STEP energy services

COMPENSATED NEUTRON

PEL DENSITY MICRO LOG

Company BEREXCO, LLC.
Well LEMKE 'A' #3
Field WAKEENEY
County TREGO
State KANSAS
Country USA
API No. 15-195-23101-00-00

File No : HAYS-70631
Company : BEREXCO, LLC.
Well : LEMKE 'A' #3
Field : WAKEENEY
County : TREGO
State : KANSAS
Country : USA
API No : 15-195-23101-00-00

Location :
330' FSL & 1320' FWL
S2 S2 SW

LSD : **Sect :** 15 **Twp :** 11S **Rge :** 23W

Permanent Datum:	GL	**Elevations:**		**Services:**	
Drilling Measured From:	KB	**KB**	2271.00 Ft	CNP	MLT
Log Measured From:	KB	**DF**	2270.00 Ft	LDP	PIT
Above Permanent Datum:	7.00 Ft	**GL**	2264.00 Ft	CST	

Date	03-16-2020			
Run Number	1			
Depth--Driller	4075.0 Ft			
Depth--Logger	4076.0 Ft			
First Reading	4054.0 Ft			
Last Reading	263.0 Ft			
Casing--Driller	263.0 Ft			
Casing--Logger	263.0 Ft			
Bit Size	7.875 In			
Casing Size	8.625 In			
Hole Fluid Type	CHEMICAL			
Density	9.3			
Fluid Loss	7.6			
PH/Viscosity	9.5	50.0		
Sample Source	MEASURED			
RM@Measured Temp.	1.000 @ 79 F			
RMF@Measured Temp	0.850 @ 79 F			
RMC@Measured Temp.	1.150 @ 79 F			
Source RMF/RMC	CALCULATED	CALCULATED		
RM@BHT	0.680 @ 123 F			
Time Circulation Stopped	03-16-2020 12:00			
Max Recorded Temp.	123 F			
Equipment/Base	TRK137	HAYS		
Recorded By	B.BAILEY			
Witnessed By	JERRY SMITH			

Bitsize Intervals

Size (In)	Bottom (Ft)
7.875	4075.00

Casing Strings

Size (In)	Weight (Lbs)	Bottom (Ft)	Top (Ft)
8.625	17.00	263.00	0.00

Run Number	1		
Date	03-16-2020		
Date/Time On Bottom	03-16-2020 17:15		
Depth to Fluid	0.0 Ft		
Salinity	3000.000		
RMF@BHT	0.680 @ 123 F		
RMC@BHT	0.780 @ 123 F		

Run Number 1

Comments

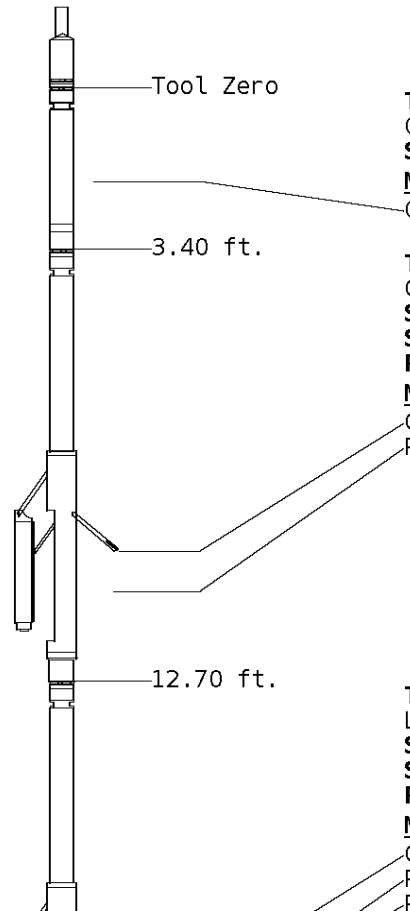
ALL PRESENTATIONS AS PER CUSTOMER REQUEST
GRT, CNT, LDT, CST, MLT AND PIT RUN IN COMBINATION
CALIPERS ORIENTED ON X-Y AXIS
2.71 G/CC USED TO CALCULATE POROSITY
ANNULAR HOLE VOLUME CALCULATED USING 5.5" PRODUCTION CASING
PHIN IS CALIPER CORRECTED

GRT: GRP
CNT: PHIN, CLCNIN,
LDT: PORL, LCORN, PECLN, LDENN, PORLLS, CLLDIN
CST: PORS, CDTF, TTIPF, TT2PF, TT3PF, TT4PF, ITT
MLT: NOR_RF, INV_RF, MSCLPIN
PIT: ILD, ILM, SPU, SFLAEC, CIRD

OPERATORS:
D. RAGSDALE
J. VAUGHN
D.LEGLEITER

Tool String Schematic

Total Tool Length - 66.95 **ft.**
Maximum Outside diameter - 6.00 **in.**
Net Weight in Air - 1171.00 **lbs.**



Tool: GRT-B **Length:** 3.40 **ft.** **O.D.** 3.60 **in.**
Gamma Ray Controller
Sonde ID :GRT-BC-038

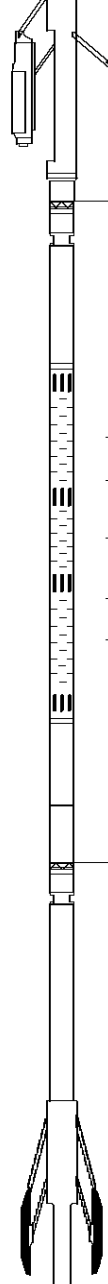
Measure Point	Tool Offset	Stack Offset	Bottom Offset
GRP	2.00	2.00	64.95

Tool: CNT-AA **Length:** 9.30 **ft.** **O.D.** 4.36 **in.**
Compensated Neutron A Pad on NDT-A
Sonde ID :NDT-AF-411
Source ID :N-1104
Pad ID :CNP-AE-41

Measure Point	Tool Offset	Stack Offset	Bottom Offset
CLCN	6.00	9.40	57.55
PHIN	6.80	10.20	56.75

Tool: LDT-DA **Length:** 9.30 **ft.** **O.D.** 4.80 **in.**
Litho Density D Pad on NDT-A
Sonde ID :NDT-FA-404
Source ID :1637GW
Pad ID :LDP-DA-062

Measure Point	Tool Offset	Stack Offset	Bottom Offset
CLLD	6.00	18.70	48.25
PEL	7.00	19.70	47.25
PES	7.40	20.10	46.85



LDEN	7.20	19.90	47.05
LCOR	7.20	19.90	47.05

22.00 ft.

Tool: CST-AD **Length:** 13.80 **ft.** **O.D.** 3.60 **in.**
Open Hole Sonic
Sonde ID :CST-AB-21

Measure Point	Tool Offset	Stack Offset	Bottom Offset
TT1	4.80	26.80	40.15
TT3	5.80	27.80	39.15
CDT	7.30	29.30	37.65
TT4	8.80	30.80	36.15
TT2	9.80	31.80	35.15

35.80 ft.

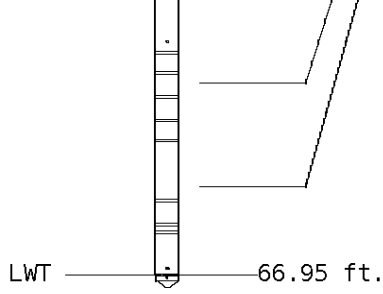
Tool: MST-DA **Length:** 9.66 **ft.** **O.D.** 6.00 **in.**
Micro Spherically Focused (IC)
Sonde ID :MST-DA-13

Measure Point	Tool Offset	Stack Offset	Bottom Offset
MSFL	7.60	43.40	23.55
MSCLP	7.60	43.40	23.55
INV	7.60	43.40	23.55
NOR	7.60	43.40	23.55

45.46 ft.

Tool: PIT-CA **Length:** 21.49 **ft.** **O.D.** 3.62 **in.**
Phased Dual Induction w/ RM & D
Sonde ID :PIT-AC-043

Measure Point	Tool Offset	Stack Offset	Bottom Offset
ILD	8.92	54.38	12.56
ILM	10.10	55.56	11.39
SFLU	17.49	62.95	4.00
SP	20.60	66.06	0.88



Well File: Berexco_Lemke_A_3_Mar16_Quint
Segment: V1.D1.S6 Reprocess MAIN
Reference: 0

Scale: 1:240 **Format:** NLD-240
Acquired: 2020-03/16 18:22 3.4.1-13972
Processed: 2020-03/16 19:59 3.4.1-13972

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

BIT SIZE
INCHES (IN)
6 — 16

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

NORMAL
OHMM
0 — 40

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

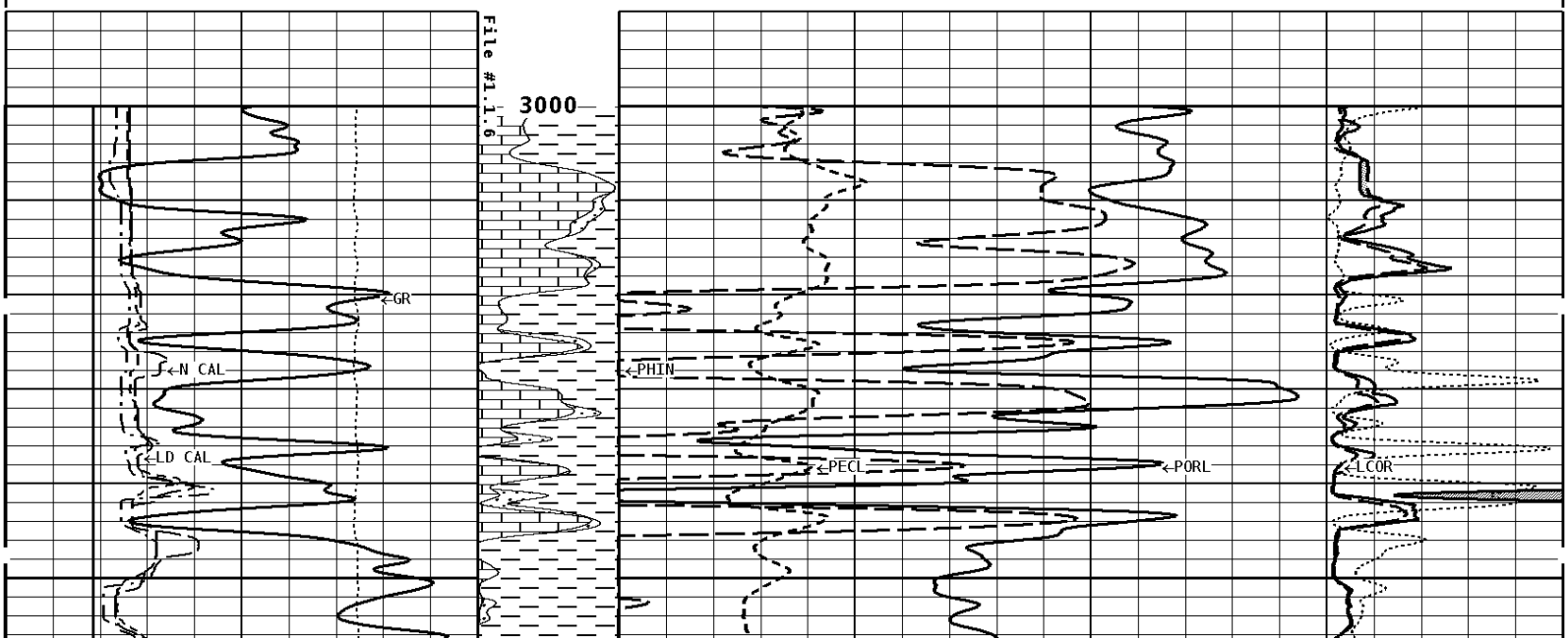
DENSITY POROSITY (2.71g/cc)
PERCENT
70 — 30
30 — -10
-10 — -50

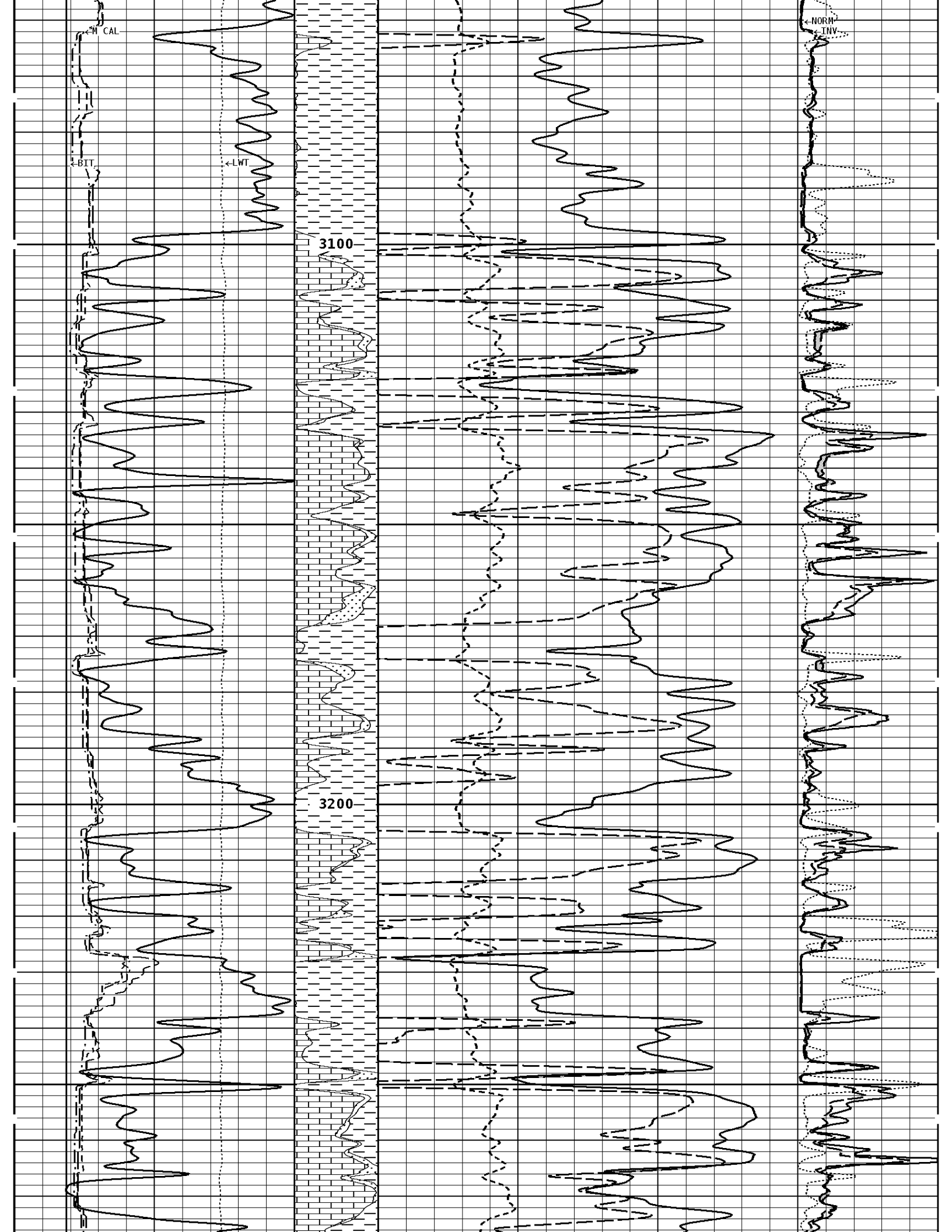
GAMMA RAY
API UNITS
150 — 300
0 — 150

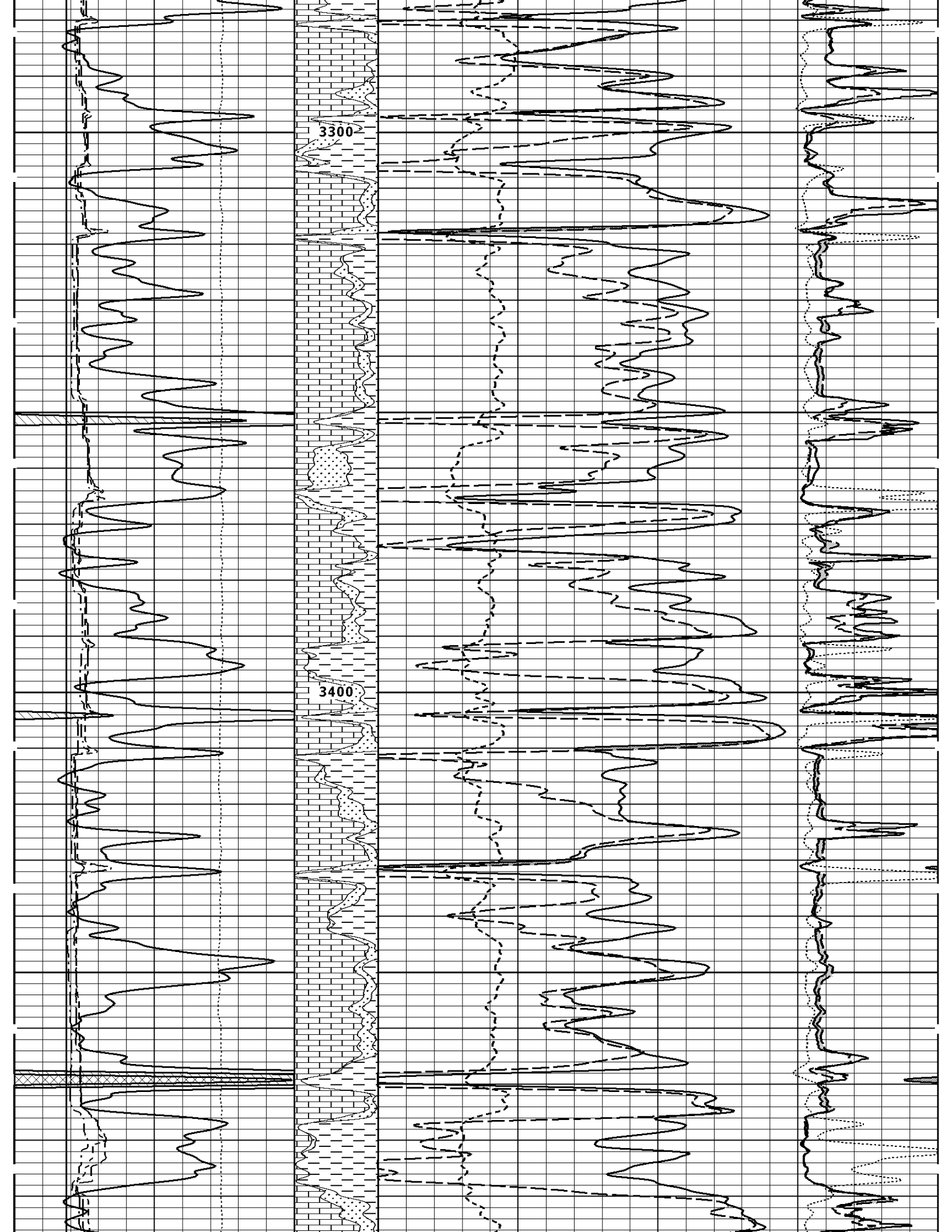
Volume
Dolo/Shale

NEUTRON POROSITY (LIMESTONE)
PERCENT
30 — -10

1:240 MAIN SECTION




M CAL
BIT
LWT
NORM
INV
3100
3200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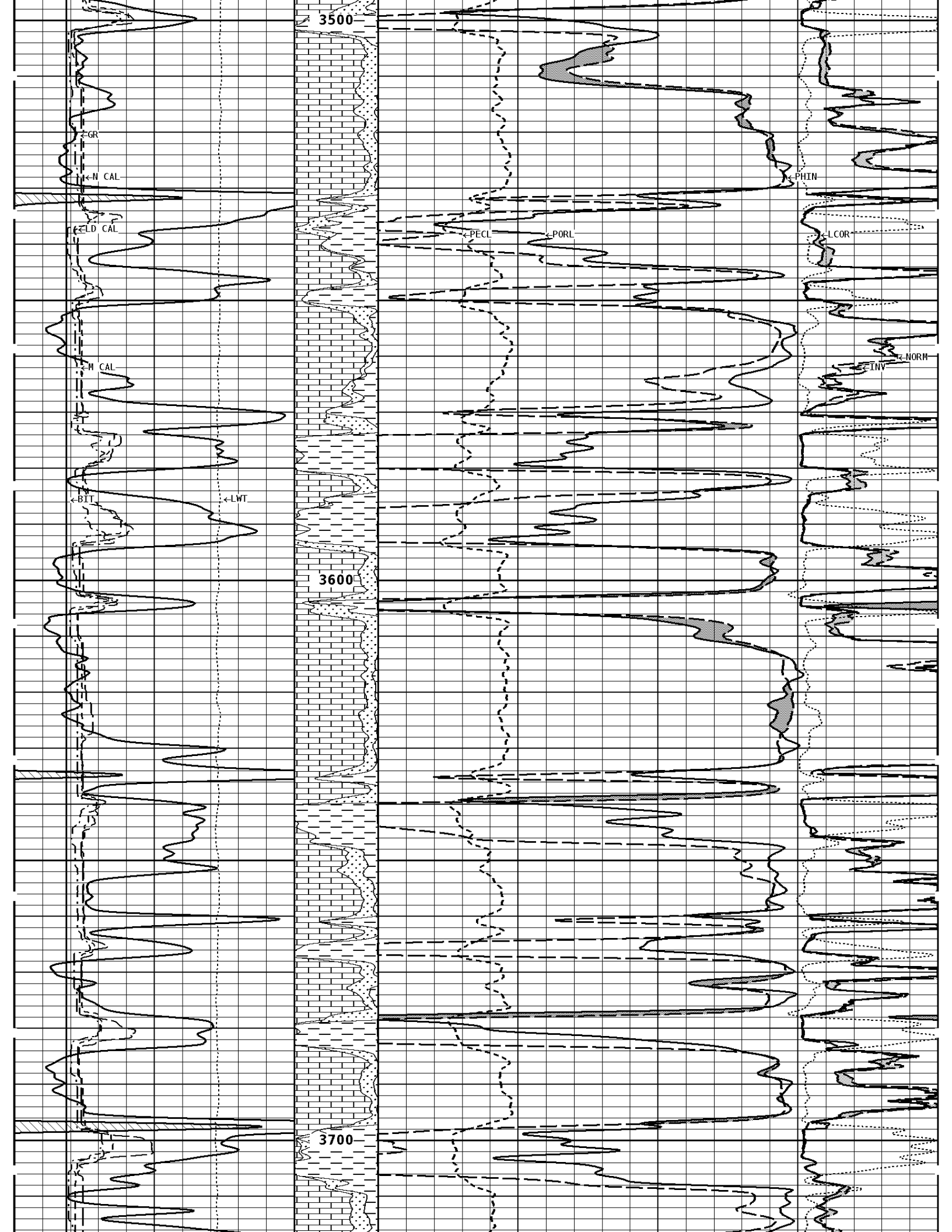
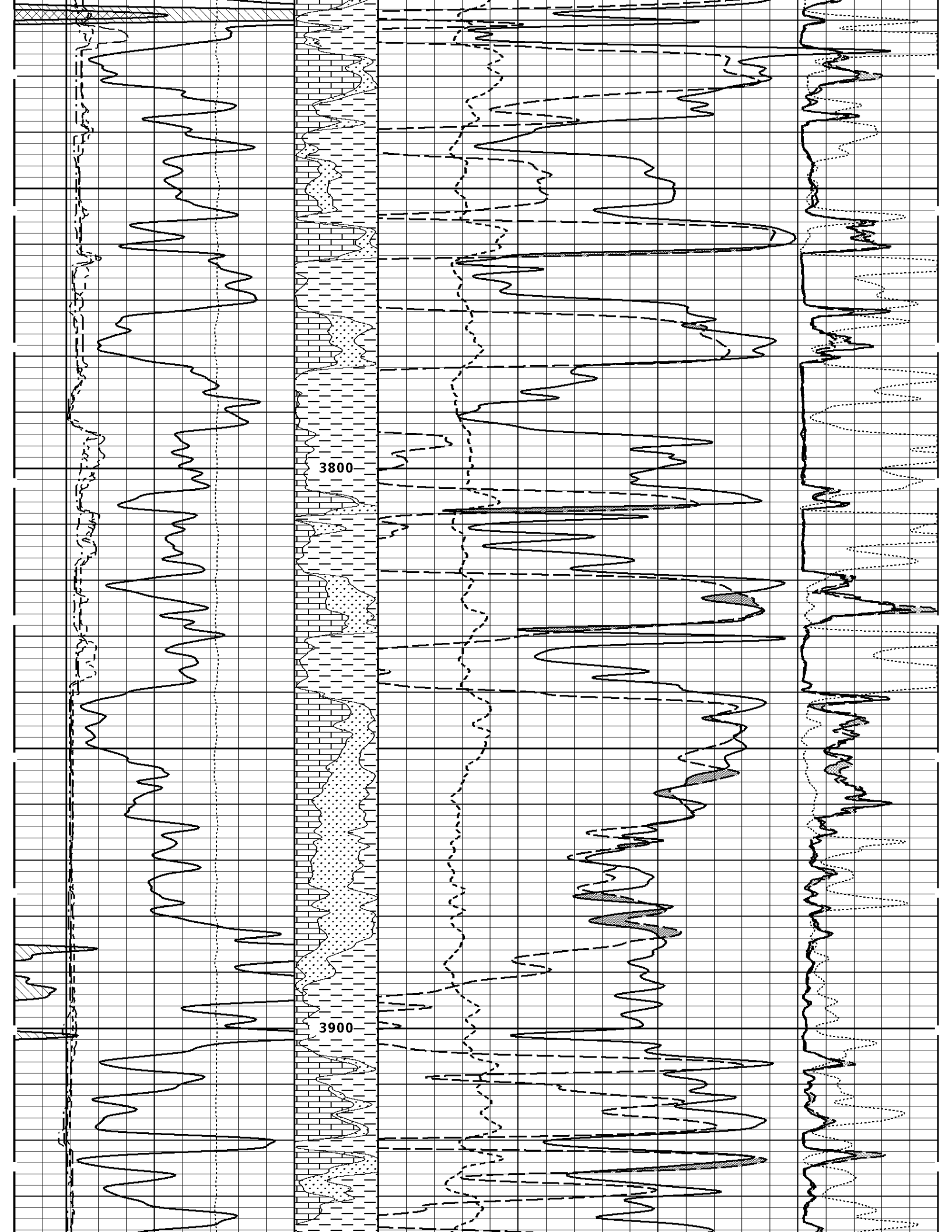
3400


3500
GR
N CAL
LD CAL
PECL
PORL
PHIN
LCOR
NORM
INV
M CAL
BIT
LWT
3600
3700


3800
3900

1:240 MAIN SECTION

GAMMA RAY **API UNITS** 150 — 300 0 — 150	Volume Dolo/Shale	**NEUTRON POROSITY (LIMESTONE)** **PERCENT** 30 — -10
TENSION **LBS** 10000 — 0	Volume Calcite	**DENSITY POROSITY (2.71g/cc)** **PERCENT** 70 — 30 30 — -10 -10 — -50
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

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

INVERSE
OHMM
0 40

BIT SIZE
INCHES (IN)
6 16

NORMAL
OHMM
0 40

CALIPER MICRO
INCHES (IN)
16 26
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 Thickness	0.250	in
Casing Correction (PHI N)	Disable	

Well File: Berexco_Lemke_A_3_Mar16_Quint **Scale:** 1:240 **Format:** NLD-240
Segment: V1.D1.S5 Reprocess REPEAT **Acquired:** 2020-03/16 17:39 3.4.1-13972
Reference: 0 **Processed:** 2020-03/16 19:59 3.4.1-13972

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

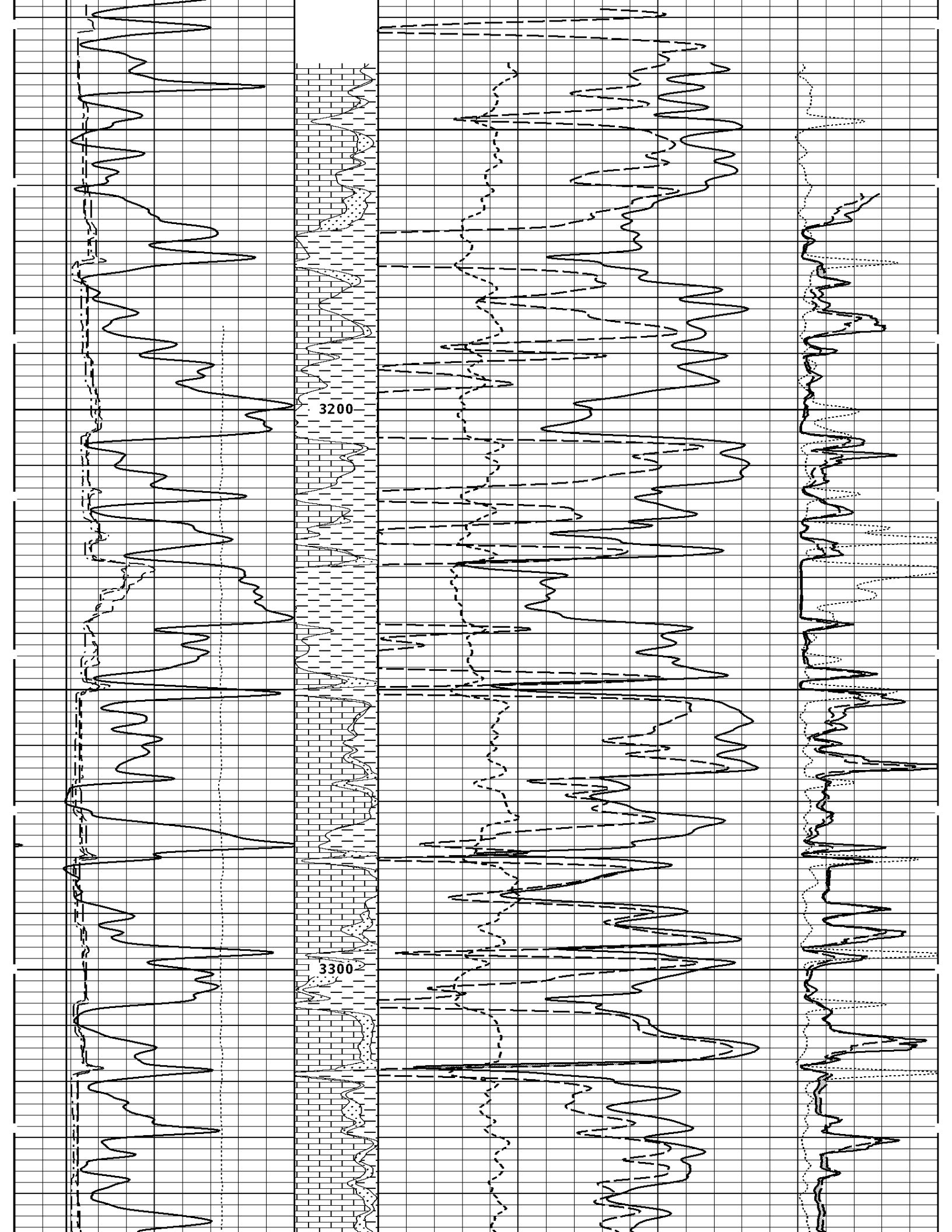
GAMMA RAY
API UNITS
150 300
0 150

Volume
Dolo/Shale

NEUTRON POROSITY (LIMESTONE)
PERCENT
30 -10

1:240 REPEAT SECTION

File #1.1.5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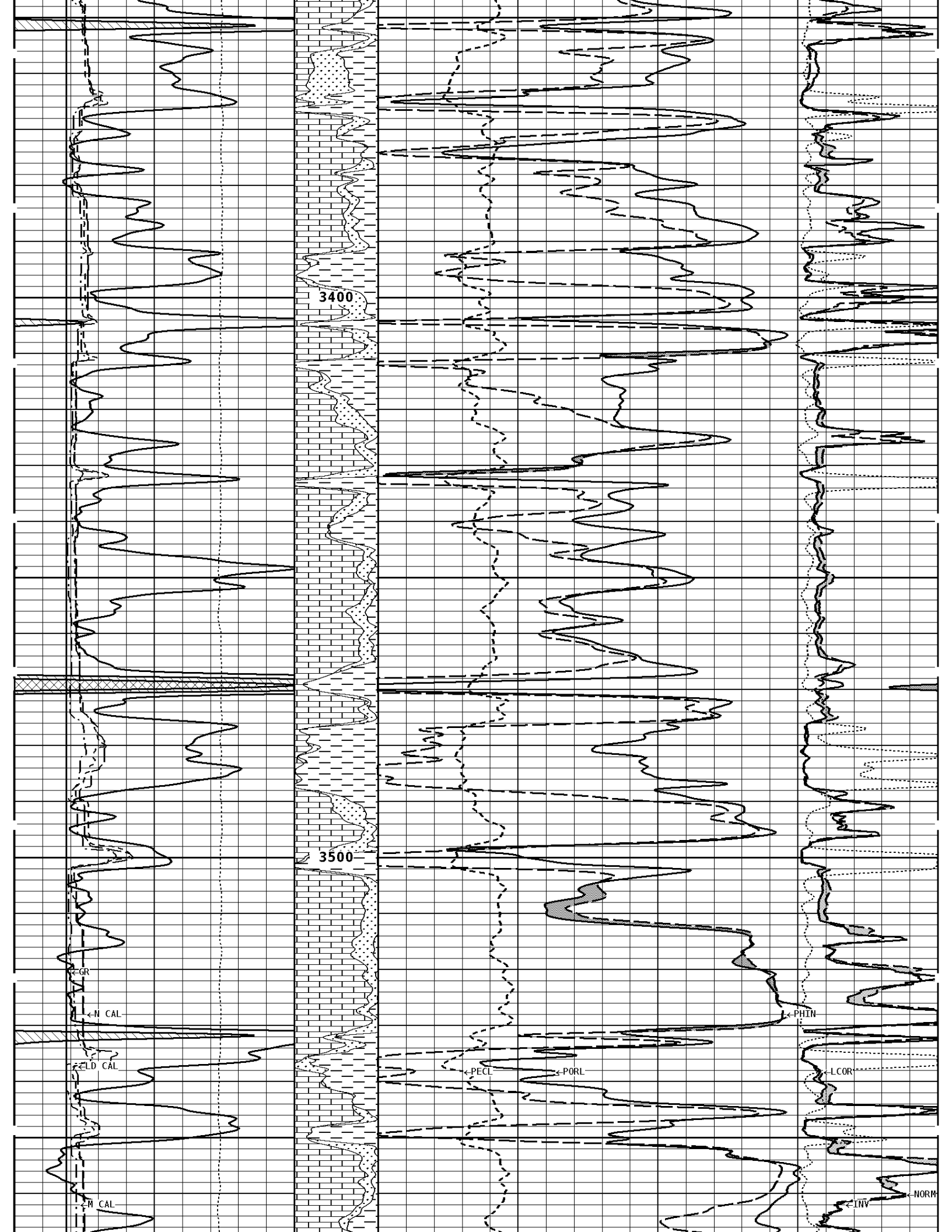
3300


3400
3500
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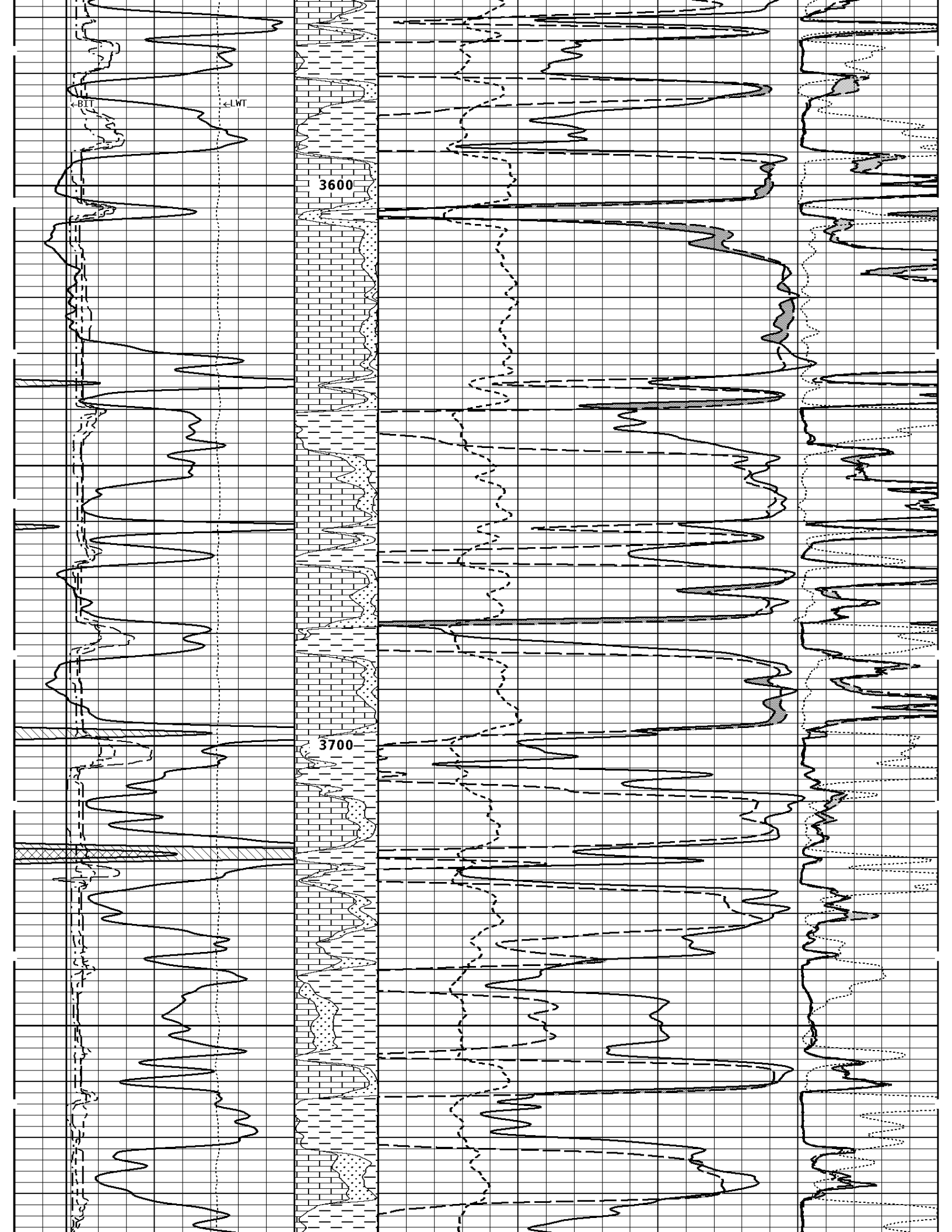
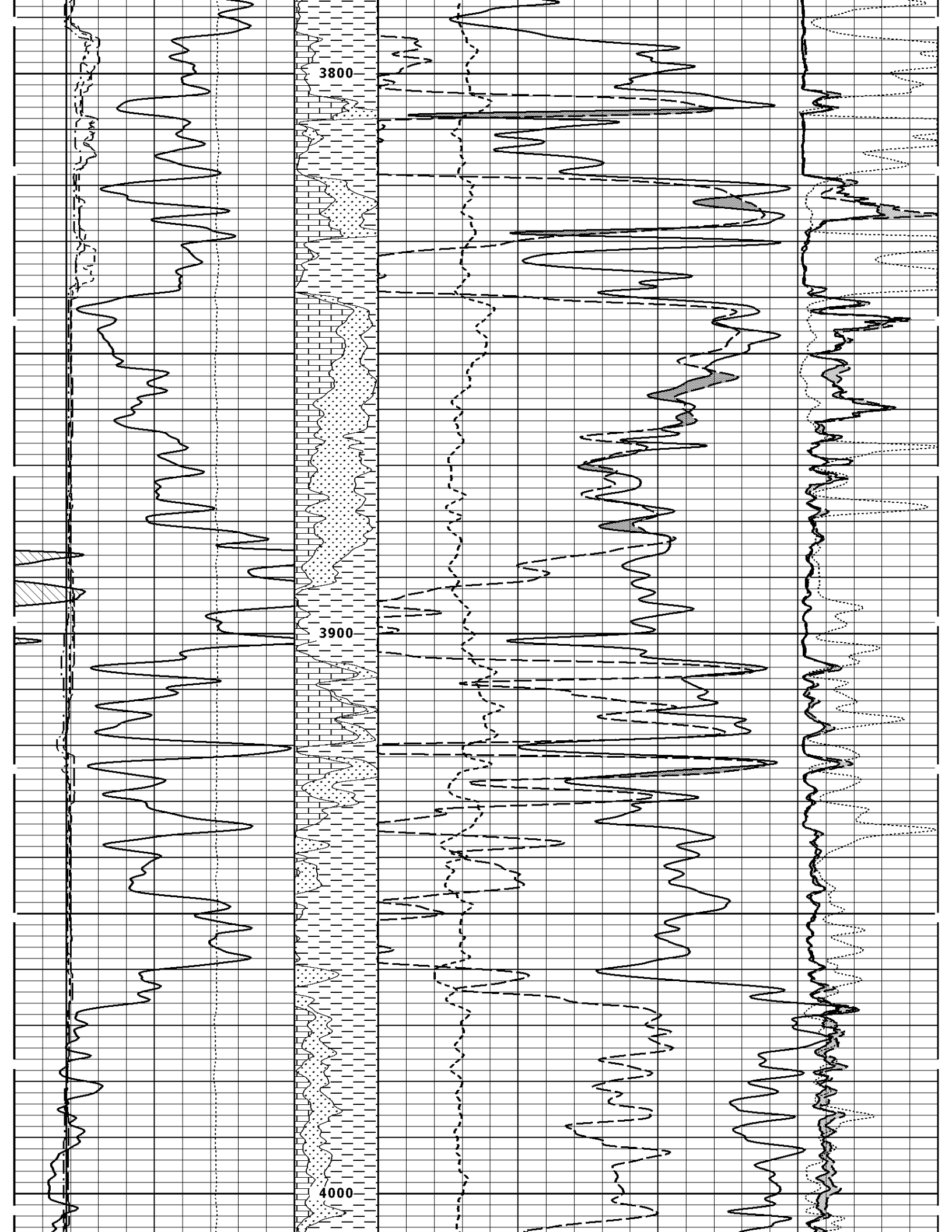
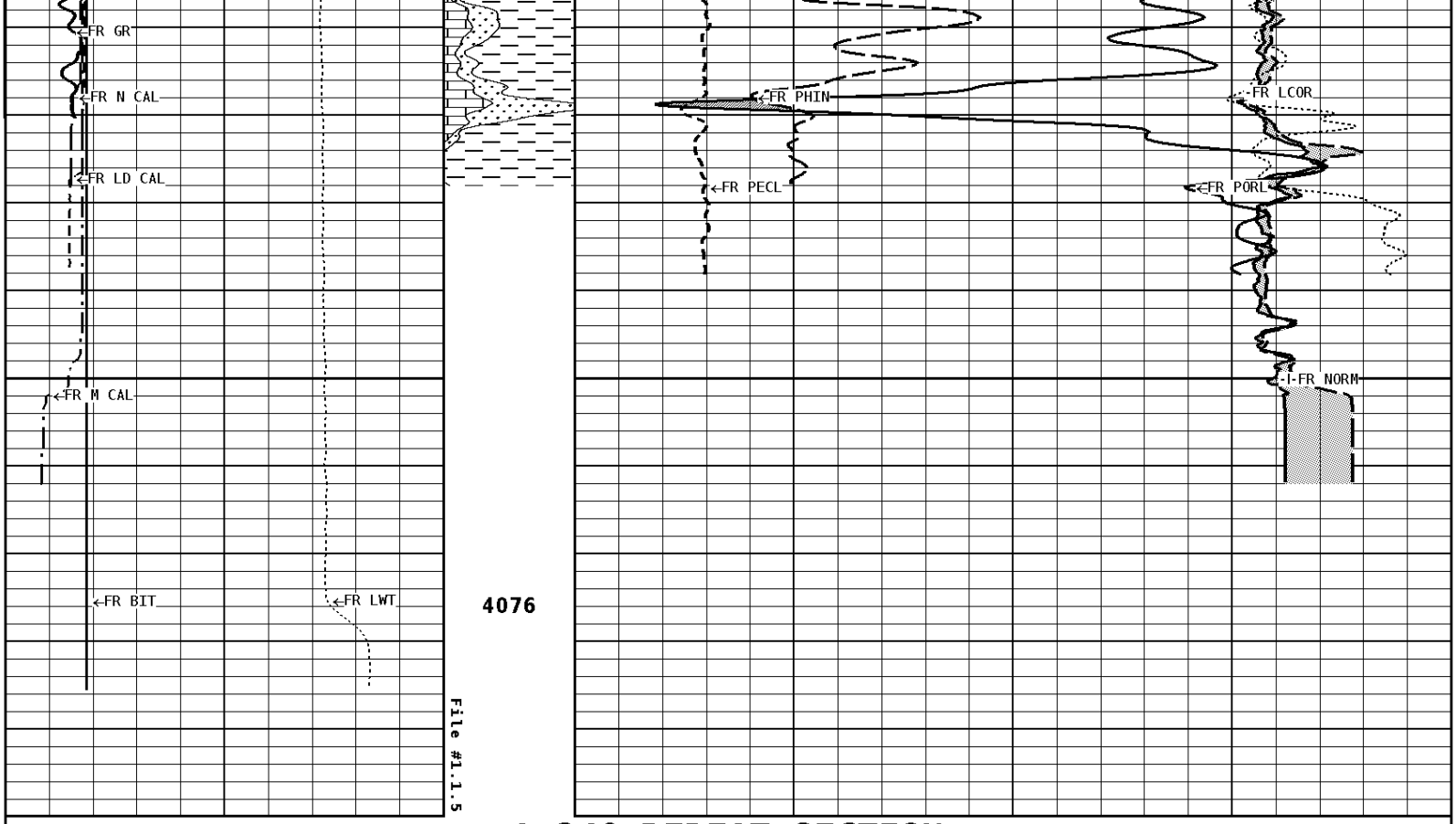
←LD CAL
←M CAL
←PECL
←PORL
←PHIN
←LCOR
←INV
←NORM


←BIT
←LWT
3600
3700


3800
3900
4000



1:240 REPEAT SECTION

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

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: Berexco_Lemke_A_3_Mar16_Quint **Scale:** 1:240 **Format:** LDT-240
Segment: V1.D1.S6 Reprocess MAIN **Acquired:** 2020-03/16 18:22 3.4.1-13972
Reference: 0 **Processed:** 2020-03/16 19:59 3.4.1-13972

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

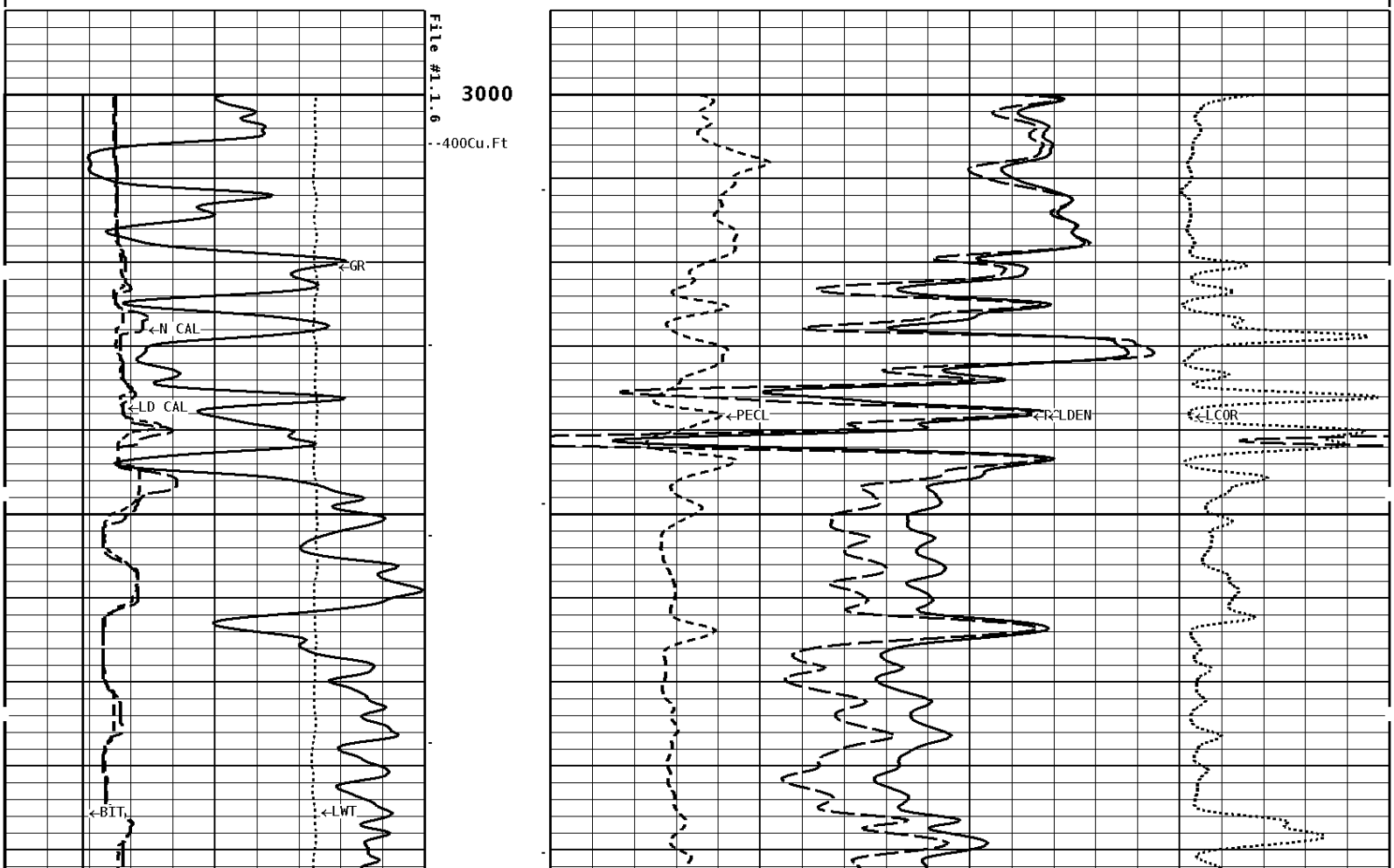
COMPENSATED BULK DENSITY
G/CC
3.0 — 4.0
2.0 — 3.0
1.0 — 2.0

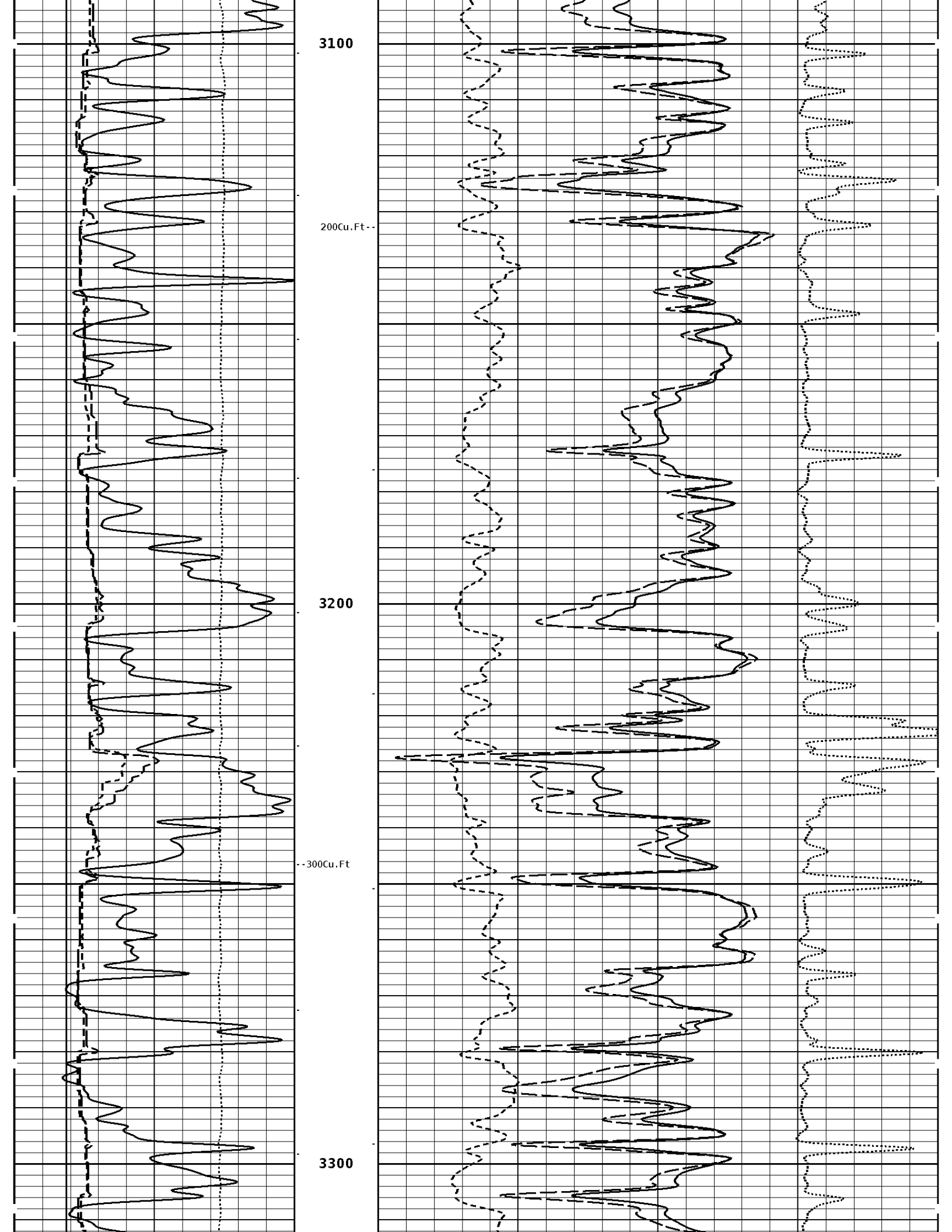
GAMMA RAY
API UNITS
150 — 300
0 — 150

-BHV AHV-
CU.FT

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

1:240 MAIN SECTION
BULK DENSITY

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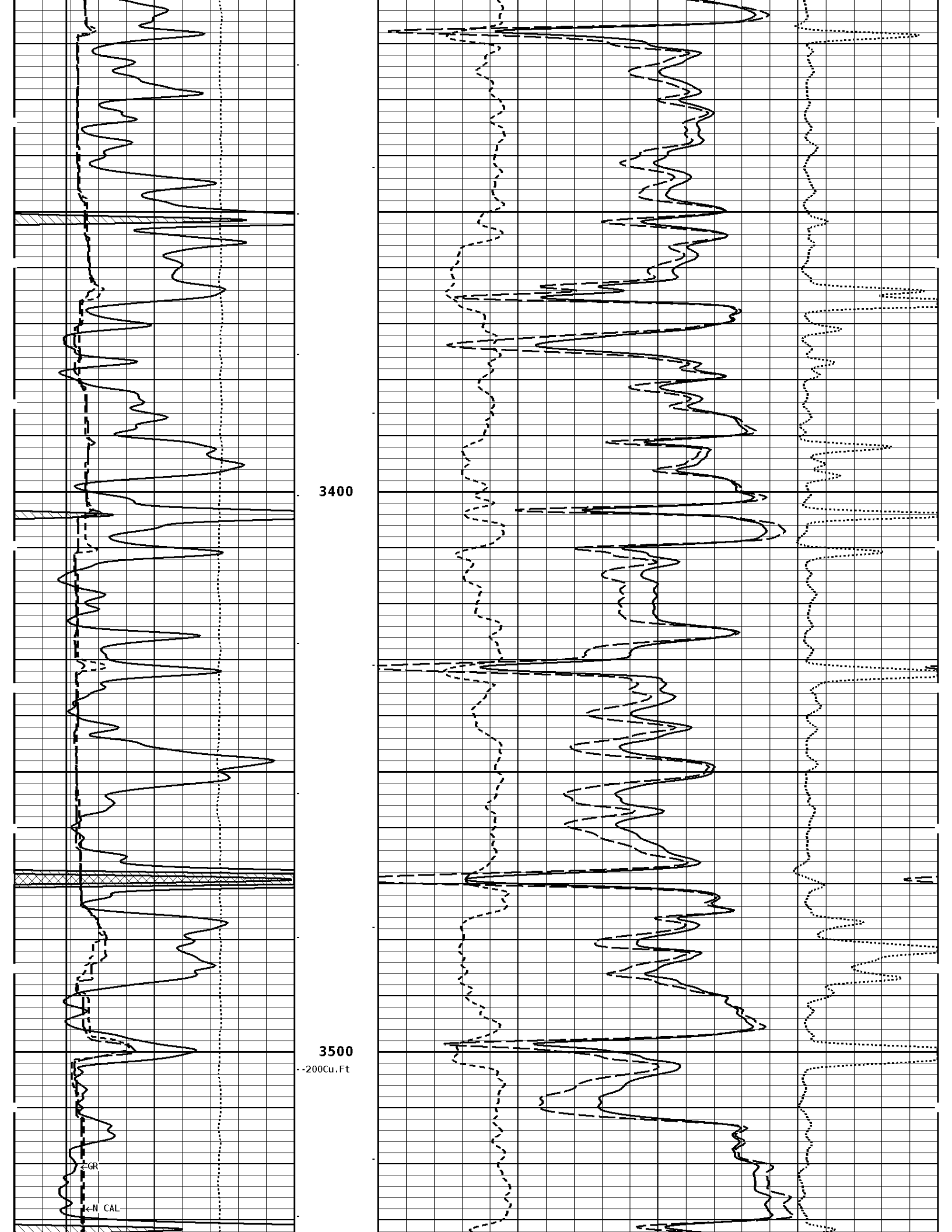
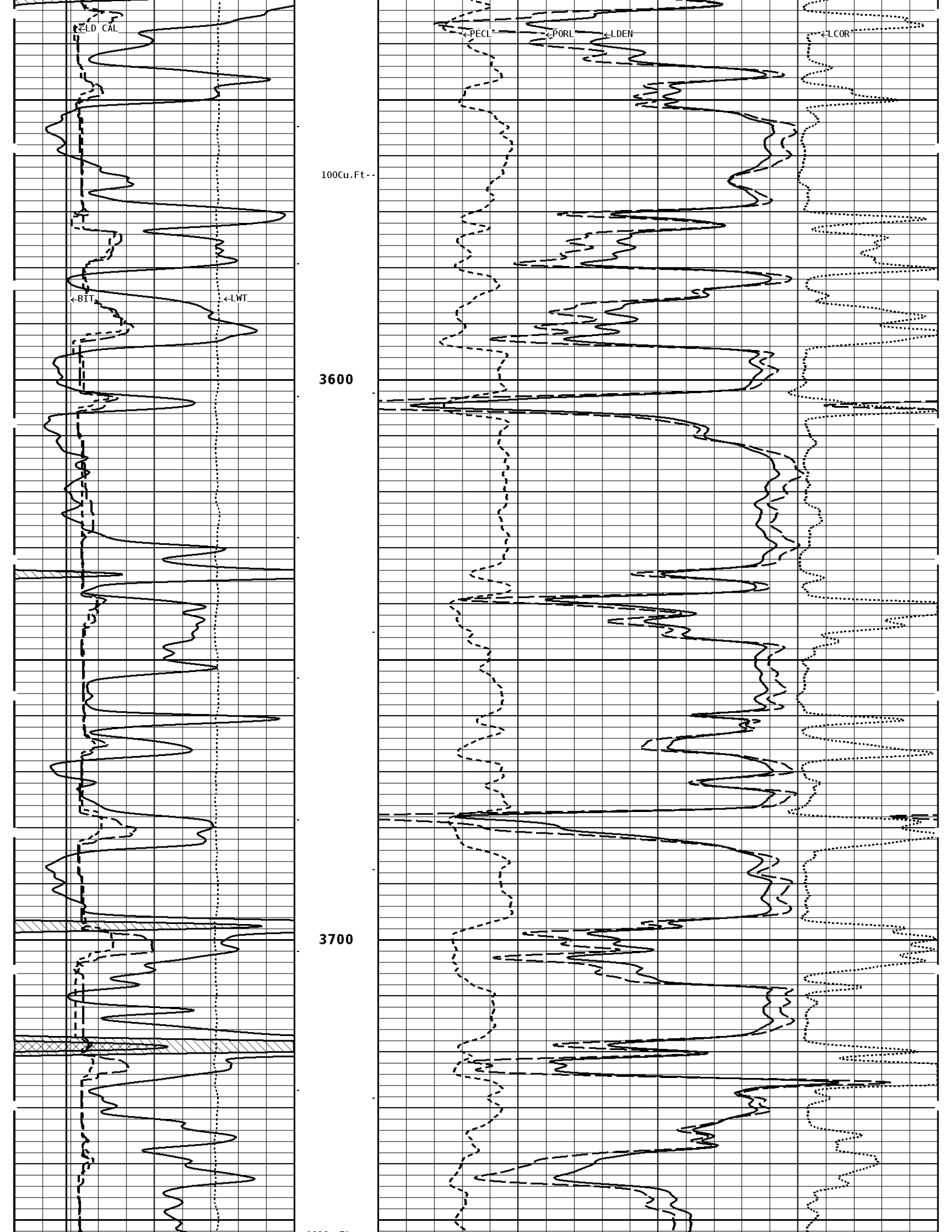
3200
--300Cu.Ft
3300


3400
3500
-200Cu.Ft
GR
N CAL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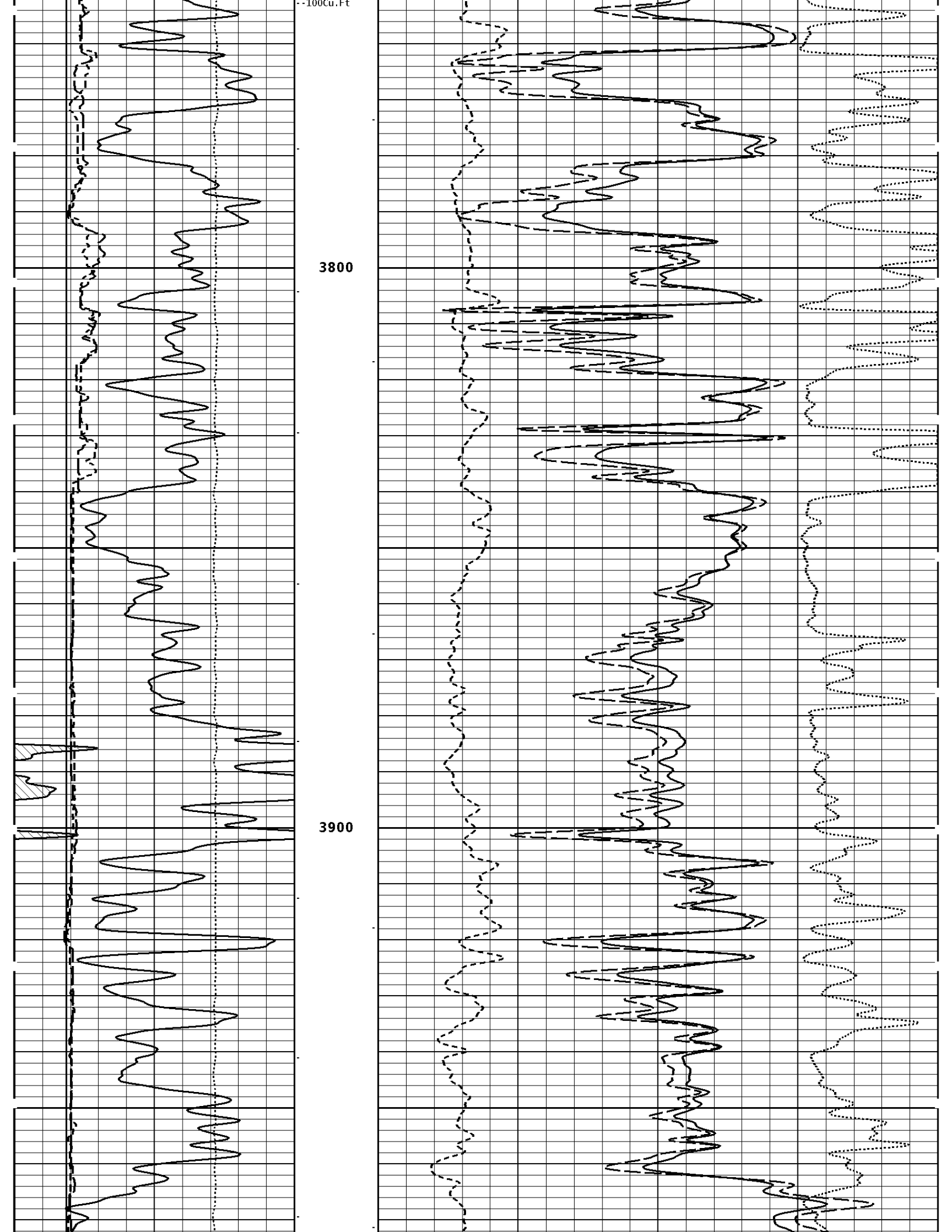
100Cu.Ft→
←BIT
←LWT
3600
3700
←PECL
←PORL
←LDEN
←LCOR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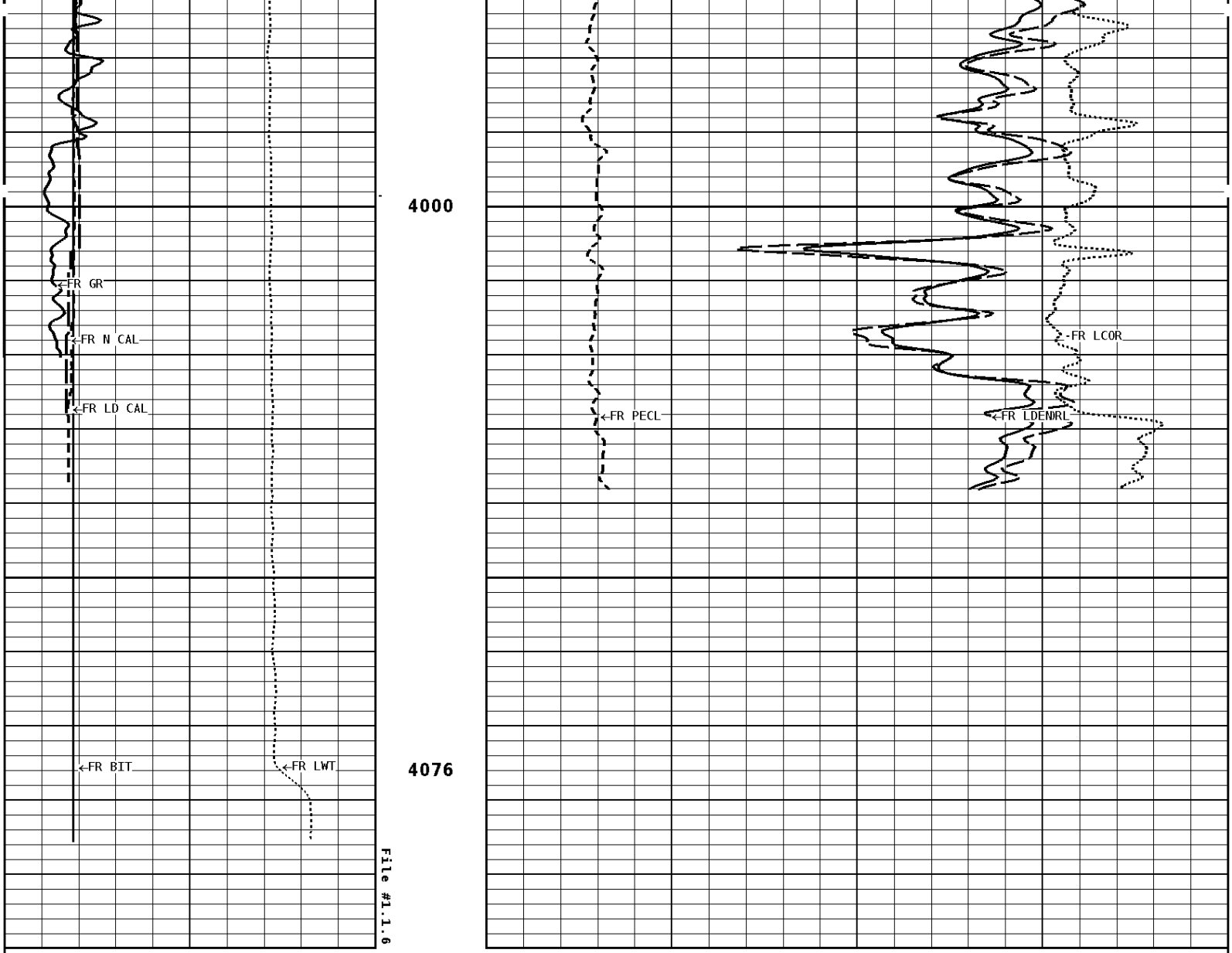
3800
3900



1:240 MAIN SECTION

BULK DENSITY

GAMMA RAY
API UNITS
150 — 300
0 — 150

-BHV AHV-
CU.FT

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

TENSION
LBS
10000 — 0

COMPENSATED BULK DENSITY
G/CC
3.0 — 4.0
2.0 — 3.0
1.0 — 2.0

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

PE CROSS-SECTION
BARNS/ELECTRON
0 — 10

DENSITY CORRECTION
G/CC
-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 : 24-JUN-2019 Time : 12:20
Sensor Suite : GR-GR5 ID : GRT-BC-038

	Measured Background	Measured Jig	Units	Calibrated Jig	Units
GR	36	266	CPS	160	GRAPI

Shop Calibration
CNT-AA

Performed : 03-Jun-2019 Time : 11:01
Sensor Suite : CALI-BCN ID : NDT-AF-411

	Jig - Measured Ring#1	Jig - Measured Ring#2	Jig - Calibrated Ring#1	Jig - Calibrated Ring#2	Units
CL # 1	7.5	12.5	6.0	12.0	IN.

Performed : 12-FEB-2020 Time : 10:01
Sensor Suite : BHC NEUT ID : CNP-AE-41
Source ID : N-1104

	Tank Measured	Tank Calibrated	Verification Jig	Units
N/F	3.5474	3.6893	3.6873	
Porosity	18.4	20.5	20.5	%

Shop Calibration
LDT-DA

Performed : 21-DEC-2019 Time : 21:43
Sensor Suite : CALI-LTH ID : NDT-FA-404

	Jig - Measured Ring#1	Jig - Measured Ring#2	Jig - Calibrated Ring#1	Jig - Calibrated Ring#2	Units
CL # 1	8.3	13.2	6.0	12.0	IN.

Performed : 29-Jan-2020 Time : 14:42
Sensor Suite : BHCPELNG ID : LDP-DA-062
Source ID : 1637GW

Short Space

	BKGD	Al	Mg	Al+Fe	Units
LSW1	59	960	1557	625	CPS
LSW2	61	1121	1778	816	CPS
LSW3	228	2554	4127	2191	CPS
LSW4	286	2191	3138	1951	CPS
LSW5	25	44	49	41	CPS
LSW6	79	82	79	83	CPS
LSW7	50	54	53	53	CPS
LSW8	1	3	4	3	CPS
QS	0.227	0.208	0.194	0.217	
PES			2.778	5.967	
SSDN		2.600	1.680		G/CC

Long Space

	BKGD	Al	Mg	Al+Fe	Units
LLW1	84	1100	4544	670	CPS
LLW2	94	1944	7684	1420	CPS
LLW3	352	3530	13460	3067	CPS
LLW4	463	1657	5105	1519	CPS
LLW5	52	64	102	63	CPS
LLW6	146	154	134	154	CPS
LLW7	95	101	92	101	CPS
LLW8	3	6	14	6	CPS
QL	0.213	0.209	0.187	0.205	
PEL			2.697	5.458	
LSDN		2.600	1.680		G/CC

STEP energy services

Company:	BEREXCO, LLC.
Well:	LEMKE 'A' #3
Location:	330' FSL & 1320' FWL
Logged:	03-16-2020
K.B. Elev:	2271.0 Ft