OILFIELD RESEARCH LABORATORIES

May 9, 1952

Deep Rock Oil Corporation
Atlas Life Building
Tulsa, Oklahoma

Gentlemen:

Enclosed herewith is the report of the analysis of the 2½" Rotary core taken from the Gingrich Lease, Well No. S-5, Franklin County, Kansas, and submitted to our laboratory on April 24, 1952.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Carl L. Pate

CLP:mm

c.c.

DEEP ROCK OIL CORPORATION

CORE ANALYSIS REPORT

GINORICH LEASE WELL NO. S-5

FRANKLIN COUNTY, KANSAS

OILFIELD RESEARCH LABORATORIES

CHANUTE, KANSAS

MAY 9, 1952

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Deep Rock Oil Corporation Lease Gingrich Well No. S-5

Location

Section 28 Twp. 16S Rge. 21E County Franklin State Kansas

Name of Sand	Squirrel
Top of Core	644.65
Bottom of Core	681.20
Top of Pay Sand	662.30
Bottom of Sand	673.35
Total Feet of Permeable Sand	11.98
Total Feet of Floodable Sand	8.65

Distribution of Permeable Sand:

Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 25	3.95	3.95
25 - 50	3.12	7.07
50 - 100	2.71	9.78
100 & above	2.20	11.98

Average Permeability Millidarcys	51.19
Average Percent Porosity	20.22
Average Percent Oil Saturation	36.82
Average Percent Water Saturation	45.16
Average Oil Content, Bbls./A. Ft.	580.
Total Oil Content, Bbls./Acre	6,724.
Average Percent Oil Recovery by Laboratory Flooding Tests	7.38
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	117.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	1,319.
Total Calculated Oil Recovery, Bbls./Acre	1,950.
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	

Salt water was used as the circulating fluid in the coring of the sand in this well.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
644.65 - 650.50	According to log, green sandy shale (Core not received).
650.50 - 657.90	Laminated sandstone and shale.
657.90 - 658.10	Brown fine grained micaceous shaley sandstone.
658.10 - 658.95	Laminated sandstone and shale.
658.95 - 660.30	Brown fine grained laminated micaceous shaley sandstone.
660.30 - 661.30	Laminated sandstone and shale.
661.30 - 661.60	Brown fine grained micaceous shaley sandstone.
661.60 - 661.92	Brown fine grained micaceous slightly shaley sandstone.
661.92 - 662.18	Brown fine grained micaceous sandstone.
662.18 - 662.30	Laminated sandstone and shale.
662.30 - 666.60	Brown fine grained micaceous sandstone.
666.60 - 667.70	Laminated sandstone and shale.
667.70 - 668.20	Brown fine grained slightly laminated micaceous shaley sandstone.
668.20 - 668.90	Brown fine grained micaceous sandstone.
668.90 - 670.20	Brown fine grained slightly laminated micaceous carbonaceous sandstone.
670.20 - 670.95	Brown fine grained micaceous sandstone.
670.95 - 673.35	Brown fine grained micaceous slightly shaley sandstone.
673.35 - 675.37	Gray shale.
675.37 - 681.20	According to log, shale (Core not received).

Coring was started at a depth of 644.65 feet in green sandy shale and completed at 681.20 feet in shale. This core shows a total of 12.38 feet of sandstone. For the most part, the pay is made up of fine grained micaceous to shaley sandstone.

PERMEABILITY

For the sake of distribution, the core was divided into three sections. The weighted average permeability of the upper, middle and lower sections is 22.56, 96.06 and 27.79 respectively; the overall average being 51.19 (See Table II). By observing the data given on the coregraph, it is noticeable that the sand has a very irregular permeability profile.

PERCENT SATURATION AND OIL CONTENT

The sand in this core shows a fair overall weighted average percent oil saturation, namely, 36.82. The weighted average percent oil saturation of the upper, middle and lower sections is 35.76, 37.98 and 36.25 respectively. The weighted average percent water saturation of the upper, middle and lower sections is 56.61, 35.07 and 49.49 respectively; the overall average being 45.16 (See Table IV). This gives an overall weighted average total fluid saturation of 81.98 percent.

Inasmuch as salt water was used as the circulating fluid in the coring of the sand in this well, no chloride determinations were made as the results would not be representative.

The weighted average oil content of the upper, middle and lower sections is 461, 659 and 554 barrels per acre foot respectively; the overall average being 580. The total oil content, as shown by this core, is 6,724 barrels per acre (See Table IV).

LABORATORY FLOODING TESTS

The sand in this core responded fairly well to laboratory flooding tests as a total recovery of 1,319 barrels of oil per acre was obtained from 11.30 feet of sand. The weighted average percent oil saturation was reduced from 35.95 to 28.57, or represents an average recovery of 7.38 percent. The weighted average effective permeability of the samples is 5.15 millidarcys, while the average initial fluid production pressure is 23.1 pounds per square inch (See Table VI).

By observing the data given in Table V, you will note that of the 13 samples tested, 12 produced water and oil. This indicates that practically all of the sand represented by these samples is floodable, however, some of the sand is very tight. The tests also show that the sand has a wide variation in effective permeability.

CONCLUSION

From a study of the above data, it is evident that an efficient water flood within the vicinity of this well will recover approximately 1,950 barrels of oil per acre, or an average of 225 barrels per acre foot from the 8.65 feet of floodable pay sand analyzed. In calculating this recovery, an allowance was made for oil lost during coring, and it was assumed that the primary production is 10 percent and that the sand is not pressured up. The above tests also indicate that practically all of the recoverable oil will be obtained from that part of the sand section extending 662.30 to 666.60 feet.

The principle drawback of this core is the fact that it has a wide variation in permeability.

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SHOT RECOMMENDATION

Company Deep Rock Oil Corporation Lease Gingrich Well No. 3-5

Depth Interval, Feet	Feet of Sand	Size of Shell Inches	Qts./Ft.	Total Quarts
664.5 - 672.0	7.5	3½	2.0	15.0

Recommended Packer Setting - - 659.5 feet.

Note: Plug hole back to - - - 673.0 feet.

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RESULTS OF PERMEABILITY TESTS

TABLE I

Company Deep Rock Oil Corporation Lease Gingrich Well No. S-5

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
1	657.95	Fractured	0.20	0.20	-
2	659.00	23.	0.65	0.85	14.95
3	660.12	15.	0.70	1.55	10.50
4	661.03	3.6	0.60	2.15	2.16
5	661.75	49.	0.32	2.47	15.68
6	662.15	53.	0.26	2.73	13.78
7	662.65	52.	0.60	3.33	31.20
8	663.20	68.	0.60	3.93	40.80
9	663.82	100.	0.50	4.43	50.00
10	664.16	171.	0.40	4.83	68.40
11	664.72	145.	0.50	5.33	72.50
12	665.15	60.	0.45	5.78	27.00
13	665.55	71.	0.45	6.23	31.95
14	666.12	108.	0.50	6.73	54.00
15	666.55	124.	0.30	7.03	37.20
16	668.27	25.	0.30	7.33	7.50
17	668.75	44.	0.40	7.73	17.60
18	669.26	12.	0.45	8.18	5.40
19	669.45	2.3	0.30	8.48	0.69
20	669.83	29.	0.55	9.03	15.95
21	670.40	39.	0.40	9.43	15.60
22	670.87	51.	0.35	9.78	17.85
23	671.50	19.	0.75	10.53	14.25
24	671.95	18.	0.50	11.03	9.00
25	672.45	36.	0.45	11.48	16.20
26	672.87	37.	0.35	11.83	12.95
27	673.15	29.	0.35	12.18	10.15

Oil Field Research Laboratories

SUMMARY OF PERMEABILITY TESTS

TABLE II

Company Deep Rock Oil Corporation Lease Gingrich Well No. S-5

Depth Interval Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity, Ft. x Md.
657.90 - 662.18	2.53	22.56	57.07
662.30 - 666.60	4.30	96.06	413.05
667.70 - 673.35	5.15	27.79	143.14
657.90 - 673.35	11.98	51.19	613.26

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RESULTS OF SATURATION TESTS

TABLE III

Company Deep Rock Oil Corporation Lease Gingrich Well No. S-5

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.	
3	659.75	16.5	34.6	56.6	91.2	444	1.35	1.35	599
4	661.46	16.9	40.7	56.3	97.0	535	0.30	1.65	161
5	662.45	21.4	41.9	30.7	72.6	697	0.60	2.25	418
6	663.46	22.2	43.8	33.0	76.8	756	1.00	3.25	756
7	664.45	22.0	33.0	38.4	71.4	565	1.00	4.25	565
8	665.36	21.9	38.5	33.9	72.4	655	0.90	5.15	590
9	666.35	24.2	33.5	38.1	71.6	630	0.80	5.95	504
10	668.05	18.2	35.1	52.6	87.7	497	1.20	7.15	596
11	669.06	18.4	36.6	51.6	88.2	524	0.45	7.60	236
12	669.60	19.2	35.4	46.9	82.3	529	0.85	8.45	450
13	670.65	18.7	37.4	49.3	86.7	544	0.75	9.20	408
14	671.76	21.8	34.7	49.3	84.0	587	1.25	10.45	734
15	672.70	20.4	38.8	47.7	86.5	615	1.15	11.60	707
							Total		6,724

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SUMMARY OF SATURATION TESTS

TABLE IV

Company Deep Rock Oil Corporation Lease Gingrich Well No. S-5

Depth Interval, Feet	Feet of Core Analyzed	Average Percent Porosity	Average Percent Oil Saturation	Average Percent Water Saturation	Average Oil Content Bbl./A. Ft.	Total Oil Content Bbls./Acre
658.95 - 661.60	1.65	16.61	35.76	56.61	461	760
662.30 - 666.60	4.30	22.35	37.98	35.07	659	2,833
667.70 - 673.35	5.65	19.66	36.25	49.49	554	3,131
658.95 - 673.35	11.60	20.22	36.82	45.16	580	6,724

Oil Field Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS

TABLE V

Company Deep Rock Oil Corporation Lease Gingrich Well No. S-5

Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery		Residual Saturation			Volume of Water Recovered cc*	Effective Permeability, Millidarcys **	Initial Fluid Production Pressure Lbs./Sq. In.
			Percent	Bbls./A. Ft.	Percent	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
3	659.75	16.9	38.7	429	1.8	16	31.5	65.6	413	21	0.870	20
4	661.45	17.1	39.0	518	0.0	0	39.0	60.3	516	0	Imp.	50
5	662.45	21.5	40.4	674	16.6	277	23.8	74.3	397	144	12.28	15
6	663.45	22.6	41.6	730	17.0	298	24.6	70.7	432	167	10.62	15
7	664.45	25.4	32.1	558	8.0	139	24.1	69.6	419	142	8.00	20
8	665.35	22.2	37.5	646	14.1	243	23.4	70.2	403	225	21.00	10
9	666.35	24.2	34.7	652	8.2	154	26.5	67.0	498	168	10.11	15
10	668.05	18.7	32.4	570	4.4	64	28.0	71.8	406	27	0.843	25
11	669.05	18.3	37.9	539	1.1	18	36.8	58.3	523	2	0.097	45
12	669.60	19.3	36.1	541	1.4	21	34.7	57.9	520	2	0.093	45
13	670.65	18.9	36.0	429	7.6	118	28.4	69.4	417	48	1.80	25
14	671.77	21.4	33.2	551	2.8	46	30.4	62.2	505	12	0.344	30
15	672.70	20.5	37.3	594	5.9	94	31.4	60.8	500	37	1.01	20

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.

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SUMMARY OF LABORATORY FLOODING TESTS

TABLE VI

Company Deep Rock Oil Corporation Lease Gingrich Well No. S-5

Depth Interval, Feet	658.95 - 666.60	667.70 - 673.35	658.95 - 673.35
Feet of Core Analyzed	5.65	5.65	11.30
Average Percent Porosity	21.26	19.75	20.50
Average Percent Original Oil Saturation	36.05	35.84	35.95
Average Percent Oil Recovery	9.89	4.87	7.38
Average Percent Residual Oil Saturation	26.16	30.97	28.57
Average Percent Residual Water Saturation	69.04	63.89	66.47
Average Percent Total Residual Fluid Saturation	95.20	94.86	95.04
Average Original Oil Content, Bbls./A. Ft.	597.	537.	567.
Average Oil Recovery, Bbls./A. Ft.	171.	62.	117.
Average Residual Oil Content, Bbls./A. Ft.	426.	475.	450.
Total Original Oil Content, Bbls./Acre	3,375.	3,033.	6,408.
Total Oil Recovery, Bbls./Acre	967.	352.	1,319.
Total Residual Oil Content, Bbls./Acre	2,408.	2,681.	5,089.
Average Effective Permeability, Millidarcys	9.58	0.722	5.15
Average Initial Fluid Production Pressure, p.s.i.	15.1	31.1	23.1

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