

OIL FIELD RESEARCH LABORATORIES
CHANUTE, KANSAS

January 18, 1952

Okco Oil & Gas Company
Atlas Life Building
Tulsa, Oklahoma

Gentlemen:

Enclosed herewith is the report of the analysis of the 2 $\frac{1}{2}$ " Rotary core taken from the S. P. Johnson Lease, Well No. A-21, Anderson County, Kansas, and submitted to our laboratory on January 5, 1952.

Very truly yours,

OIL FIELD RESEARCH LABORATORIES

Carl L. Pate

CLP:eda
c.c.

DEO OIL & GAS COMPANY

CORE ANALYSIS REPORT

S. P. JOHNSON LEASE WELL NO. A-21

ANDERSON COUNTY, KANSAS

OIL FIELD RESEARCH LABORATORIES

CHANDLER, KANSAS

JANUARY 18, 1952

Oil Field Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Okc Oil & Gas Company Lease S. P. Johnson Well No. A-21

Location W $\frac{1}{2}$, S $\frac{32}{2}$ and E $\frac{1}{2}$, S $\frac{32}{2}$

Section 7 Twp. 21S Rge. 20E County Anderson State Kansas

Name of Sand	Squirrel
Top of Core	792.70
Bottom of Core	841.70
Top of Sand	798.15
Bottom of Sand	834.68
Total Feet of Permeable Sand (Analyzed)	18.51
Total Feet of Floodable Sand (Analyzed)	14.08

Distribution of Permeable Sand:
Permeability Range
Millidarcys

Feet

Cum. Ft.

0 - 2	7.78	7.78
2 - 4	5.30	13.08
4 - 6	2.43	15.51
6 - 8	1.26	16.77
8 & above	1.74	18.51

Average Permeability Millidarcys

3.61

Average Percent Porosity

15.74

Average Percent Oil Saturation

44.16

Average Percent Water Saturation

41.68

Average Oil Content, Bbls./A. Ft.

562.

Total Oil Content, Bbls./Acre

14,245.

Average Percent Oil Recovery by Laboratory Flooding Tests

12.13

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

162.

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

2,168.

Total Calculated Oil Recovery, Bbls./Acre

1,800.

Packer Setting, Feet

Viscosity, Centipoises @

A. P. I. Gravity, degrees @ 60 °F

Elevation, Feet

1105.00

Fresh 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:

<u>Depth Interval, Feet</u>	<u>Description</u>
792.70 - 793.83	- Gray sandy calcareous shale.
793.83 - 794.10	- Gray shale.
794.10 - 795.25	- Gray sandy shale.
795.25 - 795.58	- Light brown fine grained micaceous shaley sandstone.
795.58 - 796.00	- Gray shale.
796.00 - 797.73	- Gray sandy shale.
797.73 - 797.90	- Brown fine grained micaceous sandstone.
797.90 - 798.15	- Gray sandy shale.
798.15 - 798.35	- Brown fine grained micaceous sandstone.
798.35 - 798.80	- Gray sandy shale.
798.80 - 799.55	- Brown fine grained slightly laminated micaceous shaley sandstone.
799.55 - 799.71	- Gray shale.
799.71 - 800.20	- Brown fine grained slightly laminated micaceous shaley sandstone.
800.20 - 800.43	- Laminated sandstone and shale.
800.43 - 801.00	- Brown fine grained micaceous sandstone.
801.00 - 801.40	- Finely laminated sandy shale.
801.40 - 801.70	- Brown fine grained micaceous slightly shaley sandstone.
801.70 - 801.80	- Laminated sandy shale.
801.80 - 801.90	- Laminated shaley sandstone.
801.90 - 802.35	- Gray shale.

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- 802.35 - 802.75 - Brown fine grained laminated micaceous shaley sandstone.
- 802.75 - 803.20 - Laminated shaley sandstone.
- 803.20 - 803.40 - Laminated sandstone and shale.
- 803.40 - 804.15 - Brown fine grained slightly laminated micaceous shaley sandstone.
- 804.15 - 804.25 - Laminated sandy shale.
- 804.25 - 804.50 - Brown fine grained finely laminated micaceous shaley sandstone.
- 804.50 - 804.68 - Finely laminated shale and sandstone.
- 804.68 - 804.95 - Brown fine grained finely laminated micaceous shaley sandstone containing a shale streak.
- 804.95 - 805.30 - Finely laminated shale and sandstone.
- 805.30 - 806.05 - Alternate layers of shale and sandstone.
- 806.05 - 806.35 - Finely laminated sandy shale.
- 806.35 - 806.47 - Brown fine grained micaceous sandstone.
- 806.47 - 806.70 - Finely laminated shaley sandstone.
- 806.70 - 807.00 - Gray sandy calcareous shale.
- 807.00 - 807.13 - Brown fine grained finely laminated micaceous carbonaceous sandstone.
- 807.13 - 807.45 - Brown fine grained micaceous sandstone containing a shale streak.
- 807.45 - 807.81 - Brown fine grained slightly laminated micaceous carbonaceous sandstone.
- 807.81 - 808.20 - Laminated sandy shale.
- 808.20 - 808.32 - Brown fine grained micaceous shaley sandstone.
- 808.32 - 808.52 - Laminated sandstone and shale.
- 808.52 - 809.10 - Gray sandy shale.
- 809.10 - 809.56 - Brown fine grained micaceous sandstone.
- 809.56 - 810.50 - Laminated sandy shale.
- 810.50 - 810.85 - Laminated shaley sandstone.

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- 810.85 - 811.15 - Brown fine grained slightly laminated micaceous shaley sandstone.
- 811.15 - 811.50 - Brown fine grained micaceous sandstone.
- 811.50 - 812.62 - Laminated sandstone and shale.
- 812.62 - 813.30 - Laminated sandy shale.
- 813.30 - 813.93 - Brown fine grained micaceous sandstone.
- 813.93 - 814.73 - Laminated sandstone and shale.
- 814.73 - 814.97 - Laminated shaley sandstone.
- 814.97 - 815.55 - Brown fine grained micaceous sandstone.
- 815.55 - 815.80 - Brown fine grained laminated micaceous shaley sandstone.
- 815.80 - 816.00 - Gray shale.
- 816.00 - 816.50 - Brown fine grained micaceous sandstone.
- 816.50 - 817.87 - Brown fine grained slightly laminated micaceous shaley sandstone.
- 817.87 - 818.25 - Laminated sandy shale.
- 818.25 - 818.45 - Brown fine grained finely laminated micaceous shaley sandstone.
- 818.45 - 818.75 - Brown fine grained micaceous sandstone.
- 818.75 - 819.25 - Laminated sandy shale.
- 819.25 - 819.50 - Laminated sandstone and shale.
- 819.50 - 819.70 - Laminated sandy shale.
- 819.70 - 819.92 - Brown fine grained laminated micaceous shaley sandstone.
- 819.92 - 820.05 - Brown fine grained micaceous sandstone.
- 820.05 - 820.17 - Gray sandy shale.
- 820.17 - 820.35 - Laminated shale and sandstone.
- 820.35 - 821.65 - Laminated sandstone and shale.
- 821.65 - 822.40 - Brown fine grained laminated micaceous shaley sandstone.
- 822.40 - 822.50 - Laminated sandstone and shale.

- 822.50 - 824.55 - Brown fine grained laminated micaceous shaley sandstone.
- 824.55 - 824.80 - Brown fine grained slightly laminated micaceous shaley sandstone.
- 824.80 - 825.65 - Brown fine grained laminated micaceous shaley sandstone.
- 825.65 - 826.85 - Brown fine grained slightly laminated micaceous shaley sandstone.
- 826.85 - 827.61 - Brown fine grained laminated micaceous shaley sandstone.
- 827.61 - 827.75 - Gray shale.
- 827.75 - 828.20 - Laminated shaley sandstone.
- 828.20 - 828.35 - Laminated sandstone and shale.
- 828.35 - 829.00 - Brown fine grained laminated micaceous shaley sandstone.
- 829.00 - 829.73 - Brown fine grained micaceous sandstone.
- 829.73 - 833.00 - Gray sandy shale.
- 833.00 - 833.30 - Brown fine grained micaceous sandstone.
- 833.30 - 833.40 - Gray sandy shale.
- 833.40 - 834.68 - Brown fine grained micaceous sandstone.
- 834.68 - 834.88 - Gray shale.
- 834.88 - 835.00 - Brown fine grained micaceous sandstone.
- 835.00 - 837.40 - Gray shale.
- 837.40 - 838.00 - Gray sandy calcareous shale.
- 838.00 - 841.70 - According to log, discarded at well.

Coring was started at a depth of 792.70 feet in gray sandy calcareous shale and completed at 841.70 feet probably in shale. That part of the cored section extending from 838.00 to 841.70 feet was discarded at well. This core shows a total of 26.44 feet of formation containing oil. For the most part, the pay sand is made up of fine grained micaceous shaley sandstone. The whole cored section is badly broken by layers of shale and sandy shale.

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 3.14, 4.93 and 3.29 millidarcys respectively; the overall average being 3.61 (See Table II). By observing the data given above and on the coregraph, it is noticeable that the sand is very tight and has a wide variation in permeability.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a good weighted average percent oil saturation, namely, 44.16. The weighted average percent oil saturation of the upper, middle and lower sections is 39.70, 45.83 and 47.72 respectively. The weighted average percent water saturation of the upper, middle and lower sections is 47.08, 35.51 and 39.06 respectively; the overall average being 41.68 (See Table IV). This gives an overall weighted average total fluid saturation of 85.84 percent.

In an effort to determine whether or not any flushing of the sand occurred during coring, all of the saturation samples were analyzed for chloride content. The results of these tests are given in Tables VII and VIII. From the data given in these tables and on the coregraph, it is evident that some flushing of the sand did occur during coring. However, we are of the opinion that most of the oil lost during coring was due to the expansion of gas carried in solution by the oil.

The weighted average oil content, of the upper, middle and lower sections is 472, 652 and 613 barrels per acre foot respectively; the overall average being 562. The total oil content, as shown by this core, is 14,245 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 2,168 barrels of oil per acre was obtained from 13.41 feet of sand. The weighted average percent oil saturation was reduced from 46.23 to 34.10, or represents an average recovery of 12.13 percent. The weighted average effective permeability of the samples is 0.171 millidarcys, while the average initial fluid production pressure is 31.4 pounds per square inch (See Table VI).

By observing the data given in Table V, you will note that of the 36 samples tested 15 produced water and 22 oil. This indicates that only approximately 2/3 of the sand represented by these samples is floodable. The tests show that the sand has a low effective permeability and, chances are, comparatively high pressures will be required to force the sand to take water.

CONCLUSION

From a study of the above data, we believe that an efficient water flood within the vicinity of this well will recover approximately 1,200 barrels of oil per acre, or an average of 85 barrels per acre foot from the 14.08 feet of floodable sand analyzed 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 primary production and the true water saturation of the sand are 10 and 38 percent respectively.

The principle drawback of this core is the fact that the sand is badly broken and tight and, as a result, considerable difficulty may be encountered in forcing the sand to take the required amount of water.

Oil Field Research Laboratories
RESULTS OF PERMEABILITY TESTS
TABLE I

Company Oko Oil & Gas Company Lease S. P. Johnson Well No. A-21

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
1	794.95	Imp.	0.55	0.55	0.00
2	795.57	Imp.	0.33	0.88	0.00
3	798.31	7.8	0.20	1.08	1.56
4	798.95	1.4	0.35	1.43	0.49
5	799.35	Imp.	0.40	1.83	0.00
6	800.24	4.8	0.29	2.06	1.10
7	800.54	5.1	0.57	2.63	2.91
8	801.87	5.2	0.10	2.73	0.52
9	802.50	Imp.	0.40	3.13	0.00
10	803.09	Imp.	0.45	3.58	0.00
11	803.72	1.7	0.50	4.08	0.85
12	804.08	1.4	0.25	4.33	0.35
13	804.65	Imp.	0.18	4.51	0.00
14	805.10	Imp.	0.35	4.86	0.00
15	805.56	1.4	0.18	5.04	0.25
16	806.23	0.46	0.30	5.34	0.14
17	807.07	0.53	0.13	5.47	0.07
18	807.68	0.97	0.36	5.83	0.35
19	808.50	Imp.	0.20	6.03	0.00
20	809.55	6.6	0.46	6.49	3.04
21	810.08	Imp.	0.50	6.99	0.00
22	810.65	1.6	0.35	7.34	0.56
23	811.03	6.6	0.30	7.64	1.98
24	811.60	0.70	0.30	7.94	0.21
25	811.95	Imp.	0.30	8.24	0.00
26	812.30	Imp.	0.52	8.76	0.00
27	813.32	9.9	0.30	9.06	2.97
28	813.82	11.	0.33	9.39	3.63
29	814.30	0.67	0.40	9.79	0.27
30	814.75	0.56	0.24	10.03	0.13
31	815.17	13.	0.33	10.36	4.29
32	815.48	3.6	0.25	10.61	0.90
33	816.09	2.7	0.25	10.86	0.68
34	816.44	5.1	0.25	11.11	1.28
35	816.83	5.8	0.50	11.61	2.90
36	817.21	1.4	0.40	12.01	0.56
37	817.66	0.82	0.47	12.48	0.39
38	818.65	6.1	0.30	12.78	1.83
39	819.38	Imp.	0.25	13.03	0.00
40	819.75	0.42	0.22	13.25	0.09

Oil Field Research Laboratories
RESULTS OF PERMEABILITY TESTS
TABLE I

Company Okro Oil & Gas Company Lease S. P. Johnson Well No. A-21

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
41	820.30	Imp.	0.18	13.43	0.00
42	821.16	0.60	0.55	13.98	0.39
43	821.63	0.67	0.30	14.28	0.20
44	822.05	3.5	0.75	15.03	2.63
45	822.55	1.9	0.30	15.33	0.57
46	823.10	1.4	0.45	15.78	0.63
47	823.42	3.7	0.45	16.23	1.67
48	824.04	3.5	0.55	16.78	1.93
49	824.45	0.99	0.30	17.08	0.30
50	824.90	3.0	0.30	17.38	0.90
51	825.27	3.9	0.30	17.68	1.17
52	825.60	1.2	0.25	17.93	0.30
53	826.03	3.3	0.60	18.53	1.98
54	826.55	3.1	0.60	19.13	1.86
55	827.13	1.2	0.45	19.58	0.54
56	827.55	4.6	0.31	19.89	1.43
57	828.15	2.4	0.45	20.34	1.08
58	828.64	3.6	0.65	20.99	2.34
59	829.45	0.58	0.73	21.72	0.42
60	833.42	2.7	0.15	21.87	0.41
61	833.69	5.0	0.35	22.22	1.75
62	834.15	14.	0.45	22.67	6.30
63	834.56	10.	0.33	23.00	3.30
64	834.95	4.3	0.12	23.12	0.52

Oil Field Research Laboratories

SUMMARY OF PERMEABILITY TESTS

TABLE II

Company Okro Oil & Gas Company Lease S. P. Johnson Well No. A-21

Depth Interval Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity, Ft. x Md.
794.70 - 812.62	4.58	3.14	14.38
813.30 - 818.75	4.02	4.93	19.83
819.25 - 835.00	9.91	3.29	32.65
794.70 - 835.00	18.51	3.61	66.86

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RESULTS OF SATURATION TESTS

TABLE III

Company Oto Oil & Gas Company Lease W. W. Johnson Well No. A-21

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	794.72	17.7	27.2	67.4	94.6	280	1.15	1.15	322
2	795.35	14.9	33.8	50.0	83.8	292	0.33	1.48	129
F-4	798.31	15.9	41.9	-	-	518	0.20	1.68	104
5	799.15	17.2	55.7	42.2	97.9	570	0.75	2.43	428
6	799.95	18.7	42.5	32.5	75.0	617	0.49	2.92	302
7	800.82	15.9	47.2	30.0	77.2	589	0.57	3.49	332
8	801.55	17.5	46.7	36.0	81.6	694	0.30	3.79	190
9	802.66	17.2	37.0	40.5	77.5	495	0.60	4.19	198
F-9	802.82	15.7	47.2	-	-	560	0.45	4.64	252
10	803.52	15.5	43.2	39.8	83.0	521	0.75	5.39	391
11	804.35	15.0	41.2	45.0	86.2	480	0.25	5.64	120
F12	805.23	13.0	31.4	-	-	317	0.35	5.99	111
12	805.38	17.2	31.5	33.6	65.1	422	0.15	6.14	67
F-14	806.42	17.9	42.2	-	-	586	0.12	6.26	70
14	806.57	14.4	47.4	48.0	91.4	486	0.27	6.49	112
15	807.36	18.4	50.0	34.8	84.8	715	0.26	6.75	186
F15	807.52	15.6	27.7	-	-	736	0.36	7.11	121

Oil Field Research Laboratories

RESULTS OF SATURATION TESTS

TABLE III

Company Oko Oil & Gas Company Lease E. P. Johnson Well No. A-21

Sat. No.	Depth, Feet	Effective Porosity Percent	Percent Saturation		Oil Content, Bbbs./A. Ft.	Feet of Core		Total Oil Content Bbbs./Acre
			Oil	Water		Total	Ft.	
16	808.25	16.5	54.1	32.0	86.1	0.12	7.23	83
F16	808.38	14.0	25.1	-	-	0.20	7.43	55
17	809.30	17.0	45.4	41.2	86.6	0.46	7.89	276
18	810.35	13.1	30.7	67.7	98.4	0.94	8.83	292
19	811.34	18.9	43.3	36.8	80.1	0.35	9.18	223
20	812.50	14.1	40.8	49.0	89.8	1.12	10.30	501
21	813.55	18.9	50.0	35.1	85.1	0.63	10.93	464
22	814.92	15.8	51.2	41.6	92.8	0.20	11.13	126
F22	815.04	17.7	51.8	-	-	0.58	11.71	412
23	815.66	15.5	44.9	51.7	96.6	0.25	11.96	135
24	816.63	16.4	53.9	34.4	88.3	1.00	12.96	687
25	817.45	15.7	44.8	43.3	88.1	0.87	13.83	477
F26	818.42	17.4	44.1	-	-	0.20	14.03	119
26	818.52	17.8	49.8	31.8	81.6	0.30	14.33	207
F28	819.06	15.8	44.0	-	-	0.22	14.55	119
28	819.98	17.0	48.2	34.3	82.5	0.13	14.68	83
29	821.42	14.7	26.8	48.9	85.7	1.30	15.98	545

Oil Field Research Laboratories

RESULTS OF SATURATION TESTS

TABLE III

Company OKO OIL & GAS COMPANY Lease S. P. JOHNSON Well No. A-21

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.	
30	822.77	16.1	44.1	40.2	84.3	551	1.50	17.48	827
31	823.65	16.1	52.5	36.4	88.9	657	1.40	18.88	920
32	824.65	16.4	55.0	33.0	88.0	700	1.10	19.98	770
33	825.80	17.5	55.7	30.5	86.2	756	0.60	20.58	454
34	826.82	17.3	64.8	33.8	98.6	870	0.60	21.18	522
F34	826.92	16.7	40.5	-	-	825	0.76	21.94	799
35	827.87	15.8	33.2	61.1	94.3	407	0.45	22.39	183
36	828.85	16.2	53.2	38.5	91.7	668	1.38	23.77	922
37	833.14	18.6	36.0	36.8	72.8	520	0.30	24.07	156
38	833.87	18.9	46.8	37.3	84.1	687	0.70	24.77	481
39	834.36	17.8	46.8	35.0	81.8	649	0.58	25.35	376
Total - - -							Total - - -		-14,245

Oil Field Research Laboratories

SUMMARY OF SATURATION TESTS

TABLE IV

Company	Lease	Well No.	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
OKO Oil & Gas Company	S. P. Johnson	A-21	794.10-812.62	10.30	14.98	39.70	47.08	472	4,861
			813.30-818.75	4.03	15.61	45.83	35.51	652	2,627
			819.70-834.68	11.02	16.50	47.72	39.06	613	6,757
			794.10-834.68	25.35	15.74	44.16	41.68	562	14,245

Oil Field Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS

TABLE V

Company Okla Oil & Gas Company

Lease E. P. Johnson

Well No. A-21

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	794.72	12.4	25.6	268	0.0	0	23.6	70.3	268	0	Imp.	50+
2	795.35	14.6	35.2	399	0.0	0	33.2	58.6	399	0	Imp.	50+
4	796.31	15.9	41.9	518	9.6	119	32.3	59.8	399	6	0.193	35
5	799.15	13.4	37.0	593	0.0	0	57.0	41.3	593	0	Imp.	50+
6	799.95	18.5	41.5	598	14.0	201	27.5	65.7	595	15	0.233	30
7	800.82	16.0	46.1	574	16.8	208	29.5	63.7	358	1	0.093	35
8	801.55	17.0	46.7	617	3.4	45	43.3	52.3	572	1	0.087	45
9	802.82	15.3	47.2	560	5.8	87	41.6	48.8	493	0	0.019	45
10	803.52	15.2	39.6	467	0.0	0	39.6	50.1	467	0	Imp.	50+
11	804.55	15.1	41.9	492	0.0	0	41.9	50.1	492	0	Imp.	50+
12	805.23	13.0	31.4	317	0.0	0	31.4	39.7	317	0	Imp.	50+
14	806.42	17.9	42.2	586	9.9	138	32.3	59.4	448	8	0.187	30
15	807.52	15.6	27.7	356	0.0	0	27.7	61.4	356	0	Imp.	50+
16	808.58	14.0	25.1	273	0.0	0	25.1	61.5	273	0	Imp.	50+
17	809.30	17.2	44.6	596	22.9	306	21.7	65.2	290	6	0.187	25
18	810.35	15.5	29.5	305	0.0	0	29.5	67.5	309	0	Imp.	50+
19	811.34	19.0	41.3	509	6.5	96	34.8	60.2	513	32	0.753	25
20	812.30	14.0	40.8	444	0.0	0	40.8	51.9	444	0	Imp.	50+
21	813.55	18.5	48.8	701	23.8	348	25.0	71.1	559	8	0.143	15
22	815.04	17.7	51.8	711	17.2	236	54.6	64.6	475	6	0.150	25
23	815.68	15.0	42.6	497	4.0	47	38.6	58.5	450	0	0.016	30
24	816.63	15.9	54.6	673	17.7	218	36.9	64.5	453	0	0.016	30
25	817.45	18.1	48.6	589	9.7	121	35.9	62.3	448	0	0.019	45
26	818.42	17.4	44.1	595	16.6	224	27.5	59.7	371	2	0.200	30
28	819.66	15.8	44.0	540	0.0	0	44.0	55.6	540	0	Imp.	50+
29	821.42	15.1	34.7	407	0.0	0	54.7	62.8	407	0	Imp.	50+
30	822.77	15.8	45.1	554	5.4	79	35.7	65.7	475	0	0.017	40
31	823.65	15.3	49.9	632	2.6	109	41.3	47.3	523	0	0.011	40
32	824.65	15.1	53.2	665	14.9	186	33.3	50.3	479	0	0.016	40
33	825.80	17.7	35.6	664	19.1	352	35.5	55.0	502	3	0.192	20

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RESULTS OF LABORATORY FLOODING TESTS

TABLE V

Company Oko Oil & Gas Company Lease S. P. Johnson Well No. A-21

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.			
34	825.92	16.7	40.5	525	4.0	52	36.5	58.7	475	3	0.190	35
35	827.68	15.8	30.5	374	0.0	0	50.5	65.0	374	0	Imp.	50
36	828.85	15.9	32.6	655	0.0	0	52.6	48.7	655	0	Imp.	50
37	833.14	18.9	36.1	539	2.4	35	35.7	57.4	494	19	0.398	25
38	835.87	18.8	44.4	646	10.4	132	34.0	59.2	496	30	0.766	25
39	834.56	17.2	45.1	623	13.6	168	31.5	56.8	435	29	0.766	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.

Oil Field Research Laboratories

SUMMARY OF LABORATORY FLOODING TESTS

TABLE VI

Company	Lease	S. P.	Johnson	Well No.
Okro Oil & Gas Company	798.15	813.30	821.65	798.15
Depth Interval Feet	811.50	818.75	834.68	834.68
Feet of Core Analyzed	2.94	3.53	6.94	13.41
Average Percent Porosity	17.04	16.74	16.81	16.85
Average Percent Original Oil Saturation	44.36	52.04	44.10	45.23
Average Percent Oil Recovery	12.18	18.24	9.01	12.13
Average Percent Residual Oil Saturation	32.18	33.80	35.09	34.10
Average Percent Residual Water Saturation	59.97	59.18	54.57	56.96
Average Percent Total Residual Fluid Saturation	92.15	92.98	90.66	91.06
Average Original Oil Content, Bbls./A. Ft.	585.	643.	625.	621.
Average Oil Recovery, Bbls./A. Ft.	162.	208.	138.	162.
Average Residual Oil Content, Bbls./A. Ft.	423.	435.	487.	459.
Total Original Oil Content, Bbls./Acre	1,720.	2,267.	4,340.	8,327.
Total Oil Recovery, Bbls./Acre	475.	733.	960.	2,168.
Total Residual Oil Content, Bbls./Acre	1,245.	1,534.	3,380.	6,159.
Average Effective Permeability, Millidarcys	0.215	0.072	0.204	0.171
Average Initial Fluid Production Pressure, p.s.i.	33.8	29.2	30.6	31.4

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 Oko Oil & Gas Company Lease S. P. Johnson Well No. A-21

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Percent Water Saturation		Total
			Connate	Drilling & Foreign	
1	794.72	24,200			
2	795.35	23,000			
5	799.15	21,400			
6	799.95	21,600			
7	800.82	31,800			
8	801.55	23,800			
9	802.68	20,200			
10	803.52	27,200			
11	804.35	24,300			
12	805.38	24,400			
14	806.53	25,000			
15	807.37	20,500			
16	808.25	28,200			
17	809.30	18,000			
18	810.35	26,300			
19	811.34	13,300			
20	812.50	30,800			
21	813.55	22,000			
22	814.92	27,000			
23	815.66	30,300			
24	816.63	26,800			
25	817.45	25,900			
26	818.52	24,900			
28	819.98	24,400			
29	821.42	29,600			
30	822.77	25,700			
31	823.65	23,000			
32	824.65	21,400			
33	825.80	22,000			
34	826.82	21,500			
35	827.88	19,900			
36	828.85	26,900			
37	833.14	14,700			
38	833.87	14,200			
39	834.36	25,200			

Note: ppm - parts per million.

Oil Field Research Laboratories

SUMMARY OF WATER DIFFERENTIATION TESTS

TABLE VIII

Company Okro Oil & Gas Company Lease S. P. Johnson Well No. A-21

Depth Interval, Feet	Chloride Content of Brine in Sand, ppm	Average Percent Connate Water	Average Percent Drilling & Foreign Water
794.10 - 812.62	24,400		
813.30 - 818.75	28,800		
819.70 - 834.68	23,600		
794.10 - 834.68	24,690		

Note: ppm - parts per million.