

ARRAY COMPENSATED
TRUE RESISTIVITY
LOG

COMPANY	HERMAN L. LOEB, LLC.		
WELL	WHITE 2-4		
FIELD/BLOCK	GREENSBURG SW		
COUNTY	KIOWA	STATE KANSAS	
API No.	15-097-21804-00-00	Other Services: DSN / SDL MICROLOG ACRT MRIL	
Location	(SHL) 2300' FSL & 1830' FWL SE-NW-NE-SW		
Sect. 4	Twp. 28S	Rge. 18W	

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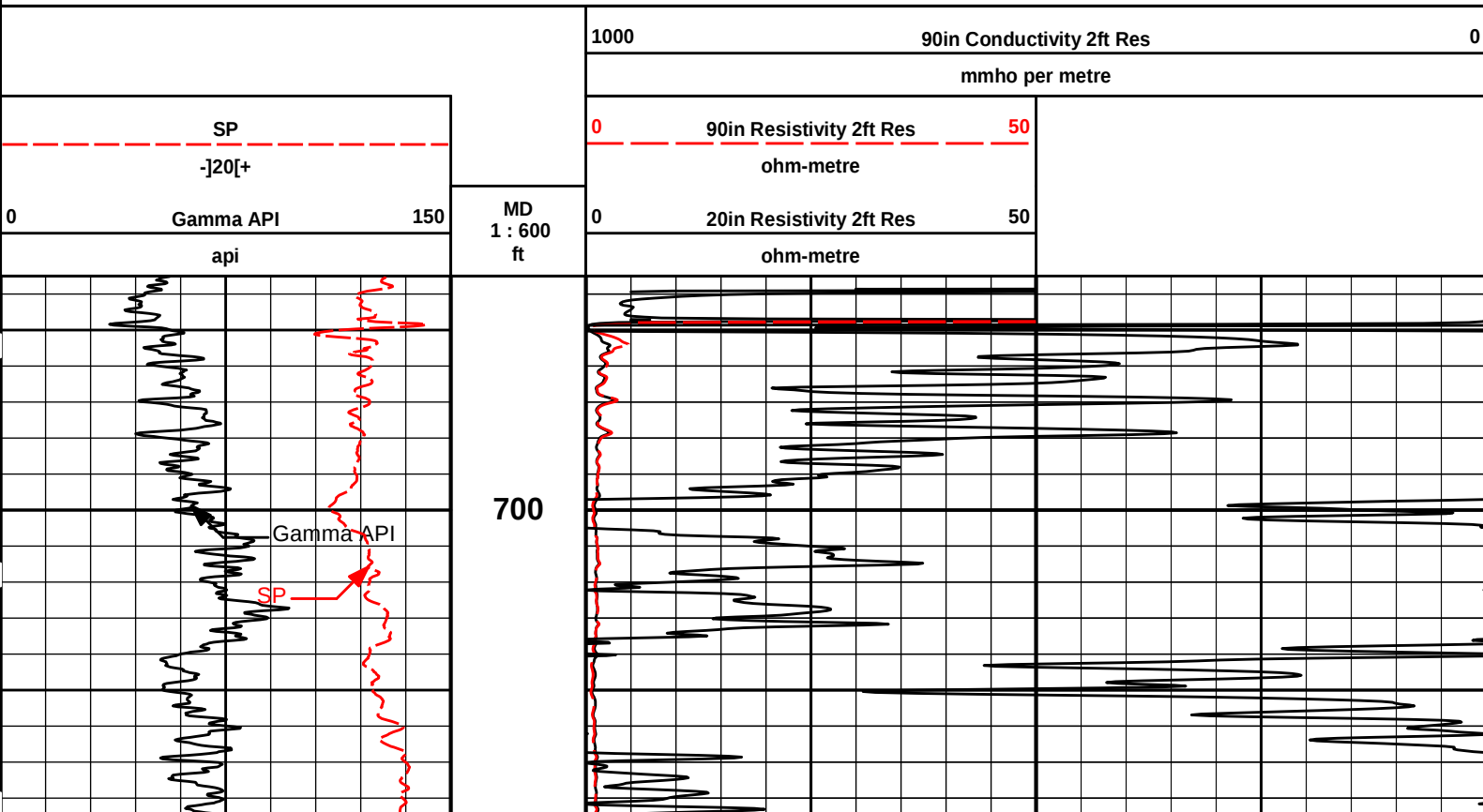
Service Ticket No.: 901626122						API Serial No.: 15-097-21804-00-00						PGM Version: WL INSITE R4.2.0 (Build 2)					
CHANGE IN MUD TYPE OR ADDITIONAL SAMPLE						RESISTIVITY SCALE CHANGES											
Date	Sample No.					Type Log	Depth	Scale Up Hole		Scale Down Hole							
Depth-Driller																	
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	N/A	1.5" S.O.								
Rmc @ Meas. Temp.		@		@			10800784										
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.	10811258		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.	T-102		Spacing			Log Type			Log Type								
Type	SCINT					Source Type			Source Type								
Length	8"		LSA [Y/N]			Serial No.			Serial No.								
Distance to Source	N/A		FWDA [Y/N]			Strength			Strength								

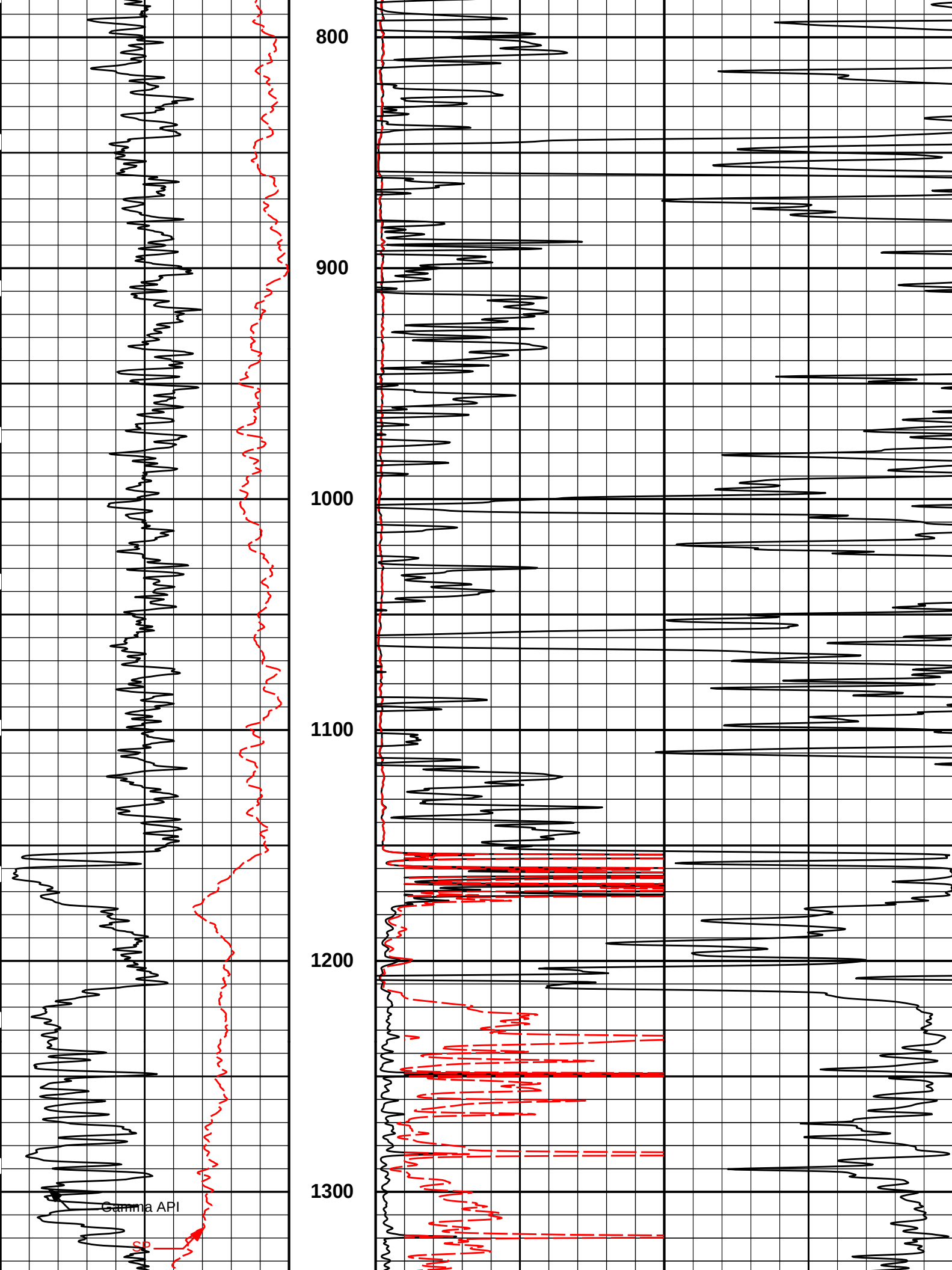
GENERAL				GAMMA		ACOUSTIC			DENSITY			NEUTRON		
Run	Depth		Speed	Scale		Scale		Matrix	Scale		Matrix	Scale		Matrix
No.	From	To	ft/min	L	R	L	R		L	R		L	R	
ONE	TD	CSG	REC	0	150									
DIRECTIONAL INFORMATION														
Maximum Deviation @								KOP @						
Remarks: ANNULAR HOLE VOLUME CALCULATED FOR 5.5 INCH CASING.														
CHLORIDES REPORTED AT 8000 ppm.														
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.														
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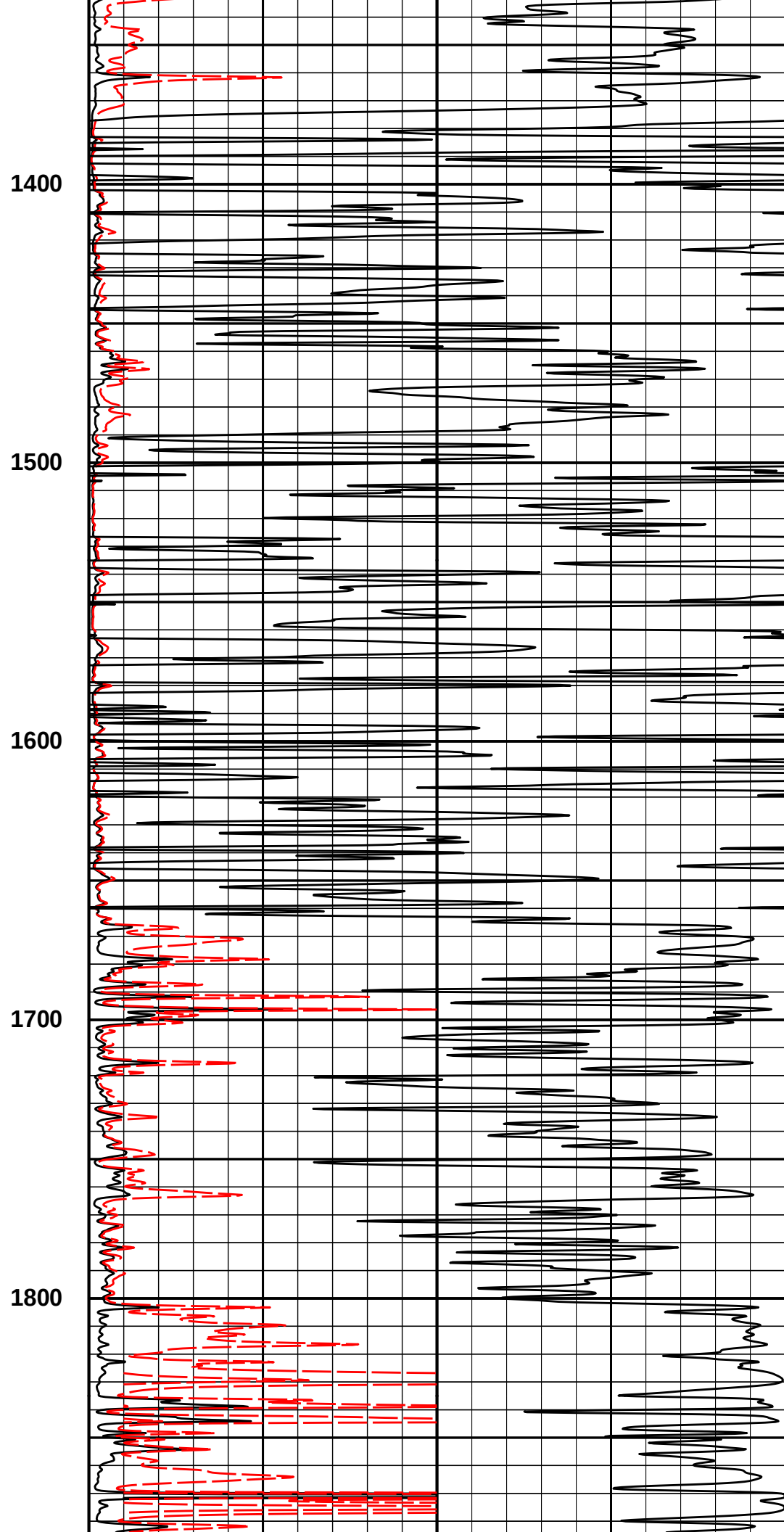
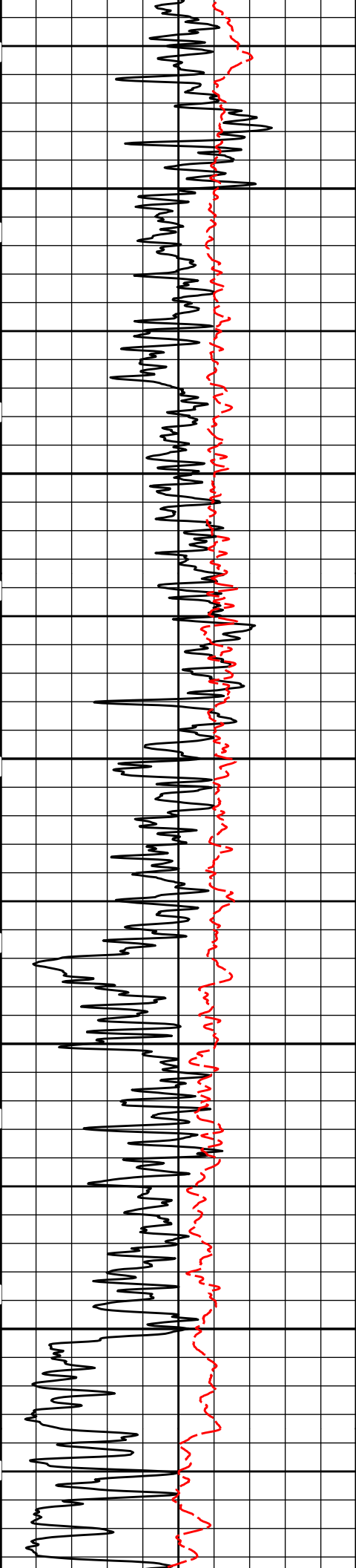
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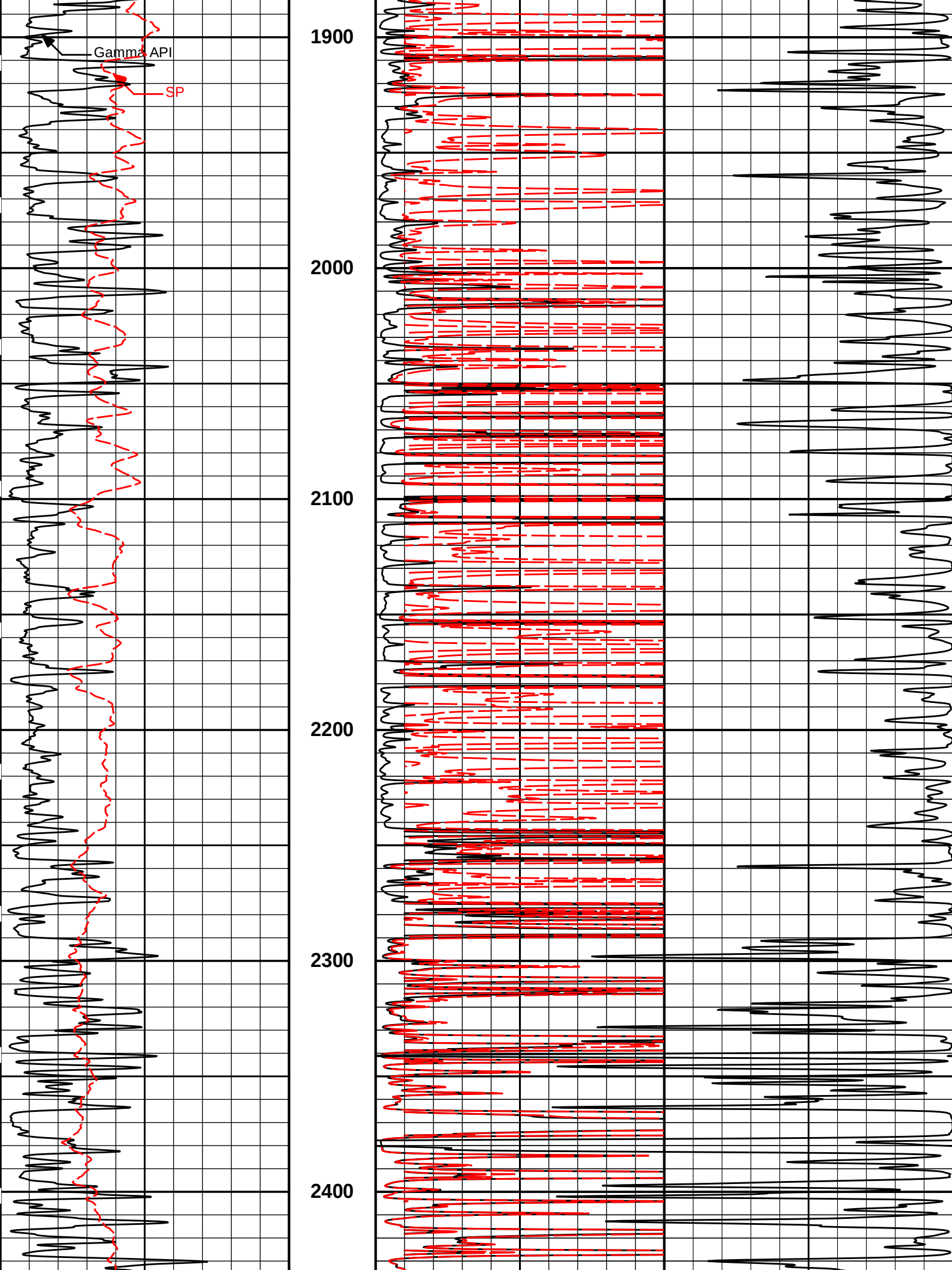
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Plot Range: 635 ft to 4921.92 ft
Data: WHITE_2-4\Well Based\R1 ACRT CASING\
Plot File: \\LOCAL-1\WHITE_2-4\Well Based\ACRT\ACRT_2_lib

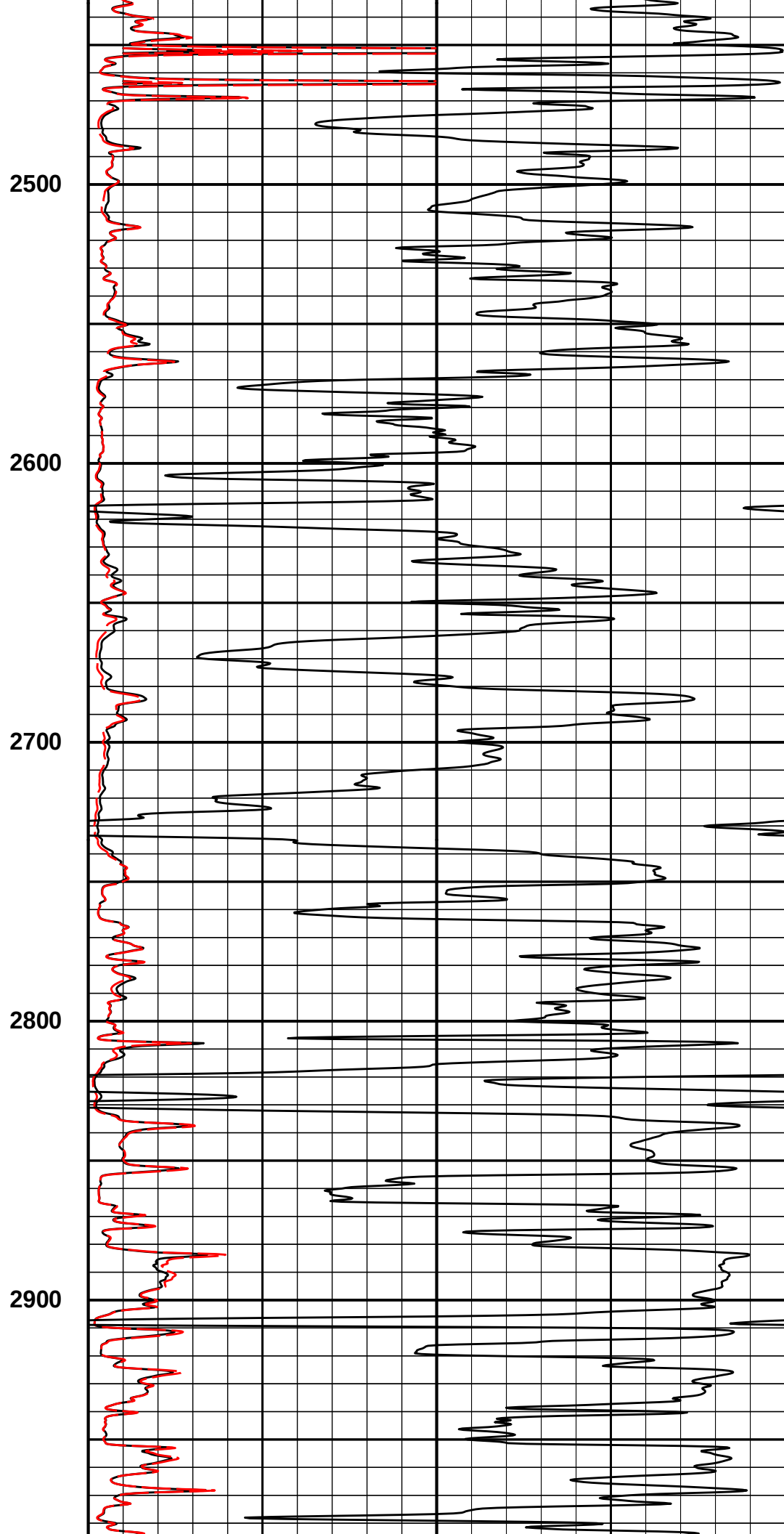
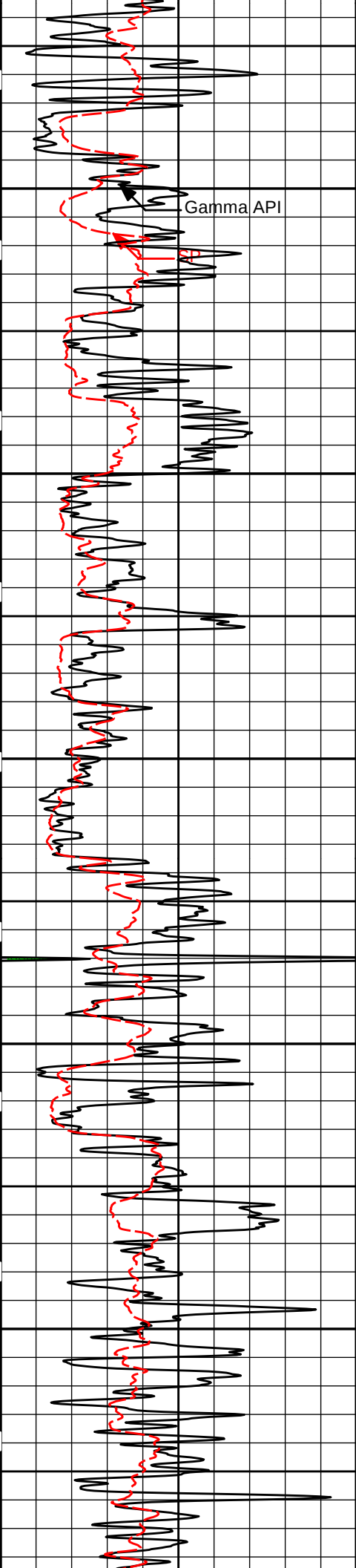
2 INCH MAIN LOG

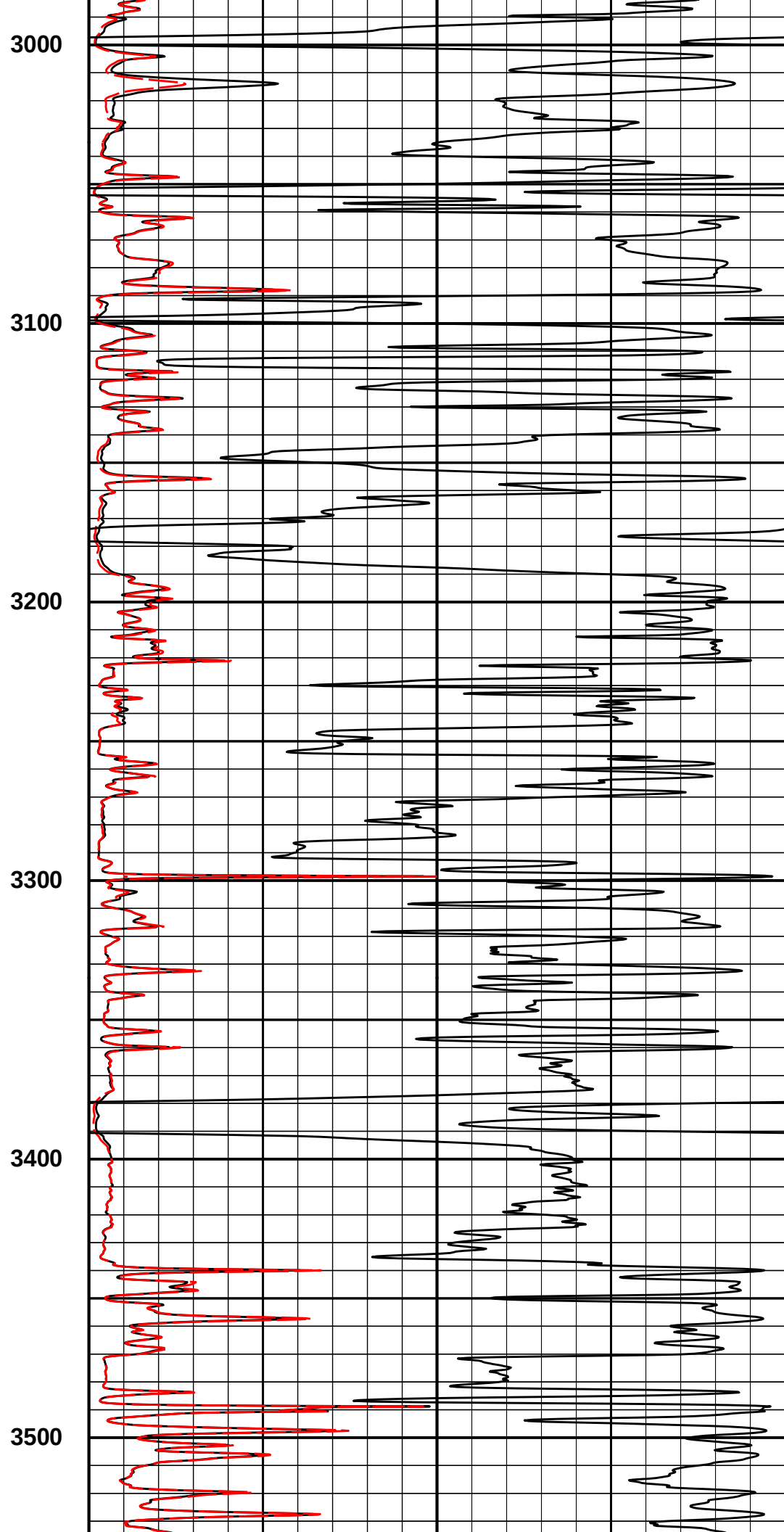
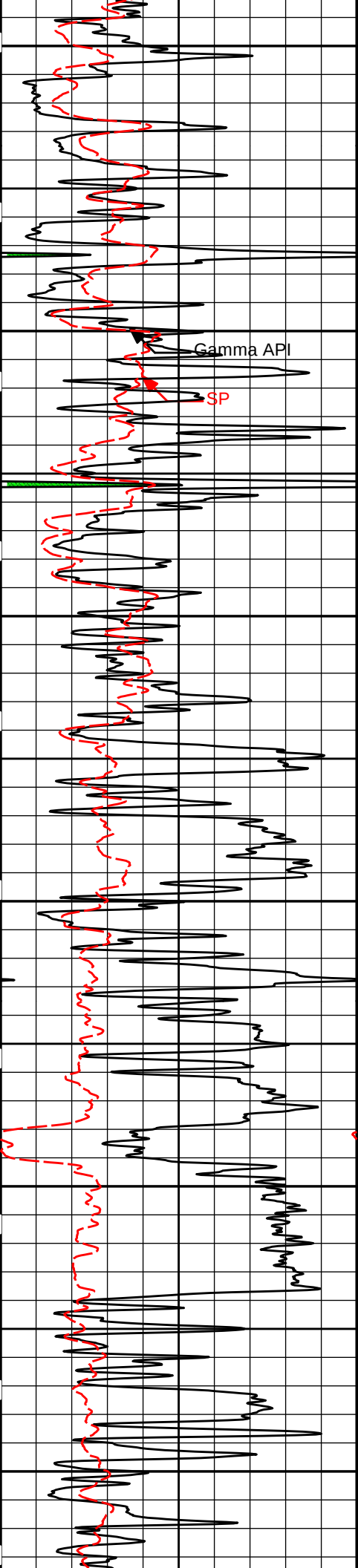


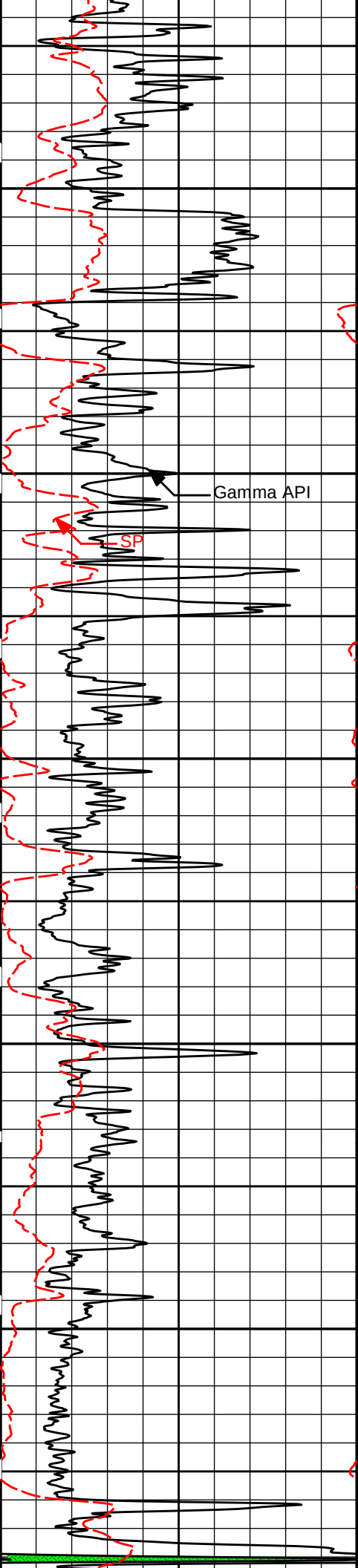












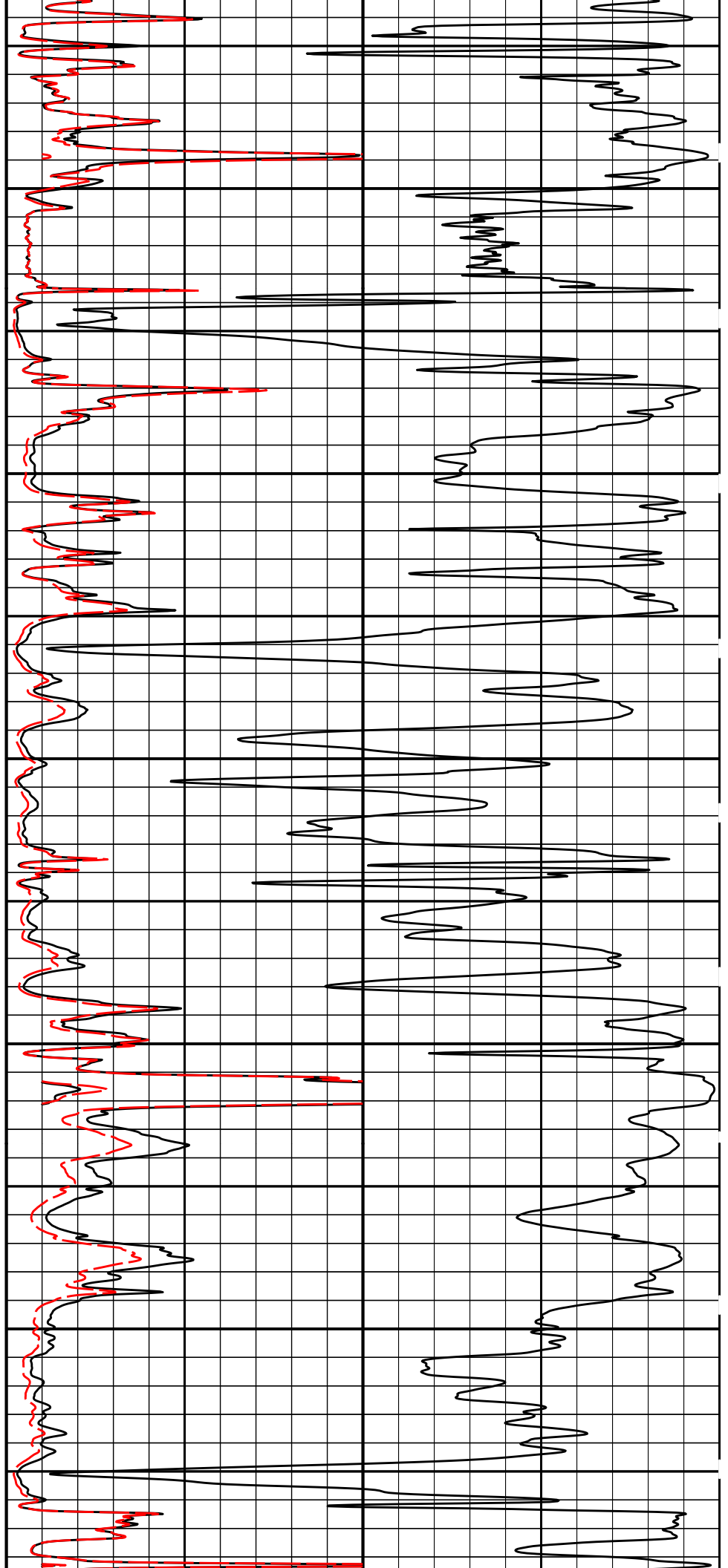
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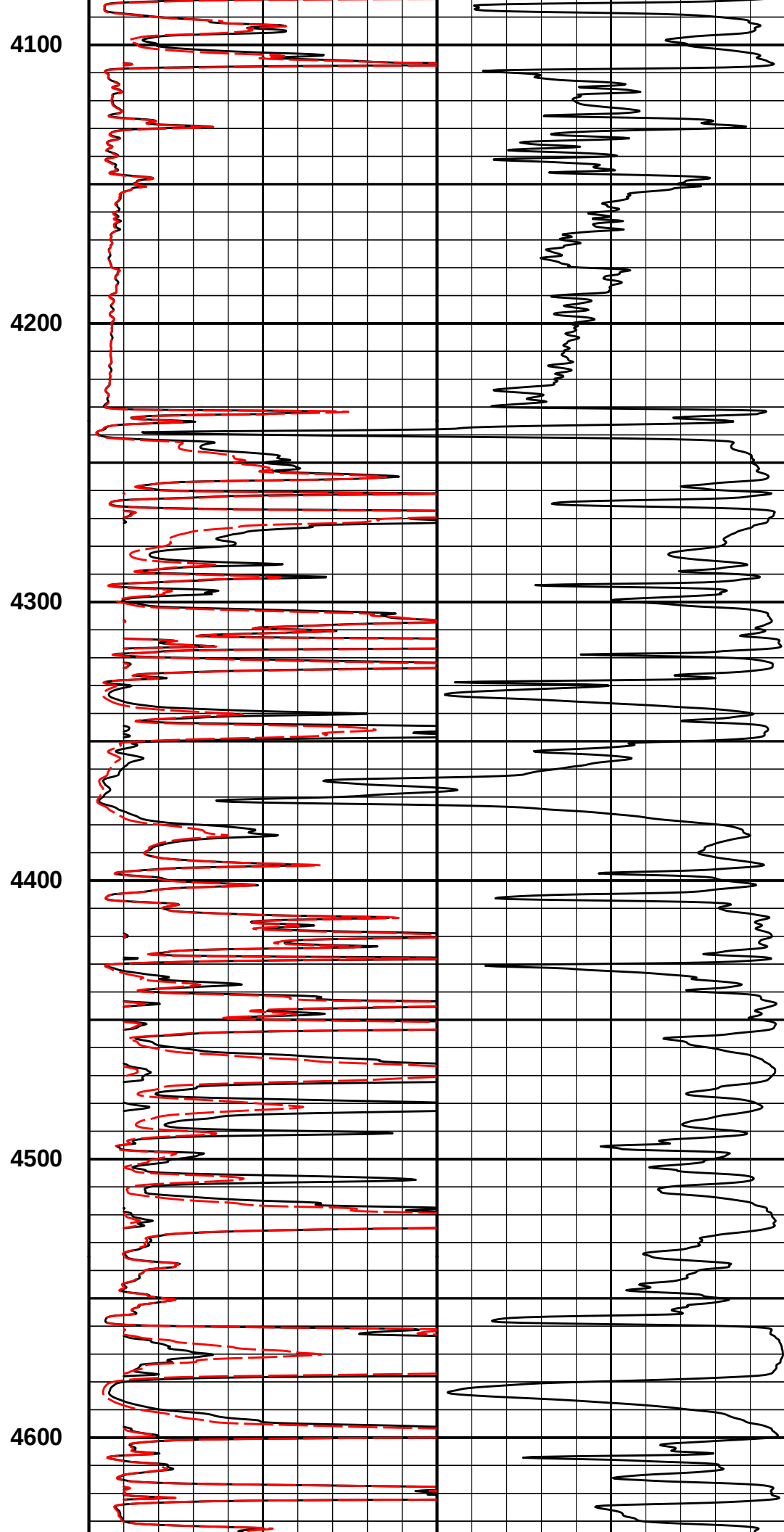
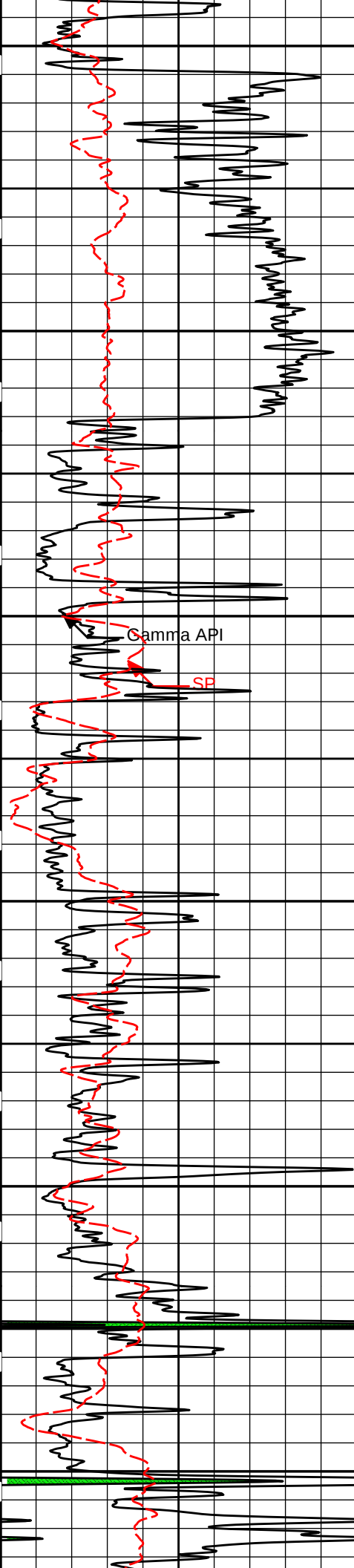
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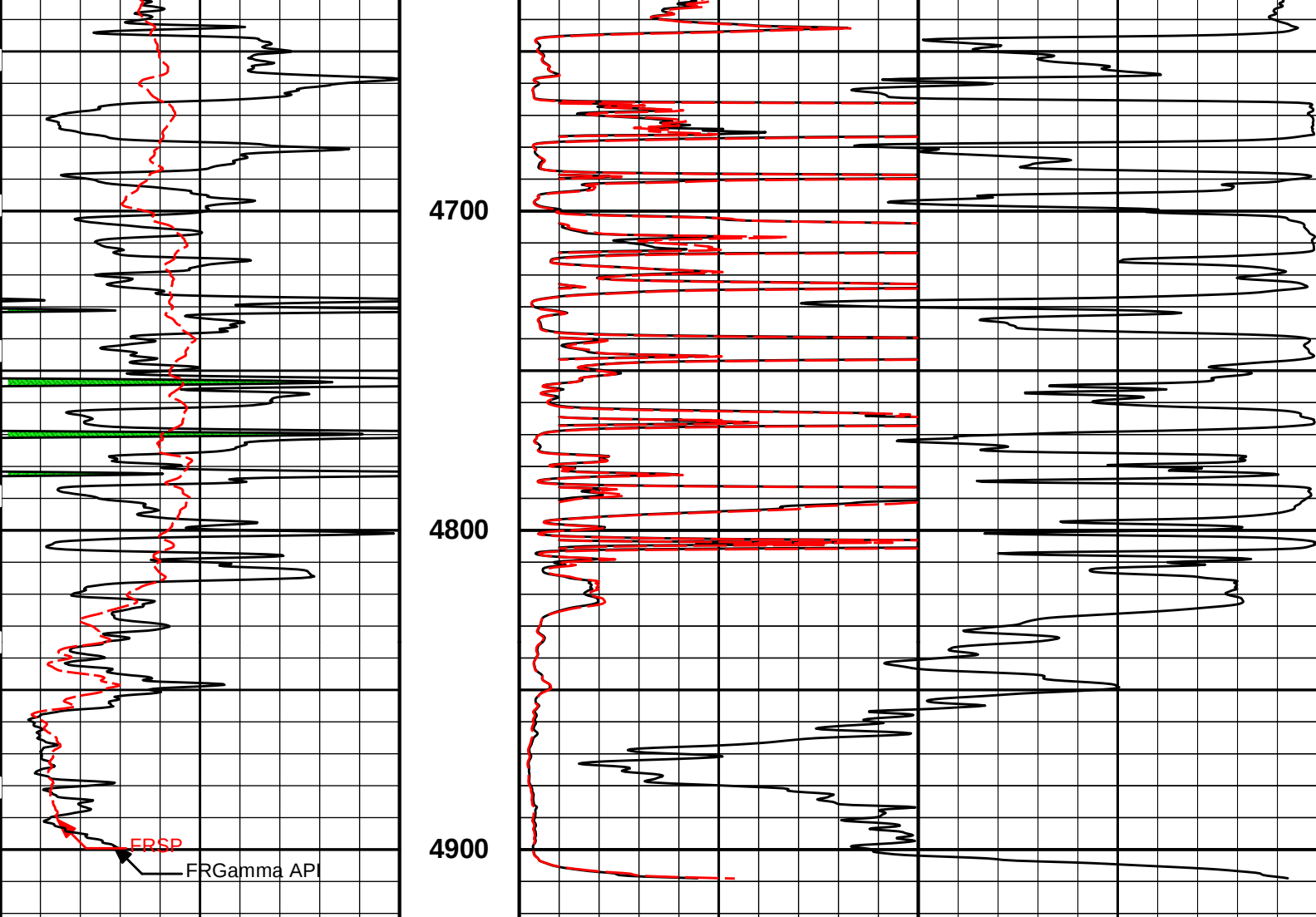
3800

3900

4000







0	Gamma API	150	MD 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		

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Plot Time: 31-Aug-14 05:49:54

Plot Range: 635 ft to 4921.92 ft

Data: WHITE_2-4\Well Based\R1 ACRT CASING\

Plot File: \\-LOCAL-\\WHITE_2-4\Well Based\ACRT\ACRT_2_lib

2 INCH MAIN LOG

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Plot Time: 31-Aug-14 05:49:54

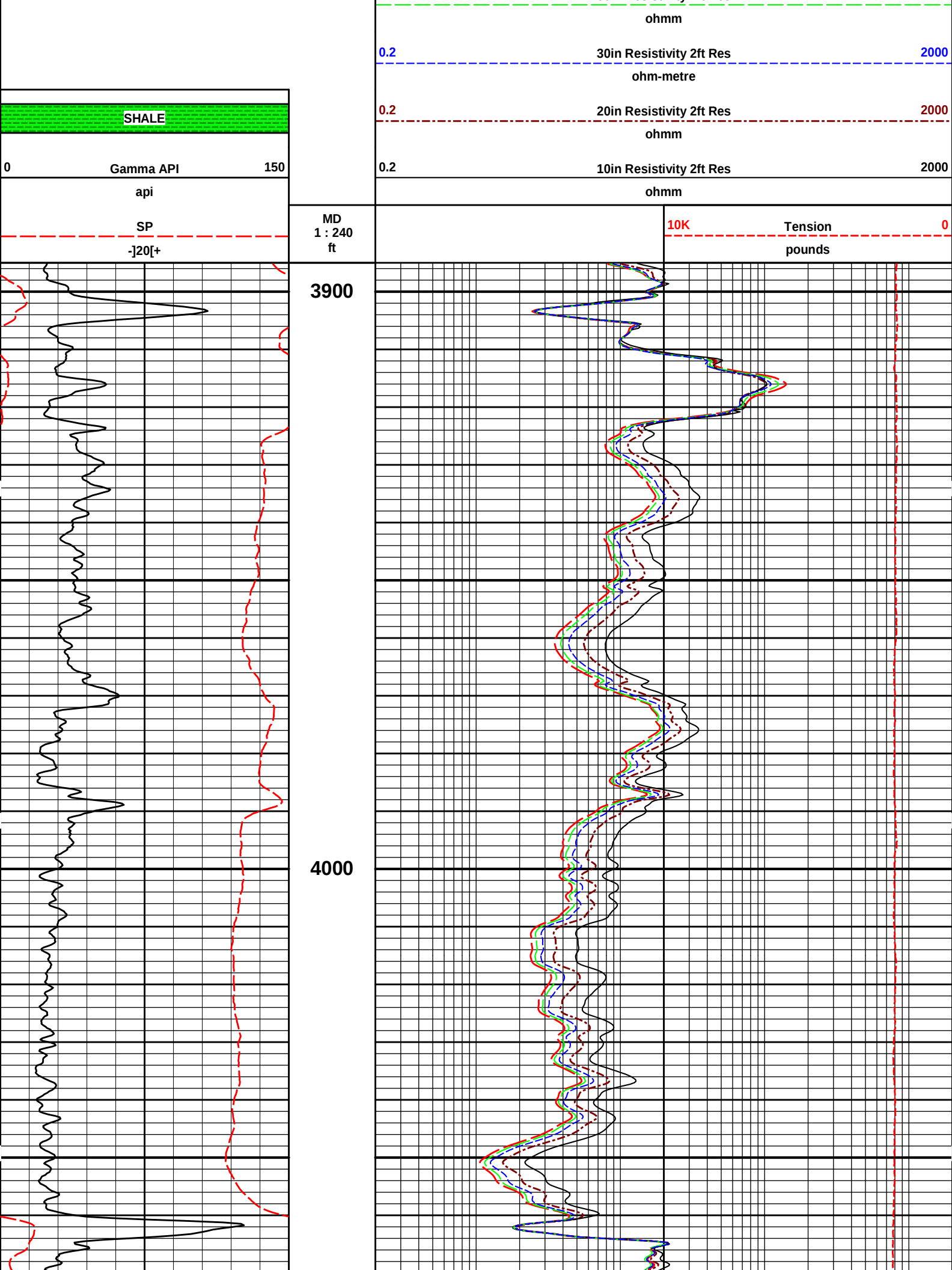
Plot Range: 3895 ft to 4921.92 ft

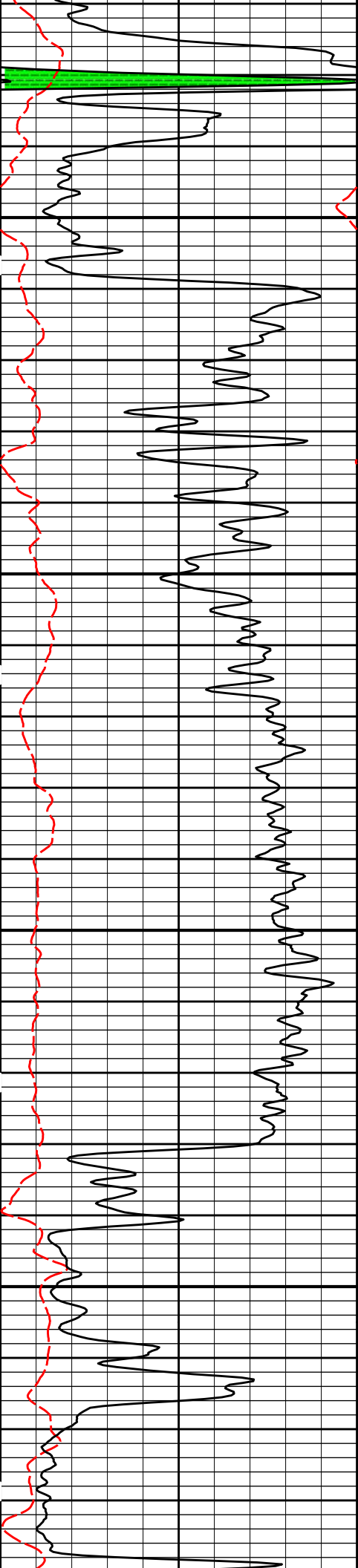
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Plot File: \\-LOCAL-\\WHITE_2-4\Well Based\ACRT\ACRT_5_main_lib

5 INCH MAIN LOG

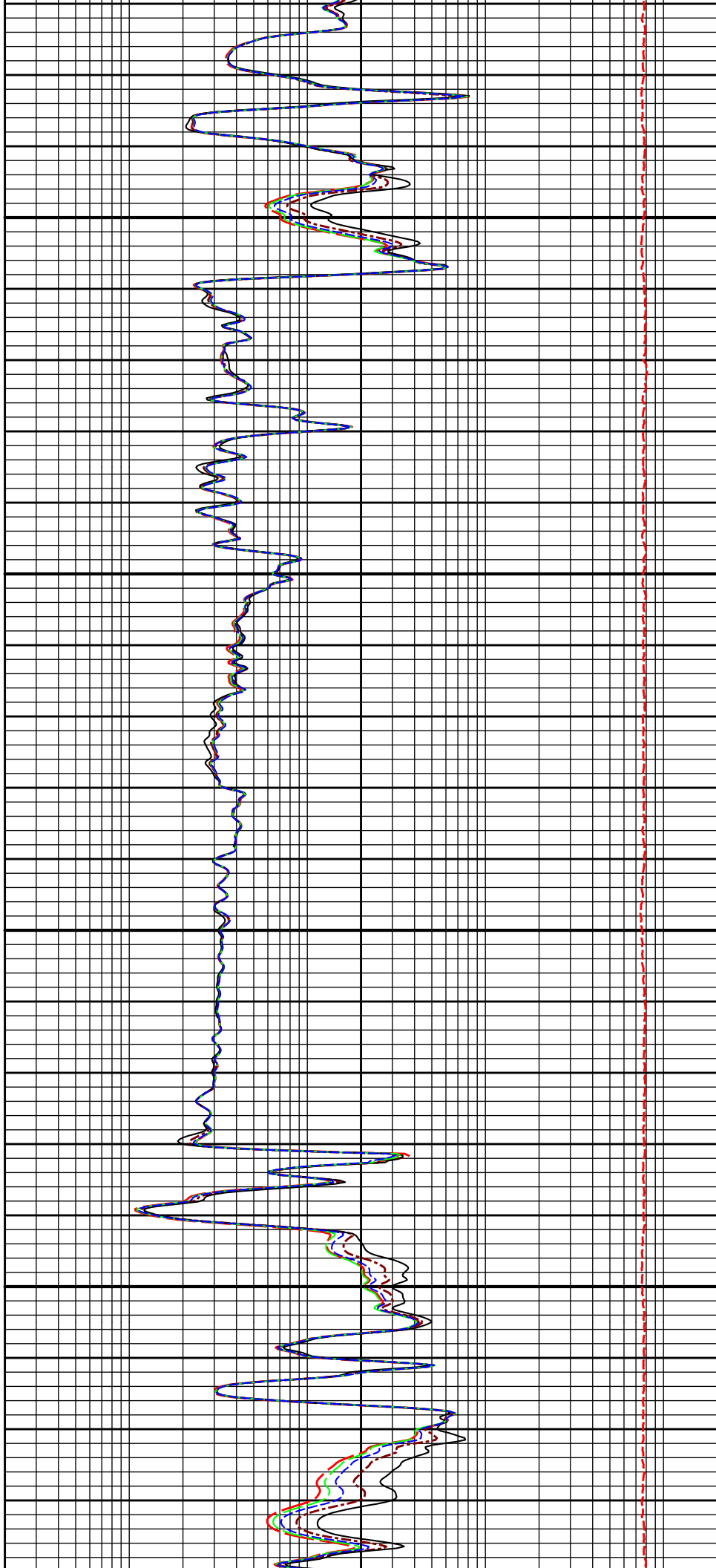
	0.2	90in Resistivity 2ft Res	2000
		ohmm	
	0.2	60in Resistivity 2ft Res	2000

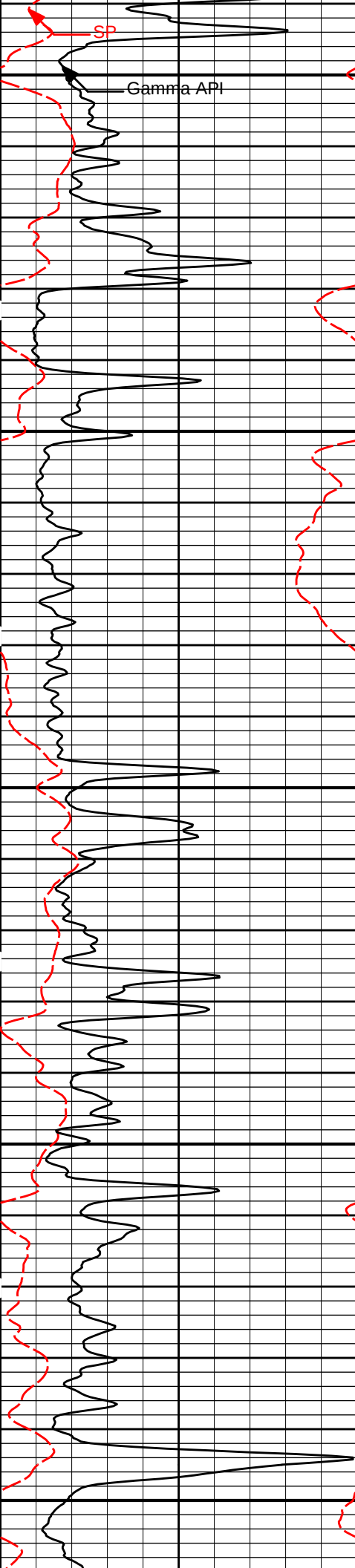




4100

4200

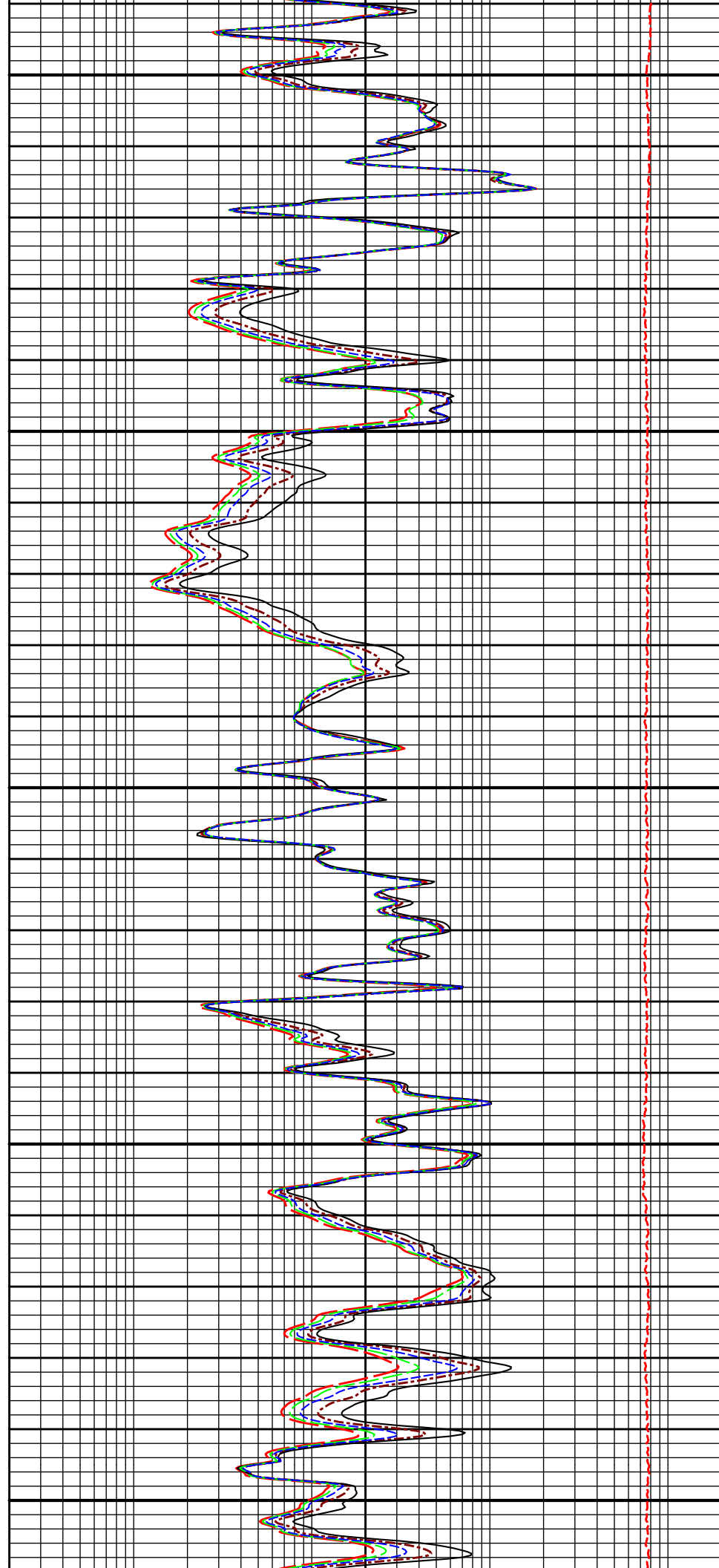


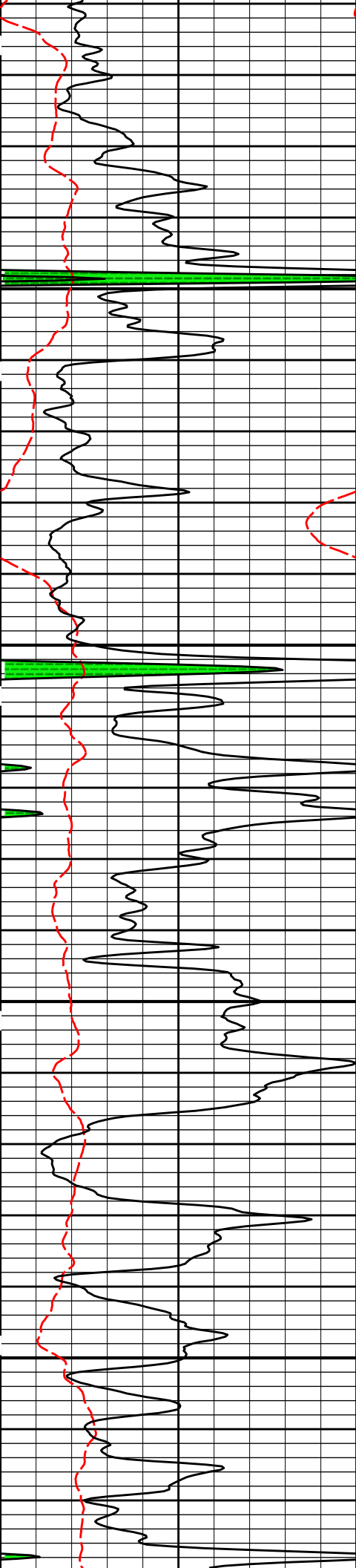


4300

4400

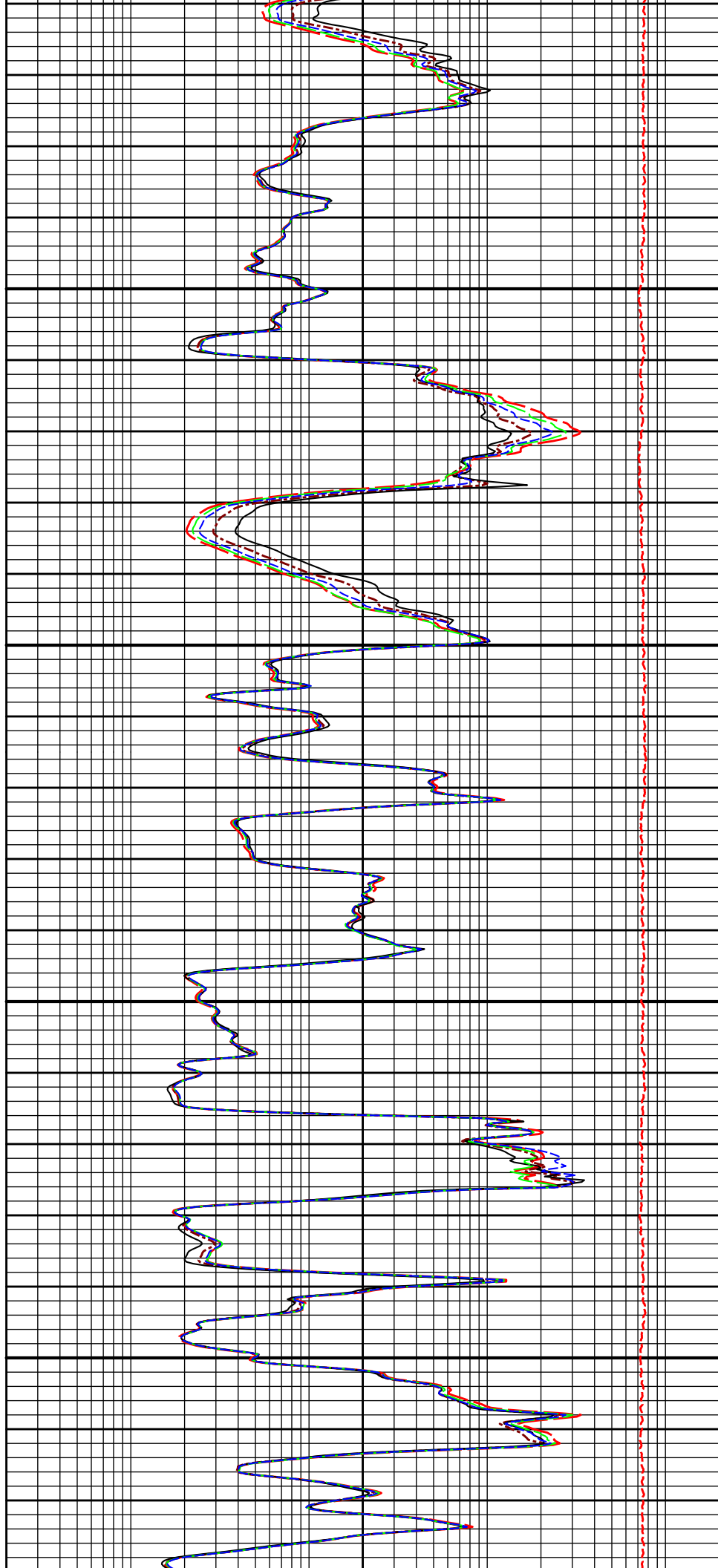
4500

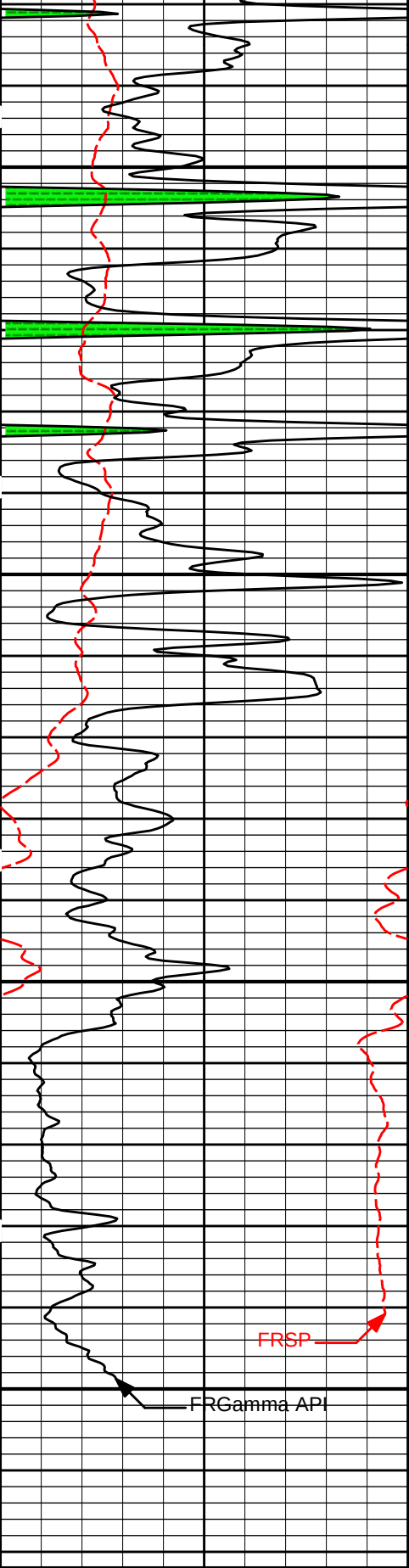




4600

4700





4800

4900

SP

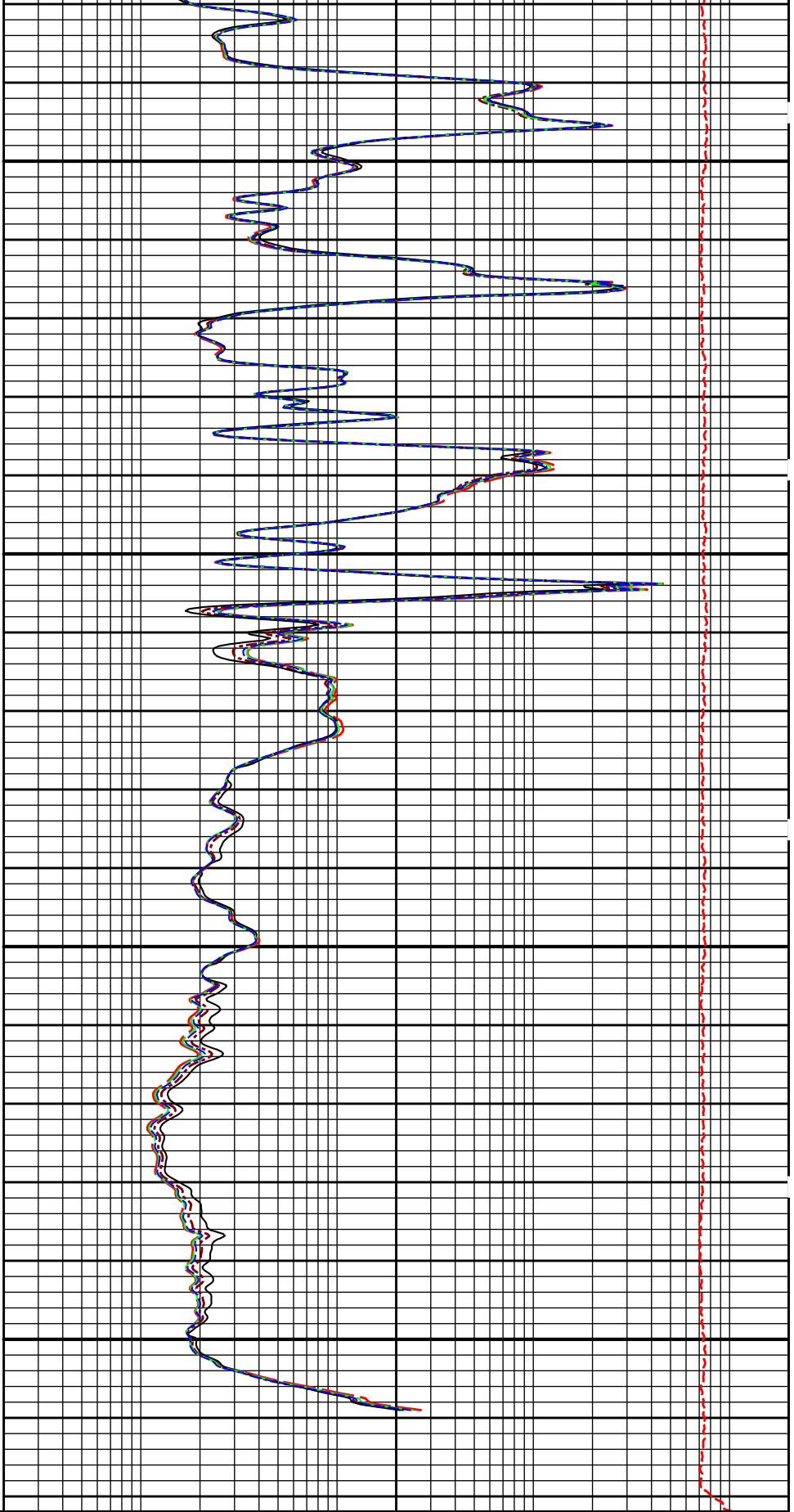
-]20[+

Gamma API

api

SHALE

MD
1 : 240
ft



10K

Tension

0

pounds

0.2

10in Resistivity 2ft Res

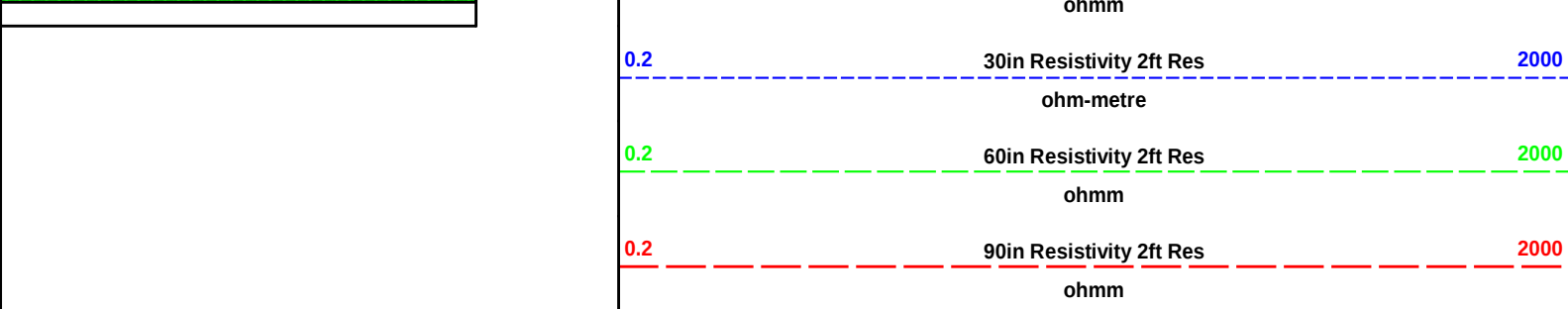
2000

ohmm

0.2

20in Resistivity 2ft Res

2000



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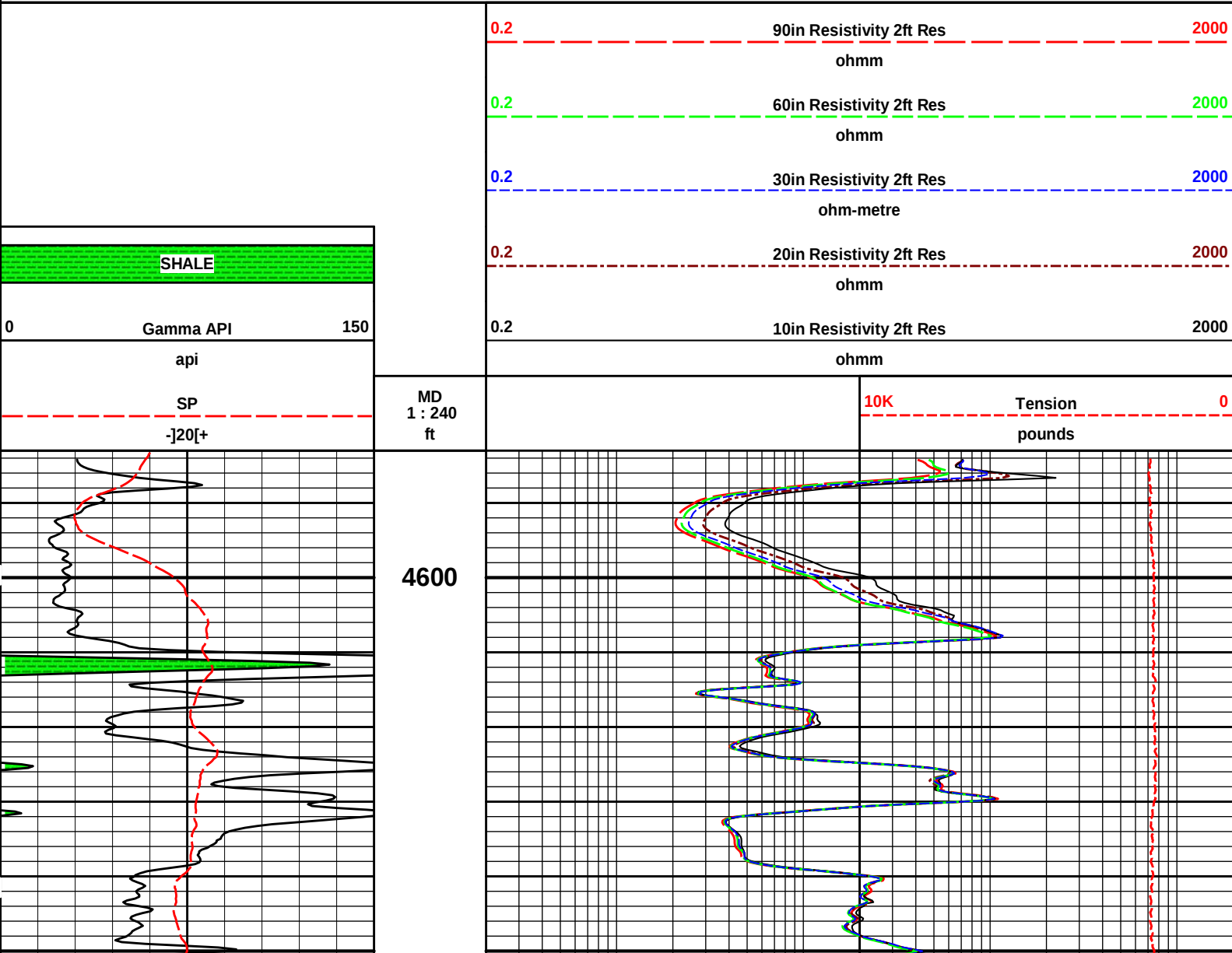
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Plot File: \\LOCAL-WHITE_2-4\Well Based\ACRT\ACRT_5_main_lib

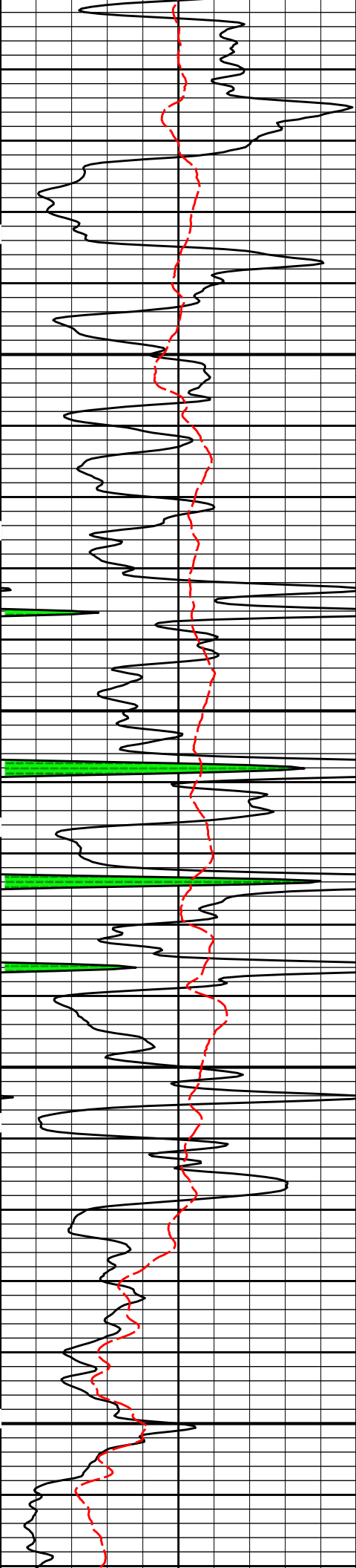
5 INCH MAIN LOG

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Plot Time: 31-Aug-14 05:49:56
Plot Range: 4583 ft to 4922.5 ft
Data: WHITE_2-4\Well Based\IR1 ACRT REPEAT\
Plot File: \\LOCAL-WHITE_2-4\Well Based\ACRT\ACRT_5_repeat_lib

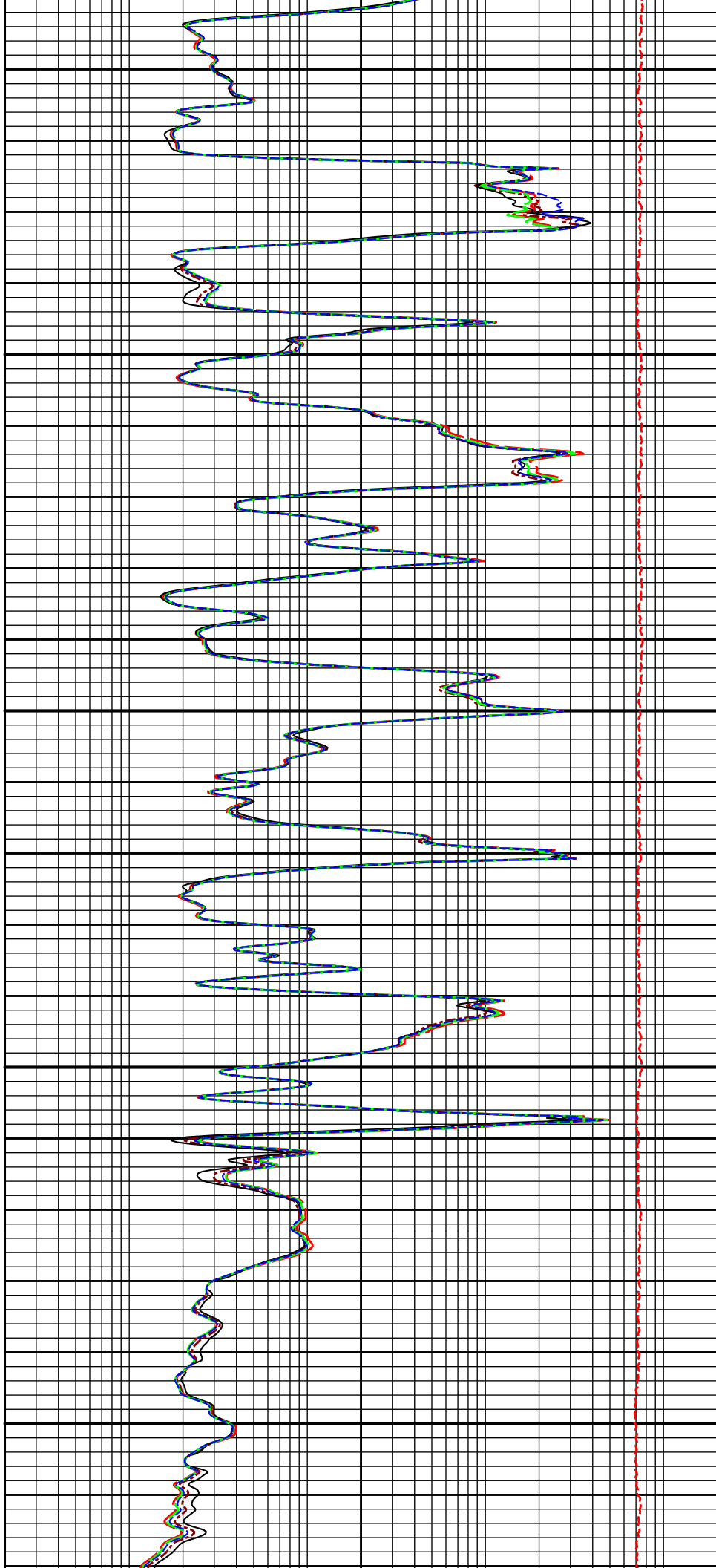
REPEAT SECTION

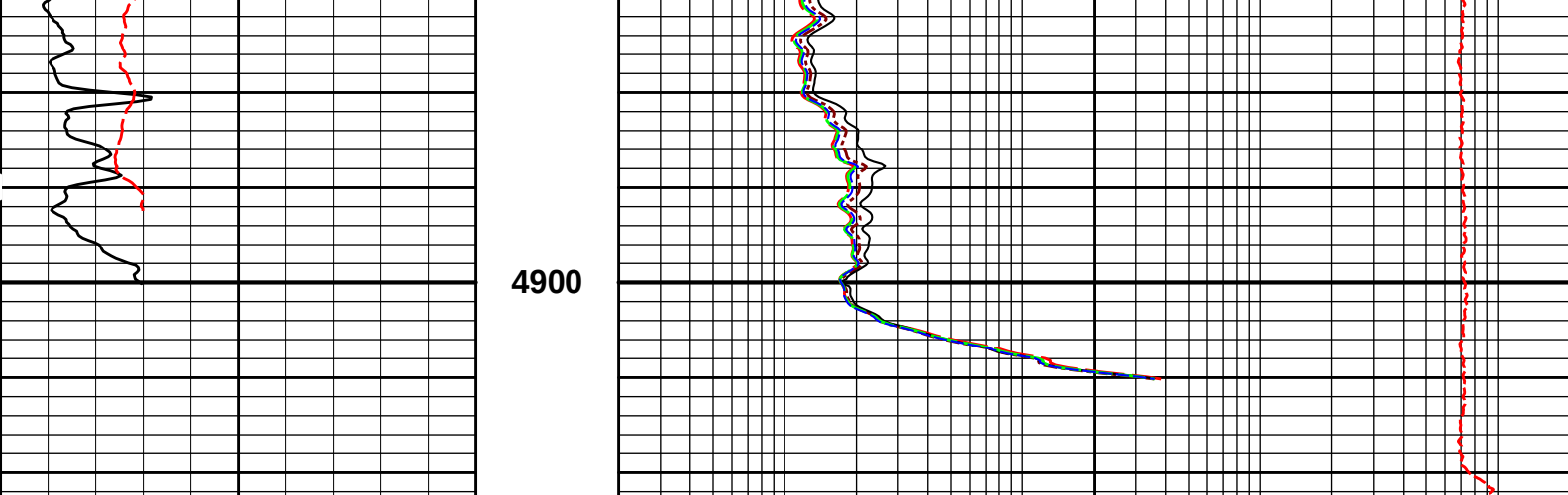




4700

4800





SP -]20[+		MD 1 : 240 ft		10K	Tension	0
					pounds	
0	Gamma API	150		0.2	10in Resistivity 2ft Res	2000
api					ohmm	
SHALE				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	2000
					ohmm	

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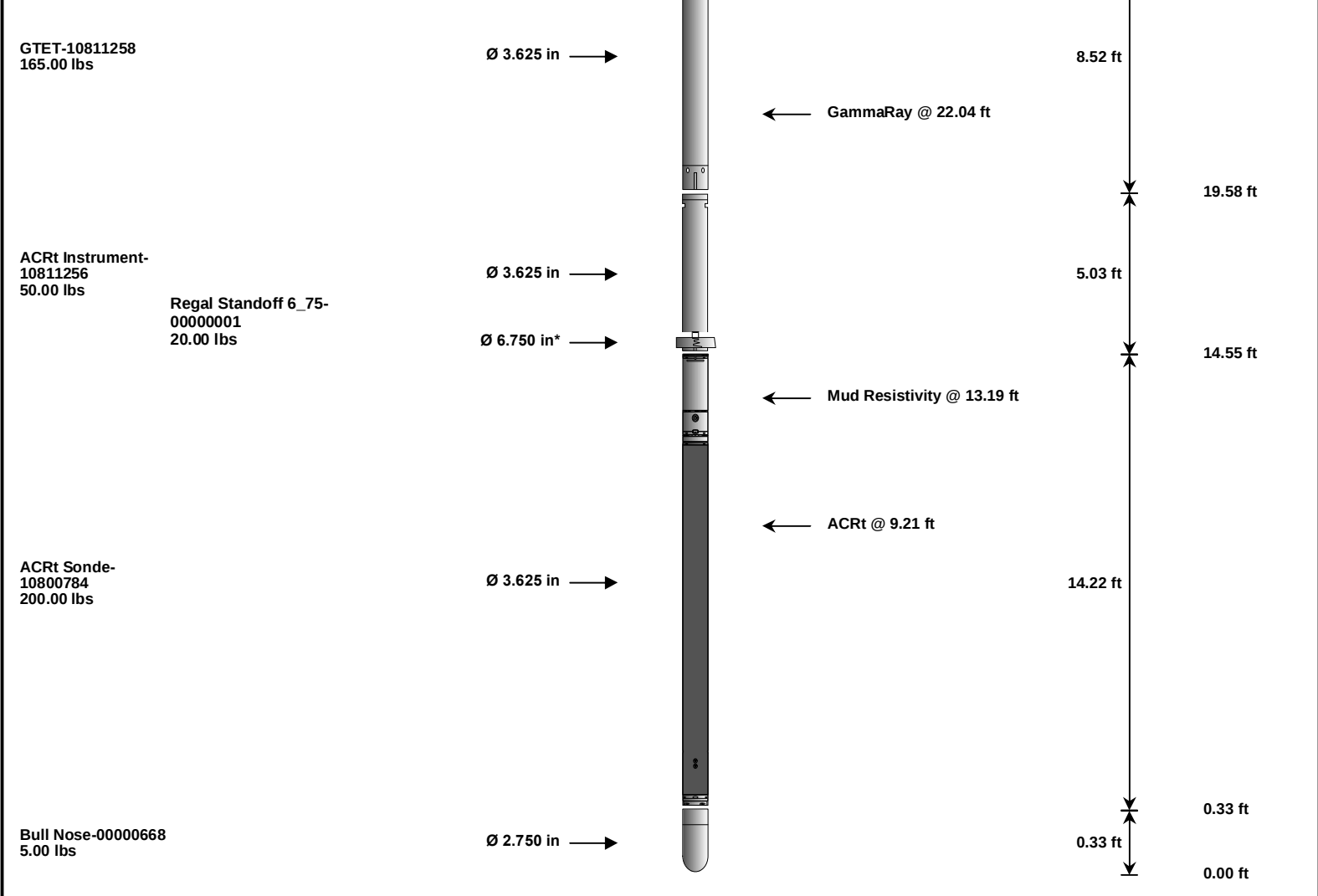
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Plot Range: 4583 ft to 4922.5 ft
Data: WHITE_2-4\Well Based\R1 ACRT REPEAT\
Plot File: \\LOCAL-WHITE_2-4\Well Based\ACRT\ACRT_5_repeat_lib

REPEAT SECTION

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TOOL STRING DIAGRAM REPORT

Description	Overbody Description	O.D.	Diagram	Sensors @ Delays	Length	Accumulated Length	
RWCH-12156658 135.00 lbs		Ø 3.625 in →		← Load Cell @ 34.41 ft ← BH Temperature @ 33.84 ft	6.25 ft	38.09 ft	
							31.84 ft
SP Sub-12345678 60.00 lbs		Ø 3.625 in →		← SP @ 30.06 ft	3.74 ft	28.10 ft	



Mnemonic	Tool Name	Serial Number	Weight (lbs)	Length (ft)	Accumulated Length (ft)	Max.Log. Speed (fpm)
RWCH	Releasable Wireline Cable Head	12156658	135.00	6.25	31.84	300.00
SP	SP Sub	12345678	60.00	3.74	28.10	300.00
GTET	Gamma Telemetry Tool	10811258	165.00	8.52	19.58	60.00
ACRt	Array Compensated True Resistivity Instrument Section	10811256	50.00	5.03	14.55	120.00
RSOF	Regal Standoff 6.75in	00000001	20.00	0.52 *	14.68	300.00
ACRt	Array Compensated True Resistivity Sonde Section	10800784	200.00	14.22	0.33	120.00
BLNS	Bull Nose	00000668	5.00	0.33	0.00	300.00
Total			635.00	38.09		
* Not included in Total Length and Length Accumulation.						
Data: WHITE_2-410001 SP-GTET-ACRTIDLE					Date: 31-Aug-14 03:27:51	

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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	ESAL	Formation Salinity NaCl	0.00	ppm

SHARED	PSAL	Formation Salinity NaCl	0.00	ppm
SHARED	KPCT	Percent K in Mud by Weight?	0.00	%
SHARED	RMUD	Mud Resistivity	1.000	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	4920.00	ft
SHARED	BHT	Bottom Hole Temperature	130.0	degF
SHARED	SVTM	Navigation and Survey Master Tool	NONE	
SHARED	AZTM	High Res Z Accelerometer Master Tool	GTET	
SHARED	TEMM	Temperature Master Tool	NONE	
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	Depth Panel	
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	
GTET	BHSM	Borehole Size Source Tool	Depth Panel	
ACRt Sonde	RTOK	Process ACRt?	Yes	
ACRt Sonde	MNSO	Minimum Tool Standoff	1.50	in
ACRt Sonde	TCS1	Temperature Correction Source	FP Lwr & FP Up	
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	
ACRt Sonde	MRFX	Fixed mud resistivity	2000	ohmm
ACRt Sonde	BHSM	Borehole Size Source Tool	Depth Panel	
BOTTOM				
Data: WHITE_2-4\0001 SP-GTET-ACRT\005 31-Aug-14 04:12 Up @4932.0f				Date: 31-Aug-14 05:33:30

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CALIBRATION REPORT

NATURAL GAMMA RAY TOOL SHOP CALIBRATION

Tool Name:	GTET - 10811258	Reference Calibration Date:	23-Jul-14 09:11:42
Engineer:	SHELDON INGERSOLL	Calibration Date:	22-Aug-14 14:02:06
Software Version:	WL INSITE R4.2.0 (Build 2)	Calibration Version:	1

Calibrator Source S/N: TB-185

Calibrator API Reference: 228.00 eni

Calibrator API Reference:228.00 api
Equivalent Calibrator API Reference:232.0 api

Measurement	Measured	Calibrated	Units
Background	35.3	34.4	api
Background + Calibrator	273.1	266.4	api
Calibrator	237.8	232.0	api

NATURAL GAMMA RAY TOOL FIELD CALIBRATION

Tool Name:	GTET - 10811258	Reference Calibration Date:	22-Aug-14 14:02:06
Engineer:	SHELDON INGERSOLL	Calibration Date:	30-Aug-14 22:09:39
Software Version:	WL INSITE R4.2.0 (Build 2)	Calibration Version:	1

Calibrator Source S/N: TB-185
Calibrator API Reference:228.00 api
Equivalent Calibrator API Reference:232.0 api

Field Verification	Shop	Field	Units
Background	34.4	43.2	api
Background + Calibrator	266.4	269.5	api
Calibrator	232.0	226.3	api

Shop	Field	Difference	Tolerance
232.0	226.3	5.7	+/- 9.00

ARRAY COMPENSATED TRUE RESISTIVITY SHOP CALIBRATION

Tool Name:	ACRt Sonde - 10800784	Reference Calibration Date:	05-May-14 10:36:04
Engineer:	SHELDON INGERSOLL	Calibration Date:	22-Aug-14 10:25:04
Software Version:	WL INSITE R4.2.0 (Build 2)	Calibration Version:	1
Host Tool Name:	ACRt Instrument - 10811256		

TYPICAL GAIN RANGE

Subarray	R12KHz			R36KHz			R72KHz		
	Lower	(mmho/m)	Upper	Lower	(mmho/m)	Upper	Lower	(mmho/m)	Upper
A1 (80")	0.95	1.0143	1.05	0.95	1.0083	1.05	0.95	0.9944	1.05
A2 (50")	0.95	1.0200	1.05	0.95	1.0168	1.05	0.95	1.0060	1.05
A3 (29")	0.95	1.0167	1.05	0.95	1.0136	1.05	0.95	1.0026	1.05
A4 (17")	0.95	1.0141	1.05	0.95	1.0096	1.05	0.95	1.0023	1.05
A5 (10")	N/A	N/A	N/A	0.95	1.0037	1.05	0.95	0.9958	1.05
A6 (6")	N/A	N/A	N/A	0.95	0.9874	1.05	0.95	0.9796	1.05

SONDE OFFSET

Subarray	R12KHz		R36KHz		R72KHz	
	(mmho/m)		(mmho/m)		(mmho/m)	
A1 (80")	0.140		-3.696		-4.814	
A2 (50")	-1.633		-3.741		-4.342	
A3 (29")	-16.162		-4.620		-3.462	
A4 (17")	-98.624		-32.995		-26.875	
A5 (10")	N/A		-98.184		-49.266	
A6 (6")	N/A		293.685		155.844	

TRANSMITTER CURRENT GAIN

Signal	Lower	R	Upper
12K	0.6	0.88	1.3
36K	1.0	1.20	2.0

R-MUD VERIFICATION

Signal	Lower (ohm-m)	Measured (ohm-m)	Upper (ohm-m)
Mud Cell	0.95	1.00	1.05

72K

1.0

1.53

2.0

PASS/FAIL SUMMARY

GAIN RANGE CHK	PASS
SONDE OFFSET CHK	PASS

TOOL OK TO LOG

CALIBRATION SUMMARY

Sensor	Shop	Field	Post	Difference	Tolerance	Units
GTET-10811258						
Gamma Ray Calibrator	232.0	226.3	-----	5.7	+/- 9.00	api
ACRt Sonde-10800784						
Mud Cell	1.00	-----	-----	0.00	-----	ohm-m

Data: WHITE_2-410001 SP-GTET-ACRT1005 31-Aug-14 04:12 Up @4932.0f

Date: 31-Aug-14 05:33:56

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INPUTS, DELAYS AND FILTERS TABLE

Mnemonic	Input Description	Delay (ft)	Filter Type	Filter Length (ft)
Depth Panel				
TENS	Tension	0.00	NO	
Rwa / CrossPlot				
TPUL	Tension Pull	38.09	NO	
BS	Bit Size	38.09	NO	
HDIA	Measured Hole Diameter	0.00	NO	
RWCH				
DHTN	DownholeTension	0.00	BLK	0.000
SP Sub				
PLTC	Plot Control Mask	30.06	NO	
SP	Spontaneous Potential	30.06	BLK	1.250
SPR	Raw Spontaneous Potential	30.06	NO	
SPO	Spontaneous Potential Offset	30.06	NO	
GTET				
TPUL	Tension Pull	22.04	NO	
GR	Natural Gamma Ray API	22.04	TRI	1.750
GRU	Unfiltered Natural Gamma Ray API	22.04	NO	
EGR	Natural Gamma Ray API with Enhanced Vertical Resolution	22.04	W	1.416 , 0.750
HDIA	Measured Hole Diameter	0.00	NO	
ACCZ	Accelerometer Z	0.00	BLK	0.083
DEVI	Inclination	0.00	NO	
ACRt Sonde				
TPUL	Tension Pull	2.73	NO	
F1R1	ACRT 12KHz - 80in R value	8.98	BLK	0.000
F1X1	ACRT 12KHz - 80in X value	8.98	BLK	0.000
F1R2	ACRT 12KHz - 50in R value	6.48	BLK	0.000
F1X2	ACRT 12KHz - 50in X value	6.48	BLK	0.000

F1R3	ACRT 12KHz - 29in R value	4.98	BLK	0.000
F1X3	ACRT 12KHz - 29in X value	4.98	BLK	0.000
F1R4	ACRT 12KHz - 17in R value	3.98	BLK	0.000
F1X4	ACRT 12KHz - 17in X value	3.98	BLK	0.000
F1R5	ACRT 12KHz - 10in R value	3.48	BLK	0.000
F1X5	ACRT 12KHz - 10in X value	3.48	BLK	0.000
F1R6	ACRT 12KHz - 6in R value	3.23	BLK	0.000
F1X6	ACRT 12KHz - 6in X value	3.23	BLK	0.000
F2R1	ACRT 36KHz - 80in R value	8.98	BLK	0.000
F2X1	ACRT 36KHz - 80in X value	8.98	BLK	0.000
F2R2	ACRT 36KHz - 50in R value	6.48	BLK	0.000
F2X2	ACRT 36KHz - 50in X value	6.48	BLK	0.000
F2R3	ACRT 36KHz - 29in R value	4.98	BLK	0.000
F2X3	ACRT 36KHz - 29in X value	4.98	BLK	0.000
F2R4	ACRT 36KHz - 17in R value	3.98	BLK	0.000
F2X4	ACRT 36KHz - 17in X value	3.98	BLK	0.000
F2R5	ACRT 36KHz - 10in R value	3.48	BLK	0.000
F2X5	ACRT 36KHz - 10in X value	3.48	BLK	0.000
F2R6	ACRT 36KHz - 6in R value	3.23	BLK	0.000
F2X6	ACRT 36KHz - 6in X value	3.23	BLK	0.000
F3R1	ACRT 72KHz - 80in R value	8.98	BLK	0.000
F3X1	ACRT 72KHz - 80in X value	8.98	BLK	0.000
F3R2	ACRT 72KHz - 50in R value	6.48	BLK	0.000
F3X2	ACRT 72KHz - 50in X value	6.48	BLK	0.000
F3R3	ACRT 72KHz - 29in R value	4.98	BLK	0.000
F3X3	ACRT 72KHz - 29in X value	4.98	BLK	0.000
F3R4	ACRT 72KHz - 17in R value	3.98	BLK	0.000
F3X4	ACRT 72KHz - 17in X value	3.98	BLK	0.000
F3R5	ACRT 72KHz - 10in R value	3.48	BLK	0.000
F3X5	ACRT 72KHz - 10in X value	3.48	BLK	0.000
F3R6	ACRT 72KHz - 6in R value	3.23	BLK	0.000
F3X6	ACRT 72KHz - 6in X value	3.23	BLK	0.000
RMUD	Mud Resistivity	12.52	BLK	0.000
F1RT	Transmitter Reference 12 KHz Real Signal	2.73	BLK	0.000
F1XT	Transmitter Reference 12 KHz Imaginary Signal	2.73	BLK	0.000
F2RT	Transmitter Reference 36 KHz Real Signal	2.73	BLK	0.000
F2XT	Transmitter Reference 36 KHz Imaginary Signal	2.73	BLK	0.000
F3RT	Transmitter Reference 72 KHz Real Signal	2.73	BLK	0.000
F3XT	Transmitter Reference 72 KHz Imaginary Signal	2.73	BLK	0.000
TFPU	Upper Feedpipe Temperature Calculated	2.73	BLK	0.000
TFPL	Lower Feedpipe Temperature Calculated	2.73	BLK	0.000
ITMP	Instrument Temperature	2.73	BLK	0.000
TCVA	Temperature Correction Values Loop Off	2.73	NO	
TIDV	Instrument Temperature Derivative	2.73	NO	
TUDV	Upper Temperature Derivative	2.73	NO	
TLDV	Lower Temperature Derivative	2.73	NO	
TRBD	Receiver Board Temperature	2.73	NO	
HDIA	Measured Hole Diameter	0.00	NO	
Data: WHITE_2-4I0001 SP-GTET-ACRTIDLE			Date: 31-Aug-14 05:33:09	

COMPANY	HERMAN L. LOEB, LLC.
WELL	WHITE 2-4
FIELD	GREENSBURG SW

COUNTY	KIOWA	STATE	KANSAS
HALLIBURTON		ARRAY COMPENSATED TRUE RESISTIVITY LOG	