MUD AND CUTTINGS ANALYSIS REPORT

FOR

GULF OIL EXPLORATION & PRODUCTION CO.
BOPP NO. 2-17 WELL
KEARNY COUNTY, KANSAS

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
OKLAHOMA CITY, OKLAHOMA

July 30, 1980

Gulf Oil Exploration & Production Co.
324 North Robinson
Oklahoma City, Oklahoma 73102

Subject: Mud and Cuttings Analysis
Bopp No. 2-17 Well
Kearny County, Kansas
CLI File 3533-269-5

Gentlemen:

A mobile laboratory of Core Laboratories, Inc. was present at the site of the subject well during drilling operations between the depths of 2600 to 5005 feet.

Two men, using standard equipment and procedures, continuously monitored the drilling fluid for hydrocarbon content and examined the drill cuttings at regular intervals for gas and oil content and lithology. To supplement the hot wire gas detector, a programmed hydrocarbon detector (gas chromatagraph) was used for detecting and measuring each hydrocarbon in the total gas. The results of the observations are shown on the accompanying grapholog along with other pertinent information, including drilling rate data and drilling fluid properties.

We appreciate this opportunity to serve you.

Very truly yours,

CORE LABORATORIES, INC.

Cortez L. Mays

Cortez L. Mays
Central District Manager

CLM/ai

5 cc - Addressee

Log Analysis

Schlumberger

COMPANY: GULF EXPLORATION & PRODUCTION COMPANY
WELL: BOPP #2-17
FIELD: "WTR"
COUNTY: KEARNEY
STATE: KANSAS

DEPTH	R_w	R_T	R_{xo}/R_T	m & n	S_w RATIO	ϕ_D	ϕ_N	% POROSITY	% WATER	REMARKS
COUNSIL GROVE										
3040 - 44	.04	8		2		8	12	10	72	WET
TORONTO										
3870 - 78	"	11	2	"	70	12	14	13	46	PROB. OLICAS.
4140 - 44	"	23		"		2	7	4	100	TITE
4144 - 46	"	18	3	"	77	17	17	17	28	PROB. OLICAS.
4180 - 90	"	36	3	"	100	16	20	18	19	PROB OLICAS.
4410 - 16	"	20	3	"	100	22	26	23	19	"
MARMATON										
4486 - 96	"	13		"		6	8	7	79	WET
4505 - 10	"	12		"		11	11	11	53	POS. SHOW
4510 - 14	"	15	4	"	75	10	14	12	43	PROB. OLICAS.
UPPER MORROW										
4848 - 54	"	10		"		6	10	8	79	WET
LOWER MORROW										
4874 - 78	"	7				10	10	10	76	WET

DATE: 5-9-80
LOCATION: LIBERAL
ENGINEER: S. SCHEID

CORE LAB Grapholog

CORE LABORATORIES, INC.

COMPANY GULF OIL EXPLORATION AND PRODUCTION CO
WELL BOPP #2-17
FIELD WTR
COUNTY KEARNY STATE KANSAS
LOCATION SEC 17 22S--35W ELEVATION GL-3107
KB-3118

DEPTH LOGGED, FROM 2600 TO 5005 FT.
DATE LOGGED 5/2/80 TO 5/9/80
CREW CHIEF TAYLOR/LOUDON FILE NO. 269-05
DRLG. FLUID NATIVE 606 TO 2485 FT.
GEL AND PREMIX 2485 TO TD FT.

LEGEND

ABBREVIATIONS

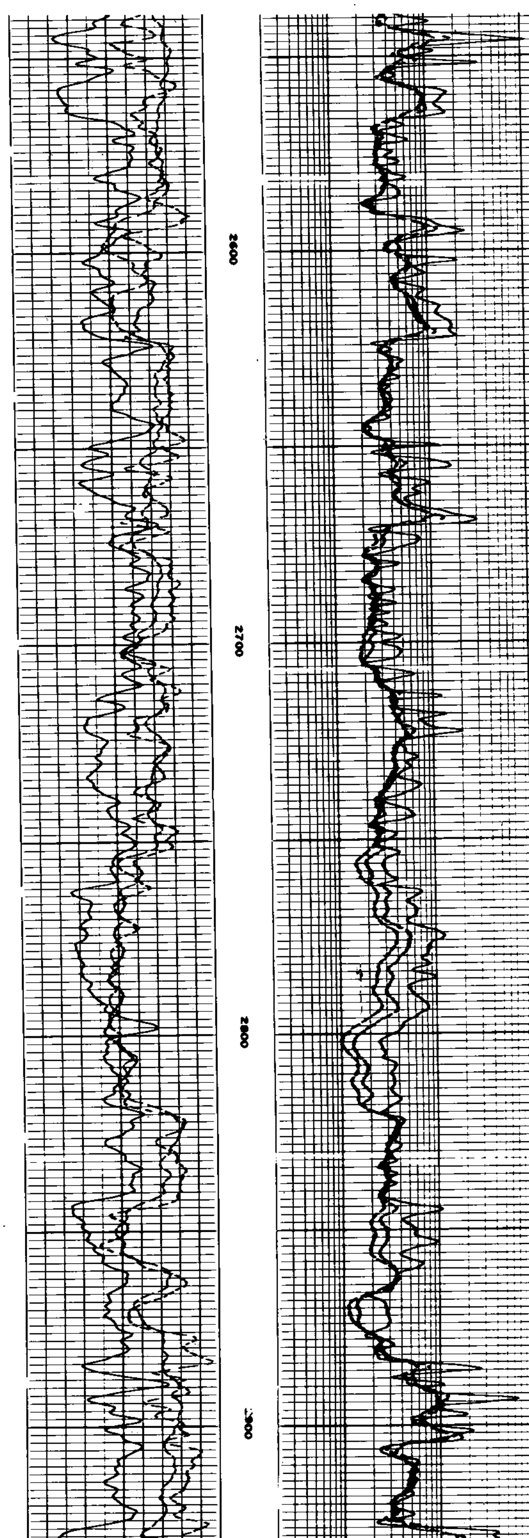
NB = NEW BIT
NCB = NEW CORE BIT
CO = CIRCULATED OUT
DST = DRILL STEM TEST
LAT = LOGGED AFTER TRIP
TG = TRIP GAS
NR = NO RETURNS
DS = DIRECTIONAL SURVEY
DC = DEPTH CORRECTION
DEPTHS CORRESPOND TO DRILL PIPE MEASUREMENTS

RESISTIVITY, OHM-METERS
Rm = MUD
Rmc = MUD CAKE
Rmf = MUD FILTRATE

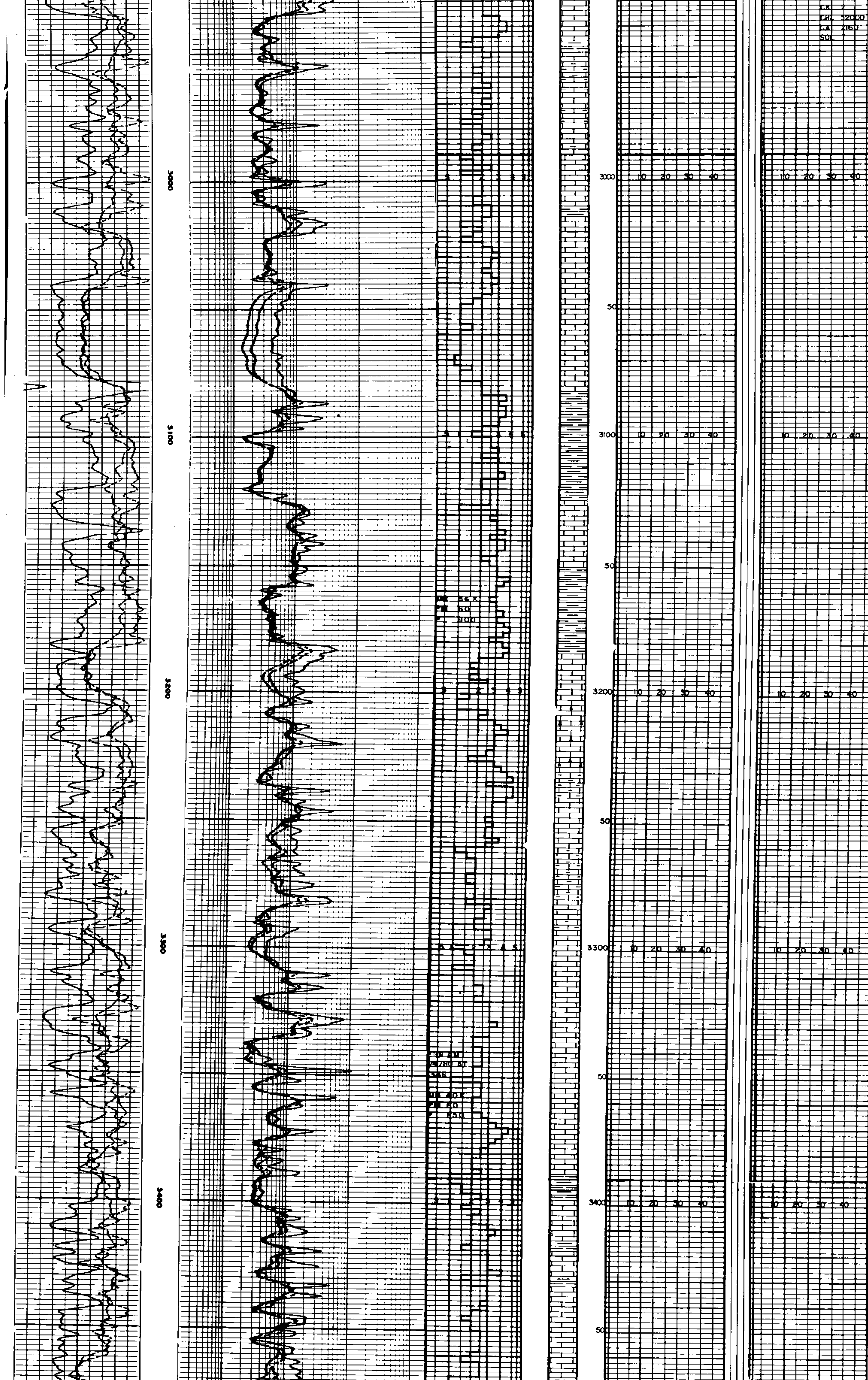
MUD DATA
CK = CAKE THICKNESS 32nds
V = VISCOSITY API SECONDS
F = FILTRATE API CC'S
W = WEIGHT
S = SALINITY, ppm Cl

LITHOLOGY

SAND, SALT, COAL, CONG, CLAY, DOLOMITE, ANHYDRITE OR GYPSUM, SHALE, CHERT, LIMESTONE, CHALK, SILTSTONE



DRILLING RATE MIN/FT ■ FT/HR □	POR G F P % VISUAL 75 50 25	LITH	DEPTH	HYDROCARBON ANALYSIS (HOT WIRE: Total Gas, Methane (by difference); ELECTRONIC: Methane, Ethane, Propane, Butane, Pentane) PHD CHROMATOGRAPH Units/Div Methane, Ethane & Propane, Butane & Pentane	FLUOR P F G 25 50 75	HOT WIRE TOTAL GAS & METHANE Units/Div CUTTINGS MUD	REMARKS FORMATION DESCRIPTION, MUD DATA, DRILL STEM TESTS, etc.
SPUD DATE 4/29/80 SURFACE CASING SET AT 606' SIZE 8-5/8"				TWO-MAN UNIT WITH GAS DETECTOR ON LOCATION AT 2550 BEGAN LOGGING 5/2/80		SAMPLES AND GAS LAGGED TO CORRECT DEPTH	
NB NO 2 STC F2 7-7/8" ON AT 1934							
			2600	10 20 30 40		10 20 30 40	DOL GY - BLK MOTT MOD DNS - DNS FN - V FN XTLN SLTY QTZ
							DOL GY - BLK MOTT MOD DNS FN - V FN XTLN
WOB 35K RPM 60-65 PP 900			50				DOL GY - BLK MOTT MOD DNS FN - V FN GRN
							DOL BUFF - CRM - LT GY FN GRN XTLN MOD DNS - DNS W/ SM INTCLST SUCR TEXT NO VIS POR
			2700			POOR SAMPLES	SH GY - LT GY MOTT BLKY TEXT V SLTY - SNDY IP
							SH GY - LT GY MOTT BLKY TEXT V SLTY - SNDY IP
			50				
5/3/80 12:01 AM 2775							DOL BUFF - CRM - LT GY MOD DNS FN XTLN
			2800	10 20 30 40		10 20 30 40	DOL BUFF - CRM - LT GY MOD DNS FN XTLN SHLY - SLTY
							DOL MED GY - LT GY MOTT W/ SM BLK PELS FN GRN XTLN MOD DNS - LOW DNS SHLY INTCLST NO VIS POR
			50				DOL AA
			2900				
						MUD WT 9.7 VIS 31 PV 4 YP 8 PH 7.0 FIL NC	LS WH - BUFF MOTT FN GRN SPAR MOD - LOW DNS CHKY IP TR QTZ INTCLST
							LS WH - BUFF MOTT



FN GRN SPAR
MOD - LOW DNS
CHKY IP

LS LT GY - MED GY
& TN MOTT
MED - FN SPAR
V SHLY - SLTY
PEL IP W/
TR VUG POR

LS GY CRM FN-MD
SPAR MOD-LOW
DNS CHLKY IP
INT CLSTS IP

SH LT GY CARB CMNT
SFT ARGIL NO VIS
Ø

LS GY & MD GY MOTT
CRM-WHT MIC
CALC CMNT MOD
DNS SUCR TEX

SH LT GY BLCKY TEX
CARB SFT

LS LT GY CRM MIC
MOD-LOW DNS
EARTH TEX W/
GY-BLK CHRT IP

LS WH SPAR ERTHY
TEX CALC CMNT
MOD-LOW DNS W/
SM GY CHRT IP

LS WH LT CRM MIC
MOD DNS EARTHY
TEX CALC CMNT
NO VIS Ø

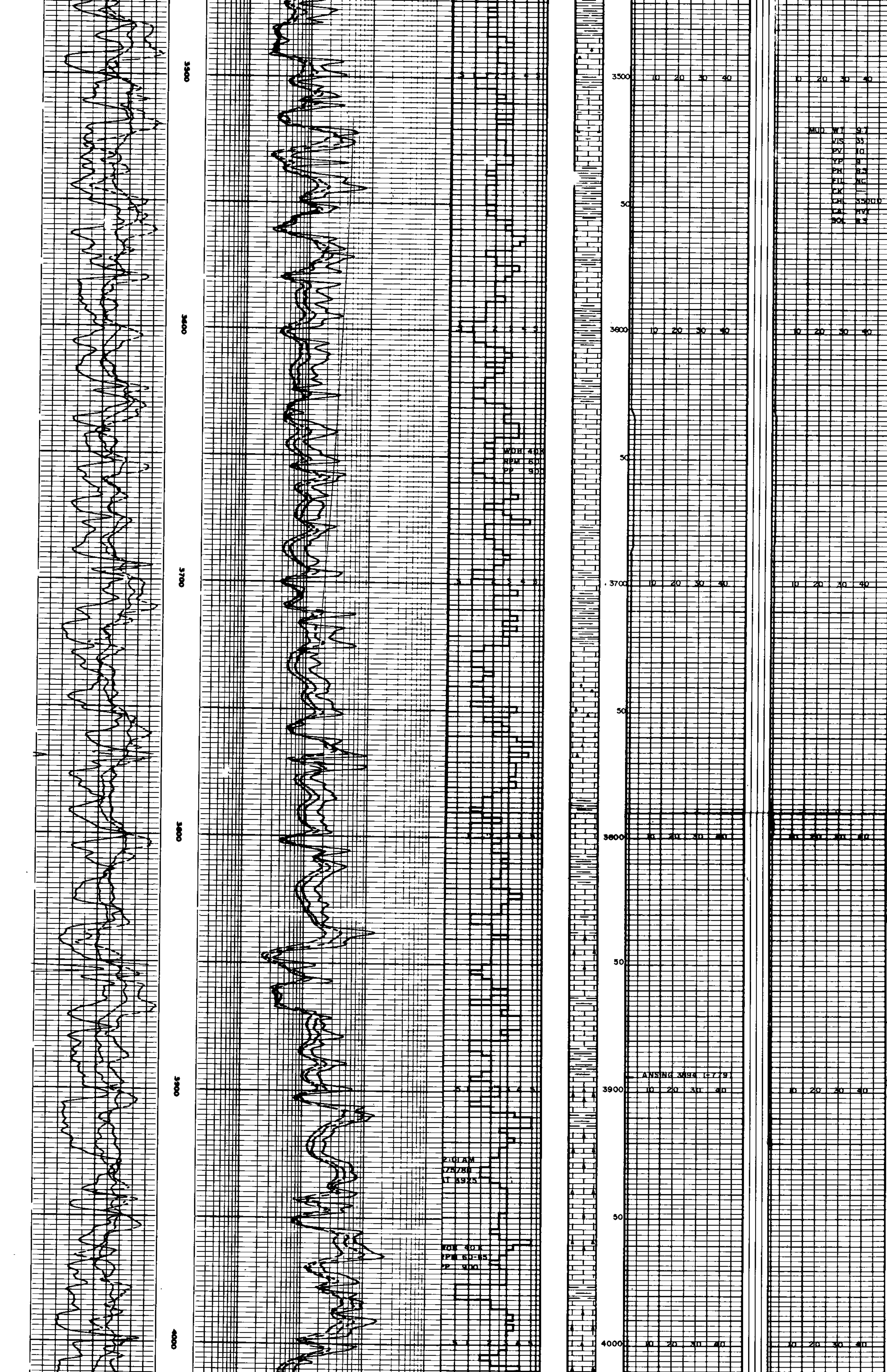
LS GY MOTT MIC-SPAR
MOD DNS ARGIL IP
NO VIS Ø

LS WH-LT GY MIC MOD
DNS CALC CMNT
NO VISØ

LS LT GY-BLK MOTT
SPAR MOD DNS
CALC CMNT NO VIS
Ø

LS LT GY CRM & BUFF
MOTT FN-VRY FN
SPAR MOD DNS W/
RDD QTZ INT CLST
TR GLAUC SHLY
INT CLSTS IP TR
INT PT Ø

LS CRM-BUFF FN SPAR
MOD DNS W/ SHLY
BDD LAYERS PYR



IP TR FOSS STEM
NO VIS Ø

SH GY LT GRN FSS TR CARB SFT

LS LT GY & BUFF & TN MOTT FN SPAR W/ TN-CRM MICTRIC INT CLSTS & MIC OOL SM PEL MOD DNS CHLKY IP TR SH-SLT

LS GY & MD GY MOTT BUFF FN-VRY FN S SPAR MOD DNS SLTY INT CLSTS TR PEL & SM MICRO BDD SHLY LAYERS BECOMING BUFF & CHLKY

SH LT OLV GRN-GY FSS VRY SFT IP ARGIL

LS BUFF LT CRM WHT VRY FN SPAR-MIC MOD DNS TR FOSS STEM SEGS PLTY FRAC

SH LT GY/GRN SLTY CALC CMNT

LS WHT LT GY W/ SM CRM MIC INT CLSTS FN-MD SPAR TR FOSS CRIN STEMS TR QTZ INT CLSTS

LS A/A BECOMING FN-VRY FN SPAR BIOMIC DNS

SH LT OLV GRN MD GY FSS BLKY

LS BUFF-CRM LT GY MOTT FN SPAR MOD LOW DNS QTZ INT CEBT IP CHLKY MATRIX W/ LT GY CHRT W/ SM OOL

LS TN INTRASPARRUDITE W/ SLTY/SHLY MICRO BDD LAYERS

LS LT CRM - V LT GY MIC - SPAR IP MOD SFT NO VIS POR POOR DULL YEL FLUO

SH MED GY BLKY TEXT V SLTY SL CARB

LS DK CRM MOTT MIC ARGIL IP CALC CMT SFT CHRT DK CRM - LT GY SM TEXT HCKY - CONCH FRAC BLK ASPHA OSTN FAIR YEL MINRL FLUO

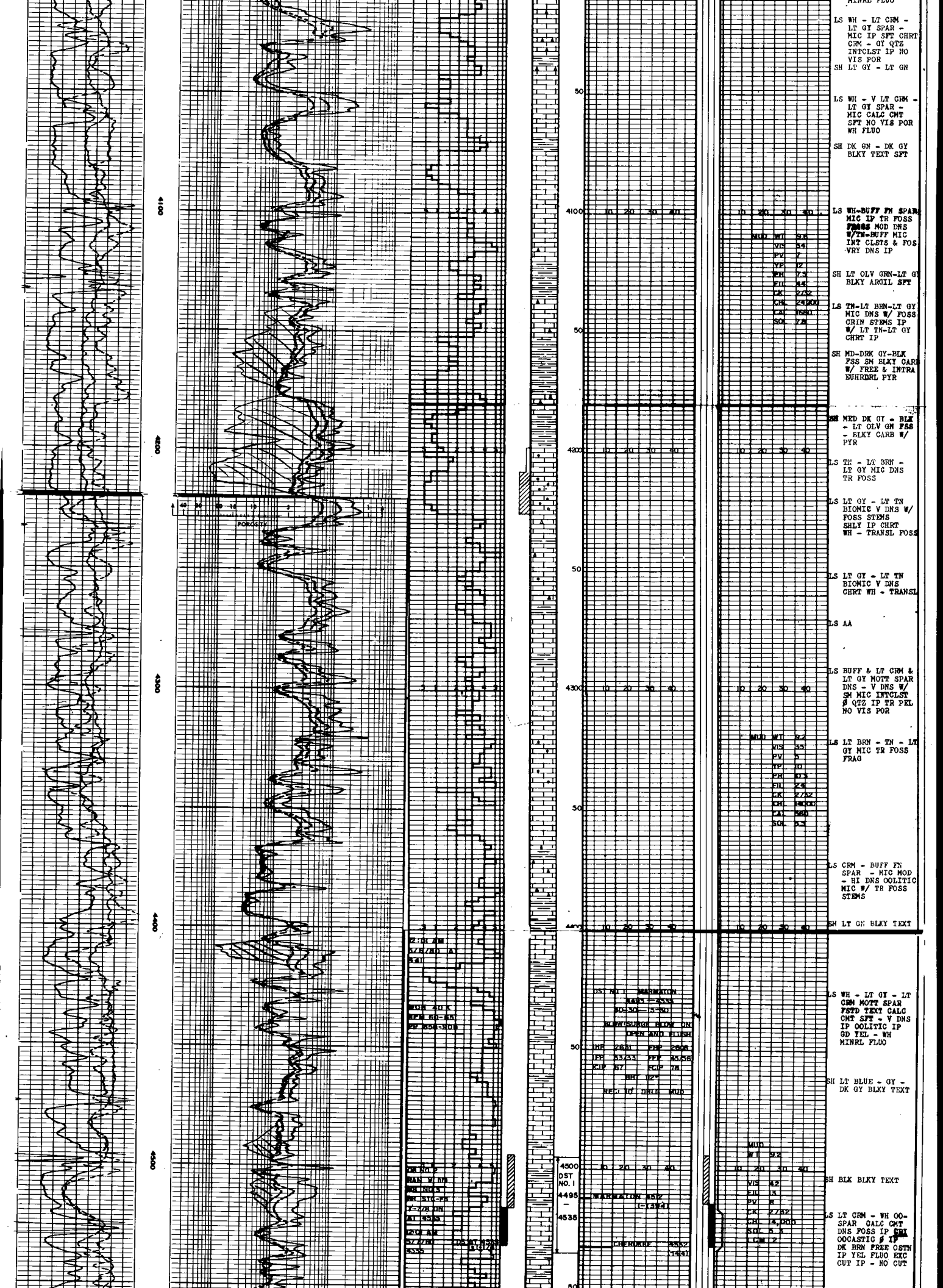
SAMPLES NOT CAUGHT

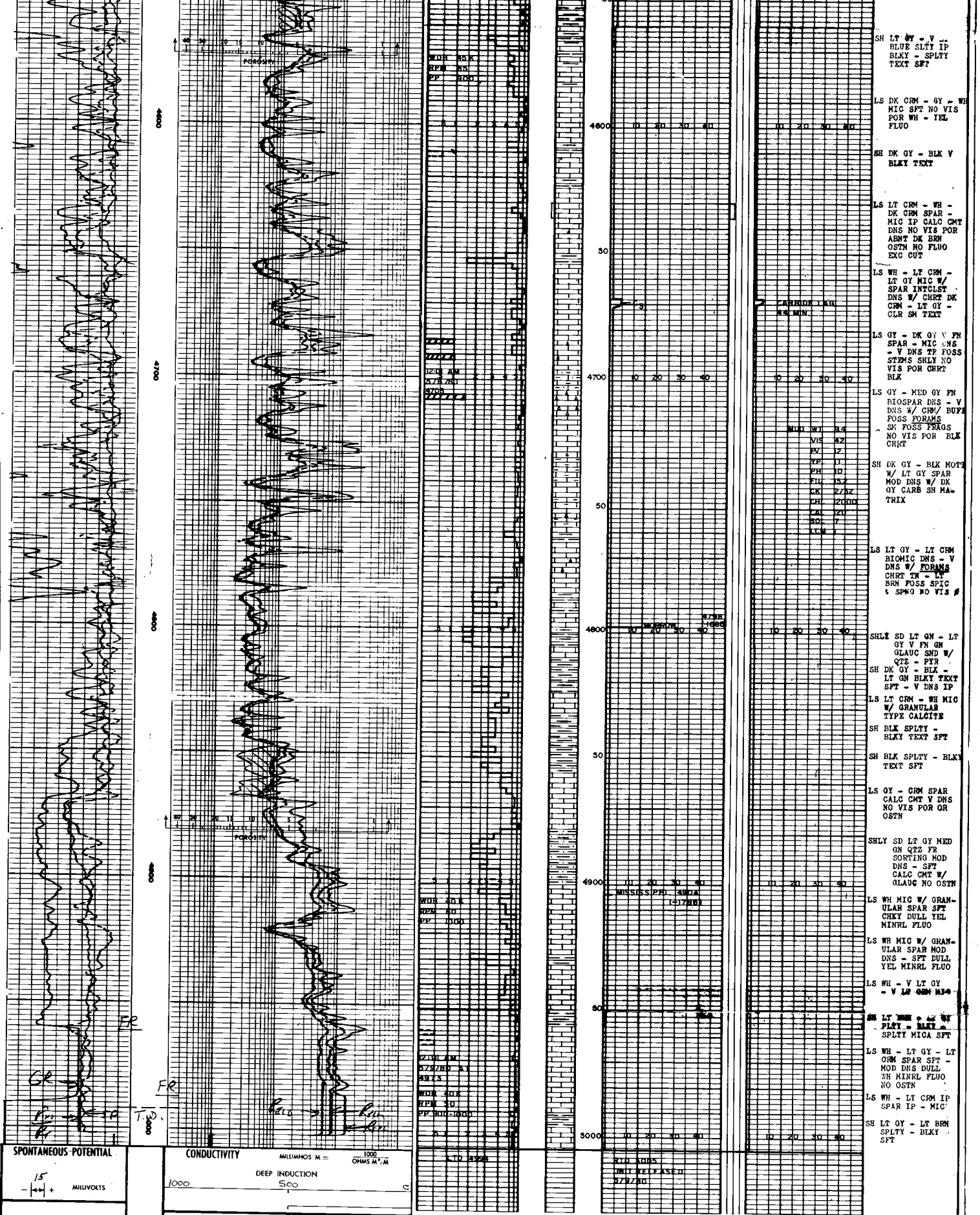
LS WH - MED CRM MIC FSTD TEXT CALC CMT V SFT CHRT LT GY - CLR ABNT BRIGHT WH FLUO

LS WH - V LT CRM MIC & SPAR CALC CMT SFT - DNS CHRT LT GY - CRM - CLR SM TEXT CONCH FRAC V DNS GD WH FLUO

LS LT CRM - WH S AR SFT CHRT WH - LT GY SM TEXT CONCH FRAC DNS

LS V LT CRM - WH SPAR W/ MIC MATRIX CALC CMT QTZ INTCLST IP OOLITIC IP CHRT LT GY - DK GY SM TEXT CONCH FRAC EXC WH MINRL FLUO


LS WH - LT GRM - LT GY SPAR - MIC IP SFT CHRT GRM - GY QTZ INTCLST IP NO VIS POR
SH LT GY - LT GN
LS WH - V LT GRM - LT GY SPAR - MIC CALC CMT SFT NO VIS POR WH FLUO
SH DK GN - DK GY BLKY TEXT SFT
LS WH-BUFF FN SPAR MIC IP TR FOSS FRAG MOD DNS W/TN-BUFF MIC INT CLSTS & FOS VRY DNS IP
SH LT OLV GRN-LT GY BLKY ARGIL SFT
LS TN-LT BRN-LT GY MIC DNS W/ FOSS STEMS IP W/ LT TN-LT GY CHRT IP
SH MD-DRK GY-BLK FSS SM BLKY CARB W/ FREE & INTRA EUHRDRL PYR
SH MED DK GY - BLK - LT OLV GN FSS - BLKY CARB W/ PYR
LS TN - LT BRN - LT GY MIC DNS TR FOSS
LS LT GY - LT TN BIOMIC V DNS W/ FOSS STEMS SHLY IP CHRT WH - TRANSL FOSS
LS LT GY - LT TN BIOMIC V DNS CHRT WH - TRANSL
LS AA
LS BUFF & LT GRM & LT GY MOTT SPAR DNS - V DNS W/ SM MIC INTCLST Ø QTZ IP TR PEL NO VIS POR
LS LT BRN - TN - LT GY MIC TR FOSS FRAG
LS GRM - BUFF FN SPAR - MIC MOD - HI DNS OOLITIC MIC W/ TR FOSS STEMS
SH LT GN BLKY TEXT
LS WH - LT GY - LT GRM MOTT SPAR FSTD TEXT CALC CMT SFT - V DNS IP OOLITIC IP GD YEL - WH MINRL FLUO
SH LT BLUE - GY - DK GY BLKY TEXT
SH BLK BLKY TEXT
LS LT GRM - WH OO-SPAR CALC CMT DNS FOSS IP GRN OOCASTIC Ø IP DK BRN FREE OSTN IP YEL FLUO EXC CUT IP - NO CUT
MUD WT 9.6 VIS 54 PV 7 YP 12 PH 7.5 FIL 4.4 CK 2/32 CHL 24000 CA 1680 SOL 7.8
MUD WT 9.2 VIS 55 PV 5 YP 10 PH 10.5 FIL 2.8 CK 2/32 CHL 18000 CA 360 SOL 5.3
MUD WT 9.2 VIS 42 FIL 13 PV 8 CK 2/32 CHL 14,000 SOL 5.5 LCM 2
DST NO. 1 MARMATON 4495 - 4535 30-30-30-30 BLOWISURGE BLOW DN OPEN AND FLUSH IHP 2681 FHP 2668 IFP 53/53 FFP 85/58 ICIP 87 FCIP 78 BHT 124° REC 30' DNLG MUD
4500 DST NO. 1 4495 - 4535 MARMATION 85% (-1341) CHEROKEE 85% (-1441)



SPONTANEOUS POTENTIAL
15
− + MILLIVOLTS

R_{xo}/R_t

GAMMA RAY
0 150
150 300

CONDUCTIVITY MILLIMHOS M = $\frac{1000}{\text{OHMS M}^2/\text{M}}$
DEEP INDUCTION
1000 500 0

RESISTIVITY OHMS M²/M
DEEP INDUCTION R_{ID}
0 50

SPHERICALLY FOCUSED LOG R_{SFL}
0 50

Schlumberger

DUAL INDUCTION-SFL
WITH LINEAR CORRELATION

WITH LINEAR CORRELATION LOG

COMPANY GULF EXPLORATION & PRODUCTION CO., INC.

WELL BOPP #2-17

FIELD "WTR"

COUNTY KEARNEY STATE KANSAS

LOCATION CSE-SE

API SERIAL NO | SEC 17 | TWP 22S | RANGE 35W

Other Services: FDC-CNL-GR

Permanent Datum: GROUND LEVEL, Elev.: 3107

Log Measured From KB, 11 ft. Above Perm. Datum

Drilling Measured From KB

Elev.: K.B. 3118, D.F. —, G.L. 3107

Date	5/9/80				
Run No.	ONE				
Depth—Driller	5095				
Depth—Logger	4992				
Btm. Log Interval	4986				
Top Log Interval	656				
Casing—Driller	8 5/8 @ 606	@	@	@	
Casing—Logger	600				
Bit Size	7 7/8				
Type Fluid in Hole	CHEMICAL				
Dens. / Visc.	9.1 / 47				
pH / Fluid Loss	10 / 15.1 ml		ml	ml	ml
Source of Sample	FLOW LINE				
Rm @ Meas. Temp.	.867 @ 74 °F	@ °F	@ °F	@ °F	@ °F
Rmf @ Meas. Temp.	.650 @ 73 °F	.413 @ 115 °F	@ °F	@ °F	@ °F
Rmc @ Meas. Temp.	— @ — °F	@ °F	@ °F	@ °F	@ °F
Source: Rmf / Rmc	M. / —				
Rm @ BHT	.558 @ 115 °F	@ °F	@ °F	@ °F	@ °F
TIME: Circulation Stopped	0900				
TIME: Logger on Bottom	1209				
Max. Rec. Temp.	114 °F	°F	°F		°F
Equip. / Location	1734 / LIBERAL				
Recorded By	SCOTT SCHEID				
Witnessed By MR.	JOHN RENM				