

OILFIELD RESEARCH LABORATORIES

536 NORTH HIGHLAND - CHANUTE, KANSAS 66720 - PHONE (316) 431-2650

November 30, 1981

Jackson Brothers
514 North Main
Eureka, Kansas 67045

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the V. Rice Lease, Well No. 8, located in Greenwood County, Kansas and submitted to our laboratory on November 18, 1981.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/mkf

6 c to Eureka, Ks.

Oilfield Research Laboratories
GENERAL INFORMATION & SUMMARY

Company Jackson Brothers Lease V. Rice Well No. 8
 Location 660' WEL & 1155' SNL
 Section 10 Twp. 26S Rge. 8E County Greenwood State Kansas

Elevation, Feet

Name of Sand.....

BARTLESVILLE

Top of Core

2416.0

Bottom of Core

2452.6

Top of Sand (Tested)

2421.5

Bottom of Sand

2452.6

Total Feet of Permeable Sand

21.7

Total Feet of Floodable Sand

6.9

Distribution of Permeable Sand:
Permeability Range
Millidarcys

Feet

Cum. Ft.

0 - 10

5.9

5.9

10 - 20

8.1

14.0

30 - 40

3.7

17.7

40 - 67

4.0

21.7

Average Permeability Millidarcys

22.5

Average Percent Porosity

15.6

Average Percent Oil Saturation

20.0

Average Percent Water Saturation.....

65.1

Average Oil Content, Bbls./A. Ft.

250.

Total Oil Content, Bbls./Acre.....

7,238.

Average Percent Oil Recovery by Laboratory Flooding Tests.....

3.7

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.

52.

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre

357.

Total Calculated Oil Recovery, Bbls./Acre.....

See "Calculated Recovery"

Section

The core was sampled by a representative of Oilfield Research Laboratories. Fresh water mud was used as a drilling fluid. The core was reported to be from a semi-virgin area.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, <u>Feet</u>	<u>Description</u>
2416.0 - 2420.9	Gray shale.
2420.9 - 2421.5	Gray and light gray laminated shale and sandstone.
2421.5 - 2424.9	Light brown and gray laminated sandstone and shale.
2424.9 - 2425.4	Gray shale with light gray sandstone partings.
2425.4 - 2427.7	Light brown and gray laminated sandstone and shale.
2427.7 - 2428.2	Gray shale.
2428.2 - 2429.4	Light brown sandstone.
2429.4 - 2430.2	Grayish brown shaly sandstone.
2430.2 - 2432.4	Light brown sandstone.
2432.4 - 2434.7	Light brown sandstone with large shale partings.
2434.7 - 2435.2	Gray shale.
2435.2 - 2435.9	Light brown shaly sandstone with shale inclusions.
2435.9 - 2436.5	Gray shale with light gray sandstone partings.
2436.5 - 2437.6	Gray and light brown laminated shale and sandstone.
2437.6 - 2438.6	Light brown sandstone with large shale partings.
2438.6 - 2440.6	Light brown sandstone
2440.6 - 2443.3	Light brown and gray laminated sandstone and shale.
2443.3 - 2445.4	Light brown sandstone.
2445.4 - 2446.0	Light brown slightly shaly sandstone.
2446.0 - 2451.4	Light brown sandstone.
2451.4 - 2452.0	Light brown shaly sandstone.

2452.0 - 2452.6 Light brown and gray laminated sandstone and shale.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 357 barrels of oil per acre was obtained from 6.9 feet of sand. The weighted average percent oil saturation was reduced from 29.1 to 25.4, or represents an average recovery of 3.7 percent. The weighted average effective permeability of the samples is 2.41 millidarcys, while the average initial fluid production pressure is 25.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 32 samples tested, 7 produced water and oil, and 13 produced water only. This indicates that approximately 22 percent of the sand represented by these samples is floodable pay sand.

CALCULATED RECOVERY

It would appear from a study of the core data, that efficient primary and waterflood operations in the vicinity of this well should recover approximately 1430 barrels of oil per acre. This is an average recovery of 207 barrels per acre foot from 6.9 feet of floodable sand analyzed in this core.

These recovery values were calculated using the following data and assumptions:

Original formation volume factor, estimated

1.19

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Reservoir water saturation, percent, estimated	35.0
Average porosity, percent	18.3
Oil saturation after flooding, percent	25.4
Performance factor, percent, estimated	50.0
Net floodable sand, feet	6.9

RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Jackson Brothers

Lease V. Rice

Well No. 8

Sample No.	Depth, Feet	Effective Porosity Percent	Percent Saturation			Oil Content Bbls. / A Ft.	Perm., Mill.	Feet of Sand		Total Oil Content	Perm. Capacity Ft. X md.
			Oil	Water	Total			Ft.	Cum. Ft.		
1	2421.6	13.0	34	61	95	343	Imp.	0.5	0.5	172	0.00
2	2422.5	12.9	10	76	86	100	Imp.	1.0	1.5	100	0.00
3	2423.7	10.6	12	86	98	99	Imp.	1.0	2.5	99	0.00
4	2424.5	10.7	13	79	92	108	Imp.	0.9	3.4	97	0.00
5	2425.7	9.0	4	90	94	28	Imp.	0.6	4.0	17	0.00
6	2426.5	11.4	14	82	96	124	Imp.	0.7	4.7	87	0.00
7	2427.5	13.9	7	80	87	76	2.7	1.0	5.7	76	2.70
8	2428.8	17.5	40	37	77	543	54.	1.2	6.9	652	64.80
9	2429.5	12.4	36	57	93	346	Imp.	0.8	7.7	277	0.00
10	2430.5	18.7	28	48	76	406	66.	1.0	8.7	406	66.00
11	2431.4	17.7	27	61	88	371	34.	1.2	9.9	445	40.80
12	2432.5	16.6	1	56	57	13	50.	0.6	10.5	8	30.00
13	2433.6	14.5	24	50	74	270	52.	0.7	11.2	189	36.40
14	2434.5	17.5	24	69	93	272	39.	1.0	12.2	272	39.00
15	2435.6	7.6	17	79	96	100	Imp.	0.7	12.9	70	0.00
16	2436.6	11.8	3	92	95	28	Imp.	1.1	14.0	31	0.00
17	2437.7	16.7	16	77	93	207	13.	1.0	15.0	207	13.00
18	2438.7	19.6	21	47	68	319	49.	0.5	15.5	160	24.50
19	2439.5	20.6	25	50	75	400	32.	0.5	16.0	200	16.00
20	2440.5	19.5	9	53	62	136	34.	1.0	17.0	136	34.00
21	2441.5	18.7	28	62	90	406	6.7	1.7	18.7	690	11.39
22	2442.5	14.3	21	73	94	233	0.82	1.0	19.7	233	0.82
23	2443.5	18.5	25	58	83	359	14.	1.0	20.7	359	14.00
24	2444.5	17.2	32	52	84	427	13.	1.1	21.8	470	14.30
25	2445.5	15.9	31	66	97	382	6.8	0.6	22.4	229	4.08
26	2446.5	16.2	20	65	85	251	11.	1.4	23.8	351	15.40
27	2447.5	17.2	10	67	77	133	9.2	1.0	24.8	133	9.20
28	2448.5	17.5	18	59	77	244	15.	1.0	25.8	244	15.00
29	2449.5	16.3	30	61	91	379	12.	1.0	26.8	379	12.00
30	2450.5	17.7	10	63	73	137	15.	1.0	27.8	137	15.00

RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Jackson Brothers

Lease V. Rice

Well No. 8

Sample No.	Depth, Feet	Effective Porosity Percent	Percent Saturation			Oil Content Bbls. / A Ft.	Perm., Mill.	Feet of Sand		Total Oil Content	Perm. Capacity Ft. X md.
			Oil	Water	Total			Ft.	Cum. Ft.		
31	2451.6	15.3	35	60	95	415	2.1	0.6	28.4	249	1.26
32	2452.4	16.9	8	65	73	105	16.	0.6	29.0	63	9.60

Oilfield Research Laboratories

SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company	Lease	Well No.				
Jackson Brothers	V. Rice	8				
Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.	Average Percent Oil Saturation	Average Percent Water Saturation	Total Oil Content Bbls./Acre
2421.5 - 2427.7	1.0	2.7	2.70	12.3	79.8	114
2428.2 - 2446.0	14.1	29.0	409.09	23.3	60.9	301
2446.0 - 2452.6	6.6	11.7	77.46	18.5	63.0	236
2421.5 - 2452.6	21.7	22.5	489.25	20.0	65.1	250
2421.5 - 2427.7	5.7			11.7		648
2428.2 - 2446.0	16.7			16.5		5,034
2446.0 - 2452.6	6.6			16.8		1,556
2421.5 - 2452.6	29.0			15.6		7,238

Oilfield Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Well No. 8

Lease V. Rice

Jackson Brothers

Company

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.
			%	Bbbls./A. Ft.	%	Bbbls./A. Ft.	% Oil	% Water			
1	2421.6	13.4	33	343	0	0	33	63	0	Imp.	-
2	2422.5	13.0	10	101	0	0	10	77	0	Imp.	-
3	2423.7	10.7	12	100	0	0	12	86	0	Imp.	-
4	2424.5	10.8	13	109	0	0	13	80	0	Imp.	-
5	2425.7	9.2	4	29	0	0	4	91	0	Imp.	-
6	2426.5	11.5	14	125	0	0	14	83	0	Imp.	-
7	2427.5	13.7	7	74	0	0	7	81	0	Imp.	-
8	2428.8	17.6	40	546	9	123	31	47	86	1.35	25
9	2429.5	12.5	36	349	0	0	36	58	0	Imp.	25
10	2430.5	18.8	28	408	2	29	26	52	302	6.52	40
11	2431.4	17.8	27	373	0	0	27	66	18	0.56	40
12	2432.5	16.9	1	13	0	0	1	82	34	0.94	-
13	2433.6	14.9	23	266	0	0	23	52	0	Imp.	15
14	2434.5	17.6	24	328	2	27	22	71	226	4.34	-
15	2435.6	7.9	17	104	0	0	17	80	32	Imp.	-
16	2436.6	11.5	3	27	0	0	3	93	0	Imp.	25
17	2437.7	16.8	16	209	0	0	16	78	134	2.55	20
18	2438.7	19.7	21	321	2	31	19	68	100	1.72	15
19	2439.5	20.6	25	400	3	48	22	58	274	4.65	30
20	2440.5	19.4	9	135	0	0	9	81	32	0.52	35
21	2441.5	18.9	28	411	3	44	25	68	16	0.22	45
22	2442.5	14.5	21	236	0	0	21	74	12	0.15	25
23	2443.5	18.7	25	363	0	0	25	59	48	0.60	40
24	2444.5	17.3	32	429	0	0	32	53	32	0.45	45
25	2445.5	16.4	30	382	0	0	30	68	16	0.30	40
26	2446.5	16.3	20	253	0	0	20	66	24	0.37	35
27	2447.5	17.4	10	135	0	0	10	70	28	0.37	40
28	2448.5	17.7	18	247	0	0	18	63	26	0.50	40
29	2449.5	16.4	30	382	3	38	27	65	26	0.60	40

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.

RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Jackson Brothers Lease V. Rice Well No. 8

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.
			%	Bbls./A. Ft.	%	Bbls./A. Ft.	% Oil	% Water			
30	2450.5	17.4	10	135	0	0	10	77	40	0.67	30
31	2451.6	15.4	35	418	0	0	35	61	48	0.67	35
32	2452.4	16.7	8	104	0	0	8	66	0	Imp.	-

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.

Oilfield Research Laboratories

SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company	Jackson Brothers		Lease	V. Rice	Well No.	8
Depth Interval, Feet	2428.2 - 2446.0	2446.0 - 2452.6	2446.0 - 2452.6	2428.2 - 2452.6		
Feet of Core Analyzed	5.9	1.0	6.9			
Average Percent Porosity	18.6	16.4	18.3			
Average Percent Original Oil Saturation	28.9	30.0	29.1			
Average Percent Oil Recovery	3.8	3.0	3.7			
Average Percent Residual Oil Saturation	25.1	27.0	25.4			
Average Percent Residual Water Saturation	60.7	65.0	61.3			
Average Percent Total Residual Fluid Saturation	85.8	92.0	86.7			
Average Original Oil Content, Bbls./A. Ft.	416.	382.	411.			
Average Oil Recovery, Bbls./A. Ft.	54.	38.	52.			
Average Residual Oil Content, Bbls./A. Ft.	362.	344.	359.			
Total Original Oil Content, Bbls./Acre	2,452.	382.	2,834.			
Total Oil Recovery, Bbls./Acre	319.	38.	357.			
Total Residual Oil Content, Bbls./Acre	2,133.	344.	2,477.			
Average Effective Permeability, Millidarcys	2.72	0.60	2.41			
Average Initial Fluid Production Pressure, p.s.i.	22.5	40.0	25.0			

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

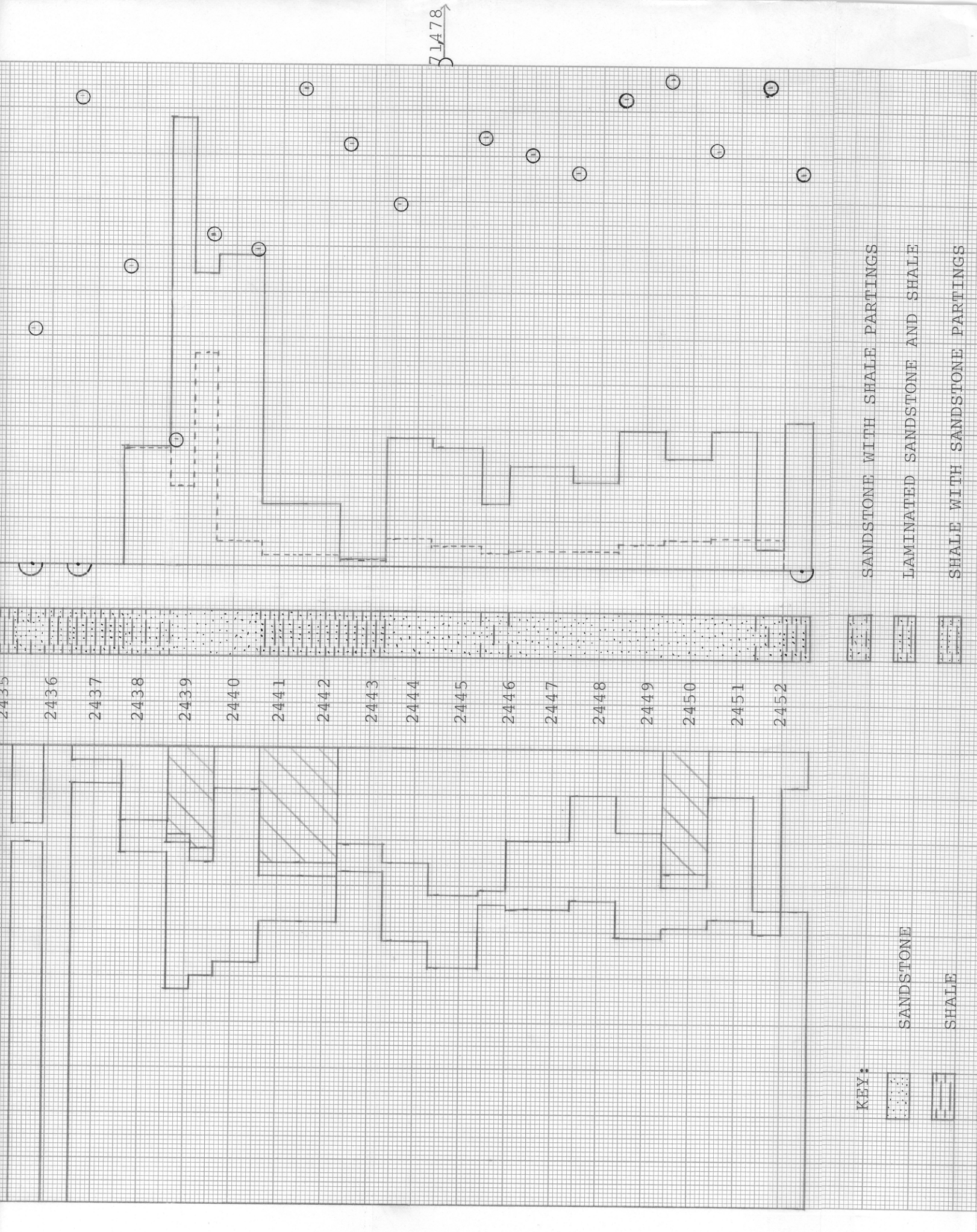
Oilfield Research Laboratories
RESULTS OF WATER DIFFERENTIATION TESTS

TABLE VI

Company Jackson Brothers Lease V. Rice Well No. 8

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Percent Water Saturation	
			Connate	Drilling & Foreign Total
1	2421.6	57,917		
2	2422.5	59,278		
3	2423.7	62,381		
4	2424.5	60,711		
5	2425.7	56,144		
6	2426.5	62,155		
7	2427.5	53,233		
8	2428.8	18,245		
9	2429.5	49,094		
10	2430.5	24,038		
11	2431.4	51,119		
12	2432.5	48,010		
13	2433.6	51,795		
14	2434.5	46,520		
15	2435.6	40,711		
16	2436.6	66,074		
17	2437.7	47,640		
18	2438.7	28,886		
19	2439.5	51,390		
20	2440.5	49,669		
21	2441.5	67,406		
22	2442.5	61,447		
23	2443.5	54,769		
24	2444.5	71,478		
25	2445.5	62,001		
26	2446.5	60,075		
27	2447.5	58,187		
28	2448.5	66,454		
29	2449.5	68,550		
30	2450.5	60,676		
31	2451.6	67,916		
32	2452.4	58,295		

Note: ppm — parts per million



31478 →

2435

2436

2437

2438

2439

2440

2441

2442

2443

2444

2445

2446

2447

2448


2449

2450


2451


2452


KEY:

 SANDSTONE

 SHALE

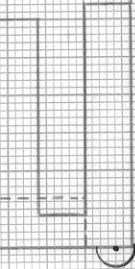
 SANDSTONE WITH SHALE PARTINGS

 LAMINATED SANDSTONE AND SHALE

 SHALE WITH SANDSTONE PARTINGS

2451

2452



KEY:



SANDSTONE



SHALE



SHALY SANDSTONE



IMPERMEABLE TO WATER

SANDSTONE WITH SHALE PARTINGS

LAMINATED SANDSTONE AND SHALE

SHALE WITH SANDSTONE PARTINGS

SHALY SANDSTONE WITH SHALE PARTINGS

FLOODPOT RESIDUAL OIL SATURATION

JACKSON BROTHERS

V. RICE LEASE

WELL NO. 8

GREENWOOD COUNTY, KANSAS

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE PERCENT POROSITY	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVERAGE PERMEABILITY, MILLIDARCS	CALCULATED OIL RECOVERY BBLs. / ACRE
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2421.5 - 2427.7	5.7	11.7	12.3	79.8	2.7	
2428.2 - 2446.0	16.7	16.5	23.3	60.9	29.0	
2446.0 - 2452.6	6.6	16.8	18.5	63.0	11.7	
2421.5 - 2452.6	29.0	15.6	20.0	65.1	22.5	1430 (PRIMARY AND WATERFLOODING)

OILFIELD RESEARCH LABORATORIES
 CHANUTE, KANSAS
 NOVEMBER, 1981
 PDC