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OIL AND GAS DEVELOPMENTS OF THE  
LARAMIE AND MEDICINE BOW DISTRICTS

The inquiries coming to the State Geologist for information about various fields are for general geological data and information as to recent developments. This bulletin has been prepared to take care of such inquiries.

The region to be discussed is reached from the Union Pacific Railroad from Laramie to Walcott, and includes approximately twenty-five structures, mainly in the Laramie and Hanna Basins. The geology of this territory has been covered by U.S. Geological Survey Bulletin #316 d and 364, Professional Paper 108 L, Geological Folio 173, and Press Bulletin 12514. Publications of the State Geologist relating to the area are Press Bulletins #4, #7, and #12, which are now out of print. Recent discoveries of oil in the Rex Dome, Simpson Ridge, and Medicine Bow structures have aroused considerable interest in the entire area and have created a demand for information regarding developments.

The Rock Creek Field is one of the most important producing fields in Wyoming; the Fields recently discovered may become important; some structures have not yet been fully tested, while others have been proven to be barren. It is the intention of this bulletin to cover briefly the results of the various tests, with a short discussion of the geology.

In a number of cases the wells were drilled several years ago, the wells abandoned, and the operators have left. The law requiring operators on patented or state land to file logs and reports in the Office of the State Geologist was not passed until 1921, consequently it is almost impossible to secure a complete and accurate record of all the tests in this area, but the information give herein is believed to be as accurate as is obtainable at this time.

The State Geologist has for free distribution a limited number of copies of a map showing the location of oil structures on which can be found the structures mentioned in this bulletin.

BIG HOLLOW

The Big Hollow Anticline is a north and south trending anticline mainly along the west side of Township 15 N., Range 75 W., and plunges to the north, the surface formation being the Niobrara. In the eastern part of the same township and in the northwestern part of Township 15 N., Range 74 W., evidences of an anticline have been found and have led to drilling.

The Wyoming Spindletop Oil Company drilled in the SW $\frac{1}{4}$  of Section 32 Township 16 N., Range 74 W., to a depth of 1500 feet; a little dead oil was found in the first sand at 700 feet and some gas at 1100 feet. The Briggs Oil Syndicate started a well May 1, 1922, on the SW $\frac{1}{4}$  of Section 32-16-74, which at this time is drilling at a depth of 3075 feet with blue shale at 3040.



The surface rocks belong to the Niobrara; the Muddy, Dakota and Lakota were tested, the Muddy being dry, the Dakota water-bearing. At 1995 feet in the Morrison a heavy gas pressure was encountered. In the Chugwater, red shale was found from 2110 to 2940 feet, with limestone beneath.

In Section 12, Township 15 Range 75, the Kasoming Oil Company abandoned its well in the SE $\frac{1}{4}$  SE $\frac{1}{4}$  at a depth of 1440 feet, water being found in both the Muddy and Cloverly sands. The Steffin Syndicate drilled in the SW $\frac{1}{4}$  of the same section, going through the Frontier sands at 480 feet, with no oil showing, a comparison of the logs of the two wells indicating that this well is from sixty to eighty feet higher on the structure.

A number of shallow wells drilled several years ago in the south half of Section 6-15-75 indicates the possibility of small production of heavy oil from the Harris sand at about 900 feet, but on account of quality and small production it has not been marketed up to this time. Two wells are being cleaned out now, with the expectation of putting them on production.

The Apex oil and Refining Company has a standard rig on Section 18-15-75. The well has been drilled to a depth of about 1600 feet, but at present is shut down, and is reported to have had a showing of oil in the Harris sand at 781 feet, Kirk and Tracy, the Wyoming Hollow Basin Oil Company, have a star rig on Section 14-15-75, shut down for the winter after drilling to a depth of 1220 feet.

In the south end of the field, on the Murphy Dome, the Kasoming people found water in their well in both Muddy and Cloverly sands, in the NW $\frac{1}{4}$  of Section 32-15-75. Until the present wells are completed, the Big Hollow cannot be said to be completely tested.

#### MANDEL OR MILBROOK STRUCTURE

The associated Oil Company drilled north of Milbrook in Section 11-16-76, starting in the Steele Shale, encountering the Wall Creek at 2385 feet, bearing water, continuing to a depth of 3089 feet with water in what was probably the Muddy Sand, at 3005 feet. This was called the Mandel structure.

#### LAKE HATTIE

This is called Strom Anticline on the State Map issued by the U.S. Geological Survey. A well was started by the Centennial Valley Oil Company in September 1919 and finished in May 1922, in the N $\frac{1}{2}$  S $\frac{1}{2}$  of Section 30-15-76, in the Steele Shale, the structure here being slightly terraced. A showing of oil was encountered at 2005 feet, and the Muddy sand at 2938 carried water; a showing of oil was found at 3108 in the top of the Dakota, the remainder of the Dakota carrying water, and the hole was abandoned at 3200 feet.

#### CENTENNIAL VALLEY

The Centennial Valley Oil Company started a well in September 1918 and finished it in June 1923, on the NE $\frac{1}{4}$  of Section 12-15-76. This was also started in the Steele Shale and drilled to the Dakota, which carried water; depth 3013 feet. Showings of gas were obtained at 1205 and 2736 feet in black lime shale.

#### SODERGREEN

The Sodergreen structure proved to be a failure and has been definitely abandoned. It is located in Sections 20 and 28 Township 14 Range 76, and appears to be a small, narrow anticline with the axis running north-east and southwest. The well was drilled by the Producers and Refiners Corporation in the NE $\frac{1}{4}$  of Section 28-14-76.



#### REX LAKE

The Ohio Oil Company commenced drilling this structure July 13, 1923, and oil was discovered October 7, 1923, in the muddy sand, at a depth of 3733 feet, on the NE $\frac{1}{4}$ NW $\frac{1}{4}$  of Section 26-16-77. The Dakota was entered at 3845 feet and carried oil, as did the Lakota at 3868; the well was drilled to a depth of 2936 feet and was still in the Lakota. It is reported that a twenty-four hour bailing test brought up 575 barrels of oil similar in quality to the Rock River crude. There is no gas pressure and the well does not flow. The axis of the structure has a northeast southwest strike, but the length and width of the productive area have not been determined.

#### JAMES LAKE

This structure is located in Township 18 Range 75 and Township 17 Range 75, about three or four miles east of James Lake, and about eighteen miles northwest of Laramie. Topographically the area presents a gently rolling surface which consists of Alluvium and Terrace deposits. The Steele shale outcrops in a few places and the Mesaverde formation is prominent to the north and northwest. The axis of the structure bears nearly north and south. The Cactus Petroleum Company drilled on the SE $\frac{1}{4}$  of Section 32-18-76, getting a small showing of oil in a hard thin sand at 1565, but with water in the Muddy and Dakota, and the hole was abandoned. The dips were probably too slight to afford an accumulation of oil. West of James Lake the Western Petroleum Company suspended operations indefinitely at a depth of 3000 feet. The Western Holding Company of St. Louis drilled on the NE $\frac{1}{4}$  of Section 3-17-76 in 1920 to a depth of 3050 feet, without getting production.

#### TWO RIVERS

The Two River Anticline, lying about five or six miles east of the James Lake structure, is apparently a parallel structure, as it has a nearly north and south axis. It is located in the southwest portion of Township 18 Range 74 and the northwest portion of 17-74. The Steele shale is exposed along the north bank of the Laramie Range, which crosses the anticline in a westerly and northwesterly direction. This area is somewhat lower stratigraphically than the James Lake field. The Ohio Oil Company abandoned its test on Section 23-18-74, after getting water in the Wall Creek at 1215 to 1265 feet, the Muddy at 1940 to 1980 feet, and the Dakota at 2090 to 2107 feet. This structure apparently did not have sufficient dips to trap the oil.

#### QUEALY

The Quealy area is located in the northwestern part of Township 17 Range 76 and the northeastern part of Township 17 Range 77. It was tested by the Matador Petroleum Company and proven to be a failure. A few barrels production was found in the Mowry shale at a depth of 3400 feet, but the Muddy sand was found to be water bearing and likewise the Dakota. This small production in the Mowry shale was not considered sufficient to justify making a well of it.

#### COOPER COVE

Cooper Cove is located in the southwest part of Township 18 Range 77 and the southeast corner of Township 18 Range 78, about twelve miles southeast of the Rock Creek field and about thirty miles northwest of Laramie. It is a small natural basin practically surrounded by low hills to the north, east and south, and the foothills of the Medicine Bow Range to the west. The floor of the basin is nearly level and is crossed in a northeasterly direction by Cooper Creek. The exposures in the surrounding hills show the Mesaverde sandstones and light colored shales and the dark shales of the Steele formation. No detailed study of the structure was made, but it is believed to be on the same general fold with the Rock Creek structure.



Development has been going on for some time in this area but as yet no wells have reached the oil producing sand. The Utah Oil and Refining Co. of Salt Lake City is operating, and the fifth well, on the SW $\frac{1}{4}$  of Section 20 18-77, was lost at a depth of 4575 feet, having failed to reach the Muddy sand, and had to be abandoned. The depth of this sand was originally estimated at 3500 to 4000 feet, and the additional depth is difficult to account for, unless the hole was drilled through the axis of the structure into the steeper dips on the west side of the fold, or unless there was faulting not observed at the surface.

Four other wells were abandoned for different causes; one drilled to a depth of 1800 feet and encountered some gas at 1500 feet. The crude oil situation in 1923 did not encourage further testing of a field where the oil is at such a depth as this latest test indicates. It was believed that the Muddy sand was within a short distance, probably 200 feet, from the bottom of the last well. It is unfortunate that this well could not have been deepened to the Dakota and Lakota formations. A new test will undoubtedly be drilled when market conditions make it advisable.

#### ROCK RIVER ANTICLINE

This is a long and narrow dome, the major axis bearing nearly north and south, the productive area having a length of about  $3\frac{1}{4}$  miles, and a width of probably not over a mile. The limits of the field have been fairly well outline by Township 20-73, an area of probably 1100 acres. There are about fifty producing wells in the field, the production in February 1924 being approximately 3500 bbls. per day, and for the year 1923 was approximately a million and half barrels. Production comes from three sands, First and Second Muddy, depths 2570 to 2600 feet, and 2670 to 2695 feet, and the Dakota 2725 to 2775 feet, the Dakota being the big pay. It has been estimated that the recoverable production would approximate 20,000 barrels per acre, or 20,000,000 barrels for the field. The Ohio Oil Company holds all the producing acreage.

The Prairie Dog Oil and Gas Company of Norton, Kansas, is now drilling in the S $\frac{1}{2}$  of Section 12 Township 19-78, and has reached a depth of 2400 feet, on a test for an extension of the field to the southeast.

#### MCGILL ANTICLINE

This structure lies about twelve miles northeast of the town of Rock River, being a narrow anticline trending northeast and southwest, and having a closure three or four miles in length. The surface rocks here belong to the Chugwater formation. The sands which are oil bearing in other parts of the Basin, the Muddy and Dakota, are eroded away from the crest, the Morrison and Sundance being also removed. Consequently the oil, if any, in this structure, would be found in the Forelle, which corresponds to the Embar, or in the Casper formation, which is believed to represent the Amsden and Tensleep of the central and northwestern parts of Wyoming. They have not been found to be oil bearing in any part of the Laramie Basin as yet.

This anticline continues to the southwest to the Rock River Oil Field, and has been drilled near the town of Rock River without showing production, but it is reported that further tests are planned in 1924.

#### GILLESPIE ANTICLINE

This structure is parallel to the McGill Anticline and lies four to five miles north of it. It plunges to the southwest and is open to the northeast, rock from the Cretaceous down to the Pennsylvanian being exposed on its crest, no trap for oil being present. It was tested in 1910 or 1911 and found to be barren.



#### FOOTE CREEK ANTICLINE

The highest point structurally on this anticline is in the southeastern part of Township 22 Range 78, where there is a small exposure of rocks of the Morrison Formation, the Cloverly, Benton and Niobrara encircling it. The crest of the anticline runs southeasterly, almost along the Union Pacific Railroad into the northeastern part of Township 21 Range 77.

It has been tested by two wells and found barren, all of the sands being water-bearing. The Southwestern Petroleum Company, drilling in the NE $\frac{1}{4}$  of Section 3-21-77, found the Wall Creek at 290 to 295 feet, the First Muddy at 1195 to 1440 feet, and was abandoned in the Morrison at 1573 feet. The United Western drilled on the SE $\frac{1}{4}$  SW $\frac{1}{4}$  of Section 2-21-77 to a depth of 1490 feet and encountered water in the First Muddy. It was on the south limb of the anticline.

#### MEDICINE BOW DOME

The crest of this structure is located in the southeastern part of Township 21-79, where the rocks of the upper part of the Montana, (Mesaverde), are outcropping, indicating considerable depth to the Muddy and Dakota sands, which has delayed testing, although it is known to be a closed structure of considerable area. The oil discovery in this structure, ten miles south of Medicine Bow, was made by the Cliff Petroleum Company and Southwestern Petroleum after drilling several other tests in the southern part of the state. This discovery was made on July 17, 1923, at a depth of 4033 feet, the initial flow being several hundred barrels per day. The gravity of the oil is 39 degrees. The sand is 47 feet in thickness but only the top few feet were oil bearing and water was encountered. The operators are not certain whether this production is in the Muddy or Frontier sands, and are now drilling on Section 36-21-79 and 26-21-79.

Other wells have been drilled near Medicine Bow, one about two miles south of the town of Medicine Bow by the Mitchell Oil Company, to a depth of about 2200 feet finding water in the Dakota. This was not on a closed structure.

#### COMO RIDGE

This is along broad anticline plunging to the southwest, practically all of the sedimentary rocks being exposed, a widening of the outcrop of the Chugwater formation occurring in the vicinity of the southeast corner of Township 23 Range 77. It was drilled and an Artesian flow of good water, estimated at 1000 to 1200 gallons per minute, was struck in the Tensleep at a depth of 800 feet.

#### ALLEN LAKE

Situated in the southern part of Township 23 Range 79, extending into 22-79, it was drilled about six years ago by the Cosden interests, and a gas flow estimated at 35,000,000 feet was encountered in the Muddy sand at 1365 foot depth, deeper drilling showing water and the well was abandoned. It was drilled again by L.R. Pattinson to a depth of about 600 feet on a government permit.

July 1, 1923, the Laramie Syndicate started drilling at Allen Lake, four miles northwest of Medicine Bow, and in October encountered some gas at 1403 feet; the flow, however, is reported to have ceased. At 1331 feet this well encountered a flow of 4,500,000 feet, and casing was cemented. The well is now shut down for the winter.

#### FLATTOP ANTICLINE

This is a large dome six miles due north of the town of Medicine Bow. All of the earlier sedimentary rocks are exposed, including the Tensleep, and no test of this structure is necessary, as all of the oil bearing formation are eroded away.



#### OIL SPRINGS ANTICLINE

A very narrow faulted structure, in the northern part of Township 23, Range 79, about two miles and a half in length, east and west, by about 900 feet wide. Its name is derived from an oil spring in a ten foot hole on the west end of the structure in the shale near the Wall Creek Sandstone. It was drilled in 1917 by the Ohio Oil Company, and gas found in the Mowry, not over 1,000,000 cubic feet. It was drilled to a depth of 1498 feet and water was encountered in the Muddy sand. Some operators believe the well may have struck the Muddy at a point off the axis of the structure, as it is very narrow and sharp, and the depth to the Muddy sand should be less than 1498.

#### FREEZEOUT HILLS

Here, as on Flattop, the formation are exposed to the Tensleep, the more recent oil bearing formations having been removed by erosion, leaving no oil possibilities. The anticlines are mainly in Townships 24-79 and 25-78.

#### TROUBLESOME ANTICLINE

This is in the northeastern part of Township 24 Range 81, having a nearly north and south trend, plunging to the south, and open at the north end. It has never been tested as there is little prospect for accumulation of oil.

#### SHIRLEY ANTICLINE

This structure is in the southern part of Township 26 Range 80 and northeastern part of Township 25-80, the axis having approximately a northwest and southeast strike. In Township 25-80 it opens to the southeast, as it plunges to the northwest. It was tested in 1922 by H.P. Hynds, to a depth of 1910 feet. The Wall Creek, depth approximately 700 to 800 feet, was dry, and the Muddy, Dakota and Lakota carried water.

#### SIMPSON RIDGE

It is believed that this anticline will be developed into a commercial field. The Producers and Refiners Corporation drilling on Section 20 Township 21 Range 80 about ten miles southeast of Hanna, in the latter part of June, encountered oil at a depth of 665 feet, estimated originally at about 100 barrels but probably under 25 barrels, the lower part of the sand being saturated with water. This sand is probably the Shannon or a stray sand above the Shannon and the well is being drilled deeper to carry out the original intention of testing the Frontier sands. It may be possible to develop a small commercial production from the shallow sands, and the possibilities are being tested.

It is a long narrow structure along the west side of Township 20 Range 80, the surface rocks belonging to the Mesaverde formation, which indicates that the probable producing formations will be fairly deep, the First Wall Creek estimated at 4200 feet. A 630 foot well in Section 20 makes about 10 barrels per day. Deep tests are being drilled on Section 16, 17, and 20, by the Producers and Refiners Corporation.

#### ELK MOUNTAIN

The structure is about six miles southwest of Simpson Ridge in the northern part of Township 19 Range 81, the structure being partially encircled by the outcrop of the Mesaverde formation, part of the Pierre shale being eroded away, with the Wall Creek at an approximate depth of 2500 feet. It was tested by the Kasoming Oil Company, a depth of approximately 4200 foot having been reached without obtaining production.



## BOTHWELL STRUCTURE

In 1919 the Utah Oil and Refining Company drilled on the NW<sup>1</sup>/<sub>4</sub> of Section 30-26-76, beginning in the Benton formation, and drilling to a depth of 550 feet, where water was encountered in a sand believed to be the Dakota.

## CONCLUSION

We find that of the twenty-five structures, sixteen have been found to be unproductive, as follows:

Millbrook, Lake Hattie, Centennial Valley, Sodergreen, James Lake, Two Rivers, Quealy Dome, Foote Creek, McGill Anticline, Gillespie, Como Ridge, Flat-top, Freezeout Hills, Shirley, Elk Mountain, Bothwell.

One structure, the Rock River, has been a big producer for a number of years, and in three structures oil was discovered in 1923: in Simpson Ridge, Medicine Bow Dome, and Rex Lake, which will probably be commercial producers, though they are not fully tested as yet. Gas was found at Allen Lake in 1923, but this has not been fully tested. Big Hollow has some low grade oil and an attempt will be made to produce it. Further tests are now in progress. The Rock River Anticline will probably be tested deeper. The Oil Springs Anticline is not considered by some operators as sufficiently tested.

It will be noted that the unproductive structures are in most cases plunging anticlines open at one end so that no trap exists for the accumulation of oil or gas. In some cases where the structures are closed, the dips are so slight that they did not continue with depth, or else were not sufficient to trap oil where water was circulating in the sands. In other cases the oil bearing formations have been eroded away.

The showings of oil and gas in numerous tests indicate that wherever structures exist in which oil or gas can be properly trapped, these structures will prove productive, if the sands can be reached by drill.