

# OILFIELD RESEARCH LABORATORIES

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

October 20, 1982

Sand Bar Oil Company  
Box 143  
Canton, Kansas 67428

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Decker Lease, Well No. 2, located in Crawford County, Kansas and submitted to our laboratory on October 14, 1982.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/rmc

5 c to Canton, Kansas  
2 c to Box 45, McCune, Kansas

- REGISTERED ENGINEERS -

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

**Oilfield Research Laboratories**  
**GENERAL INFORMATION & SUMMARY**

Company Sand Bar Oil Company Lease Decker Well No. 2  
 Location 1980' FSL & 500' FWL, SW $\frac{1}{4}$   
 Section 31 Twp. 30S Rge. 22E County Crawford State Kansas

Elevation, Feet .....

Name of Sand..... Bartlesville

Top of Core ..... 228.0

Bottom of Core ..... 248.0

Top of Sand ..... 228.0

Bottom of Sand ..... 248.0

Total Feet of Permeable Sand ..... 17.7

Total Feet of Floodable Sand ..... 13.6

Distribution of Permeable Sand:  
 Permeability Range  
 Millidarcys

Feet

Cum. Ft.

Permeability Range (Millidarcys)	Feet	Cum. Ft.
0 - 4	6.9	6.9
4 - 8	2.9	9.8
8 - 20	4.2	14.0
20 - 38	3.7	17.7

Average Permeability Millidarcys ..... 11.4

Average Percent Porosity ..... 18.5

Average Percent Oil Saturation ..... 39.5

Average Percent Water Saturation..... 47.7

Average Oil Content, Bbls./A. Ft. .... 579.

Total Oil Content, Bbls./Acre..... 10,823.

Average Percent Oil Recovery by Laboratory Flooding Tests..... 11.9

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. .... 190.

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre ..... 2,586.

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

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
228.0 - 228.8	Brown shaly sandstone with scattered gray shale and micaceous partings.
228.8 - 230.4	Brown slightly shaly sandstone with scattered gray shale and micaceous partings.
230.4 - 232.0	Brown sandstone with widely scattered gray shale and micaceous partings.
232.0 - 232.4	Light brown shaly sandstone.
232.4 - 233.2	Gray and brown finely laminated shale and sandstone.
233.2 - 239.5	Brown sandstone.
239.5 - 240.0	Brown sandstone with fine coal partings.
240.0 - 241.3	Brown slightly shaly sandstone.
241.3 - 244.0	Brown shaly sandstone containing a vertical fracture.
244.0 - 246.0	Brown very shaly slightly calcareous sandstone.
246.0 - 248.0	Brown shaly sandstone with gray shale and coal partings and nodules.

#### LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 2,586 barrels of oil per acre was obtained from 13.6 feet of sand. The weighted average percent oil saturation was reduced from 43.2 to 31.3, or represents an average recovery of 11.9

-3-

percent. The weighted average effective permeability of the samples is 0.94 millidarcys, while the average initial fluid production pressure is 26.1 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 20 samples tested, 14 produced water and oil, and 2 produced water only. This indicates that approximately 70 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 4,890 barrels of oil per acre. This is an average recovery of 360 barrels per acre foot from 13.6 feet of floodable sand analyzed in this core.

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

Original formation volume factor, estimated	1.03
Reservoir water saturation, percent, estimated	25.0
Average porosity, percent	20.3
Oil saturation after flooding, percent	31.3
Performance factor, percent, estimated	55.0
Net floodable sand, feet	13.6

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Sand Bar Oil Company Lease Decker Well No. 2

Sample No.	Depth, Feet	Effective Porosity Percent	Percent Saturation		Oil Content Bbbls. / A Ft.	Perm., Mill.	Feet of Sand		Total Oil Content	Perm. Capacity Ft. X md.
			Oil	Water			Ft.	Cum. Ft.		
1	228.7	18.9	51	39	748	3.1	0.8	0.8	598	2.48
2	229.6	19.0	42	42	619	6.8	1.6	2.4	990	10.88
3	230.5	21.7	51	34	859	17.	0.6	3.0	515	10.20
4	231.5	22.1	44	35	754	26.	1.0	4.0	754	26.00
5	232.3	15.6	31	59	375	3.0	0.4	4.4	150	1.20
6	233.5	20.8	46	33	742	18.	1.0	5.4	742	18.00
7	234.4	22.3	45	24	779	26.	1.0	6.4	779	26.00
8	235.5	20.7	50	29	803	37.	1.0	7.4	803	37.00
9	236.5	21.2	42	32	691	13.	1.0	8.4	691	13.00
10	237.5	18.0	38	54	531	14.	0.7	9.1	372	9.80
11	238.5	20.5	58	38	922	20.	0.7	9.8	645	14.00
12	239.4	20.2	38	54	596	13.	0.9	10.7	536	11.70
13	240.6	19.0	43	52	634	6.8	1.3	12.0	824	8.84
14	241.4	17.5	41	56	557	1.3	0.7	12.7	390	0.91
15	242.4	17.5	29	67	394	3.0	1.0	13.7	394	3.00
16	243.5	16.7	26	70	337	2.4	1.0	14.7	337	2.40
17	244.6	12.4	14	80	135	0.68	1.0	15.7	135	0.68
18	245.5	3.6	41	56	115	Imp.	1.0	16.7	115	0.00
19	246.7	21.4	37	47	614	3.3	1.0	17.7	614	3.30
20	247.4	20.2	28	57	439	2.0	1.0	18.7	439	2.00

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## SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company	Sand Bar Oil Company	Lease	Decker	Well No.		
				2		
Depth Interval, Feet	Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.		
228.0 - 241.3	228.0 - 241.3	12.0	15.8	189.10		
241.3 - 248.0	241.3 - 248.0	5.7	2.2	12.29		
228.0 - 248.0	228.0 - 248.0	17.7	11.4	201.39		
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
228.0 - 241.3	12.0	20.1	44.6	39.7	700	8,399
241.3 - 248.0	6.7	15.5	30.4	62.1	362	2,424
228.0 - 248.0	18.7	18.5	39.5	47.7	579	10,823

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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	228.7	19.0	51	752	18	265	33	60	22	0.33	20
2	229.6	18.8	42	613	8	117	34	56	15	0.28	45
3	230.5	21.6	51	855	19	318	32	54	24	0.37	20
4	231.5	22.1	44	754	16	274	28	57	44	0.67	10
5	232.3	15.1	32	375	0	0	32	58	0	Imp.	-
6	233.5	20.9	46	746	20	324	26	55	14	0.37	15
7	234.4	22.2	45	775	17	293	28	51	62	0.82	25
8	235.5	20.6	50	799	16	256	34	50	36	0.60	20
9	236.5	21.1	42	688	16	262	26	71	72	1.00	20
10	237.5	18.2	38	537	10	141	28	66	92	1.80	20
11	238.5	20.4	58	918	14	222	44	53	302	4.16	15
12	239.4	20.3	38	598	6	94	32	63	68	1.00	30
13	240.6	18.9	43	630	7	103	36	61	170	2.33	25
14	241.4	17.0	42	554	0	0	42	55	0	Imp.	-
15	242.4	17.3	29	389	0	0	29	67	4	0.15	50
16	243.5	17.2	25	334	0	0	25	71	0	Imp.	-
17	244.6	12.9	14	140	0	0	14	80	5	0.17	50
18	245.5	3.8	41	121	0	0	41	56	0	Imp.	-
19	246.7	21.3	37	611	5	83	32	61	3	0.15	50
20	247.4	20.3	28	441	2	31	26	60	3	0.08	50

Company Sand Bar Oil Company
Lease Decker
Well No. 2

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

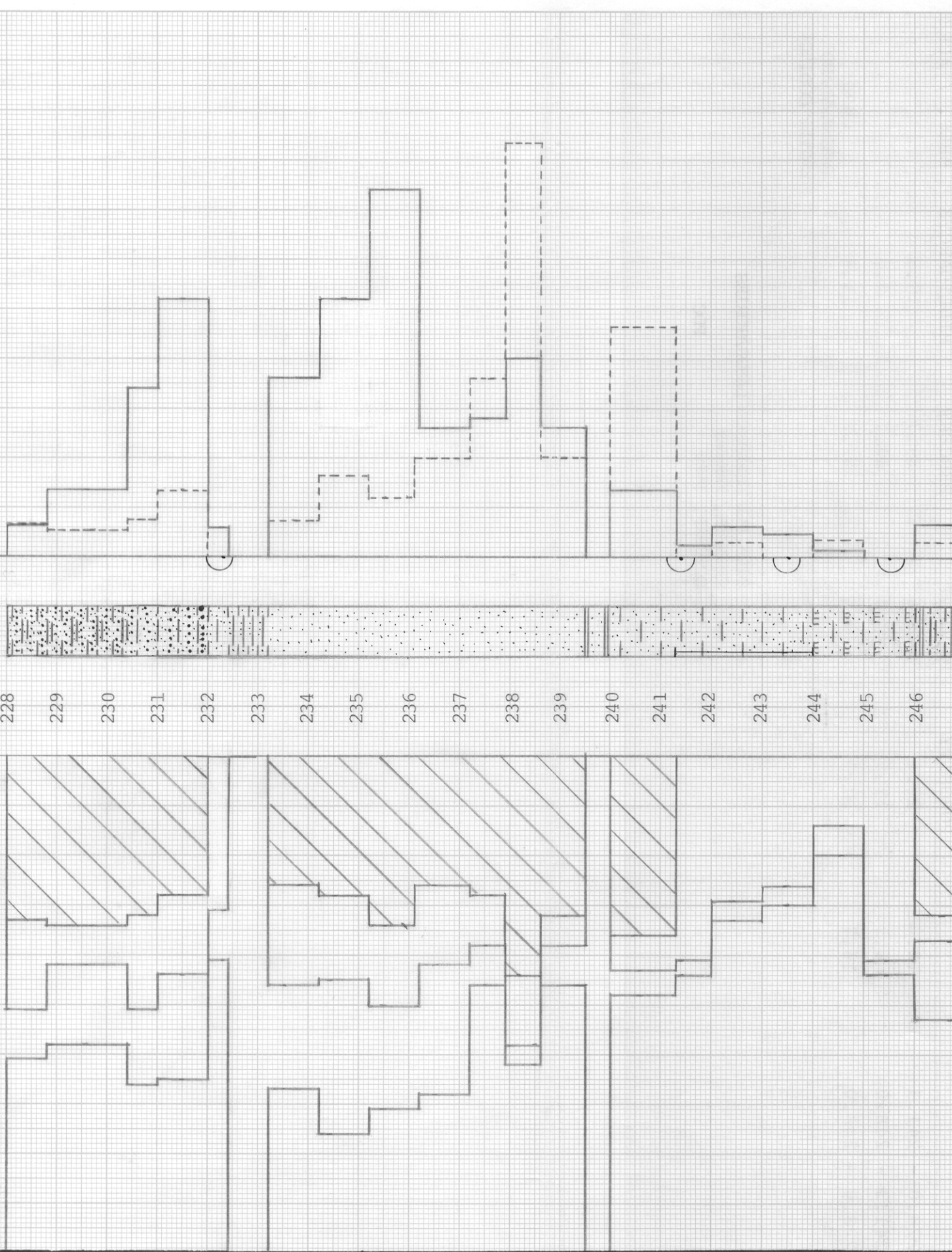
Company <u>Sand Bar Oil Company</u>	Lease <u>Decker</u>	Well No. <u>2</u>	
Depth Interval, Feet	228.0 - 241.3	241.3 - 248.0	228.0 - 248.0
Feet of Core Analyzed	11.6	2.0	13.6
Average Percent Porosity	20.3	20.8	20.3
Average Percent Original Oil Saturation	45.1	32.5	43.2
Average Percent Oil Recovery	13.4	3.5	11.9
Average Percent Residual Oil Saturation	31.7	29.0	31.3
Average Percent Residual Water Saturation	58.0	60.5	58.4
Average Percent Total Residual Fluid Saturation	89.7	89.5	89.7
Average Original Oil Content, Bbls./A. Ft.	710.	526.	683.
Average Oil Recovery, Bbls./A. Ft.	213.	57.	190.
Average Residual Oil Content, Bbls./A. Ft.	497.	469.	493.
Total Original Oil Content, Bbls./Acre	8,234.	1,052.	9,286.
Total Oil Recovery, Bbls./Acre	2,472.	114.	2,586.
Total Residual Oil Content, Bbls./Acre	5,762.	938.	6,700.
Average Effective Permeability, Millidarcys	1.08	0.12	0.94
Average Initial Fluid Production Pressure, p.s.i.	22.1	50.0	26.1

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

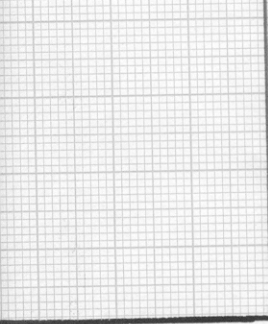
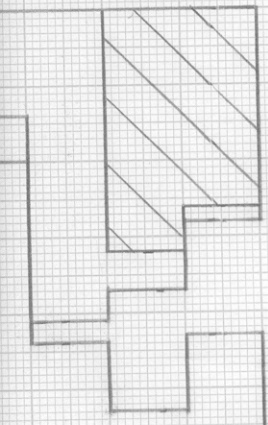
PERMEABILITY, IN MILLIDARCYS  
 EFFECTIVE PERMEABILITY TO WATER, IN MILLIDARCYS

PERMEABILITY, IN MILLIDARCYS  
 EFFECTIVE PERMEABILITY TO WATER, IN MILLIDARCYS

WATER SAT., PERCENT  
 OIL SAT., PERCENT



245  
246  
247  
248



SANDSTONE WITH SHALE PARTINGS AND MICACEOUS PARTINGS  
 SHALY SANDSTONE WITH SHALE PARTINGS AND MICACEOUS PARTINGS  
 SANDSTONE WITH COAL PARTINGS  
 FORMATION CONTAINING A VERTICAL FRACTURE  
 SHALY SANDSTONE WITH COAL PARTINGS AND SHALE PARTINGS  
 FLOODPOT RESIDUAL OIL SATURATION

SANDSTONE  
 SHALY SANDSTONE  
 SHALY CALCAREOUS SANDSTONE  
 LAMINATED SANDSTONE AND SHALE  
 IMPERMEABLE TO WATER

KEY:



# SAND BAR OIL COMPANY

DECKER LEASE  
 CRAWFORD COUNTY, KANSAS  
 WELL NO. 2

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
228.0 - 241.3	12.0	20.1	44.6	39.7	15.8	4890 (PRIMARY AND WATERFLOODING)
241.3 - 248.0	6.7	15.5	30.4	62.1	2.2	
228.0 - 248.0	18.7	18.5	39.5	47.7	11.4	

OILFIELD RESEARCH LABORATORIES  
 CHANUTE, KANSAS  
 OCTOBER, 1982  
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