April 10, 1950

Deep Rock Oil Corporation
Atlas Life Building
Tulsa, Oklahoma

Attention: Mr. T. F. Lavry

Gentlemen:

Enclosed herewith is the report of the analysis made on the 2½" Rotary core taken from the McDowell No. 2 Lease, Core Test No. 2, Crawford County, Kansas, and submitted to our laboratory on April 3, 1950.

Very truly yours,

OIL FIELD RESEARCH LABORATORIES

Carl L. Pate

Carl L. Pate

CLP:bb
c.c. to Mr. Neil Henderson

DEEP ROCK OIL CORPORATION

CORE ANALYSIS REPORT

McDOWELL #2 LEASE CORE TEST WELL NO. 2

CRAWFORD COUNTY, KANSAS

OIL FIELD RESEARCH LABORATORIES

GRANITE, KANSAS

APRIL 10, 1950

Oil Field Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Deep Rock Oil Corporation Lease McDowell #2 Core Test 2 Well No. 2

Location 625' W. of E. line, 495' S of N. Line, NE¼

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

Name of Sand	Peru
Top of Core	125.00
Bottom of Core	149.70
Top of Pay Sand	134.46
Bottom of Sand	141.05
Total Feet of Permeable Sand	6.74

Distribution of Permeable Sand:

Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 4	1.36	1.36
4 - 8	2.78	4.14
8 - 16	0.30	4.44
16 - 24	0.90	5.34
24 & above	1.40	6.74

Average Permeability, Millidarcys	11.78
Average Percent Porosity	17.00
Average Percent Oil Saturation	22.86
Average Percent Water Saturation	61.72
Average Oil Content, Bbls./A. Ft.	295.
Total Oil Content, Bbls./Acre	2,097.
Average Percent Oil Recovery by Laboratory Flooding Tests	3.03
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	43.
Aotal Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	144.
Total Calculated Oil Recovery, Bbls./Acre	600.
Packer Setting, Feet	-
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	

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:

Depth Interval, Feet	Description
125.00 - 126.45	Gray laminated sandstone and shale.
126.45 - 126.55	Gray laminated carbonaceous shale.
126.55 - 128.70	Gray shale.
128.70 - 129.10	Gray sandy shale.
129.10 - 131.65	Laminated sandy shale.
131.65 - 132.00	Hard gray fine grained slightly laminated micaceous sandstone.
132.00 - 132.20	Laminated sandstone and shale.
132.20 - 132.45	Hard gray fine grained laminated micaceous sandstone.
132.45 - 133.32	Laminated sandstone and shale.
133.32 - 133.46	Laminated shale and sandstone.
133.46 - 134.25	Hard brownish gray fine grained micaceous calcareous sandstone.
134.25 - 134.48	Laminated sandstone and shale.
134.48 - 135.80	Light brown fine grained micaceous slightly shaley sandstone.
135.80 - 137.65	Light brown fine grained micaceous sandstone.
137.65 - 137.85	Light brown fine grained micaceous slightly calcareous sandstone.
137.85 - 138.61	Light brown fine grained laminated micaceous carbonaceous sandstone.
138.61 - 138.85	Gray finely laminated micaceous carbonaceous sandstone.
138.85 - 139.55	Light brown fine grained slightly laminated micaceous carbonaceous sandstone.

139.55 - 140.30 - Light brown fine grained micaceous slightly shaley sandstone.

140.30 - 140.43 - Light brown fine grained micaceous slightly shaley calcareous sandstone.

140.43 - 140.65 - Light brown fine grained micaceous shaley sandstone.

140.65 - 140.88 - Light brown fine grained micaceous calcareous sandstone.

140.88 - 141.05 - Light brown fine grained micaceous shaley sandstone.

141.05 - 141.75 - Sandstone and shale.

141.75 - 142.40 - Coal.

142.40 - 143.90 - Gray shale.

143.90 - 149.70 - Black shale (discarded at well).

Coring was started at a depth of 125.00 feet in laminated sandstone and shale and completed at 149.70 feet in dark shale. This core shows a total of 7.34 feet of sandstone. For the most part, the sand body is made up of fine grained micaceous sandstone.

PERMEABILITY

The sand in this core is tight; having an overall weighted average permeability of 11.78 millidarcys (See Table II). By observing the data given on the coregraph, you will note that the sand also has a very irregular permeability profile.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a low weighted average percent oil saturation, namely, 22.25. The weighted average percent water saturation is 61.72 (See Table IV). This gives an overall weighted average total fluid saturation of 83.97 percent.

In order 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 some flushing of the sand did occur during coring.

The overall weighted average oil content is 293 barrels per acre foot while the total oil content, as shown by this core, is 2,097 barrels per acre (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 144 barrels per acre was obtained from 3.37 feet of sand. The weighted average percent oil saturation was reduced from 23.36 to 20.33, or represents an average recovery of 3.03 percent. The weighted average effective permeability of the samples is 4.42 millidarcys while the average initial fluid production pressure is 16.7 pounds per square inch (See Table VI). The above data shows that the sand flooded down to a low residual oil saturation.

From the data given in Table V, you will note that of the 7 samples tested, 3 produced oil and all took water. However, for the most part, comparatively high pressures were required to force the sand to take water. The tests show that only 3.37 feet of the sand tested produced oil.

CONCLUSION

On the basis of the above data, we believe that an efficient water flood within the vicinity of this well will recover approximately 600 barrels of oil per acre provided the sand will take water satisfactorily. In calculating this recovery, an allowance was made for oil lost during coring and it was assumed that the true water saturation of the sand is 50 percent and that the well was drilled in virgin territory.

From the data given in this report, it is evident that the sand in this core is badly flushed as the sand has a high water saturation to be a virgin well. Inasmuch as the sand flooded down to a low percent residual oil saturation, we believe that this sand contains a less viscous oil than that found in the Bartlesville sand in this area. There is a possibility that the sand, in the area where this well was drilled, naturally carries a high water saturation and likewise, a comparatively low oil saturation. The principle drawback of this core is the fact that it contains very little floodable sand and, for the most part, the sand is very tight.

Oil Field Research Laboratories

RESULTS OF PERMEABILITY TESTS

TABLE I

Company Deep Rock Oil Corporation Lease McDowell #2 Core Test Well No. 2

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
1	133.89	2.8	0.77	0.77	2.16
2	134.60	5.5	0.27	1.04	1.49
3	134.95	16.	0.45	1.49	7.20
4	135.36	4.5	0.60	2.09	2.70
5	135.65	17.	0.30	2.39	5.10
6	136.25	47.	0.30	2.69	14.10
7	136.52	25.	0.30	2.99	7.50
8	136.83	27.	0.25	3.24	6.75
9	137.10	37.	0.25	3.49	9.25
10	137.42	24.	0.30	3.79	7.20
11	137.60	21.	0.15	3.94	3.15
12	138.10	4.4	0.76	4.70	3.34
13	138.73	1.7	0.24	4.94	0.41
14	139.30	4.2	0.70	5.64	2.94
15	139.65	5.6	0.45	6.09	2.52
16	140.26	9.7	0.30	6.39	2.91
17	140.41	0.9	0.13	6.52	0.12
18	140.56	2.4	0.22	6.74	0.53
19	141.15	Imp.	0.35	7.09	0.00
20	141.62	Imp.	0.35	7.44	0.00

Oil Field Research Laboratories

SUMMARY OF PERMEABILITY TESTS

TABLE II

Company Deep Rock Oil Corporation Lease McDowell #2 Core Test 2 Well No. 2

Depth Interval Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity, Ft. x Md.
133.46 - 141.05	6.74	11.76	79.37

Oil Field Research Laboratories

RESULTS OF SATURATION TESTS

TABLE III

Company Deep Rock Oil Corporation Lease McDowell #2 Core Test Well No. 2

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	133.90	10.1	20.3	70.9	91.2	158	0.77	0.77	122
F-2	135.66	17.1	24.5	-	-	326	1.32	2.09	431
2	136.05	19.3	22.9	54.8	77.7	344	0.60	2.69	206
3	136.70	20.7	20.7	55.9	76.6	334	1.25	3.94	417
F-4	137.75	18.9	25.2	-	-	369	0.20	4.14	74
4	138.00	18.9	18.1	59.7	77.8	266	0.76	4.90	202
5	139.13	18.4	27.3	60.7	88.2	393	0.70	5.60	275
6	140.10	17.8	23.9	59.0	82.9	330	0.75	6.35	247
7	140.75	9.6	20.3	76.5	96.8	151	0.58	6.93	88
F-7	140.95	15.7	16.9	-	-	206	0.17	7.10	35
								Total - -	-2,097

Oil Field Research Laboratories

SUMMARY OF SATURATION TESTS

TABLE IV

Company Deep Rock Oil Corporation Lease McDowell #2 Core Test Well No. 8

Depth Interval, Feet	Feet of Core Analyzed	Average Percent Porosity	Average Percent Oil Saturation	Average Percent Water Saturation	Average Oil Content Bbls./A. Ft.	Total Oil Content Bbls./Acre
133.48-141.05	7.10	17.00	22.25	61.72	295	2,097

Oil Field Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS

TABLE V

Company Deep Rock Oil Corporation Lease McDowell #2 Well No. Core Test No. 2

Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery		Residual Saturation			Volume of Water Recovered cc*	[redacted] Effective Permeability, Millidarcys **	Initial Fluid Production Pressure Lbs./Sq. In.
			Percent	Bbls./A. Ft.	Percent	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
1	134.13	9.4	18.9	138	0.0	0	18.9	66.7	138	0.5	0.044	50
2	135.65	17.1	24.5	326	4.7	63	19.8	71.0	263	37	0.819	15
3	136.92	19.4	22.4	337	1.8	27	20.6	73.5	310	161.5	7.44	10
4	137.75	18.9	25.2	369	3.6	53	21.6	66.8	316	19	0.322	25
5	138.95	16.8	30.4	396	0.0	0	30.4	67.1	396	4.5	0.127	55
6	139.84	17.2	24.5	327	0.0	0	24.5	71.8	327	6	0.092	40
7	140.95	15.7	16.9	206	0.0	0	16.9	75.5	206	3	0.054	30

Notes: cc - cubic centimeter
*Volume of water recovered at the time of maximum oil recovery.
**Determined by passing water through sample which still contains residual oil.

Oil Field Research Laboratories

SUMMARY OF LABORATORY FLOODING TESTS

TABLE VI

Company Deep Rock Oil Corporation Lease McDowell #2 Core Test Well No. 2

Depth Interval, Feet	134.48 - 137.85
Feet of Core Analyzed	3.37
Average Percent Porosity	18.49
Average Percent Original Oil Saturation	23.36
Average Percent Oil Recovery	3.03
Average Percent Residual Oil Saturation	20.33
Average Percent Residual Water Saturation	72.11
Average Percent Total Residual Fluid Saturation	92.44
Average Original Oil Content, Bbls./A. Ft.	335.
Average Oil Recovery, Bbls./A. Ft.	43.
Average Residual Oil Content, Bbls./A. Ft.	292.
Total Original Oil Content, Bbls./Acre	436.
Total Oil Recovery, Bbls./Acre	144
Total Residual Oil Content, Bbls./Acre	292.
Average Effective Permeability, Millidarcys	4.42
Average Initial Fluid Production Pressure, p.s.i.	16.7

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

Oil Field Research Laboratories

RESULTS OF WATER DIFFERENTIATION TESTS

TABLE VII

Company Deep Rock Oil Corporation Lease McDowell #2 Core Test Well No. 2

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Percent Water Saturation Connate	Drilling & Foreign	Total
1	133.90	4,830			
2	136.05	2,880			
3	136.70	2,615			
4	138.00	2,040			
5	139.13	2,755			
6	140.10	2,995			
7	140.75	3,560			

Note: ppm - parts per million

Oil Field Research Laboratories

SUMMARY OF WATER DIFFERENTIATION TESTS

TABLE VIII

Company Deep Rock Oil Corporation Lease McDowell #2 Core Test Well No. 8

Depth Interval, Feet	Chloride Content of Brine in Sand, ppm	Average Percent Connate Water	Average Percent Drilling & Foreign Water
133.48 - 140.83	3,053		

Note: ppm - parts per million