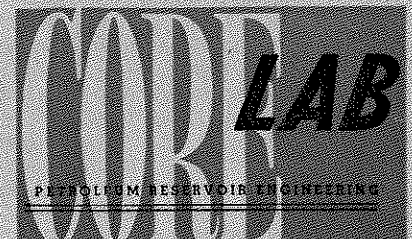


CORE ANALYSIS REPORT  
FOR  
KEWANEE OIL COMPANY  
  
LARKIN NO. 3 WELL  
HALLET FIELD  
HODGEMAN COUNTY, KANSAS



CORE LABORATORIES, INC.

*Petroleum Reservoir Engineering*

DALLAS, TEXAS

February 27, 1957

REPLY TO  
710 NORTH BROADWAY  
OKLAHOMA CITY, OKLAHOMA

Kewanee Oil Company  
P. O. Box 2093  
Wichita, Kansas

Attention: Mr. Paul G. Arnold

Subject: Core Analysis  
Larkin No. 3 Well  
Hallet Field  
Hodgeman County, Kansas

Gentlemen:

Diamond coring equipment and water base mud were used to core the interval from 4546.0 to 4656.5 feet in the Larkin No. 3. Representatives of Kewanee Oil Company selected and quick-froze samples of recovered formation on which analysis was desired, and these samples were analyzed in the Oklahoma City laboratory. The analysis was made by whole-core procedures using long segments of full-diameter core, and the results are presented in this report.

Marmaton limestone from 4552.5 to 4561.5 feet is characterized at permeable points by residual oil and total water saturations indicating the formation to be oil productive. The 4.7 feet of permeable formation in this interval has an arithmetic average permeability of 105 millidarcys and a total observed productive capacity of 494 millidarcy-feet, inadequate to support satisfactory rates of oil production. A satisfactory commercial completion in this Marmaton section will be dependent upon the response of the formation to treatment. The average porosity is quite low, 1.8 per cent, and the empirically calculated connate water saturation is 66.4 per cent of pore space.

Estimates of recoverable oil have been calculated for the Marmaton lime between 4552.5 and 4561.5 feet using the observed core analysis data from

Kewanee Oil Company  
Larkin No. 3 Well

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the 4.7 feet of formation in the interval having permeability equal to or greater than 0.1 millidarcy, together with estimated reservoir fluid characteristics considered applicable. These estimates are presented on page one of the report, and are subject to the conditions set forth in the body of and in the footnotes to the summary page.

Mississippian formation from 4589 to 4645 feet is interpreted to be oil productive from all points where permeability is equal to or greater than 0.1 millidarcy. However, this interval is characterized by very low permeability, only 35.6 feet of formation in the zone having permeability equal to or greater than 0.1 millidarcy. The arithmetic average permeability of these 35.6 feet of formation is 5.5 millidarcys, and the total observed productive capacity is 196 millidarcy-feet, inadequate to support satisfactory rates of oil production. The commercial possibilities of this zone appear to be dependent to a large degree upon favorable response to permeability stimulation. The porosity of the 35.6 feet of formation under consideration in the interval averages 10.5 per cent, and the empirically calculated connate water saturation is 69.3 per cent of pore space.

Recoverable oil estimates have been calculated for the Mississippian formation between 4589 and 4645 feet using the observed core analysis data in conjunction with estimated reservoir fluid characteristics considered applicable. These estimates are presented on page one of the report, and are subject to the conditions set forth in the body of and in the footnotes to the summary page.

Formation from 4645 to 4651 feet is not considered to have productive possibilities, and should be excluded from the completion interval.

Thank you for the opportunity to be of service to you.

Very truly yours,

Core Laboratories, Inc.

A handwritten signature in cursive script, reading "J W Barbour Jr", followed by a small circled number "174".

J. W. Barbour, Jr.,  
District Manager

JWB:TLK:ea

## CORE LABORATORIES, INC.

Petroleum Reservoir Engineering

DALLAS, TEXAS

CP-1-2807 WC

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Well Larkin No. 3

## CORE SUMMARY AND CALCULATED RECOVERABLE OIL

FORMATION NAME AND DEPTH INTERVAL: Marmaton 4552.5-4561.5

|                                                         |                        |                                                                                       |      |
|---------------------------------------------------------|------------------------|---------------------------------------------------------------------------------------|------|
| FEET OF CORE RECOVERED FROM ABOVE INTERVAL              | 9.0                    | AVERAGE TOTAL WATER SATURATION: PER CENT OF PORE SPACE                                | 66.4 |
| FEET OF CORE INCLUDED IN AVERAGES                       | 4.7                    | AVERAGE CONNATE WATER SATURATION: PER CENT OF PORE SPACE (c)                          | 66.4 |
| AVERAGE PERMEABILITY: MILLIDARCYS                       | Max.: 105<br>90°.: 0.2 | OIL GRAVITY: °API (e)                                                                 | 38   |
| PRODUCTIVE CAPACITY: MILLIDARCY-FEET                    | Max.: 494<br>90°.: 0.9 | ORIGINAL SOLUTION GAS-OIL RATIO: CUBIC FEET PER BARREL (e)                            | 480  |
| AVERAGE POROSITY: PER CENT                              | 1.8                    | ORIGINAL FORMATION VOLUME FACTOR: BARRELS SATURATED OIL PER BARREL STOCK-TANK OIL (e) | 1.29 |
| AVERAGE RESIDUAL OIL SATURATION: PER CENT OF PORE SPACE | 10.3                   | CALCULATED ORIGINAL STOCK-TANK OIL IN PLACE: BARRELS PER ACRE-FOOT                    | 36   |

Calculated maximum solution gas drive recovery is 9 barrels per acre-foot, assuming production could be continued until reservoir pressure declined to zero psig. Calculated maximum water drive recovery is 22 barrels per acre-foot, assuming full maintenance of original reservoir pressure, 100% areal and vertical coverage, and continuation of production to 100% water cut. (Please refer to footnotes for further discussion of recovery estimates.)

FORMATION NAME AND DEPTH INTERVAL: Mississippian 4589.0-4645.0

|                                                         |                        |                                                                                       |      |
|---------------------------------------------------------|------------------------|---------------------------------------------------------------------------------------|------|
| FEET OF CORE RECOVERED FROM ABOVE INTERVAL              | 56.0                   | AVERAGE TOTAL WATER SATURATION: PER CENT OF PORE SPACE                                | 69.3 |
| FEET OF CORE INCLUDED IN AVERAGES                       | 35.6                   | AVERAGE CONNATE WATER SATURATION: PER CENT OF PORE SPACE (c)                          | 69.3 |
| AVERAGE PERMEABILITY: MILLIDARCYS                       | Max.: 5.5<br>90°.: 4.7 | OIL GRAVITY: °API (e)                                                                 | 38   |
| PRODUCTIVE CAPACITY: MILLIDARCY-FEET                    | Max.: 196<br>90°.: 167 | ORIGINAL SOLUTION GAS-OIL RATIO: CUBIC FEET PER BARREL (e)                            | 480  |
| AVERAGE POROSITY: PER CENT                              | 10.5                   | ORIGINAL FORMATION VOLUME FACTOR: BARRELS SATURATED OIL PER BARREL STOCK-TANK OIL (e) | 1.29 |
| AVERAGE RESIDUAL OIL SATURATION: PER CENT OF PORE SPACE | 10.0                   | CALCULATED ORIGINAL STOCK-TANK OIL IN PLACE: BARRELS PER ACRE-FOOT                    | 194  |

Calculated maximum solution gas drive recovery is 46 barrels per acre-foot, assuming production could be continued until reservoir pressure declined to zero psig. Calculated maximum water drive recovery is 112 barrels per acre-foot, assuming full maintenance of original reservoir pressure, 100% areal and vertical coverage, and continuation of production to 100% water cut. (Please refer to footnotes for further discussion of recovery estimates.)

(c) Calculated (e) Estimated (m) Measured (\*) Refer to attached letter.

These recovery estimates represent theoretical maximum values for solution gas and water drive. They assume that production is started at original reservoir pressure; i.e., no account is taken of production to date or of prior drainage to other areas. The effects of factors tending to reduce actual ultimate recovery, such as economic limits on oil production rates, gas-oil ratios, or water-oil ratios, have not been taken into account. Neither have factors been considered which may result in actual recovery intermediate between solution gas and complete water drive recoveries, such as gas cap expansion, gravity drainage, or partial water drive. Detailed predictions of ultimate oil recovery to specific abandonment conditions may be made in an engineering study in which consideration is given to overall reservoir characteristics and economic factors.

These analyses, opinions or interpretations are based on observations and materials supplied by the client to whom, and for whose exclusive and confidential use, this report is made. The interpretations or opinions expressed represent the best judgment of Core Laboratories, Inc. (all errors and omissions excepted); but Core Laboratories, Inc., and its officers and employees assume no responsibility and make no warranty or representation as to the productivity, proper operation, or profitability of any oil, gas or other mineral well or sand in connection with which such report is used or relied upon.