of the Pennsylvanian system of the Ardmore Basin tends to remove much of the confusion which formerly clouded the subject. He draws attention to Goldston's²⁷ interpretation of the orogeny and stratigraphy in the area and to the differing opinion held by Girty and Roundy.²⁸ He gives structural evidence that the Criner Hills of Carter County are related to the Wichita uplift and not to the Arbuckle uplift.

CADDO ANTICLINE

The Caddo anticline is a striking structural feature in central Carter County. The exposed beds range in age from Springer to Hoxbar. The structure has not been thoroughly tested for commercial oil or gas but at the present time there is a test drilling on the anticline in sec. 22, T. 3 S., R. 1 E.

The beds exposed at the surface at the location are almost vertical. Cores taken as the drill went down show decreasing dips and at a depth of 2,000 feet the beds are almost flat. With the decreased dip allowing for accumulation there is a possibility for production if a reservoir bed is found below the Caney shale which has not been penetrated at the present depth of more than 3,100 feet.

OVERBROOK ANTICLINE

The Overbrook anticline extends from central Carter County in a southeasterly direction to Red River and possibly on into Texas. Tomlinson²⁹ says in part that the Overbrook anticline is " * * * an overturned fold with a structural height of at least 10,000 feet, which can be traced continuously for 15 miles through the belt of Pennsylvanian rocks which lies between Ardmore and the Criner Hills."

The structure is not productive. Some very good shows of oil have been found, especially in the Schemerhorn-Ardmore Company's well in sec. 24, T. 5 S., R. 1 E. The steep surface dips indicate a doubtful area of accumulation but the condition encountered in the Caddo anticline test tends to enhance the prospects for commercial production on the structure under discussion.

26. Tomlinson, C. W., Unpublished manuscript.
 27. Goldston, W. L. Jr., Differentiation and structure of the Glenn formation: Bull. Amer. Assoc. Pet. Geol., Vol. VI, No. 5, 1922.
 28. Girty, George H., and Roundy, P. V., Notes on the Glenn formation of Oklahoma, with consideration of new paleontologic evidence: Bull. Amer. Assoc. Pet. Geol., Vol. VIII, No. 4, 1923.
 29. Op. cit.

MARSHALL COUNTY TRENDS

Hopkins, Powers and Robinson,³⁰ Bullard,³¹ Taff,³² Stephenson³³ and Tomlinson³⁴ have each contributed to a study of the geology of Marshall County. The structural axes shown on the accompanying map represents a combination of their work.

The Mansville-Madill anticline extends from the Carter-Johnson County line southeast across Marshall County and possibly into Bryan County. The structure is determinable in the Comanchean beds exposed at the surface. Tomlinson³⁵ has described an outcrop of Paleozoics exposed in Turkey Creek in the northwestern part of the county. The writer does not know of any other such exposure along the anticline or for that matter in the county.

It is difficult to determine the structural relationship of the Paleozoic rocks and the structures in the Comanchean rocks of the county but for the present purpose it is assumed that the positive areas overlie pre-Comanchean topographic highs.

The Madill sector of the anticline produces small, though commercial, quantities of high gravity oil from the Trinity sand at the base of the Comanchean. The producing horizon is called the Arbuckle sand and further work may prove it to belong to the Pontotoc instead of the Trinity.

The Oakland dome is located near the village of Oakland in the northwestern part of the county. It is not productive but it is being tested at the present time.

The Preston anticline extends from the south-central part of Marshall County southeast to the northeastern corner of Grayson County, Texas. It has long been a disappointment to geologists and oil operators. It is a well exposed, almost perfectly formed structure and easily worked in Comanchean beds. Although it has been extensively tested it has produced only small quantities of gas. At the present time there is a test being drilled on a nose extending south of the anticline near Pottshoro. A good but thin oil sand was encountered at the base of the Trinity at about 800 feet.

The Kingston syncline is a broad, shallow basin separating the two positive areas just discussed. The Cumberland syncline is a similar feature northeast of and parallel to the Mansville-Madill anticline and extends into Bryan County.

30. Hopkins, O. B., Powers, Sidney, and Robinson, H. M., U. S. Geol. Survey, Bull. 736, 1922.
 31. Bullard Fred M., Geology of Marshall County, Oklahoma: Oklahoma Geol. Survey Bull. No. 39, 1926.
 32. Op. cit.
 33. Stephenson, L. W., U. S. Geol. Survey, Prof. Paper 120, 1918.
 34. Tomlinson, C. W., Buried hills near Mannsville, Oklahoma: Bull. Amer. Assoc. Pet. Geol., Vol. X, No. 2, 1926.
 35. Op. cit.

LOVE COUNTY

The surface structure of Love County does not lend itself easily to detailed investigation. It is, in the main, covered either by Trinity sand or Red River alluvium, thus precluding satisfactory surface work. Not enough wells have been drilled to permit complete subsurface work.

Bullard's³⁶ map shows the Marietta syncline as the most outstanding feature. Surface work farther northwest suggests that the Criner Hills may extend a considerable distance southeast under the Comanchean. Subsurface work indicates the possibility of an anticline with its axis roughly along the line between the villages of Burneyville and Pike. There is no commercial production in Love County although it has been rather extensively tested.

The Marietta syncline is of post-Comanchean age. As Bullard³⁷ says, it is quite reasonable to assume that the folding took place along a line of weakness established in an earlier period. The structures mentioned above are probably related to the Wichita orogeny.

NORTH TEXAS

The writer is only vaguely acquainted with the structures of northern Texas further than that they conform in a general way to those across the line to the north. In most cases the structure seems to conform to the general northwest-southeast trend. There is some reason to believe that the structures in the Wilbarger-Wichita-Archer area may be influenced slightly by the Ellenberger high or Bend Arch which plunges north from the Llano-Burnett uplift.

The Nacona folds in Montague County and the Bulcher and Muenster structures in Cooke County are undoubtedly true trend folds, probably a part of the Wichita orogeny. We do not know at present how far that influence will extend to the southeast. The Cooke County structures are weakly reflected in the Comanchean beds at the surface.

CADDO AND GRADY COUNTIES

Becker's³⁸ interpretation of the structure in Caddo and Grady counties is that shown with slight modification on the accompanying map.

The Anadarko Basin which traverses the two counties is the major structural feature. Greene,³⁹ and Gould and Lewis⁴⁰ have described that feature so thoroughly as to eliminate the necessity of discussing them.

The remaining structures of the two counties are quite probably related directly to the Arbuckle uplift. The writer is in thorough accord with Becker⁴¹ in his interpretation of the Caddo County structure. How-

36. Bullard, Fred M., *Geology of Love County, Oklahoma: Oklahoma Geol. Survey, Bull. No. 33, 1925.*

37. *Op. cit.*

38. *Op. cit.*

39. Greene, Frank C., *Oil and gas in Creek County, Oklahoma: Oklahoma Geol. Survey Bull. No. 40-C, 1926.*

40. *Op. cit.*

41. *Op. cit.*

ever, by subsurface methods, he is unable to find the faults shown by Becker⁴² in T. 3 N., R. 5 W. in Grady County. The writer's interpretation of the Kilgore trend (25) shows this feature extending from sec. 15, T. 5 N., R. 7 W., southeast to sec. 20, T. 2 N., R. 4 W. The statement is offered empirically inasmuch as it would require a paper longer than this to prove this point.

NORTHEASTERN STEPHENS AND NORTHWESTERN CARTER COUNTIES

This area is the most active in the southern Oklahoma district at the present time. With slight variations, the work of George and Bunn⁴³ still holds for the Fox and Graham structures. Later subsurface work shows their work to have been in error in detail but the general interpretation of the trend was correct.

The Cruce trend extends from sec. 2, T. 1 N., R. 6 W., in a general southeasterly direction to sec. 28, T. 2 S., R. 3 W. It cannot be stated with certainty just what the condition is between the south end of the Cruce anticline and the Graham structure. However, there is undoubtedly a number of small highs between the two and it is quite probable that there is a direct connection between the two structures.

In Tps. 1 N., 1 S., Rs. 3-4 W. there is considerable activity at present. The subsurface condition is not thoroughly known. The writer's work in the area shows that there is a distinct probability that the Doyle anticline is in direct trend with the Tussey structure and that this subsurface feature extends southeast into T. 1 S., R. 2 W. The Sholom Alechem trend, made up of a number of anticlines, manifests a tendency to extend northwest across T. 1 S., R. 4 W. The present development will soon prove the case.

SUMMARY

1. In general the structural axes in the southern Oklahoma district lie northwest and southeast.
2. The position of the axes is controlled by the Wichita and Arbuckle mountain systems.
3. The areas controlled by the two major orogenies can be roughly separated by a line extending N. 53° W. from a point midway between the Overbrook anticline and the Criner Hills.
4. Past experience indicates that future exploration for oil and gas will be found profitable along trend lines now well established.

42. *Op. cit.*

43. George, H. C., and Bunn, John R., *Petroleum engineering in the Fox and Graham oil and gas fields: Bull. U. S. Bureau Mines, 1924.*

OKLAHOMA PETROLEUM—AN INDUSTRIAL SURVEY

By

Charles E. Bowles

ACKNOWLEDGMENTS

The statistics used in this report have been drawn from many sources and specific acknowledgment is hereby made to the United States Bureau of Mines, the United States Geological Survey, the Oklahoma Geological Survey, and the Oil and Gas Journal.

Further and general acknowledgment is also made for the cooperation of numerous corporations, publications, and individuals.

OKLAHOMA'S PETROLEUM FUTURE SECURE

What will Oklahoma do when her oil plays out?

That question is almost certain to be asked whenever the State of Oklahoma comes up for discussion, providing, of course, the persons discussing the State live outside it, and especially if they live in a state that does not produce oil.

Of course, no one asks what an agricultural state will do when its soil plays out—because we all know that a farm can be operated for a thousand years and produce as much the last year as the first.

Not so, however, with oil. Unlike the soil, whose fertility may be indefinitely maintained—the forest that may be re-grown—or the supply of water for power that will perform the same task a million times, oil and gas are not “renewed”, at least so far as our present knowledge has determined.

Hence as Oklahoma's major industry has been so outstandingly petroleum, any one contemplating making this still-young State their future home may well ask, in all sincerity, “What about oil in Oklahoma tomorrow?”

From statehood in 1907 to the end of 1927, Oklahoma has ranked either first or second in both the output and value of the crude oil produced in the United States. For ten of these years, she has ranked first in production and for fourteen years first in value.

Out of this background of twenty-one years of marvelous development must come the answer to the question that is in the mind of the man who, whether he made “the run” in 1889, moved here several years ago, or is considering removing to Oklahoma, gives serious consideration to the question, “Will this virile State continue to give as abundantly as it has in the past?”

(Originally published as Bulletin 40-AA, March, 1928).

The final conclusion of this paper may be anticipated and the question answered by two direct, specific, and undoubtedly accurate statements:

First—There is today not a single conclusive proof that Oklahoma will not continue, for many years, to be a large producer of crude oil and there is not a single conclusive proof that the oil industry will not continue to be one of the State's big industries.

Second—Both agriculture and manufacturing have been developing so rapidly, and have today gained such momentum, that even if Oklahoma's crude oil production were to reach its peak in the next several years and start on a slow decline, the other industries would be so large and so diversified that any "ebb" in the oil industry would be more than replaced.

In the following pages statistics have been used rather liberally but only with the single idea of enabling the reader to visualize in definite, concrete way just how the development of oil and gas in Oklahoma has been accomplished, and the part they have played and will undoubtedly continue to play in the development of the State.

BIRTH OF THE INDUSTRY IN OKLAHOMA

Probably the most direct cause leading to the birth of the oil industry in Oklahoma was the development of a small struggling industry in Kansas. Small though it was, this work stimulated the Cherokee, Choctaw, and Creek Indian Councils in the Indian Territory to take active steps to have their lands leased for prospecting for oil and gas. Hardships and privations, unknown today, were encountered in the drilling of a dozen scattering wells in this wild country which had been set aside for the Indians and into which few white men came and the land of which they could not acquire title.

Nearly all of the wells had showings of oil and gas, but none of any real importance was accomplished until, in the mid-summer of 1901, a little four-barrel well near Red Fork, a few miles from Tulsa, put Oklahoma on the front page of the newspapers of the United States.

Then came several years of scattered, but more or less definite development in the northeast part of the Territory—and then, in December, 1905, Glenn Pool, Oklahoma's first big oil field, was discovered.

Three Early Great Fields

The flood of oil from Glenn Pool reached its peak at almost exactly the same time that Oklahoma was admitted into the Union. Then came the great Cushing field in 1912 with a peak of over three hundred thousand barrels a day in May, 1915—then the Healdton field with its biggest year in 1917.

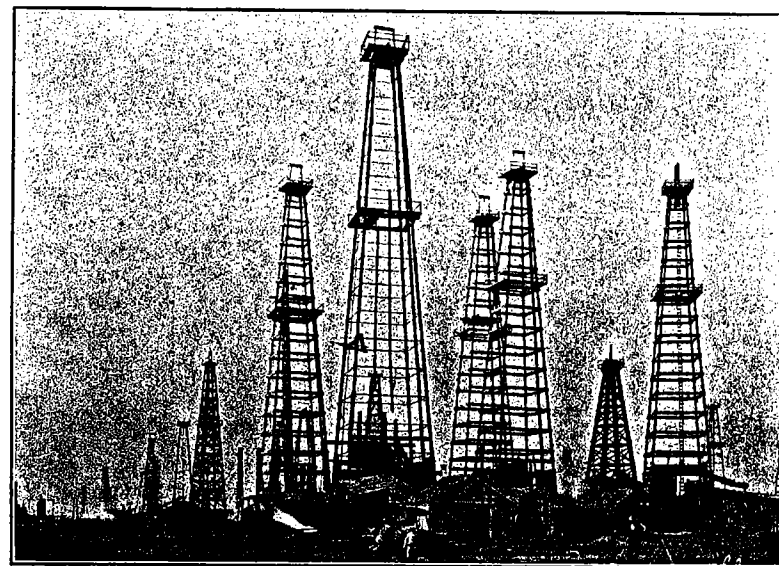
Table 1. Date of discovery and total production of largest Oklahoma fields to end of 1926.

POOL	DATE OF DISCOVERY	TOTAL PRODUCTION
Glenn Pool	Nov. 1905	195,000,000
Cushing	Mch. 1912	286,000,000
Healdton	Aug. 1913	140,000,000
Burbank	May 1920	126,000,000
Tonkawa*	June 1921	89,000,000
Wewoka	Mch. 1923	17,000,000
Cromwell	Dec. 1923	27,000,000
Garber	Apr. 1925	14,000,000
Seminole**	Mch. 1926	8,000,000

*Deep sand discovered April 8, 1924.

**Deep sand discovered July 16, 1926. To the end of November, 1927, the Greater Seminole field has produced a grand total of approximately 125,000,000 barrels of oil of about 42 gravity and of high gasoline content.

PLATE II



FIVE WELLS ON ONE LOCATION
Garber field, Garfield County.

These three great, outstanding fields, that so definitely launched Oklahoma as an oil state, also associated the words "Oklahoma" and "Oil" so closely in the minds of the people of the entire country that, regardless of the State's future industrial development, it will probably never get away from its early and popular trade mark, "The Oil State."

After these three big fields came several years of steady, substantial growth in which the Okmulgee District had a large share. Then, in 1919, came the Hewitt field in southern Oklahoma, followed in 1920 by the Burbank field on the western edge of the Osage Indian Reservation.

Table 2. Peak production of large fields.

Illustrating, by data on representative big fields, how the production in all oil fields declines from the so-called "peak" production to what is usually called "settled" production. One of the oil industry's major accomplishments of recent years has been the rejuvenation of old fields and the accelerated production of new fields by the use of air and gas lifts and by water flooding.

FIELD	FIRST WELL	PEAK DATE	PEAK PRODUCTION	PRODUCTION END OF 1926
Glenn Pool	Nov. 1905	June 1907	117,000	11,300
Cushing	Mch. 1912	May 1915	305,000	21,400
Burbank	May 1920	July 1923	121,700	47,000
Tonkawa	Apr. 1924*	Sept. 1924	108,500	27,500
Garber	Apr. 1925	Nov. 1925	71,700	21,600

Note—The deep sand in Seminole field was discovered in July 1926—the peak of 527,000 barrels was reached July 30, 1927 from 636 wells. Production at the end of November, 1927 of Greater Seminole field was 425,000 barrels a day from 1,021 wells.

Tonkawa came in in 1921 and then a rapid succession of big fields—Bristow, Wewoka, Cromwell, Papoose, Garber, Braman, Davenport, and others—and, in the spring of 1926, the biggest of all—Seminole—that on July 30, 1927, produced 527,000 barrels of high gravity crude oil—and at the end of November, 1927, was producing 425,000 barrels a day. This is the largest daily production of any high gravity oil field in the world.

Verily, Oklahoma has had a baptism and a christening of "Oil."

The Osage Sales

But probably the most spectacular phase of the development of the industry in the State has been the auctioning off of 160-acre tracts in the Burbank part of the Osage Indian Reservation. From the first sale in 1912, to date, twenty-eight of these sales have been held and slightly over seven hundred thousand acres of land have been leased upon which bonuses of over one hundred million dollars have been paid by the oil companies. This bonus money, plus the royalty on the oil produced and gas produced, plus minor sources of revenue has poured a flood of gold into the laps of the Osage Indians that has made them "rich beyond the dreams of avarice."

So the world knows about Oklahoma and its prolific oil fields, and it thinks about Oklahoma in terms of oil.

OKLAHOMA COMPARED WITH OTHER STATES

Her production, the year she was admitted to statehood, was greater, by ten million barrels, than the best year of the best oil-producing state east of the Mississippi River.

On the Pacific Coast, California's best year, up to the time of Oklahoma's statehood, was four million barrels less than Oklahoma's production in 1907.

In the southwest, Kansas' best year, and the only year that she ever exceeded Oklahoma's 1907 production, was in 1917. Texas' best year, prior to 1907, fell fifteen million barrels short of Oklahoma's production in 1907.

REASON FOR OKLAHOMA'S STRATEGIC IMPORTANCE

Thus we have the unusual spectacle of Oklahoma entering the Union in 1907 with not only the largest production of any state that year, but a production far in excess of what any other state had produced in any year up to that time.

Obviously this fact had tremendous influence on the early development of the state—a great constructive influence of which practically every other industry and line of development has been, either directly or indirectly, the beneficiary.

Prior to the drilling of the little four-barrel well at Red Fork in 1901 the United States had produced a billion barrels of oil. Since that time, the United States has produced over eight billion barrels—a grand total of well over nine billion barrels.

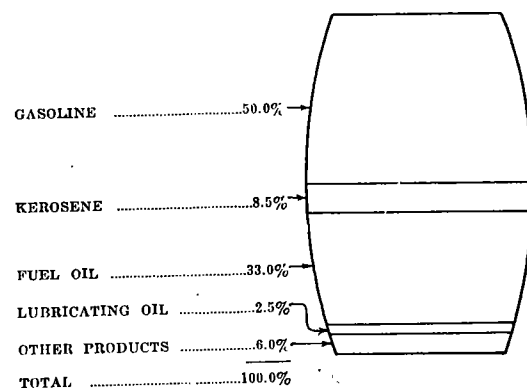
Of this huge amount Oklahoma has produced two billion barrels.

But the story of oil is not told in terms of barrels. Oil is merely "raw material" and its value depends upon what is made out of it.

Herein, then lies the real significance of Oklahoma's strategic position that she has held for twenty years and that, from present indications, she will continue to hold for long years to come.

At the present time the refineries that are handling crude oil produced in Oklahoma are getting about the following out of the average barrel: gasoline 50.0 per cent, kerosene 8.5 per cent, fuel oil 33.0 per cent, lubricating oil 2.5 per cent, other products and refining losses 6.0 per cent.

In 1926 Oklahoma produced, in round numbers, 180,000,000 barrels of crude oil. As about fifty per cent of gasoline was made from it, this means that from the crude oil produced in Oklahoma in 1926 approximately ninety million barrels of gasoline were made. As the production of refinery gasoline in the United States in 1926 was, in round numbers, three hundred million barrels, it follows that from the crude



Out of the crude oil produced in Oklahoma today more gasoline is made than from the oil of any other State in the Union—or country in the world.

Figure 12. The products obtained by the refining of an average barrel of Oklahoma crude oil.

oil produced in Oklahoma approximately thirty per cent of all of the refinery gasoline of the United States was made.

This amazing fact is one of several reasons for Oklahoma's strategic position in the oil industry of the United States today.

As the production of crude oil throughout the world in 1926 was slightly over one billion barrels, of the United States about seven hundred seventy million barrels, and of Oklahoma almost one hundred eighty million barrels, it follows that Oklahoma furnished, last year, almost eighteen per cent of the world output and over twenty-three per cent of the output of the United States.

Since the development of the Cushing field fifteen years ago, Oklahoma has been famous as a producer of "high grade" oil which by general interpretation means oil from which a large percentage of gasoline can be recovered.

How Quality Affects Price

Some idea of how the average quality of oil produced in different states varies, and how this variation is reflected in its price, is revealed by the following tabulation comparing the two greatest oil-producing states, Oklahoma and California, for 1926:

Item	California	Oklahoma
Crude produced, bbls.	224,673,000.00	179,195,000.00
Value at well	\$345,547,000.00	\$413,900,000.00
Value per barrel	1.54	2.31
Gasoline content, per cent	22	50
Fuel oil content, per cent	70	33

Since oil was first produced in Oklahoma the State has produced a total of two billion barrels. It took until about the mid-summer of 1920 to produce the first billion barrels and only six and a half years to produce the second billion. The first billion barrels were worth, at the wells, one billion dollars and the second billion barrels almost two billion dollars.

Of these three billion dollars of "new wealth" the great bulk remained in Oklahoma and most of it was used in further developing the oil industry. A vast amount went into the development of other industries in the State. A total of more than sixty million dollars, in gross production taxes alone, has been paid into the State Treasury.

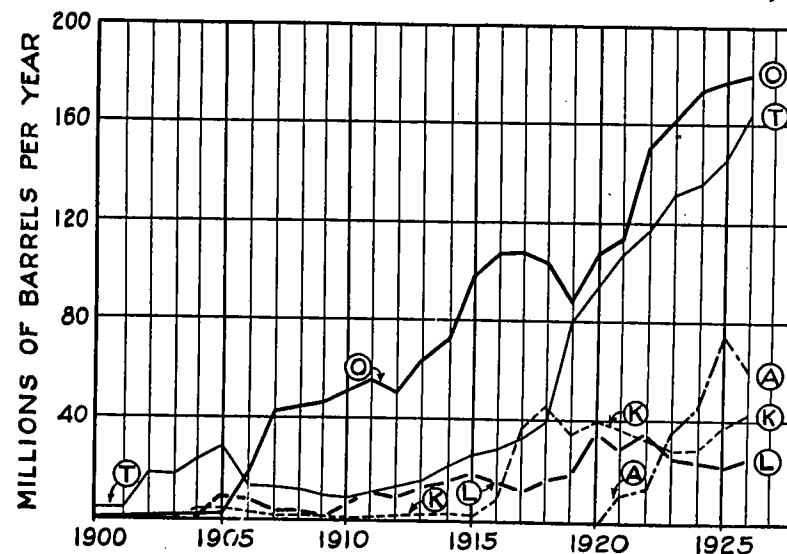


Figure 13. Graph of oil production of principal oil producing states. O—Oklahoma; T—Texas; A—Arkansas; K—Kansas; and L—Louisiana.

Drilling Wells in Oklahoma

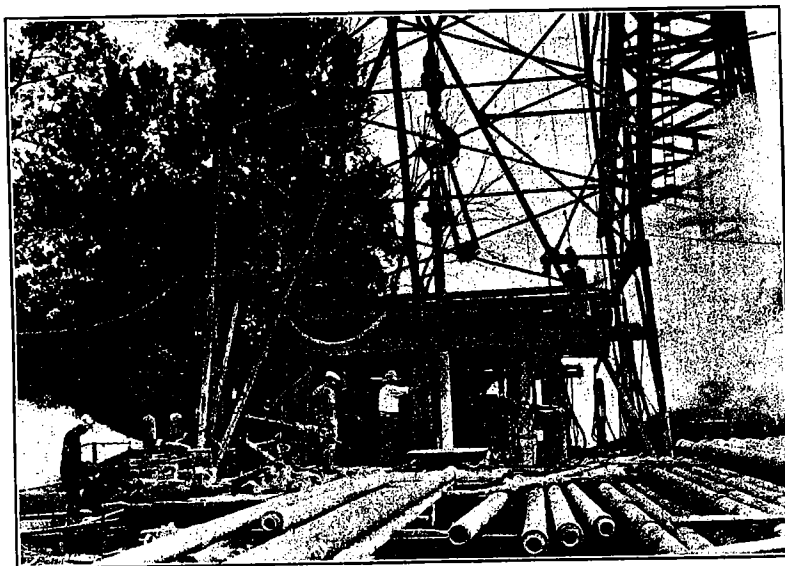
Referring to Table 3, it is interesting to note that since the beginning of the industry in Oklahoma a total of slightly over 125,000 wells have been drilled of which over 25,000 were dry holes. These dry holes easily cost a half billion dollars.

Of all the wells drilled in Oklahoma almost exactly 25 per cent have been dry holes. However, taking the last five years shown in Table 3, almost 29 per cent were dry holes. When the Bartlesville area was being developed 20 years ago the wells were practically all shallow and cheap. Today practically all of the wells drilled in Oklahoma are

deep and costly. It is currently stated that the average well in the Seminole field costs, completed, around \$75,000. This money would have drilled more than a dozen wells 20 years ago.

Again referring to Table 3 we find that, from the beginning, something over 90,000 wells have been completed as "oil" wells. According to the Oil and Gas Journal, on Dec. 31, 1926, there were 60,440 producing oil wells in Oklahoma. This means that out of all of the wells completed as oil wells, from the beginning of the industry in Oklahoma, two-thirds of them were still producing Dec. 31, 1926.

PLATE III



A ROTARY DRILLING WELL
Running casing.

If, in Oklahoma since the fall of 1913, every well completed as an oil well were still producing oil, the total would be about 60,000 oil wells—or as many as are producing oil in Oklahoma today. But, obviously, thousands of the wells completed as oil wells since the fall of 1913 have ceased flowing. Hence to "account for" these thousands of wells that have ceased flowing since 1913 there must be thousands of wells drilled before 1913 that are still flowing. The old Red Fork well, drilled in 1901, is still producing a little oil—likewise the well, drilled in 1898, near Bartlesville.

And if a "roll call of old oil wells" in Oklahoma were made it would be surprising how many of them were ten, fifteen, and twenty years old.

Table 3. Wells drilled in Oklahoma from 1900 to 1926, with amount of production of oil, gas, and natural gasoline.

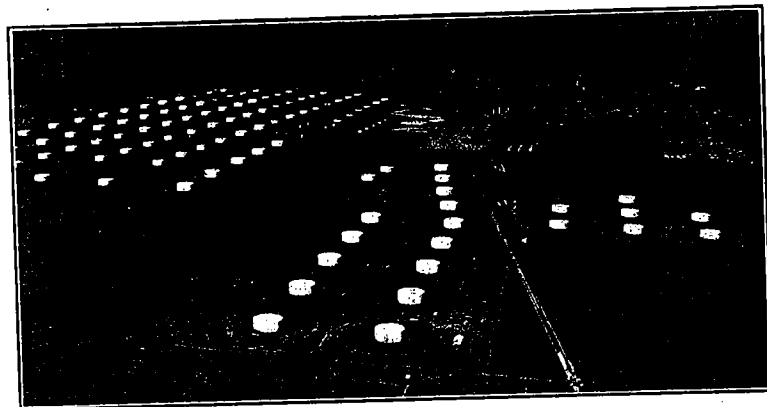
YEAR	WELLS COMPLETED				Crude Oil Produced Barrels	Natural Gas Produced M. Cubic Feet	Natural Gasol. Produced Gallons
	Total	Oil	Gas	Dry			
1900					7,554		
1901					10,000		
1902					37,100		
1903		110			138,911		
1904	361	243	21	97	1,366,748		
1905	2,510	2,059	98	353	6,466,200		
1906	2,779	2,268	163	348	18,003,600	3,520,396	
1907	3,956	3,490	148	318	43,524,128	4,867,031	
1908	2,844	2,458	102	284	45,798,765	11,924,574	
1909	3,279	2,742	157	380	47,859,218	23,036,976	
1910	4,370	3,622	201	547	52,028,718	50,429,646	
1911	4,445	3,466	364	615	56,069,637	67,275,608	388,058
1912	5,982	4,718	444	820	51,427,071	73,799,319	1,575,644
1913	9,131	7,225	589	1,317	63,579,384	75,017,668	6,462,968
1914	8,297	6,444	529	1,324	73,631,724	78,167,414	17,277,555
1915	4,603	3,407	350	846	97,915,243	87,516,753	31,665,991
1916	7,700	6,205	359	1,136	107,071,715	123,517,385	148,359,602
1917	6,676	4,988	397	1,291	107,507,471	137,384,154	115,123,424
1918	8,367	5,514	753	2,100	103,347,070	124,317,179	163,700,550
1919	8,171	5,186	718	2,267	86,911,000	163,649,000	189,995,038
1920	9,097	6,303	758	2,035	106,206,000	154,467,000	162,761,829
1921	5,715	3,538	670	1,507	114,634,000	124,058,000	195,960,900
1922	6,148	4,149	571	1,428	149,571,000	140,631,000	189,403,670
1923	5,833	3,515	587	1,731	160,929,000	203,082,000	270,249,000
1924	4,814	3,038	468	1,308	173,538,000	214,452,000	301,062,000
1925	4,978	2,929	471	1,478	176,768,000	249,285,000	390,861,000
1926	5,352	3,119	498	1,735	179,272,000		
Total	125,408	90,626	9,416	25,366	2,023,620,000	2,115,398,103	2,084,847,229

It is most obvious that had Oklahoma not been an oil-producing state, her marvelous growth and her present remarkable development would have required at least two generations instead of coming within the active lifetime of thousands of those who launched her in 1890 as a Territory and in 1907 as a State.

Development of Pipe Lines and Storage

Especially in the earlier history of Oklahoma each successive "wave" of big production has been followed by big increases in the building of storage, of pipelines, and of refineries.

PLATE IV



AIR VIEW OF TANK FARM AT PONCA CITY

Prior to the bringing in of Glenn Pool, the Prairie's pipeline carried the oil to refineries to the north and east. Their pipeline system connected, near Whiting, Indiana, with other great systems that finally ended on the Atlantic seaboard. Glenn Pool caused the building of two eight-inch lines from that area to refineries on the Gulf of Mexico. Cushing and the later big fields have resulted in the building of two ad-

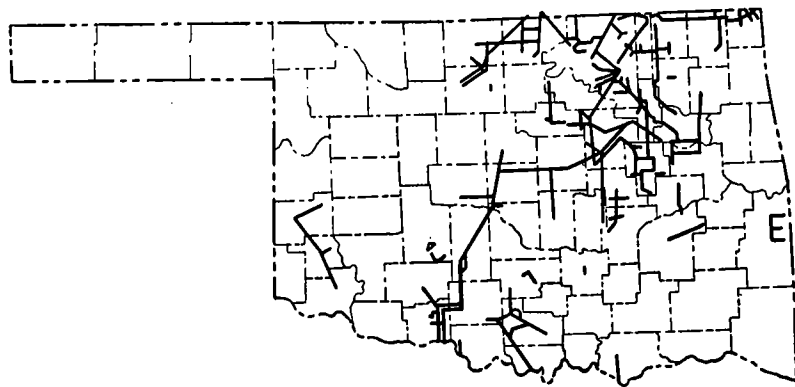


Figure 14. Map showing natural gas pipelines in Oklahoma, furnishing cheap fuel to cities and towns of the State.

ditional lines to the north and more lines to the Gulf, to say nothing of frequent increases in the capacity of the lines first laid down by the different companies. The necessity for this is clearly indicated by Oklahoma's production of forty-three million barrels in 1907, and likewise almost one hundred eighty million barrels in 1926.

Today there are over nineteen thousand miles of oil pipe line in Oklahoma of which, in May, 1926, almost eleven thousand miles were gathering lines (four inches in diameter or smaller) for gathering oil from individual wells and over eight thousand miles were trunk lines (usually eight-inch) for transporting the oil from leases to tank farms or refineries. To fill these 19,180 miles of pipe line with crude oil would require over 2,600,000 barrels. This "oil in transit", at the average price of Oklahoma crude in 1926 was worth over \$6,000,000.

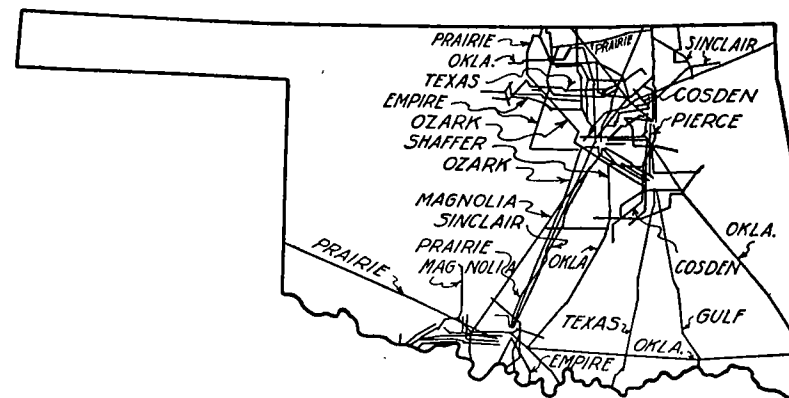


Figure 15. Map showing location of pipelines in Oklahoma and their ownership. These lines represent an important aspect of industrial Oklahoma.

Inseparable from the pipeline is the storage tank—the "shock absorber"—when new, big fields come in and produce crude oil faster than the refineries can handle it. Some idea of the provision that the oil industry has made for storing its "raw material" can be had from the fact that in May, 1926, the aggregate tank farm storage for crude oil, in Oklahoma, was over 117,000,000 barrels. In addition to this crude storage there was a total of almost 23,000,000 barrels for the storage of refined products—gasoline, kerosene, fuel oil, etc.

This means that in May, 1926, there was a grand total of slightly over 140,000,000 barrels of storage available for crude oil and its refined products.

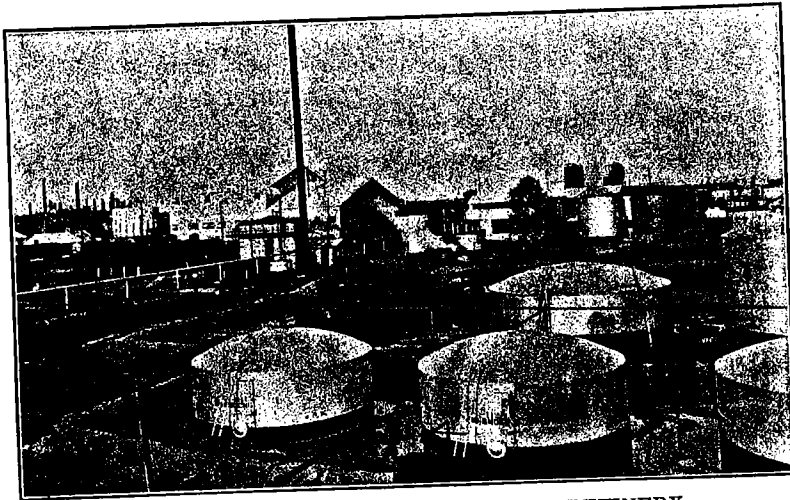
Some idea of the high quality of the crude oil produced in Oklahoma, and the necessity for storing it in vapor-tight tanks, can be had from the fact that of the State's total storage capacity for crude oil 99.9 per cent is steel storage, while the average for the United States, outside of Oklahoma, is less than 77 per cent.

Growth in Refining

There are in Oklahoma today about fifty refineries that can be rated as "operating" plants. They range all the way from a few hundred barrels to thirty-five thousand barrels daily capacity and have a combined capacity of around two hundred sixty thousand barrels of crude oil a day.

The refining industry in Oklahoma has undergone a rapid evolution in the last few years and few of the once numerous "skimming" plants remain, at least in the sense that they were called skimming plants ten years ago. Instead, we have greatly enlarged refineries a number of which represent investments running well up into the millions of dollars.

PLATE V



INDEPENDENT OIL & GAS COMPANY'S REFINERY
Okmulgee, Oklahoma.

The refining industry in Oklahoma has very definitely passed from the small plant to the large plant—from relatively simple equipment to complicated equipment of the highest type—from the skimming plant that in 1909 recovered slightly over ten per cent of gasoline from the crude to the "cracking" plant that in 1926 helped to push the total recovery up to at least fifty per cent of gasoline.

Natural Gas and Natural Gasoline

But oil is not all of the "oil" industry—it also includes both the natural gas and the natural gasoline industries.

While natural gas is usually transported and distributed to consumers by public service companies, the gas itself is usually produced by the oil industry. Oklahoma is today producing more natural (dry) gas than any other state in the Union—twenty-one per cent of the total for the United States. Also its natural gasoline plants are making more natural gasoline from the dry gas from natural gas wells and the wet (casing-head) gas from oil wells than any other state in the Union—thirty-six per cent of the total for the United States in 1925.

Today practically every cubic foot of wet gas produced in Oklahoma is run through natural gasoline plants and "wrung dry" of its gasoline content. Some idea of the amount of real liquid gasoline, but in vapor form, that is contained in the invisible gas from gas wells and from oil wells in Oklahoma can be gotten from the fact that in 1926 over forty million dollars worth of "natural" gasoline was made from this source. From the first records of this new industry (1911) to the end of 1926 a total of over two hundred fifty-five million dollars worth of this kind of gasoline has been made in the State.

The production of natural gas in Oklahoma has grown at about the same rate as the production of crude oil. The value of the present production, at the point of consumption, has averaged, during recent years, around twenty-five million dollars a year.

From the first records of natural gas in Oklahoma, in 1906, to the end of 1926, the total value of the output, at the point of consumption, was about two hundred ninety-five million dollars. Thus, the "gas" end of the "oil" industry has added something like five hundred fifty million dollars to the three billion dollars received for the crude produced in Oklahoma.

Vast Deposits of Asphalt

While asphalt is not so directly connected with crude oil as are casing-head and natural gas, the asphalt deposits that are so widely distributed throughout southern Oklahoma are nevertheless a part of the oil industry and should be taken into account in any discussion of the State's petroleum resources.

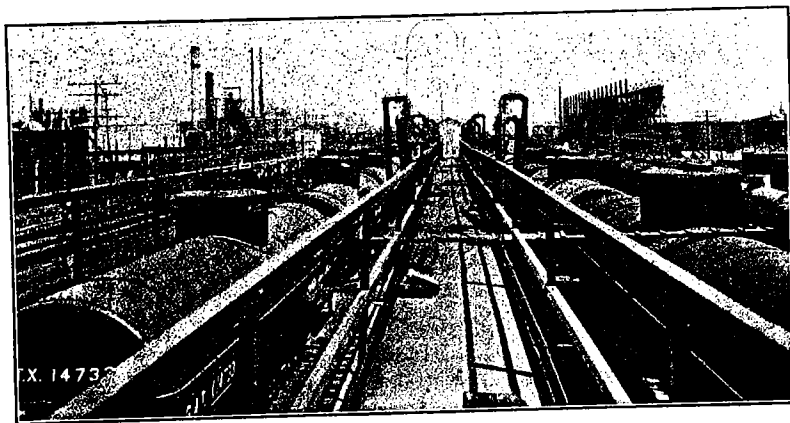
The Oklahoma Geological Survey has estimated that these deposits contain "unnumbered millions of tons of asphalt—enough to furnish paving material for all the streets and public roads of Oklahoma." In the report of the United States Bureau of Mines for 1924 the output of "native" asphalt is put at about eighteen thousand tons with a value of eighty thousand dollars. This negligible development of this vast resource only serves to emphasize the future possibilities of Oklahoma asphalt when the situation becomes favorable for developing these deposits.

INVESTMENT IN PETROLEUM INDUSTRY IN OKLAHOMA

Probably no clearer general conception could be gotten of the oil and gas industry in Oklahoma than from a brief summary of the industry's approximate investment in the State today. Easily fifteen million acres of land are under oil and gas lease and are classified as producing, offset, prospective, and wildcat. This land, together with the oil and gas wells and equipment, drilling tools, supplies, houses, etc., represent probably one and a quarter billion dollars. Gathering lines and trunk lines for crude oil, transmission lines, and distributing lines for natural gas (6,464 miles in 1926), pumping stations for oil and compression stations for gas, storage tanks and tank farms with equipment and supplies easily represent three hundred fifty million dollars. Refineries, natural gasoline plants, tank cars, marketing stations, etc., represent at least two hundred million dollars.

The foregoing summary totals one billion, eight hundred million dollars—and it is undoubtedly a very conservative estimate of the oil industry, as "a going concern", in Oklahoma.

PLATE VI



LOADING RACKS AT A LARGE OKLAHOMA REFINERY
Mid-Continent Petroleum Corp., Tulsa.

PETROLEUM OUR MOST VALUABLE MINERAL

According to the United States Bureau of Mines, the value of the crude oil produced in Oklahoma in 1926 was \$413,900,000. A rough estimate places the value of the natural gas produced at around forty-two million dollars and of natural gasoline at around forty-one million dollars. This gives a total of about four hundred ninety-seven million dollars.

In the same year the value of all the other minerals produced in the State—zinc, lead, coal, gypsum, stone, gravel, granite, clay products, etc., was around eighty-two million dollars. This, added to the value of crude oil, gas, and gasoline listed in the preceding paragraph, gives a grand total of five hundred sixty-nine million dollars of "mineral" wealth produced in Oklahoma in 1926.

In this connection it is interesting to note that the value contributed by the petroleum industry (crude oil, natural gas, and natural gasoline) was over 85 per cent of the total mineral value produced in 1926—and that the combined value of the output of lead, zinc, coal, etc., was less than 15 per cent of the total mineral value.

Royalties, Rentals, Bonuses, and Taxes

The owners of the land (usually farmers) on which oil and gas are produced receive a royalty (usually one-eighth) of the value of the oil and gas produced on their property. In 1926 the royalties paid on oil produced in Oklahoma amounted to approximately fifty-two million dollars.

Probably five million dollars a year is being paid to land owners as bonuses when leases are made on their lands and at least thirteen million dollars a year is being paid out on leases that have not yet produced oil or gas.

The estimated total from these royalties, bonuses, and rentals for the State of Oklahoma in 1926 was in the neighborhood of seventy million dollars. And a large part of this goes directly to the farm to be used for its improvement and frequently to pay off the mortgage.

In 1926 the three per cent gross production tax levied by the State on the value, at the well, of the crude oil produced, brought in over ten million dollars. Two-thirds of this money goes to the State, the remainder to the counties where the tax originated.

In addition to this gross production tax the industry also pays very substantial amounts in the form of ad valorem taxes.

Salaries, Wages, Supplies, and Equipment

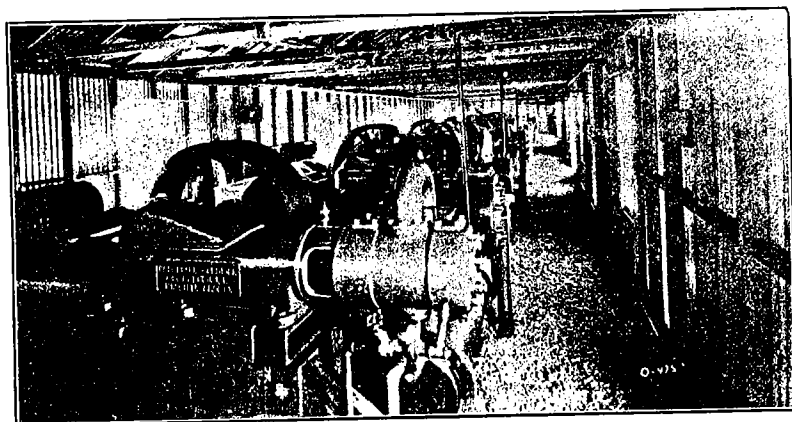
The crude oil producing end of the industry is spending easily one hundred fifty million dollars a year in Oklahoma in the drilling of an average of something over five thousand wells a year in the search for oil and gas. To this must be added a great many more millions for labor, repairs, supplies, etc., for operating the sixty thousand producing wells in the State.

The pipeline companies are also spending millions of dollars a year in operating their present properties, making repairs, replacements, etc., to say nothing of the demand, every day in the year, for making connections to new oil and gas wells.

For the last several years in Oklahoma there has been a daily average of more than ten new wells, either oil or gas, that had to be connected up to a pipe line system that would ultimately deliver the oil to a refinery or the gas to a consumer.

Refineries, natural gasoline plants, the handling of thousands of tank cars, and the operation of hundreds of drive-in filling stations and curb pumps throughout the State call for many more millions of dollars a year for labor, equipment, repairs, supplies, etc.—and especially for improvements. No other end of the industry is making more rapid advancement than is being made today in refining, and especially cracking, and in the making of natural gasoline—and there is no place where good equipment is so quickly rendered obsolete by better equipment.

PLATE VII



AIR COMPRESSORS IN A FLOWING PLANT
Carter Oil Co., Seminole field.

All of these things call for the expenditure, every year, of huge sums of money a large part of which remains within the State, touching and stimulating every other industry, business, and activity.

No other industry in Oklahoma is today "putting back" anything like the amount of money into the assurance of an unending supply of its "raw material" and into improvements in procuring, processing, transporting, and marketing its products.

OKLAHOMA'S INDUSTRY FUNDAMENTALLY SOUND

To those, then, who have marveled at Oklahoma's growth and development but who, knowing what a large part was traceable to "oil", have been just a little uncertain as to whether oil would continue to be one of the State's big industries, no more convincing assurance can be given than the inescapable conclusion that not only, for long

years to come, will her oil and gas continue to rank among her big industries, but that long before any measurable shrinkage could reasonably come, agriculture and manufacturing will have grown to such proportions that the economic balance of the State will not be disturbed and the oil industry will have fully adjusted itself to the change.

Table 4. Refineries and Natural Gasoline Plants in Oklahoma.

COMPANY AND PLANT ADDRESS	FIELD LOCATION	TYPE OF PLANT	DAILY CAPACITY GALLONS
A. C. F. Gasoline Co., Box 1561, Tulsa.....	Sec. 4-18-7	Comp.	750
Akin Gasoline Co., Box 1403, Tulsa.....	Sec. 9-26-13	Absp.	600
Akin Gasoline Co., Box 1403, Tulsa.....	Sec. 3-16-13	Comp.	600
Altitude Petroleum Co., Tulsa Trust Bldg., Tulsa	Oilton	Absp.	*3,000
Amerada Petroleum Corp., Ardmore.....	Sec. 20-5s-1e	Absp.	3,500
Amerada Petroleum Corp., Tonkawa.....	Sec. 34-25n-1w	Absp.	12,000
Amerada Petroleum Corp., Yeager.....	Sec. 18-8n-10e	Absp.	3,000
Amerada Petroleum Corp., Healdton.....	Sec. 31-2s-2w	Absp.	15,000
Amerada Petroleum Corp., Okmulgee.....	Sec. 13-12n-11e	Absp.	7,500
Amerada Petroleum Corp., Wewoka.....	Sec. 5-7n-8e	Absp.	7,500
Amerada Petroleum Corp., Earlsboro.....	Sec. 16-9n-5e	Absp.	22,500
Amerada Petroleum Corp., Seminole.....	Sec. 15-8n-6e	Absp.	†15,000
Amerada Petroleum Corp., Seminole.....	Sec. 23-9n-6e	Comp.	5,000
Amity Gasoline Co., Alluwe.....	Alluwe	Comp.	4,500
Amity Gasoline Co., Dewey.....	Dewey	Comp.	1,500
Arrow Gasoline Co., Mounds.....	Mounds	Comp.	350
Arthur Oil Co., Broken Arrow.....	25-18-14	Comp.	1,500
Atlantic Oil Producing Co., Sapulpa.....	Sapulpa	Comp.	1,000
Atlantic Oil Producing Co., Box 426, Okemah.....	Sec. 36-12n-10e	Absp.	1,800
Aztec Oil Co., Ingalls.....	Sec. 16-14n-10e	Absp.	3,000
Aztec Oil Co., Jenks.....	Sec. 22-19-4	Absp.	*5,000
Aztec Oil Co., Henryetta.....	Sec. 35-18-12	Comp.	1,500
Barco Gasoline Co., Wirt.....	Sec. 6-11-12	Absp.	2,500
Barnsdall Oil Co., R. R. No. 8, Tulsa.....	Wirt	Comp.	2,000
Barnsdall Oil Co., Osage.....	Sec. 5-20-12	Absp.	2,500
Barnsdall Oil Co., Avant.....	Sec. 20-21-9	Absp.	2,000
Barnsdall Oil Co., Beggs.....	Sec. 18-23-12	Absp.	2,400
Barnsdall Oil Co., Phillipsville.....	Sec. 6-14-12	Absp.	6,000
Barnsdall Oil Co., Barnsdall.....	Sec. 23-14-11	Comp.	2,800
Barnsdall Gas Co., Okemah.....	Sec. 29-25-11	Absp.	3,000
Boynnton Gasoline Co., Boynnton.....	Sec. 15-10-9	Comp.	†1,500
Bradstreet, J. G. & Co., Muskogee.....	Boynnton	Comp.	500
Burgess Gasoline Co., Nowata.....	Muskogee	Comp.	300
Carter Oil Co., Burbank.....	Collinsville	Absp.	1,000
Carter Oil Co., Hewitt.....	Burbank	Absp.	16,000
Carter Oil Co., Oilton.....	Hewitt	Absp.	10,000
Carter Oil Co., Cromwell.....	Oilton	Absp.	6,000
Carter Oil Co., Cromwell.....	Cromwell	Absp.	17,000
Carter Oil Co., Seminole.....	Seminole	Absp.	32,000
Carter Oil Co., Seminole.....	Seminole	Absp.	15,000
Carter Oil Co., Seminole.....	Seminole	Absp.	60,000
Chase Gasoline Co., Muskogee.....	Seminole	Absp.	50,000
Chase Gasoline Co., Muskogee.....	Muskogee	Comp.	1,000
Chesney, Chas., Gasoline Co., Box 857, Okmulgee	Muskogee	Comp.	2,000
Chestnut & Smith Corp.....	Okmulgee	Absp.	500
Chestnut & Smith Corp. (2).....	Kiefer	A-C	3,000
Chestnut & Smith Corp.....	Morris	A-C	20,500
Comar Gasoline Co. (Marland and Roxana), Tonkawa.....	Morris	A-C	3,500
Comar Gasoline Co., Tonkawa.....	Sec. 10-24n-1w	Absp.	16,000
Comar Gasoline Co., Tonkawa.....	Sec. 2-24n-1w	Absp.	24,000
Comar Gasoline Co., Tonkawa.....	Sec. 3-25n-1w	Absp.	3,000
Crosbie & Gillespie, Kiefer.....	Sec. 28-25n-1w	Absp.	8,000
Crosbie & Gillespie, Stonebluff.....	Kiefer	Comp.	7,500
Cushing Refining & Gasoline Co., Blackwell.....	Stonebluff	Comp.	600
Cushing Refining & Gasoline Co., Ripley.....	Blackwell	Absp.	10,000
Denver Producing & Refining Co., Okmulgee.....	Ripley	Absp.	8,000
DeSoto Gasoline Co., Muskogee.....	Okmulgee	Absp.	1,000
Devonian Oil Co., Chickasha.....	Sec. 5-14-8	Comp.	500
Devonian Oil Co., Kellyville.....	Sec. 32-7n-6w	Absp.	2,000
Devonian Oil Co., Tulsa.....	Sec. 22-17n-10e	Absp.	7,500
Devonian Oil Co., Stroud.....	Sec. 22-10n-12e	Absp.	3,000
Devonian Oil Co., Stroud.....	Sec. 34-15n-6e	Absp.	*5,000

Table 4. Refineries and Natural Gasoline Plants in Oklahoma, Cont'd.

COMPANY AND PLANT ADDRESS	LOCATION FIELD	TYPE OF PLANT	DAILY CAPACITY GALLONS
Dewey Portland Cement Co., Dewey.....	Dewey	A-C	2,000
Diamond Refining Co., Delaware.....	Sec. 29-27-16	Comp.	3,000
Diamond Refining Co., Ochelata.....	Ochelata	Absp.	800
Diamond Refining Co., Jenks.....	Jenks	Comp.	600
Diamond Refining Co., Jenks.....	Jenks	Comp.	3,000
Eagle Gasoline Co., Kiefer.....	Sec. 6-11-13	Absp.	5,000
Eagle-Picher Lead Co., Henryetta.....	Sec. 13-14-14	Comp.	300
Elm Oil Co., Tulsa.....	Sec. 35-25-10e	Absp.	10,000
Empire Gasoline Co., Tallent.....	Sec. 16-11-11c	Absp.	6,500
Empire Gasoline Co., Okemah.....	Sec. 12-27-5e	A-C	8,000
Empire Gasoline Co., Burbank.....	Sec. 24-9-6c	Absp.	30,000
Empire Gasoline Co., Seminole.....	Sec. 24-9-6c	Absp.	20,000
Empire Gasoline Co., Seminole.....	Sec. 14-8-6e	A-C	160,000
Empire Gasoline Co., Seminole.....	Sec. 17-17-13	Comp.	4,000
Enfisco Oil Corp., Court Arcade Bldg., Tulsa.....	20-17-13	Comp.	500
Enfisco Oil Corp., Court Arcade Bldg., Tulsa.....	20-17-13	Comp.	900
Foster & Davis, Bartlesville.....	Osage	Absp.	15,000
Foster, Dean E., 304 New Wright Bldg., Tulsa.....	Sec. 27-27-3w	Absp.	2,500
Foster Petroleum Corp., Bartlesville.....	Sec. 13-21-8	Absp.	500
Foster Petroleum Corp., Box 1561, Tulsa.....	Sec. 22-17-13	Comp.	500
Four Gasoline Co., Box 1561, Tulsa.....	Sec. 17-17-12	Comp.	500
Franchot, D. W., & Co., Box 1561, Tulsa.....	Sec. 17-17-12	Comp.	15,000
Gilliland Oil Co., Shamrock.....	Shamrock	Absp.	5,000
Gilliland Oil Co., Barnsdall.....	Barnsdall	Absp.	4,000
Gilmore, Forest E., Co., Mannford.....	Sec. 14-19-8	Absp.	110,000
Gilmore, Forest E., Co., Kellyville.....	Sec. 1-17n-10e	Absp.	18,000
Gilmore, Forest E., Co., Wetumka.....	Sec. 21-9n-10e	Absp.	2,000
Glenn Gas Co., Glenn Pool.....	Glenn Pool	Comp.	2,500
Glomar Gasoline Co., Jennings.....	Jennings	Comp.	*250
Glomar Gasoline Co., Mannford.....	Mannford	Absp.	1,800
Glomar Gasoline Co., Oakhurst.....	Oakhurst	Absp.	1,500
Glomar Gasoline Co., Oakhurst.....	Sec. 12-14-15	Absp.	1,500
Grimes Gasoline Co., Haskell.....	Sec. 6-19-10	Absp.	2,000
Grimes Gasoline Co., Keystone.....	Sec. 2-10-9	Absp.	5,000
Grimes Gasoline Co., Okemah.....	Sec. 35-10-9	Absp.	1,000
Grimes Gasoline Co., Okemah.....	Sperry	Absp.	1,000
Grimes & Gillespie, Tulsa.....	Sec. 16-17-12	Comp.	48,100
Gypsy Oil Co., Kiefer.....	Sec. 20-18-13	Comp.	2,300
Gypsy Oil Co., Jenks.....	Sec. 34-21-8	Comp.	4,500
Gypsy Oil Co., Cleveland.....	Sec. 5-17-7	Comp.	10,200
Gypsy Oil Co., Drumright.....	Sec. 10-16-7	Comp.	9,200
Gypsy Oil Co., Shamrock.....	Sec. 10-16-7	Comp.	8,100
Gypsy Oil Co., Cleveland.....	Sec. 1-21-7	Comp.	10,600
Gypsy Oil Co., Shidler.....	Sec. 32-27-6	Absp.	19,700
Gypsy Oil Co., Shidler.....	Sec. 2-24-1w	Absp.	33,800
Gypsy Oil Co., Three Sands.....	Sec. 24-27-5e	Absp.	4,900
Gypsy Oil Co., Bristow.....	Sec. 3-14n-8e	Absp.	5,000
Gypsy Oil Co., Davenport.....	Sec. 11-14n-5e	Absp.	37,000
Gypsy Oil Co., Earlsboro.....	Sec. 16-9-5e	Absp.	2,000
Gypsy & Cassidy, Cushing.....	Cushing	Absp.	3,000
Hales & Cassidy, Cushing.....	Sec. 25-21-11	Absp.	3,000
Harland Oil Co., Wolco.....	Sec. 20-25-11	Absp.	3,000
Harland Oil Co., Barnsdall.....	Sec. 18-23-12	Comp.	1,500
Harlis Oil & Gas Co., Avant.....	Sec. 17-16-15	Absp.	10,000
Henderson Co., Nowata.....	Sec. 20-19n-12e	Comp.	500
Highway Oil Refining Co., Lynch Bldg., Tulsa.....	Sec. 21-16n-15e	Comp.	600
Highway Oil Refining Co., Lynch Bldg., Tulsa.....	Hallett	Absp.	3,000
Hilditch, John, Tulsa.....	Sec. 26-9-6	Absp.	25,000
Independent Oil & Gas Co., Seminole.....	Sec. 33-14-17	Comp.	500
Invader 50 Well Syndicate, Muskogee.....	6-13-12	Absp.	1,800
Junior Refining Co., Okmulgee.....	Nowata	Comp.	500
Lane Gasoline Co., Nowata.....	Okemah	Absp.	800
Lane Gasoline Co., Nowata.....	Hollis	Absp.	110,000
Lone Star Gas Co., Hollis.....	9-17n-7e	Comp.	2,436
Magnolia Petroleum Co., Cushing.....	8 and 9-18n-7e	Comp.	3,000
Magnolia Petroleum Co., Cushing.....	7-18n-7e	Comp.	710
Magnolia Petroleum Co., Cushing.....	2 and 3-18n-7e	Comp.	2,270
Magnolia Petroleum Co., Cushing.....	3 and 4-16n-7e	A-C	925
Magnolia Petroleum Co., Cushing.....	27-17n-7e	Comp.	460
Magnolia Petroleum Co., Cushing.....	29-18n-5e	Comp.	2,436
Magnolia Petroleum Co., Cushing.....	34-15n-5e	A-C	4,660
Magnolia Petroleum Co., Davenport.....	34-15n-5e	Absp.	1,450
Magnolia Petroleum Co., Davenport.....	3-14n-5e	A-C	750
Magnolia Petroleum Co., Duncan.....	19-15n-8e	A-C	3,000
Magnolia Petroleum Co., Earlsboro.....	26-9n-6e	A-C	350
Magnolia Petroleum Co., Fox.....	33-1s-3w	Comp.	4,800
Magnolia Petroleum Co., Fox.....	23-2s-3w	Comp.	280
Magnolia Petroleum Co., Graham.....	4-4s-3w	Comp.	280
Magnolia Petroleum Co., Healdton.....	Healdton	Comp.	280

Table 4. Refineries and Natural Gasoline Plants in Oklahoma, Cont'd.

COMPANY AND PLANT ADDRESS	FIELD LOCATION	TYPE OF PLANT	DAILY CAPACITY GALLONS
Magnolia Petroleum Co., Healdton.....	15-4s-3w	Comp.	300
Magnolia Petroleum Co., Healdton.....	16-4s-2w	Comp.	725
Magnolia Petroleum Co., Morrison.....	5-22-3w	A-C	1,890
Magnolia Petroleum Co., Okmulgee.....	1-11n-13e	Comp.	73
Magnolia Petroleum Co., Wewoka.....	32-8n-8e	Comp.	1,740
Magnolia Petroleum Co., Wewoka.....	5-7n-8e	Comp.	3,580
Magnolia Petroleum Co., Yale.....	6-19n-6e	Comp.	165
Magnolia Petroleum Co., Yale.....	17-20n-6e	A-C	2,850
Magnolia Petroleum Co., Yale.....	27-19n-4e	Comp.	550
Marland Refining Co., Ponca City.....	Sec. 33-25n-2e	A-C	18,000
Marland Refining Co., Blackwell.....	Sec. 1-26n-2w	A-C	4,500
Marland Refining Co., Three Sands.....	Sec. 15-25n-2w	Absp.	4,200
Marland Refining Co., Blackwell.....	Sec. 6-26n-1w	Absp.	2,200
Marland Refining Co., and Mid-Continent Petroleum Corp., Garber.....	Sec. 13-22n-1w	A-C	7,000
Masoncel Gasoline Co., Osage.....	Sec. 23-21-8	A-C	1,800
Masoncel Gasoline Co., Copan.....	Sec. 33-28-13	Absp.	900
McMan Oil & Gas Co., Tonkawa.....	Three Sands	Absp.	8,000
Midco Oil Corp., Box 2085, Tulsa.....	Oilton	Comp.	4,000
Midco Oil Corp., Box 2085, Tulsa.....	Drumright	Comp.	250
Midco Oil Corp., Box 2085, Tulsa.....	Dewey	Comp.	1,800
Midco Oil Corp., Box 2085, Tulsa.....	Billings	Comp.	1,000
Mid-Continent Petroleum Corp., Bethel.....	Sec. 17-9-8	Absp.	5,000
Mid-Continent Petroleum Corp., Covington.....	Sec. 13-22-4w	Absp.	25,000
Mid-Continent Petroleum Corp., Cromwell.....	Sec. 15-10-8	Absp.	50,000
Mid-Continent Petroleum Corp., Leonard.....	Sec. 28-17-14	Comp.	5,000
Mid-Continent Petroleum Corp., Morris.....	Sec. 12-13-13	Absp.	5,000
Mid-Continent Petroleum Corp., Okmulgee.....	Sec. 19-13-13	Comp.	3,000
Mid-Continent Petroleum Corp., Shamrock.....	Sec. 22-17-7	Absp.	15,000
Mid-Continent Petroleum Corp., Stonebluff.....	Sec. 5-16-15	Comp.	3,000
Mid-Continent Petroleum Corp., Tulsa.....	Sec. 28-20-12	Absp.	5,000
Mid-Continent Petroleum Corp., Weleetka.....	Sec. 4-9-11	Absp.	6,000
Mid-Continent Petroleum Corp., Stroud.....	Sec. 8-15-6	Absp.	6,000
Mid-Kansas Oil & Gas Co., Petroleum Bldg., Tulsa.....	Sec. 15-27n-5e	Absp.	5,000
Moon Gasoline Co., Box 267, Bixby.....	Bixby	Comp.	3,000
Moon Gasoline Co., Box 36, Rt. 4, Muskogee.....	Muskogee	Comp.	2,000
M. T. C. Oil & Gas Co. (and Elbucan Oil Co.) Tulsa.....	Muskogee	Comp.	2,000
National Oil & Development Co., Tulsa.....	Meham	A-C	7,000
National Products Co., Cleveland.....	Bartlesville	Comp.	2,000
National Products Co., Cleveland (2).....	Cleveland (2)	Absp.	2,000
National Products Co., Mounds.....	Mounds	Absp.	2,000
National Products Co., Terilton.....	Terilton	Absp.	1,400
National Products Co., Oilton.....	Oilton (2)	Absp.	2,000
National Products Co., Slick.....	Slick	Absp.	2,000
Noble Oil & Gas Co., Quay.....	Quay	Absp.	1,500
Oil State Gasoline Co., Jenks.....	Sec. 17-18-13	Comp.	1,500
Oil State Gasoline Co., Beggs.....	Sec. 7-14-12	Comp.	1,200
Oil State Gasoline Co., Yale.....	Sec. 13-19-5	A-C	3,000
Oklahoma Gasoline Plants, Inc., Sapulpa.....	Sec. 18-18n-7e	Absp.	5,500
Okmulgee Producers & Manufacturers Gas Co., Okmulgee.....	Okmulgee	Absp.	500
Orlic Gasoline Co., Cleveland.....	Sec. 13-12-13	Absp.	500
Orlic Gasoline Co., Jennings.....	Sec. 18-21-8	Comp.	2,500
Owen Gasoline Co., Barnsdall.....	Sec. 3-19-7	Absp.	2,500
Owen Gasoline Co., Owen.....	Sec. 19-24-11	Absp.	3,000
Peppers Gasoline Co., Box 858, Enid.....	Sec. 29-29-13	Absp.	10,000
Phillips Petroleum Co., DeNoya.....	Sec. 6-24-10	Absp.	3,000
Phillips Petroleum Co., Shidler.....	Sec. 26-27-5	Absp.	44,000
Phillips Petroleum Co., Shidler.....	Sec. 16-27-5	Absp.	45,000
Phillips Petroleum Co., Shidler.....	Sec. 14-27-5	Absp.	42,000
Phillips Petroleum Co., Fairfax.....	Sec. 21-25-6	Comp.	22,000
Phillips Petroleum Co., Bartlesville.....	Sec. 12-25-11	Comp.	3,000
Phillips Petroleum Co., Pershing.....	Sec. 6-24-10	Absp.	10,000
Phillips Petroleum Co., Stroud.....	Sec. 12-14-6	Absp.	4,000
Phillips Petroleum Co., Norfolk.....	Sec. 1-18-5	Absp.	3,000
Phillips Petroleum Co., Beggs.....	Sec. 11-15-12	Absp.	5,000
Phillips Petroleum Co., Bryant.....	Sec. 24-11-11	Absp.	12,000
Phillips Petroleum Co., Wewoka.....	Sec. 33-8-8	Absp.	31,000
Phillips Petroleum Co., Wetumka.....	Sec. 3-9-9	Absp.	32,000
Phillips Petroleum Co., Wetumka.....	Sec. 33-11-8	Absp.	26,000
Powers, M. F., Depew.....	Depew	Absp.	4,000
Powers & Quimlan, Rt. 2, Box 22, Beggs.....	Beggs	Comp.	2,000
Powers & Quimlan, Rt. 2, Box 22, Beggs.....	Beggs	Comp.	2,000

Table 4. Refineries and Natural Gasoline Plants in Oklahoma, Cont'd.

COMPANY AND PLANT ADDRESS	FIELD LOCATION	TYPE OF PLANT	DAILY CAPACITY GALLONS
Pure Oil Co., Drumright	Sec. 32-18-7	Comp.	8,000
Pure Oil Co., Drumright	Sec. 32-19-7	Comp.	5,000
Pure Oil Co., Healdton	Sec. 11-4-3	Comp.	1,500
Pure Oil Co., Depue	Sec. 5-15-8	Comp.	8,000
Pure Oil Co., Okmulgee	Sec. 7-13-13	Comp.	1,000
Pure Oil Co., Seminole	Sec. 26-9-6	A-C	20,000
Pure Oil Co., Seminole	Sec. 14-8-6	A-C	120,000
Romarti Gasoline Co., Burbank	Sec. 31-27n-6c	Absp.	12,000
Rotary Gasoline Co., Tulsa	Sec. 11-21n-12c	Comp.	1,200
Roxana Petroleum Corp., Yale	Sec. 18-19n-6e	Comp.	1,200
Roxana Petroleum Corp., Stroud	Sec. 1-14n-6c	Absp.	7,000
Roxana Petroleum Corp., Drumright	Sec. 8-17n-7e	Absp.	3,500
Roxana Petroleum Corp., Covington	Sec. 18-22n-3w	Comp.	10,000
Roxana Petroleum Corp., Mannford	Sec. 18-19n-9e	Absp.	1,500
Sand Springs Home, Box 277, Sand Springs	Sec. 4-19-7	Comp.	3,000
Sand Springs Home, Box 277, Sand Springs	Sec. 6-19-12	Absp.	3,000
Shaffer Oil & Refining Co., Mehan	Mehan	Absp.	6,000
Shaffer Oil & Refining Co., Shamrock	Shamrock	Absp.	4,000
Shaffer Oil & Refining Co., Drumright	Drumright	Absp.	4,000
Shaffer Oil & Refining Co., Kellyville	Kellyville	Absp.	2,000
Shaffer Oil & Refining Co., Kellyville	Bristow	Absp.	4,000
Signal Gasoline Co., Inc., Bristow	Bristow	Absp.	4,000
Signal Gasoline Co., Inc., Bristow	Bristow	Comp.	2,000
Situran Oil Co., Avant	Sec. 17-23-12	Comp.	4,500
Sinclair Oil & Gas Co., Cleveland	Sec. 35-21-8e	Comp.	8,500
Sinclair Oil & Gas Co., Drumright	Sec. 28-18-7e	Comp.	14,500
Sinclair Oil & Gas Co., Shamrock	Sec. 28-17-7e	Comp.	2,000
Sinclair Oil & Gas Co., Haskell	Sec. 23-15-14e	Comp.	2,000
Sinclair Oil & Gas Co., Stonebluff	Sec. 5-16-15e	Comp.	500
Sinclair Oil & Gas Co., Covington	Sec. 19-22-3w	Absp.	60,000
Sinclair Oil & Gas Co., Hominy	Sec. 9-23-8e	Comp.	4,000
Sinclair Oil & Gas Co., Shidler	Sec. 29-27-6e	Absp.	40,000
Sinclair Oil & Gas Co., Cromwell	Sec. 4-10-8e	Absp.	25,000
Sinclair Oil & Gas Co., Seminole	Sec. 35-9-6	Absp.	80,000
Sinclair Oil & Gas Co., Seminole	Sec. 22-9-6	Comp.	10,000
Sinclair Oil & Gas Co., Seminole	Sec. 24-24-9	Comp.	7,000
Skelly Oil Co., Wynona	Sec. 15-15-10	Absp.	11,000
Skelly Oil Co., Slick	Sec. 15-14-8	Absp.	5,000
Skelly Oil Co., Bristow	Sec. 13-14-8	Absp.	3,200
Skelly Oil Co., Bristow	Sec. 4-15-9	Absp.	5,000
Skelly Oil Co., Maramac	Sec. 15-20-6	Char.	1,500
Skelly Oil Co., Davenport	Sec. 7-15-6	Absp.	7,250
Skelly Oil Co., Davenport	Sec. 2-14-5	Absp.	7,250
Skelly Oil Co., Davenport	Sec. 11-27-5	Absp.	28,500
Skelly Oil Co., Lyman	Lyman	A-C	500
Smith, T. K., Skiatook	Sec. 33-19-7	Comp.	3,000
Southland Gasoline Co., Oilton	Sec. 19-18-12	Comp.	1,500
Southland Gasoline Co., Sapulpa	1 mile north of Bristow	Absp.	2,000
Southwest Pipe Line Co., Bristow	Sec. 4-18n-7e	Comp.	15,840
Standard Oil Co. of Indiana	Sec. 21-17n-7e	Comp.	17,680
Standard Oil Co. of Indiana	Sec. 34-18n-7e	Comp.	20,064
Standard Oil Co. of Indiana	Sec. 4-16n-7e	Comp.	6,300
Standard Oil Co. of Indiana	Eram	Absp.	800
Star Gasoline Co., Sapulpa	Sec. 9-19-16	Absp.	500
Stebbins Oil & Gasoline Co., Inola	Sec. 17-14-16	Comp.	200
Stebbins Oil & Gasoline Co., Boynton	Sec. 17-14-16	Comp.	200
Sterling Oil & Gas Co., 418 Citizens National Bank Bldg., Abilene, Tex.	Sec. 1-21-11	Absp.	600
Test Gasoline Co., Bartlesville	Dewey	Comp.	3,000
The Texas Company, Drumright	Sec. 16-17n-7e	Comp.	9,510
The Texas Company, Kiefer	Sec. 8-17n-12e	Comp.	13,365
The Texas Company, Oilton	Sec. 1-14n-12e	Comp.	4,610
The Texas Company, Preston	Sec. 11-14n-12e	Comp.	2,363
The Texas Company, Haskell	Sec. 22-15n-14e	Comp.	3,153
The Texas Company, Haskell	Sec. 22-15n-11e	Absp.	4,620
The Texas Company, Beggs	Sec. 29-15n-14e	Comp.	1,950
The Texas Company, Beggs	Sec. 35-21n-8e	Comp.	1,875
The Texas Company, Osage	Sec. 2-14n-5e	Absp.	11,200
The Texas Company, Davenport	Sec. 2-18n-12e	Comp.	804
The Texas Company, Jenks	Sec. 4-24n-17c	Absp.	10,000
Tidal Chelsea Refining Co., Chelsea	Sec. 7-25n-17e	Absp.	3,000
Tidal Chelsea Refining Co., Chelsea	Sec. 8-17n-7e	Absp.	15,000
Tidal Refining Co., Drumright	Sec. 12-24n-12e	Comp.	3,000
Tidal Refining Co., Okelata	Sec. 14-17n-13e	Absp.	15,000
Tidal Refining Co., Glenn Pool	Sec. 7-22n-3w	Comp.	1,500
Tidal Refining Co., Garber	Sec. 36-12n-13e	Comp.	2,500
Tidal Refining Co., Bartlett	Sec. 24-20n-9e	Absp.	2,000
Tidal Refining Co., Keystone	Sec. 24-20n-9e	Absp.	2,000

Table 4. Refineries and Natural Gasoline Plants in Oklahoma, Cont'd.

COMPANY AND PLANT ADDRESS	FIELD LOCATION	TYPE OF PLANT	DAILY CAPACITY GALLONS
Tiger Mountain Oil Co., Youngstown	Sec. 36-14-11	Comp.	5,000
Tiger Mountain Oil Co., Bartlett	Sec. 35-12-13	Comp.	2,500
Transcontinental Oil Co., Box 2067, Tulsa	Sec. 1-25n-16e	Comp.	500
Transcontinental Oil Co., Box 2067, Tulsa	Sec. 22-13-14	Absp.	5,000
Transcontinental Oil Co., Box 2067, Tulsa	Sec. 28-15-14	Absp.	2,500
Transcontinental Oil Co., Box 2067, Tulsa	Sec. 21-25-16	Comp.	1,000
Transcontinental Oil Co., Box 2067, Tulsa	Sec. 11-13-14	Comp.	1,500
Transcontinental Oil Co., Box 2067, Tulsa	Sec. 27-16-9	Absp.	9,000
Triumph Gasoline Co., Morris	Sec. 1-14-15	Comp.	1,000
Twin State Oil Co., Quay	Sec. 12-14-14	Comp.	1,400
United States Zinc Co., Henryetta	Henryetta	Comp.	2,000
Valley Osage Oil Co., Sapulpa	Sec. 21-18-11	Absp.	2,000
Victor Gasoline Co., Box 272, Bristow	Bristow	Comp.	1,500
Victor Gasoline Co., Box 272, Bristow	Bristow	Comp.	2,000
Victor Gasoline Co., Box 152, Drumright	Drumright	Absp.	6,000
Victor Gasoline Co., Box 152, Davenport	Davenport	Comp.	4,000
Victor Gasoline Co., Box 7, Covington	Covington	Absp.	6,000
Victor Gasoline Co., Seminole	Seminole	Comp.	3,000
Warner-Caldwell Oil Co., Nowata	Sec. 36-26-14	Comp.	110,000
Warner-Caldwell Oil Co., Nowata	Sec. 7-26-16	Absp.	200
Warner-Caldwell Oil Co., Nowata	Sec. 1-25-16	Absp.	300
Warner-Caldwell Oil Co., Nowata	Sec. 17-26-17	Absp.	1,000
Warner-Caldwell Oil Co., Nowata	Sec. 19-26-16	Absp.	200
Watchorn Oil & Gas Co., Morrison	Sec. 33-23-3c	Absp.	*15,000
Wentz, L. H., Ponca City	Sec. 21-28n-1e	Comp.	5,000
Wentz, L. H., Ponca City	Sec. 34-25n-1w	Absp.	15,000
Wilcox Oil & Gas Co., Beggs	Sec. 30-15-11	Comp.	2,500
Wilcox Oil & Gas Co., Bristow	Sec. 32-15-8	Absp.	2,500
Wiser Oil Co., Bartlesville	Sec. 33-15-10	Absp.	3,500
Wiser Oil Co., Bartlesville	Sec. 31-25n-17c	Comp.	2,500
Wolverine Petroleum Corp., Avant	Sec. 27-27n-13c	Comp.	1,000
Wolverine Petroleum Corp., Comyn	Sec. 12-23n-11c	Comp.	3,000
Wolverine Petroleum Corp., Bartlesville	Sec. 32-28n-13c	Comp.	600
Wolverine Petroleum Corp., Bartlesville	Sec. 26-26n-13c	Comp.	1,000
Wolverine Petroleum Corp., Wilson	Sec. 13-26n-12e	Comp.	2,000
Wolverine Petroleum Corp., Avant	Sec. 21-45-2w	Absp.	1,000
Worley & Jones, Okmulgee	Sec. 24-24n-11c	Comp.	6,500
Wright, J. H., Sapulpa	Okmulgee	Absp.	500
Wright, J. H., Sapulpa	Sec. 24-17n-10e	Absp.	4,000

DIGEST OF OKLAHOMA OIL AND GAS FIELDS

Compiled
By
Bess Mills-Bullard

ACKNOWLEDGMENTS

The writer is under great obligation to many individuals for the data which are included herein. This publication represents a compilation of material which has been collected since petroleum development began in Oklahoma. The material was scattered and in many forms, but in all cases where calls have been made for information it has been given freely.

The preparation of this material was started under the direction of C. W. Shannon in 1921. Chas. N. Gould has been helpful in making suggestions for writing, and in giving a title to the paper. Luther H. White checked over the various producing horizons and the correlation chart of producing sands of the northeastern part of the State. Charles E. Bowles suggested the form of the publication, following the Index to the Stratigraphy of Oklahoma, by Gould. Isaac Jay of the Gypsy Oil Company added to the data on gravity of the various oil horizons. J. Phillip Boyle submitted the information found for the fields of Wagoner County. The Osage Indian Agency at Pawhuska added to the geological information of the Osage County pools and supplied much other data concerning the fields. Special acknowledgment is due W. M. Crawford for this material. The United States Geological Survey production map of Oklahoma was used as a check on the areas, as was also a map furnished by George F. Kelly of the Kelly Map Company, Tulsa, Oklahoma.

The entire report was submitted in galley form to the following persons for correction:—Dollie Radler and Sidney Powers, Amerada Petroleum Corporation; Everett Carpenter, consulting geologist; W. E. Bernard, Gypsy Oil Co.; Frank Gouin, consulting geologist; R. L. Clifton, Champlin Refining Co.; C. W. Tomlinson, Schermerhorn-Ardmore Co.; Glenn C. Clark, Marland Refining Co.; George F. Burton, Humble Oil and Refining Co.; Robert W. Clark, consulting geologist; Luther H. White, J. A. Hull Co.; and Frank C. Greene, Skelly Oil Co. These geologists and their associates have carefully gone over the material, so that the report, as issued, represents all the material available as of this date.

THE PRODUCTION MAP

The production map which accompanies this report is compiled on the base map of Oklahoma, published by the U. S. Geological Survey.

The fields are named and numbered on the map in the order of their occurrence in the report, with the corresponding numeral to be found on the map at the field's location.

Since the sources of information range from official publications to newspaper clippings and personal communications it is understood that variations in accuracy and consistency are inevitable. It is hoped that any changes in the facts recorded herein from local interpretations will not be regarded as errors, for all data have been checked by individuals who are qualified to know; and all information has been obtained from the most reliable sources that were available.

It has been judged advisable to print the complete tabulated form of description of each field in the text, even where all data are not known, so that additions may be inserted individually. Information on depths of producing horizons, amount of production, and so on, represents average conditions in the field.*

The surface elevation refers to elevations above sea level as given on the U. S. Geological Survey topographic sheets. The surface formations for each pool are taken from the U. S. Geological Survey, Geologic Map of Oklahoma, and the age of the surface formations are from the Index to the Stratigraphy of Oklahoma by Chas. N. Gould.

REFERENCES

In the matter of citations to the literature which were used no attempt has been made to present complete bibliographies. Attention is called to the reports of the United States Geological Survey, to the files of the United States Bureau of Mines, to the bulletins of the Oklahoma Geological Survey and the bulletins of the American Association of Petroleum Geologists. The oil trade journals were used constantly, as were the files of state newspapers and the well logs of the State Corporation Commission. A number of books were referred to, namely:—Oil and Gas in the Mid-Continent Fields by L. C. Snider; Geology of the Mid-Continent Oil Fields by T. O. Bosworth; Production of Petroleum in 1924, published by the American Institute of Mining and Metallurgical Engineers, and the Geology of the Stonewall Quadrangle, by George D. Morgan.

*In reference to the amount of gas from the various sands, "M" represents millions of cubic feet of gas.

ADA

COUNTY: Pontotoc.
LOCATION: T. 3-4 N., R. 6 E.
SURFACE ELEVATION: 1,150-1,250 feet.
SURFACE FORMATION: Ada formation, Frances formation, and Guertie sand.
AGE OF SURFACE ROCKS: Pennsylvanian.
STRUCTURE: Small dome, local folding, and faulting.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Vamoosa	500			
Belle City	530			
Francis	875		gas	
Seminole	930			
Holdenville	1000		gas	
Thurman	1300			
Boggy	1500		gas	2.5 M. cu. ft.
Wapanucka	1900			
Caney	2050			
Sycamore	2075			
Chattanooga	2100			
Hunton	2300	95	oil	20 bbls.
Sylvan	2370			
Viola	2450	500		
Simpson	2950	5	Show of oil	

CHARACTER OF OIL: Gravity, 30-32°B. Color, green.

CHARACTER OF GAS: Wet.

DATE OF OPENING: 1909?

REMARKS: The initial well in the Ada gas field was drilled by Mac Thwaite Oil and Gas Company in sec. 31, T. 4 N., R. 6 E. This well produced two million cubic of gas from a 50 foot sand at a depth of 1,000 feet. In most of the first wells drilled there were two gas sands, one at 900 feet and the other at 1,000 feet. Deeper drilling has revealed sands productive of both oil and gas.

ADAIR

COUNTY: Nowata.
LOCATION: T. 26 N., R. 15 E.
SURFACE ELEVATION: 750-850 feet.
SURFACE FORMATION: Coffeyville formation.
AGE OF SURFACE ROCKS: Pennsylvanian.
STRUCTURE: Normal monocline with reverse dips.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Fort Scott	625			
Bartlesville	1025	30-50	oil show gas	5-150 bbls.

CHARACTER OF OIL: Gravity, 38°B.

CHARACTER OF GAS:

DATE OF OPENING: 1911.

REMARKS: This field lies about six miles west of the town of Nowata. While it is in the Nowata District it is more closely related geologically to the Hogshooter field of the Bartlesville District than to the shallow pools east and north of Nowata. Most of the wells have been small producers averaging about 20 barrels a day initial yield, and the development of the field was very rapid.

AGRA
(Wildhorse)

COUNTY: Lincoln.

LOCATION: T. 16-17 N., R. 5 E.

SURFACE ELEVATION: 980-1,069 feet.

SURFACE FORMATION: Cushing limestone.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Terrace with subsurface domes. Faulted on east.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton	1830	30	oil gas show	1-2 M. cu. ft.
Jones	1920	15	show of gas	
Cleveland	2060	20	gas	10-21 M. cu. ft.
Skinner	3550	3600	oil	
Bartlesville	3650	3700	oil	
Mississippi	3768	10		
Chattanooga	3965	100	show of oil	
Misener	3995	30		
Wilcox	4100	45	oil	5-10 M. cu. ft. 1200 bbls.
Viola	4260		oil	30 bbls.

CHARACTER OF OIL: Gravity

CHARACTER OF GAS: Rock pressure 220 to 660 pounds.

DATE OF OPENING: 1919.

REMARKS: The Agra pool was discovered by the Cosden Oil and Gas Company with a well drilled in sec. 31, T. 17 N., R. 5 E., completed April, 1919, to a depth of 2,081 feet for 21 million cubic feet of gas per day. The Wilcox sand was opened by Shaffer and Peerless in 1927.

ALABAMA

COUNTY: Hughes.

LOCATION: T. 9 N., R. 11 E.

SURFACE ELEVATION: 820-900 feet.

SURFACE FORMATION: Calvin sandstone.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Terraces and noses.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Glenn	1725	55	gas	3-11 M. cu. ft.
Booeh	2170	130		
Deaner	2910	400	oil	20-200 bbls.
Lyons	3130	130	oil	3-50 bbls.

CHARACTER OF OIL: Gravity, 36.7° B.

CHARACTER OF GAS:

DATE OF OPENING: 1917.

REMARKS: Gillispie and others are reported to have drilled the first well in the sec. 3, T. 9 N., R. 11 E. It was a gas well of 10 million cubic feet per day at 725 feet. Deeper drilling in this area started in 1925; the oil production was doubled and the gravity of the deeper oil is found to be 39° B.

ALLEN

COUNTY: Pontotoc.

LOCATION: T. 5 N., R. 8 E.

SURFACE ELEVATION: 750-850 feet.

SURFACE FORMATION: Wewoka formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticlinal folding, subsurface faulting.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Uncorrelated	350	4-10	gas	1-4 M. cu. ft.
Boggy	700	20	gas	1 M. cu. ft.
	720	45	oil	10-100 bbls.
	825	50	oil gas	45-200 bbls.
	1180	5	gas	1 M. cu. ft.
Top. Savanna	1400			1-6 M. cu. ft.
Savanna	2450	10	oil	10-40 bbls.
Wapanucka	2900	50	oil gas	10-400 bbls. 1 M. cu. ft.

CHARACTER OF OIL: Gravity, 30-32.9° B.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1913.

REMARKS: The Allen oil and gas field was discovered during the latter part of 1913, and while production was not large it was encouraging. All production was found at depths ranging between 300 to 800 feet but in the year 1926 deeper drilling started with larger quantities of both oil and gas being found at depths ranging between 2,400 to 2,500 feet, at a distance of one to two miles northwest of the original field.

ALLUWE

COUNTY: Nowata.
 LOCATION: T. 24-25 N., R. 16-17 E.
 SURFACE ELEVATION: 650-750 feet.
 SURFACE FORMATION: Cherokee shale.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Anticline, pitching northward.

PRODUCING				INITIAL
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
Bartlesville	400-450		oil	25-500 bbls.
Burgess	465-800		oil gas	

CHARACTER OF OIL: Gravity, 36.4° B. Color, greenish black.
 Quality, 8% paraffin, 1% asphalt.

CHARACTER OF GAS:
 DATE OF OPENING: 1904.

REMARKS: The Alluwe field was discovered among the first of the Oklahoma pools. It is a part of a large field, Coody's Bluff-Alluwe-Chelsea District, which was one of the most active areas in the State in 1905-1906 when a total of 1,490 wells were drilled, all producing oil.

AMABEL

See March, page 191

ASPHALTUM

COUNTY: Jefferson.
 LOCATION: T. 3 S., R. 4 W.
 SURFACE ELEVATION: 900-1,000 feet.
 SURFACE FORMATION: Wichita-Clear Fork formation.
 AGE OF SURFACE ROCKS: Permian.
 STRUCTURE: Buried structure and fault zone.

PRODUCING				INITIAL
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
750 gas sand	750	10	gas	1-3 M. cu. ft.
Gas sand	1550		gas	

CHARACTER OF OIL: Gravity, 20° B. Quality, asphaltic.

CHARACTER OF GAS:

DATE OF OPENING: 1913.

REMARKS: The territory between the Healdton field and the asphalt deposits in sec. 32, T. 3 S., R. 4 W., suggested favorable prospects to operators, and development started in the area at the time Healdton was opened. There are two gas wells in the field.

ALMEDA

COUNTY: Osage.
 LOCATION: T. 26 N., R. 11-12 E.

SURFACE ELEVATION: 700-900 feet.
 SURFACE FORMATION: Ochelata-Dewey limestones.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Folding; Panther Creek anticline.

PRODUCING				INITIAL
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
Big Lime	680	30		
Peru	860	60		
Oswego	888	20		
Squirrel	1030	50		
Bartlesville	1320	10	oil gas	10-50 bbls.
Burgess	1665	5	oil	1-2 M. cu. ft.
Mississippi	1740	10	gas	10-20 bbls.
				1-2 M. cu. ft.

CHARACTER OF OIL: Gravity -----.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1918.

REMARKS: The Panther Creek anticline is an elongated upfold with northward-trending axis which roughly parallels the township line. This uplift was tested for production in 1918 and is now yielding good quantities of both oil and gas. The crowns of the two northern domes of the anticline have been almost completely drilled. The oil production comes from the Bartlesville sand and the gas from the Mississippi limestone.

ATLANTIC

COUNTY: Osage.
 LOCATION: T. 25 N., R. 8 E.
 SURFACE ELEVATION: 900-1,050 feet.
 SURFACE FORMATION: Pawhuska formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Anticlinal folding and domes.

PRODUCING				INITIAL
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
Layton	1125	10	oil show	
Peru	1955	15		
Oswego	2070	65		
Squirrel	2236	20	gas show	
Burgess	2500	25	oil	125-300 bbls.
Wileox	2690	20-30	oil show	
Siliceous	2750	10-20		3000 bbls.

CHARACTER OF OIL: Gravity, 41° B.

CHARACTER OF GAS:

DATE OF OPENING: 1924.

REMARKS: Seven miles west of Pawhuska the Atlantic Oil Producing Company drilled the discovery well of the Atlantic pool, in sec. 27, T.

25, N., R. 8 E., early in 1924; this well caused the drilling of other good producers.

AVANT

COUNTY: Osage.
 LOCATION: T. 23 N., R. 11-12 E.
 SURFACE ELEVATION: 700-950 feet.
 SURFACE FORMATION: Ochelata formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Anticinal folds, and dome.

PRODUCING HORIZONS		DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Bartlesville	1400-1450			oil gas	75 bbls. 1-12 M. cu. ft.
Burgess	1465-1600			oil	25-50 bbls.

CHARACTER OF OIL: Gravity.

CHARACTER OF GAS:

DATE OF OPENING: 1904-1905.

REMARKS: The Avant pool is practically the southern extension of the Bartlesville field and occupies a long narrow strip of territory along the eastern border of Osage County.

BAIRD

COUNTY: Cotton-Stephens.
 LOCATION: T. 1 S., R. 9 W.
 SURFACE ELEVATION: 1,068 feet.
 SURFACE FORMATION: Wichita-Clear Fork formation.
 AGE OF SURFACE ROCKS: Permian.
 STRUCTURE: Buried structure.

PRODUCING HORIZONS		DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Surber	1700			gas	1-4 M. cu. ft.
Smith	2100		65	oil	25-200 bbls.
Blaydes	2200		42	oil gas	5-150 bbls. 1-5 M. cu. ft.

CHARACTER OF OIL: Gravity, 32° B.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1919.

REMARKS: The development of the Baird field followed that of the Walters pool. The surface rocks belong to the Permian red beds but the oil and gas is probably Pennsylvanian possibly from the Glenn formation.

BALD HILL
Mose-Carr
Jolly-Ogg
Pine Pool
Booch

COUNTY: Okmulgee.
 LOCATION: T. 14-15 N., R. 13-14-15 E.
 SURFACE ELEVATION: 650-750 feet.
 SURFACE FORMATION: Foggy shale to Wewoka formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Terraces and local folds. Subsurface anticlines.

PRODUCING HORIZONS		DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Salt Sand	750		150	oil	25-50 bbls.
Booch	1200		40	oil	10-1500 bbls.
Red Fork	1300		25	oil	10-200 bbls.
Morr's	1575		25	oil	20-300 bbls.
Glenn of Morris	1700		40	oil	10-150 bbls.
Fields	1850		60	oil	20-50 bbls.
Lyons-Quinn	1950		20	oil	
Wileox	2250		50	oil	100-500 bbls.
Turkey Mt'n.	2400				

CHARACTER OF OIL: Gravity, 42° B. Color, dark green.

CHARACTER OF GAS:

DATE OF OPENING: 1907-1908.

REMARKS: In the spring of 1908, Joe Burns and Lou Caton completed a well near the center of the NE. ¼ sec. 6, T. 14 N., R. 14 E. The sand was 1,661 feet deep and the well came in for 400 barrels. This is the first well in the Bald Hill area and started the development there. In the same year Bob Galbraith came down directly from Glenn Pool and drilled a good well in sec. 22, T. 15 N., R. 14 E. He found the sand around 1,700 feet in depth, being about the depth of the pay in the Glenn Pool. He called it the "Glenn" sand. That name stuck but the correlation was not correct as this is a member of the Dutcher group, while the real Glenn sand is the Salt sand.

BARNES

COUNTY: Garfield.
 LOCATION: T. 23 N., R. 3 W.
 SURFACE ELEVATION: 1,000-1,100 feet.
 SURFACE FORMATION: Enid formation (Garber).
 AGE OF SURFACE ROCKS: Permian.
 STRUCTURE: Anticlinal nose.

PRODUCING HORIZONS		DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Barnes	2000		50	oil gas	100 bbls.
Tonkawa	3300				
Layton	3900				

CHARACTER OF OIL: Gravity, 39.5° B.

CHARACTER OF GAS:

DATE OF OPENING: 1918.

REMARKS: The Oil State Petroleum Company brought in the discovery well of the Barnes pool with an initial production of 100 barrels, from 2,029-2,037 feet, in sec. 15 T. 23 N., R. 3 W., on the Barnes farm.

BARNSDALL

COUNTY: Osage.

LOCATION: T. 24 N., R. 11-12 E.

SURFACE ELEVATION: 700-800 feet.

SURFACE FORMATION: Nelagoney formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Minnehoma dome, Bigheart anticline, terraces and noses, Manhattan dome, 11-12 anticline, Gypsy dome.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Big Lime	900-1000	80	show of gas	
Peru	1100		oil	8-50 bbls.
Oswego	1150-1300	75	gas	1 M. cu. ft.
Squirrel	thin		show of gas	
Bartlesville	1550-1725	75	oil gas	100-300 bbls. 1-3 M. cu. ft.
Burgess	1900	30	gas	5-10 M. cu. ft.
Mississippi	1950-2100		gas	
Siliceous	2300			

CHARACTER OF OIL: Gravity, 35.5° B.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1916.

REMARKS: The Barnsdall pool was once called Big Heart, being located near a town by that name. The Barnsdall Oil Company came into the area built a refinery, and practically bought out the town of Big Heart, giving the place the Company name.

BARTLETT

COUNTY: Okmulgee and McIntosh.

LOCATION: Cor. T. 11-12 N., R. 13-14 E.

SURFACE ELEVATION: 700-800 feet.

SURFACE FORMATION: Stuart shale and Thurman sandstone.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticlinal folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Glenn	1250	150	gas	
Booch	1550	60	oil gas	12-15 M. cu. ft.

(Table continued on next page)

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
1st Dutcher	1750	25	oil gas	10-200 bbls.
2nd Dutcher	1950	60	oil gas	20-100 bbls. 1-4 M. cu. ft.
Lyons-Quinn Wileox	2898	15	oil	15-100 bbls.

CHARACTER OF OIL: Gravity, 31-42° B.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1916.

REMARKS: Encouraging results were obtained in this area as early as 1916 when the Gundich Oil Company brought in a 400 barrel well in sec. 6, T. 11 N., R. 14 E.

BARTLESVILLE

See Dewey, page 145

BAYOU

COUNTY: Carter.

LOCATION: T. 5 S., R. 2 W.

SURFACE ELEVATION: 775-875 feet.

SURFACE FORMATION: Wichita-Clear Fork (Cisco?) formation.

AGE OF SURFACE ROCKS: Permian or late Pennsylvanian.

STRUCTURE: Anticlinal fold.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
	2200-3900		oil	50-600

CHARACTER OF OIL: Gravity, 34-35° B. Color, black.

CHARACTER OF GAS:

DATE OF OPENING: 1921.

REMARKS: The Bayou field was opened in 1921 following the discovery of oil in the Hewitt area and the general extension of southern oil fields.

BEARDEN

COUNTY: Okfuskee.

LOCATION: T. 10 N., R. 9 E.

SURFACE ELEVATION: 750-900 feet.

SURFACE FORMATION: Francis formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Surface anticlinal folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Glenn	1875			
Booch	2850		gas	5-35 M. cu. ft.
Gilcrease	3025		gas	2-15 M. cu. ft.
Papoose	3230	70	gas	15-70 M. cu. ft.

CHARACTER OF OIL: Gravity
 CHARACTER OF GAS: Dry; rock pressure 1,250 lbs.
 DATE OF OPENING: 1924.
 REMARKS: The Bearden pool is essentially a gas field, although recent deep drilling has made some shows of oil.

BEEBE

COUNTY: Pontotoc.
 LOCATION: T. 5 N., R. 5 E.
 SURFACE ELEVATION: 950-1,050 feet.
 SURFACE FORMATION: Pontotoc group.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Beebe anticline.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Boggy	1600	150	oil	10-25 bbls.
Caney	1800			
Hunton	2300	107	oil	100-125 bbls.
Viola			oil	

CHARACTER OF OIL: Gravity 32°-40° B.
 CHARACTER OF GAS:
 DATE OF OPENING: 1923.

REMARKS: North of Beebe is an anticline which opens toward the northwest; the maximum structural relief amounts to 25 feet and in no place does the structure close toward the north. It is on the north-eastern flank of the much larger Center anticline.

Wells drilled near the crest of the fold in the area north of Beebe encountered oil horizons in what is thought to be the Boggy shale. The Hunton limestone found in this area at 2,300 feet was identified by fossils secured when the well was shot.

BEGGS
Riverland
South Beggs

COUNTY: Okmulgee.
 LOCATION: T. 14-15 N., R. 11-12 E.
 SURFACE ELEVATION: 650-950 feet.
 SURFACE FORMATION: Coffeyville formation, Holdenville shale, We-woka formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Terraces and noses with much crossbedding. Subsurface domes.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Salt sand	1170	10	gas	1-6 M. cu. ft.
Glenn	1550	100-120		
Tancha	1700	50	oil gas	150-2000 bbls.
Dutcher	2090	90	oil gas	10-30 M. cu. ft.
Mississippi	2150			100-300 bbls.
Wilcox	2550	250		1-3 M. cu. ft.
				100-1000 bbls.

CHARACTER OF OIL: Gravity, 35-36.9° B. Wilcox oil, 42° B.
 CHARACTER OF GAS: Dry.
 DATE OF OPENING: 1910-1911, for shallow sand; 1919-1920 for Wilcox sand.

REMARKS: Active development commenced in the Beggs area after the discovery of the Preston pool in 1909. In 1910 and 1911 about 44 wells were drilled, some producing 1,000 barrels a day. The field rapidly declined until 1919 when Youngstown came in and revived the development of the region.

The Wilcox sand was first extensively developed in the Beggs pool proper.

BELAND

COUNTY: Muskogee.
 LOCATION: T. 14 N., R. 17 E.
 SURFACE ELEVATION: 500-800 feet.
 SURFACE FORMATION: Winslow formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Subsurface folds and terraces.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Booch	750	20	gas	1-5 M. cu. ft.
Muskogee	1270	25	oil	8-10 bbls.
1st Dutcher	1650	50	oil	25 bbls.
2nd Dutcher	1700	75	oil	25-50 bbls.
Mississippi	2100			
Wilcox	2250	20	gas	1-3 M. cu. ft.
Siliceous	2700			

CHARACTER OF OIL: Gravity, 35-36.9° B.
 CHARACTER OF GAS:
 DATE OF OPENING: 1906.

REMARKS: As early as 1894 development was begun in the Muskogee townsite by the Cudahy Oil Company. About 1906 extensions southwestward were started and drilling was continuous despite the spottedness of production. Practically one-third of all the wells were gas producers.

BILBO

COUNTY: Marshall.
 LOCATION: T. 5 S. R., 5 E.
 SURFACE ELEVATION: 650-700 feet.
 SURFACE FORMATION: Washita group.
 AGE OF SURFACE ROCKS: Cretaceous.
 STRUCTURE: Madill anticline.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Trinity sand	420-650	10-100	oil	30-200 bbls.

CHARACTER OF OIL: Gravity, 47.5° B. Gasoline content 25-30%.

CHARACTER OF GAS:

DATE OF OPENING: 1925.

REMARKS: George W. Bilbo and associates, after five years search, opened the Bilbo field as a shallow pool in November 1925, with a well averaging 298 barrels daily from sand at 571 feet in depth.

BILLINGS

North Billings
 East Billings

COUNTY: Noble.

LOCATION: T. 23-24 N., R. 1-2 W.
 SURFACE ELEVATION: 950-1,000 feet.
 SURFACE FORMATION: Enid formation (Garber).
 AGE OF SURFACE ROCKS: Permian.
 STRUCTURE: Billings anticline. Large well defined subsurface dome.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
550 foot sand	550-570	20	gas	2 M. cu. ft.
700 foot sand	700-780	80	gas	2 M. cu. ft.
900 foot sand	900-920	20	gas	5 M. cu. ft.
1000 ft. sand	1100-1200		gas	10 M. cu. ft.
1300 ft. sand	1300-1340		gas	1-6 M. cu. ft.
Hoover	2000-2225		oil gas	500 bbls. 21 M. cu. ft.
Tonkawa	2620-2800		oil	50-100 bbls.
Layton	3350-3450			
Oswego	3700-3800			
Burgess	4048-4100			

CHARACTER OF OIL: Gravity, 39.5-43° B.

CHARACTER OF GAS: Wet.

DATE OF OPENING: 1917.

REMARKS: In February, 1917, the Mid-Co Petroleum Company completed the discovery well of the Billings pool in sec. 22, T. 23 N., R. 2 W. This well was located on a wildcat structure which geologists of the Company had mapped, and was 15 miles from the nearest pro-

duction. The production was 250 barrels of oil per day from sand at a depth of 2,121 to 2,136 feet. In June 1919, the initial well was deepened to 2,334-2,351 feet, at which depth it produced 150 barrels of oil per day but a little water appeared at the bottom of the sand.

The Billings pool proper covers a small area, about one section square, the adjoining extensions of North and East Billings increase the length of the pool about four miles.

BILLINGSLEA

COUNTY: Creek.
 LOCATION: T. 14 N., R. 8 E.
 SURFACE ELEVATION: 765 feet.
 SURFACE FORMATION: Ochelata formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Terrace.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Wheeler	2250			
Prue	2390	50	oil	250 bbls.
Bartlesville	3310	100	oil	25-110 bbls.
Dutcher	3500			
Wilcox	3785	155	oil	100-200 bbls.

CHARACTER OF OIL: Gravity, 32° B.

CHARACTER OF GAS:

DATE OF OPENING: 1925.

REMARKS:

BIRD CREEK—FLAT ROCK

COUNTY: Tulsa-Osage.
 LOCATION: T. 20-21 N., R. 12-13 E.
 SURFACE ELEVATION: 850-950 feet.
 SURFACE FORMATION: Coffeyville formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Anticlinal noses and terraces.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Oswego	790	55	oil gas	
Bartlesville	1110	95	oil gas	20-400 bbls.
Burgess	1345	20	oil gas	5 M. cu. ft. 10-100 bbls.
Wilcox	1667	100		1-3 M. cu. ft.

CHARACTER OF OIL: Gravity, 30-32.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1906.

REMARKS: The Bird Creek-Flat Rock pool was one of the early developments in the State. Considerably over 1,000 wells were drilled and many of them came in at several hundred barrels a day. There is a narrow gas belt bordering the northeastern edge of the oil producing area of the pool from which good gas wells were obtainable.

BIXBY

COUNTY: Tulsa.
 LOCATION: T. 16-17 N., R. 13 E.
 SURFACE ELEVATION: 700-900 feet.
 SURFACE FORMATION: Wewoka formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Folding with local variations.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Glenn	995	50	oil	200-400 bbls.
Tanchea	1192	25	oil	100-150 bbls.
Futcher	1700	70	oil	1-5 M. cu. ft.
Mississippi	1850	25	gas	50-150 bbls.
Wileox	2110	40	oil	
Turkey Mt.	2260			

CHARACTER OF OIL: Gravity, 35-36.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1916.

REMARKS: A small but highly productive field is situated about 4 miles southwest of Bixby; many of the wells have come in at 400-800 barrels a day.

BLACKWELL

COUNTY: Kay.
 LOCATION: T. 27-28 N., R. 1 W. and 1 E.
 SURFACE ELEVATION: 1,005 feet.
 SURFACE FORMATION: Pennsylvanian and Permian formations.
 AGE OF SURFACE ROCKS: Pennsylvanian and Permian.
 STRUCTURE: Blackwell anticline.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
1st gas sand	225	20	gas	2-5 M. cu. ft.
Blackwell	750	20	gas	5-10 M. cu. ft.
Newkirk	1450	30	gas	1-5 M. cu. ft.
Ponea	1600	10	oil	100-400 bb
Lower Hoover	1750	15	oil	100-1350 bb
Endicott (?)	1900	20	oil	20-1200 bt
Revard (?)	1950	13		
Tonkawa	2200-2300	32-23	gas	5-20 M. cu.
Layton	2600	75	gas	5-20 M. cu.

(Table continued on next page)

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Big Lime	3100		gas	100-200 M. cu. ft.
Wileox	3300	100	oil gas	3-45 M. cu. ft.
Siliceous	3400		oil	50-500 bbls. oil 100-1000 bbls.

CHARACTER OF OIL: Gravity, 39°-40.9°-42.7° B.

CHARACTER OF GAS:

DATE OF OPENING: 1914.

REMARKS: The first wells of the Blackwell field were drilled by local parties. In 1912 the north end of the area was developed by E. W. Marland, with 21 gas wells, but real activity started in 1914 when an oil well and a number of good gas wells were drilled.

The first oil well was drilled by B. B. Jones in sec. 32, T. 29 N., R. 1 E. It made 600 barrels of oil from sand at 3,365 to 3,367 feet. This well is making about 2½ barrels today.

BOOCH

See Bald Hill, page 109

BOOCH SAND FIELD

COUNTY: Muskogee.
 LOCATION: Sec. 31, T. 15 N., R. 15 E.
 SURFACE ELEVATION: 675 feet.
 SURFACE FORMATION: Stuart shale.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Local folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Booch	1075		oil	

CHARACTER OF OIL: Gravity,-----

CHARACTER OF GAS:

DATE OF OPENING:

REMARKS: Present (1928) production 6 barrels per day.

BOSTON

COUNTY: Osage.
 LOCATION: T. 21-22 N., R. 7-8 E.
 SURFACE ELEVATION: 700-900 feet.
 SURFACE FORMATION: Buck Creek formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Surface anticline and subsurface folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Elgin	1450		gas	1 M. cu. ft.
Layton	1500		oil	
Cleveland	1790		oil gas	50-250 bbls. 1 M. cu. ft.

Oswego 1990

(Table continued on next page)

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Prue	2165		gas	1-10 M. cu. ft.
Skinner	2250		gas	1-3 M. cu. ft.
Bartlesville	2325	30	oil	20-3000 bbls.
Burgess	2400			
Mississippi	2580	10	gas	
Wilcox				
Tyner (Hominy)				
Siliceous	2620	60	oil	100-6000 bbls.

CHARACTER OF OIL: Gravity, 31.5° B.

CHARACTER OF GAS:

DATE OF OPENING: 1904.

REMARKS: The Boston Pool is a small but very productive area situated on the Arkansas River in Osage County and is really a north-west extension of the Cleveland pool. The productive area was leased and developed mainly by the Gypsy Oil Company.

The Siliceous lime is the main producing horizon of this field.

BOWLEGS

COUNTY: Seminole.

LOCATION: T. 8 N., R. 6 E.

SURFACE ELEVATION: 950-960 feet.

SURFACE FORMATION: Pontotoc group.

AGE OF SURFACE ROCKS: Permian and Pennsylvanian.

STRUCTURE: Subsurface highs.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Hunton	3835	10	oil	100-2500 bbls.
Sylvan	3845	40		
Viola	3925	75		
Wilcox	4046	30	oil	500-7000 bbls.
Siliceous	4200 (?)			

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1927.

REMARKS: The Indian Territory Illuminating Oil Company brought in the discovery well of the Bowlegs pool, January, 1927, on the Livingston lease in sec. 15, T. 8 N; R. 6 E. This was a Wilcox sand producer and started at 504 barrels a day at a depth of 4,070 feet.

The Lizzie Bowlegs lease in T. 8 N., R. 6 E., was developed, immediately after the discovery of the pool by a number of companies, and from it came the name of the pool.

BOWRING

COUNTY: Osage.

LOCATION: T. 28 N., R. 11 E.

SURFACE ELEVATION: 850-1,000 feet.

SURFACE FORMATION: Nelagoney formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticlinal folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton	665	60	gas	
Peru	1150	30		
Oswego	1425	85		
Mississippi	1866	30	gas	1-4 M. cu. ft.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS: Dry. Rock pressure 720 pounds.

DATE OF OPENING: 1921.

REMARKS: The Owen Osage Oil and Gas Company is the chief developer of the Bowring pool.

BOYLE

COUNTY: Muskogee.

LOCATION: Sec. 8, T. 15 N., R. 15 E.

SURFACE ELEVATION: 650 feet.

SURFACE FORMATION: Stuart shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE:

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Dutcher	1617		oil	165 bbls.

CHARACTER OF OIL: Gravity,-----

CHARACTER OF GAS:

DATE OF OPENING: October, 1927.

REMARKS:

BOYNTON

COUNTY: Muskogee.

LOCATION: T. 14 N., R. 15-16 E.

SURFACE ELEVATION: 550-700 feet.

SURFACE FORMATION: Boggy shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Boynton dome, anticlinal folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Salt sand	625		oil gas	15-75 bbls.
Booch	1000		oil	1-5 M. cu. ft.
Mounds	1100		gas	10-150 bbls.
Leidecker	1400		oil	1-5 M. cu. ft.
				1-10 bbls.

(Table continued on next page)

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Boynton	1500		oil gas	50-200 bbls. 1-7 M. cu. ft.
Mississippi	1800		oil gas	10 bbls. 1-10 M. cu. ft.

Wilcox

CHARACTER OF OIL: Gravity, 37-38.9° B. Color, green.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1914.

REMARKS: The Boynton pool created a great deal of excitement early in 1914, although the first producers were small averaging only 12 to 150 barrels per day. H. H. Galbreath completed the first well for 5 to 10 million cubic feet of gas at 1,800 feet.

BRADLEY

See Jolly-Patton, page 177

BRAMAN

North Braman
South Braman

COUNTY: Kay.

LOCATION: T. 28-29 N., R. 1 W.

SURFACE ELEVATION: 1,050-1,150 feet.

SURFACE FORMATION: Wellington shale.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Core drilled anticlines.

North Braman, flat-topped hill with west dips.

South Braman, sharp fold, probably faulted to west.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Hoover	1900	95	oil	100-1800 bbls.
U. Endicott (?)	2100		oil	175-500 bbls.
Tonkawa	2387	15	oil	
Layton	2800	45	oil	100-5000 bbls
Wilcox	3300	100	oil	200-2500 bbls.
Siliceous				

CHARACTER OF OIL: Gravity, 40.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1924.

REMARKS: In June, 1924 the Comar Oil Company completed a well of considerable promise in sec. 21, T. 28 N., R. 1 W., which had an initial production of 1,770 barrels of oil per day in sand at a depth of 2,071 feet.

The initial production of the wells of the Braman pool is from 1,000 to 2,000 barrels per day which decline to the average production of 175 to 500 barrels. There is some Wilcox production in both the North and South Braman pools.

BRINTON Brookins

COUNTY: Okmulgee.

LOCATION: Secs. 9 and 16, T. 13 N., R. 12 E.

SURFACE ELEVATION: 700-850 feet.

SURFACE FORMATION: Wewoka formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Local folds, subsurface dome.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Booch	1700	20	oil gas	30 M. cu. ft. 35-60 bbls.
Glenn	2100	65	oil gas	20-300 bbls. 1-18 M. cu. ft.
Upper Dutcher	1960		water	
Lower Dutcher	2025		oil	50 bbls.
Lyons-Qinn	2150		oil	20-100 bbls.
Wilcox	2700	20	oil	25-300 bbls.

CHARACTER OF OIL: Gravity, 31-42° B.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1915.

REMARKS: Development started in this area about 1910, but no production was discovered until after the Tiger Flats area developed in 1913 and 1914. The Wilcox sand was discovered in 1918.

BRISTOW

COUNTY: Creek.

LOCATION: T. 16 N., R. 9 E.

SURFACE ELEVATION: 800-900 feet, B. M. at Bristow S17.

SURFACE FORMATION: Ochelata formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURES: Surface faults (normal *en echelon*). Pay zone dips westward.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton (?)	1200			
Ft. Scott (?)	1275	20	gas	1-1 M. cu. ft.
Oswego	1500	40		
Red Fork (?)	2000			
Bartlesville	2500	35	gas	2-18 M. cu. ft.
Dutcher	2700	55	oil gas	50-900 bbls. 6 M. cu. ft.
Mississippi	2800	20	oil gas	20-150 bbls. 1-10 M. cu. ft.
Wilcox	3200		oil	100-1000 bbls.

CHARACTER OF OIL: Gravity, 34-35.9—40-41° B.

CHARACTER OF GAS:

DATE OF OPENING: 1916.

REMARKS: J. J. Curl, of Bartlesville, drilled the first hole of the Bristow District in 1905, sec. 29, T. 16 N., R. 9 E., the present site of the refinery. The hole was plugged and abandoned at 1,000 feet. The first well to discover gas was drilled in 1906 by Mattson, Barnes and Freeland to a depth of 1,395 feet. This gas was turned into the Bristow town supply and was used during cotton-ginning season.

In the summer of 1907, Frank Barnes and Claude Freeland started a well in sec. 2, T. 15 N., R. 9 E., and in December of that year a flow of one million cubic feet of gas at 1,000 pounds rock pressure was encountered in a 15-foot sand at a depth of 2,485 feet. This gas was used by the town of Bristow and was the first successful well of the Bristow Quadrangle.

BROCK Crinerville

COUNTY: Carter.

LOCATION: T. 5 S., R. 1 E.

SURFACE ELEVATION: 750-900 feet.

SURFACE FORMATION: Glenn formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Three terraces on a monocline.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Glenn fm.	800-2100			30-600 bbls.
Ordovician	1100-2200		oil-gas	3-30 M. cu. ft.

CHARACTER OF OIL: Green; gravity, 27-39° B.

CHARACTER OF GAS: 1½-2½ gal. casinghead gasoline per 1,000 cu. ft.; rock pressure averages 500 lbs. per sq. in.

DATE OF OPENING: 1922.

REMARKS: The Brock pool was discovered by the Amerada Petroleum Corporation, Jan., 1922. The field, 5½ years after discovery, had 139 oil wells (7 abandoned), 3 gas wells (2 abandoned), and 46 dry holes. The depth of production ranges from 845 to 2,200 feet. The wells had an average initial production of about 50 barrels and an average settled production of 15 barrels. The oil originated in the Pennsylvanian shales and migrated laterally.

BROKEN ARROW

COUNTY: Tulsa.

LOCATION: T. 18 N., R. 14 E.

SURFACE ELEVATION: 700-800 feet.

SURFACE FORMATION: Labette shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Local anticlinal folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Bartlesville	1350	20	oil gas	50-200 bbls. 2-4 M. cu. ft.
Tucker	1430	5	gas	1-7 M. cu. ft.
Dutcher	1500	15	oil gas	10-60 bbls. 1 M. cu. ft.
Burgess	2080	5		
Chattanooga	2545	67	gas	1-4 M. cu. ft.
Misener	2623	28		
Turkey Mt.	2755	40		

CHARACTER OF OIL: Gravity, 33-34.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1901.

REMARKS: This pool is a long narrow strip east and south of Broken Arrow. Development followed the discovery of the Red Fork area.

BROOKINS See Brinton, page 121

BRUNER-VERN

COUNTY: Tulsa.

LOCATION: T. 19 N., R. 12 E.

SURFACE ELEVATION: 750-850 feet.

SURFACE FORMATION: Nellie Bly formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticlinal folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Oswego	770			
Bartlesville	1175			
Burgess	1580	16	gas	5-10 M. cu. ft.
Tyner	1920	22	oil	200-500 bbls.
Turkey Mt.	2020		oil	100-400 bbls.

CHARACTER OF OIL: Gravity, 39-40° B.

CHARACTER OF GAS:

DATE OF OPENING: 1920.

REMARKS: Bruner-Vern, two pools close together but both on separate structures, are known as "Tulsa's back yard pools." The discovery well in the Bruner Pool, which opened the area, was completed in December of 1923 by the Shaffer Oil and Refining Company and Fitzpatrick. It was good for 460 barrels from sand at 2,026 to 2,058 feet, which was the second pay sand. In June, 1923, Chas. Page had completed this same well as a gasser for 15,000,000 cubic feet in the Burgess sand at a depth of 1,580-1,586 feet. The Shaffer Company really started the development of the fields and though

they are not record breakers they are excellent Wilcox sand pools of high gravity production.

BRUSHY MOUNTAIN

COUNTY: Muskogee.
LOCATION: Secs. 32 and 33, T. 14 N., R. 19 E.
SURFACE ELEVATION: 600-650 feet.
SURFACE FORMATION: Winslow formation.
AGE OF SURFACE ROCKS: Pennsylvanian.
STRUCTURE: Subsurface folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Sand	1432	15	gas	7 M. cu ft

CHARACTER OF OIL: Gravity,-----
CHARACTER OF GAS:
DATE OF OPENING: February, 1916.
REMARKS:

BURBANK

COUNTY: Osage-Kay.
LOCATION: T. 26-27 N., R. 5-6 E.
SURFACE ELEVATION: 950-1,075 feet.
SURFACE FORMATION: Eskridge, Neva, Elmdale formations.
AGE OF SURFACE ROCKS: Permian-Pennsylvanian.
STRUCTURE: Monocline, lenticular sand accumulation.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Hoover	990	20		
Suitcase	1725	20	gas	(?)
Layton	2115-90	4-10		
Oswego	2425-2500			
Burbank	2700-90	40-80	oil	50-5000 bb's
Wilcox	3300		dry	

CHARACTER OF OIL: Gravity, 37-39.9° B.
CHARACTER OF GAS: Wet.
DATE OF OPENING: 1920.
PEAK PRODUCTION DATE: July, 1923.
PEAK PRODUCTION: 121,760 barrels per day.
NUMBER OF WELLS: 1,935.

REMARKS: The Marland Oil Company drilled the first well in the Burbank field, May, 1920, in sec. 36, T. 27 N., R. 5 E., on a small anticline. The Carter Oil Company drilled the second well, September, 1920, on another small anticline.

The possibilities of the field were recognized by the oil fraternity as is demonstrated by the prices paid for leases during the govern-

ment sales. So far, the highest price paid to the Osage Agency was \$1,990,000.00 for 160 acres; but some leases have produced 20,000 barrels per acre. Burbank is the most evenly drilled area in the Mid-Continent field.

BUTLER

COUNTY: Muskogee.
LOCATION: Sec. 30, T. 15 N., R. 16 E.
SURFACE ELEVATION: 625 feet.
SURFACE FORMATION: Boggy shale.
AGE OF SURFACE ROCKS: Pennsylvanian.
STRUCTURE: Subsurface folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Sand	860	100	gas	½ M. cu. ft.
Sand	1213-1268	47	oil	20-100 bbls.

CHARACTER OF OIL: Gravity,-----
CHARACTER OF GAS:
DATE OF OPENING: August, 1918.
REMARKS:

BU-VI-BAR

COUNTY: Noble.
LOCATION: T. 21 N., R. 2 W.
SURFACE ELEVATION: 1,078 feet.
SURFACE FORMATION: Permian formations.
AGE OF SURFACE ROCKS: Permian.
STRUCTURE: Monocline on surface.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Uncorrelated	1894-1900	6-10	oil	10-100 bbls.
B. Foraker	2370-2390	5-10	gas	1-20 M. cu. ft.
Mississippi	4700			
Viola	4950			
Wilcox	5000			
Siliceous	5300			

CHARACTER OF OIL: Gravity, 39.7° B.
CHARACTER OF GAS:
DATE OF OPENING: 1926.

REMARKS: The Bu-Vi-Bar Company completed the discovery well of the pool in sec. 15, T. 21 N., R. 2 W., at 1,902 feet for 130 barrels of oil at 39.7° B., in March, 1925. The pool is derived from the names of three men who composed the company: J. Garfield Buel—(Bu-); Mr. Vincent—(Vi-); and Bob Bartlett—(Bar).

CALIFORNIA CREEK

COUNTY: Nowata.
 LOCATION: T. 28 N., R. 15 E.
 SURFACE ELEVATION: 750-900 feet.
 SURFACE FORMATION: Coffeyville formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Terraces.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Wayside	220			
Oswego	515			
Tucker	1020		gas	2-4 M. cu. ft.
1st Break				
Mississippian	1145		gas	3-5 M. cu. ft.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1911.

REMARKS: California Creek is an extension of the production from Kansas. The field is located along both banks of California Creek in Oklahoma but most of the production was used in southern Kansas; it was piped out by the Kansas Natural Gas Company.

CAMERON

COUNTY: LeFlore.
 LOCATION: T. 7-8 N., R. 26 E.
 SURFACE ELEVATION: 500-750 feet.
 SURFACE FORMATIONS: McAlester shale.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Cavanna fault and anticlinal folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Uncorrelated	1575	15-25	gas	1-20 M. cu. ft.
	1900	20-60	gas	1-12 M. cu. ft.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS: Dry. Rock pressure: 250-412 pounds

DATE OF OPENING: 1914.

REMARKS: Comparatively few of the Mid-Continent fields contain gas without oil, however, where the formations have undergone pronounced folding, gas alone is found. In a strip of sharply folded territory north of the Ouachita Mountains there are several gas fields from which gas is produced in large quantities; the Cameron field is one of the larger of these areas.

CANARY

COUNTY: Washington.
 LOCATION: T. 29 N., R. 13 E.
 SURFACE ELEVATION: 700-800 feet.
 SURFACE FORMATION: Ochelata formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Local folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Big Lime	670	65	(?)	
Oswego	970	90	(?)	
Bartlesville	1190	55	oil	5-150 bbls.
Tucker	1480	30	oil gas	10-25 bbls.
				1-3 M. cu. ft.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1907.

REMARKS: The northwestern part of Canary pool is producing principally oil, while the southwestern end produces principally gas.

CANEY

COUNTY: Washington.
 LOCATION: T. 29 N., R. 12 E.
 SURFACE ELEVATION: 750-950 feet.
 SURFACE FORMATION: Ochelata formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Local folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Big Lime	615	20	oil	
Oswego	815	50	oil	
Bartlesville	1185	50	oil	10-100 bbls.
Tucker	1400	30	oil gas	10-20 bbls.
				1-2 M. cu. ft.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1909.

REMARKS: The Caney field lies a little southwest of the Caney gas field in Kansas from which it derived its name.

CATOOSA

COUNTY: Rogers.
 LOCATION: T. 20 N., R. 15 E.

SURFACE ELEVATION: 600-800 feet.
 SURFACE FORMATION: Cherokee formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Local folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Booch	850		gas	2-15 M. cu. ft.
Mississippi	900		gas	10-20 M. cu. ft.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1913.

REMARKS: The Kansas Natural Gas Company drilled the initial volume of gas in the Catoosa field. The largest initial production from the wells was 10 to 15 million cubic feet of gas per day.

CEMENT

COUNTY: Caddo.
 LOCATION: T. 5-6 N., R. 9-10 W.
 SURFACE ELEVATION: 1,454 feet.
 SURFACE FORMATION: Cloud Chief and Whitehorse formations.
 AGE OF SURFACE ROCKS: Permian.
 STRUCTURE: Cement anticline.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Permian	1850	14	oil	250 bbls.
	1900	15	oil	25 bbls.
	2200	50	gas	40 M. cu. ft.
	2400	15	oil gas	50-100 bbls.
	2800		oil	1-5 M. cu. ft. 20-50 bbls.

CHARACTER OF OIL: Gravity, 34.7-37° B.

CHARACTER OF GAS:

DATE OF OPENING: 1914.

REMARKS: The Cement anticline was first mapped in 1916 by D. W. Ohern and Frank Buttram. Operation for development of oil and gas in this region began in 1916 with the drilling of a shallow well 3 miles east of Cement which was drilled to a depth of 1,415 feet encountering half a million cubic feet of gas. Active drilling started in 1917 by the completion of the Kunsemuller well, sec. 32, T. 6 N., R. 9 W., which encountered oil at 1,700 feet sufficient to encourage future drilling. The Fortuna Oil Company drilled the third well in 1917 for 35 million cubic feet of gas at 2,340 feet which established the field. Deep test now drilling in sec. 4, T. 5 N., R. 9 W., are in gravels and cherts around 2,700-2,800 feet which is probably basal Pontotoc.

CHANDLER

COUNTY: Lincoln.
 LOCATION: T. 14 N., R. 4 E.
 SURFACE ELEVATION: 967 feet.
 SURFACE FORMATION: Pennsylvanian-Permian formations.
 AGE OF SURFACE ROCKS: Pennsylvanian-Permian.
 STRUCTURE: Subsurface Dome.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Cleveland	3250-3310	30	oil gas	2-5 M. cu. ft. 50-100 bbls.
Prue	3950-4010	30-50	oil gas	1-2 M. cu. ft. 50-75 bbls.
Bartlesville	4470-4515	15		
Burgess	4560-4580	20	oil	20 bbls.
Viola Lime	4490-5020	20	oil	75-100 bbls.

CHARACTER OF OIL: Gravity 37.7° to 41.0°.

CHARACTER OF GAS:-----1000 lbs. Rock Pressure.

DATE OF OPENING: 1924.

REMARKS: Green and Hines completed the discovery well of the Chandler Pool February 25, 1924, in sec. 7, T. 14 N., R. 4 E., for an initial production 6 million cubic feet of gas at 3,307 feet.

The first Wilcox test was drilled by the Magnolia in May, 1928. Their No. 2 Gilliam NE. ¼ SE. ¼ SW. ¼ sec. 8, T. 14 N., R. 4 E., reached the Wilcox sand at a depth of 5,052 feet, getting water.

CHELSEA

COUNTY: Rogers.
 LOCATION: T. 24 N., R. 17 E.
 SURFACE ELEVATION: 700-850 feet.
 SURFACE FORMATION: Cherokee formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Anticlinal folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Stray	400	20	oil	15-30 bbls.
Bartlesville	463	80	oil	20-100 bbls.
Burgess	600	40	oil	40-60 bbls.

CHARACTER OF OIL: Gravity, 30-31.9° B.

CHARACTER OF GAS:

REMARKS: The Cherokee Oil and Gas Company drilled three small wells on their leases near Chelsea in 1889. The average depth of these wells was 36-120 feet and the initial production 5 to 10 barrels of oil per day. In 1900 other wells were developed and the oil piped to Chelsea. This is the first record of drilling for oil production in Oklahoma.

CHICKASHA

COUNTY: Grady.

LOCATION: T. 5 N., R. 8 W.

SURFACE ELEVATION: 1,200-1,440 feet.

SURFACE FORMATION: Whitehorse, Dog Creek and Blaine formations.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Chickasha anticline.

PRODUCING		THICKNESS	PRODUCTION	INITIAL
HORIZONS	DEPTH			PRODUCTION
Nichlos	1350		gas	10-50 M. cu. ft.
Ramsey	2000-2500		gas	50-60 M. cu. ft.
(1)	2450-2475	10-20	oil	

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1922.

REMARKS: The Chickasha gas field was discovered July, 1922 by John B. Nichols. The discovery well in sec. 26, T. 5 N., R. 8 W., gauged approximately 48 million cubic feet of gas from a shallow Permian sand at a depth of 1,350 feet. This is known as the Nichlos sand.

CHICKEN FARM

COUNTY: Muskogee.

LOCATION: T. 14 N., R. 18 E.

SURFACE ELEVATION: 550-650 feet.

SURFACE FORMATION: Winslow formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Lenticular sands.

PRODUCING		THICKNESS	PRODUCTION	INITIAL
HORIZONS	DEPTH			PRODUCTION
Oswego	400	10	oil	10-25 bbls.
Tucker	700	30	oil	20 bbls.
Boynton	1200	10	oil	20-60 bbls.
Taneha	1350	20	oil	15-150 bbls.

CHARACTER OF OIL: Gravity, 32° B.

CHARACTER OF GAS:

DATE OF OPENING: 1904.

REMARKS: The Chicken Farm pool is an extension of the Muskogee pool, being located 6 miles southwest of the city of Muskogee.

CHILDERS

See Delaware, page 144

CLAGGETT

See Nowata-Claggett, Page 202

CLAREMORE
East and North Claremore

COUNTY: Rogers.

LOCATION: T. 21 N.; R. 15-16-17 E.

SURFACE ELEVATION: 600-750 feet.

SURFACE FORMATION: Cherokee formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Local structure.

PRODUCING		THICKNESS	PRODUCTION	INITIAL
HORIZONS	DEPTH			PRODUCTION
Bartlesville	550		oil	20-60 bbls.
Tucker	700		gas	1-7 M. cu. ft.
Burgess	810-825		oil	10-50 bbls.
Chattanooga	1050			
Tyner	1175		none	
Siliceous	1200			

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1904.

REMARKS: The Claremore radium water is from the Siliceous limestone horizon. The Tucker and Burgess sands are found at 400-500 feet in T. 21 N., R. 17 E.

CLEVELAND

COUNTY: Pawnee.

LOCATION: T. 21 N., R. 8 E.

SURFACE ELEVATION: 700-900 feet.

SURFACE FORMATION: Pawhuska formation.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Local structure.

PRODUCING		THICKNESS	PRODUCTION	INITIAL
HORIZONS	DEPTH			PRODUCTION
Kelso	500	30	oil	
Layton	1300	50	oil	20-125 bbls.
Cleveland	1700	20	oil	20-300 bbls.
Oswego	2090	20	oil gas	75 bbls.
Skinner	2180			1-5 M. cu. ft.
Bartlesville	2400	110	oil	60 bbls.
Wilcox	2720			35-1000 bbls.
Siliceous	2900			

CHARACTER OF OIL: Gravity, 36-37.9° B. Content: 5.42 paraffin.

CHARACTER OF GAS:

DATE OF OPENING: 1904.

REMARKS: This large oil field occupies some 50 square miles of the east end of Pawnee County. The first good well of the Cleve-

land pool was completed September, 1904, great activity resulted; many wells were drilled close together on town lots and the initial production was 25-300 barrels per day.

COAL

COUNTY: Coal.
LOCATION: T. 3 N., R. 11 E.
SURFACE ELEVATION: 750-850 feet.
SURFACE FORMATION: McAlester shale.
AGE OF SURFACE ROCKS: Pennsylvanian.
STRUCTURE: Savanna anticline.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Hartshorne	1400	40-50	gas	1-6 M. cu. ft.

CHARACTER OF OIL: Gravity -----
CHARACTER OF GAS: Dry.
DATE OF OPENING: 1912.

REMARKS: In Coal County a considerable amount of gas is found on the Savanna and Coalgate anticlines but no definite pool has been discovered. Considerable gas was developed in sand beds in the McAlester shale from 350 to 1,000 feet deep. The sand beds are 10 to 40 feet thick.

COALTON

COUNTY: Okmulgee.
LOCATION: T. 12 N., R. 13 E.
SURFACE ELEVATION: 750-850 feet.
SURFACE FORMATION: Stuart shale.
AGE OF SURFACE ROCKS: Pennsylvanian.
STRUCTURE: Terraces, anticline and fault.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Booth Sand	1300	100-300	black oil	15-600 bbls.
1st Dutcher	1850			
2nd Dutcher	1930		green oil	
Wilcox	2835		oil	100 bbls.

CHARACTER OF OIL: Gravity -----
DATE OF OPENING: 1907.

REMARKS: The discovery well in the Coalton Pool is known as the "picnic well" because of a picnic held at the well the day it was completed. It came in for an initial production of 60 barrels of oil per day at a depth of 1,800 feet, in sec. 22, T. 12 N., R. 13 E., and was drilled by Smith and Swan.

COLE

COUNTY: Muskogee.
LOCATION: Secs. 10 and 11, T. 14 N., R. 15 E.
SURFACE ELEVATION: 600-650 feet.
SURFACE FORMATION: Boggy shale.
AGE OF SURFACE ROCKS: Pennsylvanian.
STRUCTURE: Subsurface folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Sand	1475	10	gas	20 M. cu. ft.
Sand	1610	20	oil	300-700 bbls.

CHARACTER OF OIL: Gravity, 35.4° B.

CHARACTER OF GAS:

DATE OF OPENING: August, 1914.

REMARKS: Present production of the pool is about 70 barrels.

COLLINSVILLE

COUNTY: Tulsa.
LOCATION: T. 22 N., R. 14 E.
SURFACE ELEVATION: 600-750 feet.
SURFACE FORMATION: Coffeyville formation.
AGE OF SURFACE ROCKS: Pennsylvanian.
STRUCTURE: Terraces.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Oswego	700	30	oil	10-25 bbls.
Red Fork	850	25	gas	1-20 M. cu. ft.
Bartlesville	1390	175	oil gas	20-60 bbls.
Burgess	1600	30	oil	1-18 M. cu. ft.
Mississippi	1680			20-30 bbls.
Wilcox	1800			
Siliceous	1950		none	
			none	

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1916.

REMARKS: This pool is part of a large field which covers some twenty-five square miles. The Collinsville area is noted more for its gas than for oil, for many large gas wells were brought in and the gas used in the zinc smelters of Collinsville.

COMANCHE

COUNTY: Stephens.
LOCATION: T. 2 S., R. 7-8 W.
SURFACE ELEVATION: 950-1,100 feet.

SURFACE FORMATION: Clear Fork-Wichita formations.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Elongated dome.

PRODUCING HORIZONS		DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
800 ft. gas sd.		800-900		gas	1-20 M. cu. ft.
Wilson		1400		oil	10-150 bbls.
1800 ft. sand		1800		oil	100-400 bbls.

CHARACTER OF OIL: Gravity, 32-33.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1918.

REMARKS: The Comanche pool was discovered when the Comanche Petroleum Company completed a well in sec. 20, T. 2 S., R. 7 W., for 20 million cubic feet of gas in sand from 1,286 to 1,324 feet, August, 1918. The well was located just north of the top of the surface dome upon the strength of which the well was drilled. The first oil well in this pool was the third test of the Comanche Petroleum Company drilled in sec. 19, T. 2 S., R. 7 W., with an initial production of 30 barrels in sand at 1,390 feet. This well was completed December, 1918, and started several other tests in the vicinity.

CONTINENTAL

COUNTY: Creek.

LOCATION: T. 16 N., R. 9 E.

SURFACE ELEVATION: 800-900 feet.

SURFACE FORMATION: Nelagoney formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Terraces.

PRODUCING HORIZONS		DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton		1240	10	Show gas	
Big Lime		1850	10		
Oswego		2100	10		
Glenn		2475	175	oil gas	50-100 bbls. 1-3 M. cu. ft.
Dutcher		2900	90	oil gas	50-100 bbls. 10-30 M. cu. ft.
Mississippi		3140	200		
Wilcox		3300	46		

CHARACTER OF OIL: Gravity, 37.7° B.

CHARACTER OF GAS:

DATE OF OPENING: 1918.

REMARKS: In June, 1918 the discovery well of the Continental pool was drilled in sec. 8, T. 16 N., R. 9 E. The oil was from the Bartlesville (Glenn) sand zone and the initial production 65 barrels

per day. In June, 1920 a well was drilled to the Dutcher sand with a large initial production; this started development in the area north of Bristow.

COODY

COUNTY: Muskogee.

LOCATION: Sec. 19, T. 15 N., R. 15 E.

SURFACE ELEVATION: 825-875 feet.

SURFACE FORMATION: Stuart shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Subsurface folding—possibly faulting.

PRODUCING

HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
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CHARACTER OF OIL: Gravity,-----.

CHARACTER OF GAS:

DATE OF OPENING: 1909.

REMARKS: Present production about 10 barrels.

COODY'S BLUFF

COUNTY: Nowata.

LOCATION: T. 25-26 N., R. 16-17 E.

SURFACE ELEVATION: 600-800 feet.

SURFACE FORMATION: Labette shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticline.

PRODUCING

HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Bartlesville	850	40	oil	25-125 bbls.
Burgess	1000	15	gas	1-16 M. cu. ft.
Mississippi	1180			
Chattanooga	1200			
Siliceous	1300			

CHARACTER OF OIL: Gravity, 36.40° B.

CHARACTER OF GAS:

DATE OF OPENING: 1904.

REMARKS: Coody's Bluff is the northern part of a large oil field which occupies part of the southeast quarter of Nowata County and extends several miles into Rogers County. The field is on an anticline which pitches down toward the north.

COPAN

COUNTY: Washington.

LOCATION: T. 28 N., R. 13 E.

SURFACE ELEVATION: 700-900 feet.

SURFACE FORMATION: Ochelata formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Slight folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Wayside	700	35	gas	1-10 M. cu. ft.
Big Lime	800	50	oil show	
Oswego	1000	20	oil	20-100 bbls.
Tucker	1550	25	gas	10-30 M. cu. ft.
Burgess				
Siliceous	1800	30	oil	70-150 bbls.

CHARACTER OF OIL: Gravity, 32-33° B.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1907.

REMARKS: The Copan pool occupies an area of 8 square miles; it is almost continuous with the Canary pool to the north. The gas pressure in the Copan pool fell from 440 pounds to 18 pounds and the average capacity of the wells from 32½ million cubic feet to one million cubic feet of gas. From 1907 to 1915, 2,182 wells were completed in this area.

COUNCIL HILL

COUNTY: Muskogee.

LOCATION: T. 13 N., R. 16 E.

SURFACE ELEVATION: 600-650 feet.

SURFACE FORMATION: Boggy shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Terraces.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Salt	600		oil	
Booch	1000		oil	
Dutcher	1650-2100		oil	
Lyons-Quinn	2400		oil	

CHARACTER OF OIL: Gravity, 38° B.

CHARACTER OF GAS:

DATE OF OPENING: 1919.

REMARKS: The Council Hill pool is located about three miles northeast of the town of that name. The Prairie Oil and Gas Company drilled the first well in this area April, 1911. Three sands were encountered as follows:

2,180-2,202 feet, show of oil.

2,318-2,320 feet, sand.

2,318-2,320 feet, water.

The well was abandoned.

COUNTRY CLUB

COUNTY: Tulsa.

LOCATION: T. 20 N., R. 12 E.

SURFACE ELEVATION: 650-750 feet.

SURFACE FORMATION: Coffeyville formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Local folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Oswego	820	30	gas	½-1 M. cu. ft.
Bartlesville	1210	45	gas	1-3 M. cu. ft.
Tucker	1495	10	oil	2-4 M. cu. ft.
Burgess	1600	25	gas	10-45 M. cu. ft.
Wilcox	2050	120	oil	200-2400 bbls.
Turkey Mt.	2230	30	oil	50-200 bbls.

CHARACTER OF OIL: Gravity, 36-37° B.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1922.

REMARKS: This pool is two miles west of the Tulsa Country Club and was discovered by Munn Brothers in May, 1922. The first five wells came in as follows:

1. 7 M. cu. ft. of gas, 1,977-2,003 feet, 200 bbls., 2,092-2,096 feet, May, 1922.
2. 60 M. cu. ft. of gas, 1,590-1,593 feet; 225 bbls., 2,032-2,048 feet, August, 1922.
3. 600 bbls., 2,015-2,030 feet, October, 1923.
4. 850 bbls., 2,034-2,040 feet, January, 1924.
5. 2,400 bbls., 2,045-2,062 feet, January, 1924, the best initial producer.

In March of 1924 the Mutual Oil Company purchased the entire pool for a consideration of \$2,200,000. Like all lime production the field has declined greatly but it has to date an average daily output of 1,000 barrels of oil.

COWETA

COUNTY: Wagoner.

LOCATION: T. 17 N., R. 16 E.

SURFACE ELEVATION: 650-800 feet.

SURFACE FORMATION: Blue Jacket sandstone.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Seneca fault, subsurface folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Dutcher	700	300	oil gas	5-500 bbls.
Mississippi	1200	200	gas	1-6 M. cu. ft.

(Table continued on next page)

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Chattanooga	1260	40		
Burgen	1280	400	oil	5-30 bbls.
Turkey Mt.	1600	550		

CHARACTER OF OIL: Gravity, 36-41° B.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1914.

REMARKS: The first well drilled in the Coweta pool; sec. 11, T. 17 N., R. 16 E., had an initial production of 720 barrels of oil per day. About \$60,000.00 worth of oil was wasted before this well could be placed under control.

The Burgen sandstone of Ordovician age is found over the entire county, and became important as a producing horizon in 1925 when R. W. Sawyer and the Newman Corporation discovered gas in this field. Structures in this sand conform to those in the Tyner series.

COX

COUNTY: Carter.

LOCATION: T. 2 S., R. 2 W.

SURFACE ELEVATION: 900-975 feet.

SURFACE FORMATION: Clear Fork-Wichita formation.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Monocline or terrace covered by unconformable beds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Base of Permian	550			
Pennsylvanian Glenn	1250	10-50	oil	5-100 bbls.
	1300			
	1415			
	1550			
	1623			
	2910			

CHARACTER OF OIL: Gravity, 20-27° B.

CHARACTER OF GAS:

DATE OF OPENING: 1925.

REMARKS: The Cox pool was discovered by the Magnolia Petroleum Company in the latter part of 1925. The Cox farm was one of the first areas developed and this is sometimes called the Ed Cox pool.

CRESCENT or LOVELL

COUNTY: Logan.

LOCATION: T. 18 N., R. 4 W.

SURFACE ELEVATION: 1,009-1,115 feet.

SURFACE FORMATION: Enid formation.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Anticline, (subsurface).

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Foraker	2200-2350			
Pawhuska	2950			
Hoover Series	3300-3500			
Oread	3600	40		
Endicott	3650	60		
Tonkawa	4000	30-100	oil	50 bbls.
Layton	4650	50-150		
Oswego	5350	70		
Miss. Lime	5670	30-127		
Viola	5930-5970			
Simpson	5960-6040			
Wilcox	6200			

CHARACTER OF OIL: Gravity 40° to 42° B.

CHARACTER OF GAS: Wet.

DATE OF OPENING: 1926.

REMARKS: This wildcat area was discovered by the Texas-Pacific Coal and Oil Company with a well in sec. 28, T. 18 N., R. 4 W., in May, 1926. This well was completed in the Tonkawa at a depth of 4059-4080 feet.

The same company also drilled the first Wilcox test in sec. 27, T. 18 N., R. 4 W., in January, 1928, at a depth of 6,295-6,389 feet. This was not a producer.

CRINERVILLE

See Brock, page 122

CROMWELL

COUNTY: Seminole.

LOCATION: T. 10-11 N., R. 8 E.

SURFACE ELEVATION: 750-850 feet.

SURFACE FORMATION: Francis formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Faulted nose, subsurface folded dome.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Stray	1850	15	oil gas	50 bbls.
Booch	3050	30	gas	1-5 M. cu. ft.
Deaner	3160	40	oil	1-10 M. cu. ft.
Cromwell	3470	90	oil	20-200 bbls.
				30-2000 bbls.
Fayetteville-				10-80 M. cu. ft.
Mayer	4000	100		
Chattanooga	4265	25		

(Table continued on next page)

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Hunton	4300	100		
Sylvan	4400	85		
Viola	4485	15		
Wilcox	4550	20	oil	30 bbls.

CHARACTER OF OIL: Gravity, 38-39.9° B.

CHARACTER OF GAS: Wet. Rock pressure 1,100 to 1,400 pounds.

DATE OF OPENING: 1923.

PEAK PRODUCTION DATE: August 3, 1924.

PEAK PRODUCTION: 64,000 barrels of oil.

NUMBER OF WELLS: 402.

REMARKS: Although the Cromwell pool is the largest contributor of the year 1923 it was practically an unknown quantity at the beginning of the year. The Cosden Oil and Gas Company's discovery well was completed December, 1923. T. B. Hoffer and Harry C. Poudier completed the first big well in the area, March, 1924, in sec. 16, T. 10 N., R. 8 E., for 4,600 barrels of high-gravity oil.

CRUCE

COUNTY: Stephens.

LOCATION: T. 1 N., R. 5-6 W.

SURFACE ELEVATION: 1,000-1,200 feet.

SURFACE FORMATION: Clear Fork-Wichita and Duncan formations.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Cruce anticline.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Gas	400	7-20	gas	2-5 M. cu. ft.
Stray	800	10-20	oil	5-60 bbls.
Gas sand	850	10-15	gas	3-17 M. cu. ft.
Gas sand	1700	15	gas	2-15 M. cu. ft.
Sand	1720	10	oil	5-40 bbls.
Sand	1900		oil	10-25 bbls.

CHARACTER OF OIL: Gravity, 17°-28° B.

CHARACTER OF GAS: Wet.

DATE OF OPENING: 1907.

REMARKS: Although drilling in the Cruce pool was started in 1907 the first wells were not completed until 1912 when the Wichita Gas and Fuel Company brought in a 3 million cubic foot gas well in section 12, T. 1 N., R. 6 W., at a depth of 850 feet. The first wells supplied the towns of Duncan and Marlow for a number of years but are now almost completely exhausted.

CUSHING

The discovery well was drilled by C. B. Shaffer on the Wheeler lease, sec. 31, T. 18 N., R. 7 E., and was completed in March, 1912,

with an initial production of 400 barrels of oil per day at a depth of 2,319 to 2,347 feet.

To the end of 1919, the Cushing oil field, with an area of 32 square miles, had produced about 236 million barrels of oil which was about 3% of all the oil produced in the world, for all the sands in the field contained some gas and many of the wells had a great capacity of both oil and gas.

For descriptions of the original Cushing pool areas see Drumright, Shamrock, Pemeta, Oilton and Olive.

PEAK PRODUCTION DATE: May, 1915.

PEAK PRODUCTION: 305,000 barrels of oil.

NUMBER OF WELLS: 3,090.

DARBY

COUNTY: Pottawatomie.

LOCATION: T. 7 N., R. 4 E.

SURFACE ELEVATION: 750-900 feet.

SURFACE FORMATION: Pontotoc group.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Monocline.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Hunton	3718	40	oil	200-600 bbls.
Wilcox				

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1927.

REMARKS: The Darby Petroleum Company discovered the Darby pool early in 1927 with a well drilled in sec. 11, T. 7 N., R. 4 E. The Magnolia Petroleum Company drilled the second well of the pool in sec. 15, for 530 barrels of oil per day from the Hunton limestone and the third well in the same section for 265 barrels of oil. These two companies own practically all the acreage containing the producing wells.

DAVENPORT

COUNTY: Lincoln.

LOCATION: T. 14-15 N., R. 5 E.

SURFACE ELEVATION: 800-900 feet.

SURFACE FORMATION: Cushing limestone.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Surface and subsurface anticline.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton	2340			
Cleveland	2600	50	oil	60-100 bbls.
Oswego, Meaner	2830	60		
Prue	3422	4	oil gas	100-1100 bbls. 1 M. cu. ft.
Bartlesville	3580			

CHARACTER OF OIL: Gravity, 43-53° B.

CHARACTER OF GAS:

DATE OF OPENING: 1924.

REMARKS: The Davenport pool was opened by Flynn and Morgan, September, 1924, in sec. 34, T. 15 N., R. 5 E. The well had an initial production of 467 barrels of oil per day from sand at a depth of 3,460 to 3,467 feet.

The oil from the 2,600 foot sand is over 53° B., or only about 6° heavier than the average motor fuel oil.

DAWSON

COUNTY: Tulsa.

LOCATION: T. 20 N., R. 14 E.

SURFACE ELEVATION: 650-750 feet.

SURFACE FORMATION: Oologah limestone.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Local folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Bartlesville	850	20	oil	25-50 bbls.
Tucker	1050	15		
Burgess	1390	120	gas	1-5 M. cu. ft.
Mississippi	1600	20	gas	11-20 M. cu. ft.

CHARACTER OF OIL: Gravity. -----

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1906.

REMARKS: The Dawson pool, three miles north of Tulsa is a part of a large oil and gas area. The field is more noted for its gas than for oil.

DEANER-CLEARVIEW

COUNTY: Okfuskee.

LOCATION: T. 11 N., R. 11 E.

SURFACE ELEVATION: 750-900 feet.

SURFACE FORMATION: Wewoka formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticlinal dome, lenticular sands.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Deaner	2800	40	oil gas	50-250 bbls.
Lyons	3150	70	oil gas	5 M. cu. ft.
Wilcox	3650		oil	100-3,000 bbls.

CHARACTER OF OIL: Gravity, 27°-33° B. Wilcox 40.9°-43° B.

CHARACTER OF GAS: Dry. Casing head gas.

DATE OF OPENING: 1920. Wilcox sand production in 1927.

REMARKS: Dr. J. J. Deaner of Okmulgee, who opened the area, established a dental clinic with the proceeds. Of the first 50 wells drilled in this pool 36 produced oil and 14 gas in paying quantities. Clearview, a southern extension, was opened by the Riverland Oil and Gas Co., as a Wilcox sand pool.

DEER CREEK

COUNTY: Grant.

LOCATION: T. 27 N., R. 3 W.

SURFACE ELEVATION: 1,075 feet.

SURFACE FORMATION: Lower Enid formation.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Deer Creek anticline, faulted.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Hotson	1300	15	gas	1-10 M. cu. ft.
Hoover	2300	20		
Stray	2410	15	gas	8-25 M. cu. ft.
Swaggart	2900	25	oil	10-300 bbls.
Layton	3375	80	oil gas	100-200 bbls. 1-6 M. cu. ft.
Oswego	3770-4000	100		
Miss. Lime	3975-4150	10-50		
Wilcox	4040-4175	10-50	oil	100-500 bbls.

CHARACTER OF OIL: Gravity, 38.9° B. Color, black.

CHARACTER OF GAS: Wet.

DATE OF OPENING: 1920.

REMARKS: The Western States Land & Development Company completed the discovery well of the Deer Creek pool, July, 1920 in sec. 22, T. 27 N., R. 3 W., for 18 million cubic feet of gas per day from sand at 2,430 to 2,440 feet in depth. This well was deepened to 3,303 to 3,353 feet and produced 10 barrels of oil. The first oil well was drilled by the same Company in sec. 15, T. 27 N., R. 3 W., with an initial production of 450 barrels of oil at 2,943 to 2,948 feet. No. 1, M. Howel, produced 1,000 barrels from the "Wilcox" sand in a well completed Oct., 1927.

DEEP ROCK
 Mehan

COUNTY: Payne.
 LOCATION: T. 18 N., R. 3 E.
 SURFACE ELEVATION: 935.
 SURFACE FORMATION: Pennsylvanian-Permian formation.
 AGE OF SURFACE ROCKS: Pennsylvanian-Permian.
 STRUCTURE: Local folds, dome.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton	1720	20	gas	1-6 M. cu. ft.
Cleveland	2072	40	oil	
Oswego	2500	30	oil	
Skinner	2900	50	oil	
Bartlesville	3100	50	oil	
Mississippi	3792	200	oil	
Hunton	4150	20	gas	3-10 M. cu. ft.
Wilcox	4300	60	oil	100-600 bbls.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1925.

REMARKS:

DELAWARE-CHILDERS

COUNTY: Nowata.
 LOCATION: T. 26 N., R. 15-16 E.
 SURFACE ELEVATION: 700-800 feet.
 SURFACE FORMATION: Coffeyville formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Local folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Big Lime	190	20	oil	10-50 bbls.
Oswego	370	30	oil gas	1-10 M. cu. ft.
Bartlesville	700-850	40	oil	15-150 bbls.
Burgess	1000	15	gas	2-5 M. cu. ft.

CHARACTER OF OIL: Gravity, 32° B.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1908.

REMARKS: The Delaware-Childers pool is limited to a narrow strip along the Coody's Bluff-Alluwe pool and extends 14 miles north-westward. The first activity was in the latter part of 1908 and because the initial production was high development was rapid. In 1911 over 475 oil wells were completed, having an initial daily production of 120 barrels per day. By 1916 the field was almost exhausted the remaining wells being small producers.

DEPEW

COUNTY: Creek.
 LOCATION: T. 15 N., R. 8 E.
 SURFACE ELEVATION: 750-1,000 feet.
 SURFACE FORMATION: Elgin and Nelagoney formations.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Fault zone, "closed" fold.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Jones	1530		gas	1-5 M. cu. ft.
Wheeler	1900			
Glenn	2700	110		
Dutcher	3125	60	oil	100-200 bbls.
Wilcox	3397	20	oil	100-2000 bbls. 50-250 bbls.

CHARACTER OF OIL: Gravity, 30-32.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1915.

REMARKS: Sheets Brothers are reported to have drilled the discovery well of the Depew pool in sec. 15, T. 15 N., R. 8 E., for 100 barrels of oil per day at a depth of 3,160 feet.

DEVONIAN

COUNTY: Okmulgee.
 LOCATION: T. 15 N., R. 13 E.
 SURFACE ELEVATION: 650-850 feet.
 SURFACE FORMATION: Wewoka formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Local folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Perryman	1160	20		
Red Fork	1350	60	gas	1-2 M. cu. ft.
Glenn	1540	60	oil gas	20 bbls.
Dutcher	2158	100	gas	1-5 M. cu. ft.
Wilcox	2675	25	oil	3-15 M. cu. ft. 20-200 bbls.

CHARACTER OF OIL: Gravity, 43° B.

CHARACTER OF GAS: Wet.

DATE OF OPENING: 1925.

REMARKS:

DEWEY-BARTLESVILLE

COUNTY: Washington.
 LOCATION: T. 26-27 N., R. 12-13 E.
 SURFACE ELEVATION: 650-800 feet.

SURFACE FORMATION: Ochelata-Dewey formations.
AGE OF SURFACE ROCKS: Pennsylvanian.
STRUCTURE: Anticlinal folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
McEwin	515	30		
Big Lime	650	70	oil	10-30 bbls.
Peru	700	30	oil	30-60 bbls.
Oswego	900	80	oil	50-60 bbls.
Skinner	1050	25	gas	1-10 M. cu. ft.
Bartlesville	1265	35	oil	100-500 bbls.
Burgess	1500	35	gas	3-10 M. cu. ft.

CHARACTER OF OIL: Gravity, 32-33.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1904.

REMARKS: The proximity of producing fields in Kansas was the main factor in promoting oil and gas development in Washington County, Oklahoma. In 1894 the Cudahy Oil Company leased 200,000 acres in the vicinity of Bartlesville but development was retarded until 1904 on account of the necessary approval of the Department of the Interior on allotments. At the close of 1904 more than 100 wells had been drilled at Bartlesville. In 1905 a new pool was discovered northwest of Dewey and in 1906 this production was extended southward until the two areas merged. Rapid development followed for some of the wells had an initial production of 1,000 barrels of oil.

At present this field is practically exhausted, however, one of the first wells, drilled in 1899, located in the city park at Bartlesville, is still producing, others are being pumped and still other wells are being deepened.

DILWORTH
(See Blackwell)

COUNTY: Kay.

LOCATION: T. 28-29 N., R. 1 E. and 1 W.

SURFACE ELEVATION: 1,010-1,200 feet.

SURFACE FORMATION: Permian formations.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Dilworth anticline and fault.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Blackwell	750	10	gas	1-12 M. cu. ft.
Uncorrelated }	960	25	gas	10-18 M. cu. ft.
	1060	15	gas	5-12 M. cu. ft.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS: Wet.

DATE OF OPENING: 1911.

REMARKS: The Dilworth pool was opened in 1911 with the completion of several gas wells. In 1912 the north end of the field was developed by the Marland Refining Company and others, with the result of 21 gas wells out of 37 completions. The Blackwell pool merges into this field.

DIX

See Oklahoma-Central, page 207

DOMES

COUNTY: Osage.

LOCATION: T. 27 N., R. 10-11 E.

SURFACE ELEVATION: 750-900 feet.

SURFACE FORMATION: Nelagoney-Ochelata formations.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticlines and domes.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Stray	1057	67	oil	10-25 bbls.
Big Lime	1270	30	gas	1-5 M. cu. ft.
Oswego	1330	125		
Bartlesville	1680	100	oil	10-110 bbls.
Mississippi	1880	45	oil gas	25-75 bbls.
				1-3 M. cu. ft.

CHARACTER OF OIL: Gravity, 32° B.

CHARACTER OF GAS:

DATE OF OPENING: 1917.

REMARKS: The Domes pool is situated on a series of domes and anticlines and the production of the area follows closely the various structural features.

DONAHUE or MASHAM

COUNTY: Pawnee.

LOCATION: T. 23 N., R. 4 E.

SURFACE ELEVATION: 980 feet.

SURFACE FORMATION: Eskridge formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticlinal structure.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Cleveland	2340	20	gas	1-2 M. cu. ft.
Oswego	2900	50	gas	1-5 M. cu. ft.
Bartlesville	3180	40		
Burgess	3320	15		
Mississippi	3350	325		
Wilcox	3700	75	oil	100-1000 bbls.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS: Dry. Rock pressure 245 to 790 pounds.

DATE OF OPENING: 1925.

REMARKS: In December of 1924, J. L. Donahue, et al, opened a new pool in sec. 22, T. 23 N., R. 4 E., with a well making 300 barrels of oil per day in Wilcox sand at 3,714 feet. The well was located on a prominent structure with about 40 feet of closure.

DONNELLY

COUNTY: Creek.

LOCATION: T. 14 N., R. 10 E.

SURFACE ELEVATION: 810 feet.

SURFACE FORMATION: Nellie Bly formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Subsurface folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Glenn	2265	175	gas	1-5 M. cu. ft.
Dutcher	2800	20	oil gas	15-100 bbls.
				5-15 M. cu. ft.
Misener	3200	10	oil	40-60 bbls.
Wilcox	3340	50	oil	20-100 bbls.

CHARACTER OF OIL: Gravity, 36-39° B.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1924.

REMARKS: In August, 1924, Donnelly and Hall brought in a 300 barrel oil well at a depth of 3,391 feet, sec. 17, T. 14 N., R. 10 E. Several similar producers have been completed in the Donnelly pool.

DOYLE

COUNTY: Stephens.

LOCATION: T. 1 N., R. 5 W.

SURFACE ELEVATION: 1,050-1,200 feet.

SURFACE FORMATION: Duncan and Clear Fork-Wichita formations.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Dome.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Uncorrelated	850-959	15	gas	1-10 M. cu. ft.
	1110		oil	10-20 bbls.
	1250	5	oil	10-50 bbls.
	3720	5	gas	6 M. cu. ft.

CHARACTER OF OIL: Gravity 28-34° B.

CHARACTER OF GAS:

DATE OF OPENING: 1922.

REMARKS: The discovery well was completed in September, 1922, in sec. 11, T. 1 N., R. 5 W., by Clark and Cowden with an initial production of 75 barrels of oil per day at a depth of 1,090 feet. Most of the development of the Doyle pool was completed during the following year.

DRUMRIGHT

COUNTY: Creek.

LOCATION: T. 17 N., R. 7 E.

SURFACE ELEVATION: 1,125 feet.

SURFACE FORMATION: Pawhuska formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Drumright dome.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton	1450	20	gas	10-20 M. cu. ft.
Wheeler	2175	5-20	oil	50-300 bbls.
Bartlesville	2675	50	oil	250-2000 bbls.
Wilcox	2800	20	oil	100-1000 bbls.
Siliceous				

CHARACTER OF OIL: Gravity, 37-40.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1912.

REMARKS: The Drumright pool is in the central portion of the original Cushing field which has been one of the chief producing fields of the world. It is located on the Drumright dome. The discovery well in the Cushing field was completed in March, 1912 and the principal development of the area was within the vicinity of Drumright during the first twelve months following. In 1913 the Bartlesville sand was found in the Prairie Oil and Gas Company's test in sec. 3, T. 17 N., R. 7 E. From that date attention was confined chiefly to the Bartlesville sand until 1915 when deeper producing horizons were discovered.

DUNCAN North Duncan and West Duncan

COUNTY: Stephens.

LOCATION: T. 1 S., R. 8-9 W.; T. 1 N., R. 8-9 W.

SURFACE ELEVATION: 950-1,100 feet.

SURFACE FORMATION: Clear Fork-Wichita formations.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Domes and anticlines.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Miller	1600		gas	
Surber	1700		oil	10-1000 bbls.
Brown	2100		oil gas	50-1000 bbls. 10-70 M. cu. ft.
Blaydes	2200		oil	15-1000 bbls.
Kagay	2300		gas oil	10-25 M. cu. ft. 40 bbls.

CHARACTER OF OIL: Gravity, 33.7-38° B.

CHARACTER OF GAS:

DATE OF OPENING: 1919.

REMARKS: The West Duncan pool was discovered in 1919 by the Ft. Ring Oil and Gas Company in sec. 30, T. 1 S., R. 8 W.

The North Duncan pool was discovered in November, 1920 by the Parsons-Gant Oil Company, with a 20 million cubic foot gas well in sec. 32, T. 1 N., R. 8 W. The 2400-foot sand produces in North Duncan and lenticular sands at 2,400 and 2,600 feet in spots in the West Duncan pool.

DUQUESNE

COUNTY: Pawnee.

LOCATION: T. 21 N., R. 6 E.

SURFACE ELEVATION: 923 feet.

SURFACE FORMATION: Buck Creek formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Terraces, local folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton	2060	20	oil	
Cleveland	2100	60	oil	
Pruc	2680	50	oil	10-50 bbls.
Burgess	3000	35	oil	
Wilcox	3125	50	oil	

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1925.

REMARKS: Not producing (Dec., 1927).

DUSTIN (South Weleetka)

COUNTY: Hughes.

LOCATION: T. 9 N., R. 11 E.

SURFACE ELEVATION: 700-1,000 feet.

SURFACE FORMATION: Stuart formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Local folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Uncorrelated	450		Show of gas	
	750	10	gas	1-10 M. cu. ft.
	2000	67	gas	1-8 M. cu. ft.
Lyons-Quinn	2900	70	oil	10-50 bbls.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1918.

REMARKS: The Dustin pool was one of the early developments in Hughes County which until about 1920 had only a few scattered gas producing areas.

EARLSBORO

COUNTY: Seminole.

LOCATION: T. 9 N., R. 5 E.

SURFACE ELEVATION: 950-1,000 feet.

SURFACE FORMATION: Pontotoc formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Folds and faults.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Earlsboro	3500	16	oil	75-400 bbls.
Viola	4220	60		
Wilcox	4300	10	oil	50-10,175 bbls.

CHARACTER OF OIL: Gravity, 39-40° B.

CHARACTER OF GAS:

DATE OF OPENING: 1926.

REMARKS: The Earlsboro pool was discovered by a well drilled by Morgan and Flynn in the center of section 10. The production was from the Earlsboro sand.

EAST BILLINGS

See Billings, page 114

EAST CLAREMORE

See Claremore, page 131

ELLIOTT

COUNTY: Nowata.

LOCATION: T. 28 N., R. 15 E.

SURFACE ELEVATION: 750-850 feet.

SURFACE FORMATION: Coffeyville formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Subsurface anticlinal folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Oswego	740	30	gas	1-2 M. cu. ft.
Bartlesville	1040	25	oil	10-250 bbls.
Mississippi	1150	5	gas	1-3 M. cu. ft.
Chattanooga	1250	25		
Wilcox	1490			

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1909.

REMARKS: The discovery of the Elliott pool was in October, 1909, however, the principal development took place in the fall of 1910 and the spring of 1911 when wells were completed with initial production of 25 to 700 barrels of oil per day at depths ranging from 800 to 1,000 feet.

It is estimated that approximately 91% of the oil of the Elliott pool was left in the formations, therefore, in July, 1924, the wells of this pool were put on air pumps with the result that the production which was practically negligible was increased 24%. Fourteen new wells have been drilled of which nine are producers of oil. This method of artificially restoring rock pressure by air is extensively used in eastern fields and is rapidly coming into use in the Mid-Continent fields.

EMPIRE

COUNTY: Stephens.

LOCATION: T. 1 S., R. 8-9 W.

SURFACE ELEVATION: 1,000-1,100 feet.

SURFACE FORMATION: Clear Fork-Wichita formations.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Subsurface dome.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Gas sand	1000		gas	
Miller	1500		gas	1-12 M. cu. ft.
Nigh	1600		oil	10-25 bbls.
Surber	1700		oil	50-1000 bbls.
Cantrell	1800		oil	
Shelton	1900		oil	
Smith	2000		oil	
Brown	2100		oil	
Blaydes	2200		oil	15-1000 bbls.
Kagay	2300		oil gas	
Maloney	2600		gas	

CHARACTER OF OIL: Gravity, 38-40° B.

CHARACTER OF GAS:

DATE OF OPENING: 1920.

REMARKS: The Empire pool is the banner high gravity oil pool of southern Oklahoma. It was discovered by the Empire Gas and Fuel Company in April, 1920 by a well located in sec. 33, T. 1 S., R. 8 W., which was completed with an initial production of 834 barrels of oil per day from sand 1,700 feet in depth.

ENOS

COUNTY: Marshall.

LOCATION: T. 7 S., R. 5 E.

SURFACE ELEVATION: 700-800 feet.

SURFACE FORMATION: Trinity sand.

AGE OF SURFACE ROCKS: Cretaceous.

STRUCTURE: Preston anticline.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Lower Trinity	450	25	oil	1-4 bbls.
	550-600		gas	1-4 M. cu. ft.

CHARACTER OF OIL: Gravity, high grade oil.

CHARACTER OF GAS:

DATE OF OPENING: 1916.

REMARKS: The largest gas wells of the Enos pool have been drilled in sections 23, 35 and 36, T. 7 S., R. 5 E. The best oil showings have been found in sec. 23, T. 7 S., R. 5 E., in the Trinity sand. At the present time no commercial production of either oil or gas has been obtained from this pool.

ERAM

COUNTY: Okmulgee.

LOCATION: T. 13 N., R. 15 E.

SURFACE ELEVATION: 650-750 feet.

SURFACE FORMATION; Boggy shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Subsurface dome.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Salt	770		gas	1 M. cu. ft.
Booch	1260	100		
Dutcher	1900	15	oil	50-175 bbls.
Mississippi	2200	15	gas	½-2 M. cu. ft.
Wileox	2700	10	oil gas	100-2000 bbls.

CHARACTER OF OIL: Gravity, 36-37.9° B. Color, light amber. Wilcox oil, 45° B.

CHARACTER OF GAS: Wet.

DATE OF OPENING: 1921.

REMARKS: The Eram pool is a type area of Wilcox sand production. Dips in the Wilcox sand are generally quite steep especially on one side of a producing structure and in this pool the north dip amounts to 150 feet in a quarter of a mile. The Wilcox sand produces oil in paying quantities only from structures of the dome type.

EUFAULA

COUNTY: McIntosh.
LOCATION: T. 10 N., R. 16 E.
SURFACE ELEVATION: 600-700 feet.
SURFACE FORMATION: Boggy shale.
AGE OF SURFACE ROCKS: Pennsylvanian.
STRUCTURE: Subsurface folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Salt	600	40	gas	1-3 M. cu. ft.
Booch	1300-1500		gas	10-35 M. cu. ft.
Dutcher	2100		gas	
Wilcox	3000		gas	

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1889.

REMARKS: In 1885 Dr. H. W. Faucett of New York drilled a test 14 miles west of Atoka, Oklahoma and another 20 miles north of Tahlequah. The latter well was soon abandoned but the Atoka well was drilled to a depth of 1,414 feet with showings of both oil and gas. This well was also abandoned at the death of Dr. Faucett in 1888. During this period a third test was drilled near Eufaula, to a depth of 2,575 feet. Three horizons with showings of oil or gas were encountered.

FAIRFAX

COUNTY: Osage.
LOCATION: T. 25 N., R. 6 E.
SURFACE ELEVATION: 950-1,000 feet.
SURFACE FORMATION: Buck Creek formation.
AGE OF SURFACE ROCKS: Pennsylvanian.
STRUCTURE: Local folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Oswego	2684	10	oil gas	5-45 bbls. 1-5 M. cu. ft.
Burbank	2700	42	oil gas	15-500 bbls. 1-6 M. cu. ft.
Wilcox	2900			

CHARACTER OF OIL: Gravity, 37-38° B.

CHARACTER OF GAS:

DATE OF OPENING: 1925.

REMARKS: The Prairie Oil and Gas Company completed the discovery well of the Fairfax pool, January, 1925, in sec. 21, T. 25 N., R. 6 E., for 560 barrels of oil per day at a depth of 2,722 feet. This well started immediate drilling in this area which is about 6 miles south of Burbank.

FISHER

COUNTY: Tulsa.
LOCATION: T. 19 N., R. 11 E.
SURFACE ELEVATION: 650-940 feet.
SURFACE FORMATION: Nellie Bly formation.
AGE OF SURFACE ROCKS: Pennsylvanian.
STRUCTURE: Anticline.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Oswego	1140	60		
Bartlesville	1675	25	gas	
Taneha	1725	75	gas	1-3 M. cu. ft.
Burgess	1980	20	gas	1-6 M. cu. ft.
Tyner	2265	10	oil	10-40 bbls.
Turkey Mt.	2400	100	oil	250-500 bbls.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1918.

REMARKS:

FLAT ROCK

See Bird Creek, page 115

FORAKER

COUNTY: Osage.
LOCATION: T. 28 N., R. 7 E.
SURFACE ELEVATION: 1,100-1,200 feet.
SURFACE FORMATION: Sand Creek formation.
AGE OF SURFACE ROCKS: Permian.
STRUCTURE: Dome.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Cleveland	1100	20	gas	
Oswego	1250	25	gas	1 M. cu. ft.
Burbank	1800	25	gas	1-3 M. cu. ft.
Mississippi	2750	50	oil	10-100 bbls.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:
DATE OF OPENING: 1922.
REMARKS:

FOX

COUNTY: Carter.
LOCATION: T. 2 S., R. 3 W.
SURFACE ELEVATION: 900-1,100 feet.
SURFACE FORMATION: Clear Fork-Wichita formation.
AGE OF SURFACE ROCKS: Permian.
STRUCTURE: Anticlinal folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Shallow	900	50	gas	2-20 M. cu. ft.
Glenn	1600	75	gas	1-5 M. cu. ft.
	1900	80-120	oil	50-600 bbls.
	2100	60-130	oil	250-550 bbls.
	2300	50-200	gas	5-25 M. cu. ft.
	2725	40-150	gas	10-25 M. cu. ft.
	3012	50	gas	5-15 M. cu. ft.
	3500-3650	30	gas	8-37 M. cu. ft.

CHARACTER OF OIL: Gravity, 32-33.9° B.
DATE OF OPENING: 1917.

REMARKS: In 1912 the Gypsy Oil Company leased a number of acres in what is now the Fox pool and drilled a dry hole. In 1916 the same Company completed a gas well in sec. 28, T. 2 S., R. 3 W., for 22 million cubic feet of gas per day at a depth of 2,013 feet. The first oil well in the Fox pool was completed by the same company in sec. 29, T. 2 S., R. 3 W., with an initial production of 604 barrels of oil per day at a depth of 2,033 feet.

FRANCIS

COUNTY: Pontotoc.
LOCATION: T. 5 N., R. 7 E.
SURFACE ELEVATION: 750-900 feet.
SURFACE FORMATION: Holdenville formation and Seminole cgl.
AGE OF SURFACE ROCKS: Pennsylvanian.
STRUCTURE: Local folds—terraces, and faults.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Uncorrelated	500		show of gas	1 M. cu. ft.
	600		gas	1-15 M. cu. ft.
	1200		oil	4-100 bbls.
	2000		oil	10-20 bbls.

CHARACTER OF OIL: Gravity -----
CHARACTER OF GAS:
DATE OF OPENING: 1916.
REMARKS: The Francis pool came in as a result of the activity during 1914 and 1915 in the Ada and Allen pools.

FRANKFORT

COUNTY: Osage.
LOCATION: T. 29 N., R. 6 E.
SURFACE ELEVATION: 1,195 feet.
SURFACE FORMATION: Eskridge shale.
AGE OF SURFACE ROCKS: Pennsylvanian.
STRUCTURE: Structural dome.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Big Lime	1535			
Peru	2040	50	oil	10 bbls.
Oswego	2360	40	gas show	
Mississippi	2905	40	oil gas	1-3 M. cu. ft.

CHARACTER OF OIL: Gravity -----
CHARACTER OF GAS:
DATE OF OPENING: 1920.
REMARKS: The Tidal Oil Company has been the chief company in developing the Frankfort pool.

FRENCH

COUNTY: Okmulgee.
LOCATION: T. 11 N., R. 12 E.
SURFACE ELEVATION: 750-900 feet.
SURFACE FORMATION: Wetumka shale.
AGE OF SURFACE ROCKS: Pennsylvanian.
STRUCTURE: Minor folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Salt	1100	75	oil	50-75 bbls.
Booch	1500		gas	2-3 M. cu. ft.
Deaner	2000	20	oil	50-250 bbls.
Kingwood	2570	30	gas	5-10 M. cu. ft.
Lyons-Quinn			gas	10-20 M. cu. ft.
Wilcox	3600	20		

CHARACTER OF OIL: Gravity, 35-38° B.
CHARACTER OF GAS:
DATE OF OPENING: 1912.
REMARKS: After two or three failures to find oil in the area west of Henryetta, M. C. French drilled the first successful well in

sec. 8, T. 11 N., R. 12 E., to a sand at 1,100 feet in depth. Several other wells were drilled to this sand and deeper horizons, all obtaining production.

FUHRMAN

COUNTY: Hughes.
LOCATION: T. 9 N., R. 9 E.
SURFACE ELEVATION: 750-900 feet.
SURFACE FORMATION: Wetumka shale.
AGE OF SURFACE ROCKS: Pennsylvanian.
STRUCTURE: Fault and folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Booch	3100	15		
Deaner	3350	60	oil gas	25-1250 bbls.
Lyons	3580	20		

CHARACTER OF OIL: Gravity, 37.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1925.

REMARKS: The Fuhrman pool was one of the major spots of interest in the latter part of 1925 as a result of the discovery well drilled by the Fuhrman Petroleum Company and the Transcontinental Oil Company in sec. 26, T. 9 N., R. 9 E., for 1,200 barrels of oil per day at a depth of 3,360 to 3,370 feet.

GARBER

COUNTY: Garfield.
LOCATION: T. 22 N., R. 3-4 W.
SURFACE ELEVATION: 1,050-1,150 feet.
SURFACE FORMATION: Lower Enid formation.
AGE OF SURFACE ROCKS: Permian.
STRUCTURE: Garber anticline, subsurface domes.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Kisner	700	10	gas	
Whitney	800	10	gas	
Hoy	1100	20	oil	20-150 bbls.
Hotson	1430	20	oil	20-150 bbls.
Walker	1500	20	oil	10-100 bbls.
Belveal	1600			
Campbell	1700			
Crews	1800			
Garber	2000		oil	15-100 bbls.
Covington	2100			
Hoover	2400	40	oil	25-200 bbls.
Tonkawa	3100	60	oil	

(Table continued on next page)

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton	3617	10	oil	
Oswego	4040-4400	30	oil	
Siliceous	4215-4400	30	oil	
Granite	5462			5-27,000 bbls.

Wilcox is present only on the flanks of the folds.

CHARACTER OF OIL: Gravity, 43° B. Deep sands 41-42.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1917.

PEAK PRODUCTION DATE: November, 1925.

PEAK PRODUCTION: 71,875 barrels.

NUMBER OF WELLS: 760.

REMARKS: The area around the Garber well had been leased rather closely before the Sinclair Oil and Gas Company interests completed the discovery well in sec. 25, T. 22 N., R. 4 W., September, 1917. This well was located on the Hoy farm and the producing sand found at 1,130 to 1,156 feet is named the "Hoy" sand. This well had an initial production of 200 barrels of oil per day and is at present pumping about 5 barrels per day.

The largest initial production of any well in Oklahoma to date was completed by the Sinclair Oil and Gas Company in sec. 18, T. 22 N., R. 3 W., for 27,000 barrels of oil per day in Siliceous limestone at a depth of 4,085-4,110 feet.

GARRISON

COUNTY: Okfuskee.
LOCATION: T. 10 N., R. 9 E.
SURFACE ELEVATION: 750-900 feet.
SURFACE FORMATION: Holdenville formation.
AGE OF SURFACE ROCKS: Pennsylvanian.
STRUCTURE: Subsurface folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Doggett				
Deaner				
Papoose				
Wilcox	3100	50	gas	

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1922.

REMARKS:

GILLILAND

COUNTY: Osage.
LOCATION: T. 23 N., R. 7 E.

SURFACE ELEVATION: 900-1,000 feet.
 SURFACE FORMATION: Buck Creek formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Anticlinal folds and domes.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton	1500	20	gas	
Cleveland	1850	30		
Oswego	2050	60	gas	1 M. cu. ft.
Prue	2240	10		2-2000 bbls.
Bartlesville	2400	15	oil gas	50 bbls.
				1-3 M. cu. ft.
Mississippi	2500	100	oil	20-50 bbls.
Siliceous	2775		oil	300-3500 bbls.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS: Wet. Rock pressure 260 pounds.

DATE OF OPENING: 1919.

REMARKS: The Gilliland pool was discovered by the completion of a well in sec. 36, T. 23 N., R. 7 E., by the Cosden Oil and Gas Company in November, 1919.

GILLETTE

COUNTY: Wagoner.
 LOCATION: T. 17 N., R. 16-17 E.
 SURFACE ELEVATION: 600-700 feet.
 SURFACE FORMATION: Bluejacket formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Small domes and subsurface folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Dutcher	850		gas	1-5 M. cu. ft.
Mississippi	1080			
Chattanooga	1280			
Tyner	1320	200	oil	25-75 bbls.
Burgen	1400	50		

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS: Dry. Rock pressure 185 to 650 pounds.

DATE OF OPENING: 1924.

REMARKS: In May, 1924 the Sewell Petroleum Company discovered production in a well drilled in sec. 30, T. 17 N., R. 17 E., since named the Gillette pool after Carl W. Gillette, an oil operator of Tulsa, Oklahoma. The initial production was 50 barrels of oil per day from the Tyner sand at a depth of 1,354 feet.

GLENN POOL

COUNTY: Creek.
 LOCATION: T. 17 N., R. 12-13 E.

SURFACE ELEVATION: 675-875 feet.
 SURFACE FORMATION: Coffeyville-Wewoka formations.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Anticlinal folding. Minor folds with local variations in dip.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Big Lime	695	4	gas	
Oswego	815	30	oil gas	10-20 bbls.
Perryman	1003	35	oil	
Red Fork	1225	15	oil	
Glenn	1350	20	oil gas	40-600 bbls.
				2-10 M. cu. ft.
Taneha	1550	100	oil	10-100 bbls.
Burgess	1710	25	oil gas	1-4 M. cu. ft.
Mississippi	1875	150	gas	1-6 M. cu. ft.
Sylvan	2100	11		
Wilcox		10	oil gas	70-300 bbls.
Hominy	2160	30	oil	25-100 bbls.
Turkey Mt.	2250	20	oil	30-2000 bbls.

CHARACTER OF OIL: Gravity, 32-38° B. Color: black.

CHARACTER OF GAS: Wet and dry.

DATE OF OPENING: 1905-1906.

PEAK PRODUCTION DATE: June, 1907.

PEAK PRODUCTION: 117,000 barrels.

NUMBER OF WELLS: 2,700.

REMARKS: In the summer of 1905 Robert Galbraith and Frank Chelsey started a test on the Ida Glenn farm 12 miles south of Tulsa. The discovery well completed November, 1905 made 85 barrels of oil per day at a depth of 1,481 feet. The second well on this lease produced 700 barrels of oil, the third 2,000 barrels per day and other large producers followed.

GLENOAK

COUNTY: Nowata.
 LOCATION: T. 26 N., R. 14 E.
 SURFACE ELEVATION: 700-850 feet.
 SURFACE FORMATION: Coffeyville formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Local folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Big Lime	500			
Peru	680		oil	2-10 bbls.
Oswego	880		gas	1-5 M. cu. ft.
Bartlesville	1080		oil	10-50 bbls.
Burgess	1160		oil	5-30 bbls.
Mississippi	1300		gas	1-3 M. cu. ft.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1911.

REMARKS: The Glenoak pool is a small gas area about 2 miles south of the town of Glenoak. It merges into the Hogshooter pool.

GOTEBO

COUNTY: Kiowa.

LOCATION: T. 7 N., R. 16 W.

SURFACE ELEVATION: 1,408 feet.

SURFACE FORMATION: Clear Fork-Wichita formations.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Slight folding, local variations in dip.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Uncorrelated	460	2	oil	20 bbls.
	545	10	gas	1-5 M. cu. ft.
	855	5	gas	1-2 M. cu. ft.
	1337	10	gas	
	1880	10	gas	
	2825	15	oil	10-25 bbls.

CHARACTER OF OIL: Gravity, 20° B.

CHARACTER OF GAS:

DATE OF OPENING: 1908.

REMARKS: The greater part of development in Kiowa County has been confined to the Gotebo pool. At the close of 1925 about 155 wells had been drilled in this area: 72 produced gas, 30 produced oil and the remainder were abandoned or dry holes. The pool is located some 10 miles north of the Wichita uplift.

GRAHAM

COUNTY: Carter.

LOCATION: T. 2-3 S., R. 2-3 W.

SURFACE ELEVATION: 900-1,000 feet.

SURFACE FORMATION: Clear Fork-Wichita formation.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Anticlinal fold.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Shallow	750			
Patsy	985			
Glenn	1300-2400	50+	gas	10-14 M. cu. ft.
	1750-2900	5-100	oil gas	10-950 bbls.
	2100-3350	10-125	oil	3-43 M. cu. ft.
	2700-3700	5-40	oil	15-1200 bbls.
	3370+	10-30	oil	15-100 bbls.
			oil	20-25 bbls.

CHARACTER OF OIL: Gravity, 27-38° B.

CHARACTER OF GAS:

DATE OF OPENING: 1917.

REMARKS: Leases on restricted Indian land had been secured as early as 1913. It was not until April, 1917 that the first well was drilled by Dr. J. E. Bristow in the Graham pool. This well was located in sec. 32, T. 2 S., R. 2 W. It passed through 20 feet of oil sand at a depth of 1,270 feet and produced 3 or 4 barrels of heavy black oil per day. Four similar shallow wells were drilled in the vicinity, then the original well was deepened to 1,490 feet which opened a gas well of 14 million cubic feet of gas per day at 650 pounds rock pressure.

The first commercial oil well was drilled by Roy M. Johnson, after whom the Johnson sand was named, the Healdton Petroleum Company and C. R. Smith, in sec. 31, T. 2 S., R. 2 W. It came in first for 15 million cubic feet of gas at a depth of 1,478 feet and was deepened to 2,539 feet where it had an initial production of 90 barrels of oil per day. This is considered the first well drilled into the sand from which most of the production of the Graham field is secured.

GRANITE

COUNTY: Greer.

LOCATION: T. 6-7 N., R. 20-21 W.

SURFACE ELEVATION: 1,582 feet.

SURFACE FORMATION: Clear Fork-Wichita formations.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Steep dips.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Uncorrelated	196	2	Show of oil	
	330	1	oil	2-3 bbls.
	700	2	gas	½ M. cu. ft.
	875	5	oil	
	970	3	oil	3-5 bbls.
	1085	10	gas	1-2 M. cu. ft.
	1550	40	gas	

CHARACTER OF OIL: Gravity, 19.4° B. Color, black.

CHARACTER OF GAS:

DATE OF OPENING: 1901.

REMARKS: The first wells of the Granite pool were drilled in 1901 and activity has continued intermittently since that date but results have been disappointing for a very small yield of oil and only a few million feet of gas have been obtained. The area is near the west end of the Wichita uplift.

GYPSY HILL

See Salt Creek, page 236

HALLETT

COUNTY: Pawnee.

LOCATION: T. 20 N., R. 7 E.

SURFACE ELEVATION: 850-950 feet.

SURFACE FORMATION: Buck Creek limestone.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Local folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton	1715	30		
Cleveland	2140	25		
Hallett	2210	40		
Peru	2355	45	gas	2-4 M. cu. ft.
Skinner	2565	35	oil	40-100 bbls.
Bartlesville	2688	12		
Wilcox	2880	10		

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1922.

REMARKS: Turner Investment Company drilled the discovery well on the McMillan farm NE. cor. SW.¼ sec. 3, T. 20 N., R. 7 E. It had an initial production of 60 to 75 bbls. from the Cleveland sand, 2,140 to 2,150 feet in depth.

There are two areas of the Hallett pool, the one in sections 21 and 22 is a small oil pool and the other in sections 23 and 26 is a small gas area.

HAMBRO

See Oscar, page 212

HAMILTON SWITCH

COUNTY: Okmulgee.

LOCATION: T. 14 N., R. 12-13 E.

SURFACE ELEVATION: 750-900 feet.

SURFACE FORMATION: Wewoka formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Subsurface domes.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Glenn	1385	150	oil	10-100 bbls.
Roach	1743	10	Show of oil	
Dutcher	2020	20	oil	10-200 bbls.
Wilcox	2700	30		

CHARACTER OF OIL: Gravity, 38.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1909.

REMARKS: In August, 1909, Alex Preston completed the discovery well of the Hamilton Switch pool. It was an edge well in sec. 11, T. 14 N., R. 12 E., and it started development in the area where wells of very large initial production have been obtained.

HANBURY

COUNTY: Comanche.

LOCATION: T. 2 N., R. 9-10 W.

SURFACE ELEVATION: 1,350 feet.

SURFACE FORMATION: Clear Fork-Wichita formations.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Flat dome.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Uncorrelated	1530		show oil gas	
	1640		oil gas	10-100 bbls.
	1860		oil gas	
Pontotoc group	2000	10	oil	20-400 bbls.
	2100		oil gas	

CHARACTER OF OIL: Gravity, 29-40-42° B.

CHARACTER OF GAS:

DATE OF OPENING: 1920.

REMARKS: In the summer of 1920 the Gladys-Belle Oil Company completed the discovery well of this area in sec. 32, T. 2 N., R. 9 W., for 100 (?) barrels of oil in a sand 1,640 feet deep.

In August, 1925, Mr. Hanbury completed a well in sec. 30, T. 2 N., R. 9 W., which had an initial production of 400 barrels of oil per day from a sand 2,010 feet deep. This well started the development which is in progress at present.

HANNA

COUNTY: McIntosh.

LOCATION: T. 9 N., R. 13 E.

SURFACE ELEVATION: 700-800 feet.

SURFACE FORMATION: Stuart shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Local folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Uncorrelated	990	10	gas	
	1350	5	gas	
	3370	10	gas	3-4 M. cu. ft.

CHARACTER OF OIL: Gravity -----
 CHARACTER OF GAS:
 DATE OF OPENING: 1914.
 REMARKS:

HARNES

COUNTY: Grady.
 LOCATION: T. 5 N., R. 7 W.
 SURFACE ELEVATION: 1,185 feet.
 SURFACE FORMATION: Dog Creek shale and Blaine gypsum.
 AGE OF SURFACE ROCKS: Permian.
 STRUCTURE: Grady anticline.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Pontotoc (?)	1950-1970	25	gas	4-10 M. cu. ft.
	1975		oil	30 bbls.

CHARACTER OF OIL: Gravity, 36° B.
 CHARACTER OF GAS:
 DATE OF OPENING: 1925.
 REMARKS: The development in this field is being carried on by Robert Sutton, et al, of Walters, Oklahoma.

HASKELL

COUNTY: Muskogee.
 LOCATION: T. 15-16 N., R. 15 E.
 SURFACE ELEVATION: 600-750 feet.
 SURFACE FORMATION: Stuart shale.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Local folds, fault zone.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Tucker (?)	1360	20	oil	10-100 bbls.
	1850	20	gas	1-20 M. cu. ft.
	1900	15	oil	100-350 bbls.

CHARACTER OF OIL: Gravity -----
 CHARACTER OF GAS:
 DATE OF OPENING: 1909.
 REMARKS: The Haskell pool is about 5 miles southwest of the town of Haskell. This pool might be regarded as an extension of the Bald Hill pool of Okmulgee County.

HEALDTON

COUNTY: Carter.
 LOCATION: T. 3-4 S., R. 2-3-4 W.

SURFACE ELEVATION: 850-1,050 feet.
 SURFACE FORMATION: Clear Fork-Wichita formation.
 AGE OF SURFACE ROCKS: Permian.
 STRUCTURE: Anticlinal folds, two faults.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Upper Penn.	685	5	gas	1-2 M. cu. ft.
	717	10	gas	1-2 M. cu. ft.
	920	30	oil	5-20 bbls.
	1025		oil	20-100 bbls.
Glenn	1130		oil	10-3000 bbls.
	1320		oil	10-40 M. cu. ft.
Healdton zone	1730		oil	20-250 bbls.
	2000		oil	10-20 M. cu. ft.
Ordovician	2220	175	oil show	10-560 bbls.
	2375	10	oil	10-250 bbls.
	3076	50	oil	
	3500	400	oil	

CHARACTER OF OIL: Gravity, 30-31.9° B. Gasoline content, 15%.
 CHARACTER OF GAS:
 DATE OF OPENING: 1913.

REMARKS: The discovery well of the Healdton field was completed August, 1913, at a depth of 919 feet for 100 barrels of oil per day. This well was drilled on the Wirt Franklin, et al lease by J. M. Critchlow of the Red River Oil Company, who had been induced to undertake the test by Roy M. Johnson, Edward Galt, and Wirt Franklin.

Healdton has been referred to as a "buried hill." The topographic contours on "Healdton Hill" determined from elevations on the Arbuckle and Viola limestones coincide closely with the structural contours on the producing horizons.

HECTOR

COUNTY: Okmulgee.
 LOCATION: T. 16 N., R. 13 E.
 SURFACE ELEVATION: 650-750 feet.
 SURFACE FORMATION: Wewoka formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Local folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Salt	800	100	oil show	8 bbls.
Glenn	1200	60	oil gas	
Booch	1650	50	oil	
Dutcher	1717	3	oil	10-150 bbls

(Table continued on next page)

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Mississippi	1862	70	oil	10-75 bbls.
Wilcox	1240	30	oil	50-250 bbls. 1-8 M. cu. ft.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1918.

REMARKS: The first production in commercial quantity was reported in June, 1914 by the Buck Petroleum Company.

HENRYETTA

COUNTY: Okmulgee.

LOCATION: T. 11 N., R. 12 E.

SURFACE ELEVATION: 600-850 feet.

SURFACE FORMATION: Stuart-Boggy shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Local folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Sand	1200	50	gas	½-2 M. cu. ft.
Glenn-Salt	1500			
Booch	2070	30	gas	1-3 M. cu. ft.
Dutcher	2460	60	gas	
Lyons-Quinn	2630	20	oil gas	10-700 bbls. 1-5 M. cu. ft.
Hunton	2700	10		
Wilcox	2410	15		1-4 M. cu. ft.
Siliceous	2545	5		1-6 M. cu. ft.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS: Rock pressure 750 pounds.

DATE OF OPENING: 1910.

REMARKS: The discovery well of the Henryetta pool was drilled in 1910 and produced 600 barrels per day. It was followed by a gas well with a capacity of 80 million cubic feet per day.

Development continued to 1913 when a total of 471 wells were completed. A decline came in 1914 but with the discovery of deeper production new development was started in 1920.

HEWITT

COUNTY: Carter.

LOCATION: T. 4 S., R. 2 W.

SURFACE ELEVATION: 850-950 feet.

SURFACE FORMATION: Clear Fork-Wichita formation.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Two anticlinal domes connected by a saddle.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Shallow	400	20	gas	1-3 M. cu. ft.
600 Foot	600	30	gas	2-10 M. cu. ft.
2 Strays	920-1130	20-60	oil	25-200 bbls.
1st Hewitt	1200-2000		oil	10-150 bbls.
2nd	2090	15		20-50 bbls.
3rd	2170	20	oil	30-200 bbls.
4th	2200	15	oil	10-50 bbls.
5th	2250	30	oil	200 bbls.
6th	2300	50	oil	90-400 bbls.
7th	2700	40		100-400 bbls.

CHARACTER OF OIL: Gravity, 32-33.9° B.

CHARACTER OF GAS:

DATE OF OPENING: June, 1919.

REMARKS: The Hewitt pool, the second largest field in southern Oklahoma, was opened early in 1919. In 1923 the Ordovician horizon was found productive in the Hewitt pool, and in May, 1924 one of the largest wells actually gauged in Oklahoma was completed in sec. 21, T. 4 S., R. 2 W., for 12,800 barrels of oil per day at a depth of 2,940 feet.

HICKORY CREEK

COUNTY: Osage.

LOCATION: T. 29 N., R. 11 E.

SURFACE ELEVATION: 700-900 feet.

SURFACE FORMATION: Nelagoney formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticlinal folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Big Lime	550		gas	1 M. cu. ft.
Peru	750		oil show	
Oswego	900	30	oil gas	1 M. cu. ft.
Bartlesville	1000	45	oil	75-125 bbls.
Mississippi	1300		oil gas	8-200 bbls. 1-3 M. cu. ft.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1914.

REMARKS: The Hickory Creek pool is located in an area of antilinal structures having in general a north-south trend.

HOFFMAN

COUNTY: Okmulgee.

LOCATION: T. 12 N., R. 14 E.

SURFACE ELEVATION: 600-800 feet.

SURFACE FORMATION: Stuart shale and Senora formation.
AGE OF SURFACE ROCKS: Pennsylvanian.
STRUCTURE: Subsurface dome.

PRODUCING		INITIAL		
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
Salt-Glenn	900-1000	60	gas	1-6 M. cu. ft.
Booch	1120	40	gas	1-3 M. cu. ft.
Dutcher	1780	10	oil gas	20-60 bbls. 1-18 M. cu. ft.
Lyons-Quinn	2250		gas	10-30 M. cu. ft.
Wilcox	2900	50	oil	200 bbls.

CHARACTER OF OIL: Gravity -----.

CHARACTER OF GAS: Dry. Rock pressure 540 to 600 pounds.

DATE OF OPENING: 1917.

REMARKS: The Hoffman pool is an extension of the Coalton and Henryetta pools. Wilcox sand production was discovered by deepening the Sterling Oil and Gas Company's well in sec. 30, T. 12 N., R. 14 E., May, 1925. This well produced 30 to 90 barrels of oil per day at a depth of 2,844 to 2,850 feet.

HOGSHOOTER

COUNTY: Washington.

LOCATION: T. 25-26 N., R. 13-14 E.

SURFACE ELEVATION: 700-850 feet.

SURFACE FORMATION: Coffeyville-Hogshooter limestone.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticlinal folds.

PRODUCING		INITIAL		
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
Layton	500			
Big Lime	460			
Oswego	680		gas	5-10 M. cu. ft.
Bixler	710			
	880		gas	5-7 M. cu. ft.
Bartlesville	1080		oil	10-500 bbls.
Burgess	1160		gas	5-15 M. cu. ft.

CHARACTER OF OIL: Gravity -----.

CHARACTER OF GAS:

DATE OF OPENING: 1907.

REMARKS: The Hogshooter pool is situated on both sides of Hogshooter Creek in southeastern Washington County. The developed area is about 12 miles in length and is now continuous with the Dewey-Bartlesville pool to the north. Only the northern part of the pool produces oil, the southern and larger portion of the field constituting one of the largest gas fields in the State.

The gas has been piped to Bartlesville, Dewey and Miami for use in smelters; to Joplin, St. Joseph and Kansas City, Missouri; also to southeastern Kansas.

HOLDENVILLE

COUNTY: Hughes.

LOCATION: T. 7 N., R. 8-9 E.

SURFACE ELEVATION: 750-950 feet.

SURFACE FORMATION: Wewoka formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Monocline with varying dips and faults.

PRODUCING		INITIAL		
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
Glenn (f)	2660		oil	10 bbls.
Booch	3030		gas	1-3 M. cu. ft.
Gilcrease	3175		oil show	
Smith	3940	8	oil	
Hunton	4000	50	oil gas	10-300 bbls.
Sylvan	4050			
Viola	4100			
Wilcox	4180	20	oil	10-4000 bbls.

CHARACTER OF OIL: Gravity, 38-38.9° B.

CHARACTER OF GAS: Wet.

DATE OF OPENING: 1916.

REMARKS: One of the first wells in the Holdenville pool was drilled by the Penn-West Oil Company in sec. 4, T. 7 N., R. 8 E., with a production of 16 million cubic feet of gas per day and 5 barrels of oil.

The Holdenville area contains many small structures with possibilities of much production in the sands as yet not penetrated, and in the deeper sands exploited since 1924.

HOLM-JARVIS
See Road, page 234

HOMER

COUNTY: Carter.

LOCATION: T. 1 S., R. 2 W.

SURFACE ELEVATION: 900-1,000 feet.

SURFACE FORMATION: Pontotoc series.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Plunging anticline.

PRODUCING		INITIAL		
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
Pontotoc	480	20	oil	1-5 bbls.

CHARACTER OF OIL: Gravity, 22° B.

CHARACTER OF GAS:

DATE OF OPENING: 1916.

REMARKS: The Homer pool is a small area. At present there are only two wells and these are pumped infrequently, producing 2 to 4 barrels of oil at each pumping. The oil has a very high lubricating content. It is hauled to Davis by truck and shipped from there.

HOMINY

COUNTY: Osage.

LOCATION: T. 22 N., R. 8-9 E.

SURFACE ELEVATION: 800-1,000 feet.

SURFACE FORMATION: Pawhuska limestone, Elgin sandstone.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticlinal folds, domes, and faults.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Cleveland	1450	110	gas show	
Peru	1720	25	oil	10-40 bbls.
Oswego	1870	75	gas	1-6 M. cu ft.
Bartlesville	2040	10	oil	1-25 bbls.
Mississippi	2265	300	oil	10-2500 bbls.
Chattanooga	2300	20		
Hominy	2540	60	oil	20-300 bbls.
Siliceous	2609	70	oil	50 bbls.

CHARACTER OF OIL: Gravity, 35.5° B.

CHARACTER OF GAS: Wet.

DATE OF OPENING: 1916.

REMARKS: The Hominy pool was opened in 1916 with the principal production from the Mississippi limestone which produced wells of several hundreds of barrels of oil per day.

HOMINY FALLS

COUNTY: Osage.

LOCATION: T. 21-22 N., R. 11-12 E.

SURFACE ELEVATION: 700-900 feet.

SURFACE FORMATION: Ochelata formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticlinal folds and domes.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Cleveland	1974	20	oil show	
Oswego	1215	60		
Bartlesville	1390	20	oil	
Taneha	1590	55	oil gas	10-125 bbls. 1-8 M. cu. ft.

(Table continued on next page)

HORIZONS PRODUCING	DEPTH	THICKNESS	PRODUCTION	PRODUCTION INITIAL
Burgess	1750	10	oil	10-50 bbls.
Mississippi	2045	20	oil	
Siliceous	2472			

CHARACTER OF OIL: Gravity, -----.

CHARACTER OF GAS:

DATE OF OPENING: 1919.

REMARKS:

HUBBARD or RETTA

COUNTY: Kay.

LOCATION: T. 26 N., R. 2 W.

SURFACE ELEVATION: 1,030 feet.

SURFACE FORMATION: Lower Enid formation.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Anticline and fault.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Tonkawa	2640	60	oil	100-800 bbls.
Layton	2990	90	oil	100-200 bbls.
Wilcox	3550	50	oil	300-1300 bbls.
Siliceous	3700		oil	50-600 bbls.

CHARACTER OF OIL: Gravity, 36-37.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1925.

REMARKS: The discovery well of this pool is the Hubbard No. 1, in sec. 12, T. 16 N., R. 2 W., one and a half miles from the town of Retta. The first Wilcox sand well was completed September, 1926 with an initial production of 600 barrels of oil per day. At present the pool has not been defined.

HUMBLE or SEAY

COUNTY: Jefferson.

LOCATION: T. 7 S., R. 5-6 W.

SURFACE ELEVATION: 750-850 feet.

SURFACE FORMATION: Clear Fork-Wichita (Cisco) formations.

AGE OF SURFACE ROCKS: Permian or late Pennsylvanian.

STRUCTURE: Anticlinal axis and folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Uncorrelated	600	3	gas	10-45 M. cu. ft.
	790	10	gas	10-15 M. cu. ft.
	820		gas	20-70 M. cu. ft.
	1100	5	oil gas	10 bbls. 10-70 M. cu. ft.

(Table continued on next page)

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Uncorrelated	1425	3	oil show oil show gas pink granite	1-3 M. cu. ft.
	1850			
	1980			

CHARACTER OF OIL: Gravity -----.

CHARACTER OF GAS: Dry. Rock pressure 350 to 450 pounds.

DATE OF OPENING: 1924.

REMARKS: The Marion Oil, Gas and Mining Company drilled the first well in the Seay pool. Much salt water was encountered and a showing of gas at 1,535 feet. This well was completed in March, 1917 at a depth of 2,000 feet as a dry hole.

The Seay pool was discovered in September, 1924 on the Seay farm. The Humble Oil and Refining Company have developed the greater portion of the area to the present date.

INDEPENDENT Sheridan

COUNTY: Okmulgee.

LOCATION: T. 16 N., R. 12 E.

SURFACE ELEVATION: 700-760 feet.

SURFACE FORMATION: Coffeyville formation, Checkerboard limestone.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Subsurface dome.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Glenn	1480	170		
Taneha	1830	45		
Dutcher	2100	55	oil gas	50-100 bbls. 1-5 M. cu. ft.
Wilcox	2550		oil	40-70 bbls.

CHARACTER OF OIL: Gravity -----.

CHARACTER OF GAS:

DATE OF OPENING: 1908.

REMARKS: The Independent pool is an extension of the production from the Mounds pool in Creek County. The Sheridan pool is located on the same structure as the Independent pool and produces from the Wilcox sand at about the same depth.

INGALLS

COUNTY: Payne.

LOCATION: T. 19 N., R. 4 E.

SURFACE ELEVATION: 800-1,140 feet.

SURFACE FORMATION: Eskridge shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Ingalls dome.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Oswego	3115		oil	
Skinner	3350		oil	
Bartlesville	3400		oil	50-100 bbls.
Misener sand	3680			
Wilcox sand	3760		oil	100-300 bbls.

CHARACTER OF OIL: Gravity, 36-37.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1914.

REMARKS: The Roxana Petroleum Company drilled the discovery well of the Ingalls pool in sec. 34, T. 19 N., R. 4 E., near the apex of the dome. The well was drilled to a depth of 1,825 feet and the gas production amounted to 15 million cubic feet of gas per day. Wilcox sand production was discovered in 1925 at depths between 3,690 and 3,800 feet.

INOLA

COUNTY: Rogers.

LOCATION: T. 19 N., R. 16 E.

SURFACE ELEVATION: 700-800 feet.

SURFACE FORMATION: Cherokee shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Local variations in normal dip.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Bartlesville	540	60	oil gas	2-20 bbls. 1-2 M. cu. ft.
Burgess	670	20	oil	1-30 bbls.
Mississippi	750	30	gas	2-4 M. cu. ft.

CHARACTER OF OIL: Gravity -----.

CHARACTER OF GAS: Wet. Rock Pressure: 95 to 150 pounds.

DATE OF OPENING: 1913.

REMARKS: Southeast of the town of Inola is a small area of oil production and southwest of the town is a small area of oil and gas production. The southwest area bordering the east side of the Verdigris River is the main Inola pool.

IRON POST

COUNTY: Creek.

LOCATION: T. 14 N., R. 8 E.

SURFACE ELEVATION: 750-950 feet.

SURFACE FORMATION: Pawhuska and Ochelata formations.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Subsurface folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton	1478	25		
Cleveland	2320	100	oil	
Wheeler	2420	25	oil	40-100 bbls.
Prue	2475	50	oil	5-25 bbls.

CHARACTER OF OIL: Gravity, 36.7° B.

CHARACTER OF GAS:

DATE OF OPENING: 1917.

REMARKS: The Iron Post pool is located in sections 24, 25, 35 and 36, T. 14 N., R. 8 E., and is now merging into the Billingslea pool. An iron location post in section 36 contributes the name of the pool.

JENKS

COUNTY: Tulsa.

LOCATION: T. 18 N., R. 13 E.

SURFACE ELEVATION: 600-800 feet.

SURFACE FORMATION: Broken Arrow formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Local folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Skinner	1000			
Red Fork	1400	20	oil	20-40 bbls.
Bartlesville	1600	40	oil	40-100 bbls.
Dutcher	1750	60	oil gas	10-200 bbls.
Mississippi	1800	40	oil gas	1-6 M. cu. ft. 5-40 bbls. 1-2 M. cu. ft.
Tyner	2100			
Siliceous	2350			

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS: Wet. Rock pressure 340 to 720 pounds.

DATE OF OPENING: 1901.

REMARKS: The Jenks pool is always closely associated with the Red Fork pool of Tulsa which was one of the first pools to be developed in the State.

JENNINGS

COUNTY: Pawnee-Creek.

LOCATION: T. 19-20 N., R. 7 E.

SURFACE ELEVATION: 750-1,000 feet.

SURFACE FORMATION: Buck Creek limestone.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Local folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Oswego	2300	100		
Skinner	2500	55	oil	20-200 bbls.
Bartlesville	2685	15	oil gas	100-400 bbls. 1-3 M. cu. ft.
Taneha	2800	50	oil	
Burgess	3000	15		
Mississippi	3100			
Wilcox	3260			

CHARACTER OF OIL: Gravity, 36-37.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1916.

REMARKS: The Jennings pool was established by the Republic Oil & Pipe Line Company in sec. 21, T. 20 N., R. 7 E., with a well having an initial production of 200 barrels of oil per day. Several small oil wells and two gas wells had been drilled in the area in the year 1916 prior to the large producer.

JOLLY-OGG

See Bald Hill, page 109

JOLLY-PATTON

Bradley

COUNTY: Muskogee.

LOCATION: Secs. 5, 6, 7, and 8, T. 14 N., R. 19 E.

SURFACE ELEVATION: 550 feet.

SURFACE FORMATION: Winslow formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Subsurface folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Sand	512	20	oil	150 bbls.
Muskogee	675	12	oil	150 bbls.
Timber Ridge	707	10	oil	150 bbls.

CHARACTER OF OIL: Gravity 43° B.

CHARACTER OF GAS:

DATE OF OPENING: August, 1920.

REMARKS: In Sept. 1927, 16 wells had been drilled. The maximum production, obtained Aug., 1927, amounted to 280 barrels. The field was extended in Feb., 1928 with the discovery of the 500-foot sand in section 6.

JOSEY

COUNTY: Okfuskee.
 LOCATION: T. 12 N., R. 11 E.
 SURFACE ELEVATION: 700-800 feet.
 SURFACE FORMATION: Wewoka formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Local anticlinal structures.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Deaner	2735	80	gas	1-20 M. cu. ft.
Lyons	2980	50	oil	25-190 bbls.
Sylvan	3425	40		
Wilcox	3500-3600			

CHARACTER OF OIL: Gravity 40.9° B.
 CHARACTER OF GAS: Wet.
 DATE OF OPENING: 1923 (?)
 REMARKS: This pool was opened by the Josey Oil Co., in 1923 or 1924 under the direction of D. H. Radcliff.

KEEFETON

COUNTY: Muskogee.
 LOCATION: Sec. 14, T. 13 N., R. 18 E.
 SURFACE ELEVATION: 550-600 feet.
 SURFACE FORMATION: Winslow formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Subsurface folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Sand	748	11	gas	12 M. cu. ft.

CHARACTER OF OIL: Gravity,-----
 CHARACTER OF GAS:
 DATE OF OPENING: December, 1925.
 REMARKS: Three or four wells now producing.

KELLYVILLE

COUNTY: Creek.
 LOCATION: T. 17 N., R. 10 E.
 SURFACE ELEVATION: 700-850 feet.
 SURFACE FORMATION: Oologah limestone.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Anticlinal folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Oswego	1560	30	oil gas	20-30 bbls. 1-8 M. cu. ft.
Red Fork	2010	30	oil	10-100 bbls.

(Table continued on next page)

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Glenn	2140	40	oil	10-50 bbls.
Dutcher	2450	30	oil	50-200 bbls.
Mississippi	2800	40	oil gas	10-40 bbls. 1 M. cu. ft.
Chattanooga	2880			
Wilcox	2933-3100			

CHARACTER OF OIL: Gravity, 30-32.9° B.
 CHARACTER OF GAS: Dry. Rock pressure 450 to 720 pounds.
 DATE OF OPENING: 1915.

REMARKS: In the northeastern part of Creek county are two small oil areas which comprise the Kellyville pool. The discovery well was completed by the Aiko Oil and Gas Company, April, 1925, in sec. 11, T. 17 N., R. 10 E., at a depth of 1,605 feet, where a small amount of gas was encountered.

KENDRICK or SKELLY-FORD

COUNTY: Lincoln.
 LOCATION: T. 15 N., R. 6 E.
 SURFACE ELEVATION: 800-900 feet.
 SURFACE FORMATION: Salt Creek formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Local variations from normal monoclinial structure.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Prue	2500	40	oil gas	1 M. cu. ft.
Bartlesville	3150	60	oil	
Taneha	3300	60	oil	
Dutcher	3775	10	oil	
Mississippi	3850	50	gas	
Chattanooga	4050	6	oil show	
Hunton	4090		oil	100-900 bbls.
Wilcox	4120	20	oil	100-600 bbls.
Siliceous	4360	20	oil	20 bb's

CHARACTER OF OIL: Gravity, 43° B.
 CHARACTER OF GAS:
 DATE OF OPENING: 1925.
 REMARKS: The Kendrick pool was opened by the Skelly Oil Company on the Rhoda Ford farm, 5 miles east of the town of Kendrick, August, 1925.

KEYSTONE

COUNTY: Pawnee.
 LOCATION: T. 20 N., R. 9-10 E.
 SURFACE ELEVATION: 700-850 feet.
 SURFACE FORMATION: Coffeyville and Nelagoney formations.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Minor folds.

AGE OF SURFACE ROCKS: Pennsylvanian.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton	1080			
Cleveland	1100	45	oil gas	4-100 bbls. 1-6 M. cu. ft.
Oswego	1250	60	oil	10-85 bbls.
Red Fork	1710	55	gas	
Skinner	1800	20	oil gas	1-2 M. cu. ft.
Mississippi	1970	55	oil gas	30-60 bbls. 1-2 M. cu. ft.
Wilcox	2525	10	oil show	
Turkey Mt.	2640	10		

CHARACTER OF OIL: Gravity, 36-37.9° B.

CHARACTER OF GAS: Dry. Rock Pressure 125 to 750 pounds.

DATE OF OPENING: 1919.

REMARKS: The records show that Pomeroy & Hamilton completed the first well in the Keystone pool November, 1919 in sec. 25, T. 20 N., R. 9 E., for 50 barrels of oil per day in sand at 1,160 to 1,166 feet in depth. This company drilled a number of wells on the Appalachia townsite north of Keystone which were all productive of either oil or gas.

KIEFER

COUNTY: Creek.

LOCATION: T. 17 N., R. 11-12 E.

SURFACE ELEVATION: 700-850 feet.

SURFACE FORMATION: Coffeyville formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticlinal folds and terraces.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Dawson	575	10		
Big Lime	1271	20		
Oswego	1485	30	gas	1 M. cu. ft.
Perryman	1520	20		
Red Fork	1850	20	oil	10-60 bbls.
Glenn	1890	100	gas	1-7 M. cu. ft.
Taneha	1990	20	oil gas	15-100 bbls. 1-30 M. cu. ft.
Dutcher	2100	50	oil gas	50-90 bbls. 1 M. cu. ft.
Mississippi	2290	10		
Hunton	2500	70		
Wilcox	2600	10	oil gas	10-50 bbls. 1-3 M. cu. ft.
Siliceous	2960	20		

CHARACTER OF OIL: Gravity, 32-33.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1910.

REMARKS: The Kiefer pool is rather a spotted area belonging to the Sapulpa District. The development in this area was a result of the Glenn pool success.

KILGORE

COUNTY: Grady-Stephens.

LOCATION: T. 3 N., R. 5 W.

SURFACE ELEVATION: 1,150-1,250 feet.

SURFACE FORMATION: Chickasha-Duncan formations.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Faulted anticline.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Permian	1000			
Unconformity	1550		gas	2-10 M. cu. ft.
	1725	25	oil gas	30-200 bbls.
Pontotoc (†)	1850	30	oil	1-5 M. cu. ft.
	1990	10	oil gas	20-200 bbls.
	2200	10	oil	11-42 M. cu. ft. 50-500 bb'a.

CHARACTER OF OIL: Gravity, 30-31.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1919.

REMARKS: In 1916 the southern end of the Grady anticline was mapped for the A. T. & S. F. Railway Company. They drilled several wells along the Grady-Stephens County line north of Kilgore with showings in three of them. Activity was intermittent until 1924 when Walter Critchlow of Ardmore completed a 42 million cubic foot gas well in sec. 27, T. 3 N., R. 5 W., on a structure mapped by Clyde Becker in 1921.

KNOX

COUNTY: Stephens.

LOCATION: T. 2 N., R. 5 W.

SURFACE ELEVATION: 1,150-1,250 feet.

SURFACE FORMATION: Chickasha-Duncan formations.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Anticline.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Pontotoc (†)	1330	5	gas	1-3 M. cu. ft.
	1706	50	oil	50-200 bbls.
	2092	10	oil	50-100 bbls.

CHARACTER OF OIL: Gravity 33-38° B.

CHARACTER OF GAS: Wet.

DATE OF OPENING: 1916.

REMARKS: In 1924, Walter H. Gant and associates began the development of the Knox pool with a well in sec. 2, T. 2 N., R. 5 W., just across the Stephens County line. This well was completed in sand at a depth of 1,210 to 1,213 feet for 7 million cubic feet of gas per day and it soon began showing oil. This favorable showing resulted in the Carter Oil Company buying half interest in the property and the establishment of the Carter-Knox Petroleum Company. The developments of this company brought the field into prominence.

KUSA

COUNTY: McIntosh.

LOCATION: T. 11 N., R. 14 E.

SURFACE ELEVATION: 550-850 feet.

SURFACE FORMATION: Stuart and Boggy shales and Thurman sandstone.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Local variations in normal dip.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Salt or Glenn	700	150	gas	1.5 M. cu. ft.
Booch	1400	40	gas	1-20 M. cu. ft.
Dutcher	1800	25	oil	50 bbls.

CHARACTER OF OIL: Gravity -----.

CHARACTER OF GAS:

DATE OF OPENING: 1914.

REMARKS: The Gundich Oil Company has the credit of discovering the first oil in the Kusa pool with a well in sec. 6, T. 11 N., R. 14 E., which was completed for 400 barrels of oil per day. Considerable gas has been found in this area.

LANDON

COUNTY: Osage.

LOCATION: T. 28 N., R. 9 E.

SURFACE ELEVATION: 850-1,000 feet.

SURFACE FORMATION: Pawhuska formation, Elgin sandstone.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Minor folds and possible faults.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
	1660	50	oil	10-50 bbls.
Peru	1770	20	oil gas	1 M. cu. ft.
Oswego	1950	15	oil gas	15-25 bbls.
				5 M. cu. ft.

(Table continued on next page)

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Bartlesville	2890	10	oil gas	15-40 bbls.
Mississippi Wilcox	3390	285	oil show	1-3 M. cu. ft.

CHARACTER OF OIL: Gravity -----.

CHARACTER OF GAS:

DATE OF OPENING: 1914.

REMARKS: The Landon pool is named from the principal operator of the area, A. M. Landon. Most of the production has been drilled by the Wiser Oil Company.

LAUDERDALE

COUNTY: Pawnee.

LOCATION: T. 20-21 N., R. 7-8 E.

SURFACE ELEVATION: 750 feet.

SURFACE FORMATION: Elgin sandstone.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Local variations in normal dip (dome).

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton	1185	15	oil gas	25 bbls.
Cleveland	1611	50	oil	50 bbls.
Oswego	1920	20		
Skinner	2275	25	oil	10-25 bbls.
Bartlesville	2350	25	oil gas	70-100 bbls.
				2 M. cu. ft.
Wilcox	2450	30	oil	25-600 bbls.
Siliceous	3000	25	oil	10 bbls.

CHARACTER OF OIL: Gravity -----.

CHARACTER OF GAS:

DATE OF OPENING: 1915.

REMARKS: Charles Page completed the discovery well of the Lauderdale pool in sec. 34, T. 20 N., R. 8 E., at a depth of 1,400 feet for 2 million cubic feet of gas.

LAWTON

COUNTY: Comanche.

LOCATION: T. 2-3 N., R. 10-11 W.

SURFACE ELEVATION: 763 feet.

SURFACE FORMATION: Clear Fork-Wichita formations.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Flat dome.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Uncorrelated	161-180	10	oil	1-3 bbls.
	244-255	13	oil	2-6 bbls.
	380-400	20	oil gas	1-5 bbls.
	800-1000	50	oil	1-2 M. cu. ft.
	1250	30	oil show	5-10 bbls.

CHARACTER OF OIL: Gravity, 28-30° B.

CHARACTER OF GAS:

DATE OF OPENING: 1904.

REMARKS: The first well of the Lawton pool was drilled by the Lawton Natural Gas Company, August, 1904 in sec. 6, T. 1 N., R. 10 W., just 5 miles east of the town. It had a production of ½ million cubic feet of gas per day, with rock pressure of 125 pounds at a depth of 400 feet. Later in the year the second well was completed southeast of the first well but gas was not found, although a small amount of heavy black oil was obtained. Nothing more was done in the pool until 1916.

LENAPAH

COUNTY: Nowata.

LOCATION: T. 27 N., R. 15 E.

SURFACE ELEVATION: 700-900 feet.

SURFACE FORMATION: Coffeyville formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Minor folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Oswego	355	30	gas	1 M. cu. ft.
Squirrel	670	20	gas	1-3 M. cu. ft.
Bartlesville	940	35	oil gas	1-60 bbls.

CHARACTER OF OIL: Gravity, 32° B.

CHARACTER OF GAS:

DATE OF OPENING: 1904.

REMARKS: The Lenapah pool was among the early developments of northeastern Oklahoma. The first large well of the area was drilled by the Bearea Oil and Gas Company in sec 2, T. 27 N., R. 15 E., for 500 barrels of oil per day at a depth of 982 feet, November, 1910.

LEONARD

COUNTY: Tulsa.

LOCATION: T. 17 N., R. 14 E.

SURFACE ELEVATION: 950-1,000 feet.

SURFACE FORMATION: Stuart shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Local folds, lenticular sands.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton	1220	10	oil	60-100 bbls.
Oswego	1365	5	gas	1-15 M. cu. ft.
Red Fork	1430	20	oil	3-120 bbls.
Bartlesville	1500	22	oil gas	10-150 bbls.
Mississippi	1890	10		1-17 M. cu. ft.
Wilcox	2100			
Siliceous lime	2300			

CHARACTER OF OIL: Gravity -----.

CHARACTER OF GAS:

DATE OF OPENING: 1916.

REMARKS: The Leonard pool is a small spotted area one mile south of the town of that name. One of the early wells of the pool was reported for 1,200 barrels of oil per day. The most active development was in 1916 and 1917.

LIMA

COUNTY: Seminole.

LOCATION: T. 8 N., R. 7 E.

SURFACE ELEVATION: 850-1,000 feet.

SURFACE FORMATION: Pontotoc group.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Subsurface folding and faulting.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Gilcrease	3170	20	oil	50-80 bbls
Zone	3240	15	oil	15-300 bbls

CHARACTER OF OIL: Gravity -----.

CHARACTER OF GAS:

DATE OF OPENING: 1927.

REMARKS: The Lima pool was discovered by the Magnolia Petroleum Company April, 1925, by the completion of a 75 barrel oil well in sec. 15, T. 8 N., R. 7 E., in the Hunton limestone at a depth of 3,188 feet. This well is two miles east of Lima and the nearest production is the Wewoka pool.

LINK

COUNTY: Muskogee.

LOCATION: Secs. 32 and 33, T. 15 N., R. 15 E.

SURFACE ELEVATION: 600-650 feet.

SURFACE FORMATION: Stuart shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Probable subsurface faulting.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Sand	2044	8	oil	90-100 bb's.

CHARACTER OF OIL: Gravity,-----

CHARACTER OF GAS:

DATE OF OPENING:

REMARKS: Present production about 25 barrels.

LITTLE RIVER

COUNTY: Seminole.

LOCATION: T. 7-8 N., R. 6 E.

SURFACE ELEVATION: 850-1,000 feet.

SURFACE FORMATION: Pawhuska and Ochelata formations.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Probable subsurface structures.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Chattanooga	2750	20	oil	50-120 bbls.
Sylvan	4320	45		
Viola	4365	65		
Wilcox	4457	3	oil	100-6000 bb's.

CHARACTER OF OIL: Gravity, 6.5-38°.

CHARACTER OF GAS:

DATE OF OPENING: 1927.

REMARKS: The Indian Territory Illuminating Oil Company discovered the Little River pool in March, 1927 by the completion of a well which produced 6,000 barrels of oil per day in the Wilcox sand at a depth of 4,017 to 4,027 feet. This well was located in sec. 1, T. 7 N., R. 6 E., and was one of the largest initial producers in the State.

LOCO

COUNTY: Stephens.

LOCATION: T. 3 S., R. 5 W.

SURFACE ELEVATION: 875-975 feet.

SURFACE FORMATION: Clear Fork-Wichita formation.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Loco anticline; faulting.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Permian	600			
Glenn	700	25	gas	1.5 M cu. ft.
	850	10	oil	
	980	5	oil	1-15 bbls.
Ordovician (?)	1550	15	oil	1-5 bbls.
	1550	15		

CHARACTER OF OIL: Gravity, 28-32° B. Color, black.

CHARACTER OF GAS:

DATE OF OPENING: 1913.

REMARKS: In 1903 a refinery was built to develop the asphalt deposits in T. 3 S., R. 4 W., this being the first move to promote the petroleum possibilities of this region.

In 1913 the Oklahoma Diamond Oil and Gas Company completed several gas wells in sections 13 and 14, T. 3 S., R. 5 W. Oil was discovered by the Owl Oil Company in 1915 in sec. 9, T. 3 S., R. 5 W. Development in the Loco pool has been slow due to the small initial production of the wells and the extremely low gravity of the oil.

LOVELL

See Crescent, page 138

LUCKY POOL

See Okmulgee, page 208

LYONS-QUINN

COUNTY: Okmulgee-Okfuskee.

LOCATION: T. 11 N., R. 11-12 E.

SURFACE ELEVATION: 750-850 feet.

SURFACE FORMATION: Seminole formation, Holdenville shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Lyons dome, Quinn dome.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Deaner	1820		oil	
Lyons	2600	25	oil	50-700 bbls.
Jefferson	2700	25	gas	2.7 M. cu. ft.
Ingram	2850		gas	5-45 M. cu. ft.
Viola limestone	3350			
Wilcox sand	3400		gas	

CHARACTER OF OIL: Gravity, 38-39.9° B.

CHARACTER OF GAS: Dry. Rock pressure: 1,000 to 1,300 pounds.

DATE OF OPENING: 1921.

REMARKS: The discovery well of the Lyons-Quinn pool was completed by the Independent Oil and Gas Company, November, 1921.

The initial production was 700 barrels of oil per day in the Lyons sand, located in sec. 13, T. 11 N., R. 11 E. Practically all the oil wells in the pool were drilled before the discovery of the "deep gas" well in sec. 13, T. 11 N., R. 11 E., completed May, 1922, by the Waite Phillips Petroleum Company. The open flow volume of this well was 7 million cubic feet of gas per day with a rock pressure of 1,100 pounds.

MADALENE

COUNTY: Osage.
LOCATION: T. 21 N., R. 10 E.
SURFACE ELEVATION: 750-850 feet.
SURFACE FORMATION: Oologah formation.
AGE OF SURFACE ROCKS: Pennsylvanian.
STRUCTURE: Anticlinal folds, and faults.

PRODUCING				INITIAL
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
Oswego	1475	150	gas	1-10 M. cu ft.
Prue	1535	65	gas	
Bartlesville	1900	35	oil	10-30 bbls.
Tyner	2450	75		
Turkey Mt.	2580	20		

CHARACTER OF OIL: Gravity -----
CHARACTER OF GAS:
DATE OF OPENING: 1920.
REMARKS:

MADILL

COUNTY: Marshall.
LOCATION: T. 5 S., R. 5 E.
SURFACE ELEVATION: 700-750 feet.
SURFACE FORMATION: Goodland limestone.
AGE OF SURFACE ROCKS: Cretaceous.
STRUCTURE: Madill anticline.

PRODUCING				INITIAL
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
Goodland	120		show of gas	
Trinity (base)	402		oil	5-20 bbls.
Caney	500-1450		gas	½-1 M. cu. ft.

CHARACTER OF OIL: Gravity, 42-65° B. High gasoline content.
CHARACTER OF GAS:
DATE OF OPENING: 1906.

REMARKS: Prior to the discovery of the Cushing pool the Madill pool was producing the highest grade of oil in the State, but in quantities too small to receive much consideration. The porous con-

glomerate and the sand at the base of the Trinity form the receptacle which holds the oil that is being exploited at Madill.

MAGNOLIA

COUNTY: Stephens.
LOCATION: T. 1 S., R. 9 W.
SURFACE ELEVATION: 1,050-1,150 feet.
SURFACE FORMATION: Clear Fork-Wichita formations.
AGE OF SURFACE ROCKS: Permian.
STRUCTURE: Buried structure.

PRODUCING				INITIAL
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
Smith	2000	44	oil	
Brown	2100	30	oil	
Blaydes	2200	27	oil	10-400 bbls.
Kagay	2300	85	oil	25-100 bbls.

CHARACTER OF OIL: Gravity -----
CHARACTER OF GAS:
DATE OF OPENING: 1918.

REMARKS: The Magnolia Petroleum Company completed the discovery well of the Magnolia pool July, 1918, in sec. 22, T. 1 S., R. 9 W., with an initial production of 400 barrels of oil per day from the Blaydes sand. There are at present (October 1926) some 12 producing wells in the pool making a total daily production of 150 barrels of oil.

MAJOR

COUNTY: Okmulgee.
LOCATION: T. 16 N., R. 14 E.
SURFACE ELEVATION: 650-800 feet.
SURFACE FORMATION: Wewoka formation.
AGE OF SURFACE ROCKS: Pennsylvanian.
STRUCTURE: Local folds.

PRODUCING				INITIAL
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
Uncorrelated	115		coal	
	1255	30	oil	29-40 bbls.
	1640	20	oil gas	10-400 bbls.
	1750	10		2-5 M. cu. ft.
Wilcox	2830		oil	20-100 bbls.

CHARACTER OF OIL: Gravity -----
CHARACTER OF GAS:
DATE OF OPENING: 1916.
REMARKS:

MANION

COUNTY: Osage.

LOCATION: T. 23 N., R. 9 E.

SURFACE ELEVATION: 700-1,000 feet.

SURFACE FORMATION: Nelagoney formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Dome.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton	1060	20	show of gas	
Cleveland	1460	20		
Oswego	1808	17	oil gas	12-200 bbls. 2-5 M. cu. ft.
Bartlesville	2190	30	oil	
Burgess	2300		oil	50-400 bbls.
Siliceous	2410	10		

CHARACTER OF OIL: Gravity -----.

CHARACTER OF GAS:

DATE OF OPENING: 1927.

REMARKS:

MANNFORD

COUNTY: Creek.

LOCATION: T. 19 N., R. 9 E.

SURFACE ELEVATION: 600-700 feet.

SURFACE FORMATION: Nelagoney formation.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Terraces and noses.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton	1550	20	oil	
Oswego	1750	40	oil	
Skinner	2230	70	oil gas	1-6 M. cu. ft.
Bartlesville	2380	10	oil gas	
Mississippi	2500			
Wilcox	2980	10	oil gas	80-600 bbls. 1-3 M. cu. ft.

CHARACTER OF OIL: Gravity, 33-34.9° and 42° B.

CHARACTER OF GAS:

DATE OF OPENING: 1922.

REMARKS: In April, 1922 the Mannford dome was drilled to a depth of 2,966 feet. The well had an initial production of 1,000 barrels of oil per day.

MARAMEC

COUNTY: Pawnee.

LOCATION: T. 20 N., R. 6 E.

SURFACE ELEVATION: 949 feet.

SURFACE FORMATION: Buck Creek formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Subsurface folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton	2070	50	oil	
Cleveland	2400	60	oil	15-100 bbls.
Oswego	2650	70	oil	
Prue	2750	60	oil	
Skinner	2900	40	oil gas	45 bbls.
Bartlesville	3080	50	oil	10 M. cu. ft.
Burgess	3200	40	oil	50-300 bbls.
Wilcox				20-60 bbls.

CHARACTER OF OIL: Gravity, 38° B.

CHARACTER OF GAS:

DATE OF OPENING: 1920.

REMARKS:

MARCH or AMABEL

COUNTY: Payne.

LOCATION: T. 18 N., R. 5 E.

SURFACE ELEVATION: 1,050 feet.

SURFACE FORMATION: Cushing limestone.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Local anticlinal folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton	1975	20	oil	
Cleveland	2470	30	oil	
Oswego	2650	40	oil	
Prue	2760	95	oil	10-60 bbls.
Skinner	2980	30	gas	3-11 M. cu. ft.
Bartlesville	3130	50	oil	50-150 bbls.
Wilcox	3440	50	oil	

CHARACTER OF OIL: Gravity -----.

CHARACTER OF GAS:

DATE OF OPENING: 1922.

REMARKS: The March pool was discovered by the March Oil Company in March, 1922, one mile southeast of Amabel on an anticlinal fold known to some geologists as the Amabel anticline. There is a subsurface dome which apparently coincides with surface structure.

MASHAM

See Donahue, page 147

MAUD

COUNTY: Pottawatomie-Seminole.

LOCATION: T. 7 N., R. 5 E.

SURFACE ELEVATION: 800-1,000 feet.

SURFACE FORMATION: Pontotoc group.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Folding and faulting.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Uncorrelated	2950		oil	1.3 M. cu. ft.
	3167	85		
	3410	60	gas	
Hunton	3830	45	oil	
Wilcox	4242	20	oil	

CHARACTER OF OIL: Gravity, 32° B.

DATE OF OPENING: 1920.

REMARKS: The Maud pool has been under development for a number of years. The first well drilled in the Maud region was started by the Prairie Oil and Gas Company in 1916. A small amount of gas was discovered. The best well drilled in the area was the Mid-Kansas Oil and Gas Company's wildcat, in sec. 34 with an initial production of 250 barrels of oil per day at a depth of 4,285 feet.

MERVINE

COUNTY: Kay.

LOCATION: T. 27 N., R. 3 E.

SURFACE ELEVATION: 1,148 feet.

SURFACE FORMATION: Pennsylvanian-Permian formations.

AGE OF SURFACE ROCKS: Pennsylvanian and Permian.

STRUCTURE: Dome.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Mervine	1000	25	oil	20-400 bbls.
Hoover	1250	15	oil	10-400 bbls.
Endicott	1500	13	oil	50-250 bbls.
Stalnaker	1800	22	oil	5-40 bbls.
Burbank	3100	50	oil	50-400 bbls.
Wilcox				

CHARACTER OF OIL: Gravity, 38-39.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1913.

REMARKS: The discovery well of the Mervine pool was the first well to be drilled on a structure mapped by the Oklahoma Geological Survey. The well was drilled in 1913 in sec. 2, T. 27 N., R. 3 E., and had an initial production of 100 barrels of oil per day. The discovery well was followed by a number of good wells which made from 500 to 1,000 barrels of oil from the "1,000 foot" sand zone.

MICAWBER

COUNTY: Okfuskee.

LOCATION: T. 13 N., R. 8 E.

SURFACE ELEVATION: 770 feet.

SURFACE FORMATION: Pawhuska-Ochelata formations.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Local folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Wheeler	2430	10	oil	
Dutcher	3470	50	oil	
Wilcox	4130	30		
Turkey Mt.	4300	40		

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1926.

REMARKS:

MIDWEST

COUNTY: Okfuskee.

LOCATION: T. 11 N., R. 10 E.

SURFACE ELEVATION: 850 feet.

SURFACE FORMATION: Holdenville formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Local folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Glenn (?)	2000			
Booch	2620	50		
Deaner	2960	70	oil gas	20 bbls.
Lyons	3230	70	oil gas	1-12 M. cu ft 20-200 bbls.
Mississippi	3585			10-32 M. cu. ft.
Chattanooga	3790			
Hunton	3926		show of oil	
Sylvan	4225			
Viola	4235			
Wilcox	4305			

CHARACTER OF OIL: Gravity -----
 CHARACTER OF GAS: Dry. Rock pressure 400-1,450 pounds.
 DATE OF OPENING: 1921.
 REMARKS:

MILROY

COUNTY: Stephens.
 LOCATION: T. 2 S., R. 4 W.
 SURFACE ELEVATION: 1,000-1,100 feet.
 SURFACE FORMATION: Clear Fork-Wichita formation.
 AGE OF SURFACE ROCKS: Permian.
 STRUCTURE: Elongated dome.

PRODUCING			INITIAL	
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
Permian	340-370	10	oil	1-4 M. cu. ft.
Unconformity	580	5	oil	20-40 bbls.
Pennsylvanian	985	15	gas	4-25 bbls.
Glenn	1060	25	oil	10-35 bbls.

CHARACTER OF OIL: Gravity, 28-29.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1916.

REMARKS: At present (October, 1926) there are about 70 producing oil wells in the Milroy pool, producing an average of about 15 barrels of oil per day. The greatest development in the pool took place from 1916 to 1920.

MISSION

COUNTY: Wagoner.
 LOCATION: T. 17 N., R. 15 E.
 SURFACE ELEVATION: 700-750 feet.
 SURFACE FORMATION: Stuart shale.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Fault and minor folds.

PRODUCING			INITIAL	
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
Bartlesville	995	20		
Dutcher	1290	30		
Mississippi	1385	15		
Tyner	1495	10	oil gas	30-300 bbls.
Burgen	1840	20	oil	1-5 M. cu. ft. 15-150 bbls.

CHARACTER OF OIL: Gravity, 39° B.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1914.

REMARKS: The first well in the Mission pool was drilled in sec. 12, T. 17 N., R. 15 E. The well flowed \$72,000.00 worth of oil before it was placed under control. The Mission Oil Company developed the area.

MORRIS

COUNTY: Okmulgee.
 LOCATION: T. 13 N., R. 14 E.
 SURFACE ELEVATION: 700-900 feet.
 SURFACE FORMATION: Stuart shale.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Anticlinal folds.

PRODUCING			INITIAL	
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
Stray	450	25	oil	10 bbls.
Salt or Glenn	700	150	oil gas	
1st Booch	1200	20	oil	10-3000 bbls.
2nd Booch	1300	25	oil	10-200 bbls.
Morris	1600	20	oil	20-300 bbls.
Glenn of Morris	1725	25	oil	15-75 bbls.
Fields	1800	10	oil	10-150 bbls.
Lyons-Quinn	2000	25	oil	25-200 bbls.
Wilecox	2450	45	oil	60-300 bbls.
Wilecox at Morris	2580		gas	20 M. cu. ft.

CHARACTER OF OIL: Gravity, 35-36.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1906.

REMARKS: In 1906, a well was drilled on the Booch farm, sec. 20, T. 13 N., R. 14 E., to a sand which afterwards became famous for large producing wells. This well, however, had an initial production of only 10 barrels of oil per day and was never used commercially. Early in 1907, the Tulsa Fuel and Manufacturing Company drilled a well in sec. 20, T. 13 N., R. 14 E., to the "Morris" sand at a depth of 1,486 feet which had an initial production of 5,000 barrels of oil per day. It was this well which started intense activity in the Morris pool.

MORRISON or WATCHORN

COUNTY: Pawnee.
 LOCATION: T. 22-23 N., R. 3 E.
 SURFACE ELEVATION: 850 feet
 SURFACE FORMATION: Pennsylvanian and Permian formations.
 AGE OF SURFACE ROCKS: Pennsylvanian-Permian.
 STRUCTURE: Surface folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Tonkawa	1960	40	gas	1-35 M. cu. ft.
Layton	2690	30	oil gas	15-500 bbls.
Oswego	3400	60	oil show	
Mississippi	3750	140	oil	10-150 bbls.
Wilcox	4015	120	oil	50-850 bbls.

CHARACTER OF OIL: Gravity, 36.5° B.

CHARACTER OF GAS: Dry. Rock pressure 320 to 850 pounds.

DATE OF OPENING: 1917.

REMARKS: This pool had been referred to as the "Morrison Gas field" until June, 1922, when Robert Watchorn drilled the first oil well in the area. The discovery well of the area was drilled in sec. 33, T. 23 N., R. 3 E., and completed December, 1915 for 11 million cubic feet of gas per day with a rock pressure of 840 pounds.

MOSE-CARR

See Bald Hill, page 109

MOUNDS

COUNTY: Creek.

LOCATION: T. 16 N., R. 12 E.

SURFACE ELEVATION: 650-900 feet.

SURFACE FORMATION: Coffeyville formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Subsurface structural folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Oswego	900	25	gas	1-2 M. cu. ft.
Red Fork	1100	20	oil	
Glenn	1480	170	oil gas	20-300 bbls. 1-4 M. cu. ft.
Tucker	1650	20	oil	
Taneha	1850	45	oil	
Dutcher	2050	55	oil gas	100-2000 bbls. 1-3 M. cu. ft.
Wilcox	2400	30	oil	35-1000 bbls.

CHARACTER OF OIL: Gravity, 33-34.9° B. Color: bright green.
Quality: paraffin.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1915.

REMARKS: The well that started activity in the Mounds pool was drilled by Smith and Swan in sec. 20, T. 16 N., R. 12 E., with gas production at a depth of 2,100 feet. This well was in Okmulgee County but it supplied the town of Mounds in Creek County with gas for ten years.

MULDROW

See Sequoyah, page 242

MUSKOGEE

See Jolly-Patton, page 177

COUNTY: Muskogee.

LOCATION: T. 14 N., R. 18 E.

SURFACE ELEVATION: 550-800 feet.

SURFACE FORMATION: Winslow formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Folding and faulting.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Uncorrelated	826	10	gas	3 M. cu. ft.
	1052	20	oil	5-50 bbls.
	1137	10	oil	10 bbls.
	1260	30	oil gas	100-500 bbls.
Muskogee	1400	20	oil	40-80 bbls.
Uncorrelated	1600	15	oil	25-120 bbls.
	1790	15	oil	1-20 bbls.
Wilcox	2040	16		

CHARACTER OF OIL: Gravity, 38.9-39° B. Color, light.

CHARACTER OF GAS:

DATE OF OPENING: 1904. Jolly Patton, 1920.

REMARKS: The first development of the Muskogee pool was begun as early as 1894 in the townsite of Muskogee by the Cudahy Oil Company. A small production of light oil resulted, but the opening of the pool was not until 1904, due to the difficulty of securing lawful land titles.

MYERS DOME

COUNTY: Osage.

LOCATION: T. 26 N., R. 8 E.

SURFACE ELEVATION: 900-1,000 feet.

SURFACE FORMATION: Pawhuska formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Myers dome, Bench Mark anticline.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Tonkawa	920			
Swaggart	985	15	gas	1-5 M. cu. ft.
Layton	1400	10	gas	3-10 M. cu. ft.
Oswego	2100	100		
Burgess	2400	40		
Wilcox	2700		oil	4-150 bbls.

CHARACTER OF OIL: Gravity, 34° B.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1916.

REMARKS: The first gas well of the Myers Dome pool was drilled by the American Pipe Line Company, October, 1916 to a depth of 548 feet. The well had an initial open flow of over 3 million cubic feet of gas per day. The first oil well of the pool was drilled by the Minnehoma Oil and Gas Company, sec. 14, T. 26 N., R. 8 E., to a depth of 2,298 feet with an initial production of 50 barrels of oil per day.

This pool at present has only 9 producing oil wells and 2 gas wells. Leases sold in this area amounted to as much as \$140,000.00 per quarter section.

NATURA

COUNTY: Okmulgee.

LOCATION: T. 15 N., R. 13 E.

SURFACE ELEVATION: 600-750 feet.

SURFACE FORMATION: Wewoka formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticlinal folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Salt	1300(?)	40	gas	1-4 M. cu. ft.
Booch	1550	22	gas	1-60 M. cu. ft.
Glenn of Morris	1730	10	oil	10-60 bbls.
Dutcher	2050	20		1-8 M. cu. ft.
Mississippi	2170	20	gas	1-2 M. cu. ft.
Chattanooga	2465	20		
Viola	2661	30		
Wileox	2755	10	oil	60-150 bbls.

CHARACTER OF OIL: Gravity, 37.9° B. Color, green.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1914.

REMARKS: The Natura pool was known first as a gas producing area as all the upper horizons carried gas. The Kingwood Oil Company drilled the first gas well of commercial production in sec. 22, T. 15 N., R. 13 E.

NELAGONEY

COUNTY: Osage.

LOCATION: T. 25 N., R. 10 E.

SURFACE ELEVATION: 750-1,000 feet.

SURFACE FORMATION: Nelagoney formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Nelagoney anticline, small faults.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Skinner	1200	20	gas	1-5 M. cu. ft.
Bartlesville	1400	60	oil	15-300 bbls.
Siliceous	2350		gas	50 M. cu. ft.

CHARACTER OF OIL: Gravity, 33° B.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1917.

REMARKS: The Nelagoney pool has been a disappointment to the oil fraternity for little oil has been encountered. Recent deep drilling has opened some fine gas wells. The Phillips Petroleum Company produced 50 million cubic feet of gas in one well, from the Siliceous lime found at a depth of 2,350 feet in sec. 10, T. 25 N., R. 10 E.

NELLIE

COUNTY: Stephens.

LOCATION: T. 2 N., R. 9 W.

SURFACE ELEVATION: 1,050-1,200 feet.

SURFACE FORMATION: Clear Fork-Wichita formations.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Minor folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Post-Glenn	1840		gas	5-15 M. cu. ft.
Arkosic gravel	4550			

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1925.

REMARKS: Late in 1925, the Nellie gas pool was discovered by the completion of a well in sec. 26, T. 2 N., R. 9 W., with an initial production of 5 million cubic feet of gas per day and another well in sec. 36, for 15 million cubic feet of gas per day. The depth of each well was 1,840 feet, which is thought to be the post-Glenn of the Pontotoc group.

NEW CUSHING

COUNTY: Payne.

LOCATION: T. 18 N., R. 5 E.

SURFACE ELEVATION: 600-1,100 feet.

SURFACE FORMATION: Cushing limestone.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Subsurface folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton	2000	20	oil	
Cleveland	2400	30	oil	
Oswego	3000	10	oil gas	1-10 M. cu. ft.
Skinner	3300	20	oil	
Bartlesville	3400	20	oil	
Tucker	3500	15	oil	100-600 bbls.
Wilcox	3900	15	oil	

CHARACTER OF OIL: Gravity, 37.9-45° B.

CHARACTER OF GAS:

DATE OF OPENING: 1922.

REMARKS: The New Cushing pool is located in the Cushing township, sec. 33, T. 18 N., R. 5 E. It was established as a pool in January, 1922.

NEWKIRK

COUNTY: Kay.

LOCATION: T. 28 N., R. 3 E.

SURFACE ELEVATION: 1,195 feet.

SURFACE FORMATION: Pennsylvanian-Permian formations.

AGE OF SURFACE ROCKS: Pennsylvanian-Permian.

STRUCTURE: Newkirk anticline.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Neva	500	10	gas	1.5 M. cu. ft.
Oswego	3000			
Burbank	3250	20-40	gas	28 M. cu. ft.
Miss. Lime	3350	30-40	oil	50-200 bbls.
Granite	4800			

CHARACTER OF OIL: Gravity, 40.3° B.

CHARACTER OF GAS:

DATE OF OPENING: 1916.

REMARKS: Late in 1916 the Marland Refining Company opened the Newkirk field in sec. 17, T. 28 N., R. 3 E., with a well for 2 million cubic feet of gas per day. The gas from this well was used to supply the towns of Newkirk, Kildare, Tonkawa and Ponca City for about three years. In July, 1919, Marland completed a well in the Mississippi limestone for 200 barrels of oil per day. This led to the development of the field.

NEWMAN

COUNTY: Hughes.

LOCATION: T. 8 N., R. 12 E.

SURFACE ELEVATION: 810 feet.

SURFACE FORMATION: Stuart shale and Senora formation.

AGE OF SURFACE ROCKS: Pennsylvanian.
STRUCTURE: Folds and faults.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Deaner	3369	9	gas	½-1 M. cu. ft.
Lyons	3710		oil	10-50 bbls.

CHARACTER OF OIL: Gravity, 38° B. Quality: paraffin.

CHARACTER OF GAS:

DATE OF OPENING: 1923.

REMARKS: The famous "vaseline well" of W. C. Newman and associates in sec. 31, T. 8 N., R. 12 E., produced a minimum of 10 to 12 barrels of oil per day until cleaning when the production rose rapidly to 50 to 60 barrels of oil daily. There has been a market for this oil which has been produced for several years.

NEW YORK

COUNTY: Creek.

LOCATION: T. 16 N., R. 11 E.

SURFACE ELEVATION: 700-850 feet.

SURFACE FORMATION: Nellie Bly formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Local anticlinal folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Glenn	1850	150	oil	10-100 bbls.
Dutcher	2200	300	oil	20-200 bbls.
Wilcox	2850	50	oil	

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1915.

REMARKS: The New York pool, located in sec. 5, T. 16 N., R. 11 E., was discovered by the New York Oil Company early in 1915.

NORTH BALTIMORE

COUNTY: Okfuskee.

LOCATION: T. 12 N., R. 11 E.

SURFACE ELEVATION: 750-950 feet.

SURFACE FORMATION: Wewoka formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Subsurface folds and faults.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Booch	2402	20	gas	1-6 M. cu. ft.
Deaner	2470	40	oil gas	50-300 bbls.

(Table continued on next page)

4-11 M. cu. ft.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Lyons	2610	20	oil	10-300 bbls.
Hunton	3395	30	oil	50-600 bbls.
Sylvan	3425	10		
Viola	3435			
Wilcox	3480			

CHARACTER OF OIL: Gravity, 37-38.9° B.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1920.

REMARKS: The North Baltimore pool was discovered December, 1920 by the North Baltimore Oil and Gas Association. The well in sec. 13, T. 12 N., R. 11 E., was drilled through several good gas shows and at a depth of 2,740 feet there was a show of oil but water filled the hole. In May, 1922 the Anglo-Texas Oil Company and the North Baltimore Oil and Gas Association drilled another well in sec. 13 to a depth of 2,692 feet with an initial production of 200 barrels of oil per day. This well started the development in the eastern part of Okfuskee county.

NORTH CLAREMORE
See Claremore, page 131

NORTH BILLINGS
See Billings, page 114

NORTH BRAMAN
See Braman, page 120

NORTH DUNCAN
See Duncan, page 149

NORTH PONCA CITY
See Ponca City, page 221

NOWATA-CLAGGETT

COUNTY: Nowata.

LOCATION: T. 25-26 N., R. 16 E.

SURFACE ELEVATION: 700-900 feet.

SURFACE FORMATION: Lenapah limestone.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Subsurface folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Big Lime	300(?)	20	oil	1-10 bbls.
Oswego	600(?)	30	oil	20-180 bbls.
Bartlesville	950	30	oil	20-180 bbls.
Burgess	1350	20	oil	10-50 bbls.

CHARACTER OF OIL: Gravity, 30-31.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1908.

REMARKS: Dry holes completely define the limits of production in the Nowata-Claggett pool and commercial production is being revived in the area by use of the air pump on old wells.

OAK GROVE

COUNTY: Wagoner.

LOCATION: T. 19 N., R. 15 E.

SURFACE ELEVATION: 700-800 feet.

SURFACE FORMATION: Cherokee formations.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Monocline, small dome, and lensing sands.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Pitkin	785	30	oil	20-200 bbls.
Chattanooga	900	15	gas	1 M. cu. ft.
Tyner	1000	20	gas	1-6 M. cu. ft.
Burgen	1190	4	oil	

CHARACTER OF OIL: Gravity, 36-39.5° B.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1920.

REMARKS: The future production of oil and gas in Wagoner county will depend largely upon the exploration of sands in the Tyner and Burgen horizons. The Oak Grove pool is a typical area of Tyner sand production. The structure does not appear on the surface but there is complete closure on the Burgen sand forming the dome.

OAKHURST
See Sunray, page 250

OCHELATA

COUNTY: Washington.

LOCATION: T. 25 N., R. 13 E.

SURFACE ELEVATION: 700-850 feet.

SURFACE FORMATION: Oologah formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Local folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Big Lime	542			
Prue	690	20	oil	20-40 bbls.
Oswego	730	30	gas	1 M. cu. ft.
Squirrel	1090	10	gas	

(Table continued on next page)

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Bartlesville	1185	20	oil	15-60 bbl's.
Mississippi	1380	10	gas	1-3 M. cu. ft.
Siliceous	1750	6		

CHARACTER OF OIL: Gravity, 32° B.

CHARACTER OF GAS:

DATE OF OPENING: 1910.

REMARKS: The Ochelata pool is one of the extensions of the Dewey-Bartlesville pool and extends several miles into Osage county. However, there are distinct breaks which separate it from the Bartlesville development.

OGLESBY

COUNTY: Washington.

LOCATION: T. 24-25 N., R. 14 E.

SURFACE ELEVATION: 700-800 feet.

SURFACE FORMATION: Coffeyville formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Minor folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Big Lime	395	25		
Oswego	640	80		
Bartlesville	985	15	oil gas	25-50 bbl's. 1-2 M. cu. ft.
Burgess	1125	10	gas	1 6 M. cu. ft.

CHARACTER OF OIL: 32-33° B.

CHARACTER OF GAS:

DATE OF OPENING: 1919.

REMARKS: The Oglesby pool is an extension to the Hogshooter gas pool.

OILTON

COUNTY: Creek.

LOCATION: T. 19 N., R. 7 E.

SURFACE ELEVATION: 950-1,050 feet.

SURFACE FORMATION: Pawhuska formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Dropright dome, Wheeler saddle.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Musselman	700	25		
Layton	1480	20	oil	10-25 bbl's.
Jones	1730	25	gas	1-2 M. cu. ft.
Cleveland	1920	40	gas	1 M. cu. ft.

(Table continued on next page)

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Wheeler	2250	70	oil gas	10-50 bbl's. 1 M. cu. ft.
Squirrel	2375	30	gas	
Skinner	2620	20	gas	
Bartlesville	2700	90	oil gas	50-5000 bbl's. 1 M. cu. ft.
Tyner	2830	15	oil	10-75 bbl's.
Wilcox	2960	30		
Siliceous				

CHARACTER OF OIL: Gravity, 37° B.

CHARACTER OF GAS:

DATE OF OPENING: 1914.

REMARKS: During the time of development in the Cushing District only two wells were drilled in the Oilton pool both in sec. 32, T. 19 N., R. 7 E., and only one had production. It was drilled by the McMan Oil Company to the Bartlesville sand 2,599 feet in depth, with an initial production of 150 barrels of oil per day.

OKAY

COUNTY: Wagoner.

LOCATION: T. 16 N., R. 19 E.

SURFACE ELEVATION: 500-750 feet.

SURFACE FORMATION: Winslow formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Surface, two domes.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Dutcher	550	60	oil	1-10 bbl's.
Tyner	820	170		
Burgen	1070	10		

CHARACTER OF OIL: Gravity -----.

CHARACTER OF GAS:

DATE OF OPENING: 1919.

REMARKS: The Okay pool was developed on the Maney Brothers Ranch. Three wells producing a small amount of high grade lubricating oil established the pool.

OKEMAH

COUNTY: Okfuskee.

LOCATION: T. 11 N., R. 10-11 E.

SURFACE ELEVATION: 750-900 feet.

SURFACE FORMATION: Holdenville formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Subsurface anticline.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Glenn	2380	40		
Booch	2620	50	gas	3-6 M. cu. ft.
Deaner	2970	70	oil	100-400 bbls.
Lyons	3230	70		
Wilcox	3600	25	Show of gas	

CHARACTER OF OIL: Gravity, 38-39.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1921.

REMARKS:

OKESA

COUNTY: Osage.

LOCATION: T. 26 N., R. 11 E.

SURFACE ELEVATION: 700-950 feet.

SURFACE FORMATION: Oologah formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Okesa dome, anticlines and faults.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Big Lime	910	30		
Peru	1095	75	oil	
Oswego	1270	80		
Bartlesville	1527	17	oil	20-600 bb's.
Mississippi	1646	20	gas	2-4 M. cu. ft.
Siliceous	1900			

CHARACTER OF OIL: Gravity, 33° B. Casing-head gas with oil.

CHARACTER OF GAS: Dry and wet.

DATE OF OPENING: 1904.

REMARKS: The first well of the Okesa pool was completed by the Workman Oil and Gas Company June, 1904 in sec. 16, T. 26 N., R. 11 E. The initial production was 25 barrels of oil per day. This well is still producing one-half barrel of oil per day.

The pool was drilled extensively in 1920. Approximately 50 wells were completed with an initial production ranging from 10 to 600 barrels of oil per day. About 30 of these wells are still producing.

Most of this area was developed before the inauguration of the lease sales, but recent leases have sold as high as \$13,200.00 per quarter section.

OKFUSKEE

COUNTY: Okfuskee.

LOCATION: T. 13 N., R. 10 E.

SURFACE ELEVATION: 700-900 feet.

SURFACE FORMATION: Coffeyville formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Noses.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Glenn	2000	175	gas	1-3 M. cu. ft.
Dutcher	2660	50	oil	50-300 bbls.
Wilcox	3360			

CHARACTER OF OIL: Gravity, 34-39.4° B.

CHARACTER OF GAS:

DATE OF OPENING: 1917.

REMARKS: Development in the Okfuskee area followed the discovery of production in the Youngstown and other adjacent Okmulgee County pools.

OKLAHOMA-CENTRAL Dix

COUNTY: Okmulgee.

LOCATION: T. 15 N., R. 11 E.

SURFACE ELEVATION: 800-900 feet.

SURFACE FORMATION: Coffeyville formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Subsurface dome and fault.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Oswego	1255	10		
Glenn	1800	12	oil	30-250 bbls.
Taneha	2091	15	oil gas	10-100 bbls.
				5-20 M. cu. ft.
Dutcher	2500	35	oil	300-1000 bbls.
Mississippi	2700	180		
Wilcox	3010	12	oil	115-650 bbls.

CHARACTER OF OIL: Gravity, 37.9° B.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1920.

REMARKS: The Wilcox sand production of the Oklahoma-Central pool was discovered in a well drilled in sec. 22, T. 15 N., R. 11 E., during 1921.

OKLAHOMA CITY

COUNTY: Oklahoma.

LOCATION: T. 12 N., R. 3 W.

SURFACE ELEVATION: 1,150-1,200 feet.

SURFACE FORMATION: Lower Enid formation.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Monocline.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Hoover	4384	20	oil	40 bbls. †

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: August, 1926.

REMARKS: The Oklahoma City well was drilled by Joe I. Cromwell and others, almost outside the north door of the State Capitol, in section 13, T. 12 N., R. 3 W. A limited amount of oil rose in the hole which seemed to indicate about a 40 barrel well. At least the presence of an oil-bearing sand has been established for this part of Oklahoma.

OKMULGEE
Lucky Pool
1,000 Acre Lake

COUNTY: Okmulgee.

LOCATION: T. 13 N., R. 12-13 E.

SURFACE ELEVATION: 600-900 feet.

SURFACE FORMATION: Wewoka formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Terrace-noses.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Elgin	1000	50		
Bartlesville	1240	75	oil gas	25 bbls.
Glenn	1500-1600		—	
Tucker	1870	10		
Booch	2000	10	oil gas	25 bbls.
Dutcher	2400	35	oil gas	2-9 M. cu. ft. 15-300 bbls. 1-5 M. cu. ft.
Mississippi	2550			
Wilcox	2750	100	gas	1-3 M. cu. ft.

CHARACTER OF OIL: Gravity, 38-39.9° B. Color, dark green.

CHARACTER OF GAS:

DATE OF OPENING: 1906.

REMARKS: On April 21, 1904, Congress passed an act in which "All restrictions upon alienation of the lands of all allottees of either of the Five Civilized Tribes, who are not of Indian blood, except minors, are, except as to homesteads, hereby removed." This opened the way for extensive leasing of Indian lands in Okmulgee county and development began to increase rapidly.

OLEAN

COUNTY: Okmulgee.

LOCATION: T. 15 N., R. 12 E.

SURFACE ELEVATION: 850-950 feet.

SURFACE FORMATION: Wewoka formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Subsurface dome.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Glenn	1545	60		
Taneha	1860	50	gas	5-11 M. cu. ft.
Dutcher	2075	25	oil gas	20-100 bbls.
Wilcox	2660	70	oil	1-5 M. cu. ft. 15-150 bbls.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS: Dry. Rock pressure 415 pounds.

DATE OF OPENING: 1920.

REMARKS: In January, 1920 the Oklahoma Natural Gas Company completed a well in sec. 11, T. 15 N., R. 12 E., for 1,300,000 cubic feet of gas. This was one of the first wells drilled in the Olean pool. In 1925 the Olean Petroleum Company started a deep-drilling program in this area and a number of excellent producers have been completed as a result.

OLIVE

COUNTY: Creek.

LOCATION: T. 18 N., R. 7 E.

SURFACE ELEVATION: 900-1,000 feet.

SURFACE FORMATION: Pawhuska formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticline and fault.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton	1300	15	oil	10-50 bbls.
Cleveland	1795	75		
Wheeler	2140	50	gas	1-5 M. cu. ft.
Peru	2175	13		
Skinner	2330	30	oil gas	3-100 bbls. 2-10 M. cu. ft.
Bartlesville	2560	70	oil	50-6000 bbls.
Tucker	2730	110	oil	10-75 bbls.
Dutcher	3120	10	oil	50-300 bbls.
Burgess	3200	10	oil	25-100 bbls.
Wilcox	3480			

CHARACTER OF OIL: Gravity, 34-37.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1914.

REMARKS: During the development of the Cushing district the Olive pool was a small producer and not until ten years later did it have a large initial production per well.

ONAPA

COUNTY: McIntosh.
 LOCATION: T. 11 N., R. 17 E.
 SURFACE ELEVATION: 600-750 feet.
 SURFACE FORMATION: Boggy shale.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Minor folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Uncorrelated }	802	20	gas	1-5 M. cu. ft.
	1830	10	gas	3-5 M. cu. ft.
Mississippi	2950	40		
Wilcox	3075	25		

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1912.

REMARKS: A considerable amount of gas has been found in McIntosh County but few pools have been developed. The Onapa pool was opened by the Gladys-Belle Oil Company in the southwest corner of T. 11 N., R. 17 E., where several wells were drilled with the hope of obtaining oil.

ONETA

COUNTY: Wagoner.
 LOCATION: T. 18 N., R. 15 E.
 SURFACE ELEVATION: 650-800 feet.
 SURFACE FORMATION: Cherokee formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Four small domes on a large anticline.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Dutcher	1000-1200		oil	10-1300 bbls.
Mississippi	1200-1300			
Tyner	1700			

CHARACTER OF OIL: 32-38° B.

CHARACTER OF GAS:

DATE OF OPENING: 1916.

REMARKS: The first record of a well completed in the Oneta pool was one drilled by the M. B. S. Oil Company in November, 1916. The well was located in sec. 32, T. 18 N., R. 15 E., and had an initial production of 300 barrels of oil per day.

1,000 ACRE LAKE
 See Okmulgee, page 208

OOLOGAH

COUNTY: Rogers.
 LOCATION: T. 22 N., R. 15 E.
 SURFACE ELEVATION: 600-750 feet.
 SURFACE FORMATION: Nowata shale.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Monocline with reverse dips eastward.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Oswego	700	20		
Bartlesville	910	70	gas	1-2 M. cu. ft.
Burgess	1250	5		
Mississippi	1355	45		
Siliceous	1600	20	gas	1-3 M. cu. ft.

CHARACTER OF OIL: Gravity, 32° B.

CHARACTER OF GAS:

DATE OF OPENING: 1906.

REMARKS: The Oologah pool is named from a formation which outcrops in the northwestern corner of Rogers County.

OSAGE CITY

COUNTY: Osage.
 LOCATION: T. 21 N., R. 8-9 E.
 SURFACE ELEVATION: 725 feet.
 SURFACE FORMATION: Nelagoney formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Anticlinal folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton	1280	20		
Cleveland	1620	25	oil	10-100 bbls.
Oswego	1875	35		
Prue	1925	20		
Skinner	2030	20		
Bartlesville	2250	30	oil gas	20-75 bbls.
Mississippi	2431	30	show of oil	1-3 M. cu. ft.

CHARACTER OF OIL: Gravity, 34° B.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1911.

REMARKS: The first oil well was drilled in the Osage City pool by the Barnsdall Oil Company, November, 1904, in sec. 20, T. 21 N., R. 9 E. The well was drilled to a depth of 1,075 feet with an initial production of only 5 barrels of oil per day. The second well of the pool was drilled by the same company in November, 1905 for an initial production of 20 barrels of oil per day.

The greatest development of the pool started in December, 1910 when the Finance Oil Company and Foster and Davis completed a well in sec. 19, T. 21 N., R. 9 E., to a depth of 2,314 feet with an initial production of 4,000 barrels of oil per day. Approximately 450 wells have been drilled in the Osage City pool since 1910 and most of them are still producing.

Although most of this area was developed under the blanket lease, recent leases have sold for as high as \$65,000.00 per quarter section.

OSCAR or HAMBRO

COUNTY: Jefferson.
 LOCATION: T. 6 S., R. 5 W.
 SURFACE ELEVATION: 750-850 feet.
 SURFACE FORMATION: Wichita-Clear Fork (Cisco?) formations.
 AGE OF SURFACE ROCKS: Permian or late Pennsylvanian.
 STRUCTURE: Anticlinal axis.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Glenn	1180	18	oil	10-200 bbls.
	1270	20	oil	25-220 bbls.
	1320	35	oil	150-600 bbls.
	1430	30	oil	200-2000 bbls.
	1500	30	oil	30-500 bbls.
	1610	15	oil	10-60 bbls.

CHARACTER OF OIL: Gravity, 34-35.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1925.

REMARKS: This pool, one mile north and half a mile east of Oscar, was opened by the owners of the Hamilton-Brown Shoe Company, hence the name Ham-Bro., from the owners, or Oscar from the town.

OTSTOT

COUNTY: Kay.
 LOCATION: T. 27 N., R. 1 W.
 SURFACE ELEVATION: 1,000-1,075 feet.
 AGE OF SURFACE ROCKS: Quaternary.
 STRUCTURE: Anticlinal folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Hotson	880	20	gas	1-4 M. cu. ft.
Newkirk	1450	10	gas	1-5 M. cu. ft.
Stalnaker	2350	40	oil gas	10-100 bbls. 10-40 M. cu. ft.
Wilcox	3425	40	oil gas	50-800 bbls. 10-45 M. cu. ft.
Siliceous	3640	5	oil	

CHARACTER OF OIL: Gravity, 37-40° B.

CHARACTER OF GAS:

DATE OF OPENING: 1920.

REMARKS: The defined producing area of the Otstot pool is about 4 miles in extent, (March 1927). The wells on the highest part of the structure produce large quantities of gas; the oil wells produce from the same horizons but principally on the northern part of the structure. There were 66 producing wells in the pool June, 1927.

OWASSO

COUNTY: Tulsa.
 LOCATION: T. 21 N., R. 13-14 E.
 SURFACE ELEVATION: 650-800 feet.
 SURFACE FORMATION: Coffeyville formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Local folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Oswego	590	10	gas	
Red Fork	950	50		5-10 M. cu. ft.
Bartlesville	1170	30	oil gas	10-175 bbls. 3 M. cu. ft.
Taneha	1285	15		
Burgess	1360	40	oil	10-30 bbls.
Tyner	1720	20	gas	2-6 M. cu. ft.
Siliceous				

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1913.

REMARKS: The Owasso pool is a part of the Collinsville area. It is chiefly a gas pool and the gas is utilized by the smelters at Collinsville.

PADEN

COUNTY: Okfuskee.
 LOCATION: T. 12 N., R. 7 E.
 SURFACE ELEVATION: 750-900 feet.
 SURFACE FORMATION: Vamoosa formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Terraces and faults.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Prue	2790	10	oil	10-60 bbls.
Bartlesville	2890	200	oil	90-150 bbls.
Dutcher	3796	10	oil	10-25 bbls.
Mississippi	4010	20		

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1914.

REMARKS: The first important well of the Paden pool was drilled by the Prairie Oil and Gas Company in sec. 8, T. 12 N., R. 7 E. This well was drilled to a depth of 2,900 feet with an initial production of 25 barrels per day and 7 million cubic feet of gas. Recent drilling in this pool has resulted in more production at greater depths.

PAPOOSE

COUNTY: Okfuskee—Hughes.

LOCATION: T. 9-10 N., R. 9 E.

SURFACE ELEVATION: 750-850 feet.

SURFACE FORMATION: Seminole-Holdenville formations.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Terraces, subsurface domes and anticlines.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Gilcrease	3070	20	oil gas	30-100 bbls. 35 M. cu. ft.
Papoose	3350	55	oil gas	25-3600 bbls. 10-100 M. cu. ft.
Hunton	3865	10	show of gas	
Viola	4030	20		
Wilcox	4130	20		

CHARACTER OF OIL: Gravity, 38-39.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1923.

REMARKS: The Papoose Oil Company discovered the Papoose pool in the latter part of 1923. The first wells were drilled in sections 4 and 9, T. 9 N., R. 9 E., and by the end of 1923 there were approximately 100 producing wells in the field with a daily production of 29,000 barrels of oil.

PAWHUSKA

COUNTY: Osage.

LOCATION: T. 25-26 N., R. 9-10 E.

SURFACE ELEVATION: 850-1,000 feet.

SURFACE FORMATION: Elgin sandstone and Nelagoney formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticlinal folds and faults.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton	1245	10		
Oswego	1670	30		
Bartlesville	2085	60	oil gas	60-100 bbls. 10-50 M. cu. ft.

(Table continued on next page)

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Burgess	2125	25	oil gas	10-50 bbls. 25 M. cu. ft.
Burgen-Siliceous	2880	26	oil gas	100-600 bbls. 1-8 M. cu. ft.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1919.

REMARKS: The first well of the Pawhuska pool was drilled by the New England Oil and Pipe Line Company, October, 1919, to a depth of 2,292 feet for an initial production of 150 barrels of oil per day.

Recent drilling in the area tends to connect the Pawhuska pool with the Pershing pool. Several extensions have discovered small domes and producing sands so that the pool is a mass of small producing areas.

Leases have sold in the region as high as \$33,000.00 and the Marland Oil and Refining Company paid \$620,000.00 for a lease in the northwest of sec. 34, T. 25 N., R. 9 E., which was the highest price ever paid for an 160 acre lease at that time.

PEARSONIA

COUNTY: Osage.

LOCATION: T. 27 N., R. 8 E.

SURFACE ELEVATION: 900-1,050 feet.

SURFACE FORMATION: Buck Creek formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Dome and anticlinal folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Stray	800	20	gas	2 M. cu. ft.
Stray	1000	15	gas	1 M. cu. ft.
Layton	1400	10	gas	12 M. cu. ft.
Oswego	2100	100	oil gas	10 M. cu. ft.
Miss. Lime	2410	40	oil	20-2200 bbls.

CHARACTER OF OIL: Gravity, 33° B.

CHARACTER OF GAS:

DATE OF OPENING: 1919.

REMARKS: A small oil and gas pool is located northwest of Pearsonia. The first well drilled in the Pearsonia pool was completed in December, 1916 by the American Pipe Line Company for 5¼ million cubic feet of gas at a depth of 873 feet. The first oil well was drilled by the same company, August, 1919. This well was drilled to the Burgess sand at a depth of 2,459 feet with an initial production of 400 barrels of oil per day.

There were about 15 oil wells drilled in the pool. Prices for leases in the area range from \$18,000 to \$45,000 per quarter section.

PEARSON SWITCH

COUNTY: Pottawatomie.
 LOCATION: T. 7 N., R. 4 E.
 SURFACE ELEVATION: 1,000-1,060 feet.
 SURFACE FORMATION: Pontotoc group.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Probable fault.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Boggy	3640			
Hunton	3757	30	oil	200-1000 bbls.

CHARACTER OF OIL: Gravity, 36° B.

CHARACTER OF GAS:

DATE OF OPENING: 1927.

REMARKS: One of the most important wildcat wells of 1927 was drilled by the Wrightsman Petroleum Company near Pearson Switch in February. The well, located in sec. 19, T. 7 N., R. 4 E., is estimated at 100 barrels of oil per day. In April, 1927 the same company drilled the second well in sec. 30, T. 7 N., R. 4 E., which is estimated at 3,000 barrels of oil per day. There is now pipe line capacity of about 50,000 barrels of oil daily for this field.

PEMETA

COUNTY: Creek.
 LOCATION: T. 18 N., R. 7 E.
 SURFACE ELEVATION: 900-1,050 feet.
 SURFACE FORMATION: Pawhuska formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Dropright dome.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton	1300	15		
Cleveland	1795	75		
Wheeler	2140	50	gas	1-15 M. cu. ft.
Peru	2175	13		
Skinner	2330	30	oil gas	3-100 bbls.
Bartlesville	2560	70	oil	50-8000 bbls.
Tucker	2730	110	oil	10-200 bbls.
Dutcher	3120	10	oil	50-300 bbls.
Burgess	3200	15	oil	25-200 bbls.
Wilcox	3480			

CHARACTER OF OIL: Gravity, 40-41° B.

CHARACTER OF GAS:

DATE OF OPENING: 1914.

REMARKS: The Dropright dome of the Pemeta pool was an area of remarkable activity. It is an elongated dome about 5 miles in length extending from the Cimarron River on the north, southwestward to sec. 17, T. 18 N., R. 7 E.

PERRY

COUNTY: Noble.
 LOCATION: T. 21 N., R. 1 W.
 SURFACE ELEVATION: 1,150 feet.
 SURFACE FORMATION: Pennsylvanian-Permian formations.
 AGE OF SURFACE ROCKS: Pennsylvanian and Permian.
 STRUCTURE: Nose.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Vann	1587	8	gas	1-2 M. cu. ft.
Bagan	1805	100	oil	5-15 bbls.
Tonkawa	2714	2	gas	1-4 M. cu. ft.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1922.

REMARKS: In the latter part of 1922 a wildcat well was drilled on the Munn Brothers structure southwest of Perry. The Twin State Oil Company completed the discovery well, sec. 29, T. 21 N., R. 1 W., which had an initial production of 6 million cubic feet of gas at a depth of 1,500 feet. Later the Perry Service Company drilled a second well, sec. 28, T. 21 N., R. 1 W., for 2 million cubic feet of gas in the 1,500 foot pay sand. These wells furnish the gas supply for the town of Perry.

PERSHING

COUNTY: Osage.
 LOCATION: T. 24 N., R. 10 E.
 SURFACE ELEVATION: 750-950 feet.
 SURFACE FORMATION: Pawhuska formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Dome

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Cleveland	1385	15	oil gas	30 bbls.
Oswego	1690	60	gas	1-2 M. cu. ft.
Bartlesville	2033	30	oil	100-500 bbls.
Mississippi	2150	40		

CHARACTER OF OIL: Gravity, 33-34° B.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1917.

REMARKS: The first well was drilled in the Pershing pool by the Indian Territory Illuminating Oil Company in March, 1917. The well was located in sec. 6, T. 24 N., R. 10 E., and was drilled to a depth of 813 feet with an initial production of 5½ million cubic feet of gas per day. The first oil well was drilled by the Wm. M. Graham Oil and Gas Company, July, 1918, in sec. 6, T. 24 N., R. 10 E., with an initial production of 300 barrels of oil per day. The largest well in the pool was drilled by the Carter Oil Company, January, 1919 in sec. 6, T. 24 N., R. 10 E., for an initial production of 5,500 barrels of oil per day.

The Pershing pool is an old field developed under the blanket lease but recent leases have sold for prices ranging from \$5,000.00 to \$40,000.00 per quarter section.

PETERSON

COUNTY: Muskogee.

LOCATION: Secs. 16, 17, 18, and 19, T. 15 N., R. 16 E.

SURFACE ELEVATION: 550-650 feet.

SURFACE FORMATION: Bluejacket sandstone.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Subsurface folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Sand	680	12	gas	11-30 M. cu. ft.
Sand	1208-1315	10	oil	25-950 bbls.

CHARACTER OF OIL: Gravity,-----

CHARACTER OF GAS:

DATE OF OPENING: July, 1916.

REMARKS: Present production about 50 barrels.

PETTIT

COUNTY: Osage.

LOCATION: T. 23 N., R. 8 E.

SURFACE ELEVATION: 950-1,000 feet.

SURFACE FORMATION: Nelagoney formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Domes, folds, and faults.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Stray	800	10	oil	15 bbls.
Cleveland	1390	20	oil	10-20 bbls.
Big Lime	1800	20	oil	20-90 bbls.
Oswego	1950	60	oil	5-60 bbls.
Bartlesville	2300	30	oil gas	20 bbls.

(Table continued on next page)

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Mississippi	2400			2 M. cu. ft.
Hominy	2600	50	oil	50 bbls.
Siliceous	2650		oil	75-6000 bbls.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1919.

REMARKS: In June, 1919, the Marland Oil and Refining Company bought the southeast quarter of sec. 20, T. 23 N., R. 8 E., for \$85,000.00. The first well on this lease was drilled to a depth of 725 feet with an initial production of 16 million cubic feet of gas per day. In October, 1923, the first well drilled to the Siliceous lime was completed with an initial production of 175 barrels of oil per day.

The Pettit pool produces both oil and gas from several different horizons, and is one of the most prolific Siliceous lime pools found in Osage County. To date the first well drilled to this horizon has produced 2½ million barrels of oil. There are 43 producing wells in the area. Leases have sold since 1917 for prices ranging from \$100,000 to \$150,000 per quarter section.

PHILLIPSVILLE

COUNTY: Okmulgee.

LOCATION: T. 14 N., R. 11 E.

SURFACE ELEVATION: 600-800 feet.

SURFACE FORMATION: Holdenville shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Subsurface structure; domes.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Glenn	1645	100		
Booch	1900	80		
Dutcher	2250	30	oil	10-200 bbls.
Mississippi	2500	150		
Wilcox	2750	40	oil	50-2000 bbls.

CHARACTER OF OIL: Gravity, 38.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1920.

REMARKS: The Phillipsville pool is a result of the Youngstown pool development. The Wilcox sand was discovered in this pool in sec. 22, T. 14 N., R. 11 E., in 1920.

PINE POOL

See Bald Hill, page 109

POLLYANNA

COUNTY: Okmulgee.
 LOCATION: T. 15-16 N., R. 11 E.
 SURFACE ELEVATION: 700-900 feet.
 SURFACE FORMATION: Coffeyville formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Subsurface structure.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Oswego	1365	30		
Glenn	1840	40	oil gas	20-300 bbls. 6-10 M. cu. ft.
Taneha	2285	20	oil gas	20-75 bbls. 15-35 M. cu. ft.
Dutcher	2340	10	gas	10-15 M. cu. ft.
Wilcox	2830	10	oil	
Turkey Mt.	3233	17		

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1921.

REMARKS: The Pollyanna pool is one of the many of the northern Okmulgee County area. It was a "township-line" pool but recent developments are extending it both north and south of the line between Tps. 15-16 N.

POLO

COUNTY: Noble.
 LOCATION: T. 22 N., R. 2 W.
 SURFACE ELEVATION: 1,082 feet.
 SURFACE FORMATION: Pennsylvanian-Permian formations.
 AGE OF SURFACE ROCKS: Pennsylvanian-Permian.
 STRUCTURE: Noses.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Garber	2075	30	oil	15 bbls.
Covington	2260	5	oil	20 bbls.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1920.

REMARKS: The first well completed as a producer in the Polo pool was drilled by the Prairie Oil and Gas Company, sec. 17, T. 22 N., R. 2 W., with an initial production of 25 barrels of oil per day from sand at a depth of 2,074 to 2,077 feet.

PONCA CITY
North Ponca City
South Ponca City

COUNTY: Kay.
 LOCATION: T. 25-26 N., R. 2 E.
 SURFACE ELEVATION: 968-1,000-1,003 feet.
 SURFACE FORMATION: Pennsylvanian-Permian formations.
 AGE OF SURFACE ROCKS: Pennsylvanian-Permian.
 STRUCTURE: Anticlinal fold.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Base Permian	500	20	gas	
Stray	925	30	gas	
Stray	1200	15	gas	
Newkirk	1390	30	gas	
Hoover	1500	30	gas	5-10 M. cu. ft.
Tonkawa	2100	30	oil	40-150 bbls.
Layton	2630	100	oil	20-200 bbls.
Big Lime	3000			
Oswego	3100	100	oil	
Miss. Lime	3600	50	oil	75-150 bbls.
Wilcox	3900	100	oil	100-2000 bbls.

CHARACTER OF OIL: Gravity, 38-39.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1917.

REMARKS: The Ponca City pool was the first field to be discovered in north-central Oklahoma.

In December, 1908, E. W. Marland, a Pennsylvania oil operator, made a visit to Kay County. The Ponca area attracted his attention and he secured a lease from Miller Brothers of the 101 Ranch and started a well, February, 1909. This was the first well to be drilled for oil west of the Osage Reservation and it was abandoned; the second, completed in the spring of 1910, was a gas well.

Marland and his associates continued operations until 1917, when their ninth well marked the discovery of the Ponca City pool. It was the Willie-Cry No. 1, sec. 8, T. 25 N., R. 2 E., with an initial production of 120 barrels of oil at a depth of 1,500 feet.

POOR FARM

COUNTY: Creek.
 LOCATION: T. 15-16 N., R. 8 E.
 SURFACE ELEVATION: 700-900 feet.
 SURFACE FORMATION: Nelagoney formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Monocline, lenticular sands.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton	1425	40	gas	1-5 M. cu. ft.
Prue	2400	75	oil	75-100 bbls.
Bartlesville	2800	60		10-50 bbls.
Dutcher	2067	10	oil	50-2000 bbls.
Wilcox	3700	60		

CHARACTER OF OIL: Gravity, 34.5° B.

CHARACTER OF GAS:

DATE OF OPENING: 1920.

REMARKS: The Poor Farm pool is located on the Creek County Poor Farm.

POND CREEK

COUNTY: Osage.

LOCATION: T. 28-29 N., R. 10 E.

SURFACE ELEVATION: 750-1,000 feet.

SURFACE FORMATION: Nelagoney formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticlinal folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Peru	1235	35	oil	10-50 bbls.
Oswego	1380	60	gas	1-5 M. cu. ft.
Burgess	1680	20	oil	10-100 bbls.
Mississippi	1750	65	gas	

CHARACTER OF OIL: Gravity, 31-32° B.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1913.

REMARKS: The first well of the Pond Creek pool was drilled by the Roxana Petroleum Corporation, July, 1913. The production of 100 barrels of oil per day came from the Peru sand at a depth of 1,065 feet.

Since 1925, the extensions of this pool to the north are connecting it to the South Elgin pool. Leases have sold as wildcat areas for prices ranging from \$500 to \$800 per quarter section.

PORTER

COUNTY: Wagoner.

LOCATION: T. 16 N., R. 16-17 E.

SURFACE ELEVATION: 500-700 feet.

SURFACE FORMATION: Blue Jacket sandstone.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Folding and faulting.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Dutcher	700	110	show oil gas	1-5 M. cu. ft.
Mississippi	1160	10		
Burgen	1422	10	oil gas	10-100 bbls. 1-7 M. cu. ft.

CHARACTER OF OIL: Gravity -----.

CHARACTER OF GAS: Dry. Rock pressure 530 to 650 pounds.

DATE OF OPENING: 1915.

REMARKS: In 1915, development started in the Porter pool from the Dutcher sand but only a few showings of gas were obtained. In 1925 gas production was developed in the Ordovician sands.

POTEAU

COUNTY: LeFlore.

LOCATION: T. 6-7 N., R. 26 E.

SURFACE ELEVATION: 400-600 feet.

SURFACE FORMATION: McAlester shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Poteau anticline.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Uncorrelated	1300	15	gas	1-2 M. cu. ft.
	1500	115	gas	1-3 M. cu. ft.
	1830	20	gas	1-18 M. cu. ft.
	2000	25	gas	2-7 M. cu. ft.

CHARACTER OF OIL: Gravity -----.

CHARACTER OF GAS: Dry. Rock pressure 250 to 412 pounds.

DATE OF OPENING: 1910.

REMARKS: All of the wells in the Poteau field are located on or near the axis of the Poteau anticline. The first well in the area was drilled in July, 1910, by the LeFlore County Gas and Electric Company. The gas is pumped to Poteau for domestic consumption.

PRAIRIE

COUNTY: Creek.

LOCATION: T. 16 N., R. 11 E.

SURFACE ELEVATION: 750-850 feet.

SURFACE FORMATION: Coffeyville formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticlinal folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Glenn	1850	150	oil	
Dutcher	2200	300	oil	
Wilcox	2850		oil	

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1914.

REMARKS:

PRESTON

COUNTY: Okmulgee.

LOCATION: T. 14 N., R. 12 E.

SURFACE ELEVATION: 650-900 feet.

SURFACE FORMATION: Wewoka formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Local folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Glenn or Salt	1400	150	oil	10-50 bbls.
Booch	1700	40	oil	15-25 bbls.
Dutcher	2020	30	oil	25-1000 bbls.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS: Rock pressure 450 pounds.

DATE OF OPENING: 1909.

REMARKS: The Preston pool is named for Alex Preston who started the first development in T. 14 N., R. 12 E.

PRUE

COUNTY: Osage.

LOCATION: T. 21 N., R. 10 E.

SURFACE ELEVATION: 600-850 feet.

SURFACE FORMATION: Oologah limestone.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticlinal folds and domes.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Oswego	1495	20		
Prue	1648	20	gas	1-12 M. cu. ft.
Bartlesville	1990	50	oil	30-50 bbls.
Turkey Mt.	2450	75		

CHARACTER OF OIL: Gravity, 34-36° B.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1920.

REMARKS: The Prue pool has some of the best gas wells in Osage County, the initial open flow ranging from 20 to 65 million cubic feet of gas per day. Some oil was discovered February, 1926, by the Devonian Oil Company in sec. 27, T. 21 N., R. 10 E., at a depth of 1,900 feet. The initial production of the discovery well was 25 barrels of oil per day.

PUMPKIN CENTER
See Sapulpa, page 237.

PURE

COUNTY: Creek.

LOCATION: T. 15 N., R. 8 E.

SURFACE ELEVATION: 750-1,000 feet.

SURFACE FORMATION: Pawhuska and Nelagoney formations.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Minor folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Hotson	1400	20	gas	
Layton	1600	20	gas	
Wheeler	2385	30	oil	
Prue	2500	15	oil	
Skinner	2800	50	oil	
Bartlesville	3000	100	oil	
Dutcher	3360	10	oil	
Wilcox	3715	40	oil	

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1923.

REMARKS:

QUAPAW

COUNTY: Osage.

LOCATION: T. 25 N., R. 11 E.

SURFACE ELEVATION: 750-1,000 feet.

SURFACE FORMATION: Ochelata formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticlinal nosing, Dunn terrace and folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Big Lime	1075	50		
Peru	1155	50		
Oswego	1305	90	gas	1-6 M. cu. ft.
Skinner	1685	10	show of gas	
Bartlesville	1720	60	oil	
Burgess	1830	20	show of gas	25-75 bbls.

CHARACTER OF OIL: Gravity, 30-31° B.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1914.

REMARKS: The Quapaw pool is a northwest extension of the Barnsdall pool. Most of the area drilled came under the old Foster blanket lease which did not carry a bonus. Later leases have sold for prices ranging from \$1,000 to \$100,000 per quarter section.

QUAY

COUNTY: Pawnee-Payne.

LOCATION: T. 20 N., R. 5-6 E.

SURFACE ELEVATION: 904 feet.

SURFACE FORMATION: Sand Creek formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Folding, and faulting.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton	1950	60		
Oswego	2490	60	oil	
Prue	2670	40	oil	10-50 bbls.
Skinner	2800	10		
Bartlesville	3095			
Mississippi	3125			
Wilcox	3513			

CHARACTER OF OIL: Gravity, 36-37.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1914.

REMARKS: The first well of the Quay pool was drilled in sec. 4, T. 20 N., R. 7 E., on a fault. The field is on a well marked anticline. It merges into the Yale pool.

QUINTON

COUNTY: Pittsburg.

LOCATION: T. 7 N., R. 18-19 E.

SURFACE ELEVATION: 600-950 feet.

SURFACE FORMATION: Boggy shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Kinta anticline.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Uncorrelated	1470	12	gas	1-6 M. cu. ft.
	1585	45	gas	3-10 M. cu. ft.
	1800	55	gas	10-40 M. cu. ft.
	2670	3	gas	1-7 M. cu. ft.
	2729	3	gas	1-7 M. cu. ft.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1913.

REMARKS: The Quinton Oil and Gas Company drilled and commercialized the gas of the Quinton pool. A large part of the gas was piped to McAlester, and the zinc smelter located at Quinton used about one-fourth of the supply. No oil has been found in this pool.

RAINOLA

COUNTY: Stephens.

LOCATION: T. 1 S., R. 8 W.

SURFACE ELEVATION: 1,300 feet.

SURFACE FORMATION: Clear Fork-Wichita formation.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Local folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Smith	2000	25	oil gas	10-100 bbls.
Brown	2100	55	oil gas	1-4 M. cu. ft. 20 bbls.

CHARACTER OF OIL: Gravity, 38° B.

CHARACTER OF GAS:

DATE OF OPENING: 1921.

REMARKS: The Rainola pool was discovered late in 1921 by the Rainola Oil Company in sec. 22, T. 1 S., R. 8 W., where they completed a well with an initial production of 20 barrels of oil per day at a depth of 2,010 feet. There are now (October, 1926) some 10 wells producing in this pool.

RALSTON

COUNTY: Pawnee.

LOCATION: T. 23 N., R. 5 E.

SURFACE ELEVATION: 801 feet.

SURFACE FORMATION: Sand Creek formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Ralston anticline.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Oswego	2780	20	oil	
Skinner	3000	45	oil	10-50 bbls.
Bartlesville	3200	20	oil	20-160 bbls.
Burgess	3350	60	oil	30-190 bbls.
Wilcox	3634	66		

CHARACTER OF OIL: Gravity, 36-37.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1909.

REMARKS: The Ralston anticline is in the northwest-central part of T. 23 N., R. 5 E., The first attempt to develop the area was made by J. M. Critchlow and associates with a wildcat test in sec. 3, T. 23 N., R. 5 E.

RAMONA

COUNTY: Washington.

LOCATION: T. 24 N., R. 14 E.

SURFACE ELEVATION: 700-900 feet.

SURFACE FORMATION: Coffeyville formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Terraces-faults.

PRODUCING				INITIAL
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
Big Lime	934	100	oil	10-60 bbls.
Prue	1040	60		
Oswego	1115	85		
Squirrel	1354	42		
Bartlesville	1687	20	oil	45-500 bbls.
Burgess	1753	20	oil gas	10-50 bbls.
				1-5 M. cu. ft.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1911.

REMARKS: The Ramona pool lies between the Avant and the Ochelata pools. The conditions in the pool are similar to those in the Bartlesville District although the sands lie deeper.

RAMSEY

COUNTY: Cimarron.

LOCATION: T. 5 N., R. 5 E., C. M.

SURFACE ELEVATION: 3,700 feet, approximately.

SURFACE FORMATION: Washita group.

AGE OF SURFACE ROCKS: Cretaceous.

STRUCTURE: Anticlinal dome.

PRODUCING				INITIAL
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
Granite wash	4101	6	oil	75 bbls.

CHARACTER OF OIL: Gravity, 32° B. Color, dark.

CHARACTER OF GAS:

DATE OF OPENING: 1927.

REMARKS: In February, 1927 the Ramsey Oil Company completed their wildcat test in sec. 27, T. 5 N., R. 5 E., Cimarron Meridian.

REDBIRD

COUNTY: Wagoner.

LOCATION: T. 16 N., R. 16 E.

SURFACE ELEVATION: 500-550 feet.

SURFACE FORMATION: Bluejacket sandstone.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Small dome.

PRODUCING				INITIAL
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
Dutcher	806	200	gas	1-7 M. cu. ft.
Mississippi	1100	85		
Chattanooga	1185	20		
Tyner	1480	25		
Burgen	1543	40	gas	1-10 M. cu. ft.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS: Dry. Rock pressure 220 to 700 pounds.

DATE OF OPENING: 1915.

REMARKS: In 1915, Wilson-Rhode and Gillispie drilled a well in sec. 8, T. 16 N., R. 16 E., which had a showing of oil at a depth of 1,586 feet. The production is chiefly gas.

RED BANK

COUNTY: Creek.

LOCATION: T. 16-17 N., R. 8 E.

SURFACE ELEVATION: 900-1,000 feet.

SURFACE FORMATION: Pawhuska formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: North and South Catfish anticlines, extensive faulting.

PRODUCING				INITIAL
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
Layton	1235	20		
Jones	1425	20		
Cleveland	1550	30		
Wheeler	2290	40		
Bartlesville			gas	1-4 M. cu. ft.
Tucker	2820	100	gas	1-10 M. cu. ft.
Dutcher	2150	10	oil gas	25-1500 bbls.
Mississippi	3360	10		2-22 M. cu. ft.
Wileox	3660	5	oil	60 bbls.

CHARACTER OF OIL: Gravity, 36.7° B.

CHARACTER OF GAS:

DATE OF OPENING: 1918.

REMARKS: The discovery well of the Red Bank pool by the Red Bank Oil Company, November, 1918, in sec. 9, T. 16 N., R. 8 E., where an open flow of 22 million cubic feet of gas at 2,750 to 2,816

feet in depth, was encountered. This well marks the beginning of what has since developed into a good oil and gas field.

Development was limited to the South Catfish anticline until late in 1920 when the first test was drilled in on the north fold and both oil and gas were found.

RED FORK

COUNTY: Tulsa.

LOCATION: T. 19 N., R. 12 E.

SURFACE ELEVATION: 600-850 feet.

SURFACE FORMATION: Coffeyville formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticlinal folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Oswego	599	30	oil	5-10 bbls.
Red Fork	1275	25	oil gas	3-20 bbls. 1 M. cu. ft.
Bartlesville	1320	10		
Dutcher	1484	16		
Burgess	1502	8		
Turkey Mt.	2160	15	oil gas	15-50 bbls. 1-2 M. cu. ft.

CHARACTER OF OIL: Gravity, 32.9-38.2° B. Color, dark green to black.

CHARACTER OF GAS:

DATE OF OPENING: 1901.

REMARKS: Oil was first discovered in Tulsa County in the Red Fork pool and it is claimed that this pool had the first commercial production in the State.

The wells of the Red Fork pool have been small though long-lived producers, one well having an initial production of 55 barrels of oil has produced for more than twenty years.

RED OAK

COUNTY: Latimer.

LOCATION: T. 6 N., R. 21 E.

SURFACE ELEVATION: 600-1,250 feet.

SURFACE FORMATION: McAlester shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Brazil anticline.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Uncorrelated	2500		gas	1-3 M. cu. ft.

CHARACTER OF OIL: Gravity -----.

CHARACTER OF GAS:

DATE OF OPENING: 1910.

REMARKS:

RED RIVER

COUNTY: Tillman.

LOCATION: T. 5 S., R. 14 W.

SURFACE ELEVATION: 1,015 feet.

SURFACE FORMATION: Clear Fork-Wichita formations.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Nose and folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Cisco (†)	1540	6	oil	10-25 bbls.
	1650	40	oil	50-100 bbls.
	1700	12	oil	1-5 bbls.

CHARACTER OF OIL: Gravity, 40.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1920.

REMARKS: The Red River pool is an extension of the Burkburnett production in Texas. This pool is located along the north banks and in the Red River.

RETTA

See Hubbard, page 173

RIPLEY

COUNTY: Payne.

LOCATION: T. 17-18 N., R. 4 E.

SURFACE ELEVATION: 800-1,140 feet.

SURFACE FORMATION: Pennsylvanian-Permian formations.

AGE OF SURFACE ROCKS: Pennsylvanian-Permian.

STRUCTURE: Ripley anticline.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton	2072			
Bartlesville	3400		oil gas	40 bbls. 3-5 M. cu. ft.
Mississippi	3600			
Chattanooga	3804	10		
Misener	3914	40		
Sylvan	3983	17		
Viola	4030	40	oil gas	100-3000 bbls. 5 M. cu. ft.
Wilcox	4128	10	oil	50-200 bbls.

CHARACTER OF OIL: Gravity -----.

CHARACTER OF GAS:

DATE OF OPENING: 1914.

REMARKS: The Ripley anticline is located 3 miles east of the town of Ripley with its apex in sec. 23, T. 18 N., R. 4 E. The discovery well of the Ripley pool was drilled by the Charleston Oil Company on the apex with an initial production of 75 barrels of oil per day at a depth of 1,861 feet. In trying to reach the Bartlesville sand the oil sand was lost and the well was shut in for 5 million cubic feet of gas per day.

RIVERLAND

COUNTY: Tulsa.

LOCATION: T. 18 N., R. 12 E.

SURFACE ELEVATION: 700-850 feet.

SURFACE FORMATION: Coffeyville formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticlinal folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Red Fork	1200	25		
Glenn	1320	30		
Taneha	1545	30	oil	10-60 bbls.
Burgess	1698	10	oil	15 bbls.
Mississippi	1730	45	gas	1-6 M. cu. ft.
Wilcox	2000	12	oil	70-175 bbls.
Siliceous	2120	36	oil	80-3000 bbls.
Turkey Mt.	2255	20	oil	30-2000 bbls.

CHARACTER OF OIL: Gravity -----.

CHARACTER OF GAS:

DATE OF OPENING: 1920.

REMARKS:

ROBBERSON

COUNTY: Garvin.

LOCATION: T. 1 N., R. 3 W.

SURFACE ELEVATION: 925-1,125 feet.

SURFACE FORMATION: Clear Fork-Wichita formations.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Anticlinal folds, faulting.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Pontotoc	1200	10	oil	5-200 bbls.
	1400	200	gas	1-10 M. cu. ft.
Simpson	1877	400	oil gas	10-600 bbls.
			oil	1-20 M. cu. ft.

CHARACTER OF OIL: Gravity, 25-28° B.

CHARACTER OF GAS:

DATE OF OPENING: 1920.

REMARKS: The discovery of the Robberson pool is probably due to Pierce Larkin, who, in 1915 found oil and gas in shallow water wells in sec. 16, T. 1 N., R. 3 W. He also found some local dips which were indicative of favorable structures.

In June, 1920, the Magnolia Petroleum Company completed a well for 40 million cubic feet of gas per day at a depth of 1,386 feet. Oil was discovered more than a year afterwards, July 16, 1921, in sec. 14, T. 1 N., R. 3 W. The well was estimated at 200 barrels of oil per day. This stimulated a drilling campaign which resulted in some large oil wells; the first one completed by the Texas-Pacific Coal and Oil Company for an initial production of 1,000 barrels of oil in sec. 13, T. 1 N., R. 3 W. Several gushers were completed from the upper part of the Ordovician buried hill which underlies this field.

ROBINSON

COUNTY: Muskogee.

LOCATION: Secs. 18 and 19, T. 15 N., R. 17 E.

SURFACE ELEVATION: 500-550 feet.

SURFACE FORMATION: Bluejacket sandstone.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Subsurface folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Sand	1080	28	gas	2 M. cu. ft.
Muskogee	1325	18	oil	150-800 bbls.

CHARACTER OF OIL: Gravity, 41-42° B.

CHARACTER OF GAS:

DATE OF OPENING: Production is now only 5 barrels a day due to the encroachment of water.

ROFF

COUNTY: Pontotoc.

LOCATION: T. 2 N., R. 4 E.

SURFACE ELEVATION: 1,115-1,800 feet.

SURFACE FORMATION: Pontotoc group.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Probable folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Uncorrelated	175	10	show of gas	1-2 M. cu. ft.
	390	3	show of gas	
	470	50	oil show gas	

CHARACTER OF OIL: Gravity -----.

CHARACTER OF GAS:

DATE OF OPENING: 1920.

REMARKS: A small amount of production was discovered in the Roff pool early in 1920. The producing sand was probably the Simpson, from which the asphalt of that area is obtained.

ROOD-BETHEL

Holm-Jarris

COUNTY: Seminole.

LOCATION: T. 9 N., R. 8 E.

SURFACE ELEVATION: 850-1,000 feet.

SURFACE FORMATION: Francis-Belle City limestone.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Closed fold on the Booch sand.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Booch	3230	30	oil	20-200 bbls.
Gilcrease	3342	15	oil	40-125 bbls.
Cromwell	3500	60		
Hunton	4120	95		
Wilcox	4565	30		

CHARACTER OF OIL: Gravity, 38°-40° B.

CHARACTER OF GAS:

DATE OF OPENING: December, 1924.

REMARKS: The discovery well was drilled by the Independent Oil and Gas Co. The Cromwell and Wilcox sands have proved unproductive. The Booch sand, generally water-bearing, is the producing horizon and the wells have a slow decline.

ROUND-UP

COUNTY: Carter.

LOCATION: T. 2 S., R. 2 W.

SURFACE ELEVATION: 918-982 feet.

SURFACE FORMATION: Clear Fork-Wichita formation.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Monocline under unconformity.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
	1025-128	5-40	oil	30 bbls.

CHARACTER OF OIL: Gravity, 24-28° B.

CHARACTER OF GAS: Rock pressure, 300 pounds.

DATE OF OPENING: Jan. 16, 1926.

REMARKS: Field opened by F. W. Merrick. There are, 1928, three producing wells giving a production of about 25 bbls. for the field.

ROXANA

COUNTY: Logan.

LOCATION: T. 19 N., R. 4 W.

SURFACE ELEVATION: 999-1,060 feet.

SURFACE FORMATION: Enid formation.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Subsurface faulted anticlinal domes.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Foraker	2100-2250			
Pawhuska	2900			
Hoover	3000-3250			
Oread lime	3500	100		
Endicott	3780			
Tonkawa	3950			
Layton	4580	150	gas	42 M. cu. ft.
Oswego	5210	100		
Miss. lime	5480	93-130		
Viola lime	5775			
Simpson	5800-5960		oil	250 bbls.
Wilcox	5983-6086		oil gas	2½ M. cu. ft. 2450 bbls.

CHARACTER OF OIL: Gravity 41 to 42° B. High gasoline content.

CHARACTER OF GAS: Wet.

DATE OF OPENING: 1927.

REMARKS: The Roxana Petroleum Company drilled in the discovery well on the McCully farm in sec. 30, T. 19 N. R. 4 W., June 28th, 1927, at a depth of 5,984 feet, the lowest commercial depth in State to date, and had an initial production of 2,450 bbls. Its maximum production being 2,885 barrels. The cost of drilling this well was \$150,000.00

SAGEEYAH

COUNTY: Rogers.

LOCATION: T. 22 N., R. 16 E.

SURFACE ELEVATION: 650-750 feet.

SURFACE FORMATION: Fort Scott limestone.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Local folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
	330		show of gas	
Bartlesville	525	10	oil	1-25 bbls.
Burgess	967	20	gas	1-3 M. cu. ft.
Mississippi	987			

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS: Dry. Rock pressure 250 pounds.

DATE OF OPENING: 1918.

REMARKS: In October, 1918 the Colonial Oil and Refining Company completed a well in sec. 20, T. 22 N., R. 16 E., with an initial production of 1¼ million cubic feet of gas per day in the Burgess sand at a depth of 947 feet. The same company completed another small gas well which provided the county poor farm with gas for domestic use.

SALT CREEK
Gypsy Hill

COUNTY: Okmulgee.

LOCATION: T. 13 N., R. 11-12 E.

SURFACE ELEVATION: 700-850 feet.

SURFACE FORMATION: Wewoka formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Local folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Stray	1074	30	gas	1-4 M. cu. ft.
Salt sand	1781	100		
Glenn	1960	40		
Booch	2240	200	gas	1-4 M. cu. ft.
Dutcher	2430	10	oil	35-400 bbls.
Youngstown	2575	25	oil gas	60-120 bbls. 3-33 M. cu. ft.
Wilcox	3290	5	oil	60-300 bbls.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1910.

REMARKS: The Salt Creek pool was discovered by a completion on the Tobler allotment sec. 25, T. 13 N., R. 11 E., in October, 1910. The Prairie Oil and Gas Company, after paying \$20,000 for leases on the area, drilled the well to a depth of 2,367 feet, obtaining an initial production of 200 barrels of oil per day. This was the first production in the western part of Okmulgee County.

SAND SPRINGS or CHARLES PAGE

COUNTY: Tulsa-Osage.

LOCATION: T. 19-20 N., R. 11 E.

SURFACE ELEVATION: 750-950 feet.

SURFACE FORMATION: Nellie Bly formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticlinal nose.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Oswego	1100	35	oil	10-30 bbls.
Red Fork	1435	10	gas	2-4 M. cu. ft.

(Table continued on next page)

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Bartlesville	1520	80		
Tucker	1750	15	oil	10-40 bbls.
Burgess	1861	10	gas	3-8 M. cu. ft.
Wilcox	1942	60	gas	10-16 M. cu. ft.
Tyner	2025	20	gas	1-4 M. cu. ft.
Siliceous	2177	10	oil	35-1500 bbls.

CHARACTER OF OIL: Gravity, 38.9-39.9° B.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1916.

REMARKS: The Sand Springs pool is owned by the Sand Springs Home which has vast oil and gas properties in southern Osage and northern Tulsa counties. This home is a well appointed modern asylum and school for orphan children established by the oil financier and philanthropist, Charles Page. Mr. Page made his first big strike in oil in the Taneha pool in 1907, and from that time his interests spread into many areas of the State's oil development.

SAPULPA
Pumpkin Center

LOCATION: T. 18 N., R. 11-12 E.

COUNTY: Creek.

SURFACE ELEVATION: 650-900 feet.

SURFACE FORMATION: Nellie Bly formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticlinal folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Peru	875	25	gas	1 M. cu. ft.
Oswego	950	10		
Perryman	1000	30	oil	10-30 bbls.
Red Fork	1275	10		
Glenn	1365	40	oil gas	2-100 bbls. 2 M. cu. ft.
Taneha	1635	10	oil	15-40 bbls.
Dutcher	1835	10	oil gas	25-250 bbls. 1-3 M. cu. ft.
Mississippi	2060		gas	5-10 M. cu. ft.
Wilcox	2290	5	oil gas	25-40 bbls. 5-9 M. cu. ft.
Turkey Mt.	2575			

CHARACTER OF OIL: Gravity, 24-35.8° B.

CHARACTER OF GAS:

DATE OF OPENING: 1909.

REMARKS: The Sapulpa pool is a northwest extension of Glenn pool, and development in the area followed that of Glenn pool. The structural conditions and sands are very similar. The Pumpkin Center pool was the first development in the Sapulpa area.

SARAH WHIPPLE

COUNTY: Garfield.
 LOCATION: Sec. 19, T. 23 N., R. 3 W.
 SURFACE ELEVATION: 1,100-1,160 feet.
 SURFACE FORMATION: Garber member of the Enid formation.
 AGE OF SURFACE ROCKS: Permian.
 STRUCTURE: Anticline, controlled by faulting.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton	4030-4245			
Oswego	4370-4500	460 (?)		
Mississippi	4790-5040	220		
Chattanooga	4962-5260	45		
Viola	5010	55		
Simpson	5072-5360	190		
Wilcox	5280-5485	65	oil	1,000 bbls.

CHARACTER OF OIL: Gravity 41-48° B.

CHARACTER OF GAS: Dry and one horizon wet.

DATE OF OPENING: Layton gas sand, Nov., 1925; Simpson oil sand, Aug., 1926.

PEAK PRODUCTION: 2,000 bbls.

NUMBER OF WELLS: 4.

REMARKS: The area was core-drilled by the Marland Ref. Co., who drilled the discovery well known as the Marland Garber No. 1. Later an offset to this well was drilled to the Simpson sand and completed with an initial production of 1,400 barrels. The initial production of the discovery well was 500 barrels, though this well is higher structurally than its west offset, the Marland Whipple No. 1. Wells to the north of these two wells ran very much lower due to a pronounced mid-Pennsylvanian fault.

North of the discovery well the Amerada-Champlin No. 1 Wilcox encountered a heavy gas flow in the top of the Mississippi lime at 5,050 feet. This well, located on the downthrow side of the fault, is approximately 300 feet lower than the discovery well.

This so called gas from the top of the Mississippi is gas from the Simpson formation coming through the fault zone, or brecciated Mississippi lime zone. The Mississippi lime in this well is faulted down so that it is opposite the Simpson formation.

SAYRE

COUNTY: Beckham.
 LOCATION: T. 9 N., R. 23 W.
 SURFACE ELEVATION: 1,885 feet.
 SURFACE FORMATION: Dune sand.
 AGE OF SURFACE ROCKS: Quaternary
 STRUCTURE: Subsurface, Sayre dome, and Windle dome.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Permian Pontotoc (?)	2630	60	gas	30-45 M. cu. ft.
	2775	50	oil gas	200 bbls.
	2995	10	oil gas	1-12 M. cu. ft. 50-200 bbls. 10-70 M. cu. ft.

CHARACTER OF OIL: Gravity, 32-33.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1922.

REMARKS: The Twin Hills Oil Company completed the discovery well of the Sayre pool, July, 1922 in sec. 15, T. 9 N., R. 23 W., with an initial production of 50 million cubic feet of gas per day at a depth of 2,755 feet. Later this well made some oil.

In April, 1923, Martin, et al completed an oil well with an initial production of 200 barrels of oil per day from a depth of 2,995 feet in sec. 31, T. 9 N., R. 23 W. This well created much interest in the County and the greater part of the development in the area was done in that same year.

In April, 1927, the Magnolia Petroleum Company completed one of the largest gas wells of the Sayre pool in sec. 29, T. 9 N., R. 23 W., for 75 million cubic feet of gas per day.

SCHULTER

COUNTY: Okmulgee.
 LOCATION: T. 12 N., R. 13 E.
 SURFACE ELEVATION: 600-800 feet.
 SURFACE FORMATION: Calvin sandstone.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Local structure.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Red Fork	1530	30	gas	5-18 M. cu. ft.
Glenn	1962	40	oil gas	40-400 bbls.
Booch	2015	10	gas	6-10 M. cu. ft.
Deaner	2290	20	oil gas	1-2 M. cu. ft.
Lyons-Quinn	2390	5	gas	5-15 M. cu. ft.
Wilcox	2945	5		

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1907.

REMARKS: The pool known as the Schulter "shoe string" was opened by Smith and Swan in 1907.

SCOTT

COUNTY: Creek.

LOCATION: T. 16 N., R. 10 E.

SURFACE ELEVATION: 700-800 feet.

SURFACE FORMATION: Nelagoney formations.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Local folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Red Fork	1990	10		
Glenn	2090	30	gas	2-5 M. cu. ft.
Taneha	2340	10	oil	10-30 bbls.
Dutcher	2510	20	oil gas	50-1200 bbls. 10 M. cu. ft.
Mississippi	2675			
Wilcox	2925			

CHARACTER OF OIL: Gravity -----.

CHARACTER OF GAS:

DATE OF OPENING: 1919.

REMARKS:

SEARIGHT

COUNTY: Seminole.

LOCATION: T. 9-10 N., R. 6 E.

SURFACE ELEVATION: 900-1,025 feet.

SURFACE FORMATION: Pontotoc group.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Folds and faults. Subsurface folds and domes.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Chattanooga	3910		show of gas	
Hunton	4120	30	oil gas	300-2000 bbls.
Sylvan	4150	30		3-6 M. cu. ft.
Viola	4280	200		
Wilcox	4325	200	oil	120-5000 bbls.

CHARACTER OF OIL: Gravity, 37.5-40° B.

CHARACTER OF GAS: Wet.

DATE OF OPENING: 1926.

REMARKS: The Searight pool was discovered in July, 1926 by F. J. Searight in sec. 34, T. 10 N., R. 6 E. In the beginning of development in Seminole county it was apparent that the several groups of wells would be the nucleus of a new pool, although at first it was termed one pool and named Seminole.

SEAY

See Humble, page 173

SELTZER

COUNTY: Wagoner.

LOCATION: T. 18 N., R. 16 E.

SURFACE ELEVATION: 700-800 feet.

SURFACE FORMATION: Cherokee shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Faulting, and lenticular sands.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Dutcher	800	20	oil gas	6-300 bbls. 1-5 M. cu. ft.

CHARACTER OF OIL: Gravity, 36.5° B.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1923.

REMARKS: The Seltzer pool was developed by Phillip Boyle in 1924. The developed area incudes sections 28, 29 and 32. The first well was drilled in sec. 32 T. 18 N., R. 16 E., on the Seltzer farm.

SEMINOLE CITY

COUNTY: Seminole.

LOCATION: T. 9 N., R. 6 E.

SURFACE ELEVATION: 850-900 feet.

SURFACE FORMATION: Pawhuska limestone.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Irregular folds and faults.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Hunton	3910	16	oil gas	50-2200 bbls.
Sylvan	4030	60		
Viola	4090	50		
Wilcox	4175-4230	125	oil gas	90-6000 bbls.

CHARACTER OF OIL: Gravity, 38.9-41° B.

CHARACTER OF GAS:

DATE OF OPENING: 1926.

REMARKS: The discovery well of the Seminole City pool was completed March, 1926 by the Indian Territory Illuminating Oil Company in sec. 24, T. 9 N., R. 6 E. The well flowed 240 barrels of oil per day naturally from a total depth of 4,012 feet in Hunton lime.

The first Wilcox sand well was completed July 16, 1926 by the Independent Oil & Gas Company and Robert F. Garland in sec. 26, T. 9 N., R. 6 E. Production in the Seminole City pool was increased almost 1,300% in the next six months.

SEQUOYAH
Webbers Falls
Muldraw
Vian

COUNTY: Sequoyah.

LOCATION: T. 11 N., R. 25 E.; T. 12 N., R. 21 E.; T. 12 N.,
R. 20 E.

SURFACE ELEVATION: 700-1,000 feet.

SURFACE FORMATION: McAlester shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Vian anticline.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Uncorrelated	1000	15	gas	½ M. cu. ft.
	1200	50	gas	1.2 M. cu. ft.
	2926	17	gas	
	2951	2	gas	
	3000	20	gas	
	3130	7	gas	3½ M. cu. ft.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS: Dry. Rock pressure 420 to 590 pounds.

DATE OF OPENING: 1910.

REMARKS: All the production to date in Sequoyah has been gas. The development near Muldraw resulting in a small gas pool, made it one of the principal areas in the country. However, gas has been found west of Vian and south of Webbers Falls across the county line.

There are several known anticlines in Sequoyah County but the zones of faulting and the thin Pennsylvanian section has caused some hesitancy in drilling.

SHAMROCK

COUNTY: Creek.

LOCATION: T. 16-17 N., R. 7 E.

SURFACE ELEVATION: 1,100 feet.

SURFACE FORMATION: Pawhuska formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Shamrock dome, and Mount Pleasant dome.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton	1475	10	gas	10-50 M. cu. ft.
Wheeler	2200	25	oil	50-300 bbls.
Bartlesville	2700	50	oil	250-2000 bbls.
Tucker	2800	20	oil	100-1000 bbls.

CHARACTER OF OIL: Gravity, 39.9°-41° B.

DATE OF OPENING: 1914.

REMARKS: The Shamrock dome was named from the Post Office situated some two miles southwest of the apex of the dome. The

Numa Oil Company was one of the early developers of the area; their first well was reported for 8,000 barrels of oil per day from the Bartlesville sand.

The Mount Pleasant dome was named from the church situated on the north slope of the dome.

SHEPPARD

COUNTY: Muskogee.

LOCATION: Secs. 11, 12, and 15, T. 13 N., R. 15 E.

SURFACE ELEVATION: 750 feet.

SURFACE FORMATION: Boggy shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Subsurface folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Sand	1940-1968	20	oil	50-600 bbls.

CHARACTER OF OIL: Gravity, 34.9° B.

CHARACTER OF GAS:

DATE OF OPENING: June, 1917.

REMARKS:

SHERIDAN

See Independent, page 174

SHOLEM ALECHEM

COUNTY: Carter-Stephens.

LOCATION: T. 1-2 S., R. 3-4 W.

SURFACE ELEVATION: 930-1,150 feet.

SURFACE FORMATION: Clear Fork-Wichita formations.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: A major anticline with smaller companion folds.

PRODUCING HORIZONS	DEPTH	REMARKS
1st sand	1890-2900	Main pay at County Line. Yields largest wells in field with initial production up to 2980 bbls. per day, but very erratic in thickness and yield.
2nd sand	1950-3000	Productive in only a few scattered wells.
3rd sand	1850-3300	300 to 350 ft. below first sand. Productive in only a few scattered wells, but yielded large initial production in a few wells in sec. 34-1S-3W.
4th-7th sands inclusive	2000-3300	Small production in scattered wells.
8th sand	2150-3450	300 to 350 ft. below third sand. Main pay in the south-eastern half of the field. Maximum initial production 800 bbls. per day.
9th-13th sands	2600-3750	Sporadic small production in southeast half of field.
14th sand	3050-4000	550 to 600 ft. below eighth sand. Small production in south-east half of field. Maximum initial production about 200 bbls. per day.
15th-19th sands	2850-4200	Insignificant production. Reached only in a few wells in southeast half of field.

CHARACTER OF OIL: Gravity, 24-34° B.

CHARACTER OF GAS:

DATE OF OPENING: 1923.

REMARKS: The Sholem Alechem pool, meaning in the Hebrew, "Peace be with you," was discovered by the Humble Oil and Refining Co., in Dec., 1923, when their Jennings No. 1, SW. $\frac{1}{4}$ SW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 28, T. 1 S., R. 3 W., was brought in. None of the sands of the Sholom Alechem field is uniformly productive over any large area. Even in the four sands of real importance (Nos. 1, 3, 8 and 14), the best producers may be offset by wells yielding less than 15 bbls. per day from the same horizon. The sands vary sharply, both in thickness and in content of shale and lime. The wide range in depth at which each sand is reached within the field is due to the great height of this steeply-folded anticline, which rises at least 1,200 ft. above the level of edge water in the important sands.

SKELLY-FORD

See Kendrick, page 179

SKIATOOK

COUNTY: Osage.

LOCATION: T. 22 N., R. 12-13 E.

SURFACE ELEVATION: 650-900 feet.

SURFACE FORMATION: Coffeyville formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Fox dome, two domes.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Oswego	766	24		
Cleveland	1110	15		5-15 bbls.
Bartlesville	1370	20	oil	20-100 bbls.
Burgess	1460	10	oil	10-30 bbls.
Mississippi	1500	150	oil	1-3 M. cu. ft.
Turkey Mt.	1778		gas	

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1906.

REMARKS: The Skiatook pool extends eastward into Washington County. The first well was drilled by the Barnsdall Oil Company, February, 1911, in sec. 24, T. 22 N., R. 12 E., to a depth of 1,514 feet with an initial production of 50 barrels of oil per day. The pool was developed before the inauguration of lease sales.

SLICK

COUNTY: Creek.

LOCATION: T. 15-16 N., R. 10 E.

SURFACE ELEVATION: 800-900 feet.

SURFACE FORMATION: Nellie Bly formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticlinal folding, subsurface domes and folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Oswego	1600	200		
Glenn	2340	260		
Taneha	2425	40	oil	50-500 bbls.
Dutcher	2620	45	oil gas	200-1050 bbls.
Misener	3088	120	oil gas	10 M. cu. ft.
Wilcox	3140	10	oil gas	100-250 bbls.
				3-5 M. cu. ft.
				3-10 M. cu. ft.

CHARACTER OF OIL: Gravity, 32-35.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1913.

REMARKS: Oil was discovered in the Slick pool in 1913, sec. 15, T. 15 N., R. 10 E., by Russel Brothers. The well was drilled to a depth of 2,128 feet and had an initial production of only 7 barrels of oil. The first well drilled to the Dutcher sand competed in the fall of 1918 by the Oklahoma Syndicate, Ltd., in sec. 3, T. 15 N., R. 10 E., at a depth of 2,579 feet. The initial production was 200 barrels of oil per day.

SOMMERVILLE

COUNTY: Muskogee.

LOCATION: Sec. 17, T. 15 N., R. 17 E.

SURFACE ELEVATION: 600-650 feet.

SURFACE FORMATION: Bluejacket sandstone.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Subsurface folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Sand	1260-1382	17	gas	50 M. cu. ft.
Sand	1439	11	oil	375 bbls.

CHARACTER OF OIL: Gravity,-----

CHARACTER OF GAS:

DATE OF OPENING:

REMARKS: Maximum production 100 M. cu. ft. of gas.

SOUTH BEGGS

See Beggs, page 112

SOUTH BRAMAN

See Braman, page 120

SOUTH COFFEYVILLE

COUNTY: Nowata.
 LOCATION: T. 29 N., R. 15 E.
 SURFACE ELEVATION: 700-950 feet.
 SURFACE FORMATION: Coffeyville formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Reverse dips.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
	120-140	1-10	oil gas	2-6 bbls.
Oswego	493	27	gas	1-2 M. cu. ft.
Squirrel	820	30	oil	1-2 bbls.
Bartlesville	920	15	oil	2-25 bbls.
Mississippi	1025	40	gas	½-1 M. cu. ft.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1915.

REMARKS: The South Coffeyville pool is an extension from the Coffeyville pool of southern Kansas.

SOUTH ELGIN

COUNTY: Osage.
 LOCATION: T. 29 N., R. 9 E.
 SURFACE ELEVATION: 750-850 feet.
 SURFACE FORMATION: Elgin sandstone.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Folding; faults.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Ramsey	855	5	oil	40-75 bbls.
Peru	900	160	oil	25-200 bbls.
Oswego	1150	10	oil	2-5 bbls.
Mississippi	1695	5		

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1915.

REMARKS: The South Elgin pool is an extension of the Elgin pool of southern Kansas.

SOUTH PONCA CITY
 See Ponca City, page 221

SOUTH WELEETKA
 See Dustin, page 150

SPENCER

COUNTY: Okmulgee.
 LOCATION: T. 15-16 N., R. 14 E.
 SURFACE ELEVATION: 500-650 feet.
 SURFACE FORMATION: Stuart shale.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Subsurface folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Red Fork	1255	20	oil	6-15 bbls.
Dutcher	1312	100	oil gas	10-200 bbls.
Misener	1580			1-2 M. cu. ft.
Wilcox	1660			
Tyner	1720			
Burgen	1900			
Turkey Mt.	2010			

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS: Wet. Rock pressure 200 to 250 pounds.

DATE OF OPENING: 1917.

REMARKS: The Spencer pool is an extension of the Stone Bluff pool of Wagoner county. It derived its name from the J. Spencer farm on which the first well in the area was drilled.

SPERRY

COUNTY: Tulsa.
 LOCATION: T. 20-21 N., 12 E.
 SURFACE ELEVATION: 600-750 feet.
 SURFACE FORMATION: Coffeyville formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Local folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Big Lime	590	10		
Bartlesville	1150	65	oil gas	5-75 bbls.
Taneha	1290	10	oil	3-25 M. cu. ft.
Burgess	1335	10	oil gas	10-100 bbls.
Mississippi	1440	20	oil	5-25 bbls.
Tyner	1760	40	oil gas	1 M. cu. ft.
Turkey Mt.	1860	20		15 bbls.
				10-400 bbls.
				1-6 M. cu. ft.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1909-1919.

REMARKS:

SPIRO

COUNTY: LeFlore.

LOCATION: T. 9 N., R. 25 E.

SURFACE ELEVATION: 500-600 feet.

SURFACE FORMATION: McAlester shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticlinal folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Uncorrelated	1560-1620		gas	1-5 M. cu. ft.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1914.

REMARKS: The Spiro pool, located about 5 miles northwest of Spiro on the Milton anticline, has a number of wells all producing gas. No oil has been found in this region.

STIDHAM

COUNTY: McIntosh.

LOCATION: T. 11 N., R. 15 E.

SURFACE ELEVATION: 700-850 feet.

SURFACE FORMATION: Boggy shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticlinal folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Uncorrelated	1170	20	oil gas	5-20 bbls.
	2440	5	gas	1-3 M. cu. ft.
	2550	14	show of gas	2 M. cu. ft.
Chattanooga	2740	85		
Hunton	2945	13	show of gas	
Sylvan	3060	30		
Viola	3090	13		
Wilcox	3207	7	dry	

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1914.

REMARKS: Sinclair and White drilled the first well of the area in sec. 14, T. 11 N., R. 15 E. It was completed at a depth of 2,000 feet with a reported gas production. Deep drilling was started by the Simpson Fell Oil Company, in sec. 27, T. 11 N., R. 15 E., 1926. The Wilcox sand was reached at a depth of 3,200 feet but without production.

STONE BLUFF

COUNTY: Wagoner.

LOCATION: T. 16 N., R. 14 E.

SURFACE ELEVATION: 500-900 feet.

SURFACE FORMATION: Stuart shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Local folds and faults.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Salt sand	1000-1050			
Red Fork	1100-1130		gas	1-10 M. cu. ft.
Glenn	1200			
Dutcher	1420-1600			
Misener	1800-2000		oil gas	50-400 bbls.
Wilcox	1840-2040			
Tyner	1920-2120			
Burgen	1985-2100		oil	35-60 bbls.
Turkey Mt.	2275			

CHARACTER OF OIL: Gravity, 36° B.

CHARACTER OF GAS: Wet and dry.

DATE OF OPENING: 1915.

REMARKS: The production of both oil and gas in the Stone Bluff pool is from the Dutcher sand. The first development was begun by B. C. Goble in sec. 5, T. 16 N., R. 15 E. The first well had an initial production of 600 barrels of oil per day.

STRIKER

COUNTY: Wagoner.

LOCATION: T. 18 N., R. 16 E.

SURFACE ELEVATION: 700-800 feet.

SURFACE FORMATION: Cherokee shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Faulting, and lenticular sands.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Dutcher series	450	5	oil	10-15 bbls.
	610	100	gas	1-5 M. cu. ft.
	800	20	oil	6-30 bbls.
Morrow-Pitkin	915	10	oil	10-150 bbls.

CHARACTER OF OIL: Gravity, 33-37° B.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1917.

REMARKS: The Striker pool has produced to date approximately \$1,500,000 worth of oil. There are 14 wells in the area producing from a sand about seven feet thick and which is very tight. The initial production ranges from 10 to 150 barrels of oil per day.

STROUD

COUNTY: Creek-Lincoln.

LOCATION: T. 14 N., R. 6-7 E.

SURFACE ELEVATION: 900 feet.

SURFACE FORMATION: Buck Creek-Pawhuska formation. Oologah limestone.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticlinal folding, subsurface dome.

PRODUCING		INITIAL		
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
Layton	1435	10	gas	10-15 M. cu ft.
Prue	2490	6	oil	5-25 bbls.
Skinner	2555	30	oil	15-25 bbls.
Bartlesville	3230	50	oil	35-100 bbls.
Dutcher	4138	10	oil	
Wilcox	4220		oil	10-100 bbls.
Siliceous	4575	10	oil	10 bbls.

CHARACTER OF OIL: Gravity, 40-40.9° B. 53° B., from deep sand.

CHARACTER OF GAS:

DATE OF OPENING: 1923.

PEAK PRODUCTION DATE: June, 1924.

PEAK PRODUCTION: 25,000 barrels.

NUMBER OF WELLS: 18.

REMARKS: The Stroud pool was discovered by the Union Petroleum Company in sec. 2, T. 14 N., R. 6 E. The well was a phenomenal high-gravity producer in the Wilcox sand.

SUMMERS

COUNTY: Muskogee.

LOCATION: Secs. 35 and 36, T. 15 N., R. 15 E.

SURFACE ELEVATION: 600-650 feet.

SURFACE FORMATION: Boggy Shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Subsurface folds.

PRODUCING		INITIAL		
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
Sand	1443	12	oil	50-800 bbls.

CHARACTER OF OIL: Gravity,-----

CHARACTER OF GAS:

DATE OF OPENING: 1914.

REMARKS: This pool now produces about 75 barrels.

**SUNRAY
Oakhurst**

COUNTY: Tulsa.

LOCATION: T. 18 N., R. 12 E.

SURFACE ELEVATION: 600-850 feet.
SURFACE FORMATION: Coffeyville formation.
AGE OF SURFACE ROCKS: Pennsylvanian.
STRUCTURE: Local folding.

PRODUCING		INITIAL		
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
Oswego	590	10		
Perryman	1000	35	oil gas	5-10 bbls.
Red Fork	1320	10	oil	1 M. cu. ft.
Taneha	1466	34	oil gas	5-25 bbls.
				40 bbls.
Burgess	1570	30	oil gas	1-2 M. cu. ft.
				10 bbls.
Mississippi	1610	80		1 M. cu. ft.
Wilcox	1975	25	oil gas	
				10-290 bbls.
Turkey Mt.	2170	20	oil	1-4 M. cu. ft.
				10-400 bbls.

CHARACTER OF OIL: Gravity, 36.9-38° B.

CHARACTER OF GAS:

DATE OF OPENING: 1925.

REMARKS: The Sunray pool was discovered by Munn Brothers, Inc., and the Sunray Oil Corporation late in 1925. They completed a number of excellent producing wells in the Wilcox sand in sec. 6, T. 18 N., R. 12 E.

TALALA

COUNTY: Rogers.

LOCATION: T. 24 N., R. 16 E.

SURFACE ELEVATION: 600-800 feet.

SURFACE FORMATION: Nowata shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Terraces.

PRODUCING		INITIAL		
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
Oswego	335	10		
Bartlesville	715	20	gas	1-2 M. cu. ft.
Mississippi	1035	50	gas	1 M. cu. ft.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1913.

REMARKS:

TANEHA

COUNTY: Rogers-Tulsa.

LOCATION: T. 19 N., R. 14 E.

SURFACE ELEVATION: 600-800 feet.

SURFACE FORMATION: Broken Arrow formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Local folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Oswego	580	100		
	1140	20	gas	1.4 M. cu. ft.
	1322	20	oil gas	3 bbls. 1.7 M. cu. ft.

CHARACTER OF OIL: Gravity -----.

CHARACTER OF GAS: Dry. Rock pressure 220 to 300 pounds.

DATE OF OPENING: 1917.

REMARKS:

TATUMS

COUNTY: Carter.

LOCATION: T. 1 S., R. 3 W.

SURFACE ELEVATION: 947-1,040 feet.

SURFACE FORMATION: Clear Fork-Wichita formation.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Local folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
	2320	3	oil	90 bbls.
	2350	20	oil	300 bbls.
	2380	15	oil	95 bbls.

CHARACTER OF OIL: Gravity, 27° B.

CHARACTER OF GAS:

DATE OF OPENING: 1927.

REMARKS: The Tatums pool discovered early in 1927 is believed to be located on buried structure. The Magnolia Petroleum Company completed the discovery well in sec. 14, T. 1 S., R. 3 W., January 1927 at a depth of 2,352 feet with an initial production of 25 barrels of oil per day. The pool is connected with this Company's pipe lines and two others.

TERRA-OKLA.

COUNTY: Muskogee.

LOCATION: Secs. 28 and 29, T. 15 N., R. 15 E.

SURFACE ELEVATION: 600-650 feet.

SURFACE FORMATION: Boggy shale and Stuart shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Subsurface folds and faults.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Sand	1744-1789	9-22	oil	75-1400 bbls.

CHARACTER OF OIL: Gravity, 39° A. P. I.

CHARACTER OF GAS:

DATE OF OPENING: June, 1919.

REMARKS: Present production about 80 barrels.

TERLTON

COUNTY: Pawnee.

LOCATION: T. 20 N., R. 8 E.

SURFACE ELEVATION: 750-950 feet.

SURFACE FORMATION: Nelagoney formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Terraces and noses.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton	1460	45	oil	10-15 bbls.
Cleveland	1960	35	oil gas	5-10 bbls
Peru	2100	70		1 M. cu. ft.
Wheeler	2355	30	oil	20-125 bbls.
Skinner	2580	24	oil	10-100 bbls.
Bartlesville	2680	70	oil	10-1500 bbls.
Tucker	2811	14	oil	15-75 bbls.
Wilcox	3105	20	oil	15-175 bbls.

CHARACTER OF OIL: Gravity -----.

CHARACTER OF GAS:

DATE OF OPENING: 1912.

REMARKS:

TEXHOMA

COUNTY: Texas.

LOCATION: T. 1 N., R. 12 E., C. M.

SURFACE ELEVATION: 3,500 feet approximately.

SURFACE FORMATION: Tertiary formation.

AGE OF SURFACE ROCKS: Late Tertiary.

STRUCTURE: Monocline.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
"Big Lime" of Texas Pan. (Wichita -Albany)	2710	15	gas	15-20 (?) M. cu. ft.

CHARACTER OF OIL: Gravity -----.

CHARACTER OF GAS:

DATE OF OPENING: 1926.

REMARKS: The Texhoma gas well was completed in December, 1923 by the Home Development Company, sec. 4, T. 7 N., R. 12 E., Cimarron Meridian. It was drilled to a depth of 3,040 feet with an initial

production variously estimated at 15 to 20 million cubic feet of gas per day.

THOMAS

COUNTY: Kay.

LOCATION: T. 25 N., R. 2 W.

SURFACE ELEVATION: 1,030 feet.

SURFACE FORMATION: Lower Enid formation.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Faulted anticlinal fold.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Permian	1200		gas	10-30 M. cu. ft.
	1900		oil	
Thomas	2055		oil	250 bbls.
Turk	2600		oil	
Wilcox	3955	91	oil	3600 bbls.

CHARACTER OF OIL: Gravity, 42-44° B. Color, green.

CHARACTER OF GAS:

DATE OF OPENING: 1924.

REMARKS: The discovery well of the Thomas pool was completed by the Marland Oil Company, May, 1924 as a 250 barrel oil well. It was drilled to a depth of 2,055 feet where it encountered a productive sand, since called the Thomas sand; however, the major portion of the oil in the pool has come from the Wilcox sand.

TIBBENS

COUNTY: Creek.

LOCATION: T. 15 N., R. 9 E.

SURFACE ELEVATION: 750-900 feet.

SURFACE FORMATION: Ochelata formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
	900	40	gas	3.5 M. cu. ft.
Layton	1290	10	oil	10-40 bbls.
Peru	2210	30		
Wheeler	2300	25	oil	20-40 bbls.
Bartlesville	2665	40		
Dutcher	3050	10	gas	1-10 M. cu. ft.
Wilcox	3680	5		

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1924.

REMARKS: C. G. Tibbens, an oil operator in Oklahoma, has done much to develop the southern Creek County area. The Tibbens pool is located in sec. 31, T. 15 N., R. 9 E.

**TIGER FLATS
Turkey Pen Hollow**

COUNTY: Okmulgee.

LOCATION: T. 12 N., R. 11-12 E.

SURFACE ELEVATION: 700-900 feet.

SURFACE FORMATION: Stuart shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Glenn	1515	35	oil	20-30 bbls.
Booch	1900	25	oil gas	30-570 bbls.
Deaner	2300	100	oil	1 M. cu. ft.
Lyons	2590	110	oil gas	30-400 bbls.
Wilcox	3680		Show of oil	100-300 bbls.
				10 M. cu. ft.

CHARACTER OF OIL: Gravity, 32-42° B.

CHARACTER OF GAS:

DATE OF OPENING: 1908.

REMARKS: In the spring of 1908 the Tiger Oil and Gas Company completed a well in sec. 10, T. 12 N., R. 12 E., to a depth a little over 2,300 feet. The well produced 270 barrels of oil for a few days, until all the tankage was full; it was shut in and not opened for two years, when it was opened and found dry. This was the first well of the Tiger Flats pool.

TIMBER RIDGE

COUNTY: Muskogee.

LOCATION: Secs. 11, 12, and 13, T. 14 N., R. 17 E.

SURFACE ELEVATION: 650-700 feet.

SURFACE FORMATION: Winslow formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Subsurface folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Sand	1050-1100			50-250 bbls.
Bad Hole	1385-1407			
Muskogee	1480-1510			
Timber				
Ridge	1540-1560			

CHARACTER OF OIL: Gravity,-----

CHARACTER OF GAS:

DATE OF OPENING: January, 1910.

REMARKS: The peak production of this pool reached as high as 800 barrels, but has since declined to about 20 barrels.

TONKAWA

COUNTY: Kay-Noble.

LOCATION: T. 24-25 N., R. 1 W.

SURFACE ELEVATION: 990-1,055 feet.

SURFACE FORMATION: Pennsylvanian-Permian formations.

AGE OF SURFACE ROCKS: Pennsylvanian-Permian.

STRUCTURE: Faulted anticline, and subsurface folds.

PRODUCING			INITIAL	
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
Hoy	1150	20	gas	1-40 M. cu. ft.
Hotson	1350	30		
Newkirk	1450	40	oil gas	20-75 bbls. 1-15 M. cu. ft.
Upper Hoover	1800	20	gas	3-16 M. cu. ft.
Middle Hoover	1850	15	oil	25-375 bbls.
Lower Hoover	2000	50	oil gas	35-300 bbls. 1-10 M. cu. ft.
Carmichael	2050	50	oil	15-1225 bbls.
Endicott	2100	6	oil	50 bbls.
Tonkawa	2500	30	oil gas	50-3000 bbls. 1-6 M. cu. ft.
Layton	3020	75		
Oswego	3380	100		
Mississippi	3975	25		
Chattanooga	4150	150		
Wilcox	4330	60	oil	40-10,000 bbls.

CHARACTER OF OIL: Gravity, 41-43.9° B.

CHARACTER OF GAS: Wet. Rock pressure 60-750 pounds.

DATE OF OPENING: 1921.

PEAK PRODUCTION DATE: September, 1924.

PEAK PRODUCTION: 108,500 barrels.

NUMBER OF WELLS: 814.

REMARKS: In the spring of 1921 the Marland Refining Co. completed a well in sec. 16, T. 24 N., R. 1 W., (June 29, 1921). The discovery well was drilled to a depth of 2,658 to 2,660 feet, and had an initial production of 1,000 barrels of oil per day which tested 43° B. On April 10, 1924, T. B. Slick, discovered the Wilcox production of the pool in a well in sec. 35, T. 25 N., R. 1 W. The Wilcox sand was found at a depth of 4,065 to 4,085 feet with an initial production of 2,950 barrels of high gravity oil.

TRANSCONTINENTAL

COUNTY: Muskogee.

LOCATION: Sec. 7, T. 13 N., R. 16 E.

SURFACE ELEVATION: 625-650 feet.

SURFACE FORMATION: Boggy Shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Subsurface folds.

PRODUCING

HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL
Sand	1863	15	oil	PRODUCTION 50-100 bbls.

CHARACTER OF OIL: Gravity,-----.

CHARACTER OF GAS:

DATE OF OPENING: October, 1918.

REMARKS:

TULSA

COUNTY: Tulsa.

LOCATION: T. 19 N., R. 13 E.

SURFACE ELEVATION: 650-800 feet.

SURFACE FORMATION: Coffeyville formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Local folds, lenticular sands.

PRODUCING

HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL
Big Lime	450	10		PRODUCTION
Oswego	580	15		
Perryman	1086	10	oil	10-15 bbls.
Red Fork	1300	30	oil	
Bartlesville	1446	50	oil	10-50 bbls.
Mississippi	1522	10		
Dutcher	1700	50	gas	2-3 M. cu. ft.
Wilcox	1990	20	oil gas	10-100 bbls. 1-2 M. cu. ft.

CHARACTER OF OIL: Gravity -----.

CHARACTER OF GAS:

DATE OF OPENING: 1901.

REMARKS: The Tulsa pool is an area of spotted oil and gas production located directly southeast of Tulsa. Development began in the vicinity soon after the Red Fork pool was established. The wells have not been phenomenally large ones but production has been long-lived.

TURKEY MOUNTAIN

COUNTY: Tulsa.

LOCATION: T. 18 N., R. 12 E.

SURFACE ELEVATION: 600-950 feet.

SURFACE FORMATION: Nellie Bly formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Dome folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Big Lime	490	200	oil	2-10 bbls.
Oswego	750	20	oil	2-10 bbls.
Red Fork	1390	10	oil	5 bbls.
Glenn	1452	70	oil gas	1-40 bbls. 1 M. cu. ft.
Taneha	1595	30	gas	1-2 M. cu. ft.
Dutcher	1950	30	oil gas	1-4 M. cu. ft.
Wilcox	2090	30	oil	10-200 bbls.
Turkey Mt.	2145	30	oil gas	5-1000 bbls. 1-5 M. cu. ft.

CHARACTER OF OIL: Gravity, 38-41° B.

CHARACTER OF GAS:

DATE OF OPENING: 1922.

REMARKS:

TURKEY PEN HOLLOW
See Tiger Flats, page 255

TURLEY

COUNTY: Tulsa.

LOCATION: T. 20 N., R. 12-13 E.

SURFACE ELEVATION: 650-1,000 feet.

SURFACE FORMATION: Coffeyville formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Oswego	820	30		
Bartlesville	1260	45	oil gas	10-40 bbls. 2-12 M. cu. ft.
Taneha	1495	10		
Burgess	1605	25	gas	1-10 M. cu. ft.
Siliceous	1945	20	oil gas	60-500 bbls. 1-5 M. cu. ft.

CHARACTER OF OIL: Gravity, 32° B.

CHARACTER OF GAS:

DATE OF OPENING: 1914.

REMARKS: The Turley pool was an extension of development from the Glenn pool area to northern Tulsa County.

TUSKEGEE

COUNTY: Creek.

LOCATION: T. 14 N., R. 10 E.

SURFACE ELEVATION: 700-850 feet.

SURFACE FORMATION: Coffeyville formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Faulting and possible folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Glenn	2300	50	gas	1-2 M. cu. ft.
Booch	2535	50		
Taneha	2660	40	oil	10-80 bbls.
Dutcher	2810	50	oil gas	5-75 bbls. 60-455 bbls.
Wilcox	3472	10	oil	1-10 M. cu. ft.

CHARACTER OF OIL: Gravity,

CHARACTER OF GAS:

DATE OF OPENING: 1924.

REMARKS: The discovery well of the Tuskegee pool was completed February, 1924, by the Independent Oil and Gas Company, in sec. 31, T. 14 N., R. 10 E., with an initial production of 280 barrels of oil per day.

VELMA

COUNTY: Stephens.

LOCATION: T. 1-2 S., R. 4-5 W.

SURFACE ELEVATION: 1,300 feet.

SURFACE FORMATION: Clear Fork-Wichita formations.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Anticline and faults.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Permian	350-900		oil gas	5-50 bbls.
Glenn	1700-2300		oil	1-5 M. cu. ft. 25-50 bbls.

CHARACTER OF OIL: Gravity, 35° B.

CHARACTER OF GAS:

DATE OF OPENING: 1917.

REMARKS: The Texas Company completed the discovery well of the Velma field July, 1917 in sec. 36, T. 1 S., R. 5 W., with an initial production of 20 barrels of oil per day. Lack of pipeline transportation in the region retarded further development until 1920 when the first line was built into the field and rapid development followed.

VERA

COUNTY: Washington.

LOCATION: T. 23 N., R. 13-14 E.

SURFACE ELEVATION: 650-850 feet.

SURFACE FORMATION: Coffeyville formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Local folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Oswego	1000	25		
Bartlesville	1350	40-60	oil	100-300 bbls.
Burgess	1500	10-30	gas	1-10 M. cu. ft.

CHARACTER OF OIL: Gravity, 31° B.

CHARACTER OF GAS:

DATE OF OPENING: 1915.

REMARKS: The Vera pool is located in the extreme southeastern corner of Washington County and was one of the late pools of that county. After the first wells were completed early in 1915, much activity followed until in October of 1915. About 40 wells were drilled, 25 of which produced oil and 9 produced gas.

VERNON

COUNTY: Kay.

LOCATION: T. 29 N., R. 1 E.

SURFACE ELEVATION: 1,100 feet.

SURFACE FORMATION: Wellington formation.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Dome.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Newkirk	1400	35	gas	2-25 M. cu. ft.
Endicott	2000	150	gas	30 M. cu. ft.
Tonkawa	2300	30	oil gas	100-200 bbls.
Mississippi	3350	100	oil	5-10 M. cu. ft. 50-250 bbls.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1925.

REMARKS: The discovery well of the Vernon pool was drilled by the Marland Oil and Refining Company in sec. 16, T. 29 N., R. 1 E., The well was completed September 20, 1925, at a depth of 3,393 to 3,404 feet with an initial production of 125 barrels of oil per day. This well was predicted to be the forerunner of a new pool.

VIAN

See Sequoyah, page 242

VINITA

COUNTY: Rogers-Craig.

LOCATION: T. 24 N., R. 18-19 E.

SURFACE ELEVATION: 770-960 feet.

SURFACE FORMATION: Cherokee shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Local dips and anticlinal folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Bartlesville	150	50		
Burgess	400	50	oil gas	3-10 bbls. 1-2 M. cu. ft.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS: Rock pressure 135 pounds.

DATE OF OPENING: 1910.

REMARKS: The Vinita pool is a small area of small oil and gas production. It lies between Vinita and Chelsea along the Rogers-Craig County line.

VINES or SCOTT

COUNTY: Murray.

LOCATION: T. 1 S., R. 2 E.

SURFACE ELEVATION: 900-950 feet.

SURFACE FORMATION: Viola limestone.

AGE OF SURFACE ROCKS: Ordovician.

STRUCTURE: Dome.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Simpson			oil	1-2 bbls.

CHARACTER OF OIL: Gravity, ----- Heavy, black asphaltic oil.

CHARACTER OF GAS:

DATE OF OPENING: 1915.

REMARKS:

WAGONER

COUNTY: Wagoner.

LOCATION: T. 17-18 N., R. 17-18 E.

SURFACE ELEVATION: 600-700 feet.

SURFACE FORMATION: Winslow formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Subsurface folds and faults.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Dutcher	200-360		oil gas	10-145 bbls.
Chattanooga	525	10	gas	1-3 M. cu. ft.
Wilcox	750	10	gas	1-4 M. cu. ft.
Tyner	650-800		oil	1-2 M. cu. ft.
Burgen	1094	30	gas	10-20 bbls. 1-15 M. cu. ft.

CHARACTER OF OIL: Gravity, 36-42.5° B. Color, light green.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1914.

REMARKS: The Wagoner pool is located northwest of the town of Wagoner. The production in this area is being obtained from the Peru and Ordovician series.

WAINRIGHT

COUNTY: Muskogee.

LOCATION: Sec. 16, T. 13 N., R. 16 E.

SURFACE ELEVATION: 650-675 feet.

SURFACE FORMATION: Boggy Shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Subsurface folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Sand	1910	20	oil	100-600 bbls

CHARACTER OF OIL: Gravity,-----

CHARACTER OF GAS:

DATE OF OPENING: 1910.

REMARKS:

WALTERS Keys Pool

COUNTY: Cotton.

LOCATION: T. 1-2-3 S., R. 10-11 W.

SURFACE ELEVATION: 980-1,000 feet.

SURFACE FORMATION: Clear Fork-Wichita formations.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Anticline and dome.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Stray	1700	10	gas	
Priddy	2100	10	oil gas	20-200 bbls. 1-3 M. cu. ft.
Keys	2200	50	oil	10-100 bbls.
Zypsie	2320	40	gas	1-45 M. cu. ft.
	2400	15	oil	

CHARACTER OF OIL: Gravity, 32-33.9° B.

CHARACTER OF GAS: Dry. Rock pressure 800 to 900 pounds.

DATE OF OPENING: 1917.

REMARKS: The discovery well of the Walters pool was completed February, 1917 and since that date a number of wells have been drilled having an initial production of 100 to 250 barrels of oil daily, but the rate of decline has been rapid.

The Keys pool, located in secs. 22, 23, 24, 25, 26 and 27, T. 1 S., R. 10 W., is the gas producing area, for the main part of the Walters

field produces oil. The sands on the top of the various structures have considerable gas which decreases in quantity as the rock pressure is lessened.

WANN

COUNTY: Nowata.

LOCATION: T. 28 N., R. 14 E.

SURFACE ELEVATION: 850-1,000 feet.

SURFACE FORMATION: Ochelata formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Monocline.

PRODUCING

HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Bartlesville	1000	50	oil	10-40 bbls.
Burgess	1200	40	gas	1-5 M. cu. ft.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1907.

REMARKS: The development in the Wann pool is similar to that in the Copan pool and started at about the same time. The Bartlesville sand is the chief productive horizon in the area and is about 300 feet shallower than the Bartlesville sand in the Copan field.

WATCHORN

See Morrison, page 195

WEBB

COUNTY: Grant.

LOCATION: T. 27 N., R. 3 W.

SURFACE ELEVATION: 1,060 feet.

SURFACE FORMATION: Pennsylvanian-Permian formations.

AGE OF SURFACE ROCKS: Pennsylvanian-Permian.

STRUCTURE: Local folding, probable fault.

PRODUCING

HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Tonkawa	2940	10	oil	100-400 bbls.
Layton	3390	110	gas	1 M. cu. ft.
Oswego	3760	130	gas	
Burgess	4050	200	gas	1 M. cu. ft.
Miss. lime	4090	200	gas	15 M. cu. ft.
Wilcox	4350	10	oil	50-500 bbls.

CHARACTER OF OIL: Gravity, 40° B.

CHARACTER OF GAS:

DATE OF OPENING: 1921.

REMARKS: The Webb pool was discovered by the Marland Oil and Refining Company in sec. 2, T. 27, N., R. 3 W., by a completion on

the A. Webb farm for 500 barrels of oil per day in sand at a depth of 4,349 feet.

WEBBERS FALLS
See Sequoyah, page 242

WEBSTER

COUNTY: Wagoner.
LOCATION: T. 17 N., R. 15 E.
SURFACE ELEVATION: 600-750 feet.
SURFACE FORMATION: Stuart formation.
AGE OF SURFACE ROCKS: Pennsylvanian.
STRUCTURE: Local folds.

PRODUCING				INITIAL
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
Mississippi	1100	30	gas	1-3 M. cu. ft.
Burgen	1160	30	oil	30-300 bbls.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1917.

REMARKS:

WELEETKA

COUNTY: Okfuskee.
LOCATION: T. 10 N., R. 11 E.
SURFACE ELEVATION: 750-900 feet.
SURFACE FORMATION: Calvin sandstone.
AGE OF SURFACE ROCKS: Pennsylvanian.
STRUCTURE: Various folds, probable faults.

PRODUCING				INITIAL
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
Glenn	1940	100	gas	1-4 M. cu. ft.
Gilcrease	2530-2660	30	oil gas	10-200 bbls.
Lyons	3030	10	gas	1-15 M. cu. ft.
				1-10 M. cu. ft.

CHARACTER OF OIL: Gravity, 38-39.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1913.

REMARKS: The Weleetka pool is an old productive area. In 1926 and 1927 deeper sands were being sought for greater production.

WEST DUNCAN
See Duncan, page 149

WETUMKA

COUNTY: Hughes.
LOCATION: T. 9 N., R. 10 E.
SURFACE ELEVATION: 750-950 feet.
SURFACE FORMATION: Wewoka formation.
AGE OF SURFACE ROCKS: Pennsylvanian.
STRUCTURE: Faulting.

PRODUCING				INITIAL
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
Stray	1185	20	gas	1-5 M. cu. ft.
Deaner	2900	30-50	oil	50-600 bbls.
Lyons	3400			
Hunton	3755		oil	50-800 bbls.
Wilcox	4000	250		

CHARACTER OF OIL: Gravity, 38-39.9° B.

CHARACTER OF GAS: Dry. Rock pressure 500 pounds.

DATE OF OPENING: 1919.

REMARKS: In September, 1919, local parties of the Wetumka area completed a well in sec. 4, T. 9 N., R. 10 E., with an initial production of 6 million cubic feet of gas per day at a depth of 1,204 feet. Other tests had been drilled in the area but produced only small shows of oil or were abandoned because of lack of funds.

WEWOKA

COUNTY: Seminole.
LOCATION: T. 7-8 N., R. 8 E.
SURFACE ELEVATION: 750-950 feet.
SURFACE FORMATION: Francis formation.
AGE OF SURFACE ROCKS: Pennsylvanian.
STRUCTURE: Subsurface anticlinal folds and domes.

PRODUCING				INITIAL
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
	1843	20	oil	60-100 bbls.
	2470	5	gas	1-10 M. cu. ft.
Dixie	2800			
Smith	3132	10	oil gas	70-200 bbls.
Sykes	3200	60	oil gas	1-3 M. cu. ft.
				100-3000 bbls.
				3-50 M. cu. ft.
Mayes (?)	3422	12	gas	1-3 M. cu. ft.
Hunton	3873	78	oil	250-2500 bbls.
Sylvan	4005	40		
Viola	4098	4		
Wilcox	4148	20	oil	50-3500 bbls.

CHARACTER OF OIL: Gravity, 38-39.9° B.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1912.

REMARKS: The Wewoka pool is an old producing area. On St. Patrick's day, 1923, R. H. Smith completed a well for 2,800 barrels of oil in a sand named in his honor. In July, 1924 Sykes and Boggs completed a well for 1,000 barrels of oil in a sand 3,183 to 3,200 feet in depth which is called the Sykes sand. In the latter part of 1925, the Dixie Oil Company completed the first well in the Hunton lime, sec. 32, T. 8 N., R. 8 E., or 72 barrels of oil per day.

WHEELER

COUNTY: Carter.

LOCATION: T. 3 S., R. 2 W.

SURFACE ELEVATION: 900-1,000 feet.

SURFACE FORMATION: Clear Fork-Wichita formation.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Wheeler dome.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Uncorrelated	300	50	gas	1-5 M. cu. ft.
	660	30	gas	1-12 M. cu. ft.
	960	40	oil	5-70 bbls.
	1024	20	oil	10-225 bbls.

CHARACTER OF OIL: Gravity, 18-20° B. Color, black. Content, asphalt.

CHARACTER OF GAS:

DATE OF OPENING: 1904.

REMARKS: The Wheeler pool and dome derived its name from the Wheeler townsite although Oil City is the name of the town in the field. The discovery well was drilled by the Santa Fe Railway Company, May, 1904 in sec. 21, T. 3 S., R. 2 W. In October 1905, the company had its first success in the fourth well drilled. In 1906, the sixth well was drilled with the discovery of two sands, one gas producing, the other oil producing. Since that discovery many wells in the pool have been completed as combination oil and gas wells.

WILDHORSE

See Agra, page 104

WICEY

COUNTY: Tulsa.

LOCATION: T. 16 N., R. 12 E.

SURFACE ELEVATION: 600-800 feet.

SURFACE FORMATION: Wewoka formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Local folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Red Fork	1000		gas	1 M. cu. ft.
Glenn	1480	60	oil	2-100 bbls.
Taneha	1650	50	oil gas	25-100 bbls.
Dutcher	1950	52	oil	1-3 M. cu. ft.
Mississippi	2149			10-300 bbls.
Wileox	2400			

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1915.

REMARKS: The Wicey pool was discovered by the Gypsy Oil Company, October, 1915. The discovery well was located in sec. 4, T. 16 N., R. 12 E. It was drilled to a depth of 2,000 feet with an initial production of 30 barrels of oil per day.

WIMER

COUNTY: Craig.

LOCATION: T. 28-29 N., R. 18 E.

SURFACE ELEVATION: 750-900 feet.

SURFACE FORMATION: Pawnee formation and Labette shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Monocline, local folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Oswego	325	10	gas	½ M. cu. ft.
Bartlesville	380	20		
Burgess	700	40	oil gas	20 bbls.
Mississippi	890	20		1-3 M. cu. ft.
Chattanooga	920	40		
Sylvan	975	5		
Wileox	1040	20	oil show	

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1914.

REMARKS: The Wimer pool is the only productive area wholly in Craig County. It was discovered by the Kansas-Oklahoma Oil and Gas Company in April, 1914. Small quantities of oil and gas have been found in the county since that date. In 1925 deep drilling was started but with slight success to date.

WILCOX

COUNTY: Okmulgee.

LOCATION: T. 15 N., R. 11 E.

SURFACE ELEVATION: 700-900 feet.

SURFACE FORMATION: Wewoka formation.
AGE OF SURFACE ROCKS: Pennsylvanian.
STRUCTURE: Subsurface domes.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Red Fork	1660	20	gas	1-12 M. cu. ft.
Glenn	1748	30		
Taneha	1880	20		
Dutcher	2165	45	gas	1-4 M. cu. ft.
Wilcox	2672	15	oil	100-1400 bbls.

CHARACTER OF OIL: Gravity, 35-36.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1919.

REMARKS: The Wilcox pool is named from the Wilcox sand. The "deep sand" as the Wilcox sand was first called was found about 450 below the Dutcher sand. It received its name from H. F. Wilcox, who drilled the first well to it in a pool about 6 miles west of Beggs.

WILDCAT JIM

COUNTY: Carter.

LOCATION: T. 2 S., R. 2 W.

SURFACE ELEVATION: 934-1,070 feet.

SURFACE FORMATION: Clear Fork-Wichita formations.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Buried anticlinal fold.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
	1552	8	oil	10 bbls.
	1646	26	oil	70 bbls.
	1673	15	oil	60 bbls.
	1690	32	oil	110 bbls.
	1735	10	oil	70 bbls.
	1836	30	oil	142 bbls.
	1990	32	oil	40 bbls.
	2285	16	oil	13 bbls.
	2378	8	oil	82 bbls.
	2447	51	oil	100 bbls.
	2505	15	oil	15 bbls.
	2672	63	oil	35 bbls.
	2890	15	oil	40 bbls.

CHARACTER OF OIL: Gravity, 23 to 28° B. Color, black.

CHARACTER OF GAS:

DATE OF OPENING: 1914.

REMARKS: The first well in the Wild Cat Jim pool was drilled in 1914 by the Wildcat Jim Oil Company, sec. 18, T. 2 S., R. 2 W. It was completed at a depth of 1,646 to 1,652 feet and was estimated at 12 barrels of oil per day. In 1915, the Oklahoma-Louisiana Oil Company drilled a well in sec. 7, T. 2 S., R. 2 W., which they abandoned.

This well was completed by the Oklahoma-Fox Oil Company in August, 1916 for 75 barrels of oil per day. This well is still producing.

WILDHORSE

COUNTY: Osage.

LOCATION: T. 21-22 N., R. 10-11 E.

SURFACE ELEVATION: 700-850 feet.

SURFACE FORMATION: Nelagoney formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticlinal folds and domes.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Cleveland	1150	100	oil	6-20 bbls.
Oswego	1250	55	oil	20 bbls.
Skinner	1590	50	oil	10-50 bbls.
Bartlesville	1826	110	oil gas	100-7000 bbls. 1-5 M. cu. ft.
Burgess	1990	10	oil	50-500 bbls.
Tyner	2270	25	oil gas	10-100 bbls.

CHARACTER OF OIL: Gravity, 34° B.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1912.

REMARKS: The Wildhorse pool was developed by the M. B. & K. Oil Company and the Barnsdall Oil Company in August, 1912. This was before the relinquishment of surplus acreage held by companies in excess of 4,800 acres which it was decided they could hold legally.

Greater development started in 1917 and the wells showed a variety of depths; some leases produced from 6 different horizons with an initial production ranging from 10 to 7,000 barrels of oil per day.

The Sand Springs Home Oil Company started the southern extension of the Wildhorse pool in March, 1917. More wells have been drilled in sections 33 and 34, T. 22 N., R. 10 E., than in any other sections in Osage County. Since 1919 leases have been purchased for prices ranging from \$170,000 to \$430,000 per quarter section.

WISER

COUNTY: Osage.

LOCATION: T. 27 N., R. 12 E.

SURFACE ELEVATION: 750-814 feet.

SURFACE FORMATION: Ochelata formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Folds and anticlines.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Wayside	750	20-25	oil	10-60 bbls.
Bartlesville	1475	10-20	gas	1½ M. cu. ft.
Burgess	1700	10-12	oil	10 bbls.

CHARACTER OF OIL: Gravity, 36° B.

CHARACTER OF GAS: Dry.

DATE OF OPENING: 1904.

REMARKS: Development started in the Wiser pool in 1904. The area comprises about 8 quarter sections in the southeast part of 27 N., R. 12 E. Approximately 100 wells have been drilled in the pool with an initial production ranging from 10 to 60 barrels of oil per day.

At present, air pressure is being applied to the wells in the area and a noticeable increase in production has been recorded as a result.

WOOLSEY

COUNTY: Stephens.

LOCATION: T. 2 S., R. 6 W.

SURFACE ELEVATION: 900-1,000 feet.

SURFACE FORMATION: Clear Fork-Wichita formations.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Anticline and fault.

PRODUCING				INITIAL
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
Permian	1300			
Glenn	1750	100	oil	25-130 bbls.

CHARACTER OF OIL: Gravity, 43° B.

CHARACTER OF GAS:

DATE OF OPENING: 1922.

REMARKS: The Woolsey pool was discovered by the Magnolia Petroleum Company in 1922. The discovery well, located in sec. 23, T. 2 S., R. 6 W., had an initial production of 75 barrels of oil natural from a sand at 1,750 feet.

WYNONA

COUNTY: Osage.

LOCATION: T. 24 N., R. 8-9-19 E.

SURFACE ELEVATION: 800-1,000 feet.

SURFACE FORMATION: Nelagoney formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Domes.

PRODUCING				INITIAL
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
Peru	1600	25	oil gas	20-50 bbls.
				1-9 M. cu. ft.
Oswego	1745	60	oil	10-30 bbls.
Bartlesville	2088	20	oil gas	25-500 bbls.
				1-17 M. cu. ft.
Mississippi	2281	20	oil	35-275 bbls.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS: Dry.

REMARKS: Development in the Wynona pool has been slow but continuous since 1917. Numerous domes have been developed that are very productive from the Burgen horizon. The first Burgen sand dome was developed by C. J. Wrightsman in November, 1926, with a well drilled in sec. 6, T. 24 N., R. 8-9-10 E. The pool is a continuation of the Pershing field.

X-686

COUNTY: Osage.

LOCATION: T. 20 N., R. 10 E.

SURFACE ELEVATION: 800-1,000 feet.

SURFACE FORMATION: Ochelata formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticlinal folding and terraces.

PRODUCING				INITIAL
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
Cleveland	1110	30	oil	4-80 bbls.
Oswego	1520	15		
Prue	1700	2		
Bartlesville	1870	15	gas	2-23 M. cu. ft.
Burgess	2180	10	gas	1-20 M. cu. ft.
Mississippi	2440	40	gas	1-5 M. cu. ft.
Turkey Mt.	2610	20		

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS: Dry. Rock pressure 600 to 700 pounds.

DATE OF OPENING: 1919.

REMARKS: There are no closed anticlinal folds in this area, such as have been found favorable for the accumulation of oil and gas in Osage County. There are, however, pronounced anticlinal noses and some flat terrace-like structures which have proved successful in producing gas from the Mississippi limestone.

Y-686

COUNTY: Osage.

LOCATION: T. 28 N., R. 10 E.

SURFACE ELEVATION: 900-1,000 feet.

SURFACE FORMATION: Nelagoney formation.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Dome and anticlinal folding. West Mission Creek dome.

PRODUCING				INITIAL
HORIZONS	DEPTH	THICKNESS	PRODUCTION	PRODUCTION
Peru	1385	10	oil show	
Oswego	1556	10	gas	1-6 M. cu. ft.
Burgess	1630	20	gas	1-3 M. cu. ft.
Mississippi	1880	20	gas	1-6 M. cu. ft.

CHARACTER OF GAS: Dry. Rock pressure 590 to 735 pounds.

DATE OF OPENING: 1919.

REMARKS: The West Mission Creek dome is oval in outline and its major axis extends about 2 miles in a northeast-southwest direction. This dome has been developed chiefly by the Osage Natural Gas Company whose wells are mainly on the crest of the north slope of the fold. No oil has been obtained and the gas is principally from the Mississippi limestone.

YALE

COUNTY: Payne.

LOCATION: T. 19 N., R. 5-6 E.

SURFACE ELEVATION: 900 feet. approximately.

SURFACE FORMATION: Clear Fork-Wichita formations.

AGE OF SURFACE ROCKS: Permian.

STRUCTURE: Anticlinal folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Layton	2235	10		
Oswego	2865	20	oil	25-50 bbls.
Prue	2940	40	oil gas	45-100 bbls. 10-20 M. cu. ft.
Skinner	3125	5		
Bartlesville	3150	10	oil	10-600 bbls.
Burgess	3475	25		
Wilcox	3580		oil	100-600 bbls.

CHARACTER OF OIL: Gravity, 36-37.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1914.

REMARKS: In 1914 a test was drilled by the Alice-Katherine Oil Company in sec. 7, T. 19 N., R. 6 E., which had an initial production of 80 barrels of oil per day from the Bartlesville sand at a depth of 3,145 feet. A light shot increased this natural flow to 250 barrels. This well established the pool which developed toward the north and northwest.

YEAGER

COUNTY: Hughes.

LOCATION: T. 8 N., R. 10 E.

SURFACE ELEVATION: 750-850 feet.

SURFACE FORMATION: Wewoka formation-Wetumka shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Faulting and local folds.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Stray	1900	20	gas	1-11 M. cu. ft.
Booch	2790	50	oil	25-300 bbls.
Gilcrease	3040	40	oil	100-500 bbls.
Lyons	3520	40	gas	7-30 M. cu. ft.
Wilcox	3920	80	oil	10-150 bbls.

CHARACTER OF OIL: Gravity, 38-39.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1917.

REMARKS: The Yeager pool has been producing small amounts of both oil and gas for a number of years. In 1925, the Dixie Oil Company drilled a well which had an initial production of 325 barrels of oil per day. The same company drilled an offset to the original well which had an initial production of 600 barrels of oil daily; and the third well, in sec. 18, T. 8 N., R. 10 E., completed June, 1925, for 750 barrels of oil and 40 million cubic feet of gas, was thought to be the first well in the Yeager pool to find the Gilcrease sand. It is found at a depth of 3,150 to 3,153 feet.

YAHOLA

COUNTY: Muskogee.

LOCATION: T. 15 N., R. 16 E.

SURFACE ELEVATION: 500-600 feet.

SURFACE FORMATION: Boggy shale.

AGE OF SURFACE ROCKS: Pennsylvanian.

STRUCTURE: Anticlinal folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Salt sand	670	10	gas	10-38 M. cu. ft.
Booch	1220	50	oil gas	40-500 bbls.
Boynton	1320	20	oil gas	1-3 M. cu. ft. 25-180 bbls. 1 M. cu. ft.

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1914.

REMARKS: The Gladys-Belle Oil Company was one of the chief operators in the development of the Yahola pool. The first development occurred in sections 21, 28 and 33, T. 15 N., R. 16 E. A considerable amount of gas was found, but the oil wells were of small capacity.

YOUNGSTOWN

COUNTY: Okmulgee.

LOCATIONS T. 13-14 N., R. 11-12 E.

SURFACE ELEVATION: 650-850 feet.
 SURFACE FORMATION: Wewoka formation.
 AGE OF SURFACE ROCKS: Pennsylvanian.
 STRUCTURE: Subsurface anticlinal folding.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Glenn	1860	60	oil gas	15-100 bbls. 10-40 M. cu. ft.
Booch	1994	20	gas	1-7 M. cu. ft.
Youngstown	2250	50	oil	100-300 bbls.
Dutcher	2400	60	oil	75-1000 bbls.
Wilcox	3000			

CHARACTER OF OIL: Gravity, 37-38.9° B.

CHARACTER OF GAS:

DATE OF OPENING: 1915.

REMARKS: The Youngstown pool is completely surrounded with oil development. The surface structure of the field is but slightly suggestive of favorable structure for oil and gas accumulation and oil companies passed up the area for structures with "closure" until late in 1915, when the first well was drilled to the Youngstown sand.

ZEA

COUNTY: Texas.

LOCATION: T. 4 N., R. 14 E., C. M.

SURFACE ELEVATION: 3,167 feet.

SURFACE FORMATION: Late Tertiary sandstone.

AGE OF SURFACE ROCKS: Tertiary.

STRUCTURE: Local variation in dips.

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Cottonwood (?)	2610	50	gas	3 M. cu. ft.
	2680	20	gas	1-2 M. cu. ft.
	4410		dry	

CHARACTER OF OIL: Gravity -----

CHARACTER OF GAS:

DATE OF OPENING: 1926.

REMARKS: The discovery well of the Zea pool was completed by the H. F. Wilcox Oil and Gas Company, November, 1926, in sec. 21, T. 4 N., R. 14 E., Cimarron Meridian. This well was drilled to a depth of 4,410 feet and then was plugged back to 2,751 feet where it had an initial production of 3 million cubic feet of gas per day. The same company drilled two wells on the E. W. Zea farm, in 1925 and 1926 respectively, and encountered shows of gas in each at depths ranging between 2,200 and 2,630 feet. These wells were reported dry.

Producing Horizons, South-central Oklahoma

AGE	PRODUCING HORIZON	AREA
PERMIAN	Garvin Maudlin	Robberson
	Nichols	Chickasha
	Patsy Kirk Miller	Graham
	Nigh	Stephens Co.
PENNSYLVANIAN	Magnolia zone	Chickasha
	Johnson sand Graham	Graham
	Smith Surber Cantrell Shelton Brown-Thomas	Stephens Co.
	Newberry	Robberson
	Nellis gas sand	Nellie pool
	Ramsey zone	Chickasha
	Blaydes Kagay Maloney Priddy Keys Zipsie	Stephens Co.
	Wilson fm. Healdton zone	Healdton
	Hewitt zone	Hewitt
	Wildcat Jim	Wildcat Jim
	Southerland	Graham
	Ordovician	Simpson sand

Producing Horizons, Northern Oklahoma

AGE	FORMATION	CORRELATION
PERMIAN	Hoy Kisner Hotson	
PENNSYLVANIAN	Blackwell	
	Newkirk	
	Grayhorse	
	Upper Hoover } Middle Hoover } Lower Hoover }	Hoover series
	Elgin	
	Musselman	
	Carmichael	
	Endicott	
	Tonkawa	{ Ponca, Stalnaker
	Layton	{ Swaggert, Jones
	Cleveland	
	Big Lime	
	Peru	
	Oswego	Wheeler, Ft. Scott
	Prue	Bixler, Squirrel, Perryman
	Red Fork	Skinner
	Bartlesville	Burbank*, Salt sand, Glenn
	Tucker	Booch, Tanaha, Boynton
	Doggett	
	Smith	
Sykes (Dutcher group)	Gilcrease, Youngstown	
MISSISSIPPIAN	Deaner	Lyons lime, Pitkin lime
	Burgess	Quinn, Cromwell, Papoose
	Mississippi lime	
	Chatanooga	
SILURO-DEV.	Hunton lime	
	Sylvan shale	
ORDOVICIAN	Viola lime	
	Wilcox } Tyner } Bürgen }	Simpson formation
	Bürgen }	
CAMBRO-ORD.	Siliceous lime	Arbuckle, Turkey Mt. sand

*Burbank is not Bartlesville, but is found at that horizon.

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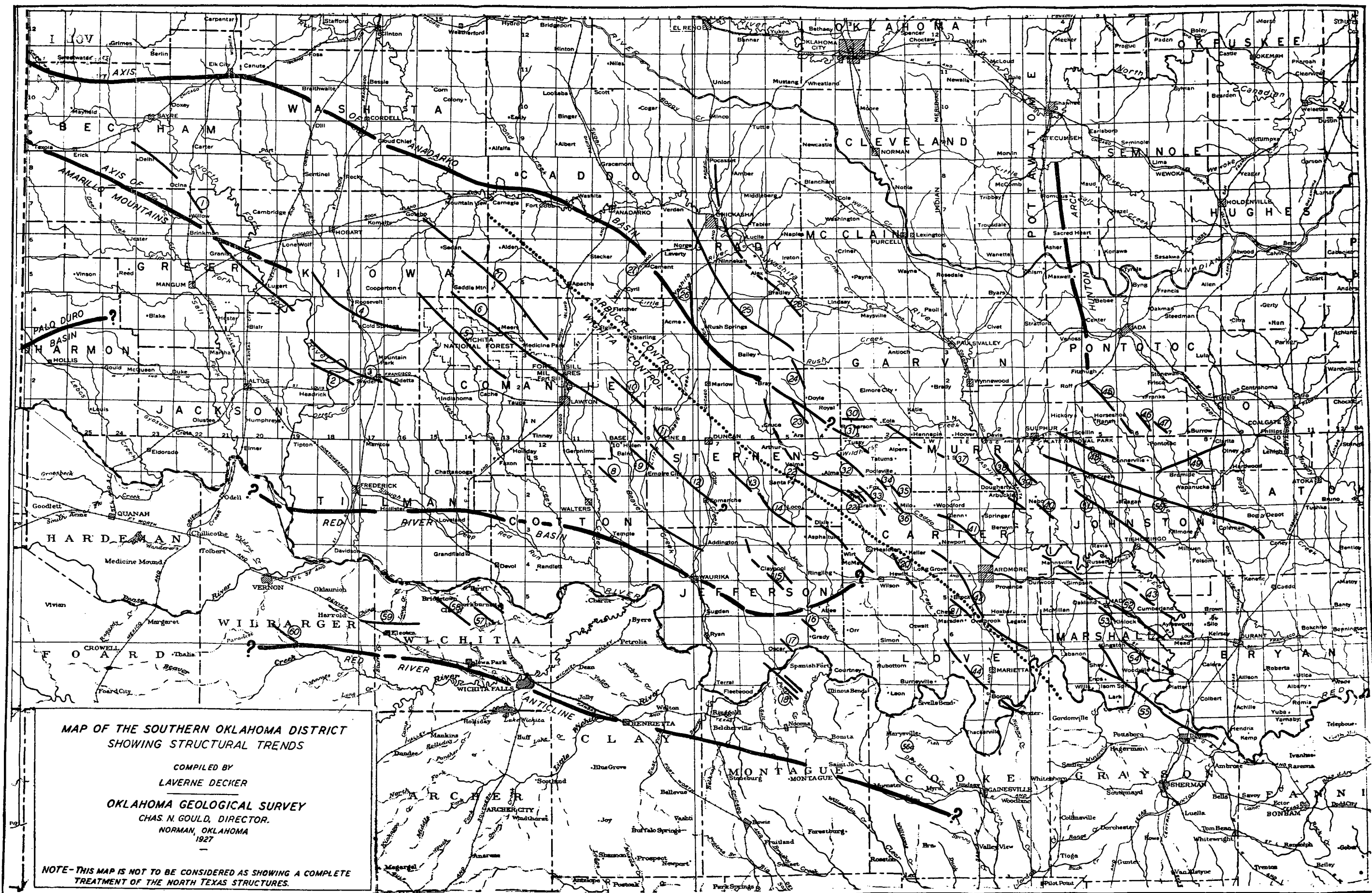
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**MAP OF THE SOUTHERN OKLAHOMA DISTRICT
SHOWING STRUCTURAL TRENDS**

COMPILED BY
LAVERNE DECKER

OKLAHOMA GEOLOGICAL SURVEY
CHAS. N. GOULD, DIRECTOR.
NORMAN, OKLAHOMA
1927

NOTE—THIS MAP IS NOT TO BE CONSIDERED AS SHOWING A COMPLETE TREATMENT OF THE NORTH TEXAS STRUCTURES.