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OIL AND GAS IN OKLAHOMA

OKFUSKEE COUNTY

By
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FOREWORD

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

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

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

This report on Okfuskee County was written by Mr. J. Philip Boyle, of Oklahoma City. Mr. Boyle has been active in the oil and gas development of the area, and has been in close touch with conditions for a number of years. He is, therefore, well qualified to write on the geologic and structural conditions of this country.

CHAS. N. GOULD,
Director.

Norman, Oklahoma
September, 1929.

OIL AND GAS IN OKLAHOMA

GEOLOGY OF OKFUSKEE COUNTY

This report is written for the purpose of giving in a general way the surface and subsurface geology and its relation to the production of oil and gas in Okfuskee County, Oklahoma.

ACKNOWLEDGMENTS

In compiling this report a large amount of the data used has been obtained from the following individuals and bureaus to whom the writer wishes to express his thanks for their assistance;

Charles N. Gould of the Oklahoma Geological Survey, the United States Geological Survey, Luther H. White of the J. A. Hull Company, Arthur Burress and Louis Roark of Okmulgee, Oklahoma, Fred Capshaw and William J. Armstrong of Oklahoma City, and Bulletin 40-Q of the Oklahoma Geological Survey.

TOPOGRAPHY

Okfuskee County is located in the east-central part of the State and covers an area included in Tps. 10-13 N., Rs. 7-12 E., making 16 entire townships and parts of three others. The total area is approximately 617 square miles.

The topography of Okfuskee County is made up of sandstone-capped hills and gently sloping valleys. These hills and valleys lie

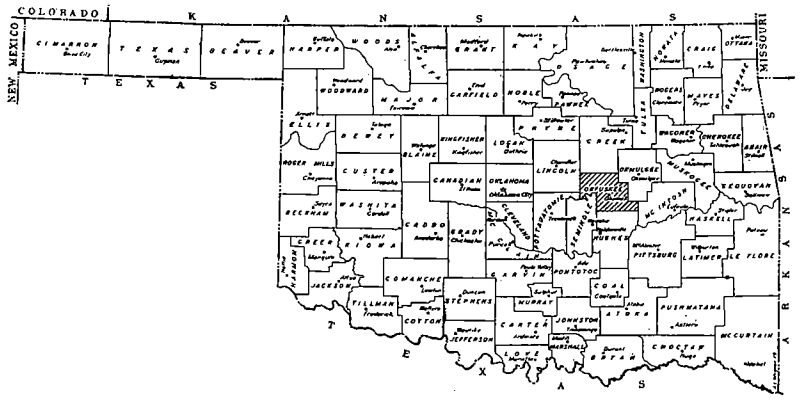

Figure 1.—Index map of Oklahoma showing area covered by this report.

in lines parallel to the strike of the outcropping formations. The hills are the topographical expression of the resistant sandstones and limestones, and the valleys are the expression of the soft clays and shales.

The county is drained by two rivers and their tributary creeks. This drainage is separated by a divide which runs approximately from the northwest corner of T. 12 N., R. 8 E., in a southeasterly direction to a point located in the center of the east line of T. 11 N., R. 11 E. North of this approximate line the drainage flows to the north and empties into the Deep Fork of Canadian River, while to the south of this line the water drains into the North Fork of Canadian River.

The average relief between hills and valleys is approximately 60 feet. The highest point above sea-level in the county is located in sec. 25, T. 12 N., R. 9 E.; and the lowest point is at the point North Fork of Canadian River intersects the county line, sec. 25, T. 10 N., R. 12 E.

SURFACE GEOLOGY

The formations exposed in Okfuskee County, with the exception of the Recent sediments along the river bottoms, belong to the Pennsylvanian system of rocks, and range from the Thurman sandstone through the Buck Creek formation. The recent sediments consist of unconsolidated silts, gravels, clays, and sands and the Pennsylvanian rocks are made up of loosely consolidated clays, shales, sandstones, and one dolomite. The shales predominate in the section, and the sandstones, second in occurrence, form flat-topped hills with east-facing escarpments.

The direction of the regional dip of the surface formations is to the north and west at the rate of fifty to seventy feet per mile. This dip has been disturbed in every township of the county by local faulting, folding, and settling.

CALVIN SANDSTONE

The Calvin sandstone, occurring just below the Wetumka formation, is made up of sandstone ledges, massive in character, which form high escarpments and a long range of hills. The formation is exposed over an area about five miles wide and 12 miles long in the west half of T. 10 N., R. 12 E., and the east third of T. 10 N., R. 11 E. It is also exposed in an area about one-half mile wide and three miles long in secs. 2, 11, and 14, T. 10 N., R. 12 E. The formation is made up of sandstones, shales, and clays. The sandstones form the prominent hills and the shales the undulating valley floors. The formation has an approximate total thickness of 100 feet, and a normal dip of approximately 5° NW.

Substitute for page 7, 40-KK

Stratigraphic section for Okfuskee County.

AGE	FORMATION		THICKNESS (feet)	PRODUCING SAND
RECENT	Sands, gravels, silts & clays		0-100	
PENNSYLVANIAN	Buck Creek Formation		140-200	
	Vamoosa Formation		367-400	
	Nellie Bly fm. Lost City ls. 4-6		170-200	
	Coffeyville fm. Checkerboard ls. 3-5		190-260	
	Seminole fm. Seminole cgl. 20-30		70-100	
	Holdenville fm.		100-150	
	Wewoka fm.		200-250	
	Wetumka fm.		170-200	
	Calvin ss.	Cherokee sh.	100-175	
	Senora fm. Stuart sh. Thurman ss.		900-1200	
	Boggy sh.			
	Savanna ss.			Bartlesville-Glenn
	McAlester sh.			
	Hartshorne ss.			Booch
	Atoka fm.			Deaner Kingwood
	Morrow fm.			Wapanucka Cromwell- Papoose
MISSISSIPPIAN	Pitkin		20-140	Mostly absent
	Boone ls.		400-450	U. Miss. ls. Break L. Miss. ls.
	Chattanooga sh.		10-130	Misener*
SILURO-DEVONIAN	Hunton fm.		0-50	
	Sylvan sh.		0-40	
ORDOVICIAN	Viola ls.		20-60	
	Simpson fm.		150-380	Wilcox ss. Tyner sh. Burgen ls. Burgen ss.
CAMBRO-ORDOVICIAN	Arbuckle ls.		250	Siliceous ls.
PRE-CAMBRIAN	Granite		Not found by drilling in this county	

*Formed during post-Devonian period of erosion and correlated with the Sylamore sandstone.

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ERRATA

Page 13, under heading "Boone formation", line 3, "four" should read "three"; lines 16-17, "Boone formation" should read "Mississippian".

Page 14, Heading "Pitkin limestone" should read "Morrow formation"; under heading "Dutcher Horizon" lines 2, 3, 6, and 7, "Pitkin" should read "Morrow"; lines 8-9 "Boone formation" should read "Mississippian".

Page 17, line 11, "up-throw" should read "normal".
Plate III, at top, "Pitkin" should read "Morrow".

Stratigraphic section for Okfuskee County.

AGE	FORMATION		THICKNESS (feet)	PRODUCING SAND
RECENT	Sands, gravels, silts, & clays		0-100	
PENNSYLVANIAN	Buck Creek Formation		140-200	
	Vamoosa Formation		367-400	
	Nellie Bly fm. Lost City ls. 4-6		170-200	
	Coffeyville fm. Checkerboard ls. 3-5		190-260	
	Seminole fm. Seminole cgl. 20-30		70-100	
	Holdenville fm.		100-150	
	Wewoka fm.		200-250	
	Wetumka fm.		170-200	
	Calvin ss.	Cherokee sh.	100-175	
	Senora fm. Stuart sh. Thurman ss.	Cherokee sh.	900-1200	
	Boggy sh.	Cherokee sh.		
	Savanna ss.	Cherokee sh.		Bartlesville-Glenn
	McAlester sh.	Cherokee sh.		
	Hartshorne ss.	Cherokee sh.		Booch
	Atoka fm.	Cherokee sh.		Dutcher
	Wapanucka			Cromwell
	Pitkin		20-140	Deaner Kingwood?
MISSISSIPPIAN	Boone ls.		400-450	U.Miss. ls. Break L. Miss. ls.
	Chattanooga sh.		10-130	
SILURO-DEVONIAN	Hunton fm.		0-50	
	Sylvan sh.		0-40	
	Viola ls.		20-60	Misener
ORDOVICIAN	Simpson fm.		150-380	Wilcox Tyner Burgen ls. Burgen ss.
CAMBO-ORDOVICIAN	Arbuckle ls.		250	Siliceous ls.
PRE-CAMBRIAN	Granite		Not found by drilling in this county	

WETUMKA FORMATION

The Wetumka formation consists chiefly of shales with massive sandstone members. It is exposed along a narrow irregular strip approximately one-half mile wide, forming a valley between the outcrops of the Wewoka formation and the Calvin sandstone running through the center of T. 10 N., R. 11 E., and the southwest corner of T. 11 N., R. 11 E. It has an approximate thickness of 170 feet, and dips about 4° NW.

WEWOKA FORMATION

The Wewoka formation is composed chiefly of well-bedded shales with two sandstone members, one being near the middle of the formation and the other near the base. Both are massive light reddish-brown sandstones, having a variable thickness of 4 to 15 feet. These sandstones form escarpments or long hills, and the intervening shale beds form broad valleys with more less level floors. This formation covers approximately Tps. 10, 11, and 12 N., Rs. 10, 11, and 12 E., the west half of T. 10 N., R. 11 E., and the southeast corner of T. 11 N., R. 10 E. The total thickness of the formation is about 200 feet.

HOLDENVILLE FORMATION

The contact of the Holdenville and Seminole formations is usually more or less marked by the abrupt change from hills to valley floors. The Holdenville is composed of two major sandstone members, one being at approximately the top of the formation, the other midway between the top and the base. These sandstone members are from four to ten feet thick, massive in character and of medium hardness. The shales predominate in thickness and are yellow to light blue-green in color. Topographically the Holdenville formation makes an irregular line of hills formed by the two major sandstone members. The total thickness of the formation is approximately 100 feet.

SEMINOLE FORMATION

The Seminole formation is exposed in a narrow strip from one to two miles wide diagonally from the southwest corner of T. 10 N., R. 9 E., to the northeast corner of T. 13 N., R. 10 E. Its exposure is prominently marked by more or less rugged hills and sharp escarpments generally covered with black-jack vegetation. The formation is composed chiefly of sandstones and conglomerates, with some sandy shales. The sandstone beds, interstratified with the conglomerates, are massive and from 4 to 6 feet thick. The conglomerates, composed of chert and quartz pebbles, range in color from light yellow to dark red. The cementing material contains a high per cent of iron. The clays and shales occurring in this formation are well stratified, blue, red, and yellow in color, and are very sandy in character.

The normal dip of this formation is 4° NW. The entire formation has an approximate thickness of 70 feet.

COFFEYVILLE FORMATION

The major part of this formation is made up of red, yellow, black and blue-green shales with the exception of one limestone member occurring near the base of the formation which is known as the Checkerboard limestone. There are two sandstone members occurring in the Coffeyville, one near the top and the other near the middle. These sandstones range in thickness from two to eight feet, thickening toward the south. The formation forms most of the good agricultural land in the valleys north and south of Okemah. The total thickness of the formation is approximately 190 feet. Its normal dip is 4½° NW.

The Checkerboard limestone, the lowest member of the Coffeyville, is exposed in a narrow strip running north and south near the little town of New Okfuskee. It has a thickness of approximately three feet, is hard, very fossiliferous, grayish brown in color, and contains cavities filled with limonite which gives it a brown speckled appearance. It forms a low escarpment, usually near the valley floor, and weathers much like a hard sandstone.

NELLIE BLY FORMATION

This formation, directly underlying the Vamoosa, has an approximate thickness of 170 feet. The contact with the Vamoosa is characterized by a noticeable change in color. The loosely stratified clays and shales of a reddish cast change into a more highly indurated shale of yellowish to light bluish green in color.

The formation consists of clays, shales, some massive sandstones, and several lenticular, thinly stratified sandstones. Its most characteristic member, the Hogshooter limestone, occurs at the base. This limestone is approximately 4½ feet thick, weathers yellowish-brown on exposure, but is blue-gray in color on a fresh surface. This limestone is exposed in a narrow strip running two miles west from the town of Okfuskee to Okemah.

VAMOOSA FORMATION

The Vamoosa formation is exposed in the county over an area of two entire townships and parts of three others, the area of exposure being in a north-south direction from near the town of Paden east to the east line of R. 8 E. The formation consists predominently of clays and shales, with massive sandstones and sandy conglomerates. The formation has an approximate thickness of 370 feet. It has three major sandstone horizons, the upper one of which is a massive cross-bedded sandstone, light red in color, with a thickness of six to fifteen feet. The second major sandstone horizon is about one-third of the way down in the formation and consists of about four feet of

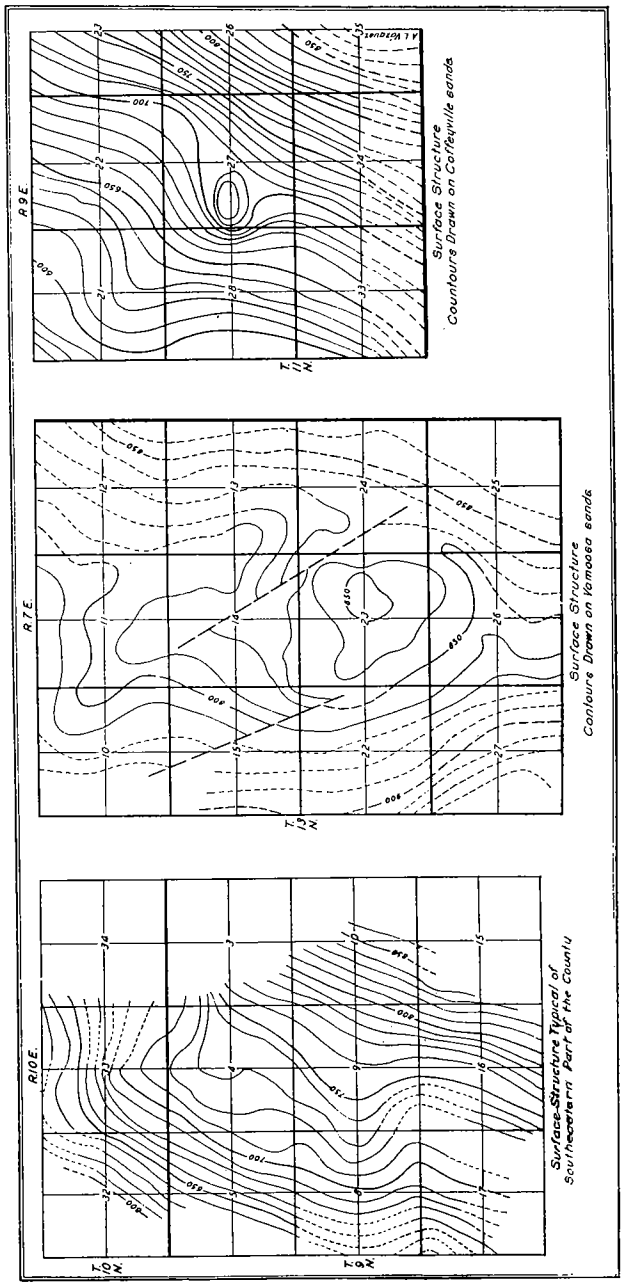


Figure 2

massive yellow sandstone. The most noticeable member of this formation occurs near its base and consists of about thirty feet of interstratified massive sandstones and conglomerates. This member forms characteristic escarpments which make hills north and south of the town of Boley. The remainder of the formation beneath this member consists of thinly stratified red clays, sandstone lenses, and vari-colored shales.

BUCK CREEK FORMATION

The Buck Creek formation is exposed in this county over a long narrow area from the town of Paden west, and from the north to the south line of the county. This formation has an approximate thickness of 140 feet, and is made up of alternating layers of thin bedded sandstones, clays, and shales, and has a dolomitic crystalline limestone at the base. The sandstones range from one to two feet in thickness and vary in color from a white gray to a very light red on exposure. It usually forms black-jack covered hills along its outcrop.

RECENT

These sediment are made up of sands, clays, silts, and muds. They occur along the flood plains and valleys of the two major rivers.

SUBSURFACE FORMATIONS

Only those subsurface formations that are important as producing horizons or form important datum planes will be discussed under "Subsurface formations." These formations are described, beginning with the oldest, in the following paragraphs.

ARBUCKLE LIMESTONE (Siliceous lime)

This limestone, found over wide areas throughout the Mid-Continent field, has a variable thickness in eastern Oklahoma, as it lies unconformably upon the granite. It also has a wide unconformity at the top and lies directly upon the Reagan sandstone below, where the Reagan is present. The writer has seen several wells drilled through the Arbuckle limestone to the granite without encountering the Reagan. This limestone is Cambro-Ordovician in age and the top of the formation is siliceous in character, sometimes producing oil and gas. The writer does not have any record of wells which have penetrated the Arbuckle limestone to a greater depth than 250 feet in the county.

SIMPSON FORMATION
BURGEN LIMESTONE

This limestone, consisting of a single limestone member, is found all over the county, and has a thickness of 30 to 70 feet. It represents the lowest limestone member of the Simpson formation in this county, and directly overlies the Burgen sand throughout northeastern Oklahoma. Very few wells have penetrated this limestone.

BURGEN SANDSTONE

The Burgen sand directly underlies the Burgen limestone and usually lies unconformably on the "Siliceous" lime. In some cases a shale is found in the unconformity below this sand. The sand is a member of the Simpson formation and has a thickness of 20 to 60 feet.

TYNER SERIES

This formation a member of the Simpson, is found throughout the county, and, although not always distinguishable from the Wilcox sand by its color, can be easily identified by its texture. It is productive of both oil and gas, and quite often the wells in this sand are known as Wilcox wells. The top of this formation is represented by fine-grained sand usually of a characteristic light green color. This color is probably due to the presence of a small amount of green shale as this sand usually grades into a sandy green shale near the base. It has a thickness of 50 to 150 feet. It directly overlies the Burgen limestone and the total horizon may be identified and measured from the point from which the Wilcox changes its color from brown to white and green to its contact with this limestone.

WILCOX SAND

This sand, a member of the Simpson formation, is found over the entire county. It directly underlies the Viola limestone and directly overlies the Tyner shale. It has a thickness of 50 to 100 feet, and is one of the most productive sands of the county.

VIOLA LIMESTONE

This formation, Ordovician in age, is found throughout the county and is one of the principal datums used by geologists for correlating the different formations of Ordovician age. It is white to gray in color, usually hard, and has a thickness of 20 to 60 feet throughout the county. It directly underlies the following formations: Misener sand, Sylvan shale, Hunton formation, and Chattanooga shale. It is an important casing point in the drilling of wells to the Wilcox sand, as it conformably overlies this sand.

MISENER SAND

This formation, composed of wind blown sand, occurs in scattered areas in the nothern and eastern parts of the county. It is usually white in color and very pure. Where present, it lies upon the Viola limestone and directly underlies the Chattanooga shale.

The writer has seen two oil pools producing from this sand where the Misener has the appearance of grading into the Viola. The most productive points are found on top of the dunes while the lower sand areas were filled with water. It is structurally conformable with the top of the Viola limestone.

SYLVAN SHALE

This formation, Silurian in age, is found all over the country with the exception of small areas where some well logs do not show its presence. It directly underlies the Hunton formation, and where the Hunton is absent it directly underlies the Chattanooga shale. It is a calcareous shale, light blue to green in color, and from 0 to 40 feet thick. In the northeastern part of the county it is quite often confused with the Tyner formation.

HUNTON FORMATION

This formation, Siluro-Devonian in age, directly underlies the Chattanooga shale. It converges toward the north and east and thins out so that except for small isolated areas it is found only in the southwest half of the county. It is the first of two white to gray limestones occurring under the Chattanooga shale. Due to the thickening of the formation to the south many operators have abandoned wells in the Misener sand under the impression that they have tested the Wilcox sand, this limestone being confused with the Viola limestone, both in stratigraphic position and physical characteristics. When present this formation directly overlies the Sylvan shale, Misener sand, and the Viola limestone.

CHATTANOOGA SHALE

This formation, the lowest member of the Mississippian, consists of a hard, well laminated shale, dark brown to black in color. It directly underlies the lower member of the Mississippi lime and is one of the best datum planes in the Mid-Continent field. It has a variable thickness ranging from 10 to 130 feet in thickness and overlaps the following formations: Hunton limestone, Sylvan shale, Misener sand, and Viola limestone.

BOONE FORMATION
MISSISSIPPI LIMESTONE

This formation, unconformably underlying the Cherokee shales, consists of four members in Okfuskee County. In the northeastern part of the county the top member of this formation is represented by a limestone, varying in thickness from 50 to 150 feet, becoming more regular in character and thickness toward the north and east in Okmulgee County. The middle member consists of shales, usually blue to black color and well laminated. The formation dips to the south and west at the rate of approximately 70 feet per mile and is steeper toward the south. The regular dip from north to south is interrupted by the structural highs occurring in T. 11 N., R. 11 E., and others of like character. These highs bring the Mississippian beds closer to the surface in these areas. From the northeast to the southwest corner of the county the upper lime member of the Mississippi disappears, changing into a shale which is in direct contact with the overlying Cherokee group. The interval of this missing part of the upper Boone formation, together with the south dip, accounts for some of the increasing intervals of the Cherokee group towards the south and west. As yet sufficient work on this variable Mississippi lime member has not been done to definitely distinguish it from the overlying Cherokee,

and, as a result the exact point of contact and the thickness of the interval is difficult to determine. A cross-section from the north to the south side of the county shows very definitely that the Boone formation was subjected to, not only great structural disturbances, but that it underwent a long period of erosion, which thinned the upper Mississippian interval on the structural highs and left a greater thickness in the structural troughs. Well logs do not show that the lower Mississippi limestone was exposed to erosion, but some logs show the absence over almost half of the Boone section. Erosion was greatest in the southern part of the county due to the less resistant nature of Boone shales, while towards the north there remains almost a total thickness of the Mississippian series as found in southern Creek and Okmulgee counties. The irregular topography of Mississippi lime was covered with shales and sands, which resulted in the leveling of the topography up to the horizon of the Morrow limestone and the deposition of the Deaner and Papoose sands. It follows that in drilling wells through the Mississippian series in the northeastern part of the county some wells, after passing through the Morrow will miss the Papoose sand and will encounter the total Boone section. Other wells, drilled farther south and west, will encounter this sand horizon and after passing through the lower Pennsylvanian shales will encounter the partial Boone section represented by shales and occasional thin limes.

PITKIN LIMESTONE

In the northeastern half of the county this formation occurs as a massive limestone, but towards the west and south it separates into thin limestones and is entirely absent in some wells. It is a cap-rock found by the drillers over the Papoose-Cromwell sand, and is the important datum for subsurface geological work on these horizons. This limestone varies from 20 to 140 feet in thickness throughout the county.

DUTCHER HORIZON
Lyons-Quinn, Papoose, Cromwell

This horizon, found over the entire county, varies in thickness from 0 to 100 feet. It often lies directly under the Pitkin limestone, but in many cases is separated from the Pitkin by a shale break. This sand horizon is often split by lenticular limestones and shales. It is the most productive sand of the county, producing everywhere proper structural conditions are found. It usually conforms to the Pitkin limestones where the interval of the Pitkin has not been split by shale breaks. Lying below this horizon unconformably upon the Boone formation occurs an irregular interval of lenticular sands, limes, and shales. In this interval occur small producing areas and such sands as the Ingram gas sand and others of local nomenclature. These lower sands cannot be correlated accurately with other horizons.

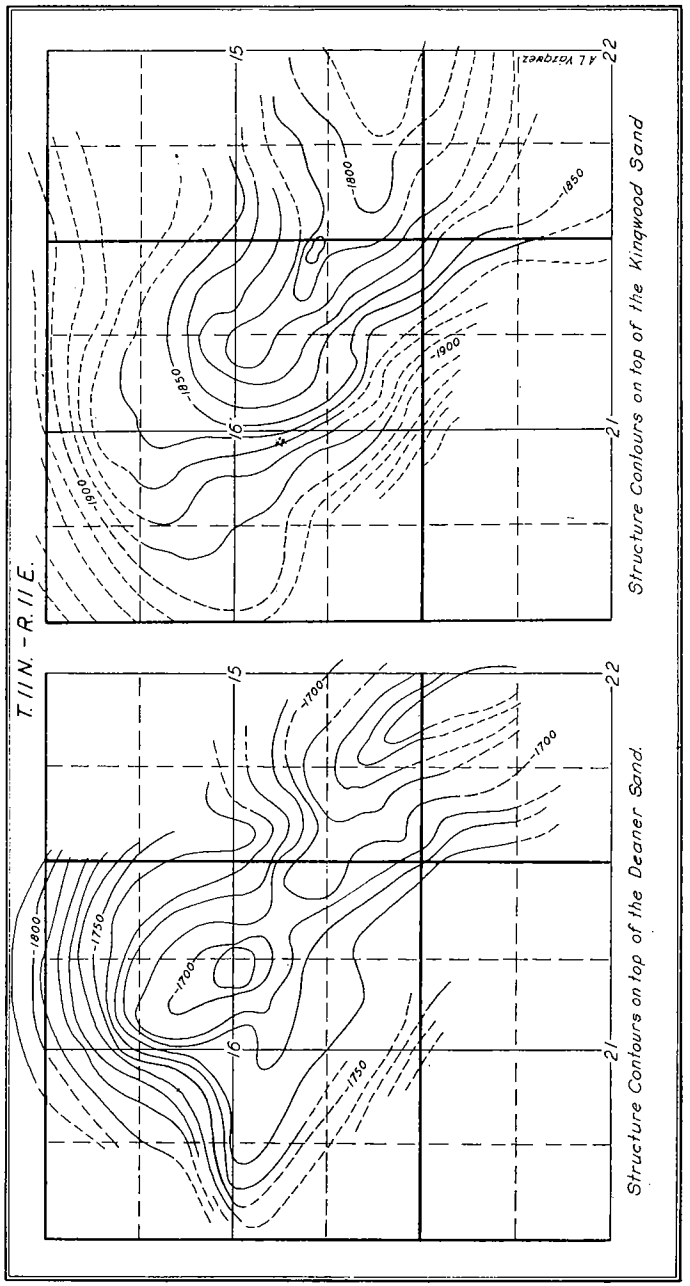


Figure 3

The Dutcher is the principal producing sand of the Lyons-Quinn and the Papoose pools. Figure 5 is a contour map showing the structure of this sand in the Papoose field, located in the southern part of the county.

KINGWOOD SAND (LIME)

This horizon, just below the Deaner horizon, is usually a limestone, but in areas, like the Deaner pool, the lime becomes sandy. It is a producer of oil and gas though its productive areas throughout the county are very limited. (See fig. 3). This horizon lies directly upon the Pitkin limestone.

DEANER HORIZON

This horizon consisting of sands, shales, and limestone occurs just above the Kingwood sand or lime, and varies from 0 to 60 feet in thickness. Its productive areas are found in the northern and eastern parts of the county. The Deaner horizon produces where the sand and structural conditions are conducive to the accumulation of oil and gas. The Deaner pool of T. 11 N., R. 11 E., (see fig. 3) produces from this horizon. In this area almost the entire thickness of this horizon is sand.

BOOCH SAND (HARTSHORNE)

This sand is a light producer of both oil and gas throughout the county. It varies from 10 to 60 feet in thickness.

CHEROKEE FORMATION

The Cherokee formation directly underlies the Boggy formation, and does not outcrop in the county. The entire formation consists of shales, sandstones, and limestones, which lie unconformably upon the Boone formation. Its variable thickness in the southwestern part of the county is due to the Boone topography, which underwent greater erosion in the southern part of the county. This formation contains several members which are most important from the standpoint of oil and gas production.

GLENN SAND (Bartlesville)

The Gleen or Bartlesville sand varies in thickness from 10 to 150 feet throughout the county, sometimes occurring as a sandy shale. It produces oil and gas in scattered areas over the county.

STRUCTURE

In Okfuskee County practically every type of surface structure is found, including almost all the gradations of structures from an anticlinal dome to a very slight nose. These structures are, in many instances, oil or gas bearing. The predominant producing type varies from a slight plunging nose to a flat terraced nose, very often carrying one to two closures. There is very little production occurring in the county that is not directly related to surface faulting or folding.

It is often the case that the accumulation of oil on these structures is associated with faulting. The fault closing the terrace or nose is

on the northeast side, from which the formations again rise and assume their normal regional dip. Production sometimes occurs between two faults. The faults may be divided into three major zones, both in direction of strike and occurrence; namely, those occurring along the escarpments of the Buck Creek, the Vamoosa, and the Holdenville formations. The strikes of the fault range from N. 20° W. to N. 40° W. Many of the faults grade into folds with depth. The effect of these faults upon oil accumulation is not the same as found in other districts as their strike almost parallels the normal dip of the formations. In Okfuskee County the operator must usually look to the up-throw side for production.

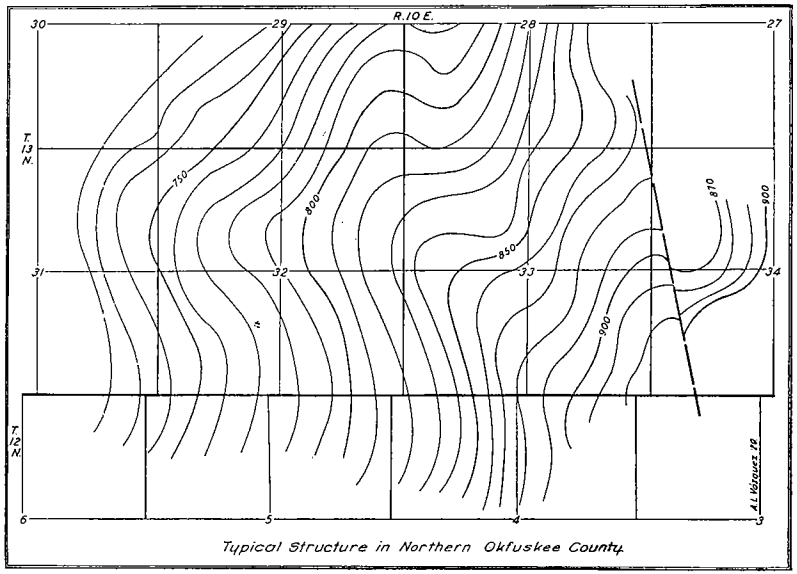


Figure 4

DEVELOPMENT

One of the most important factors controlling the accumulation of oil in the lower Pennsylvanian is the lenticular conditions of the sands, due to both horizontal variation and thickening and thinning. Both the Dutcher (Papoose) and Deaner sands often change to limes and shales in a few feet, resulting in spotted producing areas over the structure. It is typical of the entire county that the high escarpments are mainly synclinal and that the structural highs lie mostly in the valleys.

The following data on the oil and gas development of Okfuskee County was taken largely from Bulletin 40-Q of the Oklahoma Geological Survey.

BEARDEN

COUNTY: Okfuskee.
LOCATION: Twp. 10 N., Rge. 9 E.
SURFACE ELEVATION: 750 to 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.[1] 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.

CARY POOL

COUNTY: Okfuskee.
LOCATION: NW. cor. E.½ SE.¼ sec. 29, T. 12 N., R. 10 E.
SURFACE ELEVATION: 787 feet..
SURFACE FORMATION: Coffeyville.
AGE OF SURFACE ROCKS: Pennsylvanian.
STRUCTURE:

PRODUCING HORIZONS	DEPTH	THICKNESS	PRODUCTION	INITIAL PRODUCTION
Gilcrease	2930 to 2943	13	oil	1100 bbls.

CHARACTER OF OIL: 37° B'.
CHARACTER OF GAS:
DATE OF OPENING: October 1st, 1928.
REMARKS: This pool occurs on a slightly perceptible surface nose, covering about five hundred acres. There are, to date, ten producing wells and four drilling wells.

DEANER—CLEARVIEW

COUNTY: Okfuskee.
LOCATION: T. 11 N., R. 11 E.
SURFACE ELEVATION: 750 to 900 feet.
SURFACE FORMATION: Wewoka formation.
AGE OF SURFACE ROCKS: Pennsylvanian.
STRUCTURE: Anticlinal dome, lenticular sands.

1. "M" in this and following tables represents million cubic feet.

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. Cashinghead 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 Company, as a Wilcox sand pool.

GARRISON

COUNTY: Okfuskee.
LOCATION: T. 10 N., R. 9 E.
SURFACE ELEVATION: 750 to 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:

JOSEY

COUNTY: Okfuskee.
LOCATION: T. 12 N., R. 11 E.
SURFACE ELEVATION: 700 to 800 feet.
SURFACE FORMATION: Wewoka formation.
AGE OF SURFACE ROCKS: Pennsylvanian.
STRUCTURE: Local anticlinal structure.

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 Company in 1923 or 1924 under the direction of D. H. Radcliff.

LYONS—QUINN

COUNTY: Okmulgee-Okfuskee.
LOCATION: T. 11 N., Rs. 11 & 12 E.
SURFACE ELEVATION: 750 to 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	3350			
Wilcox	3400		gas	

CHARACTER OF OIL: Gravity, 38-39.9° B.
CHARACTER OF GAS: Dry. Rock pressure, 1,000 to 1,300 lbs.
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 is sec. 13, T. 11 N., R. 11 E., completed May, 1922, by the Waite Philips Petroleum Company. The open flow volume of this well was seven million cubic feet of gas per day with a rock pressure of 1,100 pounds.

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:

MID-WEST

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. 10-12 M. cu. ft.
Lyons	3230	70	oil gas	20-200 bbls. 10-32 M. cu. ft.
Mississippi	3585			
Chattanooga	3790			
Hunton	3926		show oil	
Sylvan	4225			
Viola	4235			
Wilcox	4305			

CHARACTER OF OIL: Gravity_____
CHARACTER OF GAS: Dry. Rock pressure 400-1,450 lbs.
DATE OF OPENING: 1921.
REMARKS:

NORTH BALTIMORE

COUNTY: Okfuskee.
LOCATION: T. 12 N., R. 11 E.
SURFACE ELEVATION: 750 to 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. 4-11 M. cu. ft.
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 & 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 section 13 to the 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.

OKEMAH

COUNTY: Okfuskee.
LOCATION: T. 11 N., Rs. 10-11 E.
SURFACE ELEVATION: 750 to 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 gas	

CHARACTER OF OIL: Gravity, 38-39.9° B.
CHARACTER OF GAS:
DATE OF OPENING: 1921.
REMARKS:

OKFUSKEE

COUNTY: Okfuskee.
LOCATION: T. 13 N., R. 10 E.
SURFACE ELEVATION: 700 to 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.

PADEN

COUNTY: Okfuskee.
LOCATION: T. 12 N., R. 7 E.

SURFACE ELEVATION: 750 to 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[2]

COUNTY: Okfuskee-Hughes.
LOCATION: T. 9-10 N., R. 9 E.
SURFACE ELEVATION: 750 to 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 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 secs. 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.

2. See also; Bunn, John R., and Roark, Louis, Petroleum engineering in the Papoose oil fields: Oklahoma Geol. Survey, Bull. 36, 1926.

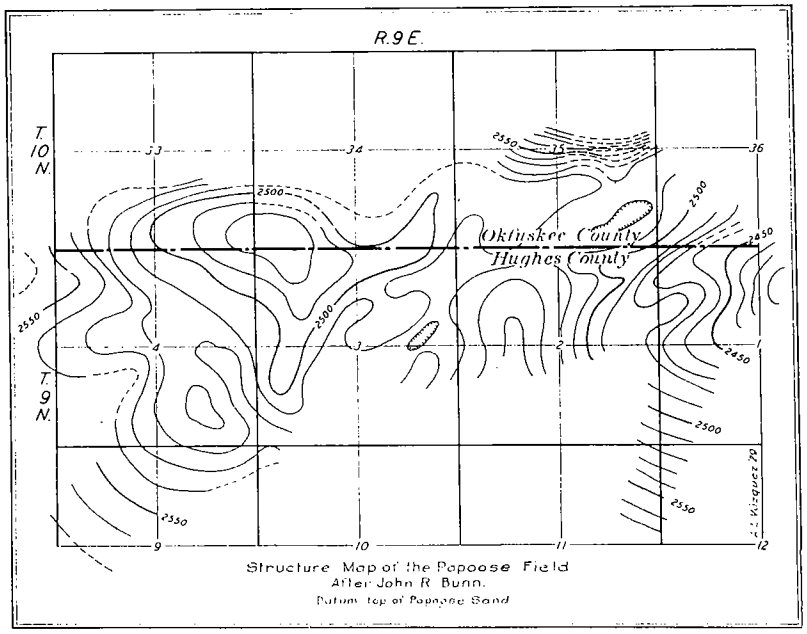


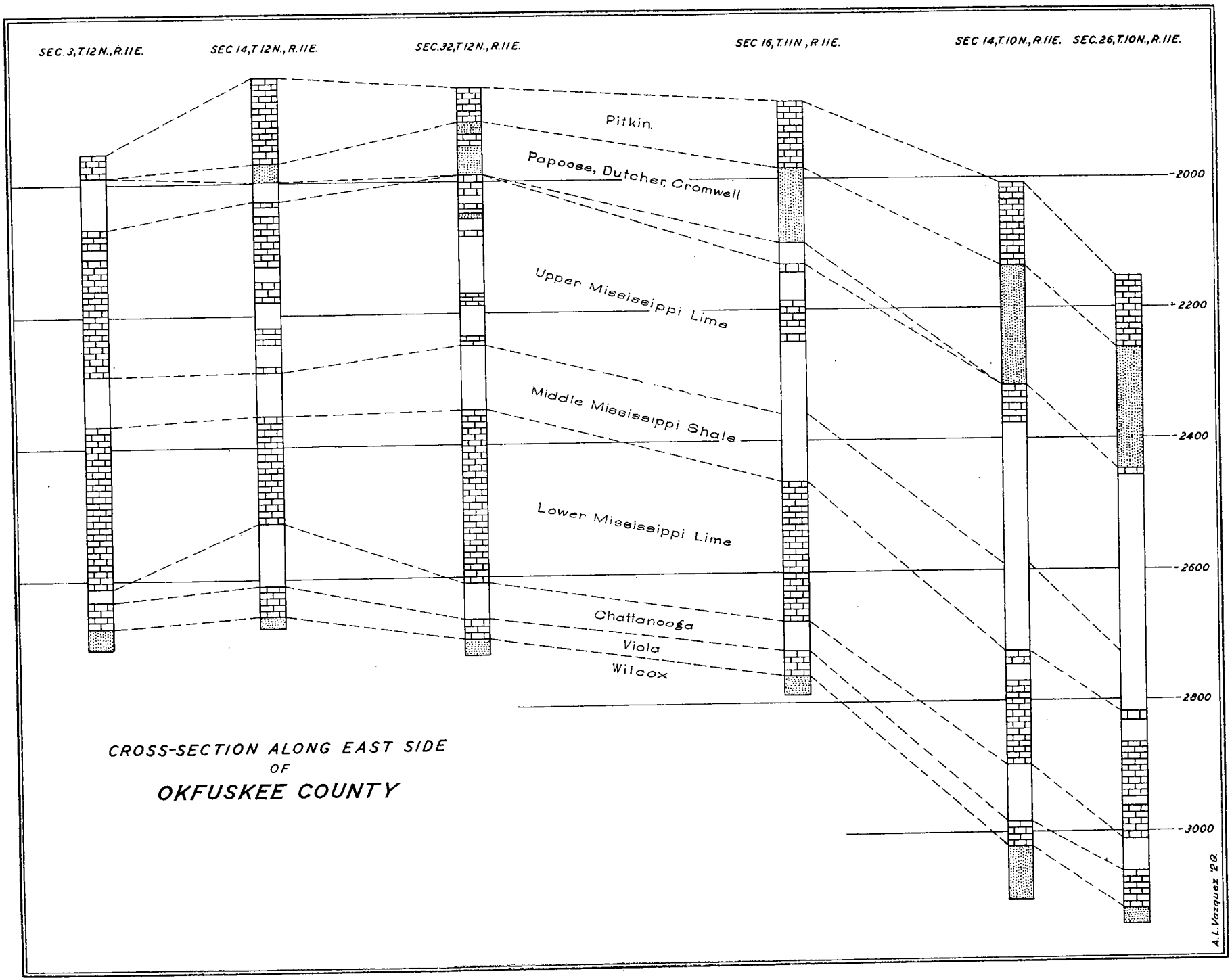
Figure 5

FUTURE DEVELOPMENT

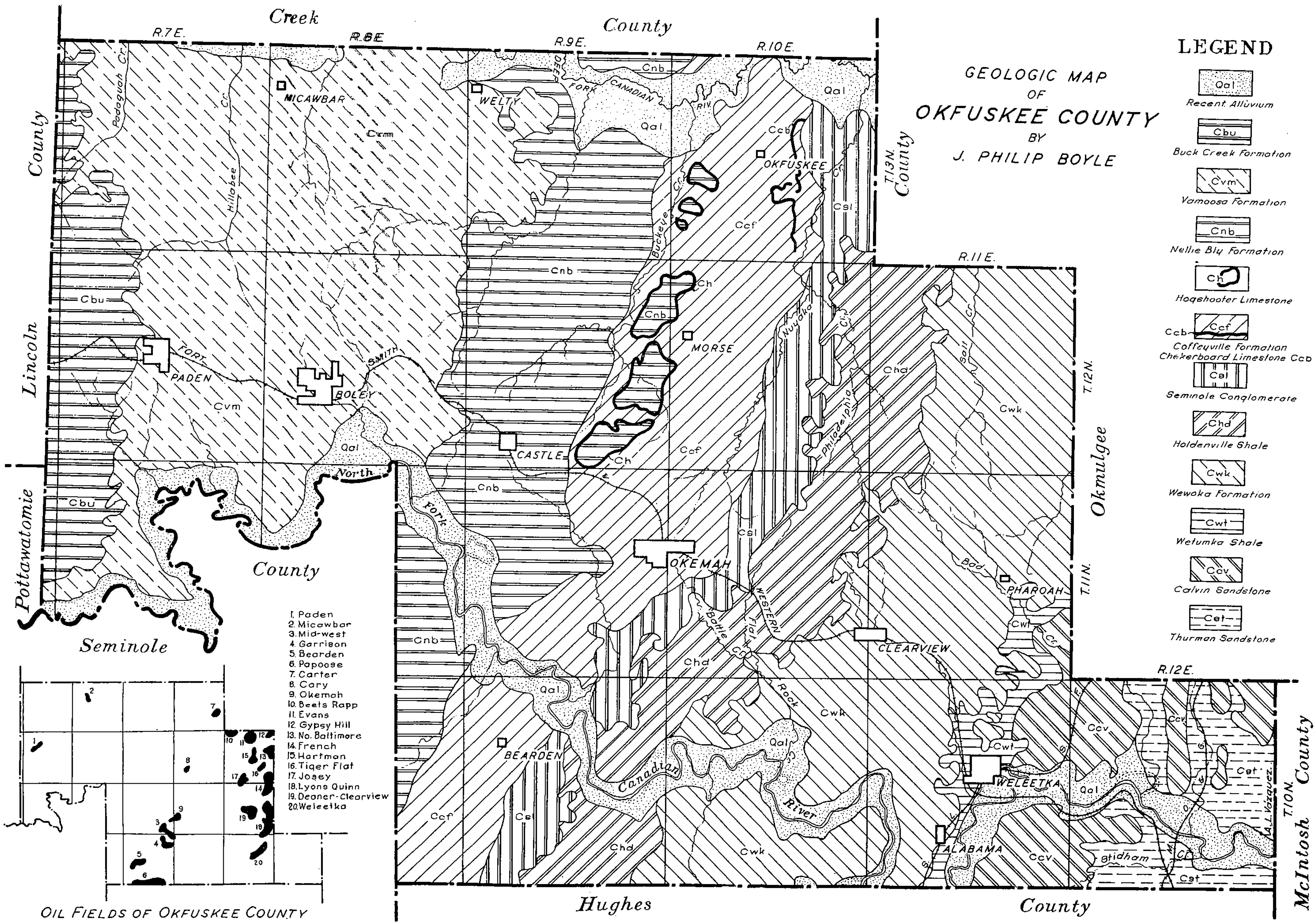
Although Okfuskee County has seen some very intensive oil and gas development over a period of several years, this development has been confined mostly to the eastern and southern parts of the county. Many small surface structures still exist that have not been thoroughly tested which may prove productive.

The Mississippian horizons such as the Papoose and Cromwell sands in the eastern half of the county are well tested, but as development moves west the horizons of the Pennsylvanian sands, such as the Cromwell series, and the Simpson offer a large area for future development.

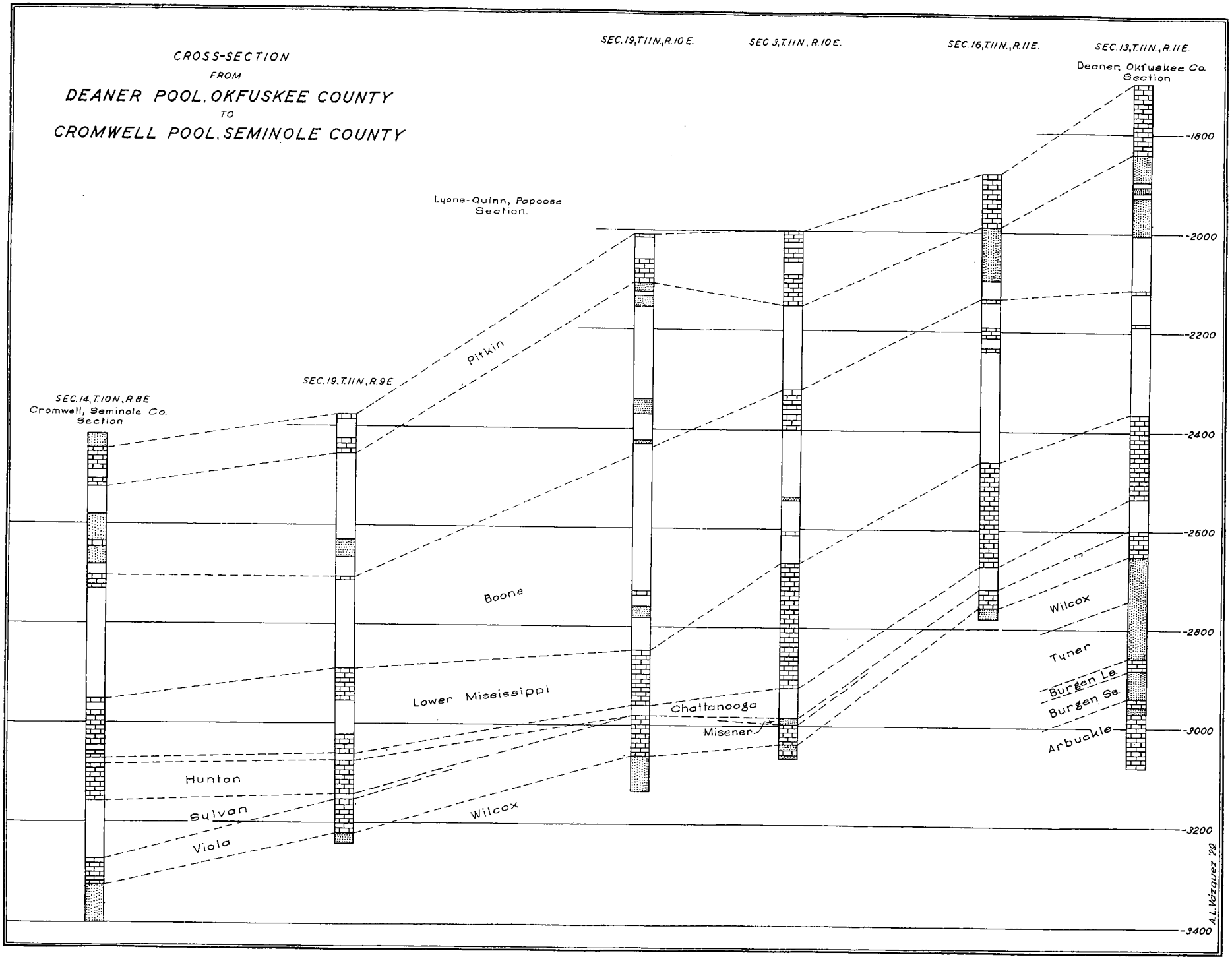
Very little Wilcox drilling has been done except along the east county line. When more wells have been drilled in the west half of the county subsurface work will no doubt reveal many Wilcox structures which at present cannot be found by surface indications. All of Okfuskee County is attractive oil and gas territory as has been proved by oil saturation of sands in every township.



CROSS-SECTION ALONG EAST SIDE
OF
OKFUSKEE COUNTY


GEOLOGIC MAP
OF
OKFUSKEE COUNTY
BY
J. PHILIP BOYLE
LEGEND
Qal
Recent Alluvium
Cbu
Buck Creek Formation
Cvm
Vamoosa Formation
Cnb
Nellie Bly Formation
Ch
Hogshooter Limestone
Ccb
Ccf
Coffeyville Formation
Chekerboard Limestone Ccb
Csl
Seminole Conglomerate
Chd
Holdenville Shale
Cwk
Wewoka Formation
Cwt
Wetumka Shale
Ccv
Calvin Sandstone
Cet
Thurman Sandstone
Creek
County
R.7E.
R.8E.
R.9E.
R.10E.
R.11E.
R.12E.
T.13N.
T.12N.
T.11N.
T.10N.
Lincoln
County
Pottawatomie
Seminole
County
Okmulgee
McIntosh
County
Hughes
County
MICAWBAR
WELTY
OKFUSKEE
MORSE
PADEN
BOLEY
CASTLE
OKEMAH
PHAROAH
CLEARVIEW
BEARDEN
WELEETKA
ALABAMA
Canadian
River
North
Fork
Fort
Smith
Deep Fork Canadian Riv
Buckeye Cr.
Nuyaka Cr.
Philadelphia
Salt Cr.
Bad Cr.
Hillabee Cr.
Podoguah Cr.
Bottle Cr.
Flat Rock
Western
Stidham
A. L. Vazquez
1. Paden
2. Micawbar
3. Mid-west
4. Garrison
5. Bearden
6. Papoose
7. Carter
8. Cory
9. Okemah
10. Beets Rapp
11. Evans
12. Gypsy Hill
13. No. Baltimore
14. French
15. Hartman
16. Tiger Flat
17. Josey
18. Lyons Quinn
19. Deaner-Clearview
20. Weleetka
OIL FIELDS OF OKFUSKEE COUNTY

CROSS-SECTION
FROM
DEANER POOL, OKFUSKEE COUNTY
TO
CROMWELL POOL, SEMINOLE COUNTY



A.L. Vázquez '29