

April 8, 1950

Deep Rock Oil Corporation
Tulsa, Oklahoma

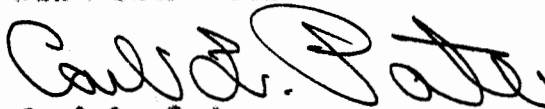
Attention: Mr. T. F. Lawry

Gentlemen:

Enclosed herewith is the report of the analysis made on the 2 1/2 inch rotary core taken from the Harris #1 Lease, Core Test Well No. 1, Crawford County, Kansas, and submitted to our laboratory on March 31, 1950.

Very truly yours,

OIL FIELD RESEARCH LABORATORIES


Carl L. Pate

CLP:cc

c.c. to Mr. Neil Henderson

DEEP ROCK OIL CORPORATION

CORE ANALYSIS REPORT

HARRIS NO. 1 LEASE CORE TESTS WELL NO. 1

CHARTER COUNTY, KANSAS

OIL FIELD RESEARCH LABORATORIES

CHANDLER, KANSAS

APRIL 8, 1950

Oil Field Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Deep Rock Oil Corporation Lease Harris #1 Core Test 1 Well No. 1

Location 400' south of north line, 320' east of west line. NE 1/4

Section 34 Twp. 28S Rge. 22E County Crawford State Kansas

Name of Sand	Bartlesville
Top of Core	375.97
Bottom of Core	406.40
Top of Sand	395.55
Bottom of Sand	403.00
Total Feet of Permeable Sand	6.85

Distribution of Permeable Sand:

Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 2	1.95	1.95
2 - 4	0.75	2.70
4 - 8	1.65	4.35
8 - 10	1.95	6.30
10 & above	0.55	6.85

Average Permeability, Millidarcys	5.76
Average Percent Porosity	15.09
Average Percent Oil Saturation	42.67
Average Percent Water Saturation	35.72
Average Oil Content, Bbls./A. Ft.	500.
Total Oil Content, Bbls./Acre	4,327.
Average Percent Oil Recovery by Laboratory Flooding Tests	7.36
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	39.
Aotal Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	357.
Total Calculated Oil Recovery, Bbls./Acre	900.

Packer Setting, Feet

Viscosity, Centipoises @

A. P. I. Gravity, degrees @ 60 °F

Note: The above averages are for that part of the sand section extending from the packer setting to the top of the cement plug. **396.00**

Fresh water was used as a circulating fluid in the coring of the sand in this well. We were advised that this well was drilled in virgin territory.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
375.97 - 379.88	- Gray calcareous sandy shale.
379.88 - 380.75	- Gray shale.
380.75 - 381.97	- Laminated sandy shale.
381.97 - 391.65	- Gray shale.
391.65 - 392.65	- Coal.
392.65 - 395.05	- Gray shale.
395.05 - 395.55	- Laminated sandstone and shale.
395.55 - 396.95	- Brown fine grained slightly laminated micaceous carbonaceous sandstone.
396.95 - 399.40	- Brown fine grained micaceous slightly carbonaceous sandstone.
399.40 - 399.75	- Brown fine grained finely laminated micaceous sandstone.
399.75 - 401.45	- Brown fine grained micaceous sandstone.
401.45 - 402.25	- Hard brownish gray fine grained slightly laminated micaceous calcareous sandstone.
402.25 - 402.85	- Hard brown fine grained micaceous calcareous sandstone.
402.85 - 403.00	- Sandstone (discarded at well).
403.00 - 403.60	- Hard brown fine grained micaceous calcareous sandstone.
403.60 - 403.80	- Brown fine grained micaceous shaley sandstone.
403.80 - 404.20	- Brown fine grained micaceous carbonaceous sandstone.
404.20 - 404.60	- Brown fine grained laminated micaceous sandstone.
404.60 - 405.00	- Brown fine grained micaceous carbonaceous sandstone.
405.00 - 405.22	- Gray shale.
405.22 - 406.40	- Gray shale (discarded at well).

Coring was started at a depth of 375.97 feet in calcareous sandy shale and completed at 406.40 feet in gray shale. This core shows a total of 7.30 feet of sandstone. For the most part, the sand body is made up of fine grained micaceous carbonaceous sandstone.

PERMEABILITY

For the sake of distribution, the core was divided into two sections. The weighted average permeability of the upper and lower sections are 6.72 and 4.07 millidarcys respectively; while that of the pay sand or that part of the sand section extending from the packer setting to the top of the cement plug is 4.76 millidarcys (See Table II). The above data shows that the sand is very tight especially for its depth.

PERCENT SATURATION & OIL CONTENT

The pay sand in this core has a good weighted average percent oil saturation, namely, 42.67. The weighted average percent oil saturation of the upper and lower sections are 41.17 and 43.07 respectively. The weighted average percent water saturation of the upper and lower sections are 37.58 and 37.03 respectively; while that of the pay sand is 36.72 percent (See Table IV). This gives an overall weighted average total fluid saturation of 79.39 percent. This comparatively low total fluid saturation indicates that an appreciable amount of fluid was lost during coring which was probably oil.

In an effort, to get some idea of the degree of flushing of the sand during coring, all of the saturation samples were analyzed for chloride content. The results of these tests are given in Tables VII and VIII. By observing the data given in these tables and on the coregraph, it is evident that a small amount of flushing of the sand did occur during coring.

The weighted average oil content of the upper and lower sections are 843 and 464 barrels per acre foot respectively; while that of the pay sand is 500. The total oil content, as shown by this core, is 4,527 barrels per acre of which 4,327 barrels are in the pay sand section (See Table IV).

LABORATORY FLOODING TESTS

The sand in this core did not respond very well to laboratory flooding tests as a total recovery of only 337 barrels per acre was obtained from 3.40 feet of sand. The weighted average percent oil saturation was reduced from 41.29 to 33.73, or represents an average recovery of 7.56 percent. The weighted average effective permeability of the samples is 0.174 millidarcys while the average initial fluid production pressure is 36 pounds per square inch (See Table VII). From the above data, it is noticeable that the sand samples after flooding have a comparatively high residual oil saturation and that the sand is very tight.

From the data given in Table V, you will note that of the 10 samples tested, only 4 produced oil and 5 took water. This would indicate that only part of the sand section is floodable. Furthermore, high pressures were required in order to force the sand to take water.

CONCLUSION

From a study of the above data, we believe that an efficient water flood within the vicinity of this well will recover approximately 900 barrels of oil per acre provided the sand will take water satisfactorily. In calculating this recovery, it was assumed that the true water saturation of the sand is 36 percent and that the well was drilled in virgin territory.

The principle drawback of the sand in this core is the fact that it is very tight and contains a rather viscous oil. Furthermore, the core contains only approximately 3.40 feet of floodable sand.

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SHOT RECOMMENDATION

Company Deep Rock Oil Corporation Lease Harrie #1 Core Test Well No. 1

Depth Interval, Feet	Feet of Sand	Size of Shell Inches	Qts./Ft.	Total Quarts
400.0 - 404.0	4	4 1/2	3.1	12.4

Recommended Packer Setting - 396.0 feet
Note: Plug hole back to 405.0 feet

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RESULTS OF PERMEABILITY TESTS
TABLE I

Company Deep Rock Oil Corporation Lease Harris #1 Core Test Well No. 1

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
1	395.70	1.0	0.65	0.65	0.65
2	396.55	3.3	0.75	1.40	2.45
3	397.00	5.0	0.45	1.85	3.60
4	397.65	9.7	0.35	2.20	3.40
5	397.90	11.	0.55	2.75	6.05
6	398.65	7.1	0.45	3.20	3.20
7	398.85	10.	0.65	3.85	6.50
8	399.45	Imp.	0.35	4.20	0.00
9	399.80	6.2	0.45	4.65	2.79
10	400.55	9.5	0.50	5.15	4.75
11	400.82	5.4	0.75	5.90	4.05
12	401.50	1.8	0.20	6.10	0.36
13	401.75	Imp.	0.20	6.30	0.00
14	401.92	Imp.	0.40	6.70	0.00
15	402.55	1.4	0.40	7.10	0.56
16	402.75	1.4	0.20	7.30	0.28
17	403.55	0.58	0.75	8.05	0.44
18	403.70	Imp.	0.20	8.25	0.00
19	404.25	0.40	0.20	8.45	0.80
20	404.50	Imp.	0.20	8.65	0.00

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SUMMARY OF PERMEABILITY TESTS

TABLE II

Company	Deep Rock Oil Corporation	Lease	Harris #1	Core Test Well No. 1
Depth Interval Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity, Ft. x Md.	
395.55 - 399.40	3.85	6.72	25.88	
399.75 - 403.00	3.45	4.07	14.03	
396.00 - 405.00	6.85	5.76	39.46	

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RESULTS OF SATURATION TESTS

TABLE III

Company Deep Rock Oil Corporation Lease Harris Core Test 1 Well No. 1

Sat. No.	Depth, Feet	Effective Porosity Percent	Percent Saturation			Oil Content Bbls./A. Ft.	Feet of Core		Total Oil Content Bbls./Acre
			Oil	Water	Total		Ft.	Cum. Ft.	
1	385.95	16.6	34.2	47.3	81.5	446	1.40	1.40	624
2	397.45	18.1	42.7	29.9	72.6	399	0.80	2.20	473
3	398.15	17.1	44.8	31.0	75.8	395	1.00	3.20	395
4	399.30	16.0	48.7	35.3	85.0	604	0.65	3.85	393
5	400.04	14.4	38.8	37.5	76.3	433	0.95	4.80	411
6	401.26	16.4	49.3	32.7	82.0	628	0.75	5.55	471
7	402.11	6.8	42.6	43.7	86.3	335	0.80	6.35	188
F-7	402.38	13.5	42.6	-	-	447	0.60	6.95	268
8	403.37	13.9	46.7	41.8	88.5	503	0.75	7.70	377
9	404.10	16.8	41.1	31.1	72.2	535	1.00	8.70	535
10	404.90	14.5	41.3	32.4	73.7	465	0.40	9.10	186
							Total	Total	4,527

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SUMMARY OF SATURATION TESTS

TABLE IV

Company	Deep Rock Oil Corporation	Lease	Harris #1	Core Test Well No. 1		
Depth Interval, Feet	Feet of Core Analyzed	Average Percent Porosity	Average Percent Oil Saturation	Average Water Saturation	Average Oil Content Bbls./A. Ft.	Total Oil Content Bbls./Acre
395.55-399.40	3.85	17.01	41.17	37.58	543	2,091
399.75-403.00	5.25	13.81	43.07	37.03	464	2,436
396.00-403.00	8.65	15.09	42.67	36.72	500	4,327

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SUMMARY OF LABORATORY FLOODING TESTS

TABLE VI

Company	Deep Rock Oil Corporation	Lease	Harris #1	Core Test	Well No. 1
Depth Interval, Feet		396.00 - 399.40			
Feet of Core Analyzed		3.45			
Average Percent Porosity		16.79			
Average Percent Original Oil Saturation		41.29			
Average Percent Oil Recovery		7.56			
Average Percent Residual Oil Saturation		33.73			
Average Percent Residual Water Saturation		61.71			
Average Percent Total Residual Fluid Saturation		95.44			
Average Original Oil Content, Bbls./A. Ft.		535.			
Average Oil Recovery, Bbls./A. Ft.		99.			
Average Residual Oil Content, Bbls./A. Ft.		436.			
Total Original Oil Content, Bbls./Acre		1,618.			
Total Oil Recovery, Bbls./Acre		337.			
Total Residual Oil Content, Bbls./Acre		1,481.			
Average Effective Permeability, Millidarcys		0.174			
Average Initial Fluid Production Pressure, p.s.i.		35.0			

NOTE: Only those samples which recovered oil were used in calculating the above averages.

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RESULTS OF WATER DIFFERENTIATION TESTS
TABLE VII

Company Deep Rock Oil Corporation Lease Harrie #1 Core Test 1
 Well No.

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Percent Water Saturation		Total
			Connate	Drilling & Foreign	
1	395.98	11,980			
2	397.48	12,975			
3	398.15	14,800			
4	399.30	12,440			
5	400.04	12,130			
6	401.26	14,790			
7	402.11	20,300			
8	403.37	12,775			
9	404.10	15,750			
10	404.90	13,950			
Note: ppm - parts per million					

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SUMMARY OF WATER DIFFERENTIATION TESTS

TABLE VIII

Company	Deep Rock Oil Corporation	Lease	Harris #1	Core Test	1
				Well No.	
Depth Interval, Feet	Chloride Content of Brine in Sand, ppm	Average Percent Connate Water	Average Percent Drilling & Foreign Water		
395.55 - 399.40	12,979				
399.75 - 405.00	15,213				
396.00 - 403.00	14,387				

Note: ppm - parts per million