

OILFIELD RESEARCH LABORATORIES

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

August 12, 1982

W. P. Moore, Incorporated
308 Terrace Trail West
Lake Quivara, Kansas 66106

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Nelson Lease, Well No. 102, located in Miami County, Kansas and submitted to our laboratory on August 7, 1982.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/rmc

5 c to Lake Quivara, Kansas

T185, R21E, Sec. 1

- REGISTERED ENGINEERS -

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

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GENERAL INFORMATION & SUMMARY

Company W. P. Moore, Incorporated Lease Nelson Well No. 102

Location _____

Section _____ Twp. _____ Rge. _____ County Miami State Kansas

Elevation, Feet

Name of Sand..... Peru

Top of Core 319.0

Bottom of Core 332.0

Top of Sand 319.0

Bottom of Sand 330.6

Total Feet of Permeable Sand 11.0

Total Feet of Floodable Sand 10.3

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
8 - 26	1.7	1.7
105 - 145	2.0	3.7
265 - 275	2.3	6.0
370 - 375	1.0	7.0
414 - 420	3.0	10.0
545 - 547	1.0	11.0

Average Permeability Millidarcys 278.9

Average Percent Porosity 22.3

Average Percent Oil Saturation 32.2

Average Percent Water Saturation..... 43.9

Average Oil Content, Bbls./A. Ft. 579.

Total Oil Content, Bbls./Acre..... 6,711.

Average Percent Oil Recovery by Laboratory Flooding Tests..... 7.1

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. 136.

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre 1,400.

Total Calculated Oil Recovery, Bbls./Acre..... See "Calculated Recovery"
Section

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The core was sampled and the samples sealed in plastic bags by a representative of the client. Fresh water mud was used as a drilling fluid.

*The nature of the vertical fracture at sample twelve did not allow a flood pot test to be taken at this depth interval.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
319.0 - 329.3	Brown slightly calcareous sandstone containing two vertical fractures.
329.3 - 330.6	Grayish brown calcareous sandstone containing a vertical fracture.
330.6 - 332.0	Gray calcareous shale containing a vertical fracture.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 1,400 barrels of oil per acre was obtained from 10.3 feet of sand. The weighted average percent oil saturation was reduced from 34.0 to 26.9, or represents an average recovery of 7.1 percent. The weighted average effective permeability of the samples is 15.59 millidarcys, while the average initial fluid production pressure is 14.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 11 samples tested, 10 produced water and oil. This indicates that

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approximately 91 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 primary and waterflood operations in the vicinity of this well should recover approximately 3,820 barrels of oil per acre. This is an average recovery of 371 barrels per acre foot from 10.3 feet of floodable sand analyzed in this core.

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

Original formation volume factor, estimated	1.03
Reservoir water saturation, percent, estimated	35.0
Average porosity, percent	24.0
Oil saturation after flooding, percent	26.9
Performance factor, percent, estimated	55.0
Net floodable sand, feet	10.3

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company W. P. Moore, Incorporated Lease Nelson Well No. 102

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	319.8	27.7	34	43	77	731	371.	1.0	1.0	731	371.00
2	320.7	29.2	35	48	83	793	546.	1.0	2.0	793	546.00
3	321.6	30.3	31	45	76	729	415.	1.0	3.0	729	415.00
4	322.6	27.9	35	41	76	758	414.	1.0	4.0	758	414.00
5	323.6	19.6	37	40	77	563	144.	1.0	5.0	563	144.00
6	324.6	19.4	25	40	65	376	109.	1.0	6.0	376	109.00
7	325.6	13.5	40	41	81	419	25.	1.0	7.0	419	25.00
8	326.5	18.6	25	22	47	361	266.	1.0	8.0	361	266.00
9	327.6	26.7	35	48	83	725	417.	1.0	9.0	725	417.00
10	328.6	26.9	41	56	97	856	273.	1.3	10.3	1,113	354.90
11	329.4	9.1	18	38	56	127	8.5,	0.7	11.0	89	5.95
12	330.5	6.8	17	69	86	90	Imp.	0.6	11.6	54	0.00

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company W. P. Moore, Inc. Lease Nelson Well No. 102

Depth Interval, Feet	Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
319.0 - 329.3	319.0 - 329.3	10.3	297.3	3061.90
329.3 - 330.6	329.3 - 330.6	0.7	8.5	5.95
319.0 - 330.6	319.0 - 330.6	11.0	278.9	3067.85

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
319.0 - 329.3	10.3	24.1	34.0	42.8	638	6,568
329.3 - 330.6	1.3	8.1	17.5	52.3	110	143
319.0 - 330.6	11.6	22.3	32.2	43.9	579	6,711

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company W. P. Moore, Incorporated Lease Nelson Well No. 102

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			
1	319.8	27.8	34	733	10	216	24	56	396	32.09	10
2	320.7	29.1	35	790	9	203	26	61	404	20.49	10
3	321.6	30.3	31	729	4	94	27	70	238	19.12	10
4	322.6	27.8	35	755	9	194	26	54	230	21.74	10
5	323.6	19.7	37	565	8	122	29	55	354	18.21	10
6	324.6	19.3	25	374	2	30	23	72	40	0.67	30
7	325.6	13.5	40	419	10	105	30	63	20	0.37	30
8	326.5	18.7	25	363	2	29	23	69	274	19.99	10
9	327.6	26.6	35	722	4	83	31	50	252	16.19	10
10	328.6	26.8	41	852	12	249	29	68	240	9.00	10
11	329.4	9.6	17	127	0	0	17	80	0	Imp.	-
12	330.5	*									

*See Page 2

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.

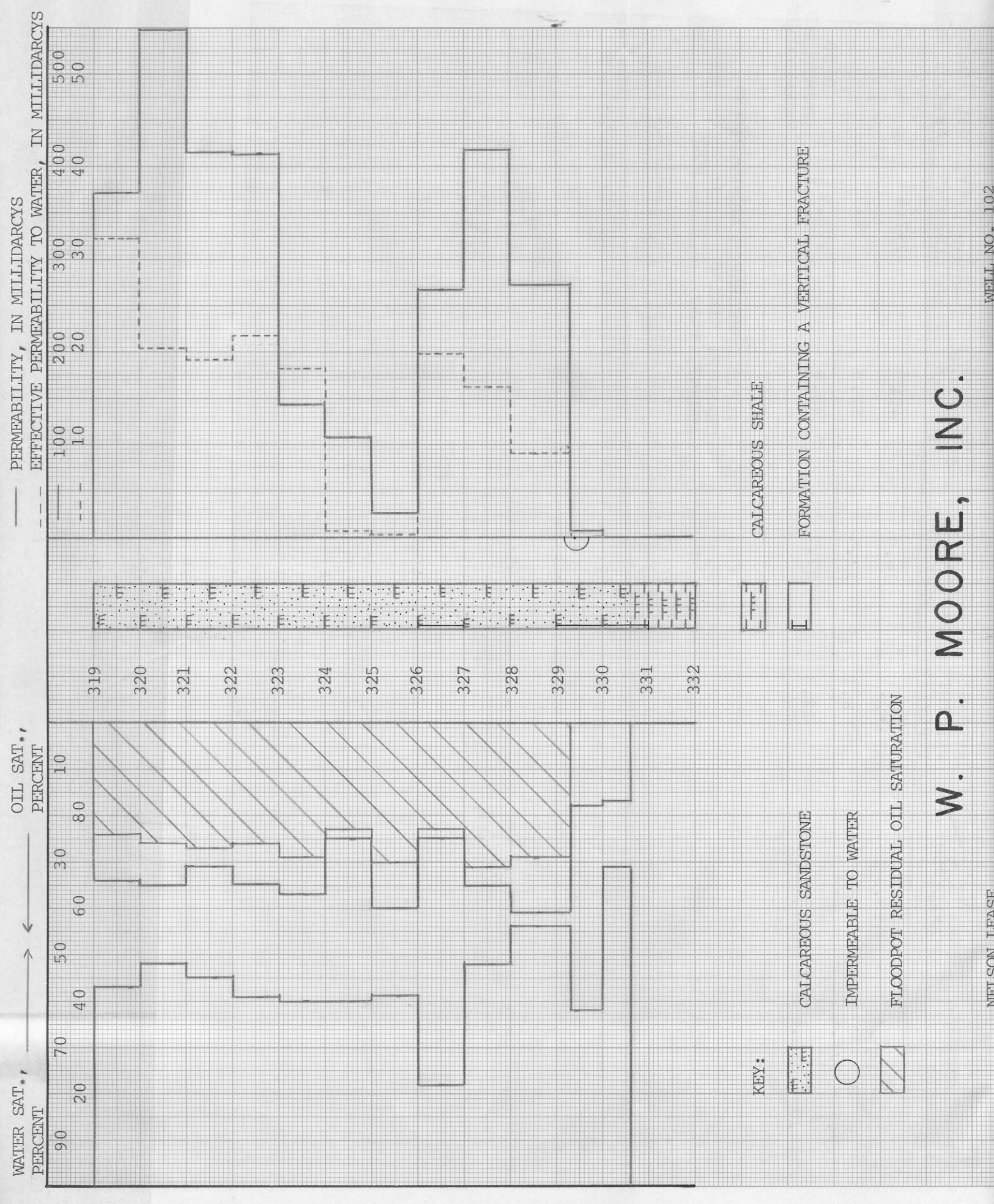
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SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company	W. P. Moore, Incorporated	Lease	Nelson	Well No.	102
Depth Interval, Feet	319.0 - 330.6				
Feet of Core Analyzed	10.3				
Average Percent Porosity	24.0				
Average Percent Original Oil Saturation	34.0				
Average Percent Oil Recovery	7.1				
Average Percent Residual Oil Saturation	26.9				
Average Percent Residual Water Saturation	62.0				
Average Percent Total Residual Fluid Saturation	88.9				
Average Original Oil Content, Bbls./A. Ft.	637.				
Average Oil Recovery, Bbls./A. Ft.	136.				
Average Residual Oil Content, Bbls./A. Ft.	501.				
Total Original Oil Content, Bbls./Acre	6,558.				
Total Oil Recovery, Bbls./Acre	1,400.				
Total Residual Oil Content, Bbls./Acre	5,158.				
Average Effective Permeability, Millidarcys	15.59				
Average Initial Fluid Production Pressure, p.s.i.	14.0				

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



KEY:			CALCAREOUS SHALE
	CALCAREOUS SANDSTONE		FORMATION CONTAINING A VERTICAL FRACTURE
	IMPERMEABLE TO WATER		
	FLOODPOT RESIDUAL OIL SATURATION		
W. P. MOORE, INC.			
NELSON LEASE		MIAMI COUNTY, KANSAS	
		WELL NO. 102	
DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE PERCENT POROSITY	AVG. OIL SATURATION PERCENT
319.0 - 329.3	10.3	24.1	42.8
329.3 - 330.6	1.3	8.1	52.3
319.0 - 330.6	11.6	22.3	43.9
		297.3	8.5
		278.9	3820 (PRIMARY AND WATERFLOODING)
OILFIELD RESEARCH LABORATORIES CHANUTE, KANSAS AUGUST, 1982 PDC			