HALLIBURTON

ARRAY COMPENSATED TRUE RESISTIVITY SPECTRAL DENSTY DUAL SPACED NEUTRON

COMPANY BLACK HILLS EXPLORATION & PRODUCTION
WELL HOMER DEEP UNIT 9-41BH
FIELD/BLOCK SOUTH SHALE RIDGE
COUNTY GARFIELD STATE CO

COMPANY **BLACK HILLS EXPLORATION & PRODUCTION**

WELL **HOMER DEEP UNIT 9-41BH**

FIELD/BLOCK **SOUTH SHALE RIDGE**

COUNTY **GARFIELD** STATE **CO**

API No. 05-045-21934-00

Location NENE SEC9 TNS8S RNG98W
LAT: 39.37967
LONG: -108.32329

Sect. N/A Twp. N/A Rge. N/A

Other Services:
N/A

Permanent Datum	GL	Elev. 5482.0 ft	Elev.: K.B. 5507.0 ft
Log measured from	KB	25.0 ft above perm. Datum	D.F. 5507.0 ft
Drilling measured from	KB		G.L. 5482.0 ft

Date		05-Jul-14					
Run No.		ONE					
Depth - Driller		6550.00 ft					
Depth - Logger		6547.0 ft					
Bottom - Logged Interval		6544.0 ft					
Top - Logged Interval		1130.0 ft					
Casing - Driller		10.750 in @ 1132.0 ft		@		@	
Casing - Logger		1130.0 ft					
Bit Size		9.875 in		@		@	
Type Fluid in Hole		Water Based Mud					
Density	Viscosity	9.3 ppg	57.00 s/qt				
PH	Fluid Loss	9.30 pH	7.0 cptm				
Source of Sample		MUD TANK					
Rm @ Meas. Temperature		0.514 ohmm @ 85.20 degF		@		@	
Rmf @ Meas. Temperature		0.39 ohmm @ 83.00 degF		@		@	
Rmc @ Meas. Temperature		0.786 ohmm @ 83.20 degF		@		@	
Source Rmf	Rmc	MEASURED	MEASURED				
Rm @ BHT		0.28 ohmm @ 165.0 degF		@		@	
Time Since Circulation		9.9 hr					
Time on Bottom		05-Jul-14 21:58					
Max. Rec. Temperature		165.0 degF @ 6547.0 ft		@		@	
Equipment	Location	11170614	ROCK SPRINC				
Recorded By		B. NEALON					
Witnessed By		K. HATFIELD					

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PGM Version: WL INSITE R4.2.1 (Build 5)

Service Ticket No.: 901469706 API Serial No.: 05-045-21934-00

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	NONE	FREE-HANGING	N/A
		I10996988			
		S10988481			

EQUIPMENT DATA

	GAMMA	ACOUSTIC		DENSITY		NEUTRON	
Run No.	ONE	Run No.		Run No.	ONE	Run No.	ONE
Serial No.	11294346	Serial No.		Serial No.	10947725	Serial No.	10846353
Model No.	GTET	Model No.		Model No.	SDLT	Model No.	DSNT
Diameter	3.625"	No. of Cent.		Diameter	4.5"	Diameter	3.625"
Detector Model No.	GTET	Spacing		Log Type	GAM-GAM	Log Type	NEU-NEU
Type	SCINT			Source Type	CS137	Source Type	AM241BE
Length	8"	LSA [Y/N]		Serial No.	5235GW	Serial No.	08-018
Distance to Source	10'	FWDA [Y/N]		Strength	1.78CI	Strength	15CI

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	6544'	1130'	REC	0 API	150 API				30%	-10%	2.68	30%	-10%	SAND

DIRECTIONAL INFORMATION

Maximum Deviation	@	KOP	@

Remarks:

ANNULAR HOLE VOLUME CALCUALTED FOR 7.625-INCH CASING

BOREHOLE RUGOSITY, TENSION PULLS, AND WASHOUTS MAY AFFECT LOG QUALITY AND REPEATABILITY

RIG: SST-66

CREW: D. PIEGER, T. CHASE, M. SKINNER, T. PETERSON

THANK YOU FOR USING HALLIBURTON: ROCK SPRINGS, WY 307-352-8600

HALLIBURTON

PARAMETERS REPORT

Depth (ft)	Tool Name	Mnemonic	Description	Value	Units
TOP					
	SHARED	BS	Bit Size	9.875	in
	SHARED	UBS	Use Bit Size instead of Caliper for all applications.	No	
	SHARED	MDBS	Mud Base	Water	
	SHARED	MDWT	Borehole Fluid Weight	9.300	ppg
	SHARED	WAGT	Weighting Agent	Natural	
	SHARED	BSAL	Borehole salinity	0.00	ppm
	SHARED	FSAL	Formation Salinity NaCl	0.00	ppm
	SHARED	KPCT	Percent K in Mud by Weight?	0.00	%
	SHARED	RMUD	Mud Resistivity	0.514	ohmm
	SHARED	TRM	Temperature of Mud	85.2	degF
	SHARED	CSD	Logging Interval is Cased?	No	
	SHARED	ICOD	AHV Casing OD	7.625	in
	SHARED	ST	Surface Temperature	75.0	degF
	SHARED	TD	Total Well Depth	6550.00	ft
	SHARED	BHT	Bottom Hole Temperature	156.0	degF
	SHARED	SVTM	Navigation and Survey Master Tool	NONE	
	SHARED	AZTM	High Res Z Accelerometer Master Tool	GTET	
	SHARED	TEMM	Temperature Master Tool	NONE	
	Rwa / CrossPlot	XPOK	Process Crossplot?	Yes	
	Rwa / CrossPlot	FCHO	Select Source of F	Automatic	
	Rwa / CrossPlot	AFAC	Archie A factor	0.6200	

Rwa / CrossPlot	MFAC	Archie M factor	2.1500	
Rwa / CrossPlot	RMFR	Rmf Reference	0.10	ohmm
Rwa / CrossPlot	TMFR	Rmf Ref Temp	75.00	degF
Rwa / CrossPlot	RWA	Resistivity of Formation Water	0.05	ohmm
Rwa / CrossPlot	ADP	Use Air Porosity to calculate CrossplotPhi	No	
Rwa / CrossPlot	BHSM	Borehole Size Source Tool	SDLT	
GTET	GROK	Process Gamma Ray?	Yes	
GTET	GRSO	Gamma Tool Standoff	0.000	in
GTET	GEOK	Process Gamma Ray EVR?	No	
GTET	TPOS	Tool Position for Gamma Ray Tools.	Eccentered	
GTET	BHSM	Borehole Size Source Tool	SDLT	
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	
DSNT	BHSM	Borehole Size Source Tool	SDLT	
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
SDLT Pad	BHSM	Borehole Size Source Tool	SDLT	
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	RMIN	Maximum Resistivity for MAP	200.00	ohmm
ACRt Sonde	THQY	Threshold Quality	0.50	
ACRt Sonde	MRFX	Fixed mud resistivity	2000	ohmm
ACRt Sonde	BHSM	Borehole Size Source Tool	SDLT	

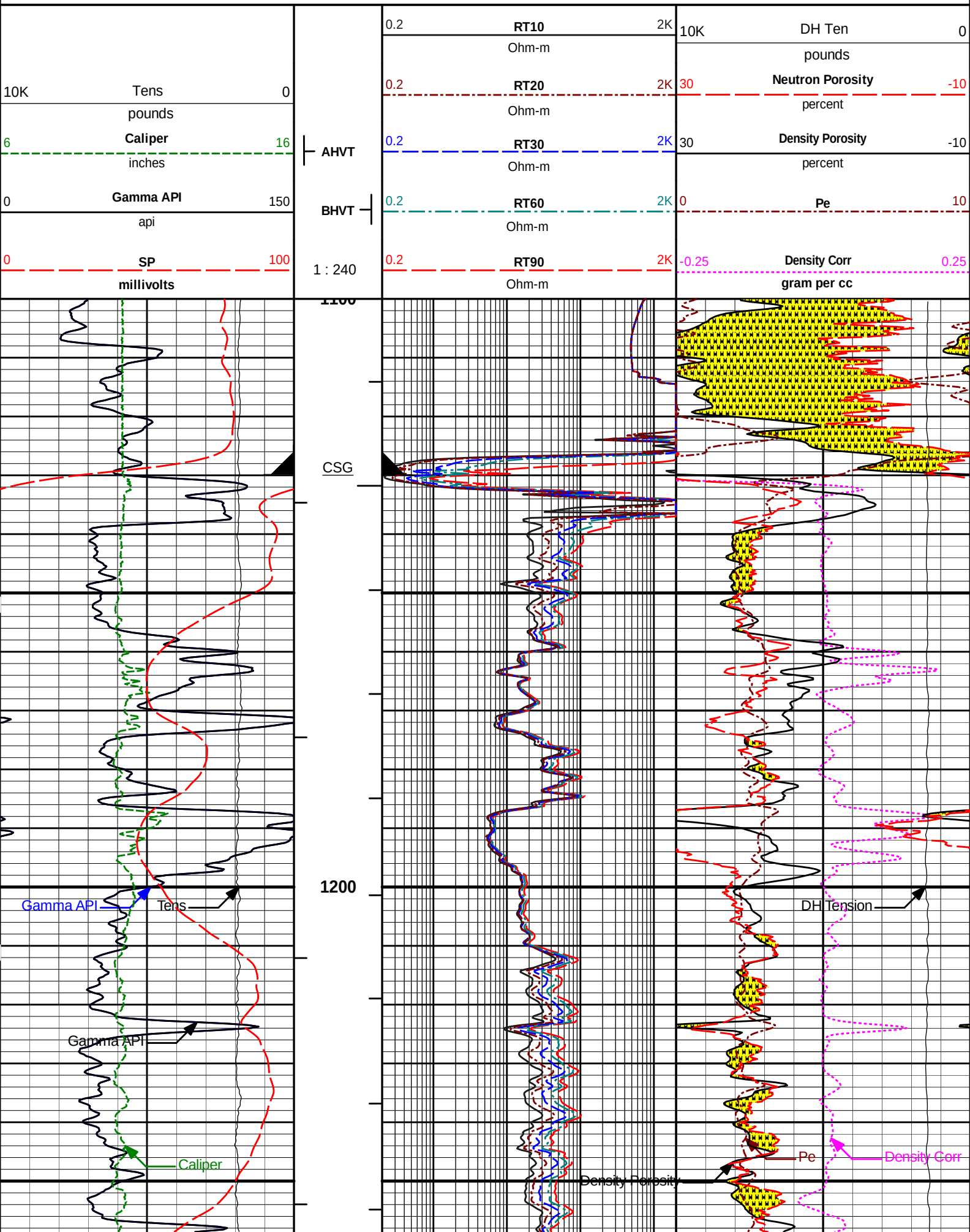
BOTTOM

Data: BH_HOMER_9-41AH\0001 TRIPLE\004 05-Jul-14 21:58 Up @6553.8f **Date: 05-Jul-14 23:59:54**

HALLIBURTON

Plot Time: 08-Jul-14 11:54:12
Plot Range: 1100 ft to 6552.17 ft
Data: BH_HOMER_9-41AH\Well Based\DAQ-0001-004*
Plot File: \\IIIC\BP_5IN_COMP_M

MAIN PASS 5" = 100'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BHVT
1 : 240
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RT10
2K
Ohm-m
0.2
RT20
2K
Ohm-m
0.2
RT30
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Ohm-m
0.2
RT60
2K
Ohm-m
0.2
RT90
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Ohm-m
10K
DH Ten
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Neutron Porosity
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percent
30
Density Porosity
-10
percent
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Pe
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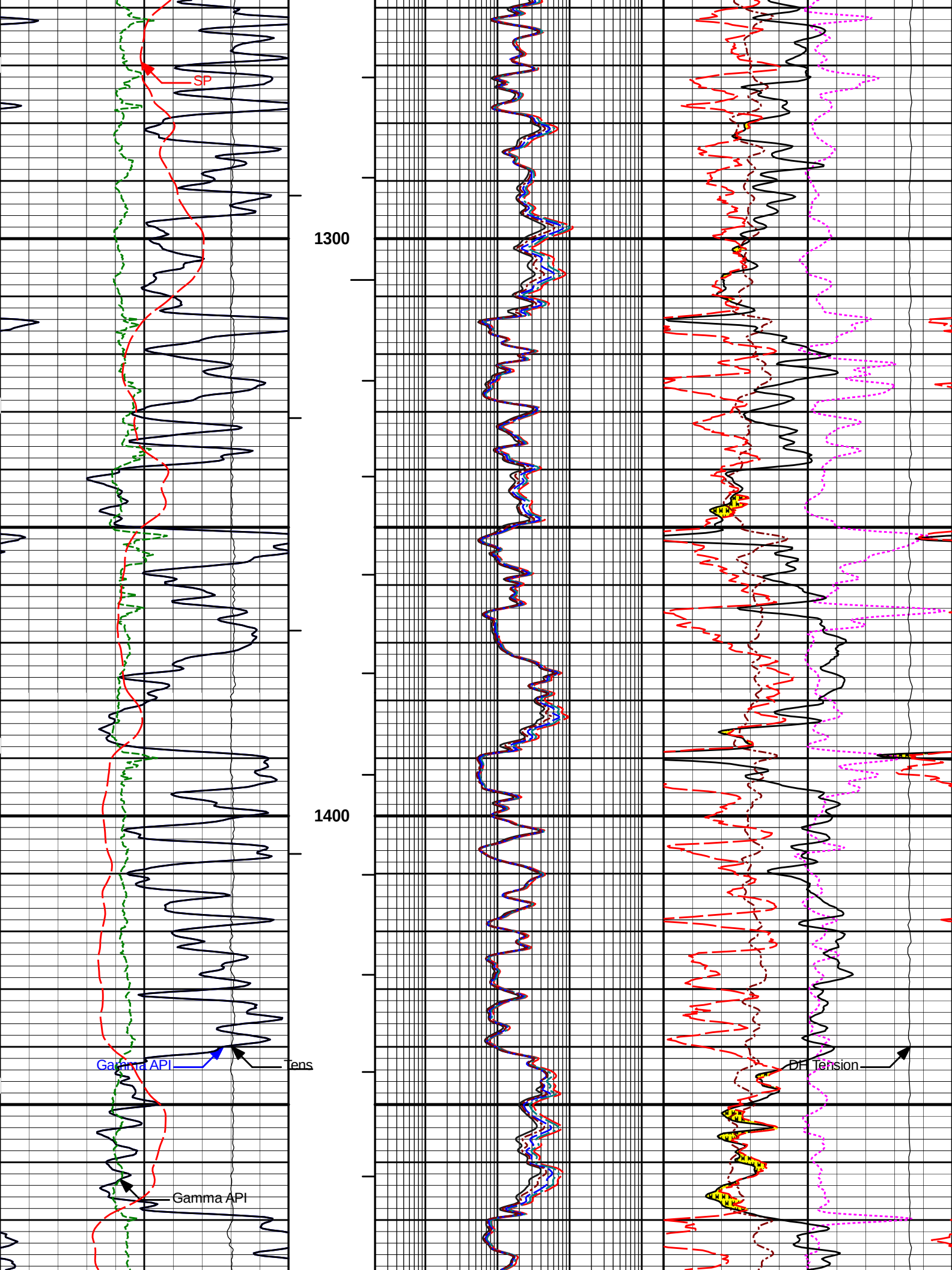
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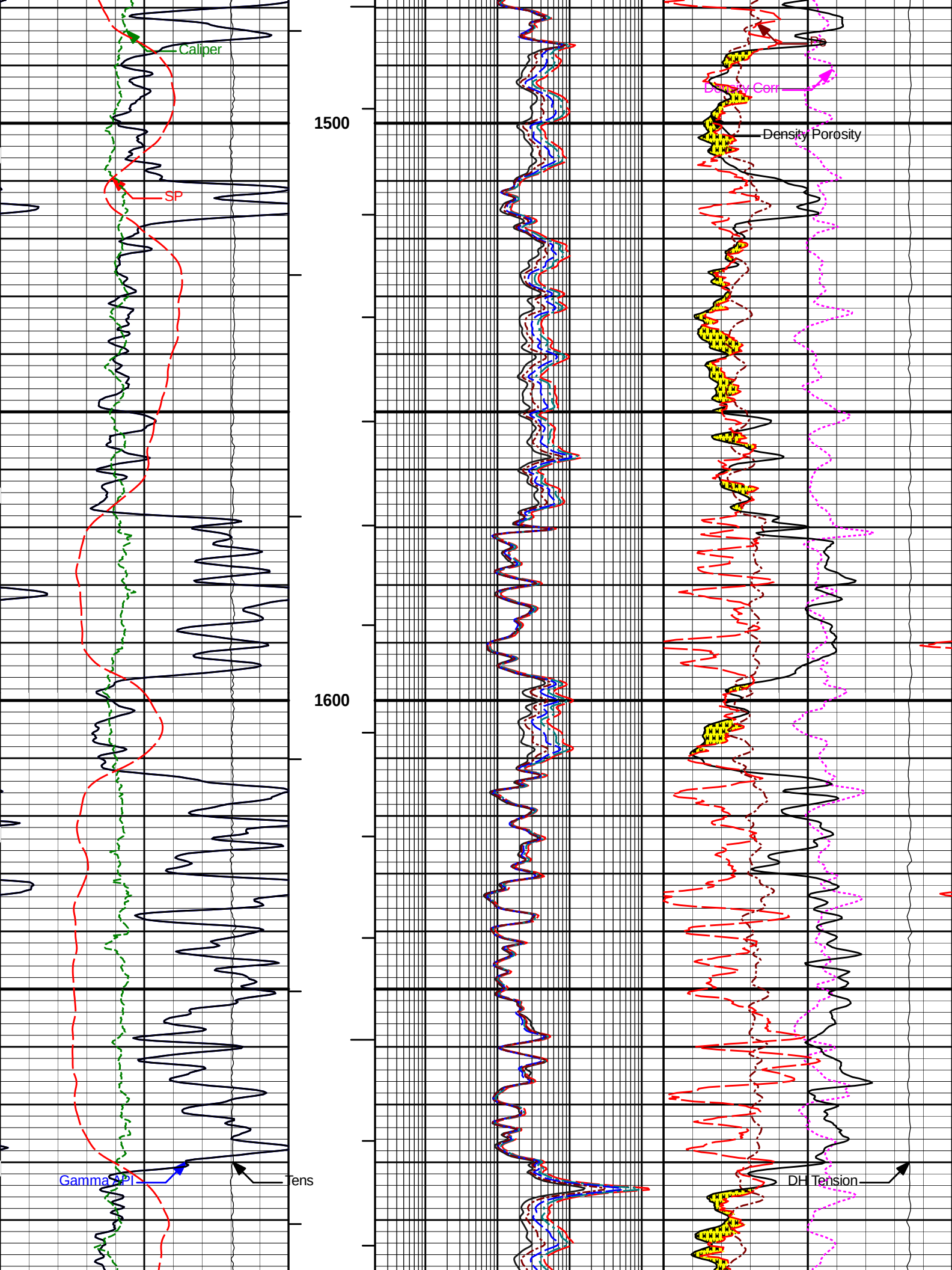
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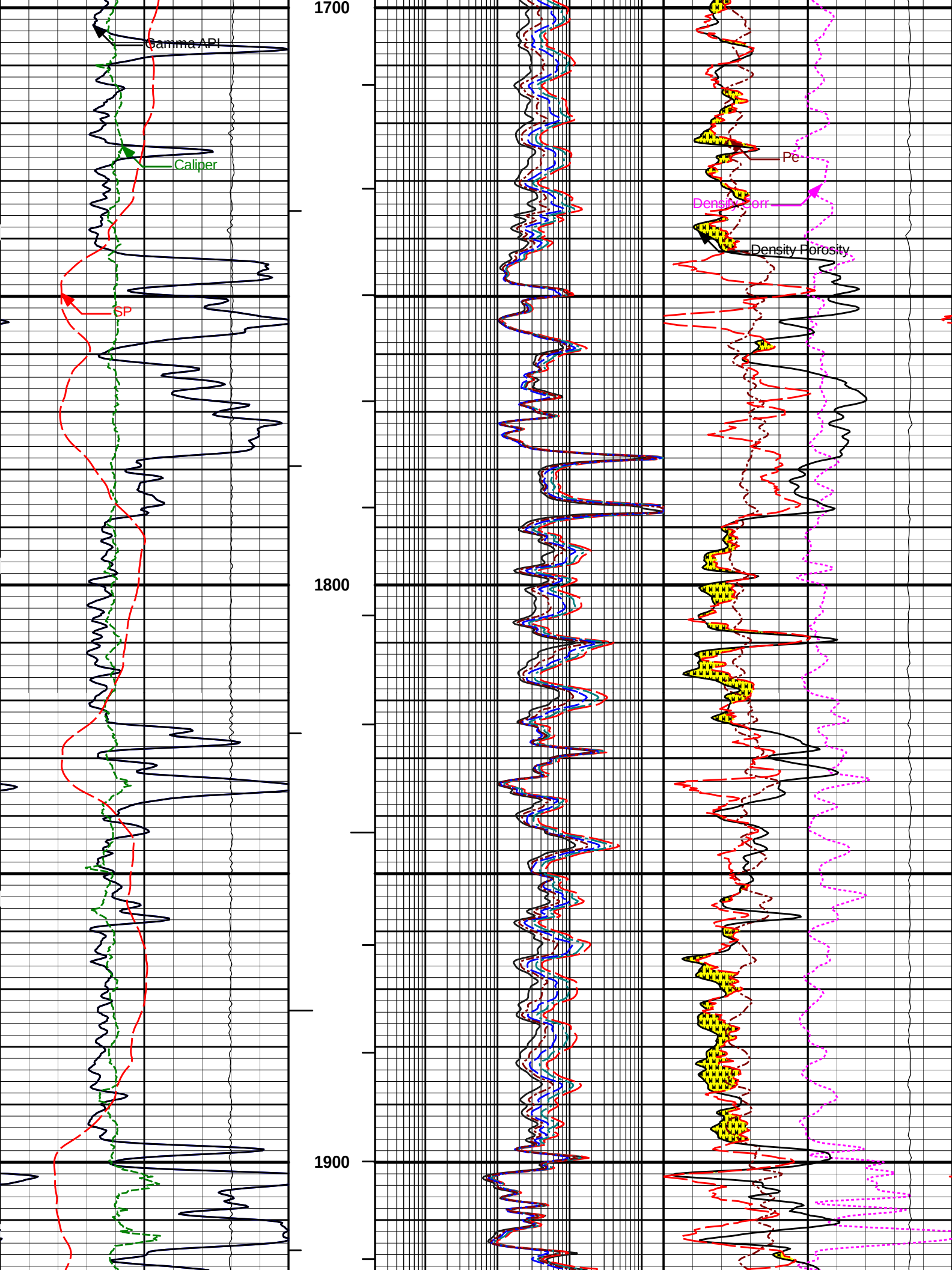
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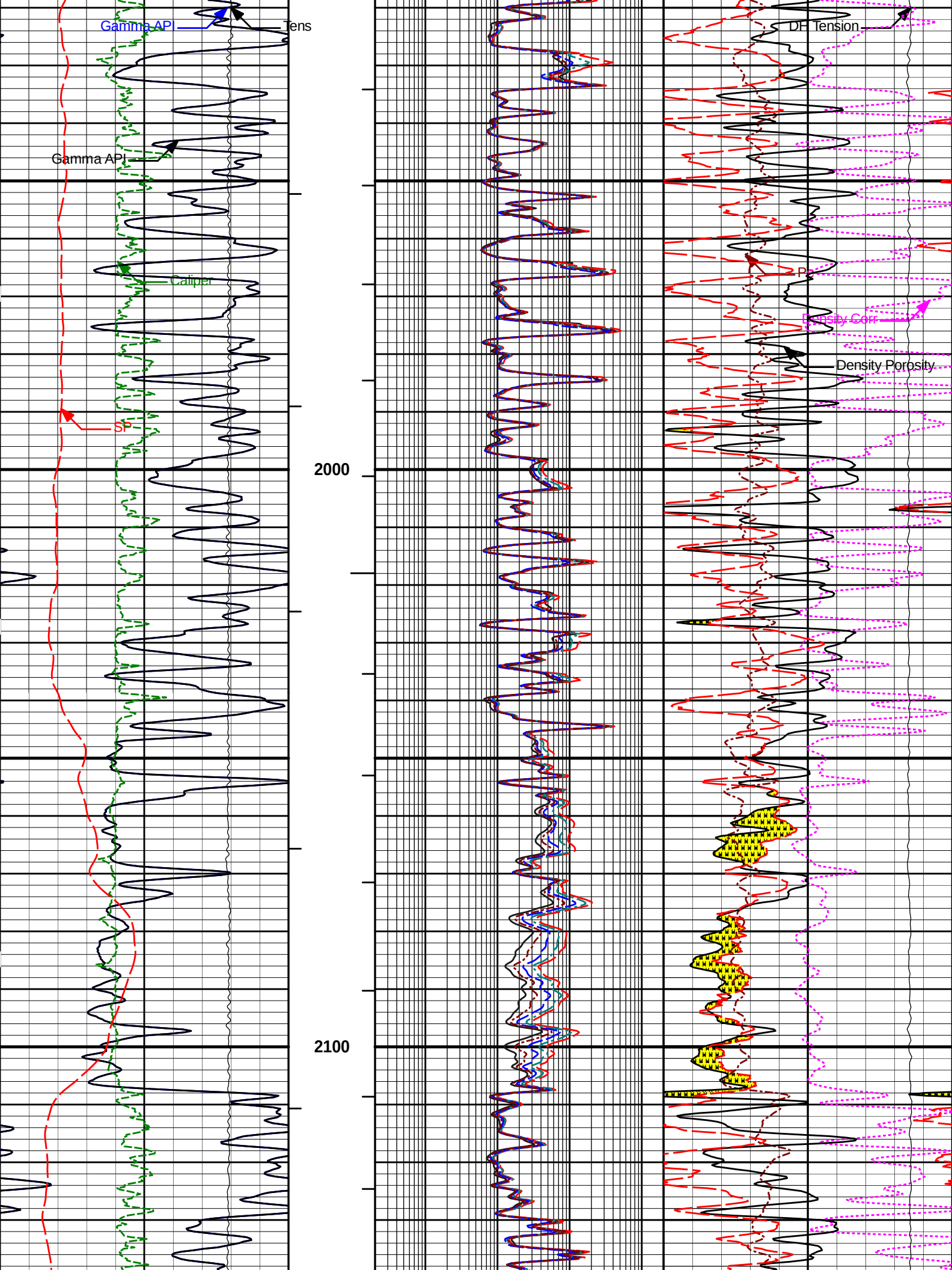
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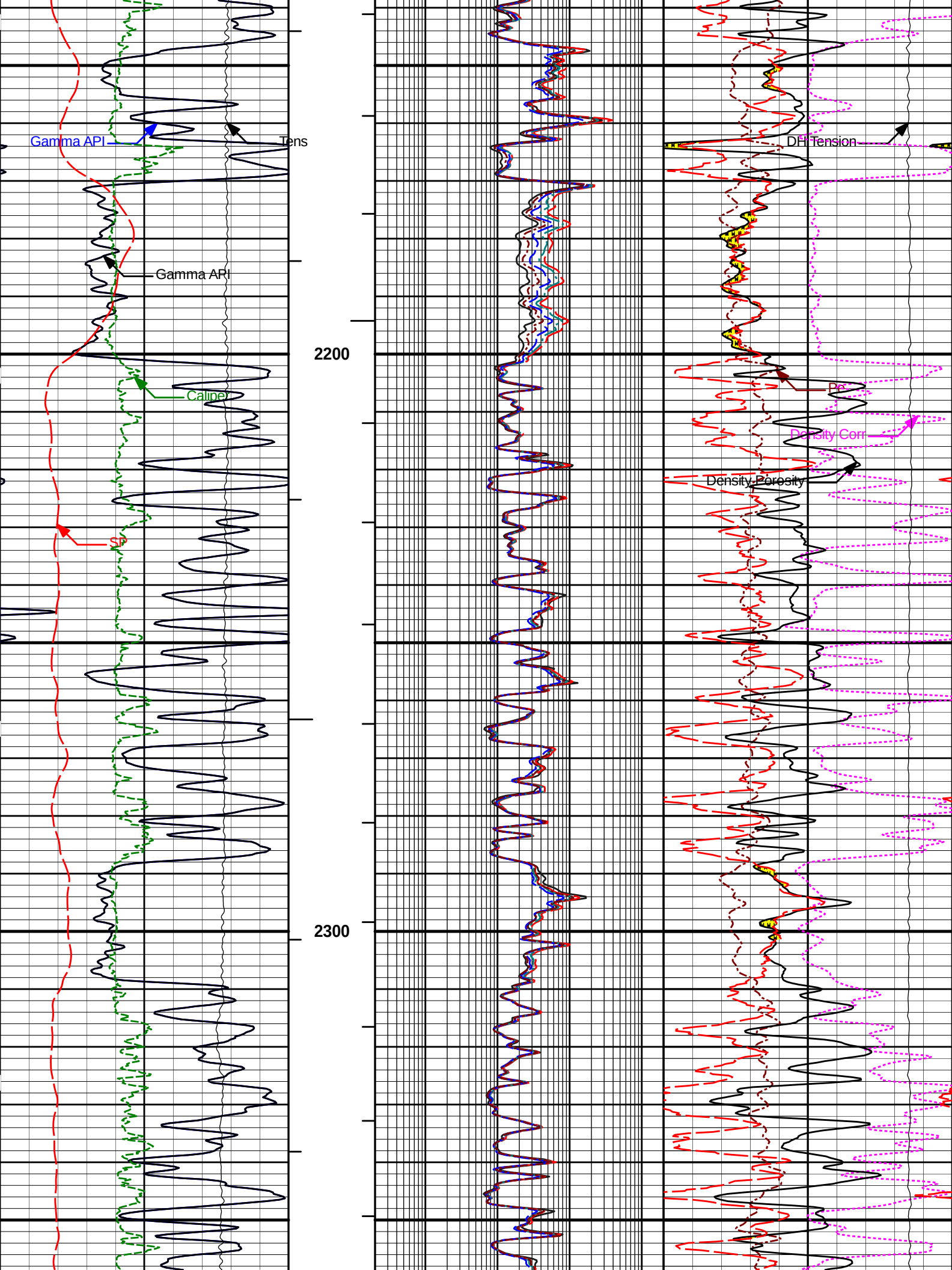
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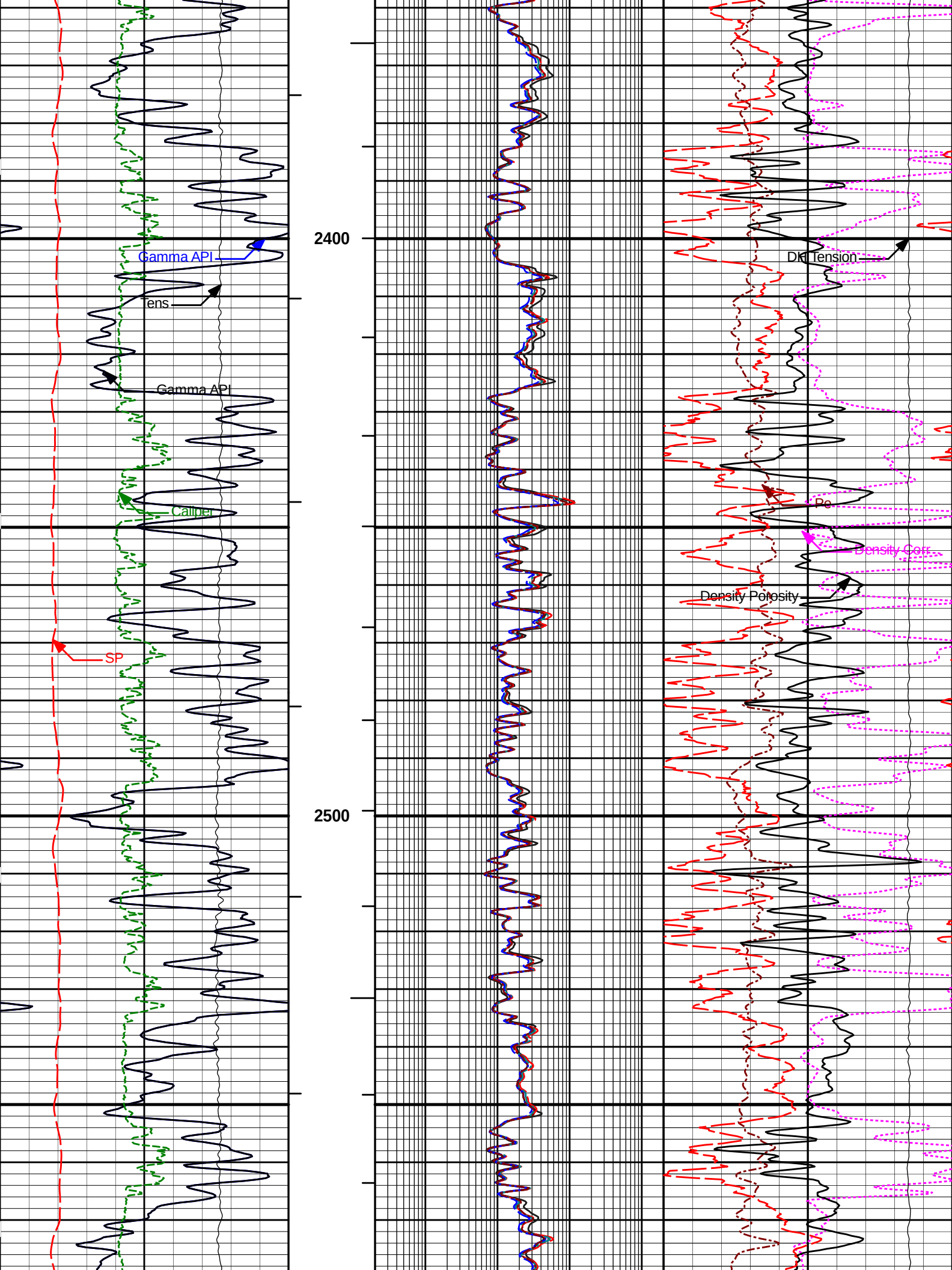
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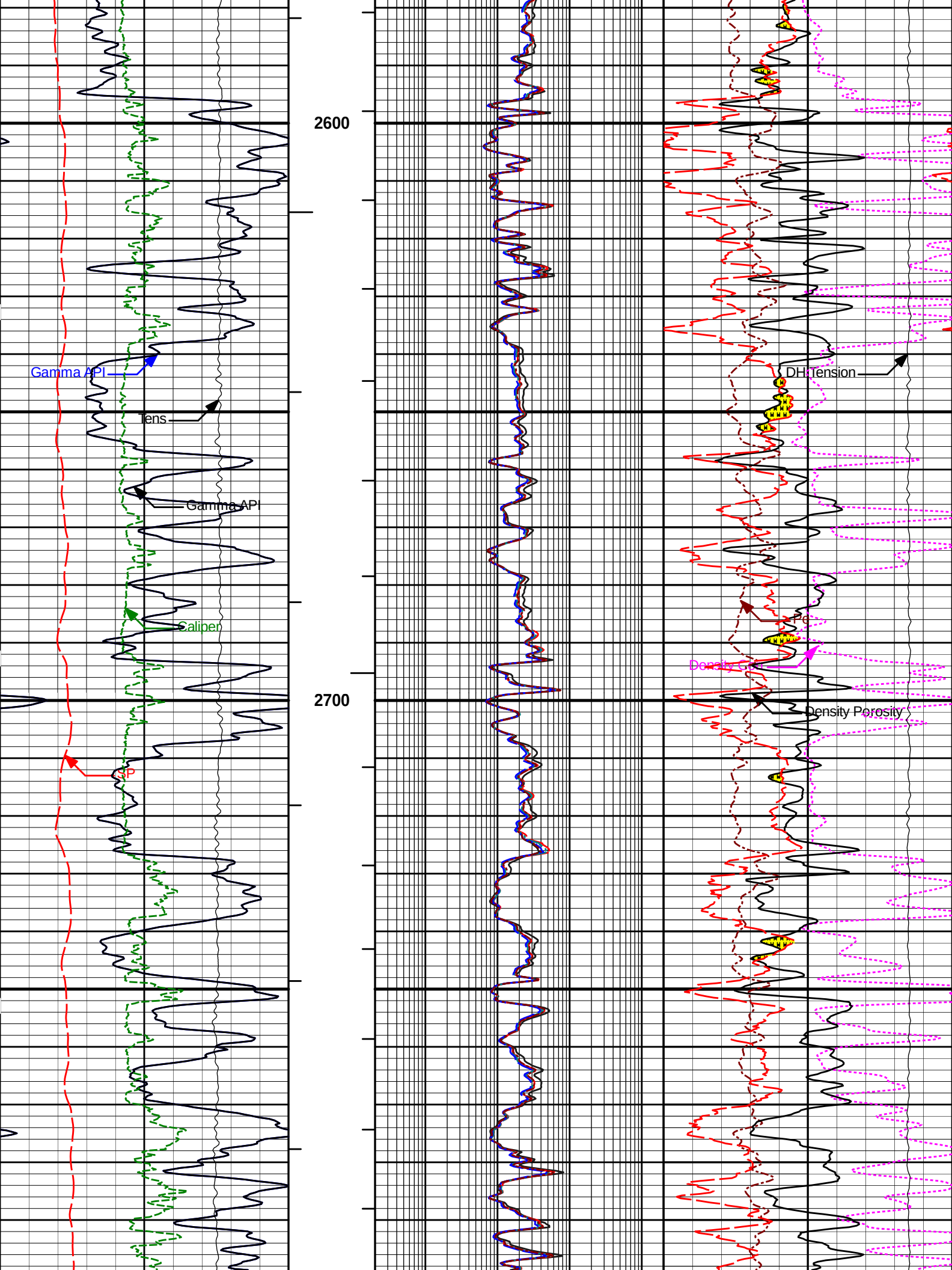
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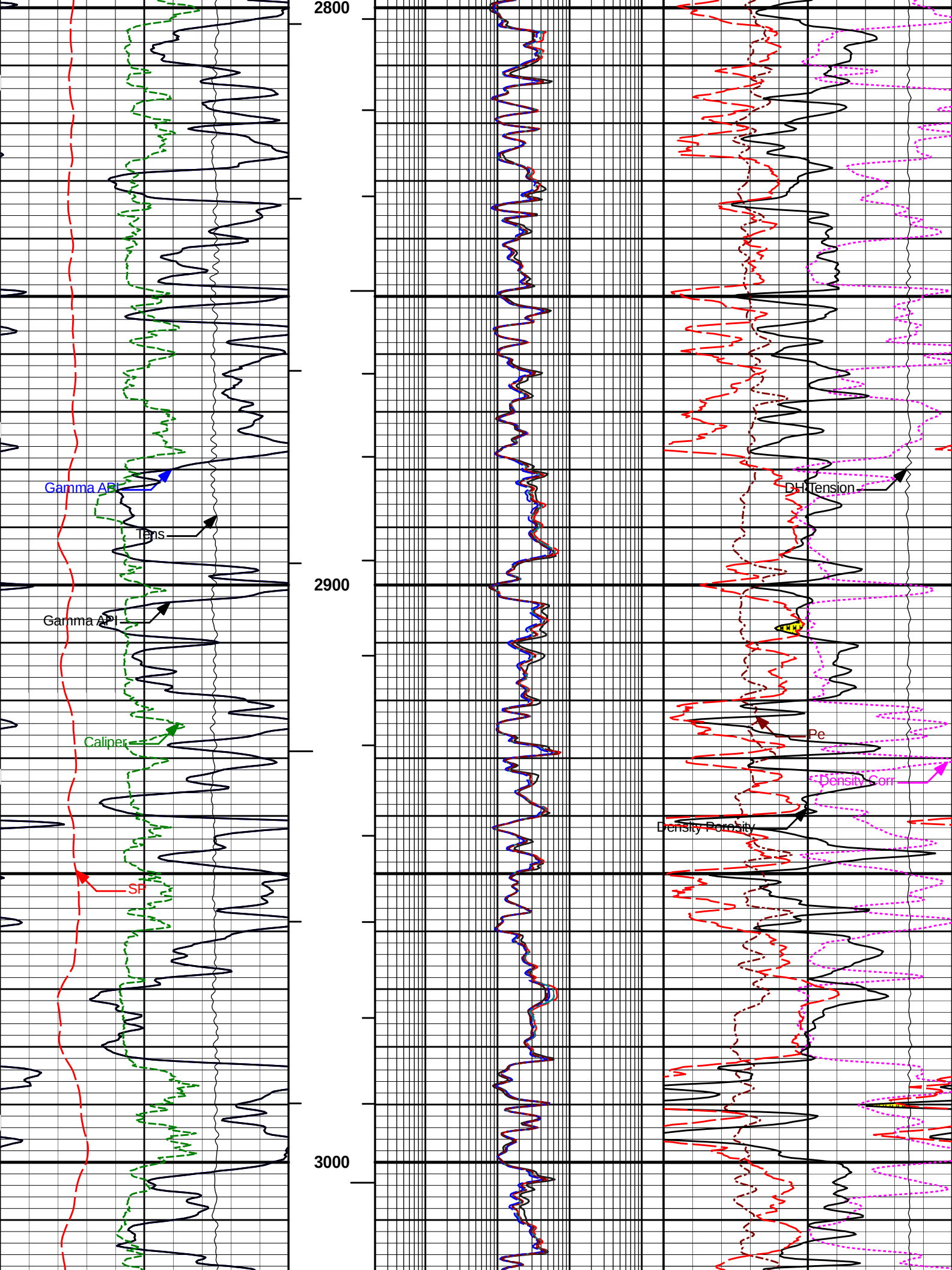
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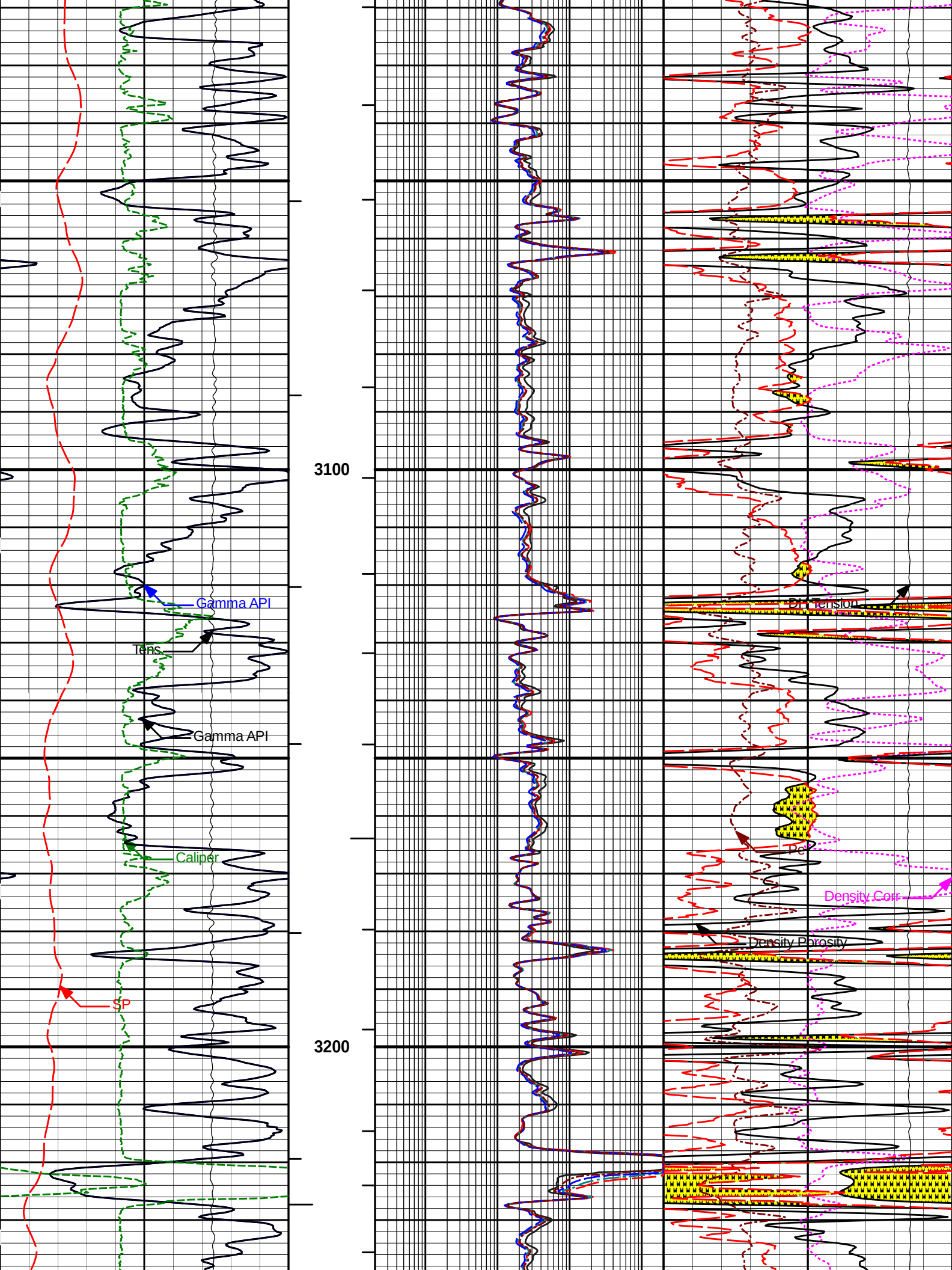
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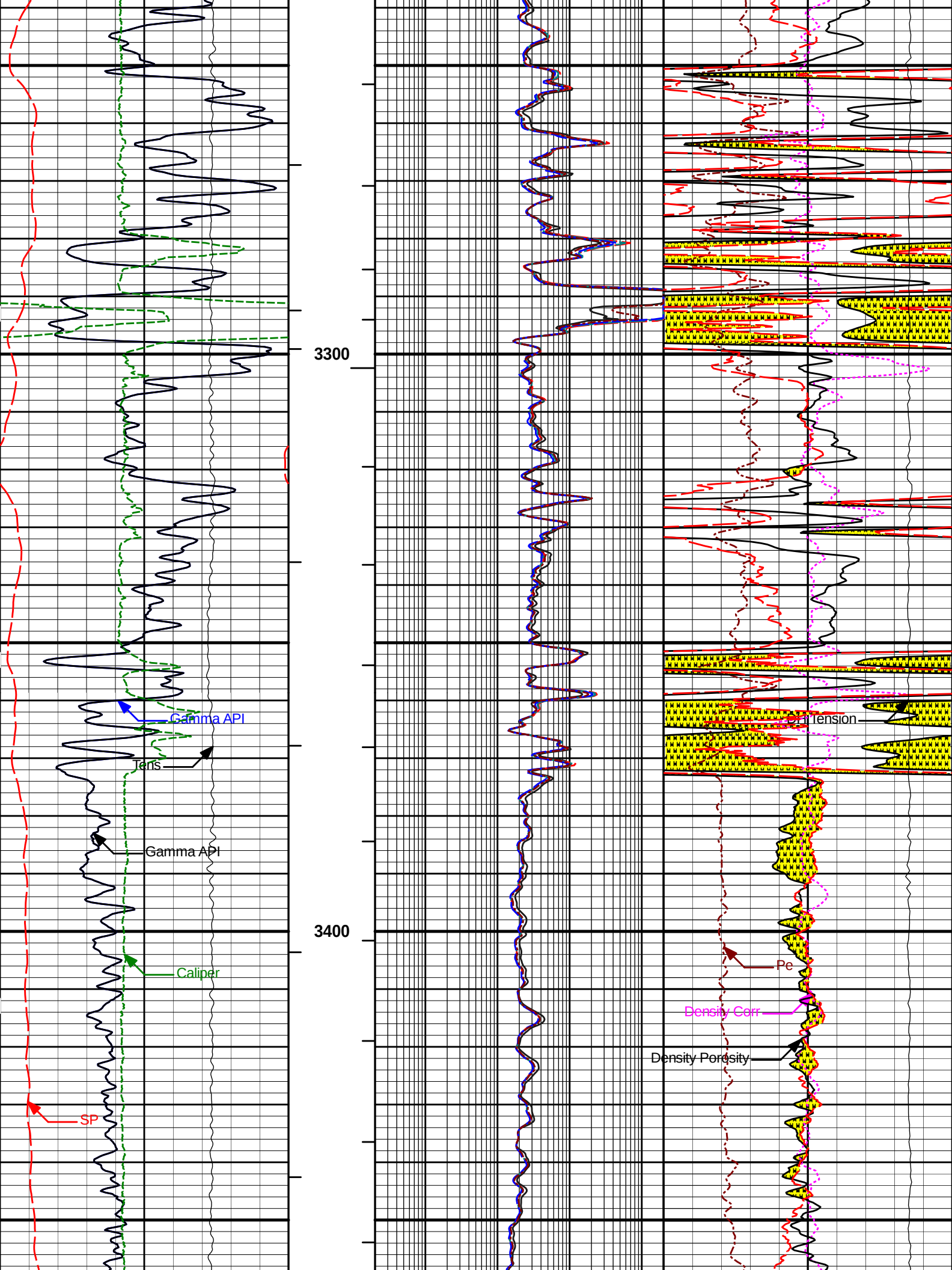
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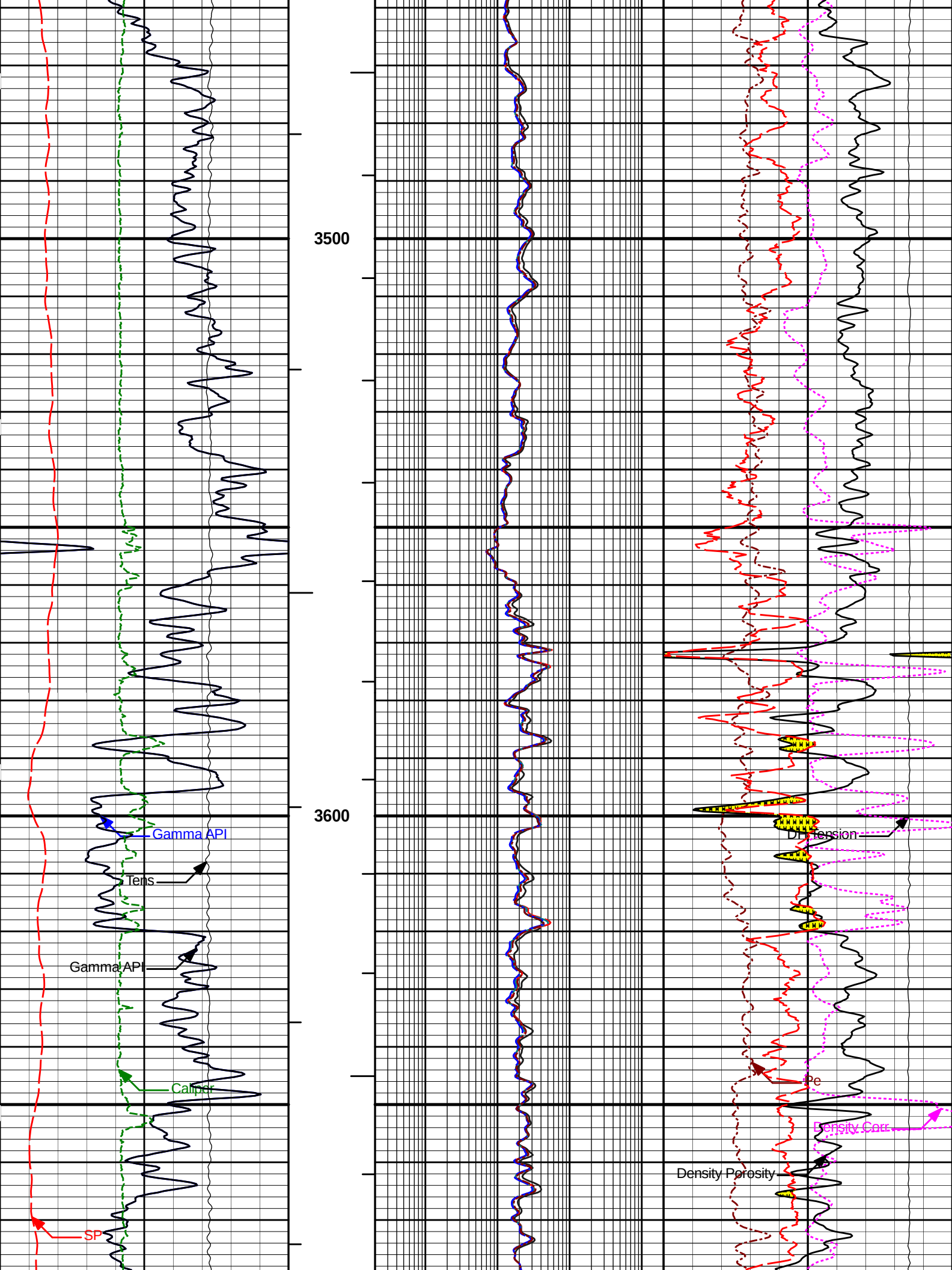
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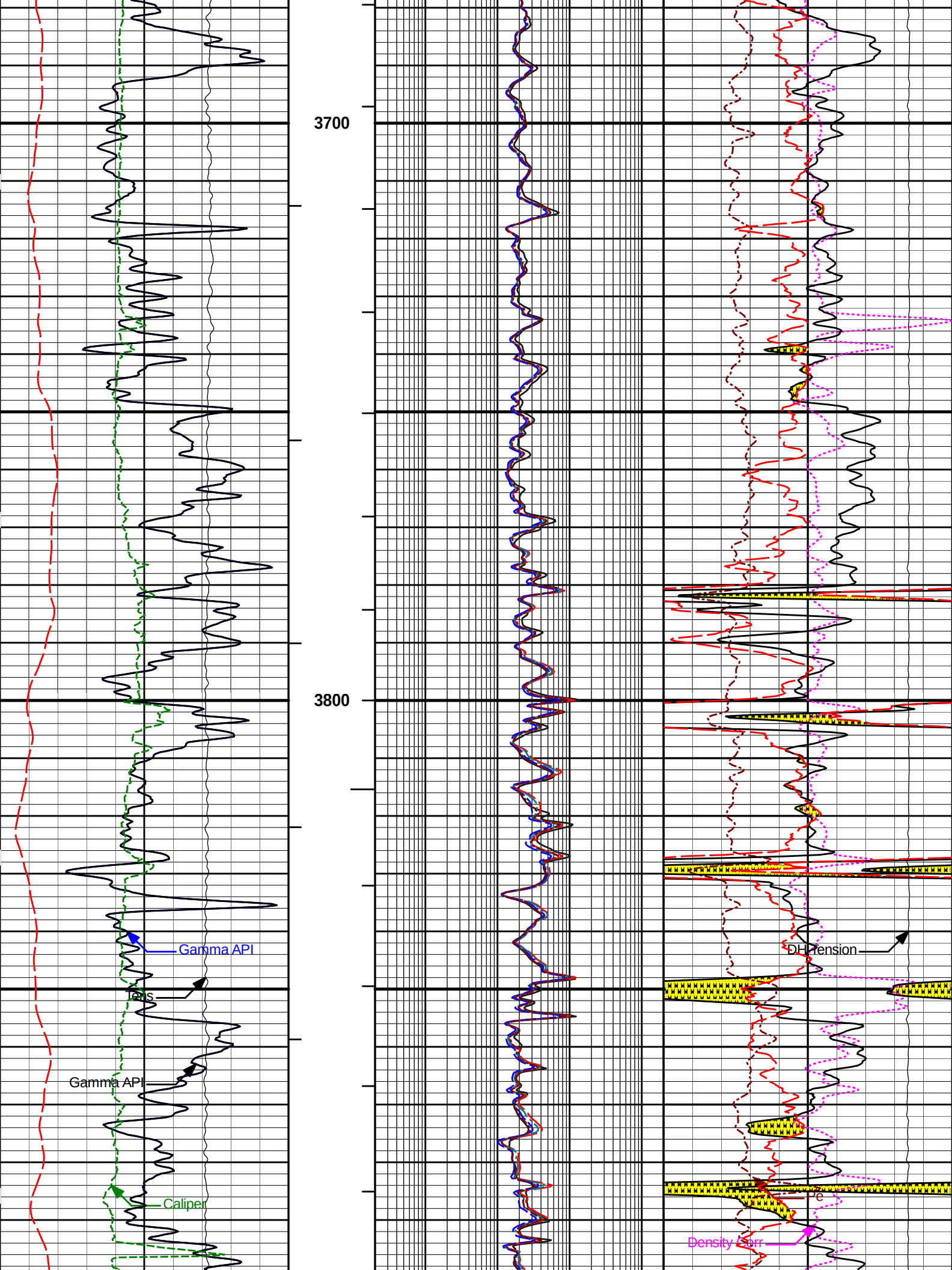
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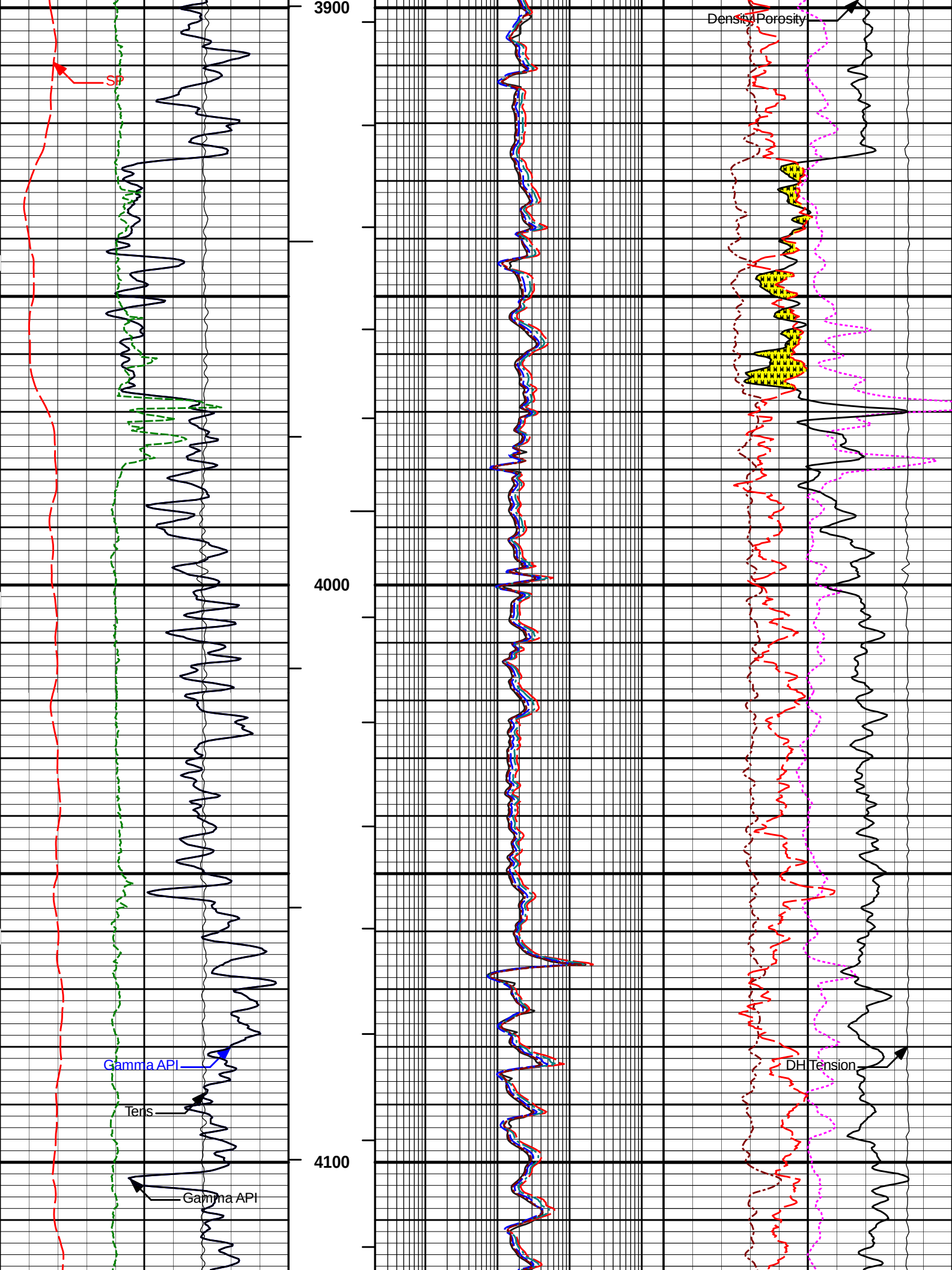
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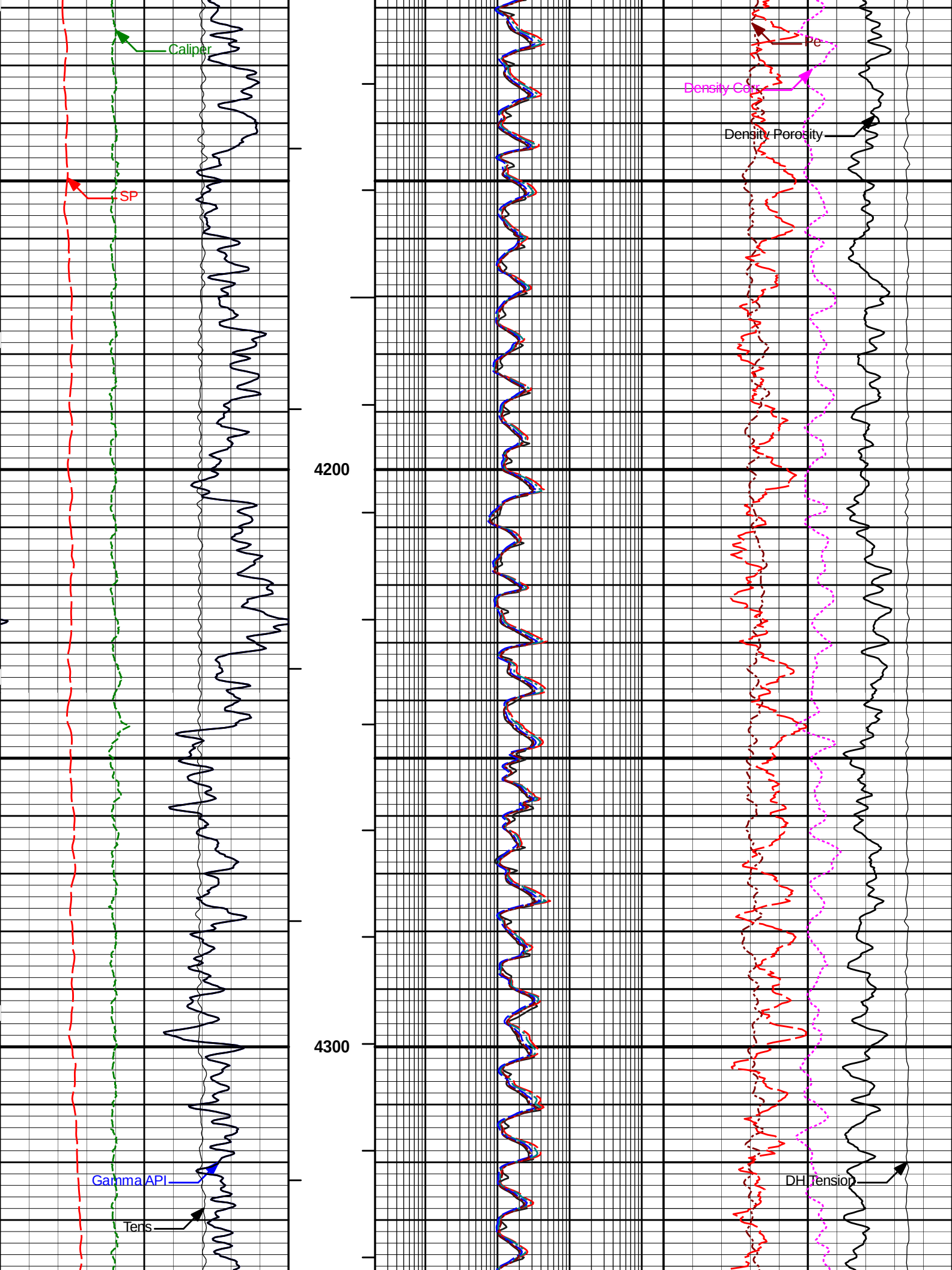
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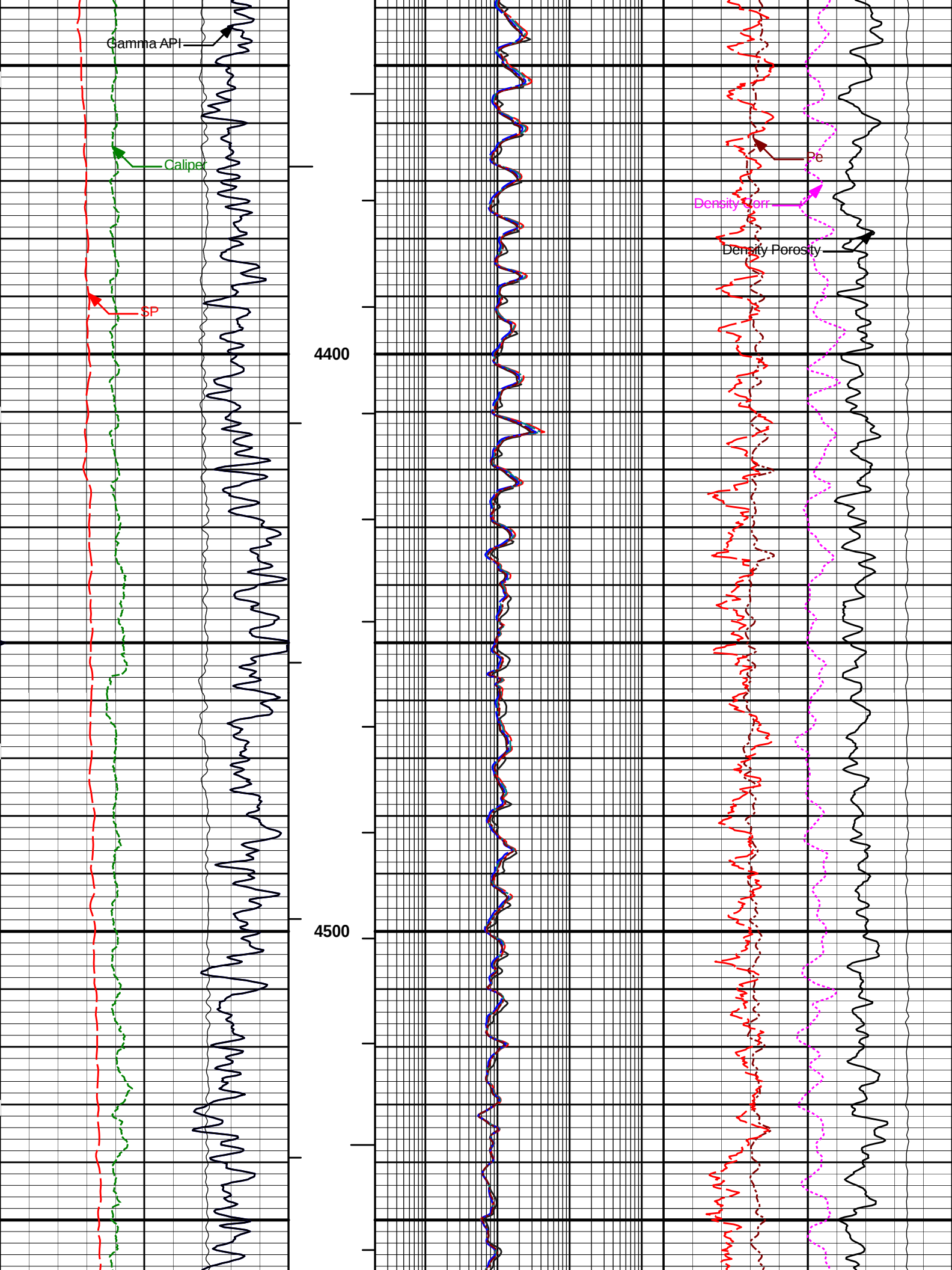
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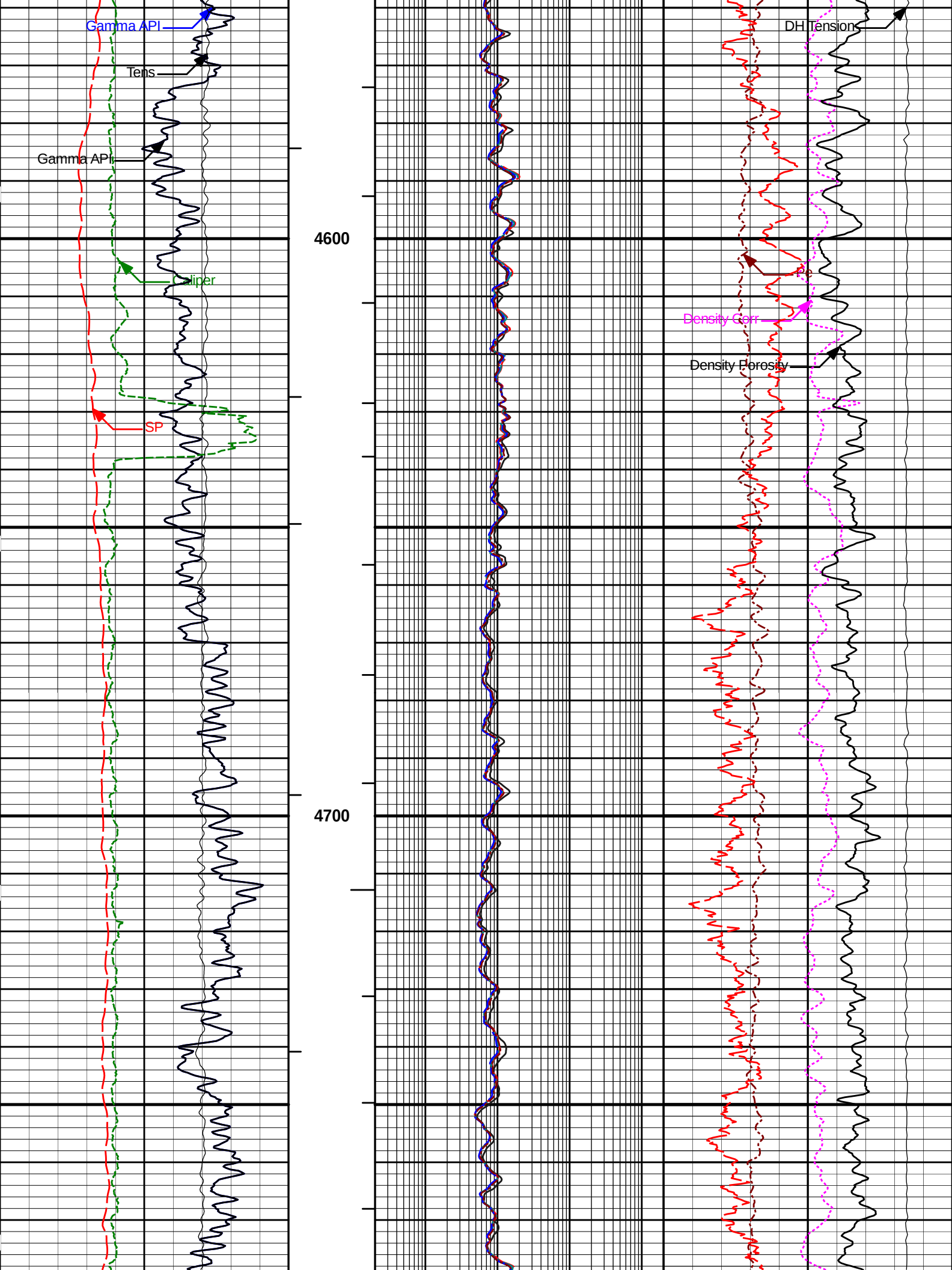
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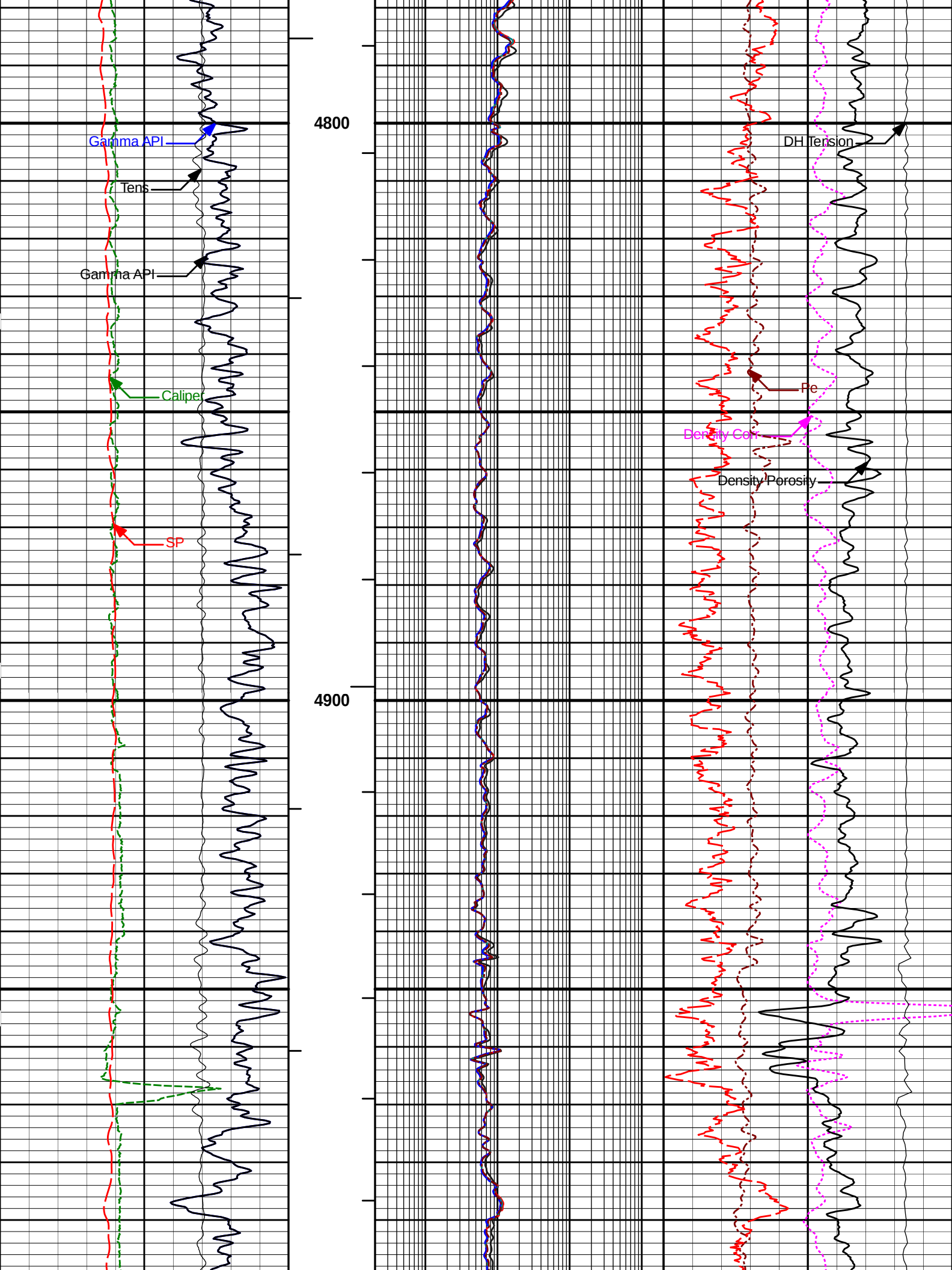
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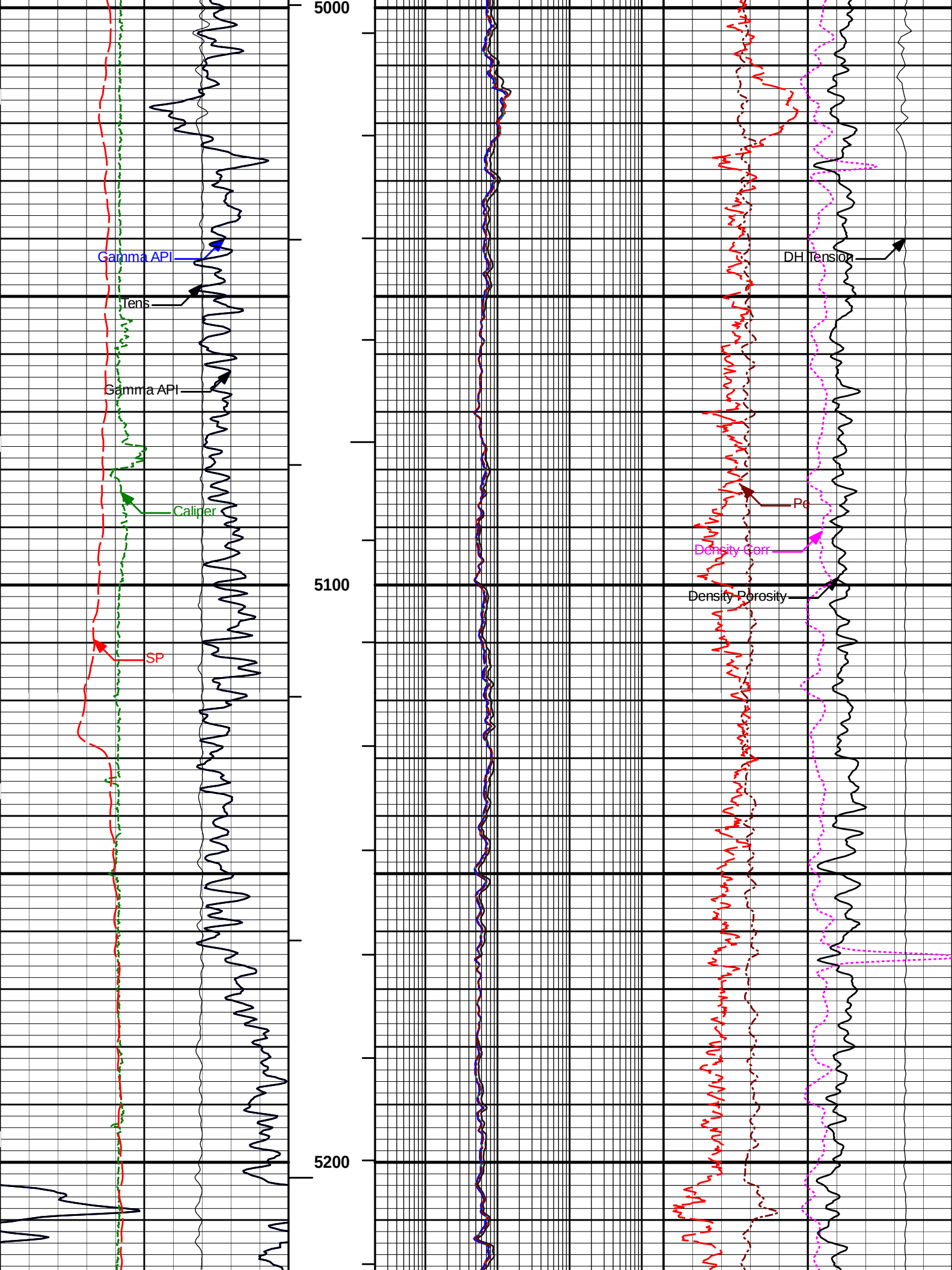
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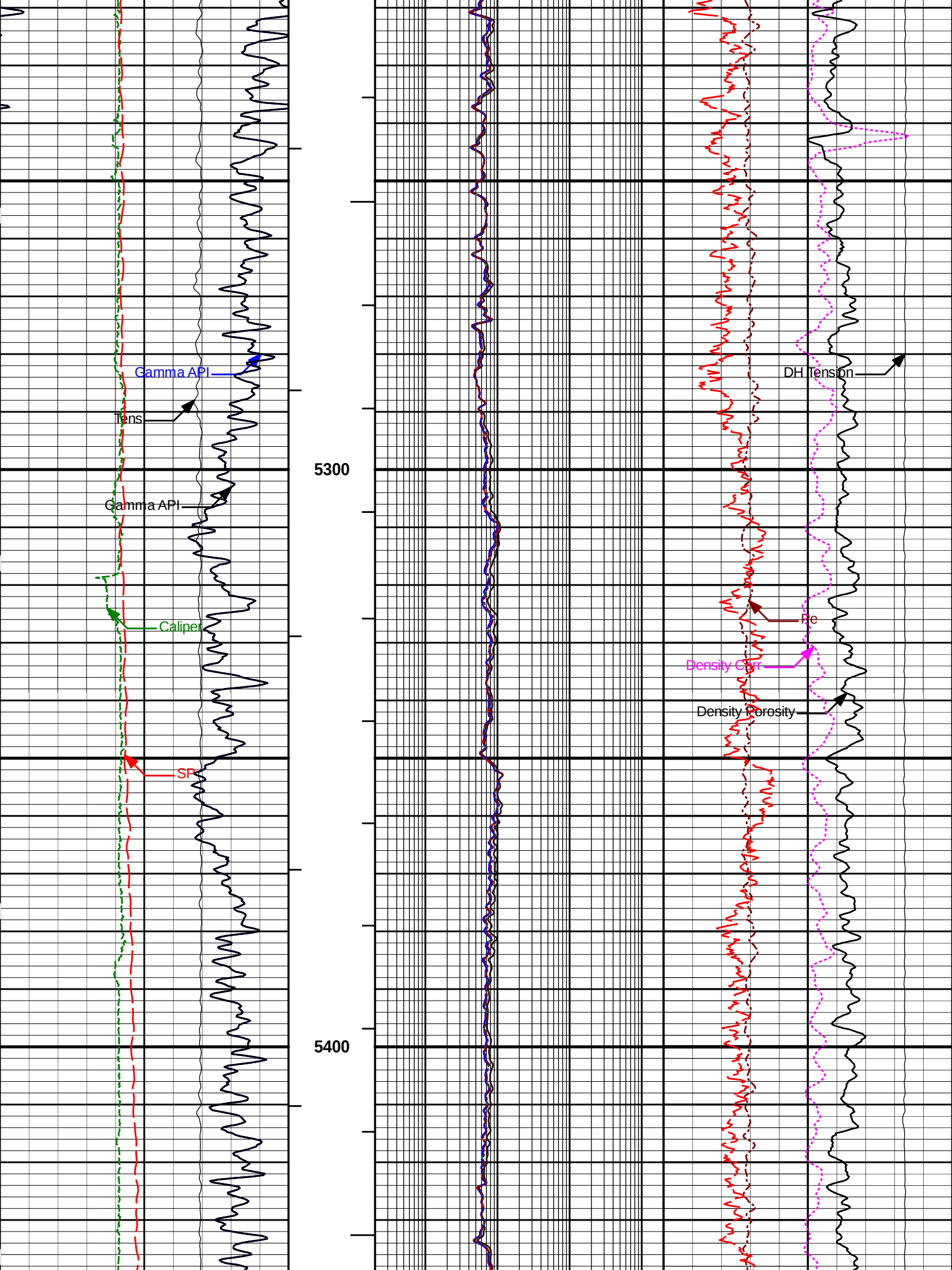
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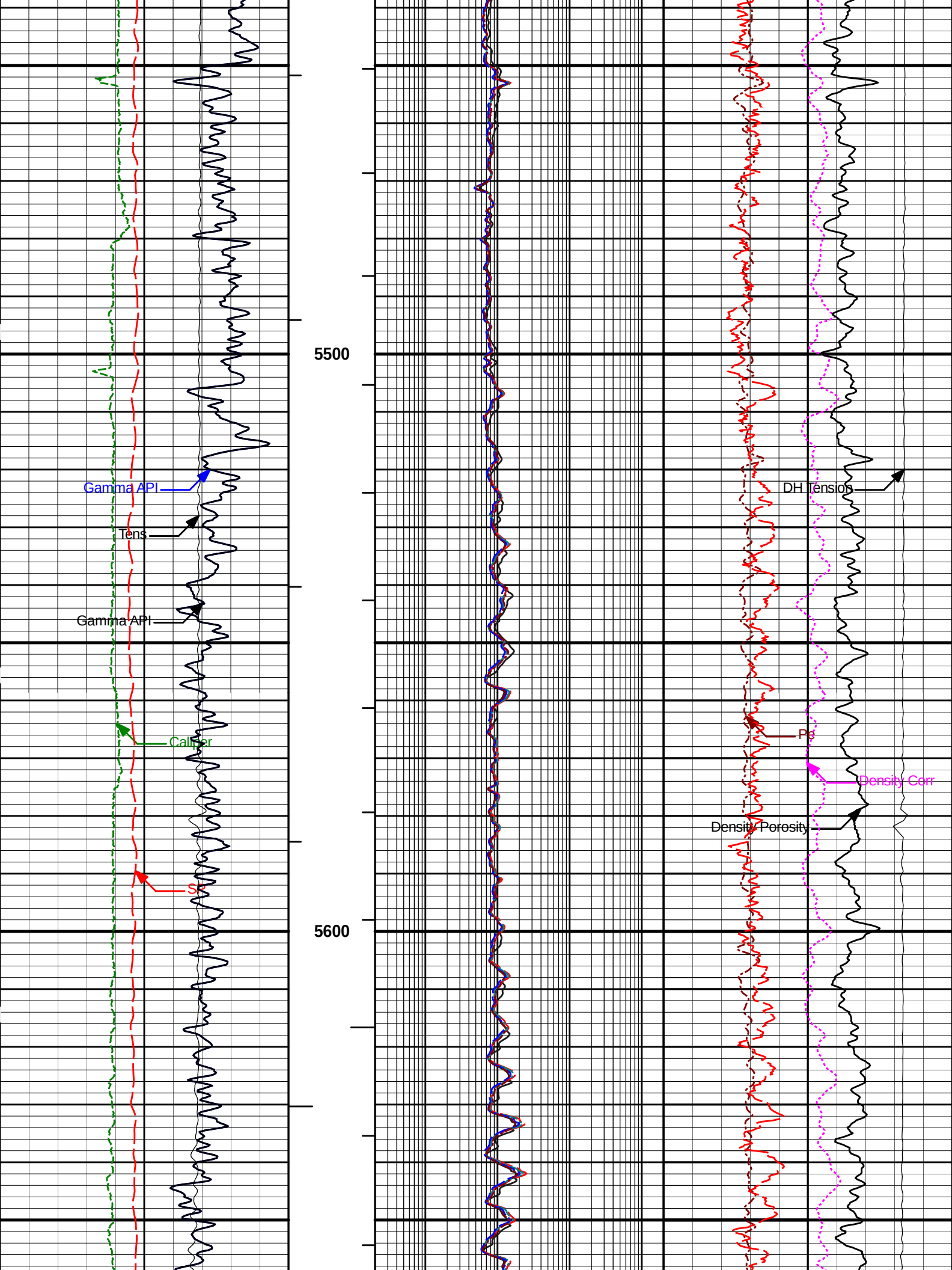
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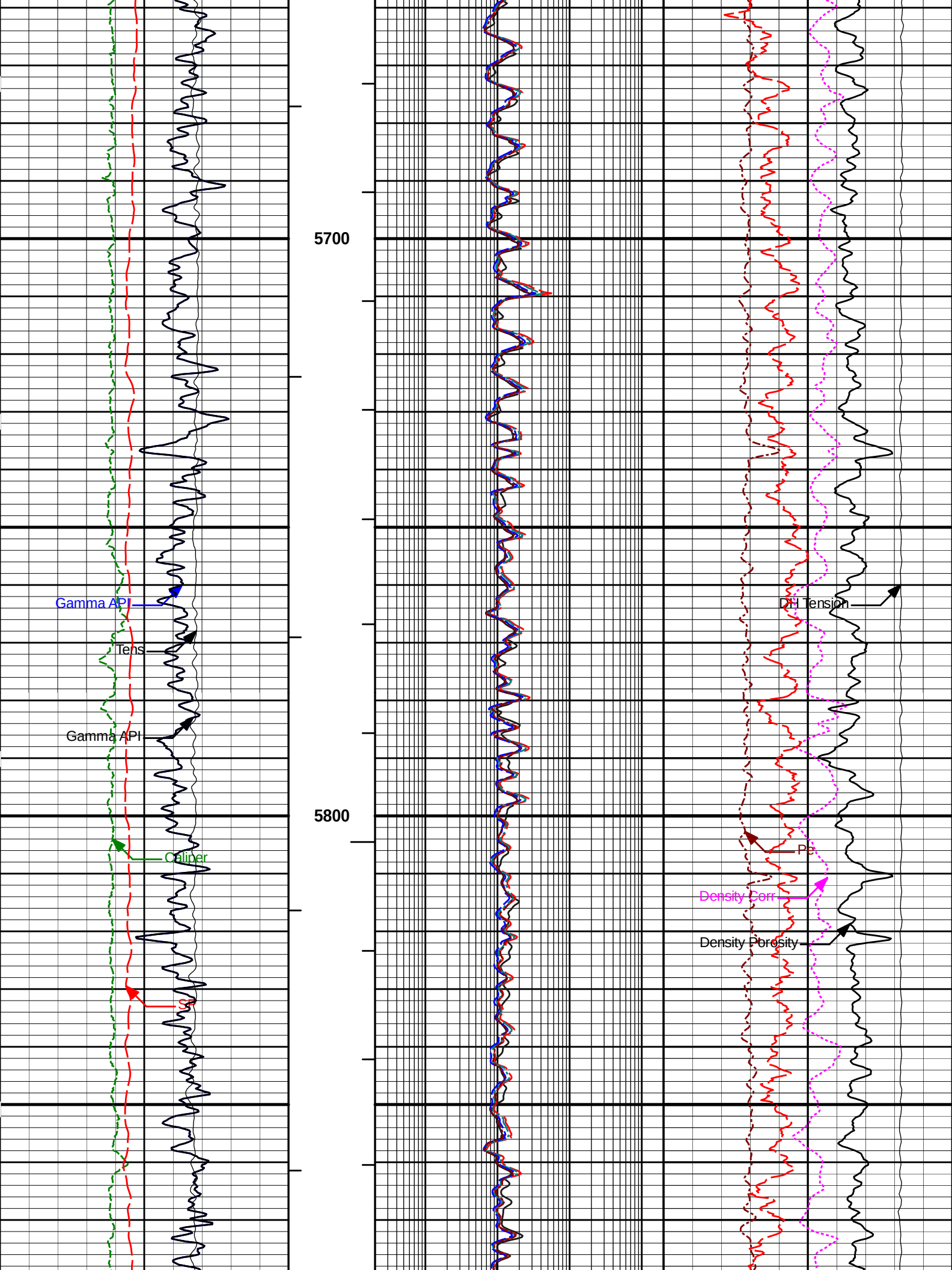
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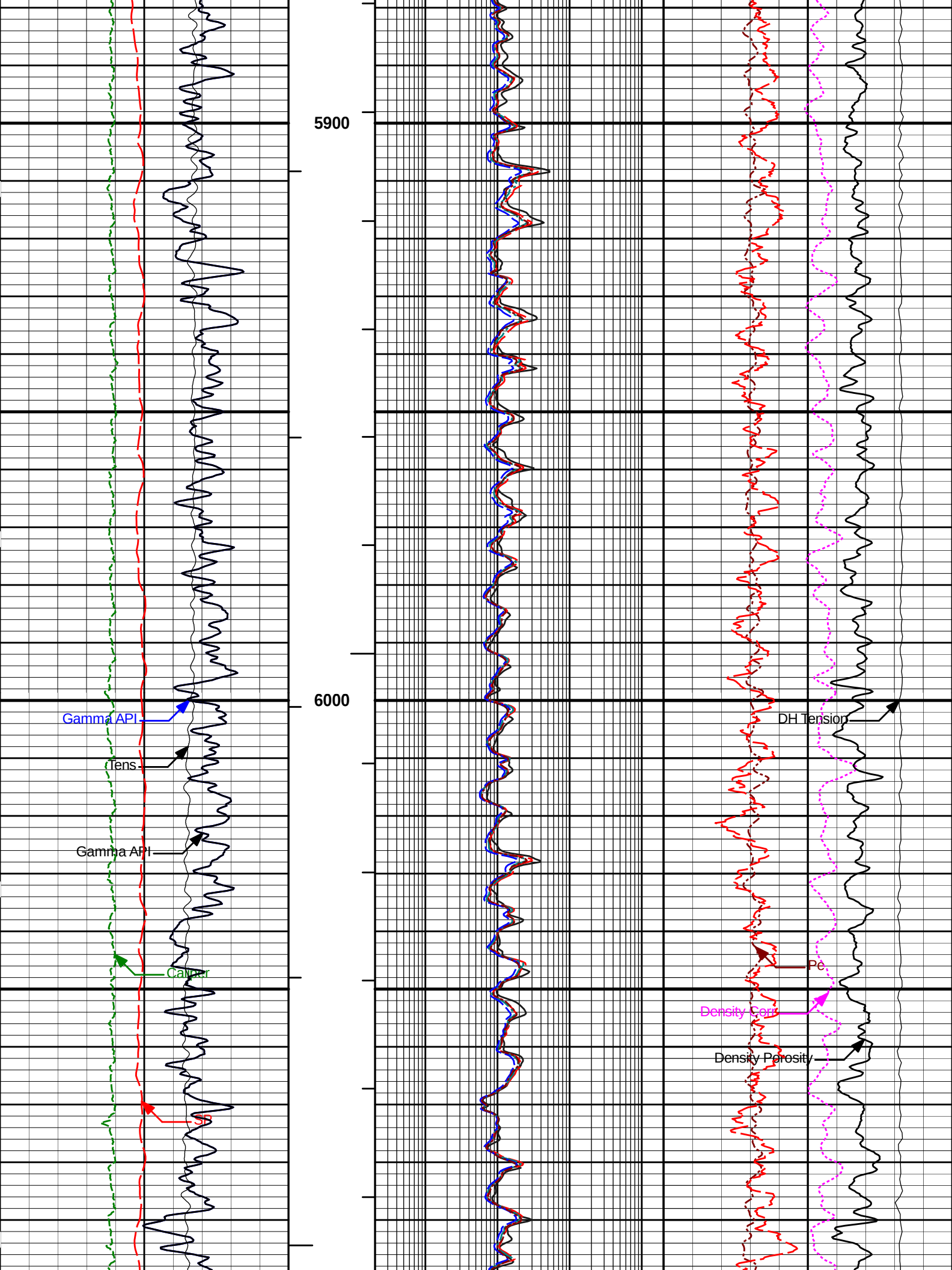
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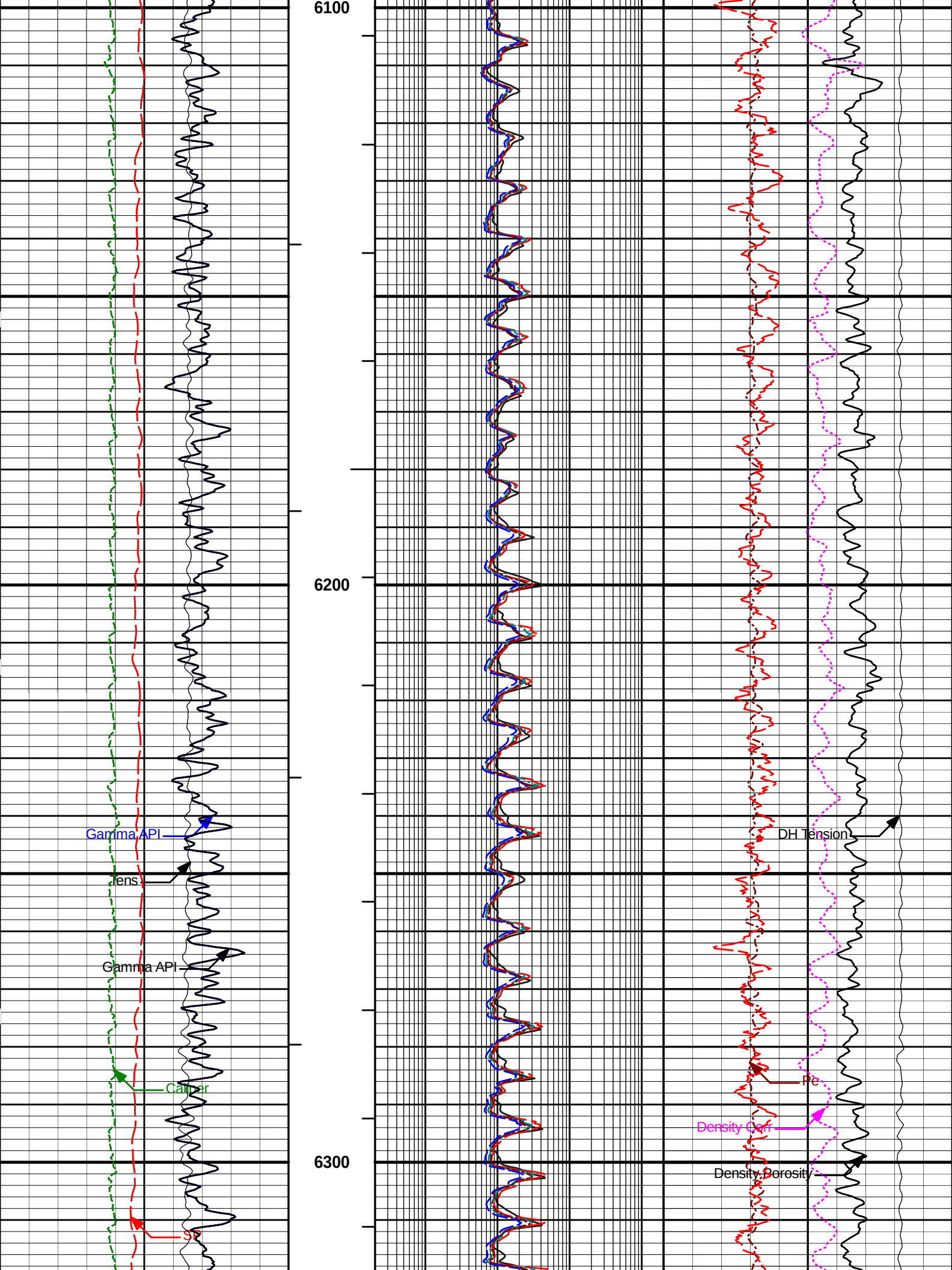
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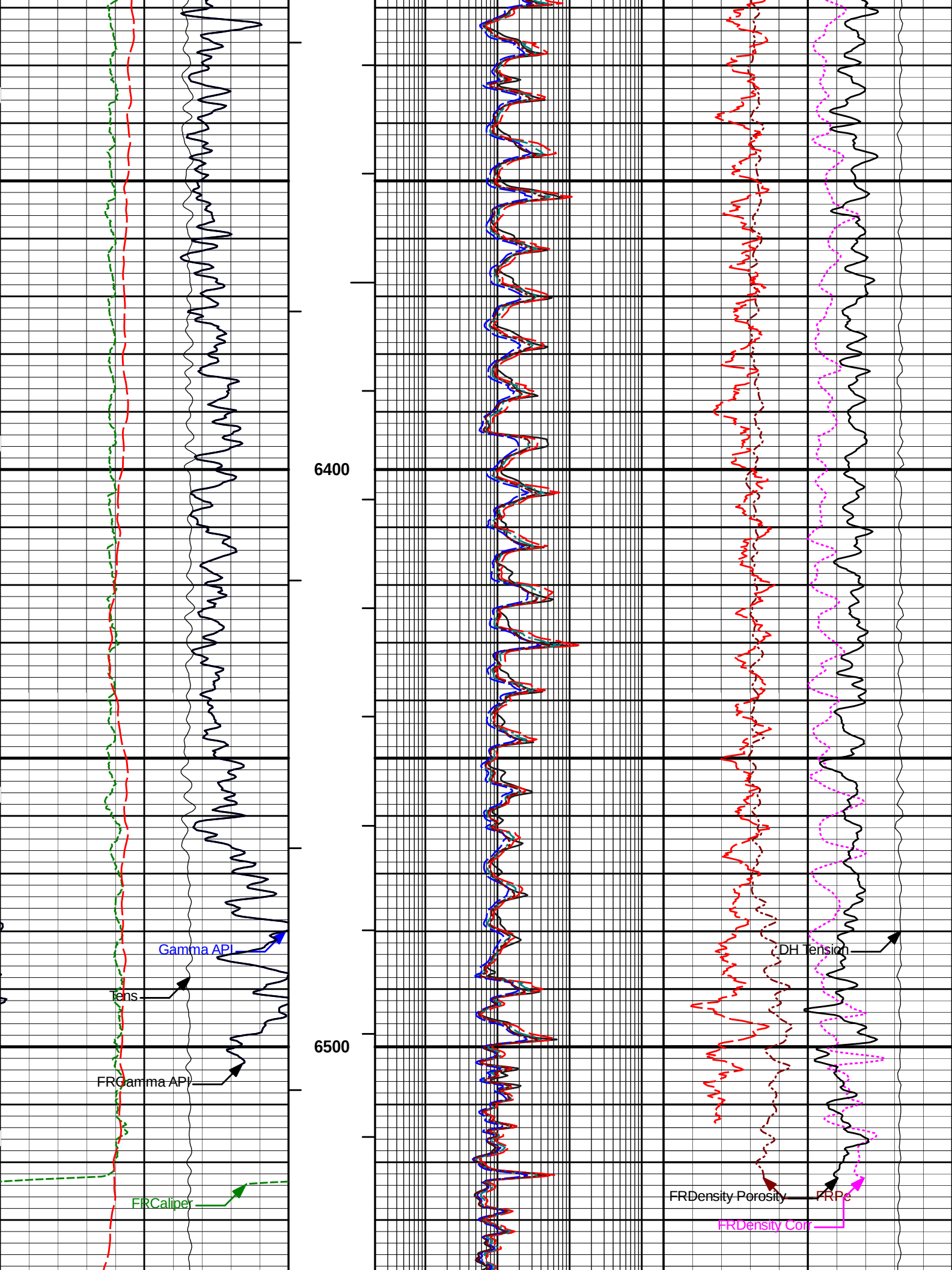
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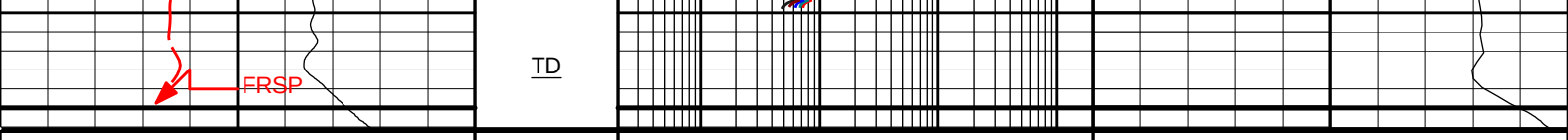


0 SP 100 millivolts		0.2 RT90 2K Ohm-m		-0.25 Density Corr 0.25 gram per cc
0 Gamma API 150 api	BHVT	0.2 RT60 2K Ohm-m		0 Pe 10
6 Caliper 16 inches	AHVT	0.2 RT30 2K Ohm-m	1 : 240	30 Density Porosity -10 percent
10K Tens 0 pounds		0.2 RT20 2K Ohm-m		30 Neutron Porosity -10 percent
		0.2 RT10 2K Ohm-m		10K DH Ten 0 pounds

HALLIBURTON

Plot Time: 08-Jul-14 11:54:19
Plot Range: 1100 ft to 6552.17 ft
Data: BH_HOMER_9-41AH\Well Based\DAQ-0001-004*
Plot File: \\IIIC\BP_5IN_COMP_M

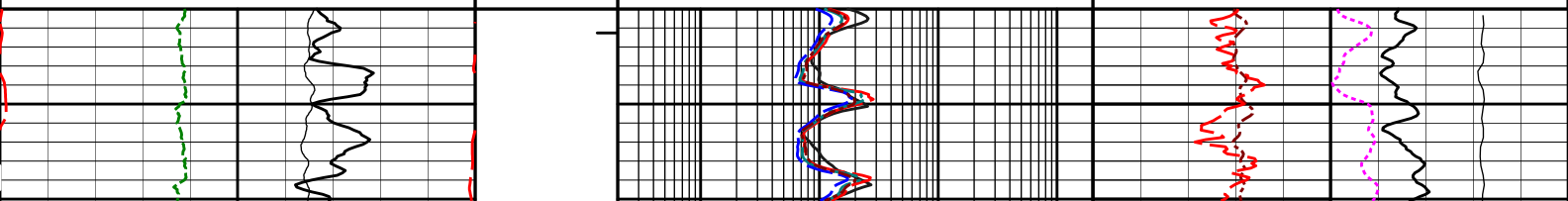
MAIN PASS 5" = 100'

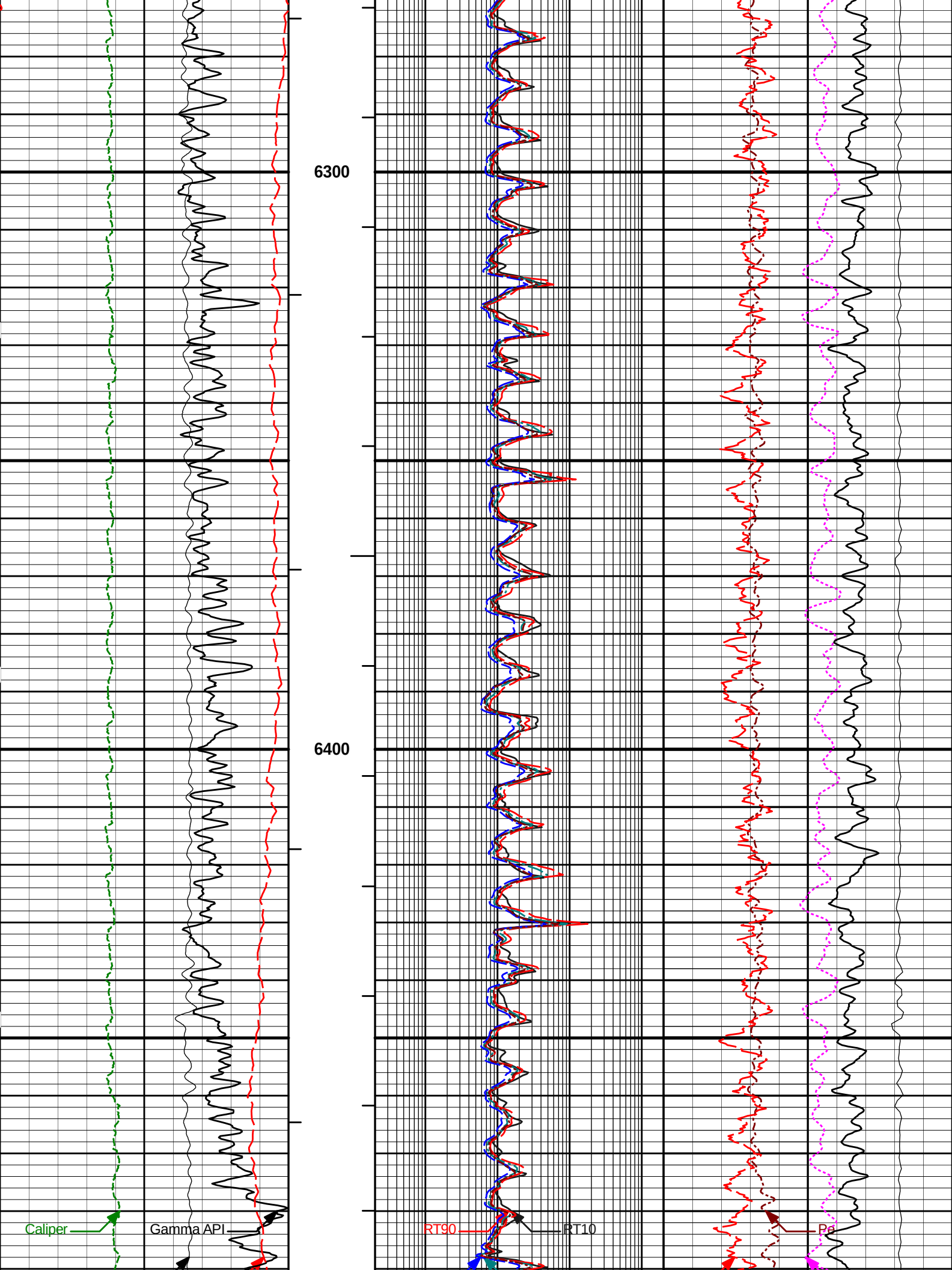
HALLIBURTON

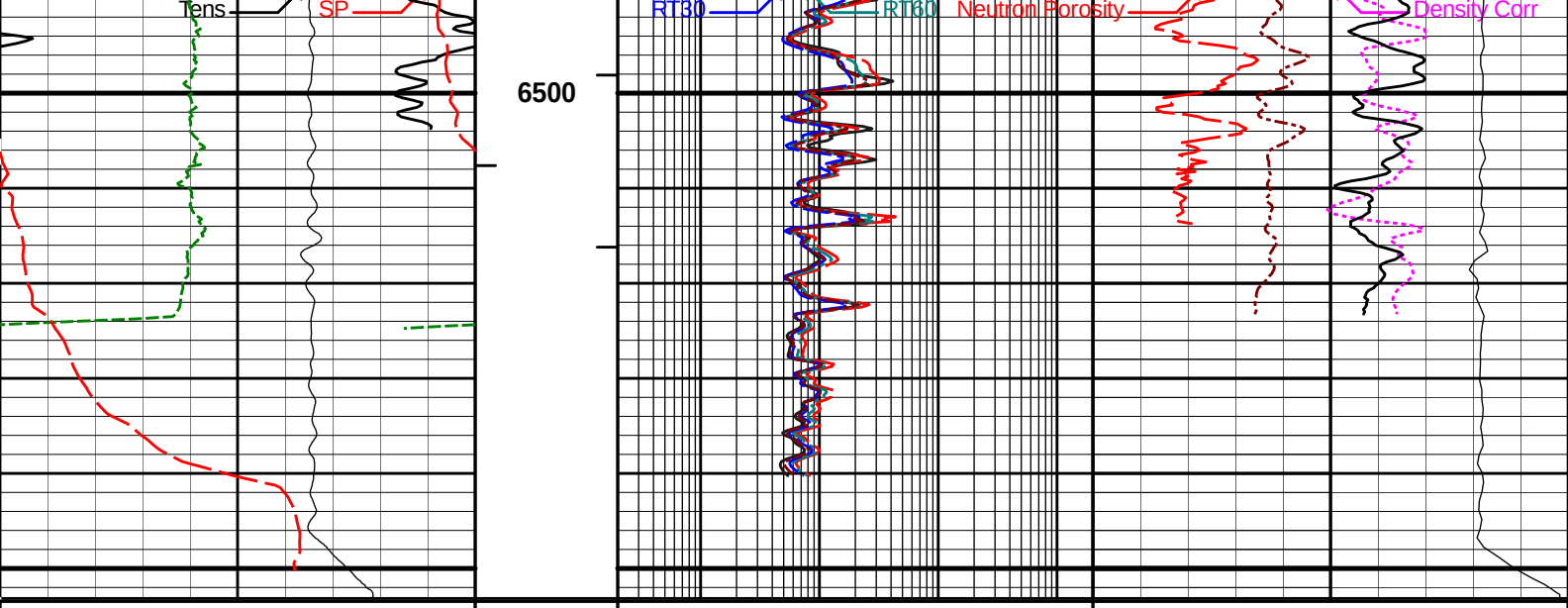
Plot Time: 08-Jul-14 11:54:19
Plot Range: 6250 ft to 6553.17 ft
Data: BH_HOMER_9-41AH\Well Based\DAQ-0001-003*
Plot File: \\IIIC\BP_5IN_COMP_R

REPEAT SECTION 5" = 100'

		0.2 RT10 2K Ohm-m		10K DH Ten 0 pounds
10K Tens 0 pounds		0.2 RT20 2K Ohm-m		30 Neutron Porosity -10 percent
6 Caliper 16 inches	AHVT	0.2 RT30 2K Ohm-m		30 Density Porosity -10 percent
0 Gamma API 150 api	BHVT	0.2 RT60 2K Ohm-m		0 Pe 10
0 SP 100 millivolts		0.2 RT90 2K Ohm-m	1 : 240	-0.25 Density Corr 0.25 gram per cc




6300
6400
Caliper
Gamma API
RT90
RT10
Pe



0 SP 100	1 : 240	0.2 RT90 2K
millivolts		Ohm-m
0 Gamma API 150	BHVT	0.2 RT60 2K
api		Ohm-m
6 Caliper 16	AHVT	0.2 RT30 2K
inches		Ohm-m
10K Tens 0		0.2 RT20 2K
pounds		Ohm-m
		0.2 RT10 2K
		Ohm-m

-0.25 Density Corr 0.25
gram per cc
0 Pe 10
30 Density Porosity -10
percent
30 Neutron Porosity -10
percent
10K DH Ten 0
pounds

HALLIBURTON

Plot Time: 08-Jul-14 11:54:20
Plot Range: 6250 ft to 6553.17 ft
Data: BH_HOMER_9-41AH\Well Based\DAQ-0001-003*
Plot File: \\IIIC\BP_5IN_COMP_R

REPEAT SECTION 5" = 100'

HALLIBURTON

CALIBRATION REPORT

SURFACE TENSION SHOP CALIBRATION

Tool Name:	**Depth Panel - 12345678**	**Reference Calibration Date:**	**05-Jul-14 16:31:37**
Engineer:	**B. NEALON**	**Calibration Date:**	**05-Jul-14 16:32:10**
Software Version:	**WL INSITE R4.2.1 (Build 5)**	**Calibration Version:**	**1**

SURFACE TENSION LOAD CELL

Measurement	Load Cell Value	Measurement	Calibrated	Units
Low	10694.68	-2.24	0.00	lbs
High	17252.19	7828.09	7830.00	lbs

DOWNHOLE TENSION SHOP CALIBRATION

Tool Name:	**RWCH - 11830878**	**Reference Calibration Date:**	**03-Jul-14 14:12:29**
Engineer:	**B. NEALON**	**Calibration Date:**	**05-Jul-14 16:34:31**
Software Version:	**WL INSITE R4.2.1 (Build 5)**	**Calibration Version:**	**1**

DOWNHOLE LOAD CELL

Measurement	Tool Value	Measurement	Calibrated	Units
Low	-911.21	26.35	0.00	lbs
High	3619.83	1468.65	1430.00	lbs

NATURAL GAMMA RAY TOOL SHOP CALIBRATION

Tool Name:	**GTET - 11294346**	**Reference Calibration Date:**	**26-Jun-14 05:42:02**
Engineer:	**B. CRAWFORD**	**Calibration Date:**	**29-Jun-14 04:56:03**
Software Version:	**WL INSITE R4.2.1 (Build 5)**	**Calibration Version:**	**1**

Calibrator Source S/N: TB-270

Calibrator API Reference:259.00 api

Equivalent Calibrator API Reference:263.5 api

Measurement	Measured	Calibrated	Units
Background	45.0	48.1	api
Background + Calibrator	287.0	307.1	api
Calibrator	262.2	259.0	api

NATURAL GAMMA RAY TOOL FIELD CALIBRATION

Tool Name:	**GTET - 11294346**	**Reference Calibration Date:**	**29-Jun-14 04:56:03**
Engineer:	**B. NEALON**	**Calibration Date:**	**04-Jul-14 20:43:00**
Software Version:	**WL INSITE R4.2.1 (Build 5)**	**Calibration Version:**	**1**

Calibrator Source S/N: TB-270

Calibrator API Reference:259.00 api

Equivalent Calibrator API Reference:263.5 api

Field Verification	Shop	Field	Units
Background	48.1	47.9	api
Background + Calibrator	307.1	311.0	api
Calibrator	259.0	263.0	api

Shop	Field	Difference	Tolerance
259.0	263.0	-4.0	+/- 9.00

ACCELEROMETER SHOP CALIBRATION

Tool Name:	**GTET - 11294346**	**Reference Calibration Date:**	**06-May-14 15:42:50**
Engineer:	**B. CRAWFORD**	**Calibration Date:**	**06-Jun-14 19:46:06**
Software Version:	**WL INSITE R4.2.1 (Build 5)**	**Calibration Version:**	**1**

Horizontal-1 Telemetry	Horizontal-2 Telemetry	Vertical Telemetry	Units
-250.27	-304.91	-16483.64	cnts

Coefficient	Coefficient Value	Tolerance
Gain	-0.000062	-----
Offset	-0.017	-----
Noise	0.0013	0.0000 - 0.0030

Orientation	Measured	Tolerance	Calibrated	Tolerance
Horizontal	0.01	-0.10 - 0.10	0.00	-0.10 - 0.10
Vertical	0.99	0.90 - 1.10	1.00	0.90 - 1.10

DUAL SPACED NEUTRON SHOP CALIBRATION

Tool Name:	**DSNT - 10846353**	**Reference Calibration Date:**	**06-May-14 15:31:32**
Engineer:	**B. CRAWFORD**	**Calibration Date:**	**06-Jun-14 19:36:13**
Software Version:	**WL INSITE R4.2.1 (Build 5)**	**Calibration Version:**	**1**

Logging Source S/N: 08-018
Tank Serial Number: 105039
Reference value assigned to Tank: 49.230
Snow Block S/N: 11170614
Calibration Tank Water Temperature: 71 degF
Min. Tool Housing Outside Diameter: 3.615 in

CALIBRATION CONSTANTS

Measurement	Prev. Value	New Value	Control Limit On New Value
Gain:	0.946	0.944	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):	0.1972	0.1968	0.0005	+/- 0.0020
Calibrated Ratio:	9.26	9.24	0.016	+/- 0.050

VERIFIER

Measurement	Value	Control Limit
Snow-Block Porosity (decp):	0.0738	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 - 10846353**	**Reference Calibration Date:**	**06-Jun-14 19:36:13**
Engineer:	**B. NEALON**	**Calibration Date:**	**04-Jul-14 20:49:49**
Software Version:	**WL INSITE R4.2.1 (Build 5)**	**Calibration Version:**	**1**

Logging Source S/N: 08-018
Snow Block S/N: 11170614

NEUTRON FIELD-CHECK SUMMARY

	Shop	Field	Difference	Control Limit On Change
Snow-Block Porosity (decp):	0.0738	0.0743	0.0005	+/- 0.0150

PASS/FAIL SUMMARY

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

DENSITY CALIPER SHOP CALIBRATION

Tool Name:	**SDLT - 10947725**	**Reference Calibration Date:**	**01-Jan-70 00:00:00**
Engineer:	**B. CRAWFORD**	**Calibration Date:**	**26-Jun-14 05:42:56**
Software Version:	**WL INSITE R4.2.1 (Build 5)**	**Calibration Version:**	**1**
Host Tool Name:	**DSNT - 10846353**		

CALIBRATION COEFFICIENTS			
Measurement	**Previous Value**	**New Value**	**Control Limit On New Value**
Pad Offset	-3141.15	-3141.15	-7000.00 - -1000.00
Pad Gain	0.0003759	0.0003759	0.000200 - 0.000600
Arm Offset	-4705.64	-4705.64	-5000.00 - 3000.00
Arm Gain	0.0005524	0.0005524	0.000300 - 0.000700
Arm Power	-0.000005103	-0.000005103	-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
Ring-Measurement Check:	Passed

PASS/FAIL SUMMARY	
Calibration-Coefficients Range Check:	Passed

SDLT CALIPER FIELD CALIBRATION

Tool Name: SDLT - 10947725 **Reference Calibration Date:** 26-Jun-14 05:42:56

Engineer: B. NEALON **Calibration Date:** 04-Jul-14 20:45:02

Software Version: WL INSITE R4.2.1 (Build 5) **Calibration Version:** 1

MEASURED CALIPER VALUES				
Measurement	**Shop**	**Field**	**Change**	**Control Limit On New Value**
Pad Extension	3.75	3.74	-0.01	+/- 0.10
Ring Diameter	8.25	8.26	0.01	+/- 0.15

PASS/FAIL SUMMARY	
Pad Extension Check:	Passed
Diameter Check:	Passed

SPECTRAL DENSITY SHOP CALIBRATION

Tool Name: SDLT Pad - 10844773 **Reference Calibration Date:** 26-May-14 09:46:45

Engineer: B. CRAWFORD **Calibration Date:** 24-Jun-14 13:12:18

Software Version: WL INSITE R4.2.1 (Build 5) **Calibration Version:** 1

Logging Source S/N: 5235GW

Aluminum Block S/N: ROCK SPRINGS Density: 2.602g/cc Pe: 3.110

Magnesium Block S/N: ROCK SPRINGS Density: 1.690g/cc Pe: 2.610

DENSITY CALIBRATION SUMMARY			
Measurement	**Previous Value**	**New Value**	**Control Limit**
Near Bar Gain	1.0254	1.0164	0.90 - 1.10

Near Dens Gain	1.0150	1.0094	0.90 - 1.10
Near Peak Gain	1.0077	1.0192	0.90 - 1.10
Near Lith Gain	0.9853	0.9923	0.90 - 1.10
Far Bar Gain	1.0129	1.0073	0.90 - 1.10
Far Dens Gain	0.9992	0.9970	0.90 - 1.10
Far Peak Gain	0.9920	0.9921	0.90 - 1.10
Far Lith Gain	0.9676	0.9655	0.90 - 1.10
Near Bar Offset	-0.1166	-0.0416	NONE
Near Dens Offset	-0.0368	0.0063	NONE
Near Peak Offset	0.0264	-0.0786	NONE
Near Lith Offset	0.1826	0.1166	NONE
Far Bar Offset	-0.0911	-0.0467	NONE
Far Dens Offset	0.0235	0.0368	NONE
Far Peak Offset	0.0457	0.0370	NONE
Far Lith Offset	0.1771	0.1869	NONE
Near Bar Background	829.38	828.99	700 - 1450
Near Dens Background	278.70	277.43	230 - 480
Near Peak Background	122.65	122.14	100 - 210
Near Lith Background	150.11	149.00	125 - 260
Far Bar Background	503.52	501.95	450 - 900
Far Dens Background	198.18	195.65	175 - 345
Far Peak Background	78.30	78.69	70 - 140
Far Lith Background	81.52	79.92	75 - 145

CALIBRATION BLOCK SUMMARY

Measurement	Current Reading (Previous Coef)	Calibrated (New Coef)	Change	Control Limit On Change
MAGNESIUM				
Density (g/cc)	1.691	1.690	-0.001	+/- 0.015
Pe	2.563	2.566	0.003	+/- 0.150
ALUMINUM				
Density (g/cc)	2.604	2.602	-0.002	+/- 0.01500
Pe	3.062	3.072	0.010	+/- 0.150

TOOL SUMMARY

Measurement	Near Detector		Far Detector	
	Value	Control Limits	Value	Control Limits
QUALITY				
Background	-0.0010	+/- 0.0110	-0.0011	+/- 0.0140
Magnesium Block	-0.0000	+/- 0.0110	0.0007	+/- 0.0140
Aluminum Block	0.0005	+/- 0.0110	0.0005	+/- 0.0140
Resolution	8.70	6.00 - 11.50	9.00	6.00 - 11.50
Internal Verifier(B+D+P+L)	1378	1200 - 2700	856	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 - 10844773**	**Reference Calibration Date:**	**24-Jun-14 13:12:18**
Engineer:	**B. NEALON**	**Calibration Date:**	**04-Jul-14 20:43:54**
Software Version:	**WL INSITE R4.2.1 (Build 5)**	**Calibration Version:**	**1**

Pad Temperature: 82.3 degF

DENSITY FIELD CALIBRATION SUMMARY

Measurement	Shop	Field	Change	Control Limit +/-
Near (B+D+P+L) cps	1377.551	1378.040	0.489	14.997
Far (B+D+P+L) cps	856.213	863.963	7.750	16.035
Near Resolution	8.70	8.79	0.090	0.50
Far Resolution	9.00	9.05	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 - 10988481**	**Reference Calibration Date:**	**18-Jun-14 11:44:20**
Engineer:	**B. CRAWFORD**	**Calibration Date:**	**18-Jun-14 11:58:20**
Software Version:	**WL INSITE R4.2.1 (Build 5)**	**Calibration Version:**	**1**
Host Tool Name:	**ACRt Instrument - 10996988**		

TYPICAL GAIN RANGE

Subarray	R12KHz			R36KHz			R72KHz		
	Lower	(mmho/m)	Upper	Lower	(mmho/m)	Upper	Lower	(mmho/m)	Upper
A1 (80")	0.95	1.0134	1.05	0.95	1.0141	1.05	0.95	1.0147	1.05
A2 (50")	0.95	1.0177	1.05	0.95	1.0168	1.05	0.95	1.0144	1.05
A3 (29")	0.95	1.0052	1.05	0.95	1.0047	1.05	0.95	1.0058	1.05
A4 (17")	0.95	1.0020	1.05	0.95	0.9993	1.05	0.95	1.0022	1.05
A5 (10")	N/A	N/A	N/A	0.95	0.9927	1.05	0.95	0.9930	1.05
A6 (6")	N/A	N/A	N/A	0.95	0.9852	1.05	0.95	0.9870	1.05

SONDE OFFSET

Subarray	R12KHz	R36KHz	R72KHz
	(mmho/m)	(mmho/m)	(mmho/m)
A1 (80")	-1.191	-4.002	-4.991
A2 (50")	-2.593	-4.064	-4.474
A3 (29")	-14.254	-4.878	-3.126
A4 (17")	-97.382	-30.031	-24.202
A5 (10")	N/A	-103.181	-50.304
A6 (6")	N/A	303.098	149.312

TRANSMITTER CURRENT GAIN

Signal	Lower	R	Upper
12K	0.6	0.79	1.3
36K	1.0	1.23	2.0

R-MUD VERIFICATION

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

72K	1.0	1.43	2.0

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

TOOL OK TO LOG

CALIBRATION SUMMARY

Sensor	Shop	Field	Post	Difference	Tolerance	Units
Depth Panel-12345678						
Tension Zero	0.00	----------	----------	0.00	----------	lbs
Tension Cal	7830.00	----------	----------	0.00	----------	lbs
RWCH-11830878						
DH Tension Zero	0.00	----------	----------	0.00	----------	lbs
DH Tension Cal	1430.00	----------	----------	0.00	----------	lbs
GTET-11294346						
Gamma Ray Calibrator	259.0	263.0	----------	-4.0	+/- 9.00	api
DSNT-10846353						
Snow-Block Porosity	0.0738	0.0743	----------	-0.0005	+/- 0.0150	decp
SDLT-10947725						
Pad Extension	3.75	3.74	----------	0.01	+/-0.10	in
Ring Diameter	8.25	8.26	----------	-0.01	+/-0.15	in
SDLT Pad-10844773						
Near(B+D+P+L)	1377.551	1378.040	----------	-0.489	+/-14.997	cps
Far(B+D+P+L)	856.213	863.963	----------	-7.750	+/-16.035	cps
ACRt Sonde-10988481						
Mud Cell	1.00	----------	----------	0.00	----------	ohm-m

Data: BH_HOMER_9-41AH\0001 TRIPLE\004 05-Jul-14 21:58 Up @6553.8f **Date: 06-Jul-14 00:01:08**

HALLIBURTON

CUSTOMER EVENT LOG

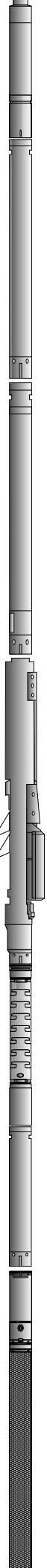
Event Type	Time & Date	Depth (ft)	Event Description
	05-Jul-14 21:09:22	350.00	Logging 001 05-Jul-14 21:09 Up @350.0f
	05-Jul-14 21:11:58	277.75	Halting 001 05-Jul-14 21:09 Up @350.0f
	05-Jul-14 21:21:16	726.50	Logging 002 05-Jul-14 21:21 Dn @726.5f
	05-Jul-14 21:47:59	6536.84	Halting 002 05-Jul-14 21:21 Dn @726.5f
	05-Jul-14 21:48:22	6554.25	Logging 003 05-Jul-14 21:48 Up @6554.3f
	05-Jul-14 21:54:17	6212.61	Halting 003 05-Jul-14 21:48 Up @6554.3f
	05-Jul-14 21:58:11	6553.75	Logging 004 05-Jul-14 21:58 Up @6553.8f
	05-Jul-14 23:30:23	1080.19	Halting 004 05-Jul-14 21:58 Up @6553.8f

Data: BH_HOMER_9-41AH\0001 TRIPLE\HW10997 **Date: 06-Jul-14 00:00:17**

HALLIBURTON

TOOL STRING DIAGRAM REPORT

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



RWCH-11830878
135.00 lbs

Ø 3.625 in

Load Cell @ 57.80 ft

BH Temperature @ 57.23 ft

6.25 ft

55.23 ft

GTET-11294346
165.00 lbs

Ø 3.625 in

8.52 ft

GammaRay @ 49.17 ft

46.71 ft

DSNT-10846353
174.00 lbs

Ø 3.625 in

9.69 ft

DSN Far @ 39.78 ft

DSN Near @ 39.03 ft

37.03 ft

SDLT-10947725
360.00 lbs

Ø 4.500 in

10.81 ft

SDLT Pad-10844773
65.00 lbs

Ø 4.750 in*

SDL Caliper @ 29.03 ft

SDL @ 29.02 ft

26.21 ft

Flex Joint-11005587
140.00 lbs

Ø 3.625 in

5.67 ft

20.54 ft

ACRt Instrument-
10996988
50.00 lbs

Ø 3.625 in

5.03 ft

15.51 ft

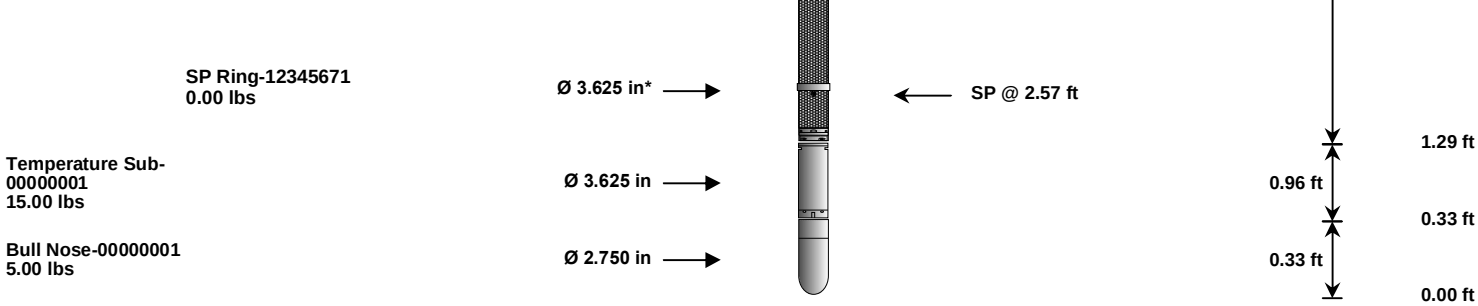
Mud Resistivity @ 14.15 ft

ACRt @ 10.17 ft

ACRt Sonde-
10988481
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	11830878	135.00	6.25		55.23	300.00
GTET	Gamma Telemetry Tool	11294346	165.00	8.52		46.71	60.00
DSNT	Dual Spaced Neutron	10846353	174.00	9.69		37.03	60.00
SDLT	Spectral Density Tool	10947725	360.00	10.81		26.21	60.00
SDLP	Density Insite Pad	10844773	65.00	2.55	*	28.42	60.00
FLEX	Flex Joint	11005587	140.00	5.67		20.54	300.00
ACRt	Array Compensated True Resistivity Instrument Section	10996988	50.00	5.03		15.51	120.00
ACRt	Array Compensated True Resistivity Sonde Section	10988481	200.00	14.22		1.29	120.00
SP	SP Ring	12345671	0.00	0.25	*	2.57	300.00
TMAX	Temperature Sub - 3_625 OD	00000001	15.00	0.96		0.33	300.00
BLNS	Bull Nose	00000001	5.00	0.33		0.00	300.00
Total			**1,309.00**	**61.48**			

* Not included in Total Length and Length Accumulation.

Data: BH_HOMER_9-41AH\0001 TRIPLE\004 05-Jul-14 21:58 Up @6553.8f **Date: 05-Jul-14 23:58:08**

COMPANY	**BLACK HILLS EXPLORATION & PRODUCTION**		
WELL	**HOMER DEEP UNIT 9-41BH**		
FIELD	**SOUTH SHALE RIDGE**		
COUNTY	**GARFIELD**	STATE	**CO**

HALLIBURTON

ARRAY COMPENSATED
TRUE RESISTIVITY
SPECTRAL DENSTY
DUAL SPACED NEUTRON