OILFIELD RESEARCH LABORATORIES
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January 7, 1980

Coral Petroleum Development, Incorporated
Post Office Box 7
Elsmore, Kansas 66732

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary cores taken from the D.J. Daniels Lease, Well No. 14, Allen County, Kansas, and submitted to our laboratory on November 29, and December 6, 1979.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Benjamin R. Pearman

Benjamin R. Pearman

BRP/tem
5 c to Elsmore, Kansas

# Oilfield Research Laboratories

## GENERAL INFORMATION & SUMMARY

Company Coral Petroleum Development, Inc. Lease D. J. Daniels Well No. 14

Location 1100' SNL & 660' EWL

Section 16 Twp. 26S Rge. 21E County Allen State Kansas

| | |
|---|---|
| Name of Sand | Bartlesville "A" Sand |
| Top of Core | 610.0 |
| Bottom of Core | 633.4 |
| Top of Sand | 618.8 |
| Bottom of Sand | 624.0 |
| Total Feet of Permeable Sand | 5.2 |
| Total Feet of Floodable Sand | |

| Distribution of Permeable Sand: Permeability Range Millidarcys | Feet | Cum. Ft. |
|---|---|---|
| 0 – 0.40 | 3.0 | 3.0 |
| 1.0 & Above | 2.2 | 5.2 |

| | |
|---|---|
| Average Permeability Millidarcys | 0.66 |
| Average Percent Porosity | 11.7 |
| Average Percent Oil Saturation | 39.1 |
| Average Percent Water Saturation | 52.4 |
| Average Oil Content, Bbls./A. Ft. | 337. |
| Total Oil Content, Bbls./Acre | 1,750. |
| Average Percent Oil Recovery by Laboratory Flooding Tests | |
| Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. | |
| Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre | |
| Total Calculated Oil Recovery, Bbls./Acre | |
| Packer Setting, Feet | |
| Viscosity, Centipoises @ | |
| A. P. I. Gravity, degrees @ 60 °F | |
| Elevation, Feet | |

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## GENERAL INFORMATION & SUMMARY

Company Coral Petroleum Development, Inc. Lease D.J. Daniels Well No. 14

Location 1100' SNL & 660' EWL

Section 16 Twp. 26S Rge. 21E County Allen State Kansas

| | |
|---|---|
| Name of Sand | Bartlesville "C" Sand |
| Top of Core | 706.0 |
| Bottom of Core | 725.5 |
| Top of Sand | 706.5 |
| Bottom of Sand | 712.8 |
| Total Feet of Permeable Sand | 4.9 |
| Total Feet of Floodable Sand | 3.9 |

Distribution of Permeable Sand:

| Permeability Range Millidarcys | Feet | Cum. Ft. |
|---|---|---|
| 0 - 20 | 1.5 | 1.5 |
| 20 - 30 | 1.6 | 3.1 |
| 70 - 80 | 1.0 | 4.1 |
| 130 - 140 | 0.8 | 4.9 |

| | |
|---|---|
| Average Permeability Millidarcys | 48.5 |
| Average Percent Porosity | 16.9 |
| Average Percent Oil Saturation | 50.2 |
| Average Percent Water Saturation | 38.2 |
| Average Oil Content, Bbls./A. Ft. | 660. |
| Total Oil Content, Bbls./Acre | 3,826. |
| Average Percent Oil Recovery by Laboratory Flooding Tests | 18.8 |
| Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. | 267. |
| Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre | 1,040. |
| Total Calculated Oil Recovery, Bbls./Acre | See "Calculated Recovery" Section. |
| Packer Setting, Feet | |
| Viscosity, Centipoises @ | |
| A. P. I. Gravity, degrees @ 60 °F | |
| Elevation, Feet | |

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

At the request of the client, only the Bartlesville "C" Sand was subjected to floodpot testing. Therefore, a calculated recovery is given for this section only.

## FORMATION CORED

The detailed log of the formation cored is as follows:

| Depth Interval, Feet | Description |
|---|---|
| | BARTLESVILLE "A" SAND |
| 610.0 - 618.8 | Gray slightly sandy shale. |
| 618.8 - 623.1 | Gray and light brown laminated shale and sandstone, 40% sandstone. |
| 623.1 - 624.0 | Gray very shaly sandstone. |
| 624.0 - 633.4 | Gray shale. |
| | BARTLESVILLE "C" SAND |
| 706.0 - 706.5 | Gray shale. |
| 706.5 - 708.3 | Dark brown sandstone. |
| 708.3 - 709.2 | Brown and gray laminated sandstone and shale. |
| 709.2 - 710.3 | Brown sandstone. |
| 710.3 - 710.8 | Brown and gray laminated sandstone and shale. |
| 710.8 - 711.3 | Brown slightly shaly sandstone. |
| 711.3 - 712.8 | Dark brown carbonaceous sandstone. |
| 712.8 - 715.6 | Gray sandy shale. |
| 715.6 - 717.3 | Coal. |
| 717.3 - 725.5 | Gray shale. |

## LABORATORY FLOODING TESTS

## BARTLESVILLE "C" SAND

The sand in this core responded to laboratory flooding tests, as a total recovery of 1,040 barrels of oil per acre was obtained from 3.9 feet of sand. The weighted average percent oil saturation was reduced from 52.5 to 33.7, or represents an average recovery of 18.8 percent. The weighted average effective permeability of the samples is 11.19 millidarcys, while the average initial fluid production pressure is 19.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 7 samples tested, 4 produced water and oil. This indicates that approximately 57 percent of the sand represented by these samples is floodable sand.

Please note the coregraph presents the residual oil saturation instead of the recovery, as in the past.

## CALCULATED RECOVERY

## BARTLESVILLE "C" SAND

It would appear from a study of the data, that efficient primary and waterflood operations in the vicinity of this well should recover approximately 1,070 barrels of oil per acre. This is an average recovery of 275 barrels per acre foot from 3.9 feet of floodable sand analyzed in this core.

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

| | |
|---|---|
| Original formation volume factor, estimated | 1.05 |
| Reservoir water saturation, percent, estimated | 25.0 |
| Average porosity, percent | 18.8 |
| Oil saturation after flooding, percent | 33.7 |
| Performance factor, percent, estimated | 50.0 |
| Net floodable sand, feet | 3.9 |

## Oilfield Research Laboratories

RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Coral Petroleum Development, Inc. Lease D.J. Daniels Well No. 14

| 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. | | |
| | | | | | | BARTLESVILLE "A" SAND | | | | | |
| 1 | 619.5 | 13.2 | 44 | 50 | 94 | 451 | 1.1 | 1.2 | 1.2 | 541 | 1.32 |
| 2 | 620.5 | 7.1 | 79 | 18 | 97 | 435 | 0.36 | 1.0 | 2.2 | 435 | 0.36 |
| 3 | 621.3 | 16.4 | 36 | 47 | 83 | 458 | 1.3 | 1.0 | 3.2 | 458 | 1.30 |
| 4 | 622.1 | 11.3 | 32 | 60 | 92 | 281 | 0.20 | 0.5 | 3.7 | 141 | 0.10 |
| 5 | 623.0 | 12.7 | 22 | 68 | 90 | 217 | 0.21 | 0.6 | 4.3 | 130 | 0.13 |
| 6 | 623.8 | 9.2 | 7 | 85 | 92 | 50 | 0.26 | 0.9 | 5.2 | 45 | 0.23 |
| | | | | | | BARTLESVILLE "C" SAND | | | | | |
| 1 | 706.6 | 20.5 | 34 | 59 | 93 | 541 | 131. | 0.8 | 0.8 | 433 | 104.80 |
| 2 | 707.6 | 19.9 | 59 | 27 | 86 | 911 | 77. | 1.0 | 1.8 | 911 | 77.00 |
| 3 | 708.6 | 12.7 | 31 | 54 | 85 | 305 | Imp. | 0.9 | 2.7 | 275 | 0.00 |
| 4 | 709.5 | 14.1 | 60 | 28 | 88 | 656 | 24. | 1.1 | 3.8 | 722 | 26.40 |
| 5 | 710.5 | 14.6 | 62 | 32 | 94 | 702 | 2.0 | 0.5 | 4.3 | 351 | 1.00 |
| 6 | 711.6 | 20.9 | 53 | 35 | 88 | 859 | 18. | 1.0 | 5.3 | 859 | 18.00 |
| 7 | 712.7 | 13.1 | 54 | 33 | 87 | 549 | 21. | 0.5 | 5.8 | 275 | 10.50 |

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### SUMMARY OF PERMEABILITY & SATURATION TESTS

### TABLE III

Company Coral Petroleum Development, Inc. Lease D.J. Daniels Well No. 14

| Depth Interval, Feet | Feet of Core Analyzed | Average Permeability, Millidarcys | Permeability Capacity Ft. x Md. |
|---|---|---|---|
| | BARTLESVILLE "A" SAND | | |
| 618.8 - 624.0 | 5.2 | 0.66 | 3.44 |
| | BARTLESVILLE "C" SAND | | |
| 706.5 - 712.8 | 4.9 | 48.5 | 237.70 |

| 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 |
|---|---|---|---|---|---|---|
| | | BARTLESVILLE "A" SAND | | | | |
| 618.8 - 624.0 | 5.2 | 11.7 | 39.1 | 52.4 | 337 | 1,750 |
| | | BARTLESVILLE "C" SAND | | | | |
| 706.5 - 712.8 | 5.8 | 16.9 | 50.2 | 38.2 | 660 | 3,826 |

## Oilfield Research Laboratories

### RESULTS OF LABORATORY FLOODING TESTS

### TABLE IV

Company Coral Petroleum Development, Inc. Lease D.J. Daniels Well No. 14

| 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. | | | |
| | | | | | BARTLESVILLE "C" SAND | | | | | | | |
| 1 | 706.6 | 20.8 | 34 | 549 | 4 | 65 | 30 | 67 | 484 | 401 | 26.28 | 10 |
| 2 | 707.6 | 19.5 | 59 | 893 | 24 | 363 | 35 | 56 | 530 | 82 | 2.20 | 15 |
| 3 | 708.6 | 13.0 | 31 | 313 | 0 | 0 | 31 | 60 | 313 | 0 | Imp. | - |
| 4 | 709.5 | 14.6 | 60 | 680 | 24 | 272 | 36 | 57 | 408 | 373 | 17.10 | 15 |
| 5 | 710.5 | 14.5 | 62 | 697 | 0 | 0 | 62 | 31 | 697 | 0 | Imp. | - |
| 6 | 711.6 | 21.0 | 53 | 863 | 20 | 326 | 33 | 54 | 537 | 49 | 1.60 | 20 |
| 7 | 712.7 | 13.1 | 54 | 549 | 0 | 0 | 54 | 34 | 549 | 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 Coral Petroleum Development, Inc. Lease D.J. Daniels Well No. 14

BARTLESVILLE "C" SAND

| | |
|---|---|
| Depth Interval, Feet | 706.5 - 712.8 |
| Feet of Core Analyzed | 3.9 |
| Average Percent Porosity | 18.8 |
| Average Percent Original Oil Saturation | 52.5 |
| Average Percent Oil Recovery | 18.8 |
| Average Percent Residual Oil Saturation | 33.7 |
| Average Percent Residual Water Saturation | 58.0 |
| Average Percent Total Residual Fluid Saturation | 91.7 |
| Average Original Oil Content, Bbls./A. Ft. | 755. |
| Average Oil Recovery, Bbls./A. Ft. | 267. |
| Average Residual Oil Content, Bbls./A. Ft. | 488. |
| Total Original Oil Content, Bbls./Acre | 2,943. |
| Total Oil Recovery, Bbls./Acre | 1,040. |
| Total Residual Oil Content, Bbls./Acre | 1,903. |
| Average Effective Permeability, Millidarcys | 11.19 |
| Average Initial Fluid Production Pressure, p.s.i. | 15.0 |

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