

OILFIELD RESEARCH LABORATORIES

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January 17, 1958

Creek Oil & Gas Company, Inc.
P. O. Box 377
Chanute, Kansas

Gentlemen:

Enclosed herewith is the report of the analysis of the 3" Rotary core taken from the Wells Lease, Well No. 17, Neosho County, Kansas, and submitted to our laboratory on January 7, 1958, by Mr. Jack McKelvey.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Carl L. McElrea
Carl L. McElrea

CLM:cb

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59-4-10101

BOX 17111 BOND

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Creek Oil & Gas Company, Inc. Lease Wells Well No. 17

Location 4,190' N. of S. Line & 700' E. of W. Line

Section 27 Twp. 28S Rge. 18E County Neosho State Kansas

Name of Sand - - - - - Bartlesville

Top of Core - - - - - 782.0

Bottom of Core - - - - - 809.0

Top of ^{Pay}Sand - - - (Analyzed) - - - 791.5

Bottom of ^{Pay}Sand - - - (Analyzed) - - - 806.5

Total Feet of Permeable Sand - - - - - 10.4

Total Feet of Floodable Sand - - (Analyzed) - - - 7.2

Distribution of Permeable Sand:
Permeability Range
Millidarcys

Feet

Cum. Ft.

0 - 20	1.6	1.6
20 - 40	2.7	4.3
40 - 60	2.7	7.0
60 & above	3.4	10.4

Average Permeability Millidarcys - - - - - 58.8

Average Percent Porosity - - - - - 17.2

Average Percent Oil Saturation - - - - - 40.2

Average Percent Water Saturation - - - - - 41.7

Average Oil Content, Bbls./A. Ft. - - - - - 559.

Total Oil Content, Bbls./Acre - - - - - 13,759.

Average Percent Oil Recovery by Laboratory Flooding Tests - - - - - 7.7

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. - - - - - 124.

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre - - - - - 893.

Total Calculated Oil Recovery, Bbls./Acre - - - - - 1,400.

Packer Setting, Feet - - - - -

Viscosity, Centipoises @ - - - - -

A. P. I. Gravity, degrees @ 60 °F - - - - -

Elevation, Feet - - - - - 963.

Water was used as the circulating fluid during the coring of the sand.

The core was sampled and the samples sealed in cans by a representative of the client.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
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782.0 - 785.5	- Laminated sandstone and shale.
785.5 - 786.0	- Brown fine grained micaceous sandstone.
786.0 - 787.1	- Brown fine grained micaceous shaley sandstone.
787.1 - 787.5	- Laminated sandstone and shale.
787.5 - 788.1	- Brown fine grained laminated micaceous shaley sandstone.
788.1 - 788.9	- Laminated sandstone and shale.
788.9 - 789.7	- Brown fine grained micaceous slightly shaley sandstone.
789.7 - 790.1	- Laminated sandstone and shale.
790.1 - 790.5	- Brown fine grained laminated micaceous shaley sandstone.
790.5 - 790.9	- Laminated sandstone and shale.
790.9 - 792.5	- Dark brown fine grained micaceous slightly shaley sandstone.
792.5 - 796.1	- Laminated sandstone and shale.
796.1 - 796.7	- Brown fine grained micaceous sandstone.
796.7 - 797.8	- Laminated sandstone and shale.
797.8 - 798.2	- Brown fine grained micaceous sandstone.
798.2 - 798.6	- Laminated sandstone and shale.
798.6 - 801.9	- Dark brown fine grained micaceous slightly carbonaceous sandstone.
801.9 - 802.8	- Brown to dark fine grained micaceous carbonaceous slightly shaley sandstone.

- 802.8 - 803.3 - Dark fine grained micaceous carbonaceous sandstone.
803.3 - 804.2 - Brown fine grained laminated micaceous shaley sandstone.
804.2 - 808.4 - Brown and dark fine grained micaceous carbonaceous sandstone.
808.4 - 809.0 - Brown fine grained laminated micaceous shaley sandstone.

Coring was started at a depth of 782.0 feet in laminated sandstone and shale and completed at 809.0 feet in brown fine grained laminated micaceous shaley sandstone. This core shows a total of 16.4 feet of sandstone. For the most part, the pay is made up of fine grained micaceous slightly shaley to carbonaceous sandstone. The cored section is very broken and shaley.

PERMEABILITY

For the sake of distribution, the core was divided into two sections. The weighted average permeability of the upper and lower sections is 22.7 and 66.3 millidarcys respectively; the overall average being 58.8 (See Table III). By observing the data given on the coregraph, it is noticeable that the sand has a very irregular permeability profile. The permeability of the sand varies from 8.6 to a maximum of 142 millidarcys.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a good weighted average percent oil saturation, namely, 40.2. The weighted average percent oil saturation of the upper and lower sections is 31.4 and 44.0 respectively. The weighted average percent water saturation of the upper and lower sections is 43.5 and 41.0 respectively; the overall average being 41.7 (See Table III). This gives an overall weighted average total fluid saturation of 81.9 percent.

The weighted average oil content of the upper and lower sections is 383 and 635 barrels per acre foot respectively; the overall average being

559. The total oil content, as shown by this core, is 13,759 barrels per acre (See Table III).

LABORATORY FLOODING TESTS

The client supplied produced brine, treated with Fludex WF-1 at the rate of 8,340 parts per million, which was used as the flooding medium during laboratory tests.

Part of the sand in this core responded fairly well to laboratory flooding tests, as a total recovery of 893 barrels of oil per acre was obtained from 7.2 feet of sand. The weighted average percent oil saturation was reduced from 51.4 to 43.7, or represents an average recovery of 7.7 percent. The weighted average effective permeability of the samples is 2.60 millidarcys, while the average initial fluid production pressure is 37.1 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 11 samples tested, 9 produced water and 7 oil. This indicates that approximately 64 percent of the sand represented by these samples is floodable pay sand. The tests also show that the sand has a very wide variation in effective permeability.

CONCLUSION

On the basis of the core analysis, we believe that an efficient water-flood, within the vicinity of this well, will recover approximately 1,400 barrels of oil per acre, or an average of 194 barrels of oil per acre foot from the 7.2 feet of floodable pay sand analyzed, provided the sand will take the required volume of water satisfactorily. In calculating this recovery, an allowance was made for oil lost during coring and it was assumed

that the primary production and true water saturation of the sand are 7 and 27 percent respectively. In these calculations, an allowance was also made for permeability distribution but not for sweep efficiency.

This core shows a broken sand section having a good oil saturation, a normal water saturation and a wide variation in effective permeability. The results of the laboratory tests indicate that the sand has a high residual oil saturation after water-flooding.

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RESULTS OF PERMEABILITY TESTS

TABLE I

Company Creek Oil & Gas Co., Inc. Lease Wells Well No. 17

Sample No.	Depth Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
1	785.7	36.	0.5	0.5	18.00
2	786.2	12.	0.5	1.0	6.00
3	789.5	21.	0.8	1.8	16.80
4	791.7	41.	0.5	2.3	20.50
5	792.2	51.	0.5	2.8	25.50
6	796.5	142.	0.6	3.4	85.30
7	798.7	58.	0.4	3.8	23.20
8	799.2	78.	0.5	4.3	39.00
9	799.7	38.	0.5	4.8	19.00
10	800.2	27.	0.5	5.3	13.50
11	800.7	55.	0.5	5.8	27.50
12	801.2	50.	0.5	6.3	25.00
13	801.7	36.	0.4	6.7	14.40
14	802.2	12.	0.6	7.3	7.20
15	802.7	54.	0.3	7.6	16.20
16	803.2	8.6	0.5	8.1	4.30
17	804.7	150.	0.8	8.9	120.00
18	805.2	125.	0.5	9.4	62.50
19	805.7	75.	0.5	9.9	37.50
20	806.2	60.	0.5	10.4	30.00

RESULTS OF SATURATION TESTS

Company Creek Oil & Gas Company, Inc. Lease Wells Well No. 17

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	782.1	11.9	24	63	87	222	0.5	0.5	111
2	783.0	13.3	25	54	79	258	1.0	1.5	258
3	784.0	13.8	29	49	78	311	1.0	2.5	311
4	785.0	13.7	32	48	80	340	1.0	3.5	340
F-5	785.9	19.5	22	-	-	333	0.5	4.0	166
5	786.1	15.5	34	34	68	409	0.5	4.5	205
6	787.0	16.5	36	36	72	461	0.6	5.1	276
7	788.0	16.8	44	34	78	574	0.6	5.7	344
8	789.0	18.7	35	31	66	508	0.8	6.5	406
9	790.0	13.2	34	53	87	348	0.4	6.9	139
10	791.0	20.4	33	29	62	523	0.6	7.5	314
11	792.0	19.7	45	29	74	689	1.0	8.5	689
12	793.0	12.4	24	69	93	231	1.0	9.5	231
13	794.0	11.5	30	66	96	268	1.0	10.5	268
14	795.0	12.6	31	64	95	304	1.0	11.5	304
15	796.0	12.9	35	59	94	350	0.6	12.1	210
F-15-A	796.2	21.0	60	-	-	978	0.6	12.7	586
16	797.0	12.2	28	66	94	265	1.1	13.8	292
17	798.0	21.7	45	23	68	758	0.4	14.2	304
18	799.0	23.2	60	20	80	1,080	0.9	15.1	973
19	800.0	19.5	49	27	76	742	1.0	16.1	742
20	801.0	20.5	48	24	72	764	1.4	17.5	1,070
21	802.0	17.9	63	26	89	875	0.9	18.4	786
22	803.0	20.2	59	25	84	925	0.5	18.9	462
23	804.0	14.4	33	53	86	369	0.9	19.8	332

RESULTS OF SATURATION TESTS

Company Creek Oil & Gas Company, Inc. Lease Wells Well No. 17

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.	
24	805.0	20.4	57	28	85	903	1.3	21.1	1,172
25	806.0	21.5	45	36	81	750	1.0	22.1	750
26	807.0	22.5	44	31	75	768	1.0	23.1	768
27	808.0	20.0	40	46	86	621	0.9	24.0	560
28	808.9	16.1	52	40	92	650	0.6	24.6	390
							Total	- - - -	13,759

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

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Creek Oil & Gas Company, Inc. Lease Wells Well No. 17

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
785.5 - 789.7	1.8	22.7	40.80
791.5 - 806.5	8.6	66.3	570.60
785.5 - 806.5	10.4	58.8	611.40

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 Bbbl./Acre
782.0 - 791.5	7.5	15.6	31.4	43.5	383	2,870
791.5 - 809.0	17.1	17.8	44.0	41.0	635	10,889
782.0 - 809.0	24.6	17.2	40.2	41.7	559	13,759

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Creek Oil & Gas Company, Inc. Lease Wells Well No. 17

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.			
5	785.9	19.5	22	333	0	0	22	66	333	25	0.800	30
8	789.3	18.6	37	534	0	0	37	53	534	9	0.305	40
11	792.0	19.4	45	677	10	150	35	58	527	12	0.400	30
15-A	796.2	21.0	60	978	13	212	47	50	766	137	7.70	40
18	799.0	22.9	60	1,066	7	124	53	45	942	60	3.24	40
19	800.0	19.8	49	753	2	31	47	44	722	14	0.500	40
20	801.0	20.3	48	756	10	158	38	54	598	46	1.61	40
21	802.0	18.2	61	862	0	0	61	33	862	0	Imp.	50+
22	803.0	20.0	57	885	0	0	57	23	885	0	Imp.	50+
24	805.0	20.5	57	908	5	80	52	44	828	38	1.91	40
25	806.0	21.2	45	740	9	148	36	57	592	117	5.60	30

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

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.

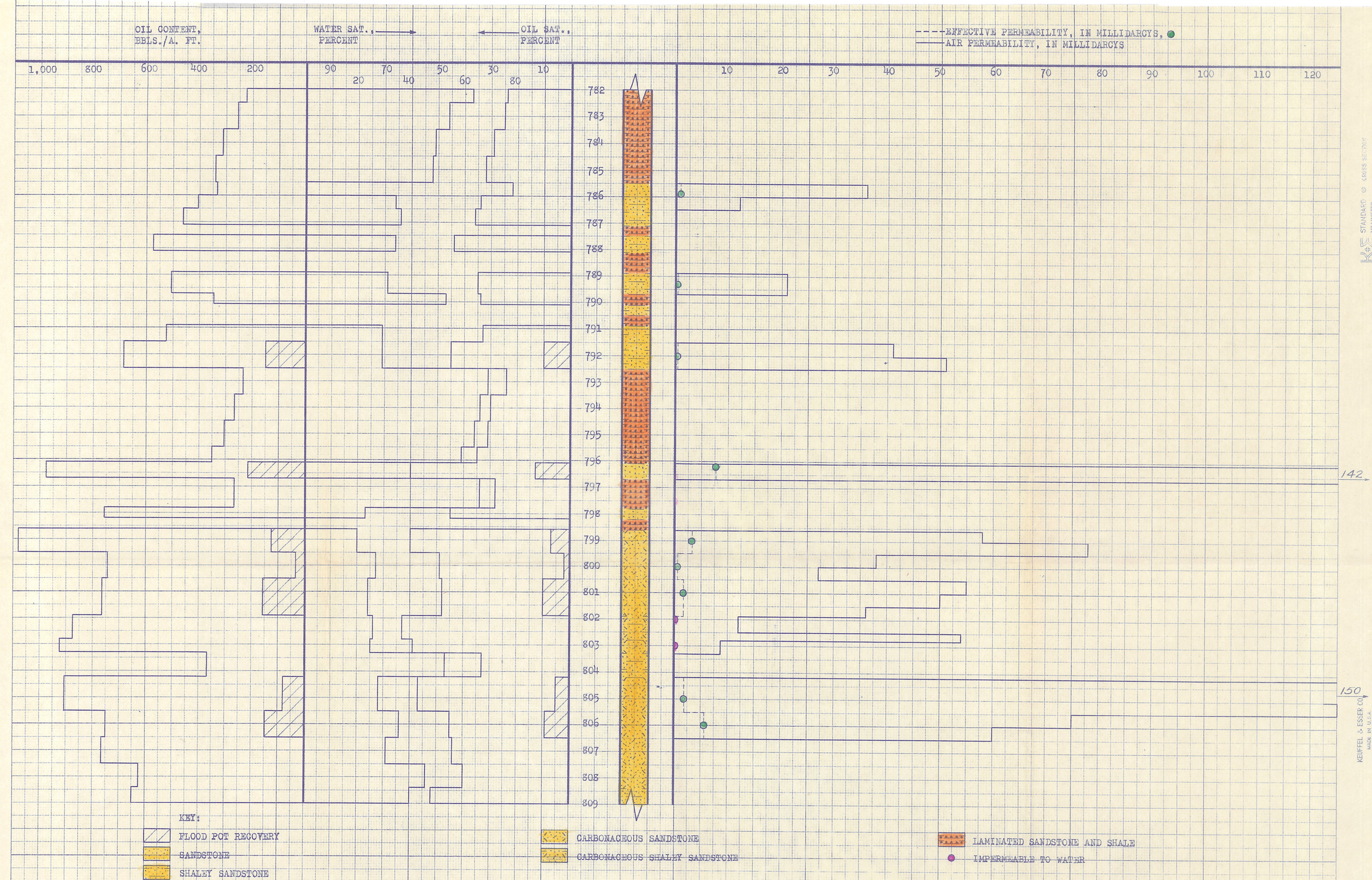
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SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company	Creek Oil & Gas Company, Inc.	Lease	Wells	Well No.	17
Depth Interval, Feet	791.5 - 806.5				
Feet of Core Analyzed	7.2				
Average Percent Porosity	20.6				
Average Percent Original Oil Saturation	51.4				
Average Percent Oil Recovery	7.7				
Average Percent Residual Oil Saturation	43.7				
Average Percent Residual Water Saturation	50.4				
Average Percent Total Residual Fluid Saturation	94.1				
Average Original Oil Content, Bbls./A. Ft.	828.				
Average Oil Recovery, Bbls./A. Ft.	124.				
Average Residual Oil Content, Bbls./A. Ft.	704.				
Total Original Oil Content, Bbls./Acre	5,955.				
Total Oil Recovery, Bbls./Acre	893.				
Total Residual Oil Content, Bbls./Acre	5,062.				
Average Effective Permeability, Millidarcys	2.60				
Average Initial Fluid Production Pressure, p.s.i.	37.1				

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



CREEK OIL & GAS COMPANY, INCORPORATED

WELLS LEASE

NEOSHO COUNTY, KANSAS

WELL NO. 17

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE POROSITY, PERCENT	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVG. OIL CONTENT BBLs./A. FT.	TOTAL OIL CONTENT BBLs./ACRE	AVG. AIR PERMEABILITY, MILLIDARCYS	CALCULATED OIL RECOVERY, BBLs./ACRE
782.0 - 791.5	7.5	15.6	31.4	43.5	383	2,870	22.7	
791.5 - 809.0	17.1	17.8	44.0	41.0	635	10,889	66.3	
782.0 - 809.0	24.6	17.2	40.2	41.7	559	13,759	58.8	1,400