

OILFIELD RESEARCH LABORATORIES

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

October 29, 1981

Graybol-Patton Company
Suite 301, Holarud Building
10 East 3rd Street
Tulsa, Oklahoma 74103

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Bates Lease, Well No. 6, located in Wilson County, Kansas and submitted to our laboratory on October 20, 1981.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/kas

5 c to Tulsa, Oklahoma

Offield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Graybol-Patton Company Lease Bates Well No. 6
 Location 700' FNL & 565' FEL NW, SE, NE
 Section 1 Twp. 29S Rge. 14E County Wilson State Kansas

Elevation, Feet

Name of Sand.....

Bartlesville

Top of Core

1034.0

Bottom of Core

1052.0

Top of Sand

1034.0

Bottom of Sand

1054.0

Total Feet of Permeable Sand

18.0

Total Feet of Floodable Sand

16.0

Distribution of Permeable Sand: Permeability Range Millidarcys

Feet

Cum. Ft.

0 - 102

9.5

9.5

140 - 195

3.0

12.5

220 - 400

2.5

15.0

550 - 987

3.0

18.0

Average Permeability Millidarcys

242.1

Average Percent Porosity

21.4

Average Percent Oil Saturation

37.8

Average Percent Water Saturation

33.8

Average Oil Content, Bbls./A. Ft.

626.

Total Oil Content, Bbls./Acre

11,272.

Average Percent Oil Recovery by Laboratory Flooding Tests

7.0

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

122.

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

1,959.

Total Calculated Oil Recovery, Bbls./Acre

See "Calculated Recovery"
Section

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 core was reported to be from a non-virgin area.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
1034.0 - 1042.0	Brown sandstone.
1042.0 - 1044.5	Light brown sandstone.
1044.5 - 1048.0	Light brown sandstone with some fine shale partings.
1048.0 - 1050.0	Brown sandstone.
1050.0 - 1052.0	Grayish brown sandstone.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 1,959 barrels of oil per acre was obtained from 16.0 feet of sand. The weighted average percent oil saturation was reduced from 37.9 to 30.9, or represents an average recovery of 7.0 percent. The weighted average effective permeability of the samples is 19.56 millidarcys, while the average initial fluid production pressure is 17.5 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 18 samples tested, 16 produced water and oil, and 1 sample produced water only. This indicates that approximately 89 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 5,950 barrels of oil per acre. This is an average recovery of 372 barrels per acre foot from 16.0 feet of floodable sand analyzed in this core.

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

Original formation volume factor, estimated	1.08
Reservoir water saturation, percent, estimated	20.0
Average porosity, percent	22.2
Oil saturation after flooding, percent	30.9
Performance factor, percent, estimated	50.0
Net floodable sand, feet	16.0

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Graybol-Patton Company Lease Bates Well No. 6

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	1034.2	22.2	38	34	72	654	556.	1.0	1.0	654	556.00
2	1035.2	22.2	45	29	74	775	170.	1.0	2.0	775	170.00
3	1036.3	17.6	29	24	53	395	140.	1.0	3.0	396	140.00
4	1037.4	28.2	32	33	65	700	955.	1.0	4.0	700	955.00
5	1038.3	23.6	31	39	70	568	382.	1.0	5.0	568	382.00
6	1039.4	24.7	35	35	70	671	221.	1.0	6.0	671	221.00
7	1040.1	23.6	49	31	80	897	192.	1.0	7.0	897	192.00
8	1041.3	17.7	41	42	83	563	37.	1.0	8.0	563	37.00
9	1042.3	16.3	33	23	56	417	54.	1.0	9.0	417	54.00
10	1043.3	15.1	40	33	73	469	18.	1.0	10.0	469	18.00
11	1044.3	22.9	35	23	58	622	392.	0.5	10.5	311	196.00
12	1045.5	19.7	32	22	54	489	90.	1.5	12.0	734	135.00
13	1046.3	20.5	34	33	67	541	101.	1.0	13.0	541	101.00
14	1047.2	20.2	38	45	83	596	40.	1.0	14.0	596	40.00
15	1048.1	25.4	38	39	77	749	89.	1.0	15.0	749	89.00
16	1049.2	28.7	36	31	67	802	986.	1.0	16.0	802	986.00
17	1050.2	20.1	47	49	96	733	44.	1.0	17.0	733	44.00
18	1051.4	18.3	49	43	92	696	42.	1.0	18.0	696	42.00

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company	Graybol-Patton Company	Lease	Bates	Well No.	6
	Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.	
	1034.0 - 1042.0	8.0	331.6	2653.00	
	1042.0 - 1052.0	10.0	170.5	1705.00	
	1034.0 - 1052.0	18.0	242.1	4358.00	

	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
	1034.0 - 1042.0	8.0	22.5	37.5	33.4	653	5,224
	1042.0 - 1052.0	10.0	20.6	38.1	34.1	605	6,048
	1034.0 - 1052.0	18.0	21.4	37.8	33.8	626	11,272

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Well No. 6

Company Graybol-Patton Company

Lease

Bates

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	1034.2	21.7	39	657	13	219	26	51	344	18.64	15
2	1035.2	22.7	44	775	15	264	29	47	180	21.74	10
3	1036.3	17.7	29	398	3	41	26	47	180	11.62	10
4	1037.4	28.1	32	698	7	153	25	46	148	55.48	10
5	1038.3	23.7	31	570	5	92	26	54	396	56.23	10
6	1039.4	24.6	35	668	5	95	30	51	298	16.24	15
7	1040.1	24.0	48	894	13	242	35	46	250	29.99	10
8	1041.3	17.8	41	566	10	138	31	53	292	15.64	15
9	1042.3	16.4	33	420	0	0	33	34	50	9.75	35
10	1043.3	15.1	40	469	0	0	40	34	0	Imp.	-
11	1044.3	22.8	35	619	5	88	30	58	440	10.72	25
12	1045.5	19.6	32	487	2	30	30	51	138	3.07	30
13	1046.3	20.6	34	543	5	80	29	52	270	11.43	20
14	1047.2	20.1	38	593	2	31	36	48	100	1.57	25
15	1048.1	25.3	38	746	9	177	29	57	304	11.99	20
16	1049.2	28.6	36	799	8	178	28	46	196	39.98	10
17	1050.2	20.5	46	732	2	32	44	53	22	0.45	45
18	1051.4	18.4	49	699	9	128	40	54	406	11.99	10

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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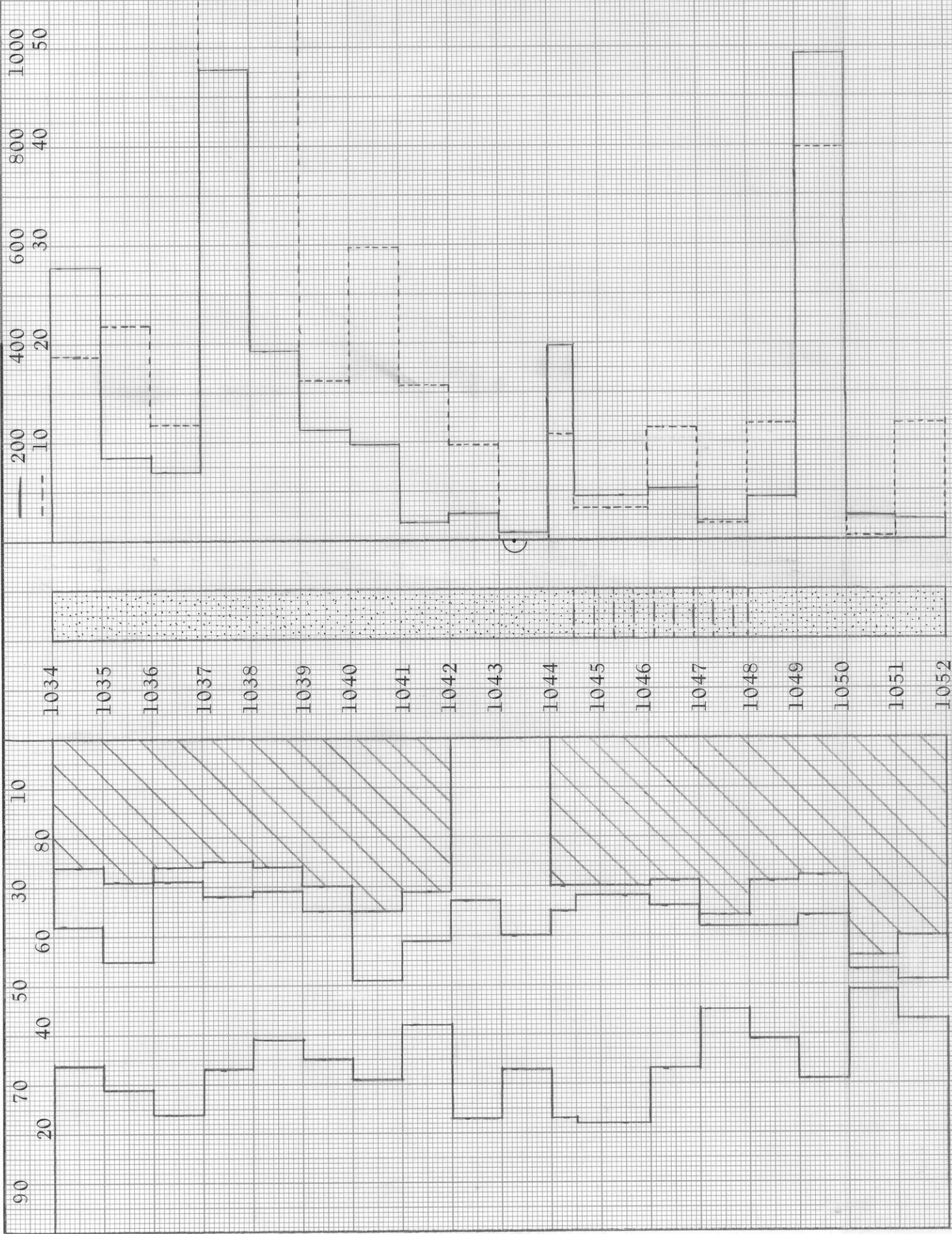
SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company	Graybol-Patton Company	Lease	Bates	Well No.	6
Depth Interval, Feet	1034.0 - 1042.0	1042.0 - 1052.0	1034.0 - 1052.0		
Feet of Core Analyzed	8.0	8.0	16.0		
Average Percent Porosity	22.5	21.8	22.2		
Average Percent Original Oil Saturation	37.9	38.4	37.9		
Average Percent Oil Recovery	8.9	5.1	7.0		
Average Percent Residual Oil Saturation	29.0	33.3	30.9		
Average Percent Residual Water Saturation	49.4	51.9	50.7		
Average Percent Total Residual Fluid Saturation	78.4	85.2	81.6		
Average Original Oil Content, Bbbls./A. Ft.	654.	644.	648.		
Average Oil Recovery, Bbbls./A. Ft.	156.	89.	122.		
Average Residual Oil Content, Bbbls./A. Ft.	498.	555.	526.		
Total Original Oil Content, Bbbls./Acre	5,226.	5,152.	10,378.		
Total Oil Recovery, Bbbls./Acre	1,244.	715.	1,959.		
Total Residual Oil Content, Bbbls./Acre	3,982.	4,427.	8,419.		
Average Effective Permeability, Millidarcys	28.20	10.92	19.56		
Average Initial Fluid Production Pressure, p.s.i.	11.9	23.1	17.5		

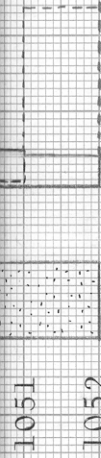
NOTE: Only those samples which recovered oil were used in calculating the above averages.

WATER SAT., ———> OIL SAT., ———< PERMEABILITY, IN MILLIDARCYS
EFFECTIVE PERMEABILITY TO WATER, IN
MILLIDARCYS



55.48

56.23



KEY:

	SANDSTONE
	SANDSTONE WITH SHALE PARTINGS
	IMPERMEABLE TO WATER

 FLOODPOT RESIDUAL OIL SATURATION

GRAYBOL - PATTON COMPANY

BATES LEASE

WELL NO. 6

WILSON COUNTY, KANSAS

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE		AVG. OIL		AVG. WATER		AVERAGE		CALCULATED	
		POROSITY	PERCENT	SATURATION	PERCENT	SATURATION	PERCENT	PERMEABILITY,	PERCENT	OIL RECOVERY	BBL'S. / ACRE

1034.0 - 1042.0	8.0	22.5	37.5	33.4	331.6
1042.0 - 1052.0	10.0	20.6	38.1	34.1	170.5
1034.0 - 1052.0	18.0	21.4	37.8	33.8	242.1

5,950

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CHANUTE, KANSAS
OCTOBER, 1981

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