CORE ANALYSIS REPORT

FOR

KEWANEE OIL COMPANY

KLINE NO. 1 WELL

HALLETT FIELD

HODGEMAN COUNTY, KANSAS

CORE LAB

PETROLEUM RESERVOIR ENGINEERING

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

January 10, 1958

REPLY TO
4010 N. YOUNGS BOULEVARD
P. O. BOX 7128
OKLAHOMA CITY, OKLAHOMA

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

Attention: Mr. Robert Gray

Subject: Core Analysis
Kline No. 1 Well
Hallett Field
Hodgeman County, Kansas

Gentlemen:

Diamond coring equipment and water base mud were used to core the interval, 4580 to 4650 feet, in the Kline No. 1. An engineer of Core Laboratories, Inc. selected samples for analysis as directed by representatives of Kewanee Oil Company. These samples were quick-frozen to preserve fluid content and were transported to the Oklahoma City laboratory where analysis was made by whole-core procedures using long segments of full-diameter core. Included with the analysis results in this report is a special reduced-scale graphical presentation of the core analysis data drawn to the scale of five inches equal one hundred feet which is for your convenience in correlating core analysis data to electrical logging data.

Mississippian formation analyzed from 4580 to 4594 feet exhibits favorable residual fluid saturations and is considered to be capable of oil production from points where permeability equals or exceeds 0.1 millidarcy. The average permeability of the 5.2 permeable feet in this interval is 89 millidarcys, and the total observed natural productive capacity is 464 millidarcy-feet. It should be observed that the bulk of this productive capacity is contained in the interval from 4580 to 4581 feet; hence, a selective treatment will be necessary in order to achieve uniform drainage of the reservoir. The average porosity of this zone is 16.2 per cent, and the average calculated connate water saturation is 41.1 per cent of pore space.

Estimates of recoverable oil have been calculated for the Mississippian formation interval, 4580 to 4594 feet, using the observed core analysis data from the 5.2 permeable feet in the interval in conjunction with estimated reservoir fluid characteristics considered applicable. These estimates are presented on page one of this report and are subject to the conditions set forth in the body of and in the footnotes to the summary page.

Portions of the Mississippian formation analyzed between 4603.2 and 4620.0 feet exhibit less than 0.1 millidarcy permeability and are considered to be essentially nonproductive.

Mississippian formation from 4620 to 4630 feet is considered to be possibly capable of oil production. The erratic nature of the residual fluid saturations observed in this interval from 4621.8 to 4630.0 feet indicate the possibility that substantial water cuts may accompany any oil produced from this zone. The average permeability of the 10.0 feet in this interval is 6.0 millidarcys, and the total observed natural productive capacity is 60 millidarcy-feet, which is inadequate to support satisfactory rates of fluid production prior to favorable response to treatment. The average porosity of this interval is 14.2 per cent, and the average calculated connate water saturation is 60.3 per cent of pore space.

The commercial value of the Mississippian formation interval, 4620 to 4630 feet, is considered to be somewhat doubtful in view of the possible water cuts which are anticipated. However, to aid in the evaluation of this interval, estimates of recoverable oil have been calculated using the observed core analysis data and estimated reservoir fluid characteristics considered applicable. These estimates are presented on page one of this report and your attention is respectfully directed to the conditions set forth in the body of and in the footnotes to the summary page where these estimates are given.

Mississippian formation from 4646.9 to 4650.0 feet is characterized by unfavorable residual fluid saturations, and is interpreted to be predominantly water productive.

We sincerely appreciate this opportunity to be of service and trust that this report will prove useful in making a preliminary evaluation of the Mississippian formation analyzed from the Kline No. 1.

Very truly yours,

Core Laboratories, Inc.

J. W. Barbour, Jr.,
District Manager

JWB:JDJ:ds

Form F-11B

CORE LABORATORIES, INC.

Petroleum Reservoir Engineering

DALLAS, TEXAS

CP-6-921

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Well Kline No. 1

CORE SUMMARY AND CALCULATED RECOVERABLE OIL

FORMATION NAME AND DEPTH INTERVAL: Mississippian 4580.0-4594.0

FEET OF CORE RECOVERED FROM ABOVE INTERVAL		14.0	AVERAGE TOTAL WATER SATURATION: PER CENT OF PORE SPACE		41.1
FEET OF CORE INCLUDED IN AVERAGES		5.2	AVERAGE CONNATE WATER SATURATION: PER CENT OF PORE SPACE	(c)	41.1
AVERAGE PERMEABILITY: MILLIDARCYS	Max.:	89	OIL GRAVITY: °API	(e)	38
	90° .:	23			
PRODUCTIVE CAPACITY: MILLIDARCY-FEET	Max.:	464	ORIGINAL SOLUTION GAS-OIL RATIO: CUBIC FEET PER BARREL	(e)	480
	90° .:	120			
AVERAGE POROSITY: PER CENT		16.2	ORIGINAL FORMATION VOLUME FACTOR: BARRELS SATURATED OIL PER BARREL STOCK-TANK OIL	(e)	1.29
AVERAGE RESIDUAL OIL SATURATION: PER CENT OF PORE SPACE		23.1	CALCULATED ORIGINAL STOCK-TANK OIL IN PLACE: BARRELS PER ACRE-FOOT		574

Calculated maximum solution gas drive recovery is 145 barrels per acre-foot, assuming production could be continued until reservoir pressure declined to zero psig. Calculated maximum water drive recovery is 284 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 4620.0-4630.0

FEET OF CORE RECOVERED FROM ABOVE INTERVAL		10.0	AVERAGE TOTAL WATER SATURATION: PER CENT OF PORE SPACE		60.3
FEET OF CORE INCLUDED IN AVERAGES		10.0	AVERAGE CONNATE WATER SATURATION: PER CENT OF PORE SPACE	(c)	60.3
AVERAGE PERMEABILITY: MILLIDARCYS	Max.:	6.0	OIL GRAVITY: °API	(e)	38
	90° .:	2.0			
PRODUCTIVE CAPACITY: MILLIDARCY-FEET	Max.:	60	ORIGINAL SOLUTION GAS-OIL RATIO: CUBIC FEET PER BARREL	(e)	480
	90° .:	20			
AVERAGE POROSITY: PER CENT		14.2	ORIGINAL FORMATION VOLUME FACTOR: BARRELS SATURATED OIL PER BARREL STOCK-TANK OIL	(e)	1.29
AVERAGE RESIDUAL OIL SATURATION: PER CENT OF PORE SPACE		11.4	CALCULATED ORIGINAL STOCK-TANK OIL IN PLACE: BARRELS PER ACRE-FOOT		339

Calculated maximum solution gas drive recovery is 84(*) barrels per acre-foot, assuming production could be continued until reservoir pressure declined to zero psig. Calculated maximum water drive recovery is 214(*) 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.