

OILFIELD RESEARCH LABORATORIES

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April 29, 1985

James E. Russell Petroleum, Inc.
P. O. Box 2618
Abilene, Texas 79604

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary cores taken from the Nelson (Lowe) Lease, Well No. 02, located in Allen County, Kansas and submitted to our laboratory on April 22 and April 23, 1985.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Alan M. Dunning
Alan M. Dunning

AMD/rmc

4 c to Abilene, Texas
2 c to Chanute, Kansas

- REGISTERED ENGINEERS -

CORE ANALYSIS - WATER ANALYSIS - REPRESSURING ENGINEERING - SURVEYING & MAPPING - PROPERTY EVALUATION & OPERATION

Oilfield Research Laboratories
GENERAL INFORMATION & SUMMARY

Company James E. Russell Petroleum, Inc. Lease Nelson (Lowe) Well No. 02
Location 4965' W & 4775' N from SE Corner, (NW $\frac{1}{4}$)
Section 28 Twp. 26S Rge. 21E County Allen State Kansas

Elevation, Feet Datum: Mean Sea Level (Ground Level) 1055.2
Name of Sand..... Bartlesville
Top of Core 630.0
Bottom of Core 693.0
Top of Pay Sand 672.0
Bottom of Pay Sand 679.0
Total Feet of Permeable Sand 27.8
Total Feet of Productive Oil Sand 5.8

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.	
0 - 1	7.2	7.2	
1 - 2	4.8	12.0	
2 - 4	1.7	13.7	
4 - 8	4.0	17.7	
8 - 12	3.2	20.9	
20 - 30	4.0	24.9	
30 - 40	2.3	27.2	
55 - 59	0.6	27.8	
			<u>Productive Sand</u>
Average Permeability Millidarcys		6.8	
Average Percent Porosity		15.6	
Average Percent Oil Saturation		41.1	
Average Percent Water Saturation		47.9	
Average Oil Content, Bbls./ A. Ft.		499.	
Total Oil Content, Bbls./ Acre		2,892.	
Average Percent Oil Recovery by Laboratory Flooding Tests		8.3	
Average Oil Recovery by Laboratory Flooding Tests, Bbls./ A. Ft.		105.	

The core from 630 feet to 650 feet was sampled by a representative of Oilfield Research Laboratories. The second and third cores from 654 feet to 693 feet were sampled and the samples sealed in plastic bags by a representative of the client. Salt water base mud was the drilling fluid used during the coring operation.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
630.0 - 635.0	Sandstone, grayish light brown, with scattered gray shale and mica partings.
635.0 - 637.3	Sandstone, light brown.
637.3 - 638.0	Sandstone, grayish light brown, shaly.
638.0 - 638.6	Sandstone, light brown.
638.6 - 640.4	Sandstone and shale, light brown and gray, laminated.
640.4 - 641.0	Sandstone, grayish light brown, shaly.
641.0 - 642.0	Sandstone, light brown, with gray shale and mica partings and inclusions.
642.0 - 644.0	Sandstone, light brown, shaly, with scattered gray shale and mica partings.
644.0 - 650.0	Sandstone, grayish light brown, very shaly, with scattered mica partings.
650.0 - 654.0	Loss.
654.0 - 660.0	Sandstone, grayish light brown, very shaly, with scattered mica partings.
660.0 - 661.0	Sandstone, light brown, shaly, with scattered gray shale and mica partings.
661.0 - 668.0	Sandstone, light brown, very shaly, with gray shale and mica partings.

<u>Depth Interval, Feet</u>	<u>Description</u>
668.0 - 669.3	Sandstone, light brown, shaly, with scattered gray shale and mica partings.
669.3 - 670.7	Shale, gray, slightly sandy.
670.7 - 671.0	Sandstone, brown, shaly.
671.0 - 672.0	Shale, gray, slightly sandy, with brown sandstone stringers.
672.0 - 672.5	Sandstone, brown, shaly.
672.5 - 672.8	Shale, gray.
672.8 - 673.3	Sandstone, brown, shaly.
673.3 - 674.0	Shale, gray.
674.0 - 675.0	Sandstone, brown, slightly shaly, with scattered gray shale stringers.
675.0 - 675.6	Sandstone, light brown, shaly, with gray shale and mica partings.
675.6 - 675.8	Shale, gray.
675.8 - 678.0	Sandstone, brown, with scattered gray shale and mica partings.
678.0 - 679.0	Sandstone, light brown, shaly.
679.0 - 680.6	Shale, gray, with scattered brown sandstone stringers.
680.6 - 680.8	Sandstone, grayish brown, very shaly.
680.8 - 693.0	Shale, gray.

DISCUSSION

Coring was commenced at 630.0 feet in sand. Bottom of pay sand section is 679.0 feet. Analysis indicates that 35.6 feet of sand between 630.0 and 672.0 feet is predominantly shaly sandstone containing low oil saturations. The main pay zone consists

of 5.8 net effective feet of probable oil sand between 672.0 and 679.0 The lower 14.0 feet of section is mostly gray shale.

The oil sand has an average porosity of 15.6 percent, 41.1 percent oil saturation, 47.9 water saturation, and permeability of 6.8 millidarcys. Permeability in the pay zone ranges between 1.9 and 11. millidarcys.

This sand responded to waterflood susceptibility tests in the laboratory. Residual oil saturation for the oil zone at "flood-out" was 32.6 percent. Core oil saturation was reduced by 8.3 percent of pore volume or 105 barrels per acre-foot. Effective water permeability at residual oil saturation was .20 millidarcys or 2.9 percent of air permeability.

Estimated primary oil recovery by solution gas energy from the area represented by this core is 60 barrels per acre-foot under original reservoir conditions to depletion. Additional oil recovery by efficient water injection is estimated at 135 barrels per acre-foot. Additional study will be necessary to relate these recovery estimates to field conditions.

Oil Recovery Barrels Stock Tank	PRIMARY AND SECONDARY		
	Solution Gas Energy	Increase By Waterflood After Primary	Total
Barrels per Acre Foot	60	135	195

The results expressed herein are the best professional opinion of the personnel of Oilfield Research Laboratories based on the rock properties determined from this core by generally accepted laboratory practices. We assume no responsibility or liability for the use of these data for purposes other than intended by the analysis of this core or circumstances over which we have no control. This report has been prepared for the exclusive use of our client.

RESULTS OF SATURATION & PERMEABILITY TESTS

Company James E. Russell Petroleum, Inc. Lease Nelson (Lowe) Well No. 02

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	630.4	15.5	3	69	72	36	25.	1.0	1.0	36	25.00
2	631.6	14.9	5	90	95	58	29.	1.0	2.0	58	29.00
3	632.5	19.9	3	93	96	46	21.	1.0	3.0	46	21.00
4	633.5	19.1	10	83	93	148	22.	1.0	4.0	148	22.00
5	634.6	21.5	4	91	95	67	31.	1.0	5.0	67	31.00
6	635.4	18.4	7	87	94	100	11.	1.0	6.0	100	11.00
7	636.5	20.5	6	84	90	95	39.	1.3	7.3	124	50.70
8	637.5	16.4	5	91	96	64	2.3	0.7	8.0	45	1.61
9	638.5	19.4	3	79	82	45	58.	0.6	8.6	27	34.80
10	639.5	11.2	2	90	92	17	Imp.	1.8	10.4	31	0.00
11	640.5	15.3	6	86	92	71	1.0	0.6	11.0	43	0.60
12	641.5	15.8	4	92	96	49	7.2	1.0	12.0	49	7.20
13	642.5	15.4	13	79	92	155	1.7	1.0	13.0	155	1.70
14	643.5	14.1	6	86	92	66	1.9	1.0	14.0	66	1.90
15	644.4	13.2	13	80	93	133	0.28	1.0	15.0	133	0.28
16	645.5	12.8	11	85	96	109	Imp.	1.0	16.0	109	0.00
17	646.6	12.4	14	79	93	135	Imp.	1.0	17.0	135	0.00
18	647.6	9.6	9	84	93	67	Imp.	1.0	18.0	67	0.00
19	648.5	10.6	14	81	95	115	Imp.	1.0	19.0	115	0.00
20	649.4	12.9	10	82	92	100	Imp.	1.0	20.0	100	0.00
21	654.6	12.3	6	89	95	57	Imp.	1.0	21.0	57	0.00
22	655.6	13.2	16	79	95	164	Imp.	1.0	22.0	164	0.00
23	656.6	14.0	16	81	97	174	Imp.	1.0	23.0	174	0.00
24	657.7	11.7	3	92	95	27	Imp.	1.0	24.0	27	0.00
25	658.5	11.6	13	83	96	117	Imp.	1.0	25.0	117	0.00
26	659.7	12.9	23	73	96	230	0.24	1.0	26.0	230	0.24
27	660.4	13.4	13	79	92	135	3.6	1.0	27.0	135	3.60
28	661.7	13.4	22	74	96	229	0.18	1.0	28.0	229	0.18
29	662.7	13.0	11	79	90	111	0.35	1.0	29.0	111	0.35

Continued

Oilfield Research Laboratories

RESULTS OF SATURATION & PERMEABILITY TESTS

Company James E. Russell Petroleum, Inc. Lease Nelson (Lowe) Well No. 02

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.		
30	663.6	13.4	15	74	89	156	0.17	1.0	30.0	156	0.17
31	664.5	13.8	28	67	95	274	Imp.	1.0	31.0	274	0.00
32	665.8	12.3	9	87	96	86	0.16	1.0	32.0	86	0.16
33	666.4	13.1	15	74	89	152	Imp.	1.0	33.0	152	0.00
34	667.6	12.7	38	53	91	374	0.25	1.0	34.0	374	0.25
35	668.5	14.3	27	64	91	300	1.4	1.3	35.3	390	1.82
36	670.8	15.3	15	74	89	178	1.0	0.3	35.6	53	0.30
37	672.4	15.1	40	46	86	469	4.7	0.5	36.1	235	2.35
38	673.2	17.2	50	38	88	667	5.0	0.5	36.6	334	2.50
39	674.2	15.4	51	39	90	609	6.3	1.0	37.6	609	6.30
40	675.4	14.6	37	55	92	419	1.9	0.6	38.2	251	1.14
41	676.5	16.9	40	46	86	524	11.	1.1	39.3	576	12.10
42	677.7	15.6	43	44	87	520	9.1	1.1	40.4	572	10.01
43	678.5	14.0	29	65	94	315	5.1	1.0	41.4	315	5.10
44	680.7	11.7	25	71	96	227	0.26	0.2	41.6	45	0.05
<u>AVERAGES</u>											<u>TOTALS</u>
	630.0 - 671.0	14.3	11.6	81.0			11.2		35.6	4,383	244.86
	672.0 - 679.0	15.6	41.1	47.9			6.8		5.8	2,892	39.50
	680.6 - 680.8	11.7	25.0	71.0			0.26		0.2	45	0.05

RESULTS OF LABORATORY FLOODING TESTS

Company James E. Russell Petroleum, Inc.

Lease Nelson (Lowe)

Well No. 02

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.			
26	659.7	13.1	23	234	0	0	23	73	234	0	Imp.	-
27	660.4	13.4	14	146	0	0	14	79	146	0	Imp.	-
28	661.7	13.6	22	232	0	0	22	75	232	0	Imp.	-
29	662.7	12.8	12	119	0	0	12	78	119	0	Imp.	-
30	663.6	13.4	15	156	0	0	15	75	156	0	Imp.	-
31	664.5	13.7	28	298	0	0	28	68	298	0	Imp.	-
32	665.8	12.8	9	89	0	0	9	86	89	0	Imp.	-
33	666.4	13.1	15	152	0	0	15	74	152	0	Imp.	-
34	667.6	12.4	39	375	0	0	39	53	375	0	Imp.	-
35	668.5	14.1	27	295	0	0	27	65	295	0	Imp.	-
36	670.8	15.0	15	175	0	0	15	75	175	0	Imp.	-
37	672.4	15.6	40	484	11	133	29	59	351	54	0.90	30
38	673.2	17.5	50	679	15	204	35	55	475	20	0.22	45
39	674.2	15.8	51	625	20	245	31	64	380	19	0.37	30
40	675.4	14.5	37	416	0	0	37	55	416	0	Imp.	-
41	676.5	16.9	40	524	8	105	32	58	419	0	0.02	50
42	677.7	15.8	43	527	6	74	37	57	453	0	0.02	50
43	678.5	14.0	28	304	0	0	28	66	304	0	Imp.	-
44	680.7	11.8	25	229	0	0	25	71	229	0	Imp.	-
AVERAGES												
	672.0 - 679.0	15.7			8.3	105	32.6	59.7	398		0.168	29.3

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

COREGRAPH

OILFIELD RESEARCH LABORATORIES

JAMES E. RUSSELL PETROLEUM, INC.

LEASE NELSON (LOWE) WELL NO. 02

DATE RECEIVED APRIL 22 & 23, 1985

FIELD SAVONBURG NORTHEAST

ELEVATION 1055.2 MSL - GL

COUNTY ALLEN STATE KANSAS

FORMATION BARTLESVILLE

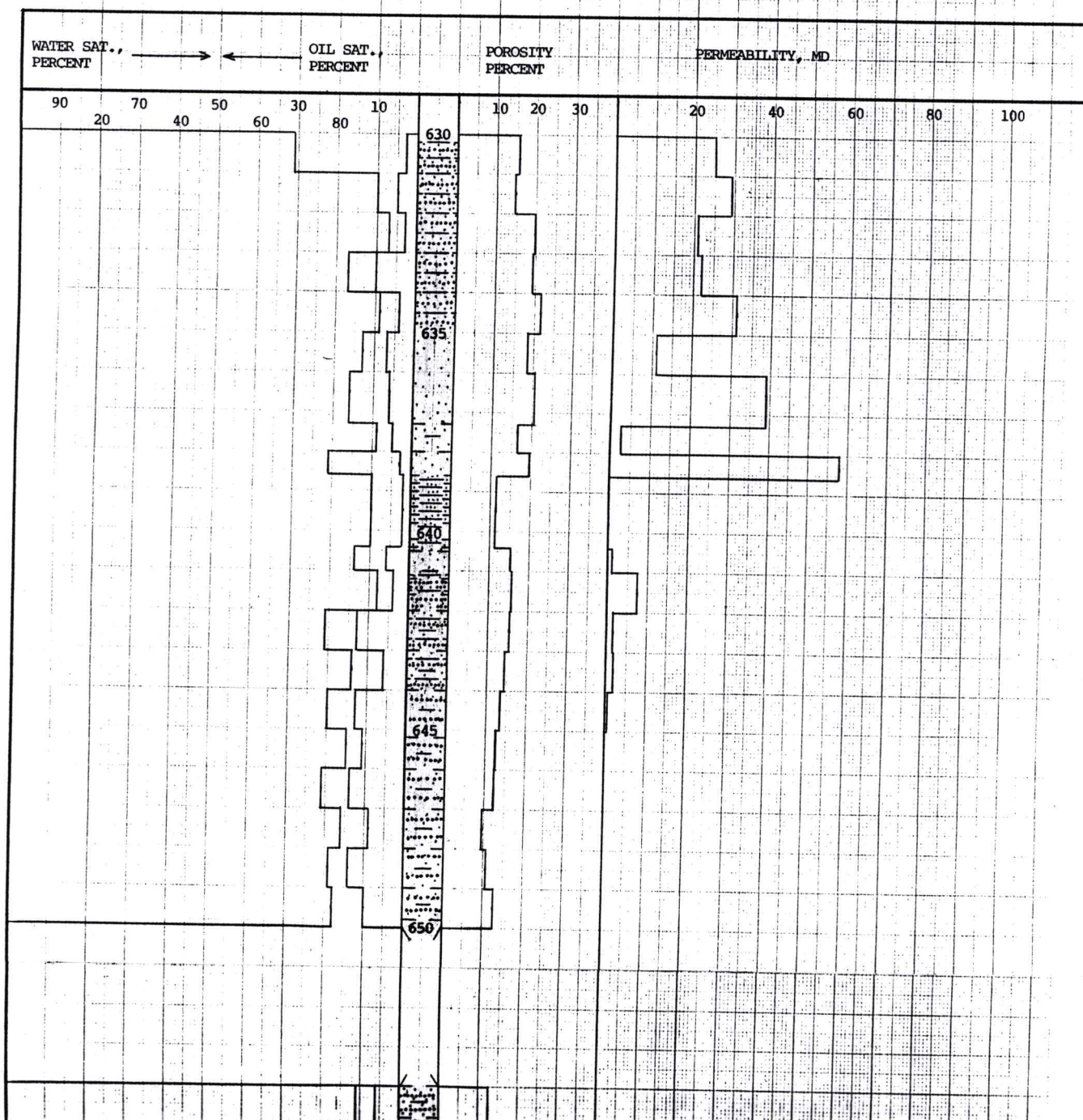
LOCATION 4965' WEL & 4775' NSL (NW)

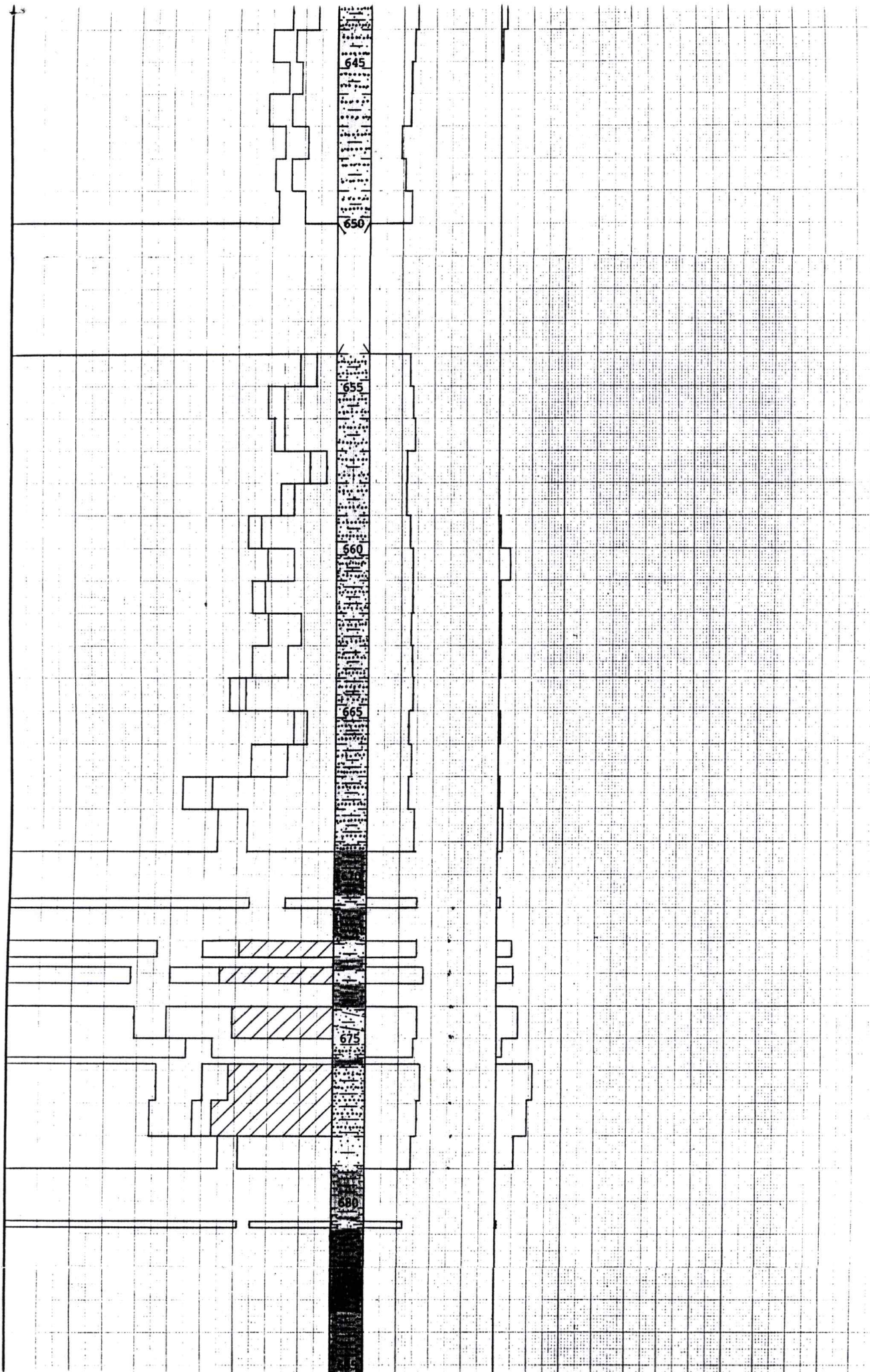
DRILLING FLUID SALT WATER

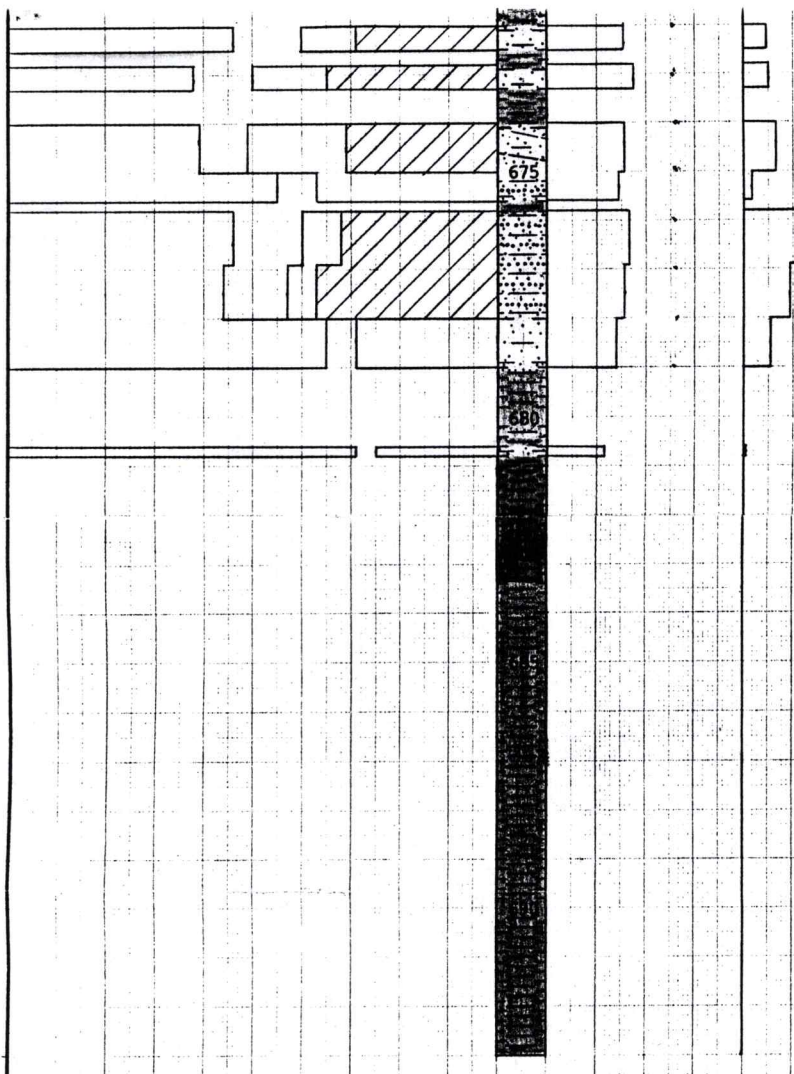
SEC. 28, T-26S, R-21E

TYPE OF CORE ROTARY

INTERVAL CORED 630.0' to 693.0'







KEY:

	SANDSTONE WITH SHALE AND MICA PARTINGS		SANDSTONE WITH SHALE AND MICA PARTINGS AND INCLUSIONS
	SANDSTONE		SANDSTONE, SHALY, WITH SHALE AND MICA PARTINGS
	SANDSTONE, SHALY		SHALE, SANDY, WITH SANDSTONE STRINGERS
	SANDSTONE AND SHALE, LAMINATED		SHALE
	SANDSTONE, SHALY, WITH MICA PARTINGS		SANDSTONE, SHALY, WITH SHALE STRINGERS
	LOSS		SHALE WITH SANDSTONE STRINGERS
	SHALE, SANDY		FLOODPOT RESIDUAL OIL SATURATION

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE POROSITY PERCENT	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVERAGE PERMEABILITY, MILLIDARCYs
630.0 - 671.0	35.6	14.3	11.6	81.0	11.2
672.0 - 679.0	5.8	15.6	41.1	47.9	6.8
680.6 - 680.8	0.2	11.7	25.0	71.0	0.26
				APRIL, 1985	RAL