

Morrow 4628-49  
Miss. 4657-780

**CORE LABORATORIES, INC.**  
*Petroleum Reservoir Engineering*  
**DALLAS, TEXAS**  
September 13, 1963

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

Shallow Water Refining Company  
542 Petroleum Building  
Wichita, Kansas

Subject: Core Analysis  
Maune No. 4 Well  
Finney County, Kansas  
CLI File No. CP-12-1140

Gentlemen:

The Maune No. 4 Well was cored using diamond coring equipment and water base mud with oil added. Cores were taken in the Morrow formation from 4628 to 4654 feet and in the St. Louis formation from 4654 to 4780 feet. Conventional analyses methods were employed in analyzing samples from these formations.

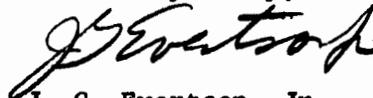
The results of these analyses indicate two productive intervals in the St. Louis formation; 4665 to 4670 feet and 4749 to 4757 feet. These intervals consisting of an oolitic limestone are considered to be oil productive. The bulk of production is expected from the interval 4749 to 4757 feet, due to more favorable productive characteristics. A light acid treatment is recommended fro this interval; a heavier treatment will be required for the upper interval from 4665 to 4670 feet.

The following zones also have oil productive characteristics but are excluded from averages due to their isolated nature; 4674.7 to 4675, 4679 to 4769 and 4770 to 4771 feet, respectively. Other permeable feet in both the Morrow and St. Louis formations are considered to be predominantly nonproductive.

Recovery estimates have been prepared for the intervals 4665 to 4670 feet and 4749 to 4757 feet and are included in the pages of this report.

Thank you for the opportunity of serving you.

Yours very truly,



J. G. Evertson, Jr.  
District Manager

JGE:db

2 cc: Addressee

6 cc: R. W. Lange, Box 1034, Garden City, Kansas

**CORE LABORATORIES, INC.**

*Petroleum Reservoir Engineering*

DALLAS, TEXAS

Page 1 of 1 File CP-12-1140

Well Maune No. 4

**CORE SUMMARY AND CALCULATED RECOVERABLE OIL**

FORMATION NAME AND DEPTH INTERVAL:		St. Louis 4665.0 - 4670.0 feet	
FEET OF CORE RECOVERED FROM ABOVE INTERVAL	5.0	AVERAGE TOTAL WATER SATURATION: PER CENT OF PORE SPACE	31.3
FEET OF CORE INCLUDED IN AVERAGES	5.0	AVERAGE CONNATE WATER SATURATION: PER CENT OF PORE SPACE	(e) 30
AVERAGE PERMEABILITY: MILLIDARCYB	5.3	OIL GRAVITY: °API	(e) 31
PRODUCTIVE CAPACITY: MILLIDARCY-FEET	26	ORIGINAL SOLUTION GAS-OIL RATIO: CUBIC FEET PER BARREL	TSTM
AVERAGE POROSITY: PER CENT	7.4	ORIGINAL FORMATION VOLUME FACTOR: BARRELS SATURATED OIL PER BARREL STOCK-TANK OIL	(e) 1.10
AVERAGE RESIDUAL OIL SATURATION: PER CENT OF PORE SPACE	24.3	CALCULATED ORIGINAL STOCK-TANK OIL IN PLACE: BARRELS PER ACRE-FOOT	367

Calculated maximum solution gas drive recovery is 79 barrels per acre-foot, assuming production could be continued until reservoir pressure declined to zero psig. Calculated maximum water drive recovery is 227 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:		St. Louis 4749.0 - 4757.0 feet	
FEET OF CORE RECOVERED FROM ABOVE INTERVAL	8	AVERAGE TOTAL WATER SATURATION: PER CENT OF PORE SPACE	34.0
FEET OF CORE INCLUDED IN AVERAGES	8	AVERAGE CONNATE WATER SATURATION: PER CENT OF PORE SPACE	(e) 30
AVERAGE PERMEABILITY: MILLIDARCYB	60	OIL GRAVITY: °API	(e) 31
PRODUCTIVE CAPACITY: MILLIDARCY-FEET	477	ORIGINAL SOLUTION GAS-OIL RATIO: CUBIC FEET PER BARREL	TSTM
AVERAGE POROSITY: PER CENT	11.3	ORIGINAL FORMATION VOLUME FACTOR: BARRELS SATURATED OIL PER BARREL STOCK-TANK OIL	(e) 1.10
AVERAGE RESIDUAL OIL SATURATION: PER CENT OF PORE SPACE	18.5	CALCULATED ORIGINAL STOCK-TANK OIL IN PLACE: BARRELS PER ACRE-FOOT	556

Calculated maximum solution gas drive recovery is 121 barrels per acre-foot, assuming production could be continued until reservoir pressure declined to zero psig. Calculated maximum water drive recovery is 394 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 DESCRIPTION - MAUNE NO. 4 WELL - CP-12-1140

CORE NO. 1

4628-31 Fg to Mg sd, sl/shy  
 4631-40 Very shaly siltstone  
 4640-54 Black & gr shale

CORE NO. 2

4654-56 Black sh  
 4656-63 Grey, very shaly siltstone  
 4663-63.5 Red & grey Ls., vert fract  
 4663.5-65 Grey shy siltstone  
 4665-69 Oolitic Ls.  
 4669-71 Ls., minute vert frac  
 4671-71.2 Fossiliferous sh  
 4671.2-71.6 Ls., dense  
 4671.6-73.2 Ls., minute vert frac  
 4673.2-74.7 Ls., dense  
 4674.7-75.4 Lmy siltstone  
 4675.4-76 same (barren)  
 4676-79 Lmy sd.  
 4679-80 Ls., silty

CORE NO. 3

4680-86 Ls., dense, sucrosic  
 4686-91 Ls., dense  
 4691-94 Ls., minute vert frac, dense  
 4694-20 Ls., dense  
 4720-26 Ls., minute vert frac, dense  
 4726-26.2 Sh  
 4726.2-30 Ls, dense

CORE NO. 4

4730-35 Ls, tan, dense  
 4735-36.7 Ls, tan, shy, dense  
 4736.7-37.4 Ls, tan cherty  
 4737.4-39.4 Ls, tan, shy  
 4739.4-41.5 Ls, tan sl/shy, cherty  
 4741.5-42.5 Ls, tan  
 4742.5-43 Ls, tan, shy  
 4743-45.7 Ls, tan, stylolitic  
 4745.7-47 Ls, tan, v/cherty, minute vert frac  
 4747-48 Chert, lmy, minute vert frac  
 4748-48.8 Ls, fractured, v/cherty  
 4748.8-57 Ls, porous, oolitic, fossils, stylolitic  
 4757-58 Ls, tan, dense, stylolitic  
 4758-60 Ls, tan, dense  
 4760-67.3 Ls, tan, sl/shy, dense  
 4767.3-68.5 Ls, porous, oolitic, tan  
 4768.5-69.9 Ls, tan, stylolitic, dense  
 4769.9-71 Ls, porous, oolitic, tan

CORE DESCRIPTION - MAUNE NO. 4 WELL - CP-12-1140

CORE NO. 4

4771-72.4	Ls, tan, dense
4772.4-74	Ls, tan, v/shy, dense
4774-76.5	Ls, tan, dense
4776.5-80	Ls, tan, highly fractured

# CORE LABORATORIES, INC.



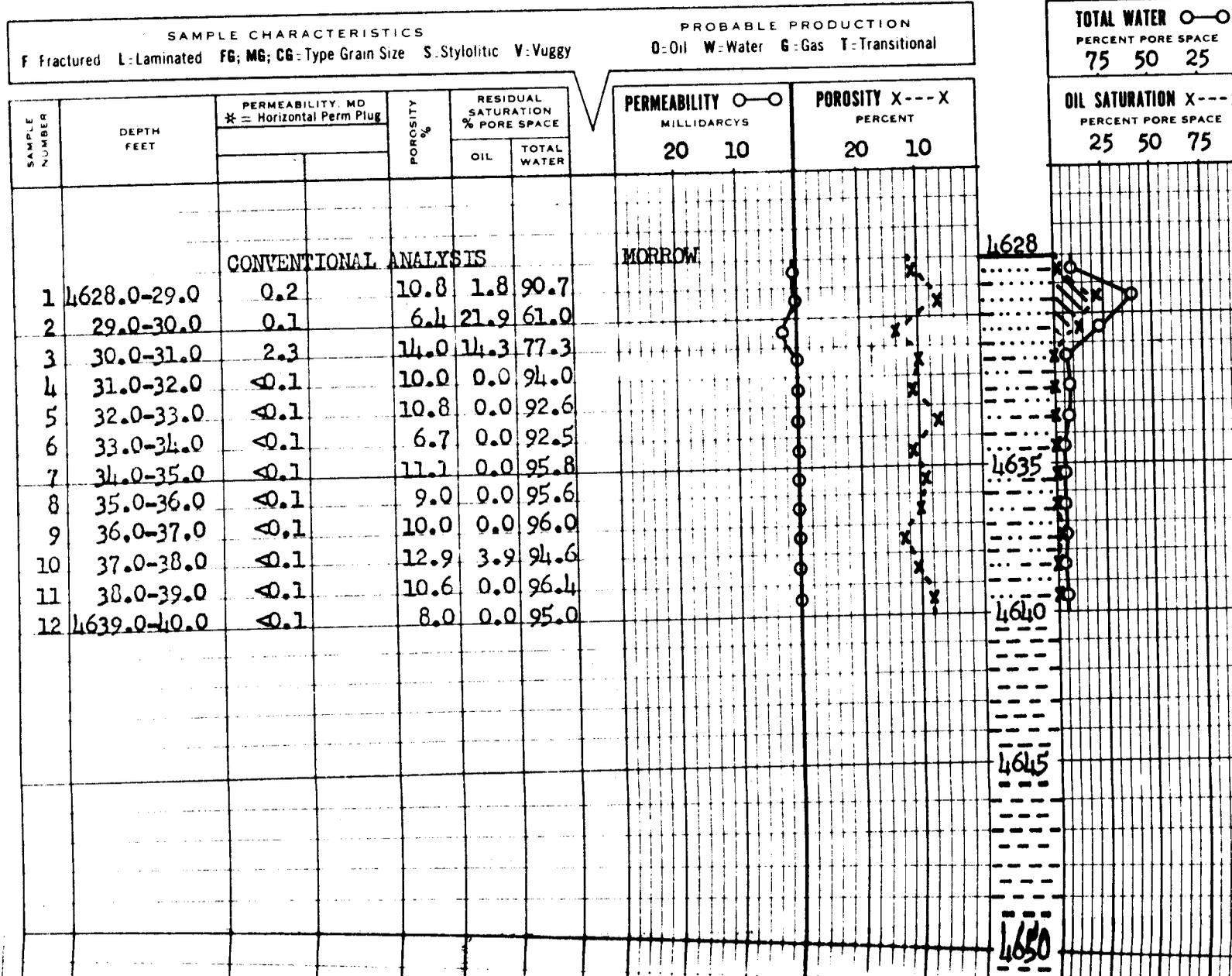
Petroleum Reservoir Engineering

COMPANY SHALLOW WATER REFINING COMPANY FILE NO. CP-12-1110  
 WELL MAUNE NO. 4 DATE AUGUST 30, 1963 ENGRS. DANIEL KEENE  
 FIELD NORTH EAST FORMATION AS NOTED ELEV. 2901' KB  
 COUNTY FINNEY STATE KANSAS DRLG FLD. WATER BASE MUD # CORES DIAMOND 3 1/2"  
 LOCATION C. NE NW SEC 31 21S 33W REMARKS SAMPLED AS DIRECTED BY CLIENT  
# OIL ADDED

## COMPLETION COREGRAPH

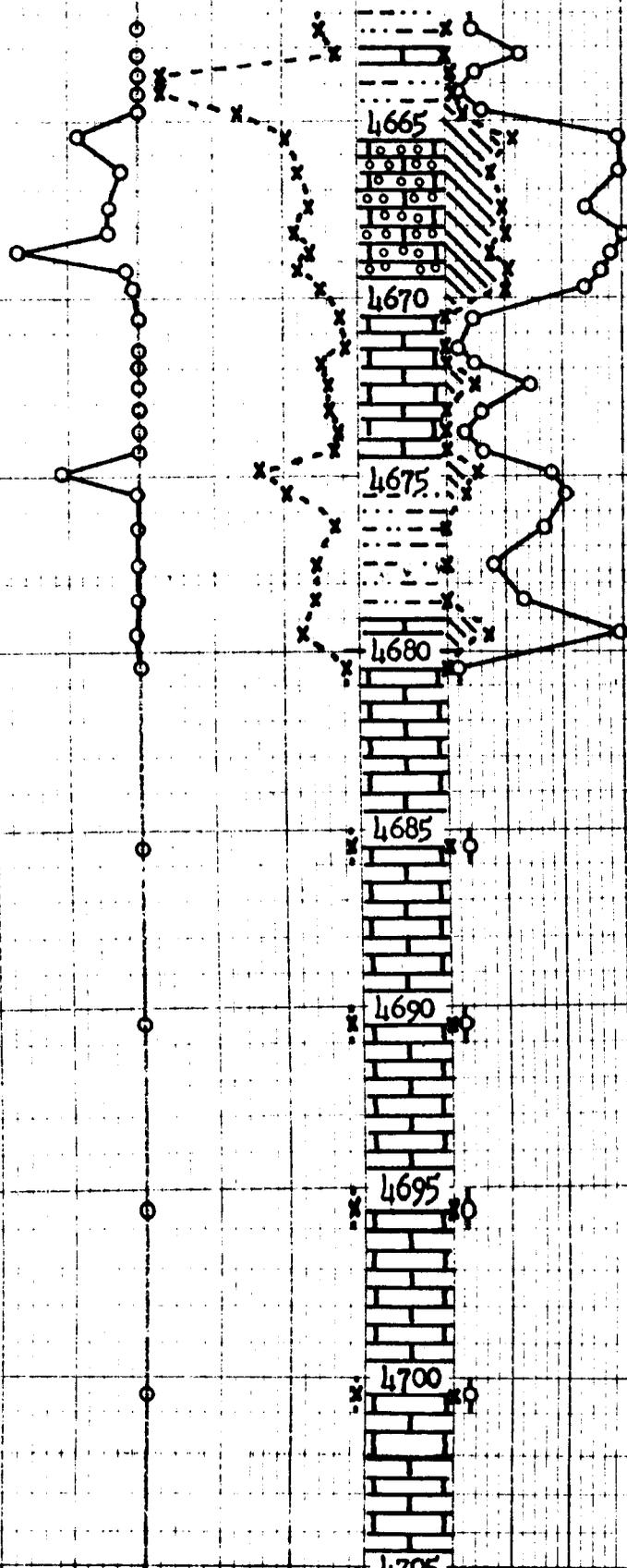
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SAND	LIMESTONE	CONGLOMERATE	CHERT	ANHYDRITE
SHALE	DOLOMITE	COOLITES		

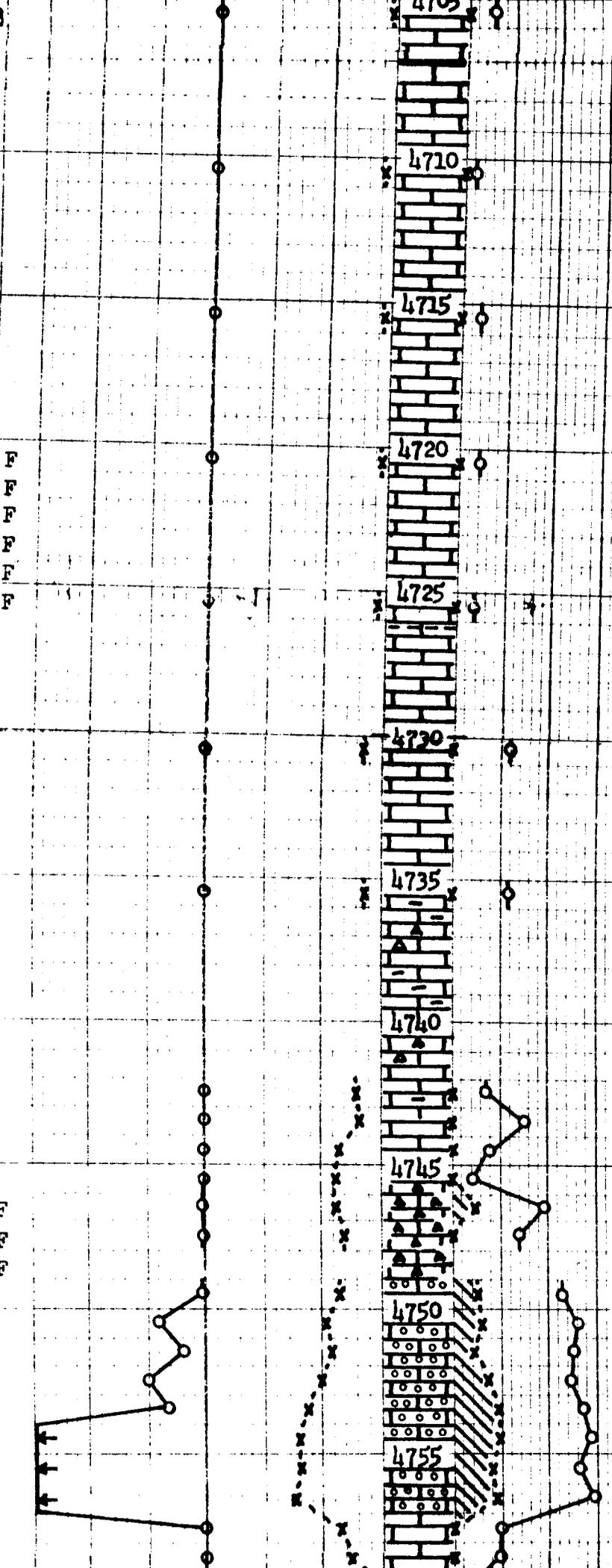


ST. LOUIS

13	4662.0-63.0	<0.1	4.9	0.0	87.9
14	63.0-63.5	<0.1	2.8	0.0	68.0 F
15	63.5-64.0	<0.1	27.1	2.6	87.1
16	64.0-64.5	<0.1	27.2	2.2	94.0
17	64.5-65.0	<0.1	16.5	8.5	84.4
18	65.0-66.0	8.3	9.7	28.9	26.8
19	66.0-67.0	2.4	8.0	20.0	25.0
20	67.0-68.0	4.0	6.2	24.2	40.3 F
21	68.0-68.5	4.1	8.3	25.4	24.1 F
22	68.5-69.0	17	6.1	19.7	29.5
23	69.0-69.4	1.8	8.0	26.2	33.7 F
24	69.4-70.0	0.9	4.7	25.6	40.5
25	70.0-71.3	<0.1	2.2	0.0	87.3
26	71.3-71.6	<0.1	1.8	0.0	94.7
27	71.6-72.0	<0.1	4.7	0.0	87.3
28	72.0-73.0	<0.1	3.9	12.8	64.0
29	73.0-73.4	<0.1	3.9	0.0	84.6
30	73.4-74.0	<0.1	2.5	0.0	92.0
31	74.0-74.7	<0.1	3.1	0.0	83.9
32	74.7-75.0	11	13.9	14.4	55.4
33	75.0-76.0	0.1	9.8	9.2	49.0
34	76.0-77.0	0.1	2.9	0.0	58.6
35	77.0-78.0	0.1	5.7	0.0	79.0
36	78.0-79.0	0.2	5.8	0.0	67.2
37	79.0-80.0	0.4	7.7	18.2	26.0
38	4680.0-81.0	<0.1	1.8	0.0	94.5
39	4685.0-86.0	<0.1	1.2	0.0	91.7
40	4690.0-91.0	<0.1	1.6	0.0	93.9
					F F F
41	4695.0-96.0	<0.1	1.6	0.0	93.9
42	4700.0-01.0	<0.1	1.3	0.0	92.5

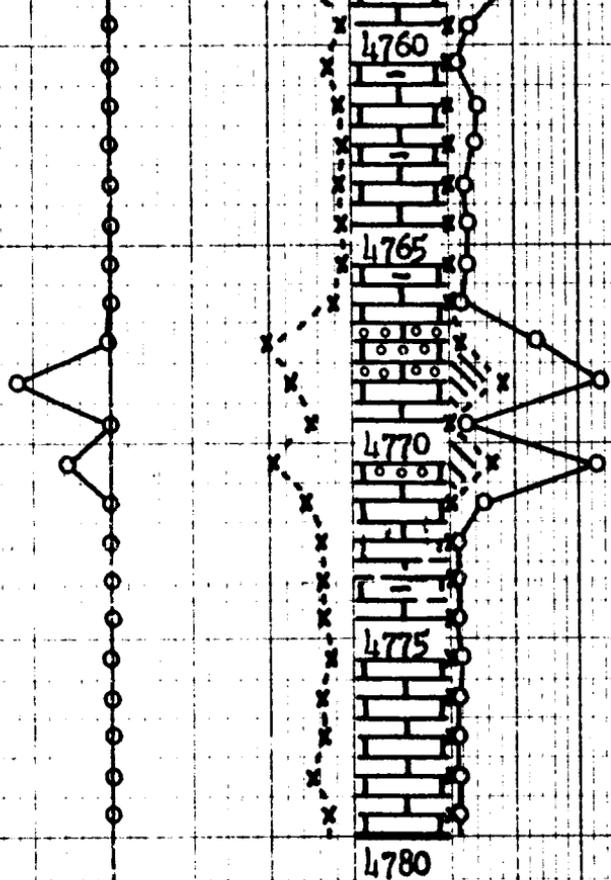


43	4705.0-06.0	<0.1	0.7	0.0	85.8
44	4710.0-11.0	<0.1	1.6	0.0	93.9
45	4715.0-16.0	<0.1	1.0	0.0	90.0
46	4720.0-21.0	<0.1	1.0	0.0	90.0
47	4725.0-26.0	<0.1	1.1	0.0	90.9
48	4730.0-31.0	<0.1	2.7	0.0	70.4
49	4735.0-36.0	<0.1	2.4	0.0	70.7
50	4742.0-43.0	<0.1	4.0	0.0	82.5
51	43.0-44.0	<0.1	3.7	0.0	62.2
52	44.0-45.0	<0.1	7.1	0.0	80.3
53	45.0-46.0	<0.1	7.6	0.0	89.5
54	46.0-47.0	0.2	7.5	12.0	52.0
55	4747.0-48.0	0.1	6.1	0.0	65.6
56	4749.0-50.0	0.2	6.8	13.2	42.7
57	50.0-51.0	8.0	9.3	15.1	34.4
58	51.0-52.0	4.0	8.2	11.0	36.6
59	52.0-53.0	10	10.0	18.0	38.0
60	53.0-54.0	6.5	12.4	23.4	31.4
61	54.0-55.0	185	14.1	24.1	28.4
62	55.0-56.0	123	14.0	20.7	34.2
63	56.0-57.0	140	15.3	22.2	26.1
64	57.0-58.0	<0.1	6.8	0.0	75.2
65	58.0-59.0	<0.1	1.0	0.0	75.5



65	58.0-59.0	0.1	4.9	0.0	91.8
66	59.0-60.0	0.1	1.2	0.0	91.8
67	60.0-61.0	0.1	2.6	0.0	96.2
68	61.0-62.0	0.1	1.7	0.0	88.4
69	62.0-63.0	0.1	1.0	0.0	90.0
70	63.0-64.0	0.1	1.6	0.0	93.7
71	64.0-65.0	0.1	1.3	0.0	92.5
72	65.0-66.0	0.1	1.3	0.0	92.5
73	66.0-67.0	0.1	2.2	0.0	95.5
74	67.0-68.0	0.3	10.2	4.9	66.6
75	68.0-69.0	12	7.7	20.8	41.6
76	69.0-70.0	0.1	4.7	0.0	93.5
77	70.0-71.0	5.4	9.7	16.5	42.3
78	71.0-72.0	0.1	5.8	0.0	86.4
79	72.0-73.0	0.1	3.9	0.0	97.0
80	73.0-74.0	0.1	3.9	0.0	97.0
81	74.0-75.0	0.1	3.6	0.0	97.2
82	75.0-76.0	0.1	2.4	0.0	95.9
83	76.0-77.0	0.1	3.9	0.0	97.0
84	77.0-78.0	0.1	3.6	0.0	97.2
85	78.0-79.0	0.1	4.7	0.0	96.0
86	4779.0-80.0	0.1	3.0	0.0	96.7

F  
F  
F





CORE LABORATORIES, INC.

Petroleum Reservoir Engineering

COMPANY SHALLOW WATER REFINING COMPANY FIELD NUNN EAST FILE CP-12-1140  
 WELL MAUNE NO. 4 COUNTY FINNEY DATE AUGUST 30, 1963  
 LOCATION NE NW SEC 31 21S 33W STATE KANSAS ELEV 2901' KB

# CORE-GAMMA CORRELATION

These analyses, opinions or interpretations are based on observations and material 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 accepted); but Core Laboratories, Inc. and its officers and employees, assume no responsibility and make no warranty or representations 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.

VERTICAL SCALE: 5" = 100'

## CORE-GAMMA SURFACE LOG (PATENT APPLIED FOR)

GAMMA RAY  
RADIATION INCREASE →

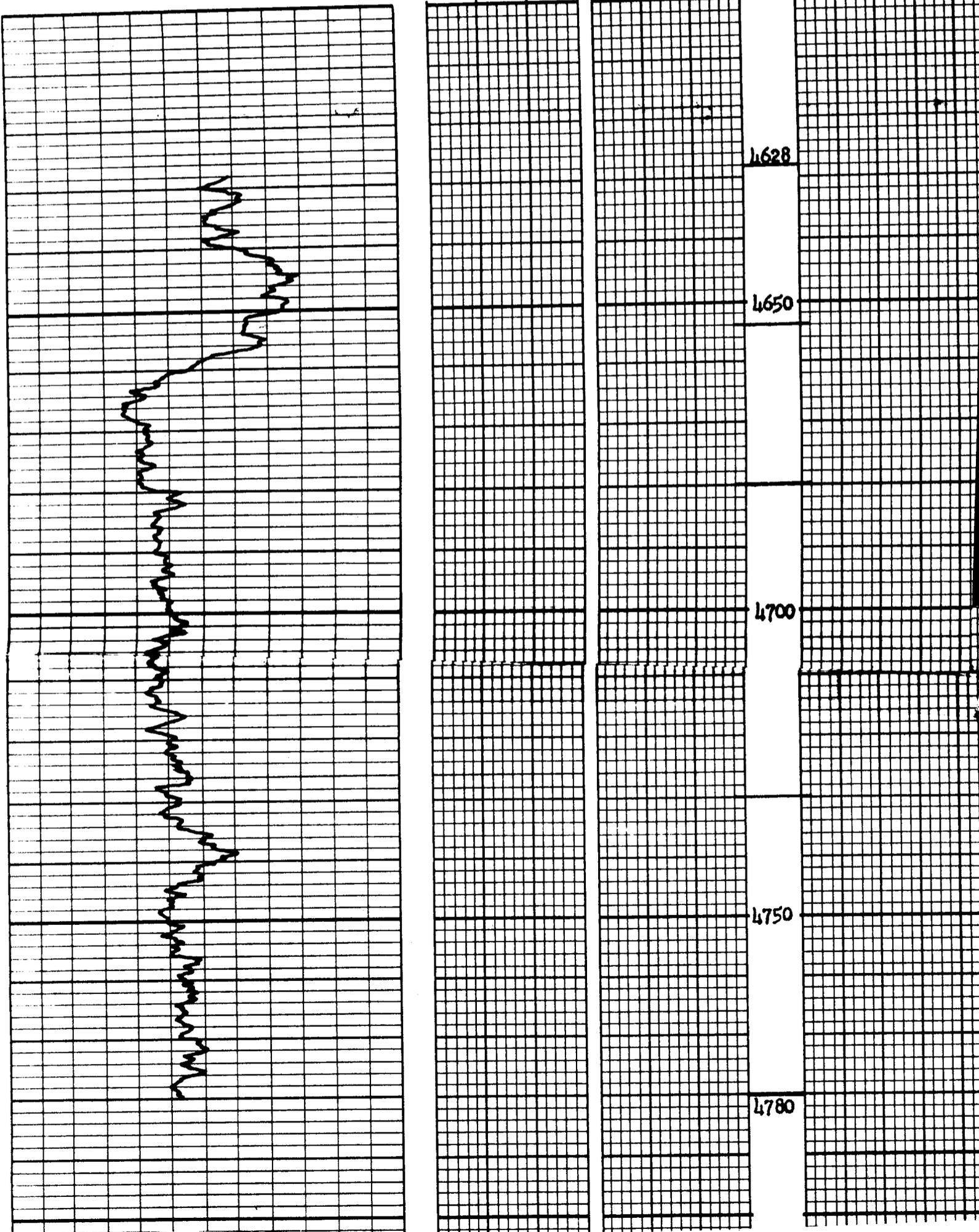
## COREGRAPH

TOTAL WATER \_\_\_\_\_  
PERCENT TOTAL WATER  
80 60 40 20

PERMEABILITY \_\_\_\_\_  
MILLIDARCS

POROSITY \_\_\_\_\_  
PERCENT

OIL SATURATION -----  
PERCENT PORE SPACE  
0 20 40 60 80









MEASURED SECTION NO. Hanford 4  
 LOCALITY Fossil Co. Kansas  
 SETTING \_\_\_\_\_

DATE 2-20-62  
 STRATIGRAPHIC UNIT Miss.  
 MEASURED BY Hanford

SEDIMENTARY TEXT & STRUCT			INTERVAL	BASIC ROCK TYPE	COLOR	TEXTURAL MAT. SUB. Maturity	DEG BIOTURE	L. REGIONAL FEATURES	CARBONATE COMPONENTS	FOSSILS					
CARBONATES										GRAV	SAND	SILT & CLAY	F	S	M
GEMPK WKB MUDST CLASTICS															
64	4	VCC M F VF													
			4700												
										17					
										15					
										13					
										20					
										11					
										18					
										16					
										7					
										8					
										12					
			10							20					
										10					
										22					
										17					
										4		med 172			
										15					

MEASURED SECTION NO. House #4  
 LOCALITY Finney Co., Kansas  
 SETTING \_\_\_\_\_

DATE 9-20-52  
 STRATIGRAPHIC UNIT M<sup>1</sup>  
 MEASURED BY Hogston

SEDIMENTARY TEXT & STRUCT			INTERVAL	BASIC ROCK TYPE	COLOR	TEXTURAL MATURITY	DEG BIOTURB	REGIONAL FEATURES	CARBONATE COMPONENTS	FOSSILS			
GRAV	SAND	SILT & CLAY								Ool. stain	a.s.h	s.s.	fossils
64 4	VCC M FVF												
[Hand-drawn sedimentary texture: wavy lines and dots]			17	[Hand-drawn rock type: brick pattern]									
[Hand-drawn sedimentary texture: wavy lines and dots]			18	[Hand-drawn rock type: brick pattern]									
[Hand-drawn sedimentary texture: wavy lines and dots]			20	[Hand-drawn rock type: brick pattern]									
[Hand-drawn sedimentary texture: wavy lines and dots]			21	[Hand-drawn rock type: brick pattern]									
[Hand-drawn sedimentary texture: wavy lines and dots]			22	[Hand-drawn rock type: brick pattern]									
[Hand-drawn sedimentary texture: wavy lines and dots]			24	[Hand-drawn rock type: brick pattern]									
[Hand-drawn sedimentary texture: wavy lines and dots]			26	[Hand-drawn rock type: brick pattern]									
[Hand-drawn sedimentary texture: wavy lines and dots]			28	[Hand-drawn rock type: brick pattern]									
[Hand-drawn sedimentary texture: wavy lines and dots]			30	[Hand-drawn rock type: brick pattern]									
[Hand-drawn sedimentary texture: wavy lines and dots]			32	[Hand-drawn rock type: brick pattern]									
[Hand-drawn sedimentary texture: wavy lines and dots]			34	[Hand-drawn rock type: brick pattern]									
[Hand-drawn sedimentary texture: wavy lines and dots]			36	[Hand-drawn rock type: brick pattern]									
[Hand-drawn sedimentary texture: wavy lines and dots]			38	[Hand-drawn rock type: brick pattern]									
[Hand-drawn sedimentary texture: wavy lines and dots]			40	[Hand-drawn rock type: brick pattern]									
[Hand-drawn sedimentary texture: wavy lines and dots]			42	[Hand-drawn rock type: brick pattern]									
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[Hand-drawn sedimentary texture: wavy lines and dots]			46	[Hand-drawn rock type: brick pattern]									
[Hand-drawn sedimentary texture: wavy lines and dots]			48	[Hand-drawn rock type: brick pattern]									
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[Hand-drawn sedimentary texture: wavy lines and dots]			60	[Hand-drawn rock type: brick pattern]									
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[Hand-drawn sedimentary texture: wavy lines and dots]			70	[Hand-drawn rock type: brick pattern]									
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[Hand-drawn sedimentary texture: wavy lines and dots]			84	[Hand-drawn rock type: brick pattern]									
[Hand-drawn sedimentary texture: wavy lines and dots]			86	[Hand-drawn rock type: brick pattern]									
[Hand-drawn sedimentary texture: wavy lines and dots]			88	[Hand-drawn rock type: brick pattern]									
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[Hand-drawn sedimentary texture: wavy lines and dots]			94	[Hand-drawn rock type: brick pattern]									
[Hand-drawn sedimentary texture: wavy lines and dots]			96	[Hand-drawn rock type: brick pattern]									
[Hand-drawn sedimentary texture: wavy lines and dots]			98	[Hand-drawn rock type: brick pattern]									
[Hand-drawn sedimentary texture: wavy lines and dots]			100	[Hand-drawn rock type: brick pattern]									

40-42  
51-72

43-44  
45-46  
51-52

44-45  
45-46  
51-52

44-45  
45-46  
51-52

Can't find fossils?  
Fossiliferous? -  
Fossiliferous? -  
Fossiliferous? -

3'  
15'

MEASURED SECTION NO. Ma 1-4  
 LOCALITY Finey Co., Kansas  
 SETTING \_\_\_\_\_

DATE 9-20-82  
 STRATIGRAPHIC UNIT Miss  
 MEASURED BY Hansford

SEDIMENTARY TEXT & STRUCT			INTERVAL	BASIC ROCK TYPE	COLOR	TEXTURAL MATURITY	DEG BIOTURB	REGIONAL FEATURES	CARBONATE COMPONENTS	FOSSILS							
CARBONATES										GRAV	SAND	SILT & CLAY	red stain	Pencil	1/4"	1/8"	φ
GEMPK WKR MUDST CLASTICS																	
64	4	VCC M FVF															
[Hand-drawn sedimentary texture: wavy lines and small circles]			473	[Hand-drawn basic rock type: horizontal lines]					[Hand-drawn carbonate components: grid with dots]								
[Hand-drawn sedimentary texture: wavy lines and small circles]			38	[Hand-drawn basic rock type: horizontal lines]	P4				[Hand-drawn carbonate components: grid with dots]				v.f. atz				
[Hand-drawn sedimentary texture: wavy lines and small circles]			26	[Hand-drawn basic rock type: horizontal lines]					[Hand-drawn carbonate components: grid with dots]								
[Hand-drawn sedimentary texture: wavy lines and small circles]			20	[Hand-drawn basic rock type: horizontal lines]					[Hand-drawn carbonate components: grid with dots]								
[Hand-drawn sedimentary texture: wavy lines and small circles]			18	[Hand-drawn basic rock type: horizontal lines]					[Hand-drawn carbonate components: grid with dots]								
[Hand-drawn sedimentary texture: wavy lines and small circles]			14	[Hand-drawn basic rock type: horizontal lines]					[Hand-drawn carbonate components: grid with dots]								
[Hand-drawn sedimentary texture: wavy lines and small circles]			12	[Hand-drawn basic rock type: horizontal lines]					[Hand-drawn carbonate components: grid with dots]								
[Hand-drawn sedimentary texture: wavy lines and small circles]			10	[Hand-drawn basic rock type: horizontal lines]					[Hand-drawn carbonate components: grid with dots]								
[Hand-drawn sedimentary texture: wavy lines and small circles]			8	[Hand-drawn basic rock type: horizontal lines]					[Hand-drawn carbonate components: grid with dots]								
[Hand-drawn sedimentary texture: wavy lines and small circles]			6	[Hand-drawn basic rock type: horizontal lines]					[Hand-drawn carbonate components: grid with dots]								
[Hand-drawn sedimentary texture: wavy lines and small circles]			4	[Hand-drawn basic rock type: horizontal lines]					[Hand-drawn carbonate components: grid with dots]								
[Hand-drawn sedimentary texture: wavy lines and small circles]			2	[Hand-drawn basic rock type: horizontal lines]					[Hand-drawn carbonate components: grid with dots]								
[Hand-drawn sedimentary texture: wavy lines and small circles]			0	[Hand-drawn basic rock type: horizontal lines]					[Hand-drawn carbonate components: grid with dots]								

MEASURED SECTION NO. Mans 4  
 LOCALITY Perm. Co. 10000  
 SETTING \_\_\_\_\_

DATE 2-2-62  
 STRATIGRAPHIC UNIT Perm.  
 MEASURED BY W. L. ...

SEDIMENTARY TEXT & STRUCT			INTERVAL	BASIC ROCK TYPE	COLOR	TEXTURAL MAT. SUB. MATURITY IN	DEG BIOTURE	DIRECTIONAL FEATURES	CARBONATE COMPONENTS	FOSSILS							
CARBONATES										GRAV 64 4	SAND VCC M FVF	SILT & CLAY	ORG. STAIN	ORG. S	FAB.	FANS	
GEMPE WKB MUDST CLASTICS																	
[Hand-drawn sedimentary texture]			47														
[Hand-drawn sedimentary texture]			48														
[Hand-drawn sedimentary texture]			49														
[Hand-drawn sedimentary texture]			50														
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[Hand-drawn sedimentary texture]			99														
[Hand-drawn sedimentary texture]			100														

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low - medium  
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5-10

5-10

