



# OILFIELD RESEARCH LABORATORIES

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

December 16, 1980

Mid-States Petroleum Corporation  
P. O. Box 402  
Paola, Kansas 66071

Gentlemen:

Enclosed herewith are the results of tests run on the rotary cores taken from the Paulsen Lease, Well No. 3, and located in Miami County, Kansas.

The cores were sampled and sealed in plastic by a representative of the client and submitted to our laboratory on November 25, 1980.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/kas

5 c to Paola, Kansas

# Oilfield Research Laboratories

## GENERAL INFORMATION & SUMMARY

Company Mid-States Petroleum Corp. Lease Paulsen Well No. 3

Location -

Section 31 Twp. 16S Rge. 24E County Miami State Kansas

|  |       |           |
|--|-------|-----------|
| Elevation, Feet . . . . .              | -     |           |
| Name of Sand . . . . .                 | Peru  | Cattleman |
| Top of Core . . . . .                  | 307.0 | 580.0     |
| Bottom of Core . . . . .               | 344.5 | 600.5     |
| Top of Sand . . . . .                  | 307.0 | 580.0     |
| Bottom of Sand . . . . .               | 344.5 | 600.5     |
| Total Feet of Permeable Sand . . . . . | 27.9  | 18.2      |

**Distribution of Permeable Sand:  
Permeability Range  
Millidarcys**

|             | Feet                  | Cum. Ft. |
|-------------|-----------------------|----------|
|             | <u>PERU SAND</u>      |          |
| 0 - 50      | 5.9                   | 5.9      |
| 50 - 100    | 2.0                   | 7.9      |
| 100 - 200   | 8.1                   | 16.0     |
| 200 - 400   | 4.5                   | 20.5     |
| 400 - 800   | 4.0                   | 24.5     |
| 890 & Above | 3.4                   | 27.9     |
|             | <u>CATTLEMAN SAND</u> |          |
| 0 - 50      | 3.6                   | 3.6      |
| 50 - 100    | 11.6                  | 15.2     |
| 200 - 400   | 3.0                   | 18.2     |

|  |        |         |
|--|--------|---------|
| Average Permeability Millidarcys . . . . . | 307.2  | 103.0   |
| Average Percent Porosity . . . . .         | 20.6   | 21.4    |
| Average Percent Oil Saturation . . . . .   | 20.8   | 53.8    |
| Average Percent Water Saturation . . . . . | 43.6   | 26.8    |
| Average Oil Content, Bbls./A. Ft. . . . .  | 312.   | 931.    |
| Total Oil Content, Bbls./Acre . . . . .    | 8,710. | 19,076. |

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LOGName Mid-States Petroleum Corporation Lease Paulsen Well No. 3

| <u>Depth Interval,</u><br><u>Feet</u> | <u>Description</u>  |
|---------------------------------------|---|
|                                       | <u>PERU SAND</u>  |
| 307.0 - 316.0                         | Grayish light brown calcareous sandstone.                         |
| 316.0 - 316.7                         | Hard gray limestone.  |
| 316.7 - 319.2                         | Grayish light brown calcareous sandstone.                         |
| 319.2 - 320.9                         | Hard gray limestone.  |
| 320.9 - 321.7                         | Light brown shaly calcareous sandstone.                           |
| 321.7 - 324.0                         | Grayish light brown calcareous sandstone.                         |
| 324.0 - 325.4                         | Hard gray limestone.  |
| 325.4 - 326.3                         | Light brown and gray laminated calcareous sandstone<br>and shale. |
| 326.3 - 334.9                         | Grayish light brown calcareous sandstone.                         |
| 334.9 - 335.9                         | Hard gray limestone.  |
| 335.9 - 338.3                         | Brown calcareous sandstone.                                       |
| 338.3 - 339.6                         | Hard gray limestone.  |
| 339.6 - 340.2                         | Light brown very calcareous sandstone.                            |
| 340.2 - 343.7                         | Hard gray fossiliferous limestone.                                |
| 343.7 - 344.5                         | Light brown calcareous sandstone.                                 |

CATTLEMAN SAND

|               |  |
|---------------|--|
| 580.0 - 580.9 | Brown sandstone.                                   |
| 580.9 - 581.6 | Brown shaly sandstone.                             |
| 581.6 - 583.7 | Brown sandstone.                                   |
| 583.7 - 585.3 | Brown and gray laminated sandstone and shale.      |
| 585.3 - 596.2 | Dark brown sandstone.                              |
| 596.2 - 600.5 | Dark brown and gray laminated sandstone and shale. |

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Mid-States Petroleum Corp. Lease Paulsen Well No. 3

| 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          | 307.5       | 27.3                       | 4                  | 71    | 75    | <u>PERU SAND</u><br>65    | 110.         | 1.0          | 1.0      | 85                | 110.00                   |
| 2          | 308.5       | 18.6                       | 18                 | 39    | 57    | 260                       | 23.          | 1.0          | 2.0      | 260               | 23.00                    |
| 3          | 309.5       | 27.5                       | 6                  | 60    | 66    | 128                       | 314.         | 1.0          | 3.0      | 128               | 314.00                   |
| 4          | 310.5       | 22.1                       | 10                 | 57    | 67    | 172                       | 23.          | 1.0          | 4.0      | 172               | 23.00                    |
| 5          | 311.5       | 25.8                       | 4                  | 70    | 74    | 80                        | 384.         | 1.0          | 5.0      | 80                | 384.00                   |
| 6          | 312.5       | 23.0                       | 19                 | 53    | 72    | 339                       | 196.         | 1.0          | 6.0      | 339               | 196.00                   |
| 7          | 313.5       | 27.2                       | 4                  | 76    | 80    | 84                        | 399.         | 1.0          | 7.0      | 84                | 399.00                   |
| 8          | 314.5       | 26.1                       | 21                 | 53    | 74    | 425                       | 509.         | 1.0          | 8.0      | 425               | 509.00                   |
| 9          | 315.6       | 17.1                       | 32                 | 44    | 76    | 425                       | 30.          | 1.0          | 9.0      | 425               | 30.00                    |
| 10         | 317.5       | 18.1                       | 11                 | 47    | 58    | 155                       | 78.          | 1.0          | 10.0     | 155               | 78.00                    |
| 11         | 318.6       | 19.7                       | 6                  | 43    | 49    | 92                        | 296.         | 1.5          | 11.5     | 138               | 444.00                   |
| 12         | 321.5       | 16.8                       | 12                 | 35    | 47    | 156                       | 0.87         | 0.8          | 12.3     | 125               | 0.70                     |
| 13         | 322.3       | 15.1                       | 29                 | 31    | 60    | 340                       | 195.         | 1.0          | 13.3     | 340               | 195.00                   |
| 14         | 323.7       | 22.6                       | 15                 | 48    | 63    | 263                       | 199.         | 1.3          | 14.6     | 342               | 258.70                   |
| 15         | 325.7       | 16.6                       | 26                 | 33    | 59    | 335                       | 8.2          | 0.9          | 15.5     | 302               | 7.38                     |
| 16         | 326.5       | 18.9                       | 18                 | 36    | 54    | 264                       | 108.         | 1.0          | 16.5     | 264               | 108.00                   |
| 17         | 327.5       | 19.0                       | 11                 | 51    | 62    | 162                       | 10.          | 0.6          | 17.1     | 97                | 6.00                     |
| 18         | 328.3       | 13.6                       | 1                  | 78    | 79    | 11                        | 133.         | 1.0          | 18.1     | 11                | 133.00                   |
| 19         | 329.5       | 21.1                       | 19                 | 12    | 31    | 311                       | 137.         | 1.0          | 19.1     | 311               | 137.00                   |
| 20         | 330.5       | 22.7                       | 18                 | 20    | 38    | 317                       | 1019.        | 1.0          | 20.1     | 317               | 1019.00                  |
| 21         | 331.5       | 21.8                       | 22                 | 31    | 53    | 372                       | 419.         | 1.0          | 21.1     | 372               | 419.00                   |
| 22         | 332.5       | 23.1                       | 29                 | 27    | 56    | 520                       | 1132.        | 1.0          | 22.1     | 520               | 1132.00                  |
| 23         | 333.5       | 19.3                       | 35                 | 27    | 62    | 524                       | 556.         | 1.0          | 23.1     | 524               | 556.00                   |
| 24         | 334.5       | 16.4                       | 59                 | 32    | 91    | 751                       | 74.          | 1.0          | 24.1     | 751               | 74.00                    |
| 25         | 336.5       | 16.2                       | 55                 | 38    | 93    | 691                       | 664.         | 1.0          | 25.1     | 691               | 664.00                   |
| 26         | 337.5       | 22.7                       | 47                 | 23    | 70    | 828                       | 899.         | 1.4          | 26.5     | 1159              | 1258.60                  |
| 27         | 339.8       | 10.5                       | 49                 | 28    | 77    | 399                       | 3.5          | 0.6          | 27.1     | 239               | 2.10                     |
| 28         | 344.2       | 22.0                       | 4                  | 64    | 68    | 68                        | 113.         | 0.8          | 27.9     | 54                | 90.40                    |

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Mid-States Petroleum Corp.

Lease Paulsen

Well No. 3

| 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. |                   |                          |
| 29         | 580.5       | 20.0                       | 51                 | 24    | 75    | CATTLEMAN SAND            | 0.9          | 0.9          | 712      | 68.40             |                          |
| 30         | 581.5       | 11.5                       | 6                  | 90    | 96    | 76.                       | 0.7          | 1.6          | 38       | 0.00              |                          |
| 31         | 582.5       | 22.7                       | 61                 | 14    | 75    | Imp.                      | 1.1          | 2.7          | 1181     | 46.20             |                          |
| 32         | 583.5       | 24.2                       | 62                 | 15    | 77    | 42.                       | 1.0          | 3.7          | 1164     | 87.00             |                          |
| 33         | 584.5       | 14.1                       | 31                 | 64    | 95    | Imp.                      | 1.6          | 5.3          | 542      | 0.00              |                          |
| 34         | 585.5       | 14.9                       | 28                 | 67    | 95    | 38.                       | 1.0          | 6.3          | 324      | 38.00             |                          |
| 35         | 586.5       | 23.1                       | 64                 | 19    | 83    | 96.                       | 1.0          | 7.3          | 1147     | 96.00             |                          |
| 36         | 587.6       | 22.6                       | 64                 | 15    | 79    | 58.                       | 1.0          | 8.3          | 1122     | 58.00             |                          |
| 37         | 588.4       | 24.6                       | 63                 | 16    | 79    | 236.                      | 1.0          | 9.3          | 1202     | 236.00            |                          |
| 38         | 589.5       | 25.5                       | 64                 | 18    | 82    | 371.                      | 1.0          | 10.3         | 1266     | 371.00            |                          |
| 39         | 590.5       | 27.1                       | 61                 | 11    | 72    | 280.                      | 1.0          | 11.3         | 1283     | 280.00            |                          |
| 40         | 591.5       | 23.6                       | 52                 | 15    | 67    | 80.                       | 1.0          | 12.3         | 952      | 80.00             |                          |
| 41         | 592.5       | 23.4                       | 65                 | 15    | 80    | 90.                       | 1.0          | 13.3         | 1180     | 90.00             |                          |
| 42         | 593.5       | 22.6                       | 61                 | 21    | 82    | 82.                       | 1.0          | 14.3         | 1070     | 82.00             |                          |
| 43         | 594.5       | 23.9                       | 61                 | 18    | 79    | 67.                       | 1.0          | 15.3         | 1131     | 67.00             |                          |
| 44         | 595.5       | 21.2                       | 60                 | 25    | 85    | 68.                       | 0.9          | 16.2         | 888      | 61.20             |                          |
| 45         | 596.5       | 23.0                       | 54                 | 19    | 73    | 44.                       | 1.0          | 17.2         | 964      | 44.00             |                          |
| 46         | 597.5       | 17.6                       | 60                 | 26    | 86    | 50.                       | 1.0          | 18.2         | 819      | 50.00             |                          |
| 47         | 598.5       | 21.2                       | 51                 | 25    | 76    | 50.                       | 1.0          | 19.2         | 839      | 50.00             |                          |
| 48         | 599.5       | 22.4                       | 55                 | 18    | 73    | 74.                       | 0.8          | 20.0         | 765      | 59.20             |                          |
| 49         | 600.3       | 22.4                       | 56                 | 20    | 76    | 23.                       | 0.5          | 20.5         | 487      | 11.50             |                          |

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## SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Mid-State Petroleum Corporation Lease Paulsen Well No. 3

| Depth Interval,<br>Feet | Feet of Core<br>Analyzed | Average<br>Permeability,<br>Millidarcys | Permeability<br>Capacity<br>Ft. x Md. | Average<br>Percent Oil<br>Saturation | Average<br>Water<br>Saturation | Average<br>Oil Content<br>Bbl./A. Ft. | Total Oil<br>Content<br>Bbls./Acre |
|-------------------------|--------------------------|---|---------------------------------------|--------------------------------------|--------------------------------|---------------------------------------|------------------------------------|
|                         | <u>PERU SAND</u>         |   |                                       |                                      |                                |                                       |                                    |
| 307.0 - 344.5           | 27.9                     | 307.2                                   | 8,570.88                              |                                      |                                |                                       |                                    |
|                         | <u>CATTLEMAN SAND</u>    |   |                                       |                                      |                                |                                       |                                    |
| 580.0 - 600.5           | 18.2                     | 103.0                                   | 1,875.50                              |                                      |                                |                                       |                                    |
|                         | <u>PERU SAND</u>         |   |                                       |                                      |                                |                                       |                                    |
| 307.0 - 344.5           | 27.9                     |   |                                       | 20.6                                 | 43.6                           | 312                                   | 8,710                              |
|                         | <u>CATTLEMAN SAND</u>    |   |                                       |                                      |                                |                                       |                                    |
| 580.0 - 600.5           | 20.5                     |   |                                       | 21.4                                 | 26.8                           | 931                                   | 19,076                             |