



00203973

## CORE LABORATORIES, INC.

*Petroleum Reservoir Engineering*  
DALLAS 1, TEXAS

November 14, 1957

REPLY TO  
706 PATTERSON BLDG.  
DENVER, COLORADO

Kansas-Nebraska Natural Gas Company, Inc.  
300 North St. Joseph  
Hastings, Nebraska

Attention: Mr. S. D. Ford, Jr.

Subject: Core Analysis  
Excelsior Oil Corporation  
Fiebig No. 3 Well  
East Atwood Field  
Logan County, Colorado

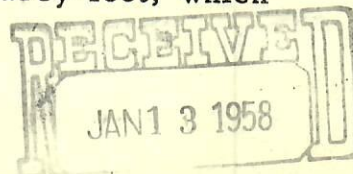
Gentlemen:

Diamond coring equipment and water base mud were used to core the interval, 4410 to 4429 feet, in the Fiebig No. 3. An engineer of Core Laboratories, Inc. selected samples of recovered formation as directed by representatives of Excelsior Oil Corporation and transported these samples to the Sterling laboratory for analysis. The results of the analysis are presented in this report.

"D" sand analyzed from 4411 to 4412 feet is interpreted to be water productive.

From 4412 to 4416 feet, "D" sand exhibits an absence of measurable permeability and is virtually nonproductive.

"D" sand from 4416 to 4424 feet exhibits residual fluid saturations indicating the interval to be capable of oil production. Those samples in the interval which are denoted by a single asterisk in the probable production column of the Completion Coregraph exhibit higher than normal total water saturations and for this reason should be excluded from the completed interval. The average permeability of the four feet considered to be predominantly oil productive in this zone is 429 millidarcys, and the total observed natural productive capacity is 1716 millidarcy-feet, which



Kansas-Nebraska Natural Gas Company, Inc.  
Fiebig No. 3 Well

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should be adequate to support satisfactory rates of production without the necessity for treatment. The average measured porosity of the interval is 18.4 per cent, and the average empirically calculated connate water saturation is 34 per cent of pore space.

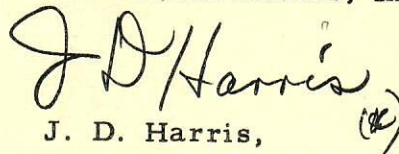
Estimates of recoverable oil have been calculated for the "D" sand interval, 4418 to 4422 feet, using the observed core analysis data in conjunction with estimated reservoir fluid characteristics considered applicable. These estimates are presented on page one of the report, and are subject to the conditions set forth in the body of and in the footnotes to the summary page.

Remaining "D" sand analyzed from 4424 to 4427 feet is interpreted to be water productive where permeable.

We sincerely appreciate this opportunity to be of service.

Very truly yours,

Core Laboratories, Inc.

  
J. D. Harris,  
District Manager

JDH:JDJ:sw



CORE LABORATORIES, INC.



Petroleum Reservoir Engineering

COMPANY EXCELSIOR OIL CORPORATION

DATE ON 11/11/57

FILE NO. RP-2-1772 PC

WELL FIEBIG NO. 3

DATE OFF 11/11/57

ENGRS. WEH, LAH

FIELD EAST ATWOOD

FORMATION "D" SAND

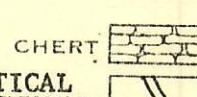
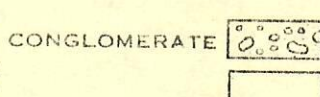
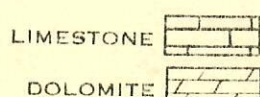
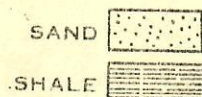
ELEV. 3987' KB

COUNTY LOGAN

STATE COLORADO DRLG. FLD. WATER BASE MUD CORES DIAMOND

LOCATION C SW SW SEC 25-7N-53W

REMARKS SAMPLED BY CLI ENGINEER.



These analyses, opinions or interpretations are based on observations and material supplied to 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. and its officers and employees, assume no responsibility and make no warranty or representation as to the product, its 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.

## COMPLETION COREGRAPH

## TABULAR DATA and INTERPRETATION

SAMPLE NUMBER	DEPTH FEET	PERM M	POROSITY %	RESIDUAL SATURATION % PORE SPACE		VERTICAL PERMEABILITY	FLUID
				OIL	TOTAL WATER		
1	4411-12	45	20.1	0.0	58.2	28	WATER
2	12-13	0.0	7.8	0.0	47.5	0.0	
3	13-14	0.0	12.9	0.0	76.0	0.0	
4	14-15	0.0	13.5	0.0	76.3	0.0	
5	15-16	0.0	11.4	0.0	89.8	0.0	
6	16-17	244	25.4	0.8	83.0	230	(*)
7	17-18	43	22.4	12.5	59.0	0.0	(*)
8	18-19	293	17.9	10.6	40.3	278	OIL
9	19-20	557	13.8	10.9	31.9	439	OIL
10	20-21	557	17.7	15.3	39.6	481	OIL
11	21-22	308	24.0	10.4	44.5	268	OIL
12	22.5-23	157	24.4	9.8	56.5	138	(*)
13	23-24	351	28.3	2.8	68.2	259	(*)
14	24-25	284	23.5	0.0	80.9	268	WATER
15	25-26	293	22.2	0.0	85.0	268	WATER
16	4426-27	0.0	14.6	0.0	73.3	0.0	

(\*) REFER TO ATTACHED LETTER FOR CLARIFICATION OF INTERPRETATION

PERMEABILITY ○—○

MILIDARBY

400 300 200 100 0

POROSITY X—X

PERCENT

40 30 20 10 0

TOTAL WATER ○—○

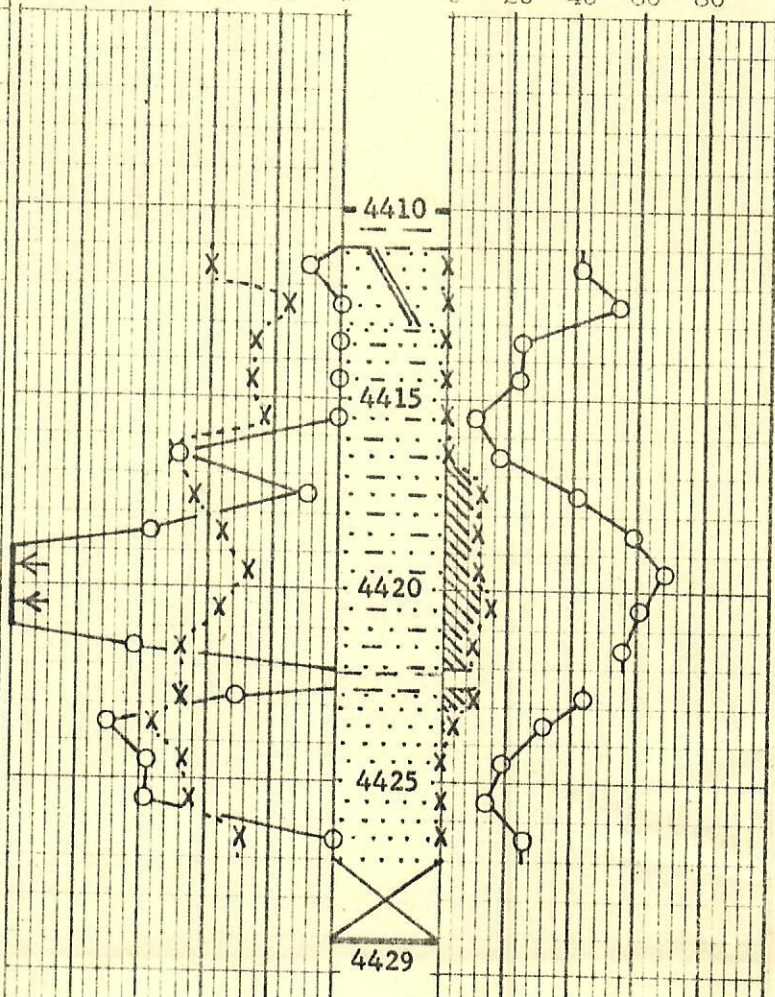
PERCENT PORE SPACE

80 60 40 20 0

OIL SATURATION X—X

PERCENT PORE SPACE

0 20 40 60 80





**CORE LABORATORIES, INC.**  
*Petroleum Reservoir Engineering*  
**DALLAS, TEXAS**

25-7N-53W

Page 1 of 1 File RP-2-1772 PC  
 Well Fiebig No. 3

**CORE SUMMARY AND CALCULATED RECOVERABLE OIL**

<b>FORMATION NAME AND DEPTH INTERVAL:</b> "D" Sand 4418.0-4422.0			
FEET OF CORE RECOVERED FROM ABOVE INTERVAL	4.0	AVERAGE TOTAL WATER SATURATION: PER CENT OF PORE SPACE	39.1
FEET OF CORE INCLUDED IN AVERAGES	4.0	AVERAGE CONNATE WATER SATURATION: PER CENT OF PORE SPACE (c)	34
AVERAGE PERMEABILITY: MILLIDARCS	429	OIL GRAVITY: °API (e)	40
PRODUCTIVE CAPACITY: MILLIDARCY-FEET	1716	ORIGINAL SOLUTION GAS-OIL RATIO: CUBIC FEET PER BARREL (e)	440
AVERAGE POROSITY: PER CENT	18.4	ORIGINAL FORMATION VOLUME FACTOR: BARRELS SATURATED OIL PER BARREL STOCK-TANK OIL (e)	1.30
AVERAGE RESIDUAL OIL SATURATION: PER CENT OF PORE SPACE	11.8	CALCULATED ORIGINAL STOCK-TANK OIL IN PLACE: BARRELS PER ACRE-FOOT	725

Calculated maximum solution gas drive recovery is 200 barrels per acre-foot, assuming production could be continued until reservoir pressure declined to zero psig. Calculated maximum water drive recovery is 557 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: MILLIDARCS		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.