OILFIELD RESEARCH LABORATORIES

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

November 21, 1981

KLI Petroleum
P. O. Box 1159
Henderson, Kentucky 42420

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Nelson Lease, Well No. KW-9, located in Allen County, Kansas and submitted to our laboratory on November 13, 1981.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/mkf

3 c to Henderson, Ky.
2 c to Evansville, Ind.
1 c to Mike Powell, P. O. Box 43
Elsmore, Ks.
1 c to Russell Engineering
Abilene, Tx.
2 c to James E. Russell Petroleum, Inc.
Chanute, Ks.

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company KLI Petroleum Lease Nelson Well No. KW-9

Location 800' FNL & 700' FEL SW¼

Section 21 Twp. 26S Rge. 21E County Allen State Kansas

Elevation, Feet	
Name of Sand	BARTLESVILLE
Top of Core	604.0
Bottom of Core	718.6
Top of Sand	609.7
Bottom of Sand	713.4
Total Feet of Permeable Sand	21.2
Total Feet of Floodable Sand	1.7

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 1	8.7	8.7
1 - 5	5.6	14.3
5 - 10	1.7	16.0
10 - 15	1.9	17.9
15 - 40	3.3	21.2

Average Permeability Millidarcys	6.0
Average Percent Porosity	13.3
Average Percent Oil Saturation	22.1
Average Percent Water Saturation	68.3
Average Oil Content, Bbls./A. Ft.	252.
Total Oil Content, Bbls./Acre	10,249.
Average Percent Oil Recovery by Laboratory Flooding Tests	9.2
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	128.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	217.
Total Calculated Oil Recovery, Bbls./Acre	See "Calculated Recovery" Section

The core was sampled by a representative of Oilfield Research Laboratories. 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:

Depth Interval, Feet	Description
604.0 - 609.7	Gray shale.
609.7 - 610.6	Gray fossiliferous slightly calcareous shaly sandstone.
610.6 - 616.4	Gray shale.
616.4 - 616.8	Gray calcareous shaly sandstone.
616.8 - 631.0	Gray shale.
631.0 - 636.1	Grayish light brown shaly sandstone.
636.1 - 637.0	Gray sandstone.
637.0 - 644.0	Gray shale.
644.0 - 645.8	Gray shaly sandstone.
645.8 - 646.7	Gray and brown finely laminated shale and sandst
646.7 - 648.0	Grayish light brown shaly sandstone.
648.0 - 650.1	Gray shale.
650.1 - 666.2	Grayish brown very shaly sandstone containing a vertical fracture.
666.2 - 667.0	Grayish brown slightly shaly sandstone.
667.0 - 667.5	Grayish brown shaly sandstone.
667.5 - 668.0	Gray shale.
668.0 - 670.0	Grayish brown shaly sandstone.
670.0 - 672.0	Gray shale.
672.0 - 675.2	Grayish brown slightly sandy shale.

675.2 - 680.0	Gray shale.
680.0 - 681.0	Gray slightly sandy shale.
681.0 - 682.0	Brown sandstone.
682.0 - 682.8	Gray shale.
682.8 - 684.3	Grayish brown shaly sandstone.
684.3 - 686.7	Dark brown sandstone.
686.7 - 710.0	Gray shale.
710.0 - 713.4	Gray shaly sandstone containing a vertical fract
713.4 - 717.7	Gray shale containing a vertical fracture.
717.7 - 718.2	Coal.
718.2 - 718.6	Gray shale.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 217 barrels of oil per acre was obtained from 1.7 feet of sand. The weighted average percent oil saturation was reduced from 51.5 to 42.3, or represents an average recovery of 9.2 percent. The weighted average effective permeability of the sample is 0.32 millidarcys, while the average initial fluid production pressure is 37.5 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 41 samples tested, 2 produced water and oil. This indicates that approximately 5 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 prima and waterflood operations in the vicinity of this well should recov approximately 376 barrels of oil per acre. This is an average recovery of 221 barrels per acre foot from 1.7 feet of floodable sand analyzed in this core.

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

Original formation volume factor, estimated	1.05
Reservoir water saturation, percent, estimated	25.0
Average porosity, percent	17.8
Oil saturation after flooding, percent	42.3
Performance factor, percent, estimated	55.0
Net floodable sand, feet	1.7

RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company KLI Petroleum Lease Nelson Well No. KW-9

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	610.5	4.0	7	90	97	22	Imp.	0.9	0.9	20	0.00
2	631.4	10.0	4	94	98	31	Imp.	1.0	1.9	31	0.00
3	632.5	14.3	34	60	94	377	0.43	1.0	2.9	377	0.43
4	633.6	11.1	10	87	97	86	0.17	1.0	3.9	86	0.17
5	634.5	9.2	5	91	96	36	Imp.	1.0	4.9	36	0.00
6	635.6	14.8	10	67	77	115	0.85	1.1	6.0	127	0.94
7	636.4	16.2	26	55	81	327	22.	0.9	6.9	294	19.80
8	644.5	7.5	4	94	98	23	Imp.	1.0	7.9	23	0.00
9	645.3	10.9	12	84	96	102	Imp.	0.8	8.7	82	0.00
10	646.6	12.4	19	79	98	183	10.	0.9	9.6	165	9.00
11	647.7	8.1	15	82	97	94	Imp.	1.3	10.9	122	0.00
12	650.6	12.8	29	67	96	280	Imp.	0.9	11.8	252	0.00
13	651.8	12.9	1	93	94	10	1.4	1.0	12.8	10	1.40
14	652.8	9.6	7	81	88	52	Imp.	1.0	13.8	52	0.00
15	653.5	9.5	4	94	98	30	Imp.	1.0	14.8	30	0.00
16	654.5	13.9	10	74	84	108	1.1	1.0	15.8	108	1.10
17	655.3	12.6	31	63	94	303	Imp.	1.0	16.8	303	0.00
18	657.7	13.2	23	70	93	236	0.89	1.0	17.8	236	0.89
19	658.7	10.9	22	76	98	186	0.34	1.0	18.8	186	0.34
20	659.6	16.2	36	44	80	452	2.7	1.0	19.8	452	2.70
21	660.6	15.9	28	52	80	345	1.5	1.0	20.8	345	1.50
22	661.4	9.3	40	58	98	289	Imp.	1.0	21.8	289	0.00
23	663.5	12.6	43	55	98	420	Imp.	1.0	22.8	420	0.00
24	664.6	18.3	22	50	72	312	5.0	1.0	23.8	312	0.00
25	665.6	18.6	33	46	79	476	0.42	1.2	25.0	571	0.50
26	666.6	19.1	32	38	70	474	8.3	0.7	25.7	332	5.81
27	667.4	19.7	34	38	72	520	2.3	0.6	26.3	312	1.38
28	668.5	18.1	40	42	82	562	1.2	1.0	27.3	562	1.20
29	669.6	18.0	35	50	85	489	0.49	1.0	28.3	489	0.49
30	672.6	12.2	9	85	94	85	Imp.	1.0	29.3	85	0.00
31	673.7	12.0	6	91	97	56	Imp.	1.0	30.3	56	0.00

RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company KLI Petroleum Lease Nelson Well No. KW-9

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.		
32	674.2	13.0	13	81	94	131	Imp.	1.1	31.4	144	0.00
33	680.4	8.6	34	63	97	227	Imp.	1.0	32.4	227	0.00
34	681.6	17.7	56	29	85	769	39.	1.0	33.4	769	39.00
35	683.5	13.1	36	58	94	366	Imp.	1.5	34.9	549	0.00
36	684.4	18.8	50	41	91	729	27.	0.7	35.6	510	18.90
37	685.5	18.5	48	42	90	689	16.	0.7	36.3	482	11.20
38	686.5	17.2	54	40	94	721	11.	1.0	37.3	721	11.00
39	710.6	13.0	2	96	98	20	Imp.	1.0	38.3	20	0.00
40	711.3	13.5	3	86	89	31	Imp.	1.0	39.3	31	0.00
41	713.2	13.9	2	81	83	22	0.21	1.4	40.7	31	0.29

Oilfield Research Laboratories

SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company KLI Petroleum Lease Nelson Well No. KW-9

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
609.7 - 665.0	11.9	3.2	38.27
665.0 - 675.2	4.5	2.1	9.38
680.0 - 686.7	3.4	23.6	80.10
710.0 - 713.4	1.4	0.21	0.29
609.7 - 713.4	21.2	6.0	128.04

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
609.7 - 665.0	23.8	11.9	18.4	73.3	183	4,358
665.0 - 675.2	7.6	16.1	24.6	60.8	336	2,551
680.0 - 686.7	5.9	15.2	45.2	47.0	552	3,258
710.0 - 713.4	3.4	13.5	2.3	86.9	24	82
609.7 - 713.4	40.7	13.3	22.1	68.3	252	10,249

RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company KLI Petroleum Lease Nelson Well No. KW-9

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	610.5	4.3	6	20	0	0	6	91	20	0	Imp.	-
2	631.4	9.5	5	37	0	0	5	93	37	0	Imp.	-
3	632.5	14.2	34	375	0	0	34	61	375	0	Imp.	-
4	633.6	11.0	10	85	0	0	10	87	85	0	Imp.	-
5	634.5	9.6	4	30	0	0	4	92	30	0	Imp.	-
6	635.6	14.9	10	116	0	0	10	69	116	0	Imp.	-
7	636.4	16.1	26	325	0	0	26	56	325	0	Imp.	-
8	644.5	7.4	4	23	0	0	4	94	23	0	Imp.	-
9	645.3	10.9	12	101	0	0	12	85	101	0	Imp.	-
10	646.6	12.1	20	188	0	0	20	78	188	0	Imp.	-
11	647.7	8.2	15	95	0	0	15	82	95	0	Imp.	-
12	650.6	12.5	30	291	0	0	30	67	291	0	Imp.	-
13	651.8	12.9	1	10	0	0	1	94	10	0	Imp.	-
14	652.8	9.5	7	52	0	0	7	83	52	0	Imp.	-
15	653.5	9.4	4	29	0	0	4	94	29	0	Imp.	-
16	654.5	13.6	11	116	0	0	11	75	116	0	Imp.	-
17	655.3	12.1	32	319	0	0	32	63	319	0	Imp.	-
18	657.7	13.5	22	230	0	0	22	71	230	0	Imp.	-
19	658.7	11.4	21	186	0	0	21	77	186	0	Imp.	-
20	659.6	16.1	36	450	0	0	36	50	450	0	Imp.	-
21	660.6	15.6	29	351	0	0	29	54	351	0	Imp.	-
22	661.4	9.4	40	292	0	0	40	58	292	0	Imp.	-
23	663.5	12.9	42	400	0	0	42	56	400	0	Imp.	-
24	664.6	18.2	22	311	0	0	22	54	311	0	Imp.	-
25	665.6	18.2	34	480	0	0	34	47	480	0	Imp.	-
26	666.6	19.4	31	467	0	0	31	40	467	0	Imp.	-
27	667.4	19.8	34	522	0	0	34	39	522	0	Imp.	-
28	668.5	18.6	39	563	0	0	39	45	563	0	Imp.	-
29	669.6	18.4	34	485	0	0	34	52	485	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.

RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company KLI Petroleum Lease Nelson Well No. KW-9

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.			
30	672.6	12.3	9	86	0	0	9	85	86	0	Imp.	-
31	673.7	12.0	6	56	0	0	6	91	56	0	Imp.	-
32	674.2	13.1	13	132	0	0	13	82	132	0	Imp.	-
33	680.4	8.5	34	224	0	0	34	63	224	0	Imp.	-
34	681.6	18.0	55	768	0	0	55	30	768	0	Imp.	-
35	683.6	12.8	37	367	0	0	37	57	367	0	Imp.	-
36	684.4	18.7	50	725	0	0	50	42	725	0	Imp.	-
37	685.5	18.4	48	685	11	157	37	55	528	32	0.45	30
38	686.5	17.3	54	725	8	107	46	47	618	15	0.22	45
39	710.6	13.1	2	20	0	0	2	96	20	0	Imp.	-
40	711.3	13.4	3	31	0	0	3	87	31	0	Imp.	-
41	713.2	14.0	2	22	0	0	2	82	22	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.

Oilfield Research Laboratories

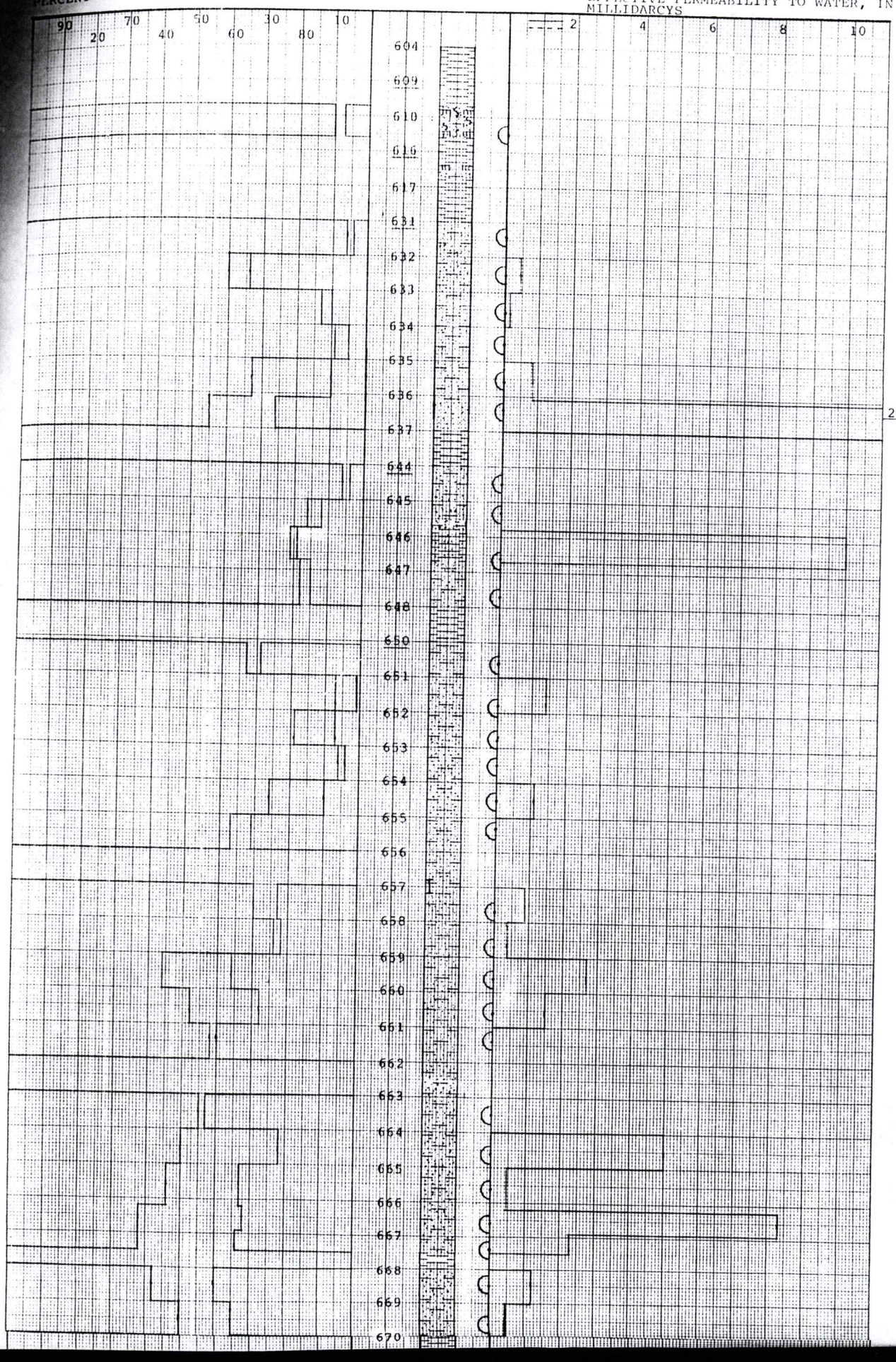
SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company KLI Petroleum Lease Nelson Well No. KW-9

Depth Interval, Feet	680.0 - 686.7
Feet of Core Analyzed	1.7
Average Percent Porosity	17.8
Average Percent Original Oil Saturation	51.5
Average Percent Oil Recovery	9.2
Average Percent Residual Oil Saturation	42.3
Average Percent Residual Water Saturation	50.3
Average Percent Total Residual Fluid Saturation	92.6
Average Original Oil Content, Bbls./A. Ft.	709.
Average Oil Recovery, Bbls./A. Ft.	128.
Average Residual Oil Content, Bbls./A. Ft.	581.
Total Original Oil Content, Bbls./Acre	1,205.
Total Oil Recovery, Bbls./Acre	217.
Total Residual Oil Content, Bbls./Acre	988.
Average Effective Permeability, Millidarcys	0.32
Average Initial Fluid Production Pressure, p.s.i.	37.5

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


ATER SAT., PERCENT
OIL SAT., PERCENT
PERMEABILITY, IN MILLIDARCYS
EFFECTIVE PERMEABILITY TO WATER, IN MILLIDARCYS
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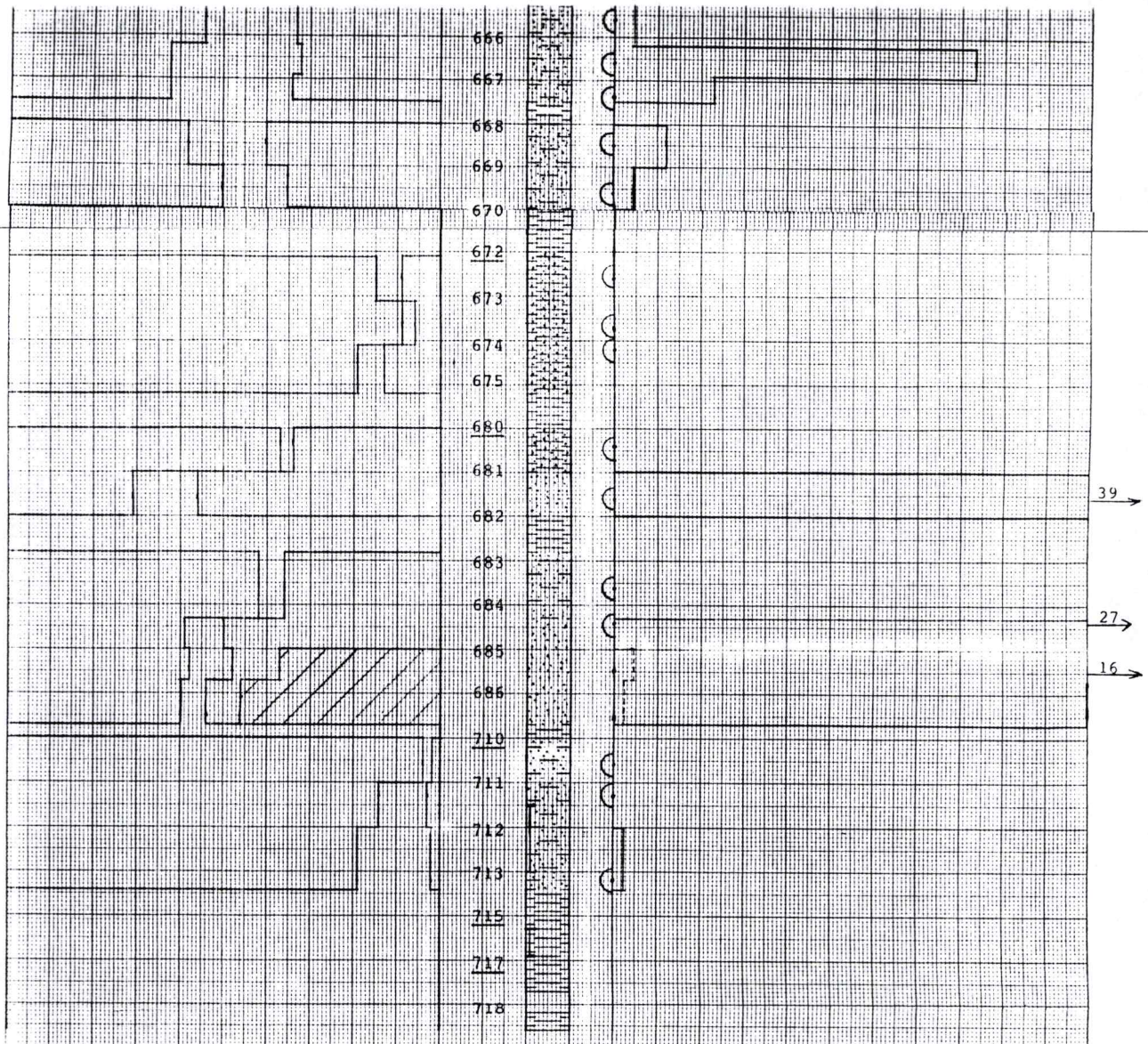

KEY:

- COAL
- SANDSTONE
- SHALY SANDSTONE
- SHALE
- SANDY SHALE
- LAMINATED SANDSTONE AND SHALE
- SHALY CALCAREOUS SANDSTONE
- FOSSILIFEROUS SHALY CALCAREOUS SANDSTONE
- FORMATION CONTAINING A VERTICAL FRACTURE
- FLOODPOT RESIDUAL OIL SATURATION
- IMPERMEABLE TO WATER

KLI PETROLEUM

NELSON LEASE — WELL NO. KW-9

ALLEN COUNTY, KANSAS

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
609.7 - 665.0	23.8	11.9	18.4	73.3	3.2	
665.0 - 675.2	7.6	16.1	24.6	60.8	2.1	
680.0 - 686.7	5.9	15.2	45.2	47.0	23.6	
710.0 - 713.4	3.4	13.5	2.3	86.9	0.21	
609.7 - 713.4	40.7	13.3	22.1	68.3	6.0	376 (PRIMARY AND WATERFLOODING)

OILFIELD RESEARCH LABORATORIES
CHANUTE, KANSAS
NOVEMBER, 1981