OILFIELD RESEARCH LABORATORIES

536 NORTH HIGHLAND - CHANUTE, KANSAS - PHONE HE1-2650

May 4, 1967

34-28-14E

Petex Producing, Inc.
6210 West 10th Street
Topeka, Kansas 66615

Gentlemen:

Enclosed herewith is the report of the analysis of the Rotary core taken from the Holdeman Lease, Well No. WI-6, Wilson County, Kansas and submitted to our laboratory on April 27, 1967.

This core was sampled and the samples sealed in cans by a representative of Oilfield Research Laboratories.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Benjamin R. Pearman

Benjamin R. Pearman

BRP:rf

5 c. - Topeka, Kansas

Holdeman WI-6

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Petex Producing, Inc. Lease Holdeman Well No. WI-6

Location 1540' SNL & 440' EWL, NE/4

Section 34 Twp. 28S Rge. 14E County Wilson State Kansas

Name of Sand	New Albany
Top of Core	249.0
Bottom of Core	285.0
Top of Sand (Analyzed)	258.0
Bottom of Sand (Analyzed)	281.6
Total Feet of Permeable Sand	23.6
Total Feet of Floodable Sand	12.4

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
15 - 100	7.2	7.2
100 - 200	14.4	21.6
200 & above	2.0	23.6

Average Permeability Millidarcys	118.0
Average Percent Porosity	23.8
Average Percent Oil Saturation	27.6
Average Percent Water Saturation	51.1
Average Oil Content, Bbls./A. Ft.	511.
Total Oil Content, Bbls./Acre	12,079.
Average Percent Oil Recovery by Laboratory Flooding Tests	4.7
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	86.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	1,063.
Total Calculated Oil Recovery, Bbls./Acre (Primary & Secondary)	3,580.
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	

Salt water mud was used as the circulating fluid while taking this core. The core was sampled and the samples sealed in cans by a representative of Oilfield Research Laboratories. The well was drilled in semi-virgin territory.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
249.0 - 251.0	Sandy shale.
251.0 - 251.1	Coal.
251.1 - 251.7	Shale.
251.7 - 251.8	Coal.
251.8 - 254.5	Sandy shale.
254.5 - 258.0	Gray and brown, laminated, shaly sandstone.
258.0 - 259.0	Brown, slightly shaly sandstone.
259.0 - 259.7	Gray and brown, shaly sandstone.
259.7 - 261.0	Gray, slightly shaly sandstone.
261.0 - 263.0	Brown, slightly shaly sandstone.
263.0 - 271.5	Brown sandstone.
271.5 - 280.0	Brown, slightly laminated, shaly sandstone.
280.0 - 283.8	Gray, slightly carbonaceous sandstone.
283.8 - 284.0	Coal.
284.0 - 285.0	Shale.

Coring was started at a depth of 249.0 feet in sandy shale and completed at 285.0 feet in shale. For the most part, the pay is made up of brown and brown slightly shaly sandstone.

PERMEABILITY

For the sake of distribution, the core was divided into three sections. The weighted average permeability of the upper, middle and lower sections is 52.6, 108.6 and 150.2 millidarcys respectively; the overall average being 118.0 (See Table III). By observing the data given on the coregraph, it is noticeable that the sand has a rather uniform permeability profile. The permeability of the sand varies from 15. to a maximum of 238. millidarcys.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a fairly good weighted average percent oil saturation, namely, 27.6. The weighted average percent oil saturation of the upper, middle and lower sections is 20.1, 34.0 and 23.8 respectively. The weighted average percent water saturation of the upper, middle and lower sections is 64.2, 41.9 and 55.6 respectively; the overall average being 51.1 (See Table III). This gives an overall weighted average total fluid saturation of 78.7 percent. This low total fluid saturation indicates some fluid was lost during coring, most of which was probably oil.

The weighted average oil content of the upper, middle and lower sections is 406, 626 and 438 barrels per acre foot respectively; the overall average being 511. The total oil content, as shown by this core, is 12,079 barrels per acre of which 7,723 barrels are in the pay sand section (See Table III).

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 1,063 barrels of oil per acre was obtained from

12.4 feet of sand. The weighted average percent oil saturation was reduced from 33.9 to 29.2, or represents an average recovery of 4.7 percent. The weighted average effective permeability of the samples is 6.15 millidarcys, while the average initial fluid production pressure is 10.4 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 24 samples tested, all produced water and 12 oil. This indicates that approximately 50 percent of the sand represented by these samples is floodable pay sand. The tests also show that the sand has a fairly uniform effective permeability to water.

CONCLUSION

The results of the laboratory tests indicate that efficient primary and secondary operations in the vicinity of this well should recover approximately 3,580 barrels of oil per acre or an average of 289 barrels per acre foot from the 12.4 feet of floodable pay sand analyzed in this core. These recovery values were calculated using the following data and assumptions:

Original formation volume factor	1.02
Reservoir water saturation, percent	35.0
Average porosity, percent	23.6
Oil saturation after flooding, percent	29.2
Performance factor, percent	45.0
Net floodable pay sand, feet	12.4

This core shows a pay sand section having a good oil saturation, a moderate water saturation and a fairly uniform effective permeability to water.

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Petex Producing, Inc. Lease Holdeman Well No. WI-6

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	258.1	26.1	32	43	75	648	59.	1.0	1.0	648	59.00
2	259.1	28.2	27	37	64	590	106.	0.7	1.7	413	74.20
3	260.1	24.5	11	86	97	209	15.	1.3	3.0	272	19.50
4	261.1	23.8	12	85	97	222	62.	0.6	3.6	133	37.20
5	262.1	25.1	39	40	79	759	27.	1.4	5.0	1,062	37.80
6	263.1	22.9	37	37	74	658	106.	0.6	5.6	394	63.60
7	264.1	23.2	27	36	63	486	102.	1.0	6.6	486	102.00
8	265.1	24.2	37	42	79	694	145.	1.0	7.6	694	145.00
9	266.1	24.2	39	35	74	732	128.	1.0	8.6	732	128.00
10	267.1	24.0	41	35	76	764	115.	1.0	9.6	764	115.00
11	268.1	22.6	26	59	85	456	99.	1.0	10.6	456	99.00
12	269.1	20.7	36	43	79	578	143.	1.0	11.6	578	143.00
13	270.1	24.2	30	47	77	563	168.	1.0	12.6	563	168.00
14	271.1	25.0	27	44	71	524	81.	0.9	13.5	471	72.90
15	272.1	24.1	23	48	71	430	151.	1.1	14.6	473	166.10
16	273.1	23.5	14	69	83	255	194.	1.0	15.6	255	194.00
17	274.1	23.3	28	58	86	506	169.	1.0	16.6	506	169.00
18	275.1	24.4	33	48	81	624	111.	1.0	17.6	624	111.00
19	276.1	24.9	30	51	81	580	100.	1.0	18.6	580	100.00
20	277.1	20.0	29	51	80	450	202.	1.0	19.6	450	202.00
21	278.1	23.2	27	48	75	486	238.	1.0	20.6	486	238.00
22	279.1	24.9	29	44	73	560	115.	1.4	22.0	784	161.00
23	280.1	23.4	4	74	78	73	114.	0.6	22.6	44	68.40
24	281.1	22.7	12	79	91	211	110.	1.0	23.6	211	110.00
								Total------		12,079	

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Petex Producing, Inc. Lease Holdeman Well No. WI-6

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
258.0 - 261.6	3.6	52.6	189.90
261.6 - 271.5	9.9	108.6	1,074.30
271.5 - 281.6	10.1	150.2	1,519.50
258.0 - 281.6	23.6	118.0	2,783.70

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
258.0 - 261.6	3.6	25.5	20.1	64.2	406	1,466
261.6 - 271.5	9.9	23.7	34.0	41.9	626	6,200
271.5 - 281.6	10.1	23.4	23.8	55.6	438	4,413
258.0 - 281.6	23.6	23.8	27.6	51.1	511	12,079

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Petex Produing, Inc. Lease Holdeman Well No. WI-6

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	258.1	25.8	33	660	0	0	33	52	660	84	1.69	10
2	259.1	28.0	27	584	0	0	27	74	584	63	1.32	15
3	260.1	24.0	9	168	0	0	9	90	168	95	1.61	10
4	261.1	24.2	13	244	0	0	13	86	244	61	1.61	15
5	762.1	24.8	39	750	3	58	36	60	692	181	3.74	10
6	263.1	23.3	37	668	2	36	35	64	632	124	3.88	10
7	264.1	23.7	28	514	0	0	28	71	514	124	3.45	15
8	265.1	24.5	37	702	5	95	32	59	607	97	2.64	10
9	266.1	23.8	39	719	11	203	28	66	516	66	1.76	15
10	267.1	23.5	41	746	7	128	34	65	618	148	4.47	10
11	268.1	22.1	26	445	0	0	26	72	445	241	6.01	10
12	269.1	21.0	36	586	6	98	30	69	488	201	5.72	10
13	270.1	24.4	30	568	2	38	28	70	530	224	6.82	10
14	271.1	24.6	28	534	0	0	28	71	534	261	6.23	10
15	272.1	24.2	25	469	0	0	25	72	469	329	8.50	10
16	273.1	23.9	14	259	0	0	14	85	259	419	8.06	10
17	274.1	22.9	28	496	3	53	25	74	443	194	5.65	10
18	275.1	24.0	33	614	5	93	28	70	521	275	9.34	10
19	276.1	25.1	30	584	4	78	26	68	506	460	8.55	10
20	277.1	20.4	29	458	4	63	25	74	395	280	7.26	10
21	278.1	23.6	27	494	0	0	27	71	494	412	13.44	10
22	279.1	25.4	29	570	4	79	25	72	491	341	11.88	10
23	280.1	23.0	5	89	0	0	5	76	89	124	2.84	10
24	281.1	23.0	13	232	0	0	13	82	232	345	11.36	10

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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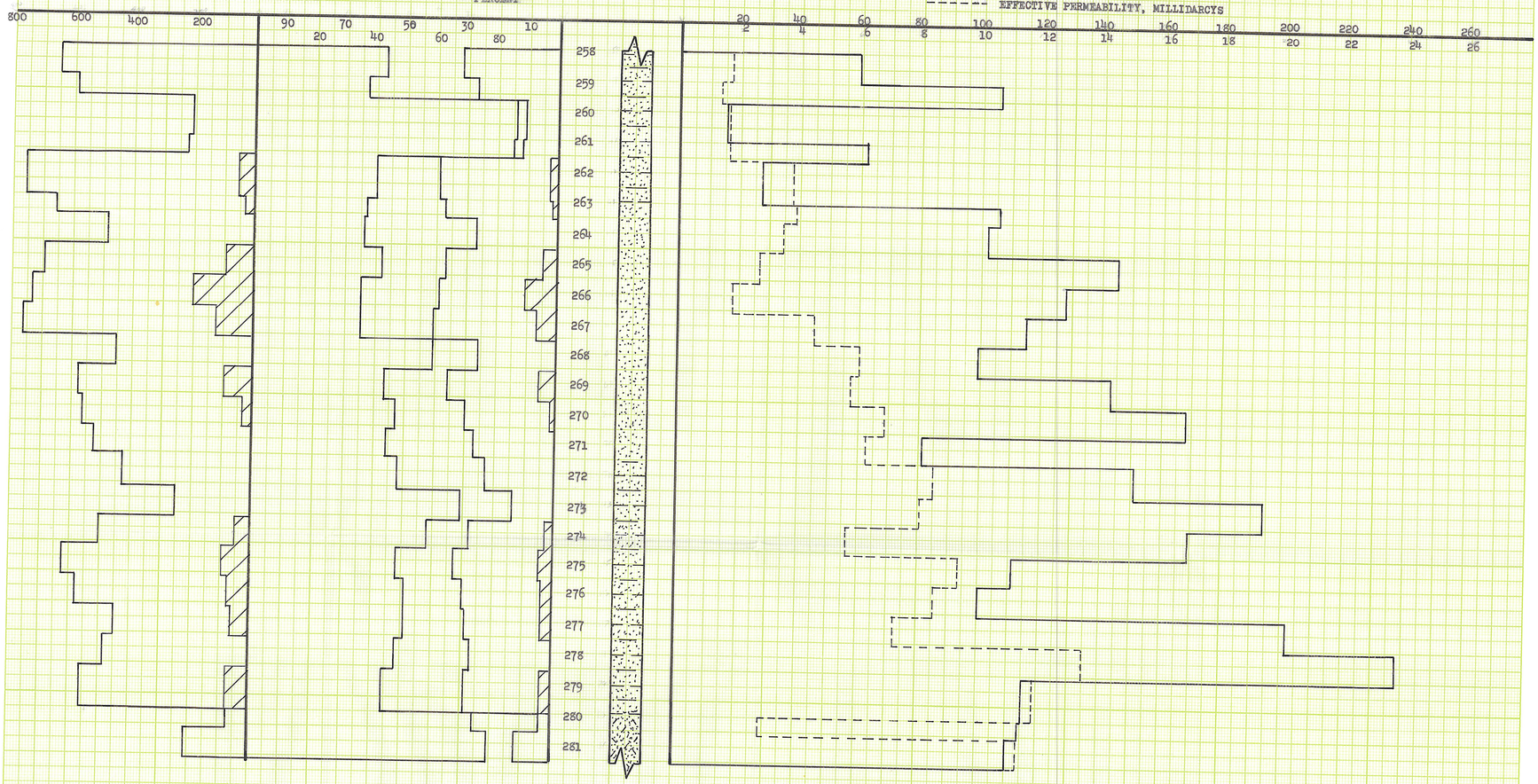
SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company Petex Producing, Inc. Lease Holdeman Well No. WI-6

Depth Interval, Feet	261.6 - 271.5	271.5 - 281.6	261.6 - 281.6
Feet of Core Analyzed	7.0	5.4	12.4
Average Percent Porosity	23.6	23.7	23.6
Average Percent Original Oil Saturation	37.1	29.8	33.9
Average Percent Oil Recovery	5.2	4.0	4.7
Average Percent Residual Oil Saturation	31.9	25.8	29.2
Average Percent Residual Water Saturation	64.5	71.6	67.5
Average Percent Total Residual Fluid Saturation	96.4	97.4	96.7
Average Original Oil Content, Bbls./A. Ft.	681.	546.	624.
Average Oil Recovery, Bbls./A. Ft.	95.	74.	86.
Average Residual Oil Content, Bbls./A. Ft.	586.	472.	538.
Total Original Oil Content, Bbls./Acre	4,773.	2,950.	7,723.
Total Oil Recovery, Bbls./Acre	665.	398.	1,063.
Total Residual Oil Content, Bbls./Acre	4,108.	2,552.	6,660.
Average Effective Permeability, Millidarcys	4.14	8.78	6.15
Average Initial Fluid Production Pressure, p.s.i.	10.7	10.0	10.4

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



FLOOD POT RECOVERY

SHALY SANDSTONE

SANDSTONE

CARBONACEOUS SANDSTONE

PETEX PRODUCING, INC.

HOLDEMAN LEASE WELL NO. WI-6

WILSON COUNTY, KANSAS

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE POROSITY, PERCENT	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVG. OIL CONTENT BBLS./A.FT.	TOTAL OIL CONTENT BBLS./ACRE	AVG. AIR PERMEABILITY, MILLIDARCYS	CALCULATED OIL RECOVERY, BBLS./ACRE
258.0 - 261.6	3.6	25.5	20.1	64.2	406	1,466	52.6	
261.6 - 271.5	9.9	23.7	34.0	41.9	626	6,200	108.6	
271.5 - 281.6	10.1	23.4	23.8	55.6	438	4,413	150.2	
258.0 - 281.6	23.6	23.8	27.6	51.1	511	12,079	118.0	3,580 (Primary & Secondary)

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CHANUTE, KANSAS
MAY, 1967