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CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

October 16, 1972

REPLY TO
6 N. W. 42ND ST.
OKLAHOMA CITY, OKLA.
73118

Oasis Petroleum, Inc.
800 Sutton Place
Wichita, Kansas 67202

Attn: Mr. E. G. McNeil

Subject: Core Analysis Data
Deutsch No. 2 Well
Bindley Field
Hodgeman County, Kansas
CLI File No. CP-1-7661

Gentlemen:

Diamond coring equipment and water base mud were used to core the Mississippian formation from 4602 to 4655 feet in the subject well. The recovered portions were preserved in plastic bags and shipped to our Oklahoma City laboratory where the accompanying Surface Core-Gamma Log was recorded to aid correlation with downhole electrical surveys.

Whole-core analysis techniques were employed to obtain the data presented on pages one and two of this report. Formation analyzed between 4602 and 4635 feet is predicted to be oil productive where permeable. A number of the permeabilities within this interval are quite low, hence formation treatment is recommended to increase the fluid flow rate from these layers.

Dolomite below 4635 feet has little or no significant permeability and would produce predominantly water if perforation and formation treatment were affected.

Average core analysis data along with calculated oil in place values are presented on the Core Summary page.

We appreciate this opportunity to be of service.

Very truly yours,

CORE LABORATORIES, INC.

Dale E. Boyle
Oklahoma City Laboratory Manager

DEB:es

6 cc - Addressee

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

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CORE ANALYSIS RESULTS

Company OASIS PETROLEUM, INC. Formation MISSISSIPPIAN File CP-1-7661
Well DEUTSCH NO. 2 Core Type DIAMOND 3 1/2" Date Report 9-8-72
Field BINDLEY Drilling Fluid WATER BASE MUD Analysts BOYLE
County HODGEMAN State KANSAS Elev. 2414' KB Location C NW SE SEC. 33-21S-24W

Lithological Abbreviations

SAND-SD, SHALE-SH, LIME-LM, DOLOMITE-DOL, CHERT-CH, GYPSUM-GYP, ANHYDRITE-ANHY, CONGLOMERATE-CONG, FOSSILIFEROUS-FOSS, SANDY-SDY, SHALY-SHY, LIMY-LMY, FINE-FN, MEDIUM-MED, COARSE-CSE, CRYSTALLINE-XLN, GRAIN-GRN, GRANULAR-GRNL, BROWN-BRN, GRAY-GY, VUGGY-VGY, FRACTURED-FRAC, LAMINATION-LAM, STYLOLITIC-STY, SLIGHTLY-SL/, VERY-V/, WITH-W/

SAMPLE NUMBER	DEPTH FEET	PERMEABILITY MILLIDARCYS		POROSITY PER CENT	RESIDUAL SATURATION PER CENT PORE		SAMPLE DESCRIPTION AND REMARKS
		PERM. MAX.	PERM. 90°		OIL	TOTAL WATER	
	WHOLE-CORE ANALYSIS						
1	4602-03	5.8	3.6	12.6	25.4	26.6	Dol
2	03-04	1.5*		11.8	24.4	26.0	Dol
3	04-05	0.2*		8.6	21.0	45.5	Dol, sl/shy
4	05-06	<0.1*		6.0	9.8	39.5	Dol, sl/shy
5	06-07	<0.1	<0.1	5.5	7.3	68.3	Dol, shy
6	07-08	0.1*		7.0	6.8	69.5	Dol, shy
7	08-09	2.2	0.5	7.9	1.6	68.3	Dol, shy, vert frac
8	09-10	0.8	<0.1	8.8	1.6	77.8	Dol, shy, vert frac
9	10-11	<0.1*		10.1	10.4	60.4	Dol, shy
10	11-12	<0.1	<0.1	8.7	15.4	53.2	Dol
11	12-13	59	<0.1	8.2	16.9	63.9	Dol, vert frac
12	13-14	0.1	<0.1	11.3	5.7	65.7	Dol
13	14-15	0.1	<0.1	8.3	9.1	70.5	Dol
	15-16						Lost core
14	16-17	0.2	0.2	10.4	12.7	66.0	Dol
15	17-18	0.8	0.4	10.4	10.5	60.1	Dol
16	18-19	1.6	0.1	11.0	14.7	66.3	Dol
17	19-20	121	26	11.0	8.8	67.4	Dol, vert frac
18	20-21	8.8	8.3	15.5	17.7	41.1	Dol, pp vugs
19	21-22	17	16	14.4	16.9	43.2	Dol, pp vugs, vert frac
20	22-23	71	49	18.4	12.2	47.6	Dol, lmy, pp vugs
21	23-24	17	14	15.4	15.2	45.6	Dol, lmy, pp vugs
22	24-25	23	21	13.9	18.1	41.9	Dol, lmy, pp vugs
23	25-26	21	19	12.1	14.3	40.7	Dol, lmy, pp vugs
24	26-27	0.1	<0.1	7.0	17.8	62.5	Dol, pp vugs
25	27-28	0.2	0.1	12.7	2.5	76.0	Dol, pp vugs
26	28-29	1.9	1.9	16.8	2.2	74.1	Dol, pp vugs
27	29-30	6.4	6.4	17.3	16.5	49.0	Dol, pp vugs
28	30-31	13	13	17.4	19.7	43.0	Dol, lmy, pp vugs
29	31-32	3.6	2.1	13.0	18.4	47.8	Dol, pp vugs
30	32-33	0.4	0.3	14.7	17.7	61.1	Dol, pp vugs
31	33-34	1.0	0.8	13.4	14.2	81.2	Dol
32	34-35	0.7	0.7	15.0	13.9	56.8	Dol
33	35-36	0.1	<0.1	12.5	4.2	76.8	Dol
34	36-37	<0.1*		9.1	3.2	72.0	Dol, vert frac
35	37-38	<0.1	<0.1	12.0	1.7	76.5	Dol
36	38-39	<0.1	<0.1	2.2	5.2	57.9	Dol, lmy
37	39-40	<0.1	<0.1	3.9	5.4	62.2	Dol, lmy
38	40-41	<0.1*		7.2	4.1	59.2	Dol, vert frac
39	4641-42	<0.1*		8.3	1.5	73.5	Dol, vert frac

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

File CP-1-7661 Page No. 2
Well DEUTSCH NO. 2

CORE ANALYSIS RESULTS

SAMPLE NUMBER	DEPTH FEET	PERMEABILITY MILLIDARCYS MAX.	90°	POROSITY PER CENT	RESIDUAL SATURATION PER CENT PORE OIL	TOTAL WATER	SAMPLE DESCRIPTION AND REMARKS
40	4642-43	<0.1*		13.2	1.0	80.0	Dol, vert frac
41	43-44	<0.1	<0.1	13.4	1.3	81.8	Dol
42	44-45	<0.1	<0.1	14.0	1.1	82.6	Dol
43	45-46	<0.1	<0.1	11.7	0.8	81.1	Dol
44	46-47	<0.1	<0.1	9.3	0.0	74.6	Dol
45	47-48	<0.1	<0.1	7.4	2.5	75.3	Dol, sl/cherty
46	48-49	<0.1	<0.1	11.9	2.6	75.6	Dol, sl/cherty
47	49-50	<0.1	<0.1	10.6	0.0	76.7	Dol, sl/cherty
48	50-51	1.5	0.1	10.8	7.9	59.2	Dol, cherty
49	51-52	0.1	<0.1	12.8	4.7	71.6	Dol, cherty
50	52-53	0.3	0.1	17.0	0.0	76.7	Dol
	4653-55						Lost core

* DENOTES PLUG PERMEABILITY

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CORE LABORATORIES, INC.

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DALLAS, TEXAS

Well DEUTSCH NO. 2

CORE SUMMARY AND CALCULATED RECOVERABLE OIL

FORMATION NAME AND DEPTH INTERVAL: Mississippian - 4602 to 4635 ft.

FEET OF CORE RECOVERED FROM ABOVE INTERVAL	33	AVERAGE TOTAL WATER SATURATION: PER CENT OF PORE SPACE	55.3
FEET OF CORE INCLUDED IN AVERAGES	25	AVERAGE CONNATE WATER SATURATION: PER CENT OF PORE SPACE	44
AVERAGE PERMEABILITY: MILLIDARCYS Max. / 90°	13 / 7.4	OIL GRAVITY: °API	
PRODUCTIVE CAPACITY: MILLIDARCY-FEET	325	ORIGINAL SOLUTION GAS-OIL RATIO: CUBIC FEET PER BARREL	
AVERAGE POROSITY: PER CENT	12.6	ORIGINAL FORMATION VOLUME FACTOR: BARRELS SATURATED OIL PER BARREL STOCK-TANK OIL	1.03
AVERAGE RESIDUAL OIL SATURATION: PER CENT OF PORE SPACE	13.9	CALCULATED ORIGINAL STOCK-TANK OIL IN PLACE: BARRELS PER ACRE-FOOT	531

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.*)

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.

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CORE LABORATORIES, INC. *Petroleum Reservoir Engineering*

COMPANY OASIS PETROLEUM, INC. FIELD BINDLEY FILE CP-1-7661

WELL DEUTSCH NO. 2 COUNTY HODGEMAN DATE 10-16-72

LOCATION C NW SE SEC. 33-21S-24W STATE KANSAS ELEV. 2414' KB

CORE-GAMMA CORRELATION

VERTICAL SCALE: 5" = 100'

CORE-GAMMA SURFACE LOG
(PATENT APPLIED FOR)

GAMMA RAY
RADIATION INCREASE →

COREGRAPH

TOTAL WATER
PERCENT TOTAL WATER
80 60 40 20 0

PERMEABILITY
MILLIDARCYS
100 50 10 5 1

POROSITY
PERCENT
20 10

OIL SATURATION
PERCENT PORE SPACE
0 20 40 60 80