HALLIBURTON

DUAL SPACED NEUTRON SPECTRAL DENSITY ARRAY COMPENSATED TRUE RESISTIVITY

BLACK DIAMOND MINERALS | TPR 176-25 | MAMM CREEK | GARFIELD | CO

COMPANY / WELL / FIELD/BLOCK / COUNTY / STATE

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°

Sect. 25 Twp. 7S Rge. 94W

Other Services:
WSTT

Permanent Datum	GL	Elev. 9131.0 ft	Elev.: K.B. 9155.0 ft
Log measured from	KB	24.0 ft above perm. Datum	D.F. 9155.0 ft
Drilling measured from	KB		G.L. 9131.0 ft

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	Viscosity	9.2 ppg	58.00 s/qt				
PH	Fluid Loss	9.10 pH	8.0 cptm				
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	Rmc	MEASURED	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	Location	11454566	BRIGHTON				
Recorded By		J. SCHMIDT					
Witnessed By		J. BRUMLEY					

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									
Rm @ Meas. Temp		@	@						
Rmf @ Meas. Temp.		@	@						
Rmc @ Meas. Temp.		@	@						
Source Rmf	Rmc								
Rm @ BHT		@	@						
Rmf @ BHT		@	@						
Rmc @ BHT		@	@						

RESISTIVITY EQUIPMENT DATA

	Run No.	Tool Type & No.	Pad Type	Tool Pos.	Other
	ONE	ACRT	N/A	CENT	N/A
		11302817			
		11294353			

EQUIPMENT DATA

	GAMMA	ACOUSTIC	DENSITY	NEUTRON
Run No.	ONE	ONE	ONE	ONE
Serial No.	11812883	34515236	11795867	11812167
Model No.	GTET	WSTT	SDLT	DSNT
Diameter	3.625"	2	4.5"	3.625"
Detector Model No.	GTET	Spacing	GAM-GAM	NEU-NEU
Type	SCINT	0.5'	Cs 137	Am241Be
Length	8"	LSA [Y/N]	5471GW	DSN434
Distance to Source	10'	FWDA [Y/N]	1.78 Ci	15 Ci
		Y	Strength	Strength
		Y		

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

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 /				

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	Wylie	
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 Upr	
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

Data: TPR_176-25\0001 QUAD_COMBO_RED\IDLE

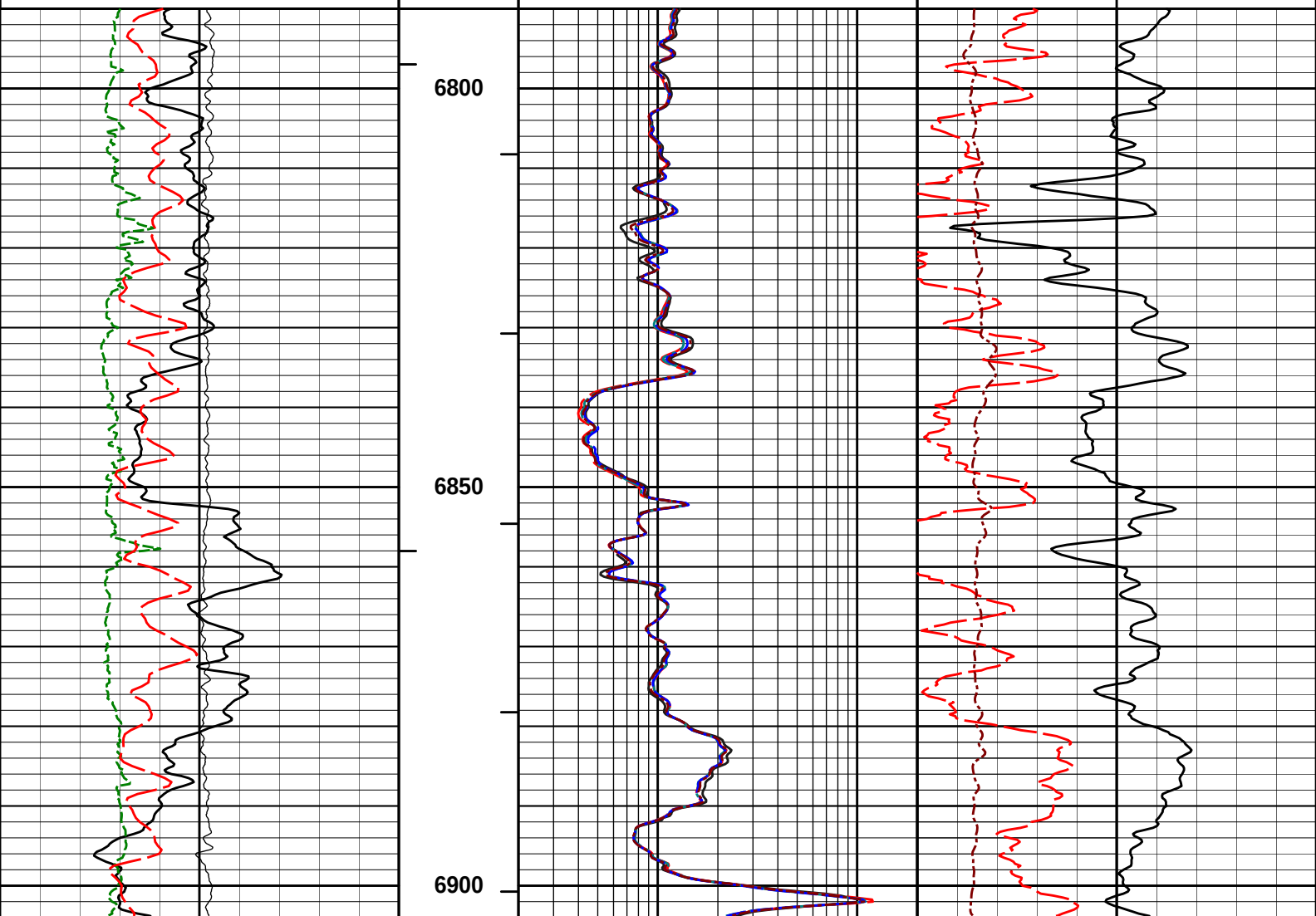
Date: 23-Oct-13 23:15:32

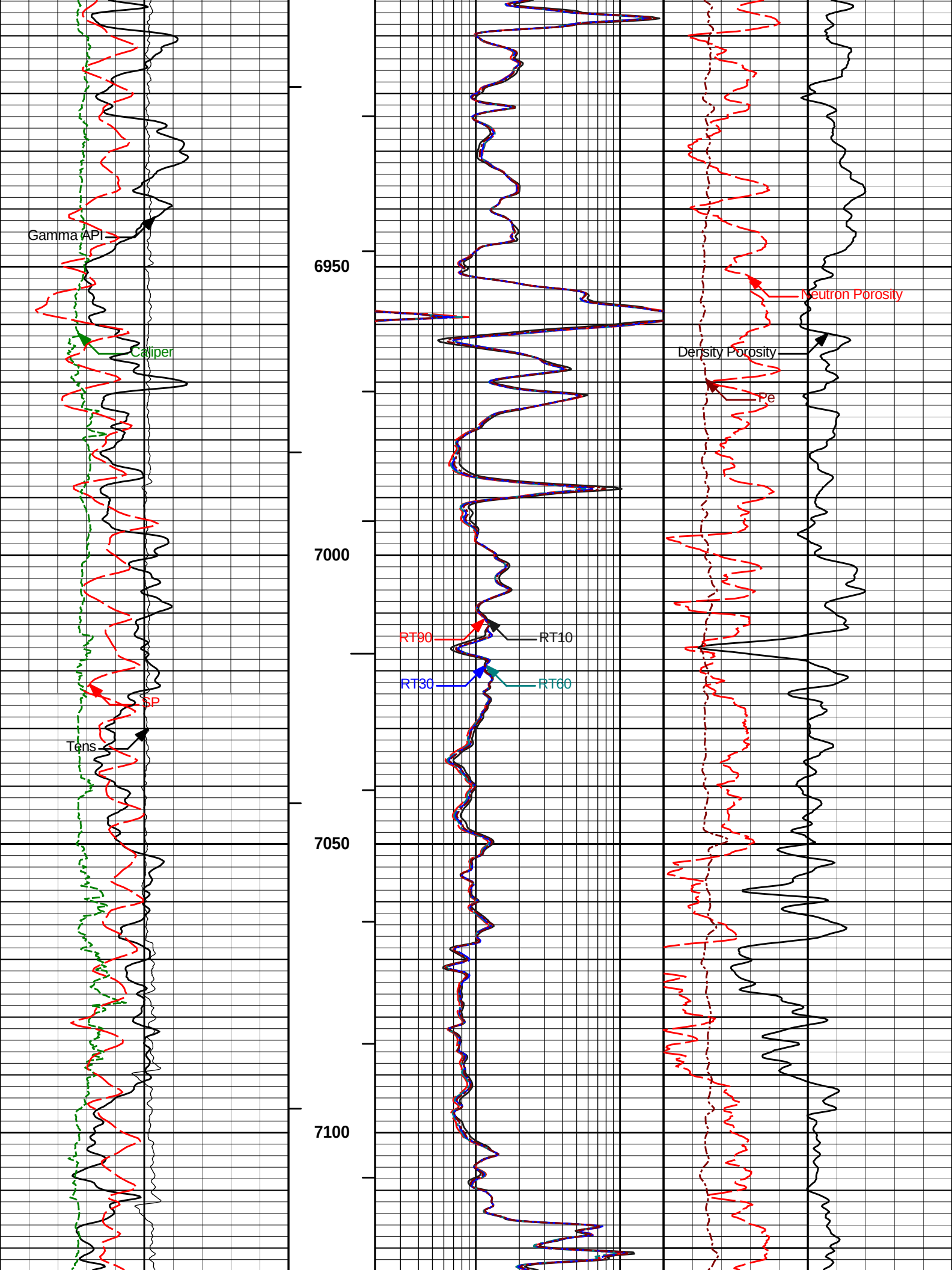
HALLIBURTON

Plot Time: 24-Oct-13 04:33:04
Plot Range: 6790 ft to 11850.4 ft
Data: TPR_176-25\Well Based\MAIN*
Plot File: \\COMP\MAIN

MAIN PASS 5" = 100'

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

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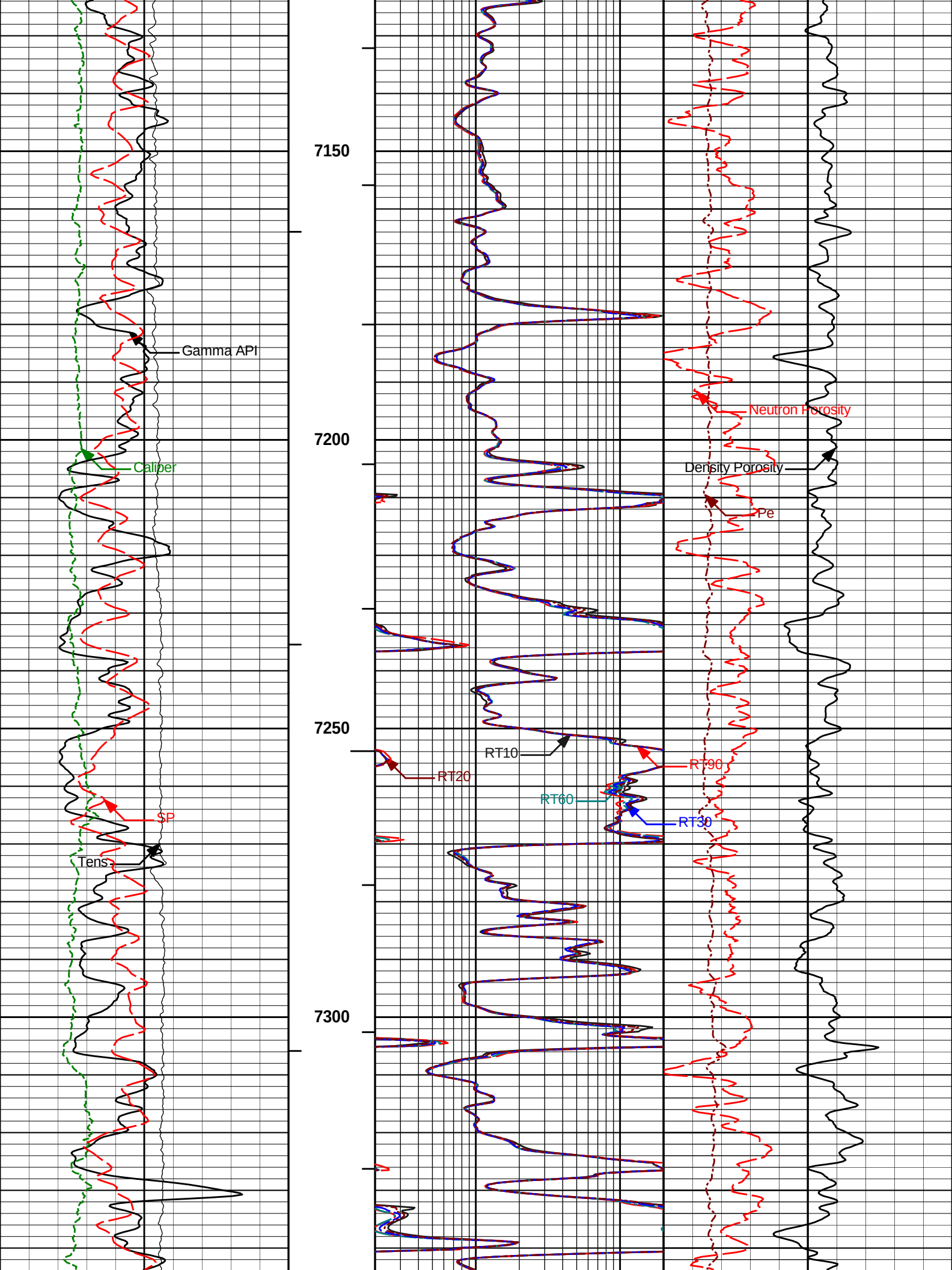
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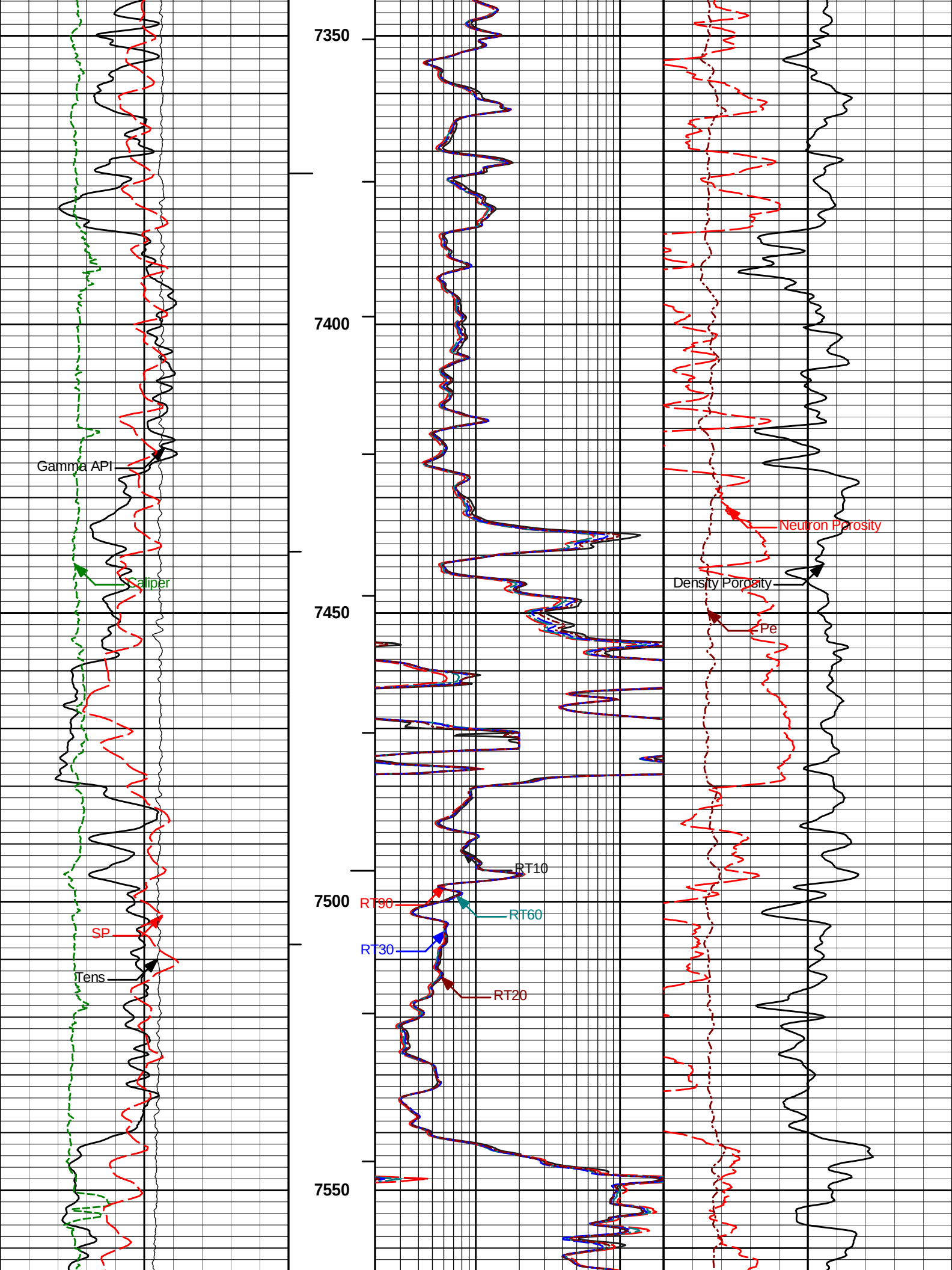
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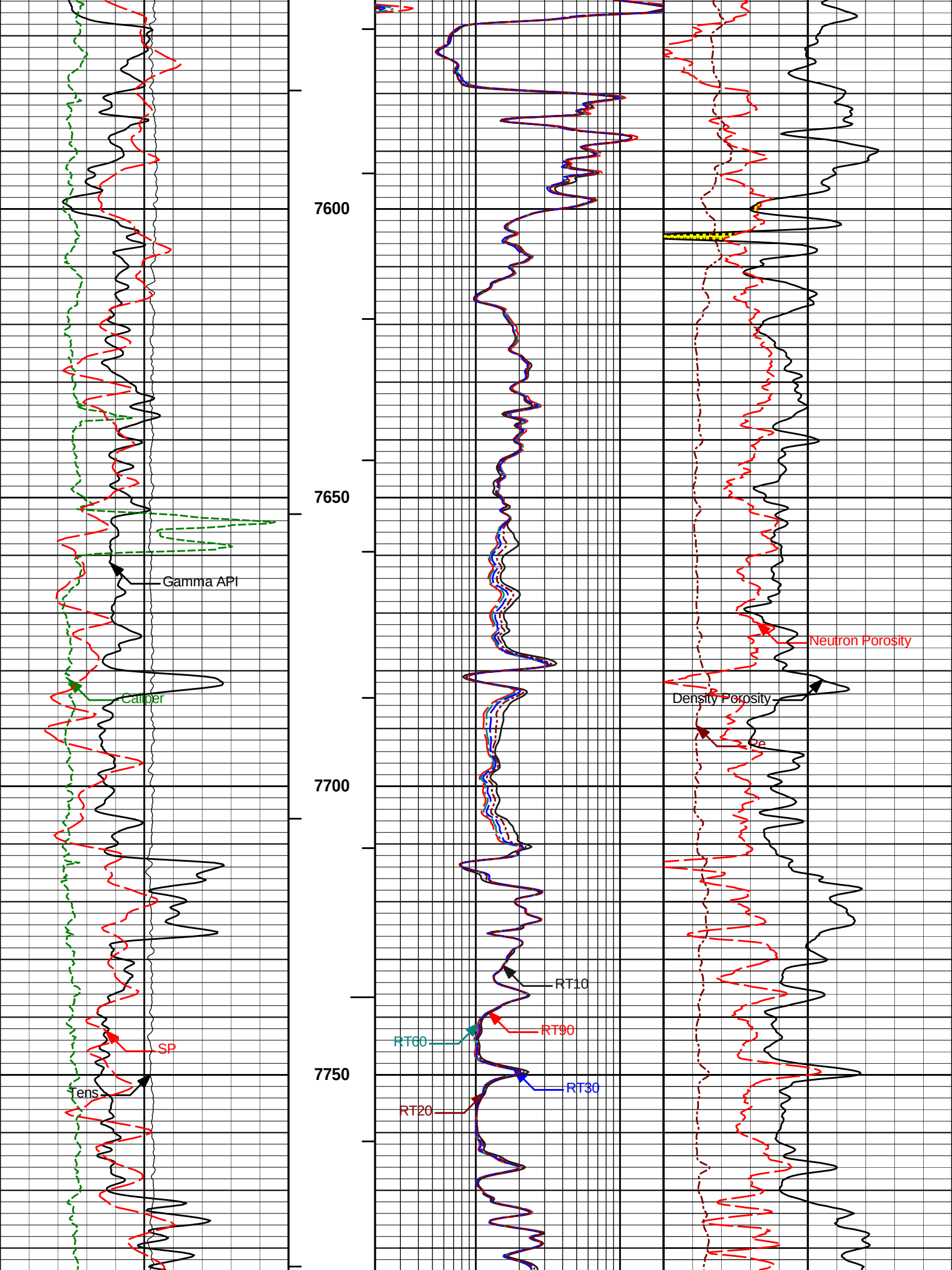
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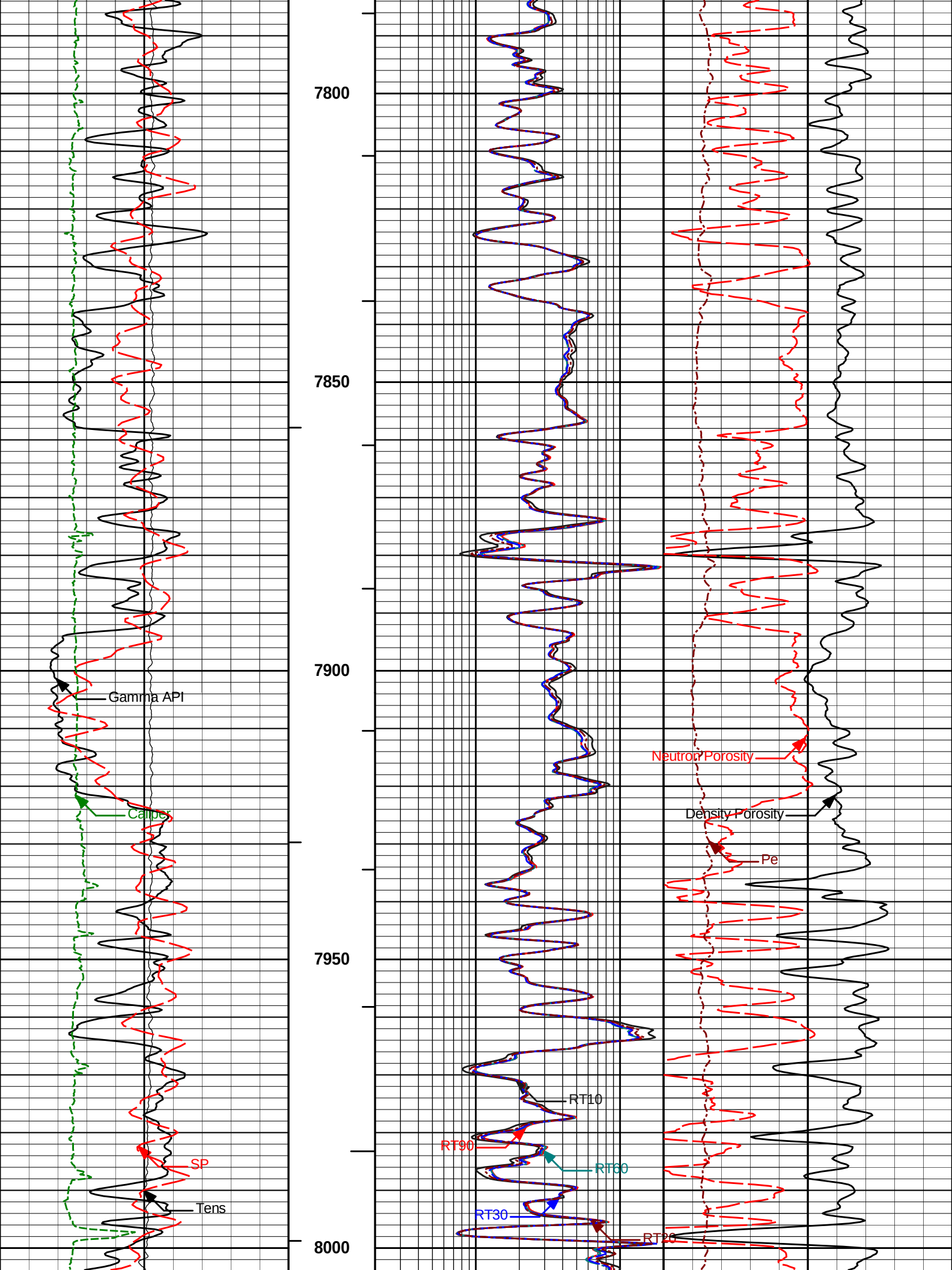
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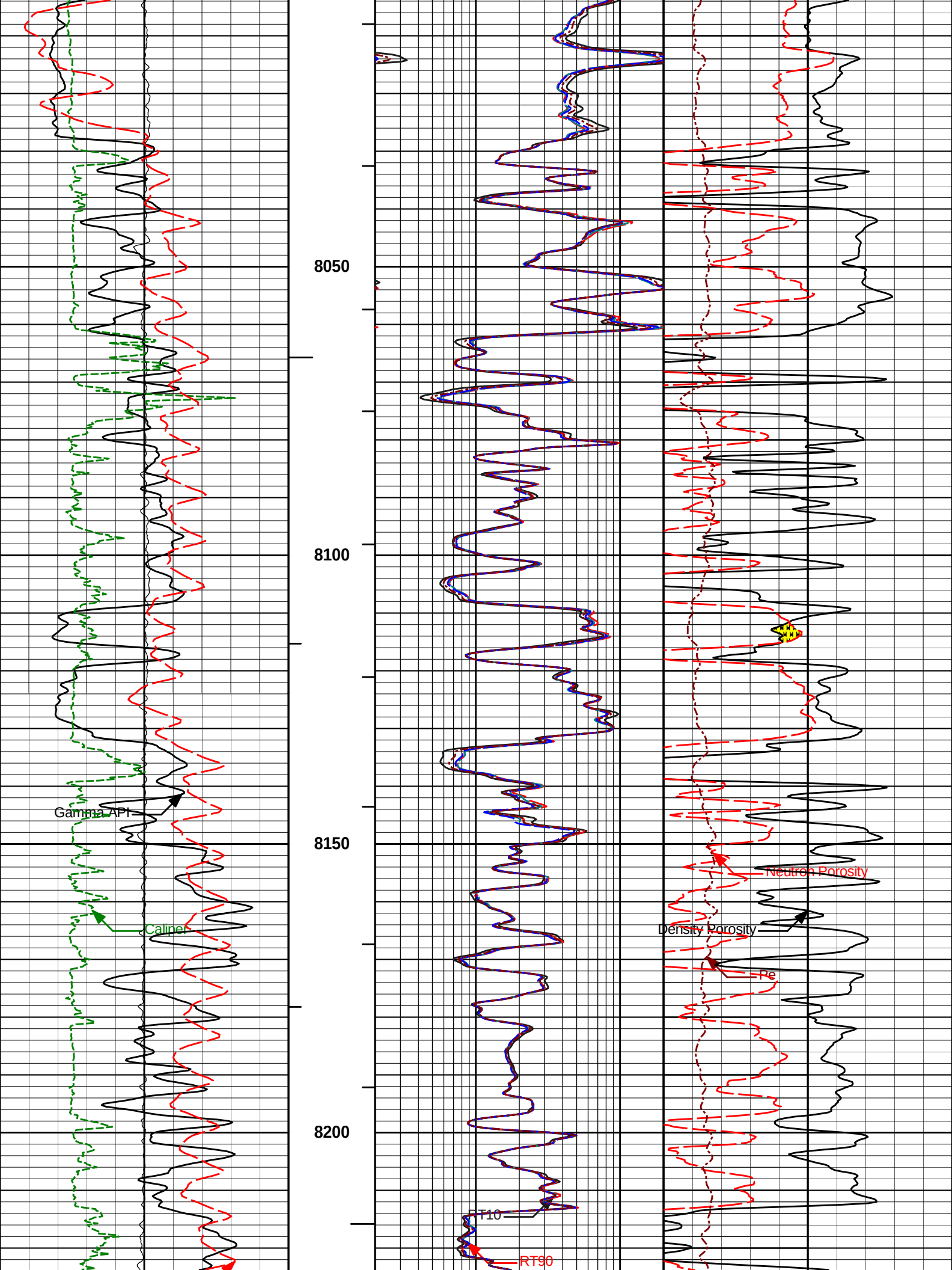
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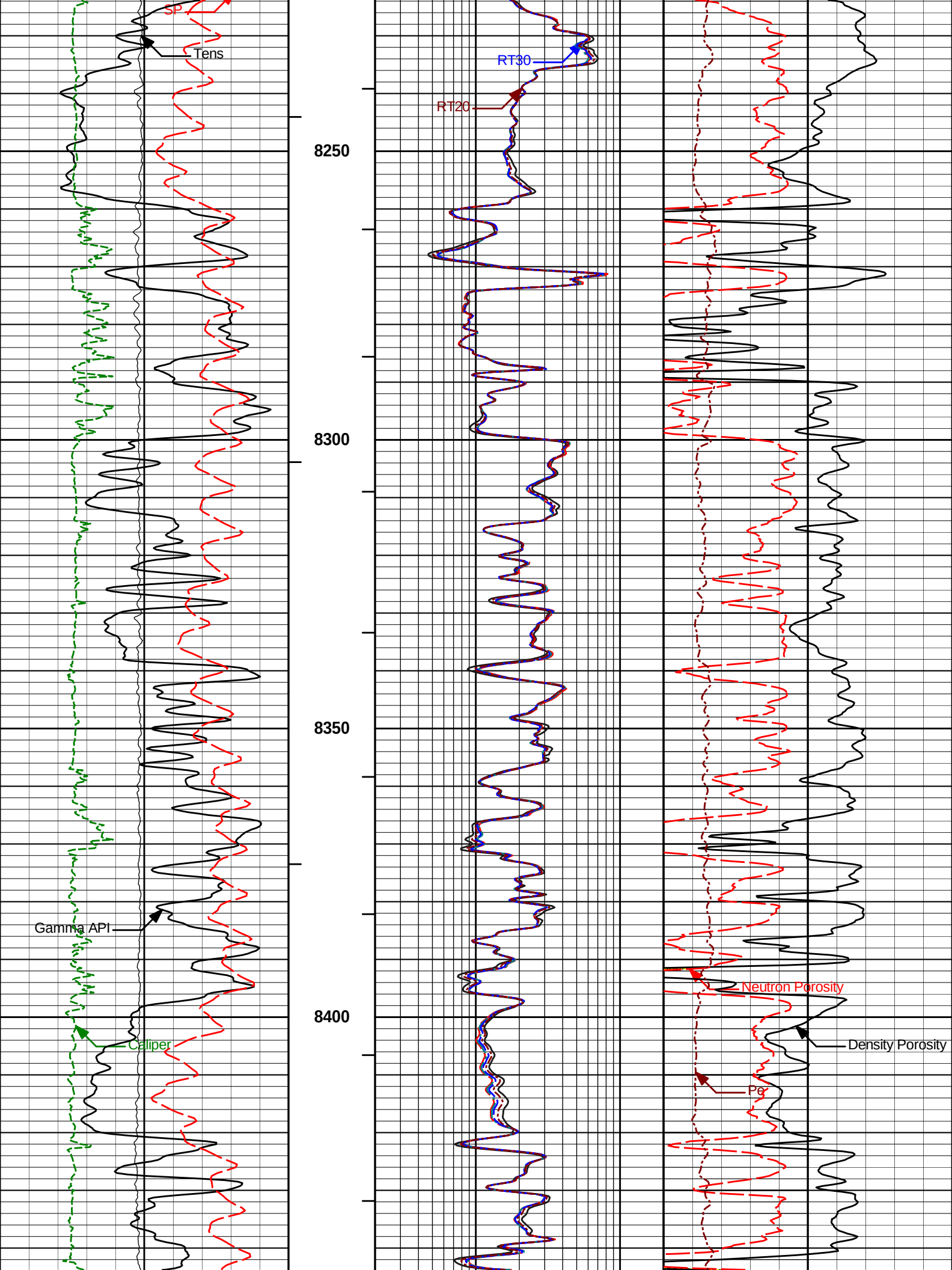
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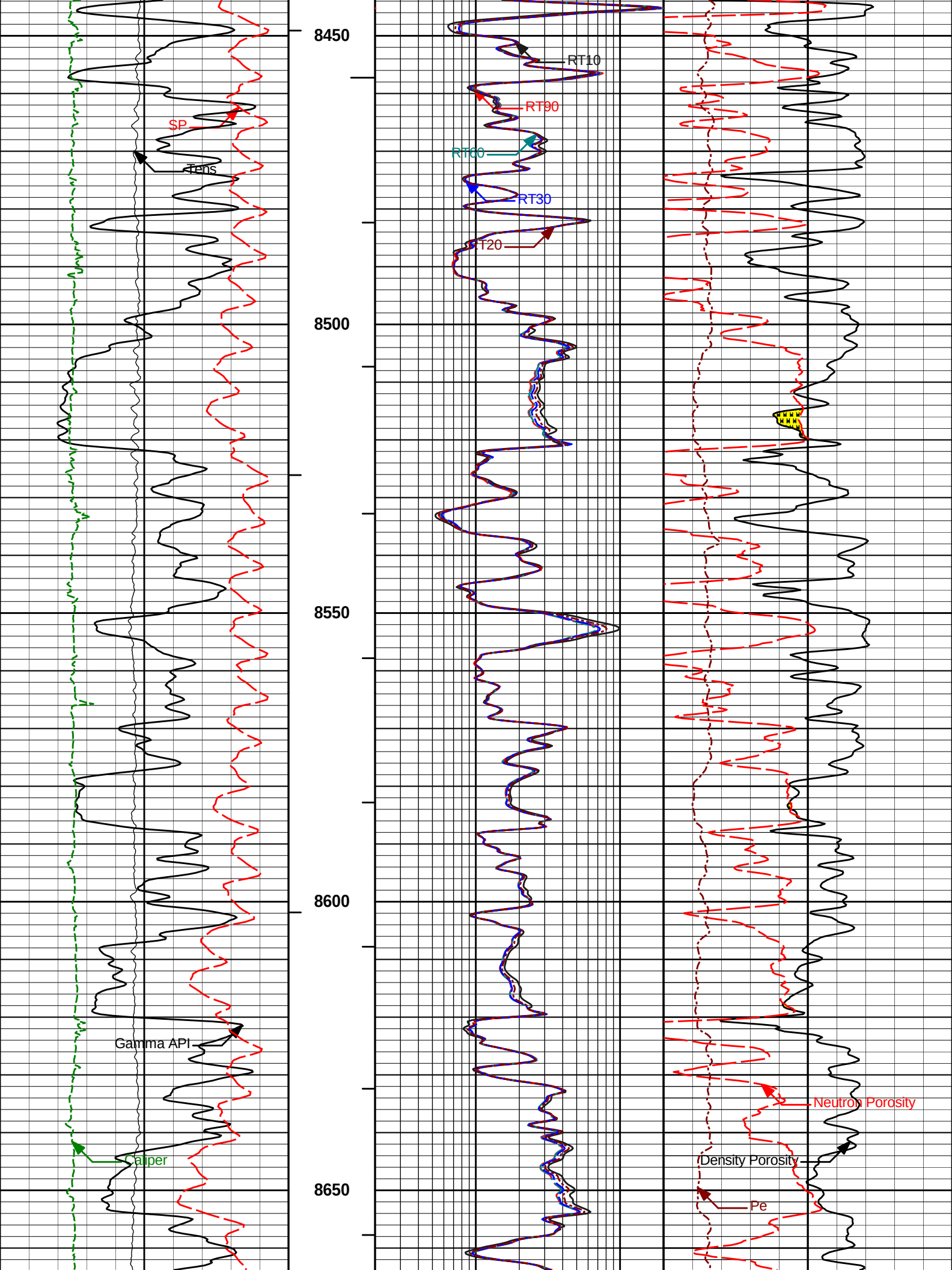
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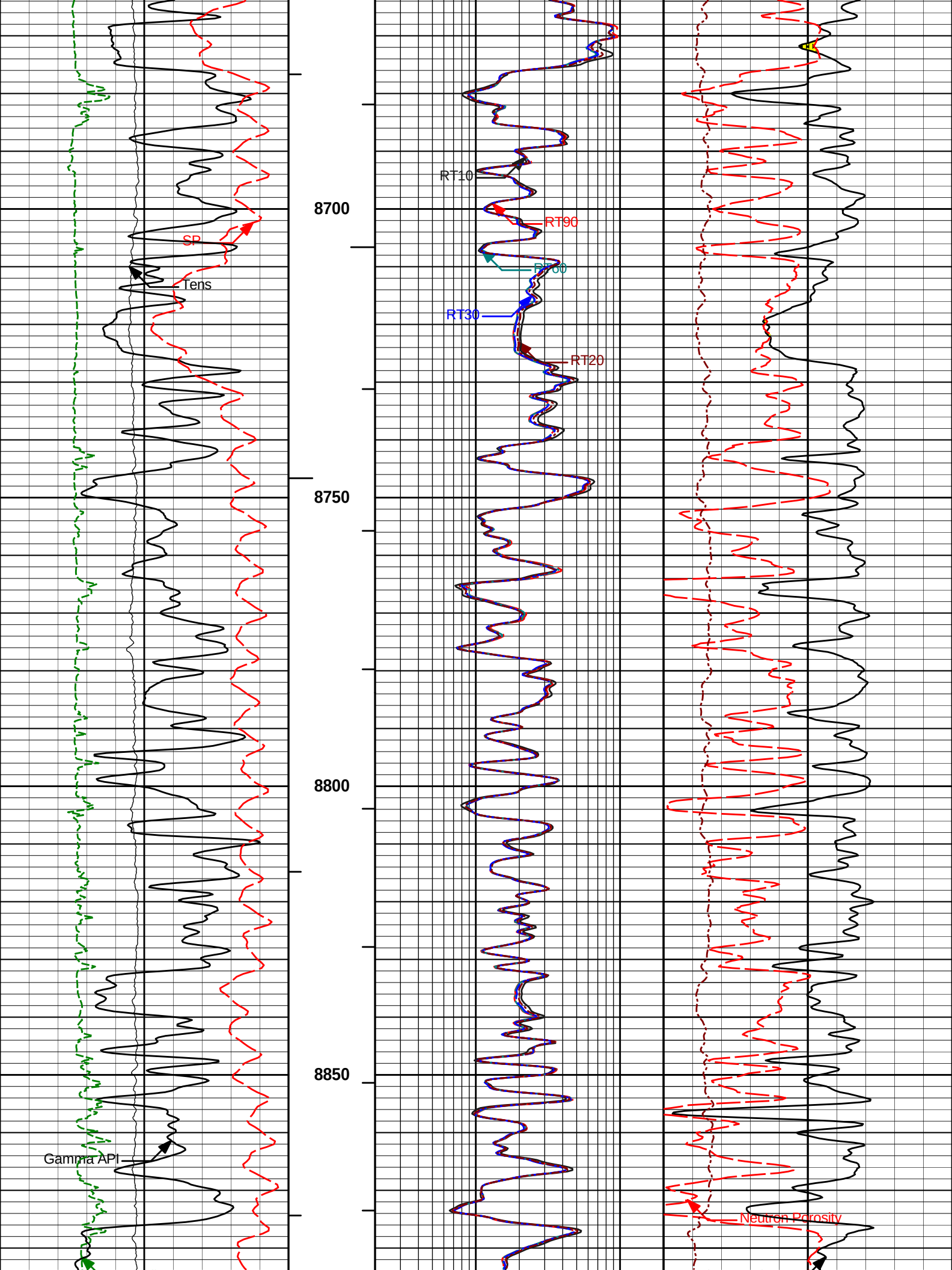
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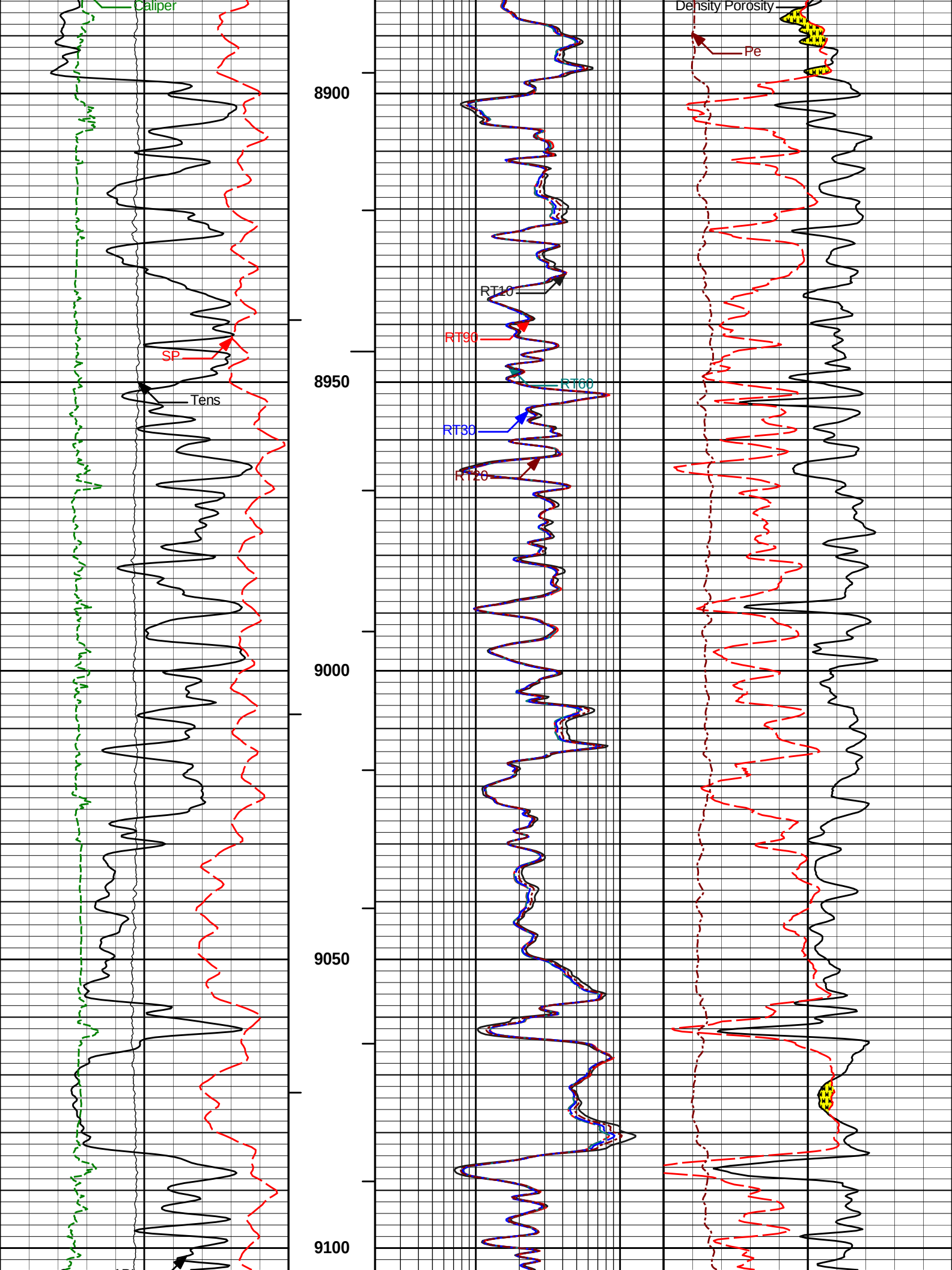
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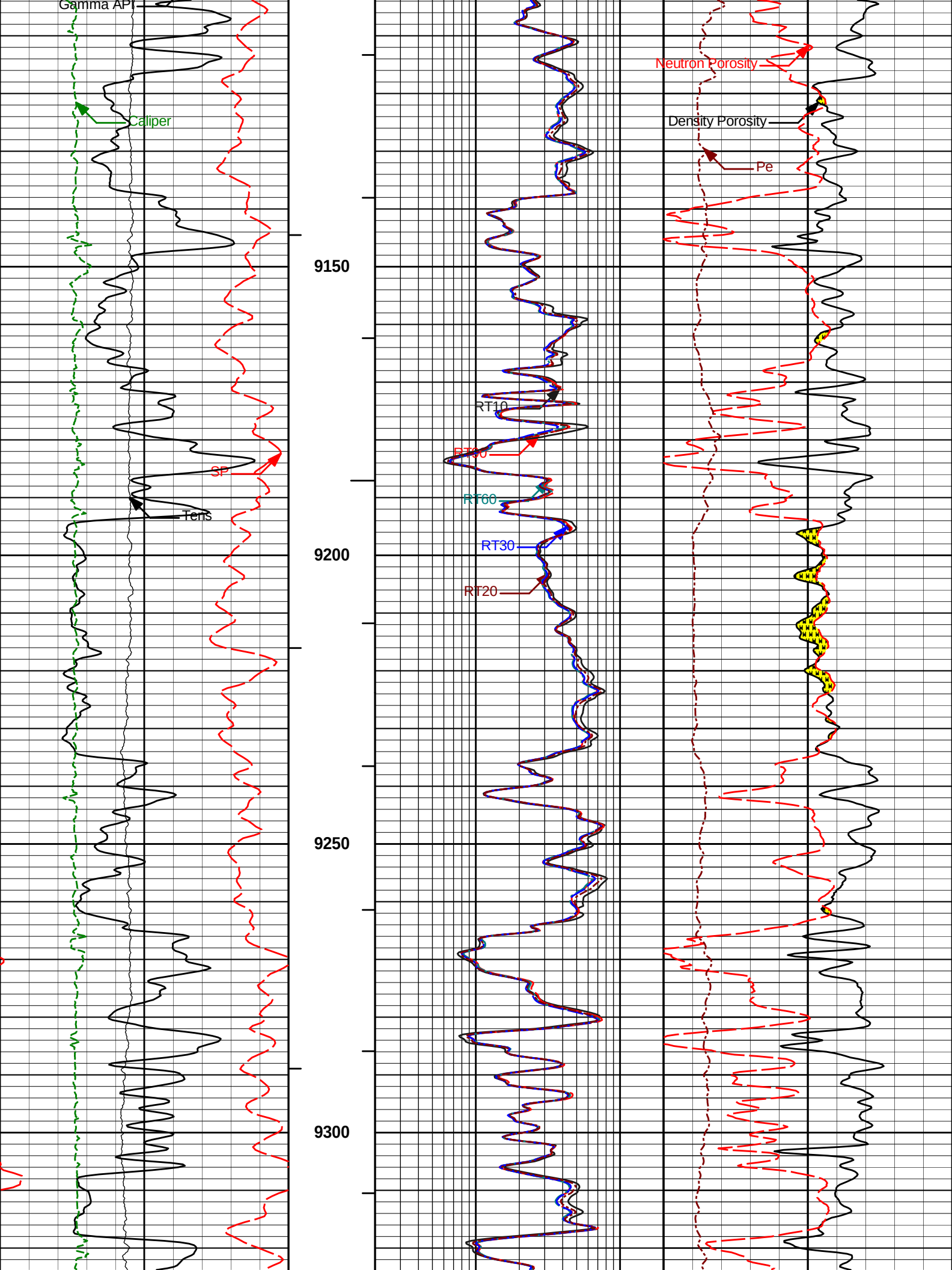
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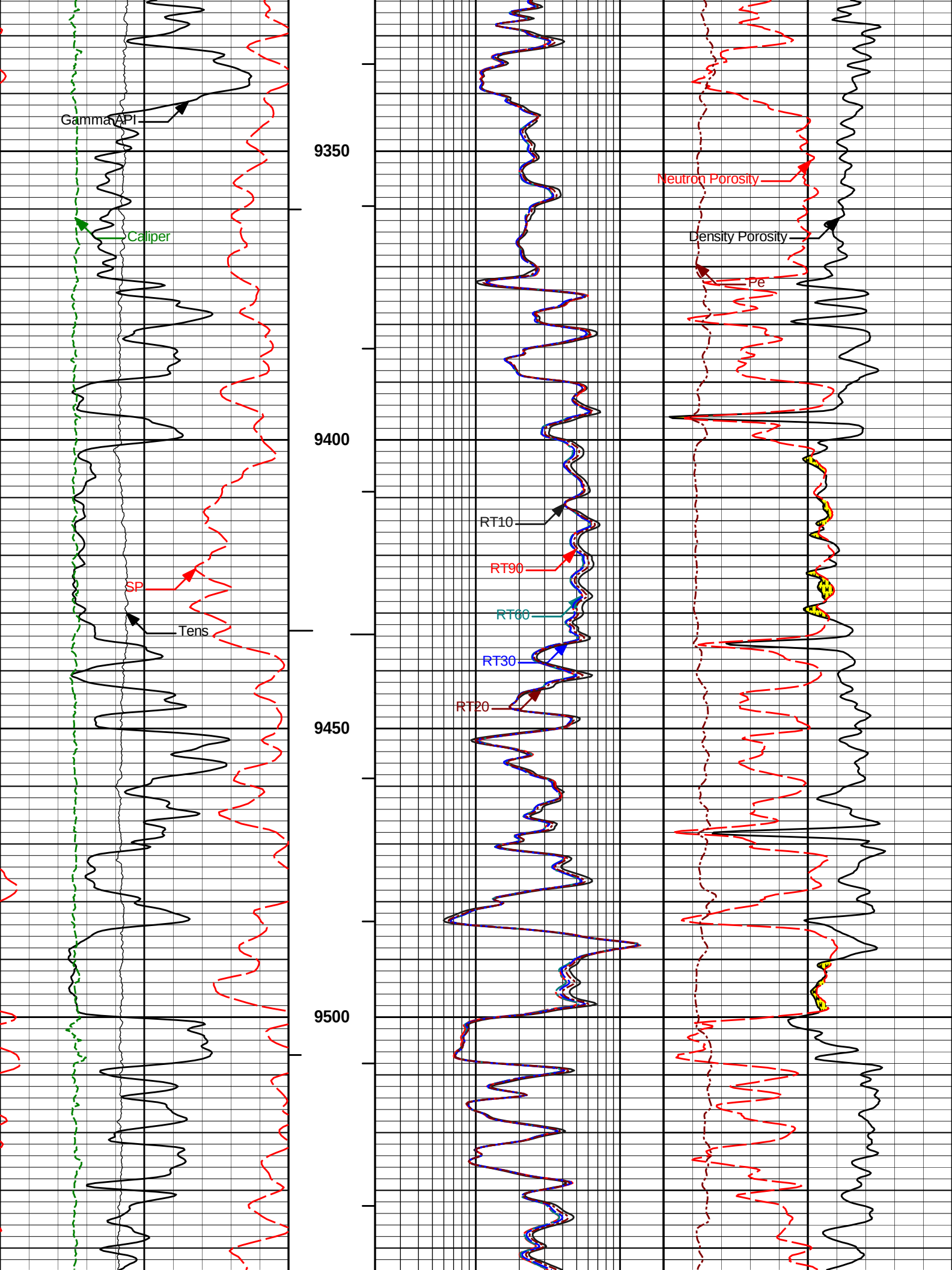
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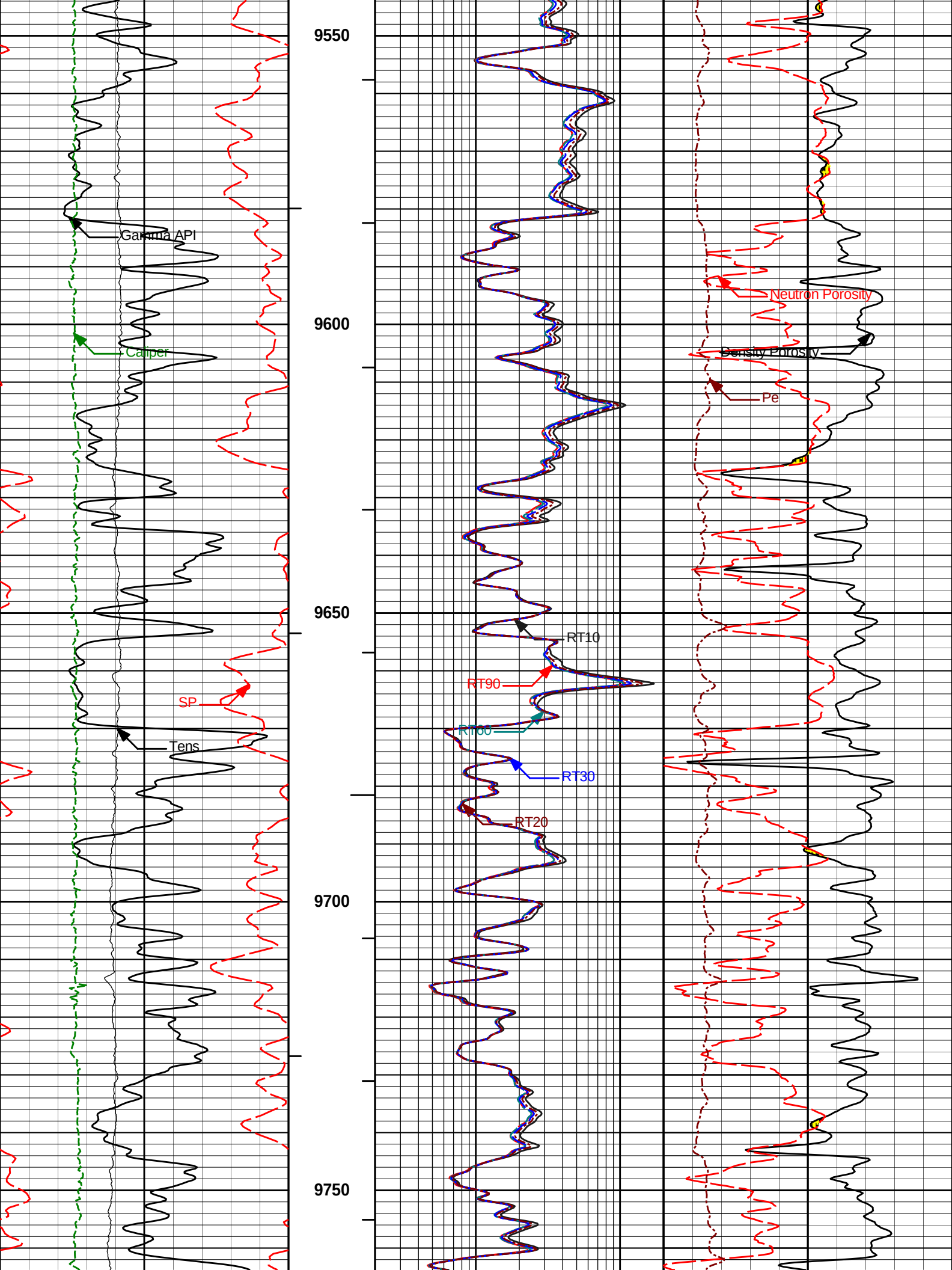
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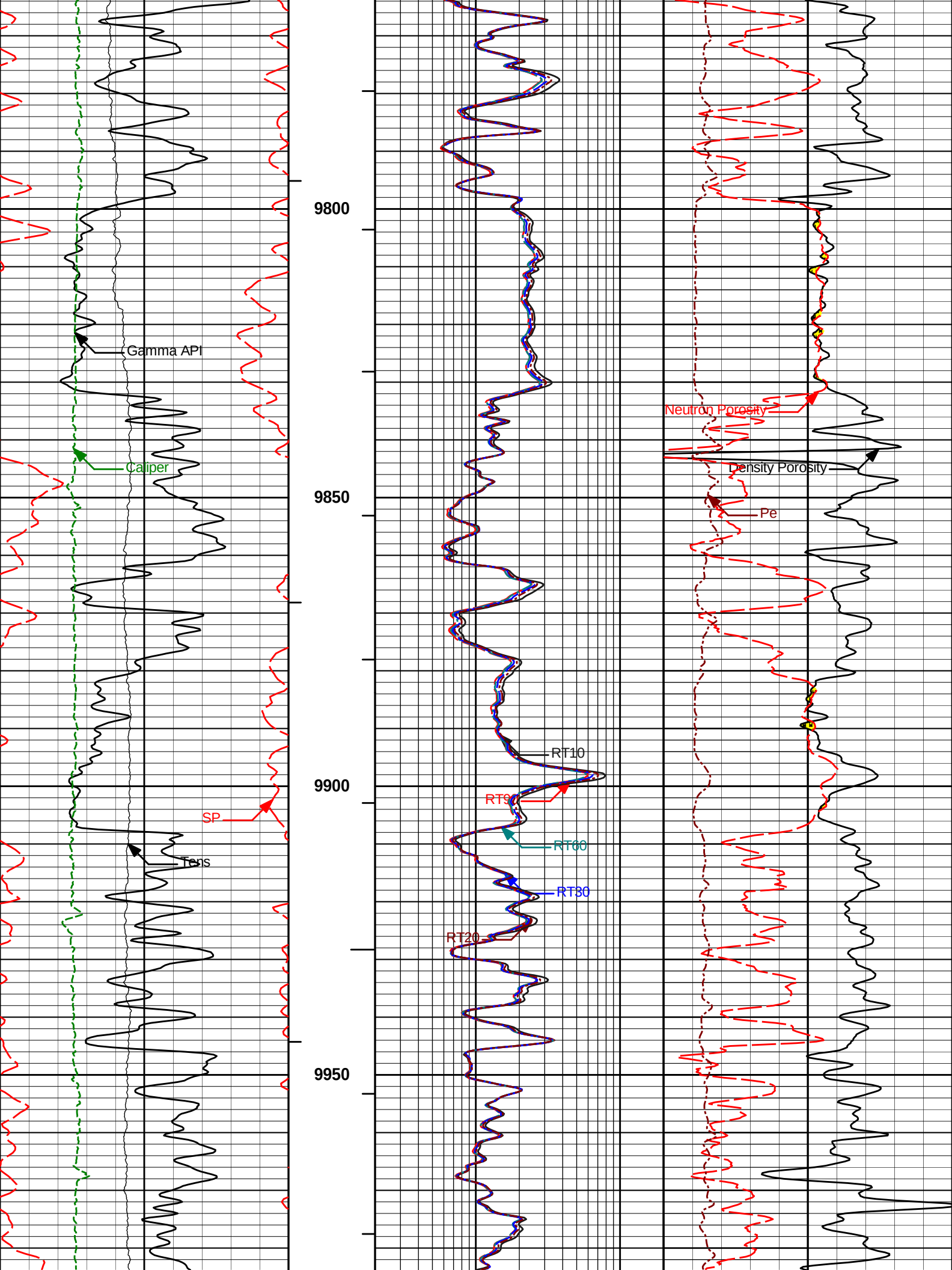
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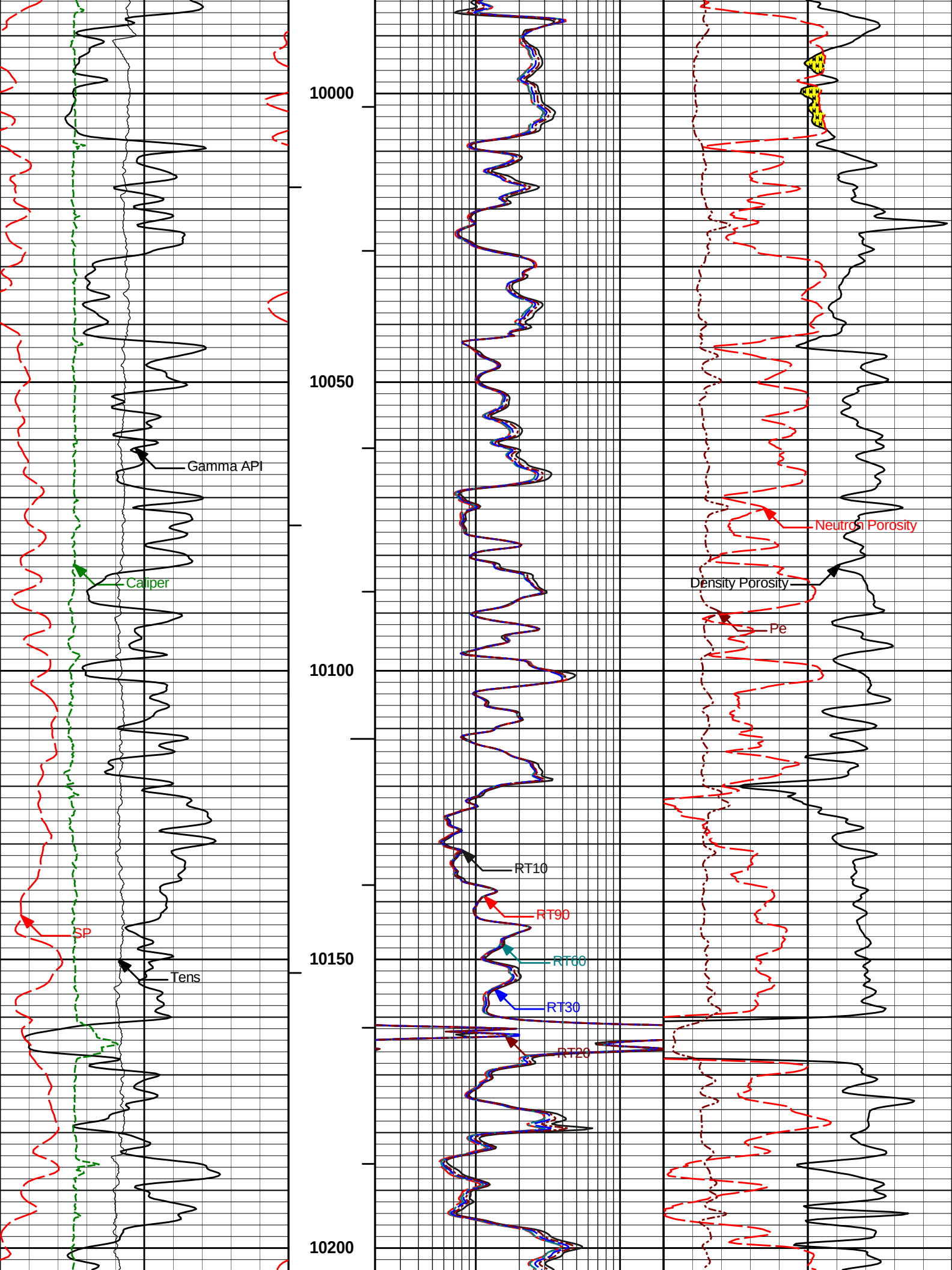
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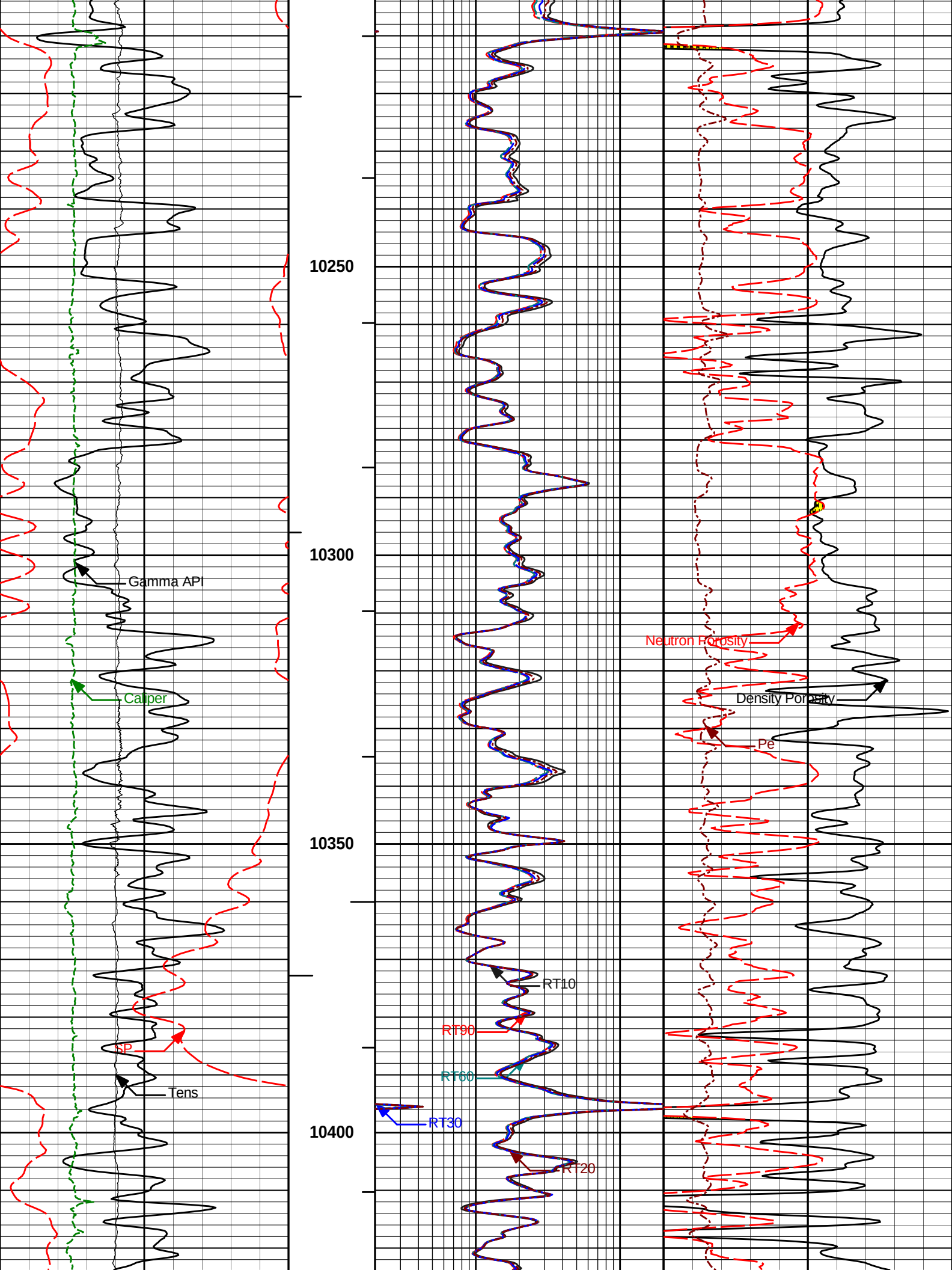
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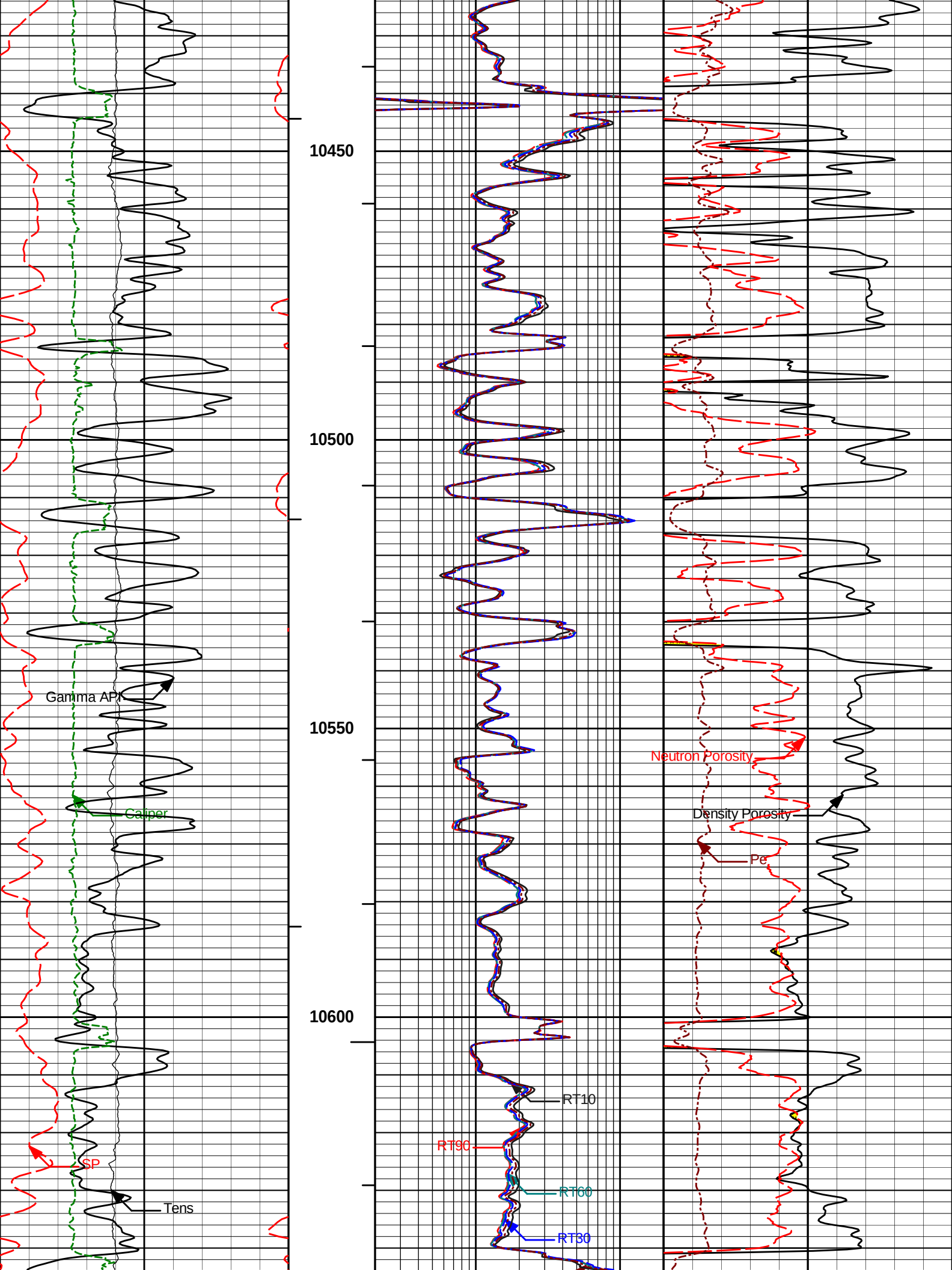
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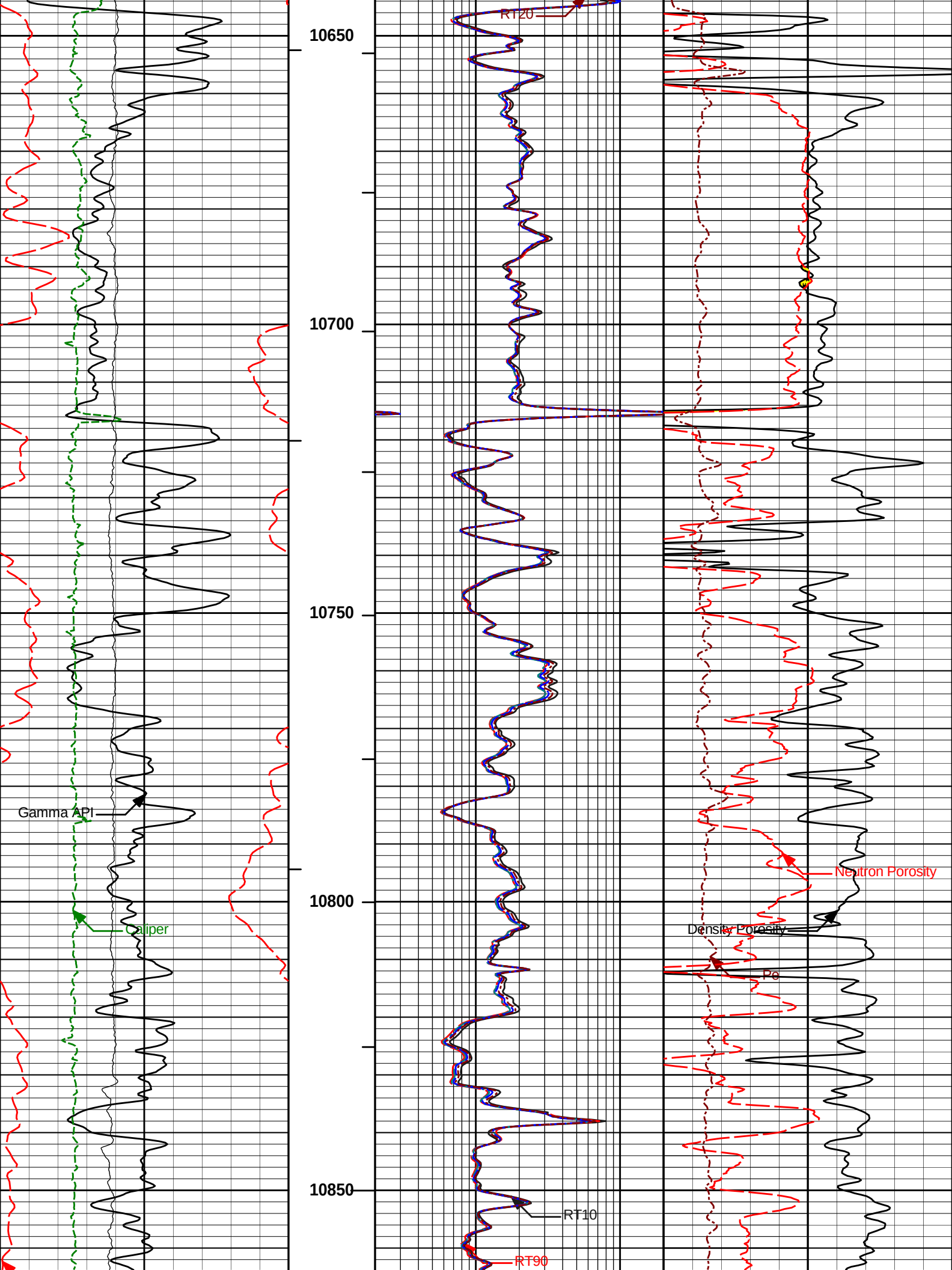
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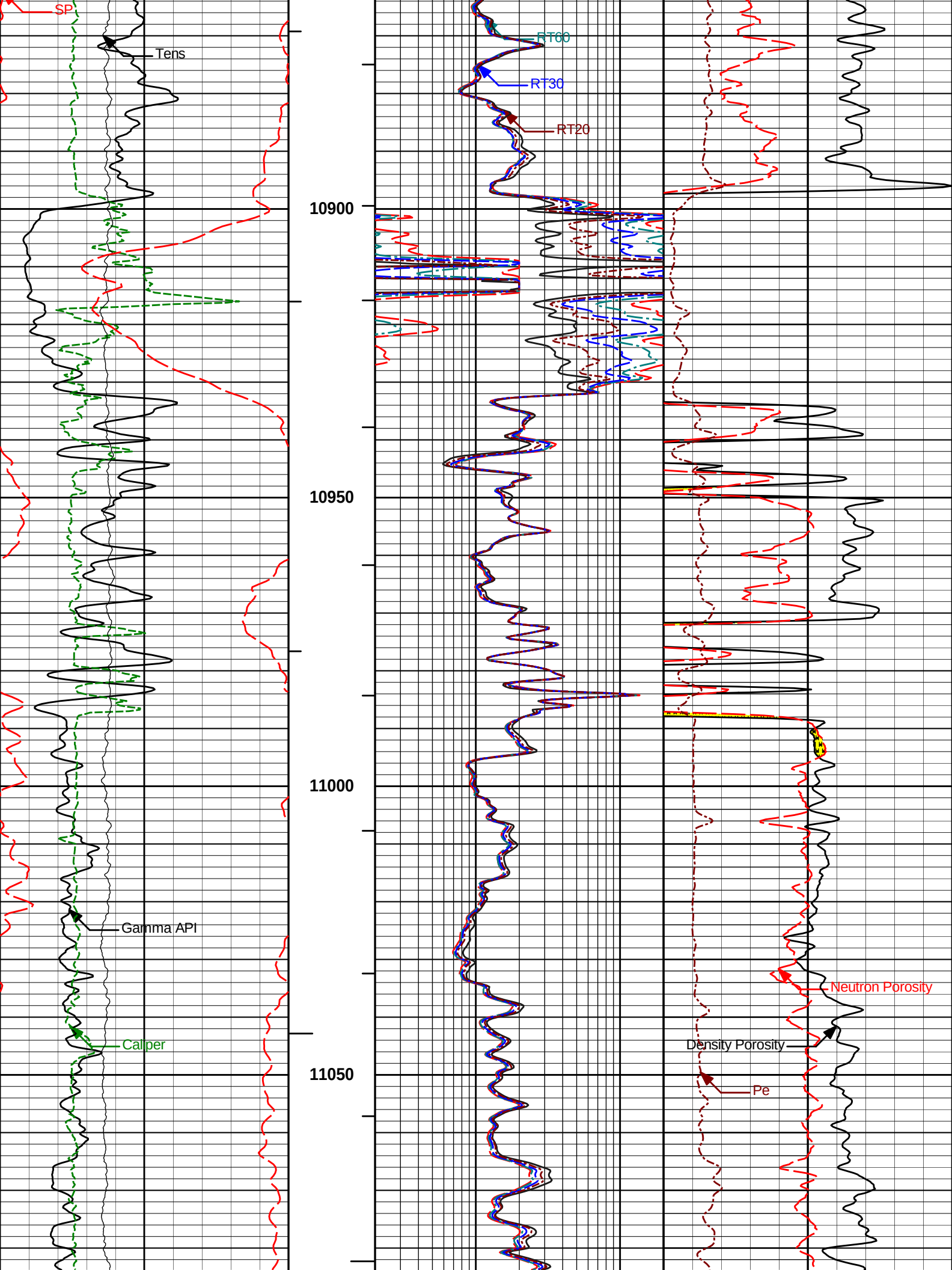
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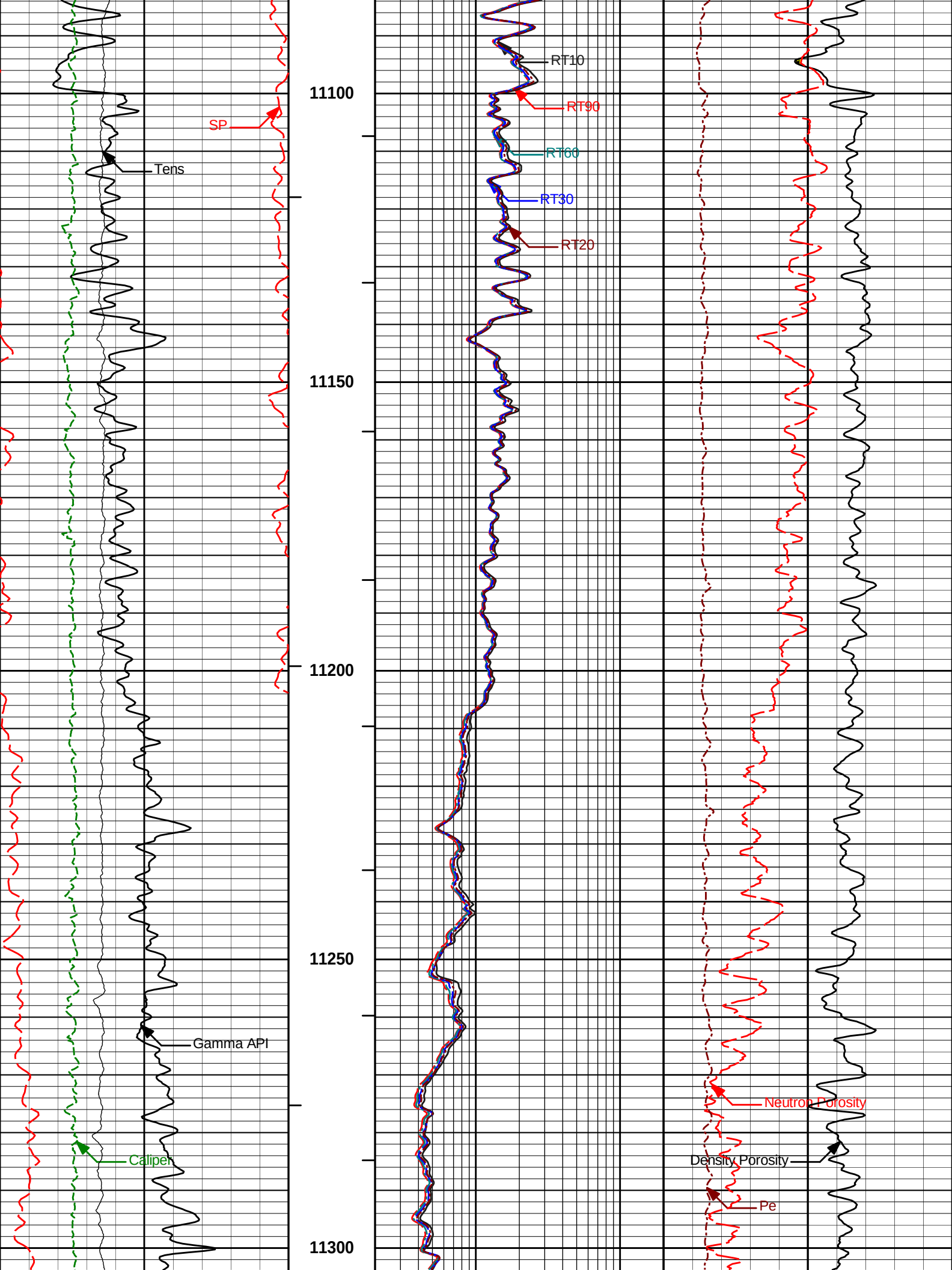
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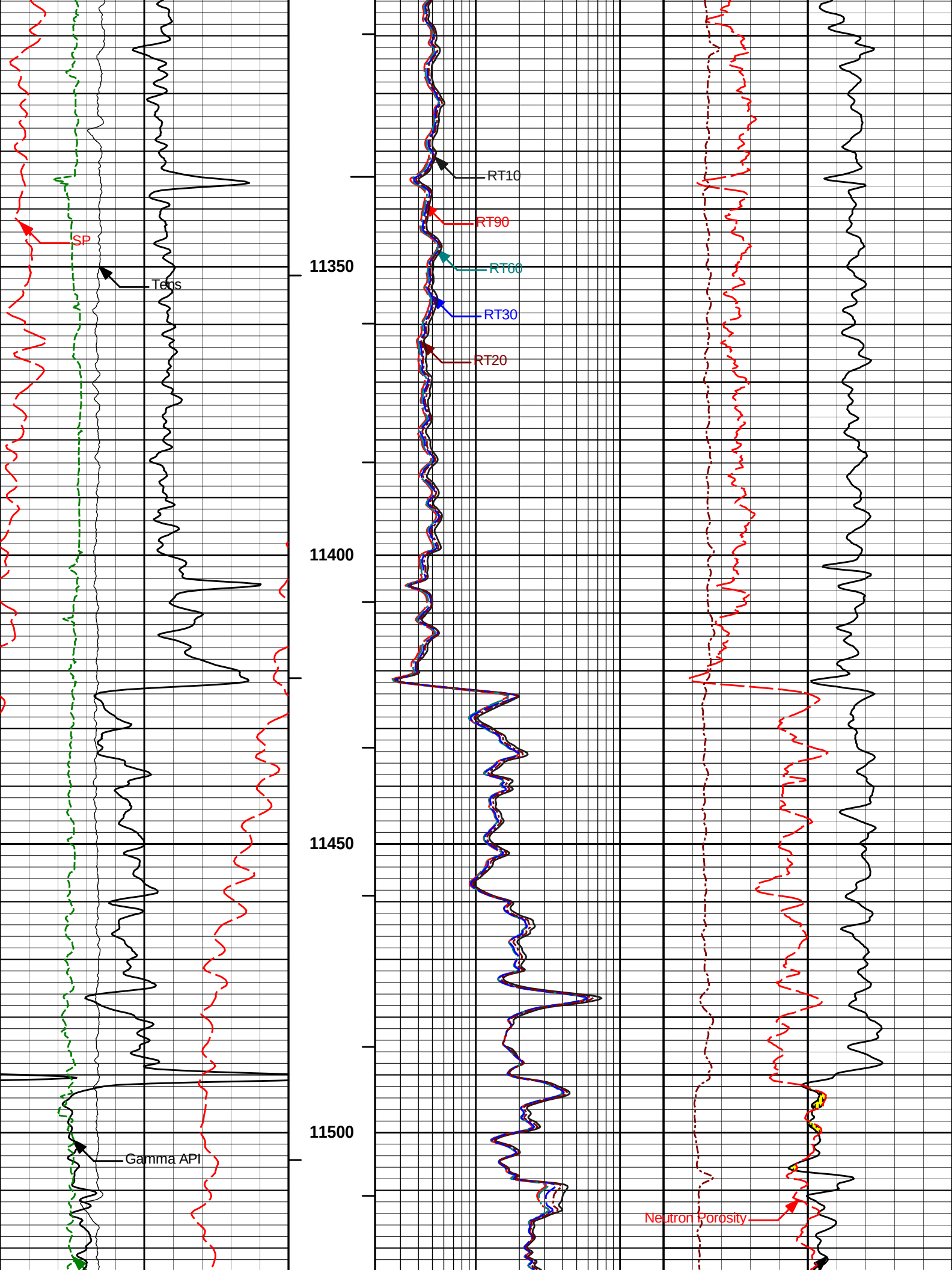
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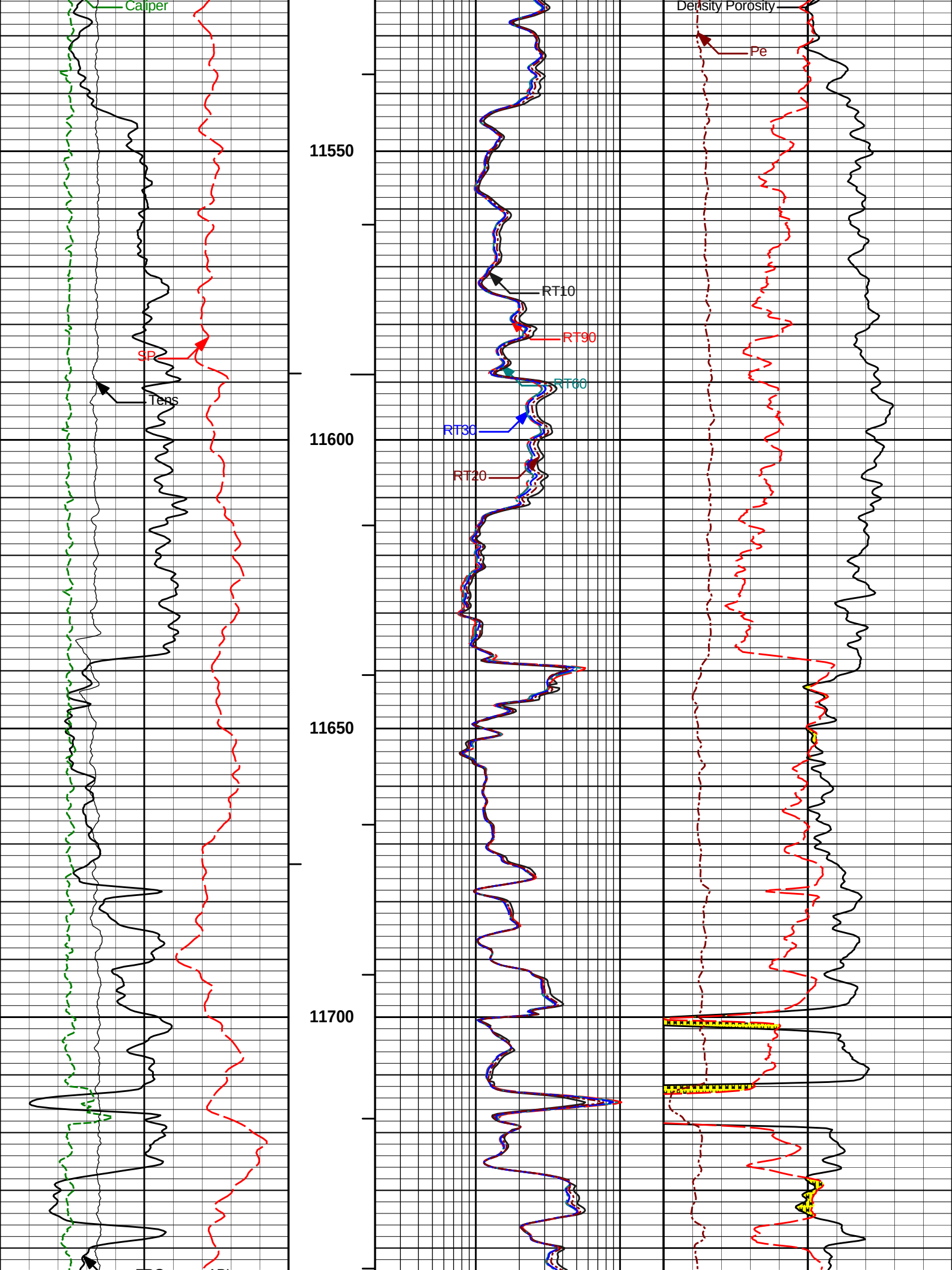
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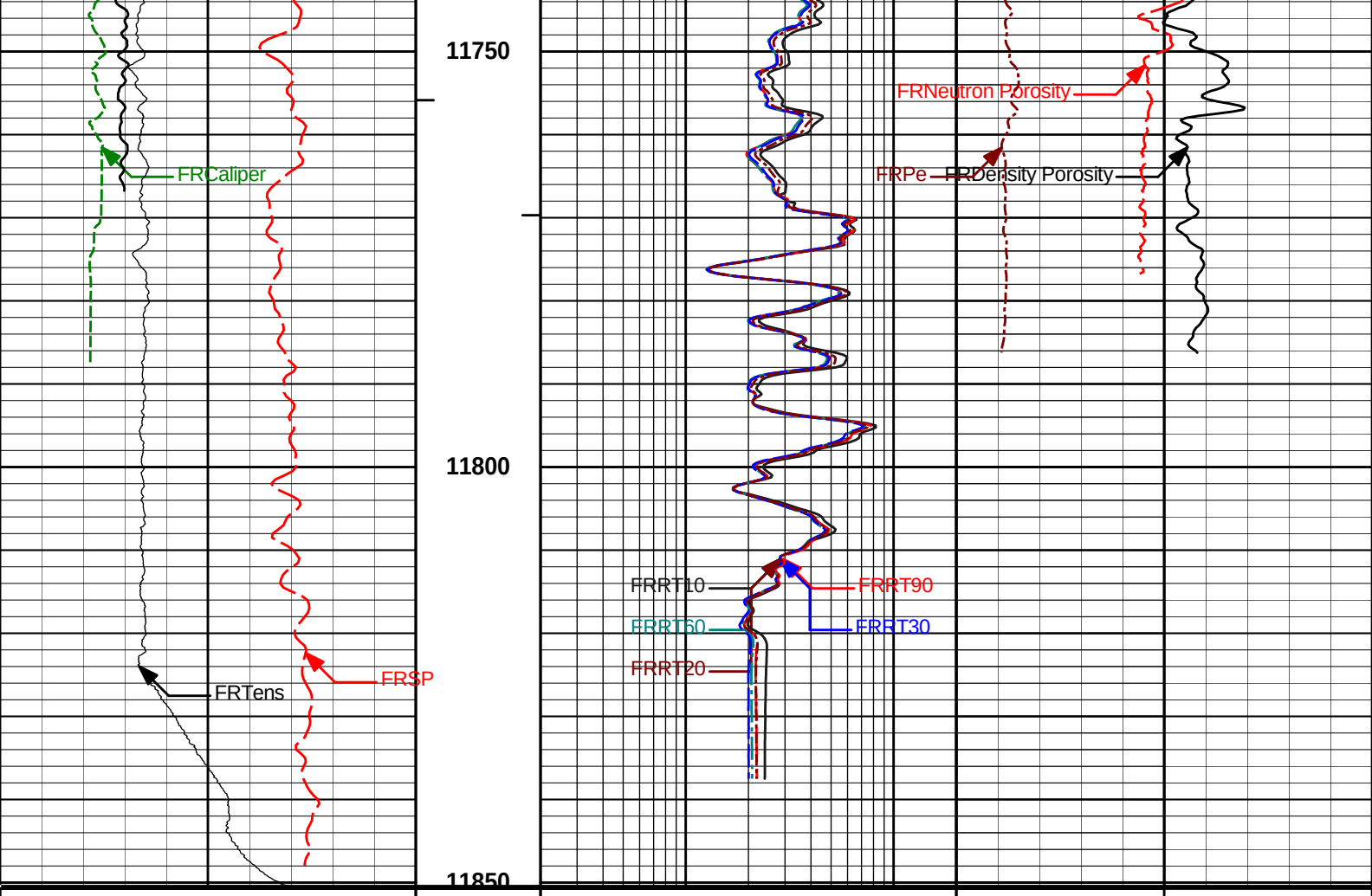


0 SP 100 millivolts	1 : 240	2 RT90 200 ohmm	0 Pe 10	
0 Gamma API 200 api	BHVT	2 RT60 200 ohmm	30 Density Porosity -10 percent	
6 Caliper 16 inches	AHVT	2 RT30 200 ohmm	30 Neutron Porosity -10 percent	
10K Tens 0 pounds		2 RT20 200 ohmm		
		2 RT10 200 ohmm		

HALLIBURTON

Plot Time: 24-Oct-13 04:33:13
Plot Range: 6790 ft to 11850.4 ft
Data: TPR_176-25\Well Based\MAIN*
Plot File: \\COMP\MAIN

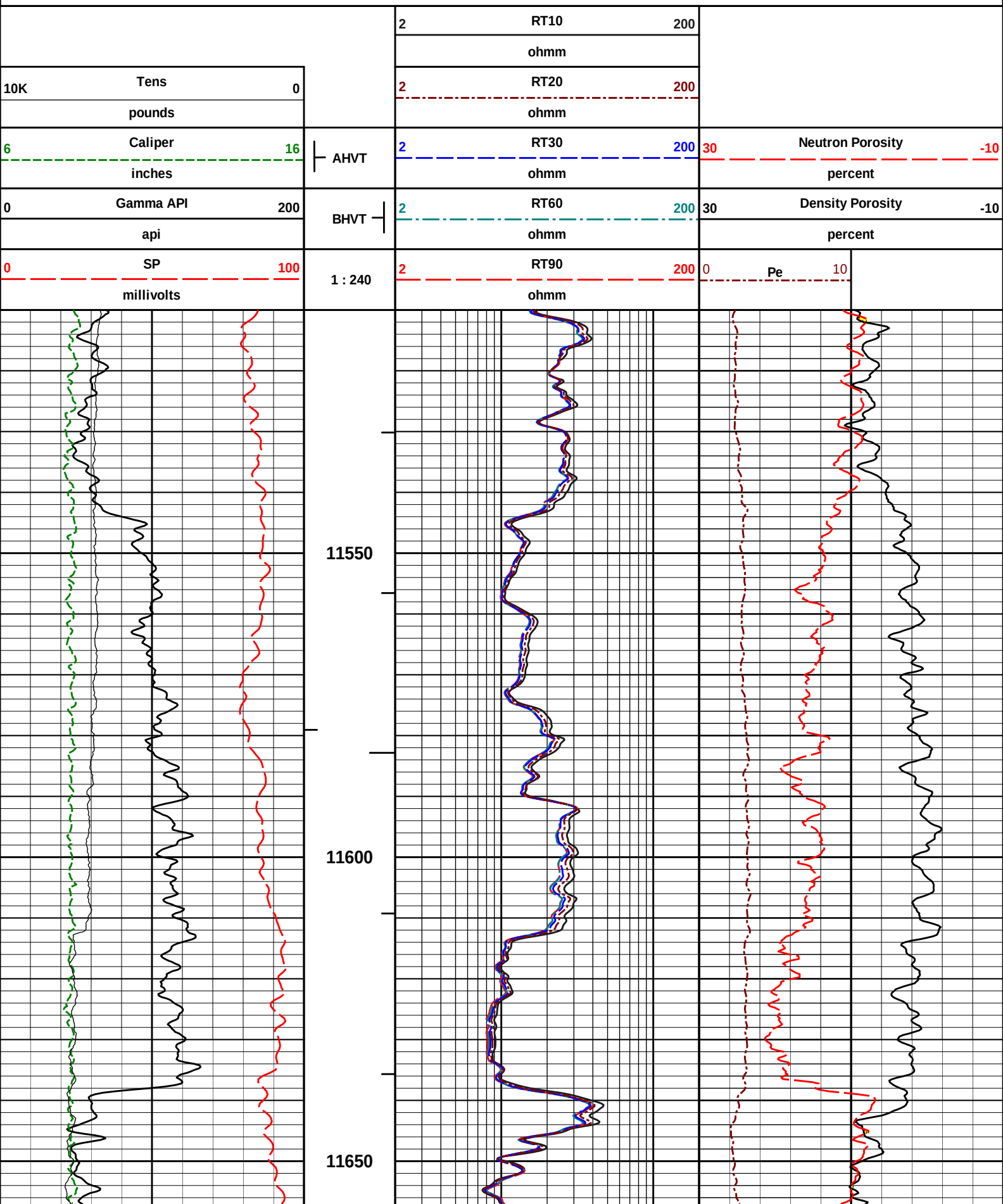
MAIN PASS 5" = 100'

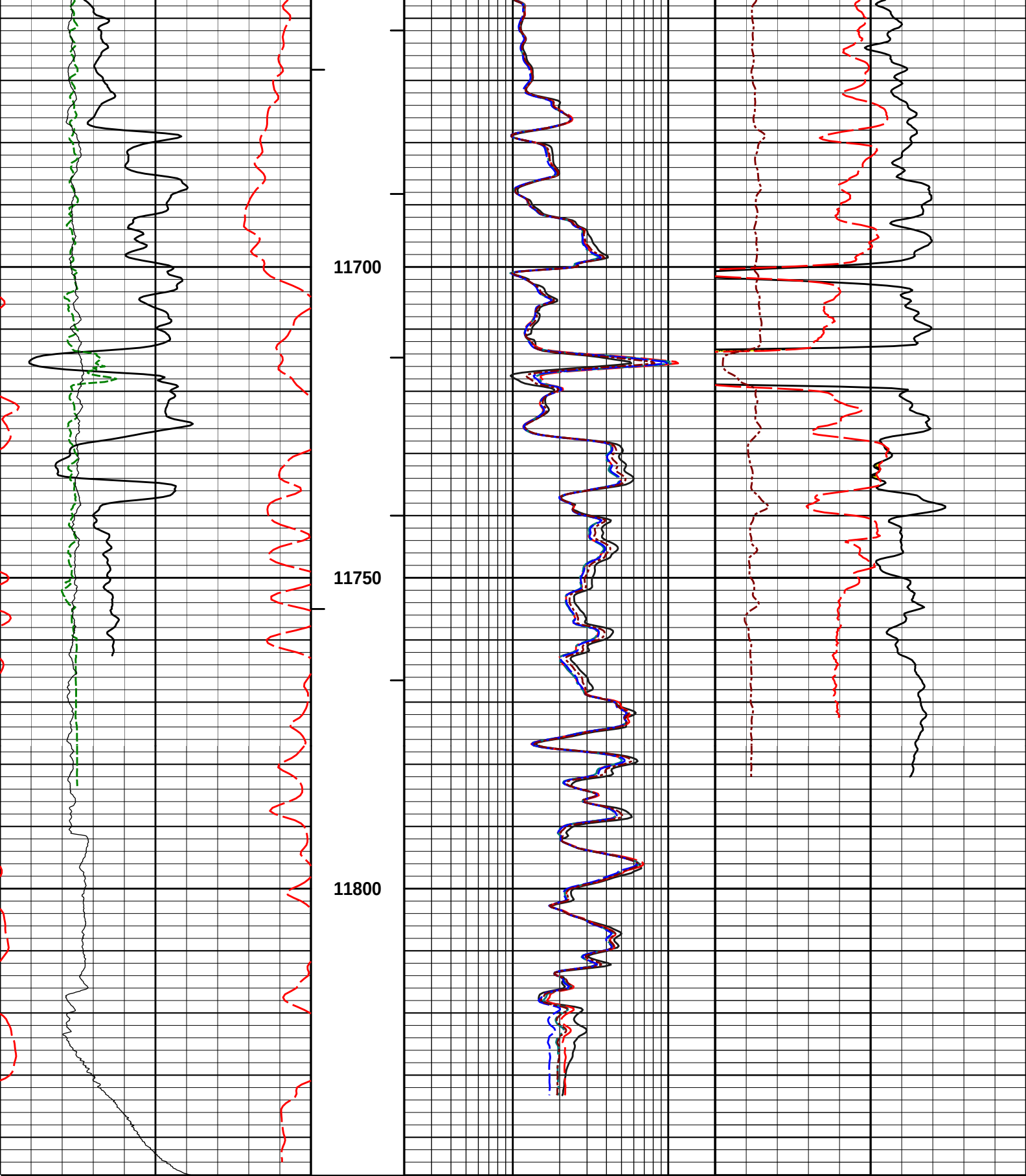
HALLIBURTON

Plot Time: 24-Oct-13 04:33:13
Plot Range: 11510 ft to 11846.2 ft
Data: TPR_176-25\Well Based\REPEAT*
Plot File: \\COMP\REPEAT

REPEAT SECTION 5" = 100'

REPEAT SECTION 5" = 100'





0 SP 100		2 RT90 200	0 Pe 10
millivolts	1 : 240	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
	pounds	

2	RT20	200
	ohmm	
2	RT10	200
	ohmm	

HALLIBURTON

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

REPEAT SECTION 5" = 100'

HALLIBURTON

CALIBRATION REPORT

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: 11068236
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

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

PASS/FAIL SUMMARY	
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

PASS/FAIL SUMMARY	
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

Arm Gain	0.0005846	0.0004967	0.000300 - 0.000700
Arm Power	-0.000006419	-0.000000774	-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)	1.85	2.00	0.15	+/- 0.20
Medium Ring (in)	3.70	3.75	0.05	+/- 0.20
RING DIAMETER:				
Small Ring (in)	6.30	6.50	0.20	+/- 0.20
Medium Ring (in)	8.23	8.25	0.02	+/- 0.20
Large Ring (in)	14.88	15.00	0.12	+/- 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 - 11812177**	**Reference Calibration Date:**	**04-Oct-13 16:17:50**
Engineer:	**J. PINKETT**	**Calibration Date:**	**23-Oct-13 09:42:11**
Software Version:	**WL INSITE R3.8.4 (Build 5)**	**Calibration Version:**	**1**

MEASURED CALIPER VALUES

Measurement	Shop	Field	Change	Control Limit On New Value
Pad Extension	3.75	3.78	0.03	+/- 0.10
Ring Diameter	8.25	8.18	-0.07	+/- 0.15

PASS/FAIL SUMMARY

Pad Extension Check:	Passed
Diameter Check:	Passed

SPECTRAL DENSITY SHOP CALIBRATION

Tool Name:	**SDLT Pad - 11795867**	**Reference Calibration Date:**	**31-Aug-13 09:54:47**
Engineer:	**J. SCHMIDT**	**Calibration Date:**	**04-Oct-13 15:32:09**
Software Version:	**WL INSITE R3.8.4 (Build 5)**	**Calibration Version:**	**1**

Logging Source S/N: 5471GW

Aluminum Block S/N: 63066	Density: 2.602g/cc	Pe: 3.100
Magnesium Block S/N: BRIGHTON MAGNESIUM BLOCK	Density: 1.691g/cc	Pe: 2.650

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

Signal	Lower	R	Upper
12K	0.6	0.89	1.3
36K	1.0	1.84	2.0
72K	1.0	1.14	2.0

R-MUD VERIFICATION

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

PASS/FAIL SUMMARY

GAIN RANGE CHK	PASS
SONDE OFFSET RANGE CHK	PASS
Tx CURRENT GAIN	PASS

Rmud VERIFICATION	PASS

TOOL OK TO LOG

CALIBRATION SUMMARY

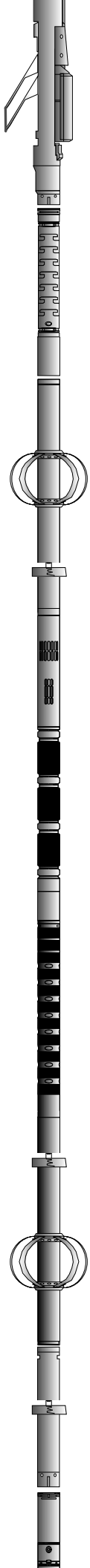
Sensor	Shop	Field	Post	Difference	Tolerance	Units
GTET-11812883						
Gamma Ray Calibrator	243.0	236.5	----------	6.5	+/- 9.00	api
DSNT-11812167						
Snow-Block Porosity	0.0661	0.0718	----------	-0.0057	+/- 0.0150	decp
SDLT-11812177						
Pad Extension	3.75	3.78	----------	-0.03	+/-0.10	in
Ring Diameter	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_RED\IDLE 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			8.52 ft	
				GammaRay @ 82.58 ft		
	UnivWearRing3.6-11812883 5.00 lbs	Ø 4.200 in*				
						80.12 ft
	DSN Decentralizer-11812167 6.60 lbs	Ø 5.000 in*				
DSNT-11812167 174.00 lbs		Ø 3.625 in			9.69 ft	
				DSN Far @ 73.19 ft DSN Near @ 72.44 ft		
	UnivWearRing3.6-11812167 5.00 lbs	Ø 4.200 in*				
						70.44 ft



SDLT-11812177
360.00 lbs

Ø 4.500 in

10.81 ft

SDLT Pad-11795867
65.00 lbs

Ø 4.750 in*

SDL Caliper @ 62.44 ft

SDL @ 62.43 ft

59.62 ft

Flex Joint - Pressure Comp-12152214
140.00 lbs

Ø 3.625 in

5.97 ft

53.65 ft

Centralizer 25-00000001
8.00 lbs

Ø 4.000 in*

Regal Standoff 6_75-00000001
20.00 lbs

Ø 6.750 in*

Wavesonic-I-34515236
520.00 lbs

Ø 3.625 in

34.07 ft

Wavesonic Delay @ 31.08 ft

Regal Standoff 6_75-00000002
20.00 lbs

Ø 6.750 in*

Centralizer 25-00000002
8.00 lbs

Ø 4.000 in*

19.58 ft

Regal Standoff 6_75-00000003
20.00 lbs

Ø 6.750 in*

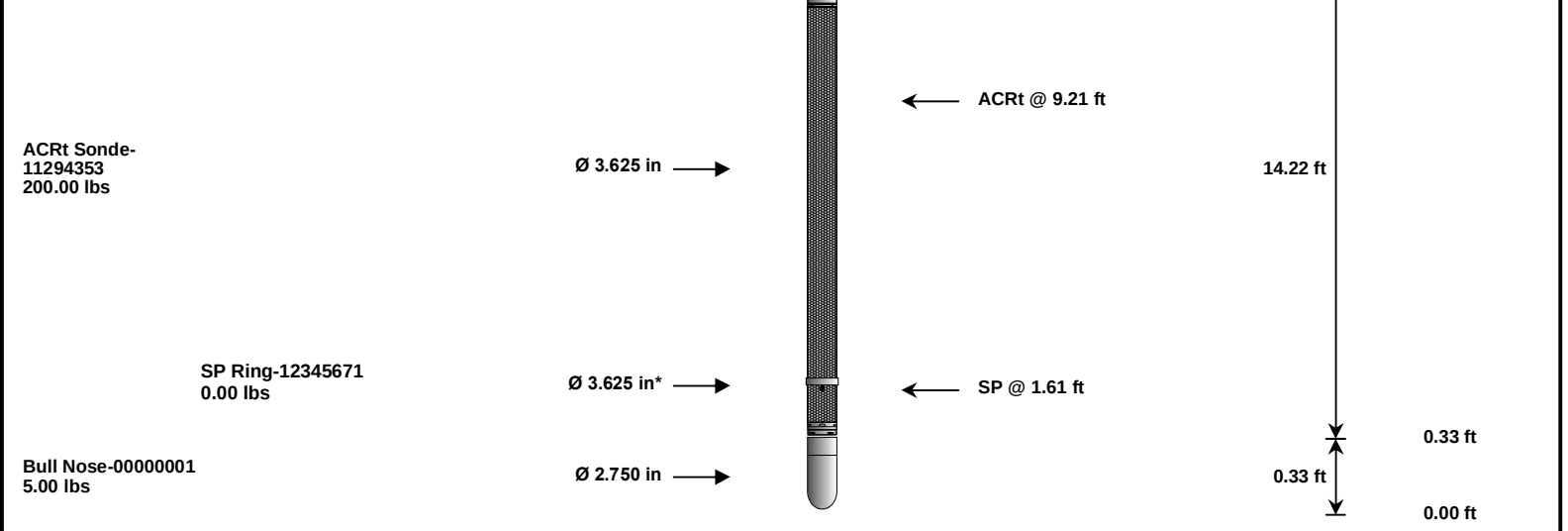
Ø 3.625 in

ACRt Instrument-11302817
50.00 lbs

5.03 ft

14.55 ft

Mud Resistivity @ 13.19 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\IDLE **Date: 23-Oct-13 23:17:05**

COMPANY	**BLACK DIAMOND MINERALS**		
WELL	**TPR 176-25**		
FIELD	**MAMM CREEK**		
COUNTY	**GARFIELD**	STATE	**CO**

HALLIBURTON

DUAL SPACED NEUTRON
SPECTRAL DENSITY
ARRAY COMPENSATED
TRUE RESISTIVITY