



# OILFIELD RESEARCH LABORATORIES

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December 10, 1981

Eagle Resources, Incorporated  
P.O. Box 352  
Canton, Kansas 67428

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Price Lease, Well #9, located in Montgomery County, Kansas and submitted to our laboratory on December 3, 1981.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

  
Sanford A. Michel

SAM/tem

5 c to Canton, Kansas

- REGISTERED ENGINEERS -

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

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

Company Eagle Resources, Incorporated Lease Price \_\_\_\_\_ Well No. 9  
 Location \_\_\_\_\_  
 Section -27 Twp. 32S Rge. 17E County Montgomery State Kansas

Elevation, Feet .....  
 Name of Sand..... Bartlesville  
 Top of Core ..... 687.0  
 Bottom of Core ..... 706.0  
 Top of Sand ..... 691.5  
 Bottom of Sand ..... 706.0  
 Total Feet of Permeable Sand ..... 12.0  
 Total Feet of Floodable Sand ..... 3.5

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 10	2.7	2.7
10 - 20	5.3	8.0
20 - 36	3.0	11.0
60 - 63	1.0	12.0

Average Permeability Millidarcys ..... 18.6  
 Average Percent Porosity ..... 17.0  
 Average Percent Oil Saturation ..... 34.8  
 Average Percent Water Saturation ..... 50.9  
 Average Oil Content, Bbls./A. Ft. .... 464.  
 Total Oil Content, Bbls./Acre ..... 6,033.  
 Average Percent Oil Recovery by Laboratory Flooding Tests ..... 2.3  
 Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. .... 32.  
 Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre ..... 113.  
 Total Calculated Oil Recovery, Bbls./Acre .....

See "Calculated Recovery" Section.

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The core was sampled by a representative of Oilfield Research Laboratories. Salt water mud was used as a drilling fluid.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
687.0 - 691.5	Gray shale.
691.5 - 693.5	Grayish brown very shaly sandstone.
693.5 - 696.5	Brown sandstone.
696.5 - 697.0	Gray shale.
697.0 - 701.3	Brown sandstone.
701.3 - 702.0	Grayish brown slightly shaly sandstone.
702.0 - 705.0	Brown sandstone.
705.0 - 706.0	Grayish brown shaly sandstone.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 113 barrels of oil per acre was obtained from 3.5 feet of sand. The weighted average percent oil saturation was reduced from 43.9 to 41.6, or represents an average recovery of 2.3 percent. The weighted average effective permeability of the samples is 0.25 millidarcys while the average initial fluid production pressure is 42.5 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 14 samples tested, 4 produced water and oil, and 8 samples water only. This indicates that approximately 29 percent of the sand represented by these samples is floodable pay sand. The tests also show that the sand has a relatively uniform effective permeability profile.

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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 500 barrels of oil per acre. This is an average recovery of 142 barrels per acre foot from 3.5 feet of floodable sand analyzed in this core.

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

Original formation volume factor, estimated	1.05
Reservoir water saturation, percent, estimated	35.0
Average porosity, percent	18.0
Oil saturation after flooding, percent	41.6
Performance factor, percent, estimated	50.0
Net floodable sand, feet	3.5

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## RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Eagle Resources, Incorporated Lease Price Well No. 9

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	691.7	11.3	30	65	95	263	Imp.	1.0	1.0	263	0.00
2	693.7	19.4	29	53	82	437	35.	0.5	1.5	219	17.50
3	694.4	19.9	46	38	84	710	62.	1.0	2.5	710	62.00
4	695.6	18.9	32	49	81	469	24.	1.0	3.5	469	24.00
5	696.3	18.1	47	36	83	660	24.	0.5	4.0	330	12.00
6	697.5	16.4	34	51	85	433	26.	1.0	5.0	433	26.00
7	698.5	16.9	45	44	89	590	11.	1.0	6.0	590	11.00
8	699.6	17.7	32	55	87	439	15.	1.0	7.0	439	15.00
9	700.5	17.5	32	52	84	434	11.	1.3	8.3	564	14.30
10	701.4	16.7	42	53	95	544	5.0	0.7	9.0	381	3.50
11	702.5	17.0	39	49	88	514	13.	1.0	10.0	514	13.00
12	703.6	18.3	31	50	81	440	11.	1.0	11.0	440	11.00
13	704.4	15.8	29	56	85	356	9.6	1.0	12.0	356	9.60
14	705.4	16.1	26	56	82	325	4.2	1.0	13.0	325	4.20

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## SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company	Eagle Resources, Incorporated	Lease	Price	Well No.						
				9						
Depth Interval, Feet	Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.	Average Percent Porosity	Average Percent Oil Saturation	Average Percent Water Saturation	Average Oil Content Bbl./A. Ft.	Total Oil Content Bbls./Acre	
691.5 - 706.0	691.5 - 706.0	12.0	18.6	223.10	17.0	34.8	50.9	464	6,033	
691.5 - 706.0	691.5 - 706.0	13.0			17.0	34.8	50.9	464	6,033	

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## RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company		Lease		Price		Well No.		9			
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	691.7	11.6	29	261	0	0	29	66	0	Imp.	-
2	693.7	19.5	29	439	0	0	29	59	18	0.30	45
3	694.4	19.8	46	707	3	46	43	48	30	0.37	35
4	695.6	19.0	32	472	0	0	32	50	12	0.37	50
5	696.3	17.9	47	653	2	28	45	46	8	0.15	50
6	697.5	16.4	34	433	0	0	34	55	16	0.22	45
7	698.5	17.0	45	593	2	26	43	51	20	0.22	40
8	699.6	17.6	32	437	0	0	32	59	18	0.22	35
9	700.5	17.9	31	430	0	0	31	60	10	0.30	45
10	701.4	16.4	43	547	0	0	43	53	0	Imp.	-
11	702.5	17.1	39	517	2	27	37	55	14	0.22	45
12	703.6	18.1	31	435	0	0	31	59	28	0.30	35
13	704.4	15.8	29	355	0	0	29	62	14	0.22	35
14	705.4	16.2	26	327	0	0	26	60	14	0.45	50

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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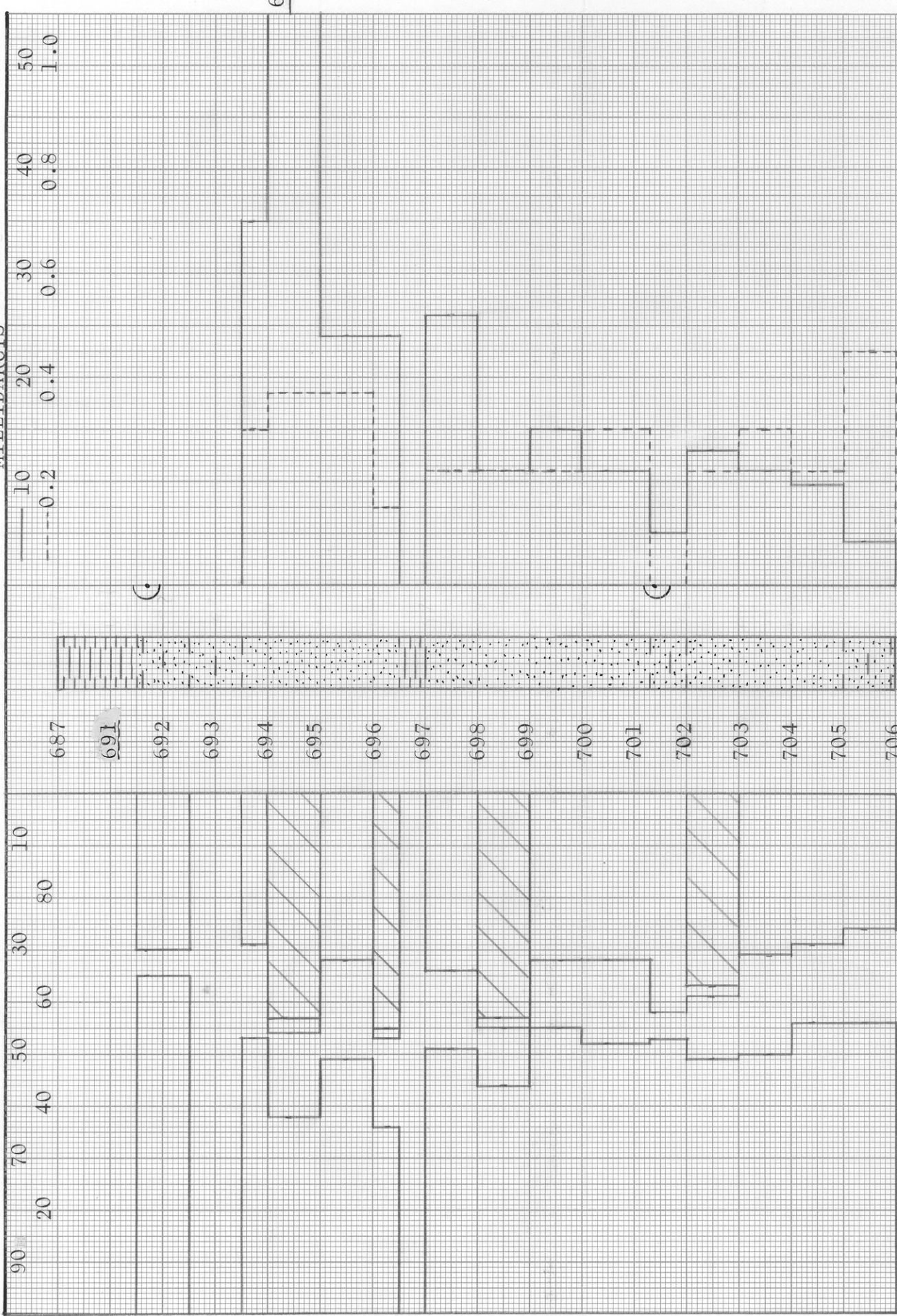
## SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company <u>Eagle Resources, Incorporated</u>	Lease <u>691.5 - 706.0</u>	Price	Well No. <u>9</u>
Depth Interval, Feet	691.5 - 706.0		
Feet of Core Analyzed	3.5		
Average Percent Porosity	18.0		
Average Percent Original Oil Saturation	43.9		
Average Percent Oil Recovery	2.3		
Average Percent Residual Oil Saturation	41.6		
Average Percent Residual Water Saturation	50.6		
Average Percent Total Residual Fluid Saturation	92.2		
Average Original Oil Content, Bbls./A. Ft.	612.		
Average Oil Recovery, Bbls./A. Ft.	32.		
Average Residual Oil Content, Bbls./A. Ft.	580.		
Total Original Oil Content, Bbls./Acre	2,144.		
Total Oil Recovery, Bbls./Acre	113.		
Total Residual Oil Content, Bbls./Acre	2,031.		
Average Effective Permeability, Millidarcys	0.25		
Average Initial Fluid Production Pressure, p.s.i.	42.5		

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

WATER SAT., PERCENT → ← OIL SAT., PERCENT  
 PERMEABILITY, IN MILLIDARCS  
 EFFECTIVE PERMEABILITY TO WATER, IN MILLIDARCS



KEY:

SANDSTONE

SHALY SANDSTONE

SHALE

62

KEY:



SANDSTONE



SHALY SANDSTONE



SHALE



IMPERMEABLE TO WATER



FLOODPOT RESIDUAL OIL SATURATION

# EAGLE RESOURCES

PRICE LEASE

MONTGOMERY COUNTY, KANSAS

WELL NO. 9

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE PERCENT POROSITY	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVERAGE PERMEABILITY, MILLIDARCYS	CALCULATED OIL RECOVERY BELS. / ACRE
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691.5 - 706.0

13.0

17.0

34.8

50.9

18.6

500

(PRIMARY AND  
WATERFLOODING)

OILFIELD RESEARCH LABORATORIES  
CHANUTE, KANSAS  
DECEMBER, 1981

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