

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS
August 1, 1963

REPLY TO
1810 N. W. 4TH ST.
P. O. BOX 7128
OKLAHOMA CITY, OKLA.

S & C Drilling Company, Inc.
Box 271
Hays, Kansas

Attention: Mr. D. J. Sullivan

Subject: Core Analysis
Lundgren No. 1 Well
Lundgren Pool
Gove County, Kansas
CLI File No. CP-10-986

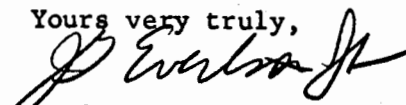
Gentlemen:

Diamond cores taken in the subject well were sampled by Mr. Lee Cornell. The samples were then sent to the Wichita laboratory for analysis of their physical properties. The measured data are presented on the accompanying coregraph.

<u>Interval, Feet</u>	<u>Interpretation and Remarks</u>
Pawnee	
4058 to 4064	Oolitic limestone has residual fluid saturations indicative of oil production. Low permeability indicates acid treatment necessary to establish desired production rates.
Fort Scott	
4141 to 4144	Crystalline limestone having saturation data indicative of oil production after acid treatment.
Cherokee	
4165.5 to 4168	Crystalline limestone considered to be oil productive. An average permeability of 34 millidarcys indicates that an acid treatment is needed to acquire desired production rates.

Average core analysis data and unit estimates of recoverable oil are presented on the summary page of this report. Thank you for this opportunity of serving you.

Yours very truly,


J. G. Evertson, Jr.

JGE:db

CORE LABORATORIES, INC.

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DALLAS, TEXAS

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Well

CORE SUMMARY AND CALCULATED RECOVERABLE OIL

FORMATION NAME AND DEPTH INTERVAL: Cherokee 4165.5 - 4168.0 feet			
FEET OF CORE RECOVERED FROM ABOVE INTERVAL	3	AVERAGE TOTAL WATER SATURATION: PER CENT OF PORE SPACE	24.1
FEET OF CORE INCLUDED IN AVERAGES	2.5	AVERAGE CONNATE WATER SATURATION: PER CENT OF PORE SPACE (e)	24
AVERAGE PERMEABILITY: MILLIDARCYS	34	OIL GRAVITY: °API (e)	35
PRODUCTIVE CAPACITY: MILLIDARCY-Feet	85	ORIGINAL SOLUTION GAS-OIL RATIO: CUBIC FEET PER BARREL (e)	385
AVERAGE POROSITY: PER CENT	8.9	ORIGINAL FORMATION VOLUME FACTOR: BARRELS SATURATED OIL PER BARREL STOCK-TANK OIL (e)	1.25
AVERAGE RESIDUAL OIL SATURATION: PER CENT OF PORE SPACE	23.8	CALCULATED ORIGINAL STOCK-TANK OIL IN PLACE: BARRELS PER ACRE-FOOT	419

Calculated maximum solution gas drive recovery is 106 barrels per acre-foot, assuming production could be continued until reservoir pressure declined to zero psig. Calculated maximum water drive recovery is 255 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.

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.

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Petroleum Reservoir Engineering
DALLAS, TEXAS

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 Well

CORE SUMMARY AND CALCULATED RECOVERABLE OIL

FORMATION NAME AND DEPTH INTERVAL: Pawnee 4058 - 4064 feet			
FEET OF CORE RECOVERED FROM ABOVE INTERVAL	6	AVERAGE TOTAL WATER SATURATION: PER CENT OF PORE SPACE	52.9
FEET OF CORE INCLUDED IN AVERAGES	6	AVERAGE CONNATE WATER SATURATION: PER CENT OF PORE SPACE (e)	45
AVERAGE PERMEABILITY: MILLIDARCYs	7.6	OIL GRAVITY: °API (e)	35
PRODUCTIVE CAPACITY: MILLIDARCY-Feet	46	ORIGINAL SOLUTION GAS-OIL RATIO: CUBIC FEET PER BARREL (e)	365
AVERAGE POROSITY: PER CENT	14.5	ORIGINAL FORMATION VOLUME FACTOR: BARRELS SATURATED OIL PER BARREL STOCK-TANK OIL (e)	1.24
AVERAGE RESIDUAL OIL SATURATION: PER CENT OF PORE SPACE	12.4	CALCULATED ORIGINAL STOCK-TANK OIL IN PLACE: BARRELS PER ACRE-FOOT	556

Calculated maximum solution gas drive recovery is 124 barrels per acre-foot, assuming production could be continued until reservoir pressure declined to zero psig. Calculated maximum water drive recovery is 345 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: Fort Scott 4141 - 4144 feet			
FEET OF CORE RECOVERED FROM ABOVE INTERVAL	3	AVERAGE TOTAL WATER SATURATION: PER CENT OF PORE SPACE	33.8
FEET OF CORE INCLUDED IN AVERAGES	3	AVERAGE CONNATE WATER SATURATION: PER CENT OF PORE SPACE (e)	33
AVERAGE PERMEABILITY: MILLIDARCYs	26	OIL GRAVITY: °API (e)	35
PRODUCTIVE CAPACITY: MILLIDARCY-Feet	79	ORIGINAL SOLUTION GAS-OIL RATIO: CUBIC FEET PER BARREL (e)	385
AVERAGE POROSITY: PER CENT	15.4	ORIGINAL FORMATION VOLUME FACTOR: BARRELS SATURATED OIL PER BARREL STOCK-TANK OIL (e)	1.25
AVERAGE RESIDUAL OIL SATURATION: PER CENT OF PORE SPACE	29.1	CALCULATED ORIGINAL STOCK-TANK OIL IN PLACE: BARRELS PER ACRE-FOOT	640

Calculated maximum solution gas drive recovery is 161 barrels per acre-foot, assuming production could be continued until reservoir pressure declined to zero psig. Calculated maximum water drive recovery is 290 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.

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- 3 CC: S & C DRILLING COMPANY, INC.
ATTENTION: MR. D. J. SULLIVAN
BOX 271
HAYS, KANSAS

CORE LABORATORIES, INC.

Petroleum Reservoir Engineering

COMPANY	S & C DRILLING COMPANY, INC.	DATE ON	7-19-63	FILE NO.	CP10-986
WELL	LUNDGREN NO.1	DATE OFF	7-20-63	ENGRS.	BOYLE
FIELD	LUNDGREN	FORMATION	AS NOTED	ELEV.	
COUNTY	GOVE	STATE	KANSAS	DRLG. FLD.	WATER BASE MUD
LOCATION	C N/2 NW SEC. 32-11S-29W	CORES	DIAMOND	REMARKS	CLIENT SAMPLED

SAND  LIMESTONE  CONGLOMERATE  CHERT 
SHALE  DOLOMITE   

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TABULAR DATA and INTERPRETATION

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COMPLETION COREGRAPH

PERMEABILITY 

TOTAL WATER 

PERCENT PORE SPACE

50 40 30 20 10 0

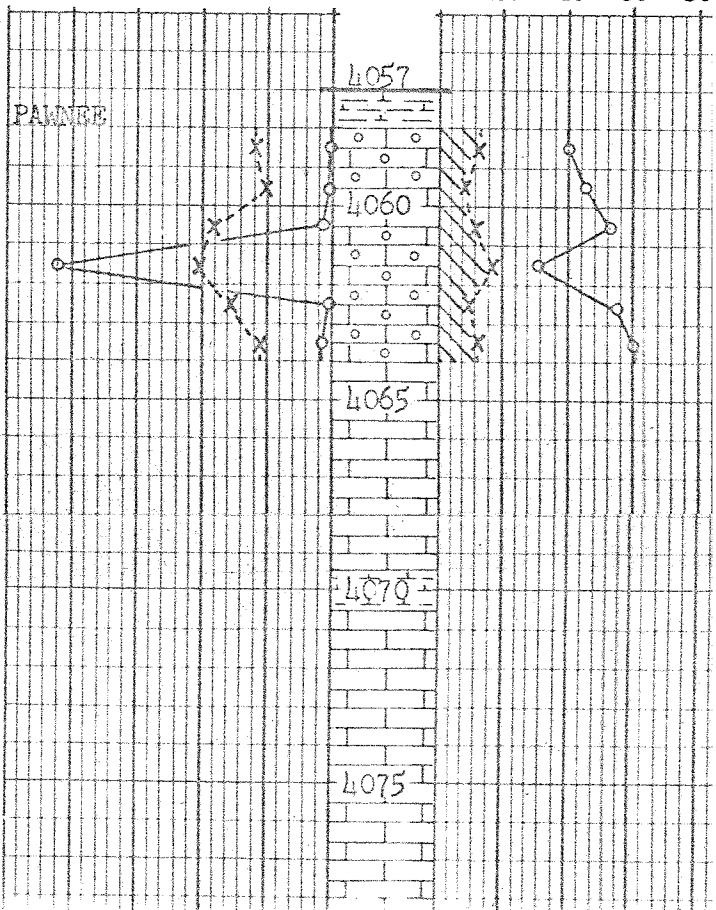
80 60 40 20

POROSITY X---X
PERCENT

OIL SATURATION X--
PERCENT PORE SPACE

40 30 20 10 0

0 20 40 60 80

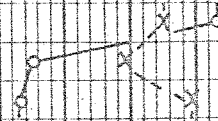


7	4141-42	7.0	15.0	25.3	36.0
8	42-43	35	20.6	28.6	34.0
9	43-44	37	10.5	33.3	31.4

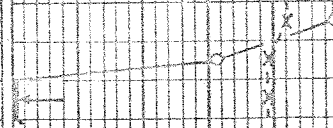
10	4165.5-66.0	0.5	7.8	33.4	19.2
11	66-67	19	10.3	13.4	20.4
12	67-68	66	10.2	24.5	30.4

13	4170.0-70.5	0.1	5.4	11.1	40.7
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FORT SCOTT



CHEROKEE



4080

4085

4087

DRILLED

4135

4140

4145

4150

4155

4160

4165

4170

4171

4000

S.T.C. DRILLING CO.
1-LUNDGREN

4050

→ e1 ←

Pawnee Ls.

Pawnee Ls.

4100

Labette Sh.

Ft. Scott Ls.

Cherokee Sh.

→ e2 ←
4150

→ e3 ←

→ e4 ←

4200

Miss.?

INDIAN COUNTY: GOVER C NW - NW 32-14S-29W ELEV. K.B. = 2584'