

OILFIELD RESEARCH LABORATORIES

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October 2, 1980

Tokan Oil, Inc.
Box 2343
Hutchinson, Kansas 67501


Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Needham Lease, Well No. 3, Miami County, Kansas and submitted to our laboratory on August 22, 1980.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES



Sanford A. Michel

SAM/ks

5 c to Hutchinson, Kansas

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Token Oil, Inc. Lease Needham Well No. 3

Location -

Section 12 Twp. 18S Rge. 22E County Miami State Kansas

Elevation, Feet	-
Names of Sand	Peru
Top of Core	254.0
Bottom of Core	267.7
Top of Sand	254.0
Bottom of Sand	267.7
Total Feet of Permeable Sand	12.5
Total Feet of Floodable Sand	6.1

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 20	6.2	6.2
20 - 60	1.7	7.9
100 - 500	3.8	11.7
800 - 900	0.8	12.5

Average Permeability Millidarcys	141.1
Average Percent Porosity	24.3
Average Percent Oil Saturation	43.8
Average Percent Water Saturation	35.4
Average Oil Content, Bbls./A. Ft.	848.
Total Oil Content, Bbls./Acre	11,024.
Average Percent Oil Recovery by Laboratory Flooding Tests	10.8
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	218.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	1330.
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. Salt water mud was used as a drilling fluid. The core was reported to be from a virgin area.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
254.0 - 255.5	Grayish brown shaly sandstone.
255.5 - 259.2	Light brown shaly sandstone.
259.2 - 263.8	Dark brown calcareous sandstone.
263.8 - 264.5	Dark brown shaly sandstone.
264.5 - 267.7	Dark brown calcareous sandstone.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 1330 barrels of oil per acre was obtained from 6.1 feet of sand. The weighted average percent oil saturation was reduced from 38.9 to 28.1, or represents an average recovery of 10.8 percent. The weighted average effective permeability of the samples is 15.97 millidarcys, while the average initial fluid production pressure is 18.3 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 13 samples tested, 6 produced water and oil, and 1 sample produced water only. This indicates that approximately 46 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 2350 barrels of oil per acre. This is an average recovery of 385 barrels per acre foot from 6.1 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	30.0
Average porosity, percent	24.9
Oil saturation after flooding, percent	28.1
Performance factor, percent, estimated	50.0
Net floodable sand, feet	6.1

RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Tokan Oil, Inc. Lease Needham 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	Total			Ft.	Cum. Ft.		
1	254.9	20.1	25	65	90	390	1.6	1.0	390	1.60	
2	255.3	19.8	21	65	86	323	Imp.	0.5	162	0.00	
3	256.6	20.4	35	56	91	554	19.	1.5	831	28.50	
4	257.8	20.6	31	56	87	495	12.	1.5	743	18.00	
5	259.5	26.8	43	31	74	894	266.	0.8	715	212.80	
6	260.8	22.8	40	44	84	708	113.	1.0	708	113.00	
7	261.7	27.6	39	31	70	835	415.	1.0	835	415.00	
8	262.5	27.1	42	35	77	883	231.	1.0	883	231.00	
9	263.5	27.4	43	33	76	914	804.	0.8	731	643.20	
10	264.3	25.7	64	8	72	1276	6.3	0.7	893	4.41	
11	265.7	26.0	64	9	73	1291	18.	1.5	1937	27.00	
12	266.5	26.4	56	8	64	1147	28.	1.0	1147	28.00	
13	267.5	28.0	69	9	78	1499	58.	0.7	1049	40.60	

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company	Lease	Needham	Well No.			
Tokan Oil, Inc.			3			
Depth Interval, Feet	Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.		
254.0 - 263.8	254.0 - 263.8	8.6	193.4	1663.10		
263.8 - 267.7	263.8 - 267.7	3.9	25.6	100.01		
254.0 - 267.7	254.0 - 267.7	12.5	141.1	1763.11		
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
254.0 - 263.8	9.1	23.3	35.6	46.9	659	5,998
263.8 - 267.7	3.9	26.4	62.9	8.6	1287	5,026
254.0 - 267.7	13.0	24.3	43.8	35.4	848	11,024

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Well No. **3**

Lease **Needham**

Company **Token Oil, Inc.**

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	254.9	20.2	25	392	0	0	25	69	16	0.15	45
2	255.3	19.9	21	324	0	0	21	75	0	Imp.	-
3	256.6	20.6	35	559	0	0	35	56	0	Imp.	-
4	257.8	20.6	31	495	4	64	27	61	17	0.75	50
5	259.5	26.7	43	891	15	311	28	66	210	11.14	15
6	260.8	22.9	40	711	10	178	30	60	307	13.12	15
7	261.7	27.4	39	829	11	234	28	53	298	15.74	10
8	262.5	27.2	42	885	15	317	27	63	386	34.49	10
9	263.5	27.5	43	917	15	320	28	53	169	30.00	10
10	264.3	25.7	64	1276	0	0	64	10	0	Imp.	-
11	265.7	25.5	65	1286	0	0	65	11	0	Imp.	-
12	266.5	26.3	56	1143	0	0	56	13	0	Imp.	-
13	267.5	28.1	69	1504	0	0	69	10	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

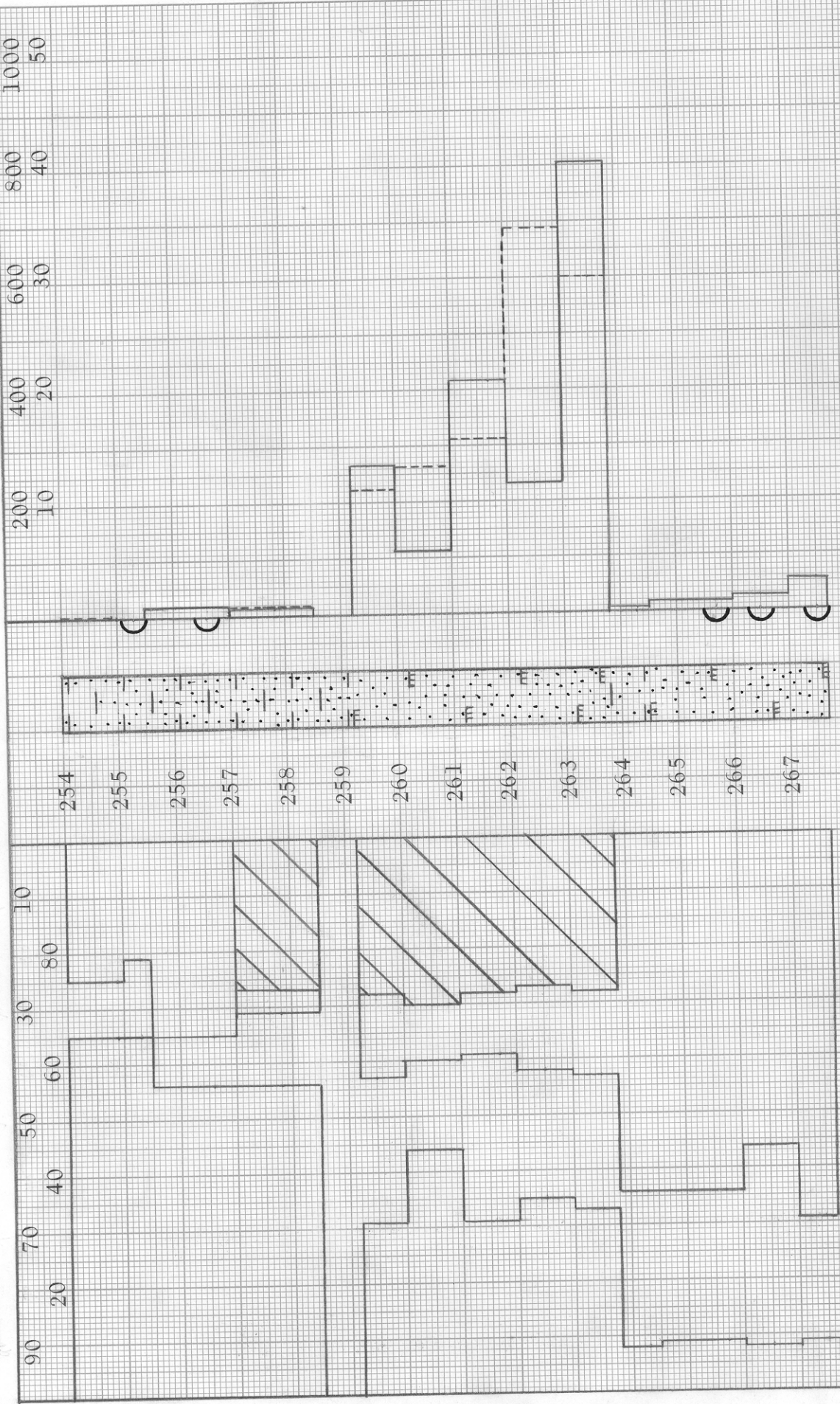
Company	Token Oil, Inc.	Lease	Needham	Well No.	3
Depth Interval, Feet	254.0 - 263.8				
Feet of Core Analyzed	6.1				
Average Percent Porosity	24.9				
Average Percent Original Oil Saturation	38.9				
Average Percent Oil Recovery	10.8				
Average Percent Residual Oil Saturation	28.1				
Average Percent Residual Water Saturation	59.5				
Average Percent Total Residual Fluid Saturation	87.6				
Average Original Oil Content, Bbls./A. Ft.	757.				
Average Oil Recovery, Bbls./A. Ft.	218.				
Average Residual Oil Content, Bbls./A. Ft.	539.				
Total Original Oil Content, Bbls./Acre	4615.				
Total Oil Recovery, Bbls./Acre	1330.				
Total Residual Oil Content, Bbls./Acre	3285.				
Average Effective Permeability, Millidarcys	15.97				
Average Initial Fluid Production Pressure, p.s.i.	18.3				

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
- CALCAREOUS SANDSTONE
- IMPERMEABLE TO WATER
- FLOODPOT RESIDUAL OIL SATURATION

TOKAN OIL, INC.

WELL NO. 3

NEEDHAM LEASE

MIAMI COUNTY, KANSAS

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE POROSITY PERCENT	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVERAGE PERMEABILITY MILLIDARCS	CALCULATED OIL RECOVERY BBLs./ACRE
254.0 - 263.8	9.1	23.3	35.6	46.9	193.4	
263.8 - 267.7	3.9	26.4	62.9	8.6	25.6	
254.0 - 267.7	13.0	24.3	43.8	35.4	141.1	2,350 (PRIMARY & WATERFLOODING)

OILFIELD RESEARCH LABORATORIES
CHANUTE, KANSAS
SEPTEMBER, 1980