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BULLETIN 28

EXPLORATION FOR OIL AND GAS IN
WESTERN KANSAS DURING 1939

By WALTER A. VER WIEBE



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Exploration for Oil and Gas in Western Kansas During 1939

WALTER A. VER WIEBE

INTRODUCTION

For several years the State Geological Survey of Kansas has published annual reviews of oil and gas development in the state. The first of these was published in 1928 as Mineral Resources Circular 1. The latest issue of the series was Mineral Resources Circular 13, which appeared in October, 1939, and discussed developments in western Kansas to the end of 1938. The present report includes the results of drilling activity to the end of 1939.

The number of wells drilled in western Kansas in 1939 totals 1,075. This figure does not include wells that were drilled deeper nor those that were recompleted in a different geological formation. Slightly more than three-fourths of the total number (824) were completed as commercial oil wells, 24 were completed as gas wells, and 204 test wells were abandoned as dry holes. Estimates based on daily potential capacity indicate that the new wells added 1,158,827 barrels to reserves and thus raised the total beyond 4,000,000 barrels.

It is interesting to note that the number of wells completed annually in the state rose gradually to a first peak in 1904, when 2,782 were drilled. The number decreased rapidly, and was only 368 three years later, but increased to the second and highest peak in 1918, when 4,671 wells were completed. In the period between 1904 and 1912 more gas wells than oil wells were completed. Between the high peak of 1918 and the somewhat lower peak of 1937, the low point was reached in 1931, when only 470 wells were completed.

Kansas again ranks high in the number of new pools discovered. Whether some new areas are new pools or extensions of older pools cannot be determined until more wells are drilled within the areas. Therefore, the figures given in this report may differ from those presented in the trade journals. In western Kansas sixteen new oil pools were discovered, of which seven are in Barton county, three in Russell county, two in Rice county and one each in Norton, Phillips, and Pratt counties. One new gas pool was discovered in far western Kansas, the Goodland pool in Sherman county. In addition

to new pools, new producing zones were found in 17 pools, among which are two that were discovered in 1939.

New Geological Information.—In most fields these new zones are the same as those found to be productive elsewhere in the state. It is common, for example, to find the Arbuckle limestone to be productive in a pool producing from the Lansing-Kansas City limestone (formerly called Oswald), or vice versa. In a few fields the new zone is the Simpson formation (sometimes called "Wilcox") or a formation high in the Pennsylvanian subsystem.

Most Active Pools.—The most active pools in Kansas during the year were the Hittle pool in Cowley county, the Bemis pool in Ellis county, the Burnett pool in Ellis county, the Bornholdt pool in McPherson county, and the Trapp pool in Russell county. Important extensions were made to many pools during the year. These will be discussed by counties in alphabetical order.

In Barton county the Bloomer pool was extended in several directions and now has 140 wells as compared to 90 at the end of the preceding year. In addition, a new producing zone, the Pennsylvanian basal conglomerate (Sooy) was found to be productive in one well. In the northeastern part of the county much drilling in and near the Prusa pool resulted in the addition of 17 new wells and 2 new producing zones, the Lansing-Kansas City limestone and the "granite wash." Two new pools were discovered nearby as a result of efforts to extend the Prusa pool. These new pools are called Prusa North and Prusa West.

In Cowley county a large number of wells were drilled during the year, resulting in the discovery of two new pools and very important extensions to old pools. The two new pools are the Darien and Rahn pools. The important extensions were made in the Frog Hollow pool, which now has 20 wells as compared to 8 at the end of the preceding year, and in the Hittle pool, which now has 61 wells as compared to 19 at the end of the previous year.

In Ellis county the Bemis pool gained 45 wells and was joined to the old Shutts pool. The pool thus formed is called Bemis-Shutts because of the fact that Arbuckle production in western Kansas was discovered in the old Shutts pool. The Burnett pool now has 65 wells as compared to 10 at the end of the previous year, and the Walters pool has 33 wells as compared to 24.

In Ellsworth county, many wells in the Lorraine pool were plugged back to the Lansing-Kansas City limestone. In Graham county, in the Morel pool, four additional wells were drilled, bringing the total to five.

In Kingman county the Cunningham pool was extended and now has 41 wells as compared to 36 at the end of the preceding year.

In McPherson county a great deal of excitement was created by the finding of important quantities of oil in the "chat" zone. The Bornholdt pool, which was discovered in August, 1937, was neglected during 1938, but in 1939 a revival of drilling brought the total number of wells to 14, and also resulted in the discovery of a new pool called Bornholdt North pool. The only other pool in the county that received important attention was the Roxbury. The five additional wells drilled there brought the total to six.

In Reno county the Buhler pool now has ten wells as compared to two the previous year. A new producing zone was discovered when one of the old wells was plugged back to the Viola limestone and produced commercially at that level.

In Rice county four pools were actively exploited during the year. The Campbell pool now has 19 wells as compared to 3, Geneseo now has 142 wells as compared to 103, and the Wherry pool has 191 wells as compared to 165 for the preceding year. A well drilled more than a mile east of the Orth pool produced oil from the pre-Cambrian quartzite. Later an offset well was drilled, and the two wells were added to the Orth pool.

In Rooks county the only pool that received much attention was the Laton pool. The total number of wells was doubled.

In Russell county five pools were actively exploited during the year. The Atherton pool now has 16 wells as compared to 10, the Gurney pool now has 52 wells as compared to 15, and the Hall pool has 119 wells as compared to 55 for the preceding year. The Coralena pool was united to the Coralena East and the Coralena North pools during the early part of the year and these three pools were united with the Trapp pool late in the year. This rearrangement of pool areas makes the Trapp pool the third largest pool in Kansas, as it now includes an area of 17,920 acres and a total of 553 wells. The only larger pools in Kansas are the El Dorado and Silica pools.

In Stafford county five pools received important extensions. The Drach pool now has 9 wells as compared to 1, the Leesburgh pool has 7 wells as compared to 1, the Sittner South pool has 6 wells as compared to 1, and the Zenith has 162 wells as compared to 97 at the end of the previous year. The Max pool now produces from a zone in the Lansing-Kansas City limestone.

In Sumner county the most important extension was recorded in

the Latta pool, which now has 12 wells. The large Wellington pool of that county added only two wells during the year.

Newly Productive Counties.—In 1939 three counties produced oil for the first time. One of these is *Norton county*, in the northwest part of the state, where the Power Oil Company No. 1 Van Patten well produced at the rate of 200 barrels per day from two different porous zones in the Lansing-Kansas City limestone. The second is *Phillips county*, in the northern part of the state. There the Blue Stem No. 1 Donaldson well found commercial production in the Lansing-Kansas City limestone at a depth of 3,111 feet. The potential production of the well exceeded 800 barrels. The name of the new pool is Bow Creek. The third county is *Sherman county*, in the far western part of Kansas. In this county gas was found in the Smoky Hill chalk at a depth of approximately 1,100 feet. Whereas the daily production is not large, it does indicate a possible large gas field in this part of Kansas.

Important Wildcats.—In 1939 at least 163 wildcat wells were completed in Western Kansas. Of these, 76 were oil wells, 6 were gas wells, and the other 81 were dry holes. It is interesting to note that most of the dry wildcat wells completed during the year were drilled by independent operators. In many cases the acreage was farmed out to them by the large oil companies. Most of these wells penetrated all zones that could possibly produce oil, down to and including the Arbuckle limestone. It is also interesting to note that many of these wildcat wells were drilled because the leases on the acreage involved were about to expire. About one-fourth of the wells were drilled on the basis of subsurface information. Fewer were drilled on the basis of core-drill information, and only about 6 percent were drilled on the basis of seismograph information. Approximately 33 percent were drilled without any of the usual geological prerequisites.

Acknowledgment.—The author wishes to acknowledge the assistance given by several geologists of Wichita. Edward Koester supplied a list of wildcat wells drilled in 1939. Anthony Folger supplied important data on new producing zones and some of the new pools discovered during the year. Data on total number of wells drilled were provided by Zenas Stucky. The production figures were supplied by T. A. Morgan and J. H. Page of the State Corporation Commission.

TABLE I.—DATA ON NEW POOLS FOUND IN 1939

COUNTY, POOL AND LOCATION.	Discovery well.	Potential production, bbla. per day.	Producing zone.	Depth in feet.
Barton County:				
Felten, 14-16-12W	Day No. 1, Felten	50	Sooy	3,342-44
Harman, 33-16-11W	Republic No. 1, Harman	25	Lana-K. C.	3,124-32
Krier, 30-16-11W	B. B. & M. No. 1, Krier	100	Sooy	3,130-33
Kruckenber, 14-19-15W	Ameruda No. 1, Kruckenber	130	Arbuckle	3,880-83
Pospisil, 20-17-15W	Republic No. 1, Pospisil	230	Arbuckle	3,948-80
Prusa North, 17-16-11W	Sindclair No. 1, Oser	100	Lana-K. C.	3,133-42
Prusa West, 18-16-11W	Vernon No. 1, Hoffman	525	Lana-K. C.	3,207-17
McPherson County:				
Bornholdt North, 18-20-5W	Springrose No. 1, Swanson	2,500	Chat.	3,304-40
Norton County:				
Van Patten, 26-4-21W	Power No. 1, Van Patten	200	Lana-K. C.	3,475-82
			Lana-K. C.	3,487-96
Phillips County:				
Bow Creek, 25-5-18W	Blue Stem No. 1, Donaldson	825	Lana-K. C.	3,111-15
Pratt County:				
Catro, 7-28-11W	Skelly No. 1, Harding	375	Viola	4,267-83
Rice County:				
Bredfield West, 12-18-10W	Saco No. 1, Haber	250	Arbuckle	3,265-68
Mulway, 8-20-9W	Phillips No. 1, Proffit	210	Arbuckle	3,260-63
Russell County:				
Atherton North, 18-13-14W	Cities Service No. 1, Dutt	270	Arbuckle	3,130-33
Fairfield North, 16-15-13W	Wakefield No. 1, Mcbarg	840	Lana-K. C.	3,112-20
			Arbuckle	3,232-39
Trapp West, 15-15-14W	Phillips No. 1, Maier	275	Arbuckle	3,250-56

OIL AND GAS DEVELOPMENT IN WESTERN KANSAS COUNTIES

BARBER COUNTY

The geology of Barber county and its producing areas has been described in Mineral Resources Circulars 10 and 13. In 1939 two of the producing areas received important extensions.

Lake City Pool.—The Lake City pool, 15 miles northwest of Medicine Lodge, was discovered in July, 1937. Pryor and Lockhart drilled the first well on the Gant ranch, and it produced oil from the Viola limestone at a depth of 4,435 feet. In 1938, a second well, drilled by the same interests on the Gant ranch (No. 1C Gant, in sec. 18, T. 31 S., R. 13 W.), penetrated the Viola limestone and found commercial production in the Arbuckle dolomite at a depth of 4,607 feet. The potential production measured 1,200 barrels of pipe-line oil per day. No new oil wells were added in 1939.

Whelan Pool.—The Whelan pool was the second pool to be discovered in Barber county. It was located by means of a magne-

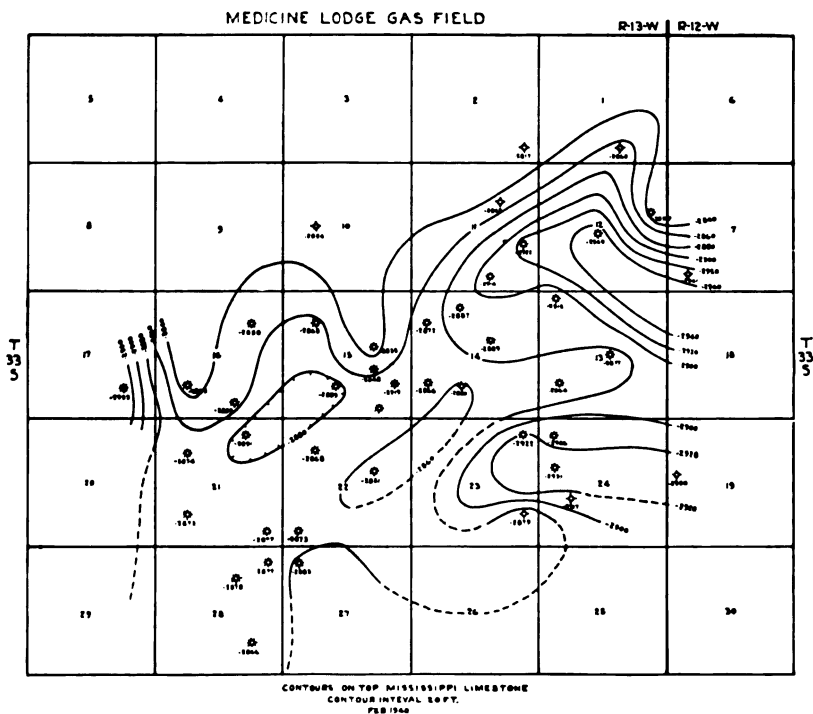


FIG. 1. Contour map of Medicine Lodge Gas Field (after J. H. Page).

tometer survey conducted by the Lario Oil Company. The first well was drilled on the Whelan ranch, in sec. 32, T. 32 S., R. 11 W. Oil was found in the "chat" or eroded top of the Mississippian limestone at a depth of 4,355 to 4,384 feet. In 1939 one producing well was added to the eight that were producing at the end of the preceding year.

Oil and Gas Pools of Barber County

POOL AND LOCATION.	Area, acres.	Cumulative production to end of 1939, bbls.	Number wells.	Producing zone.	Depth in feet.
Lake City, 7-31-13W.....	160	29,485	1	Viola.....	4,435
			1	Arbuckle....	4,607
Medicine Lodge, 13-33-13W.....	80	28,829	2	Misener....	4,845
Whelan, 32-31-11W.....	640	243,625	9	Chat.....	4,355
Medicine Lodge (gas), 13-33-13W....	6,400	36,437,112 M cu. ft.	32	Chat.....	4,455

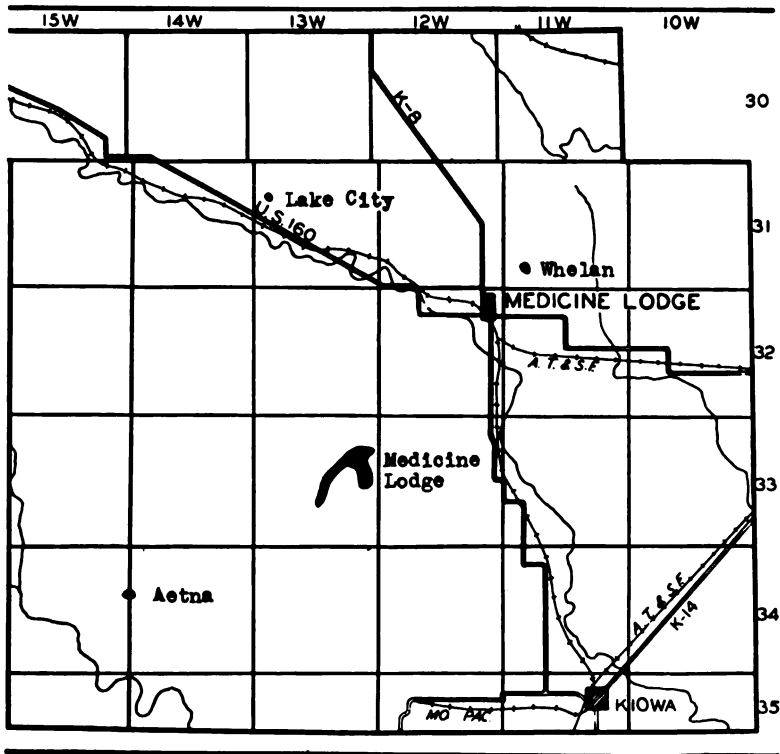


FIG. 2. Map of Barber county showing oil and gas pools.
(Solid areas are oil pools; lined areas are gas pools.)

BARBER COUNTY

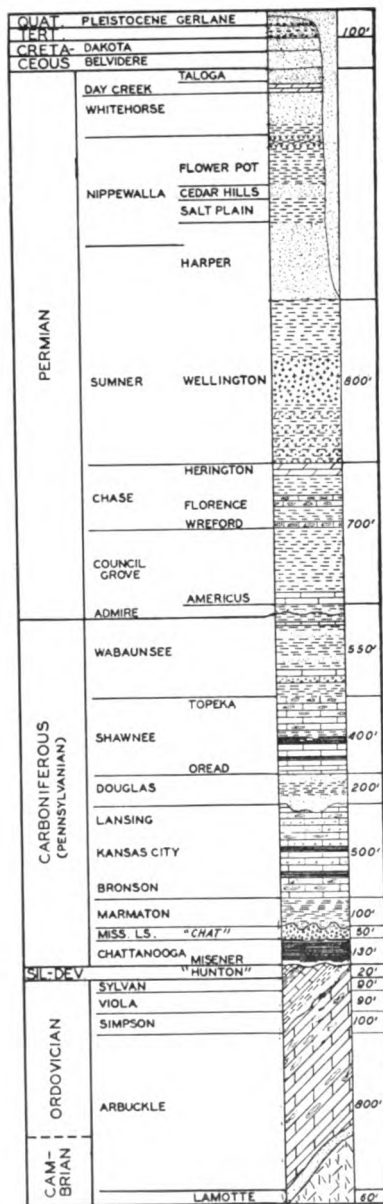


FIG. 3. Columnar section of rocks in Barber county.

Medicine Lodge Gas Field.—Nine additional producing wells were completed in this field during the year, bringing the total number of wells to 32. One additional oil well was drilled, so that now there are two wells producing oil from the Misener formation.

Production of the new gas wells ranges from 3,000,000 to 25,000,000 cubic feet per day. The largest well is the Barbara Oil Company No. 3 "B" Root well, in sec. 15, T. 33 S., R. 13 W. Several wells were drilled through the gas zone and later plugged back. One of these, the No. 2 "B" Thompson well, in section 14, reached the "chat" at a depth of 4,605 feet and Viola limestone at 4,915 feet, and finished in the latter formation at 4,958 feet. Later it was plugged back to the "chat" zone at a depth of 4,605 to 4,675 feet and was completed as a gas well having a potential production of 18,000,000 cubic feet per day. The No. 1 Wilson well, in section 17, was drilled into the Arbuckle limestone, but was plugged back to a porous zone at a depth of 4,657 to 4,706 feet, where it was completed as a gas well.

Wildcat Operations.—Of fourteen test wells drilled in Barber county in 1939, two were completed as oil wells, nine as gas wells, and three as dry holes. One of the unsuccessful wells was drilled by the Olson Drilling Company in an attempt to extend the Whelan pool. It was drilled on the Coffman farm in sec. 25, T. 31 S., R. 12 W. After penetrating the Mississippian rocks, from which the Whelan pools now produce oil, the well was drilled into the Viola limestone at a depth of 4,512 feet, the Simpson formation at 4,600 feet, and the Arbuckle dolomite at 4,805 feet. It was abandoned after penetrating the Arbuckle formation 45 feet.

A second dry hole was drilled by Pryor and Lockhart, the No. 1 "D" Gant well, in sec. 17, T. 31 S., R. 13 W. It failed to find oil at the expected level and was abandoned at a depth of 3,615 feet. The third dry hole was located on favorable structure, but may be regarded as a rank wildcat. It is the Patton No. 1 Hoss well, in sec. 12, T. 30 S., R. 15 W. In this well the Topeka limestone was reached at a depth of 3,091 feet, the Lansing limestone at 3,890 feet, the chat at 4,410 feet, the Viola limestone at 4,495 feet, the Simpson formation at 4,520 feet, and the Arbuckle dolomite at 4,614 feet.

The production from the oil pools of Barber county was 91,958 barrels in 1939. The cumulative total to the end of that year was 826,765 barrels. The gas pool at Medicine Lodge produced 6,380,558,000 cubic feet of gas during the year, bringing the total to 67,308,558,000 cubic feet to the end of 1939.

BARTON COUNTY

Drilling activity in Barton county was very extensive in 1939. No less than 165 test wells were completed, of which 110 were oil wells. Wildcat drilling resulted in the discovery of seven new pools—Feltes, Harzman, Krier, Kruckenberg, Pospishel, Prusa North, and Prusa West. The older pools are described in Mineral Resources Circular 10 and will not be mentioned in this report unless they received important additions or extensions. The distribution of the pools in Barton county is shown in figure 4.

Ainsworth Pool.—The Ainsworth pool, in the southern part of T. 16 S., R. 13 W., was connected with the Ainsworth South pool by the completion of the Western Kansas Oil and Refining Company No. 1 Linser well. In this well the Arbuckle dolomite, reached at a depth of 3,362 feet, was treated with 1,000 gallons of acid, and the well, when completed, had a potential production of 1,166 barrels per day. Attempts to extend this pool resulted in the successful completion of ten additional producing wells. Nine of these produce from the Arbuckle dolomite and one from the Oread limestone, a new producing zone. One of the wells on the Gage lease of the Skelly Oil Company, in sec. 35, T. 16 S., R. 13 W., was plugged back to a depth of 2,929 feet, where it produced oil from a limestone near the base of the Shawnee formation.

Albert Pool.—In the Albert pool of western Barton county three additional oil wells were completed. Oil is produced from the Lamotte (Reagan) sandstone of Cambrian age at a depth of 3,575 feet.

Beaver Pool.—One new well was added in the Beaver pool, but no new wells in the Beaver North pool. These pools are on opposite sides of a pre-Cambrian granite knob. Therefore, oil is produced from the lenticular edges of several formations, including the Lamotte sandstone, the Arbuckle dolomite, and the basal Pennsylvanian Sooy ("Gorham") sandstone. The new well found oil at a depth of 2,885 to 2,890 feet in a limestone near the base of the Shawnee formation. This well is the Martin and Hearing No. 1 Feltes well, in sec. 8, T. 16 S., R. 12 W. Approximately 12,000,000 cubic feet of gas accompanied the oil, and the potential production gauged 2,546 barrels of 32°-gravity oil.

Bloomer Pool.—In the Bloomer pool, which extends into Rice county on the southeast and Ellsworth county on the east, 13 additional Arbuckle wells and 29 additional Lansing wells were completed. This pool produced a total of 3,449,126 barrels of oil to the

end of 1939. In this pool also a new producing zone was found. The Polhamus and Shield No. 1 Matthews well, in sec. 19, T. 17 S., R. 10 W. (Rice county), found commercial production in the Sooy conglomerate at a depth of 3,310 feet. The oil has a gravity of 43° A. P. I. and the well has a potential production of 275 barrels per day.

Clawson Pool.—A pool discovered in December, 1938, was named the Clawson pool, from the farm on which the first well was drilled. It is located in sec. 17, T. 20 S., R. 11 W. Oil is obtained from the Arbuckle dolomite at a depth of 3,285 to 3,299 feet. The discovery well was drilled by Murphy and Harris, sometimes known as the Virginia Drilling Company. In 1939 this pool was extended westward by the completion of five additional wells.

Feltes Pool.—One of the new discoveries for 1939 is the Feltes pool. The first well was the Day et al No. 1 Feltes well, in sec. 14, T. 16 S., R. 12 W. It was completed November 4, and had an initial production of 50 barrels per day from the Sooy conglomerate at a depth of 3,342 feet. The gravity of the oil is 42° A. P. I.

Harzman Pool.—A second new pool for Barton county was found close to the Feltes pool. The discovery well was the Republic Oil Company No. 1 Harzman well in sec. 33, T. 16 S., R. 11 W. The oil came into the hole from porous Lansing-Kansas City limestone at a depth of 3,124 to 3,132 feet. An initial production of 20 barrels per day was allowed after tests had been made by the State Corporation Commission.

Kraft Pool.—In the Kraft pool, in the northern part of T. 17 S., R. 11 W., considerable drilling took place during 1939. In addition to some dry holes, 8 oil wells were completed, bringing the total to 38.

Krier Pool.—The third new pool for 1939 is the Krier pool, named from the Krier farm where the B. B. & M. Oil Company completed the discovery well on October 31. The well had a potential production of 450 barrels per day. The producing zone is the Sooy conglomerate, which here lies directly upon the Arbuckle dolomite.

Kruckenbergs Pool.—The fourth new pool for Barton county is the Kruckenbergs pool, which lies south of Albert in the western part of the county. It was discovered by the Amerada Petroleum Corporation early in February. Oil was found on the Kruckenbergs farm in the Arbuckle dolomite at a depth of 3,580 to 3,585 feet, approximately 8 feet below the top of the formation. The initial potential production was 132 barrels. Subsequently the Amerada

Petroleum Corporation completed a second well on the Merten farm. The Arbuckle dolomite was absent, so the well was later completed in the Lansing-Kansas City limestone at a depth of 3,342 to 3,395 feet.

Pospishel Pool.—In June the Republic Oil and Gas Company No. 1 Pospishel well, in sec. 20, T. 17 S., R. 15 W., opened the fifth new pool for the year. The area in which this pool is located lies north of the Albert gas field, in which the Arbuckle dolomite is missing. Nevertheless a thin wedge of Arbuckle dolomite was found in the Pospishel well and a porous zone at a depth of 3,550 to 3,557 feet yielded 230 barrels of oil per day. The oil tests 38° A. P. I. gravity. Before the end of the year the Transwestern Oil Company drilled a well on an adjoining section on a lease farmed out by the Shell Petroleum Company.

Prusa Pool.—The Prusa pool, in sec. 20, T. 16 S., R. 11 W., was the seventh pool to be discovered. It was discovered in December, 1938, when the Sinclair Oil Company successfully completed the first well on the Prusa ranch. Arbuckle dolomite was found at a depth of 3,335 feet and the porous zone extended to the total depth of 3,352 feet. The well produced at the rate of 1,300 barrels per day on the official test. Previous drilling in this township had revealed a complicated pattern of ancient rocks beneath the Pennsylvanian sediments, accounting for some dry holes in high structural positions. During 1939 a very intensive drilling campaign in the area immediately surrounding the Prusa pool resulted in 14 additional producing wells being completed in the Arbuckle dolomite. Two new producing zones were discovered. One of these is the porous zone in the Lansing-Kansas City limestone, from which two wells are now producing, and the other is the basal sand, usually called the Reagan, from which one well now produces oil.

Prusa North.—The determined efforts of producers to extend the Prusa pool resulted in finding two closely adjacent producing areas—the Prusa North and the Prusa West pools. The pool that was subsequently named the Prusa North pool was opened by the Solar Oil Company No. 1 Schartz well, in sec. 18, T. 16 S., R. 11 W., which found commercial quantities of oil in the Arbuckle dolomite at a depth of 3,328 feet. A few months later the Sinclair Oil Company No. 1 M. Oeser, an offset well, found oil in the Lansing-Kansas City limestone at a depth of 3,133 to 3,142 feet, thus giving the pool an additional producing zone. This well, incidentally, produced a great quantity of gas. The initial flow was estimated at nearly

12,000,000 cubic feet per day. It is also interesting to note that the well was drilled into the pre-Cambrian quartzite without finding any Arbuckle dolomite, and was then plugged back to the producing zone in the Lansing-Kansas City limestones.

Prusa West Pool.—In the southwest quarter of the same section in which the Solar Oil Company discovered oil to open the Prusa North pool, oil had been discovered three months earlier. The Vernon Oil Company No. 1 Hoffman, in the SW $\frac{1}{4}$ sec. 18, found a porous zone in the Lansing-Kansas City limestone. This zone was saturated with oil and the potential production of the discovery well was 527 barrels per day.

Silica Pool.—In the Silica pool an extensive drilling campaign resulted in the completion of many additional producing wells, bringing the total to 624 at the end of the year. The oil is produced from the Arbuckle dolomite, as in most of the pools of Barton county. The Silica pool extends into Rice county; indeed, nearly half the area of the pool lies in that county, but because the discovery well, Hilligoss No. 1 Isern, was drilled in Barton county, in sec. 12, T. 20 S., R. 1 W., this large pool is listed under Barton county. During 1939 the whole pool produced 4,670,170 barrels of oil, and the total to the end of the year was 23,136,453 barrels. It is interesting to note that the discovery well is still producing, its potential production being 800 barrels per day. The total production of this well amounts to nearly 500,000 barrels.

Silica South Pool.—The Silica South pool lies a short distance south of the main pool, across Arkansas river from it. This river seemed to separate the Silica and the Silica South pools, but after the completion of two wells in the NE $\frac{1}{4}$ sec. 15, T. 20 S., R. 11 W., in 1939, scarcely a half mile separated the two pools. The Ellinwood pool was separated from the Silica pool by about the same distance. Inasmuch as there seems to be no structural barrier between these three producing areas and they all seem to have a common source of oil, the Nomenclature Committee has joined them. This fact accounts for the large total number of wells at the end of the year (624) and the large total area, exceeding 24,000 acres. Upon the eventual addition of the Ellinwood West pool, which appears imminent, the Silica field will take rank as the largest oil-producing area in Kansas.

The Ellinwood pool, when joined to the Silica pool, included 16 wells, having a combined potential production of 4,672 barrels. It was discovered in 1932 when the Midwest Oil Company No. 29

Oil and Gas Pools of Barton County

POOL AND LOCATION.	Area, acres.	Cumulative production to end of 1939, bbls.	Number wells.	Producing zone.	Depth in feet.
Ainsworth, 26-16-13W	5,000	1,209,362	1 58	Oread	3,390
				Arbuckle	
Albert, 30-18-15W	1,200	455,000	14	Reagan	3,601
Beaver, 16-16-12W	1,000	667,626	1 19	Oread	2,885
				Arbuckle	3,348
				Reagan	3,335
Beaver North, 4-16-12W	160	157,950	3	Arbuckle	3,316
Bloomer, 36-17-11W	4,000	3,449,126	33 1 109	Lans.-K. C.	3,044
				Sooy	3,310
				Arbuckle	3,257
Boyd, 3-18-14W				Arbuckle	3,285
Clawson, 17-20-11W	600	111,668	6	Arbuckle	3,285
Davidson, 4-16-11W	80	37,214	1 1	Sooy	3,317
				Arbuckle	3,314
Eberhardt, 14-19-11W	160	131,880	4	Arbuckle	3,311
Ellinwood (a).					
Ellinwood North, 33-19-11W	80	32,369	1	Arbuckle	3,328
Ellinwood West, 7-20-11W	160	59,489	4	Arbuckle	3,346
Feist, 29-18-11W	40	41,435	1	Arbuckle	3,430
Feltes, 14-16-12W	40		1	Sooy	3,342
Hagan, 20-20-11W	40	8,070	1	Arbuckle	3,323
Harzman, 33-16-11W	40	355	1	Lans.-K. C.	3,124
Heiser, 16-19-14W	40	15,530	1	Lans.-K. C.	3,228
Hiss, 31-20-13W	160	212,798	4	Lans.-K. C.	3,270
Hoisington, 21-17-13W	160	26,635	1 2	Lans.-K. C.	
				Arbuckle	3,440
Kraft, 10-17-11W	2,200	614,518	38	Arbuckle	3,281
Krier, 30-16-11W	80	3,725	2	Sooy	3,327
Kruckenber, 14-19-15W	160	5,839	1 1	Lans.-K. C.	3,342
				Arbuckle	3,580
Lanterman, 15-19-11W	200	165,647	4 2	Lans.-K. C.	3,109
				Arbuckle	3,235
Odin, 10-17-12W	80	13,486	1	Arbuckle	3,340
Pospishel, 20-17-15W	80	3,645	2	Arbuckle	3,548
Prusa, 20-16-11W	800	116,363	2 15 2	Lans.-K. C.	3,160
				Arbuckle	3,335
				Reagan	3,310
Prusa North, 18-16-11W	80		2	Lans.-K. C.	3,167
				Arbuckle	
Prusa West, 18-16-11W	40	8,958	1	Lans.-K. C.	3,207
Rick, 1-19-11W	160	169,265	5	Arbuckle	3,355

Oil and Gas Pools of Barton County—Concluded

POOL AND LOCATION.	Area, acres.	Cumulative production to end of 1939, bbls.	Number wells.	Producing zone.	Depth in feet.
Silica, 12-20-11W.....	24,000	23,136.453	7 617	Lans.-K. C. Arbuckle...	2,955 3,328
Silica South (a).					
Trapp (b).					
Wolf (c).					
Prusa North (gas). 17-16-11W.....	160	7,701 M cu. ft. (d)	1	Lans.-K. C.	3,133

- a. Joined to Silica pool, September, 1939.
b. See Russell county.
c. Joined to Ellinwood West, January, 1940.
d. Production during 1939.

Scheufler well was completed. As an indication of the great per acre recovery of parts of this region the production of this well and of the No. 2 Scheufler well in the same section are enlightening. According to the Stanolind Oil Company records, these two wells have produced almost 500,000 barrels of oil to the end of 1939.

Trapp Pool.—In the northern part of Barton county lies the very extensive Trapp pool. Originally, this portion of the area was called the Trapp South pool, but in 1938 it was included with the main part of the pool for proration. The few wells on the southwest side, originally classed as the Trapp Southwest pool, were also included in the main pool. As thus constituted, the pool includes the nine sections in the northwest corner of T. 16 S., R. 13 W.; four sections in the northeast corner of T. 16 S., R. 14 W.; six sections in the southwest corner of T. 15 S., R. 13 W., and ten sections along the east side of T. 15 S., R. 14 W. The two townships last mentioned are in Russell county. The first well in the Barton county part of the pool was the Phillips Petroleum Company No. 1 McClanahan well, in sec. 7, T. 16 S., R. 13 W. The discovery well in the Russell county Trapp pool was the Coralena Oil Company No. 1 Trapp well, in sec. 30, T. 15 S., R. 13 W. Subsequently the Ochs pool, which was an older pool, was united with the Trapp pool of Russell county. Inasmuch as the discovery well of this pool, the No. 1 Ochs, is in sec. 23, T. 15 S., R. 14 W., the Ochs well also becomes the discovery well of the present Trapp pool. Complete statistical details of the pool are therefore included under Russell county. In the Barton county portion, several new wells define the southern and southwestern sides of the pool. Among these the Central Petroleum No. 1 Miller well, in the SE¼ sec. 17, T. 16 S.,

R. 13 W., extends the limits of the pool nearly 1 mile southward, toward the Ainsworth pool.

Dry Holes and Wildcat Wells.—Many dry holes were drilled in Barton county in 1939. Most of the 52 test wells so classified were drilled within a mile of a producing area. The 12 wildcat wells that were drilled farther from pools do not provide much new in-

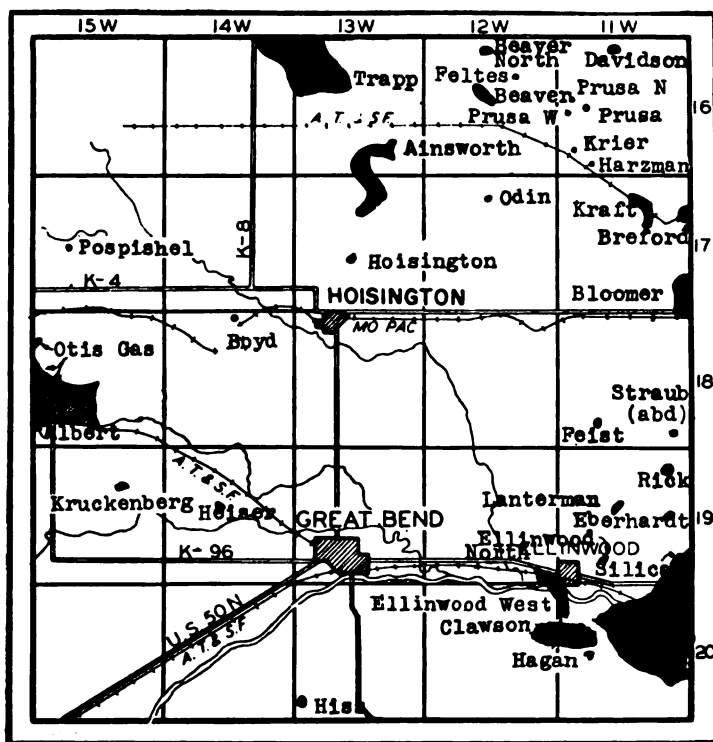


FIG. 4. Map of Barton county.

formation other than control points for contour mapping. Most of the wildcat wells were drilled by independent operators on "farm-outs" from the major companies and by the major companies on acreage on which the leases were about to expire. One interesting test well in the Silica pool gave some new information on the thickness of the Arbuckle dolomite. It was the Stanolind Oil Company No. 12 Kowalski well, in sec. 11, T. 20 S., R. 11 W. In this well the Arbuckle dolomite was reached at a depth of 3,312 feet, Lamotte sandstone at 3,815 feet, and the pre-Cambrian rocks at 3,872 feet.

The thickness of the Arbuckle dolomite in this part of Kansas is approximately 500 feet.

Production Figures.—The production of Barton county for 1939 was 7,163,458 barrels, and the cumulative total to the end of the year was 30,854,406 barrels. These figures include all the production of the Silica pool, which lies partly in Rice county, but do not include any portion of the Trapp pool, although a considerable portion of that pool lies in Barton county.

Completions.—Wells completed in Barton county during 1939 total 165, of which 110 are classed as oil wells, 3 as gas wells, and 52 as dry holes.

CLARK COUNTY

The history of oil and gas development in Clark county and the areal geology are described briefly in Mineral Resources Circular 10, which summarizes results of drilling to the end of 1937. In 1938 only two wells were completed. Unfortunately, both were dry holes. In 1939 no wells were drilled. The distribution of pools in Clark county is shown in figure 5. A generalized section of the rocks of this county is given in figure 6.

In the Morrison oil and gas pool two wells produce oil from the Viola limestone at a depth of approximately 6,450 feet. The first successful well in the pool was drilled by the Watchorn Oil and Gas Company in 1928 on the Morrison ranch. It encountered a strong flow of gas in the basal Pennsylvanian Sooy beds at a depth of 5,312 feet. Drilling was continued into the "Mississippi lime," which was reached at a depth of 5,345 feet and was penetrated 352 feet, to a total depth of 5,607 feet. The well was then plugged back to a depth of 5,312 feet, where it produced 10,000,000 cubic feet of gas per day for some time, but it was later abandoned. This well was located in the NE $\frac{1}{4}$ sec. 20, T. 32 S., R. 21 W. An offset well was drilled through the Mississippian rocks, which were approximately 1,100 feet thick. A second gas well, in section 17, produced from the Sooy conglomerate at a depth of 5,443 feet.

Oil and Gas Pools of Clark County

POOL AND LOCATION.	Area, acres.	Cumulative production to end of 1939, bbls.	Number wells.	Producing zone.	Depth in feet.
Morrison (oil), 17-32-21W.....	160	95,650	2	Viola.....	6,467
Morrison (gas), 21-32-21W.....				Sooy.....	5,443

The first oil well was the Olson Drilling Company No. 3 Morrison well, in section 17, completed in 1937. In this well the Wellington shale was reached at a depth of 1,650 feet, salt at 1,940 feet, and the Herington limestone at 2,578 feet. The base of the Americus limestone was logged at 3,085 feet, the top of the Topeka limestone at 3,840 feet, the Lansing limestone at 4,385 feet, Marmaton shale

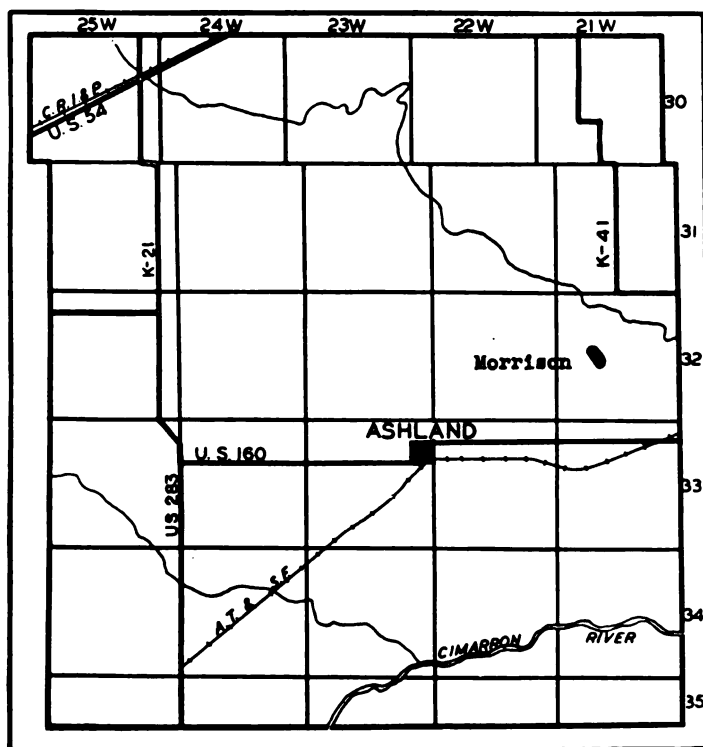


FIG. 5. Map of Clark county.

at 5,040 feet, and Cherokee shale at 5,280 feet. Mississippian chert was reached at 5,435 feet and the tripolitic chert of the Viola limestone at 6,450 feet. Drilling continued to 6,468 feet where the potential production tested 622 barrels per day. Early in 1937 the No. 2 Morrison well, in sec. 20, was completed and produced from the Viola limestone. These two wells were the only wells producing oil at the end of 1939. They produced 28,560 barrels during that year, raising the cumulative total to 95,650 barrels.

CLARK COUNTY

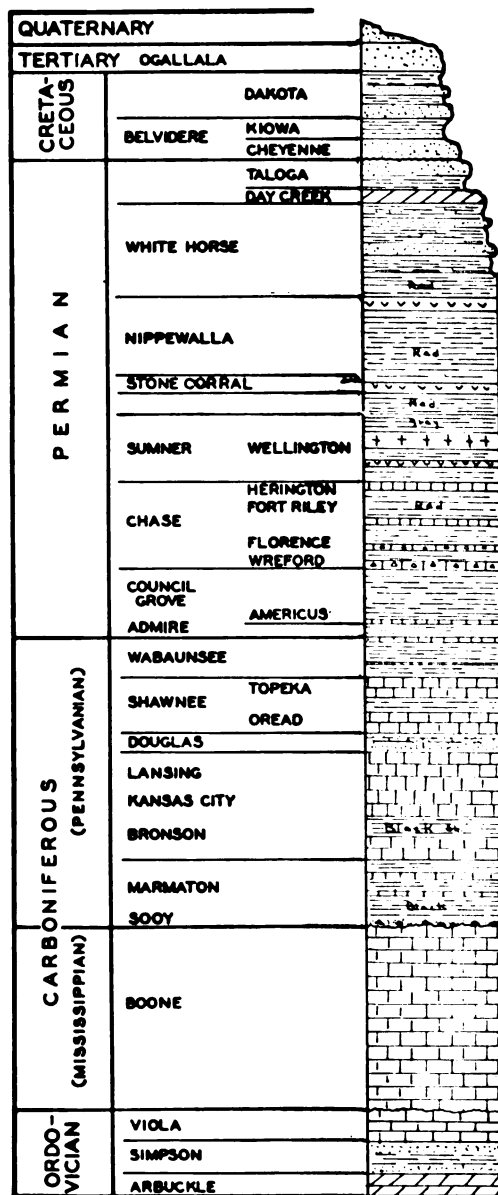


FIG. 6. Columnar section of rocks in Clark county.

ELLIS COUNTY

One of the areas of most active oil and gas development in 1939 was Ellis county. No fewer than 104 wells were completed, of which 94 were commercial producing wells. Most of the 10 dry holes were drilled around the fringes of established pools. Very few were rank wildcat wells. The distribution of oil pools in Ellis county is shown in figure 7 and a generalized section of the rocks of this county is given in figure 8.

Cress Pool.—The Cress pool lies along the west side of the northeastern township in Ellis county. It was discovered in March, 1937, and before the end of that year it included 18 wells, all producing from the Arbuckle dolomite. One year later there were 25 wells, and the pool extended into sec. 18, T. 11 S., R. 16 W., and sec. 14, T. 11 S., R. 17 W. In 1939 this pool produced 224,180 barrels of oil, bringing the total to 609,386 barrels. No additional wells were completed in this pool in 1939. This area is not now regarded as separate from the Bemis-Shutts pool.

Bemis Pool.—In the next township west, T. 11 S., R. 17 W., there are two pools, the Bemis and the Hadley pools. The Bemis pool is the largest in the county, underlying approximately 3,200 acres and including a total of 218 wells. During the year, 56 of the 104 wells drilled in the county were drilled in this field. Oil is produced from a porous zone in the Arbuckle dolomite at a depth of approximately 3,400 feet.

The discovery of oil in the Margay and Lario No. 1 Bemis well, in sec. 33, T. 11 S., R. 17 W., suggested that the Bemis and Shutts pools were parts of one common reservoir. Therefore, the Nomenclature Committee combined them in September. At the same time the committee also decided that no structural barrier existed between the Bemis and the Cress pools, and therefore merged these two also. The producing area now called the Bemis-Shutts pool, therefore, extends from the northwestern portion of T. 11 S., R. 16 W., southwestward through T. 11 S., R. 17 W., to the northwestern part of T. 12 S., R. 17 W. The hyphenated name is used to perpetuate the name of the pool (Shutts) where the first Arbuckle dolomite production was found in western Kansas, and also to perpetuate the name of the largest original pool in the county.

Burnett Pool.—In T. 11 S., R. 18 W., there are six pools—the Burnett, Burnett South, Haller, Marshall, Peavey, and Richard pools. The discovery well of the Burnett pool was drilled in sec-

Oil Pools of Ellis County

POOL AND LOCATION.	Area, acres.	Cumulative production to end of 1939, bbls.	Number wells.	Producing zone.	Depth in feet.
Bemis-Shutts, 16-11-17W.....	5,200	7,841,663	296	Topeka..... Arbuckle....	3,032 3,380
Bemis South, 2-12-17W.....	40	8,775	1	Arbuckle....	3,592
Blue Hill, 14-12-16W.....	640	81,569	1	Topeka.....	3,072
			4	Lans.-K. C.	3,360
			1	Arbuckle....	3,391
			1	"Wilcox"....	
Burnett, 1-11-18W.....	2,000	325,621	1	Lans.-K. C.	3,093
			63	Arbuckle....	3,570
Burnett South (a).					
Catherine, 3-13-17W.....	160	93,877	3	Lans.-K. C.	3,262
Cross (c), 12-11-17W.....	600	609,386	25	Arbuckle....	3,293
Emmeram, 4-13-16W.....	40	28,591	1	Lans.-K. C.	3,260
Hadley, 20-11-17W.....	40		1	Lans.-K. C.	3,428
Haller, 10-11-18W.....	40	11,887	1	Topeka.....	3,036
Koblitz, 23-12-18W.....	100	2,608	3	Arbuckle....	3,694
Kraus, 22-14-19W.....	100	45,811	2	Sooy.....	3,735
Madden, 26-15-18W.....				Lans.-K. C.	3,331
				Arbuckle....	3,600
Marshall, 26-11-18W.....	1,000	359,579	14	Arbuckle....	3,638
Peavey (b).					
Penny Wann, 13-15-20W.....	40	19,083	1	Sooy.....	3,653
Richards, 5-11-18W.....	120	52,375	2	Lans.-K. C.	3,332
Ruder, 17-15-18W.....	700	506,473	14	Lans.-K. C.	3,422
				Arbuckle....	3,572
Shutts (c).					
Solomon, 28-11-19W.....	160	30,401	3	Arbuckle....	3,629
Toulon, 3-14-17W.....	200	115,376	5	Lans.-K. C.	3,298
				Arbuckle....	3,512
Ubert, 12-13-18W.....	160	98,103	4	Arbuckle....	3,707
Victoria (abandoned).					
Walters, 2-12-18W.....	1,200	638,329	1	Topeka.....	3,160
			31	Arbuckle....	3,619

a. Joined to Burnett in May, 1939.

b. Joined to Burnett in June, 1939.

c. Joined to Bemis in September, 1939.

tion 1, in September, 1937, and produced oil from the Arbuckle dolomite. The Burnett South pool lies about one mile south of the original pool, and was merged with it in 1939 because both derive their oil from the Arbuckle dolomite. The discovery well was the Duwe and Farris No. 1 Hadley in sec. 12, T. 11 S., R. 18 W., which

had an initial potential production of 1,266 barrels per day. The Arbuckle dolomite was found in this well at a depth of 3,329 feet, and at 3,330 feet oil came into the hole. The well was completed at a depth of 3,333 feet.

It is interesting to note the importance of the Simpson cap rock in the Burnett pool. Although somewhat irregular in thickness and composition, it seems to be present over the whole extent of the pool. In many wells there is 5 to 10 feet of dolomite, underlain by a similar thickness of green shale, which in turn rests upon a few feet of sandstone. In most places the basal sandstone is tightly cemented and pyritic, so that the drilling time changes abruptly when the bit passes into the Arbuckle dolomite below the unconformity. The soft porous character of the Arbuckle dolomite, and its distinctly cherty composition bespeak long erosion before the Simpson formation was deposited.

At the end of 1939 the enlarged Burnett pool, including the original Peavey pool, had 64 wells, one of which was producing from a porous zone in the Lansing-Kansas City limestone. The cumulative production to the end of 1939 was 325,621 barrels.

Haller Pool.—The Haller pool in section 10 includes only one well, which is unique because it produces from the Topeka limestone at a depth of 3,036 feet. This one well has produced 11,887 barrels of oil.

Marshall Pool.—The Marshall pool in the southeastern part of T. 11 S., R. 18 W., was opened in November, 1936. Subsequent drilling extended the pool into the corner sections of the three adjacent townships. At the end of 1938 there were 14 wells, all producing from the Arbuckle dolomite. No additional wells were drilled in 1939.

Richards Pool.—The Richards pool, in the northwestern part of T. 11 S., R. 18 W., was discovered early in 1938. The discovery well was the Glimac Oil Company No. 1 Richards, in sec. 5, T. 11 S., R. 18 W. In this well the top of the Lansing limestone was reached at a depth of 3,251 feet, and the producing zone lies at a depth of 3,332 to 3,373 feet. No additional wells were drilled in 1939.

Peavey Pool.—When the Burnett and the Burnett South pools were combined the Peavey pool was also linked with them. Although the original well in the Peavey pool is located as far south as section 24, nevertheless the structural contours indicate that all three pools lie on a single structural feature. The well that brought

about the merger of the pools was the Dickey No. 1 Gumble well, in sec. 6, T. 11 S., R. 17 W.

Solomon Pool.—The Solomon pool, the only producing area in T. 11 S., R. 19 W., was discovered in June, 1936, and has not been extended much. Three wells were completed in rapid succession, but none were added in 1939. The gravity of the oil is exceptionally low—21° A. P. I.

Bluehill Pool.—In T. 12 S., R. 16 W., there are two oil-producing areas, the Bluehill pool and the north end of the Fairport pool. The Bluehill pool was opened late in 1937 by the J. J. Hall No. 1 Billings well, in sec. 14, T. 12 S., R. 16 W. Oil was produced from the Arbuckle dolomite at a depth of 3,358 to 3,373 feet. The same operator drilled a second well on the Oswald farm, in section 11, and obtained oil at a higher stratigraphic level, the Lansing limestone, at a depth of 3,072 feet. In 1938 one additional Lansing limestone well was completed. A third producing zone, the Simpson sandstone, was found, and because this formation had not previously produced oil in the county, the well occasioned considerable comment. The successful well, drilled by C. B. Davis on the Oswald lease in section 8, flowed at the rate of 225 barrels per day from a depth of 3,391 to 3,391½ feet. In 1939 two additional Lansing-Kansas City limestone wells were completed. One new well found oil in a fourth producing zone, the Topeka limestone. In March, J. J. Hall drilled a twin well to his No. 4 "B" Oswald well, but numbered it the No. 12 "B" Oswald. In this well oil was obtained from a porous zone in the Topeka limestone at the top of the Shawnee formation at a depth of 3,030 feet. It will be recalled that this same formation also produced the first oil in the now famous Bemis pool.

Koblitz Pool.—The Koblitz and Waters pools lie in T. 12 S., R. 18 W. The Koblitz pool was discovered in December, 1936, but the well was not completed until May, 1937. Oil was found in the Arbuckle dolomite at a depth of 3,694 to 3,698 feet. One additional well was completed in 1938, and a third in 1939.

Walters Pool.—The Walters pool, in section 2, was opened in May, 1936, by the successful completion of a well in the Topeka limestone at a depth of 3,165 feet. In February, 1937, a second producing zone was found, in the Arbuckle dolomite at a depth of 3,619 feet. Before the end of 1937 an additional 18 wells had been completed in the Arbuckle dolomite. During the next two years 13 more were added, making a total of 31 in this zone. This oc-

currence of oil in the Topeka limestone and in the Arbuckle dolomite brings to mind the history of the Bemis pool, in which the first oil was produced from the upper zone. Although oil in the upper zone proved to be of sporadic distribution in both fields, it nevertheless indicates a peculiar relationship to the origin and migration of oil. The only other pool in the county that has produced from the Topeka limestone in commercial quantities is the Haller pool.

Emmeram Pool.—The Emmeram pool, in T. 13 S., R. 16 W., is still a one-well pool. The well was completed in June, 1937, and has produced 28,591 barrels of oil.

Catherine Pool.—The Catherine pool lies in the next township west of the Emmeram field, about 6 miles distant. It was discovered in 1936 and included four wells at the end of 1937. None were added in 1939.

Ubert Pool.—The Ubert pool lies about 5 miles farther west, in sec. 12, T. 13 S., R. 18 W. It was opened late in 1936, by the Bridgeport Oil Well Supply Company well on the Ubert farm. Oil was found in the Arbuckle dolomite at a depth of 3,630 to 3,637 feet, the initial potential production being 420 barrels per day. The pool now includes four wells, two of which were completed in 1938.

Toulon Pool.—The Victoria pool, in sec. 18, T. 14 S., R. 16 W., was abandoned in 1938. Another pool, originally called the Victoria, lies 4 miles northwest, in sec. 3, T. 14 S., R. 17 W. The name of this pool was later changed to Toulon. Three wells were completed in the Toulon pool before the end of 1937. Oil is obtained from the Lansing limestone and from the Arbuckle dolomite. In 1938 two additional producing wells were drilled. No wells were drilled in the Toulon pool in 1939.

Kraus Pool.—No new developments took place in the Kraus pool, in sec. 22, T. 14 S., R. 19 W. Two wells producing from the Pennsylvanian "basal conglomerate" (Sooy formation) have yielded a total of 45,811 barrels since July, 1936.

Madden, Ruder, and Penny Wann Pools.—In the southern tier of townships of Ellis county there are three pools, the Madden, Ruder, and Penny Wann. The first two produce from the Lansing limestone and the Arbuckle dolomite. The third, which lies in an area where the Arbuckle dolomite is missing, produces from the Sooy conglomerate. The Madden pool was discovered in June 1936, the

discovery well having been drilled on the Madden estate by the Bridgeport Oil Well Supply Company. No producing wells were added to the two original wells in 1939. The Ruder pool was opened in August, 1935, when Palmer completed the first Lansing limestone well in sec. 17, T. 15 S., R. 18 W. Before the end of 1937 a total of 17 wells had been drilled in the pool and none have been added since. This pool produced a total of 566,473 barrels to the end of

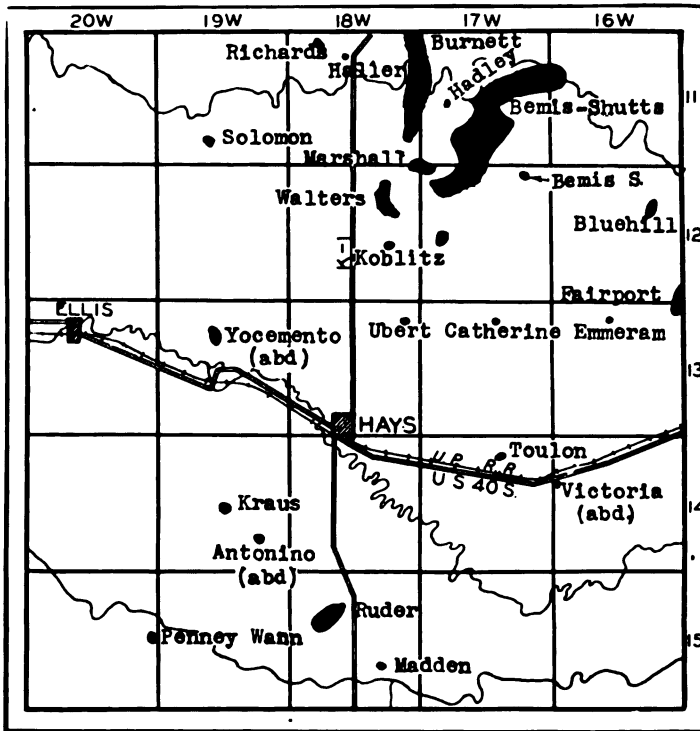


FIG. 7. Map of Ellis county.

1939. The Penny Wann is still a one-well pool, although it was discovered in September, 1936.

Exploratory Drilling.—Among the dry holes drilled in Ellis county three deserve special mention because they were drilled far from proven areas. One of these was a test well in sec. 36, T. 13 S., R. 16 W., drilled by Nelson on the Novak ranch. In this well the Topeka limestone was reached at a depth of 2,821 feet, the Lansing limestone at 3,085 feet, the Sooy conglomerate at 3,341 feet, and the Arbuckle dolomite at 3,415 feet. The test was abandoned at 3,420 feet.

ELLIS COUNTY

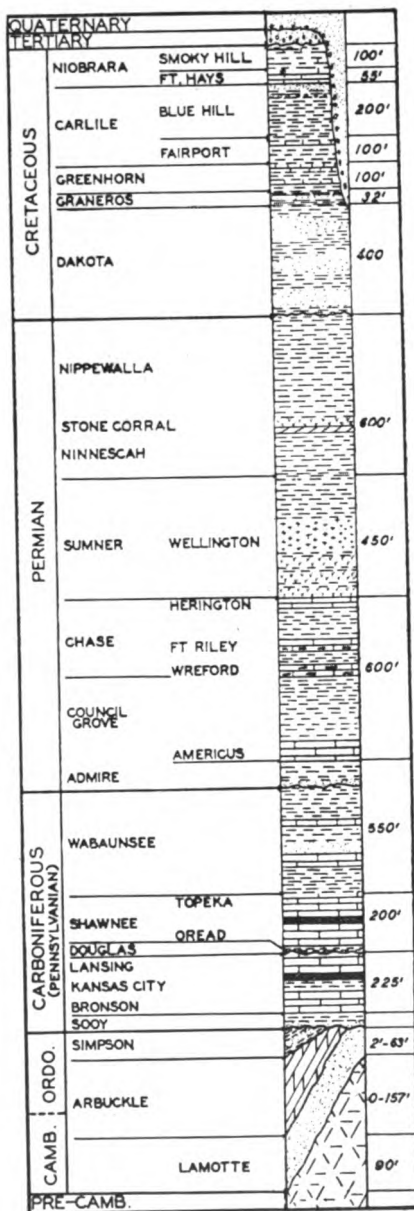


FIG. 8. Columnar section of rocks in Ellis county.

The second well was drilled by Carlock et al., on the Philip ranch in sec. 10, T. 15 S., R. 17 W. In this well the Lansing limestone was reached at a depth of 3,208 feet, the Sooy conglomerate at 3,445 feet, and the Arbuckle dolomite at 3,475 feet. The Arbuckle dolomite was penetrated a distance of 45 feet before the well was abandoned. The third well was drilled by the Republic Oil and Gas Company in sec. 24, T. 15 S., R. 20 W., on the Moran ranch. This well reached the Topeka limestone at a depth of 3,105 feet, the Lansing limestone at 3,385 feet, the Marmaton shale at 3,637 feet, and the Sooy conglomerate at 3,676 feet. The Sooy conglomerate was 54 feet thick and rested upon the Reagan sandstone, as is common in this part of the county. The top of the Reagan sandstone was reached at a depth of 3,728 feet, and the well was abandoned at a total depth of 3,764 feet.

ELLSWORTH COUNTY

In 1939 there were 37 wells completed in Ellsworth county. Most of these were drilled within or near old pools, so that 32 were successful in finding oil and only 5 were dry holes. No new pools were found, and because of the merger of the Schroeder and Wilkins pools the number of pools was decreased to six. Inasmuch as the geological features of Ellsworth county were fully described in Mineral Resources Circular 10, the following paragraphs will be devoted to a brief summary of developments during 1939. A map showing distribution of oil-productive areas in Ellsworth county is given in figure 9.

Breford Pool.—The Breford pool, in sec. 7, T. 17 S., R. 10 W., was discovered in September, 1932. The first well produced oil from the Arbuckle dolomite at a depth of 3,269 feet. Eventually 14 wells were completed in this zone, but 8 of these were abandoned or plugged back to the Lansing limestone in 1938. The first well to produce from the Lansing limestone was drilled in 1937, and produced oil at a depth of 3,140 feet. At the end of 1939 there were 11 wells producing from this zone.

Heiken Pool.—The Heiken pool is the oldest pool in Ellsworth county, having been discovered in June, 1930. The first well was drilled by Slick, Pryor, and Lockhart in sec. 25, T. 17 S., R. 10 W. Although a large amount of gas was found in the Topeka limestone and also in the Lansing limestone, the well was drilled to the Arbuckle dolomite where oil came into the hole at a depth of 3,222 to 3,243 feet. The production was not large and therefore drilling

activity was retarded. By the end of 1937, however, 11 wells had been drilled, of which 5 were commercially productive. None were added in 1938, but one additional well was drilled in 1939. At present five wells are producing oil. In an attempt to extend the pool southwestward the Central Petroleum Company drilled a test well in section 27. It entered the Lansing limestone at a depth of 2,987 feet and the Arbuckle dolomite at 3,321 feet, but did not produce a commercial quantity of oil.

Lorraine Pool.—The last pool to be discovered prior to 1938 was the Lorraine pool. Between November, 1934, and the end of 1938 nearly 100 oil wells were completed within the area of this pool. No new wells were added in 1938, but eight wells were abandoned and one was plugged back from the Arbuckle dolomite, which is the main producing zone, to the Lansing limestone. In 1939 another well was abandoned and 20 others were plugged back to the Lansing-Kansas City zone. The Texas Company No. 4 Dees well was deepened 900 feet to a depth of 4,100 feet and was converted into a water-disposal well. No doubt many of the remaining wells in the pool will be plugged back to the Lansing limestone during the coming year, because of the persistent encroachment of water in the lower zone.

Schroeder Pool.—The Schroeder pool was discovered by the Cities Service Oil Company on January 27, 1938. Oil was found in the Arbuckle dolomite at a depth of 3,231 to 3,237 feet, in a porous zone 26 feet below the top of the formation. Although the initial production of the first well was large, the well was acidized, and the potential production gauged 2,645 barrels. Gravity of the oil was

Oil Pools of Ellsworth County

POOL AND LOCATION.	Area, acres.	Cumulative production to end of 1939, bbls.	Number wells.	Producing zone.	Depth in feet.
Preford, 7-17-10W.....	700	918,312	11 6	Lans.-K. C. Arbuckle...	3,140 3,368
Heiken, 25-17-10W.....	320	324,446	5	Arbuckle...	3,269
Lorraine, 13-17-9W.....	5,500	7,290,204	22 66	Lans.-K. C. Arbuckle...	3,060 3,200
Schroeder (a). Stoltenberg, 21-16-10W.....	800	2,249,169	22	Arbuckle...	3,333
Stratman, 1-17-10W.....	600	1,924,125	17	Arbuckle...	3,255
Wilkins, 13-17-10W.....	800	367,807	19	Arbuckle...	3,260

a. Joined to Wilkins in May, 1939.

39° A. P. I. A very thin remnant of the Simpson formation (5 feet thick) was penetrated between the overlying Sooy conglomerate, which is 15 feet thick, and the underlying Arbuckle dolomite. The Lansing limestone was entered at a depth of 2,865 feet. During the year other producing wells were completed in rapid succession around the first well. By the end of the year nine wells in the pool had potential production of 17,000 barrels per day.

In 1939 the Central Petroleum Company No. 1 Frances well, in sec. 19, T. 17 S., R. 9 W., was completed in the Arbuckle limestone. Its potential production was 490 barrels per day. Inasmuch as the well was located almost half way between the Schroeder and Wilkins pools and as no structural barrier is present, the Nomenclature Committee decided to combine the two pools. The newly defined Wilkins pool includes all the producing area in sec. 18, 19, 20, 29, and 30 of T. 17 S., R. 9 W., and sec. 13, T. 17 S., R. 10 W.

Stoltenberg Pool.—In the Stoltenberg pool 4 additional wells were drilled in 1939, raising the total number of wells to 22. In this pool the Arbuckle dolomite produces oil at a depth of 3,330 feet. One of the new wells, the Atlantic Refining Company No. 1 Loula, in the SE $\frac{1}{4}$ sec. 28, extended the pool 0.75 mile southwestward. In this well the Arbuckle dolomite was reached at a depth of 3,282 feet. A second well, the Duwe and Farris No. 1 Boye, in the SW $\frac{1}{4}$ sec. 9, extended the pool 0.5 mile northward. As a result of these rather important extensions the Stoltenberg area will doubtless witness an energetic revival of drilling during 1940.

Stratman Pool.—The Stratman pool lies about 1 mile north of the Wilkins pool. The discovery well was drilled in 1931 by J. A. Aylward on the Stratman farm, in sec. 12, T. 17 S., R. 10 W. In this well the Arbuckle dolomite was reached at a depth of 3,255 feet and drilling proceeded to a depth of 3,271 feet, where the initial flow of oil amounted to 10,991 barrels per day. This large production stimulated drilling so that 26 test wells were completed, of which 17 produced oil. In 1938 no wells were added, but in 1939 one additional producing well was completed. This field had produced a total of 1,924,125 barrels of oil to the end of 1939.

Wilkins Pool. The Wilkins pool, which was opened in April, 1934, had four wells producing from the Arbuckle dolomite at the end of 1938. Smith and Ash No. 1 Wilkins, in sec. 13, T. 17 S., R. 10 W., completed in December, 1938, extended this field, and in 1939 it was linked with the younger Schroeder pool by the successful completion

of the Central Petroleum Company No. 1 Frances well. The combined pools had 19 wells at the end of the year.

Bloomer Pool.—Some of the most prolific wells drilled in Ellsworth county are located in the southwestern corner where it adjoins Barton and Rice counties. Originally there were two separate pools in this part of the county, the Habiger pool and the Stumps pool. The Habiger pool has now been combined with the Bloomer pool, which is described under Barton county. In 1939 an important

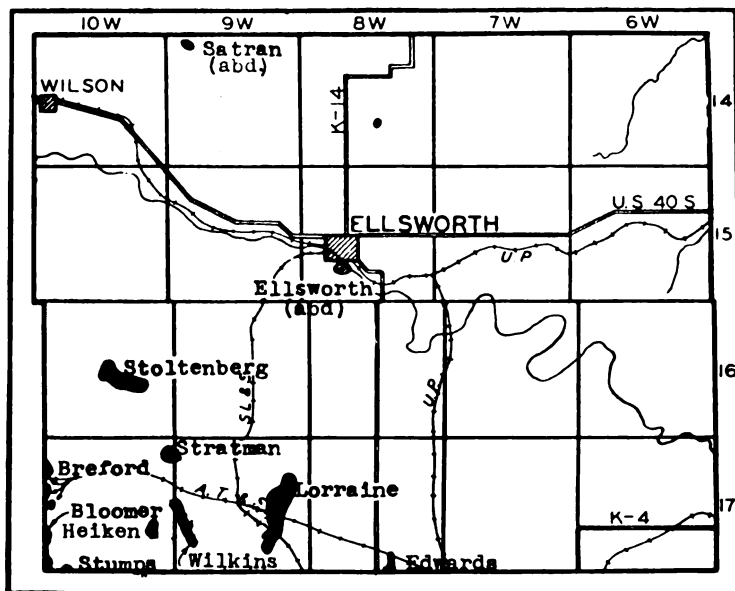


FIG. 9. Map of Ellsworth county.

extension well was drilled in sec. 29, T. 17 S., R. 10 W., by the Gulf Oil Corporation. This outpost well entered saturated Arbuckle dolomite at a depth of 3,254 feet. Doubtless the pool will be extended farther into Ellsworth county during 1940.

Edwards Pool.—Another pool that was discovered in a different county but that has been extended into Ellsworth county is the Edwards pool. (See Rice county.) Of the 54 wells in the Edwards pool, 28 are located in Ellsworth county. Important extensions to the northwest in 1939 indicate that considerable new producing territory will be discovered in that part of the county.

Exploratory Wells.—Wildcat drilling was at a low ebb in Ellsworth county during 1939. Of the six dry holes recorded for the

year all were fairly close to producing areas. One test well, northeast of the Breford pool, the Ewers-Simpson Drilling Company No. 1 Zajic, in sec. 31, T. 16 S., R. 10 W., reached the Lansing limestone at a depth of 2,676 feet, and the Arbuckle dolomite at 3,348 feet, and the total depth was 3,376 feet. The well drilled by the Central Petroleum Company southwest of the Heiken pool has been mentioned. An interesting test well was drilled by Bartlett and Crum west of the Lorraine pool in sec. 21, T. 17 S., R. 9 W. It reached the Lansing limestone at a depth of 2,859 feet and the Sooy conglomerate at 3,187 feet, but was dry in the Arbuckle dolomite. One dry hole was drilled on the edge of each of the following pools: Stratman, Wilkins, and Edwards.

FINNEY COUNTY

Discussion of oil and gas developments in Finney county to the end of 1937 and description of the general geology were included in Mineral Resources Circular 10. Reference was made to the Holcomb gas field, which was discovered in this county in December, 1932. Subsequent drilling of four additional wells brought the total number to five, two of which are in Kearny county. In 1938 these wells were incorporated in the Hugoton gas field of southwestern Kansas.

A map showing distribution of oil and gas production in Finney county is given in figure 10.

Nunn Pool.—The first oil pool in Finney county was discovered in 1938 by the Atlantic Refining Company. A wildcat well on the Eva Nunn ranch, in sec. 27, T. 21 S., R. 34 W., found oil in a porous zone of the "Mississippi lime", the top of which was reached at a depth of 4,616 feet. The producing zone lay at a depth of 4,654 to 4,658 feet. On an official production test this well was rated as being capable of yielding 600 barrels per day. The well was deepened later in the year to a depth of 4,718 feet, but did not find additional producing zones. In this well the Greenhorn chalk, of Cretaceous age, was reached at a depth of 422 feet, the Dakota sandstone at 560 feet, the top of the Cimarron redbeds at 1,030 feet, and the Day Creek dolomite, which is 10 feet thick here, at 1,070 feet. The Blaine gypsum and dolomite was reached at a depth of 1,345 to 1,520 feet, and the Stone Corral formation, consisting of similar materials, at 2,040 feet. The salt in the Wellington formation was reached at a depth of 2,110 feet to 2,390 feet and the Herington limestone at 2,495 feet. The Pennsylvanian Topeka limestone was

reached at a depth of 3,560 feet, Douglas shale at 3,890 feet, Lansing limestone at 3,905 feet, and Marmaton shale at 4,480 feet. A shale correlated with the Cherokee shale was found at a depth of 4,580 feet and the top of the Mississippian limestone was reached at 4,616 feet. The Permian redbeds were subdivided by George Norton, who classifies beds between 1,090 and 1,345 feet as the Whitehorse formation, those between 1,520 and 1,610 feet as the Flowerpot formation,

Oil Pools of Finney County

POOL AND LOCATION.	Area, acres.	Cumulative production to end of 1939, bbls.	Number wells.	Producing zone.	Depth in feet.
Nunn, 27-21-34W.....	800	53,105	2	Mississippian	4,654

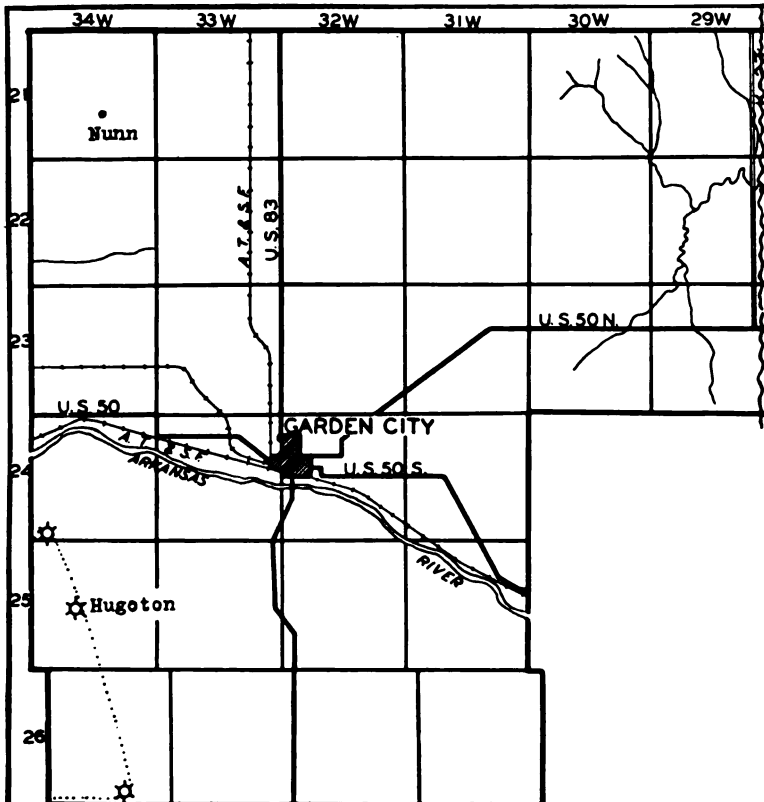


FIG. 10. Map of Finney county.

and those between 1,610 and 1,650 feet as the Cedar Hills formation. The large well-rounded sand grains of the Cedar Hills formation, which have a pale amber-colored tint, are very characteristic, and may be used to make closer correlation of that part of the Cimarron group. The section from the Herington limestone to the Americus limestone, of Permian age, is very sandy, and contains much red rock. The Lansing-Kansas City-Bronson zone consists of limestone and black shale beds to a depth of 4,480 feet, below which thin limestones and shales predominate to 4,580 feet. The Mississippian limestone is sandy and oölitic near the top. There is also a second sandy zone at a depth of 4,655 to 4,664 feet. One additional well was drilled in the Nunn pool in 1939. The initial production of this well was 1,724 barrels after acidization. It was drilled on the Gobelman ranch in sec. 34, T. 21 S., R. 34 W., by the Atlantic Refining Company.

The gas wells of Finney county are prorated with those of the rest of the Hugoton area. The Brown well, in sec. 16, T. 25 S., R. 34 W., which had an open-flow capacity of 4,186,000 cubic feet per day and a pressure of 431 pounds, had an allowable flow (at the beginning of 1939) of 13,343,000 cubic feet for the month. The gas is taken by the Northern Natural Gas Company. The Hamlin well, in sec. 31, T. 24 S., R. 34 W., which had an open-flow capacity of 13,024,000 cubic feet per day and a pressure of 421 pounds, had an allowable of 16,191,000 cubic feet for the month of January. The gas is bought by the Tri-County Gas Company. The Jones well, in sec. 34, T. 26 S., R. 34 W., owned by Helmerick and Payne, is not connected with a pipe-line outlet. It has an open-flow capacity of 8,450,000 cubic feet per day and a pressure of 440 pounds.

GRAHAM COUNTY

In 1938 Graham county was added to the list of Kansas counties producing oil. In April the Continental Oil Company No. 1 Morel well, in sec. 15, T. 9 S., R. 21 W., was completed and had an initial production exceeding 2,100 barrels. Oil was found in a porous zone of the Arbuckle dolomite at a depth of 3,718 to 3,720 feet.

GEOLOGY

The surface rocks of Graham county are of Tertiary and Cretaceous age. The Ogallala formation, which consists of gravel and sand, once covered the whole county. It bears evidence of having originated in the Rocky Mountain Front of central Colorado when that part of the continent was being uplifted during early Tertiary

time. During Pleistocene time this blanket of thin Tertiary material was cut through by Solomon river, which flows eastward through the central portion of the county. Saline river, which flows eastward along the south border of the county, also cuts through the Tertiary rocks to bare the underlying Cretaceous.

Cretaceous Rocks.—Of the Cretaceous rocks, only the Niobrara group is exposed on the surface. It consists of calcareous and chalky shale and thin chalk beds. The lower 50 feet is so massive that it is defined as a separate member, the Fort Hays limestone. The top of the Fort Hays member is used as a marker for subsurface correlation. It lies at depths ranging from 430 feet in T. 8 S., R. 24 W., to 614 feet in T. 6 S., R. 23 W. Beneath the Fort Hays limestone lies a sandstone, named the Codell by Rubey and Bass, which is the uppermost member of the Carlile shale, a soft bluish-gray clay shale. The thickness of the Carlile shale is about 260 feet in Graham county. A second limestone or chalk layer of considerable prominence lies at depths ranging from 750 to 950 feet. This is the Greenhorn limestone. It is underlain by a dark bituminous shale that locally appears almost black. This is the Graneros shale.

At depths ranging from 900 to 1,100 feet the Dakota sandstone is reached. It consists of somewhat large, angular grains of transparent quartz. Shale beds of various colors occupy certain zones. Some lignite has also been reported. The most characteristic material in the sand is pellets of siderite, which appear as small rounded concretionary masses. The thickness of the Dakota sandstone ranges from 100 feet in the western part of the county to 500 feet in the eastern part.

Jurassic (?) rocks.—In Graham county some thin layers of a very unctuous green shale underlie the Dakota sandstone. These are usually correlated with the Jurassic rocks of Colorado. In some wells a small amount of sandstone has been found in the Jurassic part of the section penetrated, and this may be called the Sundance sandstone. The opalescent chert that is so common in the Jurassic of western Kansas is not prominent in Graham county.

Permian rocks.—The Permian rocks of Graham county are approximately 1,500 feet thick and usually are divided into the Cimarron, the Wellington, and the Big Blue divisions. Revised classification of the Permian rocks of Kansas by R. C. Moore recognizes the series divisions that are based on the western Texas section and introduces the names Guadalupe, Leonard, and Wolfcamp (in downward order) instead of Cimarron and Big Blue series. The upper-

most portion of the Permian section consists of red silts, red clays, and some thin sandstones. The sandstone beds are characteristically pale wine-colored and the grains are well rounded. A prominent marker near the base of the red beds, called the Stone Corral (or "Cimarron") anhydrite, is composed of anhydrite and dolomite. It lies at depths ranging from 1,800 to 2,100 feet and is 40 feet thick. The thickness of the red beds is 600 to 820 feet.

The Wellington shale is mainly distinguished by the sombre gray or a very faint green color of the sediments. In Graham county the thickness of the gray-green Wellington shale and thin gypsum beds is 140 to 250 feet. The Hollenberg limestone and Pearl shale, recognized in some outcrops, are here included with the Wellington shale of subsurface classification.

One of the most remarkable stratigraphic units in Kansas is the sequence of thin limestone and shale strata that occupy the lower portion of Cragin's Big Blue group. A peculiar pale cream-colored, slightly granular dolomitic limestone lies at the top, and this can almost invariably be identified in well cuttings. This is the Herington limestone. Some translucent masses of gypsum are commonly imbedded in it, and these produce a speckled appearance. Other limestones of the group, named in downward succession, Winfield, Fort Riley, Florence, Wreford, Cottonwood, Neva, and Americus, have distinctive characteristics that generally permit determination with some precision. In Graham county the beds between the top of the Herington limestone and the base of the Americus limestone have a thickness of 650 to 670 feet. Strata of the Admire group, estimated to have a thickness of 25 to 50 feet in this region, are assigned to the lower part of the Permian system, but the boundary at the top of the Carboniferous system is not clearly determinable in wells.

Pennsylvanian Rocks.—Below the Admire group there are shales, thin limestones, and several sandstones, the total thickness of which is about 115 to 150 feet. These are referred to the Wabaunsee group, of Pennsylvanian age. The underlying beds, consisting principally of limestone, comprise the Shawnee group, including the Topeka limestone at the top and the Oread limestone at the base; this group is 350 to 400 feet thick in Graham county. Red and green shale of the Douglas group, here less than 50 feet thick, underlies the Oread limestone and constitutes the basal division of the Virgil series. The underlying Lansing-Kansas City-Bronson limestones, which represent the Missouri series (upper middle Pennsylvanian), are dis-

tinguished by the oölitic nature of several zones and the occurrence of cherts and black shales; the thickness ranges from 200 to 300 feet. Shale and thin limestone beds of the Marmaton group, with which are doubtless included some Bourbon (lowermost Missouri) beds, represent the Des Moines series, and in this area comprise the basal part of the Pennsylvanian subsystem. A prominent cherty limestone about 25 feet thick is correlated with the Fort Scott limestone of eastern Kansas. The basal sediments of the Pennsylvanian rocks include a mixture of materials derived by erosion from the older formations. This deposit, which has commonly been called "Pennsylvanian basal conglomerate" by subsurface workers, is here designated the Sooy formation, from its occurrence in characteristic form in the Sooy oil well of Barton county, in sec. 27, T. 18 S., R. 12 W. Samples from many wells show its lithologic character and stratigraphic relationship. The Sooy conglomerate of Graham county contains red clay, yellow clay, green clay, chert fragments of various colors, and rare sand grains.

It lies directly and unconformably upon the much older Ordovician strata. Elsewhere, various intervening formations of Mississippian, Devonian, and Silurian age underlie the Sooy deposits, and in some places pre-Ordovician rocks underlie it.

Ordovician Rocks.—In most places in Graham county a thin layer of greenish shales and thin sandstones, belonging to the Simpson formation, constitutes the top of the Ordovician section. The thickness of Simpson beds ranges from a feather edge to 30 feet. The formation rests upon the eroded top of the dolomitic limestones of the Arbuckle group. In one well, in sec. 3, T. 8 S., R. 34 W., the Arbuckle dolomites were penetrated completely and found to have a thickness of only 38 feet. The Lamotte sandstone (for which the Oklahoma name, Reagan, has been used also) lies beneath the Arbuckle dolomite.

DRILLING ACTIVITY

In 1938 four wells were completed in Graham county. One of these opened a new pool, which was named the Morel pool, from the ranch on which the first well was drilled. The description of this well was given in the first paragraph of this chapter. The Continental Oil Company No. 1 Putnam Investment well, in sec. 3, T. 9 S., R. 21 W., was a failure, although the Arbuckle dolomite was found at a depth of 3,681 feet. In 1939, however, four wells were successful in discovering important oil reserves. One of these is located in sec. 10; one in sec. 15; one in sec. 16; and one in sec. 23.

A dry hole in sec. 16, the No. 1 Kolste well, was drilled to a depth about 600 feet below the top of the Arbuckle dolomite and was completed as a salt-water disposal well. This well encountered a sink hole in the Arbuckle dolomite. The Pennsylvanian basal conglomerate was 147 feet thick, so the top of the Arbuckle dolomite was not found until drilling had reached a depth of 3,874 feet. The Reagan sandstone was reached at a depth of 4,130 feet. It was 40 feet thick and rested on the pre-Cambrian rocks at a depth of 4,170 feet.

Oil Pools of Graham County

POOL AND LOCATION.	Area, acres.	Cumulative production to end of 1939, bbls.	Number wells.	Producing zone.	Depth in feet.
Morel, 15-9-21W.....	1,200	18,352	5	Arbuckle...	3,718

GRANT COUNTY

Grant county lies in the southwestern part of Kansas. At the end of 1937 it had seven gas-producing areas, as well as five additional wells scattered over an area of eight townships (figure 11). Inasmuch as all these wells produce from the same strata as those of the

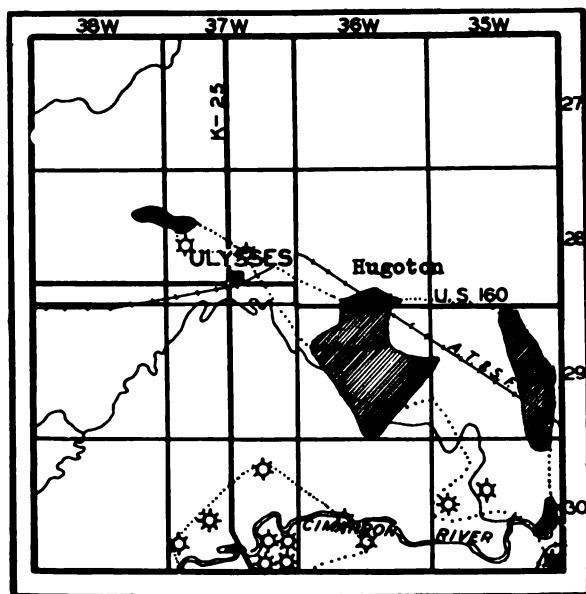


FIG. 11. Map of Grant county.

Hugoton district, they have been regarded as belonging to the Hugoton gas field. The chapter on Stevens county describes the geology, gas-producing zones, and production for the whole field. Therefore, only a few data regarding the drilling activity in Grant county during 1939 are given here.

Four gas wells were drilled in the county in 1939. Two of them are located on leases owned and operated by the Panhandle Eastern Pipe Line Company and two on leases of the Columbian Fuel Corporation. All were very productive, the smallest producing 2,500,000 and the largest almost 40,000,000 cubic feet per day. This last is the largest gas well ever completed within the confines of the large Hugoton area. In this well the producing zone was found at a depth of 2,610 feet, where 10,000,000 cubic feet of gas entered the hole. After acidization the well produced at the rate of 39,500,000 cubic feet per day. This record-breaking well is the Panhandle Eastern Pipe Line Company No. 1 Parsons, in sec. 34, T. 30 S., R. 37 W.

HARVEY COUNTY

Oil was first discovered in Harvey county in T. 23 S., R. 2 E., in the eastern part of the county. The Walton pool, as it came to be called, was defined by 18 wells. This pool was finally abandoned in 1937, after producing a total of 123,000 barrels. The next discovery came 3½ years later, when the Friesen gas well was completed in July, 1927. About two years later gas was discovered in the Halstead pool, in the north-central part of the county. Although the gas accumulation proved to be small, later drilling revealed an important reserve of oil in the Mississippian "chat" at a depth of 2,972 feet. At the end of 1939, this pool included a total of 20 wells, and the production had reached a total of 1,044,186 barrels. The distribution of oil and gas pools in Harvey county is shown in figure 12.

Hollow-Nikkel Pool.—In December, 1931, a large pool was opened in the northwestern part of the county, the Hollow-Nikkel pool. No wells were added in 1939, but 12 were abandoned, so that the total number of wells is now 104. The pool produces from Pennsylvanian limestone (Lansing), Mississippian "chat", Siluro-Devonian (Hunton) limestone, Ordovician ("Wilcox") sandstone, and Arbuckle dolomite. To the end of 1939 a total of 17,755,207 barrels of oil had been taken from the pool.

Burrton Pool.—The Burrton pool, which is often regarded as the southwestern extension of the Hollow-Nikkel pool because it lies on

Oil and Gas Pools of Harvey County

POOL AND LOCATION.	Area, acres.	Cumulative production to end of 1939, bbls.	Number wells.	Producing zone.	Depth in feet.
Halstead, 36-22-2W.....	1,200	1,044,186	20	Chat.....	3,005
Hesston (a).					
Hollow-Nikkel, 30-22-3W.....	1,500	17,755,207	104	Lans.-K. C. Chat..... Hunton..... "Wilcox" Arbuckle.	2,499 3,195 3,507 3,500
Sperling, 23-22-2W.....	500	248,024	7	Hunton..... "Wilcox"....	3,279 3,447
Sperling (gas), 23-22-2W.....		65,878 M cu. ft. (b)	2	Chat.....	2,955

a. Now included with the Graber pool, McPherson county.

b. Production in 1939.

the same trend of folding, was named for the city of Burrton. In 1939 there was considerable drilling between the main part of the Burrton pool and the townsite of Burrton. The eight successful wells had a potential production ranging from 90 barrels to 1,140 barrels per day. Most of the new wells were drilled in sections 17 and 18, about one mile northwest of the townsite of Burrton, but two of them were drilled west of the town limits.

Sperling Pool.—In January, 1935, an important gas pool was discovered in sec. 23, T. 22 S., R. 2 W., which later became known as the Sperling pool. Gas was found in the Mississippian "chat" at a depth of 2,955 feet. Although the well gauged 22,000,000 cubic feet of gas per day, drilling proceeded to the Hunton limestone, where oil was found at a depth of 3,279 feet. The large potential production of 1,600 barrels caused other wells to be drilled in rapid succession. By the end of 1937 there were eight oil wells and ten gas wells in the Sperling pool. In 1939 no additional wells were drilled in this pool. Furthermore, six of the original gas wells were abandoned.

Exploratory work.—The search for new production was confined to three areas, only one of which was far removed from existing pools. A test well in sec. 7, T. 22 S., R. 1 W., was drilled by Davis on the Nickel farm along the south side of the Graber (formerly Hesston) pool. It reached the Misener sand at a depth of 3,308 feet and the Hunton limestone at 3,311 feet, and was abandoned when both proved dry. Jock Garden drilled an unsuccessful well in sec. 4, T. 23 S., R. 3 W., on the Lagree farm. It was abandoned at a depth of 3,430 feet after finding the "chat" unproductive. The

Western Kansas Oil & Refining Company drilled a rank wildcat in sec. 24, T. 23 S., R. 1 W., on the Moorehead farm southeast of the Halstead pool and northeast of the townsite of Halstead. In this well the Lansing limestone was reached at a depth of 2,315 feet and the "chat" at 2,972 feet. The total depth was 3,630 feet.

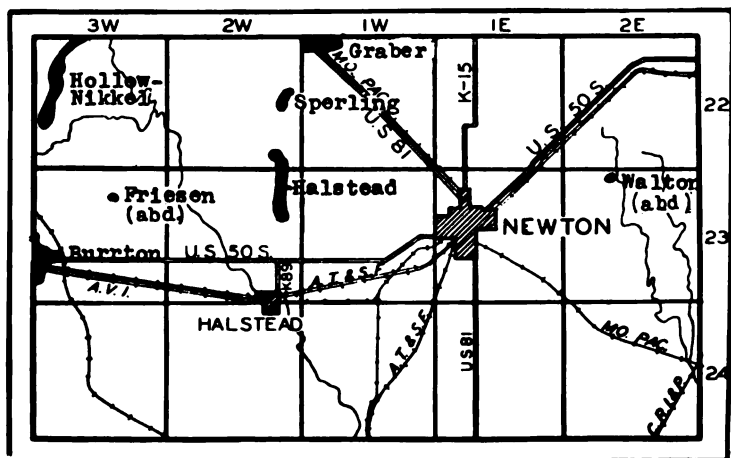


FIG. 12. Map of Harvey county.

KEARNY COUNTY

The great Hugoton gas field of southwestern Kansas extends northward into Kearny county. At the end of 1939 there were seven producing wells in the county, all of which were completed in previous years (figure 13). Gas is produced from the Wreford limestone or the Florence limestone of the Wolfcamp group of the Permian system at a depth of approximately 2,700 feet.

The gas wells in Kearny county were originally included in the Holcomb gas pool, which was described in Mineral Resources Circular 10 (p. 66).

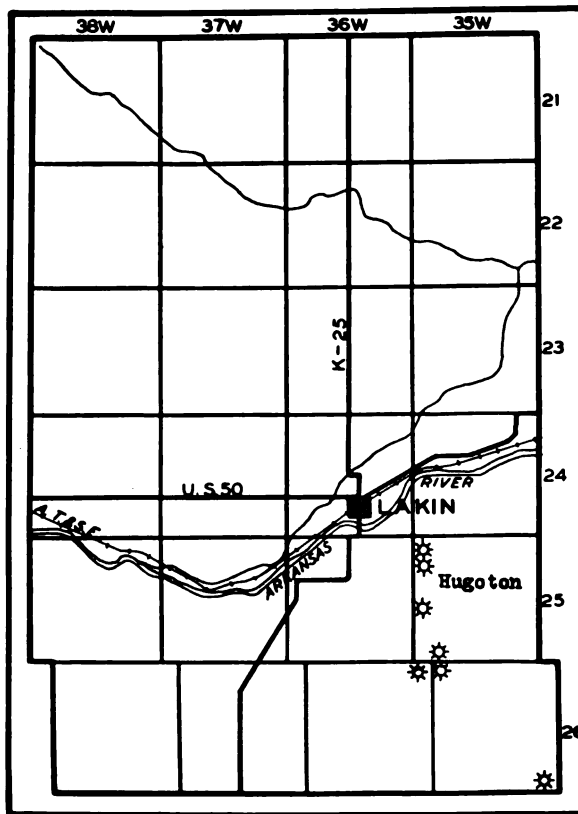


FIG. 13. Map of Kearny county.

KINGMAN COUNTY

Drilling activity in Kingman county in 1939 was at a low ebb, as indicated by the fact that only seven wells were completed. One of these was a gas well in the Cunningham pool, four were oil wells in the same pool, and the other two were dry holes. A map showing pools of Kingman county is given in figure 14.

Cunningham Pool.—The Cunningham pool, which lies in the northwestern part of the county, in T. 27 S., R. 10 W., was discovered in January, 1931. The first well in this pool was drilled by the Skelly Oil Company on the Miles farm, and 48 wells had been drilled by the end of 1938. Of this number 40 were listed at the close of the year as producing wells, 36 producing oil from the Lansing limestone and 4 producing gas from Ordovician zones. In 1939 one additional gas well was completed, the No. 1 Miller well, in sec. 31, T. 27 S., R. 10 W. It was completed in October and produced at the rate of 17,000,000 cubic feet of gas per day from the Viola (Ordovician) limestone. Successful oil wells were completed in the Lansing limestone in secs. 19, 20, and 29. Some of these also produced gas from the same zone. This pool extends into Pratt county, and a summary of the drilling in that part of the pool is included in the discussion of Pratt county. The Cunningham pool is one of the few pools in the state in which the wells flow naturally. The original bottom-hole pressure was 1,100 pounds. By the end of 1935 the pressure had declined to 424 pounds and the production totaled slightly more than 1,000,000 barrels. An expensive plant was installed to return to the producing formation the gas produced with the oil. This "repressuring" gradually raised the bottom-hole pressure and has undoubtedly prolonged the life of the pool. The amount of gas returned to the reservoir is approximately 84 percent of the total quantity produced. It has been estimated that the total recovery without "repressuring" would be 2,750,000 barrels, but that if repressuring is continued, more than 5,000,000 barrels will be produced.

Exploratory Wells.—In addition to the test wells that were successful in finding oil or gas, three dry holes were drilled. Two of these were drilled along the fringe of the Cunningham pool. The No. 1 "A" Steffen well in the NE $\frac{1}{4}$ sec. 31, reached the Viola limestone 200 feet lower than it had been found in the Miller well 0.5 mile west, suggesting the presence of a fault in this part of the field. Jock Garden drilled a shallow dry hole several miles northeast of the Cunningham pool in sec. 11, T. 27 S., R. 10 W. (See figure 20.)

Oil and Gas Pools of Kingman County

POOL AND LOCATION.	Area, acres.	Cumulative production to end of 1939, bbls.	Number wells.	Producing zone.	Depth in feet.
Cunningham, 30-27-10W.....	1,400	1,917,533	40	Lans.-K. C. Viola..... "Wilcox"..... Arbuckle....	3,390 3,925 4,055 4,094
Cunningham (gas) (a), 30-27-10W.....				Cottonwood, Wabaunsee, Viola..... Simpson.... Arbuckle....	1,993 2,475 3,922 4,003 4,109

a. Included with Cairo pool, Pratt county.

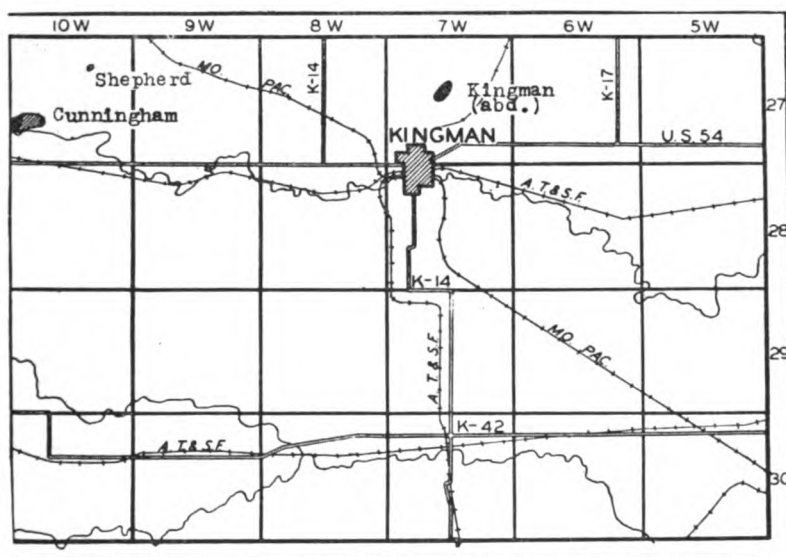


FIG. 14. Map of Kingman county.

McPHERSON COUNTY

The year 1939 proved to be eventful for McPherson county. Among the 52 wells completed there were 36 oil wells and 2 gas wells. One new oil-producing area was discovered, which was named, for a nearby pool, the Bornholdt North pool. A map of the pools in this county appears in figure 15.

McPherson Pool.—The accompanying list of pools shows 11 oil pools and 1 gas pool at the beginning of 1940. The oldest is the McPherson pool, which was discovered in September, 1926, when Merri-man, Reeves, and Shidel completed the first gas well on the Anderson

farm, in sec. 29, T. 18 S., R. 2 W. Oil was found in the same pool in July, 1928, in the Mid-Kansas Oil Company No. 1 Larson well, in section 31. Both wells produced from Mississippian rocks at depths slightly less than 3,000 feet. Subsequently some oil was produced from the Kansas City limestone and some from the Viola limestone. At the beginning of 1940 there were 29 wells deriving their production from the Mississippian "chat". The total production to that time was slightly more than 800,000 barrels.

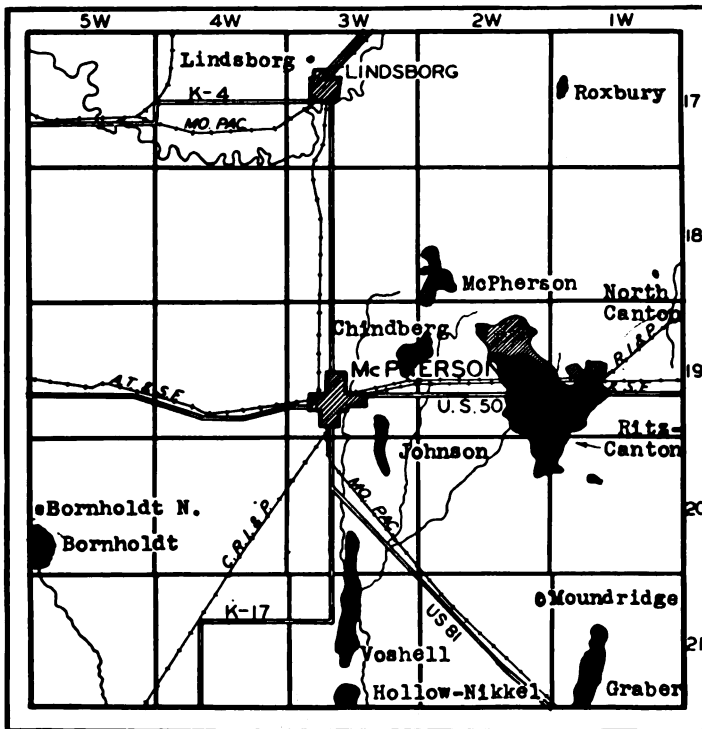


FIG. 15. Map of McPherson county.

Chindberg Pool.—The Chindberg pool lies several miles southwest of the McPherson pool. Oil has been found here in the Lansing limestone and in the Mississippian "chat". In 1939 the pool was extended southeastward by the Springrose Company No. 2 Carlson well, in sec. 24, T. 19 S., R. 3 W. A dry hole in section 25 seems to indicate that the pool is not connected with the Johnson pool.

Johnson Pool.—The Johnson pool was opened in January, 1932, by the Shell Petroleum Company No. 1 Johnson well, in sec. 35, T.

Oil and Gas Pools of McPherson County

POOL AND LOCATION.	Area, acres.	Cumulative production to end of 1939, bbls.	Number wells.	Producing zone.	Depth in feet.
Bornholdt, 30-20-5W.....	640	74,936	16	Chat.....	3,292
Bornholdt North, 18-20-5W.....	40	.....	1	Chat.....	3,304
Canton North, 26-18-1W.....	40	50,768	1	Chat.....	2,803
Chindberg, 18-19-2W.....	700	1,126,460	6 25	Lans.-K. C. Chat.....	2,363 3,007
Graber, 32-21-1W (a).....	2,800	4,191,978	3 2 121 1	Chat..... Misener..... Hunton..... "Wilcox".....	3,323 3,274 3,398
Johnson, 35-19-3W.....	1,200	2,456,565	15	Chat.....	3,032
Lindsborg, 8-17-3W.....	160	17,732	2	Viola.....	3,352
McPherson, 29-18-2W.....	2,000	802,485	29	Lans.-K. C. Chat..... Viola.....	2,340 2,967 3,140
Ritz-Canton, 1-21-2W.....	13,000	32,186,873	265	Lans.-K. C. Chat..... Viola..... "Wilcox".....	2,360 2,935 3,412 3,440
Roxbury, 18-17-1W.....	250	59,255	6	Chat.....	2,684
Voshell, 9-21-3W.....	3,500	22,385,068	105	Chat..... Viola..... "Wilcox"..... Arbuckle.....	3,095 3,301 3,322 3,394
Moundridge (gas), 12-21-2W.....	.....	.....	.....	Miss. lime..	3,007

a. Includes Hesston.

19 S., R. 3 W. This well produced gas, but also yielded some oil from the Mississippian "chat", which is the gas-producing zone. At the beginning of 1939 there were 16 oil wells in this pool. No additional producing wells were drilled in 1939, but 1 well was abandoned, so the total now stands at 15. One dry hole was drilled in an attempt to link this pool with the Chindberg pool to the northeast. This well was drilled by Carey in the NE¼ sec. 35, T. 19 S., R. 3 W., on the Helstrom farm. It was completed at a depth of 3,035 feet, some distance within the Mississippian limestone. To the end of 1939 this pool had produced 2,456,565 barrels of oil.

Voshell Pool.—The Voshell pool, which lies on the same trend as the three pools previously described, was discovered in August, 1929. Its discovery precipitated one of the most sensational drilling campaigns witnessed in Kansas. At the beginning of 1939 the field had a total of 112 wells. This number was reduced to 105 by the end of the year. No new producing wells were drilled. Production for

the year was 572,440 barrels, bringing the total almost to 22,500,000 barrels.

Ritz-Canton Pool.—The largest producing area in McPherson county is the Ritz-Canton pool, which was opened by the McPherson Oil and Gas Company No. 1 Wedel well, in sec. 12, T. 20 S., R. 2 W., in December, 1928. Most of the oil, as well as virtually all the gas, produced from this pool has been obtained from the Mississippian "chat". Late in 1937 many old wells were deepened to the "Wilcox" sand, which had been found productive as early as 1932. The completion of ten new "chat" wells in 1939 brought the total number of wells at the end of the year to 265. In addition two new gas wells were completed. One of these had an initial potential production of 8,000,000 cubic feet per day, but the other was rated as capable of producing 21,000,000 cubic feet per day. The producing area now exceeds 13,000 acres and the total oil production to the end of 1938 exceeds 32,000,000 barrels.

Graber Pool.—Ranking third in activity in McPherson county in 1939 was the Graber pool, discovered in June, 1937. The main producing zone here is Siluro-Devonian limestone, the Hunton formation. It lies at a depth of about 3,250 to 3,350 feet. The eight wells completed in the Hunton formation in 1939 increased the total to 121. In June, 1937, one well found oil in the upper Devonian or basal Mississippian Misener formation, overlying the Hunton limestone. In February, 1938, the Continental Oil Company No. 6 Huxman well found a commercial quantity of oil in the "Wilcox" sandstone at a depth of 3,398 feet. In addition to the three producing zones mentioned, the Mississippian "chat" also yields oil in the Derby No. 1 Arnold well and in the Dickey Oil Company No. 1 and 2 "A" Goering wells. This pool produced more than 1,000,000 barrels of oil in 1939 and the cumulative total to the end of the year was 4,191,978 barrels.

Lindsborg Pool.—The Lindsborg oil pool, discovered in 1938, lies close to the northern border of the county and also close to the present northern limit of oil production in the state. The discovery well, completed in January, was drilled on the Hoglund farm, in sec. 8, T. 17 S., R. 3 W., by the Carter Oil Company. Oil was found in a limestone at present correlated with the Viola limestone of Ordovician age, at a depth of 3,352 feet. The potential production of 345 barrels per day encouraged the drilling of a second well, which was completed in April, on the Nelson farm, in sec. 7, T. 17 S., R. 3 W. No additional wells were drilled in 1939.

In this part of the county the Herington limestone lies at a depth of 460 feet, the top of the Shawnee group at 1,750 feet, the Douglas group at 2,070 feet, the Lansing limestone, which is perhaps the most useful marker, at 2,250 feet, the base of the Bronson group at 2,650 feet, the red rock of the Cherokee(?) formation at 2,795 feet, and the top of the Mississippian limestone at 2,916 feet. The last consists of cherty dolomite and extends downward to a depth of 3,117 feet. The Kinderhook shale in this area is a pale greenish shale about 227 feet thick, and rests on the Viola limestone at a depth of 3,344 feet.

Roxbury Pool.—The Roxbury pool was discovered in November, 1938, by the Western Kansas Oil and Refining Company No. 1 Fraternal Aid well, in sec. 18, T. 17 S., R. 1 W. In this well the Mississippian “chat” was reached at a depth of 2,682 feet. At a depth of 2,687 feet, oil entered the hole, but drilling continued to a total depth of 2,986 feet. The potential production of this well was 419 barrels per day. In 1939 five additional producing wells and one dry hole were drilled. The potential production of the producing wells ranged from 400 barrels to 1,000 barrels per day. In the dry hole drilled by the Westgate Greenland Oil Company on the McCulle farm, in sec. 29, T. 17 S., R. 1 W., the “chat” was reached at a depth of 2,679 feet, the Hunton limestone at 2,955 feet, and the Viola limestone at 3,133 feet.

Bornholdt Pool.—The most active pool during 1939 was the Bornholdt pool, which lies along the west side of the county in R. 5 W. Although the field was discovered in August, 1937, drilling was retarded because of the relatively small size of the discovery well, and no additional wells were drilled in 1938, but in May, 1939, the Continental Oil Company completed the second well of the pool on the Mattson farm, in sec. 31, T. 20 S., R. 5 W. This well penetrated the Mississippian “chat” at a depth of 3,292 to 3,317 feet, where a 5-foot saturated zone was encountered. The potential production was 775 barrels per day. A very active drilling campaign resulted and 12 additional wells were drilled before the end of the year. Ten of these were commercial oil wells, one of them having a potential production exceeding 3,000 barrels per day. The other two wells were dry holes. One was located in sec. 6, T. 21 S., R. 5 W., on the Ely farm on the south side of the pool and the other was located in sec. 21, T. 20 S., R. 5 W., on the Briggs farm, on the east side of the pool. At the end of 1939 the pool included 16 wells, 3 of which are in Rice county. Much of the productive area of 1,500 acres is undeveloped.

Bornholdt North Pool.—The discovery well in the Bornholdt North pool indicates the probable future limits of the Bornholdt pool. This well is located about 1.75 miles north of the northernmost well in the main pool. It was drilled by the Springrose Drilling Company on the Swanson farm, in sec. 18, T. 20 S., R. 5 W. A saturated zone was found at the top of the "chat" at a depth of 3,304 to 3,310 feet and another at 3,312 to 3,319 feet. The well was eventually deepened to 3,346 feet and its potential production gauged 2,500 barrels of oil per day. The well was completed on the last day of the year.

Exploratory Drilling.—Drilling in search of new pools was fairly active in McPherson county in 1939 and resulted in the discovery of the new Bornholdt North pool just described and also another area listed as a pool until the early part of 1940. The latter is the so-called Battle Hill discovery of the Westgate Greenland Oil Company No. 1 Chindberg well, in sec. 18, T. 18 S., R. 1 W., 5 miles south of the Roxbury pool. In this well the "chat" was reached at a depth of 2,763 feet, but the well was drilled 57 feet deeper to a porous zone where considerable oil and water entered the hole. When the well was later drilled 5 feet deeper the amount of water was so great that the well had to be abandoned. Early in 1940 the Nomenclature Committee of Kansas ruled that the name Battle Hill should be dropped.

In the old Voshell area the Sinclair Oil Company drilled one dry hole on the J. H. Martens farm in section 20. In the same pool this company deepened its No. 8 Moorehouse well in order to make a deep water-disposal well. The Arbuckle dolomite was penetrated at a depth of 3,399 to 4,303 feet proving to be 904 feet thick; the Lamotte sand was only 32 feet thick and rested upon pre-Cambrian rocks at a depth of 4,335 feet. The pre-Cambrian rock was penetrated a distance of 95 feet.

NESS COUNTY

The general geology and the oil discoveries of Ness county were described in Mineral Resources Circulars 10 and 13. At present the only oil pool is the Aldrich pool, in the western part of the county, 12 miles west of Ness City (figure 16). This pool was discovered by the Continental Oil Company in October, 1929. The first well was drilled in sec. 7, T. 18 S., R. 25 W., but later developments extended the pool over an area including parts of eight sections. In

1938 five additional oil wells were drilled. One of these extended the pool 1 mile northward and another extended it 1.5 miles eastward. In 1939 one additional producing well was drilled, so that the total number of wells is now 11. Production to the end of 1939 totaled 118,156 barrels.

Inasmuch as no other test wells were drilled during the year, information on the subsurface geology and the oil-producing possibilities of the county remains the same as at the close of the previous year (see Mineral Resources Circ. 13).

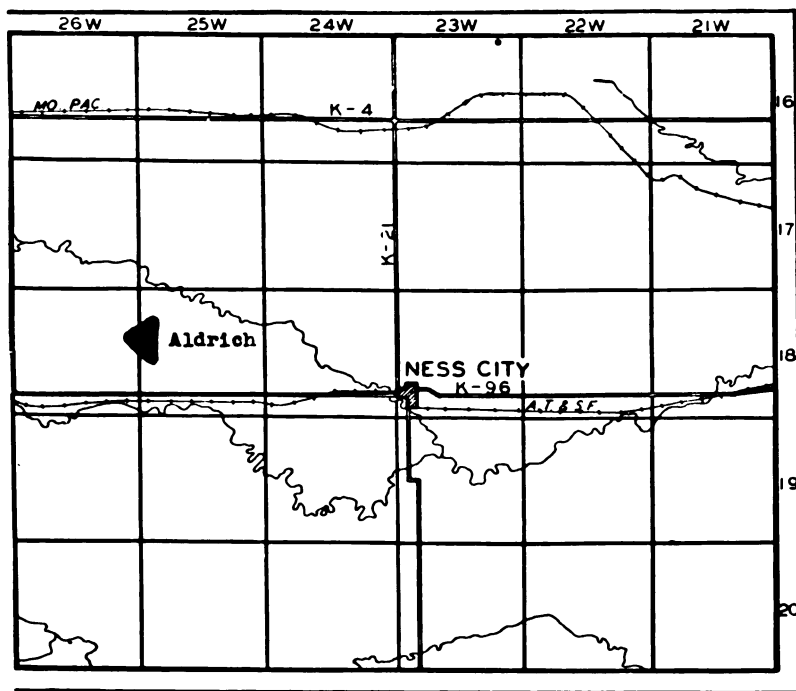


FIG. 16. Map of Ness county.

Oil Pools of Ness County

POOL AND LOCATION.	Area, acres.	Cumulative production to end of 1939, bbls.	Number wells.	Producing zone.	Depth in feet.
Aldrich, 7-18-25W	2,000	118,156	11	Fort Scott.. Miss. lime.	4,378 4,428

PAWNEE COUNTY

The first and only oil pool in Pawnee county was discovered in September, 1936, by the Simpson and Noble No. 1 Gates well, which was completed in the Arbuckle dolomite at a depth of 3,841 feet. The porous zone was 9 feet thick and the initial production of the well was 187 barrels of oil and 4,000,000 cubic feet of gas per day. In 1938 two additional producing wells were completed, and in 1939 one more was added, bringing the total to six. The new well is the Texon Oil and Land Company No. 1 Nelson, in sec. 14, T. 20 S., R. 16 W. The production from this pool to the end of 1939 was 81,762 barrels.

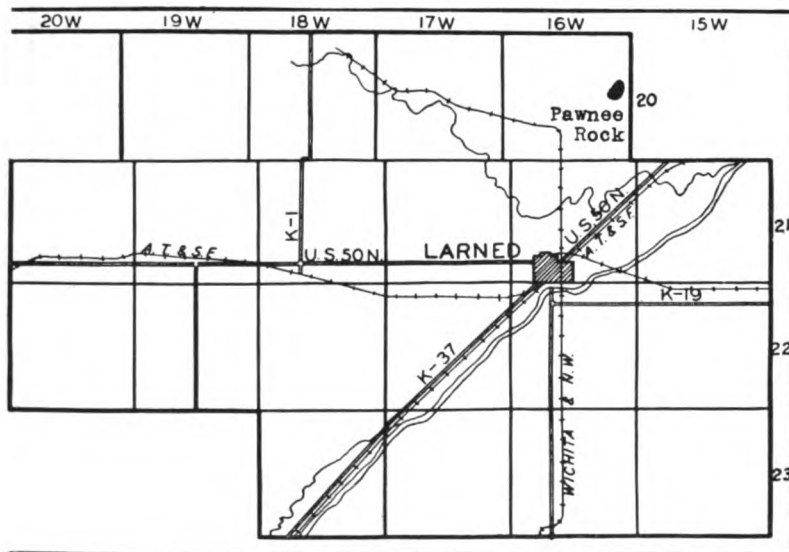


FIG. 17. Map of Pawnee county.

Exploratory drilling in Pawnee county in 1939 was limited to two test wells. One of these was located near the Pawnee Rock pool in section 14. This well entered the Simpson formation at a depth of 3,667 feet and the Arbuckle dolomite at 3,777 feet and was drilled almost 29 feet into the Arbuckle dolomite, but was later plugged back to 3,777 feet without favorable results. The other test well was drilled by the Cities Service Company on the Roberts ranch in sec. 31, T. 21 S., R. 15 W., 10 miles southeast of the Pawnee Rock pool. The Arbuckle dolomite, which produces oil in the Pawnee Rock pool, was found relatively low at a depth of 3,924 feet and the test proved to be a dry hole (figure 17).

For information on the geology and structure of Pawnee county, the reader is referred to Mineral Resources Circular 10, published in 1938.

Oil Pools of Pawnee County

POOL AND LOCATION.	Area, acres.	Cumulative production to end of 1939, bbls.	Number wells.	Producing zone.	Depth in feet.
Pawnee Rock, 13-20-16W.....	640	81,762	6	Arbuckle...	3,825

PHILLIPS COUNTY

In 1939 Phillips county was added to the ever-lengthening list of oil-producing counties. Several deep test wells had been drilled prior to 1939, but none had given indications of important oil or gas reserves in that part of Kansas. Nevertheless the presence of oil in the Faubion pool of Rooks county just south of the Phillips county line, as well as the structural attitude of the strata in the south-central part of the county, pointed the way to further exploration.

GEOLOGY

Surface formations. The areal geology of Phillips county is similar to that of Rooks county, which was described in Mineral Resources Circular 10. There are surface rocks of two ages, Tertiary and Cretaceous. A blanket of Tertiary sands, silts, and clays covers most of the northern half of the county and a small section of the southwestern part (see geologic map of Kansas published by the Survey, 1937). Where this blanket of young strata has been stripped away, Cretaceous rocks are exposed at the surface. With two exceptions these rocks belong to the Niobrara. Calcareous shales, chalks, and chalky limestones characterize the Niobrara. A prominent limestone at the base is named the Fort Hays limestone member. This rock crops out at the surface near the new Bow Creek oil pool, the first pool in Phillips county. The limestone is approximately 55 feet thick in that part of Kansas. The Carlile shale, which underlies the Fort Hays limestone, crops out in the eastern ranges of the county. Older portions of the Cretaceous strata do not appear on the surface, but some younger strata belonging to the Pierre division do appear in a small area along Prairie Dog creek in the northwestern township of the county (T. 1 S., R. 20 W.)

Subsurface Formations.—The geological formations beneath the surface have been penetrated by the 12 exploratory test wells that were drilled in various parts of the county. Several of the wells were less than 500 feet deep, but most of the others reached a depth of 3,000 feet and two were drilled to a depth exceeding 4,000 feet. These test wells indicate that the Carlile shale, Greenhorn limestone, and Graneros shale combined are approximately 440 feet thick. The Graneros shale rests upon the Dakota sandstone. In Phillips county this formation consists of alternating layers of sandstone and shale totaling 350 feet in thickness. The basal portion, which may be the equivalent of the Cheyenne sandstone of southern Kansas, consists of a continuous series of sandstone beds 170 feet thick. Thus the total thickness of the "Dakota" beds is approximately 520 feet.

Beneath the Cretaceous rocks are red beds of Permian age 550 feet thick. These are underlain by the gray shales of the Wellington formation. In the 420 feet of Wellington shales there is considerable gypsum at various levels, and some chalky limestones at various levels in the lower half of the formation. The Herington limestone, which lies at depths ranging from 2,000 to 2,400 feet in Phillips county, marks the top of a sequence characterized by limestone layers. The sequence is broken by many intercalations of red shales and some gypsum layers. Several cherty zones are included in the sequence and one of these, about 300 feet below the Herington, may be the Wreford member, so well known farther south. The base of the Americus limestone is not conspicuous, but probably lies 500 feet below the Herington limestone.

The Wabaunsee formation of Pennsylvanian age is approximately 350 feet thick. It contains red shale near the top, green shale in the middle, and much limestone in the lower half. The Shawnee formation, including the Topeka limestone at the top, consists of thick beds of limestone alternating with black shales. It is about 200 feet thick. The red shales of the Douglas formation are very thin and rest upon the Lansing-Kansas City-Bronson limestones. These three groups together are approximately 275 feet thick. They are underlain by the Marmaton red shales and thin limestones totaling 150 feet thick. The basal layers of the Marmaton consist of sand, chert, and red shale, which is characteristic of the Sooy or Pennsylvanian basal conglomerate.

The Sooy conglomerate rests unconformably upon the Arbuckle dolomite of Ordovician age. In one well, Stearns and Streeter No. 1

Miller, in sec. 34, T. 2 S., R. 19 W., 245 feet of this dolomite was penetrated and the base was not reached. Two prominent zones of sandstone were included in that part of the Arbuckle dolomite. In another well drilled by Stearns and Streeter on the Merklein farm, in sec. 21, T. 3 S., R. 19 W., the Arbuckle dolomite was only 75 feet thick. Below it there was a thin wedge of the Lamotte sand, which rested upon a quartz schist. The well was completed at a depth of 4,071 feet, nearly 200 feet below the top of the pre-Cambrian schist.

OIL DEVELOPMENT

Bow Creek Pool.—The first oil well in Phillips county was completed in May, 1939. It was drilled by the Blue Stem Oil Company on the Donaldson farm, in sec. 25, T. 5 S., R. 18 W. Oil was found in a porous zone of the Lansing limestone at a depth of 3,111 feet, approximately 30 feet below the top of the formation. The gravity of the oil is 40° A. P. I, which is regarded as high-gravity oil in Kansas. The potential production of the discovery well was gauged at 827 barrels per day by the State Corporation Commission. In 1939 this well produced 3,525 barrels of oil.

Oil Pools of Phillips County

POOL AND LOCATION.	Area, acres	Cumulative production to end of 1939, bbls.	Number wells.	Producing zone.	Depth in feet.
Bow Creek, 25-5-18W	40	3,525	1	Lans.-K. C.	3,111

PRATT COUNTY

Drilling was fairly active in Pratt county in 1939 and was fairly well distributed over the county. Among the 25 completed wells there were 4 oil wells, 19 gas wells, and 2 dry holes. The pools and the stratigraphy in the pools have been described in Mineral Resources Circulars 10 and 13. At present there are two oil pools and one gas pool in the county (see figure 18).

Cunningham Pool.—The most important producing area is the Cunningham oil pool, which lies mostly in Kingman county, but extends into Pratt county. Three additional wells were drilled in the Pratt county portion of this pool by the Skelly Oil Company. Their No. 1 Miller well in sec. 36, T. 27 S., R. 11 W., produced 300 barrels per day. The other two wells were drilled in the adjacent section 25, and are the No. 1 South Maxedon and the No. 5 East

Maxedon. All three are producing from the Lansing limestone and all three produce considerable gas with the oil.

Iuka Pool.—The Iuka pool was opened in August, 1937, by the Atlantic Refining Company No. 1 Runyon well, in sec. 11, T. 27 S., R. 13 W. No other wells were completed in 1937, but in 1938 two additional producing wells were drilled. Oil is obtained from a dolomite layer at the top of the Simpson formation at a depth of approximately 4,300 feet. In 1939 the Atlantic Refining Company drilled a test well on the Hacker farm in section 11, 0.5 mile south of the pool. This well reached the Lansing limestone at a depth of 3,797 feet, the Viola limestone at 4,240 feet, and the Simpson dolomite at

Oil and Gas Pools of Pratt County

POOL AND LOCATION.	Area, acres.	Cumulative production to end of 1939, bbls.	Number wells.	Producing zone.	Depth in feet.
Cairo, 7-28-11W.....	40	218	1	Viola.....	4,267
Iuka, 11-27-13W.....	160	43,468	3	Simpson....	4,292
Cairo (gas), 7-28-11W.....	12,000	8,525,362 M cu. ft.	27	Viola.....	4,278

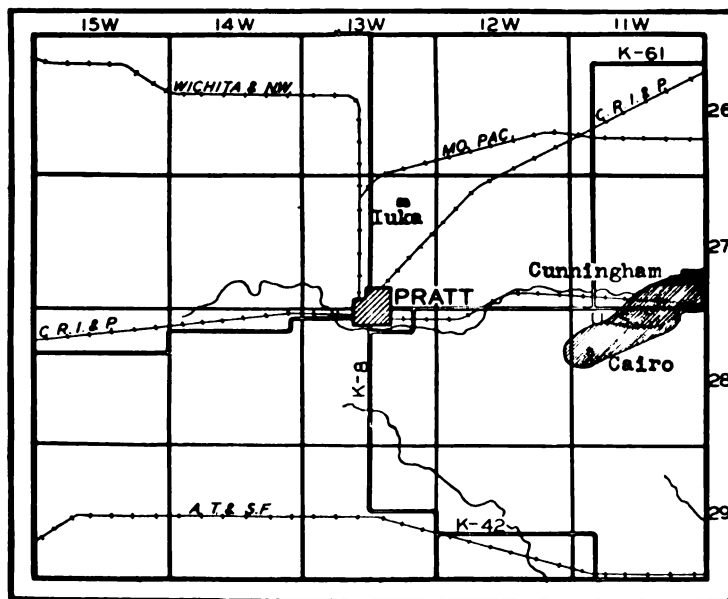


FIG. 18. Map of Pratt county.

4,355 feet. The dolomite was not porous so the well was drilled 9 feet deeper and abandoned as a dry hole.

Cairo Pool.—The Cairo gas field was discovered in 1935 by the Skelly Oil Company No. 2 Gilchrist well, in sec. 7, T. 28 S., R. 11 W., which was completed in the Viola limestone at a depth of 4,278

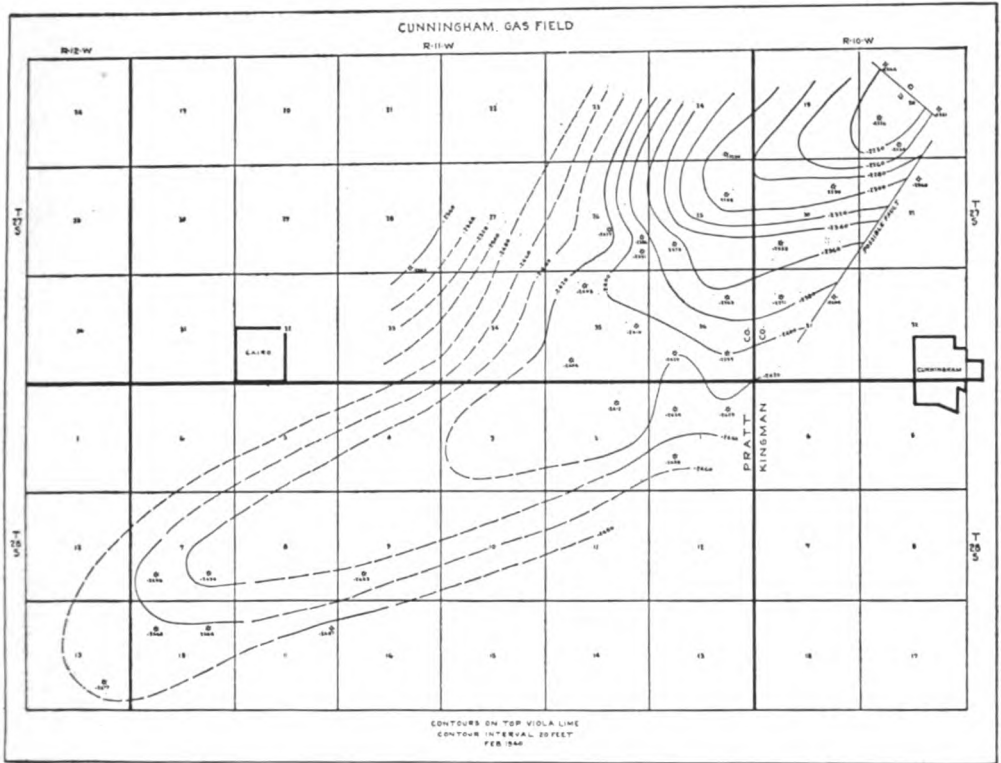


FIG. 19. Contour map of Cunningham and Cairo gas field.

(After J. H. Page and A. P. I.)

feet, and had a potential production of 14,000,000 cubic feet of gas per day. In 1938 two additional wells were completed, one on the Adams farm, in section 2, and the other on the Lunt farm, in section 18. Both were wells of large capacity and proved that a large reserve of gas exists in this part of the state.

In 1939 a determined drilling campaign was undertaken by the Skelly Oil Company, which has large holdings in that part of the state. Eleven gas wells were completed by the Skelly Oil Company and many of these had surprisingly large initial production. Fur-

thermore, the wells were widely spaced so that a large part of one township is now proved to be underlain by gas-bearing Viola limestone. The Sinclair Oil Company also completed two gas wells in this field, one of which is the No. 1 Greider well, in sec. 26, T. 27 S., R. 11 W. The Drillers Gas Company completed one well in the same section on the Hoagland farm, and another on the Gerber farm in sec. 35 nearby. In T. 28 S., R. 11 W., one well was drilled by the Sinclair Oil Company on the Allbritten farm. On the extreme west side of the field the Shell Petroleum Company drilled a gas well in sec. 13, T. 28 S., R. 12 W.

The largest well drilled during the year, and one of the largest on record for the state, was the Skelly No. 3 Moore well, in sec. 25, T. 27 S., R. 11 W. After it was acidized with 1,000 gallons of acid its potential production was 109,000,000 cubic feet per day. What may prove to be an important development was the discovery of oil in the Skelly Oil Company No. 1 Levi Harding well, in sec. 7, T. 28 S., R. 11 W. This well reached the Mississippian "chat" at a depth of 4,058 feet and the producing Viola limestone at 4,267 feet. Gravity of the oil is 36° A. P. I.

At the present time there is no line of division between the Cunningham pool and the Cairo pool, but inasmuch as the former produces chiefly from the Lansing limestone and the latter from the Viola limestone, they are still listed separately. No rank wildcat wells were drilled in Pratt county in 1939.

RENO COUNTY

Drilling activity in Reno county was somewhat subdued in 1939, inasmuch as only 21 wells were completed. Considerable drilling in old established pools resulted in 12 additional oil wells, the other wells being dry holes. The distribution of oil and gas pools in Reno county is shown in figure 20.

Buhler Pool.—The Buhler pool was discovered in April, 1938. The discovery well was drilled by the Amerada Petroleum Company on the Johns ranch, in sec. 25, T. 22 S., R. 5 W., and produced from the "Wilcox sandstone" (Simpson formation) at a depth of 3,897 feet. The potential rate of production was 912 barrels per day, by official test, and the gravity of the oil was 38° A. P. I. Of 12 additional test wells in the Buhler pool, 9 were oil wells and 3 were dry holes. Eight of the new wells found oil in the Simpson formation. One well found oil in the Viola limestone after its production from the Simpson formation had declined to the economic limit. It was the Westgate Greenland No. 1 "B" Johns well, in sec. 25, T. 22 S., R. 5

W. The producing zone lies 2 feet below the top of the Viola limestone at a depth of 3,892 to 3,898 feet. One of the dry holes, the Westgate Greenland Company No. 2 "B" Hegarty well, was converted into a salt-water-disposal well. It entered the Arbuckle dolomite at a depth of 4,010 feet and was drilled to a depth of 4,605 feet in that formation. Another deep salt-water-disposal well was drilled by the Sinclair Oil Company on the Schroeder farm (well No. 3). It stopped in the Arbuckle dolomite at a depth of 4,586 feet. These wells indicate that the thickness of the Arbuckle exceeds 500 feet in this part of Kansas. The Buhler pool has produced 222,359 barrels of oil to the end of 1939.

Oil and Gas Pools of Reno County

POOL AND LOCATION.	Area, acres.	Cumulative production to end of 1939, bbls.	Number wells.	Producing zone.	Depth in feet.
Abbyville, 24-24-8W	1,200	346,978	4	Lans.-K. C.	3,540
Buhler, 25-22-5W	500	222,359	1 10	Viola Simpson	3,890 3,897
Burrton, 23-23-4W	5,000	27,962,307	346 92 1 2	"Chat" Hunton "Wilcox" Arbuckle	3,266 3,583 3,723 3,775
Hilger, 16-26-4W	600	1,509,459	33	Viola	4,062
Lerado, 11-26-9W	1,800	1,825,670	1 32	Lans.-K. C. Viola	3,535 4,128
Yoder, 34-24-5W	500	62,520	6	"Chat"	3,450
Burrton (gas), 23-23-4W	5,000	6,387,118 M cu. ft. (a)	50	"Chat"	3,298
Yoder (gas), 34-24-5W	500	861,461 M cu. ft. (a)	3	"Chat"	3,402

a. Production in 1939.

Burrton Pool.—The Burrton pool, which was nearly nine years old at the end of the year, was extended slightly by the completion of 11 wells (three in Reno county and the rest in Harvey county), all of which produce from the Mississippian "chat". Of the 11 new oil wells, three were old "chat" wells that were drilled deeper into the thick zone of cherty detritus in which the oil occurs. Two other wells failed to find deeper production and were finished as salt-water-disposal wells. Both of these were owned by the Shell Oil Company. The No. 7 Blake, in section 23, was drilled into the pre-Cambrian rocks nearly 200 feet. It encountered the pre-Cambrian rocks at a depth of 4,530 feet and was drilled to a total depth of 4,709 feet. The other, the No. 5 "A" Goering well, in sec. 26, T. 23 S., R. 4 W., was deepened from a depth of 3,595 feet to 4,497 feet. The only dry hole was drilled by the Barnsdall Oil Company on the

Anna Krehbiel farm, in sec. 18, T. 24 S., R. 5 W. Because the "chat" was unproductive, the well was drilled through the Viola limestone (3,832 feet) and the "Wilcox" sandstone (3,863 feet), into the Arbuckle dolomite, which was reached at a depth of 3,954 feet.

Wildcat Wells.—Only two wildcat wells were drilled in Reno county in 1939. Both were offsets to the large Zenith pool in the southeastern corner of adjacent Stafford county. One was the Herndon Drilling Company No. 1 Compton, in sec. 31, T. 25 S., R. 10 W. The other was the Landon No. 1 Union Central, in sec. 7, T. 24 S., R. 10 W. Both were dry holes.

The Herndon test well proved to be most interesting geologically, as it penetrated all formations down to the Arbuckle dolomite. The Ft. Riley limestone was reached at a depth of 1,830 feet, the Topeka limestone at 3,010 feet, the Lansing limestone at 3,520 feet, the Mississippian system at 3,965 feet, the Kinderhook shale at 4,050 feet, the Viola limestone at 4,200 feet, the Simpson shale at 4,290 feet, and the Arbuckle dolomite at 4,370 feet. The well was abandoned at a depth of 4,400 feet without finding oil or gas.

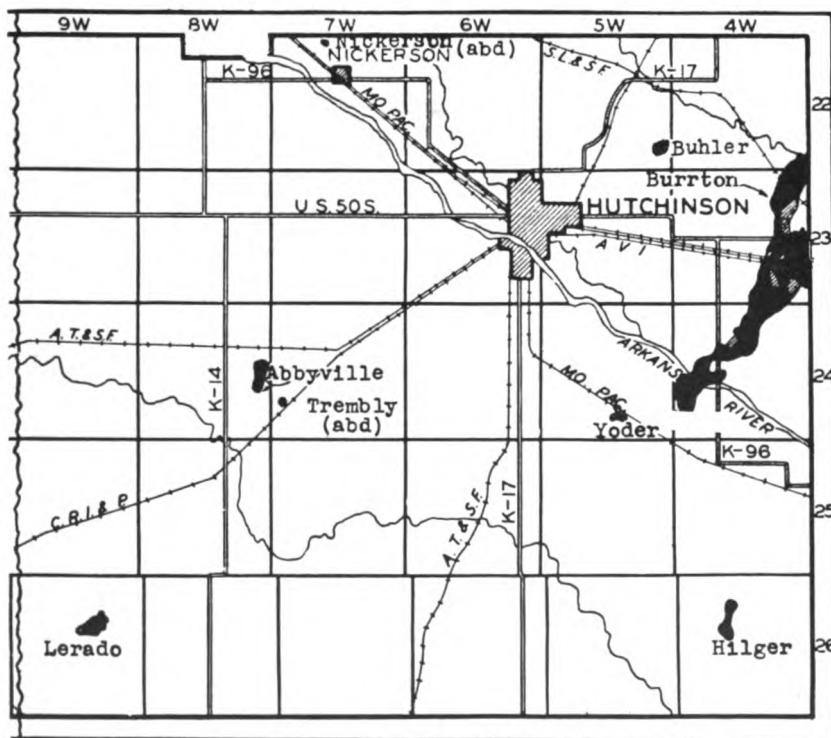


FIG. 20. Map of Reno county.

RICE COUNTY

One of the most actively exploited counties in Kansas during 1939 was Rice county. The completions for this year number 234 wells, of which 170 were commercial oil wells, 5 were gas wells, and the other 59 were dry holes. The series of successful completions in the Geneseo pool marks it as the most remarkable area in the county. The large number of pools in Rice county makes it advantageous to describe them in alphabetical order. The distribution of the pools is shown on the accompanying map (figure 21).

OIL POOLS

Brandenstein Pool.—The Brandenstein pool, in T. 19 S., R. 10 W., was discovered in November, 1933. No new wells were added in 1939, but the two wells in that pool continued to produce oil, increasing the cumulative total production to 343,851 barrels at the end of the year.

Bredfeldt Pool.—The Bredfeldt pool, in the northwestern part of T. 18 S., R. 9 W., remained a one-well pool. It was discovered in April, 1937, and produces oil from the Arbuckle dolomite.

Campbell Pool.—The Campbell pool, located less than 1 mile east of the large Chase pool, included three wells at the end of 1938. They produce from the Arbuckle dolomite at a depth of approximately 3,200 feet. The original well was deepened from a depth of 3,208 feet to 3,221 feet and recompleted, the new potential production being 900 barrels per day. In 1939 active drilling in the immediate vicinity of the Campbell pool resulted in the addition of 16 new oil wells, bringing the total number of wells to 19. The production to the end of 1939 was 438,650 barrels.

Chase Pool.—One of the most important pools in Rice county is the Chase pool, which extends from sec. 16, T. 19 S., R. 9 W., southwestward to sec. 18, T. 20 S., R. 9 W., a distance of 7 miles. This pool had 229 wells at the end of 1937, all producing from the Arbuckle dolomite at a depth of approximately 3,250 feet. By the end of 1938 this number had been reduced to 223 by the encroachment of water in edge wells. In 1939 the number was further reduced, but because of the joining of the Chase pool with the Cramm, Cramm North, and Soeken pools, the number of producing wells at the end of 1939 was 137.

Cramm Pool.—The Cramm pool was located about 1 mile east of the northern end of the Chase pool. The first well was completed there in July, 1937, and produced oil from the Lansing limestone.

Before the end of 1937 two other producing wells were added. In 1939 this pool was combined with the Chase pool.

Cramm North Pool.—The Cramm North pool was located in sec. 15, T. 19 S., R. 9 W., less than 1 mile north of the Cramm pool. A well drilled by the Shell Petroleum Company along the north line of the section in the northeast quarter was completed in August, 1938. Its potential production was 1,622 barrels of oil of 50° A. P. I. gravity. The oil comes from a porous zone in the Arbuckle dolomite at a depth of 3,246 feet. Two other wells were completed in the pool before the end of the year. This pool also was combined with the Chase pool in 1939.

Doran Pool.—The Doran pool, discovered in September, 1936, and located 3 miles west of the north end of the Chase pool, added one new producing well in 1938. No new wells were added in 1939.

Edwards Pool.—The Edwards pool, which lies in the northern part of the county and extends several miles northward into Ellsworth county, was the scene of rather active drilling. Completion of 13 producing wells raised the total number to 54. The producing zone here also is the Arbuckle dolomite.

• *Geneseo Pool.*—A short distance southeast of the Edwards pool lies the Geneseo pool, extending southward nearly 6 miles from a point just south of Geneseo townsite into sec. 6, T. 19 S., R. 7 W. The number of wells was 103 at the beginning of 1939, but was greatly increased by the end of the year, and wells were being completed here at the rate of almost one a week. An interesting deep salt-water-disposal well, the Continental Oil Company No. 1 "B" Hamilton, in sec. 19, T. 18 S., R. 7 W., was drilled into the Viola limestone at a depth of 3,200 feet and the Arbuckle limestone at 3,286 feet. The Arbuckle limestone was penetrated 894 feet to a total depth of 4,180 feet.

Guldner Pool.—This pool is situated about 8 miles west of the north end of the Geneseo pool and was discovered in June, 1935. It produces oil from the Arbuckle dolomite at a depth of 3,230 feet. In 1939 no wells were added. Production to the end of 1939 was 223,639 barrels.

Haferman Pool.—This pool lies 8 miles south of the Habiger pool (now part of the Bloomer pool). It was discovered in 1936. In 1939 one important well was drilled, extending the pool 0.5 mile southwestward. Two other wells were completed in the main part of the pool.

Heinz Pool.—This new pool, discovered in August, 1938, lies scarcely 1 mile south of the Bloomer pool. The discovery well was drilled by Carlock and associates in sec. 8, T. 18 S., R. 10 W. The Lansing limestone was reached at a depth of 2,925 feet, and 79 feet lower a 10-foot porous zone yielded oil at the rate of 1,120 barrels per day. No wells were added in 1939.

Keesling Pool.—Three miles east of the Chase pool, near the center of T. 20 S., R. 9 W., lies the Keesling pool. Oil was found here in April, 1935, in the Arbuckle dolomite, and 40 wells had been completed by the end of 1937. In 1938 one producing well was added and in 1939 two more oil wells were added, bringing the total to 43. The total production to the end of 1939 was 2,337,461 barrels. A deep water-disposal well, drilled by the Texas Company in sec. 10 reached the Arbuckle at a depth of 3,309 feet, and was completed 726 feet deeper in granite wash.

Orth Pool.—This pool, located in the northwestern township of the county, was one of the first pools in the county to produce oil. The field is particularly interesting because commercial amounts of oil have been produced here from pre-Cambrian quartzite. At the end of 1939 nine wells were still producing from this zone at a depth of approximately 3,240 feet. The two wells that were drilled 1 mile east of the Orth pool were classified with the Orth pool until the end of the year, but early in 1940 the Kansas Nomenclature Committee decided to classify them as the Orth East pool.

Ploog and Ponce Pools.—No additional development took place in the Ploog pool nor in the Ponce pool.

Proffitt Pool.—This new pool, discovered in 1938, lies in sec. 12, T. 20 S., R. 10 W., about 1 mile west of the Chase pool and about 3 miles east of the Silica pool. The discovery well was drilled by Tatlock on the Proffitt lease. Oil was found in the Arbuckle dolomite at a depth of 3,227 feet. The initial potential production was 300 barrels per day.

Raymond Pool.—This is the second oldest pool in Rice county, having been discovered in July, 1929. It is not surprising, therefore, that 15 wells were abandoned in 1938, reducing the total to 37 wells producing from Arbuckle dolomite and 4 from Lansing limestone. Nine more Arbuckle wells were abandoned in 1939. The Raymond pool has produced a total of 5,522,353 barrels of oil.

Rickard, Socken, and Stumps Pools.—Situated in the northern part of the county, between the Ploog and the Guldner pools, is the

Rickard area, unique because it produces from the Simpson sandstone. The Soeken pool is a few miles south of the Ploog pool. In 1939 it was joined to the Chase pool. The Stumps pool lies in the northwestern part of the county, about 1 mile east of the Habiger pool. Four additional wells were drilled here during the year. All produce oil from the Arbuckle dolomite at a depth of 3,230 feet.

Welch Pool.—The Welch pool is the oldest oil pool in Rice county. It was discovered in April, 1924, and was the first pool to yield commercial production from the erosional detritus found at the top of the "Mississippi lime". Because this material is composed principally of fragments of chert, the drillers called it "chat" and this name has become one of the common terms used by oil men. Before the end of 1935 a total of 40 wells had been drilled in the Welch pool. Of these, 28 still produced oil at the end of 1939. The pool has produced more than 4,000,000 barrels of oil. The Welch North pool is separated from the main pool by a distance of about 1 mile. No new wells were added here in 1939.

Wenke Pool.—No new wells were drilled in the Wenke pool, which lies along the western side of the county only a few miles southeast of the large Silica pool. In the Wenke West pool one additional producing well was completed. Both pools produce oil from the Arbuckle dolomite.

Wherry Pool.—One of the most remarkable pools of the county, and indeed of Kansas, is the Wherry pool, which covers approximately 6,000 acres in the northern half of T. 21 S., R. 7 W. The first well was completed in September, 1933, on the Thode farm in section 11. Oil was found in a mixture of materials near the base of the Pennsylvanian rocks at a depth of 3,358 feet. Before the end of 1937 a total of 141 producing wells had been completed, and 24 additional producing wells were added in 1938. One deep water-disposal well (Mid Plains No. 4 Hauschild) reveals the sequence of rocks below the producing zone. The Pennsylvanian basal conglomerate (Sooy) was 102 feet thick, the Mississippian limestone being reached at a depth of 3,475 feet. The Hunton (?) limestone was reached at a depth of 3,575 feet, Viola limestone at 3,704 feet, Simpson sandstone at 3,733 feet, and Arbuckle dolomite at 3,804 feet. The Arbuckle was penetrated 173 feet to a total depth of 3,977 feet. It is important to emphasize that the Wherry pool is distinctly a "Pennsylvanian conglomerate" pool. Many wells pass directly from the Sooy conglomerate into the very similar cherty residue of the Mississippian "chat" below. The oil, however, is

Oil and Gas Pools of Rice County

POOL AND LOCATION.	Area, acres.	Cumulative production to end of 1939, bbls.	Number wells.	Producing zone.	Depth in feet.
Brandenstein, 10-19-10W	160	343,851	2	Lans.-K. C.	3,011
Bredfeldt, 7-18-9W	40	12,446	1	Arbuckle...	3,223
Bredfeldt West, 12-18-10W	40	.....	1	Arbuckle...	.....
Campbell, 28-19-9W	800	438,650	19	Arbuckle...	3,195
Chase, 32-19-9W	4,800	18,689,991	4 133	Lans.-K. C. Arbuckle...	2,942 3,246
Cramm (a).					
Cramm North (b).					
Doran, 13-19-10W	160	90,714	2	Arbuckle...	3,201
Edwards, 3-18-8W	2,000	1,610,998	54	Arbuckle...	3,278
Geneseo, 25-18-8W	4,600	3,765,599	143	Arbuckle...	3,132
Guldner, 16-18-9W	160	223,639	3	Lans.-K. C. Arbuckle...	2,884 3,227
Habiger (c).					
Haferman, 6-19-9W	700	339,938	9	Arbuckle...	3,192
Heinz, 8-18-10W	80	17,142	1	Lans.-K. C. Arbuckle...	3,000 3,254
Keesling, 10-20-9W	700	2,337,461	43	Arbuckle...	3,239
Lyons, 14-20-8W	40	887	1	Simpson....	.....
Midway, 8-20-9W	240	35,689	6	Arbuckle...	3,244
Orth, 27-18-10W	1,000	580,762	2 9	Lans.-K. C. Pre-Cambr.	2,915 3,240
Orth East, 25-18-10W	80	.....	2	Pre-Cambr.	.....
Ploog, 33-18-9W	300	1,097,270	10	Arbuckle...	3,252
Ponce, 28-21-7W	40	20,497	1	Sooy.....	3,388
Proffitt, 12-20-10W	40	1,553	1	Arbuckle...	3,227
Raymond, 21-20-10W	1,000	5,522,353	4 28	Lans.-K. C. Arbuckle...	3,130 3,330
Rickard, 22-18-9W	40	44,710	1	"Wilcox"... Arbuckle...	3,285 3,324
Soeken (a).					
Silica (d).					
Stumps, 4-18-10W	1,200	1,617,151	25	Arbuckle...	3,229
Welch, 2-21-6W	1,500	4,087,020	28	"Chat"....	3,370
Welch North, 23-20-6W	160	30,131	3	"Chat"....	3,334
Wenke, 7-20-10W	300	209,422	7	Arbuckle...	3,360
Wenke West, 18-20-10W	80	10,656	2	Arbuckle...	3,292
Wherry, 11-21-7W	7,200	5,367,561	193	Sooy.....	3,358
Wherry East, 12-21-7W	160	52,128	3	Sooy.....	3,455

Oil and Gas Pools of Rice County—Concluded

POOL AND LOCATION.	Area, acres.	Cumulative production to end of 1939, bbls.	Number wells.	Producing zone.	Depth in feet.
Guldner (gas), 16-18-9W	160	.....	1	Lansing....	2,884
Lyons (gas), 35-19-8W	1,500	2,838,722 M cu. ft. (e)	1 8	Simpson.... Arbuckle...	3,290 3,277
Orth (gas), 27-18-10W	640	460,465 M cu. ft. (e)	3	Lans.-K. C.	2,906
Thurber (gas), 22-21-9W	160	769,577 M cu. ft. (e)	3	Misener....	3,317
Stumps (gas)		28,342 M cu. ft. (e)			

- a. Joined to Chase pool, January, 1940.
b. Joined to Cramm pool, March, 1939.
c. Joined to Bloomer pool, May, 1939.
d. See Barton county.
e. Production in 1939.

present only in the former. This accounts for many an unexpected dry hole, for the Sooy thins remarkably in certain areas. In 1939 drilling continued on a moderate scale, but nevertheless 28 new wells were added to the previous total. This pool had produced 5,367,561 barrels of oil to the end of 1939.

Wherry East Pool.—The Wherry East pool lies about 1 mile east of the main pool. No additional wells were drilled here in 1939.

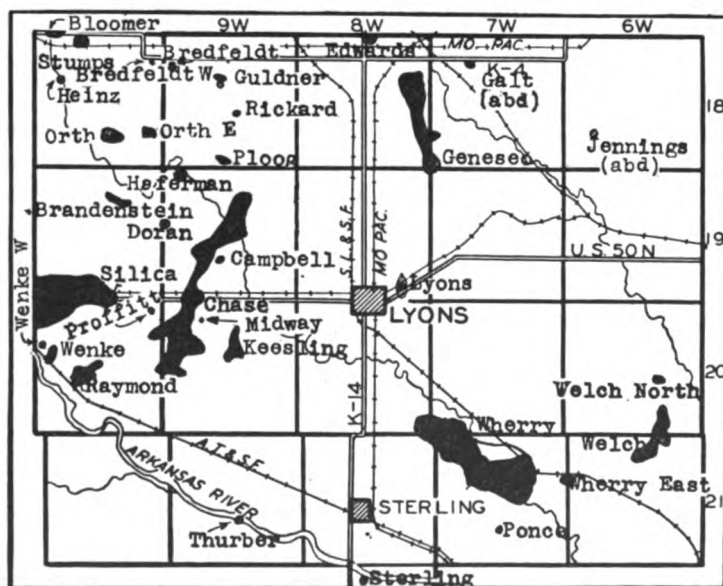


FIG. 21. Map of Rice county.

NEW OIL POOLS

In 1939 three new producing areas were found in Rice county. They have been named the Bredfeldt West, Midway, and Orth East pools.

Bredfeldt West Pool.—The Bredfeldt West pool was discovered in December, 1939, by the Saco Oil Company No. 1 Habiger well, in sec. 12, T. 18 S., R. 10 W. This is more than 0.5 mile west of the lone producer in the original Bredfeldt pool and therefore is entitled to a separate name. In the Habiger well the Topeka limestone was reached at a depth of 2,494 feet, the Lansing limestone at 2,905 feet, and the Arbuckle dolomite at 3,294 feet. The Arbuckle dolomite was saturated to a depth of 3,268 feet, where the well was completed.

Midway Pool.—The new Midway pool is located less than 1 mile east of the Chase pool, less than 1 mile north of the former Cold-water pool, and about 1.5 miles northwest of the Keesling pool, hence the name Midway pool. The discovery well is the Phillips Petroleum Company No. 1 Proffitt well, in the NE $\frac{1}{4}$ sec. 8, T. 20 S., R. 9 W. The Arbuckle dolomite was saturated at a depth of 3,244 feet and the well was finished at a depth of 3,263 feet. Initial potential production was 212 barrels per day.

Orth East Pool.—Late in October, 1939, Fred Jones and Walter Swain drilled the first successful oil well in the Orth East pool. The discovery well is located on the Behnke farm, in sec. 25, T. 18 S., R. 10 W. Gas in numerous upper zones indicated that the well was situated on a favorable structure and this was later corroborated by finding the Stone Corral anhydrite at a depth of 401 feet, the Topeka limestone at 2,450 feet, the Lansing limestone at 2,863 feet, and the Sooy conglomerate at 3,181 feet. Gas was found at depths of 2,865 to 2,870 feet, 2,940 feet, 2,950 feet, and 2,973 feet, all of which zones are in the Lansing-Kansas City limestone. The well failed to find any Paleozoic rocks below the Pennsylvanian basal conglomerate and went directly into the pre-Cambrian quartzite at a depth of 3,198 feet. At a depth of 3,204 feet the crevices of this rock contained sufficient oil to make a commercial well. The producing zone extended from a depth of 3,204 to 3,209 feet, but the well was drilled to a total depth of 3,214 feet. One offset well was drilled immediately on the Culbertson farm to the north. It also proved to be productive from the pre-Cambrian quartzite. The oil has a gravity of 43° A. P. I.

GAS POOLS

Considerable amounts of gas have been found in the various pools of Rice county. In some fields the amount is great enough to justify transportation and distribution, as in the Guldner and Orth pools. In other fields the gas has been found separate and distinct from oil, as in the Lyons, Thurber, and Sterling pools.

In the Guldner pool, one well produces gas from the Lansing limestone at a depth of 2,884 feet. In the Orth pool there are three gas wells, which also produce from the Lansing limestone. They produced 460,000,000 cubic feet of gas in 1939.

The Lyons pool was discovered in 1888 and rediscovered in September, 1937, when the Atlantic Refining Company No. 1 Pulliam well, in sec. 35, T. 19 S., R. 8 W., was completed as a producing well. It was somewhat surprising that the producing zone in this well was the Arbuckle limestone, which unexpectedly contained gas at a depth of 3,277 feet. At only one other place in the state has gas been found in quantity in this formation. Furthermore, the amount, 150,000,000 cubic feet per day, was unexpected. The fact that the gas is sour and must be treated before it can be sold caused some delay in the sale of the gas. A treating plant was erected by the Cities Service Gas Company and in 1938 the gas was admitted to their pipe lines. In 1938 also three other wells were drilled into the Arbuckle producing zone, proving an area of larger size for future exploitation. In 1939 a new producing zone was discovered. The Shell Petroleum Company well on the Wiggins farm in sec. 11, T. 20 S., R. 8 W., produced from the Simpson dolomite at a depth of 3,290 to 3,297 feet. In this well the Arbuckle limestone proved to be barren and the well was plugged back to the Simpson dolomite.

Lyons Pool.—Another interesting development in this part of the county was the finding of commercial quantities of oil in the Lyons pool. The successful well was the Derby Oil Company No. 1 Williams well, in sec. 14, T. 20 S., R. 8 E., which had a potential production exceeding 100 barrels per day from a porous zone in the Simpson dolomite. The dolomite was found at a depth of 3,274 feet and the well was drilled to a total depth of 3,283 feet. This well is located about 1 mile south of the well that produces gas from the Simpson dolomite on the Wiggins farm. Inasmuch as gas was first found in the Lyons pool in 1888, in sec. 34, T. 19 S., R. 8 W., this discovery was not given a new name. The first gas in the Arbuckle dolomite was found in 1937 in the Pulliam well of the Atlantic Re-

fining Company. Inasmuch as some oil from the same well was sold, it constitutes the discovery well for the Lyons oil pool. A contour map of this interesting pool is shown in figure 22.

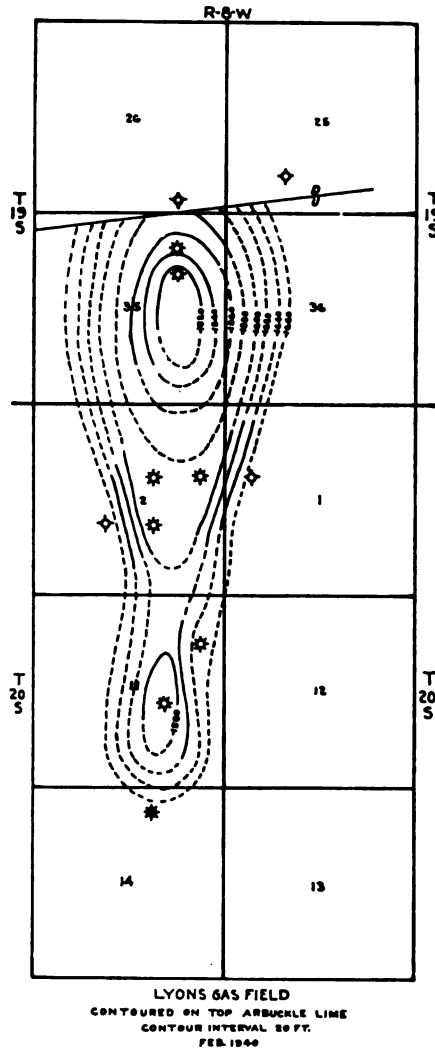


FIG. 22. Contour map of the Lyons pool contoured on the top of the Arbuckle dolomite. (After J. H. Page and A. P. I., Wichita meeting, March, 1940.)

Thurber Pool.—The Thurber Pool is situated in the southern part of the county, 7 miles west of Sterling. It produces gas from the Misener conglomerate at a depth of 3,317 feet. Two dry holes were drilled in an effort to extend the Thurber pool in 1939. The production from this pool in 1939 was 770,000,000 cubic feet. The total production of all gas pools in Rice county during 1939 was 4,097,000,000 cubic feet.

WILDCAT WELLS

Although many dry holes were drilled in Rice county in 1939, only a few of these can be regarded as wildcat wells. Perhaps five should be included under this heading. Because of the close spacing between pools in the county even these are hardly rank wildcats. Nearly all were drilled into the Arbuckle dolomite in order to test all possible producing formations, but none penetrated completely through this formation and information on geological conditions below the Arbuckle dolomite is therefore not increased.

Some of the wells that were deepened in order to be used as salt-water-disposal wells provide additional data on the deep formations of the county. One well of this kind is the Continental Oil Company No. 1 "B" Hamilton well in the Geneseo pool (sec. 19, T. 18 S., R. 7 W.) This well penetrated Arbuckle dolomite at a depth of 3,286 to 4,180 feet. The well is capable of absorbing 200 barrels of water in 35 minutes on vacuum. Another deep salt-water-disposal well was drilled by the same company in the Keesling pool. It is their No. 3 Orla Peterson, in sec. 10, T. 20 S., R. 9 W. This well penetrated the Arbuckle dolomite nearly 800 feet and was completed at a total depth of 4,032 feet.

Rice county stands out as one of the most prolific producing areas in the state. The production for 1939 was 6,824,105 barrels, not including any portion of the production from the Silica pool. This pool occupies approximately four townships, two of which lie in Rice county, but because the discovery well of the pool is located in Barton county, and because the production cannot well be allocated between the counties involved, it has all been assigned to Barton county in this report. The Silica pool produced 4,670,170 barrels in 1939. If half of this be added to the Rice county production, the total for Rice county is 9,159,180 barrels. The cumulative total for the county, not counting the Silica pool, is 46,548,219 barrels. If half of the Silica production be added, the total is 50,251,757 barrels.

ROOKS COUNTY

Nine oil pools have been discovered within the boundaries of Rooks county. They are listed on the accompanying statistical page and were described in Mineral Resources Circulars 10 and 13. In 1939 some wells were drilled in an effort to extend these pools and also to find new ones, but no new pools were discovered. Instead, two pools were abandoned, leaving only seven on the present list. Drilling was active in only three pools, viz., the Laton, Westhusan, and Burnett pools. A map showing distribution of pools in this county is given in figure 23 and a generalized section of the rocks in figure 24.

Laton Pool.—Considerable drilling in the Laton pool, 6 miles north of the Kruse pool, resulted in completion of seven additional producing wells. One of these, the Broadview No. 1 Beardmore well, in section 2, extended the pool 1 mile northward. Its potential production was 500 barrels per day. Another well was drilled by the same company on the Baxter ranch, in the SW $\frac{1}{4}$ sec. 35, T. 8 S., R. 16 W., and its potential production is rated at 250 barrels per day. This well extended the pool another full mile northward into the next township. Like other wells in the Laton pool these new wells derive their oil from the Lansing-Kansas City limestone. To the end of 1939 this pool had produced 353,046 barrels and stands in first place among the pools of Rooks county.

Nyra Pool.—The Nyra pool was abandoned in 1939. The original well in the pool was drilled by Graham and associates on the Fike ranch, in sec. 9, T. 9 S., R. 17 W. It found commercial quantities of oil in the Lansing limestone at a depth of 3,255 to 3,260 feet, and also at 3,302 to 3,326 feet. The oil tested 34° A. P. I. gravity. In 1938 the well was deepened to the Arbuckle dolomite at a depth of 3,498 feet. When that formation was penetrated 9 feet water came into the hole. The well was then plugged back to the original porous zones higher in the hole. No considerable amount of oil was produced from this well.

Stockton and Westhusin Pools.—There was no additional drilling in the Stockton pool, which produces oil from the Lansing limestone. The total production of the Stockton pool amounted to 22,695 barrels at the end of the year. A successful attempt was made to extend the Westhusin pool southeastward. The Trickett well on the Dougherty ranch, in sec. 13, T. 9 S., R. 17 W., reached the Lansing limestone at a depth of 3,142 feet and a porous zone at 3,163 to 3,165

Oil Pools of Rooks County

POOL AND LOCATION.	Area, acres.	Cumulative production to end of 1939, bbls.	Number wells.	Producing zone.	Depth in feet.
Dopita, 31 8-17W	160	77,020	1 4	Lans.-K. C. Arbuckle...	3,212 3,409
Faubion, 12-6-18W	80	33,100	2	Lans.-K. C.	3,128
Kruse, 3-10-16W	40	10,211	1	Lans.-K. C.	3,115
Laton, 11-9-16W	400	353,046	13	Lans.-K. C.	3,228
Nyra (abandoned).					
Stockton, 26-7-17W	160	22,695	2	Lans.-K. C.	3,118
Westhusin, 11-9-17W	400	238,213	9	Lans.-K. C.	3,231
Zurich, 26-10-19W	200	90,699	4	Lans.-K. C.	3,340

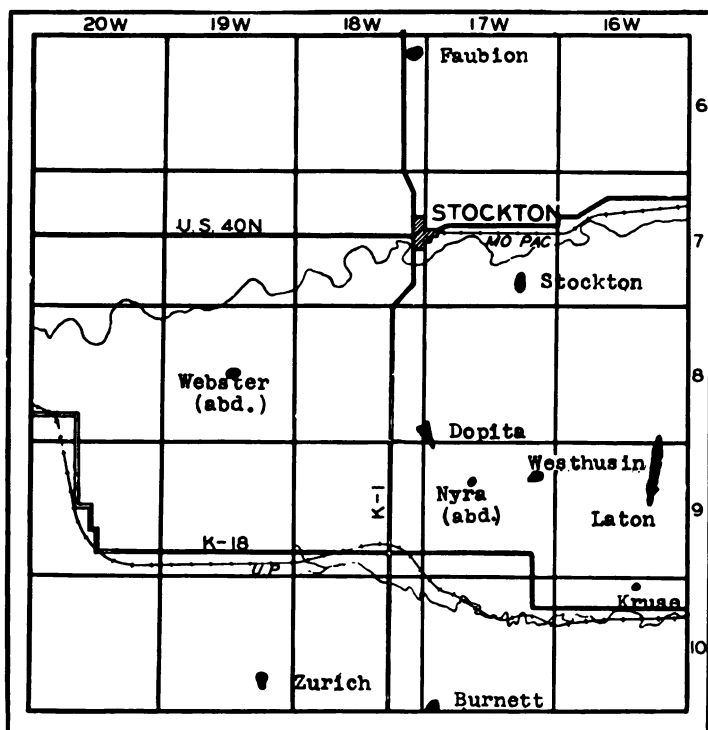


FIG. 23. Map of Rooks county.

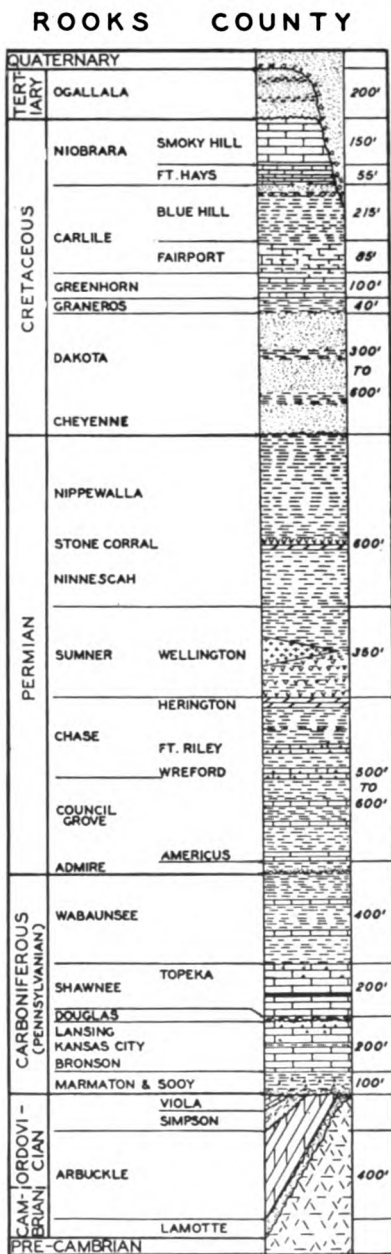


Fig. 24. Columnar section of rocks in Rooks county.

feet, or about 21 feet below the top of the limestone. The other new well was the No. 2 Westhusin in the southeast corner of section 11, close to the original group of wells.

Zurich Pool.—No new producing wells were drilled in the Zurich pool, but one well was abandoned, leaving only four wells producing from the Lansing limestone at the end of the year. One important test well was drilled in sec. 34, T. 10 S., R. 19 W., approximately 1 mile southwest of the pool. In it the Simpson formation was reached at a depth of 3,667 feet, and the Arbuckle dolomite at 3,693 feet. Inasmuch as all zones were dry the well was abandoned at a depth of 3,707 feet.

Burnett Pool.—The Burnett pool lies chiefly in Ellis county, but it extends a short distance into Rooks county. Three additional producing wells were drilled in the Rooks county extension in 1939. The potential production of one of these wells was very large, gauging more than 15,000 barrels per day.

RUSH COUNTY

Drilling activity in Rush county was considerably curtailed in 1939. Only three wells were completed, of which one was an oil well and the other two were dry holes. The accompanying map (figure 25) shows two pools, one of which, the Otis pool, is a combination oil and gas pool, and the other, the Winget pool, is an oil pool.

Otis Pool.—The Otis pool was discovered in March, 1930. The first well was the Morgan Flynn and Glimac Oil Company No. 1 Eitel in sec. 11, T. 18 S., R. 16 W., which produced gas from the Lamotte sandstone at a depth of 3,507 to 3,509 feet. The initial flow of the well measured 16,500,000 cubic feet. The gas, as it comes from the well, contains approximately 24.8 grains of hydrogen sulphide, whereas commercial gas must not contain more than 1.5 grains if it is to be sold to the public. To eliminate the hydrogen sulphide and remove water from the gas, a dehydrating and sweetening plant was built by the Producers Gas Company of Hays. This refinery is situated in sec. 14, T. 18 S., R. 16 W., in Barton county. When the gas leaves the plant, virtually all the water and most of the hydrogen sulphide have been removed. The sourness is about 0.5 grain when the gas enters the transportation lines.

At the end of 1939 there were 57 gas wells in the pool, some of which are located in Barton county, near Albert. Most wells are located in the center of 160-acre plots, but a few of the early wells were located on 40-acre tracts. The field covers an area of approxi-

mately 21 townships, or about 12,000 acres. The open-flow capacity of the wells ranges from 500,000 to 101,000,000 cubic feet. The largest well is the No. 1 Schroyer, in the NW¼ sec. 12, T. 18 S., R. 16 W. The original rock pressure was 1,350 pounds, but this has declined during the last nine years until at the beginning of 1939 it averaged slightly more than 725 pounds. The production has been prorated since January, 1938, according to this formula: acreage times pressure weighted at three-fourths, and open flow weighted at one-fourth of the whole. At the end of 1939 the market demand for dry gas purchased direct from the wells was fixed at 1,170,000,000 cubic feet for the month of January, 1940. The total open-flow potential at that time amounted to 1,093,000,000 cubic feet per day and the acreage involved was set at 9,480 acres. In 1939 the production was 8,062,919,000 cubic feet and the cumulative total to the end of the year was 44,426,000,000 cubic feet. The gas is transported by the Northern Natural Gas Company to its main 26-inch line, which supplies gas to Minneapolis, St. Paul, and other northern cities. Four other purchasers supply local markets. No additional gas wells were completed in 1939. Instead, one gas well was drilled deeper and was later abandoned as a dry hole. This is the No. 1 Jones well in the extreme northwest corner of the producing area, in sec. 35, T. 17 S., R. 16 W. It was deepened from a depth of 3,626 feet to 3,669 feet.

The first oil well in the Otis pool was drilled in August, 1934, by the Mid-Kansas Oil and Gas Company on the Mohr farm, in sec. 10, T. 18 S., R. 16 W., near the northwestern limits of the pool. Another group of oil wells was drilled later around the center of section 23 in the same township. A third group of oil wells clusters around the southwest corner of sec. 30, T. 18 S., R. 15 W., about 1 mile west of the town of Albert. The total number of oil wells at the end of 1939 was 17. The wells produced 445,390 barrels of oil during the year and have produced 1,108,527 barrels since 1934. One

Oil and Gas Pools of Rush County

POOL AND LOCATION.	Area, acres.	Cumulative production to end of 1939, bbls.	Number wells.	Producing zone.	Depth in feet.
Otis, 10-18-16W.....	600	1,108,527	17	Lamotte ...	3,527
Winget, 15-16-16W.....	80	42,329	3 1	Lans.-K. C. Arbuckle...	3,213 3,537
Otis (gas), 11-18-16W.....		44,426,000 Net cu. ft.	57	Lamotte....	3,507

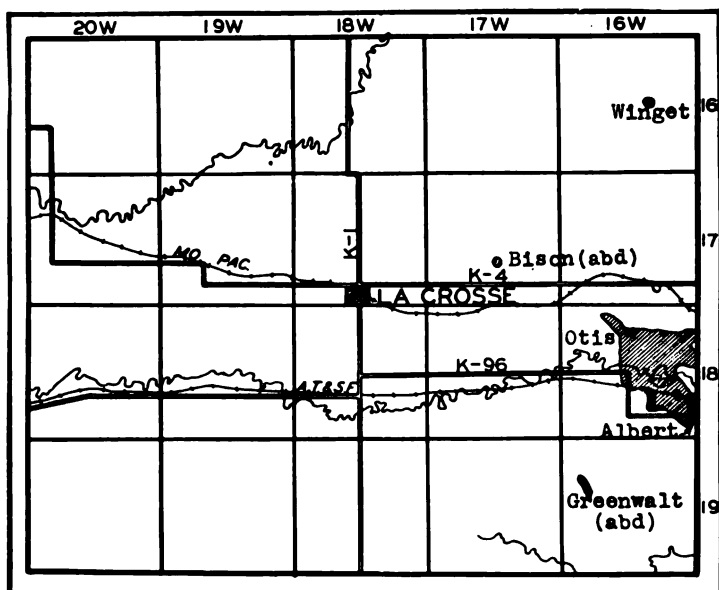


FIG. 25. Map of Rush county.

new oil well was drilled in 1939. It is the No. 1 "B" Hergert in the SW $\frac{1}{4}$ sec. 23, T. 18 S., R. 16 W. A dry hole in the southwest corner of sec. 26, T. 17 S., R. 16 W., was drilled in 1939. In this well the Arbuckle dolomite was reached at a depth of 3,634 feet and the Lamotte sand at 3,682 feet. Total depth was 3,734 feet.

Winget Pool.—The Winget pool was discovered in December, 1936. Schoenfeldt and Kotch drilled the first well in sec. 15, T. 16 S., R. 16 W. It produces from the Lansing limestone at a depth of approximately 3,250 feet. No wells were added to this pool in 1939.

RUSSELL COUNTY

As usual, Russell county is outstanding among the areas in western Kansas because it had the largest number of completed wells (237) in 1939. Among these, 212 were oil wells and 12 were dry holes. Three new pools, the Atherton North, Fairfield North, and Trapp West record the success of wildcat drilling in 1939. Despite this fact, the total number of pools, 28, at the end of the year was 10 fewer than at the end of the preceding year, owing to the fact that many pools were combined as a result of the successful completion of connecting wells. A map of Russell county, showing distribution of oil pools, is given in figure 26.

Inasmuch as the older pools were described in Mineral Resources Circulars 10 and 13, they will not be mentioned here unless important additions or extensions were made. The accompanying table indicates the number of producing wells, the producing zones, and the production of each pool.

Atherton Pool.—The Atherton pool lies a few miles west of the townsite of Russell. The discovery well was drilled in July, 1935, on the Atherton ranch by the McMorro Oil Company, in sec. 30, T. 13 S., R. 14 W. Oil was found in the Arbuckle dolomite at a depth of 3,281 to 3,290 feet. Two years later a second producing zone was found on the ranch in section 32 in the Lansing-Kansas City limestone at a depth of 3,039 feet. By the end of 1938 there were 9 wells producing oil from the Lansing limestone and 10 wells producing from the Arbuckle dolomite. One year later there were 9 Lansing wells and 33 Arbuckle wells. The large increase is due partly to the merging of the Balta and Balta North pools with the Atherton pool and partly to the completion of 22 additional wells.

Atherton North Pool.—The discovery well in the Atherton North pool was drilled on the Dutt ranch in sec. 18, T. 13 S., R. 14 W., by the Cities Service Oil Company. Oil was found in the Arbuckle dolomite at a depth of 3,130 feet. At the end of 1939 no additional wells had been completed, although the discovery well was completed in June.

Big Creek East Pool.—The Big Creek East pool was discovered in 1938. Oil was found in the Arbuckle dolomite on the Solback ranch in sec. 31, T. 14 S., R. 14 W. In 1939 one additional well was drilled to the same producing zone. Another well in the same pool found commercial quantities of oil in the Lansing-Kansas City limestone, thus providing a second producing zone.

Coralena Pools.—In April the successful completion of the Shields No. 1 Gross well, in sec. 5, T. 15 S., R. 13 W., joined the old Coralena pool to the newer Coralena East pool. One month later the Kansas Nomenclature Committee joined the Coralena and Coralena South pools because of the completion of the Coralena Oil Company No. 1 Sellens well, in the northwest corner of sec. 17, T. 15 S., R. 13 W. At a meeting in September the Nomenclature Committee joined the enlarged Coralena pool to the Trapp pool and decided to eliminate the name Coralena. The enlarged Trapp pool then included 17,920 acres. The well that connected the Coralena and Trapp pools was the Gulf No. 1 Everett, in the NE $\frac{1}{4}$ sec. 20, T. 15 S., R. 13 W.

Fairfield North Pool.—The Fairfield North pool was discovered in January, 1939. Wakefield completed an oil well on the Maharg ranch in sec. 16, T. 15 S., R. 13 W. In this well the Lansing-Kansas City limestone was reached at a depth of 3,066 feet and a porous zone was found 30 feet lower. A potential production of 840 barrels per day was measured by the State Corporation Commission. Later this well was deepened to the Arbuckle dolomite where a second porous zone produced oil. The top of the Arbuckle dolomite was reached at a depth of 3,332 feet and the porous zone at 3,339 feet. Later three additional wells were completed, so that two wells were producing from each zone at the end of 1939.

Fairport Pool.—The oldest pool in the county is the Fairport pool, discovered in November, 1923. It had produced 13,812,764 barrels to the end of 1939. At that time there were still 145 producing wells in the pool, which is only 4 fewer than a year previous. Some of the wells in the pool have been deepened to lower zones.

Gorham Pool.—The Gorham pool, 10 miles west of Russell, is the second largest pool with respect to area, quantity of production, and number of producing wells. It holds first place in the number of producing zones, as there are five: the Tarkio limestone, Topeka limestone, Lansing limestone, Gorham sandstone, and Arbuckle dolomite. Most of the 283 wells produce from the Lansing limestone, but many produce from a sandstone below the Lansing limestone. It is called the Gorham sandstone and part of it may be basal Pennsylvanian in age, but in places it is definitely the same as the Reagan sandstone. To the end of 1939 this large area had produced nearly 15,000,000 barrels of oil.

Greenvale Pool.—The first well in the Greenvale pool was the Jones and Shelburne No. 1 Kuhnle, in sec. 4, T. 15 S., R. 12 W. It penetrated porous zones in the Lansing limestone at depths of 2,954 feet and 2,967 to 2,975 feet. After treatment with acid this well had a potential production of 945 barrels per day. An offset well, the No. 1 "A" Kuhnle, failed to produce from the Lansing limestone and was drilled to the Arbuckle dolomite at a depth of 3,267 feet. The porous zone continued downward to a depth of 3,288 feet, where a test showed potential production to be 490 barrels per day. Before the end of 1939 four additional wells were completed in the pool.

Gurney Pool.—This producing area in T. 14 S., R. 14 W., is interesting because oil has been obtained from pre-Cambrian rocks in several wells. The first well to find commercial amounts of oil in

Oil Pools of Russell County

POOL AND LOCATION.	Area, acres.	Cumulative production to end of 1939, bbls.	Number wells.	Producing zone.	Depth in feet.
Allon (a).					
Anshutz, 10-15-13W.....	80	85,637	2	Arbuckle...	3,311
Atherton, 30-13-14W.....	1,800	604,214	9 33	Lans.-K. C. Arbuckle...	3,008 3,284
Atherton North, 18-13-14W.....	40	2,119	1	Arbuckle...	3,130
Balta (b).					
Balta North (b).					
Benso (c).					
Big Creek, 36-14-15W.....	900	1,224,783	2 24 4	Lans.-K. C. Gorham.... Arbuckle...	2,908 3,152 3,171
Big Creek East, 31-14-14W.....	80	20,107	1 2	Lans.-K. C. Arbuckle...	..... 3,149
Boxberger, 36-15-15W.....	160	116,200	4	Lans.-K. C.	3,147
Bunker Hill, 31-13-12W.....	160	53,912	3	Lans.-K. C.	2,965
Coralena (d).					
Coralena East (e).					
Coralena South (f).					
Donovan, 10-15-15W.....	40	26,676	1	Lans.-K. C.	3,193
Dubuque, 34-15-12W.....	160	130,377	2	Arbuckle...	3,275
Eichman, 34-15-13W.....	800	578,315	6	Arbuckle...	3,316
Fairfield, 22-15-13W.....	40	3,831	1	Arbuckle...	3,352
Fairfield North, 16-15-13W.....	80	34,218	2 2	Lans.-K. C. Arbuckle...	3,112 3,332
Fairport, 8-12-15W.....	3,600	13,164,474	145	Lans.-K. C. Gorham....	2,950 3,211
Foster, 19-15-15W.....	40	10,570	1	Lans.-K. C.	3,114
Gideon, 8-15-14W.....				Sooy.....	3,266
Gorham (g), 5-14-15W.....	6,000	14,849,948	1 9 140 2 131	Tarkio.... Topeka.... Lans.-K. C. Arbuckle.... Gorham....	2,525 2,765 3,027 3,289 3,299
Greenvale, 4-15-12W.....	200	65,212	7 1	Lans.-K. C. Arbuckle...	3,040 3,267
Gurney, 23-14-14W.....	2,000	1,371,048	3 61 9 2	Topeka.... Lans.-K. C. Gorham.... Pre-Cambr.	2,675 3,001 3,165
Gurney South (h).					
Hall, 30-14-13W.....	2,000	2,395,522	110 12 1 1	Lans.-K. C. Reagan.... Arbuckle.... Pre-Cambr.	2,985 3,129 3,451 3,156
Hall North (i).					

Oil Pools of Russell County—Concluded

POOL AND LOCATION.	Area, acres.	Cumulative production to end of 1939, bbls.	Number wells.	Producing zone.	Depth in feet.
Karst, 27-15-14W.....	160	145,350	4	Arbuckle...	3,315
Letch (j).					
Letch South (k).					
Michel (h).					
Neidenthal, 23-14-15W.....	600	794,848	10	Arbuckle...	3,246
Russell, 22-13-14W.....	1,200	4,032,396	3	Lans.-K. C.	3,195
			46	Arbuckle...	3,280
Schneider (l).					
Sellens, 26-15-13W.....	1,200	2,205,973	28	Lans.-K. C.	3,088
				Arbuckle...	3,352
Smoky Hill, 2-15-14W.....	80		2	Lans.-K. C.	2,950
Steinert, 21-15-15W.....	40	31,892	1	Lans.-K. C.	3,060
Trapp, 23-15-14W.....	17,920	13,013,806	2	Topeka...	2,889
			46	Lans.-K. C.	3,062
			1	Sooy...	
			500	Arbuckle...	3,252
Trapp West, 15-15-14W.....	160	9,648	3	Arbuckle...	3,249
Vaughn, 17-14-14W.....	1,000	567,831	21	Lans.-K. C.	3,004
			2	Gorham...	3,282
			4	Arbuckle...	
Williamson, 9-14-14W.....	160	38,623	2	Tarkio.....	2,522

- a. Joined to Gurney pool, May, 1939.
- b. Joined to Atherton pool, January, 1940.
- c. Joined to Gorham pool, January, 1940.
- d. Joined to Trapp pool, September, 1939.
- e. Joined to Coralena pool, April, 1939.
- f. Joined to Coralena pool, June, 1939.
- g. Includes Dumlér, Milberger, Peterson and Sullivan.
- h. Joined to Gurney pool, September, 1939.
- i. Joined to Hall pool, 1938.
- j. Joined to Hall pool, August, 1939.
- k. Joined to Hall pool, January, 1940.
- l. Joined to Trapp pool, December, 1939.

this deep zone was the Cities Service No. 1 Ebel well, in section 24, which was completed in July, 1922. It produces oil from granite wash at a depth of 3,258 to 3,263 feet, but the top of the granite wash was reached at a depth of 3,188 feet. All rocks belonging between the Bronson group and the granite wash are absent. The second well to produce from pre-Cambrian rocks was the Stanolind Oil Company No. 2 Rein well in section 25. In 1939 an extremely active drilling campaign was conducted in and adjacent to the Gurney pool. This resulted in completion of 2 additional wells producing from Topeka limestone, 43 from Lansing-Kansas City limestone, and 8 from the Gorham sand. Part of the increase in the number of wells is due to the joining of the Gurney South pool to the main

Gurney pool. The completion of the Alva Billings No. 3 "B" Herbel well in the SW $\frac{1}{4}$ sec. 26, T. 14 S., R. 14 W., proved the connecting link between the pools. The four-well Michel pool was also united with the Gurney pool at the same time.

Hall Pool.—Considerable drilling in the area of the Hall pool resulted in its union with the Letch pool and the Letch South pool to

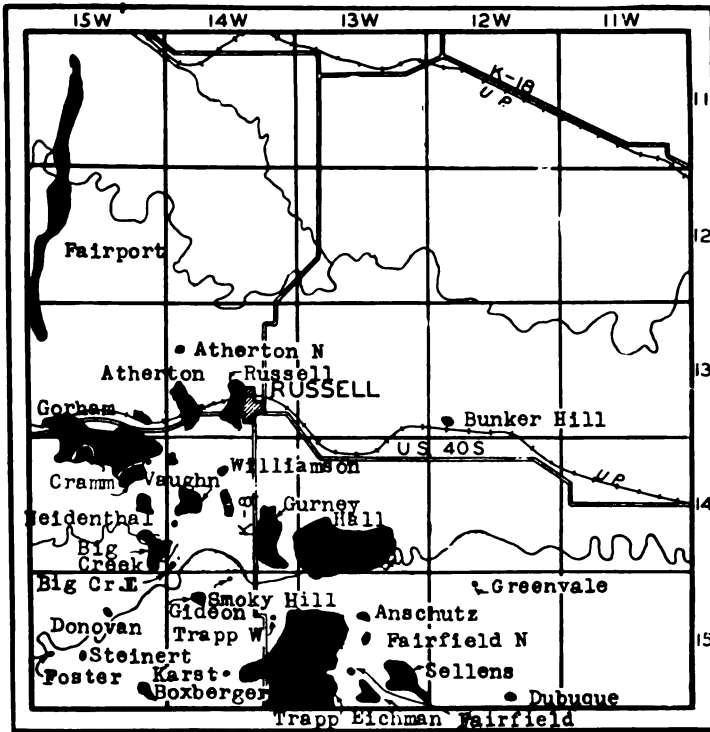


FIG. 26. Map of Russell county.

the eastward. These three pools included 55 wells at the end of 1938. One year later there were 124 in the same area. Oil is obtained from the Lansing limestone, the Arbuckle dolomite, the Reagan sandstone, and the pre-Cambrian granite. In the Skelly Oil Company No. 3 Opdyke well, in sec. 29, T. 14 S., R. 13 W., the Lansing limestone was reached at a depth of 2,873 feet. It proved to be very thin and rested directly upon the pre-Cambrian granite at a depth of 3,141 feet. The granite was somewhat weathered at the top, but fresh below a depth of 3,147 feet. Oil in commercial quantity came into the hole at a depth of 3,156 to 3,181 feet and the well is now producing from that zone. The total depth of the hole is 3,243 feet.

Smoky Hill Pool.—In sec. 2, T. 15 S., R. 14 W., the Coralena Oil Company discovered another new pool in 1938. It was named the Smoky Hill pool. The first well was drilled on the Michel ranch, and produced from the Lansing limestone at a depth of 2,950 to 2,959 feet. The potential production was 1,139 barrels per day. In 1939 a second producing well was drilled in the Smoky Hill pool.

Trapp Pool.—Perhaps the most remarkable pool of western Kansas is the Trapp pool, which is now known to underlie parts of four townships. It is described under Barton county. Because the first well in the Ochs pool (later combined with the Trapp pool) was drilled in Russell county, the statistics pertaining to the Trapp pool are included with that county. Oil is produced from four different zones, the Topeka limestone, Lansing limestone, Sooy conglomerate, and Arbuckle dolomite. The Arbuckle dolomite produces oil in 500 wells and the Lansing in 46 wells. At the end of the previous year there were only 288 wells in the pool. This discrepancy is partly due to the merging of the three original Coralena pools with the Trapp pool in 1939 as already explained.

Trapp West Pool.—The Trapp West pool was discovered in July, 1939. It lies approximately 0.75 mile northwest of the Ochs (now Trapp) pool. The discovery well was drilled by the Phillips Oil Company on the Maier ranch in the NE $\frac{1}{4}$ sec. 15, T. 15 S., R. 14 W. Oil was found in the top zone of the Arbuckle dolomite at a depth of 3,250 to 3,256 feet. Before the end of 1939 two additional wells had been completed.

Production Data.—The production of oil from the many pools in Russell county is impressive; 10,298,012 barrels of oil was marketed in 1939, and the total cumulative production was 55,577,530 barrels to the end of 1939. In this connection it should be recalled that part of the Trapp pool lies in Barton county.

SCOTT COUNTY

The history of oil and gas developments in Scott county was briefly reviewed in Mineral Resources Circulars 10 and 13. The Shallow Water oil pool (figure 27) was described in Circular 10 as it appeared toward the end of 1937. Oil is obtained from the top of the "Mississippi lime" at a depth of approximately 4,665 feet. Two additional wells were completed in this pool in 1938 and none in 1939, so the total number is now eight. One well was deepened without changing its status. The Shallow Water pool produced 257,460 barrels of oil in 1939. The cumulative total production to

the end of 1939 was 749,962 barrels. The oil is taken to Scott City, where it is refined.

The local geology and regional relations of the Shallow Water pool have recently been described fully by George Norton in the 12th Annual Conference Guidebook of the Kansas Geological Society. He states that fossils indicate the age of the producing portion of the Mississippian limestone to be Ste. Genevieve, or middle Mississippian, in age. Crinoidal limestones at the base of the "Mississippi lime" appear to overlie dolomites of Ordovician age. Also, shale that is usually present in the Simpson formation is here represented by calcareous rocks.

Oil Pools of Scott County

POOL AND LOCATION.	Area, acres.	Cumulative production to end of 1939, bbls.	Number wells.	Producing zone.	Depth in feet.
Shallow Water, 15-20-33W.....	600	749,962	8	Miss. lime..	4,670

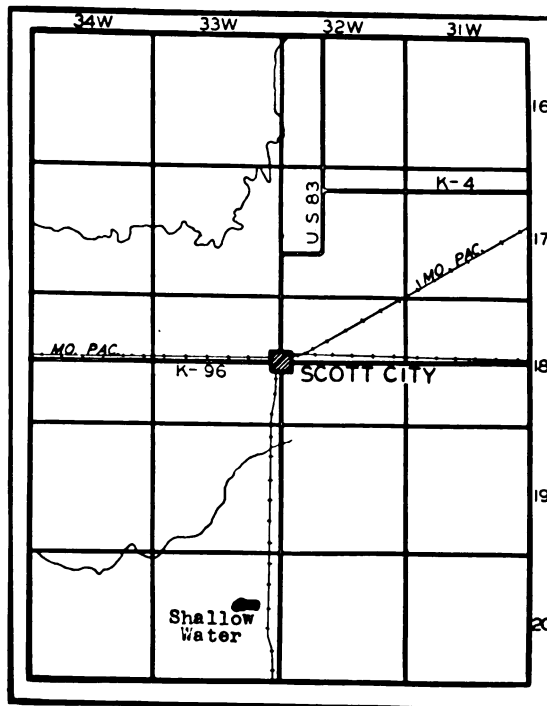


FIG. 27. Map of Scott county.

SEDGWICK COUNTY

At the present time there are ten active oil pools and one gas pool in Sedgwick county. One of these, the North Eastborough pool, was discovered in 1938. No new pools were discovered in 1939. Of the ten test wells drilled in 1939, seven were dry holes, two were oil wells in the Goodrich pool, and one was a small gas well in the Andover South pool. A map of the pools in Sedgwick county is given in figure 28 and a columnar section in figure 29.

Andover South Pool.—The Andover South pool was discovered in November, 1937, when the National Refining Company encountered a flow of gas from the Stalnaker sand in a well on their Downs lease. The discovery well was later deepened to 3,098 feet, at which depth the "Wilcox" sand produced oil. In 1939 one additional test well was drilled in this pool, but it is located in Butler county. It is the No. 3 Elmer Pray well, in sec. 31, T. 27 S., R. 3 E., which yielded 4,000,000 cubic feet of gas from the Stalnaker sand. The top of the sand was reached at a depth of 2,007 feet, but the porous gas zone lies at a depth of 2,020 to 2,026 feet. Potential production from the four gas wells in the Andover South pool is 11,000,000 cubic feet per day.

Eastborough North Pool.—The first well in the Eastborough North pool was drilled by the National Refining Company in the SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 8, T. 27 S., R. 2 E. The geological formations penetrated are similar to those in the Eastborough pool, which lies several miles farther south. An initial production of 460 barrels of oil was obtained from Mississippian basal conglomerate, called the Misener sand. The second well in the pool was completed a few months later at virtually the same depth, but in a lower zone, the Misener dolomite. In the second well the Misener sand was not found. The depth to the producing zone is approximately 3,258 feet. One dry hole was completed in this pool in 1939. It was drilled on the Feik lease by the National Refining Company. In this well the Lansing limestone was reached at a depth of 2,137 feet, the Bronson limestone at 2,484 feet, and the "chat" at 2,943 feet. There was a good show of oil in the "chat" at a depth of 2,960 to 2,967 feet, but water later intruded, making the zone of no commercial value. Later the well was deepened and reached the top of the Viola limestone at a depth of 3,260 feet, the Simpson formation at 3,289 feet, and the Arbuckle dolomite at 3,382 feet. Another hole full of water at 3,395 feet caused the abandonment of the well.

Goodrich Pool.—The Goodrich pool, which was discovered in December, 1928, was extended by two wells, and thus accounted for all the new oil wells drilled in Sedgwick county in 1939. This pool produces from porous zones in the Kansas City limestone, as well as from the Mississippian "chat" and from a deeper rock, which is either the Hunton or Misener dolomite. One of the wells completed in 1939 found oil in this lowest dolomite. There is some difference of opinion about its age, because it is found below typical Chattanooga shale and above a shale that may be Chattanooga or Sylvan. The available evidence favors the conclusion that the lower shale is part of the Chattanooga shale. The dolomite is brownish, sandy, and granular in texture. The second new well in this pool found a porous zone in the Lansing limestone at a depth of 2,280 feet. Inasmuch as this zone is considerably higher than the Kansas City zone previously found to be productive, it constitutes a new producing zone for the pool, making a total of four. The large potential production of this well, 1,975 barrels, caused two other wells to be drilled in sec. 21, T. 25 S., R. 1 E. Both were abandoned as dry holes, although one was an offset well and the second located only one-eighth of a mile from the producing well.

Oil and Gas Pools of Sedgwick County

POOL AND LOCATION.	Area, acres.	Cumulative production to end of 1939, bbls.	Number wells.	Producing zone.	Depth in feet.
Andover South, 36-27-2E.....	80	15,372	1	"Wilcox"....	3,098
Bentley, 19-25-1W.....				Lans.-K. C.	2,911
Cross, 27-25-1W.....	160	66,210	2	Lans.-K. C.	2,690
Eastborough, 19-29-2E.....	1,000	7,691,661	47	"Chat".....	2,956
				Viola.....	3,258
Eastborough North, 8-27-2E.....	80	3,881	2	Viola.....	3,258
Goodrich, 16-25-1E.....	640	2,413,200	34	Lans.-K. C.	2,614
				"Chat".....	3,010
				Misener.....	3,334
Greenwich, 14-26-2E.....	700	6,036,162	43	"Chat".....	2,865
				Viola.....	3,321
				"Wilcox"....	
Kuske, 24-25-1E.....	40	135,340	1	Burgess.....	3,489
Oatville, 18-28-1E.....	40	8,370	1	"Wilcox"....	3,489
Robbins, 20-28-1E.....	420	2,777,847	51	"Chat".....	3,090
Valley Center, 1-26-1W.....	1,500	19,537,909	70	Lans.-K. C.	2,579
				Misener.....	3,368
				Viola.....	3,366
Derby (gas), 32-28-2E.....		648,758	1	Stalnaker....	2,215
		M cu. ft. (a)			

a. Production in 1939.

Robbins and Valley Center Pools.—The Robbins pool, which lies 8 miles south of Wichita, has evidently passed the peak and started on the downward side of its production curve. In 1939 five wells were abandoned, but the production of the remaining wells is still satisfactory.

The Valley Center pool also is depleted and is approaching abandonment. In 1939 eight wells were abandoned. The production for the year was 322,495 barrels.

Wildcat Wells.—Only four wildcat wells were drilled in 1939 and none of these was located far from a producing area. In sec. 6, T. 25 S., R. 2 E., in the northeastern township of the county, a test well on the Evans farm was dry and was abandoned at a depth of 3,608 feet. It was drilled on the Kuske trend and penetrated all possible producing zones down to the Arbuckle dolomite, the top of which was found at a depth of 3,574 feet.

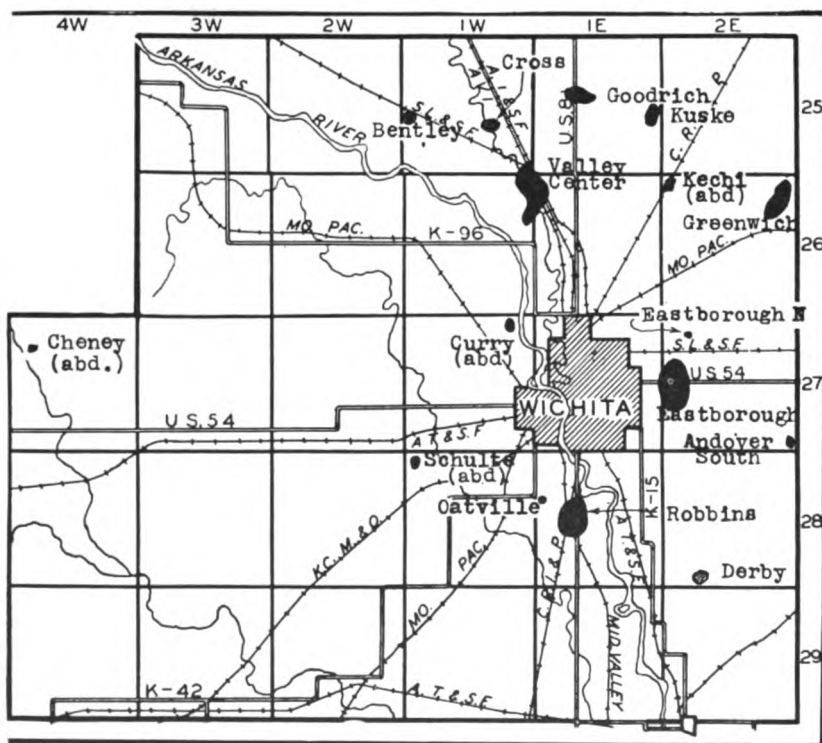


FIG. 28. Map of Sedgwick county.

SEDGWICK COUNTY

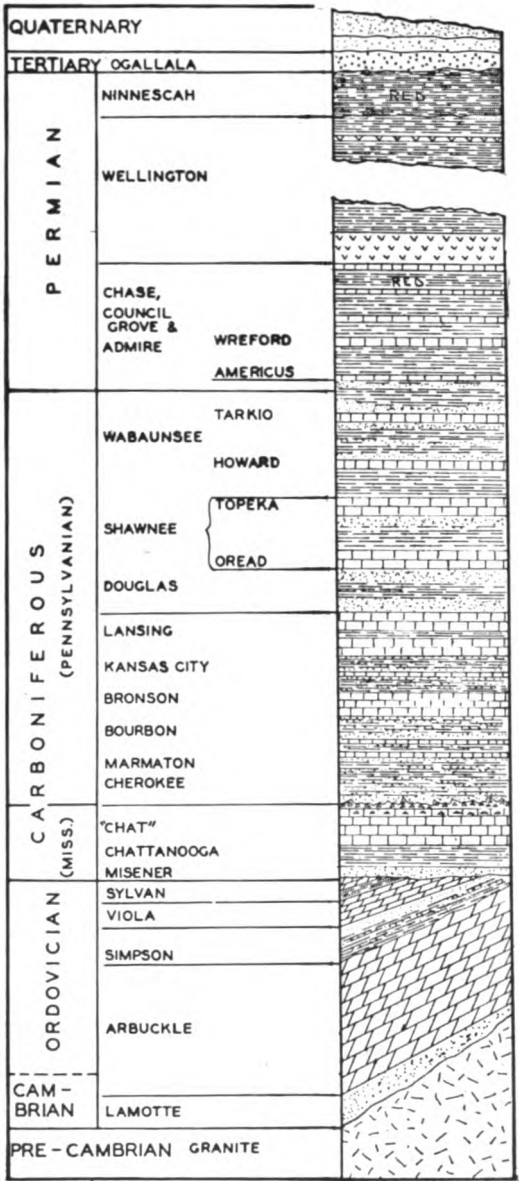


Fig. 29. Columnar section of rocks in Sedgwick county.

An interesting test well was drilled in sec. 25, T. 26 S., R. 1 E., on the Fisher farm. This well was favorably located on geologic structure, but was abandoned when water entered the well from the top of the Mississippian limestone at a depth of 3,029 feet. This well reached the Lansing limestone at a depth of 2,595 feet and a porous zone at 2,645 to 2,658 feet. Only water was present in this upper porous zone.

In T. 28 S., R. 2 E. two test wells were drilled. One of these was the Cameron and Spencer No. 1 Fields in sec. 4. It reached the Bronson limestone at a depth of 2,516 feet, the Mississippi limestone at 2,980 feet, and the Simpson formation at 3,296 feet. A hole full of water caused abandonment of the well in the "Wilcox" sand at a depth of 3,312 feet. The second test well was the Dickey No. 1 Schweitzer well, in section 32. It was an incomplete test, inasmuch as it was abandoned at a depth of 2,604 feet. This well was located just west of the Derby gas field and failed to find commercial quantities of gas in the Stalnaker sand, which produces in the Derby pool.

STAFFORD COUNTY

Stafford county, prominent in 1938 because of the large number of new pools discovered, settled down to routine drilling in 1939. Of the total of 89 wells drilled, only 12 were dry holes. Most of the new oil wells were completed in the sensational Zenith pool, situated in the southeastern part of the county. In this pool alone 70 wells were drilled. The distribution of Stafford county pools is shown in figure 30.

In the Fisher pool two additional wells producing from Arbuckle dolomite were drilled. The drilling of six new wells in the Leesburgh pool brought the total to seven.

Max Pool.—The Max pool was discovered in 1938. The Rowley No. 1 Max Sittner well found oil in a porous zone of the Arbuckle dolomite at a depth of 3,570 to 3,575 feet. In 1939 two more wells were completed, one of which produced oil from the Arbuckle dolomite. The other was drilled into the Arbuckle dolomite, but found only water, so it was plugged back to a porous zone 26 feet below the top of the Lansing limestone, at a depth of 3,356 to 3,372 feet, and was treated with 1,000 gallons of acid. Its potential production was 880 barrels per day. It is interesting to note that this well, the No. 1 Teichmann, presumably found a sinkhole in the Arbuckle dolomite, inasmuch as the top of the dolomite was found at a depth nearly 100 feet lower than in the offset well on the Max Sittner farm.

Sittner South Pool.—The first well in the Sittner South pool was the Stanolind Oil Company No. 2 Siefkes well, in sec. 3, T. 22 S., R. 12 W. Oil was found in the Arbuckle dolomite at a depth of 3,594 to 3,595 feet. Potential production of 2,221 barrels of 42° gravity oil indicates the presence of a large reserve in this part of the county. The well was treated with 3,000 gallons of hydrochloric acid before the final tests were made. In 1939 five oil wells were added in this pool. The northernmost well in the pool is located in sec. 34, T. 21 S., R. 12 W., scarcely a mile from the easternmost wells in the Sittner pool. The presence of two dry holes between the pools indicates that they are separate pools entitled to be listed separately. The Max pool lies about 1 mile northeast of the Sittner South pool, and there are no dry holes between them.

Oil Pools of Stafford County

POOL AND LOCATION.	Area, acres.	Cumulative production to end of 1939, bbls.	Number wells.	Producing zone.	Depth in feet.
Bonham, 28-25-12W.....				Arbuckle...	4,210
Drach, 12-22-13W.....	800	139,178	9	Arbuckle...	3,693
Fischer, 31-21-12W.....	120	37,714	5	Arbuckle...	3,641
Gates, 27-21-13W.....	640	489,118	11	Arbuckle...	3,679
Jordan, 15-25-14W.....	160	130,427	4	Lans.-K. C.	3,722
Kipp, 27-25-14W.....	80	57,601	2	Lans.-K. C.	.....
Leesburgh, 12-25-13W.....	300	26,832	7	Arbuckle...	4,153
Max, 35-21-12W.....	80	17,533	1 2	Lans.-K. C. Arbuckle...	3,356 3,570
Mueller, 29-21-12W.....	80	.....	2	Arbuckle...	3,594
Rattlesnake, 13-24-14W.....	40	11,089	1	Lans.-K. C.	3,608
Richardson, 36-22-12W.....	1,200	3,365,966	59	Arbuckle...	3,537
St. John, 23-24-13W.....	1,200	527,128	19	Lans.-K. C. Arbuckle...	3,588 4,075
Sittner, 33-21-12W.....	600	174,931	2 4	Lans.-K. C. Arbuckle...	3,278 3,600
Sittner South, 3-22-12W.....	240	31,669	6	Arbuckle...	3,594
Snider, 3-21-11W.....	320	141,770	4 1 3	Lans.-K. C. Simpson.... Arbuckle...	..... 3,362 3,324
Snider South, 16-21-11W.....	80	12,429	2	Arbuckle...	3,402
Zenith, 23-24-11W.....	4,000	1,671,536	167	Misener....	3,804

Snider South Pool.—The Snider South pool (16-21-11W) was opened in August, 1938, by the Cities Service Oil Company No. 1 Smith "B" well, which produced at the rate of 412 barrels per day from a porous zone in the Arbuckle dolomite at a depth of 3,402 to 3,409 feet. The gravity of the oil is 35° A. P. I. Another well was drilled in the Snider South pool in 1939.

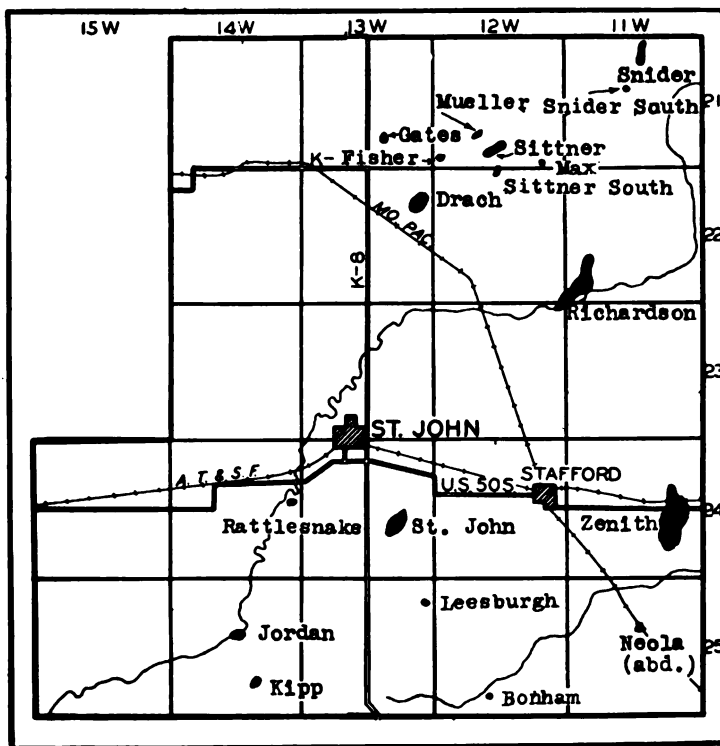


FIG. 30. Map of Stafford county.

Zenith Pool.—The most remarkable pool in the county is the Zenith pool, situated in the southeastern part of T. 25 S., R. 11 W., near the town of Zenith. It was discovered in September, 1937, by the Stanolind Oil Company No. 1 M. Hartnett well. Somewhat unexpectedly oil was found in a sandstone below the Kinderhook shale, at a depth of 3,801 to 3,807 feet. For some time considerable doubt existed as to the identity of the sand, many operators believing that it must be the "Wilcox" or Simpson sandstone. Before the end of the year, however, a dry hole at the edge of the field

penetrated a succession of beds below the sand, and dispelled any doubt about its age being the same as that of the Misener sand found farther east in the state. This particular patch of Misener sand is nevertheless somewhat exceptional in that it is a relatively pure sand, and also in that it is moderately thick (28 feet maximum). It seemingly fills a depression in the Ordovician rocks and has the shape of a lense. Also remarkable is the occurrence of water in some wells near the center of pool under conditions that indicate that it is trapped fossil sea water, which has not migrated very far. In 1939 this pool was extended in several directions, especially northeastward and westward. Drilling was particularly active in sec. 13, T. 24 S., R. 11 W., but many wells were drilled in section 11 and some in section 24. In an attempt to extend the pool northeastward into Reno county, Landon drilled a test well in the southwest corner of sec. 7, T. 24 S., R. 10 W. The Misener sand was found at a depth of 3,775 feet, but proved to be dry. The Zenith pool now has 167 producing wells and had produced 1,671,563 barrels of oil to the end of 1939.

Exploratory Wells.—Among the 12 dry holes drilled in Stafford county, 9 were important because they indicated definite limits to known pools or because they revealed new geological data. In sec. 1, T. 21 S., R. 13 W., Seaney and Clampitt drilled a test well on the Brown ranch. In this well the Lansing limestone was reached at a depth of 3,243 feet, the Sooy conglomerate at 3,462 feet, the Simpson formation at 3,492 feet, and the Arbuckle dolomite at 3,509 feet. A porous zone in the Arbuckle dolomite at a depth of 3,509 to 3,514 feet did not produce enough oil to make a commercial well.

Southeast of the Rattlesnake pool Lauck & Monereif drilled a test well on the McConnaughy ranch, in sec. 18, T. 24 S., R. 13 W. In this well the Lansing limestone was reached at a depth of 3,590 feet, the Simpson formation at 4,157 feet, and the Arbuckle dolomite at 4,211 feet. The well was drilled to a depth of 4,234 feet and plugged back to a porous zone in the Lansing-Kansas City limestone at a depth of 3,672 to 3,797 feet. The amount of oil from this zone was not sufficient to make a commercial well. Another dry hole northeast of the same pool was drilled by the Atlantic Refining Company on the Porter ranch in sec. 11, T. 24 S., R. 14 W.

An interesting test well was drilled by E. H. Moore on the Secrest farm in sec. 21, T. 25 S., R. 11 W., 5 miles south of the Zenith pool. In this well the Lansing limestone was reached at a depth of 3,495 feet, the Mississippian limestone at 3,845 feet, the Viola limestone

at 3,987 feet, the "Wilcox" sand at 4,110 feet, and the Arbuckle dolomite at 4,157 feet. The hole was abandoned at a depth of 4,165 feet.

STEVENS COUNTY

The geology of Stevens county was described in Mineral Resources Circular 10, and the history of the Hugoton gas field to the end of 1937 was reviewed. In 1939 an additional five wells were drilled in the Stevens county portion of this large gas reserve. A map of the proved gas-producing area (shaded) is given in figure 31. A generalized section of the rocks penetrated in southwestern Kansas is shown in figure 32. Most of these wells were drilled deep enough to test adequately the gas-producing possibilities of the Wreford cherty limestone. The base of this limestone lies at depths averaging 2,850 feet. Some of the wells produced a large amount of gas from the upper part of the Fort Riley limestone at a depth of about 2,600 feet. A few wells were drilled to the base of the Wreford limestone and then plugged back to the Fort Riley limestone. A list of all wells in the county completed in 1939 follows:

Wells Completed in 1939 in Stevens County

NAME AND LOCATION.	Open flow capacity (M cu. ft.).	Total depth, feet.
Central Utilities No. 1 McClure, 34-31-38.....	28,000	2,525
Panhandle Eastern No. 1 McClure, 4-32-38.....	18,543	2,715
Stevens County O. & G. No. 1 Brubaker, 34-33-37.....	21,600	2,777
United Producing No. 1 Gregory, 1-33-39.....	29,000	2,628
Stevens County O. & G. No. 1 "A" Burrows, 22-34-38.....	Dry	*1,374
Stevens County O. & G. No. 1 Beavers, 23-34-38.....	18,544	2,715

* Incomplete test.

At the end of 1939 the Hugoton field included approximately 2,000,000 acres. In the Kansas portion of the area there were 283 wells, of which 22 were not provided with pipe-line connections and therefore were not producing. Most of the wells are located in Stevens county, but there are some in eastern Morton, western Seward, Grant, Haskell, southwestern Finney, and southeastern Kearny counties. The pressure of the gas at the wellhead was remarkably uniform over this large area. Most of the wells had a pressure of approximately 410 pounds, but in exceptional wells the pressure was 435 pounds in connected wells and 445 pounds in un-

connected wells. Very few wells showed a pressure less than 395 pounds and in only one was it less than 390 pounds. Most of the wells are spaced one well to 640 acres, but there are small areas in which the spacing is somewhat closer. The flow of the wells is prorated by the State Corporation Commission. For January, 1939, the allowable for the whole field was 2,633,000 000 cubic feet, compared with a total open-flow capacity of 1,863,212,000 cubic feet per day. The production for 1939 was 28,964,493,000 cubic feet, and the cumulative total reached 188,964,000,000 cubic feet.

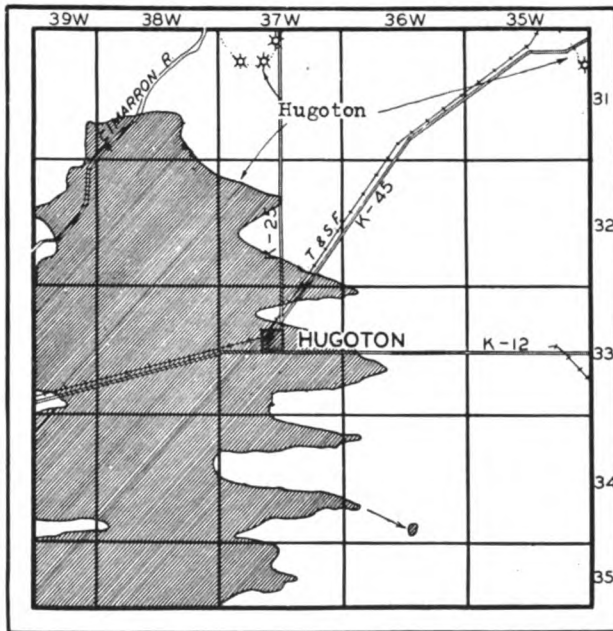


FIG. 31. Map of Stevens county.

The gas of the Hugoton pool is a sweet gas and its average heat content is between 1,000 and 1,025 B.t.u. per cubic foot. An average of 0.4 gallon of gasoline per thousand cubic feet of gas is extracted by the absorption process. Approximately 3,000,000 cubic feet of gas per day is burned by the Peerless Carbon Black Company. The United Carbon Company is now building a plant near the town of Ryus. J. H. Page, the gas expert of the State Corporation Commission, estimates the gas reserve in Kansas at 13,750,000,000,000 cubic feet. The 175,000,000,000 cubic feet produced to the end of 1939 constitutes less than 2 percent of the original recoverable gas reserve.

SOUTHWEST KANSAS

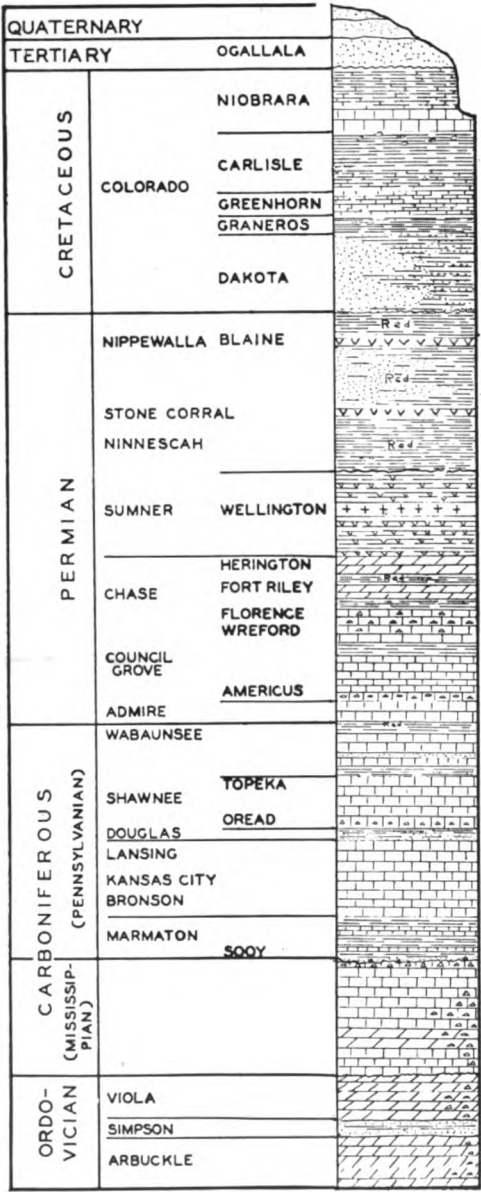


FIG. 32. Columnar section of rocks in Hugoton region.

In recent years the use of acid has been increasing. The wells listed were all treated with 1,000 to 10,000 gallons of acid. To illustrate the effectiveness of this treatment the No. 1 Gregory well is cited. When originally completed in October it produced 11,000,-000 cubic feet per day. After the well was treated with 8,000 gallons of acid the production increased to 29,000,000 cubic feet per day.

SUMNER COUNTY

In 1939 only 13 wells were drilled in Sumner county. Of these, five new oil wells in the Latta pool, one additional oil well in the Rainbow Bend West pool, and two new oil wells in the Wellington pool were productive. Five dry holes were drilled. In several old pools some wells were abandoned, as at Oxford, Oxford West, and Padgett. Otherwise the list of pools and wells is similar to the list published in Mineral Resources Circular 13 (see figure 33).

Latta Pool.—The Latta pool was discovered in June, 1927. The Champlin Refining Company No. 1 Latta well, in sec. 9, T. 30 S., R. 2 W., produced oil from the Bronson limestone at a depth of 3,042 to 3,046 feet. In October of the same year the No. 1 "B" Latta well found a porous zone filled with gas in the Topeka limestone at a depth of 2,015 to 2,031 feet. Later other wells found another oil zone in the Bronson limestone about 175 feet below the top of the formation. The successful completion of 5 new wells in this pool in 1939 increased the total to 12 at the end of the year. Most of these produce from the upper porous zone of the Bronson limestone. During 1939 the Latta pool produced 1,775 barrels of oil, increasing the cumulative total to 42,232 barrels.

Exploratory Wells.—Among the five dry holes drilled in Sumner county several are interesting because they reveal new geological data. One rank wildcat well was drilled in sec. 16, T. 30 S., R. 1 W., by Shawver on the Hitchcock farm. It tested the Lansing limestone, the top of which was found at a depth of 3,560 feet. The hole was abandoned at a depth of 3,625 feet, without testing the lower possible producing zones.

North of the Rutter field and northeast of the abandoned Tate pool the Stelbar Oil Company No. 1 Potucek well got a very favorable show of oil from the Ordovician "Wilcox" sand at a depth of 3,435 to 3,440 feet, but the quantity of oil was not sufficient to make a commercial producing well, so the well was abandoned at a depth of 3,500 feet. Nearby and in the same section the Shawver

Oil and Gas Pools of Sumner County

POOL AND LOCATION.	Area, acres.	Cumulative production to end of 1939, bbls.	Number wells.	Producing zone.	Depth in feet.
Anness, 2-30-4E.....	40	29,298	1	"Wilcox"...	4,394
Caldwell, 17-35-3W.....	160	1,276,200	4	"Wilcox"...	4,765
Churchill, 25-31-2E.....	1,000	18,143,957	69	Stalnaker...	1,820
Latta, 9-30-2W.....	200	42,232	12	Lans.-K. C. Lans.-K. C.	3,042 3,200
Oxford, 23-32-2E.....	800	14,033,175	13 6 40	Stalnaker... Layton... Arbuckle...	2,020 2,890
Oxford West, 17-32-2E.....	160	475,874	3	Arbuckle...	.....
Padgett, 23-34-2E.....	1,800	1,770,638	20	"Chat"....	3,474
Rainbow Bend West, 24-33-2E.....	160	.....	3	Burbank... Arbuckle...	..... .....
Rutter, 21-33-2E.....	40	39,241	1	"Chat"....	3,315
Vernon North, 15-35-2E.....	200	182,466	5	"Chat"....	3,443
Wellington, 33-31-1W.....	1,200	3,989,202	99	"Chat"....	3,655
Zyba, 7-30-1E.....	40	4,704	1	"Wilcox"...	3,866
Wellington (gas), 33-31-1W.....	.....	828,063 M cu. ft. (a)	.....	"Chat"....	3,655
Padgett (gas).....	.....	166,262 M cu. ft. (a)	.....	.....	.....

a. Production in 1939.

No. 1 Nice well, in sec. 16, T. 32 S., R. 2 E., also proved to be a dry hole. In this well the Mississippian "chat" was reached at a depth of 3,240 feet and the Mississippian limestone at 3,265 feet, and 25 feet lower a porous zone yielded considerable oil. The "Wilcox" sandstone was reached at a depth of 3,418 feet, but contained only water. Arbuckle dolomite was reached at a depth of 3,500 feet and the total depth of the well was 3,565 feet.

Several miles west of the Padgett field a deep test well was drilled by Burke Greiss on the Seyfert farm in sec. 18, T. 34 S., R. 2 E. The Mississippian "chat" was reached at a depth of 3,482 feet, the limestone at 3,561 feet, the Simpson green shale and sandstone at 3,860 feet, and the Arbuckle dolomite at 3,938 feet. The well was abandoned at a depth of 3,960 feet, no important shows of oil or gas having been found. Southwest of the Padgett pool a test well in sec. 9, T. 35 S., R. 2 E., was drilled by Palmer on the Lawson lease. In this well the Arbuckle dolomite was reached at a depth of 3,654 feet and was penetrated a distance of 16 feet before the well was abandoned.

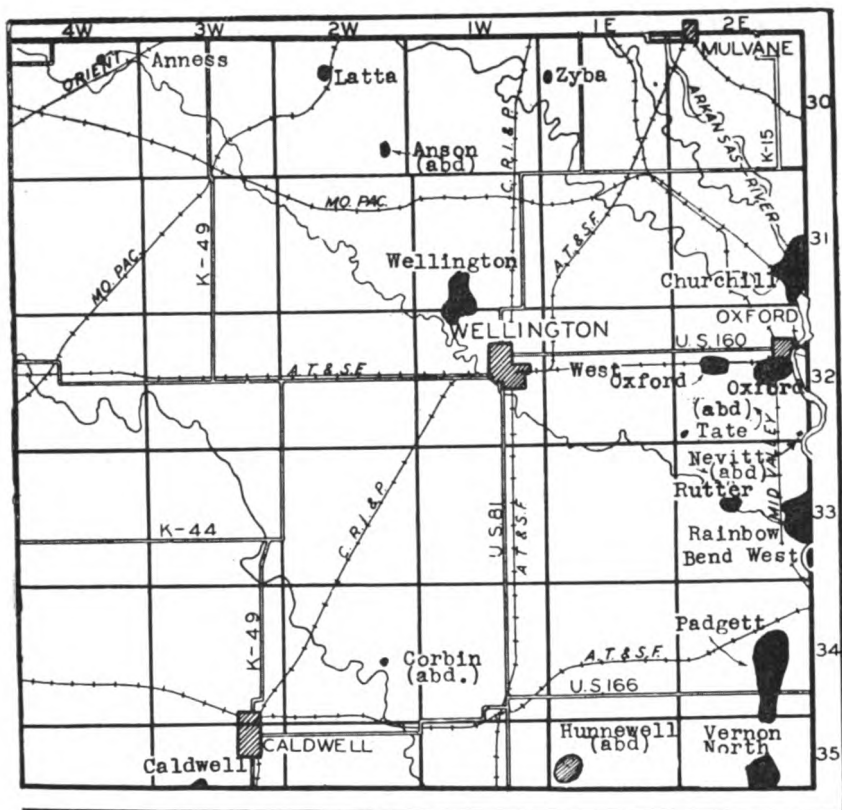


FIG. 33. Map of Sumner county.

TREGO COUNTY

Trego county has been explored for possible oil pools since 1923. The first commercial oil well was drilled in sec. 20, T. 13 S., R. 21 W., by the Central Commercial Oil Company on the King ranch. Before abandonment, this well produced 14,883 barrels. No other wells were successfully completed in the vicinity of this well. The location of oil-producing areas in Trego county is shown in figure 34.

Gugler Pool.—A second pool was discovered about four miles northeast of the Rega pool. Here the York State Oil Company opened the Gugler pool in December, 1936, when they found commercial quantities of oil in the Arbuckle dolomite at a depth of 3,830 feet. The small total production of 14,188 barrels to the end of 1939 has discouraged further drilling in this pool.

Wakeeney Pool.—This pool, in the northern part of the county, was opened in August, 1934, by the Alma Petroleum Company. The first well, drilled on the Rhodes estate, in sec. 14, T. 11 S., R. 23 W., found oil in the Lansing limestone at a depth of 3,619 feet. Subsequently 14 other wells were drilled, 11 of which were completed as producing wells. No wells were added in 1939. During 1939 the yield from this pool was 39,000 barrels. The cumulative total to the end of 1939 is 340,670 barrels.

Oil Pools of Trego County

POOL AND LOCATION.	Area, acres.	Cumulative production to end of 1939, bbls.	Number wells.	Producing zone.	Depth in feet.
Gugler, 36-12-21W.....	40	14,188	1	Arbuckle...	3,830
Wakeeney, 14-11-23W.....		340,670	12	Lans.-K. C.	3,619

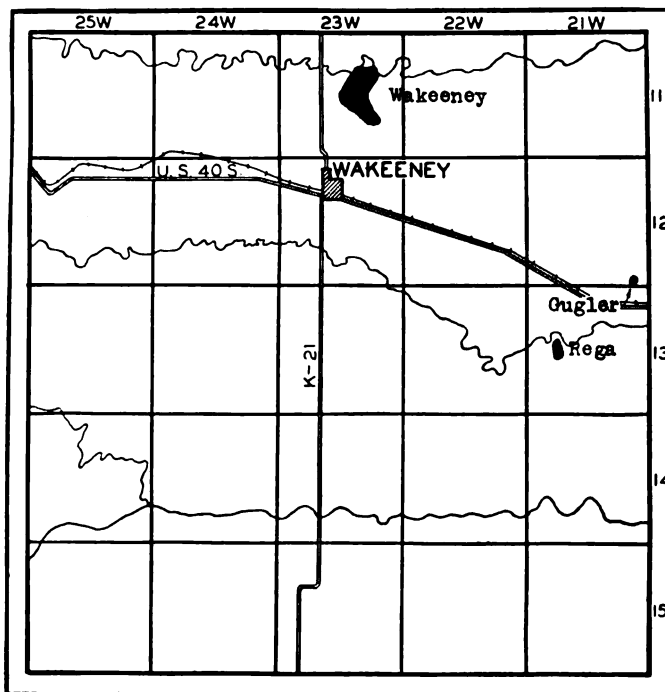


FIG. 34. Map of Trego county.

IMPORTANT WILDCAT WELLS

In 1939 several important wildcat wells were completed at widely scattered points in western Kansas. Some of these, such as the Duwe and Farris No. 1 Kimmenau well in Kingman county, and the Patton Drilling Company No. 1 Hoss well in Barber county, have been discussed under the heading of the county. In addition to these, there were test wells drilled in Comanche, Gray, Kiowa, Norton, Ottawa, Phillips, Saline, Sheridan, and Sherman counties.

Comanche County.—The Indian Territory Illuminating Oil Company finished a very interesting well in Comanche county in September. This well was drilled in sec. 25, T. 34 S., R. 16 W., on the McMoran farm. The Wellington shale of Permian age was reached at a depth of 1,400 feet, the Herington limestone at 2,290 feet, the base of the Americus limestone at 2,960 feet, the Topeka limestone at 3,720 feet, a prominent sandstone at 4,080 to 4,110 feet, and another at 4,330 feet just above the top of the Lansing limestone, which was reached at 4,368 feet. A great deal of black shale appeared in the cuttings from 4,680 feet to the top of the Mississippian rocks at approximately 5,020 feet. Finely crystalline dolomite and much tripolitic chert extended to a depth of 5,220 feet. The Ordovician rocks seem to have been reached at a depth of about 5,425 feet, and consist of limestone similar to the Viola limestone found in that part of Kansas. A dolomite interpreted as the Simpson dolomite was reached at a depth of 5,590 to 5,640 feet. The usual sandstone ("Wilcox") and green shale of the Simpson formation was found at a depth of 5,640 to 5,764 feet, and these beds were underlain by the Arbuckle dolomite. Except for a show of gas at a depth of 4,783 to 4,790 feet, no indications of oil or gas were found.

Gray County.—In Gray county an interesting test well was drilled by the Champlin Refining Company on the Becker ranch in sec. 34, T. 28 S., R. 29 W., not far from the town of Montezuma. In this well the Blaine gypsum was reached at a depth of 1,040 feet, the Cedar Hills formation at 1,270 feet, the Stone Corral anhydrite at 1,720 feet, the Wellington shale at 2,010 feet, the "Big Blue" dolomites, which correlate with the producing zones at Hugoton, at 2,620 feet (Herington limestone) to 3,220 feet (base of the Americus limestone). Of the Pennsylvanian rocks, the Topeka limestone was reached at a depth of 3,690 feet, the Douglas group at 4,070 feet, the Lansing limestone at 4,120 feet, the Marmaton shale at 4,410 feet,

and Cherokee shales at 4,740 feet, resting upon the Mississippian oölitic limestone at a depth of 4,810 feet. The crystalline limestone of the Ordovician Viola formation was reached at a depth of 5,356 feet, the Simpson green shale at 5,477 feet, and the Arbuckle dolomite at 5,635 feet. This formation proved to be very thick, as it still appeared in well cuttings at the total depth of 6,505 feet. Throughout the 870 feet of Arbuckle there are zones of chert and of sand, which suggest that the well started in the equivalent of the Cotter or Jefferson City dolomites of the Missouri section. The well was abandoned as a dry hole in July 1939.

Kiowa County.—In Kiowa county a deep test well was drilled by the Sinclair Refining Company on the Price ranch in sec. 22, T. 28 S., R. 20 W. The well started in alluvium and passed through a portion of the Comanchean series at a depth of 110 to 330 feet. The Cimarron redbeds were reached at a depth of 330 feet and were penetrated to approximately 1,620 feet, the Blaine gypsum being reached at 490 feet and the Stone Corral dolomite at 1,242 feet. The Wellington shales seemingly contain some chalky limestones and some sandstones in this area. The Herington dolomite was reached at a depth of 2,470 feet, the Fort Riley limestone at 2,700 feet, and the base of the Americus limestone at 3,020 feet. Of the Pennsylvanian rocks, the Douglas group was reached at a depth of 4,220 feet, and the Lansing limestone at 4,315 feet. The top of the Mississippian rocks was reached at a depth of 4,910 feet, below which considerable dolomite and chert appeared in the cuttings. The dark shales of the Kinderhook were reached at a depth of 5,290 feet, the Viola cherty limestone at 5,360 feet, the "Wilcox" sandstone of the Simpson formation at 5,498 feet, and the green shale at 5,520 feet. The first fragments of the Arbuckle dolomite appeared in the cuttings from a depth of 5,535 feet. It proved to be a somewhat cherty dolomite and extended to the total depth of 5,800 feet. The well was abandoned as a dry hole in July, 1939.

Norton County.—In the northwestern part of the state, a commercial oil well was completed in June by the Power Oil Company on the Van Patten farm. This well was drilled in Norton county in sec. 26, T. 4 S., R. 21 W. In it the Dakota sandstone was reached at a depth of 800 feet, the Cimarron redbeds at 1,431 feet, the Stone Corral anhydrite at 1,720 feet, the Lansing limestone at 3,325 feet, and the Arbuckle dolomite at 3,610 feet. A good show of oil was found at a depth of 3,475 to 3,482 feet and another at 3,487 to 3,496

feet in the Lansing-Kansas City limestone. After the well had been drilled to a total depth of 3,665 feet it was plugged back to the porous zones in the Pennsylvanian rocks and prepared for production. Its potential production gauged 200 barrels per day. Inasmuch as no oil was produced subsequently, the actual potentialities of this well are not yet known.

Ottawa County.—A test well in Ottawa county revealed much geological information on a part of Kansas that has not been tested to a great extent. This well was drilled by Babcock on the Copeman farm, in sec. 18, T. 10 S., R. 2 W. The base of the Permian limestones was reached at a depth of 1,260 feet (base of Americus limestone), the Topeka limestone at 1,800 feet, the Lansing limestone at 2,171 feet, the Marmaton shales at 2,650 feet, the Mississippian "chat" at 2,903 feet, the Ordovician Viola dolomite at 3,497 feet, the Simpson green shale at 3,652 feet, the "Wilcox" sandstone at 3,690 feet, the Arbuckle dolomite (Cotter equivalent) at 3,723 feet, and the Reagan sandstone at 3,697 feet. Pre-Cambrian arkosic material was found at 4,008 feet and the well was abandoned in June, 1939, in pre-Cambrian schist, at a depth of 4,114 feet.

Saline County.—Another test well that reveals the underground geology of Kansas was drilled in Saline county. It is the Central States Oil Company No. 1 Crawford well, in sec. 26, T. 13 S., R. 3 W. This well started in the Pleistocene sands and reached the top of the Wellington shale at a depth of 95 feet. Just above the Hollenberg dolomite, which was reached at a depth of 235 feet, some salt was found with the anhydrite that is common in that interval. The Fort Riley limestone was reached at a depth of 400 feet, the Florence flint at 570 feet, the Wreford limestone at 660 feet, and the base of the Americus limestone at 1,045 feet. The upper portion of the "Big Blue" dolomite sequence contained much anhydrite. Of the Pennsylvanian rocks, the Topeka limestone was reached at a depth of 1,635 feet, the Lansing limestone at 2,110 feet, and the Cherokee shale at 2,700 feet. The Mississippian limestone was reached at 2,790 feet, the Kinderhook beds at 2,990 feet, the Hunton limestone at 3,130 feet, the Simpson formation at 3,335 feet, the Viola limestone at 3,400 feet, and the Arbuckle dolomite at 3,615 feet. The well was abandoned at a total depth of 3,632 feet.

Sheridan County.—One of the most interesting wells drilled in 1939 was the Cities Service Oil Company No. 1 McGinnis well, in sec. 10, T. 9 S., R. 27 W., in Sheridan county. Only the cuttings

from 330 feet to the total depth of 4,865 feet were saved. At a depth of 330 feet the well was drilling in the Niobrara shales of Cretaceous age. The Fort Hays limestone was reached at a depth of 725 feet, the Greenhorn limestone at 1,035 feet, the Graneros shale at 1,090 feet, and the Dakota sandstone at 1,195 feet. The last was very thick and rested on the Jurassic Morrison beds at 1,685 feet. The Morrison beds penetrated in this well contain limestone, sandstone, pink shale, chert, and anhydrite. The Permian redbeds were reached at a depth of 1,860 feet, the Stone Corral anhydrite at 2,300 feet, the Herington dolomite at 2,830 feet, the Florence flint at 3,190 feet, the Wreford limestone at 3,300 feet, and the base of the Americus limestone at 3,550 feet. The upper Pennsylvanian beds appear to be very thin in this part of Kansas, for the Topeka limestone was reached at a depth of 3,580 feet, and the Lansing limestone at 3,835 feet. The Mississippian cherty limestones were found at a depth of 4,415 to 4,580 feet, and only a thin wedge of Kinderhook intervened between that formation and typical cherty Viola dolomite at 4,588 feet. Simpson green shale and sandstone was reached at a depth of 4,645 feet, and Arbuckle dolomite at 4,650 feet. This dolomitic formation extended to the total depth of the well, 4,865 feet. The well was abandoned as a dry hole.

Sherman County.—In Sherman county two test wells were completed as gas wells of small potential capacity. The first was drilled by the Goodland Independent Oil Company on the Keeran ranch in sec. 30, T. 8 S., R. 39 W. The gas was found in the Smoky Hill chalk at a depth of 1,307 feet. Potential production was 75,000 cubic feet per day. The second well was drilled in section 27 and was completed in the same formation at a depth of 1,100 feet, but found gas 5 feet higher. Its potential production was 25,000 cubic feet per day. The future possibilities of this gas discovery are not yet known.

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