

*Lance Creek* 19-1  
Douglas, Wyoming,  
Lance Creek Oil Field.  
Preliminary Report.  
Enclosures.  
G.B. Morgan.

Cheyenne, Wyoming, July 28, 1919.

The Commissioner,  
General Land Office.

Approved:

Sir:

Chief of Field Division.

Referring to your letter of June 9, 1919, to Mr. C. Gordon, requesting report on the Lance Creek Oil Field, I have the honor to submit the following preliminary report on the development of the field and the status of the lands involved in regard to agricultural entries and also in regard to the holdings of the operating Companies. The Lance Creek Field is included in Petroleum Reserve No. 60, Wyoming No. 25, established by Executive Order dated October 16, 1918. Field examination was made July 17, 18 and 19, 1919.

No attempt was made in this investigation to trace the titles of the mineral claimants as this would involve an extensive research covering a considerable period of time and it is not known at this time how large the oil producing area will be nor what lands will come up for patent. For the same reasons no particular attention was paid to the bona fides of the claims and as to whether or not they are valid in the face of the

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withdrawal. Such an investigation would entail a mass of detail work that should be undertaken only after the field has been pretty well defined. It is well known that the withdrawal covers a large area of non-oil lands as well as the productive area in the heart of the field. From present indications it appears that the productive zone will probably not cover more than five or six sections and in any event it will hardly embrace more than nine sections unless other structures are discovered on the same general anticline or fold. Of the area that seems to be oil in character about sixty or seventy per cent are patented or approved State Lands. In view of the above it is therefore apparent that a great deal of needless work might be done now by going into the validity of the claims embraced in the withdrawal. Needless to say all the unpatented lands in the field were covered by mineral locations and in addition seventy five per cent of them are also embraced in unperfected homestead entries. This condition of affairs is going to give rise to a great deal of litigation on lands which prove to be valuable for oil or gas. The two plats herewith, exhibits "1" and "2" illustrate that point. Exhibit "1" is a map of the field showing the holdings of the operating companies marked out in different colors, and Exhibit "2" is likewise the same map with the status of the land office entries indicated

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by colors. This shows the patented and vacant lands, the homestead entries allowed, the homestead entries suspended and rejected; also entries where final proof has been offered.

Several prints of the field map uncolored are also forwarded for your inspection. The information thereon shows what was obtainable up to July 19, 1919. This map is self explanatory. It shows the location of all the wells drilled in the field and some which are temporarily shut down. A chart on the map contains reliable and valuable data as to depth, production, if any, and the present status of the wells. The map also shows the approximate location of the axis of the Lance Creek anticline and the approximate location of the Lance Creek dome, as indicated by the contour line drawn through Sections 25, 26, 27, 32, 33 and 36, T. 36 N., R. 65 and Sections 2, 3, 4, 5, 6, 7, 8 and 9, T. 35 N., R. 65. This contour line which indicates the dome proper probably includes all of the lands that will be found to be productive of oil or gas but it is by no means certain that the productive area will extend out as far as the contour line.

There are at this time five oil wells and three gas wells in the field. Only two oil wells are producing to any extent. Well No. 1 in the NW $\frac{1}{4}$ NW $\frac{1}{4}$ , Sec. 3, is flowing to the extent of 526 barrels per day according to the report of the week ending July 19. Well No. 1 in the NW $\frac{1}{4}$ NW $\frac{1}{4}$ , Sec. 36, T. 36, R. 65

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is flowing to the extent of 400 barrels per day, according to the same report. Well No. 2 on said Section 36 is producing intermittently. There is so much water in this well that it will not flow continually and then when it does flow the yield is comparatively small. The Ohio Oil Company has installed tubing with a packer in this well and are preparing to pump off the water to relieve the pressure so that it will flow more readily. This was being done at the time of my examination. An average daily flow of this well for the week ending July 19, was seventy two barrels. This production will probably be increased by pumping off the water. A very interesting item in connection with Wells no's. 1 and 2 on Sec. 36 is that when Well No. 2 flows the yield from Well No. 1 is lowered about the same amount. They are about 600 or 700 feet apart and the oil in Well No. 2 is believed to come from a lower sand than the one in Well No. 1. There are two productive sands separated by 18 feet of shale but the Upper Sand in Well No. 2 produces water. See the logs of the wells herein. It seems therefore that Well No. 2 is pretty close to the line of demarkation between oil and water.

Well No. 1 on the NW<sub>1</sub> Sec. 3, T. 35 N., R. 65 is the largest producer in the field. This well also blows out a lot of gas. These wells are all Ohio Oil Company wells. The gas

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well in the NW $\frac{1}{4}$ NE $\frac{1}{4}$ , Sec. 4, T. 35 N., R. 65 W., is also an Ohio well. Its capacity is rated at 20,000,000 cubic feet per day. It is now shut in. An absorption plant is being installed by the Ohio Oil Company to extract the gasoline from the gas produced in the field. Some two or two and one half gallons of gasoline from one thousand cubic feet of gas is the reported possible extraction.

The other gas wells are owned by the Buck Creek Oil Company. These wells are on Sec. 34, T. 36 R., 65 W. Well No. 1 in the SW $\frac{1}{4}$  of Sec. 34 is shut in. It has a capacity of about 20,000,000 cubic feet per day. Well No. 27 on the NW $\frac{1}{4}$  Sec. 34 is blowing out at the rate of thirty or thirty five million feet per day. This represents a loss of about \$15,000.00 worth of gasoline per day. These wells are on patented ground. It is claimed that to shut this well down would cause the gas to blow out around the casing but Mr. William Holland, Field Superintendent for the Ohio Oil Company stated to me that the hole could be mudded up so as to obviate this danger.

The Buck Creek Company oil wells No's 4 and 7 are not producing. There does not seem to be enough gas pressure in the holes to cause the oil to flow. Well No. 7 in the SE $\frac{1}{4}$ SE $\frac{1}{4}$ , Sec. 26, T. 36 N., R. 65 W., and No. 7 is in the SE $\frac{1}{4}$ NE $\frac{1}{4}$ , Sec. 35. They can be made pumpers as there is a column of oil in each hole about 3300 feet high. Well No. 37 flowed for thirty five minutes after

it was brought in but has not flowed since.

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Several drilling wells are near the sand and it will not be a great while until some idea can be formed as to the approximate extent of the same.

Well No. 5 in Sec. 36, T. 36 N., R. 65 W. should be in the sand by this time. Well No. 1, Sec. 37, T. 36<sup>35</sup>, is also nearing the sand and likewise are several wells in Sec. 30 and 31, T. 36 N., R. 64. The Texas Company is drilling a well in the NE<sup>4</sup><sub>4</sub>, Sec. 25, T. 36, R. 65, which is now 3950 feet deep. This well should be brought in shortly. It will probably define the northeastern limits of the producing area. Following are the logs of the completed wells drilled by the Ohio Oil Company:

Record of Well No. 1, NW<sup>1</sup><sub>4</sub> Sec. 36, 36-65, Niobrara County, Wyoming, Lance Creek Field. Drilling commenced September 27, 1917, and was completed October 2, 1918. Drilled with Standard Rig.

<u>Formation.</u>	<u>From Depth of</u>	<u>To Depth of</u>
Muddy Shale	0	6
Hard Sand Rock	6	25
Sand Rock	25	80
Shale and soft sand	80	105
Hard Rock	105	130
Hard shale and sand rock	130	145
Shale and mud	145	165
Muddy Shale	165	185
Gumbo Shale	185	225
Gray Shale	225	255
Shale	255	330
Tough Gray Shale	330	350
Shale	350	2070

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<u>Formation</u>	<u>From Depth of</u>	<u>To Depth of</u>
Showing of Gas	2070	
Gray shale and shells	2070	2105
Hard shells	2105	2115
Shale	2115	2290
Gray Shale	2290	2330
White Slate <i>Mohica</i>	2330	2350
Shale	2350	2425
Shale with shells	2425	2440
Gas	2425	
Sandy shale	2440	2505
Hard shell	2505	2507
Sandy Shale	2507	2565
Gray sandy shale	2565	2580
Broken sand	2580	2630
Oil sand (stray)	2615	
Sandy Shale	2630	2660
Shale	2660	2689
Oil Sand	2689	2701
Shale	2701	2720
Sandy Shale	2720	2730
Shale	2730	2808
Soft Shale	2808	2986
Shale (Color changeable)	2986	3076
Soft black shale	3076	3206
Shale	3206	3233
Hard shell	3233	3250
Shale	3250	3333
Dark Lime	3333	3460
Shale	3460	3657
Hard Shell	3657	3663
Oil Sand	3663	3665

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Pipe Record.

15½ ----- 39 Feet  
 12½ ----- 805 Feet  
 10 ----- 1643 Feet  
 8½ ----- 2148 Feet  
 6 5-8 ----- 3660 Feet  
 8½ Pulled. ---- 456 Feet.

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Record of Well No. 1, NW Corner SW $\frac{1}{4}$ NE $\frac{1}{4}$ , Sec. 33, T. 36 N., R. 64 W., Niobrara County, Wyoming-Lance Creek Field. Lease operated by The Ohio Oil Company, Tom Bell patented land.

Drilled with Standard Rig.  
Drilling commenced May 13th, 1918.  
Drilling completed May 17th, 1919.  
Sand was water bearing.

<u>Formation.</u>	<u>From depth of</u>	<u>To depth of</u>
Blue Shale	0	500
Sand, very hard	500	510
Blue Shale, very cavey	510	600
Grey Sandy Shale	600	610
Broken Shale and Sand with water about 10 bbls. per 24 hrs.	610	620
Grey Shale with grit	620	700
Blue Shale	700	730
Blue Sandy Shale with streaks of Grit	730	1000
Dark Shale, caving bad	1000	1025
Grey Sandy Shale	1025	1175
Brown Sandy Shale with thin Limestone Shells, very cavey in places	1175	1440
Sandy Grey Shale	1440	1660
Broken Brown Shale. Carried gas enough to raise water and mud 50 feet over tools while drilling	1660	1670
Grey Sandy Shale, very Hard and Sandy in places	1670	2040
Brown Shale	2040	2170
Brown Shale, Very cavey, traces of oil	2170	2200
Brown Shale, Dark, Soft and very cavey in places	2200	2490
Black Shale, Very Black	2490	2520
Brown Hard Sandy Shale, 70 per cent lime	2520	2635
Grey Shale with Grit	2635	2740
Hard Shell	2740	2742
Brown Shale	2742	2840
Light Brown Shale	2840	2930
Black Granulated Shale	2930	2966
Hard, Cavey Gritty Brown Shale	2966	3010
Grey, Sandy Shale, Hard	3010	3090

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FormationFrom depth ofTo depth of

Hard White Sand, supposed to be 1st wall creek	3090	3140
Broken Sandy Formation	3140	3175
Small amount of Salt Water in this Sand and broken formation at 3145.		
Brown Shale, Soft,	3175	3330
Brown Shale, Soft, and with shells	3330	3350
Brown Shale, Soft and cavey	3350	3400
Brown Shale, Soft and Muddy	3400	3410
Brown Shale, Soft and cavey	3410	3500
Brown Shale, very Cavey	3500	3505
White Hard Lime Shells	3505	3510
Brown Shale, Soft and Cavey	3510	3530
Brown Shale, Cavey and Hard with Shells	3530	3550
Hard Grey Cavey Sandy Shale	3575	3620
Soft Brown Shale	3620	3636
Hard Black Granite Shale with shells	3636	3650
This shale was hard and granulated, very cavey with thick streaks of shell,		
Black Hard Cavey Shale	3650	3720
Broken Lime with Bentonite, White and hard	3720	3750
Black Hard Shale with Shells	3750	3820
Black Hard Shale	3820	3840
Black Medium Shale	3840	3851
Black Shale	3851	3980
Black Hard Shale	3980	4051
Grey Shale, Hard	4051	4055
Black Shale	4055	4110
Black Shale with Shell	4110	4130
Black Shale	4130	4138
Sand bearing water (drilled 4 ft in)	4138	4142

Total depth of well 4142 feet  
Top of Water bearing Sand 4138 feet.

## Record of Pipe:

15½ in. Pipe	20 ft.
12½ " "	652 ft.
10 " "	1676 " in.
8½ " "	2535 "
6½ " "	
5 3-16"	4134 "

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Record of Well No. 1, NW $\frac{1}{4}$ NE $\frac{1}{4}$ , Sec. 4, 35-65. Niobrara County  
Wyoming, Lance Creek Field. Drilled with Standard Rig,  
commenced May 16, 1918, and completed October 4, 1918. Gas  
sand struck October 2, 1918.

	10 Feet.		20 Feet.
Cellar	10 "	to	45 "
Gumbo	20 "	"	790 "
Sand Stone	45 "	"	793 "
Shale	790 "	"	1780 "
Shells	793 "	"	1835 "
Shale	1780 "	"	2230 "
Shells	1835 "	"	2295 "
Hard Grey Shale	2230 "	"	2410 "
Sand and Shells	2295 "	"	2658 "
Grey Shale	2410 "	"	2701 "
Dark Shale	2658 "	"	2905 "
Dark Cavy Shale	2701 "	"	2950 "
Dark Shale	2905 "	"	3095 "
Dark Cavy Shale	2950 "	"	3100 "
Dark Shale	3095 "	"	3215 "
Hard Shell	3100 "	"	3300 "
Dark Sandy Shale	3215 "	"	3405 "
Brown Shale	3300 "	"	3418 "
Dark Sandy Shale	3405 "	"	3450 "
Gas Sand (Gas)	3418 "	"	
Shale			

RECORD OF PIPE

15 $\frac{1}{2}$ ' ----- 38 Feet.  
10' ----- 1280 Feet  
6 5-8 ----- 3405 Feet.



RECORD OF WELL No. 1. NW $\frac{1}{4}$ NW $\frac{1}{4}$ , Sec. 3, T. 35, R. 65.

LEASE OHIO Oil Co.

BASIS: OHIO OIL CO. 1-3. )  
 BUCK CREEK OIL CO. 1-3. )  
 WYO.-Mont. Dev. Co. -1-3.)

STANDARD RIG- DRILLING COMMENCED JAN. 11, 1919, 2 P.M.

PRODUCTION APR. 11, 1919.

Cellar	10 ft.		15 feet
Sand and gravel with water	10 "	-	40 "
Dary Gray Shale	15 "		540 "
Shale	40 "		775 "
Shale Caving slightly	540 "		785 "
" " badly	775 "		1045 "
"	785 "		1270 "
" Caving	1045 "		1345 "
" Muddy	1270 "		1455 "
"	1345 "		1545 "
" Caving	1455 "		1820 "
" (hard Shell 1588-1590)	1545 "		2045 "
" hard	1820 "		2165 "
" Gray	2045 "		2375 "
" Gray sandy	2165 "		2405 "
Broken sandy formation	2375 "		2440 "
Shale smooth	2405 "		2455 "
" sandy	2440 "		2490 "
" smooth	2455 "		2495 "
" caving	2490 "		2535 "
" Hard	2495 "		2545 "
" Soft	2535 "		2625 "
" with hard shells	2545 "		2650 "
" hard	2625 "		2790 "
" "	2650 "		2900 "
" "	2790 "		2920 "
" with cave	2900 "		3130 "
" caving	2920 "		3160 "
" with hard shells	3130 "		



Shale caving	3160	3260
" Dark	3260	3265
" Sandy	3265	3290
" Dark	3290	3300
" Caving	3300	3425
Hard shell and sand with gas		3427
gas in top of sand	3425	3452
sand showing gas, some oil	3427	3465
Shale	3452	3467
Sand producing oil	3465	3473
Drilled sand deeper		
Apr. 19 showing more gas		

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Pipe - 20" casing	19'	
15 1/2" "	111' 9"	
12 1/2" "	881' 3"	
10" "	1787' 8"	
8" "	2566'	
6 5/8" "	3418'	

Water - 1st 6 5/8" showed water.

Estimated production first 24 hours 1500 bbl.

Initial production 180 bbl. Flow diminished by water pressure, until it is now practically ceased flowing against 800' column of water. Tubing is being installed to pump off water and allow flow to resume.

LOG OF WELL NO. 2. NW 1/4 NW 2, Sec. 36, T. 36 R. 65.

Well No. 5, Sec. 36, T. 36, R. 65 is down to 3418'.

Spudded in Feb. 17, 1919.

Feb. 18, shale	75	95
" "	95	2140
Sandy "	2140	2280
Dark "	2280	2725
" sandy shale	2725	2745
" " "	2745	2765
" " "	2765	2805
" " "	2805	2840
Sandy shale with showing of oil and gas	2840	2860
Sandy shale	2860	2885

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There are two water wells in the District. The Ohio Company well is in Section 33, T. 36, R. 64. This well has been abandoned. The other well was drilled by the Western States Oil & Land Company in the SW $\frac{1}{4}$ SE $\frac{1}{4}$ , of Sec. 3, T. 35, R. 65. This Company is attempting to shut off the water so as to drill deeper in this well.

An examination of the map Exhibit "1" will disclose the fact that the best portions of the Lance Creek structure are held by the Ohio Oil Company and the Buck Creek Oil Company. The Midwest Refining Company and Western States Oil & Land Company have small holdings in the structure proper but they may not be oil producing. However, it is not my purpose to render an opinion on the extent of the oil and gas zone or to lead you to the belief that oil may not be found outside the indicated structure. There may be other and minor cross folds on the eastern extension of the anticline, which will be found to be productive but development so far indicates a comparatively small producing area.

There is very little to be said concerning the geology of the field, considerably more than half the structure is covered by Tertiary beds of sand and clay and it has been very difficult to trace out the structure, especially in the southern portion thereof. On the surface, which is not covered by Tertiary deposits, the Fox Hills Sandstone and Pierre shale outcrop. The Fox Hills

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formation form an escarpment to the north and west of the field. This formation is dipping from 20° to 30° to the west and north. Following is a columnar section of the stratified rocks beginning at the surface and ending in the oil sand. This is a generalized section obtained from the logs of the different wells:

Shale 0 to 25'.  
Shannon Sand 25' to 80'.  
Pierre Shale 80' to 2070' (Gas sand 5').  
Pierre Shale 2075 to 2330'.  
White Slate Niobrara 2330' to 2350'.  
Shale 250' to 2425'.  
Gas Sand 2425' to 2430'.  
Shale 2430 to 2575'.  
Wall Creek Sand 2575' to 2684' (trace of oil at 2615').  
Greenhorn Limestone 2684' to 2700'.  
Benton Shale 2700' to 3662'.  
First oil sand 3662 to 3680'.  
Shale 3680' to 3698'.  
Second oil sand 3700'.  
} ~~Chloride~~  
} Gramercy.

Insofar as a real discovery of oil or gas is concerned only two were made prior to the date of withdrawal. Two wells were brought in by the Ohio Oil Company October 2, 1918. One is Well No. 1 on Sec. 36, T. 36, R. 65. The other is Well No. 1 on NW $\frac{1}{4}$ NE $\frac{1}{4}$  of Sec. 4, T. 35, R. 65. The latter is a gas well. The oil well is on a school section and the gas well is on a placer mining claim. The oil well on Section 3, T. 35, R. 65 was spudded in on January 11, 1919 and completed April 11, 1919. Well No. 2 on Section 36 was spudded in on February 17, 1919 and completed in June 1919. The Buck Creek wells were brought in

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subsequent to the date of withdrawal. I understand that no wells were being drilled in this field when the Ohio Oil Company brought in their first wells on October 2, 1918, but that between October 2, and October 16, (date of withdrawal) practically every mineral location in the field was occupied by the lessee thereof and a drilling rig erected thereon. I made several inquiries into this matter but did not go into it extensively for the reasons before stated; that the acreage involved in the area may be many times larger than the area found to be oil or gas land and there was no good reason for making an extensive investigation of his lot of claims that will never come up for patent. The claimants are depending upon occupancy of the land and work leading to discovery to hold their land as against the withdrawal. It is evident that they are relying on Judge Riner's Grass Creek Decision as approved by the U. S. Court of Appeals, in these cases in that they showed due diligence in the pursuit of work leading to discovery prior to and at the time of withdrawal. On a great number of the claims, especially the outside ones, no work has been done except the erection of a standard derrick. These claim holders are waiting for the field to develop to such an extent as to prove their territory. Between the date of the first discovery of oil October 2, and the date of withdrawal, thousands of tons of <sup>mineral</sup> and equipment were hauled to this field by the

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Ohio Oil Company and other Companies and placed upon the different mineral locations, and from that time on the work of development has proceeded as fast as practicable. I think there is no question that every parcel of unpatented public land was in this way protected against the withdrawal by the lessees. Whether or not this action completely protects the operating companies from the force and effect of the withdrawal is not for me to say.

RECOMMENDATION.

In view of the above, I recommend either one of the following courses of action. If in your mind the Act of preparing material and equipment on a claim does not constitute due diligence and pursuit of work leading to discovery, I recommend that further investigation be made as early as possible in regard to those claims which are apparently in the heart of the field and will probably be oil or gas producing. If, on the other hand, such Act does constitute diligent pursuit of work leading to discovery and would hold the claims in spite of the withdrawal, I recommend that no further investigation be made until the said claims come up for patent. In this matter unnecessary work will be practically eliminated.

Very respectfully,

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Mineral Examiner C.L.O.



Dark shale	2885	3015	
Sandy "	3015	3085	
Dark "	3085	3195	
Gray "	3195	3225	
Dark Gray shale	3225	3510	
Sandy gray "	3510	3575	
Black lime	3575	3595	
Shale	3595	3635	
Black sand	3635	3650	
Dark shale	3650	3695	
Sand and shale	3695	3702	
Sand	3702	3720	1st sand
Shale	3720	3725	
Black shale	3725	3730	
" "	3730	3738	
Sand	3738	3738	2nd sand

Note:- 1st Sand showed oil and water.

2nd " " oil and heavy gas.

Initial production 180 bbl. Flow diminished by water pressure, until it is now practically ceased flowing against 800' column of water. Tubing is being installed to pump off water and allow flow to resume.

Note: Well No. 5, Sec. 36, T. 36, R. 65 is down to 3610'.

(Cap rock hard shale and shell) 3578 3581

Soft black shale 3581- 3610 oil showings. Should get first sand at about 3630 -3640.

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