OILFIELD RESEARCH LABORATORIES

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

May 13, 1977

Glenn Caldwell
Box 42
Garnett, Kansas 66032

Dear Mr. Caldwell:

Enclosed herewith is the report of the analysis of the Rotary core taken from the North Unit Lease, Well No. 24, Anderson County, Kansas, and submitted to our laboratory on May 6, 1977.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Carl L. Pate

Carl L. Pate

CLP:ss
4 c to Garnett, Kansas

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Glenn Caldwell Lease North Unit Well No. 24

Location SE NE SW NW

Section 4 Twp. 21S Rge. 21E County Anderson State Kansas

Name of Sand	Bartlesville
Top of Core - (Received)	717.0
Bottom of Core - (Received)	737.0
Top of Sand	717.4
Bottom of Pay Sand	736.3
Total Feet of Permeable Sand	19.6
Total Feet of Floodable Sand	18.9

Distribution of Permeable Sand:

Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 50	8.3	8.3
50 - 100	3.0	11.3
100 - 150	4.3	15.6
150 & above	4.0	19.6

Average Permeability Millidarcys	92.7
Average Percent Porosity	21.2
Average Percent Oil Saturation	43.6
Average Percent Water Saturation	41.0
Average Oil Content, Bbls./A. Ft.	723.
Total Oil Content, Bbls./Acre	14,168.
Average Percent Oil Recovery by Laboratory Flooding Tests	16.7
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	272.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	5,139.
Total Calculated Oil Recovery, Bbls./Acre	
Packer Setting, Feet	
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F -(Reported)	34.0
Elevation, Feet	

A salt water mud was used as a circulating fluid in the coring of the sand in this well. The sand reservoir has been waterflooded. The core was sampled by the client.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
717.0 - 717.4	Gray sandy shale.
717.4 - 736.3	Brown fine grained sandstone.
736.3 - 737.0	Brown and gray conglomeratic sandstone.

Coring was started at a depth of 717.0 feet in gray sandy shale and completed at 737.0 feet in brown and gray conglomeratic sandstone. This core shows a total of 19.6 feet of sandstone. For the most part, the pay is made up of brown fine grained sandstone.

PERMEABILITY

For the sake of distribution, the core was divided into two sections. The weighted average permeability of the upper and lower sections is 90.3 and 95.5 millidarcys respectively; the overall average being 92.7 (See Table III). By observing the data given on the coregraph, it is noticeable that the sand has a very irregular permeability profile. The permeability of the sand varies from 11.0 to a maximum of 273. millidarcys.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a good weighted average percent oil saturation, namely, 43.6. The weighted average percent oil

saturation of both the upper and lower sections is 43.6. The weighted average percent water saturation of the upper and lower sections is 40.1 and 41.9 respectively; the overall average being 41.0 (See Table III). This gives an overall weighted average total fluid saturation of 84.6 percent.

The weighted average oil content of the upper and lower sections is 718 and 729 barrels per acre foot respectively; the overall average being 72.3. The total oil content, as shown by this core, is 14,168 barrels per acre (See Table III).

LABORATORY FLOODING TESTS

The sand in this core responded very well to laboratory flooding tests, as a total recovery of 5,139 barrels of oil per acre was obtained from 18.9 feet of sand. The weighted average percent oil saturation was reduced from 43.9 to 27.2, or represents an average recovery of 16.7 percent. The weighted average effective permeability of the samples is 8.88 millidarcys, while the average initial fluid production pressure is 12.5 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 20 samples tested, all produced water and 19 oil. This indicates that approximately 95 percent of the sand represented by these samples is floodable pay sand. The tests also show that the sand has a rather wide variation in effective permeability.

CONCLUSION

The core shows a clean sand section having a good oil saturation, a moderate water saturation and a good permeability and porosity.

For the same reason as mentioned before, no estimated oil recovery value is given.

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Glenn Caldwell **Lease** North Unit **Well No.** 24

Sample No.	Depth, Feet	Effective Porosity Percent	Percent Saturation			Oil Content Bbls. / A Ft.	Perm., Mil.	Feet of Sand		Total Oil Content	Perm. Capacity Ft. X md.
			Oil	Water	Total			Ft.	Cum. Ft.		
1	717.5	22.2	56	32	88	965	45.	0.6	0.6	579	27.00
2	718.5	21.7	42	32	84	707	151.	1.0	1.6	707	151.00
3	719.5	23.1	50	30	80	896	161.	1.0	2.6	896	161.00
4	720.5	18.9	44	49	93	645	273.	1.0	3.6	645	273.00
5	721.5	23.6	47	42	89	861	68.	1.0	4.6	861	68.00
6	722.5	20.2	45	37	82	705	101.	1.0	5.6	705	101.00
7	723.5	19.3	39	42	81	584	39.	1.0	6.6	584	39.00
8	724.5	19.8	38	55	93	572	40.	1.0	7.6	572	40.00
9	725.5	21.4	40	49	89	664	45.	1.0	8.6	664	45.00
10	726.5	20.9	39	33	72	633	11.	1.0	9.6	633	11.00
11	727.5	21.8	45	37	82	761	41.	1.0	10.6	761	41.00
12	728.5	21.5	37	43	80	617	135.	1.0	11.6	617	135.00
13	729.5	25.1	57	27	84	1,110	195.	1.0	12.6	1,110	195.00
14	730.5	20.9	47	42	89	762	122.	1.0	13.6	762	122.00
15	731.5	21.8	44	47	91	745	99.	1.0	14.6	745	99.00
16	732.4	21.5	41	36	77	684	42.	1.0	15.6	684	42.00
17	733.5	21.5	48	43	91	801	28.	1.0	16.6	801	28.00
18	734.5	20.6	39	47	86	623	73.	1.0	17.6	623	73.00
19	735.5	21.4	40	41	81	664	113.	1.3	18.9	863	146.90
20	736.5	16.8	39	56	95	508	26.	0.7	19.6	356	18.20

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Glenn Caldwell Lease North Unit Well No. 24

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
717.4 - 728.0	10.6	90.3	957.00
728.0 - 737.0	9.0	95.5	859.10
717.4 - 737.0	19.6	92.7	1,816.10

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
717.4 - 728.0	10.6	21.1	43.6	40.1	718	7,607
728.0 - 737.0	9.0	21.4	43.6	41.9	729	6,561
717.4 - 737.0	19.6	21.2	43.6	41.0	723	14,168

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Glenn Caldwell Lease North Unit Well No. 24

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	717.5	22.5	56	978	33	576	23	69	402	188	5.00	10
2	718.5	22.2	42	724	20	345	22	72	379	209	10.50	10
3	719.5	19.5	50	757	29	439	21	73	318	105	5.00	15
4	720.5	23.8	44	812	20	369	24	73	443	512	49.97	5
5	721.5	21.5	44	734	22	367	22	75	367	386	19.50	10
6	722.5	20.0	45	698	21	326	24	75	372	92	4.00	15
7	723.5	19.7	47	719	27	413	20	71	306	41	1.50	10
8	724.5	19.2	36	536	15	223	21	74	313	58	2.00	15
9	725.5	20.7	40	582	17	273	23	73	369	126	5.20	10
10	726.5	17.5	39	529	11	149	28	66	380	113	5.50	15
11	727.5	21.1	45	736	20	327	25	73	409	261	9.50	10
12	728.5	18.6	37	534	13	188	24	75	346	82	3.20	15
13	729.5	23.0	57	1017	17	303	40	59	714	268	12.00	15
14	730.5	21.8	47	795	14	237	33	67	558	172	7.20	10
15	731.5	21.8	44	745	16	271	28	71	474	385	14.00	10
16	732.5	21.2	41	675	10	165	31	69	510	96	4.00	15
17	733.5	22.8	48	850	11	195	37	62	655	109	4.20	10
18	734.5	19.5	39	590	8	121	31	67	469	50	2.30	20
19	735.5	20.2	40	627	4	63	36	50	564	87	4.00	15
20	736.5	17.2	39	521	0	0	39	60	521	22	1.20	25

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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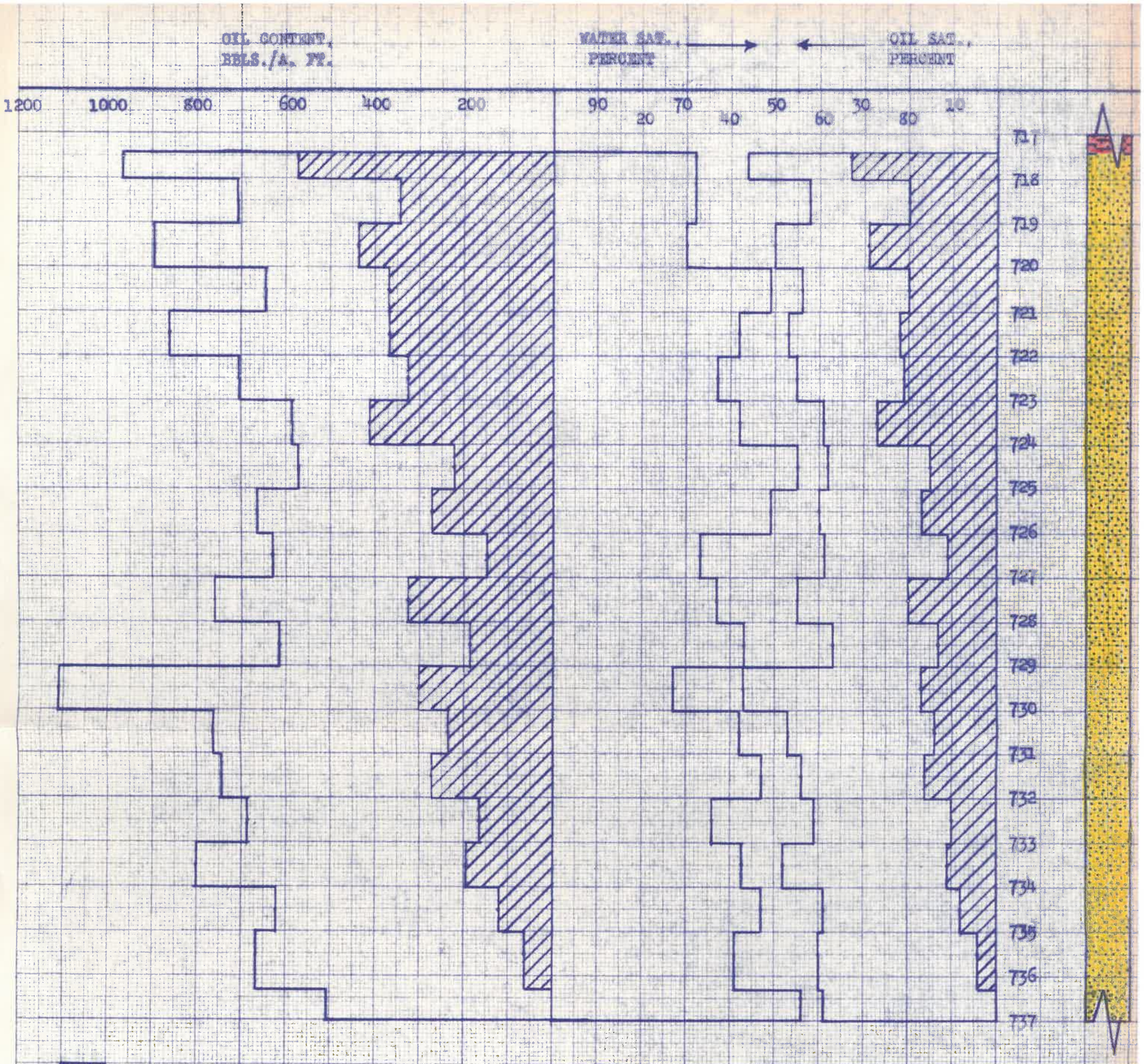
SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company Glenn Caldwell Lease North Unit Well No. 24

Depth Interval, Feet	717.4 - 728.0	728.0 - 736.3	717.4 - 736.3
Feet of Core Analyzed	10.6	8.3	18.9
Average Percent Porosity	20.6	21.1	20.8
Average Percent Original Oil Saturation	43.9	43.9	43.9
Average Percent Oil Recovery	20.9	11.3	16.7
Average Percent Residual Oil Saturation	23.0	32.6	27.2
Average Percent Residual Water Saturation	72.3	64.5	68.9
Average Percent Total Residual Fluid Saturation	95.3	97.1	96.1
Average Original Oil Content, Bbls./A. Ft.	710	725	717
Average Oil Recovery, Bbls./A. Ft.	337	188	272
Average Residual Oil Content, Bbls./A. Ft.	373	537	445
Total Original Oil Content, Bbls./Acre	7,534	6,021	13,555
Total Oil Recovery, Bbls./Acre	3,577	1,562	5,139
Total Residual Oil Content, Bbls./Acre	3,957	4,459	8,416
Average Effective Permeability, Millidarcys	10.91	6.28	8.88
Average Initial Fluid Production Pressure, p.s.i.	11.4	13.8	12.5

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



GLENN C

NORTH UNIT LEASE

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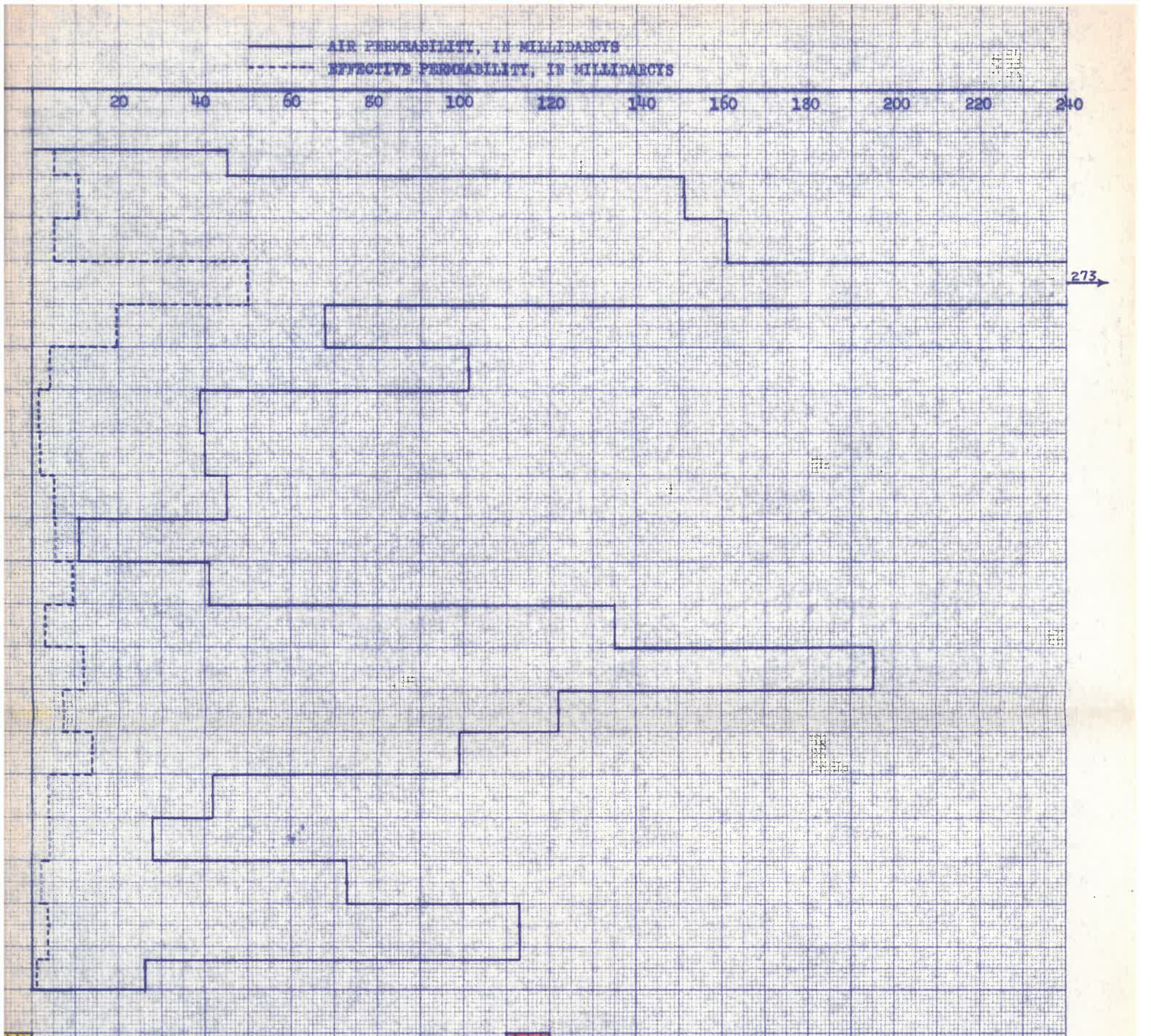
DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE PERCENT POROSITY	AVG. OIL SATURATION, PERCENT	AVG. SATURA PERCE
717.4 - 728.0	10.6	21.1	43.6	40.
728.0 - 737.0	9.0	21.4	43.6	41.
717.4 - 737.0	19.6	21.2	43.6	41.



CONGLOMERATIC SANDSTONE

SANDY SHALE

ALDWELL

WELL NO. 24

TY, KANSAS

ATER ION, T	AVG. OIL CONTENT, BBLS./A.FT.	TOTAL OIL CONTENT, BBLS./ACRE	AVG. AIR PERMEABILITY, MILLIDARCYS	CALCULATED OIL RECOVERY, BBLS./ACRE
	718	7,607	90.3	
	729	6,561	95.5	
	723	14,168	92.7	-

OILFIELD RESEARCH LABORATORIES
CHANUTE, KANSAS
MAY, 1977.