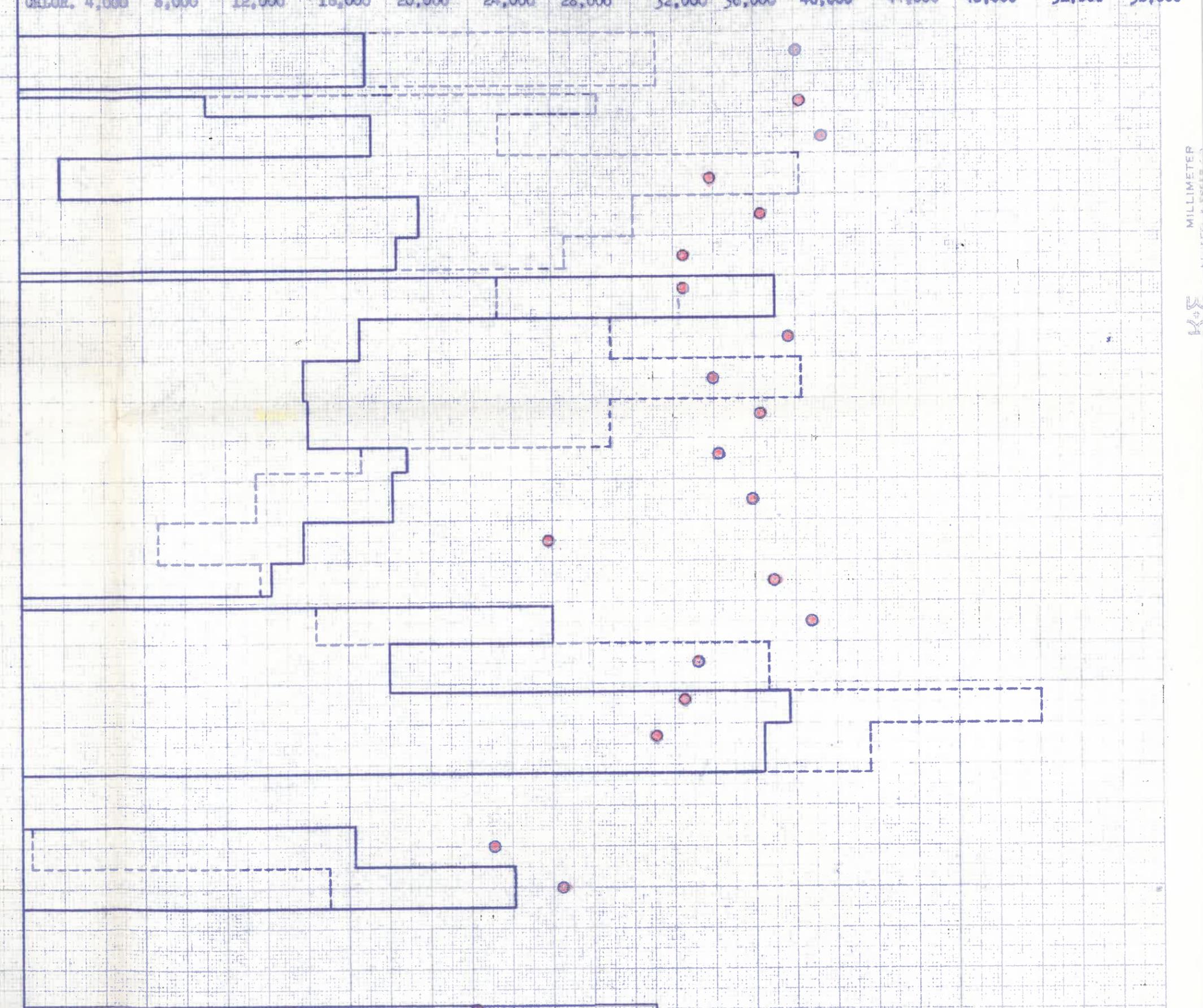
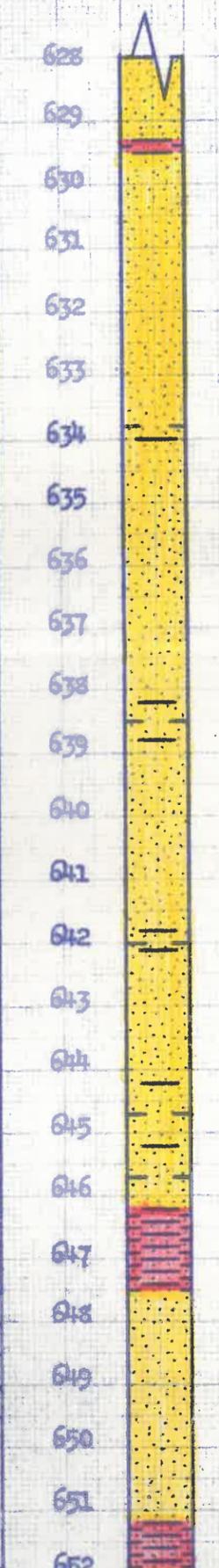
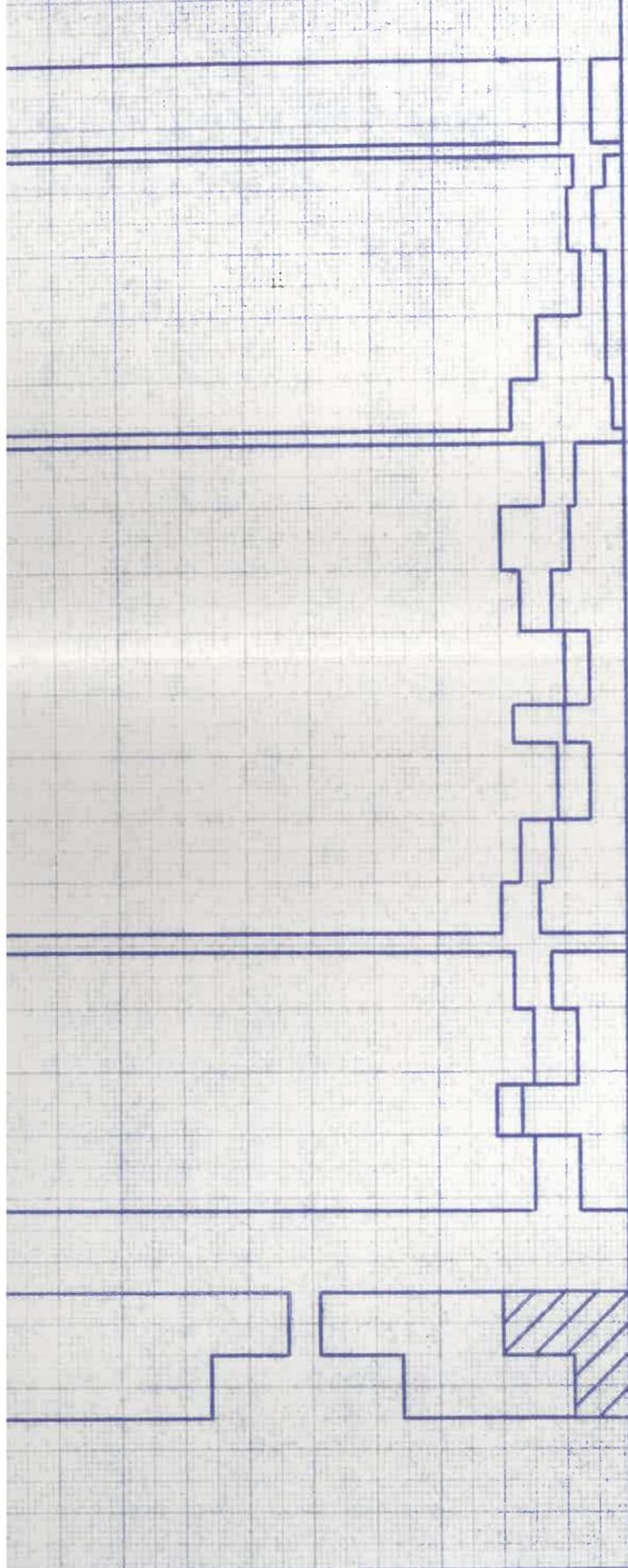


WATER SAT., PERCENT → ← OIL SAT., PERCENT

— AIR PERMEABILITY, IN MILLIDARCY
 - - - EFFECTIVE PERMEABILITY, IN MILLIDARCY
 ● CHLORINE CONTENT OF BRINE IN SAND, ppm

90 70 50 30 10
 20 40 60 80

AIR EFF.	40	80	120	160	200	240	280	320	360	400	440	480	520	560
CHLOR.	4,000	8,000	12,000	16,000	20,000	24,000	28,000	32,000	36,000	40,000	44,000	48,000	52,000	56,000



MILLIMETER SCALE

OIL CONTENT,
BBL./A. FT.

WATER SAT.,
PERCENT

OIL SAT.,
PERCENT

800

600

400

200

90

20

70

50

40

30

60

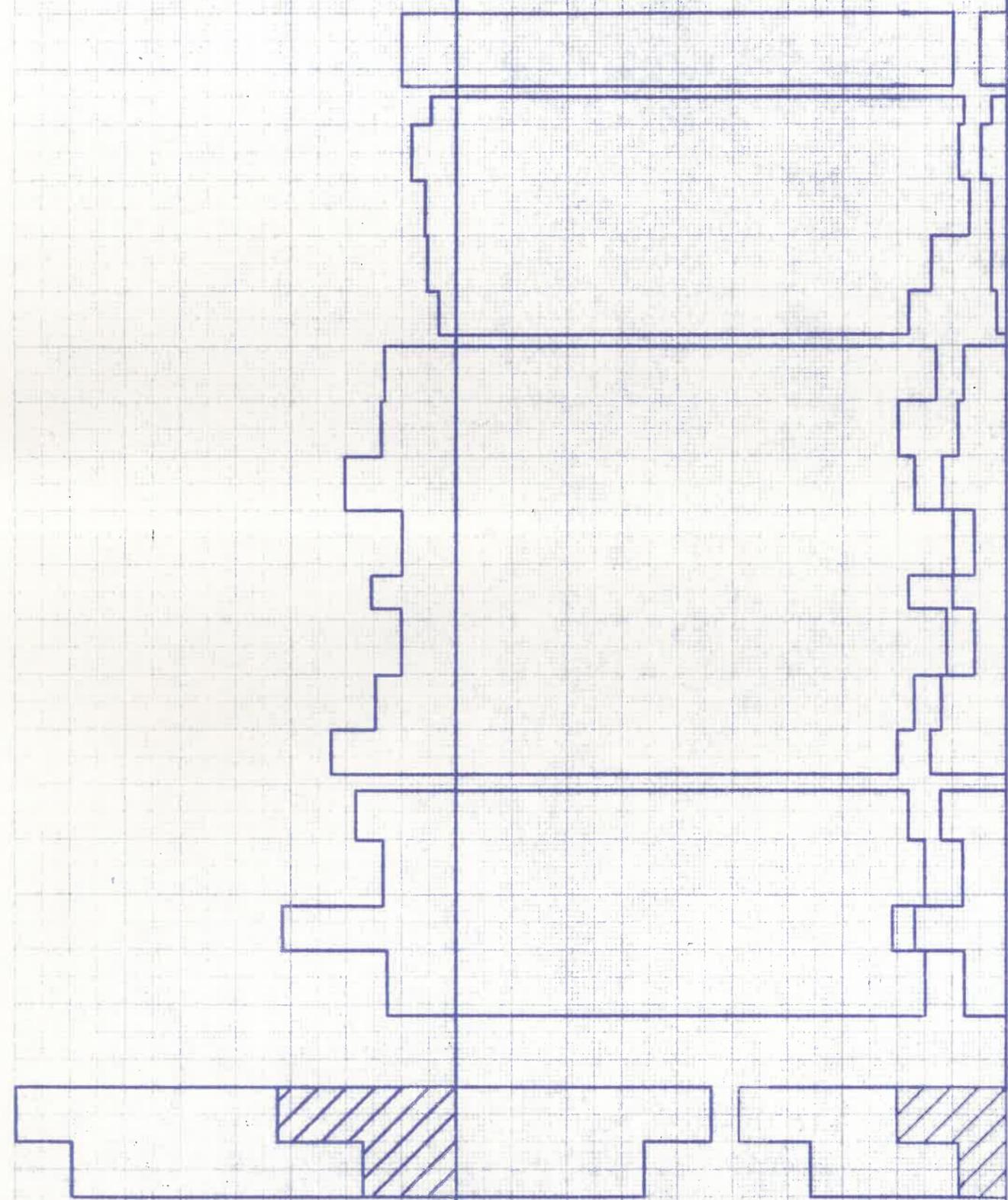
80

10

AIR 10

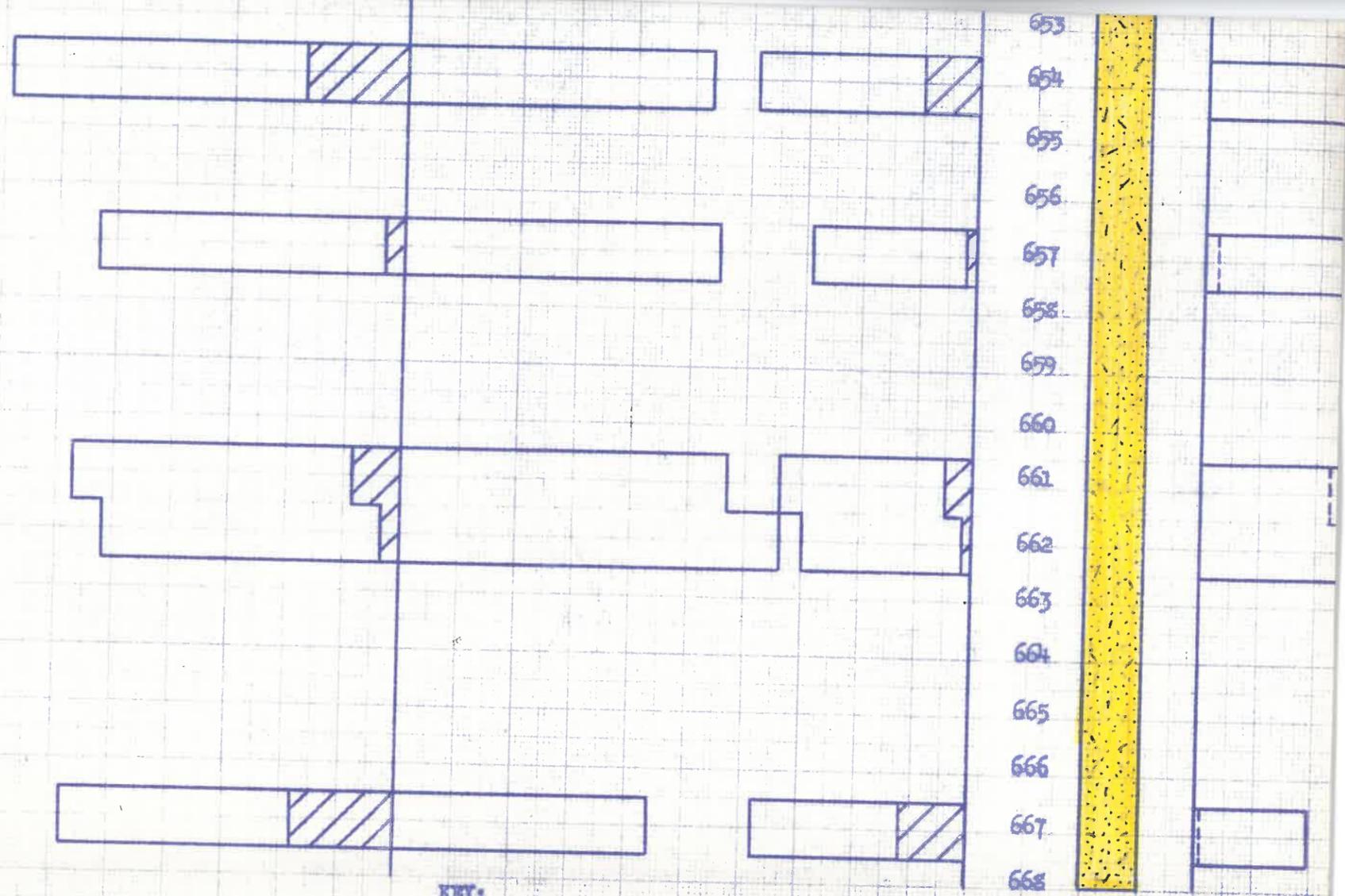
EFF. 10

CHLOR. 4.0



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KEY:

-  FLOOD POT RECOVERY
-  SHALY SANDSTONE

-  SAND
-  SAND

COMPTON INDUSTRIES
ELLIOTT LEASE

BOURBON CO.

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE PERCENT POROSITY	AVG. OIL SATURATION PERCENT
628.0 - 646.2	17.5	21.4	7.8
647.5 - 667.5	7.6	22.3	37.0
628.0 - 667.5	25.1	21.6	16.6



OILFIELD RESEARCH LABORATORIES

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

July 18, 1978

Compton Industries
P.O. Box 437
Moran, Kansas 66755

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Elliott Lease, Well No. 1, Bourbon County, Kansas, and submitted to our laboratory on June 30, 1978.

The core from the depth of 628 feet to 647 feet was sampled by a representative of Oilfield Research Laboratories after it was received in the laboratory, approximately three (3) hours after the core was taken. The core from the depth of 647 feet to 668 feet was sampled by the client in drilling mud filled jars.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Benjamin R. Pearman
Benjamin R. Pearman

BRP:cb
4 c to Moran, Kansas

Salt water mud (19,858 milligrams per liter chlorides) was used as the circulating fluid while taking the core. The core was sampled by a representative of the client. The well was drilled in non-virgin territory.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
628.0 - 629.3	Gray sandstone.
629.3 - 629.5	Gray sandy shale.
629.5 - 633.8	Gray sandstone.
633.8 - 634.0	Gray laminated shaly sandstone.
634.0 - 638.2	Gray sandstone.
638.2 - 638.8	Dark laminated shaly sandstone.
638.8 - 641.8	Gray sandstone.
641.8 - 642.1	Dark laminated shaly sandstone.
642.1 - 644.2	Gray sandstone.
644.2 - 646.2	Dark laminated shaly sandstone.
646.2 - 647.5	Gray sandy shale.
647.5 - 651.2	Dark brown sandstone.
651.2 - 651.9	Gray sandy shale.
651.9 - 668.0	Brown sandstone containing widely scattered thin carbonaceous partings.

Coring was started at a depth of 628.0 feet in gray sandstone and completed at 668.0 feet in brown sandstone. For the most part, the pay is made up of brown 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 193.9 and 250.5 millidarcys respectively; the overall average being 210.8 (See Table III). By observing the data given on the coregraph, it is noticeable that the sand has a rather irregular permeability profile. The permeability of the sand varies from 19 to a maximum of 377 millidarcys.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a low weighted average percent oil saturation, namely, 16.6. The weighted average percent oil saturation of the upper and lower sections is 7.8 and 37.0 respectively. The weighted average percent water saturation of the upper and lower sections is 85.9 and 50.9 respectively; the overall average being 75.2 (See Table III). This gives an overall weighted average total fluid saturation of 91.8 percent.

The weighted average oil content of the upper and lower sections is 127 and 635 barrels per acre foot respectively; the overall average being 281. The total oil content, as shown by this core, is 7,057 barrels per acre of which 4,830 barrels are in the pay sand section (See Table III).

LABORATORY FLOODING TESTS

The lower portion of the sand in this core responded to laboratory flooding tests, as a total recovery of 1,184 barrels

of oil per acre was obtained from 7.6 feet of sand. The weighted average percent oil saturation was reduced from 36.9 to 27.6, or represents an average recovery of 9.3 percent. The weighted average effective permeability of the samples is 16.90 millidarcys, while the average initial fluid production pressure is 20.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 26 samples tested, all produced water and 8 oil. This indicates that approximately 31 percent of the sand represented by these samples is floodable pay sand. The tests also show that the sand has a wide variation in effective permeability to water.

CONCLUSION

The results of the laboratory tests indicate that efficient primary and waterflooding operations in the vicinity of this well should recover approximately 350 barrels of oil per acre foot or 2,660 barrels per acre from the 7.6 feet of 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	30.0
Present oil saturation, percent	68.6
Average porosity, percent	22.0
Oil saturation after flooding, percent	27.6
Performance factor, percent	50.0
Net floodable pay sand, feet, analyzed	7.6

OILFIELD RESEARCH LABORATORIES

- 5 -

This core shows a pay sand section (647.5 - 668.0 feet) showing a good oil saturation, a moderate water saturation and a wide variation in effective permeability to water.

Oilfield Research Laboratories

RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Compton Industries, Inc. Lease Elliott Well No. 1

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	628.5	25.9	5	90	95	100	169.	1.3	1.3	130	219.70
2	629.7	20.0	3	92	95	47	91.	0.5	1.8	23	45.50
3	630.6	20.6	5	91	96	80	172.	1.0	2.8	80	172.00
4	631.6	23.6	3	93	96	55	19.	1.0	3.8	55	19.00
5	632.5	22.2	3	86	89	52	195.	1.0	4.8	52	195.00
6	633.5	20.9	2	82	84	32	184.	0.8	5.6	26	147.20
7	634.3	21.2	8	87	95	131	370.	1.0	6.6	131	370.00
8	635.5	19.5	9	80	89	136	166.	1.0	7.6	136	166.00
9	636.5	21.6	12	83	95	201	138.	1.0	8.6	201	138.00
10	637.4	21.4	6	90	96	100	140.	1.2	9.8	120	168.00
11	638.4	20.0	10	82	92	155	189.	0.6	10.4	93	113.40
12	639.5	21.5	6	89	95	100	182.	1.2	11.6	120	218.40
13	640.5	15.9	12	83	95	148	138.	1.0	12.6	148	138.00
14	641.5	21.0	14	80	94	228	122.	0.8	13.4	183	97.60
15	642.5	19.7	12	82	94	183	260.	0.9	14.3	165	234.00
16	643.5	21.4	8	85	93	133	180.	1.2	15.5	160	216.00
17	644.4	24.0	17	79	96	316	377.	0.8	16.3	253	301.60
18	645.3	20.3	8	85	93	126	364.	1.2	17.5	151	436.80
19	648.0	21.0	49	46	95	800	163.	1.0	18.5	800	163.00
20	649.0	24.9	36	34	70	697	241.	1.0	19.5	697	241.00
21	652.0	22.0	43	52	95	736	310.	0.6	20.1	442	186.00
22	654.0	22.7	39	53	92	688	324.	1.0	21.1	688	324.00
23	657.0	23.5	29	55	84	530	301.	1.0	22.1	530	301.00
24	661.0	21.6	34	57	91	571	277.	1.0	23.1	571	277.00
25	662.0	22.3	30	66	96	520	371.	1.0	24.1	520	371.00
26	667.0	19.7	38	44	82	582	39.	1.0	25.1	582	39.00

Oilfield Research Laboratories

SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Compton Industries, Inc. Lease Elliott Well No. 1

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
628.0 - 646.2	17.5	193.9	3396.20
647.5 - 667.5	7.6	250.5	1902.00
628.0 - 667.5	25.1	210.8	5298.20

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
628.0 - 646.2	17.5	21.4	7.8	85.9	127	2,227
647.5 - 667.5	7.6	22.3	37.0	50.9	635	4,830
628.0 - 667.5	25.1	21.6	16.6	75.2	281	7,057

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Compton Industries, Inc. Lease Elliott Well No. 1

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	628.5	25.6	5	99	0	0	5	92	99	267	77.90	5
2	629.7	20.4	3	47	0	0	3	93	47	315	70.60	5
3	630.6	20.8	5	81	0	0	5	92	81	221	58.40	5
4	631.6	23.0	4	71	0	0	4	92	71	173	95.60	5
5	632.5	22.6	5	88	0	0	5	87	88	289	75.00	5
6	633.5	21.3	3	50	0	0	3	91	50	270	66.60	5
7	634.3	21.7	8	135	0	0	8	87	135	306	58.20	5
8	635.5	19.8	7	108	0	0	7	86	108	271	72.10	5
9	636.5	22.0	11	188	0	0	11	85	188	175	95.60	5
10	637.4	21.6	7	117	0	0	7	89	117	275	72.10	5
11	638.4	20.3	10	157	0	0	10	86	157	631	41.60	5
12	639.5	21.1	7	114	0	0	7	89	114	392	28.60	5
13	640.5	16.4	12	153	0	0	12	85	153	489	16.70	5
14	641.5	21.3	15	248	0	0	15	79	248	574	29.20	5
15	642.5	20.0	10	155	0	0	10	86	155	504	36.00	5
16	643.5	21.8	9	152	0	0	9	85	152	164	91.60	5
17	644.4	23.6	16	292	0	0	16	81	292	225	125.00	5
18	645.3	20.6	9	144	0	0	9	86	144	179	104.00	5
19	648.0	20.8	49	791	20	323	29	67	468	45	1.08	30
20	649.0	24.4	36	681	9	170	27	69	511	180	37.50	5
21	652.0	21.4	43	713	18	298	25	73	415	205	5.57	20
22	654.0	23.1	39	698	10	179	29	66	519	569	61.50	5
23	657.0	23.0	29	516	2	35	27	70	481	46	1.00	35
24	661.0	21.4	34	564	5	83	29	70	481	429	11.23	25
25	662.0	22.0	30	511	2	34	28	70	477	471	12.50	15
26	667.0	19.5	38	574	12	181	26	73	393	8	0.33	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.

Oilfield Research Laboratories

SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company <u>Compton Industries, Inc.</u>	Lease <u>Elliott</u>	Well No. <u>1</u>
Depth Interval, Feet	647.5 - 667.5	
Feet of Core Analyzed	7.6	
Average Percent Porosity	22.0	
Average Percent Original Oil Saturation	36.9	
Average Percent Oil Recovery	9.3	
Average Percent Residual Oil Saturation	27.6	
Average Percent Residual Water Saturation	69.5	
Average Percent Total Residual Fluid Saturation	97.1	
Average Original Oil Content, Bbls./A. Ft.	626.	
Average Oil Recovery, Bbls./A. Ft.	156.	
Average Residual Oil Content, Bbls./A. Ft.	470.	
Total Original Oil Content, Bbls./Acre	4,763.	
Total Oil Recovery, Bbls./Acre	1,184.	
Total Residual Oil Content, Bbls./Acre	3,579.	
Average Effective Permeability, Millidarcys	16.90	
Average Initial Fluid Production Pressure, p.s.i.	20.0	

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

Oilfield Research Laboratories
RESULTS OF WATER DIFFERENTIATION TESTS

TABLE VI

Company Compton Industries, Inc. Lease Elliott Well No. 1

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Percent Water Saturation	
			Connate	Drilling & Foreign
			Total	
1	628.5	38,088		
2	629.7	38,286		
3	630.6	39,373		
4	631.6	33,895		
5	632.5	36,298		
6	633.5	32,584		
7	634.3	32,510		
8	635.5	37,706		
9	636.5	33,988		
10	637.4	36,301		
11	638.4	34,249		
12	639.5	35,875		
13	640.5	25,797		
14	641.5	36,936		
15	642.5	38,759		
16	643.5	33,197		
17	644.4	32,485		
18	645.3	31,127		
19	648.0	23,169		
20	649.0	26,469		
21	652.0	22,178		
22	654.0	20,711		
23	657.0	29,170		
24	661.0	20,617		
25	662.0	25,110		
26	667.0	31,373		

Note: ppm — parts per million

Oilfield Research Laboratories

SUMMARY OF WATER DIFFERENTIATION TESTS

TABLE VII

Company Compton Industries, Inc. Lease Elliott Well No. 1

Depth Interval, Feet	Chloride Content of Brine in Sand, ppm	Average Percent Connate Water	Average Percent Drilling & Foreign Water
628.0 - 646.2	34,859		
647.5 - 667.5	24,850		
628.0 - 667.5	31,779		

Note: Chloride content of drilling fluid = 19,858 milligrams per liter.

Note: ppm — parts per million.