● CORE ANALYSIS ● WATER REPRESSURING ENGINEERING ● WATER ANALYSIS ● FLOODING WATER TREATMENT ● SURVEYING

OILFIELD RESEARCH LABORATORIES

- REGISTERED ENGINEERS -

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April 20, 1959

Ward A. McGinnis &
Greenwood Petroleum Management, Inc.
Eureka, Kansas

Gentlemen:

Enclosed herewith is the report of the analysis of the 3" Rotary core taken from the Oldham Lease, Well No. 5, Greenwood County, Kansas, and submitted to our laboratory by Mr. Dan M. Cox on April 12, 1959.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Carl L. McElrea

Carl L. McElrea

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GENERAL INFORMATION & SUMMARY

Company Ward A. McGinnis & Greenwood Pet. Mangmnt., Inc. Lease Oldham Well No. 5

Location SW¼

Section 6 Twp. 24S Rge. 10E County Greenwood State Kansas

Name of Sand	Bartlesville
Top of Core	2231.0
Bottom of Core	2282.0
Top of Sand	?
Bottom of Sand	?
Total Feet of Permeable Sand	42.0
Total Feet of Floodable Sand	-

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 1.0	7.0	7.0
1.0 - 1.5	9.0	16.0
1.5 - 2.0	9.0	25.0
2.0 - 2.5	7.0	32.0
2.5 - 3.0	5.0	37.0
3.0 & above	5.0	42.0

Average Permeability Millidarcys	2.0
Average Percent Porosity	14.7
Average Percent Oil Saturation	29.0
Average Percent Water Saturation	51.1
Average Oil Content, Bbls./A. Ft.	335.
Total Oil Content, Bbls./Acre	17,078.
Average Percent Oil Recovery by Laboratory Flooding Tests	
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	
Total Calculated Oil Recovery, Bbls./Acre	4,400.
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	

A fresh water mud was used as the circulating fluid during the coring of the sand.

The samples were taken from the core by a representative of the client.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
2231.0 - 2262.0	Grayish light brown laminated micaceous shaley sandstone.
2262.0 - 2263.0	Gray laminated shaley sandstone.
2263.0 - 2279.0	Grayish light brown micaceous shaley sandstone.
2279.0 - 2280.0	Gray laminated shaley sandstone.
2280.0 - 2282.0	Grayish light brown micaceous shaley sandstone.

Coring was started at a depth of 2231.0 feet in grayish light brown laminated micaceous shaley sandstone and completed at 2282.0 feet in grayish light brown micaceous shaley sandstone. This core shows a total of 51.0 feet of sandstone. For the most part, the pay is made up of grayish light brown micaceous shaley 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 is 1.3, 1.8 and 2.5 millidarcys respectively; the overall average being 2.0 (See Table III). By observing the data given on the coregraph, it is noticeable that the sand is tight. The permeability of the sand varies from 0.62 to a maximum of 6.5 millidarcys.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a fairly good weighted average percent

oil saturation, namely, 29.0. The weighted average percent oil saturation of the upper, middle and lower sections is 25.8, 30.8 and 29.4 respectively. The weighted average percent water saturation of the upper, middle and lower sections is 51.6, 51.8 and 49.5 respectively; the overall average being 51.1 (See Table III). This gives an overall weighted average total fluid saturation of 80.1 percent. This total fluid saturation indicates some fluid was lost during coring, part of which probably was oil.

The weighted average oil content of the upper, middle and lower sections is 289, 349 and 356 barrels per acre foot respectively; the overall average being 335. The total oil content, as shown by this core, is 17,078 barrels per acre (See Table III).

LABORATORY FLOODING TESTS

The sand in this core did not respond satisfactorily to laboratory flooding tests as all samples tested were found to be impermeable.

CONCLUSION

From a study of the enclosed data, we believe that efficient primary production methods will recover approximately 4,400 barrels of oil per acre from the area represented by this core. In calculating this recovery it was assumed that this well was drilled in virgin territory.

This core shows a good section of pay sand having fairly good oil and rather high water saturations. The analysis results indicate that the sand is comparatively tight.

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Ward A. McGinnis & Greenwood Pet. Mangmnt., Inc. Lease Oldham Well No. 5

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	2231.5	14.8	21	57	78	241	1.1	1.0	1.0	241	1.10
2	2232.5	15.0	29	51	80	338	0.62	1.0	2.0	338	0.62
3	2233.5	14.6	23	58	81	261	Imp.	1.0	3.0	261	0.00
4	2234.5	14.5	21	59	80	236	Imp.	1.0	4.0	236	0.00
5	2235.5	16.3	22	51	73	278	Imp.	1.0	5.0	278	0.00
6	2236.5	15.0	34	51	85	396	1.2	1.0	6.0	396	1.20
7	2237.5	14.0	34	47	81	370	Imp.	1.0	7.0	370	0.00
8	2238.5	13.5	26	55	81	272	1.9	1.0	8.0	272	1.90
9	2239.5	14.1	27	45	72	295	0.90	1.0	9.0	295	0.90
10	2240.5	14.9	33	47	80	382	2.0	1.0	10.0	382	2.00
11	2241.5	12.5	19	58	77	184	1.7	1.0	11.0	184	1.70
12	2242.5	14.2	26	49	75	287	0.92	1.0	12.0	287	0.92
13	2243.5	14.4	22	46	68	246	1.5	1.0	13.0	246	1.50
14	2244.5	14.0	24	48	72	261	1.3	1.0	14.0	261	1.30
15	2245.5	16.3	28	44	72	355	2.8	1.0	15.0	355	2.80
16	2246.5	15.2	26	53	79	307	1.7	1.0	16.0	307	1.70
17	2247.5	16.1	26	48	74	325	Imp.	1.0	17.0	325	0.00
18	2248.5	15.2	19	53	72	224	2.0	1.0	18.0	224	2.00
19	2249.5	15.1	30	56	86	352	1.2	1.0	19.0	352	1.20
20	2250.5	15.3	34	51	85	404	1.5	1.0	20.0	404	1.50
21	2251.5	13.9	24	50	74	259	1.1	1.0	21.0	259	1.10
22	2252.5	15.4	30	48	78	358	2.7	1.0	22.0	358	2.70
23	2253.5	14.0	37	50	87	402	1.1	1.0	23.0	402	1.10
24	2254.5	13.3	30	58	88	310	Imp.	1.0	24.0	310	0.00
25	2255.5	13.5	38	53	91	398	1.8	1.0	25.0	398	1.80

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Ward A. McGinnis & Greenwood Pet. Mangmnt., Inc. Lease Oldham Well No. 5

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.		
26	2256.5	13.6	48	43	91	506	2.0	1.0	26.0	506	2.00
27	2257.5	14.2	33	44	77	364	2.0	1.0	27.0	364	2.00
28	2258.5	15.1	25	45	70	293	1.4	1.0	28.0	293	1.40
29	2259.5	16.0	43	44	87	534	3.4	1.0	29.0	534	3.40
30	2260.5	14.1	29	59	88	317	0.99	1.0	30.0	317	0.99
31	2261.5	11.6	25	59	84	225	Imp.	1.0	31.0	225	0.00
32	2262.5	8.2	13	80	93	83	Imp.	1.0	32.0	83	0.00
33	2263.5	15.9	38	52	90	500	0.72	1.0	33.0	500	0.72
34	2264.5	14.7	37	48	85	422	2.8	1.0	34.0	422	2.80
35	2265.5	15.7	33	52	85	402	0.86	1.0	35.0	402	0.86
36	2266.5	16.4	28	49	77	356	3.6	1.0	36.0	356	3.60
37	2267.5	16.9	30	44	74	394	0.88	1.0	37.0	394	0.88
38	2268.5	15.4	26	51	77	310	5.4	1.0	38.0	310	5.40
39	2269.5	16.1	39	48	87	487	1.7	1.0	39.0	487	1.70
40	2270.5	17.2	32	42	74	427	2.8	1.0	40.0	427	2.80
41	2271.5	17.8	44	39	83	608	6.5	1.0	41.0	608	6.50
42	2272.5	15.0	22	51	73	256	2.0	1.0	42.0	256	2.00
43	2273.5	13.0	23	58	81	232	2.2	1.0	43.0	232	2.20
44	2274.5	16.0	31	52	83	385	1.7	1.0	44.0	385	1.70
45	2275.5	15.5	30	43	73	361	3.5	1.0	45.0	361	3.50
46	2276.5	14.7	31	63	94	354	2.6	1.0	46.0	354	2.60
47	2277.5	15.4	30	52	82	359	1.9	1.0	47.0	359	1.90
48	2278.5	15.7	31	45	76	378	2.1	1.0	48.0	378	2.10
49	2279.5	10.7	23	63	86	191	Imp.	1.0	49.0	191	0.00
50	2280.5	14.7	23	46	69	262	1.4	1.0	50.0	262	1.40
51	2281.5	15.8	27	47	74	331	1.3	1.0	51.0	331	1.30
								Total-	- - -	17,078	

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III - B

Company Ward A. McGinnis & Greenwood Pet. Mangmnt., Inc. Lease Oldham Well No. 5

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
2231.0 - 2245.0	10.0	1.3	13.14
2245.0 - 2266.0	17.0	1.8	30.07
2266.0 - 2282.0	15.0	2.5	39.58
2231.0 - 2282.0	42.0	2.0	82.79

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
2231.0 - 2245.0	14.0	14.4	25.8	51.6	289	4,047
2245.0 - 2266.0	21.0	14.4	30.8	51.8	349	7,340
2266.0 - 2282.0	16.0	15.4	29.4	49.5	356	5,691
2231.0 - 2282.0	51.0	14.7	29.0	51.1	335	17,078

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Ward A. McGinnis & Greenwood Pet. Mangmnt., Inc. Lease Oldham Well No. 5

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	Bbls./A. Ft.			
1	2231.5	14.8	18	207	0	0	18	64	207	0	Imp.	50+
2	2232.5	14.9	27	312	0	0	27	59	312	0	Imp.	50+
3	2233.5	14.5	22	248	0	0	22	60	248	0	Imp.	50+
4	2234.5	14.7	22	251	0	0	22	60	251	0	Imp.	50+
5	2235.5	15.9	21	260	0	0	21	59	260	0	Imp.	50+
6	2236.5	14.5	31	349	0	0	31	55	349	0	Imp.	50+
7	2237.5	14.0	32	348	0	0	32	52	348	0	Imp.	50+
8	2238.5	13.3	29	299	0	0	29	60	299	0	Imp.	50+
9	2239.5	14.2	24	264	0	0	24	57	264	0	Imp.	50+
10	2240.5	14.8	31	356	0	0	31	50	356	0	Imp.	50+
11	2241.5	12.9	17	170	0	0	17	59	170	0	Imp.	50+
12	2242.5	14.3	29	322	0	0	29	63	322	0	Imp.	50+
13	2243.5	14.4	24	268	0	0	24	62	268	0	Imp.	50+
14	2244.5	13.7	21	223	0	0	21	61	223	0	Imp.	50+
15	2245.5	16.1	27	338	0	0	27	56	338	0	Imp.	50+
16	2246.5	15.5	22	265	0	0	22	64	265	0	Imp.	50+
17	2247.5	15.8	29	356	0	0	29	58	356	0	Imp.	50+
18	2248.5	15.5	22	265	0	0	22	64	265	0	Imp.	50+
19	2249.5	15.4	27	323	0	0	27	60	323	0	Imp.	50+
20	2250.5	15.5	32	385	0	0	32	59	385	0	Imp.	50+
21	2251.5	14.0	26	285	0	0	26	63	285	0	Imp.	50+
22	2252.5	15.6	27	327	0	0	27	60	327	0	Imp.	50+
23	2253.5	14.0	36	392	0	0	36	51	392	0	Imp.	50+
24	2254.5	13.3	28	289	0	0	28	57	289	0	Imp.	50+
25	2255.5	13.8	35	375	0	0	35	54	375	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.

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Ward A. McGinnis & Greenwood Pet. Mangmnt., Inc. Lease Oldham Well No. 5

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	Bbls./A. Ft.			
26	2256.5	13.8	46	493	0	0	46	40	493	0	Imp.	50+
27	2257.5	13.9	32	345	0	0	32	48	345	0	Imp.	50+
28	2258.5	14.7	26	297	0	0	26	53	297	0	Imp.	50+
29	2259.5	15.9	40	494	0	0	40	50	494	0	Imp.	50+
30	2260.5	14.1	32	351	0	0	32	56	351	0	Imp.	50+
31	2261.5	11.8	22	202	0	0	22	56	202	0	Imp.	50+
32	2262.5	8.5	15	99	0	0	15	72	99	0	Imp.	50+
33	2263.5	16.3	36	455	0	0	36	60	455	0	Imp.	50+
34	2264.5	15.1	35	410	0	0	35	65	410	0	Imp.	50+
35	2265.5	15.5	30	361	0	0	30	59	361	0	Imp.	50+
36	2266.5	16.7	27	350	0	0	27	60	350	0	Imp.	50+
37	2267.5	16.8	33	430	0	0	33	56	430	0	Imp.	50+
38	2268.5	15.4	24	287	0	0	24	58	287	0	Imp.	50+
39	2269.5	15.7	36	438	0	0	36	52	438	0	Imp.	50+
40	2270.5	17.1	31	412	0	0	31	53	412	0	Imp.	50+
41	2271.5	17.3	43	577	0	0	43	46	577	0	Imp.	50+
42	2272.5	15.4	25	299	0	0	25	59	299	0	Imp.	50+
53	2273.5	12.9	20	200	0	0	20	72	200	0	Imp.	50+
44	2274.5	16.0	34	422	0	0	34	57	422	0	Imp.	50+
45	2275.5	15.9	33	407	0	0	33	56	407	0	Imp.	50+
46	2276.5	14.3	32	356	0	0	32	64	356	0	Imp.	50+
47	2277.5	14.8	28	322	0	0	28	58	322	0	Imp.	50+
48	2278.5	15.9	34	420	0	0	34	58	420	0	Imp.	50+
49	2279.5	10.4	26	210	0	0	26	64	210	0	Imp.	50+
50	2280.5	15.3	25	297	0	0	25	57	297	0	Imp.	50+
51	2281.5	15.6	26	315	0	0	26	55	315	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.