

1913

THE STATE OF WYOMING

GEOLOGIST'S OFFICE

Bulletin Number 5

Series B

Prospective Oil Fields

AT

UPTON, Weston County

BUCK CREEK, Niobrara County

RATTLESNAKE MOUNTAINS, Natrona County

LA BARGE, Lincoln County

BY

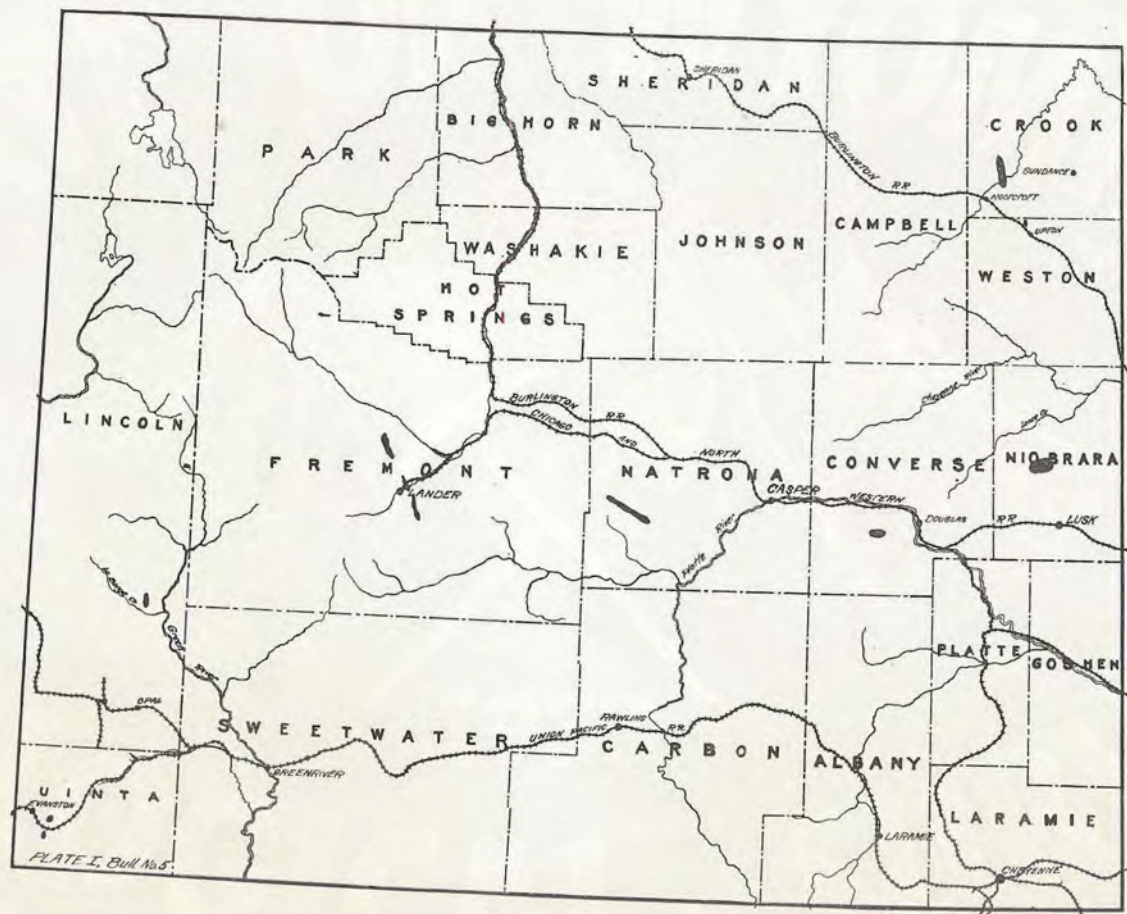
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CHEYENNE, WYO.

THE S. A. BRISTOL CO., PRINTERS AND BINDERS

1913



FOREWORD

The following preliminary reports are published, not because it is thought that all the particular districts described are going to become prominent oil producers, but because so many people, both resident and non-resident, are writing to the Geologist's Office asking for facts regarding the geology of these various fields. In order to satisfy this demand the present bulletin is issued, following visits to the fields, and in some cases careful instrumental survey of the districts. Wherever previous reports have covered the field, footnotes call the attention of the reader to them. The Federal publications have been freely consulted for the general geology of the regions.

L. W. TRUMBULL,

CHEYENNE, Aug. 31, 1913.

State Geologist.

Prospective Oil Fields

THE UPTON OIL FIELD

Early this summer (1913) attention was attracted to a small dome in the very northern part of Weston County, along the Burlington R. R. between Upton and Thornton. This is a small upraise in parts of Secs. 7, 8, 17 and 18, T. 48 N., R. 65 W.

Erosion has cut away everything down to the lower black shales (Graneros) of the Benton formation. The sandstone member of the Benton, which is oil bearing in the Moorcroft field, a few miles to the northwest, outcrops as an oval band about two miles in northwest-southeast dimension and one mile in width, enclosing the black shales area, and underlying the Mowry shales member. It is barren of oil along its outcrop in this area. Outside and above the Mowry shales member are the black shales of the upper part of the Graneros, which form the surface of a large part of the surrounding country.

The Dakota formation which shows outcrops of oil saturated sandstones in the Moorcroft field, lies only 220 feet below the surface. A shallow hole will, therefore, prove the presence of oil or water in the only possible oil bearing sandstone under the area. For years the Dakota sandstone has been considered as a probable oil producer in the eastern half of the State, but recent developments have caused the writer to seriously doubt. The Dakota is, however, almost always water bearing. The forthcoming Bulletin upon the Moorcroft Field will discuss in detail the geology of the Moorcroft-Upton region.

THE BUCK CREEK OIL FIELD

For a long time the comparatively level range lands

along Buck Creek in T. 35 N., Rs. 63, 64 and 65 W. have been known as the Buck Creek Flats. Now that the same area is being drilled for oil it has become known as the Buck Creek Oil Field. This area lies near the center of Niobrara County, about twenty miles from the towns of Lusk and Manville on the C. & N. W. R. R. Good roads run from both towns to the field.

No wells have been drilled in the area, but due to the efforts of Mr. C. H. McWhinnie, of Douglas, a well is now (August, 1913) being drilled in Sec. 31, T. 35 N., R. 64 W., and a group of the residents of Lusk are preparing to drill on Sec. 10, T. 34 N., R. 64 W.

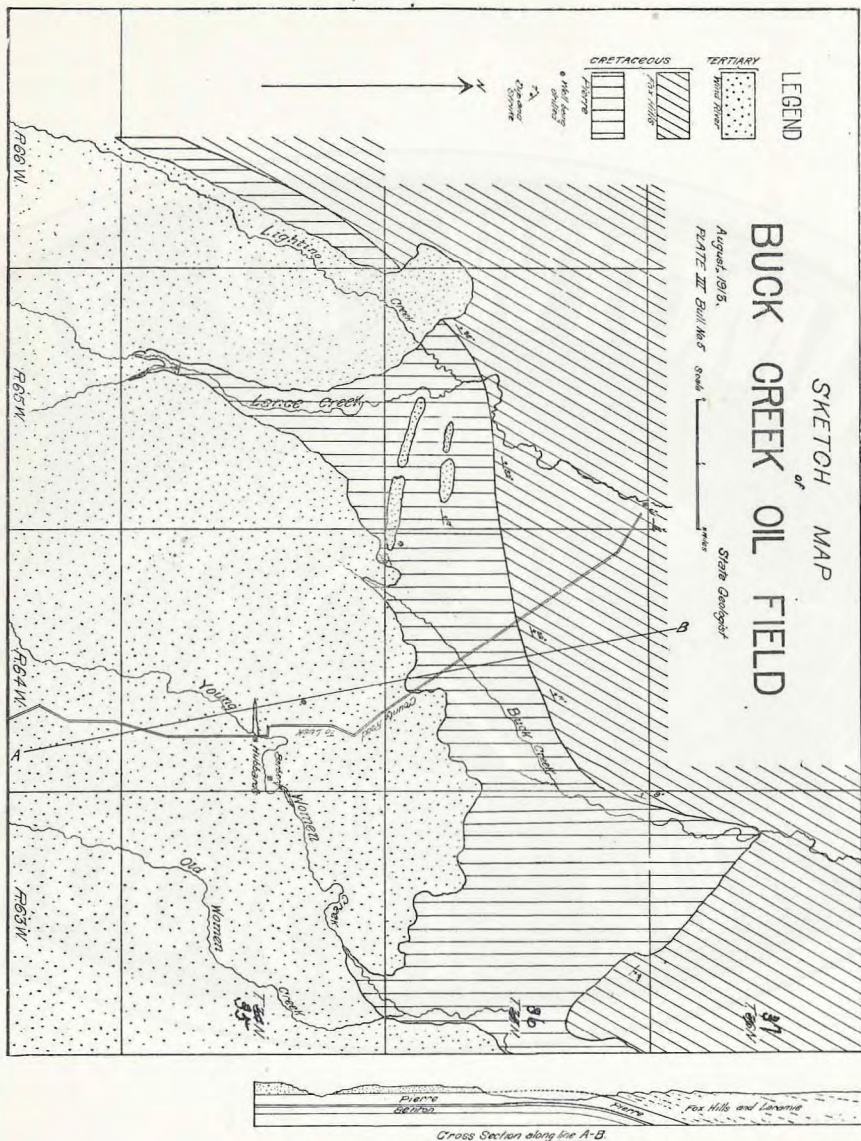
GEOLOGY

A long strip of Pierre shales is exposed through the center of the field. On the south the Tertiary (White River) beds lie horizontally upon the nearly horizontal Pierre. On the north the Pierre dips under the Fox Hills outcrops at an angle of 20 degrees, or even steeper. At a few places along Young Woman Creek, within the Tertiary area, small patches of Pierre shales are exposed in the bottom of the gulch. Where exposed they are broken and show dips in every direction so that no idea of the general dip can be obtained.

In order to understand the structure of the field one must consider a few exposures outside the area mapped. At Manville, and extending in a northeasterly direction from Manville, there are exposures of Carboniferous, or allied Paleozoic, rocks sticking up through the Tertiary beds. East of Old Woman Creek, about six miles east of the junction of Old Woman and Young Woman Creeks, the Dakota outcrops along a pronounced anticline.* This anticline runs under the Tertiary beds to the south and plunges under the Cretaceous to the north. This anticline is, no doubt, the northern extension of the rib of Paleozoic rocks extending through Manville.

Considering this upraise a few miles to the southeast, it is evident that there is not room for the Cretaceous series to dip very heavily to the south of the Buck Creek

*N. H. Darton, *Geology and Water Resources of the Central Great Plains*, U. S. G. S., Prof. Paper No. 32.



exposure. At a few points along the Pierre-Tertiary contact the Pierre showed a very slight dip toward the south-east. These may be local, however, rather than indicative of the general dip.

The cross-section (Plate III) shows the structure as far south as can be observed in the field. If extended to the south it would probably show the Cretaceous Series gradually rising again to meet the horizontal overlying Tertiary, and at a distance of about fifteen miles, the Paleozoic rocks cutting up through the Tertiary to the surface. The general structure is, then, more of a monocline than an anticline.

While no heavy faulting was observed in the field, faults of slight throw were noticed across the Cretaceous-Tertiary contact, and evidences of faulting were noticed in the Pierre surface area. The contact plane of the Tertiary butte in Sec. 26, T. 35 N., R. 63 W. is considerably lower than the plane of the Tertiary contact to the south.

The region is wonderfully prolific in fossils. Not only the invertebrate fossils of the Cretaceous, but the large vertebrate fossils of the Laramie and the White River are seen strewn over the surface of the ground.

THICKNESS OF THE CRETACEOUS FORMATIONS

The Pierre is, in this area, about 1200 feet thick. The Niobrara about 250 and the Benton 800 on the exposures along the anticline east of Old Woman Creek. A total of 2250 feet from the top of the Pierre to the top of the Dakota. Along the axis of the anticline (if we may use the word) some 300 feet of the Pierre has been eroded. Wells will have to be 1950 feet deep to tap the Dakota.

POSSIBLE OIL SANDSTONES

So far as known, there is no heavy sandstone capable of being a good oil reservoir, above the Dakota, in this area. Whether the Dakota is oil or water bearing in this field can only be proven by the drill. The fact that no oil seeps are known along the Dakota outcrops on the anticline to the east, argues against the presence of oil in that formation in this field.

THE RATTLESNAKE OIL FIELD

Under this title we would place the limited area on the northeast flank of the Rattlesnake Mountains. The territory drained by Wallace Creek takes in nearly the whole of the field. It lies in the southwestern part of Natrona County, and would be described by legal subdivision as Townships 32 and 33 North, Ranges 87 and 88 West. The long axis of the field extends in a northwest-southeast direction for a distance of about ten miles, and the width is about half that much.

The field is best reached from Waltman on the C. & N. W. R. R., about fifteen miles to the northeast. Road is good and without heavy grades.

GEOLOGY

The core of the Rattlesnake Range consists of granite, while the two high peaks, reaching above 8000 feet, are eruptive. The oldest sedimentary rocks cap the crest of the range and the rocks of the succeeding ages flank the northeastern side, outcropping in parallel lines of hogbacks of decreasing altitude, while on the plain below the Tertiary rocks lie practically horizontal.

The rocks of Cambrian, Ordovician, Carboniferous, Triassic, Jurassic and Cretaceous ages lie against the granite core at an angle of about thirty degrees from the horizontal, while the rocks of Tertiary age abut against and overlap the edges of the Cretaceous. (See Section on Plate IV.)

EVIDENCES OF OIL

Along the outcrops of the Cretaceous rocks (from Dakota to Mesa Verde), deposits of asphaltum mark the location of former oil springs, and at many places oil saturated sandstones stand out in prominent ledges. What particular members of the Cretaceous series were the original oil reservoirs is not now apparent, but earlier writers* have considered that three oil zones existed; in the Dakota, Benton and Mesa Verde.

DEVELOPMENT

The oil seepages and springs of the Rattlesnake region

* W. C. Knight, School of Mines, University of Wyoming, Bul. No. 4, Petroleum Series.

have been recognized for over forty years, and at various times during the past forty years efforts have been made to develop the field by digging pits and drilling wells. As a result many shallow holes have been made, but so far as known, no deep holes have been drilled. Owing to the high dip of the strata the belt of oil sand that can be reached by wells of reasonable depth is very narrow.

POSSIBILITIES OF THE FIELD

By drilling at a point where the hole will penetrate the oil stratum at considerable depth it may be possible to get pumping wells which will produce a few barrels per day. The oil is very thick and cannot be expected to flow very readily under the very slight pressure which would act upon it. On the other hand, there is good reason to think that at depth a well will find nothing but water, the oil having long since been driven up the slope by the water.

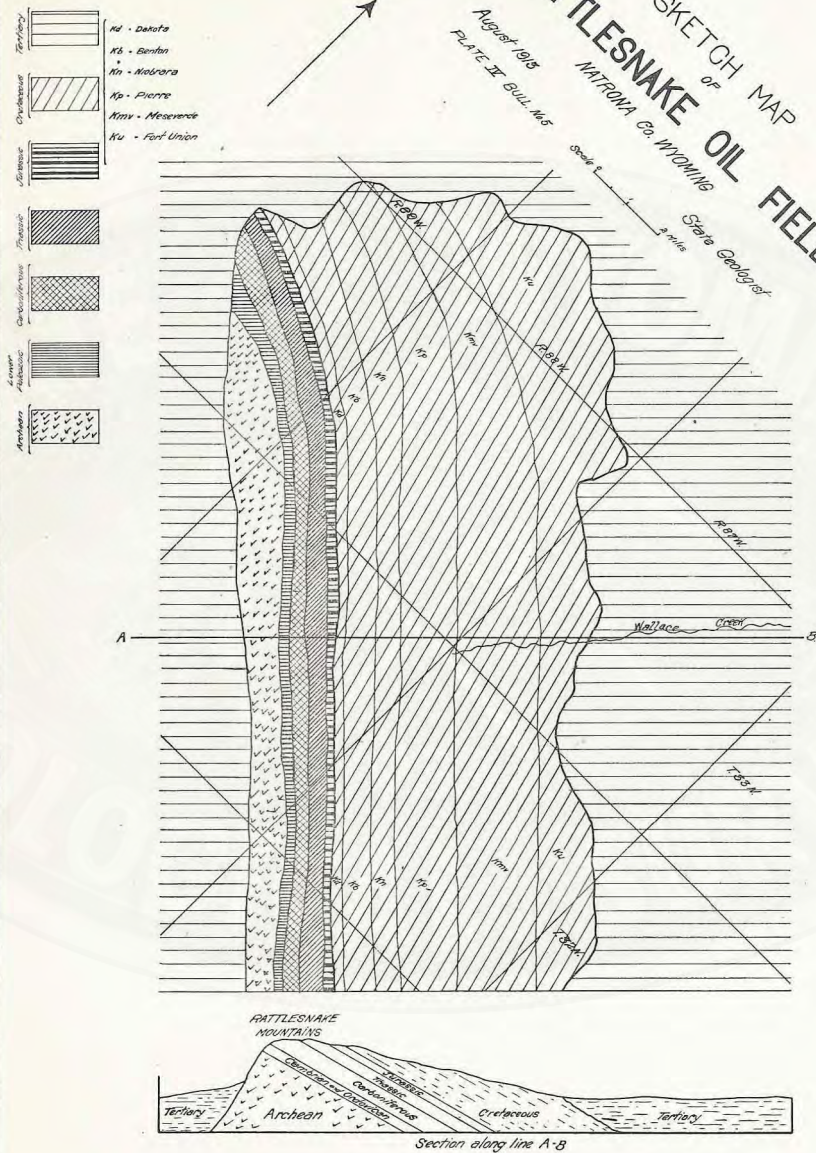
Wells very far from the oil sand outcrops will be unable to get deep enough to reach the oil stratum. The well now being drilled in Sec. 16, T. 34 N., R. 87 W. for instance, is so far from the outcrop of the highest oil sand that it will not reach it in less than 6000 feet.

On the whole the Rattlesnake district holds very little promise of ever making an oil production. Oil certainly did exist in the rocks of the area at one time, but it has practically all escaped. Where the same rocks have been folded into proper structure to hold oil, the production will be large. Any closed domes or anticlines in the vicinity of the Rattlesnake Mountains are well worthy of investigation.

THE LA BARGE OIL FIELD

The La Barge Oil Field lies on the line between Twps. 26 and 27 N., Range 113 W., in Lincoln County, on the west side of Green River and to the north of La Barge Creek. The range of hills, of which La Barge Mountain is the highest peak, bounds it on the west.

Oil was discovered seeping from the Tertiary sandstones on the flat east of La Barge Mountain in 1907. Since that time many oil locations have been made in the vicinity, and many prospect holes bored. No hole has been put



down over a thousand feet, however, and oil in quantity has not been found.

The field may best be reached from Opal on the O. S. L. R. R., from which point the mail route leaves for La Barge and Big Piney. The distance is about thirty-five miles and the road is good. A poorly maintained road reaches the field from Kemmerer.

TOPOGRAPHY

Most of the surface of the area is covered with drift, with buttes and ridges of Wasatch (Tertiary) sandstones and clays standing out prominently in places. Green River, which lies on the east side of the area is the low point toward which all the intermittent streams flow. These streams have cut nearly straight, shallow, parallel valleys through the Tertiary from the hills on the west to the flats along the river bottom. The valley bottoms are grass covered, while the intervening hills are covered with sage brush and a scanty growth of grass. The La Barge Mountains, which reach an altitude of 9000 feet or more, are partially pine covered.

GEOLOGY

The oil springs in Sec. 34, T. 27 N., R. 113 W. are in drift and the oil saturated sandstone a few hundred feet south of the springs is Tertiary. The Tertiary is nearly horizontal, dipping to the east at from one to five degrees at many places.

Underlying the Tertiary, and exposed in the first hills to the west, is the Cretaceous series. These hills are of the Adaville formation, with numerous coal seams in which many prospect openings have been made.

To the west of the Cretaceous outcrop the Carboniferous rocks are brought to the surface along a heavy north-south thrust fault.

The Cretaceous (Adaville) rocks show dips to the west varying from twenty-five to thirty-five degrees. The structure of the Cretaceous underneath the Tertiary can only be inferred from the structure as seen at a few isolated points outside the area mapped. The cross section as shown in Plate V is, therefore, liable to be erroneous. Deep

SKETCH MAP OF LA BARGE OIL FIELD

LINCOLN COUNTY WYOMING

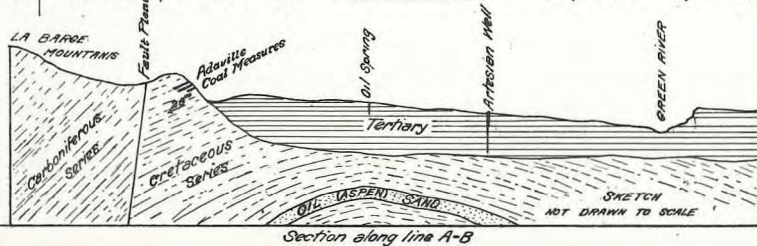
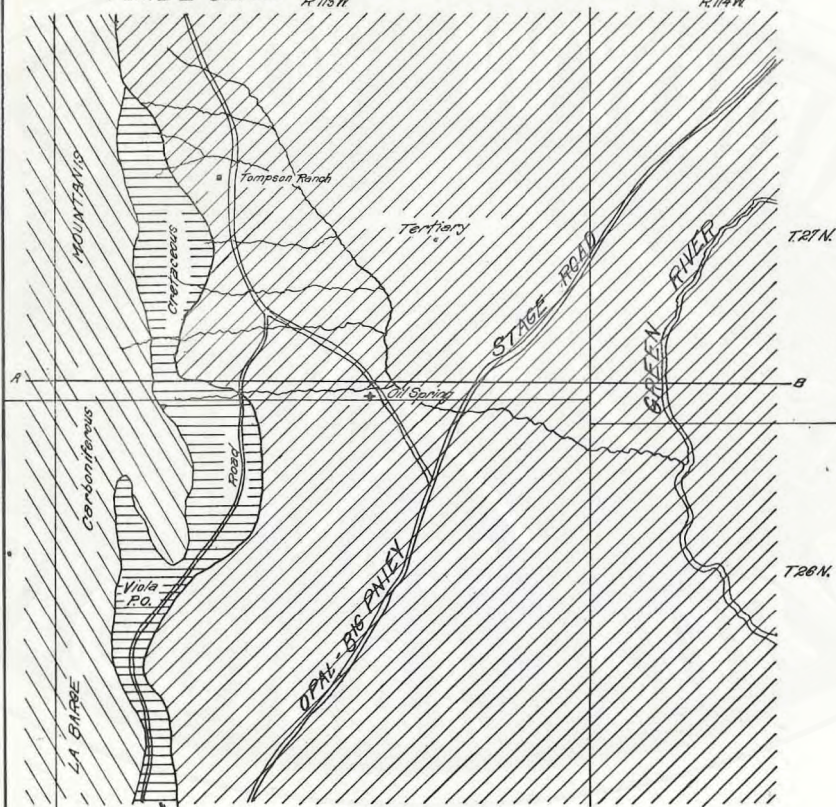
August 1913

State Geologist

Scale 0 1 2 miles

PLATE V Bull No 5 R. 113 W.

R. 114 W.



drill holes may prove the presence of a fault along the axis of the anticline.

The oil samples collected by the writer were taken from shallow auger holes bored near the water course in the bottom of the draw just north of the oil sand outcrop in the south part of Sec. 34, T. 27 N., R. 113 W. The oil seeps into these holes slowly, making possibly a total of ten gallons in the eight or ten holes during the course of twenty-four hours. It is gathered for local use or for sale to the ranches along Green River for lubrication of mowing machines and other farm tools. The writer found one sawmill outfit using it as cylinder oil in the mill engine, with rather indifferent success.

The oil is heavy and dark colored. Analysis has not been made on the samples collected by the writer during August, 1913, but analysis of a sample collected by A. R. Shultz during the summer of 1907 is given below.

"ANALYSIS OF OIL FROM PIT IN SEC. 34, T. 27 N., R. 113 W.,
MADE BY DR. DAVID T. DAY, UNITED STATES GEOLOGICAL
SURVEY, JAN. 8, 1908.*

TEMP. (°C) AT WHICH GAS WAS GIVEN OFF ON DISTILLATION	PERCENTAGE	SPECIFIC GRAVITY	NATURE OF PRODUCT
Below 150° 150°-300°	Trace 34	0.891	Suitable for burning

Specific gravity of original oil, 0.9435 equals 18.75 Baume."

DEPTH OF THE OIL STRATUM

From the known thickness of rocks between the Ada-ville coal formation, forming the hills on the west side of the area, and the Aspen oil bearing formation, it would seem that the Aspen formation lies nearly three thousand feet below the surface at the apex of the anticline.

If this be true we must suspect the presence of a fault along the anticline to account for the oil having risen through such a great thickness of rocks.

In any case, in order to reach the Aspen formation a driller must be prepared to go three thousand feet. That oil will be found in sands higher than the Aspen is probable. That it did fill the Tertiary sandstone at one time, is now evident from the outcrops of oil saturated Tertiary sand-stones in the hill south of the present springs.

*U. S. G. S. Bul. No. 340, p. 372.

GENERAL SECTION OF THE CRETACEOUS ROCKS.*

SYSTEM	GROUP	FORMATION	THICKNESS	CHARACTERISTICS
Cretaceous	Lower Laramie	Adaville	2800	Gray, yellow and brown clays and shales with brown and white sandstones. Prolifically coal-bearing throughout.
	Montana			
		Hilliard	3000	Gray and black sandy shales and shaley sandstones. Usually a region of low relief.
	Colorado	Niobrara		
		Frontier	2400 to 3800	Gray and yellow clays, shales and sandstones. Oyster ridge sandstone near the top of the formation.
		Aspen	1200 to 1800	Gray and black shales and sandstones and beds of compact gray sandstone and limestone. Weather to silver-gray. OIL-BEARING.
	Bear River	Bear River	800 to 1500	Shales, sandstones and limestones. Thin beds of coal. Oil showing in a few wells.

* A. R. Shultz in Bul. 340, p. 367.

