

OILFIELD RESEARCH LABORATORIES

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

November 3, 1981

Blackhawk Oil Company, Inc.
15 North Highland
Chanute, Kansas 66720

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Campbell Lease, Well No. 18, located in Wilson County, Kansas and submitted to our laboratory on October 27, 1981.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/mkf

5 c to Chanute, Ks.

- REGISTERED ENGINEERS -

CORE ANALYSIS - WATER ANALYSIS - REPRESSURING ENGINEERING - SURVEYING & MAPPING - PROPERTY EVALUATION & OPERATION

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GENERAL INFORMATION & SUMMARY

Company Blackhawk Oil Co., Inc. Lease Campbell Well No. 18
 Location 820' SNL & 1210' EWL - NW $\frac{1}{4}$, SW $\frac{1}{4}$
 Section 36 Twp. 27S Rge. 16E County Wilson State Kansas

Elevation, Feet

Name of Sand.....

BARTLESVILLE

Top of Core

975.0

Bottom of Core

982.6

Top of Sand

975.0

Bottom of Sand

981.5

Total Feet of Permeable Sand

6.5

Total Feet of Floodable Sand

3.3

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 4	4.2	4.2
25 - 57	2.3	6.5

Average Permeability Millidarcys

15.0

Average Percent Porosity

15.0

Average Percent Oil Saturation

34.8

Average Percent Water Saturation

36.9

Average Oil Content, Bbls./A. Ft.

406.

Total Oil Content, Bbls./Acre

2,640.

Average Percent Oil Recovery by Laboratory Flooding Tests

4.8

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

59.

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

194.

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. Salt water mud was used as a drilling fluid.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, <u>Feet</u>	<u>Description</u>
975.0 - 976.0	Grayish brown shaly sandstone.
976.0 - 978.3	Brown sandstone with fine shale partings.
978.3 - 981.5	Grayish brown shaly sandstone.
981.5 - 982.6	Gray shale.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 194 barrels of oil per acre was obtained from 3.3 feet of sand. The weighted average percent oil saturation was reduced from 34.2 to 29.4, or represents an average recovery of 4.8 percent. The weighted average effective permeability of the samples is 0.20 millidarcys, while the average initial fluid production pressure is 40.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 7 samples tested, 3 produced water and oil. This indicates that approximately 43 percent of the sand represented by these samples is floodable pay sand.

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-3-

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 840 barrels of oil per acre. This is an average recovery of 256 barrels per acre foot from 3.3 feet of floodable sand analyzed in this core.

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

Original formation volume factor, estimated	1.06
Reservoir water saturation, percent, estimated	30.0
Average porosity, percent	16.4
Oil saturation after flooding, percent	29.4
Performance factor, percent, estimated	55.0
Net floodable sand, feet	3.3

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Blackhawk Oil Company, Inc. Lease Campbell Well No. 18

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	975.6	14.5	42	37	79	473	3.3	1.0	1.0	473	3.30
2	976.4	17.5	32	33	65	434	56.	1.0	2.0	434	56.00
3	977.6	17.0	30	36	66	396	28.	1.3	3.3	515	36.40
4	978.6	16.4	39	31	70	496	0.47	0.7	4.0	347	0.33
5	979.5	12.7	46	52	98	453	1.1	0.6	4.6	272	0.66
6	980.2	9.4	27	36	63	197	0.35	0.9	5.5	177	0.32
7	981.4	16.0	34	38	72	422	0.22	1.0	6.5	422	0.22

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company		Blackhawk Oil Company, Inc.		Lease	Campbell	Well No.	18
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	
975.0 - 978.3	3.3	16.4	34.2	35.4	431	1,422	
978.3 - 981.5	3.2	13.6	35.4	38.5	381	1,218	
975.0 - 981.5	6.5	15.0	34.8	36.9	406	2,640	

RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Blackhawk Oil Company, Inc. Lease Campbell Well No. 18

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	975.6	14.6	42	476	9	102	33	50	4	0.15	45
2	976.4	17.4	32	432	3	40	29	54	6	0.22	45
3	977.6	17.1	30	398	3	40	27	51	16	0.22	30
4	978.6	15.9	40	493	0	0	40	31	0	Imp.	-
5	979.5	13.0	45	454	0	0	45	53	0	Imp.	-
6	980.2	9.5	27	199	0	0	27	38	0	Imp.	-
7	981.4	16.5	33	422	0	0	33	40	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

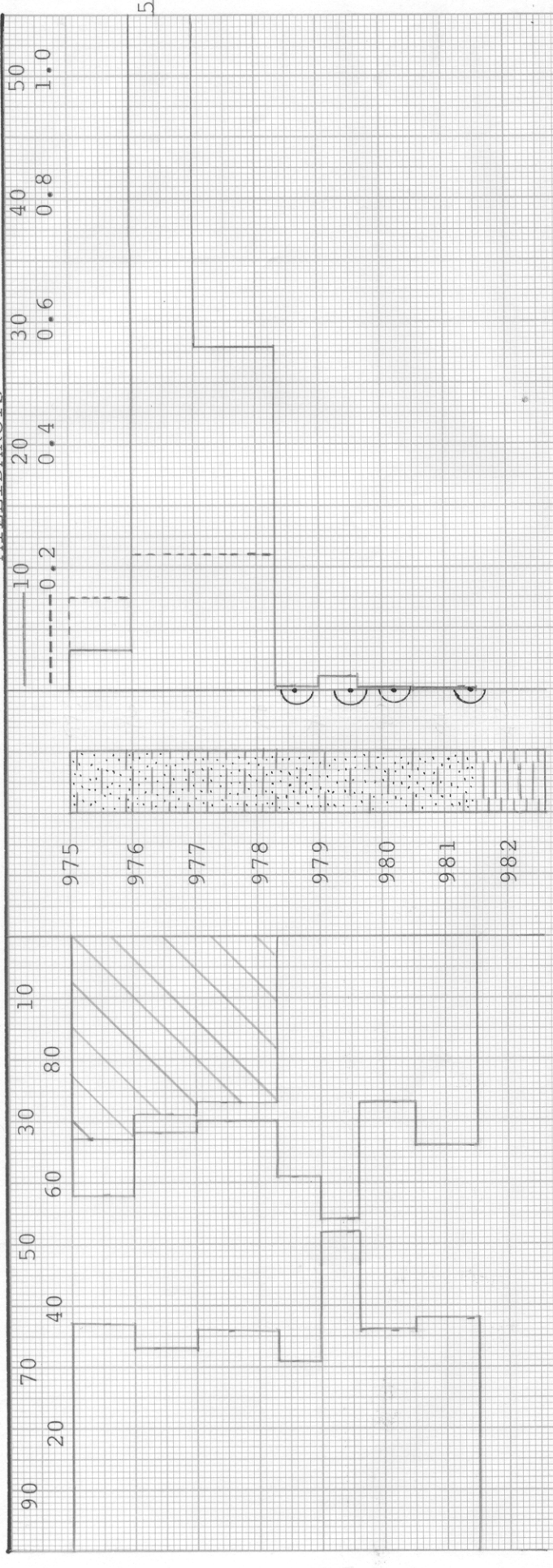
TABLE V

Company	Blackhawk Oil Company, Inc.	Lease	Campbell	Well No.	18
Depth Interval, Feet	975.0 - 978.3				
Feet of Core Analyzed	3.3				
Average Percent Porosity	16.4				
Average Percent Original Oil Saturation	34.2				
Average Percent Oil Recovery	4.8				
Average Percent Residual Oil Saturation	29.4				
Average Percent Residual Water Saturation	51.6				
Average Percent Total Residual Fluid Saturation	81.0				
Average Original Oil Content, Bbls./A. Ft.	432.				
Average Oil Recovery, Bbls./A. Ft.	59.				
Average Residual Oil Content, Bbls./A. Ft.	373.				
Total Original Oil Content, Bbls./Acre	1,425.				
Total Oil Recovery, Bbls./Acre	194.				
Total Residual Oil Content, Bbls./Acre	1,231.				
Average Effective Permeability, Millidarcys	0.20				
Average Initial Fluid Production Pressure, p.s.i.	40.0				

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

WATER SAT., PERCENT → ← OIL SAT., PERCENT

PERMEABILITY, IN MILLIDARCYS
EFFECTIVE PERMEABILITY TO WATER, IN MILLIDARCYS



KEY:

SHALY SANDSTONE

SHALE

SANDSTONE WITH SHALE PARTINGS

FLOODPOT RESIDUAL OIL SATURATION

IMPERMEABLE TO WATER

BLACKHAWK OIL COMPANY, INC.

CAMPBELL LEASE WILSON COUNTY, KANSAS WELL NO. 18

WATER SAT. PERCENT OIL SAT. PERCENT PERMEABILITY, IN MILLIDARCYS EFFECTIVE PERMEABILITY TO WATER, IN MILLIDARCYS AVERAGE WATER AVERAGE OIL CALCULATED

BLACKHAWK OIL COMPANY, INC.

CAMPBELL LEASE

WELL NO. 18

WILSON COUNTY, KANSAS

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE PERCENT POROSITY	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVERAGE PERMEABILITY, MILLIDARCYS	CALCULATED OIL RECOVERY BBLs. / ACRE
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975.0 - 978.3	3.3	16.4	34.2	35.4	29.0	
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978.3 - 981.5	3.2	13.6	35.4	38.5	0.48	
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975.0 - 981.5	6.5	15.0	34.8	36.9	15.0	840 (PRIMARY AND WATERFLOODING)
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CHANUTE, KANSAS
NOVEMBER, 1981

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