

## T.30 Rge. 21E Sec. 34

Unifield Research Laboratories

## RESULTS OF SATURATION &amp; PERMEABILITY TESTS

TABLE 1-B

Company Missouri Lead & Zinc Company Lease Johnson Gray Well No. 4*Perforated 173.5 to 180.5*

| 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 m.d. |
|------------|-------------|----------------------------|--------------------|-------|-------|---------------------------|--------------|--------------|----------|-------------------|---------------------------|
|            |             |                            | Oil                | Water | Total |                           |              | Ft.          | Cum. Ft. |                   |                           |
| 1          | 173.5       | 23.8                       | 71                 | 11    | 82    | 1,314                     | 324.         | 0.9          | 0.9      | 1,182             | 291.60                    |
| 2          | 174.5       | 19.8                       | 70                 | 24    | 94    | 1,078                     | 407.         | 1.0          | 1.9      | 1,078             | 407.00                    |
| 3          | 175.5       | 20.6                       | 59                 | 22    | 81    | 945                       | 212.         | 1.0          | 2.9      | 945               | 212.00                    |
| 4          | 176.5       | 26.8                       | 64                 | 11    | 75    | 1,334                     | 187.         | 1.0          | 3.9      | 1,334             | 187.00                    |
| 5          | 177.5       | 27.0                       | 68                 | 9     | 77    | 1,428                     | 116.         | 1.0          | 4.9      | 1,428             | 116.00                    |
| 6          | 178.5       | 26.8                       | 63                 | 11    | 74    | 1,313                     | 415.         | 1.0          | 5.9      | 1,313             | 415.00                    |
| 7          | 179.5       | 27.1                       | 64                 | 8     | 72    | 1,349                     | 220.         | 1.0          | 6.9      | 1,349             | 220.00                    |
| 8          | 180.5       | 28.3                       | 62                 | 9     | 71    | 1,364                     | 471.         | 1.0          | 7.9      | 1,364             | 471.00                    |
| 9          | 181.5       | 25.9                       | 64                 | 11    | 75    | 1,289                     | 203.         | 1.0          | 8.9      | 1,289             | 203.00                    |
| 10         | 182.5       | 25.1                       | 55                 | 17    | 72    | 1,073                     | 434.         | 1.0          | 9.9      | 1,073             | 434.00                    |
| 11         | 183.5       | 22.1                       | 43                 | 26    | 69    | 739                       | 118.         | 0.8          | 10.7     | 591               | 94.40                     |
| 12         | 184.5       | 18.1                       | 52                 | 41    | 93    | 732                       | 60.          | 1.5          | 12.2     | 1,098             | 90.00                     |
| 13         | 185.5       | 15.8                       | 39                 | 57    | 96    | 478                       | 70.          | 0.5          | 12.7     | 239               | 35.00                     |
| F-14       | 186.4       | 16.9                       | 40                 | -     | -     | 525                       | -            | 0.3          | 13.0     | 157               | -                         |
| 14         | 186.6       | 21.2                       | 46                 | 31    | 77    | 758                       | 147.         | 0.5          | 13.5     | 379               | 73.00                     |
| 15         | 187.5       | 24.1                       | 51                 | 24    | 75    | 956                       | 184.         | 1.0          | 14.5     | 956               | 184.00                    |
| 16         | 188.5       | 23.5                       | 46                 | 20    | 66    | 841                       | 110.         | 1.0          | 15.5     | 841               | 110.00                    |
| 17         | 189.5       | 26.3                       | 42                 | 35    | 77    | 859                       | 266.         | 1.0          | 16.5     | 859               | 266.00                    |
| 18         | 190.5       | 25.7                       | 38                 | 37    | 75    | 759                       | 225.         | 1.0          | 17.5     | 759               | 225.00                    |
| 19         | 191.5       | 25.0                       | 40                 | 41    | 81    | 778                       | 241.         | 1.0          | 18.5     | 778               | 241.00                    |
| 20         | 192.5       | 18.7                       | 46                 | 40    | 86    | 669                       | 63.          | 1.0          | 19.5     | 669               | 63.00                     |
| 21         | 193.5       | 19.5                       | 49                 | 36    | 85    | 743                       | 47.          | 1.0          | 20.5     | 743               | 47.00                     |
| 22         | 194.5       | 24.3                       | 47                 | 33    | 80    | 888                       | 203.         | 1.0          | 21.5     | 888               | 203.00                    |
| 23         | 195.5       | 23.6                       | 41                 | 36    | 77    | 752                       | 115.         | 1.0          | 22.5     | 752               | 115.00                    |
| 24         | 196.5       | 21.5                       | 46                 | 35    | 81    | 769                       | 172.         | 0.8          | 23.3     | 615               | 137.60                    |
| 25         | 197.5       | 22.2                       | 40                 | 37    | 77    | 688                       | 60.          | 1.2          | 24.5     | 826               | 72.00                     |

# RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Missouri Lead & Zinc Company Lease Johnson Gray 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 | Bbls./A. Ft. |                               |                                      |                                                |
| 1          | 173.5       | 25.5                       | 71                      | 1405         | 40 <sup>56.4</sup> | 792          | 31                  | 62      | 613          | 496                           | 82.97                                | 5                                              |
| 2          | 174.5       | 21.2                       | 70                      | 1152         | 33 <sup>47.1</sup> | 543          | 37                  | 60      | 609          | 147                           | 19.70                                | 5                                              |
| 3          | 175.5       | 21.0                       | 59                      | 961          | 27 <sup>45.8</sup> | 440          | 32                  | 64      | 521          | 308                           | 25.32                                | 10                                             |
| 4          | 176.5       | 25.1                       | 64                      | 1247         | 33 <sup>51.6</sup> | 643          | 31                  | 63      | 604          | 163                           | 25.30                                | 5                                              |
| 5          | 177.5       | 26.4                       | 68                      | 1393         | 37 <sup>54.4</sup> | 758          | 31                  | 63      | 635          | 397                           | 46.38                                | 5                                              |
| 6          | 178.5       | 26.6                       | 63                      | 1300         | 30 <sup>47.6</sup> | 619          | 32                  | 64      | 681          | 582                           | 82.47                                | 5                                              |
| 7          | 179.5       | 26.4                       | 64                      | 1311         | 31 <sup>48.4</sup> | 635          | 33                  | 63      | 676          | 425                           | 45.72                                | 5                                              |
| 8          | 180.5       | 26.8                       | 62                      | 1289         | 32 <sup>51.6</sup> | 665          | 30                  | 67      | 624          | 250                           | 22.49                                | 5                                              |
| 9          | 181.5       | 26.1                       | 64                      | 1296         | 30 <sup>54</sup>   | 607          | 34                  | 60      | 689          | 257                           | 26.62                                | 5                                              |
| 10         | 182.5       | 24.8                       | 55                      | 1059         | 27 <sup>48</sup>   | 520          | 28                  | 63      | 539          | 353                           | 22.02                                | 10                                             |
| 11         | 183.5       | 24.1                       | 43                      | 804          | 14 <sup>32.6</sup> | 262          | 29                  | 67      | 542          | 598                           | 44.89                                | 10                                             |
| 12         | 184.5       | 19.9                       | 52                      | 803          | 20                 | 309          | 32                  | 64      | 494          | 172                           | 8.81                                 | 20                                             |
| 13         | 185.5       | 17.9                       | 39                      | 542          | 4                  | 56           | 35                  | 60      | 486          | 125                           | 5.83                                 | 20                                             |
| 14         | 186.4       | 16.9                       | 40                      | 525          | 6                  | 79           | 34                  | 62      | 446          | 16                            | 0.61                                 | 30                                             |
| 15         | 187.5       | 23.5                       | 51                      | 930          | 15                 | 274          | 36                  | 61      | 656          | 200                           | 19.93                                | 10                                             |
| 16         | 188.5       | 22.3                       | 46                      | 796          | 9                  | 156          | 37                  | 57      | 640          | 228                           | 16.96                                | 10                                             |
| 17         | 189.5       | 24.7                       | 42                      | 805          | 11                 | 211          | 31                  | 65      | 594          | 304                           | 18.59                                | 10                                             |
| 18         | 190.5       | 25.7                       | 38                      | 758          | 7                  | 140          | 31                  | 63      | 618          | 237                           | 24.99                                | 5                                              |
| 19         | 191.5       | 25.8                       | 40                      | 801          | 7                  | 140          | 33                  | 58      | 661          | 198                           | 28.11                                | 5                                              |
| 20         | 192.5       | 16.9                       | 46                      | 603          | 0                  | 0            | 46                  | 44      | 603          | 0                             | Imp.                                 | -                                              |
| 21         | 193.5       | 19.1                       | 49                      | 726          | 0                  | 0            | 49                  | 48      | 726          | 12                            | 0.42                                 | 30                                             |
| 22         | 194.5       | 24.7                       | 47                      | 901          | 5                  | 96           | 42                  | 53      | 805          | 220                           | 12.49                                | 10                                             |
| 23         | 195.5       | 24.9                       | 41                      | 793          | 5                  | 97           | 36                  | 64      | 696          | 314                           | 13.33                                | 15                                             |
| 24         | 196.5       | 22.8                       | 46                      | 814          | 4                  | 71           | 42                  | 55      | 743          | 193                           | 16.66                                | 10                                             |
| 25         | 197.5       | 23.4                       | 40                      | 727          | 4                  | 73           | 36                  | 55      | 654          | 74                            | 3.08                                 | 20                                             |
| 26         | 198.5       | 19.6                       | 39                      | 593          | 5                  | 76           | 34                  | 59      | 517          | 23                            | 0.75                                 | 25                                             |
| 27         | 199.5       | 20.2                       | 38                      | 596          | 3                  | 47           | 35                  | 62      | 549          | 102                           | 3.75                                 | 15                                             |
| 28         | 200.5       | 22.0                       | 35                      | 597          | 3                  | 51           | 32                  | 67      | 546          | 312                           | 24.29                                | 10                                             |
| 29         | 201.5       | 18.7                       | 34                      | 493          | 0                  | 0            | 34                  | 52      | 493          | 9                             | 0.25                                 | 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.

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# RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Missouri Lead & Zinc Company Lease Johnson Gray 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 | Bbls./A. Ft. |                               |                                      |                                                |
| 30         | 202.5       | 19.3                       | 29                      | 434          | 0            | 0            | 29                  | 68      | 434          | 32                            | 1.33                                 | 20                                             |
| 31         | 203.5       | 22.2                       | 35                      | 603          | 0            | 0            | 35                  | 60      | 603          | 196                           | 12.49                                | 15                                             |
| 32         | 204.5       | 18.0                       | 40                      | 559          | 0            | 0            | 40                  | 55      | 559          | 7                             | 0.25                                 | 40                                             |
| 33         | 205.5       | 20.5                       | 35                      | 557          | 0            | 0            | 35                  | 60      | 557          | 184                           | 6.66                                 | 15                                             |
| 34         | 206.5       | 19.2                       | 36                      | 536          | 0            | 0            | 36                  | 58      | 536          | 28                            | 1.00                                 | 25                                             |
| 35         | 207.5       | 20.5                       | 30                      | 477          | 0            | 0            | 30                  | 67      | 477          | 235                           | 12.49                                | 15                                             |
| 36         | 208.5       | 19.8                       | 35                      | 538          | 0            | 0            | 35                  | 63      | 538          | 326                           | 14.05                                | 10                                             |
| 37         | 209.5       | 22.0                       | 27                      | 461          | 0            | 0            | 27                  | 73      | 461          | 237                           | 19.99                                | 5                                              |
| 38         | 210.5       | 21.4                       | 28                      | 465          | 0            | 0            | 28                  | 70      | 465          | 340                           | 20.82                                | 5                                              |
| 39         | 211.5       | 20.9                       | 28                      | 454          | 0            | 0            | 28                  | 70      | 454          | 361                           | 21.51                                | 5                                              |

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 SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Missouri Lead & Zinc Company Lease ~~Johnson~~ Gray Well No. 4

| Sample No. | Leptb, 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. |                   |                          |
| 26         | 198.5       | 20.0                       | 39                 | 38    | 77    | 604                       | 38.          | 1.0          | 25.5     | 604               | 38.00                    |
| 27         | 199.5       | 18.8                       | 38                 | 41    | 79    | 553                       | 20.          | 1.0          | 26.5     | 553               | 20.00                    |
| 28         | 200.5       | 21.1                       | 35                 | 52    | 87    | 572                       | 153.         | 1.0          | 27.5     | 572               | 153.00                   |
| 29         | 201.5       | 17.8                       | 31                 | 40    | 71    | 427                       | 70.          | 1.0          | 28.5     | 427               | 70.00                    |
| 30         | 202.5       | 19.5                       | 31                 | 32    | 63    | 469                       | 22.          | 1.0          | 29.5     | 469               | 22.00                    |
| 31         | 203.5       | 21.9                       | 31                 | 44    | 75    | 526                       | 112.         | 1.0          | 30.5     | 526               | 112.00                   |
| 32         | 204.5       | 18.8                       | 38                 | 44    | 82    | 553                       | 19.          | 1.0          | 31.5     | 553               | 19.00                    |
| 33         | 205.5       | 18.8                       | 37                 | 47    | 84    | 538                       | 54.          | 1.0          | 32.5     | 538               | 54.00                    |
| 34         | 206.5       | 19.3                       | 37                 | 44    | 81    | 554                       | 44.          | 1.0          | 33.5     | 554               | 44.00                    |
| 35         | 207.5       | 21.2                       | 30                 | 43    | 73    | 493                       | 69.          | 1.0          | 34.5     | 493               | 69.00                    |
| 36         | 208.5       | 17.9                       | 37                 | 50    | 87    | 514                       | 60.          | 1.0          | 35.5     | 514               | 60.00                    |
| 37         | 209.5       | 20.8                       | 31                 | 54    | 85    | 502                       | 64.          | 1.2          | 36.7     | 602               | 76.80                    |
| 38         | 210.5       | 21.0                       | 28                 | 61    | 89    | 456                       | 133.         | 0.8          | 37.5     | 365               | 106.40                   |
| 39         | 211.5       | 21.1                       | 26                 | 58    | 84    | 425                       | 110.         | 1.0          | 38.5     | 425               | 110.00                   |