OIL FIELD RESEARCH LABORATORIES
CHANUTE, KANSAS

August 6, 1951

Deep Rock Oil Corporation
Atlas Life Building
Tulsa, Oklahoma

Attention: Mr. T. F. Lawry

Gentlemen:

Enclosed herewith is the report of the analysis of the 2½" Rotary core taken from the Gingrich Lease, Well No. O-7, Franklin County, Kansas, and submitted to our laboratory on July 23, 1951.

Very truly yours,

OIL FIELD RESEARCH LABORATORIES

Clayton A. Hattier

CAN:pmd
4 c.c.

DEEP ROCK OIL CORPORATION

CORE ANALYSIS REPORT

GINGRICH LEASE WELL NO. O-7

FRANKLIN COUNTY, KANSAS

OIL FIELD RESEARCH LABORATORIES

CHANUTE, KANSAS

AUGUST 6, 1951

Oil Field Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Deep Rock Oil Corporation Lease Gingrich Well No. 6-7

Location

Section 23 Twp. 16 Rge. 21 County Franklin State Kansas

Name of Sand		Squirrel
Top of Core		641.78
Bottom of Core		726.13
Top of Sand		648.85
Bottom of Sand		666.15
Total Feet of Permeable Sand	(Analysed)	12.92
Total Feet of Floodable Sand	(Analysed)	8.60

Distribution of Permeable Sand:

Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 10	2.62	2.62
10 - 30	2.35	4.97
30 - 60	1.15	6.12
60 - 120	3.10	9.22
120 - 200	1.70	10.92
200 & above	2.00	12.92

Average Permeability, Millidarcys	95.44
Average Percent Porosity	22.47
Average Percent Oil Saturation	51.72
Average Percent Water Saturation	32.09
Average Oil Content, Bbls./A. Ft.	909.
Total Oil Content, Bbls./Acre	9,335.
Average Percent Oil Recovery by Laboratory Flooding Tests	20.74
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	371.
Aotal Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	3,357.
Total Calculated Oil Recovery, Bbls./Acre	2,330.
Packer Setting, Feet	652.00
Bottom of Cement	650.00
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	

Note: The above averages are for that part of the sand section extending from the bottom of the cement to the bottom of the sand.

Salt water was used as a 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
641.78 - 642.15	Laminated sandy shaley limestone.
642.15 - 642.70	Laminated sandy shale.
642.70 - 643.00	Laminated shaley sandstone.
643.00 - 644.10	Laminated sandy shale.
644.10 - 645.88	Gray shale.
645.88 - 646.33	Laminated sandy shale.
646.33 - 646.42	Brown fine grained micaceous sandstone.
646.42 - 648.55	Gray shale.
648.55 - 648.80	Brown fine grained micaceous sandstone.
648.80 - 649.10	Laminated sandy shale.
649.10 - 649.70	Brown fine grained micaceous slightly shaley sandstone.
649.70 - 650.40	Limestone.
650.40 - 651.30	Brown fine grained micaceous sandstone.
651.30 - 651.93	Brown fine grained laminated micaceous shaley sandstone.
651.93 - 652.40	Brown fine grained micaceous sandstone.
652.40 - 653.00	Laminated sandy shale.
653.00 - 653.60	Brown fine grained laminated micaceous shaley sandstone.
653.60 - 653.90	Finely laminated sandy shale.
653.90 - 654.40	Gray shale.

654.40 - 654.65 - Laminated sandy shale.

654.65 - 654.82 - Brown fine grained micaceous sandstone.

654.82 - 654.95 - Laminated shaley sandstone.

654.95 - 655.28 - Gray shale.

655.28 - 656.05 - Laminated sandy shale.

656.05 - 656.25 - Gray shale.

656.25 - 661.40 - Brown fine grained micaceous sandstone.

661.40 - 661.55 - Finely laminated shaley sandstone.

661.55 - 662.90 - Brown fine grained micaceous sandstone.

662.90 - 663.95 - Dark fine grained micaceous carbonaceous sandstone.

663.95 - 664.20 - Gray shale.

664.20 - 664.45 - Dark fine grained micaceous carbonaceous shaley sandstone.

664.45 - 664.65 - Laminated sandy shale.

664.65 - 665.85 - Dark fine grained micaceous carbonaceous sandstone containing a sand streak.

665.85 - 666.15 - Dark fine grained micaceous carbonaceous slightly shaley sandstone.

666.15 - 668.10 - Gray shale.

668.10 - 674.20 - Dense blue shale (Discarded at well).

674.20 - 677.00 - Lime buttons in shale (Discarded at well).

677.00 - 692.00 - Discarded at well.

692.00 - 694.24 - Lime buttons in shale (Discarded at well).

694.24 - 711.21 - Blue shale (Discarded at well).

711.21 - 724.00 - Shale (Discarded at well).

724.00 - 725.00 - Coal.

725.00 - 726.13 - Shale.

Coring was started at a depth of 641.78 feet in laminated sandy shaley limestone and completed at 726.13 feet in shale. This core shows a total

of 12.97 feet of sandstone. For the most part, the pay sand is made up of fine grained micaceous 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 10.22, 152.74 and 55.49 millidarcys respectively; while that of the pay sand, or that part of the cored section extending from the bottom of the cement to the bottom of the sand, is 95.44 (See Table II). By observing the data given on the coregraph, it is noticeable that the sand has a very irregular permeability profile and that part of the sand is very loose.

PERCENT SATURATION & OIL CONTENT

The pay sand in this core shows a good weighted average percent oil saturation, namely, 51.72. The weighted average percent oil saturation of the upper, middle and lower sections is 41.79, 56.72 and 46.64 respectively. The weighted average percent water saturation of the upper, middle and lower sections is 41.52, 28.23 and 34.94 respectively; while that of the pay sand is 32.09 (See Table IV). This gives an overall weighted average total fluid saturation of 83.81 percent.

Inasmuch as salt water was used as a 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 628, 1,048 and 794 barrels per acre foot respectively; while that of the pay sand is 908. The total oil content, as shown by this core, is 9,611 barrels per acre of which 9,323 barrels are in the pay sand section (See Table IV).

LABORATORY FLOODING TESTS

The sand in this core responded very well to laboratory flooding tests, as a total recovery of 3,367 barrels of oil per acre was obtained from 9.07 feet of sand. The weighted average percent oil saturation was reduced from 52.17 to 31.43, or represents an average recovery of 20.74 percent. The weighted average effective permeability of the samples is 9.42 millidarcys, while the average initial fluid production pressure is 14.5 pounds per square inch (See Table VI).

By observing the data given in Table V, you will note that of the 13 samples tested, 10 produced water and 11 oil. This indicates that most of the sand represented by these samples is floodable. The tests also show that the sand has a wide variation in effective permeability.

CONCLUSION

From a study of the above data, we believe that an efficient water flood within the vicinity of this well will recover a minimum of 2,565 barrels of oil per acre or an average of 296 barrels per acre foot from the 8.60 feet of floodable sand analyzed. In calculating this recovery, no allowance was made for oil lost during coring, and it is assumed that the sand is not pressured up.

The principle drawback of this core is the fact that it shows a fairly thin sand section and has a wide variation in permeability.

Oil Field Research Laboratories

SHOT RECOMMENDATION

Company Deep Rock Oil Corporation Lease Gingrich Well No. 0-7

Depth Interval, Feet	Feet of Sand	Size of Shell Inches	Qts./Ft.	Total Quarts
654.5 - 665.0	10.5	3½	2.0	21.0

Recommended Packer Setting - - - 649.5 (Bottom of Cement)

Note: Plug hole back to - - - - 666.0

Notes: (1) The sand in this well was shot before the core was analysed.
(2) The actual Shot is shown on the coregraph.

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RESULTS OF PERMEABILITY TESTS

TABLE I

Company Deep Rock Oil Corporation Lease Gingrich Well No. 0-7

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
1	648.70	18.	0.25	0.25	4.50
2	649.50	12.	0.60	0.85	7.20
3	650.45	13.	0.30	1.15	3.90
4	650.90	9.4	0.60	1.75	5.64
5	651.32	12.	0.15	1.90	1.80
6	651.60	6.6	0.48	2.38	3.17
7	652.00	6.2	0.47	2.85	2.92
8	653.15	3.7	0.35	3.20	1.30
9	653.55	1.1	0.25	3.45	0.28
10	654.75	1.3	0.17	3.62	0.22
11	656.30	159.	0.20	3.82	31.80
12	656.60	52.	0.40	4.22	20.80
13	657.10	98	0.35	4.57	34.25
14	657.30	138.	0.35	4.92	48.35
15	657.80	240.	0.30	5.22	72.00
16	657.91	191.	0.30	5.52	57.30
17	658.40	241.	0.55	6.07	132.55
18	659.01	346.	0.60	6.67	207.60
19	659.55	66.	0.60	7.27	39.60
20	660.25	171.	0.50	7.77	85.50
21	660.55	88.	0.45	8.22	39.60
22	661.10	242.	0.55	8.77	133.10
23	661.80	105.	0.35	9.12	36.75
24	661.99	144.	0.35	9.47	50.40
25	662.50	69.	0.65	10.12	44.40
26	663.15	64.	0.45	10.57	28.80
27	663.45	48.	0.30	10.87	14.40
28	663.75	13.	0.30	11.17	3.90
29	664.25	25.	0.25	11.42	6.25
30	664.70	60.	0.25	11.67	15.00
31	665.15	10.	0.50	12.17	5.00
32	665.62	55.	0.45	12.62	24.75
33	666.00	2.1	0.30	12.92	0.63

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SUMMARY OF PERMEABILITY TESTS

TABLE II

Company Deep Rock Oil Corporation Lease Gingrich Well No. 0-7

Depth Interval Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity, Ft. x Md.
649.10 - 652.40	2.85	10.22	29.13
652.40 - 661.40	5.92	152.74	904.25
661.40 - 666.15	4.15	55.49	230.28
650.00 - 666.15	12.07	95.44	1,151.96

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RESULTS OF SATURATION TESTS

TABLE III

Company Deep Rock Oil Corporation Lease Gingrich Well No. 0-7

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	649.33	20.6	30.0	47.1	77.1	479	0.60	0.60	288
2	650.73	19.6	51.5	28.0	79.5	783	0.90	1.50	705
3	652.33	17.6	37.9	60.4	98.3	518	0.47	1.97	244
4	656.93	23.6	56.4	29.4	95.8	1,032	0.95	2.92	980
5	657.63	23.7	54.8	27.3	82.1	1,007	0.70	3.62	705
6	658.23	23.5	61.7	22.5	84.2	1,120	0.90	4.52	1,010
7	659.33	23.5	57.9	27.5	85.4	1,057	1.20	5.72	1,270
8	660.93	24.6	53.7	32.3	86.0	1,025	1.40	7.12	1,439
F-9	661.47	16.4	32.3	-	-	415	0.15	7.27	62
9	661.63	23.2	50.3	42.4	92.7	905	0.35	7.62	316
10	662.32	23.1	51.0	41.6	92.6	914	1.00	8.62	914
11	663.05	22.4	42.2	30.6	72.8	734	1.05	9.67	770
12	664.95	20.5	49.0	31.4	80.4	779	0.70	10.37	545
13	665.80	20.9	45.8	30.4	76.2	743	0.50	10.87	372
							Total		9,620

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SUMMARY OF SATURATION TESTS

TABLE IV

Company Deep Rock Oil Corporation Lease Gingrich Well No. C-7

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
649.10 - 652.40	1.97	19.44	41.74	41.52	620	1,237
656.85 - 661.40	5.16	23.84	56.72	28.23	1,049	5,404
661.40 - 665.85	3.75	21.80	46.64	34.94	794	2,979
650.00 - 666.15	10.27	22.47	51.72	30.09	909	9,335

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RESULTS OF LABORATORY FLOODING TESTS

TABLE V

Company [illegible] Lease [illegible] Well No. [illegible]

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.			
1	649.18	19.9	38.8	807	4.1	83	20.7	70.8	444	13	0.275	30
2	650.38	19.1	51.7	760	20.1	296	31.6	68.0	468	6	0.102	15
3	652.17	17.4	36.0	513	4.9	66	33.1	66.3	447	0	0.005	40
4	656.77	23.4	56.3	1,005	20.9	360	34.4	64.4	625	137	6.83	10
5	657.48	23.9	54.3	1,007	27.6	515	26.5	66.6	498	141	20.20	5
6	658.08	23.9	60.5	1,122	32.1	595	28.4	60.3	567	189	26.00	5
7	659.18	23.2	59.5	1,070	30.5	550	29.9	64.5	580	126	11.50	5
8	660.78	24.2	65.9	1,012	25.1	471	28.8	67.3	541	106	12.80	5
9	661.48	16.4	38.6	415	0.0	0	38.6	64.3	415	0	Imp.	50#
10	662.17	23.4	40.0	672	10.1	329	29.9	65.1	643	113	0.79	10
11	663.36	23.4	44.3	771	7.9	137	36.4	59.3	634	11	0.370	35
12	664.82	21.0	47.5	774	0.0	0	47.5	51.6	774	0	Imp.	80#
13	665.73	21.2	44.9	738	2.3	38	42.6	50.7	700	181	4.87	15

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 Gingrich Well No. 6-7

Depth, Interval, Feet	649.10 - 652.40	656.25 - 661.40	661.90 - 665.85	650.00 - 665.85
Feet of Core Analyzed	1.97	5.15	2.55	9.07
Average Percent Porosity	18.93	23.71	22.55	22.60
Average Percent Original Oil Saturation	42.69	56.66	45.87	52.17
Average Percent Oil Recovery	11.62	27.20	10.82	20.74
Average Percent Residual Oil Saturation	31.07	29.46	35.05	31.43
Average Percent Residual Water Saturation	66.35	65.75	59.49	63.79
Average Percent Total Residual Fluid Saturation	97.42	95.21	94.54	95.22
Average Original Oil Content, Bbls./A. Ft.	626.	1,842.	804.	920.
Average Oil Recovery, Bbls./A. Ft.	171.	500.	193.	371.
Average Residual Oil Content, Bbls./A. Ft.	455.	542.	611.	549.
Total Original Oil Content, Bbls./Acre	1,234.	5,369.	2,050.	8,349.
Total Oil Recovery, Bbls./Acre	337.	2,576.	492.	3,367.
Total Residual Oil Content, Bbls./Acre	897.	2,793.	1,558.	4,982.
Average Effective Permeability, Millidarcys	0.168	14.70	3.77	9.42
Average Initial Fluid Production Pressure, p.s.i.	28.3	6.0	20.0	14.5

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