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

September 22, 1981

Wells-Battelstein Oil & Gas, Inc.
7700 San Felipe Blvd.
Houston, Texas 77002

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary cores taken from the Pearce Lease, Well No. 35, located in Chautauqua County, Kansas and submitted to our laboratory on September 2, 1981.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/kas

6 c to Houston, Texas
1 c to Chanute, Kansas

# Oilfield Research Laboratories

## GENERAL INFORMATION & SUMMARY

Company Wells-Battelstein Oil & Gas, Inc. Lease Pearce Well No. 35

Location

Section 19 Twp. 33S Rge. 13E County Chautauqua State Kansas

Elevation, Feet

| | Redd | Wiser |
|---|---|---|
| Name of Sand | | |
| Top of Core | 865.0 | 1135.0 |
| Bottom of Core | 927.6 | 1176.6 |
| Top of Sand | 865.0 | 1135.0 |
| Bottom of Sand | 927.6 | 1169.7 |
| Total Feet of Permeable Sand | 56.2 | 25.0 |
| Total Feet of Floodable Sand | 8.3 | 0.0 |

Distribution of Permeable Sand:

| Permeability Range Millidarcys | Feet | Cum. Ft. |
|---|---|---|
| | REDD SAND | |
| 0 - 5 | 11.2 | 11.2 |
| 5 - 20 | 9.5 | 20.7 |
| 20 - 40 | 9.7 | 30.4 |
| 40 - 80 | 17.4 | 47.8 |
| 80 - 190 | 8.4 | 56.2 |
| | WISER SAND | |
| 0 - 1 | 20.0 | 20.0 |
| 1 - 4 | 5.0 | 25.0 |

| | | |
|---|---|---|
| Average Permeability Millidarcys | 41.4 | 0.75 |
| Average Percent Porosity | 18.1 | 13.8 |
| Average Percent Oil Saturation | 18.5 | 12.7 |
| Average Percent Water Saturation | 63.6 | 73.5 |
| Average Oil Content, Bbls./A. Ft. | 264. | 137. |
| Total Oil Content, Bbls./Acre | 16,290. | 4,753. |
| Average Percent Oil Recovery by Laboratory Flooding Tests | 4.6 | 0. |
| Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. | 73. | 0. |
| Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre | 602. | 0. |
| Total Calculated Oil Recovery, Bbls./Acre | See "Cal. Rec." Section | 0. |

The core was sampled by a representative of Oilfield Research Laboratories. Salt water mud was used as a drilling fluid. The core was reported to be from a virgin area.

Since only the Redd sand responded to flooding susceptibility tests, calculated recovery is given for the Redd sand only.

## FORMATION CORED

The detailed log of the formation cored is as follows:

| Depth Interval, Feet | Description |
|---|---|
| | REDD SAND |
| 865.0 - 882.0 | Gray and brown laminated shale and sandstone. |
| 882.0 - 885.0 | Brown sandstone with fine shale partings. |
| 885.0 - 886.3 | Grayish brown shaly sandstone. |
| 886.3 - 886.7 | Light brown sandstone. |
| 886.7 - 888.2 | Gray and brown laminated shale and sandstone. |
| 888.2 - 896.0 | Light brown sandstone. |
| 896.0 - 897.7 | Grayish light brown slightly calcareous shaly sandstone. |
| 897.7 - 898.8 | Brown sandstone. |
| 898.8 - 899.7 | Grayish brown shaly sandstone. |
| 899.7 - 906.0 | Light brown sandstone. |
| 906.0 - 907.0 | No core. |
| 907.0 - 913.0 | Brown sandstone with some shale partings. |
| 913.0 - 914.7 | Gray calcareous shaly sandstone. |
| 914.7 - 927.6 | Grayish light brown sandstone with fine shale partings. |

WISER SAND

1135.0 - 1169.7 Grayish light brown shaly sandstone containing a vertical fracture.

1169.7 - 1176.6 Gray very shaly sandstone

## LABORATORY FLOODING TESTS

### REDD SAND

The sand in this core responded to laboratory flooding tests, as a total recovery of 602 barrels of oil per acre was obtained from 8.3 feet of sand. The weighted average percent oil saturation was reduced from 36.3 to 31.7, or represents an average recovery of 4.6 precent. The weighted average effective permeability of the samples is 3.68 millidarcys, while the average initial fluid production pressure is 25.0 pounds per square inch (See Table V).

## 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 1,460 barrels of oil per acre. This is an average recovery of 176 barrels per acre foot from 8.3 feet of floodable sand analyzed in this core.

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

| | |
|---|---|
| Original formation volume factor, estimated | 1.06 |
| Reservoir water saturation, percent, estimated | 40.0 |
| Average porosity, percent | 20.3 |
| Oil saturation after flooding, percent | 31.7 |
| Performance factor, percent, estimated | 45.0 |
| Net floodable sand, feet | 8.3 |

## Oilfield Research Laboratories

RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Wells-Battelstein Oil & Gas, Inc. Lease Pearce Well No. 35

| 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. | Vert. Perm. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Oil | Water | Total | | | Ft. | Cum. Ft. | | | |
| | | | | | | REDD SAND | | | | | | |
| 1 | 865.5 | 14.4 | 3 | 83 | 86 | 34 | Imp. | 1.0 | 1.0 | 34 | 0.00 | Imp. |
| 2 | 866.5 | 18.8 | 12 | 69 | 81 | 175 | 6.1 | 1.0 | 2.0 | 175 | 6.10 | Imp. |
| 3 | 867.6 | 18.0 | 10 | 71 | 81 | 140 | 5.0 | 1.0 | 3.0 | 140 | 5.00 | Imp. |
| 4 | 868.5 | 18.6 | 13 | 65 | 78 | 188 | 7.5 | 1.0 | 4.0 | 188 | 7.50 | Imp. |
| 5 | 869.6 | 14.1 | 10 | 82 | 92 | 109 | 3.6 | 1.0 | 5.0 | 109 | 3.60 | Imp. |
| 6 | 870.5 | 6.9 | 16 | 80 | 96 | 86 | Imp. | 1.0 | 6.0 | 86 | 0.00 | Imp. |
| 7 | 871.5 | 14.6 | 31 | 67 | 98 | 351 | Imp. | 1.0 | 7.0 | 351 | 0.00 | Imp. |
| 8 | 872.5 | 16.4 | 18 | 69 | 87 | 229 | 3.9 | 1.0 | 8.0 | 229 | 3.90 | Imp. |
| 9 | 873.5 | 16.4 | 11 | 72 | 83 | 140 | 3.8 | 1.0 | 9.0 | 140 | 3.80 | Imp. |
| 10 | 874.5 | 19.1 | 16 | 61 | 77 | 237 | 0.39 | 1.0 | 10.0 | 237 | 0.39 | Imp. |
| 11 | 875.5 | 13.3 | 13 | 81 | 94 | 134 | 6.8 | 1.0 | 11.0 | 134 | 6.80 | Imp. |
| 12 | 876.3 | 14.4 | 22 | 76 | 98 | 246 | 0.38 | 1.0 | 12.0 | 246 | 0.38 | Imp. |
| 13 | 877.5 | 14.6 | 10 | 78 | 88 | 113 | 0.89 | 1.0 | 13.0 | 113 | 0.89 | Imp. |
| 14 | 878.5 | 16.1 | 11 | 71 | 82 | 137 | 0.19 | 1.0 | 14.0 | 137 | 0.19 | Imp. |
| 15 | 879.5 | 14.7 | 23 | 72 | 95 | 262 | 0.74 | 1.0 | 15.0 | 262 | 0.74 | Imp. |
| 16 | 880.6 | 16.4 | 24 | 74 | 98 | 307 | Imp. | 1.0 | 16.0 | 307 | 0.00 | Imp. |
| 17 | 881.6 | 14.5 | 12 | 79 | 91 | 135 | 0.78 | 1.0 | 17.0 | 135 | 0.78 | 12. |
| 18 | 882.5 | 14.9 | 16 | 82 | 98 | 185 | 19. | 1.0 | 18.0 | 185 | 19.00 | 24. |
| 19 | 883.5 | 19.7 | 35 | 50 | 85 | 535 | 19. | 1.0 | 19.0 | 535 | 19.00 | Imp. |
| 20 | 984.5 | 20.0 | 42 | 50 | 92 | 652 | 31. | 1.0 | 20.0 | 652 | 31.00 | 15. |
| 21 | 885.3 | 17.0 | 22 | 59 | 81 | 290 | 2.0 | 0.5 | 20.5 | 145 | 1.00 | Imp. |
| 22 | 885.6 | 15.2 | 26 | 69 | 95 | 307 | 1.5 | 0.8 | 21.3 | 246 | 1.20 | Imp. |
| 23 | 886.5 | 20.0 | 13 | 58 | 71 | 202 | 22. | 0.4 | 21.7 | 81 | 8.80 | Imp. |
| 24 | 887.5 | 18.7 | 13 | 80 | 93 | 189 | 5.7 | 1.5 | 23.2 | 284 | 8.55 | Imp. |

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RESULTS OF SATURATION & PERMEABILITY TESTS



TABLE 1-B

Company Wells-Battelstein Oil & Gas, Inc. Lease Pearce Well No. 35

| 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. | Vert. Perm. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Oil | Water | Total | | | Ft. | Cum. Ft. | | | |
| 25 | 888.5 | 24.1 | 10 | 58 | 68 | 187 | 80. | 0.8 | 24.0 | 150 | 64.00 | Imp. |
| 26 | 889.4 | 20.9 | 31 | 53 | 84 | 503 | 60. | 1.0 | 25.0 | 503 | 60.00 | Imp. |
| 27 | 890.5 | 21.4 | 38 | 47 | 85 | 631 | 31. | 1.0 | 26.0 | 631 | 31.00 | 28. |
| 28 | 891.5 | 22.9 | 23 | 53 | 76 | 409 | 63. | 1.0 | 27.0 | 409 | 63.00 | 14. |
| 29 | 892.5 | 20.0 | 31 | 50 | 81 | 481 | 25. | 1.0 | 28.0 | 481 | 25.00 | 6.6 |
| 30 | 893.5 | 20.5 | 31 | 55 | 86 | 493 | 42. | 1.0 | 29.0 | 493 | 42.00 | 4.8 |
| 31 | 894.6 | 20.3 | 45 | 46 | 91 | 709 | 80. | 1.0 | 30.0 | 709 | 80.00 | 32. |
| 32 | 895.5 | 20.3 | 22 | 53 | 75 | 347 | 56. | 1.0 | 31.0 | 347 | 56.00 | 16. |
| 33 | 896.5 | 13.0 | 19 | 75 | 94 | 192 | 0.24 | 1.0 | 32.0 | 192 | 0.24 | 23. |
| 34 | 897.6 | 8.2 | 28 | 66 | 94 | 178 | Imp. | 0.7 | 32.7 | 125 | 0.00 | 4.9 |
| 35 | 898.5 | 19.6 | 14 | 67 | 81 | 213 | 40. | 1.1 | 33.8 | 234 | 44.00 | 0.48 |
| 36 | 899.5 | 20.7 | 23 | 51 | 74 | 369 | 2.0 | 0.9 | 34.7 | 332 | 1.80 | 60. |
| 37 | 900.5 | 19.5 | 32 | 47 | 79 | 484 | 50. | 1.3 | 36.0 | 629 | 65.00 | 52. |
| 38 | 901.5 | 23.1 | 26 | 52 | 78 | 466 | 42. | 1.0 | 37.0 | 466 | 42.00 | 33. |
| 39 | 902.5 | 19.8 | 23 | 55 | 78 | 353 | 141. | 1.0 | 38.0 | 353 | 141.00 | 13. |
| 40 | 903.5 | 20.2 | 24 | 53 | 77 | 376 | 42. | 1.0 | 39.0 | 376 | 42.00 | Imp. |
| 41 | 904.4 | 20.3 | 21 | 47 | 68 | 331 | 41. | 1.0 | 40.0 | 331 | 41.00 | 19. |
| 42 | 905.5 | 15.9 | 36 | 57 | 93 | 444 | 58. | 1.0 | 41.0 | 444 | 58.00 | 5.0 |
| 43 | 907.6 | 19.9 | 26 | 45 | 71 | 401 | 47. | 1.0 | 42.0 | 401 | 47.00 | 72. |
| 44 | 908.5 | 20.6 | 15 | 52 | 67 | 240 | 60. | 1.0 | 43.0 | 240 | 60.00 | 44. |
| 45 | 909.6 | 19.7 | 6 | 63 | 69 | 92 | 39. | 1.0 | 44.0 | 92 | 39.00 | 8.6 |
| 46 | 910.5 | 17.4 | 17 | 52 | 69 | 230 | 17. | 1.0 | 45.0 | 230 | 17.00 | 9.3 |
| 47 | 911.6 | 22.9 | 48 | 41 | 89 | 853 | 127. | 1.0 | 46.0 | 853 | 127.00 | Imp. |
| 48 | 912.5 | 19.8 | 28 | 47 | 75 | 430 | 22. | 1.0 | 47.0 | 430 | 22.00 | 40. |

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RESULTS OF SATURATION & PERMEABILITY TESTS



TABLE 1-B

Company Wells-Battelstein Oil & Gas, Inc. Lease Pearce Well No. 35

| 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. | Vert. Perm. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Oil | Water | Total | | | Ft. | Cum. Ft. | | | |
| 49 | 913.5 | 12.8 | 15 | 24 | 39 | 149 | 9.4 | 1.0 | 48.0 | 149 | 9.40 | 2.5 |
| 50 | 914.5 | 4.2 | 12 | 59 | 71 | 39 | Imp. | 0.7 | 48.7 | 27 | 0.00 | 2.1 |
| 51 | 915.4 | 18.4 | 3 | 79 | 82 | 43 | 24. | 1.3 | 50.0 | 56 | 31.20 | 10 |
| 52 | 916.5 | 22.5 | 17 | 46 | 63 | 297 | 188. | 1.0 | 51.0 | 297 | 188.00 | 57. |
| 53 | 917.5 | 21.7 | 1 | 57 | 58 | 17 | 169. | 1.0 | 52.0 | 17 | 169.00 | 37. |
| 54 | 918.5 | 20.6 | 17 | 47 | 64 | 272 | 58. | 1.0 | 53.0 | 272 | 58.00 | 12. |
| 55 | 919.6 | 21.4 | 5 | 75 | 80 | 83 | 103. | 1.0 | 54.0 | 83 | 103.00 | 5.7 |
| 56 | 920.5 | 20.8 | 10 | 79 | 89 | 161 | 127. | 1.0 | 55.0 | 161 | 127.00 | 17. |
| 57 | 921.6 | 17.8 | 7 | 89 | 96 | 97 | 23. | 1.0 | 56.0 | 97 | 23.00 | 25. |
| 58 | 922.5 | 18.8 | 3 | 79 | 92 | 44 | 32. | 1.0 | 57.0 | 44 | 32.00 | 14. |
| 59 | 923.6 | 19.6 | 15 | 74 | 89 | 228 | 58. | 1.0 | 58.0 | 228 | 58.00 | 13. |
| 60 | 924.4 | 20.2 | 9 | 87 | 96 | 141 | 62. | 1.0 | 59.0 | 141 | 62.00 | 8.2 |
| 61 | 925.5 | 16.9 | 4 | 77 | 81 | 52 | 46. | 1.0 | 60.0 | 52 | 46.00 | 58. |
| 62 | 926.5 | 19.0 | 2 | 73 | 75 | 30 | 77. | 1.0 | 61.0 | 30 | 77.00 | 5.1 |
| 63 | 927.3 | 18.3 | 4 | 67 | 71 | 57 | 80. | 0.6 | 61.6 | 34 | 48.00 | 11. |
| | | | | | | WISER SAND | | | | | | |
| 64 | 1135.5 | 14.7 | 10 | 55 | 65 | 114 | 3.0 | 1.0 | 1.0 | 114 | 3.00 | Imp. |
| 65 | 1136.5 | 13.8 | 4 | 74 | 78 | 43 | 0.80 | 1.0 | 2.0 | 43 | 0.80 | 0.89 |
| 66 | 1137.5 | 13.3 | 2 | 89 | 91 | 21 | 0.43 | 1.0 | 3.0 | 21 | 0.43 | Imp. |
| 67 | 1138.6 | 12.5 | 14 | 78 | 92 | 136 | 0.43 | 1.0 | 4.0 | 136 | 0.43 | Imp. |
| 68 | 1139.4 | 12.5 | 17 | 70 | 87 | 165 | 0.25 | 1.0 | 5.0 | 165 | 0.25 | Imp. |
| 69 | 1140.5 | 11.6 | 1 | 83 | 84 | 9 | 0.18 | 1.0 | 6.0 | 9 | 0.18 | Imp. |
| 70 | 1141.5 | 16.2 | 1 | 68 | 69 | 13 | 2.3 | 1.0 | 7.0 | 13 | 2.30 | 0.82 |
| 71 | 1142.6 | 14.3 | 3 | 62 | 65 | 33 | 3.4 | 1.0 | 8.0 | 33 | 3.40 | 1.8 |
| 72 | 1143.5 | 13.4 | 3 | 71 | 74 | 31 | 1.5 | 1.0 | 9.0 | 31 | 1.50 | Imp. |

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RESULTS OF SATURATION & PERMEABILITY TESTS



TABLE 1-B

Company Wells-Battelstein Oil & Gas, Inc. Lease Pearce Well No. 35

| 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. | Vert. Perm. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Oil | Water | Total | | | Ft. | Cum. Ft. | | | |
| 73 | 1144.5 | 12.4 | 1 | 87 | 88 | 10 | 0.26 | 1.0 | 10.0 | 10 | 0.26 | Imp. |
| 74 | 1145.6 | 12.9 | 3 | 84 | 87 | 30 | 0.19 | 1.0 | 11.0 | 30 | 0.19 | Imp. |
| 75 | 1146.5 | 15.1 | 8 | 76 | 84 | 94 | 0.50 | 1.0 | 12.0 | 94 | 0.50 | 0.33 |
| 76 | 1147.5 | 15.1 | 16 | 70 | 86 | 187 | 1.2 | 1.0 | 13.0 | 187 | 1.20 | Imp. |
| 77 | 1148.5 | 13.7 | 17 | 79 | 96 | 181 | Imp. | 1.0 | 14.0 | 181 | 0.00 | Imp. |
| 78 | 1149.5 | 14.2 | 5 | 77 | 82 | 55 | 0.68 | 1.0 | 15.0 | 55 | 0.68 | Imp. |
| 79 | 1150.6 | 14.4 | 38 | 59 | 97 | 425 | 0.30 | 1.0 | 16.0 | 425 | 0.30 | 0.26 |
| 80 | 1151.5 | 13.9 | 13 | 77 | 90 | 140 | Imp. | 1.0 | 17.0 | 140 | 0.00 | 0.28 |
| 81 | 1152.5 | 15.1 | 11 | 73 | 84 | 129 | 0.57 | 1.0 | 18.0 | 129 | 0.57 | 0.43 |
| 82 | 1153.5 | 12.1 | 14 | 76 | 90 | 131 | Imp. | 1.0 | 19.0 | 131 | 0.00 | Imp. |
| 83 | 1154.5 | 14.4 | 19 | 69 | 88 | 212 | 0.41 | 1.0 | 20.0 | 212 | 0.41 | 0.21 |
| 84 | 1155.6 | 14.4 | 21 | 71 | 92 | 235 | 0.41 | 1.0 | 21.0 | 235 | 0.41 | Imp. |
| 85 | 1156.5 | 14.8 | 18 | 74 | 92 | 207 | Imp. | 1.0 | 22.0 | 207 | 0.00 | Imp. |
| 86 | 1157.6 | 15.1 | 17 | 71 | 88 | 199 | 0.29 | 1.0 | 23.0 | 199 | 0.29 | Imp. |
| 87 | 1158.5 | 15.5 | 30 | 67 | 97 | 361 | 0.22 | 1.0 | 24.0 | 361 | 0.22 | Imp. |
| 88 | 1159.5 | 14.0 | 16 | 69 | 85 | 174 | 0.41 | 1.0 | 25.0 | 174 | 0.41 | Imp. |
| 89 | 1160.5 | 14.4 | 9 | 77 | 86 | 101 | 0.27 | 1.0 | 26.0 | 101 | 0.27 | Imp. |
| 90 | 1161.5 | 16.1 | 10 | 74 | 84 | 125 | 0.44 | 1.0 | 27.0 | 125 | 0.44 | 0.25 |
| 91 | 1162.6 | 14.5 | 17 | 69 | 86 | 191 | 0.18 | 1.0 | 28.0 | 191 | 0.18 | Imp. |
| 92 | 1163.6 | 14.2 | 11 | 73 | 84 | 121 | 0.25 | 1.0 | 29.0 | 121 | 0.25 | Imp. |
| 93 | 1164.5 | 12.9 | 16 | 77 | 93 | 160 | Imp. | 1.0 | 30.0 | 160 | 0.00 | Imp. |
| 94 | 1165.4 | 11.9 | 17 | 74 | 91 | 157 | Imp. | 1.0 | 31.0 | 157 | 0.00 | Imp. |
| 95 | 1166.4 | 12.2 | 14 | 78 | 92 | 133 | Imp. | 1.0 | 32.0 | 133 | 0.00 | Imp. |
| 96 | 1167.6 | 13.9 | 18 | 65 | 83 | 194 | Imp. | 1.0 | 33.0 | 194 | 0.00 | Imp. |
| 97 | 1168.4 | 10.8 | 18 | 76 | 94 | 151 | Imp. | 1.0 | 34.0 | 151 | 0.00 | Imp. |
| 98 | 1169.4 | 11.2 | 14 | 83 | 97 | 122 | Imp. | 0.7 | 34.7 | 85 | 0.00 | Imp. |

## Oilfield Research Laboratories

### SUMMARY OF PERMEABILITY & SATURATION TESTS

### TABLE III

Company Wells-Battelstein Oil & Gas, Inc. Lease Pearce Well No. 35

| Depth Interval, Feet | Feet of Core Analyzed | Average Permeability, Millidarcys | Permeability Capacity Ft. x Md. |
|---|---|---|---|
| | REDD SAND | | |
| 865.0 - 888.2 | 19.2 | 6.7 | 128.62 |
| 888.2 - 913.0 | 23.1 | 50.6 | 1168.04 |
| 913.0 - 927.6 | 13.9 | 74.2 | 1031.60 |
| 865.0 - 927.6 | 56.2 | 41.4 | 2328.26 |
| | WISER SAND | | |
| 1135.0 - 1169.7 | 25.0 | 0.75 | 18.87 |

| Depth Interval, Feet | Feet of Core Analyzed | Average Percent Porosity | Average Percent Oil Saturation | Average Percent Water Saturation | Average Oil Content Bbl./A. Ft. | Total Oil Content Bbls./Acre |
|---|---|---|---|---|---|---|
| | | | REDD SAND | | | |
| 865.0 - 888.2 | 23.2 | 16.1 | 17.4 | 71.5 | 222 | 5,151 |
| 888.2 - 913.0 | 23.8 | 19.7 | 25.9 | 53.3 | 397 | 9,451 |
| 913.0 - 927.6 | 14.6 | 18.5 | 8.2 | 67.9 | 116 | 1,688 |
| 865.0 - 927.6 | 61.6 | 18.1 | 18.5 | 63.6 | 264 | 16,290 |
| | | | WISER SAND | | | |
| 1135.0 - 1169.7 | 34.7 | 13.8 | 12.7 | 73.5 | 137 | 4,753 |

## Oilfield Research Laboratories

### RESULTS OF LABORATORY FLOODING TESTS

### TABLE IV

Company Wells-Battelstein Oil & Gas, Inc. Lease Pearce Well No. 35

| 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 | Bbls./A. Ft. | | | |
| | | | | | REDD | SAND | | | | | | |
| 1 | 865.5 | 14.5 | 3 | 34 | 0 | 0 | 3 | 84 | 34 | 0 | Imp. | - |
| 2 | 866.5 | 18.9 | 12 | 176 | 0 | 0 | 12 | 75 | 176 | 16 | 0.45 | 50 |
| 3 | 867.6 | 18.1 | 10 | 140 | 0 | 0 | 10 | 72 | 140 | 0 | Imp. | - |
| 4 | 868.5 | 18.5 | 13 | 187 | 0 | 0 | 13 | 67 | 187 | 0 | Imp. | - |
| 5 | 869.6 | 14.2 | 10 | 110 | 0 | 0 | 10 | 83 | 110 | 0 | Imp. | - |
| 6 | 870.5 | 6.8 | 16 | 84 | 0 | 0 | 16 | 81 | 84 | 0 | Imp. | - |
| 7 | 871.5 | 14.7 | 31 | 353 | 0 | 0 | 31 | 67 | 353 | 0 | Imp. | - |
| 8 | 872.5 | 16.5 | 18 | 230 | 0 | 0 | 18 | 71 | 230 | 0 | Imp. | - |
| 9 | 873.5 | 16.5 | 11 | 141 | 0 | 0 | 11 | 73 | 141 | 17 | 0.30 | 45 |
| 10 | 874.5 | 19.0 | 16 | 236 | 0 | 0 | 16 | 77 | 236 | 8 | 0.15 | 50 |
| 11 | 875.5 | 13.4 | 13 | 135 | 0 | 0 | 13 | 82 | 135 | 15 | 0.22 | 40 |
| 12 | 876.3 | 14.5 | 22 | 247 | 0 | 0 | 22 | 76 | 247 | 10 | 0.15 | 50 |
| 13 | 877.5 | 14.7 | 10 | 114 | 0 | 0 | 10 | 80 | 114 | 0 | Imp. | - |
| 14 | 878.5 | 16.2 | 11 | 138 | 0 | 0 | 11 | 72 | 138 | 0 | Imp. | - |
| 15 | 879.5 | 14.8 | 23 | 264 | 0 | 0 | 23 | 73 | 264 | 0 | Imp. | - |
| 16 | 880.6 | 16.6 | 24 | 309 | 0 | 0 | 24 | 74 | 309 | 0 | Imp. | - |
| 17 | 881.6 | 14.6 | 12 | 136 | 0 | 0 | 12 | 81 | 136 | 45 | 0.75 | 30 |
| 18 | 882.5 | 14.8 | 16 | 184 | 0 | 0 | 16 | 82 | 184 | 0 | Imp. | - |
| 19 | 883.5 | 19.2 | 36 | 536 | 0 | 0 | 36 | 51 | 536 | 51 | 1.05 | 25 |
| 20 | 884.5 | 20.1 | 42 | 655 | 0 | 0 | 42 | 52 | 655 | 79 | 1.65 | 30 |
| 21 | 885.3 | 17.1 | 22 | 292 | 0 | 0 | 22 | 68 | 292 | 24 | 0.37 | 30 |
| 22 | 885.6 | 15.3 | 26 | 309 | 0 | 0 | 26 | 70 | 309 | 0 | Imp. | - |
| 23 | 886.5 | 19.9 | 13 | 201 | 0 | 0 | 13 | 71 | 201 | 8 | 0.60 | 40 |
| 24 | 887.5 | 18.8 | 13 | 190 | 0 | 0 | 13 | 82 | 190 | 206 | 4.65 | 25 |

**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

## RESULTS OF LABORATORY FLOODING TESTS

### TABLE IV



Company Wells-Battelstein Oil & Gas, Inc. Lease Pearce Well No. 35

| 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 | Bbls./A. Ft. | | | |
| 25 | 888.5 | 24.0 | 10 | 186 | 0 | 0 | 10 | 78 | 186 | 207 | 3.60 | 25 |
| 26 | 889.4 | 21.0 | 31 | 505 | 2 | 33 | 29 | 56 | 472 | 98 | 1.80 | 25 |
| 27 | 890.5 | 21.5 | 38 | 634 | 5 | 83 | 33 | 54 | 551 | 39 | 0.90 | 30 |
| 28 | 891.5 | 22.9 | 23 | 409 | 0 | 0 | 23 | 65 | 409 | 159 | 3.30 | 25 |
| 29 | 892.5 | 20.1 | 31 | 483 | 2 | 31 | 29 | 60 | 452 | 158 | 4.20 | 25 |
| 30 | 893.5 | 20.6 | 31 | 495 | 2 | 32 | 29 | 58 | 463 | 73 | 1.20 | 25 |
| 31 | 894.6 | 20.7 | 44 | 707 | 7 | 112 | 37 | 58 | 595 | 307 | 7.87 | 20 |
| 32 | 895.5 | 20.4 | 22 | 348 | 0 | 0 | 22 | 66 | 348 | 346 | 8.40 | 20 |
| 33 | 896.5 | 13.1 | 19 | 193 | 0 | 0 | 19 | 76 | 193 | 0 | Imp. | - |
| 34 | 897.6 | 8.4 | 28 | 182 | 0 | 0 | 28 | 59 | 182 | 0 | Imp. | - |
| 35 | 898.5 | 19.7 | 14 | 214 | 0 | 0 | 14 | 71 | 214 | 45 | 0.75 | 35 |
| 36 | 899.5 | 20.8 | 23 | 371 | 0 | 0 | 23 | 64 | 371 | 60 | 1.25 | 35 |
| 37 | 900.5 | 19.4 | 32 | 482 | 3 | 45 | 29 | 68 | 437 | 303 | 6.60 | 20 |
| 38 | 901.5 | 23.0 | 26 | 464 | 0 | 0 | 26 | 63 | 464 | 108 | 2.25 | 20 |
| 39 | 902.5 | 19.9 | 23 | 355 | 0 | 0 | 23 | 66 | 355 | 288 | 5.40 | 20 |
| 40 | 903.5 | 20.3 | 24 | 378 | 0 | 0 | 24 | 63 | 378 | 308 | 6.15 | 20 |
| 41 | 904.4 | 20.4 | 21 | 332 | 0 | 0 | 21 | 63 | 332 | 120 | 2.40 | 25 |
| 42 | 905.5 | 16.0 | 36 | 447 | 6 | 74 | 30 | 64 | 373 | 178 | 3.90 | 25 |
| 43 | 907.6 | 20.0 | 26 | 403 | 0 | 0 | 26 | 67 | 403 | 136 | 2.10 | 20 |
| 44 | 908.5 | 20.7 | 15 | 241 | 0 | 0 | 15 | 74 | 241 | 84 | 1.80 | 30 |
| 45 | 909.6 | 19.8 | 6 | 92 | 0 | 0 | 6 | 78 | 92 | 51 | 0.90 | 30 |
| 46 | 910.5 | 17.8 | 17 | 235 | 0 | 0 | 17 | 65 | 235 | 61 | 0.75 | 25 |
| 47 | 911.6 | 23.0 | 48 | 856 | 10 | 178 | 38 | 52 | 678 | 140 | 2.10 | 30 |
| 48 | 912.5 | 20.3 | 27 | 425 | 0 | 0 | 27 | 58 | 425 | 400 | 7.20 | 20 |

**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

## RESULTS OF LABORATORY FLOODING TESTS

### TABLE IV

Company Wells-Battelstein Oil & Gas, Inc. Lease Pearce Well No. 35

| 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 | Bbls./A. Ft. | | | |
| 49 | 913.5 | 12.9 | 15 | 150 | 0 | 0 | 15 | 61 | 150 | 0 | Imp. | - |
| 50 | 914.5 | 4.3 | 12 | 40 | 0 | 0 | 12 | 70 | 40 | 0 | Imp. | - |
| 51 | 915.4 | 18.5 | 3 | 43 | 0 | 0 | 3 | 80 | 43 | 154 | 1.65 | 20 |
| 52 | 916.5 | 22.6 | 17 | 298 | 0 | 0 | 17 | 65 | 298 | 273 | 7.65 | 15 |
| 53 | 917.5 | 21.8 | 1 | 17 | 0 | 0 | 1 | 88 | 17 | 281 | 22.49 | 15 |
| 54 | 918.5 | 20.7 | 17 | 273 | 0 | 0 | 17 | 63 | 273 | 79 | 1.20 | 25 |
| 55 | 919.6 | 21.5 | 5 | 83 | 0 | 0 | 5 | 82 | 83 | 541 | 10.05 | 10 |
| 56 | 920.5 | 20.9 | 10 | 162 | 0 | 0 | 10 | 80 | 162 | 507 | 10.80 | 10 |
| 57 | 921.6 | 17.7 | 7 | 96 | 0 | 0 | 7 | 90 | 96 | 229 | 3.75 | 10 |
| 58 | 922.5 | 18.7 | 3 | 44 | 0 | 0 | 3 | 92 | 44 | 435 | 7.80 | 15 |
| 59 | 923.6 | 19.7 | 15 | 229 | 0 | 0 | 15 | 75 | 229 | 244 | 19.49 | 10 |
| 60 | 924.4 | 20.2 | 9 | 141 | 0 | 0 | 9 | 88 | 141 | 222 | 12.74 | 10 |
| 61 | 925.5 | 17.0 | 4 | 53 | 0 | 0 | 4 | 84 | 53 | 196 | 23.24 | 10 |
| 62 | 926.5 | 19.1 | 2 | 30 | 0 | 0 | 2 | 91 | 30 | 270 | 12.99 | 10 |
| 63 | 927.3 | 18.4 | 4 | 57 | 0 | 0 | 4 | 78 | 57 | 207 | 2.40 | 15 |
| | | | | | WISER SAND | | | | | | | |
| 64 | 1135.5 | 14.8 | 10 | 115 | 0 | 0 | 10 | 56 | 115 | 0 | Imp. | - |
| 65 | 1136.5 | 13.7 | 4 | 43 | 0 | 0 | 4 | 76 | 43 | 0 | Imp. | - |
| 66 | 1137.5 | 13.2 | 2 | 20 | 0 | 0 | 2 | 90 | 20 | 0 | Imp. | - |
| 67 | 1138.6 | 13.0 | 13 | 131 | 0 | 0 | 13 | 80 | 131 | 11 | 0.15 | 30 |
| 68 | 1139.4 | 12.6 | 17 | 166 | 0 | 0 | 17 | 71 | 166 | 9 | 0.15 | 45 |
| 69 | 1140.5 | 11.5 | 1 | 9 | 0 | 0 | 1 | 84 | 9 | 0 | Imp. | - |
| 70 | 1141.5 | 16.1 | 1 | 12 | 0 | 0 | 1 | 69 | 12 | 0 | Imp. | - |
| 71 | 1142.6 | 14.2 | 3 | 33 | 0 | 0 | 3 | 63 | 33 | 0 | Imp. | - |
| 72 | 1143.5 | 13.3 | 3 | 31 | 0 | 0 | 3 | 75 | 31 | 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.

# Oilfield Research Laboratories

## RESULTS OF LABORATORY FLOODING TESTS

## TABLE IV

Company Wells-Battelstein Oil & Gas, Inc. Lease Pearce Well No. 35

| 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 | Bbls./A. Ft. | | | |
| 73 | 1144.5 | 12.3 | 1 | 10 | 0 | 0 | 1 | 88 | 10 | 0 | Imp. | - |
| 74 | 1145.6 | 12.8 | 3 | 30 | 0 | 0 | 3 | 85 | 30 | 0 | Imp. | - |
| 75 | 1146.5 | 15.7 | 8 | 97 | 0 | 0 | 8 | 77 | 97 | 0 | Imp. | - |
| 76 | 1147.5 | 15.2 | 16 | 189 | 0 | 0 | 16 | 76 | 189 | 7 | 0.15 | 50 |
| 77 | 1148.5 | 14.2 | 16 | 176 | 0 | 0 | 16 | 81 | 176 | 0 | Imp. | - |
| 78 | 1149.5 | 14.3 | 5 | 55 | 0 | 0 | 5 | 78 | 55 | 0 | Imp. | - |
| 79 | 1150.6 | 14.4 | 38 | 425 | 0 | 0 | 38 | 59 | 425 | 0 | Imp. | - |
| 80 | 1151.5 | 14.0 | 13 | 141 | 0 | 0 | 13 | 78 | 141 | 0 | Imp. | - |
| 81 | 1152.5 | 15.2 | 11 | 130 | 0 | 0 | 11 | 74 | 130 | 0 | Imp. | - |
| 82 | 1153.5 | 12.2 | 14 | 133 | 0 | 0 | 14 | 77 | 133 | 0 | Imp. | - |
| 83 | 1154.5 | 14.9 | 18 | 208 | 0 | 0 | 18 | 71 | 208 | 0 | Imp. | - |
| 84 | 1155.6 | 14.5 | 21 | 236 | 0 | 0 | 21 | 72 | 236 | 0 | Imp. | - |
| 85 | 1156.5 | 14.9 | 18 | 208 | 0 | 0 | 18 | 75 | 208 | 0 | Imp. | - |
| 86 | 1157.6 | 15.6 | 16 | 194 | 0 | 0 | 16 | 73 | 194 | 0 | Imp. | - |
| 87 | 1158.5 | 15.4 | 30 | 358 | 0 | 0 | 30 | 68 | 358 | 0 | Imp. | - |
| 88 | 1159.5 | 14.1 | 16 | 175 | 0 | 0 | 16 | 70 | 175 | 0 | Imp. | - |
| 89 | 1160.5 | 14.5 | 9 | 101 | 0 | 0 | 9 | 78 | 101 | 0 | Imp. | - |
| 90 | 1161.5 | 16.2 | 10 | 126 | 0 | 0 | 10 | 75 | 126 | 0 | Imp. | - |
| 91 | 1162.6 | 14.6 | 17 | 193 | 0 | 0 | 17 | 70 | 193 | 0 | Imp. | - |
| 92 | 1163.6 | 14.3 | 11 | 122 | 0 | 0 | 11 | 75 | 122 | 0 | Imp. | - |
| 93 | 1164.5 | 13.4 | 15 | 156 | 0 | 0 | 15 | 79 | 156 | 0 | Imp. | - |
| 94 | 1165.4 | 12.0 | 17 | 158 | 0 | 0 | 17 | 75 | 158 | 0 | Imp. | - |
| 95 | 1166.4 | 12.1 | 14 | 131 | 0 | 0 | 14 | 79 | 131 | 0 | Imp. | - |
| 96 | 1167.6 | 13.8 | 18 | 193 | 0 | 0 | 18 | 67 | 193 | 0 | Imp. | - |
| 97 | 1168.4 | 10.7 | 18 | 149 | 0 | 0 | 18 | 77 | 149 | 0 | Imp. | - |
| 98 | 1169.4 | 11.1 | 14 | 121 | 0 | 0 | 14 | 84 | 121 | 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.

## Oilfield Research Laboratories

### SUMMARY OF LABORATORY FLOODING TESTS

### TABLE V

Company Wells-Battelstein Oil & Gas, Inc. Lease Pearce Well No. 35

| | REDD SAND |
|---|---|
| Depth Interval, Feet | 888.2 - 913.0 |
| Feet of Core Analyzed | 8.3 |
| Average Percent Porosity | 20.3 |
| Average Percent Original Oil Saturation | 36.3 |
| Average Percent Oil Recovery | 4.6 |
| Average Percent Residual Oil Saturation | 31.7 |
| Average Percent Residual Water Saturation | 59.1 |
| Average Percent Total Residual Fluid Saturation | 90.8 |
| Average Original Oil Content, Bbls./A. Ft. | 573. |
| Average Oil Recovery, Bbls./A. Ft. | 73. |
| Average Residual Oil Content, Bbls./A. Ft. | 500. |
| Total Original Oil Content, Bbls./Acre | 4,754. |
| Total Oil Recovery, Bbls./Acre | 602. |
| Total Residual Oil Content, Bbls./Acre | 4,152. |
| Average Effective Permeability, Millidarcys | 3.68 |
| Average Initial Fluid Production Pressure, p.s.i. | 25.0 |

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