OILFIELD RESEARCH LABORATORIES

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

June 20, 1978

TAP Oil Company
% Allison Oil
P.O. Box 95
Chanute, Kansas 66720

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary cores taken from the Glades Lease, Well No. T-14, Woodson County, Kansas, and submitted to our laboratory on June 9, 1978.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Carl L. Pate

Carl L. Pate

CLP:cb
5 c to Chanute, Kansas

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company TAP Oil Company Lease Glades Well No. T-14

Location 825' FEL & 560' FSL

Section 9 Twp. 24S Rge. 16E County Woodson State Kansas

Name of Sand		Lower Squirrel
Top of Core	(Received)	1,012.0
Bottom of Core	(Received)	1,027.0
Top of Sand	(Received)	1,012.0
Bottom of Sand	(Analyzed)	1,026.0
Total Feet of Permeable Sand	(Analyzed)	13.5
Total Feet of Floodable Sand		4.0

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 5	3.6	3.6
5 - 20	5.7	9.3
20 & above	4.2	13.5

Average Permeability Millidarcys	19.3
Average Percent Porosity	17.6
Average Percent Oil Saturation	49.5
Average Percent Water Saturation	29.4
Average Oil Content, Bbls./A. Ft.	697.
Total Oil Content, Bbls./Acre	9,413.
Average Percent Oil Recovery by Laboratory Flooding Tests	14.4
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	226.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	905.
Total Calculated Oil Recovery, Bbls./Acre (Primary & Waterflooding)	1,244.
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F (Reported)	24.0
Elevation, Feet	

A fresh water mud was used as a circulating fluid in the coring of the sands in this well. This well was drilled in a virgin area. The cores were sampled by a representative of the client.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
	Upper Squirrel Sand
968.0 - 973.2	Brown slightly shaly sandstone.
973.2 - 975.7	Brown shaly sandstone.
975.7 - 976.0	Dark carbonaceous shaly sandstone.
976.0 - 977.0	Grayish brown very shaly sandstone.
	Lower Squirrel Sand
1012.0 - 1016.6	Brown shaly sandstone.
1016.6 - 1019.3	Brown very shaly sandstone.
1019.3 - 1019.8	Gray sandy shale.
1019.8 - 1022.8	Dark brown slightly carbonaceous slightly shaly sandstone.
1022.8 - 1025.0	Dark carbonaceous slightly shaly sandstone.
1025.0 - 1027.0	Grayish brown very shaly sandstone.

Coring of the Upper and Lower Squirrel Sands were started at depths of 968 and 1012 feet and completed at 977 and 1027 feet respectively. These cores show a total of 23.5 feet of sandstone. For the most part, the pay in each formation is made up of brown slightly shaly to shaly sandstone.

PERMEABILITY

The weighted average permeability of the upper and lower sands is 28.0 and 19.3 millidarcys respectively (See Table III). By observing the data given on the coregraph, it is noticeable that the lower sand has a very irregular permeability profile. The permeability of the sands vary from 0.48 to a maximum of 79 millidarcys.

PERCENT SATURATION & OIL CONTENT

The weighted average percent oil saturation of the upper and lower sands is 50.5 and 49.5 respectively; while the weighted average percent water saturation is 29.6 and 29.4 (See Table III). This gives an overall weighted average total fluid saturation of 80.1 and 78.9 percent for the two sands.

The weighted average oil content of the upper and lower sands is 704 and 697 barrels per acre foot repsectively; while the total oil content, as shown by these cores, is 5,419 and 9,413 barrels per acre (See Table III).

LABORATORY FLOODING TESTS

Part of the sand in the cores responded rather well to laboratory flooding tests, as a total recovery of 1,942 barrels of oil per acre was obtained from 10 feet of sand. The weighted average percent oil saturation for the upper and lower sands was reduced from 52.3 and 58.5 to 40.7 and 44.1, or represents an average recovery of 11.6 and 14.4 percent respectively (See Table V).

By observing the data given in Table IV, you will note that of the 21 samples tested, 10 produced water and oil. This indicates that approximately 48 percent of the sand represented by the samples is floodable pay sand. The tests also show that the sand samples, after flooding, had a rather high oil saturation.

CONCLUSION

On the basis of the above data, we estimate approximately 2,906 barrels of oil per acre (1,662 barrels from the upper sand and 1,244 barrels from the lower sand) can be recovered from the two zones by efficient primary and waterflood operations. The following data and assumptions were used in calculating the above oil recovery values:

	Upper Sand	Lower Sand
Original formation volume factor	1.05	1.05
Irreducible water saturation, percent	18.0	11.0
Primary recovery	None	None
Present oil saturation, percent	78.1	84.8
Average porosity, percent	19.1	19.7
Oil saturation after flooding, percent	40.7	44.1
Performance factor	0.50	0.50
Net floodable pay sand, feet	6.0	4.0

The cores show rather shaly pay sand sections having good oil saturations, low water saturations and fairly good permeability and porosity.

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company TAP Oil Company Lease Glades Well No. T-14

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.		
						Upper Squirrel					
1	968.5	17.6	47	25	72	643	33.	1.0	1.0	643	33.00
2	969.5	19.0	55	24	79	813	42.	1.0	2.0	813	42.00
3	970.5	19.3	54	22	76	810	60.	1.0	3.0	810	60.00
4	971.5	17.5	47	33	80	640	12.	1.0	4.0	640	12.00
5	972.5	18.6	57	27	84	824	36.	1.2	5.2	989	43.20
6	973.5	17.3	53	31	84	713	12.	0.8	6.0	570	9.60
7	974.5	16.7	42	39	81	545	12.	1.0	7.0	545	12.00
8	975.5	16.0	47	40	87	585	5.2	0.7	7.7	409	3.64
						Lower Squirrel					
9	1012.5	14.8	59	13	72	678	5.8	1.0	1.0	678	5.80
10	1013.5	16.8	46	34	80	600	0.78	1.0	2.0	600	0.78
11	1014.5	16.3	45	33	78	569	19.	1.0	3.0	569	19.00
12	1015.5	17.0	50	27	77	660	6.0	1.0	4.0	660	6.00
13	1016.5	17.2	47	26	73	627	0.84	0.6	4.6	376	0.50
14	1017.8	15.8	22	54	76	270	13.	1.4	6.0	378	18.20
15	1018.5	14.9	21	57	78	243	14.	1.3	7.3	316	18.20
16	1020.5	21.2	53	16	69	872	52.	1.2	8.5	1,046	62.40
17	1021.5	21.7	66	9	75	1,111	28.	1.0	9.5	1,111	28.00
18	1022.5	20.9	68	11	79	1,103	79.	0.8	10.3	882	63.20
19	1023.5	20.1	70	21	91	1,092	31.	1.2	11.5	1,310	37.20
20	1024.5	15.1	47	37	84	551	1.2	1.0	12.5	551	1.20
21	1025.5	18.0	67	25	92	936	0.48	1.0	13.5	936	0.48

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company TAP Oil Company Lease Glades Well No. T-14

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
		Upper Squirrel	
968.0 - 975.7	7.7	28.0	215.44
		Lower Squirrel	
1012.0 - 1026.0	13.5	19.3	260.96

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
			Upper Squirrel			
968.0 - 975.7	7.7	17.8	50.5	29.6	704	5,419
			Lower Squirrel			
1012.0 - 1026.0	13.5	17.6	49.5	29.4	697	9,413

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company TAP Oil Company Lease Glades Well No. T-14

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.			
						Upper Squirrel						
1	968.5	19.6	47	715	10	152	37	61	563	201	5.13	25
2	969.5	19.4	55	828	16	241	39	57	587	60	1.25	30
3	970.5	18.8	54	788	14	204	40	58	584	85	1.76	30
4	971.5	18.2	47	664	6	85	41	55	579	11	0.22	35
5	972.5	19.8	57	875	15	230	42	51	645	20	0.51	40
6	973.5	18.2	53	749	7	99	46	44	650	8	0.22	45
7	974.5	16.7	42	545	0	0	42	39	545	0	Imp.	-
8	975.5	16.0	47	585	0	0	47	40	585	0	Imp.	-
						Lower Squirrel						
9	1012.5	14.8	59	678	0	0	59	13	678	0	Imp.	-
10	1013.5	16.8	46	600	0	0	46	34	600	0	Imp.	-
11	1014.5	16.3	45	569	0	0	45	33	569	0	Imp.	-
12	1015.5	16.8	50	652	6	78	44	49	574	2	0.07	50
13	1016.5	17.2	47	627	0	0	47	26	627	0	Imp.	-
14	1017.8	15.8	22	270	0	0	22	54	270	0	Imp.	-
15	1018.5	14.9	21	243	0	0	21	57	243	0	Imp.	-
16	1020.5	21.7	53	892	16	269	37	58	623	148	2.33	30
17	1021.5	19.6	66	1004	18	274	48	44	730	13	0.20	40
18	1022.5	20.7	68	1092	18	289	50	44	803	52	0.80	35
19	1023.5	20.1	70	1092	0	0	70	21	1092	0	Imp.	-
20	1024.5	15.1	47	551	0	0	47	37	551	0	Imp.	-
21	1025.5	18.0	67	936	0	0	67	25	936	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 TAP Oil Company Lease Glades Well No. T-14

Depth Interval, Feet	Upper Squirrel 968.0 to 975.7	Lower Squirrel 1012.0 to 1026.0
Feet of Core Analyzed	6.0	4.0
Average Percent Porosity	19.1	19.7
Average Percent Original Oil Saturation	52.3	58.5
Average Percent Oil Recovery	11.6	14.4
Average Percent Residual Oil Saturation	40.7	44.1
Average Percent Residual Water Saturation	54.6	49.4
Average Percent Total Residual Fluid Saturation	95.3	93.5
Average Original Oil Content, Bbls./A. Ft.	774.	899.
Average Oil Recovery, Bbls./A. Ft.	173.	226.
Average Residual Oil Content, Bbls./A. Ft.	601.	673.
Total Original Oil Content, Bbls./Acre	4,644.	3,599.
Total Oil Recovery, Bbls./Acre	1,037.	905.
Total Residual Oil Content, Bbls./Acre	3,607.	2,694.
Average Effective Permeability, Millidarcys	1.52	0.93
Average Initial Fluid Production Pressure, p.s.i.	34.0	38.5

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