

HALLIBURTON

DUAL SPACED NEUTRON  
SPECTRAL DENSITY  
ARRAY COMPENSATED  
TRUE RESISTIVITY

COMPANY				BLACK DIAMOND MINERALS			
WELL				TPR 176-25			
FIELD/BLOCK				MAMM CREEK			
COUNTY				GARFIELD			
STATE				CO			
Permanent Datum				GL			
Log measured from				KB			
Drilling measured from				KB			
Date				23-Oct-13			
Run No.				ONE			
Depth - Driller				11825.00 ft			
Depth - Logger				11824.0 ft			
Bottom - Logged Interval				11822 ft			
Top - Logged Interval				6800 ft			
Casing - Driller				9.625 in @ 2187.0 ft			
Casing - Logger				2184.0 ft			
Bit Size				8.250 in			
Type Fluid in Hole				WATER BASED MUD			
Density				9.2 ppg			
Viscosity				58.00 s/qt			
PH				9.10 pH			
Source of Sample				MUD CELL			
Rm @ Meas. Temperature				1.690 ohmm @ 80.00 degF			
Rmf @ Meas. Temperature				5.22 ohmm @ 46.60 degF			
Rmc @ Meas. Temperature				6.290 ohmm @ 46.50 degF			
Source Rmf				MEASURED			
Rmc				MEASURED			
Rm @ BHT				0.73 ohmm @ 234.0 degF			
Time Since Circulation				10.0 hr			
Time on Bottom				23-Oct-13 23:52			
Max. Rec. Temperature				234.0 degF @ 11824.0 ft			
Equipment				11454566			
Location				BRIGHTON			
Recorded By				J. SCHMIDT			
Witnessed By				J. BRUMLEY			

COMPANY	BLACK DIAMOND MINERALS
WELL	TPR 176-25
FIELD/BLOCK	MAMM CREEK
COUNTY	GARFIELD
STATE	CO
API No.	05045221530000
Location	SHL: 645' FSL & 1932' FEL SWSE
LATITUDE: 39.404562°	
LONGITUDE: -107.832781°	
Other Services:	WSTT

Sect.	25	Twp.	7S	Rge.	94W
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Elev.	9131.0 ft
D.F.	9155.0 ft
G.L.	9131.0 ft

Fold here

Service Ticket No.:				API Serial No.: 05045221530000				PGM Version: WL INSITE R3.8.4 (Build 5)			
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	CENT	N/A	
Rmc @ Meas. Temp.	@			@			11302817				
Source Rmf	Rmc						11294353				
Rm @ BHT	@			@							
Rmf @ BHT	@			@							
Rmc @ BHT	@			@							
EQUIPMENT DATA											
GAMMA		ACOUSTIC				DENSITY		NEUTRON			
Run No.	ONE	Run No.	ONE	Run No.	ONE	Run No.	ONE	Run No.	ONE		
Serial No.	11812883	Serial No.	34515236	Serial No.	11795867	Serial No.	11795867	Serial No.	11812167		
Model No.	GTET	Model No.	WSTT	Model No.	SDLT	Model No.	SDLT	Model No.	DSNT		
Diameter	3.625"	No. of Cent.	2	Diameter	4.5"	Diameter	4.5"	Diameter	3.625"		
Detector Model No.	GTET	Spacing	0.5'	Log Type	GAM-GAM	Log Type	GAM-GAM	Log Type	NEU-NEU		
Type	SCINT			Source Type	Cs 137	Source Type	Cs 137	Source Type	Am241Be		
Length	8"	LSA [Y/N]	Y	Serial No.	5471GW	Serial No.	5471GW	Serial No.	DSN434		
Distance to Source	10'	FWDA [Y/N]	Y	Strength	1.78 Ci	Strength	1.78 Ci	Strength	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	6800'	REC	0	200	140	40	55.5	2	3	2.68	30	-10	SAND
DIRECTIONAL INFORMATION														
Maximum Deviation @								KOP @						
Remarks: RWCH/GTET/DSNT/SDLT/FLEX/WSTT/ACRT RAN IN COMBINATION														
TENSION PULLS, WASHOUTS, AND BOREHOLE RUGOSITY CAN AFFECT TOOL RESPONSE														
ANNULAR HOLE VOLUME CALCULATED FOR 7.0-INCH CASING														
TIGHT HOLE														
YOUR CREW: A. AXE, B.RIEDEL														
RIG: H&P 319														
THANK YOU FOR CHOOSING HALLIBURTON ENERGY SERVICES - BRIGHTON, CO - (303) 825-4346														
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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PARAMETERS REPORT

Depth (ft)	Tool Name	Mnemonic	Description	Value	Units
TOP					
	SHARED	BS	Bit Size	8.250	in
	SHARED	UBS	Use Bit Size instead of Caliper for all applications.	No	
	SHARED	MDBS	Mud Base	Water	
	SHARED	MDWT	Borehole Fluid Weight	9.200	ppg
	SHARED	WAGT	Weighting Agent	Barite	
	SHARED	BSAL	Borehole salinity	900.00	ppm
	SHARED	FSAL	Formation Salinity NaCl	0.00	ppm
	SHARED	KPCT	Percent K in Mud by Weight?	0.00	%
	SHARED	RMUD	Mud Resistivity	2.000	ohmm
	SHARED	TRM	Temperature of Mud	75.0	degF
	SHARED	CSD	Logging Interval is Cased?	No	
	SHARED	ICOD	AHV Casing OD	7.000	in
	SHARED	ST	Surface Temperature	45.0	degF
	SHARED	TD	Total Well Depth	11825.00	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 /	AFAC	Acoustic Factor	0.0000	

	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	
	SimpleLithology	RMF	Mud Filtrate Resistivity	0.10	ohmm
	SimpleLithology	RMFT	Temperature of Mud Filtrate	175.00	degF
	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	Sandstone	
	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	2.680	g/cc
	SDLT Pad	DFL	Formation Density Fluid	1.000	g/cc
	Wavesonic-I	WSOK	Process WSTT?	Yes	
	Wavesonic-I	AFIL	Adaptive Filtering?	No	
	Wavesonic-I	PINT	Process 1 Sample and Skip	0	
	Wavesonic-I	PROM	Process Mode: M=1,MX=2,MY=3,MXY=4	4	
	Wavesonic-I	DTSH	Delta -T Shale	100.00	uspf
	Wavesonic-I	DTMT	Delta -T Matrix Type	Sandstone 55.5	
	Wavesonic-I	DTMA	Delta -T Matrix	57.00	uspf
	Wavesonic-I	DTFL	Delta -T Fluid	189.00	uspf
	Wavesonic-I	RHOM	Matrix Density	2.6800	g/cc
	Wavesonic-I	RHOF	Fluid Density	1.0000	g/cc
	Wavesonic-I	SMTH	Semblance Threshold	0.25	
	Wavesonic-I	VPVS	VPVS Ratio for Porosity	1.40	
	Wavesonic-I	APEQ	Acoustic Porosity Equation	Wyllie	
	Wavesonic-I	NAVS	Navigation Source Tool	NONE	
	ACRt Sonde	RTOK	Process ACRt?	Yes	
	ACRt Sonde	MNSO	Minimum Tool Standoff	1.25	in
	ACRt Sonde	TCS1	Temperature Correction Source	FP Lwr & FP Up	
	ACRt Sonde	TPOS	Tool Position	Centered	
	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
BOTTOM					

HALLIBURTON

Plot Time: 24-Oct-13 04:33:04

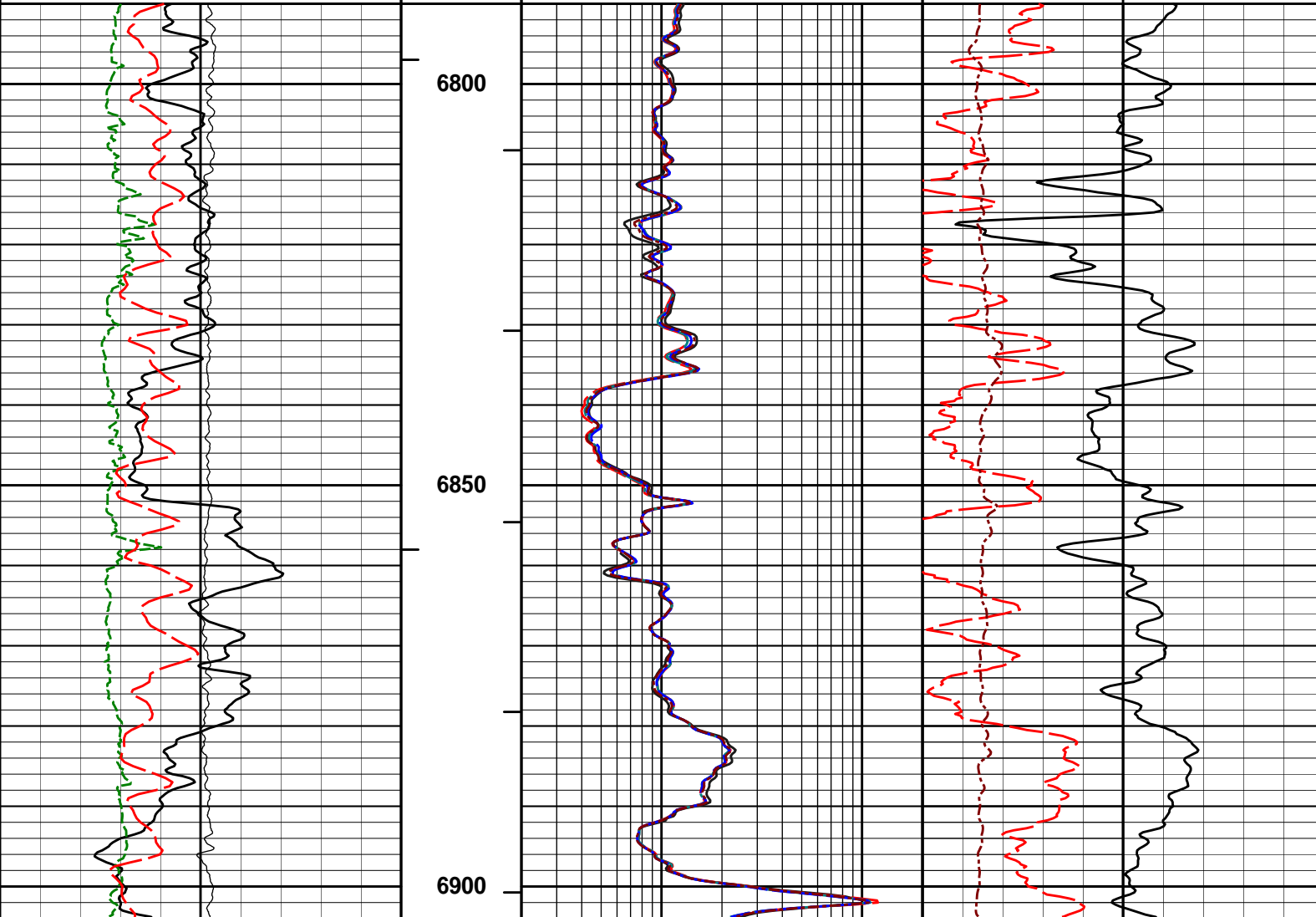
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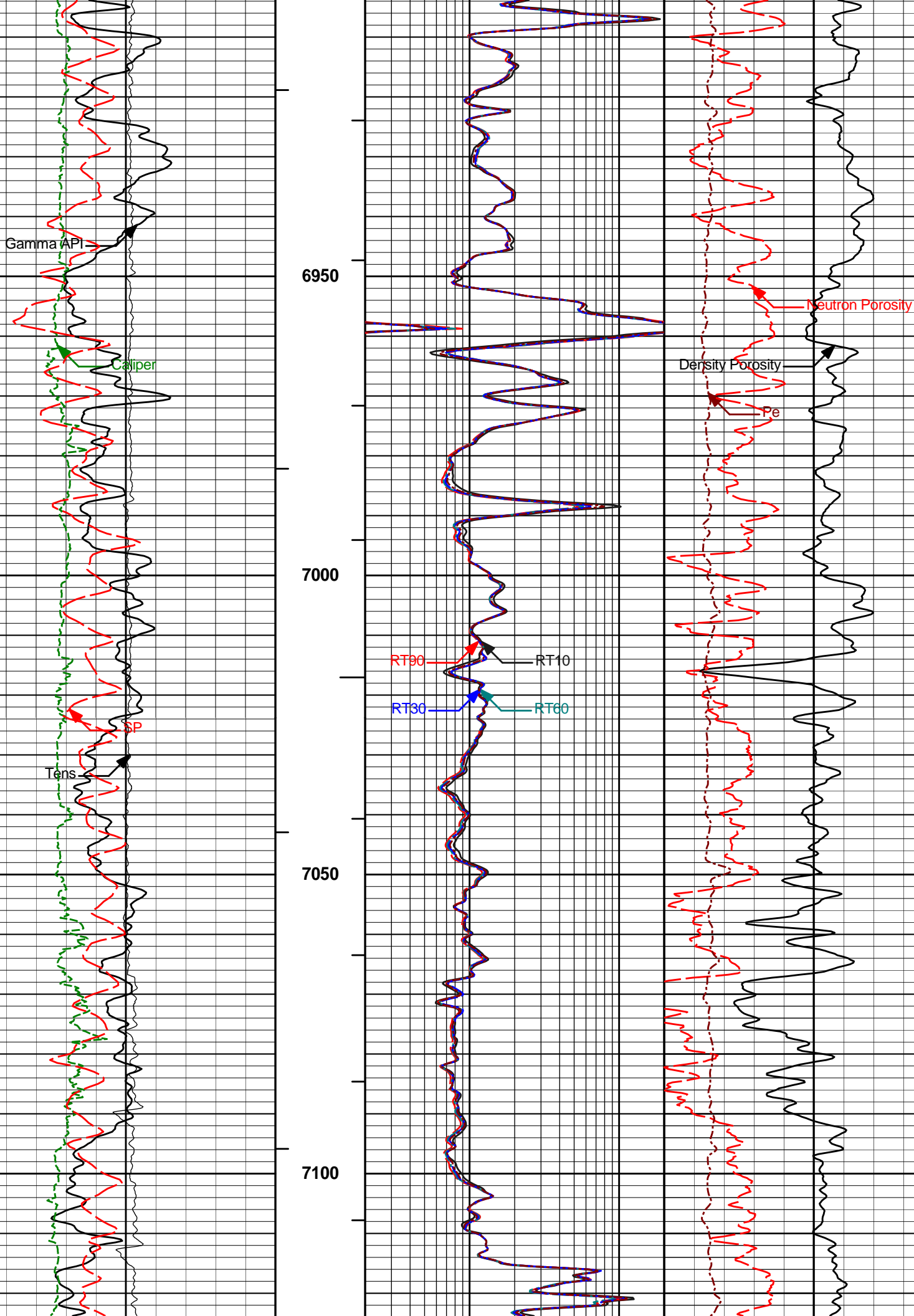
Data: TPR\_176-25\Well Based\MAIN\*

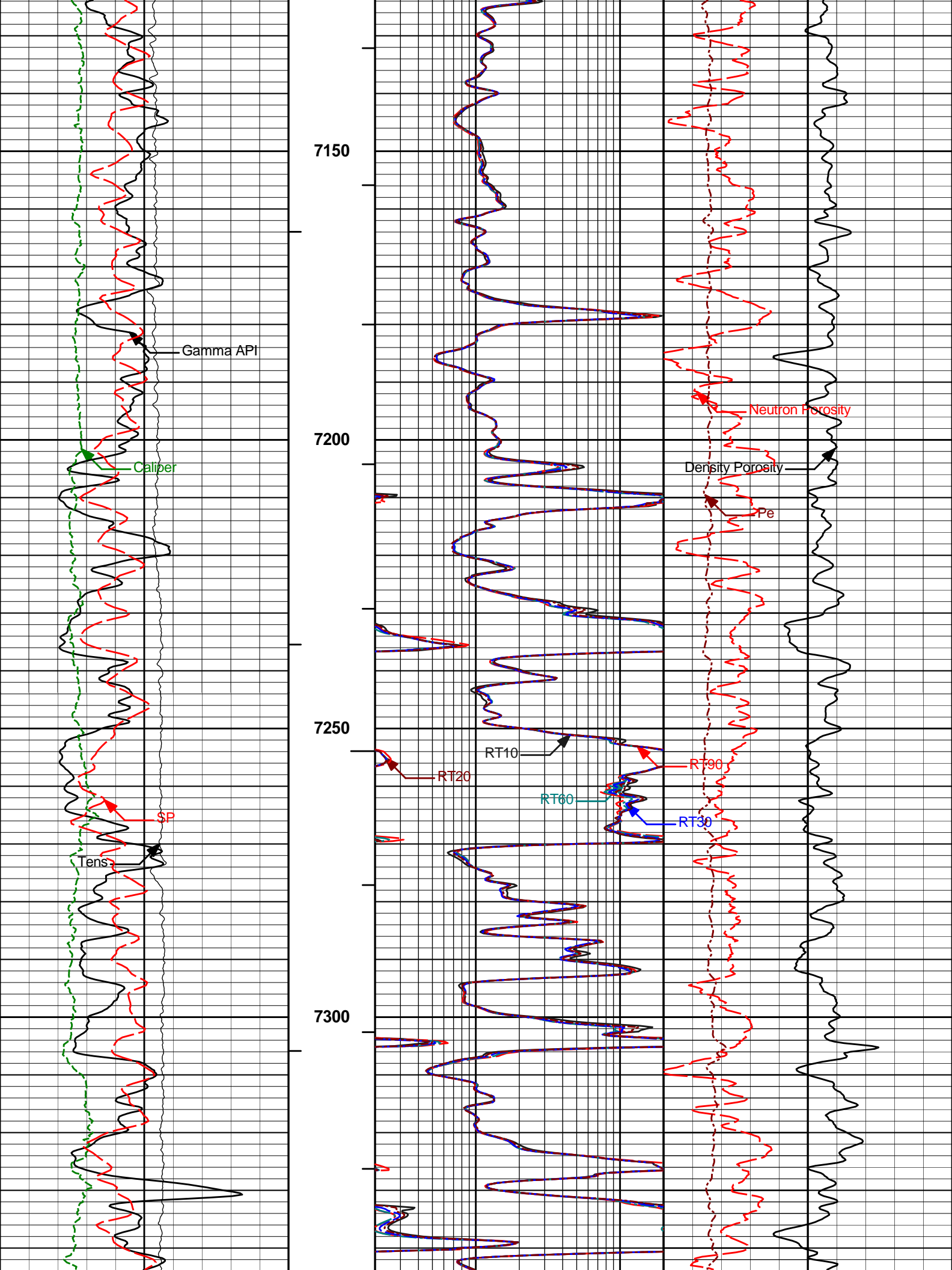
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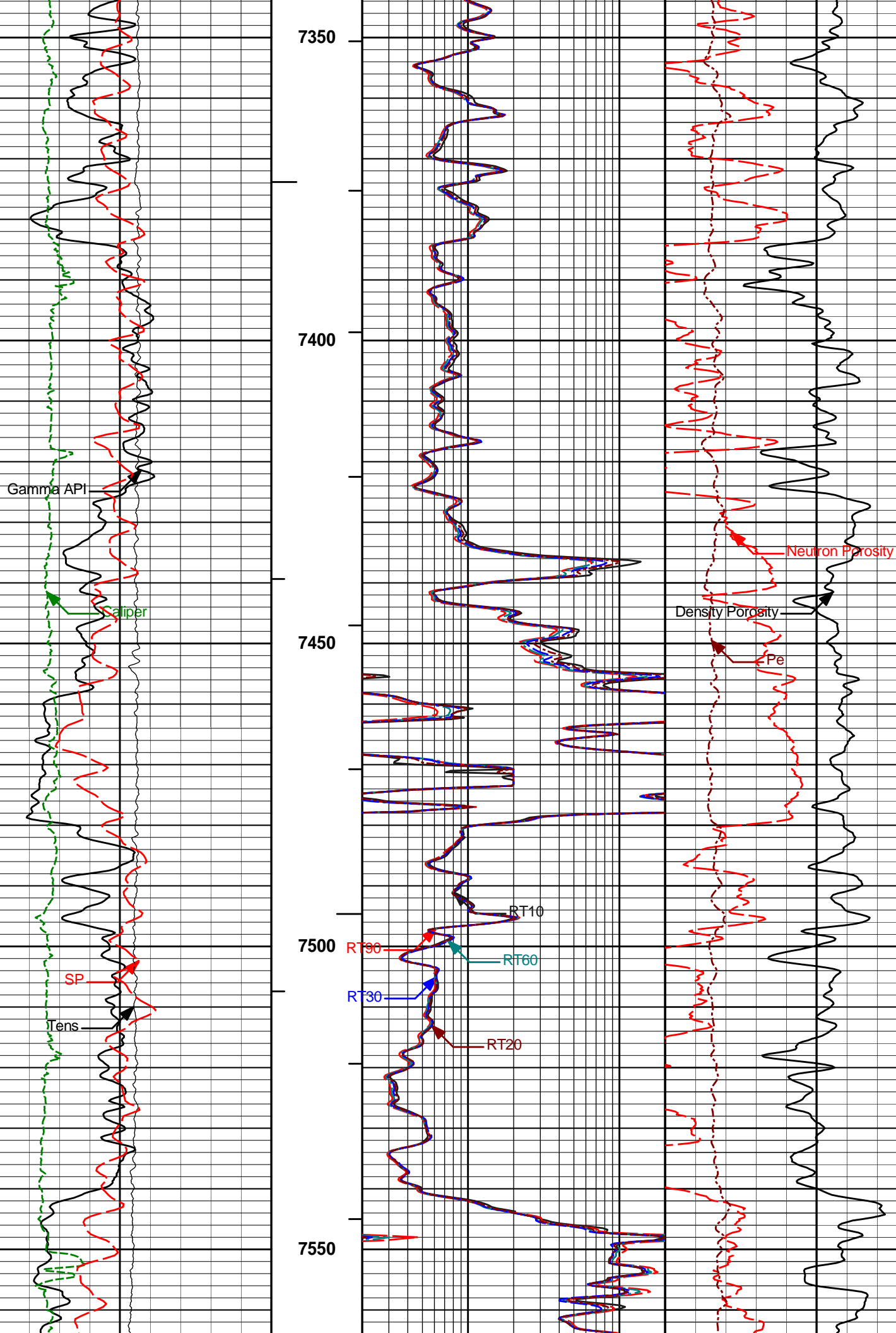
MAIN PASS 5" = 100'

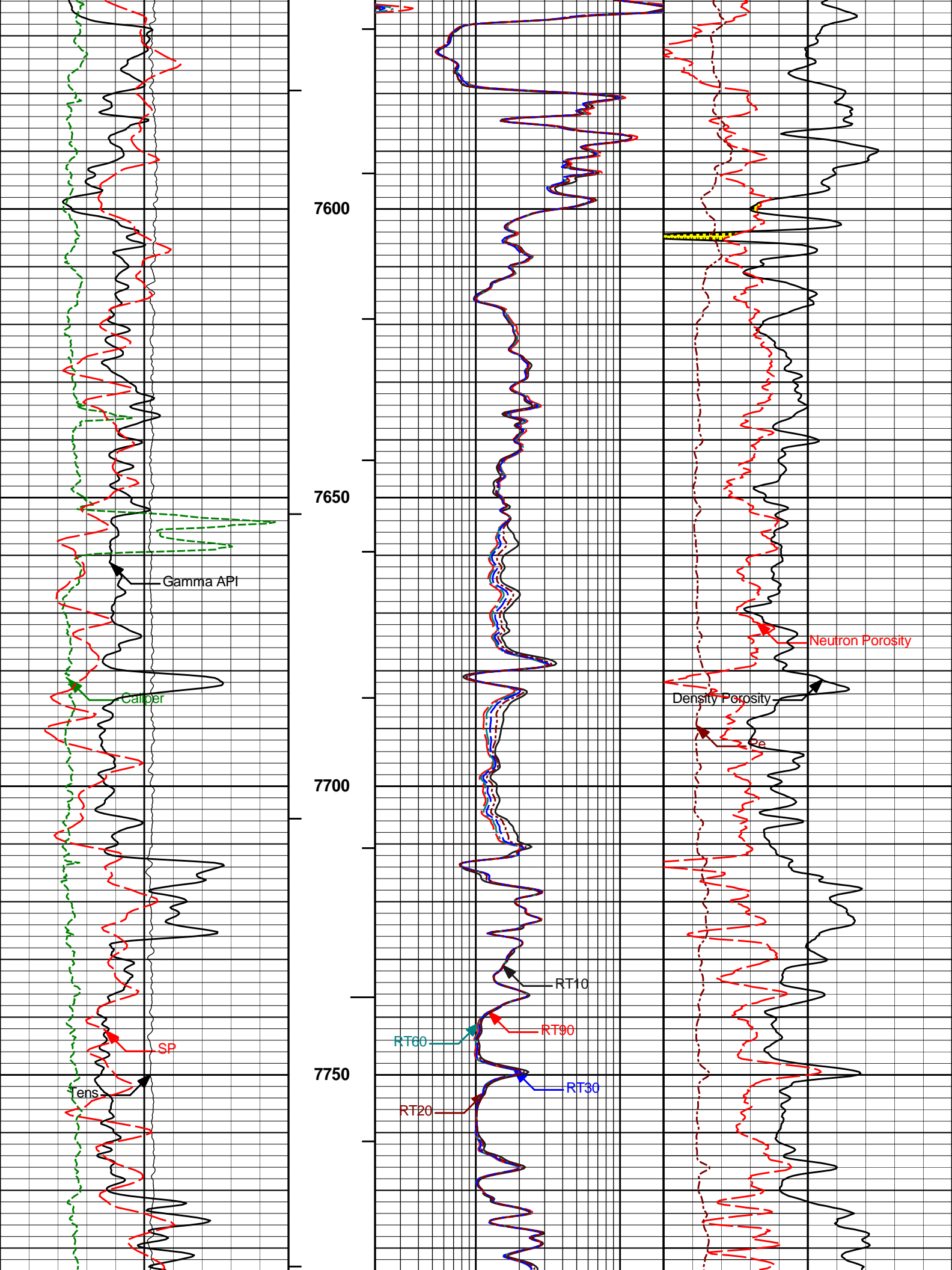
			2	RT10	200				
				ohmm					
10K	Tens	0		2	RT20	200			
			ohmm						
6	Caliper	16	AHVT	2	RT30	200	30	Neutron Porosity	-10
				ohmm		percent			
0	Gamma API	200	BHVT	2	RT60	200	30	Density Porosity	-10
				ohmm		percent			
0	SP	100	1 : 240	2	RT90	200	0	Pe	10
				ohmm					

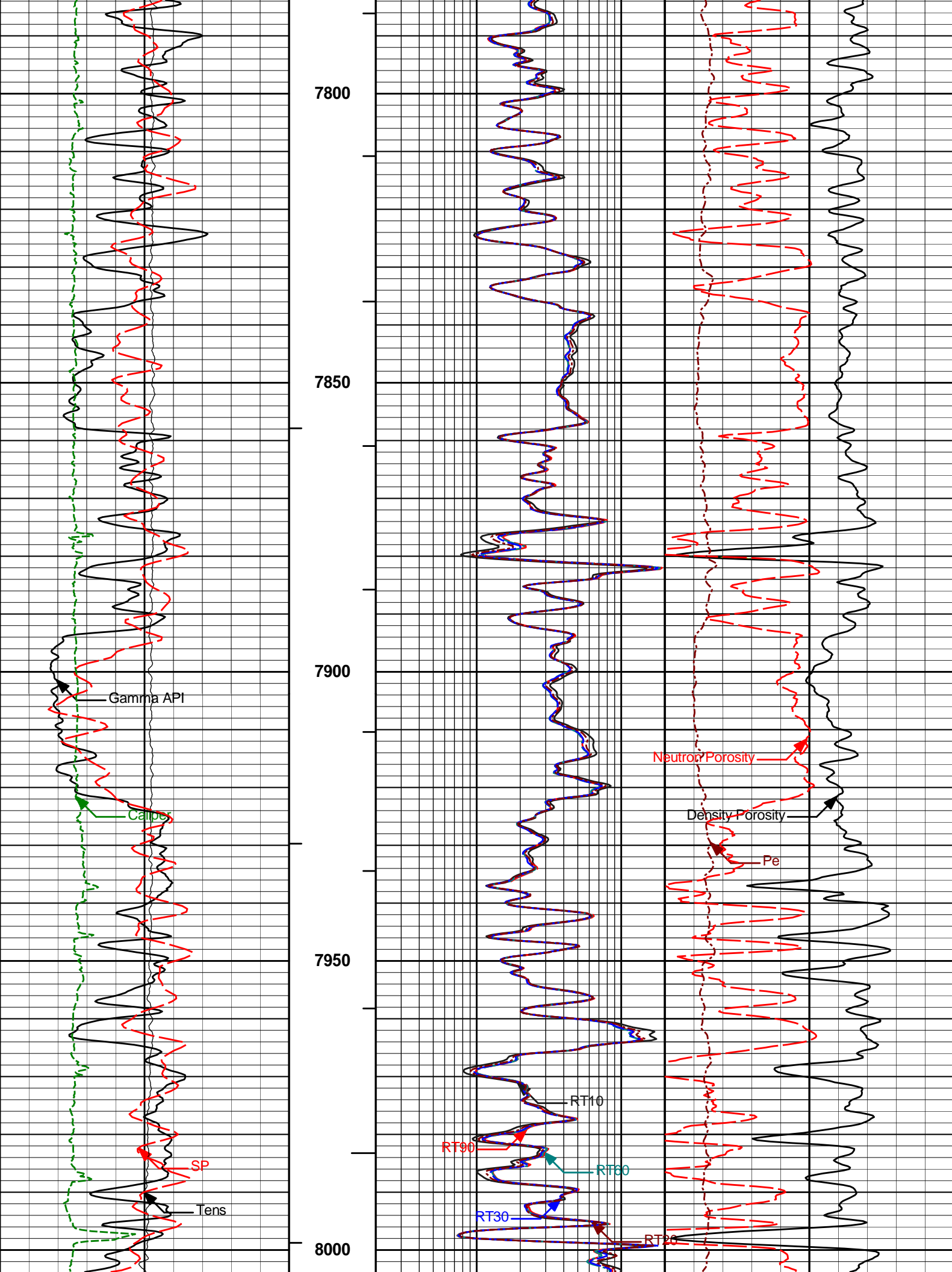


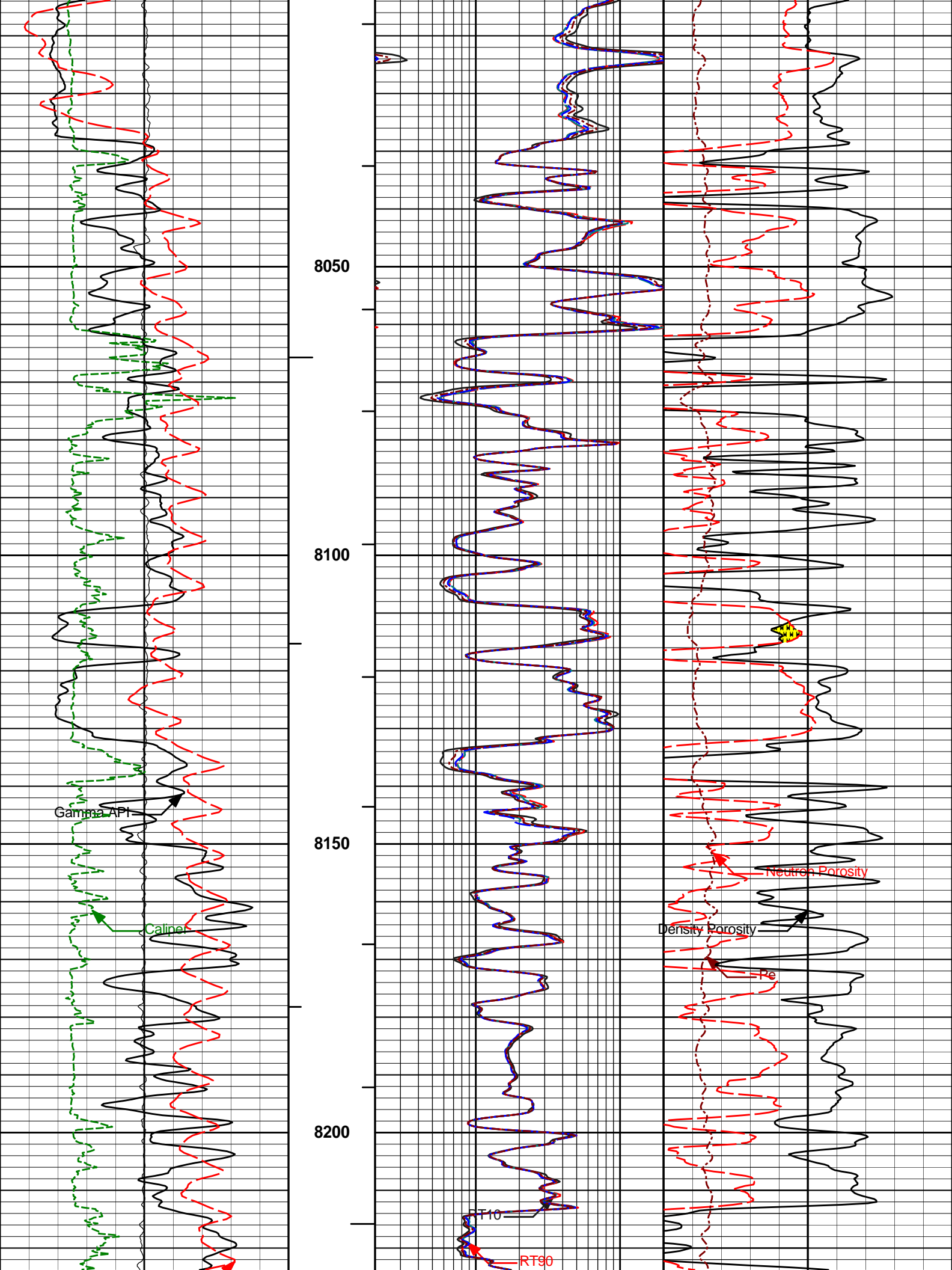


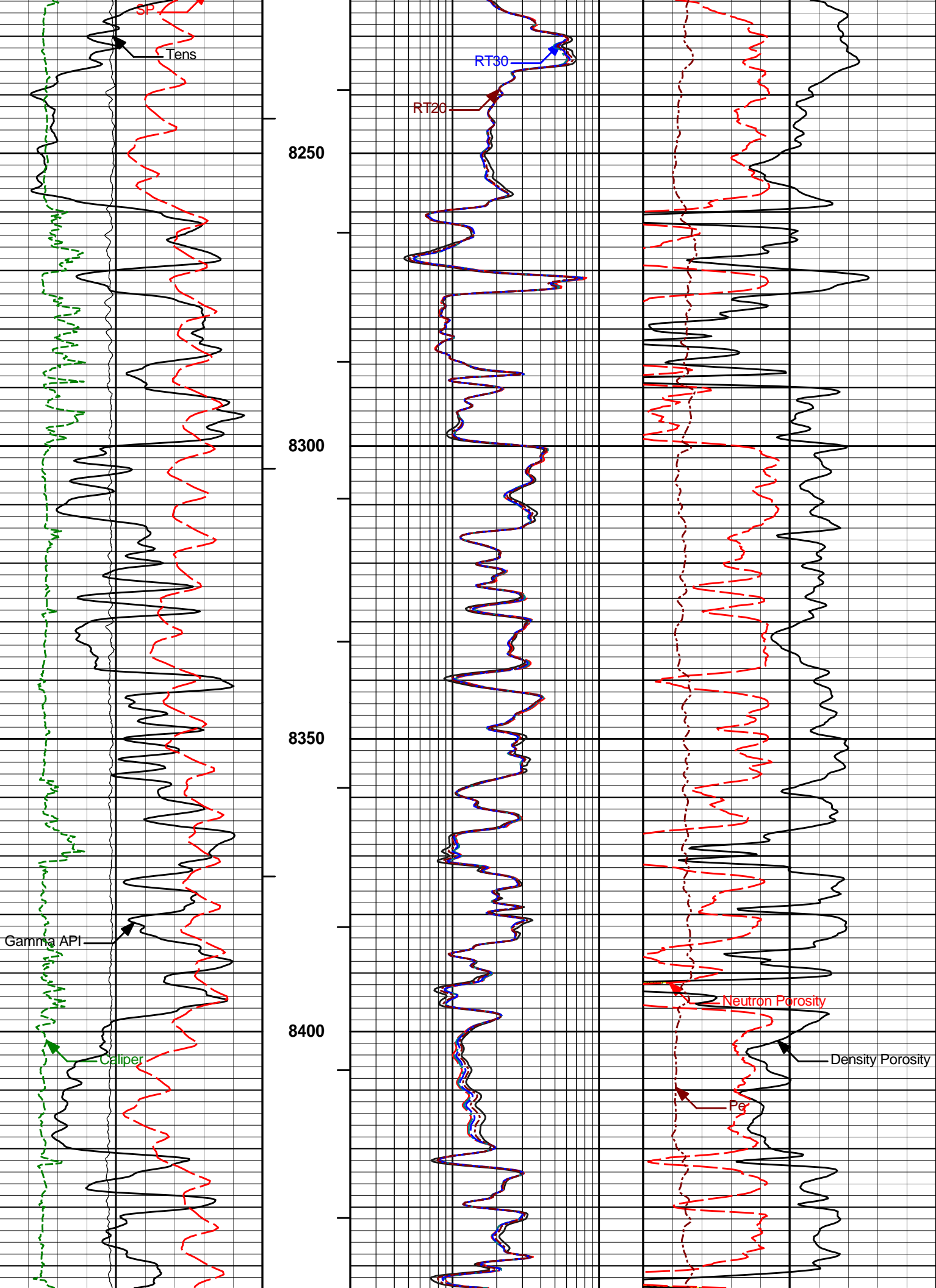


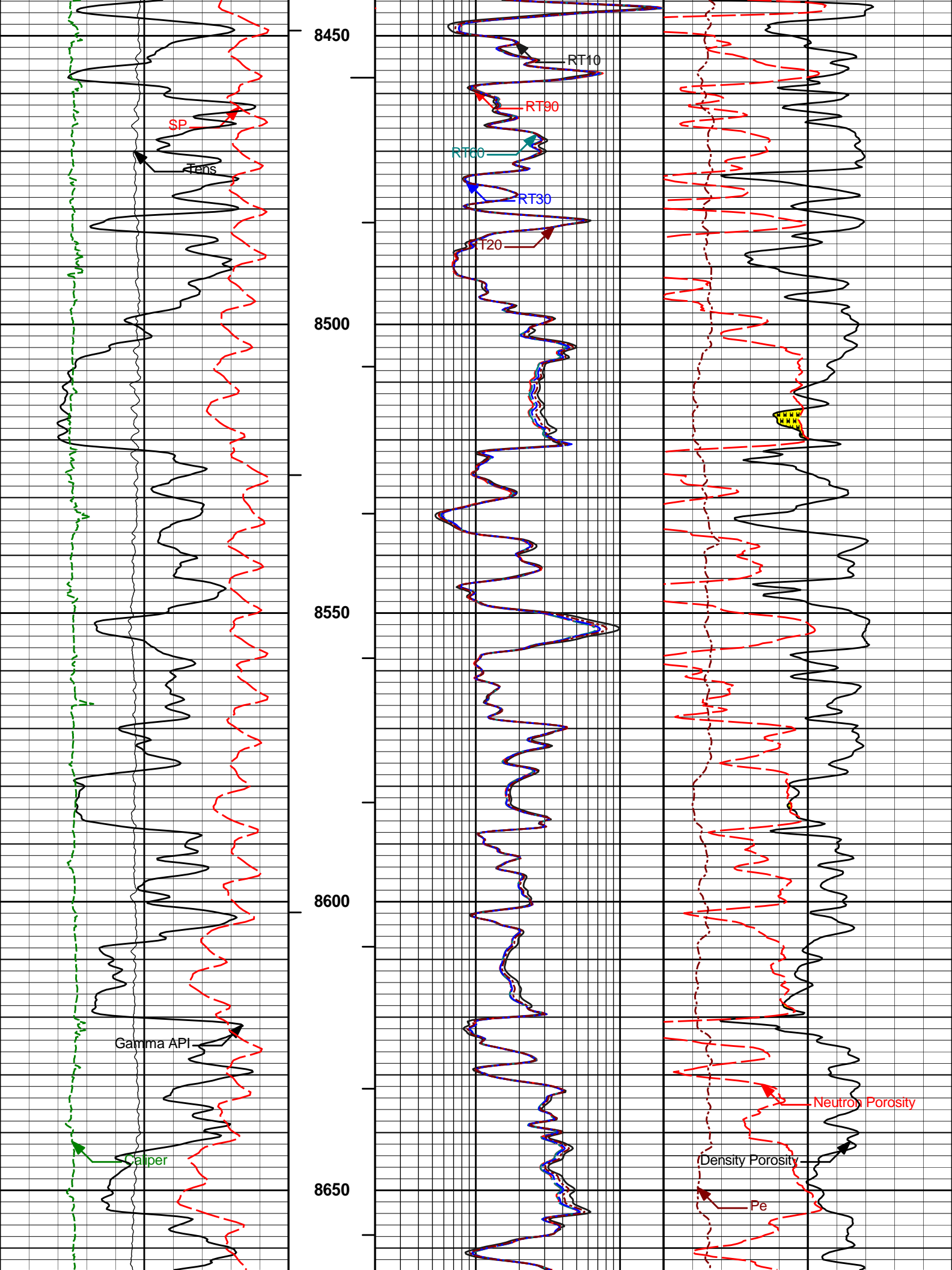


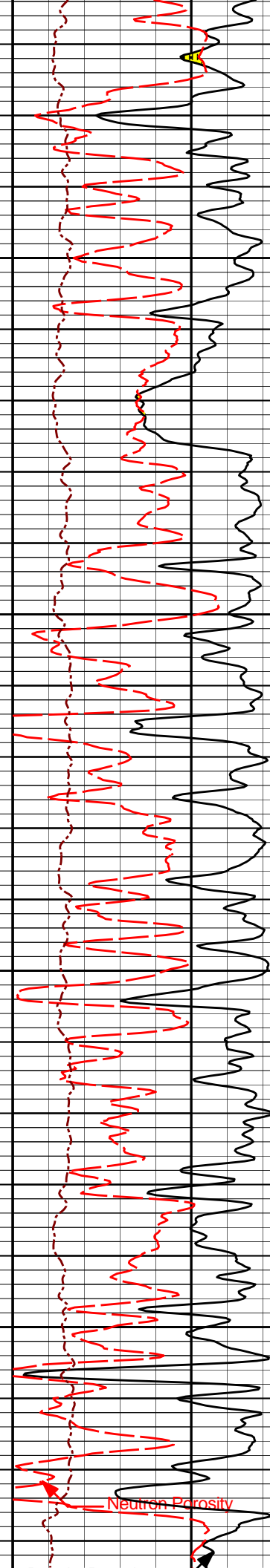
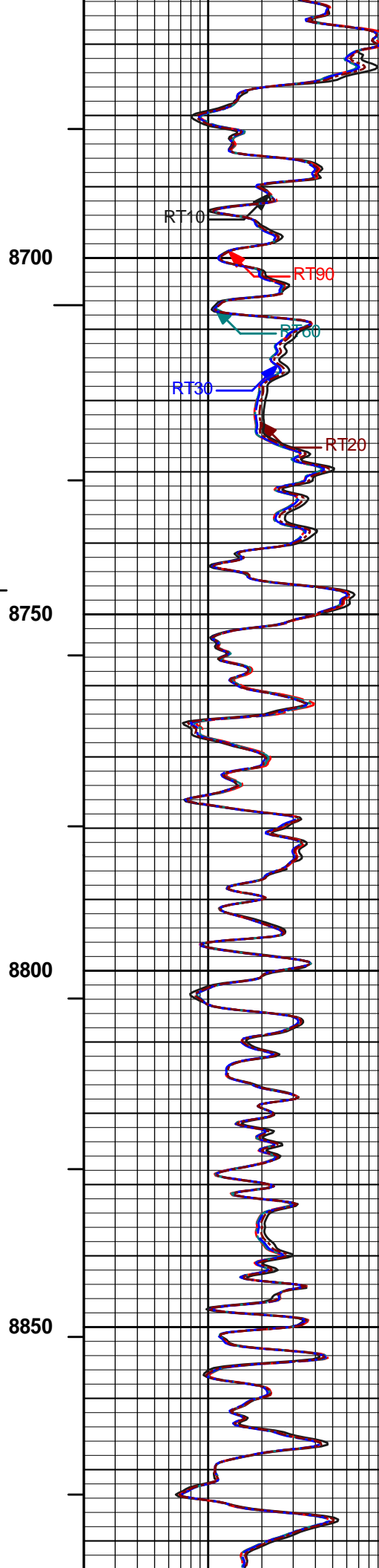
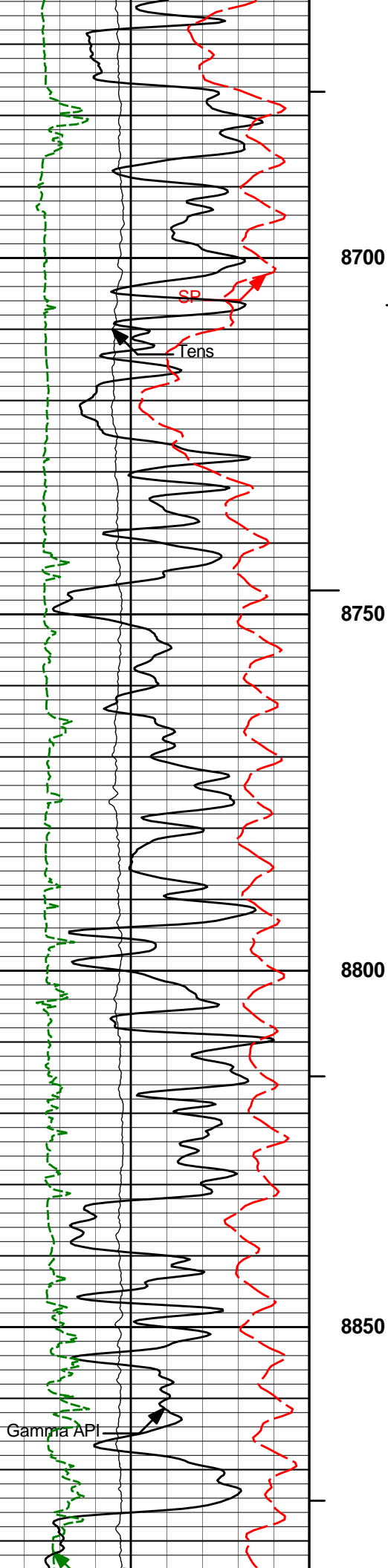


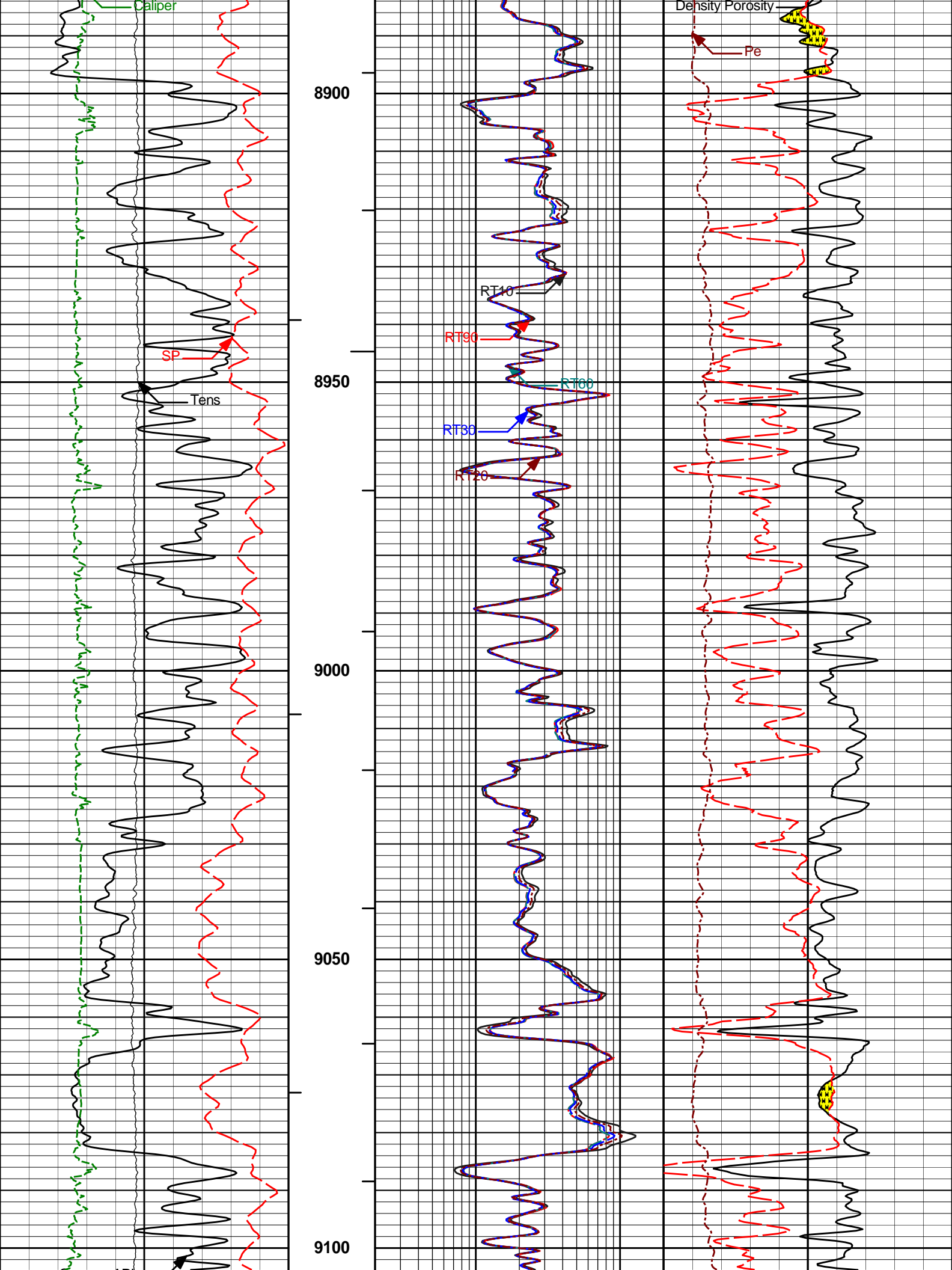


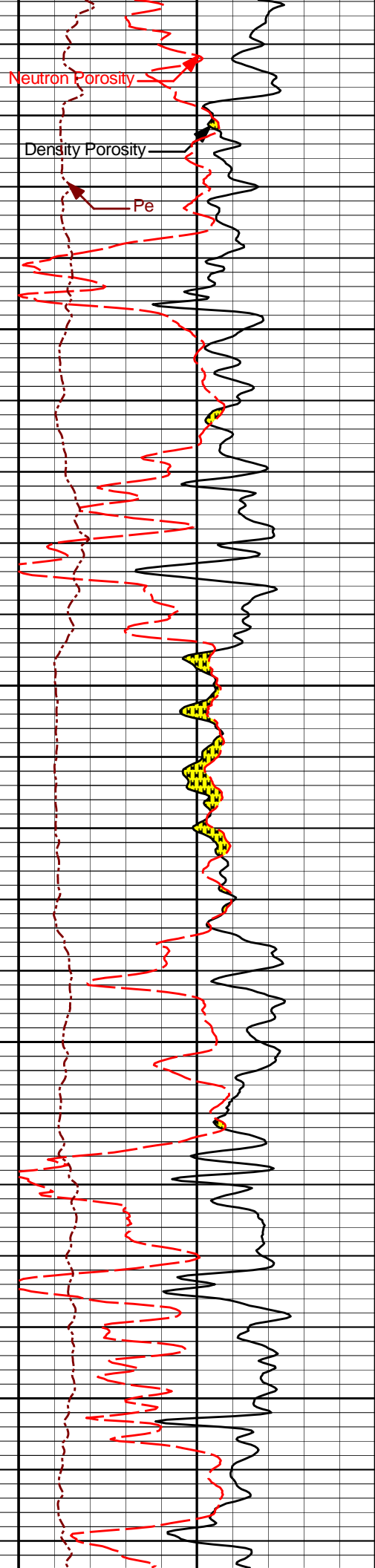
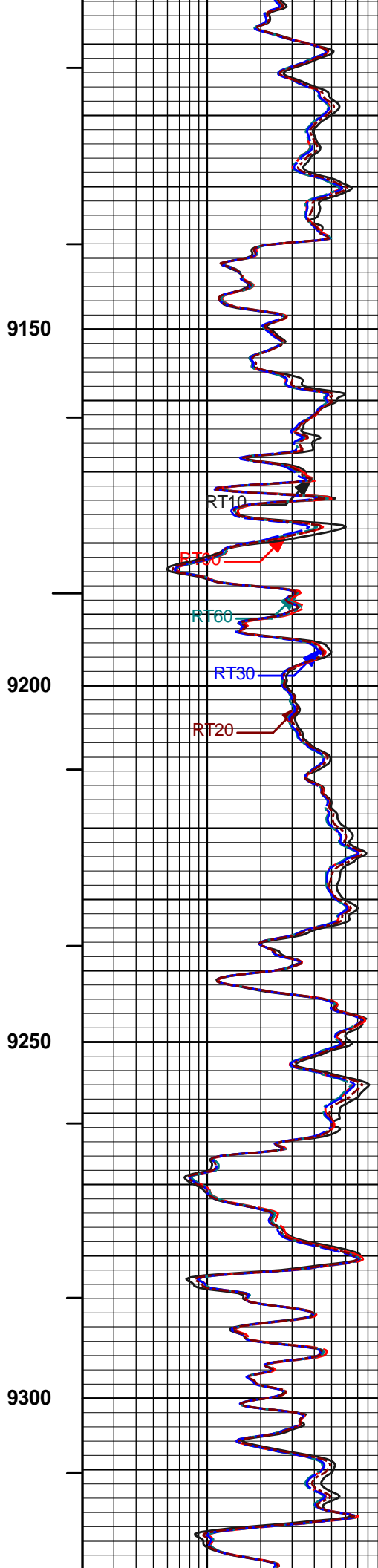
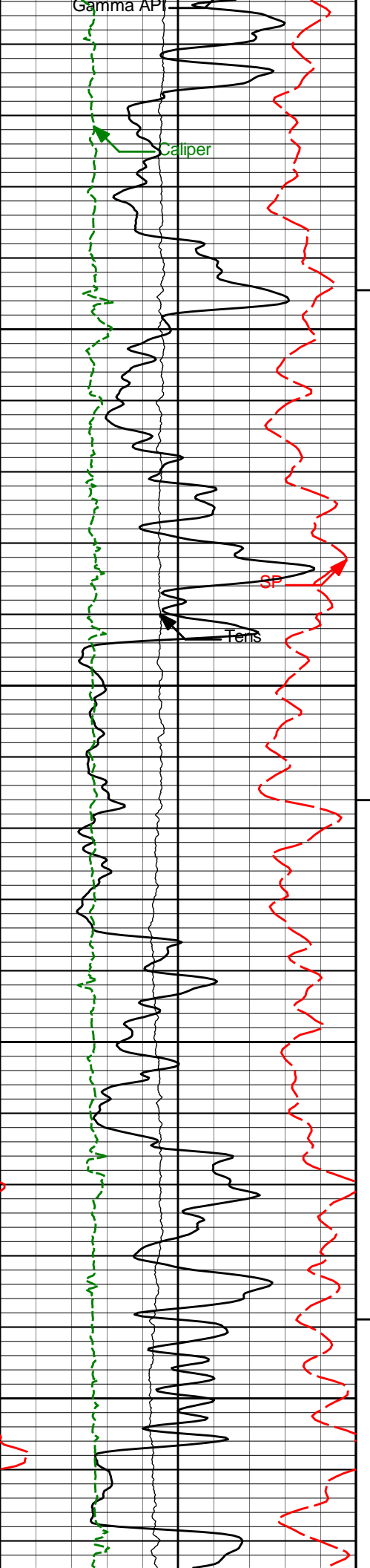


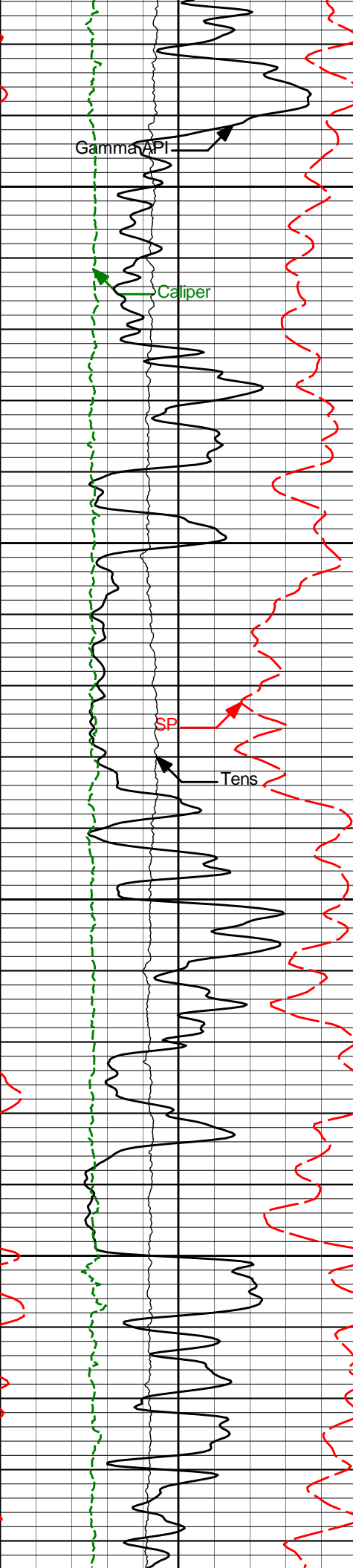










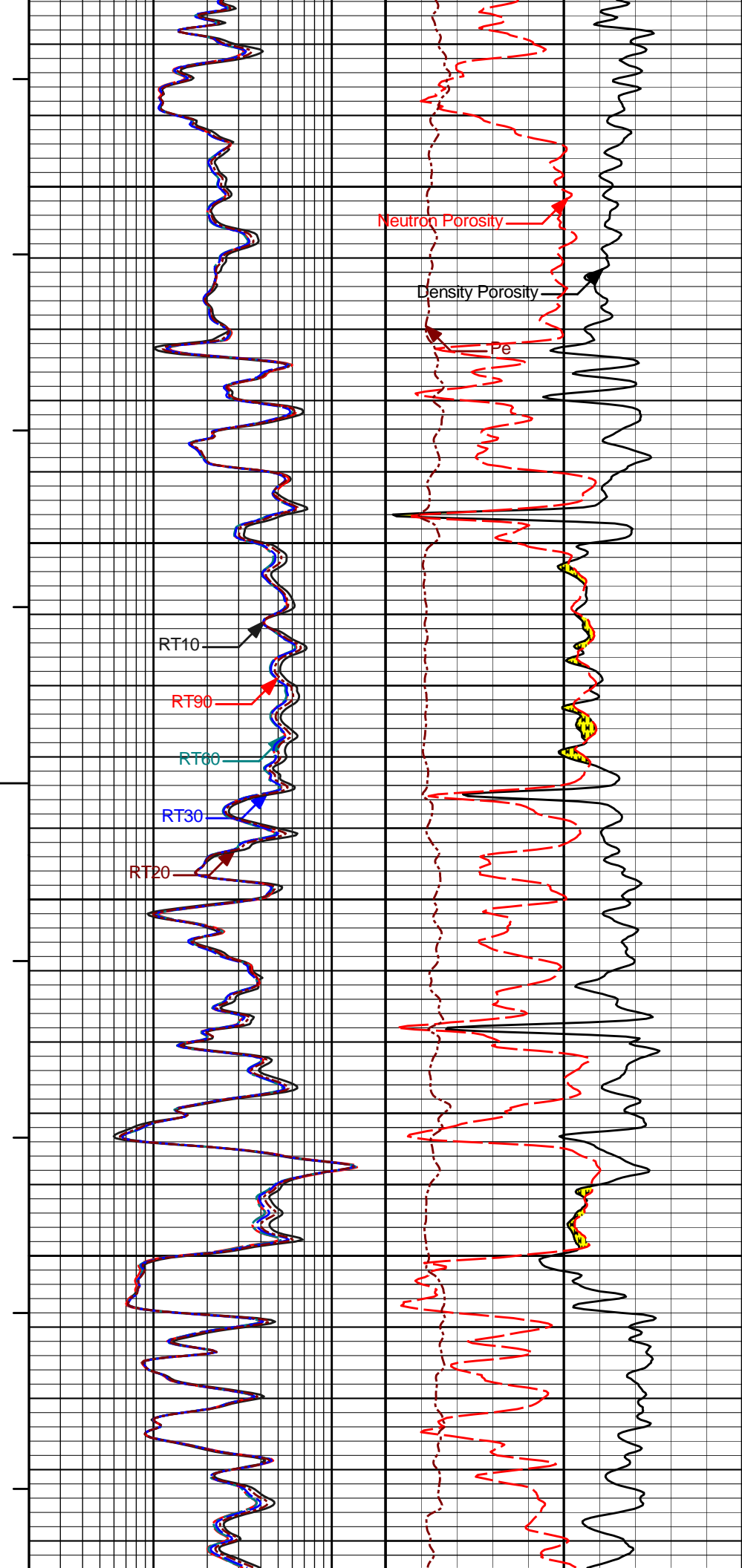


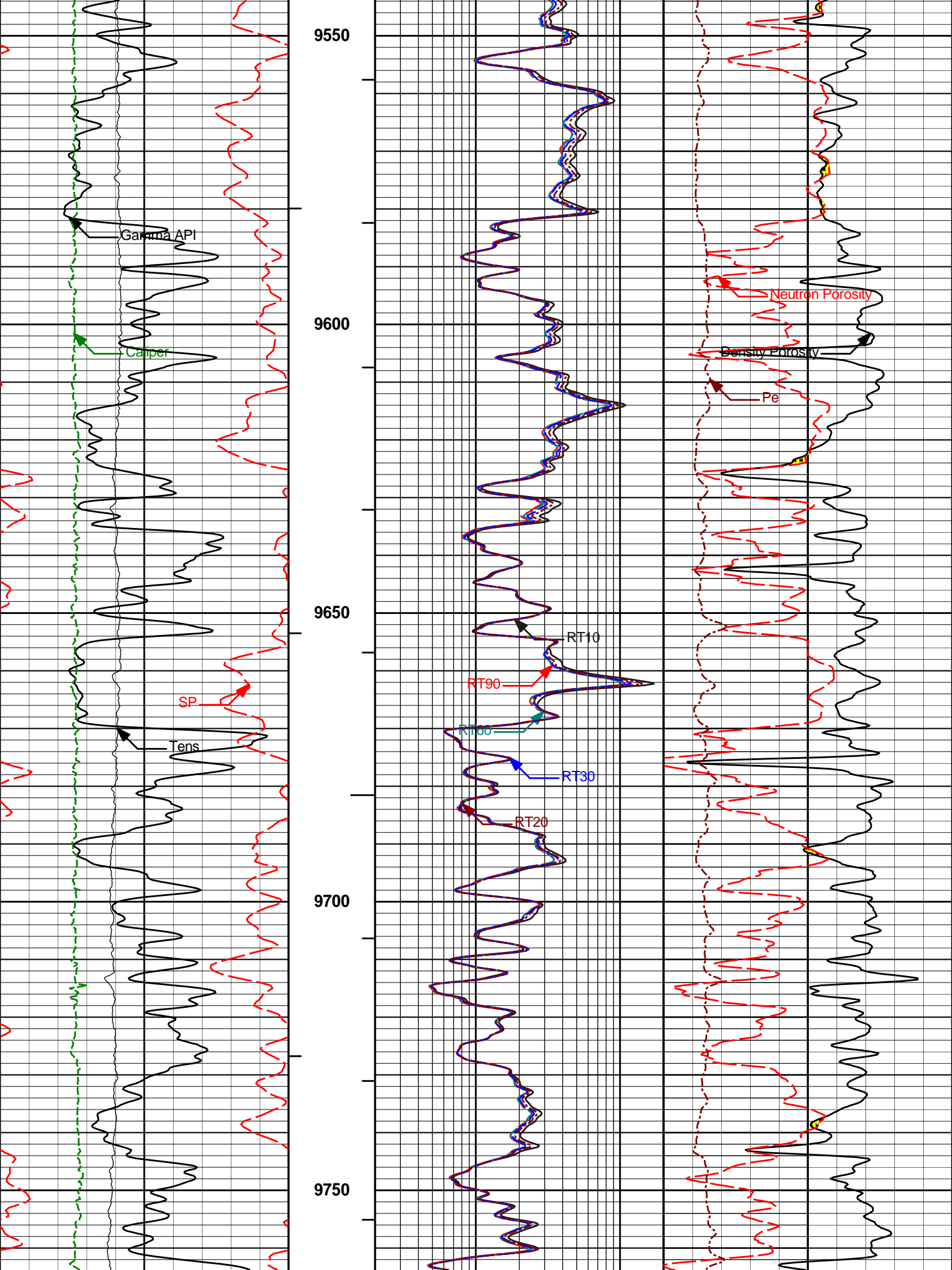
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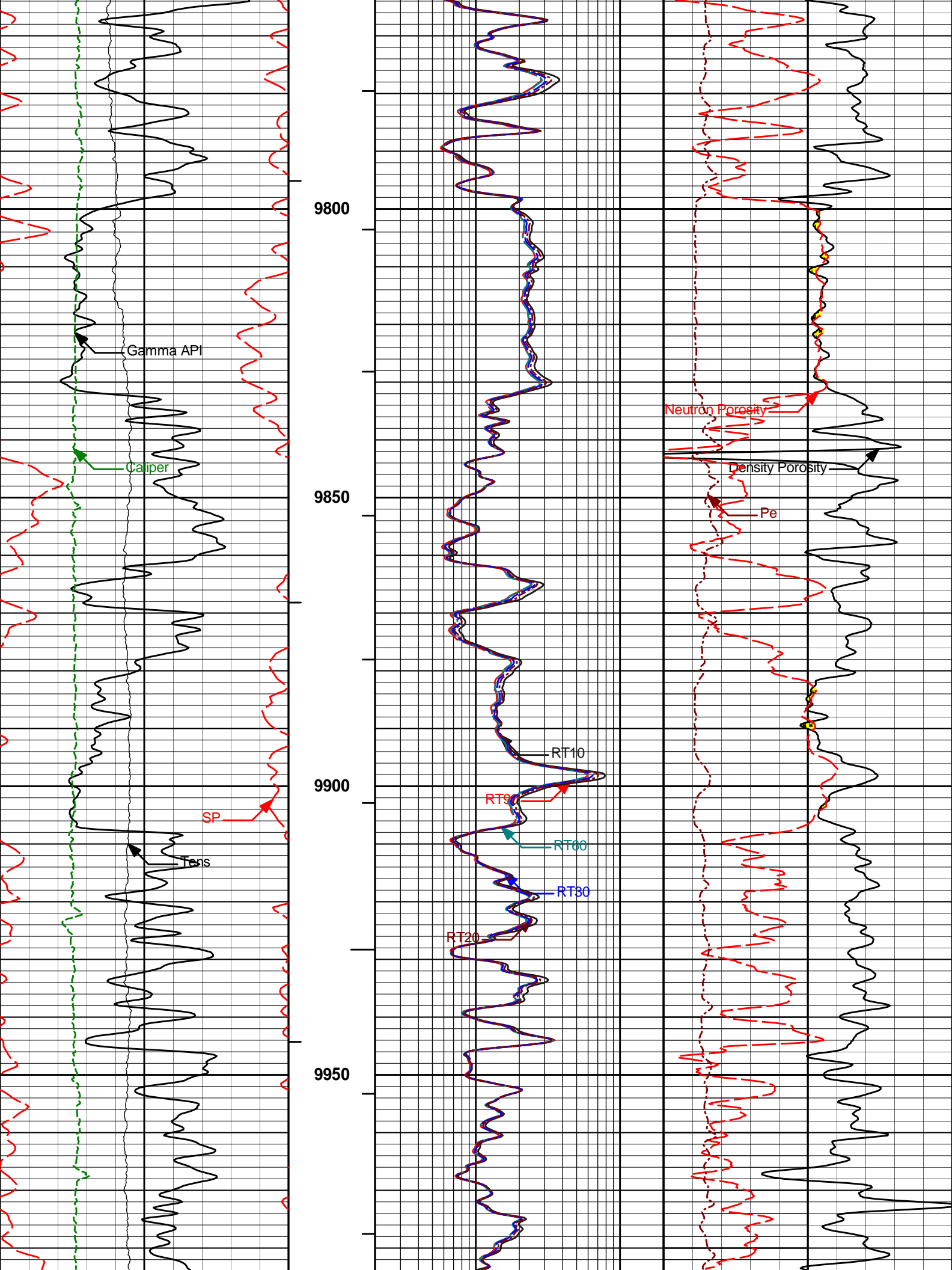
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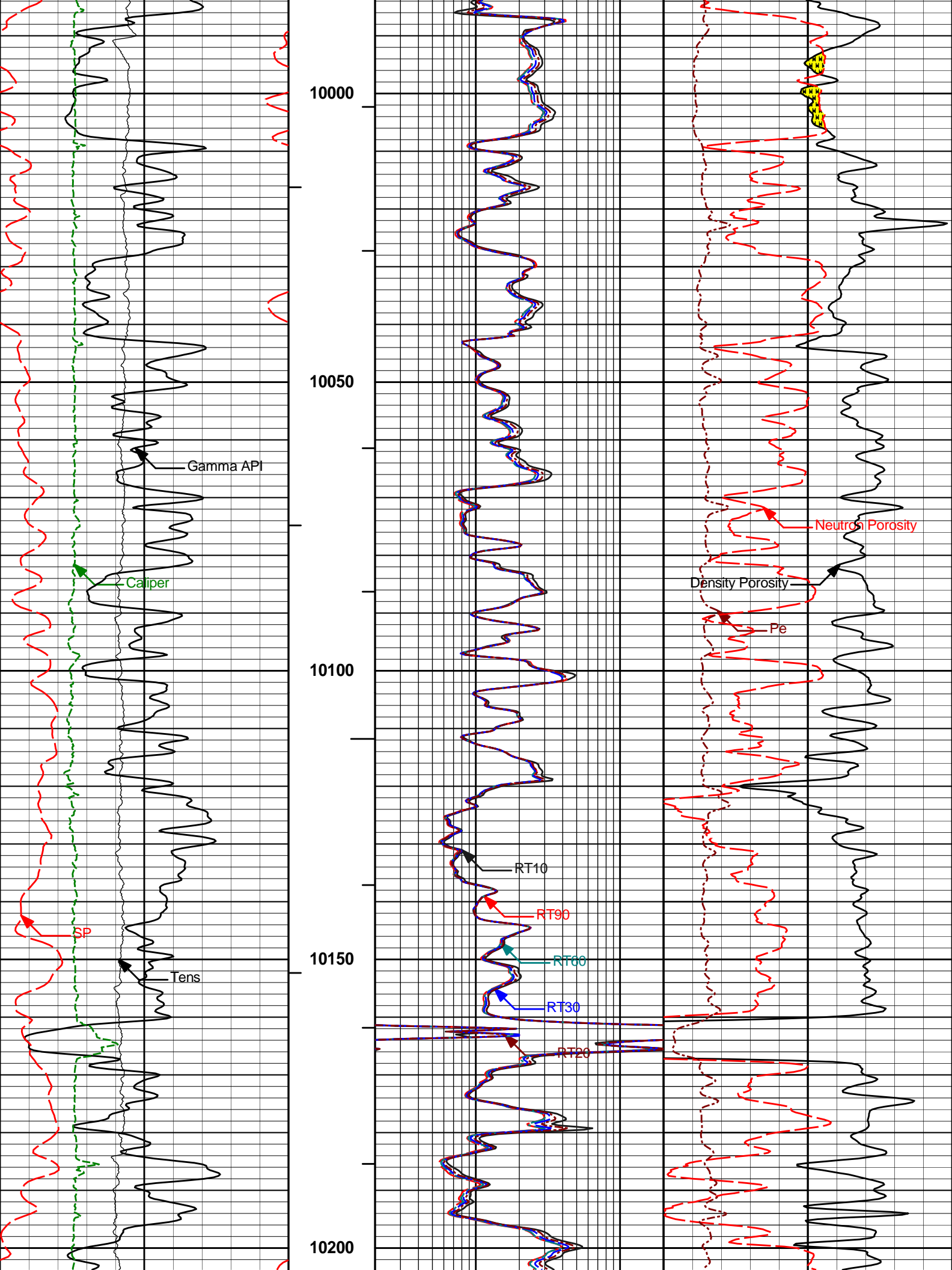
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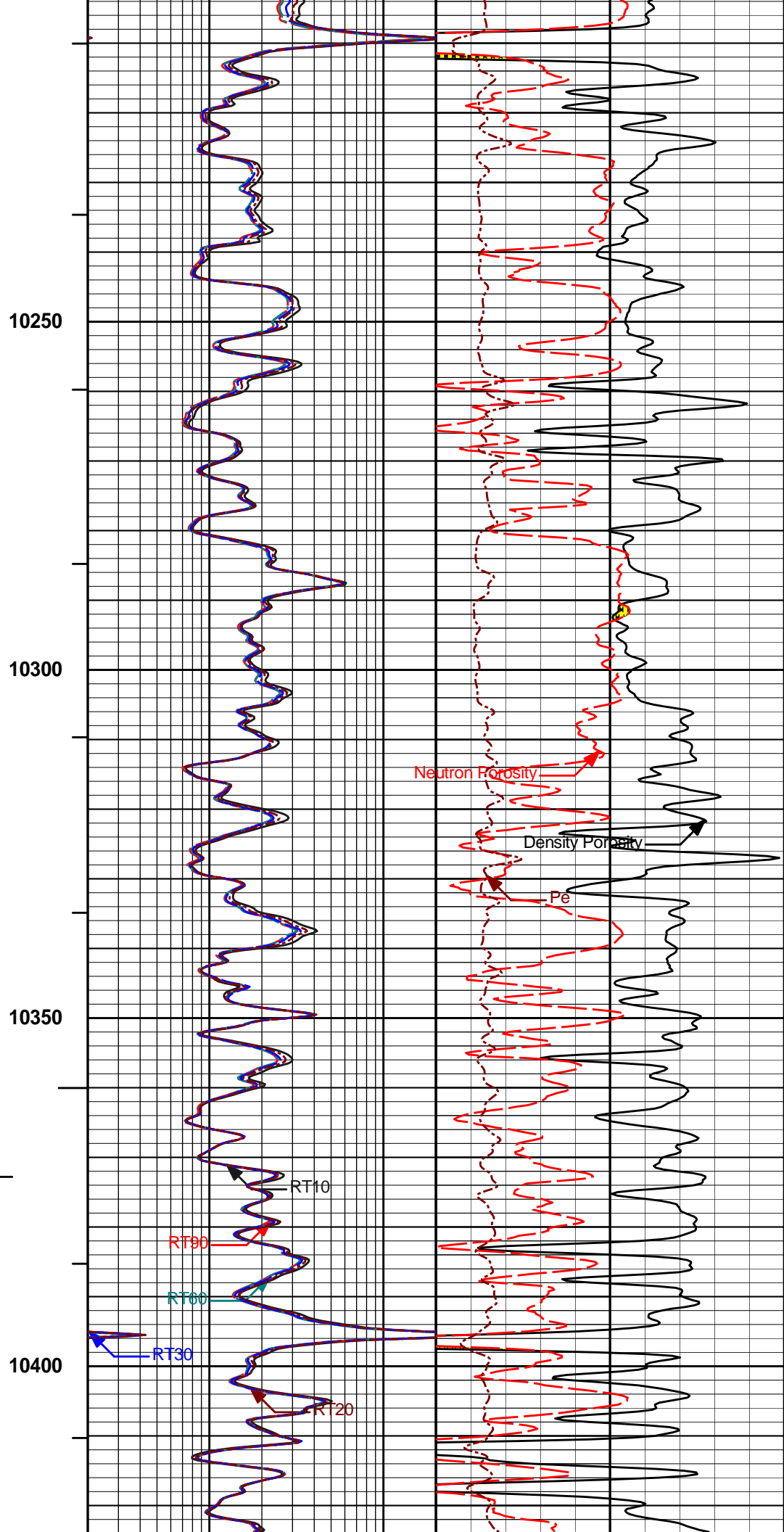
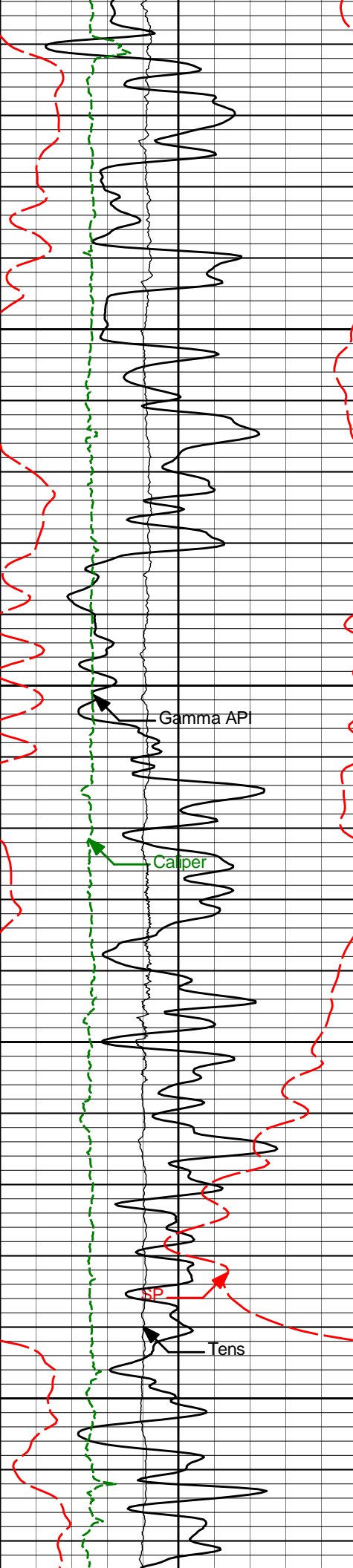
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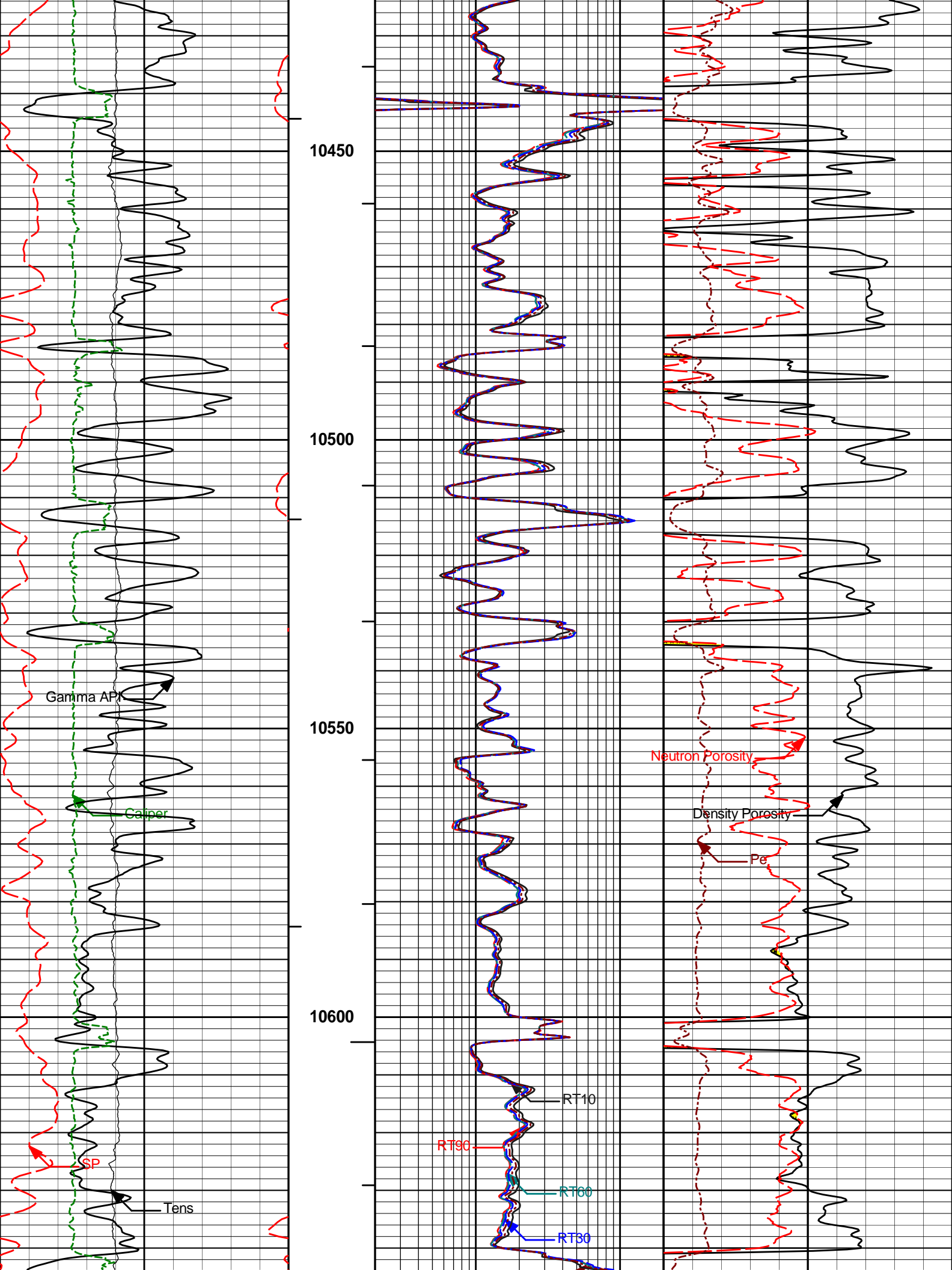


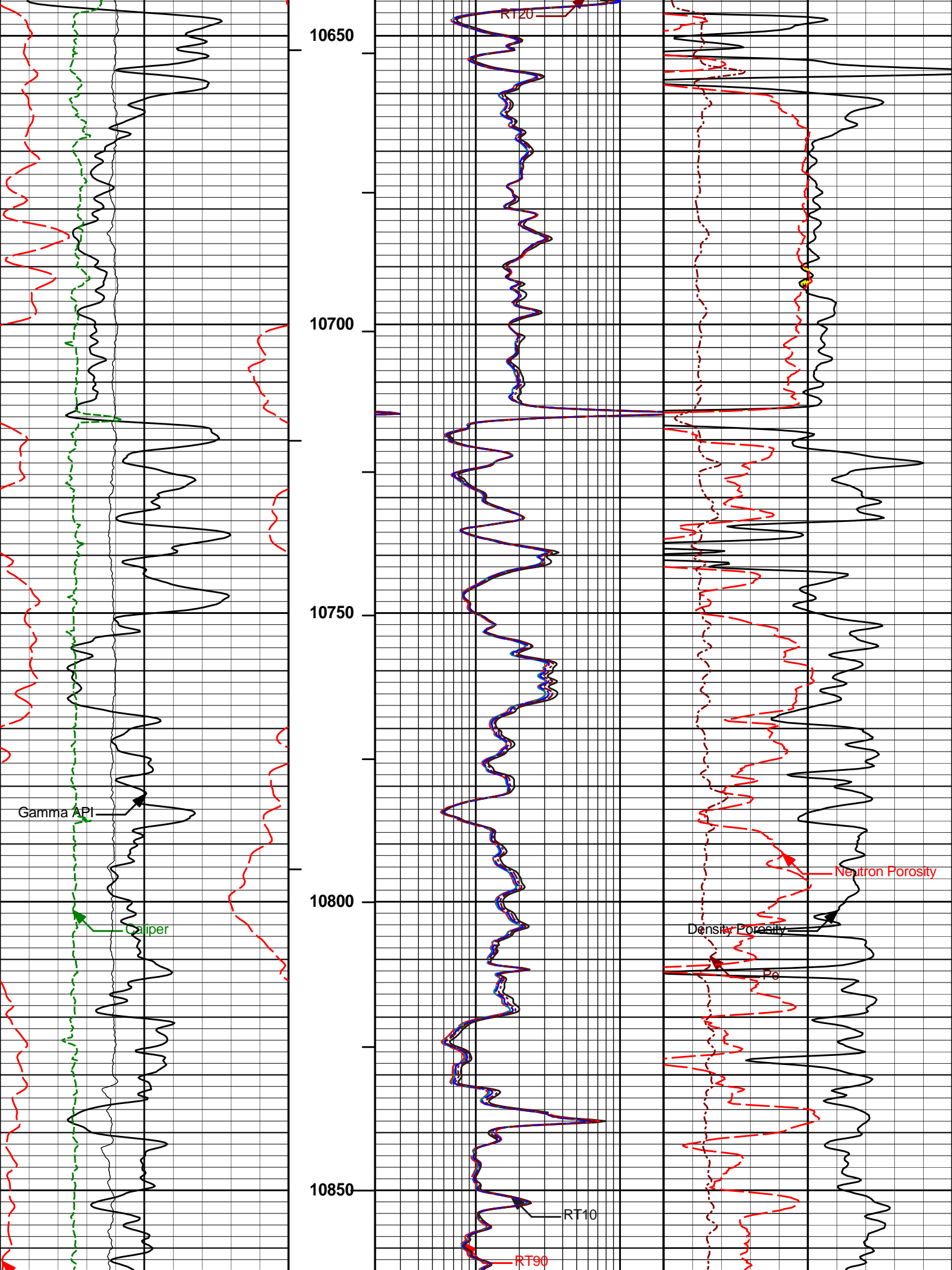


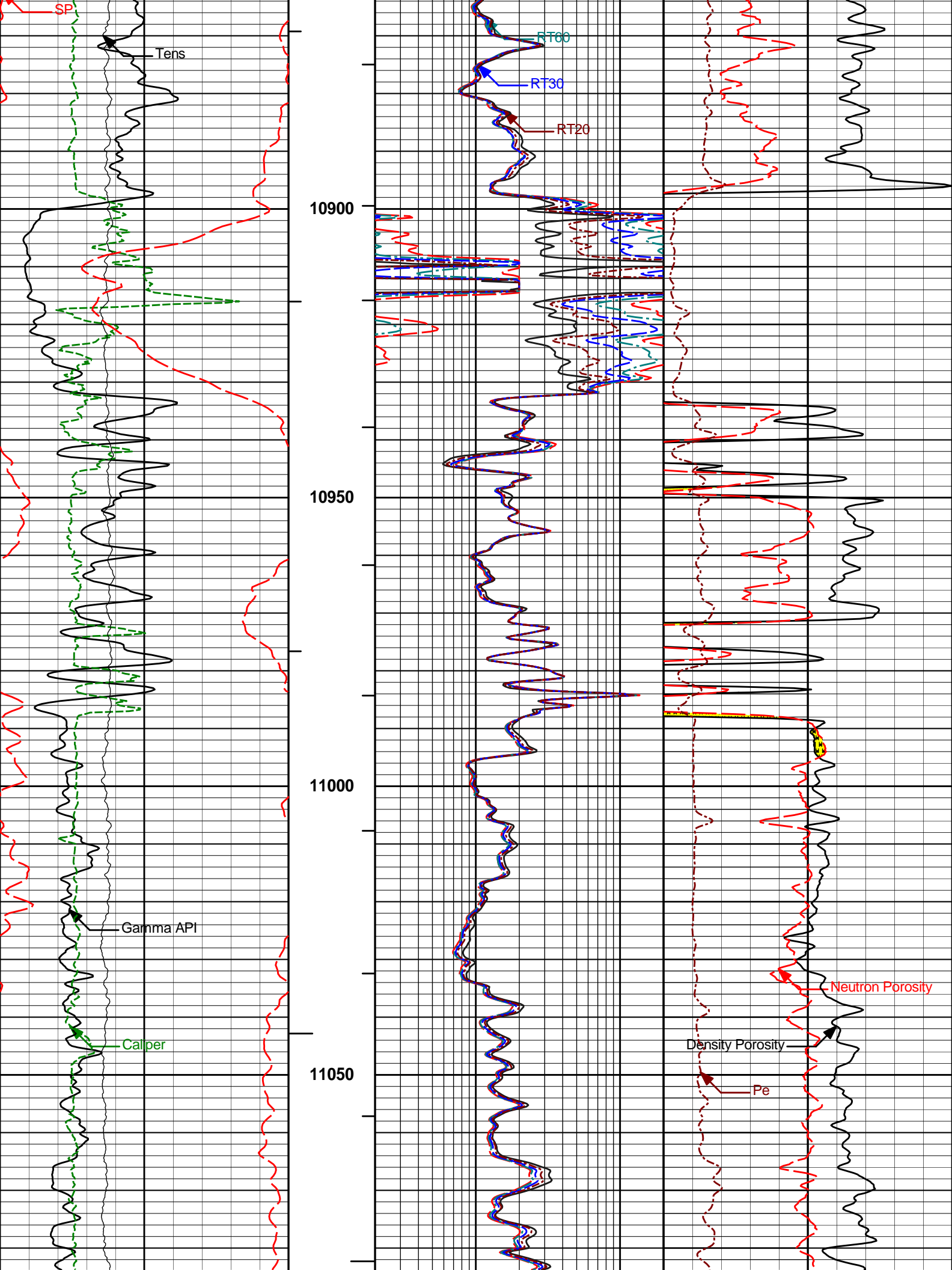


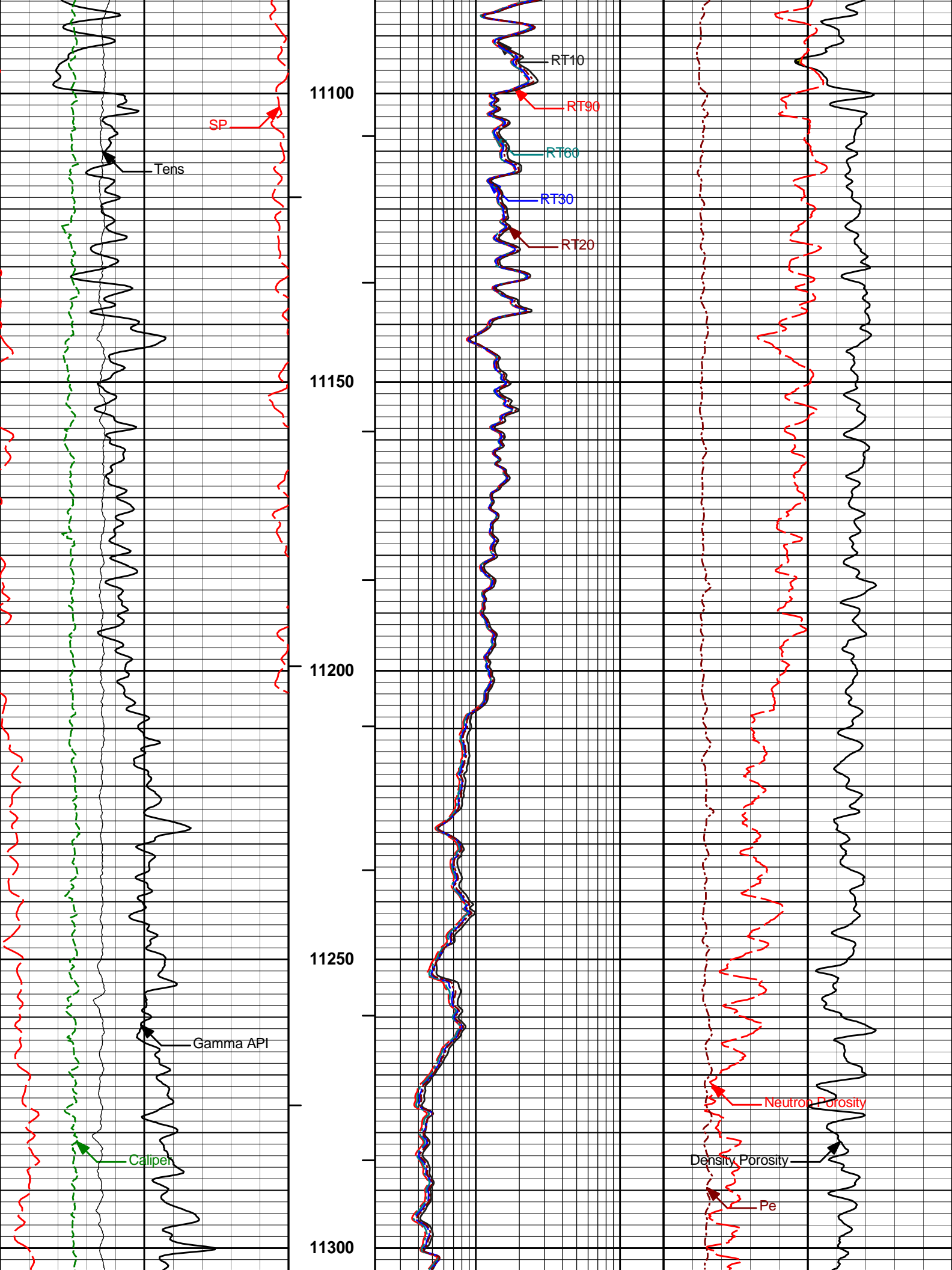


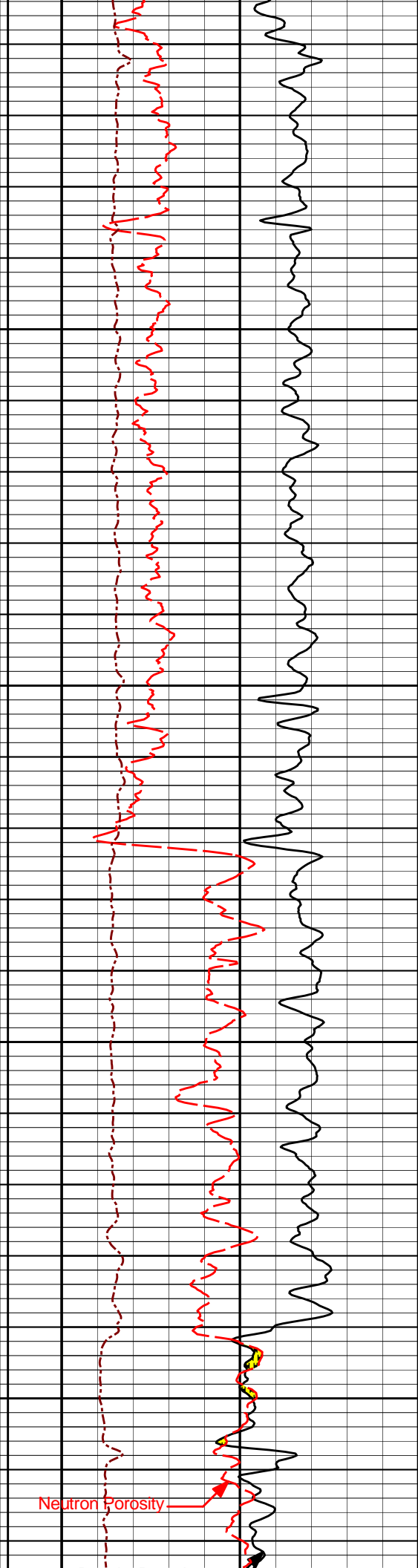
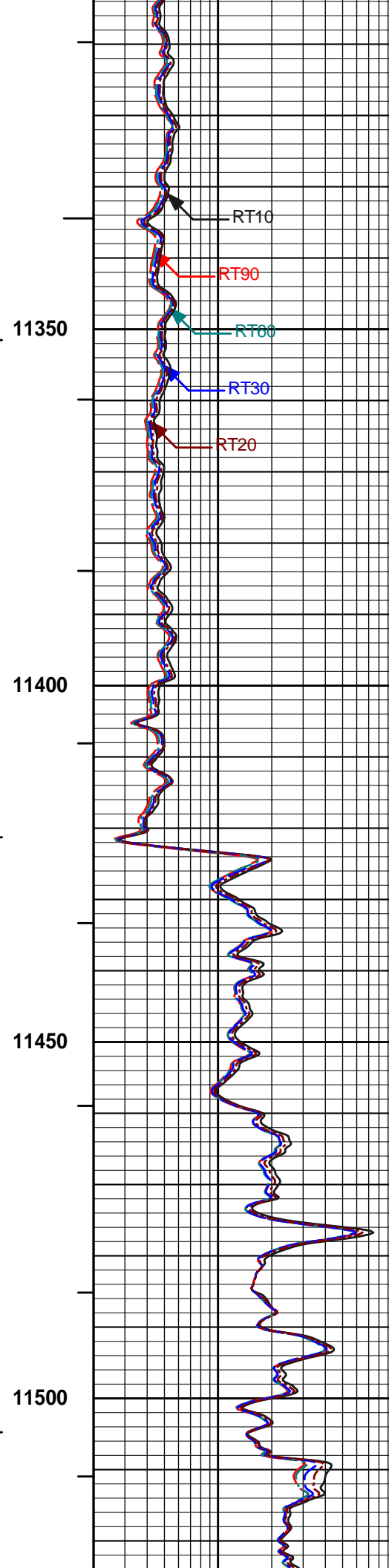
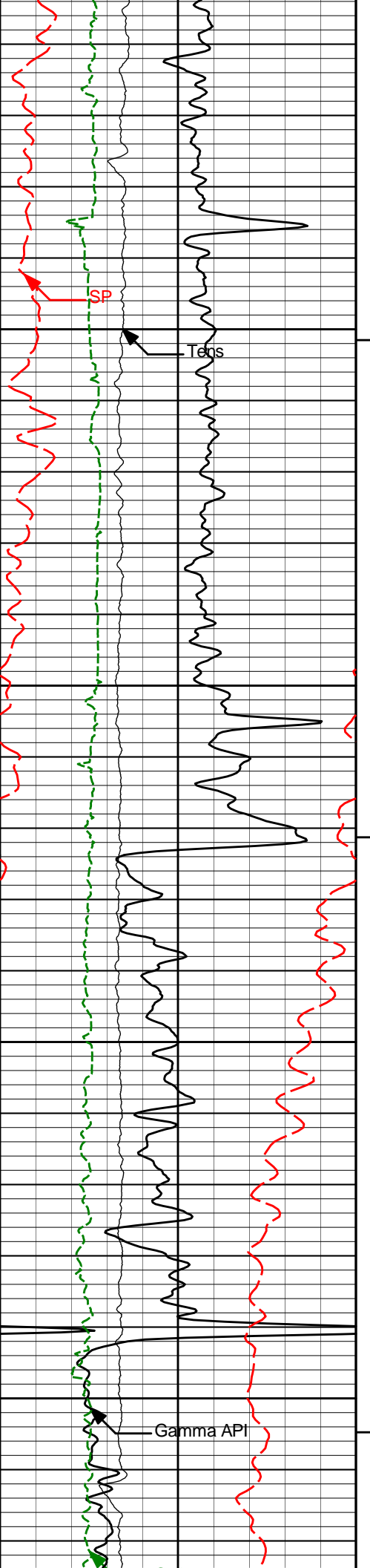


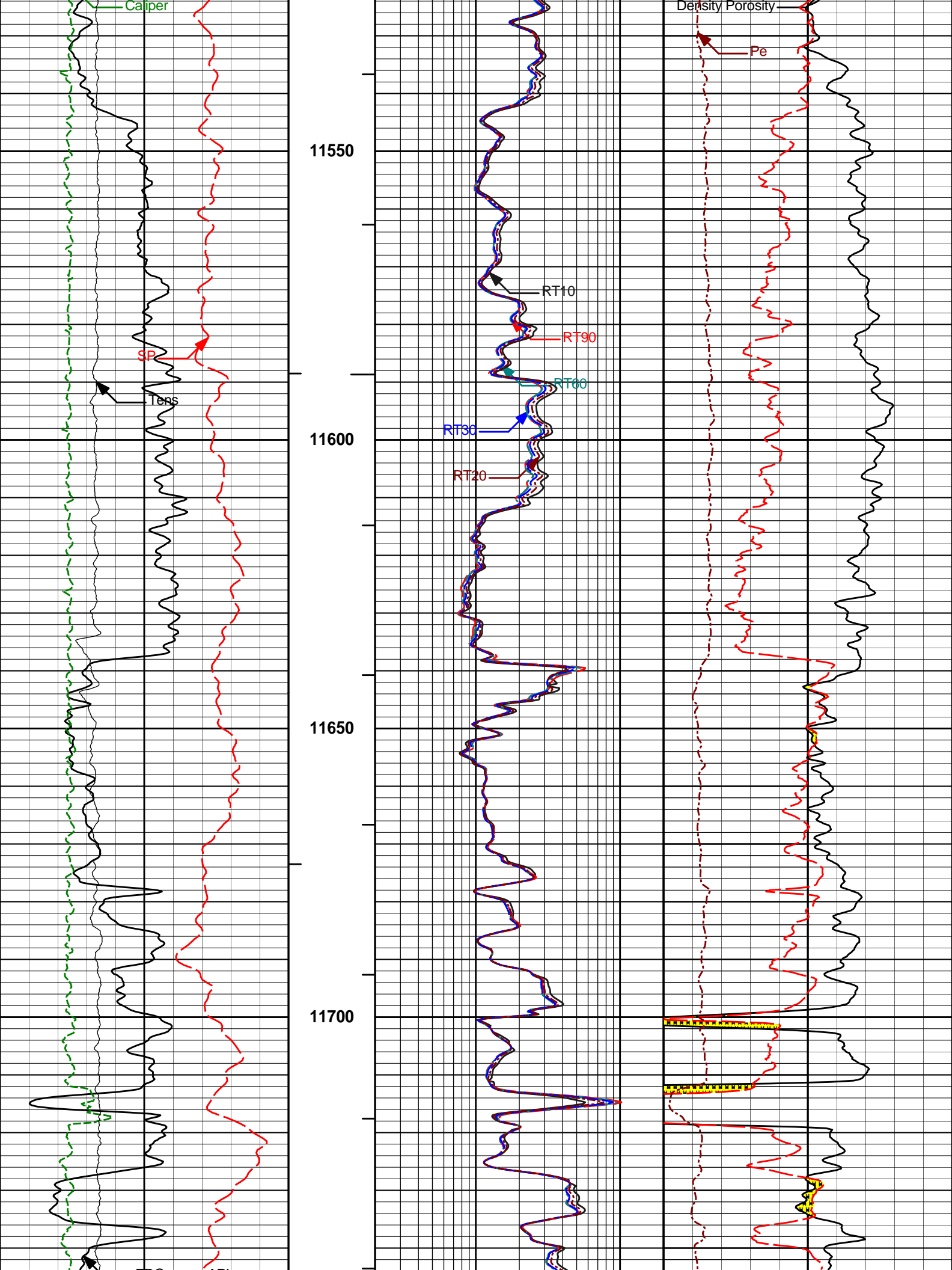


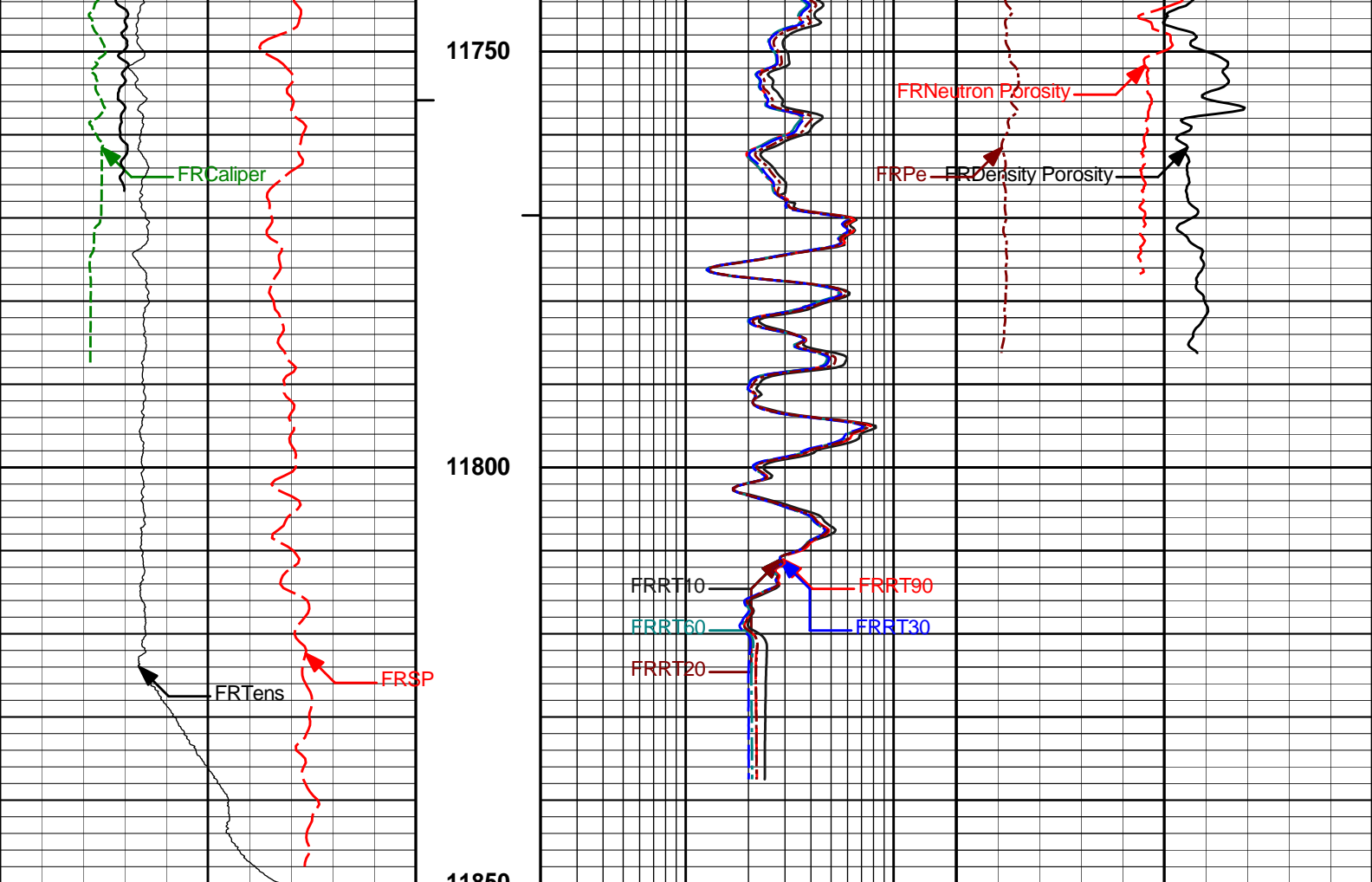












0	SP	100	1 : 240	2	RT90	200	0	Pe	10
	millivolts				ohmm				
0	Gamma API	200	BHVT	2	RT60	200	30	Density Porosity	-10
	api				ohmm			percent	
6	Caliper	16	AHVT	2	RT30	200	30	Neutron Porosity	-10
	inches				ohmm			percent	
10K	Tens	0		2	RT20	200			
	pounds				ohmm				
				2	RT10	200			
					ohmm				

**HALLIBURTON**

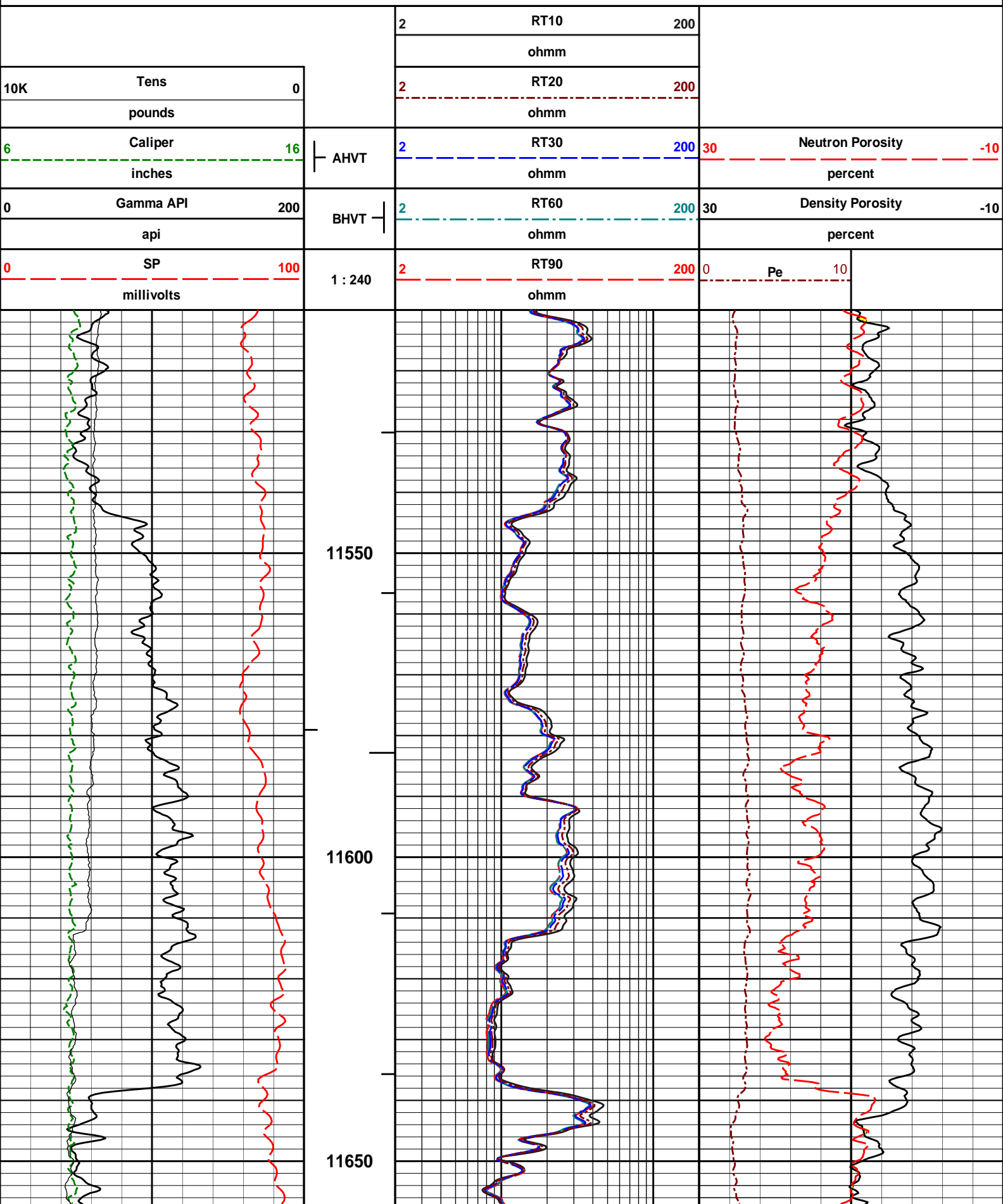
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 Plot Range: 6790 ft to 11850.4 ft  
 Data: TPR\_176-25Well Based\MAIN\*  
 Plot File: \COMP\MAIN

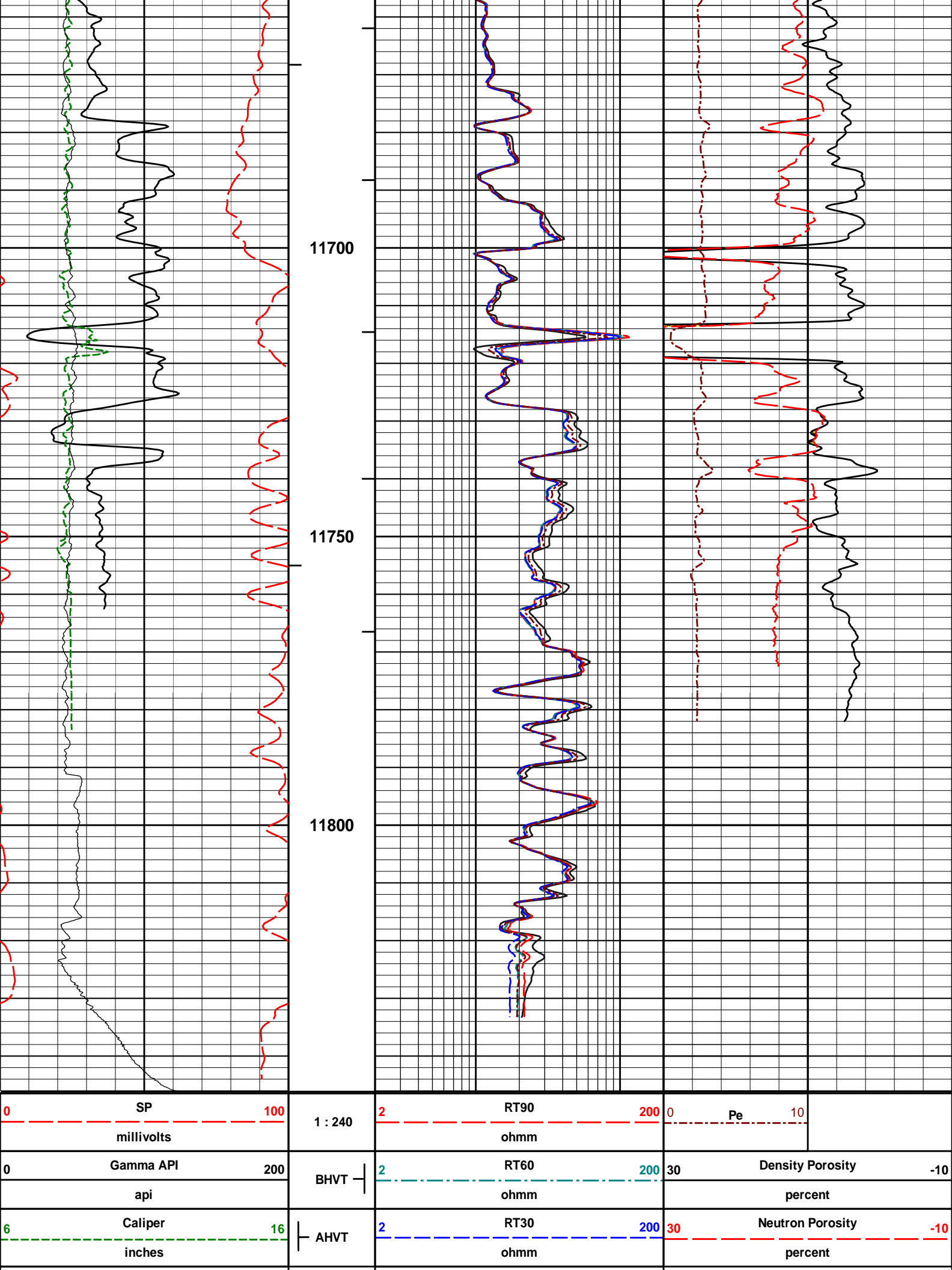
MAIN PASS 5" = 100'

**HALLIBURTON**

Plot Time: 24-Oct-13 04:33:13  
 Plot Range: 11510 ft to 11846.2 ft  
 Data: TPR\_176-25Well Based\REPEAT\*  
 Plot File: \COMP\REPEAT

REPEAT SECTION 5" = 100'





10K	Tens	0	2	RT20	200
	pounds			ohmm	
			2	RT10	200
				ohmm	
<div><div>HALLIBURTON</div><div>Plot Time: 24-Oct-13 04:33:15 Plot Range: 11510 ft to 11846.2 ft Data: TPR_176-25\Well Based\REPEAT\ Plot File: \\COMP\REPEAT</div></div>					
REPEAT SECTION 5" = 100'					
<div><div>HALLIBURTON</div><div>CALIBRATION REPORT</div></div>					
NATURAL GAMMA RAY TOOL SHOP CALIBRATION					
Tool Name:		GTET - 11812883		Reference Calibration Date: 03-Oct-13 15:21:39	
Engineer:		J. SCHMIDT		Calibration Date: 12-Oct-13 11:01:30	
Software Version:		WL INSITE R3.8.4 (Build 5)		Calibration Version: 1	
Calibrator Source S/N: TB-289 Calibrator API Reference:243.00 api Equivalent Calibrator API Reference:247.3 api					
Measurement		Measured	Calibrated	Units	
Background		119.8	113.5	api	
Background + Calibrator		376.2	356.5	api	
Calibrator		236.7	243.0	api	
NATURAL GAMMA RAY TOOL FIELD CALIBRATION					
Tool Name:		GTET - 11812883		Reference Calibration Date: 12-Oct-13 11:01:30	
Engineer:		J. PINKETT		Calibration Date: 23-Oct-13 09:36:47	
Software Version:		WL INSITE R3.8.4 (Build 5)		Calibration Version: 1	
Calibrator Source S/N: TB-289 Calibrator API Reference:243.00 api Equivalent Calibrator API Reference:247.3 api					
Field Verification		Shop	Field	Units	
Background		113.5	179.0	api	
Background + Calibrator		356.5	415.6	api	
Calibrator		243.0	236.5	api	
Shop		Field	Difference	Tolerance	
243.0		236.5	6.5	+/- 9.00	
DUAL SPACED NEUTRON SHOP CALIBRATION					
Tool Name:		DSNT - 11812167		Reference Calibration Date: 31-Aug-13 09:10:37	
Engineer:		J. SCHMIDT		Calibration Date: 04-Oct-13 14:46:36	
Software Version:		WL INSITE R3.8.4 (Build 5)		Calibration Version: 1	
Logging Source S/N: DSN 434 Tank Serial Number: 11068226					

Tank Serial Number: T1068230  
Reference value assigned to Tank: 53.720  
Snow Block S/N: Brighton  
Calibration Tank Water Temperature: 75 degF  
Min. Tool Housing Outside Diameter: 3.625 in

CALIBRATION CONSTANTS			
Measurement	Prev. Value	New Value	Control Limit On New Value

Gain:	1.001	1.003	0.900 - 1.100
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WATER TANK SUMMARY (Horizontal Water Tank)				
Measurement	Current Reading (Previous Coef.)	Calibrated (New Coef.)	Change	Control Limit On Change
Porosity (decp):	0.2218	0.2224	0.0005	+/- 0.0020
Calibrated Ratio:	10.09	10.11	0.018	+/- 0.050

VERIFIER		
Measurement	Value	Control Limit

Snow-Block Porosity (decp):	0.0661	0.02000 - 0.09000
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PASS/FAIL SUMMARY	
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Background Check:	Passed
Gain-Range Check:	Passed
Snow-Block Check:	Passed

DUAL SPACED NEUTRON FIELD CALIBRATION

Tool Name:	DSNT - 11812167	Reference Calibration Date:	04-Oct-13 14:46:36
Engineer:	J. PINKETT	Calibration Date:	23-Oct-13 09:45:37
Software Version:	WL INSITE R3.8.4 (Build 5)	Calibration Version:	1

Logging Source S/N: DSN 434  
Snow Block S/N: Brighton

NEUTRON FIELD-CHECK SUMMARY				
	Shop	Field	Difference	Control Limit On Change

Snow-Block Porosity (decp):	0.0661	0.0718	0.0057	+/- 0.0150
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PASS/FAIL SUMMARY	
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Block Change Check:	Passed
Snow Block Stat Check:	Passed
Temperature Check:	Passed

DENSITY CALIPER SHOP CALIBRATION

Tool Name:	SDLT - 11812177	Reference Calibration Date:	31-Aug-13 10:31:31
Engineer:	J. SCHMIDT	Calibration Date:	04-Oct-13 16:17:50
Software Version:	WL INSITE R3.8.4 (Build 5)	Calibration Version:	1
Host Tool Name:	DSNT - 11812167		

CALIBRATION COEFFICIENTS			
Measurement	Previous Value	New Value	Control Limit On New Value

Pad Offset	-4338.35	-3691.94	-7000.00 - -1000.00
Pad Gain	0.0004132	0.0003905	0.000200 - 0.000600
Arm Offset	-4029.33	-3600.79	-5000.00 - 3000.00

Density Calibration Summary			
Measurement	Previous Value	New Value	Control Limit
Near Bar Gain	1.0400	1.0212	0.90 - 1.10
Near Dens Gain	1.0062	0.9965	0.90 - 1.10
Near Peak Gain	0.9845	0.9874	0.90 - 1.10
Near Lith Gain	0.9429	0.9463	0.90 - 1.10
Far Bar Gain	1.0068	1.0049	0.90 - 1.10
Far Dens Gain	0.9929	0.9931	0.90 - 1.10
Far Peak Gain	0.9865	0.9885	0.90 - 1.10

Far Lith Gain	0.9726	0.9774	0.90 - 1.10
Near Bar Offset	-0.4216	-0.2468	NONE
Near Dens Offset	-0.0966	-0.0088	NONE
Near Peak Offset	0.0933	0.0674	NONE
Near Lith Offset	0.4107	0.3908	NONE
Far Bar Offset	-0.1661	-0.1499	NONE
Far Dens Offset	-0.0303	-0.0306	NONE
Far Peak Offset	0.0126	0.0004	NONE
Far Lith Offset	0.1276	0.1017	NONE

Near Bar Background	829.46	826.50	700 - 1450
Near Dens Background	274.83	275.63	230 - 480
Near Peak Background	120.65	119.59	100 - 210
Near Lith Background	145.58	144.43	125 - 260
Far Bar Background	648.05	648.86	450 - 900
Far Dens Background	255.33	254.34	175 - 345
Far Peak Background	101.85	101.50	70 - 140
Far Lith Background	103.84	103.02	75 - 145

CALIBRATION BLOCK SUMMARY				
Measurement	Current Reading (Previous Coef)	Calibrated (New Coef)	Change	Control Limit On Change
MAGNESIUM				
Density (g/cc)	1.694	1.691	-0.003	+/- 0.015
Pe	2.672	2.598	-0.074	+/- 0.150
ALUMINUM				
Density (g/cc)	2.603	2.602	-0.001	+/- 0.01500
Pe	3.110	3.058	-0.052	+/- 0.150

TOOL SUMMARY				
Measurement	Near Detector		Far Detector	
	Value	Control Limits	Value	Control Limits
QUALITY				
Background	-0.0003	+/- 0.0110	-0.0010	+/- 0.0140
Magnesium Block	0.0003	+/- 0.0110	-0.0009	+/- 0.0140
Aluminum Block	-0.0009	+/- 0.0110	0.0002	+/- 0.0140
Resolution	8.60	6.00 - 11.50	8.92	6.00 - 11.50
Internal Verifier(B+D+P+L)	1366	1200 - 2700	1108	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 - 11795867

Reference Calibration Date: 04-Oct-13 15:32:09

Engineer: J. PINKETT		Calibration Date: 23-Oct-13 09:37:01	
Software Version:	WL INSITE R3.8.4 (Build 5)	Calibration Version:	1

Pad Temperature: 68.2 degF

DENSITY FIELD CALIBRATION SUMMARY				
Measurement	Shop	Field	Change	Control Limit +/-
Near (B+D+P+L) cps	1366.153	1369.420	3.267	14.939
Far (B+D+P+L) cps	1107.711	1102.867	-4.844	17.552
Near Resolution	8.60	8.52	-0.080	0.50
Far Resolution	8.92	8.87	-0.050	1.00

PASS/FAIL SUMMARY	
Bkg Quality Check:	Passed
Bkg Resolution Check:	Passed
Bkg Verification Check:	Passed

ARRAY COMPENSATED TRUE RESISTIVITY SHOP CALIBRATION			
Tool Name:	ACRt Sonde - 11294353	Reference Calibration Date:	09-Sep-13 17:00:00
Engineer:	J. PINKETT	Calibration Date:	12-Oct-13 16:24:47
Software Version:	WL INSITE R3.8.12 (Build 3)	Calibration Version:	1
Host Tool Name:	ACRt Instrument - 11302817		

TYPICAL GAIN RANGE									
Subarray	R12KHz			R36KHz			R72KHz		
	Lower	(mmho/m)	Upper	Lower	(mmho/m)	Upper	Lower	(mmho/m)	Upper
A1 (80")	0.95	1.01	1.05	0.95	1.01	1.05	0.95	1.01	1.05
A2 (50")	0.95	1.01	1.05	0.95	1.02	1.05	0.95	1.02	1.05
A3 (29")	0.95	1.01	1.05	0.95	1.01	1.05	0.95	1.01	1.05
A4 (17")	0.95	1.02	1.05	0.95	1.02	1.05	0.95	1.02	1.05
A5 (10")	N/A	N/A	N/A	0.95	1.00	1.05	0.95	1.00	1.05
A6 (6")	N/A	N/A	N/A	0.95	0.99	1.05	0.95	0.99	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	-0.55	2	-6	-4.45	-2	-8	-5.06	-2
A2 (50")	-7	-1.19	0	-7	-2.81	0	-7	-4.82	0
A3 (29")	-27	-12.72	-9	-9	-3.44	-3	-7	-3.71	-1
A4 (17")	-180	-90.42	-60	-45	-28.82	-15	-39	-24.83	-13
A5 (10")	N/A	N/A	N/A	-150	-97.94	-50	-80	-47.19	-10
A6 (6")	N/A	N/A	N/A	175	345.49	525	90	174.64	270

TRANSMITTER CURRENT GAIN					R-MUD VERIFICATION			
Signal	Lower	R	Upper		Signal	Lower (ohm-m)	Measured (ohm-m)	Upper (ohm-m)
12K		0.6	0.89	1.3	Mud Cell	0.95	1.00	1.05
36K		1.0	1.84	2.0				
72K		1.0	1.14	2.0				

PASS/FAIL SUMMARY	
GAIN RANGE CHK	PASS
SONDE OFFSET RANGE CHK	PASS
Tx CURRENT GAIN	PASS

TOOL OK TO LOG

## CALIBRATION SUMMARY

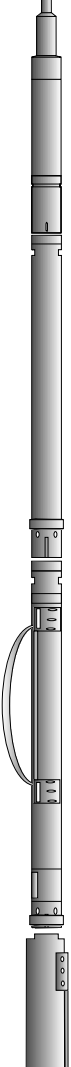
Sensor	Shop	Field	Post	Difference	Tolerance	Units
GTET-11812883						
Gamma Ray Calibrator	243.0	236.5	-----	6.5	+/- 9.00	api
DSNT-11812167						
Snow-Block Porosity	0.0661	0.0718	-----	-0.0057	+/- 0.0150	decP
SDLT-11812177						
Pad Extension	3.75	3.78	-----	-0.03	+/-0.10	in
Ring Diameter	8.25	8.18	-----	0.07	+/-0.15	in
SDLT Pad-11795867						
Near(B+D+P+L)	1366.153	1369.420	-----	-3.267	+/-14.939	cps
Far(B+D+P+L)	1107.711	1102.867	-----	4.844	+/-17.552	cps
ACRt Sonde-11294353						
Mud Cell	1.00	-----	-----	0.00	-----	ohm-m

Data: TPR 176-25\0001 QUAD COMBO REDNDLE

Date: 23-Oct-13 23:16:11

HALLIBURTON

## TOOL STRING DIAGRAM REPORT

Description	Overbody Description	O.D.	Diagram	Sensors @ Delays	Length	Accumulated Length
						94.89 ft
RWCH-10409638 135.00 lbs		Ø 3.625 in →		← Load Cell @ 91.21 ft ← BH Temperature @ 90.64 ft	6.25 ft	
						88.64 ft
GTET-11812883 165.00 lbs		Ø 3.625 in →		← GammaRay @ 82.58 ft	8.52 ft	
UnivWearRing3.6- 11812883 5.00 lbs		Ø 4.200 in* →				80.12 ft
DSN Decentralizer- 11812167 6.60 lbs		Ø 5.000 in* → Ø 3.625 in →			9.69 ft	
DSNT-11812167 174.00 lbs				← DSN Far @ 73.19 ft ← DSN Near @ 72.44 ft		70.44 ft
UnivWearRing3.6- 11812167 5.00 lbs		Ø 4.200 in* →				

SDLT-11812177  
360.00 lbs

SDLT Pad-11795867  
65.00 lbs

Flex Joint -  
Pressure Comp-  
12152214  
140.00 lbs

Centralizer 25-00000001  
8.00 lbs

Regal Standoff 6\_75-  
00000001  
20.00 lbs

Wavesonic-I-  
34515236  
520.00 lbs

Regal Standoff 6\_75-  
00000002  
20.00 lbs

Centralizer 25-00000002  
8.00 lbs

ACRt Instrument-  
11302817  
50.00 lbs

Regal Standoff 6\_75-  
00000003  
20.00 lbs

Ø 4.500 in →

Ø 4.750 in\* →

Ø 3.625 in →

Ø 4.000 in\* →

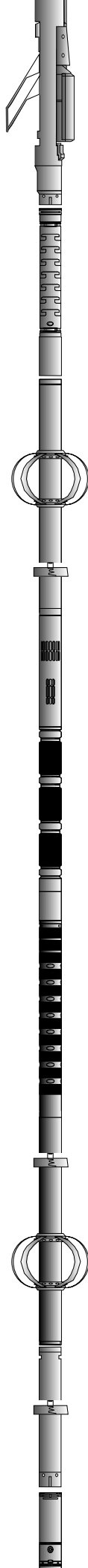
Ø 6.750 in\* →

Ø 3.625 in →

Ø 6.750 in\* →

Ø 4.000 in\* →

Ø 6.750 in\* →  
Ø 3.625 in →



SDL Caliper @ 62.44 ft  
SDL @ 62.43 ft

← Wavesonic Delay @ 31.08 ft

← Mud Resistivity @ 13.19 ft

10.81 ft

5.97 ft

34.07 ft

5.03 ft

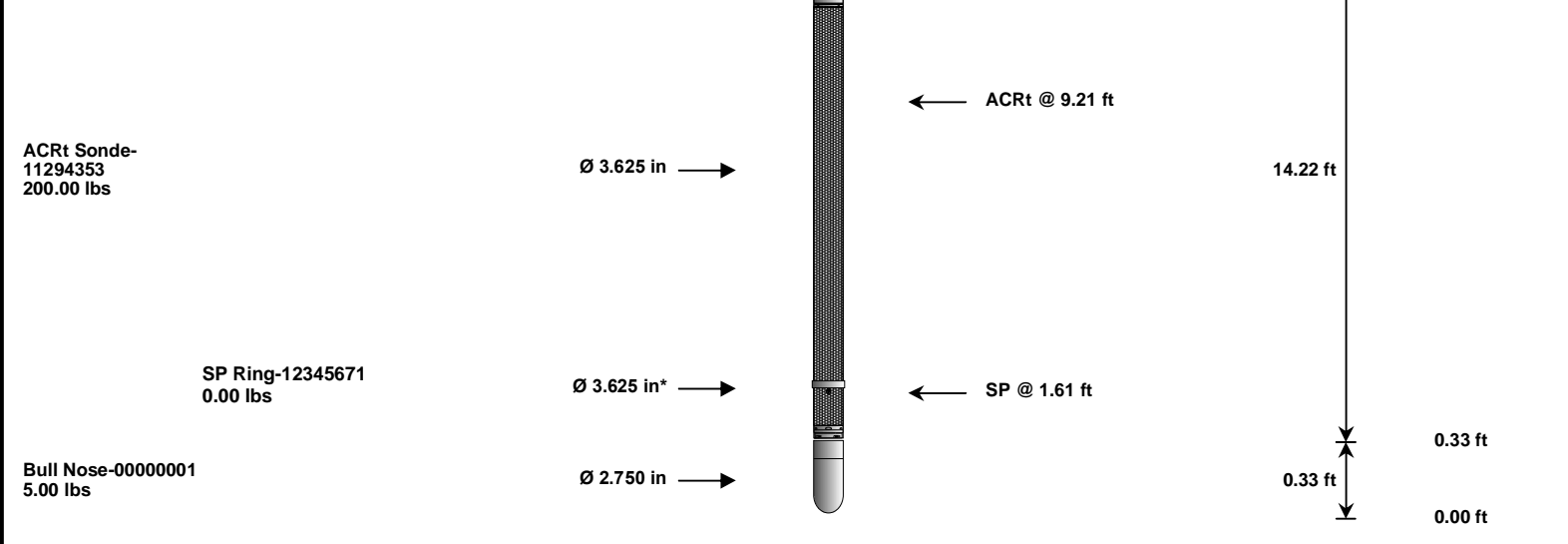
14.55 ft

59.62 ft

53.65 ft

19.58 ft

14.55 ft



Mnemonic		Tool Name	Serial Number	Weight (lbs)	Length (ft)	Accumulated Length (ft)	Max.Log. Speed (fpm)
RWCH	Releasable Wireline Cable Head		10409638	135.00	6.25	88.64	300.00
GTET	Gamma Telemetry Tool		11812883	165.00	8.52	80.12	60.00
UWR3P6	Universal Wear Ring 3 5-8 inch		11812883	5.00	0.35	* 80.85	300.00
DSNT	Dual Spaced Neutron		11812167	174.00	9.69	70.44	60.00
UWR3P6	Universal Wear Ring 3 5-8 inch		11812167	5.00	0.35	* 70.56	300.00
DCNT	DSN Decentralizer		11812167	6.60	5.13	* 73.77	300.00
SDLT	Spectral Density Tool		11812177	360.00	10.81	59.62	60.00
SDLP	Density Insite Pad		11795867	65.00	2.55	* 61.83	60.00
FLEX	Flex Joint - Pressure Compensated		12152214	140.00	5.97	53.65	300.00
WSTT	WaveSonic Insite		34515236	520.00	34.07	19.58	30.00
OBCEN	Centralizer - 25 in. Overbody		00000002	8.00	2.08	* 21.52	300.00
RSOF	Regal Standoff 6.75in		00000002	20.00	0.52	* 25.91	300.00
RSOF	Regal Standoff 6.75in		00000001	20.00	0.52	* 46.60	300.00
OBCEN	Centralizer - 25 in. Overbody		00000001	8.00	2.08	* 49.06	300.00
ACRt	Array Compensated True Resistivity Instrument Section		11302817	50.00	5.03	14.55	300.00
RSOF	Regal Standoff 6.75in		00000003	20.00	0.52	* 17.13	300.00
ACRt	Array Compensated True Resistivity Sonde Section		11294353	200.00	14.22	0.33	300.00
SP	SP Ring		12345671	0.00	0.25	* 1.61	300.00
BLNS	Bull Nose		00000001	5.00	0.33	0.00	300.00
Total				1,906.60	94.89		
* Not included in Total Length and Length Accumulation.							
Data: TPR_176-25\0001 QUAD_COMBO_RED\DL							
Date: 23-Oct-13 23:17:05							

COMPANY	BLACK DIAMOND MINERALS		
WELL	TPR 176-25		
FIELD	MAMM CREEK		
COUNTY	GARFIELD	STATE	CO
<b>HALLIBURTON</b>		DUAL SPACED NEUTRON SPECTRAL DENSITY ARRAY COMPENSATED TRUE RESISTIVITY	