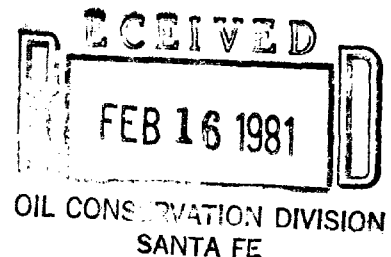


Energy Reserves Group, Inc.
P.O. Box 3280
Casper, Wyoming 82602
Phone 307 265 7331



11 February 1981

Oil Conservation Commission
State of New Mexico
P.O. Box 2088
Santa Fe, New Mexico 87501

Subject: Application of Energy Reserves Group, Inc., for permission
permitting the disposal of produced water from the Pictured
Cliffs Formation into the Mesa Verde Formation, Gallegos
Canyon Unit Well No. 328.

Gentlemen:

Energy Reserves Group, Inc., presents to the Oil Conservation Commission
the following application and requests that administrative approval be
granted. The following data is submitted.

- A. Applicant is a working-interest owner and the suboperator of the Gallegos Canyon Unit, West Kutz Pictured Cliffs Field, located in Township 27, 28, and 29 North, Ranges 11, 12, and 13 West, San Juan County, New Mexico.
- B. The applicant desires to dispose of water produced from the Pictured Cliffs formation from the Gallegos Canyon Unit into the Mesa Verde formation, through the wellbore of Gallegos Canyon Unit #328, located 1,070' FSL, 1,520' FWL Sec. 33-T29N-R12W, San Juan County, New Mexico.

Applicant presents the following in support of the application:

1. Exhibit A-Plat showing the location of the proposed input well and location of all oil and gas wells including abandoned and dry holes, and the names of operators within a two mile radius of the proposed input well.
2. Exhibit B-Water analysis of the Pictured Cliffs water. Approximately 1235 BWPD will be disposed of into well No. 328.
3. It is proposed to inject the produced Pictured Cliffs water into the Mesa Verde formation in the Gallegos Canyon Unit No. 328 through perforations from 2,852'-3,797'. Exhibit C are log sections of well number 328.
4. Exhibit D-Water analysis of the water contained in the Mesa Verde formation.
5. Exhibit E-Schematic diagram of the wellbore of Gallegos Canyon Unit #328, showing all pertinent data.
6. Injection will be through 2-3/8" plastic-coated steel tubing with an injection packer set at approximately 50' above the top of the injection zone. Anticipated maximum injection pressure will be 900 psi.



Page 2 - continued

7. Exhibit F-Wellbore diagram of Amoco Gallegos Canyon Unit #159. This is the only wellbore that penetrates the Mesa Verde formation within 1/2 mile of Gallegos Canyon Unit #328.

Sincerely yours,
ENERGY RESERVES GROUP, INC.

R.E. Schanaman
Production Engineer
Rocky Mountain District

RES:erl

NEW MEXICO OIL CONSERVATION COMMISSION

APPLICATION TO DISPOSE OF SALT WATER BY INJECTION INTO A POROUS FORMATION

Form O-108

Revised 3-1-68

FEB 13 1981

OPERATOR Energy Reserves Group, Inc.		ADDRESS P.O. Box 3280, Casper, Wyoming 82602	
LEASE NAME Gallegos Canyon Unit	WELL NO. 328	FIELD West Kutz	COUNTY San Juan
LOCATION UNIT LETTER <u>N</u> ; WELL IS LOCATED <u>1070'</u> FEET FROM THE <u>South</u> LINE AND <u>1520'</u> FEET FROM THE <u>West</u> LINE, SECTION <u>33</u> TOWNSHIP <u>29N</u> RANGE <u>12W</u> NMPM. <u>San Juan County, New Mexico</u>			

CASING AND TUBING DATA

NAME OF STRING	SIZE	SETTING DEPTH	SACKS CEMENT	TOP OF CEMENT	TOP DETERMINED BY
SURFACE CASING	9-5/8"	277'	275	Surface	Cmt circulated
INTERMEDIATE					
LONG STRING	7"	4,085'	1000	Surface	Cmt circulated
TUBING			NAME, MODEL AND DEPTH OF TUBING PACKER		
Plastic Lined	2-3/8"	2,805'	Baker Lok-Set @ 2,805'		
NAME OF PROPOSED INJECTION FORMATION Mesa Verde			TOP OF FORMATION 2,834'		BOTTOM OF FORMATION 4,020'
IS INJECTION THROUGH TUBING, CASING, OR ANNULUS? Tubing		PERFORATIONS OR OPEN HOLES Perforations	PROPOSED INTERVAL(S) OF INJECTION 2,852' - 3,797'		
IS THIS A NEW WELL DRILLED FOR DISPOSAL? Yes		IF ANSWER IS NO, FOR WHAT PURPOSE WAS WELL ORIGINALLY DRILLED? (It also was drilled as a Fruitland producer)		HAS WELL EVER BEEN PERFORMED IN ANY ZONE OTHER THAN THE PROPOSED INJECTION ZONE? Fruitland	
LIST ALL SUCH PERFORATED INTERVALS AND SACKS OF CEMENT USED TO SEAL OFF OR SQUEEZE EACH					
This well will be dually completed as a Fruitland producer and Mesa Verde injector					
DEPTH OF BOTTOM OF DEEPEST FRESH WATER ZONE IN THIS AREA Approximately 270'		DEPTH OF BOTTOM OF NEXT HIGHER OIL OR GAS ZONE IN THIS AREA Pictured Cliffs @ 1,560'		DEPTH OF TOP OF NEXT LOWER OIL OR GAS ZONE IN THIS AREA Gallup @ approximately 5,100'	
ANTICIPATED DAILY INJECTION VOLUME (BBLS.) 1235	MINIMUM 800	MAXIMUM 1300	OPEN OR CLOSED TYPE SYSTEM Open	IS INJECTION TO BE BY GRAVITY OR PRESSURE? Pressure	APPROX. PRESSURE (PSI) 900 psi
ANSWER YES OR NO WHETHER THE FOLLOWING WATERS ARE MINERALIZED TO SUCH A DEGREE AS TO BE UNFIT FOR DOMESTIC, STOCK, IRRIGATION, OR OTHER GENERAL USE -			WATER TO BE DISPOSED OF Yes	NATURAL WATER IN DISPOSAL ZONE Yes	ARE WATER ANALYSES ATTACHED? Yes
NAME AND ADDRESS OF SURFACE OWNER (OR LESSEE, IF STATE OR FEDERAL LAND) Federal Land					
LIST NAMES AND ADDRESSES OF ALL OPERATORS WITHIN ONE-HALF (1/2) MILE OF THIS INJECTION WELL Amoco Production Company, Security Life Building - Denver, Colorado 80202					
HAVE COPIES OF THIS APPLICATION BEEN SENT TO EACH OF THE FOLLOWING?		SURFACE OWNER Yes		EACH OPERATOR WITHIN ONE-HALF MILE OF THIS WELL Yes	
ARE THE FOLLOWING ITEMS ATTACHED TO THIS APPLICATION (SEE RULE 701-B)		PLAT OF AREA Yes		ELECTRICAL LOG Yes	
				DIAGRAMMATIC SKETCH OF WELL Yes	

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

(Signature)

Production Engineer - RMD

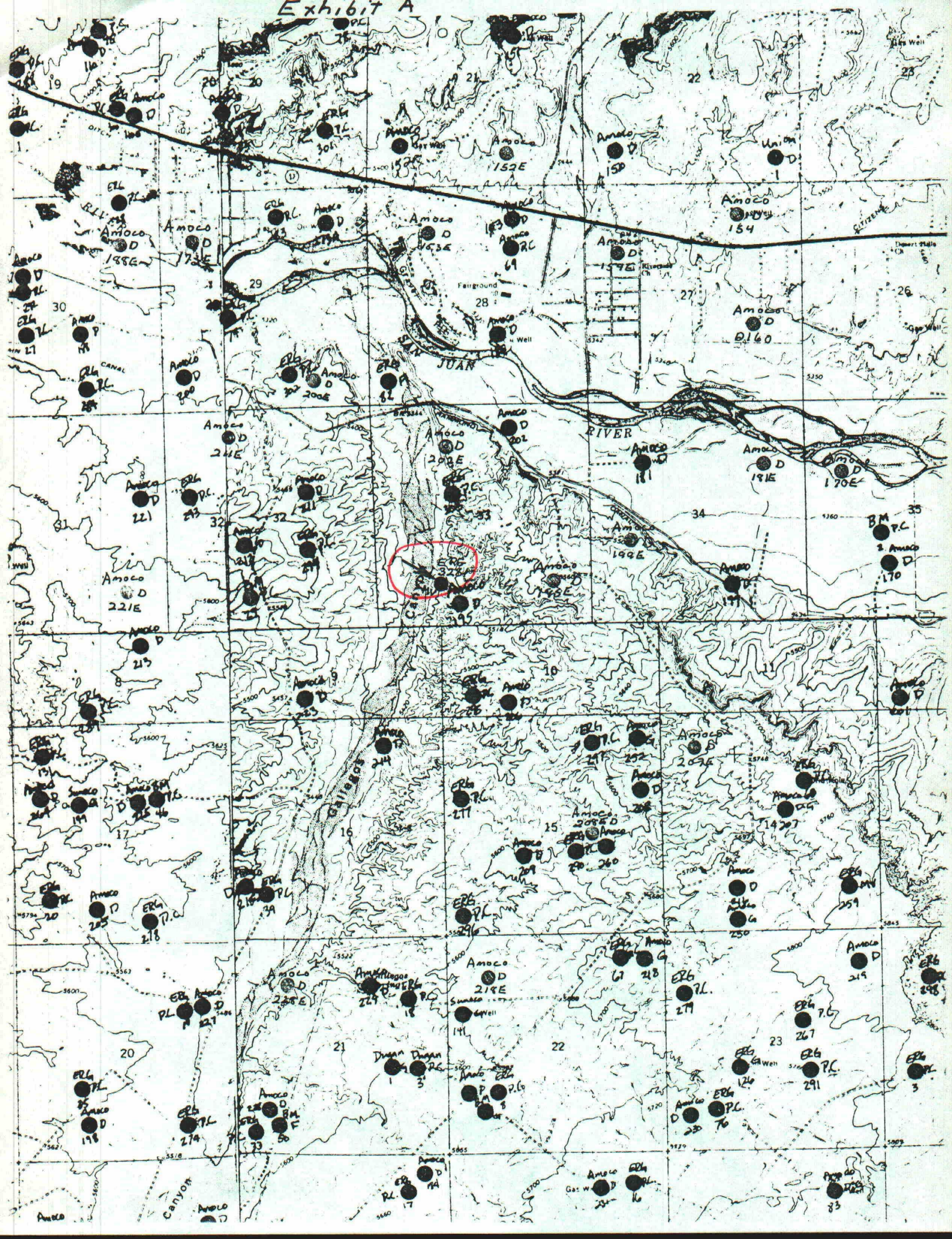
(Title)

11 February 1981

(Date)

NOTE: Should waivers from the surface owner and all operators within one-half mile of the proposed injection well not accompany this application, the New Mexico Oil Conservation Commission will hold the application for a period of 15 days from the date of receipt by the Commission's Santa Fe office. If at the end of the 15-day waiting period no protest has been received by the Santa Fe office, the application will be processed. If a protest is received, the application will be set for hearing, if the applicant so requests. SEE RULE 701.

Exhibit A



Chemical Consultants

All Types Oil Field Chemicals and Services

P.O. Box 421 • 515 So. Miller
Farmington, New Mexico 87401

WATER ANALYSIS TEST REPORT

COMPANY							SHEET NUMBER
Energy Reserves Group							DATE
FIELD							1-10-81
West Kutz Pictured Cliffs					COUNTY OR PARISH	STATE	
San Juan					New Mexico		
LEASE OR UNIT			WELL(S) NAME OR NO.		WATER SOURCE (FORMATION)		
Gallegos Canyon Unit			Well # 307		Pictured Cliffs		
DEPTH, FT.	BHT, F	SAMPLE SOURCE	TEMP, F	WATER, BBL/DAY	OIL, BBL/DAY	GAS, MMCF/DAY	
		Injection Tanks					
TYPE OF OIL		API GRAVITY	TYPE OF WATER				
		0	☐ PRODUCED WATER ☒ INJECTION WATER OTHER _____				

WATER ANALYSIS PATTERN
(NUMBER BESIDE ION SYMBOL INDICATES mg/l * SCALE UNIT)

Na ⁺ 20	15	10	5	0	5	10	15	20 Cl ⁻
Ca ⁺⁺								HCO ₃ ⁻
Mg ⁺⁺								SO ₄ ⁼
Fe ⁺⁺⁺								CO ₃ ⁼

DISSOLVED SOLIDS

CATIONS

	me/l *	mg/l *
Total Hardness	65	3300 as CaCO ₃
Sodium, Na ⁺ (calc.)	737	18,101
Calcium, Ca ⁺⁺	46	920
Magnesium, Mg ⁺⁺	20	243
Iron (Total), Fe ⁺⁺⁺	.1	2

ANIONS

Chloride, Cl ⁻	846	30,000
Sulfate, SO ₄ ⁼	0	0
Carbonate, CO ₃ ⁼	0	0
Bicarbonate, HCO ₃ ⁻	7.7	470
Hydroxyl, OH ⁻	0	0
Sulfide, S ⁼		
Phosphate-Meta, PO ₃ ⁼		
Phosphate-Ortho, PO ₄ ⁼		

DISSOLVED GASES

Hydrogen Sulfide, H ₂ S	_____	mg/l *
Carbon Dioxide, CO ₂	_____	mg/l *
Oxygen, O ₂	_____	mg/l *

PHYSICAL PROPERTIES

pH	6.4	
Eh (Redox Potential)	_____	MV
Specific Gravity	_____	
Turbidity, JTU Units	_____	
Total Dissolved Solids (Calc.)	_____	mg/l *
Stability Index @ _____ F	_____	
CaSO ₄ Solubility @ _____ F	_____	mg/l *
Max. CaSO ₄ Possible (Calc.)	_____	mg/l *
Max. BaSO ₄ Possible (Calc.)	_____	mg/l *
Residual Hydrocarbons	_____	ppm (Vol/Vol)

SUSPENDED SOLIDS (QUALITATIVE)

 Iron Sulfide ☐ Iron Oxide ☐ Calcium Carbonate ☐ Acid Insoluble ☐

REMARKS AND RECOMMENDATIONS:

* NOTE: me/l and mg/l are commonly used interchangeably for epm and ppm respectively. Where epm and ppm are used, corrections should be made for specific gravity.

ENGINEER

DIST. NO.

ADDRESS

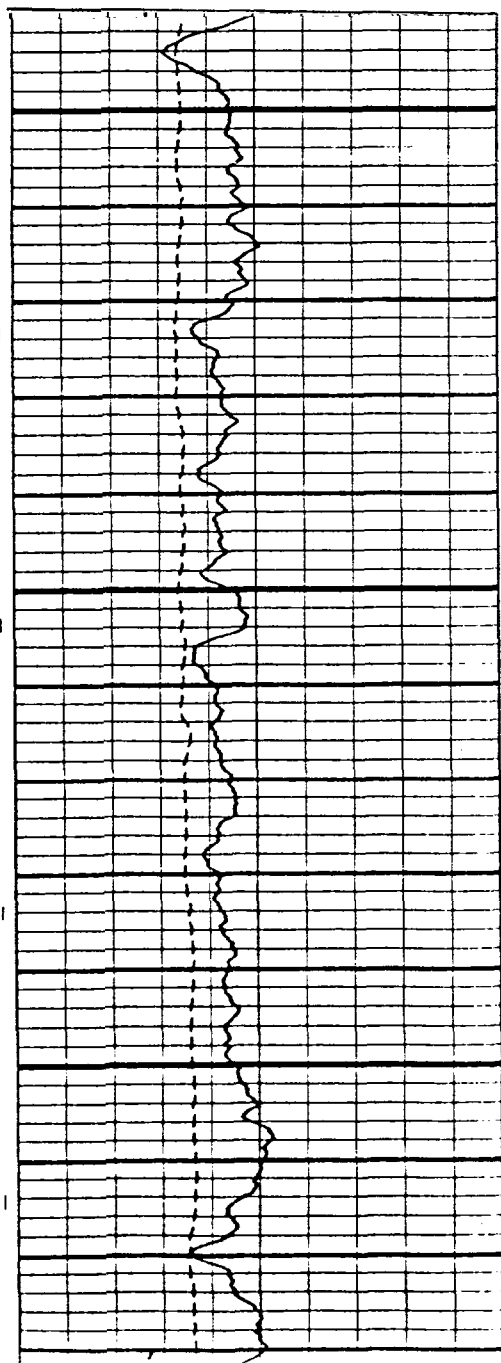
OFFICE PHONE

HOME PHONE

Exhibit C

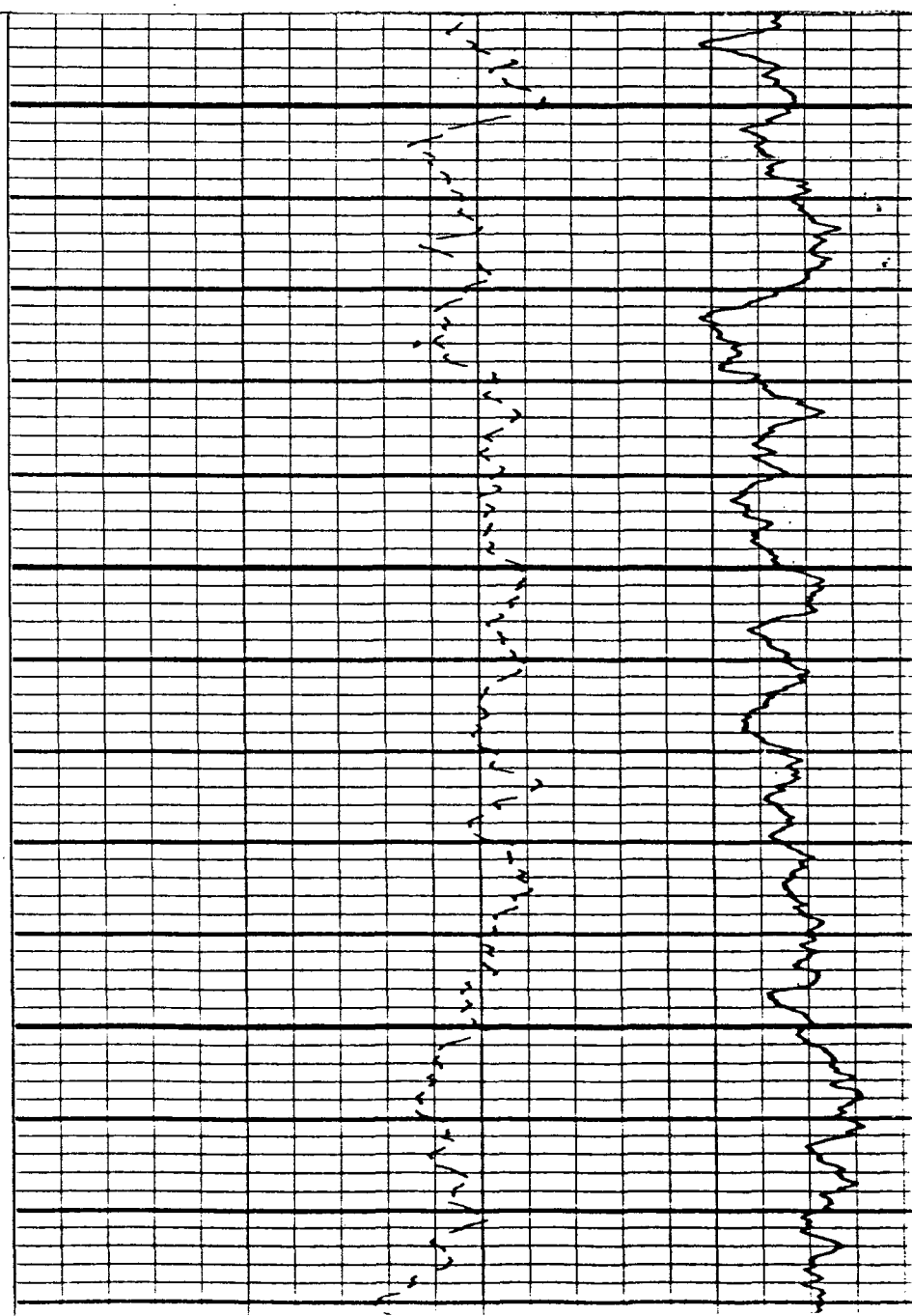
Gallegos Canyon Unit # 328

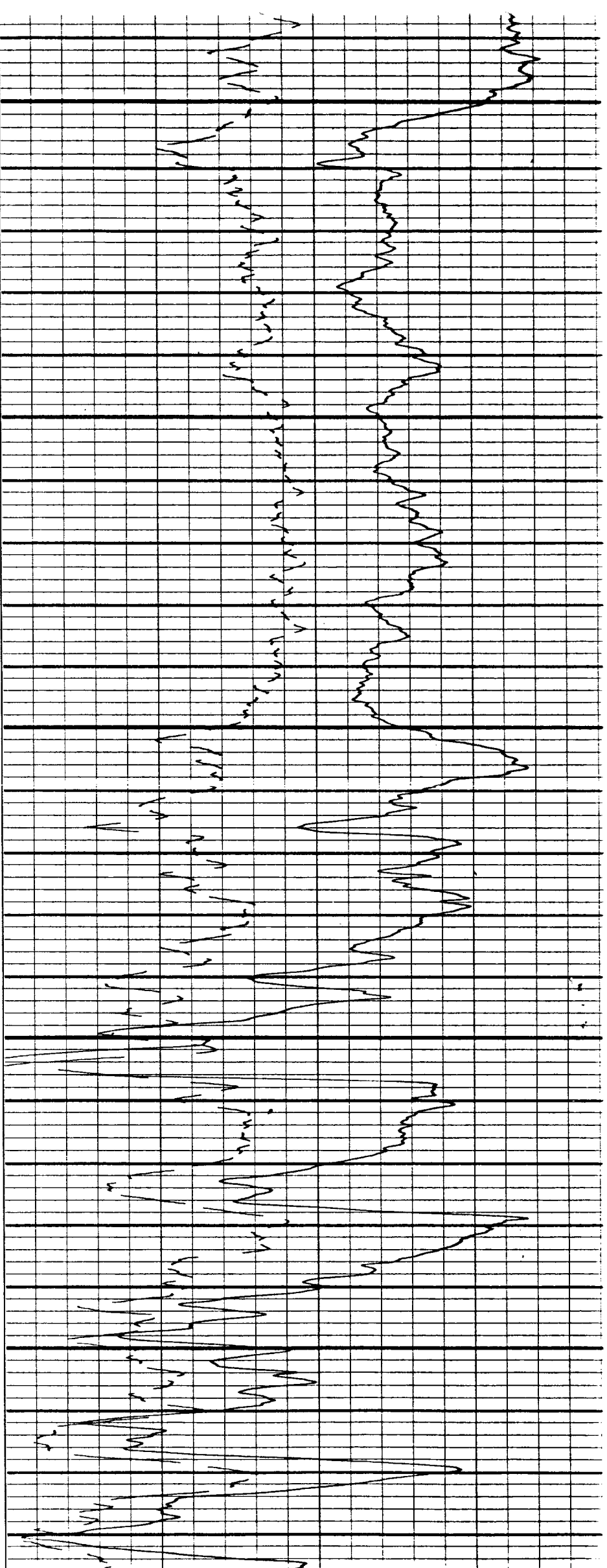
GAMMA RAY	DEPTH	COMPENSATED DENSIOLOG
API UNITS 0 100		BULK DENSITY—POROSITY 40 30 20 10 0
CALIPER		COMPENSATED NEUTRON
HOLE SIZE-INCHES 6 16		Sandstone ϕ POROSITY 40 30 20 10 0



2700

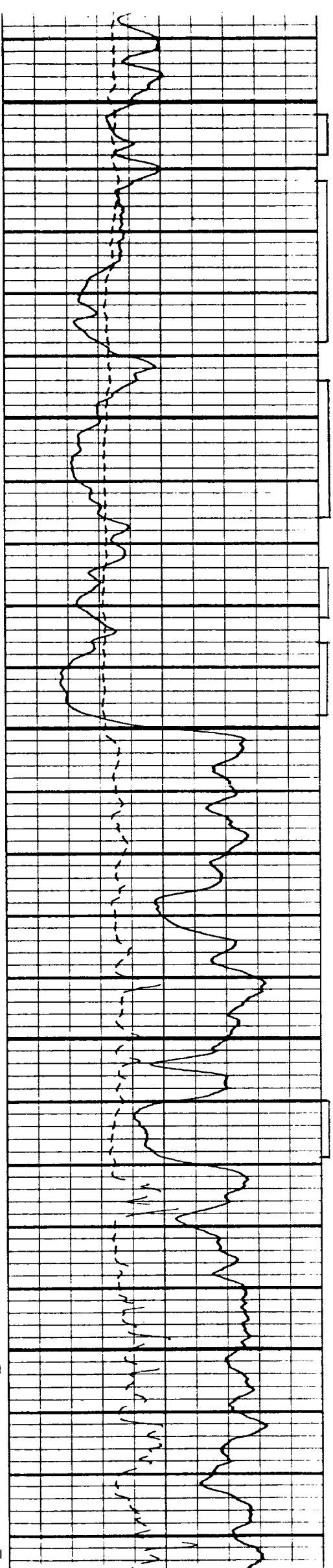
2800

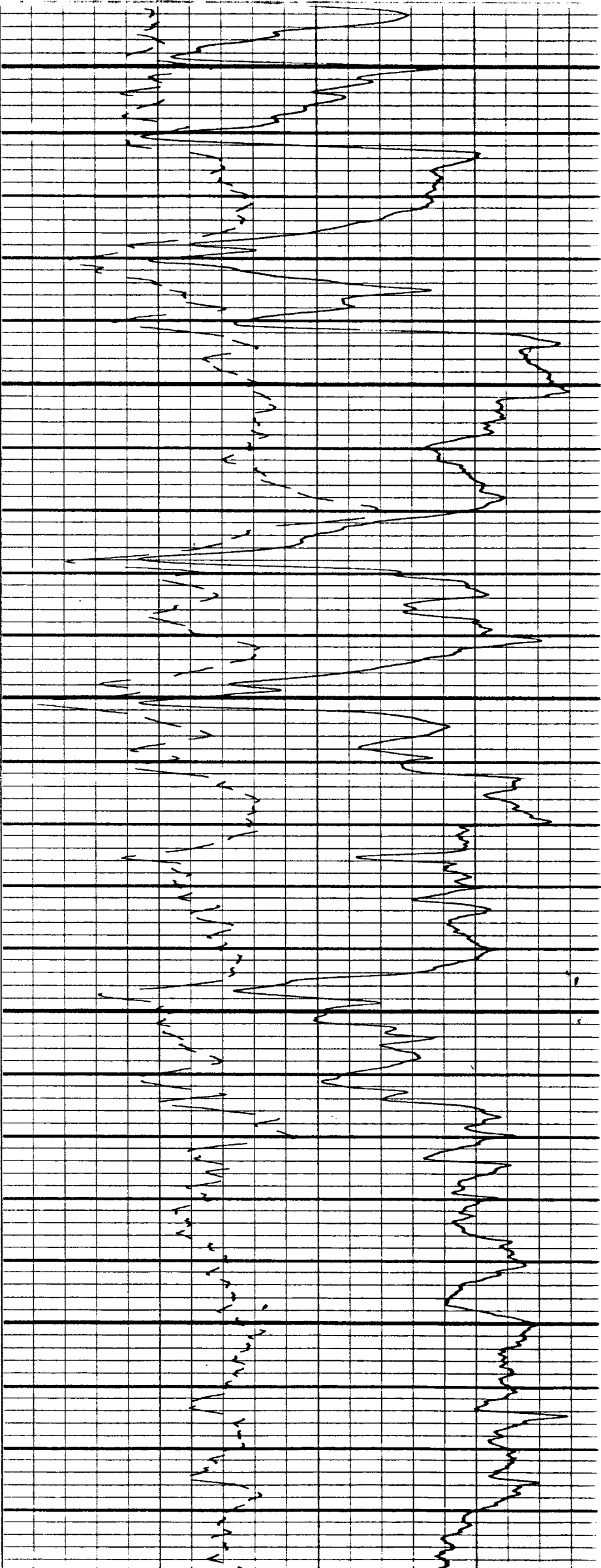




2900

3000

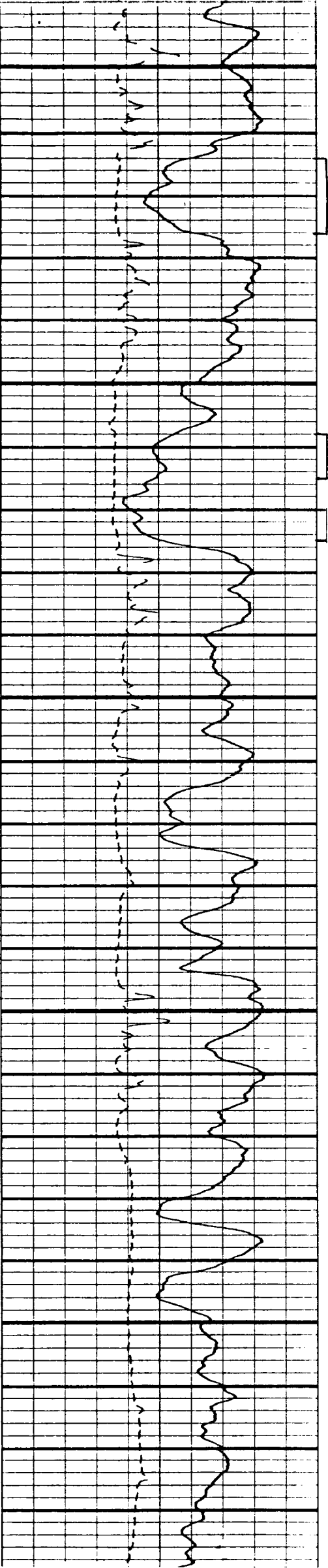


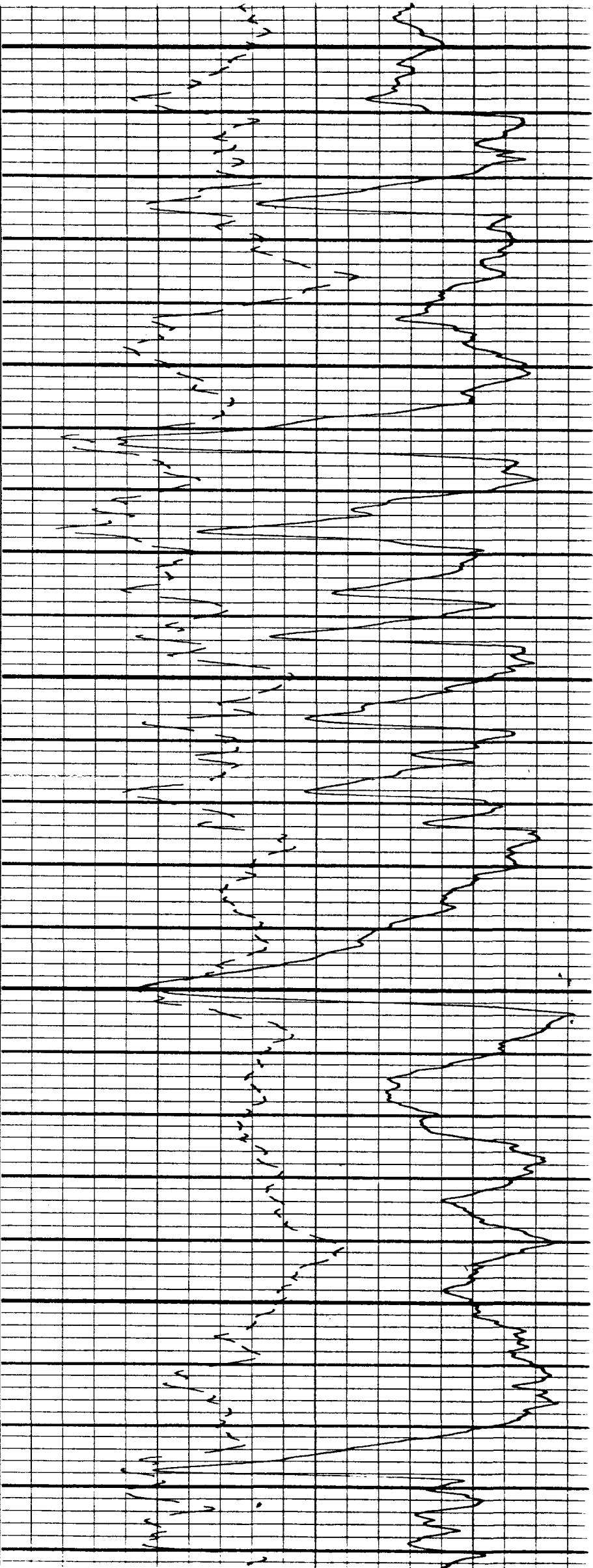


3100

3200

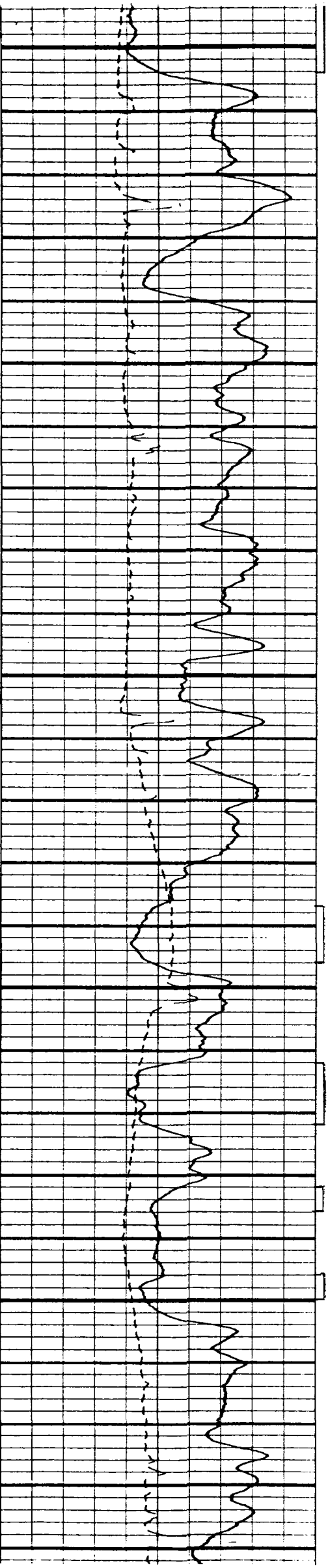
3300

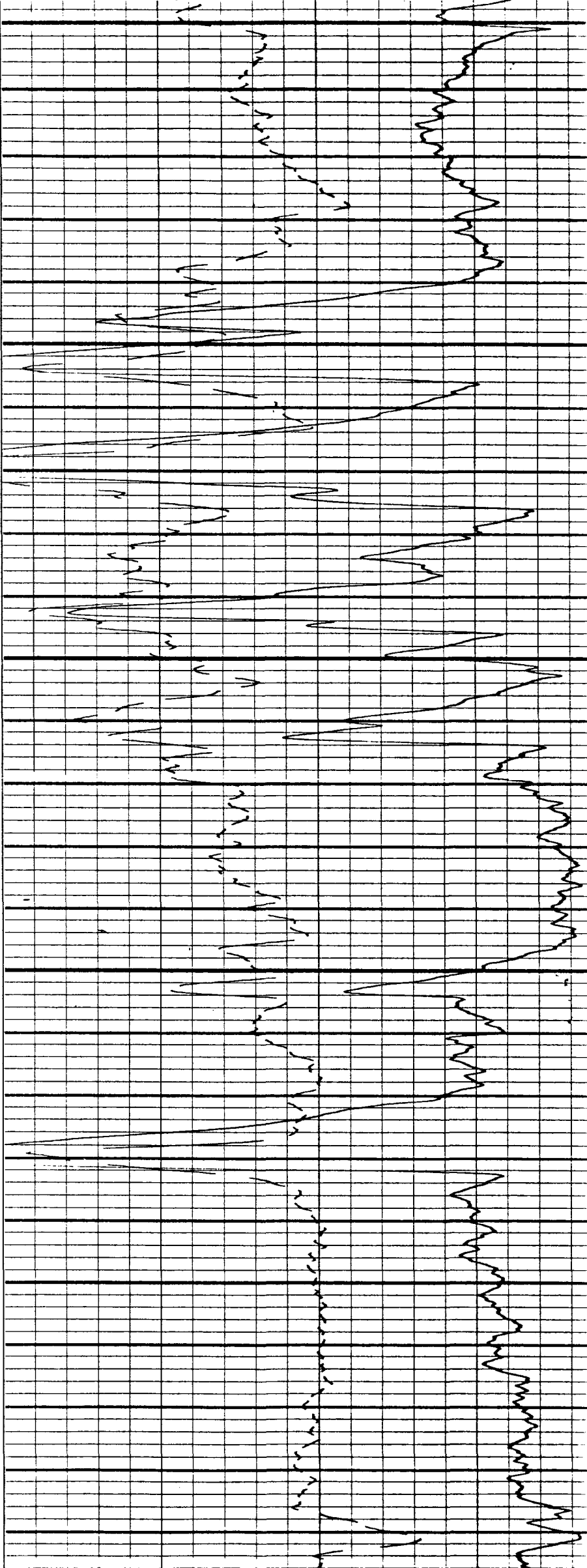




3400

3500

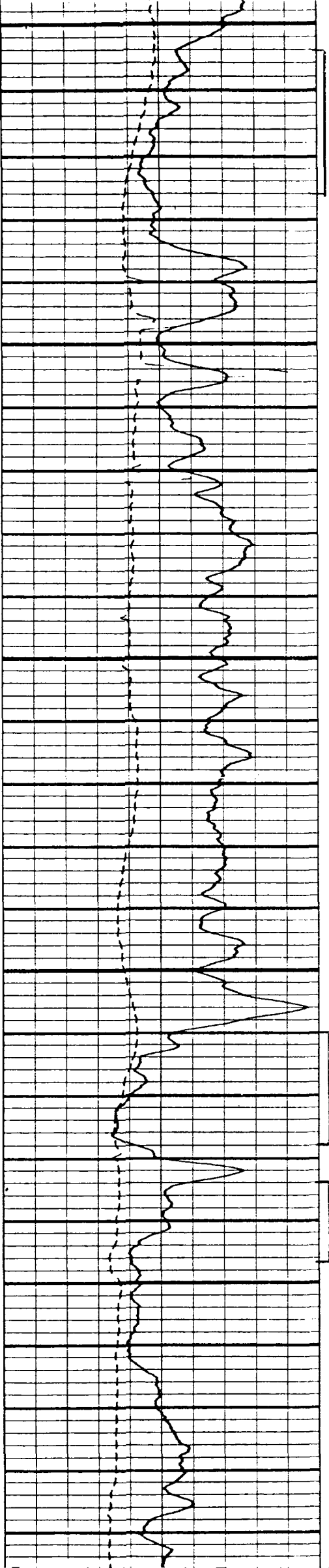


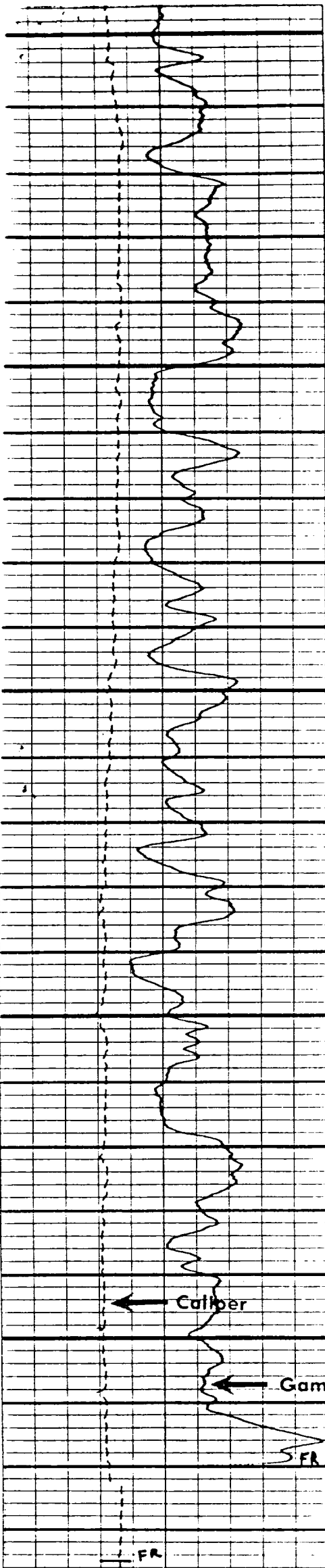


3600

3700

3800

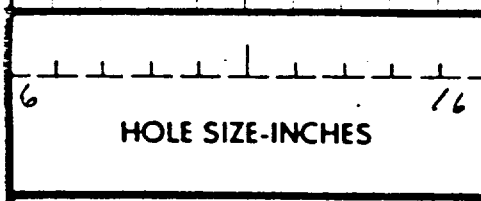




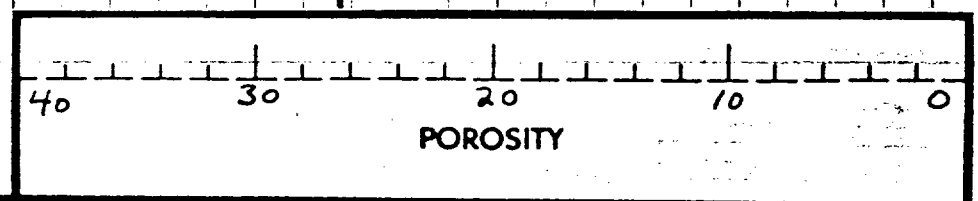
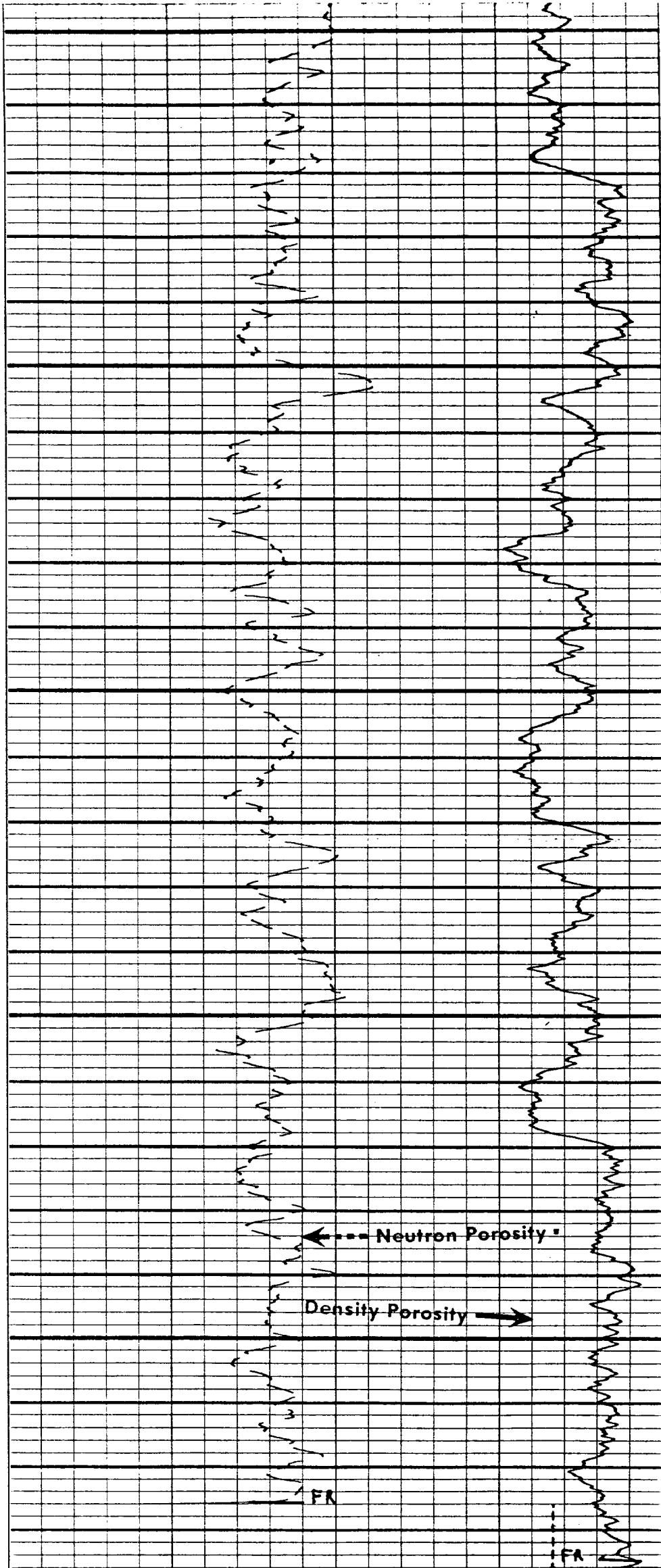
3900

4000

T.O.



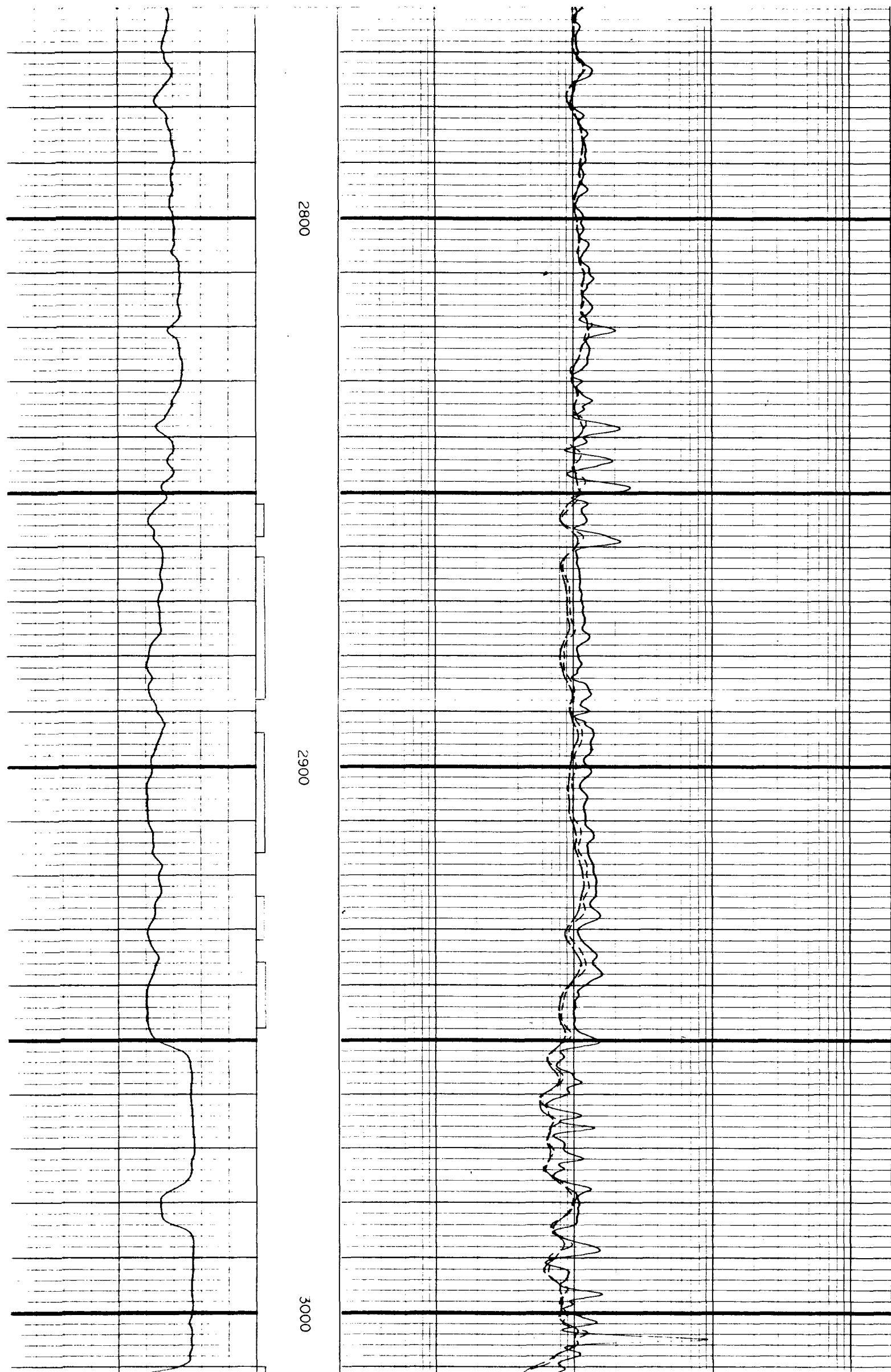
CALIPER

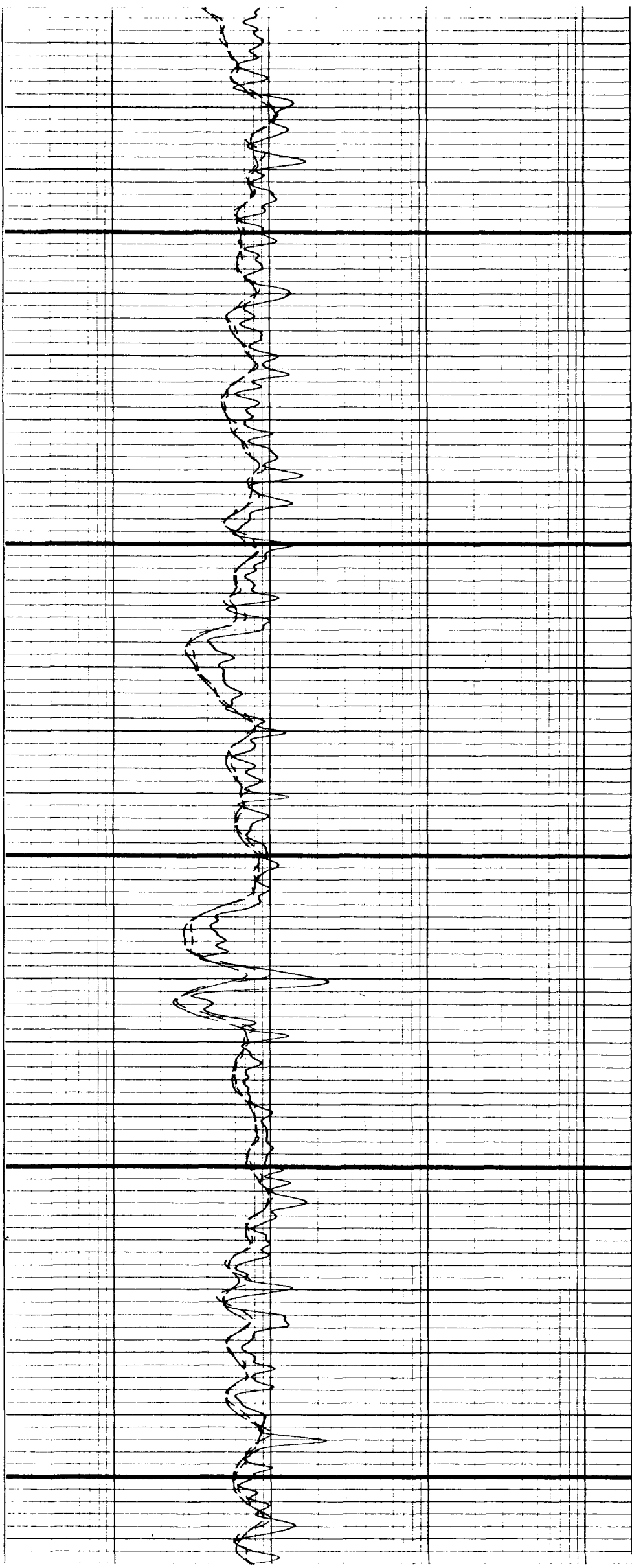


COMPENSATED NEUTRON

Gallegos Canyon Unit # 328

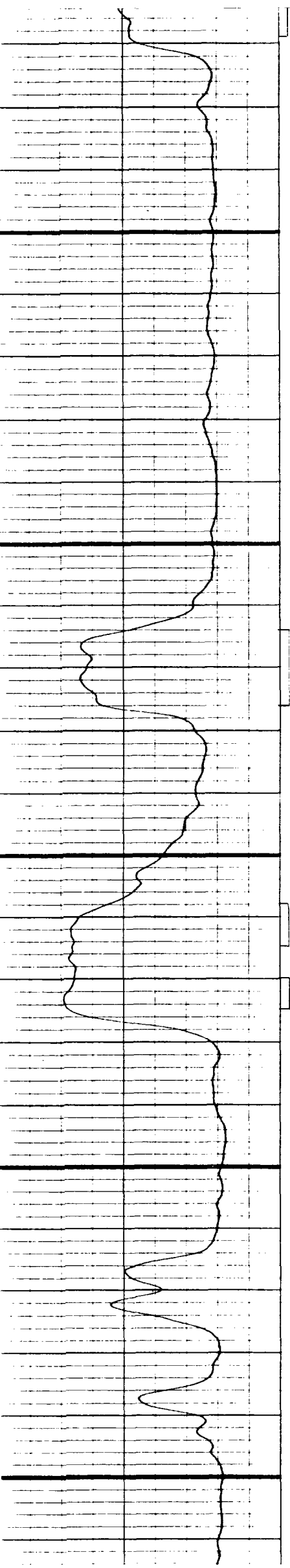
Dual Induction Focused Log

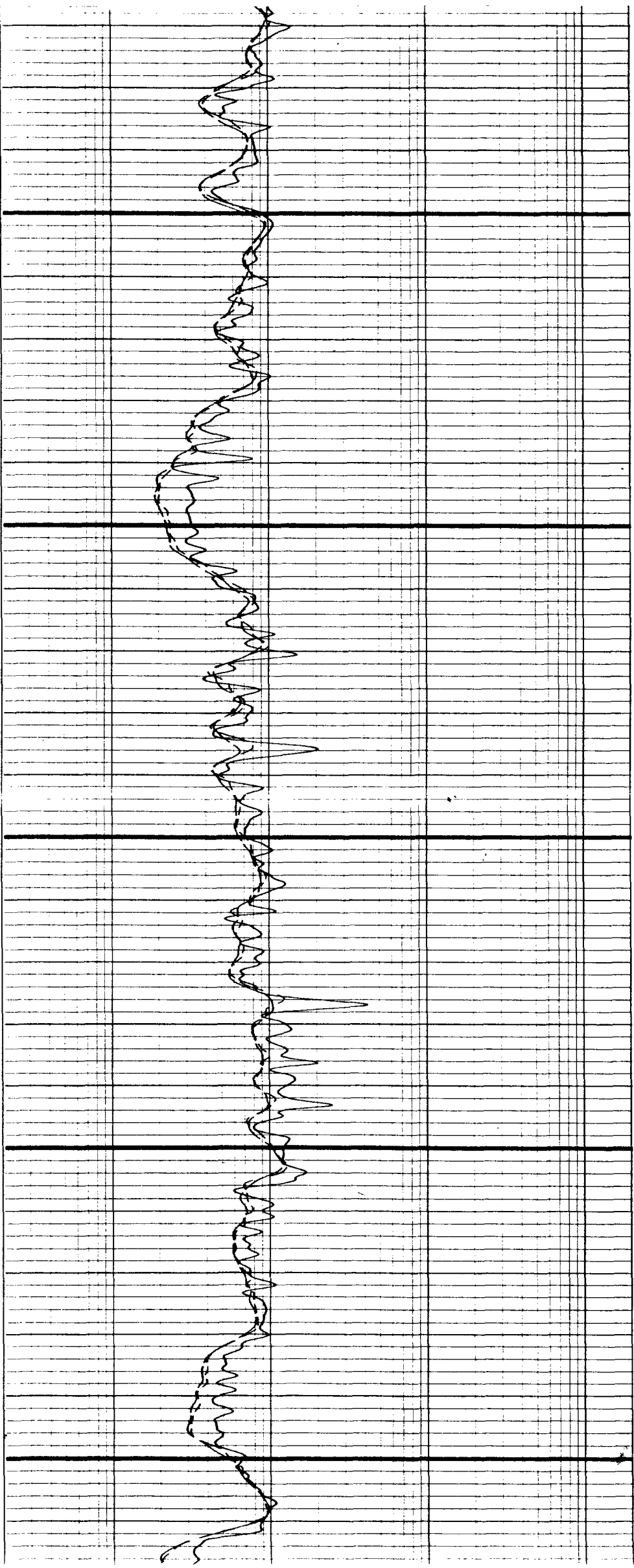




3100

3200

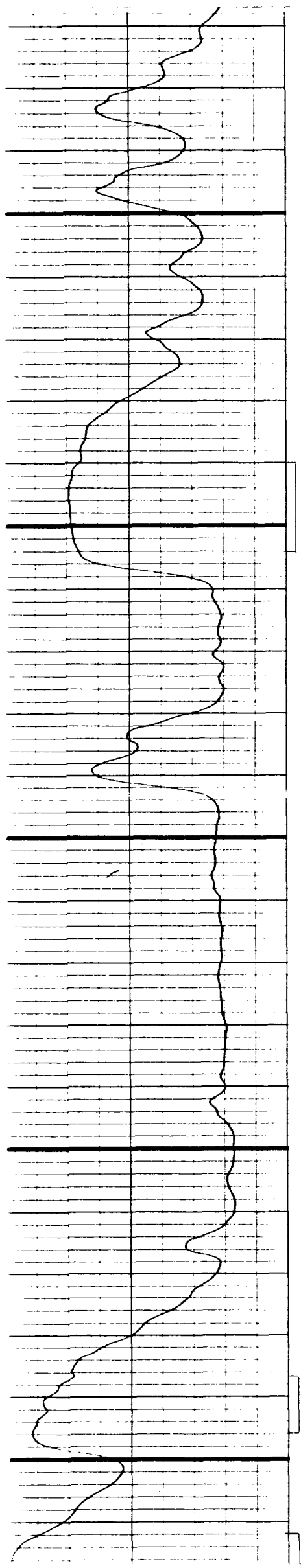


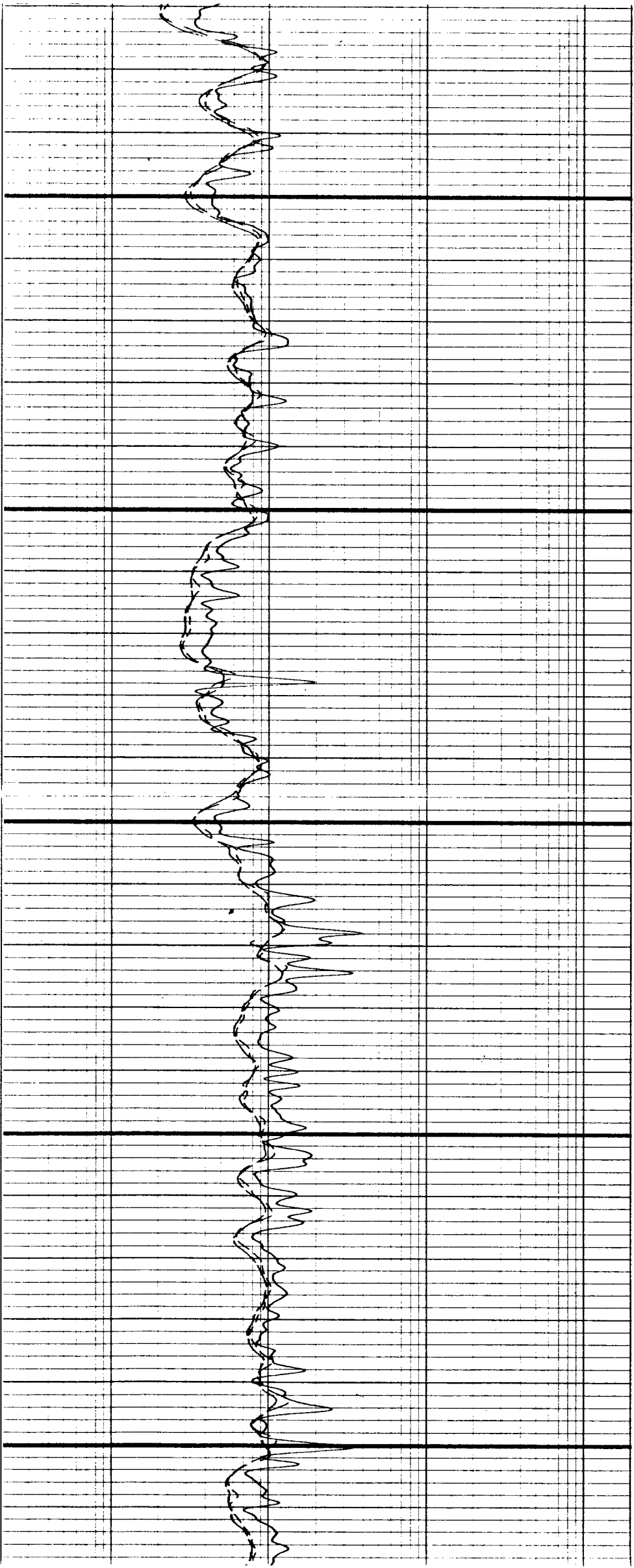


3300

3400

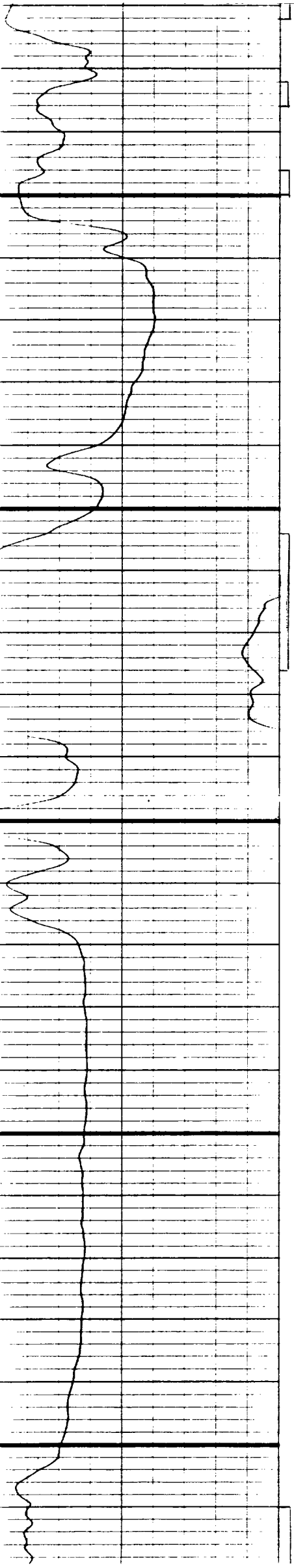
3500

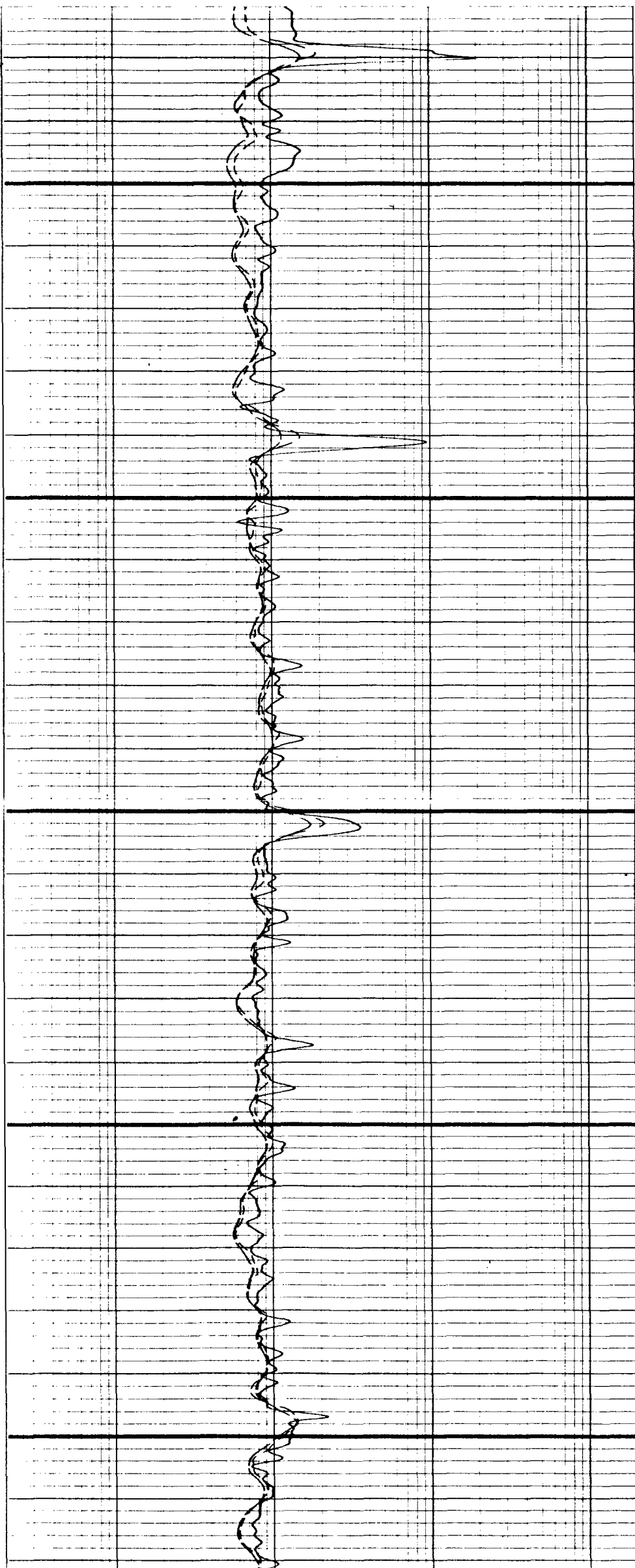




3600

3700

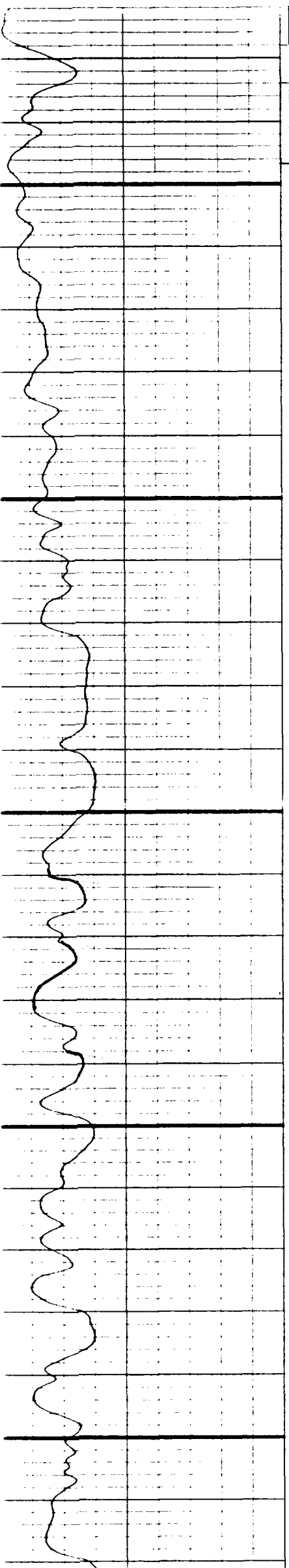


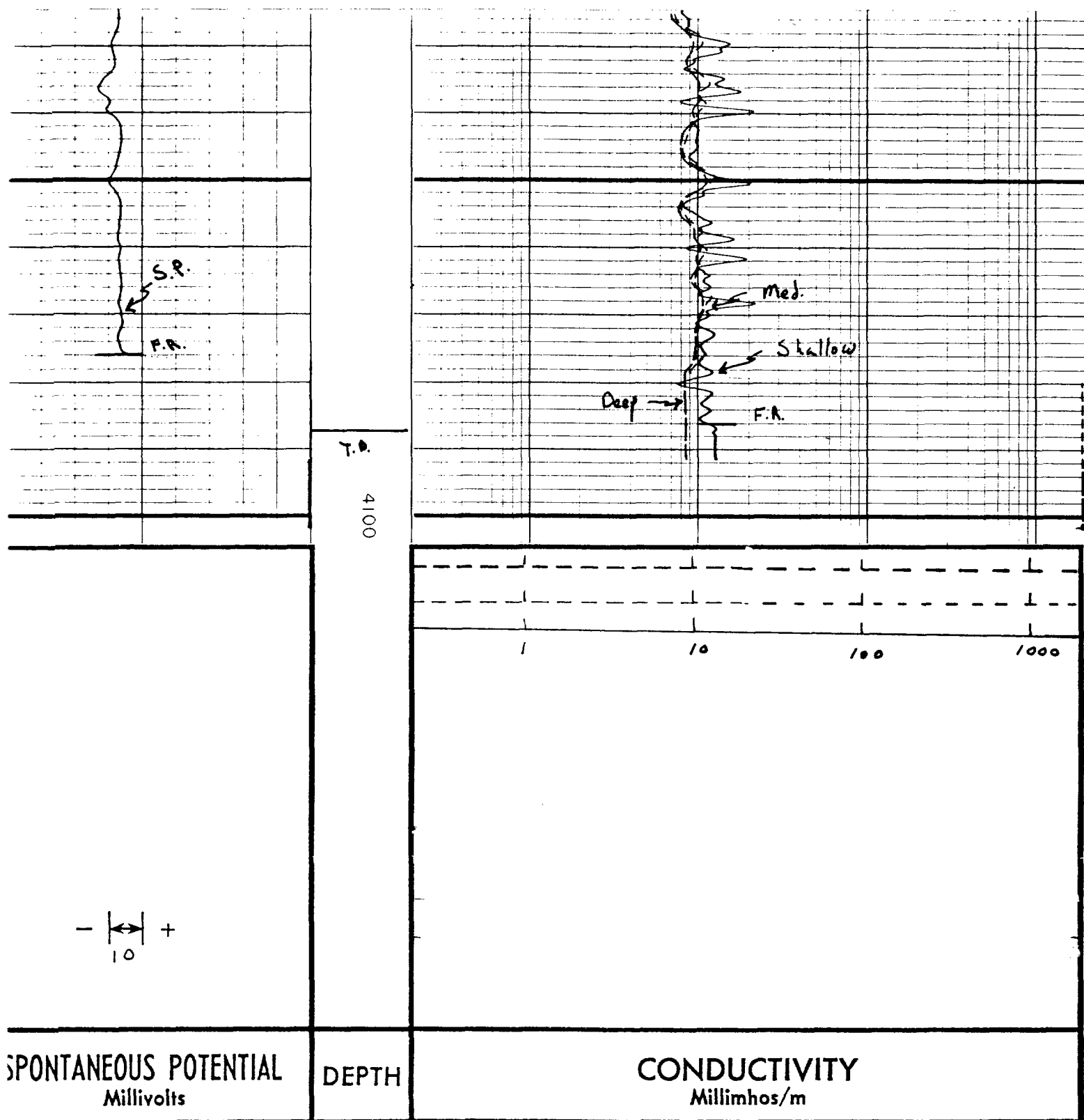


3800

3000

4000

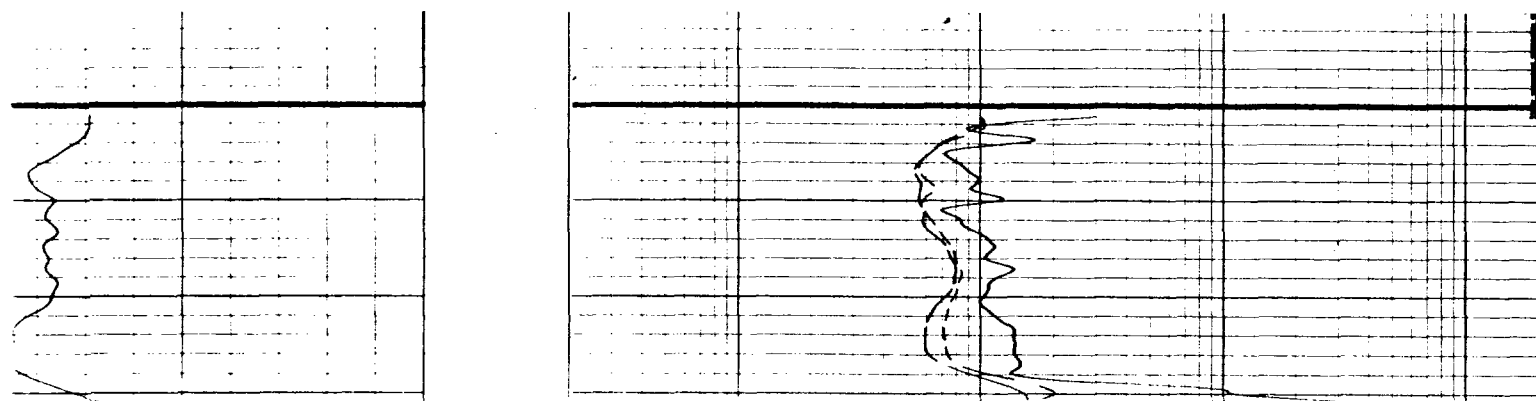




Company Energy Reserves Group
Well Gallegos Canyon Unit 328
Field Kutz West - P.C.
County San Juan
State N.M.

Drillers T.D. 4085
Log F.R. 4086
Log T.D. 4087
Elevations:
K.B. 5407 D.F. 5406 G.L. 5394

REPEAT SECTION





BAROID DIVISION
NL Industries, Inc.
P.O. Box 1675 Houston, Texas 77001

WATER ANALYSIS TEST REPORT

BAROID TREATING CHEMICALS

Exhibit D

RECEIVED
RECEIVED

SHEET NUMBER

COMPANY Energy Reserves		DATE 6-10-77	
FIELD BASIN DAKOTA		COUNTY OR PARISH SAN JUAN	STATE N MEXICO
LEASE OR UNIT King Gas Comm.		WELL(S) NAME OR NO. #1	WATER SOURCE (FORMATION) MESAVERDE - CLIFFHOUSE
DEPTH, FT.	BHT, F	SAMPLE SOURCE	TEMP, F
TYPE OF OIL		API GRAVITY 0	TYPE OF WATER ☒ PRODUCED WATER ☐ INJECTION WATER OTHER

WATER ANALYSIS PATTERN (NUMBER BESIDE ION SYMBOL INDICATES me/l * SCALE UNIT)

Na ⁺ 20	15	10	5	0	5	10	15	20 Cl ⁻
Ca ⁺⁺								HCO ₃ ⁻
Mg ⁺⁺								SO ₄ ⁼
Fe ⁺⁺⁺								CO ₃ ⁼

DISSOLVED SOLIDS

CATIONS	me/l *	mg/l *
Total Hardness	8	
Sodium, Na ⁺ (calc.)	2	40
Calcium, Ca ⁺⁺	6	73
Magnesium, Mg ⁺⁺		1.9
Iron (Total), Fe ⁺⁺⁺		
ANIONS		
Chloride, Cl ⁻		10,600
Sulfate, SO ₄ ⁼		90
Carbonate, CO ₃ ⁼		1,200
Bicarbonate, HCO ₃ ⁻	232	14,152
Hydroxyl, OH ⁻		-0-
Sulfide, S ⁼		
Phosphate - Meta, PO ₃ ⁼		
Phosphate - Ortho, PO ₄ ⁼		

DISSOLVED GASES

Hydrogen Sulfide, H ₂ S	mg/l *
Carbon Dioxide, CO ₂	mg/l *
Oxygen, O ₂	mg/l *

PHYSICAL PROPERTIES

pH	8.4
Eh (Redox Potential)	MV
Specific Gravity	
Turbidity, JTU Units	
Total Dissolved Solids (Calc.)	mg/l *
Stability Index @ F	
CaSO ₄ Solubility @ F	mg/l *
Max. CaSO ₄ Possible (Calc.)	mg/l *
Max. BaSO ₄ Possible (Calc.)	mg/l *
Residual Hydrocarbons	ppm (Vol/Vol)

SUSPENDED SOLIDS (QUALITATIVE)

Iron Sulfide ☐ Iron Oxide ☐ Calcium Carbonate ☐ Acid Insoluble ☐

REMARKS AND RECOMMENDATIONS:

* NOTE: me/l and mg/l are commonly used interchangeably for epm and ppm respectively. Where epm and ppm are used, corrections should be made for specific gravity.

BTC ENGINEER Max Woolery	DIST. NO.	ADDRESS Farmington, NM	OFFICE PHONE 325-29701	HOME PHONE
TESTED BY Woolery	DATE 6-10-77	DISTRIBUTION ☐ CUSTOMER ☐ AREA OR ☐ DISTRICT OFFICE ☐ BTC ENGINEER OR ☐ BTC LAB ☐ BTC SALES SUPERVISOR		

Gallegos Canyon Unit # 326

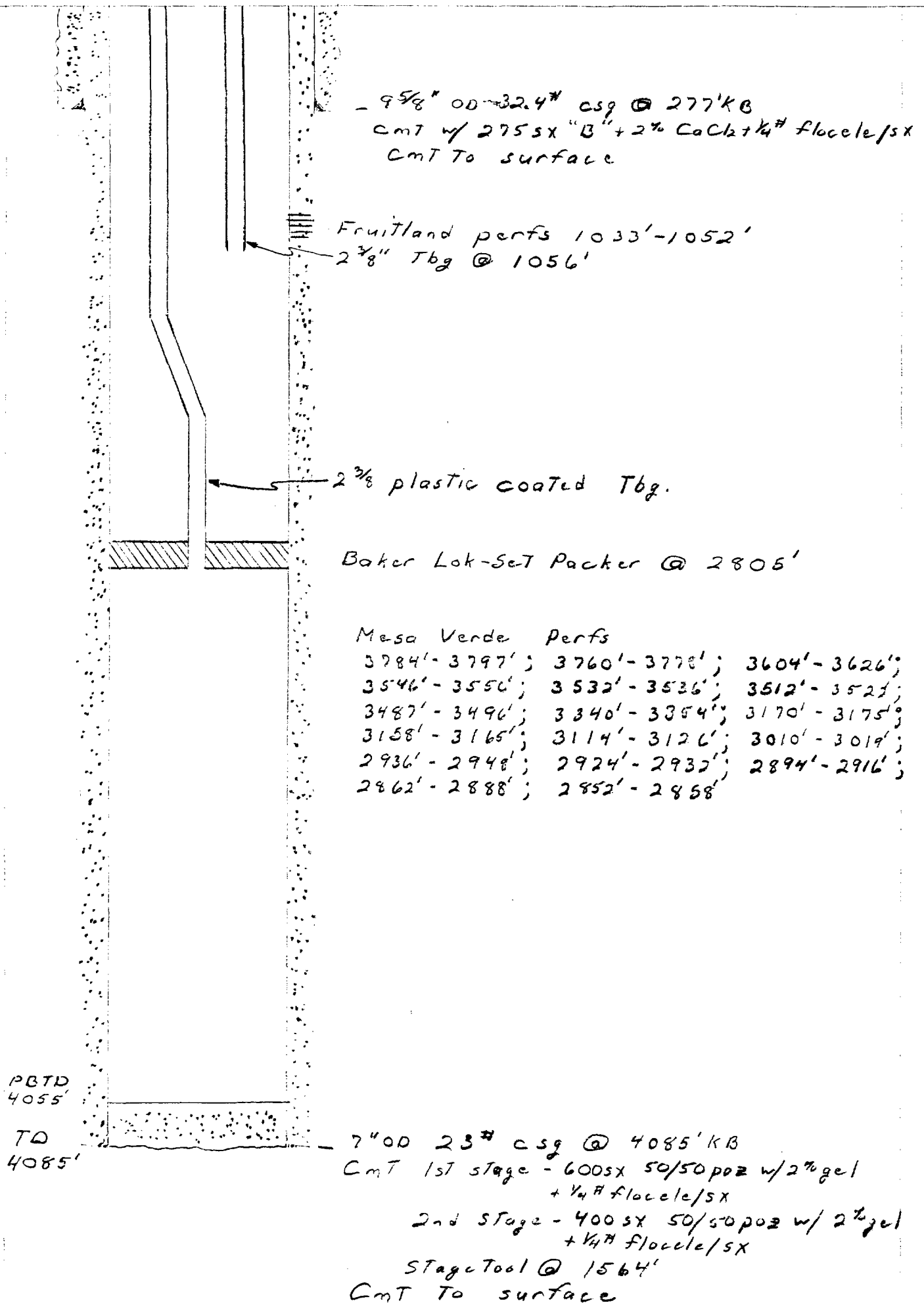


Exhibit F

Amoco College Canyon Unit No 195
Sec 33-T29N-R12W
790' FSL, 2310' FWL
San Juan County, New Mexico

