

# HALLIBURTON

## ARRAY COMPENSATED TRUE RESISTIVITY LOG

COMPANY	RUSSELL OIL, INC.		
WELL	RUMBACK B #21-2		
FIELD/BLOCK	RUMBACK		
COUNTY	LOGAN		
STATE	KANSAS		
COMPANY	RUSSELL OIL, INC.	WELL	RUMBACK B #21-2
FIELD/BLOCK	RUMBACK	COUNTY	LOGAN
STATE	KANSAS		
API No.	15-109-21555-00-00	Location	(SHL) NW SW NE NE 952' FNL & 1313' FEL
Permanent Datum	GL	Elev.	3017.0 ft
Log measured from	KB	D.F.	3021.0 ft
Drilling measured from	KB	G.L.	3017.0 ft
Date	08-Aug-18	Other Services:	ACRT SDL-DSN MICLOG
Run No.	1		
Depth - Driller	4690.0 ft		
Depth - Logger	4692.0 ft		
Bottom - Logged Interval	4682		
Top - Logged Interval	344		
Casing - Driller	8.625 in	@	
Casing - Logger	344.0 ft	@	
Bit Size	7.875 in	@	
Type Fluid in Hole	Water Based Mud		
Density	8.90 g/cc	55.00 s/qt	
PH	10.00 pH	6.8 cphm	
Source of Sample	FLOWLINE		
Rm @ Meas. Temperature	0.78 ohmm	@	88.00 degF
Rmf @ Meas. Temperature	0.61 ohmm	@	85.00 degF
Rmc @ Meas. Temperature	0.96 ohmm	@	85.00 degF
Source Rmf	Rmc		
Rm @ BHT	0.55 ohmm	@	128.0 degF
Time Since Circulation	09:00 hr		
Time on Bottom	08-Aug-18 13:29		
Max. Rec. Temperature	128.00 degF	@	4692.0 ft
Equipment	12156883	EL RENO	
Recorded By	WHITLOCK		
Witnessed By	KITT NOAH		

Fold here

Service Ticket No.: 905046367		API No.: 15-109-21555-00-00		PGM Version: WL INSITE R5.6.3 (Build 4)	
CHANGE IN MUD TYPE OR ADDITIONAL SAMPLE			RESISTIVITY SCALE CHANGES		
Date	Sample No.	Type Log	Depth	Scale Up Hole	Scale Down Hole
Depth-Driller					
Type Fluid in Hole					
Density	Viscosity				
Ph	Fluid Loss				
Source of Sample			RESISTIVITY EQUIPMENT DATA		
Rm @ Meas. Temp	@	Run No.	Tool Type & No.	Pad Type	Tool Pos.
Rmf @ Meas. Temp.	@				
Rmc @ Meas. Temp.	@				
Source Rmf	Rmc				
Rm @ BHT	@				
Rmf @ BHT	@				
Rmc @ BHT	@				
EQUIPMENT DATA					
GAMMA		ACOUSTIC		DENSITY	
Run No.	Run No.	Run No.	Run No.	Run No.	Run No.
Serial No.	Serial No.	Serial No.	Serial No.	Serial No.	Serial No.
Model No.	Model No.	Model No.	Model No.	Model No.	Model No.
Diameter	No. of Cent.	Diameter	Diameter	Diameter	Diameter
Detector Model No.	Spacing	Log Type	Log Type	Log Type	Log Type
Type		Source Type	Source Type	Source Type	Source Type
Length	LSA [Y/N]	Serial No.	Serial No.	Serial No.	Serial No.
Distance to Source	FWDA [Y/N ]	Strength	Strength	Strength	Strength
LOGGING DATA					
GENERAL		GAMMA		ACOUSTIC	
Run	Depth	Speed	Scale	Scale	Matrix
No.	From To	ft/min	L R	L R	L R

DIRECTIONAL INFORMATION

Maximum Deviation @ KOP @

Remarks: 5 1/2" CASING USED FOR ANNULAR HOLE VOLUME

HALLIBURTON DOES NOT GUARANTEE THE ACCURACY OF ANY INTERPRETATION OF THE LOG DATA, CONVERSION OF LOG DATA TO PHYSICAL ROCK PARAMETERS OR RECOMMENDATIONS WHICH MAY BE GIVEN BY HALLIBURTON PERSONNEL OR WHICH APPEAR ON THE LOG OR IN ANY OTHER FORM. ANY USER OF SUCH DATA, INTERPRETATIONS, CONVERSIONS, OR RECOMMENDATIONS AGREES THAT HALLIBURTON IS NOT RESPONSIBLE EXCEPT WHERE DUE TO GROSS NEGLIGENCE OR WILLFUL MISCONDUCT, FOR ANY LOSS, DAMAGES, OR EXPENSES RESULTING FROM THE USE THEREOF.

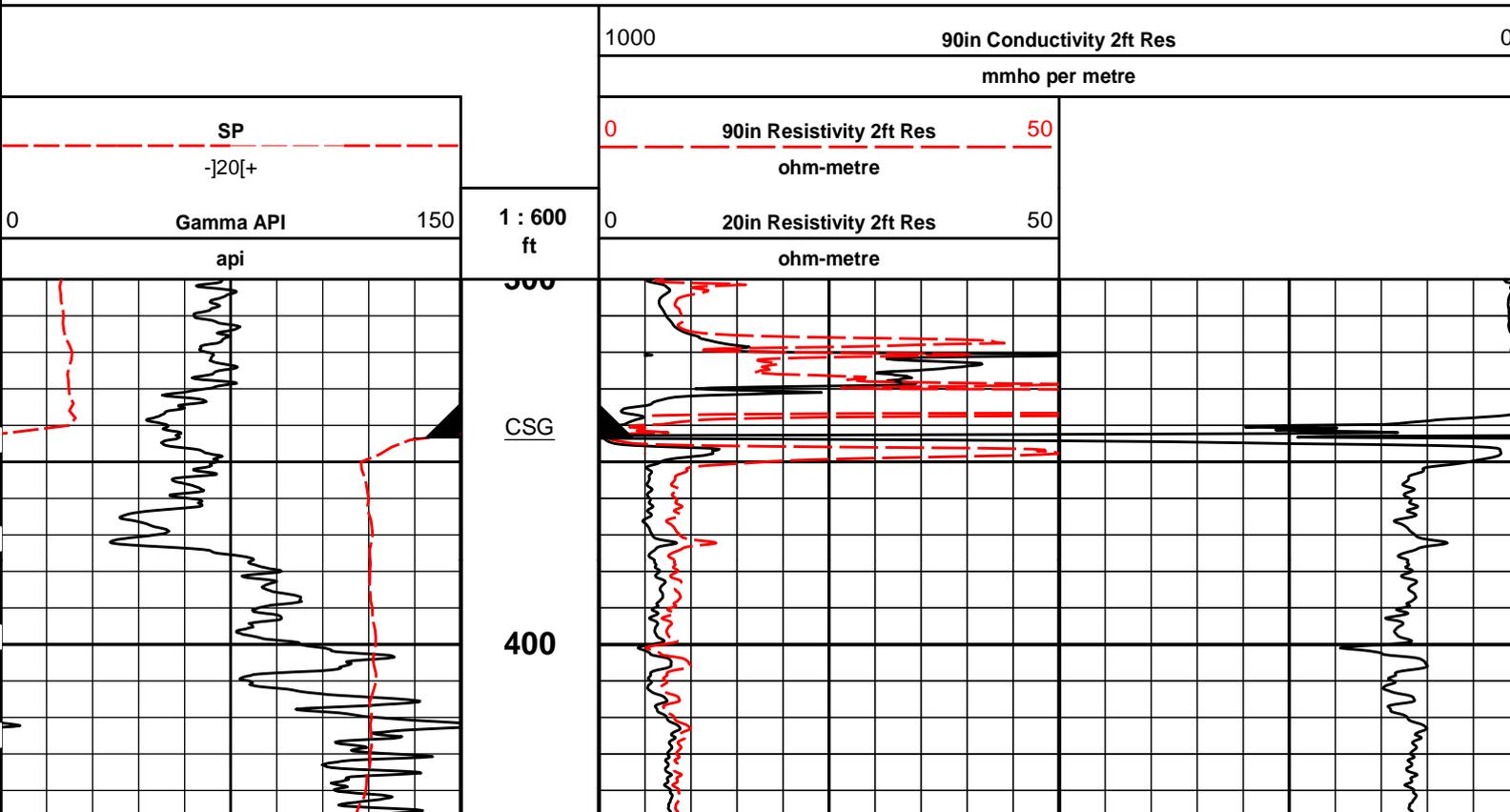
HALLIBURTON

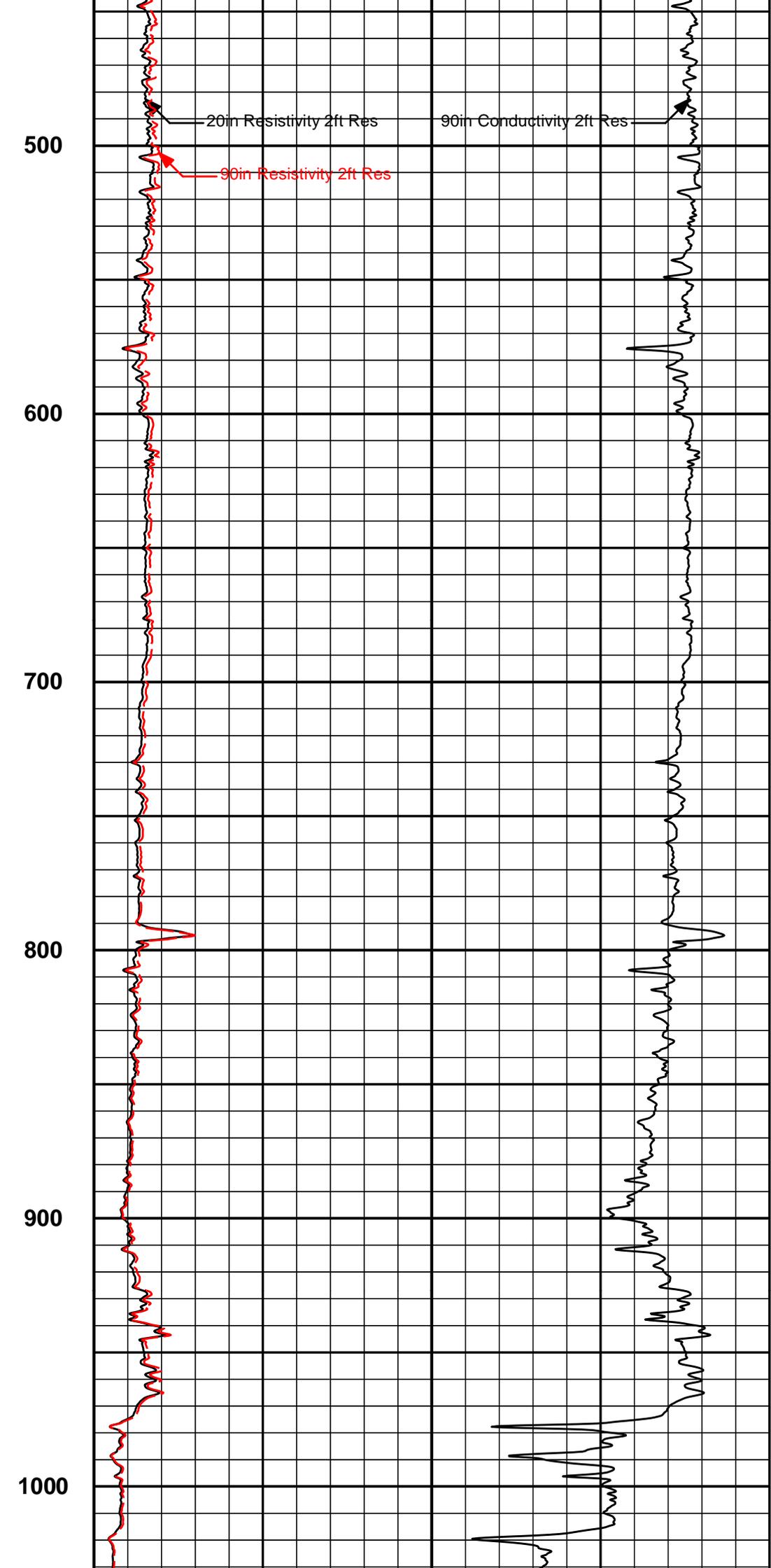
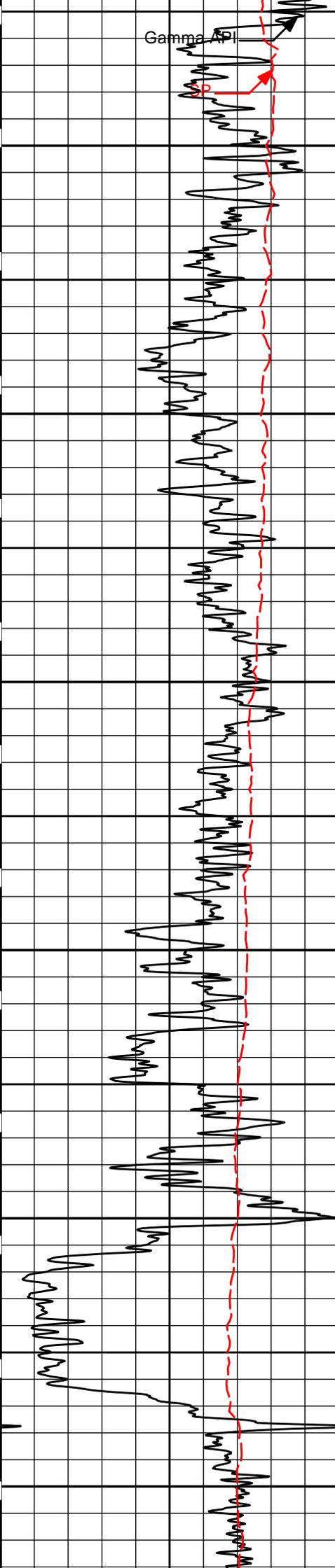
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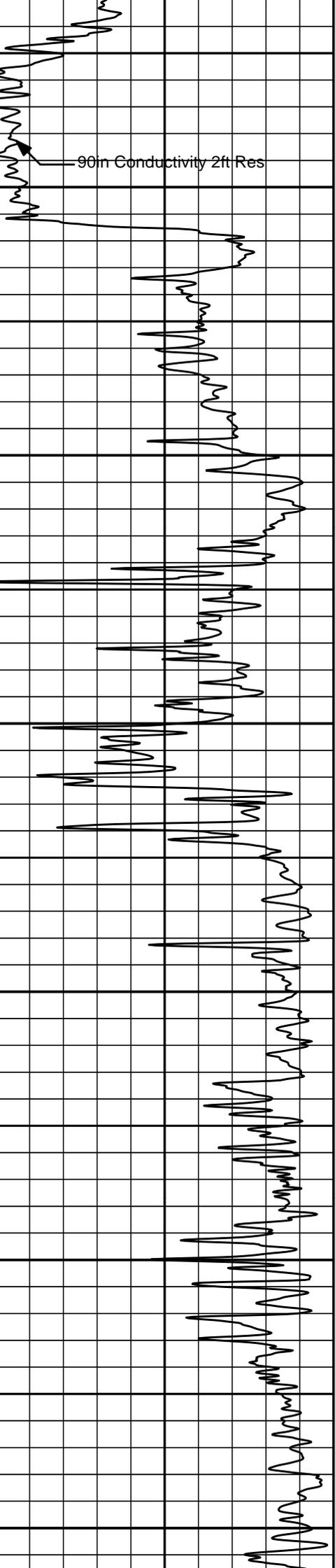
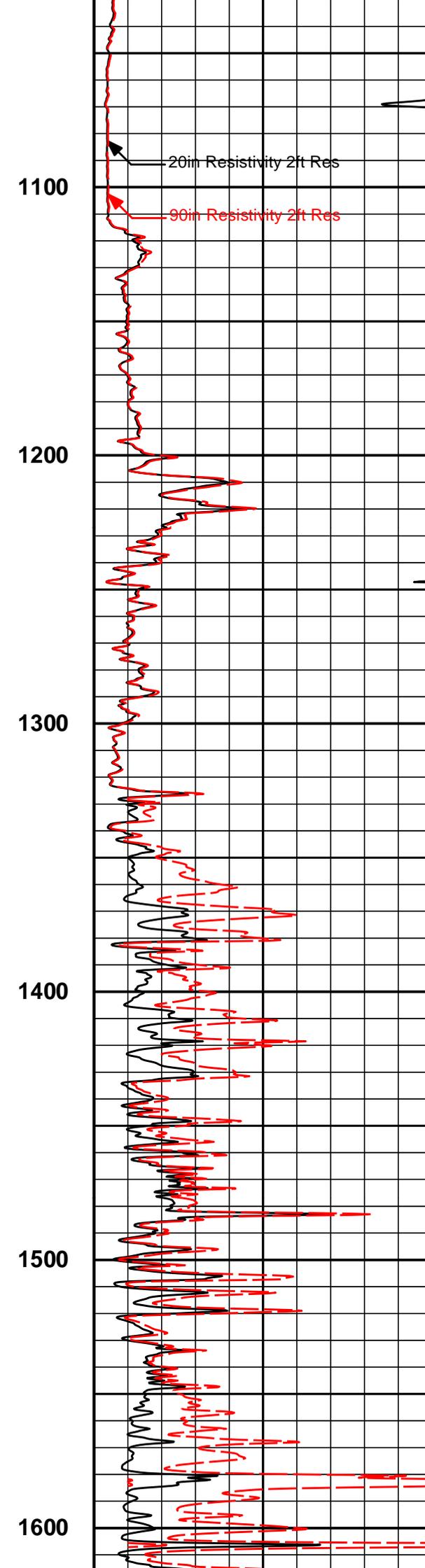
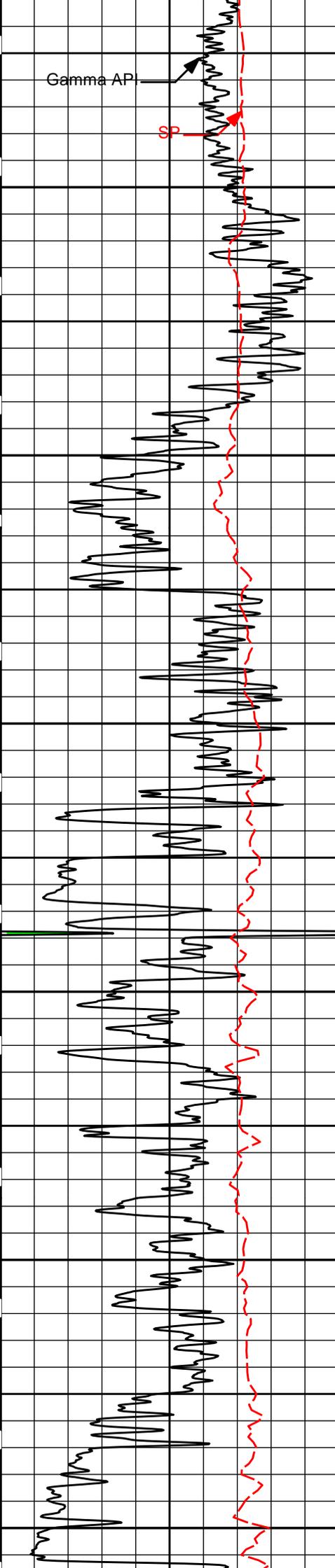
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 Plot File: \\-LOCAL-RUSSEL\_RUMBACK\0001 GTET-DSNT-SDLT-ACRTIACRTIACRT\_2\_main

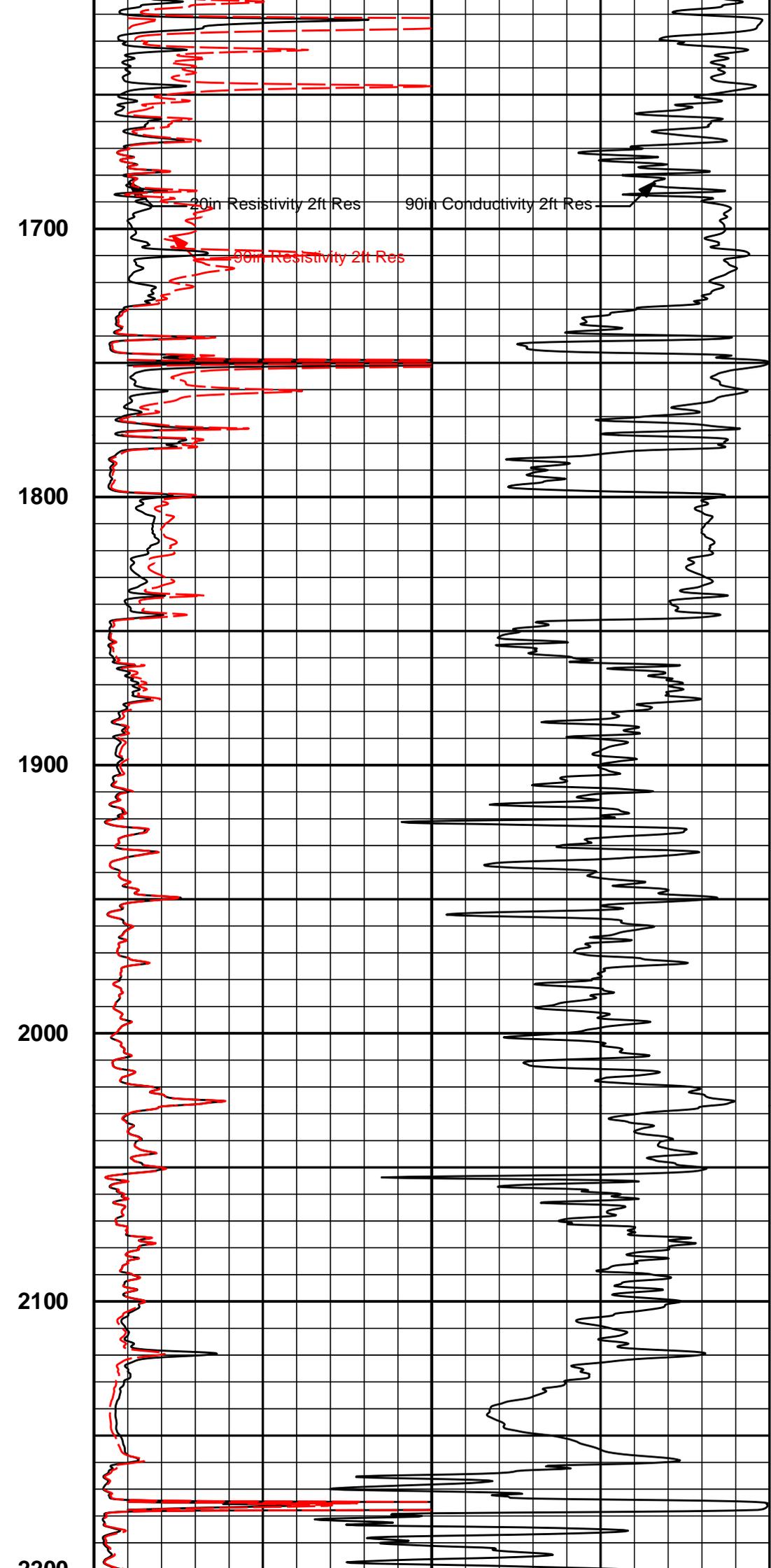
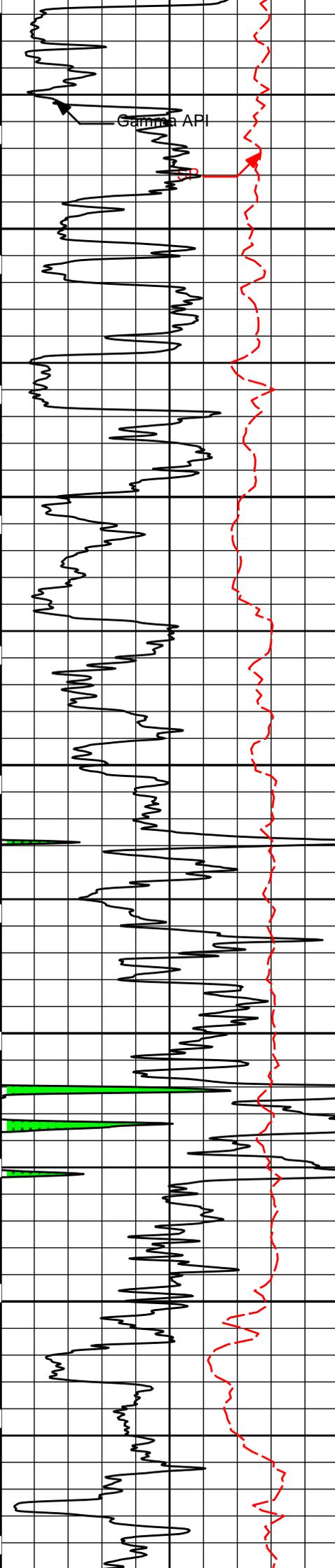
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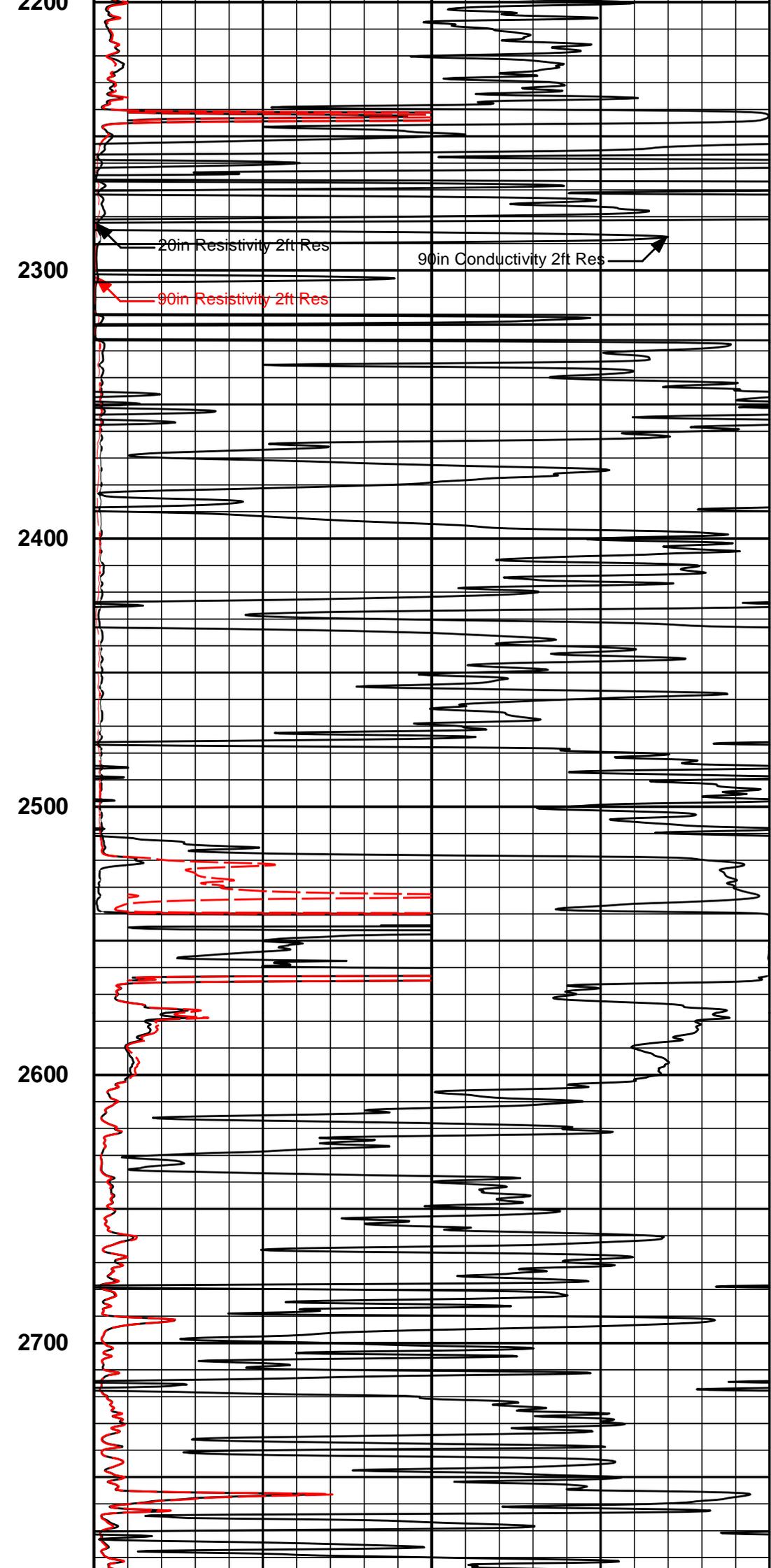
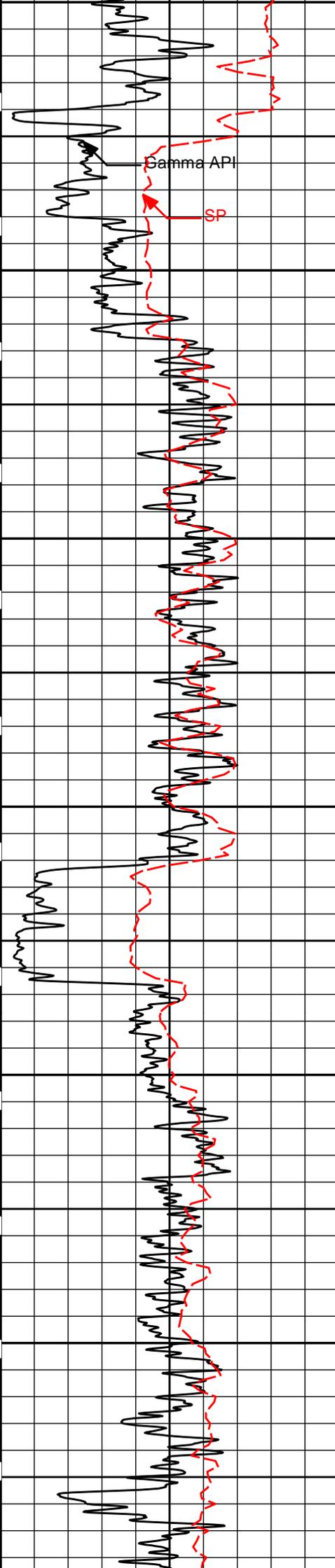
**2 INCH MAIN LOG**

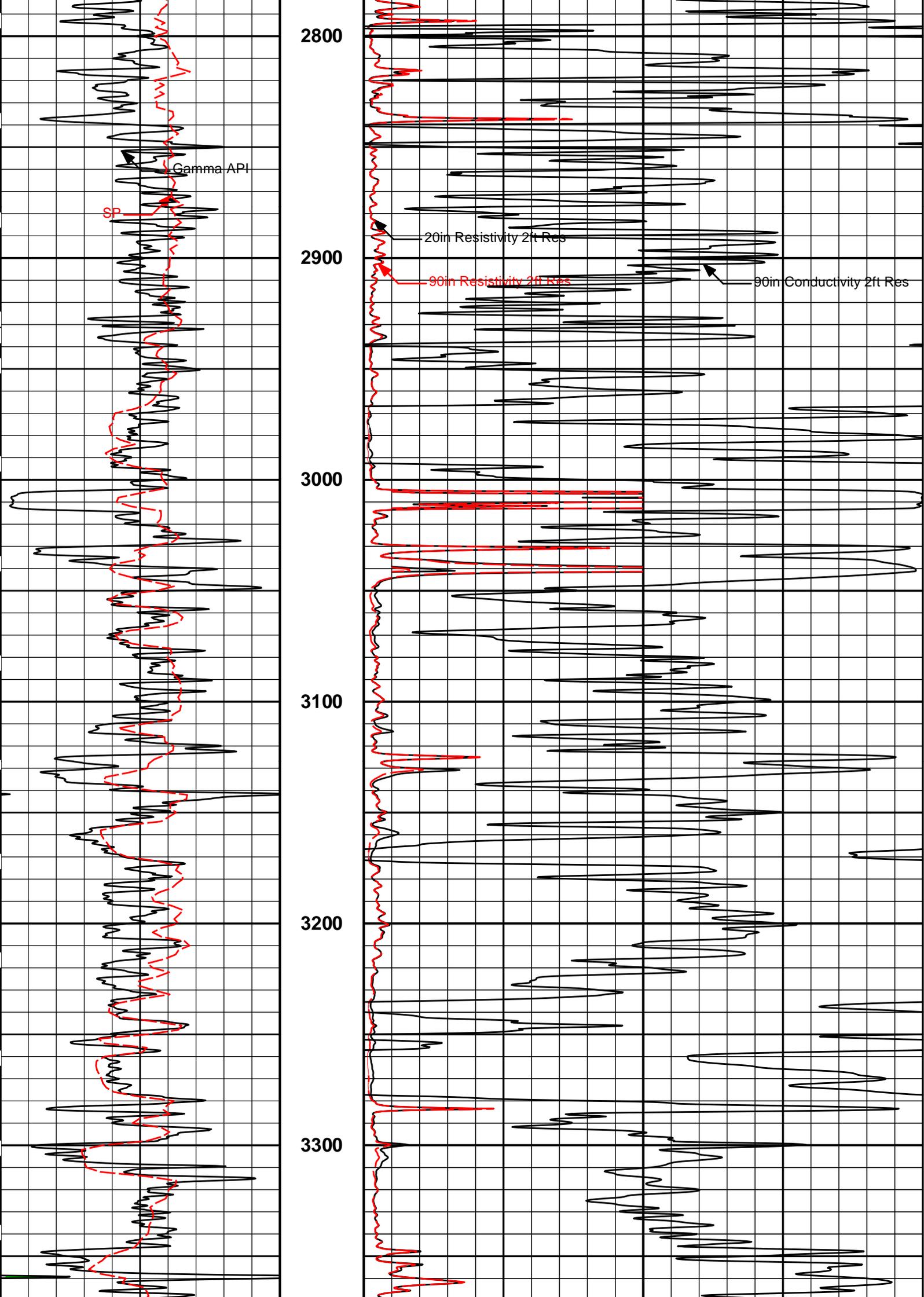


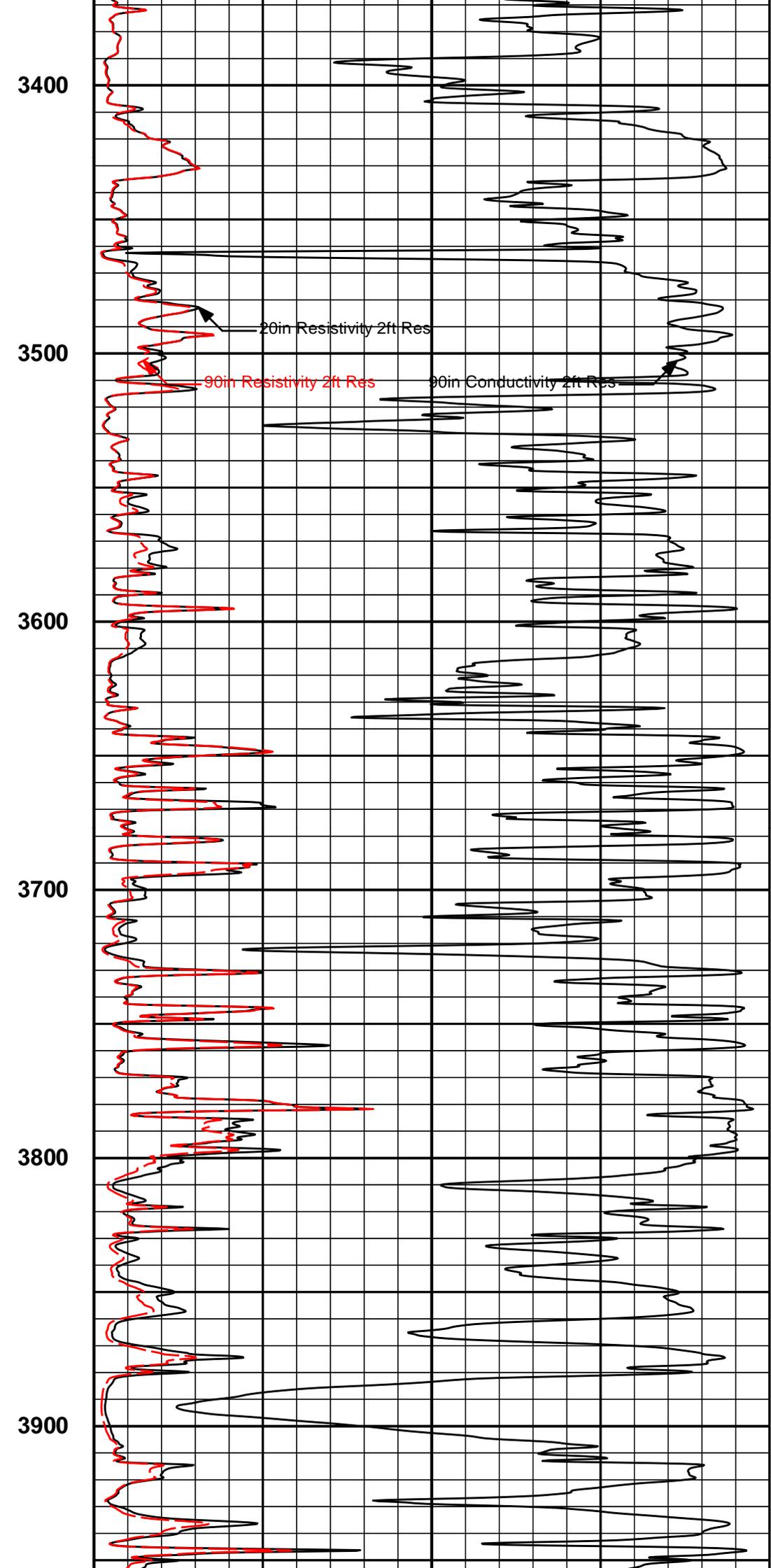
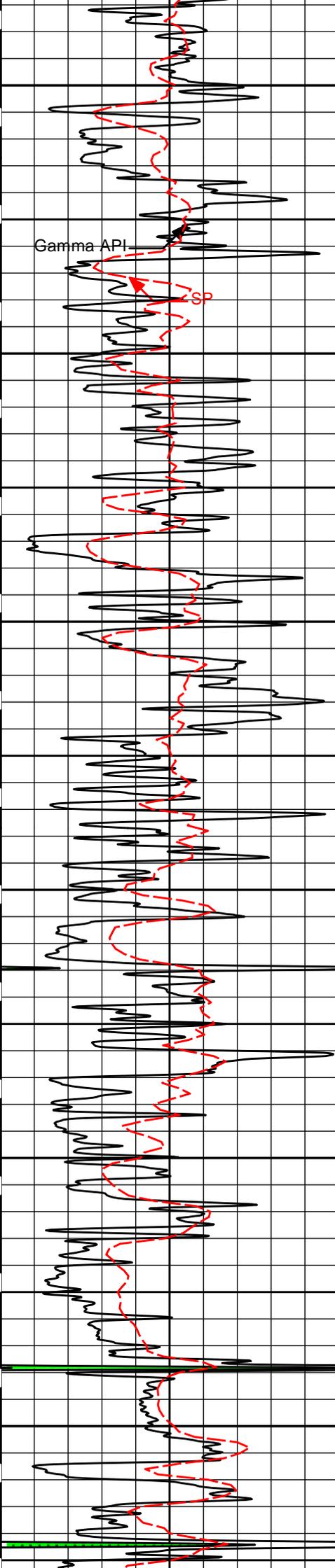


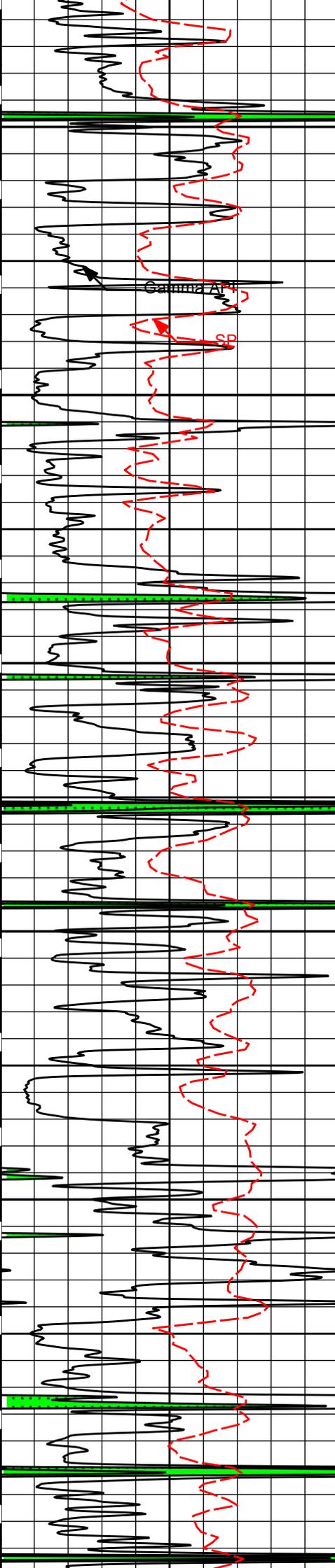




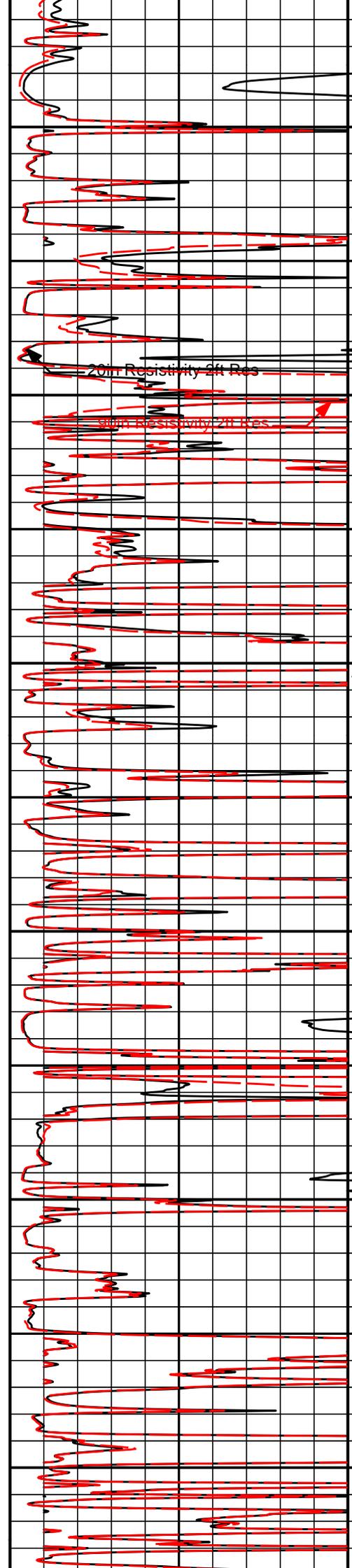




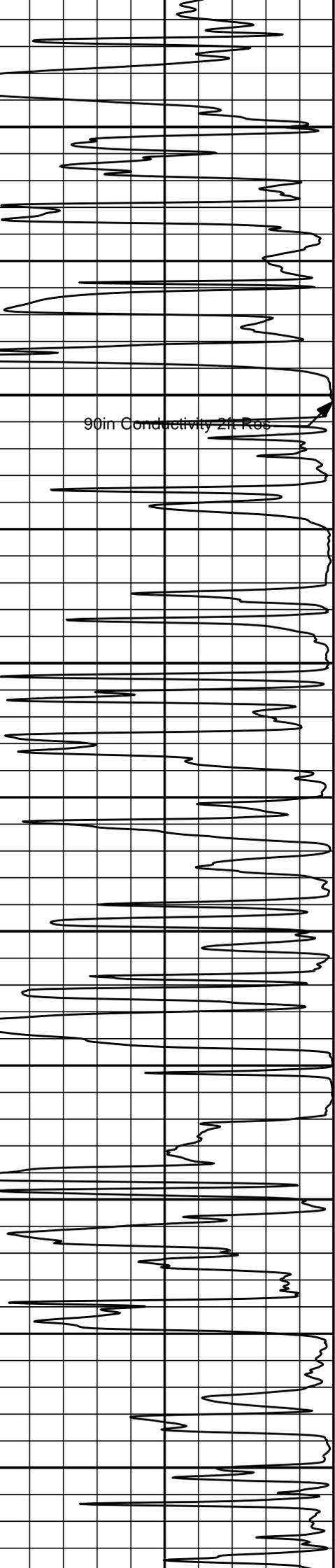


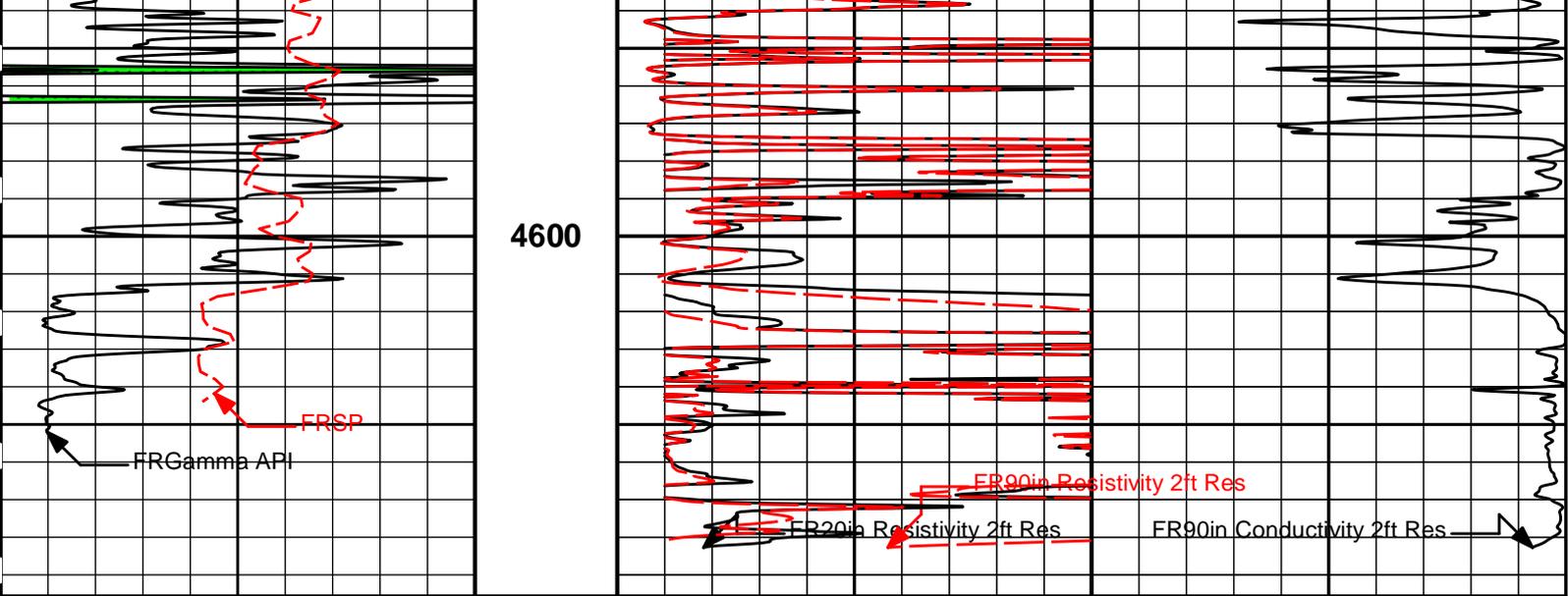


4000  
4100  
4200  
4300  
4400  
4500



20in Resistivity 2ft Res  
90in Resistivity 2ft Res  
90in Conductivity 2ft Res





0	Gamma API	150	1 : 600 ft	0	20in Resistivity 2ft Res	50
	api					ohm-metre
	SP			0	90in Resistivity 2ft Res	50
	-]20[+				ohm-metre	
				1000	90in Conductivity 2ft Res	0
					mmho per metre	

**HALLIBURTON**

Plot Time: 08-Aug-18 16:12:22  
 Plot Range: 300 ft to 4695.58 ft  
 Data: RUSSEL\_RUMBACK\Well Based\DAQ-0001-005\  
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**2 INCH MAIN LOG**

**2 INCH MAIN LOG**

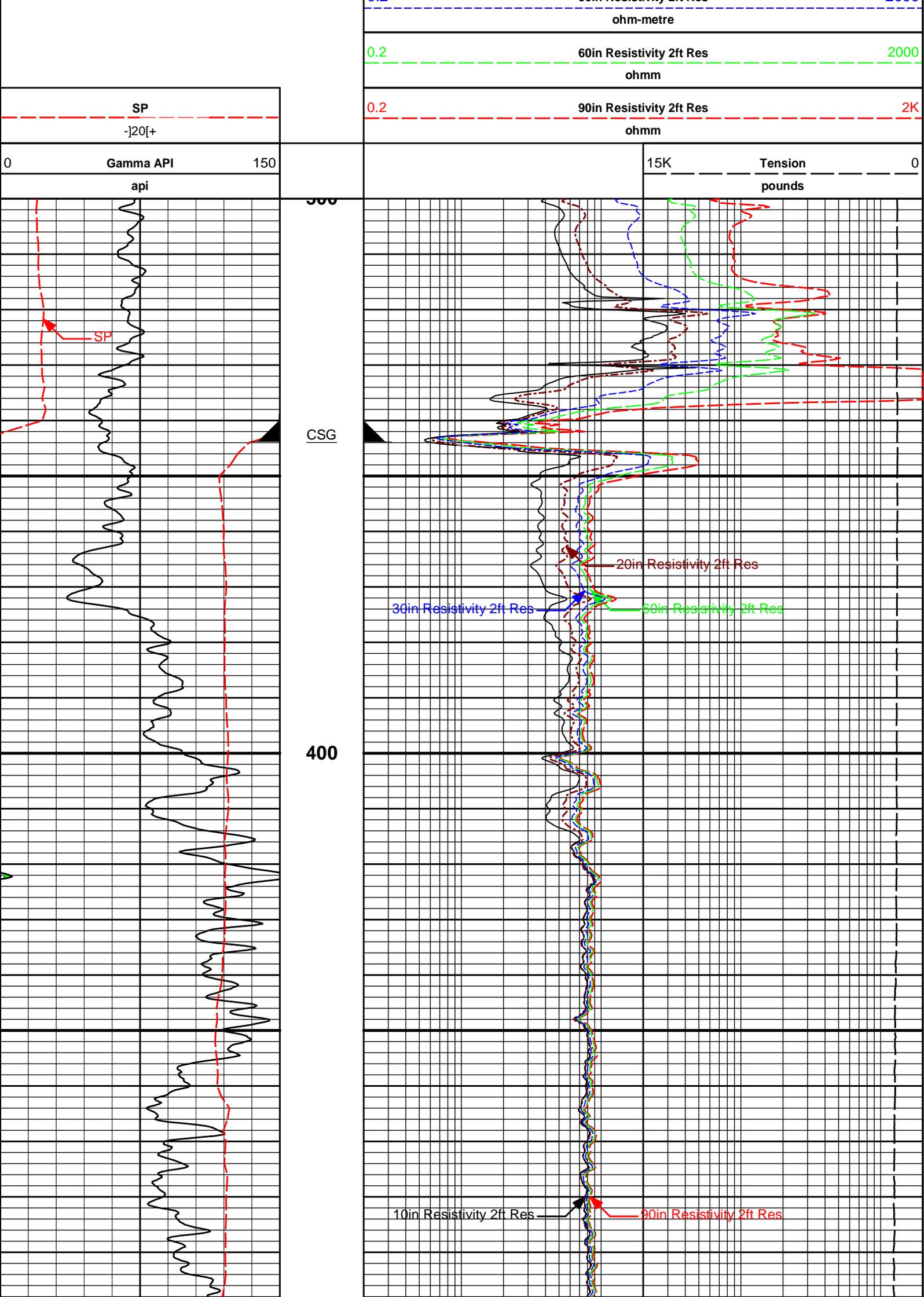
**HALLIBURTON**

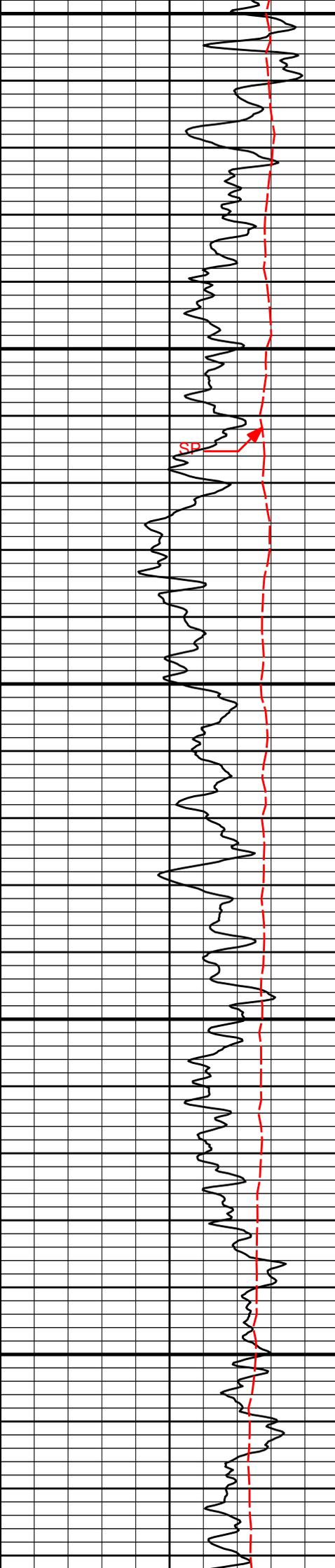
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 Plot File: \\-LOCAL-1\RUSSEL\_RUMBACK\0001 GTET-DSNT-SDLT-ACRTACRTACRT\_5inch\_main

**5 INCH MAIN LOG**

**5 INCH MAIN LOG**

0.2	10in Resistivity 2ft Res	2K
	ohmm	
0.2	20in Resistivity 2ft Res	2000
	ohmm	
0.2	30in Resistivity 2ft Res	2000

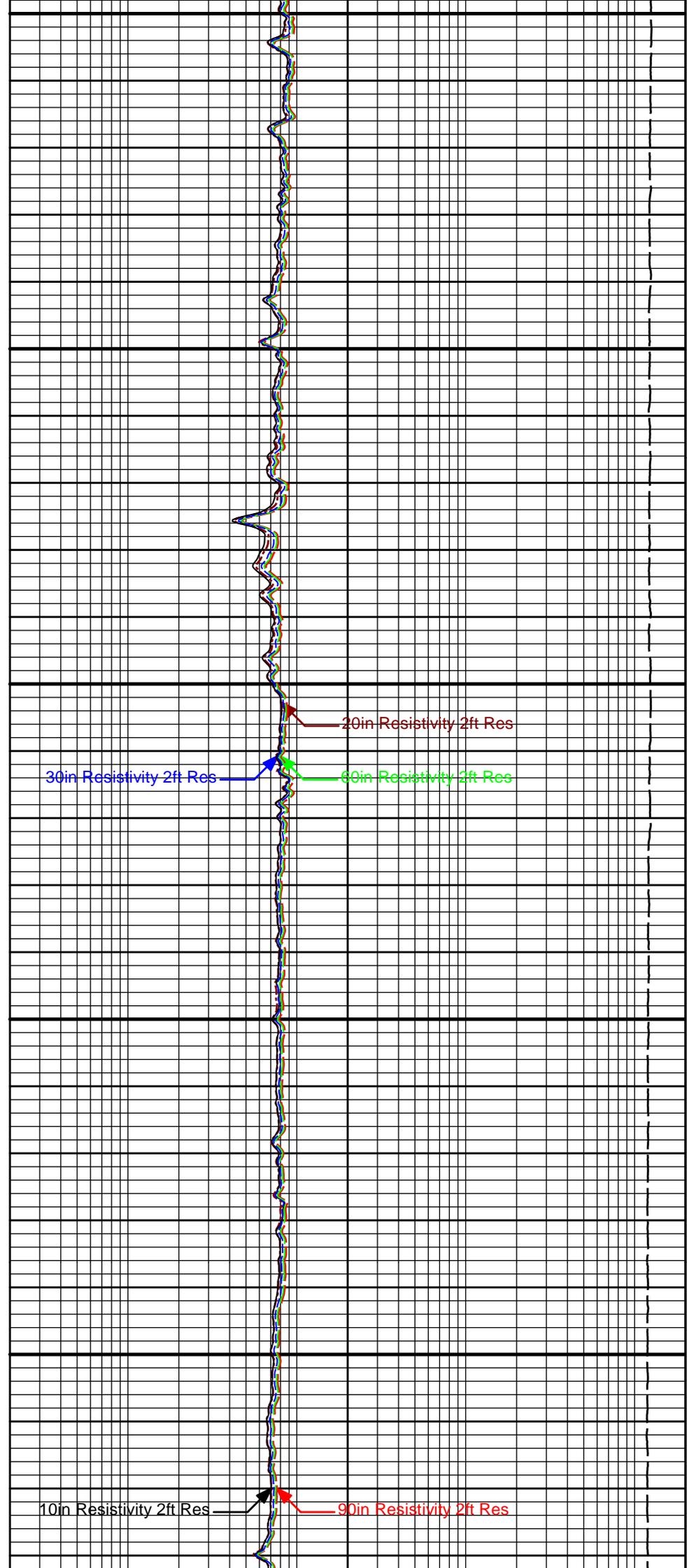




500

600

700



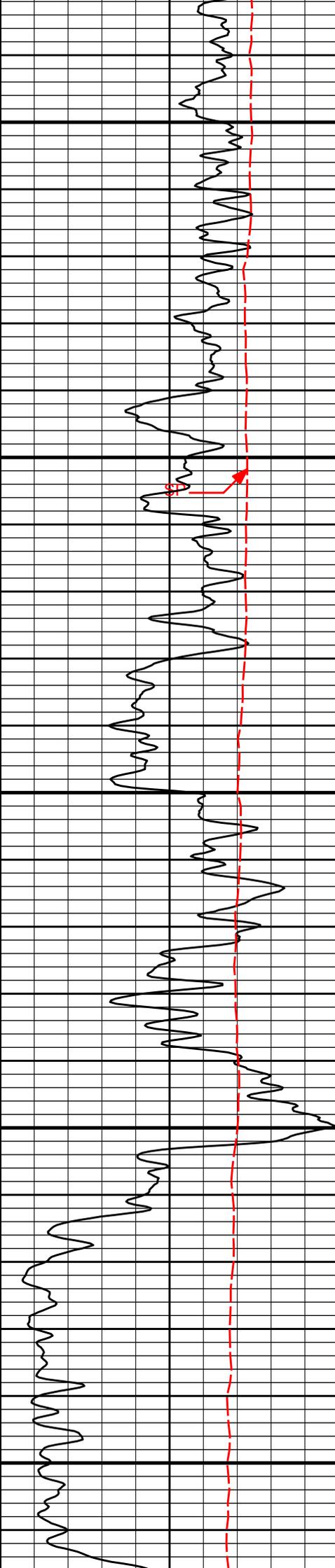
20in Resistivity 2ft Res

30in Resistivity 2ft Res

60in Resistivity 2ft Res

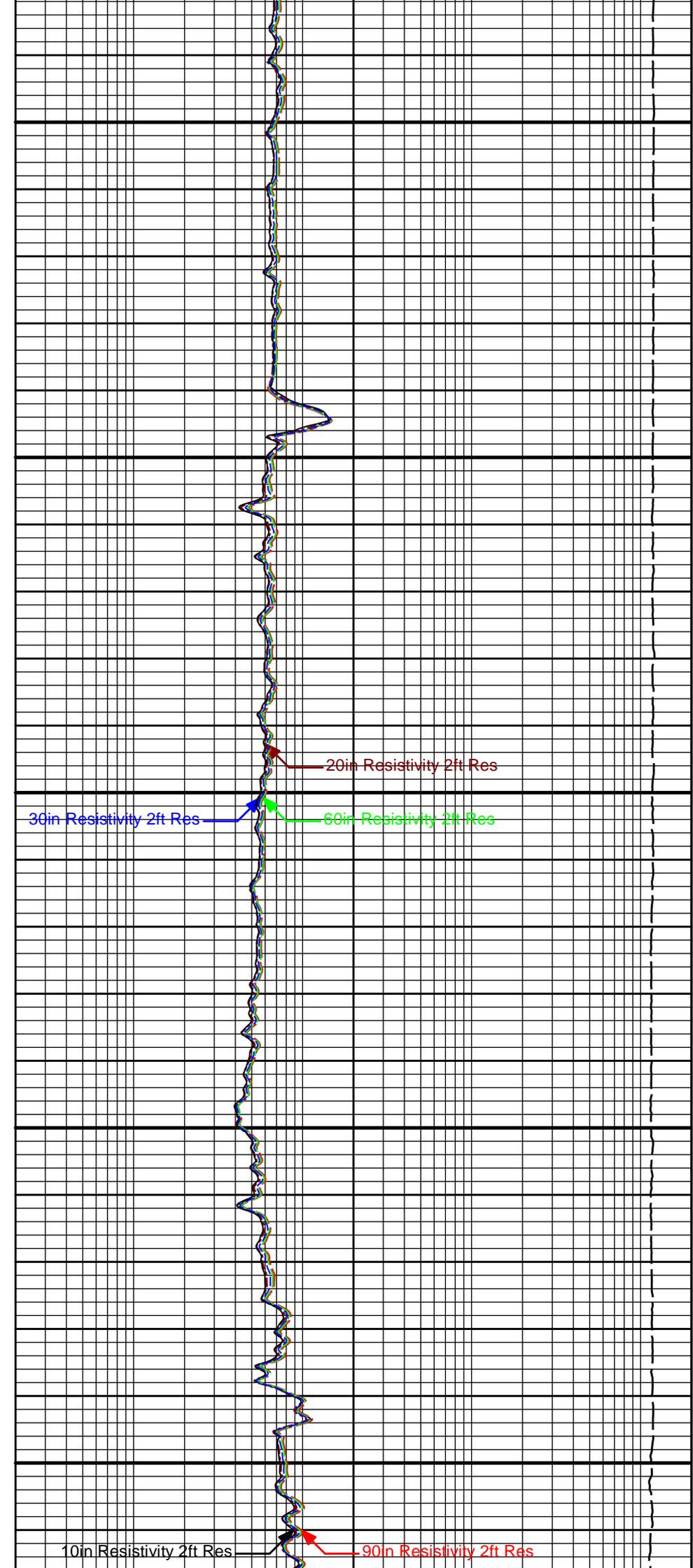
10in Resistivity 2ft Res

90in Resistivity 2ft Res



800

900



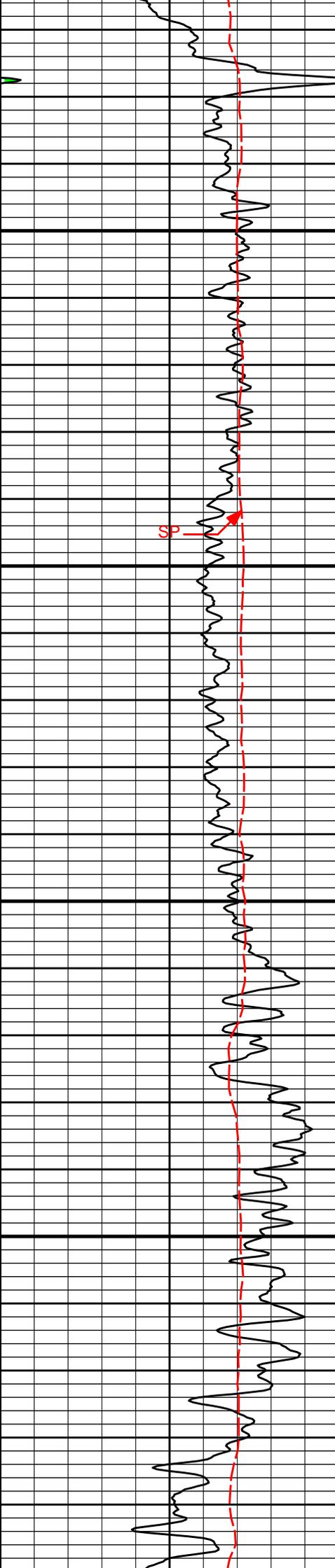
30in Resistivity 2ft Res

20in Resistivity 2ft Res

60in Resistivity 2ft Res

10in Resistivity 2ft Res

90in Resistivity 2ft Res

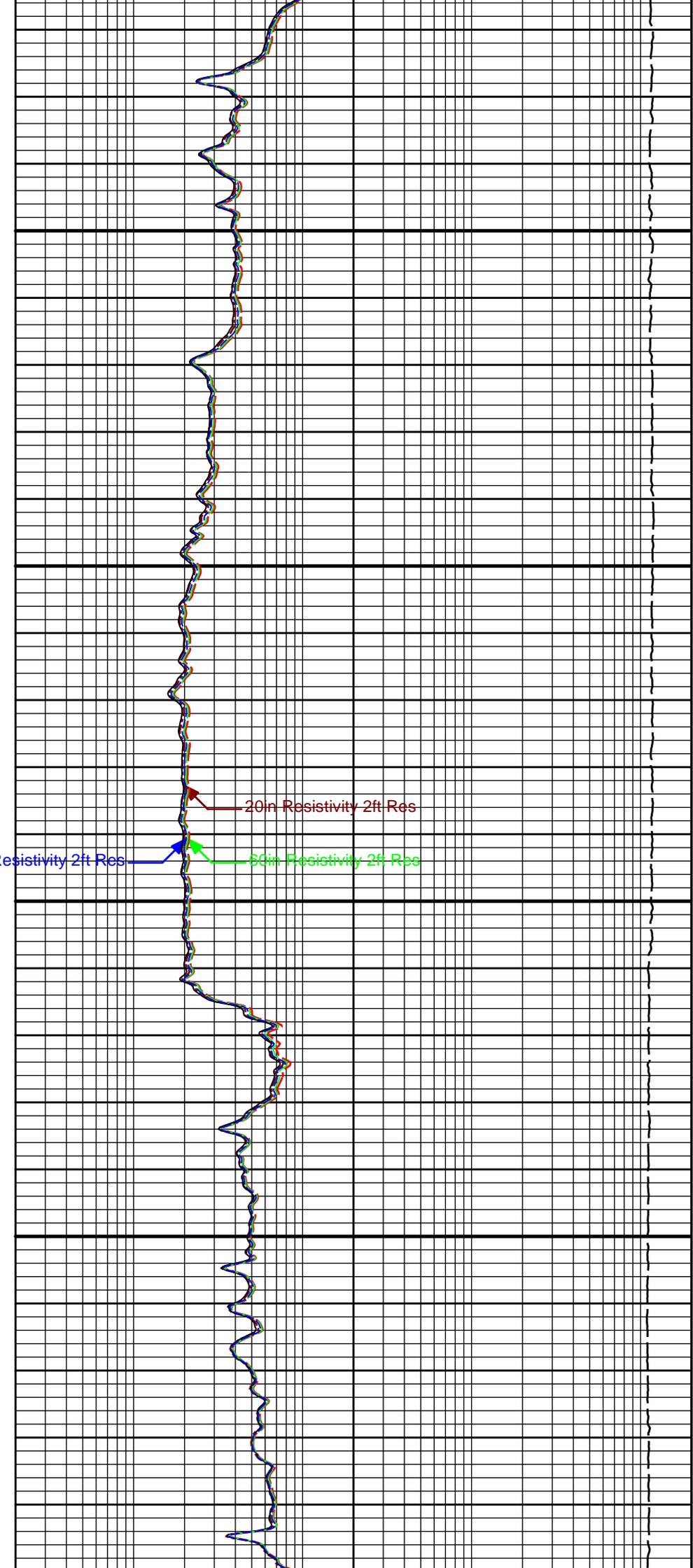


1000

SP

1100

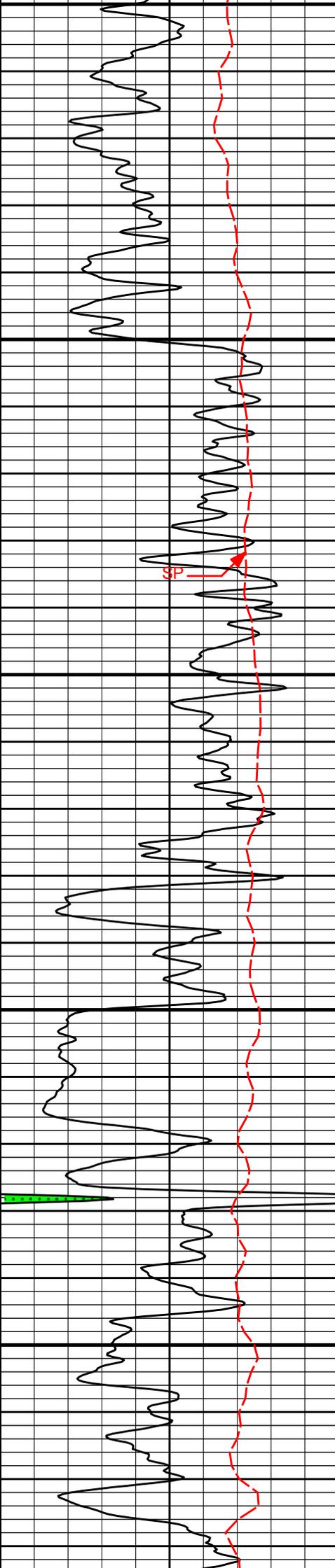
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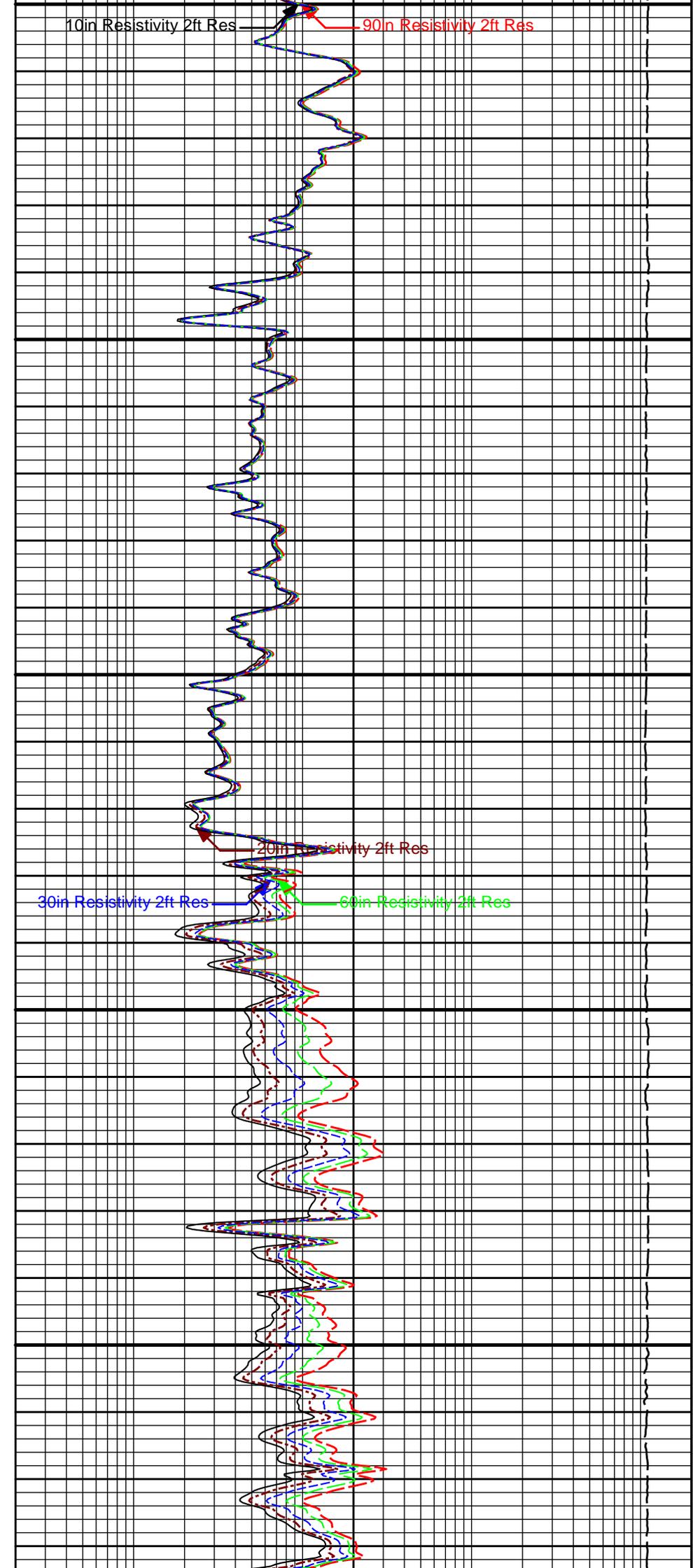
20in Resistivity 2ft Res

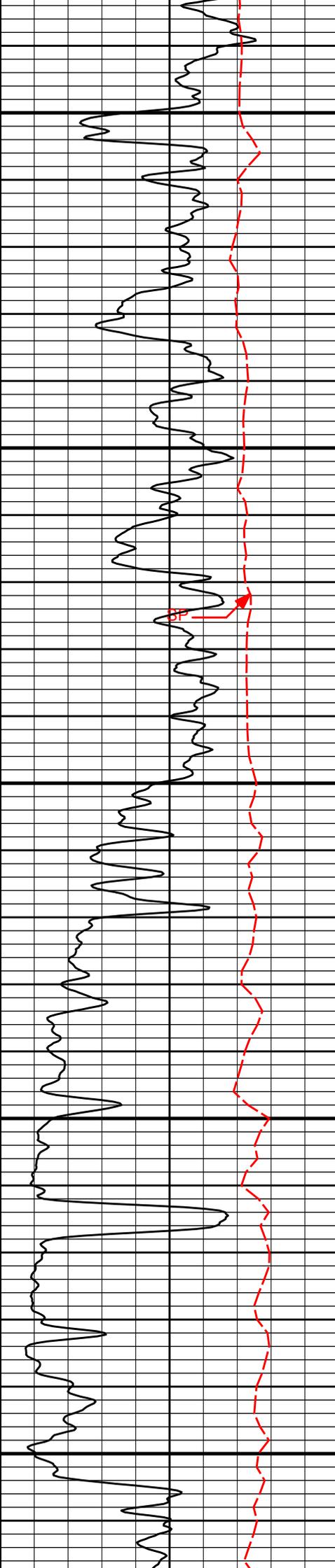
30in Resistivity 2ft Res

60in Resistivity 2ft Res



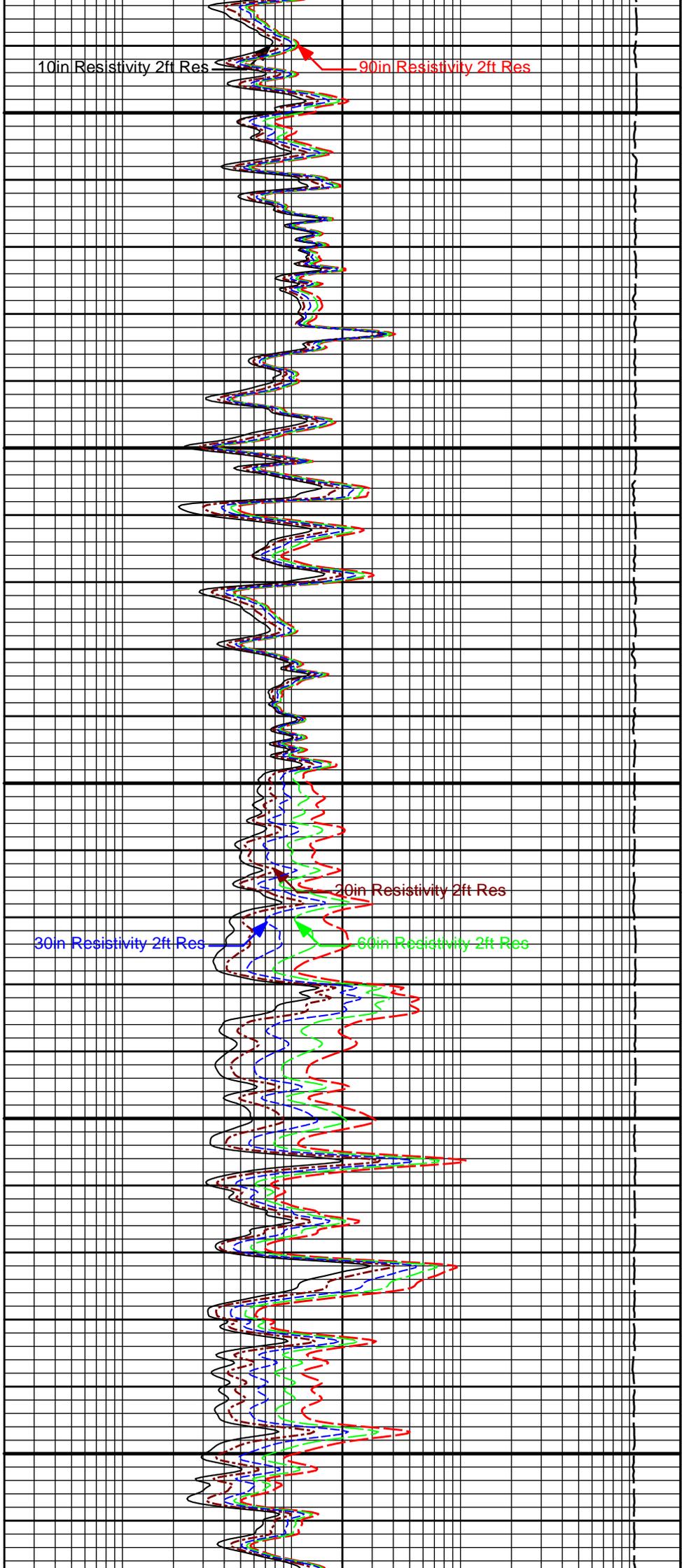
1200  
1300  
1400





1500

1600



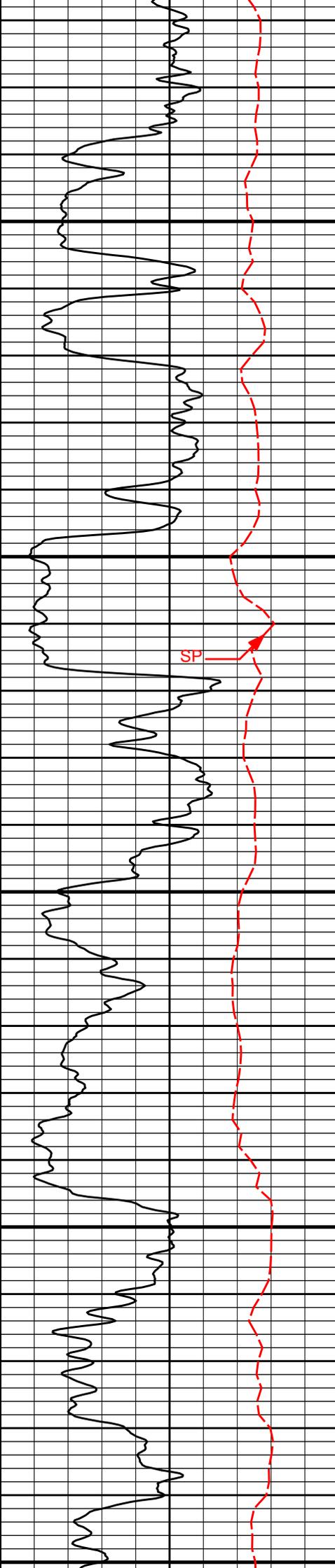
10in Resistivity 2ft Res

90in Resistivity 2ft Res

30in Resistivity 2ft Res

20in Resistivity 2ft Res

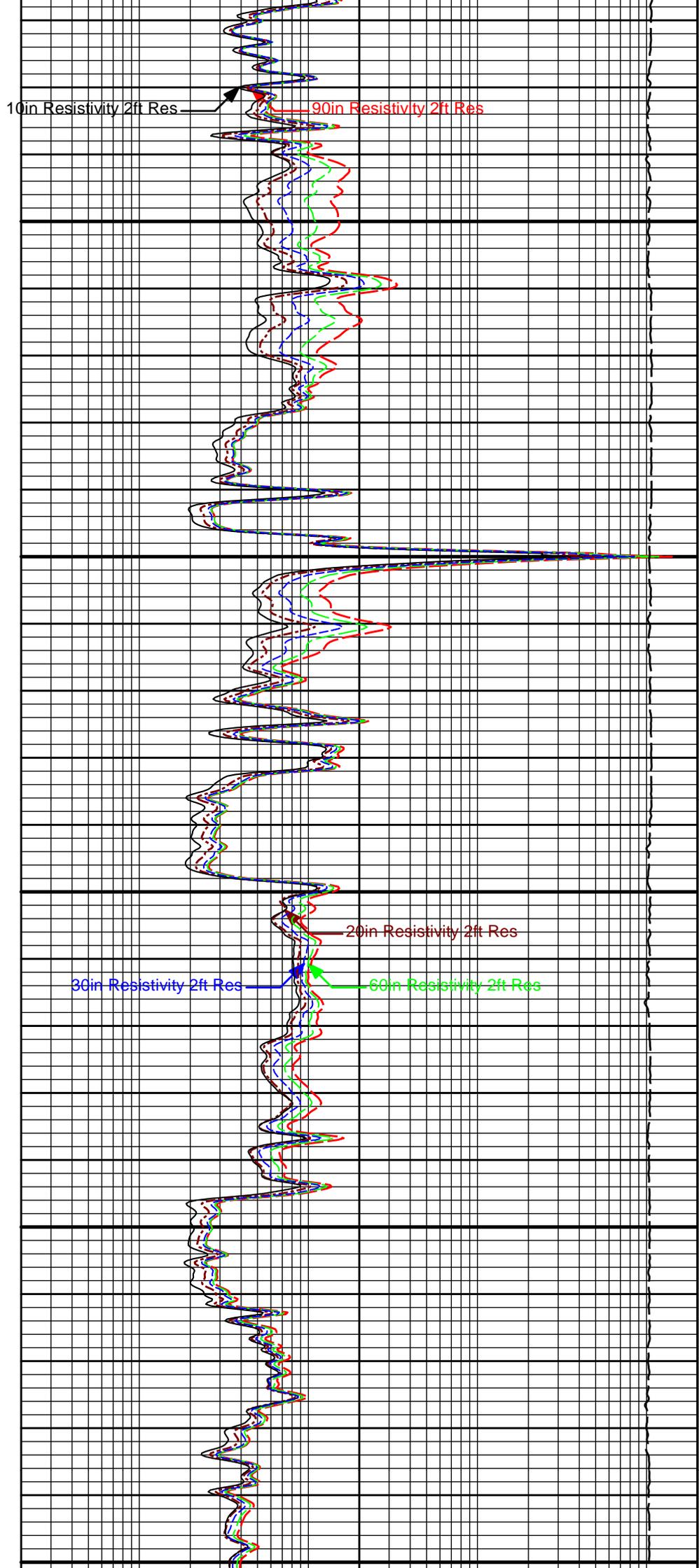
60in Resistivity 2ft Res



1700

1800

1900



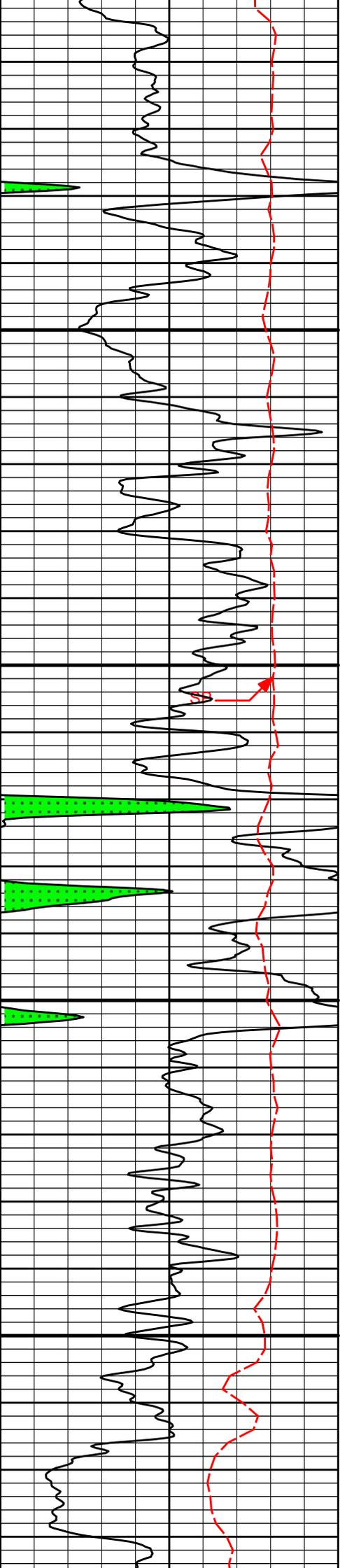
10in Resistivity 2ft Res

90in Resistivity 2ft Res

20in Resistivity 2ft Res

30in Resistivity 2ft Res

60in Resistivity 2ft Res



1000  
2000  
2100

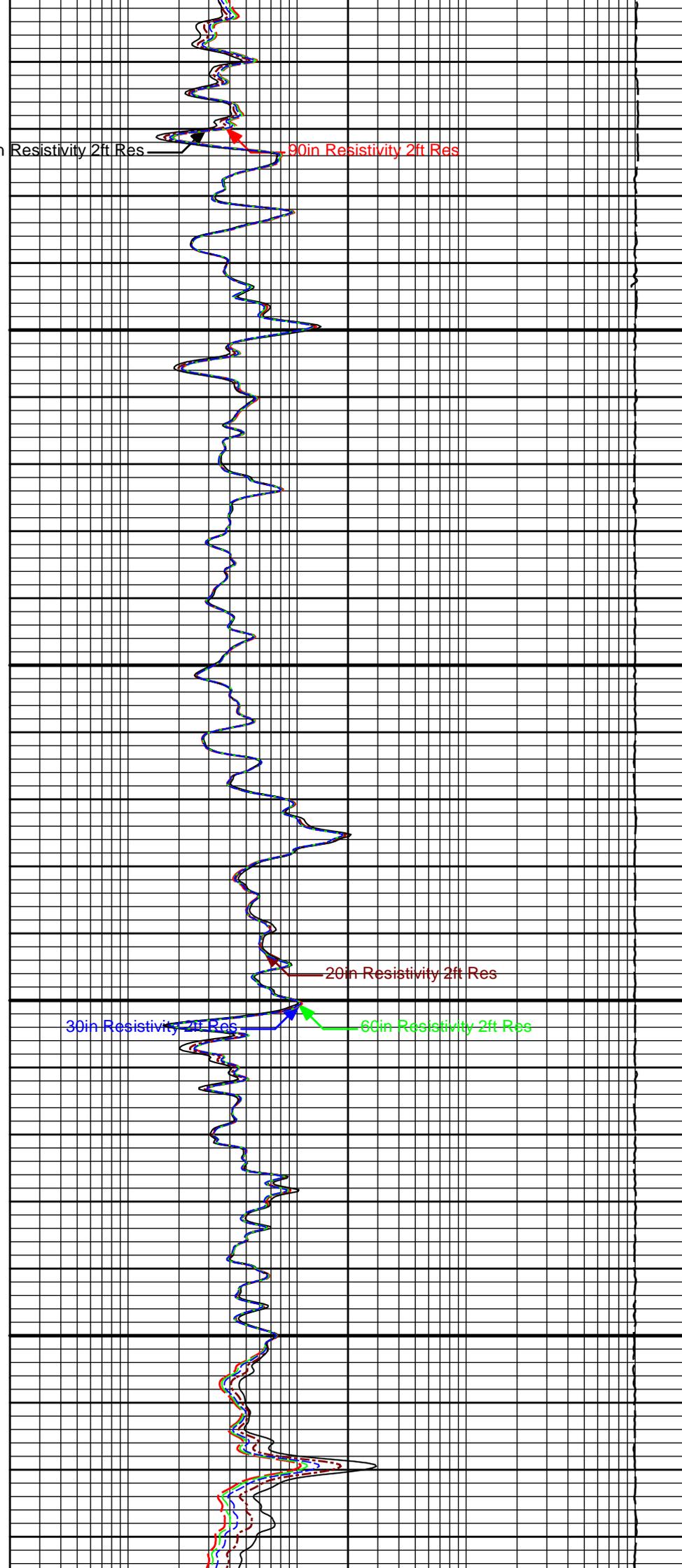
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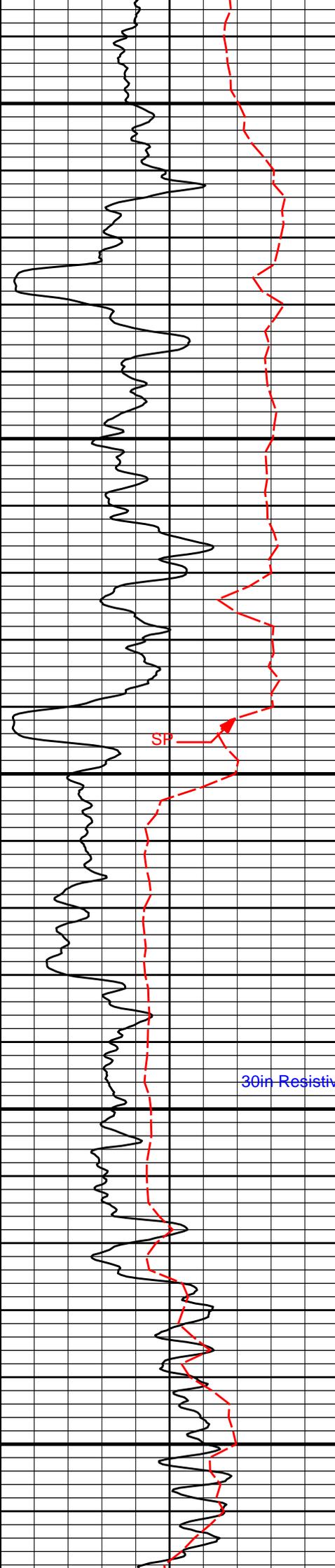
90in Resistivity 2ft Res

20in Resistivity 2ft Res

30in Resistivity 2ft Res

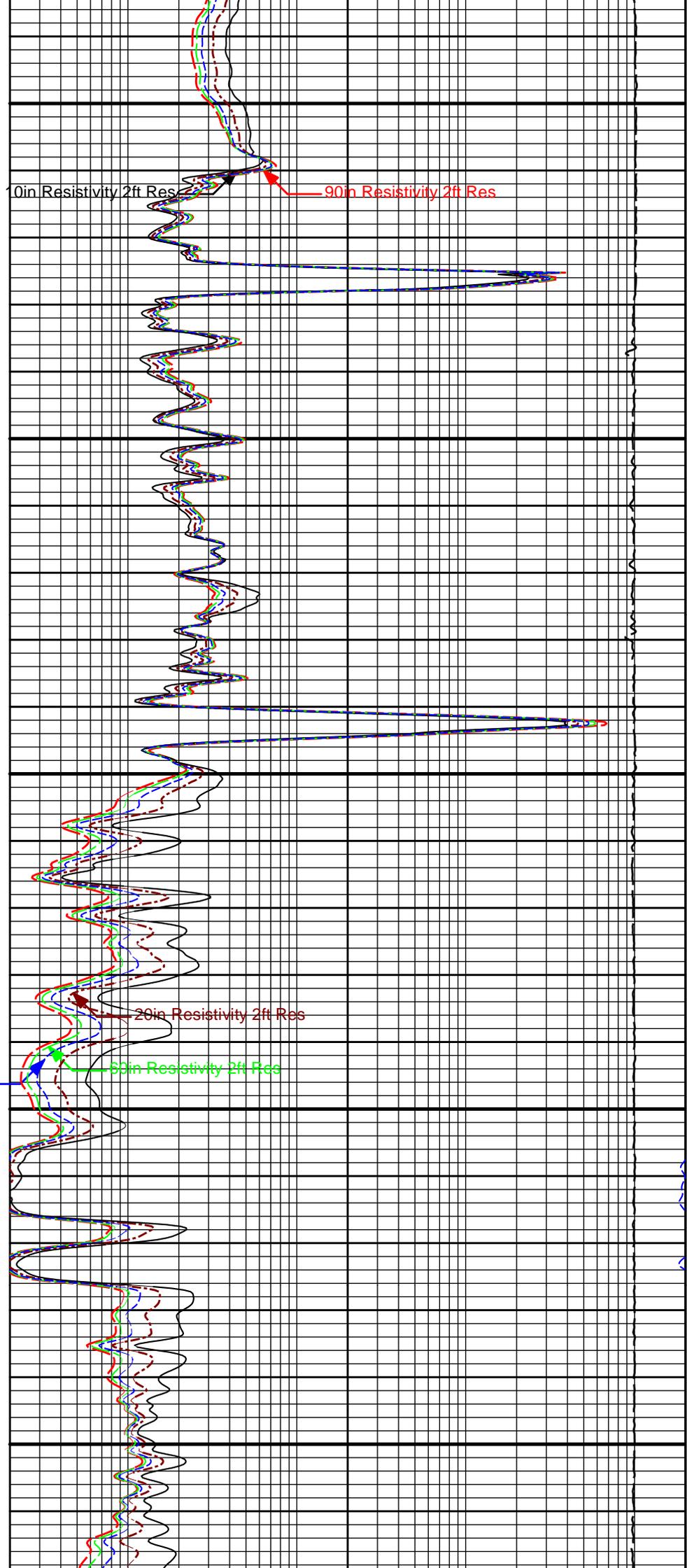
60in Resistivity 2ft Res





2200

2300



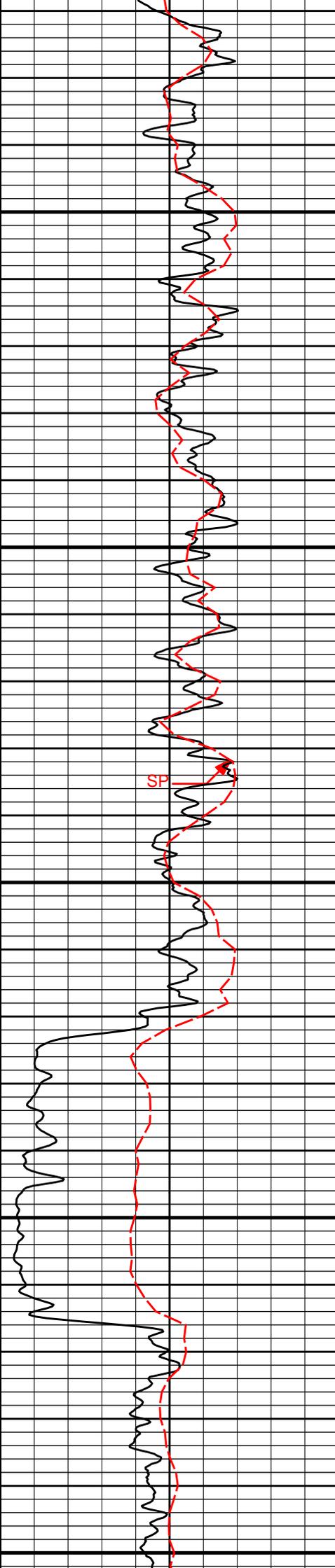
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90in Resistivity 2ft Res

20in Resistivity 2ft Res

30in Resistivity 2ft Res

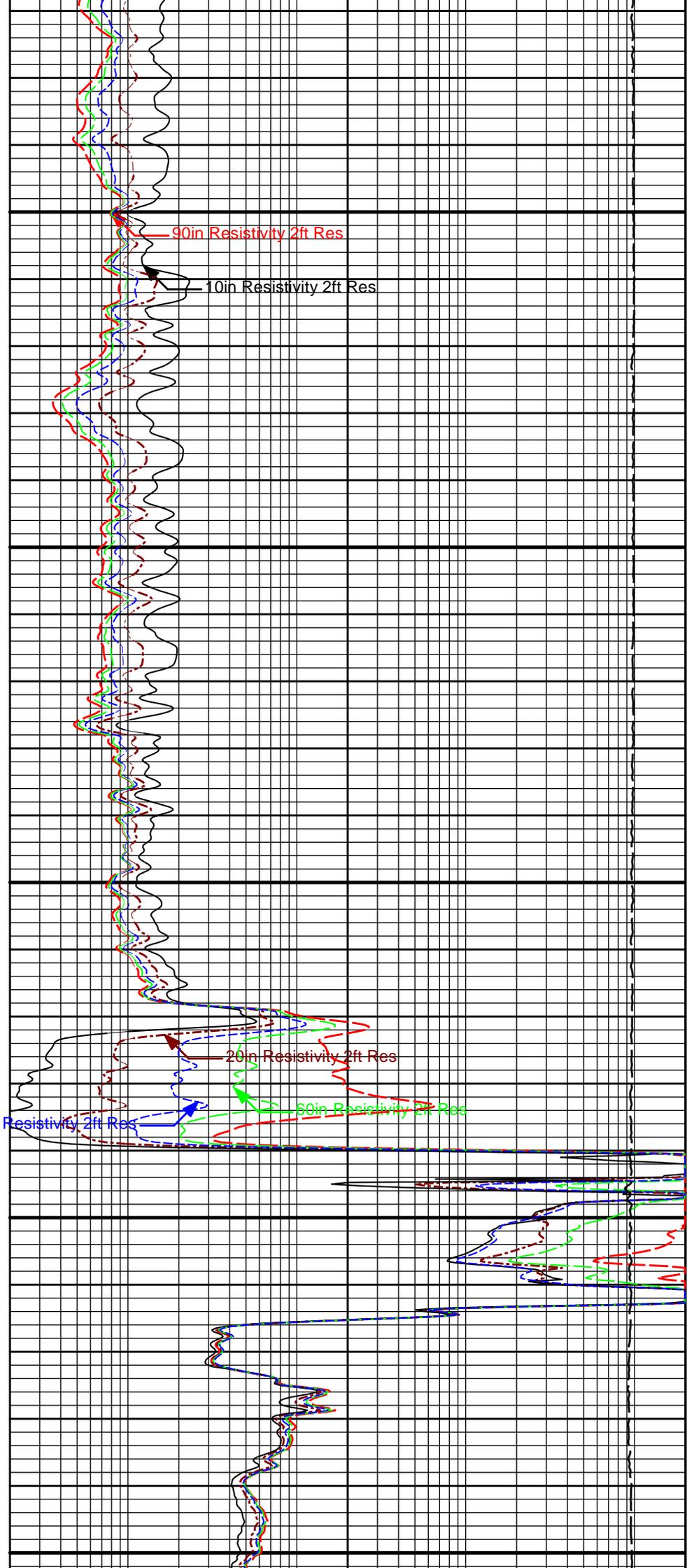
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2400

2500

2600



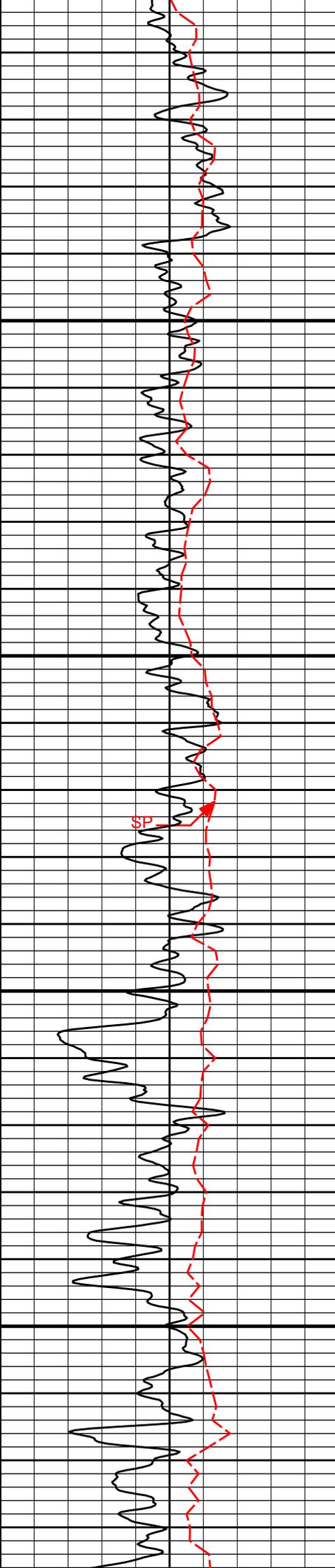
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10in Resistivity 2ft Res

20in Resistivity 2ft Res

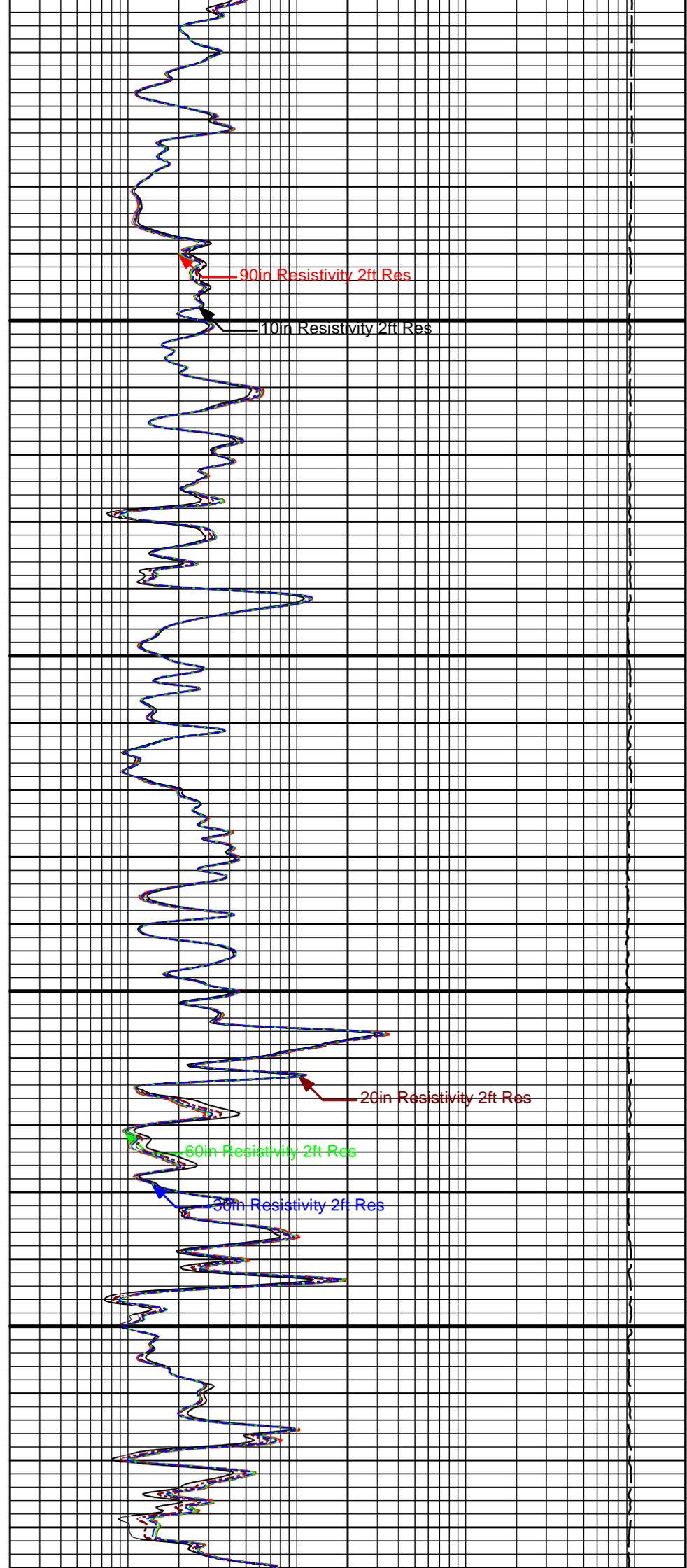
30in Resistivity 2ft Res

60in Resistivity 2ft Res



2700

2800



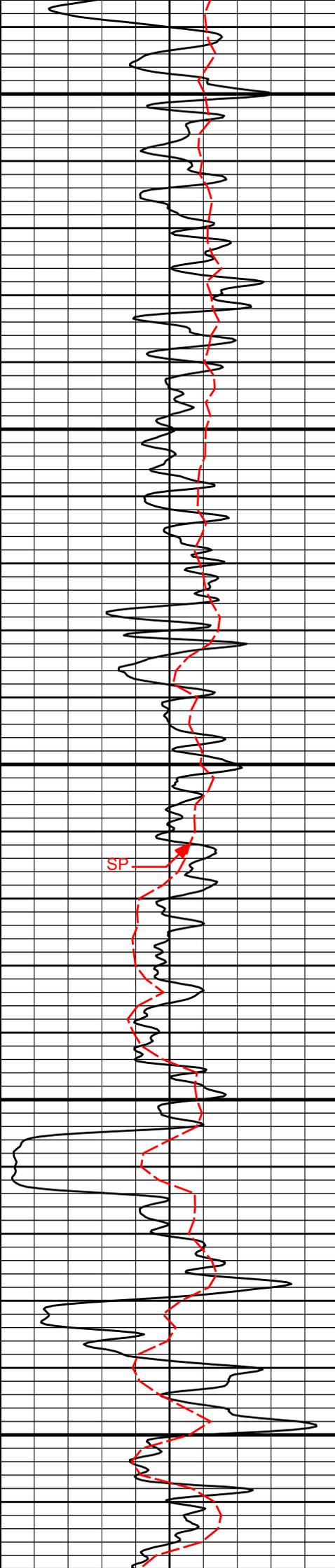
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10in Resistivity 2ft Res

20in Resistivity 2ft Res

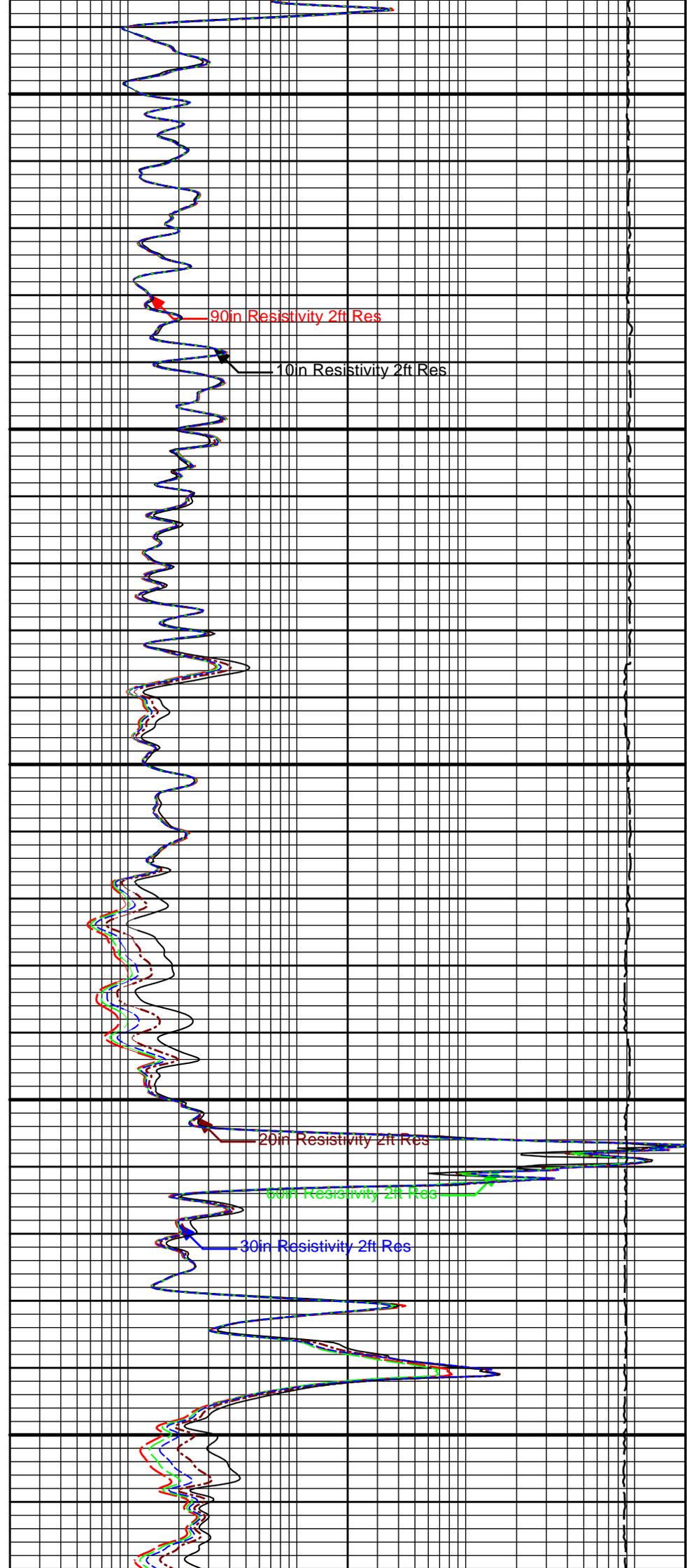
60in Resistivity 2ft Res

30in Resistivity 2ft Res



2900

3000



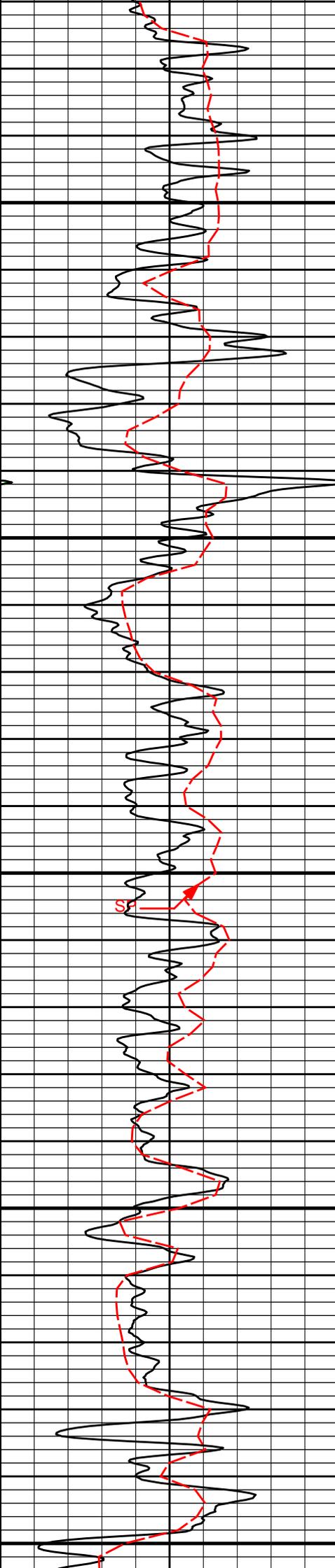
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10in Resistivity 2ft Res

20in Resistivity 2ft Res

60in Resistivity 2ft Res

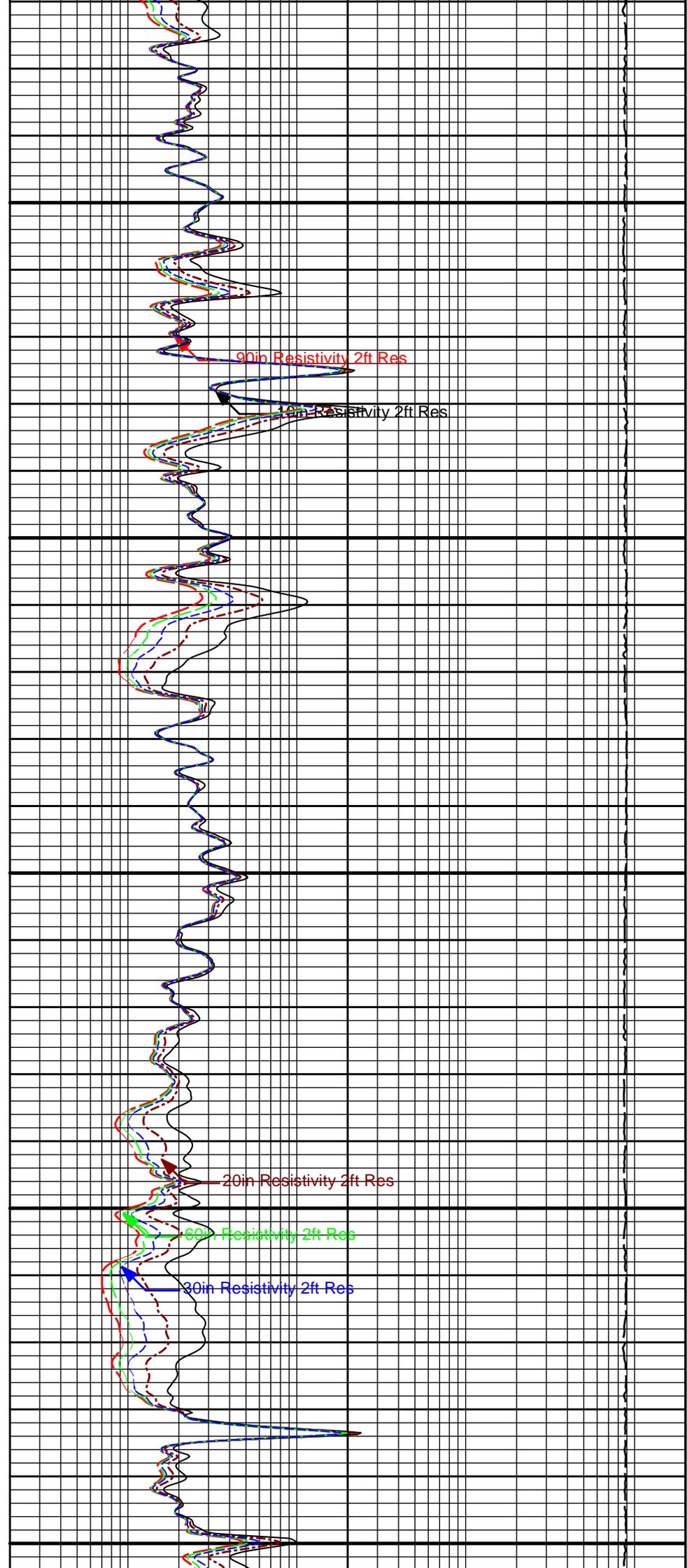
30in Resistivity 2ft Res



3100

3200

3300



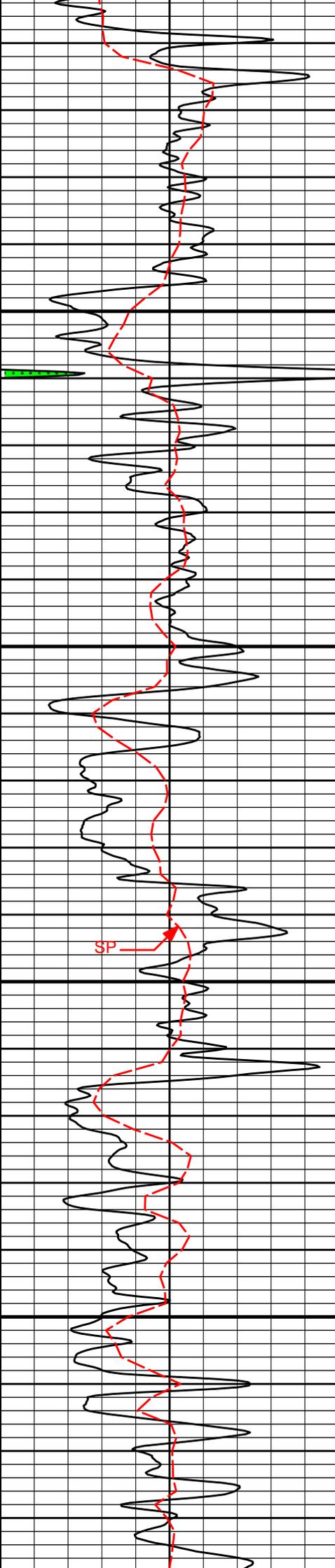
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10in Resistivity 2ft Res

20in Resistivity 2ft Res

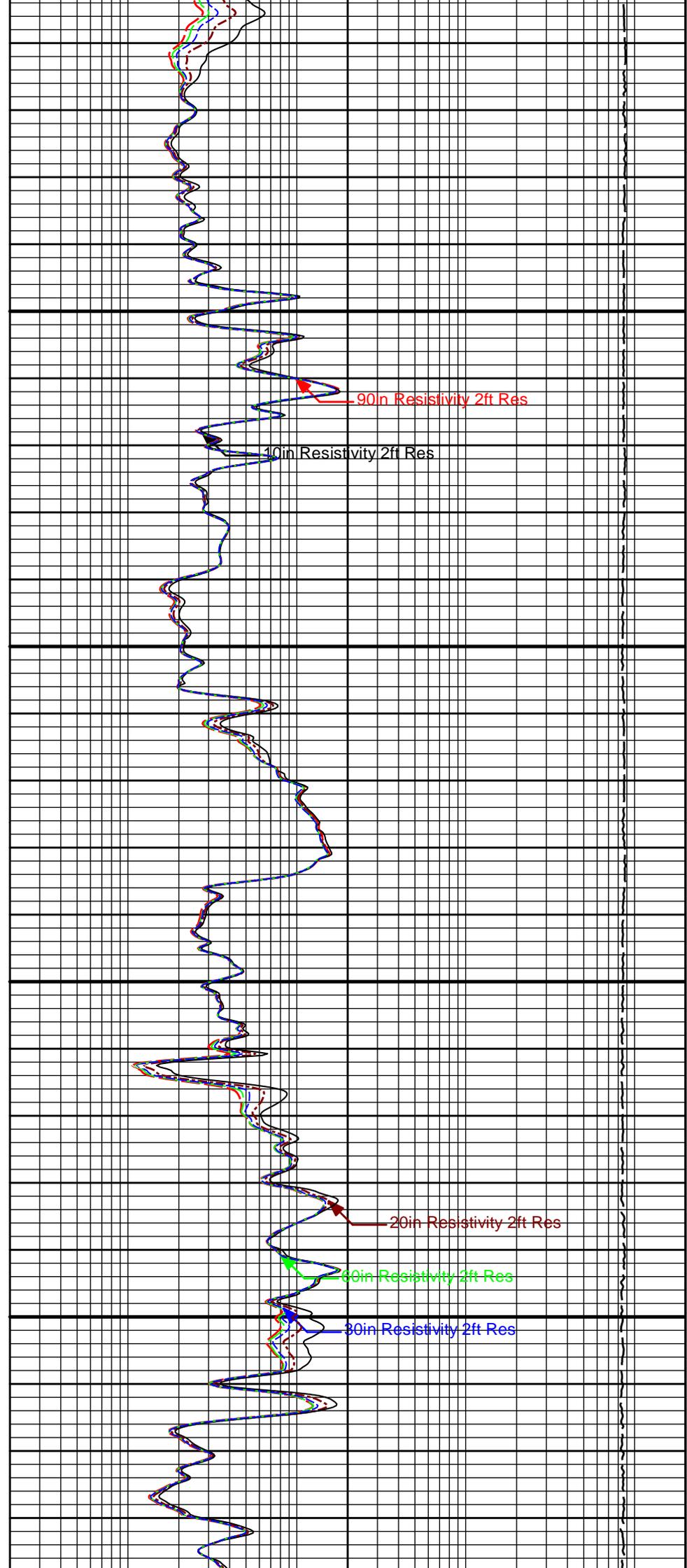
60in Resistivity 2ft Res

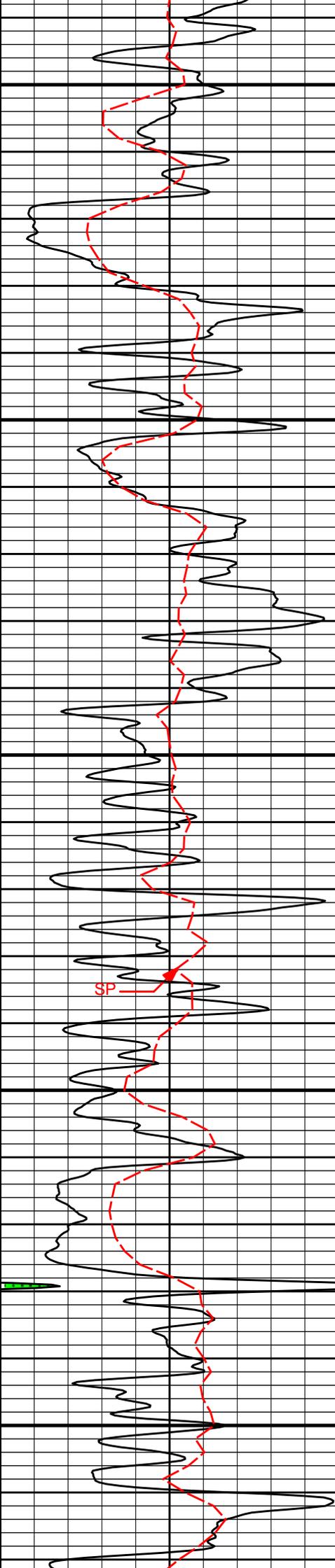
30in Resistivity 2ft Res



3400

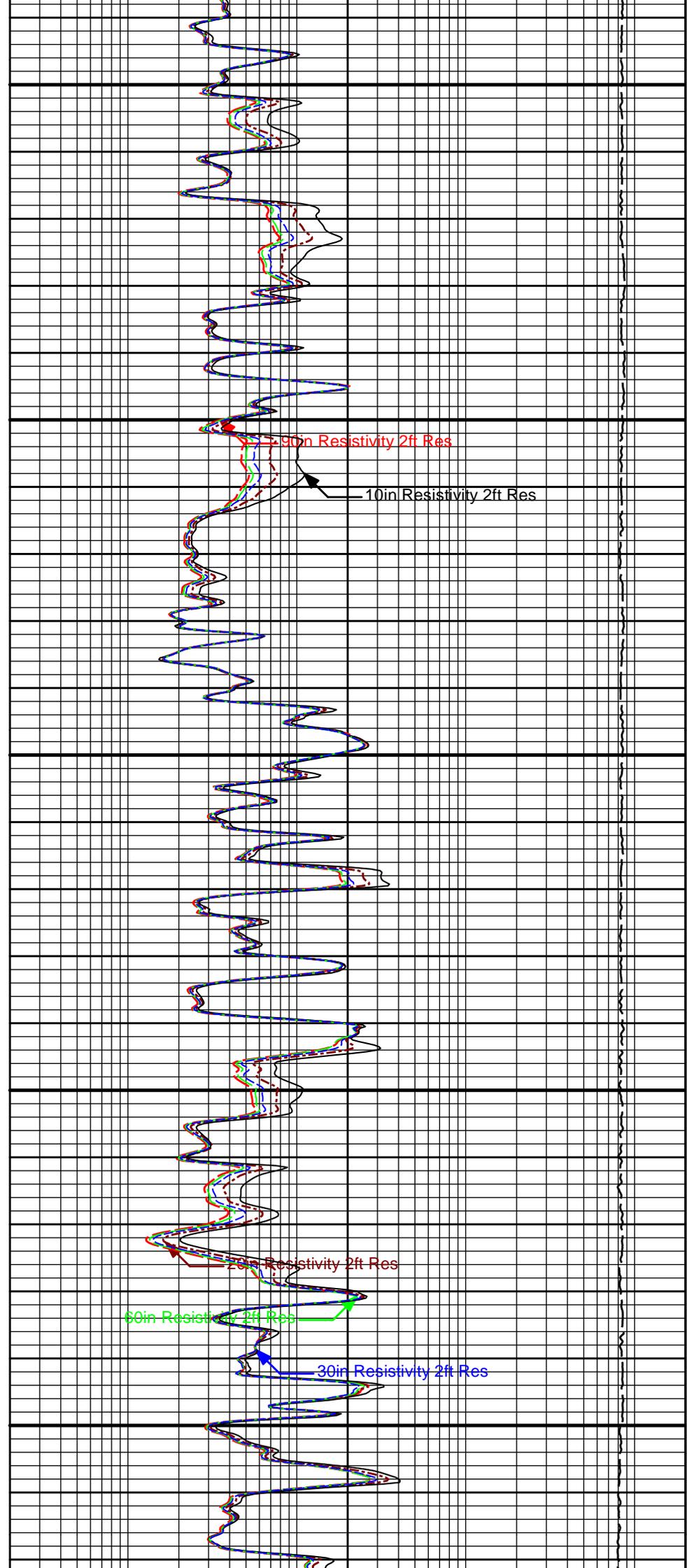
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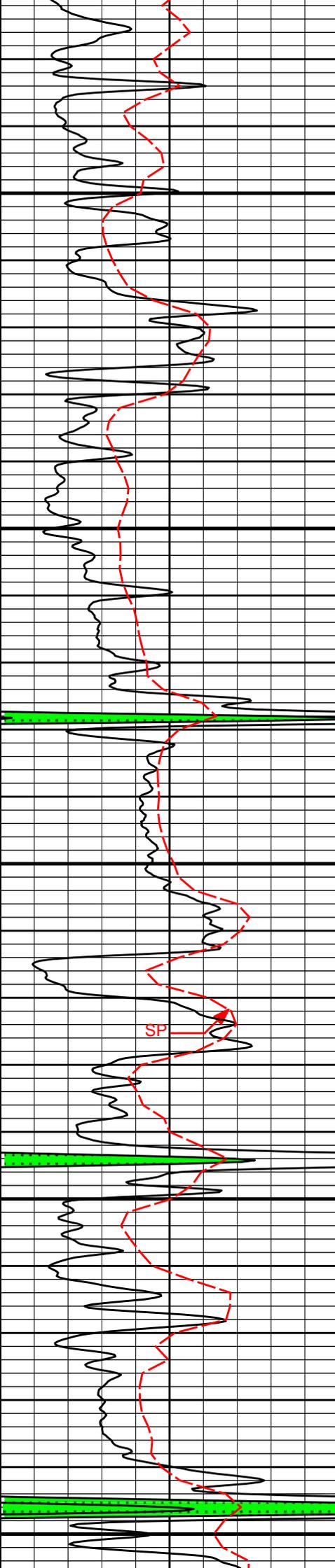




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3700

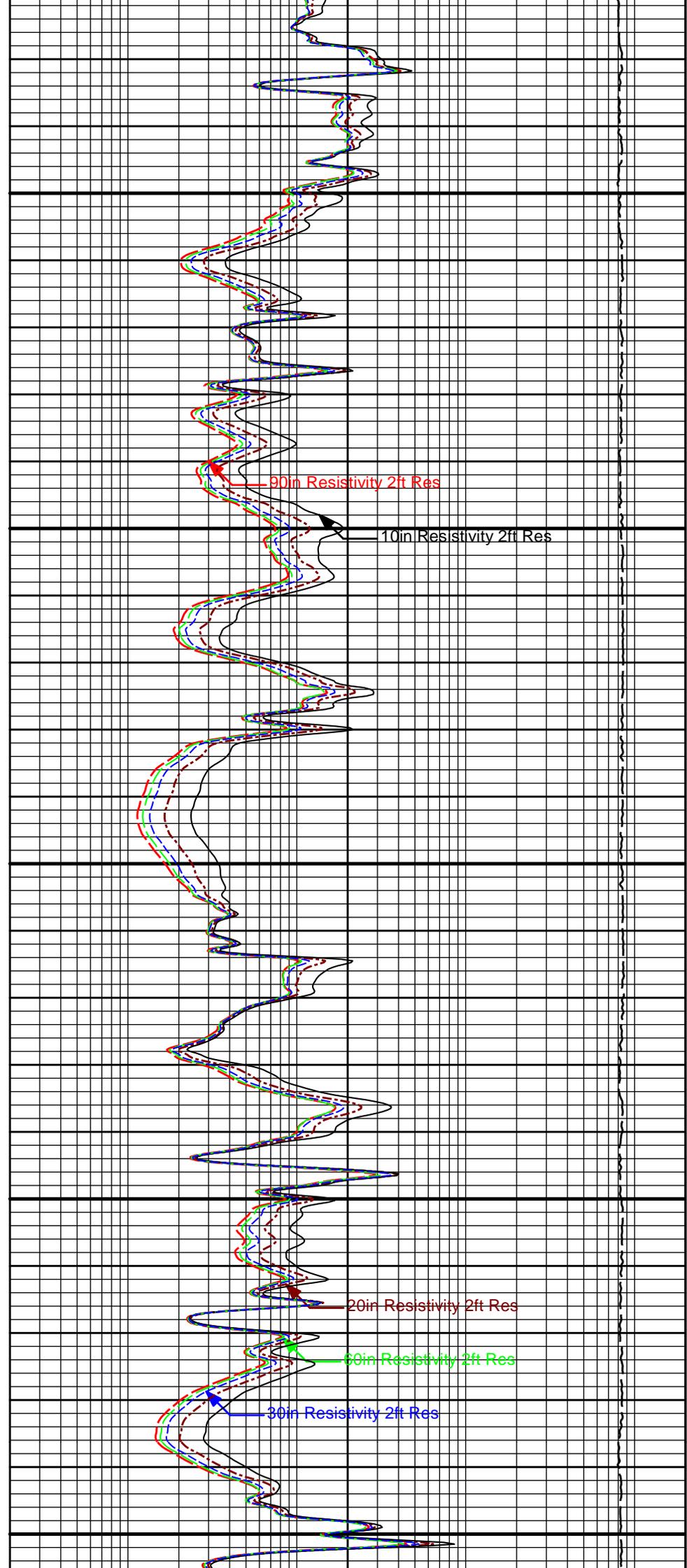




3800

3900

4000



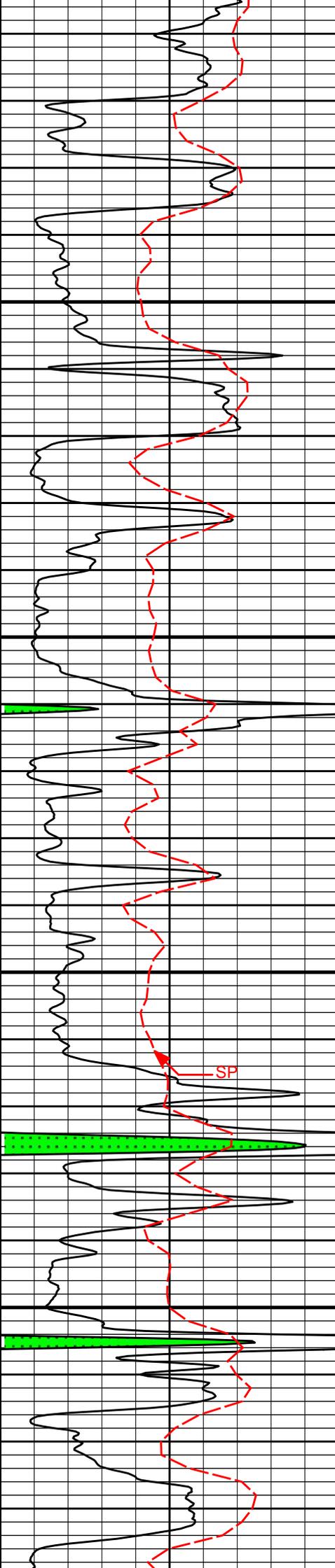
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10in Resistivity 2ft Res

20in Resistivity 2ft Res

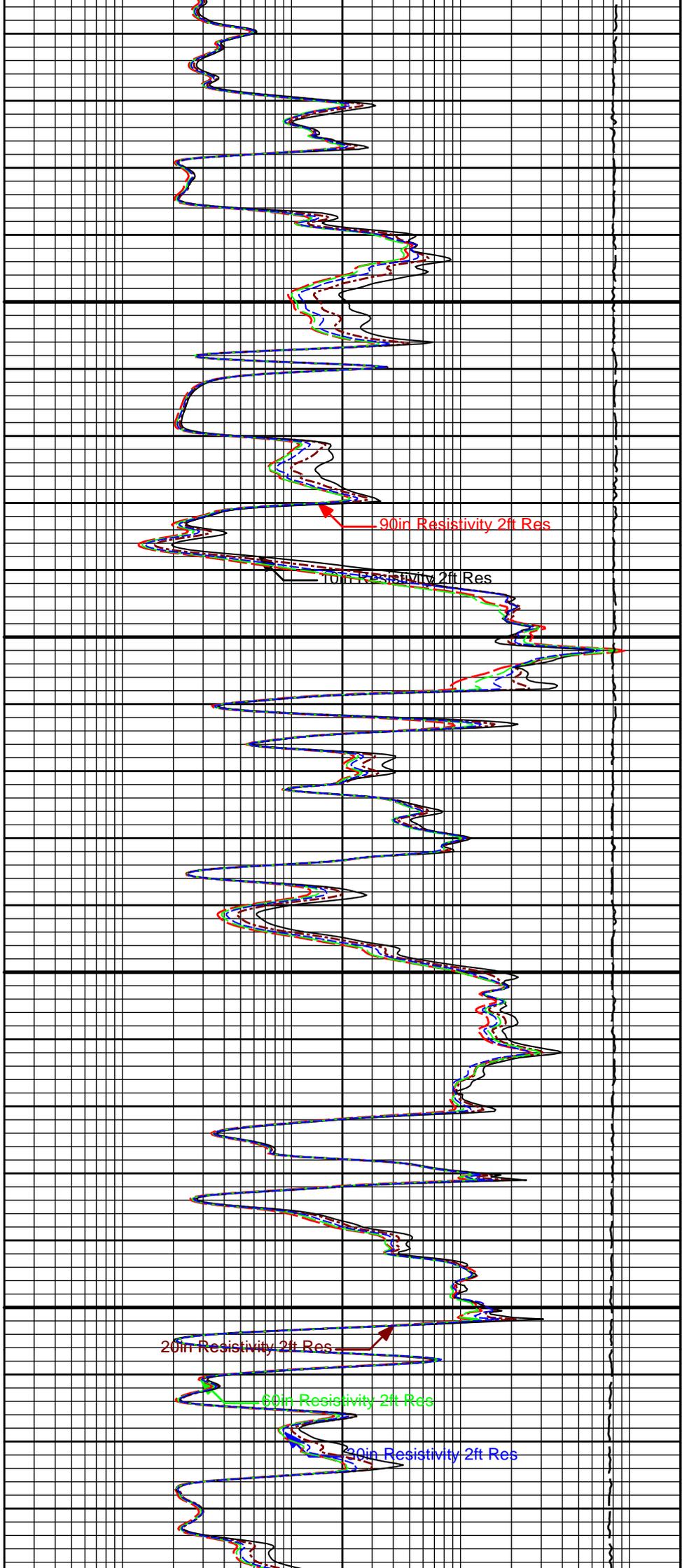
60in Resistivity 2ft Res

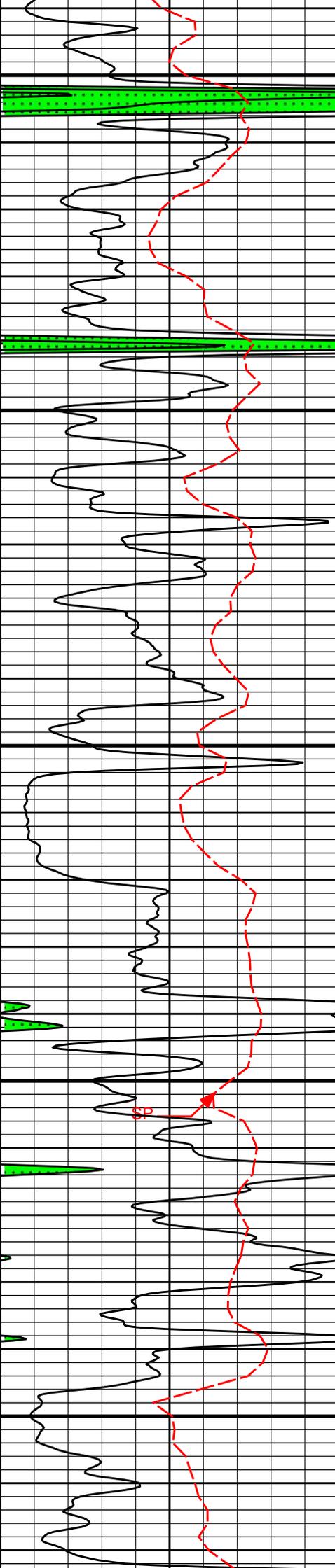
30in Resistivity 2ft Res



4100

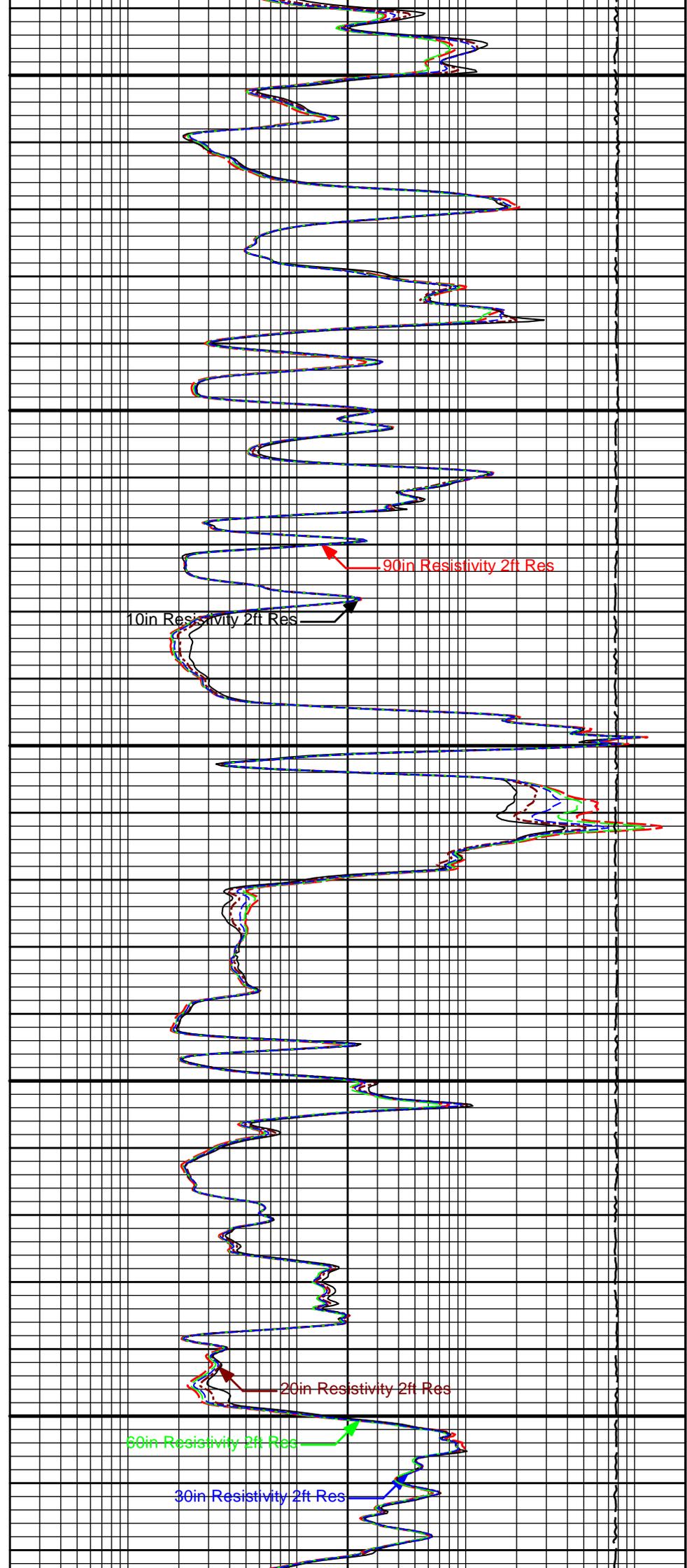
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4300

4400



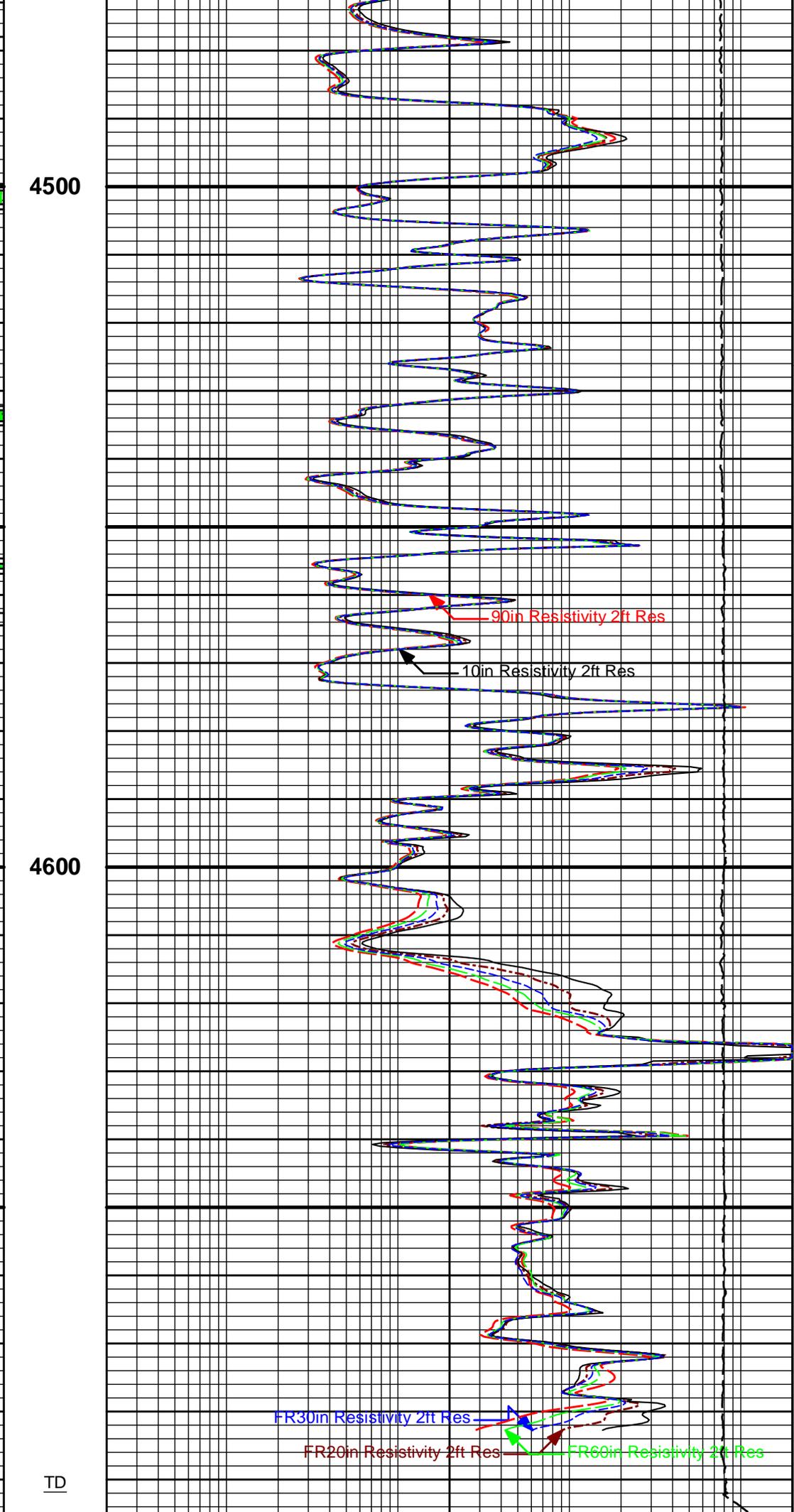
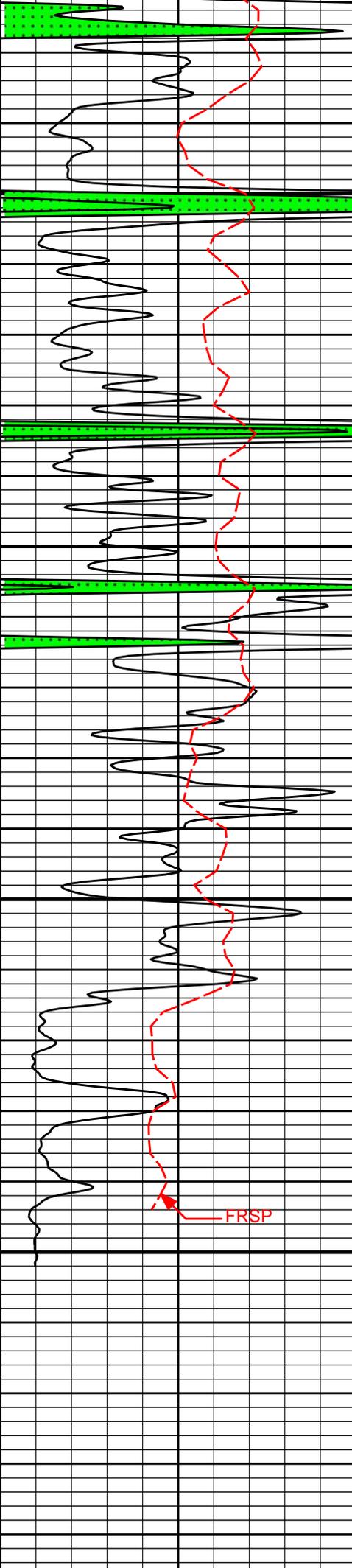
10in Resistivity 2ft Res

90in Resistivity 2ft Res

20in Resistivity 2ft Res

60in Resistivity 2ft Res

30in Resistivity 2ft Res



0      Gamma API      150  
api

TD

15K      Tension      0  
pounds

SP

-]20[+

0.2

90in Resistivity 2ft Res

2K

ohmm

0.2

60in Resistivity 2ft Res

2000

ohmm

0.2

30in Resistivity 2ft Res

2000

ohm-metre

0.2

20in Resistivity 2ft Res

2000

ohmm

0.2

10in Resistivity 2ft Res

2K

ohmm

**HALLIBURTON**

Plot Time: 08-Aug-18 16:12:26

Plot Range: 300 ft to 4695.58 ft

Data: RUSSEL\_RUMBACK\Well Based\DAQ-0001-005\

Plot File: \\-LOCAL-RUSSEL\_RUMBACK\0001 GTET-DSNT-SDLT-ACRTIACRTIACRT\_5inch\_main

### 5 INCH MAIN LOG

### 5 INCH MAIN LOG

**HALLIBURTON**

Plot Time: 08-Aug-18 16:12:26

Plot Range: 4390 ft to 4695.17 ft

Data: RUSSEL\_RUMBACK\Well Based\DAQ-0001-004\

Plot File: \\-LOCAL-RUSSEL\_RUMBACK\0001 GTET-DSNT-SDLT-ACRTIACRTIACRT\_5inch\_main

### REPEAT SECTION

### REPEAT SECTION

0.2

10in Resistivity 2ft Res

2K

ohmm

0.2

20in Resistivity 2ft Res

2000

ohmm

0.2

30in Resistivity 2ft Res

2000

ohm-metre

0.2

60in Resistivity 2ft Res

2000

ohmm

0.2

90in Resistivity 2ft Res

2K

ohmm

SP

-]20[+

0

Gamma API

150

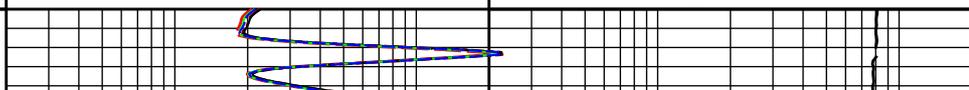
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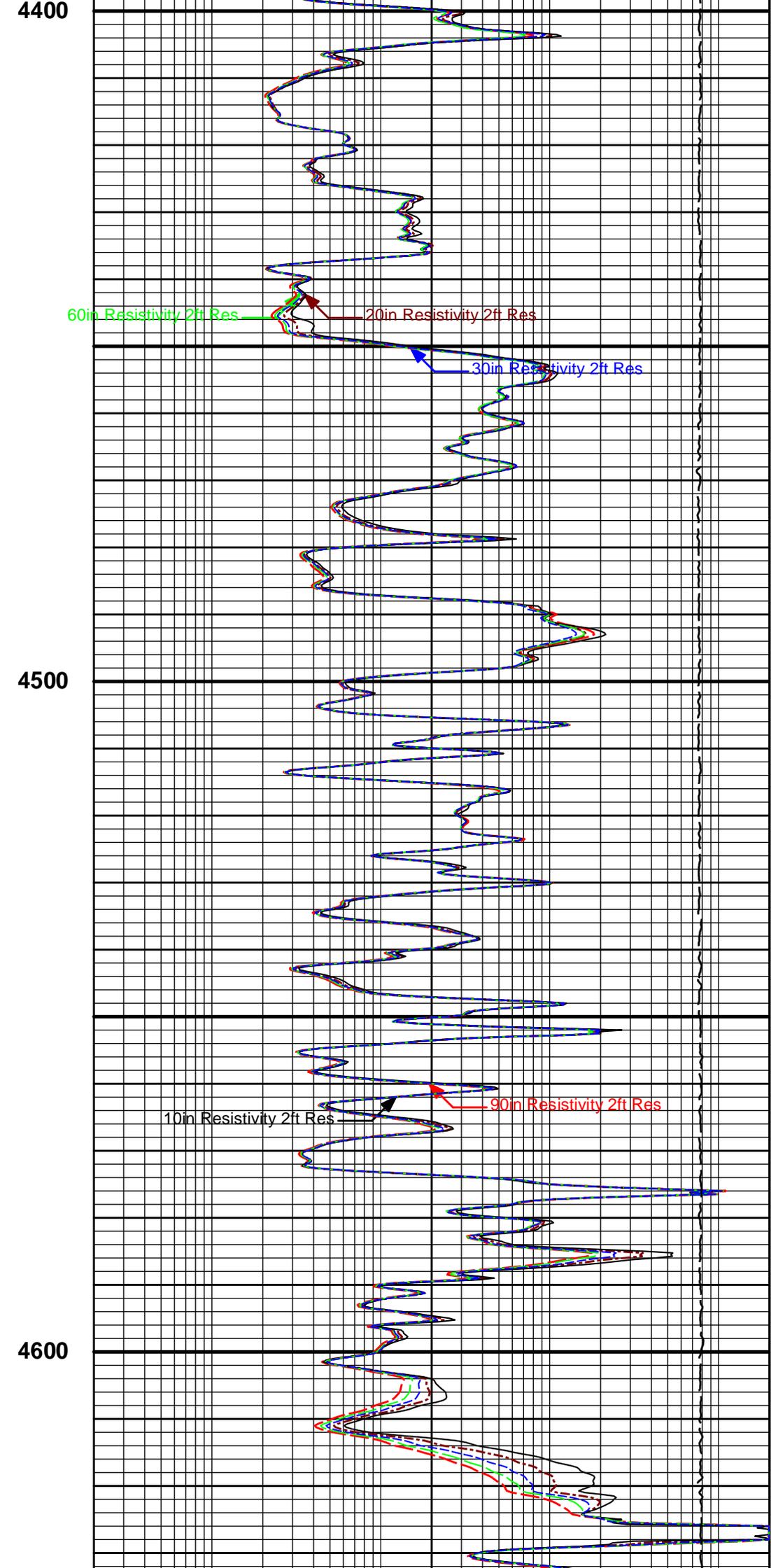
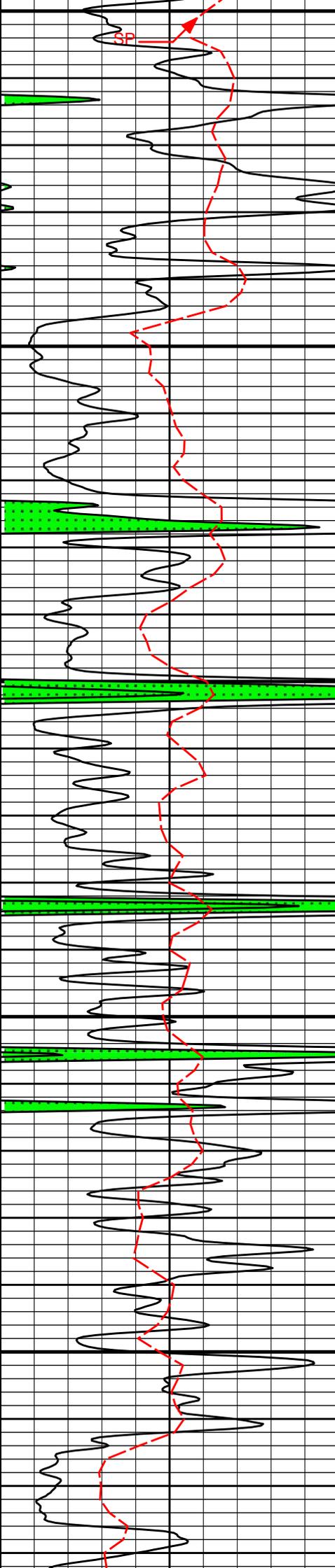
15K

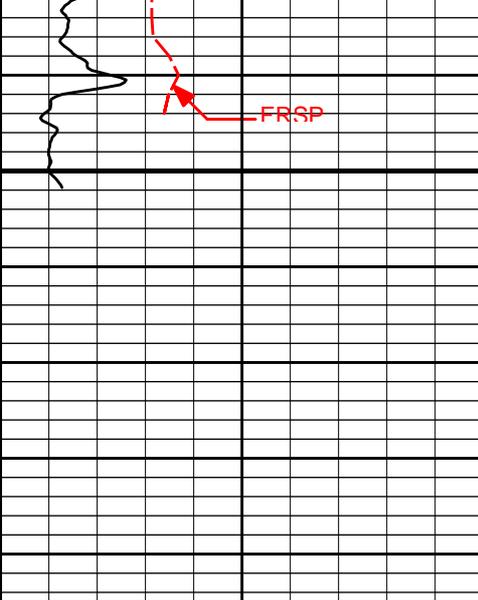
Tension

0

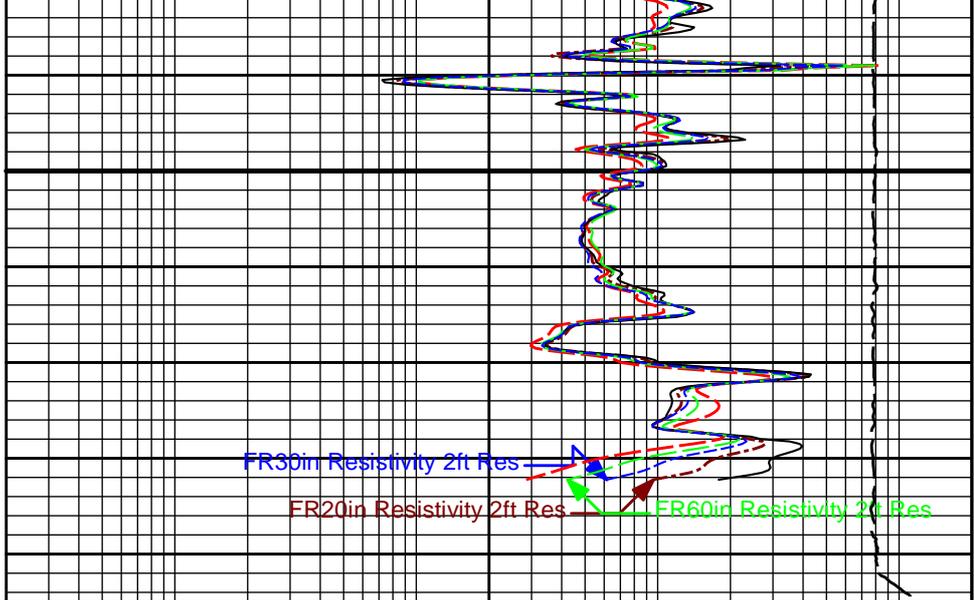
pounds







TD



0	Gamma API	150
	api	

15K	Tension	0
	pounds	

	SP	
	-]20[+	

0.2	90in Resistivity 2ft Res	2K
	ohmm	
0.2	60in Resistivity 2ft Res	2000
	ohmm	
0.2	30in Resistivity 2ft Res	2000
	ohm-metre	
0.2	20in Resistivity 2ft Res	2000
	ohmm	
0.2	10in Resistivity 2ft Res	2K
	ohmm	

**HALLIBURTON**

Plot Time: 08-Aug-18 16:12:28  
 Plot Range: 4390 ft to 4695.17 ft  
 Data: RUSSEL\_RUMBACK\Well Based\DAQ-0001-004\  
 Plot File: \\-LOCAL-RUSSEL\_RUMBACK\0001 GTET-DSNT-SDLT-ACRTIACRTIACRT\_5inch\_main

## REPEAT SECTION

# REPEAT SECTION

**HALLIBURTON**

## CALIBRATION REPORT

SURFACE TENSION SHOP CALIBRATION			
Tool Name:	Depth Panel - 12345678	Reference Calibration Date:	26-Jul-18 22:37:08
Engineer:	SEAN WOLTEMATH	Calibration Date:	27-Jul-18 07:45:06
Software Version:	WL INSITE R5.6.3 (Build 4)	Calibration Version:	1

SURFACE TENSION LOAD CELL				
Measurement	Load Cell Value	Measurement	Calibrated	Units
Low	10231.00	51.22	0.00	lbs

High

17531.89

7880.51

7830.00

lbs

**DOWNHOLE TENSION SHOP CALIBRATION**

Tool Name: CH\_HOS - CH\_HOS\_I

Reference Calibration Date: 27-Jul-18 07:48:20

Engineer: WHITLOCK

Calibration Date: 02-Aug-18 15:36:38

Software Version: WL INSITE R5.6.3 (Build 4)

Calibration Version: 1

**DOWNHOLE LOAD CELL**

Measurement	Tool Value	Measurement	Calibrated	Units
Low	-1717.47	-221.33	0.00	lbs
High	9809.57	4097.73	1500.00	lbs

**NATURAL GAMMA RAY TOOL SHOP CALIBRATION**

Tool Name: GTET - 11013113

Reference Calibration Date: 02-May-18 11:20:36

Engineer: WHITLOCK

Calibration Date: 05-Aug-18 09:58:00

Software Version: WL INSITE R5.6.3 (Build 4)

Calibration Version: 1

Calibrator Source S/N: TB-79

Calibrator API Reference:222.00 api

Equivalent Calibrator API Reference:225.9 api

Measurement	Measured	Calibrated	Units
Background	26.4	26.2	api
Background + Calibrator	253.6	252.1	api
Calibrator	227.2	225.9	api

**NATURAL GAMMA RAY TOOL FIELD CALIBRATION**

Tool Name: GTET - 11013113

Reference Calibration Date: 05-Aug-18 09:58:00

Engineer: WHITLOCK

Calibration Date: 05-Aug-18 10:00:58

Software Version: WL INSITE R5.6.3 (Build 4)

Calibration Version: 1

Calibrator Source S/N: TB-79

Calibrator API Reference:222.00 api

Equivalent Calibrator API Reference:225.9 api

Field Verification	Shop	Field	Units
Background	26.2	26.1	api
Background + Calibrator	252.1	251.2	api
Calibrator	225.9	225.0	api

Shop	Field	Difference	Tolerance
225.9	225.0	0.9	+/- 9.00

**DUAL SPACED NEUTRON SHOP CALIBRATION**

Tool Name: DSNT - 11019641

Reference Calibration Date: 04-Aug-18 12:03:14

Engineer: SCHLIEM

Calibration Date: 04-Aug-18 12:26:27

Software Version: WL INSITE R5.6.3 (Build 4)

Calibration Version: 1

Logging Source S/N: DSN-436

Tank Serial Number: EL RENO HWT

Reference value assigned to Tank: 56.100

Snow Block S/N: 12156883

Calibration Tank Water Temperature: 89 degF

Min. Tool Housing Outside Diameter: 3.625 in

**CALIBRATION CONSTANTS**

Measurement	Prev. Value	New Value	Control Limit On New Value
Gain:	0.97922	0.97742	0.900 - 1.100

**WATER TANK SUMMARY (Horizontal Water Tank)**

Current Reading	Calibrated	Control Limit
-----------------	------------	---------------

Measurement	(Previous Coef.)	(New Coef.)	Change	On Change
Porosity (decp):	0.2364	0.2358	0.0006	+/- 0.0020
Calibrated Ratio:	10.5794	10.5599	0.019	+/- 0.050

VERIFIER		
Measurement	Value	Control Limit
Snow-Block Porosity (decp):	0.0667	0.02000 - 0.09000

PASS/FAIL SUMMARY	
Background Check:	Passed
Gain-Range Check:	Passed
Snow-Block Check:	Passed

**DUAL SPACED NEUTRON FIELD CALIBRATION**

<b>Tool Name:</b> DSNT - 11019641	<b>Reference Calibration Date:</b> 04-Aug-18 12:26:27
<b>Engineer:</b> WHITLOCK	<b>Calibration Date:</b> 05-Aug-18 09:45:13
<b>Software Version:</b> WL INSITE R5.6.3 (Build 4)	<b>Calibration Version:</b> 1

Logging Source S/N: DSN-436  
Snow Block S/N: 12156883

NEUTRON FIELD-CHECK SUMMARY				
	Shop	Field	Difference	Control Limit On Change
Snow-Block Porosity (decp):	0.0667	0.0665	-0.0002	+/- 0.0150

PASS/FAIL SUMMARY	
Block Change Check:	Passed
Snow Block Stat Check:	Passed
Temperature Check:	Passed

**DENSITY CALIPER SHOP CALIBRATION**

<b>Tool Name:</b> SDLT - 10960494	<b>Reference Calibration Date:</b> 01-Jan-70 00:00:00
<b>Engineer:</b> WHITLOCK	<b>Calibration Date:</b> 08-Jun-18 16:19:27
<b>Software Version:</b> WL INSITE R5.6.3 (Build 4)	<b>Calibration Version:</b> 1
<b>Host Tool Name:</b> DSNT - 11019641	

CALIBRATION COEFFICIENTS			
Measurement	Previous Value	New Value	Control Limit On New Value
Pad Offset	-3977.11	-3977.11	-7000.00 - -1000.00
Pad Gain	0.0003897	0.0003897	0.0002000 - 0.0006000
Arm Offset	-3073.13	-3073.13	-5000.00 - 3000.00
Arm Gain	0.0005210	0.0005210	0.000300 - 0.000700
Arm Power	-0.000005094	-0.000005094	-0.000010000 - 0.000010000

The ring diameter is computed from:  $DIAMETER = PAD\ EXTENSION + ARM\ EXTENSION + TOOL\ DIAMETER$   
Tool Diameter: 4.50 in

CALIBRATION RINGS					
Measurement	Current Reading (Previous Coeff.)	Calibrated (New Coeff.)	Change	Control Limit On New Value	
PAD EXTENSION:					
Small Ring (in)	2.00	2.00	0.00	+/- 0.20	
Medium Ring (in)	3.75	3.75	0.00	+/- 0.20	
RING DIAMETER:					
Small Ring (in)	6.50	6.50	0.00	+/- 0.20	
Medium Ring (in)	8.25	8.25	0.00	+/- 0.20	
Large Ring (in)	15.00	15.00	0.00	+/- 0.20	

PASS/FAIL SUMMARY	
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Calibration-Coefficients Range Check: Passed

Ring-Measurement Check: Passed

**PASS/FAIL SUMMARY**

Calibration-Coefficients Range Check: Passed

**SDLT CALIPER FIELD CALIBRATION**

Tool Name: SDLT - 10960494

Reference Calibration Date: 08-Jun-18 16:19:27

Engineer: WHITLOCK

Calibration Date: 05-Aug-18 09:46:30

Software Version: WL INSITE R5.6.3 (Build 4)

Calibration Version: 1

**MEASURED CALIPER VALUES**

Measurement	Shop	Field	Change	Control Limit On New Value
Pad Extension	3.75	3.79	0.04	+/- 0.10
Ring Diameter	8.25	8.25	-0.00	+/- 0.15

**PASS/FAIL SUMMARY**

Pad Extension Check: Passed

Diameter Check: Passed

**ARRAY COMPENSATED TRUE RESISTIVITY SHOP CALIBRATION**

Tool Name: ACRt Sonde - 11830728

Reference Calibration Date: 23-Feb-18 10:15:37

Engineer: WHITLOCK

Calibration Date: 06-Jun-18 13:24:46

Software Version: WL INSITE R5.6.3 (Build 4)

Calibration Version: 1

Host Tool Name: ACRt Instrument - 11830684

**TYPICAL GAIN RANGE**

Subarray	R12KHz			R36KHz			R72KHz		
	Lower	(mmho/m)	Upper	Lower	(mmho/m)	Upper	Lower	(mmho/m)	Upper
A1 (80")	0.95	1.0279	1.05	0.95	1.0076	1.05	0.95	0.9997	1.05
A2 (50")	0.95	1.0334	1.05	0.95	1.0139	1.05	0.95	1.0097	1.05
A3 (29")	0.95	1.0346	1.05	0.95	1.0146	1.05	0.95	1.0081	1.05
A4 (17")	0.95	1.0279	1.05	0.95	1.0063	1.05	0.95	1.0018	1.05
A5 (10")	N/A	N/A	N/A	0.95	1.0001	1.05	0.95	0.9950	1.05
A6 (6")	N/A	N/A	N/A	0.95	0.9869	1.05	0.95	0.9818	1.05

**SONDE OFFSET**

Subarray	R12KHz		R36KHz		R72KHz	
	(mmho/m)		(mmho/m)		(mmho/m)	
A1 (80")	0.315		-4.964		-5.711	
A2 (50")	0.409		-3.450		-5.485	
A3 (29")	-11.648		-3.720		-3.783	
A4 (17")	-90.980		-28.724		-23.707	
A5 (10")	N/A		-76.200		-37.537	
A6 (6")	N/A		280.488		149.005	

**TRANSMITTER CURRENT GAIN**

Signal	Lower	R	Upper
12K	0.6	0.82	1.3
36K	1.0	1.80	2.0
72K	1.0	1.05	2.0

**R-MUD VERIFICATION**

Signal	Lower (ohm-m)	Measured (ohm-m)	Upper (ohm-m)
Mud Cell	0.95	0.99	1.05

**PASS/FAIL SUMMARY**

GAIN RANGE CHK PASS

SONDE OFFSET CHK PASS

**QUALITY CHECK SHOP CALIBRATION**

<b>Tool Name:</b> ACRt Sonde - 11830728	<b>Reference Calibration Date:</b> 23-Feb-18 10:21:17
<b>Engineer:</b> WHITLOCK	<b>Calibration Date:</b> 06-Jun-18 14:01:20
<b>Software Version:</b> WL INSITE R5.6.3 (Build 4)	<b>Calibration Version:</b> 1
<b>Host Tool Name:</b> ACRt Instrument - 11830684	

**STANDARD DEVIATIONS**

	R12KHz			R36KHz			R72KHz		
	Measured (mmho/m)	Expected (mmho/m)	Pass/Fail	Measured (mmho/m)	Expected (mmho/m)	Pass/Fail	Measured (mmho/m)	Expected (mmho/m)	Pass/Fail
A1 (80")	0.000	< 0.750	Pass	0.000	< 0.750	Pass	0.000	< 0.750	Pass
A2 (50")	0.000	< 0.750	Pass	0.000	< 0.750	Pass	0.000	< 0.750	Pass
A3 (29")	0.000	< 0.750	Pass	0.000	< 0.750	Pass	0.000	< 0.750	Pass
A4 (17")	0.000	< 0.750	Pass	0.000	< 0.750	Pass	0.000	< 0.750	Pass
A5 (10")	0.000	< 0.750	Pass	0.000	< 0.750	Pass	0.000	< 0.750	Pass
A6 (6")	0.000	< 0.750	Pass	0.000	< 0.750	Pass	0.000	< 0.750	Pass

**AVERAGES**

	R12KHz			R36KHz			R72KHz		
	Measured (mmho/m)	Expected (mmho/m)	Pass/Fail	Measured (mmho/m)	Expected (mmho/m)	Pass/Fail	Measured (mmho/m)	Expected (mmho/m)	Pass/Fail
A1 (80")	0.000	< 0.500	Pass	-0.001	> -0.500	Pass	-0.006	> -0.500	Pass
A2 (50")	0.000	< 0.500	Pass	-0.001	> -0.500	Pass	-0.005	> -0.500	Pass
A3 (29")	-0.000	< 0.500	Pass	-0.001	> -0.500	Pass	-0.003	> -0.500	Pass
A4 (17")	-0.002	> -0.500	Pass	-0.006	> -0.500	Pass	-0.022	> -0.500	Pass
A5 (10")	-0.010	> -0.500	Pass	-0.017	> -0.500	Pass	-0.036	> -0.500	Pass
A6 (6")	0.014	< 0.500	Pass	0.063	< 0.500	Pass	0.138	< 0.500	Pass

**GAIN TOLERANCE**

**R12KHz**

	Measured (mmho/m)	Last Month (mmho/m)	Difference (mmho/m)	Tolerance (mmho/m)	Pass/Fail
A1 (80")	-213173456.000	-213653808.000	480352.000	10682690.400	Pass
A2 (50")	-205651744.000	-206143280.000	491536.000	10307164.000	Pass
A3 (29")	-200817664.000	-201197776.000	380112.000	10059888.800	Pass
A4 (17")	-200193568.000	-200629872.000	436304.000	10031493.600	Pass
A5 (10")	-200252336.000	-200678960.000	426624.000	10033948.000	Pass
A6 (6")	-199820688.000	-200219344.000	398656.000	10010967.200	Pass

**R36KHz**

	Measured (mmho/m)	Last Month (mmho/m)	Difference (mmho/m)	Tolerance (mmho/m)	Pass/Fail
A1 (80")	48114080.000	48477272.000	363192.000	2423863.600	Pass
A2 (50")	33966292.000	34324412.000	358120.000	1716220.600	Pass
A3 (29")	28032378.000	28346680.000	314302.000	1417334.000	Pass
A4 (17")	27853682.000	28207516.000	353834.000	1410375.800	Pass
A5 (10")	27373208.000	27716930.000	343722.000	1385846.500	Pass
A6 (6")	26035236.000	26360300.000	325064.000	1318015.000	Pass

**R72KHz**

	Measured (mmho/m)	Last Month (mmho/m)	Difference (mmho/m)	Tolerance (mmho/m)	Pass/Fail
A1 (80")	-92927656.000	-93022904.000	95248.000	4651145.200	Pass
A2 (50")	-90501024.000	-90617752.000	116728.000	4530887.600	Pass
A3 (29")	-88192472.000	-88292832.000	100360.000	4414641.600	Pass
A4 (17")	-88397088.000	-88515880.000	118792.000	4425794.000	Pass
A5 (10")	-88477440.000	-88596232.000	118792.000	4425794.000	Pass
A6 (6")	-88557792.000	-88676584.000	118792.000	4425794.000	Pass

A5 (10")	-86957704.000	-87076952.000	119248.000	4353847.600	Pass
A6 (6")	-87976216.000	-88080696.000	104480.000	4404034.800	Pass

**PASS/FAIL SUMMARY**

Std Deviation Verification	Pass
Average Verification	Pass
Gain Tolerance Verification	Pass

**MICRO LOG SHOP CALIBRATION**

<b>Tool Name:</b> Microlog Pad - 10960494	<b>Reference Calibration Date:</b> 01-Jan-70 00:00:00
<b>Engineer:</b> WHITLOCK	<b>Calibration Date:</b> 08-Jun-18 16:08:54
<b>Software Version:</b> WL INSITE R5.6.3 (Build 4)	<b>Calibration Version:</b> 1
<b>Host Tool Name:</b> DSNT - 11019641	

**CALIBRATION COEFFICIENT SUMMARY**

Measurement	Micro Log Normal		Micro Log Lateral		Units
	Measured	Calibrated	Measured	Calibrated	
Tool Zero	-0.07	-0.07	-0.01	-0.01	ohmm
Calibration Point #1	0.00	0.00	0.00	0.00	ohmm
Calibration Point #2	20.00	20.00	20.00	20.00	ohmm
Internal Reference	19.92	19.92	19.98	19.98	ohmm

Measurement	Micro Log Normal Tool Value	Micro Log Lateral Tool Value	Units
Tool Zero	-0.11	0.18	V
Calibration Point #1	18.42	2.03	V
Calibration Point #2	5354.08	6974.83	V
Internal Reference	5331.77	6967.38	V

**MICRO LOG FIELD CHECK**

<b>Tool Name:</b> Microlog Pad - 10960494	<b>Reference Calibration Date:</b> 08-Jun-18 16:08:54
<b>Engineer:</b> WHITLOCK	<b>Calibration Date:</b> 05-Aug-18 09:54:07
<b>Software Version:</b> WL INSITE R5.6.3 (Build 4)	<b>Calibration Version:</b> 1

Measurement	Micro Log Normal		Micro Log Lateral		Units
	Shop	Field	Shop	Field	
Tool Zero	-0.07	-0.07	-0.01	-0.00	ohmm
Internal Reference	19.92	19.89	19.98	19.95	ohmm

Summary				
Signal	Shop	Field	Difference	Tolerance
Microlog Normal	19.92	19.89	0.03	+/- 0.80
Microlog Lateral	19.98	19.95	0.03	+/- 0.80

**SPECTRAL DENSITY SHOP CALIBRATION**

<b>Tool Name:</b> SDLT Pad - 11213308	<b>Reference Calibration Date:</b> 08-Jun-18 10:39:59
<b>Engineer:</b> WHITLOCK	<b>Calibration Date:</b> 08-Jun-18 11:01:29
<b>Software Version:</b> WL INSITE R5.6.3 (Build 4)	<b>Calibration Version:</b> 1

Logging Source S/N: 5475GW		
Aluminum Block S/N: EL RENO	Density: 2.581g/cc	Pe: 3.170
Magnesium Block S/N: EL RENO	Density: 1.687g/cc	Pe: 2.594

**DENSITY CALIBRATION SUMMARY**

Measurement	Previous Value	New Value	Control Limit
Near Bar Gain	1.0041	1.0112	0.90 - 1.10
Near Dens Gain	0.9869	0.9898	0.90 - 1.10

Near Peak Gain	0.9943	0.9998	0.90 - 1.10
Near Lith Gain	1.0181	1.0093	0.90 - 1.10
Far Bar Gain	1.0040	1.0066	0.90 - 1.10
Far Dens Gain	0.9932	0.9944	0.90 - 1.10
Far Peak Gain	0.9916	0.9923	0.90 - 1.10
Far Lith Gain	0.9744	0.9710	0.90 - 1.10
<hr/>			
Near Bar Offset	0.0934	0.0300	NONE
Near Dens Offset	0.2485	0.2218	NONE
Near Peak Offset	0.1593	0.1112	NONE
Near Lith Offset	-0.0690	0.0007	NONE
Far Bar Offset	0.0165	-0.0022	NONE
Far Dens Offset	0.1281	0.1192	NONE
Far Peak Offset	0.1238	0.1182	NONE
Far Lith Offset	0.2190	0.2467	NONE
<hr/>			
Near Bar Background	955.07	955.02	700 - 1450
Near Dens Background	316.53	316.75	230 - 480
Near Peak Background	138.87	138.74	100 - 210
Near Lith Background	168.67	169.41	125 - 260
Far Bar Background	482.41	482.24	450 - 900
Far Dens Background	194.46	191.91	175 - 345
Far Peak Background	77.48	77.25	70 - 140
Far Lith Background	79.35	80.04	75 - 145

#### CALIBRATION BLOCK SUMMARY

Measurement	Current Reading (Previous Coef)	Calibrated (New Coef)	Change	Control Limit On Change
<b>MAGNESIUM</b>				
Density (g/cc)	1.688	1.687	-0.001	+/- 0.015
Pe	2.517	2.559	0.042	+/- 0.150
<b>ALUMINUM</b>				
Density (g/cc)	2.582	2.581	-0.001	+/- 0.01500
Pe	3.106	3.132	0.026	+/- 0.150

#### TOOL SUMMARY

Measurement	Near Detector		Far Detector	
	Value	Control Limits	Value	Control Limits
<b>QUALITY</b>				
Background	0.0017	+/- 0.0110	0.0006	+/- 0.0140
Magnesium Block	-0.0008	+/- 0.0110	-0.0008	+/- 0.0140
Aluminum Block	-0.0005	+/- 0.0110	-0.0001	+/- 0.0140
Resolution	9.21	6.00 - 11.50	9.21	6.00 - 11.50
Internal Verifier(B+D+P+L)	1580	1200 - 2700	831	800 - 1700

#### PASS/FAIL SUMMARY

Background Quality Check:	Passed
Background Range Check:	Passed
Background Resolution Check:	Passed
Background Verification Check:	Passed
Magnesium Quality Check:	Passed
Aluminum Quality Check:	Passed
Gains Check:	Passed
Changes in Calibration Blocks:	Passed

### SPECTRAL DENSITY FIELD CHECK

Engineer: WHITLOCK

Calibration Date: 05-Aug-18 09:57:45

Software Version: WL INSITE R5.6.3 (Build 4)

Calibration Version: 1

Pad Temperature: 89.3 degF

**DENSITY FIELD CALIBRATION SUMMARY**

Measurement	Shop	Field	Change	Control Limit +/-
Near (B+D+P+L) cps	1579.927	1575.636	-4.291	15.990
Far (B+D+P+L) cps	831.441	827.695	-3.746	15.874
Near Resolution	9.21	9.13	-0.080	0.50
Far Resolution	9.21	9.31	0.100	1.00

**PASS/FAIL SUMMARY**

Bkg Quality Check:	Passed
Bkg Resolution Check:	Passed
Bkg Verification Check:	Passed

**CALIBRATION SUMMARY**

Sensor	Shop	Field	Post	Difference	Tolerance	Units
<b>Depth Panel-12345678</b>						
Tension Zero	0.00	-----	-----	0.00	-----	lbs
Tension Cal	7830.00	-----	-----	0.00	-----	lbs
<b>CH_HOS-CH_HOS_I</b>						
DH Tension Zero	0.00	-----	-----	0.00	-----	lbs
DH Tension Cal	1500.00	-----	-----	0.00	-----	lbs
<b>GTET-11013113</b>						
Gamma Ray Calibrator	225.9	225.0	-----	0.9	+/- 9.00	api
<b>DSNT-11019641</b>						
Snow-Block Porosity	0.0667	0.0665	-----	0.0002	+/- 0.0150	decpc
<b>SDLT-10960494</b>						
Pad Extension	3.75	3.79	-----	-0.04	+/-0.10	in
Ring Diameter	8.25	8.25	-----	0.00	+/-0.15	in
<b>ACRt Sonde-11830728</b>						
Mud Cell	0.99	-----	-----	0	-----	ohm-m
<b>Microlog Pad-10960494</b>						
MicroLog Normal	19.92	19.89	-----	0.03	+/-0.80	ohmm
MicroLog Lateral	19.98	19.95	-----	0.03	+/-0.80	ohmm
<b>SDLT Pad-11213308</b>						
Near(B+D+P+L)	1579.927	1575.636	-----	4.291	+/-15.990	cps
Far(B+D+P+L)	831.441	827.695	-----	3.746	+/-15.874	cps

Data: RUSSEL\_RUMBACK\0001 GTET-DSNT-SDLT-ACRT\IDLE

Date: 08-Aug-18 12:56:33



**PARAMETERS REPORT**

Depth (ft)	Tool Name	Mnemonic	Description	Value	Units
TOP					
	SHARED	BS	Bit Size	7.875	in
	SHARED	UBS	Use Bit Size instead of Caliper for all applications.	No	
	SHARED	MDBS	Mud Base	Water	
	SHARED	MDWT	Borehole Fluid Weight	8.900	ppg
	SHARED	WAGT	Weighting Agent	Natural	
	SHARED	BSAL	Borehole salinity	0.00	ppm
	SHARED	FSAL	Formation Salinity NaCl	0.00	ppm
	SHARED	KPCT	Percent K in Mud by Weight?	0.00	%

SHARED	RMUD	Mud Resistivity	1.100	ohmm
SHARED	TRM	Temperature of Mud	75.0	degF
SHARED	CSD	Logging Interval is Cased?	No	
SHARED	ICOD	AHV Casing OD	5.500	in
SHARED	CSTR	Compressive Strength	1000.00	psia
SHARED	ST	Surface Temperature	75.0	degF
SHARED	TD	Total Well Depth	4670.00	ft
SHARED	BHT	Bottom Hole Temperature	128.0	degF
SHARED	SVTM	Navigation and Survey Master Tool	NONE	
SHARED	AZTM	High Res Z Accelerometer Master Tool	GTET	
SHARED	TEMM	CBM Temperature Master Tool	GTET	
SHARED	SOCI	Source of Casing Information	Parameters	
SHARED	MSAL	Water-base mud filtrate salinity	0.00	ppm
Rwa / CrossPlot	XPOK	Process Crossplot?	Yes	
Rwa / CrossPlot	FCHO	Select Source of F	Automatic	
Rwa / CrossPlot	AFAC	Archie A factor	0.6200	
Rwa / CrossPlot	MFAC	Archie M factor	2.1500	
Rwa / CrossPlot	RMFR	Rmf Reference	0.10	ohmm
Rwa / CrossPlot	TMFR	Rmf Ref Temp	75.00	degF
Rwa / CrossPlot	RWA	Resistivity of Formation Water	0.05	ohmm
Rwa / CrossPlot	ADP	Use Air Porosity to calculate CrossplotPhi	No	
Rwa / CrossPlot	BHSM	Borehole Size Source Tool	SDLT	
Rwa / CrossPlot	ROIN	Input for RO Calculation	Rwa	
GTET	GROK	Process Gamma Ray?	Yes	
GTET	GEOK	Process Gamma Ray EVR?	No	
GTET	TPOS	Tool Position for Gamma Ray Tools.	Eccentered	
GTET	BHSM	Borehole Size Source Tool	SDLT	
DSNT	DNOK	Process DSN?	Yes	
DSNT	DEOK	Process DSN EVR?	No	
DSNT	NLIT	Neutron Lithology	Limestone	
DSNT	DNSO	DSN Standoff - 0.25 in (6.35 mm) Recommended	0.250	in
DSNT	DNTT	Temperature Correction Type	None	
DSNT	DPRS	DSN Pressure Correction Type	None	
DSNT	SHCO	View More Correction Options	No	
DSNT	UTVD	Use TVD for Gradient Corrections?	No	
DSNT	LHWT	Logging Horizontal Water Tank?	No	
DSNT	UCLA	Classic Neutron Parameter utilized?	No	
DSNT	BHSM	Borehole Size Source Tool	SDLT	
SDLT	CLOK	Process Caliper Outputs?	Yes	
Microlog Pad	MLOK	Process MicroLog Outputs?	Yes	
SDLT Pad	DNOK	Process Density?	Yes	
SDLT Pad	DNOK	Process Density EVR?	No	
SDLT Pad	CB	Logging Calibration Blocks?	No	
SDLT Pad	SPVT	SDLT Pad Temperature Valid?	Yes	
SDLT Pad	DTWN	Disable temperature warning	No	
SDLT Pad	DMA	Formation Density Matrix	2.710	g/cc
SDLT Pad	DFL	Formation Density Fluid	1.000	g/cc
SDLT Pad	BHSM	Borehole Size Source Tool	SDLT	
ACRt Sonde	RTOK	Process ACRt?	Yes	
ACRt Sonde	MNSO	Minimum Tool Standoff	1.50	in
ACRt Sonde	TCS1	Temperature Correction Source	FP Lwr & FP Upr	
ACRt Sonde	TPOS	Tool Position	Free Hanging	
ACRt Sonde	RMOP	Rmud Source	Mud Cell	

ACRt Sonde	RMIN	Minimum Resistivity for MAP	0.20	ohmm
ACRt Sonde	RMAX	Maximum Resistivity for MAP	200.00	ohmm
ACRt Sonde	THQY	Threshold Quality	0.50	
ACRt Sonde	MRFX	Fixed mud resistivity	2000	ohmm
ACRt Sonde	BHSM	Borehole Size Source Tool	SDLT	
ACRt Sonde	MBFL	Apply Corkscrew Effect?	No	

BOTTOM

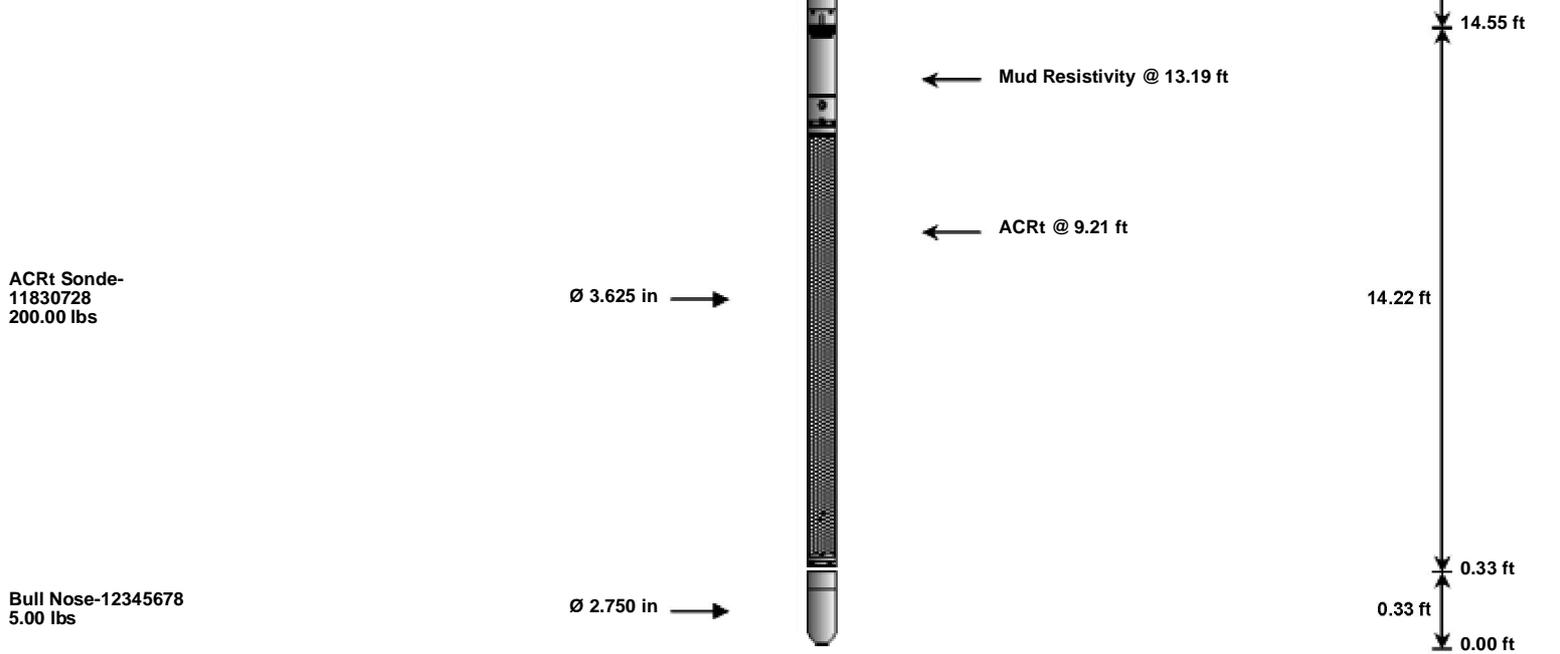
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Date: 08-Aug-18 12:57:44

**HALLIBURTON**

## TOOL STRING DIAGRAM REPORT

Description	Overbody Description	O.D.	Diagram	Sensors @ Delays	Length	Accumulated Length
CH_HOS_I 37.50 lbs	Weak Point 7000 lbs- CH_HOS_I 0.01 lbs	Ø 2.750 in Ø 0.010 in*		← Temperature @ 55.29 ft	3.03 ft	56.32 ft
XOHD-12345678 20.00 lbs		Ø 2.750 in Ø 3.625 in			0.95 ft	53.29 ft
SP Sub-11812437 60.00 lbs		Ø 3.625 in		← SP @ 50.56 ft	3.74 ft	52.34 ft
				← Z-Accelerometer @ 48.15 ft		48.60 ft
GTET-11013113 165.00 lbs		Ø 3.625 in		← GammaRay @ 42.54 ft	8.52 ft	
						40.08 ft
DSNT-11019641 174.00 lbs	DSN Decentralizer- 11019641 6.60 lbs	Ø 5.000 in* Ø 3.625 in		← DSN Far @ 33.15 ft ← DSN Near @ 32.40 ft	9.69 ft	
						30.40 ft
SDLT-10960494 360.00 lbs	SDLT Pad-11213308 65.00 lbs Microlog Pad-10960494 8.00 lbs	Ø 4.500 in Ø 4.500 in* Ø 4.750 in*		← Microlog @ 22.58 ft ← SDL Caliper @ 22.40 ft ← SDL @ 22.39 ft	10.81 ft	
						19.58 ft
ACRt Instrument- 11830684 50.00 lbs		Ø 3.625 in			5.03 ft	



Mnemonic	Tool Name	Serial Number	Weight (lbs)	Length (ft)	Accumulated Length (ft)	Max.Log. Speed (fpm)
CH_HOS	Hostile Cable Head with Load Cell	CH_HOS_I	37.50	3.03	53.29	300.00
WP7K	Weak Point 7000 lbs	CH_HOS_I	0.01	0.01	* 54.09	300.00
XOHD	Hostile to Dits Cross Over	12345678	20.00	0.95	52.34	300.00
SP	SP Sub	11812437	60.00	3.74	48.60	300.00
GTET	Gamma Telemetry Tool	11013113	165.00	8.52	40.08	60.00
DSNT	Dual Spaced Neutron	11019641	174.00	9.69	30.40	60.00
DCNT	DSN Decentralizer	11019641	6.60	5.13	* 33.73	300.00
SDLT	Spectral Density Tool	10960494	360.00	10.81	19.58	60.00
SDLP	Density Insite Pad	11213308	65.00	2.55	* 21.79	60.00
MICP	Microlog Pad	10960494	8.00	1.00	* 22.08	60.00
ACRt	Array Compensated True Resistivity Instrument Section	11830684	50.00	5.03	14.55	120.00
ACRt	Array Compensated True Resistivity Sonde Section	11830728	200.00	14.22	0.33	120.00
BLNS	Bull Nose	12345678	5.00	0.33	0.00	300.00

**Total** **1,151.11**    **56.32**

\* Not included in Total Length and Length Accumulation.

Data: RUSSEL\_RUMBACK\0001 GTET-DSNT-SDLT-ACRT\IDLE

Date: 08-Aug-18 12:57:55

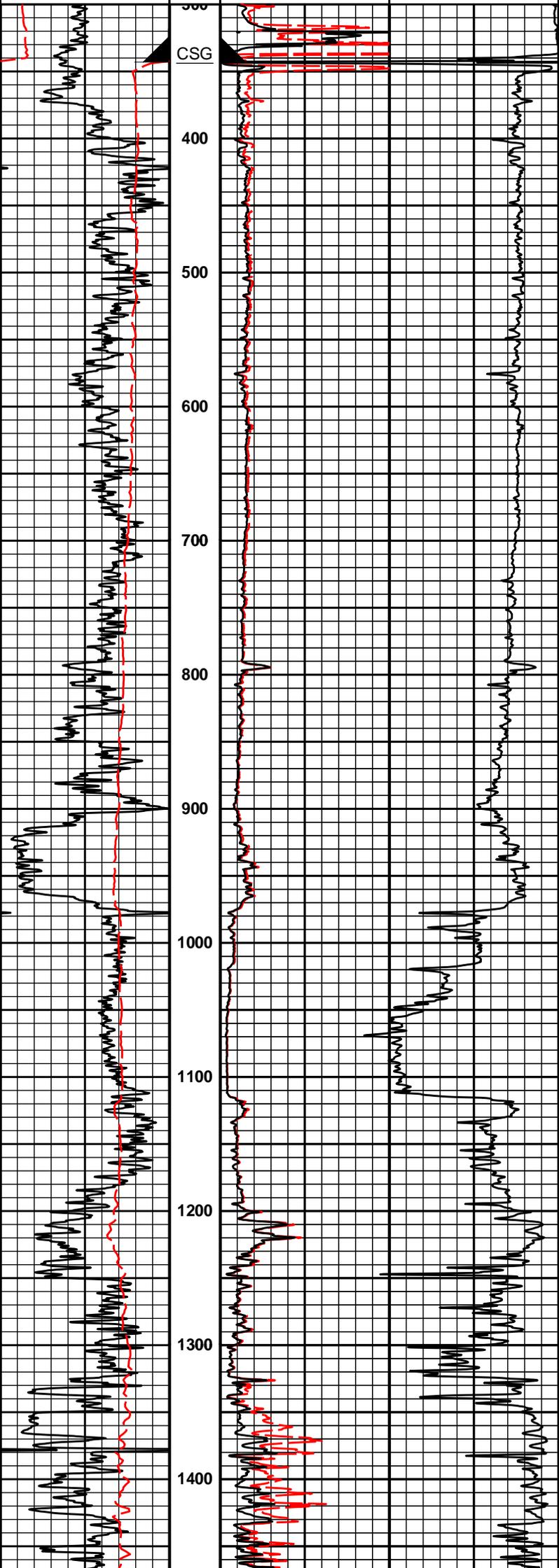
# HALLIBURTON

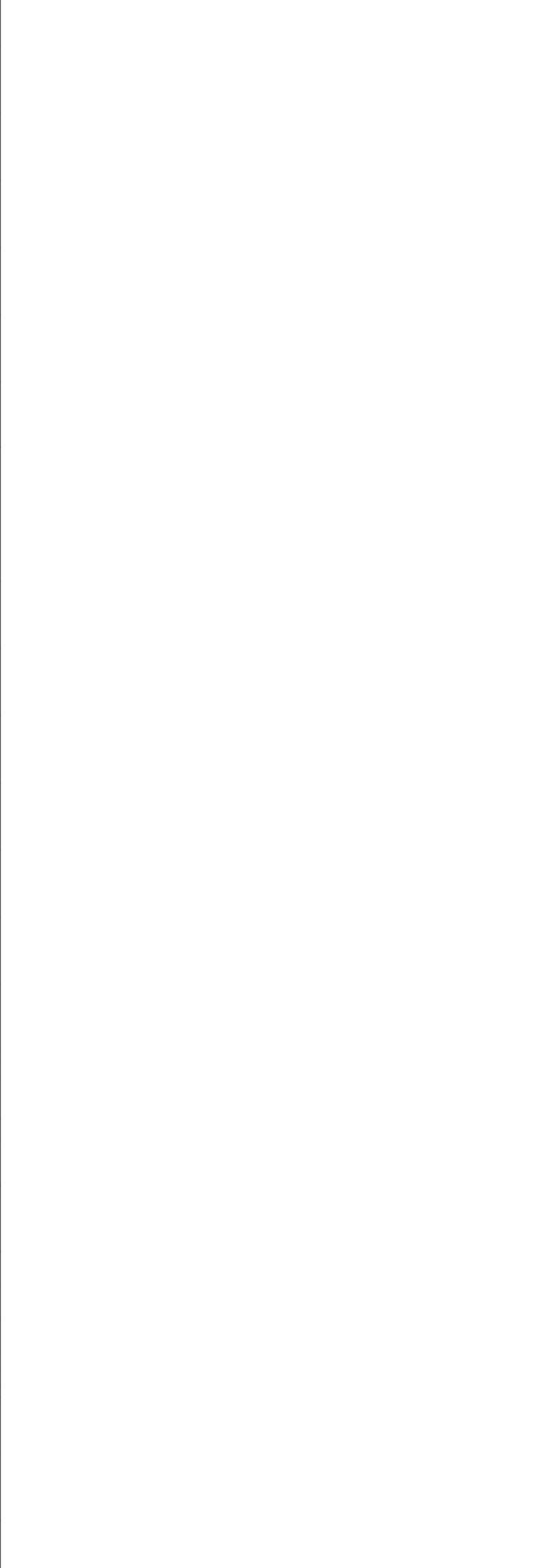
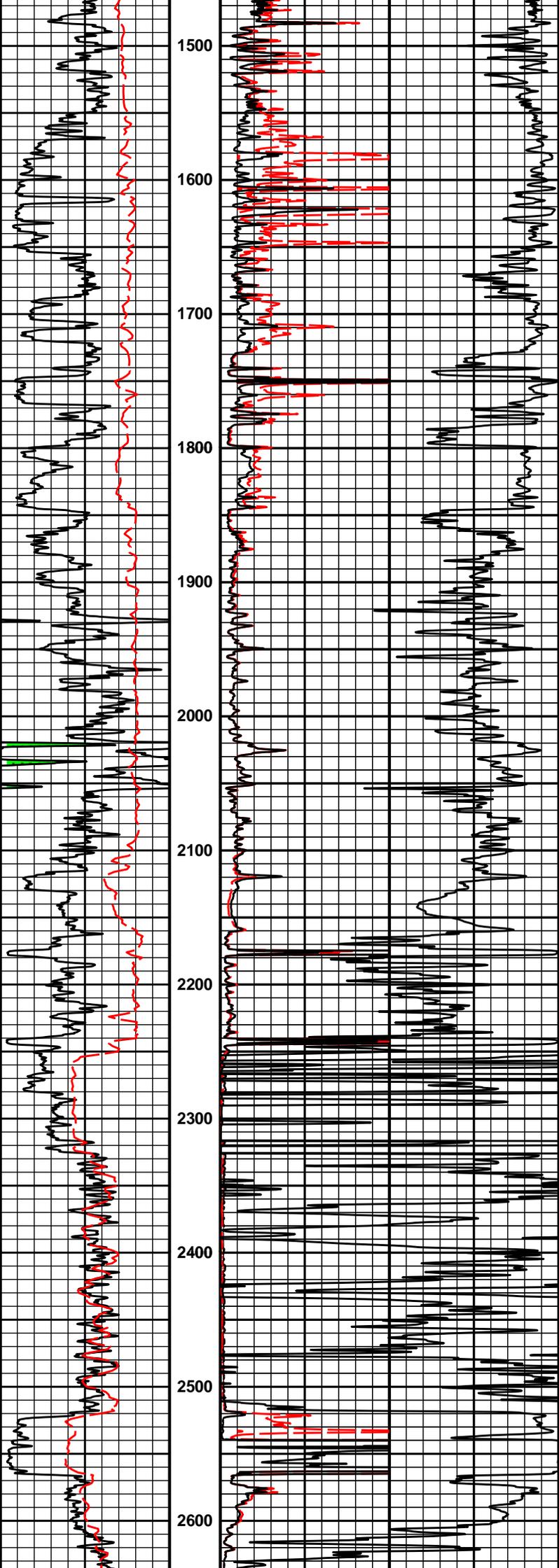
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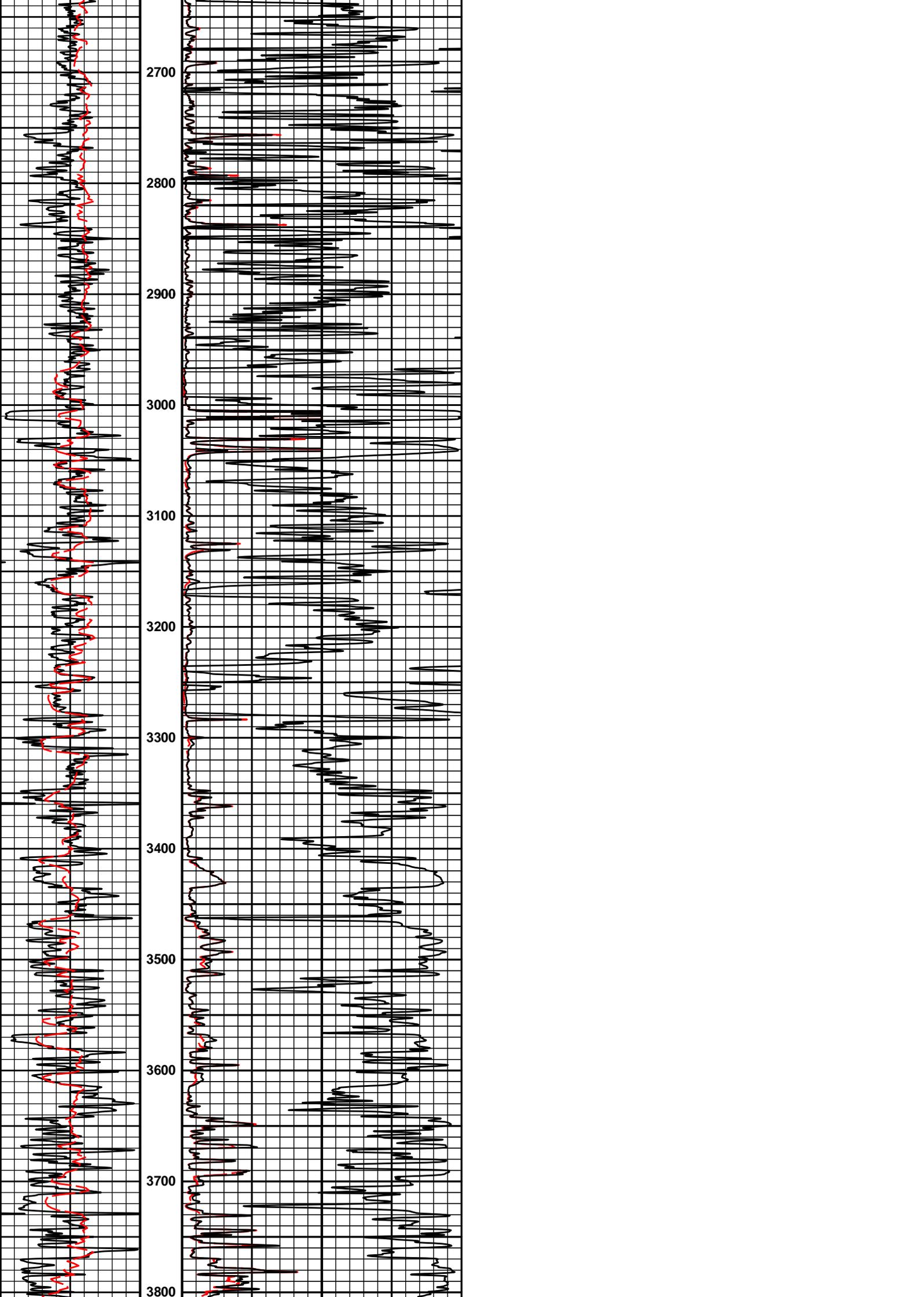
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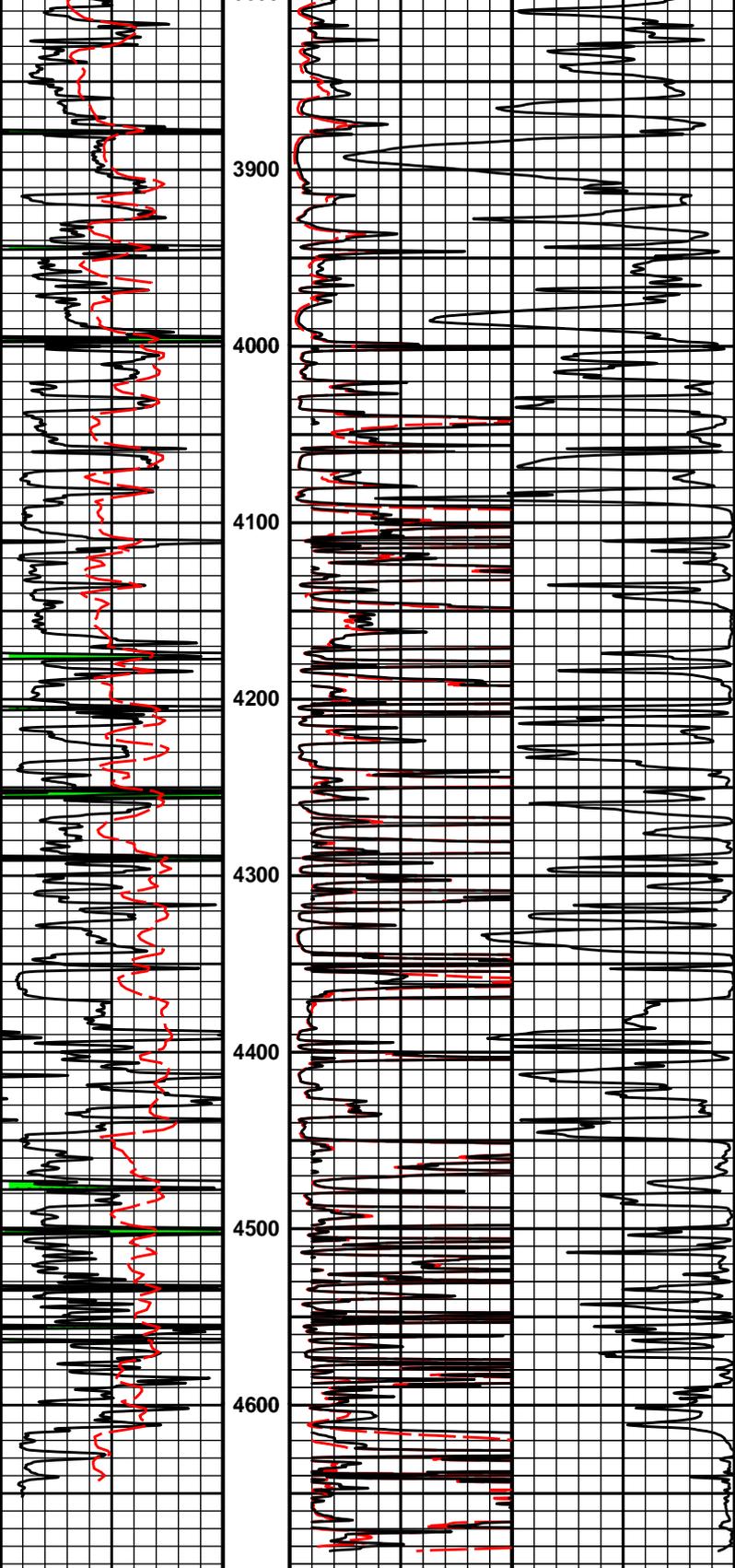
## 1 INCH CORRELATION LOG

	1000	90in Conductivity 2ft Res	0
mmho per metre			
SP		90in Resistivity 2ft Res	
-]20[+		ohm-metre	
0	Gamma API 150	RT20	50
	api	ohm-metre	









0	Gamma API	150	1 : 1200	0	RT20	50	
	api		FT		ohm-metre		
	SP				90in Resistivity 2ft Res	50	
	-]20[+				ohm-metre		
				1000	90in Conductivity 2ft Res	0	
					mmho per metre		

**HALLIBURTON**

Plot Time: 08-Aug-18 16:12:42  
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 Data: RUSSEL\_RUMBACK\Well Based\DAQ-0001-005\  
 Plot File: \\LOCAL\RUSSEL\_RUMBACK\0001 GTET-DSNT-SDLT-ACRT\ACRT\ACRT\_1\_main

**1 INCH MAIN LOG**

1 INCH CORRELATION LOG