RECONNAISANCE GEOLOGICAL REPORT

WHITE RIVER DOME

Northwestern Colorado

by

E. B. Emrick

Report furnished by: Clifford R. Horn

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LOCATION.

The White River Dome is located about twenty miles west of Meeker near the junction of White River and Piceance Creek in Rio Blanco County, Northwestern Colorado. It covers parts of Twps. 1 and 2 North, Range 96 and 97 West, and is about forty miles east of the Rangely Field.

The nearest railroad point is Rifle, Colorado, a station on the Denver & Rio Grande Western Railroad, which lies about fifty-five miles to the southeast. The Pike's Peak Ocean to Ocean Highway from Rifle crosses the structure about one mile south of the crest.

HISTORY.

Gas was first discovered on Oil Well Gulch in 1890. The well was about 200 ft. in depth, but is still throwing up mud and water thru a two-inch pipe that is sticking out the hole. Several local companies took up the land in 1917 and several hundred wells have been drilled for validation purposes but only four are more than 400 ft. in depth. A shallow gas is found about 500 ft. and at about 800 ft., a gas is found to which two wells have been drilled, each making about 15,000,000 cubic feet.

TOPOGRAPHY

The flat topography of the structure is broken by low rounded hills and gulches. Roads have been built to most all points of the structure. The White River crosses about one mile south of the crest.

AREAL GEOLOGY AND STRATIGRAPHY.

The surface of the structure is composed of the Wasatch formation. Approximately 1,000 feet of Wasatch has eroded, leaving the lower two-thirds or about 2450 feet. Beneath the Wasatch, lies the Mesaverde formation which is here more than twice as thick as it is on the Battlement Dome. The Larime and Lewis Shale form the top beds of the Mesaverde here while they are entirely missing in the area to the south. It is likely on the Battlement Dome area that the Larime beds and Lewis shales were eroded after it was deposited and before the next succeeding Tertiary strata was laid down. The entire structure is surrounded by beds of the Green River formation, locally known as oil shales. The lower two-thirds of the Wasatch formation is exposed in the vicinity of the mouth of Crooked Wash Creek and on the steep dip of the strata which form the east limit of the Blue Mountain uplift. The upper one-third of the Wasatch is exposed in cliffs on the northeast and south sides of the Dome. An approximate section of the Wasatch formation is as follows: (Section measured by J. A. Taff at the mouth of Crooked Wash Creek.)

SECTION OF THE ROCKS IN WHITE RIVER ANTICLINAL DOME
in decending order from the base of the Green
River formation to the top of the Mesaverde

	Thickness	Approximate Drilling Depth	Depth from top Wasatch
Light yellow to brown sandstone beds in upper part, yellow to reddish shales and sand beds in lower part.	250 ft.	. . .	. . .
Light brown to yellow sandstone beds with some shale interstratified.	200 "	. . .	450 ft.
Yellow and reddish shales and soft sandy beds.	100 "	. . .	550 ft.
Brownish soft sandstone.	15 "	. . .	565 ft.
Shale, yellow and pink with some sandstone beds, shale predominating.	200 "	. . .	765 "
Estimated stratigraphic position of surface on oil well gulch near center of SE/4 of SW/4 of Sec. 31, T. 2 N., R 96 W.			
Approximate surface of Dome. Light yellow shales and thin bedded sandstone	150 "	150 ft.	915 "
Light yellow, greenish and drab shale and light colored sandstone beds, shale	400 "	550 "	1315 "
Massive brown sandstone with dark brown segregation.	30 "	580 "	1345 "
Drab shale, weathering red.	90 "	670 "	1435 "
Soft sandstone.	10 "	680 "	1445 "
Drab shale.	18 "	698 "	1463 "
Soft brown sandstone.	30 "	728 "	1493 "
Dark brown and drab shale and occasional thin sandstone.	790 "	1518 "	2283 "
Brown, greenish, and yellow shales.	100 "	1618 "	2383 "
Massive light brown sandstone.	25 "	1643 "	2408 "
Greenish shale with occasional thin yellow S. S.	105 "	1748 "	2513 "
Massive brown sandstone.	17 "	1765 "	2530 "
Brown and drab shale, weathering red and green.	77 "	1842 "	2607 "
Massive brown sandstone with hard dark brown segregations.	65 "	1907 "	2672 "
Green and brown shale with occasional thin bedded S. S.	100 "	2007"	2772 "

Dark brown sandstone.	10 "	2017 "	2782 "
Drab and brown shale.	58 "	2075 "	2840 "
Brown sandstone.	15 "	2090 "	2855 "
Greenish shale and thin brown sandstone.	85 "	2175 "	2940 "
Brown sandstone with darker hard segregations.	60 "	2235 "	3000 "
Shale, shaley sandstone and thin beds of brown S. S.	275 "	2510 "	3275 "
Sandstone with coal crop below.	10 "	2520 "	3285 "

Several of the above sands would be suitable oil sands.

LARIME

The Larime which underlies the Wasatch is the uppermost Cretaceous formation. The upper portion is composed of brackish and fresh water deposition while the lower portion is of marine origin. The formation consists of sandstone and shale. The sandstone stratas are generally quite massive. Bituminous and sub-bituminous coal are found at many horizons which vary in thickness from 4 to 28 feet. About 75 feet of coal is being worked from this formation at Camp Streeter which lies at a short distance to the northeast.

LEWIS SHALES.

This formation is composed of dark colored soft clay shales resembling the Mancos shale or Pierre of Lower Cretaceous age. Some sandstones also occur especially near the top which in most places exposed are rather massive. Below the Lewis Shale there is more than 3,000 ft. of Mesaverde remaining described in a previous report "The Battlement Dome".

A Generalized section of the formation follows: (Ref. U. S. G. S. Bulletin 350, 415, 510.)

System	Group	Formation	Member	Thickness	Description	Economic Value
Tertiary (Eocene Series		Green River		2000 ft	Composed of shale, sandstone and beds of oolitic rock and shale. The shaley beds predominate and are very compact and firmly bedded. Generally exposed in escarpments, and high bluffs in the weathered beds have a very characteristic chalky white appearance. The shales are however, of various shades of gray, drab and light brown and are in many places hard and	Oil Shale Gasoline
		Wasatch		3400 ft.	Composed chiefly of clay or soft clay shale; commonly variegated, but various shades of red and drab predominate. It also contains beds of pebbles or conglomerate of perfectly rounded silicious material. Sandstone in places are very massive and hard.	Oil and asphaltum deposits near Vernal, Ut. Gas & small oil show upper 2/3 formationWhite River Dome.

System	Group	Formation	Member	Thickness	Description	Economic Value
		Post Laramie (Coal-bearing) Unconformity		800 ft	Consists of massive white or white or light-colored S. S. and shales containing valuable coal beds sharply defined at the base by a conglomerate or conglomerate sandstone.	Workable coal
		Laramie	Laramie	1200 ft.	Consists massive S. S. and light-colored sandy or clay shales and many kinds of lignite or sub-bituminous coal. The coal represents the transitional deposits of brackish or fresh water origin, conformably over lying the uppermost marine formation. The Lowermost massive sandstones contain a marine fauna similar to that of the underlying Lewis shale.	Workable coal
Cretaceous		Lewis Shale	Lewis Shale	1000 ft.	Composed largely of soft dark-gray or black clay shales with calcarious seams and sandy beds	Possible origin oil & gas.
			Undifferntiated	2000 ft.	Gray sandstone ranging from soft and friable to hard and cliff-making. Fresh water fossils.	
	Montana	Mesaverde	Paonia Shale	400 ft.	Carbonaceous shale and sandstone. Fresh water fossils.	
			Bowie Shale	425 ft.	Dark-colored shale and gray S. S. seams, also massive cliff marking S. S. Marine and brackish water fossils	
			Rollins	100 ft.	White sandstone. Cliff marker? Marine origin	
	Colorado	Mancos		5000 ft.	Dark carbonaceous shales.	Possible origin oil and gas.
		Dakota				

It will be noticed from the table that large quantities of coal underlie the structure which no doubt will account for the gas as tremendous quantities of gas are formed in the changing of lignite to sub-bituminous and bituminous coal. The Lewis shales may also be an origin for both oil and gas, and also the Mancos shales. The depth to the sands overlying the Mancos would be beyond a reasonable drilling depth, unless the "Battlement Dome" would reveal exceptional possibilities in the lower Mesaverde.

STRUCTURE.

The structure is that of a simple anticline or dome. The south flank is somewhat steeper and much greater in extent, but the structure could not be called an asymetrical anticline as it has generally been termed. The axis of the dome trends in an almost east and west direction.

The dips are all light, being from 1° to 5° to the east, 2° and less to the north, 2° to the west. From the crest of the dome south about two miles, the strata dips from 1° to 2°, then increases to as much as 15°, again decreasing to 3° or 4°, until about seven miles south along Piceance Creek where the dip is from 1° to 2° for about eightmiles, when the strata are very nearly horizontal, lying in the big structural Basin that lies between Uinta Mountain uplift and the Uncompahgre Pleateau. The beds of the Green River formation completely surround the structure except at a few places where erosion has carried them away.

DEVELOPMENT.

Four wells have been drilled as follows: White River No. 1. Drilled several years ago to a depth of 760 ft. Deepened in 1919 to a depth of 1250 when the hole was abandoned after the casing collapsed. Gas was struck at 760 ft. Water and showing of oil at 895 ft. White River No. 2. Depth 528 ft. Stopped at first gas for fuel which has been used in drilling the No. 3 and No. 4. White River No. 3. Depth 762. Gas, about 15,000,000 cu. ft. per day. Wet gas. Sp. Gr. .522. Absorption 9.7.

White River No. 4. 800 ft. Gas, about 15,000,000 cu. ft. Same sand as No. 3. Wet gas. Sp. Gr. .539.

LAND STATUS.

The land is held by local companies as follows:

The Lad Oil Company over 10,000 acres

The White River Oil Company about 6,000 acres

The Rio Blanco Oil Company about 1920 acres

The same men have the financial responsibility of all the companies. Senator Dick of Ohio has controlling interest in all.

The land that is not deeded is held under the old oil placer laws, being located in 1917 and validation holes drilled to gas discovery on each 160-acre claim. Gas was found at depths of from 10 to 200 ft. in each hole. All assessment work has been done to date. Roads have been constructed to all parts of the acreage over which it is possible to drive a car.

DRILLING CONDITIONS.

1. General supplies could be purchased at Meeker.
2. Fuel supplies. Free use of gas for any drilling or in any way developing the property.
3. Water supplies. Reservoirs have been constructed at several points for a water supply. This was done as assessment work. The crest of the structure and south portion is on or near the White River.
4. Transportation. The Pike's Peak State Highway crosses the structure. The distance by this road to Rifle, which is the nearest railroad point is about 55 miles. This road is a United States mail route and should be open most of the year.
5. Labor available. Labor could easily be secured at Meeker. Good buildings are on the property which could be used as a camp.
6. The most economical drilling method would be a Standard rig. The clay shales of the Wasatch are very difficult to drill with a machine.