

DAVIS OIL COMPANY
CORE ANALYSIS REPORT
UMBARGER LEASE WELL NO. D-13
WILSON COUNTY, KANSAS

OILFIELD RESEARCH LABORATORIES

536 N. HIGHLAND

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OILFIELD RESEARCH LABORATORIES

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May 16, 1980

Davis Oil Company
212 East Locust
Independence, Kansas 67301

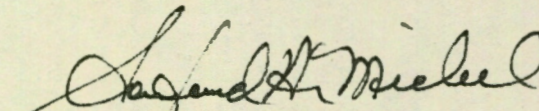
Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Umbarger Lease, Well No. D-13, Wilson County, Kansas, and submitted to our laboratory on April 10, 1980.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES


Sanford A. Michel

SAM/tem

5 c to Independence, Kansas

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GENERAL INFORMATION & SUMMARY

Company Davis Oil Company Lease Umbarger Well No. D-13

Location -

Section 36 Twp 28S Rge 16E County Wilson State Kansas

Elevation, Feet - - - - -

Name of Sand - - - - - Squirrel

Top of Core - - - - - 653.0

Bottom of Core - - - - - 672.8

Top of Sand - - - - - 653.0

Bottom of Sand - - - - - (Tested) - 671.0

Total Feet of Permeable Sand - - - - - (Tested) - 15.3

Total Feet of Floodable Sand - - - - - (Tested) - 5.2

Distribution of Permeable Sand: Permeability Range Millidarcys

Feet

Cum. Ft.

0 - 1	4.1	4.1
1 - 5	3.0	7.1
5 - 10	2.2	9.3
40 - 80	4.0	13.3
100 - 150	2.0	15.3

Average Permeability Millidarcys - - - - - 32.0

Average Percent Porosity - - - - - 22.3

Average Percent Oil Saturation - - - - - 37.2

Average Percent Water Saturation - - - - - 26.9

Average Oil Content, Bbls./A. Ft. - - - - - 560.

Total Oil Content, Bbls./Acre - - - - - 9,633.

Average Percent Oil Recovery by Laboratory Flooding Tests - - - - - 9.2

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. - - - - - 149.

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre - - - - - 776.

Total Calculated Oil Recovery, Bbls./Acre - - - - - See "Calculated Recovery" Section.

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The core was sampled and the samples sealed in plastic bags by a representative of the client. Fresh water mud was used as a drilling fluid. The core was reported to be from a non-virgin area.

FORMATION CORED

<u>Depth Interval, Feet</u>	<u>Description</u>
653.0 - 656.6	Gray-brown shaly sandstone.
656.6 - 657.0	Brown slightly shaly sandstone.
657.0 - 657.4	Limestone.
657.4 - 662.1	Dark brown sandstone.
662.1 - 667.9	Brown and gray laminated sandy shale.
667.9 - 668.7	Gray-brown shaly sandstone.
668.7 - 672.8	Grayish light brown sandy shale.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 776 barrels of oil per acre was obtained from 5.2 feet of sand. The weighted average percent oil saturation was reduced from 45.1 to 35.9, or represents an average recovery of 9.2 percent. The weighted average effective permeability of the samples is 3.32 millidarcys, while the average initial fluid production pressure is 24.2 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 18 samples tested, 6 produced water and oil, and 1 sample produced water only. This indicates that approximately 33 percent

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of the sand represented by these samples is floodable pay sand.

CALCULATED RECOVERY

It would appear from a study of the core data, that efficient primary and waterflood operations in the vicinity of this well should recover approximately 1,810 barrels of oil per acre. This is an average recovery of 348 barrels per acre foot from 5.2 feet of floodable sand analyzed in this core.

These recovery values were calculated using the following data and assumptions:

Original formation volume factor, estimated	1.04
Reservoir water saturation, percent, estimated	20.0
Average porosity, percent	21.9
Oil saturation after flooding, percent	35.9
Performance factor, percent, estimated	50.0
Net floodable sand, feet	5.2

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Davis Oil Company Lease Umbarger Well No. D-13

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	653.5	15.1	47	40	87	551	0.45	1.0	1.0	551	0.45
2	654.5	8.4	44	51	95	287	Imp.	1.0	2.0	287	0.00
3	655.5	25.7	40	28	68	797	2.1	1.0	3.0	797	2.10
4	656.5	22.0	30	50	80	512	8.5	0.6	3.6	307	5.10
5	657.5	18.2	62	32	94	875	8.9	0.6	4.2	525	5.34
6	658.5	17.8	46	37	83	635	58.	1.0	5.2	635	58.00
7	659.5	20.9	52	30	82	843	145.	1.0	6.2	843	145.00
8	660.5	25.1	41	22	63	798	63.	1.0	7.2	798	63.00
9	661.5	27.4	32	22	54	680	52.	1.1	8.3	748	57.20
10	662.5	20.4	58	10	68	918	41.	0.9	9.2	826	36.90
11	663.5	11.2	66	31	97	573	101.	1.0	10.2	573	101.00
12	664.5	10.3	52	44	96	416	7.1	1.0	11.2	416	7.10
13	665.5	24.9	28	17	45	541	2.8	1.0	12.2	541	2.80
14	666.5	34.2	17	11	28	451	3.3	1.0	13.2	451	3.30
15	667.5	29.7	27	12	39	622	Imp.	0.9	14.1	560	0.00
16	668.5	10.7	20	31	51	166	0.45	0.8	14.9	133	0.36
17	669.5	37.7	7	14	21	205	0.49	1.3	16.2	267	0.64
18	670.5	32.2	15	15	30	375	0.59	1.0	17.2	375	0.59

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Davis Oil Company Lease Umbarger Well No. D-13

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
653.0 - 662.1	7.3	46.1	336.19
662.1 - 671.0	8.0	19.1	152.69
653.0 - 671.0	15.3	32.0	488.88

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
653.0 - 662.1	8.3	20.1	43.4	33.9	662	5,491
662.1 - 671.0	8.9	24.2	31.4	20.3	465	4,142
653.0 - 671.0	17.2	22.3	37.2	26.9	560	9,633

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Davis Oil Company Lease Umberger Well No. D-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.
			%	Bbls./A. Ft.	%	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
1	653.5	14.7	48	547	0	0	48	42	547	0	Imp.	-
2	654.5	8.9	43	297	0	0	43	52	297	0	Imp.	-
3	655.5	25.7	40	798	8	160	32	66	638	101	1.57	25
4	656.5	22.0	30	512	2	34	28	62	478	12	0.15	45
5	657.5	18.5	62	890	19	273	43	49	617	78	1.35	25
6	658.5	18.0	46	642	8	112	38	57	530	321	5.32	15
7	659.5	21.0	52	847	15	244	37	60	603	350	6.30	15
8	660.5	24.6	41	782	4	76	37	59	706	234	3.15	20
9	661.5	27.2	32	675	0	0	32	63	675	127	1.80	20
10	662.5	20.3	58	913	0	0	58	26	913	10	0.15	45
11	663.5	11.6	65	585	0	0	65	32	585	0	Imp.	-
12	664.5	10.5	52	424	0	0	52	45	424	0	Imp.	-
13	665.5	24.8	28	539	0	0	28	30	539	0	Imp.	-
14	666.5	34.0	17	448	0	0	17	20	448	0	Imp.	-
15	667.5	30.0	26	605	0	0	26	16	605	0	Imp.	-
16	668.5	11.1	18	155	0	0	18	34	155	0	Imp.	-
17	669.5	37.4	8	232	0	0	8	20	232	0	Imp.	-
18	670.5	31.7	16	393	0	0	16	18	393	0	Imp.	-

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	Davis Oil Company	Lease	Umbarger	Well No.	D-13
Depth Interval, Feet	653.0 - 662.1				
Feet of Core Analyzed	5.2				
Average Percent Porosity	21.9				
Average Percent Original Oil Saturation	45.1				
Average Percent Oil Recovery	9.2				
Average Percent Residual Oil Saturation	35.9				
Average Percent Residual Water Saturation	59.4				
Average Percent Total Residual Fluid Saturation	95.3				
Average Original Oil Content, Bbls./A. Ft.	752.				
Average Oil Recovery, Bbls./A. Ft.	149.				
Average Residual Oil Content, Bbls./A. Ft.	603.				
Total Original Oil Content, Bbls./Acre	3,910.				
Total Oil Recovery, Bbls./Acre	776.				
Total Residual Oil Content, Bbls./Acre	3,134.				
Average Effective Permeability, Millidarcys	3.32				
Average Initial Fluid Production Pressure, p.s.i.	24.2				

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