July 30, 1951

32-19-22E

Hardesty & Schoonover
Richart Hotel
Garnett, Kansas

Gentlemen:

Enclosed herewith is the report of the analysis of the Cable Tool core taken from the S. Kehl Lease, Well No. 2, Linn County, Kansas, and submitted to our laboratory on July 26, 1951.

Very truly yours,

OIL FIELD RESEARCH LABORATORIES

Carl L. Pate By cmw

Carl L. Pate

CLP:eda
c.c.

S. Kehl 2

G. HARDESTY & R. SCHOONOVER

CORE ANALYSIS REPORT

S. KEHL LEASE WELL NO. 2

LINN COUNTY, KANSAS

OIL FIELD RESEARCH LABORATORIES

CHANUTE, KANSAS

JULY 30, 1951

Oil Field Research Laboratories

GENERAL INFORMATION & SUMMARY

Company C. Hardesty & R. Schoonover Lease S. Kehl Well No. 2

Location 660' South of North Line and 165' West of East Line, NE¼

Section 32 Twp. 19S Rge. 22E County Linn State Kansas

Name of Sand	Bartlesville
Top of Core	632.00
Bottom of Core	675.50
Top of Sand (According to driller)	630.80
Bottom of Pay Sand	668.80
Total Feet of Permeable Sand	35.91
Total Feet of Floodable Sand	27.52

Distribution of Permeable Sand:

Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 50	4.81	4.81
50 - 100	8.75	13.56
100 - 150	13.80	27.36
150 - 200	3.45	30.81
200 - 250	2.57	33.38
250 - 300	1.35	34.73
300 & above	1.18	35.91

Average Permeability, Millidarcys	128.23
Average Percent Porosity	23.24
Average Percent Oil Saturation	34.68
Average Percent Water Saturation	46.77
Average Oil Content, Bbls./A. Ft.	627.
Total Oil Content, Bbls./Acre	22,972.
Average Percent Oil Recovery by Laboratory Flooding Tests	12.75
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	234.
Aotal Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	6,223.
Total Calculated Oil Recovery, Bbls./Acre	12,950.
Packer Setting, Feet	632.00
Viscosity, Centipoises @76°F	10.9
A. P. I. Gravity, degrees @ 60 °F	33.3

Fresh water was used as a circulating fluid in the coring of the sand in this well. According to the driller, the top of the sand was found at a depth of 630.80 feet. This well was drilled in virgin territory.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
632.00 - 633.75	Brown fine grained micaceous sandstone.
633.75 - 633.85	Limestone.
633.85 - 634.50	Brown fine grained micaceous sandstone.
634.50 - 634.65	Sandy limestone.
634.65 - 641.80	Brown fine grained micaceous sandstone.
641.80 - 644.30	Soft finely laminated sandy shale.
644.30 - 644.60	Brown fine grained micaceous sandstone.
644.60 - 644.95	Brown fine grained slightly laminated micaceous shaley sandstone.
644.95 - 646.06	Brown fine grained micaceous sandstone.
646.06 - 646.20	Brown fine grained laminated micaceous shaley sandstone.
646.20 - 649.10	Brown fine grained micaceous sandstone.
649.10 - 650.00	Finely laminated sandy shale.
650.00 - 655.00	Brown fine grained micaceous sandstone.
655.00 - 657.70	Brown fine grained finely laminated micaceou s shaley sandstone containing a vertical fracture.
657.70 - 664.80	Light brown fine grained micaceous sandstone.
664.80 - 665.25	Light brown fine grained finely laminated micaceous shaley sandstone.
665.25 - 673.22	Light brown fine grained micaceous sandstone.
673.22 - 673.65	Light brown fine grained micaceous slightly carbonaceous sandstone.

673.65 - 675.15 - Dark fine grained micaceous carbonaceous sandstone.

675.15 - 675.50 - Dark gray shale.

Coring was started at a depth of 632.00 feet in fine grained micaceous sandstone and completed at 675.50 feet in dark gray shale. This core shows a total of 39.51 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 are 118.65, 114.05 and 145.07 millidarcys respectively; the overall average being 128.23 (See Table II). By observing the data given on the coregraph, it is noticeable that the sand has a fairly uniform permeability profile.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a fairly good weighted average percent oil saturation, namely, 34.68. The weighted average percent oil saturation of the upper, middle and lower sections are 44.04, 30.25 and 27.94 respectively. The weighted average percent water saturation of the upper, middle and lower sections are 36.08, 54.08 and 52.61 respectively; the overall average being 46.77 (See Table IV). This gives an overall weighted average total fluid saturation of 81.45 percent.

In an effort to determine the degree of flushing of the sand during coring, all of the saturation samples were analyzed for chloride content which in turn were used in the determination of percent connate water saturation. The chloride content of a sample of water bailed from a core hole after coring had a chloride content of 20,897 parts per million. This value was also used in the calculation of percent connate water. 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 considerable flushing of the sand did occur, especially, in the lower two-thirds of the sand section.

The weighted average oil content of the upper, middle and lower sections are 804, 528 and 512 barrels per acre foot respectively; the overall average being 627. The total oil content, as shown by this core, is 22,972 barrels per acre (See Table IV).

VISCOSITY

The viscosity of a sample of crude oil taken from the adjoining producing well is 10.9 centipoises at 76° F. The A.P.I. gravity of the oil is 33.3° at 60° F. With other factors being favorable, a sand containing an oil of this viscosity should respond very satisfactorily to water repressuring.

LABORATORY FLOODING TESTS

The sand in this core responded very well to laboratory flooding tests, as a total recovery of 6,223 barrels of oil per acre was obtained from 26.62 feet of sand. The weighted average percent oil saturation was reduced from 36.49 to 23.74, or represents an average recovery of 12.75 percent. The weighted average effective permeability of the samples is 17.11 millidarcys, while the average initial fluid production pressure is 8.0 pounds per square inch (See Table VI). By observing the data given in Table V, you will note that most of the recoverable oil was obtained from the upper section.

By observing the data given in Table V, you will note that of the 36 samples tested, all produced water and 30 oil. This indicates that all of the sand represented by these samples will take water. The tests

also show that the sand has a fairly uniform effective permeability and that the lower part of the cored section did not produce any oil even though the sand took water very freely.

CONCLUSION

From a study of the above data, we believe that an efficient water flood within the vicinity of this well will recover approximately 12,950 barrels of oil per acre, or an average of 485 barrels per acre foot from the 26.72 feet of good floodable sand analyzed. In calculating this recovery, an allowance was made for oil lost during coring, and it was assumed that the upper part of the cored section has an average water saturation of 35 percent and that the well was drilled in virgin territory.

From the results of the above data, it is evident that that part of the cored section extending from 655.00 to 673.22 feet has a rather high water saturation. The results of the percent connate water saturation of the formation indicates that the degree of flushing may be somewhat higher in this zone. In calculating the recovery for this lower zone, it was assumed that the true water saturation of the sand is 50 percent. Inasmuch as the lower part of the core did not produce any oil by laboratory flooding tests, it is recommended that the hole be plugged back to 668.50 feet. A shot recommendation is given for this well, however if it is to be used for an injection well, shooting should not be necessary in order to get the sand to take the required amount of water.

Oil Field Research Laboratories

SHOT RECOMMENDATION

Company C. Hardesty & H. Schoonover Lease E. Kahl Well No. 8

Depth Interval, Feet	Feet of Sand	Size of Shell Inches	Qts./Ft.	Total Quarts
637.0 - 666.0	29.0	3½	2.0	58.0

Recommended Packer Setting 638.0

Note: Plug hole back to 668.5

Oil Field Research Laboratories

RESULTS OF PERMEABILITY TESTS

TABLE I

Company C. Hardesty & R. Schoonover Lease S. Kehl Well No. 2

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
1	632.25	24.	0.45	0.45	10.80
2	632.60	144.	0.35	0.80	50.40
3	633.00	231.	0.40	1.20	92.40
4	633.40	140.	0.30	1.50	42.00
5	633.63	103.	0.25	1.75	25.75
6	634.10	141.	0.65	2.40	91.65
7	635.18	82.	1.00	3.40	82.00
8	636.10	282.	0.70	4.10	197.40
9	636.60	77.	0.45	4.55	34.65
10	637.00	79.	0.35	4.90	27.65
11	637.30	21.	0.45	5.35	9.45
12	637.95	104.	0.50	5.85	52.00
13	638.25	117.	0.40	6.25	46.80
14	638.72	98.	0.45	6.70	44.10
15	639.15	99.	0.40	7.10	39.60
16	639.50	109.	0.25	7.35	27.25
17	639.70	124.	0.35	7.70	43.40
18	640.20	206.	0.50	8.20	103.00
19	640.70	128.	0.45	8.65	57.60
20	641.10	165.	0.45	9.10	74.25
21	641.61	156.	0.45	9.55	70.20
22	644.65	12.	0.20	9.75	2.40
23	644.90	32.	0.15	9.90	4.80
24	645.30	105.	0.65	10.55	68.25
25	645.88	248.	0.35	10.90	86.80
26	646.05	20.	0.11	11.01	2.20
27	646.59	23.	0.55	11.56	12.65
28	646.95	33.	0.45	12.01	14.85
29	647.40	128.	0.45	12.46	57.60
30	647.90	110.	0.55	13.01	60.50
31	648.50	137.	0.55	13.56	75.35
32	649.00	122.	0.35	13.91	42.70
33	650.02	274.	0.25	14.16	68.50
34	650.48	93.	0.55	14.71	51.15
35	651.18	129.	0.50	15.21	64.50
36	651.45	124.	0.35	15.56	43.40
37	651.80	157.	0.25	15.81	39.25
38	652.00	122.	0.30	16.11	36.60
39	652.35	100.	0.25	16.36	25.00
40	652.59	88.	0.30	16.66	26.40

Oil Field Research Laboratories

RESULTS OF PERMEABILITY TESTS

TABLE I

Company C. Hardesty & R. Schoonover Lease S. Kohl Well No. 2

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
41	652.91	53.	0.40	17.06	21.20
42	653.38	76.	0.40	17.46	30.40
43	653.72	72.	0.45	17.91	32.40
44	654.20	47.	0.30	18.21	14.10
45	654.38	135.	0.70	18.91	94.50
46	657.95	44.	0.55	19.46	24.20
47	658.49	71.	0.45	19.91	31.95
48	658.90	140.	0.40	20.31	56.00
49	659.30	185.	0.40	20.71	74.00
50	659.65	156.	0.25	20.96	39.00
51	659.85	127.	0.25	21.21	31.75
52	660.15	195.	0.35	21.56	68.25
53	660.50	140.	0.45	22.01	63.00
54	661.08	97.	0.45	22.46	43.65
55	661.40	105.	0.25	22.71	26.25
56	661.60	51.	0.25	22.96	12.75
57	661.92	85.	0.40	23.36	34.00
58	662.35	94.	0.40	23.76	37.60
59	662.78	80.	0.35	24.11	28.00
60	663.05	75.	0.40	24.51	30.00
61	663.50	128.	0.40	24.91	51.20
62	663.90	163.	0.40	25.31	65.20
63	664.25	170.	0.40	25.71	68.00
64	664.75	303.	0.30	26.01	90.90
65	665.35	131.	0.25	26.26	32.75
66	665.70	286.	0.40	26.66	114.40
67	666.15	104.	0.50	27.16	52.00
68	666.68	65.	0.45	27.61	29.25
69	667.05	446.	0.45	28.06	200.70
70	667.55	203.	0.45	28.51	91.35
71	667.95	72.	0.35	28.86	25.20
72	668.25	115.	0.35	29.21	40.25
73	668.65	174.	0.50	29.71	87.00
74	669.25	131.	0.55	30.26	72.05
75	669.72	128.	0.50	30.76	64.00
76	670.25	120.	0.45	31.21	54.00
77	670.60	146.	0.45	31.66	65.70
78	671.15	41.	0.55	32.21	22.55
79	671.70	98.	0.50	32.71	49.00
80	672.20	38.	0.40	33.11	15.20

Oil Field Research Laboratories

RESULTS OF PERMEABILITY TESTS

TABLE I

Company C. Hardesty & R. Schoonover Lease S. Kehl Well No. 2

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
81	672.50	220.	0.35	33.46	77.00
82	672.90	236.	0.52	33.98	122.72
83	673.45	483.	0.43	34.41	207.69
84	673.92	106.	0.45	34.86	47.70
85	674.22	34.	0.45	35.31	15.30
86	674.80	100.	0.40	35.71	40.00
87	675.10	27.	0.20	35.91	5.40

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SUMMARY OF PERMEABILITY TESTS

TABLE II

Company C. Hardesty & R. Schoonover Lease S. Kahl Well No. 2

Depth Interval Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity, Ft. x Md.
632.00 - 649.10	13.91	118.65	1,650.45
650.00 - 660.35	7.65	114.05	872.55
660.35 - 675.15	14.35	145.07	2,081.76
632.00 - 675.15	35.91	128.23	4,604.76

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RESULTS OF SATURATION TESTS

TABLE III

Company C. Hardesty & R. Schoonover Lease S. Kehl 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	632.10	20.3	32.8	49.4	82.2	517	0.45	0.45	233
2	632.80	23.8	32.2	36.1	68.3	595	1.30	1.75	774
3	633.90	20.9	42.3	25.4	67.7	686	0.65	2.40	446
5	635.00	23.4	45.5	31.0	76.5	826	0.80	3.20	661
6	635.90	23.2	45.9	36.6	82.5	826	0.90	4.10	744
7	636.80	22.6	50.6	42.3	92.9	887	0.85	4.95	754
8	637.52	22.9	45.0	38.6	83.6	800	0.80	5.75	640
9	638.45	24.1	56.4	22.6	79.0	1,053	0.90	6.65	948
10	639.30	23.4	51.0	31.5	82.5	926	1.00	7.65	926
11	640.45	24.8	50.1	25.7	75.8	963	0.95	8.60	915
12	641.40	25.3	41.6	43.6	85.2	819	0.95	9.55	778
13	644.45	23.9	42.7	30.1	72.8	792	0.30	9.85	238
14	645.05	25.0	47.7	32.1	79.8	925	0.40	10.25	370
15	645.62	24.4	40.6	37.3	77.9	770	0.71	10.96	547
16	646.35	23.0	43.0	38.8	80.8	768	0.80	11.76	614
17	647.65	23.4	40.2	37.3	77.5	730	1.20	12.96	876
18	648.75	23.4	41.6	53.2	94.8	755	0.90	13.86	680
19	650.30	24.0	32.3	39.2	71.5	601	0.65	14.51	391
20	651.00	23.9	33.0	42.7	75.7	612	0.95	15.46	581

Oil Field Research Laboratories

RESULTS OF SATURATION TESTS

TABLE III

Company C. Hardesty & R. Schoonover Lease S. Kehl 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.	
22	652.20	24.2	29.1	50.0	79.1	550	1.05	16.51	578
23	653.15	23.2	31.5	50.7	82.2	568	0.85	17.36	483
24	653.90	23.9	27.8	51.6	79.4	515	0.70	18.06	361
25	654.50	25.0	28.7	54.8	83.5	556	0.80	18.86	445
26	655.40	20.0	30.1	64.7	94.8	468	1.30	20.16	608
27	657.15	21.2	30.8	61.9	92.7	506	1.40	21.56	708
28	657.95	21.5	31.3	62.2	93.5	523	0.80	22.36	418
29	659.05	21.0	30.7	47.8	78.5	500	1.00	23.36	500
31	660.00	22.1	27.0	58.6	85.6	463	0.85	24.21	394
32	660.65	23.4	29.5	47.8	77.3	535	0.90	25.11	482
33	661.80	22.0	31.3	54.6	85.9	535	1.10	26.21	589
34	662.90	23.6	32.9	51.9	84.8	604	1.35	27.56	815
35	664.45	23.7	30.0	58.7	88.7	552	1.11	28.67	613
36	665.92	23.1	27.3	53.8	81.1	490	1.15	29.82	564
37	666.90	24.2	29.3	51.9	81.2	551	1.10	30.92	606
38	668.10	22.9	29.6	51.0	80.6	526	1.30	32.22	684
39	669.55	24.8	25.2	52.5	77.7	485	1.70	33.92	825
40	671.40	23.3	22.2	57.0	79.2	401	1.20	35.12	481
41	672.00	22.8	24.3	49.9	74.2	430	0.65	35.77	280
42	672.70	25.4	24.6	46.9	71.5	485	0.87	36.64	422
							Total	- - - -	22,972

Oil Field Research Laboratories

SUMMARY OF SATURATION TESTS

TABLE IV

Company C. Hardesty & R. Schoonover Lease S. Kohl Well No. 2

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
632.00 - 649.10	13.86	23.48	44.04	36.08	804	11,144
650.00 - 660.35	10.35	22.48	30.25	54.08	528	5,467
660.35 - 673.22	12.43	23.60	27.94	52.61	512	6,361
632.00 - 673.22	36.64	23.24	34.68	46.77	627	22,972

Oil Field Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS

TABLE V

Company C. Hardesty & R. Schoonover Lease S. Kohl Well No. 2

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	632.10	20.8	31.3	505	4.2	68	27.1	70.0	437	211	21.10	10
2	632.80	23.6	31.3	573	8.9	163	22.4	68.5	410	143	35.10	5
3	633.90	21.1	42.4	694	16.0	262	26.4	67.9	432	117	12.10	15
5	635.00	23.4	45.3	822	23.0	417	22.3	70.5	405	151	16.60	5
6	635.90	22.8	47.2	835	24.2	428	23.0	67.0	407	132	11.10	10
7	636.80	23.2	50.4	906	31.7	570	18.7	71.0	336	89	10.43	5
8	637.51	22.8	46.0	813	22.7	401	23.3	70.2	412	257	22.10	10
9	638.45	25.2	55.1	1,076	34.6	676	20.5	69.9	400	367	23.10	5
10	639.30	23.9	49.1	910	27.5	510	21.6	70.3	400	135	20.10	5
11	640.45	24.6	49.0	934	26.6	507	22.4	68.1	427	92	22.25	10
12	641.25	25.2	41.6	813	20.0	391	21.6	71.0	422	85	15.38	5
13	644.45	24.3	45.8	826	14.3	270	29.3	64.0	556	40	14.70	10
14	645.05	25.1	46.8	911	21.0	409	25.8	67.3	502	91	14.40	5
15	645.62	25.2	40.6	793	19.0	371	21.6	70.5	422	183	26.70	10
16	646.35	23.0	44.9	800	24.4	435	20.5	72.3	365	180	17.60	10
17	647.65	22.3	40.7	704	17.3	299	23.4	71.4	405	155	3.29	20
19	650.30	23.9	31.7	588	11.7	217	20.0	68.2	371	164	32.55	5
20	651.00	24.1	32.0	580	11.4	195	20.6	70.3	385	261	10.65	5
22	652.20	24.6	28.7	546	5.5	105	23.2	68.2	441	125	22.46	5
23	653.15	22.6	30.0	526	6.0	105	24.0	69.3	421	201	7.99	10
24	653.90	24.1	27.3	510	3.7	69	23.6	67.8	441	86	12.15	10
25	654.50	24.8	29.1	561	4.3	83	24.8	66.2	478	167	22.25	5
28	657.95	21.4	32.2	534	3.4	56	28.8	69.5	478	175	8.69	10
29	659.05	20.7	29.6	475	2.0	32	27.6	68.9	443	84	10.50	10
31	660.00	22.1	25.0	429	1.7	29	23.3	69.4	400	117	15.77	10
32	660.65	23.2	28.7	516	0.0	0	28.7	62.8	516	161	25.86	5
33	661.80	21.9	29.7	505	0.0	0	29.7	59.6	505	157	12.84	5
34	662.90	23.7	32.5	597	3.6	66	28.9	70.0	531	178	18.62	5
35	664.45	23.7	29.5	542	1.1	20	28.4	67.5	522	122	10.78	5
36	665.93	23.9	25.1	465	3.9	72	21.2	70.0	393	201	35.10	5

Oil Field Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS

TABLE V

Company C. Hardesty & R. Schoonover Lease S. Kehl Well No. 2

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.			
37	666.90	23.9	20.9	545	5.5	102	24.4	68.3	445	132	18.70	5
38	668.10	23.4	27.9	506	2.1	38	25.8	66.8	468	109	11.65	5
39	669.55	24.8	24.0	462	0.0	0	24.0	65.9	462	116	16.89	5
40	671.40	23.3	23.4	423	0.0	0	23.4	67.1	423	259	19.78	5
41	672.00	23.8	23.3	431	0.0	0	23.3	66.8	431	175	24.90	5
42	672.70	25.1	23.0	448	0.0	0	23.0	68.8	448	214	33.22	5

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

Oil Field Research Laboratories

SUMMARY OF LABORATORY FLOODING TESTS

TABLE VI

Company C. Hardesty & R. Schoonover Lease S. Kehl Well No. 2

	632.00	650.00	660.35	632.00
Depth, Interval, Feet	649.10	660.35	668.80	668.80
Feet of Core Analyzed	12.96	7.65	6.01	26.62
Average Percent Porosity	23.54	23.11	23.71	23.46
Average Percent Original Oil Saturation	44.08	29.48	29.05	36.49
Average Percent Oil Recovery	21.50	5.41	3.23	12.75
Average Percent Residual Oil Saturation	25.58	24.07	25.82	23.74
Average Percent Residual Water Saturation	69.66	68.71	63.51	68.00
Average Percent Total Residual Fluid Saturation	92.24	92.78	89.33	91.74
Average Original Oil Content, Bbls./A. Ft.	807.	587.	532.	664.
Average Oil Recovery, Bbls./A. Ft.	396.	97.	59.	234.
Average Residual Oil Content, Bbls./A. Ft.	411.	430.	473.	430.
Total Original Oil Content, Bbls./Acre	10,457.	4,027.	3,198.	17,682.
Total Oil Recovery, Bbls./Acre	5,127.	741.	355.	6,223.
Total Residual Oil Content, Bbls./Acre	5,330.	3,286.	2,843.	11,459.
Average Effective Permeability, Millidarcys	10.26	15.53	18.86	17.11
Average Initial Fluid Production Pressure, p.s.i.	8.8	7.3	6.9	5.0

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 C. Hardesty & R. Schoonover Lease S. Kahl Well No. 2

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Percent Water Saturation		
			Connate	Drilling & Foreign	Total
1	632.10	16,900	44.6	4.8	49.4
2	632.80	12,000	20.8	15.3	36.1
3	633.90	24,000	25.4	0.0	25.4
5	635.00	17,100	25.3	5.7	31.0
6	635.90	18,100	31.7	4.9	36.6
7	636.80	19,200	38.8	3.5	42.3
8	637.52	24,500	38.6	0.0	38.6
9	638.45	15,700	17.0	5.6	22.6
10	639.30	14,900	22.4	9.1	31.5
11	640.45	19,000	23.4	2.3	25.7
12	641.40	9,600	20.0	23.6	43.6
13	644.45	19,000	27.4	2.7	30.1
14	645.05	19,300	29.6	2.5	32.1
15	645.62	15,800	28.2	9.1	37.3
16	646.35	52,400	-	-	38.8
17	647.65	14,100	25.2	12.0	37.3
18	648.75	11,200	28.5	24.7	53.2
19	650.30	16,000	30.0	9.2	39.2
20	651,00	13,500	27.6	14.1	42.7
22	652.20	11,300	27.0	23.0	50.0
23	653.15	13,100	31.8	18.9	50.7
24	653.90	13,500	33.3	18.3	51.6
25	654.50	13,200	34.6	20.2	54.8
26	655.40	15,800	48.9	15.8	64.7
27	657.15	10,900	32.3	29.6	61.9
28	657.95	7,400	33.0	40.2	62.2
29	659.05	24,600	47.8	0.0	47.8
31	660.00	10,700	30.0	28.6	58.6
32	660.65	15,300	35.0	12.8	47.8
33	661.80	15,300	40.0	14.6	54.6
34	662.90	15,900	39.5	12.4	51.9
35	664.45	13,200	37.1	21.6	58.7
36	665.92	11,300	29.1	24.7	53.8
37	666.90	13,600	33.7	18.2	51.9
38	668.10	15,700	38.3	12.7	51.0
39	669.55	13,800	34.7	17.8	52.5
40	671.40	13,700	37.3	19.7	57.0
41	672.00	16,100	38.4	11.5	49.9
42	672.70	16,100	36.1	10.8	46.9

Note: ppm - parts per million.

Oil Field Research Laboratories

SUMMARY OF WATER DIFFERENTIATION TESTS

TABLE VIII

Company C. Hardesty & R. Schoonover Lease S. Kehl Well No. 2

Depth Interval, Feet	Chloride Content of Brine in Sand, ppm	Average Percent Connate Water	Average Percent Drilling & Foreign Water
632.00 - 649.10	18,413	26.87	10.14
650.00 - 660.35	13,692	34.00	22.19
660.35 - 673.22	14,426	36.26	16.42
632.00 - 673.22	15,727	32.18	15.85

Note: ppm - parts per million.