HALLIBURTON

ARRAY COMPENSATED TRUE RESISTIVITY LOG

COMPANY HERMAN L. LOEB, LLC
WELL BRENSING 1-10
FIELD/BLOCK FRALICK WEST
COUNTY KIOWA
STATE KANSAS

COMPANY **HERMAN L. LOEB, LLC**

WELL **BRENSING 1-10**

FIELD/BLOCK **FRALICK WEST**

COUNTY **KIOWA** STATE **KANSAS**

API No. 15-097-21848-00-00

Location
(SHL) SE NW NE NW
549' FNL & 1802' FWL

Sect. 10 Twp. 28S Rge. 20W

Other Services:
ACRT
SDL-DSN
MICROLOG
SONIC

Permanent Datum	GL		Elev. 2301.0 ft	Elev.: K.B.	2312.0 ft
Log measured from	KB		11.0 ft above perm. Datum	D.F.	2310.0 ft
Drilling measured from	KB			G.L.	2301.0 ft

Date		30-Jan-19					
Run No.		ONE					
Depth - Driller		5000.0 ft					
Depth - Logger		5000.0 ft					
Bottom - Logged Interval		4990					
Top - Logged Interval		485					
Casing - Driller		8.625 in	@ 478.0 ft	@		@	
Casing - Logger		485.0 ft					
Bit Size		7.875 in		@		@	
Type Fluid in Hole		Water Based Mud					
Density	Viscosity	9.0 ppg	60.00 s/qt				
PH	Fluid Loss	10.50 pH	8.8 cptm				
Source of Sample		FLOWLINE					
Rm @ Meas. Temperature		0.53 ohmm	@ 68.00 degF	@		@	
Rmf @ Meas. Temperature		0.45 ohmm	@ 64.00 degF	@		@	
Rmc @ Meas. Temperature		0.64 ohmm	@ 64.00 degF	@		@	
Source Rmf	Rmc	MEAS	MEAS				
Rm @ BHT		0.31 ohmm	@ 120.0 degF	@		@	
Time Since Circulation		11:00 hr					
Time on Bottom		30-Jan-19 13:57					
Max. Rec. Temperature		120.00 degF	@ 5000.0 ft	@		@	
Equipment	Location	12156883	EL RENO, OK				
Recorded By		WHITLOCK					
Witnessed By		JON CHRISTENSEN					

Fold here

Service Ticket No.: 905440007

API No.: 15-097-21848-00-00

PGM Version: WL INSITE R5.8.9 (Build 6)

CHANGE IN MUD TYPE OR ADDITIONAL SAMPLE

	Date	Sample No.	Depth-Driller	Type Fluid in Hole	Density	Viscosity	Ph	Fluid Loss	Source of Sample	Rm @ Meas. Temp	Rmf @ Meas. Temp.	Rmc @ Meas. Temp.	Source Rmf	Rmc	Rm @ BHT	Rmf @ BHT	Rmc @ BHT
										@	@	@			@	@	@
										@	@	@			@	@	@

RESISTIVITY SCALE CHANGES

Type Log	Depth	Scale Up Hole	Scale Down Hole

RESISTIVITY EQUIPMENT DATA

	Run No.	Tool Type & No.	Pad Type	Tool Pos.	Other

EQUIPMENT DATA

GAMMA	ACOUSTIC	DENSITY	NEUTRON
Run No.	Run No.	Run No.	Run No.
Serial No.	Serial No.	Serial No.	Serial No.
Model No.	Model No.	Model No.	Model No.
Diameter	No. of Cent.	Diameter	Diameter
Detector Model No.	Spacing	Log Type	Log Type
Type		Source Type	Source Type
Length	LSA [Y/N]	Serial No.	Serial No.
Distance to Source	FWDA [Y/N]	Strength	Strength

LOGGING DATA

GENERAL					GAMMA		ACOUSTIC		DENSITY		NEUTRON	
Run No.	Depth From	Depth To	Speed ft/min		Scale L	Scale R	Scale L	Scale R	Matrix	Scale L	Scale R	Matrix

DIRECTIONAL INFORMATION

Maximum Deviation	@	KOP	@

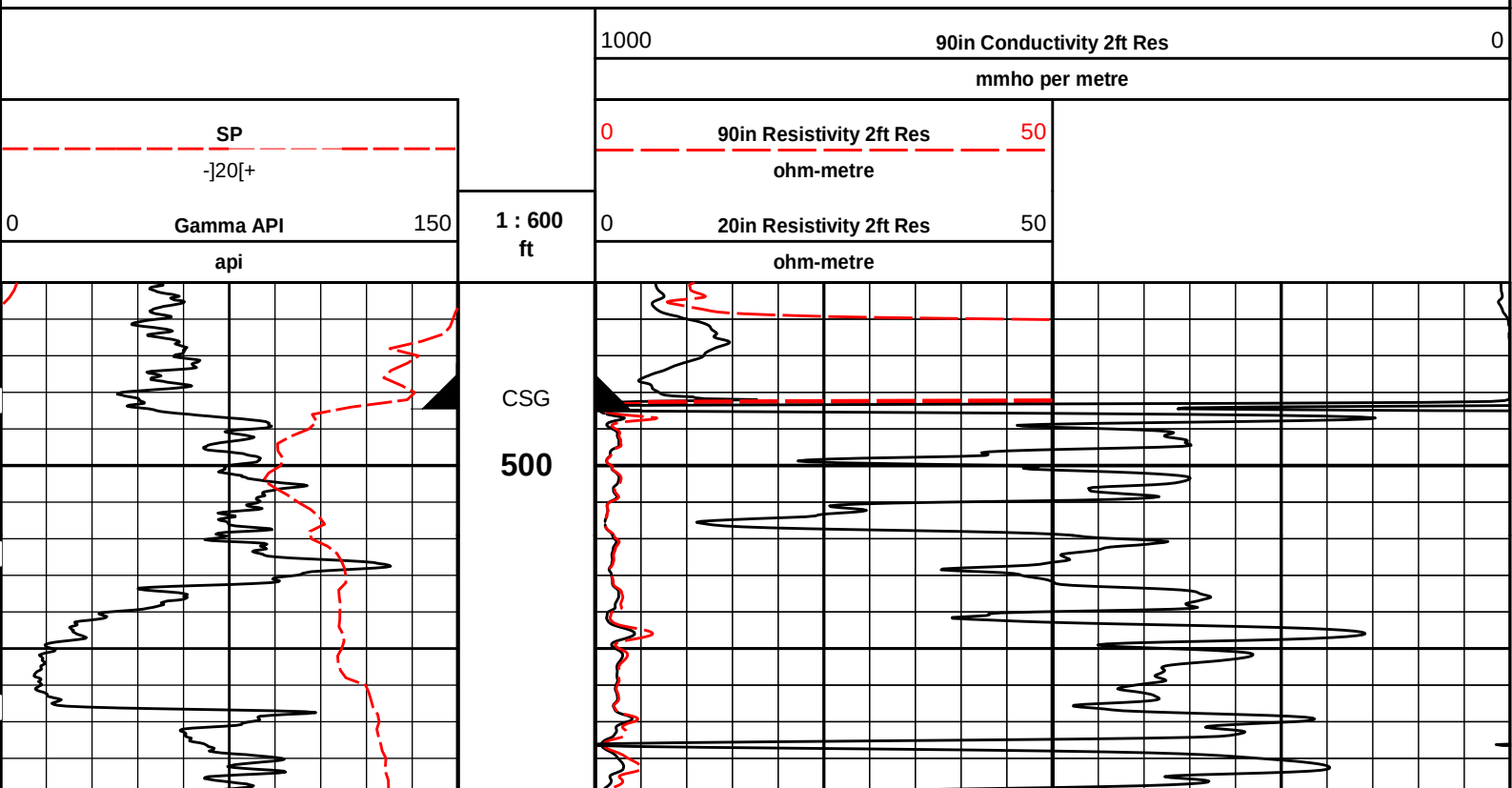
Remarks: 5 1/2" CASING USED FOR ANNULAR HOLE VOLUME

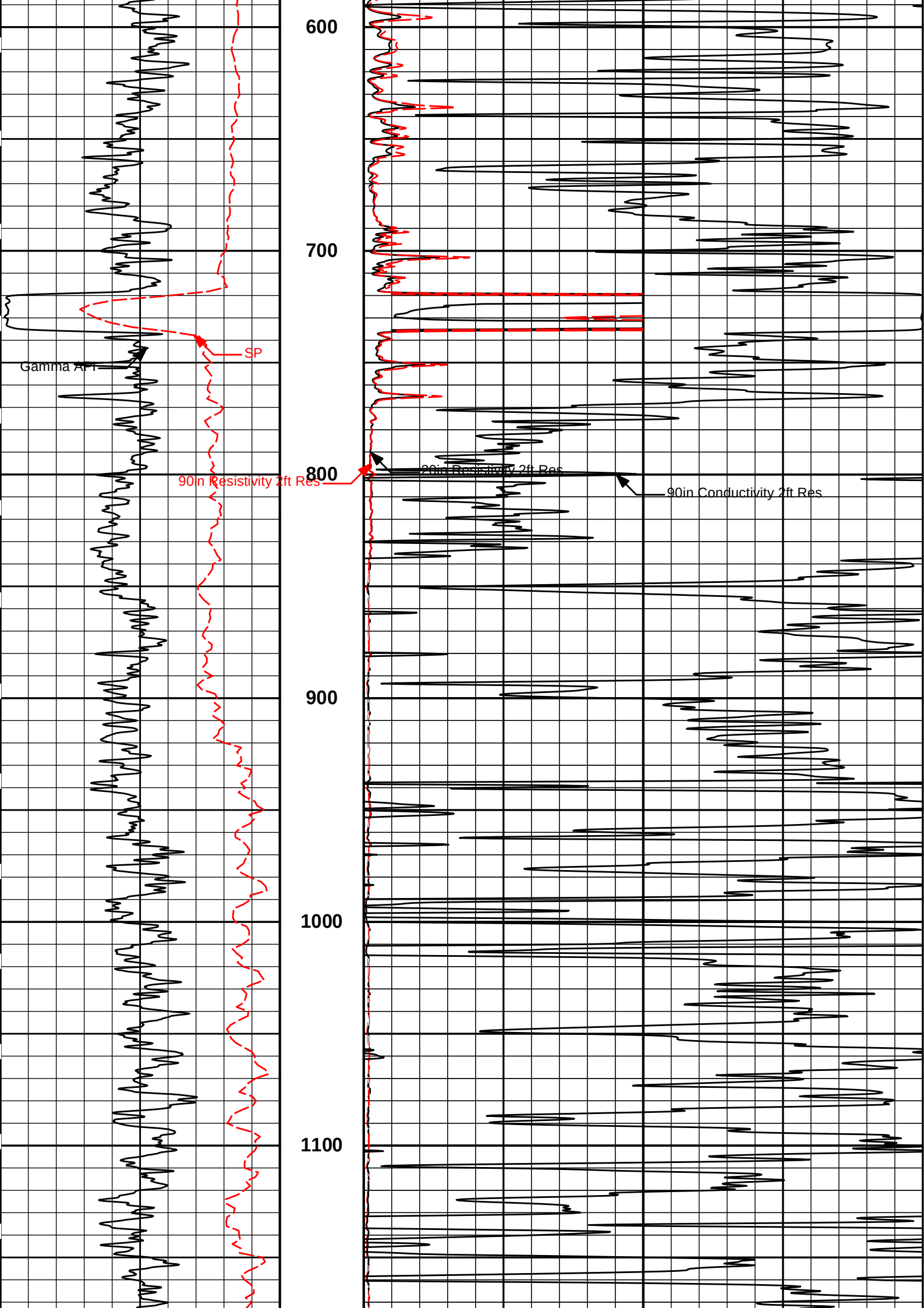
HALLIBURTON

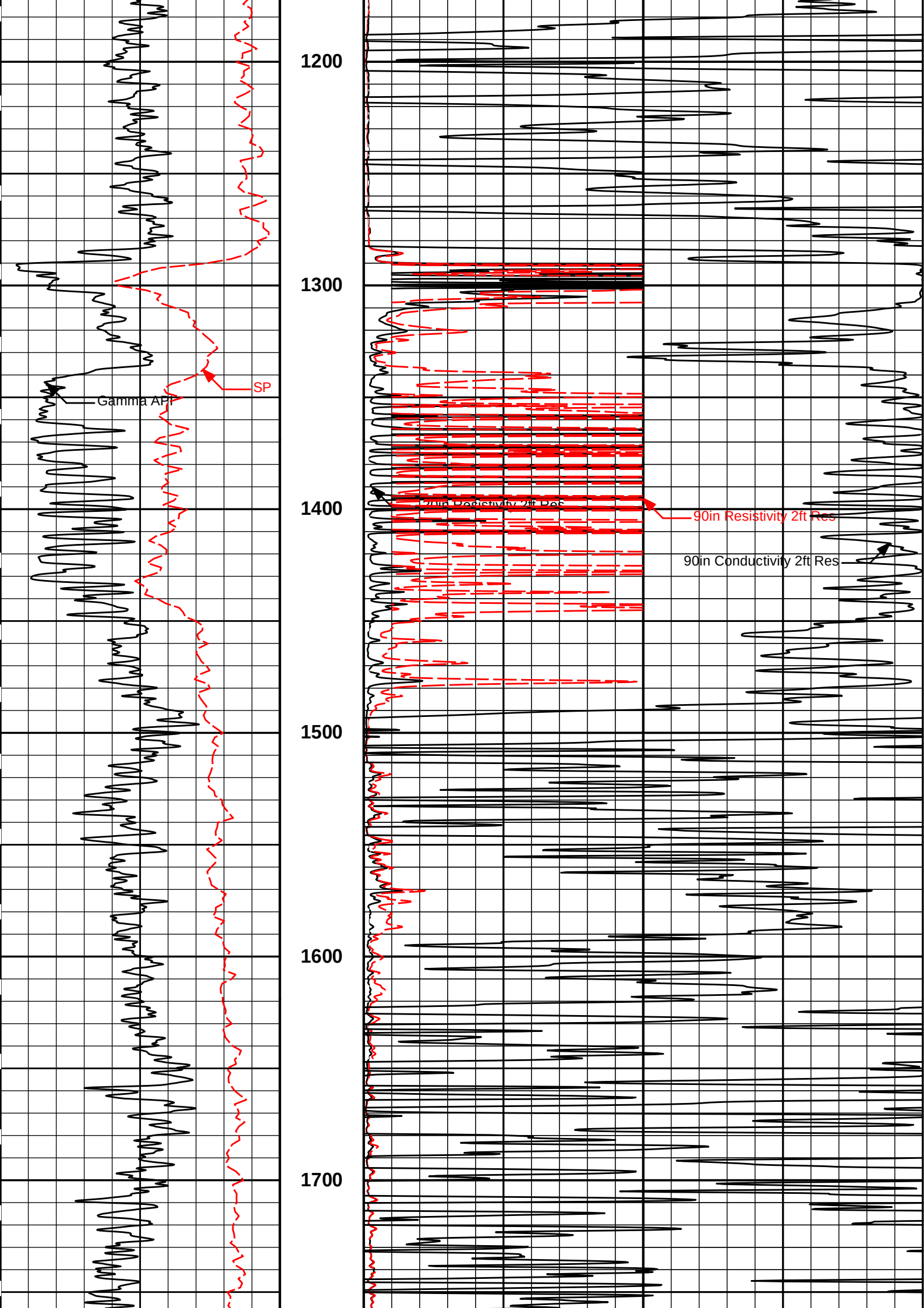
Plot Time: 30-Jan-19 17:04:39
Plot Range: 450 ft to 5003.08 ft
Data: HERMAN_BRENSING\Well Based\DAQ-0002-002
Plot File: \\-LOCAL-\HERMAN_BRENSING\0001 RWCH-SP-GTET-DSNT-SDLT-BSAT-ACRT\ACRT\ACRT_2_main

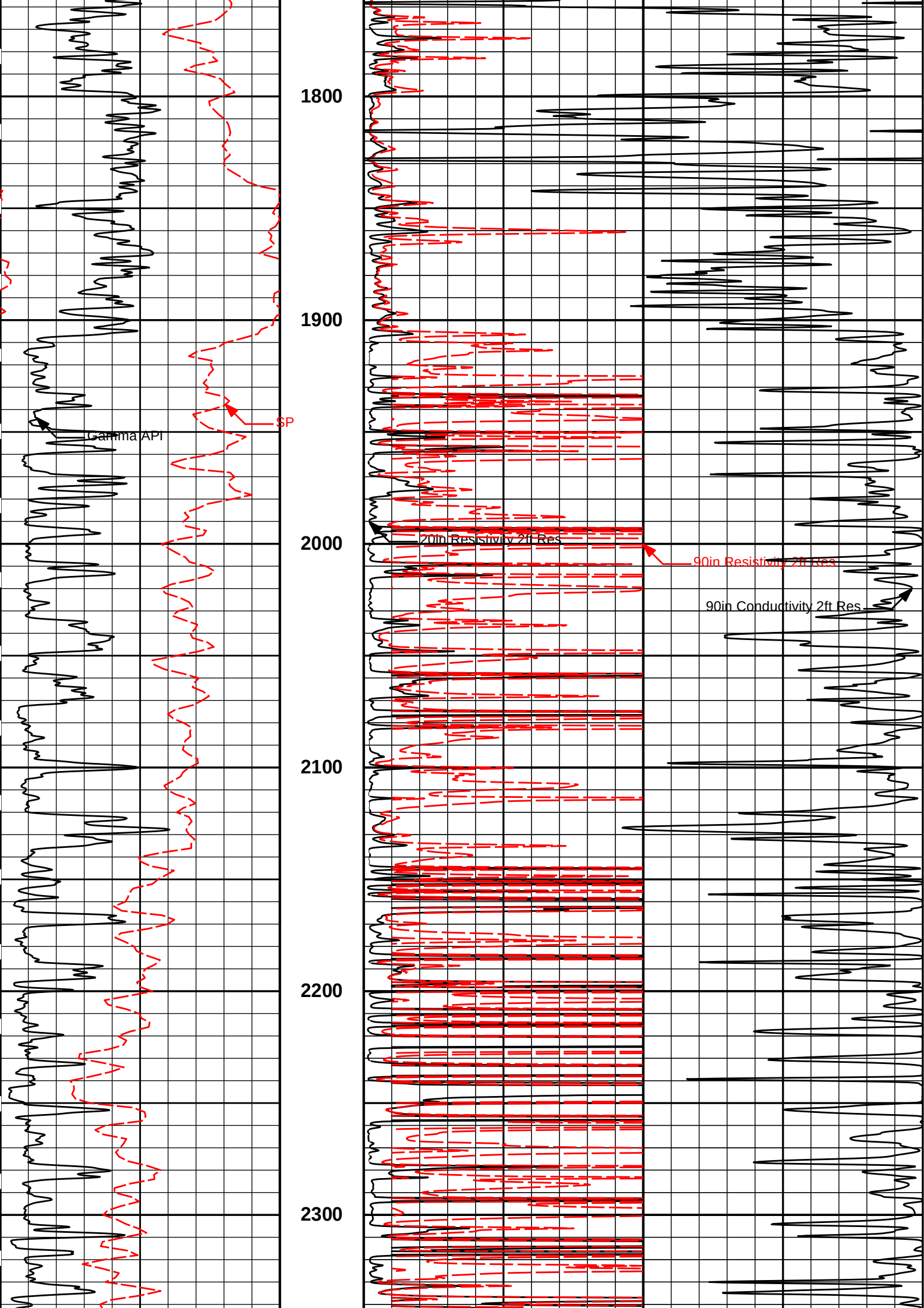
2 INCH MAIN LOG

2 INCH MAIN LOG




600
700
800
900
1000
1100
SP
Gamma API
90in Resistivity 2ft Res
90in Conductivity 2ft Res


1200
1300
1400
1500
1600
1700
SP
Gamma API
90in Resistivity 2ft Res
90in Conductivity 2ft Res


1800
1900
2000
2100
2200
2300
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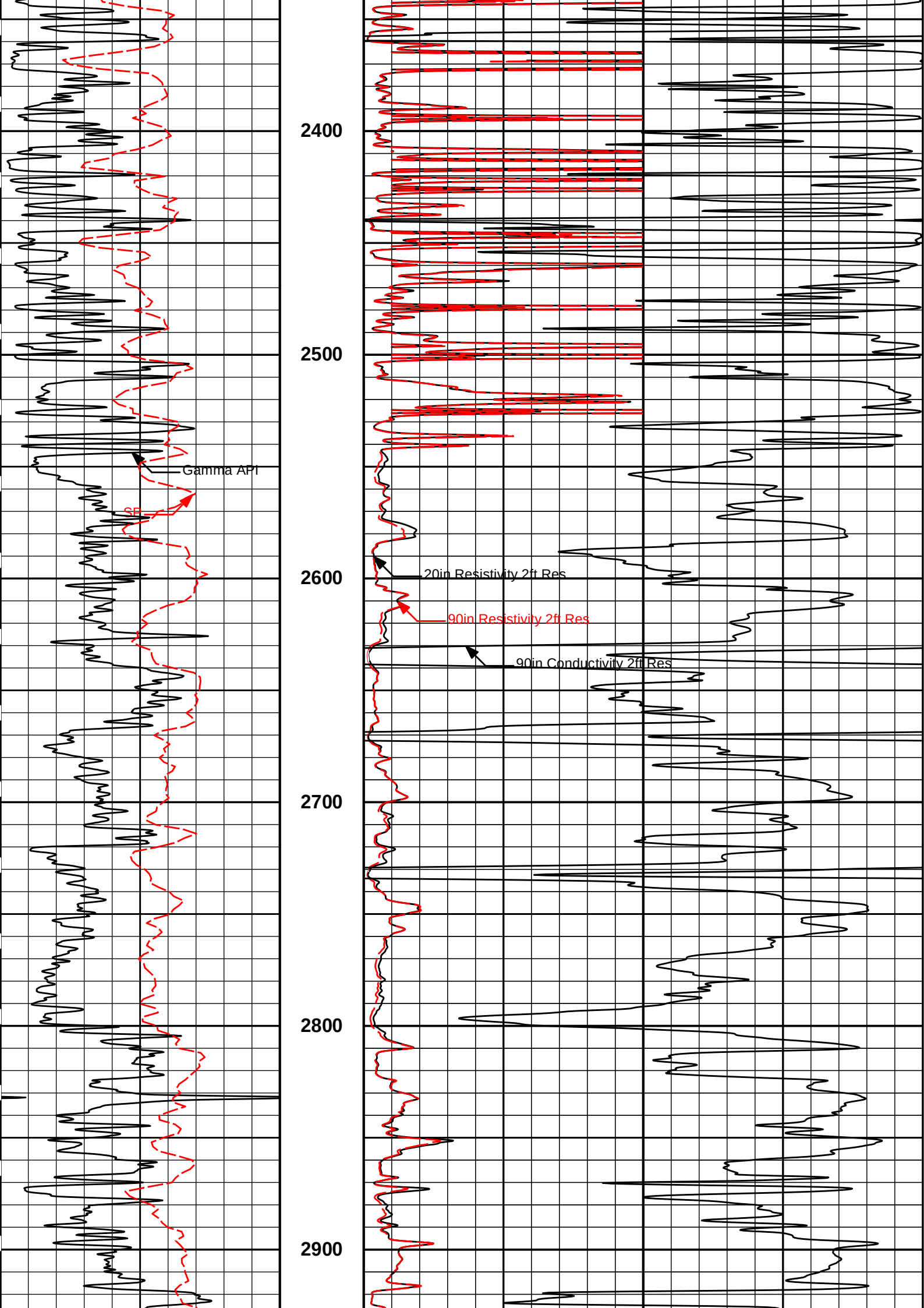
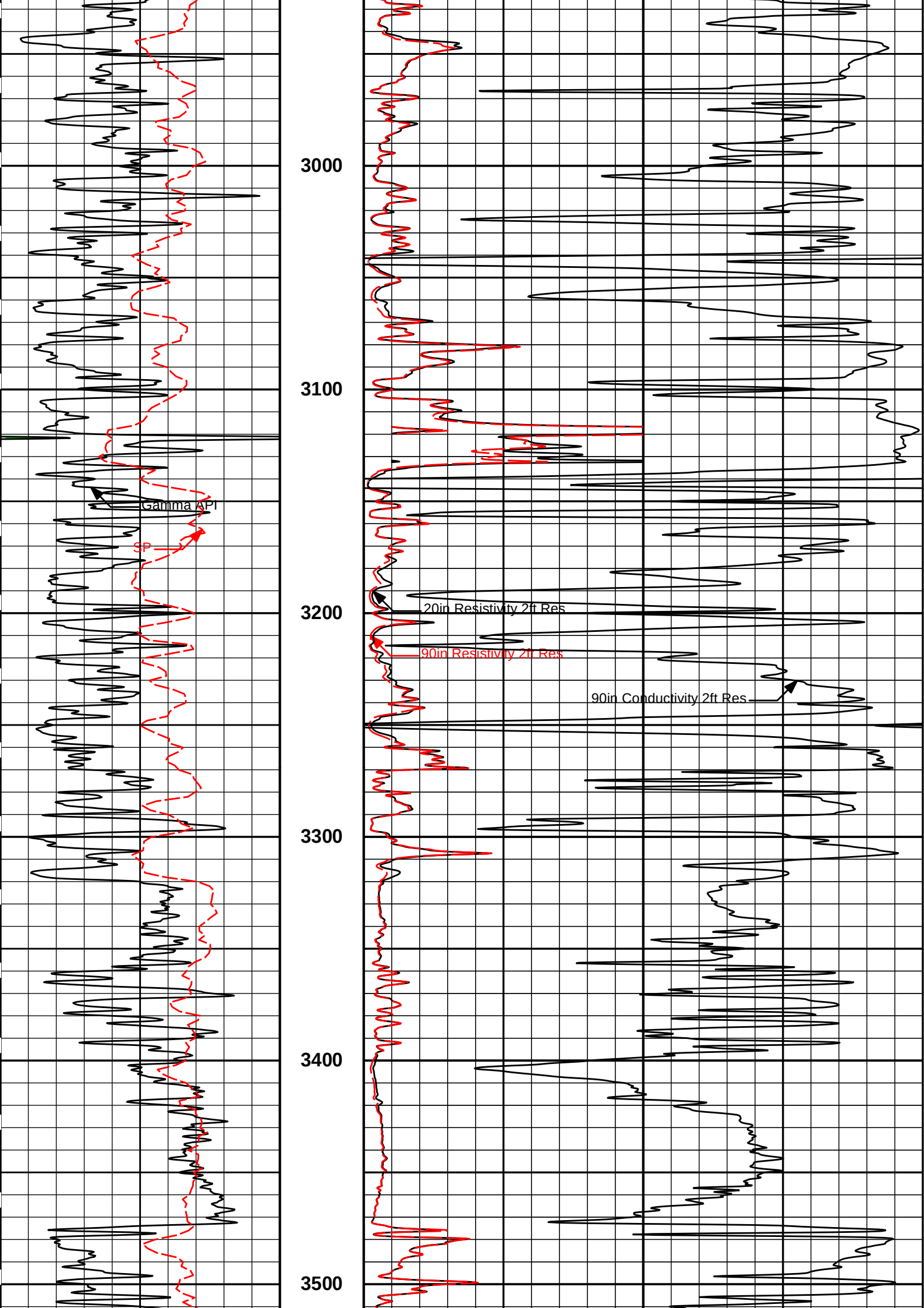
SP
20in Resistivity 2ft Res
90in Resistivity 2ft Res
90in Conductivity 2ft Res


2400
2500
Gamma API
SP
2600
20in Resistivity 2ft Res
90in Resistivity 2ft Res
90in Conductivity 2ft Res
2700
2800
2900


3000
3100
3200
3300
3400
3500
Gamma API
SP
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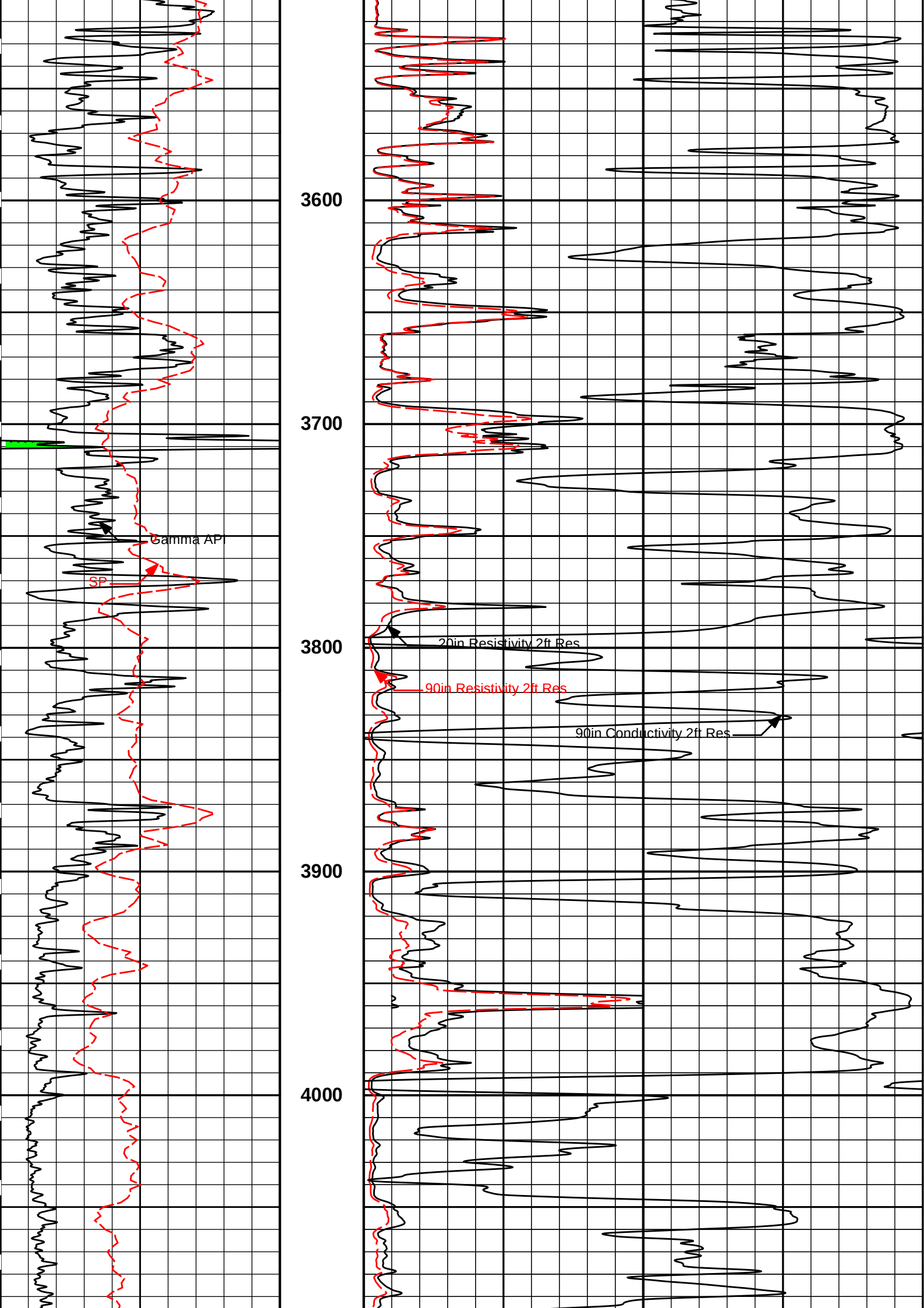
90in Resistivity 2ft Res
90in Conductivity 2ft Res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3700
3800
3900
4000
Gamma API
SP
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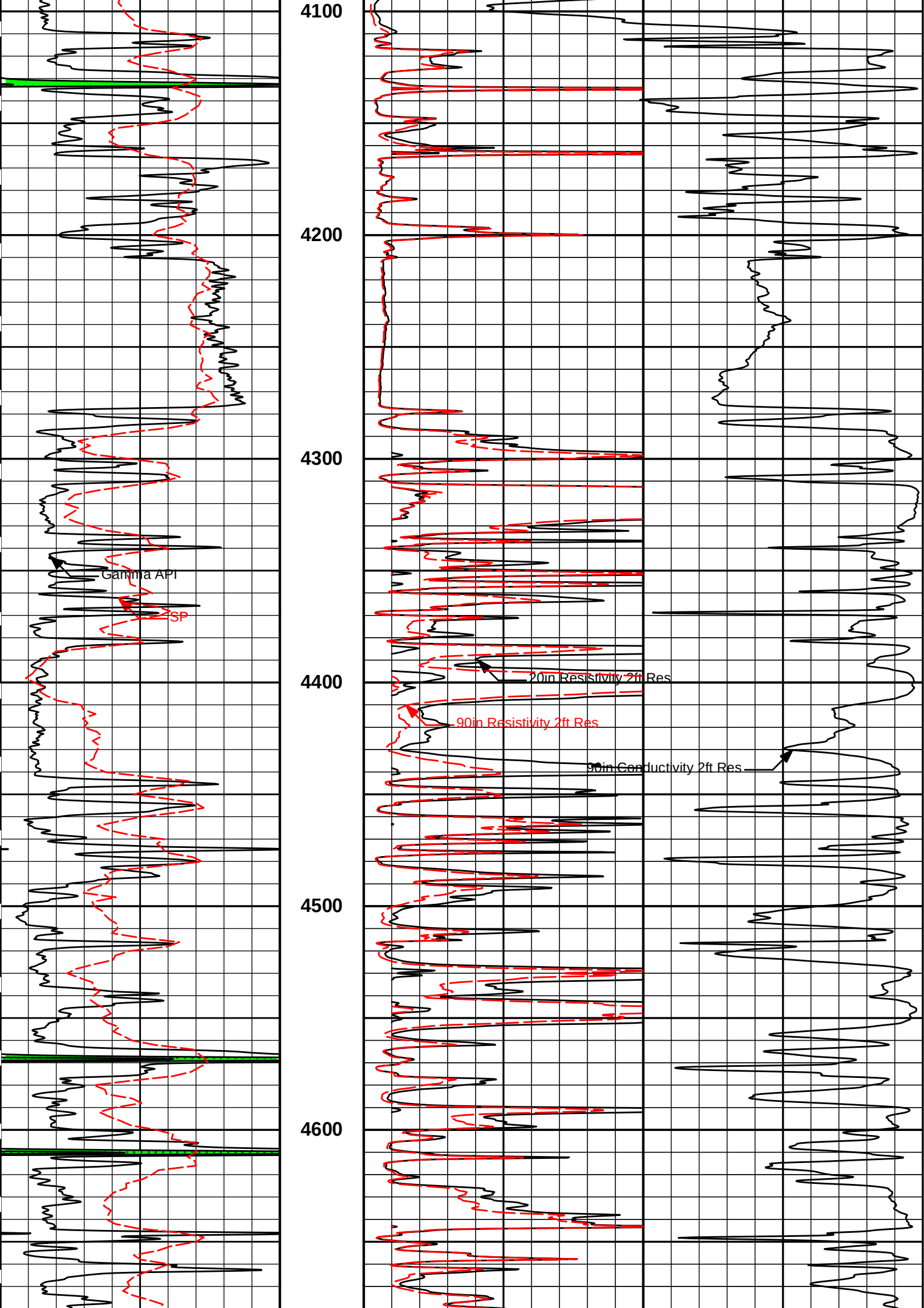
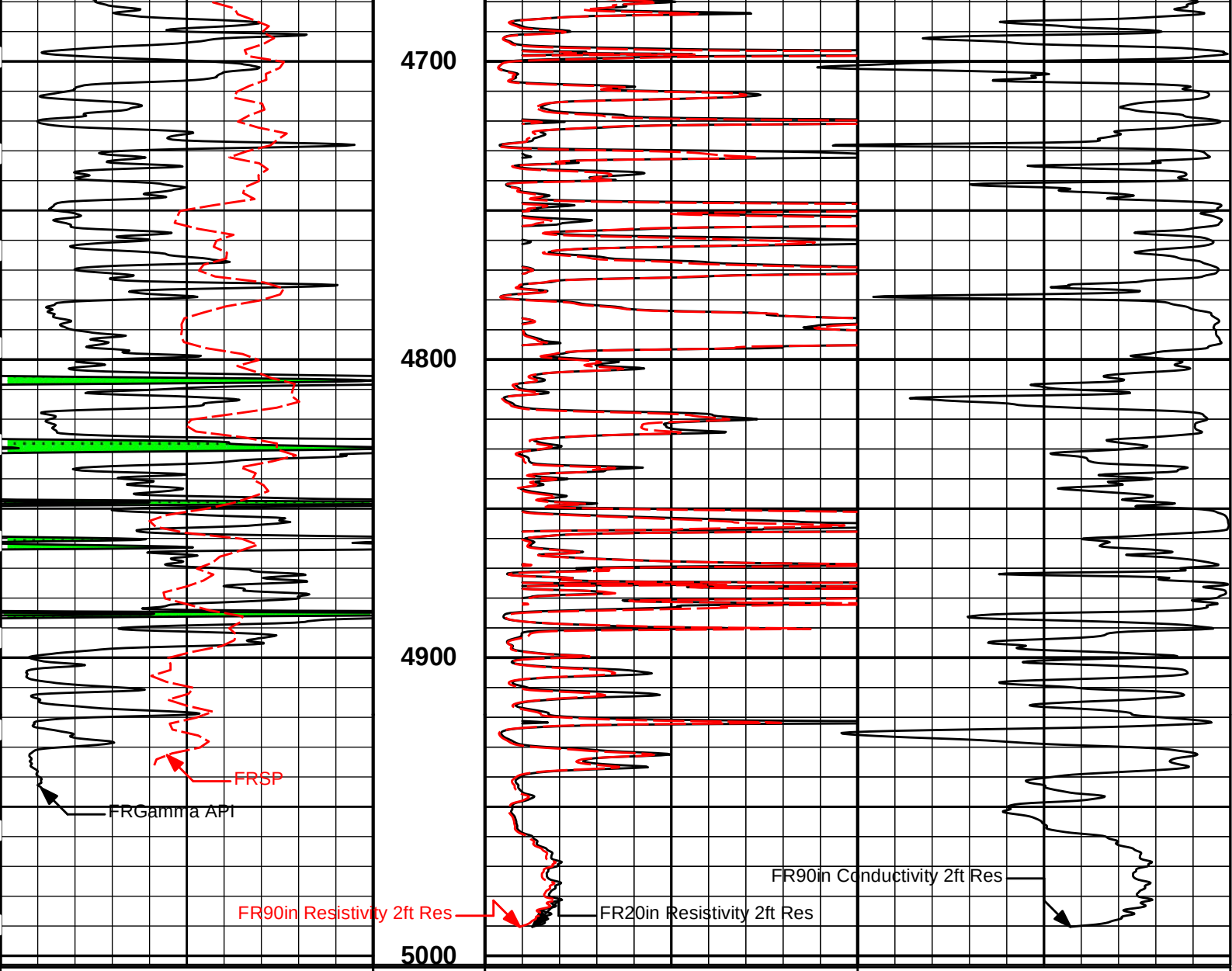
90in Resistivity 2ft Res
90in Conductivity 2ft Res


4100
4200
4300
4400
4500
4600
Gamma API
SP
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: 30-Jan-19 17:04:43
Plot Range: 450 ft to 5003.08 ft
Data: HERMAN_BRENSING\Well Based\DAQ-0002-002\
Plot File: \\-LOCAL-\HERMAN_BRENSING\0001 RWCH-SP-GTET-DSNT-SDLT-BSAT-ACRT\ACRT\ACRT_2_main

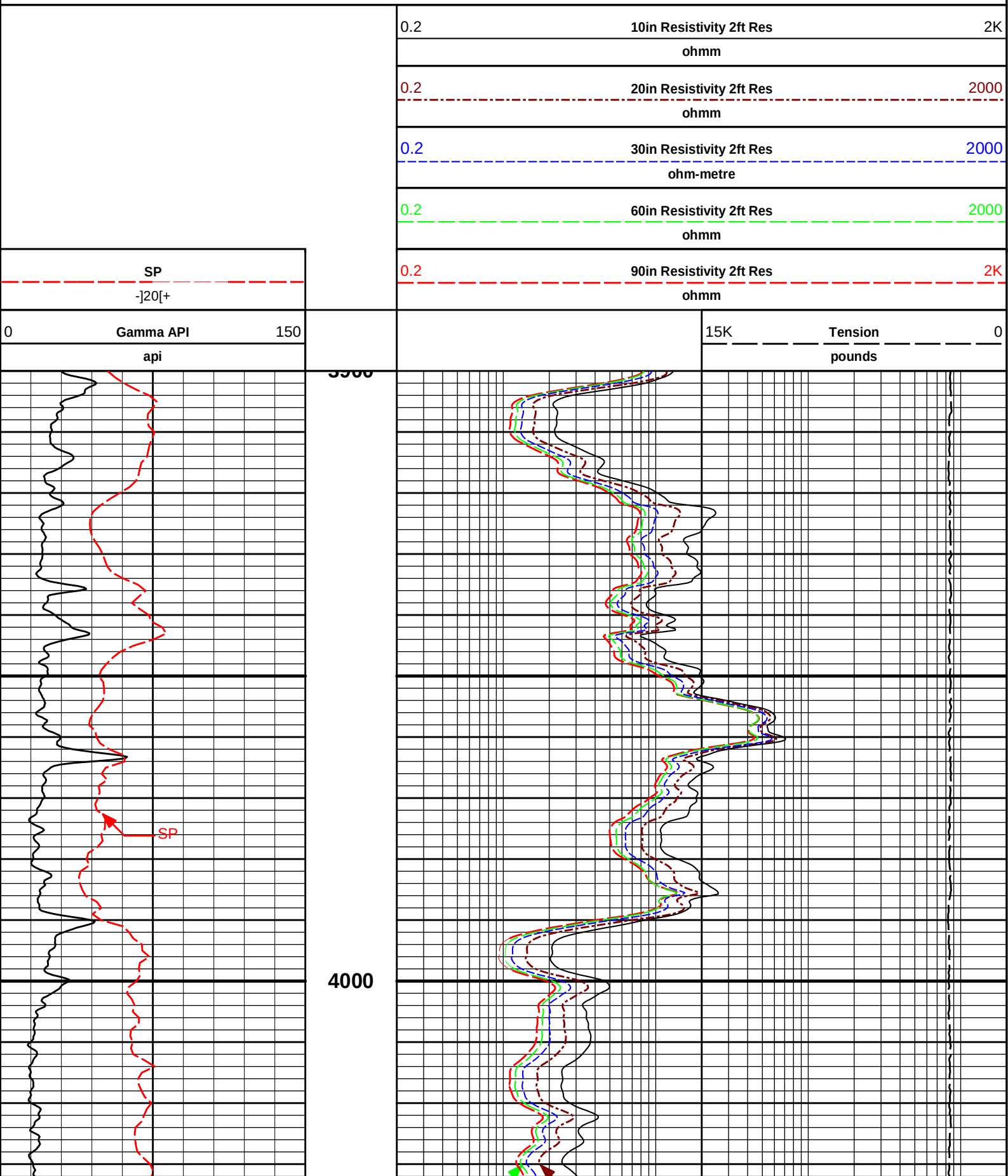
2 INCH MAIN LOG

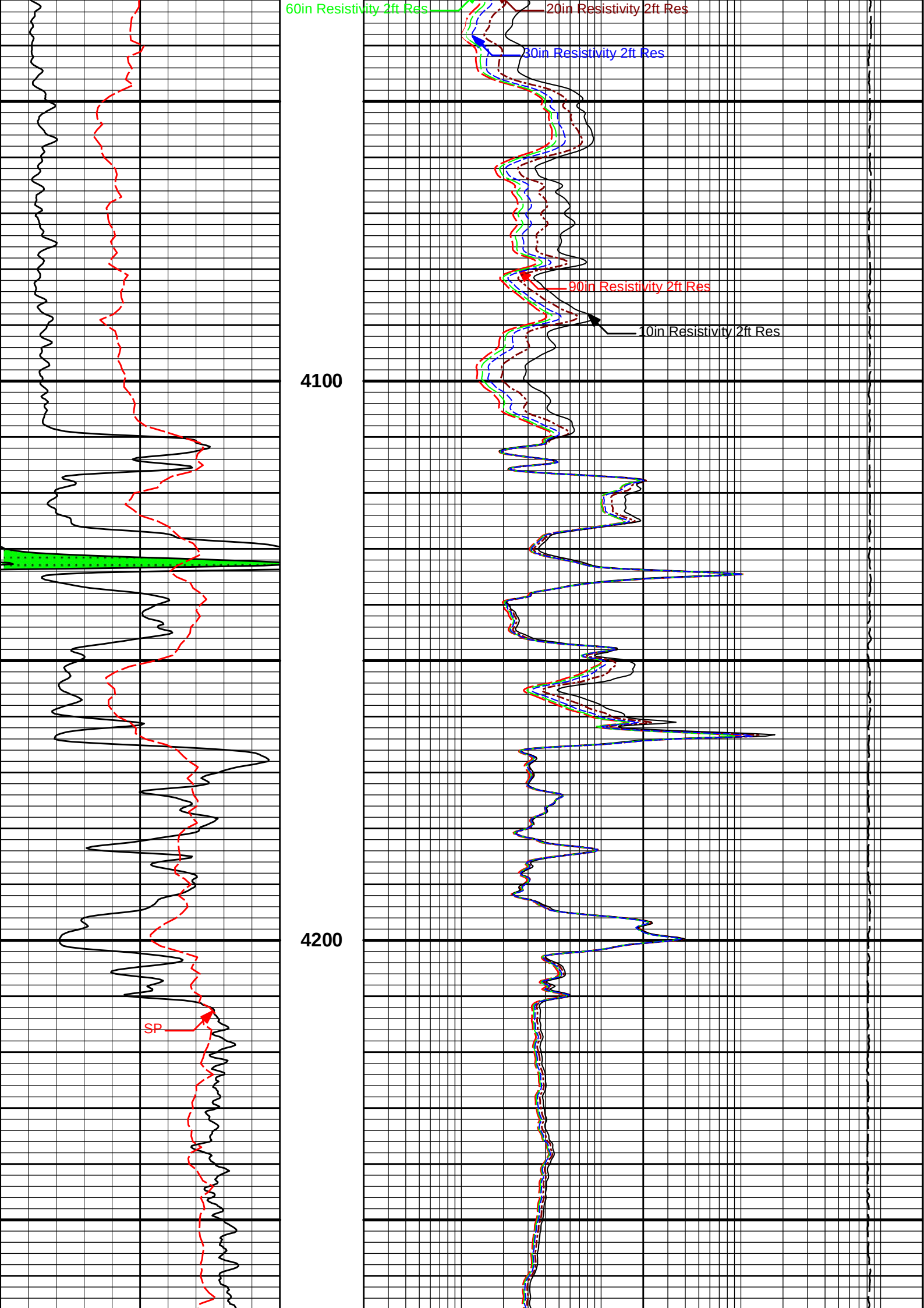
2 INCH MAIN LOG

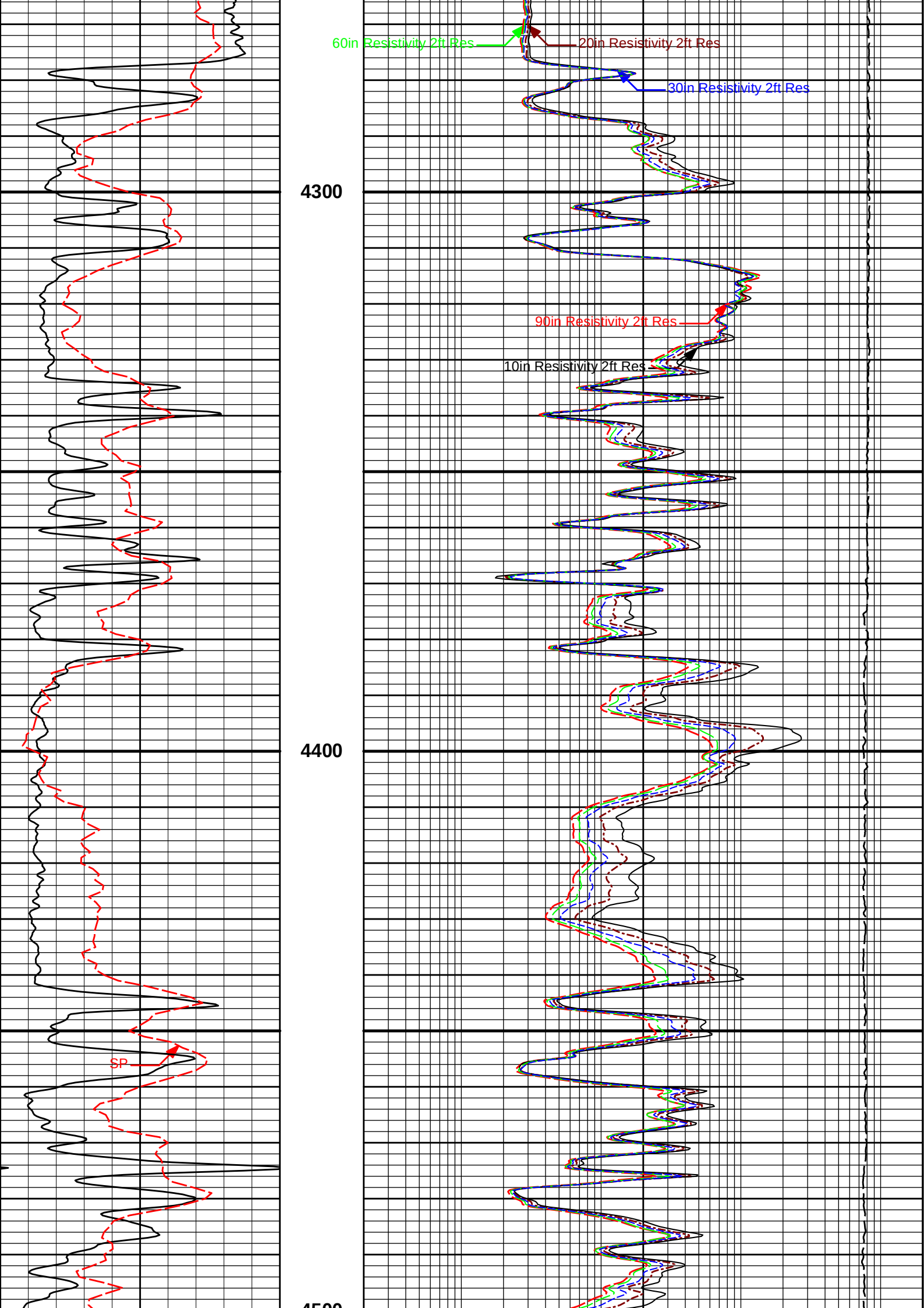
HALLIBURTON

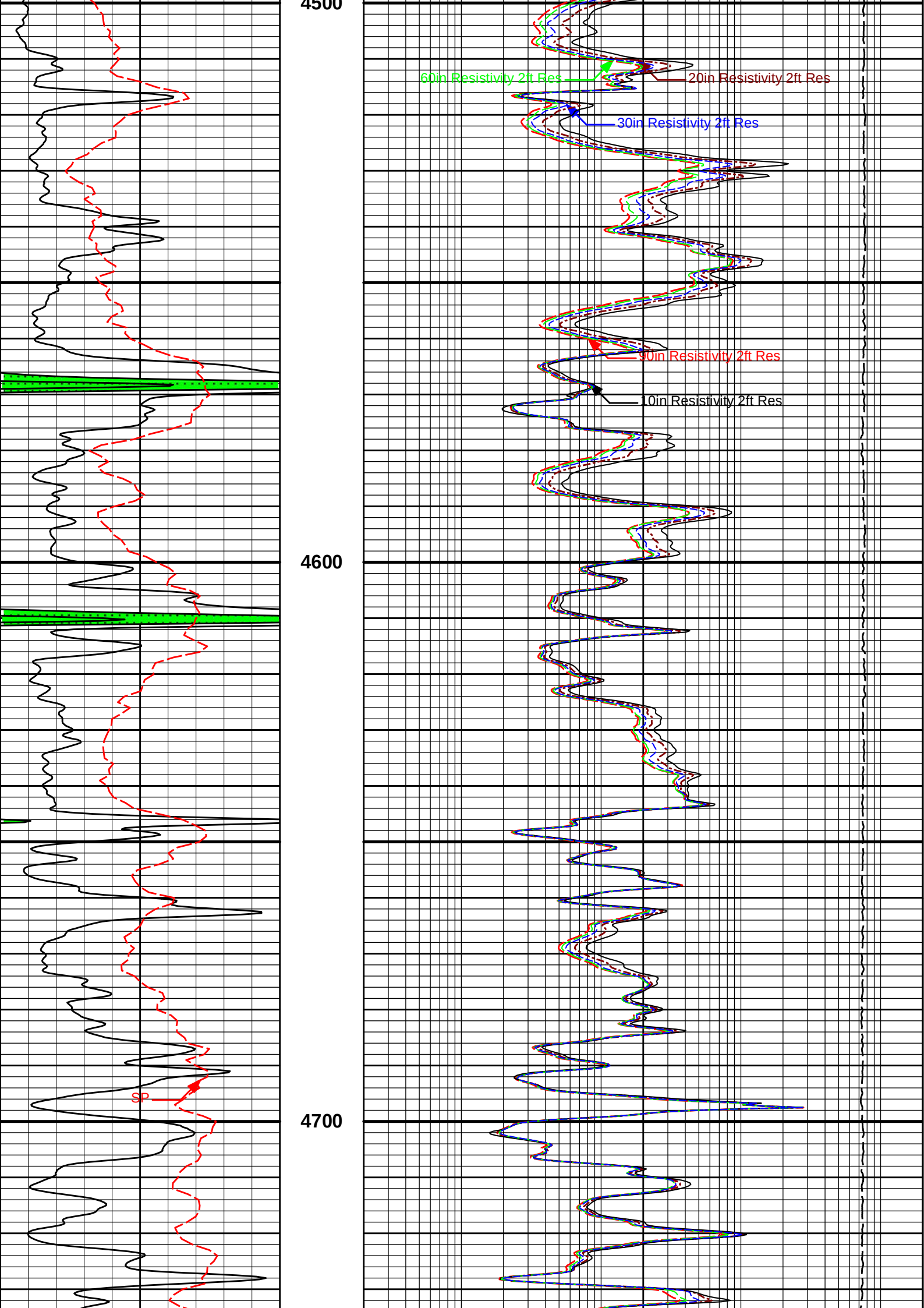
Plot Time: 30-Jan-19 17:04:43
Plot Range: 3900 ft to 5003.08 ft
Data: HERMAN_BRENSING\Well Based\DAQ-0002-002\
Plot File: \\-LOCAL-\HERMAN_BRENSING\0001 RWCH-SP-GTET-DSNT-SDLT-BSAT-ACRT\ACRT\ACRT_5inch_main

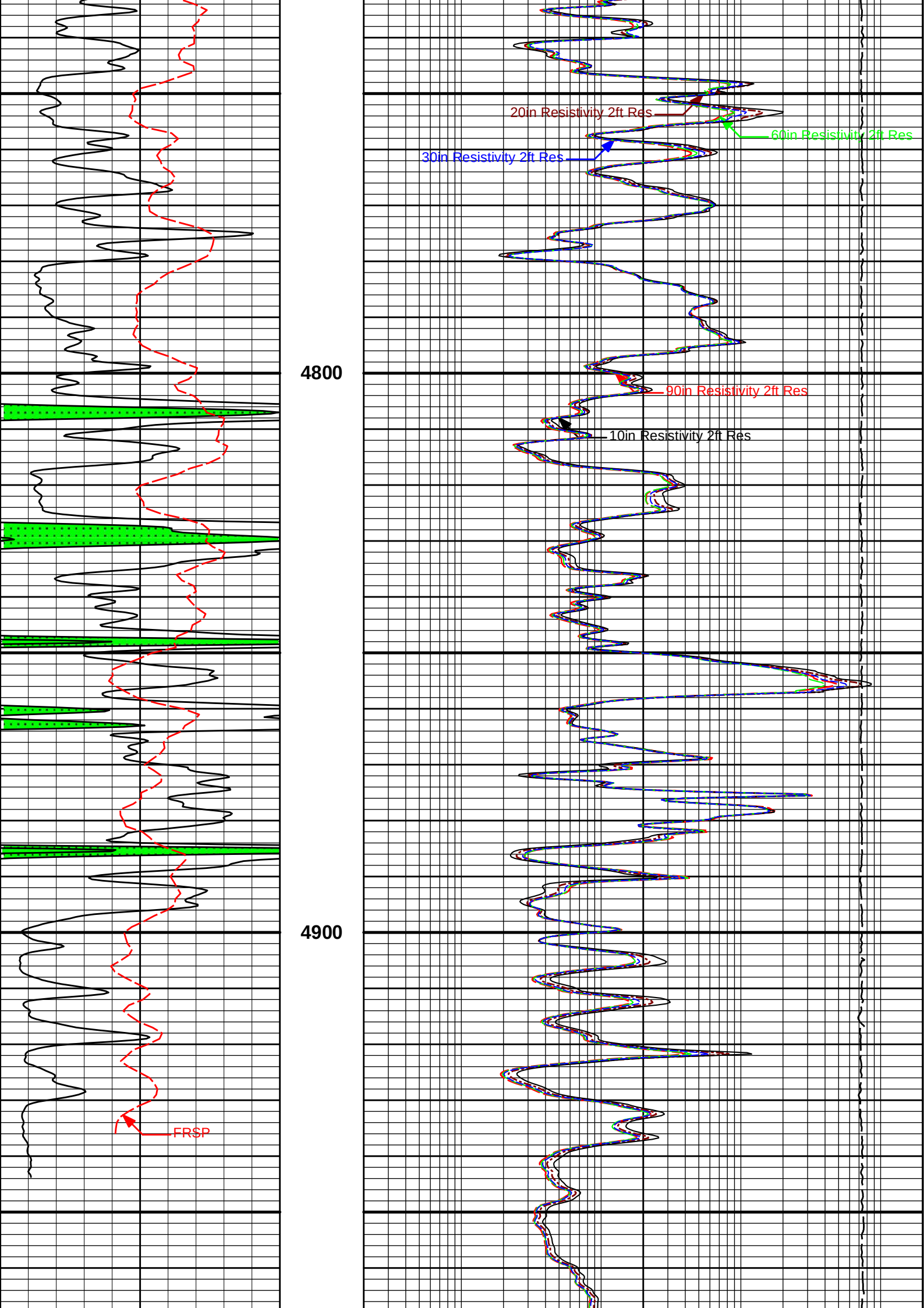
5 INCH MAIN LOG

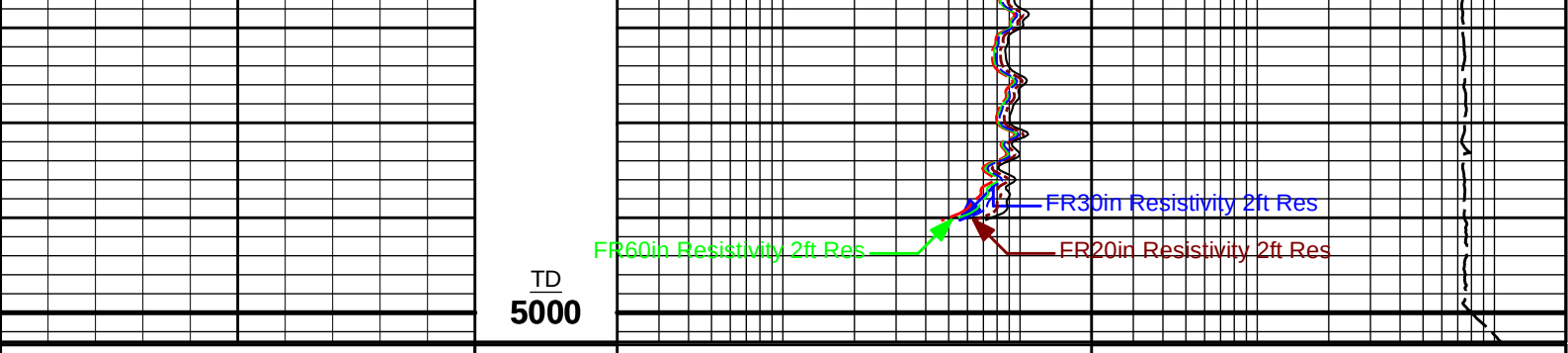



60in Resistivity 2ft Res
20in Resistivity 2ft Res
30in Resistivity 2ft Res
90in Resistivity 2ft Res
10in Resistivity 2ft Res
4100
4200
SP


60in Resistivity 2ft Res
20in Resistivity 2ft Res
30in Resistivity 2ft Res
4300
90in Resistivity 2ft Res
10in Resistivity 2ft Res
4400
SP


4500
60in Resistivity 2ft Res
20in Resistivity 2ft Res
30in Resistivity 2ft Res
90in Resistivity 2ft Res
10in Resistivity 2ft Res
4600
SP
4700


20in Resistivity 2ft Res
60in Resistivity 2ft Res
30in Resistivity 2ft Res
4800
90in Resistivity 2ft Res
10in Resistivity 2ft Res
4900
FRSP



0 Gamma API 150		15K Tension 0
api		pounds
SP	0.2 90in Resistivity 2ft Res	2K
-]20[+	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: 30-Jan-19 17:04:46
Plot Range: 3900 ft to 5003.08 ft
Data: HERMAN_BRENSING\Well Based\DAQ-0002-002\
Plot File: \\-LOCAL-\HERMAN_BRENSING\0001 RWCH-SP-GTET-DSNT-SDLT-BSAT-ACRT\ACRT\ACRT_5inch_main

5 INCH MAIN LOG

5 INCH MAIN LOG

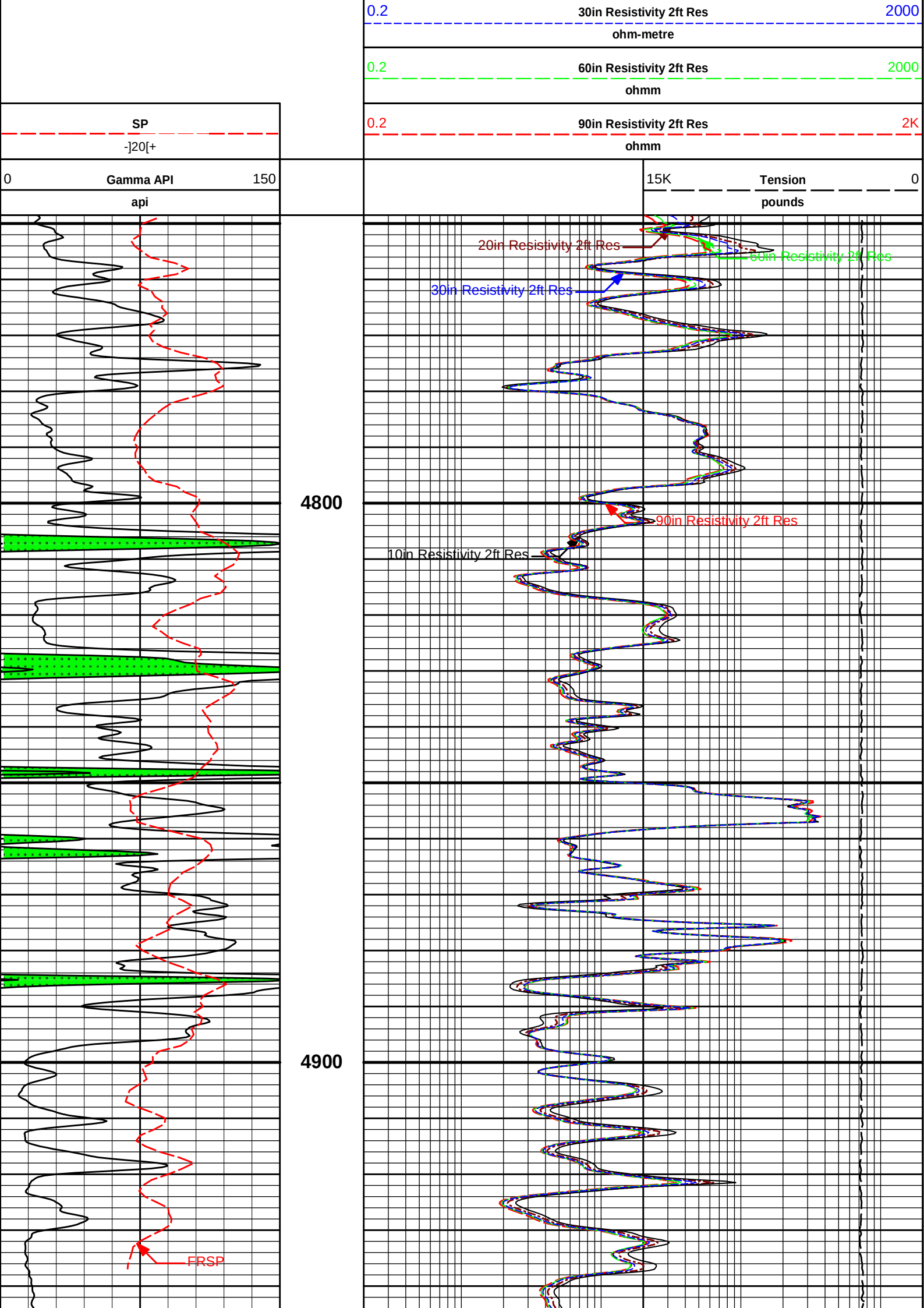
HALLIBURTON

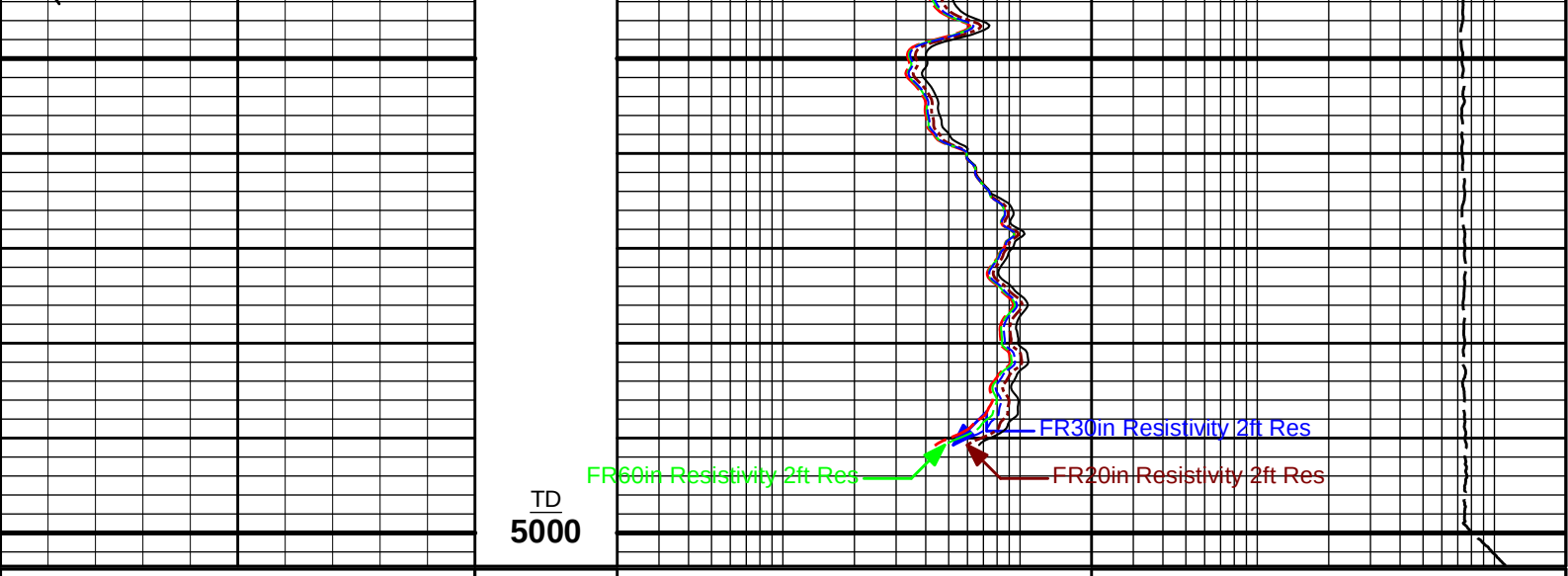
Plot Time: 30-Jan-19 17:04:46
Plot Range: 4748.5 ft to 5003.5 ft
Data: HERMAN_BRENSING\Well Based\REPEAT\
Plot File: \\-LOCAL-\HERMAN_BRENSING\0001 RWCH-SP-GTET-DSNT-SDLT-BSAT-ACRT\ACRT\ACRT_5inch_main

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
SP
0.2
90in Resistivity 2ft Res
2K
ohmm
-]20[+
0
Gamma API
150
api
15K
Tension
0
pounds
20in Resistivity 2ft Res
60in Resistivity 2ft Res
30in Resistivity 2ft Res
90in Resistivity 2ft Res
10in Resistivity 2ft Res
4800
4900
FRSP



0 Gamma API 150		15K Tension 0
api		pounds
SP	0.2 90in Resistivity 2ft Res 2K	
-]20[+	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: 30-Jan-19 17:04:48
Plot Range: 4748.5 ft to 5003.5 ft
Data: HERMAN_BRENSING\Well Based\REPEAT\
Plot File: \\-LOCAL-\HERMAN_BRENSING\0001 RWCH-SP-GTET-DSNT-SDLT-BSAT-ACRT\ACRT\ACRT_5inch_main

REPEAT SECTION

REPEAT SECTION

HALLIBURTON

CALIBRATION REPORT

SURFACE TENSION SHOP CALIBRATION

Tool Name:	**Depth Panel - 12345678**	**Reference Calibration Date:**	**07-Jan-19 16:27:03**
Engineer:	**SEAN WOLTEMATH**	**Calibration Date:**	**09-Jan-19 20:45:16**
Software Version:	**WL INSITE R5.8.9 (Build 6)**	**Calibration Version:**	**1**

SURFACE TENSION LOAD CELL

Measurement	Load Cell Value	Measurement	Calibrated	Units
Low	10261.13	56.05	0.00	lbs
High	17547.65	7892.32	7830.00	lbs

DOWNHOLE TENSION SHOP CALIBRATION

Tool Name:	**RWCH - 12345678**	**Reference Calibration Date:**	**09-Jan-19 20:48:08**
Engineer:	**WHITLOCK**	**Calibration Date:**	**20-Jan-19 09:15:27**
Software Version:	**WL INSITE R5.8.9 (Build 6)**	**Calibration Version:**	**1**

DOWNHOLE LOAD CELL

Measurement	Tool Value	Measurement	Calibrated	Units
Low	-105.48	98.98	0.00	lbs
High	20090.40	5035.86	2420.00	lbs

NATURAL GAMMA RAY TOOL SHOP CALIBRATION

Tool Name:	**GTET - 11013113**	**Reference Calibration Date:**	**27-Nov-18 10:49:38**
Engineer:	**WHITLOCK**	**Calibration Date:**	**14-Dec-18 10:17:09**
Software Version:	**WL INSITE R5.8.9 (Build 6)**	**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	19.9	19.6	api
Background + Calibrator	249.5	245.5	api
Calibrator	229.5	225.9	api

NATURAL GAMMA RAY TOOL FIELD CALIBRATION

Tool Name:	**GTET - 11013113**	**Reference Calibration Date:**	**14-Dec-18 10:17:09**
Engineer:	**WHITLOCK**	**Calibration Date:**	**29-Jan-19 19:13:52**
Software Version:	**WL INSITE R5.8.9 (Build 6)**	**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	19.6	21.5	api
Background + Calibrator	245.5	243.3	api
Calibrator	225.9	221.8	api

Shop	Field	Difference	Tolerance
225.9	221.8	4.1	+/- 9.00

DUAL SPACED NEUTRON SHOP CALIBRATION

Tool Name:	**DSNT - 11019641**	**Reference Calibration Date:**	**04-Aug-18 12:26:27**
Engineer:	**SEAN WOLTEMATH**	**Calibration Date:**	**07-Nov-18 10:07:09**
Software Version:	**WL INSITE R5.8.9 (Build 6)**	**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: 66 degF
Min. Tool Housing Outside Diameter: 3.625 in

CALIBRATION CONSTANTS

Measurement	Prev. Value	New Value	Control Limit On New Value
Gain:	0.97742	0.98053	0.900 - 1.100

WATER TANK SUMMARY (Horizontal Water Tank)

Measurement	Current Reading (Previous Coef.)	Calibrated (New Coef.)	Change	Control Limit On Change

Porosity (decp):	0.2348	0.2358	0.0010	+/- 0.0020
Calibrated Ratio:	10.5259	10.5595	0.034	+/- 0.050

VERIFIER		
Measurement	**Value**	**Control Limit**
Snow-Block Porosity (decp):	0.0724	0.02000 - 0.09000

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

DUAL SPACED NEUTRON FIELD CALIBRATION

Tool Name: DSNT - 11019641
Reference Calibration Date: 07-Nov-18 10:07:09
Engineer: WHITLOCK
Calibration Date: 29-Jan-19 18:55:12
Software Version: WL INSITE R5.8.9 (Build 6)
Calibration Version: 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):	0.0724	0.0771	0.0047	+/- 0.0150

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

DENSITY CALIPER SHOP CALIBRATION

Tool Name: SDLT - 10960494
Reference Calibration Date: 01-Jan-70 00:00:00
Engineer: SEAN WOLTEMATH
Calibration Date: 28-Dec-18 10:43:24
Software Version: WL INSITE R5.6.3 (Build 4)
Calibration Version: 1
Host Tool Name: 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	
Calibration Coefficients Range Check:	Passed

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:**	**28-Dec-18 10:43:24**
Engineer:	**WHITLOCK**	**Calibration Date:**	**29-Jan-19 18:52:29**
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:**	**06-Jul-18 13:24:46**
Engineer:	**WHITLOCK**	**Calibration Date:**	**31-Oct-18 14:22:50**
Software Version:	**WL INSITE R5.8.9 (Build 6)**	**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

TOOL OK TO LOG

TOOL OK TO LOG

QUALITY CHECK SHOP CALIBRATION

Tool Name:	**ACRt Sonde - 11830728**	**Reference Calibration Date:**	**06-Jun-18 14:01:20**
Engineer:	**WHITLOCK**	**Calibration Date:**	**31-Oct-18 14:33:20**
Software Version:	**WL INSITE R5.8.9 (Build 6)**	**Calibration Version:**	**1**
Host Tool Name:	**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")	-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

Tool Name: Microlog Pad - 10960494
Reference Calibration Date: 30-Sep-18 13:47:51
Engineer: WHITLOCK
Calibration Date: 14-Dec-18 13:35:14
Software Version: WL INSITE R5.8.9 (Build 6)
Calibration Version: 1
Host Tool Name: DSNT - 11019641

CALIBRATION COEFFICIENT SUMMARY

Measurement	Micro Log Normal		Micro Log Lateral		
	Measured	Calibrated	Measured	Calibrated	Units
Tool Zero	-0.14	-0.07	-0.01	-0.01	ohmm
Calibration Point #1	-0.07	0.00	-0.00	0.00	ohmm
Calibration Point #2	19.86	20.00	19.94	20.00	ohmm
Internal Reference	19.80	19.93	19.94	20.00	ohmm

Measurement	Micro Log Normal Tool Value	Micro Log Lateral Tool Value	Units
Tool Zero	-0.06	0.13	V
Calibration Point #1	18.08	2.07	V
Calibration Point #2	5320.00	6936.65	V
Internal Reference	5302.63	6935.59	V

MICRO LOG FIELD CHECK

Tool Name: Microlog Pad - 10960494
Reference Calibration Date: 14-Dec-18 13:35:14
Engineer: WHITLOCK
Calibration Date: 29-Jan-19 19:11:49
Software Version: WL INSITE R5.8.9 (Build 6)
Calibration Version: 1

Measurement	Micro Log Normal		Micro Log Lateral		
	Shop	Field	Shop	Field	Units
Tool Zero	-0.07	-0.07	-0.01	-0.01	ohmm
Internal Reference	19.93	19.94	20.00	20.00	ohmm

Summary

Signal	Shop	Field	Difference	Tolerence
Microlog Normal	19.93	19.94	-0.01	+/- 0.80
Microlog Lateral	20.00	20.00	0.00	+/- 0.80

SPECTRAL DENSITY SHOP CALIBRATION

Tool Name: SDLT Pad - 11213308
Reference Calibration Date: 14-Dec-18 10:49:18
Engineer: WHITLOCK
Calibration Date: 14-Dec-18 11:15:00
Software Version: WL INSITE R5.8.9 (Build 6)
Calibration Version: 1

Logging Source S/N: 5475GW
Aluminum Block S/N: El Reno Aluminum Block — Density: 2.581g/cc — Pe: 3.170
Magnesium Block S/N: El Reno Magnesium Block — Density: 1.687g/cc — Pe: 2.594

DENSITY CALIBRATION SUMMARY

Measurement	Previous Value	New Value	Control Limit
Near Bar Gain	0.9935	0.9902	0.90 - 1.10
Near Dens Gain	0.9891	0.9881	0.90 - 1.10
Near Peak Gain	1.0020	1.0148	0.90 - 1.10

Near Lith Gain	1.0071	1.0175	0.90 - 1.10
Far Bar Gain	1.0015	1.0048	0.90 - 1.10
Far Dens Gain	0.9919	0.9938	0.90 - 1.10
Far Peak Gain	0.9878	0.9921	0.90 - 1.10
Far Lith Gain	0.9743	0.9808	0.90 - 1.10
Near Bar Offset	0.1918	0.2246	NONE
Near Dens Offset	0.2308	0.2401	NONE
Near Peak Offset	0.0959	-0.0122	NONE
Near Lith Offset	0.0296	-0.0574	NONE
Far Bar Offset	0.0411	0.0135	NONE
Far Dens Offset	0.1442	0.1314	NONE
Far Peak Offset	0.1660	0.1305	NONE
Far Lith Offset	0.2364	0.1860	NONE
Near Bar Background	937.48	939.15	700 - 1450
Near Dens Background	311.57	312.43	230 - 480
Near Peak Background	135.23	136.70	100 - 210
Near Lith Background	166.58	166.31	125 - 260
Far Bar Background	479.15	478.16	450 - 900
Far Dens Background	191.75	190.12	175 - 345
Far Peak Background	77.50	76.92	70 - 140
Far Lith Background	79.00	78.81	75 - 145

CALIBRATION BLOCK SUMMARY

Measurement	Current Reading (Previous Coef)	Calibrated (New Coef)	Change	Control Limit On Change
MAGNESIUM				
Density (g/cc)	1.689	1.687	-0.002	+/- 0.015
Pe	2.556	2.551	-0.005	+/- 0.150
ALUMINUM				
Density (g/cc)	2.580	2.581	0.001	+/- 0.01500
Pe	3.107	3.123	0.016	+/- 0.150

TOOL SUMMARY

Measurement	Near Detector		Far Detector	
	Value	Control Limits	Value	Control Limits
QUALITY				
Background	-0.0000	+/- 0.0110	-0.0004	+/- 0.0140
Magnesium Block	-0.0005	+/- 0.0110	-0.0010	+/- 0.0140
Aluminum Block	-0.0013	+/- 0.0110	0.0004	+/- 0.0140
Resolution	9.27	6.00 - 11.50	9.45	6.00 - 11.50
Internal Verifier(B+D+P+L)	1555	1200 - 2700	824	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

Tool Name: SDLT Pad - 11213308 **Reference Calibration Date:** 14-Dec-18 11:15:00

Engineer: WHITLOCK **Calibration Date:** 29-Jan-19 19:18:47

Engineer: WHITLOCK Calibration Date: 29-Jan-19 19:18:47

Software Version: WL INSITE R5.8.9 (Build 6) Calibration Version: 1

Pad Temperature: 68.2 degF

DENSITY FIELD CALIBRATION SUMMARY

Measurement	Shop	Field	Change	Control Limit +/-
Near (B+D+P+L) cps	1554.595	1556.967	2.372	15.869
Far (B+D+P+L) cps	824.007	819.972	-4.035	15.826
Near Resolution	9.27	9.20	-0.070	0.50
Far Resolution	9.45	9.37	-0.080	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
Depth Panel-12345678						
Tension Zero	0.00	----------	----------	0.00	----------	lbs
Tension Cal	7830.00	----------	----------	0.00	----------	lbs
RWCH-12345678						
DH Tension Zero	0.00	----------	----------	0.00	----------	lbs
DH Tension Cal	2420.00	----------	----------	0.00	----------	lbs
GTET-11013113						
Gamma Ray Calibrator	225.9	221.8	----------	4.1	+/- 9.00	api
DSNT-11019641						
Snow-Block Porosity	0.0724	0.0771	----------	-0.0047	+/- 0.0150	decp
SDLT-10960494						
Pad Extension	3.75	3.79	----------	-0.04	+/-0.10	in
Ring Diameter	8.25	8.25	----------	0.00	+/-0.15	in
ACRt Sonde-11830728						
Mud Cell	0.99	----------	----------	0	----------	ohm-m
Microlog Pad-10960494						
MicroLog Normal	19.93	19.94	----------	-0.01	+/-0.80	ohmm
MicroLog Lateral	20.00	20.00	----------	0.00	+/-0.80	ohmm
SDLT Pad-11213308						
Near(B+D+P+L)	1554.595	1556.967	----------	-2.372	+/-15.869	cps
Far(B+D+P+L)	824.007	819.972	----------	4.035	+/-15.826	cps

Data: HERMAN_BRENSING\0001 RWCH-SP-GTET-DSNT-SDLT-BSAT-ACRT\IDLE **Date: 30-Jan-19 12:26:04**

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	9.000	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	1.000	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	CSTR	Compressive Strength	1000.00	psia
SHARED	ST	Surface Temperature	75.0	degF
SHARED	TD	Total Well Depth	5000.00	ft
SHARED	BHT	Bottom Hole Temperature	125.0	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	
BSAT	MBOK	Compute BCAS Results?	Yes	
BSAT	FLLO	Frequency Filter Low Pass Value?	5000	Hz
BSAT	FLHI	Frequency Filter High Pass Value?	27000	Hz
BSAT	DTFL	Delta -T Pore Fluid	189.00	uspf
BSAT	DTMT	Delta -T Matrix Type	Limestone 47.6	

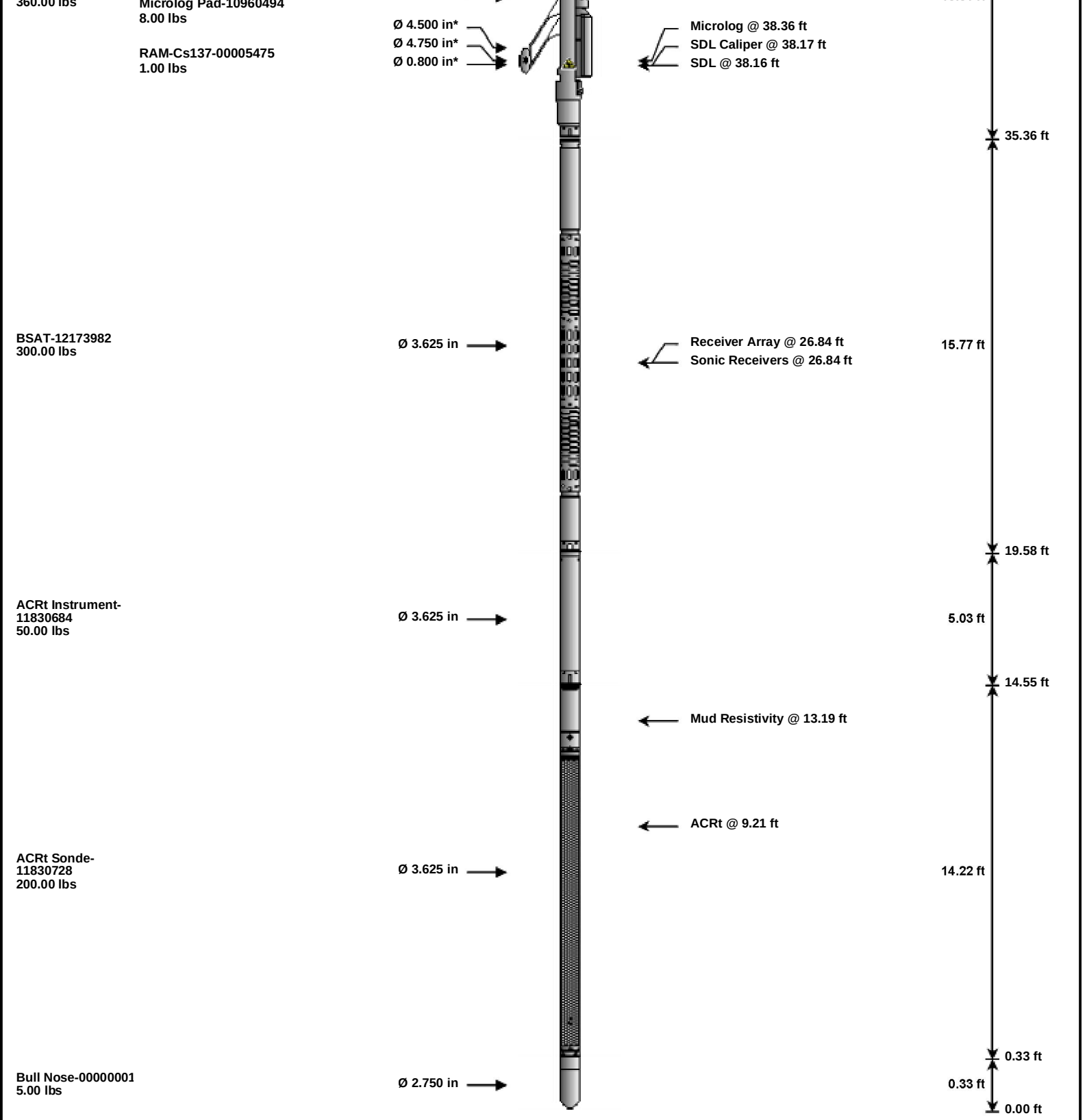
	BSAT	DTSH	Delta -T Shale	100.00	uspf
	BSAT	SPEQ	Acoustic Porosity Equation	Wylie	
	ACRt Sonde	RTOK	Process ACRt?	Yes	
	ACRt Sonde	MNSO	Minimum Tool Standoff	1.50	in
	ACRt Sonde	TCS1	Temperature Correction Source	FP Lwr & FP Upr	
	ACRt Sonde	TPOS	Tool Position	Free Hanging	
	ACRt Sonde	RMOP	Rmud Source	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					

Data: HERMAN_BRENSING\0001 RWCH-SP-GTET-DSNT-SDLT-BSAT-ACRT\IDLE **Date: 30-Jan-19 12:27:38**

HALLIBURTON

TOOL STRING DIAGRAM REPORT

Description	Overbody Description	O.D.	Diagram	Sensors @ Delays	Length	Accumulated Length
		Ø 2.310 in		Fishing Neck @ 73.49 ft		74.37 ft
RWCH-12345678 135.00 lbs		Ø 3.625 in		Load Cell @ 70.68 ft BH Temperature @ 70.12 ft	6.25 ft	
	Weak Point Solid-00000025 0.01 lbs	Ø 0.010 in*				68.12 ft
SP Sub-11812437 60.00 lbs		Ø 3.625 in		SP @ 66.34 ft	3.74 ft	
				Z-Accelerometer @ 63.93 ft		64.38 ft
GTET-11013113 165.00 lbs		Ø 3.625 in		GammaRay @ 58.32 ft	8.52 ft	
						55.86 ft
DSNT-11019641 174.00 lbs	DSN Decentralizer-11660709 6.60 lbs	Ø 5.000 in* Ø 3.625 in		DSN Far @ 48.92 ft DSN Near @ 48.17 ft	9.69 ft	
						46.17 ft
SDLT-10960494	SDLT Pad-11213308 65.00 lbs	Ø 4.500 in			10.81 ft	



Mnemonic	Tool Name	Serial Number	Weight (lbs)	Length (ft)		Accumulated Length (ft)	Max.Log. Speed (fpm)
RWCH	Releasable Wireline Cable Head	12345678	135.00	6.25		68.12	300.00
WPSS	Weak Point Solid	00000025	0.01	0.01	*	68.12	300.00
SP	SP Sub	11812437	60.00	3.74		64.38	300.00
GTET	Gamma Telemetry Tool	11013113	165.00	8.52		55.86	60.00
DSNT	Dual Spaced Neutron	11019641	174.00	9.69		46.17	60.00
DCNT	DSN Decentralizer	11660709	6.60	5.13	*	49.50	300.00
SDLT	Spectral Density Tool	10960494	360.00	10.81		35.36	60.00
SDLP	Density Insite Pad	11213308	65.00	2.55	*	37.57	60.00
Cs137	Logging Source, SDLT-I, 1.78 Ci - Cs137	00005475	1.00	0.80	*	37.80	300.00
MICP	Microlog Pad	10960494	8.00	1.00	*	37.86	60.00
BSAT	Borehole Sonic Array Tool	12173982	300.00	15.77		19.58	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	00000001	5.00	0.33		0.00	300.00
Total			**1,529.61**	**74.37**			

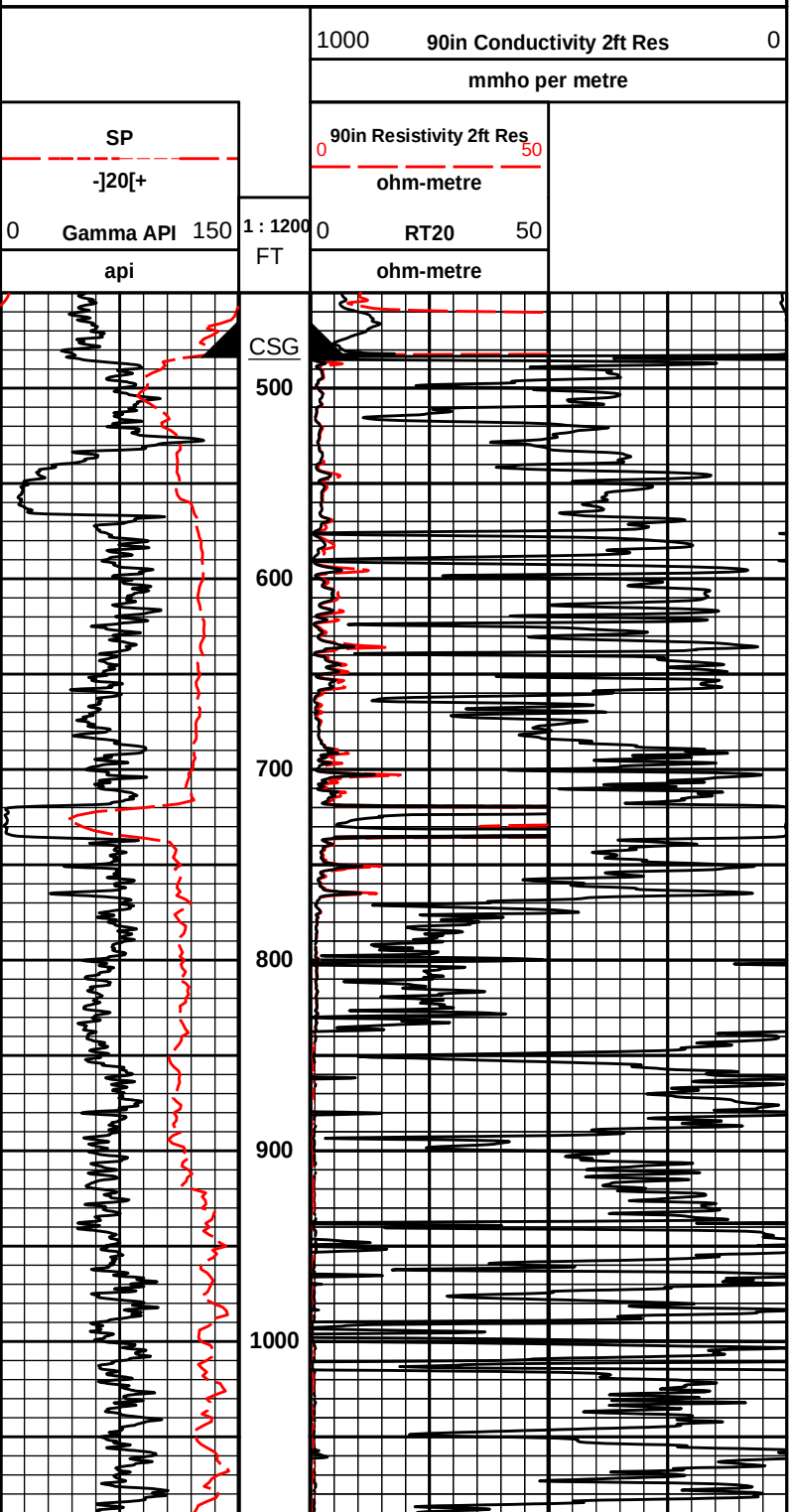
* Not included in Total Length and Length Accumulation

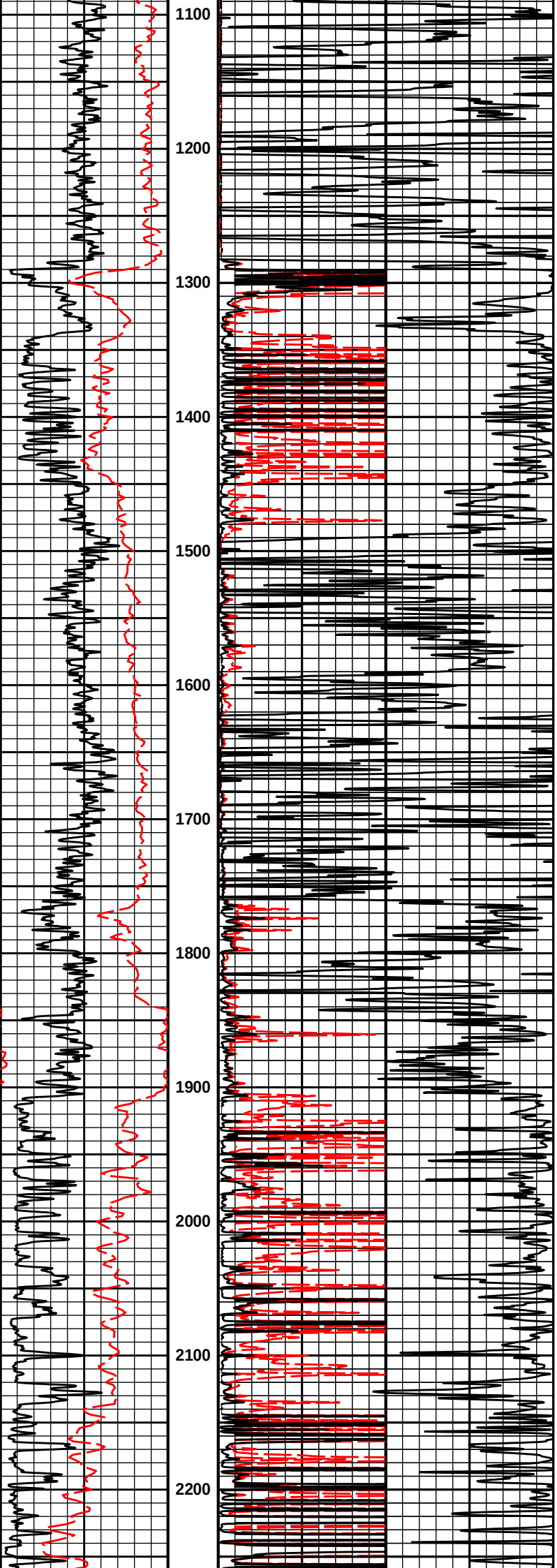
HALLIBURTON

Plot Time: 30-Jan-19 17:05:02
Plot Range: 450 ft to 5003 ft
Data: HERMAN_BRENSING\Well Based\DAQ-0002-002\
Plot File: \\-LOCAL-\HERMAN_BRENSING\0001 RWCH-SP-GTET-DSNT-SDLT-BSAT-ACRT\ACRT\ACRT_1_main

1 INCH MAIN LOG

1 INCH CORRELATION LOG

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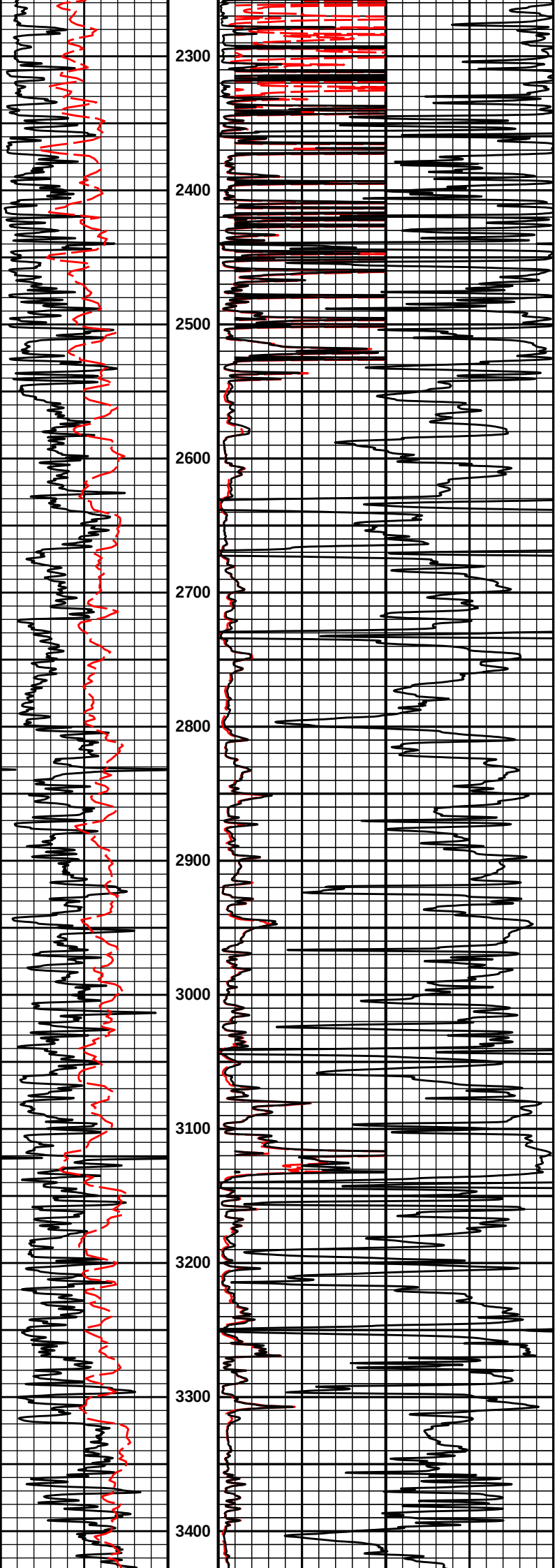
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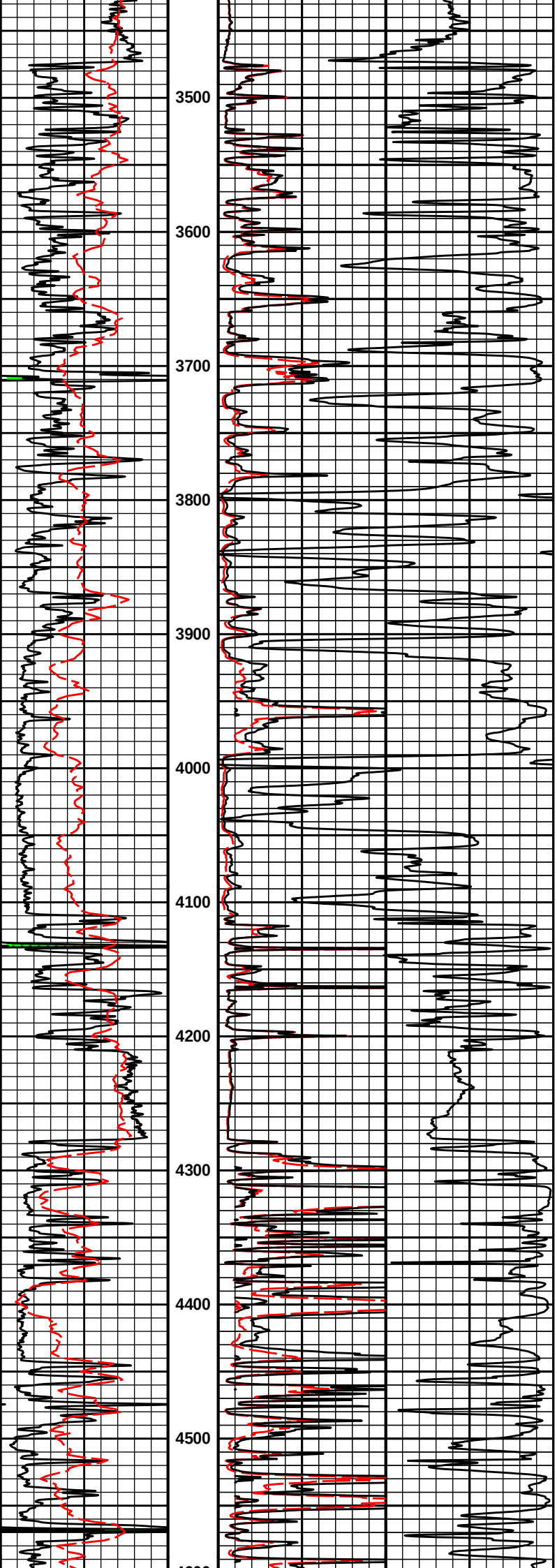
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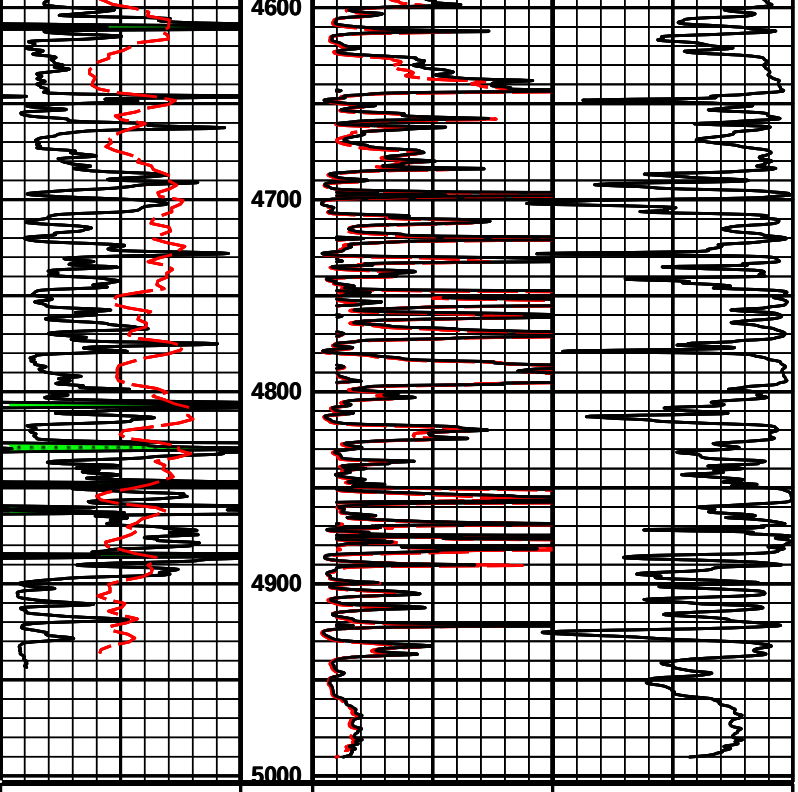

0 Gamma API 150	1 : 1200 FT	0 RT20 50
api		ohm-metre
SP		90in Resistivity 2ft Res 0 50
-]20[+		ohm-metre
		1000 90in Conductivity 2ft Res 0
		mmho per metre

HALLIBURTON

Plot Time: 30-Jan-19 17:05:04
Plot Range: 450 ft to 5003 ft
Data: HERMAN_BRENSING\Well Based\DAQ-0002-002
Plot File: \\-LOCAL-\HERMAN_BRENSING\0001 RWCH-SP-GTET-DSNT-SDLT-BSAT-ACRT\ACRT\ACRT_1_main

1 INCH MAIN LOG

1 INCH CORRELATION LOG