

OIL FIELD RESEARCH LABORATORIES
CHANUTE, KANSAS

January 4, 1952

Okco Oil & Gas Company
Atlas Life Building
Tulsa, Oklahoma

Attention: Mr. T. F. Lawry

Gentlemen:

Enclosed herewith is the report of the analysis of the 3" Rotary core taken from the East Ware Lease, Well No. A-13, Anderson County, Kansas, and submitted to our laboratory on December 20, 1951.

In calculating the recovery for the area represented by this core, an allowance was made for oil lost during coring, and it was assumed that the true water saturation of the sand is 38 percent.

Very truly yours,

OIL FIELD RESEARCH LABORATORIES

Carl L. Pate

CLP:bl
c.c. to Mr. D. E. Auld

OFC OIL & GAS COMPANY

CORE ANALYSIS REPORT

E. WARE LEASE WELL NO. A-13

ANDERSON COUNTY, KANSAS

OIL FIELD RESEARCH LABORATORIES

CHANUTE, KANSAS

JANUARY 4, 1952

Oil Field Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Oko Oil & Gas Company Lease F. Ware Well No. A-13

Location NE 1

Section 13 Twp. 21S Rge. 20E County Anderson State Kansas

Name of Sand	Squirrel
Top of Core	800.00
Bottom of Core	849.00
Top of Sand ^{pay}	807.05
Bottom of Sand	843.15
Total Feet of Permeable Sand	27.00
Total Feet of Floodable Sand	26.00

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
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Average ^{Effective} Permeability Millidarcys	3.63
Average Percent Porosity	18.54
Average Percent Oil Saturation	38.33
Average Percent Water Saturation	-
Average Oil Content, Bbls./A. Ft.	547.
Total Oil Content, Bbls./Acre	15,858.
Average Percent Oil Recovery by Laboratory Flooding Tests	10.47
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	152.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	4,074.
Total Calculated Oil Recovery, Bbls./Acre	4,600.
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	1186.00

Company Oko Oil & Gas Company Lease East Ware Well No. A-13

LOG

<u>Depth Interval, Feet</u>	<u>Description</u>
800.00 - 800.35	- Laminated sandstone and shale.
800.35 - 800.70	- Brown fine grained micaceous shaley sandstone.
800.70 - 801.10	- Laminated sandstone and shale.
801.10 - 801.60	- Brown fine grained micaceous sandstone.
801.60 - 802.10	- Laminated shaley sandstone.
802.10 - 802.30	- Finely laminated sandy shale.
802.30 - 802.50	- Finely laminated shaley sandstone.
802.50 - 803.00	- Finely laminated sandy shale.
803.00 - 804.16	- Brown fine grained micaceous sandstone containing two shale streaks.
804.16 - 804.40	- Laminated sandstone and shale.
804.40 - 804.60	- Brown fine grained finely laminated micaceous shaley sandstone.
804.60 - 804.70	- Laminated sandy shale.
804.70 - 804.90	- Laminated shaley sandstone.
804.90 - 805.78	- Finely laminated sandstone and shale.
805.78 - 806.35	- Finely laminated shale and sandstone.
806.35 - 807.05	- Laminated sandy shale containing a sand streak.
807.05 - 807.30	- Brown fine grained micaceous sandstone.
807.30 - 807.66	- Laminated sandstone and shale.
807.66 - 810.10	- Brown fine grained micaceous sandstone.
810.10 - 810.30	- Laminated sandstone and shale.
810.30 - 810.45	- Laminated shaley sandstone.
810.45 - 810.80	- Laminated sandstone and shale.

- 810.80 - 811.00 - Laminated shaley sandstone.
- 811.00 - 811.30 - Brown fine grained laminated micaceous shaley sandstone.
- 811.30 - 812.00 - Laminated sandstone and shale.
- 812.00 - 814.00 - Gray sandy shale.
- 814.00 - 814.40 - Brown fine grained slightly laminated micaceous shaley sandstone.
- 814.40 - 814.70 - Laminated sandy shale.
- 814.70 - 815.30 - Brown fine grained laminated micaceous shaley sandstone.
- 815.30 - 815.65 - Brown fine grained slightly laminated micaceous shaley sandstone.
- 815.65 - 815.90 - Hard brown fine grained micaceous sandstone.
- 815.90 - 816.55 - Laminated sandstone and shale.
- 816.55 - 819.70 - Brown fine grained micaceous sandstone.
- 819.70 - 820.25 - Brown fine grained micaceous shaley sandstone.
- 820.25 - 820.55 - Laminated sandy shale.
- 820.55 - 820.95 - Brown fine grained micaceous shaley sandstone.
- 820.95 - 823.08 - Brown fine grained micaceous sandstone.
- 823.08 - 825.00 - Gray sandy shale.
- 825.00 - 825.20 - Laminated shaley sandstone.
- 825.20 - 825.47 - Laminated sandy shale.
- 825.47 - 826.05 - Brown fine grained laminated micaceous shaley sandstone.
- 826.05 - 826.60 - Laminated sandstone and shale.
- 826.60 - 826.85 - Brown fine grained micaceous sandstone containing a shale inclusion.
- 826.85 - 828.30 - Brown fine grained micaceous sandstone.
- 828.30 - 828.58 - Gray shale.
- 828.58 - 829.45 - Brown fine grained micaceous sandstone.
- 829.45 - 829.65 - Gray shale.
- 829.65 - 830.20 - Brown fine grained micaceous slightly shaley sandstone.

- 830.20 - 831.27 - Brown fine grained micaceous sandstone.
- 831.27 - 831.50 - Gray shale.
- 831.50 - 831.77 - Gray sandy shale.
- 831.77 - 837.35 - Brown fine grained micaceous sandstone.
- 837.35 - 837.73 - Laminated sandy shale.
- 837.73 - 838.20 - Brown fine grained micaceous shaley sandstone.
- 838.20 - 843.15 - Brown fine grained micaceous sandstone.
- 843.15 - 844.60 - Black shale.
- 844.60 - 845.00 - Dark gray sandy calcareous shale.
- 845.00 - 849.00 - According to log, black shale and lime shell (Discarded at well).

Oil Field Research Laboratories

RESULTS OF SATURATION TESTS

TABLE III

Company Oko Oil & Gas Company

Lease E. Ware

Well No. A-13

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.	
1A	807.75	20.6	34.7	-	-	549	0.77	0.77	400
1	804.50	16.8	47.6	-	-	568	0.20	0.97	114
2	805.53	14.7	36.2	-	-	403	0.88	1.81	355
3	806.10	14.6	36.4	-	-	413	0.57	2.38	235
4	807.18	21.0	34.2	-	-	558	0.25	2.63	140
5	808.13	20.0	35.5	-	-	480	0.99	3.62	475
6	809.14	18.6	34.1	-	-	492	0.90	4.52	443
7	809.95	17.6	37.0	-	-	505	0.55	5.07	278
8	811.13	17.7	44.0	-	-	604	0.30	5.37	181
11	814.27	20.0	32.2	-	-	500	0.40	5.77	200
13	815.78	15.7	40.6	-	-	529	1.20	6.97	635
14	816.90	18.6	31.6	-	-	456	0.75	7.72	342
15	817.80	17.6	31.4	-	-	428	0.90	8.62	385
16	818.63	20.2	32.0	-	-	502	1.50	10.12	753
18	819.94	17.1	39.5	-	-	525	0.55	10.67	289
19	820.80	14.5	35.7	-	-	402	0.40	11.07	161
20	821.58	20.4	42.5	-	-	673	1.25	12.32	841

Oil Field Research Laboratories

RESULTS OF SATURATION TESTS

TABLE III

Company **OKO Oil & Gas Company**

Lease **E. NARE**

Well No. **A-13**

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	822.86	19.9	38.8	-	-	601	0.88	13.20	530
25	825.10	14.6	38.2	-	-	477	0.20	13.40	87
26	825.68	14.8	37.8	-	-	474	0.58	13.98	252
27	826.44	17.9	37.8	-	-	408	0.55	14.53	224
29	828.02	18.0	45.1	-	-	630	1.45	15.98	914
30	828.82	19.6	39.8	-	-	606	0.87	16.85	527
31	829.80	17.5	52.3	-	-	710	0.55	17.40	791
32	830.62	19.1	43.7	-	-	651	1.07	18.47	697
33	832.58	20.1	39.2	-	-	612	1.07	19.50	630
34	837.28	18.8	35.9	-	-	524	0.85	20.35	445
35	834.02	20.9	34.0	-	-	551	0.75	21.10	413
36	834.87	17.0	46.3	-	-	611	1.20	22.30	773
38	836.45	19.4	36.3	-	-	546	1.20	23.50	655
39	837.24	20.2	39.6	-	-	627	0.55	24.05	745
40A	838.30	22.1	31.5	-	-	560	0.40	24.45	716
41	838.87	22.7	34.1	-	-	601	0.70	25.15	420
42	839.79	21.7	36.2	-	-	608	0.85	26.00	517

Oil Field Research Laboratories

RESULTS OF SATURATION TESTS

TABLE III

Company Oko Oil & Gas Company Lease E. Ware Well No. A-13

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.	
43	840.97	19.6	40.7	-	-	588	0.80	26.80	470
44	841.36	17.7	36.0	-	-	495	1.05	27.85	520
46	842.73	17.8	40.6	-	-	561	1.15	29.00	615
							Total	- - -	- 15,858

Note: 'A' - Sample was taken from core after it was received in the laboratory.

Oil Field Research Laboratories

SUMMARY OF SATURATION TESTS

TABLE IV

Company **OKO OIL & GAS COMPANY** Lease **E. Ware** Well No. **A-13**

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
803.00-823.08	13.20	18.25	36.67	-	512	6,757
825.00-831.27	5.27	17.53	42.87	-	587	3,092
831.77-843.15	10.53	19.40	38.12	-	571	6,009
803.00-843.15	29.00	18.54	38.33	-	547	15,858

Oil Field Research Laboratories

SUMMARY OF LABORATORY FLOODING TESTS

TABLE VI

Company	Lease	S. Ware	Well No.
OKO OIL & Gas Company	825.00	831.77	803.00
Depth Interval Feet	823.08	843.15	843.15
Feet of Core Analyzed	11.55	10.53	26.80
Average Percent Porosity	18.75	19.49	18.87
Average Percent Original Oil Saturation	36.60	38.10	38.40
Average Percent Oil Recovery	9.46	10.18	10.47
Average Percent Residual Oil Saturation	27.14	27.92	27.93
Average Percent Residual Water Saturation	68.76	66.79	67.55
Average Percent Total Residual Fluid Saturation	95.90	94.71	95.48
Average Original Oil Content, Bbls./A. Ft.	524.	570.	556.
Average Oil Recovery, Bbls./A. Ft.	136.	151.	152.
Average Residual Oil Content, Bbls./A. Ft.	388.	419.	404.
Total Original Oil Content, Bbls./Acre	6,052.	6,006.	14,924.
Total Oil Recovery, Bbls./Acre	1,571.	1,593.	4,074.
Total Residual Oil Content, Bbls./Acre	4,481.	4,413.	10,850.
Average Effective Permeability, Millidarcys	3.45	4.85	3.63
Average Initial Fluid Production Pressure, p.s.i.	19.3	14.2	18.5

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

Oil Field Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS

TABLE V

Company Oko Oil & Gas Company

Lease E. Ware

Well No. A-13

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.			
1A	803.35	20.6	34.3	549	3.5	36	30.6	62.3	493	344	5.83	5
1	804.30	18.8	43.8	558	0.0	0	43.8	48.5	558	45	1.37	20
2	805.33	14.3	38.2	403	0.0	0	38.2	61.8	403	0	Imp.	50+
3	806.10	14.6	36.4	413	0.0	0	36.4	60.7	413	0	Imp.	50+
4	807.18	21.0	34.2	558	9.4	153	24.8	66.0	405	212	6.03	15
5	808.15	20.0	35.5	480	8.3	112	27.2	68.5	382	161	5.78	10
6	809.14	18.8	34.1	492	8.3	120	28.8	73.0	372	157	5.20	10
7	809.95	17.6	37.0	503	9.0	123	28.0	65.1	382	21	0.676	25
8	811.13	17.7	44.0	604	12.1	166	31.9	58.8	438	6	0.208	30
11	814.27	20.0	32.2	500	10.8	165	21.8	72.6	335	202	6.39	10
13	815.78	15.3	44.6	529	14.6	173	30.0	61.5	356	1	0.125	55
14	816.90	18.8	31.6	456	5.1	117	25.5	70.7	339	112	3.95	15
15	817.60	17.6	31.4	426	5.3	72	26.1	68.8	356	36	1.01	20
16	818.63	20.2	32.0	502	7.0	110	25.0	62.1	392	144	6.01	15
18	819.94	17.1	39.3	525	10.5	139	29.0	66.7	388	33	1.03	20
19	820.60	14.5	35.7	402	1.3	15	34.4	63.6	387	2	0.147	45
20	821.58	20.4	42.5	473	17.3	274	23.2	70.0	399	82	2.30	15
22	822.88	19.9	38.8	601	10.2	158	28.8	60.7	443	77	2.45	20
23	823.10	14.6	38.2	433	7.0	79	31.2	60.7	354	0	0.020	35
25	823.68	14.8	37.8	434	6.2	71	31.6	63.6	363	0	0.012	40
27	826.44	13.9	37.8	408	0.0	0	37.8	32.4	408	0	Imp.	50+
29	828.02	18.0	45.1	630	14.7	205	30.4	69.3	423	56	1.96	15
30	828.82	19.8	39.8	606	13.8	210	28.0	66.1	396	77	2.30	15
31	829.80	17.3	52.3	710	16.5	224	35.8	56.6	456	7	0.253	25
32	830.62	19.1	43.7	631	15.7	233	22.2	69.5	418	51	1.53	20
33	832.54	20.1	39.2	612	14.4	225	24.8	69.5	387	139	7.43	10
34	833.28	18.8	35.9	524	8.7	127	27.2	71.6	397	68	2.58	15
35	834.02	20.9	34.0	551	8.4	136	26.6	69.2	416	180	7.74	10
36	834.83	17.0	46.3	611	17.1	226	29.2	69.0	385	15	0.406	25
38	838.45	19.4	38.3	546	10.5	158	25.8	71.0	388	179	5.21	15
39	837.24	20.2	39.4	627	15.0	235	24.4	68.8	382	116	3.88	15

Oil Field Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS

TABLE V

Company Oko Oil & Gas Company

Lease X. Ware

Well No. A-15

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.			
40A	838.30	22.1	31.5	540	6.4	93	26.1	65.6	447	194	13.08	10
41	838.87	22.7	34.1	601	7.8	136	26.3	64.0	483	243	8.41	10
42	839.79	21.7	36.2	608	5.2	88	30.7	63.2	520	171	6.33	15
43	840.57	16.6	40.7	588	3.9	143	30.6	61.9	445	143	4.14	15
44	841.34	17.7	36.0	495	6.4	98	29.6	61.0	407	84	2.41	15
45	842.73	17.8	40.6	561	2.2	187	31.4	64.7	454	127	3.62	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.
 *1 - Sample was taken from core after it was received in the laboratory.