

CORE ANALYSIS REPORT

FOR

NORTHERN NATURAL GAS COMPANY
NO. 11-05 WELL
RICE COUNTY, KANSAS

Truesdell

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

May 3, 1976

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

Northern Natural Gas Company
P. O. Box 88
Lyons, Kansas 67554

Attn: Mr. Fred Holliger

Subject: Core Analysis Data
No. 11-05 Well
Rice County, Kansas
CLI File 3402-8578

Gentlemen:

Cores taken in the subject well in the Arbuckle formation were received at the Oklahoma City laboratory for special analytical testing described on the procedure page.

The accompanying coregraph presents the surface Core-Gamma Log and 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 pages one through eight of this report.

Data averages reflecting zone changes are presented on pages nine and ten.

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

Very truly yours,

CORE LABORATORIES, INC.

Dale E. Boyle (RP)

Dale E. Boyle
District Manager

DEB:VJP:es

7 cc - Addressee

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

Northern Natural Gas Company
No. 11-05 Well
CLI File 3402-8578

Procedure Page

Handling and Analytical Procedures

Diamond coring equipment and water base mud were used to obtain 4.0 inch diameter cores between 3196 to 3440 feet.

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

The cores were transported to Oklahoma City by CLI personnel.

A Core-Gamma Log was recorded for downhole E-Log correlation.

Core analysis was made in the intervals requested on right cylinder full diameter samples.

Samples were taken to adequately cover changes in lithology.

Fluid removal was accomplished using Dean Stark extraction.

Total porosity was determined by Boyle's law grain volume--caliper bulk volumes.

Air permeability in two horizontal directions and vertical direction measured without Klinkenberg correction.

Color photos of the whole core were made for future reference.

Temporary storage of cores in Oklahoma City laboratory awaiting additional instructions.

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
 DALLAS, TEXAS

NORTHERN NATURAL GAS COMPANY
 NO. 11-05 WELL
 E. LYONS STORAGE FIELD
 RICE COUNTY, KANSAS

DATE: 3/18/76
 FORMATION: ARBUCKLE
 DRLG. FLUID: WATER BASE MUD
 LOCATION: 2570'FNL & 2900'FEL SEC. 11-20S-8W

FILE NO: 3402-8578
 ENGINEER: PUGH
 ELEVATION: 1678' KH

* INDICATES PLUG PERM

SMP. NO.	DEPTH	PERM. TO AIR MD. MAXIMUM	90 DEG	VERT. PER CENT	POROSITY PER CENT	FLUID OIL	SATS. WTR.	GR. DEN.	DESCRIPTION
1	3246.0-47.0	0.8	0.2	<0.1	4.1	4.6	37.7	2.83	DOL,SL/VGY
2	3247.0-48.0	*	0.1	0.1	11.5	4.5	68.2	2.85	DOL,SHY,FISS
3	3248.0-49.0	6.4	4.3	0.5	11.6	1.3	74.6	2.83	DOL,V/SHY
4	3249.0-50.0	3.0	1.8	0.4	9.1	1.1	42.7	2.85	DOL,PP VUGS,SL/SHY
5	3250.0-51.0	1.7	1.3	0.5	9.0	2.0	48.6	2.84	DOL,PP VUGS
6	3251.0-52.0	3.6	1.7	0.2	7.7	2.2	49.7	2.83	DOL,VGY,CHTY,SHY
7	3252.0-53.0	3.0	2.2	1.7	6.7	1.8	42.8	2.82	DOL,VGY,SL/SHY
8	3253.0-54.0	*	<0.1	<0.1	6.5	3.4	71.5	2.80	DOL,V/SHY
9	3254.0-55.0	9.4	1.4	1.6	7.8	3.9	58.1	2.80	DOL,VGY,SHY,FISS
10	3255.0-56.0	0.2	<0.1	<0.1	2.0	0.8	60.1	2.83	DOL,SL/SHY,FISS
11	3256.0-57.0	*	0.6	0.1	8.1	0.0	67.8	2.82	DOL,SHY,FISS
12	3257.0-58.0	0.6	0.6	0.2	3.8	0.0	34.0	2.83	DOL,VGY,FISS

WHOLE CORE ANALYSIS

DEPTHS CORRELATED TO ELECTRIC LOG

3196.0-46.0 NOT ANALYZED

3258.0-60.0 LOST CORE

13	3260.0-61.0	27.0	13.0	1.4	10.5	0.9	53.2	2.84	DOL,VGY,FISS
14	3261.0-62.0	2816.0	2413.0	772.0	19.9	1.1	54.0	2.84	DOL,LG VUGS
15	3262.0-63.0	27.0	16.0	8.3	14.8	1.6	34.5	2.85	DOL,FISS
16	3263.0-64.0	2.0	1.3	0.7	17.8	2.1	53.2	2.85	DOL
17	3264.0-65.0	3.1	2.4	0.3	17.9	2.6	51.6	2.83	DOL,PP VUGS
18	3265.0-66.0	57.0	22.0	16.0	9.2	2.4	58.5	2.84	DOL,VGY,SHY,FISS

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CORE LABORATORIES, INC.
Petroleum Reservoir Engineering

DALLAS, TEXAS

NORTHERN NATURAL GAS COMPANY DATE: 3/18/76 FILE NO: 3402-8578
 NO. 11-05 WELL FORMATION: ARBUCKLE ENGINEER: PUGH

SMP. NO.	DEPTH	PERM. TO AIR MD. MAXIMUM	90 DEG	VERT	POROSITY PER CENT	FLUID SATS. OIL	GR. DEN.	DESCRIPTION
19	3266.0-67.0	32.0	9.6	9.0	18.3	2.2	2.82	DOL, VGY, CHTY, FISS
20	3267.0-68.0	*	0.7	0.1	19.8	1.4	2.82	DOL, SL/SHY
21	3268.0-69.0	11.0	4.1	0.5	14.3	1.6	2.76	SD, DOL, CHTY, SHY
22	3269.0-70.0	14.0	9.3	3.2	21.0	0.0	2.83	DOL, VGY, CHTY, FISS
	3270.0-74.0							SH
23	3274.0-75.0	1958.0	193.0	15.0	6.6	1.2	2.83	DOL, VGY, CHTY, FISS
24	3275.0-76.0	4.2	4.2	0.2	13.3	1.4	2.83	DOL, VGY, FISS
25	3276.0-77.0	32.0	26.0	8.4	14.8	1.6	2.85	DOL, VGY, FISS
26	3277.0-78.0	36.0	29.0	5.2	15.9	1.6	2.85	DOL, PP VUGS, FISS
27	3278.0-79.0	9.1	8.1	2.1	14.4	1.1	2.85	DOL, VGY, FISS
28	3279.0-80.0	1.3	0.8	0.4	10.4	0.7	2.84	DOL, PP VUGS, SHY
29	3280.0-81.0	9.7	2.3	1.0	18.9	3.3	2.82	DOL, PP VUGS, SHY
	3281.0-82.0							SH
30	3282.0-83.0	*	0.6	<0.1	13.0	3.9	2.81	DOL, VGY, CHTY, FISS
31	3283.0-84.0	170.0	3.3	0.1	7.3	4.1	2.74	LM, DOL, V/SHY
32	3284.0-85.0	0.1	0.1	<0.1	6.4	4.4	2.78	LM, DOL, SL/SHY
33	3285.0-86.0	1.6	0.1	0.1	8.6	1.1	2.85	DOL, FISS
34	3286.0-87.0	34.0	0.1	0.1	6.2	1.5	2.82	DOL, LMY, FISS
35	3287.0-88.0	*	<0.1	<0.1	6.6	2.7	2.68	LM, DOL, V/CHTY, SHY
36	3288.0-89.0	0.1	0.1	0.1	2.1	1.6	2.83	DOL, VGY, CHTY, FISS
	3289.0-92.0							LOST CORE
37	3292.0-93.0	5.2	1.2	0.5	10.7	0.9	2.84	DOL, VGY, FISS
38	3293.0-94.0	25.0	6.7	0.1	16.9	1.9	2.78	DOL, VGY, CHTY, FISS
39	3294.0-95.0	0.3	0.1	0.1	16.5	2.9	2.81	DOL
40	3295.0-96.0	*	1.7	1.1	15.1	2.5	2.74	DOL, VGY, CHTY, FISS
41	3296.0-97.0	0.6	0.4	0.4	7.5	2.2	2.84	DOL, PP VUGS
42	3297.0-98.0	0.7	0.6	0.5	10.3	2.2	2.85	DOL, PP VUGS
43	3298.0-99.0	61.0	33.0	6.2	16.7	3.2	2.75	LM, CONG, V/SHY
44	3299.0-00.0	1.6	<0.1	1.4	8.5	3.0	2.75	LM, DOL, V/SHY
45	3300.0-01.0	0.1	0.1	0.1	4.4	3.0	2.78	DOL, LMY, VGY

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CORE LABORATORIES, INC.
Petroleum Reservoir Engineering

DALLAS, TEXAS

FILE NO: 3402-8578
 ENGINEER: PUGH

DATE: 3/18/76
 FORMATION: ARBUCKLE

NORTHERN NATURAL GAS COMPANY
 NO. 11-05 WELL

SMP. NO.	DEPTH	PERM. TO AIR MD. MAXIMUM	90 DEG	VERT	POROSITY PER CENT	FLUID SATS.		GR. DEN.	DESCRIPTION
						OIL	WTR.		
46	3301.0-02.0	0.1	0.1	<0.1	4.9	2.6	70.1	2.74	LM,DOL,VGY,SHY
47	3302.0-03.0	20.0	2.6	1.4	12.2	0.0	75.0	2.72	LM,SDY,VGY,SHY
48	3303.0-04.0	76.0	71.0	26.0	10.5	0.0	83.5	2.74	LM,DOL,V/SHY
49	3304.0-05.0	<0.1	<0.1	<0.1	2.1	4.3	46.9	2.80	DOL,LMY
50	3305.0-06.0	*	<0.1	<0.1	4.1	5.5	51.5	2.74	LM,SL/VGY,SHY
51	3306.0-07.1	40.0	0.3	0.8	6.0	4.3	79.7	2.72	LM,SDY,SHY
52	3307.1-07.9	*	<0.1	<0.1	4.4	1.8	73.6	2.78	SH
53	3307.9-08.5	*	<0.1	<0.1	4.4	1.8	73.6	2.78	DOL,LMY,SHY
54	3308.5-09.0	*	<0.1	<0.1	11.8	1.7	90.7	2.74	SH
55	3309.0-09.5	5.5	2.7	<0.1	7.1	1.8	78.3	2.73	LM,V/SHY
56	3309.5-10.2	*	<0.1	<0.1	9.6	1.8	88.1	2.73	LM,PP VUGS,SHY
57	3310.2-10.7	*	<0.1	<0.1	5.4	1.4	75.7	2.72	LM,PP VUGS,V/SHY
58	3310.7-11.4	*	<0.1	<0.1	8.4	2.1	87.0	2.74	SH
59	3311.4-12.2	*	<0.1	<0.1	5.4	1.4	75.7	2.72	LM,SHY,FISS
60	3312.2-12.8	*	<0.1	<0.1	8.4	2.1	87.0	2.74	LM,V/SHY
3312.8-14.0 LOST CORE									
61	3314.0-14.7	*	<0.1	<0.1	3.5	1.9	58.0	2.75	SH
62	3314.7-15.6	*	<0.1	<0.1	4.4	1.3	51.9	2.78	LM,SHY
63	3315.6-15.9	*	0.1	0.1	16.1	2.1	77.0	2.69	LM,DOL,V/SHY
64	3315.9-16.3	*	0.2	<0.1	6.3	0.4	86.5	2.83	CONG,CHTY,LMY,SHY
65	3316.3-17.9	*	0.5	<0.1	8.7	0.3	61.7	2.84	SH
66	3317.9-18.4	0.5	39.0	0.6	16.6	1.7	49.7	2.83	DOL,SHY
67	3318.4-20.0	*	0.5	0.2	15.9	3.0	50.4	2.77	SH
68	3320.0-20.5	*	28.0	14.0	20.0	1.2	46.8	2.84	DOL,PP VUGS,SHY
69	3320.5-21.0	*	39.0	<0.1	12.4	1.0	49.0	2.84	DOL,VGY,SL/SHY
70	3321.0-23.0	*	3.9	2.0	15.9	3.0	50.4	2.77	SH
71	3323.0-23.3	*	28.0	14.0	20.0	1.2	46.8	2.84	DOL,LMY,VGY,SHY
72	3323.3-23.6	*	39.0	<0.1	12.4	1.0	49.0	2.84	DOL,VGY,SHY,FISS
73	3323.6-24.0	*	39.0	<0.1	12.4	1.0	49.0	2.84	SH
74	3324.0-24.6	*	39.0	<0.1	12.4	1.0	49.0	2.84	DOL,VGY,FISS

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CORE LABORATORIES, INC.
Petroleum Reservoir Engineering

DALLAS, TEXAS

FILE NO: 3402-8578
 ENGINEER: PUGH

DATE: 3/18/76
 FORMATION: ARBUCKLE

NORTHERN NATURAL GAS COMPANY
 NO. 11-05 WELL

SMP. NO.	DEPTH	PERM. TO AIR MD. MAXIMUM	90 DEG	VERT	POROSITY PER CENT	FLUID SATS. OIL	GR. DEN.	DESCRIPTION
67	3324.6-25.2	5.0	1.9	0.1	15.0	0.9	2.88	DOL, PYR, VGY
68	3325.2-25.6	1.5	0.4	<0.1	11.2	0.4	2.84	DOL, PYR, V/SHY
69	3325.6-26.0	*	1.8	0.9	11.2	1.6	2.75	CONG, CHTY, DOL, PYR
70	3326.0-26.2	64.0	16.0	17.0	10.7	1.3	2.76	DOL, OUL, CHTY
71	3326.2-26.8	*	1.8	0.1	7.2	0.3	2.83	DOL, SHY, FISS
72	3326.8-27.2	*	0.9	2.4	9.0	0.6	2.85	DOL, VGY, FISS
73	3327.2-27.7	0.9	0.2	0.1	16.1	2.8	2.81	DOL, CHTY, FISS
	3327.7-28.7							SH, DOL
74	3328.7-29.0	*	0.7	0.2	11.7	1.2	2.83	DOL, SHY, FISS
75	3329.0-29.5	3.7	2.1	3.2	12.5	1.7	2.76	DOL, CHTY, VGY
76	3329.5-30.0	*	0.8	0.5	13.4	2.3	2.71	DOL, CHTY, VGY
	3330.0-30.9							SH
77	3330.9-32.0	4.7	4.5	1.2	7.6	0.7	2.83	DOL, VGY, SHY
78	3332.0-32.4	0.6	0.3	0.2	5.8	2.2	2.84	DOL, VGY, FISS
79	3332.4-33.0	0.3	0.2	0.3	5.0	2.0	2.84	DOL, VGY, FISS
80	3333.0-33.5	13.0	6.4	0.3	10.4	0.0	2.85	DOL, V/SHY
81	3333.5-34.0	8.6	0.5	0.1	8.9	0.2	2.83	DOL, CHTY, VGY
82	3334.0-34.8	0.1	<0.1	<0.1	8.2	0.0	2.84	DOL, VGY, FISS
83	3334.8-35.7	169.0	0.3	0.3	10.4	0.0	2.80	DOL, CHTY, VGY, SHY
	3335.7-37.5							SH
84	3337.5-38.0	*	7.4	2.6	17.0	0.4	2.81	DOL, CHTY, VGY, FISS
85	3338.0-38.5	8.9	8.2	3.4	9.8	0.4	2.83	DOL, VGY, CHTY, FISS
86	3338.5-39.0	39.0	1.0	6.0	9.8	0.9	2.83	DOL, VGY, CHTY, FISS
87	3339.0-39.9	113.0	42.0	10.0	13.4	1.9	2.82	DOL, VGY, CHTY, FISS
88	3339.9-40.6	51.0	45.0	5.4	13.5	1.6	2.83	DOL, VGY, FISS
89	3340.6-41.8	11.0	4.2	3.7	15.4	1.5	2.83	DOL, VGY, FISS
90	3341.8-42.4	5.5	5.5	4.1	12.3	1.3	2.82	DOL, VGY, CHTY, FISS
91	3342.4-42.9	54.0	45.0	4.2	12.8	2.0	2.78	DOL, VGY, CHTY, FISS
	3342.9-44.0							SH

3344.0-45.0 LOST CORE

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 DALLAS, TEXAS

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DATE: 3/18/76
 FORMATION: ARBUCKLE

NORTHERN NATURAL GAS COMPANY
 O. 11-05 WELL

WELL NO.	DEPTH	PERM. TO AIR MD. MAXIMUM	VERT	POROSITY PER CENT	FLUID SATS.		GR. DEN.	DESCRIPTION
					OIL	WTR.		
92	3345.0-45.2	*	<0.1	9.8	1.5	50.2	2.81	DOL, VGY, CHTY
93	3345.2-45.4	*	1.4	14.9	1.6	58.7	2.79	DOL, VGY, CHTY, LMY
94	3345.4-46.1	7.8	5.3	17.8	2.9	53.3	2.80	DOL, VGY, CHTY, FISS
95	3346.1-46.3	*	1.0	11.7	3.4	49.9	2.80	DOL, VGY, CHTY, FISS
	3346.3-47.0							SH, DOL
96	3347.0-47.3	0.1	0.1	9.8	0.0	68.4	2.83	DOL
97	3347.3-48.3	*	<0.1	4.7	0.0	72.3	2.83	DOL, VGY, FISS
98	3348.3-49.0	13.0	0.4	12.7	1.7	51.9	2.81	DOL, VGY, CHTY
	3349.0-52.0							SH
99	3352.0-52.3	*	<0.1	11.7	0.3	87.8	2.83	DOL, SHY
	3352.3-53.3							SH, DOL
100	3353.3-53.7	*	0.3	18.4	1.9	63.2	2.80	DOL, VGY, CHTY, FISS
101	3353.7-54.2	*	0.3	16.2	2.6	69.4	2.80	DOL, CHTY, SHY
	3354.2-55.1							SH
102	3355.1-55.6	74.0	13.0	7.8	1.2	49.0	2.82	DOL, VGY, FISS
103	3355.6-56.2	62.0	6.4	11.5	0.3	49.3	2.83	DOL, VGY, FISS
104	3356.2-56.5	*	0.6	10.5	0.0	56.5	2.83	DOL, VGY, FISS
	3356.5-58.0							SH
105	3358.0-58.4	*	2.7	13.9	0.0	62.0	2.73	DOL, VGY, CHTY
	3358.4-58.9							SH
106	3358.9-59.6	45.0	1.0	8.8	1.0	47.8	2.83	DOL, VGY, CHTY, FISS
107	3359.6-60.4	9.9	0.9	4.8	0.3	56.3	2.83	DOL, VGY
108	3360.4-60.8	3100.0	3100.0	3.8	0.0	59.6	2.82	DOL, VGY, LG FISS
109	3360.8-61.2	*	<0.1	5.6	0.0	55.7	2.70	DOL, CHTY, VGY
110	3361.2-61.7	*	<0.1	8.3	2.9	69.4	2.80	DOL, CHTY, VGY
	3361.7-63.0	LOST CORE						
111	3363.0-63.3	*	9.3	19.8	3.5	56.8	2.79	DOL, V/CHTY, FISS
	3363.3-64.0							SH
112	3364.0-64.4	*	1.4	17.3	2.2	64.4	2.81	DOL, SHY
113	3364.4-64.6	0.9	0.6	8.5	2.6	54.7	2.75	DOL, VGY, V/CHTY

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Petroleum Reservoir Engineering

DALLAS, TEXAS

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NORTHERN NATURAL GAS COMPANY
 NO. 11-05 WELL

SMP. NO.	DEPTH	PERM. MAXIMUM	TO AIR 90 DEG	MD. VERT	POROSITY PER CENT	FLUID SATS.		GR. DEN.	DESCRIPTION
						OIL	WTR.		
114	3364.6-65.1	*	64.0	2.6	9.2	2.7	54.2	2.81	DOL,VGY,CHTY
115	3365.1-66.0	15.0	8.1	1.2	12.3	1.1	50.6	2.91	DOL,VGY,PYR,FISS
116	3366.0-66.8	4.0	2.0	2.9	13.6	2.0	56.0	2.82	DOL,FISS
117	3366.8-67.8	*	0.3	<0.1	5.0	0.9	51.5	2.84	DOL,VGY,FISS
118	3367.8-69.2	*	0.1	0.6	11.8	2.2	61.4	2.82	DOL,FISS
119	3369.2-70.1	2.4	2.4	1.5	9.3	2.8	58.5	2.75	DOL,V/CHTY,FISS
120	3370.1-70.6	2.1	1.7	1.3	9.9	3.0	58.7	2.81	DOL,VGY,CHTY,FISS
121	3370.6-71.0	13.0	12.0	5.3	14.0	1.3	42.3	2.83	DOL,VGY
122	3371.0-71.8	31.0	28.0	3.5	16.2	0.6	43.9	2.83	DOL,VGY
123	3371.8-72.1	9.4	5.2	1.6	12.2	0.5	48.5	2.83	DOL,VGY,FISS
124	3372.1-73.1	81.0	70.0	1.2	11.2	2.2	58.9	2.81	DOL,VGY,CHTY,FISS
125	3373.1-73.6	9.7	8.9	3.7	13.7	1.0	49.3	2.83	DOL,VGY,CHTY
126	3373.6-74.5	*	113.0	124.0	17.2	3.4	50.7	2.80	DOL,VGY,CHTY
LOST CORE									
127	3377.0-78.0	*	23.0	5.9	21.8	3.7	42.2	2.80	DOL,VGY,CHTY
128	3378.0-78.5	36.0	22.0	36.0	11.0	0.6	49.8	2.84	DOL,VGY,FISS
129	3378.5-79.6	67.0	63.0	4.4	15.9	0.7	48.2	2.83	DOL,VGY,FISS
130	3379.6-80.8	509.0	26.0	23.0	5.7	1.1	62.0	2.82	DOL,VGY,LG FISS
131	3380.8-81.7	4.9	2.9	2.5	6.9	2.9	46.9	2.81	DOL,VGY,FISS
132	3381.7-82.5	*	87.0	5.0	5.4	1.5	54.8	2.84	DOL,VGY,FISS
133	3382.5-83.0	*	4.8	<0.1	6.1	1.9	50.1	2.82	DOL,PP VUGS
134	3383.0-83.4	*	2.0	<0.1	9.3	0.0	45.6	2.81	DOL,PP VUGS,CHTY
135	3383.4-83.9	77.0	52.0	22.0	12.9	0.0	55.0	2.83	DOL,VGY,CHTY,FISS
136	3383.9-84.4	39.0	36.0	24.0	13.8	0.0	50.6	2.81	DOL,VGY,V/CHTY,FISS
137	3384.4-85.5	7.1	5.2	3.0	11.0	3.0	49.4	2.78	DOL,VGY,V/CHTY,FISS
138	3385.5-86.2	4.8	2.9	4.7	13.0	2.7	42.0	2.82	DOL,PP VUGS,CHTY
139	3386.2-86.9	2.0	1.1	1.6	11.8	1.6	51.1	2.83	DOL,VGY
140	3386.9-87.9	7.5	7.0	2.8	9.7	0.0	53.4	2.84	DOL,VGY,FISS
141	3387.9-88.4	38.0	28.0	7.1	13.9	0.0	52.9	2.81	DOL,PP VUGS,CHTY
142	3388.4-88.9	*	0.8	0.8	12.7	0.0	55.9	2.84	DOL,PP VUGS,FISS

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CORE LABORATORIES, INC.
Petroleum Reservoir Engineering

DALLAS, TEXAS

FILE NO: 3402-8578
 ENGINEER: PUGH

DATE: 3/18/76
 FORMATION: ARBUCKLE

NORTHERN NATURAL GAS COMPANY
 NO. 11-05 WELL

SMP. NO.	DEPTH	PERM. MAXIMUM	TO AIR MD. 90 DEG	VERT	POROSITY PER CENT	FLUID SATS.		GR. DEN.	DESCRIPTION
						OIL	WTR.		
143	3388.9-89.5	2.9	1.9	0.7	8.3	3.7	64.7	2.82	DOL,PP VUGS,SHY,FISS
144	3389.5-90.0	0.4	0.3	0.2	6.1	3.0	73.4	2.83	DOL,SL/VGY,FISS
145	3390.0-90.4	0.5	0.5	0.3	10.2	3.0	57.8	2.83	DOL,PP VUGS,FISS
146	3390.4-91.2	17.0	13.0	8.8	12.1	2.5	69.0	2.82	DOL,PP VUGS,SHY,FISS
147	3391.2-91.8	2.0	1.0	0.7	9.3	4.5	52.3	2.80	DOL,VGY,FISS
148	3391.8-92.5	2024.0	1237.0	36.0	7.8	4.0	56.3	2.80	DOL,VGY,FISS
149	3392.5-93.2	*	<0.1	<0.1	1.8	2.1	61.8	2.82	DOL,PP VUGS,SHY
150	3393.2-93.9	901.0	826.0	17.0	14.1	6.0	46.9	2.80	DOL,VGY,CHTY,FISS
	3393.9-95.3								SH
151	3395.3-95.7	28.0	19.0	28.0	11.1	3.5	50.5	2.84	DOL,SL/VGY,FISS,SHY
152	3395.7-96.5	*	122.0	0.1	15.7	2.0	65.8	2.84	DOL,VGY,CHTY,LG FISS
153	3396.5-97.1	173.0	17.0	13.0	7.7	1.7	66.4	2.84	DOL,PP VUGS,FISS,SHY
154	3397.1-97.7	7.0	4.1	1.6	5.5	1.8	62.2	2.83	DOL,VGY,FISS
155	3397.7-99.0	5.9	5.6	1.2	4.6	1.5	58.7	2.83	DOL,VGY,FISS,SHY
156	3399.0-99.5	120.0	61.0	0.7	7.2	3.7	56.0	2.81	DOL,VGY,CHTY,FISS
157	3399.5-00.2	*	<0.1	<0.1	5.6	2.1	54.1	2.83	DOL,PP VUGS,FISS
158	3400.2-01.1	*	<0.1	<0.1	14.8	2.9	63.8	2.83	DOL,VGY,SHY,FISS
	3401.1-03.5								SH
159	3403.5-03.9	281.0	72.0	12.0	5.4	2.9	68.4	2.83	DOL,VGY,FISS
160	3403.9-04.4	3.3	1.8	0.7	8.7	0.0	63.3	2.85	DOL,PP VUGS,FISS
161	3404.4-05.2	77.0	67.0	4.7	7.1	0.0	68.8	2.82	DOL,VGY,SHY,LG FISS
162	3405.2-06.1	*	<0.1	55.0	9.0	0.0	62.4	2.83	DOL,PP VUGS,FISS
	3406.1-06.9								SH
163	3406.9-08.5	108.0	56.0	30.0	9.6	0.0	66.7	2.77	DOL,V/VGY,CHTY
164	3408.5-08.7	62.0	60.0	13.0	8.5	3.1	66.1	2.69	DOL,VGY,V/CHTY,FISS
165	3408.7-09.3	76.0	63.0	49.0	9.4	3.3	59.4	2.79	DOL,VGY,CHTY,FISS
166	3409.3-10.0	19.0	11.0	4.3	6.6	3.0	56.8	2.81	DOL,SL/VGY,CHTY,FISS
167	3410.0-11.0	23.0	12.0	6.1	6.9	1.8	61.4	2.83	DOL,SL/VGY,CHTY,FISS
168	3411.0-11.5	44.0	29.0	27.0	13.2	2.0	64.2	2.82	DOL,VGY,CHTY,FISS
169	3411.5-12.0	183.0	173.0	108.0	15.0	2.4	59.9	2.82	DOL,VGY,CHTY,FISS
170	3412.0-12.5	*	0.2	6.7	10.8	4.5	58.2	2.79	DOL,V/VGY,CHTY,FISS
171	3412.5-13.5	2540.0	2540.0	447.0	10.2	4.7	61.5	2.81	DOL,VGY,LG FISS

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CORE LABORATORIES, INC.
Petroleum Reservoir Engineering

DALLAS, TEXAS

8

FILE NO: 3402-8578
ENGINEER: PUGH

DATE: 3/18/76
FORMATION: ARBUCKLE

NORTHERN NATURAL GAS COMPANY
NO. 11-05 WELL

SMP. NO.	DEPTH	PERM. MAXIMUM	TO AIR 90 DEG	MD. VERT	POROSITY PER CENT	FLUID SATS.		GR. DEN.	DESCRIPTION
						OIL	WTR.		
172	3413.5-14.9	11.0	1.0	1.4	3.6	0.0	51.7	2.84	DOL,VGY,FISS
173	3414.9-15.5	*	<0.1	1.3	6.7	0.0	76.4	2.83	DOL,SL/VGY,SHY,FISS
174	3415.5-16.1	*	<0.1	<0.1	3.4	0.0	65.5	2.83	DOL,SL/VGY,STY,FISS
175	3416.1-16.9	48.0	42.0	9.0	14.0	0.0	45.2	2.81	DOL,VGY
176	3416.9-17.7	44.0	30.0	5.5	13.2	2.8	45.8	2.81	DOL,VGY
177	3417.7-18.5	43.0	38.0	2.7	5.5	2.7	45.8	2.81	DOL,VGY,FISS
178	3418.5-19.4	54.0	11.0	69.0	10.4	3.0	48.4	2.82	DOL,VGY,FISS
179	3419.4-20.6	7.0	0.1	2.7	3.7	2.3	67.7	2.83	DOL,FISS
180	3420.6-21.4	7.3	3.3	1.8	5.2	2.6	57.2	2.83	DOL,VGY,FISS
181	3421.4-22.8	591.0	110.0	10.0	5.1	2.9	48.1	2.82	DOL,VGY,FISS
182	3422.8-24.0	6.5	4.1	2.6	7.9	3.3	50.7	2.82	DOL,VGY,FISS
183	3424.0-24.7	0.3	0.2	0.1	4.0	2.9	48.2	2.82	DOL,VGY,FISS
184	3424.7-25.9	0.2	0.1	0.1	6.3	3.6	58.1	2.82	DOL,VGY,FISS
	3425.9-27.0								SH
185	3427.0-27.9	0.1	0.1	<0.1	5.0	4.0	67.0	2.82	DOL,SL/VGY,FISS
186	3427.9-28.6	8.0	7.0	3.4	4.6	1.5	63.1	2.81	DOL,SL/VGY,FISS
187	3428.6-29.7	10.0	5.2	3.0	5.8	1.0	63.9	2.82	DOL,PP VUGS,FISS
	3429.7-31.0								SH
188	3431.0-31.9	1.8	0.9	0.9	5.9	4.0	56.6	2.81	DOL,PP VUGS,FISS
189	3431.9-33.0	2.6	1.8	0.6	4.8	3.1	59.8	2.82	DOL,SL/VGY,FISS
190	3433.0-34.0	6.4	3.0	1.3	4.9	0.8	66.2	2.82	DOL,SL/VGY,FISS
	3434.0-35.4								SH,DOL
191	3435.4-36.0	92.0	27.0	25.0	11.3	0.9	80.7	2.82	DOL,SL/VGY,CHTY,FISS
	3436.0-38.5								SH
192	3438.5-38.8	*	<0.1	<0.1	6.5	0.6	68.4	2.83	DOL,PP VUGS,FISS
193	3438.8-39.7	*	0.3	1.2	13.9	1.6	76.3	2.82	DOL,SL/VGY,V/SHY
	3439.7-40.0								SH

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CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

CORE SUMMARY

COMPANY NORTHERN NATURAL GAS COMPANY
 WELL NO. 11-05
 PAGE 9 OF 10 FILE 3402-8578

DEPTH	PERMEABILITY		VERTICAL	POROSITY	SATURATION		GRAIN DENSITY
	MAXIMUM	90 DEGREES			OIL	WATER	
3246.0-3247.0	0.8	0.2	<0.1	4.1	4.6	37.7	2.83
3247.0-3251.0	3.7	1.9	0.4	10.3	2.2	58.5	2.84
3251.0-3258.0	3.4	0.9	0.5	6.1	1.7	54.9	2.82
3260.0-3270.0	332	249	81	16.4	1.6	52.5	2.83
3274.0-3275.0	1958	193	15	6.6	1.2	51.9	2.83
3275.0-3283.0	15	10	2.5	14.4	1.9	52.4	2.84
3283.0-3288.0	51	0.7	0.1	7.0	2.8	68.6	2.77
3292.0-3300.0	13	5.5	1.3	12.8	2.4	57.1	2.80
3300.0-3302.0	0.1	0.1	0.1	4.7	2.8	59.4	2.76
3302.0-3304.0	48	36	13	11.4	0.0	79.3	2.73
3304.0-3308.5	20	0.1	0.2	4.2	4.0	62.9	2.76
3309.0-3310.7	5.5	0.9	<0.1	9.5	1.8	85.7	2.73
3311.4-3312.8	*	<0.1	<0.1	6.9	1.8	81.4	2.73
3314.7-3315.9	*	<0.1	<0.1	4.0	1.6	55.0	2.77
3315.9-3316.3	*	0.1	0.1	16.1	2.1	77.0	2.69
3320.0-3321.0	*	19	0.4	12.7	1.0	55.7	2.84
3323.0-3330.0	15	7.5	3.1	12.8	1.4	55.5	2.81
3330.9-3335.7	28	1.7	0.3	8.0	0.7	62.8	2.83
3337.5-3338.0	*	7.4	2.6	17.0	0.4	80.7	2.81
3338.0-3339.0	24	4.6	4.7	9.8	0.7	65.9	2.83
3339.0-3342.9	46	28	5.5	13.5	1.7	51.7	2.82
3345.0-3346.3	*	3.2	1.9	13.6	2.4	53.0	2.80
3347.0-3352.3	6.6	0.8	0.1	9.7	0.5	70.1	2.83
3353.3-3354.2	*	0.7	0.3	17.3	2.3	66.3	2.80
3355.1-3356.5	68	15	6.7	9.9	0.5	51.6	2.83
3358.0-3358.4	*	4.4	2.7	13.9	0.0	62.0	2.73
3358.9-3361.7	1051	406	620	6.3	0.8	57.8	2.80
3363.0-3364.4	*	0.3	5.4	18.6	2.9	60.6	2.80
3364.4-3370.6	4.9	9.9	1.3	10.0	2.2	55.7	2.81
3370.6-3374.5	28	39	23	14.1	1.5	48.9	2.82

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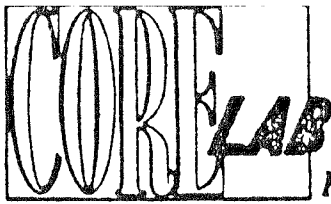
CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
 DALLAS, TEXAS

CORE SUMMARY

COMPANY NORTHERN NATURAL GAS COMPANY
 WELL NO. 11-05
 PAGE 10 OF 10 FILE 3402-8578

DEPTH	PERMEABILITY		POROSITY	SATURATION		GRAIN DENSITY
	MAXIMUM	90 DEGREES		OIL	WATER	
3377.0-3379.6	51	36	16.2	1.7	46.7	2.82
3379.6-3383.0	257	30	6.0	1.9	53.5	2.82
3383.0-3388.9	25	14	12.0	0.8	50.7	2.82
3388.9-3392.5	341	209	9.0	3.5	62.3	2.82
3393.2-3396.5	464	322	13.6	3.8	54.4	2.83
3396.5-3400.2	76	17	6.1	2.2	59.5	2.83
3400.2-3401.1	*	<0.1	14.8	2.9	63.8	2.83
3403.5-3406.1	120	35	7.6	0.7	65.7	2.83
3406.9-3409.3	82	59	9.2	2.1	64.1	2.75
3409.3-3411.0	20	11	6.8	2.4	59.1	2.82
3411.0-3413.5	922	685	12.3	3.4	61.0	2.81
3413.5-3416.1	10	0.3	4.6	0.0	64.5	2.83
3416.1-3417.7	46	35	13.6	1.4	45.5	2.81
3417.7-3425.9	88	20	6.0	2.9	53.0	2.82
3427.0-3434.0	4.8	3.0	5.2	2.4	62.8	2.82
3435.4-3436.0	92	26	11.3	0.9	80.7	2.82
3438.5-3439.7	*	0.2	10.2	1.1	72.4	2.83

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LABORATORIES, INC.

Petroleum Reservoir Engineering

FURNAL GAS COMPANY _____ FIELD E. LYONS STORAGE _____ FILE 3402-8578
 _____ COUNTY RICE _____ DATE 3/18/76
 2900' FEL _____ STATE KANSAS _____ ELEV. 1678' KB
 -8W _____

CORE-GAMMA CORRELATION

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VERTICAL SCALE: 5" = 100'

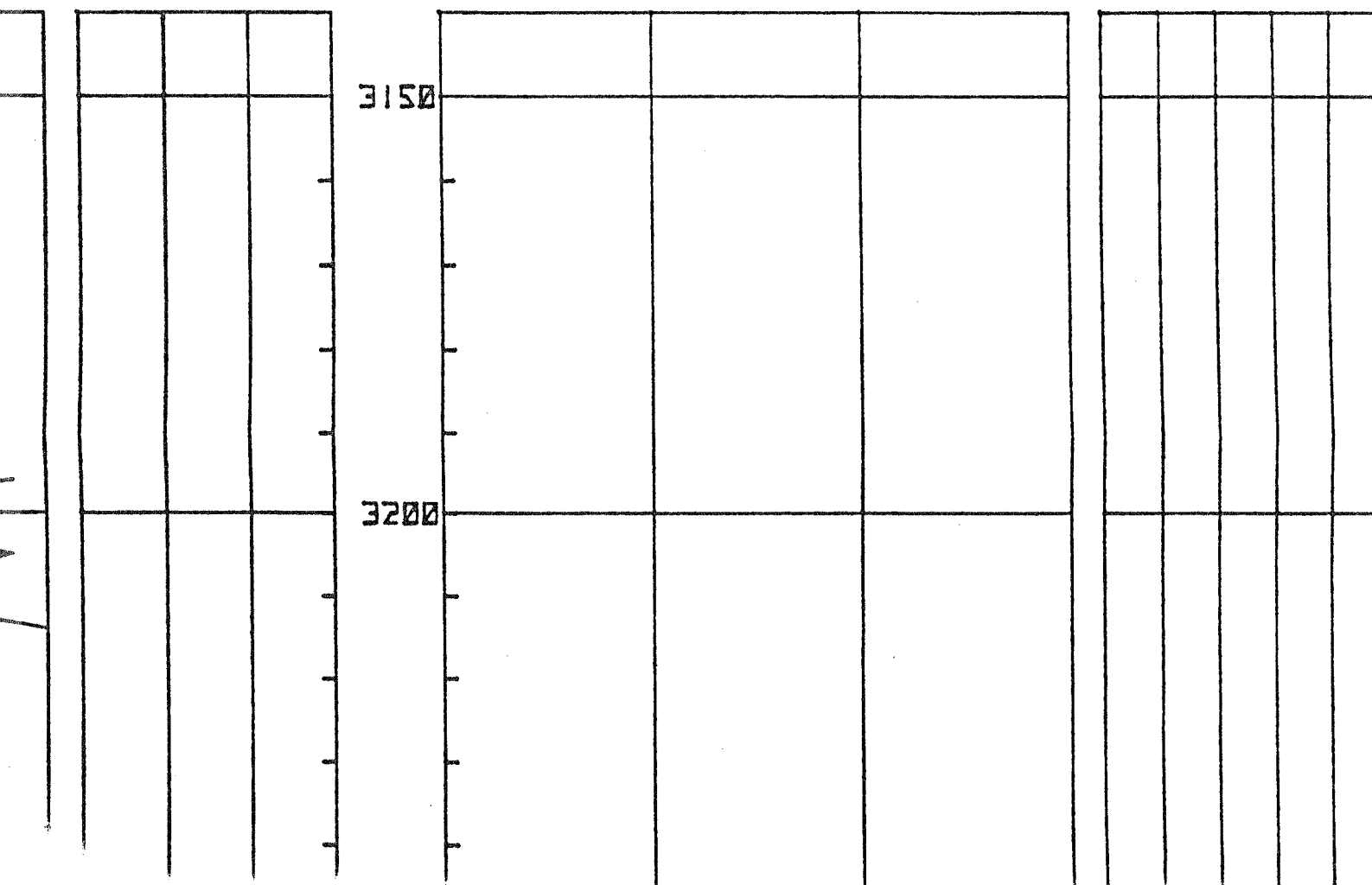
TOTAL WATER 0000
 PERCENT PORE SPACE
 80 60 40 20

PERMEABILITY _____
 MILLIDARCY

POROSITY _____
 PERCENT

OIL SATURATION XXXX
 PERCENT PORE SPACE

100.0 10.0 1.0 0.1 30 20 10 0 0 20 40 60 80



Handwritten notes on a grid background, including the number '11' at the top left. The notes consist of several lines of cursive handwriting, possibly representing a list or a set of instructions. The text is written in a fluid, connected style.

3250

3300

3350

3400

Handwritten notes on a grid background, continuing the cursive style from the previous section. The text is organized into several lines, with some characters appearing to be 'u', 'h', 'f', 'v', and 'i'. The handwriting is consistent and legible.

Handwritten notes on a grid background, continuing the cursive style. The text is organized into several lines, with some characters appearing to be 'u', 'h', 'f', 'v', and 'i'. The handwriting is consistent and legible.