OKLAHOMA GEOLOGICAL SURVEY
Chas. N. Gould, Director

Bulletin 40-UU

OIL AND GAS IN OKLAHOMA

BLAINE, DEWEY, CUSTER, AND ROGER MILLS COUNTIES

By
Ray L. Six

NORMAN
MAY, 1930

CONTENTS

ILLUSTRATIONS

FOREWORD

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

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

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

The author of the present separate, 40-UU, is Mr. Ray L. Six, instructor in geology at the University of Oklahoma. Mr. Six has had considerable acquaintance with the geology of the red beds area of the western part of the State for a number of years, and during the past summer traveled over the area securing data for this publication. He has also been assisted by geologists from a number of oil companies who have very kindly furnished maps, well logs, and other pertinent data.

Norman, Oklahoma
May 1930

CHAS. N. GOULD,
Director

BLAINE, DEWEY, CUSTER, AND ROGER MILLS COUNTIES

By

Ray L. Six

SUMMARY

This report covers in a rather superficial way over 4,000 square miles of territory in the western part of the State of Oklahoma.

Surface rocks of the area are Permian, Cretaceous, Tertiary and Quaternary in age. Little is known concerning the subsurface formations save through inference from known data on surrounding areas and the definite facts obtained from logs of the few deep wells which have been drilled.

The Anadarko Basin is the regional structural feature of this part of Oklahoma and its axis passes through the southern part of the area under consideration. Dips on the northeastern flank of the basin are low while those on the southern limb are much more steep.

Wildcat drilling has produced much activity in the leasing and royalty business. Most of the wells drilled thus far have been shallow and as yet no commercial product has been discovered.

This area would require many months of detailed field study in order to correctly interpret the stratigraphic and structural relationships. This report is largely a compilation of data obtained from men who have made detailed studies of particular areas and from their published reports.

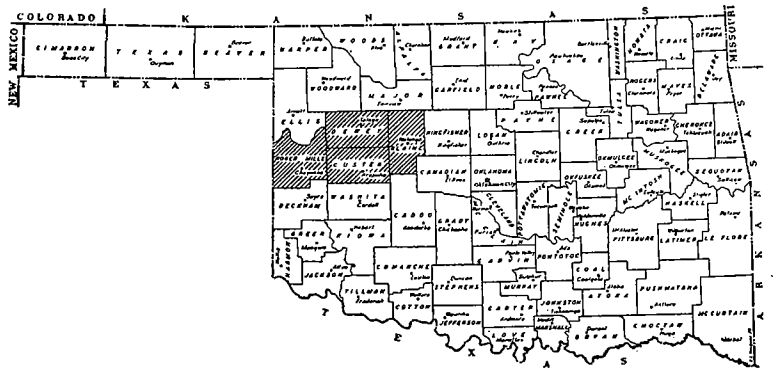


Figure 1. Index map of Oklahoma showing location of Blaine, Dewey, Custer, and Roger Mills counties.

A number of corrections in the areal geology as shown on the State Geologic map have been made on the accompanying map. Much data of a confidential nature in the files of major oil companies is not now available for publication. This, if incorporated in the present report, would greatly enhance its value.

INTRODUCTION

Blaine, Dewey, Custer, and Roger Mills counties are located in the extreme west-central part of the State. The area lies directly east of the Texas-Oklahoma line, is south of Ellis, Woodward and Major counties, west of Kingfisher and Canadian counties and north of Caddo, Washita, Beckham and a part of Canadian county. It embraces the territory between Tps. 12 to 20 N. inclusive and Rs. 10 to 26 W. inclusive. These counties are drained by the Cimarron, North Canadian, Washita and the North Fork of Red River and their tributaries. These streams have carved four nearly parallel valleys from northwest to southeast through the region.

The geologic formations found on the surface of these counties are, in ascending order, Chickasha, Blaine gypsum, Dog Creek shales, Whitehorse sandstone, Day Creek dolomite, Cloud Chief gypsum, Quartermaster, Cretaceous outliers of the Washita group, Tertiary sand, Quaternary gravels, caliche and alluvium.

Structurally, this area lies within the Anadarko Basin, mostly on the north limb, the axis of the basin passing through the southern part. See figure 2, page 30, for this relationship.

ACKNOWLEDGMENTS

Inasmuch as sufficient time was not available for detailed field studies on the part of the writer, special acknowledgment is due those whose data helped to make this report possible. The publications of R. L. Clifton and others have been a very helpful source as well as conversations with individuals working in the area and the representatives of various oil companies. The writer is also indebted to Chas. N. Gould and C. L. Cooper of the Oklahoma Geological Survey for assistance in the preparation of maps and manuscript for this report.

BLAINE COUNTY

Blaine County is the farthest east of the four counties covered in this report and lies just northwest of the center of the state. It embraces Tps. 13-19 N. inclusive and from R. 10-13 W. inclusive. It contains 26 townships and has an area of 936 square miles.

In population it exceeds 20,000 with a density of more than 20 per square mile. The principal towns are Watonga the county seat, (2,000), Geary (1,500), Homestead (500), Darrow (200), Greenfield (350), Hitchcock (100), Okeene (1,500), Eagle City (400), Southard (400), Canton (1,000), and Longdale (300). All of these towns are on railways. Numerous others shown on old maps have ceased to exist.

Blaine County is served by the Rock Island, Frisco, and Orient Railways. The Orient, now a branch of the Santa Fe passes through the northwest part of the county via Longdale and Canton. The Frisco passes through the northwestern part of the county via Okeene, Darrow, Southard and Eagle City. The main line of the Rock Island passes through the southern part of the county and Geary is a division point. A branch line leaves Geary and passes through the eastern part of the county via Greenfield, Watonga, Hitchcock and Okeene. Here the line divides and one branch goes to Enid and the other to Cherokee.

TOPOGRAPHY

Blaine County is drained by the Cimarron River and its tributaries in the northeastern section and by the Canadian River in the southwestern part. The highland between these two valleys is drained by the North Canadian River. The northeastern part of the county is a gently sloping plain the westward edge of which ends in the Blaine gypsum escarpment. This escarpment has been badly dissected dendritically by the tributaries of the Cimarron. West of this is a westward sloping plain composed of Quaternary sands and covered with Black Jack oak timber. West of North Canadian River is an eastward sloping plain ending in the bottom of North Canadian valley. It also has been badly dissected in many places by tributaries of the same river. This plain is underlaid by the Whitehorse sandstone. In the southern part of the plain west of Greenfield, dolomite beds produce a prominent escarpment which is known as the Greenfield dolomite.

The southwestern part of the county slopes westward into the valley of the North Canadian. Most of this plain is covered with Quaternary sands on which is growing scrub timber. Along the three major stream courses large quantities of alluvium are found. The Quaternary sand deposits found on the northeast valley wall of the North and South Canadian rivers have been reworked into dune topography. These eolian deposits form an elongate area paralleling the rivers and vary in width from one to six miles, being narrowest in the North Canadian River valley.

GEOLOGY

Surface formations

The surface rocks of Blaine County are composed of Chickasha formation, Blaine gypsum, Dog Creek shales, and Whitehorse sandstone, all of which are Permian in age. Within the Whitehorse sandstone some 70 feet above the base in the southern part of the county is the Greenfield dolomite whose resistant character forms an escarpment. Lying unconformably upon these formations are found two areas of Quaternary sands and gravels which lie north of and parallel to the North and South Canadian rivers. A smaller area of this same formation lies northeast of Watonga in Tps. 16 and 17 N., R. 11 W. Still smaller areas are found in various other places in the county. Along the stream courses have been deposited large quantities of alluvium.

CHICKASHA FORMATION

This formation forms the surface of the northeastern third of the county and has a thickness of approximately 175 feet. It is the oldest Permian formation in the county and lies conformably upon the Duncan sandstone found farther east in Kingfisher County. The Chickasha has been correlated with the Double Mountain of Texas and with the Flower Pot, Cedar Hills, and Salt Plain of Kansas. It is composed of red sandstones, sands, shales and mud stone, all of which seem to be lenticular in character. Some of the sands are distinctly cross-bedded. The basal part of the formation is highly arenaceous and the upper part is highly impregnated with gypsum a large portion of which is probably secondary in origin. Northward the formation increases in thickness, reaching 275 feet in Woods County. Southward it thins to only 90 feet in Comanche County and 160 feet at Rush Springs. At this point it is possible to further subdivide the formation into stratigraphic units. Freie[1] considers the Chickasha related to the Duncan sandstone in origin. The Chickasha is 9 to 28 per cent soluble in acid. The sizes of grains in the Chickasha in Blaine County increase as one progresses south toward the apex of the Anadarko Basin. Chickasha deposition is characterized by lenticular, deltaic and shallow water conditions. The source of these materials is probably from the West (The Ancentral Rocky Mountains?).

BLAINE GYPSUM

The Blaine gypsum lies unconformably upon the Chickasha formation and is overlain conformably by the Dog Creek shales. It has a thickness of over 75 feet and occurs as a dissected escarpment along the western edge of the plain formed by the Chickasha. This escarpment extends from a point eight miles east of the northwest corner of the

1. Freie, A. J., Sedimentation in the Anadarko Basin: Oklahoma Geol. Survey Bull. 48, p. 43, 1930.

county to the southwest corner of Kingfisher County. The formation was first described by Gould in 1902 and its connotation modified by him in 1905. The type locality of this gypsum is on Salt Creek (Henquenet Creek) in the southeast part of T. 18 N., R. 12 W. and in the Roman Nose canyons, secs. 7, 8, 17, and 18, T. 17 N., R. 11 W. Here it is composed of three massive beds of white gypsum separated by red shales. A dolomitic limestone occurs at the base of the two upper members. Both of these are quite fossiliferous and their horizons can be easily traced across the county. The abundance of *Pleurophorous* pelecypods have been described by Beede.[2]

Two excellent collecting grounds for fossils from the above horizons are secs. 3, 11, and 13, T. 15 N., R. 10 E., due west of Okarche of Kingfisher County and the north side of sec. 34, T. 17 N., R. 11 W. just south of the plant of the American Plaster Company. These fossil pelecypods have been observed in the Blaine of other areas in the Anadarko Basin. One place is the NW.¼ sec. 20, T. 7 N., R. 13 W., in a small creek bed, another in the vicinity of Mountain View and a third in the SW.¼ sec. 20, T. 7 N., R. 13 W. Fossiliferous horizons in the Blaine have been reported from Major, Woodward, and Woods counties farther north. Other, but badly preserved forms believed to be brachiopods, cephalopods and ferns are found in these same horizons, Manganese dendrites, "fossil" ice crystal impressions occur in some areas of the dolomite at the base of the middle gypsum member. These three massive gypsums are correlated with the Ferguson, Medicine Lodge, and Shimer of Kansas. These gypsums are thicker and more prominent in the northern part of the county and are mined at Southard and south of Hitchcock and manufactured into a number of products.

The mose picturesque exposures of the Blaine gypsum are to be found in the Roman Nose canyons southwest of Bickford. (See plate IVA, page 44). These canyons were formerly the winter campgrounds of the Cheyenne Indians and remains of their sweat houses can still be observed. The son of the old Chief Roman Nose still makes his home here.

The following sections of the Blaine formation will illustrate its character in the outcrop.

2. Beede, J. W., Invertebrate paleontology of the red beds: Adv. Bull. 1st Bien. Rept, Geol. Survey Oklahoma, 1902.

Glass Mountain Section on the Northwest Side of the Mountain
(After Gould[3])

		Feet
11.	Massive, white gypsum (Shimer)	13
10.	Fossiliferous dolomite	1
9.	Red clay	15
8.	Massive, white gypsum (Medicine Lodge)	18
7.	Greenish clay	4
6.	Red clay	8
5.	Gypsum concretions and satin spar	1
4.	Red clay	3
3.	Bluish dolomite rock, hard	2/3
2.	Red clay	4
1.	Gypsiferous rock, satin spar	4

Section near Watonga, Sec. 32, T. 16 N., R. 10 W.
(After Suffel[4])

		Feet
7.	Massive, white gypsum (Shimer)	4
6.	Gray, sandy dolomite	2
5.	Red clay with conspicuous green bands near the top	41
4.	Massive, white gypsum (Medicine Lodge)	10
3.	Grayish, sandy dolomite	1
2.	Red clay	13
1.	Massive, white gypsum (Ferguson)	3

Section in NW.¼, Sec. 29, T. 15 N., R. 9 W.
(After Snider[5])

		Feet
6.	Medicine Lodge gypsum, pink, top eroded	4
5.	Sandy, white dolomite	2
4.	Covered, probably shale	16
3.	Gypsum, with satin spar immediately underneath	2
2.	Covered, probably shale	16
1.	Ferguson gypsum	5

Section in NW.¼, Sec. 11, T. 18 N., R. 12 W., One Mile East of Southard.
(After Suffel[6])

		Feet
11.	Anhydrite, at top of hill	about 4
10.	Gypsum, white, massive	5
9.	Greenish grey sandstone	½
8.	Red shale with green bands	9
7.	Red and green shale with satin spar and green selenite bands	11
6.	Ferguson gypsum, mottled	7
5.	Greenish dolomitic sandstone	½
4.	Red and green shale	8
3.	Green selenite in clay, satin spar	1½
2.	Red shale with thin bands of satin spar	7
1.	Red and green shale with selenite	30

3. Gould, Chas. N., Geology and water resources of Oklahoma: U. S. Geol. Survey, Water-Supply Paper 148, p. 51, 1905.
4. Suffel, G. G., Dolomites of western Oklahoma: Oklahoma Geol. Survey Bull. 49, p. 72, 1930.
5. Snider, L. C., Gypsum and salt of Oklahoma: Oklahoma Geol. Survey Bull. 11, p. 174, 1913.
6. Suffel, G. G., op. cit., p. 74.

Section from south Canyon, Head of Salt Creek, West of Ferguson.
(After Gould[7])

		Feet
11.	Red clay	about 40
10.	Dolomite	about 1
9.	Red clay	about 30
8.	Dolomite	about 2
7.	Red clay	about 25
6.	Massive, white gypsum (Shimer)	15
5.	Soft, sandy dolomite	1
4.	Red, gypsiferous clay	27
3.	Massive, white gypsum (Medicine Lodge)	17
2.	Red clay with bands of selenite	25
1.	Pinkish, mottled gypsum (Ferguson)	4

Section along the Chicago, Rock Island and Pacific Railway, Four Miles South of Hitchcock.
(After Suffel[8])

		Feet
8.	Massive, white gypsum, the Shimer	8
7.	Gray, dolomitic sandstone	1
6.	Red clay	45
5.	White, massive gypsum, the Medicine Lodge	12
4.	Gray, dolomitic sandstone	2
3.	Red clay shales with greenish bands	17
2.	Massive, white gypsum, the Ferguson	3
1.	Red clay shales with bands of gypsum	90

Section in the NE.¼ Sec. 25, T. 21 N., R. 13 W.
(After Suffel[9])

		Ft.	in.
14.	Massive gypsum (Ferguson)	6	.....
13.	Dolomite	.....	3-4
12.	Red, earth, gypsiferous shales	25-30	.....
11.	Blue-gray dolomite	.....	5
10.	Blue and gray shale	9	.....
9.	Hard gray dolomitic sandstone, probably local	.....	3-10
8.	Greenish gypsiferous shale	.....	16
7.	Gypsum	.....	6-8
6.	Shale	9	.....
5.	Green, shaly gypsum	.....	4
4.	Shale	3	.....
3.	Gypsum	.....	6
2.	Soft shale	8	.....
1.	Gypsiferous shale with harder greenish capping	5	.....
	Unmeasured, bluish-green shale with thin beds of gypsum		

Cedar Hill Section in SW.¼, Sec. 18, T. 16 N., R. 10 W.
(After Suffel)

		Feet
6.	Massive, white gypsum (Shimer)	12
5.	Fossiliferous, sandy dolomite	2
4.	Red clay with selenite bands	18
3.	Massive, white gypsum (Medicine Lodge)	3
2.	Red clay with seams of selenite	17
1.	Massive, pinkish to white gypsum (Ferguson)	5

7. Gould, Chas. N., op. cit., p. 51.
8. Suffel, G. G., op. cit., p. 74.
9. Suffel, G. G., op. cit., p. 76.

General Section of the Blaine, applying to the District lying a few Miles NE. of Watonga.

(After G. D. Putnam[10])

		Ft.	in.
10.	Thin, hard dolomite	.....	2-5
9.	(Concealed)	40	.....
8.	Massive gypsum (Shimer)	10-15	.....
7.	Fossiliferous dolomite	.....	8-18
6.	(Concealed)	about 60	.....
5.	Pure gypsum (Medicine Lodge)	8-10	.....
4.	Fairly hard, slightly sandy dolomite	.....	18
3.	(Concealed)	6-10	.....
2.	Gray gypsum (Ferguson)	2-4	.....
1.	(Concealed)	60-80	.....
	Base of Blaine formation.		

Section in NE.¼, Sec. 14, T. 15 N., R. 10 W., Two Miles West of Altona.

(After Suffel)

		Feet
7.	Medicine Lodge gypsum, top removed by erosion	3
6.	White dolomitic sandstone	2
5.	Red and green shales	16
4.	Gypsum, anhydrite, white satin spar beneath	3
3.	Red and green shale	18
2.	Ferguson gypsum, selenitic	3
1.	Red and green shale	21

The following section of the Blaine formation was taken at the type locality in sec. 23, T. 18 N., R. 12 W., near the head of Salt Creek.[11]

		Ft.	in.
10.	Bed of pure white gypsum	20	0
9.	Dolomite containing pelecypods		8
8.	Red and gray gypsiferous shale	25	0
7.	Bed of massive white gypsum	10	0
6.	Red and gray gypsiferous shale	20	0
5.	Massive bed of gypsum and shale	10	1
4.	Gray, sandy dolomite with pelecypods		8
3.	Gray, sandy shale	2	0
2.	Red shale with streaks of gypsum	140	0
1.	Very small exposure of gray gypsiferous, sandy shale that looks somewhat like the Chickasha at the head of the basin	2	0

Freie reports the basal member in this section as 30 per cent soluble in acid while the other beds are 26 per cent soluble. The shape of the grains is dominantly angular (75 to 90 per cent). Quartz is the most abundant light material and feldspar is practically absent. The Blaine of this county falls into the clay detrital grade. The source of the Blaine was in the West (Ancestral Rockies?). This has not been satisfactorily determined.

10. Putnam, G. D., quoted by Suffel, G. G., op. cit., p. 76.
11. Freie, A. J., op. cit., p. 76.

DOG CREEK SHALES

The Dog Creek shales occur stratigraphically above and conformably with the Blaine gypsum. The outcrop is a long, narrow band just west of the Blaine escarpment extending from the northwest corner to the extreme southeast corner of the county and lies just north of the North Canadian River. The formation was first observed by Cragin in 1896 at its type locality on Dog Creek in western Barber County, Kansas. The Dog Creek shales consist of from 30 to 400 feet of red clay and shale impregnated with gypsum and dolomite. In Blaine County the thickness approximates 400 feet. In Woodward County to the north they thin to 235 feet while in Caddo and Grady counties to the south Becker reports a thickness of from 90 to 115 feet. In Beckham County to the west they compose 90 feet of the section. Wells drilled in Kiowa County log 400 feet. Good surface exposures of Dog Creek shales are found just northeast of Watonga on the highway to Okeene just above the Blaine escarpment in secs. 32, 33, T. 17 N., R. 11 W. A good exposure with Whitehorse in contact is found in sec. 25, T. 13 N., R. 10 W. It is correlated with the Double Mountain of Texas.

The physical character of the Dog Creek seems variable but the brilliant coloration is unchanged. The Dog Creek is conformable upon the Blaine and is overlain unconformably by the Whitehorse sandstone. The following sections taken in sec. 25, T. 13 N., R. 10 W., by Freie[12] shows the Dog Creek in contact with the Blaine below and the Whitehorse above.

		Feet
WHITEHORSE		
6.	Thinly bedded red shaly fine sandstone	11
5.	Shaly red sandstone beds 4 in. thick and some dolomite	3
DOG CREEK		
4.	Shaly sandstones interbedded with ½ in. layers of coarser sands	5
3.	Ledge of massive shaly sandstone, bedding obscure	4
2.	Resistant shaly massive sandstone beds	10
1.	Shaly fine red sandstone in massive beds	15

		Feet
WHITEHORSE		
5.	Fine light-red sandstone	2
4.	Thinly bedded fine red sandstone containing flakes of gypsum and dolomite	2
DOG CREEK		
3.	Hard gypsiferous shaly fine sandstone	2
2.	Red gypsiferous shaly sandstone containing specks of blue-gray shale	3
1.	Fine red shaly siltstone	3

Freie reports samples from this area as 4 to 8 per cent soluble in acid with angular fragments composing 70 to 80 per cent subangular 15 to 25 per cent and round and sub-round less than 5 per cent. Quartz is the most abundant light mineral and feldspar is rare or absent. Lack

12. Freie, A. J., op. cit., pp. 55 and 57.

of sorting, high per cent of soluble material and brilliant coloration are definite characteristics of the entire Dog Creek section.

Freie believes that heavy mineral analyses show insufficient evidence for an unconformity separating the Dog Creek from the overlying Whitehorse.

The source of the Dog Creek shales is to the West (Ancestral Rockies?). In the extreme western part of the area covered by this report the Dog Creek is a shallow marine deposit and to the southeast it is a terrestial deposit. Throughout Blaine County the Dog Creek has a sparse covering of scrub timber and underbrush.

WHITEHORSE SANDSTONE

The Whitehorse sandstone is the youngest Permian formation in Blaine County. It is found throughout the area south and west of the North Canadian River excepting where covered by Tertiary or Quaternary eolian sand and Recent alluvium. It was first described by Cragin in 1896 as the Red Bluff sandstone, since its type locality is at Red Bluff on Bluff Creek northwest of Protection, Kansas. In 1905 the formation name was changed at the suggestion of Gould to that of Whitehorse sandstone. The type locality in Oklahoma is Whitehorse Springs in Woods County. The following section made there by Clifton[13] is as follows:

	Feet
DAY CREEK	
7. Dolomite	2
WHITEHORSE	
6. Fine sandstone, poorly cemented	40
5. Highly cemented sandstone	10
4. Fine sandstone, sands, and sandy shales	100
3. Indurated sandstone, thin bed	5
2. Sandstones, sands and sandy shales	125
~~ Unconformity ~~~~~	
DOG CREEK	
1. Shales	

This sandstone is correlated with a part of the Double Mountain of Texas. It is one of the most persistent and easily recognized formations of the Permian and is continuously traceable from Protection, Kansas, southward into Oklahoma, around the east end and along the southern flank of the Anadarko Basin; around the western end of the Wichita Uplift and southwestward into Texas as far as Fisher County. Fossils occur in the Whitehorse in numerous localities. Gould's collection from Whitehorse Springs, Okla., and Dosier Mounds, Texas, have been described by Beede[14] as, "marine brachiopods, pelecypods and gastropods."

The unconformity which separates the Dog Creek from the Whitehorse is discontinuous and limited to the border areas of the Dog Creek

13. Clifton, R. L., Uupublished theisis, Univ. of Oklahoma, Norman.
14. Beede, J. W., Inverteb rate paleontology of the upper Permian red beds of Oklahoma and the panhandle of Texas: Kansas Univ. Sci. Bull. 4, pp. 113-171, 1907.

deposition. This condition seems best developed near Wild Cat Mounds in Woods County where Clifton describes the complete removal of Dog Creek and Blaine formations prior to Whitehorse times. In Blaine County disconformities exist and there is a marked increase in coarseness of materials composing the basal Whitehorse where it can be observed in contact with the Dog Creek. The average thickness of the Whitehorse is 200 feet but in Custer, Blaine and Washita counties greater thicknesses are reported. Logs have indicated 425 feet. The Marland Oil Company well in sec. 8., T. 3, N., R. 7 W., logs 212 feet of Whitehorse.

The upper portion of the Whitehorse is composed of highly cross-bedded sands. The lower portion is composed of more nearly continuous massive lenses of sandstone separated by lenticular shales and dolomites. The latter can be observed about 70 feet above the base of the Whitehorse in the vicinity of Geary and Greenfield. They produce escarpments and are known as the Greenfield dolomite. At the top of the Whitehorse and farther west in Dewey and Custer counties the Day Creek dolomite is found. By some geologists this is considered as a distinct formation and by others as a member of the Whitehorse while still others consider it basal Cloud Chief. The upper cross-bedded portion of the Whitehorse is probably wholly, or at least partly, of eolian origin. Some, however, consider it to be an estaurine subaerial delta More detailed studies will reveal the exact origin. The lower portion is, in all probability, deltaic in origin. The following section of lower Whitehorse was taken west of Greenfield.[15]

General Section near Greenfield, Blaine County.

	Feet
Whitehorse sandstone	350
Greenfield dolomite	?
Sandstone	27
"Twin dolomites" separated by 7 feet of sandstone	?
Sandstone	110-130
Thin white sandstone seam	?
Dog Creek shales	185

Freie reports the Whitehorse from 18 to 30 per cent soluble in acid. From 80 to 85 per cent of the grains are angular and less than 20 per cent distributed among other shapes. Among the light minerals quartz is the most abundant constituent with feldspar rare or entirely absent.

The Whitehorse of this area was derived from some western source (Ancestral Rockies?). To the southeast in the head of the Anadarko Basin the source seems to have been from the east or southeast, perhaps the Arbuckle Mountains.

QUATERNARY SAND AND GRAVELS

There are three major occurrences of these deposits. The first occurs as a strip approximately six miles wide which parallels the north

15. Suffel, G. G., Dolomites of western Oklahoma: Oklahoma Geol. Survey Bull. 49, p. 192, 1930.

side of the South Canadian River. It continues from the southwest part of the county to the northwest in the vicinity of Taloga and Dewey County. The second area lies on top of the divide between the North Canadian and Cimarron River valleys and is a band from two to five miles wide extending across the county from northwest to southeast. This particular deposit of gravel is the reservoir for numerous springs at the headquarters of the tributaries of the Cimarron River. Other deposits occur in other parts of the county the most important being northeast of Watonga lying unconformably upon the Whitehorse, Dog Creek, Blaine, and Chickasha formations. These deposits are usually covered with scrub oak.

Along the major drainage lines extensive alluvial deposits occur, A large amount of this material has been blown from the river bottoms to the uplands on the northeast side of the streams which has resulted in the formation of extensive eolian deposits.

Subsurface geology

Little is known in detail concerning the subsurface formations of Blaine County because few wells have been drilled through the underlying Permian. It is reasonable to suppose that a part or all of the formations outcropping to the eastward underlie this area. In descending order these should be Duncan sandstone, Hennessey shale, Garber sandstone, Wellington shale, and Stillwater formation of the Permian, below which should occur Pennsylvanian, Mississipian, Devonian, Silurian, and Ordovician series.

A study of the following well logs reveals the general subsurface character of the rocks underlying this county and that region directly south.

Log of W. H. Pringey, Barnett No. 1 well, SW.¼ SW.¼ SW.¼ sec. 23, T. 15 N., R. 11 W., Blaine County.

(Elevation 1,452)

Formation	Top	Bottom
Surface formation	0	14
Quick sand & water	14	50
Red bed	50	80
Lime shell	80	90
Red bed	90	120
Lime shell	120	130
Red bed	130	160
Lime shell	160	170
Red bed—wtr 1 blr per hr.	170	400
Red bed	400	780
Sand—1 blr. wtr. per hr.	780	790
Red bed	790	1772
Sand—3 blrs. wtr. per hr.	1772	1790
Red bed	1790	2089
Blue shale	2089	2095
Red bed	2095	2110
Blue shale & shells	2110	2140
Brown shale	2140	2190
Gray shale	2190	2200
Pink shale	2200	2220
Gray shale	2220	2450
Gray—shelly	2450	2515
Lime	2515	2520
Grey shale—shelly	2520	2630
Lime	2630	2635
Gray shale & shells	2635	2660
Lime	2660	2666
Gray shale	2666	2682

(Continued on page 17)

Formation	Top	Bottom
Lime	2682	2688
Gray shale	2688	2716
Lime	2716	2718
Lime	2775	2787
Gray shale	2787	2789
Lime	2789	2797
Gray shale	2797	2803
Lime	2803	2808
Gray shale	2808	2826
Lime	2826	2837
Lime	2837	2840
Shale	2840	2853
Lime	2853	2855
Shale	2855	2861
Lime	2861	2865
Shale	2865	2878
Lime	2878	2894
Shale	2894	2900
Shale	2900	2925
Lime	2925	2930
Shale	2930	2947
Lime	2947	2951
Brown shale	2951	2965
Lime	2965	2966
Shale	2966	2994
Lime	2994	3008
Shale	3008	3026
Lime	3026	3040
Dark shale	3040	3056
Lime	3056	3090
Shale	3090	3096
Lime	3096	3102
Shale	3102	3106
Lime	3106	3180
Shale	3180	3185
Lime	3185	3195
Shale	3195	3200
Lime	3200	3208
Shale	3208	3218
Lime	3218	3222
Shale	3222	3225
Lime	3225	3229
Shale	3229	3231
Lime	3231	3263
Gray shale	3263	3274
Lime	3274	3295
Gray shale	3295	3315
Lime	3315	3323
Gray shale	3323	3326
Lime	3326	3333
Gray shale	3333	3426
Gray shale	3426	3435
Lime	3435	3470
Pink shale	3470	3495
Lime	3495	3542
Shale & shells	3542	3562
Lime	3562	3579
Gray shale	3579	3588
Lime	3588	3645
Pink shale	3645	3651
Lime	3651	3654
Pink shale	3654	3657
Lime	3657	3680
Brown shale	3680	3705
Total depth		3705

Log of E. H. Morgan, Chronister No. 1 well, NW.¼ NW.¼ NE.¼ sec. 7, T. 18 N., R. 10 W., Blaine County.

(Elevation 1,196)

Commencing at 1490′ where E. H. Morgan took charge of the well the log runs as follows, to wit: Started by Cozart Oil Co. No record kept.

Formation	Top	Bottom
Blue shale	1490	1515
Gray lime	1515	1520
Red rock	1520	1540
Lime shell	1540	1550
Blue shale	1550	1580
Red beds	1580	1615
Gray lime	1615	1645
Blue shale	1645	1660
Lime shell	1660	1675
Brown shale—soft	1675	1705
Broken lime	1705	1715
White slate	1715	1735
Blue shale	1735	1800
Lime	1800	1805
Blue shale	1805	1875
Blue shale—dark	1875	1890
Blue shale—light	1890	2040
Blue ———	2040	2060
Blue shale	2060	2095
Lime	2095	2100
Blue shale	2100	2110
Blue shale—dark	2110	2148
Lime	2148	2158
Slate, dark	2158	2195
Blue shale	2195	2215
Lime	2215	2225

(Continued on page 18)

Formation	Top	Bottom
Blue shale	2225	2233
Lime shell	2233	2235
White slate	2235	2270
Lime	2270	2275
Blue shale	2275	2280
Lime	2280	2283
Shale	2283	2290
Lime	2290	2310
White slate	2310	2355
Broken lime	2355	2515
Lime, hard	2515	2560
Broken lime & shale	2560	2635
Blue shale	2635	2660
Lime	2660	2670
Blue shale	2670	2710
Lime	2710	2755
Shale	2755	2865
Red rock	2865	2880
Gray lime	2880	2890
Blue shale	2890	2910
Red beds	2910	2925
Broken lime	2925	2950
Broken lime	3135	3138
Dark slate	3138	3165
Brown shale	3165	3185
Lime shell	3185	3188
Brown shale	3188	3196
Lime shell	3196	3200
Brown shale	3200	3220
Lime	3220	3228
Gray shale	3228	3238
Lime	3238	3269
Red rock	3269	3300
Black slate	3300	3310
Red rock	3310	3340
Gray shale	3340	3355
Red rock	3355	3365
Black slate	3365	3370
Water sand (hole full)	3370	3395
Black slate	3395	3400
Red rock	3400	3405
Gray shale (sharp)	3405	3430
Sandy shale	3430	3433
Blue slate	3433	3436
Lime	3436	3445
Red rock	3445	3452
Lime, hard	3452	3468
Broken lime	3468	3475
Water sand	3475	3480
Lime, hard	3480	3540
Dark shale	3540	3585
Red rock	3585	3590
Shale	3590	3610
Lime	3610	3615
Shale	3615	3625
Red rock	3625	3640
Sand	3640	3646
Shale	3646	3666
Lime, shell, hard	3666	3670
Blue shale	3670	3685
Lime shell	3685	3690
Blue shale	3690	3695
Lime shell	3695	3700
Blue shale	3700	3715
Lime, hard	3715	3725
Blue shale	3725	3760
Lime shell	3760	3765
Blue shale	3765	3790
Red rock	3790	3795
Blue shale	3795	3805
Lime hard	3805	3810
Total depth	3810	

Bermingham and Keley, West No. 1 well, SW.¼ SW.¼ NE.¼ sec. 8 T. 11 N., R. 12 W., Caddo County.

(Elevation 1,728)

Formation	Top	Bottom
Red sand clay	0	84
Red sand rock	84	305
Red sand rock	305	355
Sand gravel	355	362
Hard sand	362	375
Quick sand	375	385
Hard sand	385	395
Sand rock	395	410
Hard sand & sand rock	410	421
Hard sand	421	440
Red clay	440	450
Broken sand	450	465
Red shale	465	530
Clay	530	538
Red shale	538	590
Sticky clay	590	595
Red shale	595	670
Lime rock	670	674
Gyp rock	674	680
Broken sand & clay	680	693
Lime shell	693	696
Red shale	696	720
Lime shell	720	724
Sandy red shale	724	733
Lime rock hard	733	738
Sandy shale	738	778

(Continued on page 19)

Formation	Top	Bottom
Lime rock	778	789
Gumbo & gravel	789	800
Lime rock	800	806
Shale, clay & gravel	806	823
Blue & red gumbo	823	878
gumbo	878	940
Gumbo	940	946
Blue & brown hard shale	946	965
Gumbo & gravel	965	980
Gumbo & shale	980	1025
Shale & gravel	1025	1045
Sandy shale, blue brown	1045	1083
Gumbo	1083	1090
Shale & gumbo	1090	1120
Sandy shale	1120	1170
Shale & gumbo	1170	1190
Gumbo	1190	1210
Sticky shale, blue-red	1210	1240
Gumbo	1240	1250
Shells & shale	1250	1258
Gumbo & shale	1258	1280
Red rock & gumbo	1280	1315
Lime, sand & gumbo	1315	1345
Sand, salt & shale	1345	1365
Shale & gumbo	1365	1370
Shale & gumbo	1370	1390
Sandy shale, blue & brown	1390	1415
Lime & gyp & gumbo	1415	1450
Hard shale & gumbo	1450	1466
Sand broken formation	1466	1483
Gumbo & shale	1483	1510
Sandy lime (broken)	1510	1520
Gumbo	1520	1535
Gumbo	1535	1540
Sandy lime	1540	1544
Gumbo, tough	1544	1551
Gumbo & gyp, tough	1551	1565
Hard shale	1565	1585
Blue & brown Gumbo	1585	1607
Gumbo	1607	1630
Shale	1630	1645
Hard & brown Gumbo	1645	1655
Sandy hard shale	1655	1665
Hard shale & gumbo	1665	1715
Sandy shale	1715	1722
Shale & gumbo	1722	1745
Red sand	1745	1749
Shale gumbo, boulders	1749	1790
Water sand	1790	1794
Shale & gumbo	1794	1810
Gumbo	1810	1830
Sandy shale & gumbo	1830	1837
Gumbo	1837	1850
Shale & gumbo	1850	1853
Gumbo gyp & lime	1853	1885
Hard shale	1885	1915
Sand, gumbo-lime	1915	1925
Lime, gyp & gumbo	1925	1965
Shale & gumbo	1965	1995
Gumbo	1995	2132
Shale & gumbo	2132	2170
Shale & boulders	2170	2198
Sandy shale	2198	2250
Gumbo	2250	2269
Gumbo & shale	2269	2295
Lime gyp & gumbo	2295	2312
Gumbo	2312	2352
Shale	2352	2364
Shale	2364	2385
Gumbo	2385	2410
Brown gumbo	2410	2440
Brown sticky shale	2440	2475
Gumbo & boulders	2475	2488
Gumbo	2488	2515
Blue & brown shale	2515	2551
Brown shale	2551	2560
Gumbo	2560	2575
Blue & brown shale	2575	2588
Sandy lime soft	2588	2600
Gumbo & boulders	2600	2626
Brown shale	2626	2645
Gumbo	2645	2690
Brown shale	2690	2710
Blue & brown shale	2710	2737
Gumbo & gyp	2737	2750
Shale & gumbo	2750	2775
Gumbo	2775	2790
Hard lime	2790	2793
Sandy lime & slate	2793	2827
Gumbo	2827	2835
Lime	2835	2838
Blue shale	2838	2846
Lime	2846	2848
Blue sandy shale	2848	2860
Gumbo	2860	2874
Lime rock	2874	2878
Blue shale	2878	2881
Lime rock	2881	2883
Blue shale	2883	2886
Lime	2886	2895
Blue shale	2895	2901
Lime	2901	2903
Blue shale	2903	2910
Lime	2910	2913
Blue shale	2913	2924
Lime	2924	2928
Blue shale	2928	2935
Gumbo & lime	2935	2940
Blue shale	2940	2944
Gumbo	2944	2950

(Continued on page 20)

Formation	Top	Bottom
Slate	2950	2953
Gumbo blue	2953	2963
Hard shell	2963	2966
Sticky blue shale	2966	2974
Blue gumbo	2974	2979
Sandy lime	2979	2982
Gumbo slate	2982	2987
Shale gumbo lime	2987	2998
Broken lime	2998	3008
Sand	3008	3010
Shale gumbo	3010	3019
Lime rock	3019	3023
Hard shale	2023	3026
Gumbo	3026	3032
Lime gumbo, shale	3032	3041
Hard shale	3041	3050
Lime rock	3050	3051
Lime & gumbo	3051	3063
Lime rock	3063	3064
Blue shale	3064	3067
Slate rock	3067	3073
Blue gumbo	3073	3080
Slate	3080	3093
Shale slate	3093	3100
Shale & lime	3100	3105
Sandy lime	3105	3112
Blue gumbo	3112	3115
Shale & lime	3115	3123
Shale	3123	3131
Lime	3131	3132
Shale lime	3132	3146
Gumbo lime	3146	3152
Gumbo	3152	3160
Slate	3160	3161
Lime	3151	3167
Shale & slate	3167	3172
Blue slate	3172	3180
Shale & gumbo	3180	3196
Slate	3196	3202
Shale & gumbo	3202	3215
Sticky shale	3215	3224
Sand shale lime	3224	3234
Shale & gumbo	3234	3251
Sand lime & shale	3251	3264
Sandy lime	3264	3267
Shale lime, slate	3267	3284
Hard sand	3284	3289
Shale & lime	3289	3298
Hard lime	3298	3302
Shale	3302	3310
Lime shell	3310	3312
Gumbo & lime	3312	3325
Shale sticky	3325	3334
Blue gumbo	3334	3339
Gumbo shale	3339	3349
Lime & slate	3349	3355
Shale slate	3355	3365
Gumbo slate	3365	3375
Slate & boulders	3375	3381
Lime & slate	3381	3390
Sandy lime shale	3390	3393
Shale & gumbo	3393	3401
Gumbo	3401	3406
Sticky shale	3406	3416
Shale hard	3416	3425
Slate	3425	3427
Shale lime	3427	3437
Gumbo blue	3437	3450
Shale blue	3450	3463
Shale	3463	3466
Lime	3466	3467
Shale & gumbo	3467	3508

Structural geology

Blaine County lies on the northeast limb of the Anadarko Basin. The strike of the formations is northwest-southeast. The regional dip is southwest in the southern part of the county and west in the northwestern part of the county. Plate I shows the general surface relationships of the rocks of this county. Plate II shows the general subsurface relationships. A number of irregularities were noted in various parts of the county but time did not permit detailing these. One of these is in the vicinity of secs. 8, 9, 16, and 17, T. 15 N., R. 10 W. Another is in the southwestern portion of T. 15 N., R. 11 W. in the vicinity of Greenfield, and a third is in the southeast portion of T. 15 N., R. 12 W. Still another is in secs. 16, 17, 18, 19, and 20 T. 15 N., R 12 W. Test wells have been drilled on each of these irregularities but none were drilled sufficiently deep to encounter known producing horizons. To reach such horizons, wells would need to be drilled to a depth of 8,000-10,000 feet unless there are structural and topographic highs in Paleozoic rocks of that area. Such probabilities are unknown to date.

DEVELOPMENT

The table on page 52 gives a list of the wells that have been or are being drilled in this area.

DEWEY COUNTY

Dewey County is the northernmost of the two central counties of the area covered in this report. It lies directly west of Blaine County, south of Major and Woodward, east of Ellis and Roger Mills and north of Custer. It is a rectangle of 24 by 42 miles and extends from Tps. 16 to 19 N., inclusive and from Rs. 14 to 20 W., inclusive. Along the northern boundary of the county is a long, narrow irregular strip of land marking the fractional area between the Cherokee strip and this county. The county covers approximately 1,008 square miles. A branch line of the Frisco from Enid to Clinton crosses the extreme southeastern part of the county. The Orient also serves this portion of the county via Oakwood and Nobscot. The Wichita Falls and Northwestern passes through the extreme western tier of townships entering the county at Vici, crossing the South Canadian River at Camargo and continuing south toward Elk City in Beckham County through Trail and Leedey. The county seat Taloga has no rail connection.

The population of the county is approximately 20,000 which is an average of 20 per square mile. The principal towns are Taloga (800), Leedey (200), Tray (150), Camargo (300), Vici (1,500), Oakwood (200) and Seiling (400). In addition to these there are numerous trading posts and postoffices such as Cestos, Lenora, Webb, Oakley, Rhea, Aledo, Putnam, and Fay.

TOPOGRAPHY

Dewey County lies in the Gypsum Hills and High Plains provinces. It is drained by the North Canadian River and its tributaries in the northeastern part. The central and eastern portion is drained by South Canadian and the extreme southern and southwestern part by the tributaries of Washita River. The eastern part of the county is a rolling plain covered partially with black jack timber. The northwestern part is a fairly level plain composed of Quaternary gravel. This is an eastward extension of the High Plains province. That part of the county along the South Canadian River is very rough and broken. The North and South Canadian rivers have been superimposed upon the present land surface by the removal of the once overlying Tertiary and Quaternary gravels.

GEOLOGY

Surface formations

The surface formations of this county are composed of Whitehorse sandstone, Day Creek dolomite, Cloud Chief gypsum and Quartermaster sandstone of Permian age and numerous scattered erosional remnants of Cretaceous oyster beds and Quaternary gravel, alluvium, and eolian deposits. Quaternary gravel is found in the eastern part of the county as a band some six to eight miles wide paralleling the north bank of the South Canadian River; in the northeastern part of the county north of North Canadian River; in the southwestern part north of Leedey and south of the South Canadian and in the northwestern part extending from Vici to the vicinity of Webb. Recent alluvial deposits are found along the main stream valleys.

WHITEHORSE SANDSTONE

The Whitehorse sandstone occurs as a wide band from northwest to southeast through the eastern third of the county. The character of this Whitehorse is the same as that previously described under Blaine County. Directly above the Whitehorse sandstone and perhaps a part of it, occurs the Day Creek dolomite. This was first described by Cragin in 1896 at its type locality along Day Creek in Clark County, Kansas. It varies in thickness from one to five feet and is continuously traceable from Clark County, Kansas, southward into Oklahoma around the Anadarko Basin. It forms conspicuous buttes in northwestern Oklahoma in Woods county and in the northern part of Dewey County. After crossing the river west of Taloga in Dewey County, it continues southwestward to the vicinity of Weatherford as a low escarpment. In the western portion of Blaine County near Eagle City some buttes occur one of which has three or four dolomites. One of these has been correlated with the Day Creek of Custer County which in turn has been correlated with the Double Mountain of Texas. Some consider all of these as Cloud Chief gypsum.

CLOUD CHIEF GYPSUM

The Cloud Chief forms the surface of approximately one-third of Dewey County and it lies geographically west of and stratigraphically on the Day Creek dolomite. North of the South Canadian River it forms a band about five miles in width around the Quaternary gravel deposits which lie unconformably upon it. South of the South Canadian it covers most of the surface area west of Tps. 16 and 17 N., R. 16 W. A long finger-like projection of this same area extends northwestward between Leedey and the river and disappears beneath the Quaternary gravel only to reappear along the South Canadian River valley in northeastern Roger Mills County. Numerous names have been applied to this formation but Gould's nomenclature of 1924 has been accepted as the authentic name. The thickness varies up to 1,500 feet and

its outcrops are traceable from their type locality in Kansas south through Oklahoma and on to the northwestern part of Texas below the Panhandle. The type locality in Oklahoma for the Cloud Chief gypsum is at Cloud Chief in eastern Washita County. It appears as heavy gypsum ledges interbedded with shale all of which are lenticular. The red shales are impregnated with gypsum and satinspar occurs in joints and along the bedding plains.

The Cloud Chief lies unconformably upon the Whitehorse sandstone and is also unconformable below the Quartermaster formation. The character of this unconformity will be discussed under "Custer County."

QUARTERMASTER FORMATION

The Quartermaster formation outcrops in the southwestern portion of the county in the vicinity of Leedey a few miles north of its type locality along Quartermaster Creek in Roger Mills County. It lies unconformably upon the Cloud Chief gypsum and consists of red shale, compacted muds, sandstone, dolomite, and lentils of gypsum. The whole formation is impregnated with gypsum and one of the outstanding characteristics is the white, sandy streaks imbedded in the shale and sandstone. Irregular erratic dips and cross-bedding further characterize it. The thickness varies from 150 to 300 feet in most places yet some well logs have recorded as little as 60 feet. The formation was first named by Gould in 1902 and is the youngest Permian formation exposed in Oklahoma unless some of the red beds of the Panhandle now referred to the Triassic prove later to be Permian. The three following sections taken farther south show the essential characteristics of the formation.

Section 6 miles southwest of Elk City in Headwaters of Elk Creek, northwest Beckham County
(After Freie[16])

		Ft.	in.
7.	Ledge of very fine shaly, red-gray sandstone, bedding 1-6 inches	4	6
6.	Red sandy shale thinly bedded	11	0
5.	Gray-red shaly sandstone thinly bedded	2	0
4.	Red sandy shale thinly bedded (Bed of gray shale separates beds 4 and 5)	8	0
3.	Red shale thinly bedded	12	0
2.	Gray and red sandy shale alternating 3-inch beds	1	6
1.	Yellowish-red shaly sandstone	4	0

Section three miles east of Clinton, Custer County, Oklahoma
(After Freie)

		Feet
3.	Red, shaly, uniformly and horizontally bedded very fine sandstone	60
2.	Red, shaly, horizontally bedded very fine sandstone	75
1.	Red, hard, firmly cemented massive beds of shaly siltstone	50

16. Freie, A. J., up. cit., pp. 66, 67, and 69.

Section in southern Washita County three miles east of No. 41 Gin
(After Freie)

		Ft.	in.
6.	Red cross-bedded sandstone	10	0
5.	Red irregularly cross-bedded sandstone containing streaks of coarse sand	5	6
4.	Gray sandy shale horizontally bedded		1
3.	Fine red sandy shale	10	0
2.	Red finely cross-bedded shale	4	0
1.	Red gypsiferous sandy shale with the gray sandy streaks characteristic of the Quartermaster	5	0

Freie described the Quartermaster as being about 20 per cent soluble in acid. Of the relatively large proportion of light minerals, quartz and feldspar are the chief constituents. The heavy mineral content of Quartermaster is quite variable. Detailed study seems to indicate that the source of the material in the Quartermaster came from the west (Ancentral Rockies?).

CRETACEOUS FORMATIONS

Erosional remnants of Cretaceous occur in three general areas of this county. One is in the vicinity of Seiling and Cestos in the north central part and south of the North Canadian River. A second occurs between Webb and Lenora in the west central part of the county and north of the South Canadian while the third makes its appearance along the southern border of the county. Some of the remnants along the South Canadian River north of Rhea and Aledo suggest that this river valley is pre-Cretaceous in age.

The following is a section of the lower Cretaceous outlier in the NE.¼ sec. 17, T. 19 N., R. 17 W., about two miles east of Cestos, Oklahoma, taken by Bullard.[17] This shows the physical and paleontologic character of the Cretaceous rocks of this area.

(This exposure occurs along the north bank of a small creek where the material has slumped into the stream valley and the creek later cut through the slumped material. None of the material is **in situ**, but clean cut exposures are available and an estimated section based on this exposure is as follows:)

		Ft.	in.
3.	Shell bed, yellowish shell limestone, composed of large and well preserved **Gyphea navia** Hall and **Gryphea corrugata hilli** Cragin, **Turritella** sp., and **Oxytropidoceras** (Marcou); occurs in large slabs and blocks up to 15 feet square	3	0
2.	Light blue to gray, limestone, hard nodular, weathers white, contains **Cyprimeria** sp., a small **Gryphea cf. corrugata hilli** Cragin, **Turritella** sp., and **Oxytropidoceras** cf. **acutocarainatum** (Shumard)	6 in. to 1	6
1.	Blue clay grading into yellowish brown clay, impossible to estimate its thickness accurately, but appears to be rather prominent	5 to 10	0

PERMIAN (Cloud Chief gypsum)

17. Bullard, F. M., Lower Cretaceous of western Oklahoma: Oklahoma Geol. Survey, Bull. 47, p. 77, 1928.

QUATERNARY DEPOSITS

The location of these has been described above. Their physical character is similar to those described in Blaine County.

Subsurface geology

Very little is known concerning the subsurface relationships of Dewey County excepting that which is revealed by the few wells that have drilled there. It is reasonable to suppose that the same formations underlying Blaine County underlie this area but at a greater depth. Plate II shows general subsurface relationships revealed by well logs. A study of these logs indicate in more detail the characteristics of the underlying rock. The third log is that of the Sharon well north of Vici in sec. 25, T. 21 N., R. 21 W. in Woodward County and shows the subsurface relationships northwest of the county.

Log of Small & Kinnison, Ball No. 1 well, sec. 34, T. 20 N., R. 20 W., Dewey County.

Formation	Top	Bottom
Clay	0	60
Red beds	60	136
Red beds & sand	136	221
Red beds & sand	221	225
Sand	225	256
Sand	256	264
Pack sand	264	282
Sand rock	282	300
Red rock	300	335
Lime shell	335	336
Red beds	336	377
Sand	377	392
Rock	392	399
Sand	399	420
Sand rock	420	423
Sand	423	462
Clay & hard sand	462	537
Gumbo	537	560
Broken lime	560	610
Gumbo	610	622
Hard lime	622	625
Blue shale	625	627
Hard lime	627	658
Gumbo	658	752
Hard lime	752	756
Gumbo	756	788
Shale	788	800
Gumbo	800	890
Blue shale & bldrs.	890	924
Hard dry sand	924	925
Rock salt	925	927
Gumbo	927	938
Gumbo	938	943
Shale & bldrs.	943	955
Sandy lime	955	959
Shale	959	965
Broken lime	965	998
Lime rock	998	1002
Broken lime	1002	1060
Hard lime	1060	1076
Broken lime	1076	1082
Hard sandy lime	1082	1089
Hard sandy lime	1089	1097
Show gas & oil		
Gray sand	1097	1126
Red Gumbo	1126	1131
Shale & bldrs.	1131	1134
Water sand	1134	1147
Gumbo & red shale	1147	1152
Hard sandy lime	1152	1157
Sandy lime	1157	1165
Gumbo	1165	1169
Lime rock	1169	1183
Gumbo	1183	1211
Lime shell	1211	1212
Hard sdy. lime	1212	1228
Sandy shale	1228	1243
Hard lime	1243	1245
Sandy shale	1245	1283
Sandy lime	1283	1294
Lime shell	1294	1330
Sandy shale	1330	1333
Sticky shale	1333	1347
Sandy lime	1347	1354
Broken lime	1354	1397
Shale	1397	1433
Hard lime	1433	1434
Lime rock	1434	1435

(Continued on page 26)

Formation	Top	Bottom
Shale & slate	1435	1449
Lime rock	1449	1476
Hard sandy lime	1476	1486
Sandy lime	1486	1490
Red gumbo	1490	1500
Shale & bldrs.	1500	1526
Rock salt	1526	1553
Shale	1553	1565
Bkn. lime & shale	1565	1580
Shale	1580	1672
Sandy shale	1672	1673
Sandy-show gas	1673	1683
Hd. sand & shale	1683	1691
Blue & brown shale	1691	1706
Broken sand & shale	1706	1722
Lime & shale	1722	1733
Shale & sand	1733	1753
Sandy shale	1753	1765
Shale & bldrs.	1765	1799
Sandy shale	1799	1805
Blue & brown shale	1805	1830
Shale & bldrs.	1830	1880
Sandy shale	1880	1910
Gumbo	1910	1920
Blue shale	1920	1945
Gumbo & bldrs.	1945	1956
Salt rock	1956	1964
Salt water sand	1964	1985
Gumbo	1985	1999
Gumbo & bldrs.	1999	2010
Sandy shale	2010	2025
Gumbo & bldrs.	2025	2058
Blue shale	2058	2070
Blue & Brown shale	2070	2094
Sandy shale	2094	2125
Hard Gumbo	2125	2152
Gumbo & bldrs.	2152	2211
Gyp	2211	2214
Red Gumbo	2214	2223
Gray gyp	2223	2226
Gumbo & bldr.	2226	2311
Dark lime	2311	2320
Gumbo	2320	2485
Red shale	2485	2500
Set 8-1/4" pipe		
Brown & blue shale	2500	2550
Blue shale	2550	2610
Blue shale	2610	2623
Lime	2623	2627
Blue shale	2627	2645
Lime	2645	2653
Light shale	2653	2670
Lime	2670	2673
Blue shale	2673	2690
Lime	2690	2694
Blue shale	2694	2704
Lime	2704	2715
Blue shale	2715	2728
Lime	2728	2732
Blue shale	2732	2750
Lime formation	2750	2775
Shale	2775	2795
Cavy formation	2795	2882
Bad cave	2882	2920
Blue shale	2920	2935
Cavy formation	2935	2965
Gypsy lime or selenite	2965	2985
Gypsy lime	2985	2995
Broken shale & shell	2995	3050
Broken shale & shell	3050	3065
Broken and caving	3065	3085
Shale	3085	3095
Shale & shell	3095	3115
Shale & shell (shell)	3115	3175
Shale & shell (dark)	3175	3275
Shale	3275	3315
Shale & shell	3315	3330
Hard gray lime	3330	3670

Log of Sharon Oil Co., Elmore No. 1 well, sec. 25, T. 21 N., R. 21 W., Woodward County.

(Elevation 2,038.8)

Formation	Top	Bottom
Surface clay and sand	0	27
Sand	27	40
Shale	40	80
Quick sand	80	100
Hard packed sand	100	104
Gummy shale	104	113
Red Bed	113	130
Red clay or shale	130	160
Red clay or shale	160	190
Red clay or shale	190	210
White lime	210	230
Red clay or shale	230	300
White lime	300	316
Red beds and streaks of lime	316	440
Lime rock	440	450
Red beds	450	474
Lime	474	526

(Continued on page 27)

Formation	Top	Bottom
Red beds	526	535
Lime	535	539
Hard lime	539	584
Lime	584	590
Red beds	590	603
Shale bluish green	603	635
Blue gummy shale	635	663
Gummy shale	663	703
Blue & brown shale	703	734
Gummy shale red & blue	734	774
Brown shale	774	803
Red & brown gummy shale streaks of lime shell	803	845
Brown & red shale with streaks of lime shell	845	905
Red & brown shale	905	950
Red & brown shale sticky & hard by streaks, some streaks of lime shell	950	1010
Red & brown shale	1010	1013
Very hard lime	1013	1033
Rock salt	1033	1057
Brown shale	1057	1075
Brown shale, streaks of hard lime and gummy streaks	1075	1101
Salt rock	1101	1110
Lime	1110	1115
Red shale	1115	1120
Brown shale with streaks of hard lime shell	1120	1164
Lime & salt in streaks	1164	1172
Shale & streaks of lime	1172	1190
Salt & lime streaks	1190	1200
Brown shale & shell lime	1200	1220
Salt rock	1220	1230
Shale & shell lime	1230	1244
Gray lime	1244	1250
Salt rock	1250	1282
Hard salt rock	1282	1292
Salt rock, very hard & flinty	1292	1299
Brown & blue shale & shell lime	1299	1308
Salt rock	1308	1327
Brown & blue shale, streaks of lime	1327	1354
Salt rock	1354	1392
Salt rock—some shale	1392	1408
Salt rock	1408	1417
Red beds & streaks of lime	1417	1457
Core	1457	1460
Blue shale — salty — streaks of lime	1457	1469
Very hard lime	1469	1476
Hard lime	1476	1480
Salt rock (core at 1481)	1480	1493
Red & blue shale, salt salt rock & gyp	1493	1507
Red rock, streaks blue shale & salt	1507	1515
Red rock & streaks blue shale	1515	1538
Salt rock quite hard	1538	1563
Blue & brown shale & streaks hard rock	1563	1595
Blue & brown shale & streaks lime	1595	1655
Salt rock	1655	1662
Blue & brown shale & streaks slate	1662	1712
Blue & brown shale, streaks of salt & salt rock	1712	1750
Blue shale & streaks lime	1750	1780
Blue shale — gummy — streaks lime	1780	1835
Sticky shale & streaks lime	1835	1890
Hard shale & slate	1890	1900
Gummy shale	1900	1952
Hard brown shale—Gummy	1952	1975
Red & blue shale—Gummy streaks	1975	2017
Red & blue shale—Thin streaks hard lime	2017	2076
Blue shale—gummy—& streaks lime	2076	2101
Blue shale—very hard & very gummy in streaks also streaks of hard lime	2101	2115
Blue shale—hard streaks hard red rock & lime	2115	2136
Blue gummy & hard shale—some hard, almost black, shale, red rock in 1 to 2 ft. streaks & some lime	2136	2153
Hard gummy shale & streaks lime	2153	2215
Hard shale & streaks of lime	2215	2222
Lime in 1 to 2 ft. streaks, brown shale between	2222	2242

(Continued on page 28)

Formation	Top	Bottom
Lime streaks & gummy shale	2242	2250
Thicker lime streaks, slightly sandy at bottom	2250	2257
Streaks of lime & shale	2257	2293
Hard gray shale	2293	2298
Hard lime	2298	2306
Hard gray shale	2306	2318
Dark lime	2318	2323
Hard gray shale	2323	2335
Hard lime rock	2335	2342
Rock	2342	2349
Rock & gumbo	2349	2356
Lime	2356	2366
Lime rock & gumbo	2366	2378
Hard lime rock	2378	2387
Hard lime rock	2387	2395
Hard lime rock	2395	2399
Gumbo	2399	2407
Gumbo with streaks hard lime rock	2407	2419
Gummy shale	2419	2431
Hard lime	2431	2434
Rock lime	2434	2447
Gumbo with streaks of shell	2447	2454
Shale with streaks lime	2454	2483
Shale with hard lime streaks	2483	2495
Gummy shale (?)	2495	2503
Shale, streaks of lime	2503	2550
Slaty shale	2550	2559
Gummy shale	2559	2572
Hard shale streaks of lime	2572	2580
Gummy shale, streaks of lime	2580	2615
Hard shale, streaks of lime	2615	2626
Slaty shale, streaks of lime	2626	2643
Hard slaty shale, streaks of lime	2643	2662
Hard crystal	2662	2668
Hard crystal lime	2668	2678
Gummy shale	2678	2681
Gummy shale & streaks of lime	2681	2688
Shale, streaks of lime	2688	2703
Slaty shale, thin streaks lime	2703	2729
Hard lime	2729	2735
Shale, thin streaks of lime	2735	2755
Shale, streaks of lime	2755	2767
Hard lime	2767	2772
Hard lime	2772	2777
Hard lime	2777	2782
Hard lime	2782	2786
Very hard lime	2786	2790
Hard lime	2790	2795
Hard lime	2795	2796
Hard shale	2796	2799
Hard lime	2799	2812
Hard lime	2812	2816
Salt shale	2816	2819
Hard shale	2819	2822
Hard lime with streaks of hard shale	2822	2832
B..... lime with shale	2832	2839
Hard lime	2839	2842
..... lime ..... shale	2842	2853
Broken lime	2853	2867
Broken lime .....shale	2867	2874
Sealy shale .....shells	2874	2887
Gyp rock	2887	2898
Gyp rock	2898	2902
Hard lime	2902	2907
Hard lime	2907	2914
Hard shale	2914	2920
Lime rock	2920	2932

Log of Morton & Co., Jessie Elder No. 1 well, cen. SE.¼ sec. 22, T. 16 N., R. 18 W., Dewey County

(Elevation 2,035)

Formation	Top	Bottom
Red shale red	0	55
Gyp lime white	55	78
Shale red	78	83
Gyp rock white	83	90
Gyp rock white	100	105
Red mud red	105	125
Sand rock red	125	145
Red mud red	145	180
Red rock (HFW) red	180	230
Quick sand red	230	388
Red rock red	388	525
Shale red	525	600
Gyp rock white	600	620
Red rock red	620	625

(Continued on page 29)

Formation	Top	Bottom
Gyp rock white	625	640
Shale red	640	644
Red rock red	644	665
Gyp rock white	665	670
Red rock red	670	690
Gyp rock white	690	700
Slate blue	700	720
Red rock red	720	740
Gyp rock white	740	750
Red rock red	750	780
Red rock red	780	1830
Gyp rock white	1830	1835
Red rock red	1835	1925
Blue mud blue	1925	1950
Brown mud brown	1950	2000
Red rock red	2000	2698
Shale blue	2698	2750
Gyp rock white	2750	2757
Shale blue	2757	2802
Shale red	2802	2823
Shale blue	2823	2962
Gyp rock white	2962	2970
Shale blue	2970	3049
Shale light	3049	3070
Shale light	3070	3092
Shale light	3092	3109
Lime light	3109	3118
Shale light	3118	3124
Broken lime	3124	3242
Shale & lime shells	3242	3296
Shale light	3296	3350
Shale—lime shells	3350	3390
Broken lime	3390	3420
Shale—lime shells	3420	3483
Lime	3483	3506
Total depth		3506

Structural geology

Dewey County lies on the north limb of the Anadarko Basin and the accompanying figure shows the structural relationships of this area to the basin. The strike of the formations is northwest-southeast with the regional dip to the west and southwest, similar but not so steep as in Blaine County. Numerous structural irregularities have been mapped in this county but time did not permit the checking or detailing of these.

The Day Creek dolomite, a very persistent marker through this area, is difficult upon which to map structural details. This is due to the tremendous amount of slumping in the buttes and escarpments. The underlying shale also allows the dolomite to slump in such a manner as to produce dips varying in all degrees of angle and direction. As yet, wells have not been drilled sufficiently deep to encounter any known producing horizons but small shows of oil and gas have been reported from various wells drilled in the county. Inasmuch as the area is near to the axis of the Anadarko Basin it would be necessary to drill through some 7,000 feet of sediments to encounter known producing horizins. The structural relationship of underlying Pennsylvanian formations may be such as to bring these producing horizons nearer the surface. As yet we know of no surface indications to justify such a belief.

DEVELOPMENT

To date no production in commercial quantities has been found in Dewey County. The table on page 52 gives a list of wells which have been drilled.

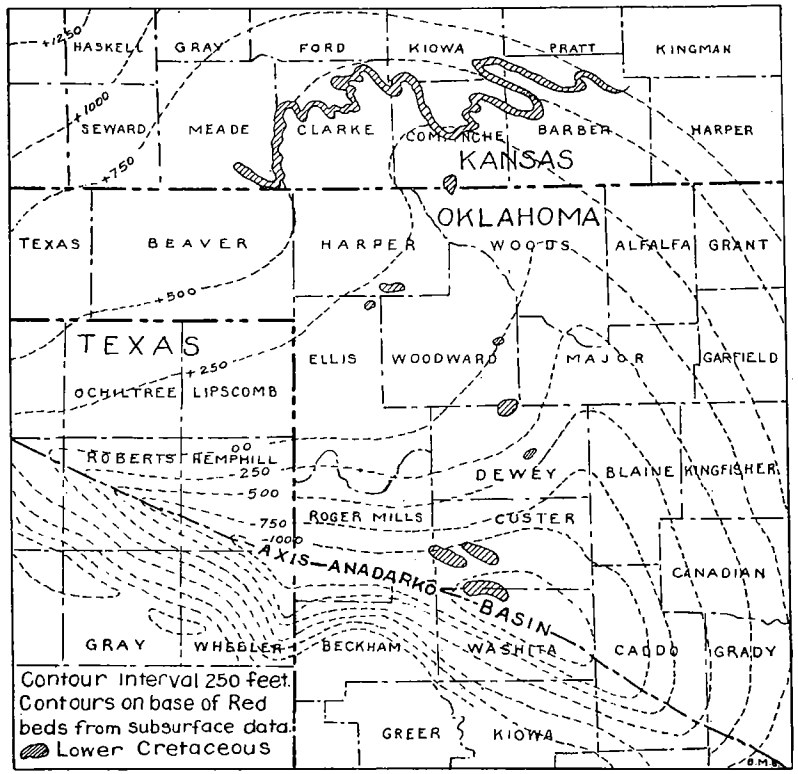


Figure 2. Map showing the relation of the lower Cretaceous outliers to the Anadarko Basin. (After Bullard and Clifton.)

CUSTER COUNTY

Custer county is the southern of the two central counties covered by this report. In shape it is rectangular and has 28 townships from Tps. 12 to 15 N., inclusive and Rs. 14 to 20 W., inclusive, an area of approximately 1,008 square miles. It lies within the valleys of the South Canadian and the Washita rivers and their tributaries.

The main line of the Rock Island traverses the southern part of the county, the Frisco and Orient the eastern part, and a branch line of the Santa Fe serves the Washita Valley from Clinton west. The Wichita and Northwestern crosses the extreme western part.

The county has a population of approximately 30,000 and Arapaho with a population of 500 is the county seat. Clinton is the largest and most important city with 6,000 population. Four of the five railroads

intersect at this point. Other places of importance are Custer City (1,500), Thomas (400), Weatherford (4,000), and Butler (300). Weatherford is the site of the Southwestern State Teachers College.

TOPOGRAPHY

The northern part of Custer County is a rolling plain drained by the northern tributaries of the Washita and Deer Creek which is a tributary of the South Canadian. The eastern part of the county slopes gently toward the South Canadian River. The southeastern part is a badly dissected plain. Streams have cut deep, canyon-like valleys in the Whitehorse sandstone and Cloud Chief formations. The southwestern part slopes northeast into the valley of the Washita. The streams which have eroded the surface are largely intermittent due to light rainfall which averages only 25 inches annually. The timber along the streams presents a semi-park landscape.

GEOLOGY

Surface formations

Surface formations of this county are the Whitehorse sandstone, Day Creek dolomite, Cloud Chief gypsum, Quartermaster formation, Cretaceous oyster beds (as outliers) and Quaternary gravels and sands. Alluvium is very abundant along the South Canadian and Washita rivers.

WHITEHORSE SANDSTONE

The Whitehorse sandstone outcrops in the eastern part of the county, forming a wide band south and west of South Canadian River. Deer Creek and its tributaries have carved their valleys into this formation, the character of which has been described under Blaine County.

DAY CREEK DOLOMITE

The Day Creek dolomite forms a low escarpment just west of the Whitehorse area and can be traced from the northern boundary of the county down to the Weatherford area. The character of this formation has been described under Dewey County. Outliers are found in the vicinity of Thomas, lying upon Whitehorse. Northwest of Eagle City in Blaine County it occurs(?) as one of the series of dolomites and gypsums which form a prominent outlier.

CLOUD CHIEF GYPSUM

The Cloud Chief gypsum forms the surface of the central half of the county and wider in the northern than in the southern part. That along the southern border is very similar to that in the type locality of Cloud Chief in Washita County. The character of this formation has been described under Dewey County.

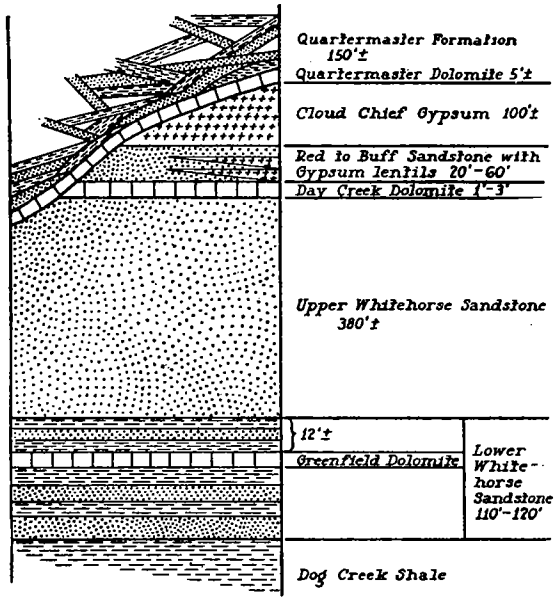


Figure 3. Section showing the stratigraphy of the Weatherford district (Evans, 1928, p. 708).

QUARTERMASTER FORMATION

This formation outcrops in the northwestern and southwestern parts of the county and lies unconformably upon the older Permian rocks. Gypsum or dolomite forms the basal portion of the formation and is well developed in the southeastern part of the county between Clinton and Weatherford. The following section made by Evans shows the relationships between the Quartermaster and the underlying Permian formations. It is interesting to note that the Quartermaster caps the buttes in Caddo County to the southeast and rests unconformably upon the Whitehorse.

The following figure shows the stratigraphic relationships of the Weatherford area as interpreted by Noel Evans.[18]

18. Evans, Noel, Stratigraphy of the Weatherford area: Bull. Am. Assoc. Pet. Geol. vol. 12, fig. 12, 1928.

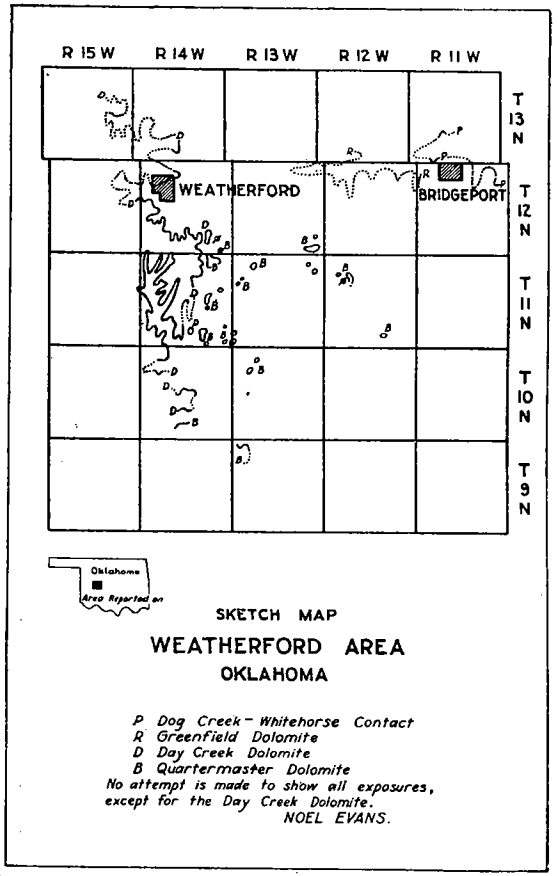


Figure 4. Sketch map of Weatherford district, showing the chief occurrences of the Day Creek and Quartermaster dolomites.

The map above, figure 4, shows the distribution of the various dolomites in this area described by Evans.[19] A great deal of detail work needs to be done in this county to clarify the structural relationships of the existing formations.

CRETACEOUS FORMATIONS

The Cretaceous formations in Custer County occur as erosional remnants in widely scattered areas throughout the northern, central and southern portions and they rest unconformably upon the older formations. Most of the cretaceous formations are but a few acres in extent. In the southwestern part near Butler and Foss they form low lying

19. Evans, Noel, up. cit., p. 706.

hills. The following section made by Bullard[20] at the NW. cor. sec. 9, T. 11 N., R. 19 W., three miles west of Foss, Oklahoma and just north of the Custer County line sets forth the character of these formations.

	Ft.	in.
Shell bed, yellowish brown shell conglomerate composed of **Gryphea corrugata** Say, **Gryphea navia** Hall, and **Oxytropidoceras belknapi** (Marcou)	3	0
Yellowish clay, blue and yellow mottled	10	0
Coarse sand, conglomeratic and locally quartzitic	3 to 5	0
PERMIAN (Quartermaster formation)		

As in other parts of the Cretaceous area, that of this county is correlated with the Washita group by Bullard. The following photograph shows the physical character of the *Gryphea corrugata* zone of these rocks in secs. 13, T. 13 N., R. 20 W. and is characteristic of this entire region.[21]

Figure 5. Close view of the "Shell Bed," **Gryphea corrugata** zone. Sec. 13, T. 13 N., R. 20 W.

Subsurface Formations

The rocks underlying Custer County are, perhaps, the same as those underlying Dewey and Blaine counties but lie at a greater depth due to their nearness to the axis of the Anadarko Basin. Most of the wells drilled in this county are shallow and reveal little concerning the subsurface character of formations in which production might be expected.

20. Bullard, F. M., up. cit., p. 79.
21. Bullard, F. M., up. cit., p. 85, pl. VI B.

The following series of well logs show the general character of underlying rocks. The one drilled by the Day Oil Company in the SE.¼ SE.¼ sec. 21, T. 14 N., R. 17 W., in 1923, may be considered the type log of this area.

Log of Empire Gas & Fuel Co., Stone No. 1 well, SE.¼ SE¼ SW.¼ sec. 25, T. 12 N., R. 14 W., Custer County.

(Elevation 1,685)

Formation	Top	Bottom
Formation	Top	Bottom
Sandy soil	0	22
Hard sand	22	30
Very hard sand	30	36
Red sand	36	105
Water sand—coarse	105	150
Hard sand	150	156
Red sand—shale	156	400
Red sand	400	520
Red shale	520	580
Sticky red shale	580	673
Gyp—lime	673	683
Gumbo	683	708
Gyp—lime	708	716
Red shale	716	722
Gyp	722	727
Gumbo	727	770
Gyp—lime	770	775
Gyp	775	785
Sticky red shale	785	819
Gyp	819	823
Gumbo	823	861
Sticky red shale	861	938
Very fine blue sand	938	942
Red shale	942	976
Sandy red shale	976	984
Sticky red shale	984	1093
Chalky red shale	1093	1097
Red shale	1097	1128
Hard sandy shale	1128	1173
Red shale	1173	1258
Sandy shale	1258	1278
Red shale	1278	1356
Gumbo	1356	1364
Gyp	1364	1374
Hard red shale	1374	1379
Gyp	1379	1389
Hard red shale	1389	1397
Sticky red shale	1397	1417
Hard red-gray shale	1417	1427
Gyp	1427	1447
Hard red shale	1447	1513
Very fine gray sand	1513	1423
Red shale	1523	1543
Sandy gray shale	1543	1552
Broken sand	1552	1572
Red shale	1572	1592
Sandy shale	1592	1617
Soft red shale	1617	1653
Red shale	1653	1738
Sticky red shale	1738	1797
Red shale	1797	1811
Sand gray fine	1811	1816
Gyp	1816	1826
Sandy shale	1826	1874
Gumbo	1874	1911
Hard red shale	1911	1936
Sticky red grey shale	1936	1995
Hard red shale	2015	2055
Red shale-gyp	2055	2075
Gyp—red shale	2075	2105
Red—brn. shale	2165	2220
Red shale	2220	2230
Hard red shale—brn. grey	2230	2260
Red—brn. shale	2260	2305
Red shale	2305	2330
Red brown shale	2330	2342
Sandy red shale	2342	2364
Red shale	2364	2377
Broken gyp	2367	2384
Gyp	2384	2395
Red shale—bldrs.	2395	2416
Gyp	2416	2417
Broken gyp	2417	2427
Red shale	2427	2447
Sticky red shale	2447	2457
Red shale—bldrs.	2457	2484
Gyp—bldrs.	2484	2491
Red shale	2491	2508
Red shale	2508	2543
Gyp	2543	2548
Red shale—bldrs.	2548	2564
Red shale	2564	2566
Broken gyp	2566	2578
Red shale	2578	2584
Red—brn. shale	2584	2588
Red—shale—bldrs.	2588	2622
Red shale	2622	2630
Gyp	2630	2642

(Continued on page 36)

Formation	Top	Bottom
Red shale	2642	2650
Gyp	2650	2660
Hard gyp	2660	2670
Red shale	2670	2692
Gyp	2692	2700
Red shale	2700	2704
Gyp	2704	2712
Measured pipe in hole		
31 fourbles 2622-10′		
1 double 42′8″		
Kelly down 22′ drill collar 6′		
T. D.	2693′6″	
Gyp	2693	2702
Broken sand	2702	2707
Blue shale	2707	2727
Red—blue shale	2727	2734
Red shale	2734	2742
Gyp—hard	2742	2750
Gyp	2750	2753
Red shale	2753	2766
Gyp	2766	2770
Red—blue shale	2770	2785
Broken sand—gas	2785	2787
Gyp	2787	2790
Red sticky shale	2790	2792
Red—blue shale	2792	2806
Blue shale	2806	2826
Lime	2826	2829
Cherty lime	2829	2831
Blue shale	2831	2852
Lime	2852	2856
Blue sticky shale	2856	2860
Lime	2860	2869
Blue shale	2869	2870
Lime	2870	2871
Sticky blue shale	2871	2873
Lime	2873	2879
Blue shale	2879	2880
Broken lime—shale	2880	2890
Broken lime	2890	2892
Blue sticky	2892	2904
Bldts. shale—sticky	2904	2892
Blue shale	2904	2905
Broken lime—bldrs.	2905	2920
Lime	2920	2922
Blue shale	2922	2929
Broken lime	2929	2935
Gumbo	2935	2940
Blue shale	2940	2950
Broken lime	2950	2960
Lime	2960	2969
Lime—sandy shale	2969	2972
Lime	2972	2973
Gumbo	2973	2977
Blue shale	2977	2980
Sandy shale	2980	2982
Lime	2982	2985
Shale—bldrs.	2985	2995
Gumbo	2995	2998
Sticky blue shale	2998	3008
Some gas—bldrs.		
Broken shale—lime	3008	3023
Sticky blue shale	3023	3034
Gumbo	3034	3044
Broken shale—sand	3044	3054
Gumbo	3054	3069
Sand	3069	3071
Lime	3071	3072
Broken wht. sand	3072	3074
Broken—lime—shale	3074	3081
Hard shale—bldrs.	3081	3105
Blue shale	3105	3132
Gumbo	3132	3138
Lime	3138	3140
Blue shale	3140	3151
Hard lime	3151	3155
Blue shale	3155	3161
Lime	3161	3164
Broken lime—shale	3164	3169
Blue shale	3169	3183
Gumbo	3183	3187
Blue shale—brkn. lime	3187	3196
Blue shale—bldrs.	3196	3203
Lime	3203	3204
Broken lime—shale	3204	3213
Cherty grey lime	3213	3220
Broken lime—blue shale	3220	3246
Lime	3246	3250
Blue shale	3250	3265
Lime	3265	3267
Sticky blue shale	3267	3270
Brkn. lime—blue shale	3270	3281
Gumbo	3281	3291
Fine wht. sand	3291	3293
Lime	3293	3294
Shale—bldrs.	3294	3308
Blue shale	3308	3310
Hard chalky shale	3310	3312
Lime	3312	3317
Blue shale	3317	3321
Blue shale—bldrs.	3321	3332
Chalky blue shale	3332	3338
Sticky blue shale	3338	3343
Gumbo	3343	3369
Chalky shale	3369	3371
Blue shale	3371	3375
Blue shale—bldrs	3375	3386
Sticky blue shale	3386	3391
Blue shale—gumbo	3391	3404
Broken lime	3404	3405
Blue shale	3405	3409
Lime	3409	3414

(Continued on page 37)

Formation	Top	Bottom
Sticky blue shale	3414	3424
Chalky shale	3424	3434
Chalky shale	3434	3436
Sticky blue shale	3436	3442
Lime	3442	3448
Sticky blue shale	3448	3475
Chalky shale	3475	3480
Lime	3480	3482
Chalky shale	3482	3483
Sticky blue shale	3483	3489
Blue shale	3489	3496
Lime	3496	3497

Log of Day Oil Co., Miller No. 1 well, SE.¼ SE.¼ sec. SE.¼ 21, T. 14 N., R. 17 W., Custer County.

[Elevation 1,773 (1,770)]

Formation	Top	Bottom
Red sand	0	10
Hard pack sand	10	13
Hard sharp sand	13	35
Hard rock	35	51
Red clay	51	69
Hard pack sand	69	78
Hard red sand	78	89
Gyp rock	89	104
Hard sand rock	104	124
Hard red sand	124	137
Cavity	137	140
Gyp rock	140	150
Sand	150	180
Red clay	180	196
Sand	196	218
Red bed	218	221
Red sand	221	230
Rock	230	238
Red sand water sand	238	321
Quick sand	321	384
Rock	384	386
Gravel sand	386	390
Quicksand	390	406
Gyp rock	406	419
Hard sand	419	430
Red clay	430	450
Sand	450	478
Shale sand	478	502
Sand	502	518
Rock	518	526
Shale red	526	534
Clay red	534	568
Clay red	568	588
Gyp rock	588	592
Clay	592	594
Hard sand	594	607
Mud blue	607	617
Shale red	617	650
Gumbo red	650	667
Red gumbo clay mixed	667	671
Shells, gray shale	671	691
Hard rock	691	699
Shale sand	699	705
Hard lime rock	705	715
Hard shale shells	715	720
Lime rock hard	720	731
Sticky shale shells	731	754
Hard lime rock	754	766
Shale blue	766	778
Lime shell	778	780
Red gumbo	780	792
Hard lime rock	792	798
Hard white flint lime	798	800
Hard lime rock	800	801
Hard shell	801	803
Red clay	803	809
Red gumbo	809	814
Shale blue	814	818
Lime rock	818	820
Shale brown	820	825
Red gumbo	825	830
Salt rock show gas on ditch	830	833½
Red gumbo	833½	841
Lime shell	841	844
Blue gumbo	844	845
Oil sand dry	845	847
Red gumbo	847	870
Hard gray shale	847	874
Red gumbo	874	890
Shale gray	890	898
Red gumbo	898	922
Red blue gumbo	922	945
Shell	945	946
Red gumbo	946	956
Shell	956	957
Red gumbo	957	975
Shale gray	975	983
Red gumbo	983	1000
Hard sand	1000	1003
Red gumbo	1003	1014
Shell	1014	1016
Red gumbo	1016	1021
Shell	1021	1023

(Continued on page 38)

Formation	Top	Bottom
Hard sand	1023	1027
Red gumbo	1027	1030
Red shale	1030	1034
Shell red gumbo	1034	1040
Shell	1040	1042
Shale blue	1042	1050
Red gumbo	1050	1054
Cong. lime, blue shale	1054	1061
Gumbo, boulders	1061	1080
Hard sand	1080	1083
Cong. of gumbo, bldrs. shale	1083	1099
Hard sand rock	1099	1109
Red gumbo	1109	1117
Hard sand	1117	1126
Gumbo, boulders	1126	1135
Lime sandy	1135	1140
Gumbo boulders	1140	1147
Red gumbo	1147	1192
Lime sandy	1192	1196
Red gumbo boulders	1196	1228
Hard sand	1228	1230
Gumbo bldrs.	1230	1240
Lime sandy	1240	1242
Hard sand broken	1242	1248
Red gumbo bldrs.	1248	1250
Sand	1250	1252
Hard sand	1252	1256
Hard sand rock	1256	1258
Red gumbo	1258	1270
Hard bldrs. gumbo	1270	1276
Red gumbo	1276	1308
Rock	1308	1309
Red gumbo	1309	1310
Hard sand	1310	1312
Gumbo bldrs.	1312	1323
Hard gray gumbo	1323	1335
Hard sand	1335	1337
Gumbo	1337	1347
Hard rock	1347	1348
Gumbo, flint, bldrs.	1348	1360
Gray sand	1360	1364
Gumbo, flint, bldrs.	1364	1367
Hard rock	1367	1370
Hard gray sand	1370	1372
Hard sand	1372	1389
Red gumbo	1389	1424
Lime sandy	1424	1426
Gumbo, bldrs.	1426	1431
Hard sand rock	1431	1502
Hard rock	1502	1503
Sand	1503	1508
Gumbo bldrs.	1508	1512
Hard sand rock	1512	1537
Gumbo flint bldrs.	1537	1550
Hard sandy lime	1550	1555
Gumbo bldrs.	1555	1560
Hard sand rock	1560	1563
Gumbo bldrs.	1563	1568
Sand rock	1568	1576
Hard sand rock	1567	1586
Red gumbo	1586	1589
Gumbo bldrs.	1555	1560
Sandy shale	1589	1600
Hard sand	1600	1604
Gumbo bldrs.	1604	1621
Hard sand	1621	1623
Sandy lime rock	1623	1639
Gumbo shale	1639	1655
Lime rock	1655	1661
Gumbo	1661	1665
Rock	1665	1668
Soft gray sand	1668	1670
Gumbo bldrs.	1670	1677
Sand rock	1677	1686
Gumbo bldrs	1686	1688
Gumbo	1688	1690
Hard pack sand	1690	1693
Hard sand rock	1693	1695
Red gumbo	1695	1698
Hard sand rock	1698	1700
Hard pack sand	1700	1708
Red gumbo bldrs.	1708	1721
Gumbo	1721	1723
Red gumbo	1723	1726
Gumbo	1726	1757
Sand gray	1757	1760
Red gumbo	1760	1773
Rock	1773	1775
Gumbo red	1775	1786
Shale sticky	1786	1793
Red gumbo	1793	1818
Shale	1818	1829
Rock	1829	1833
Red gumbo	1833	1837
Rock	1837	1839
Gumbo	1839	1843
Shell	1843	1844
Sand rock	1844	1855
Sand rock	1855	1864
Red gumbo	1864	1871
Red sand	1871	1874
Red gumbo	1874	1888
Hard rock	1888	1891
Hard sand rock	1891	1892
Red rock bldrs.	1892	1899
Red gumbo	1899	1903
Red rock bldrs.	1903	1909
Red gumbo	1909	1923
Shale sticky	1923	1930
Hard gumbo bldrs.	1930	1935
Hard sand	1935	1942

(Continued on page 39)

Formation	Top	Bottom
Hard gumbo bldrs.	1942	1947
Red rock bldrs.	1947	1956
Lime rock	1956	1968
Cong.	1968	1971
Blue gumbo	1971	1973½
Gumbo shale	1973½	1978
Hard gray sand	1978	1980
Gumbo blue	1980	1987
Shale bldrs.	1987	2000
Gumbo bldrs.	2000	2004
Shale gray	2004	2010
Gumbo red	2010	2016
Gumbo	2016	2020
Sand hard	2020	2022
Gumbo bldrs.	2022	2033
Hard sand	2033	2035
Gumbo bldrs.	2035	2039
Gumbo blue	2039	2052
Hard sand	2052	2054
Blue gumbo bldrs.	2054	2058
Shell	2058	2059
Blue gumbo bldrs.	2059	2067
Blue gumbo	2067	2074
Gray sandy shale	2074	2079
Blue gumbo	2079	2102
Shale	2102	2120
Gumbo blue	2120	2145
Shale sticky	2145	2165
Blue gumbo bldrs.	2165	2173
Gumbo	2173	2207
Shale	2207	2229
Gumbo	2229	2236
Shale	2236	2245
Gumbo	2245	2251
Shale	2251	2268
Shale sticky	2268	2276
Shale sticky	2276	2281
Gumbo	2281	2296
Shale sticky	2296	2312
Gumbo	2312	2338
Shale sticky	2338	2358
Gumbo	2358	2363
Shale mixed	2363	2383
Gumbo	2383	2388
Lime sandy	2388	2392
Shale	2392	2401
Gumbo	2401	2428
Gumbo tough	2428	2444
Shale sticky	2444	2454
Shell	2454	2455
Gumbo	2455	2460
Shale	2460	2466
Shale blue	2466	2492
Shale	2492	2493
Shale blue	2493	2510
Lime rock	2510	2512
Gumbo blue	2512	2522
Lime rock	2522	2527
Cong.	2527	2531
Gumbo	2531	2537
Lime rock	2537	2540
Gumbo	2540	2548
Shale	2548	2556
Gumbo	2556	2563
Shale	2563	2570
Gumbo	2570	2580
Gumbo blue	2580	2596
Shale blue	2596	2606
Gumbo bldrs.	2606	2610
Gumbo	2610	2630
Shale	2630	2646
Gumbo	2646	2650
Gumbo thin shell	2650	2660
Gumbo lime shell	2660	2667
Brown sand sandy shale	2667	2669
Lime	2669	2687
Brown shale	2687	2704
Brown slate	2704	2714
Brown shale	2714	2740
Blue slate	2740	2745
Brown shale caving	2745	2750
Slate blue	2750	2765
Shale brown	2765	2775
Slate blue	2775	2793
Lime broken	2793	2798
Slate blue	2798	2805
Blue shale soft	2805	2821
Blue mud cavy	2821	2835
Shale blue	2835	2865
Lime	2865	2870
Shale blue	2870	2875
Lime shells blue shale	2875	2880
Shale blue	2880	2904
Shale blue, lime shell	2904	2920
Lime shell blue shale	2920	2938
Slate blue	2938	2947
Shale blue	2947	2965
Slate shells	2965	2978
Shale blue	2978	2988
Lime	2988	2990
Shale	2990	2991
Lime hard	2991	2993
Slate blue	2993	2998
Shale blue	2998	3000
Lime hard	3000	3004
Slate	3004	3012
Shale blue	3012	3026
Shale pink	3026	3030
Shale blue	3030	3035
Lime	3035	3040
Shale blue	3040	3085

(Continued on page 40)

Formation	Top	Bottom
Slate gray	3085	3097
Shale blue	3097	3174
Lime shell	3174	3178
Lime	3178	3185
Shale blue	3185	3192
Lime	3192	3195
Shale blue	3195	3210
Shale blue, lime	3210	3228
Shale blue	3228	3240
Lime	3240	3245
Slate blue	3245	3250
Shale blue	3250	3258
Lime	3258	3265
Shale gray	3265	3270
Shale blue	3270	3280
Shale gray	3280	3290
Shale blue	3290	3310
Lime	3310	3335
Shale gray	3335	3390
Lime	3390	3395
Lime hard	3395	3405
Lime	3405	3415
Shale blue	3415	3430
Lime	3430	3435
Shale blue	3435	3460
Lime	3460	3473
Shale blue	3473	3480
Lime	3480	3490
Slate soft	3490	3508

Log of J. H. Santrock, Robert Ruth No. 1 well, cen. SE.¼ NW.¼ sec. 1, T. 15 N., R. 15 W., Custer County.

[Elevation 1,699 (1,705)]

Surface sand red	0	18
Red sand	18	45
Water sand	45	52
Red rock	52	125
Red sand—water	125	175
Hard red rock	175	260
Soft red rock	260	455
Grey lime	455	475
Red rock	475	515
Hard white lime	515	535
Red rock	535	560
Lime	560	687
Gravel	687	699
Red rock	699	700
Lime	700	705
Sandy lime	705	710
Red rock	710	860
Lime shell	860	863
Red rock	863	940
Lime	940	945
Sand	945	955
Red rock—lime shell	955	1250
Red rock	1250	1670
Brown shale	1670	1680
Red rock	1680	1690
Brown shale	1690	1705
Sand	1705	1715
Red rock	1715	1770
Blue shale	1770	1820
Red rock	1820	2115
Lime	2115	2120
Red rock	2120	2150
Blue shale	2150	2165
Dark red rock hd.	2165	2380
Red rock cavy	2380	2490
Brn. shale—lime shell	2490	2950
Light brn. sand	2950	2962
Brn. shale	2962	3005
Blue shale—lime shell	3005	3308
Grey lime	3308	3334
Blue slate	3334	3338
Grey lime	3338	3342
Blue shale	3342	3347
Grey lime	3347	3385
Blue shale	3385	3399
Grey lime	3399	3406
Sandy lime	3406	3490
White lime	3490	3505
Blue shale	3505	3545
White lime	3545	3570
Blue shale	3570	3585
Grey lime	3585	3595
White lime	3595	3630
Black slate	3630	3675
Grey sand	3712	3722
Grey lime	3722	3735
Black slate	3735	3740
Black sandy shale	3740	3778
Dark grey sand	3778	3817
Blue shale	3817	3838
Dark grey sand	3838	3860
Black sand	3860	3875
Sandy grey lime	3875	3890
Hard grey sandy lime	3890	3925
Grey sand	3925	3960
Broken grey lime	3960	4005
Hard grey lime	4005	4040
Broken lime	4040	4060
Hard sandy lime	4060	4080
Blue shale—lime shell	4080	4163
Hard grey lime	4163	4185
Red mud	4185	4212

Log of Homaokla Oil Co., W. H. Wasman No. 1 well, NW.¼ SW.¼ SE.¼ sec. 21, T. 13 N., R. 14 W., Custer County.

(Elevation 1,683)

Formation	Top	Bottom
Soil	0	15
Sand rock	15	85
Sand red rock	85	165
Sand rock	165	195
Sand rock packed	195	245
Red clay	245	250
Packed sand	250	270
Coarse sand red	270	285
Packed red sand	285	295
Packed sand	295	325
Red clay	325	367
Quick sand	367	370
Red clay	370	580
Hard sandy lime	580	600
Red clay	600	650
Lime—gyp rock	650	670
Red shale	670	712
Lime—dolomite very hard	712	720
Red shale	720	795
Dolomite	795	815
Red shale	815	884
Dolomite	884	885
Red shale	885	960
Sandy shale—show wtr.	960	970
Broken salt sands sandy shale	970	975
Salt sand, shale making 4 bbls.	975	1000
Salt sand—shale	1000	1020
Sandy shale	1020	1035
Red shale	1035	1080

Structural Geology

The strike of Quartermaster formations in this county is north south. The dips are very low and generally west by south. A number of small structures are reported to have been mapped here and considerable leasing has resulted. A number of companies have procured large holdings.

The general and historical relationships of the surface to sub-surface formations of this area are graphically presented in the following series of diagrams taken from Bullard.[22]

Plate I shows the areal relationships of this county and Plate III the general relationships as revealed by type logs taken in this portion of Oklahoma. Inasmuch as Custer County lies mainly in the bottom of the Anadarko Basin, producing horizons known north and east of here would lie, perhaps, at prohibitive depths. Conditions, however, may exist similar to those in the Sayre field in Beckham County to the southeast, but this is hypothetical as yet.

DEVELOPMENT

The table on page 53 gives a list of wells drilled or now drilling in Custer County up to date. No production has as yet been found in Custer County.

22. Bullard, F. M., up. cit., fig. 7.

ROGER MILLS COUNTY

Roger Mills County is located in the extreme western part of the state and its western boundary is a part of the Oklahoma-Texas boundary line, the 100th meridian west of Greenwich. The South Canadian River forms the northern boundary, Dewey and Custer counties the eastern boundary, and Beckham the southern boundary. This county contains 25 complete townships and parts of 16 others. The area is approximately 1,160 square miles.

A branch line of the Santa Fe extends from Pampa, Texas, to Clinton, Oklahoma and follows the Washita River valley through Roger Mills County. The county has a population of 15,000 and Cheyenne, the county seat and pricipal town has about 1,200.

TOPOGRAPHY

The northern part of Roger Mills County is drained by the South Canadian River and its tributaries and the central portion by the Washita River and its many tributaries, most important of which are Quartermaster, Nine Mile, Wild Horse, Dead Indian, Turkey, Rush, Croton, Broken Leg, Sergeant Major, Beaver Dam, Sandstone, Kiowa, and White Shield creeks. The southern part is drained by Meridian, Freezeout, Sweetwater, Buffalo, and Starvation creeks which flow into North Fork of Red River. With the exception of Washita River all of the streams of this county are intermittent due to light rainfall which averages only 22 inches annually. Timber is conspicuously absent.

The topography may be divided into two parts. The eastern two-thirds of the county is a plain broken by low lying sandstone hills while the eastern third is a sandy plain sloping gently southeast. The most important topographic features are the Antelope Hills (See plate IVB) and the Twin Hills which rise approximately 100 feet above the surrounding plains. These are flat topped buttes capped by High Plains Tertiary rocks and caliche. The Twin Hills are located in the SE.¼ sec. 9, and the SW.¼ sec. 10, T. 16 N., R. 25 W., on the divide between the Washita and the Canadian rivers. The Antelope Hills are located in secs. 32 and 33, T. 17 N., R. 35 W., in the first northward bend of the Canadian River inside the Oklahoma line. These hills are the most characteristic landmarks in this portion of Oklahoma. A government benchmark and triangulation point of primary importance is found on the top of the highest and largest of these hills.

GEOLOGY

Surface Formations

The following formations outcrop in Roger Mills County; Cloud Chief gypsum, Quartermaster formation, Cretaceous outliers, Tertiary gravel, possibly of Miocene and Pliocene age, and Quaternary gravels, sands, and caliche.

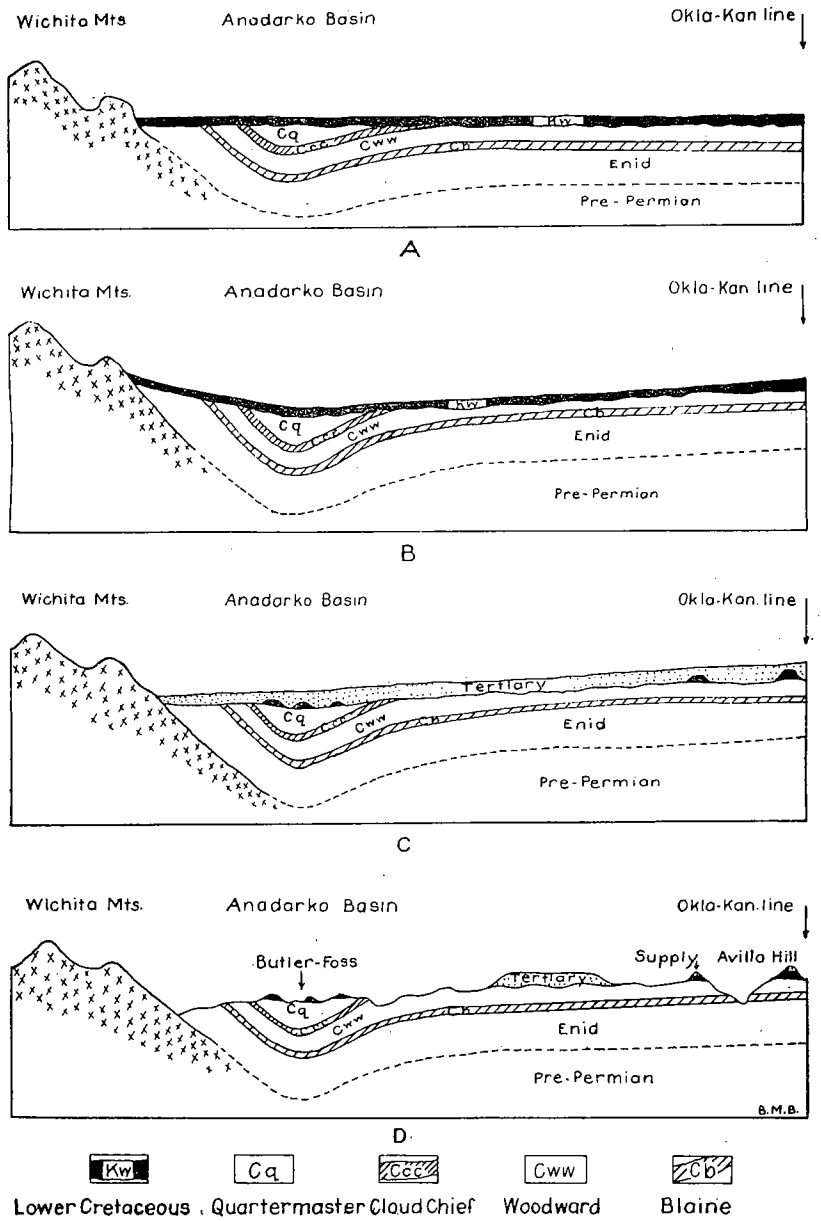
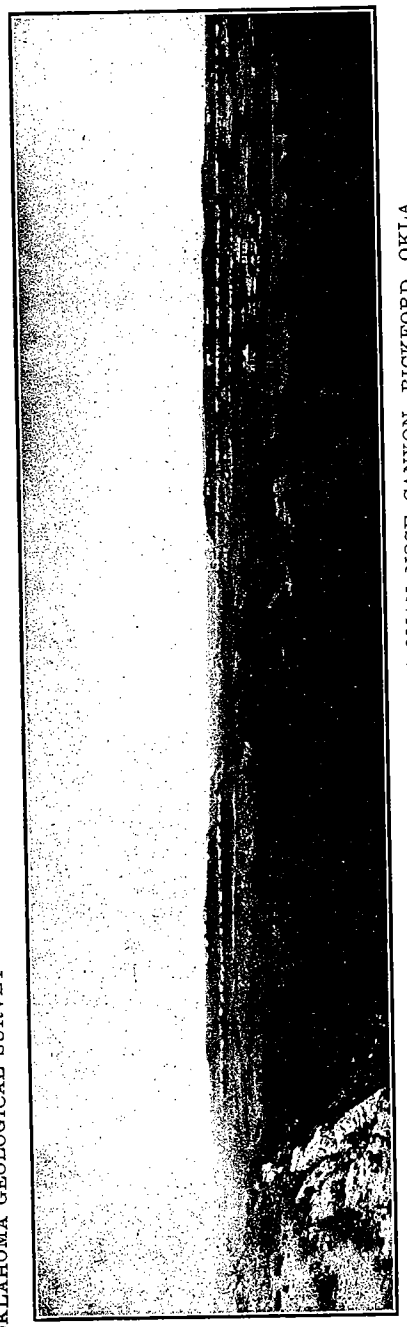
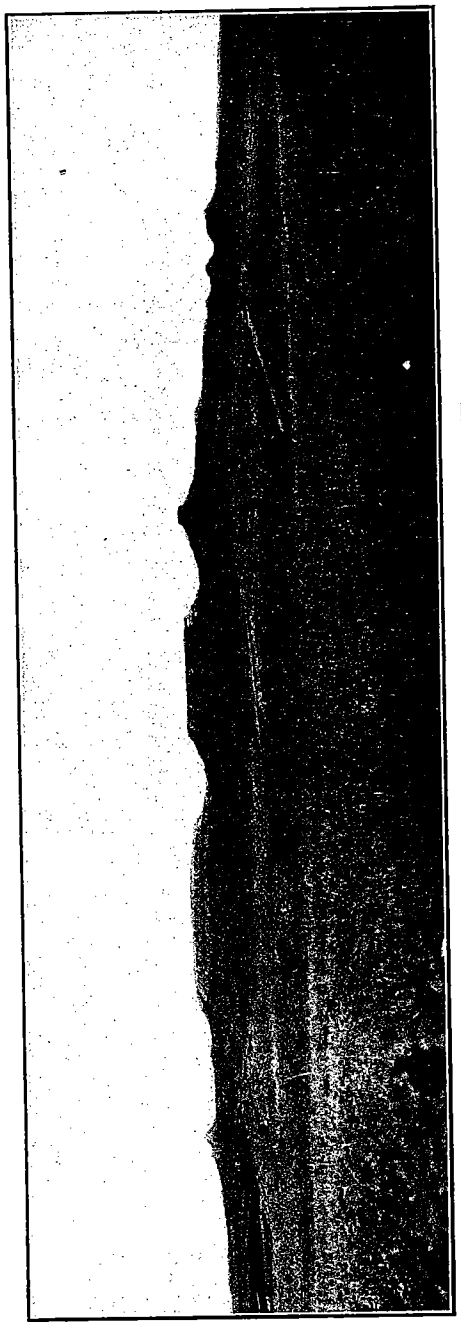


Figure 6. Diagrammatic representation of the stages in the geologic history of the Lower Cretaceous of western Oklahoma. (After Bullard)



A. BLAINE GYPSUM ESCARPMENTS IN ROMAN NOSE CANYON, BICKFORD, OKLA.



B. ANTELOPE HILLS IN ROGER MILLS COUNTY.

CLOUD CHIEF FORMATION

This formation outcrops in the northern edge of the county and in the breaks south of the South Canadian River in the northeast portion in T. 16 N., R. 21 W. and in the eastern portion in the valleys of the Washita and its tributaries. Outcrops follow the Washita River valley as far west as Tps. 13 and 14 N., R. 24 W. The Cloud Chief has been described under Dewey County.

QUARTERMASTER FORMATION

This formation is composed of dolomite at the base, massive lenticular sandstones in the central part and highly cross-bedded sandstones and shales in the upper part. It comprises the surface of most of the county and lies unconformably upon the Cloud Chief. Due to the physical character of the formation and the climatic environment, erosion has produced a characteristic topography. The red sandstone hillocks resulting are known as "haystack" topography. The surface is practically barren of vegetation.

CRETACEOUS OUTLIERS

These occur as erosional remnants in the eastern part of the county near Hamon and Carpenter and are similar in every way to those described under Custer County and lie unconformably upon the Quartermaster.

TERTIARY GRAVELS

These occur in at least two areas, one in the northeast part of the county in secs. 3, 4, 9, and 10, T. 16 N., R. 21 W., and on the northwest slope of the largest of the Antelope Hills. In these gravel deposits *Equus* and *Elephas* remains have been found which are probably Miocene. Other isolated outcrops of these gravels may occur.

QUATERNARY SAND AND GRAVELS

Quaternary formations occur as gravel deposits along the western edge of the county and cover the divides eastward between South Canadian, Washita, and North Fork of Red rivers. The surface of these deposits is covered with scrub timber. Recent alluvium is abundant in the Washita Valley and also the valley of the South Canadian. These gravel deposits are a source of "sweet" water. As in other areas of western Oklahoma most of the water is saline or gypsiferous. The character of these deposits of gravel is similar to that described under Blaine County except that they are coarser.

Subsurface Geology

Very little is known concerning the subsurface stratigraphy of Roger Mills County for the few wells drilled have not reached any

producing horizon to this date. Those formations which have producing horizons occurring to the northeast and south of this area should lie at great depths since this county lies in the bottom of the Anadarko Basin. The interpretation of subsurface conditions from data available at the surface is difficult to interpret because of the complex cross-bedding and slumping within the Quartermaster and the absence of mapable horizons in the overlying Quaternary gravels and sands.

The following series of logs of wells drilled in this county reveal the general character of the subsurface formations.

Log of Principle Oil Co., Barker No. 1 well, SE.¼ NW.¼ SW.¼ sec. 3, T. 13 N., R. 26 W., Roger Mills County.

[Elevation 2,248 (2,387)]

Formation	Top	Bottom
Sand shale gyp & red bed	0	600
Brown shale	600	660
Gyp	660	706
Sandy lime & gyp	706	848
Crystalized sand rock	848	908
Broken sand shale and salt	908	974
Hard shale & lime	974	1087
Gumbo & boulders	1087	1308
Hard sand & salt	1308	1497
Gumbo	1497	1548
Brown shale & rock salt	1548	1601
Crystalized sand rock	1601	1628
Sandy shale & lime	1628	1758
Gumbo & boulders	1758	1768
Hard lime & sandy shale	1768	1889
Red rock & shale	1889	1932
Sandy lime	1932	1992
Shale & gumbo	1992	2016
Sandy lime	2016	2045
Hard shale	2045	2080
Sand rock	2080	2100
Broken lime	2100	2143
Gumbo	2143	2197
Sandy black shale	2197	2208
Hard sand show of oil	2208	2222
Rock salt & brown shale	2222	2230
Blue shale & ? ?	2230	2248
Broken shale & rock salt	2248	2600
Gumbo shale & boulders	2600	2789
Shale & shells	2789	2814
Sandy shale & shells	2834	2898
Trace of gas		
Blue shale gumbo & shells	2898	3000
Hard lime	3000	3010
Blue shale	3010	3200
Slate	3200	3243
Sandy lime	3243	3267
Blue shale	3267	3340
Slate	3340	3360
Blue shale	3360	3400
Total depth		3400

Log of Porter Syndicate, Kendall No. 1 well, SW.¼ SE.¼ SE.¼ sec. 28, T. 14 N., R. 23 W., Roger Mills County.

(Elevation 1,910)

Formation	Top	Bottom
Quick sand	0	56
Pack sand—shale	56	80
Hard shale	80	106
Hard red sand	106	255
Red shale	255	290
Boulders—shale	290	365
Gyp—lime	365	440
Lime rock	440	500
Sandy lime rock	500	540
Lime—gyp	540	594
Broken sandy lime	594	639
Red rock	639	692

(Continued on page 47)

Formation	Top	Bottom
Sandy lime rock	692	760
Blue—red shale	760	799
Tough gumbo	799	871
White rock	871	889
Sandy lime rock	889	900
Hard shale	900	972
Gumbo—bldrs.	972	1000
Tough sticky shale	1000	1057
Hard red shale	1057	1088
Gumbo—bldrs.	1088	1102
Rock salt	1102	1125
Sand rock	1125	1150
Hard dry shale	1150	1269
Hard rock white	1269	1314
Hard sand rock	1314	1397
Rock salt	1397	1410
Blue lime rock	1410	1450
Hard red rock	1450	1509
Hard sand rock	1509	1565
Hard white rock	1565	1625
Boulders	1625	1634
Gumbo	1634	1641
Hard rock	1641	1664
Red sand rock	1664	1672
Hard sand rock	1672	1689
Blue shale	1689	1696
Hard white rock	1696	1715
Blue shale—bldrs.	1715	1724
Blue lime	1724	1740
Hard lime	1740	1758
Blue shale—bldrs.	1758	1763
Hard sandy shale	1763	1772
Sand lime	1772	1774
Blue sand shale	1774	1780
Gumbo	1780	1800
Sandy shale	1800	1830
Sticky mud	1830	1840
Fresh water sand	1840	1849
Hard sand	1849	1853
Water sand	1853	1858
Blue—red shale	1858	1894
Broken blue lime	1894	1923
Hard sandy shale	1923	1956
Gyp—lime	1956	1968
Water sand	1968	1980
Blue—red shale	1980	1995
Red sandy shale	1995	2002
Hard shale lime	2002	2040
Red—blue shale	2040	2055
Blue lime	2055	2070
Lime shell	2070	2076
Lime—shale	2065	2080
Blue—red shale	2084	2092
Brown sand	2092	2098
Blue—brown shale	2098	2102
Blue—red shale	2102	2112
Sandy lime—gyp	2112	2130
Brown shale	2130	2140
Sandy lime	2140	2157
Chocolate clay	2157	2160
Blue sandy lime	2160	2165
Brown sand	2165	2168
Chocolate clay—sand	2168	2170
Brown sand	2170	2172

Log of Morton & Co., L. Dean No. 1 well, NW.¼ NW.¼ NW.¼ sec. 32, T. 16 N., R. 22 W., Roger Mills County.

Formation	Top	Bottom
Red rock	100	120
Red sand	120	150
25 bailers water		
Rer rock	150	165
Red sand	165	180
3 bailers water		
Red shale	180	200
Red sand HFW	200	300
Red rock	300	360
Gyp rock	360	362
Red rock & shells	362	450
Sand red	450	480
Sand is dry		
Red rock	480	624
Gyp lime white	624	675
Red rock	675	680
Gyp rock	680	715
Red rock	715	760
Blue shale	760	767
Gyp lime	767	771
Red shale	771	825
Blue shale	825	852
Red rock	852	864
Blue shale	864	898
Red rock	898	1174
Gyp rock	1174	1175
Red rock	1175	1195
Gyp shell	1195	1197
Red rock	1197	1880
Brown shale	1880	1884
Red shale	1884	2019
Blue shale	2019	2060
Red shale—T. D.	2060	2365

The hole was not finished caused from fishing job loosing one jt. 10 pipe & 2 jts. 8¼ pipe which is the reason for plugging same.

Log of Mutual Oil Co. Wilson No. 1 well, cen. S.½ N.½ NE.¼ SE.¼ sec. 1, T. 16 N., R. 21 W., Roger Mills County.

(Elevation 2,266)

Formation	Top	Bottom
Surface	0	67
Sand	67	97
Red beds	97	140
Red beds	140	170
Red beds	170	230
Red rock	230	240
Red beds	240	265
Red rock	265	275
Red beds	275	300
Sand rock	300	307
Gyp	307	310
Red beds	310	314
Rock	314	365
Broken rock	366	376
Red beds	376	382
Rock	382	385
Pack sand	385	391
Red bed	391	410
Rock	410	426
Red rock	426	437
Red sand	437	445
Red bed	445	451
Rock	451	466
Red bed	466	475
Rock	475	490
Soft sand	490	535
Rock	535	538
Sand rock	538	547
Red beds	547	565
Soft sand	565	576
Rock	576	585
Red bed	585	591
Rock	591	595
Red bed	595	600
Rock	600	610
Red beds	610	615
Hard rock	615	641
Soft sand	641	644
Rock	644	674
Lime	674	780
Rock	780	806
Gyp	806	809
Gumbo	809	815
Red bed	815	820
Gyp & rock	820	837
Hard rock	837	839
Gypsum	839	879
Hard red shale	879	1008
Hard red bed	1008	1133
Red bed & gyp	1133	1207
Gumbo	1207	1218
Blue shale and shell	1218	1226
Red shale hard	1226	1259
Rock	1259	1264
Red bed	1264	1301
Red bed & shale	1301	1369
Rock	1369	1378
Hard limy shale	1378	1418
Hard sandy shale broken	1418	1502
Brown shale	1502	1508
Broken lime & sandy shale	1508	1564
Red bed	1564	1588
Shale & shell	1588	1610
Rock	1610	1617
Broken & sandy shale	1617	1640
Sandy lime & hard shale	1640	1680
Sandy shale & red bed	1680	1688
Gypsum	1688	1692
Sandy shale	1692	1704
Sandy shale & red hard beds	1704	1730
Broken red beds & hard shale	1730	1747
Hard red bed	1747	1793
Hard sand & red bed	1793	1811
Brown shale	1811	1820
Hard sandy shale	1820	1835
Red shale	1838	1840
Hard sand	1840	1847
Sandy shale & hard sand	1847	1861
Hard sand	1861	1866
Broken shale & shell	1866	1878
Hard shale	1878	1890
Shale & red bed	1890	1905
Gumbo	1905	1911
Red bed	1911	1922
Hard sand	1922	1929
Hard shale & shell	1929	1940
Hard sand	1940	1948
Red bed	1948	1959
Hard sand	1959	1968
Broken red bed	1968	1996
Brown shale	1996	2027
Hard shale	2027	2100
Gumbo	2100	2106
Hard sandy shale	2106	2136

(Continued on page 49)

Formation	Top	Bottom
Shale	2136	2160
Gumbo	2160	2188
Shale	2188	2206
Red bed	2206	2260
Shale & slate	2260	2279
Red bed	2279	2290
Shale & shell	2290	2303
Red bed	2303	2363
Hard slate	2363	2368
Red bed	2368	2396
Broken shale & shell	2396	2409
Red bed	2409	2556
Red bed & gyp	2556	2582
Red shale & hard sand	2582	2587
Red bed	2587	2593
Red shale & sand	2593	2633
Hard shale & slate	2633	2794
Hard shale & gyp	2794	2864
Sand & slate	2864	2866
Hard shale & gyp	2866	2934
Lime	2934	2941
Hard shale & lime	2941	2963
Lime	2963	2967
Hard shale	2967	2972
Lime	2972	2976
Hard shale	2976	2985
Lime	2985	2992
Hard shale	2992	2995
Broken lime shell & shale	2995	3026
Lime	3026	3041
Broken shale	3041	3045
Broken lime	3045	3054
Lime	3054	3077
Gumbo	3077	3080
Shale	3080	3088
Lime	3088	3096
Shale	3096	3108
Broken lime	3108	3116
Broken lime & shale	3116	3146
Broken shale & shell	3146	3180
Sand rock	3180	3190
Gumbo & shale	3190	3205
Lime	3205	3208
Shale & lime shell	3208	3228
Sand rock	3228	3235
Gumbo & shale	3235	3240
Sand rock	3240	3242
Broken & lime	3242	3287
Rock broken	3287	3319
Blue shale	3319	3321
Rock	3321	3383
Viola rock	3383	3386
Rock—T. D.	3386	3526

Log of Roxana Pet. Corp., Selba well, CWL. NE.¼ NE.¼ sec. 9, T. 16 N., R. 21 W., Roger Mills County.

(Elevation 2,219)

Formation	Top	Bottom
Red shale	0	310
Gypsum	310	325
Red shale	325	540
Red sand	540	567
Gypsum	567	569
Red sand	560	650
Red shale	650	690
Blue shale	690	700
Red shale	700	740
Gypsum	740	747
Red brown shale	747	765
Gypsum	765	795
Red shale	795	805
Gypsum	805	858
Blue shale	858	875
Red shale	875	895
Blue shale	895	905
Red shale	905	970
Gypsum	970	972
Red shale	972	1085
Gyp & red shale	1085	1090
Red shale	1090	1150
Blue shale	1150	1165
Red shale	1165	1270
Red rock	1270	1435
Red mud	1435	1950
Red blue bands	1950	1970
Hard brown shale	1970	2100
Red and blue shale	2100	2130
Brown shale	2130	2250
Blue shale	2250	2332
Red shale	2332	2345
Brown shale	2345	2352
Blue shale	2352	2381
Brown shale	2381	2725
Hard gray lime	2725	2726
Brown shale	2726	2750

(Continued on page 50)

Formation	Top	Bottom
Brown & blue shale	2750	2885
Blue shale	2885	2985
Hard lime	2985	3005
Lime shell	3005	3009
Blue shale	3009	3090
Lime	3090	3095
Blue shale	3095	3115
Lime	3115	3120
Blue shale	3120	3270
Blue shale & shell	3270	3325
Blue shale	3325	3330
Blue shale & shell	3330	3345
Blue shale	3345	3360
Blue shale & shell	3360	3375
Blue shale & black shell	3375	3385
Blue shale & shells	3385	3435
Lime and shale breaks	3435	3450
Gray white lime	3450	3570
Lime & shale	3570	3595
Gray lime & shale	3595	3655
Blue shale & shells	3655	3730
Gray lime	3730	3890
Blue-black shale	3890	3900
Gray lime	3900	3930
Blue shale	3930	3940
Gray lime—T. D.	3940	4055

Log of Bu-Co-Oil Ref. Co., Garnett No. 1 well, SE.¼ SW.¼ SE.¼ sec. 27, T. 17 N., R. 21 W., Roger Mills County.

(Elevation 2,175)

Formation	Top	Bottom
Surface	0	40
Sand and gravel	40	132
Sand & rock	132	156
Red sand	156	306
Rock	306	310
Red sand	310	420
Rock	420	430
Sand	430	440
Rock	440	445
Sand	445	493
Rock	493	500
Soft rock	500	560
Soft rock layers & sand rock	560	575
Gyp rock	575	580
Rock sand & layers of rock	580	615
Rock sand & layers	615	625
Rock	625	632
Sandstone	632	688
Sand	688	700
Gyp rock	700	705
Sand	705	710
Rock chalk	710	763
Soft sand rock	763	870
Gumbo sand rock	870	875
Small showing of gas at 811' Approx 1,000,000.		
Soft sand rock	875	900
Gumbo	900	915
Shale & sand	915	950
Sand rock	950	985
Shale	985	1014
Sand rock	1014	1047
Shale	1047	1085
Gumbo	1085	1243
Hard gray rock	1243	1251
Sand rock	1251	1293
Gumbo	1293	1309
Hard gray rock	1309	1438
Shale & sand	1438	1498
Hard gray rock	1498	1527
Hard rock	1527	1532
Shale & shell rock	1532	1600
Shell & Gumbo	1600	1640
Rock	1640	1670
Shell & rock	1670	1890
Rock	1890	1900
Shale	1900	2008
Rock	2008	2010
Shale	2010	2153
Total depth		2153

Structural Geology

Roger Mills County lies at the bottom of the Anadarko Basin and most of it north of the axis. Accurate regional dips are difficult to determine for they are very low. They dip southwest in the northern part of the county and northeast in the southwestern part.

Numerous structural irregularities have been mapped and some wells have been drilled but most of those drilled have proved dry or have disappeared in depth. A large structure is reported to have been detailed in the southern portion of the county in the vicinity of Berlin, Grimes, and Sweetwater. Due to the proximity of this area to the Sayre field in Beckham County there has been considerable interest manifested. Smaller structures have been reported in the north and northwestern part of the county. Time alloted for field work in this and other counties covered by this report permitted only a superficial checking of reported structures.

DEVELOPMENT

Numerous wells have been drilled in Roger Mills County with reported shows of gas and oil at various horizons and at shallow depths. These were, no doubt, drilled with the hope of encountering shallow producing horizons similar to those found in the Sayre field of Beckham County. Known producing horizons of surrounding areas should lie at great depths in this county because of reason mentioned before.

The table on page 53 gives a list of the wells drilled or drilling in this county up to date.

Wells Drilled in Blaine County

COMPANY AND FARM	LOCATION	DEPTH Feet	ELEVATION Feet	RESULT
Deitz Co. Matthew's No. 1	SE SE NW 20-15N-12W	887	1,762	Dry
Okomo Oil Co. Enlennein No. 1	SE SE SW 21-15N-10W	2,519 2,702 ?	1,540	Dry
Morgan Drilling Co. F. L. Chronister No. 1	NW NW NE 7-18N-10W	3,810	1,196	Dry
The Ima Oil & Gas Co. Eberhart No. 1	SW SW SW NW 7-18N-10W	2,285	1,190	Dry
Cozart No. 1	NW NW NE 7-18N-10W	1,542		Dry
Pingery et al. Barnett No. 1	SW SW SW 23-15N-11W	3,705 3,708 ?	1,452	Dry
Lowen & others. Unknown No. 1	NW cor. SW NW 17-16N-11W	Spudded in		Renewing leases shut down
Washoma Oil Co. et al. Phillips No. 1	C NW SW 13-19N-10W	2,935		Shut down
Watonga Oil Co.	NW NW 10-16N-11W	1,021		Dry
Donnally Bros. (dt 10) Bought	SE SE 26-15N-12W	3,215 4,500 ?		Dry

Wells Drilled in Dewey County

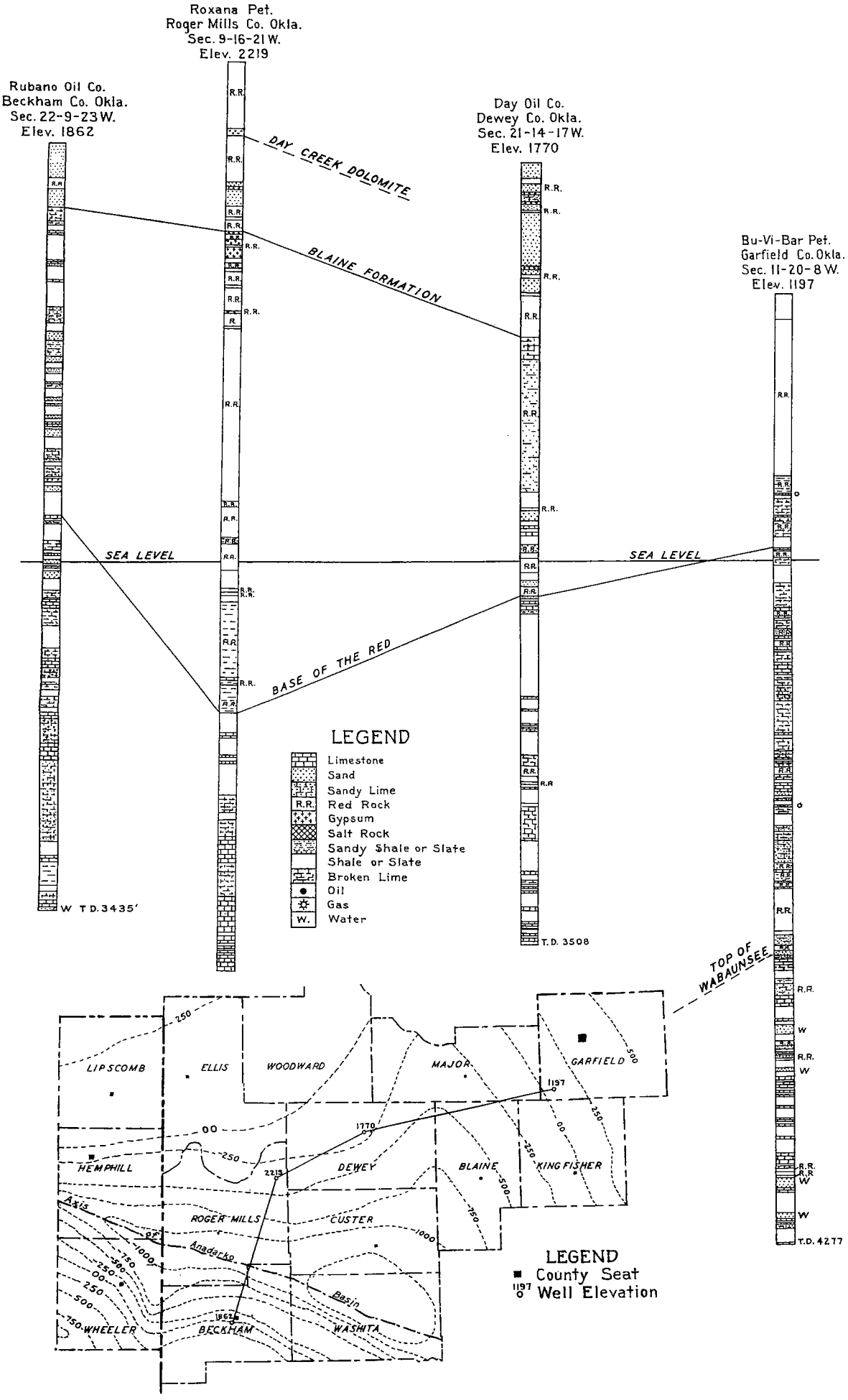
COMPANY AND FARM	LOCATION	DEPTH Feet	ELEVATION Feet	RESULT
Morton & Co. Bartelsville Jessie	C. SE 22-16N-18W	3,500 3,506?	2,035	Dry
Elder No. 1.	NE 9-18N-15W	4,500 ?		Dry
McCoy et al.		4,000		
?	NE 16-9N-20W	800	2,450	Dry
?	T. 16 N. R. 14W	?		
Garfield Oil Co. Enid	NW cor. 36-19N-30W	730 ?		
Kinnson & Small, Dallas, Texas	NW NW NE 34-20N-20W	3,800		Gas at 1,100

Wells Drilled in Custer County

COMPANY AND FARM	LOCATION	DEPTH Feet	ELEVATION Feet	RESULT
Parker et al, Robt. Ruth No. 1	C SE NW 1, 15N-15W	4,212 4,000 ?	1,699 1,705 ?	Dry
Price and others	SW 36, 15N-18W	4,000		Through red beds
C. N. Lainard, Wichita, Kansas	SW SW 22, 15-N16W	?		
	SE NE 30, 13N-16W	600 ?		
Empire Oil and Gas, Stone No. 1	SE SE SW 24-12N-14W	3,497	1,685	
Homaokla Oil Co. Wasman No. 1	SW SW SE 21-13N-14W	1,080	1,683	
Clay et al.	SW 21-13N-14W	1,100 ?		
Clay et al.	NE 23-13N-14W			Location
W. E. Witt et al Wellman No. 1	SW SE 1-14N-14W			Rig & Tools
Day Oil Co. Miller No. 1	SE SE SE 21-14N-17W	3,508	1,770 1,773 ?	

Wells Drilled in Roger Mills County

COMPANY AND FARM	LOCATION	DEPTH Feet	ELEVATION Feet	RESULT
Principle Oil Co. Barker No. 1	3-13N-26W	3,400	2,248 ? 2,387 ?	Dry
Porter Syndicate J. H. Kendall No. 1	SW SE SE 28-14N-23W	2,172	1,910 1,795 ?	Dry
Morton & Co. L. Dean No. 1	32-16N-22W	2,365		Dry
Mutual Oil Co. Wilson No. 1	C. S½ N½ NE ?			
Roxana Petroleum Co. W. E. Selba No. 1	CWL NE NE 9-16N-21W	4,055	2,219	Dry
Bu-Co Oil Co. Garnett No. 1	SE SW SE 27-17N-21W	2,153 2,175 ?	2,175	Dry
Bucy and Stone, Williams No. 1	C SW 23-12N-24W	2,245		Drilling
L. C. Hivick, Davis No. 1	C NW NE 4-11N-26W	2,905		Shut Down
J. J. Rook, Shotwell No. 1	4-11N-26W	2,316		


Roxana Pet.
Roger Mills Co. Okla.
Sec. 9-16-21W.
Elev. 2219
Rubano Oil Co.
Beckham Co. Okla.
Sec. 22-9-23W.
Elev. 1862
Day Oil Co.
Dewey Co. Okla.
Sec. 21-14-17W.
Elev. 1770
Bu-Vi-Bar Pet.
Garfield Co. Okla.
Sec. 11-20-8W.
Elev. 1197
DAY CREEK DOLOMITE
BLAINE FORMATION
BASE OF THE RED
SEA LEVEL
SEA LEVEL
W T.D. 3435'
T.D. 3508
T.D. 4277
TOP OF WABAUNSEE
LEGEND
Limestone
Sand
Sandy Lime
Red Rock
Gypsum
Salt Rock
Sandy Shale or Slate
Shale or Slate
Broken Lime
Oil
Gas
Water
LIPSCOMB
ELLIS
WOODWARD
MAJOR
GARFIELD
HEMPHILL
DEWEY
BLAINE
KINGFISHER
ROGER MILLS
CUSTER
BECKHAM
WASHITA
WHEELER
Anadarko Basin
Axis of
LEGEND
County Seat
Well Elevation