

# BAKER HUGHES

## COMPENSATED NEUTRON LOG GAMMA RAY LOG

Baker Atlas

FILE NO: 1626  
APN NO: 05046180870000  
COMPANY: MARATHON OIL COMPANY  
WELL: 596-29C-21  
FIELD: GRAND VALLEY  
COUNTY: GARFIELD  
STATE: COLORADO

Ver: 3.87  
PAD: 697-29C  
LOCATION: S1/4 1763' FSL & 1425' PML  
SEC 29 TWP 5S RGE 96W

OTHER SERVICES

PERMANENT DATUM  
LOG MEASURED FROM  
DRILL MEAS. FROM  
G.L. ELEVATION 8180 FT  
K.B. 24 FT ABOVE P.D.  
KELLY BUSHING  
ELEVATIONS:  
KB 8204 FT  
DF 8203 FT  
OL 8180 FT

DATE	10-Feb-2010
RUN	1
TRIP	1
SERVICE ORDER	5576883
DEPTH DRILLER	9940 FT
DEPTH LOGGER	9781 FT
BOTTOM LOGGED INTERVAL	9781 FT
TOP LOGGED INTERVAL	2175 FT
TIME STARTED	16:00
TIME FINISHED	18:40
OPERATOR RIG TIME	1 hr
TYPE OF FLUID IN HOLE	WATER
FLUID DENSITY	8.80 LB/G
FLUID SALINITY	NA
FLUID LEVEL	NA
LOGGED CELENT TOP	NA
WELLHEAD PRESSURE	0 PSI
MAXIMUM HOLE DEVIATION	NA
NOMINAL LOGGING SPEED	30 F/IN
MAX. RECORDED TEMP.	258 DEGF
REFERENCE LOG	ATLAS BOND LOG
REFERENCE LOG DATE	08-JAN-2010
EQUIP. NO.	6670
LOCATION	VERNAL, UT
RECORDED BY	CUMMINGS
WITNESSED BY	PENELL

IN MAKING INTERPRETATIONS OF LOGS OUR EMPLOYEES WILL GIVE CUSTOMER THE BENEFIT OF THEIR BEST JUDGEMENT. BUT SINCE ALL INTERPRETATIONS ARE OPINIONS BASED ON INFERENCES FROM ELECTRICAL OR OTHER MEASUREMENTS, WE CANNOT, AND WE DO NOT GUARANTEE THE ACCURACY OR CORRECTNESS OF ANY INTERPRETATION. WE SHALL NOT BE LIABLE OR RESPONSIBLE FOR ANY LOSS, COST, DAMAGES, OR EXPENSES WHATSOEVER INCURRED OR SUSTAINED BY THE CUSTOMER RESULTING FROM ANY INTERPRETATION MADE BY ANY OF OUR EMPLOYEES.

### BOREHOLE RECORD

BIT SIZE	FROM	TO
8.75 IN	0 FT	9940 FT

### CASING RECORD

SIZE	WEIGHT	GRADE	FROM	TO
4.5 IN	11.6 LB/F	P-110	0 FT	9940 FT

### REMARKS

RUN 1 TRIP 1 : DEPTH CORRELATED TO BOND LOG DONE ON 08-JAN-2010  
ON RAN FREE DUE TO CASING SIZE  
CREW: ROBERTSON/ MCCORMICK  
THANK YOU FOR CHOOSING BAKER ATLAS

### EQUIPMENT DATA

RUN	TRIP	TOOL	SERIES NO.	SERIAL NO.	POSITION
1	1	CCL	23348A	101114233	FREE

1	1	TTWA	2380VA	10380720	FREE
1	1	TEL/GR	3518VA	10081345	FREE
1	1	CN	2436VA	10124386	FREE

## MAIN LOG 5"/100FT SCALE

ECLIPS 6.01 Feb 21, 2008  
Updates: 1,40,41 Patches: 1,2,4,5,6

Wed Feb 10 18:26:28 2010

Perpllt /main/62

Cplot

Pdf\_Cpp /main/16

Fileview 5.42

### PARAMETER AND FILTER SUMMARY REPORT

FILE: /data/1626/16970alc04.prm  
LOGGING MODE: DEPTH DIRECTION: UP  
TOP DEPTH: 2085.066 ft BOTTOM DEPTH: 2301.719 ft

#### SYMMETRIC FILTER

MEASUREMENT TYPE	PARAMETER	VALUE	UNITS	INTERVAL (ft)	
GR LOW RES	FILTER (.1)	medium (1)		TOP	BOTTOM
GR MED RES	FILTER ()	medium (1)		"	"
TENSION	FILTER ()	medium (1)		"	"
CN LOW RES	FILTER (.1)	medium (1)		"	"
CN MED RES	FILTER ()	medium (1)		"	"

#### BOREHOLE & CEMENT

MEASUREMENT TYPE	PARAMETER	VALUE	UNITS	INTERVAL (ft)	
CASING - BOREHOLE & CEMENT VOLUME	CASING O.D.	4.500	1in	TOP	BOTTOM
	CASING THICKNESS	0.250	1in	"	"
BIT SIZE	BIT SIZE	8.750	1in	"	"
BOREHOLE CORR DIAMETER SOURCE	CALIPER/FIXED DIA. (cnbh*)	USE FIXED SIZE		"	"
BOREHOLE CORR DIAMETER	FIXED DIAMETER (cnbh*)	8.750	1in	"	"

#### ACCELERATION PROCESSING

MEASUREMENT TYPE	PARAMETER	VALUE	UNITS	INTERVAL (ft)	
ACCEL CORR SWITCH	ACCEL DEPTH CORR	CORRECTION ON		TOP	BOTTOM

#### CN PROCESSING

MEASUREMENT TYPE	PARAMETER	VALUE	UNITS	INTERVAL (ft)	
CN MATRIX	2436 MATRIX	SANDSTONE		TOP	BOTTOM
CN BOREHOLE CORRECTION	SALINITY	861	ppm	"	"
	BOREHOLE CORRECTION	ON		"	"
CN CASING & CEMENT CORRECTION	CORRECTION	OFF		"	"
	BIT SIZE BEHIND CSNG	8.750	1in	"	"

### CURVE DESCRIPTION REPORT

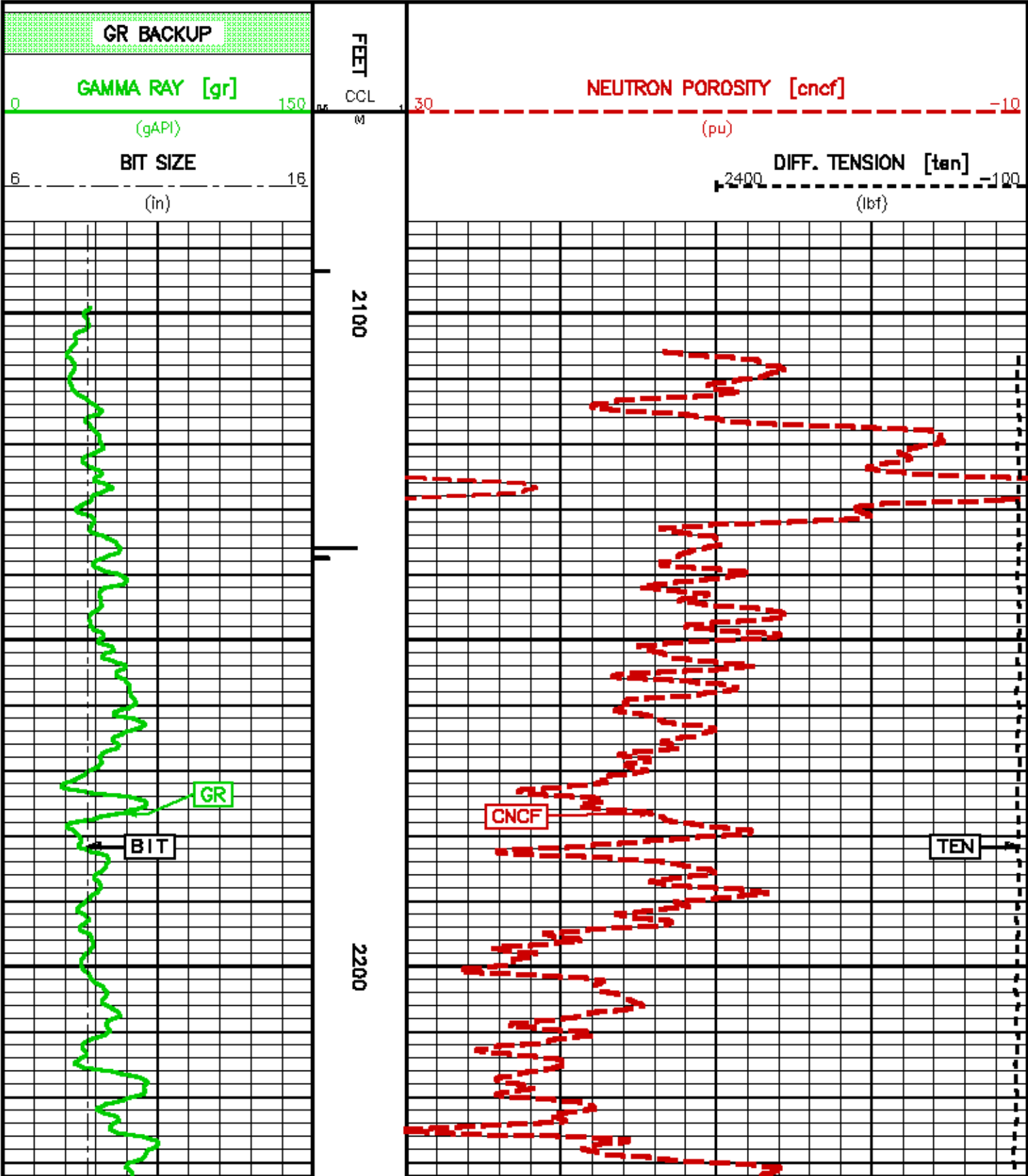
CURVE NAME	CURVE ALIAS	CREATION DATE	CURVE DESCRIPTION
F1:BIT	BIT	Feb 10 18:19:26 2010	BIT SIZE
F1:CCL	CCL	Feb 10 18:19:26 2010	CASING COLLAR LOCATOR
F1:CNCF	CNCF	Feb 10 18:19:26 2010	FIELD NORMALIZED COMPENSATED NEUTRON POROSITY
F1:GR	GR	Feb 10 18:19:26 2010	GAMMA RAY
F1:TEN	TEN	Feb 10 18:19:26 2010	DIFFERENTIAL TENSION

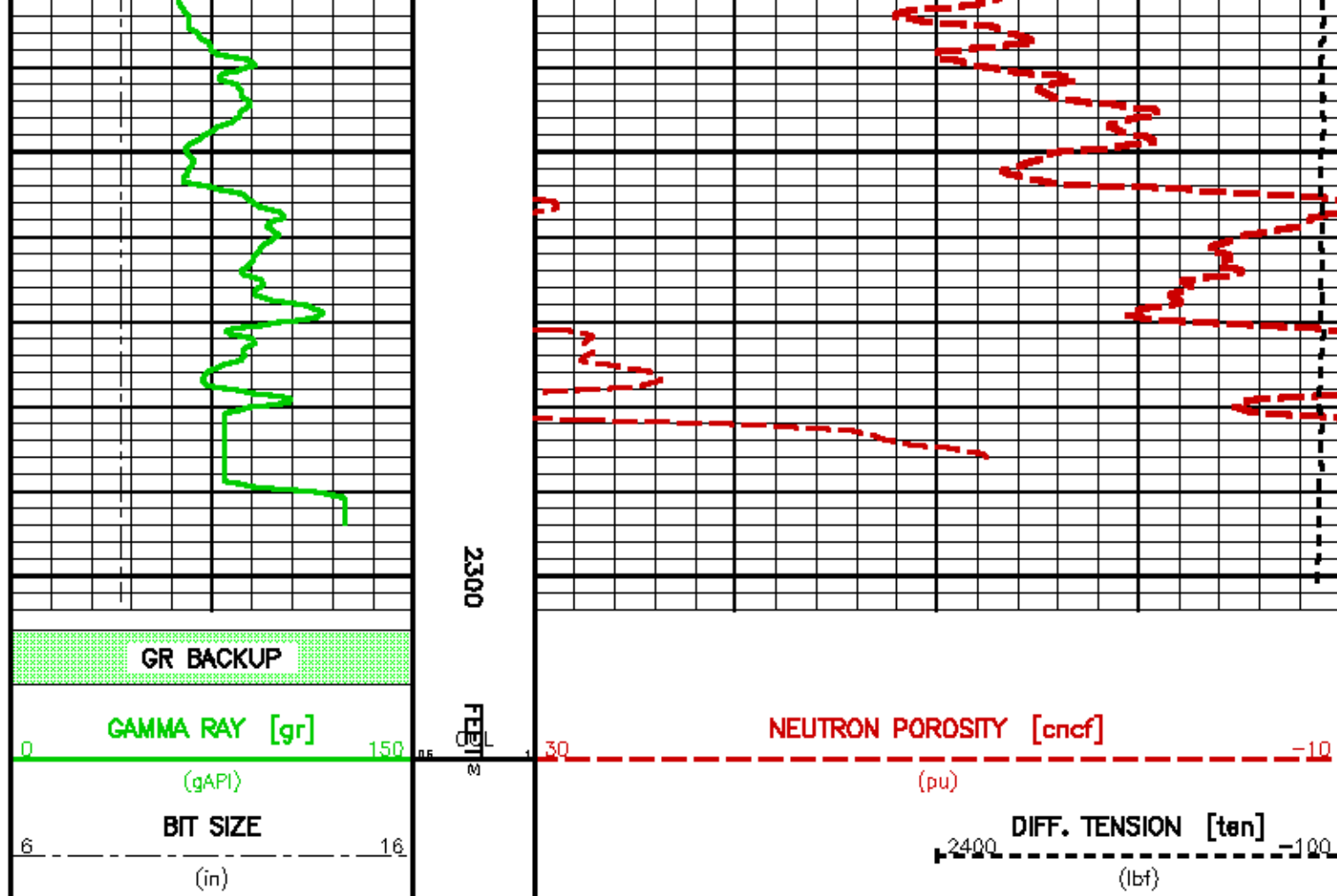
### CURVE MEASURE POINT OFFSET

CURVE	OFFSET (ft)	CURVE	OFFSET (ft)	CURVE	OFFSET (ft)	CURVE	OFFSET (ft)
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BIT	0.00	CNCF	1.50	TEN	0.00
CCL	19.00	GR	7.50		

Presentation : cpu1:cn\_sase.pdf [5"/100" Scale]  
 Plot Interval : 2086.5 - 2307.75 Feet  
  
 Data File 1 : F1 : cpu1:/data/1626/k970alc04\_sase.xif  
 Created On : Feb 10 18:19:28 2010  
 Company : MARATHON OIL COMPANY  
 Well : 506-29C-21  
 Field : GRAND VALLEY  
 File Interval : 0 - 2308 Feet  
 Oct : k970alc





## MAIN LOG 5"/100FT SCALE

ECLIPS 6.01 Feb 21, 2008  
Updates: 1,40,41 Patches: 1,2,4,5,6

Wed Feb 10 18:02:18 2010

Perplot /main/62

Cplot

Pdf\_Cpp /main/16

Fileview 5.42

### PARAMETER AND FILTER SUMMARY REPORT

FILE: /data/1828/k970a/c03.prm  
LOGGING MODE: DEPTH DIRECTION: UP  
TOP DEPTH: 6263.000 ft BOTTOM DEPTH: 9784.087 ft

#### SYMMETRIC FILTER

MEASUREMENT TYPE	PARAMETER	VALUE	UNITS	INTERVAL (ft)	
GR LOW RES	FILTER (.1)	medium (1)		TOP	BOTTOM
GR MED RES	FILTER ()	medium (1)		''	''
TENSION	FILTER ()	medium (1)		''	''
CN LOW RES	FILTER (.1)	medium (1)		''	''
CN MED RES	FILTER ()	medium (1)		''	''

#### BOREHOLE & CEMENT

MEASUREMENT TYPE	PARAMETER	VALUE	UNITS	INTERVAL (ft)	
CASING - BOREHOLE & CEMENT VOLUME	CASING O.D.	4.500	1in	TOP	BOTTOM
	CASING THICKNESS	0.250	1in	''	''

BIT SIZE	BIT SIZE	8.750	1in	''	''
BOREHOLE CORR DIAMETER SOURCE	CALIPER/FIXED DIA. (cnbh*)	USE FIXED SIZE		''	''
BOREHOLE CORR DIAMETER	FIXED DIAMETER (cnbh*)	8.750	1in	''	''

### ACCELERATION PROCESSING

MEASUREMENT TYPE	PARAMETER	VALUE	UNITS	INTERVAL (ft)	
ACCEL CORR SWITCH	ACCEL DEPTH CORR	CORRECTION ON		TOP	BOTTOM

### CN PROCESSING

MEASUREMENT TYPE	PARAMETER	VALUE	UNITS	INTERVAL (ft)	
CN MATRIX	2436 MATRIX	SANDSTONE		TOP	BOTTOM
CN BOREHOLE CORRECTION	SALINITY	881	ppm	''	''
	BOREHOLE CORRECTION	ON		''	''
CN CASING & CEMENT CORRECTION	CORRECTION	OFF		''	''
	BIT SIZE BEHIND CSNG	8.750	1in	''	''

### CURVE DESCRIPTION REPORT

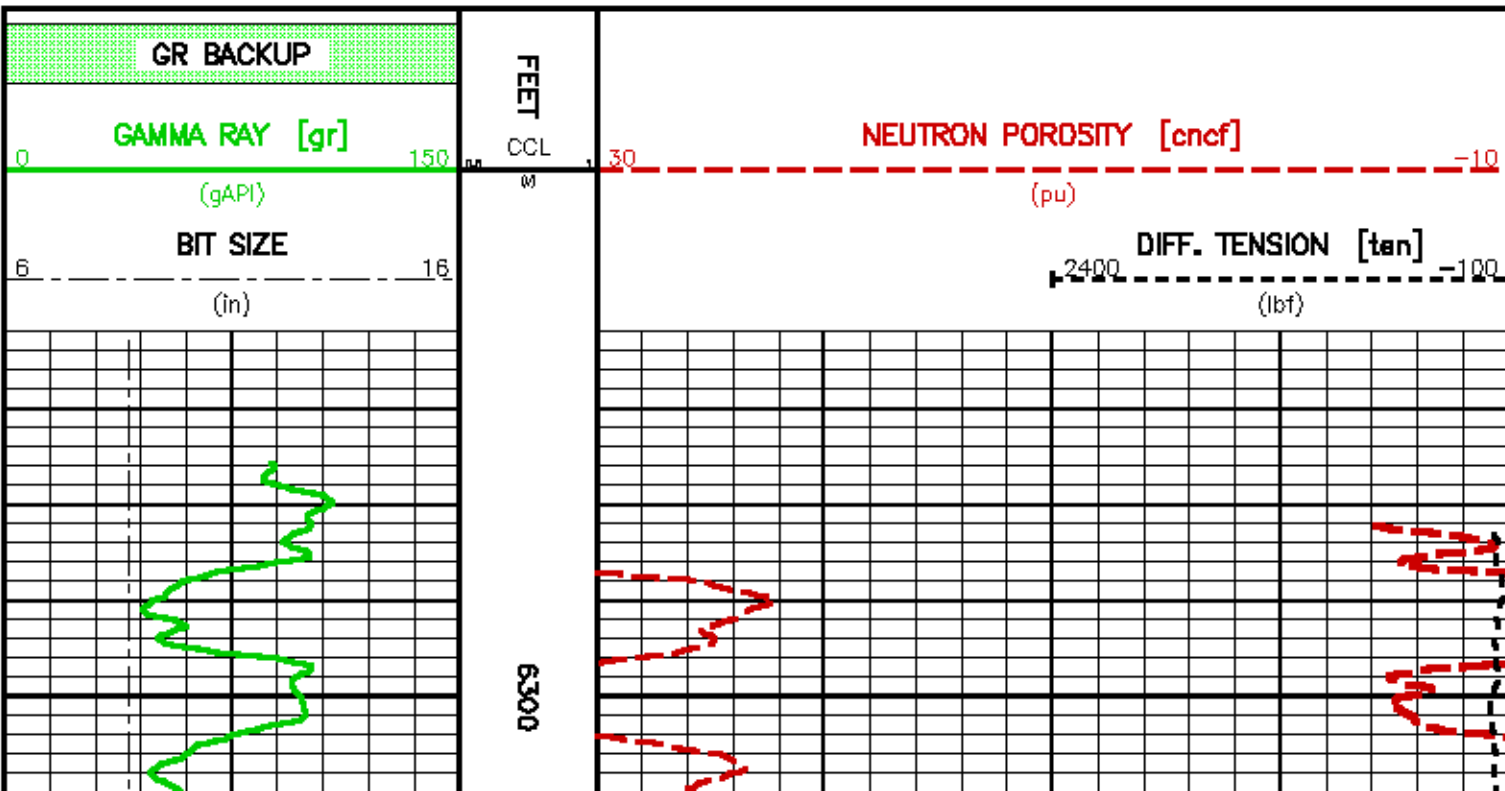
CURVE NAME	CURVE ALIAS	CREATION DATE	CURVE DESCRIPTION
F1:BIT	BIT	Feb 10 16:58:48 2010	BIT SIZE
F1:CCL	CCL	Feb 10 16:58:48 2010	CASING COLLAR LOCATOR
F1:CNCF	CNCF	Feb 10 16:58:48 2010	FIELD NORMALIZED COMPENSATED NEUTRON POROSITY
F1:GR	GR	Feb 10 16:58:48 2010	GAMMA RAY
F1:TEN	TEN	Feb 10 16:58:48 2010	DIFFERENTIAL TENSION

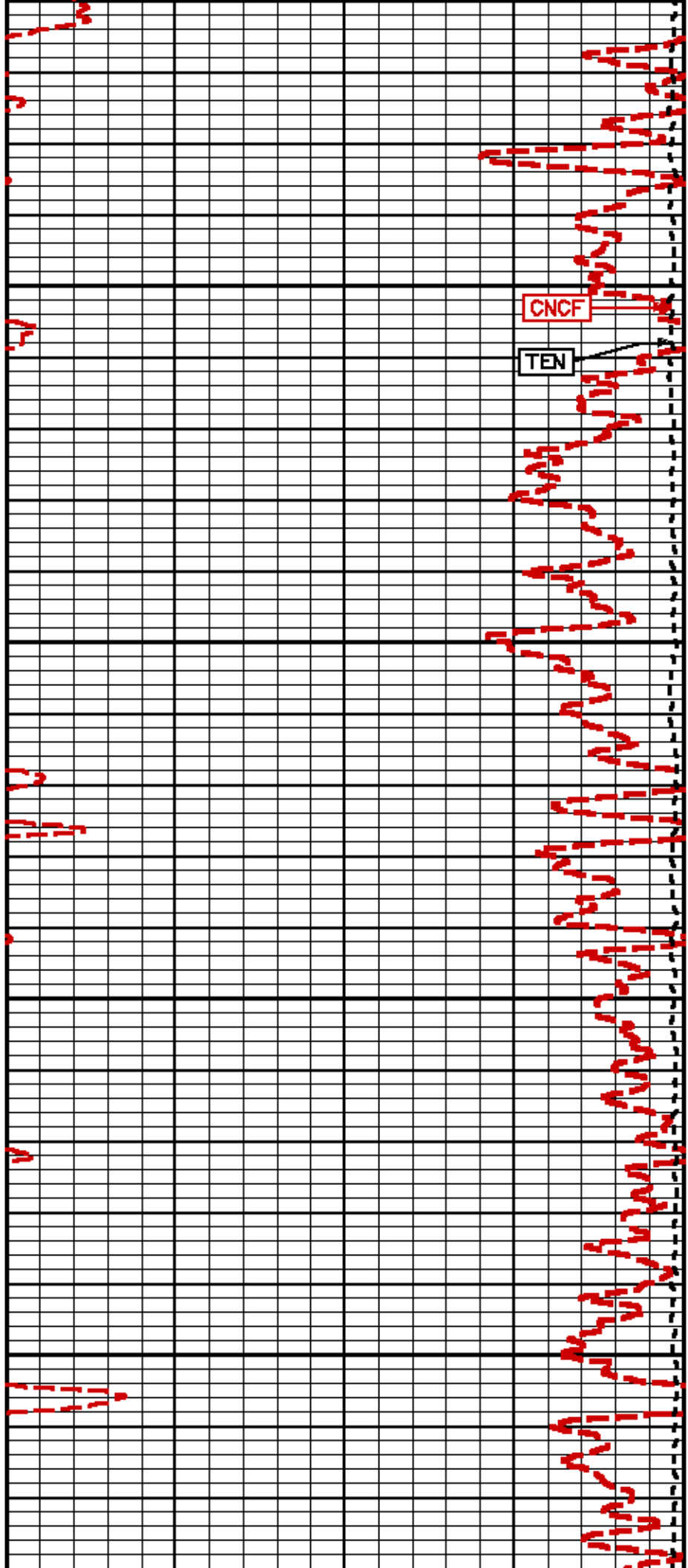
### CURVE MEASURE POINT OFFSET

CURVE	OFFSET (ft)	CURVE	OFFSET (ft)	CURVE	OFFSET (ft)	CURVE	OFFSET (ft)
BIT	0.00	CNCF	1.50	TEN	0.00		
CCL	19.00	GR	7.50				

Presentation : cpu1:cn\_main.pdf [5"/100' Scale]  
Plot Interval : 6263 - 9788.75 Feet

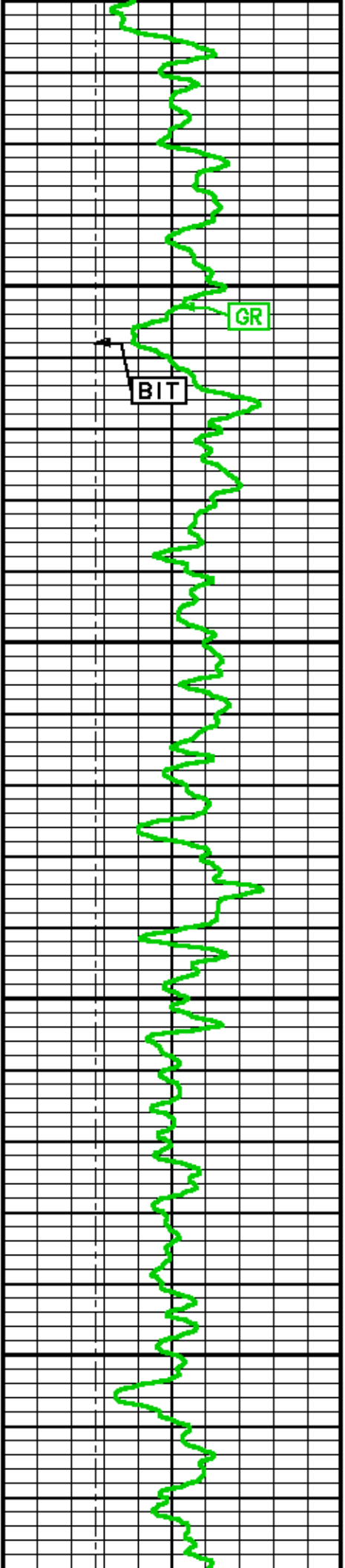
Data File 1 : F1 : cpu1:/data/1626/main.pdf  
Created On : Feb 10 16:58:48 2010  
Company : MARATHON OIL COMPANY  
Well : 586-28C-21  
Field : GRAND VALLEY  
File Interval : 0 - 9780 Feet  
Oct : 1697Date





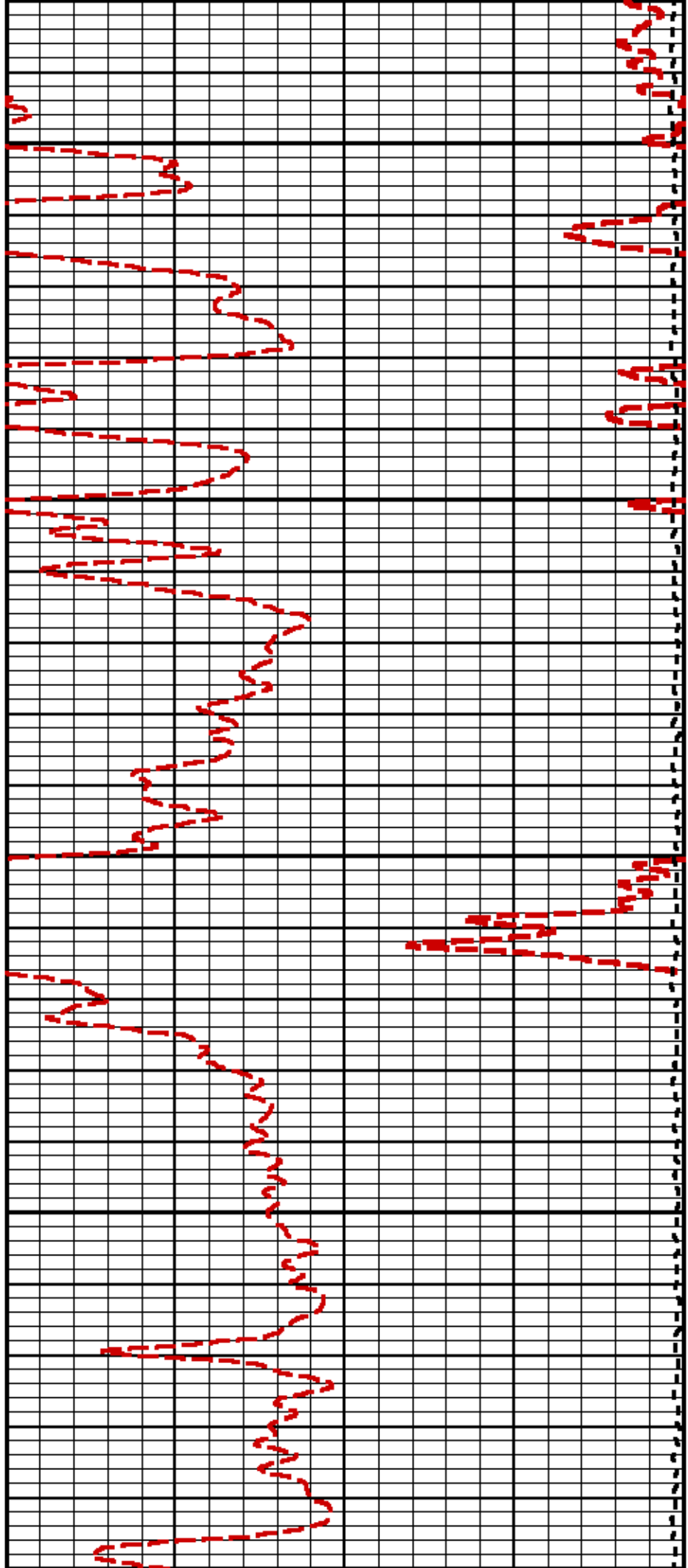
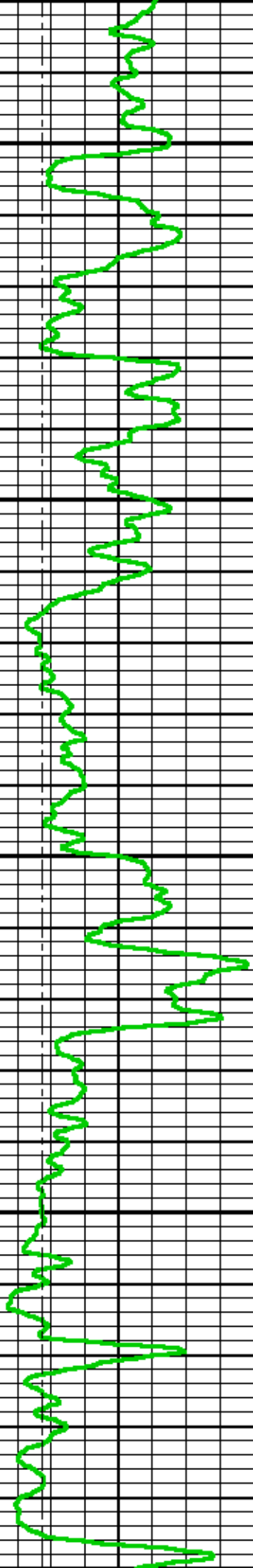
6400

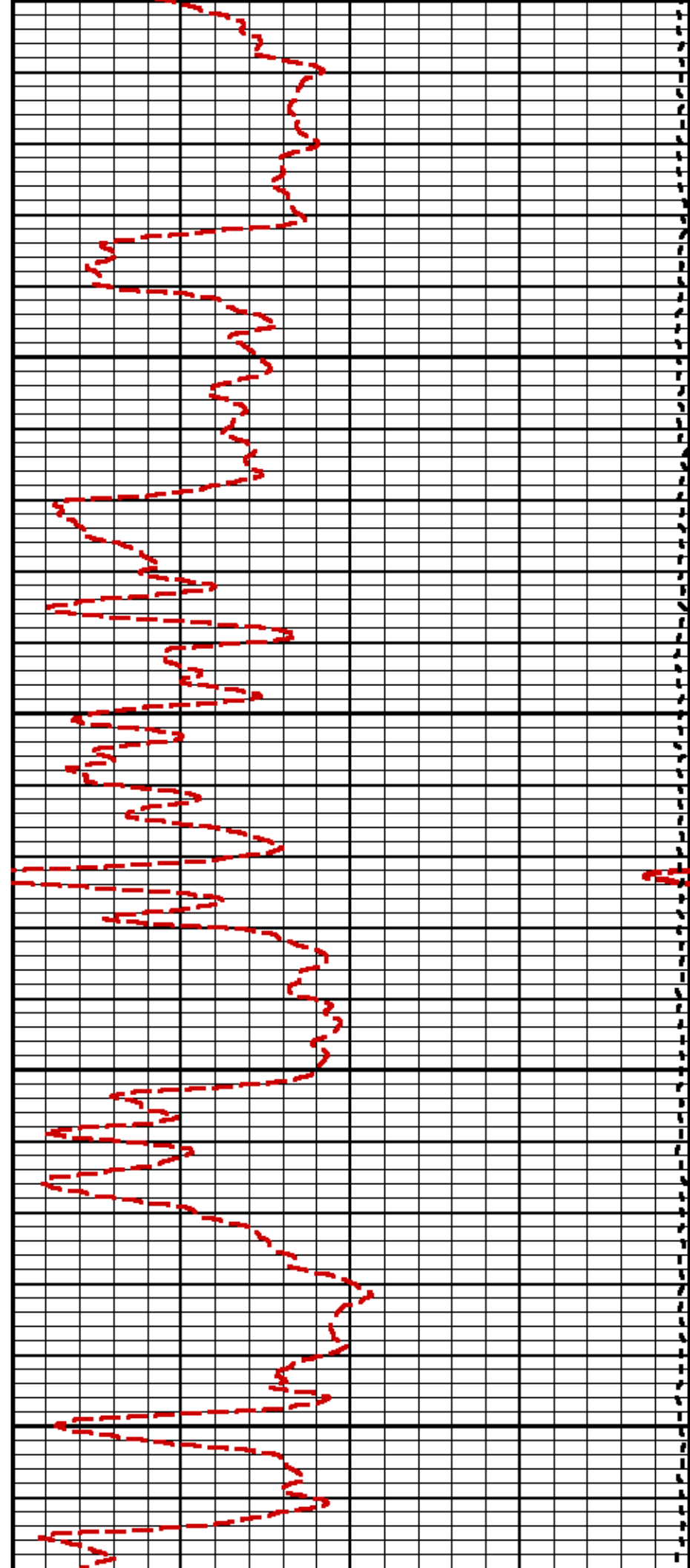
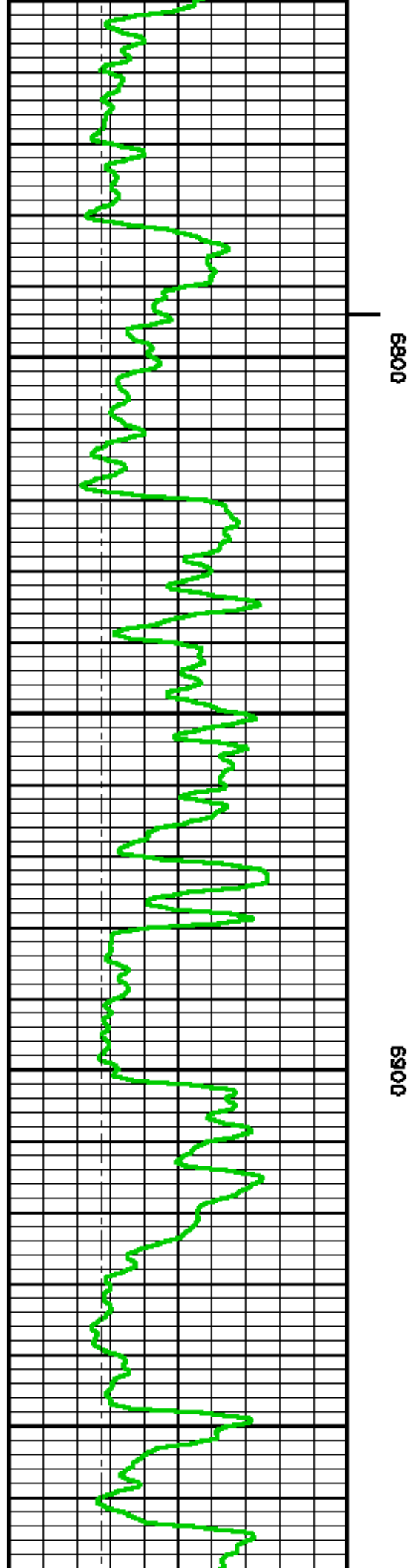
6500



6600

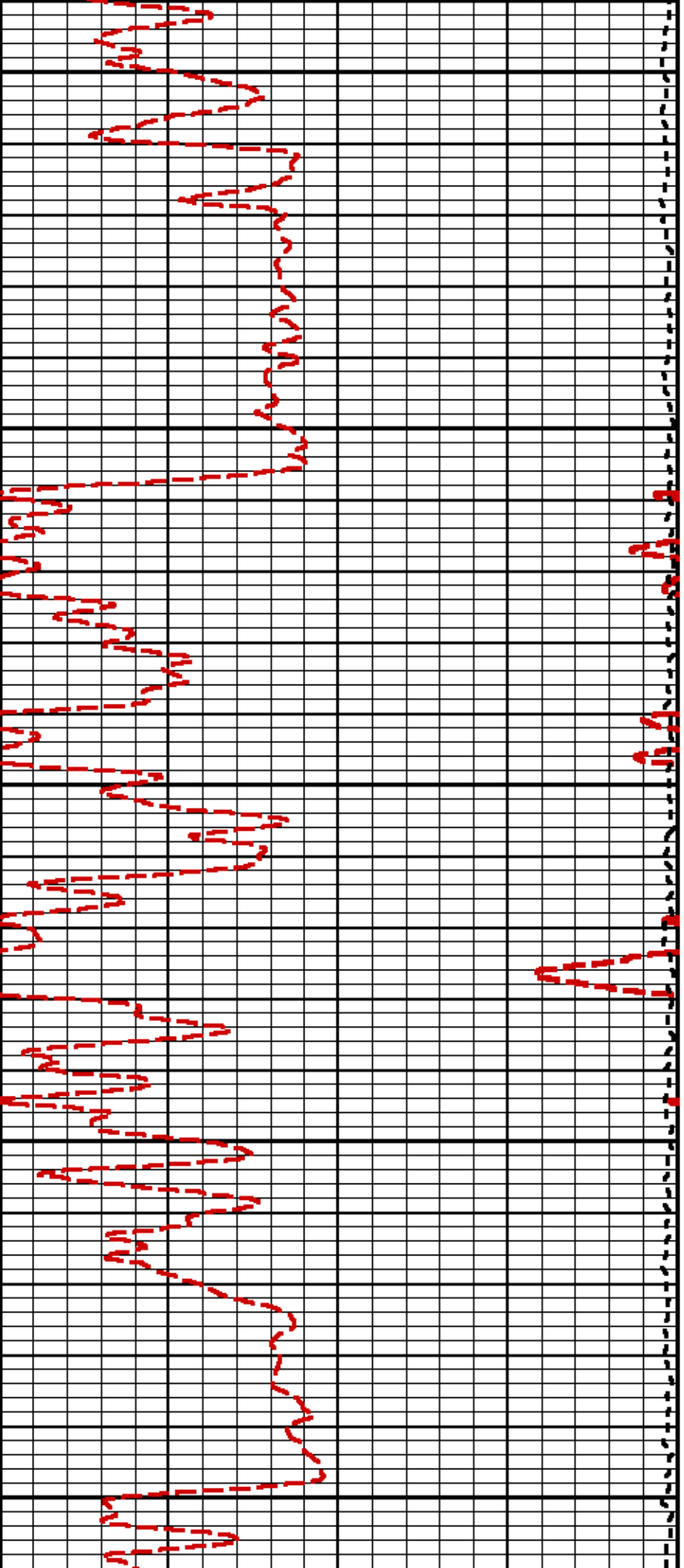
6700







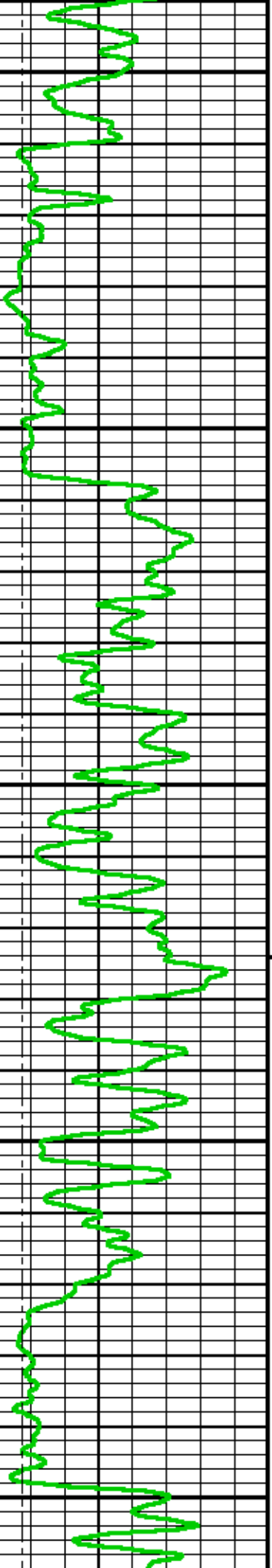




7200

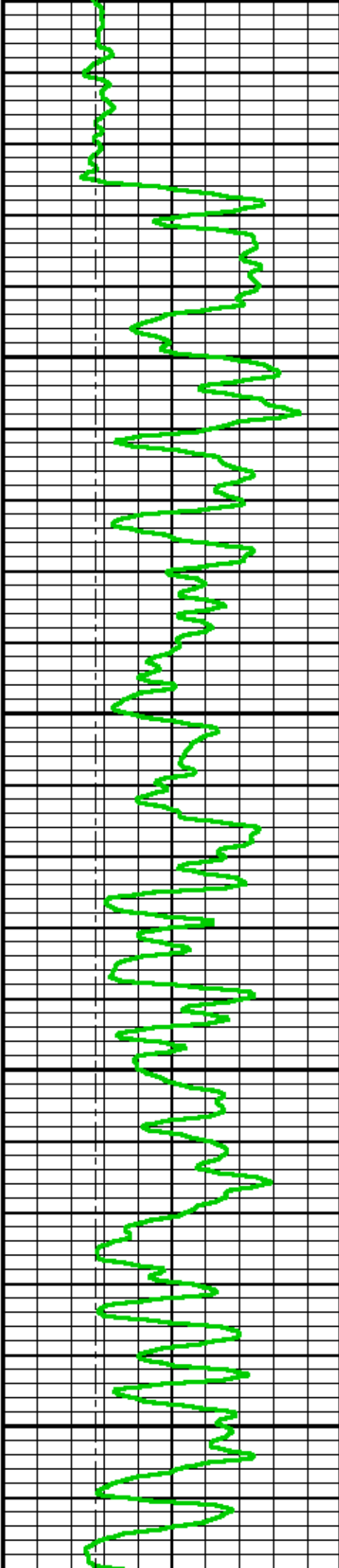
7300

7400



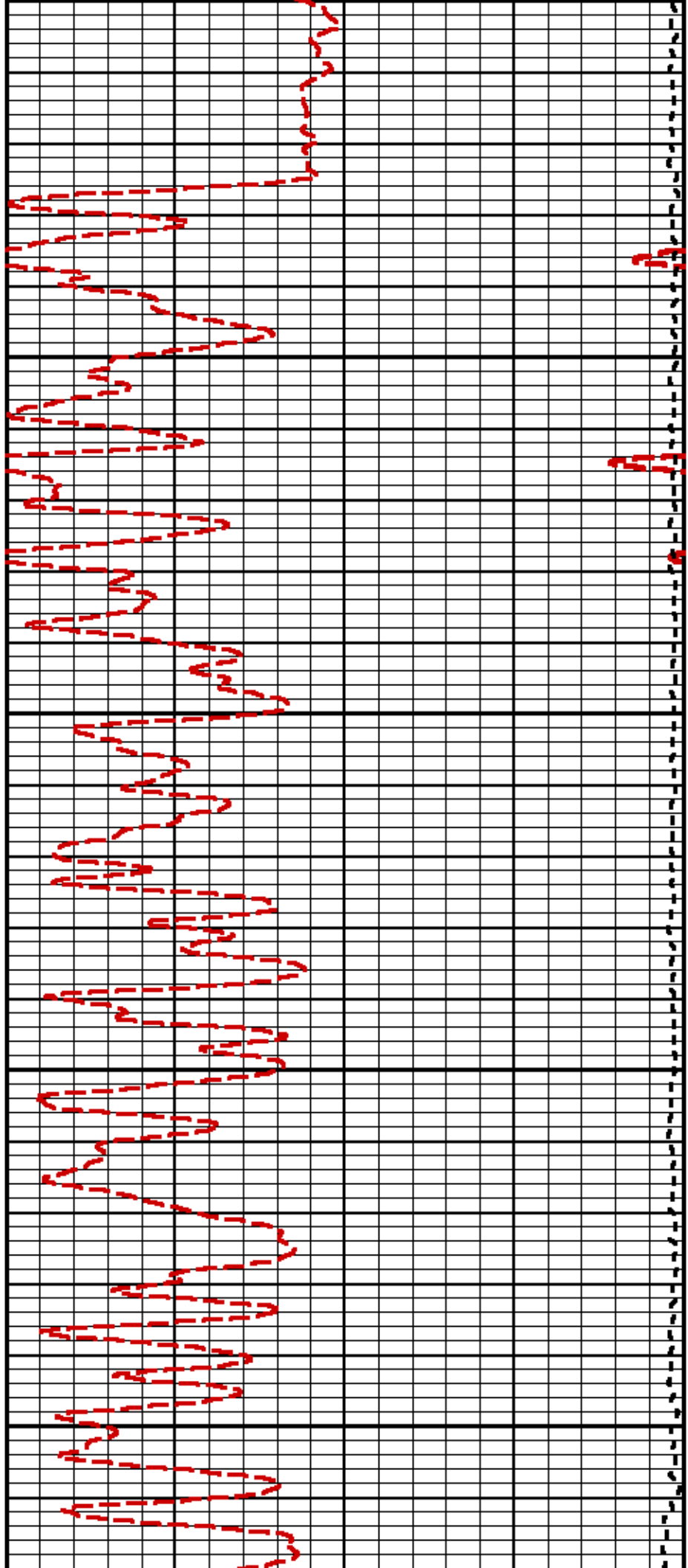


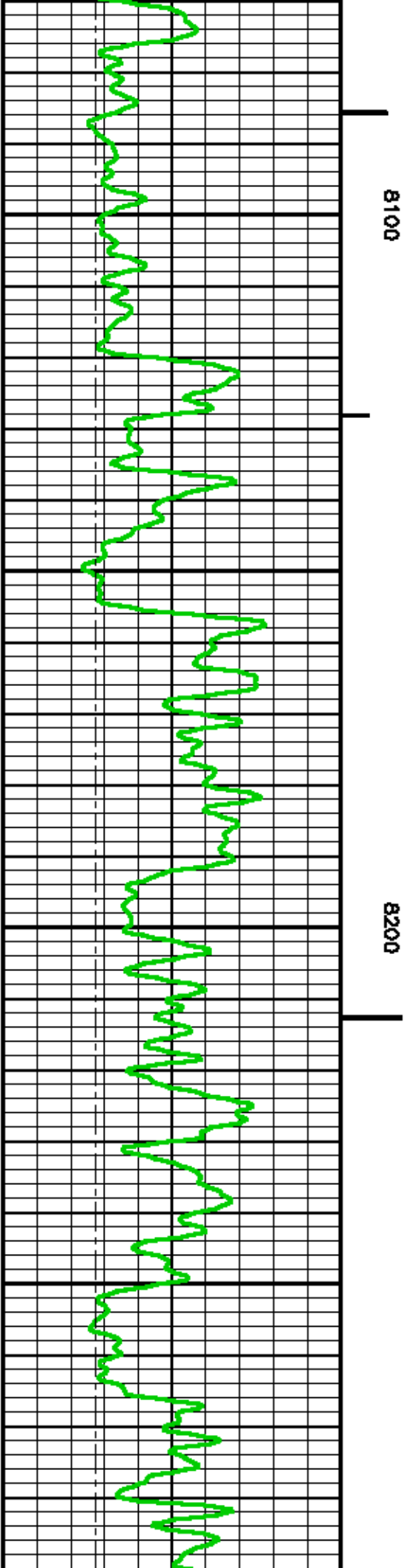
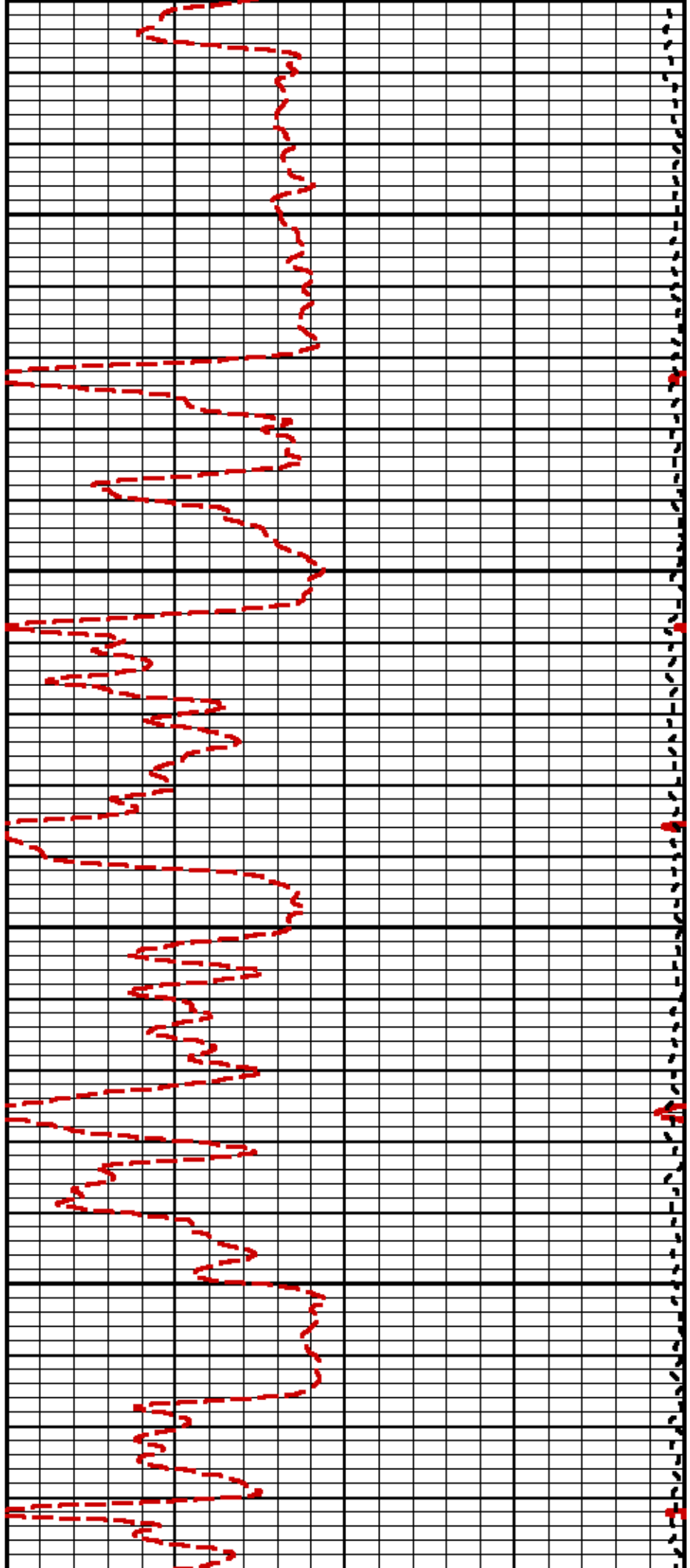


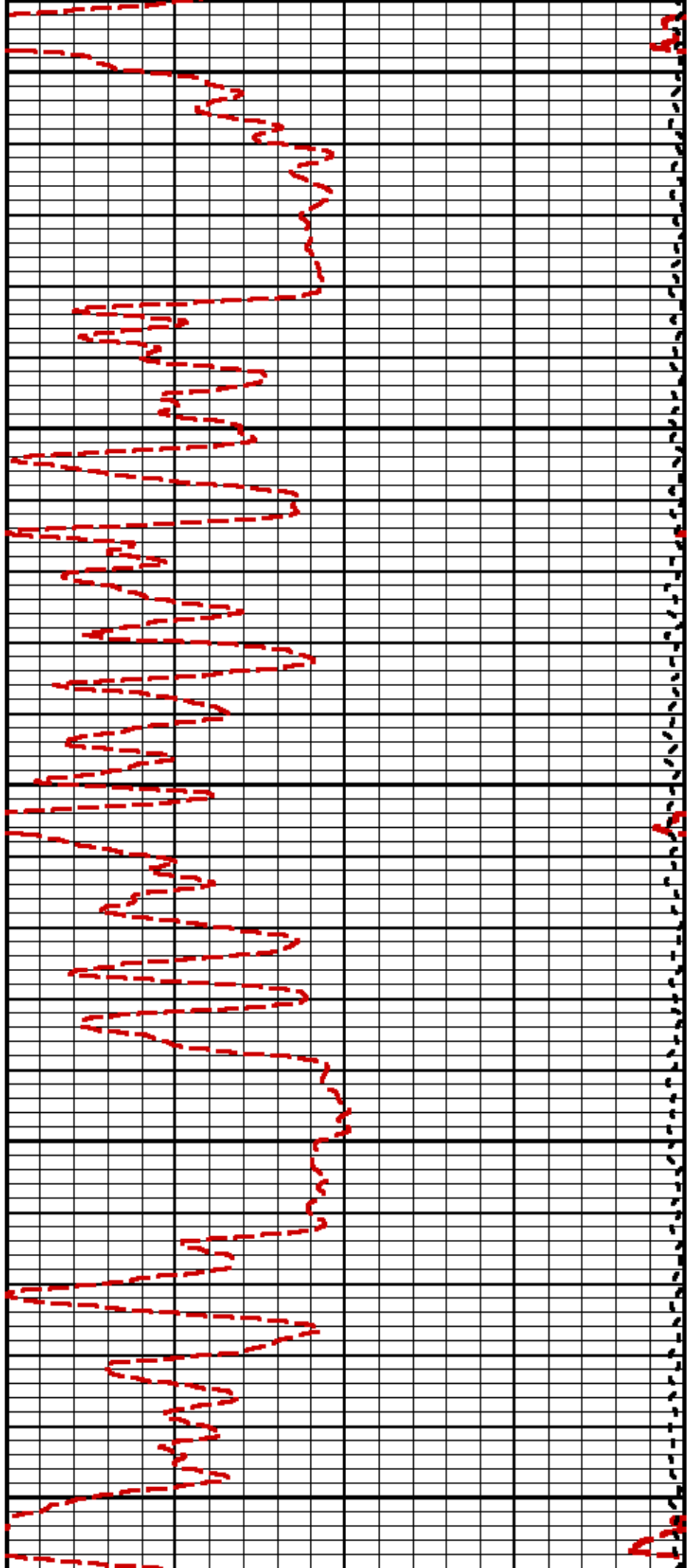


7900

8000



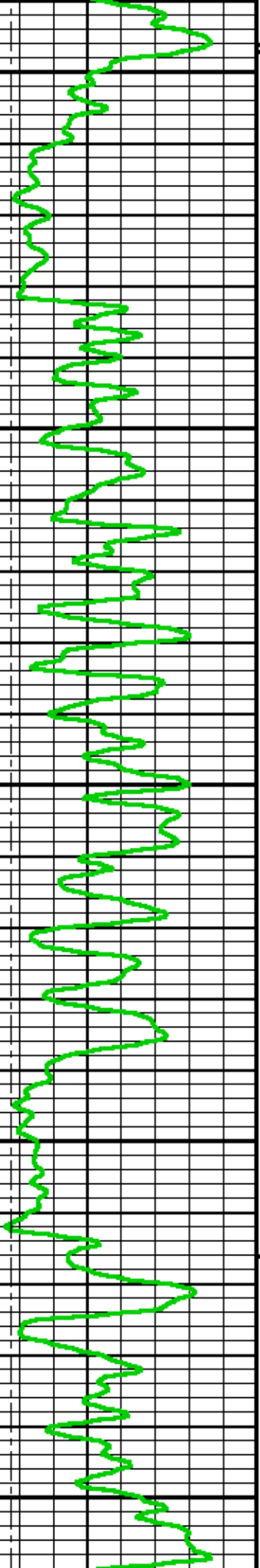


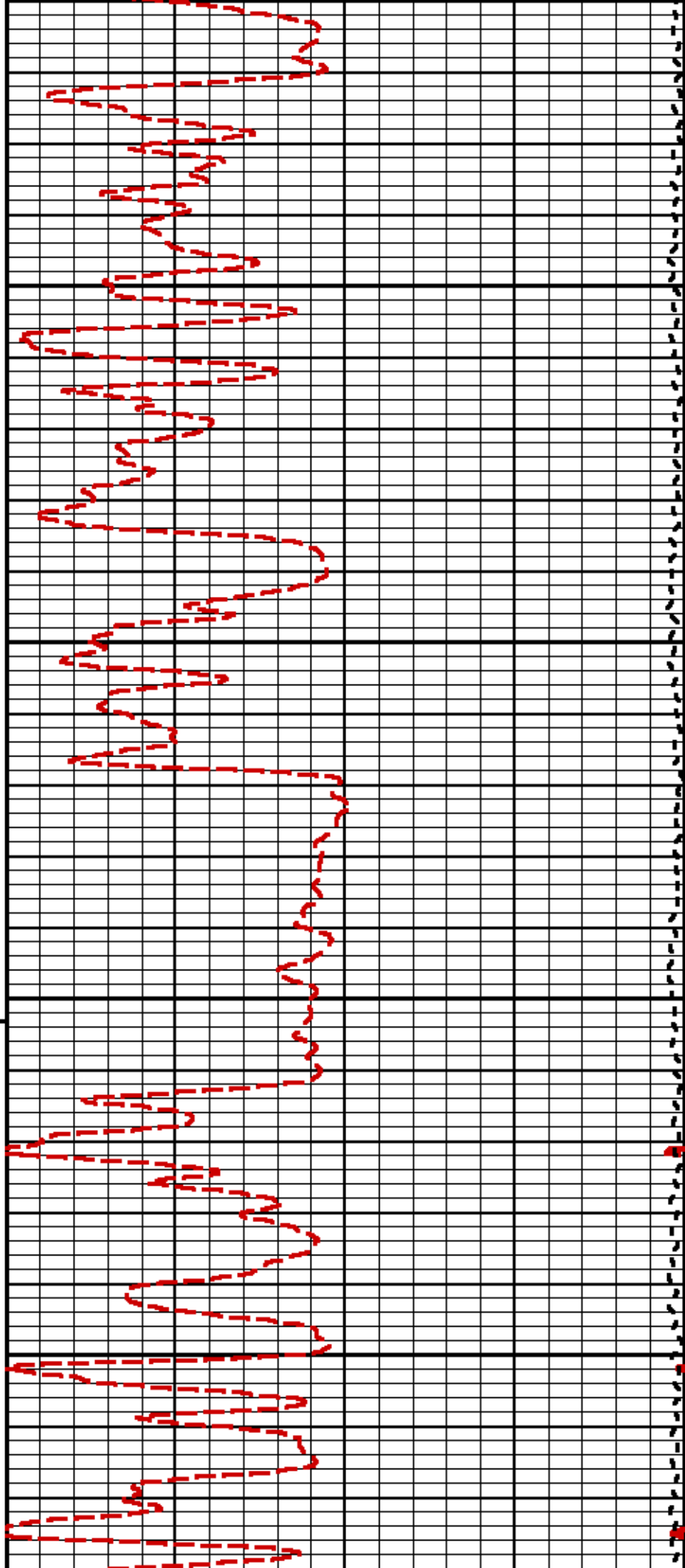


8300

8400

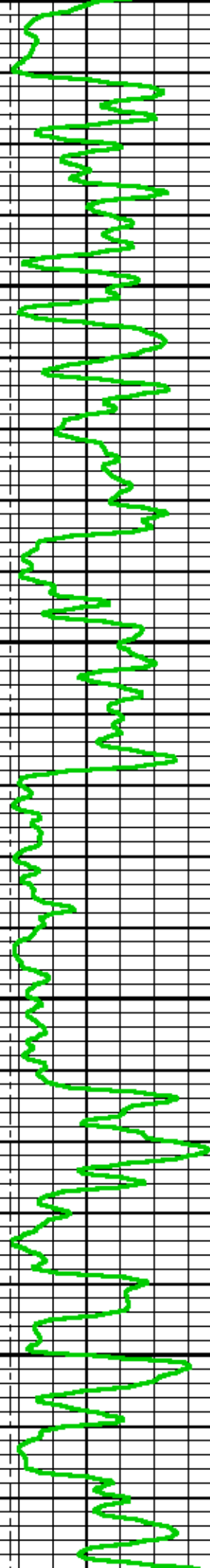
8500



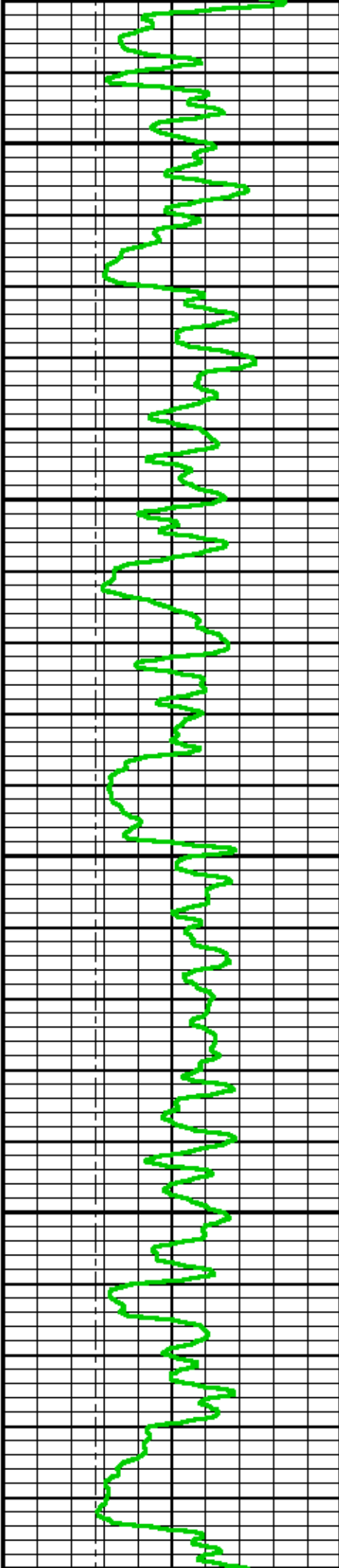


8600

8700

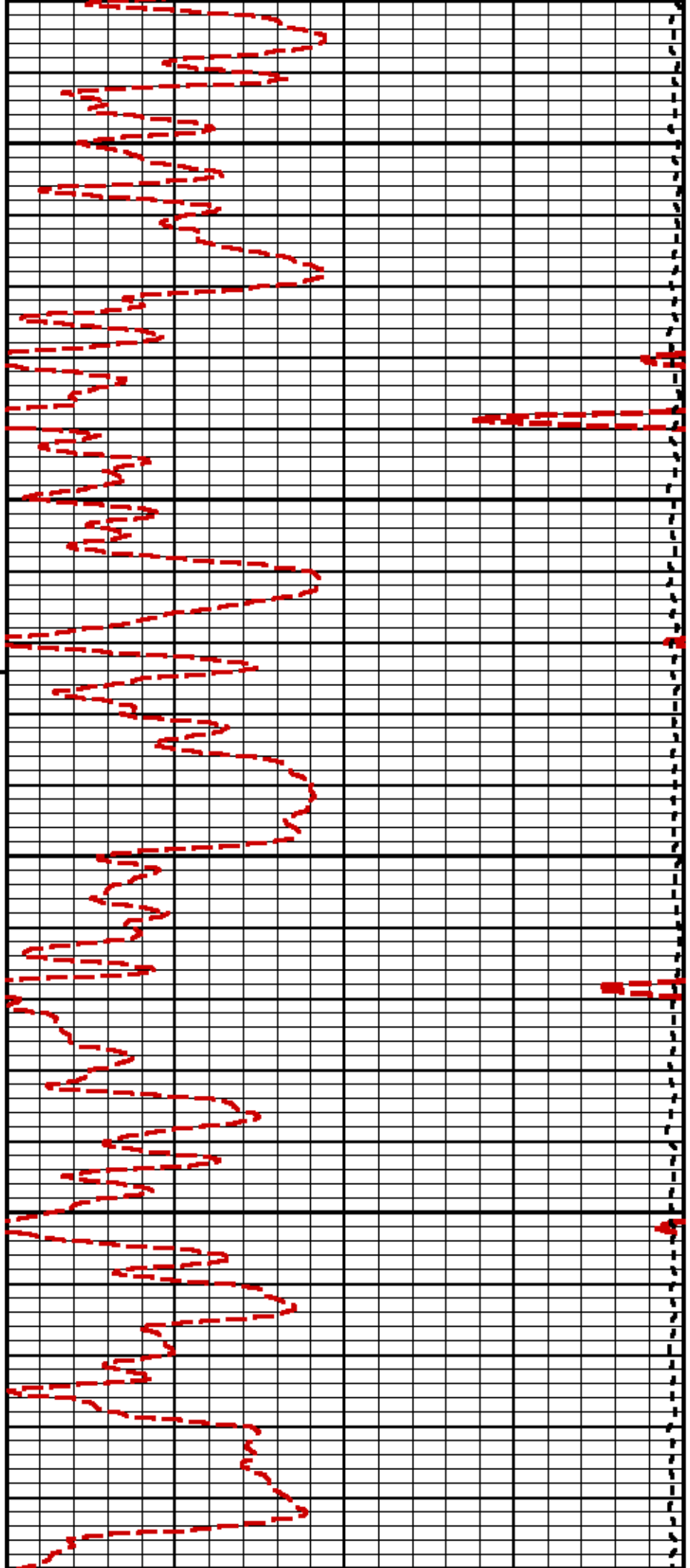






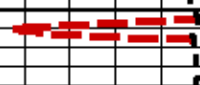
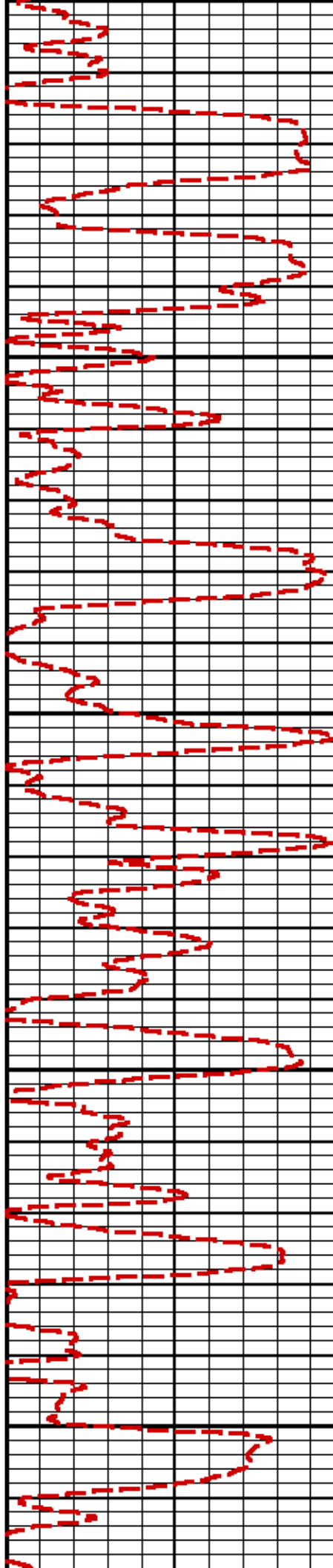
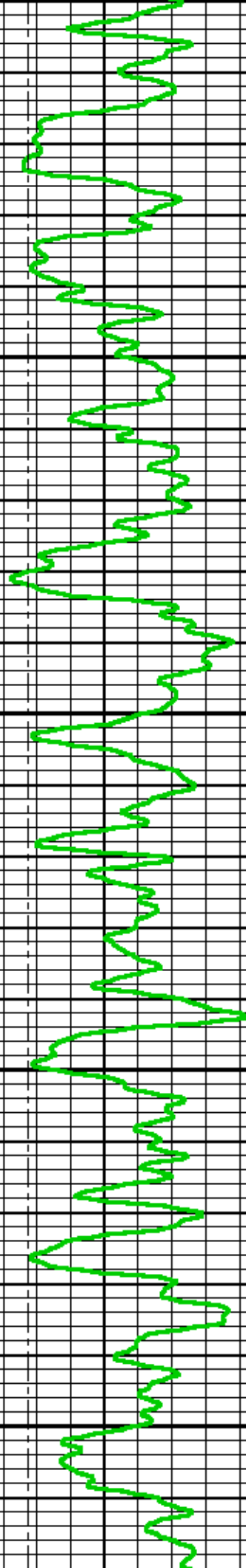
8800

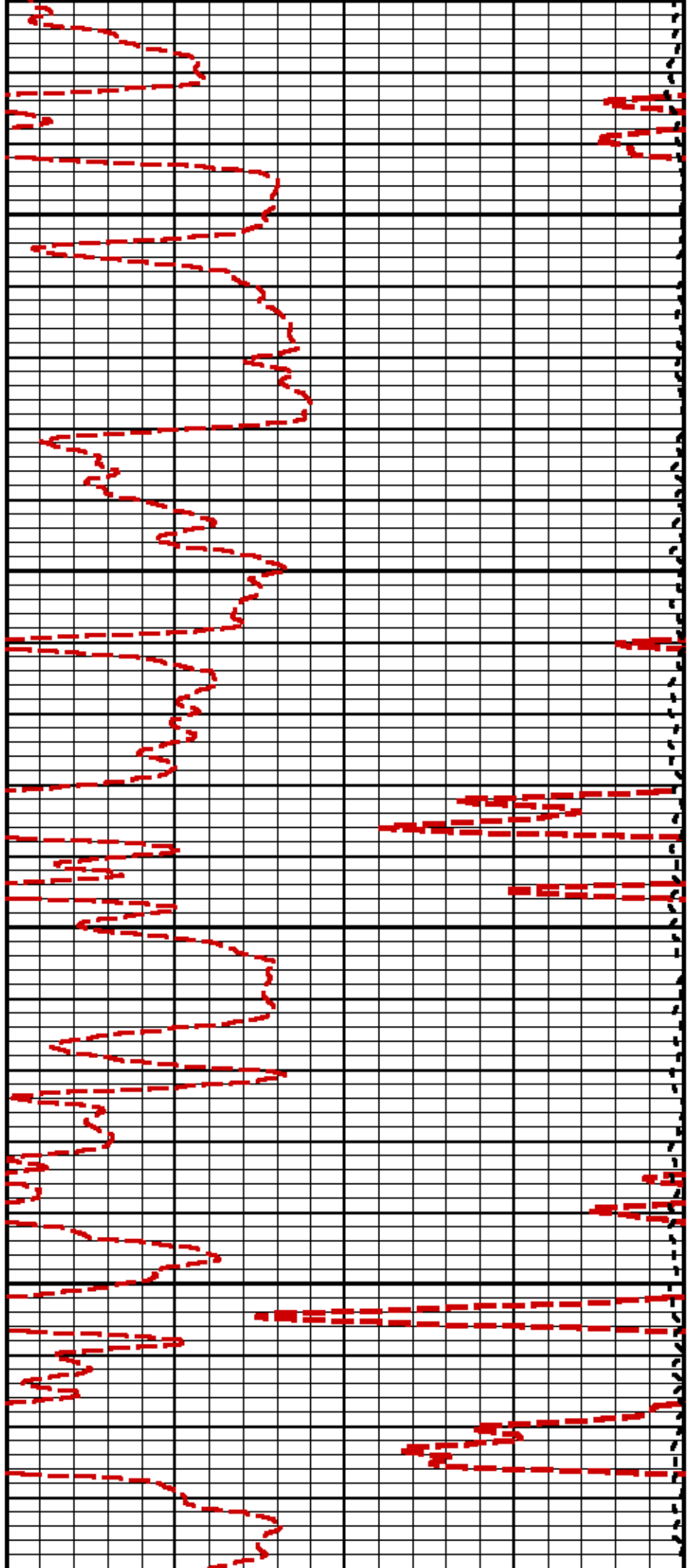
8900



0005

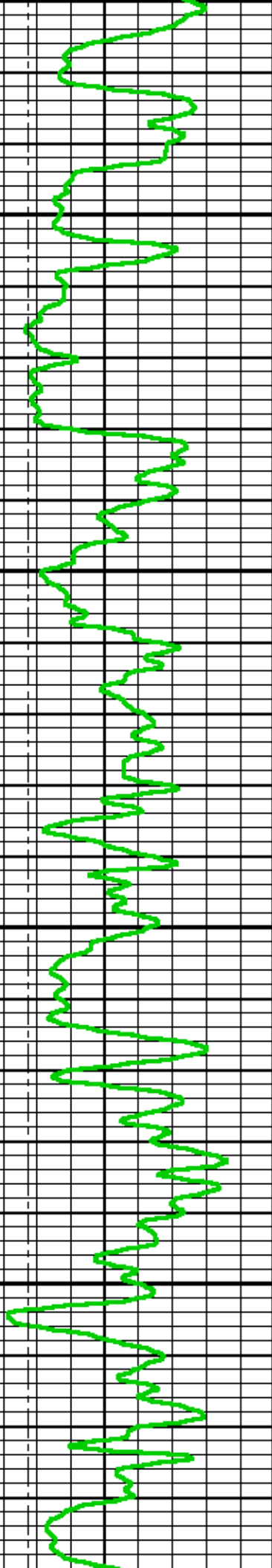
9100

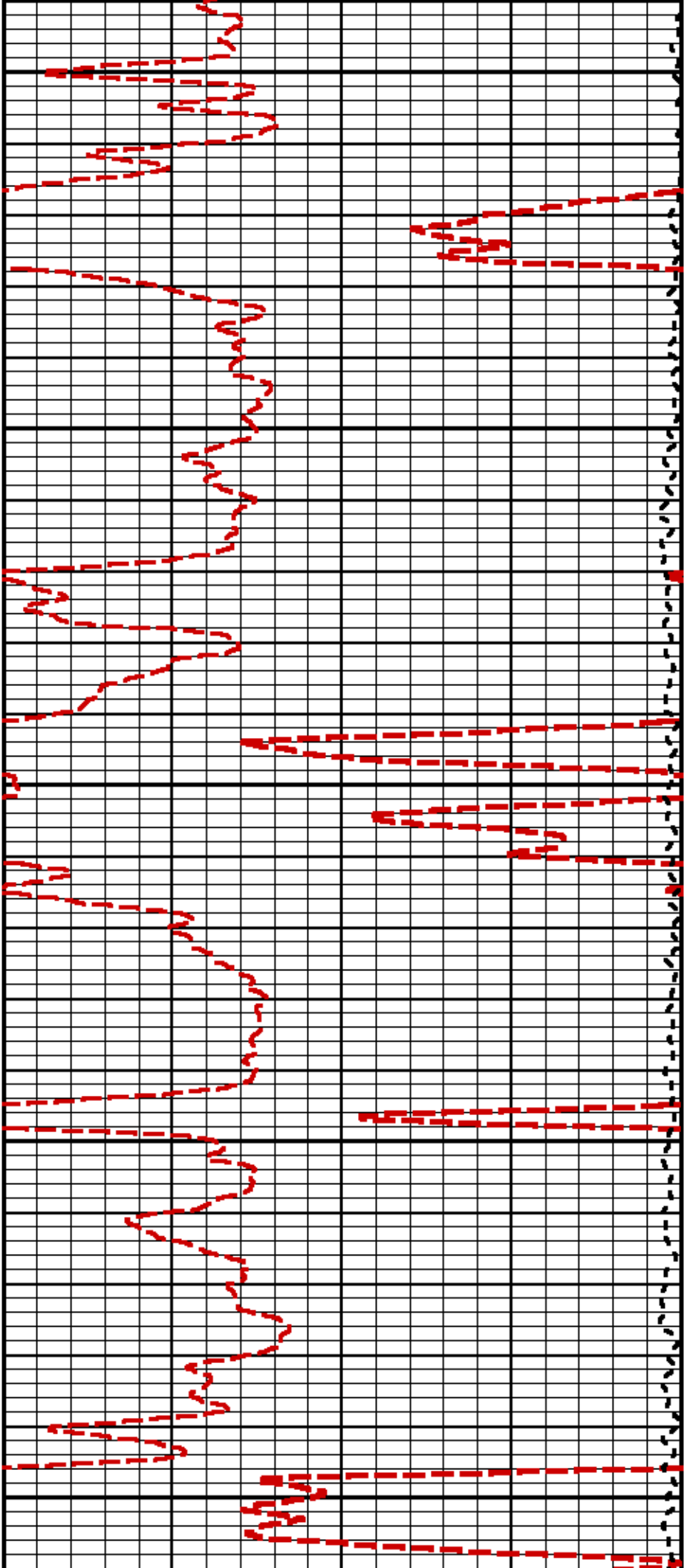




9200

9300

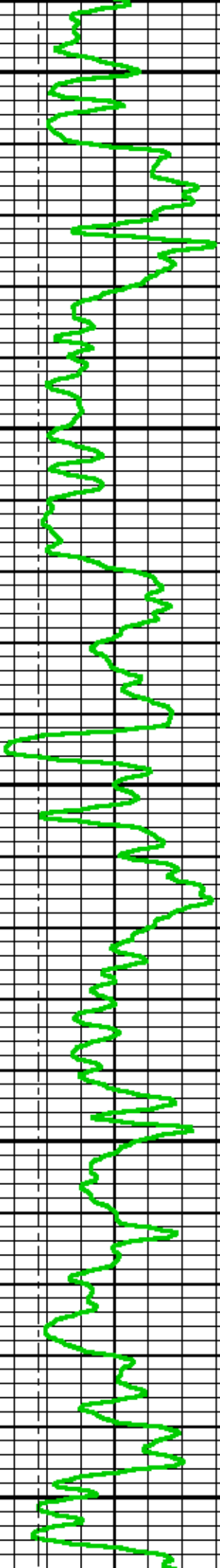


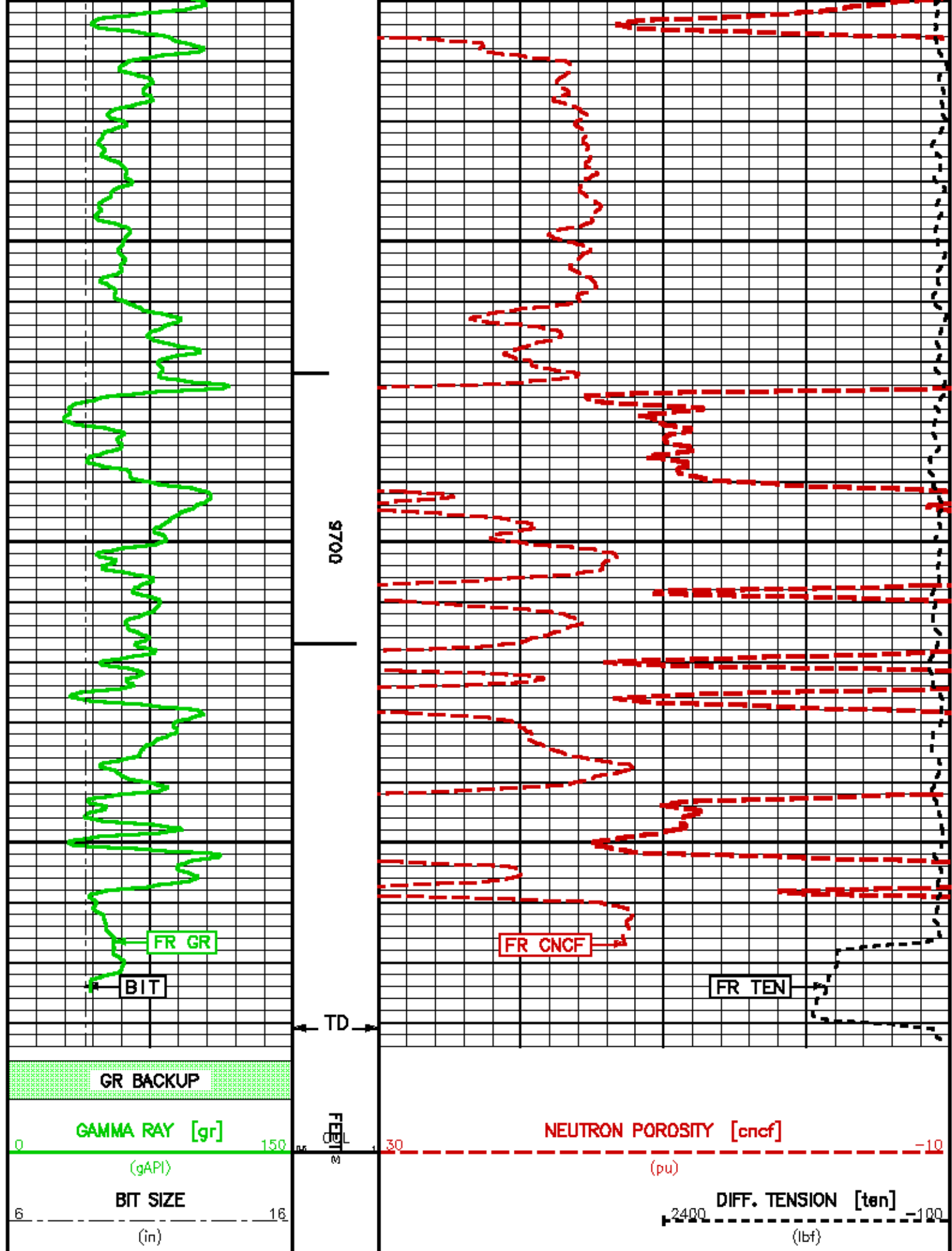


9400

9500

9600





# REPEAT LOG 5"/100FT SCALE

ECLIPS 6.01 Feb 21, 2008  
Updates: 1,40,41 Patches: 1,2,4,5,6

Wed Feb 10 17:05:19 2010

Perplt /main/62

Cplot

Plot\_Cpp /main/16

Fileview 5.42

## PARAMETER AND FILTER SUMMARY REPORT

FILE: /data/1628/k970calc02.prm  
LOGGING MODE: DEPTH DIRECTION: UP  
TOP DEPTH: 8586.500 ft BOTTOM DEPTH: 9787.918 ft

### SYMMETRIC FILTER

MEASUREMENT TYPE	PARAMETER	VALUE	UNITS	INTERVAL (ft)	
GR LOW RES	FILTER (.1)	medium (1)		TOP	BOTTOM
GR MED RES	FILTER ()	medium (1)		"	"
TENSION	FILTER ()	medium (1)		"	"
CN LOW RES	FILTER (.1)	medium (1)		"	"
CN MED RES	FILTER ()	medium (1)		"	"

### BOREHOLE & CEMENT

MEASUREMENT TYPE	PARAMETER	VALUE	UNITS	INTERVAL (ft)	
CASING - BOREHOLE & CEMENT VOLUME	CASING O.D.	4.500	1in	TOP	BOTTOM
	CASING THICKNESS	0.250	1in	"	"
BIT SIZE	BIT SIZE	8.750	1in	"	"
BOREHOLE CORR DIAMETER SOURCE	CALIPER/FIXED DIA. (cnbh*)	USE FIXED SIZE		"	"
BOREHOLE CORR DIAMETER	FIXED DIAMETER (cnbh*)	8.750	1in	"	"

### ACCELERATION PROCESSING

MEASUREMENT TYPE	PARAMETER	VALUE	UNITS	INTERVAL (ft)	
ACCEL CORR SWITCH	ACCEL DEPTH CORR	CORRECTION ON		TOP	BOTTOM

### CN PROCESSING

MEASUREMENT TYPE	PARAMETER	VALUE	UNITS	INTERVAL (ft)	
CN MATRIX	2436 MATRIX	SANDSTONE		TOP	BOTTOM
CN BOREHOLE CORRECTION	SALINITY	881	ppm	"	"
	BOREHOLE CORRECTION	ON		"	"
CN CASING & CEMENT CORRECTION	CORRECTION	OFF		"	"
	BIT SIZE BEHIND CSNG	8.750	1in	"	"

### CURVE DESCRIPTION REPORT

CURVE NAME	CURVE ALIAS	CREATION DATE	CURVE DESCRIPTION
F1:BIT	BIT	Feb 10 16:48:50 2010	BIT SIZE
F1:CCL	CCL	Feb 10 16:48:50 2010	CASING COLLAR LOCATOR
F1:CNCF	CNCF	Feb 10 16:48:50 2010	FIELD NORMALIZED COMPENSATED NEUTRON POROSITY
F1:GR	GR	Feb 10 16:48:50 2010	GAMMA RAY
F1:TEN	TEN	Feb 10 16:48:50 2010	DIFFERENTIAL TENSION

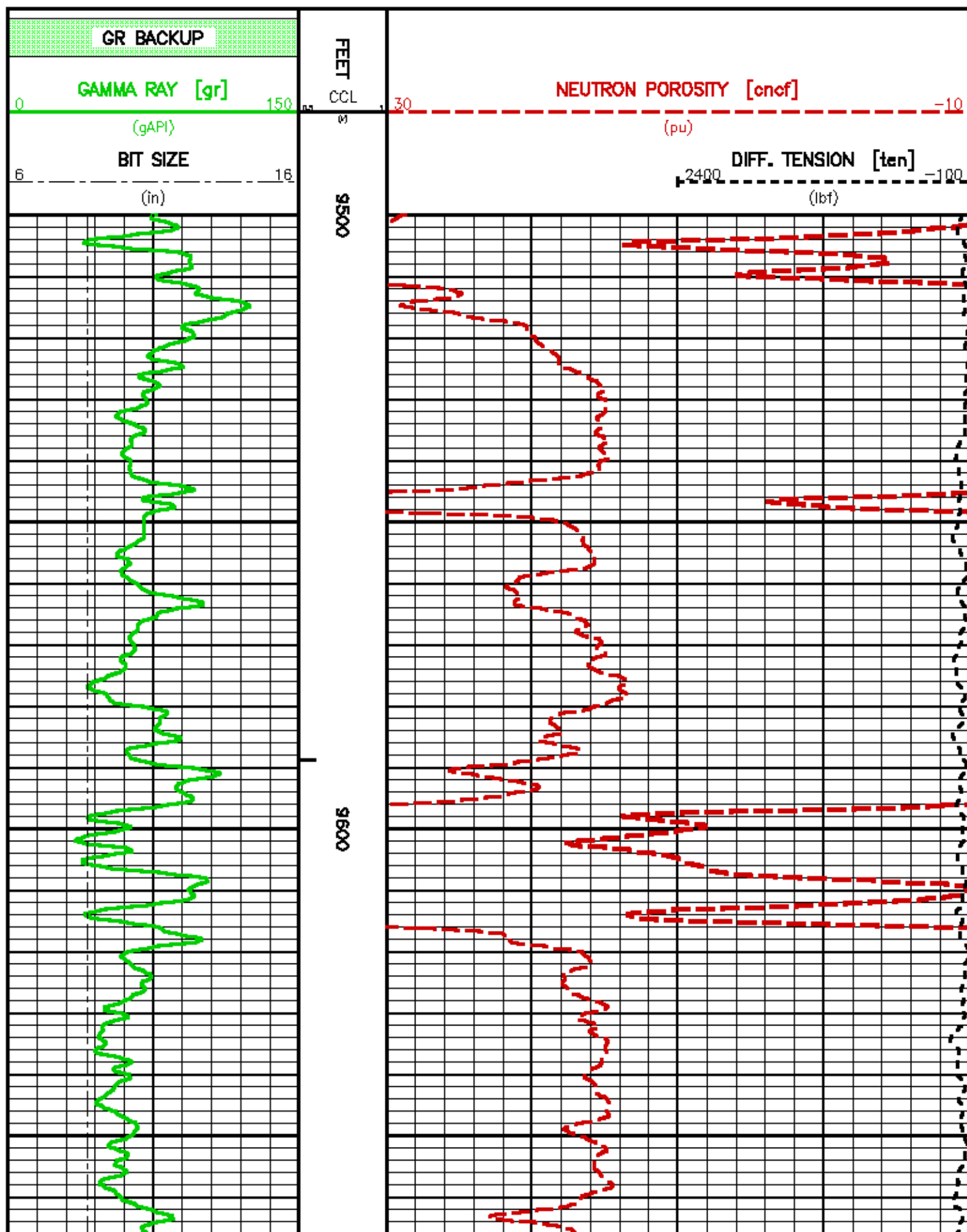
### CURVE MEASURE POINT OFFSET

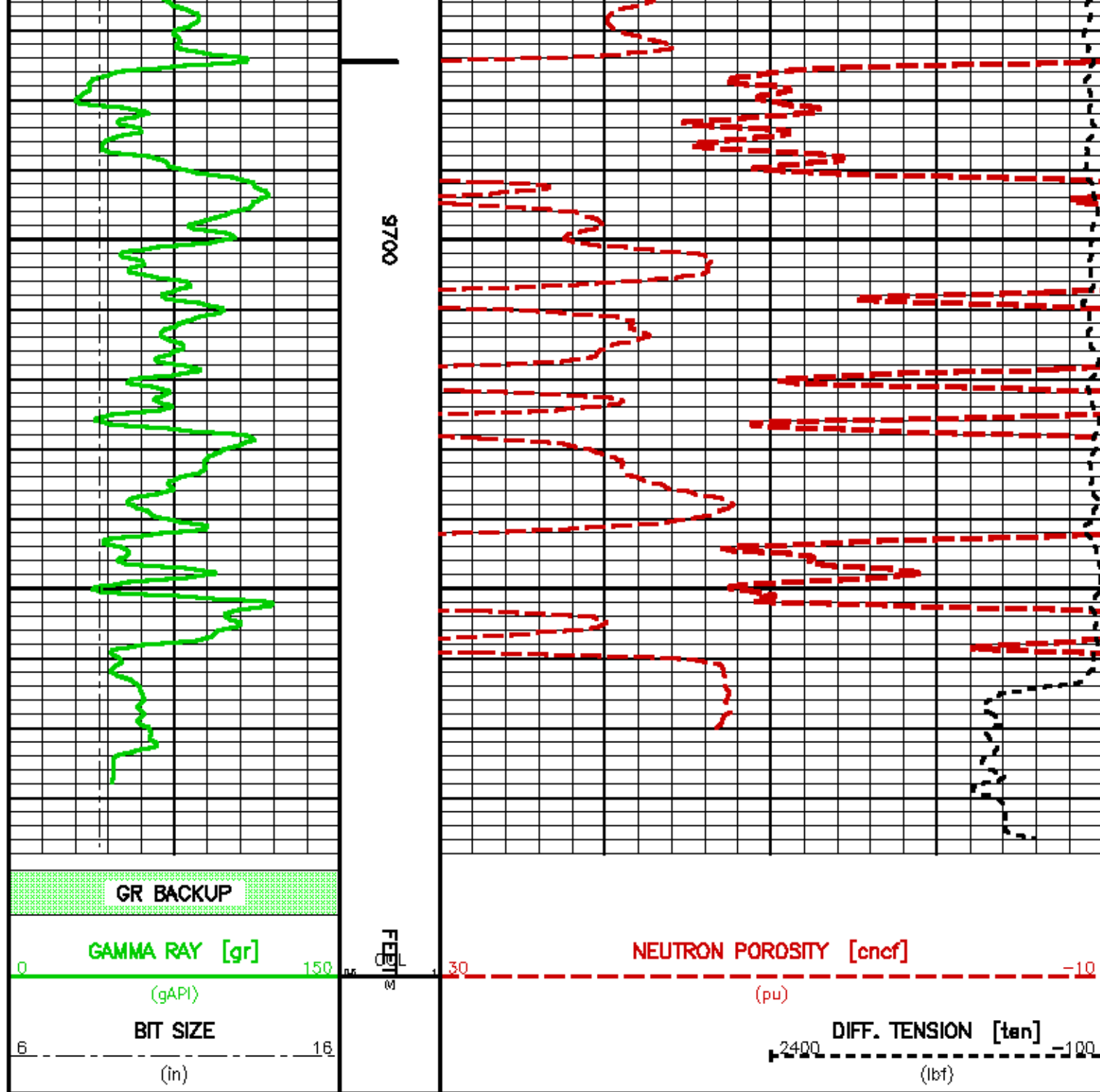
CURVE	OFFSET (ft)	CURVE	OFFSET (ft)	CURVE	OFFSET (ft)	CURVE	OFFSET (ft)
BIT	0.00	CNCF	1.50	TEN	0.00		
CCL	18.00	GR	7.50				

Presentation : cpu1scn\_repeat.pdf [5"/100' Scale]  
Plot Interval : 8500 - 9781.75 Feet

Data File 1 : F1 : cou1:/data/1628/k970calc02\_repeat.cif

Created On : Feb 10 16:49:50 2010  
Company : MARATHON OIL COMPANY  
Well : 598-28C-21  
Field : GRAND VALLEY  
File Interval : 0 - 9793 Feet  
Oct : t8970alc





## CALIBRATION / VERIFICATION SUMMARY

Source File: /data/1838/h879ole.fo1

### TTMA PRIMARY CALIBRATION SUMMARY

TOOL #: 3960XA 10380720

DATE/TIME PERFORMED: Wed Oct 8 08:07:05 2008

UNIT #: 3862TD HL6670

ACCEL #: 3960XA 10380720

ACCEL CAL DATE: 13:54 07/16/2007

GAIN OFFSET  
(ohm.m)  
RM K FACTORS 0.14570 -0.01679

### TTMA BEFORE LOG VERIFICATION SUMMARY



TOOL #: 3980XA 10380720 DATE/TIME PERFORMED: Wed Feb 10 16:07:18 2010 DAYS SINCE CAL: 490

UNIT #: 3882TD HL6670

	CHT (lbf)	MUD TEMP (degF)	RES M Q (ohm)	ACCEL Q
CAL	19152	499.20	9.99	1001.06
	18340 19940	491.00 505.40	8.00 14.00	980.00 1020.00
ZERO	-24112	-436.02	0.250	1001.064
	-24812 -23312	-443.20 -428.80	0.200 0.300	980.000 1020.000

### TTMA AFTER LOG VERIFICATION SUMMARY

TOOL #: 3980XA 10380720 DATE/TIME PERFORMED: Wed Feb 10 16:24:34 2010 DAYS SINCE CAL: 490

UNIT #: 3882TD HL6670

	CHT (lbf)	MUD TEMP (degF)	RES M Q (ohm)	ACCEL Q
CAL	19122	498.91	10.00	1001.71
	18340 19940	491.00 505.40	8.00 12.00	980.00 1020.00
ZERO	-24112	-436.02	0.250	1001.547
	-24812 -23312	-443.20 -428.80	0.200 0.300	980.000 1020.000

### GR PRIMARY CALIBRATION SUMMARY

Tool #: 3518XG 10081345 DATE/TIME PERFORMED: Mon Feb 8 15:29:59 2010

Unit #: 3882TD HL6670 Jig Series: 4702NK DA-321

Background	Calibrator ON	Jig Value (gAPI)	Mult	Background	Calibrator ON (gAPI)
129.56	550.74	183	0.257	33.23	215.23
			0.250 0.260		

### GR BEFORE LOG VERIFICATION SUMMARY

TOOL #: 3518XG 10081345 DATE/TIME PERFORMED: Wed Feb 10 16:07:22 2010 DAYS SINCE CAL: 2

UNIT #: 3882TD HL6670 Jig: INTRNL N/A

Counts	TEMP (degF)	HV (V)
976.67	67.45	1361.00
929.00 1027.00	539.00	1237.00 1512.00

### GR AFTER LOG VERIFICATION SUMMARY

TOOL #: 3518XG 10081345 DATE/TIME PERFORMED: Wed Feb 10 16:24:39 2010 DAYS SINCE CAL: 2

UNIT #: 3882TD HL6670 Jig: INTRNL N/A

Counts	TEMP (degF)	HV (V)
976.33	121.27	1365.44
929.00 1027.00	539.00	1237.00 1512.00

### CN PRIMARY CALIBRATION SUMMARY

TOOL #: 2436XA 10124368 DATE/TIME PERFORMED: Mon Feb 8 15:57:04 2010

UNIT #: 3882TD HL6670 CALIBRATOR #: 2437XB 112674 SOURCE #: 4718XA ON-B97

SSN DT CPS	LSN DT CPS	SSN/LSN	MCF	CNRATIO	CN PU
4611.90	804.96	5.72937	1.00133	5.73700	25.241
			0.98000 1.00000		

### CN BEFORE LOG VERIFICATION SUMMARY

TOOL #: 2436XA 10124368 DATE/TIME PERFORMED: Wed Feb 10 16:07:14 2010 DAYS SINCE CAL: 2

UNIT #: 3882TD HL6670 CALIBRATOR #: INTRNL N/A

SSN DT CPS	LSN DT CPS	SSN/LSN	TEMP (degF)	HV (V)	LV (V)
992.07	994.44	0.99762	69.2	1368.8	4.599
		0.95000 1.05000	580.4	1255.0 1450.0	4.500 5.000

# CN AFTER LOG VERIFICATION SUMMARY

TOOL #: 2438XA 10124368 DATE/TIME PERFORMED: Wed Feb 10 15:24:44 2010 DAYS SINCE CAL: 2

UNIT #: 3682TD HL6670 CALIBRATOR #: INTRNL N/A

SSN DT CPS	LSN DT CPS	SSN/LSN	TEMP (degF)	HV (V)	LV (V)
992.41	994.44	0.99797	130.9	1368.5	4.599
		0.95000 1.05000	280.4	1350.0 1450.0	4.200 5.000

## INSTRUMENT CONFIGURATION

Source File: /cd11a/1828/1870bitr-his

**TOOL JOINTHEAD**  
 Series : QJL318  
 Diameter : QJLH  
 Diameter : 3.15"

**COLLAR LIDATION**  
 Series : SSBAAA  
 Diameter : COL

**TOOL JOINT/TONG/HAND JOINT/ARMED**  
 Series : SSBAAA  
 Diameter : TT93  
 Diameter : 3.15"  
 Weight : 81 lbs

**TOOL JOINT/TELEMETRY GAMMA KEY**  
 Series : SS1800  
 Diameter : GA  
 Diameter : 2.12"  
 Weight : 71.4 lbs  
 Measure Points: 2.78' LSH MP

**TOOL JOINT/TELEMETRY GAMMA KEY**  
 Series : SSBAAA  
 Diameter : GA  
 Diameter : 2.12"  
 Weight : 71.4 lbs  
 Measure Points: 1.92' LSH MP

**WELL FLUID 3 1/2"**

TOTAL LENGTH: 83.18'  
 TOOL JOINT WEIGHT: 87.1 lbs  
 MAX DENSITY: 0.51 g/cc



83.18'  
 COL MP 18.81'  
 GA MP 7.88'  
 WJ MP 7.14'  
 0.00'



COMPANY MARATHON OIL COMPANY  
 WELL 596-29C-21  
 FIELD GRAND VALLEY  
 COUNTY GARFIELD STATE COLORADO

FILE NO: 1828  
 API NO: 05045180870000

LOCATION:  
 SHL: 1783' FSL & 1425' FWL

ELEVATIONS:  
 KB 8204 FT  
 DF 8203 FT  
 GL 8180 FT

PAD: 887-29C

SEC 29 TWP 55 RGE 96W

DATE 10-Feb-2010

Baker Atlas

