CORE ANALYSIS REPORT

FOR

KANSAS LAND INVESTMENT, INC.
WOODHEAD NO. 20 WELL
DOUGLAS COUNTY, KANSAS

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
TULSA, OKLAHOMA

REPLY TO
7304 EAST 38TH STREET
TULSA, OKLAHOMA
74145

September 20, 1984

Kansas Land Investment, Inc.
222 E. 3rd.
Ottawa, Kansas 66067

Attn: Mr. Jim Mietchen

Subject: Core Analysis Data
Woodhead No. 21 Well
Douglas County, Kansas
CLI File 3408-840227

Gentlemen:

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

The accompanying Coregraph presents the 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 of this report.

Core analysis data from the cored interval between 687.0 and 692.5 feet exhibits excellent porosity and good matrix permeability development. This Squirrel 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

J. Michael Edwards
District Manager

JME:MCH:jeh
5 cc: Addressee

Kansas Land Investment, Inc.
Woodhead No. 21 Well
CLI File 3408-840227

Procedure Page

Handling and Analytical Procedures

Diamond coring equipment was used to obtain 2 1/8-inch diameter cores between 687.0 and 692.5 feet.

The cores were preserved at the well site 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.

KANSAS LAND INVESTMENT, INC.
WOODHEAD NO. 21 WELL

DOUGLAS COUNTY, KANSAS

DATE: 9-20-84
FORMATION: SQUIRREL SAND
DRLG. FLUID:
LOCATION:

FILE NO: 3408-840227
ENGINEER: HUDSON
ELEVATION:

ROUTINE PLUG SUMMATION OF FLUIDS

SMP. NO.	DEPTH	PERM. TO AIR MD. PLUG	POROSITY PERCENT	FLUID SATS. OIL	FLUID SATS. WTR.	STB/ AF	DESCRIPTION
1	687.0-88.0	1.2	16.6	23.3	56.8	534	SD,SLTY,SHY,MICA
2	688.0-89.0	11.0	20.5	30.4	39.4	926	SD,SL/SHY,MICA
3	689.0-90.0	29.0	18.9	39.3	39.3	855	SD,MICA
4	690.0-91.0	33.0	21.6	34.4	32.3	1092	SD,MICA
5	691.0-92.0	22.0	20.5	38.2	34.8	998	SD,MICA,SH/LAM
6	692.0-92.5	20.0	22.3	27.2	40.3	993	SD,MICA,SH/LAM

CORE LABORATORIES, INC.

Petroleum Reservoir Engineering

DALLAS, TEXAS

Well WOODHEAD NO. 21

CORE SUMMARY AND CALCULATED RECOVERABLE OIL

FORMATION NAME AND DEPTH INTERVAL: SQUIRREL SAND 687.0-692.5

FEET OF CORE RECOVERED FROM ABOVE INTERVAL	5.5	AVERAGE TOTAL WATER SATURATION: PER CENT OF PORE SPACE	40.5
FEET OF CORE INCLUDED IN AVERAGES	6	AVERAGE CONNATE WATER SATURATION: PER CENT OF PORE SPACE	36.0 (e)
AVERAGE PERMEABILITY: MILLIDARCYS	19.4	OIL GRAVITY: °API	
PRODUCTIVE CAPACITY: MILLIDARCY-FEET	116	ORIGINAL SOLUTION GAS-OIL RATIO: CUBIC FEET PER BARREL	
AVERAGE POROSITY: PER CENT	20.0	ORIGINAL FORMATION VOLUME FACTOR: BARRELS SATURATED OIL PER BARREL STOCK-TANK OIL	1.05 (c)
AVERAGE RESIDUAL OIL SATURATION: PER CENT OF PORE SPACE	32.1	CALCULATED ORIGINAL STOCK-TANK OIL IN PLACE: BARRELS PER ACRE-FOOT	900

Calculated maximum solution gas drive recovery is 126(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: MILLIDARCYS		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.

CORE LABORATORIES, INC. *Petroleum Reservoir Engineering*

COMPANY KANSAS LAND INVESTMENT, INC. FILE NO. 3408-840227

WELL WOODHEAD NO. 21 DATE 9-20-84

FIELD _____ FORMATION SQUIRREL SAND ELEV. _____

COUNTY DOUGLAS STATE KANSAS DRLG. FLD. _____ CORES _____

LOCATION _____

CORRELATION COREGRAPH

VERTICAL SCALE: 5" = 100'

Gamma Ray
RADIATION INCREASE →

Permeability
MILLIDARCIES
1000 100 10 1

Depth Feet

Porosity
PERCENT
30 20 10 0

Total Water
PERCENT PORE SPACE
100 80 60 40 20 0

Oil Saturation
PERCENT PORE SPACE
0 20 40 60 80 100