

CORE ANALYSIS REPORT

FOR

KANSAS LAND INVESTMENT, INC.
WOODHEAD NO. 4 WELL
DOUGLAS COUNTY, KANSAS

CORE LABORATORIES, INC.

Petroleum Reservoir Engineering

TULSA, OKLAHOMA

May 1, 1984

REPLY TO
7304 EAST 38TH STREET
TULSA, OKLAHOMA
74145

Kansas Land Investment, Inc.
222 E. 4th.
Ottawa, Kansas

Attn: Mr. Jim Miechem

Subject: Core Analysis Data
Woodhead No. 4 Well
Douglas County, Kansas
CLI File 3408-840072

Gentlemen:

Cores taken in the subject well in the Squirrel Sand formation were received at the Tulsa laboratory for special analytical testing described on the Procedure Page.

The accompanying Coregraph presents binomially averaged core analysis data in graphical form to aid correlation with downhole electrical surveys.

Tabular presentation of the measured physical properties may be found on page one of this report.

Empirical estimates of stock tank oil in place may be found on page two.

Core analysis data on the cored interval between 679.0 and 689.0 feet exhibits good porosity and fair matrix permeability development. This zone should be oil productive after formation treatment.

It is a pleasure to have this opportunity of serving you.

Very truly yours,

CORE LABORATORIES, INC.



J. Michael Edwards
District Manager

JME:MCH:jeh

4 cc-Addressee

Kansas Land Investment, Inc.
Woodhead No. 4 Well
CLI File 3408-840072

Procedure Page

Handling and Analytical Procedures

Diamond coring equipment and air were used to obtain 2-1/8 inch diameter cores between 679.0 and 689.0 feet.

The cores were preserved at the well site in plastic bags by client representative.

The cores were transported to Tulsa by motor freight.

Plug analysis was made in intervals requested.

Fluid removal was accomplished using high temperature retorts.

Porosity was determined by summation-of-fluids technique.

Horizontal air permeability on plugs measured without Klinkenberg correction.

Temporary storage of cores in Tulsa laboratory awaiting additional instructions.

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering

DALLAS, TEXAS

KANSAS LAND INVESTMENT, INC.
 WOODHEAD NO. 4 WELL

DATE: 4-30-84
 FORMATION: SQUIRREL SAND
 DRLG. FLUID:
 LOCATION:

FILE NO: 3408-840072 -
 ENGINEER: HUDSON
 ELEVATION:

DOUGLAS COUNTY, KANSAS

SMP. NO.	DEPTH	PERM. TO AIR MD. PLUG	POROSITY PERCENT	FLUID OIL	SATS. WTR.	GR. DEN.	DESCRIPTION
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ROUTINE PLUG SUMMATION OF FLUIDS

1	679.0-80.0	16.0	18.7	33.7	38.5		SD, SL/CALC, MICA
2	680.0-81.0	57.0	17.7	35.0	35.0		SD, CALC, MICA
3	681.0-82.0	0.05	16.6	20.5	59.0		SD, V/SLTY, SL/CALC, MI
4	682.0-83.0	15.0	21.5	34.9	37.2		SD, SL/CALC, MICA
5	683.0-84.0	16.0	18.8	35.1	34.0		SD, SL/CALC, MICA
6	684.0-85.0	40.0	23.2	38.4	33.2		SD, SL/CALC, MICA
7	685.0-86.0	23.0	19.2	35.4	31.3		SD, SL/CALC, MICA
8	686.0-87.0	54.0	21.1	39.8	32.2		SD, SL/CALC, MICA
9	687.0-88.0	15.0	21.8	35.8	33.5		SD, SL/CALC, MICA
10	688.0-89.0	1.5	20.9	30.6	34.0		SD, SLTY, SL/CALC, MICA

2
 20.3
 36.0
 31.4
 31.5

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CORE LABORATORIES, INC.

Petroleum Reservoir Engineering

DALLAS, TEXAS

Page 2 of 3 File 3408-840072
Well WOODHEAD NO. 4

CORE SUMMARY AND CALCULATED RECOVERABLE OIL

FORMATION NAME AND DEPTH INTERVAL: SQUIRREL SAND 679-689

FEET OF CORE RECOVERED FROM ABOVE INTERVAL	10	AVERAGE TOTAL WATER SATURATION: PER CENT OF PORE SPACE	34.4
FEET OF CORE INCLUDED IN AVERAGES	8	AVERAGE CONNATE WATER SATURATION: PER CENT OF PORE SPACE	29.0 (E)
AVERAGE PERMEABILITY: MILLIDARCYB	29.5	OIL GRAVITY: °API	
PRODUCTIVE CAPACITY: MILLIDARCY-FEET	236	ORIGINAL SOLUTION GAS-OIL RATIO: CUBIC FEET PER BARREL	
AVERAGE POROSITY: PER CENT	20.3	ORIGINAL FORMATION VOLUME FACTOR: BARRELS SATURATED OIL PER BARREL STOCK-TANK OIL	1.05 (C)
AVERAGE RESIDUAL OIL SATURATION: PER CENT OF PORE SPACE	36.0	CALCULATED ORIGINAL STOCK-TANK OIL IN PLACE: BARRELS PER ACRE-FOOT	983

Calculated maximum solution gas drive recovery is 138(e) barrels per acre-foot, assuming production could be continued until reservoir pressure declined to zero psig. Calculated maximum water drive recovery is 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:

FEET OF CORE RECOVERED FROM ABOVE INTERVAL		AVERAGE TOTAL WATER SATURATION: PER CENT OF PORE SPACE	
FEET OF CORE INCLUDED IN AVERAGES		AVERAGE CONNATE WATER SATURATION: PER CENT OF PORE SPACE	
AVERAGE PERMEABILITY: MILLIDARCYB		OIL GRAVITY: °API	
PRODUCTIVE CAPACITY: MILLIDARCY-FEET		ORIGINAL SOLUTION GAS-OIL RATIO: CUBIC FEET PER BARREL	
AVERAGE POROSITY: PER CENT		ORIGINAL FORMATION VOLUME FACTOR: BARRELS SATURATED OIL PER BARREL STOCK-TANK OIL	
AVERAGE RESIDUAL OIL SATURATION: PER CENT OF PORE SPACE		CALCULATED ORIGINAL STOCK-TANK OIL IN PLACE: BARRELS PER ACRE-FOOT	

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

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COMPANY: KANSAS LAND INVESTMENT, INC.
WELL: WOODHEAD NO. 4
COUNTY, STATE: DOUGLAS COUNTY, KANSAS
CLI FILE NO: 3408-840072

CALCULATED STOCK TANK BARRELS PER ACRE FOOT, IN PLACE, FROM THE SUBJECT WELL ARE LISTED BELOW.

<u>DEPTH</u>	<u>STOCK-TANK/ACRE-FOOT</u>
679-80	850
680-81	850
681-82	503
682-83	998
683-84	917
684-85	1145
685-86	975
686-87	1057
687-88	1071
688-89	1019

CORE LABORATORIES, INC.



Petroleum Reservoir Engineering

COMPANY KANSAS LAND INVESTMENT, INC. FILE NO. 3408-840072
WELL HOODHEAD NO. 4 DATE 4-30-84
FIELD FORMATION SQUIRREL SAND ELEV. _____
COUNTY DOUGLAS STATE KANSAS DRLG. FLD. AIR CORES _____
LOCATION _____

CORRELATION COREGRAPH

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VERTICAL SCALE: 5" = 100'

Total Water
PERCENT PORE SPACE
100 80 60 40 20 0

Oil Saturation
PERCENT PORE SPACE
100 80 60 40 20 0

Gamma Ray
RADIATION INCREASE
↓

Permeability _____
MILLIDARCIES

Porosity _____
PERCENT

Depth
Feet

