

Official Report #121

"Oil Shale"

THE DRY LAKE DOME.

*Preliminary Statement.*

Compiled from various government reports and reconnaissance survey made in June 1914. Map from "Resources of Wyo"

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Office of State Geologist  
Cheyenne

THE DRY LAKE DOME.

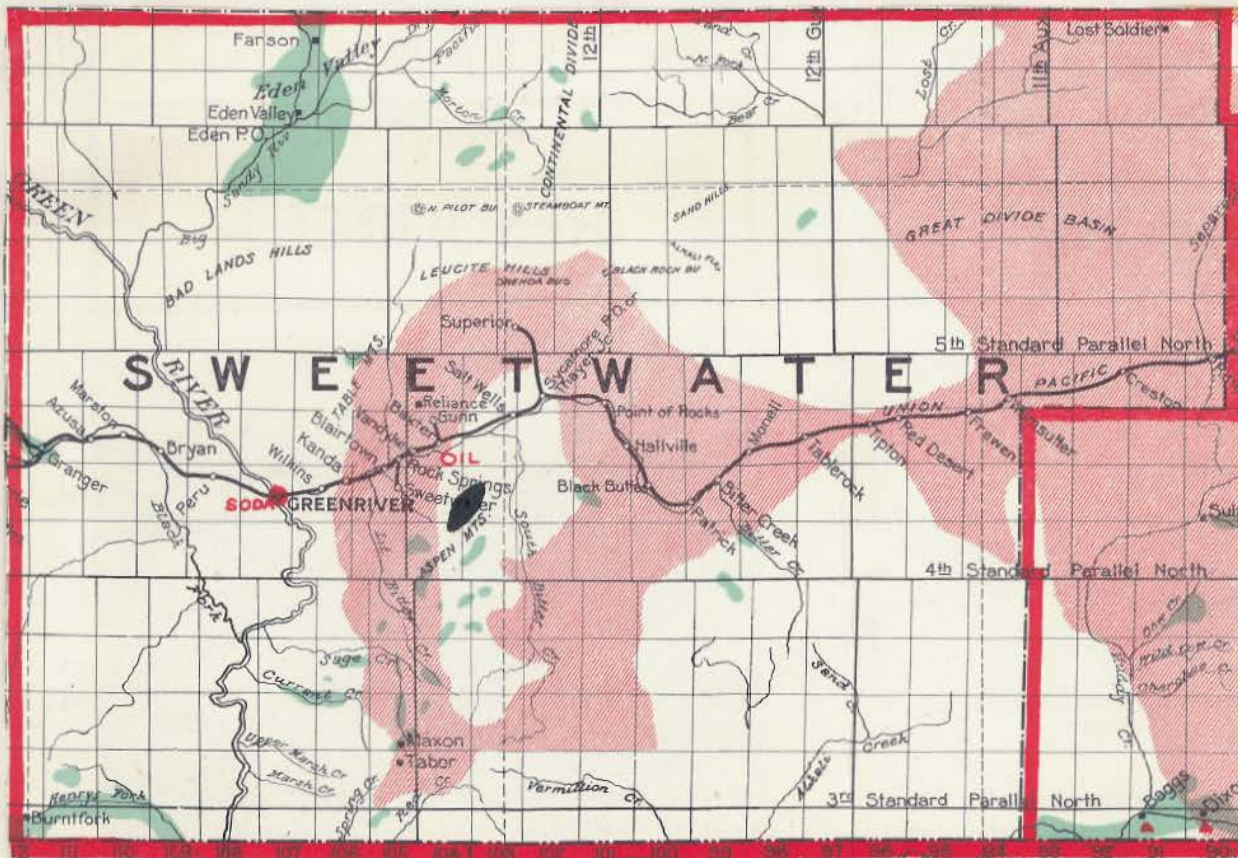
INTRODUCTION.

The area under consideration lies in Townships 17 and 18 N., Ranges 103 and 104 W., in Sweetwater County, Wyoming. The area is nine miles, by road, southeast from Rock Springs on the Union Pacific Railroad.

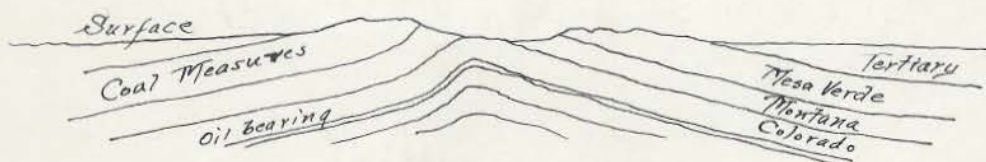
HISTORICAL.

The early surveys across the continent for the purpose of finding a practicable route for a transcontinental railway crossed this general area and recognized its geological structure. Later the region was mapped (King, 1876) and the geologic structure is shown. When the railroad was built, or soon afterward, a well was drilled near Salt Wells Station and a supply of salt water tapped. Seepages of petroleum were reported from the eastern side of the area.

These facts, together with the reports of geologists stating that the structure was ideal for petroleum accumulation, resulted in the Belgo-American Petroleum Company putting down two wells between the years 1900 and 1903.



● Dome of Colorado shales.  
 Red --- Mesa Verde coal-bearing member.  
 Inner White- The Montana Shales.  
 Outside White-Tertiary.



Geologic Section along line A-B



Unfortunately, these wells were located near Baxter Station on the railroad where the surface rocks are geologically over a thousand feet higher than are the surface rocks at the center of the dome some six miles to the south. These wells are reported to have reached a depth of 2200 feet, finding some gas but no oil or water. One other deep well was put down in the sand-shale area near Six Mile Spring, and secured a flow of water. As this is outside of any possible petroleum-bearing area, it has no bearing upon the question of an oil pool in the Dry Lake Dome. These are the only wells ever drilled in an effort to find oil. No well has ever been drilled in the area which promises most. At one time drilling machinery was taken into the field, but was later hauled away without ever having been erected. For forty years the structure has been recognized as good for the concentration of an oil pool, but no hole that really tests the territory has ever been drilled.

## TOPOGRAPHY.

The Rock Springs Uplift expresses itself on the surface as a series of great sandstone escarpments surrounding a central lower area of clay soil. (Map, page ). Outside the first ring of sandstone hills is a belt of low-lying clay soil, and outside of it again is a second series of high sandstone bluffs.

Bitter Creek, along whose course the Union Pacific Railroad was built, crosses the uplift from east to west, cutting canons through the sandstone hills and causing the central clay area to drain toward one point, a wide valley known as Baxter Basin, in which is located Baxter Station of the Union Pacific Railroad.

The elevation of Bitter Creek, where it leaves the central clay or shale area, is 6200 feet, while Dry Lake, six miles to the southeast, lies at 6600 feet, and Aspen Mountain, south of it about six miles, rises to 8000 feet.

## STRUCTURE.

The structure of the Rock Springs Coal Field has been worked out in detail by field parties of the U.S. Geological Survey and reports with maps have been issued. ( U.S. Geological Bulletin No. 381) These show the structure to be a great dome with a central shale area whose major axis ( north-south) is about 30 miles and minor (east-west) axis about 15 miles. About this central area are the encircling escarpments of the sandstone members of the coal-bearing Mesa Verde, dipping away in all directions at angles varying from 4 degrees on the east and south to 12 degrees on the west. The structure then is a quaquaversal, or true dome, of great size and low dips . In fact, the gently dipping rock strata probably extend to both the east and west for fifty miles in each direction, before beginning to rise toward the Rawlins Uplift to the east, and to the Meriden Anticline to the west.

Within the central shale area of the Rock Springs Uplift is a smaller dome structure



whose major axis is some six miles long in a northeast-southwest direction and whose minor axis is about two and a half miles long. The southeast limb of the dome has a dip of about 5 degrees, while the northwest dip averages about 15 degrees, while an extreme dip of 20 degrees was measured at one point. The main structure will be spoken of as the Rock Springs Uplift, while, for the inner shale structure, we will use the name, The Dry Lake Dome, after the dry lake which was mapped by the U.S.G.S. and which lies almost at the crest of the dome.

#### FAULTS.

The sandstones of the coal measures show many faults of slight throw and the workings of the mines have run into a great number, but none of any considerable throw. None of the faults noted in the sandstones can be traced for any great distance into the shale area, and it is not likely that they extend into the shale more than a few hundred feet. So far as the petroleum geology of the field is affected, the faulting need not be considered.

#### STRATIGRAPHY.

The central shale area of the Rock Springs Uplift has been mapped by the U.S.G.S. as Montana. The writer considers that the shales brought to the surface along the Dry Lake Dome are Colorado, and has so marked them on the map accompanying this report. The coal-bearing sandstone series is now known as the Mesa Verde and the shale member above as the Lewis shale. Above this is the Tertiary coal-bearing group, and above this and laid on horizontally, or nearly so, over the edges of all the above mentioned members are the Tertiary clays and conglomerates. The accompanying chart shows the geologic succession.



Geologic names used in different reports.

	Hayden 1861-1870	King, 1875 Expl 40" Parallel	Present Nomenclature.
<i>Tertiary</i>	Fort Union.	Unconformity	Fort Union (?)
			(Black Rock Laramie .Rock (Coal Measures
			Lewis
<i>Cretaceous</i>	Fox Hills	Fox Hills	Mesa Verde ( Rock 3500' ( Spring ( Coal ( Measures
	Pierre		Clay
	Niobrara	Colorado	Surface of dome shales- Mancos Slabby 5700' sandstones Shales Oil Mowry
	Benton		
Dakota	Dakota	Dakota	

## THE OIL-BEARING SHALES.

Under the dome at an undetermined depth lies the oil-bearing shale member known as the Benton member of the Colorado series in early reports, and as the lower part of the Mancos by later geologic reports. This member, its thickness, depth, number and position of the sands in it, etc., etc., can only be inferred from the nearest exposures. It does not outcrop for many miles in any direction.

To the west, the nearest point at which this series can be studied is Spring Valley; to the south, at Vernal, Utah, Rangely and points in Routt Co., Colorado. To the east one must go to the eastern side of Carbon County, but a drill hole at Rawlins has found oil, probably in the Benton. To the north the nearest exposures are in the vicinity of Lander.

Plate, page 12, has the oil springs and producing areas at these various points shown by red ink. From this it is seen that Rock Springs is near the center of the territory in which this shale series is known to be oil-bearing.







#### DEPTH.

Without going into the methods used to make the estimates (from the data available at points fifty miles to the west, south, east, and north), the following figures are given. Thickness of the series in which oil sands may be expected, about 700 feet. Depth to the top of this 700 foot series from 2000 to 2600 feet. As oil sometimes migrates to an overlying sand, even hundreds of feet above its zone of origin, it is possible that oil may be obtained in this field at less than the 2000 feet estimated.

#### COST OF OPERATION.

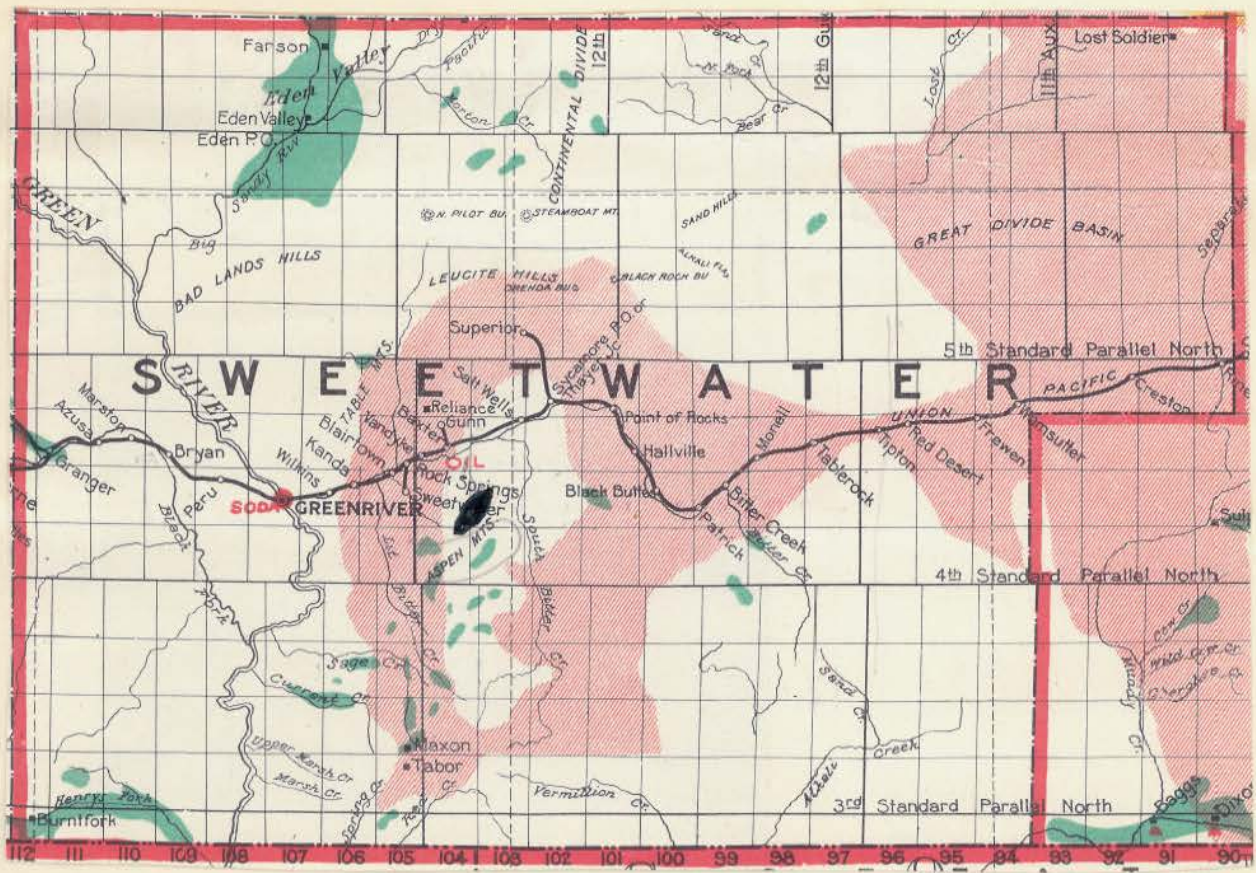
This field is ten miles over a good road from the town of Rock Springs. Coal will have to be hauled from town, water from Six Mile Springs or from a ranch about five miles southeast of Dry Lake.

Work can be carried on throughout the year. During the winter but little snow falls, but occasionally extremely low temperatures occur. The general temperature through the winter is not low. Extremely hot weather during part of the summer is expected.

The hole will be in clay, clay shale and sandy shale with very little sandstone, if any, for the







● Dome-of Colorado shales.

Red is Mesaverde Coal bearing member.

Inner white-the Montana shales.

Outside white-Tertiary



## THE DRY LAKE DOME

### INTRODUCTION

The area under consideration lies in Townships 17 and 18 N., Ranges 105 and 104 W., in Sweetwater County, Wyoming. The area is nine miles, by road, southeast from Rock Springs on the Union Pacific Railroad.

### HISTORICAL

The early surveys across the continent for the purpose of finding a practicable route for a transcontinental railway crossed this general area and recognized its geologic structure. Later the region was mapped (King 1876) and the geologic structure is shown. When the railroad was built, or soon afterward, a well was drilled near Salt Wells Station and a supply of Salt water tapped. Seepages of petroleum were reported from the eastern side of the area.

These facts together with the reports of geologists stating that the structure was ideal for petroleum accumulation, resulted in the Belgo-American Petroleum Company putting down two wells between the years 1900 and 1903. Unfortunately these wells were located near Baxter Station on the railroad where the

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The Rock Springs uplift expresses itself on the surface as a series of great sandstone escarpments surrounding a central lower area of clay soil. ( Map, P. 1.). Outside the first ring of sandstone hills is a belt of low-lying clay soil and outside of it again is a second series of high sandstone bluffs.

Bitter Creek, along whose course the Union Pacific Railroad was built, crosses the uplift from east to west, cutting canyons through the sandstone hills and causing the central clay area to drain towards one point, a wide valley known as Baxter Basin in which is located Baxter Station of the U.P.R.R.

The elevation of Bitter Creek, where it leaves the central clay or shale area, is 6200 feet, while the Dry Lake six miles to the southeast lies at 6600 feet, and Aspen Mountain, south of it about six miles, rises to 8000 feet.

## STRUCTURE.

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The highest part of the large dome shows within the central shale area of the Rock Springs Uplift as a smaller dome structure whose major axis is some six miles long in a northeast-southwest direction and whose minor axis is about two and a half miles long. The southeast limb of the



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dome has a dip of about five degrees, while the northwest dip averages about 15 degrees, while an extreme dip of 20 degrees was measured at one point. The main structure will be spoken of as the Rock Springs Uplift, while for the inner shale structure, we will use the name, The Dry Lake Dome, after the dry lake mapped by the U.S.G.S. and which lies almost on the crest of the dome.

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## STRATIGRAPHY.

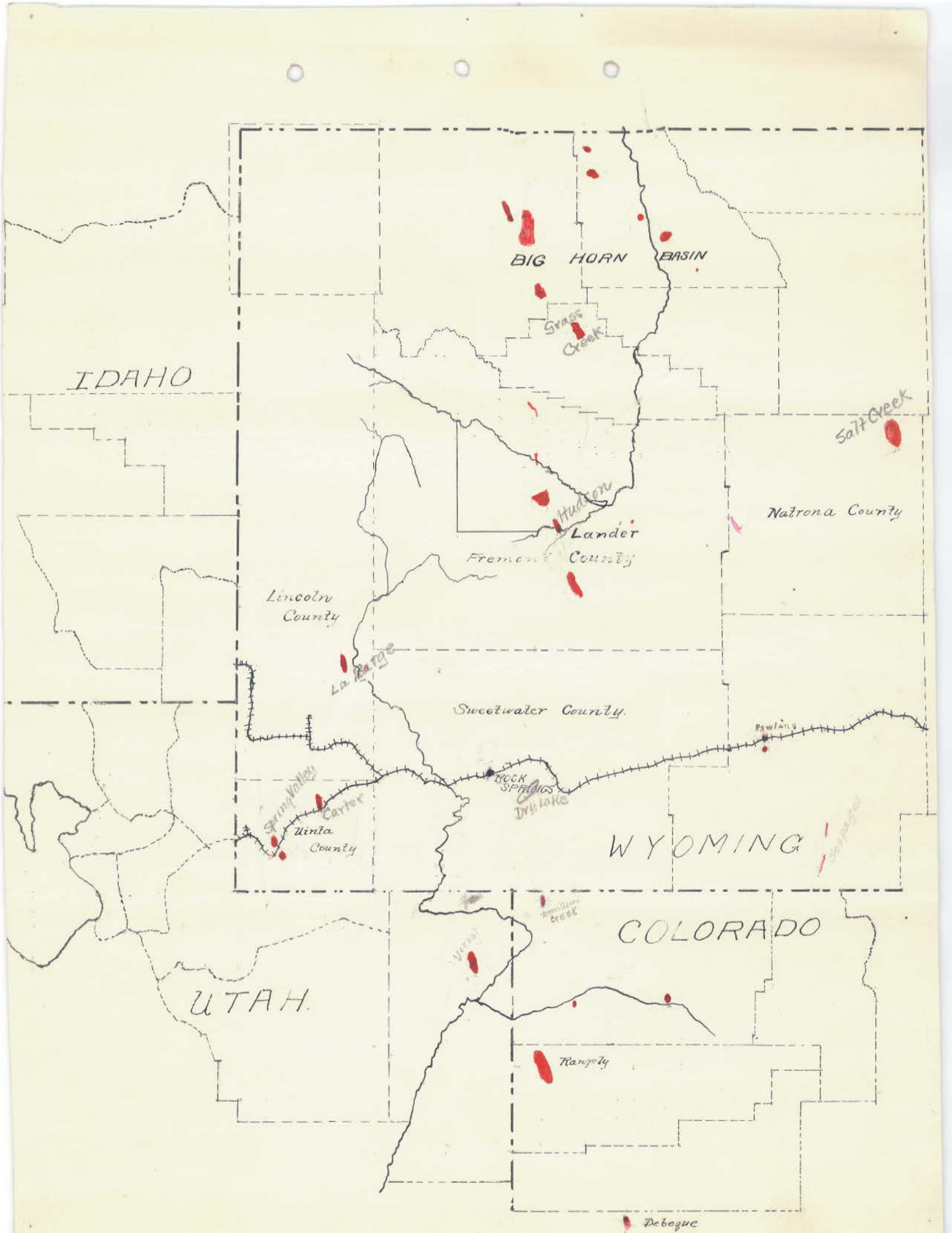
The central shale area of the Rock Springs Uplift has been mapped by the U.S.G.S. as Montana. The writer considers that the shales brought to the surface along the crest of the Dry Lake dome are Colorado, and has so marked them on the map accompanying this report. The coal-bearing sandstone series is now known as the Mesaverde and the shale member above as the Lewis shale. Above this is the Laramie coal-bearing group, and above this and laid on horizontally, or nearly so, over the beveled edges of all the above mentioned members are the Tertiary clays and conglomerates. The accompanying chart shows the geologic succession.



8.

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		Unconformity	Lewis .
<i>Cretaceous</i>		Laramie	Mesa Verde { Rock Spring Coal Measures 3500'
	Fox Hills	Fox Hills.	
	Pierre		Surface-of-dome----- Sandy shales Clay shales
	Niobrara	Colorado	Mancos 5700' slabby sandstones shales oil Mowry
	Benton		
	Dakota	Dakota	Dakota.



IDAHO

BIG HORN BASIN

Grass Creek

Hudson

Lander County

Fremont County

Lincoln County

Sweetwater County

Natrona County

La Barge

Spring Valley

Carter

Winta County

Rock Springs  
Dry Lake

Rawlins

WYOMING

COLORADO

UTAH

Verona Creek

Rangely

Debeque

Salt Creek

Salt Creek

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Under the dome, at an undetermined depth, lies the oil-bearing shale member known as the Benton member of the Colorado series in early reports, and as the lower part of the Mancos by later geologic reports. This member, its thickness, depth, number and position of sands in it, etc., etc., can only be inferred from the nearest exposures. It does not outcrop for many miles in any direction.

To the west, the nearest point at which this series can be studied is Spring Valley; to the south at Vermillion Creek, Colorado. To the east one must go to Rawlins and Granville, Carbon County. A drill hole at Rawlins has found oil probably in the Benton. A later hole tapped a gas hole in the uppermost Frontier sandstone at 3450 feet. To the north the nearest exposures are in the vicinity of Lander.

Plate p. 12 has the oil springs and producing areas at these various points shown by red ink. From this it is seen that Rock Springs is near the center of a large territory over which this shale series is known to be oil-bearing.



DEPTH.

Without going into the methods used to make the estimates (from the data available at points fifty<sup>to 100</sup> miles to the west, south, east and north) the following figures are given. Thickness of the series in which oil sands may be expected, about 700 feet. Depth to the top of this 700 foot series from 2000 to 2600 feet. As oil sometimes migrates to an overlying sand, even hundreds of feet above its zone of origin, it is possible that oil may be obtained in this field at less than the 2000 feet estimated.

*comparative*  
 For <sup>a</sup> columnar sections of  
 Hornal-Vermilion Creek - Dry Lake - <sup>(Pander)</sup> Hudson - Basin  
 and  
 Spring Valley - Dry Lake - Rawlins  
 see  
 Blueprint attached back cover this report

COST OF OPERATION.

This field is ten miles over a good road from the town of Rock Springs. Coal will have to be hauled from town, water from Six Mile Springs or from a ranch about ~~five~~<sup>four</sup> miles southeast of Dry Lake.

Work can be carried in throughout the year. During the winter but little snow falls, but occasional extremely low temperatures occur. The <sup>temperature</sup> general through the winter is not low. Extremely hot weather during part of the summer is expected.

The hole will be in clay, clay shale and sandy shale with very little sandstone, if any, for the first 2000 feet. Below this alternating sands and shales may be expected. It is not likely that the first 2000 feet will make any water, so water for drilling must be hauled or piped. A minimum of casing should be necessary, for a hole in these shales will stand open for great depth.