

OILFIELD RESEARCH LABORATORIES

536 NORTH HIGHLAND - CHANUTE, KANSAS 66720 - PHONE (316) 431-2650

October 24, 1980

Blackhawk Oil Company
15 North Highland
Chanute, Kansas 66720

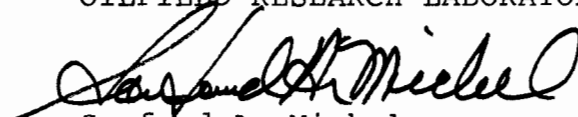
Gentlemen:

Enclosed herewith is the report of the analysis of the rotary taken from the Campbell Lease, Well No. 3, located in Wilson County, Kansas and submitted to our laboratory on October 14, 1980.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES



Sanford A. Michel

SAM/ks

4 c to Chanute, Kansas
1 c to Ralph Edwards
1838 Oak Hills Drive
Cape Girardeau, Missouri 63701

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GENERAL INFORMATION & SUMMARY

Company Blackhawk Oil Company Lease Campbell Well No. 3

Location 165' FWL & 825' FNL

Section 36 Twp. 27S Rge. 16E County Wilson State Kansas

Elevation, Feet - - - - -

Name of Sand - - - - - Squirrel

Top of Core - - - - - 875.0

Bottom of Core - - - - - 888.6

Top of Sand - - - - - 875.0

Bottom of Sand - - - - - 885.7

Total Feet of Permeable Sand - - - - - 8.6

Total Feet of Floodable Sand - - - - - 3.2

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
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0 - 5	3.5	3.5
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5 - 10	4.6	8.1
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30 - 40	0.5	8.6
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Average Permeability Millidarcys - - - - - 6.3

Average Percent Porosity - - - - - 14.3

Average Percent Oil Saturation - - - - - 45.4

Average Percent Water Saturation - - - - - 36.4

Average Oil Content, Bbls./A. Ft. - - - - - 505.

Total Oil Content, Bbls./Acre - - - - - 5203.

Average Percent Oil Recovery by Laboratory Flooding Tests - - - - - 4.4

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. - - - - - 58.

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre - - - - - 187.

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.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
875.0 - 875.9	Hard brown very calcareous sandstone.
875.9 - 878.1	Brown and gray laminated sandstone and shale.
878.1 - 878.6	Brown slightly calcareous sandstone.
878.6 - 879.8	Brown and gray laminated slightly calcareous sandstone and shale.
879.8 - 880.2	Brown slightly calcareous sandstone.
880.2 - 882.4	Brown and gray laminated slightly calcareous sandstone and shale.
882.4 - 885.7	Grayish brown very shaly sandstone.
885.7 - 888.6	Gray sandy shale.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 187 barrels of oil per acre was obtained from 3.2 feet of sand. The weighted average percent oil saturation was reduced from 37.3 to 32.9, or represents an average recovery of 4.4 percent. The weighted average effective permeability of the samples is 2.19 millidarcys, while the average initial fluid production pressure is 31.7 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 11 samples tested, 3 produced water and oil, and 1 sample produced water only. This indicates that approximately 27 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 920 barrels of oil per acre. This is an average recovery of 287 barrels per acre foot from 3.2 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	16.8
Oil saturation after flooding, percent	32.9
Performance factor, percent, estimated	50.0
Net floodable sand, feet	3.2

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE I-B

Company Blackhawk Oil Company Lease Campbell Well No. 3

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			Ft.	Cum. Ft.		
1	875.5	8.9	46	51	318	0.29	0.9	0.9	286	0.26
2	876.5	15.0	34	45	396	3.6	1.0	1.9	396	3.60
3	877.5	16.4	39	34	496	6.3	1.2	3.1	595	7.56
4	878.5	16.7	73	11	946	34.	0.5	3.6	473	17.00
5	879.5	17.5	43	25	584	9.0	1.2	4.8	700	10.80
6	880.5	12.5	59	33	572	5.8	1.2	6.0	686	6.96
7	781.5	17.5	39	30	530	6.8	1.0	7.0	530	6.80
8	882.5	15.2	50	30	590	0.30	0.6	7.6	354	0.18
9	883.5	14.5	47	37	529	1.3	1.0	8.6	529	1.30
10	884.5	10.0	32	60	248	Imp.	1.0	9.6	248	0.00
11	885.5	13.6	55	33	580	Imp.	0.7	10.3	406	0.00

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company	Lease	Well No.				
Blackhawk Oil Company	Campbell	3				
Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.			
875.0 - 885.7	8.6	6.3	54.46			
Depth Interval, Feet	Feet of Core Analyzed	Average Percent Oil Saturation	Average Percent Water Saturation	Average Oil Content Bbl./A. Ft.	Total Oil Content Bbls./Acre	
875.0 - 885.7	10.3	14.3	45.4	36.4	505	5,203

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

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			
1	875.5	9.0	45	314	0	0	45	53	0	Imp.	-
2	876.5	15.5	34	409	2	24	32	61	121	2.40	25
3	877.5	16.9	39	511	5	66	34	64	59	1.35	40
4	878.5	17.0	73	963	0	0	73	14	0	Imp.	-
5	879.5	17.3	42	564	0	0	42	30	0	Imp.	-
6	880.5	13.0	57	575	0	0	57	40	29	0.30	30
7	881.5	18.0	39	545	6	84	33	62	137	3.00	30
8	882.5	15.0	49	570	0	0	49	33	0	Imp.	-
9	883.5	14.8	47	540	0	0	47	40	0	Imp.	-
10	884.5	10.0	32	248	0	0	32	62	0	Imp.	-
11	885.5	13.5	56	587	0	0	56	38	0	Imp.	-

Blackhawk Oil Company

Lease

Campbell

Well No.

3

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	Blackhawk Oil Company	Lease	Campbell	Well No.	3
Depth Interval, Feet	875.0 - 885.7				
Feet of Core Analyzed	3.2				
Average Percent Porosity	16.8				
Average Percent Original Oil Saturation	37.3				
Average Percent Oil Recovery	4.4				
Average Percent Residual Oil Saturation	32.9				
Average Percent Residual Water Saturation	62.4				
Average Percent Total Residual Fluid Saturation	95.3				
Average Original Oil Content, Bbls./A. Ft.	489.				
Average Oil Recovery, Bbls./A. Ft.	58.				
Average Residual Oil Content, Bbls./A. Ft.	431.				
Total Original Oil Content, Bbls./Acre	618.				
Total Oil Recovery, Bbls./Acre	187.				
Total Residual Oil Content, Bbls./Acre	431.				
Average Effective Permeability, Millidarcys	2.19				
Average Initial Fluid Production Pressure, p.s.i.	31.7				

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