October 15, 1952

4-35-15E

Emery Const. Company, Inc.
P. O. Box 498
Topeka, Kansas

Attention: Mr. George B. Emery, Jr.

Gentlemen:

Enclosed herewith is the report of the analysis made on the 3" Rotary core taken from the Gillam Lease, Well No. 1, Montgomery County, Kansas, and submitted to our laboratory on October 4, 1952.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Carl L. Pate

CLP:eda

c.c. to Mr. E. A. Whitworth
Coffeyville, Kansas

Gillam 1

EMERY CONSTRUCTION CO., INC.

CORE ANALYSIS REPORT

GILLAM LEASE WELL NO. 1

MONTGOMERY COUNTY, KANSAS

OILFIELD RESEARCH LABORATORIES

CHANUTE, KANSAS

OCTOBER 14, 1952

Oilfield Research Laboratories

GENERAL INFORMATION & SUMMARY

Company Emery Construction Company, Inc. Lease Gillam Well No. 1

Location 660' South of North Line & 660' West of East Line, SE¼, NE¼

Section 4 Twp. 35 S Rge. 15 E County Montgomery State Kansas

Name of Sand	Bartlesville
Top of Core	1243.00
Bottom of Core	1270.00
Top of Pay Sand	1251.86
Bottom of Pay Sand	1255.88
Total Feet of Permeable Sand	7.27
Total Feet of Floodable Sand	4.02

Distribution of Permeable Sand:

Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 2	1.75	1.75
2 - 4	0.90	2.65
4 - 12	1.74	4.39
12 & above	2.88	7.27

Average Permeability Millidarcys	9.76
Average Percent Porosity	15.67
Average Percent Oil Saturation	22.37
Average Percent Water Saturation	54.68
Average Oil Content, Bbls./A. Ft.	277.
Total Oil Content, Bbls./Acre	2,901.
Average Percent Oil Recovery by Laboratory Flooding Tests	4.22
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	57.
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	185.
Total Calculated Oil Recovery, Bbls./Acre	800.
Packer Setting, Feet	1248.0
Viscosity, Centipoises @	
A. P. I. Gravity, degrees @ 60 °F	
Elevation, Feet	

Fresh water was used as a circulating fluid in the coring of the sand in this well. The depths given in this report are taken from the Rotary table which is 4½ feet above ground level.

FORMATION CORED

The detailed log of the formation cored is as follows:

Depth Interval, Feet	Description
1243.00 - 1243.60	Finely laminated sandy shale.
1243.60 - 1244.00	Light brown fine grained micaceous slightly shaley sandstone.
1244.00 - 1244.75	Light brown fine grained laminated micaceous shaley sandstone.
1244.75 - 1245.10	Gray fine grained finely laminated micaceous shaley sandstone.
1245.10 - 1247.60	Light brown and gray fine grained laminated micaceous shaley sandstone.
1247.60 - 1248.50	Light brown fine grained slightly laminated micaceous shaley sandstone.
1248.50 - 1249.05	Light brown fine grained micaceous slightly shaley sandstone.
1249.05 - 1251.86	Gray sandy shale containing a sand streak.
1251.86 - 1255.88	Light brown fine grained micaceous sandstone.
1255.88 - 1257.20	Gray sandy shale.
1257.20 - 1257.35	Gray fine grained laminated micaceous shaley sandstone.
1257.35 - 1257.85	Gray fine grained micaceous slightly shaley sandstone.
1257.85 - 1258.30	Gray fine grained laminated micaceous shaley sandstone.
1258.30 - 1258.95	Gray sandy shale.
1258.95 - 1259.15	Gray fine grained laminated micaceous shaley sandstone.
1259.15 - 1259.30	Grayish light brown fine grained micaceous slightly shaley sandstone.
1259.30 - 1260.60	Light brown fine grained micaceous sandstone.

1260.60 - 1261.10 - Grayish light brown fine grained micaceous slightly shaley sandstone.

1261.10 - 1262.40 - Gray fine grained laminated micaceous shaley sandstone.

1262.40 - 1263.00 - Gray fine grained micaceous slightly shaley sandstone.

1263.00 - 1264.15 - Gray sandy shale.

1264.15 - 1265.00 - Gray fine grained micaceous calcareous sandstone.

1265.00 - 1267.00 - Gray shale.

1267.00 - 1268.50 - According to log, laminated calcareous sandy shale (Discarded at well).

1268.50 - 1268.70 - According to log, dark shale with sand inclusions (Discarded at well).

1268.70 - 1269.50 - According to log, shaley limestone - crossbedded (Discarded at well).

1269.50 - 1270.00 - According to log, sandy shale (Discarded at well).

Coring was started at a depth of 1243.00 feet in finely laminated sandy shale and completed at 1270.00 feet in sandy shale. This core shows a total of 15.47 feet of sandstone. For the most part, the pay is made up of fine grained micaceous sandstone.

PERMEABILITY

For the sake of distribution, the core was divided into three sections. The weighted average permeability of the upper, middle and lower sections is 1.84, 15.66 and 2.78 millidarcys respectively; the overall average being 9.76 (See Table II). By observing the data given on the coregraph, it is noticeable that the sand has a very irregular permeability profile and, with the exception of the middle section, the sand is very tight.

PERCENT SATURATION & OIL CONTENT

The sand in this core shows a low weighted average percent oil sat-

uration, namely, 22.37. The weighted average percent oil saturation of the upper, middle and lower sections is 19.27, 27.09 and 19.65 respectively. The weighted average percent water saturation of the upper, middle and lower sections is 58.64, 47.24 and 62.85 respectively; the overall average being 54.68 (See Table IV). This gives an overall weighted average total fluid saturation of 77.05 percent. This comparatively low total fluid saturation indicates that an appreciable amount of fluid was lost during coring which was probably oil.

In an effort to determine whether or not any flushing of the sand occurred during coring, all of the saturation samples were analyzed for chloride content. The results of these tests are given in Tables VII and VIII. From the data given in these tables and on the coregraph, it is evident that some flushing of the sand did occur in the more permeable sand during coring as this sand shows a somewhat lower chloride content. We are of the opinion, however, that most of the oil lost during coring was due to the expansion of gas carried in solution by the oil.

The weighted average oil content of the upper, middle and lower sections is 210, 367 and 238 barrels per acre foot respectively; the overall average being 277. The total oil content, as shown by this core, is 2,901 barrels per acre (See Table IV).

LABORATORY FLOODING TESTS

The sand in this core did not respond very well to laboratory flooding tests as, for the most part, the sand is very tight. All of the recoverable oil was obtained from 3.27 feet of sand included in the middle section. A total recovery of 185 barrels of oil per acre

was obtained from 3.27 feet of sand. The weighted average percent oil saturation was reduced from 27.80 to 23.58, or represnets an average recovery of 4.22 percent. The weighted average effective permeability of the samples is 0.708 millidarcys, while the average initial fluid production pressure is 25.0 pounds per square inch (See Table VI).

By observing the data given in Table V, you will note that of the 11 samples tested, 7 produced water and 3 oil. From the above data, it is evident that only approximately 37 percent of the sand represented by this core is floodable pay sand. The tests also show that the sand is very tight.

CONCLUSION

From a study of the above data, it is evident that an efficient water flood within the vicinity of this well will recover approximately 800 barrels of oil per acre from the 4.02 feet of floodable pay sand analyzed. In calculating this recovery, an allowance was made for oil lost during coring, and it is assumed that the primary production and the true water saturation of the sand are 8 and 45 percent respectively.

On the basis of the above data, it is evident that this well was drilled near the edge of the trend as the cored section is very tight and badly broken.

Oil Field Research Laboratories

SHOT RECOMMENDATION

Company Emery Construction Company, Inc. Lease Gillam Well No. 1

Depth Interval, Feet	Feet of Sand	Size of Shell Inches	Qts./Ft.	Total Quarts
1252.0 - 1259.0	7.0	4½	3.1	21.7

Recommended Packer Setting 1248.0 feet.

Oilfield Research Laboratories

RESULTS OF PERMEABILITY TESTS

TABLE I

Company Emery Construction Co., Inc. Lease Gillam Well No. 1

Sample No.	Depth, Feet	Permeability Millidarcys	Feet of Core		Permeability Capacity Ft. x Md.
			Ft.	Cum. Ft.	
1	1243.86	2.3	0.40	0.40	0.92
2	1244.20	Imp.	0.75	1.15	0.00
3	1244.82	Imp.	0.35	1.50	0.00
4	1245.38	Imp.	0.50	2.00	0.00
5	1245.80	Imp.	0.50	2.50	0.00
6	1246.45	Imp.	0.65	3.15	0.00
7	1247.00	Imp.	0.50	3.65	0.00
8	1247.50	Imp.	0.35	4.00	0.00
9	1248.10	1.55	0.65	4.65	1.01
10	1248.41	Imp.	0.25	4.90	0.00
11	1248.98	Imp.	0.55	5.45	0.00
12	1252.12	7.4	0.64	6.09	4.74
13	1252.90	20.	0.80	6.89	16.00
14	1253.70	13.	0.70	7.59	9.10
15	1254.30	11.	0.50	8.09	5.50
16	1254.70	20.	0.35	8.44	7.00
17	1255.00	20.	0.45	8.89	9.00
18	1255.60	20.	0.58	9.47	11.60
19	1257.25	Imp.	0.15	9.62	0.00
20	1257.80	1.02	0.50	10.12	0.51
21	1258.22	Imp.	0.45	10.57	0.00
22	1259.05	Imp.	0.20	10.77	0.00
23	1259.80	5.1	0.60	11.37	3.06
24	1260.65	3.2	0.50	11.87	1.60
25	1261.20	Imp.	0.50	12.37	0.00
26	1261.92	Imp.	0.80	13.17	0.00
27	1262.45	1.93	0.30	13.47	0.58
28	1262.95	1.22	0.30	13.77	0.37

Oil Field Research Laboratories

SUMMARY OF PERMEABILITY TESTS

TABLE II

Company Emery Construction Company, Inc. Lease Gillam Well No. 1

Depth Interval Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity, Ft. x Md.
1243.60 - 1249.05	1.05	1.84	1.93
1251.86 - 1255.88	4.02	15.66	62.94
1257.20 - 1263.00	2.20	2.78	6.12
1243.60 - 1263.00	7.27	9.76	70.99

Oilfield Research Laboratories

RESULTS OF SATURATION TESTS

TABLE III

Company Emery Construction Company, Inc. Lease Gillam Well No. 1

Sat. No.	Depth, Feet	Effective Porosity Percent	Percent Saturation			Oil Content Bbls./A. Ft.	Feet of Core		Total Oil Content Bbls./Acre
			Oil	Water	Total		Ft.	Cum. Ft.	
1	1243.70	14.5	25.1	52.0	77.1	282	0.40	0.40	113
F-1	1244.45	13.6	14.5	-	-	153	0.75	1.15	115
2	1245.00	11.9	15.4	71.8	87.2	143	0.35	1.50	50
F-2	1245.20	13.4	15.9	-	-	165	0.90	2.40	148
3	1247.70	14.1	22.4	59.7	82.1	246	0.90	3.30	222
4	1248.60	15.4	24.3	53.3	77.6	292	0.55	3.85	161
5	1252.35	17.4	32.6	49.3	81.9	441	1.04	4.89	460
6	1253.11	17.8	24.0	49.3	73.3	332	0.75	5.64	249
7	1253.90	17.4	26.9	46.5	73.4	364	0.95	6.59	346
8	1255.15	17.2	24.5	44.8	69.3	327	1.28	7.87	419
9	1259.40	16.8	22.4	44.3	66.7	292	0.60	8.47	175
10	1260.20	16.0	20.2	56.1	76.3	241	0.70	9.17	169
11	1262.10	14.9	18.2	75.0	93.2	211	1.30	10.47	274
						Total	- - - -	- - - - - -	- 2,901

Oil Field Research Laboratories

SUMMARY OF SATURATION TESTS

TABLE IV

Company Emery Construction Company, Inc. Lease Gillam Well No. 1

Depth Interval, Feet	Feet of Core Analyzed	Average Percent Porosity	Average Percent Oil Saturation	Average Percent Water Saturation	Average Oil Content Bbls./A. Ft.	Total Oil Content Bbls./Acre
1243.60-1249.05	3.85	13.90	19.27	58.64	210	809
1251.86-1255.88	4.02	17.39	27.09	47.24	367	1,474
1259.30-1262.40	2.60	15.65	19.65	62.85	238	618
1243.60-1262.40	10.47	15.67	22.37	54.68	277	2,901

Oilfield Research Laboratories

RESULTS OF LABORATORY FLOODING TESTS

TABLE V

Company Emery Construction Company, Inc. Lease Gillam Well No. 1

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.
			Percent	Bbls./A. Ft.	Percent	Bbls./A. Ft.	% Oil	% Water	Bbls./A. Ft.			
1	1244.47	13.6	14.5	153	0.0	0	14.5	60.5	153	0	Imp.	50#
2	1245.20	13.4	15.9	165	0.0	0	15.9	60.8	165	0	Imp.	50#
3	1247.90	13.8	22.1	237	0.0	0	22.1	63.2	237	0	Imp.	50#
4	1248.80	15.3	23.3	277	0.0	0	23.3	57.0	277	0	Imp.	50#
5	1252.65	17.5	32.6	443	7.6	103	25.0	65.1	340	40	1.03	25
6	1253.35	17.5	22.8	310	0.0	0	22.8	66.5	310	25	0.688	25
7	1254.10	17.4	26.9	363	2.9	39	24.0	67.0	324	24	0.642	25
8	1255.40	17.2	24.5	327	2.4	32	22.1	66.4	295	26	0.496	25
9	1259.60	17.2	21.9	292	0.0	0	21.9	59.4	292	8	0.189	50
10	1260.46	16.2	19.0	239	0.0	0	19.0	62.6	239	7	0.093	30
11	1262.30	15.1	17.0	199	0.0	0	17.0	75.6	199	6	0.073	30

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.

Oilfield Research Laboratories

SUMMARY OF LABORATORY FLOODING TESTS

TABLE VI

Company Emery Construction Company, Inc. Lease Gillam Well No. 1

Depth Interval, Feet	1251.86 - 1255.88
Feet of Core Analyzed	3.27
Average Percent Porosity	17.34
Average Percent Original Oil Saturation	27.80
Average Percent Oil Recovery	4.22
Average Percent Residual Oil Saturation	23.58
Average Percent Residual Water Saturation	66.15
Average Percent Total Residual Fluid Saturation	89.73
Average Original Oil Content, Bbls./A. Ft.	375.
Average Oil Recovery, Bbls./A. Ft.	57.
Average Residual Oil Content, Bbls./A. Ft.	318.
Total Original Oil Content, Bbls./Acre	1,285.
Total Oil Recovery, Bbls./Acre	185.
Total Residual Oil Content, Bbls./Acre	1,040.
Average Effective Permeability, Millidarcys	0.708
Average Initial Fluid Production Pressure, p.s.i.	25.0

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

Oilfield Research Laboratories

RESULTS OF WATER DIFFERENTIATION TESTS

TABLE VII

Company Emery Construction Co., Inc. Lease Gillam Well No. 1

Sample No.	Depth, Feet	Chloride Content of Brine in Sand ppm	Percent Water Saturation		
			Connate	Drilling & Foreign	Total
1	1243.70	59,600			
2	1245.00	61,200			
3	1247.70	64,800			
4	1248.60	70,100			
5	1252.35	55,600			
6	1253.11	60,700			
7	1253.90	55,000			
8	1255.15	61,000			
9	1259.40	65,000			
10	1260.20	60,500			
11	1262.10	58,100			

Note: ppm - parts per million.

Oil Field Research Laboratories

SUMMARY OF WATER DIFFERENTIATION TESTS

TABLE VIII

Company Emery Construction Company, Inc. Lease Gillam Well No. 1

Depth Interval, Feet	Chloride Content of Brine in Sand, ppm	Average Percent Connate Water	Average Percent Drilling & Foreign Water
1234.60 - 1249.05	64,636		
1251.86 - 1255.88	58,134		
1259.30 - 1262.40	60,346		
1243.60 - 1262.40	60,408		

Note: ppm - parts per million.