

# OILFIELD RESEARCH LABORATORIES

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

December 17, 1981

Bluestem Corporation  
Box 37  
Humboldt, Kansas 66748

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Eldon Meyers Lease, Well No. 4, located in Labette County, Kansas and submitted to our laboratory on December 12, 1981.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/mkf

5 c to Humboldt, Ks.

- REGISTERED ENGINEERS -

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

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

Company Bluestem Corporation Lease Eldon Meyers Well No. 4  
 Location S½ of the NE¼  
 Section 35 Twp. 32S Rge. 17E County Labette State Kansas

Elevation, Feet .....

Name of Sand..... BARTLESVILLE

Top of Core ..... 710.0

Bottom of Core ..... 718.5

Top of Sand ..... 710.0

Bottom of Sand ..... 718.5

Total Feet of Permeable Sand ..... 8.5

Total Feet of Floodable Sand ..... 3.7

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 3	3.8	3.8
65 - 160	3.0	6.8
225 - 235	1.7	8.5

Average Permeability Millidarcys ..... 86.5

Average Percent Porosity ..... 19.3

Average Percent Oil Saturation ..... 42.8

Average Percent Water Saturation ..... 31.7

Average Oil Content, Bbls./A. Ft. .... 639.

Total Oil Content, Bbls./Acre ..... 5,431.

Average Percent Oil Recovery by Laboratory Flooding Tests ..... 3.6

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. .... 59.

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre ..... 217.

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,</u>	<u>Description</u>
<u>Feet</u>	<u>_____</u>
710.0 - 712.0	Brown sandstone with fine shale partings.
712.0 - 714.7	Brown sandstone.
714.7 - 718.5	Grayish black carbonaceous shaly sandstone.

#### LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 217 barrels of oil per acre was obtained from 3.7 feet of sand. The weighted average percent oil saturation was reduced from 36.9 to 33.3, or represents an average recovery of 3.6 percent. The weighted average effective permeability of the samples is 11.05 millidarcys, while the average initial fluid production pressure is 20.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 9 samples tested, 4 produced water and oil. This indicates that approximately 44 percent of the sand represented by these samples is floodable pay sand.

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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 1,450 barrels of oil per acre. This is an average recovery of 391 barrels per acre foot from 3.7 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	20.0
Average porosity, percent	21.0
Oil saturation after flooding, percent	33.3
Performance factor, percent, estimated	55.0
Net floodable sand, feet	3.7

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**RESULTS OF SATURATION & PERMEABILITY TESTS**

**TABLE 1-B**

Company Bluestem Corporation Lease Eldon Meyers Well No. 4

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			Ft.	Cum. Ft.		
1	710.4	20.0	37	32	574	158.	1.0	1.0	574	158.00
2	711.6	16.9	28	40	367	67.	1.0	2.0	367	67.00
3	712.7	20.7	37	35	594	115.	1.0	3.0	594	115.00
4	713.4	22.0	38	30	649	231.	1.0	4.0	649	231.00
5	714.4	21.6	35	43	587	226.	0.7	4.7	411	158.20
6	715.5	20.0	61	20	947	2.0	1.0	5.7	947	2.00
7	716.4	18.7	37	32	537	1.8	1.0	6.7	537	1.80
8	717.5	18.1	67	19	941	1.6	1.0	7.7	941	1.60
9	718.3	15.4	43	39	514	0.42	0.8	8.5	411	0.34

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## SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company	Lease	Well No.			
Bluestem Corporation	Eldon Meyers	4			
Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.		
710.0 - 714.7	4.7	155.1	729.20		
714.7 - 718.5	3.8	1.5	5.74		
710.0 - 718.5	8.5	86.5	734.94		
Depth Interval, Feet	Feet of Core Analyzed	Average Percent Oil Saturation	Average Percent Water Saturation	Average Oil Content Bbl./A. Ft.	Total Oil Content Bbls./Acre
710.0 - 714.7	4.7	35.0	35.6	552	2,595
714.7 - 718.5	3.8	52.5	26.9	746	2,836
710.0 - 718.5	8.5	42.8	31.7	639	5,431

## RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Bluestem Corporation Lease Eldon Meyers Well No. 4

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	710.4	19.9	37	571	3	46	34	50	348	13.33	20
2	711.6	16.6	29	373	0	0	29	41	0	Imp.	-
3	712.7	20.7	37	594	6	96	31	49	212	8.50	20
4	713.4	21.8	38	643	3	51	35	46	232	9.33	20
5	714.4	21.7	35	589	2	34	33	50	256	13.92	20
6	715.5	20.3	60	945	0	0	60	22	0	Imp.	-
7	716.4	18.6	37	534	0	0	37	34	0	Imp.	-
8	717.5	18.3	66	937	0	0	66	21	0	Imp.	-
9	718.3	15.1	44	515	0	0	44	40	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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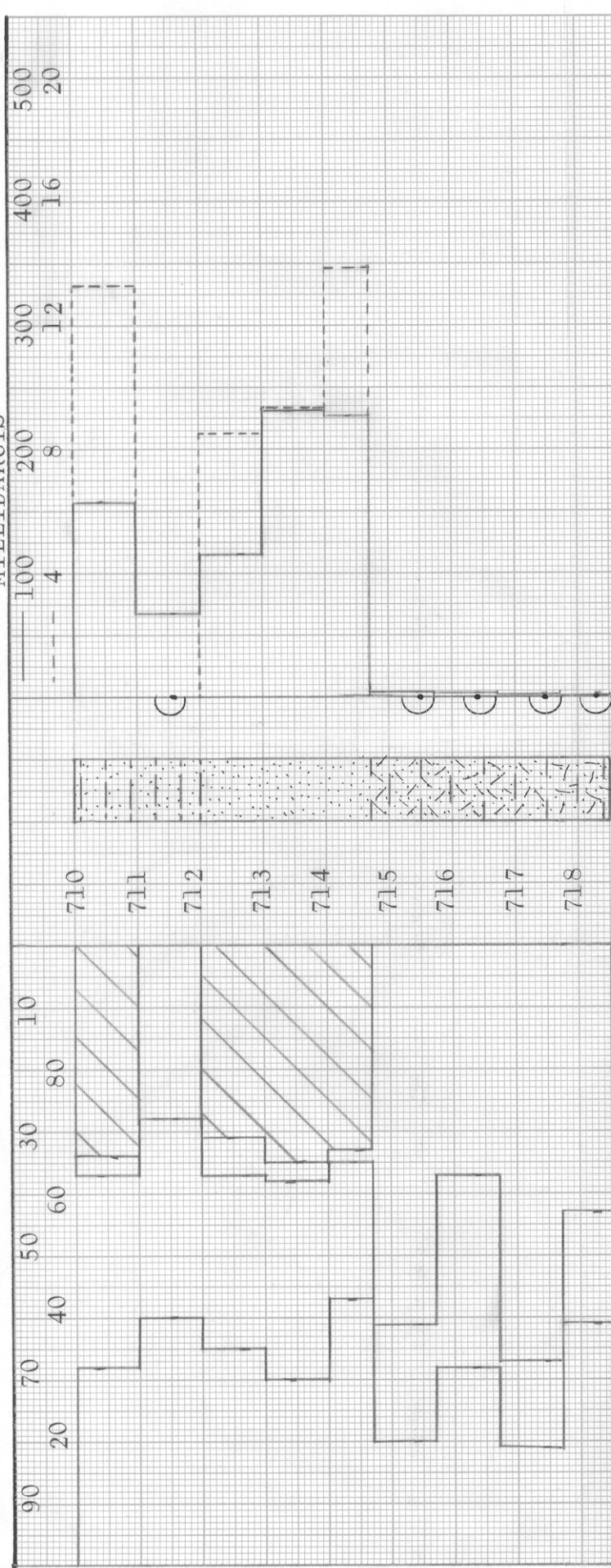
## SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company	Bluestem Corporation	Lease	Eldon Meyers	Well No.	4
Depth Interval, Feet	710.0 - 714.7				
Feet of Core Analyzed	3.7				
Average Percent Porosity	21.0				
Average Percent Original Oil Saturation	36.9				
Average Percent Oil Recovery	3.6				
Average Percent Residual Oil Saturation	33.3				
Average Percent Residual Water Saturation	48.6				
Average Percent Total Residual Fluid Saturation	81.9				
Average Original Oil Content, Bbls./A. Ft.	601.				
Average Oil Recovery, Bbls./A. Ft.	59.				
Average Residual Oil Content, Bbls./A. Ft.	542.				
Total Original Oil Content, Bbls./Acre	2,221.				
Total Oil Recovery, Bbls./Acre	217.				
Total Residual Oil Content, Bbls./Acre	2,004.				
Average Effective Permeability, Millidarcys	11.05				
Average Initial Fluid Production Pressure, p.s.i.	20.0				

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

WATER SAT., PERCENT → < ——— PERMEABILITY, IN MILLIDARCYS  
 OIL SAT., PERCENT ← ——— EFFECTIVE PERMEABILITY TO WATER, IN MILLIDARCYS



KEY:  
 SANDSTONE  
 IMPERMEABLE TO WATER  
 SANDSTONE WITH SHALE PARTINGS  
 CARBONACEOUS SHALY SANDSTONE  
 FLOODPOT RESIDUAL OIL SATURATION

# BLUESTEM CORPORATION

ELDON MEYERS LEASE  
 LABETTE COUNTY, KANSAS  
 WELL NO. 4

# BLUESTEM CORPORATION

ELDON MEYERS LEASE

WELL NO. 4

LABETTE COUNTY, KANSAS

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE POROSITY	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVERAGE PERMEABILITY, MILLIDARCYS	CALCULATED OIL RECOVERY BBLs. / ACRE
710.0 - 714.7	4.7	20.1	35.0	35.6	155.1	
714.7 - 718.5	3.8	18.2	52.5	26.9	1.5	
710.0 - 718.5	8.5	19.3	42.8	31.7	86.5	1450 (PRIMARY AND WATERFLOODING)

OILFIELD RESEARCH LABORATORIES  
CHANUTE, KANSAS  
DECEMBER, 1981

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