14-21-202

Ewing W-33

February 12, 1949

The Sloan & Zook Company
Tulsa, Oklahoma

Attention: Mr. T. F. Lawry

Gentlemen:

Enclosed herewith is the report of the analysis of the 3" rotary core taken from the Ewing Lease, Well No. W-31, Anderson County, Kansas.

Very truly yours,

OIL FIELD RESEARCH LABORATORIES

Carl L. Pate

CLP:ls
c.c. to Mr. Neil Henderson

THE SLOAN & ZOOK COMPANY

CORE ANALYSIS REPORT

KUING LEASE WELL NO. W-31

ANDERSON COUNTY, KANSAS

OIL FIELD RESEARCH LABORATORIES

CHANUTE, KANSAS

FEBRUARY 12, 1942.

Oil Field Research Laboratories

GENERAL INFORMATION & SUMMARY

Company The Sloan & Zook Company Lease Swing Well No. W-31

Location 990' north of south line and 330' west of east line, NE¼

Section 14 Twp. 21 Rge. 20 County Anderson State Kansas

Name of Sand	Squirrel
Top of Core	675.20
Bottom of Core	731.70
Top of Sand	679.00
Bottom of Sand	723.80
Total Feet of Permeable Sand	32.25

Distribution of Permeable Sand:

Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 5	17.35	17.35
5 - 10	10.30	27.65
10 - 15	2.70	30.35
15 & above	1.90	32.25

Average Permeability, Millidarcys	6.40
Average Percent Porosity	16.45
Average Percent Oil Saturation	35.06
Average Percent Water Saturation	43.95
Average Oil Content, Bbls./A. Ft.	452.
Total Oil Content, Bbls./Acre	13,733.
Average Percent Oil Recovery by Laboratory Flooding Tests	7.66
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	103.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	1,822.
Total Calculated Oil Recovery, Bbls./Acre	1,150.
Packer Setting, Feet	684.5
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	

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
675.20 - 677.80	Gray slightly laminated sandy shale.
677.80 - 679.00	Shale (discarded at well).
679.00 - 679.80	Light brown sandstone.
679.80 - 680.10	Gray shale.
680.10 - 682.70	Shale (discarded at well).
682.70 - 685.60	Gray slightly laminated sandy shale.
685.60 - 686.10	Brown sandstone.
686.10 - 689.50	Light brown laminated sandstone and shale.
689.50 - 690.20	Gray shale.
690.20 - 691.60	Gray slightly laminated sandy shale.
691.60 - 695.80	Light brown laminated sandstone and shale.
695.80 - 697.00	Brown slightly laminated shaley sandstone.
697.00 - 697.70	Brown laminated shaley sandstone.
697.70 - 698.00	Gray shale.
698.00 - 701.05	Finely laminated sandstone and shale.
701.05 - 701.40	Gray shale.
701.40 - 704.60	Gray slightly laminated shaley sandstone.
704.60 - 705.60	Laminated sandstone and shale.
705.60 - 713.40	Finely laminated sandstone and shale.
713.40 - 715.00	Dark brown micaceous sandstone.
715.00 - 715.80	Gray slightly laminated sandy shale.
715.80 - 716.30	Dark brown medium grained sandstone.

716.30 - 716.80 - Gray shale.

716.80 - 717.20 - Dark micaceous carbonaceous sandstone.

717.20 - 719.50 - Laminated sandstone and shale.

719.50 - 720.20 - Gray slightly laminated sandy shale.

720.20 - 721.30 - Gray shale.

721.30 - 722.10 - Dark brown micaceous sandstone.

722.10 - 723.20 - Gray shale.

723.20 - 723.80 - Brown fine grained sandstone.

723.80 - 731.70 - Shale (discarded at well).

Coring was started at a depth of 675.20 feet in slightly laminated sandy shale and completed at a depth of 731.70 in shale. This core shows a total of 30.35 feet of formation containing oil. The cored section is badly broken and contains very little clean sand.

PERMEABILITY

The formation in this core is very tight; having an overall weighted average permeability of only 6.40 millidarcys. For the sake of distribution, the core was divided into two sections. The weighted average permeability of the upper and lower sections are 5.90 and 7.09 respectively (See Table II). By observing the data given on the coregraph, it is noticeable that the cored section has a fairly irregular permeability profile.

PERCENT SATURATION & OIL CONTENT

The weighted average percent oil saturation of the upper and lower sections are 32.83 and 38.34 respectively; the overall average being 35.06. The weighted average percent water saturation of the upper and lower sections are 45.65 and 41.28 respectively; the overall average being 43.95, (See Table IV). This gives an overall weighted average total fluid saturation of 79.01 percent.

The formation in this core has a comparatively low weighted average oil content, namely, 432 barrels per acre foot. The weighted average oil content of the upper and lower sections are 417 and 504 barrels per acre foot respectively. The total oil content, as shown by this core, is 13,733 barrels per acre (See Table IV).

LABORATORY FLOODING TESTS

This core did not respond very well to laboratory flooding tests as a total recovery of only 1,222 barrels of oil per acre was obtained from 11.85 feet of section. The weighted average percent oil saturation was reduced from 35.90 to 25.24, or represents an average recovery of 7.66 percent. The weighted average effective permeability of the samples is 0.970 millidarcys, while the average initial fluid production pressure is 32.5 pounds per square inch (See Table VI).

By observing the data given in Table V, it is noticeable that of the 28 samples tested only 12 produced oil. Furthermore, comparatively high pressures were required in order to flood out the samples.

CONCLUSION

On the basis of the above data, we believe that an efficient water flood within the vicinity of this well will recover approximately 1,150 barrels of oil per acre. In calculating this recovery, an allowance was made for oil lost during coring.

The principle drawback of this core is that it contains only approximately 10 feet of floodable sand. Furthermore, the sand also has a fairly high water saturation.

OIL FIELD RESEARCH LABORATORIES

SHOT RECOMMENDATION

Company The Sloan & Zook Company Lease Ewing Well No. W-31

Depth Interval, Feet	Feet of Sand	Size of Shell, Inches	Qts./Ft.	Total Qts.
689.5 - 718.5	29.0	3½	2.0	58.0

Recommended Packer Setting - 684.50 feet.
Note: Plug hole back to 722.00 feet.

Oil Field Research Laboratories

RESULTS OF PERMEABILITY TESTS

TABLE I

Company The Sloan & Zook Company Lease Ewing Well No. W-31

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
1	676.00	3.9	0.10	0.10	0.39
2	679.40	4.3	0.80	0.90	3.44
3	683.60	3.4	0.50	1.40	1.70
4	684.30	4.8	0.60	2.00	2.88
5	684.80	5.7	0.60	2.60	3.42
6	685.40	4.6	0.50	3.10	2.30
7	686.20	5.0	0.20	3.30	1.00
8	686.50	2.5	0.60	3.90	1.50
9	687.25	6.2	0.60	4.50	3.72
10	687.70	4.6	0.80	5.30	3.68
11	688.75	5.2	0.80	6.10	4.16
12	691.05	2.6	0.45	6.55	1.17
13	691.50	3.4	0.35	6.90	1.19
14	692.20	5.1	0.75	7.65	3.83
15	692.60	4.0	0.65	8.30	2.60
16	693.40	5.1	0.60	8.90	3.06
17	693.80	6.6	0.50	9.40	3.30
18	694.45	16.	0.50	9.90	8.00
19	694.80	11.	0.60	10.50	6.60
20	695.55	3.2	0.60	11.10	1.92
21	695.95	12.	0.30	11.40	3.60
22	696.25	2.7	0.60	12.00	1.62
23	697.05	Broken	0.35	12.35	0.00
24	697.60	6.8	0.35	12.70	2.38
25	697.80	Imp.	0.30	13.00	0.00
26	698.25	Broken	0.70	13.70	0.00
27	699.10	5.6	0.60	14.30	3.36
28	699.50	32.	0.50	14.80	16.00
29	700.25	3.8	0.70	15.50	2.66
30	700.85	Broken	0.55	16.05	0.00
31	701.75	4.8	0.60	16.65	2.88
32	702.35	4.6	0.60	17.25	2.76
33	702.85	2.2	0.45	17.70	0.99
34	703.20	5.4	0.35	18.05	1.89
35	703.60	2.9	0.60	18.65	1.74
36	704.30	5.0	0.60	19.25	3.00
37	704.65	3.9	0.30	19.55	1.17
38	705.10	6.0	0.70	20.25	4.20
39	705.70	5.0	0.40	20.65	2.00
40	706.25	3.4	0.50	21.15	1.70

Oil Field Research Laboratories

RESULTS OF PERMEABILITY TESTS

TABLE I

Company The Sloan & Zook Company Lease Ewing Well No. W-31

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
41	707.55	5.4	0.60	21.75	3.24
42	708.30	2.5	0.55	22.30	1.38
43	708.60	3.6	0.30	22.60	1.08
44	708.90	3.5	0.55	23.15	1.93
45	709.60	3.1	0.50	23.65	1.55
46	710.00	5.7	0.50	24.15	2.85
47	710.70	2.5	0.55	24.70	1.38
48	711.10	3.7	0.65	25.35	2.41
49	712.05	7.1	0.70	26.05	4.97
50	712.40	12.	0.50	26.55	6.00
51	713.05	11.	0.70	27.25	7.70
52	713.50	9.1	0.50	27.75	4.55
53	714.30	15.	0.60	28.35	9.00
54	714.65	18.	0.50	28.85	9.00
55	715.65	3.7	0.40	29.25	1.48
56	716.45	3.9	0.10	29.35	0.39
57	716.90	16.	0.40	29.75	6.40
58	717.60	3.5	0.50	30.25	1.75
59	717.85	3.5	0.55	30.80	1.93
60	718.70	9.0	0.55	31.35	4.95
61	718.95	10.	0.70	32.05	7.00
62	719.75	5.3	0.70	32.75	3.71
63	720.30	Imp.	0.20	32.95	0.00
64	721.90	8.0	0.80	33.75	6.40
65	723.30	1.9	0.60	34.35	1.14

Oil Field Research Laboratories

SUMMARY OF PERMEABILITY TESTS

TABLE II

Company The Sloan & Zook Company Lease Ewing Well No. W-31

Depth Interval Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity, Ft. x Md.
679.00 - 705.60	18.25	5.90	107.72
707.30 - 723.80	13.00	7.09	92.19
679.00 - 723.80	31.25	6.40	199.91

Oil Field Research Laboratories

RESULTS OF SATURATION TESTS

TABLE III

Company The Sloan & Zook Company Lease Ewing Well No. W-31

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.	
4	679.15	18.4	23.8	48.8	72.6	340	0.80	0.80	272
6	685.72	18.7	38.9	33.0	71.9	565	0.50	1.30	283
7	686.75	16.8	33.3	44.8	78.1	435	1.30	2.60	566
8	687.95	15.1	25.0	59.3	84.3	293	1.20	3.80	352
9	689.13	17.0	29.1	55.8	84.9	385	0.90	4.70	346
11	691.65	16.5	31.5	48.0	79.5	403	0.60	5.30	242
12	692.85	15.4	25.2	55.0	80.2	301	1.30	6.60	392
13	694.05	15.8	32.0	43.3	75.3	393	1.00	7.60	393
14	695.00	14.5	24.6	56.4	81.0	278	1.30	8.90	362
15	696.47	15.1	37.6	44.7	82.3	442	1.20	10.10	531
16	697.20	16.1	36.9	37.1	74.0	462	0.70	10.80	323
17	698.63	15.8	39.7	34.8	74.5	487	1.20	12.00	584
18	699.73	16.7	36.1	39.2	75.3	467	1.85	13.85	863
19	701.90	15.2	35.5	47.4	82.9	420	1.60	15.45	672
20	703.85	17.7	31.7	44.8	76.5	436	1.60	17.05	698
21	705.30	17.4	48.1	30.5	78.6	651	1.00	18.05	651
23	707.83	15.1	32.5	50.0	82.5	382	1.20	19.25	459
24	709.13	16.5	29.5	41.4	70.9	378	1.20	20.45	454
25	710.23	15.8	32.6	44.9	77.5	400	1.10	21.55	440

Oil Field Research Laboratories

RESULTS OF SATURATION TESTS

TABLE III

Company The Sloan & Zook Company Lease Ewing Well No. W-31

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.	
26	711.33	18.3	42.0	40.8	82.8	597	1.20	22.75	716
27	712.61	17.4	43.4	42.0	85.4	586	1.40	24.15	822
28	713.75	19.7	49.5	32.2	81.7	759	0.90	25.05	683
29	714.90	18.9	41.6	40.4	82.0	612	0.70	25.75	428
30	715.92	18.3	37.0	46.7	83.7	526	0.50	26.25	263
31	717.10	17.6	58.5	34.0	92.5	800	0.40	26.65	320
F31	717.35	15.6	28.3	-	-	345	0.50	27.15	173
32	718.10	15.4	36.0	42.8	78.8	430	0.90	28.05	387
33	719.15	18.3	41.9	47.1	89.0	596	0.90	28.95	536
35	721.45	14.5	30.7	46.8	77.5	336	0.80	29.75	269
36	723.50	12.6	43.0	12.5	55.5	422	0.60	30.35	253
								Total -	- 13,733

Oil Field Research Laboratories

SUMMARY OF SATURATION TESTS

TABLE IV

Company The Sloan & Zook Company Lease Ewing Well No. E-31

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
679.00-705.60	18.05	16.24	32.83	45.65	417	7,530
707.30-723.80	12.30	16.76	38.34	41.28	504	6,203
679.00-723.80	30.35	16.45	35.06	43.95	452	13,733

Oil Field Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS

TABLE V

Company The Sloan & Zook Company Lease Ewing Well No. W-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.			
4	679.65	15.4	25.9	310	0.0	0	25.9	63.0	310	0	Imp.	50+
6	685.93	15.8	38.2	467	0.0	0	38.2	44.3	467	0	Imp.	50+
7	687.03	17.0	26.2	377	2.4	32	23.8	64.7	345	0	0.07	50
8	688.26	20.0	26.2	407	2.9	45	23.3	56.7	352	38.5	0.91	20
9	689.37	15.3	31.9	394	5.5	43	26.4	66.7	351	2	0.50	40
11	691.90	14.2	29.4	324	0.0	0	29.4	56.9	324	0	Imp.	50+
12	693.15	16.9	29.7	390	0.0	0	29.7	57.0	390	0	Imp.	50+
13	694.30	14.3	32.7	368	0.0	0	32.7	58.2	368	0	Imp.	50+
14	695.25	13.3	21.4	232	0.0	0	21.4	65.1	232	0	Imp.	50+
15	696.35	13.9	36.8	397	0.0	0	36.8	47.5	397	0	Imp.	50+
16	697.42	16.3	32.5	411	5.8	73	26.7	64.7	338	2	2.49	35
17	698.87	16.0	37.7	456	10.5	130	26.2	65.9	326	1	1.16	25
18	699.96	15.5	36.5	438	2.5	30	34.0	49.6	408	0	0.12	45
19	702.10	13.4	38.8	403	0.0	0	38.8	55.8	403	0	Imp.	50+
20	704.07	15.0	34.6	402	0.0	0	34.6	54.5	402	0	Imp.	50+
21	705.50	18.5	47.0	674	14.0	201	33.0	60.7	473	5	1.02	25
23	708.06	14.1	30.7	336	0.0	0	30.7	54.3	336	0	Imp.	50+
24	709.36	17.1	25.0	332	0.0	0	25.0	60.0	332	0	Imp.	50+
25	710.50	16.1	33.5	418	0.0	0	33.5	51.7	418	0	Imp.	50+
26	712.57	17.7	43.3	594	0.0	0	43.3	50.0	594	0	Imp.	50+
27	712.65	17.1	40.4	537	0.0	0	40.4	53.3	537	0	Imp.	50+
28	714.05	19.1	43.0	638	17.0	252	26.0	59.8	386	15.5	3.74	15
30	716.15	18.5	42.3	621	18.7	268	24.6	60.6	353	6.5	2.10	25
31	717.35	15.6	28.5	345	5.6	68	22.9	63.9	277	0	0.02	40
32	718.42	16.2	36.0	477	12.2	153	25.8	62.7	324	3	1.06	30
33	719.40	16.1	45.6	570	8.0	100	37.6	51.7	470	0	0.13	40
35	721.65	14.9	32.4	374.	0.0	0	32.4	52.5	374	0	Imp.	50+
36	723.70	12.3	46.3	442	0.0	0	46.3	39.5	442	0	Imp.	50+

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 The Sloan & Zook Company Lease Ewing Well No. 3-31

Depth Interval, Feet	686.10 - 705.60	713.40 - 719.50	686.10 - 719.50
Feet of Core Analyzed	8.15	3.70	11.85
Average Percent Porosity	16.96	17.14	17.01
Average Percent Original Oil Saturation	33.81	40.51	35.90
Average Percent Oil Recovery	5.53	12.35	7.66
Average Percent Residual Oil Saturation	28.28	28.16	28.24
Average Percent Residual Water Saturation	59.83	59.19	59.63
Average Percent Total Residual Fluid Saturation	88.11	87.35	87.87
Average Original Oil Content, Bbls./A. Ft.	453.	561.	480.
Average Oil Recovery, Bbls./A. Ft.	73.	168.	103.
Average Residual Oil Content, Bbls./A. Ft.	380.	393.	377.
Total Original Oil Content, Bbls./Acre	3,693.	2,002.	5,695.
Total Oil Recovery, Bbls./Acre	599.	623.	1,222.
Total Residual Oil Content, Bbls./Acre	3,094.	1,379.	4,473.
Average Effective Permeability, Millidarcys	0.736	1.49	0.970
Average Initial Fluid Production Pressure, p.s.i.	34.3	30.0	32.5

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