Weatherford®

COMPACT PHOTO DENSITY COMPENSATED NEUTRON MICRORESISTIVITY LOG

COMPANY	O'BRIEN ENERGY RESOURCES CORP.
WELL	CHARITY MAY #1A-9
FIELD	ANGEL SOUTH
PROVINCE/COUNTY	MEADE
COUNTRY/STATE	USA / KANSAS
LOCATION	2204' FSL & 341' FWL SE-NW-NW-SW

SEC 9	TWP 33S	RGE 29W	Other Services
Latitude	37.190402837		MAI/MFE
Longitude	-100.488076598		
API Number	15-119-21422		

Permanent Datum GL, Elevation 2630.9 feet
Log Measured From KB, 13.00 feet above Permanent Datum
Drilling Measured From KB

Elevations:	feet
KB	2643.90
DF	2641.90
GL	2630.90

Date	19-JUN-2018			
Run Number	ONE			
Service Order	7055-216446647			
Depth Driller	6350.00	feet		
Depth Logger	6351.00	feet		
First Reading	6330.00	feet		
Last Reading	4700.00	feet		
Casing Driller	1527.00	feet		
Casing Logger	1526.00	feet		
Bit Size	7.875	inches		
Hole Fluid Type	CHEMICAL			
Density / Viscosity	8.90 lb/USg	58.00 sec/qt		
PH / Fluid Loss	10.50	8.80 ml/30Min		
Sample Source	FLOWLINE			
Rm @ Measured Temp	0.94 @ 92.0	ohm-m		
Rmf @ Measured Temp	0.75 @ 92.0	ohm-m		
Rmc @ Measured Temp	1.13 @ 92.0	ohm-m		
Source Rmf / Rmc	CALC	CALC		
Rm @ BHT	0.71 @122.0	ohm-m		
Time Since Circulation	3 HOURS			
Max Recorded Temp	123.00	deg F		
Equipment / Base	13096	LIB		
Recorded By	JUSTIN HICKS			
Witnessed By	DANA GREATHOUSE		PETER DEBENHAM	

BOREHOLE RECORD

Last Edited: 19-JUN-2018 02:58

Bit Size inches	Depth From feet	Depth To feet
7.875	1527.00	6350.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	1527.00	24.00

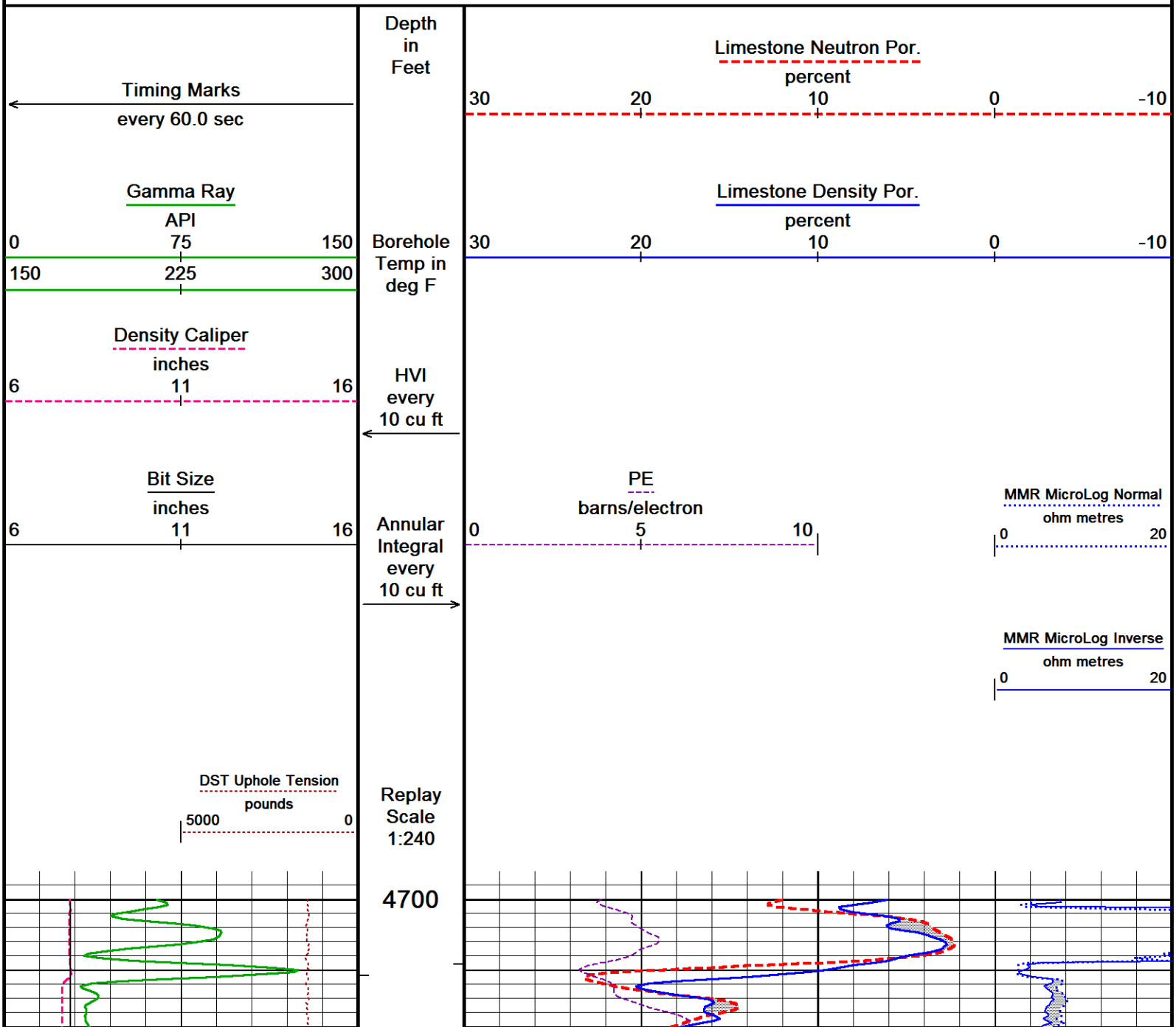
REMARKS

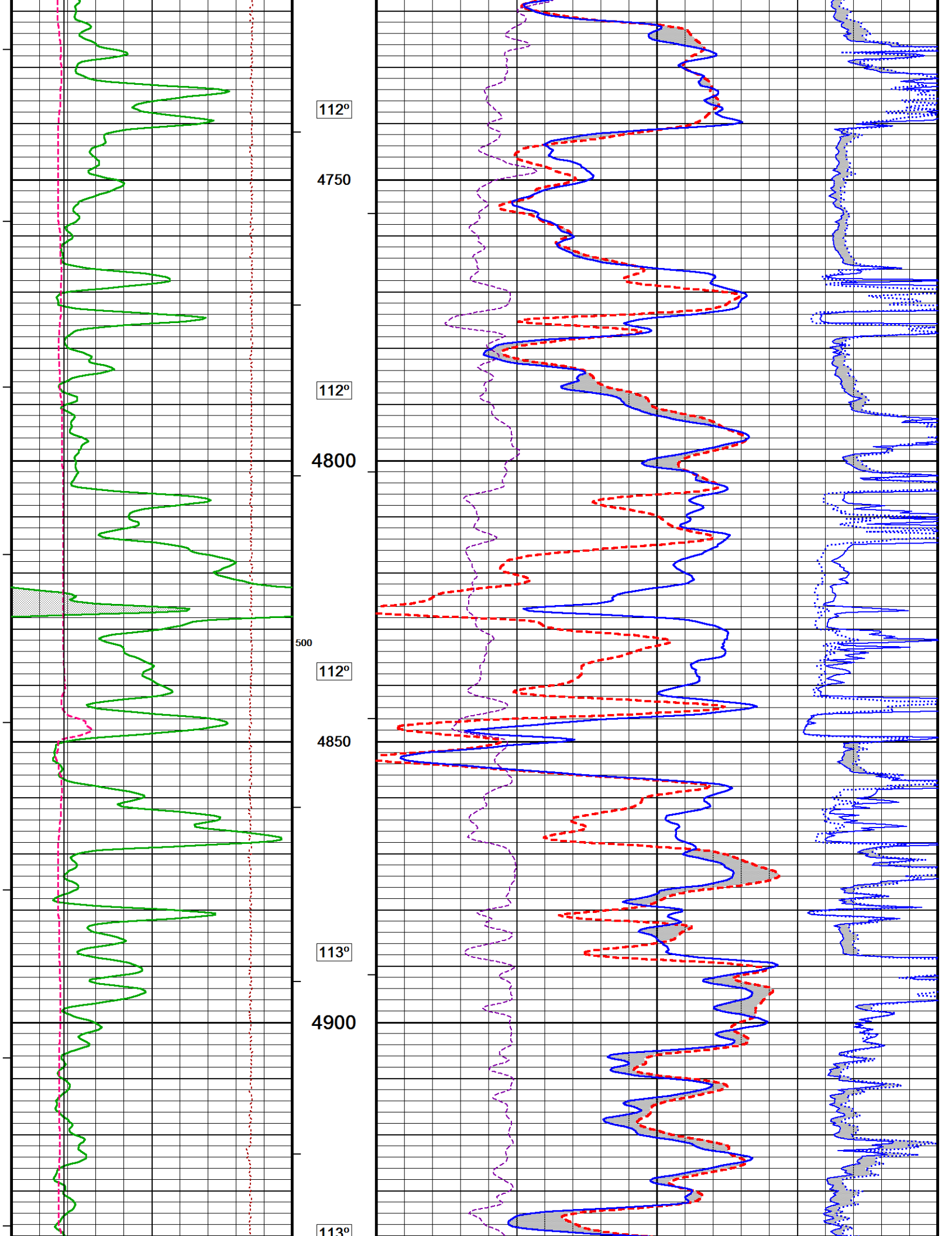
- RUN ONE: MCB, SHA, MCG, MML, MDN, MPD, SKJ, MFE, MAI RUN IN COMBINATION.
- HARDWARE: DUAL BOWSPRING USED ON MDN.
0.5 INCH STANDOFF USED ON MFE.
0.5 INCH STANDOFF USED ON MAI.
- 2.71 G/CC LIMESTONE DENSITY MATRIX USED TO CALCULATE POROSITY.
- BOREHOLE RUGOSITY, TIGHT PULLS, AND WASHOUTS WILL AFFECT DATA QUALITY.
- ALL INTERVALS LOGGED AND SCALED PER CUSTOMER'S REQUEST.
- TOTAL HOLE VOLUME FROM TD TO SURFACE CASING: 1772 CU.FT.
- ANNULAR HOLE VOLUME WITH 4.5 INCH PRODUCTION CASING FROM TD TO SURFACE CASING: 1240 CU.FT.
- RIG: DUKE DRILLING, RIG 9
- ENGINEER: J. HICKS

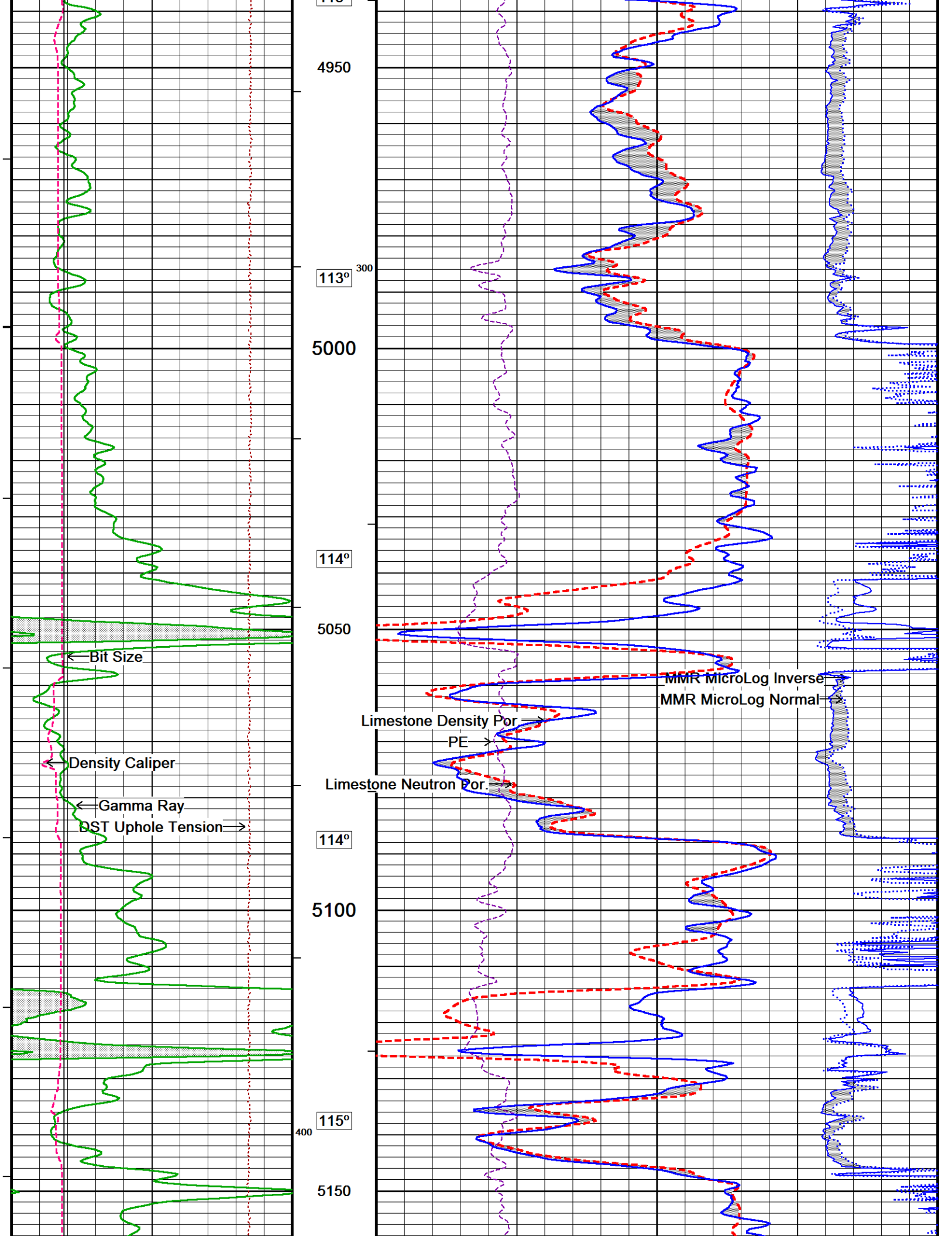
- OPERATOR: B. TOVAR, B. COPELAND

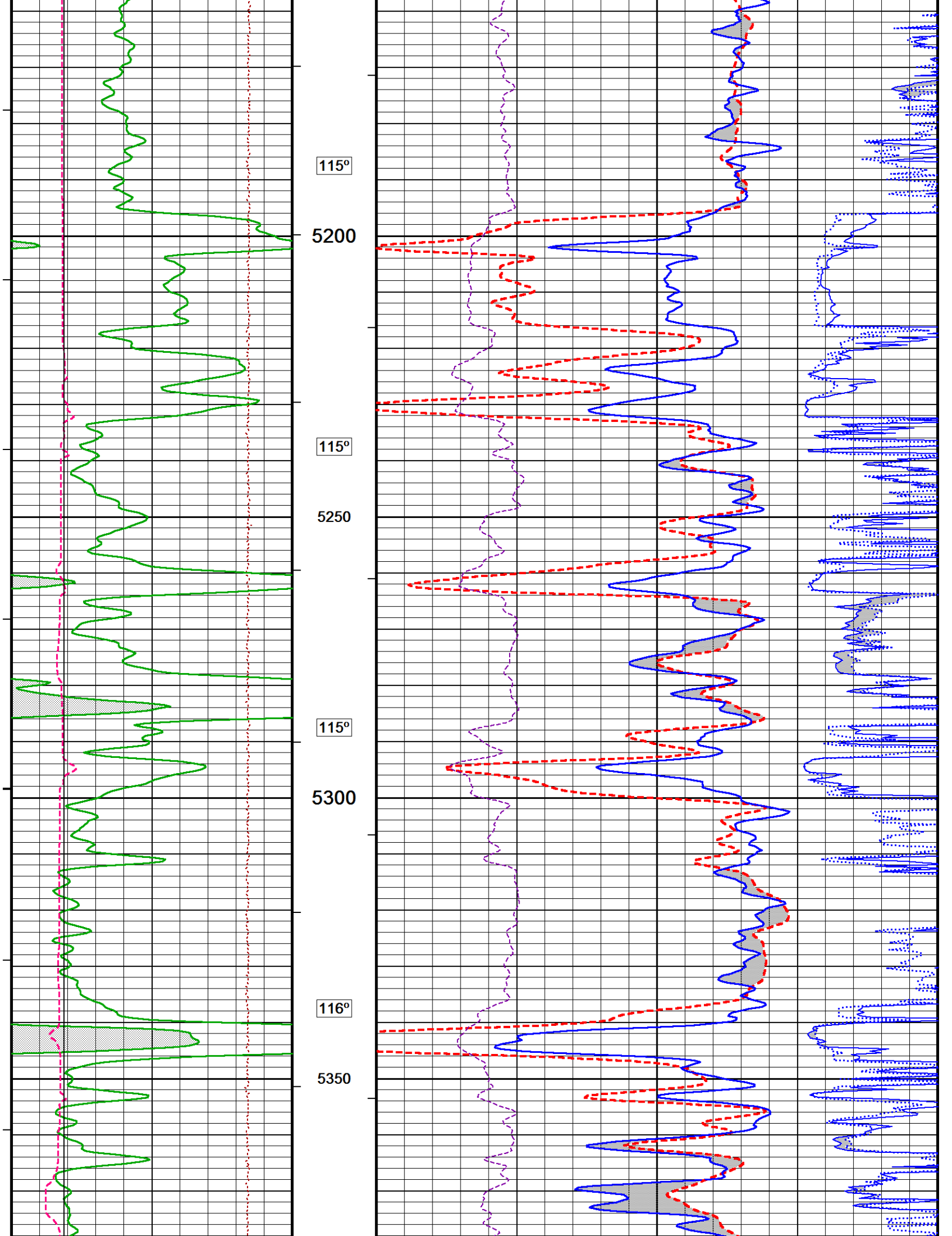
5 INCH MAIN LIMESTONE

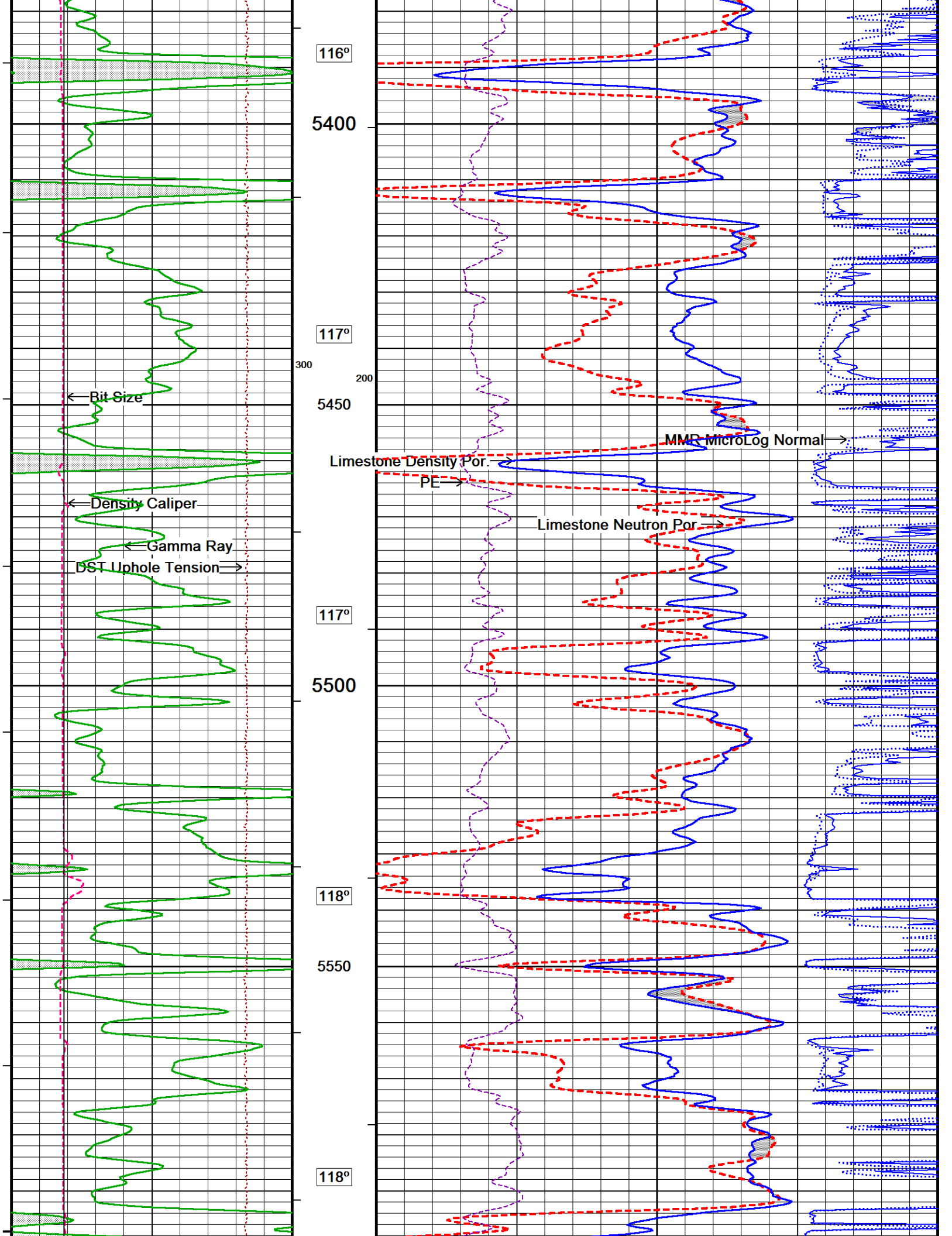
Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 19-JUN-2018 07:39
Filename: C:\Minimus 18.01.6830\Data\O'Brien (Charity May 1A)\MAIN PASS.dta
Recorded on 19-JUN-2018 04:38
System Versions: Processed with 18.01.6830 Plotted with 18.01.6830

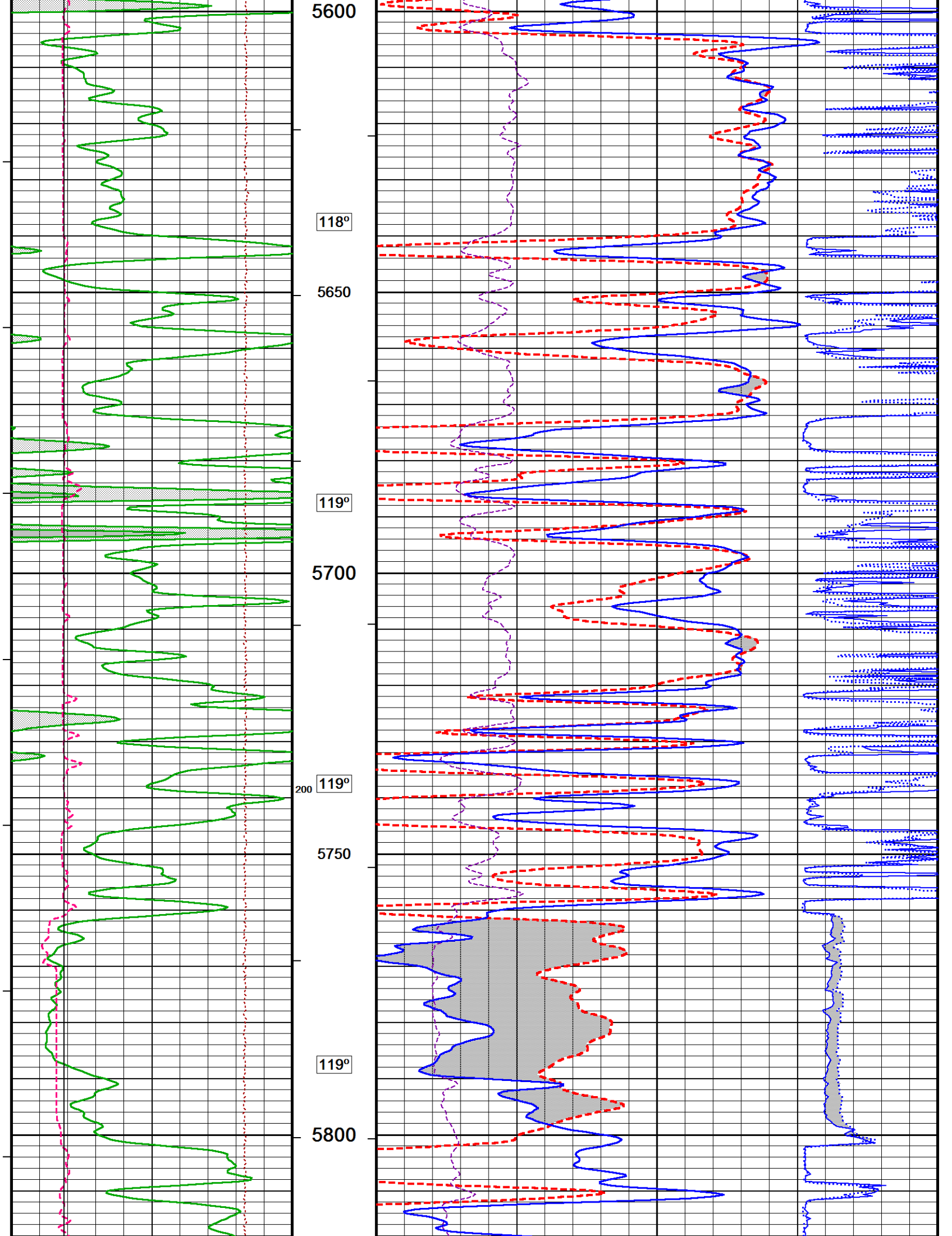


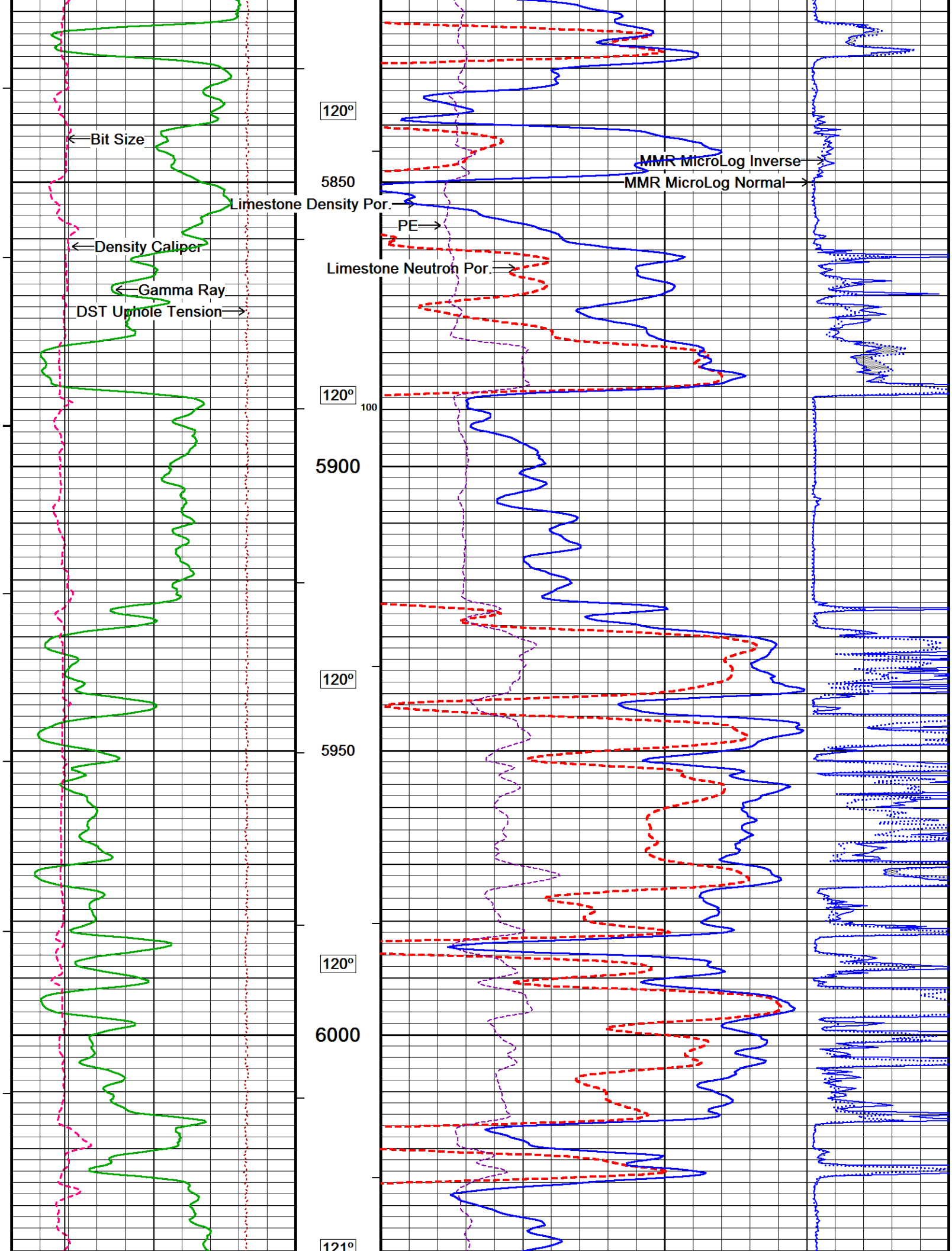

112°
4750
112°
4800
500
112°
4850
113°
4900
113°

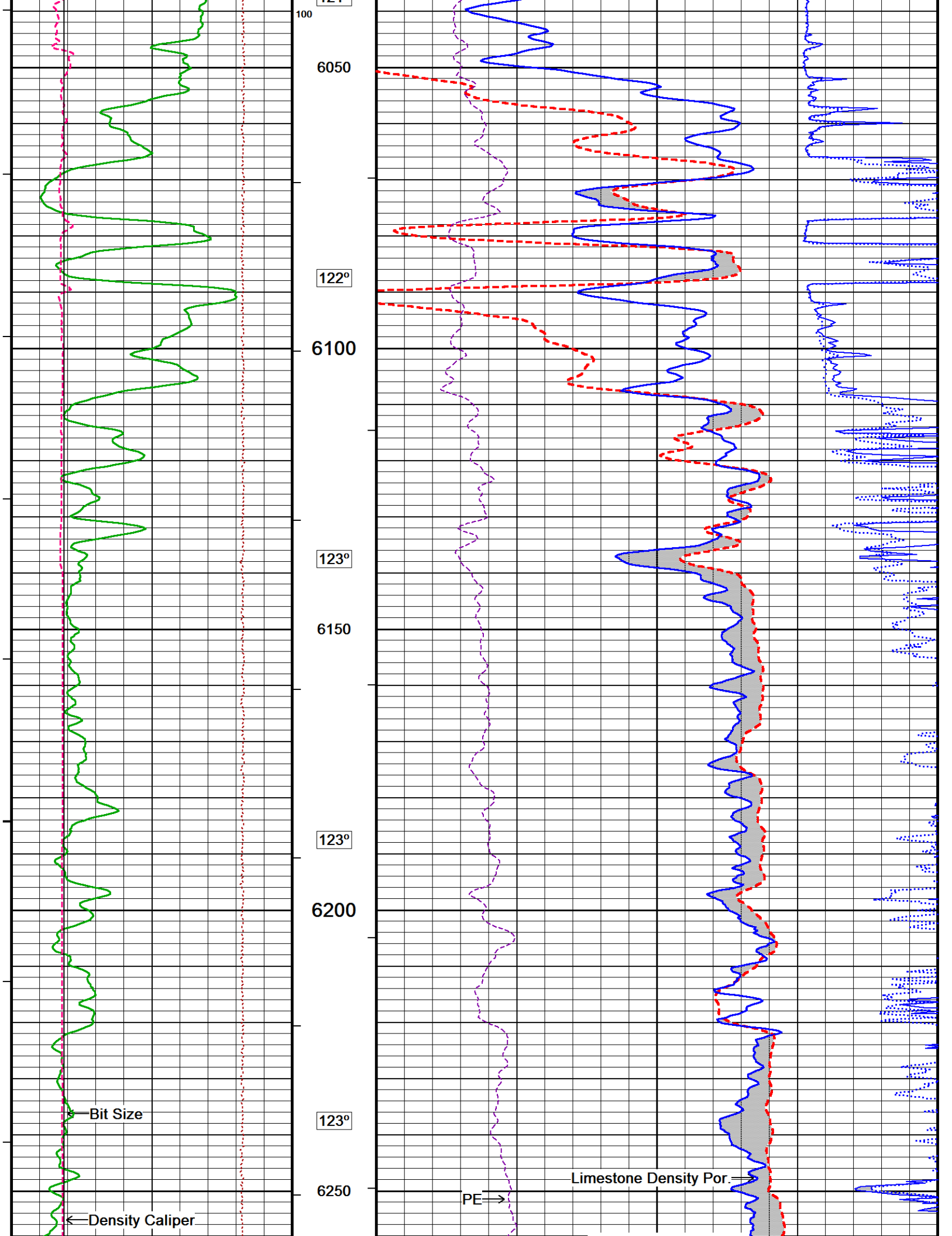

4950
113°
300
5000
114°
5050
Bit Size
MMR MicroLog Inverse
MMR MicroLog Normal
Limestone Density Por
PE
Density Caliper
Limestone Neutron Por
Gamma Ray
DST Uphole Tension
114°
5100
115°
400
5150

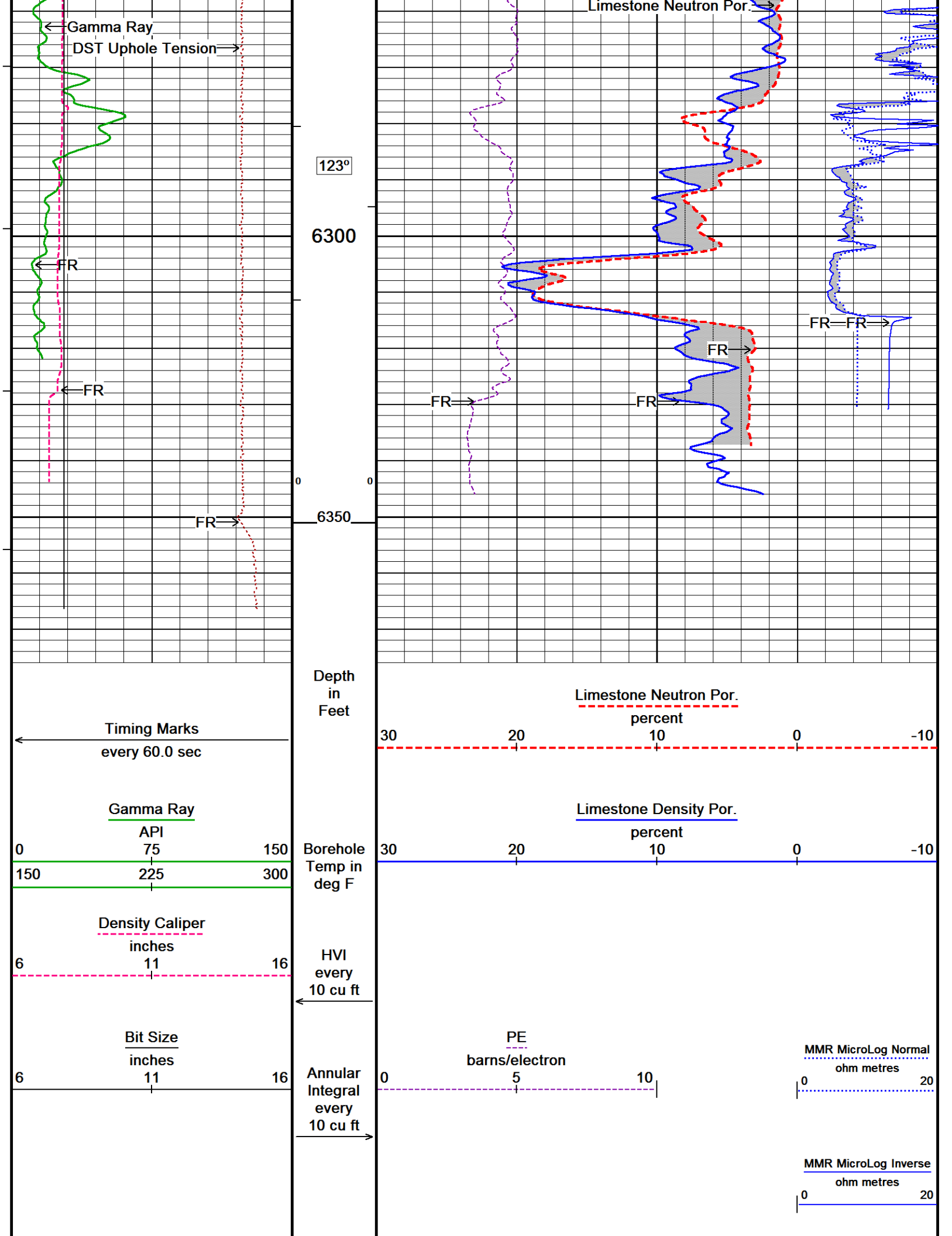

115°
5200
115°
5250
115°
5300
116°
5350


116°
5400
117°
300
200
5450
Bit Size
MMR MicroLog Normal
Limestone Density Por.
PE
Density Caliper
Limestone Neutron Por
Gamma Ray
DST Uphole Tension
117°
5500
118°
5550
118°


5600
118°
5650
119°
5700
200
119°
5750
119°
5800


Bit Size
Density Caliper
Gamma Ray
DST Uphole Tension
120°
5850
Limestone Density Por.
PE
Limestone Neutron Por.
MMR MicroLog Inverse
MMR MicroLog Normal
120°
100
5900
120°
5950
120°
6000
121°


100
6050
122°
6100
123°
6150
123°
6200
123°
6250
Bit Size
Density Caliper
PE
Limestone Density Por.


Gamma Ray
DST Uphole Tension
FR
FR
FR
Limestone Neutron Por.
123°
6300
FR
FR
FR
FR
FR
0
0
6350
Depth
in
Feet
Timing Marks
every 60.0 sec
Limestone Neutron Por.
percent
30
20
10
0
-10
Gamma Ray
API
0
75
150
150
225
300
Limestone Density Por.
percent
30
20
10
0
-10
Borehole
Temp in
deg F
Density Caliper
inches
6
11
16
HVI
every
10 cu ft
Bit Size
inches
6
11
16
PE
barns/electron
0
5
10
Annular
Integral
every
10 cu ft
MMR MicroLog Normal
ohm metres
0
20
MMR MicroLog Inverse
ohm metres
0
20

DST Uphole Tension
pounds
5000 0

Replay
Scale
1:240

Depth Based Data - Maximum Sampling Increment 10.0cm
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5 INCH MAIN LIMESTONE

REPEAT SECTION SANDSTONE

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 19-JUN-2018 07:39
Filename: C:\Minimus 18.01.6830\Data\O'Brien (Charity May 1A)\REPEAT PASS.dta
Recorded on 19-JUN-2018 03:37
System Versions: Logged with 18.01.6830 Processed with 18.01.6830 Plotted with 18.01.6830

Timing Marks
every 60.0 sec

Gamma Ray
API
0 75 150
150 225 300

Density Caliper
inches
6 11 16

Bit Size
inches
6 11 16

Depth
in
Feet

Borehole
Temp in
deg F

HVI
every
10 cu ft

Annular
Integral
every
10 cu ft

Sandstone Neutron Por.
percent
30 20 10 0 -10

Sandstone Density Por.
percent
30 20 10 0 -10

PE
barns/electron
0 5 10

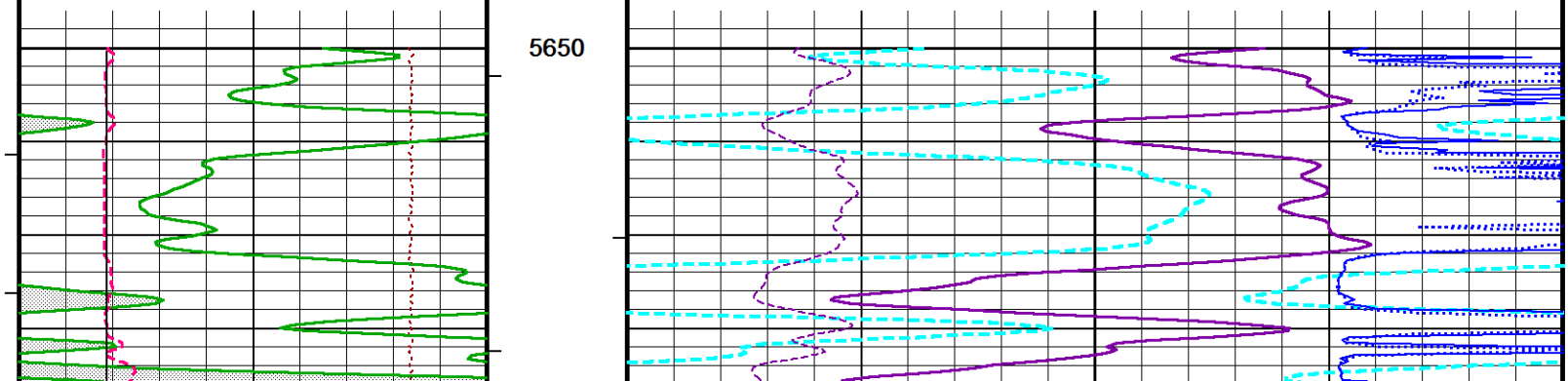
MMR MicroLog Normal
ohm metres
0 20

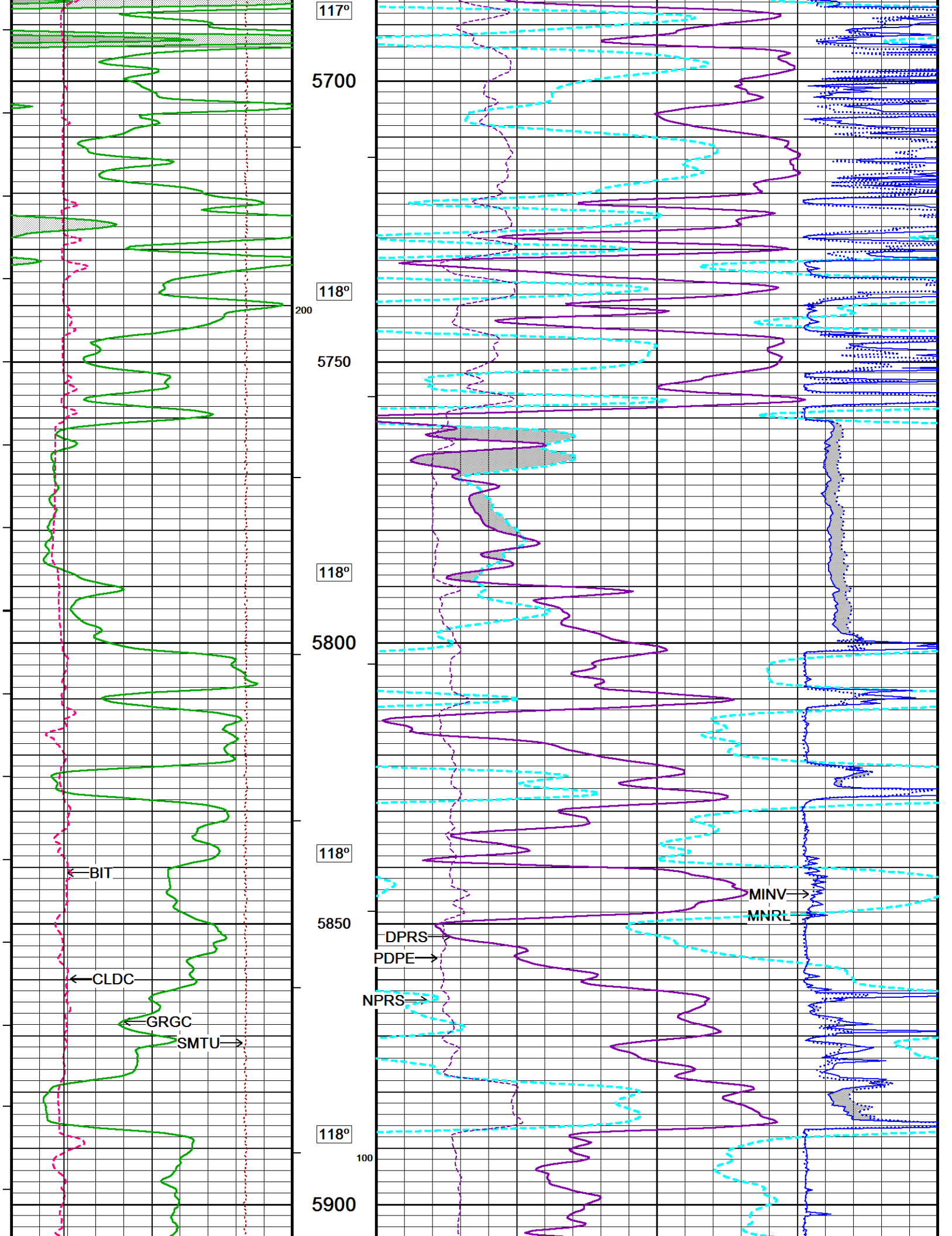
MMR MicroLog Inverse
ohm metres
0 20

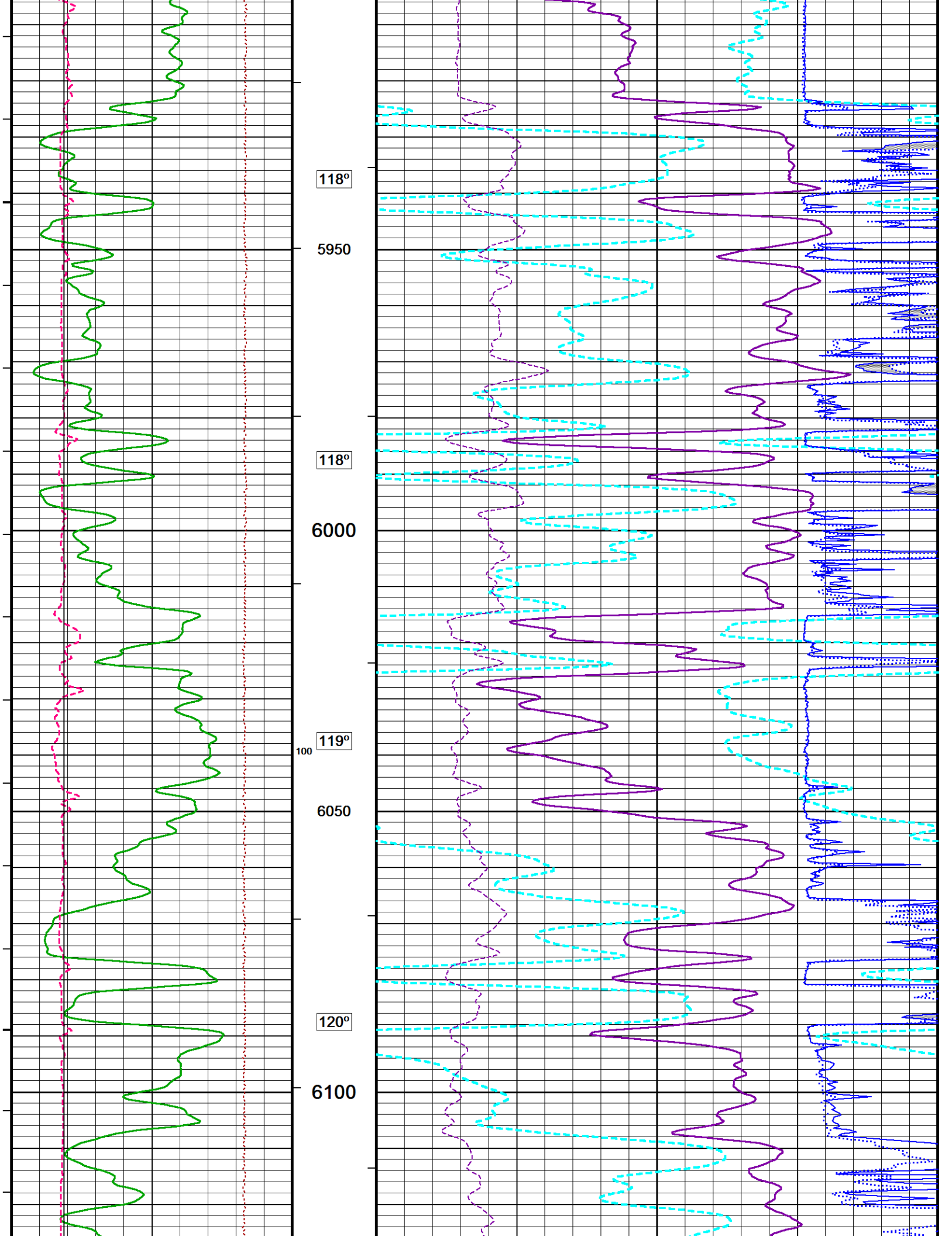
DST Uphole Tension
pounds
5000 0

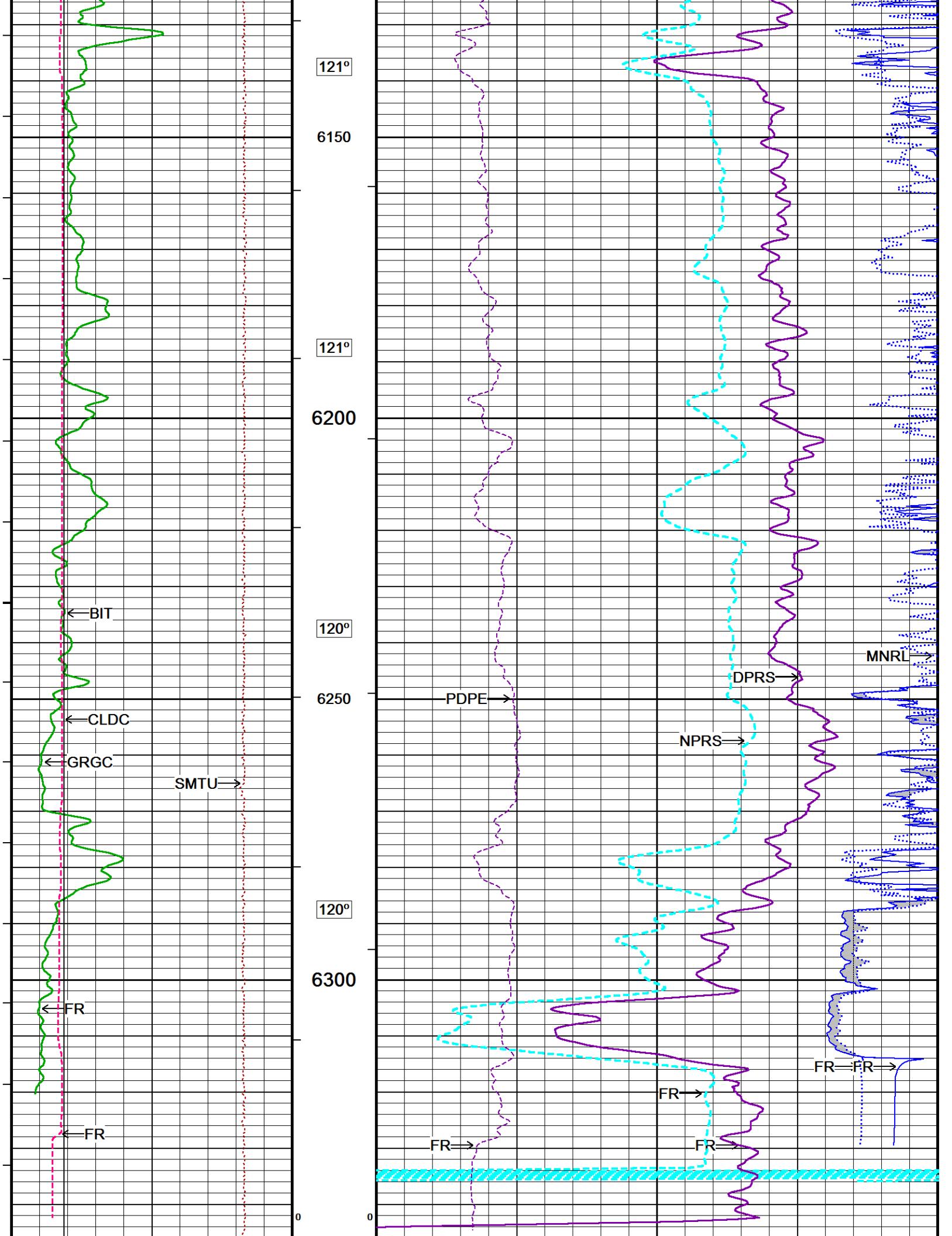
Replay
Scale
1:240

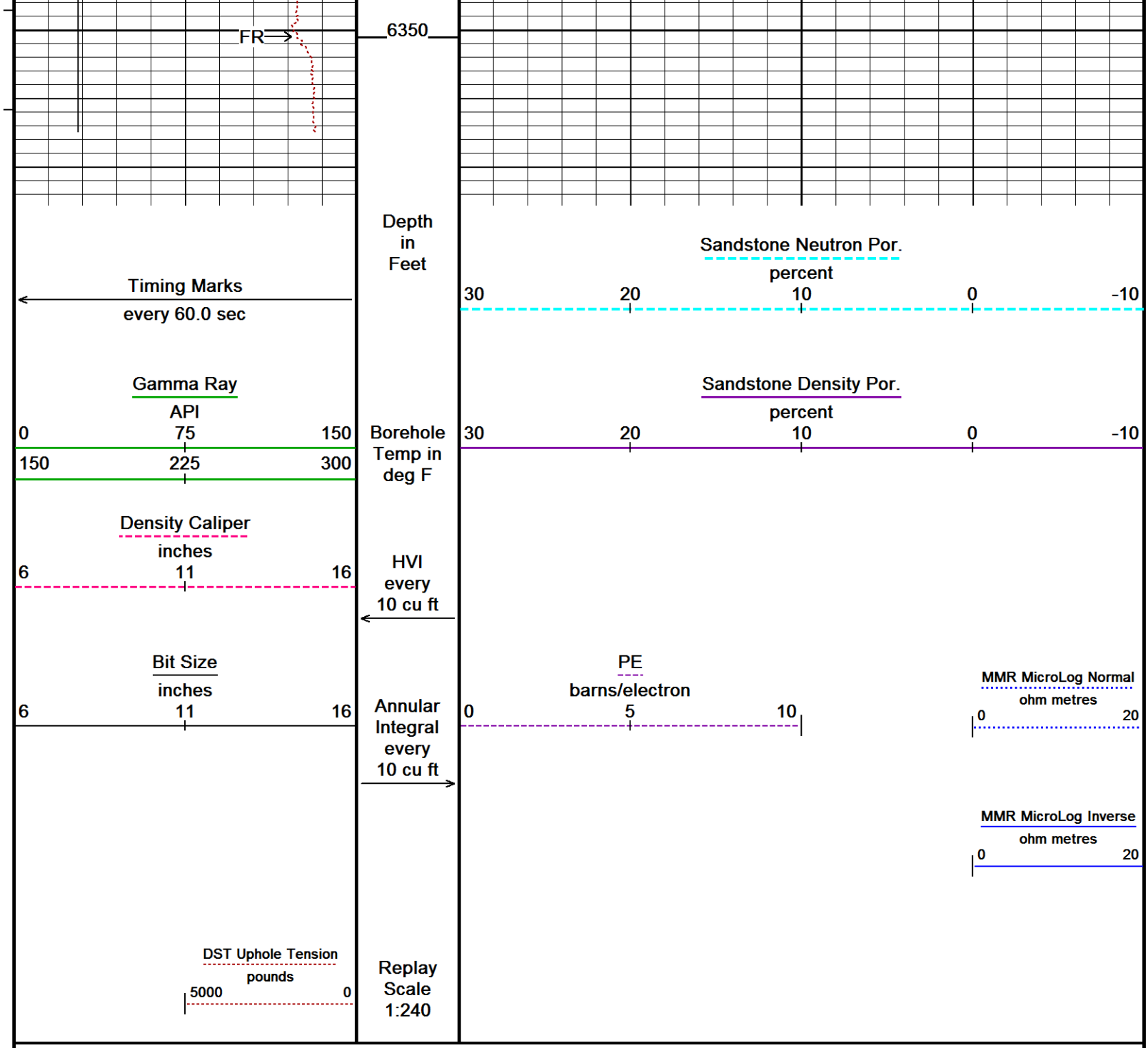
5650




117°
5700
118°
200
5750
118°
5800
118°
5850
118°
100
5900
BIT
CLDC
GRGC
SMTU
DPRS
PDPE
NPRS
MINV
MNRL


118°
5950
118°
6000
100
119°
6050
120°
6100


121°
6150
121°
6200
120°
6250
120°
6300
BIT
CLDC
GRGC
SMTU
FR
FR
PDPE
NPRS
DPRS
MNRL
FR
FR
FR
FR
FR
0
0



Depth Based Data - Maximum Sampling Increment 10.0cm
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REPEAT SECTION SANDSTONE

10 INCH HIGH RESOLUTION SANDSTONE

Depth Based Data - Maximum Sampling Increment 2.5cm
Plotted on 19-JUN-2018 07:39
Filename: C:\Minimus 18.01.6830\Data\O'Brien (Charity May 1A)\HIGH RES PASS.dta
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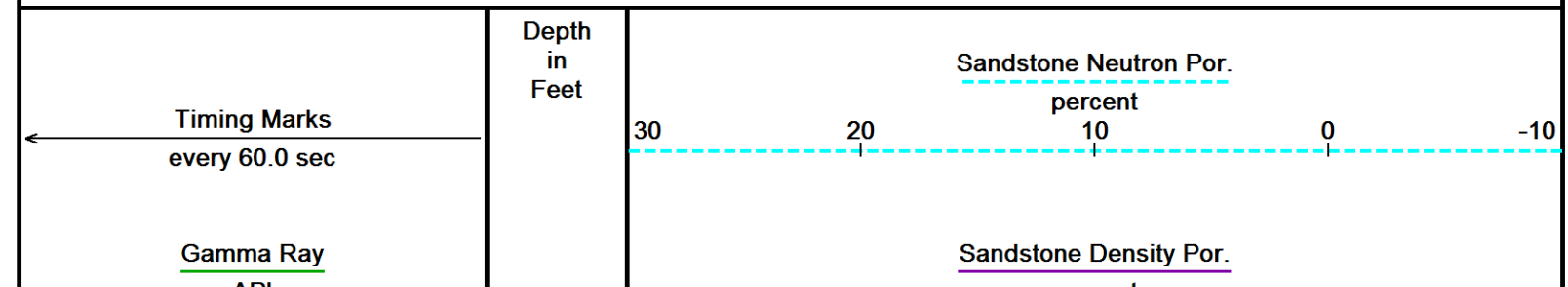
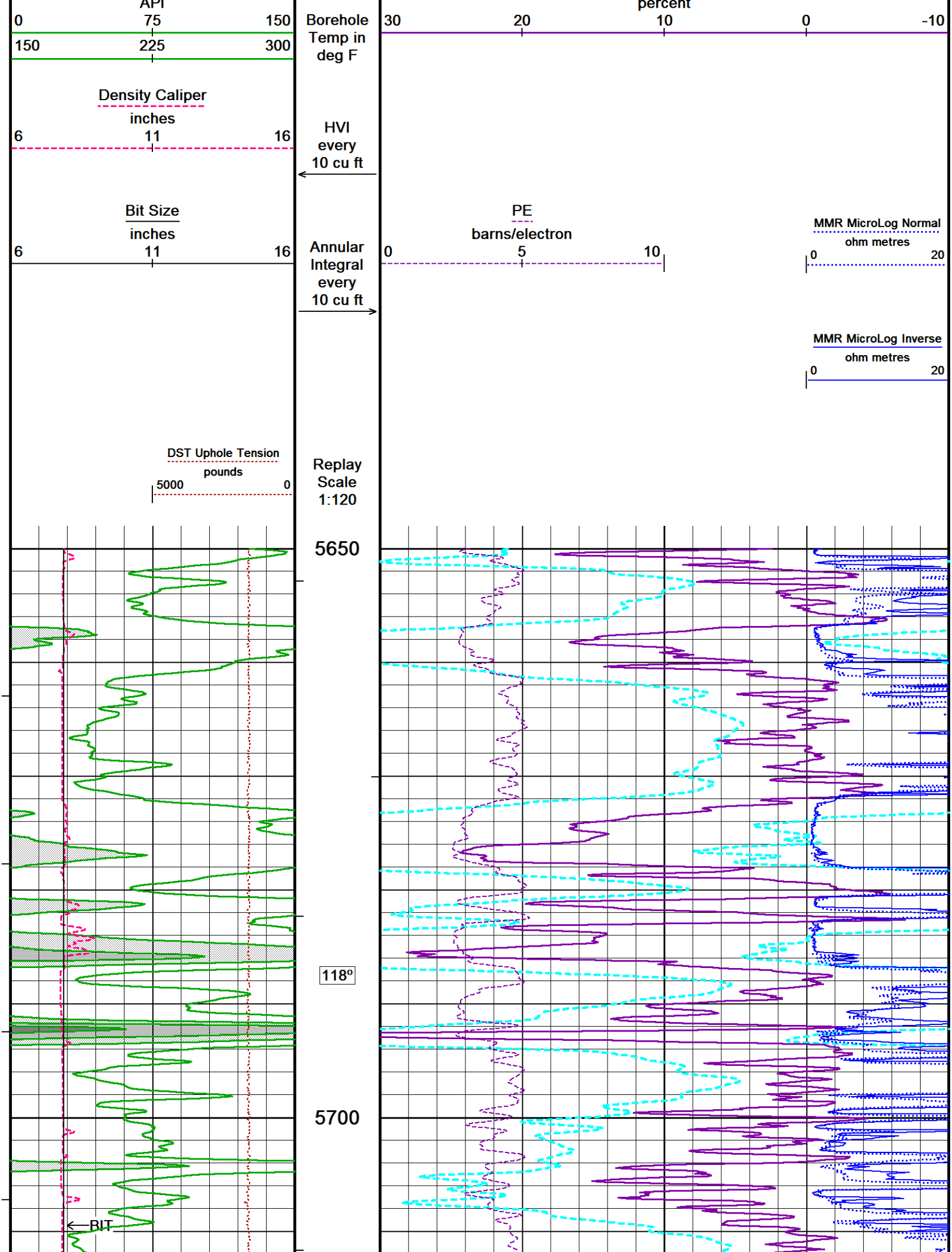
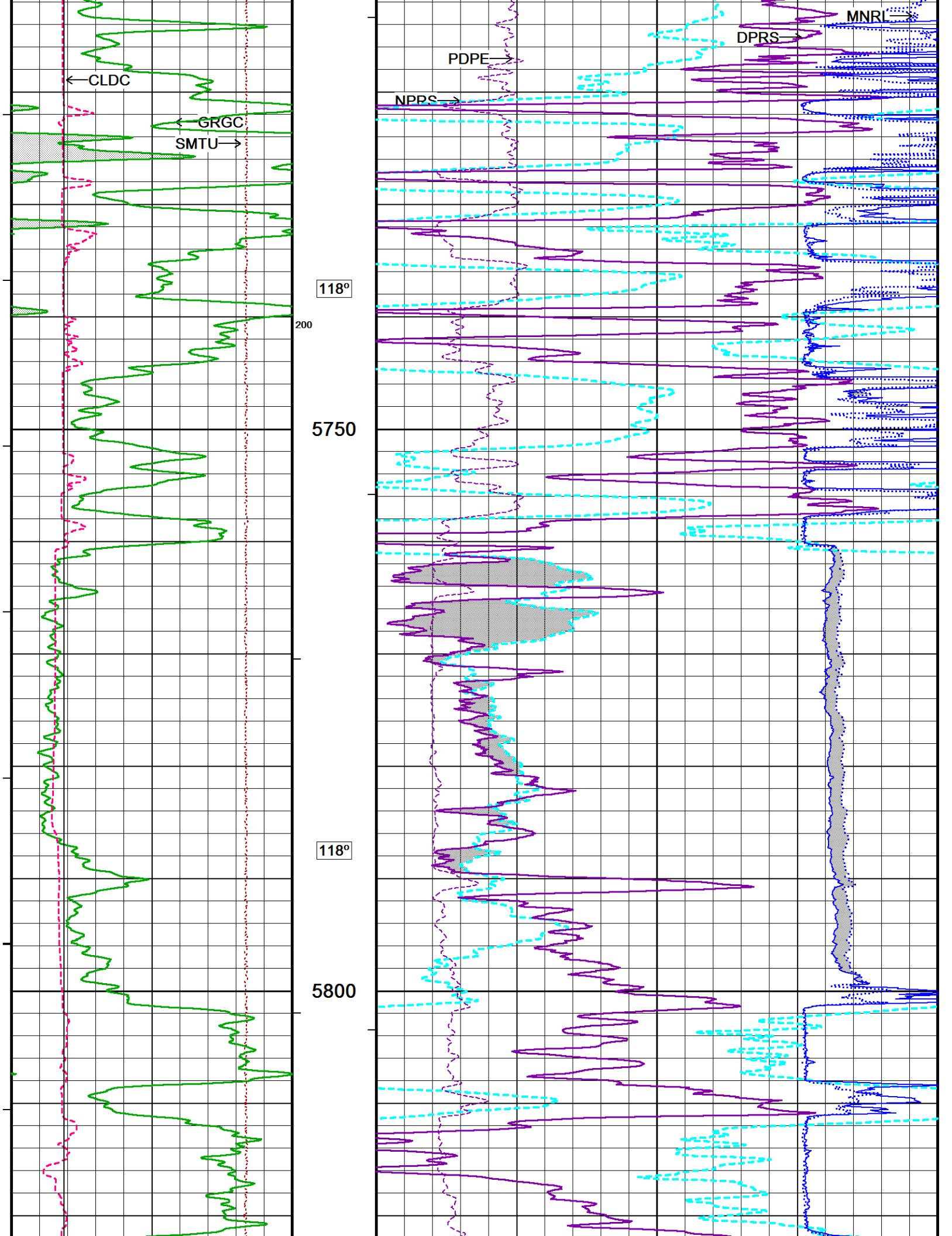
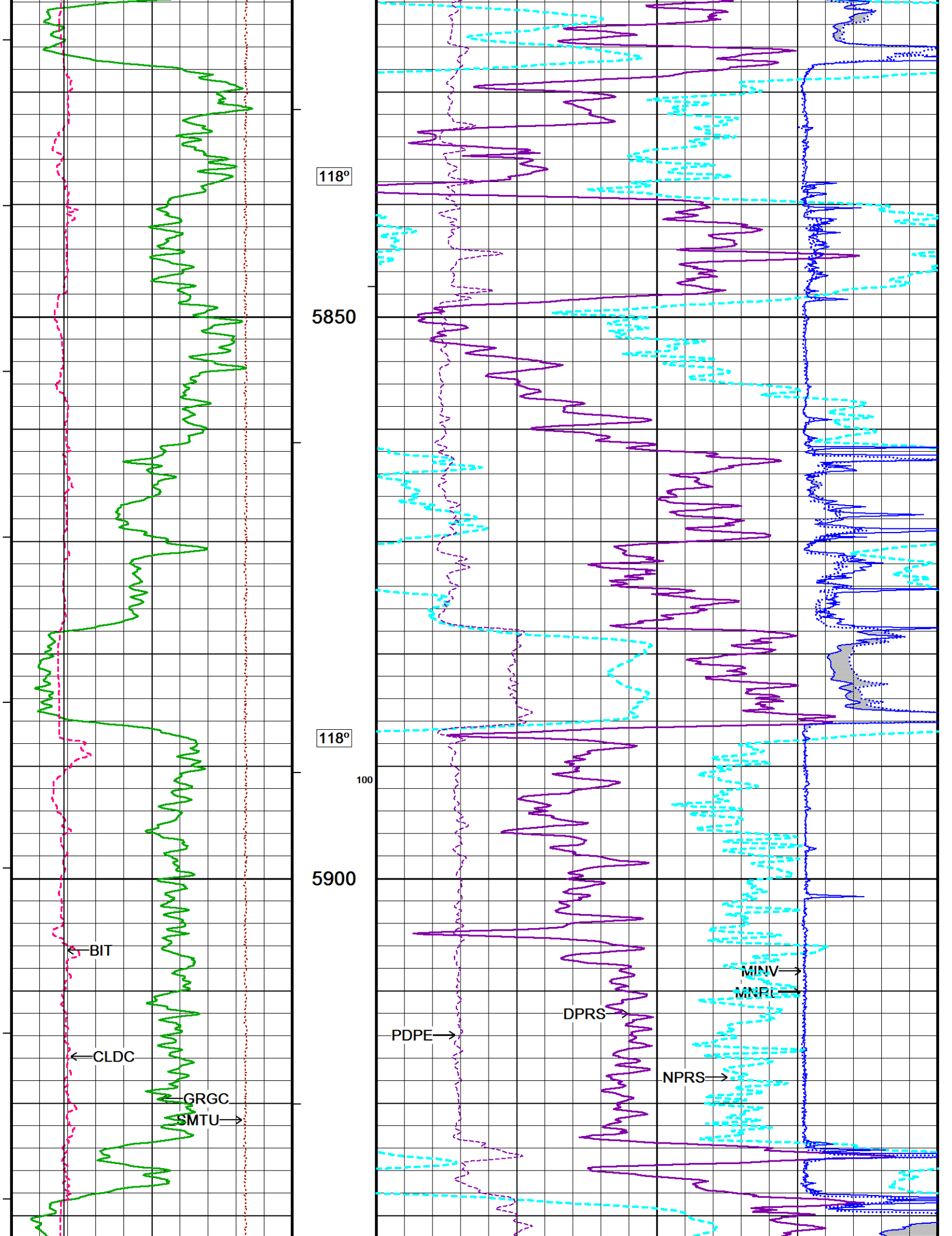
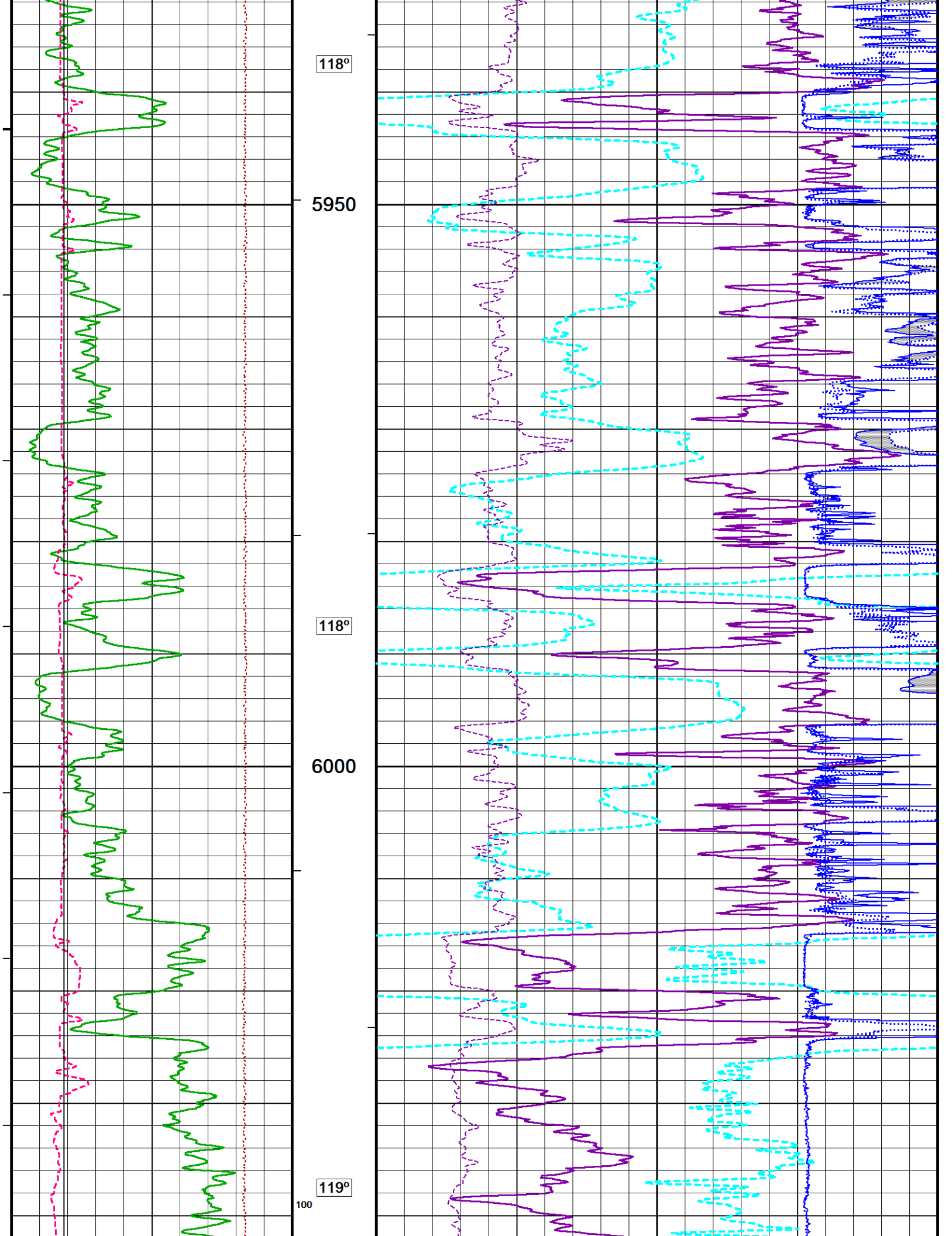
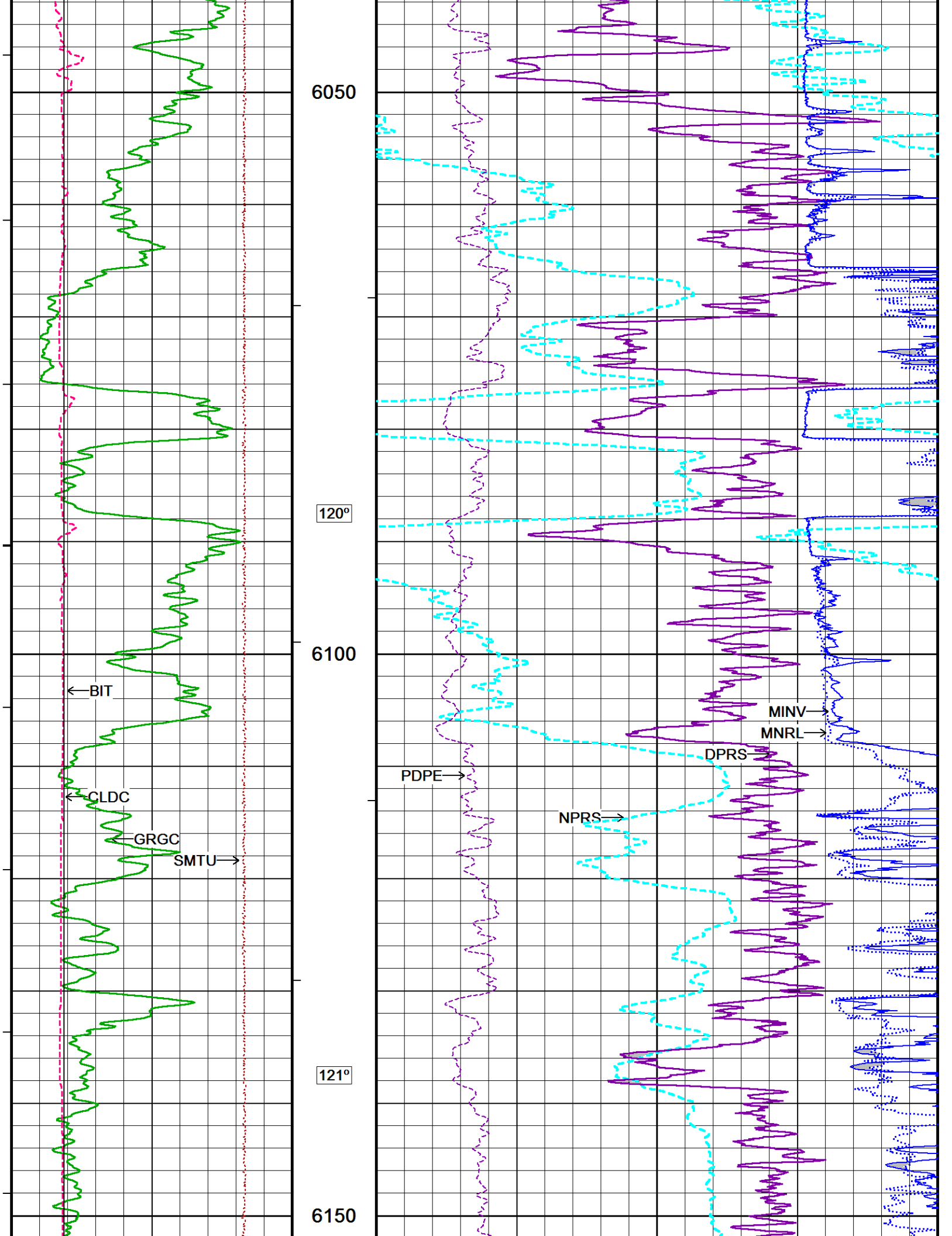


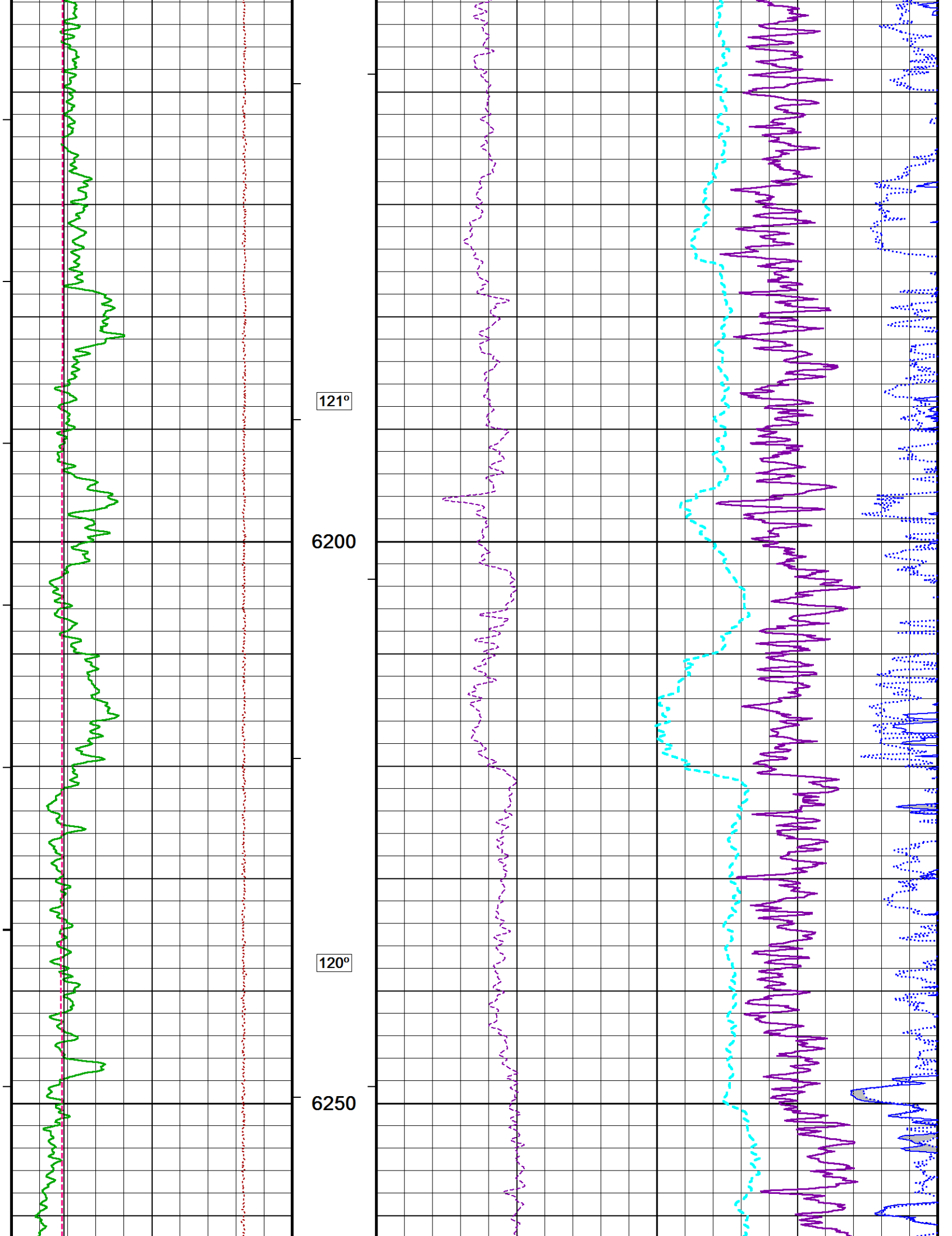

API
0
75
150
150
225
300
Borehole Temp in deg F
Density Caliper
inches
6
11
16
HVI every 10 cu ft
Bit Size
inches
6
11
16
Annular Integral every 10 cu ft
percent
30
20
10
0
-10
PE
barns/electron
0
5
10
MMR MicroLog Normal
ohm metres
0
20
MMR MicroLog Inverse
ohm metres
0
20
DST Uphole Tension
pounds
5000
0
Replay Scale 1:120
5650
118°
5700
BIT

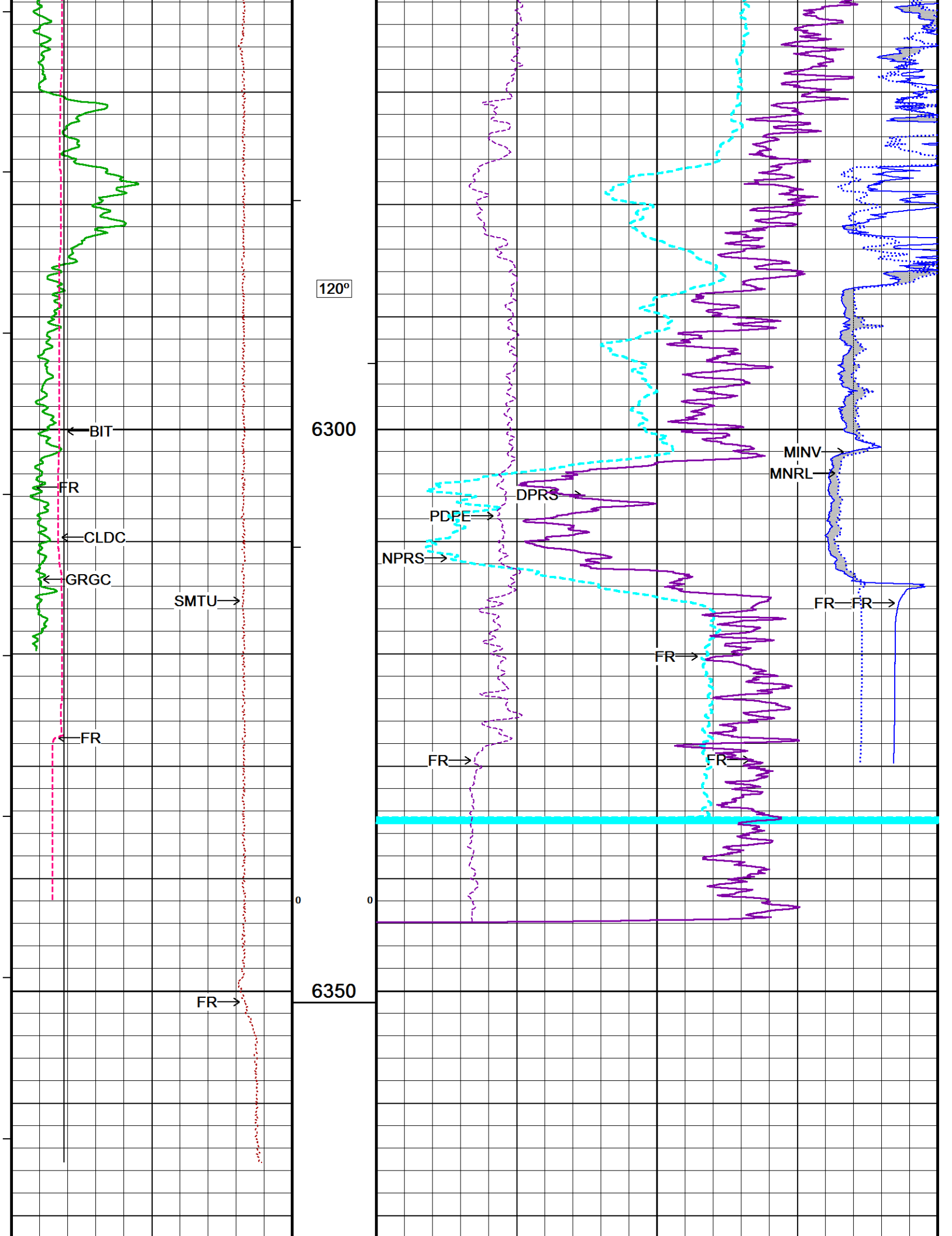

CLDC
GRGC
SMTU
PDPE
NPPS
DPRS
MNRL
118°
200
5750
118°
5800

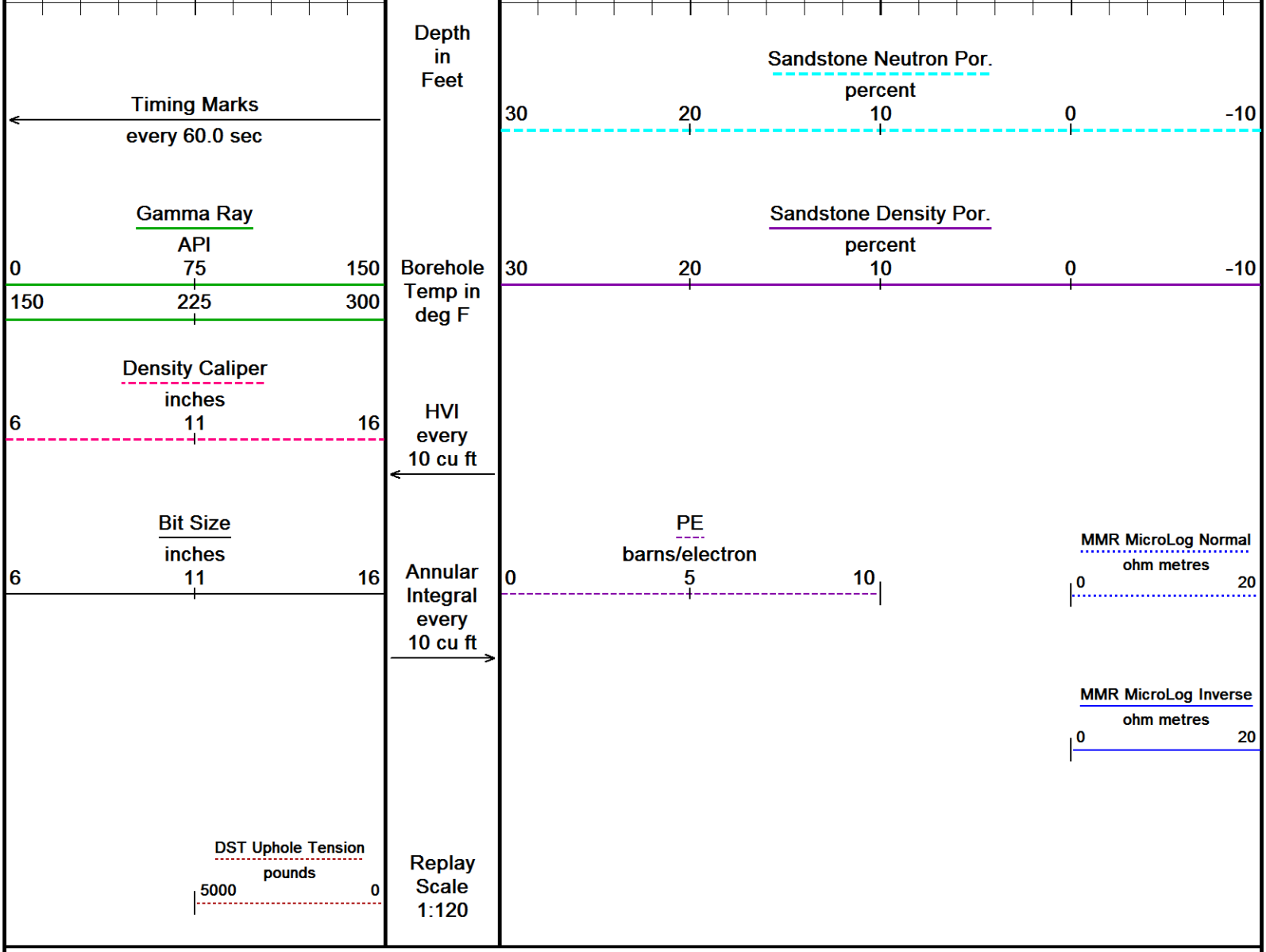

118°
5850
118°
100
5900
BIT
CLDC
GRGC
SMTU
PDPE
DPRS
NPRS
MINV
MNRL


118°
5950
118°
6000
119°
100


6050
120°
6100
121°
6150
BIT
CLDC
GRGC
SMTU
PDPE
NPRS
DPRS
MNRL
MINV


121°
6200
120°
6250


120°
6300
6350
BIT
FR
CLDC
GRGC
FR
SMTU
FR
DPRS
PDPE
NPRS
FR
FR
FR
MINV
MNRL
FR
FR
0
0



Depth Based Data - Maximum Sampling Increment 2.5cm
Plotted on 19-JUN-2018 07:39
Filename: C:\Minimus 18.01.6830\Data\O'Brien (Charity May 1A)\HIGH RES PASS.dta
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10 INCH HIGH RESOLUTION SANDSTONE

5 INCH MAIN BULK DENSITY LIMESTONE

Depth Based Data - Maximum Sampling Increment 10.0cm
Plotted on 19-JUN-2018 07:39
Filename: C:\Minimus 18.01.6830\Data\O'Brien (Charity May 1A)\MAIN PASS.dta
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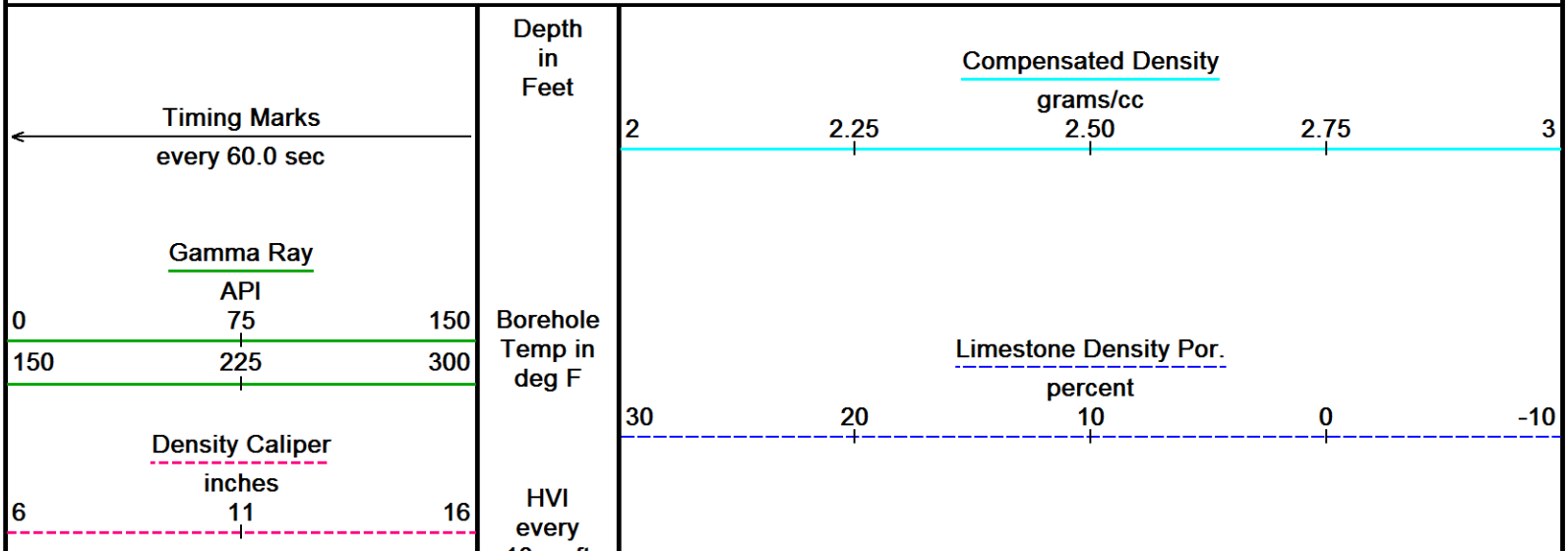
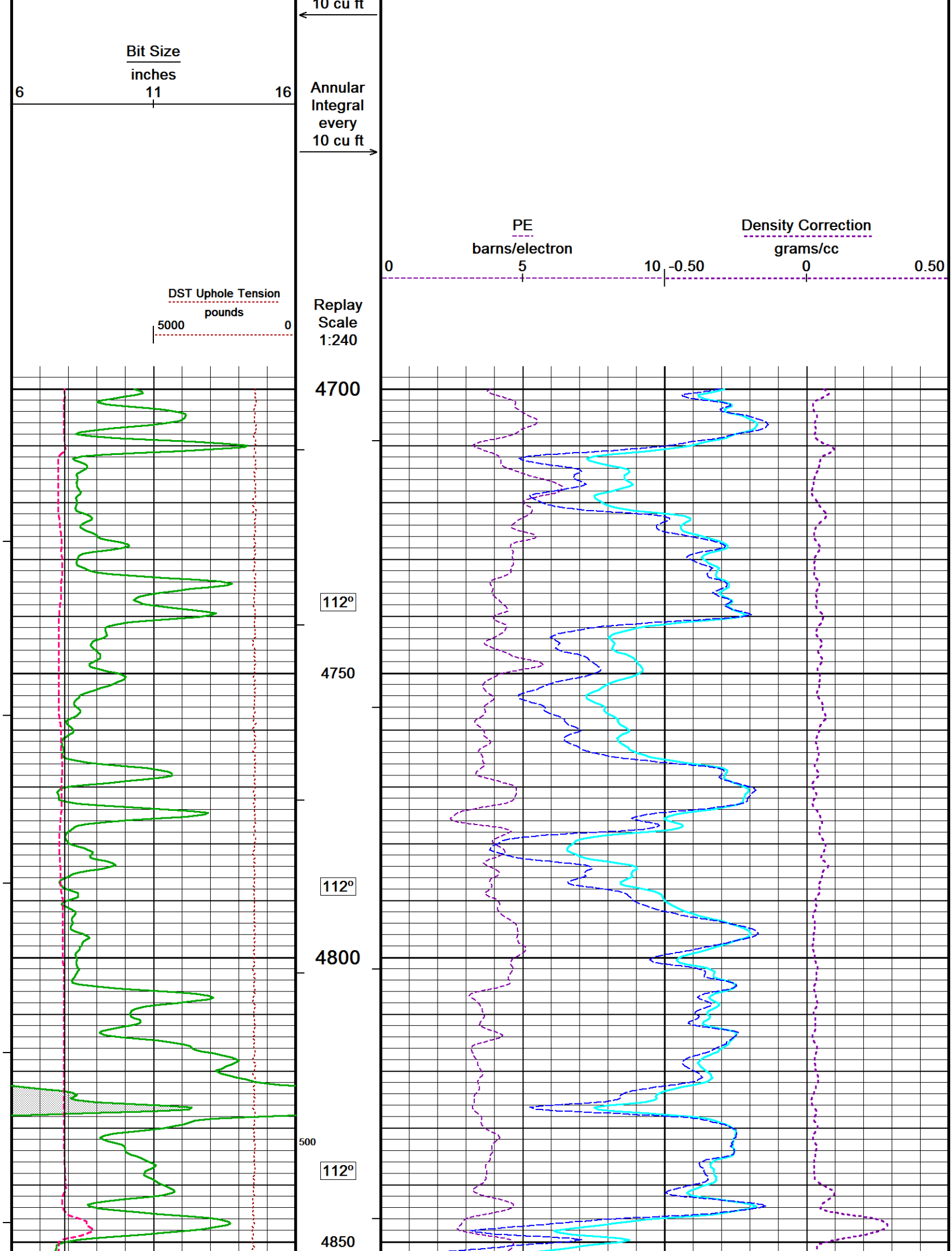
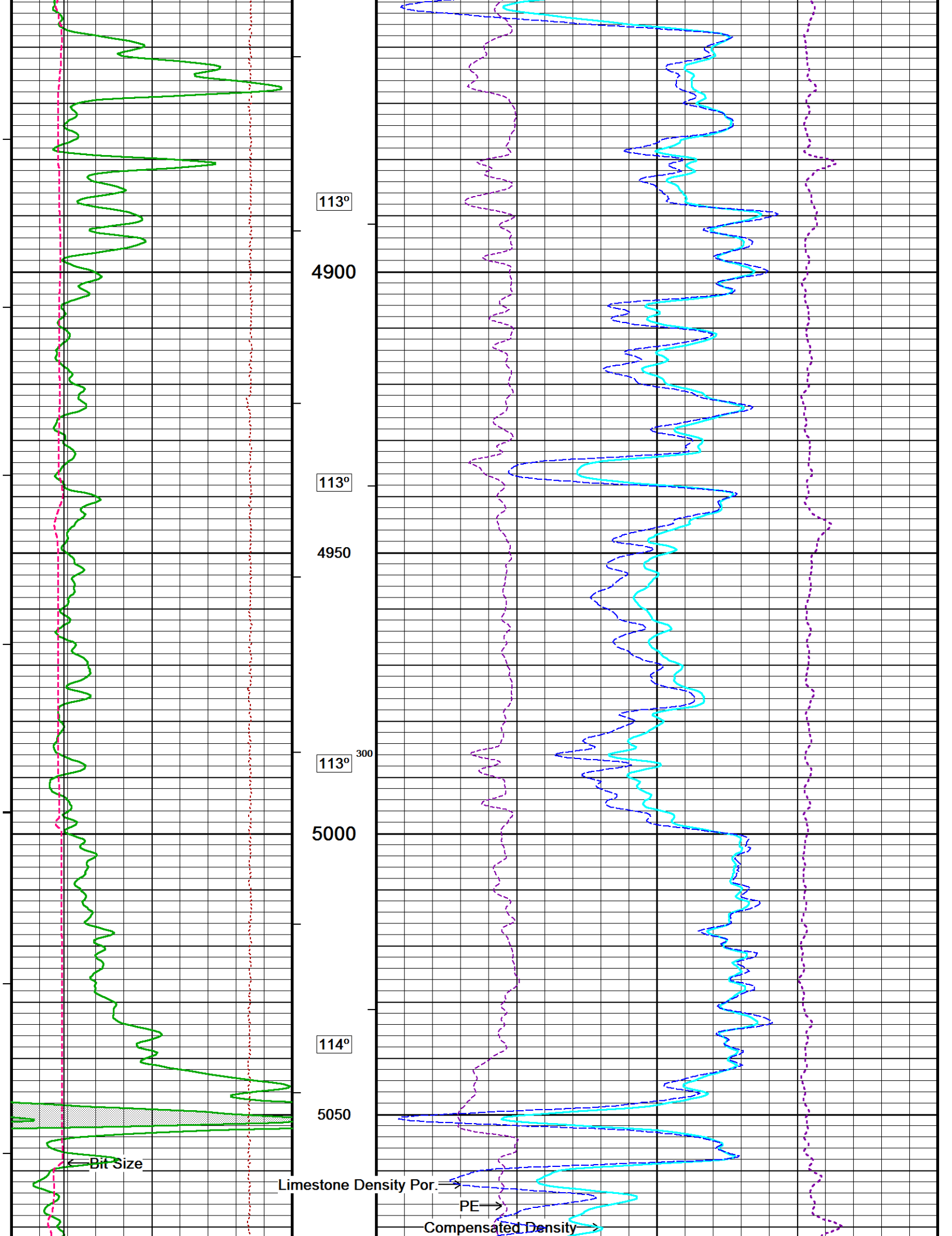
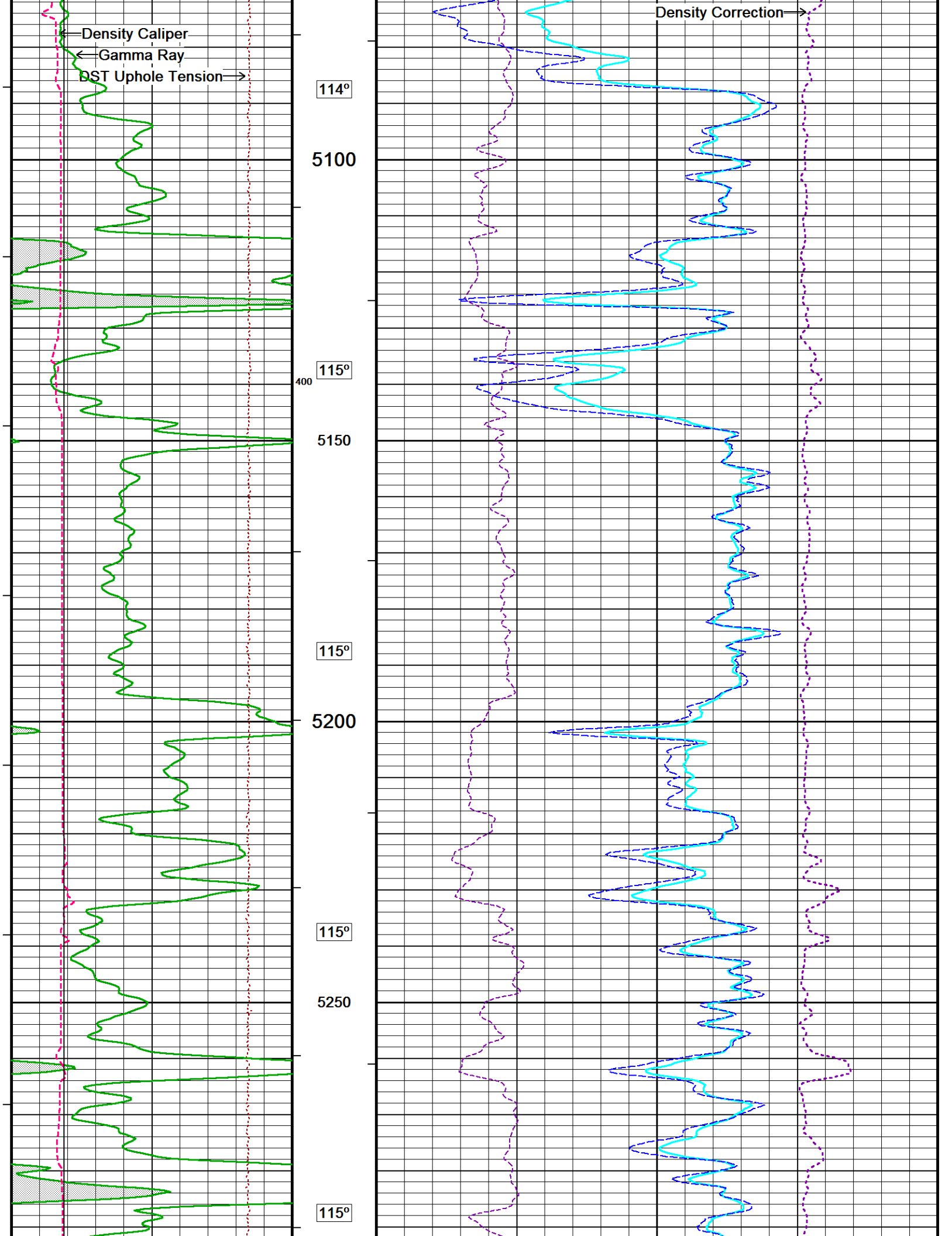
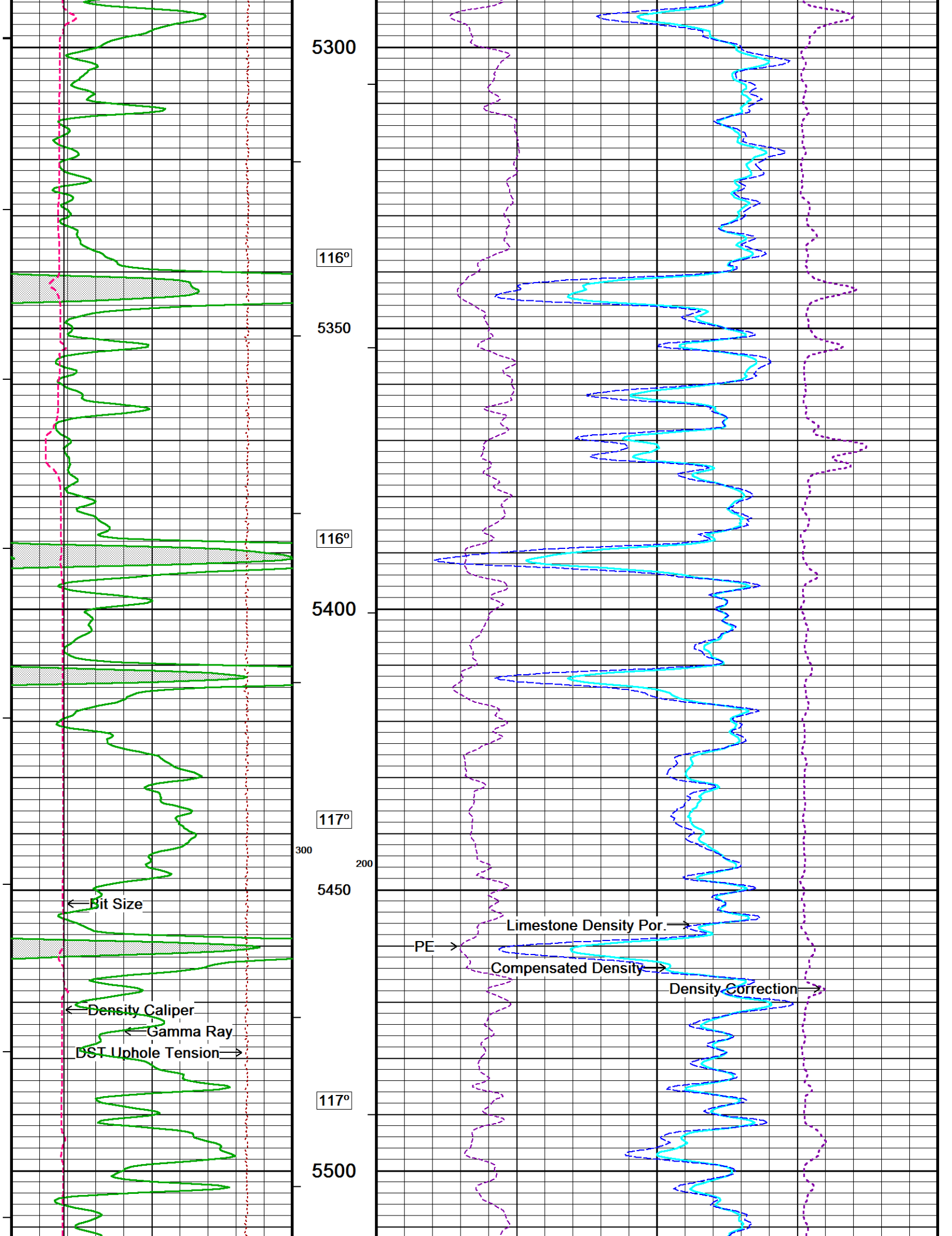
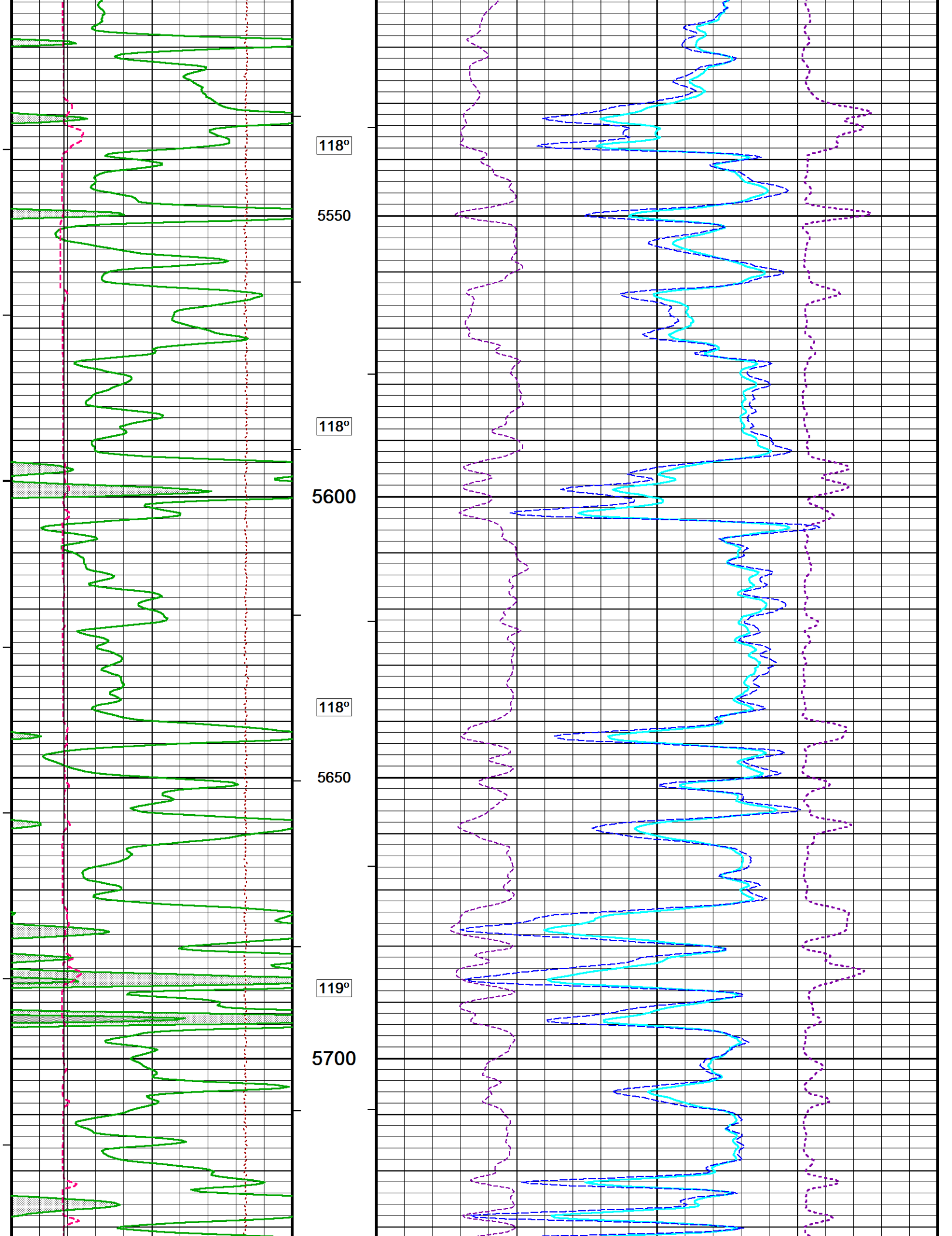


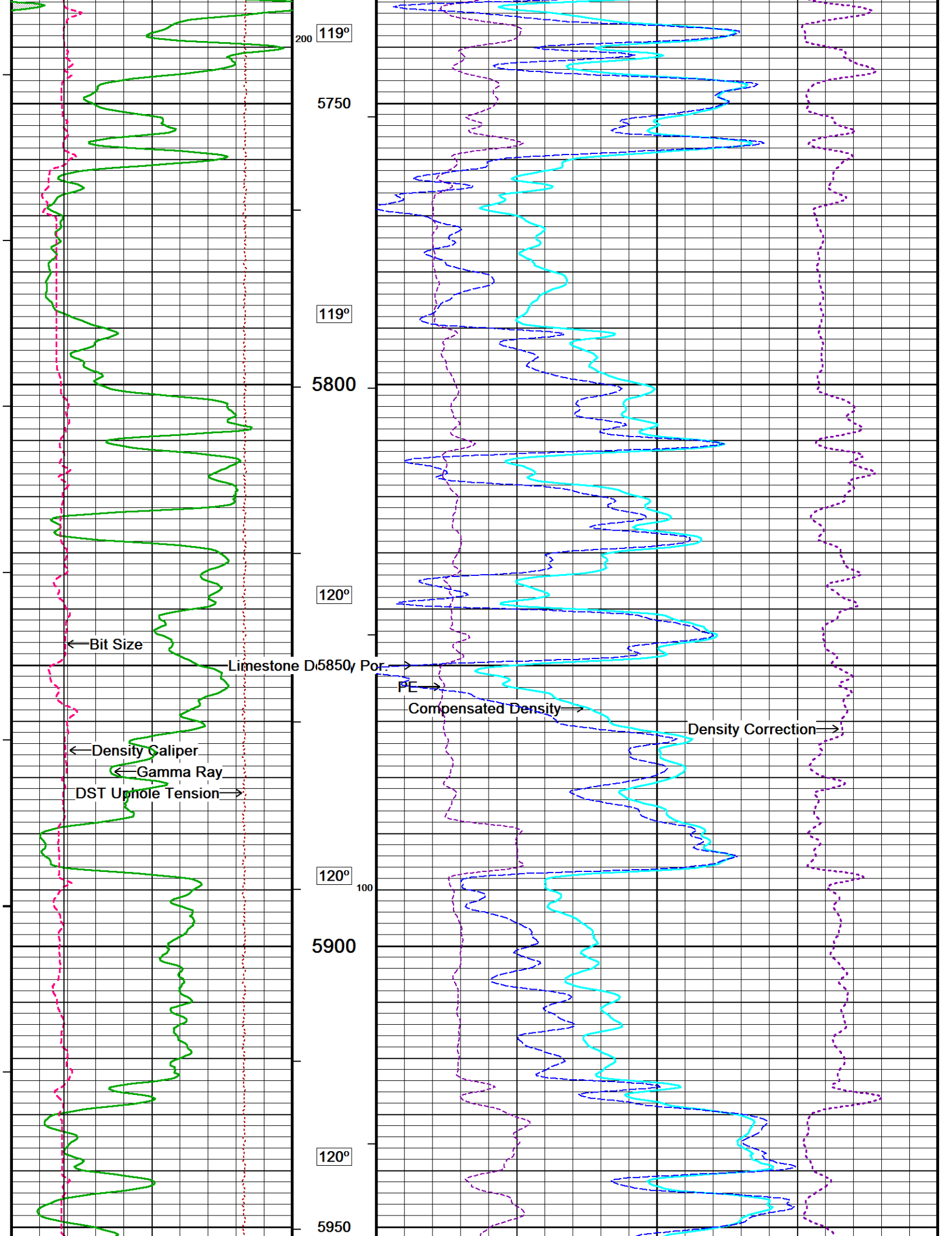

10 cu ft
Bit Size
inches
6
11
16
Annular
Integral
every
10 cu ft
PE
barns/electron
0
5
10
Density Correction
grams/cc
-0.50
0
0.50
DST Uphole Tension
pounds
5000
0
Replay
Scale
1:240
4700
112°
4750
112°
4800
500
112°
4850

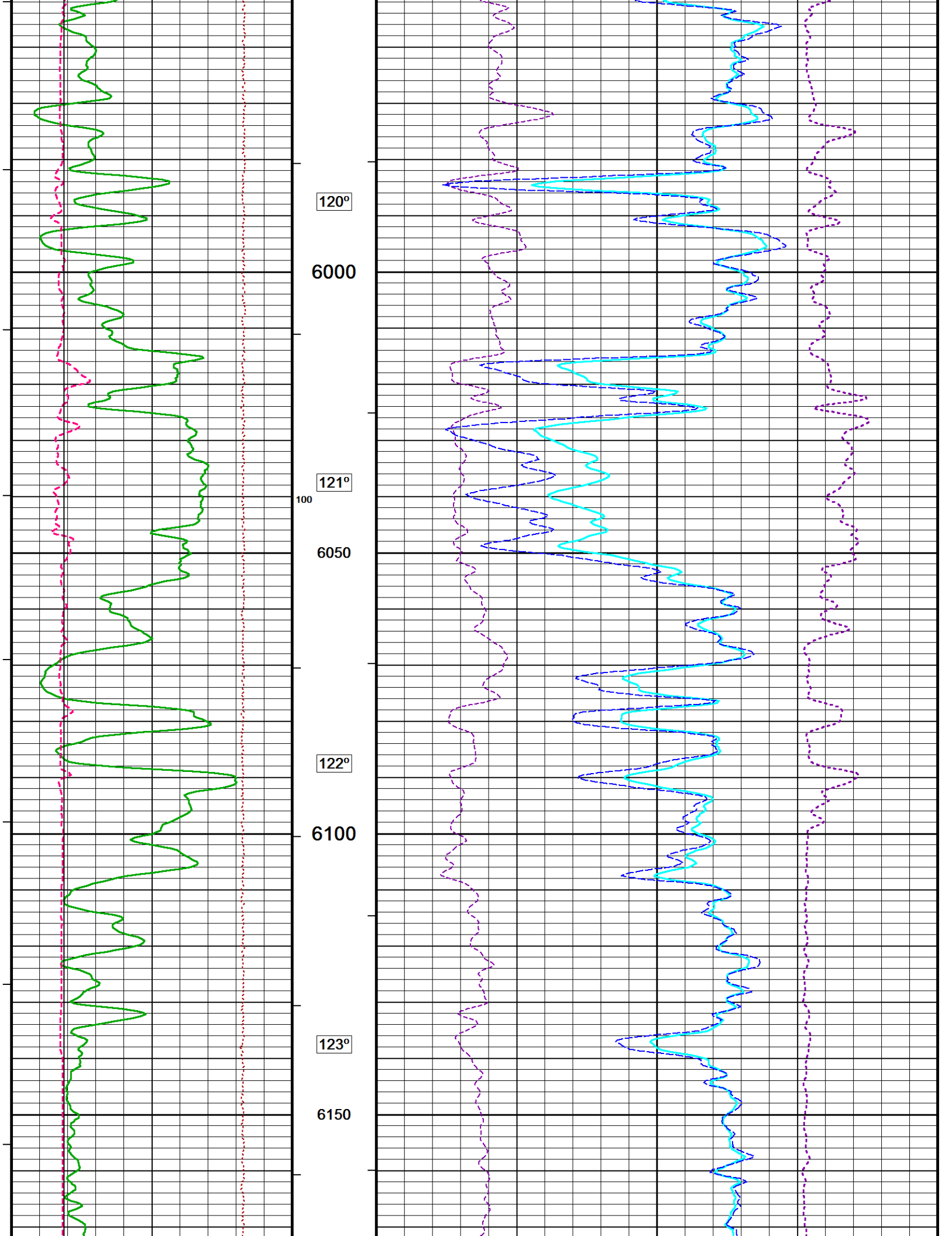

113°
4900
113°
4950
113°
300
5000
114°
5050
Bit Size
Limestone Density Por.
PE
Compensated Density

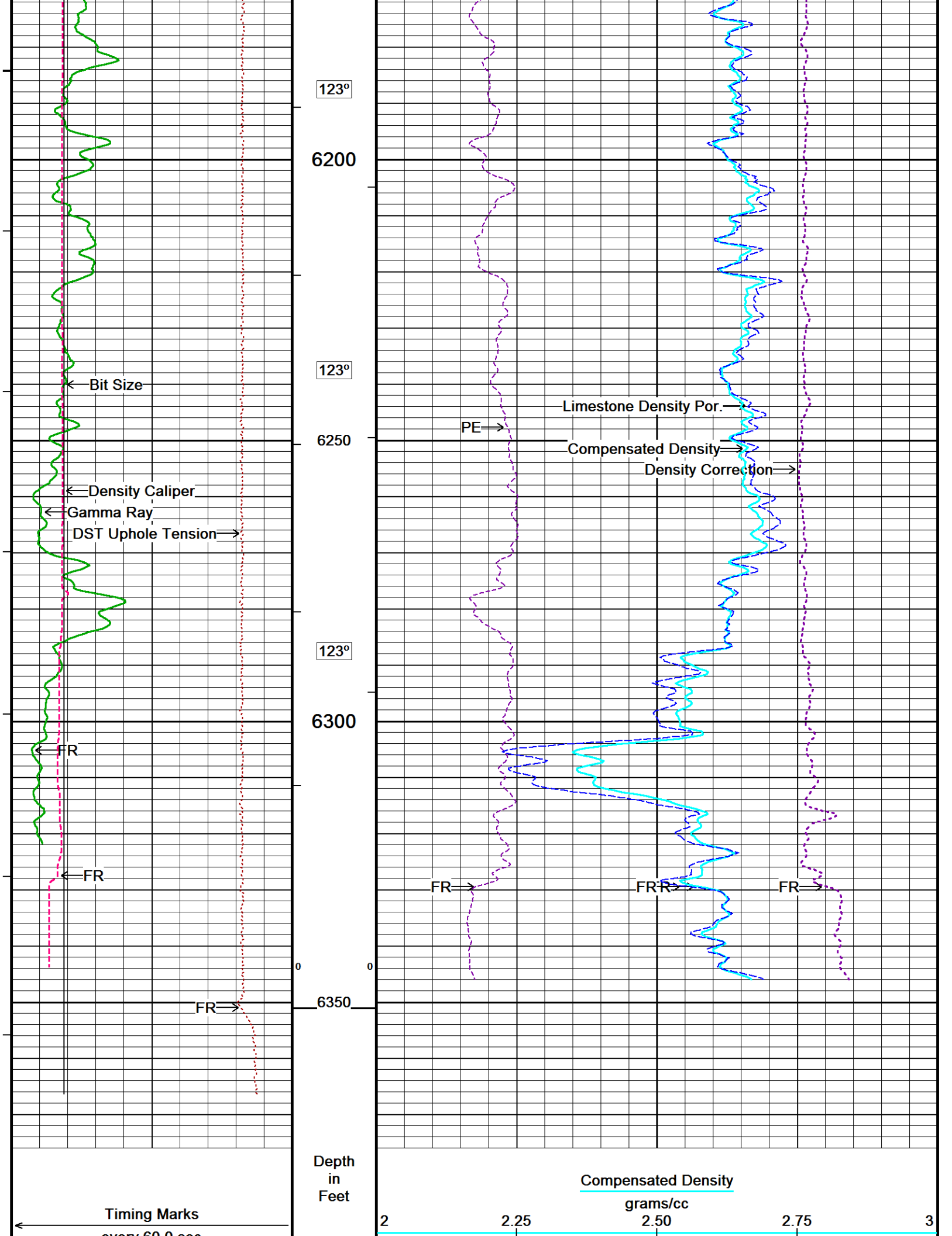

Density Caliper
Gamma Ray
DST Uphole Tension
Density Correction
114°
5100
115°
400
5150
115°
5200
115°
5250
115°


5300
116°
5350
116°
5400
117°
300
200
5450
Bit Size
Limestone Density Por.
PE
Compensated Density
Density Correction
Density Caliper
Gamma Ray
DST Uphole Tension
117°
5500


118°
5550
118°
5600
118°
5650
119°
5700


200
119°
5750
119°
5800
120°
←Bit Size
Limestone D 5850 Por→
PE→
Compensated Density→
Density Correction→
←Density Caliper
←Gamma Ray
DST Uphole Tension→
120°
100
5900
120°
5950


120°
6000
121°
100
6050
122°
6100
123°
6150


123°
6200
123°
Bit Size
Limestone Density Por.
PE
6250
Compensated Density
Density Correction
Density Caliper
Gamma Ray
DST Uphole Tension
123°
6300
FR
FR
FR
FR
FR
FR
0
0
6350
Depth
in
Feet
Timing Marks
Compensated Density
grams/cc
2
2.25
2.50
2.75
3

every 60.0 sec

Gamma Ray
API
0 75 150
150 225 300

Density Caliper
inches
6 11 16

Bit Size
inches
6 11 16

DST Uphole Tension
pounds
5000 0

Borehole Temp in deg F

HVI every 10 cu ft

Annular Integral every 10 cu ft

Replay Scale 1:240

Limestone Density Por.
percent
30 20 10 0 -10

PE
barns/electron
0 5 10

Density Correction
grams/cc
-0.50 0 0.50

Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 18.01.6830\Data\O'Brien (Charity May 1A)\MAIN PASS.dta
System Versions: Processed with 18.01.6830 Plotted with 18.01.6830

Plotted on 19-JUN-2018 07:39
Recorded on 19-JUN-2018 04:38

5 INCH MAIN BULK DENSITY LIMESTONE

REPEAT SECTION BULK DENSITY SANDSTONE

Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 18.01.6830\Data\O'Brien (Charity May 1A)\REPEAT PASS.dta
System Versions: Logged with 18.01.6830 Processed with 18.01.6830 Plotted with 18.01.6830

Plotted on 19-JUN-2018 07:39
Recorded on 19-JUN-2018 03:37

Timing Marks
every 60.0 sec

Gamma Ray
API
0 75 150
150 225 300

Density Caliper
inches
6 11 16

Bit Size
inches
6 11 16

Depth in Feet

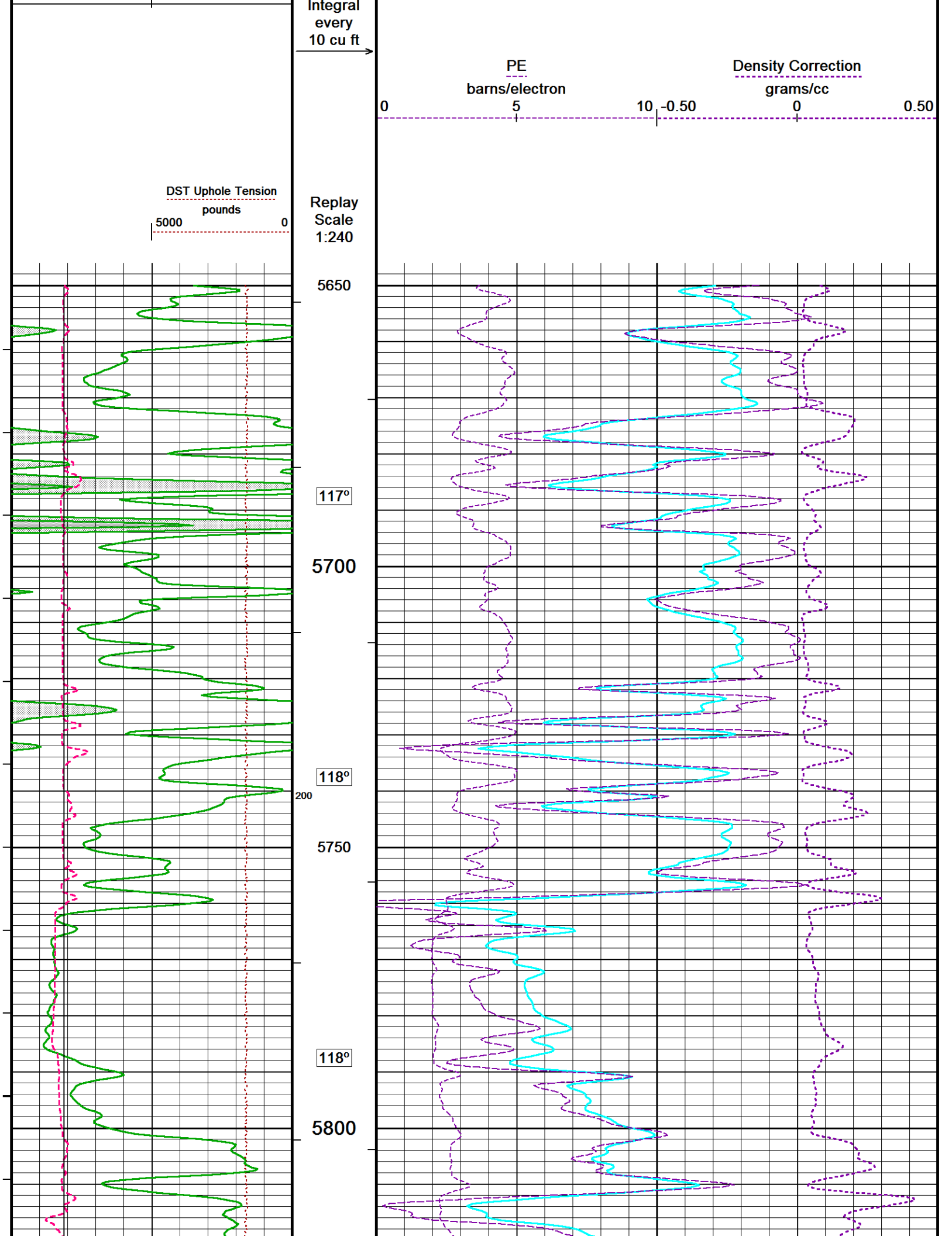
Borehole Temp in deg F

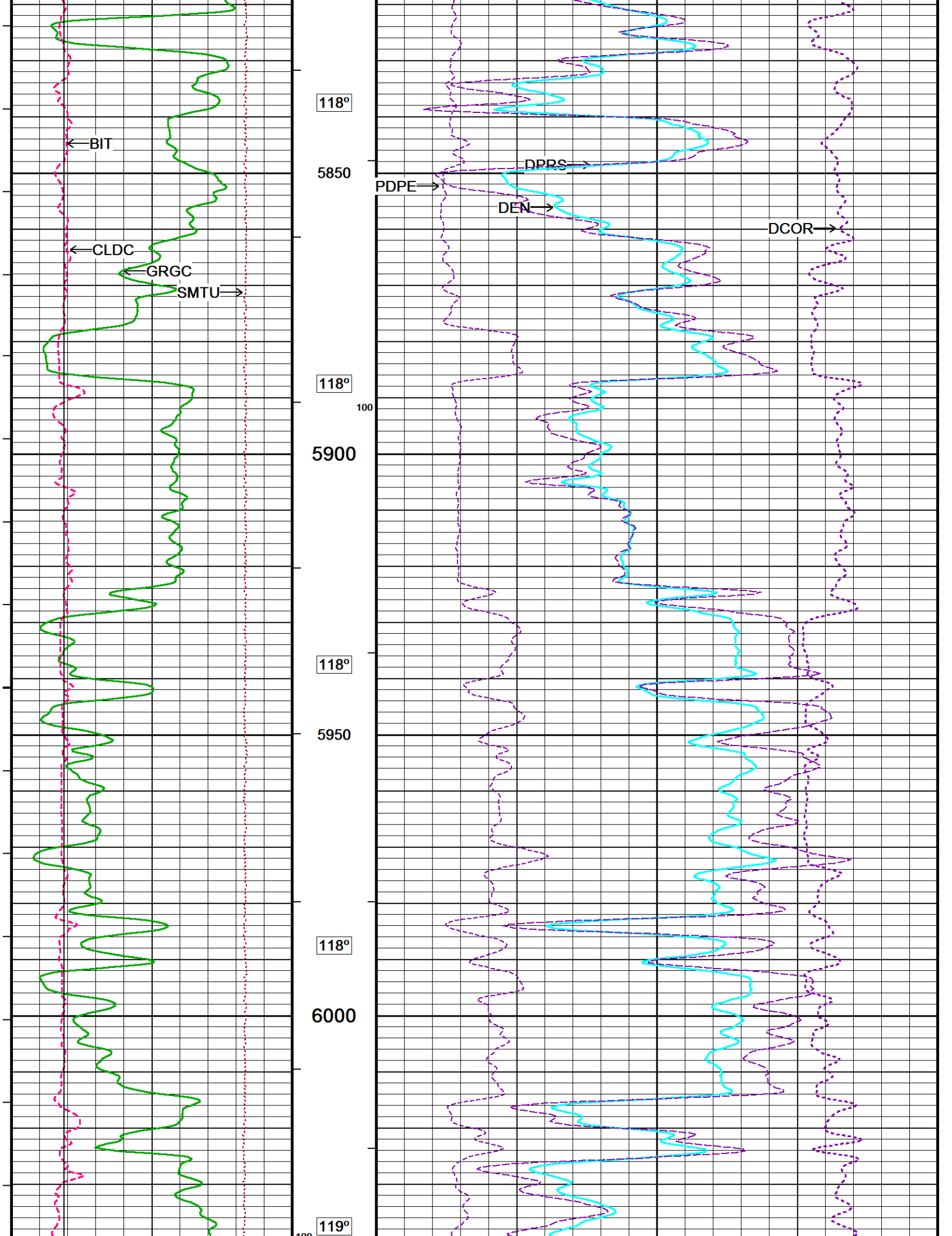
HVI every 10 cu ft

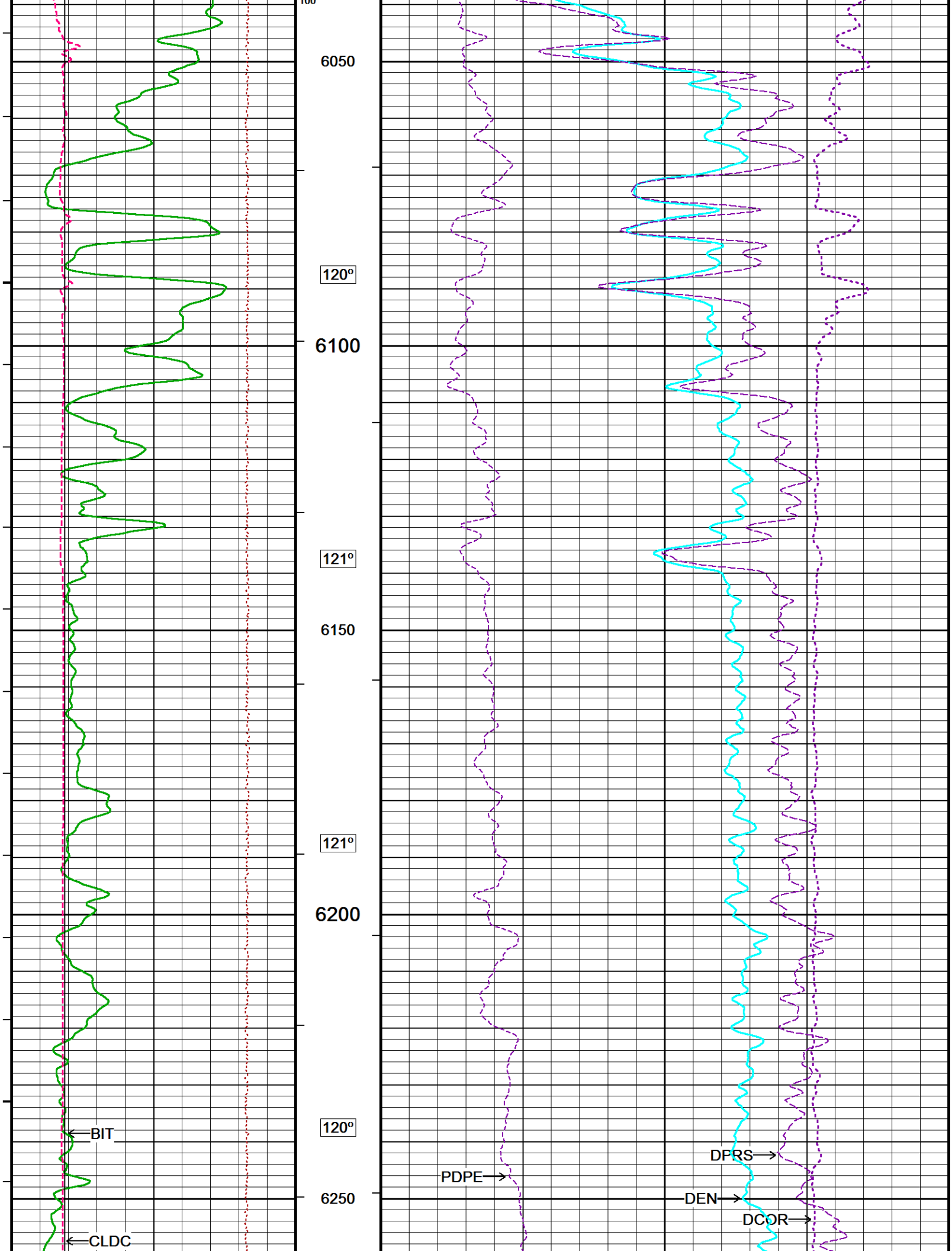
Annular

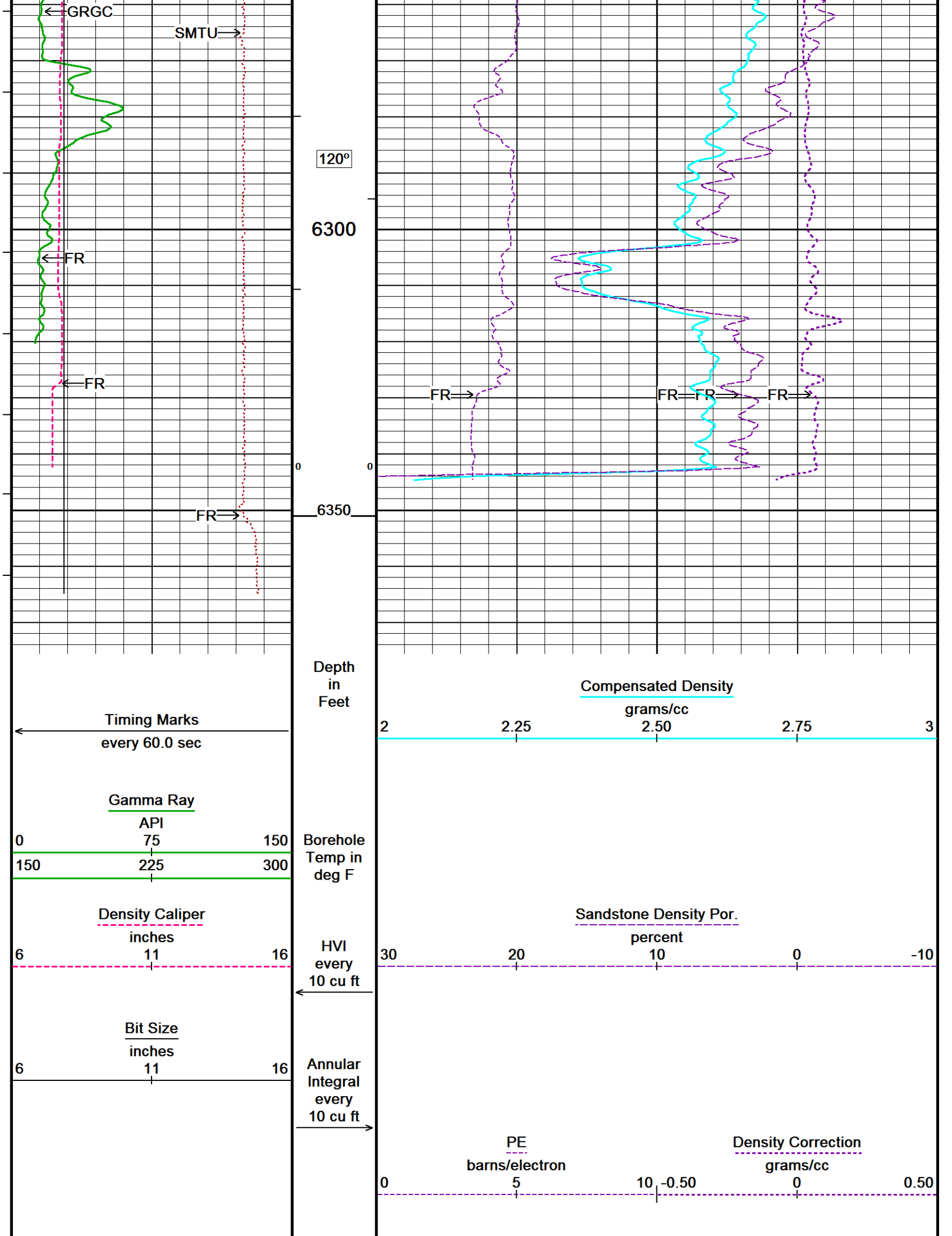
Compensated Density
grams/cc
2 2.25 2.50 2.75 3

Sandstone Density Por.
percent
30 20 10 0 -10


Integral every 10 cu ft
PE
barns/electron
0
5
10
Density Correction
grams/cc
-0.50
0
0.50
DST Uphole Tension
pounds
5000
0
Replay Scale 1:240
5650
117°
5700
118°
200
5750
118°
5800


BIT
CLDC
GRGC
SMTU
118°
5850
DPRS
PDPE
DEN
DCOR
118°
100
5900
118°
5950
118°
6000
119°


6050
120°
6100
121°
6150
121°
6200
120°
6250
BIT
CLDC
PDPE
DPRS
DEN
DCOR


GRGC
SMTU
120°
6300
FR
FR
FR
FR
FR
FR
FR
0
0
6350
Depth
in
Feet
Timing Marks
every 60.0 sec
Compensated Density
grams/cc
2
2.25
2.50
2.75
3
Gamma Ray
API
0
75
150
150
225
300
Borehole
Temp in
deg F
Density Caliper
inches
6
11
16
HVI
every
10 cu ft
Sandstone Density Por.
percent
30
20
10
0
-10
Bit Size
inches
6
11
16
Annular
Integral
every
10 cu ft
PE
barns/electron
0
5
10
Density Correction
grams/cc
-0.50
0
0.50

DST Uphole Tension
pounds
5000 0

Replay Scale 1:240

Depth Based Data - Maximum Sampling Increment 10.0cm
Filename: C:\Minimus 18.01.6830\Data\O'Brien (Charity May 1A)\REPEAT PASS.dta
System Versions: Logged with 18.01.6830 Processed with 18.01.6830 Plotted with 18.01.6830

Plotted on 19-JUN-2018 07:39
Recorded on 19-JUN-2018 03:37

REPEAT SECTION BULK DENSITY SANDSTONE

10 INCH HIGH RESOLUTION BULK DENSITY SANDSTONE

Depth Based Data - Maximum Sampling Increment 2.5cm
Filename: C:\Minimus 18.01.6830\Data\O'Brien (Charity May 1A)\HIGH RES PASS.dta
System Versions: Logged with 18.01.6830 Plotted with 18.01.6830

Plotted on 19-JUN-2018 07:39
Recorded on 19-JUN-2018 03:37

Timing Marks
every 60.0 sec

Depth in Feet

Vectar Processed Density
grams/cc
2 2.25 2.50 2.75 3

Gamma Ray
API
0 75 150
150 225 300

Borehole Temp in deg F

Density Caliper
inches
6 11 16

Sandstone Density Por.
percent
30 20 10 0 -10

HVI every 10 cu ft

Bit Size
inches
6 11 16

Annular Integral every 10 cu ft

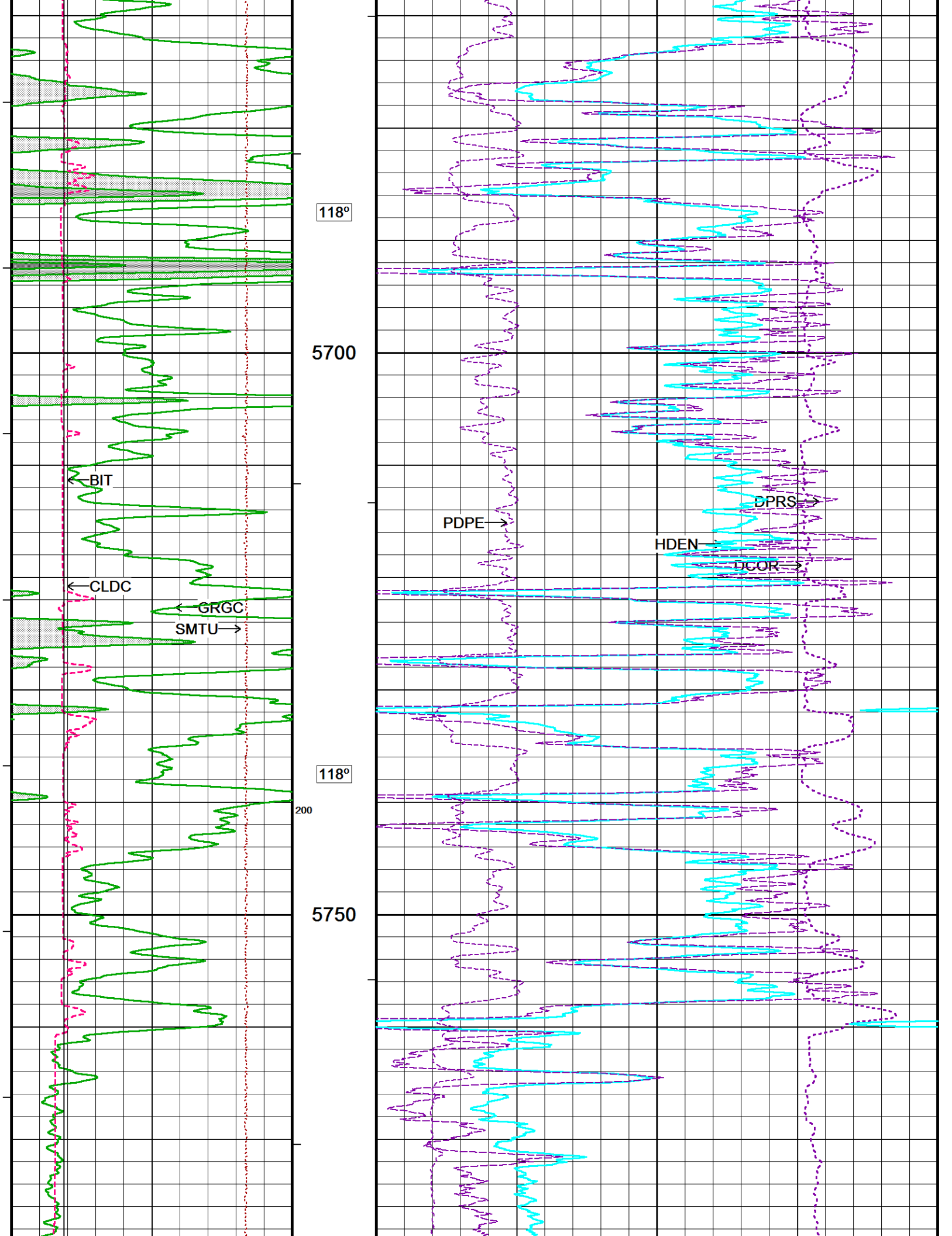
PE
barns/electron
0 5 10

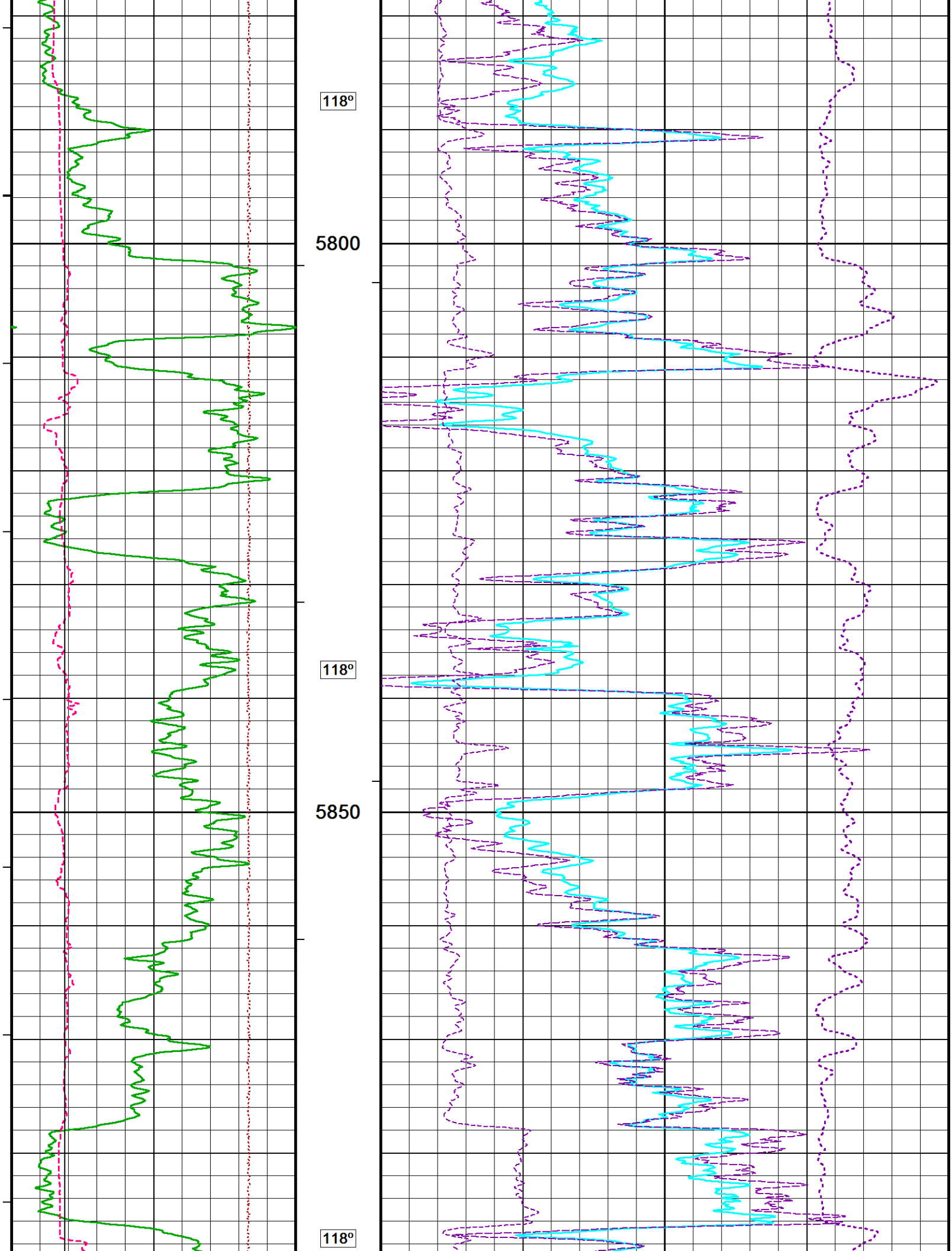
Density Correction
grams/cc
-0.50 0 0.50

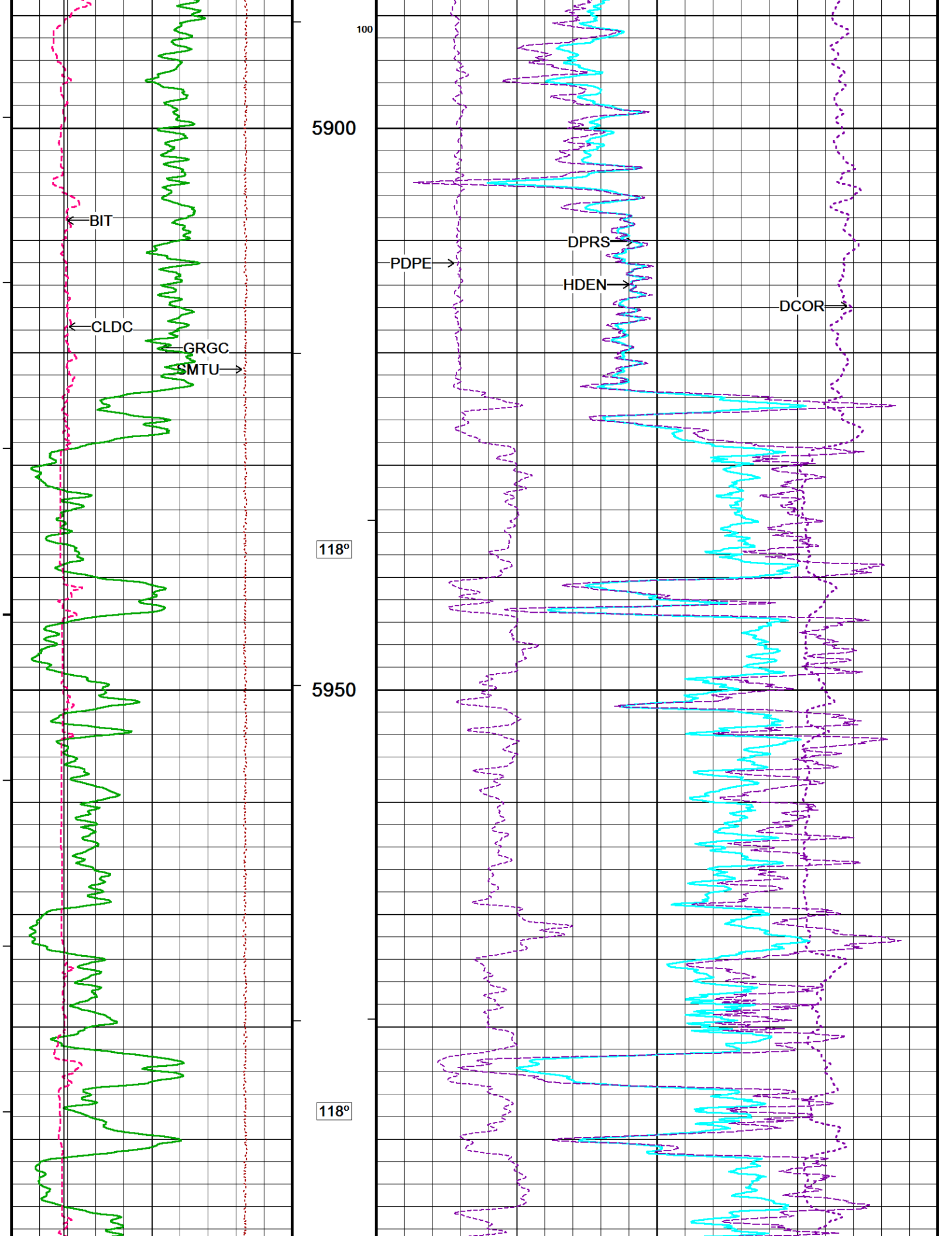
DST Uphole Tension
pounds
5000 0

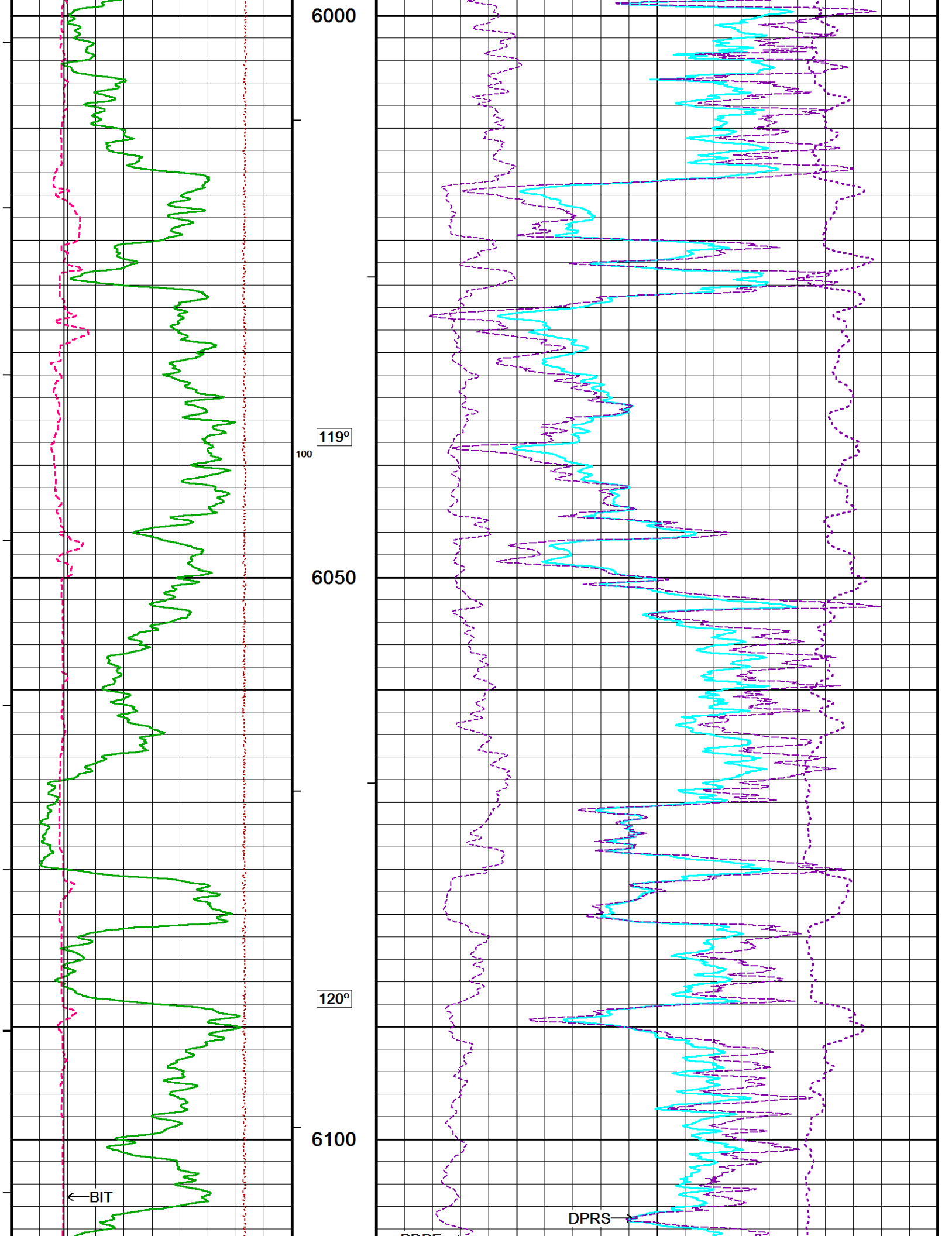
Replay Scale 1:120

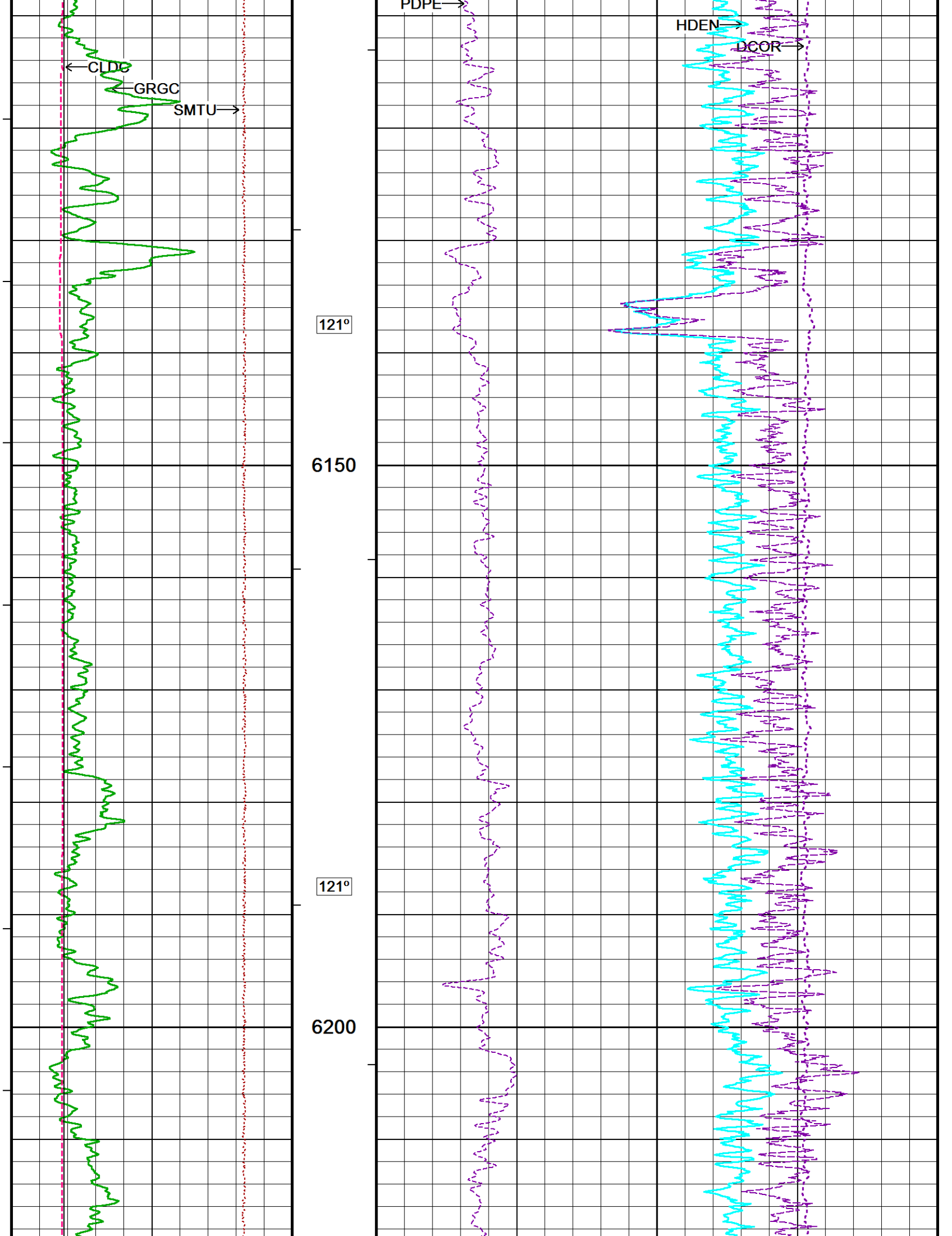
5650

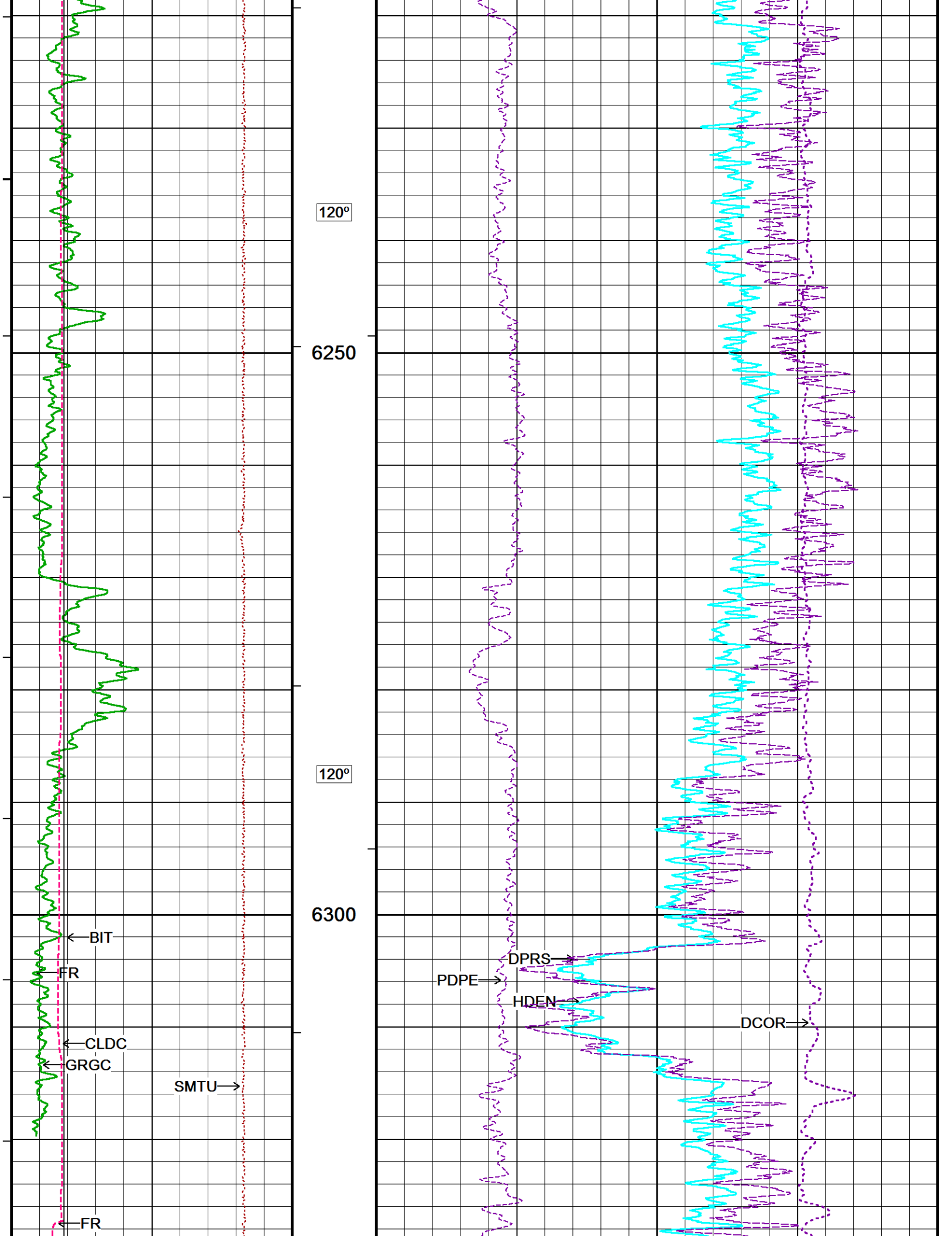

118°
5700
BIT
CLDC
GRGC
SMTU
PDPE
DPRS
HDEN
DCOR
118°
200
5750

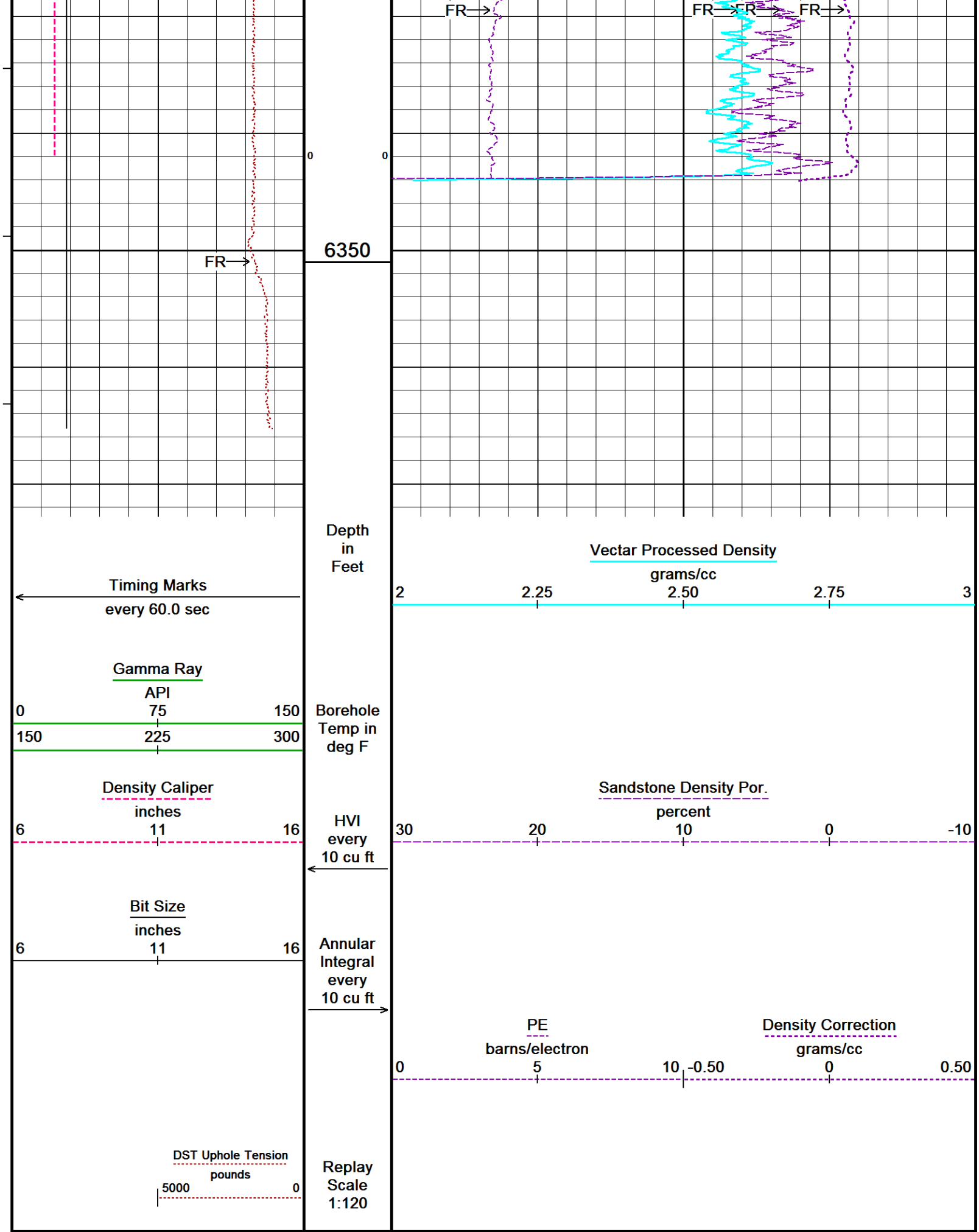

118°
5800
118°
5850
118°


100
5900
BIT
CLDC
GRGC
SMTU
PDPE
DPRS
HDEN
DCOR
118°
5950
118°


6000
119°
100
6050
120°
6100
←BIT
DPRS→


CLDC
GRGC
SMTU
PDPE
HDEN
DCOR
121°
6150
121°
6200


120°
6250
120°
6300
BIT
FR
CLDC
GRGC
SMTU
FR
DPRS
PDPE
HDEN
DCOR



Depth Based Data - Maximum Sampling Increment 2.5cm

Plotted on 19-JUN-2018 07:39

Filename: C:\Minimus 18.01.6830\Data\O'Brien (Charity May 1A)\HIGH RES PASS.dta

Recorded on 19-JUN-2018 03:37

System Versions: Logged with 18.01.6830 Plotted with 18.01.6830

System Versions: Logged with 18.01.6830 Plotted with 18.01.6830

10 INCH HIGH RESOLUTION BULK DENSITY SANDSTONE

BEFORE SURVEY CALIBRATION

C:\Minimus 18.01.6830\Data\O'Brien (Charity May 1A)\REPEAT PASS.dta

General Constants All 000

Last Edited on 19-JUN-2018,03:11

General Parameters		
Mud Resistivity	0.940	ohm-metres
Mud Resistivity Temperature	82.000	degrees F
Water Level	0.000	feet
Borehole Fluid Processing	Wet Hole	
Hole/Annular Volume and Differential Caliper Parameters		
HVOL Method	Single Caliper	
HVOL Caliper 1	Density Caliper	
HVOL Caliper 2	N/A	
Annular Volume Diameter	4.500	inches
Caliper for Differential Caliper	Density Caliper	
Rwa Parameters		
Porosity used	Crossplot Porosity	
Resistivity used	Array Ind. Two Res Rt	
RWA Constant A	0.620	
RWA Constant M	2.150	
SW/APOR Tool Source	0.000	

Down-hole Tension Calibration SMS 0

Field Calibration on 18-JUN-2018 12:36

Reading No	Measured	Calibrated (lbs)
1	15436.84	0.00
2	16614.12	522.50

Gamma Calibration MCG-D.A 246

Field Calibration on 18-JUN-2018 03:51

	Measured	Calibrated (API)
Background	57	39
Calibrator (Gross)	734	495
Calibrator (Net)	676	456

Gamma Calibration Tolerances MCG-D.A 246

Ratio 1.483 (1.40 | 1.475 | 1.55) Counts/API

Gamma Constants MCG-D.A 246

Last Edited on 19-JUN-2018,02:57

Gamma Calibrator Number	MCGGRCC141	
GRC-M Calibrator Jig in Use?	NO	
Inactive Background Jig in Use?	NO	
Mud Density	1.07	gm/cc
Caliper Source for Processing	Density Caliper	
Tool Position	Eccentred	
Potassium Equivalence	Chloride	
K Mud Concentration	0.00	%

High Resolution Temperature Calibration MCG-D.A 246

Field Calibration on 18-JUN-2018,03:47

	Measured	Calibrated(Deg F)
Lower	50.00	50.00
Upper	212.00	212.00

High Resolution Temperature Constants MCG-D.A 246

Last Edited on 07-JUN-2018,10:42

Pre-filter Length	11

SP Calibration MCG-D.A 246

Field Calibration on 18-JUN-2018,03:47

	Measured	Calibrated (mV)
Reference 1	103.5	100.0
Reference 2	-96.9	-100.1

Micro Normal and Micro Inverse Calibration MMR-B.A 91

Base Calibration on 16-JUN-2018,03:08
Field Check on 18-JUN-2018 03:31

	Resistor 1 (ohm)	Resistor 2 (ohm)
	10.0	50.0

Base Calibration

	Measured		Calibrated (ohm-m)	
Micro Normal	10.2	49.8	5.1	25.6
Micro Inverse	9.9	49.4	3.4	16.9

Channel	Base Check (ohm-m)	Field Check (ohm-m)
Micro Normal	93.9	93.9
Micro Inverse	62.3	62.3

Micro Normal & Micro Inverse Calibration Tolerance MMR-B.A 91

Micro Normal Res. 1	10.2	-5% 10.0 +5%	ohm	Micro Normal Res. 2	49.8	-5% 50.0 +5% ohm
Micro Inverse Res. 1	9.9	-5% 10.0 +5%	ohm	Micro Inverse Res. 2	49.4	-5% 50.0 +5% ohm
Micro Normal Base Check	93.9	-2% 93.39 +2%	ohm-m			
Micro Inverse Base Check	62.3	-2% 62.26 +2%	ohm-m			
Micro Normal Field Check	93.9	-2% 93.9 +2%	ohm-m			
Micro Inverse Field Check	62.3	-2% 62.3 +2%	ohm-m			

Micro Normal and Micro Inverse Constants MMR-B.A 91

Last Edited on 13-APR-2018,05:04

Pad Type	8-12 in Soft Rubber Inflatable 006-9011-159	
Micro Normal K Factor	0.5110	
Micro Inverse K Factor	0.3380	
Standoff Offset	0.0000	inches

Caliper Calibration MMR-B.A 91

Base Calibration on 07-JUN-2018 13:30
Field Calibration on 18-JUN-2018,03:34

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	13946	5.98
2	17303	7.97
3	20607	9.86
4	24616	11.92
5	0	0.00
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.98	7.97

Caliper Calibration Tolerances MMR-B.A 91

Short Arm Field Cal.	7.98	7.77 7.97 8.17	in

Micro-Resistivity Caliper Constants MMR-B.A 91

Sonde Configuration	Resistivity Mode

Micro Laterolog Calibration MMR-B.A 91

Base Calibration on 31-DEC-1999 00:00
Field Check on 31-DEC-1999 00:00

	Resistor 1 (ohm)	Resistor 2 (ohm)
	0.0	0.0

Base Calibration

	Measured		Calibrated (ohm-m)	
	Ref 1	Ref 2	Ref 1	Ref 2
	0.0	0.0	0.0	0.0

Base Check (ohm-m)	Field Check (ohm-m)
0.0	0.0

Micro Laterolog Constants MMR-B.A 91

Pad Type	6 in Solid Nylon B23059	
Standoff Offset	0.0000	inches

Micro Laterolog K Factor	0.0128	
Micro Laterolog Rm K Factor	N/A	

Mudcake Thickness Correction Constants

Mud Cake Source	Constant Value	
Mud Cake Thickness	0.4000	inches
Mud Cake Thickness Caliper		
Mud Cake Resistivity	0.1500	ohm-m
Mud Cake Resistivity Temp.	20.00	Degrees C
Mud Cake Resistivity Source	Constant Value	
Temp. for Rmc Corr.	MCG External Temperature	

Neutron Calibration MDN-B.A 292

Base Calibration on 18-JUN-2018,03:47
Field Check on 18-JUN-2018 03:58

Base Calibration

	Measured		Calibrated (cps)	
	Near	Far	Near	Far
	2945	91	3714	110
Ratio	32.304		33.764	

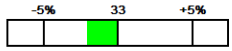
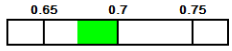
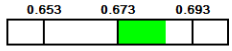
Field Calibrator at Base

	Calibrated (cps)	
	2179	3239
Ratio	0.673	

Field Check

	Calibrated (cps)	
	2196	3203
Ratio	0.685	

Neutron Calibration Tolerances MDN-B.A 292

Ratio	32.304	
Base Check	0.673	
Field Check	0.685	

Neutron Constants MDN-B.A 292

Last Edited on 18-JUN-2018,03:53

Neutron Source Id	P0204NN	
Neutron Jig Number	NJ5736	
Air Hole Processing	Modified Ratio	
Caliper Source for Processing	Density Caliper	
Stand-off	0.00	inches
Mud Density	1.00	gm/cc
Limestone Sigma	7.10	cu
Sandstone Sigma	4.26	cu
Dolomite Sigma	4.70	cu
Formation Pressure Source	None	
Formation Pressure	N/A	kpsi
Temperature Source	Constant Value	
Temperature	68.00	degrees F
Mud Salinity	0.00	kppm
Salinity Correction	Not Applied	
Formation Fluid Salinity Source	None	
Formation Fluid Salinity	N/A	kppm
Barite Mud Correction	Not Applied	

FE Calibration MFE-A.A 135

Base Calibration on 07-JUN-2018 13:53
Field Check on 18-JUN-2018,03:48

	Resistor 1 (ohm)	Resistor 2 (ohm)
	0.0	1000.0

Base Calibration

	Measured	Calibrated (ohm-m)
Reference 1	0.0	0.0
Reference 2	962.0	126.8
Base Check		281.3
Field Check		281.3

FE Calibration Tolerances MFE-A.A 135

Reference 2	962.0	-3% 980.0 +3%	ohm
Base Check	281.3	-2% 277.0 +2%	ohm-m
Field Check	281.3	-2% 281.3 +2%	ohm-m

FE Constants MFE-A.A 135

Last Edited on 18-JUN-2018,03:48

Running Mode	No Sleeve
MFE K Factor	0.1268

Borehole Correction Constants

Sonde Position	0.5	inches
Hole Size Source	Density Caliper	
Hole Size Constant Value	N/A	inches
Rm Source	Global Value: Temperature Corrected	
Temp. for Rm Corr.	MCG External Temperature	

High Resolution Temperature Calibration MAI-A.A 111

Field Calibration on 18-JUN-2018,03:48

	Measured	Calibrated(Deg F)
Lower	10.00	10.00
Upper	100.00	100.00

High Resolution Temperature Constants MAI-A.A 111

Last Edited on 26-JUN-2014,15:06

Pre-filter Length	11

Induction Calibration MAI-A.A 111

Factory Loop Calibration 07-JUN-2018 14:52
Field Check on 18-JUN-2018,03:48

Factory Loop Calibration

High Conductivity Reference Resistor	3.3	ohm
Low Conductivity Reference Resistor	333.3	ohm

	Measured Signal (unitless)		Reference Conductivity (mmho/m)		Calibration	
Array	Low	High	Low	High	Gain	Offset
1 (near)	17.6	473.6	9.3	966.2	0.000	0.0
2	6.4	385.9	7.6	821.4	0.000	0.0
3	3.2	264.0	5.2	566.0	0.000	0.0
4 (far)	2.1	135.5	2.6	279.2	0.000	0.0

Array Temperature 23.0 Deg F

Tool Checks

	Factory Reference (mmho/m)		Before Survey (mmho/m)		
Array	Low	High	Low	High	
1 (near)	11.4	3841.4	11.5	3842.1	
2	29.4	3499.6	29.4	3499.9	
3	28.8	2996.9	28.8	2997.1	
4 (far)	18.9	2041.5	18.9	2041.6	
Array Temperature		83.6		84.7	Deg F

Induction Check Tolerances MAI-A.A 111

Low Array 1	11.5	9.9 11.4 12.9	mmho/m	High Array 1	3842.1	-0.5% 3841.4 +0.5% mmho/m
Low Array 2	29.4	27.9 29.4 30.9	mmho/m	High Array 2	3499.9	-0.5% 3499.6 +0.5% mmho/m
Low Array 3	28.8	27.3 28.8 30.3	mmho/m	High Array 3	2997.1	-0.5% 2996.9 +0.5% mmho/m
Low Array 4	18.9	17.4 18.9 20.4	mmho/m	High Array 4	2041.6	-0.5% 2041.5 +0.5% mmho/m

Induction Constants MAI-A.A 111

Last Edited on 18-JUN-2018,03:48

Induction Model	RtAP-WBM

Borehole Correction Constants

Tool Centred	No	
Hole Size Source	Density Caliper	
Hole Size Constant Value	N/A	inches
Stand-off Type	Fins	

Stand-off	0.50	inches
Number of Fins on Stand-off	8.0000	
Stand-off Fin Angle	45.00	degrees
Stand-off Fin Width	0.5000	inches
Rm Source	Global Value: Temperature Corrected	
Temp. for Rm Corr.	MCG External Temperature	
Borehole Correction Method	Default	
Squasher Start	0.0020	mhos/metre
Squasher Offset	N/A	mhos/metre

Borehole Normalisation

DRM1	0.0000	DRC1	0.0000
DRM2	0.0000	DRC2	0.0000
MRM1	0.0000	MRC1	0.0000
MRM2	0.0000	MRC2	0.0000
SRM1	0.0000	SRC1	0.0000
SRM2	0.0000	SRC2	0.0000

Calibration Site Corrections

Channel 1	0.00	mmhos/metre
Channel 2	0.00	mmhos/metre
Channel 3	0.00	mmhos/metre
Channel 4	0.00	mmhos/metre

Symmetrised Receiver Gains

Receiver 1	1.00
Receiver 2	1.00
Receiver 3	1.00
Receiver 4	1.00

Apparent Porosity and Water Saturation Constants

Archie Constant (A)	1.00	
Cementation Exponent (M)	2.00	
Saturation Exponent (N)	2.00	
Saturation of Water for Apor	100.00	percent
Resistivity of Water for Apor and Sw	0.05	ohm-m
Resistivity of Mud Filtrate for Sw	0.00	ohm-m
Source for Rt	0.00	
Source for Rxo	0.00	

Caliper Calibration MPD-C.A 216

Base Calibration on 07-JUN-2018 14:09
Field Calibration on 18-JUN-2018 03:33

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	14245	3.99
2	22960	5.98
3	31650	7.97
4	39952	9.86
5	49231	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.98	7.97

Caliper Calibration Tolerances MPD-C.A 216

Long Arm Field Cal. 7.98 in

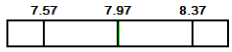


Photo Density Calibration MPD-C.A 216

Base Calibration on 07-JUN-2018 14:35
Field Check on 18-JUN-2018 03:40

Density Calibration

Base Calibration	Measured Near	Measured Far	Calibrated (sdu) Near	Calibrated (sdu) Far
Background	1007	1198		
Reference 1	50088	24364	59556	30836
Reference 2	19851	2273	24941	2541

Field Check at Base

	1006.9	1197.8

Field Check

999.4 1191.4

PE Calibration

Base Calibration	WS	Measured WH	Ratio	Calibrated Ratio
Background	184	903		
Reference 1	21030	49928	0.425	0.371
Reference 2	5765	19740	0.296	0.272

Field Check at Base

184.4 903.5

Field Check

184.2 900.5

Photo Density Calibration Tolerances MPD-C.A 216

Near Density Ratio	2.60	-5% 2.52 +5%	Far Density Ratio	21.54	-5% 21.00 +5%
PE Calibration	0.120	0.089 0.110 0.131			
Near Den. Field Check	999.4	-3% 1006.9 +3%	Far Den. Field Check	1191.4	-3% 1197.8 +3%
PE WS Field Check	184.2	-6% 184.4 +6%	PE WH Field Check	900.5	-6% 903.5 +6%

Density Constants MPD-C.A 216

Last Edited on 19-JUN-2018,02:57

Density Source Id	P50557B	
Nylon Calibrator Number	DNCE695	
Aluminium Calibrator Number	DACD698	
Density Shoe Profile	8 inch	
Caliper Source for Processing	Density Caliper	
PE Correction to Density	Not Applied	
Mud Density	1.07	gm/cc
Mud Density Type		
Mud Filtrate Density	1.00	gm/cc
Dry Hole Mud Filtrate Density	1.00	gm/cc
DNCT	0.00	gm/cc
CRCT	0.00	gm/cc
Density Z/A Correction	Hybrid	
Precision Enhanced Density Processing	Not Applied	

Matrix Density (gm/cc)	Depth (ft)
2.71	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00

DOWNHOLE EQUIPMENT

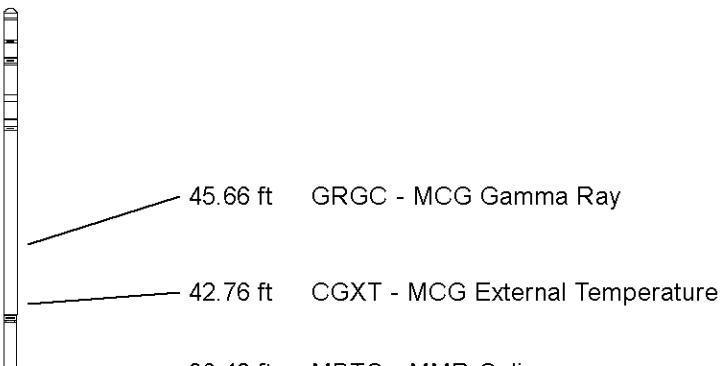
C:\Minimus 18.01.6830\Data\O'Brien (Charity May 1A)\REPEAT PASS.dta

11B Tension Cablehead
MCB-A 1 LG: 2.18 ft WT: 19.8 lb OD: 2.244 in

Compact Swivel Head Adaptor
SHA-J.B 724 LG: 2.30 ft WT: 22.0 lb OD: 2.244 in

Compact Comms Gamma
MCG-D.A 246 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in

Compact Micro-Resistivity
MMR-B.A 91 LG: 8.59 ft WT: 81.6 lb OD: 4.882 in



Compact Neutron
MDN-B.A 292 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

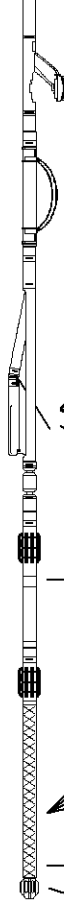
Compact Density/Caliper
MPD-C.A 216 LG: 9.59 ft WT: 90.4 lb OD: 2.913 in

Compact Knuckle Joint
SKJ-D.A 167 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

Compact Focussed Electric
MFE-A.A 135 LG: 6.05 ft WT: 48.5 lb OD: 2.244 in

Compact Induction
MAI-A.A 111 LG: 10.81 ft WT: 48.5 lb OD: 2.244 in

Total Length: 55.43 ft Weight: 449.7 lb



36.40 ft	MBTC - MMR Caliper
35.41 ft	MINV - Micro-inverse
35.41 ft	MNRL - Micro-normal
30.61 ft	NPRL - Limestone Neutron Por.
23.37 ft	AVOL - Annular Volume
23.37 ft	HVOL - Hole Volume
23.37 ft	CLDC - Density Caliper
21.44 ft	DPRL - Limestone Density Por.
21.44 ft	DEN - Compensated Density
21.44 ft	DCOR - Density Correction
21.38 ft	PDPE - PE
13.72 ft	FEFE - Shallow FE
3.34 ft	R40O - Array Ind. One Res 40
3.34 ft	R60O - Array Ind. One Res 60
3.34 ft	CTAO - Array Ind. One Cond Ct
3.34 ft	RTAO - Array Ind. One Res Rt
0.23 ft	SPCG - Spontaneous Potential
Tool Zero	(0.13ft from bottom)
-0.13 ft	SMTU - DST Uphole Tension

All measurements relative to tool zero.

COMPANY	O'BRIEN ENERGY RESOURCES CORP.
WELL	CHARITY MAY #1A-9
FIELD	ANGEL SOUTH
PROVINCE/COUNTY	MEADE
COUNTRY/STATE	USA / KANSAS

Elevation Kelly Bushing	2643.9	feet	First Reading	6330.00	feet
Elevation Drill Floor	2641.9	feet	Depth Driller	6350.00	feet
Elevation Ground Level	2630.9	feet	Depth Logger	6351.00	feet

Weatherford®

COMPACT PHOTO DENSITY
COMPENSATED NEUTRON
MICRORESISTIVITY LOG