Tucker ENERGY SERVICES

COMPENSATED NEUTRON

PEL DENSITY MICRO LOG

Company NOBLE PETROLEUM, INC.
Well BUSENITZ #1
Field PLUM GROVE
County BUTLER
State KANSAS
Country USA
API No. 15-015-24044-00-00

File No : TUL-59876
Company : NOBLE PETROLEUM, INC.
Well : BUSENITZ #1
Field : PLUM GROVE
County : BUTLER
State : KANSAS
Country : USA
API No : 15-015-24044-00-00

Location :
1632' FNL & 1564' FWL
NW NW SE NW

LSD : **Sect :** 24 **Twp :** 24S **Rge :** 4E

Permanent Datum:	GL	**Elevations:**		**Services:**	
Drilling Measured From:	KB	**KB** 1415.00	Ft	CNT	PIT
Log Measured From:	KB	**DF** 1414.00	Ft	LDT	
Above Permanent Datum:	0.00 Ft	**GL** 1406.00	Ft	MST	

Date	09-11-2014			
Run Number	1			
Depth--Driller	2620.0 Ft			
Depth--Logger	2623.0 Ft			
First Reading	2600.0 Ft			
Last Reading	235.0 Ft			
Casing--Driller	225.0 Ft			
Casing--Logger	235.0 Ft			
Bit Size	7.875 In			
Casing Size	8.625 In			
Hole Fluid Type	CHEM GEL			
Density	9.3 ppg			
Fluid Loss	9.6 ml/30min			
PH/Viscosity	10.0	55.0 sec/qt		
Sample Source	MEASURED			
RM@Measured Temp.	0.800 @ 70 F			
RMF@Measured Temp	0.640 @ 70 F			
RMC@Measured Temp.	0.960 @ 70 F			
Source RMF/RMC	CALCULATED	CALCULATED		
RM@BHT	0.570 @ 115 F			
Time Circulation Stopped	09-10-2014 11:00 pm			
Max Recorded Temp.	115 F			
Equipment/Base	127	TULSA		
Recorded By	J. ADAMS / A. DJAHO			
Witnessed By	B. STOUT			

Casing Strings

Size (In)	Weight (Lbs)	Bottom (Ft)	Top (Ft)
8.625	23.00	225.00	0.00

Bitsize Intervals

Size (In)	Bottom (Ft)
7.875	2620.00

Run Number	1
Date	09-11-2014
Date/Time On Bottom	09-11-2014 4:00 am
Depth to Fluid	0.0 Ft
Salinity	1000.000 ppm
RMF@BHT	0.460 @ 115 F
RMC@BHT	0.690 @ 115 F

Run Number 1

Comments

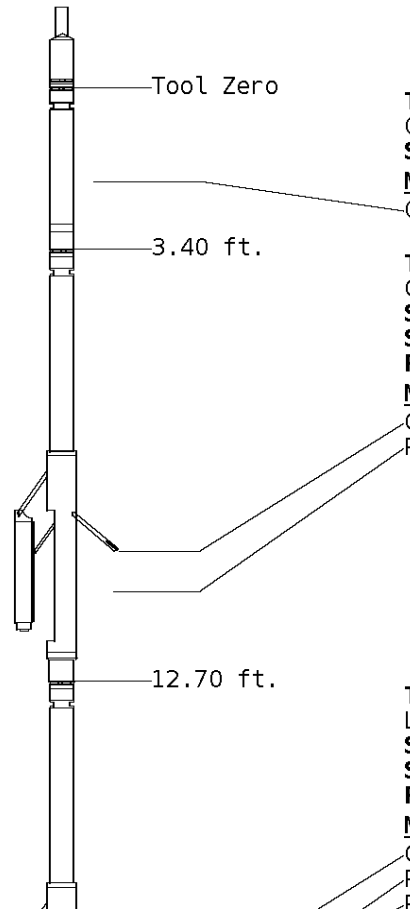
ALL PRESENTATIONS AS PER CUSTOMER REQUEST
GRT, CNT, LDT, MLT AND PIT RUN IN COMBINATION
CALIPERS ORIENTED ON X-Y AXIS
2.71 G/CC USED TO CALCULATE POROSITY
ANNULAR HOLE VOLUME CALCULATED USING 5.5" PRODUCTION CASING
PHIN IS CALIPER CORRECTED

GRT: GRP
CNT: PHIN, CLCNIN
LDT: PORL, LCORN, PECLN, LDENN, PORLLS, CLLDIN
MLT: NOR_RF, INV_RF, MSCLPIN
PIT: ILD, ILM, SPU, SFLAEC, CIRD

OPERATORS:
B. BROWN
D.DUNCAN

Tool String Schematic

Total Tool Length - 53.15 **ft.**
Maximum Outside diameter - 6.00 **in.**
Net Weight in Air - 943.00 **lbs.**



Tool: GRT-B **Length:** 3.40 **ft.** **O.D.** 3.60 **in.**
Gamma Ray Controller
Sonde ID :GRT-BB-006

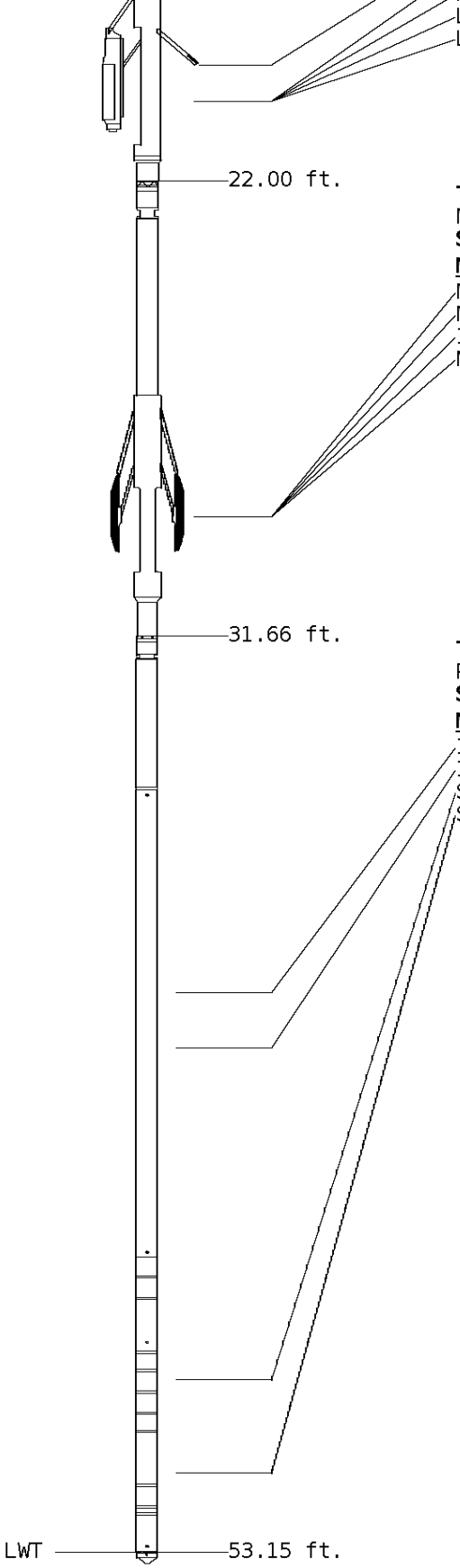
Measure Point	Tool Offset	Stack Offset	Bottom Offset
GRP	2.00	2.00	51.15

Tool: CNT-AA **Length:** 9.30 **ft.** **O.D.** 4.36 **in.**
Compensated Neutron A Pad on NDT-A
Sonde ID :NDT-BB-033
Source ID :N-1044
Pad ID :CNP-AA-101

Measure Point	Tool Offset	Stack Offset	Bottom Offset
CLCN	6.00	9.40	43.75
PHIN	6.80	10.20	42.95

Tool: LDT-DA **Length:** 9.30 **ft.** **O.D.** 4.80 **in.**
Litho Density D Pad on NDT-A
Sonde ID :NDT-CA-137
Source ID :CSV-587
Pad ID :LDP-DA-02

Measure Point	Tool Offset	Stack Offset	Bottom Offset
CLLD	6.00	18.70	34.45
PEL	7.00	19.70	33.45
PES	7.40	20.10	33.05



LDEN	7.20	19.90	33.25
LCOR	7.20	19.90	33.25

Tool: MST-DA **Length:** 9.66 **ft.** **O.D.** 6.00 **in.**
Micro Spherically Focused (IC)
Sonde ID :MLT-DA-21

Measure Point	Tool Offset	Stack Offset	Bottom Offset
MSFL	7.60	29.60	23.55
MSCLP	7.60	29.60	23.55
INV	7.60	29.60	23.55
NOR	7.60	29.60	23.55

Tool: PIT-CA **Length:** 21.49 **ft.** **O.D.** 3.62 **in.**
Phased Dual Induction w/ RM & D
Sonde ID :PIT-CA-062

Measure Point	Tool Offset	Stack Offset	Bottom Offset
ILD	8.92	40.58	12.56
ILM	10.10	41.76	11.39
SFLU	17.49	49.15	4.00
SP	20.60	52.26	0.88

Well File: NOBLE_BUSENITZ_1_SEP11_MSTK **Scale:** 1:240 **Format:** NLD-240
Segment: V1.D1.S7 FINAL MAIN **Acquired:** 2014-09/11 04:29 3.4.0-13115
Reference: 0 **Processed:** 2014-09/11 06:20 3.4.0-13115

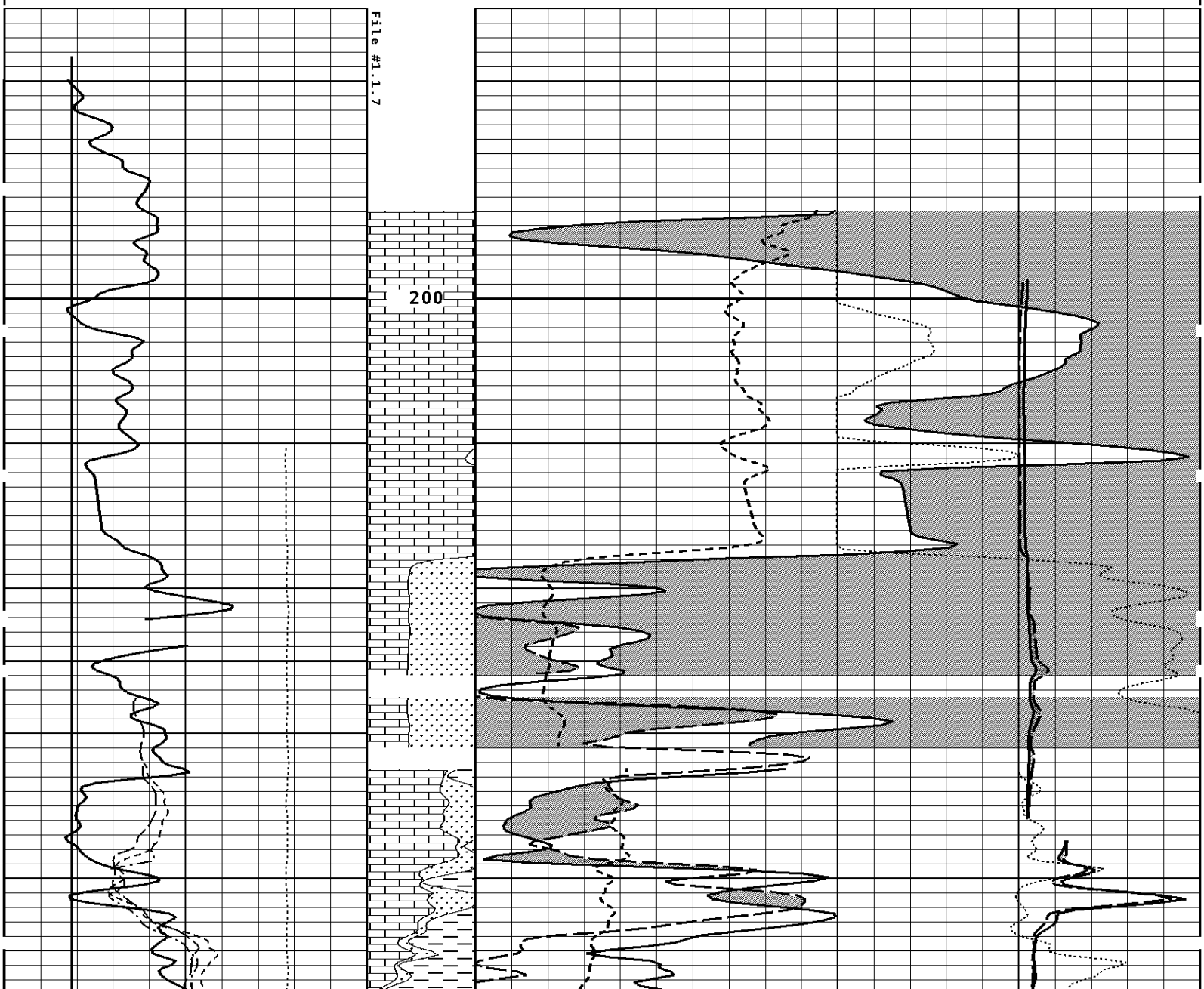
CALIPER MICRO
INCHES (IN)
16 **26**
6 **16**

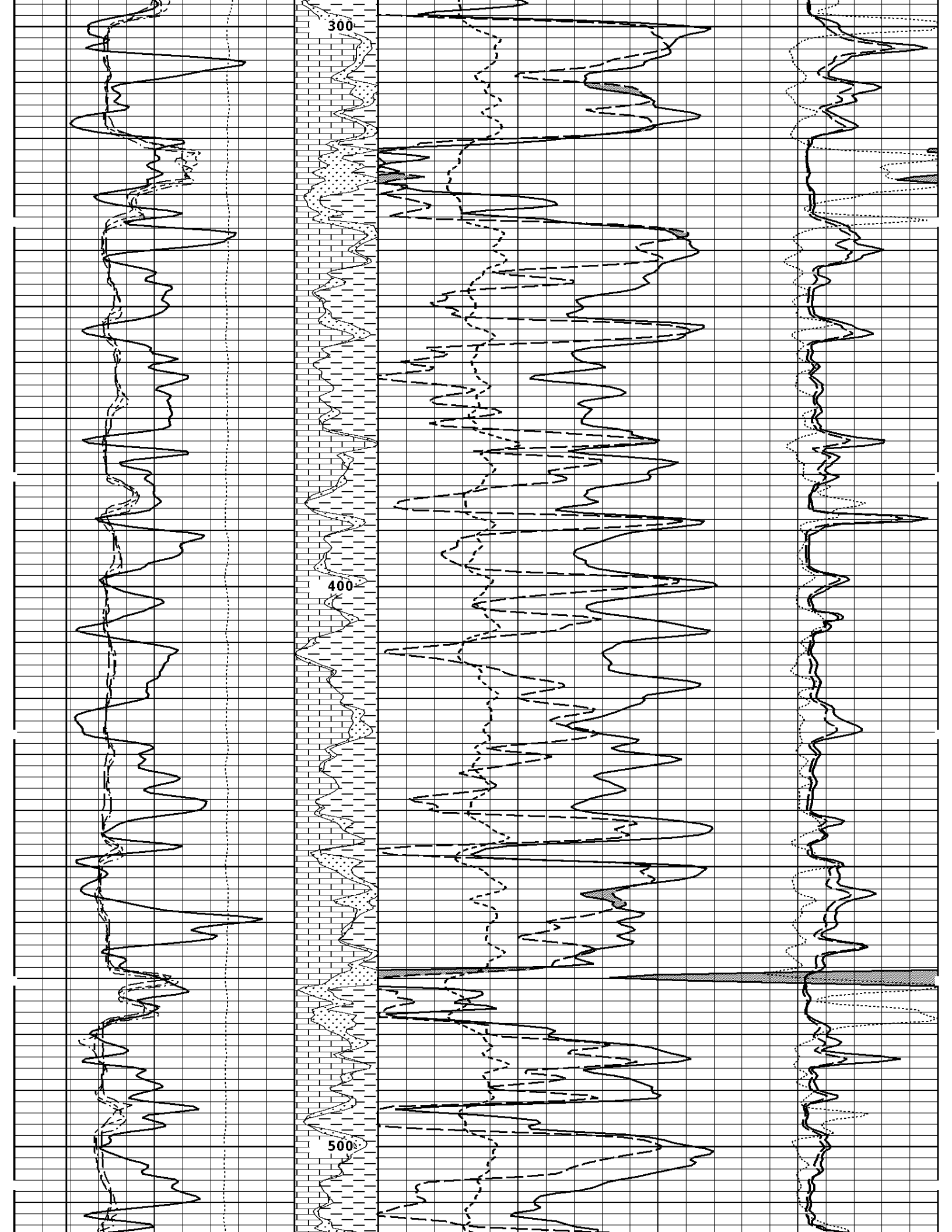
BIT SIZE
INCHES (IN)

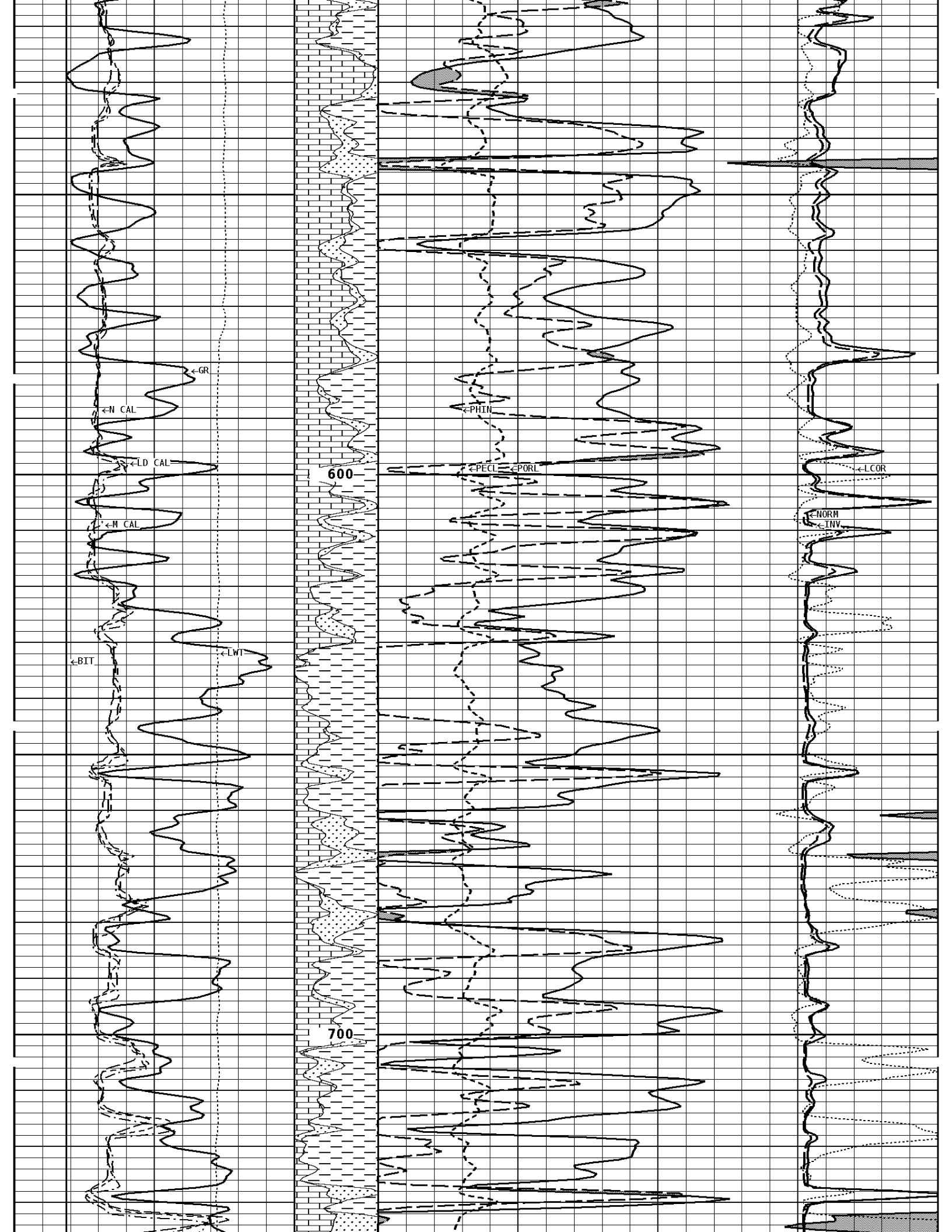
NORMAL
OHMM

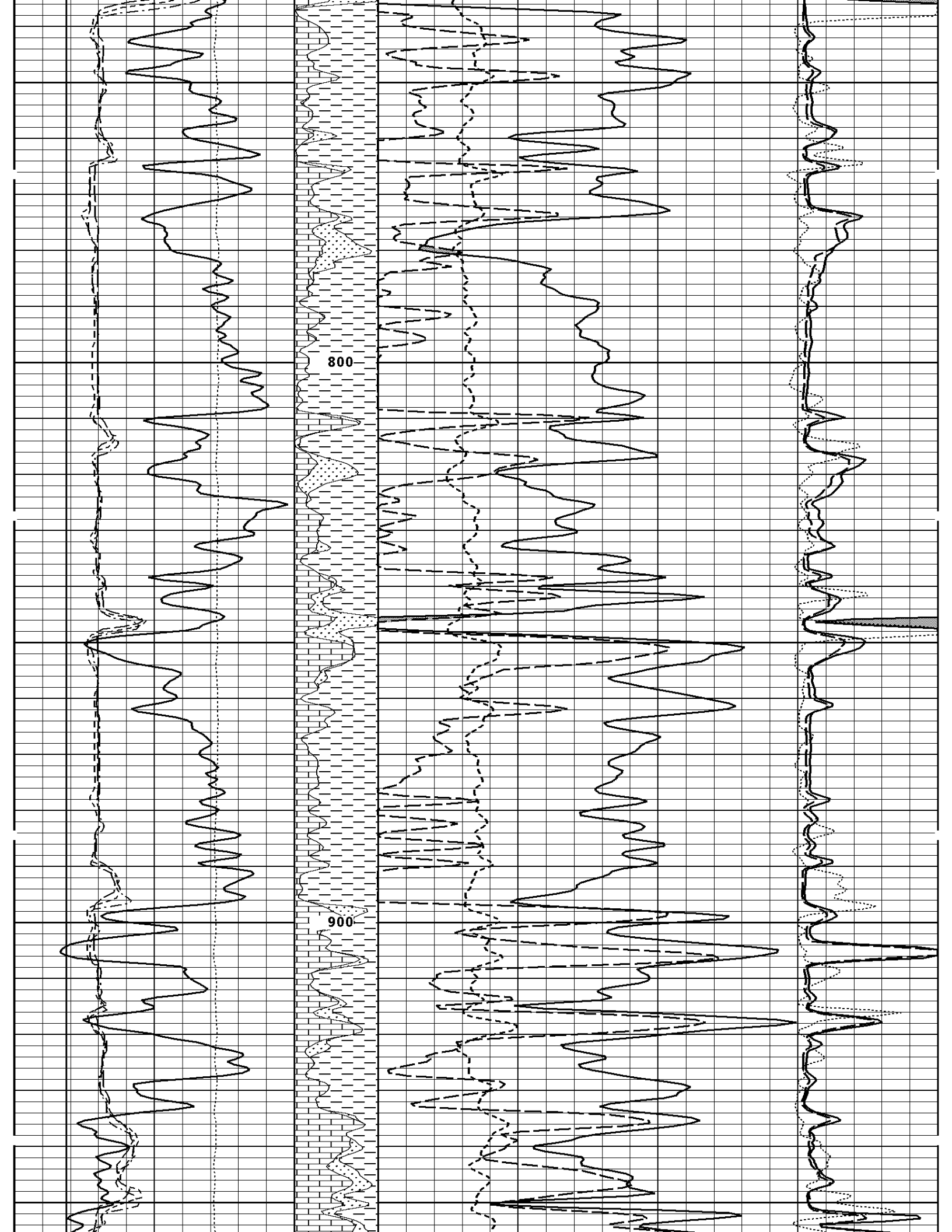
6 16			0 40
NEUTRON (Y) CALIPER INCHES (IN) 16 26 / 6 16			INVERSE OHMM 0 40
DENSITY (X) CALIPER INCHES (IN) 16 26 / 6 16	Volume Quartz	PE CROSS-SECTION BARNS/ELECTRON 0 10	DENSITY CORRECTION G/CC -0.25 0.25
TENSION LBS 10000 0	Volume Calcite	DENSITY POROSITY (2.71g/cc) PERCENT 70 30 / 30 -10 / -10 -50	
GAMMA RAY API UNITS 150 300 / 0 150	Volume Dolo/Shale	NEUTRON POROSITY (LIMESTONE) PERCENT 30 -10	

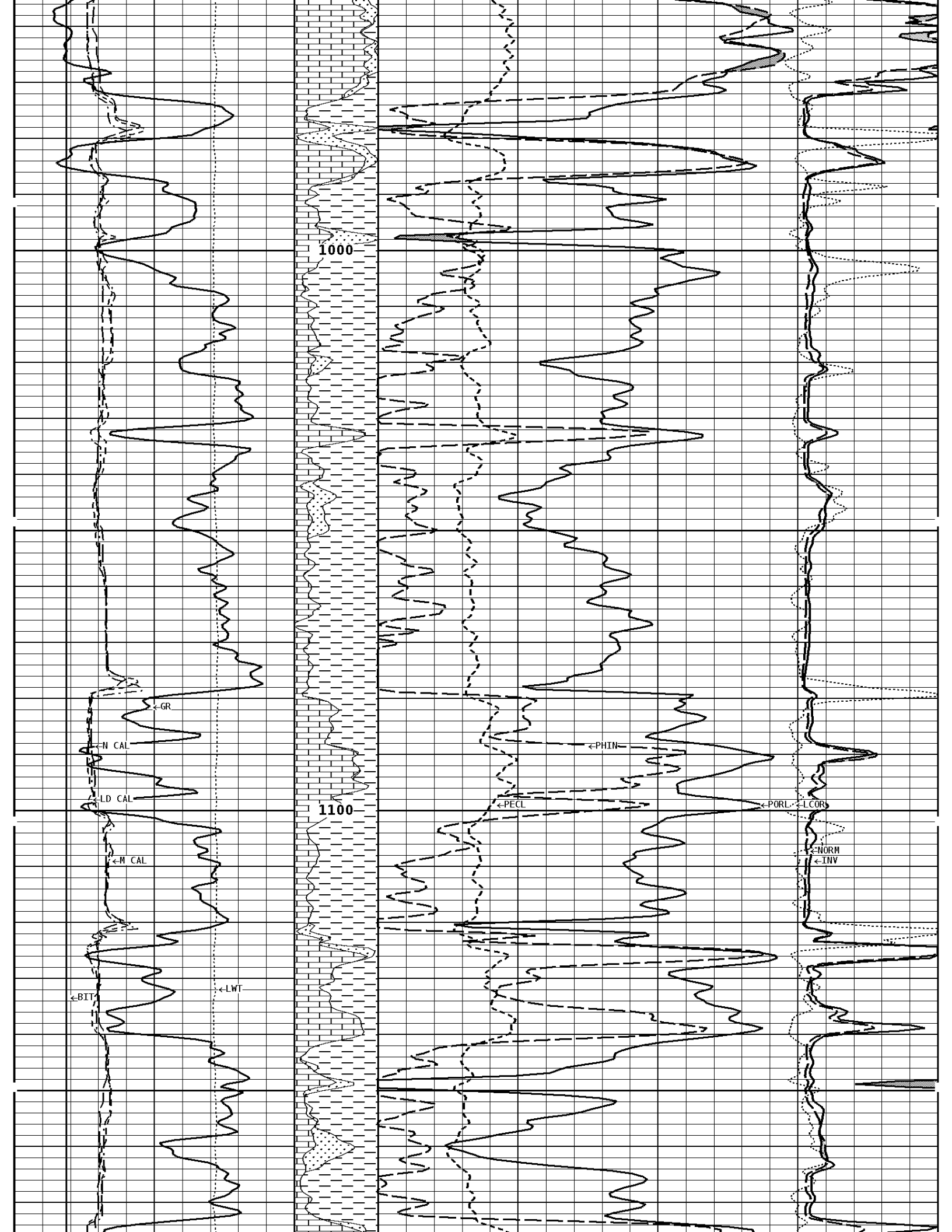
1:240 MAIN SECTION

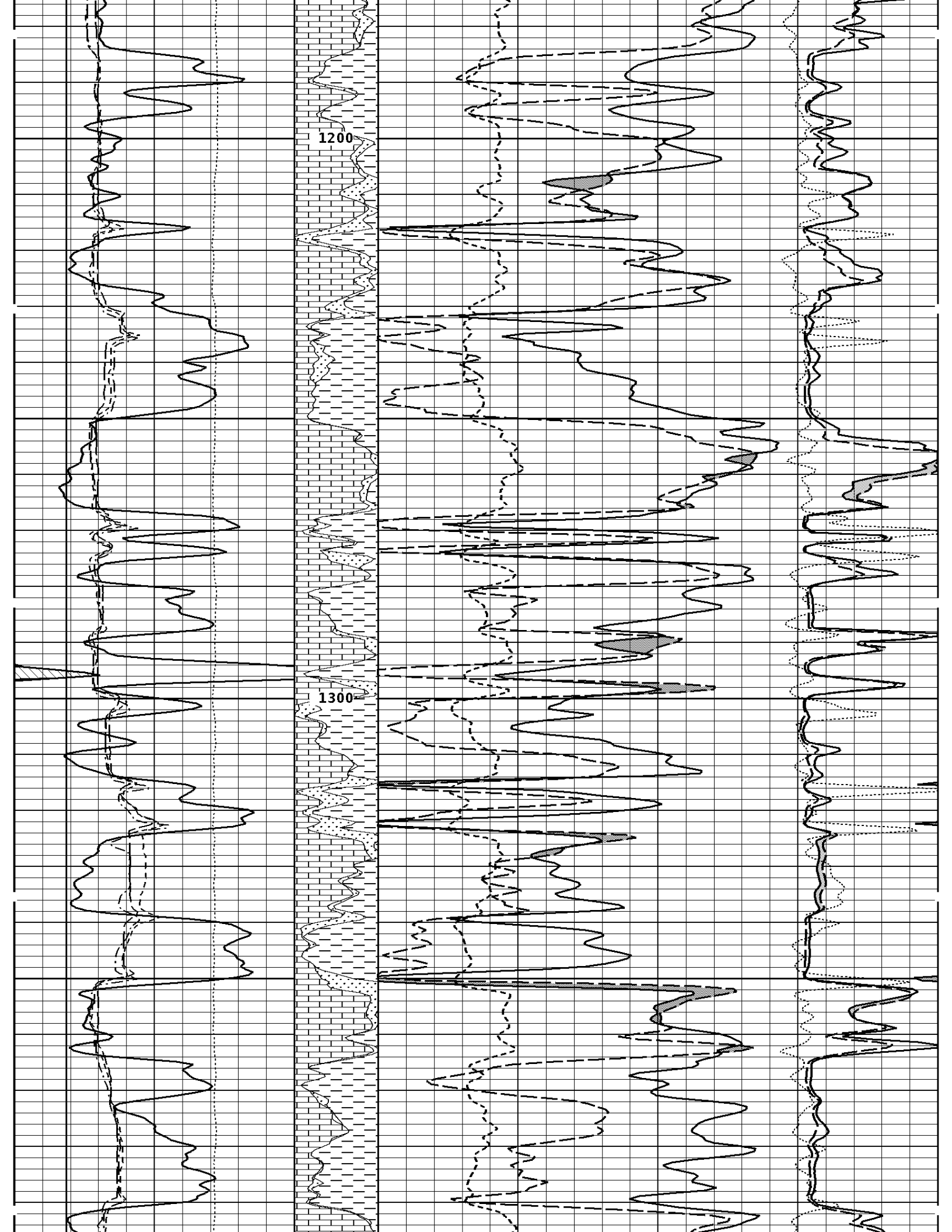



300
400
500

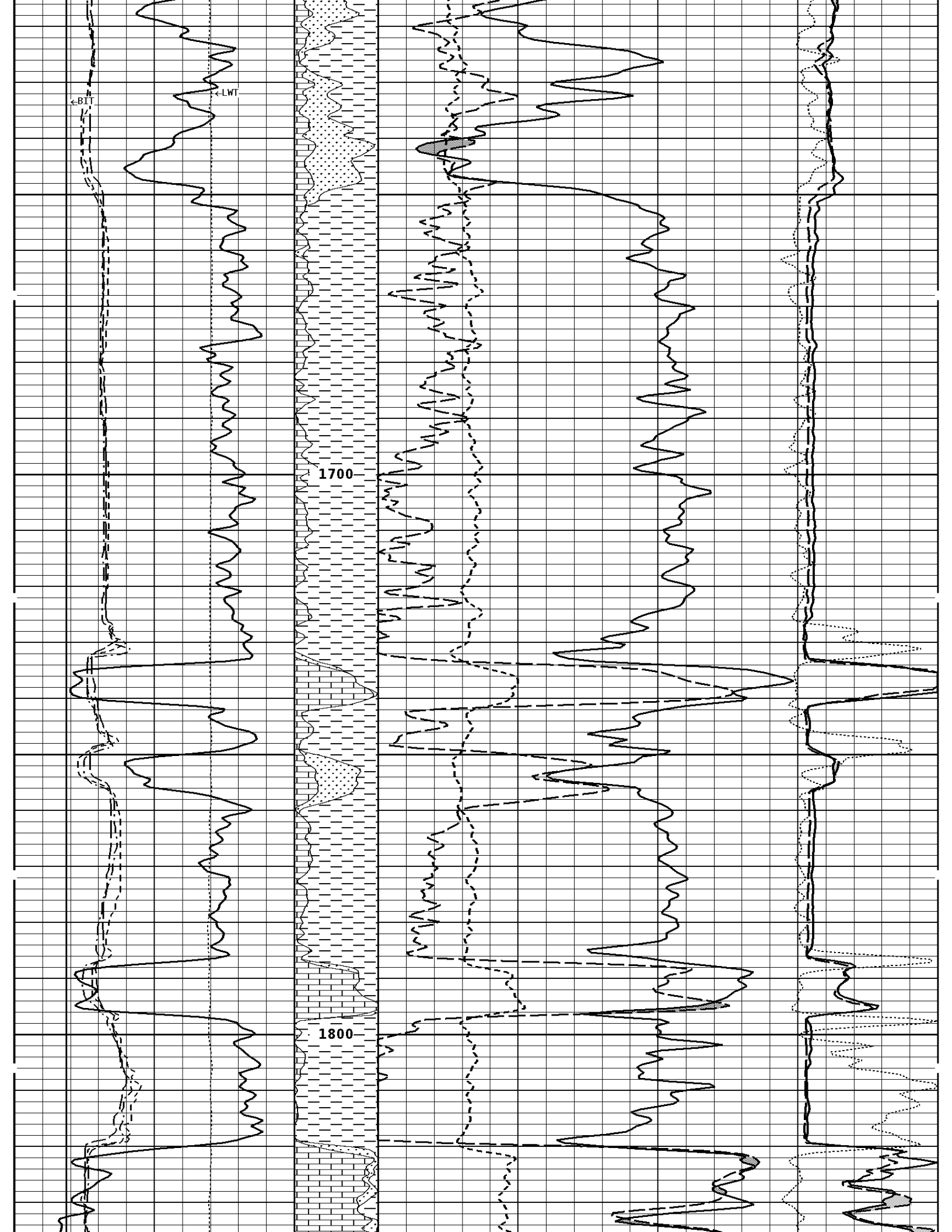

←GR
←N CAL
←LD CAL
←M CAL
←BIT
←LWT
600
700
←PHIN
←PECL
←PORL
←LCOR
←NORM
←INV

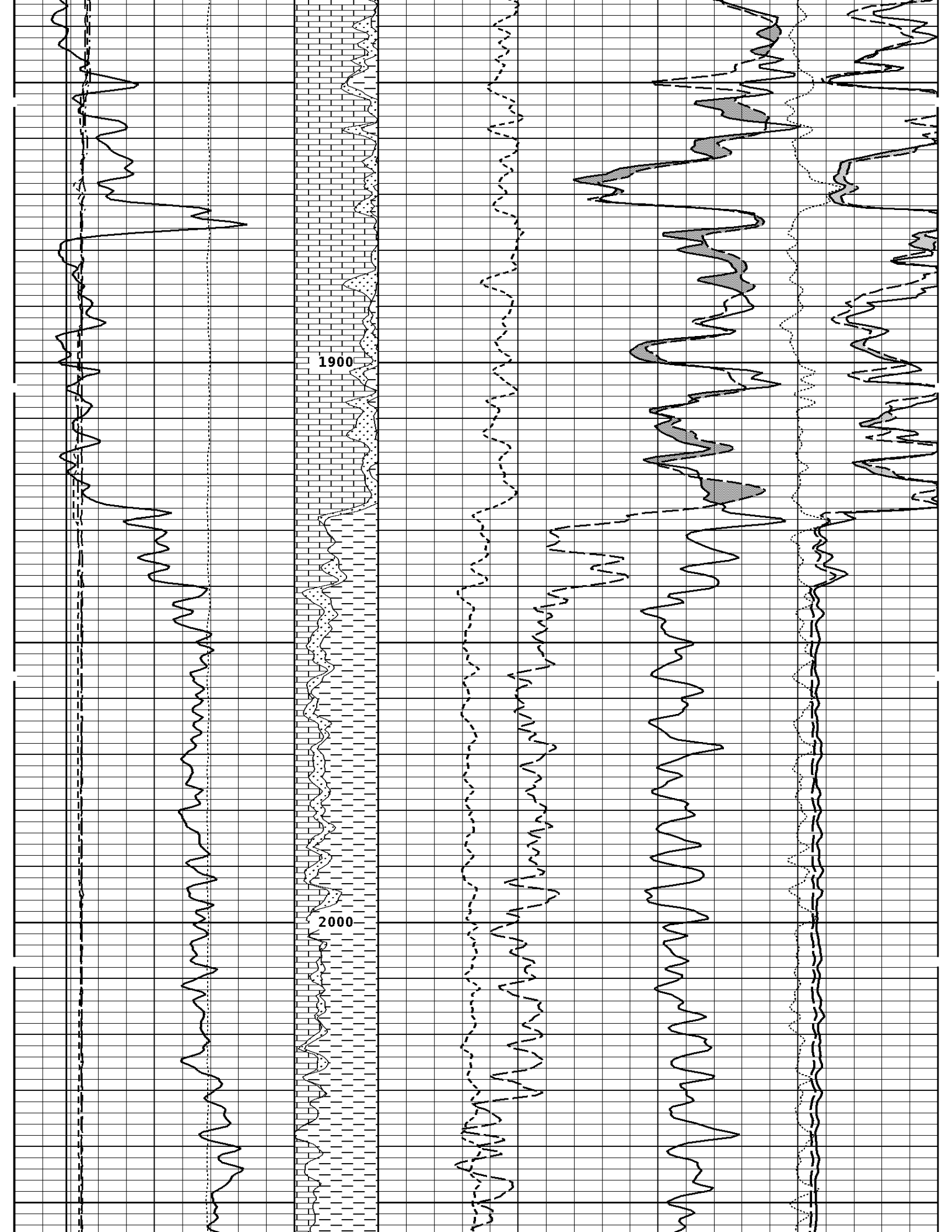

800
900

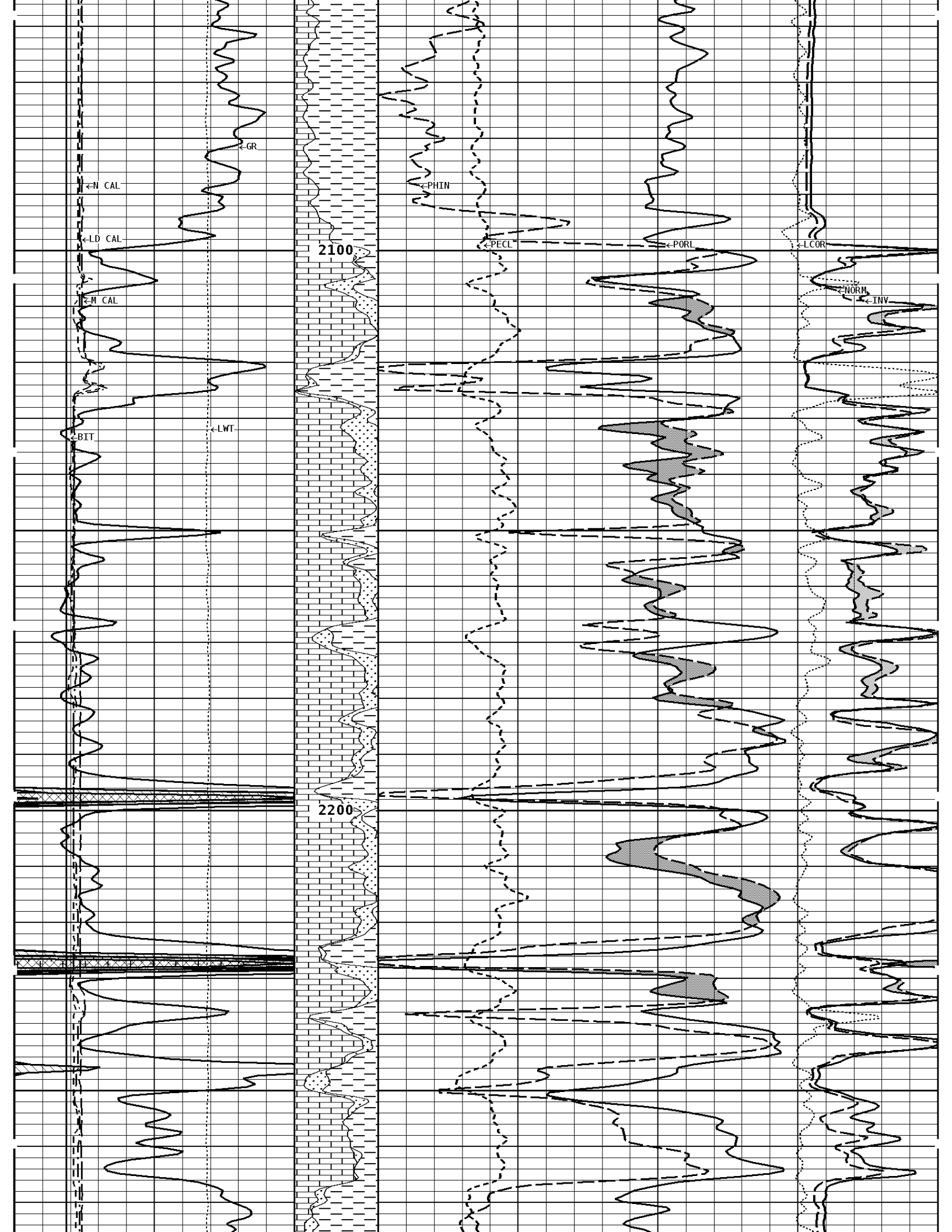

1000
1100
←GR
←N CAL
←LD CAL
←M CAL
←BIT
←LWT
←PHIN
←PECL
←PORL
←LCOR
←NORM
←INV

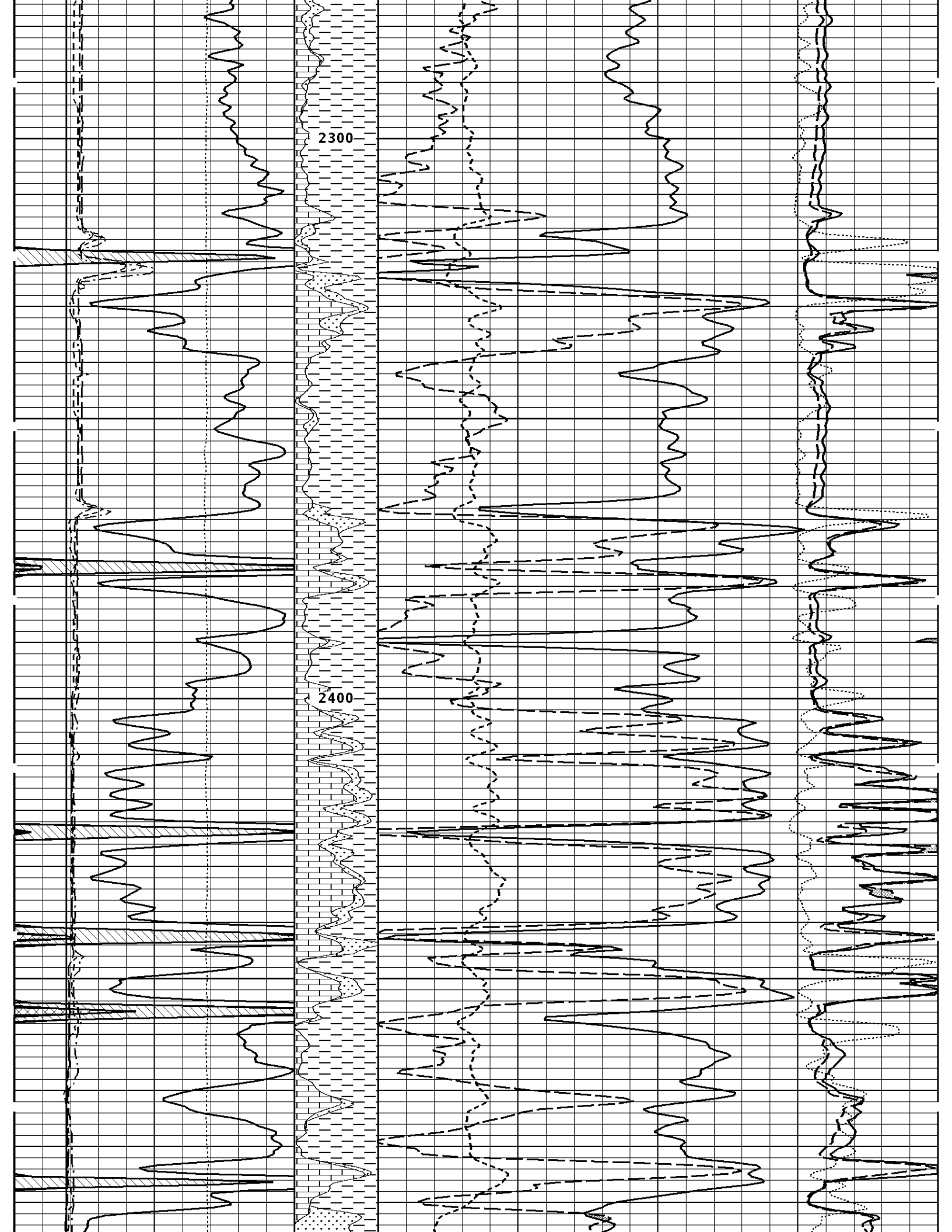

1200
1300

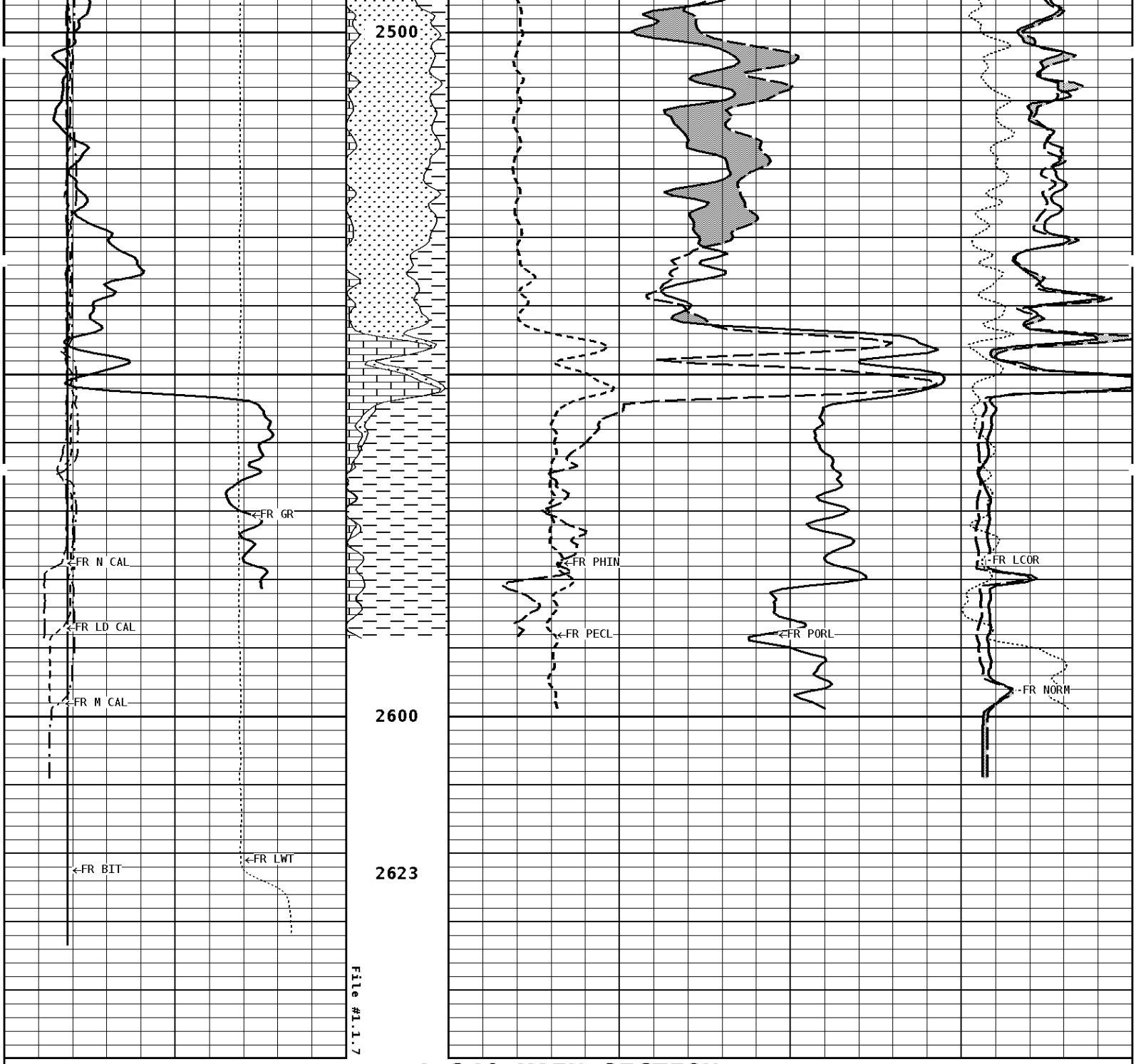

1400
1500
1600
←GR
←N CAL
←LD CAL
←M CAL
←PHIN
←PECL
←PORL
←LCOR
←NORM
←INV


←BIT
←LWT
1700
1800


1900
2000


GR
N CAL
LD CAL
M CAL
BIT
LWT
PHIN
PECL
PORL
LCOR
NORM
INV
2100
2200


2300
2400



1:240 MAIN SECTION

GAMMA RAY API UNITS	Volume Dolo/Shale	NEUTRON POROSITY (LIMESTONE) PERCENT
150 300 0 150		30 -10
TENSION LBS	**Volume Calcite**	**DENSITY POROSITY (2.71g/cc) PERCENT**
10000 0		70 30 30 -10 -10 -50
DENSITY (X) CALIPER INCHES (IN)	**Volume Quartz**	**PE CROSS-SECTION BARNS/ELECTRON** / **DENSITY CORRECTION G/CC**
16 26 6 16		0 10 / -0.25 0.25
NEUTRON (Y) CALIPER INCHES (IN)		**INVERSE**

INCHES (IN)
16 26
6 16

BIT SIZE
INCHES (IN)
6 16

CALIPER MICRO
INCHES (IN)
16 26
6 16

NORMAL
OHMM
0 40

NORMAL
OHMM
0 40

* Borehole Zone Factors *

Zone 1 99999.0 to 0.0 Feet

Matrix Density	2.71	g/cc
Fluid Density	1.00	g/cc
Formation Matrix	Limestone	
Drill Bit Size	7.875	in
Casing Diameter	5.500	in
Casing Thickness	0.250	in
Casing Correction (PHI N)	Disable	

Well File: NOBLE_BUSENITZ_1_SEP11_MSTK **Scale:** 1:240 **Format:** NLD-240
Segment: V1.D1.S3 FINAL REPEAT **Acquired:** 2014-09/11 04:08 3.4.0-13115
Reference: 0 **Processed:** 2014-09/11 06:20 3.4.0-13115

CALIPER MICRO
INCHES (IN)
16 26
6 16

BIT SIZE
INCHES (IN)
6 16

NORMAL
OHMM
0 40

NEUTRON (Y) CALIPER
INCHES (IN)
16 26
6 16

INVERSE
OHMM
0 40

DENSITY (X) CALIPER
INCHES (IN)
16 26
6 16

Volume
Quartz

PE CROSS-SECTION
BARNS/ELECTRON
0 10

DENSITY CORRECTION
G/CC
-0.25 0.25

TENSION
LBS
10000 0

Volume
Calcite

DENSITY POROSITY (2.71g/cc)
PERCENT
70 30
30 -10
-10 -50

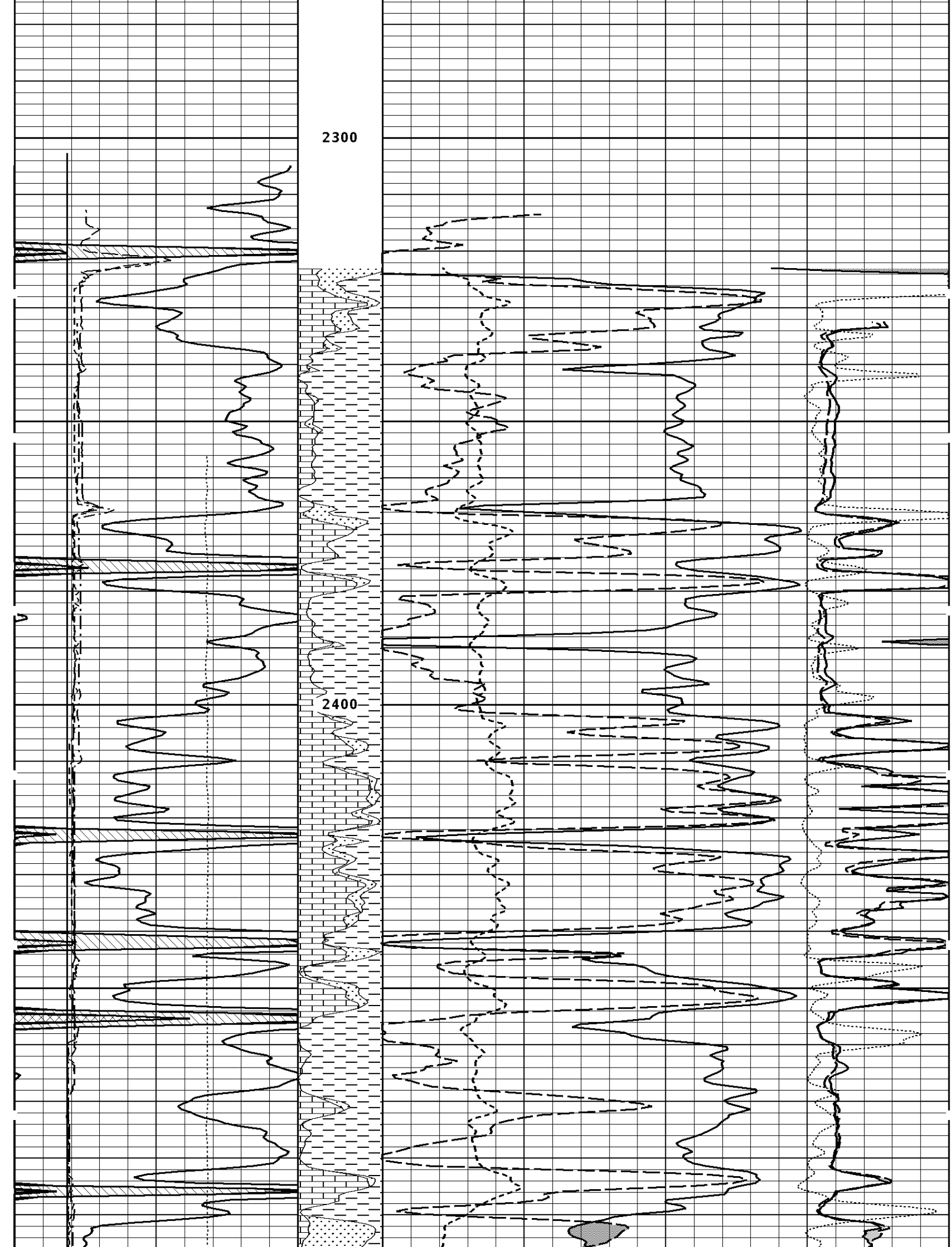
GAMMA RAY
API UNITS
150 300
0 150

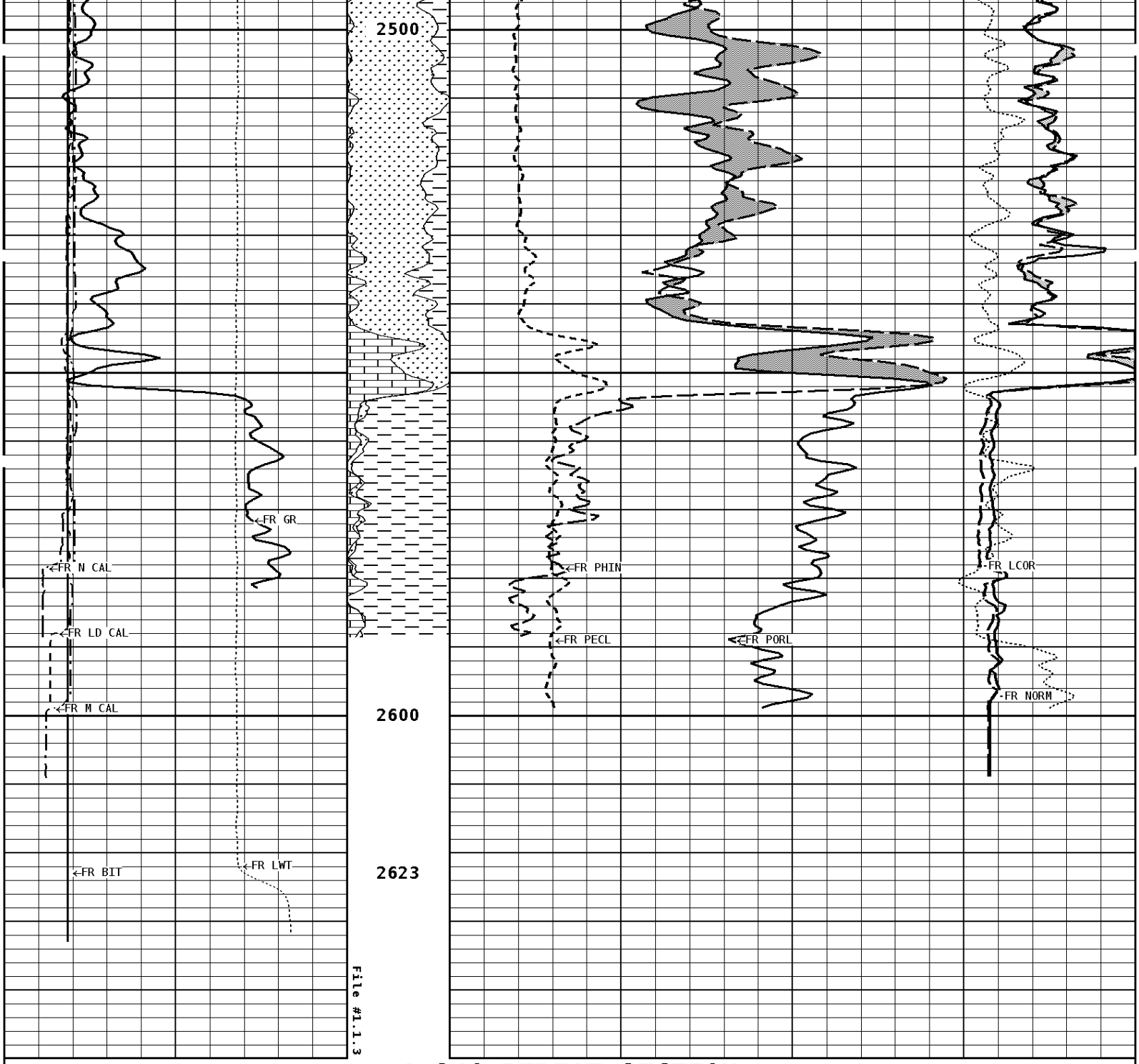
Volume
Dolo/Shale

NEUTRON POROSITY (LIMESTONE)
PERCENT
30 -10

1:240 REPEAT SECTION

File #1.1.3


2300
2400



1:240 REPEAT SECTION

GAMMA RAY API UNITS	Volume Dolo/Shale	NEUTRON POROSITY (LIMESTONE) PERCENT
150 300 0 150		30 -10
TENSION LBS	**Volume Calcite**	**DENSITY POROSITY (2.71g/cc) PERCENT**
10000 0		70 30 30 -10 -10 -50
DENSITY (X) CALIPER INCHES (IN)	**Volume Quartz**	**PE CROSS-SECTION BARNS/ELECTRON** / **DENSITY CORRECTION G/CC**
16 26 6 16		0 10 / -0.25 0.25
NEUTRON (Y) CALIPER INCHES (IN)		**INVERSE OHMM**

16 26
6 16

BIT SIZE
INCHES (IN)

6 16

CALIPER MICRO
INCHES (IN)

16 26
6 16

0 40

NORMAL
OHMM

0 40

* Borehole Zone Factors *

Zone 1 99999.0 to 0.0 Feet

Matrix Density	2.71	g/cc
Fluid Density	1.00	g/cc
Formation Matrix	Limestone	
Drill Bit Size	7.875	in
Casing Diameter	5.500	in
Casing Thickness	0.250	in
Casing Correction (PHI N)	Disable	

Well File: NOBLE_BUSENITZ_1_SEP11_MSTK **Scale:** 1:240 **Format:** LDT-240
Segment: V1.D1.S7 FINAL MAIN **Acquired:** 2014-09/11 04:29 3.4.0-13115
Reference: 0 **Processed:** 2014-09/11 06:20 3.4.0-13115

BIT SIZE
INCHES (IN)

6 16

NEUTRON (Y) CALIPER
INCHES (IN)

16 26
6 16

DENSITY (X) CALIPER
INCHES (IN)

16 26
6 16

PE CROSS-SECTION
BARNS/ELECTRON

0 10

DENSITY CORRECTION
G/CC

-0.25 0.25

TENSION
LBS

10000 0

COMPENSATED BULK DENSITY
G/CC

3.0 4.0
2.0 3.0
1.0 2.0

GAMMA RAY
API UNITS

150 300
0 150

-BHV AHV-
CU.FT

DENSITY POROSITY (2.71g/cc)
PERCENT

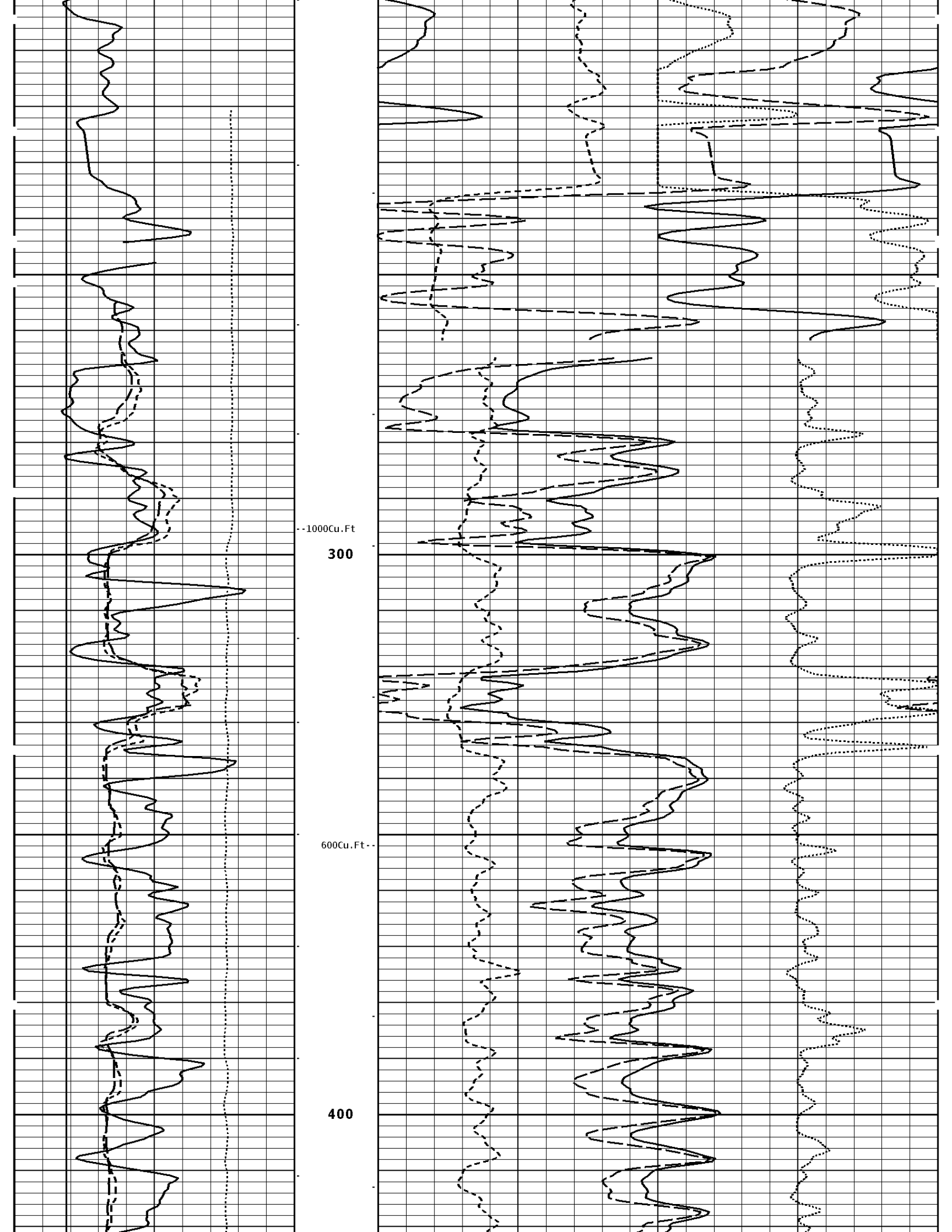
70 30
30 -10
-10 -50

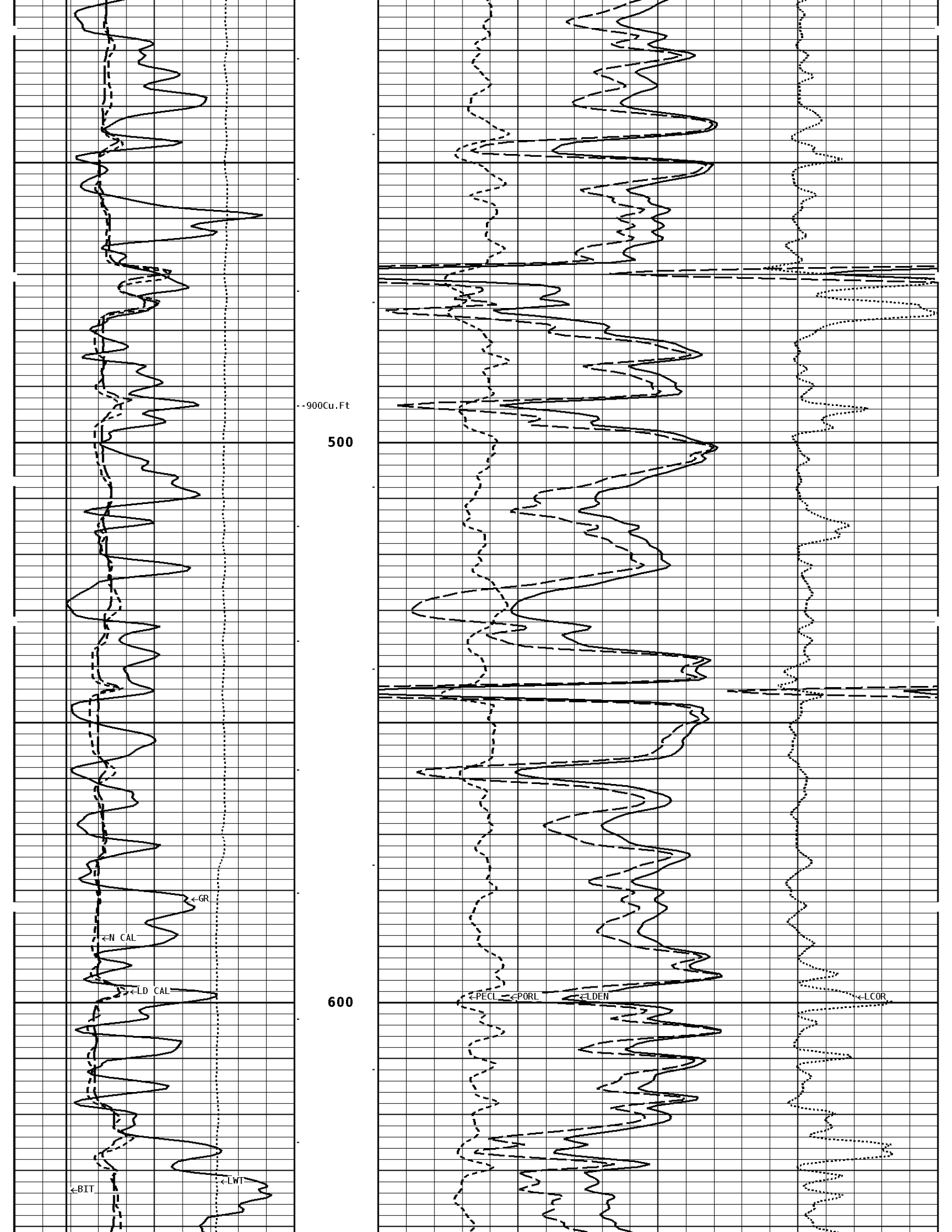
1:240 MAIN SECTION

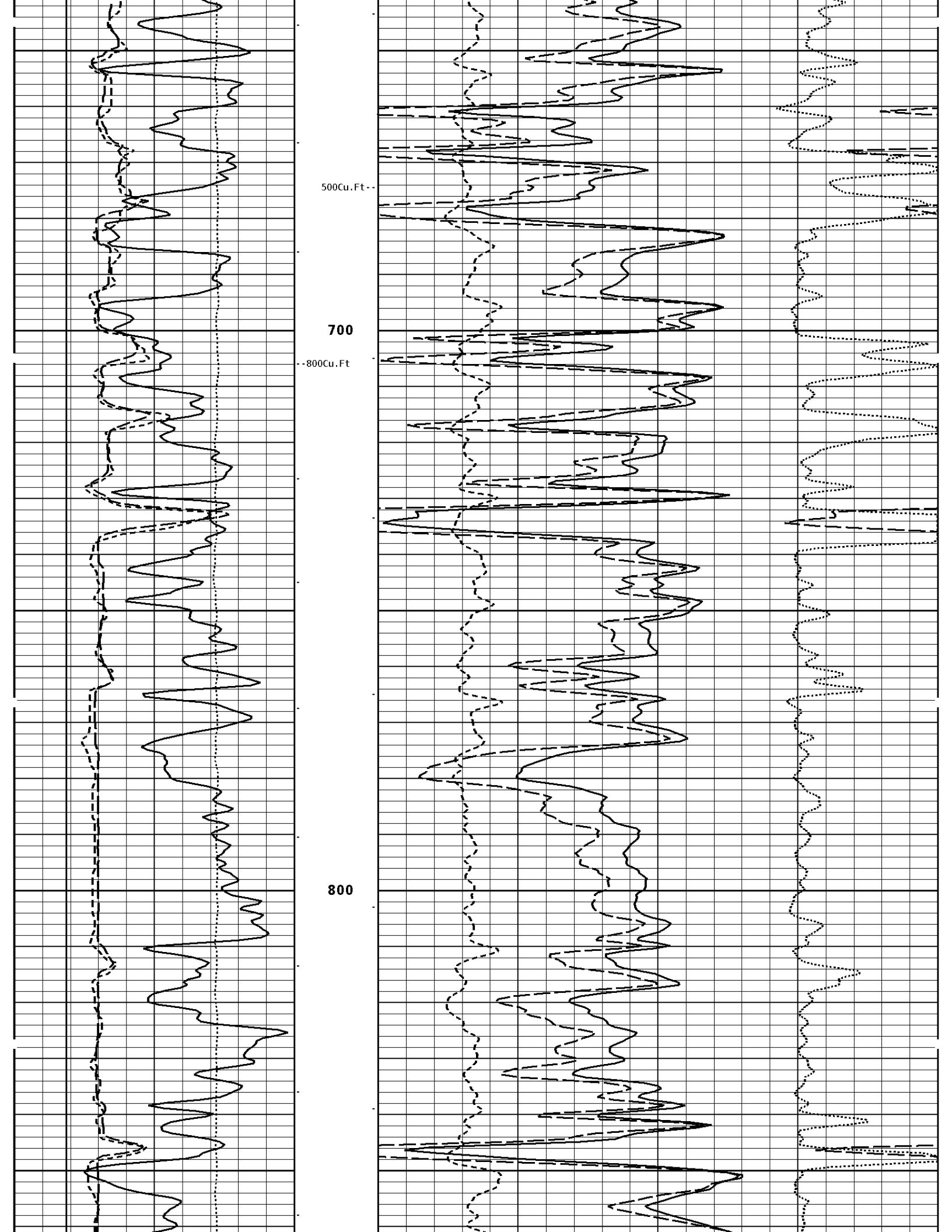
BULK DENSITY

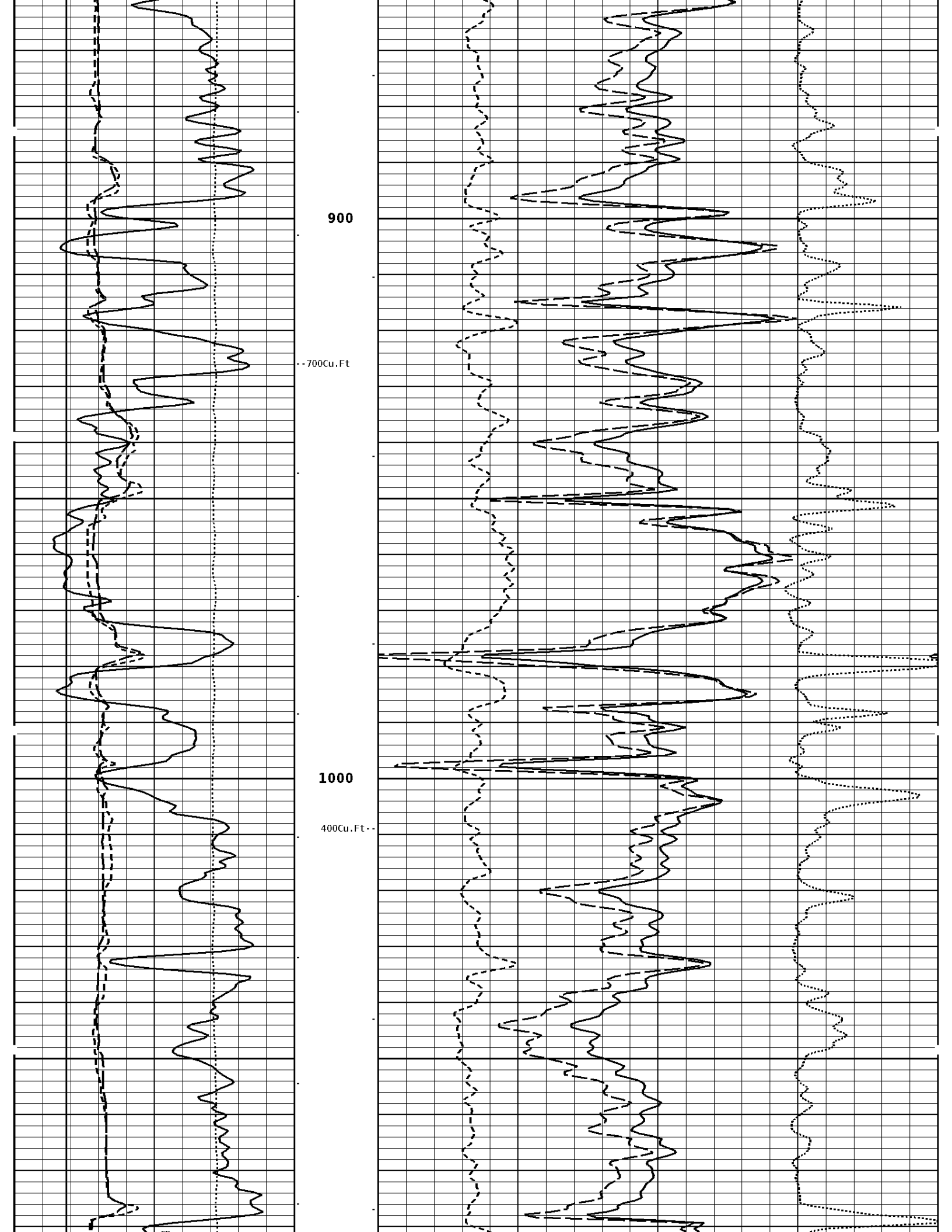
File #1.1.7

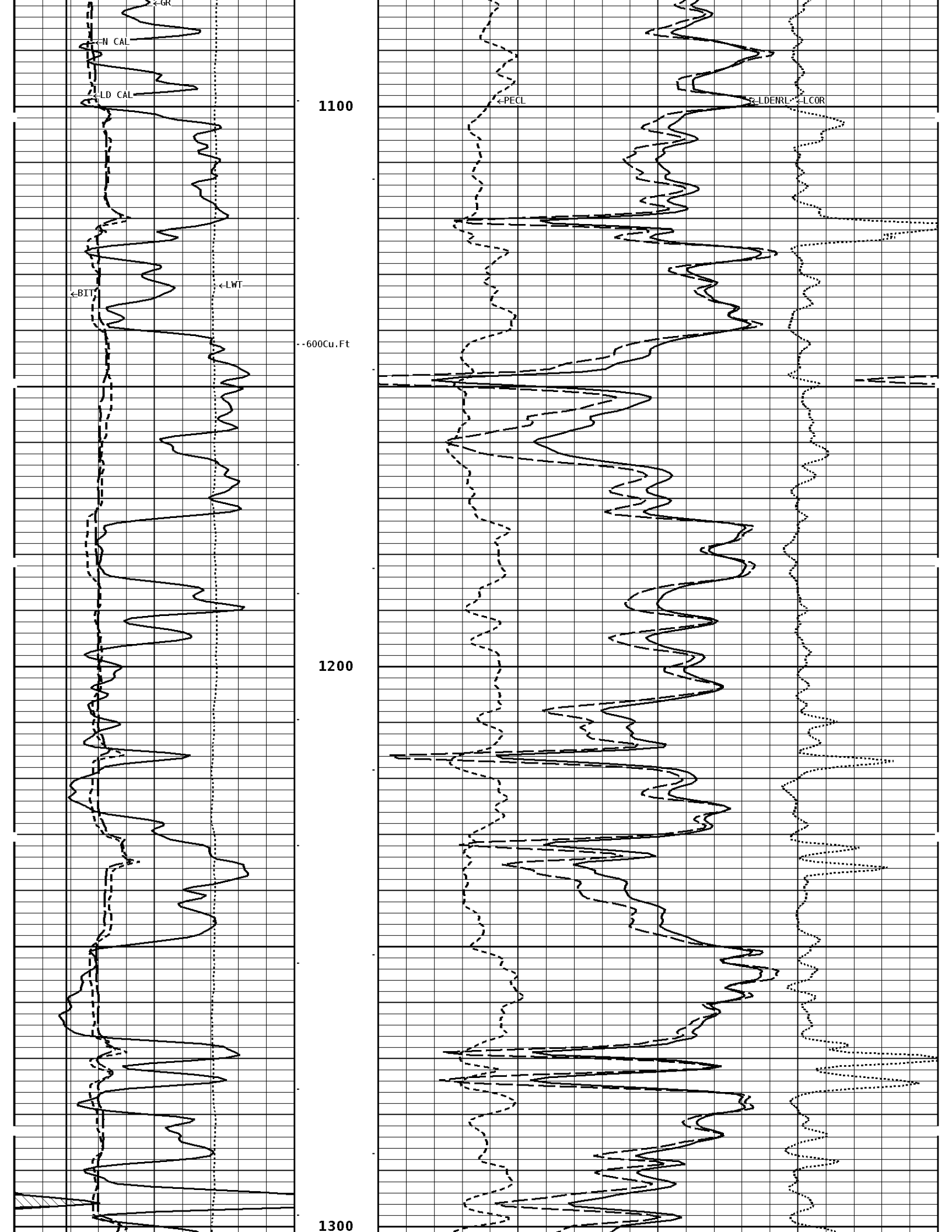
200

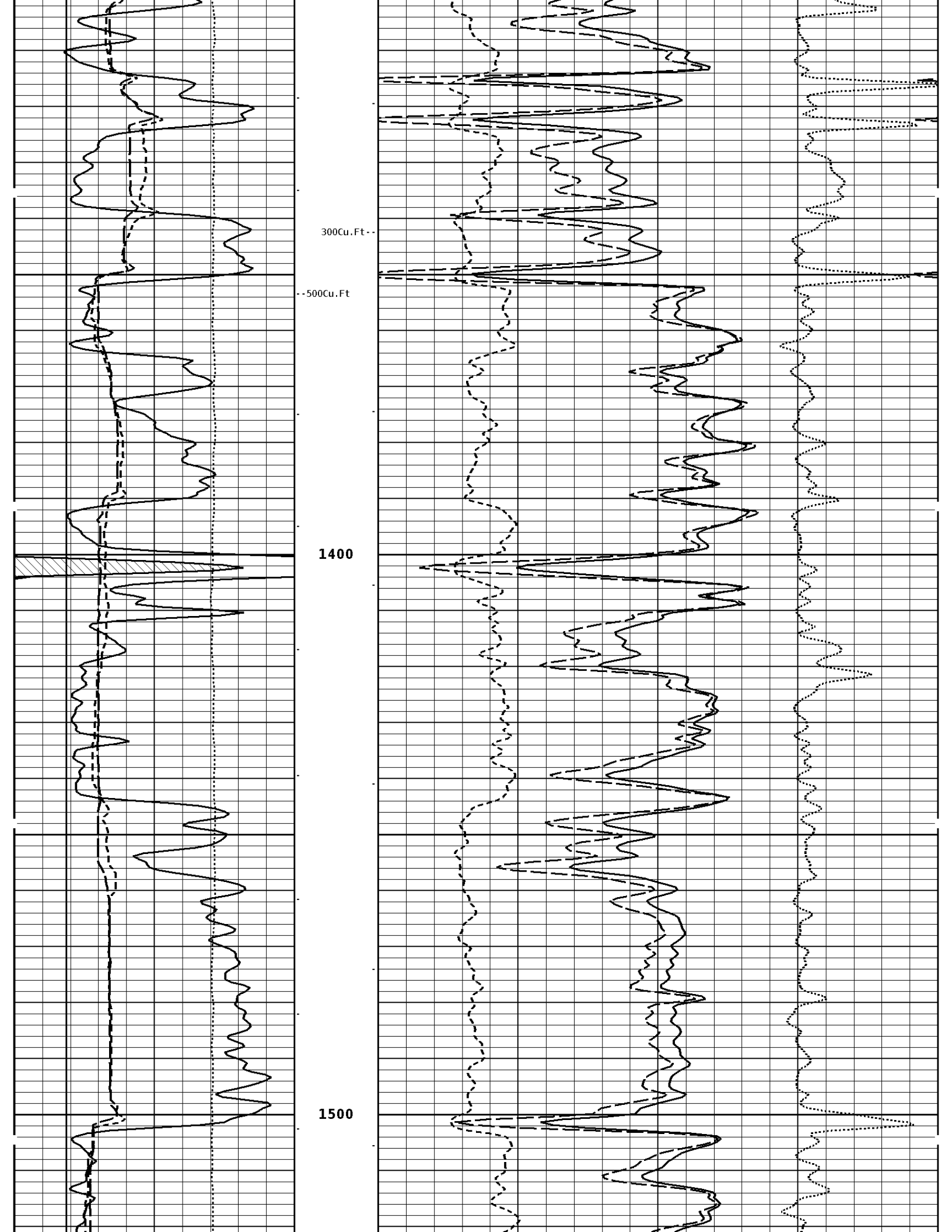

--1000Cu.Ft
300
600Cu.Ft--
400

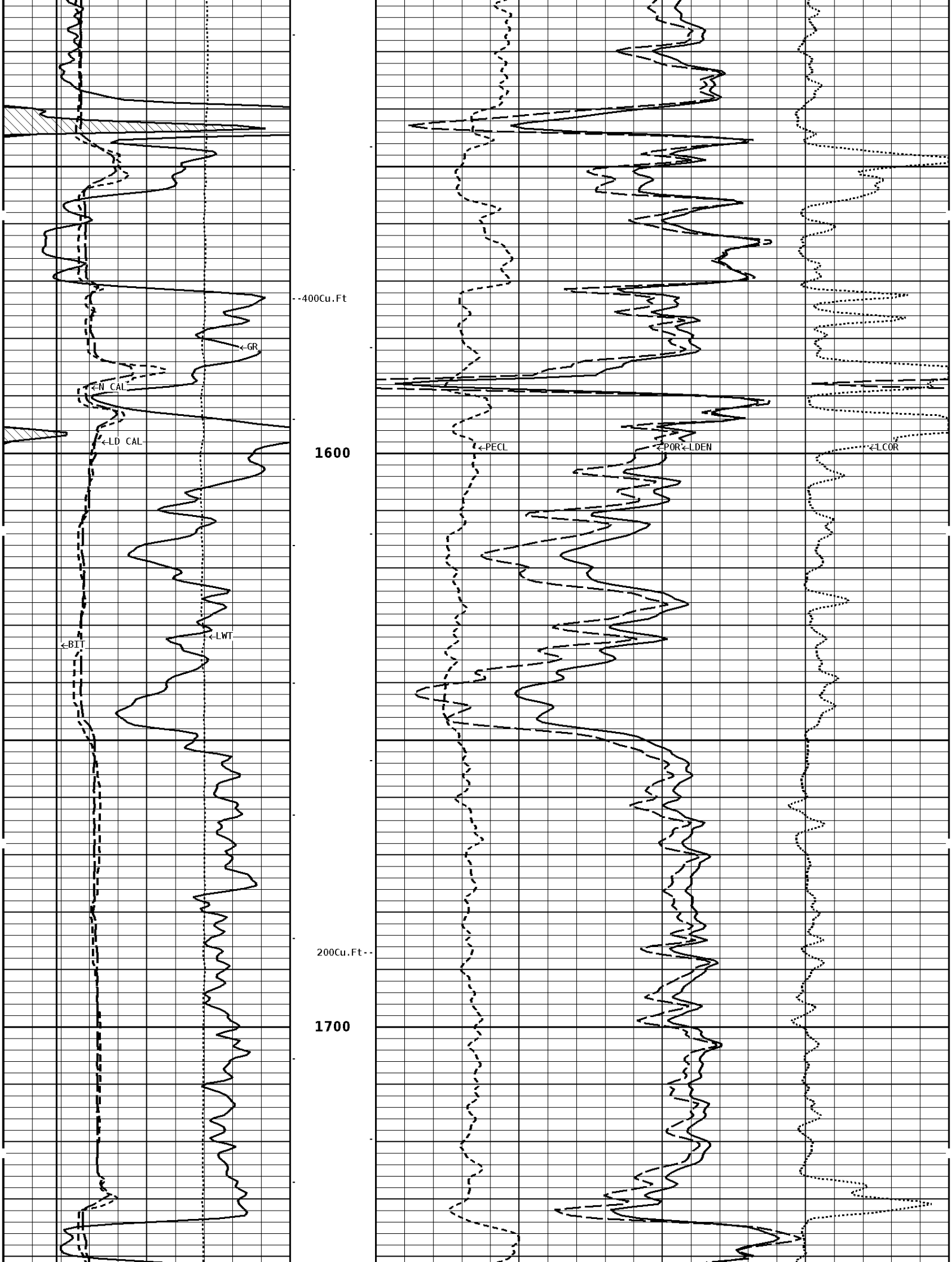

900Cu.Ft
500
600
GR
N CAL
LD CAL
BIT
LWT
PECL
PORL
LDEN
LCOR

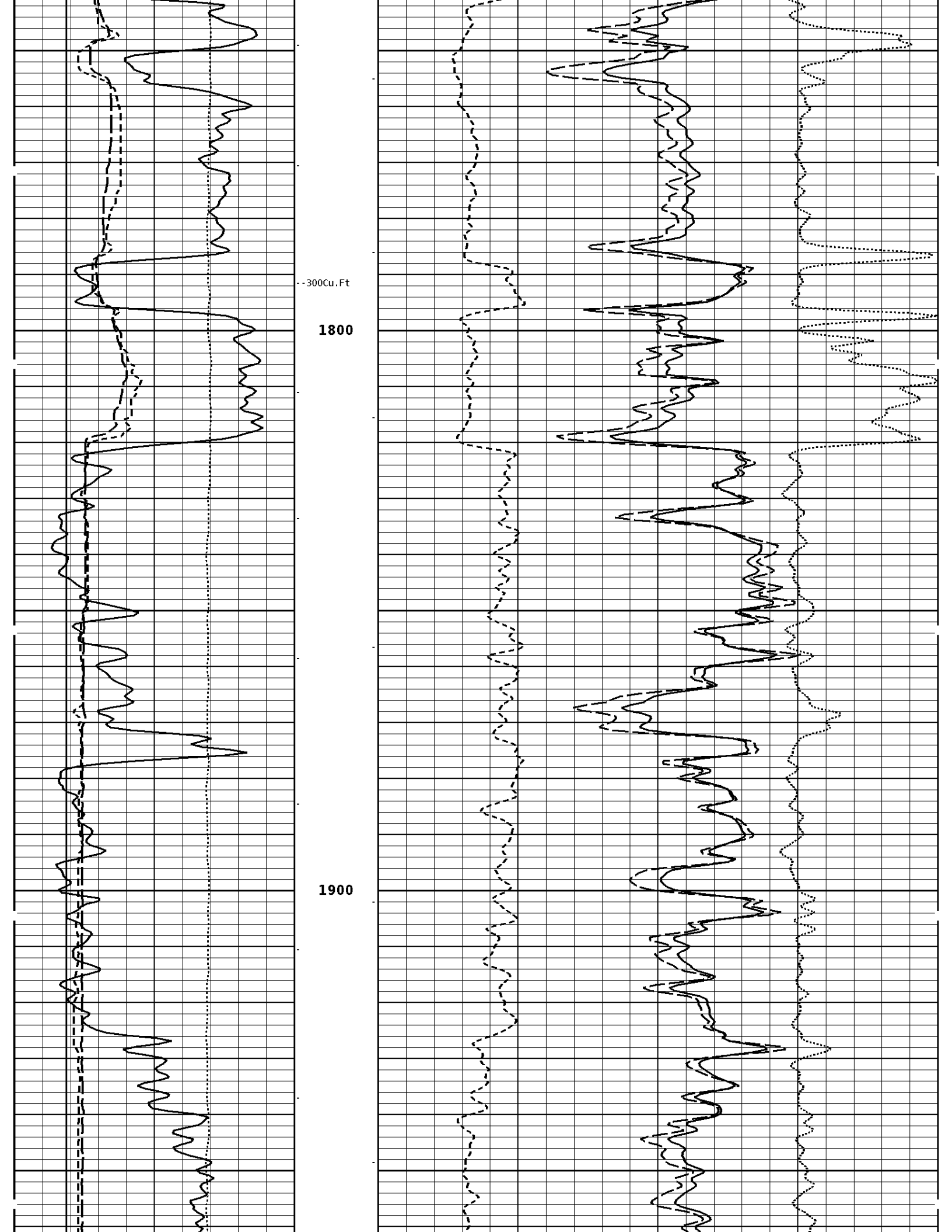

500Cu.Ft
700
800Cu.Ft
800

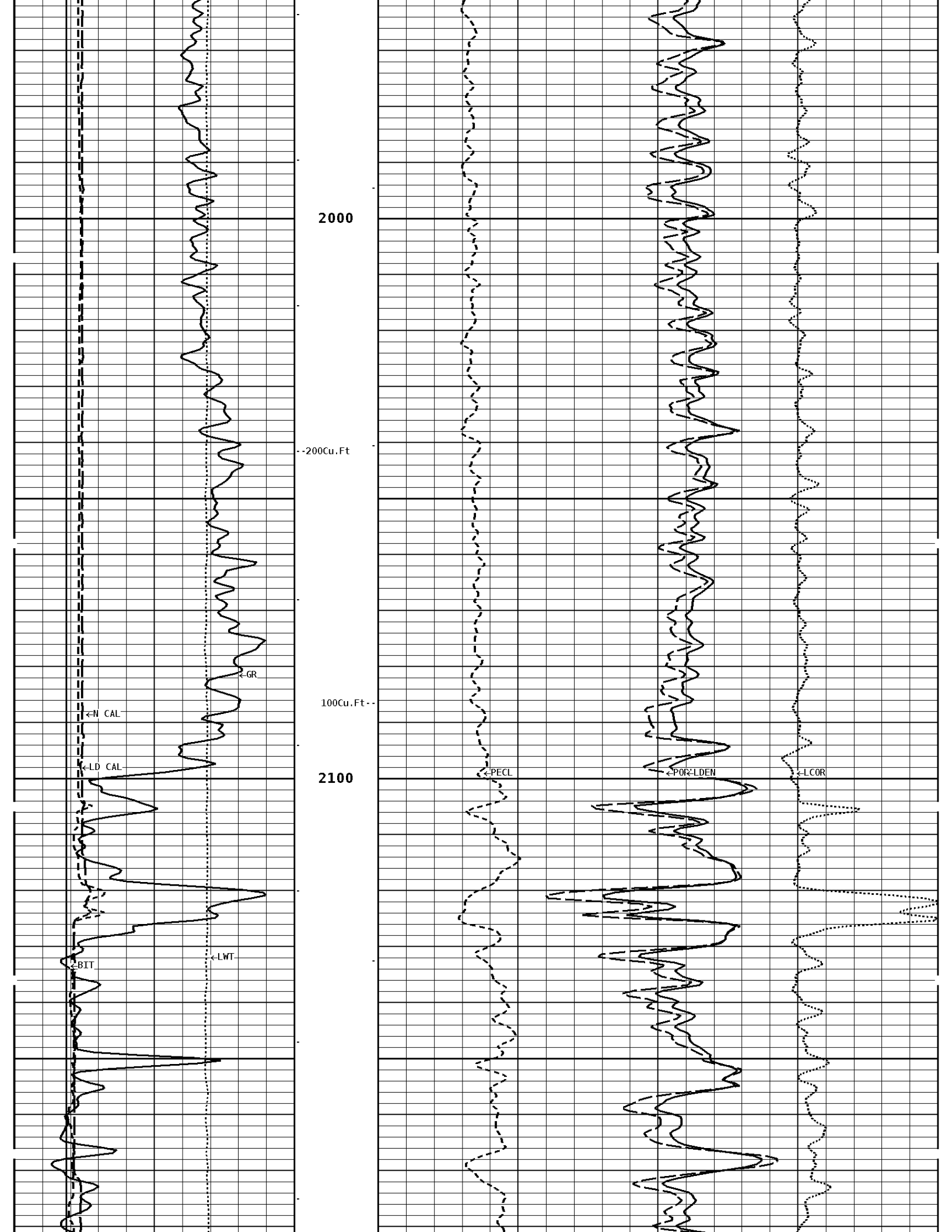

900
--700Cu.Ft
1000
400Cu.Ft--

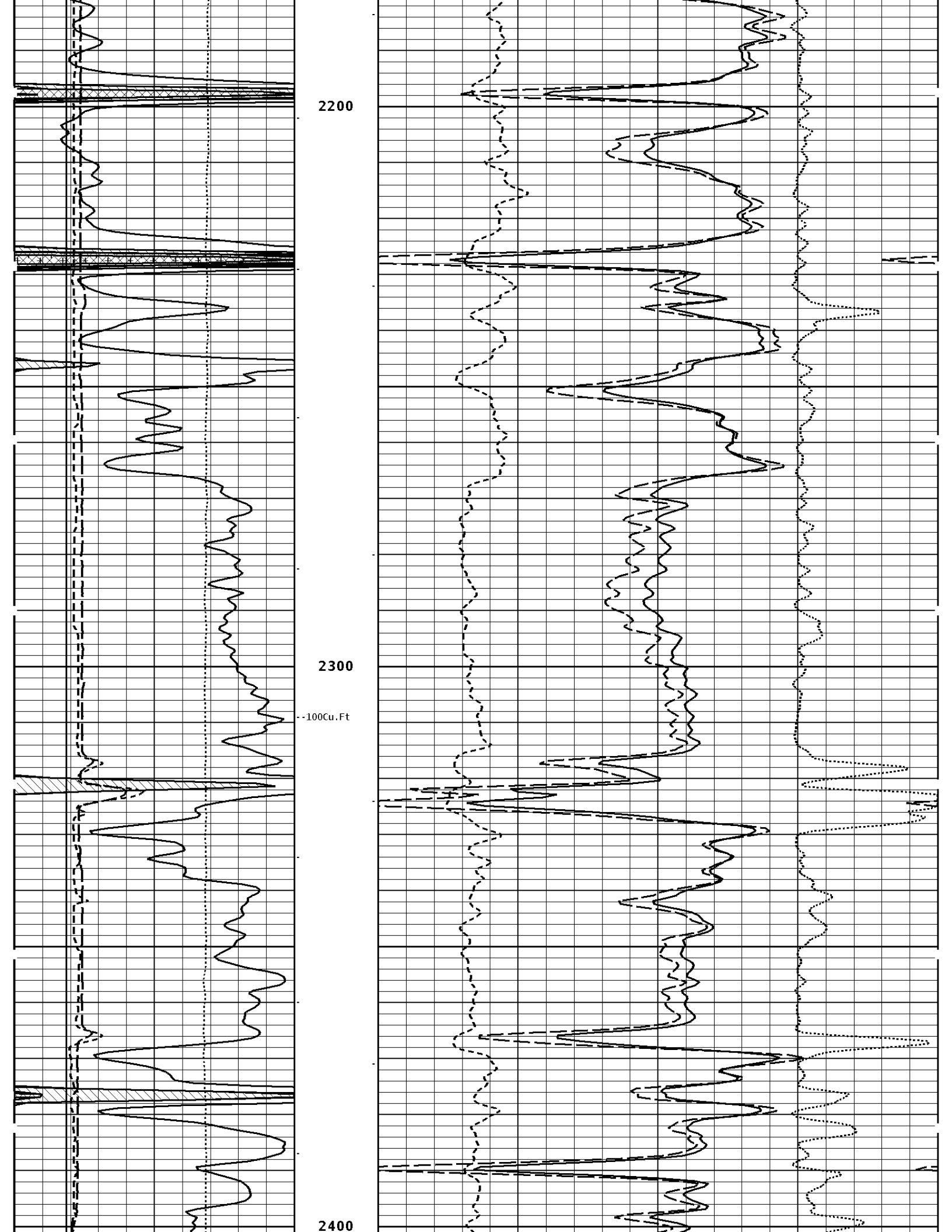

GR
N CAL
LD CAL
1100
PECL
LDENRL
LCOR
BIT
LWT
600Cu.Ft
1200
1300

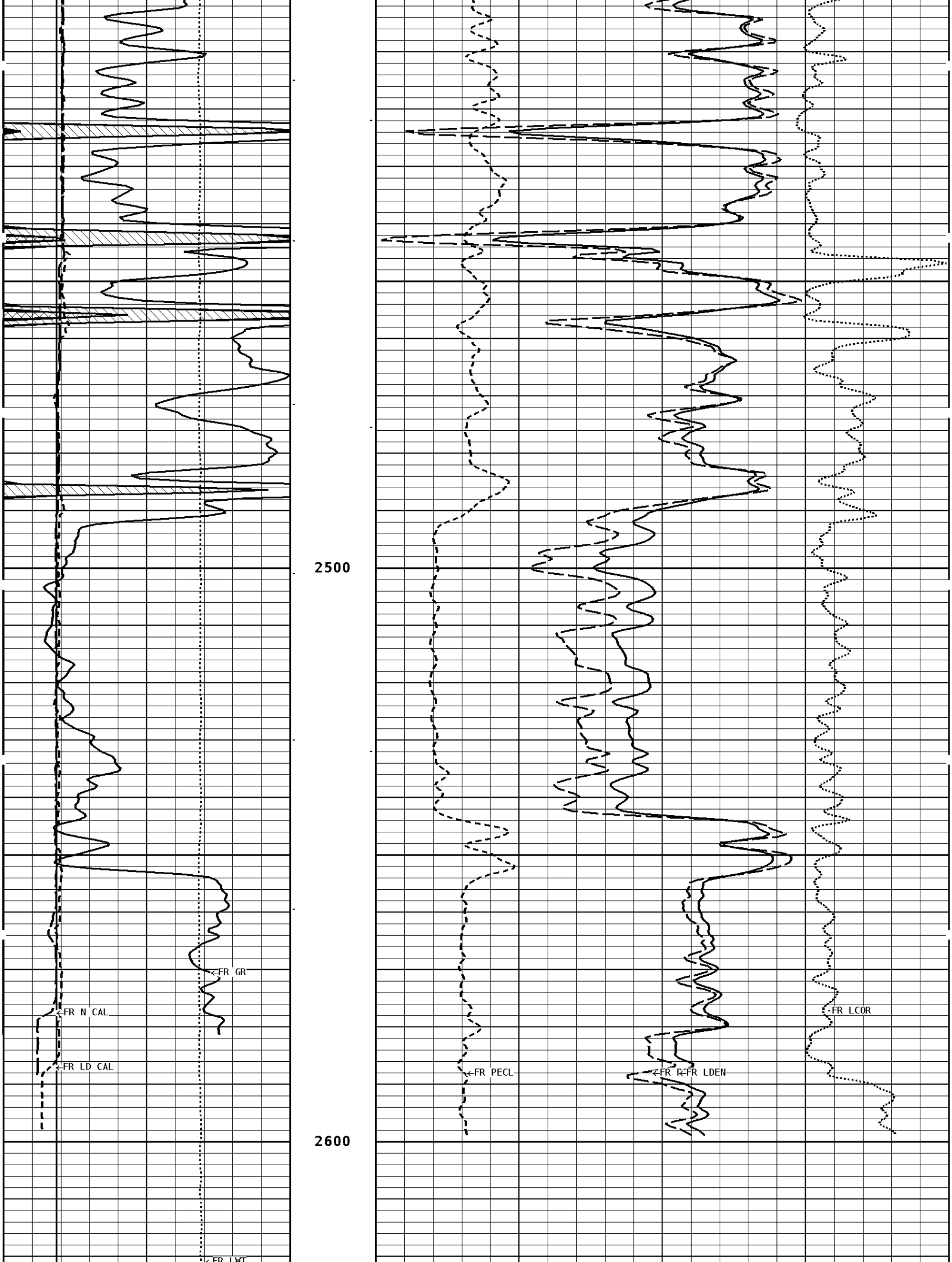

300Cu.Ft
500Cu.Ft
1400
1500

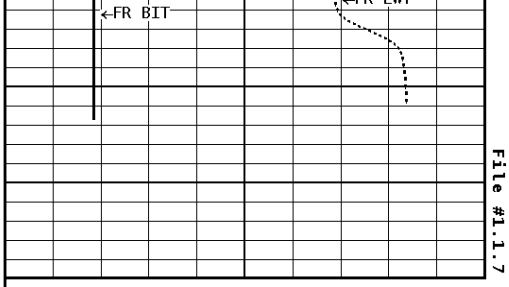

--400Cu.Ft
←GR
←N_CAL
←LD_CAL
1600
←BIT
←LWT
←PECL
←POR
←LDEN
←LCOR
200Cu.Ft--
1700


--300Cu.Ft
1800
1900


2000
--200Cu.Ft
100Cu.Ft--
2100
←GR
←N CAL
←LD CAL
←BIT
←LWT
←PECL
←POR_LDEN
←LCOR


2200
2300
--100Cu.Ft
2400


2500
2600
FR GR
FR N CAL
FR LD CAL
FR PECL
FR R
FR LDEN
FR LCOR
FR LWT



2623

File #1.1.7

1:240 MAIN SECTION

BULK DENSITY

GAMMA RAY API UNITS	-BHV AHV- CU.FT	DENSITY POROSITY (2.71g/cc) PERCENT
150 300		70 30
0 150		30 -10
		-10 -50

TENSION LBS	COMPENSATED BULK DENSITY G/CC
10000 0	3.0 4.0
	2.0 3.0
	1.0 2.0

DENSITY (X) CALIPER INCHES (IN)	PE CROSS-SECTION BARNS/ELECTRON	DENSITY CORRECTION G/CC
16 26		
6 16	0 10	-0.25 0.25

NEUTRON (Y) CALIPER INCHES (IN)
16 26
6 16

BIT SIZE INCHES (IN)
6 16

*** Borehole Zone Factors ***

Zone 1 99999.0 to 0.0 Feet

Matrix Density	2.71	g/cc
Fluid Density	1.00	g/cc
Formation Matrix	Limestone	
Drill Bit Size	7.875	in
Casing Diameter	5.500	in
Casing Correction (PHI N)	Disable	

*** Calibration Summary ***

Shop Calibration
GRT-B

Performed : 27-JUN-2014 Time : 09:30
Sensor Suite : GR-GR5 ID : GRT-BB-006

	Measured Background	Measured Jig	Units	Calibrated Jig	Units
GR	62	374	CPS	175	GRAPI

Shop Calibration
CNT-AA

Performed : 22-AUG-2014 Time : 17:26
Sensor Suite : CALI-BCN ID : NDT-BB-033

	Jig - Measured Ring#1	Jig - Measured Ring#2	Jig - Calibrated Ring#1	Jig - Calibrated Ring#2	Units
CL # 1	9.6	14.4	6.0	12.0	IN.

Performed : 22-Aug-2014 Time : 17:25
Sensor Suite : BHC NEUT ID : CNP-AA-101
Source ID : N-1044

	Tank		Verification	Units
	Measured	Calibrated	Jig	
N/F	3.4893	3.6893	3.6858	
Porosity	17.6	20.5	20.4	%

Shop Calibration
LDT-DA

Performed : 22-AUG-2014 Time : 16:21
Sensor Suite : CALI-LTH ID : NDT-CA-137

	Jig - Measured		Jig - Calibrated		Units
	Ring#1	Ring#2	Ring#1	Ring#2	
CL # 1	8.3	11.7	6.0	12.0	IN.

Performed : 22-Aug-2014 Time : 16:19
Sensor Suite : BHCPELNG ID : LDP-DA-02
Source ID : CSV-587

Short Space

	BKGD	Al	Mg	Al+Fe	Units
LSW1	65	439	717	296	CPS
LSW2	68	529	856	381	CPS
LSW3	261	1314	2080	1120	CPS
LSW4	334	1271	1784	1130	CPS
LSW5	30	42	42	40	CPS
LSW6	88	87	88	88	CPS
LSW7	56	56	55	57	CPS
LSW8	2	2	3	2	CPS
QS	0.227	0.212	0.233	0.217	
PES			2.778	5.967	
SSDN		2.600	1.680		G/CC

Long Space

	BKGD	Al	Mg	Al+Fe	Units
LLW1	101	585	2445	371	CPS
LLW2	110	1017	4233	733	CPS
LLW3	416	1950	7249	1690	CPS
LLW4	542	1135	2952	1047	CPS
LLW5	61	64	79	62	CPS
LLW6	173	172	167	174	CPS
LLW7	111	109	105	109	CPS
LLW8	4	5	9	4	CPS
QL	0.220	0.226	0.231	0.229	
PEL			2.697	5.458	
LSDN		2.600	1.680		G/CC

Shop Calibration
MST-DA

Performed : 21-MAR-2013 Time : 13:53
Sensor Suite : CALI-MSN ID : MLT-DA-21

	Jig - Measured		Jig - Calibrated		Units
	Ring#1	Ring#2	Ring#1	Ring#2	
CL # 1	7.5	11.9	6.0	12.0	IN.

Performed : 21-MAR-2013 Time : 13:53
Sensor Suite : MSTDA-NI ID : MLT-DA-21

Internal

	Measured			Calibrated		
	Zero	Reference	Units	Zero	Reference	Units
INV-V	0.0	29815.7		0.00	1946.00	MV
NOR-V	49.2	30179.6		0.00	1546.00	MV
IN-C	0.0	60547.2		0.00	15.46	UA
INV-R					40.71	OHMM
NOR-R					55.11	OHMM

Performed : 21-MAR-2013 Time : 13:53
Sensor Suite : MSTDAMSF ID : MLT-DA-21

Internal

	Measured			Calibrated		
	Zero	Reference	Units	Zero	Reference	Units
MSFC	16.0	42149.4		0.00	1522.00	UA
MSFB	32723.0	54933.0		0.00	1522.00	MA
MOM1	0.0	43079.5		0.00	1522.00	MV
MSFRA					43.30	OHMM

Tucker ENERGY SERVICES

Location: 1632' FNL & 1564' FWL

Logged: 09-11-2014

K.B. Elev: 1415.0 Ft