HALLIBURTON

SPECTRAL DENSITY DUAL SPACED NEUTRON ARRAY COMPENSATED TRUE RESISTIVITY

COMPANY NOBLE ENERGY
WELL SHABLE G17-23D
FIELD WATTENBERG
COUNTY WELD
STATE CO

COMPANY	NOBLE ENERGY	
WELL	SHABLE G17-23D	
FIELD	WATTENBERG	
COUNTY	WELD	STATE CO
API No.	05123348000000	Other Services: RWCH CSNG
Location	SHL: 689' FSL & 1991 FEL SWSE LAT: 40.307050 LONG: -104.684640	
Sect. 17	Twp. 4N	Rge. 65W

Permanent Datum	GL	Elev. 4759.0 ft	Elev.: K.B. 4773.0 ft
Log measured from	KB	, 14.0 ft above perm. Datum	D.F. 4773.0 ft
Drilling measured from	KB		G.L. 4759.0 ft

Date		25-Jan-12					
Run No.		ONE					
Depth - Driller		7510.00 ft					
Depth - Logger		7512.0 ft					
Bottom - Logged Interval		7503 ft					
Top - Logged Interval		692 ft					
Casing - Driller		8.625 in @ 692.0 ft		@		@	
Casing - Logger		692.0 ft					
Bit Size		7.875 in		@		@	
Type Fluid in Hole		WATER BASED MUD					
Density	Viscosity	9.0 ppg	33.00 s/qt				
PH	Fluid Loss	9.00 pH	7.2 cptm				
Source of Sample		MUD CELL					
Rm @ Meas. Temperature		1.100 ohmm @ 80.00 degF		@		@	
Rmf @ Meas. Temperature		1.00 ohmm @ 75.00 degF		@		@	
Rmc @ Meas. Temperature		1.041 ohmm @ 75.00 degF		@		@	
Source Rmf	Rmc	CHART	CHART				
Rm @ BHT		0.39 ohmm @ 238.0 degF		@		@	
Time Since Circulation		4.5 hr					
Time on Bottom		25-Jan-12 22:38					
Max. Rec. Temperature		238.0 degF @ 7302.0 ft		@		@	
Equipment	Location	10800785	BRIGHTON				
Recorded By		C. BLUE		A. ZWALI			
Witnessed By		S. HEARD					

Fold here

Service Ticket No.: 9225276 API Serial No.: 05123348000000 PGM Version: WL INSITE R3.4.4 (Build 2)

CHANGE IN MUD TYPE OR ADDITIONAL SAMPLE

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
Rm @ Meas. Temp	@	@			
Rmf @ Meas. Temp.	ONE	ACRT 584-585	N/A	1.5" S.O.	N/A
Rmc @ Meas. Temp.	@	@			
Source Rmf / Rmc					
Rm @ BHT	@	@			
Rmf @ BHT	@	@			
Rmc @ BHT	@	@			

EQUIPMENT DATA

	GAMMA	ACOUSTIC		DENSITY	NEUTRON
Run No.	ONE	Run No.	Run No.	ONE	ONE
Serial No.	11215095	Serial No.	Serial No.	10951319	11301132
Model No.	GTET	Model No.	Model No.	SDLT	DSNT
Diameter	3.625"	No. of Cent.	Diameter	4.5"	3.625"
Detector Model No.	102A	Spacing	Log Type	GAM/GAM	NEU/NEU
Type	SCINT		Source Type	Cs137	Am241Be
Length	8"	LSA [Y/N]	Serial No.	5256 GW	DSN 430
Distance to Source	17'	FWDA [Y/N]	Strength	1.5 Ci	15 Ci

LOGGING DATA

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	7300	REC	0	250				20%	0%	2.68 g/cc	20%	0%	SAND
ONE	7300	7003	REC	0	250				20%	0%	2.71 g/cc	20%	0%	LIME
ONE	7003	CSG	REC	0	250				20%	0%	2.68 g/cc	20%	0%	SAND

DIRECTIONAL INFORMATION

Maximum Deviation	@	KOP	@

Remarks: RWCH/GTET/CSNG/DSNT/SDLT/ACRT RAN IN COMBINATION

ANNULAR HOLE VOLUME CALCULATED USING 4.5 IN PROD CASING

TENSION PULLS, WASHOUTS, AND BOREHOLE RUGOSITY AFFECT TOOL RESPONSE

CREW: J. WALKER, S. HERMAN

THANK YOU FOR CHOOSING: HALLIBURTON ENERGY SERVICES - BRIGHTON, CO -- (303) 825-4346

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PARAMETERS REPORT

Depth ((ft))	Tool Name	Description	Value	Units
TOP				
	DSNT	Neutron Lithology	Sandstone	
	SDLT Pad	Formation Density Matrix	2.680	g/cc
7003.00				
	DSNT	Neutron Lithology	Limestone	
	SDLT Pad	Formation Density Matrix	2.710	g/cc
7300.00				
	SHARED	Bit Size	7.875	in
	SHARED	Use Bit Size instead of Caliper for all applications.	No	
	SHARED	Mud Base	Water	
	SHARED	Borehole Fluid Weight	9.000	ppg
	SHARED	Weighting Agent	Barite	
	SHARED	Borehole salinity	0.00	ppm
	SHARED	Formation Salinity NaCl	0.00	ppm
	SHARED	Percent K in Mud by Weight?	0.00	%
	SHARED	Mud Resistivity	1.100	ohmm
	SHARED	Temperature of Mud	80.0	degF
	SHARED	Logging Interval is Cased?	No	
	SHARED	AHV Casing OD	4.500	in
	SHARED	Surface Temperature	40.0	degF
	SHARED	Total Well Depth	7512.00	ft
	SHARED	Bottom Hole Temperature	238.0	degF
	SHARED	Navigation and Survey Master Tool	NONE	
	SHARED	High Res Z Accelerometer Master Tool	GTET	

SHARED	Temperature Master Tool	NONE	
SHARED	Borehole Size Master Tool	NONE	
GTET	Process Gamma Ray?	Yes	
GTET	Gamma Tool Standoff	0.000	in
GTET	Process Gamma Ray EVR?	No	
GTET	Tool Position for Gamma Ray Tools.	Eccentered	
CSNG	Process CSNG Data?	Yes	
CSNG	Is Tool Centralized?	No	
CSNG	Gamma Enviromental Corrections?	Yes	
CSNG	Barite Correction Factor	1.00	
CSNG	Use Fixed Gain	No	
CSNG	Use Fixed Offset	No	
CSNG	Use Fixed Resolution Degradation Factor	No	
DSNT	Process DSN?	Yes	
DSNT	Process DSN EVR?	No	
DSNT	Neutron Lithology	Sandstone	
DSNT	DSN Standoff - 0.25 in (6.35 mm) Recommended	0.000	in
DSNT	Temperature Correction Type	None	
DSNT	DSN Pressure Correction Type	None	
DSNT	View More Correction Options	No	
DSNT	Use TVD for Gradient Corrections?	No	
DSNT	Logging Horizontal Water Tank?	No	
SDLT	Process Caliper Outputs?	Yes	
SDLT Pad	Process Density?	Yes	
SDLT Pad	Process Density EVR?	No	
SDLT Pad	Logging Calibration Blocks?	No	
SDLT Pad	SDLT Pad Temperature Valid?	Yes	
SDLT Pad	Disable temperature warning	No	
SDLT Pad	Formation Density Matrix	2.680	g/cc
SDLT Pad	Formation Density Fluid	1.000	g/cc
Microlog Pad	Process MicroLog Outputs?	Yes	
ACRt Sonde	Process ACRt?	Yes	
ACRt Sonde	Minimum Tool Standoff	1.50	in
ACRt Sonde	Temperature Correction Source	FP Lwr & FP Upr	
ACRt Sonde	Tool Position	Free Hanging	
ACRt Sonde	Rmud Source	Mud Cell	
ACRt Sonde	Minimum Resistivity for MAP	0.20	ohmm
ACRt Sonde	Maximum Resistivity for MAP	200.00	ohmm
ACRt Sonde	Threshold Quality	0.50	

BOTTOM

Data: SHABLE_G17_23D\0001 TRIPLE-CSNG-GEM\004.01 26-Jan-12 02:27 Up **Date: 26-Jan-12 02:28:25**

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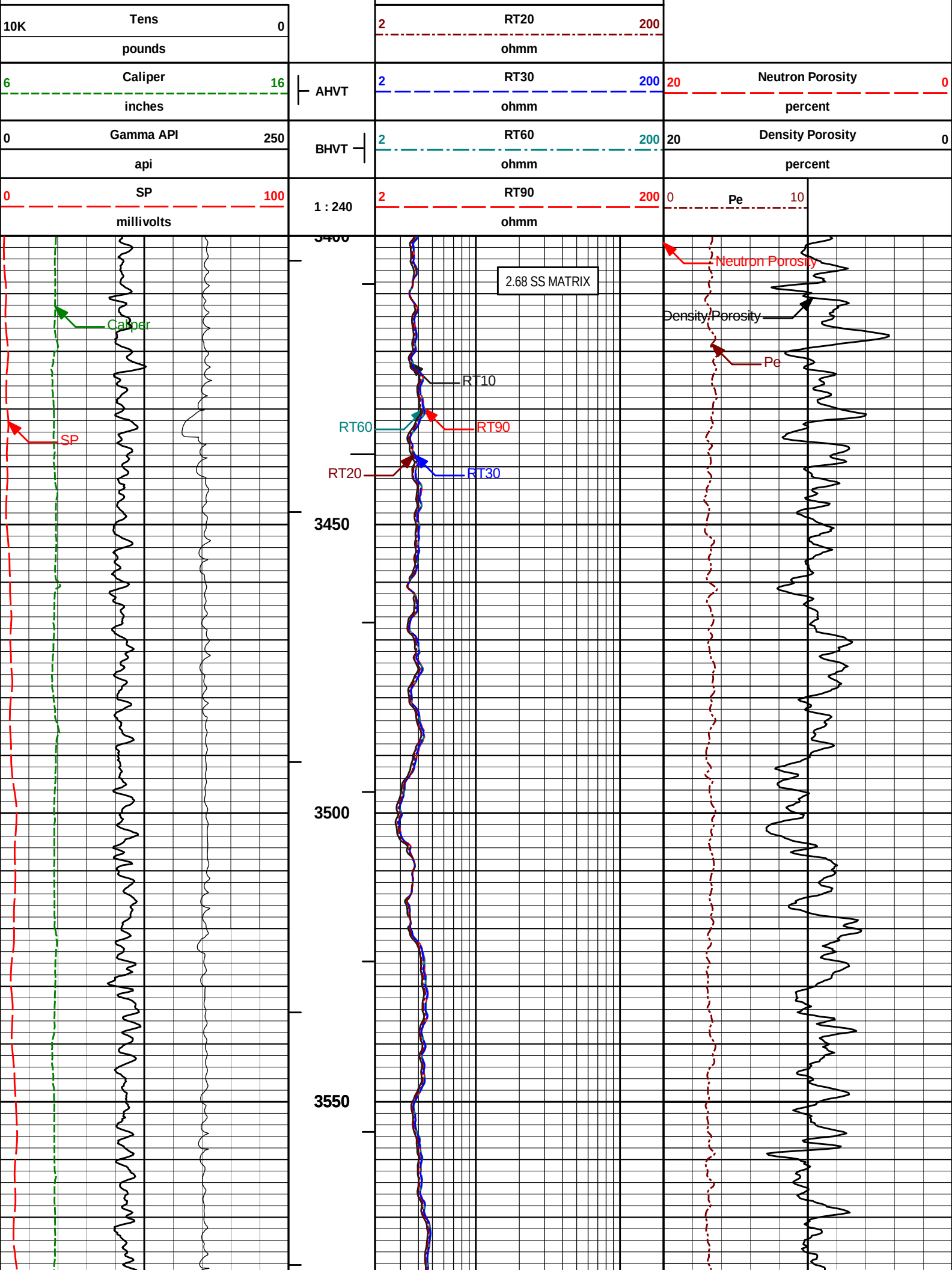
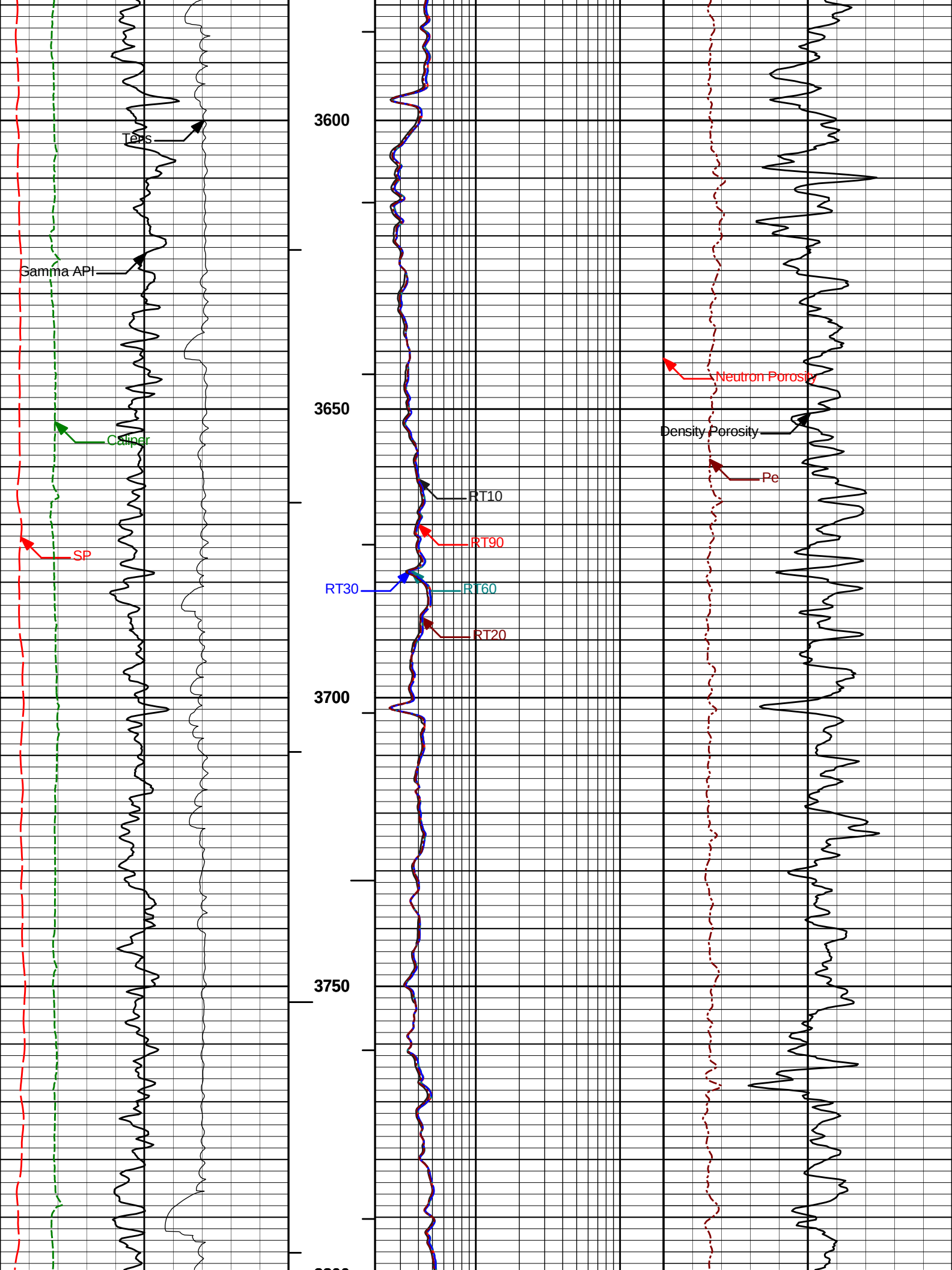
Plot Time: 26-Jan-12 02:39:37
Plot Range: 3400 ft to 5600 ft
Data: SHABLE_G17_23D\Well Based\MAIN*
Plot File: \\COMP\MAIN

MAIN PASS 5" = 100'

2	RT10	200
	ohmm	


10K
Tens
0
pounds
6
Caliper
16
inches
0
Gamma API
250
api
0
SP
100
millivolts
AHVT
BHVT
1 : 240
2
RT20
200
ohmm
2
RT30
200
ohmm
2
RT60
200
ohmm
2
RT90
200
ohmm
20
Neutron Porosity
0
percent
20
Density Porosity
0
percent
0
Pe
10
2.68 SS MATRIX
Caliper
SP
RT10
RT60
RT90
RT20
RT30
Neutron Porosity
Density Porosity
Pe
3450
3500
3550


Tens
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Caliper
SP
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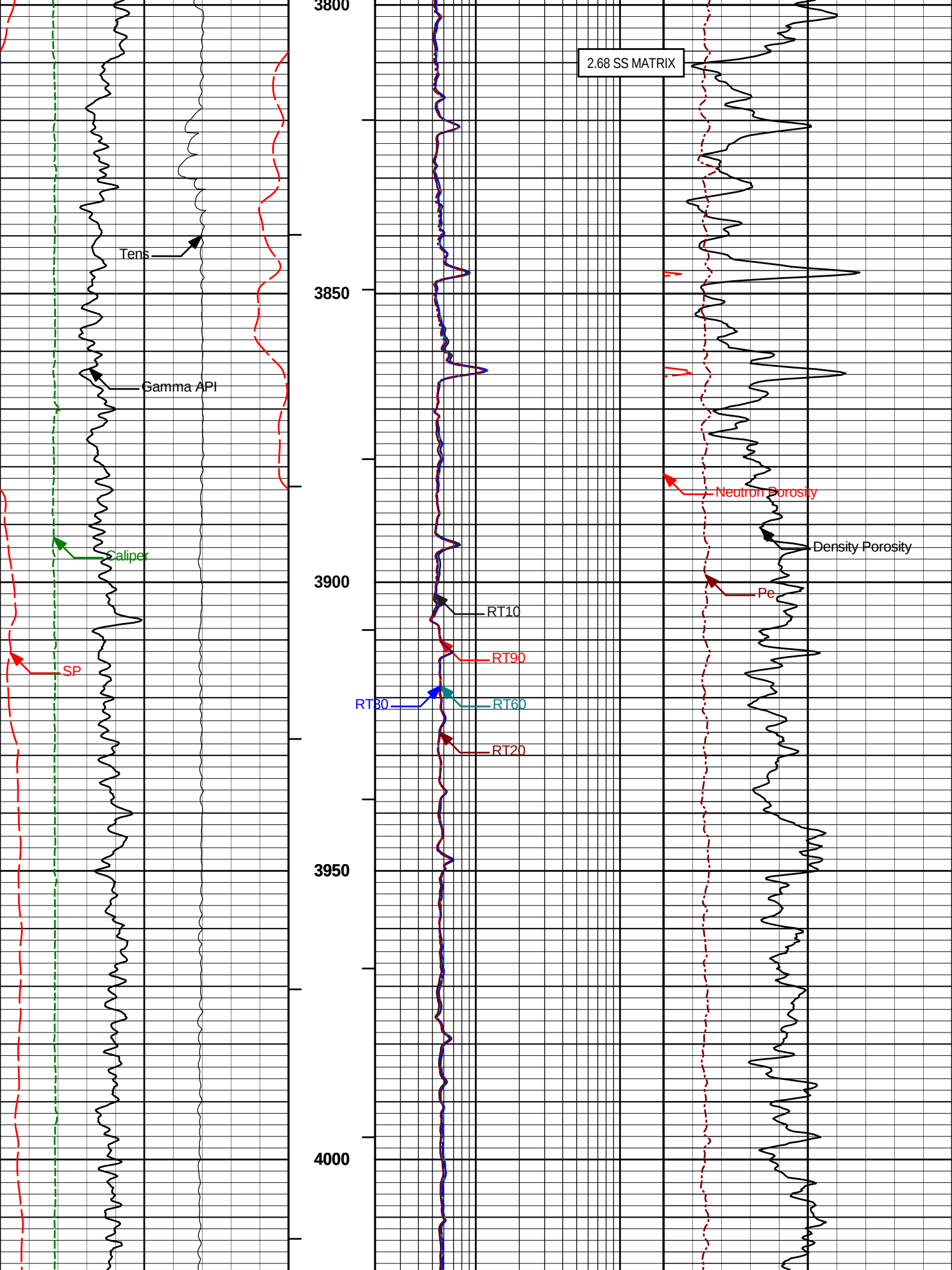
3650
3700
3750
RT10
RT90
RT30
RT60
RT20
Neutron Porosity
Density Porosity
Pe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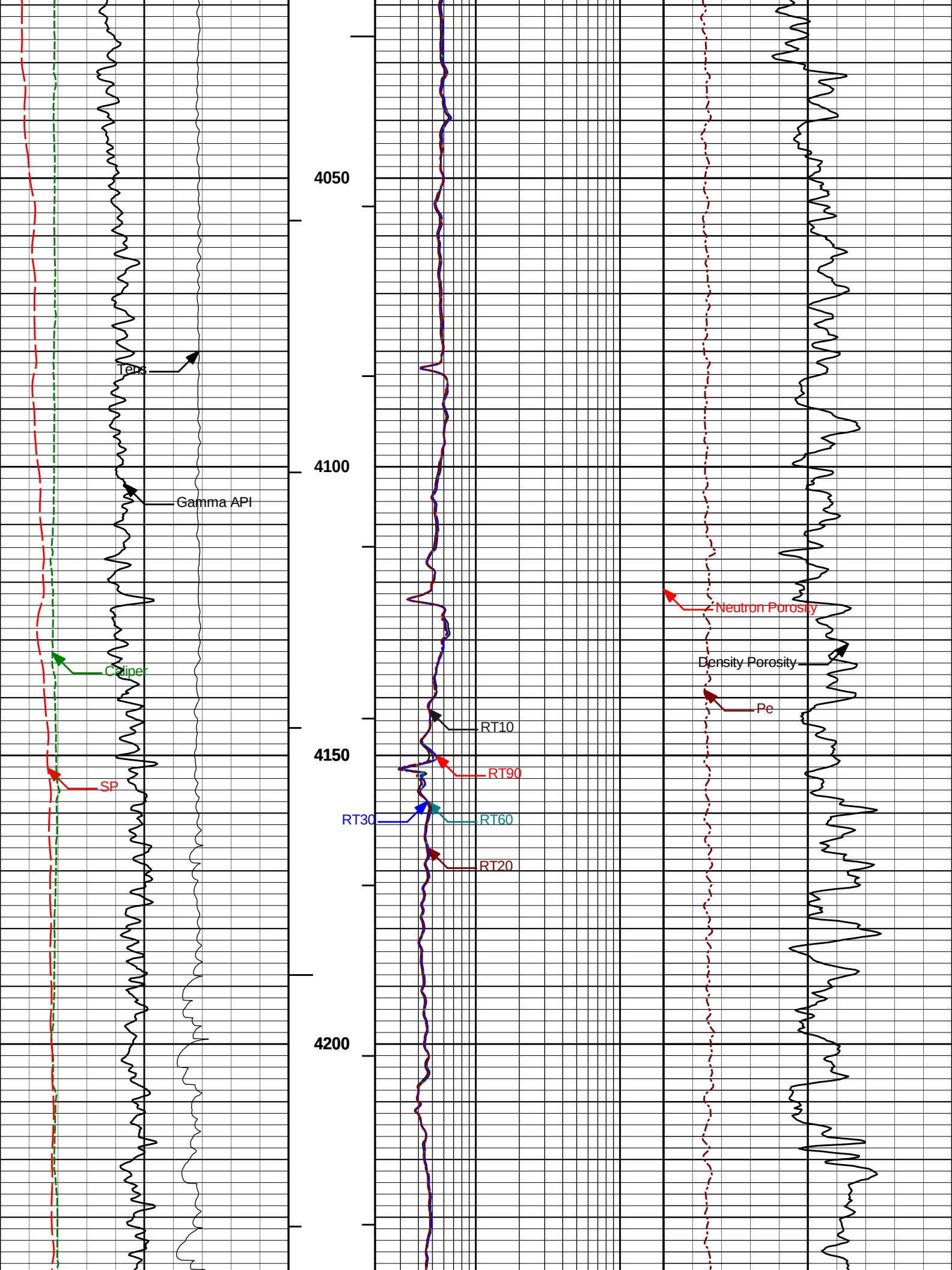
3850
3900
3950
4000
Tens
Gamma API
Caliper
SP
2.68 SS MATRIX
Neutron Porosity
Density Porosity
Pe
RT10
RT90
RT30
RT60
RT20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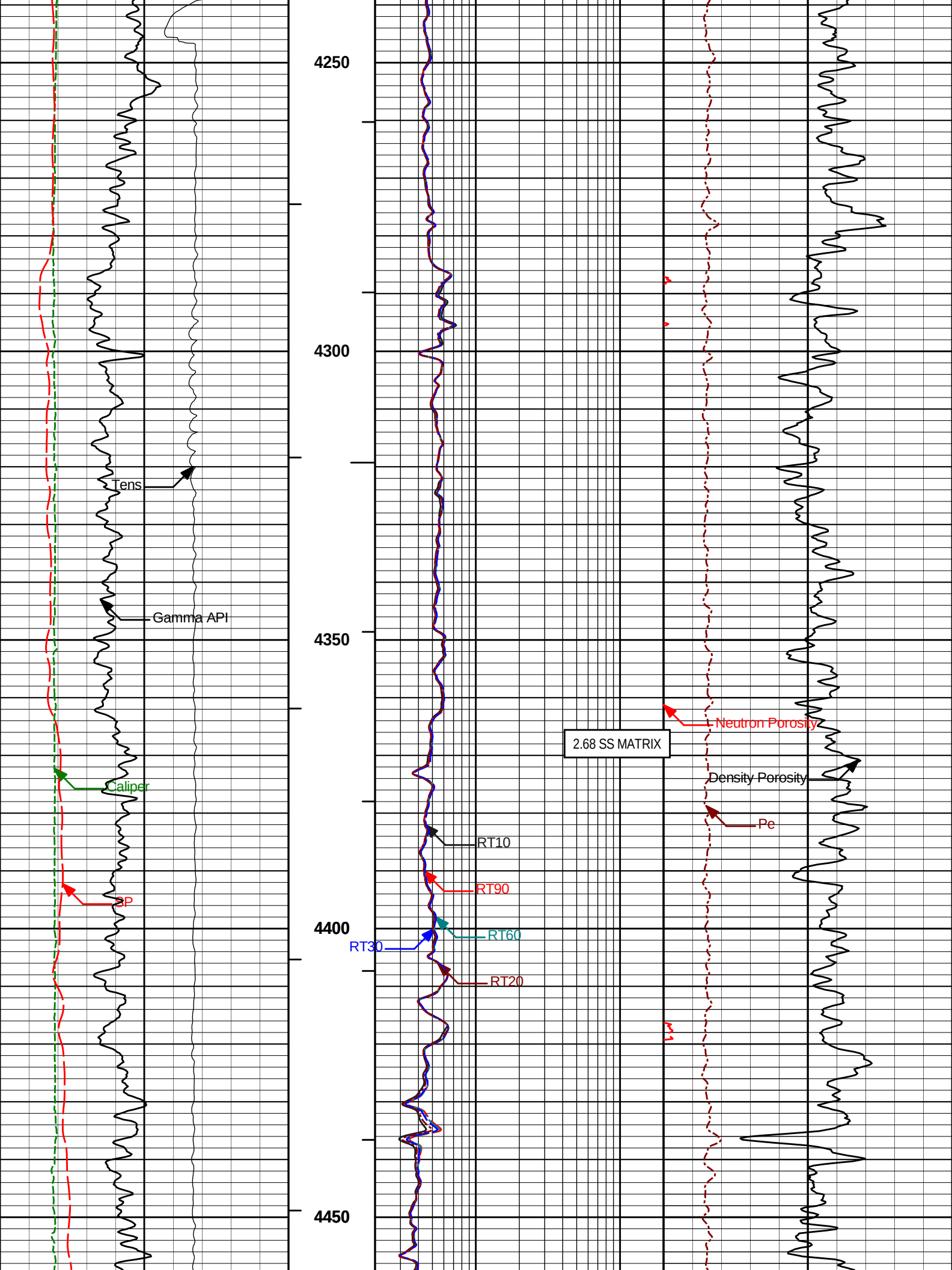
4100
4150
4200
Tens
Gamma API
Caliper
SP
RT10
RT90
RT30
RT60
RT20
Neutron Porosity
Density Porosity
Pe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4300
4350
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4450
Tens
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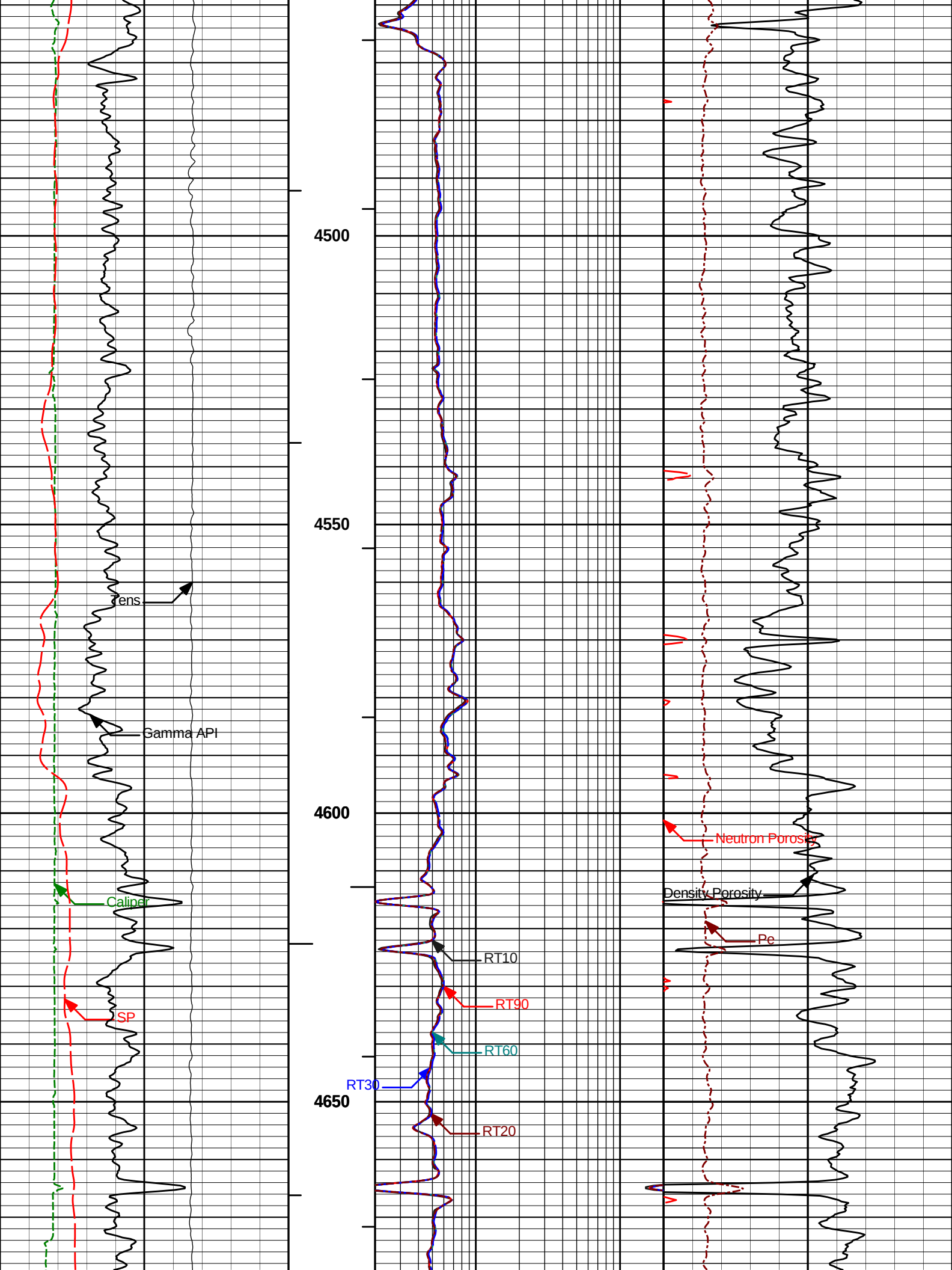
Caliper
SP
RT10
RT90
RT60
RT30
RT20
2.68 SS MATRIX
Neutron Porosity
Density Porosity
Pe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4550
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4650
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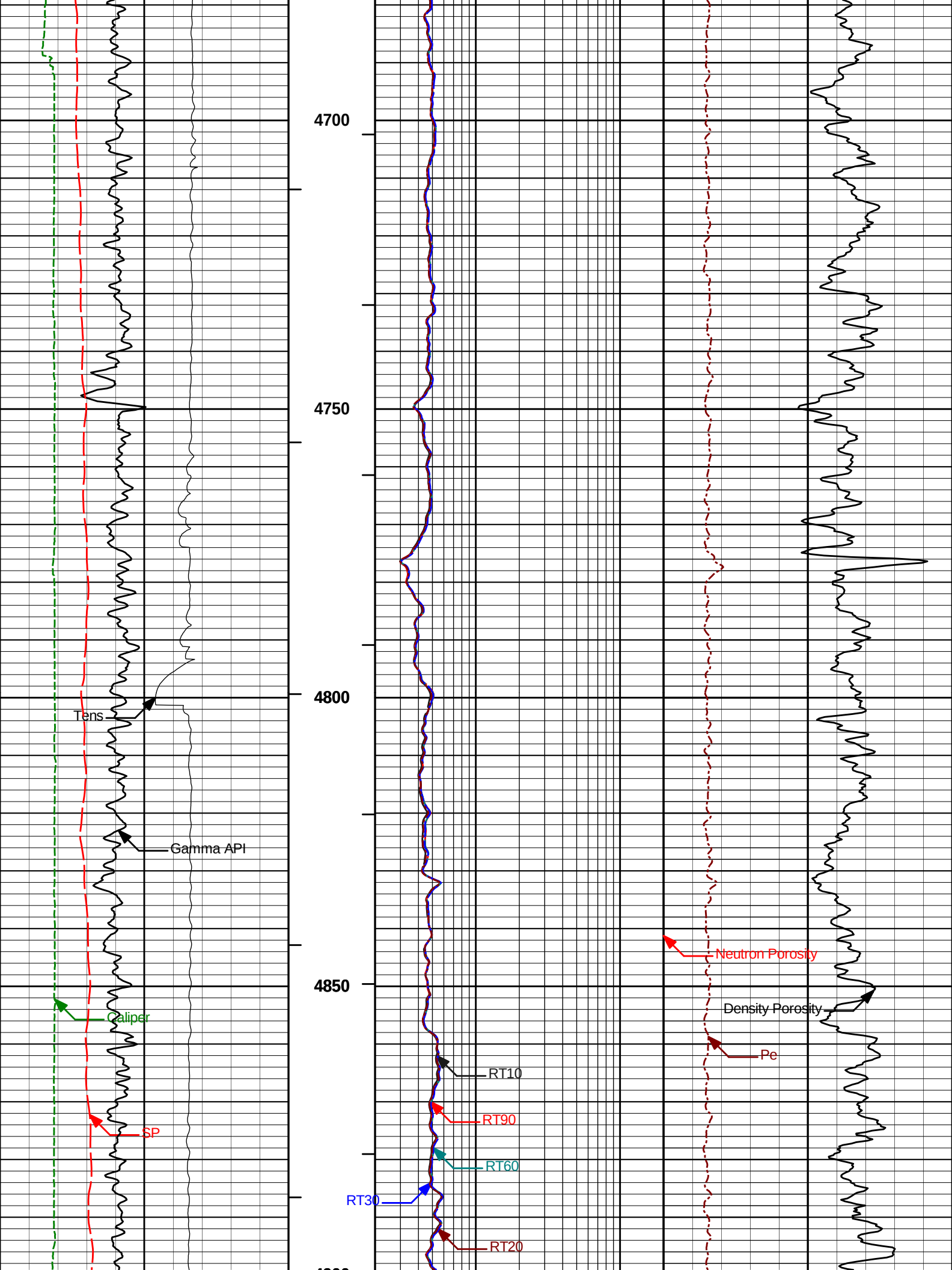
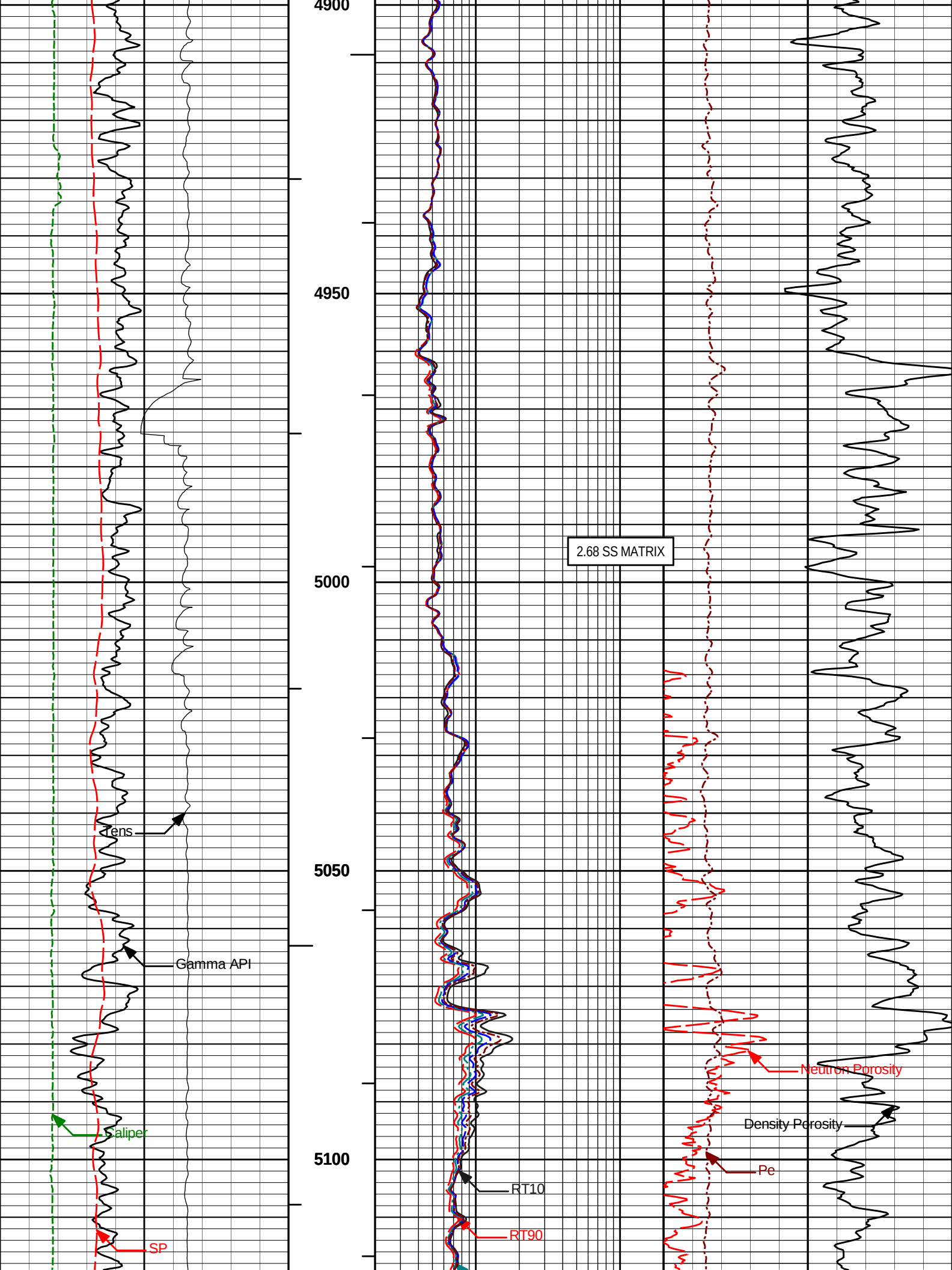
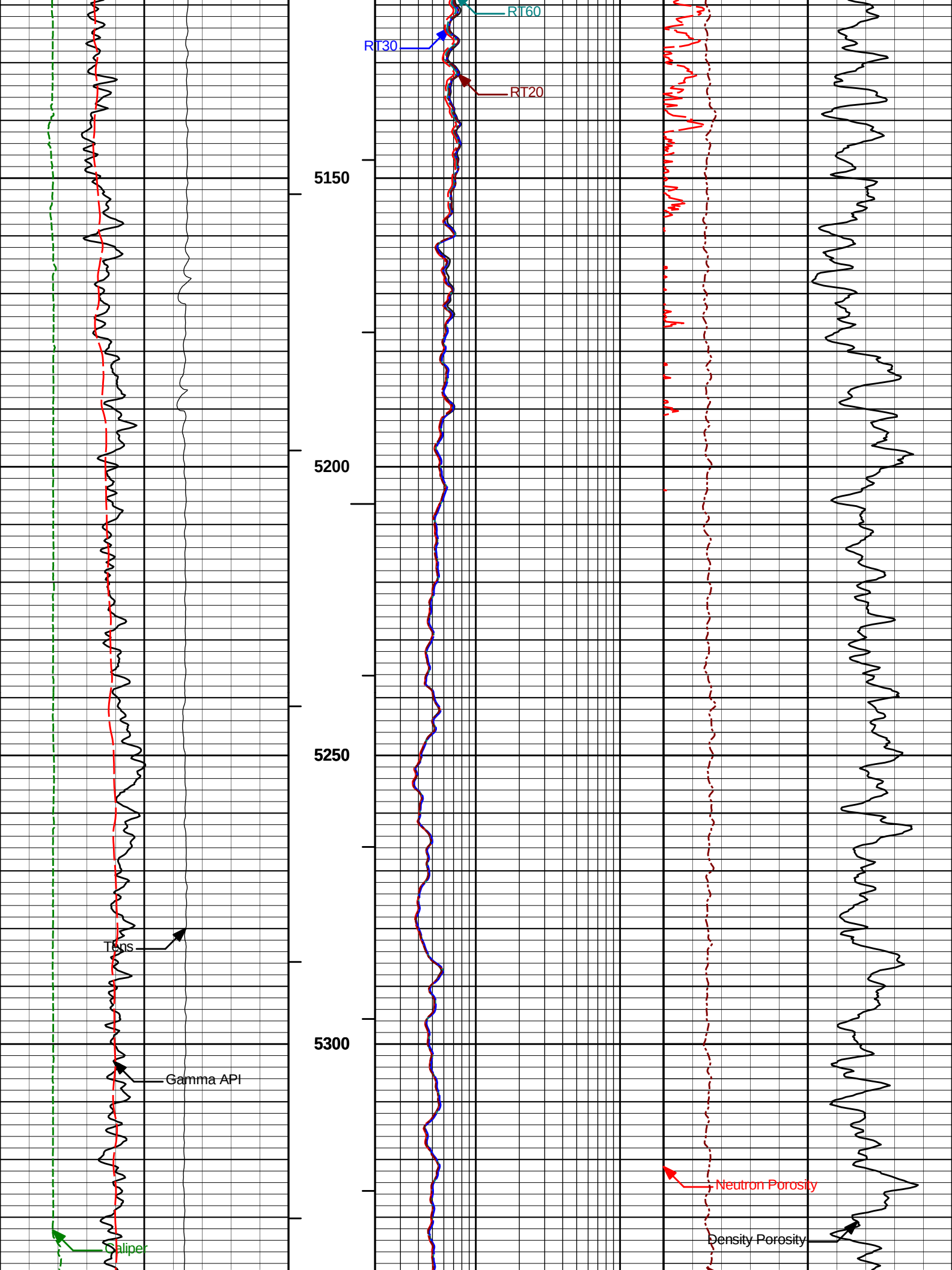
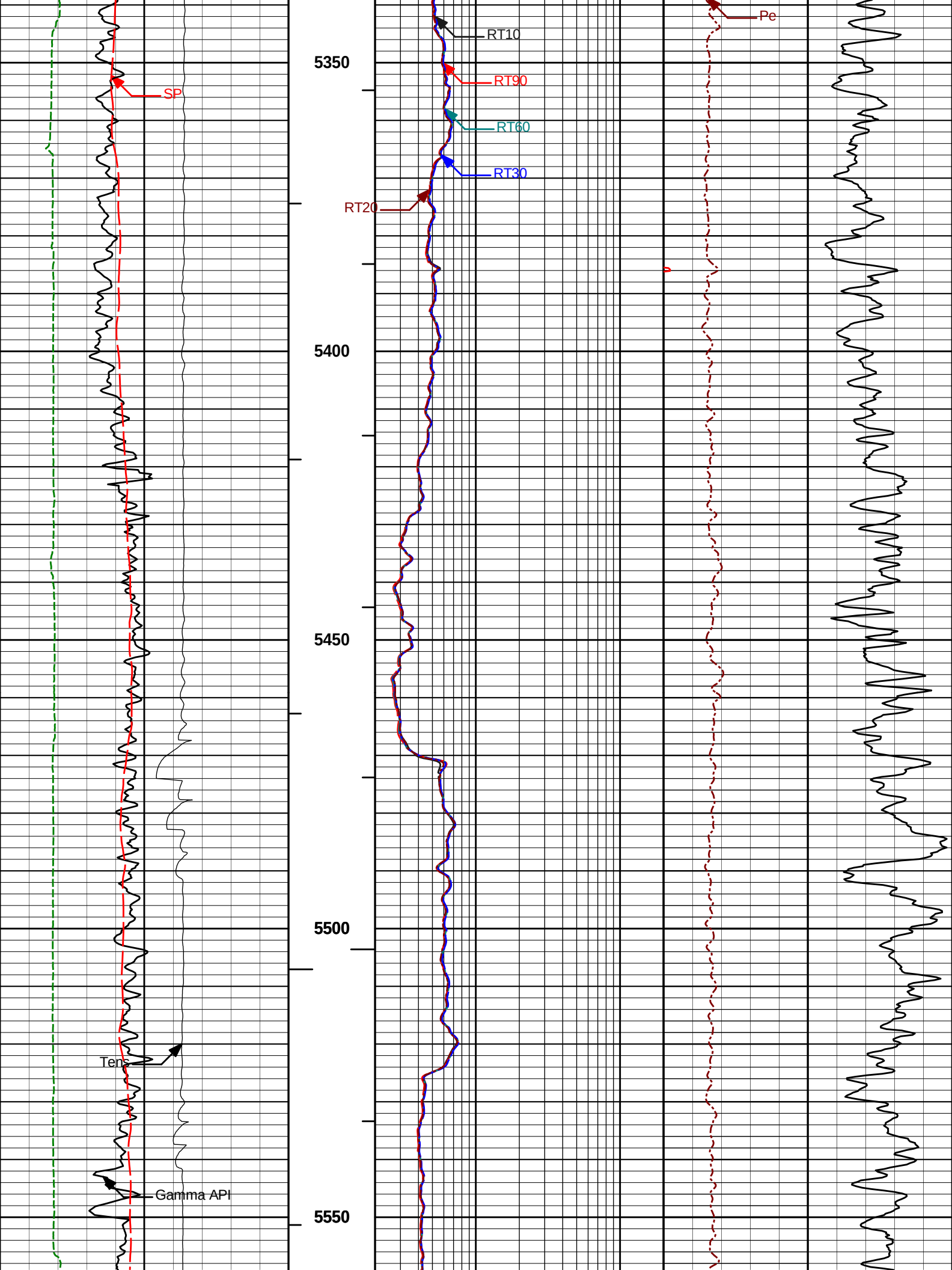
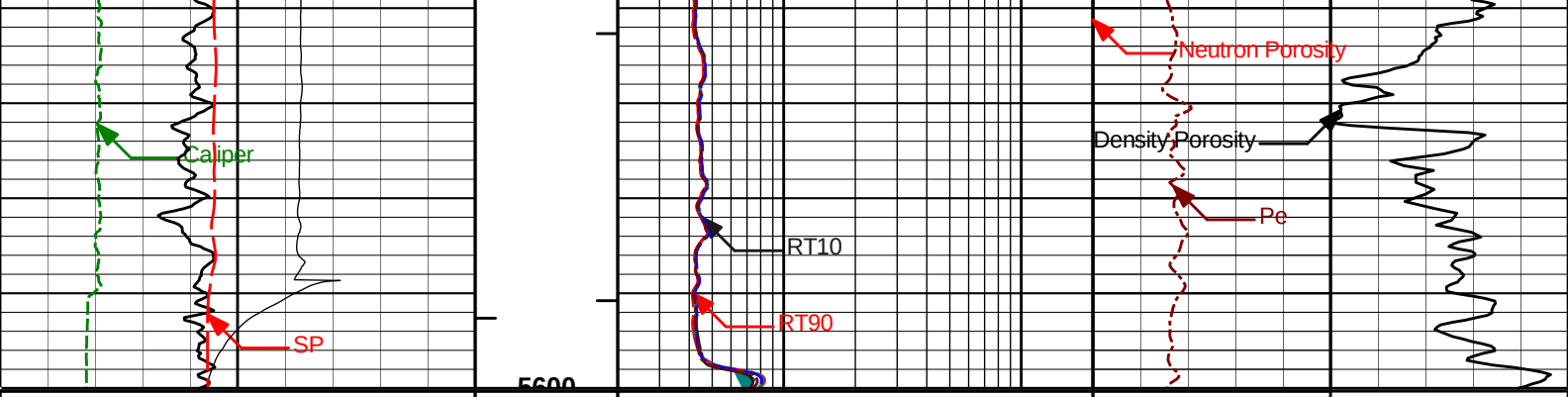
Caliper
SP
RT10
RT90
RT60
RT30
RT20
Neutron Porosity
Density Porosity
Pe


4700
4750
4800
4850
Tens
Gamma API
Caliper
SP
RT10
RT90
RT60
RT30
RT20
Neutron Porosity
Density Porosity
Pe


4900
4950
5000
5050
5100
2.68 SS MATRIX
Tens
Gamma API
Caliper
SP
RT10
RT90
Neutron Porosity
Density Porosity
Pe


RT60
RT30
RT20
5150
5200
5250
5300
Tens
Gamma API
Caliper
Neutron Porosity
Density Porosity


SP
Tens
Gamma API
RT10
RT90
RT60
RT30
RT20
Pe
5350
5400
5450
5500
5550



0	SP	100		2	RT90	200	0	Pe	10
	millivolts		1 : 240		ohmm				
0	Gamma API	250	BHVT	2	RT60	200	20	Density Porosity	0
	api				ohmm			percent	
6	Caliper	16	AHVT	2	RT30	200	20	Neutron Porosity	0
	inches				ohmm			percent	
10K	Tens	0		2	RT20	200			
	pounds				ohmm				
				2	RT10	200			
					ohmm				

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Plot Time: 26-Jan-12 02:39:40
Plot Range: 3400 ft to 5600 ft
Data: SHABLE_G17_23D\Well Based\MAIN*
Plot File: \\COMP\MAIN

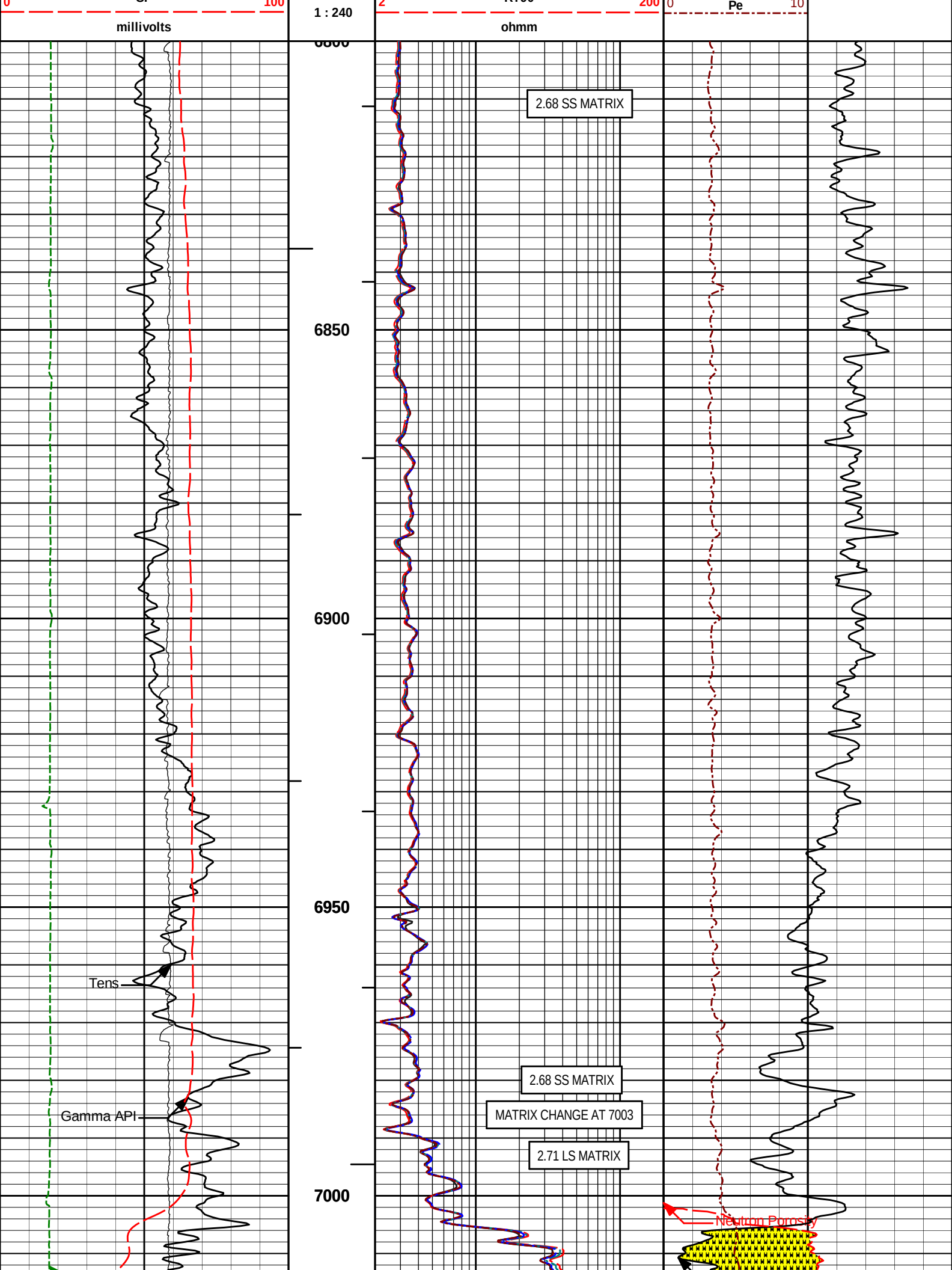
MAIN PASS 5" = 100'

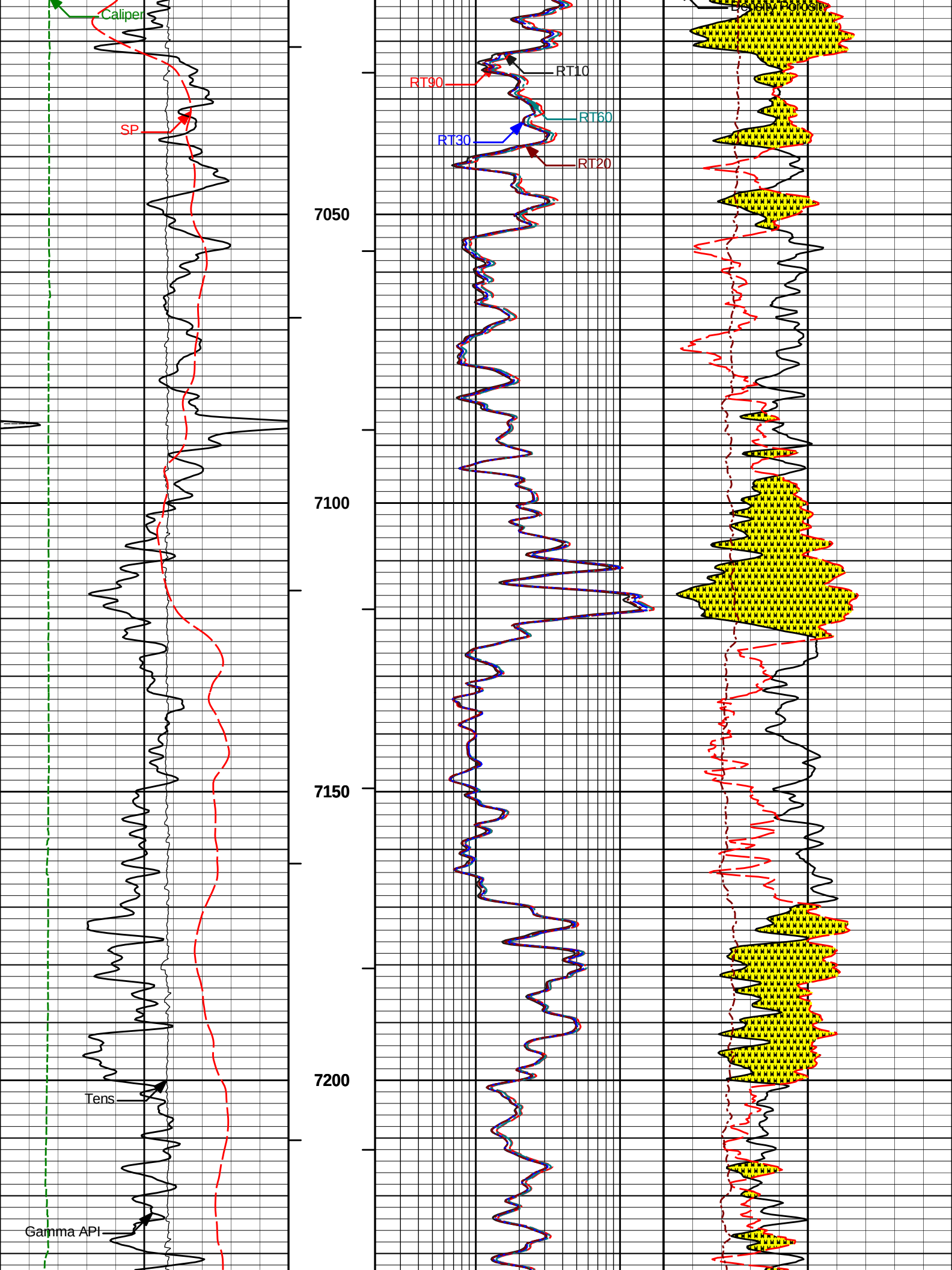
HALLIBURTON

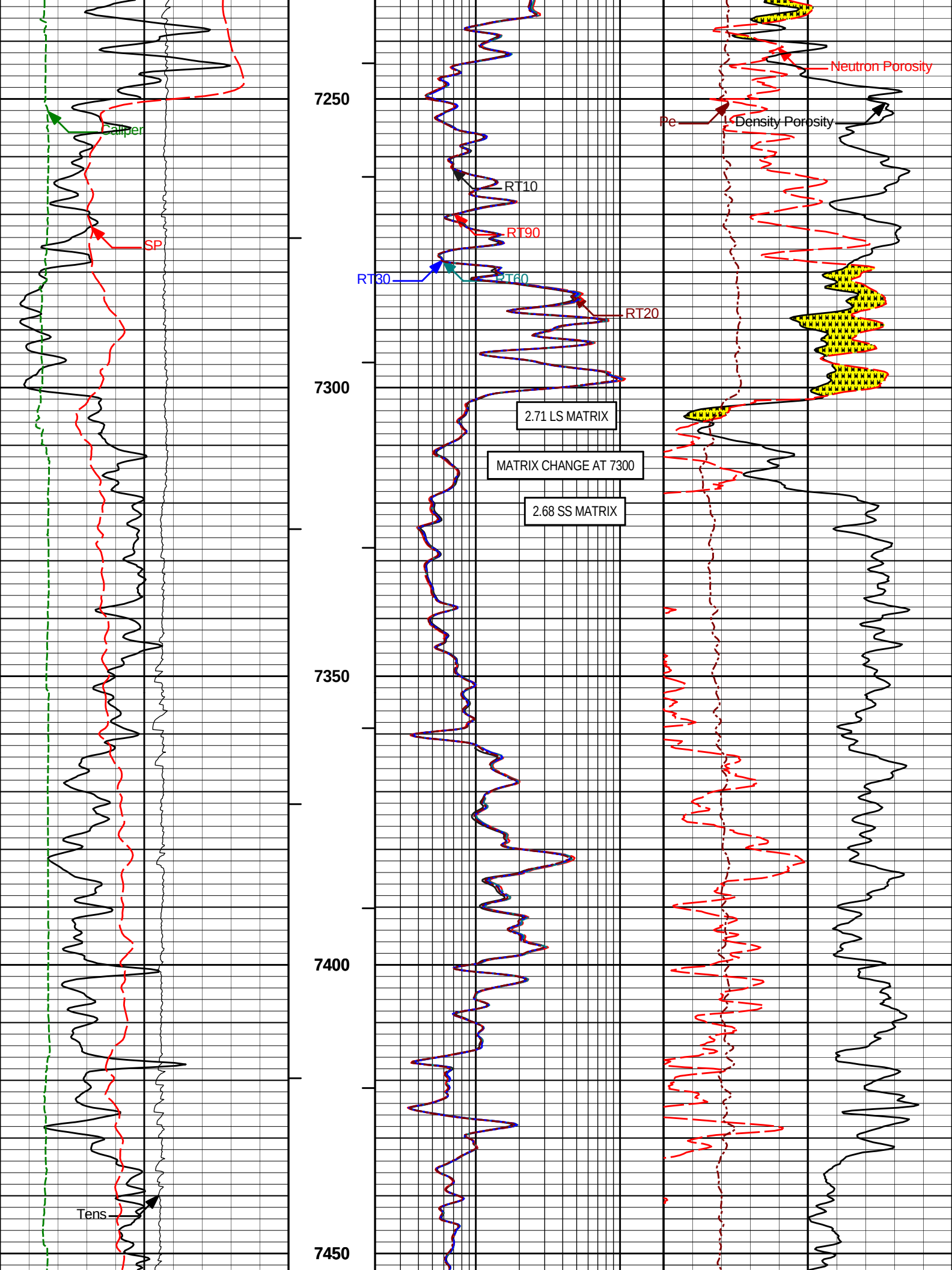
Plot Time: 26-Jan-12 02:39:41
Plot Range: 6800 ft to 7514.75 ft
Data: SHABLE_G17_23D\Well Based\MAIN*
Plot File: \\COMP\MAIN

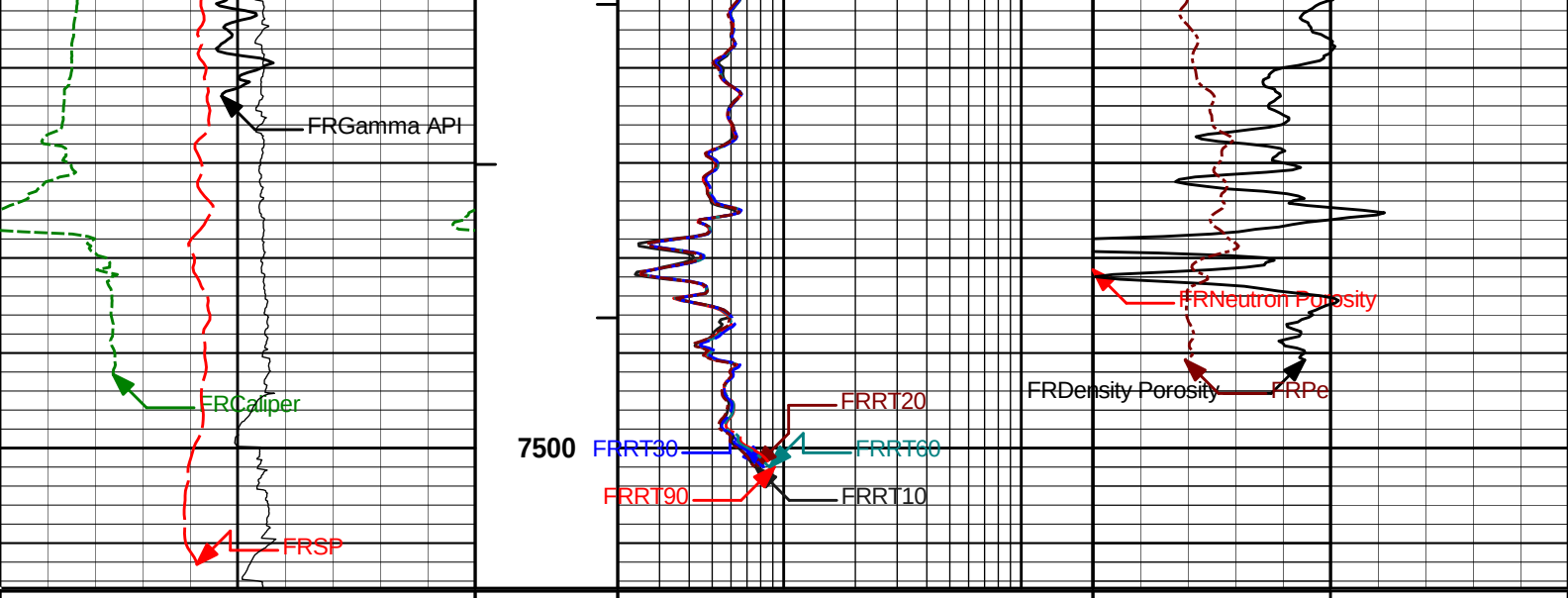
MAIN PASS 5" = 100'

				2	RT10	200			
					ohmm				
10K	Tens	0		2	RT20	200			
	pounds				ohmm				
6	Caliper	16	AHVT	2	RT30	200	20	Neutron Porosity	0
	inches				ohmm			percent	
0	Gamma API	250	BHVT	2	RT60	200	20	Density Porosity	0
	api				ohmm			percent	
0	SP	100		2	RT90	200	0	Pe	10


0
100
millivolts
1 : 240
2
200
ohmm
0
10
Pe
6850
6900
6950
7000
2.68 SS MATRIX
2.68 SS MATRIX
MATRIX CHANGE AT 7003
2.71 LS MATRIX
Tens
Gamma API
Neutron Porosity


Caliper
SP
Tens
Gamma API
RT90
RT10
RT60
RT30
RT20
Porosity
7050
7100
7150
7200


Caliper
SP
Tens
7250
7300
7350
7400
7450
RT10
RT90
RT30
RT60
RT20
2.71 LS MATRIX
MATRIX CHANGE AT 7300
2.68 SS MATRIX
Neutron Porosity
Pe
Density Porosity



0 SP 100		2 RT90 200	0 Pe 10	
millivolts	1 : 240	ohmm		
0 Gamma API 250	BHVT	2 RT60 200	20 Density Porosity 0	
api		ohmm	percent	
6 Caliper 16	AHVT	2 RT30 200	20 Neutron Porosity 0	
inches		ohmm	percent	
10K Tens 0		2 RT20 200		
pounds		ohmm		
		2 RT10 200		
		ohmm		

HALLIBURTON

Plot Time: 26-Jan-12 02:39:43
Plot Range: 6800 ft to 7514.75 ft
Data: SHABLE_G17_23D\Well Based\MAIN*
Plot File: \\COMP\MAIN

MAIN PASS 5" = 100'

HALLIBURTON

CALIBRATION REPORT

NATURAL GAMMA RAY TOOL SHOP CALIBRATION

Tool Name:	**GTET - 11215095**	**Reference Calibration Date:**	**05-Dec-11 11:45:20**
Engineer:	**C. BLUE**	**Calibration Date:**	**06-Jan-12 13:21:33**
Software Version:	**WL INSITE R3.4.4 (Build 2)**	**Calibration Version:**	**1**

Calibrator Source S/N: TB 290
Calibrator API Reference:230.00 api
Equivalent Calibrator API Reference:234.0 api

Measurement	Measured	Calibrated	Units
Background	64.9	67.0	api
Background + Calibrator	291.6	301.0	api
Calibrator	226.7	234.0	api

NATURAL GAMMA RAY TOOL FIELD CALIBRATION

Tool Name:	**GTET - 11215095**	**Reference Calibration Date:**	**06-Jan-12 13:21:33**
Engineer:	**C. BLUE**	**Calibration Date:**	**24-Jan-12 09:46:30**
Software Version:	**WL INSITE R3.4.4 (Build 2)**	**Calibration Version:**	**1**

Calibrator Source S/N: TB 290
Calibrator API Reference:230.00 api
Equivalent Calibrator API Reference:234.0 api

Field Verification	Shop	Field	Units
Background	67.0	76.4	api
Background + Calibrator	301.0	311.8	api
Calibrator	234.0	235.4	api

Shop	Field	Difference	Tolerance
234.0	235.4	-1.4	+/- 9.00

CSNG-FS SHOP CALIBRATION

Tool Name:	**CSNG - 10846351**	**Reference Calibration Date:**	**07-Dec-11 08:56:04**
Engineer:	**C. BLUE**	**Calibration Date:**	**14-Jan-12 19:24:20**
Software Version:	**WL INSITE R3.4.4 (Build 2)**	**Calibration Version:**	**1**
Source SN:	**TB 290**		

TITANIUM CASE	Measured	Calibrated	Units
60 KEV Peak Channel #	48.0	48.0	Channel #
239 KEV Peak Channel #	23.7	23.7	Channel #
583 KEV Peak Channel #	53.4	53.4	Channel #
2614 KEV Peak Channel #	219.6	219.9	Channel #
Calibrate Temperature	50.9	50.9	degF

Pass/Fail Summary	Centroid
239 KEV Peak	Passed
583 KEV Peak	Passed
2614 KEV Peak	Passed

Blanket Reference Value: 230.00 API
Calibrator Value: 261.2 API

	Counts	Units	Measured	Calibrated	Units
Thorium Blanket	1670.7	CPS	324.4	319.5	API
Background	304.9	CPS	63.2	58.3	API

Gamma Ray Gain: 0.96
Expected Gain Range: 0.85 - 1.15
Gamma Gain Check: Passed

CSNG-FS FIELD CALIBRATION

Tool Name:	**CSNG - 10846351**	**Reference Calibration Date:**	**14-Jan-12 19:24:20**
Engineer:	**C. BLUE**	**Calibration Date:**	**24-Jan-12 09:56:00**
Software Version:	**WL INSITE R3.4.4 (Build 2)**	**Calibration Version:**	**1**
Source SN:			

TITANIUM CASE	Shop	Field	Units
60 KEV Peak Channel #	48.0	48.0	Channel #
239 KEV Peak Channel #	23.7	23.7	Channel #
583 KEV Peak Channel #	53.4	53.4	Channel #
2614 KEV Peak Channel #	219.9	220.3	Channel #
Calibrate Temperature	50.9	55.5	degF

Pass/Fail Summary	Centroid
239 KEV Peak	Passed
583 KEV Peak	Passed
2614 KEV Peak	Passed

Blanket Reference Value: 230.00 API
Calibrator Value: 261.2 API

	Counts	Units	Measured	Calibrated	Units
Thorium Blanket	1710.1	CPS	319.5	321.6	API
Background	321.1	CPS	58.3	60.4	API

Gamma Ray Gain: 0.95
Expected Gain Range: 0.85 - 1.15
Gamma Gain Check: Passed

DUAL SPACED NEUTRON SHOP CALIBRATION

Tool Name:	**DSNT - 10935690**	**Reference Calibration Date:**	**18-Jan-12 09:03:07**
Engineer:	**C. BLUE**	**Calibration Date:**	**18-Jan-12 09:17:16**
Software Version:	**WL INSITE R3.4.4 (Build 2)**	**Calibration Version:**	**1**

Logging Source S/N: DSN-430
Tank Serial Number: 11068236
Reference value assigned to Tank: 53.720
Snow Block S/N: 100133139C
Calibration Tank Water Temperature: 60 degF
Min. Tool Housing Outside Diameter: 3.625 in

CALIBRATION CONSTANTS			
Measurement	**Prev. Value**	**New Value**	**Control Limit On New Value**
Gain:	1.042	1.042	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):	0.2224	0.2223	0.0001	+/- 0.0020
Calibrated Ratio:	10.11	10.11	0.002	+/- 0.050

VERIFIER		
Measurement	**Value**	**Control Limit**
Snow-Block Porosity (decp):	0.0837	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 - 10935690**	**Reference Calibration Date:**	**18-Jan-12 09:17:16**
Engineer:	**C. BLUE**	**Calibration Date:**	**24-Jan-12 10:02:26**
Software Version:	**WL INSITE R3.4.4 (Build 2)**	**Calibration Version:**	**1**

Logging Source S/N: DSN-430

Snow Block S/N: 100133139C

NEUTRON FIELD-CHECK SUMMARY

	Shop	Field	Difference	Control Limit On Change
Snow-Block Porosity (decp):	0.0837	0.0775	-0.0061	+/- 0.0150

PASS/FAIL SUMMARY

Block Change Check:	Passed
Snow Block Stat Check:	Passed
Temperature Check:	Passed

DENSITY CALIPER SHOP CALIBRATION

Tool Name:	**SDLT - 10951319**	**Reference Calibration Date:**	**06-Jan-12 15:07:10**
Engineer:	**C. BLUE**	**Calibration Date:**	**06-Jan-12 15:13:09**
Software Version:	**WL INSITE R3.4.4 (Build 2)**	**Calibration Version:**	**1**

CALIBRATION COEFFICIENTS

Measurement	Previous Value	New Value	Control Limit On New Value
Pad Offset	-1877.07	-1882.03	-7000.00 - -1000.00
Pad Gain	0.0003715	0.0003719	0.000200 - 0.000600
Arm Offset	-1892.39	-1914.73	-5000.00 - 3000.00
Arm Gain	0.0005085	0.0005095	0.000300 - 0.000700
Arm Power	-0.000004660	-0.000004770	-0.000010 - 0.000010

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)	6.51	6.50	-0.01	+/- 0.20
Medium Ring (in)	8.26	8.25	-0.01	+/- 0.20
Large Ring (in)	15.02	15.00	-0.02	+/- 0.20

PASS/FAIL SUMMARY

Calibration-Coefficients Range Check:	Passed
Ring-Measurement Check:	Passed

PASS/FAIL SUMMARY

Calibration-Coefficients Range Check:	Passed

SDLT CALIPER FIELD CALIBRATION

Tool Name:	**SDLT - 10951319**	**Reference Calibration Date:**	**06-Jan-12 15:13:09**
Engineer:	**C. BLUE**	**Calibration Date:**	**24-Jan-12 09:55:42**
Software Version:	**WL INSITE R3.4.4 (Build 2)**	**Calibration Version:**	**1**

MEASURED CALIPER VALUES

Measurement	Shop	Field	Change	Control Limit On New Value
Pad Extension	3.75	3.76	0.01	+/- 0.10
Ring Diameter	8.25	8.35	0.10	+/- 0.15

PASS/FAIL SUMMARY

Pad Extension Check:	Passed
Diameter Check:	Passed

ARRAY COMPENSATED TRUE RESISTIVITY SHOP CALIBRATION

Tool Name: ACRt Sonde - E2584-S2585 **Reference Calibration Date:** 28-Jul-11 15:52:08

Engineer: C. BLUE **Calibration Date:** 28-Jul-11 16:05:50

Software Version: WL INSITE R3.2.5 (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	1.0012	1.05	0.95	1.0001	1.05	0.95	1.0006	1.05
A2 (50")	0.95	0.9994	1.05	0.95	1.0037	1.05	0.95	1.0091	1.05
A3 (29")	0.95	0.9959	1.05	0.95	1.0005	1.05	0.95	1.0031	1.05
A4 (17")	0.95	1.0040	1.05	0.95	1.0060	1.05	0.95	1.0110	1.05
A5 (10")	N/A	N/A	N/A	0.95	1.0014	1.05	0.95	1.0048	1.05
A6 (6")	N/A	N/A	N/A	0.95	0.9776	1.05	0.95	0.9812	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	-0.761	2	-6	-4.073	-2	-8	-5.268	-2
A2 (50")	-7	-1.957	-1	-6	-3.509	-2	-7	-4.574	-2
A3 (29")	-27	-12.918	-9	-9	-3.439	-3	-7	-3.298	-1
A4 (17")	-180	-94.666	-60	-45	-30.479	-15	-39	-25.503	-13
A5 (10")	N/A	N/A	N/A	-150	-86.802	-50	-80	-43.996	-10
A6 (6")	N/A	N/A	N/A	175	306.164	525	90	153.096	270

TRANSMITTER CURRENT GAIN

Signal	Lower	R	Upper
12K	0.6	0.9962	1.3
36K	1.0	1.9266	2.0
72K	1.0	1.2354	2.0

R-MUD VERIFICATION

Signal	Lower (ohm-m)	Measured (ohm-m)	Upper (ohm-m)
Mud Cell	0.95	0.997	1.05

SPECTRAL DENSITY SHOP CALIBRATION

Tool Name: SDLT Pad - M319P593 **Reference Calibration Date:** 05-Dec-11 15:31:10

Engineer: C. BLUE **Calibration Date:** 06-Jan-12 13:50:34

Software Version: WL INSITE R3.4.4 (Build 2) **Calibration Version:** 1

Logging Source S/N: 5256 GW

Aluminum Block S/N: 63066 Density: 2.602g/cc Pe: 3.100

Magnesium Block S/N: BRIGHTON Density: 1.691g/cc Pe: 2.650

DENSITY CALIBRATION SUMMARY

Measurement	Previous Value	New Value	Control Limit
Near Bar Gain	1.0935	1.0978	0.90 - 1.10

Near Dens Gain	1.0164	1.0220	0.90 - 1.10
Near Peak Gain	1.0080	1.0091	0.90 - 1.10
Near Lith Gain	0.9726	0.9667	0.90 - 1.10
Far Bar Gain	1.0072	1.0124	0.90 - 1.10
Far Dens Gain	0.9981	1.0029	0.90 - 1.10
Far Peak Gain	0.9922	0.9968	0.90 - 1.10
Far Lith Gain	0.9877	0.9816	0.90 - 1.10
Near Bar Offset	-0.8072	-0.8532	NONE
Near Dens Offset	-0.0769	-0.1361	NONE
Near Peak Offset	-0.0059	-0.0317	NONE
Near Lith Offset	0.2543	0.2815	NONE
Far Bar Offset	-0.0879	-0.1369	NONE
Far Dens Offset	-0.0029	-0.0494	NONE
Far Peak Offset	0.0495	0.0017	NONE
Far Lith Offset	0.0922	0.1203	NONE
Near Bar Background	918.21	917.65	700 - 1450
Near Dens Background	305.19	304.64	230 - 480
Near Peak Background	132.54	131.29	100 - 210
Near Lith Background	160.63	161.93	125 - 260
Far Bar Background	530.23	530.96	450 - 900
Far Dens Background	208.84	209.24	175 - 345
Far Peak Background	82.61	83.23	70 - 140
Far Lith Background	84.39	85.76	75 - 145

CALIBRATION BLOCK SUMMARY

Measurement	Current Reading (Previous Coef)	Calibrated (New Coef)	Change	Control Limit On Change
MAGNESIUM				
Density (g/cc)	1.698	1.691	-0.007	+/- 0.015
Pe	2.473	2.597	0.124	+/- 0.150
ALUMINUM				
Density (g/cc)	2.602	2.602	-0.000	+/- 0.01500
Pe	2.959	3.057	0.098	+/- 0.150

TOOL SUMMARY

Measurement	Near Detector		Far Detector	
	Value	Control Limits	Value	Control Limits
QUALITY				
Background	-0.0008	+/- 0.0110	-0.0011	+/- 0.0140
Magnesium Block	-0.0006	+/- 0.0110	-0.0012	+/- 0.0140
Aluminum Block	0.0004	+/- 0.0110	-0.0001	+/- 0.0140
Resolution	9.27	6.00 - 11.50	8.91	6.00 - 11.50
Internal Verifier(B+D+P+L)	1516	1200 - 2700	909	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 - M319P593**	**Reference Calibration Date:**	**06-Jan-12 13:50:34**
Engineer:	**C. BLUE**	**Calibration Date:**	**24-Jan-12 09:46:50**
Software Version:	**WL INSITE R3.4.4 (Build 2)**	**Calibration Version:**	**1**

Pad Temperature: 45.6 degF

DENSITY FIELD CALIBRATION SUMMARY

Measurement	Shop	Field	Change	Control Limit +/-
Near (B+D+P+L) cps	1515.515	1513.045	-2.470	15.681
Far (B+D+P+L) cps	909.183	910.524	1.341	16.371
Near Resolution	9.27	9.65	0.380	0.50
Far Resolution	8.91	9.19	0.280	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
GTET-11215095						
Gamma Ray Calibrator	234.0	235.4	----------	-1.4	+/- 9.00	api
CSNG-10846351						
60 KEV Peak Channel #	48.0	48.0	----------	0.0	----------	Channel #
239 KEV Peak Channel #	23.7	23.7	----------	0.0	----------	Channel #
583 KEV Peak Channel #	53.4	53.4	----------	0.0	----------	Channel #
2614 KEV Peak Channel #	219.9	220.3	----------	-0.4	----------	Channel #
DSNT-10935690						
Snow-Block Porosity	0.0837	0.0775	----------	0.0062	+/- 0.0150	decp
SDLT-10951319						
Pad Extension	3.75	3.76	----------	-0.01	+/-0.10	in
Ring Diameter	8.25	8.35	----------	-0.100	+/-0.15	in
ACRt Sonde-E2584-S2585						
Mud Cell	0.997	----------	----------	0.000	----------	ohm-m
SDLT Pad-M319P593						
Near(B+D+P+L)	1515.515	1513.045	----------	2.470	+/-15.681	cps
Far(B+D+P+L)	909.183	910.524	----------	-1.341	+/-16.371	cps

Data: SHABLE_G17_23D\0001 TRIPLE-CSNG-GEM\IDLE **Date: 25-Jan-12 22:04:26**

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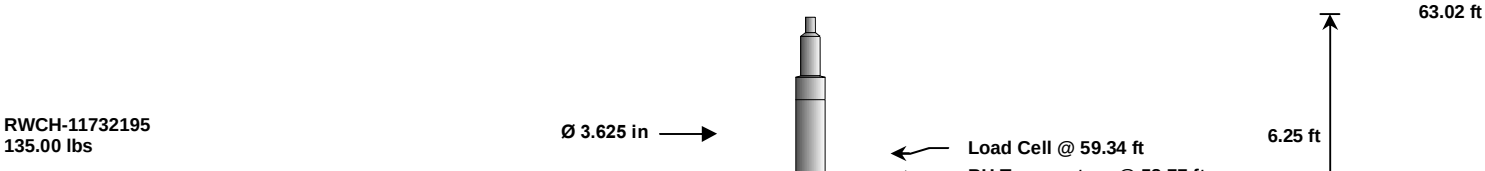
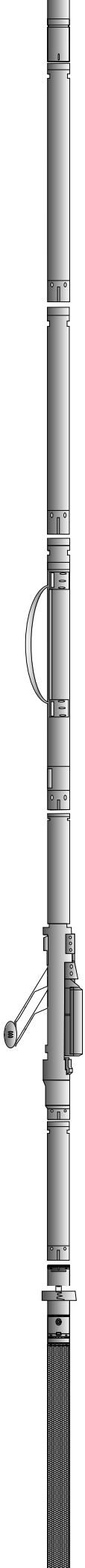
TOOL STRING DIAGRAM REPORT

Description	Overbody Description	O.D.	Diagram	Sensors @ Delays	Length	Accumulated Length





BH Temperature @ 58.77 ft

56.77 ft

GTET-11215095
165.00 lbs

Ø 3.625 in

8.52 ft

GammaRay @ 50.71 ft

48.25 ft

CSNG-10846351
114.00 lbs

Ø 3.625 in

8.17 ft

CSNG @ 42.62 ft

40.08 ft

DSN Decentralizer-11219332
6.60 lbs

Ø 5.000 in*

DSNT-10935690
174.00 lbs

Ø 3.625 in

9.69 ft

DSN Far @ 33.15 ft

DSN Near @ 32.40 ft

30.40 ft

SDLT-10951319
360.00 lbs

Ø 4.500 in

10.81 ft

SDLT Pad-M319P593
65.00 lbs

Microlog Pad-10951319
8.00 lbs

Ø 4.750 in*

Ø 4.750 in*

Microlog @ 22.58 ft

SDL Caliper @ 22.40 ft

SDL @ 22.39 ft

19.58 ft

ACRt Instrument-11532584
50.00 lbs

Ø 3.625 in

5.03 ft

14.55 ft

Regal Standoff 6_75-01
20.00 lbs

Ø 6.750 in*

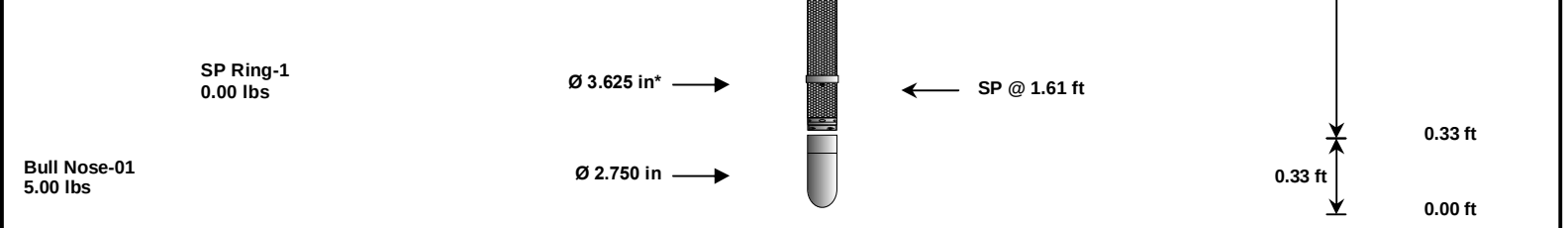
Mud Resistivity @ 13.19 ft

ACRt @ 9.21 ft

ACRt Sonde-E2584-S2585
200.00 lbs

Ø 3.625 in

14.22 ft



Mnemonic	Tool Name	Serial Number	Weight (lbs)	Length (ft)		Accumulated Length (ft)	Max.Log. Speed (fpm)
RWCH	Releasable Wireline Cable Head	11732195	135.00	6.25		56.77	300.00
GTET	Gamma Telemetry Tool	11215095	165.00	8.52		48.25	60.00
CSNG	Compensated Spectral Natural Gamma	10846351	114.00	8.17		40.08	15.00
DSNT	Dual Spaced Neutron	10935690	174.00	9.69		30.40	60.00
DCNT	DSN Decentralizer	11219332	6.60	5.13	*	33.73	300.00
SDLT	Spectral Density Tool	10951319	360.00	10.81		19.58	60.00
MICP	Microlog Pad	10951319	8.00	1.00	*	22.08	60.00
SDLP	Density Insite Pad	M319P593	65.00	2.55	*	21.79	60.00
ACRt	Array Compensated True Resistivity Instrument Section	11532584	50.00	5.03		14.55	300.00
ACRt	Array Compensated True Resistivity	E2584-S2585	200.00	14.22		0.33	300.00
SP	SP Ring	1	0.00	0.25	*	1.61	300.00
RSOF	Regal Standoff 6.75in	01	20.00	0.52	*	13.24	300.00
BLNS	Bull Nose	01	5.00	0.33		0.00	300.00
Total			**1,302.60**	**63.02**			

* Not included in Total Length and Length Accumulation.

Data: SHABLE_G17_23D\0001 TRIPLE-CSNG-GEM\002 25-Jan-12 21:41 Dn @0.0f **Date: 25-Jan-12 22:02:20**

COMPANY	**NOBLE ENERGY**		
WELL	**SHABLE G17-23D**		
FIELD	**WATTENBERG**		
COUNTY	**WELD**	STATE	**CO**

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SPECTRAL DENSITY
DUAL SPACED NEUTRON
ARRAY COMPENSATED
TRUE RESISTIVITY