

OILFIELD RESEARCH LABORATORIES

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July 2, 1979

Midway Oil Company
c/o Vick Leis
Box 223
Yates Center, Kansas 66783

Gentlemen:

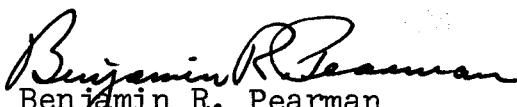
Enclosed herewith are the results of tests run on the rotary core taken from the Tannahill Lease, Well No. 5, Woodson County, Kansas, and submitted to our laboratory on June 22, 1979.

The core was out of the core barrel overnight prior to being sampled in the laboratory. The core was sampled by a representative of the client.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES


Benjamin R. Pearman

BRP:km
5 c to Yates Center, Kansas

- REGISTERED ENGINEERS -

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

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GENERAL INFORMATION & SUMMARY

Company Midway Oil Company Lease Tannahill Well No. 5
 Location NW $\frac{1}{4}$ SE
 Section 4 Twp. 23S Rge. 16E County Woodson State Kansas

| | | | |
|------------------------------|---|--|----------|
| Name of Sand | - | | Squirrel |
| Top of Core | - | | 1041.0 |
| Bottom of Core | - | | 1053.0 |
| Top of Sand | - | | 1041.2 |
| Bottom of Sand | - | | 1052.3 |
| Total Feet of Permeable Sand | - | | 10.8 |
| Total Feet of Floodable Sand | - | | 7.0 |

Distribution of Permeable Sand:
 Permeability Range
 Millidarcys

| | Feet | Cum. Ft. |
|---------|------|----------|
| 0 - 10 | 3.1 | 3.1 |
| 10 - 50 | 2.7 | 5.8 |
| 50 - 64 | 5.0 | 10.8 |

| | | | |
|--|---|--|--------|
| Average Permeability Millidarcys | - | | 34.6 |
| Average Percent Porosity | - | | 16.9 |
| Average Percent Oil Saturation | - | | 50.7 |
| Average Percent Water Saturation | - | | - |
| Average Oil Content, Bbbls./A. Ft. | - | | 710. |
| Total Oil Content, Bbbls./Acre | - | | 8,363. |
| Average Percent Oil Recovery by Laboratory Flooding Tests | - | | 4.8 |
| Average Oil Recovery by Laboratory Flooding Tests, Bbbls./A. Ft. | - | | 76. |
| Total Oil Recovery by Laboratory Flooding Tests, Bbbls./Acre | - | | 532. |
| Total Calculated Oil Recovery, Bbbls./Acre | - | | |
| Packer Setting, Feet | - | | |
| Viscosity, Centipoises @ | - | | |
| A. P. I. Gravity, degrees @ 60 °F | - | | |
| Elevation, Feet | - | | |

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LOG

Company Midway Oil Company Lease Tannahil Well No. 5

| <u>Depth Interval, Feet</u> | <u>Description</u> |
|---------------------------------|---|
| 1041.0 - 1041.2 | Hard limestone. |
| 1041.2 - 1042.9 | Dark brown slightly shaly sandstone. |
| 1042.9 - 1043.9 | Gray and brown laminated shale and sandstone. |
| 1043.9 - 1045.3 | Brown and gray laminated sandstone and shale. |
| 1045.3 - 1051.7 | Very dark brown sandstone. |
| 1051.7 - 1052.3 | Gray and brown laminated sandstone and shale. |
| 1052.3 - 1053.0 | Gray very shaly sandstone. |

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

| 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 | 1041.4 | 18.9 | 52 | - | - | 762 | 19. | 0.7 | 534 | 13.30 | |
| 2 | 1042.4 | 17.2 | 55 | - | - | 734 | 6.8 | 1.0 | 734 | 6.80 | |
| 3 | 1043.5 | 9.3 | 27 | - | - | 195 | Imp. | 1.0 | 195 | 0.00 | |
| 4 | 1044.3 | 11.0 | 36 | - | - | 307 | 8.9 | 1.4 | 430 | 12.46 | |
| 5 | 1045.5 | 21.8 | 55 | - | - | 930 | 58. | 1.0 | 930 | 58.00 | |
| 6 | 1046.8 | 19.0 | 61 | - | - | 899 | 62. | 1.0 | 899 | 62.00 | |
| 7 | 1047.5 | 21.0 | 63 | - | - | 1026 | 64. | 1.0 | 1026 | 64.00 | |
| 8 | 1048.5 | 20.1 | 64 | - | - | 998 | 54. | 1.0 | 998 | 54.00 | |
| 9 | 1049.6 | 19.7 | 56 | - | - | 856 | 56. | 1.0 | 856 | 56.00 | |
| 10 | 1050.5 | 19.4 | 58 | - | - | 873 | 28. | 1.4 | 1222 | 39.20 | |
| 11 | 1051.9 | 18.3 | 54 | - | - | 767 | 12. | 0.6 | 461 | 7.20 | |
| 12 | 1052.7 | 6.0 | 24 | - | - | 112 | 0.40 | 0.7 | 78 | 0.28 | |

Company Midway Oil Company Lease Tannahill Well No. 5

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

| Company | Lease | Tannahill | Well No. | 5 | |
|-------------------------|--------------------------|---|--|---------------------------------------|------------------------------------|
| | Midway Oil Company | | | | |
| Depth Interval, Feet | Feet of Core Analyzed | Average Permeability, Millidarcys | Permeability Capacity Ft. x Md. | | |
| 1041.2 - 1045.3 | 3.1 | 10.5 | 32.56 | | |
| 1045.3 - 1053.0 | 7.7 | 44.4 | 340.68 | | |
| 1041.2 - 1053.0 | 10.8 | 34.6 | 373.24 | | |
| 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 |
| 1041.2 - 1045.3 | 4.1 | 41.1 | - | 462 | 1,893 |
| 1045.3 - 1053.0 | 7.7 | 55.8 | - | 841 | 6,470 |
| 1041.2 - 1053.0 | 11.8 | 50.7 | - | 710 | 8,363 |

RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Midway Oil Company Lease Tannahill Well No. 5

| Sample No. | Depth, Feet | Effective Porosity Percent | Original Oil Saturation | | Oil Recovery | | Residual Saturation | | Volume of Water Recovered cc ^a | Effective Permeability Millidarcys ^{ee} | Initial Fluid Production Pressure Lbs./Sq./In. |
|------------|-------------|----------------------------|-------------------------|--------------|--------------|--------------|---------------------|---------|---|--|--|
| | | | % | Bbls./A. Ft. | % | Bbls./A. Ft. | % Oil | % Water | | | |
| 1 | 1041.4 | 18.9 | 52 | 762 | 0 | 0 | 52 | 762 | 0 | Imp. | - |
| 2 | 1042.4 | 17.2 | 55 | 734 | 0 | 0 | 55 | 734 | 13 | 0.42 | 40 |
| 3 | 1043.5 | 9.3 | 27 | 195 | 0 | 0 | 27 | 195 | 0 | Imp. | - |
| 4 | 1044.3 | 11.0 | 36 | 307 | 0 | 0 | 36 | 307 | 0 | Imp. | - |
| 5 | 1045.5 | 21.8 | 55 | 930 | 9 | 152 | 46 | 778 | 57 | 1.80 | 25 |
| 6 | 1046.8 | 19.0 | 61 | 899 | 5 | 74 | 56 | 825 | 24 | 0.68 | 30 |
| 7 | 1047.5 | 21.0 | 63 | 1,026 | 6 | 98 | 57 | 928 | 64 | 2.25 | 25 |
| 8 | 1048.5 | 20.1 | 64 | 998 | 6 | 94 | 58 | 904 | 30 | 0.75 | 25 |
| 9 | 1049.6 | 19.7 | 56 | 856 | 3 | 46 | 53 | 810 | 32 | 0.83 | 30 |
| 10 | 1050.5 | 19.4 | 58 | 873 | 2 | 30 | 56 | 843 | 34 | 0.83 | 25 |
| 11 | 1051.9 | 18.3 | 54 | 767 | 3 | 43 | 51 | 724 | 13 | 0.33 | 35 |
| 12 | 1052.7 | 6.0 | 24 | 112 | 0 | 0 | 24 | 112 | 0 | Imp. | - |

Notes: cc—cubic centimeter.

^a—Volume of water recovered at the time of maximum oil recovery.

^{ee}—Determined by passing water through sample which still contains residual oil.

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SUMMARY OF LABORATORY FLOODING TESTS

TABLE V

Company Midway Oil Company Lease Tannahill Well No. 5

| | |
|---|-----------------|
| Depth Interval, Feet | 1045.3 - 1053.0 |
| Feet of Core Analyzed | 7.0 |
| Average Percent Porosity | 20.0 |
| Average Percent Original Oil Saturation | 58.9 |
| Average Percent Oil Recovery | 4.8 |
| Average Percent Residual Oil Saturation | 54.1 |
| Average Percent Residual Water Saturation | 43.3 |
| Average Percent Total Residual Fluid Saturation | 97.4 |
| Average Original Oil Content, Bbls./A. Ft. | 914. |
| Average Oil Recovery, Bbls./A. Ft. | 76. |
| Average Residual Oil Content, Bbls./A. Ft. | 838. |
| Total Original Oil Content, Bbls./Acre | 6,393. |
| Total Oil Recovery, Bbls./Acre | 532. |
| Total Residual Oil Content, Bbls./Acre | 5,861. |
| Average Effective Permeability, Millidarcys | 1.10 |
| Average Initial Fluid Production Pressure, p.s.i. | 27.8 |

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