

# OILFIELD RESEARCH LABORATORIES

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October 20, 1981

Pathfinder Petroleum Corporation  
10603 North Penn  
Suite 300  
Oklahoma City, Oklahoma 73120

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Smith Lease, Well No. J-3, located in Neosho County, Kansas and submitted to our laboratory on October 12, 1981.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES



Sanford A. Michel

SAM/mkf

5 c to Oklahoma City, Ok.

**Oilfield Research Laboratories**  
**GENERAL INFORMATION & SUMMARY**

Company Pathfinder Petroleum Corp. Lease Smith Well No. J-3

Location \_\_\_\_\_

Section 34 Twp. 28S Rge. 19E County Neosho State Kansas

Elevation, Feet .....

Name of Sand.....	UPPER BARTLESVILLE
Top of Core .....	638.0
Bottom of Core .....	650.0
Top of Sand .....	638.0
Bottom of Sand .....	650.0
Total Feet of Permeable Sand .....	10.7
Total Feet of Floodable Sand .....	2.5

**Distribution of Permeable Sand:**  
**Permeability Range**  
**Millidarcys**

	Feet	Cum. Ft.
0 - 1	2.7	2.7
5 - 10	2.4	5.1
10 - 30	3.1	8.2
30 - 50	2.5	10.7

Average Permeability Millidarcys .....	15.7
Average Percent Porosity .....	16.6
Average Percent Oil Saturation .....	33.7
Average Percent Water Saturation .....	41.4
Average Oil Content, Bbls./A. Ft. ....	446.
Total Oil Content, Bbls./Acre .....	5,219.
Average Percent Oil Recovery by Laboratory Flooding Tests .....	4.6
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. ....	65.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre .....	164.
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.

#### FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval,</u>	<u>Description</u>
<u>Feet</u>	
638.0 - 640.4	Grayish light brown shaly sandstone with shale partings.
640.4 - 642.5	Light brown sandstone with fine shale partings.
642.5 - 642.8	Gray shaly sandstone.
642.8 - 646.3	Brown sandstone with fine shale partings.
646.3 - 647.3	Brown shaly sandstone with shale partings.
647.3 - 648.6	Dark brown and gray laminated sandstone and shale.
648.6 - 650.0	Light gray and gray laminated sandstone and shale.

#### LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 164 barrels of oil per acre was obtained from 2.5 feet of sand. The weighted average percent oil saturation was reduced from 46.8 to 42.2, or represents an average recovery of 4.6 percent. The weighted average effective permeability of the samples is 0.69 millidarcys, while the average initial fluid production pressure is 40.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 12 samples tested, 2 produced water and oil, and 4 samples produced water only. This indicates that approximately 17 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 520 barrels of oil per acre. This is an average recovery of 208 barrels per acre foot from 2.5 feet of floodable sand analyzed in this core.

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

Original formation volume factor, estimated	1.04
Reservoir water saturation, percent, estimated	25.0
Average porosity, percent	17.9
Oil saturation after flooding, percent	42.2
Performance factor, percent, estimated	50.0
Net floodable sand, feet	2.5

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Pathfinder Petroleum Corp. Lease Smith Well No. J-3

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	638.5	15.9	38	40	78	469	0.67	1.0	1.0	469	0.67
2	639.5	16.7	28	48	76	367	6.4	1.4	2.4	514	8.96
3	640.6	19.0	22	32	54	324	11.	0.6	3.0	194	6.60
4	641.4	20.3	25	32	57	394	43.	0.5	3.5	197	21.50
5	642.4	18.7	31	28	59	450	35.	1.0	4.5	450	35.00
6	643.5	18.6	28	38	66	404	35.	1.0	5.5	404	35.00
7	644.5	19.5	51	30	81	772	27.	1.0	6.5	772	27.00
8	645.6	16.9	44	30	74	577	19.	1.5	8.0	866	28.50
9	646.5	15.7	26	57	83	317	4.1	1.0	9.0	317	4.10
10	647.5	17.1	45	36	81	597	0.16	1.3	10.3	776	0.21
11	648.7	12.9	25	69	94	250	0.11	0.4	10.7	100	0.04
12	649.5	9.8	21	70	91	160	Imp.	1.0	11.7	160	0.00

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## SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company	Lease	Smith	Well No.	J-3
Pathfinder Petroleum Corp.				
Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.	
638.0 - 650.0	10.7	15.7	167.58	
Depth Interval, Feet	Feet of Core Analyzed	Average Percent Oil Saturation	Average Percent Water Saturation	Average Oil Content Bbl./A. Ft.
638.0 - 650.0	11.7	16.6	33.7	41.4
				446
				5,219

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Pathfinder Petroleum Corporation Lease Smith Well No. J-3

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	638.5	16.4	37	471	0	0	37	42	0	Imp.	-
2	539.5	16.8	28	365	0	0	28	50	116	2.62	25
3	640.6	18.8	22	321	0	0	22	64	122	1.65	20
4	641.4	20.3	25	394	0	0	25	45	286	16.71	20
5	642.4	18.4	32	457	0	0	32	29	0	Imp.	-
6	643.5	18.7	28	406	0	0	28	57	94	1.87	30
7	644.5	19.4	51	768	7	105	44	41	46	1.05	35
8	645.6	16.9	44	577	3	39	41	53	26	0.45	45
9	646.5	15.2	27	318	0	0	27	57	0	Imp.	-
10	647.5	17.4	44	594	0	0	44	38	0	Imp.	-
11	648.7	12.8	25	248	0	0	25	70	0	Imp.	-
12	649.5	9.9	21	161	0	0	21	71	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.

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## SUMMARY OF LABORATORY FLOODING TESTS

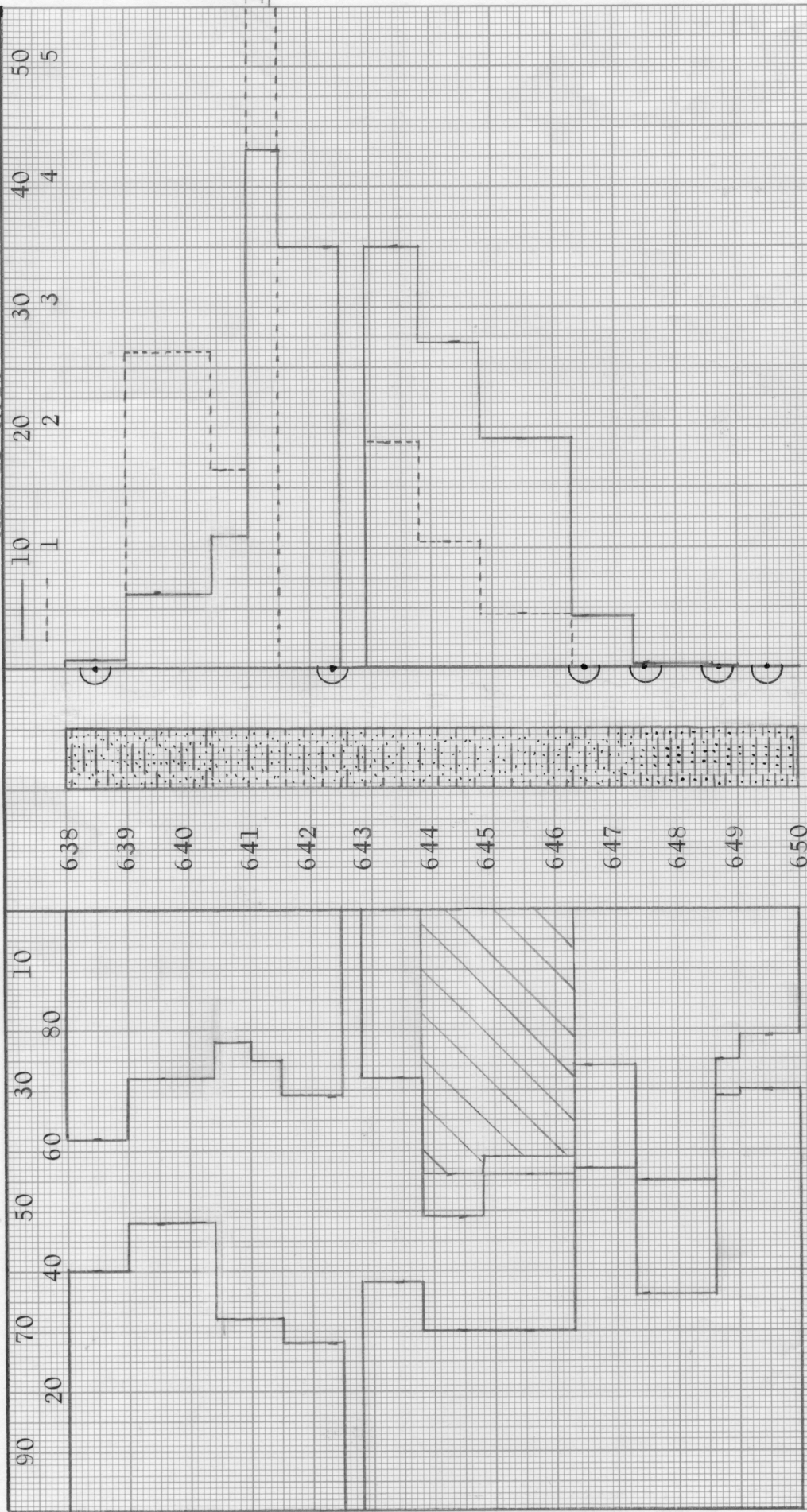
TABLE V

Company	Pathfinder Petroleum Corp.	Lease	Smith	Well No.	J-3
Depth Interval, Feet	638.0 - 650.0				
Feet of Core Analyzed	2.5				
Average Percent Porosity	17.9				
Average Percent Original Oil Saturation	46.8				
Average Percent Oil Recovery	4.6				
Average Percent Residual Oil Saturation	42.2				
Average Percent Residual Water Saturation	48.2				
Average Percent Total Residual Fluid Saturation	90.4				
Average Original Oil Content, Bbls./A. Ft.	653.				
Average Oil Recovery, Bbls./A. Ft.	65.				
Average Residual Oil Content, Bbls./A. Ft.	588.				
Total Original Oil Content, Bbls./Acre	1,634.				
Total Oil Recovery, Bbls./Acre	164.				
Total Residual Oil Content, Bbls./Acre	1,470.				
Average Effective Permeability, Millidarcys	0.69				
Average Initial Fluid Production Pressure, p.s.i.	40.0				

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

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

PERMEABILITY, IN MILLIDARCYS  
EFFECTIVE PERMEABILITY TO WATER, IN MILLIDARCYS



KEY:

SHALY SANDSTONE

LAMINATED SANDSTONE

SANDSTONE WITH SHALE PARTINGS

SHALY SANDSTONE WITH SHALE PARTINGS

FLOODPOT RESIDUAL OIL SATURATION

IMPERMEABLE TO WATER

DATE INDEXED PETROLEUM CORPORATION

# PATHFINDER PETROLEUM CORPORATION

SMITH LEASE

WELL NO. J-3

NEOSHO COUNTY, KANSAS

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE PERCENT POROSITY	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVERAGE PERMEABILITY, MILLIDARCS	CALCULATED OIL RECOVERY BBLs. / ACRE
638.0 - 650.0	11.7	16.6	33.7	41.4	15.7	520 (PRIMARY AND WATERFLOODING)

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 CHANUTE, KANSAS  
 OCTOBER, 1981

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