

HALLIBURTON

ARRAY COMPENSATED
TRUE RESISTIVITY
LOG

COMPANY	HERMAN L LOEB
WELL	CANTON C #3-20
FIELD	GLICK
COUNTY	KIOWA
STATE	KANSAS
COMPANY	HERMAN L LOEB
WELL	CANTON C #3-20
FIELD	GLICK
COUNTY	KIOWA
STATE	KANSAS
API No.	15-097-21724
Location	SE-SE-NW-1/4 NW 1300 FNL & 1135 FWL
Other Services:	SDL DSN MICROLOG

Permanent Datum	GL	Elev. 2038.0 ft
Log measured from	KB	11.0 ft above perm. Datum
Drilling measured from	KB	G.L. 2038.0 ft
Date	08-May-12	
Run No.	ONE	
Depth - Driller	5180.00 ft	
Depth - Logger	5177.0 ft	
Bottom - Logged Interval	5175 ft	
Top - Logged Interval	565 ft	
Casing - Driller	8.625 in @ 568.0 ft	
Casing - Logger	565.0 ft	
Bit Size	7.785 in	@
Type Fluid in Hole	WATER BASED MUD	
Density	9.3 ppq	56.00 s/qt
PH	9.00 pH	9.0 cpm
Source of Sample	FLOWLINE	
Rm @ Meas. Temperature	0.300 ohmm @ 75.00 degF	@
Rmf @ Meas. Temperature	0.23 ohmm @ 75.00 degF	@
Rmc @ Meas. Temperature	0.400 ohmm @ 75.00 degF	@
Source Rmf	CALC	
Rm @ BHT	0.21 ohmm @ 111.0 degF	@
Time Since Circulation	8.0 hr	
Time on Bottom	08-May-12 19:53	
Max. Rec. Temperature	111.0 degF @ 5177.0 ft	@
Equipment	592 PV OK	
Recorded By	CORY HANSON	
Witnessed By	J. CHRISTENSEN	
	RAMIRO GONZALEZ	

Fold here

Service Ticket No.: 9499188						API Serial No.: 15-097-21724						PGM Version: WL INSITE R3.4.4 (Build 2)																	
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.				Other			
Rmf @ Meas. Temp.				@				@				ONE		ACRT-I				N/A				1.5" S.O.				N/A			
Rmc @ Meas. Temp.				@				@						I910M987															
Source Rmf		Rmc																											
Rm @ BHT				@				@																					
Rmf @ BHT				@				@																					
Rmc @ BHT				@				@																					
EQUIPMENT DATA																													
GAMMA				ACOUSTIC								DENSITY								NEUTRON									
Run No.		ONE		Run No.								Run No.								Run No.									
Serial No.		11013114		Serial No.								Serial No.								Serial No.									
Model No.		GTET		Model No.								Model No.								Model No.									
Diameter		3.625"		No. of Cent.								Diameter								Diameter									
Detector Model No.		GTET		Spacing								Log Type								Log Type									
Type		SCINT										Source Type								Source Type									
Length		8"		LSA [Y/N]								Serial No.								Serial No.									
Distance to Source		10'		FWDA [Y/N]								Strength								Strength									

GENERAL			GAMMA		ACOUSTIC		DENSITY		NEUTRON					
Run	Depth		Speed	Scale		Scale		Matrix	Scale		Matrix	Scale		Matrix
No.	From	To	ft/min	L	R	L	R		L	R		L	R	
ONE	5177	565	REC	0	150									
DIRECTIONAL INFORMATION														
Maximum Deviation @								KOP @						
Remarks: THANK YOU FOR CHOOSING HALLIBURTON ENERGY SERVICES														
ANNULAR HOLE VOLUME CALCULATED USING 5.5-IN CASING														
REPEAT SECTION RAN AT 3500' AT CUSTOMERS REQUEST														

HALLIBURTON

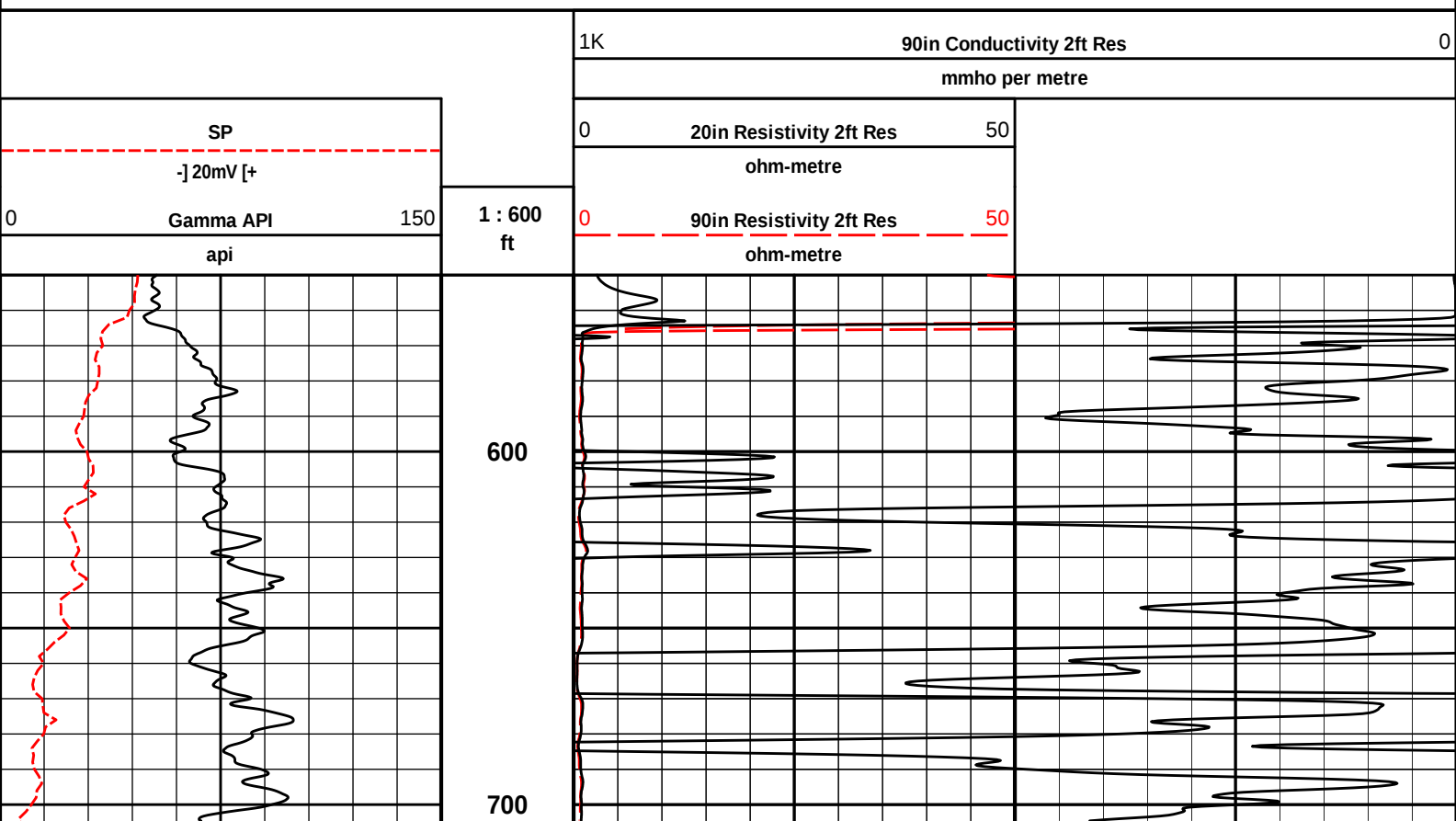
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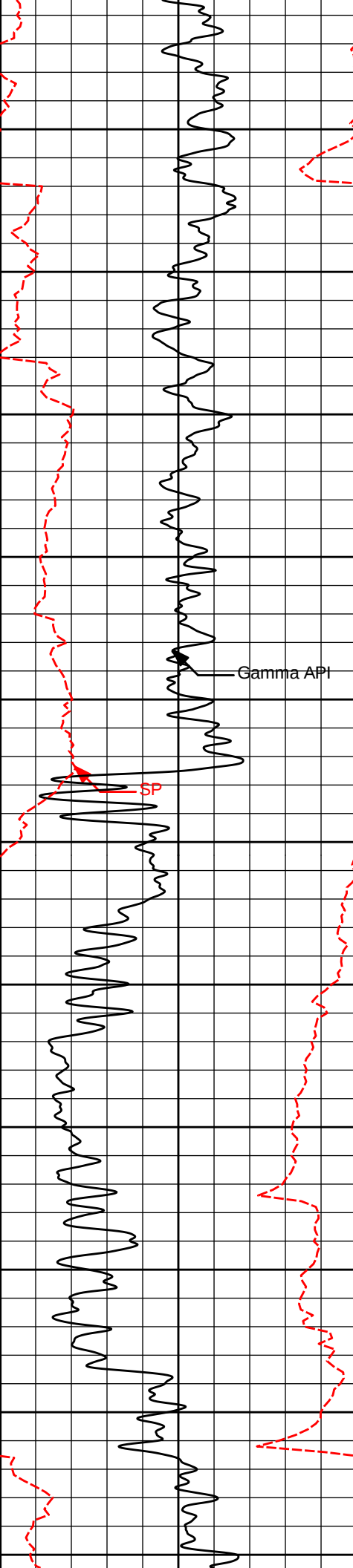
Plot Range: 550 ft to 5177.5 ft

Data: CANTON C 3 20\Well Based\RESIST MAIN\

Plot File: \\-LOCAL-\\CANTON C 3 20\\0002 RED BLACK SDL\\RESISTIVITY\\1 ACRT 2inx

2 INCH MAIN LOG





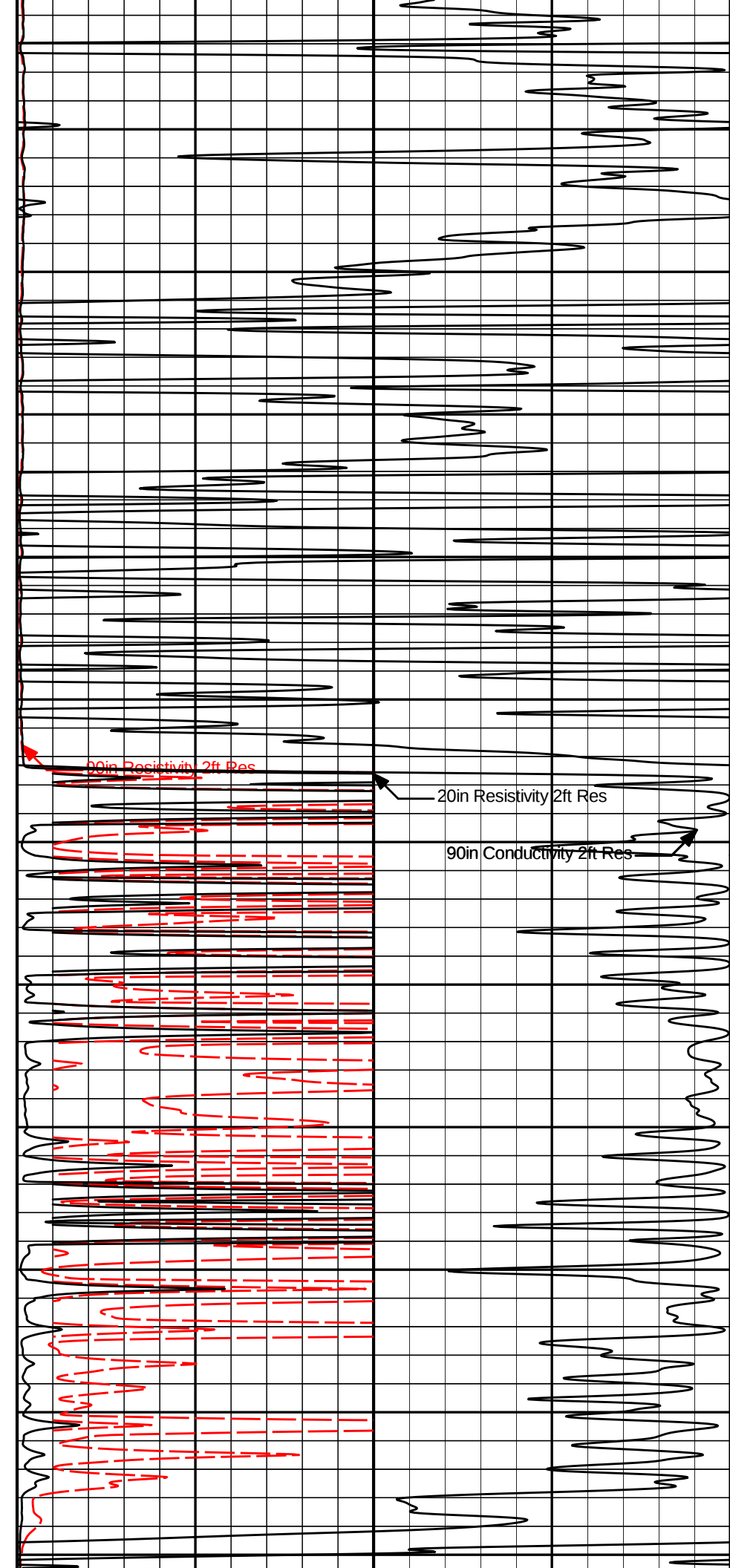
800

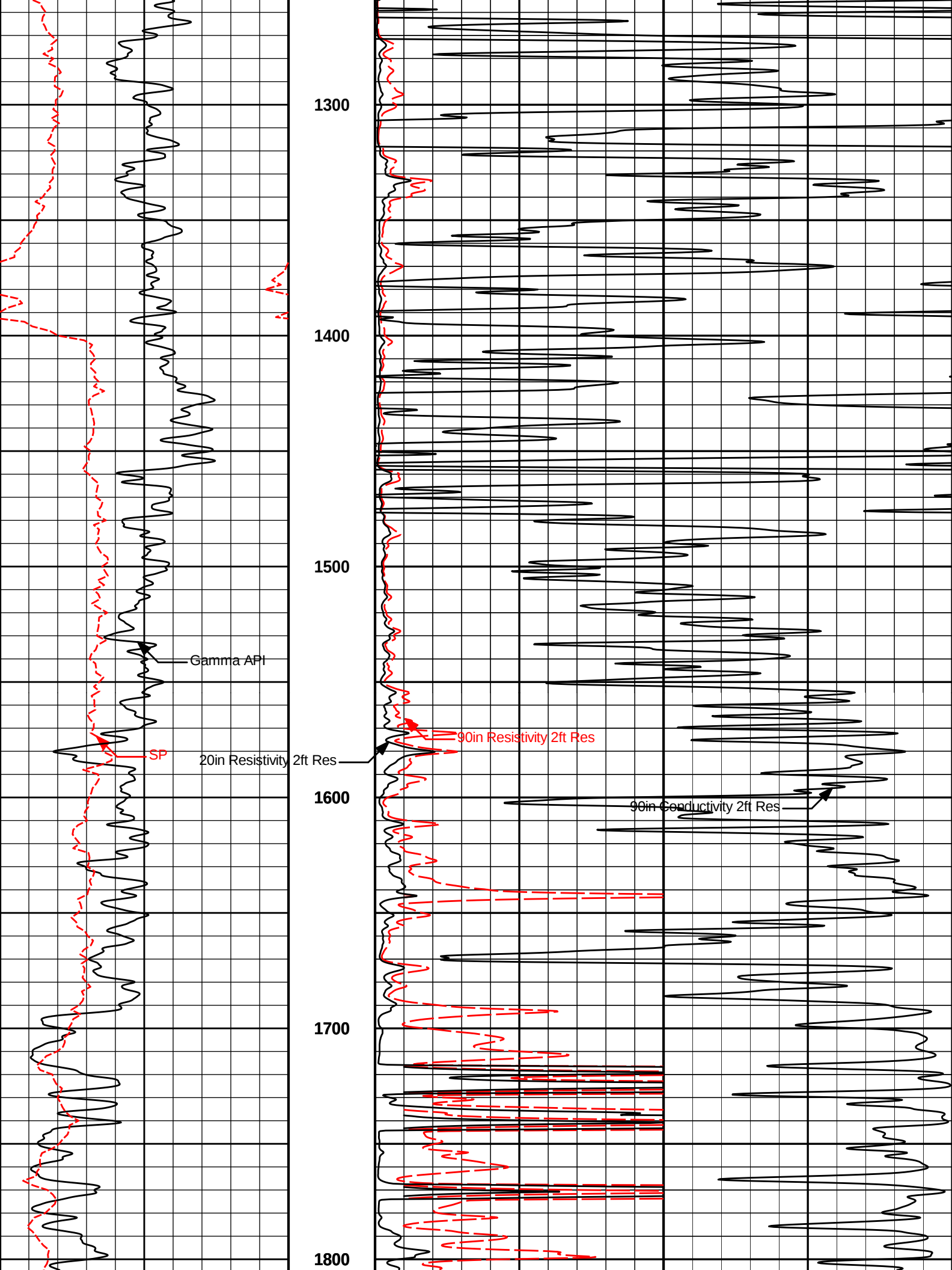
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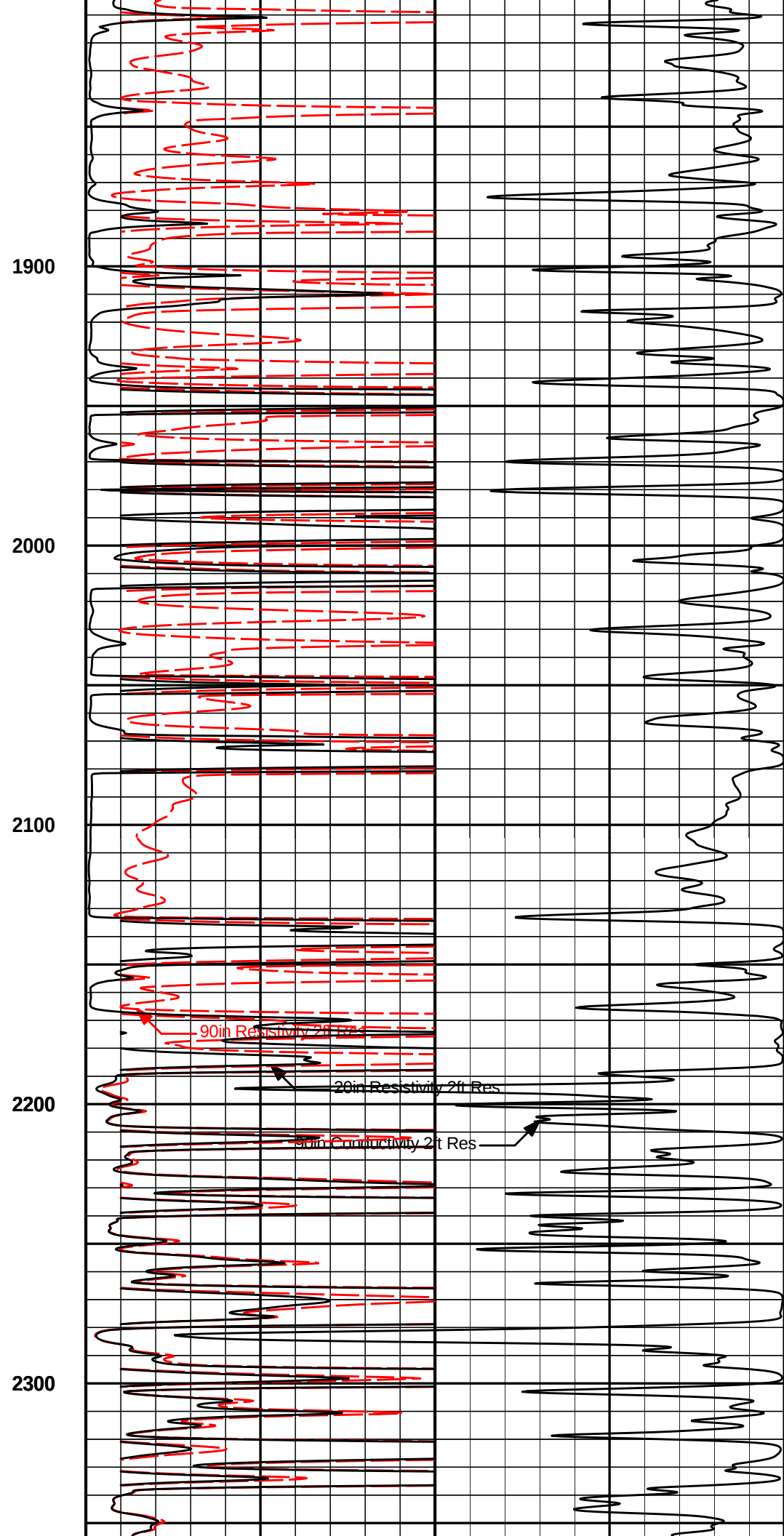
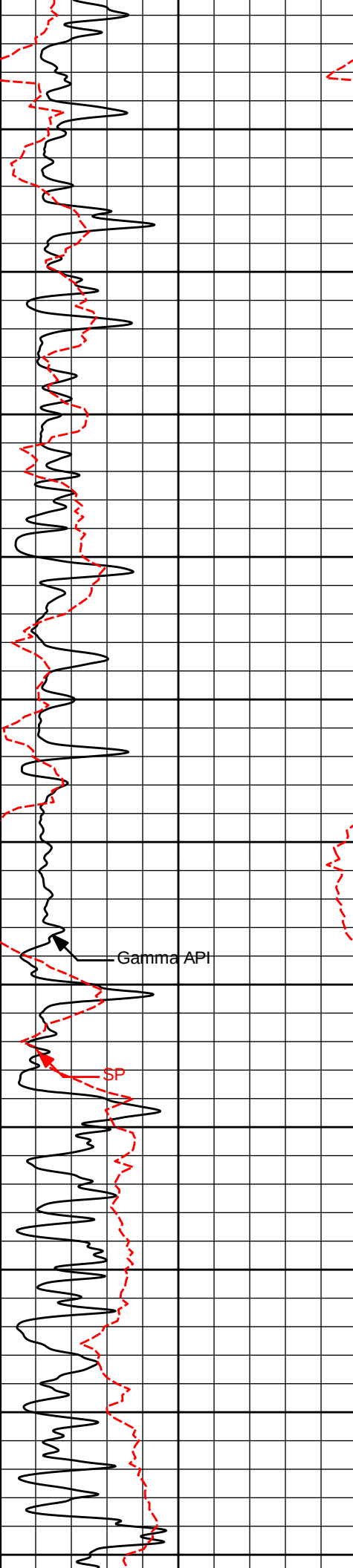
1000

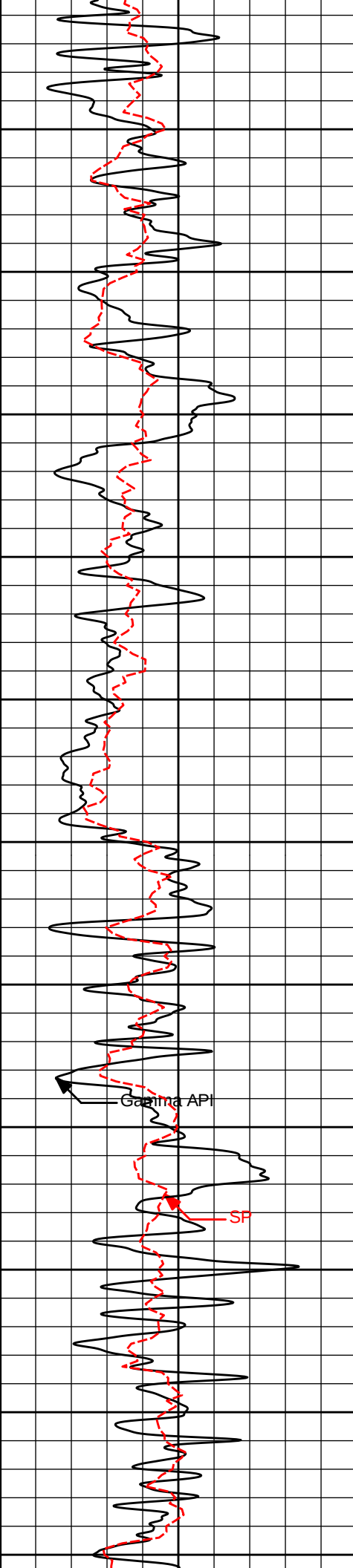
1100

1200









2400

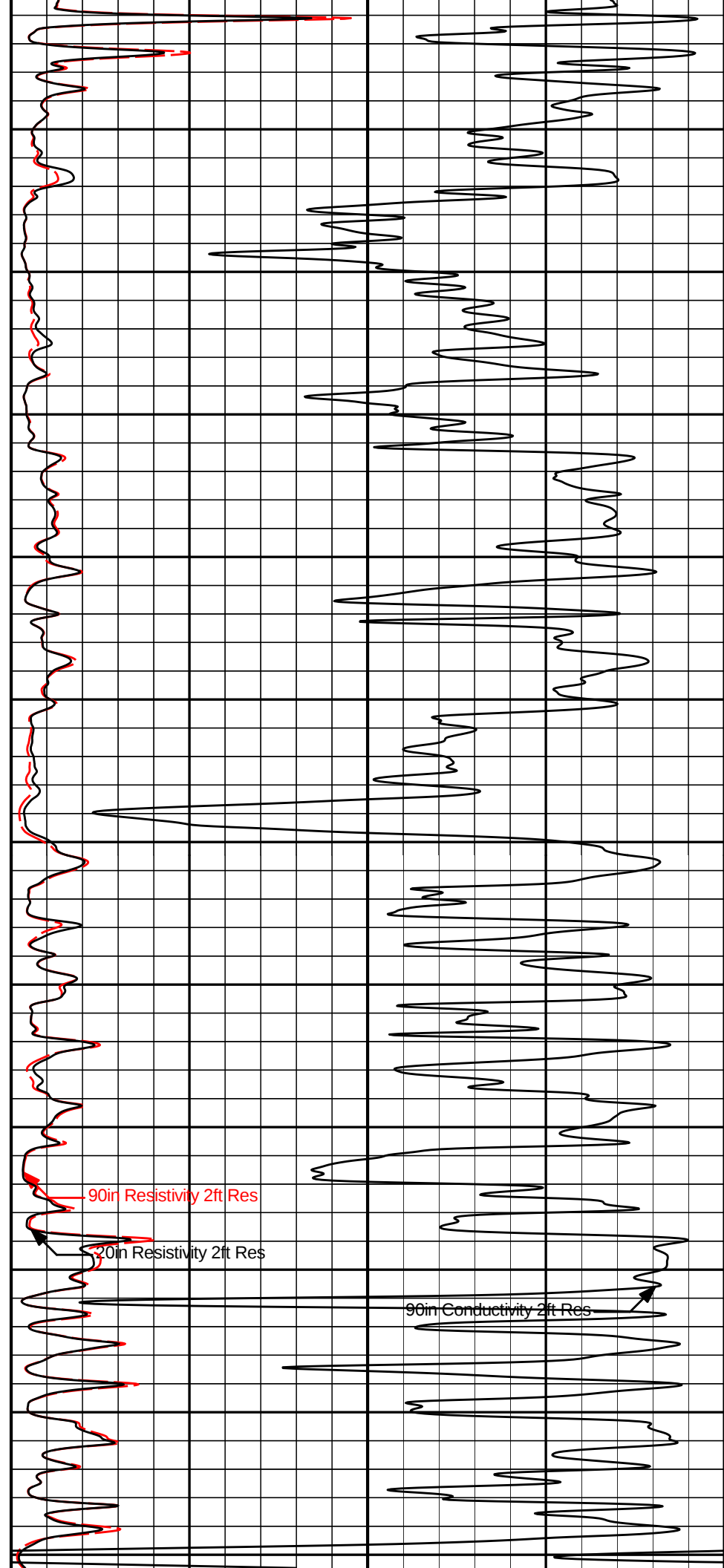
2500

2600

2700

2800

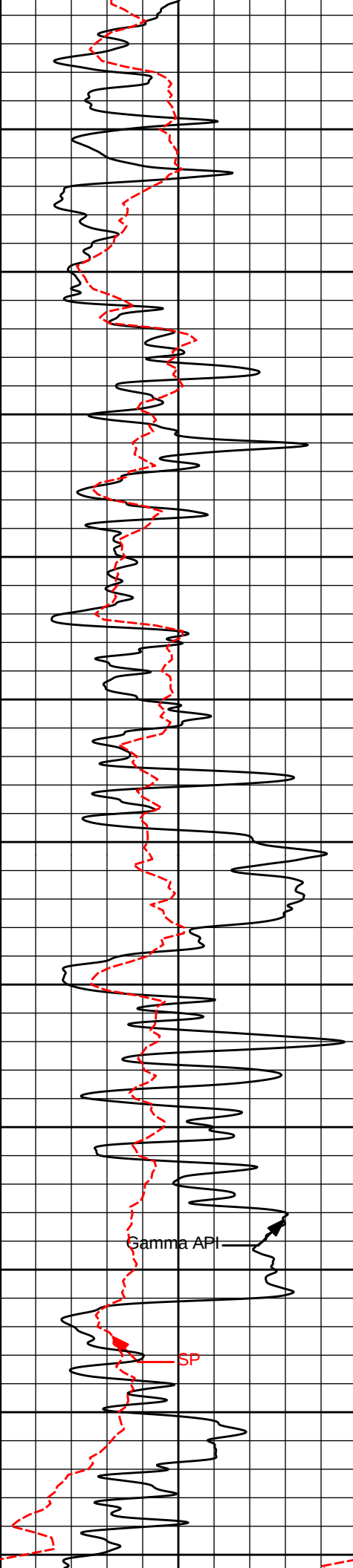
2900



90in Resistivity 2ft Res

20in Resistivity 2ft Res

90in Conductivity 2ft Res



3000

3100

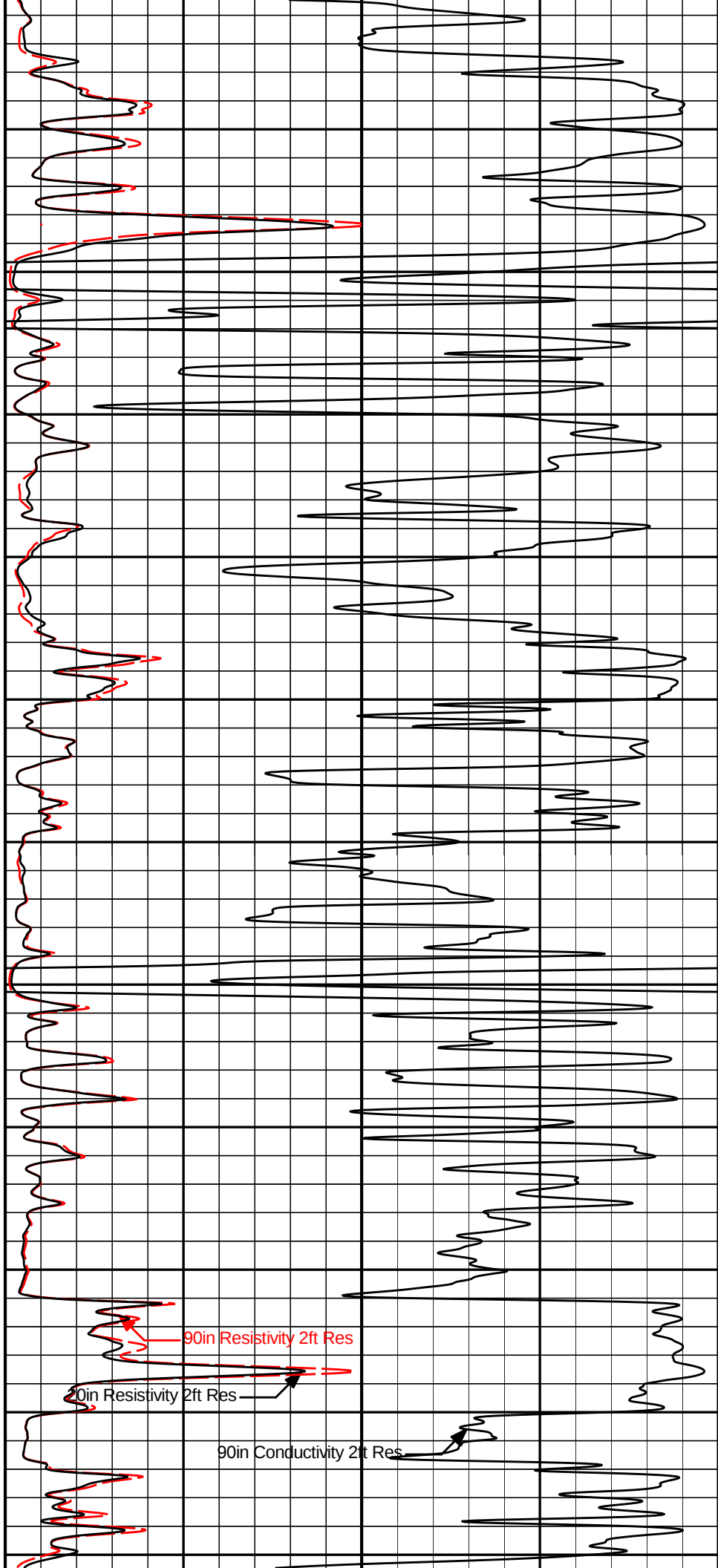
3200

3300

3400

Gamma API

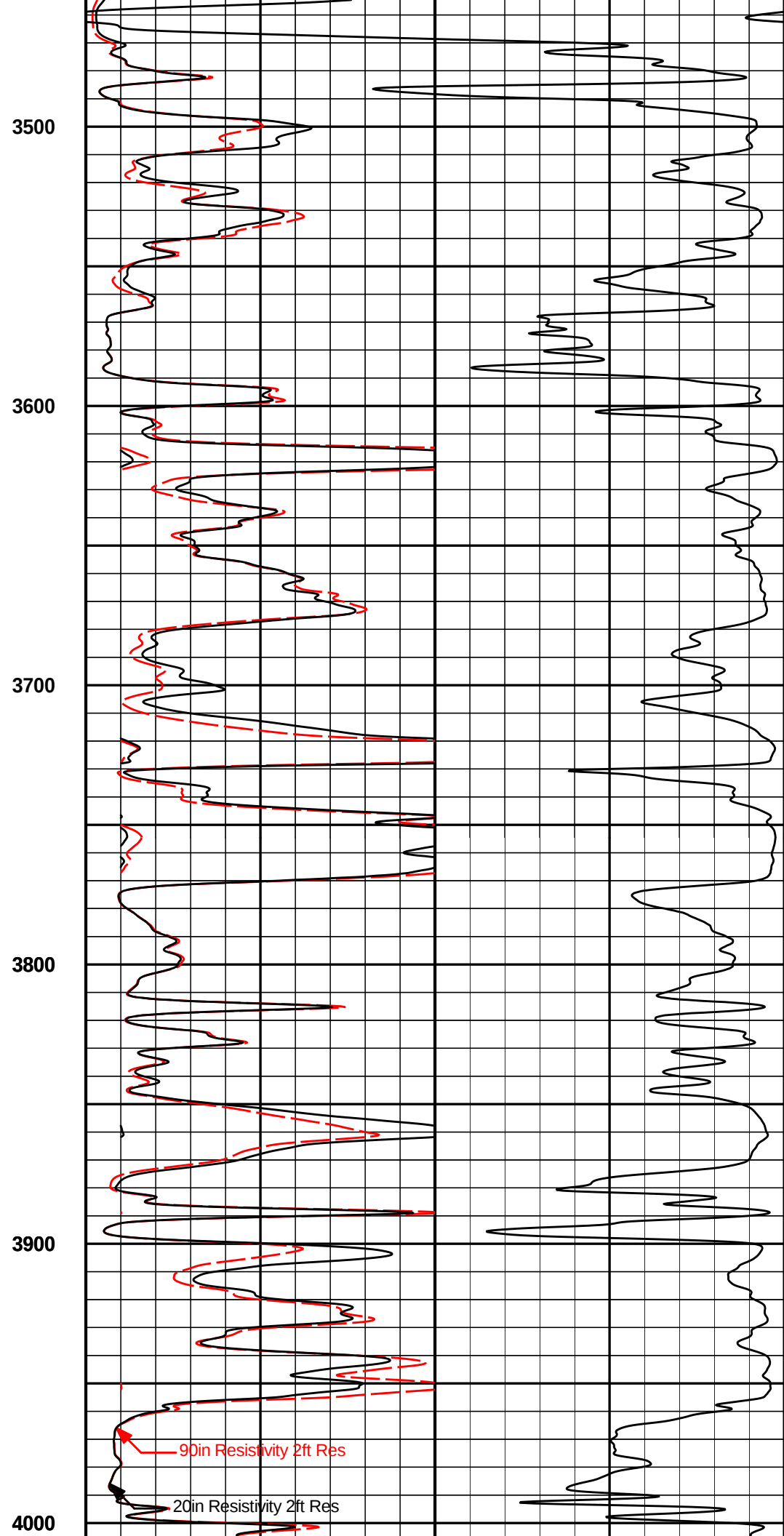
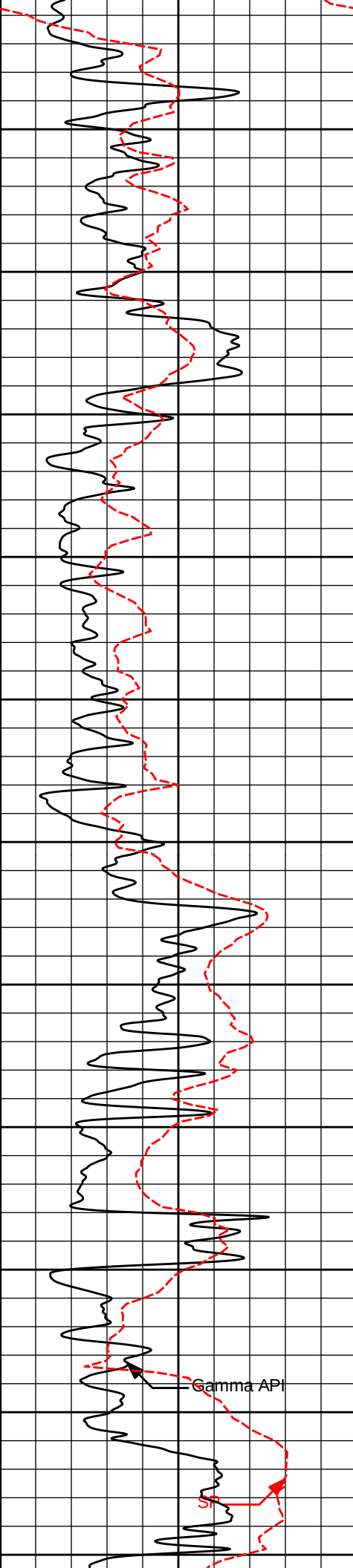
SP

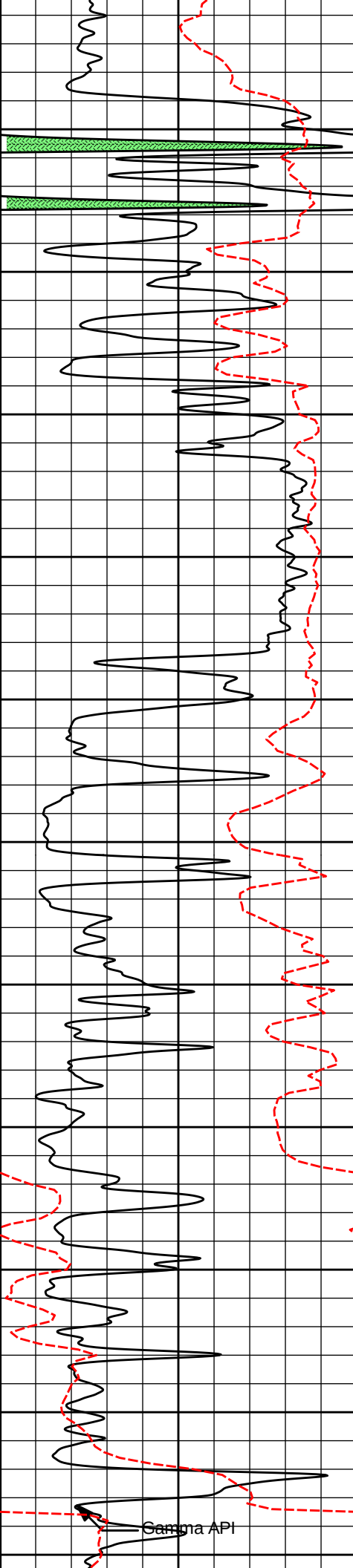


90in Resistivity 2ft Res

20in Resistivity 2ft Res

90in Conductivity 2ft Res





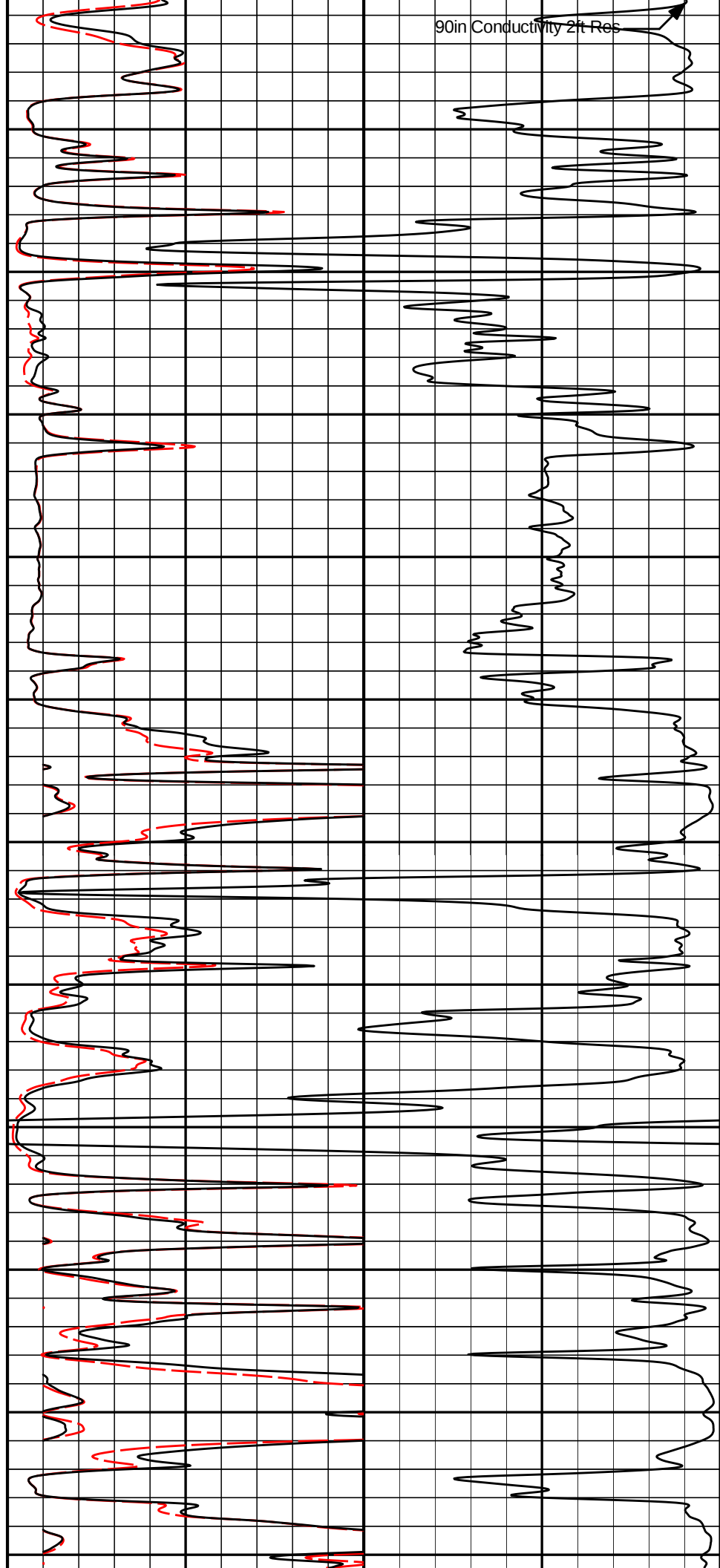
4100

4200

4300

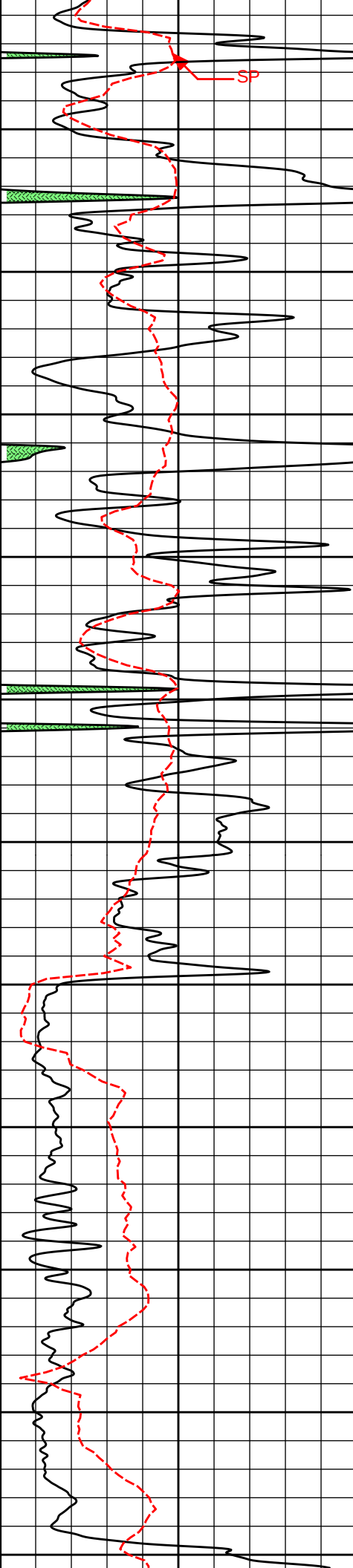
4400

4500



90in Conductivity 2ft Res

Gamma API



4600

4700

4800

4900

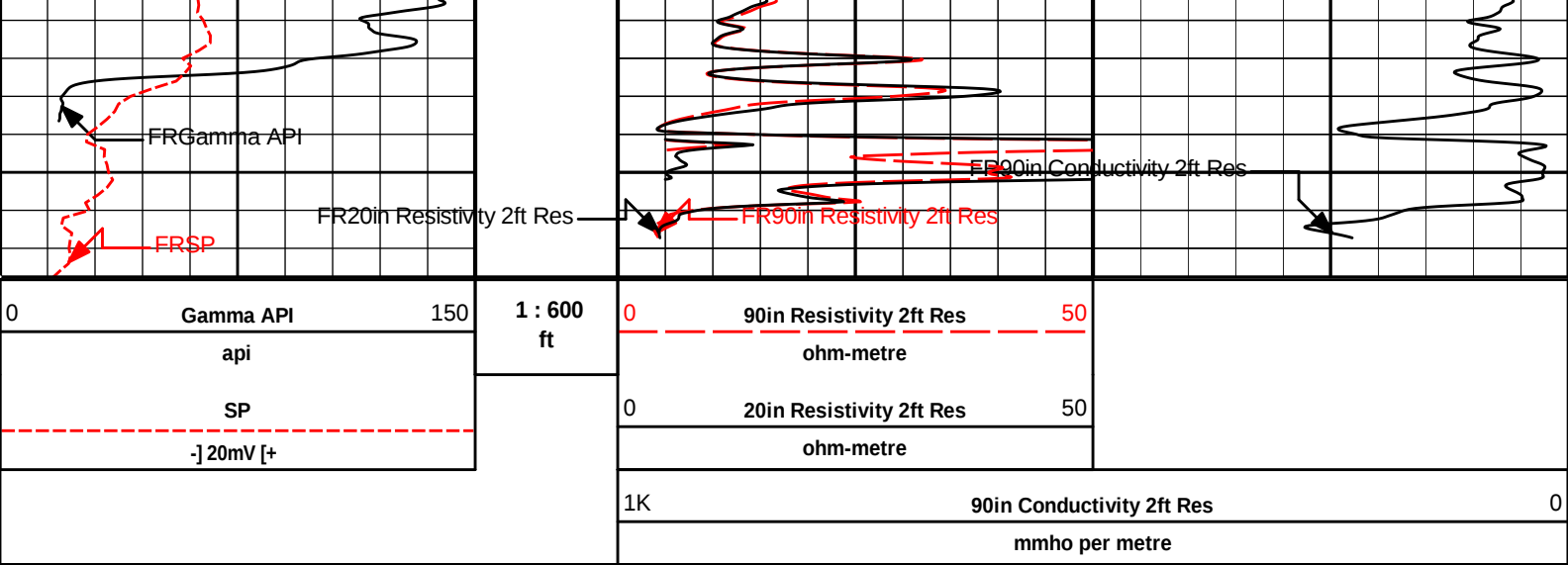
5000

5100

90in Resistivity 2ft Res

20In Resistivity 2ft Res

90in Conductivity 2ft Res



HALLIBURTON

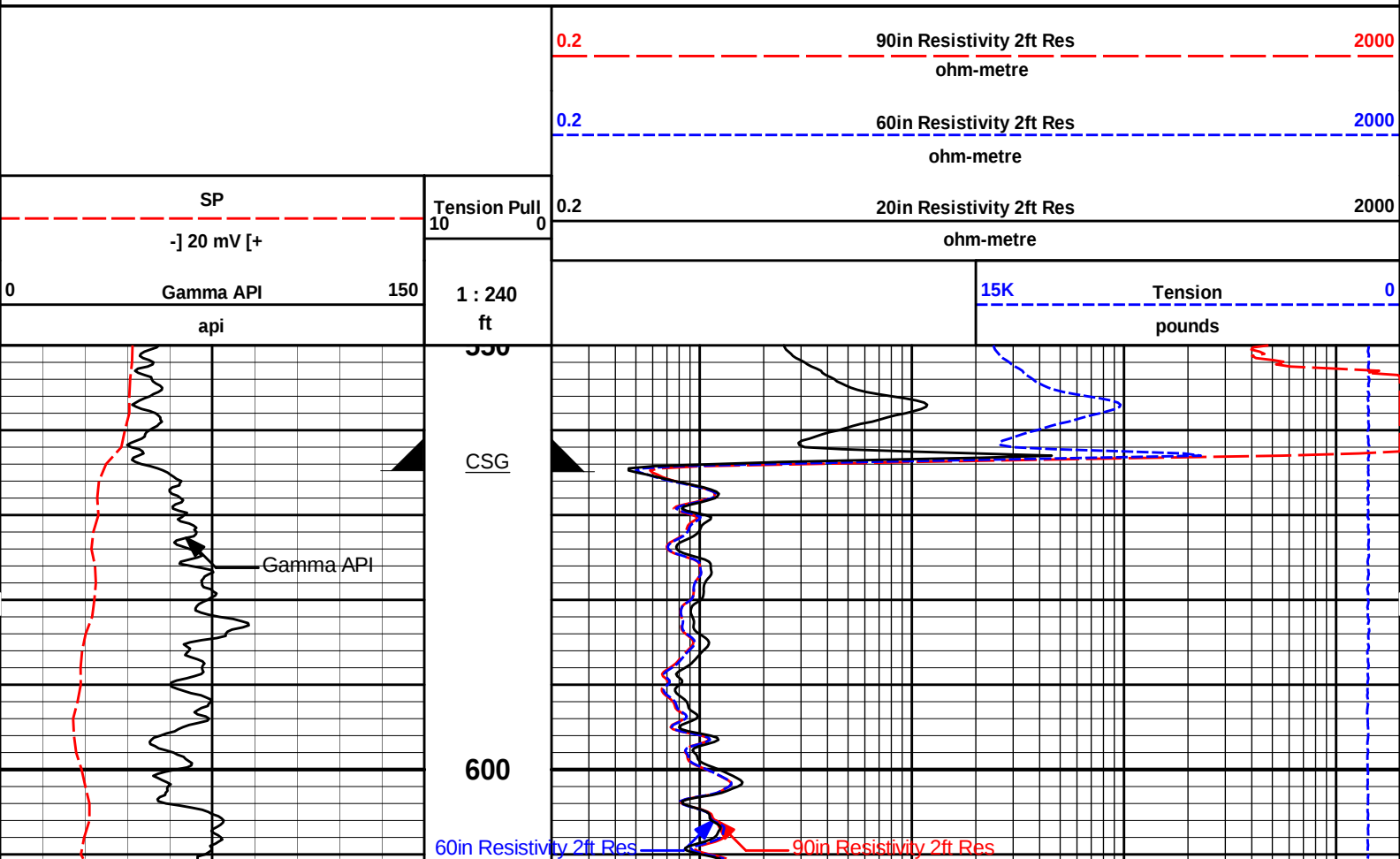
Plot Time: 08-May-12 23:43:24
Plot Range: 550 ft to 5177.5 ft
Data: CANTON_C_3_20\Well Based\RESIST MAIN\
Plot File: \\-LOCAL-CANTON_C_3_20\0002 RED_BLACK_SDL\RESISTIVITY\1_ACRT_2inx

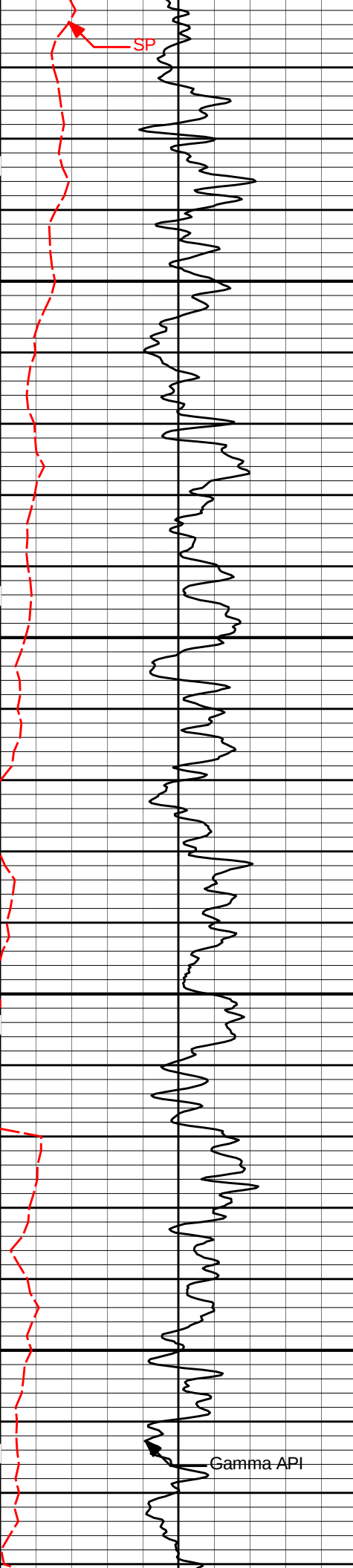
2 INCH MAIN LOG

HALLIBURTON

Plot Time: 08-May-12 23:43:25
Plot Range: 550 ft to 5179.5 ft
Data: {ActiveWell}\Well Based\RESIST MAIN\
Plot File: \\-LOCAL-CANTON_C_3_20\0002 RED_BLACK_SDL\RESISTIVITY\1_ACRT_5_mainx

5 INCH MAIN LOG





650

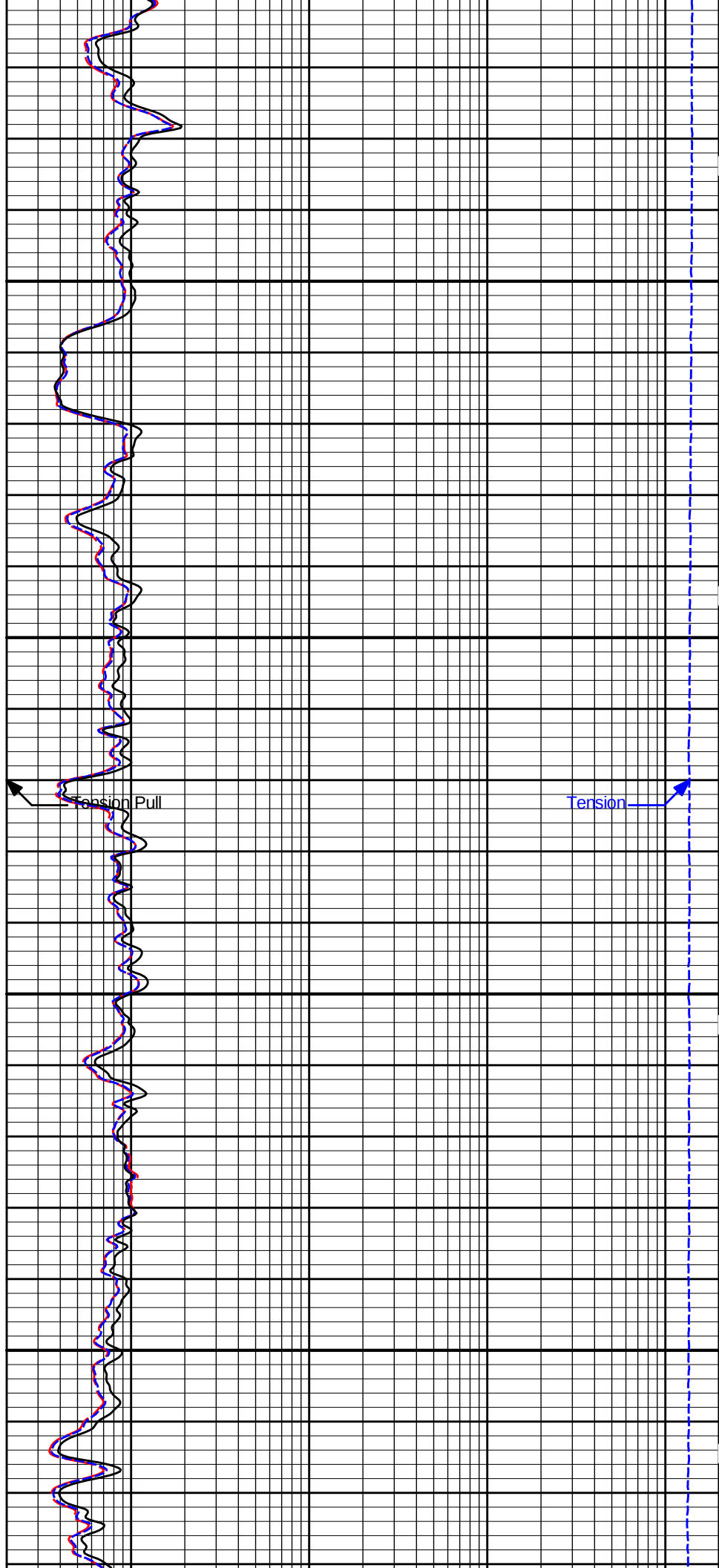
700

750

800

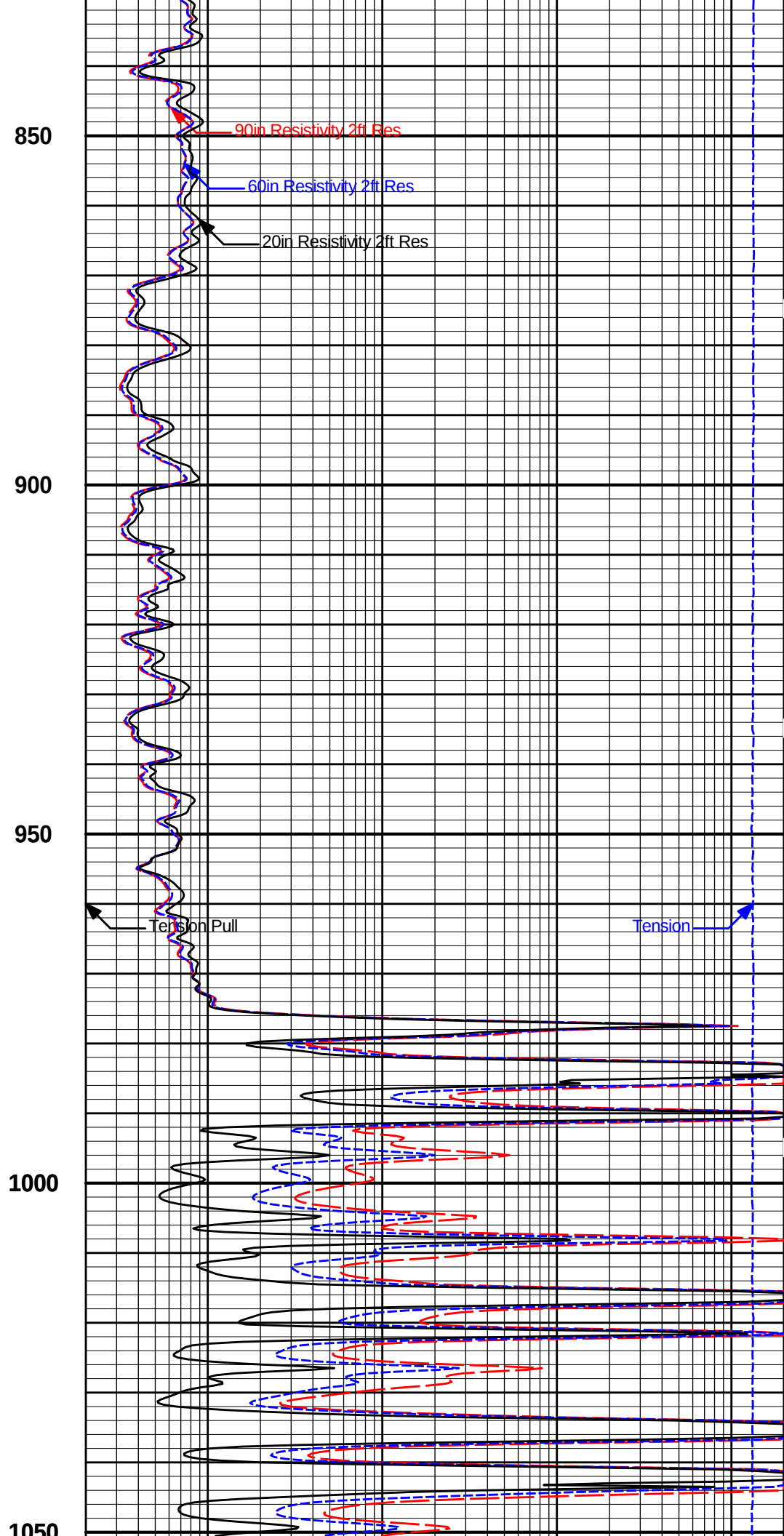
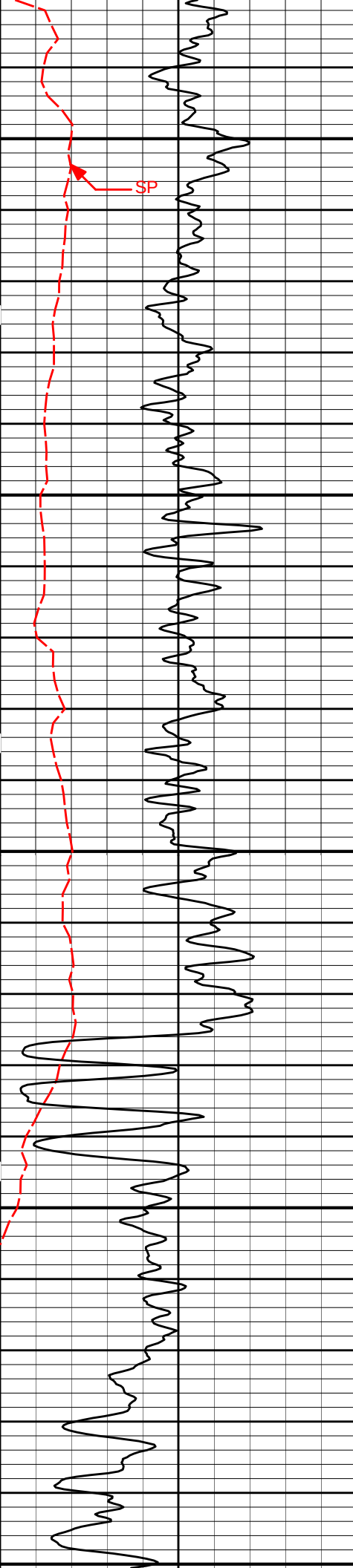
Gamma API

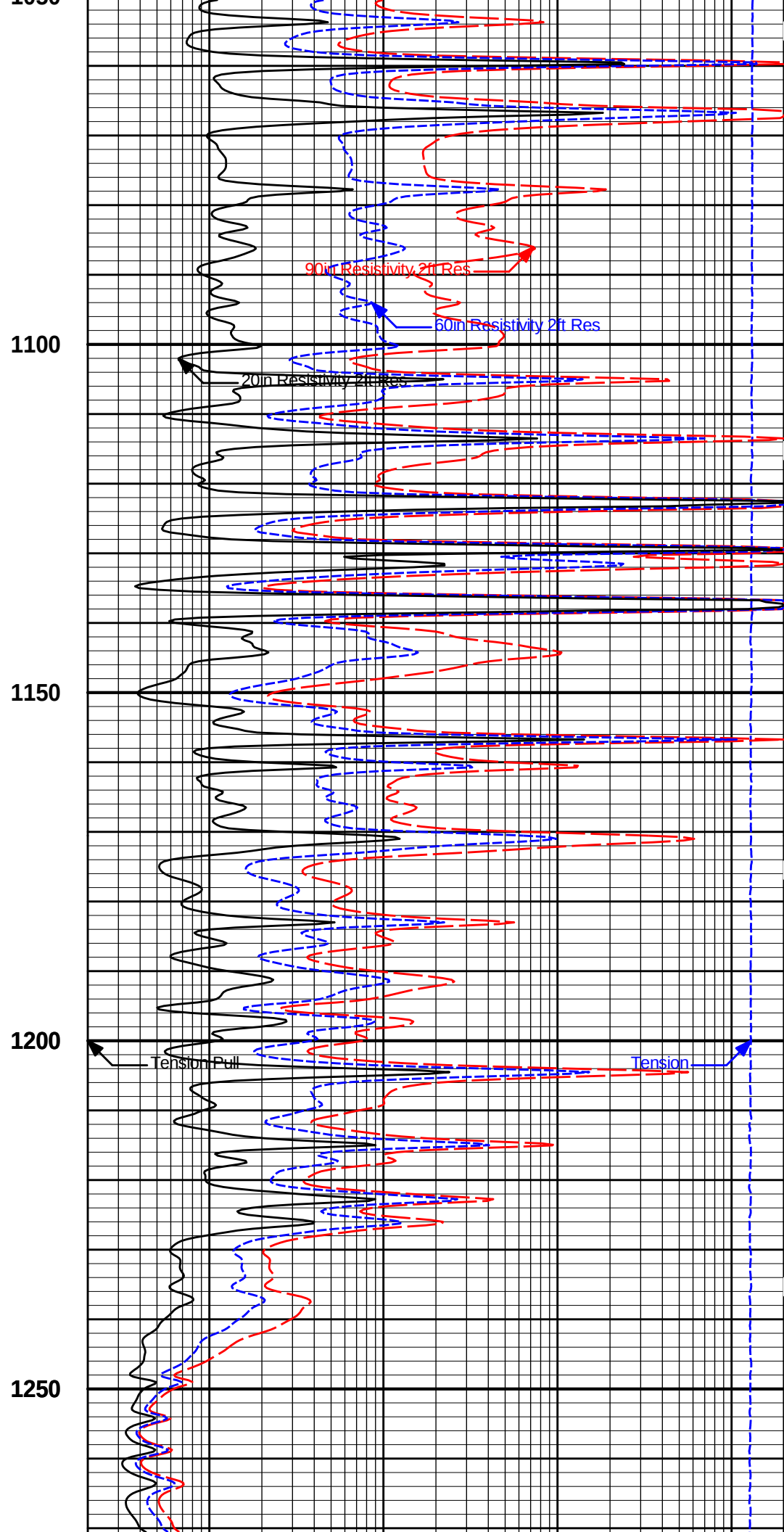
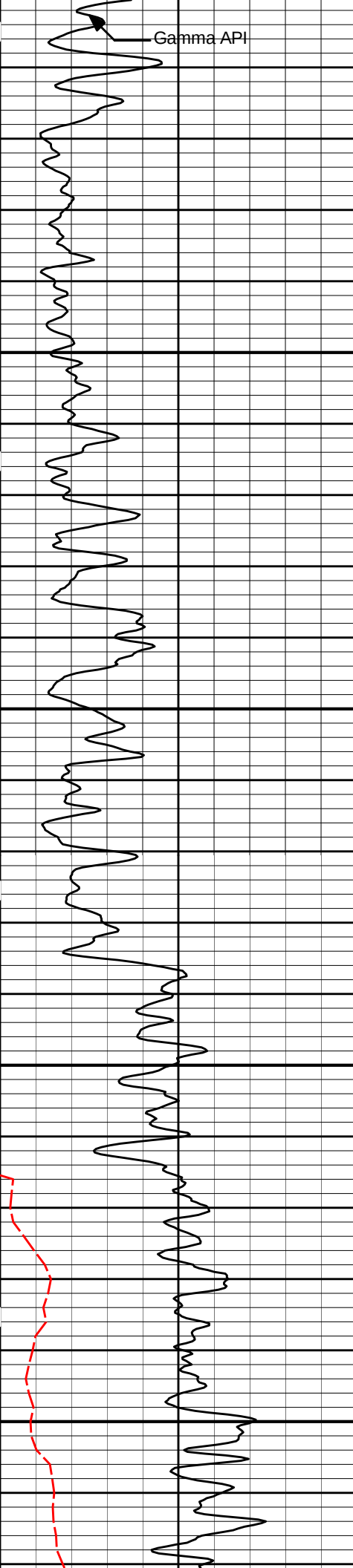
SP

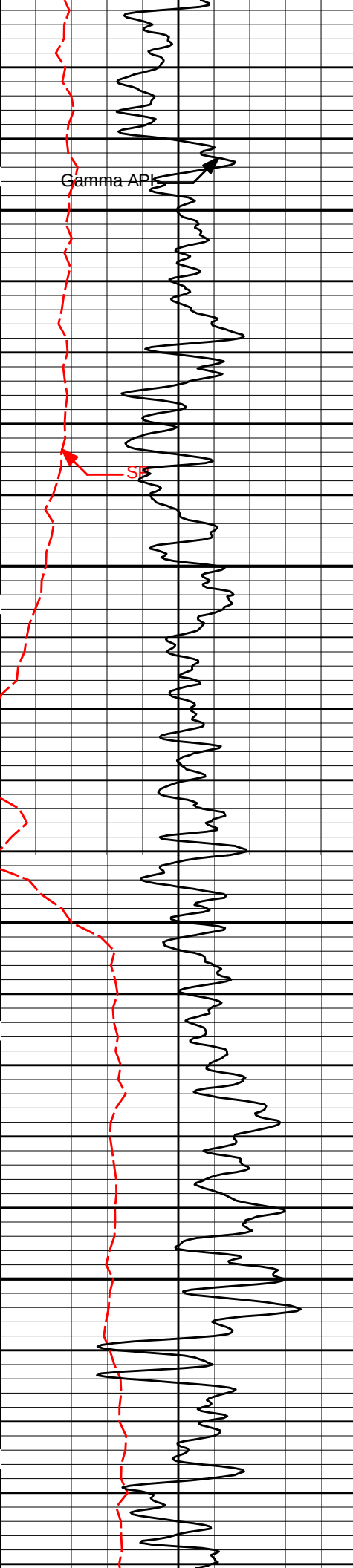


Tension Pull

Tension





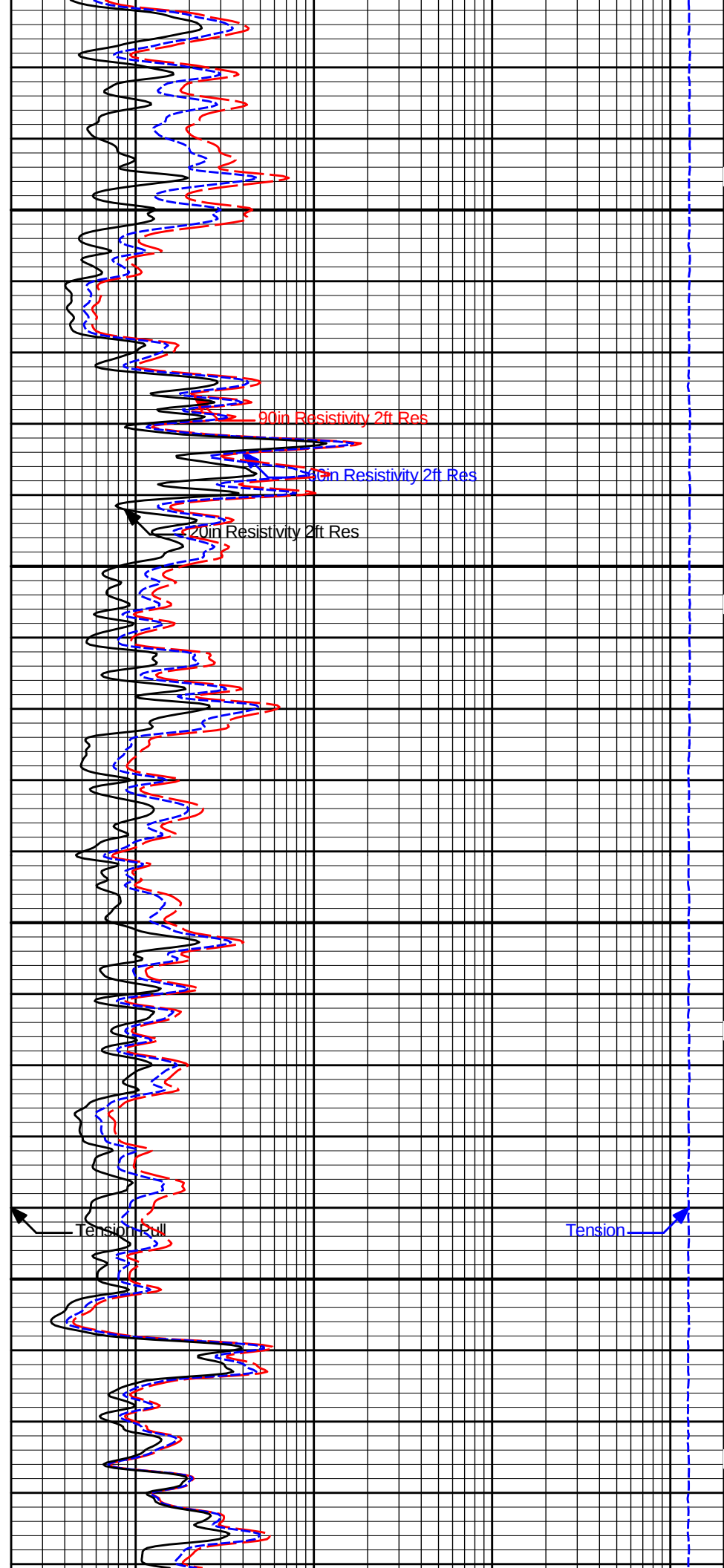


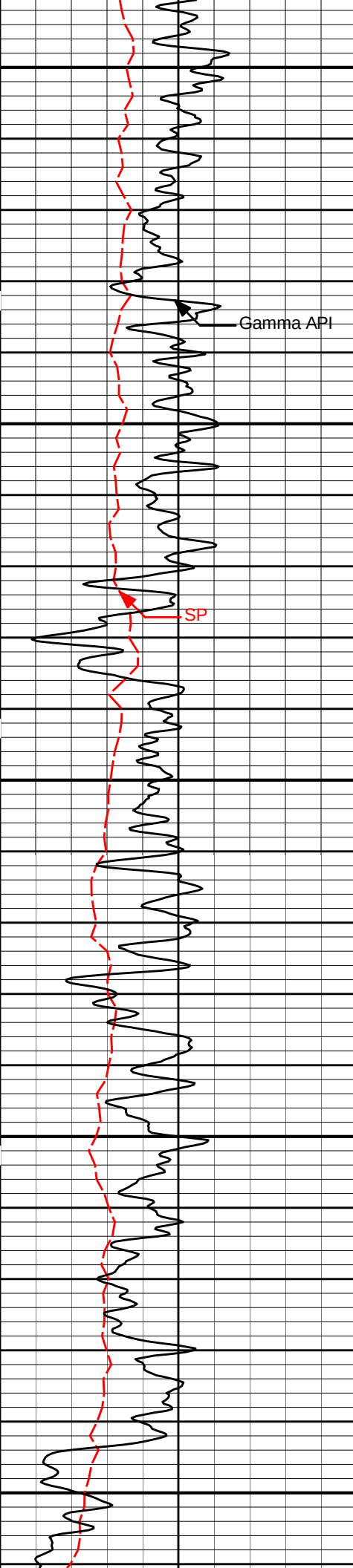
1300

1350

1400

1450





1500

1550

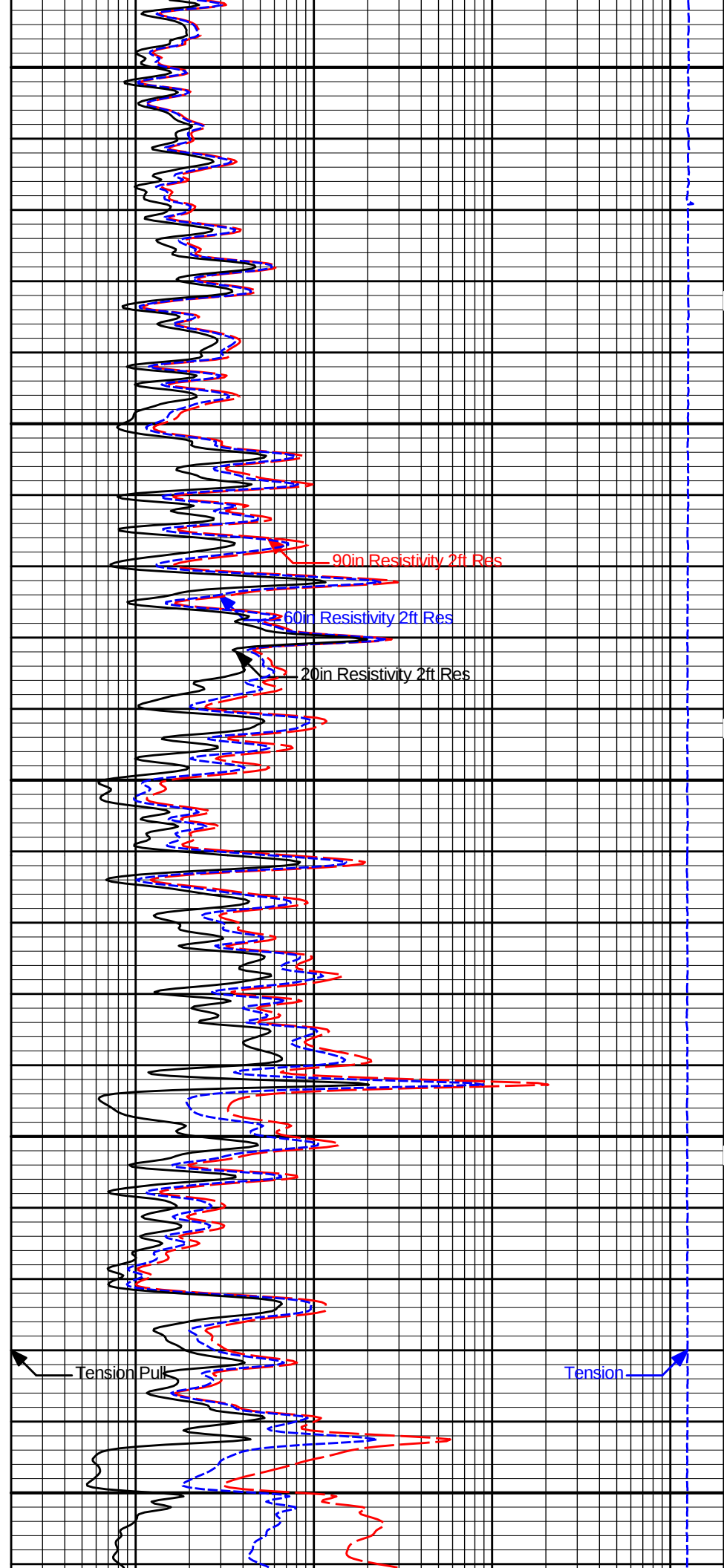
1600

1650

1700

Gamma API

SP



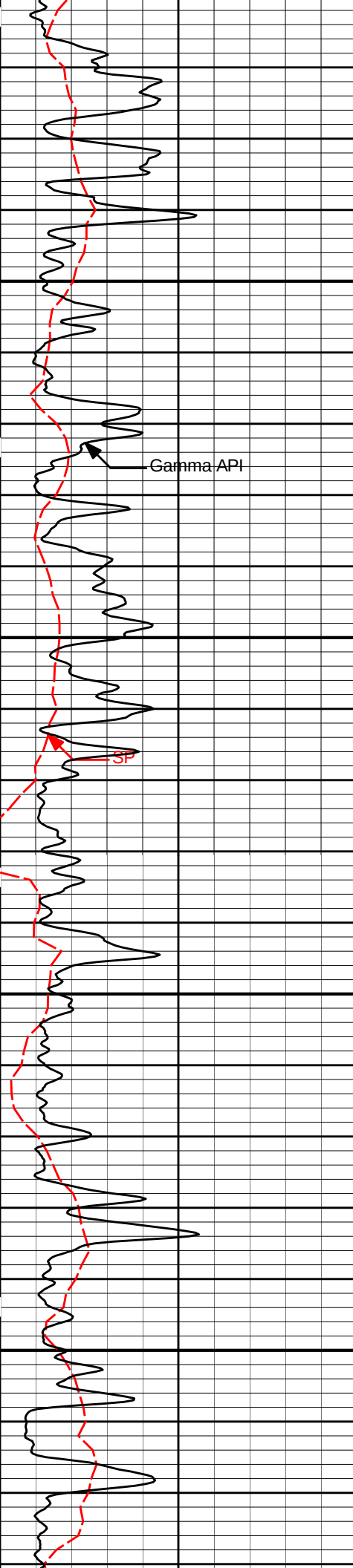
90in Resistivity 2ft Res

60in Resistivity 2ft Res

20in Resistivity 2ft Res

Tension Pulk

Tension

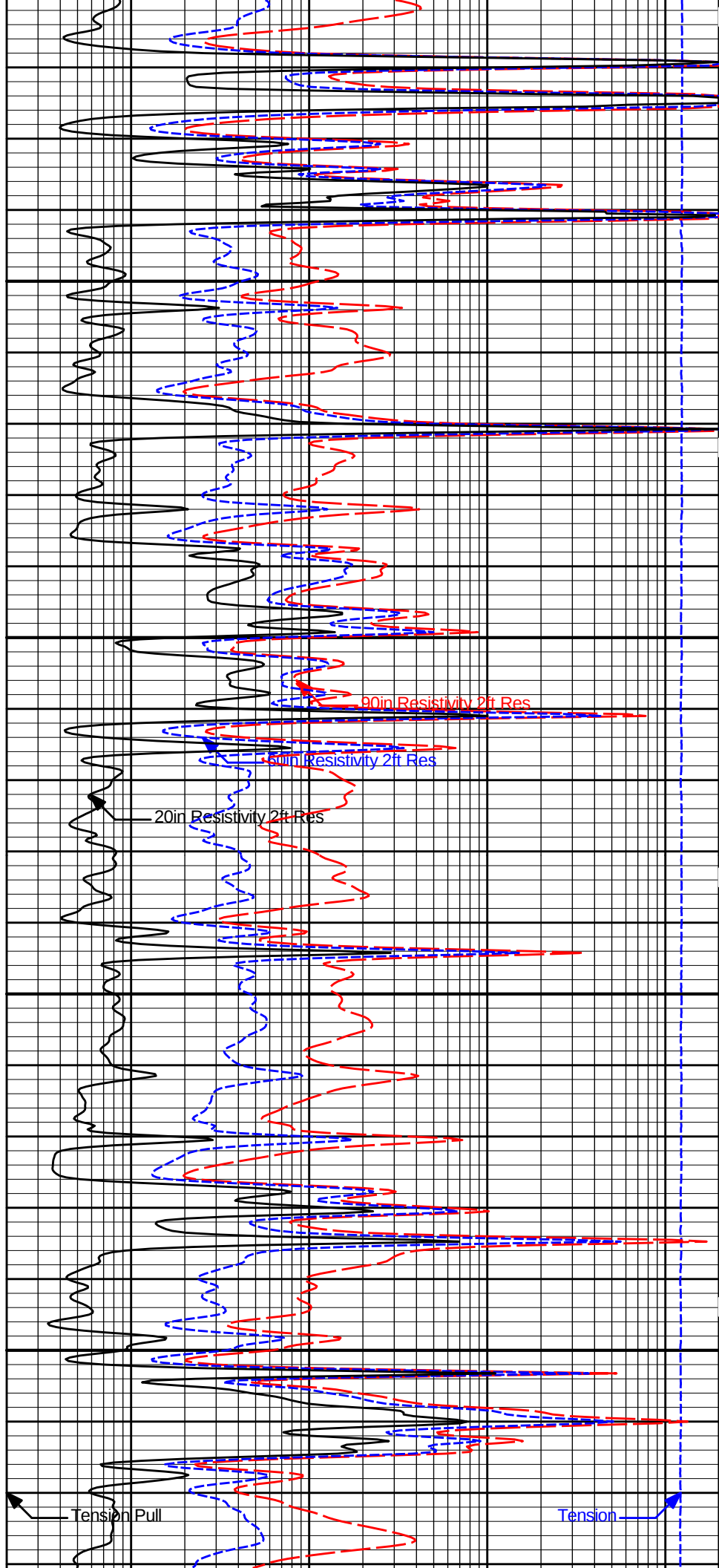


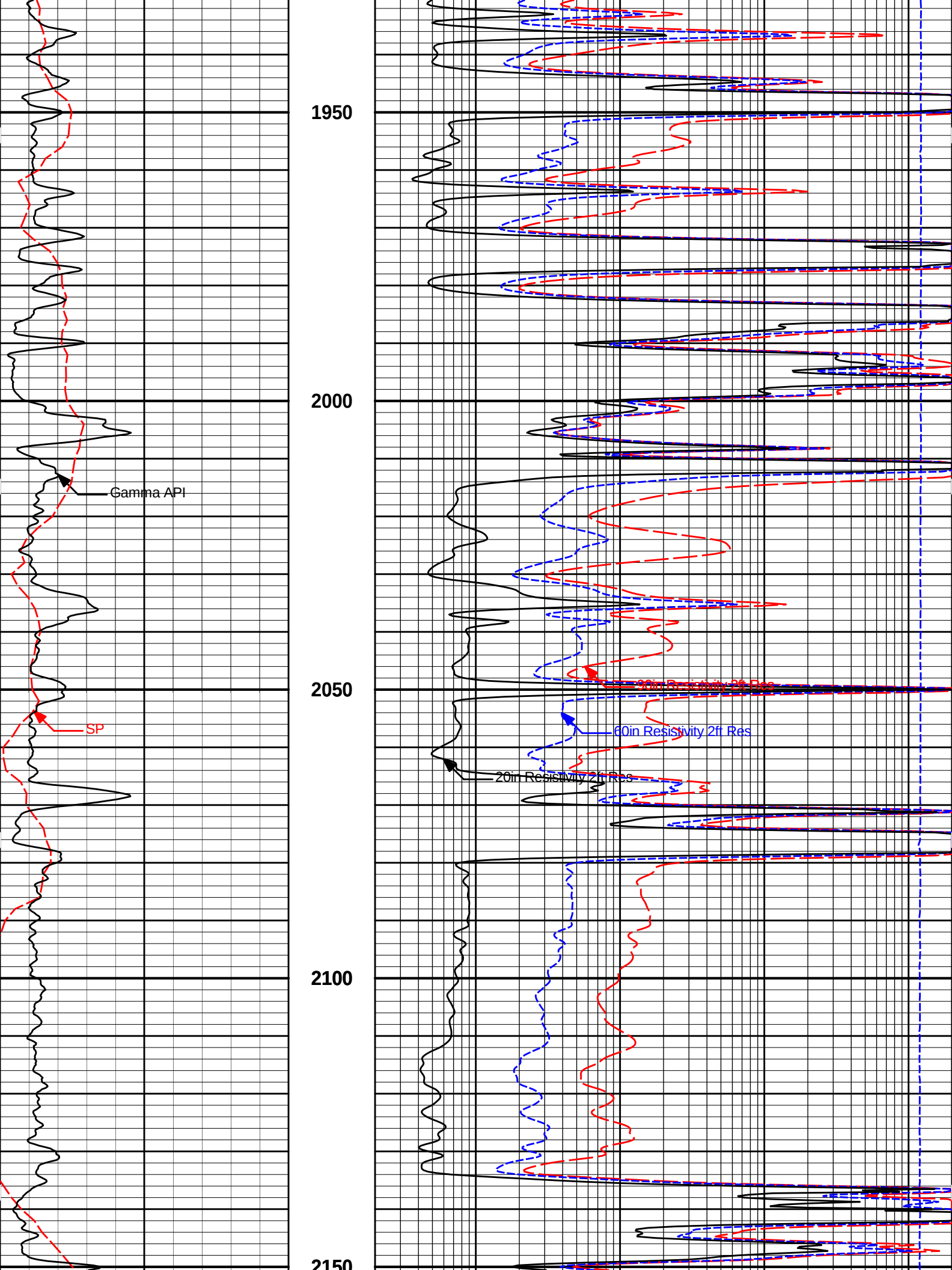
1750

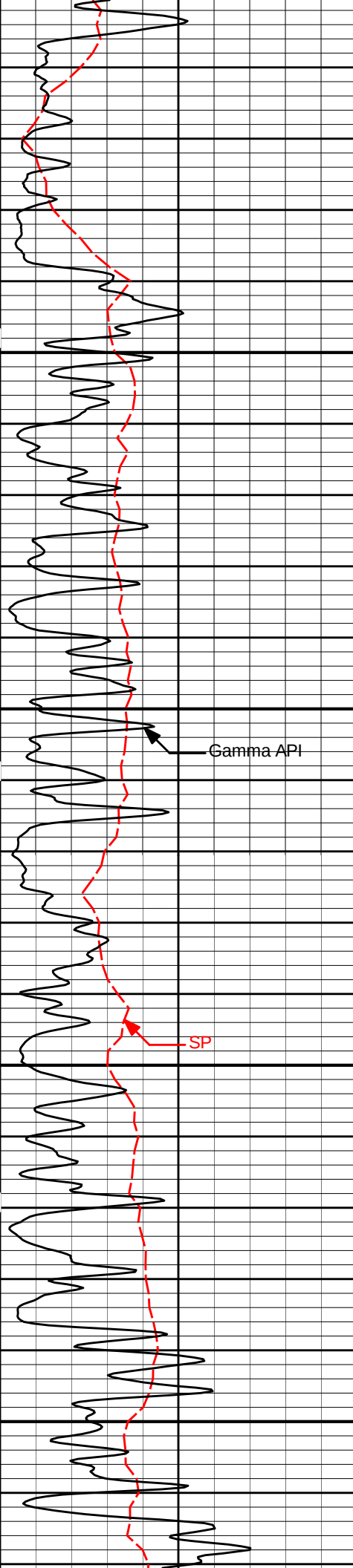
1800

1850

1900







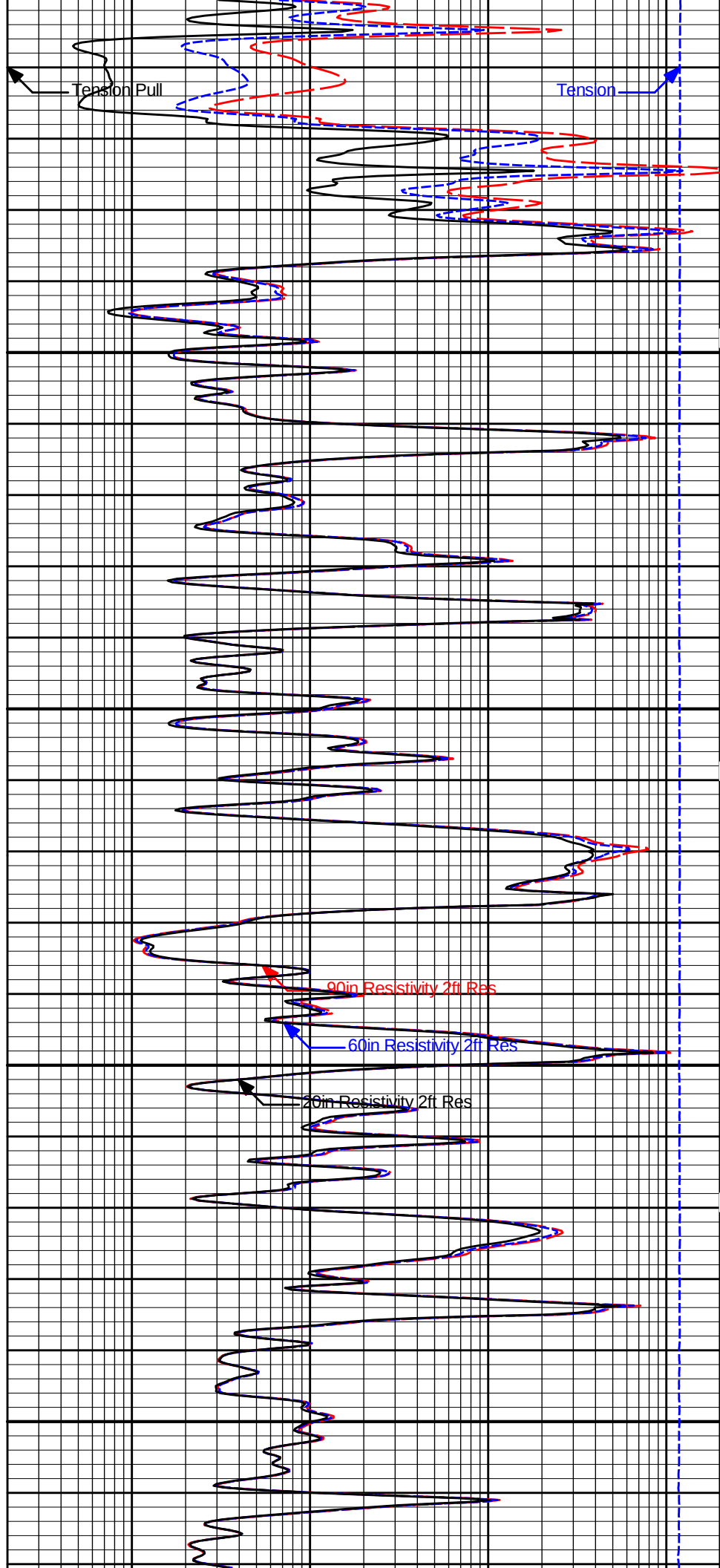
2100

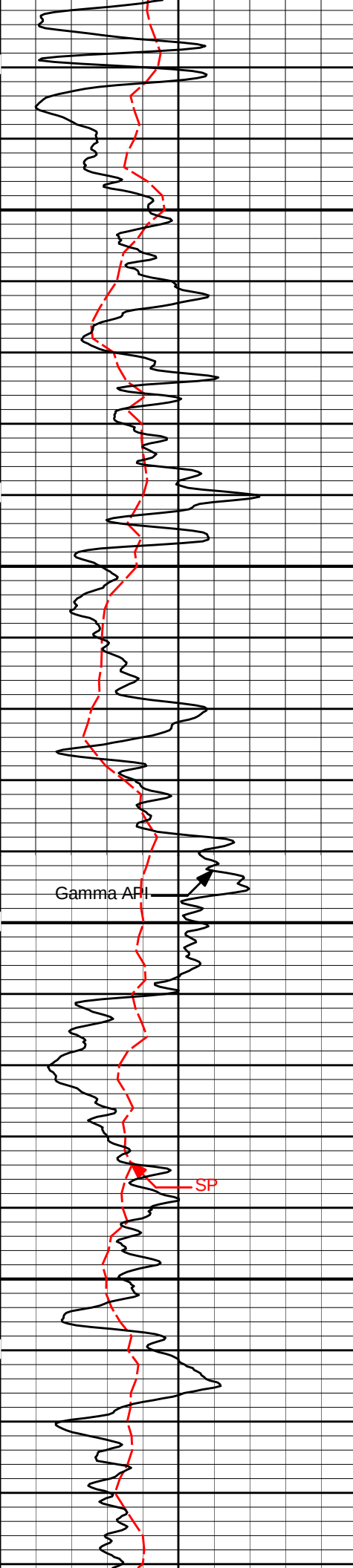
2200

2250

2300

2350



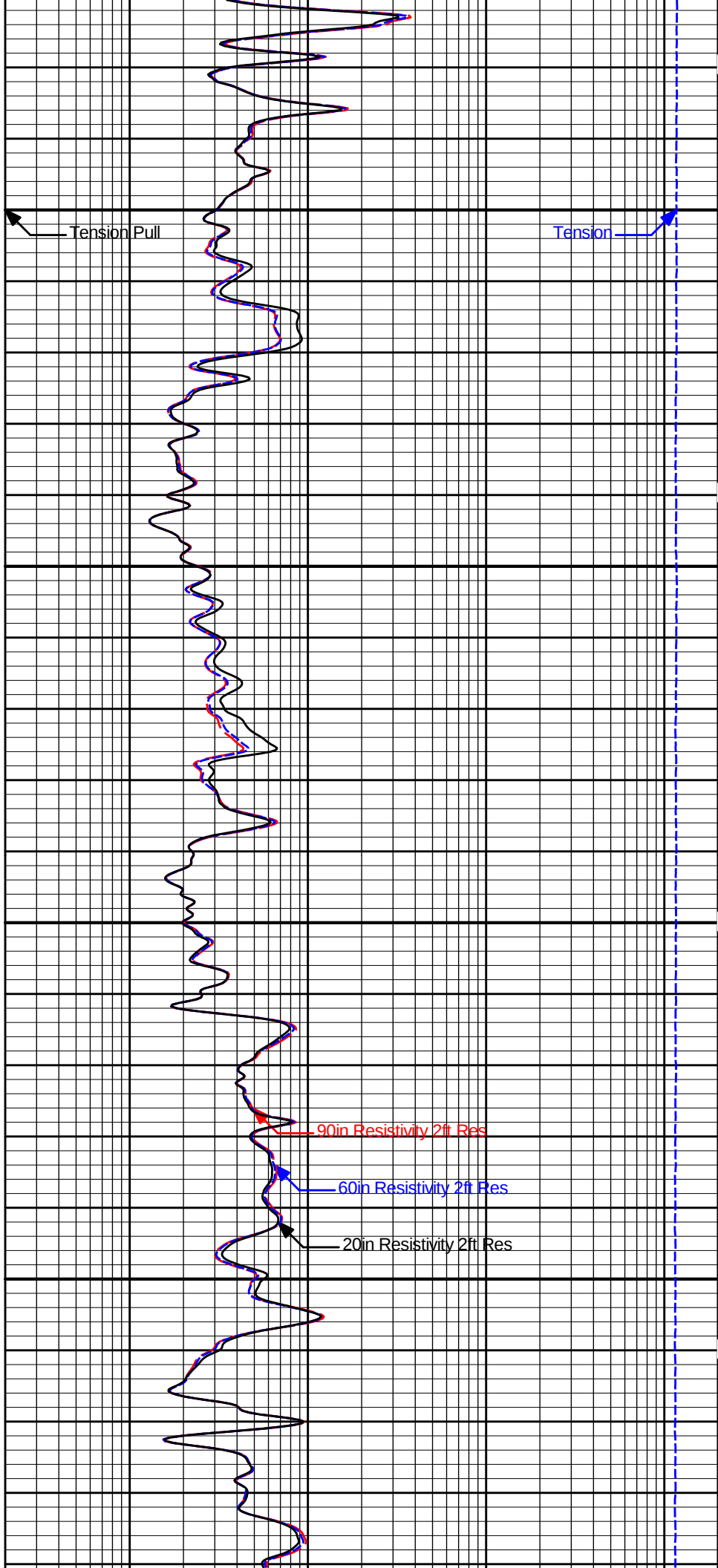


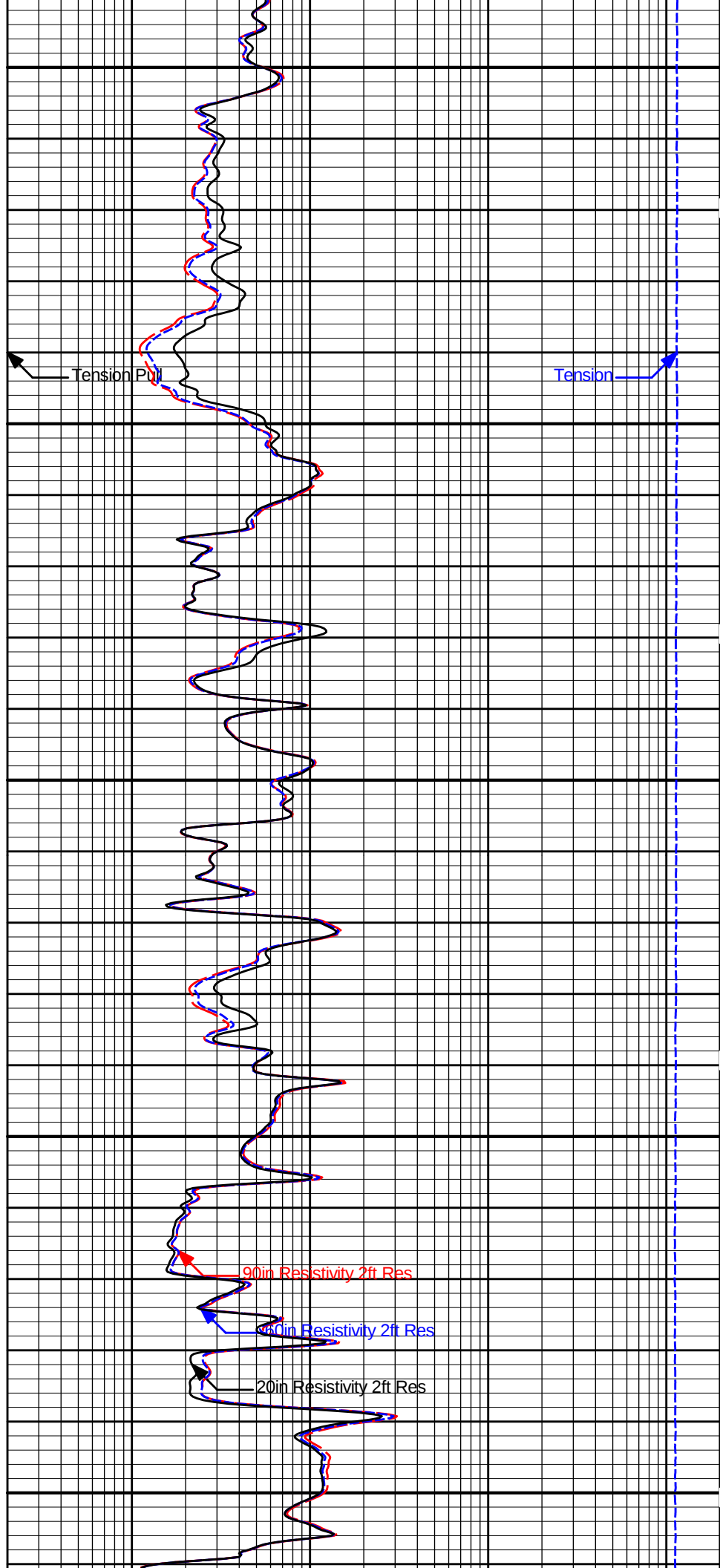
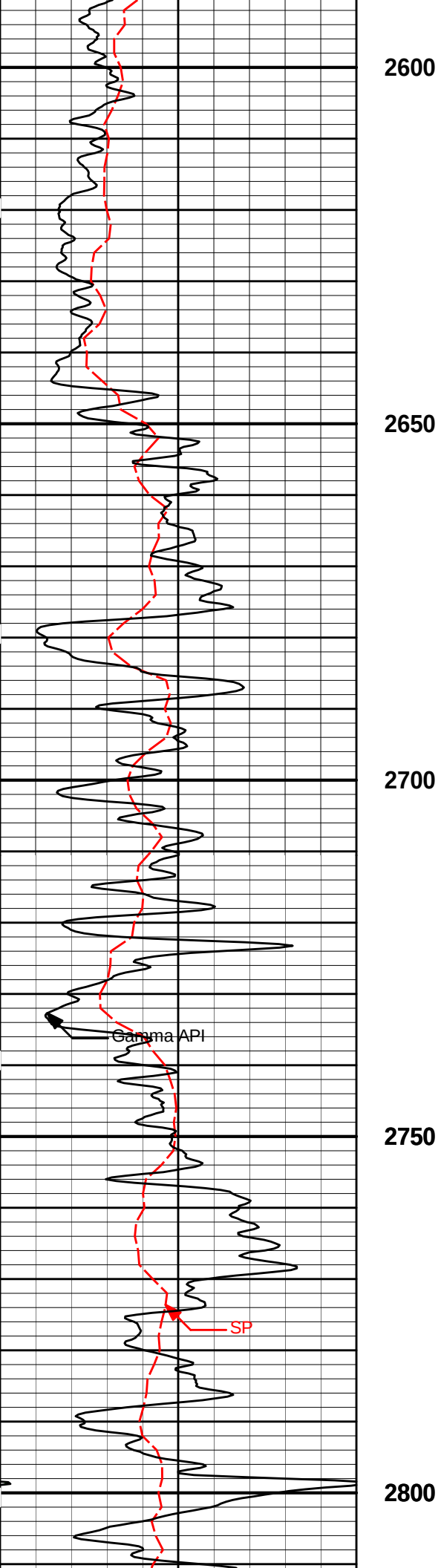
2400

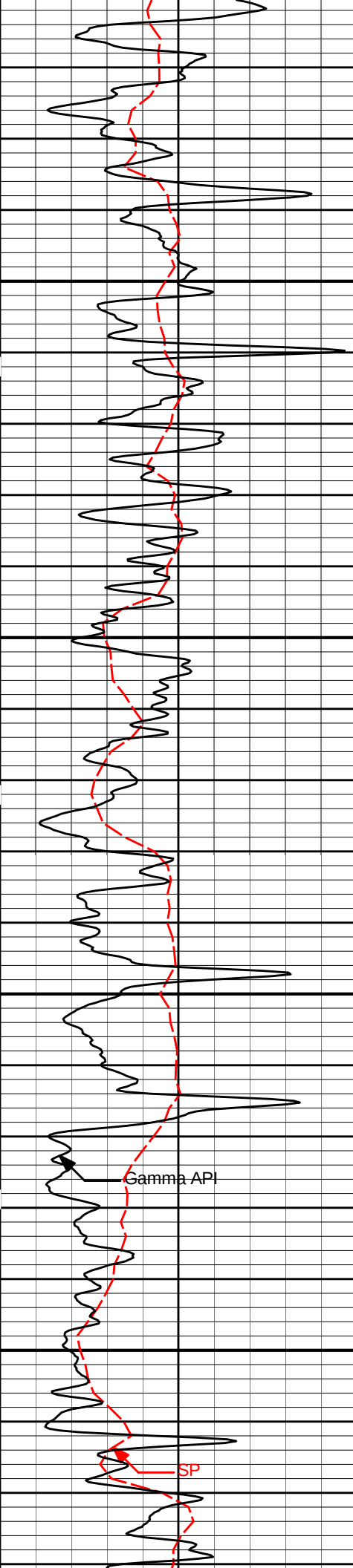
2450

2500

2550





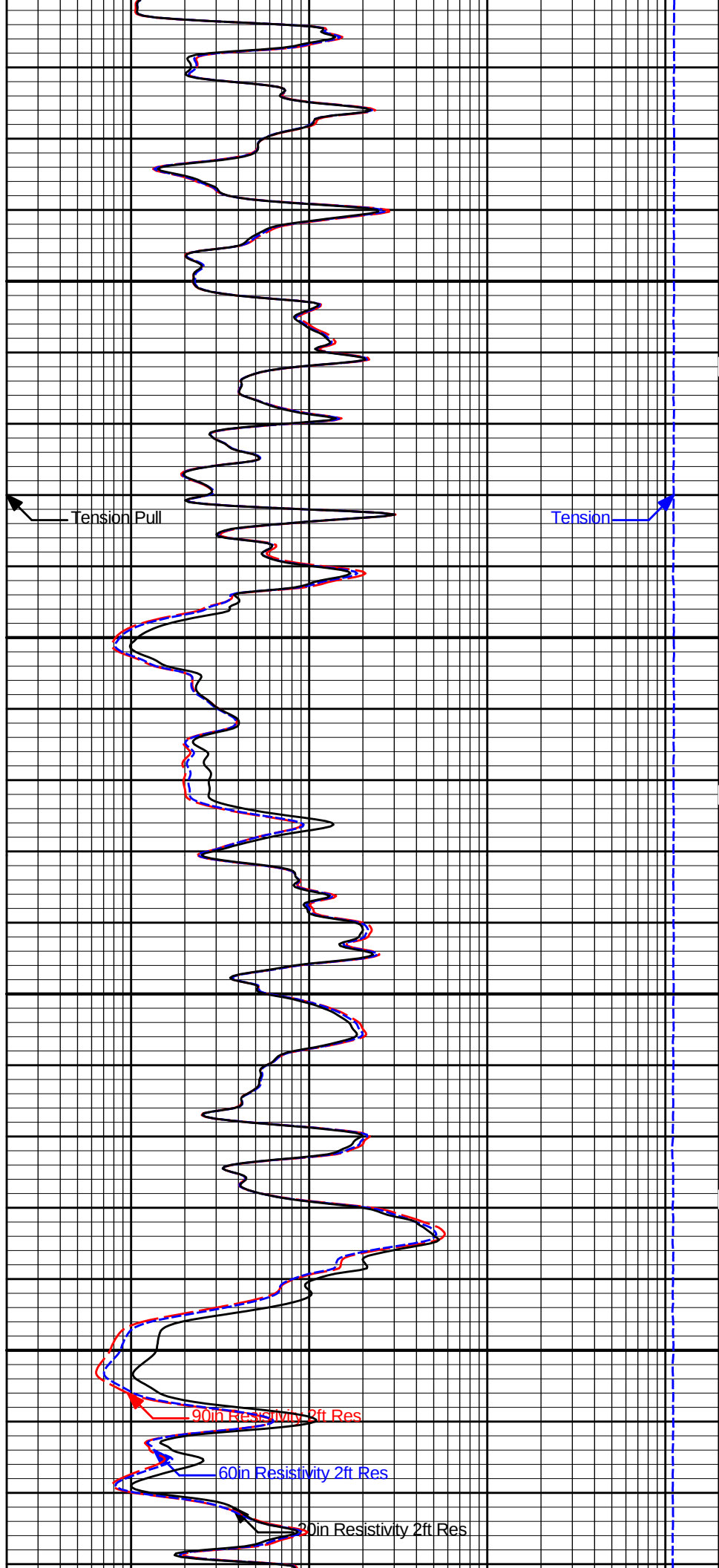


2850

2900

2950

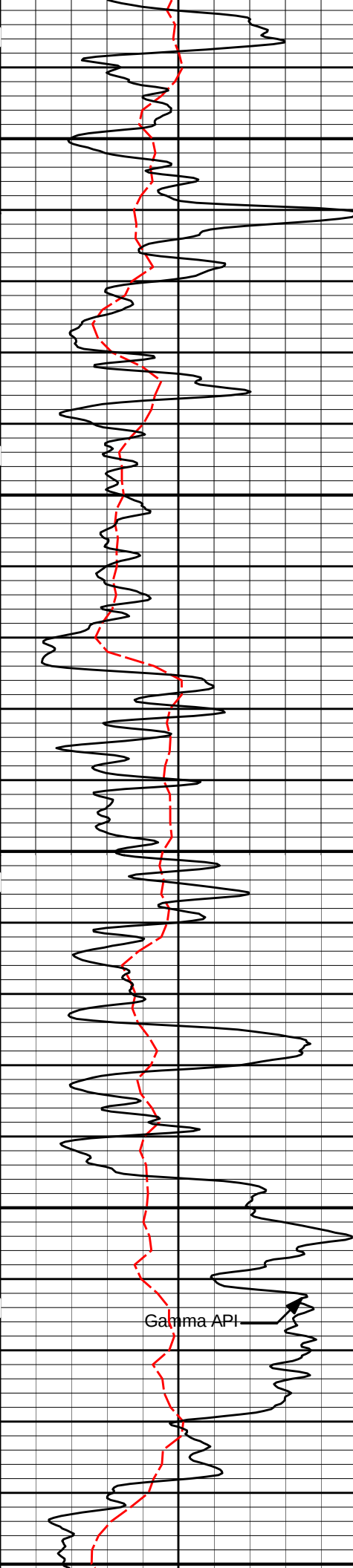
3000



90in Resistivity 2ft Res

60in Resistivity 2ft Res

20in Resistivity 2ft Res



3050

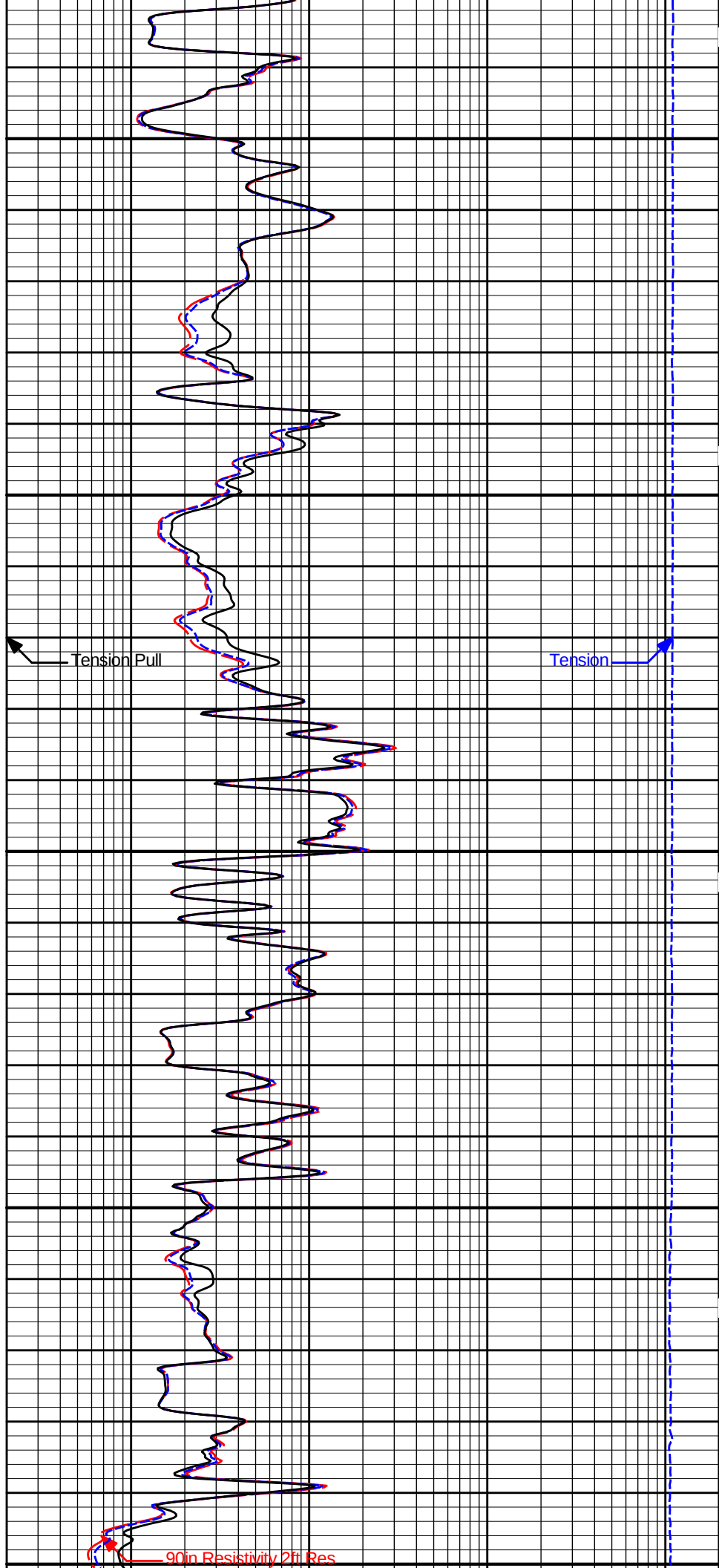
3100

3150

3200

3250

Gamma API



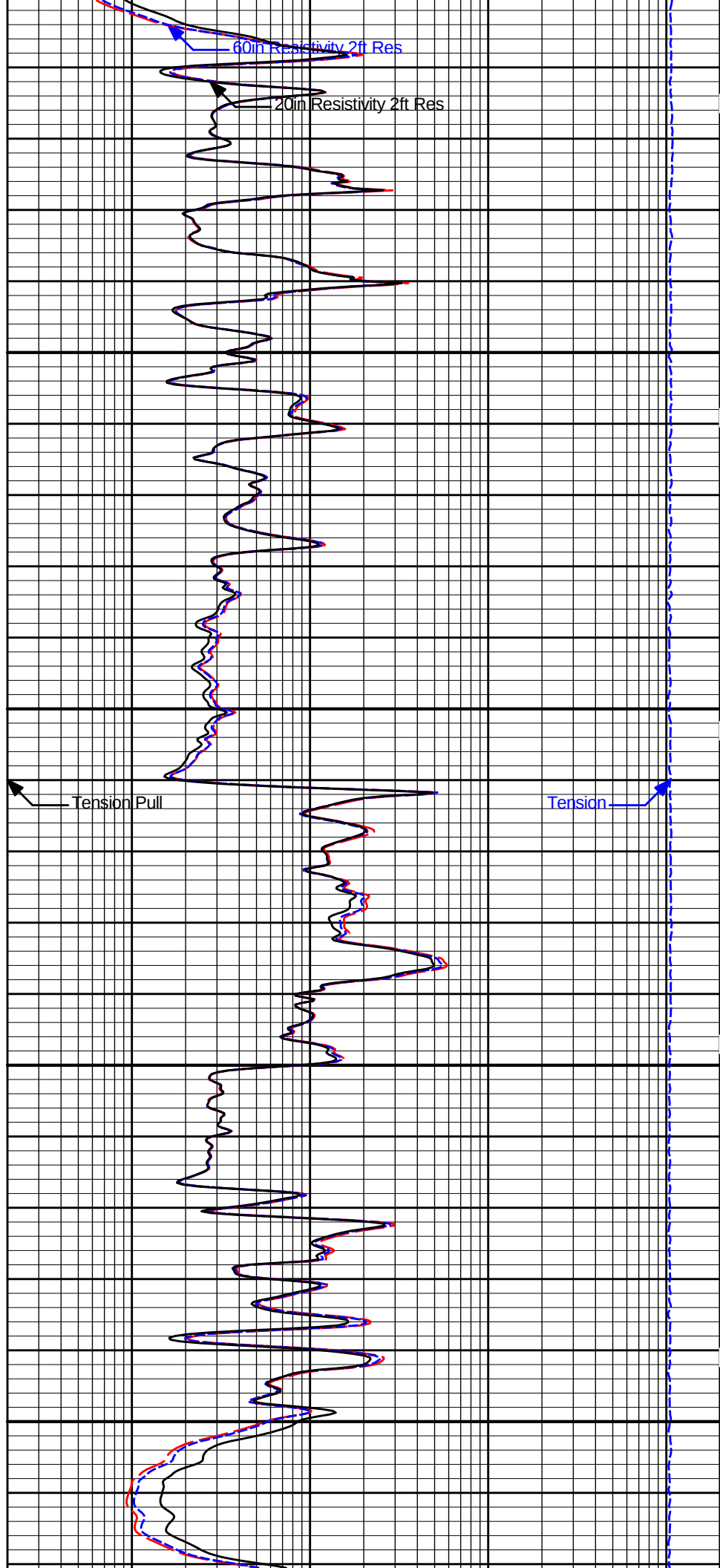
Tension Pull

Tension

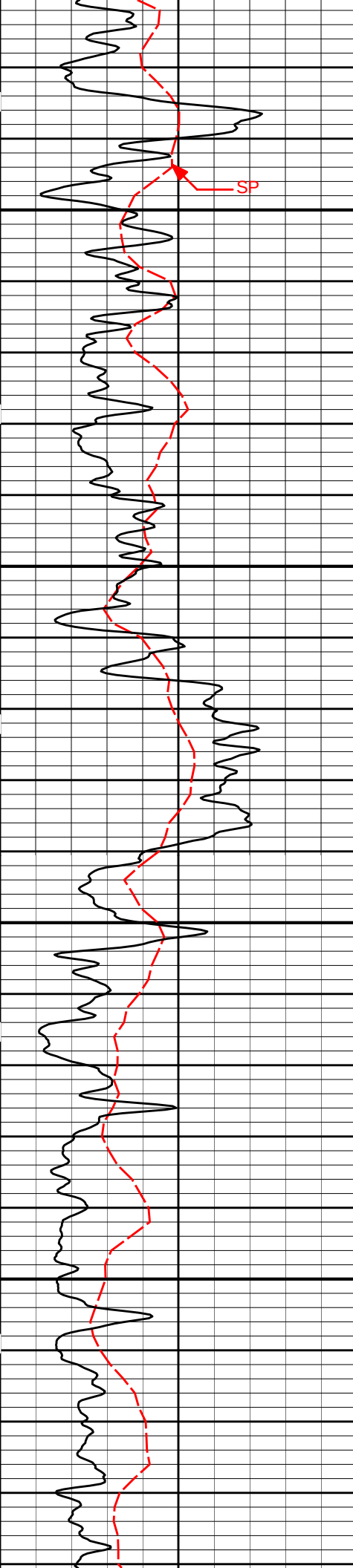
90in Resistivity 2ft Res



3250
3300
3350
3400
3450



60in Resistivity 2ft Res
20in Resistivity 2ft Res
Tension Pull
Tension

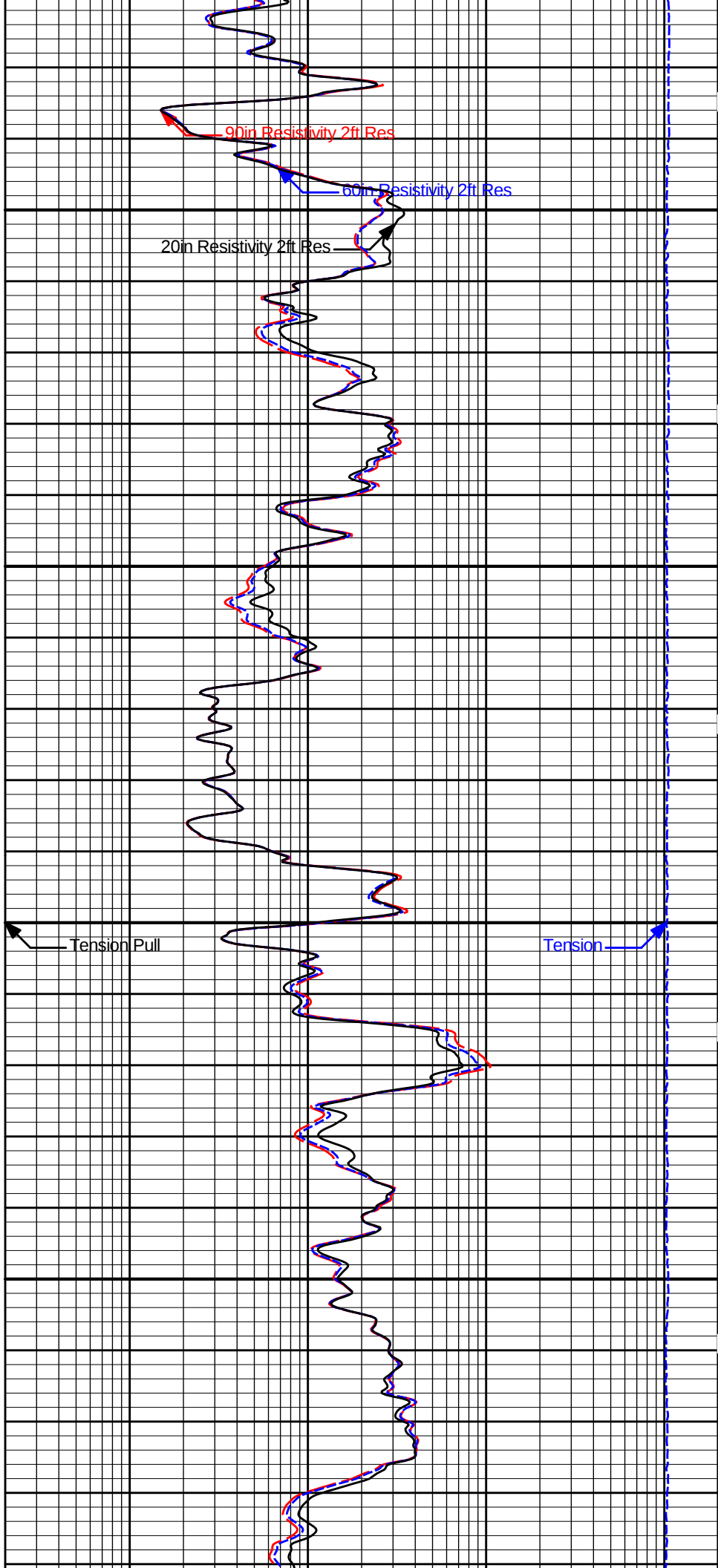


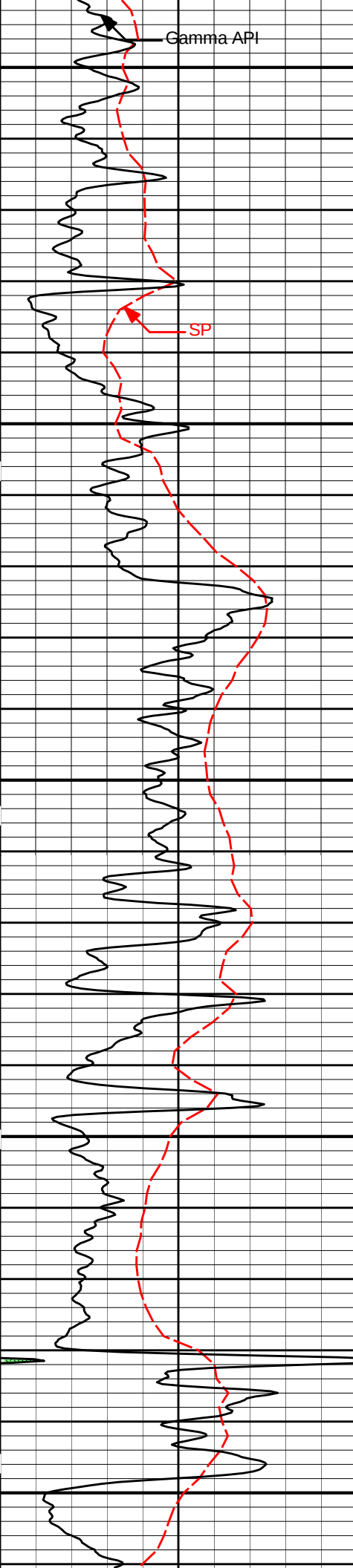
3500

3550

3600

3650





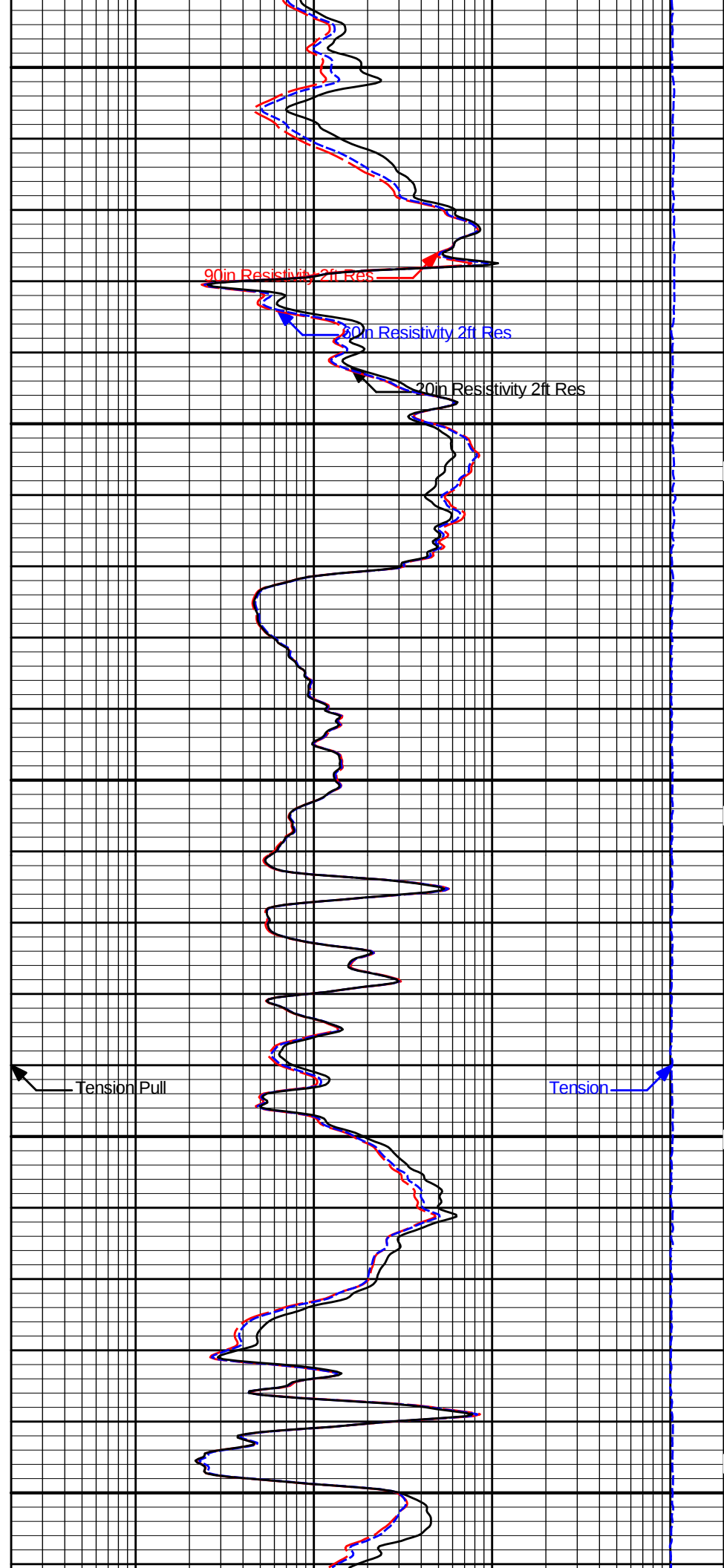
3700

3750

3800

3850

3900



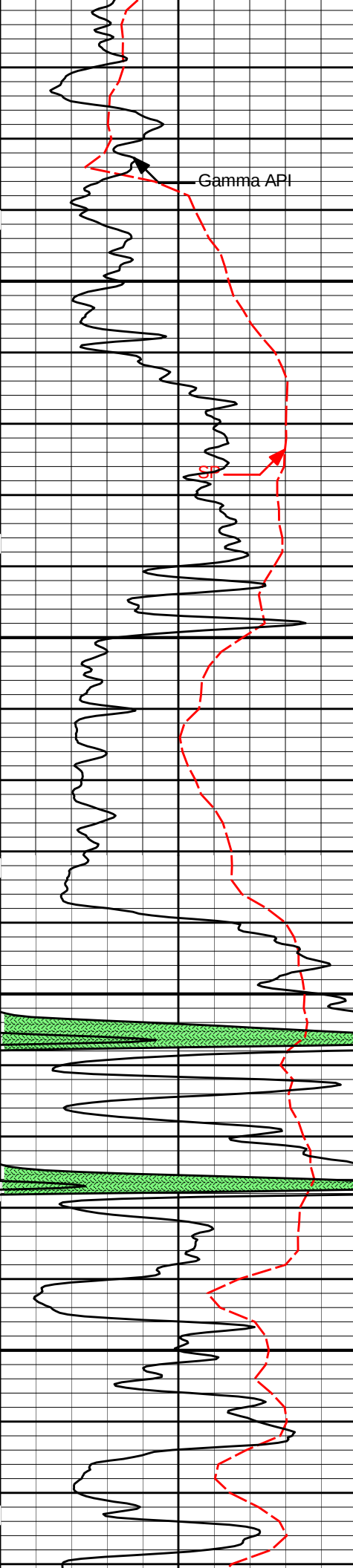
90in Resistivity 2ft Res

60in Resistivity 2ft Res

20in Resistivity 2ft Res

Tension Pull

Tension



Gamma API

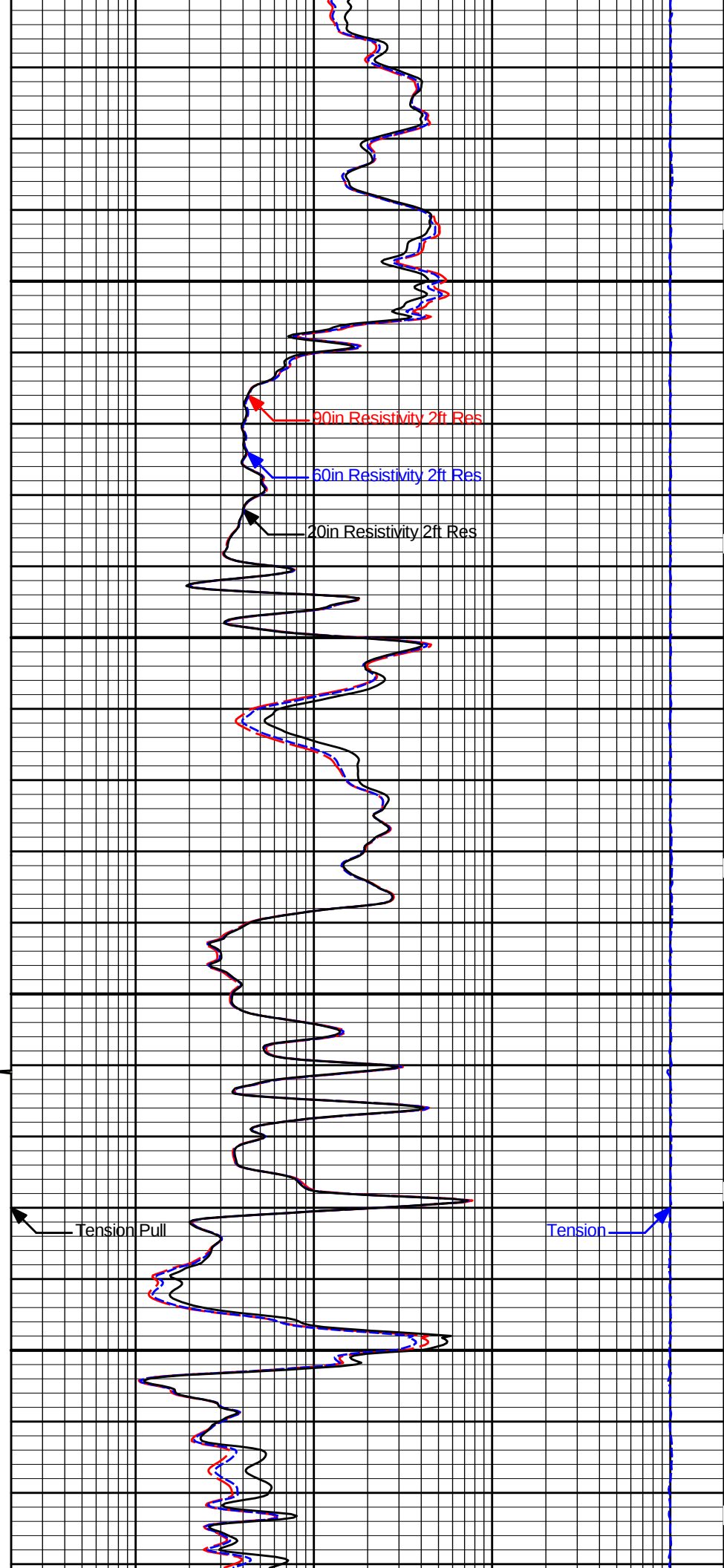
Log BGR

3950

4000

4050

4100



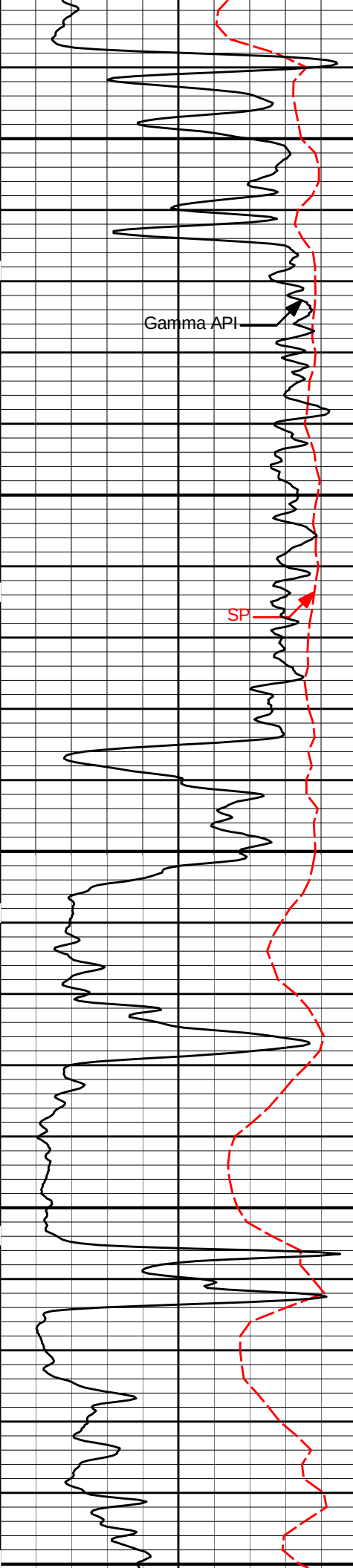
90in Resistivity 2ft Res

60in Resistivity 2ft Res

20in Resistivity 2ft Res

Tension Pull

Tension



4150

Gamma API

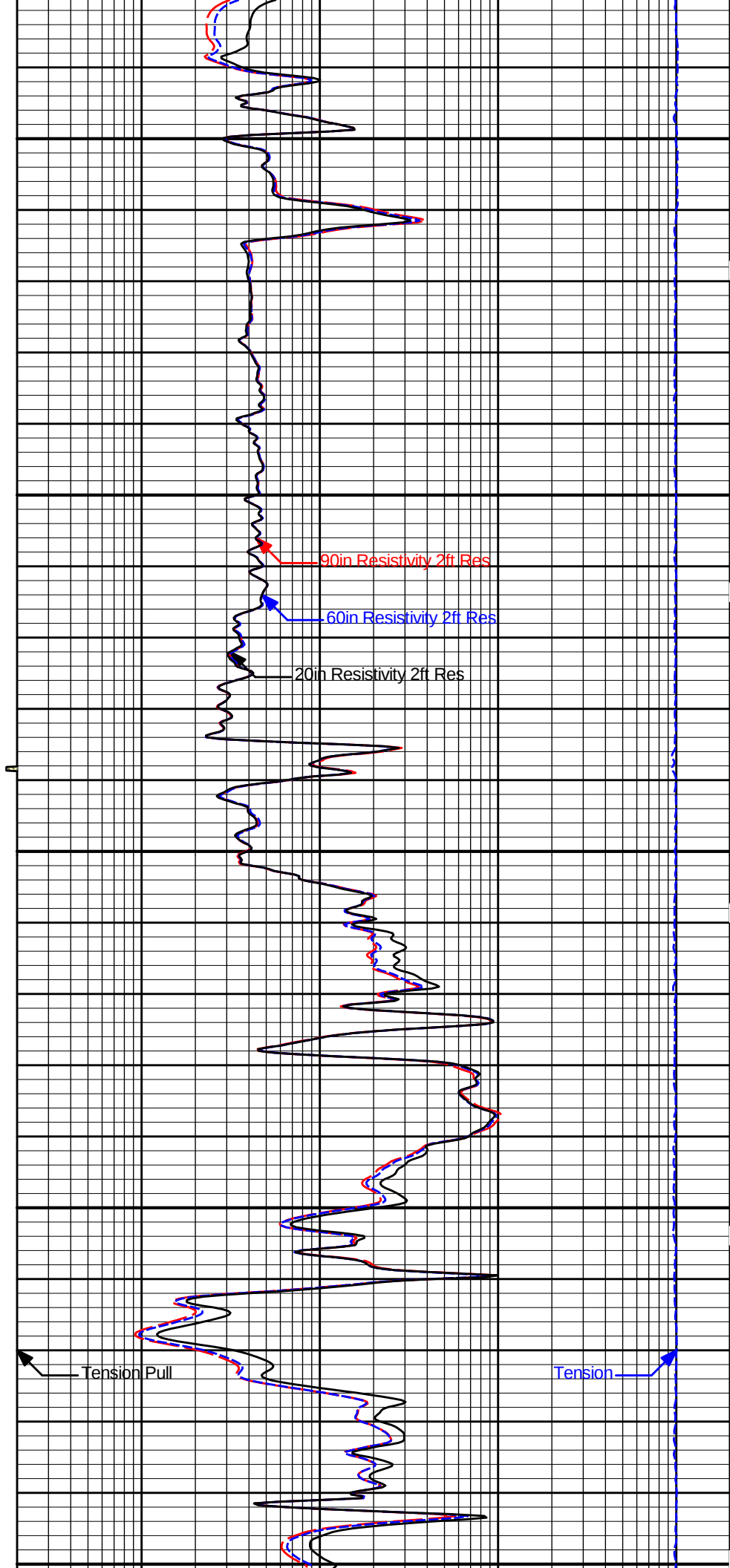
4200

SP

4250

4300

4350



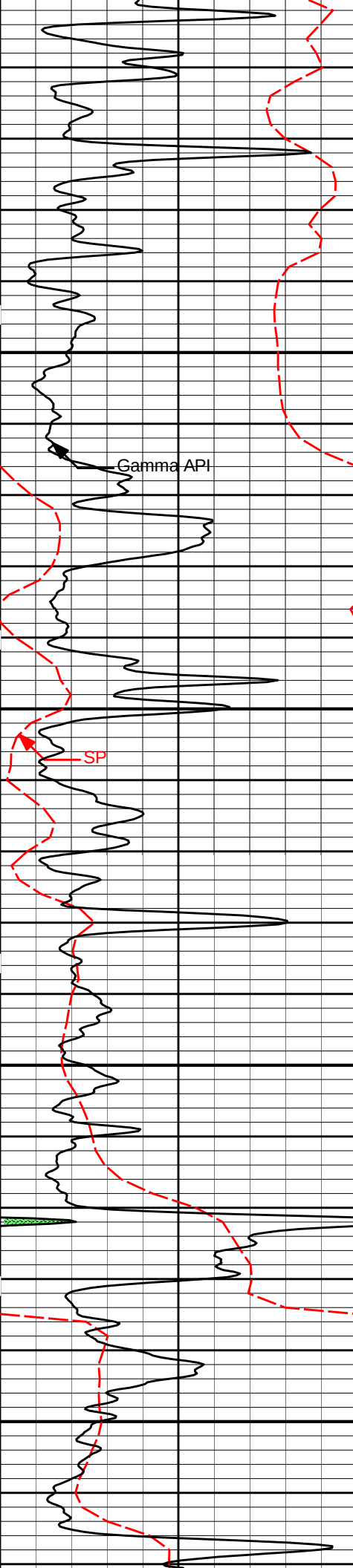
90in Resistivity 2ft Res

60in Resistivity 2ft Res

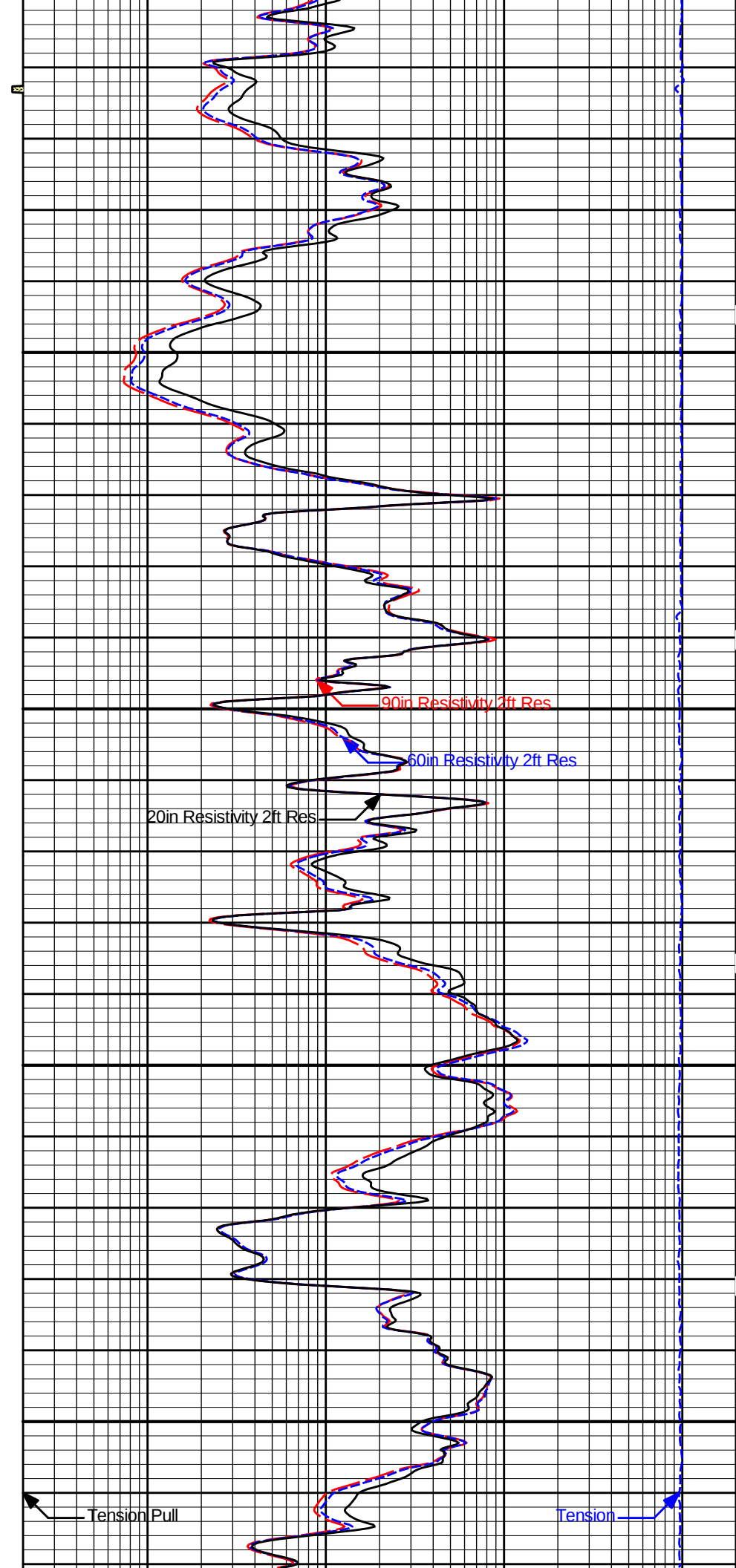
20in Resistivity 2ft Res

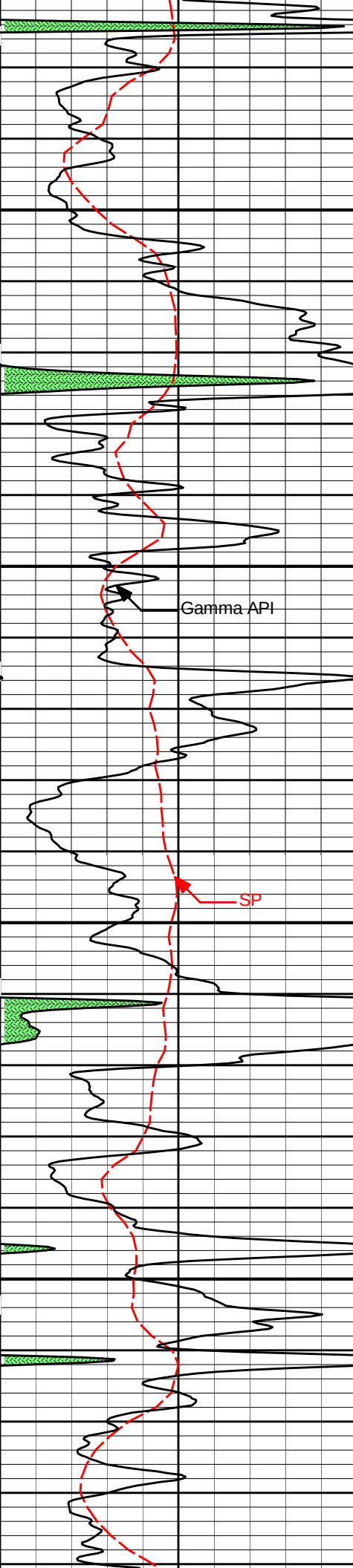
Tension Pull

Tension



4430
4440
4450
4500
4550



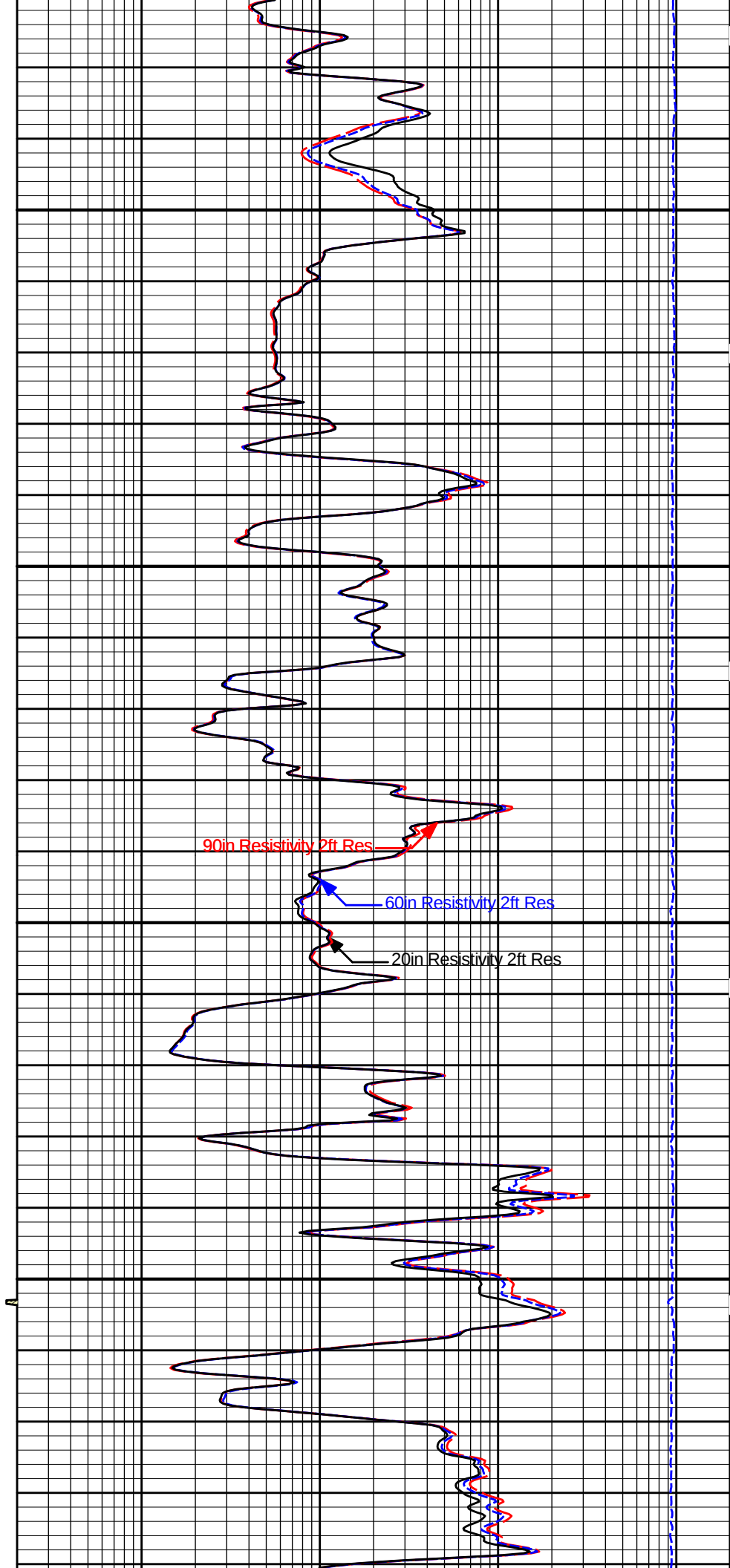


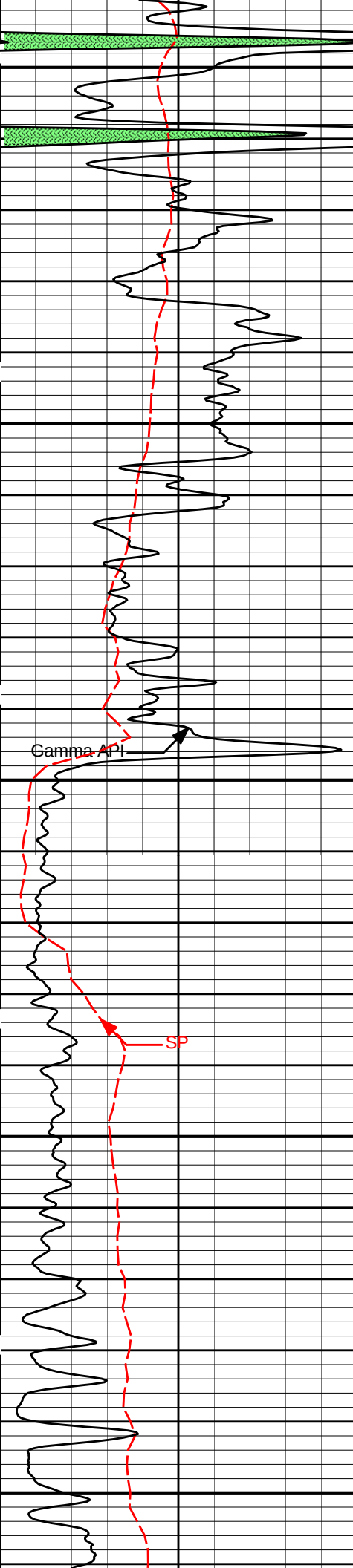
4600

4650

4700

4750





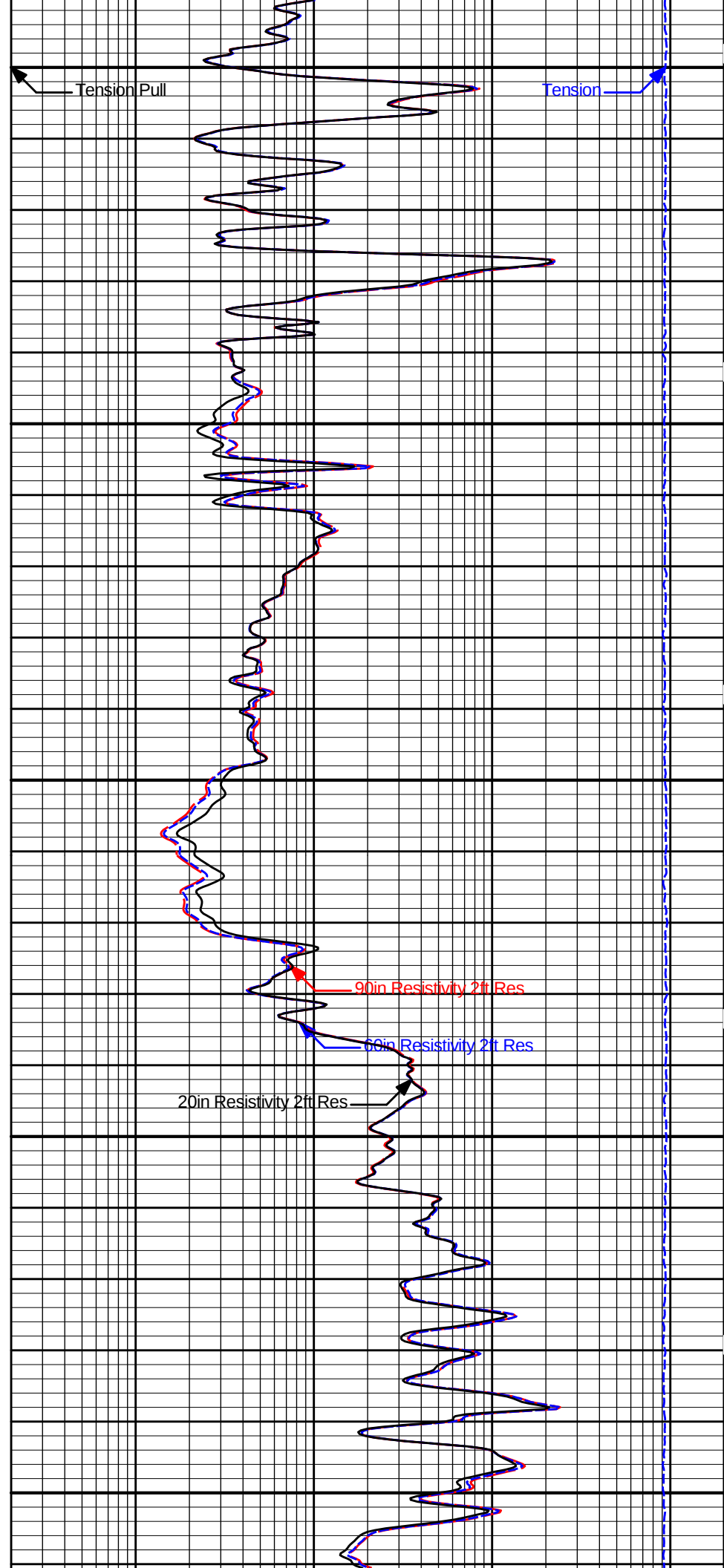
4800

4850

4900

4950

5000



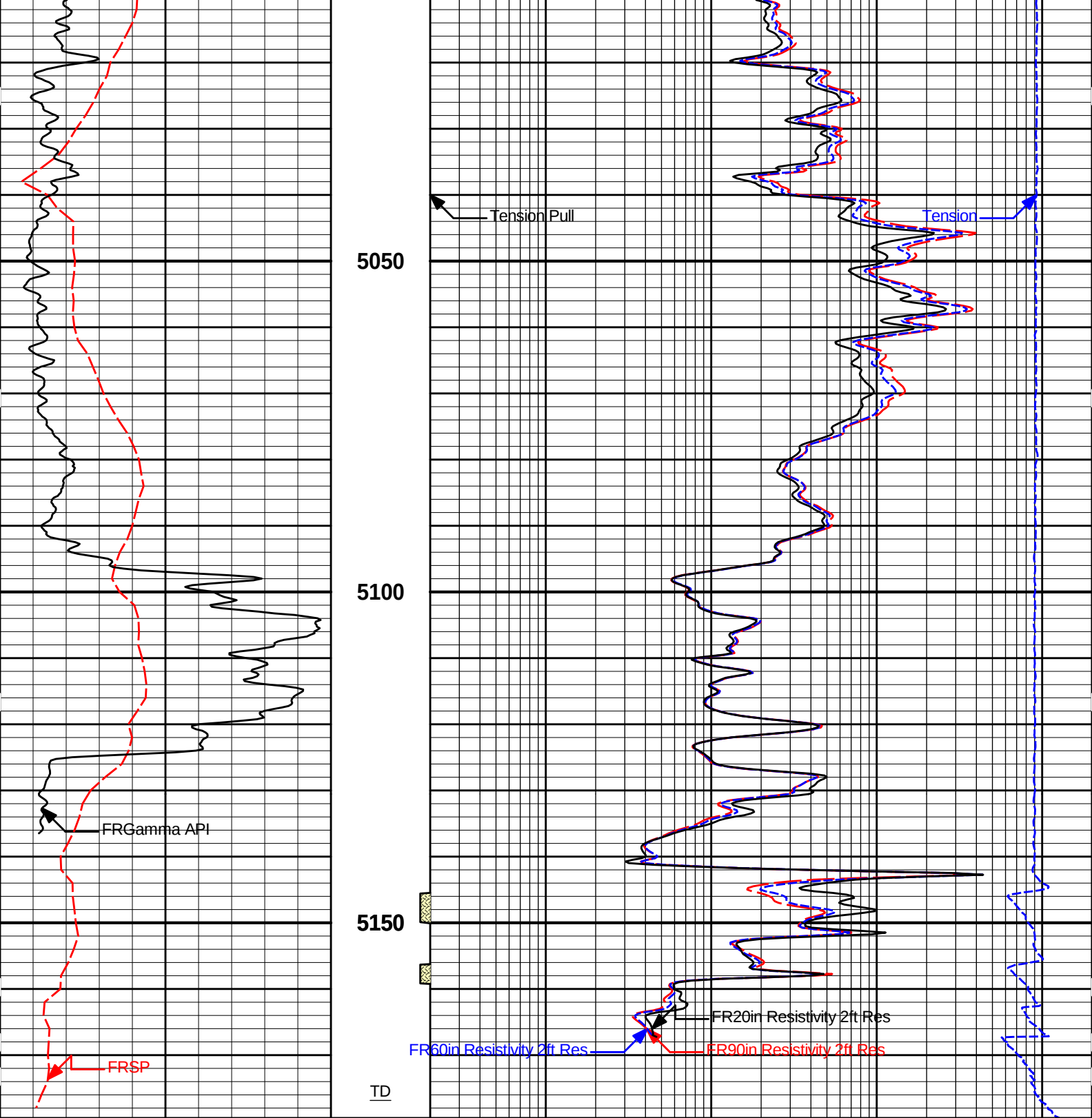
Tension Pull

Tension

90in Resistivity 2ft Res

60in Resistivity 2ft Res

20in Resistivity 2ft Res



Gamma API		150	1 : 240 ft	15K		Tension	0
api						pounds	
SP							
-] 20 mV [+]			Tension Pull 10	0.2	20in Resistivity 2ft Res	2000	
					ohm-metre		
				0.2	60in Resistivity 2ft Res	2000	
					ohm-metre		
				0.2	90in Resistivity 2ft Res	2000	
					ohm-metre		

HALLIBURTON

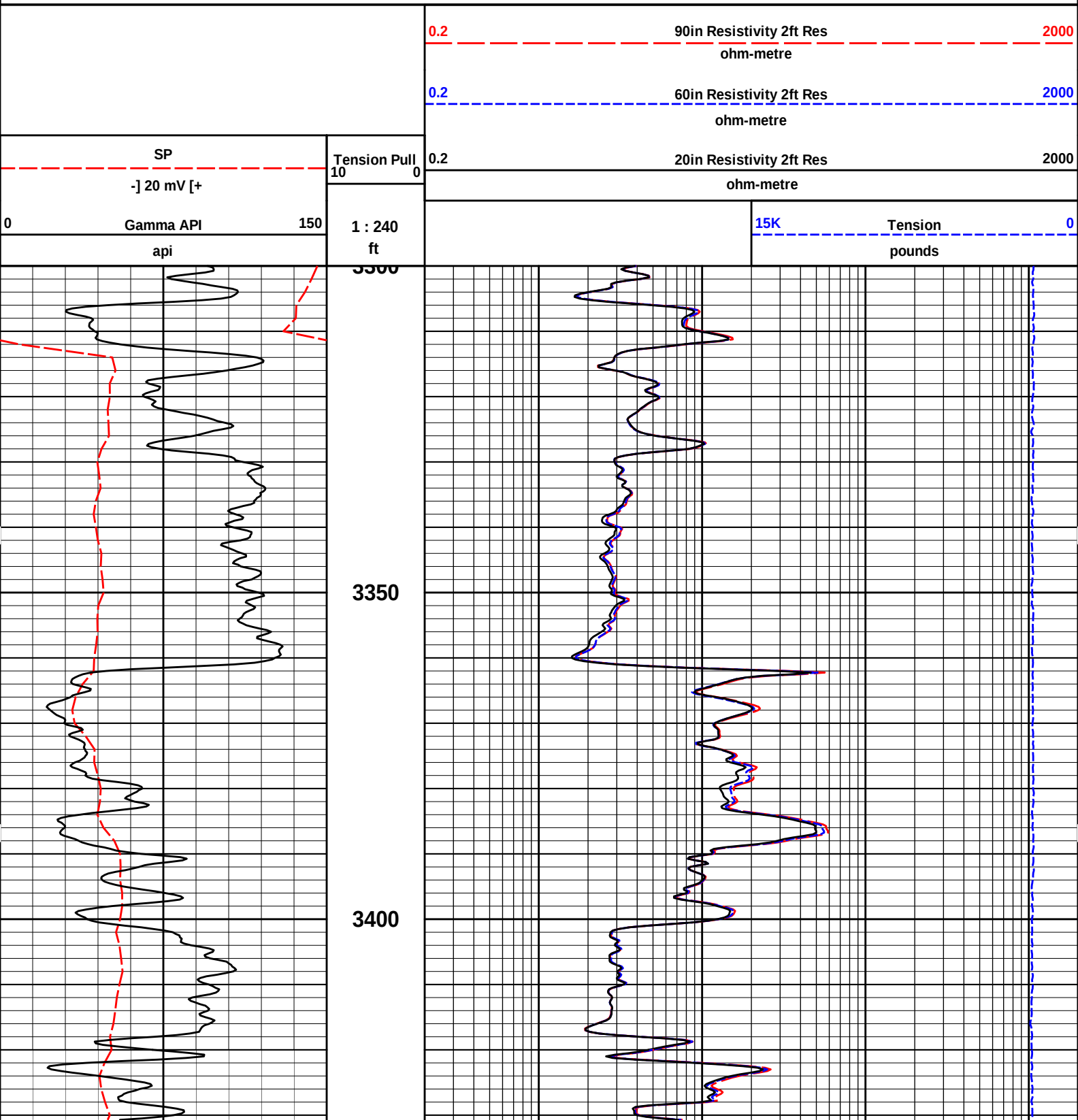
Plot Time: 08-May-12 23:43:29
Plot Range: 550 ft to 5179.5 ft
Data: {ActiveWell}\Well Based\RESIST MAIN\

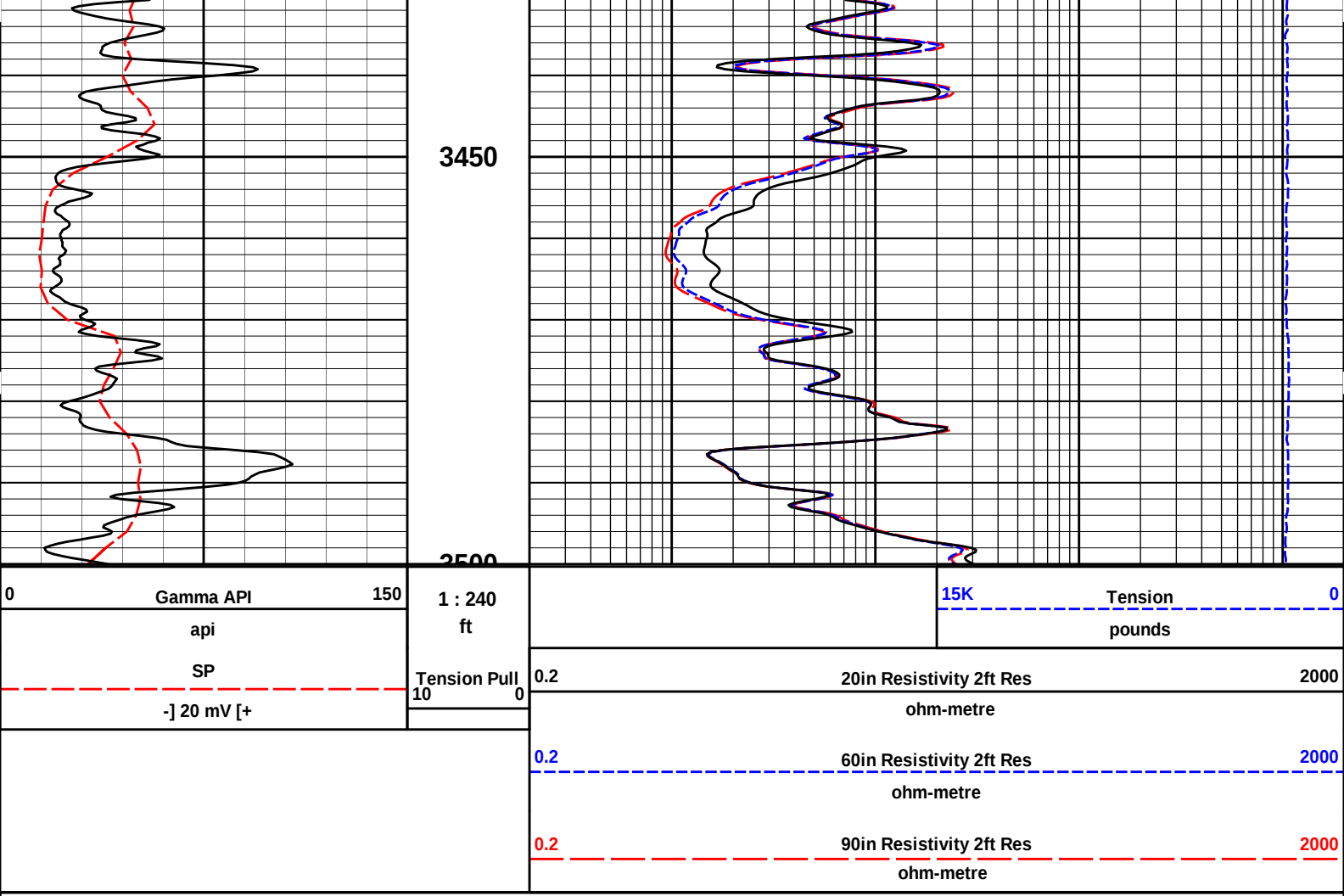
5 INCH MAIN LOG

HALLIBURTON

Plot Time: 08-May-12 23:43:29
Plot Range: 3300 ft to 3500 ft
Data: CANTON_C_3_20\Well Based\RESIST RPT\
Plot File: \\-LOCAL-ICANTON_C_3_20\0002 RED_BLACK SDL\RESISTIVITY\1_ACRT_5_rptx

REPEAT SECTION





HALLIBURTON

Plot Time: 08-May-12 23:43:31
Plot Range: 3300 ft to 3500 ft
Data: CANTON_C_3_20\Well Based\RESIST RPT\
Plot File: \\-LOCAL-\\CANTON_C_3_20\0002 RED_BLACK_SDL\RESISTIVITY\1_ACRT_5_rptx

REPEAT SECTION

HALLIBURTON

PARAMETERS REPORT

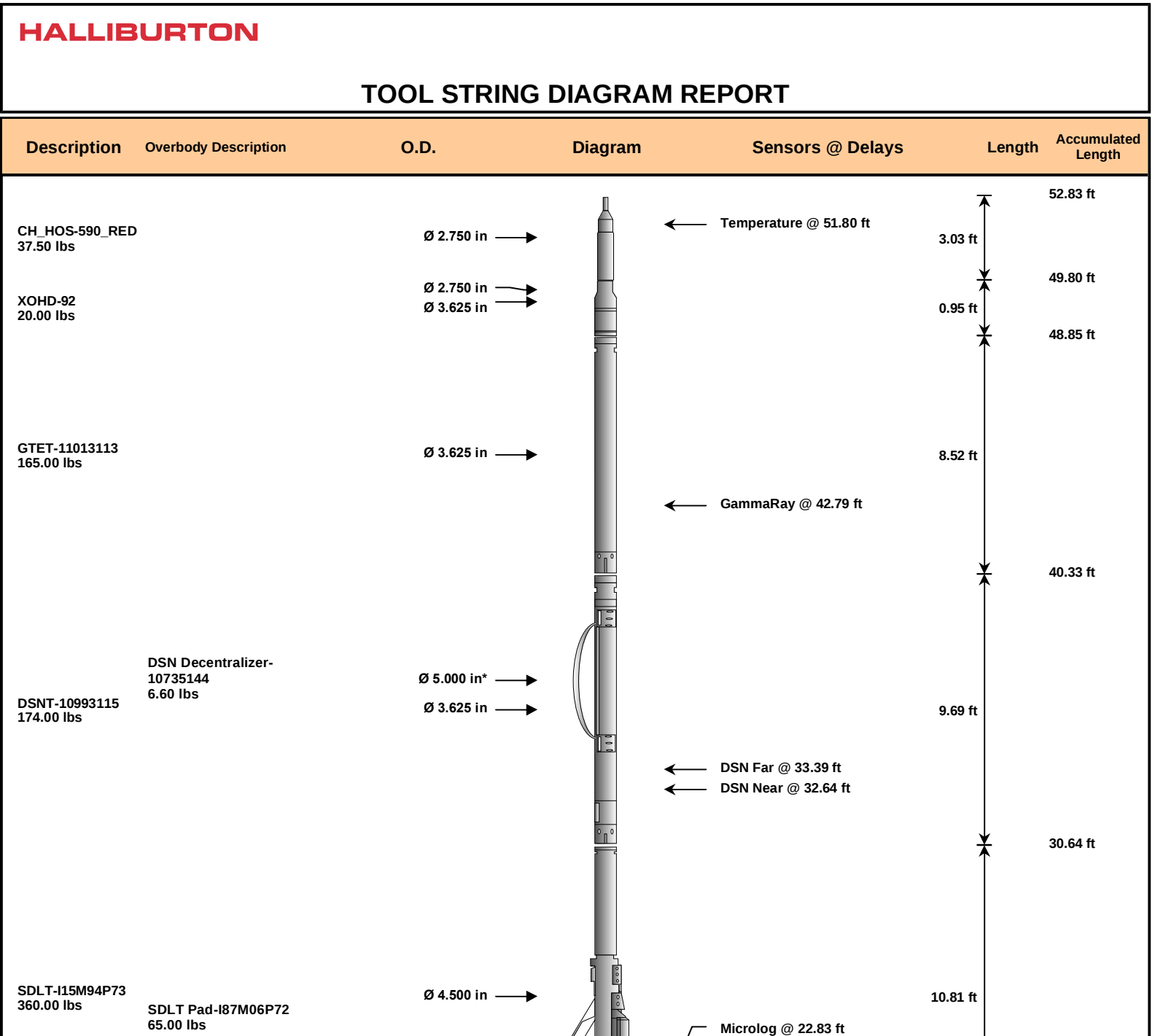
Depth (ft))	Tool Name	Mnemonic	Description	Value	Units
TOP					
	SHARED	BS	Bit Size	7.875	in
	SHARED	UBS	Use Bit Size instead of Caliper for all applications.	No	
	SHARED	MDBS	Mud Base	Water	
	SHARED	MDWT	Borehole Fluid Weight	9.300	ppg
	SHARED	WAGT	Weighting Agent	Natural	
	SHARED	BSAL	Borehole salinity	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	1.200	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	ST	Surface Temperature	75.0	degF

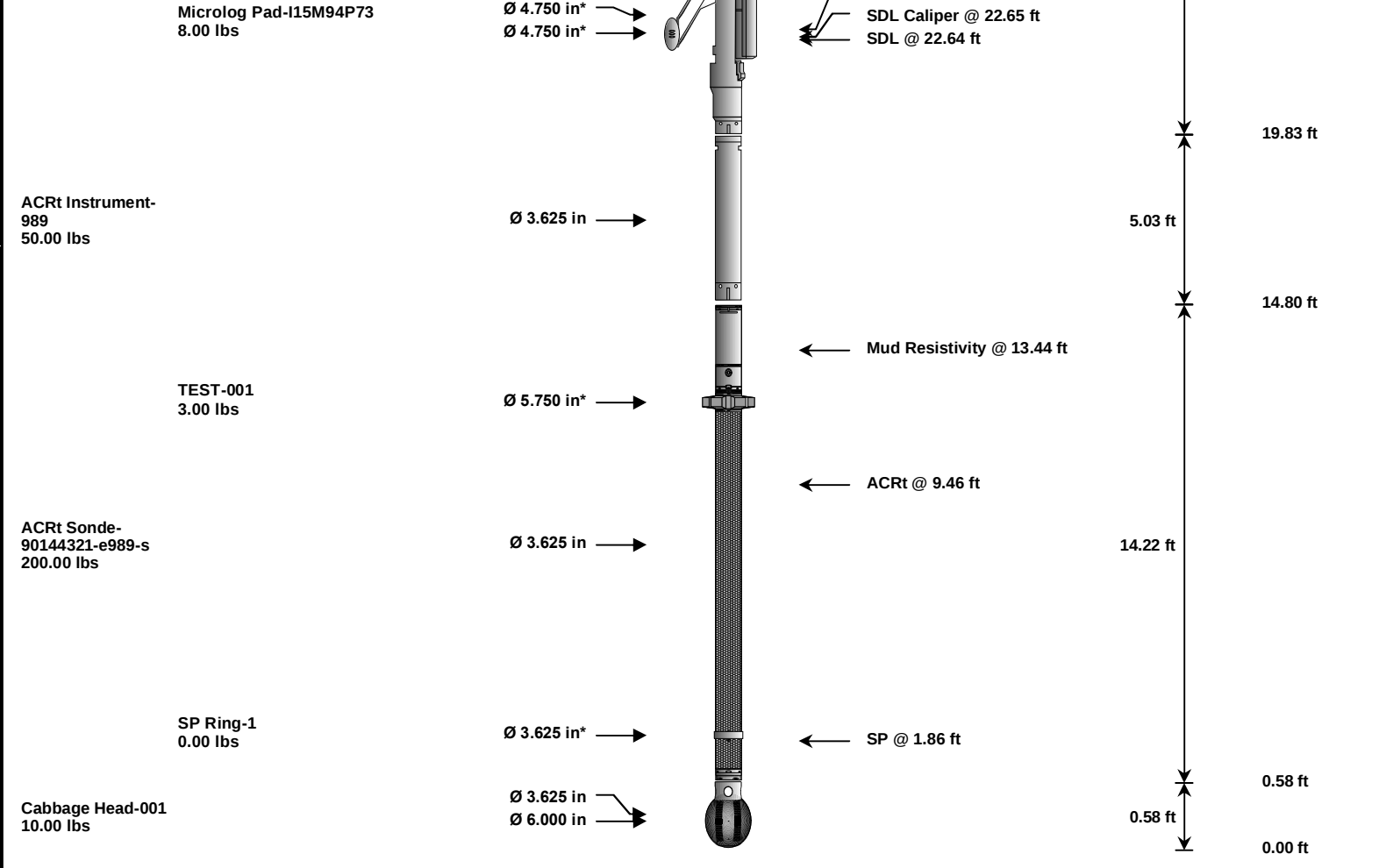
SHARED	TD	Total Well Depth	5180.00	ft
SHARED	BHT	Bottom Hole Temperature	200.0	degF
SHARED	SVTM	Navigation and Survey Master Tool	NONE	
SHARED	AZTM	High Res Z Accelerometer Master Tool	GTET	
SHARED	TEMM	Temperature Master Tool	NONE	
SHARED	BHSM	Borehole Size Master Tool	NONE	
Rwa / CrossPlot	XPOK	Process 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	
GTET	GROK	Process Gamma Ray?	Yes	
GTET	GRSO	Gamma Tool Standoff	0.000	in
GTET	GEOK	Process Gamma Ray EVR?	No	
GTET	TPOS	Tool Position for Gamma Ray Tools.	Eccentered	
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	DNTP	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	
SDLT	CLOK	Process Caliper 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
Microlog Pad	MLOK	Process MicroLog Outputs?	Yes	
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	RMIN	Maximum Resistivity for MAP	200.00	ohmm
ACRt Sonde	THQY	Threshold Quality	0.50	

BOTTOM

CALIBRATION REPORT									
NATURAL GAMMA RAY TOOL SHOP CALIBRATION									
Tool Name:		GTET - 11013113				Reference Calibration Date:		17-Nov-11 17:56:53	
Engineer:		RAMIRO GONZALEZ				Calibration Date:		27-Apr-12 07:01:57	
Software Version:		WL INSITE R3.4.4 (Build 2)				Calibration Version:		1	
Calibrator Source S/N: TB 150									
Calibrator API Reference:225.00 api									
Equivalent Calibrator API Reference:228.9 api									
		Measurement		Measured		Calibrated		Units	
		Background		15.3		15.4		api	
		Background + Calibrator		242.6		244.4		api	
		Calibrator		227.3		228.9		api	
NATURAL GAMMA RAY TOOL FIELD CALIBRATION									
Tool Name:		GTET - 11013113				Reference Calibration Date:		27-Apr-12 07:01:57	
Engineer:		CORY HANSON				Calibration Date:		08-May-12 18:10:33	
Software Version:		WL INSITE R3.4.4 (Build 2)				Calibration Version:		1	
Calibrator Source S/N: TB 150									
Calibrator API Reference:225.00 api									
Equivalent Calibrator API Reference:228.9 api									
		Field Verification		Shop		Field		Units	
		Background		15.4		32.9		api	
		Background + Calibrator		244.4		253.8		api	
		Calibrator		228.9		220.8		api	
		Shop		Field		Difference		Tolerance	
		228.9		220.8		8.1		+/- 9.00	
ARRAY COMPENSATED TRUE RESISTIVITY SHOP CALIBRATION									
Tool Name:		ACRt Sonde - 90144321-e989-s				Reference Calibration Date:		12-Jan-12 10:56:16	
Engineer:		RAMIRO GONZALEZ				Calibration Date:		12-Jan-12 11:04:57	
Software Version:		WL INSITE R3.4.4 (Build 2)				Calibration Version:		1	
TYPICAL GAIN RANGE									
Subarray	R12KHz			R36KHz			R72KHz		
	Lower	(mmho/m)	Upper	Lower	(mmho/m)	Upper	Lower	(mmho/m)	Upper
A1 (80")	0.95	1.0033	1.05	0.95	1.0077	1.05	0.95	1.0058	1.05
A2 (50")	0.95	1.0238	1.05	0.95	1.0269	1.05	0.95	1.0271	1.05
A3 (29")	0.95	1.0066	1.05	0.95	1.0090	1.05	0.95	1.0078	1.05
A4 (17")	0.95	0.9914	1.05	0.95	0.9920	1.05	0.95	0.9923	1.05
A5 (10")	N/A	N/A	N/A	0.95	0.9919	1.05	0.95	0.9921	1.05
A6 (6")	N/A	N/A	N/A	0.95	0.9756	1.05	0.95	0.9755	1.05
TYPICAL SONDE OFFSET RANGE									
Subarray	R12KHz			R36KHz			R72KHz		
	Lower	(mmho/m)	Upper	Lower	(mmho/m)	Upper	Lower	(mmho/m)	Upper
A1 (80")	-5	-0.287	2	-6	-3.309	-2	-8	-5.131	-2
A2 (50")	-7	-2.089	-1	-6	-3.899	-2	-7	-4.172	-2
A3 (29")	-27	-11.734	-9	-9	-2.933	-3	-7	-3.300	-1
A4 (17")	-180	-101.170	-60	-45	-31.023	-15	-39	-24.228	-13
A5 (10")	N/A	N/A	N/A	-150	-89.809	-50	-80	-42.698	-10
A6 (6")	N/A	N/A	N/A	-155	-91.881	-53	-85	-43.816	-10

A6 (6")	N/A	N/A	N/A	175	319.021	525	90	162.910	270
TRANSMITTER CURRENT GAIN					R-MUD VERIFICATION				
Signal	Lower	R	Upper		Signal	Lower (ohm-m)	Measured (ohm-m)	Upper (ohm-m)	
12K	0.6	0.8952	1.3		Mud Cell	0.95	1.001	1.05	
36K	1.0	1.4025	2.0						
72K	1.0	1.6530	2.0						
CALIBRATION SUMMARY									
Sensor	Shop	Field	Post	Difference	Tolerance	Units			
GTET-11013113									
Gamma Ray Calibrator	228.9	220.8	-----	8.1	+/- 9.00	api			
ACRt Sonde-90144321-e989-s									
Mud Cell	1.001	-----	-----	0.000	-----	ohm-m			
Data: CANTON_C_3_20\0002 RED_BLACK_SDL\003 08-May-12 20:02 Up @5180.5f							Date: 08-May-12 22:51:58		





Mnemonic		Tool Name	Serial Number	Weight (lbs)	Length (ft)	Accumulated Length (ft)	Max.Log. Speed (fpm)
CH_HOS	Hostile Cable Head with Load Cell		590_RED	37.50	3.03	49.80	300.00
XOHD	Hostile to Dits Cross Over		92	20.00	0.95	48.85	300.00
GTET	Gamma Telemetry Tool		11013113	165.00	8.52	40.33	60.00
DSNT	Dual Spaced Neutron		10993115	174.00	9.69	30.64	60.00
DCNT	DSN Decentralizer		10735144	6.60	5.13	* 33.97	300.00
SDLT	Spectral Density Tool		I15M94P73	360.00	10.81	19.83	60.00
SDLP	Density Insite Pad		I87M06P72	65.00	2.55	* 22.04	60.00
MICP	Microlog Pad		I15M94P73	8.00	1.00	* 22.33	60.00
ACRT	Array Compensated True Resistivity Instrument Section		989	50.00	5.03	14.80	300.00
ACRT	Array Compensated True Resistivity		90144321-e989-s	200.00	14.22	0.58	300.00
SP	SP Ring		1	0.00	0.25	* 1.86	300.00
SO	STANDOFF		001	3.00	0.59	* 11.58	100.00
CBHD	Cabbage Head		001	10.00	0.58	0.00	300.00
Total				1,099.10	52.83		
* Not included in Total Length and Length Accumulation.							
Data: CANTON_C_3_20\0002 RED_BLACK_SDL\001 08-May-12 19:22 Up @712.5f						Date: 08-May-12 23:03:13	

COMPANY	HERMAN L LOEB
WELL	CANTON C #3-20
FIELD	GLICK
COUNTY	KIOWA
STATE	KANSAS

HALLIBURTON

ARRAY COMPENSATED
TRUE RESISTIVITY
LOG

