

HALLIBURTON

SPECTRAL DENSITY DUAL SPACED NEUTRON WAVE SONIC ARRAY COMPENSATED TRUE RESISTIVITY

COMPANY WELL FIELD/BLOCK COUNTY STATE	WPX ENERGY ROCKY MOUNTAIN LLC LANGSTAFF RWF 724-16 RULISON GARFIELD CO
Permanent Datum Log measured from Drilling measured from	Sect. 16 Twp. 6S Rge. 94W Elev. 5582.0 ft 21.0 ft above perm. Datum G.L. 5582.0 ft
API No. Location SURFACE HOLE LOCATION: 1722' FSL & 1578' FWL BOTTOM HOLE LOCATION: 976' FSL & 1681' FWL	Other Services: RWCH
COMPANY WELL FIELD/BLOCK COUNTY STATE	WPX ENERGY ROCKY MOUNTAIN LLC LANGSTAFF RWF 724-16 RULISON GARFIELD STATE CO

Date Run No. Depth - Driller Depth - Logger Bottom - Logged Interval Top - Logged Interval Casing - Driller Casing - Logger Bit Size Type Fluid in Hole Density PH Source of Sample Rm @ Meas. Temperature Rmf @ Meas. Temperature Rmc @ Meas. Temperature Source Rmf Rm @ BHT Time Since Circulation Time on Bottom Max. Rec. Temperature Equipment Recorded By Witnessed By	14-Dec-13 TWO 13797.00 ft 13102.0 ft 13092.0 ft 8948.0 ft 9.625 in @ 8952.0 ft 8948.0 ft 7.875 in @ WBM 14.7 ppg 72.00 s/qt 10.50 pH 5.2 cp/m MUD TANK 1.740 ohmm @ 58.00 degF 0.96 ohmm @ 58.20 degF 2.750 ohmm @ 66.10 degF MEASURED 0.35 ohmm @ 317.0 degF 20.0 hr 14-Dec-13 12:32 317.0 degF @ 13102.0 ft 11335318 VERNAL, UT Z. TAYLOR A. DUNIHOO
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Service Ticket No.: 900961488 API Serial No.: 05045221570000 PGM Version: WL INSITE R3.8.0 (Build 2)

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.		@		@	TWO	HACRT	N/A	0.5" S.O.	N/A
Rmc @ Meas. Temp.		@		@		11005910			
Source Rmf	Rmc								
Rm @ BHT		@		@					
Rmf @ BHT		@		@					
Rmc @ BHT		@		@					

EQUIPMENT DATA							
GAMMA		ACOUSTIC		DENSITY		NEUTRON	
Run No.	TWO	Run No.	TWO	Run No.	TWO	Run No.	TWO
Serial No.	11232143	Serial No.	11275522	Serial No.	10815425	Serial No.	10706985
Model No.	H4TG	Model No.	HWST	Model No.	HSDL	Model No.	HDSN
Diameter	2.75"	No. of Cent.	0	Diameter	3.5"	Diameter	2.75"
Detector Model No.	H4TG	Spacing	0.5'	Log Type	GAMMA	Log Type	THERMAL
Type	SCINT			Source Type	Cs137	Source Type	Am241Be
Length	8"	LSA [Y/N]	YES	Serial No.	5257GW	Serial No.	08-037
Distance to Source	18'	FWDA [Y/N]	YES	Strength	1.78 Ci	Strength	15 Ci

LOGGING DATA

GENERAL			GAMMA		ACOUSTIC		DENSITY		NEUTRON					
Run	Depth		Speed	Scale		Scale		Matrix	Scale		Matrix			
No.	From	To	ft/min	L	R	L	R		L	R				
TWO	13102	8948	REC	0	150	30%	-10%	55.5 usec/ft	30%	-10%	2.68 g/cc	30%	-10%	SAND

DIRECTIONAL INFORMATION

Maximum Deviation @ KOP @

Remarks: TOOL STRING CONFIGURATION: RWCH/XODH/H4TG/HSSP/HGNI/HDSN/HSDL/HHFS/HWST/HACRT/BN

ANNULAR HOLE VOLUME CALCULATED FOR 5.5-INCH CASING

HWST CENTRALIZERS AND HDSN DECENTRALIZER WERE NOT USED DUE TO BOREHOLE CONDITIONS AT CUSTOMER REQUEST

HDSL CALIPER CLOSED REPEATEDLY DUE TO TENSION PULLS 1500 POUNDS OVER NORMAL TENSION

TENSION PULLS AND BOREHOLE RUGOSITY MAY AFFECT LOG QUALITY

LATITUDE: 39° 31' 22.0794 " N

LONGITUDE: 107° 53' 50.28" W

CREW: T. BISHOP, A. GRAFF

THANK YOU FOR CHOOSING HALLIBURTON ENERGY SERVICES - VERNAL, UT (435) 781-5517 RIG: CYCLONE #17

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	7.875	in
	SHARED	UBS	Use Bit Size instead of Caliper for all applications.	No	
	SHARED	MDBS	Mud Base	Water	
	SHARED	MDWT	Borehole Fluid Weight	14.700	ppg
	SHARED	WAGT	Weighting Agent	Barite	
	SHARED	BSAL	Borehole salinity	700.00	ppm
	SHARED	FSAL	Formation Salinity NaCl	0.00	ppm
	SHARED	KPCT	Percent K in Mud by Weight?	0.00	%
	SHARED	RMUD	Mud Resistivity	1.740	ohmm
	SHARED	TRM	Temperature of Mud	58.0	degF
	SHARED	CSD	Logging Interval is Cased?	No	
	SHARED	ICOD	AHV Casing OD	5.500	in
	SHARED	ST	Surface Temperature	20.0	degF
	SHARED	TD	Total Well Depth	13797.00	ft
	SHARED	BHT	Bottom Hole Temperature	350.0	degF
	SHARED	SVTM	Navigation and Survey Master Tool	NONE	
	SHARED	AZTM	High Res Z Accelerometer Master Tool	H4TG-A	
	SHARED	TEMM	Temperature Master Tool	NONE	
	SHARED	BHSM	Borehole Size Master Tool	NONE	
	H4TG-A	GROK	Process Gamma Ray?	Yes	
	H4TG-A	GRSO	Gamma Tool Standoff	0.000	in
	H4TG-A	GEOK	Process Gamma Ray EVR?	No	
	H4TG-A	TPOS	Tool Position for Gamma Ray Tools.	Eccentered	

HDSN	DNOK	Process DSN?	Yes	
HDSN	DEOK	Process DSN EVR?	No	
HDSN	NLIT	Neutron Lithology	Sandstone	
HDSN	DSOK	DSN Standoff Correction Source?	Fixed	
HDSN	DNSO	DSNTool Standoff	0.000	in
HDSN	TMPC	Temperature Correction Type	None	
HDSN	DPRS	DSN Pressure Correction Type	None	
HDSN	SHCO	View More Correction Options	No	
HDSN	UTVD	Use TVD for Gradient Corrections?	No	
HSDL_M	CLOK	Process Caliper Outputs?	Yes	
HSDL_M Pad	DNOK	Process Density?	Yes	
HSDL_M Pad	DNOK	Process Density EVR?	No	
HSDL_M Pad	DMA	Formation Density Matrix	2.680	g/cc
HSDL_M Pad	DFL	Formation Density Fluid	1.000	g/cc
HSDL_M Pad	CB	Logging Calibration Blocks?	No	
HWST	WSOK	Process WSTT?	Yes	
HWST	MSWN	Monopole Sliding Window Length	-1.00	us
HWST	DSWN	Dipole Sliding Window Length	-1.00	us
HWST	PINT	Process 1 Sample and Skip	0	
HWST	PROM	Process Mode: M=1,MX=2,MY=3,MXY=4	4	
HWST	SMTH	Semblance Smoothing	-2.00	
HWST	DTSH	Delta -T Shale	100.00	uspf
HWST	DTMT	Delta -T Matrix Type	Sandstone 55.5	
HWST	DTFL	Delta -T Fluid	189.00	uspf
HWST	RHOM	Matrix Density	2.6500	g/cc
HWST	RHOF	Fluid Density	1.0000	g/cc
HWST	STOL	Slow Tolerance	40.00	
HWST	SMTL	Semblance Tolerance	0.25	
HWST	SMTL	Semblance Threshold	0.25	
HWST	VPVS	VPVS Ratio for Porosity	1.40	
HWST	APEQ	Acoustic Porosity Equation	Wylie	
HWST	SHAO	Show Advanced Options?	Yes	
HWST	WRNM	Wavesonic Receiver Normalization Method	None	
HWST	DTRM	Transmitter to First Receiver Distance - Monopole	11.24	ft
HWST	DTRX	Transmitter to First Receiver Distance Dipole X	9.24	ft
HWST	DTRY	Transmitter to First Receiver Distance Dipole Y	10.24	ft
HWST	DIRM	Receiver Spacing	0.50	ft
HWST	NRAM	Number of Receivers in Array	8	
HWST	DWCM	Digitizer Word Count Monopole	400	
HWST	DSIM	Digital Sample Interval - Monopole	20.3174	us
HWST	WDDM	Waveform Recording Delay Monopole	-304.761	us
HWST	DWCX	Digitizer Word Count Dipole X	400	
HWST	DSIX	Digital Sample Interval Dipole X	40.6348	us
HWST	WDDX	Waveform Digitization Delay Dipole X	-304.761	us
HWST	DWCY	Digitizer Word Count Dipole Y	400	
HWST	DSIY	Digital Sample Interval Dipole Y	40.6348	us
HWST	WDDY	Waveform Digitization Delay Dipole Y	-304.761	us
HWST	NAVS	Navigation Source Tool	NONE	
HACRT Sonde	RTOK	Process ACRt?	Yes	
HACRT Sonde	MNSO	Minimum Tool Standoff	0.50	in
HACRT Sonde	TCS1	Temperature Correction Source	FP Lwr & FP Up	
HACRT Sonde	TPOS	Tool Position	Free Hanging	
HACRT Sonde	RMOP	Rmud Source	Mud Cell	
HACRT Sonde	RMIN	Minimum Resistivity for MAP	0.20	ohmm
HACRT Sonde	RMIN	Maximum Resistivity for MAP	200.00	ohmm
HACRT Sonde	THQY	Threshold Quality	0.50	
HACRT Sonde	MPEX	Filter Bandwidth	2000	Hz

BOTTOM

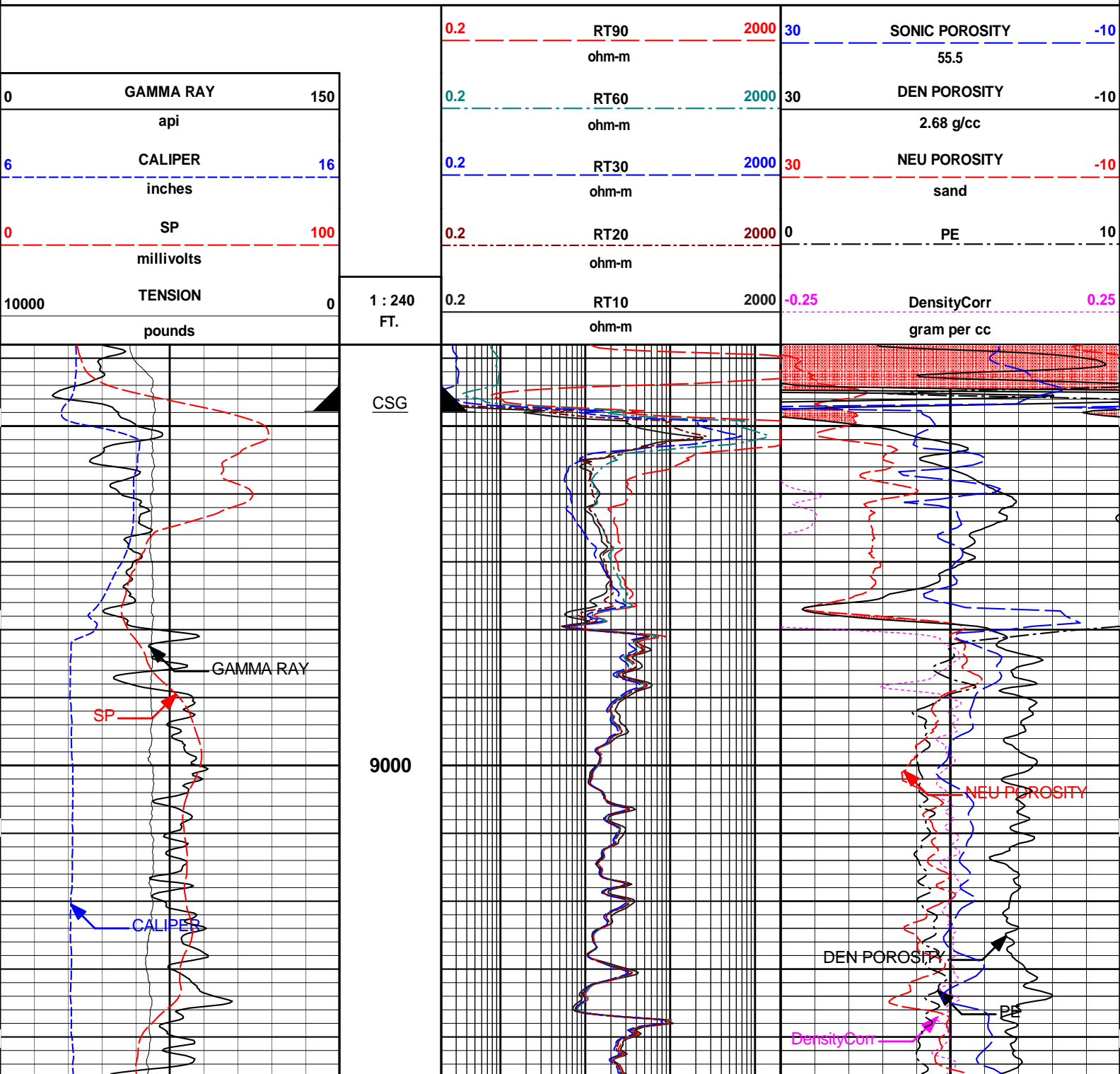
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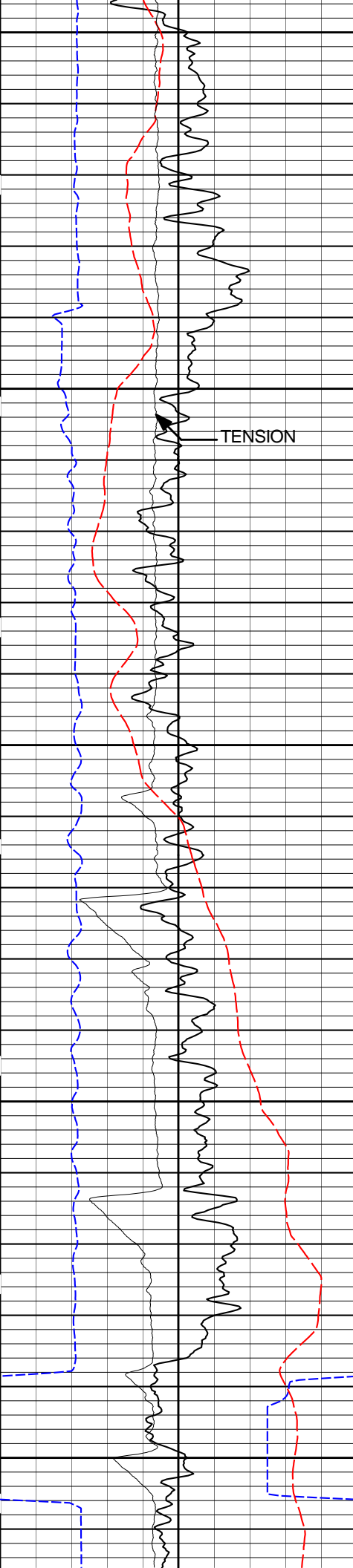
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HALLIBURTON

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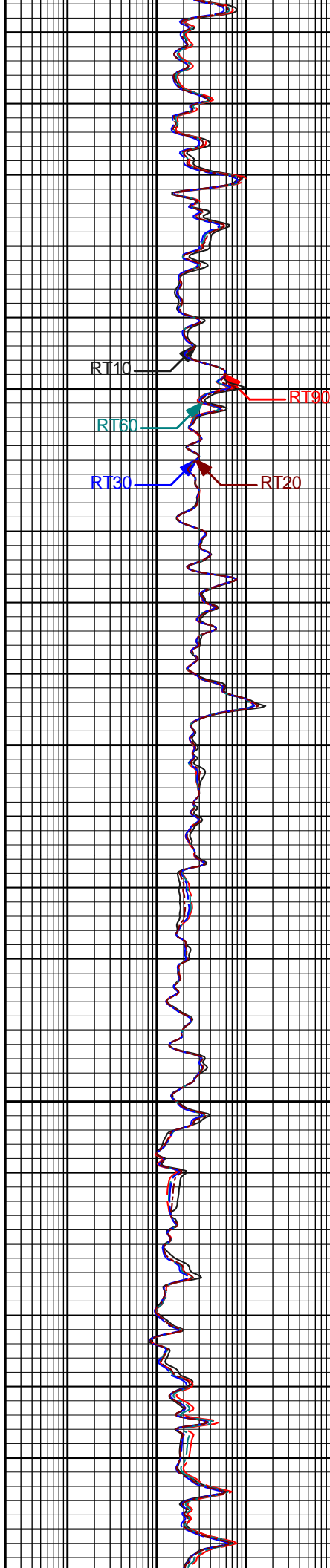
MAIN PASS 5" = 100'



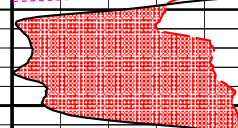


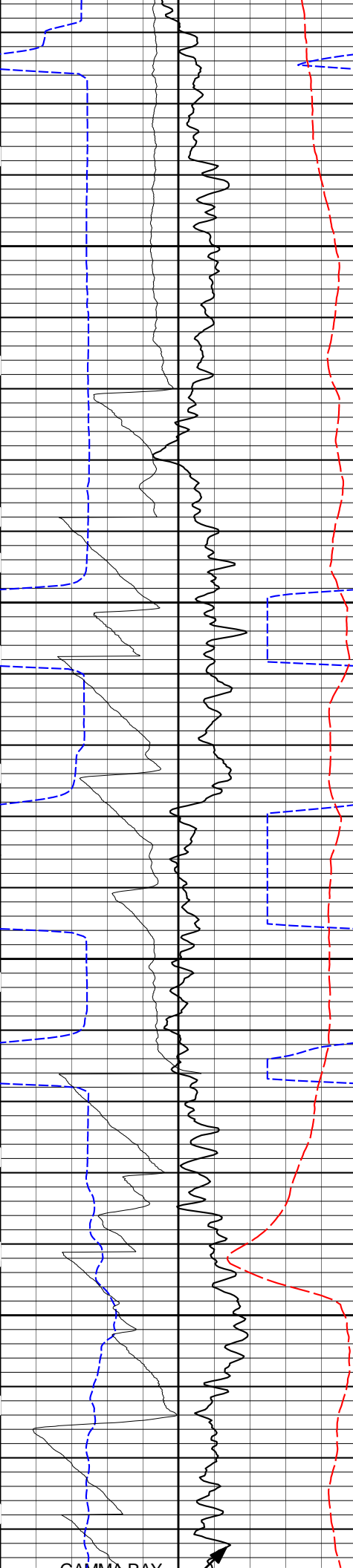
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9200



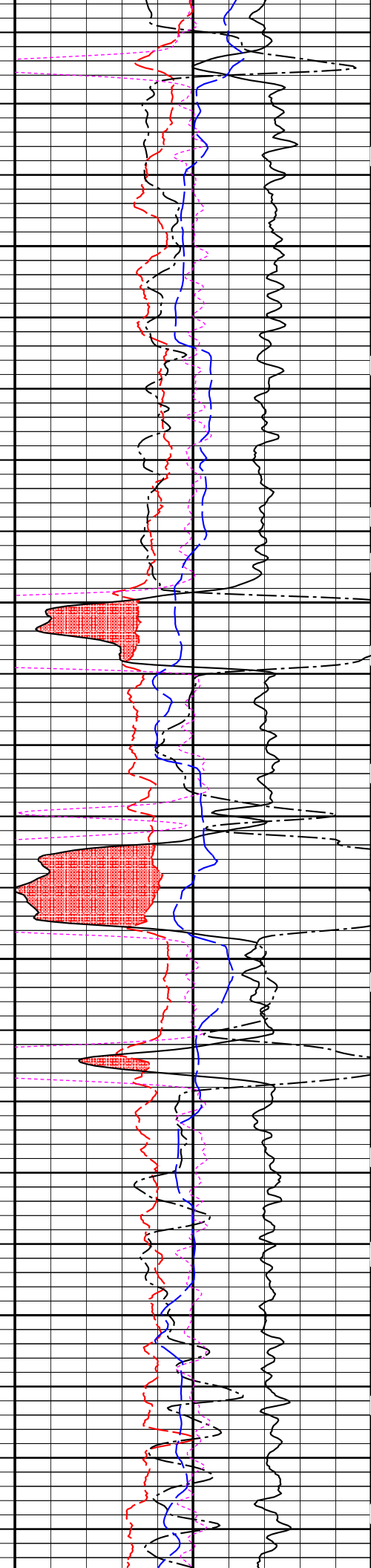
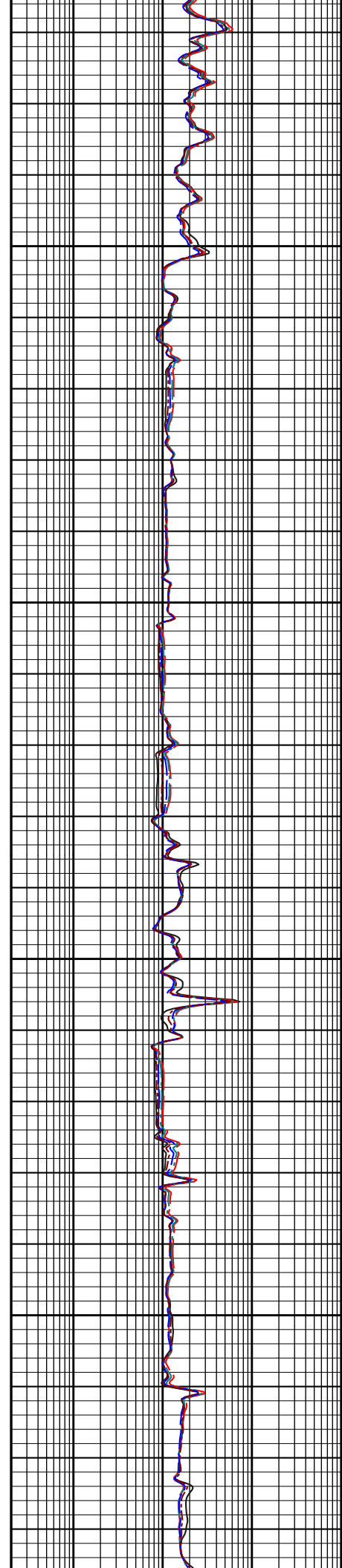
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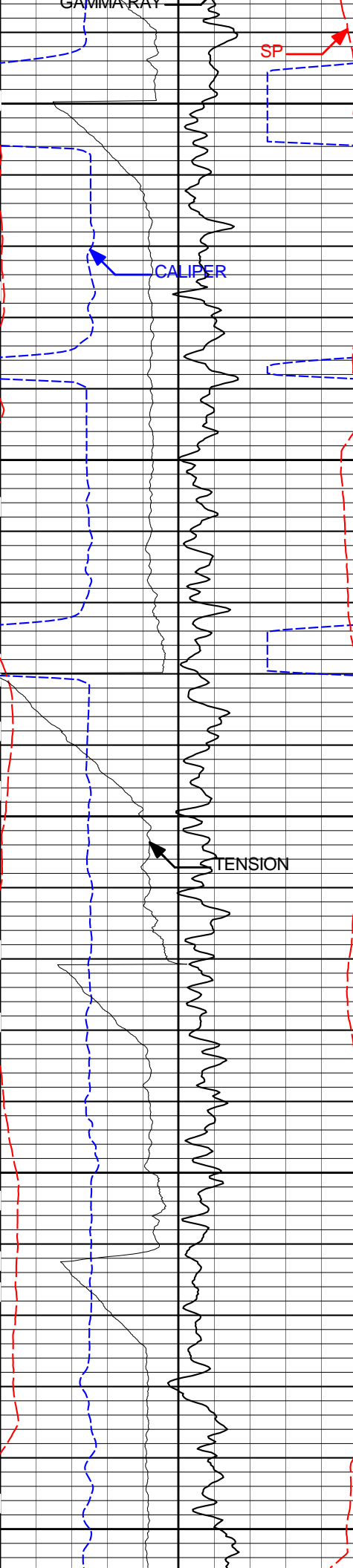




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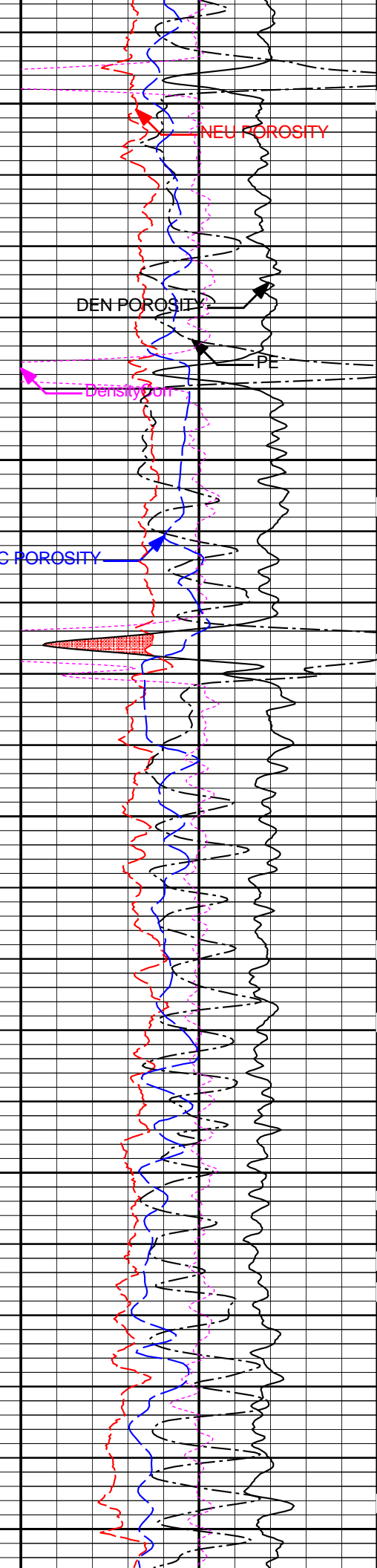
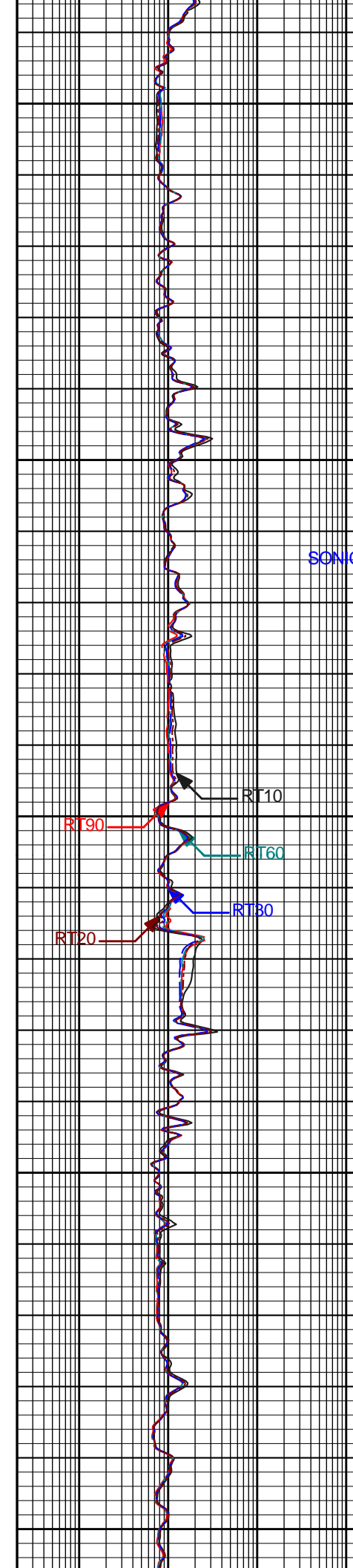


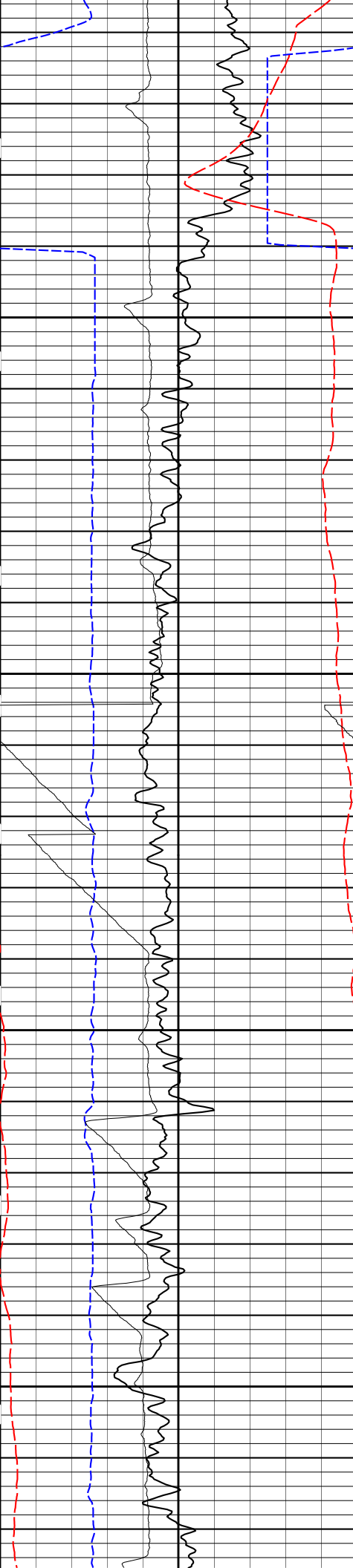


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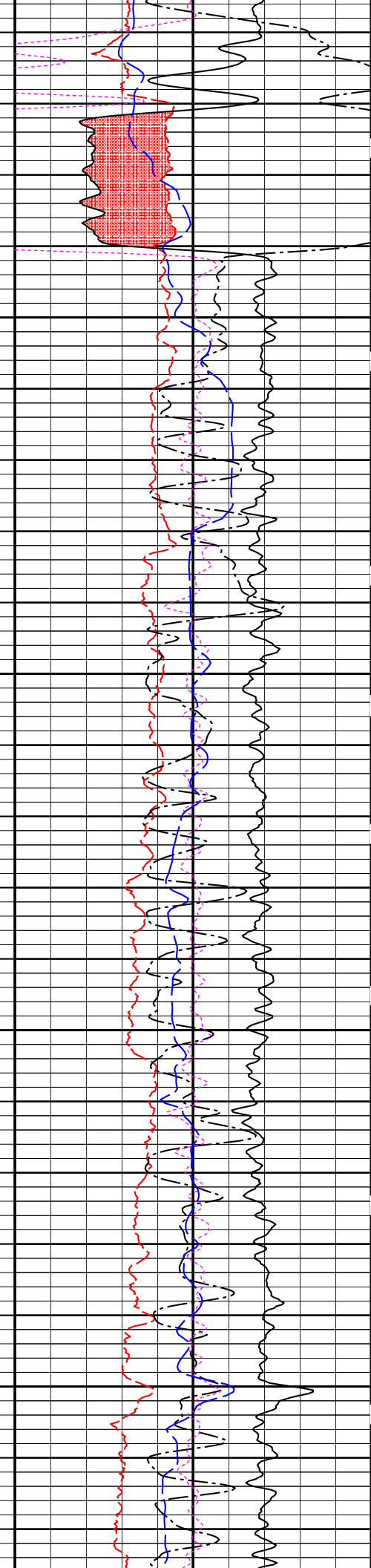
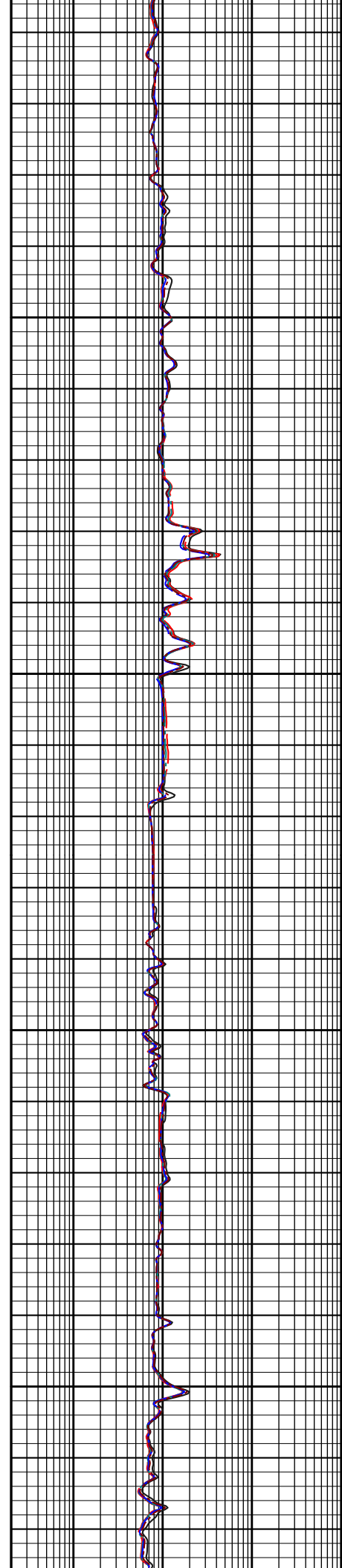
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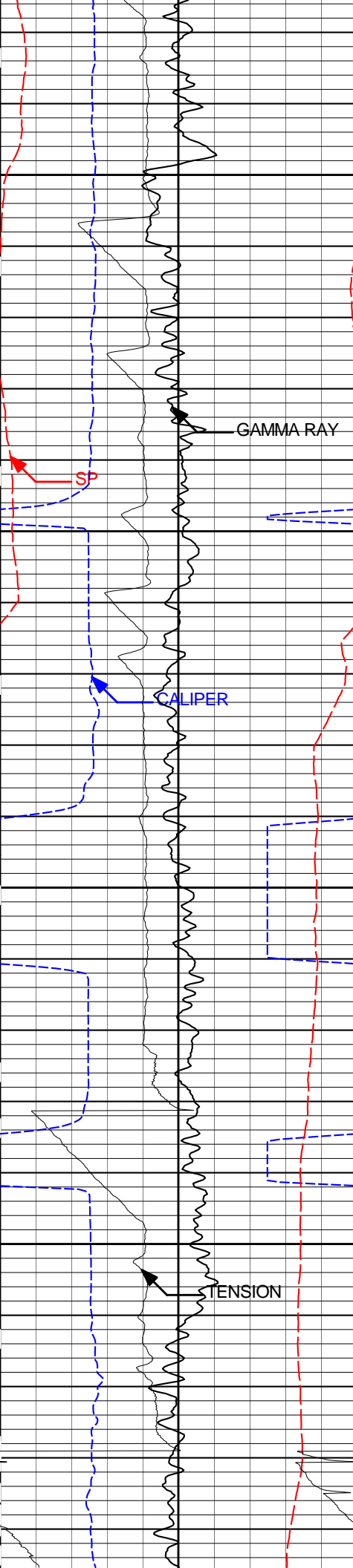




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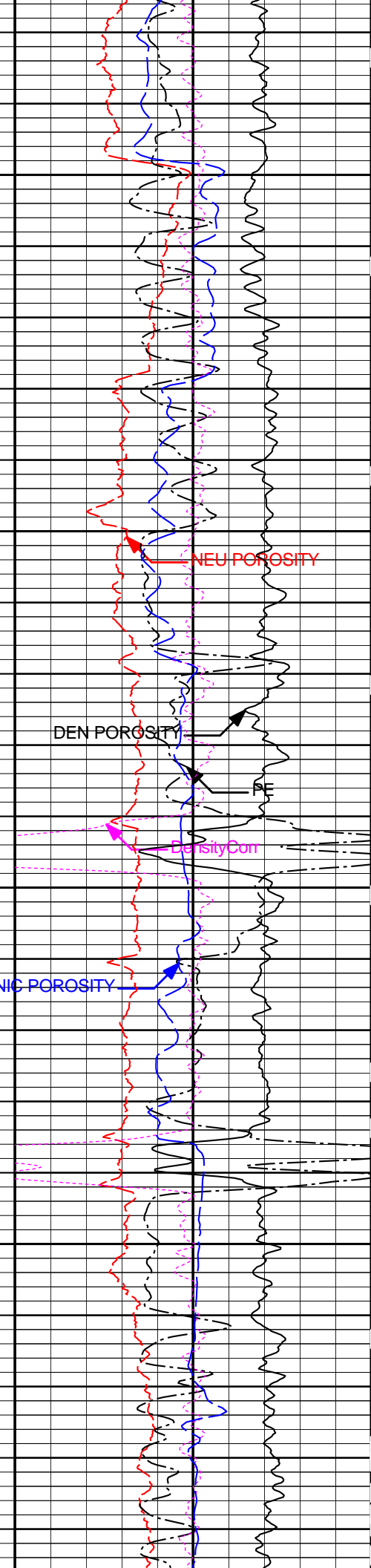
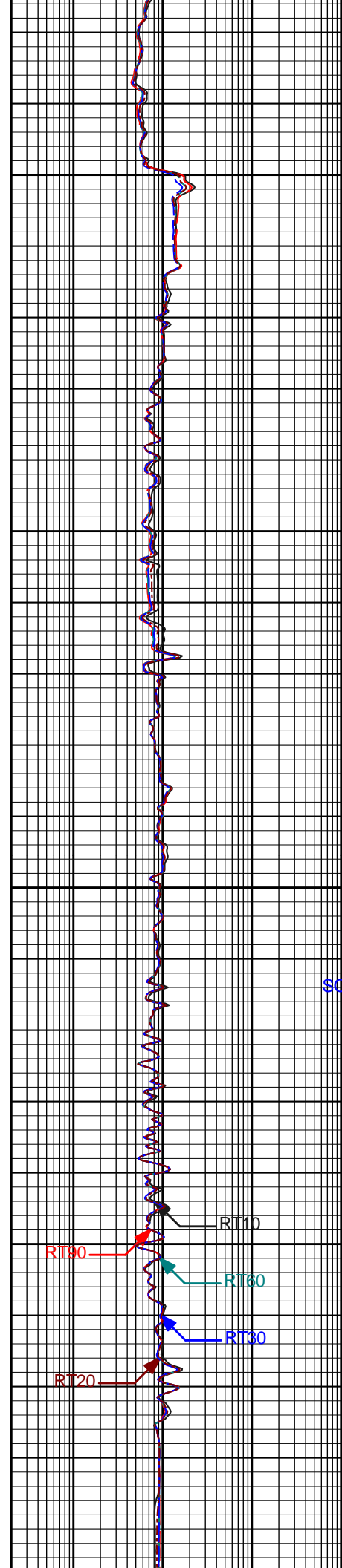
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10000

10100



GAMMA RAY

SP

CALIPER

TENSION

RT10

RT20

RT60

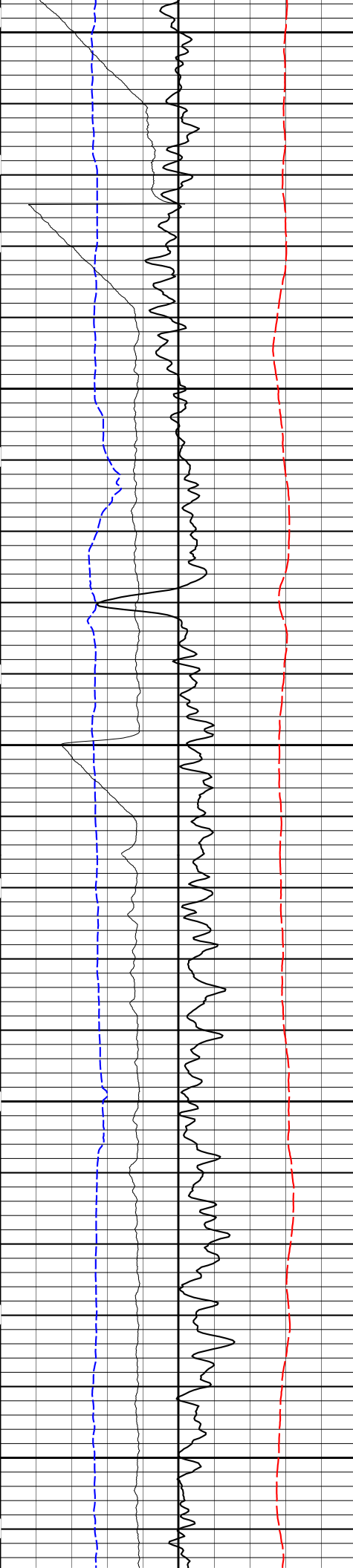
RT30

NEU POROSITY

DEN POROSITY

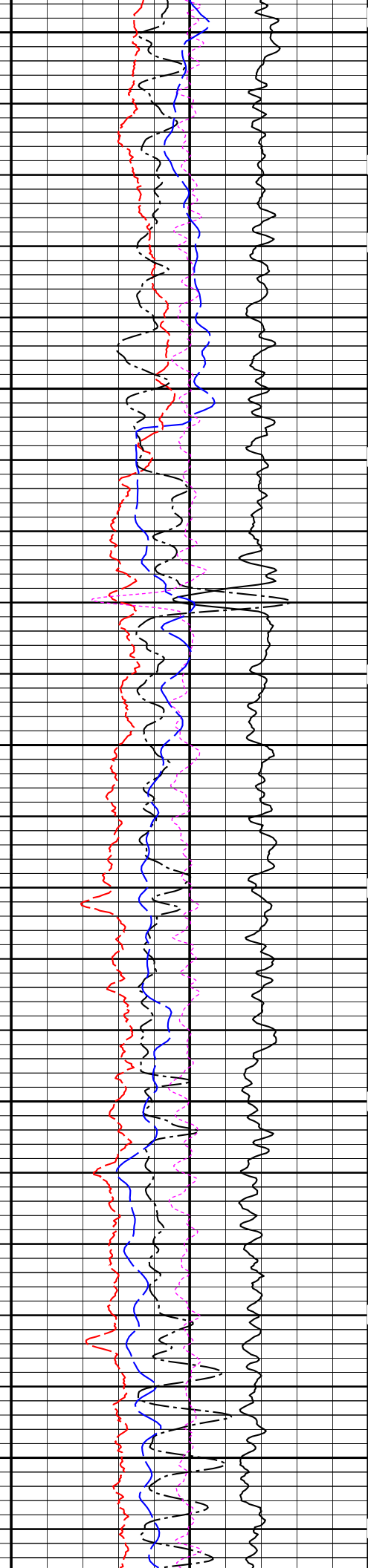
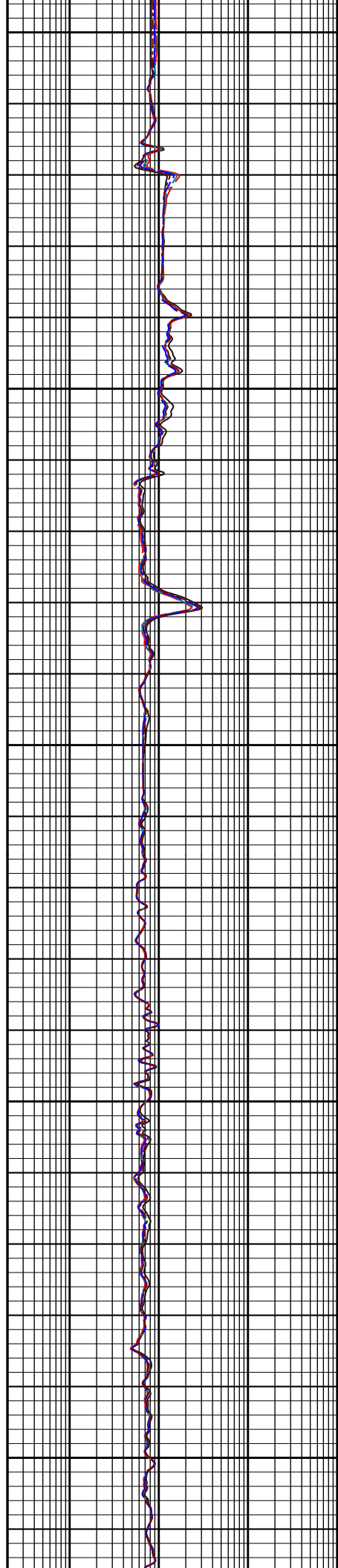
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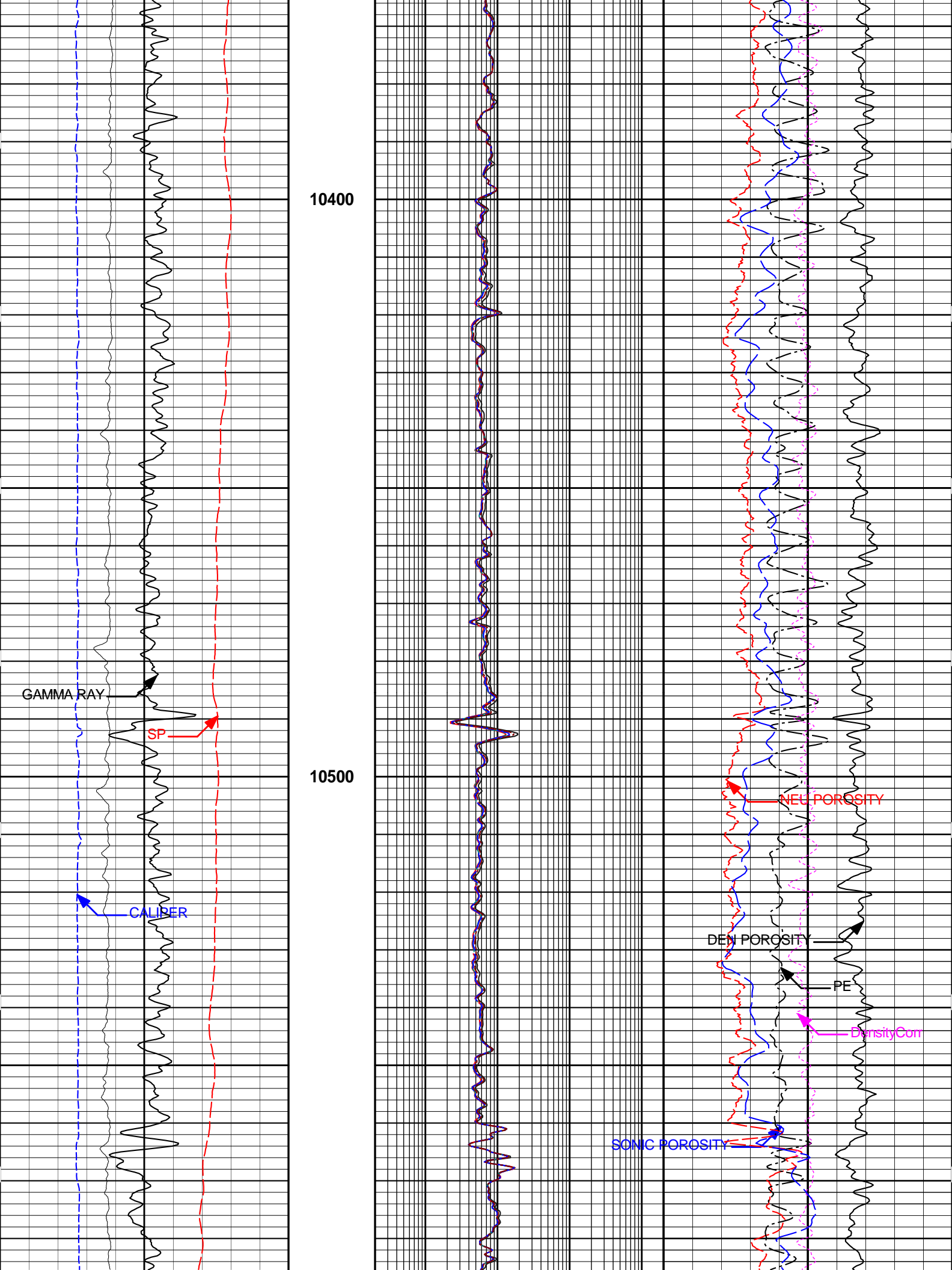
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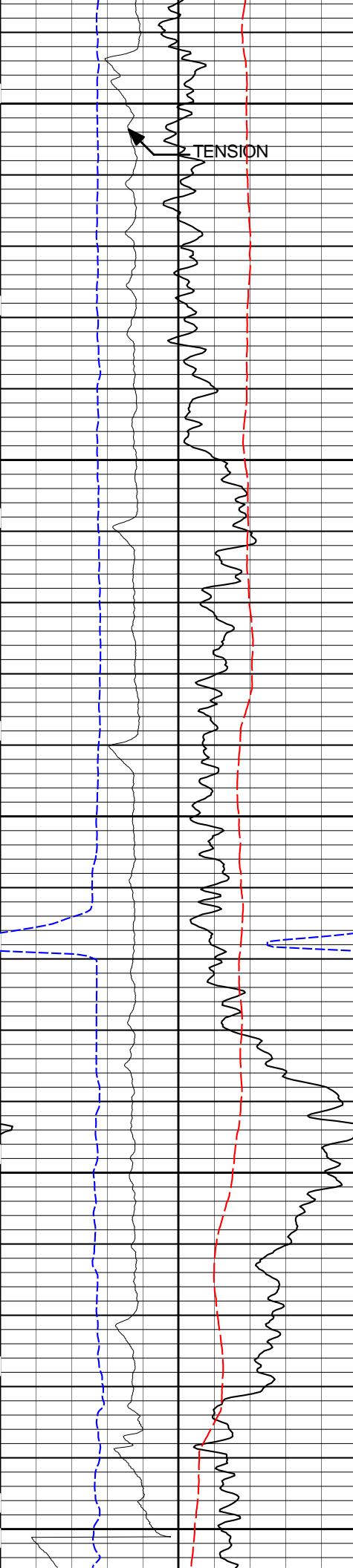


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10300



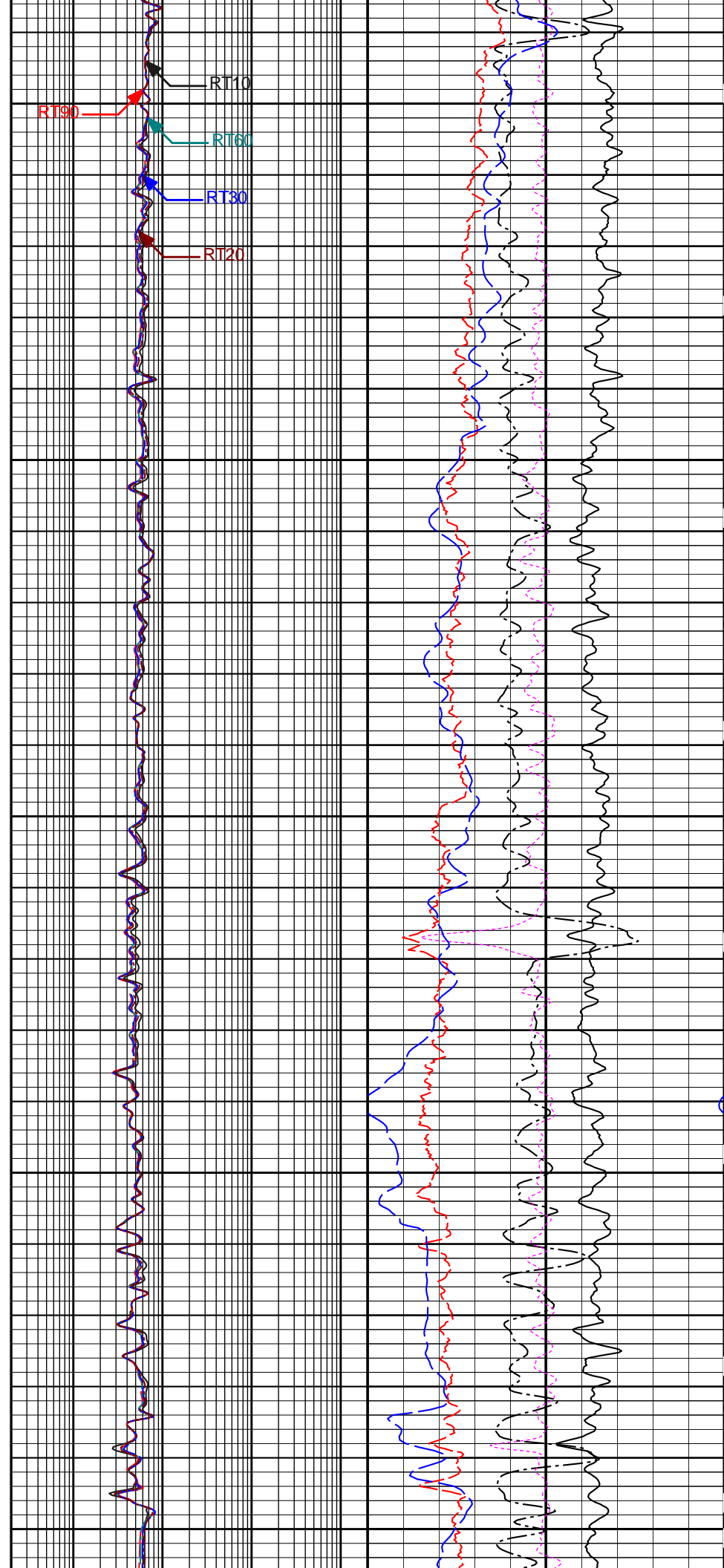


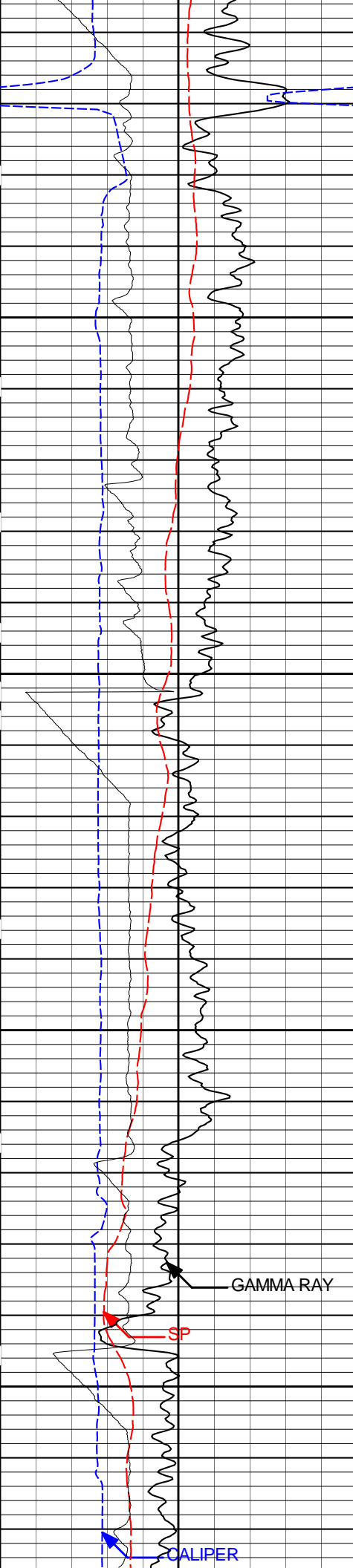


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10700

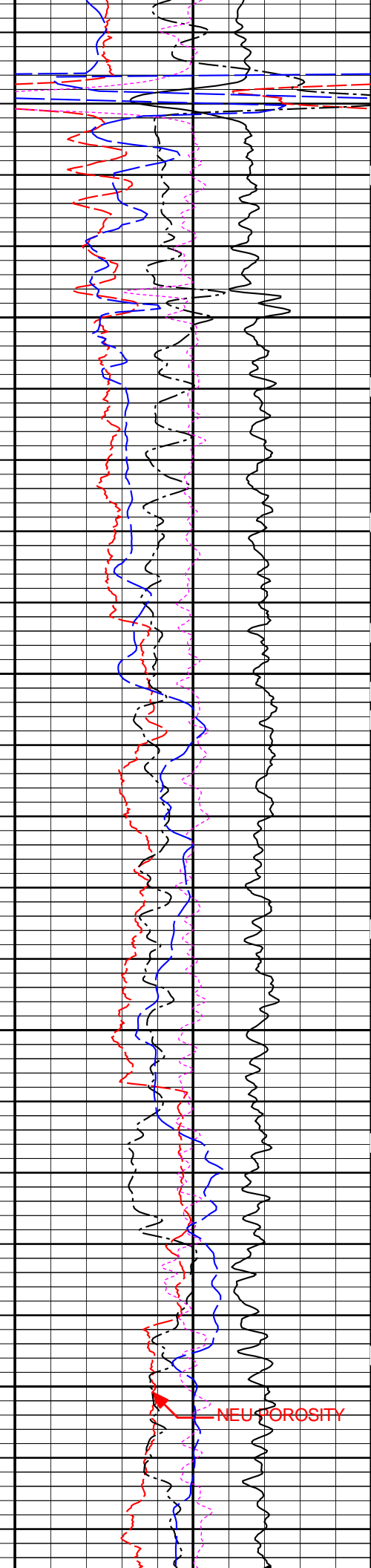
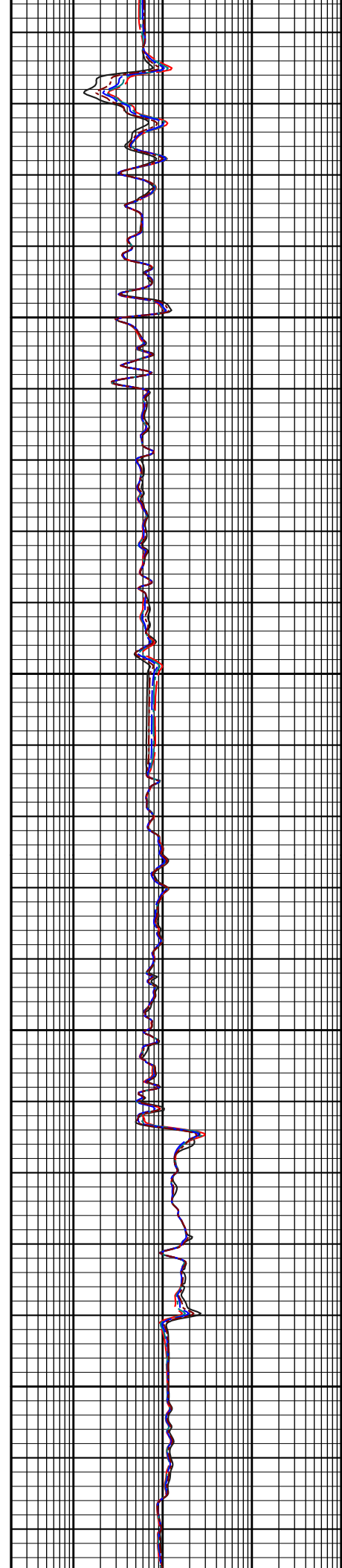
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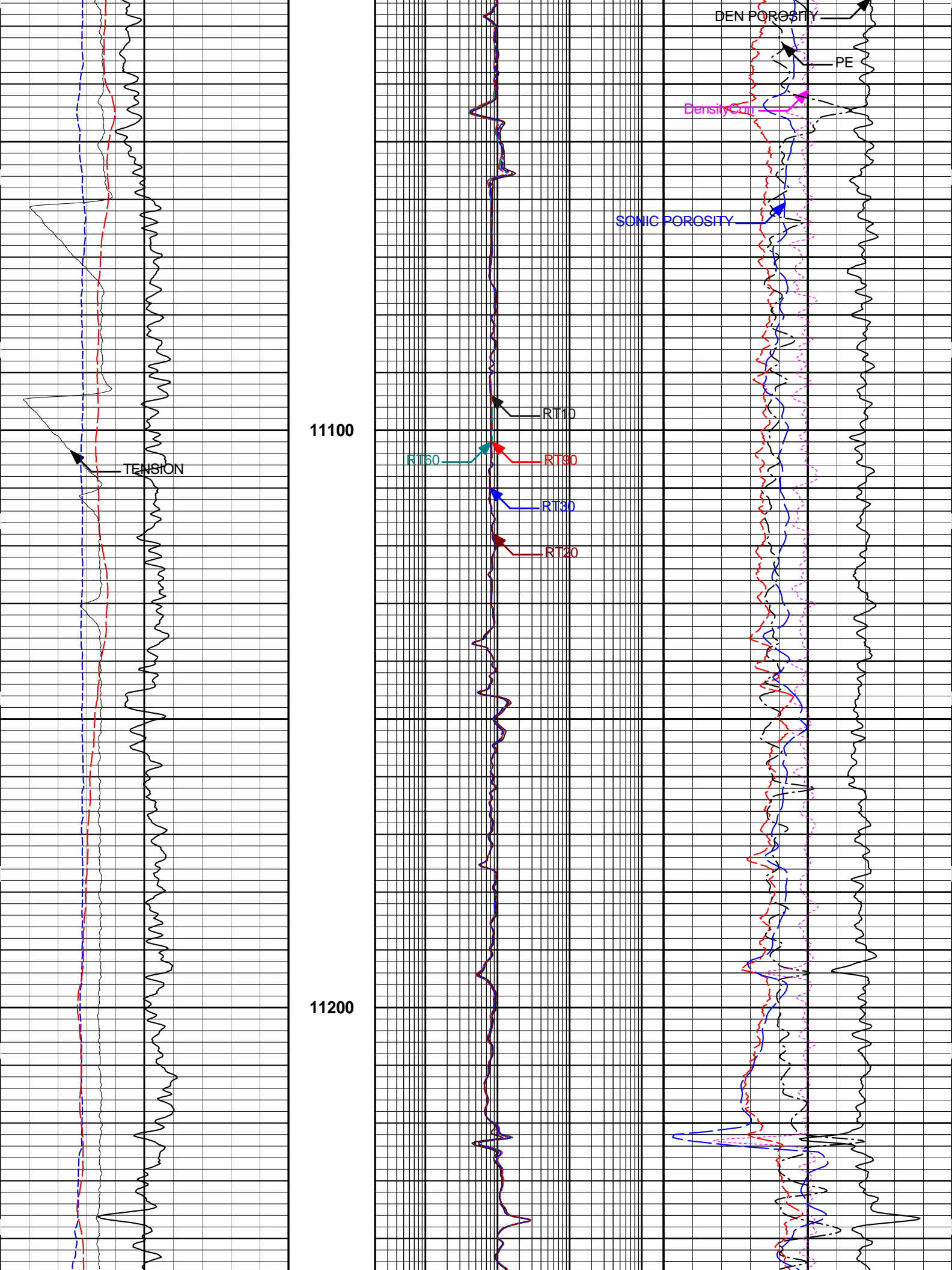


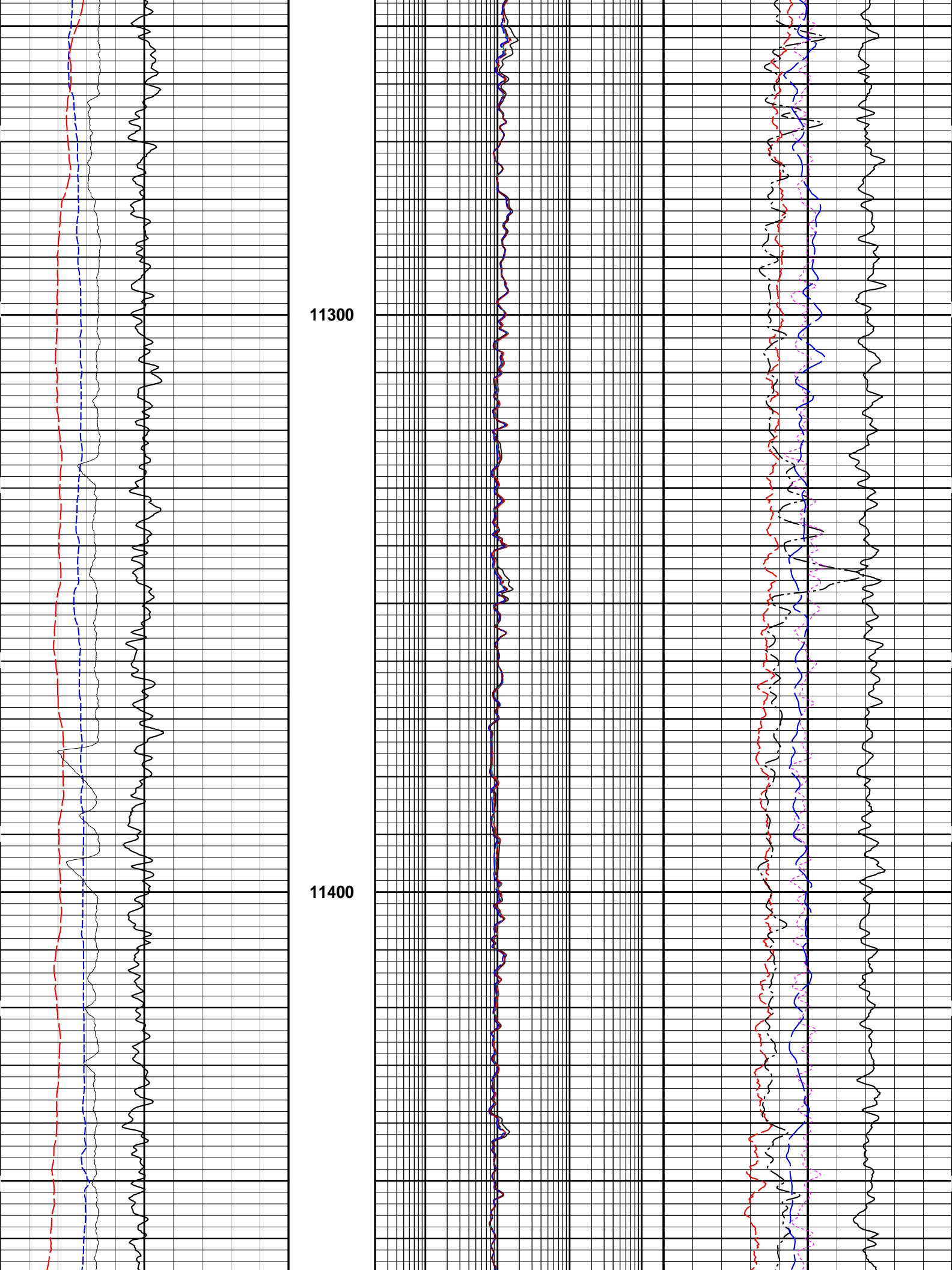
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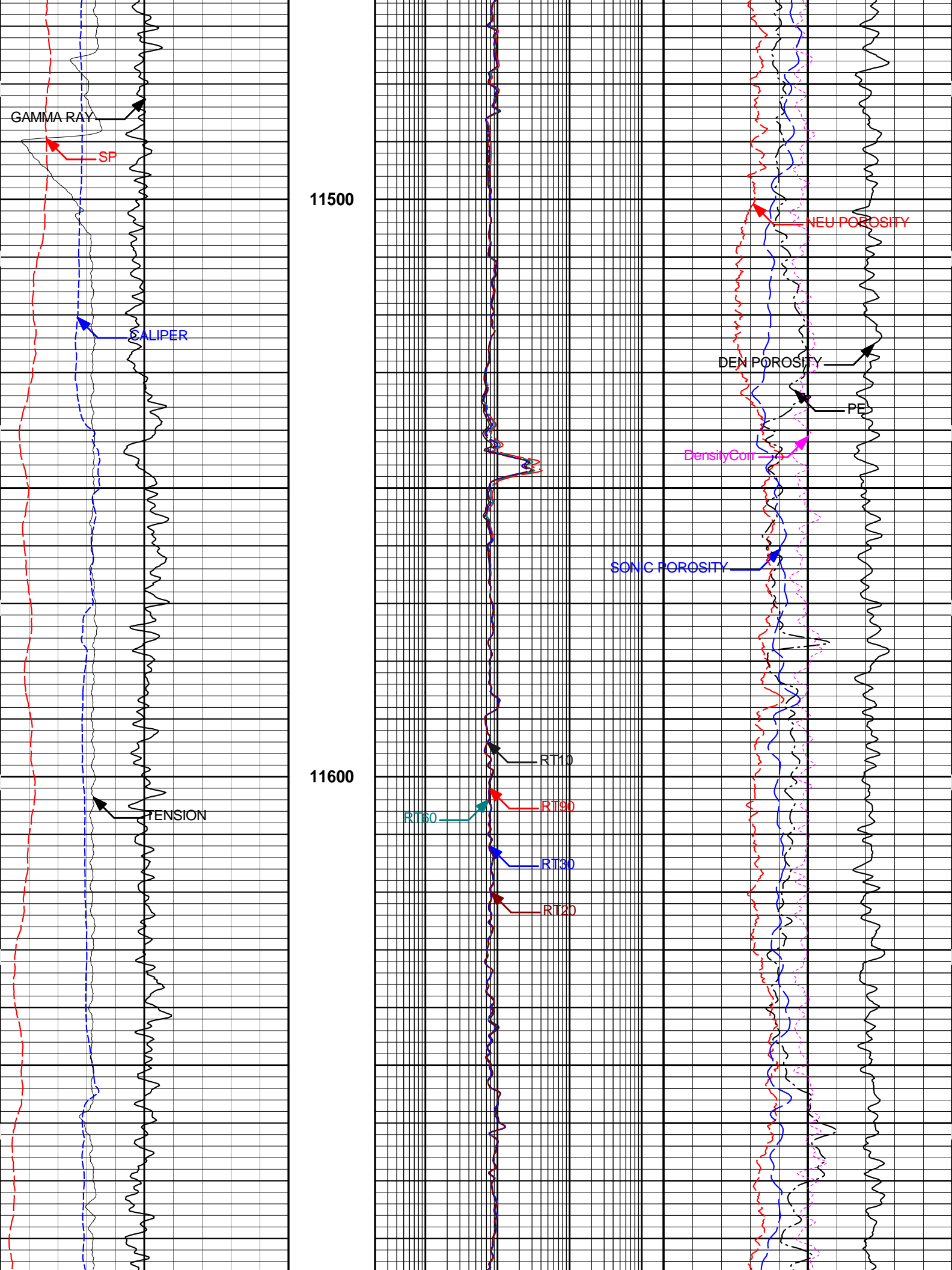
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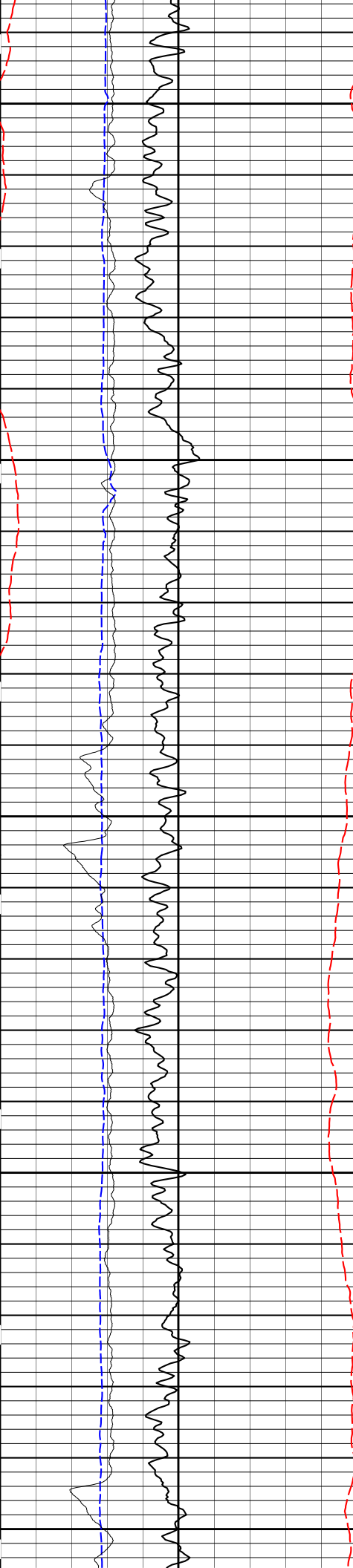


NEUTRON POROSITY





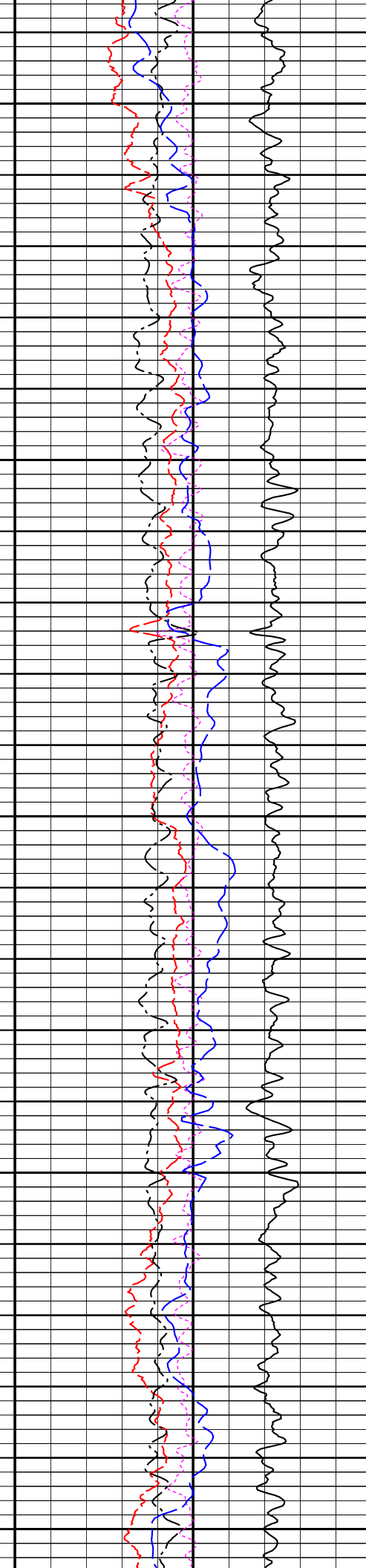
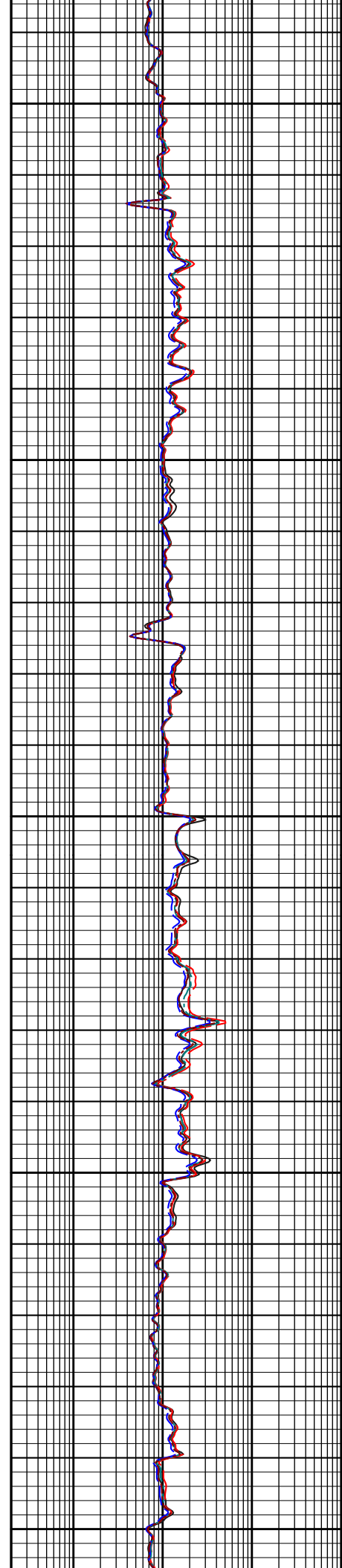


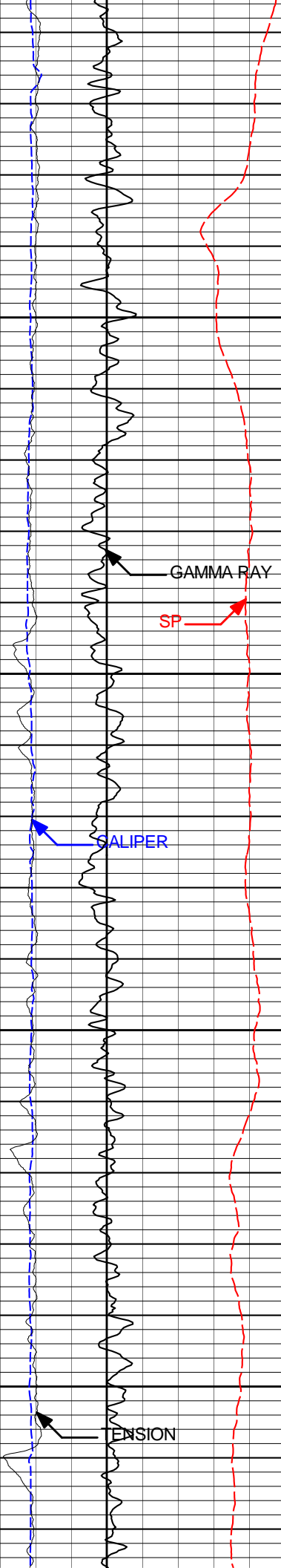


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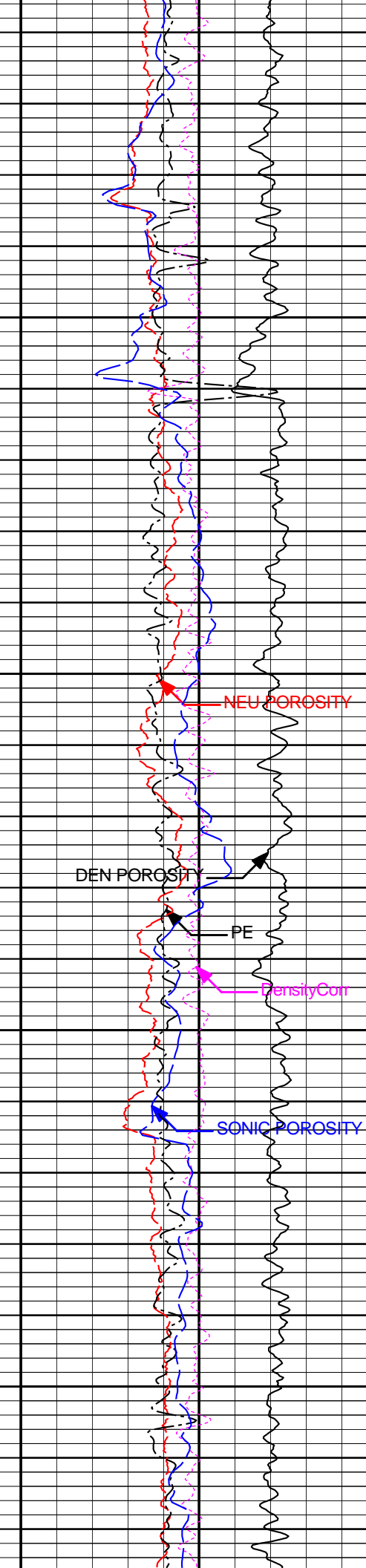
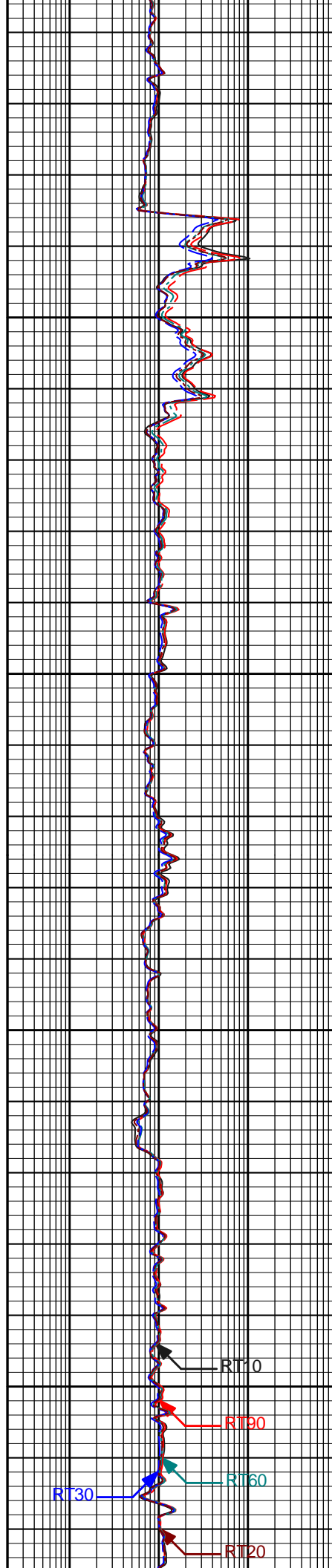
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12000

12100



NEU POROSITY

DEN POROSITY

PE

DensityCur

SONIC POROSITY

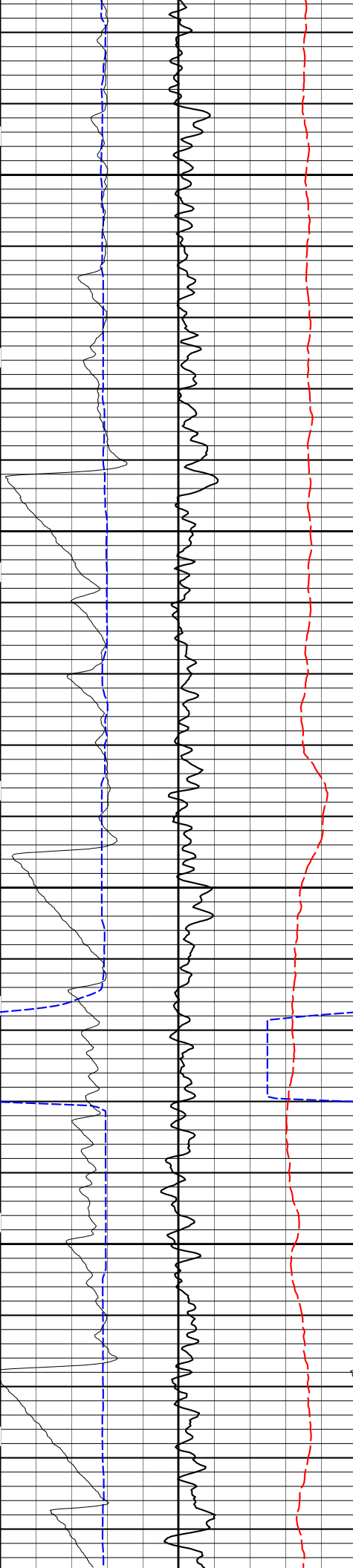
RT10

RT90

RT60

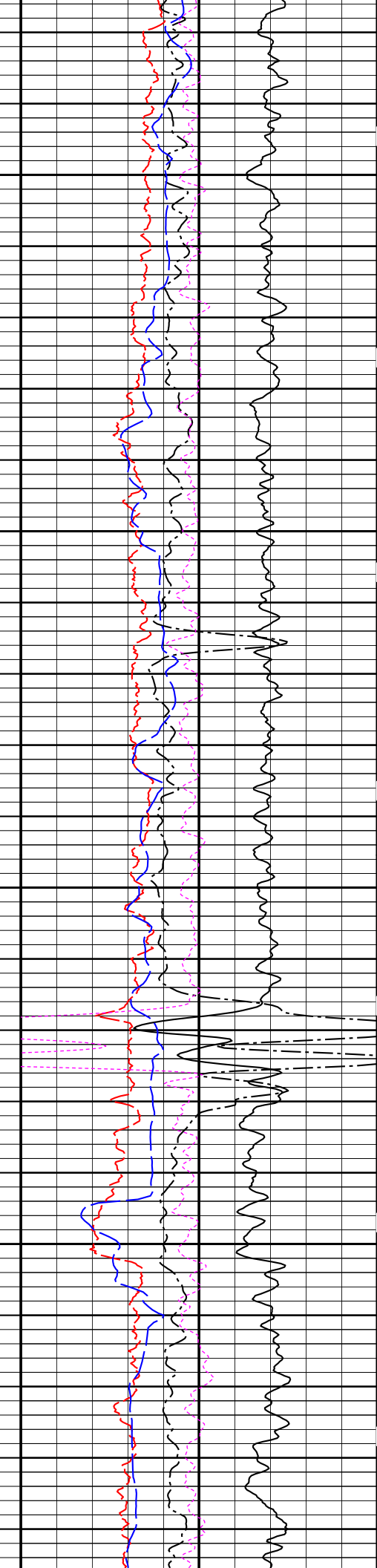
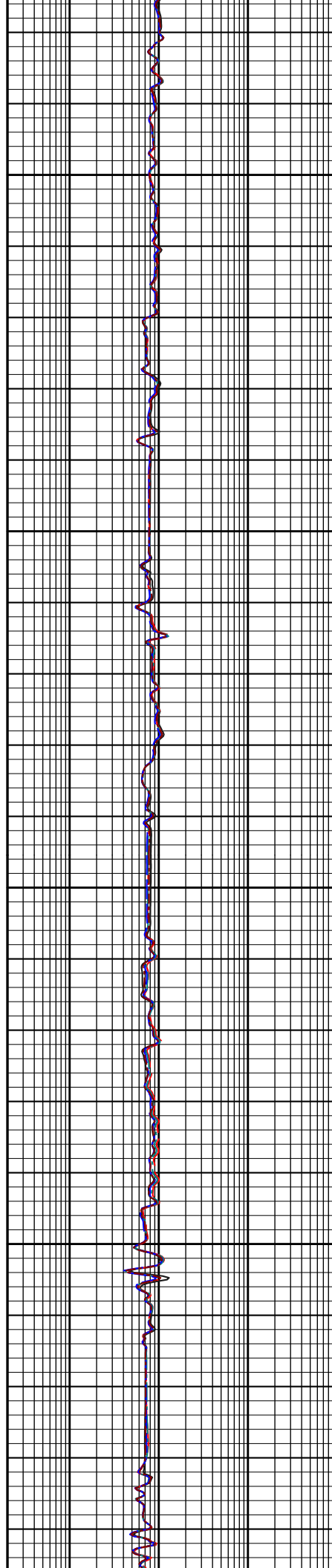
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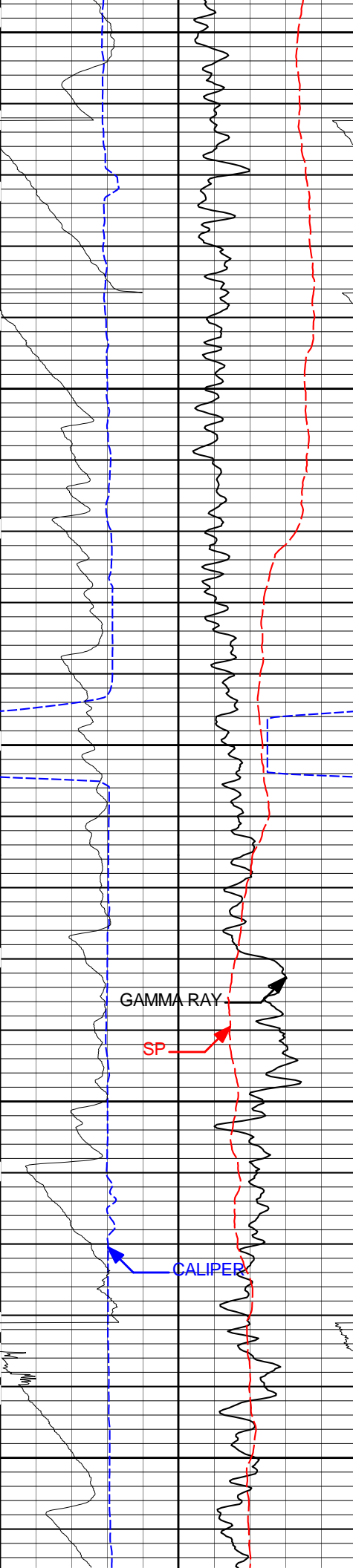
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12200

12300





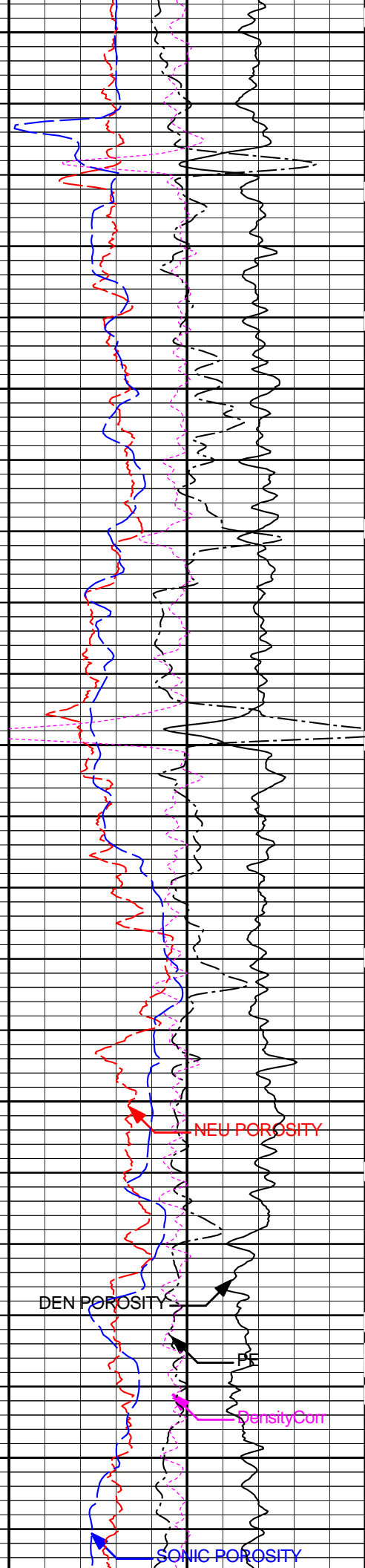
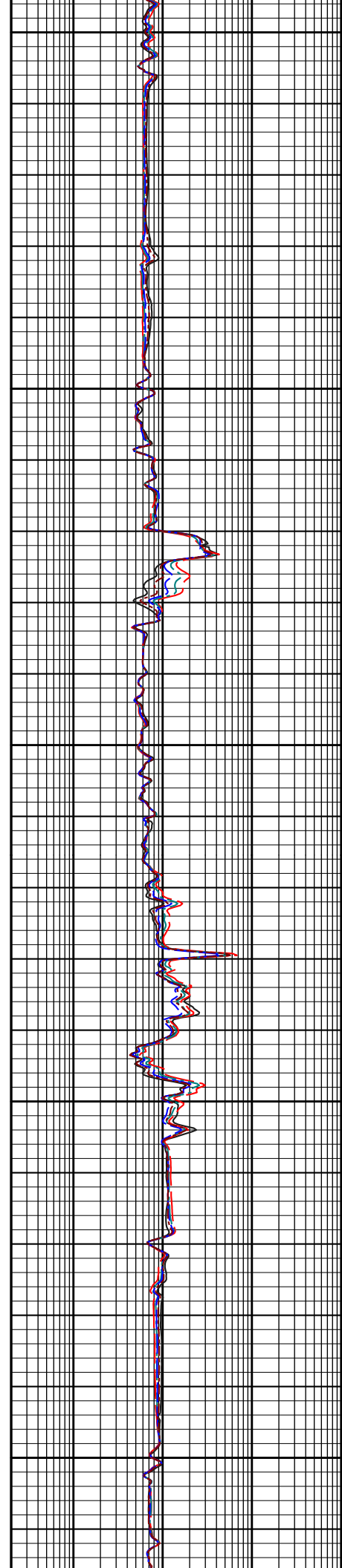
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12500

GAMMA RAY

SP

CALIPER

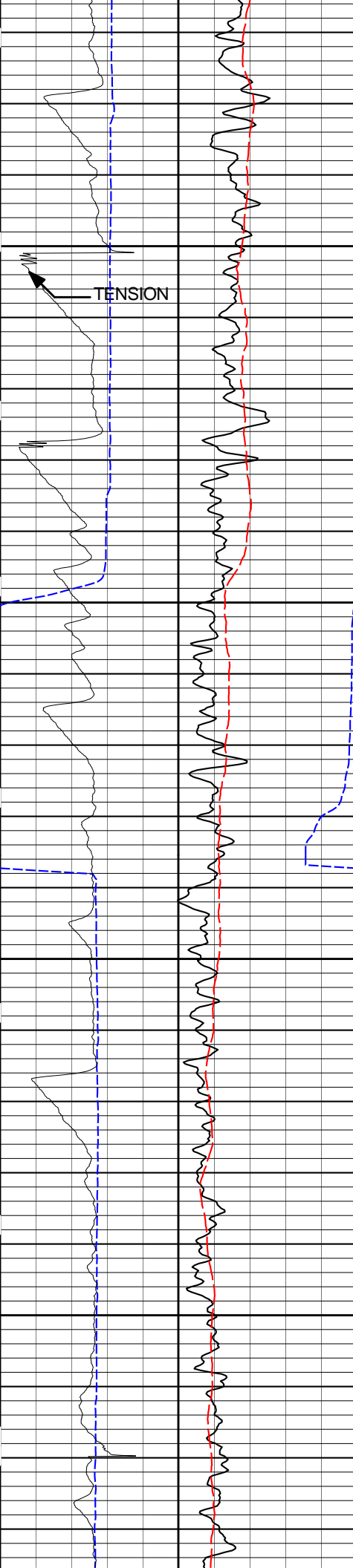


NEU POROSITY

DEN POROSITY

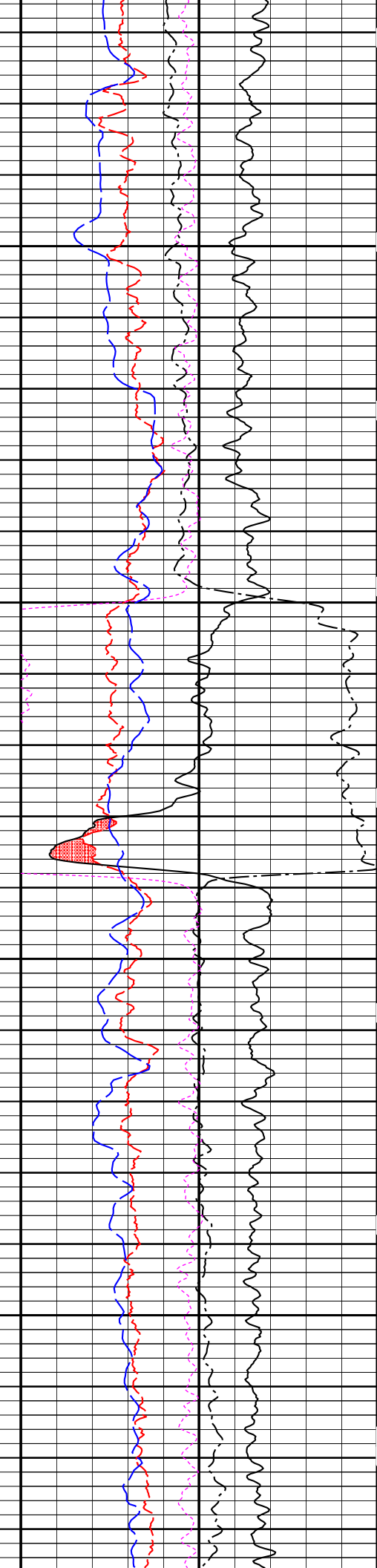
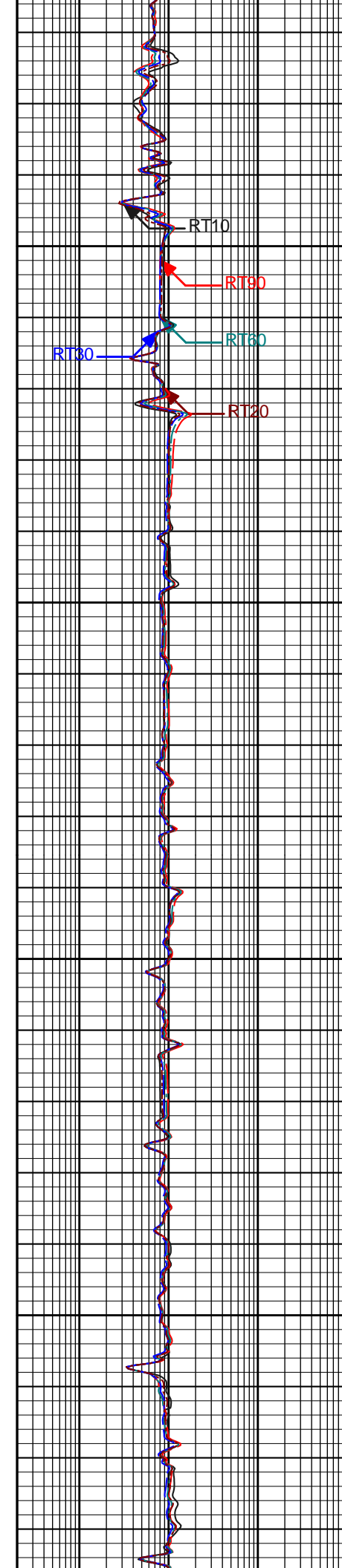
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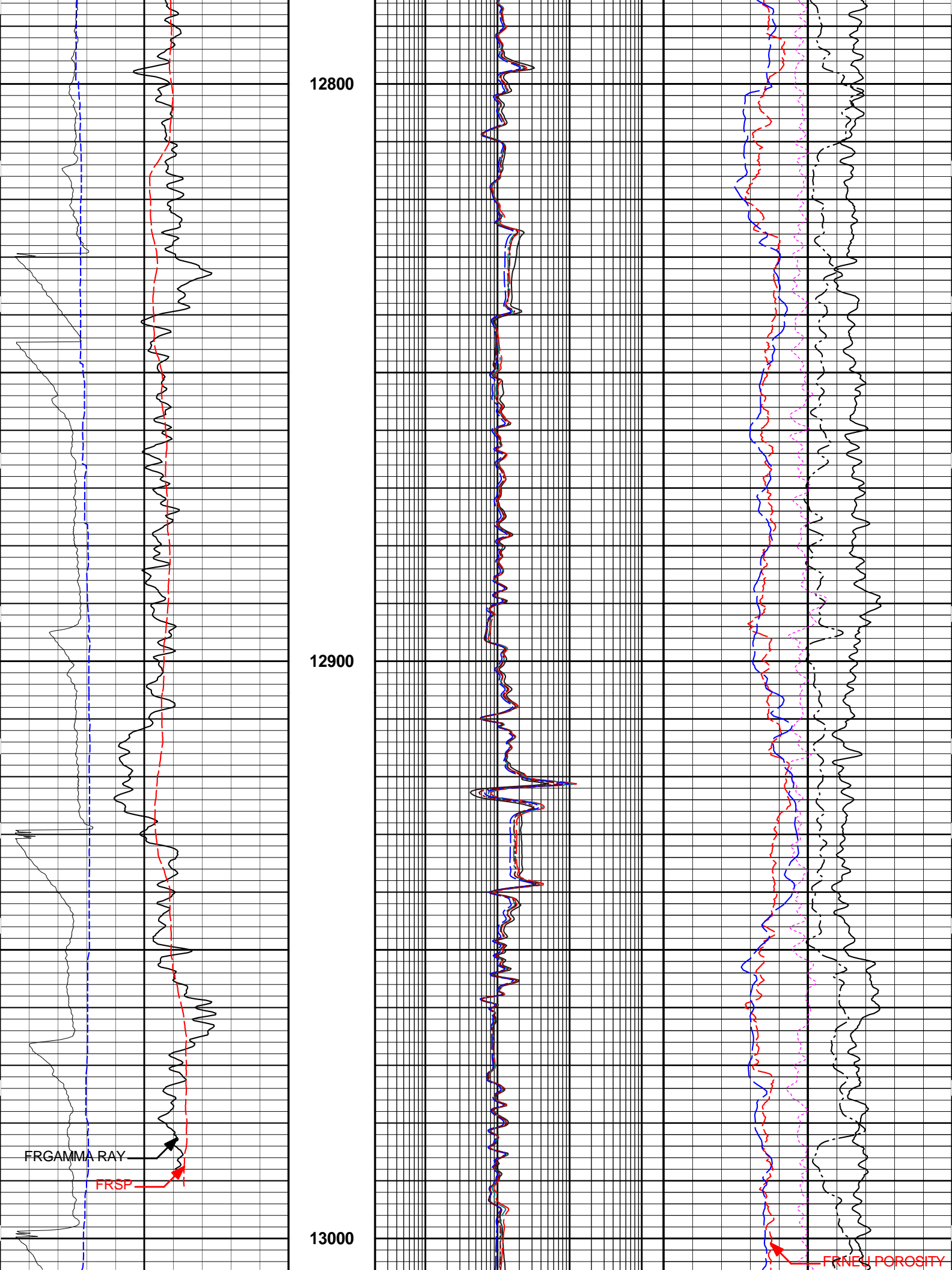
SONIC POROSITY

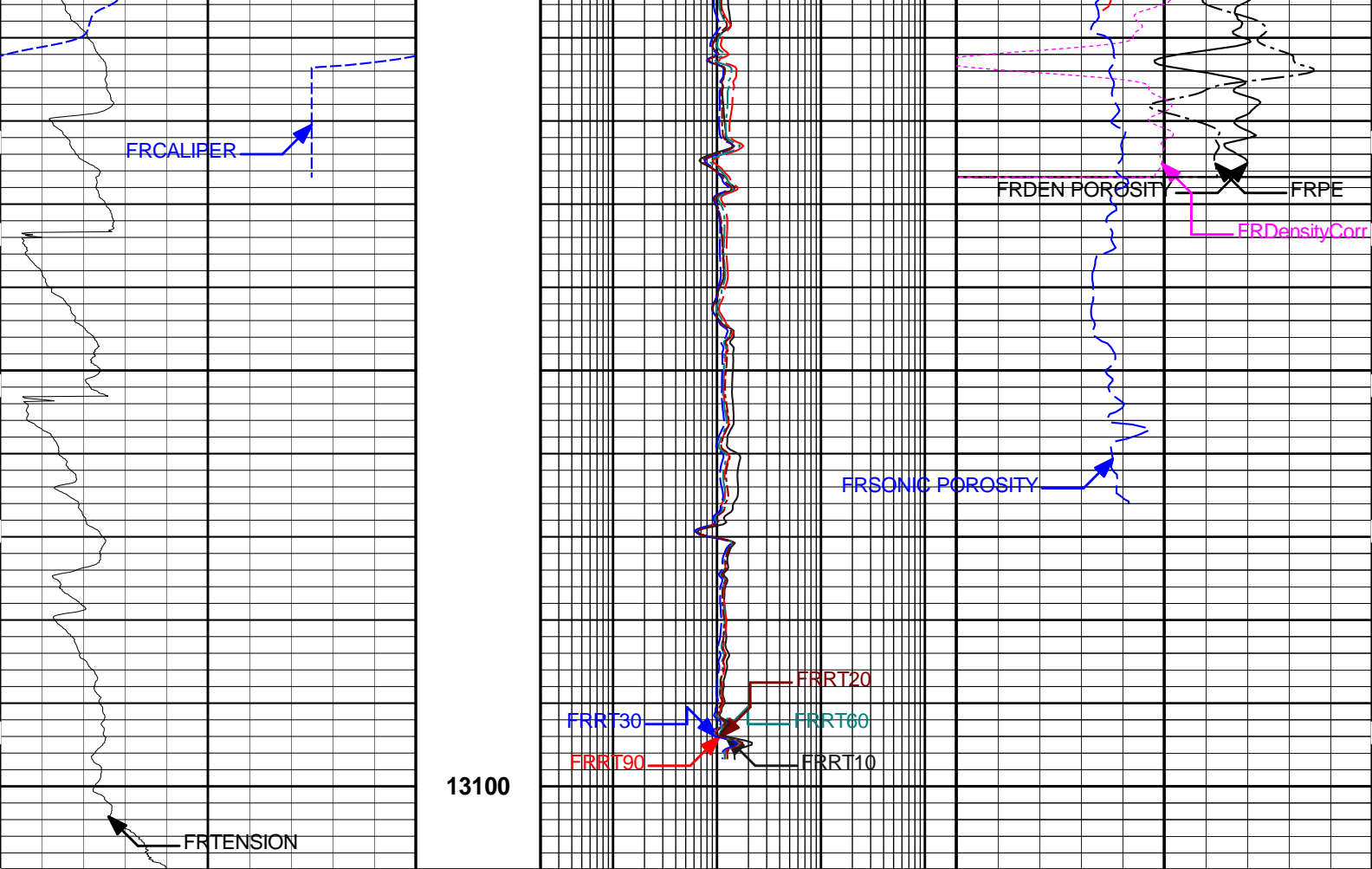


12600

12700







10000	TENSION	0	1 : 240 FT.	0.2	RT10	2000	-0.25	DensityCorr	0.25
	pounds							gram per cc	
0	SP	100		0.2	RT20	2000	0	PE	10
	millivolts								
6	CALIPER	16		0.2	RT30	2000	30	NEU POROSITY	-10
	inches							sand	
0	GAMMA RAY	150		0.2	RT60	2000	30	DEN POROSITY	-10
	api							2.68 g/cc	
				0.2	RT90	2000	30	SONIC POROSITY	-10
								55.5	

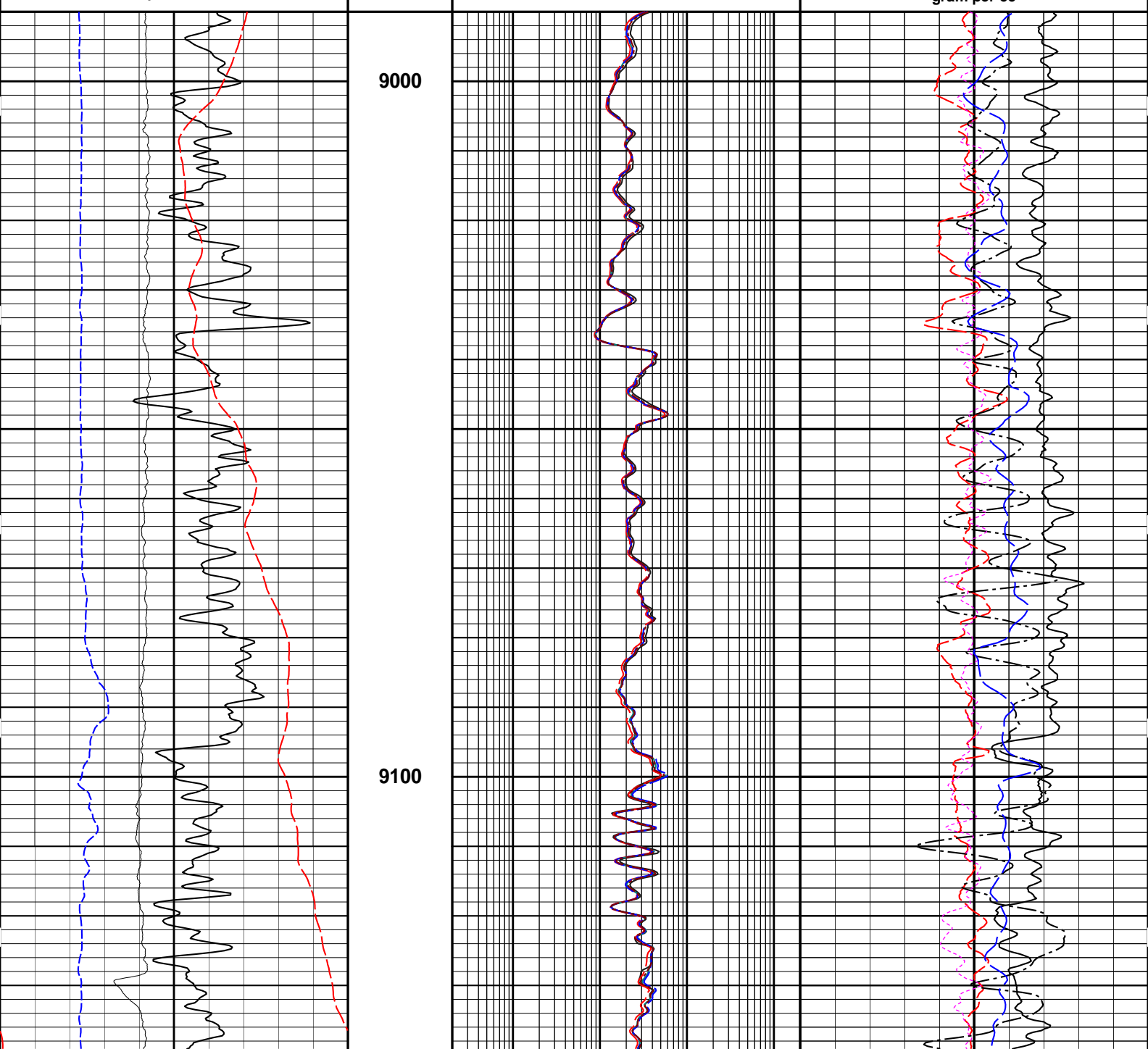
HALLIBURTON Plot Time: 16-Dec-13 16:20:33
 Plot Range: 8938 ft to 13110 ft
 Data: RWF_724_16\Well Based\HOSTILE_MAIN
 Plot File: \\COMP\WPX_QUAD_M

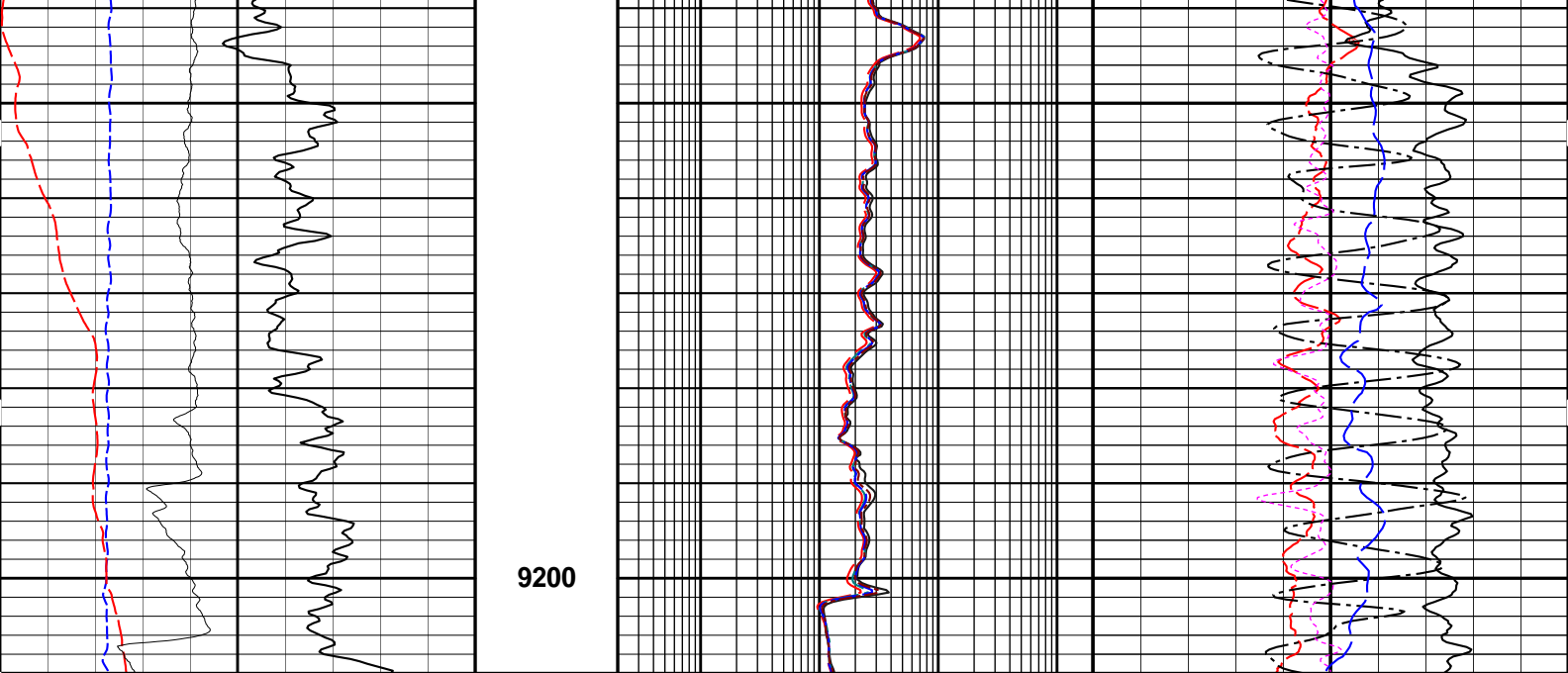
MAIN PASS 5" = 100'

HALLIBURTON Plot Time: 16-Dec-13 16:20:33
 Plot Range: 8990 ft to 9210 ft
 Data: RWF_724_16\Well Based\HOSTILE_RPT\
 Plot File: \\COMP\WPX_QUAD_R

REPEAT PASS 5" = 100'

0	GAMMA RAY	150	1 : 240 FT.	0.2	RT90	2000	30	SONIC POROSITY	-10
	api			0.2	RT60	2000	30	DEN POROSITY	-10
6	CALIPER	16		0.2	RT30	2000	30	NEU POROSITY	-10
	inches			0.2	RT20	2000	0	PE	10
0	SP	100		0.2	RT10	2000	-0.25	DensityCorr	0.25
	millivolts			ohm-m			gram per cc		
10000	TENSION	0		ohm-m					
	pounds								





10000	TENSION	0	1 : 240 FT.	0.2	RT10	2000	-0.25	DensityCorr	0.25	
	pounds								gram per cc	
0	SP	100			0.2	RT20	2000	0	PE	10
	millivolts									
6	CALIPER	16			0.2	RT30	2000	30	NEU POROSITY	-10
	inches							sand		
0	GAMMA RAY	150		0.2	RT60	2000	30	DEN POROSITY	-10	
	api							2.68 g/cc		
				0.2	RT90	2000	30	SONIC POROSITY	-10	
								55.5		

HALLIBURTON Plot Time: 16-Dec-13 16:20:36
 Plot Range: 8990 ft to 9210 ft
 Data: RWF_724_16\Well Based\HOSTILE_RPT\
 Plot File: \\COMP\WPX_QUAD_R

REPEAT PASS 5" = 100'

HALLIBURTON

CALIBRATION REPORT

ACCELEROMETER SHOP CALIBRATION

Tool Name: H4TG-A - 11232143	Reference Calibration Date: 10-Dec-13 16:47:49
Engineer: Z. TAYLOR	Calibration Date: 10-Dec-13 16:54:14
Software Version: WL INSITE R3.8.0 (Build 2)	Calibration Version: 1

Horizontal-1 Telemetry	Horizontal-2 Telemetry	Vertical Telemetry	Units
0.03	0.02	1.06	cnts

Coefficient	Coefficient Value	Tolerance

Gain	0.965233	----
Offset	-0.027	----
Noise	0.0009	0.0000 - 0.0030

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

HOSTILE DITS 4 TELEMETRY GAMMA SHOP CALIBRATION

Tool Name: H4TG-A - 11232143 **Reference Calibration Date:** 19-Sep-13 10:47:14
Engineer: Z. TAYLOR **Calibration Date:** 10-Dec-13 16:36:09
Software Version: WL INSITE R3.8.0 (Build 2) **Calibration Version:** 1

Calibrator Source S/N: TB-750
 Calibrator API Reference: 729.00
 Equivalent Calibrator API Reference: 700.7 api

Measurement	Measured	Calibrated	Units
Background	36.7	36.7	api
Background + Calibrator	738.5	737.3	api
Calibrator	701.8	700.7	api

HOSTILE DITS 4 TELEMETRY GAMMA FIELD CALIBRATION

Tool Name: H4TG-A - 11232143 **Reference Calibration Date:** 10-Dec-13 16:36:09
Engineer: Z. TAYLOR **Calibration Date:** 10-Dec-13 16:38:36
Software Version: WL INSITE R3.8.0 (Build 2) **Calibration Version:** 1

Calibrator Source S/N: TB-750
 Calibrator API Reference: 729.00 api
 Equivalent Calibrator API Reference: 700.7 api

Field Verification	Shop	Field	Units
Background	36.7	37.6	api
Background + Calibrator	737.3	741.7	api
Calibrator	700.7	704.1	api

Shop	Field	Difference	Tolerance
700.7	704.1	-3.4	+/- 9.00

HOSTILE DUAL SPACED NEUTRON SHOP CALIBRATION

Tool Name: HDSN - 10706985 **Reference Calibration Date:** 25-Sep-13 11:54:01
Engineer: PETER DIMPFL **Calibration Date:** 25-Sep-13 13:24:02
Software Version: WL INSITE R3.6.0 (Build 3) **Calibration Version:** 1

Water Tank S/N	GJ TANK	Logging Source S/N	08-037
Water Tank Value	52.750	Snow Block S/N	HOSTILE
Calibration Tank Water Temperature	75 degF	Min. Tool Housing Outside Diameter	2.750

CALIBRATION CONSTANTS			
Measurement	Previous Value	New Value	Control Limit On New Value
Gain	0.959	0.960	0.900 - 1.100

WATER TANK SUMMARY (Horizontal Water Tank)				
Measurement	Measured	Calibrated	Change	Control Limit On Change
Ratio	6.187	6.190	0.003	+/-0.15
Porosity (decn)	0.07113	0.07120	-0.000	+/-0.003

SNOW BLOCK SUMMARY

Measurement	Measured	Calibrated	Change	Control Limit On Change
Ratio	4.953	4.955	0.003	+/- 0.25
Porosity (decp)	0.04715	0.04710	0.000	----

PASS/FAIL SUMMARY

Background Check	Passed
Gain Range Check	Passed
Snow-Block Ratio Check	Passed
Water Tank Check	Passed

HOSTILE DENSITY CALIPER SHOP CALIBRATION

Tool Name: HSDL_M - 10280067	Reference Calibration Date: 26-Oct-13 02:59:06
Engineer: Z. TAYLOR	Calibration Date: 10-Dec-13 14:10:08
Software Version: WL INSITE R3.8.0 (Build 2)	Calibration Version: 1
Host Tool Name: HSDL - 10812414	

The ring diameter is computed from: $\text{DIAMETER} = \text{PAD EXTENSION} + \text{ARM EXTENSION} + \text{TOOL DIAMETER}$

Tool Diameter: 3.50 in

RING DIAMETER

Measurement	Current Reading (Previous Coeff.)	Calibrated (New Coeff.)
Small Ring (in)	3.85	4.000
Medium Ring (in)	5.80	6.00
Large Ring (in)	10.82	11.000

STANDOFF PAD

BACKUP ARM

Measurement	Current Reading (Previous Coeff.)	Calibrated (New Coeff.)	Current Reading (Previous Coeff.)	Calibrated (New Coeff.)
PAD ONLY:				
Small Ring (in)	0.39	0.50		
Medium Ring (in)	2.42	2.50		
PAD & ARM:				
Small Ring (in)	-0.29	-0.18	0.64	0.68
Medium Ring (in)	-0.16	-0.04	2.46	2.54
Large Ring (in)	0.08	0.19	7.25	7.31

PASS/FAIL SUMMARY

Calibration-Coefficients Range Check: Passed

HOSTILE SPECTRAL DENSITY SHOP CALIBRATION

Tool Name: HSDL_M Pad - 10815425	Reference Calibration Date: 10-Dec-13 10:54:20
Engineer: Z. TAYLOR	Calibration Date: 10-Dec-13 11:41:46
Software Version: WL INSITE R3.8.0 (Build 2)	Calibration Version: 1

Logging Source S/N: 5257GW

Aluminum Block S/N: 63069

Density: 2.588 g/cc

Pe: 3.160

Magnesium Block S/N: 63376

Density: 1.685 g/cc

Pe: 2.594

DENSITY CALIBRATION SUMMARY

Measurement	Previous Value	New Value	Control Limit
-------------	----------------	-----------	---------------

Near Bar Gain	0.9798	0.889	0.850 - 1.150
Near Dens Gain	1.0423	1.031	0.850 - 1.150
Near Peak Gain	1.0056	1.011	0.850 - 1.150
Near Lith Gain	0.9201	0.908	0.850 - 1.150
Far Bar Gain	0.9926	0.992	0.850 - 1.150
Far Dens Gain	1.0051	1.006	0.850 - 1.150

Near Bar Offset	-0.1906	0.596	NONE
Near Dens Offset	-0.6730	-0.559	NONE
Near Peak Offset	-0.3530	-0.394	NONE
Near Lith Offset	0.3883	0.481	NONE
Far Bar Offset	-0.1303	-0.127	NONE
Far Dens Offset	-0.1563	-0.165	NONE

Near Bar Background	593.63	594.59	385 - 850
Near Dens Background	628.54	630.17	415 - 915
Near Peak Background	130.39	129.50	90 - 200
Near Lith Background	149.47	149.20	100 - 220
Far Bar Background	292.91	292.56	205 - 450
Far Dens Background	356.60	358.89	250 - 550
Far Peak Background	73.91	72.81	55 - 120
Far Lith Background	76.60	75.59	55 - 120

CALIBRATION BLOCK SUMMARY				
Measurement	Current Reading (Previous Coef)	Calibrated (New Coef)	Change	Control Limit On Change
MAGNESIUM				
Density (g/cc)	1.697	1.683	0.013	+/- 0.015
Pe	2.449	2.564	-0.115	+/- 0.150
ALUMINUM				
Density (g/cc)	2.586	2.587	-0.001	+/- 0.015
Pe	3.078	3.147	-0.069	+/- 0.150

TOOL SUMMARY				
Measurement	Near Detector		Far Detector	
	Value	Control Limit	Value	Control Limit
QUALITY				
Background	-0.0032	+/- 0.010	0.0018	+/- 0.021
Magnesium Block	-0.0005	+/- 0.016	0.0010	+/- 0.021
Aluminum Block	0.0013	+/- 0.012	0.0023	+/- 0.015
Resolution	8.56	6.00 - 11.50	8.88	6.00 - 11.50
Internal Verifier(B+D+P+L)	1498	990 - 2180	798	560 - 1230

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

HOSTILE SPECTRAL DENSITY FIELD CALIBRATION

Tool Name: HSDL_M Pad - 10815425	Reference Calibration Date: 10-Dec-13 11:41:46
Engineer: Z. TAYLOR	Calibration Date: 10-Dec-13 14:16:35
Software Version: WL INSITE R3.8.0 (Build 2)	Calibration Version: 1

Logging Source S/N: 5257GW

PASS/FAIL SUMMARY

Background Check: Passed

HOSTILE DENSITY CALIPER FIELD CALIBRATION

Tool Name: HSDL_M - 10280067	Reference Calibration Date: 10-Dec-13 14:10:08
Engineer: Z. TAYLOR	Calibration Date: 10-Dec-13 14:12:30
Software Version: WL INSITE R3.8.0 (Build 2)	Calibration Version: 1

MEASURED CALIPER VALUES

Measurement	Shop	Field	Change	Control Limit On New Value
Pad Extension	2.50	2.52	0.02	+/- 0.25
Ring Diameter	6.00	6.00	-0.00	+/- 0.25

PASS/FAIL SUMMARY

Pad Extension Check: Passed

Diameter Check: Passed

HOSTILE ARRAY COMPENSATED TRUE RESISTIVITY SHOP CALIBRATION

Tool Name: HACRT Sonde - 11005910	Reference Calibration Date: 22-Oct-13 16:22:29
Engineer: P. DIMPFL	Calibration Date: 22-Oct-13 16:32:57
Software Version: WL INSITE R3.6.0 (Build 3)	Calibration Version: 1
Host Tool Name: HACRT Instrument - 10996985	

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	1.01	1.05	0.95	1.01	1.05
A3 (29")	0.95	1.03	1.05	0.95	1.02	1.05	0.95	1.02	1.05
A4 (17")	0.95	1.02	1.05	0.95	1.01	1.05	0.95	1.01	1.05
A5 (10")	N/A	N/A	N/A	0.95	1.02	1.05	0.95	1.02	1.05
A6 (6")	N/A	N/A	N/A	0.95	1.02	1.05	0.95	1.02	1.05

TYPICAL SONDE OFFSET RANGE

Subarray	R12KHz			R36KHz			R72KHz		
	Lower	(mmho/m)	Upper	Lower	(mmho/m)	Upper	Lower	(mmho/m)	Upper
A1 (80")	-20	-14.27	20	-10	-6.19	5	-10	-5.72	5
A2 (50")	-15	-11.53	10	-10	-5.15	5	-10	-4.92	5
A3 (29")	-50	-20.28	0	-15	-9.53	5	-12	-7.18	0
A4 (17")	-180	-140.98	-60	-60	-41.50	0	-50	-29.01	0
A5 (10")	N/A	N/A	N/A	-300	-240.22	-100	-150	-114.35	-50
A6 (6")	N/A	N/A	N/A	-100	58.05	300	-75	7.70	75

TRANSMITTER CURRENT GAIN

B MUD VERIFICATION

TRANSMITTER CURRENT GAIN

R-MUD VERIFICATION

Signal	Lower	R	Upper
12K	1.2	1.49	1.8
36K	1.5	1.82	2.1
72K	1.6	1.90	2.2

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
H4TG-A-11232143						
AccZ Horizontal	-0.00	-----	-----	0.00	-----	g
AccZ Vertical	1.00	-----	-----	0	-----	g
Gamma Ray Calibrator	700.7	704.1	-----	-3.4	+/- 9.00	api
HDSN-10706985						
Snow Block Ratio	4.955	-----	-----	0.000	+/- 0.50	-----
Snow Block Porosity	0.04710	-----	-----	0.00000	+/- 0.009	decp
HSDL_M-10280067						
Pad Extension	2.50	2.52	-----	-0.02	+/-0.25	in
Ring Diameter	6.00	6.00	-----	0.00	+/-0.25	in
HSDL_M Pad-10815425						
Near(B+D+P+L)	1498.354	1495.957	-----	2.397	+/-15.598	cps
Far(B+D+P+L)	798.435	801.012	-----	-2.577	+/-15.656	cps
HACRT Sonde-11005910						
Mud Cell	1.00	-----	-----	0.00	-----	ohm-m



CUSTOMER EVENT LOG

Event Type	Time & Date	Depth (ft)	Event Description
	14-Dec-13 10:13:04	9152.50	Logging 001 14-Dec-13 10:13 Up @9152.5f
	14-Dec-13 10:20:19	8939.51	Halting 001 14-Dec-13 10:13 Up @9152.5f
	14-Dec-13 10:21:23	8792.00	Logging 002 14-Dec-13 10:21 Dn @8792.0f
	14-Dec-13 11:51:33	12848.74	Halting 002 14-Dec-13 10:21 Dn @8792.0f
	14-Dec-13 11:55:25	12735.75	Logging 003 14-Dec-13 11:55 Dn 12735.8f
	14-Dec-13 12:29:11	12963.68	Halting 003 14-Dec-13 11:55 Dn 12735.8f
	14-Dec-13 12:32:47	13096.50	Logging 004 14-Dec-13 12:32 Up 13096.5f
	14-Dec-13 15:41:42	8690.08	Halting 004 14-Dec-13 12:32 Up 13096.5f

Data: RWF_724_16\0002 HOSTILE_QUAD\LAB

Date: 14-Dec-13 15:48:42



TOOL STRING DIAGRAM REPORT

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

RWCH-11830872
135.00 lbs

Ø 3.625 in →

← Load Cell @ 135.48 ft
← BH Temperature @ 134.92 ft

6.25 ft

139.17 ft

XODH-00000001
20.00 lbs

Ø 2.750 in ↙
Ø 3.625 in →

0.88 ft

132.92 ft

132.04 ft

H4TG-A-11232143
221.00 lbs

Ø 2.750 in →

13.77 ft

← GammaRay @ 121.30 ft

118.27 ft

HSSP-A-11107776
82.00 lbs

Ø 2.750 in →

← SP @ 116.36 ft

3.85 ft

114.42 ft

HGNI-10271402
95.00 lbs

Ø 2.750 in →

7.67 ft

106.75 ft

HDSN-10706985
86.00 lbs

Ø 2.750 in →

← HDSN Far @ 103.06 ft
← HDSN Near @ 102.56 ft

6.27 ft

100.48 ft

HSDL-10812414
120.00 lbs

Ø 2.750 in →

9.25 ft

91.23 ft



HSDL_M-10280067
310.00 lbs

HSDL_M Pad-10815425
65.00 lbs

Ø 3.500 in →

Ø 4.750 in* →

Ø 3.125 in →

Ø 3.120 in →

Ø 2.750 in →

13.37 ft

SDL Arm Caliper @ 82.36 ft
SDL @ 81.67 ft
SDL Pad Caliper @ 81.61 ft

77.86 ft

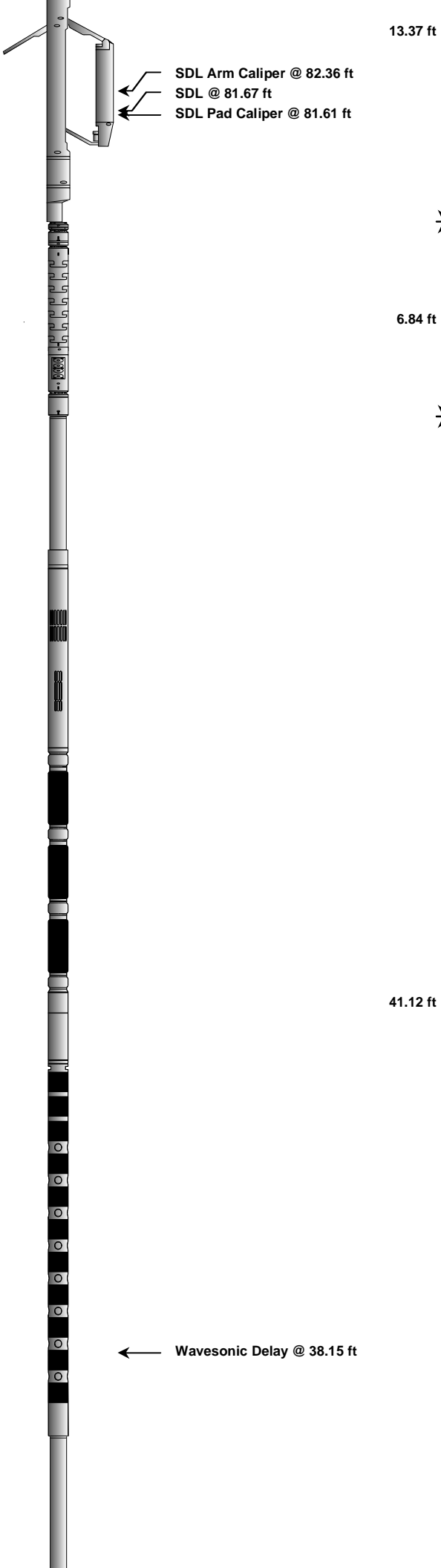
6.84 ft

71.02 ft

HHFS-00000001
90.00 lbs

HWST-11275522
595.00 lbs

← Wavesonic Delay @ 38.15 ft



HACRT Instrument-
10996985
50.00 lbs

Ø 2.790 in →

10.85 ft

29.90 ft

Ø 3.125 in ↘

19.05 ft

← Mud Resistivity @ 13.51 ft

HACRT Sonde-
11005910
370.00 lbs

Ø 3.125 in →

← ACRt @ 9.91 ft

18.72 ft

HACRt Sleeve Protector-
11005910
1.00 lbs

Ø 3.500 in* ↘

0.33 ft

Hostile Bull Nose-
00000001
5.00 lbs

Ø 2.750 in →

0.33 ft

0.00 ft



Mnemonic	Tool Name	Serial Number	Weight (lbs)	Length (ft)	Accumulated Length (ft)	Max.Log. Speed (fpm)
RWCH	Releasable Wireline Cable Head	11830872	135.00	6.25	132.92	300.00
XODH	Dits to Hostile Cross Over	00000001	20.00	0.88	132.04	300.00
H4TG	Hostile Quad Telemetry Gamma Sub	11232143	221.00	13.77	118.27	60.00
HSSP	Hostile SP Sub	11107776	82.00	3.85	114.42	300.00
HGNI_A	Hostile Gamma Neutron Instrument	10271402	95.00	7.67	106.75	300.00
HDSN-A	Hostile Dual Spaced Neutron	10706985	86.00	6.27	100.48	45.00
HSDL_A	Hostile Spectral Density Instrument	10812414	120.00	9.25	91.23	300.00
HSDL_M	Hostile Spectral Density Mandrel	10280067	310.00	13.37	77.86	45.00
SDLP	Hostile Density Extendable Pad	10815425	65.00	2.55 *	80.67	60.00
HHFS	High Temp High Press Flex Sub	00000001	90.00	6.84	71.02	300.00
HWST	Hostile Wave Sonic Dipole Tool - 25K PSI	11275522	595.00	41.12	29.90	30.00
HACRT	Array Compensated True Resistivity Instrument Section 20K	10996985	50.00	10.85	19.05	100.00
HACRT_S	Array Compensated True Resistivity Sonde Section	11005910	370.00	18.72	0.33	100.00
HSP	HACRt sleeve protector	11005910	1.00	0.15 *	0.33	300.00
BLNS	Bull Nose	00000001	5.00	0.33	0.00	300.00
Total			2,245.00	139.17		

* Not included in Total Length and Length Accumulation.

Data: RWF_724_16\0002 HOSTILE_QUAD\004 14-Dec-13 12:32 Up 13096.5f

Date: 14-Dec-13 14:47:27

WELL	LANGSTAFF RWF 724-16		
FIELD	RULISON		
COUNTY	GARFIELD	STATE	CO
HALLIBURTON		SPECTRAL DENSITY DUAL SPACED NEUTRON WAVE SONIC ARRAY COMPENSATED TRUE RESISTIVITY	