DAVIS OIL COMPANY

CORE ANALYSIS REPORT

UMBARGER LEASE WELL NO. D-11

WILSON COUNTY, KANSAS

OILFIELD RESEARCH LABORATORIES
536 N. HIGHLAND CHANUTE, KANSAS

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May 13, 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-11, Wilson County, Kansas, and submitted to our laboratory on April 8, 1980.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/tem

5 c to Independence, Kansas

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Davis Oil Company Lease Umbarger Well No. D-11

Location 600' SNL & 1045' WEL SW¼

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

Elevation, Feet	
Name of Sand	Squirrel
Top of Core	657.0
Bottom of Core	677.1
Top of Sand	657.0
Bottom of Sand (Tested)	676.0
Total Feet of Permeable Sand (Tested)	15.4
Total Feet of Floodable Sand (Tested)	10.4

Distribution of Permeable Sand:

Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 1	4.0	4.0
1 - 10	2.0	6.0
10 - 50	6.8	12.8
50 - 150	2.6	15.4

Average Permeability Millidarcys	30.0
Average Percent Porosity	17.9
Average Percent Oil Saturation	42.3
Average Percent Water Saturation	31.2
Average Oil Content, Bbls./A. Ft.	593.
Total Oil Content, Bbls./Acre	10,312.
Average Percent Oil Recovery by Laboratory Flooding Tests	7.4
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	115.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	1,192.
Total Calculated Oil Recovery, Bbls./Acre	See "Calculated Recovery" Section.

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

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
657.0 - 658.8	Gray sandy shale.
658.8 - 660.6	Gray slightly shaly sandstone.
660.6 - 661.4	Limestone.
661.4 - 664.6	Brown slightly carbonaceous sandstone.
664.6 - 671.6	Brown and gray laminated sandstone and shale.
671.6 - 677.2	Gray-brown shale.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 1,192 barrels of oil per acre was obtained from 10.4 feet of sand. The weighted average percent oil saturation was reduced from 45.5 to 38.1, or represents an average recovery of 7.4 percent. The weighted average effective permeability of the samples is 3.93 millidarcys, while the average initial fluid production pressure is 24.6 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 18 samples tested, 11 produced water and oil, and 1 sample produced water only. This indicates that approximately 61 percent 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 3,540 barrels of oil per acre. This is an average recovery of 340 barrels per acre foot from 10.4 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	15.0
Average porosity, percent	20.1
Oil saturation after flooding, percent	38.1
Performance factor, percent, estimated	50.0
Net floodable sand, feet	10.4

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Davis Oil Company Lease Umbarger Well No. D-11

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	657.5	14.4	19	63	82	212	0.29	1.0	1.0	212	0.29
2	659.5	17.5	41	22	63	557	14.	1.0	2.0	557	14.00
3	660.4	15.1	42	27	69	492	17.	0.8	2.8	394	13.60
4	661.5	20.3	48	21	69	756	54.	0.6	3.4	454	32.40
5	662.6	24.4	34	32	66	644	117.	1.0	4.4	644	117.00
6	663.5	24.4	39	24	63	738	141.	1.0	5.4	738	141.00
7	664.5	22.5	46	20	66	803	46.	0.6	6.0	482	27.60
8	665.5	24.1	46	19	65	859	11.	1.4	7.4	1203	15.40
9	666.4	21.5	50	14	64	834	32.	1.0	8.4	834	32.00
10	667.4	17.3	50	22	72	671	12.	1.0	9.4	671	12.00
11	668.4	17.4	49	22	71	661	46.	1.0	10.4	661	46.00
12	669.6	15.5	49	34	83	589	6.7	1.0	11.4	589	6.70
13	670.5	15.2	55	27	82	649	3.7	1.0	12.4	649	3.70
14	671.5	12.6	29	58	87	284	0.44	0.6	13.0	170	0.26
15	672.5	14.8	39	36	75	448	0.33	1.4	14.4	627	0.46
16	673.5	14.9	37	36	73	428	0.26	1.0	15.4	428	0.26
17	674.5	14.4	36	44	80	402	Imp.	1.0	16.4	402	0.00
18	675.5	15.4	50	45	95	597	Imp.	1.0	17.4	597	0.00

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Davis Oil Company Lease Umbarger Well No. D-11

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
657.0 - 671.0	12.4	37.2	461.69
671.0 - 676.0	3.0	0.33	0.98
657.0 - 676.0	15.4	30.0	462.67

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
657.0 - 671.0	12.4	19.3	43.6	26.8	652	8,088
671.0 - 676.0	5.0	14.6	39.0	42.0	445	2,224
657.0 - 676.0	17.4	17.9	42.3	31.2	593	10,312

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Davis Oil Company Lease Umbarger Well No. D-11

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	657.5	14.1	20	219	0	0	20	64	219	0	Imp.	-
2	659.5	17.1	41	544	2	27	39	51	517	26	0.37	45
3	660.4	15.0	42	489	3	35	39	53	454	66	0.52	25
4	661.5	20.8	48	775	7	113	47	57	662	276	4.95	25
5	662.6	24.3	34	641	2	38	32	63	603	314	18.00	20
6	663.5	24.2	39	732	6	113	33	64	619	313	10.58	15
7	664.5	22.3	46	796	4	69	42	48	727	167	6.91	15
8	665.5	24.1	46	860	15	288	31	62	580	82	1.72	20
9	666.4	21.4	50	830	10	166	40	50	664	75	1.35	15
10	667.4	17.7	50	687	6	82	44	45	605	22	0.22	30
11	668.4	17.0	49	646	7	92	42	55	554	21	0.22	35
12	669.6	15.7	49	597	11	134	38	53	463	16	0.15	25
13	670.5	15.4	55	657	0	0	55	38	657	3	0.15	50
14	671.5	13.0	28	282	0	0	28	60	282	0	Imp.	-
15	672.5	14.9	39	451	0	0	39	40	451	0	Imp.	-
16	673.5	14.5	37	416	0	0	37	37	416	0	Imp.	-
17	674.5	14.4	36	402	0	0	36	44	402	0	Imp.	-
18	675.5	15.3	50	593	0	0	50	46	593	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

ompany Davis Oil Company Lease Umbarger Well No. D-11

epth Interval, Feet	657.0 - 671.0
eet of Core Analyzed	10.4
verage Percent Porosity	20.1
verage Percent Original Oil Saturation	45.5
verage Percent Oil Recovery	7.4
verage Percent Residual Oil Saturation	38.1
verage Percent Residual Water Saturation	55.1
verage Percent Total Residual Fluid Saturation	93.2
verage Original Oil Content, Bbls./A. Ft.	695.
verage Oil Recovery, Bbls./A. Ft.	115.
verage Residual Oil Content, Bbls./A. Ft.	580.
otal Original Oil Content, Bbls./Acre	7,226.
otal Oil Recovery, Bbls./Acre	1,192.
otal Residual Oil Content, Bbls./Acre	6,034.
verage Effective Permeability, Millidarcys	3.93
verage Initial Fluid Production Pressure, p.s.i.	24.6

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