Tucker WIRELINE SERVICES

COMPENSATED NEUTRON

PEL DENSITY LOG

Company LAYNE ENERGY OPERATING, LL
Well WESTFALL #2E-12
Field
County MONTGOMERY
State KANSAS
Country USA
API No. 15-125-32074-00-00

File No : TUL-56675
Company : LAYNE ENERGY OPERATING, LLC
Well : WESTFALL #2E-12
Field :
County : MONTGOMERY
State : KANSAS
Country : USA
API No : 15-125-32074-00-00

Location :
366' FNL & 2525' FEL
SW NW NW NE

LSD : **Sect :** 12 **Twp :** 31S **Rge :** 13E

Permanent Datum:	GL		**Elevations:**			**Services:**
Drilling Measured From:	GL		**KB**	0.00	Ft	CNT
Log Measured From:	GL		**DF**	0.00	Ft	LDT
Above Permanent Datum:	0.00	Ft	**GL**	988.00	Ft	PIT

Date	May 10 2011						
Run Number	1						
Depth--Driller	1703.0	Ft					
Depth--Logger	1701.0	Ft					
First Reading	1678.0	Ft					
Last Reading	22.0	Ft					
Casing--Driller	22.0	Ft					
Casing--Logger	22.0	Ft					
Bit Size	6.750	In					
Casing Size	8.625	In					
Hole Fluid Type	FRESH / NATIVE						
Density	0.0	LBS/GAL					
Fluid Loss	0.0	CC					
PH/Viscosity	0.0	0.0 SEC					
Sample Source	MEASURED						
RM@Measured Temp.	0.100	@ 80 F					
RMF@Measured Temp	0.085	@ 80 F					
RMC@Measured Temp.	0.115	@ 80 F					
Source RMF/RMC	CALCULATED	CALCULATED					
RM@BHT	0.085	@ 101 F					
Time Circulation Stopped							
Max Recorded Temp.	101	F					
Equipment/Base	TRK123	TULSA					
Recorded By	R. FRANKLIN						
Witnessed By	M. MURPHY						

Bitsize Intervals

Size (In)	Bottom (Ft)
6.750	1703.00

Casing Strings

Size (In)	Weight (Lbs)	Bottom (Ft)
8.625	26.00	22.00

Run Number	1	
Date	May 10 2011	
Date/Time On Bottom		
Depth to Fluid	0.0	Ft
Salinity	0.000	PPM
RMF@BHT	0.072 @ 101 F	
RMC@BHT	0.098 @ 101 F	

Run Number 1

Comments

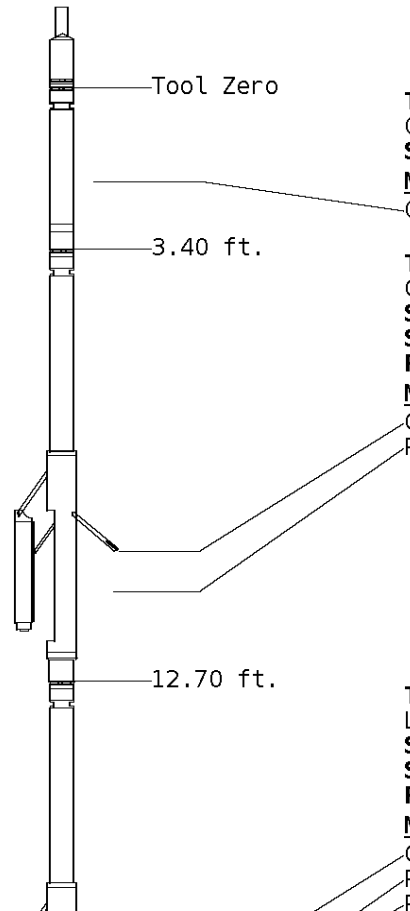
ALL PRESENTATIONS AS PER CUSTOMER REQUEST
GRT, CNT, LDT, AND PIT RUN IN COMBINATION.
CALIPERS ORIENTED ON X-Y AXIS.
2.68 G/CC USED TO CALCULATED POROSITY.
ANNULAR HOLE VOLUME CALCULATED UISING 4.50" PRODUCTION CASING.

GRT: GRP.
CNT: PHIN, CLCNIN.
LDT: PORL, LCORN, PECLN, LDENN, CLLDIN.
PIT: ILD, ILM, SPU, SFLAEC.

OPERATORS:
M. GARNER
S. DAVIS

Tool String Schematic

Total Tool Length - 43.91 **ft.**
Maximum Outside diameter - 4.80 **in.**
Net Weight in Air - 743.00 **lbs.**



Tool: GRT-B **Length:** 3.40 **ft.** **O.D.** 3.60 **in.**
Gamma Ray Controller
Sonde ID :GRT-BA-015

Measure Point	Tool Offset	Stack Offset	Bottom Offset
GRP	2.00	2.00	41.91

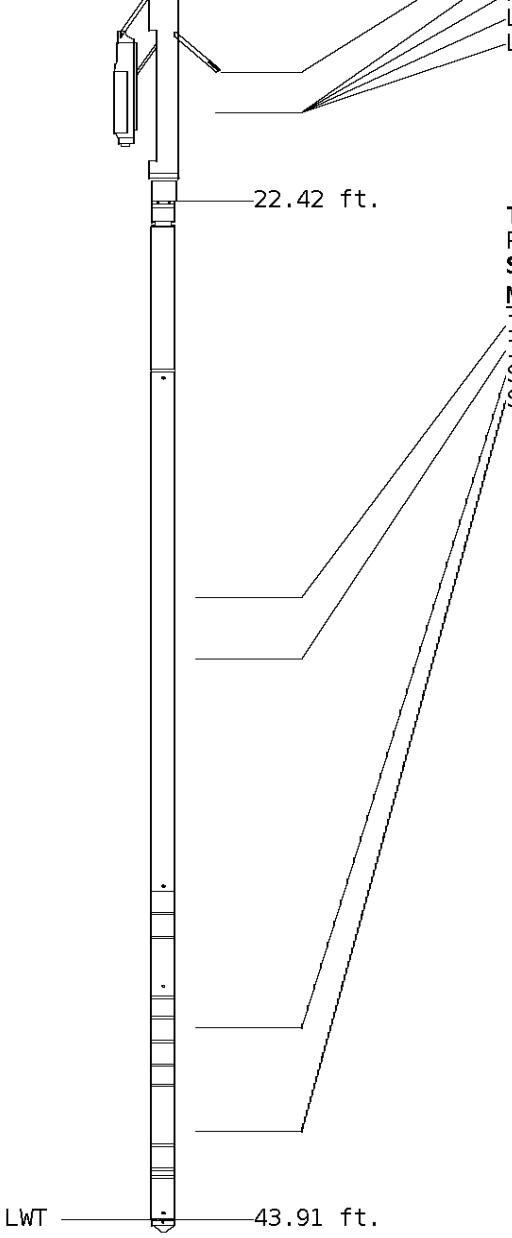
Tool: CNT-AA **Length:** 9.30 **ft.** **O.D.** 4.36 **in.**
Compensated Neutron A Pad on NDT-A
Sonde ID :NDT-AC-027
Source ID :N-1046
Pad ID :CNP-AE-42

Measure Point	Tool Offset	Stack Offset	Bottom Offset
CLCN	6.00	9.40	34.51
PHIN	6.80	10.20	33.71

Tool: LDT-DF **Length:** 9.72 **ft.** **O.D.** 4.80 **in.**
Litho Density D Pad on NDT-F
Sonde ID :PDT-GA-469
Source ID :2991GW
Pad ID :LDP-DA-067

Measure Point	Tool Offset	Stack Offset	Bottom Offset
CLLD	6.42	19.12	24.79
PEL	7.42	20.12	23.79
PES	7.82	20.52	23.39

LDEN	7.62	20.32	23.59
LCOR	7.62	20.32	23.59



Tool: PIT-CA **Length:** 21.49 **ft.** **O.D.** 3.62 **in.**
Phased Dual Induction w/ RM & D
Sonde ID :PIT-CA-069

Measure Point	Tool Offset	Stack Offset	Bottom Offset
ILD	8.92	31.34	12.56
ILM	10.10	32.52	11.39
SFLU	17.49	39.91	4.00
SP	20.60	43.02	0.88

Well File: lan_wes_2e-12_mar_10_stk **Scale:** 1:240
Segment: V1.D1.S8 MAIN **Acquired:** Not Available
Reference: 0 **Processed:** Not Available

TENSION
LBS
10000 — 0

BIT SIZE
INCHES (IN)
4 — 14

DENSITY (X) CALIPER
INCHES (IN)
14 — 24
4 — 14

Volume
Quartz

PE CROSS-SECTION
BARNS/ELECTRON
0 — 10

DENSITY CORRECTION
G/CC
-0.25 — 0.25

NEUTRON (Y) CALIPER
INCHES (IN)
14 — 24
4 — 14

Volume
Calcite

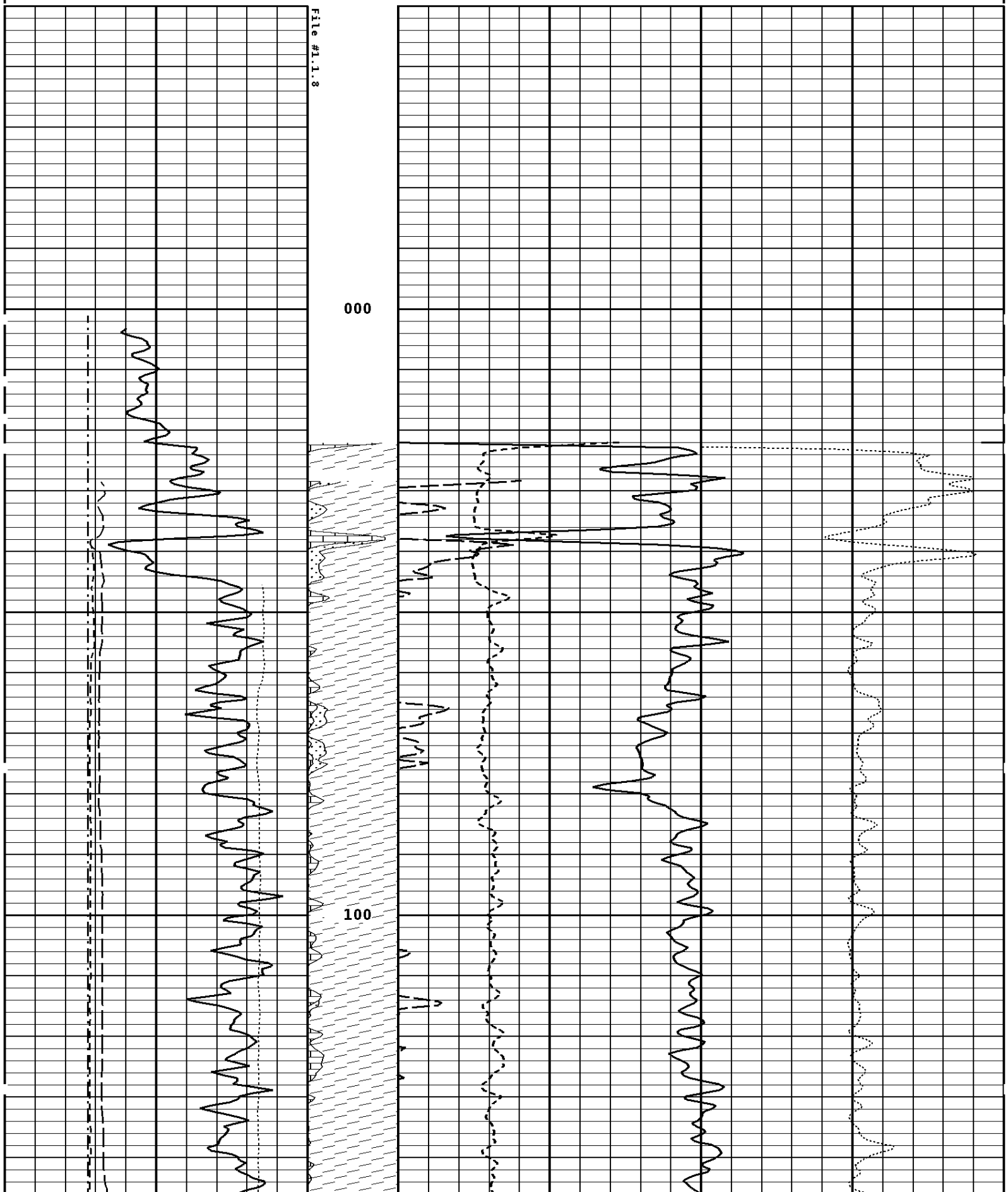
NEUTRON POROSITY
PERCENT (SANDSTONE MATRIX)
30 — -10

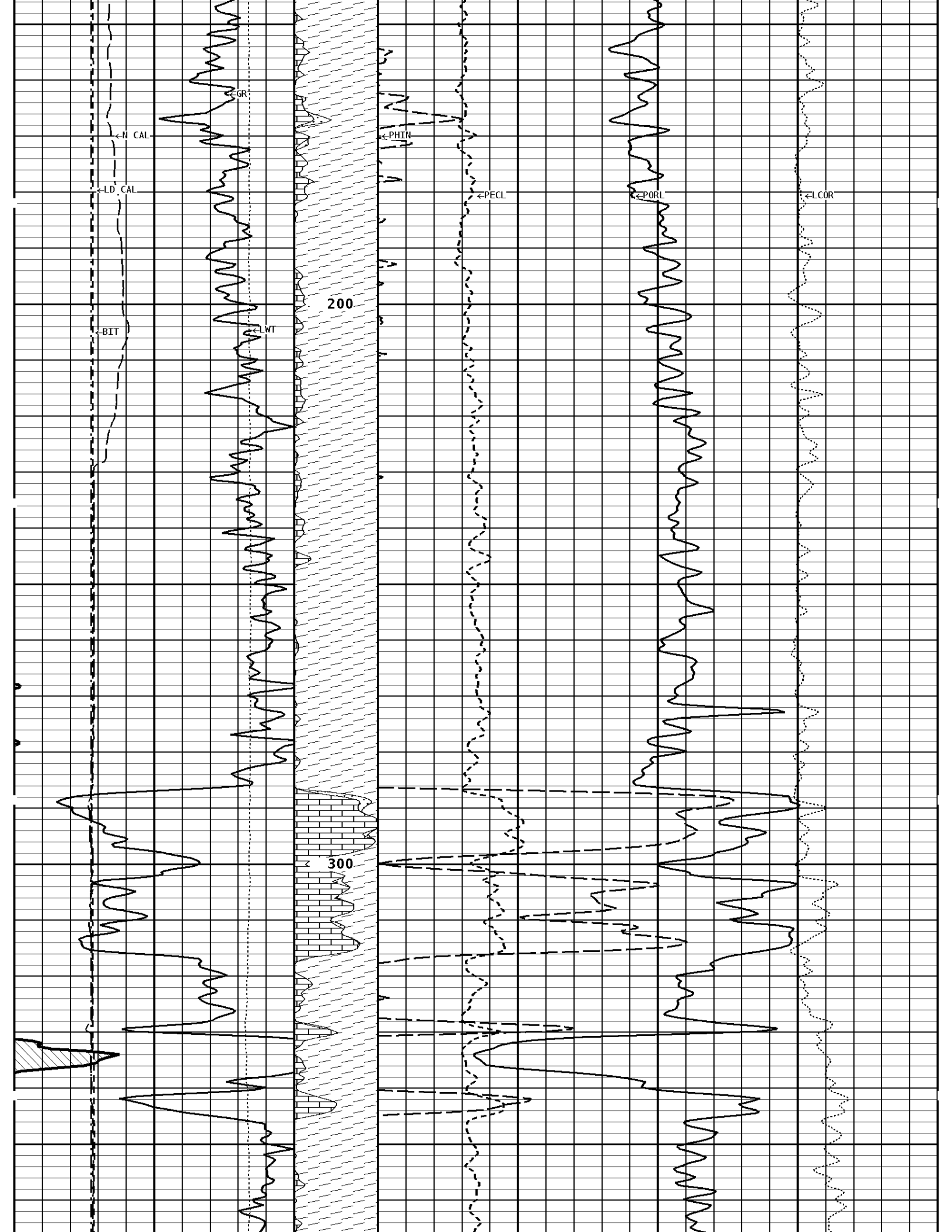
GAMMA RAY
API UNITS
150 — 300
0 — 150

Volume
Dolo/Shale

DENSITY POROSITY
PERCENT (2.68 g/cc)
70 — 30
30 — -10
-10 — -50

1:240 MAIN SECTION

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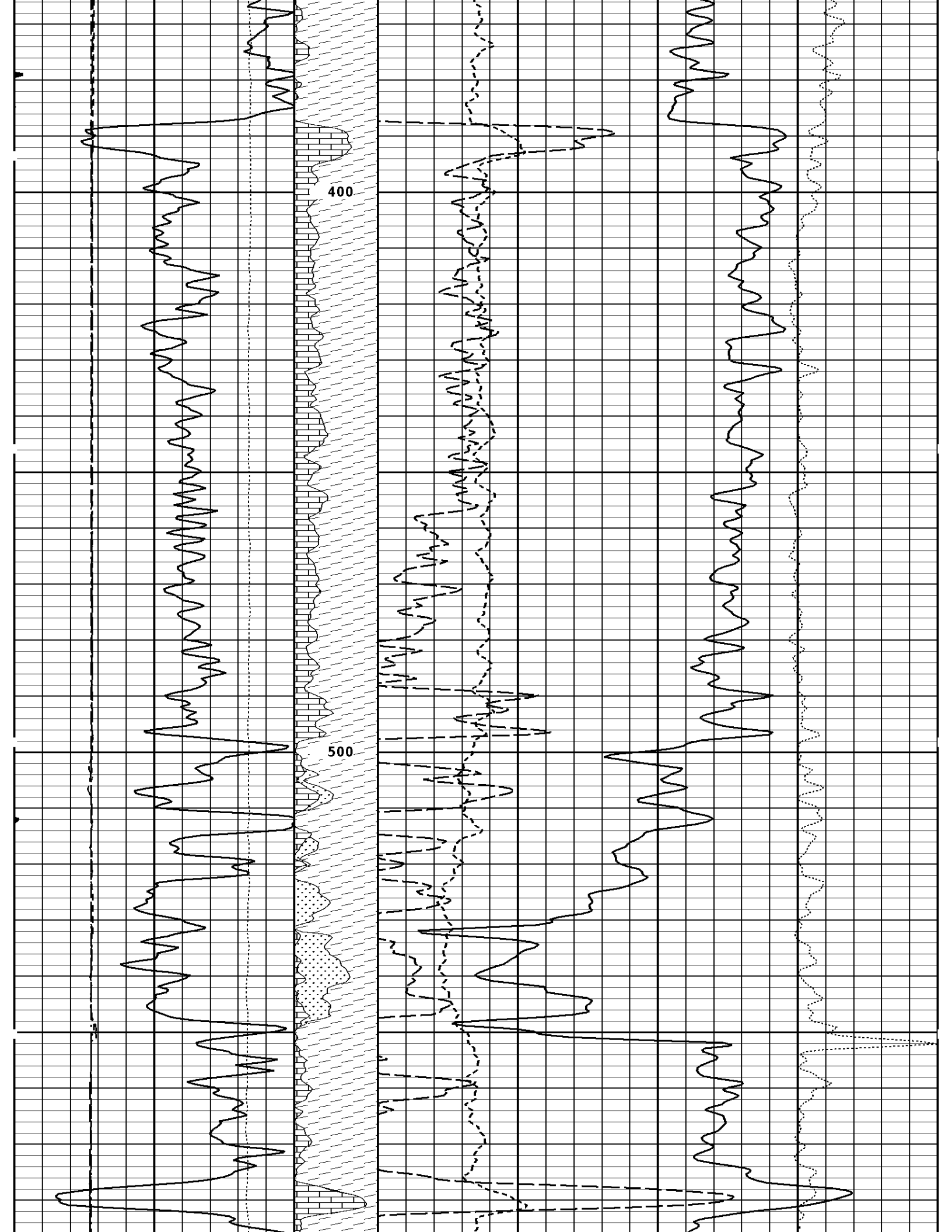
LD CAL
BIT
LWT
PHIN
PECL
PORL
LCOR
200
300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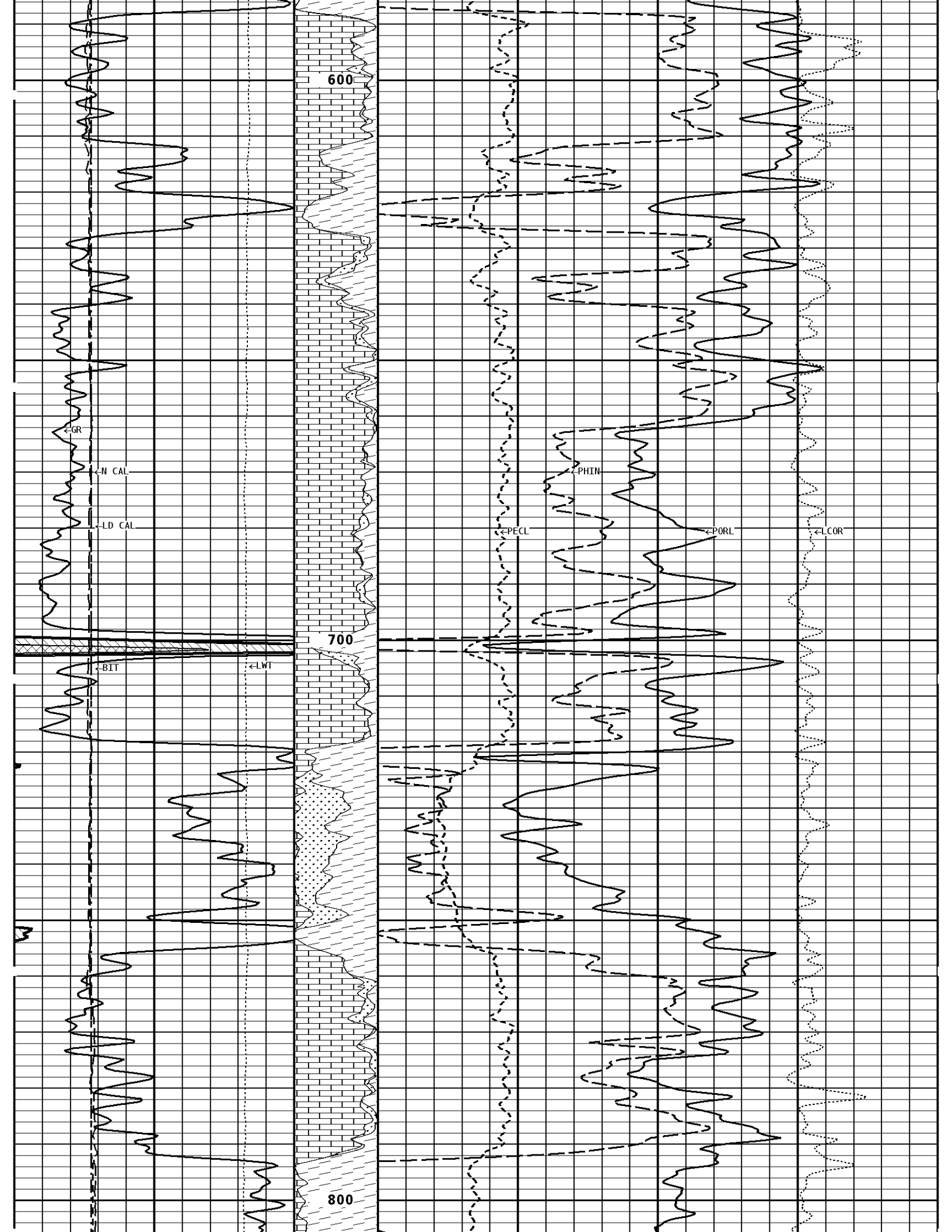
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800
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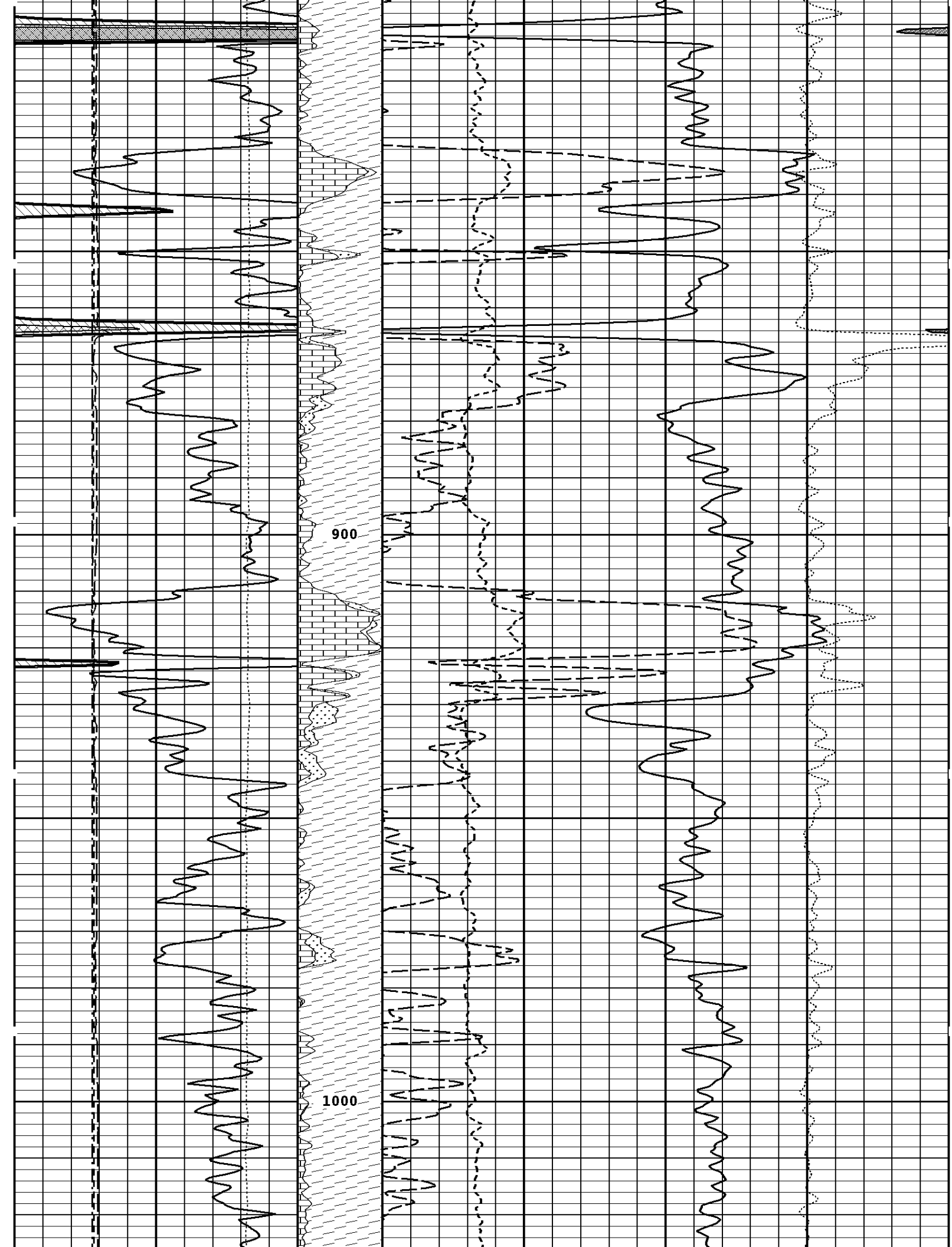
LD CAL
BIT
LWT
PHIN
PECL
PORL
LCOR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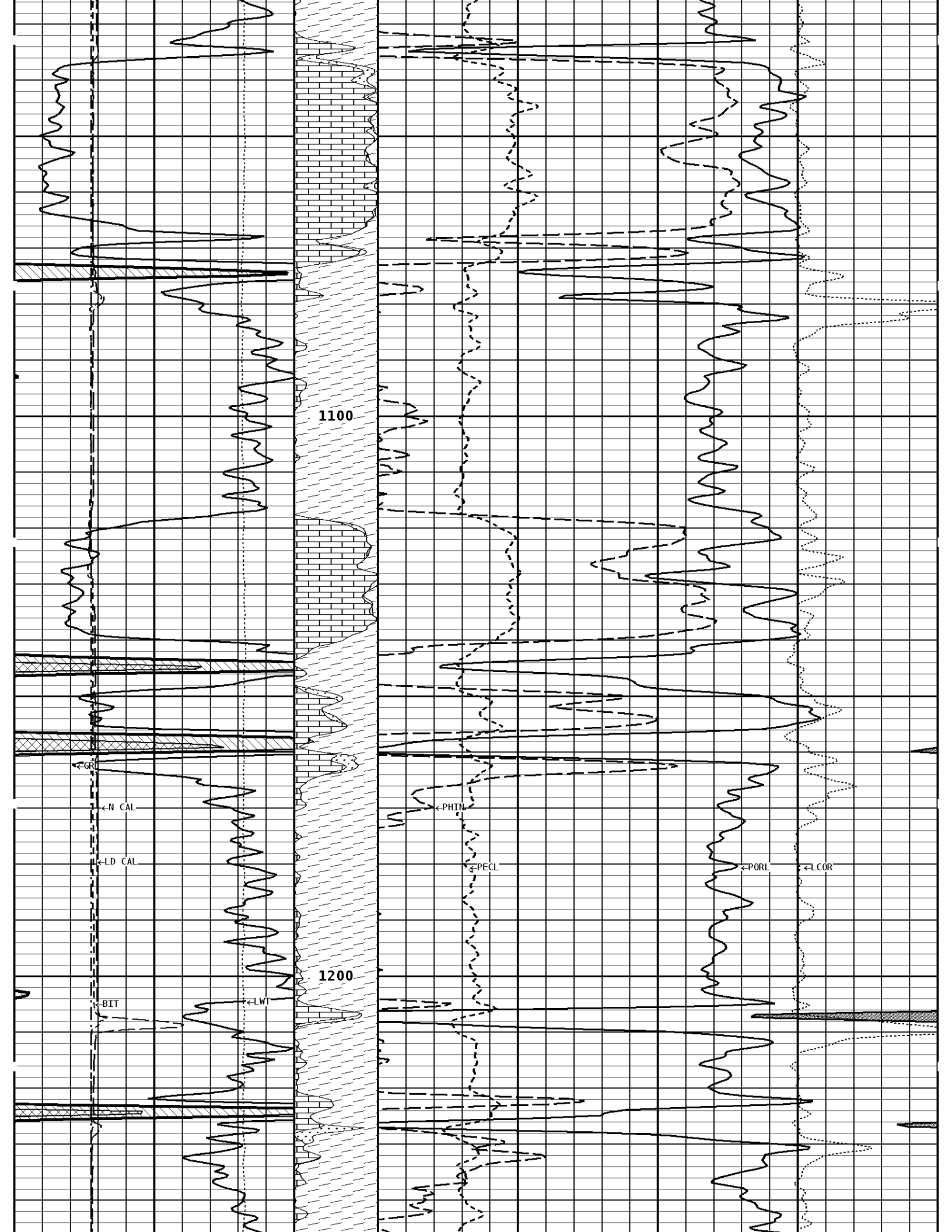
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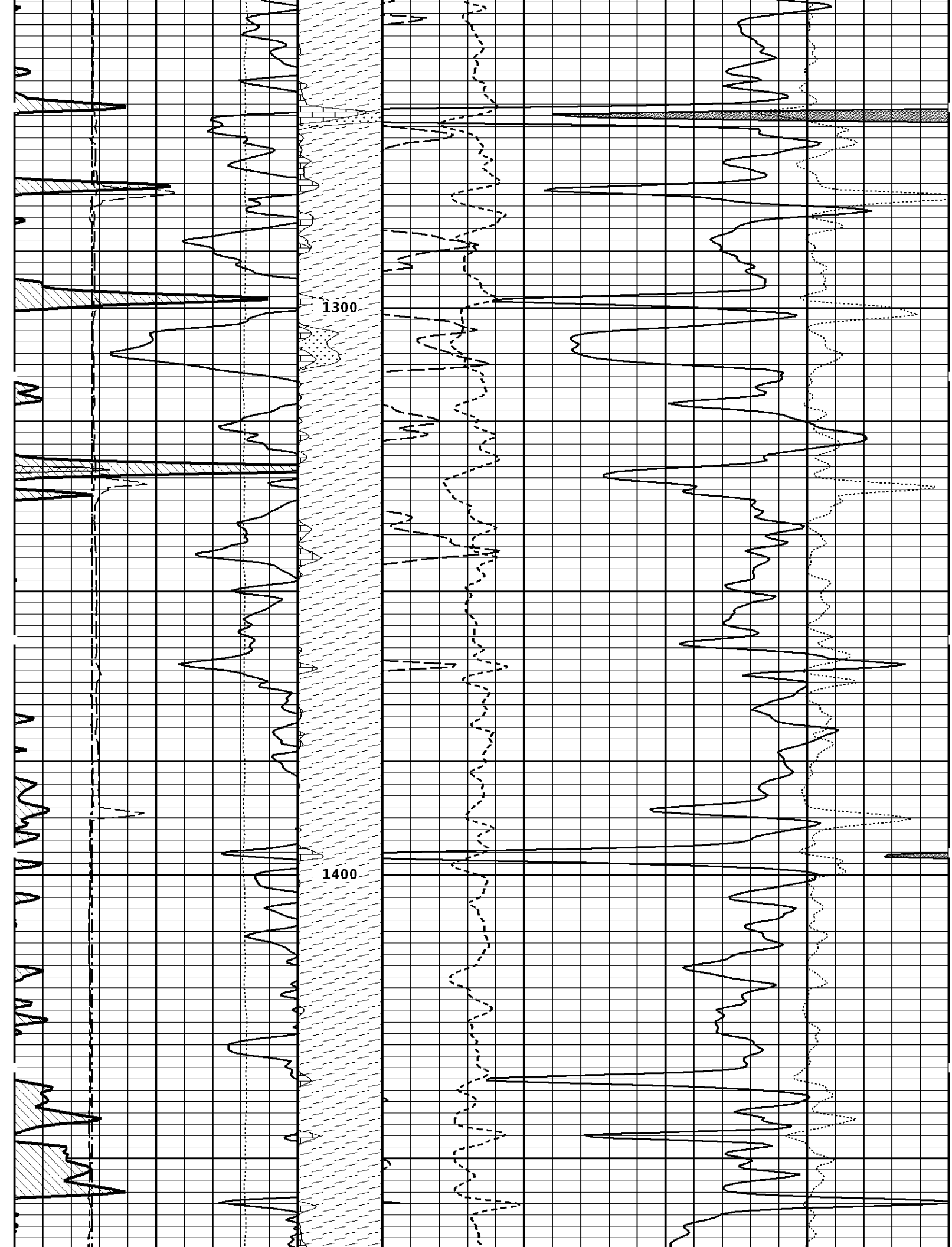
1200
GR
N CAL
LD CAL
BIT
LWT
PHIN
PECL
PORL
LCOR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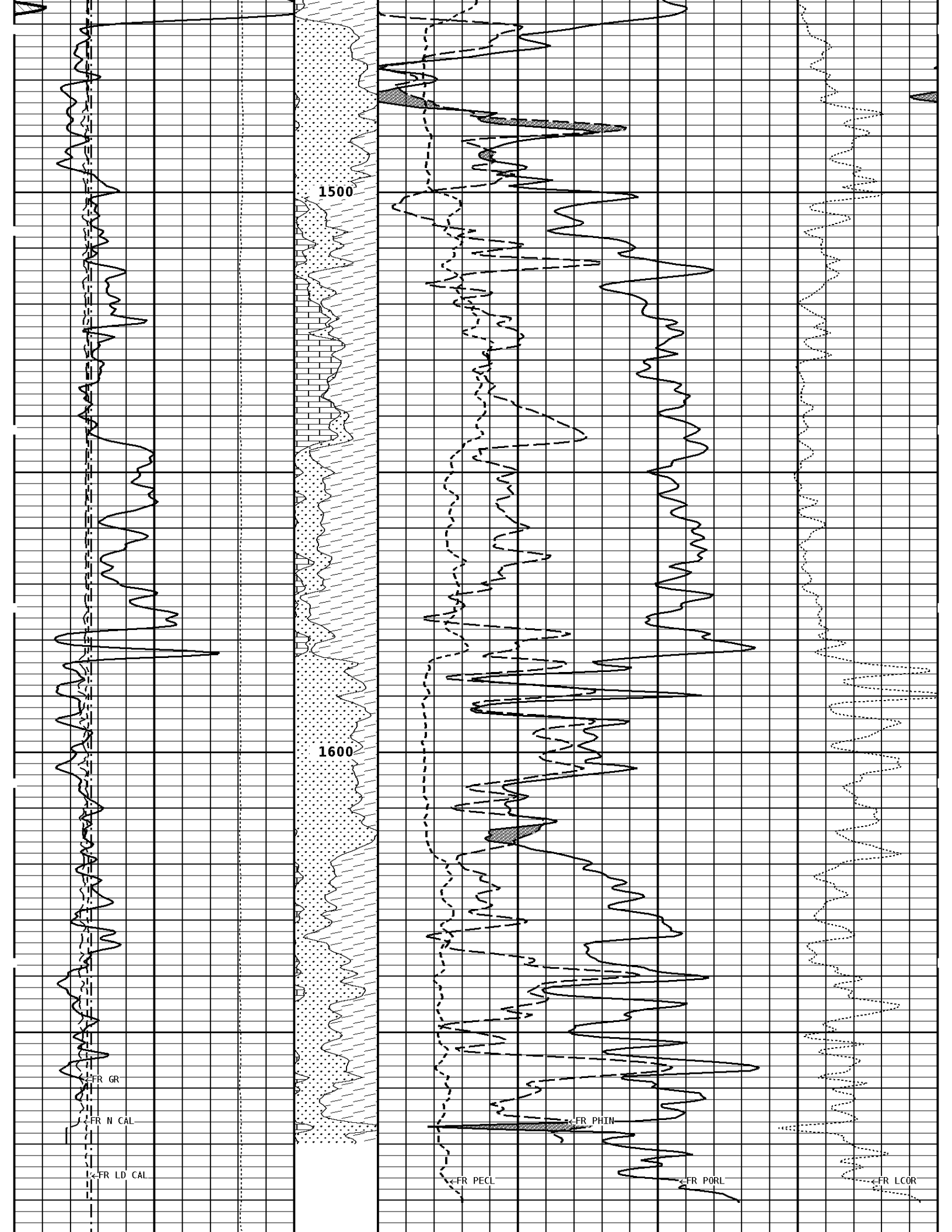
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FR PECL
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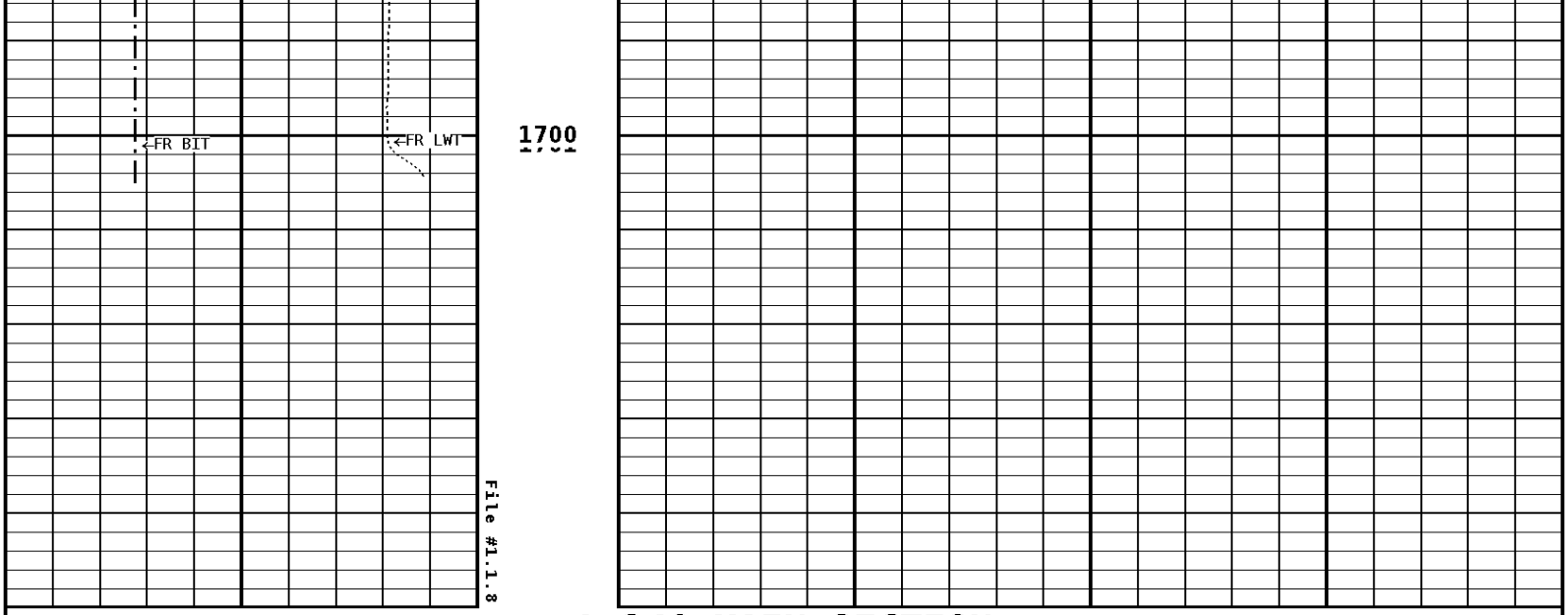
FR PORL
FR LCOR



1:240 MAIN SECTION

GAMMA RAY API UNITS	Volume Dolo/Shale	DENSITY POROSITY PERCENT (2.68 g/cc)
150 300		70 30
0 150		30 -10
		-10 -50

NEUTRON (Y) CALIPER INCHES (IN)	Volume Calcite	NEUTRON POROSITY PERCENT (SANDSTONE MATRIX)
14 24		
4 14		30 -10

DENSITY (X) CALIPER INCHES (IN)	Volume Quartz	PE CROSS-SECTION BARNS/ELECTRON	DENSITY CORRECTION G/CC
14 24			
4 14		0 10	-0.25 0.25

BIT SIZE INCHES (IN)
4 14

TENSION LBS
10000 0

*** Borehole Zone Factors ***

Zone 1 99999.0 to 0.0 Feet

Drill Bit Size	6.750	in
Casing Diameter	4.500	in
Casing Correction (PHI N)	Disable	
Fluid Density	1.00	g/cc
Matrix Density	2.68	g/cc
Formation Matrix	Sandstone	

Well File: lan_wes_2e-12_mar_10_stk	**Scale:** 1:240
Segment: V1.D1.S5 REPEAT	**Acquired:** 2011-05/10 17:50 3.2.0-9901
Reference: 0	**Processed:** 2011-05/10 18:56 3.2.0-9901

TENSION LBS
10000 0

BIT SIZE
INCHES (IN)
4 14

DENSITY (X) CALIPER
INCHES (IN)
14 24
4 14

NEUTRON (Y) CALIPER
INCHES (IN)
14 24
4 14

GAMMA RAY
API UNITS
150 300
0 150

Volume
Quartz

Volume
Calcite

Volume
Dolo/Shale

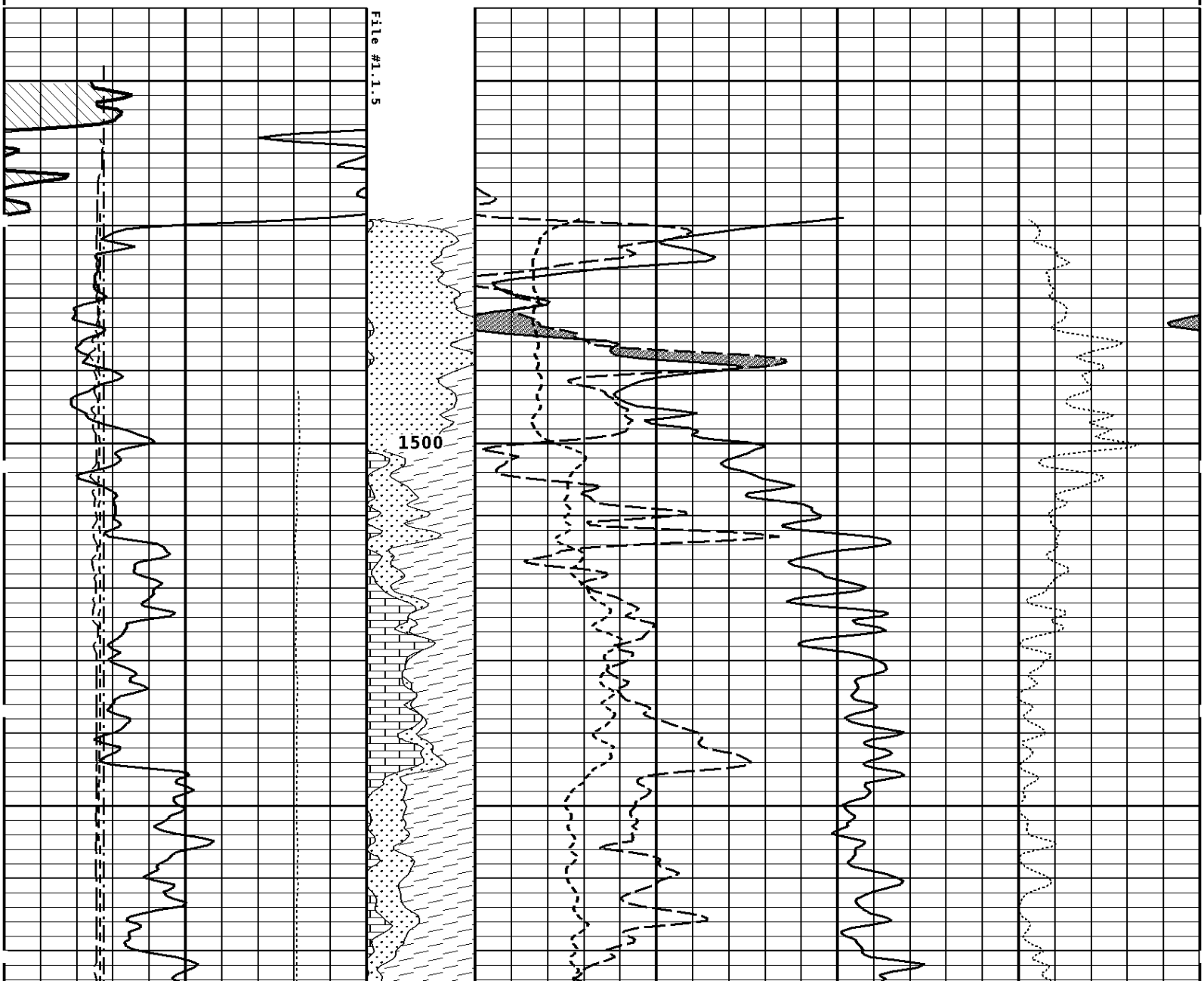
PE CROSS-SECTION
BARNS/ELECTRON
0 10

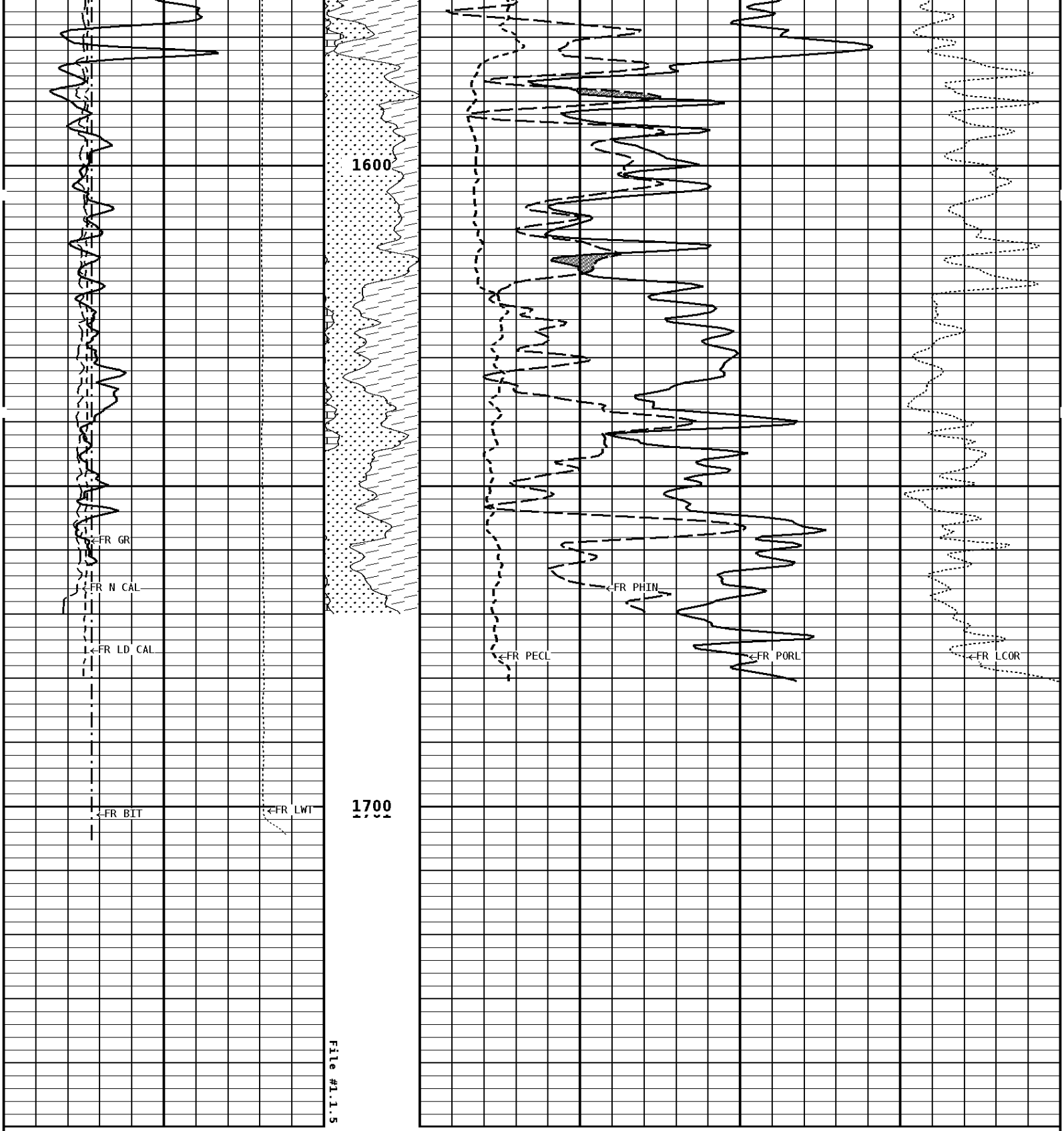
DENSITY CORRECTION
G/CC
-0.25 0.25

NEUTRON POROSITY
PERCENT (SANDSTONE MATRIX)
30 -10

DENSITY POROSITY
PERCENT (2.68 g/cc)
70 30
30 -10
-10 -50

1:240 REPEAT SECTION





1:240 REPEAT SECTION

GAMMA RAY API UNITS	Volume Dolo/Shale	DENSITY POROSITY PERCENT (2.68 g/cc)
150 300 0 150		70 30 30 -10
		-10 -50
NEUTRON (Y) CALIPER INCHES (IN)	Volume Calcite	NEUTRON POROSITY PERCENT (SANDSTONE MATRIX)

14 24 4 14		30	-10
DENSITY (X) CALIPER INCHES (IN) 14 24 4 14	Volume Quartz	**PE CROSS-SECTION BARNS/ELECTRON** 0 10	**DENSITY CORRECTION G/CC** -0.25 0.25
BIT SIZE INCHES (IN) 4 14			
TENSION LBS 10000 0			

*** Borehole Zone Factors ***

Zone 1 99999.0 to 0.0 Feet

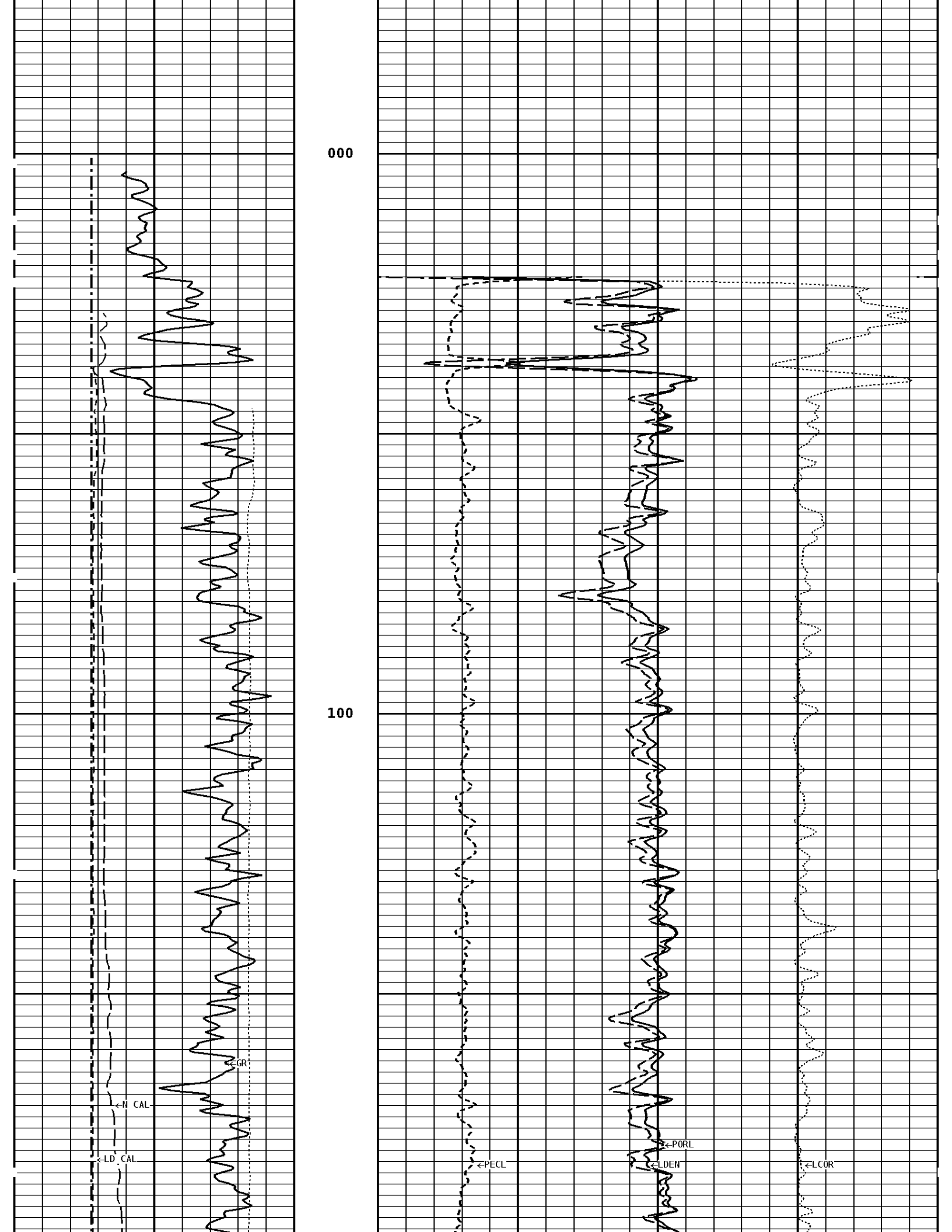
Matrix Density	2.68	g/cc
Fluid Density	1.00	g/cc
Formation Matrix	Sandstone	
Drill Bit Size	6.750	in
Casing Diameter	4.500	in
Casing Correction (PHI N)	Disable	

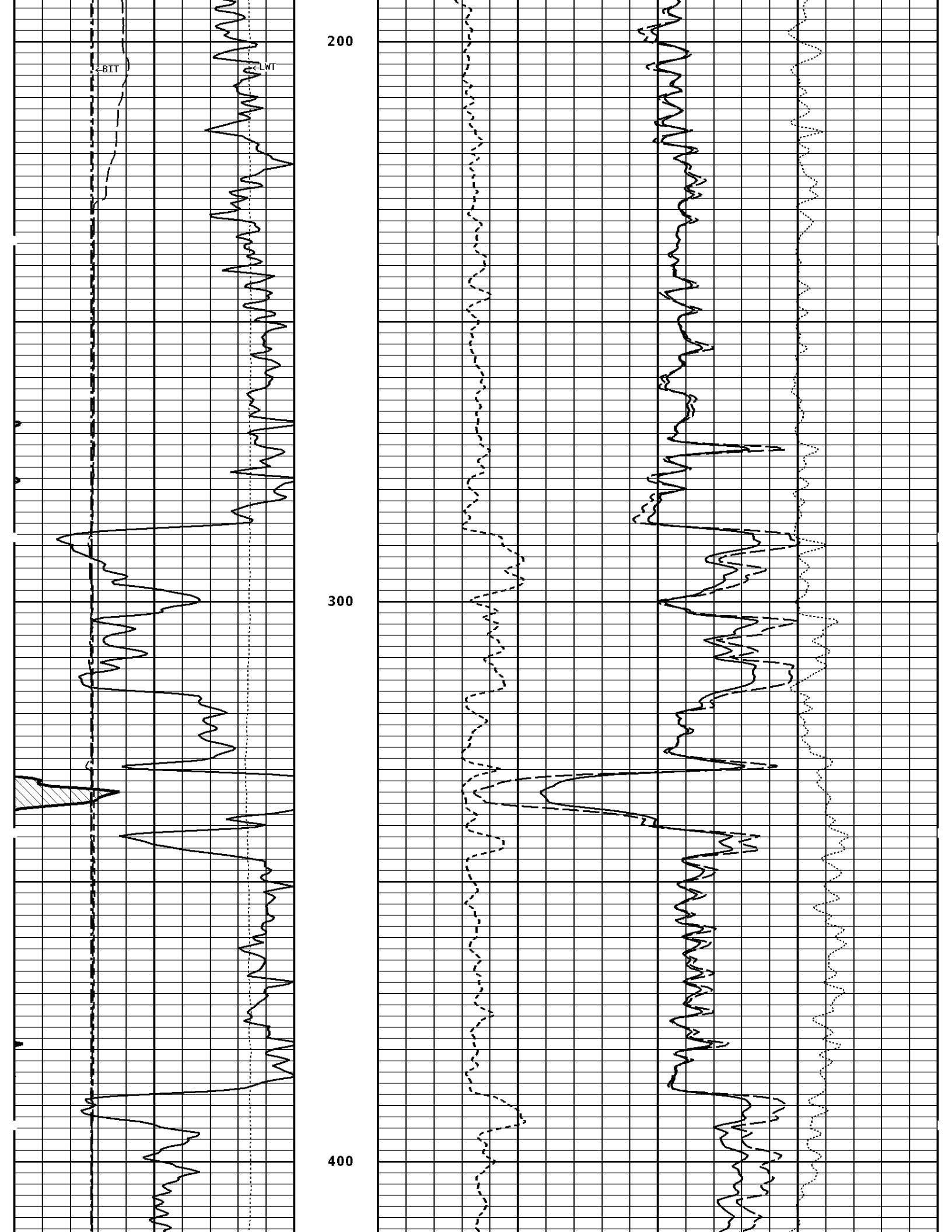
Well File: lan_wes_2e-12_mar_10_stk **Scale:** 1:240
Segment: V1.D1.S8 MAIN **Acquired:** Not Available
Reference: 0 **Processed:** Not Available

TENSION LBS 10000 0		
BIT SIZE INCHES (IN) 4 14		
DENSITY (X) CALIPER INCHES (IN) 14 24 4 14		**PE CROSS-SECTION BARNS/ELECTRON** 0 10 **DENSITY CORRECTION G/CC** -0.25 0.25
NEUTRON (Y) CALIPER INCHES (IN) 14 24 4 14		**DENSITY POROSITY PERCENT (2.68 g/cc)** 70 30 30 -10 -10 -50
GAMMA RAY API UNITS 150 300 0 150	-BHV AHV- CU.FT	**COMPENSATED BULK DENSITY G/CC** 3.0 4.0 2.0 3.0 1.0 2.0

1:240 MAIN SECTION
BULK DENSITY

File #1.1.8


000
100
←GR
←N CAL
←LD CAL
←PECL
←PORL
←LDEN
←LCOR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LWT
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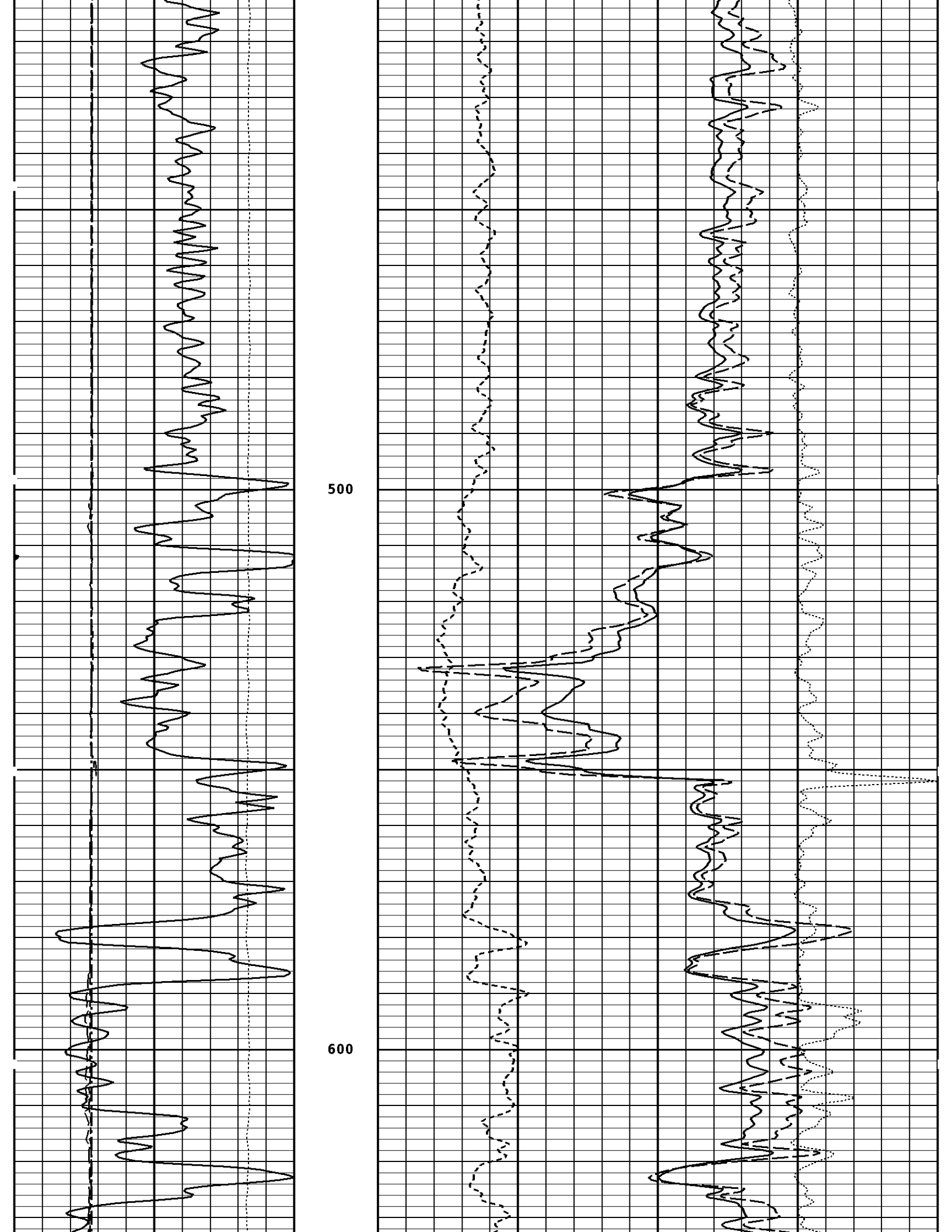
300
400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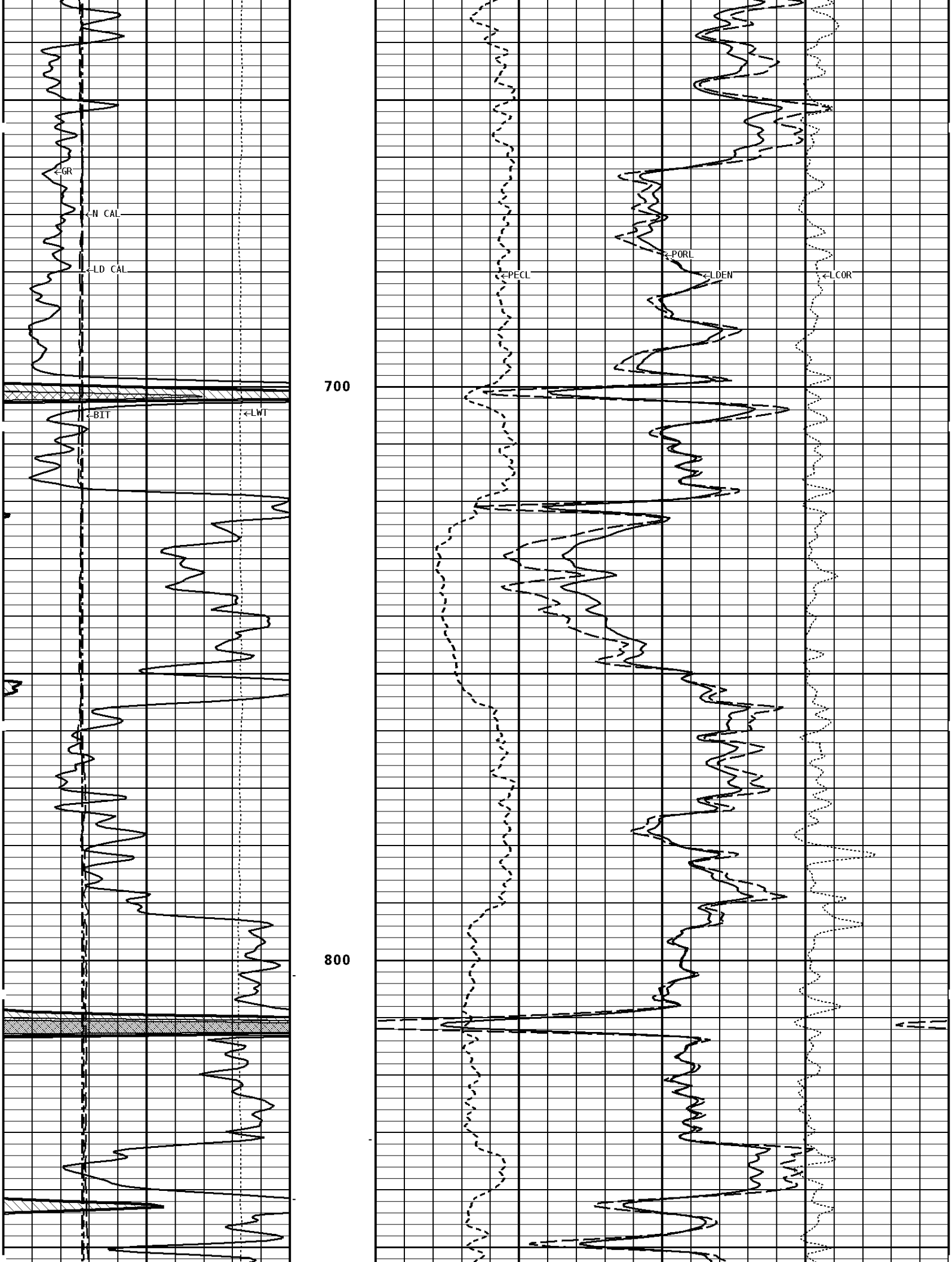
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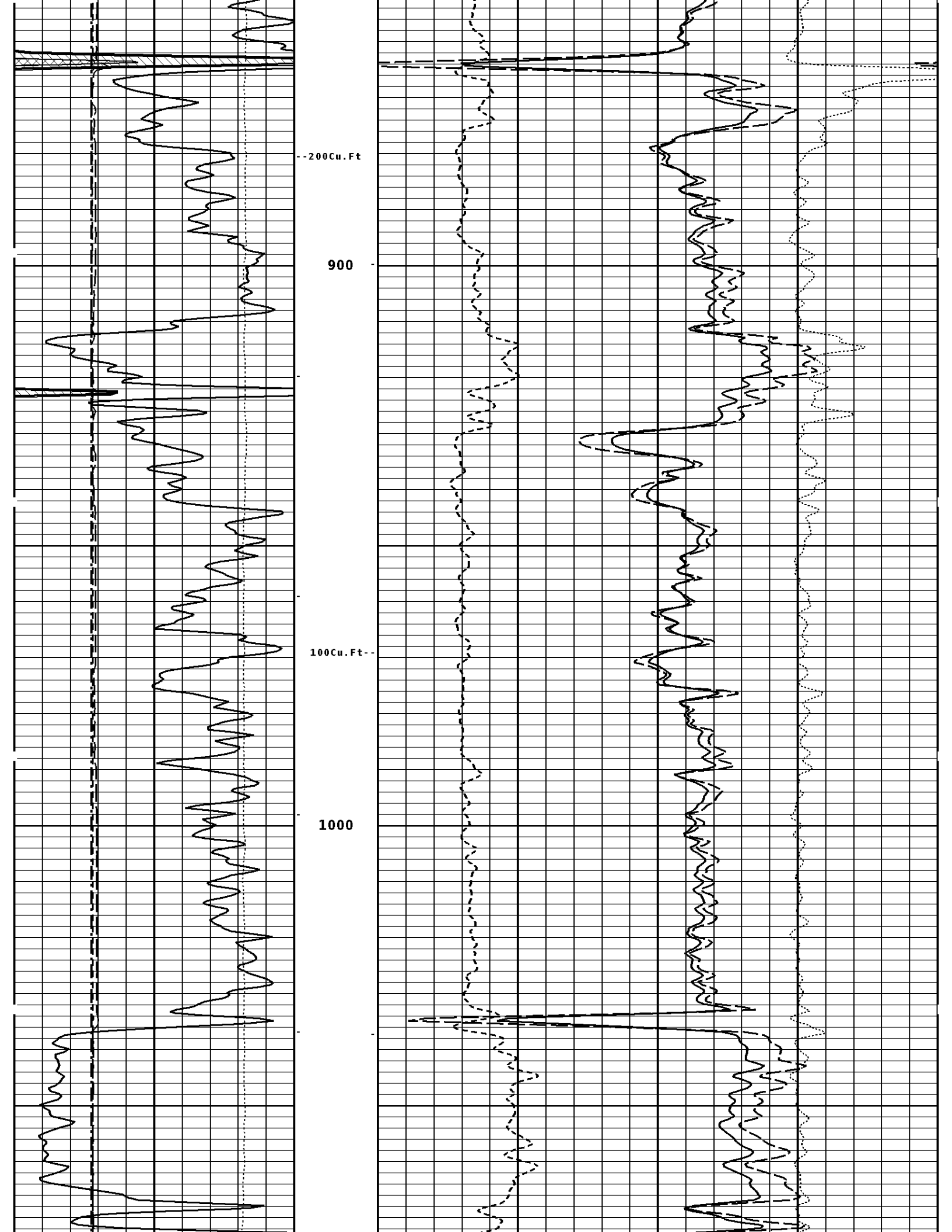
N CAL
LD CAL
BIT
LWT
700
PECL
PORL
LDEN
LCOR
800


--200Cu.Ft
900
100Cu.Ft--
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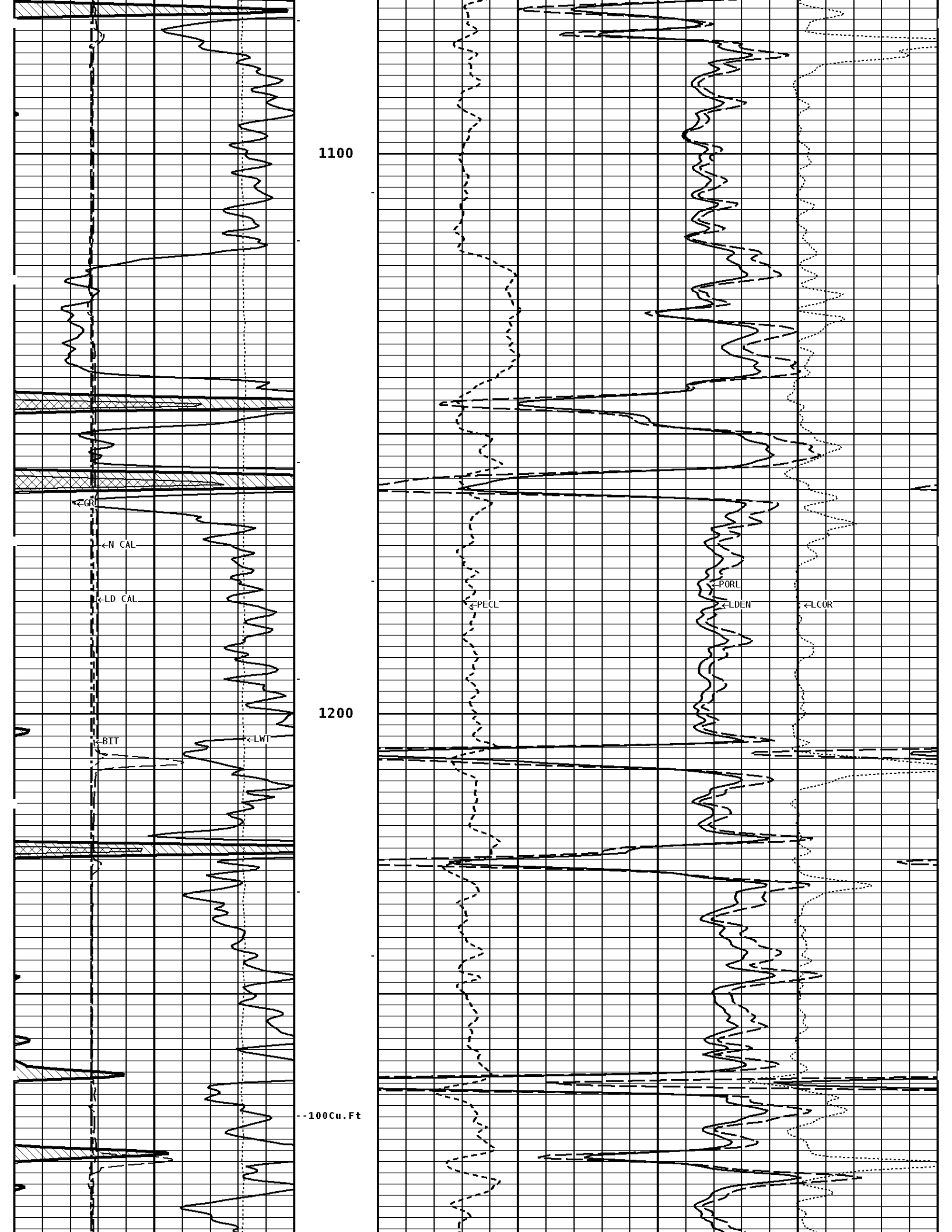
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GR
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LWT
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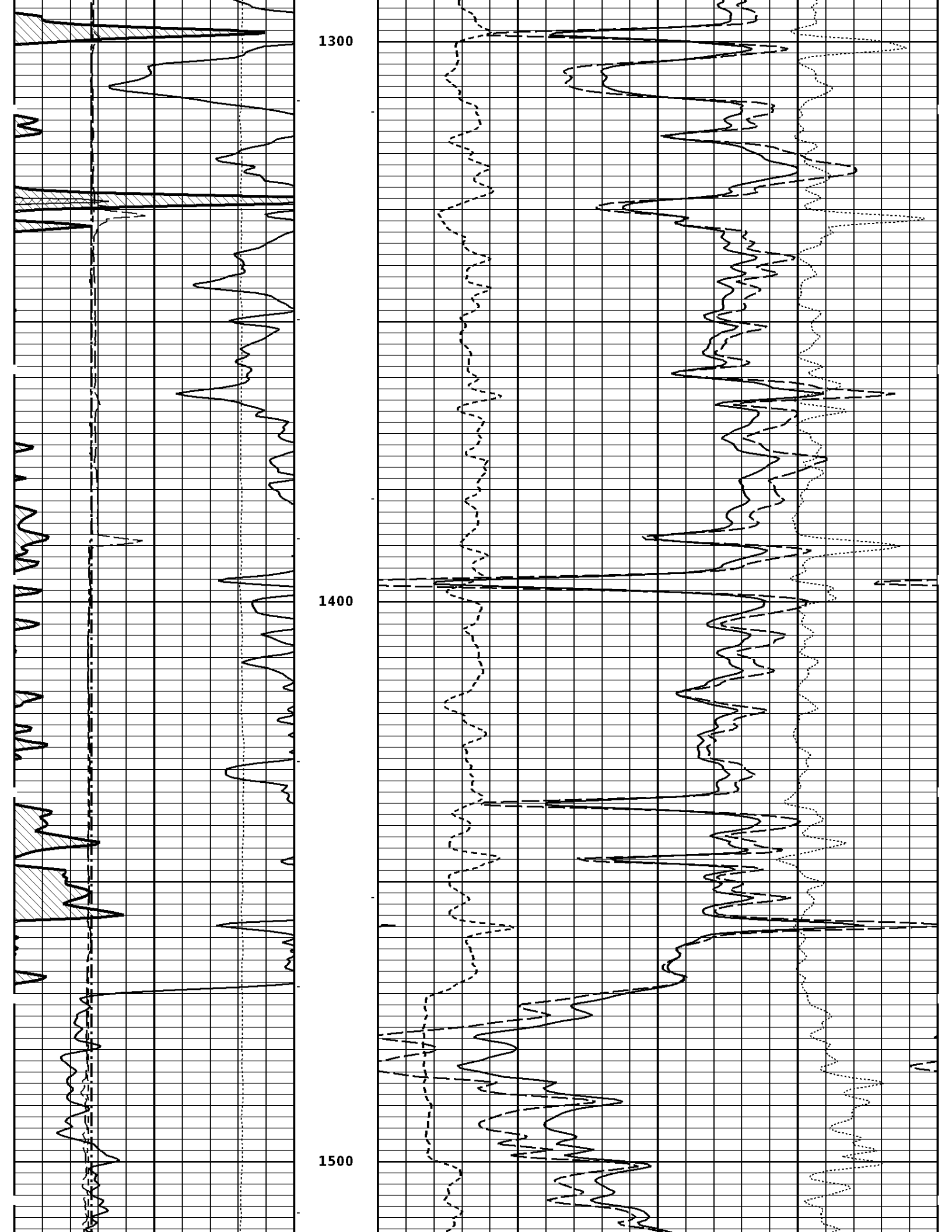
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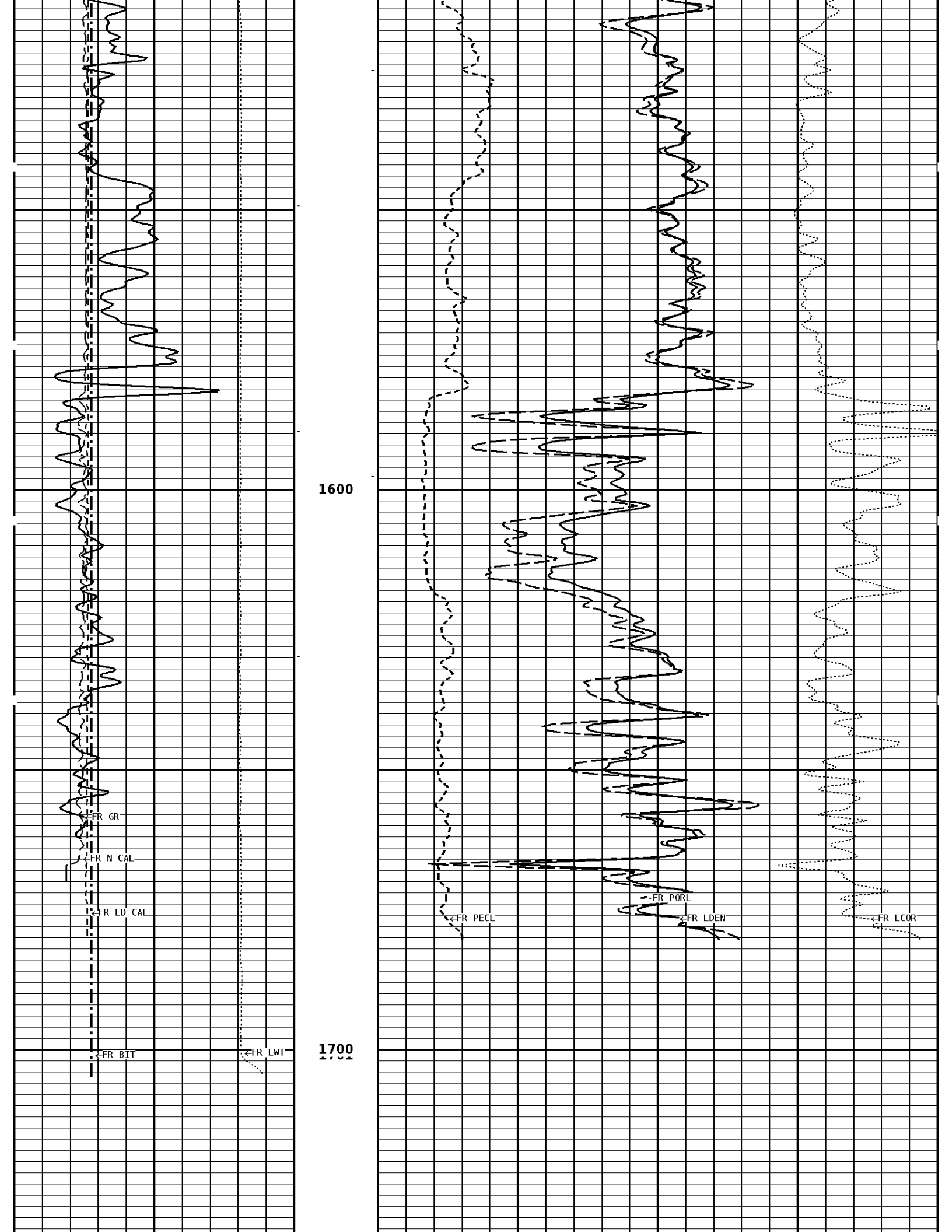
1600
1700
FR GR
FR N CAL
FR LD CAL
FR BIT
FR LWT
FR PECL
FR PORL
FR LDEN
FR LCOR

File #1.1.8

1:240 MAIN SECTION
BULK DENSITY

GAMMA RAY API UNITS	-BHV AHV- CU.FT	COMPENSATED BULK DENSITY G/CC
150 300		3.0 4.0
0 150		2.0 3.0
		1.0 2.0

NEUTRON (Y) CALIPER INCHES (IN)	DENSITY POROSITY PERCENT (2.68 g/cc)
14 24	70 30
4 14	30 -10
	-10 -50

DENSITY (X) CALIPER INCHES (IN)	PE CROSS-SECTION BARNS/ELECTRON	DENSITY CORRECTION G/CC
14 24		
4 14	0 10	-0.25 0.25

BIT SIZE INCHES (IN)
4 14

TENSION LBS
10000 0

*** Borehole Zone Factors ***

Zone 1 99999.0 to 0.0 Feet

Drill Bit Size	6.750	in
Casing Diameter	4.500	in
Casing Correction (PHI N)	Disable	
Fluid Density	1.00	g/cc
Matrix Density	2.68	g/cc
Formation Matrix	Sandstone	

*** Calibration Summary ***

Shop Calibration
GRT-B

Performed : 29-Apr-2010 Time : 11:28
Sensor Suite : GR-GR5 ID : GRT-BA-015

	Measured Background	Measured Jig	Units	Calibrated Jig	Units
GR	54	369	CPS	175	GRAPI

Shop Calibration
CNT-AA

Performed : 30-APR-2011 Time : 18:55
Sensor Suite : CALI-BCN ID : NDT-AC-027

	Jig - Measured Ring#1	Jig - Measured Ring#2	Jig - Calibrated Ring#1	Jig - Calibrated Ring#2	Units
CL # 1	7.3	14.1	6.0	12.0	IN.

Performed : 26-Apr-2011 Time : 10:33
Sensor Suite : BHC NEUT ID : CNP-AE-42
Source ID : N-1046

	Tank Measured	Tank Calibrated	Verification Jig	Units

	Measured	Calibrated	Jig	
N/F	3.6456	3.6893	3.6949	
Porosity	19.8	20.5	20.6	%

Shop Calibration
LDT-DF

Performed : 26-APR-2011 Time : 18:55
Sensor Suite : CALI-LTH ID : PDT-GA-469

	Jig - Measured		Jig - Calibrated		Units
	Ring#1	Ring#2	Ring#1	Ring#2	
CL # 1	6.8	12.8	6.0	12.0	IN.

Performed : 26-Apr-2011 Time : 11:26
Sensor Suite : BHCPELNG ID : LDP-DA-067
Source ID : 2991GW

Short Space

	BKGD	Al	Mg	Al+Fe	Units
LSW1	65	1176	1913	756	CPS
LSW2	72	1350	2147	973	CPS
LSW3	262	3080	4973	2605	CPS
LSW4	323	2759	4001	2412	CPS
LSW5	39	67	74	63	CPS
LSW6	76	82	84	84	CPS
LSW7	55	58	58	57	CPS
LSW8	7	9	10	9	CPS
QS	0.161	0.174	0.183	0.193	
PES			2.778	5.967	
SSDN		2.600	1.680		G/CC

Long Space

	BKGD	Al	Mg	Al+Fe	Units
LLW1	96	1305	5305	785	CPS
LLW2	106	2331	9081	1684	CPS
LLW3	402	4233	16063	3622	CPS
LLW4	522	1992	6430	1788	CPS
LLW5	57	67	130	65	CPS
LLW6	176	168	159	171	CPS
LLW7	108	105	100	107	CPS
LLW8	3	6	18	6	CPS
QL	0.240	0.231	0.226	0.232	
PEL			2.697	5.458	
LSDN		2.600	1.680		G/CC