

THE MUDDY CREEK OIL FIELD

MR-UN-44

Carbon County, Wyoming

By C. E. Jamison

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Introduction

In the valley of Muddy Creek, southwestern Carbon County, Wyoming are outcrops of oil-saturated sandstone, which, although known for many years, have attracted but little attention. It is the purpose of this report to briefly describe the geological features of the district.

The Muddy Creek oil field lies in Muddy Basin, Townships 15, 16, 17 and 18 north; Ranges 92 and 93 west. Rawlins is distant 36 miles northeast, Wamsutter 24 miles northwest, and Creston 16 miles north, the last named place being the nearest railway point. The greater part of the field lies within the limits of the Union Pacific Land Grant, all odd-numbered sections within the grant being controlled by that company.

The investigation on which this report is based was made in the spring of 1912, and extended over a period of eight days. Acknowledgments are due Mr. H. Larsen of Rawlins and Mr. B. C. Hoffine of Cheyenne for information and assistance. E. M. Task of Cheyenne acted as field assistant during the investigation.

Topography

The field lies in the drainage basin of Muddy Creek, the surface features consisting of shallow valleys and low ridges, having a general north-south trend. On the east the field is flanked by the comparatively high ridges of the Fort Union and Laramie formations, while on the west it extends to the high plateau which forms the western limit of the Muddy Basin. West of the Muddy Basin is a broad flat plateau which extends to Wamsutter and beyond the limits of the area under discussion. Elevations in the field range from 6,500 to 7,000 feet, as determined by aneroid, while the elevation at Wamsutter is 6,702 feet.

## GEOLOGY

### Structure

Between the Rock Springs dome on the west and the Sierra Madre uplift on the east is the Wamsutter syncline, the upper portion of the eastern limb being occupied by the Muddy Creek oil field. The structure in the oil field is extremely simple, the beds dipping regularly to the west. The dip of the Fort Union and older formations ranges from  $12^{\circ}$  to  $15^{\circ}$ , while that of the overlying Wasatch beds varies from  $3^{\circ}$  to  $10^{\circ}$ . No faults whatever were noted in the district.

### Stratigraphy.

In the following table the formations exhibited in this district are listed, together with a generalized statement as to their character, thickness, etc:

#### Mesaverde Formation

The upper portion of this formation is composed of gray and brown shales and thin-bedded sandstones, with several beds of massive sandstone near the top. The lower portion of the formation was not examined. The formation is believed to be coal bearing.

#### Lewis Shale

The Lewis shale is composed, in the greater part, of soft, gray to black, sandy shales, with a number of beds of shaly sandstone near the top of the formation. The shale weathers more rapidly than the Mesaverde and Laramie formations and produces a series of valleys between the highlands of those formations.

#### Laramie Formation

Overlying the Lewis shale is a series of gray, buff and brown sandstones and gray, brown, and black shales of Laramie age. In the upper portion of the formation are several beds of massive sandstone, some of which are concretionary, but as a rule the sandstones are thin-bedded. At the base of the formation is a bed of massive, gray to buff sandstone which forms a prominent hogback. The formation is believed to be coal bearing throughout.

#### Fort Union Formation

At the base of the Fort Union formation is a bed of very massive, cross bedded sandstone, at some points conglomeratic. Overlying the basal sandstone are buff and brown sandstones and gray and brown shales, with several coal beds. Overlying this member is a non-coalbearing member, consisting principally of sandy clay, with a few beds of soft, slabby sandstone. The formation is not

exposed in its entire thickness, being concealed in part by the overlying Wasatch beds.

#### Wasatch Formation

In the region under consideration the Wasatch is separated from the Fort Union formation by a pronounced unconformity, and rests on the middle member of that formation. In the vicinity of the oil field the upper member of the Fort Union is concealed by the overlap, though the beds which form its upper part are exposed some 15 miles north. At the base of the Wasatch formation are beds of sandy clay, overlain by a massive, coarse-grained sandstone, which was thoroughly saturated with oil at all points where its outcrop was found. This sandstone contains, locally, lenses of conglomerate of two varieties; one of which is made up of pebbles of fine-grained, gray, shaly sandstone, the pebbles ranging up to six inches in their longest diameter. The other conglomerate is finer grained, and is composed of pebbles of chert and grains of quartz, the largest of which are not more than one-half inch in diameter. Above the basal sandstone the formation consists chiefly of sandy clay, with a few beds of shale and soft massive sandstone. The clays are red, while, , green and maroon in color, while the sandstones are gray and brown. The Wasatch formation extends from Muddy Creek westward beyond the western limits of the area under discussion.

#### OIL

The presence of oil in the Muddy Creek field is indicated by the presence of oil-saturated sandstone which outcrops at many points, notably in sections 3, 10 and 15, Township 17 north, Range 92 west, and in section 34, Township 18 north, Range 92 west. At Cedar Butte, in the northwest quarter of section 10, Township 17 north, Range 92 west, the oil sand is exposed in its entire thickness- 28 feet- while at other points only the lower portion of the oil sandstone is exposed. So thoroughly saturated with oil is the lower portion of this sandstone that it was used by the writer during the course of the examination.

Development in the field is confined to the well drilled by the Larsen Oil Company on section 10. This well was located east of the outcrop of oil-bearing sandstone, the stratum dipping west, and there was, therefore, no possibility of obtaining oil from the known oil-bearing stratum.

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On Cow Creek, in section 27, Township 16, Range 91, gas is escaping in the bed of the stream, and in several springs which occur near the base of the Lewis shale. A rather large spring, 25 feet or more in diameter, situated in the north half of the section, is kept in a state of constant ebullition by the escape of gas. The presence of gas along Cow Creek led to the drilling of a well, some two or three years ago, near the junction of Cow and Deep creeks. The well was measured by the writer and the bottom reached at 75 feet, though it is probably that it had caved and filled to some extent. A small amount of water is now flowing from the well, while sufficient gas is escaping to burn with a flame ten inches in length. The gas is odorless and colorless and burns with a yellow flame. It is believed by the writer to be marsh gas, and is not thought to indicate in any way the presence of either oil or gas in commercial quantities.

The following analyses of the oil from the Muddy Creek field were furnished by Mr. H. Larsen of Rawlins, who obtained a small quantity of oil by distillation of the saturated sandstone:

Von Schultz & Low, Denver, Analysis

Below 150 degrees C.....	0.00	per cent, Benzine, naphtha, gasoline
150 to 200 degrees C.....	4.60	" " , Kerosene
200 to 250 degrees C.....	18.60	" " , High grade kerosene
250 to 300 degrees C.....	53.50	" " , Headlight oil
Above 300 degrees C.....	11.70	" " , Highgrade lubricating oil
Residue.....	11.60	" " Coke.

The above analysis apparently shows entirely too large percentages of illuminating oils.

Analysis of Oil by N. F. Harriman, Chemist and Engineer of Tests UPRR  
Omaha.

Percentage of oil in rock 8.41  
Distills between 420 degrees F. and 700 degrees F.  
Oil is of asphaltum base.

System	Formation	Thickness	Characteristics	Remarks
Tertiary	Wasatch	?	Gray, red, green and purple sandy clays; brown and gray shales and soft, massive sandstone; massive, crossbedded sandstone near the base, locally conglomeratic.	Contains oil in the lower massive sandstone.
	Port Union	3200 to 3400	Gray and brown sandstones and shales; massive, crossbedded sandstone and conglomerate at the base.	Contains numerous beds of coal.
	Laramie	3500 to 3800	Gray, buff and brown concretionary sandstone; gray, brown and black shales.	Coal bearing
CRETACEOUS	Lewis Shale	1500	Dark shales with several thin sandstone beds.	
	Mesa Verde	?	Gray and brown shales and sandstones.	

#### FUTURE DEVELOPMENT

In the future development should be confined to that portion of the district which lies west of the oil sandstone outcrop. The first wells should be drilled on sections 4, 5, 8, or 17 north, Range 92 west, where the oil bearing sandstone can be reached at depths ranging from 600 to 1,000 ft. In no case should the non-success of a single well be considered as conclusive evidence, as there are few oil fields where there are not dry holes, even near productive wells. It is not probable that flowing wells will be obtained in this field, but the conditions are such that highly productive pumping wells may be brought in at depths ranging from 600 to 2,500 feet.

#### WATER SUPPLY

The streams that traverse this region are intermittent, but water sufficient for drilling purposes may be obtained from shallow wells sunk in the alluvium of the valleys. The water of Muddy Creek carries a large amount of solid matter in suspension, and is alkaline, but it was used in the boiler operated by the Larsen Oil Company with no bad results. For domestic purposes it requires settling, or, preferably, filtration.

#### COAL

Coal beds are numerous in the Laramie and Fort Union formations, the workable beds ranging in thickness from three feet to fifteen feet. Near old Washakie stage station, in section 8, Township 17 north, Range 91 west, is an opening made in 1870 by the Overland Stage Company. This opening was cleaned and retimbered by the Larsen Oil Company, and the coal used under the company's boilers. The vein was found to be nine feet in thickness and the coal of good quality. In section 3, Township 16 north, Range 92 west, is the Corlett opening, about 35 feet in depth. Aside from these openings coal, sufficient for drilling operations can be obtained at many points in the district at but slight expense.