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OIL AND GAS IN OKLAHOMA

GEOLOGY OF BECKHAM COUNTY

By
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FOREWORD

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

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

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

This report on Beckham County has been prepared by Mr. Frank Gouin, who has had several years experience with the geology of southwestern Oklahoma. Mr. Gouin has very aptly described the subsurface geology of this county, which is very similar to that of the Amarillo district, rather than that of other producing districts of this State.

CHAS. N. GOULD
Director

May, 1927.

AND GAS IN OKLAHOMA

BECKHAM COUNTY

By

Frank Gouin

LOCATION

Beckham County is located in west-central Oklahoma, having for its western boundary a part of the eastern boundary of the Panhandle of Texas. The county includes T. 7 N., Rs. 25 and 26 W., Tps. 8 to 10 N., Rs. 20 to 26 W., inclusive, the south half of T. 11 N., Rs. 23 to 26 W. inclusive, T. 11 N. and the south half of T. 12 N., Rs. 21 and 22 W., and a tier of fractional sections between the west line of R. 26 W. and the western boundary line of the State. Altogether the area of the county, comprises about 960 square miles; Sayre, the county seat, with a population of about 2,800, is located in the central part, while Elk City, with a population of about 3,400 is located in the northeastern corner of the county. The Chicago, Rock Island and Pacific Railroad, main line from Memphis Tennessee to El Paso, Texas traverses the county from the northeast corner to the western line. The Wichita Falls and Northwestern Railroad passes through Elk City and thence south through the eastern part of the county on its way from Woodward south to Altus.

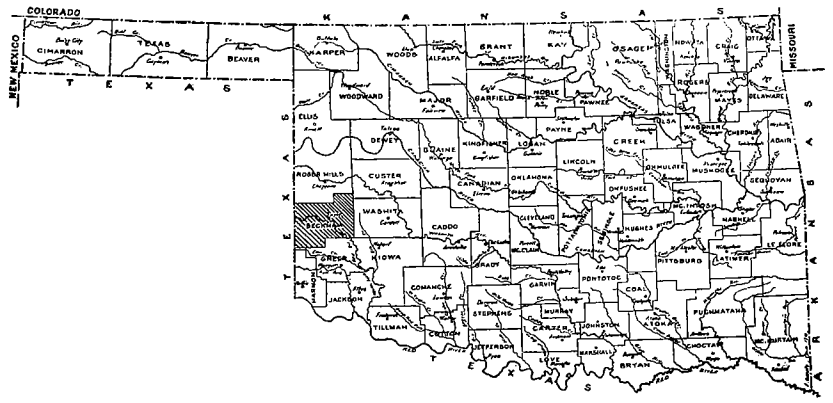

Figure 1.—Index map of Oklahoma showing area covered by this report.

ACKNOWLEDGMENTS

The writer wishes to acknowledge the following individuals and companies who have furnished data for this report: R. A. Birk, Division Geologist for the Amerada Petroleum Corporation in southern Oklahoma and the Atlantic Oil Producing Company, Dallas, Texas. In addition acknowledgment is due the following geologists for valuable suggestions: Ed. W. Owen, of the Wentz Oil Corporation; Robin Willis of the Marland Oil Company of Texas; E. D. Luman of the Atlantic Oil Producing Company; and C. Don Hughes of the Empire Gas & Fuel Company. The writer is especially indebted to Chas. N. Gould and C. L. Cooper of the Oklahoma Geological Survey for assistance in the preparation of the manuscript and the maps for this report.

TOPOGRAPHY

Beckham County has a topography varying from the rough gypsum hills of the southwestern part of the county where the relief amounts to several hundred feet, through the gently rolling sand dune country of the central portion, to the more hilly country in the northern part. The elevation ranges from about 2,100 feet above sea level in the western part of the county to about 1,600 feet above sea level in the southeastern corner where North Fork of Red River leaves the county. All of the drainage is into North Fork of Red River, which enters the county from the Texas Panhandle in the southwest corner, T. 10 N., R. 26 W., flowing east to the northwest corner, T. 9 N., R. 22 W., and thence southeast leaving the county on the south line of T. 8 N., R. 21 W. Aside from the usual trees along the streams the county is not wooded. In places there is a thick growth of such shrubs as scrub oaks, mesquite and chaparral.

GEOLOGY

SURFACE ROCKS

The surface rocks exposed in the county, excepting the Quarternary sands and alluvium, belong to the upper part of the Permian system. The formations of this age of rocks which are exposed are in ascending order as follows: Duncan sandstone, Chickasha formation, Blaine formation, Dog Creek shale, Whitehorse sandstone, Day Creek dolomite, Cloud Chief gypsum and the Quartermaster formation. Correlating with the Texas section, with which this area is very closely associated, these rocks are all a part of the Double Mountain formation. The Duncan sandstone is the equivalent of the San Angelo sandstone of Texas which is the basal member of the Double Mountain formation.[1]

1. Gould, Chas. N., Index to the stratigraphy of Oklahoma: Oklahoma Geol. Survey, Bull. 35, 1925

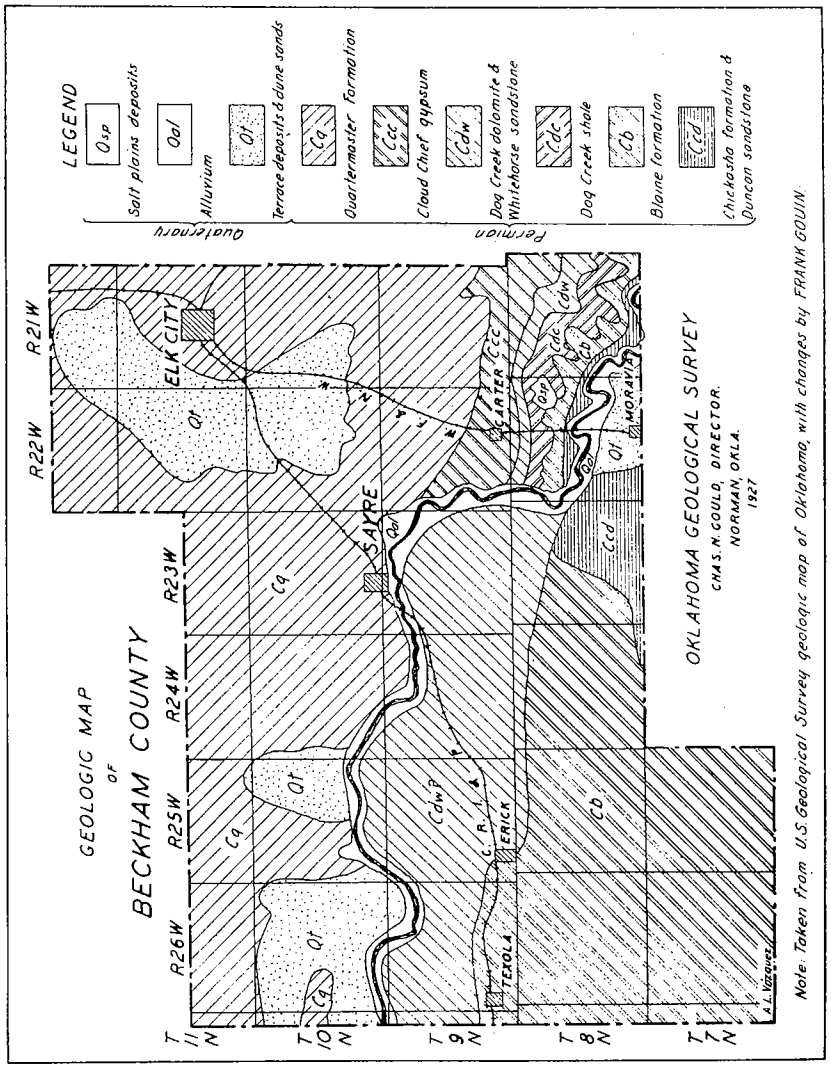

Figure 2.—Geologic map of Beckham County.

DUNCAN SANDSTONE AND CHICKASHA FORMATIONS

These formations are exposed only in the extreme southeastern corner of the county in an escarpment of rocks along the north bank of North Fork of Red River in T. 8 N., Rs. 21 and 22 W., also in the southwestern part of the latter township and in the south end of T. 8 N., R. 23 W. The Duncan sandstone in this locality is a series of brown sandstones interbedded with brown shales having a total thickness of about 100 feet. The overlying Chickasha formation is here a series of reddish-brown, gypsiferous shales having a thickness of about 200 feet.

BLAINE GYPSUM

Overlying the Chickasha formation is the Blaine gypsum. This gypsum covers the entire southwestern quarter of the county as well as being exposed in the escarpment on the north bank of North Fork mentioned in the paragraph above. A perusal of some of the old literature on this and other Permian formations of western and southwestern Oklahoma would have us believe that one cannot expect anything regular either as to the section or as to the structure of these rocks. The writer, with the assistance of several field parties, has worked on this formation from Hardeman County, Texas north through Jackson, Greer, and Beckham counties, Oklahoma and thence west into Wheeler and Collingsworth counties in the Texas Panhandle with the result that he finds it to be the most consistent of any Permian formation in this part of Oklahoma. A type section of the upper part of the formation, which will apply for all of this general area including the Oklahoma counties mentioned above, is as follows:

Section of upper part of the Blaine gypsum, Beckham County

	Feet
Dolomite, honeycombed	3
Shale, red and blue	20
Gypsum, massive, white	18
Shale, red	5
Gypsum, massive, white	15

The entire Blaine gypsum section averages 200 feet in thickness.

DOG CREEK SHALE

Overlying the Blaine gypsum and exposed in this county only on the escarpment along the north bank of North Fork lies the Dog Creek shale. In this area it is made up of brick-red, gypsiferous shales approximately 90 feet in thickness.

WHITEHORSE SANDSTONE

The Whitehorse sandstone in this locality has essentially the same characteristics as are so noticeable throughout its area of outcrop in this State. It is massive, friable, reddish to buff sandstone. Unless protected by overlying formations in an escarpment it has the appearance of recent dune deposits. In Beckham County it is exposed in the escarpment on the north bank of the North Fork. The writer also believes that there is some basis for correlating the sand hills which occupy a band about six miles in width from T. 29 N., R. 23 W. to T. 9 N., R. 26 W., inclusive with the Whitehorse sandstone. This belt of sandhills is parallel with the strike of the Blaine rocks to the south. If this belt is Whitehorse sandstone an explanation for this wide area of outcrop to the west of the east side of R. 23 W. as contrasted with the narrow band to the east of this line will be found under "Structure".

DAY CREEK DOLOMITE AND CLOUD CHIEF GYPSUM

The Day Creek dolomite and the Cloud Chief gypsum are exposed in a belt averaging three miles in width in the extreme north side of T. 8 N., Rs. 21 and 22 W. and the south side of T. 9 N., Rs. 21 and 22 W., passing through the town of Carter. The Day Creek dolomite is a thin dolomite bed at the base of the 100 foot series of massive pinkish gypsum beds with interstratified reddish shales of the Cloud Chief gypsum.

QUARTERMASTER FORMATION

The Quartermaster formation is exposed over most of the northern part of the county north of North Fork and north of the outcrop of the Cloud Chief gypsum in the northeastern part of the county with the exception of limited areas of Quarternary deposits. This formation is made up of brick-red, gypsiferous shales within which are lenticular beds of sandstone and gypsum, being altogether about 300 feet in thickness. It is this formation which has caused earlier writers on western Oklahoma to remark about the irregularities in bedding and in the dips of all formations in this broad area which are composed largely of gypsum. Everything which has been said about the irregularities of the gypsum formations of western Oklahoma is true of the Quartermaster formation but should be confined to that formation only.

SUBSURFACE ROCKS

Due entirely to the search for oil and gas in the county it has been possible to determine the section of subsurface rocks in this general area. By reference to the cross-section "A-A" the section below the base of the Blaine gypsum can be noted.

The section is similar over this entire area from the Blaine gypsum to the dolomite at the base of the Big Lime. The only variation from one place to another is in the thickness of the Clear Fork formation which is the red shale section between the base of

the Blaine and the top of the Wichita-Albany or Big Lime. This interval is thinnest over the structural highs and thickest in the lows.

PERMIAN

CLEAR FORK FORMATION

Between the base of the Blaine gypsum and the top of the Wichita-Albany or Big Lime the entire section is predominately red shales. This interval varies from a thickness of 1,420 feet in the southern part of the county to over 2,170 feet in the northern end of the county. About 300 feet of the upper part of this section belongs to the Chickasha-Duncan formation of the Double Mountain. In addition to the salt horizon present at the base of the Blaine in the top of the Chickasha formation two salt horizons occur in the Clear Fork formation, one about 600 feet and the other about 900 feet below the base of the Blaine.

Several wells have logged either a show of gas or a show of oil in a horizon about 800 feet below the base of the Blaine. Lenticular sands are present at various horizons in this interval.

WICHITA-ALBANY FORMATION

Lying immediately beneath the red shale section of Clear Fork rocks is a series of gray shales and anhydrite 700 feet thick. This section will probably average two-thirds gray shale and one-third anhydrite. The anhydrite interbedded in the gray shale in beds is usually only a few feet in thickness.

In this respect this group of rocks is the opposite of the same group in the interior of the Texas Panhandle where the proportion of anhydrite and gray shale is reversed, the anhydrite beds being extremely massive. This group of rocks is the Big Lime series of the Texas Panhandle.

PENNSYLVANIAN

CISCO-PONTOTOC GROUP

At the base of the Wichita-Albany occurs a group of rocks belonging to the upper part of the Pennsylvanian. While there is yet much room for study before all the problems concerning this group of rocks are cleared up yet the salient points are known at this writing. Above and immediately adjacent to the buried ridge of the Wichita Mountains the geologic section consists almost entirely of granite wash with some interbedded brown, blue and black shales. There is a transition in this zone both to the north and to the south—away from the ridge—in which the arkose section becomes one of limestones and dolomites. The transition is from the top of the section down, showing the gradual encroachment of the Cisco sea upon the granite ridge. In fact the top member of the lime phase—a bed of dolomite—extends to the south almost to the top

of the granite ridge. The thickness of this group of rocks is extremely variable. Just as it is in the area between the Wichita Mountains and the Arbuckle Mountains. It is thickest in the embayments and thinnest on top of the ridges. The thickness in the north end of the county is unknown for no well has been drilled through it. In the Pierce well in sec. 21 T. 8 N., R. 26 W., there was a thickness of 276 feet of Cisco between the Wichita-Albany and the basement rock. In the Skelly well in sec. 24, T. 8 N., R. 23 W., there was a thickness of 1,565 feet of Cisco, which was almost all arkose, between the Wichita-Albany and the basement rock.

While in the south end of the county the Cisco-Pontotoc is resting directly upon the basement rock, it is entirely possible and quite likely that in the north end of the county there are some older Pennsylvanian and possibly some of the lower Paleozoics present in the section. This is presumed because farther east in the vicinity of Gotebo in Kiowa County, on the north flanks of the Wichita Mountains, the Viola limestone, Simpson formation and Arbuckle limestone are exposed on the surface and have been penetrated in wells.

STRUCTURE

SURFACE STRUCTURE

The dip of the surface rocks in the county averages about fifty feet to the mile in a direction slightly east of north away from the axis of the Wichita Mountains. This dip is interrupted by the anticline in the southern part of T. 8 N., Rs. 23, 24, and 25 W. From T. 9 N. to the north end of the county the structure of the surface rocks is not known due to lack of satisfactory surface exposures upon which to obtain definite control. However, in the main the dip continues to the northward as shown by the contacts of the various surface formations. This north dip continues until the axis of the Anadarko Basin is reached.

SUBSURFACE STRUCTURE

The regional dip of the underground rocks is similar to that of the surface rocks. However, there are structural features in the underground rocks that are not revealed in the surface rocks where surface control is lacking. The chief subsurface features are: the large fault just south of the Sayre field, the Sayre dome, and the domes to the west of the Sayre domes.

BECKHAM COUNTY FAULT

The Beckham County fault is really a surface feature since were it not for the unconsolidated sand lying against the fault plane on the north or downthrow side it would be readily discernible at the surface. Since the writer and his assistants had worked the structure of the Blaine rocks in southwestern Oklahoma and part

of the Texas Panhandle in 1919 it was quite evident early in 1923 when the log of the Martin well in sec. 31 T. 9 N., R. 23 W. was studied, that the Blaine gypsum was encountered abnormally low. He immediately suspected the presence of a fault, with a downthrow to the north. Determining the trace of this fault was quite simple. In sec. 10, T. 8 N., R. 23 W. there is a large spring which has a volume probably exceeding ten thousand barrels of water a day. This spring gushed out at a point where the Blaine gypsum disappears below the surface. From this point northwest it was possible to get the trace of the fault to within a quarter of a mile by means of household wells of the farmers. It was found that water wells on the south or upthrow side of the fault were from 40 to 60 feet deep and that the water was highly impregnated with gypsum, while on the north or downthrow side of the fault wells were from 100 to 200 feet in depth and the water was very pure having no trace of gypsum whatever for it was coming from a loose, clean sand with a thickness of several hundred feet on the downthrow side of the fault. The fault was not traced farther to the northwest than just east of the center of T. 9 N., R. 25 W., but subsurface data which has been obtained later from wells drilled farther west in this county and in Wheeler County, Texas would make it seem probable that this fault continues into that county. This can easily be worked out by the method of using the household wells of the farmers living along the alignment of the projection of the fault.

Beckham County fault is a normal fault having a downthrow to the north of 300 to 500 feet. Its eastern terminus appears to be at the bend of the North Fork in sec. 12, T. 8 N., R. 23 W.

THE SAYRE DOME

The top of the Sayre dome is located in sec. 22 T. 9 N., R. 23 W. This dome is the largest subsurface fold discovered to date in the county for it affects the structure of the rocks for several miles in all directions. It has a closure of about 100 feet. The north dip off this dome continues uninterrupted for many miles. It is upon this dome that the discovery well of the Sayre field is located.

THE WINDLE DOME

The top of the Windle Dome is in the southwest corner of sec. 31, T. 9 N., R. 23 W. This dome is really a result of the Windle fault as the fault closes this dome to the south. This dome has a closure of something over 50 feet.

THE NORTH FORK DOME

The North Fork dome is suggested by control from several wells drilled in this locality. The top of this dome probably lies at about the southwest corner of sec. 1, T. 9 N., R. 25 W. and is somewhat comparable in size to the Sayre dome but lack of subsurface control prevents the exact determination of its elevation or of the location of the top.

GEOLOGIC HISTORY

The earliest orogenetic movement in southern Oklahoma which directly affected the area in which Beckman County is a part of the Wichita Mountain uplift. While the age of this folding[2] has been suggested at least once in the literature, the first proof that this uplift was pre-Pennsylvanian in age was given by the writer.[3]

In that bulletin the writer cited instances where early Pennsylvanian rocks had been found to be resting unconformably upon Ordovician rocks and favored the age of this folding as being early in Mississippian. Since that writing—May, 1926—regional studies made by the writer along the line of *en echelon* folds known as the Red River uplift between the Burkburnett field and Grayson County, Texas have furnished additional evidence together with the probability that the age of this last named uplift is older even than that of the Wichita Mountains. It was the Wichita Mountain uplift which formed the granite ridge which extends from the present exposed Wichita Mountains across the Texas Panhandle into New Mexico, together with folds southeast of the present Wichita Mountains into northeast Texas. This sharp ridge remained above water probably until the close of Glenn time which is roughly equivalent to late Canyon time. Since the steep slopes of this ridge are to the north the main drainage lines were set up to the south.

POST GLENN UPLIFT

The close of Glenn time was brought about by the uplift which produced the Arbuckle Mountains. Folding at this time also took place along the earlier folds such as the Wichita Mountains. This was followed by the period of erosion and deposition of Pontotoc (Cisco) time. That part of the Wichita Mountains between the present exposed mountains and New Mexico was above water until almost the close of Pontotoc time. Therefore, the arkosic materials from this sharp ridge were laid down as beach deposits on the flanks while at the same time, limestones and dolomites were being formed farther out both to the north and to the south in the area of deeper waters. Finally by the close of Pontotoc time that part of the present buried mountains in Oklahoma was completly submerged.

WICHITA-ALBANY

The opening of Permian time was a continuaton of the sedimentation taking place during the latter part of the Pennsylvanian with no evidence of any regular unconformity. During this time

2. Schuchert, Chas., and Pirsson, L. V., Text-book of Geology, pt. 2, p. 343, 1924.
3. Gouin, Frank, The geology of the oil and gas fields of Stephens County, Oklahoma: Oklahoma Geol. Survey, Bull. 40-E, 1926.

the Big Lime was deposited over western Oklahoma, the Panhandle of Texas, part of northeastern New Mexico and adjacent parts of Colorado and Kansas. During this time the deposition of anhydrite was widespread.

CLEAR FORK

Sedimentation continued uninterrupted during Clear Fork time but the sediments deposited differ from that of Wichita-Albany time in that the former consists of red shales, sandstones, as stated under "Subsurface". The unconformity suggested by the writer[4] at the top of the Clear Fork seems more certain when studying western Oklahoma on account of the variation in the thickness of the Clear Fork as mentioned earlier in this bulletin.

DOUBLE MOUNTAIN

That there was a period of folding after the deposition of the Blaine gypsum, possibly post-Permian, is evidenced not only by the folding on the Blaine throughout western Oklahoma but also by such marked structural features as the Beckham County fault. The writer does not take much stock in the often discussed subject of differential settling to explain the folding either in western Oklahoma or the Panhandle area of Texas where there is such a wealth of evidence to support the argument of true folding in all formations from the upper Permian to the basement rock.

PRODUCTION

THE SAYRE FIELD

The Sayre field is the only producing area in the county with the exception of a small area in which small gas wells are found at a depth of about 1,000 feet in the Clear Fork formation in the eastern part of T. 8 N., R. 22 W. The Sayre field is located in T. 9 N., R. 23 W. A discussion of the field has been well covered by Birk.[5]

The Twin Hills Oil Company completed the discovery well in the NE. cor. SW.¼, SE.¼ sec. 15 in July, 1922, This well had an initial production of 50,000,000 cubic feet of gas a day from the sand topped at 2,755 feet. Later this well started to make some oil. About 1918 a well had been started in the vicinity of this location but was abandoned at a few hundred feet due to financial difficulties of the owners. As Birk has stated, the completion of this gas well did not cause any undue excitement for at that time there were several large gas wells in the Panhandle of Texas with no market for the gas. It was not until the month of April, 1923 when Martin, et al completed an oil well with an initial production of 200 barrels of 35 gravity oil from a depth of 2,995 feet in the NE. cor. SE.¼ NW.¼ sec. 31, that there was any great interest

4. Gouin Frank, op. cit.
5. Birk, R. A., The Sayre field, Beckham County, Oklahoma: Bull. Amer. Assoc. Pet. Geol., vol. 8, No. 3, 1924.

displayed in this county. The greater part of the development which has since been completed in that field was done in that same year. In July, the Carter Oil Company completed the north offset to the original discovery well in sec. 15 with an initial production exceeding 2,000 barrels a day at a depth of 2,763 feet. This well started to cut its oil almost from the beginning. Four wells, three of them drilled on five acre tracts, one-fourth mile north of this gusher were all dry, being too low on the fold. While there are now several gas wells on the Sayre dome the Carter well and the discovery well are the only wells producing oil. On the Windle Dome no gas wells have been completed. There were at one time seven oil wells in section 31 and 32 but five of them have been abandoned leaving two producers in section 31.

The pay is found in a dolomite horizon at the top of the Cisco. This whole horizon averages 60 feet in thickness with the oil pay at the base. In the case of gas wells the first gas pay is found at the top of this horizon. The producing horizon is identical in both domes. There is a varying percentage of quartz crystals found in the pay horizon. The quartz has evidently been deposited in porous parts of the dolomite by circulating waters. The differences in the initial production of the wells is no doubt due to the varying porosity of the dolomite from place to place. Indeed, some wells which were dry have been higher structurally than some of the producers. This has happened on the Windle dome only and may be due to some structural condition not known at this time. At the same time there is a definite water level for the field as a whole. The gas wells in this field have a pressure normal for the depth at which gas is found. In this respect this area differs from that of the Panhandle of Texas, the difference possibly being due to the greater contrast in the thickness of the reservoir rock. As will be seen by the accompanying production table the wells had a very rapid decline with a mediocre average production per well. The writer does not know of any well in the field which has been given a shot. In view of the increase of oil after the shooting of the Panhandle wells it would be interesting to learn if this would be of help in the Sayre field.

While the first wells in the field were drilled with cable tools entirely the later wells were drilled either to the top of the Big Lime with the rotary and then standardized or were drilled entirely with the rotary. The Big Lime is not difficult to drill with the rotary in the area but it is very unwise to drill to the pay with the rotary in a field with a producing horizon such as is found in this area.

Total Lease Production by Months—Sayre District

Company	Rubana	Carter	Carter	Gypsy	Atlantic
Lease	W. O. Gray	W. O. Gray	Windle	Day	Windle
			1923		
In storage when purchased					10,878
July	2,517	4,116	—		3,630
August	884	8,688	6,329		4,094
September	—	3,121	17,294		3,338
October	—	3,364	13,766		3,007
November	437	5,209	10,743		1,305
December	—	385	2,273		1,925
Total 1923	3,838	24,883	50,405		28,177
			1924		
January	—	2,573	7,037	752	1,092
February	376	2,016	4,760	687	893
March	295	1,922	4,340	785	890
April	162	1,710	4,200	765	875
May	—	1,612	4,340	774	1,771
June	—	1,860	3,900	386	414
July	140	1,085	3,720	412	347
August	—	1,085	2,790	290	888
September	—	1,050	1,950	240	785
October	—	1,953	2,077	248	—
November	—	1,650	1,950	210	273
December	—	1,488	1,860	180	—
Total 1924	973	20,004	42,924	5,729	8,228
			1925		
January		1,240	1,705	155	—
February		896	1,344	110	—
March		3,100	1,364	124	437
April		1,950	1,350	110	—
May		2,325	1,240	113	—
June		1,800	1,350	abd	—
July		1,705	1,395	—	435
August		15,500	1,395	—	—
September		15,450	1,350	—	—
October		9,003	1,240	—	129
November		1,500	1,320	—	—
December		1,860	1,354	—	—
Total 1925		56,329	16,407	612	1,001
1926 Production		14,628	9,125		
Totals	4,811 (1 well)	115,844 (1 well)	118,861 (2 wells)	6,341 (1 well)	37,406 (1 well)

Empire Gas and Fuel—Windle No. 1, sec. 31 produced 10,158 barrels in 2 years from 1 well.

Foster Investment Company, sec. 32 produced 8,345 barrels in 1½ years from 1 well.

TOTAL PRODUCTION SAYRE DISTRICT—301,766 BARRELS.

FUTURE POSSIBILITIES

Bearing in mind the nature of the production in the Sayre district to date, in that the production figures show that every operator in the district has probably lost money, the writer will mention areas that have a possibility of producing. It is very unlikely that these will furnish any better results than have been achieved in the past. While there is apparently a very narrow rim of oil between the gas and the water on the Sayre dome the south flank of this dome offers chances for oil production. The top of the Windle dome has never been drilled. The same is true of the North Fork dome and a possible dome in the northwest part of T. 9N., R. 26 W.

Since there is very definite relation between the structure of the Blaine gypsum and the structure of the producing horizon procedure is to secure plenty of structural control on the Blaine by means of shallow tests—500 to 600 feet—before making any location for a deep test. For example on both the Sayre and Windle domes if the Blaine is encountered any deeper than 1,460 feet above sea level there is not much use of drilling any farther, while if it is encountered above 1,490 above sea level the well will probably produce gas rather than oil. The use of this information would have saved the drilling of several dry holes had the interested operators made use of it. Shallow wells can be drilled to the Blaine by means of a portable gasoline driven rotary at an extremely small cost. All of this is mentioned for the benefit of operators who, knowing the past history of the district, may still desire to prospect there. As a last resort for a location in the county there is still the dome in T. 8 N., R. 25 W., which has never been tested. In view of the dry holes drilled to the basement rock on similar domes to the south and west the chances on this dome do not appear encouraging. While pre-Cisco Pontotoc Paleozoic rocks are to be expected in the northern part of the county, all upper formations are dipping so steeply to the north, where the northernmost control is to be had, that there appears small chance of there being favorable structural conditions. In fact that part of the country does not appear at all promising.

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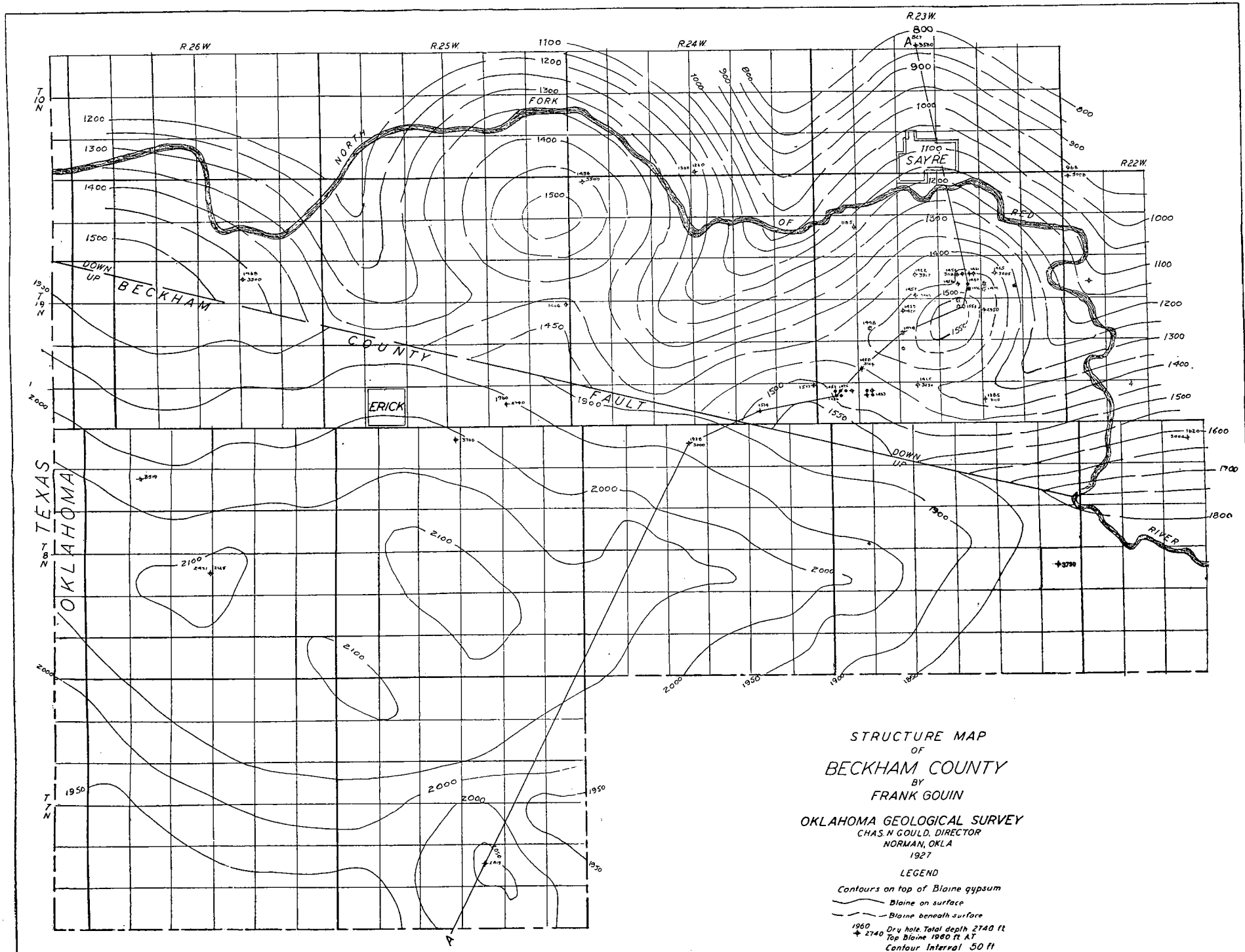

STRUCTURE MAP
OF
BECKHAM COUNTY
BY
FRANK GOUIN

OKLAHOMA GEOLOGICAL SURVEY
CHAS. N GOULD, DIRECTOR
NORMAN, OKLA
1927

LEGEND

Contours on top of Blaine gypsum

Blaine on surface

Blaine beneath surface

1960
+ 2740 Dry hole. Total depth 2740 ft
Top Blaine 1960 ft. A.T.

Contour Interval 50 ft