

**Tucker**  
ENERGY SERVICES

PHASED INDUCTION

SHALLOW FOCUS SP LOG

File No : TUL-58102  
 Company : BOP WEST  
 Well : HARBIN #3  
 Field : HUNTER NORTH  
 Country : SALINE  
 State : KANSAS  
 Country : U.S.A  
 API No : 15-169-20335

Location :  
 2160' FNL & 330' FEL

LSD : Sect : 7 Twp : 16S Rge : 1W

Company : BOP WEST  
 Well : HARBIN #3  
 Field : HUNTER NORTH  
 Country : SALINE  
 State : KANSAS  
 Country : U.S.A  
 API No. : 15-169-20335

Permanent Datum: GL  
 Drilling Measured From: KB  
 Log Measured From: KB  
 Above Permanent Datum: 0.00 Ft  
 Elevations: KB 1320.00 Ft  
 DF 1319.00 Ft  
 GL 1311.00 Ft

Services: CNP PIT  
 LDT  
 MST

Date	2014-10-11	
Run Number	0	
Depth--Driller	2765.0	Ft
Depth--Logger	2768.0	Ft
First Reading	2767.0	Ft
Last Reading	220.0	Ft
Casing--Driller	220.0	Ft
Casing--Logger	220.0	Ft
Bit Size	7.875	In
Casing Size	8.625	In
Hole Fluid Type	WBM	
Density	9.3	
Fluid Loss	8.2	
PH/Viscosity	9.0	51.0
Sample Source	MEASURED	
RM@Measured Temp.	0.000	@ 0 F
RMF@Measured Temp	0.000	@ 0 F
RMG@Measured Temp.	0.000	@ 0 F
Source RMF/RMC	CALCULATED/CALCULATED	
RM@BHT	0.000	@ 95 F
Time Circulation Stopped	2014-10-10 09:20	
Max Recorded Temp.	95	F
Equipment/Base	TRK 127	TULSA
Recorded By	B.BAILEY	
Witnessed By	FMIZE	

The customer is hereby warned that by providing the log data herein, T. E. S. does not agree to provide any interpretation of log data, conversion of log data to physical rock parameters or recommendations. T. E. S. does not guarantee or warrant either expressly or impliedly, the accuracy of any interpretation of log data, conversion of log data to physical rock parameters or recommendations which may be given by T. E. S. personnel. Any interpretation, conversion or recommendation is not part of the consideration for the agreement between the parties and is not part of any part of the charge by T. E. S. for its services. Any user of the log data is warned that said user is not entitled to rely on interpretations, conversions or recommendations as aforesaid.

Bitsize Intervals		Casing Strings			
Size (In)	Bottom (Ft)	Size (In)	Weight (Lbs)	Bottom (Ft)	Top (Ft)
7.875	2765.00	8.625	32.00	220.00	0.00

Run Number	0	
Date	2014-10-11	
Date/Time On Bottom	2014-10-10 08:20	
Depth to Fluid	0.0	Ft
Salinity	0.000	
RMF@BHT	0.000	@ 95 F
RMC@BHT	0.000	@ 95 F

Run Number 0

Comments

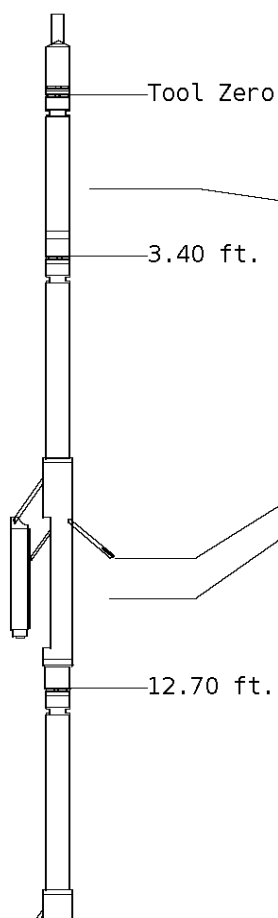
ALL PRESENTATIONS AS PER CUSTOMER REQUEST  
 GRT, CNT, LDT, MLT AND PIT RUN IN COMBINATION  
 CALIPERS ORIENTED ON X-Y AXIS  
 2.71 G/CC USED TO CALCULATE POROSITY  
 ANNULAR HOLE VOLUME CALCULATED USING 5.5" PRODUCTION CASING  
 PHIN IS CALIPER CORRECTED

GRT: GRP, GRX  
 CNT: PHIN, CLCNIN, PHXN  
 LDT: PORL, LCORN, PECLN, LDENN, PORLLS, CLLDIN, PRXL, PECLX, LDENNX, LCORX  
 MLT: NOR\_RF, INV\_RF, MSCLPIN  
 PIT: ILD, ILM, SPU, SFLAEC, CIRD

OPERATORS:  
 J.JOHNSON  
 C.GONZALES

### 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-117

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-146

**Source ID** :N-1044

**Pad ID** :CNP-AA-115

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-AH-152

**Source ID** :CSV-587

**Pad ID** :LDP-DA-50

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

22.00 ft.

**Tool:** MST-DA      **Length:** 9.66 ft.    **O.D.** 6.00 in.  
 Micro Spherically Focused (IC)  
**Sonde ID** :MST-DA-024

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

31.66 ft.

**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

LWT — 53.15 ft.

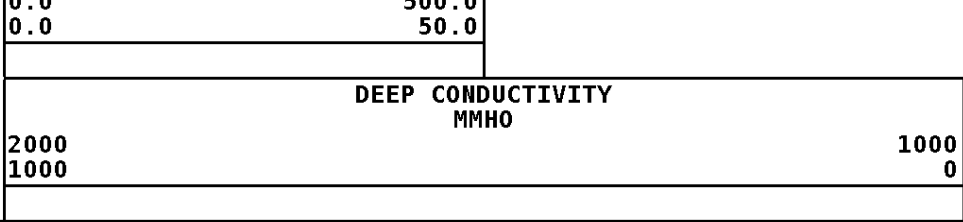
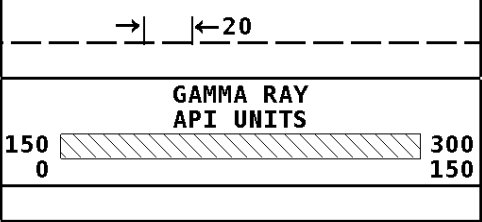
<b>Well File:</b> BOP HAR 3 OCT11_MST	<b>Scale:</b> 1:600	<b>Format:</b> DIL-600
<b>Segment:</b> V1.D2.S10 MAIN	<b>Acquired:</b> Not Available	
<b>Reference:</b> 0	<b>Processed:</b> Not Available	

<b>TENSION</b> LBS	0
10000	0

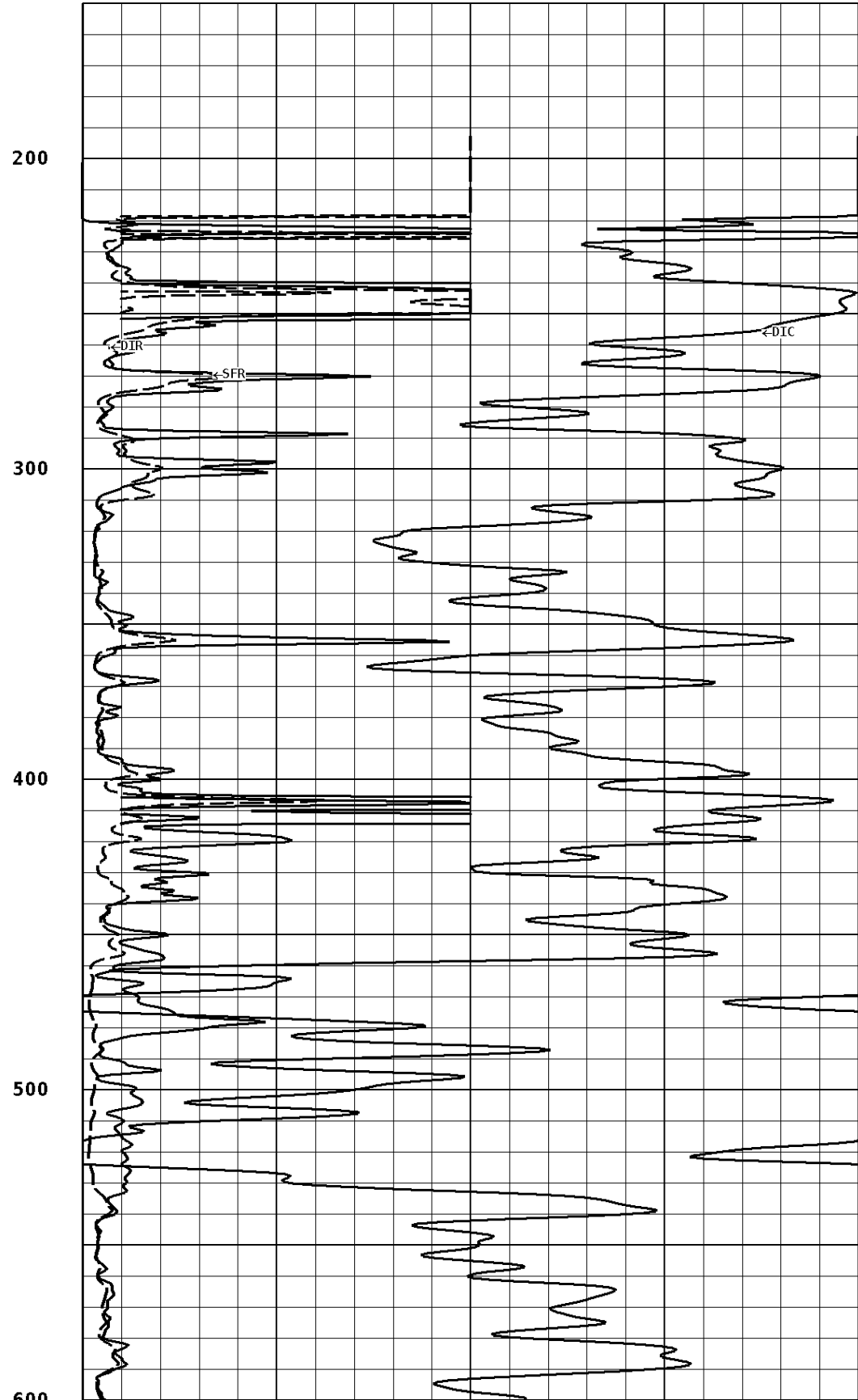
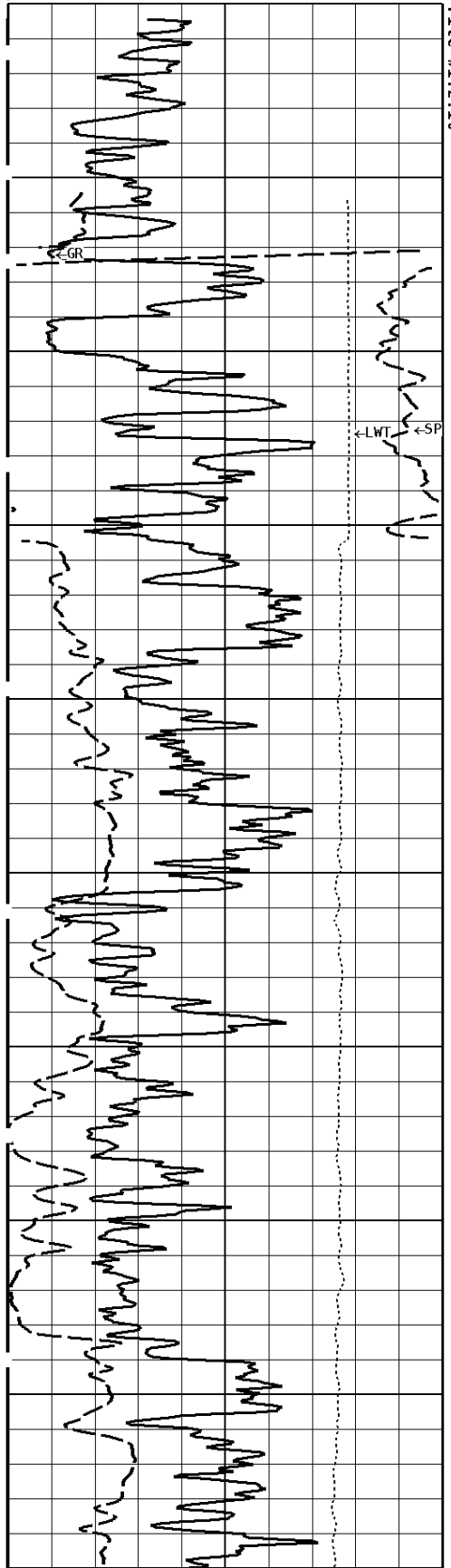
<b>DEEP INDUCTION</b> OHMM	500.0
0.0	50.0
0.0	50.0

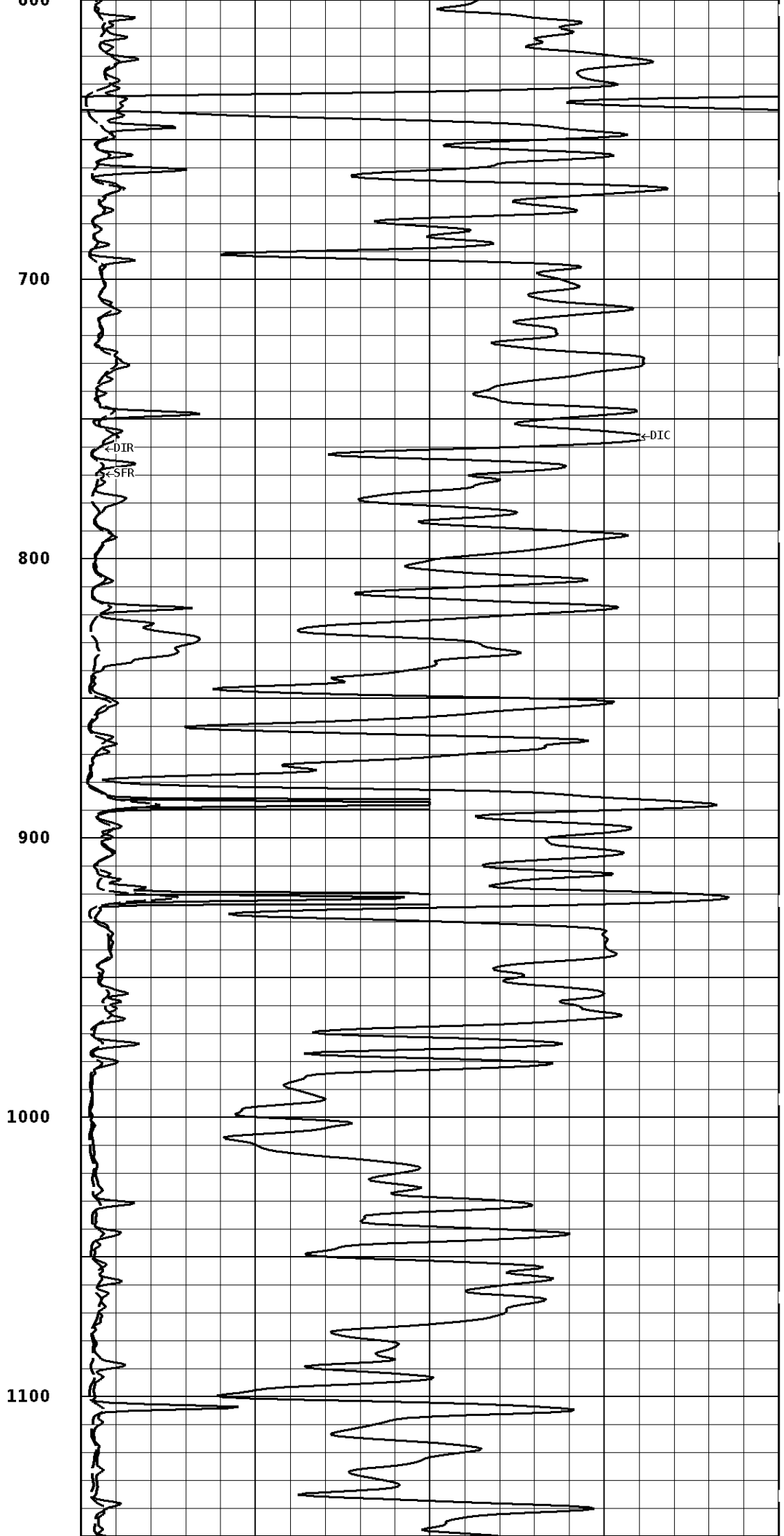
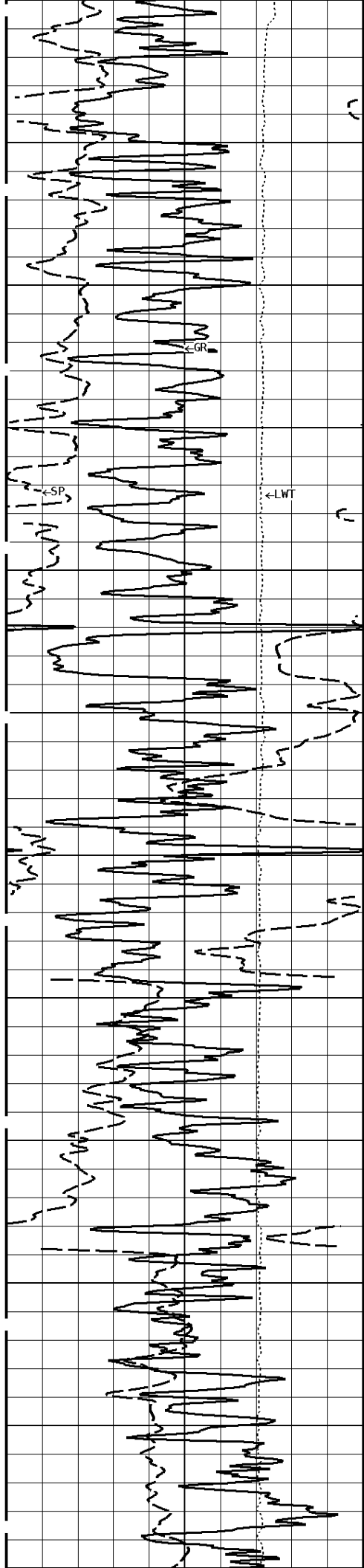
<b>SPONTANEOUS POTENTIAL</b> mV	0
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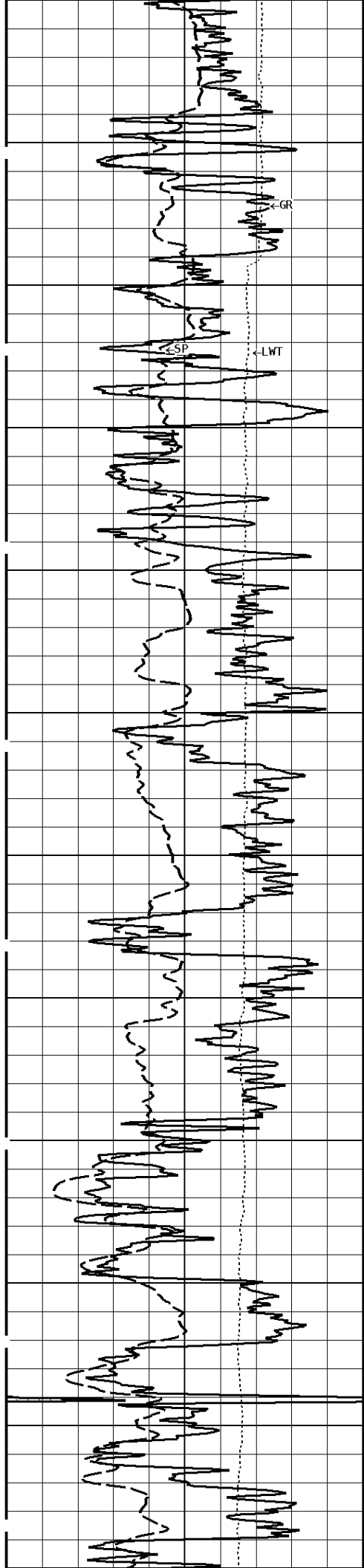
<b>SHALLOW FOCUSED RESISTIVITY</b> OHMM	500.0
0.0	500.0



## 1:600 MAIN SECTION







1200

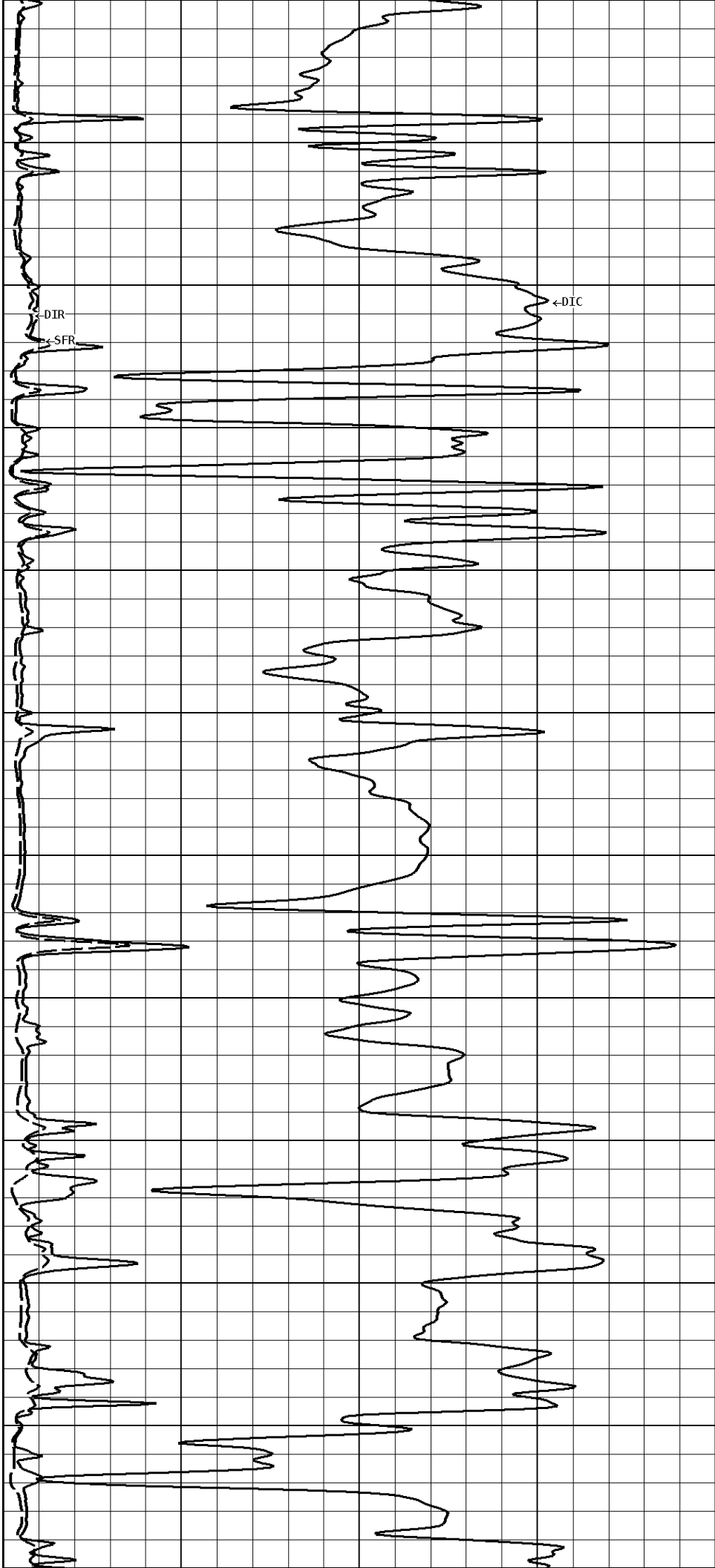
1300

1400

1500

1600

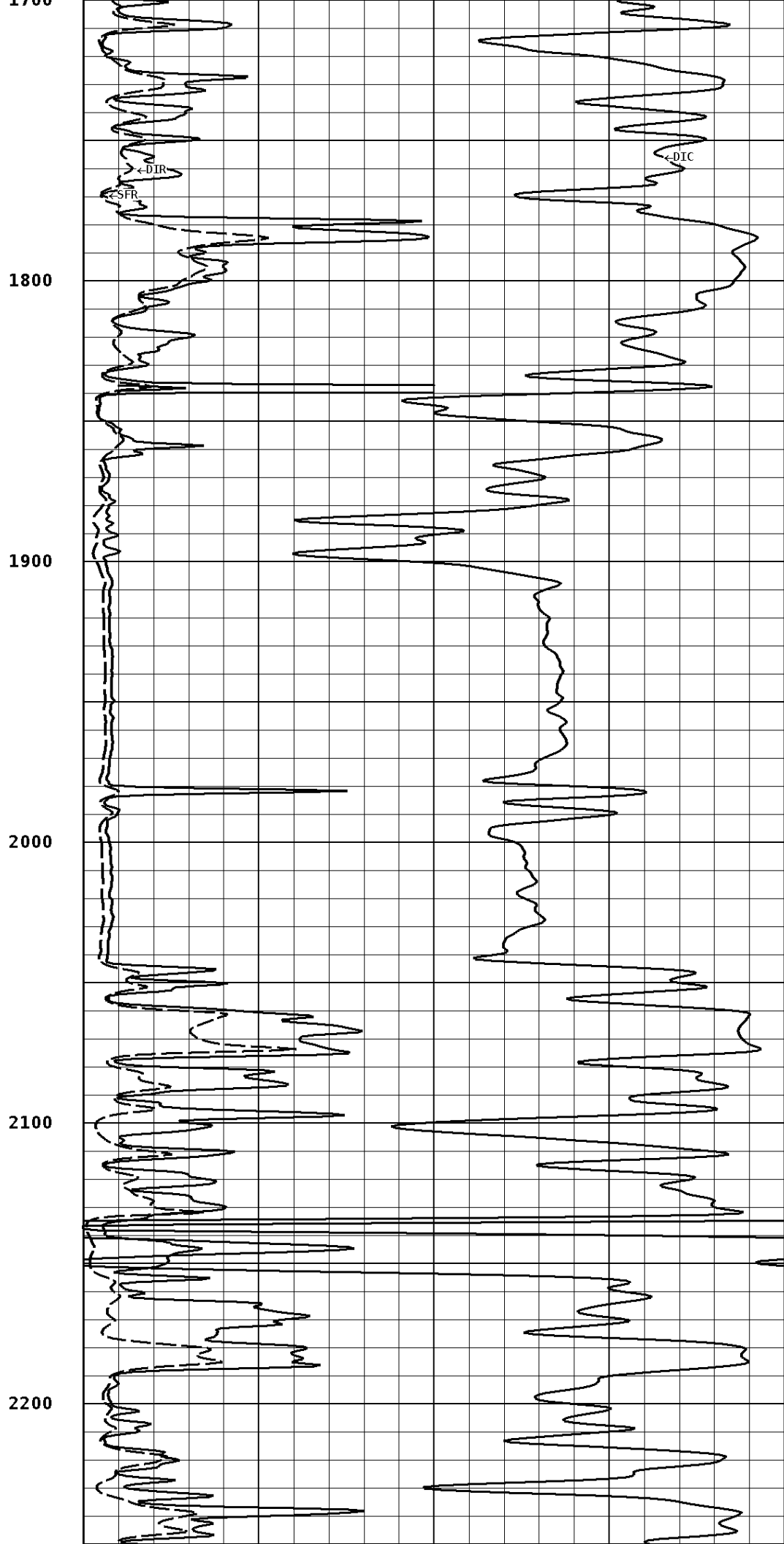
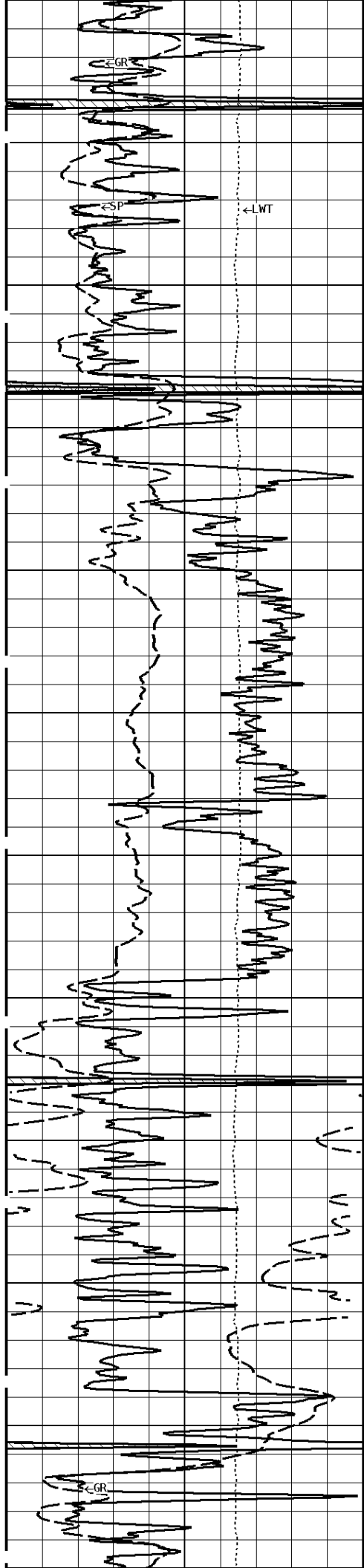
1700



DIR

SFR

DIC



1700

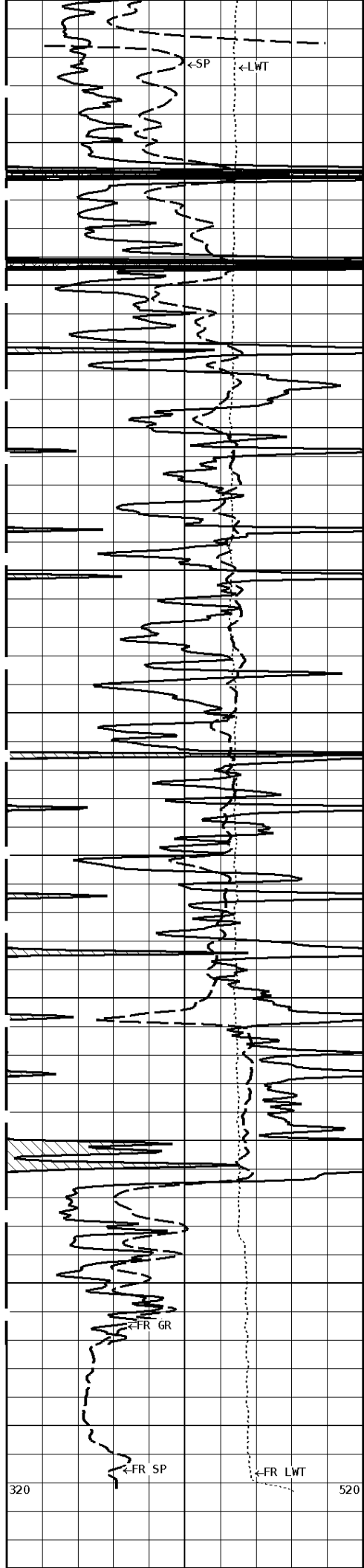
1800

1900

2000

2100

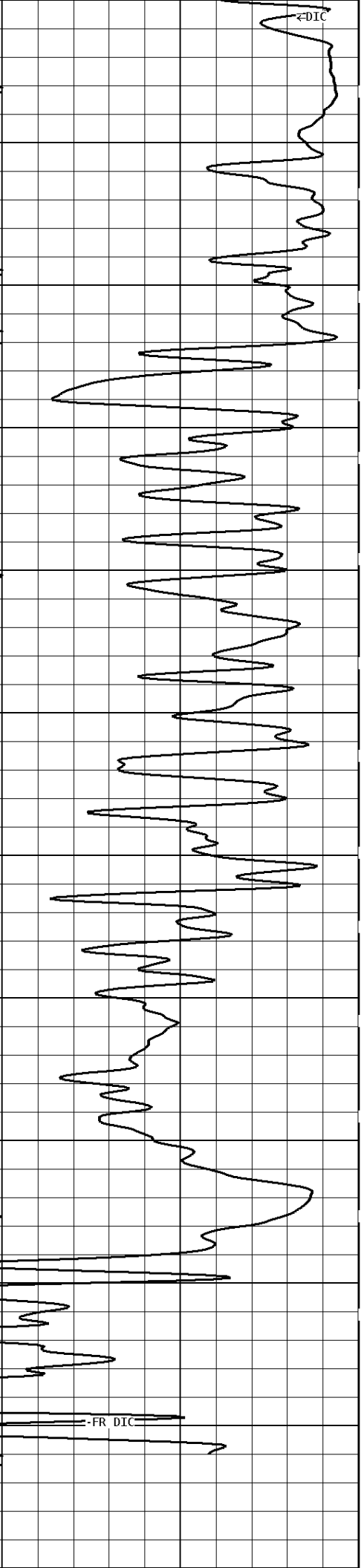
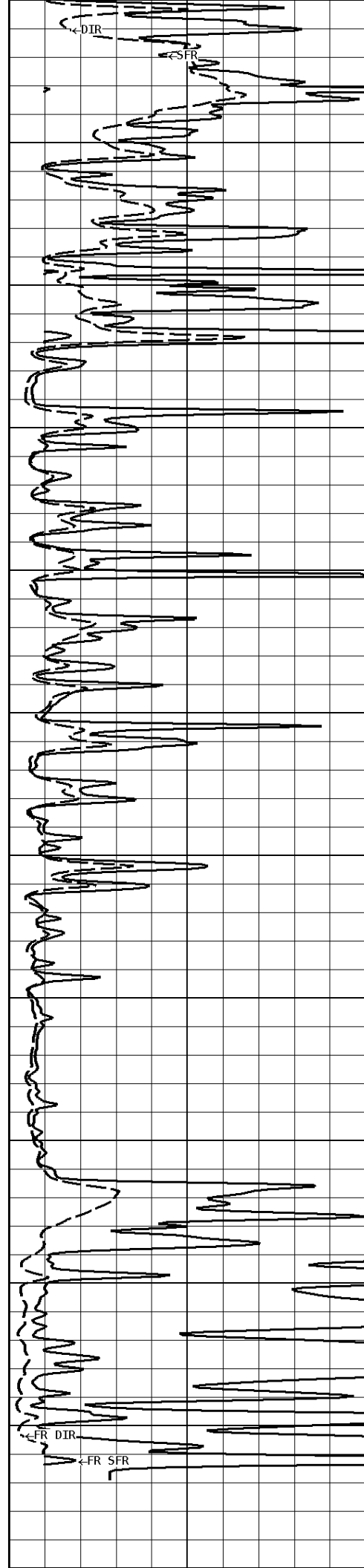
2200



2300  
2400  
2500  
2600  
2700  
2768

320 520

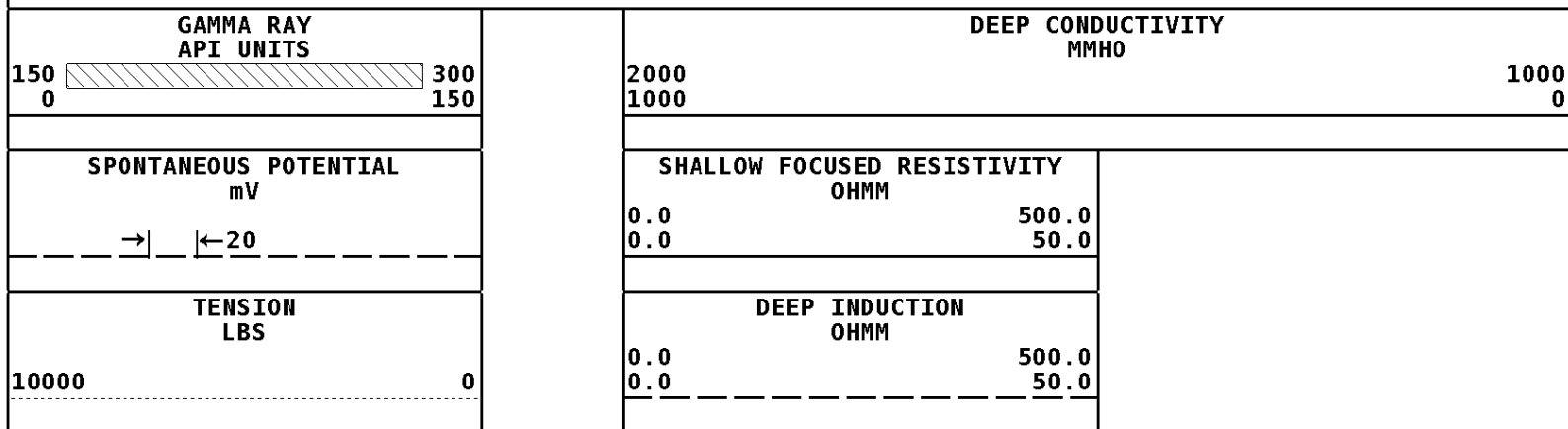
File #1.2.10



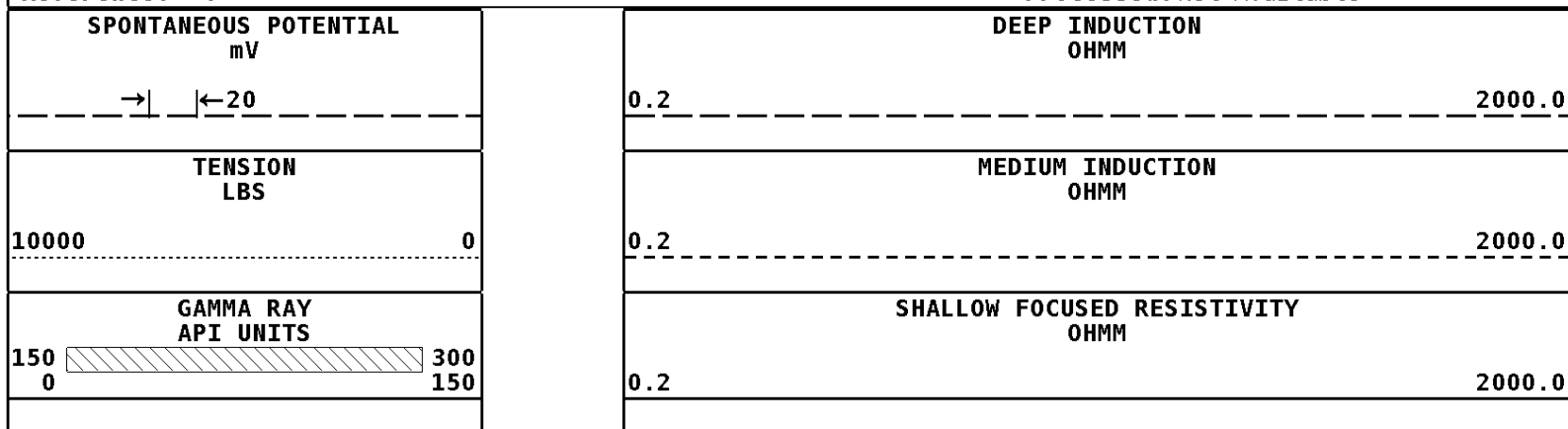
2768

FR DIR  
FR SFR  
FR DIC

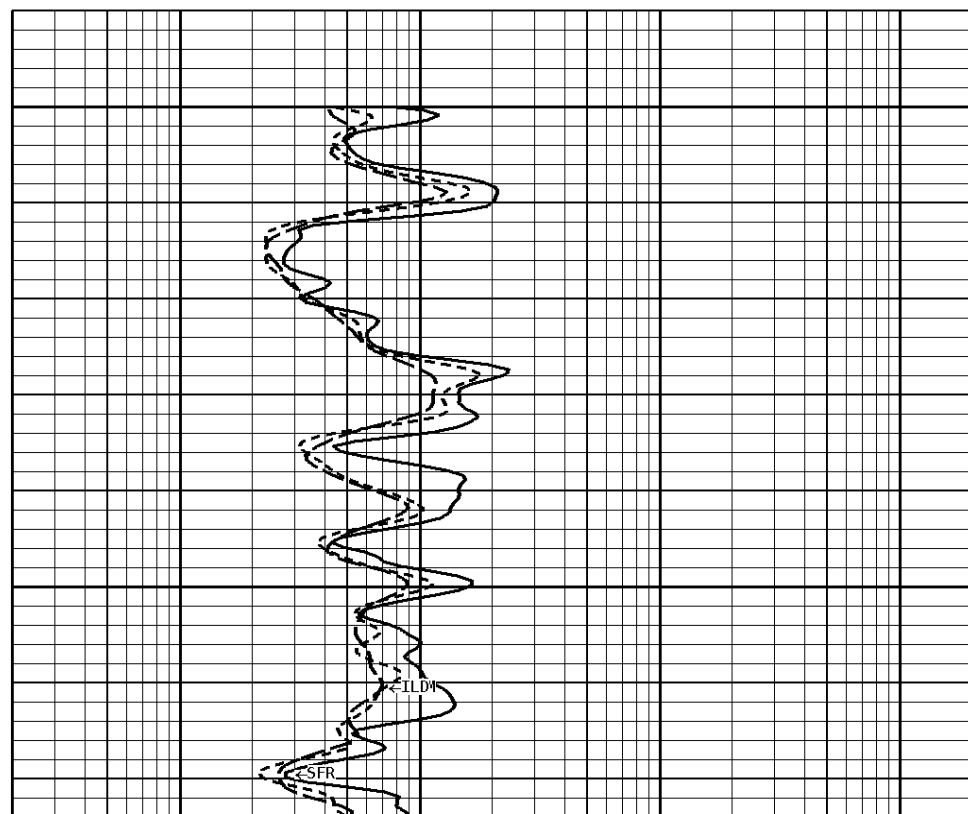
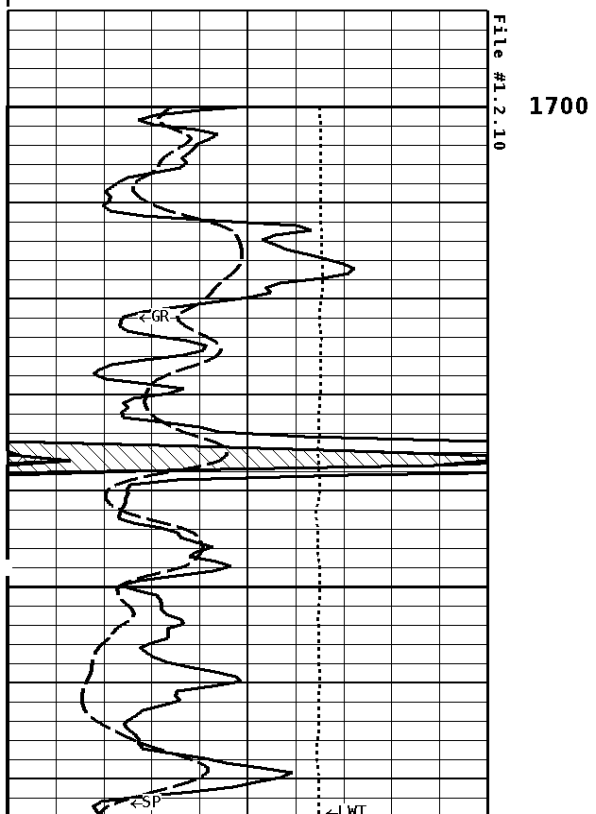
# 1:600 MAIN SECTION

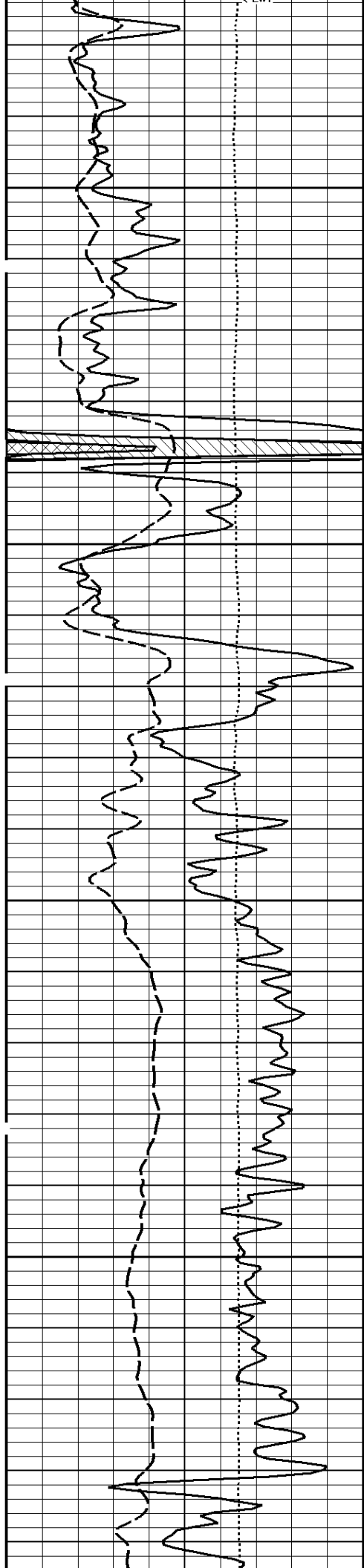


Well File: BOP HAR 3 OCT11\_MST Scale: 1:240 Format: DIL-240  
 Segment: V1.D2.S10 MAIN Acquired: Not Available  
 Reference: 0 Processed: Not Available



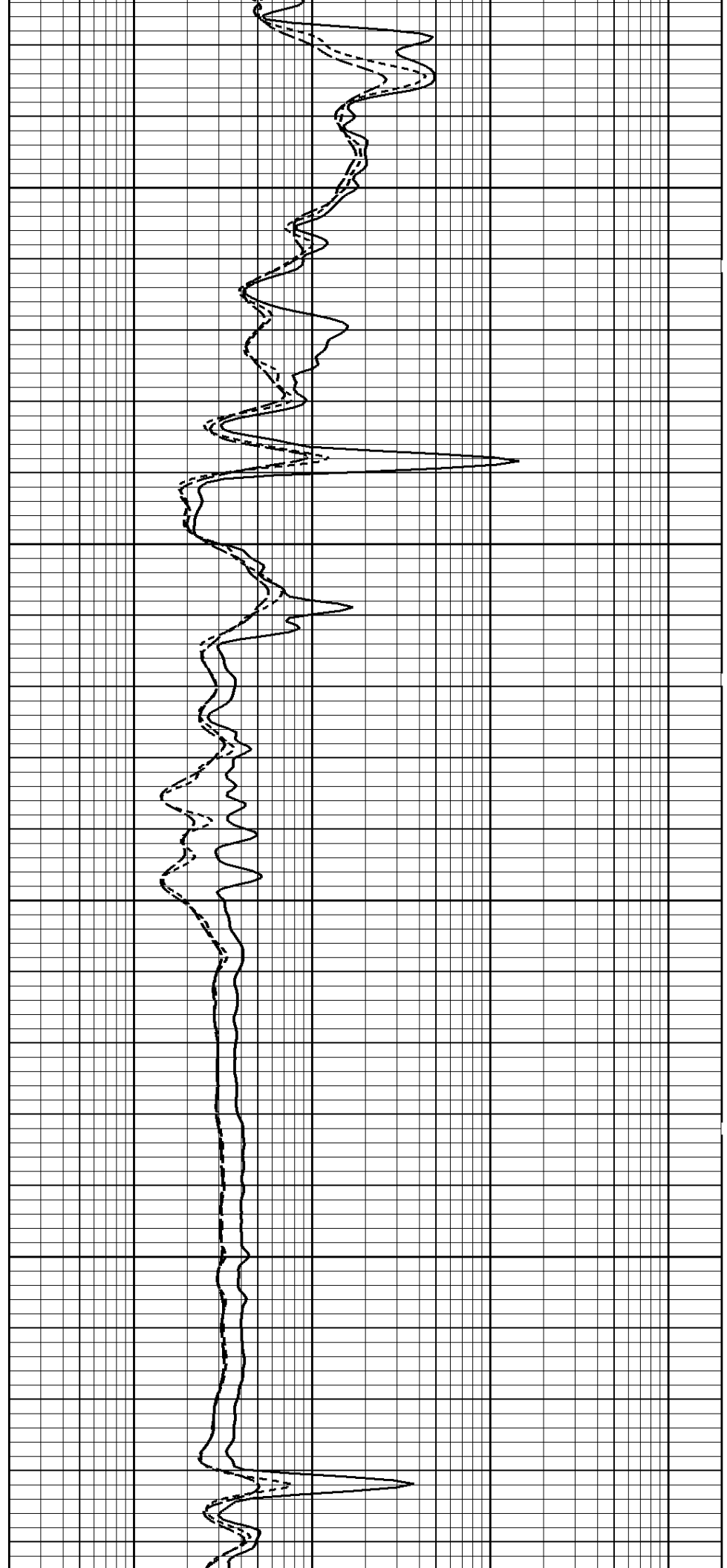
# 1:240 MAIN SECTION

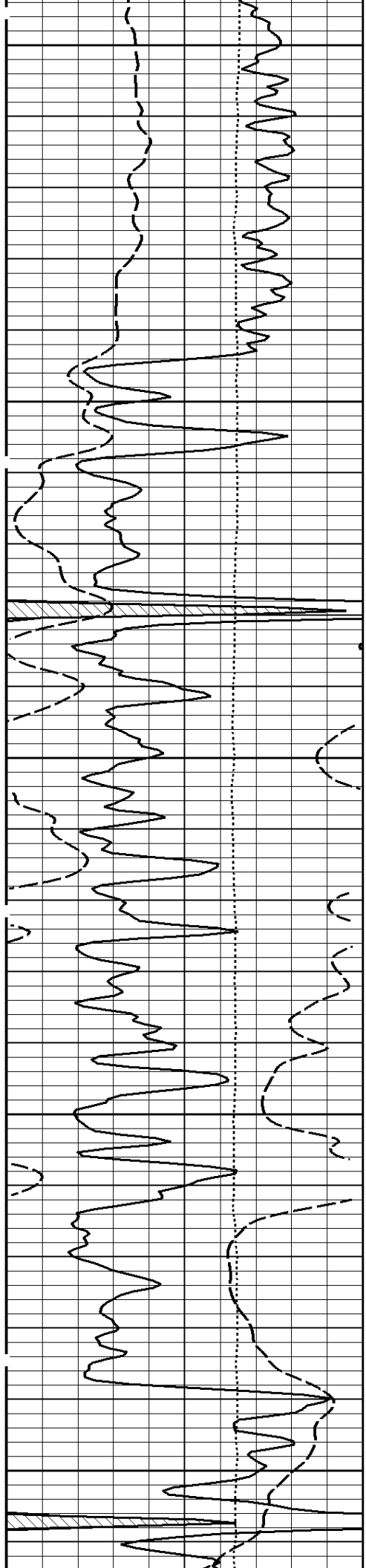




1800

1900

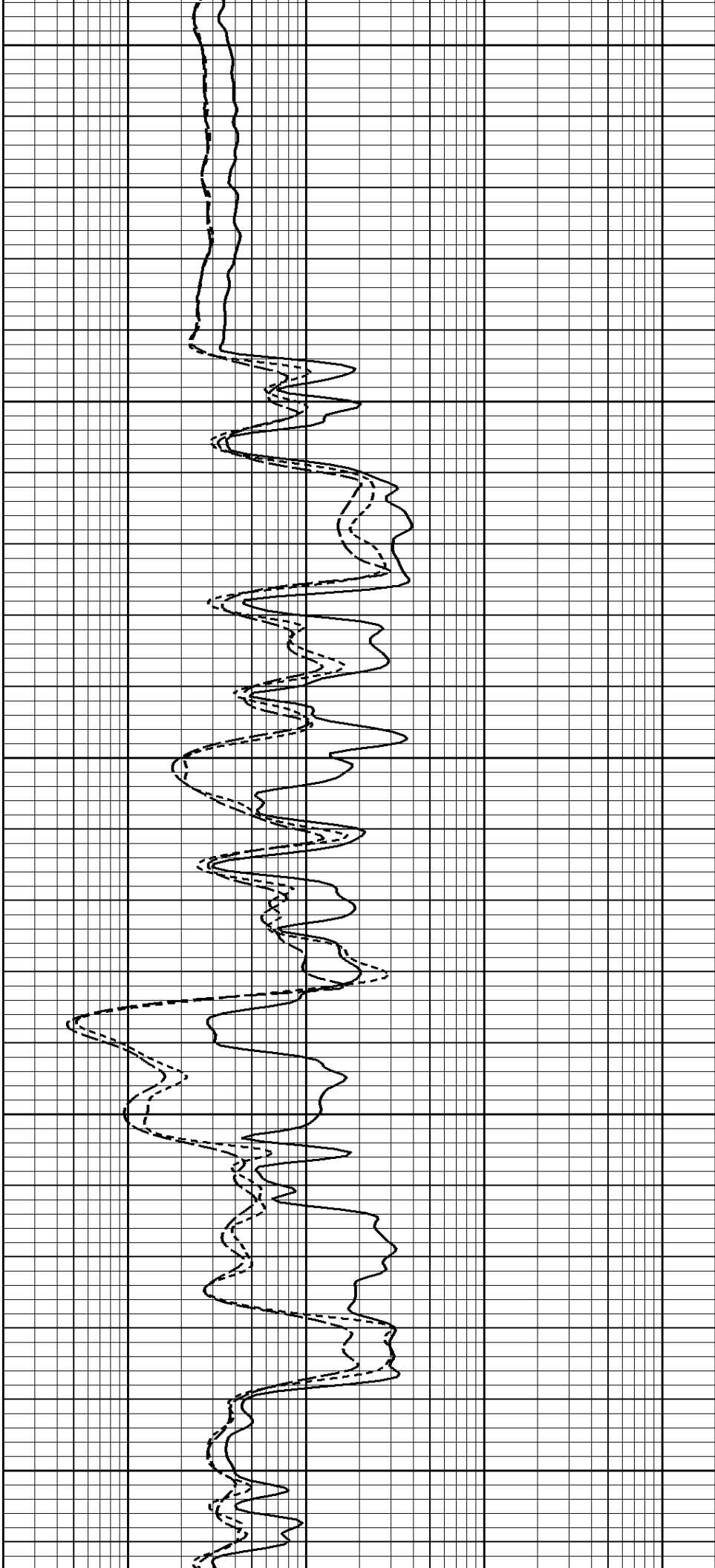


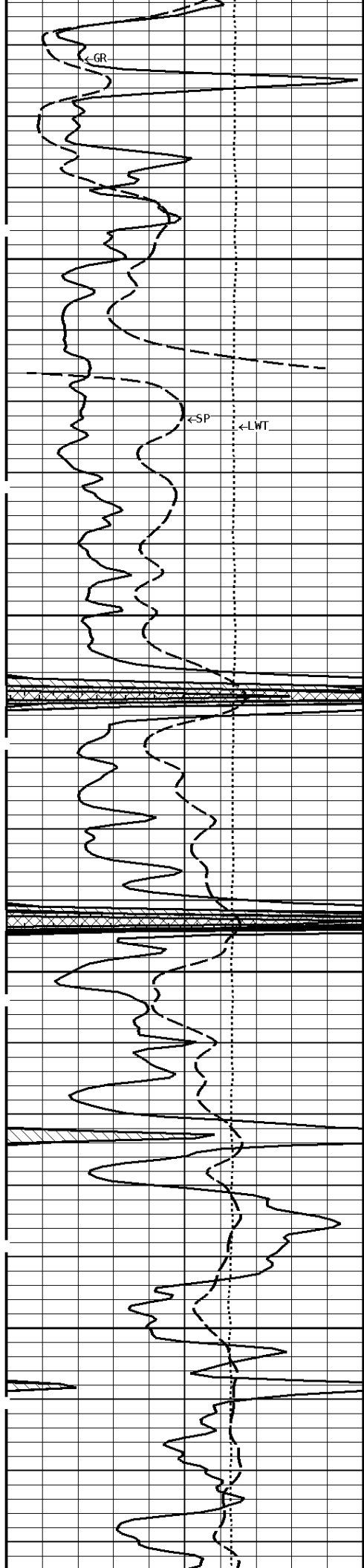


2000

2100

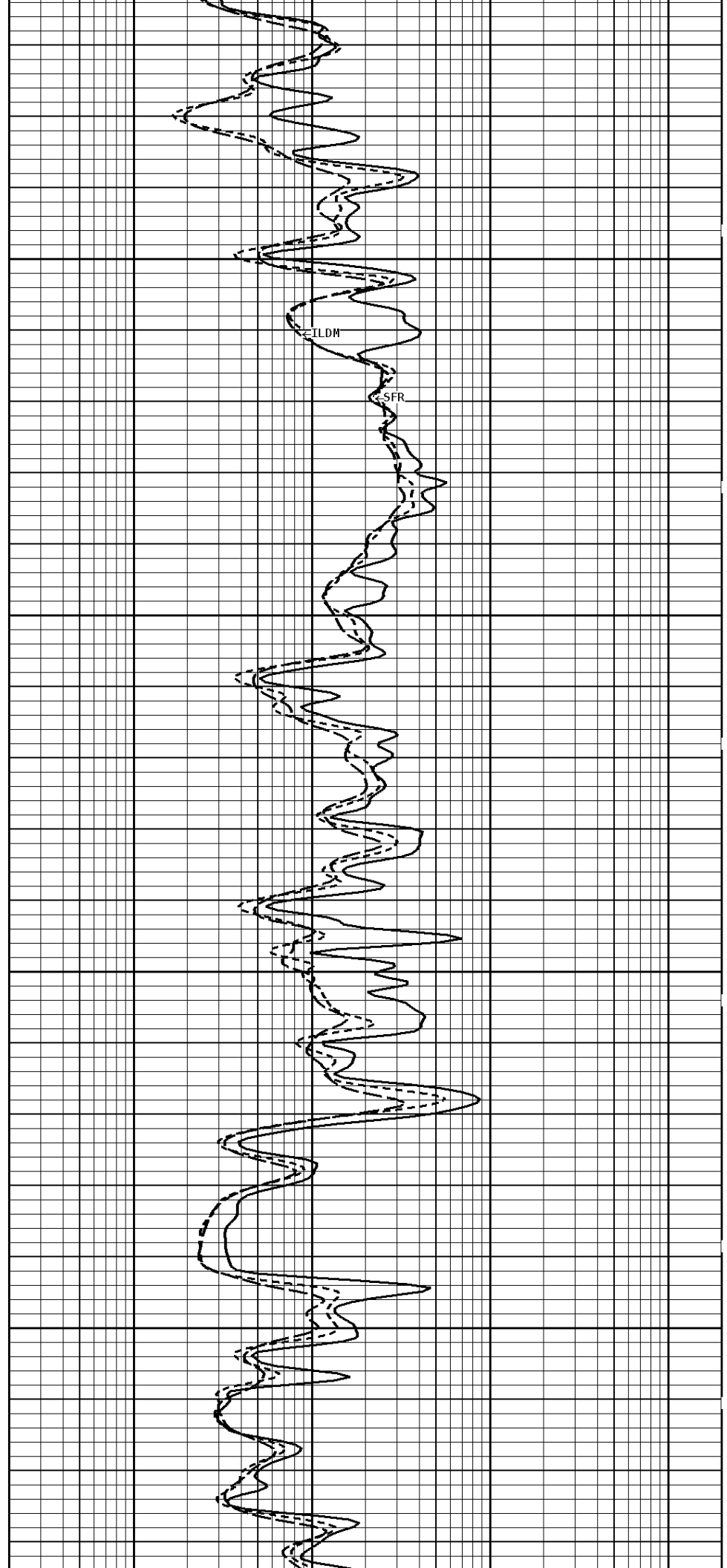
2200

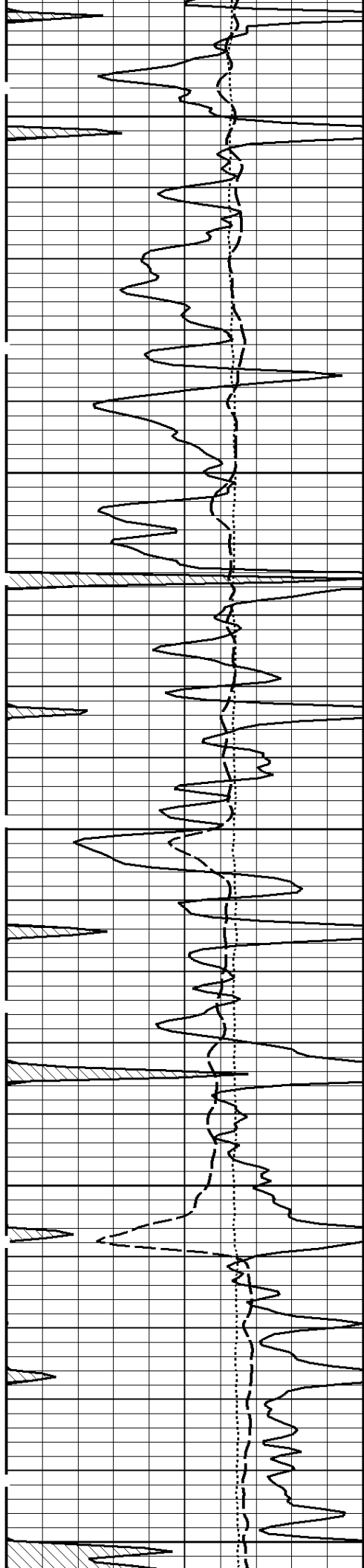




2300

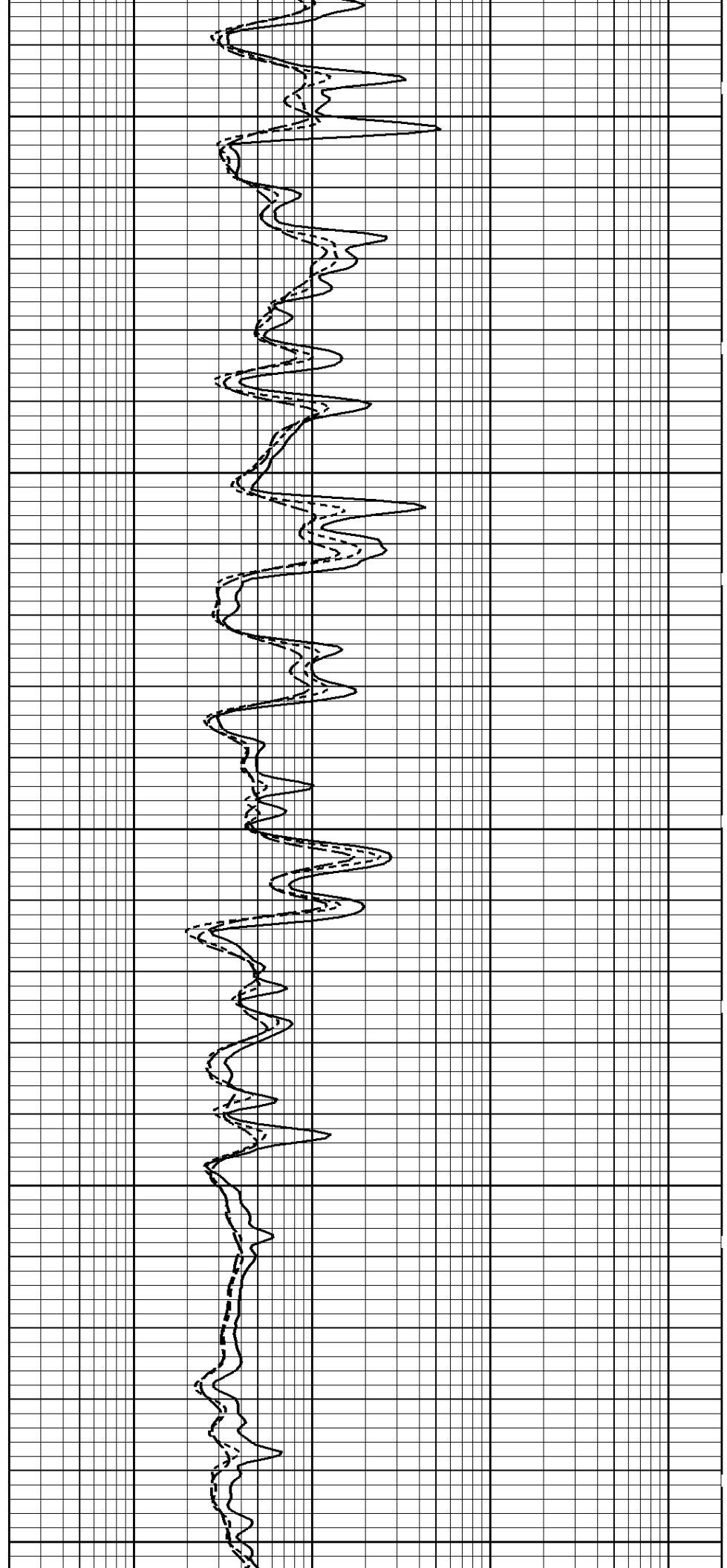
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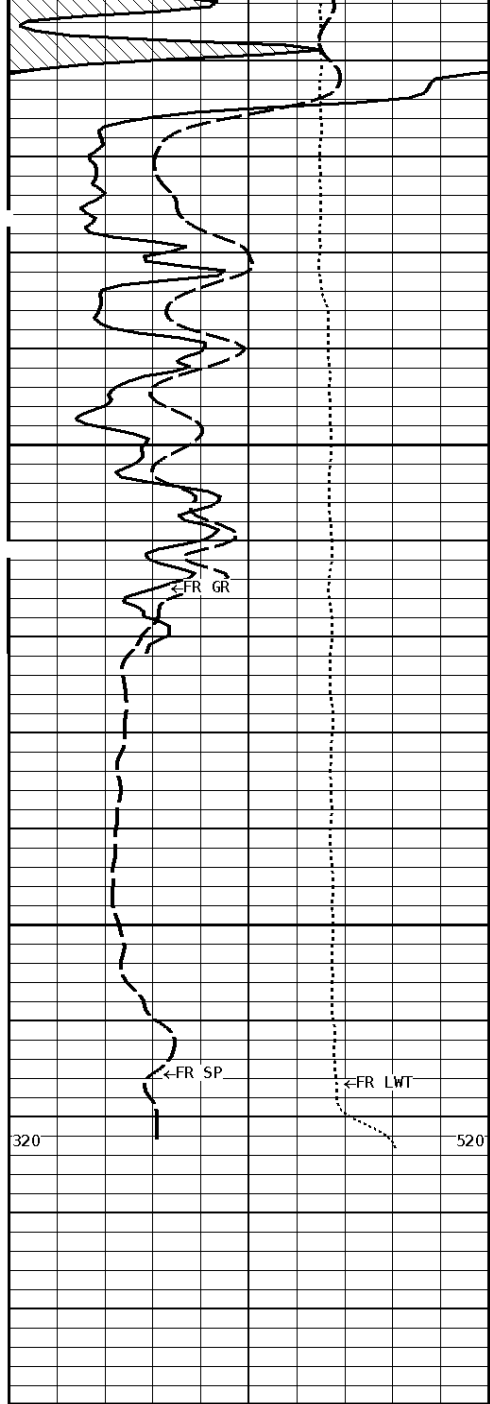




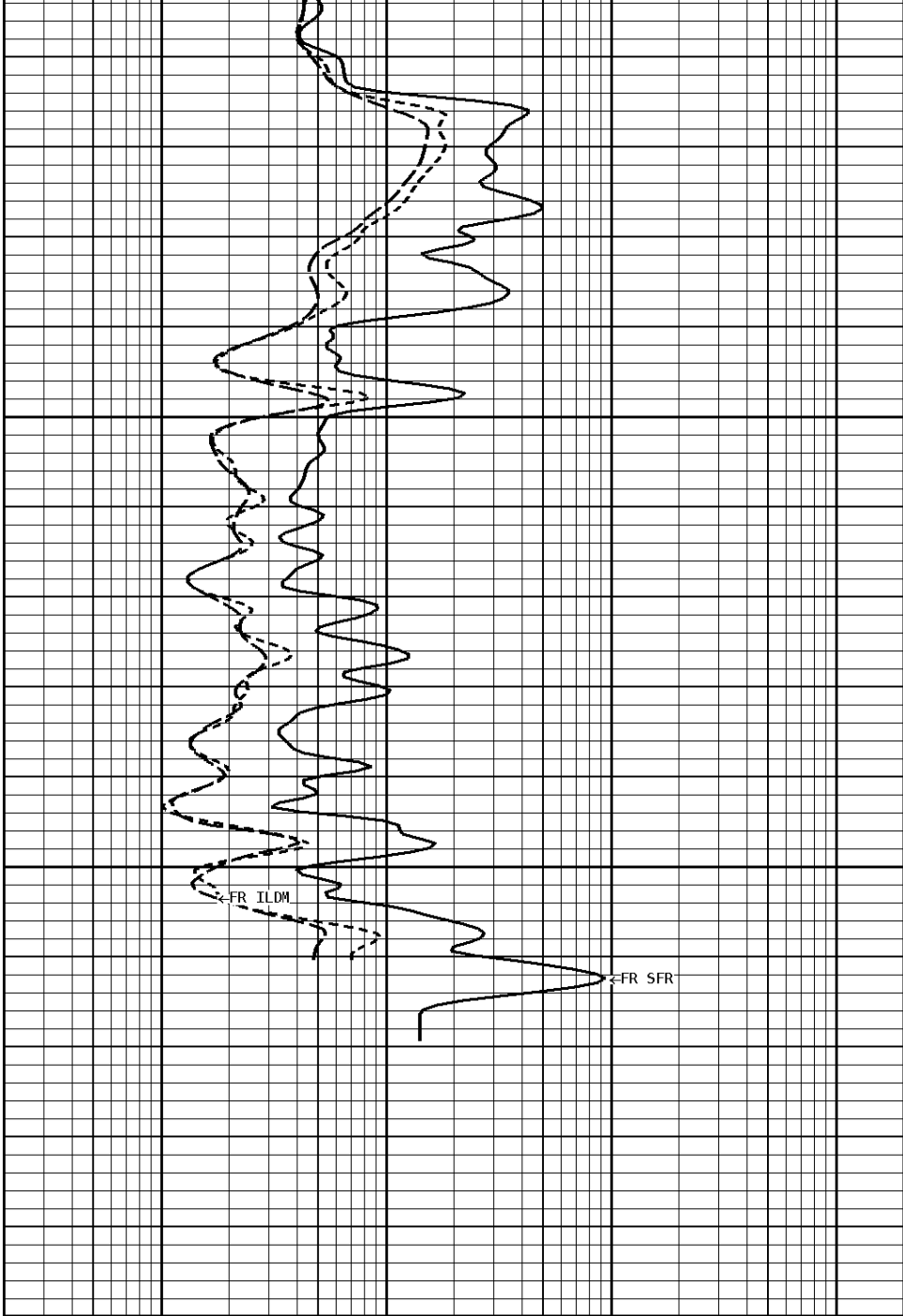
2500

2600

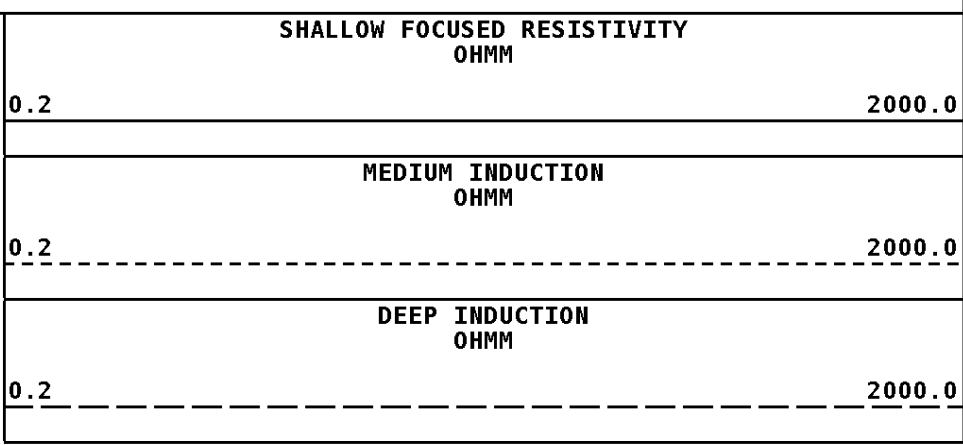
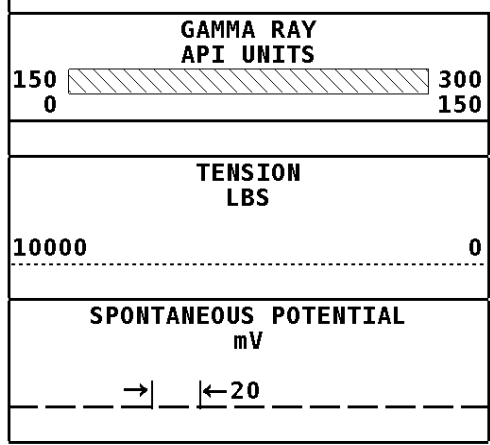




File #1.2.10



**1:240 MAIN SECTION**

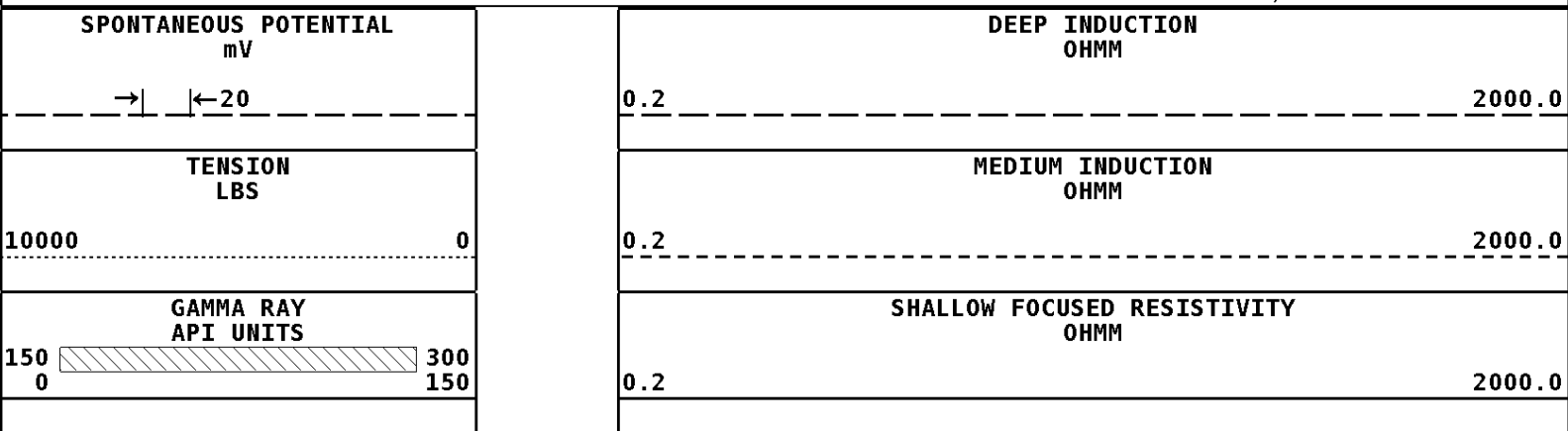


**\* Borehole Zone Factors \***

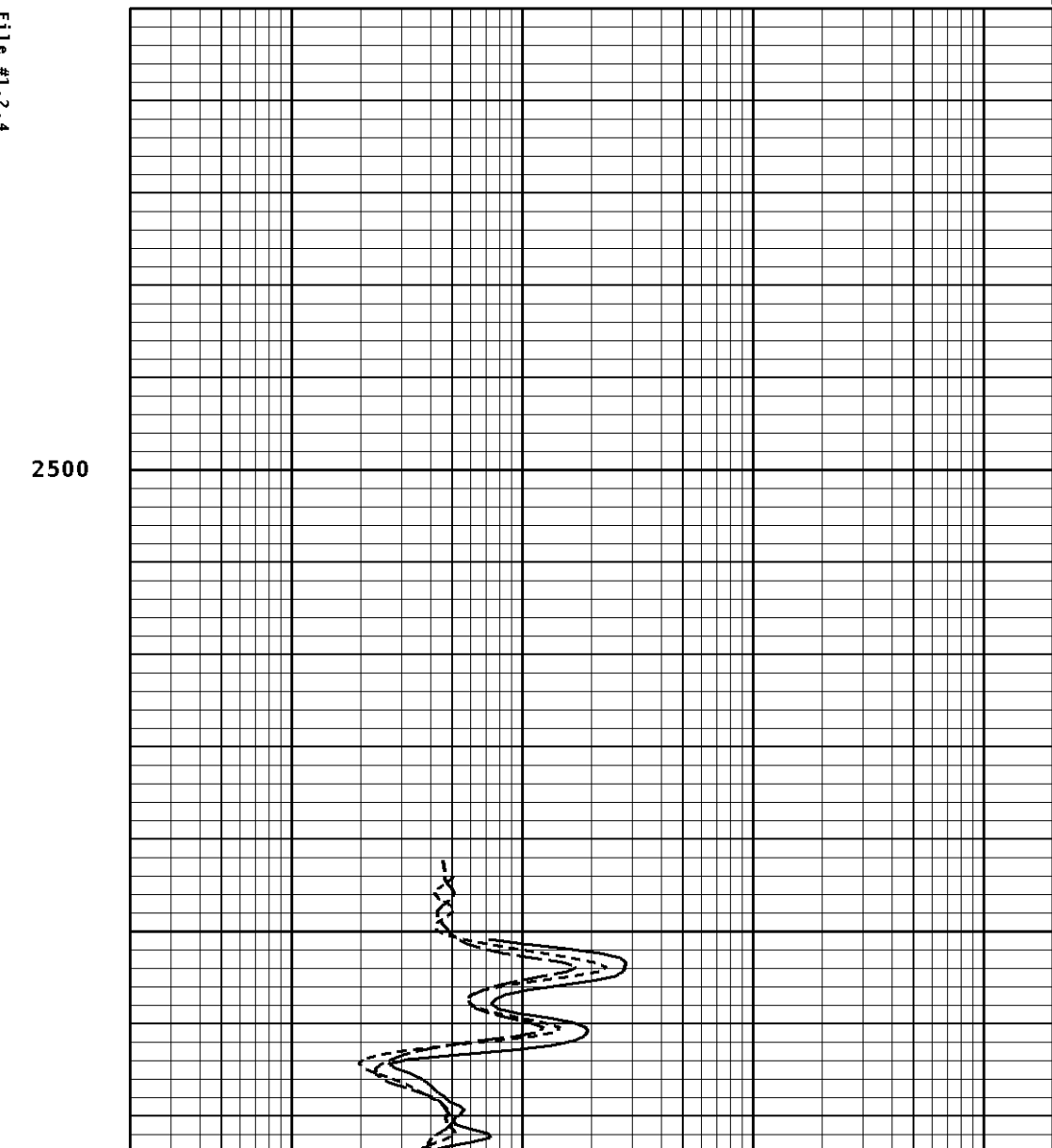
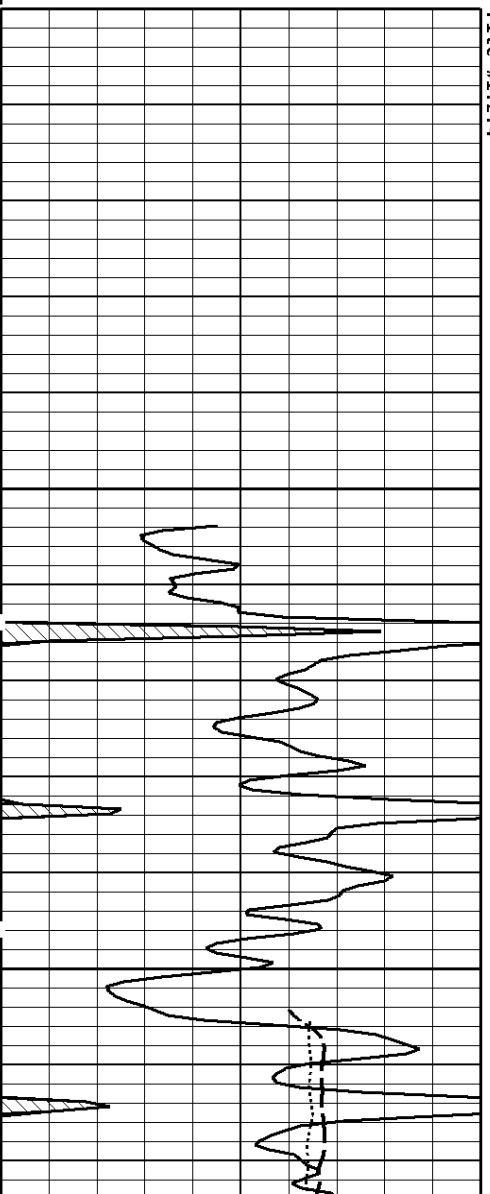
Zone 1 99999.0 to 0.0 Feet

Drill Bit Size	7.875	in
Casing Diameter	5.500	in
BHT Depth	2765.000	ft
Borehole Temperature	95.0	degF
Temperature Gradient	1.00	DFHF
Resistivity Of Mud	0.200	ohm/m
Resistivity Of Mud Temperature	50.00	degF

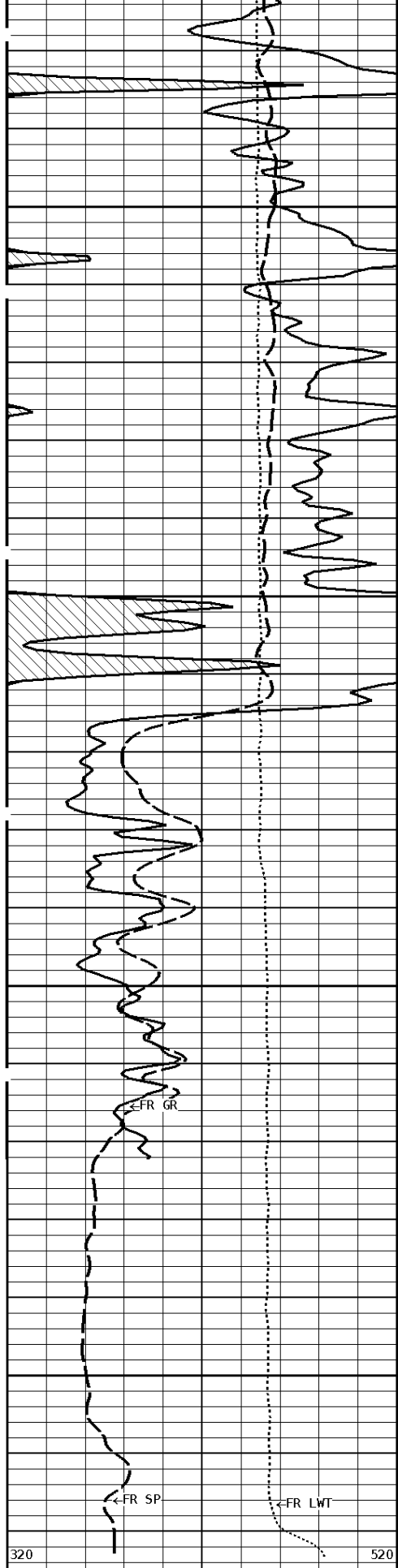
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 Segment: V1.D2.S4 RE      Acquired: 2014-10/11 02:52 3.4.0-13115  
 Reference: 0      Processed: 2014-10/11 03:03 3.4.0-13115



**1:240 REPEAT SECTION**



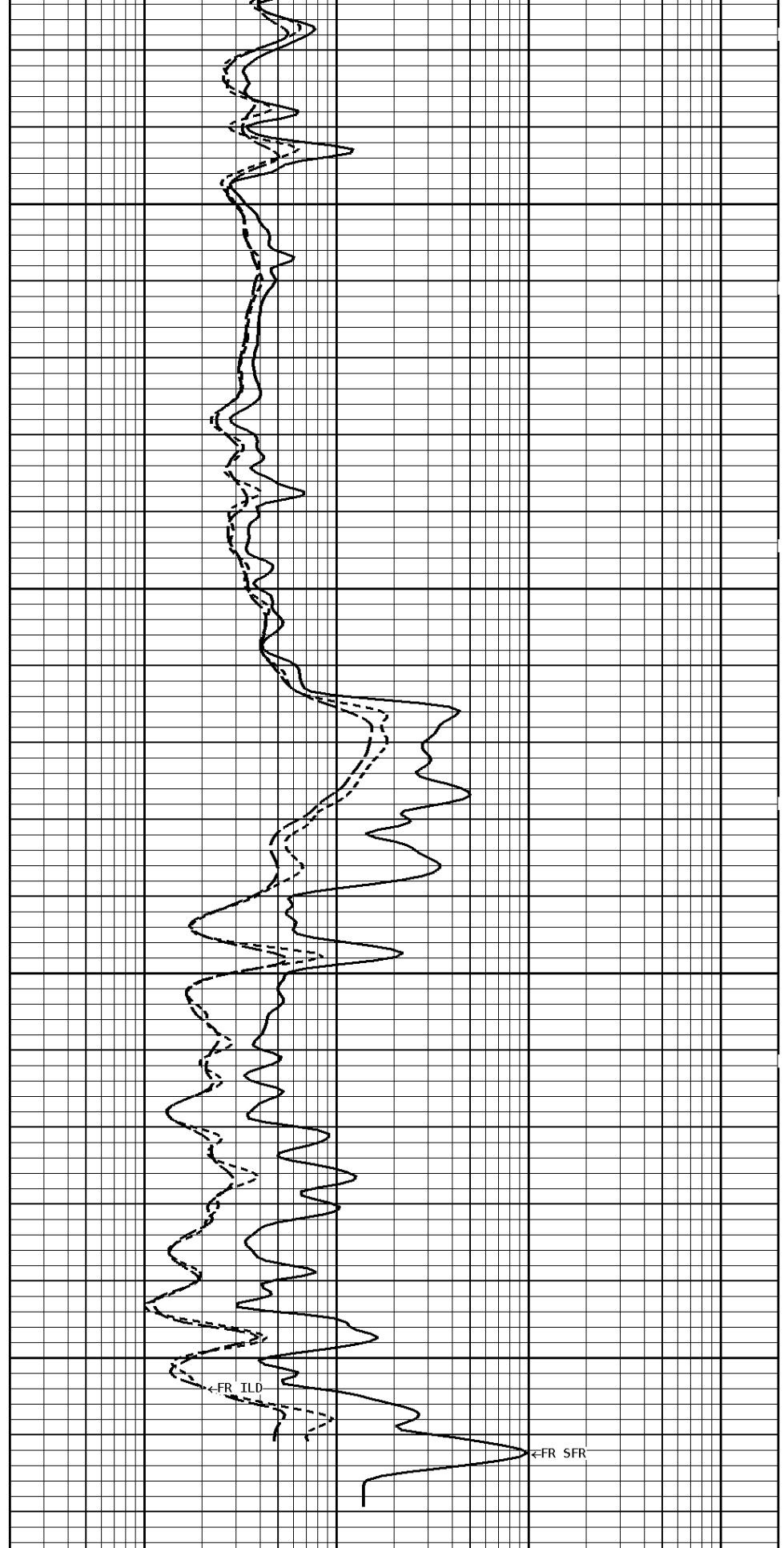
2500



2600

2700

2768



# 1:240 REPEAT SECTION

<b>GAMMA RAY API UNITS</b>
<b>TENSION LBS</b>
10000 ..... 0
<b>SPONTANEOUS POTENTIAL mV</b>
→   ← 20

<b>SHALLOW FOCUSED RESISTIVITY OHMM</b>
0.2 ..... 2000.0
<b>MEDIUM INDUCTION OHMM</b>
0.2 ..... 2000.0
<b>DEEP INDUCTION OHMM</b>
0.2 ..... 2000.0

**\* Borehole Zone Factors \***

<b>Zone 1</b>	<b>99999.0</b>	<b>to</b>	<b>0.0</b>	<b>Feet</b>
Drill Bit Size			7.875	in
Casing Diameter			5.500	in
BHT Depth			2765.000	ft
Borehole Temperature			95.0	degF
Temperature Gradient			1.00	DFHF
Resistivity Of Mud			0.200	ohm/m
Resistivity Of Mud Temperature			50.00	degF

**\* Calibration Summary \***

<b>Shop Calibration</b>					
<b>GRT-B</b>					
Performed : 22-SEP-2014			Time : 09:08		
Sensor Suite : GR-GR5			ID : GRT-BB-117		
	Measured	Units	Calibrated	Units	
GR	Background	Jig	Jig	GRAPI	
	43	344	175		
<b>Shop Calibration</b>					
<b>PIT-CA</b>					
Performed : 22-Sep-2014			Time : 12:08		
Sensor Suite : P-IND-T			ID : PIT-CA-062		
	Measured		Calibrated		Units
	R	X	R	X	
Air	130580	130694	-0.6	-0.9	MMHOS
Zero	131070	131068	26.0	5.8	MMHOS
Reference	253403	250257	5026.0	5005.8	MMHOS
Loop	130399	221825	3815.0	3829.4	MMHOS
Sonde Error			-1.9	-16.4	MMHOS
Cond			5026.0	5005.8	MMHOS
	Measured		Calibrated		Units
	R	X	R	X	
Air	129101	131419	1.1	0.3	MMHOS
Zero	131069	131067	41.2	-16.3	MMHOS
Reference	233843	231793	2041.2	1983.7	MMHOS
Loop	128983	222342	1804.2	1807.9	MMHOS
Sonde Error			-8.5	-11.5	MMHOS
Cond			2041.2	1983.7	MMHOS
	<b>Temperature</b>				
	Measured		Calibrated		Units
	Low	High	Low	High	
	16980.0	56920.0	70.0	350.0	DEGF
Performed : 22-Sep-2014			Time : 11:59		
Sensor Suite : SFL			ID : PIT-CA-062		

Internal					
	Measured		Calibrated		Units
	Zero	Reference	Zero	Reference	
Im	32760.0	48929.8	0.0	7028.0	uA
Ib	32766.9	48730.4	0.0	1750.0	mA
MOM1	32746.3	57508.7	0.0	175.0	mV
Equivalent SFL				43.97	OHMM

Performed : 22-SEP-2014	Time : 11:56
Sensor Suite : P-SP	ID : PIT-CA-062

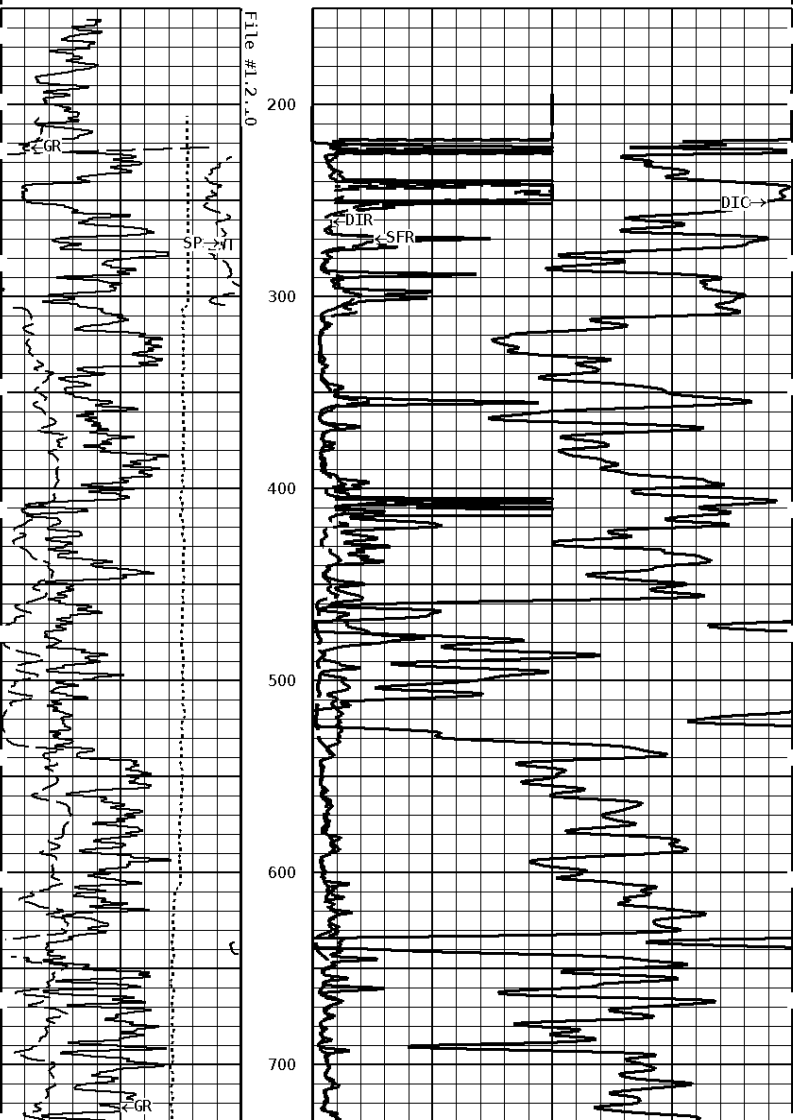
  

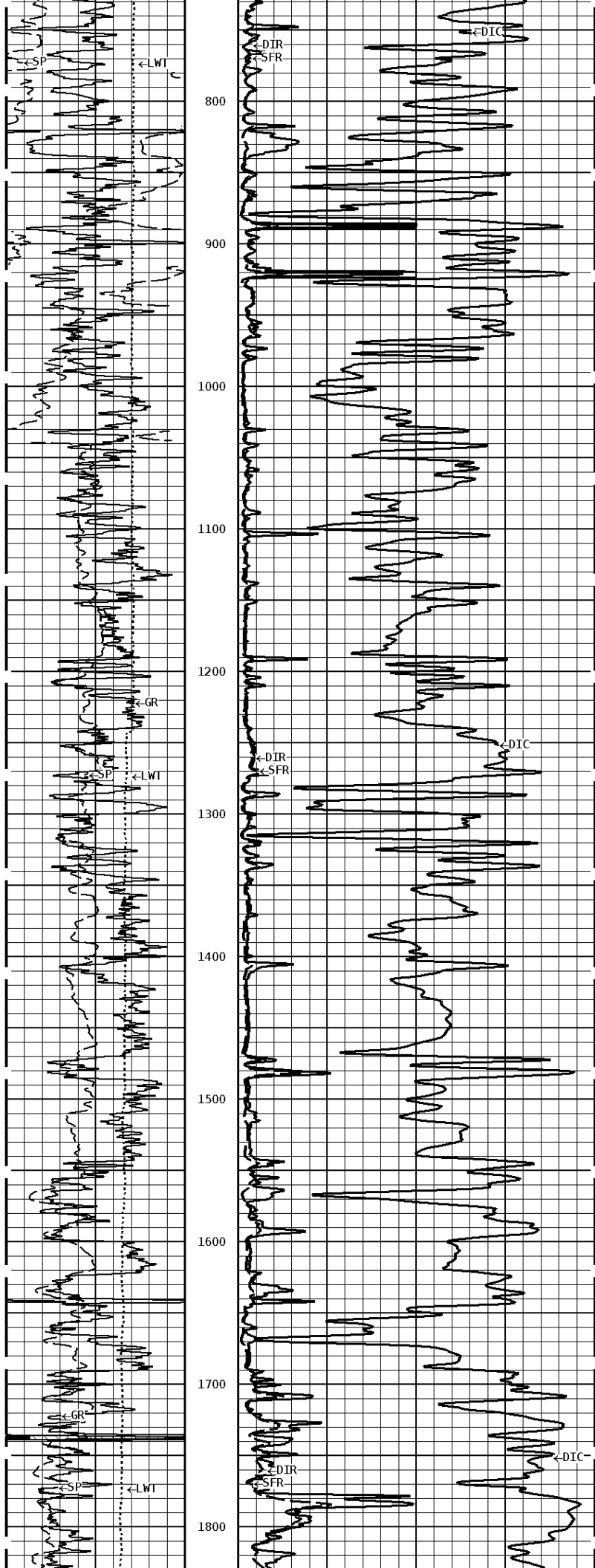
Internal					
	Measured		Calibrated		Units
	Zero	Reference	Zero	Reference	
	32765.9	58980.4	0.0	1000.0	mV

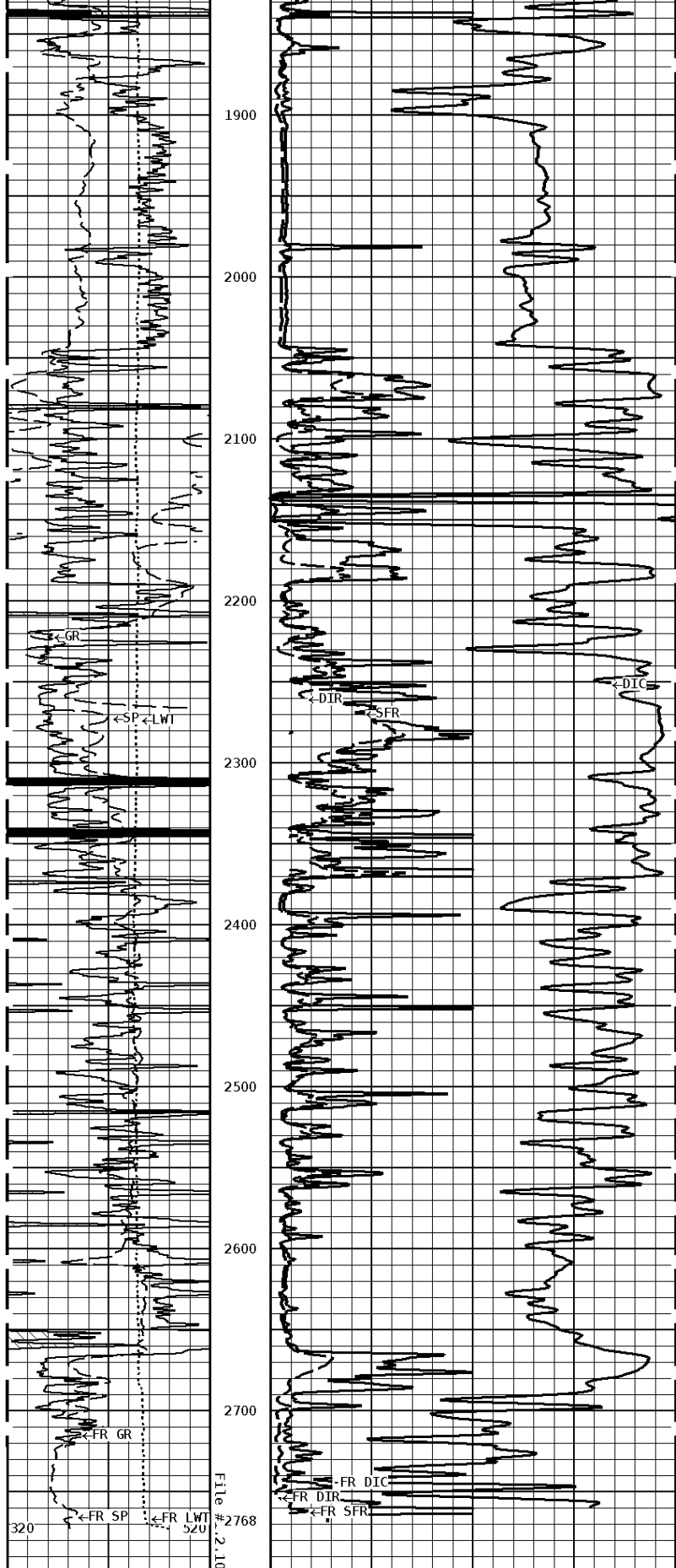
Well File: BOP HAR 3 OCT11\_MST      Scale: 1:1200      Format: DIL1200  
Segment: V1.D2.S10 MAIN      Acquired: Not Available  
Reference: 0      Processed: Not Available

<b>TENSION</b> LBS	<b>DEEP INDUCTION</b> OHMM
10000      0	0.0      500.0
-----	0.0      50.0
<b>SPONTANEOUS POTENTIAL</b> mV	<b>SHALLOW FOCUSED</b> OHMM
→   ← 20	0.0      500.0
	0.0      50.0
<b>GAMMA RAY</b> API UNITS	<b>DEEP CONDUCTIVITY</b> MHMO
150      300	2000      1000
0      150	1000      0

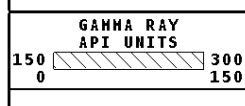
1:1200 MAIN SECTION







1:1200 MAIN SECTION



SPONTANEOUS POTENTIAL	
mV	
→	←20
TENSION	
LBS	
10000	0

SHALLOW FOCUSED	
OHMM	
0.0	500.0
0.0	50.0
DEEP INDUCTION	
OHMM	
0.0	500.0
0.0	50.0



**Tucker**  
ENERGY SERVICES

Company: BOP WEST  
 Well: HARBIN #3  
 Location: 2160' FNL & 330' FEL  
 Logged: 2014-10-11  
 K.B. Elev: 1320.0 Ft