yes look at (9)

elevation 1405

## Oilfield Research Laboratories

### GENERAL INFORMATION & SUMMARY

Company Jackson Bros. Lease Hawthorne Well No. 7

Location SE SW NW

Section 22 Twp. 25S Rge. 8E County Greenwood State Kansas

| | |
|---|---|
| Name of Sand | Bartlesville |
| Top of Core | 2452.0 |
| Bottom of Core | 2460.9 |
| Top of Oil Sand | 2455.2 |
| Bottom of Sand | 2460.5 |
| Total Feet of Permeable Sand | 5.9 |
| Total Feet of Floodable Sand | 1.9 |

Distribution of Permeable Sand:

| Permeability Range Millidarcys | Feet | Cum. Ft. |
|---|---|---|
| 0 - 1 | 5.0 | 5.0 |
| 1 & above | 0.9 | 5.9 |

| | |
|---|---|
| Average Permeability Millidarcys | 1.7 |
| Average Percent Porosity | 15.7 |
| Average Percent Oil Saturation | 21.4 |
| Average Percent Water Saturation | 68.4 |
| Average Oil Content, Bbls./A. Ft. | 262. |
| Total Oil Content, Bbls./Acre | 2,223. |
| Average Percent Oil Recovery by Laboratory Flooding Tests | 1.5 |
| Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft. | 21. |
| Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre | 40. |
| Total Calculated Oil Recovery, Bbls./Acre | - |
| Packer Setting, Feet | |
| Viscosity, Centipoises @ | |
| A. P. I. Gravity, degrees @ 60 °F | |
| Elevation, Feet | |

## Oilfield Research Laboratories

### SUMMARY OF LABORATORY FLOODING TESTS

### TABLE V

Company Jackson Bros. Lease Hawthorne Well No. 7

| | |
|---|---|
| Depth Interval, Feet | 2458.6 - 2460.5 |
| Feet of Core Analyzed | 1.9 |
| Average Percent Porosity | 18.2 |
| Average Percent Original Oil Saturation | 23.0 |
| Average Percent Oil Recovery | 1.5 |
| Average Percent Residual Oil Saturation | 21.5 |
| Average Percent Residual Water Saturation | 69.2 |
| Average Percent Total Residual Fluid Saturation | 90.7 |
| Average Original Oil Content, Bbls./A. Ft. | 325. |
| Average Oil Recovery, Bbls./A. Ft. | 21. |
| Average Residual Oil Content, Bbls./A. Ft. | 304. |
| Total Original Oil Content, Bbls./Acre | 617. |
| Total Oil Recovery, Bbls./Acre | 40. |
| Total Residual Oil Content, Bbls./Acre | 577. |
| Average Effective Permeability, Millidarcys | 0.153 |
| Average Initial Fluid Production Pressure, p.s.i. | 50.0 |

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

## Oilfield Research Laboratories

**SUMMARY OF WATER DIFFERENTIATION TESTS**

**TABLE VII**

Company Jackson Bros. Lease Hawthorne Well No. 7

| Depth Interval, Feet | Chloride Content of Brine in Sand, ppm | Average Percent Connate Water | Average Percent Drilling & Foreign Water |
|---|---|---|---|
| 2452.0 - 2460.5 | 102,582 | | |

Note: ppm — parts per million.

Fresh water mud was used as a circulating fluid in the coring of the sand in this well. The core was sampled and sealed in tin cans by a representative of Oilfield Research Laboratories.

## FORMATION CORED

The detailed log of the formation cored is as follows:

| Depth Interval, Feet | Description |
|---|---|
| 2452.0 - 2455.2 | Gray, fine grained, silty sandstone. |
| 2455.2 - 2460.5 | Brownish gray, fine grained sandstone. |
| 2460.5 - 2460.9 | Black shale. |

Coring was started at a depth of 2452.0 feet in gray, fine grained, silty sandstone and completed at 2460.9 feet in black shale. This core shows a total of 8.5 feet of sandstone. For the most part, the cored section is made up of brownish gray, fine grained sandstone.

## PERMEABILITY

The weighted average permeability of the cored section is 1.7 millidarcys (See Table III). By observing the data given on the coregraph, it is noticeable that the sand has a comparatively uniform permeability. The permeability of the sand varies from impermeable to a maximum of 7.4 millidarcys.

## PERCENT SATURATION & OIL CONTENT

The sand in this core shows a low weighted average percent oil saturation, namely, 21.4. The weighted average percent water saturation of the cored section is 68.4 (See Table III). This gives an cverall weighted average total fluid saturation of 89.8 percent.

In an effort to determine whether or not any flushing of the sand occurred during coring, all of the saturation samples were analyzed for chloride content. The results of these tests are given in Tables VI

and VII. From the data given in these tables and on the coregraph, it is evident that some flushing of the sand, in the bottom of the core, occurred during the cutting of same.

The weighted average oil content of the cored section is 262 barrels per acre foot; while the total oil content, as shown by this core, is 2,223 barrels per acre (See Table III).

## LABORATORY FLOODING TESTS

The sand in this core did not respond in any appreciable extent to laboratory flooding tests, as a total recovery of only 40 barrels of oil per acre was obtained from 1.9 feet of sand. The weighted average percent oil saturation was reduced from 23.0 to 21.5, or represents an average recovery of 1.5 percent. The weighted average effective permeability of the samples is 0.153 millidarcys, while the average initial fluid production pressure is 50.0 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 9 samples tested, 2 produced water and oil. This indicates that approximately 22 percent of the sand represented by these samples is floodable pay sand.

## CONCLUSION

From a study of the above data, it is doubtful whether this well would make a commercial oil producer. Furthermore, it does not contain sufficient floodable sand to justify water-flooding, namely - 1.9 feet.

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## RESULTS OF SATURATION & PERMEABILITY TESTS

### TABLE 1-B

Company Jackson Bros. Lease Hawthorne Well No. 7

| 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 | 2452.1 | 14.4 | 12 | 76 | 88 | 134 | Imp. | 0.6 | 0.6 | 80 | 0.00 |
| 2 | 2453.1 | 15.7 | 14 | 80 | 94 | 171 | Imp. | 1.0 | 1.6 | 171 | 0.00 |
| 3 | 2454.1 | 13.5 | 19 | 72 | 91 | 199 | Imp. | 1.0 | 2.6 | 199 | 0.00 |
| 4 | 2455.1 | 14.9 | 14 | 75 | 89 | 162 | 0.76 | 0.6 | 3.2 | 97 | 0.46 |
| 5 | 2456.1 | 15.3 | 26 | 67 | 93 | 309 | 0.74 | 1.4 | 4.6 | 433 | 1.04 |
| 6 | 2457.1 | 15.4 | 25 | 62 | 87 | 298 | 0.68 | 1.0 | 5.6 | 298 | 0.68 |
| 7 | 2458.1 | 15.7 | 28 | 66 | 94 | 341 | 0.43 | 1.0 | 6.6 | 341 | 0.43 |
| 8 | 2459.1 | 17.1 | 23 | 63 | 86 | 305 | 0.50 | 1.0 | 7.6 | 305 | 0.50 |
| 9 | 2460.1 | 18.6 | 23 | 60 | 83 | 332 | 7.4 | 0.9 | 8.5 | 299 | 6.66 |
| | | | | | | | | Total | | 2,223 | |

## Oilfield Research Laboratories

### SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Jackson Bros. Lease Hawthorne Well No. 7

| Depth Interval, Feet | Feet of Core Analyzed | Average Permeability, Millidarcys | Permeability Capacity Ft. x Md. |
|---|---|---|---|
| 2454.6 - 2460.5 | 5.9 | 1.7 | 9.77 |

| 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 |
|---|---|---|---|---|---|---|
| 2452.0 - 2460.5 | 8.5 | 15.7 | 21.4 | 68.4 | 262 | 2,223 |

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company Jackson Bros. Lease Hawthorne Well No. 7

| 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 | 2452.1 | 14.0 | 14 | 152 | 0 | 0 | 14 | 78 | 152 | 0 | Imp. | - |
| 2 | 2453.1 | 15.2 | 12 | 141 | 0 | 0 | 12 | 85 | 141 | 0 | Imp. | - |
| 3 | 2454.1 | 14.0 | 16 | 174 | 0 | 0 | 16 | 77 | 174 | 0 | Imp. | - |
| 4 | 2455.1 | 14.6 | 15 | 170 | 0 | 0 | 15 | 78 | 170 | 0 | Imp. | - |
| 5 | 2456.1 | 15.0 | 23 | 268 | 0 | 0 | 23 | 72 | 268 | 0 | Imp. | - |
| 6 | 2457.1 | 15.0 | 22 | 256 | 0 | 0 | 22 | 67 | 256 | 0 | Imp. | - |
| 7 | 2458.1 | 15.3 | 25 | 297 | 0 | 0 | 25 | 71 | 297 | 0 | Imp. | - |
| 8 | 2459.1 | 17.5 | 23 | 312 | 2 | 27 | 21 | 73 | 285 | 8 | 0.200 | 50 |
| 9 | 2460.1 | 19.0 | 23 | 339 | 1 | 15 | 22 | 65 | 324 | 5 | 0.100 | 50 |

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 WATER DIFFERENTIATION TESTS**

**TABLE VI**

Company Jackson Bros. Lease Hawthorne Well No. 7

| Sample No. | Depth, Feet | Chloride Content of Brine in Sand ppm | Percent Water Saturation Connate | Drilling & Foreign | Total |
|---|---|---|---|---|---|
| 1 | 2452.1 | 89,900 | | | |
| 2 | 2453.1 | 95,550 | | | |
| 3 | 2454.1 | 116,500 | | | |
| 4 | 2455.1 | 102,800 | | | |
| 5 | 2456.1 | 105,800 | | | |
| 6 | 2457.1 | 112,800 | | | |
| 7 | 2458.1 | 104,200 | | | |
| 8 | 2459.1 | 113,500 | | | |
| 9 | 2460.1 | 72,900 | | | |

Note: ppm — parts per million