

HALLIBURTON

BOREHOLE SONIC ARRAY LOG

COMPANY		MERIT ENERGY COMPANY, LLC	
WELL		LCSLU 108 (WSW)	
FIELD/BLOCK		BIG SKY	
COUNTY		GRANT	
STATE		KANSAS	
Permanent Datum	GL	Elev. 3112.0 ft	
Log measured from	KB	D.F. 3125.0 ft	
Drilling measured from	KB	G.L. 3112.0 ft	
Date	17-Oct-17		
Run No.	ONE		
Depth - Driller	6603.0 ft		
Depth - Logger	6601.0 ft		
Bottom - Logged Interval	6601.0 ft		
Top - Logged Interval	1448.0 ft		
Casing - Driller	8.625 in	@ 1449.0 ft	
Casing - Logger	1448.0 ft		
Bit Size	7.875 in	@	
Type Fluid in Hole	Water Based Mud		
Density	9.1 ppg	50.00 s/qt	
PH	10.50 pH	5.6 cptom	
Source of Sample	FLOWLINE		
Rm @ Meas. Temperature	0.88 ohmm	@ 75.00 degF	
Rmf @ Meas. Temperature	0.68 ohmm	@ 75.00 degF	
Rmc @ Meas. Temperature	1.01 ohmm	@ 75.00 degF	
Source Rmf	MEAS	MEAS	
Rm @ BHT	0.64 ohmm	@ 144.0 degF	
Time Since Circulation	05:52 hr		
Time on Bottom	18-Oct-17 02:07		
Max. Rec. Temperature	144.00 degF	@ 6601.0 ft	
Equipment Location	12156883	EL RENO, OK	
Recorded By	MICHAEL RICHTER		
Witnessed By	MARTIN LANGE	TROY FOWLER	

Fold here

Service Ticket No.: 904370552		API No.: 15067218410000		PGM Version: WL INSITE R5.0.5 (Build 8)									
CHANGE IN MUD TYPE OR ADDITIONAL SAMPLE				RESISTIVITY SCALE CHANGES									
Date	Sample No.			Type Log	Depth	Scale Up Hole	Scale Down Hole						
Depth-Driller													
Type Fluid in Hole													
Density	Viscosity												
Ph	Fluid Loss												
Source of Sample				RESISTIVITY EQUIPMENT DATA									
Rm @ Meas. Temp	@	@		Run No.	Tool Type & No.	Pad Type	Tool Pos.	Other					
Rmf @ Meas. Temp.	@	@		ONE	ACRT	NONE	CENT	N/A					
Rmc @ Meas. Temp.	@	@			I-11055059								
Source Rmf	Rmc				S-11038385								
Rm @ BHT	@	@											
Rmf @ BHT	@	@											
Rmc @ BHT	@	@											
EQUIPMENT DATA													
GAMMA		ACOUSTIC		DENSITY		NEUTRON							
Run No.	ONE	Run No.	ONE	Run No.	ONE	Run No.	ONE						
Serial No.	11021139	Serial No.	10939049	Serial No.	10809130	Serial No.	11020487						
Model No.	GTET	Model No.	BSAT	Model No.	SDLT	Model No.	DSNT						
Diameter	3.625"	No. of Cent.	2	Diameter	6.0"	Diameter	3.625"						
Detector Model No.	GTET	Spacing	0.5"	Log Type	GAM-GAM	Log Type	NEU-NEU						
Type	SCINT			Source Type	Cs-137	Source Type	Am241Be						
Length	8"	LSA [Y/N]		Serial No.	5155GW	Serial No.	DSN-436						
Distance to Source	N/A	FWDA [Y/N]		Strength	1.5 Ci	Strength	15 Ci						
LOGGING DATA													
GENERAL			GAMMA		ACOUSTIC		DENSITY		NEUTRON				
Run	Depth		Scale		Scale		Scale		Scale				
No.	From	To	L	R	L	R	L	R	L	R			
ONE	TD	CSG	0	150	30	-10	47.6 us/ft	30	-10	2.71 g/cc	30	-10	LIME

DIRECTIONAL INFORMATION

Maximum Deviation @ KOP @
 CLIENT REPORTED VERTICAL WELL
 Remarks: GTET-DSNT-SDLT-BSAT-ACRT
 ANNULAR HOLE VOLUME CALCULATED FOR 5.5 INCH CASING
 DETAILED SECTION LOGGED TO 3,630 FT AS PER CLIENT REQUEST
 CHLORIDES REPORTED AT 1000 PPM
 NO POST-CALS COMPLETED AS PER CLIENT REQUEST
 RIG: DUKE DRILLING RIG 9
 CREW: K. FITZPATRICK, R. BLANKENSHIP
 THANK YOU FOR CHOOSING HALLIBURTON ENERGY SERVICES -- EL RENO, OK -- 405.278.9685

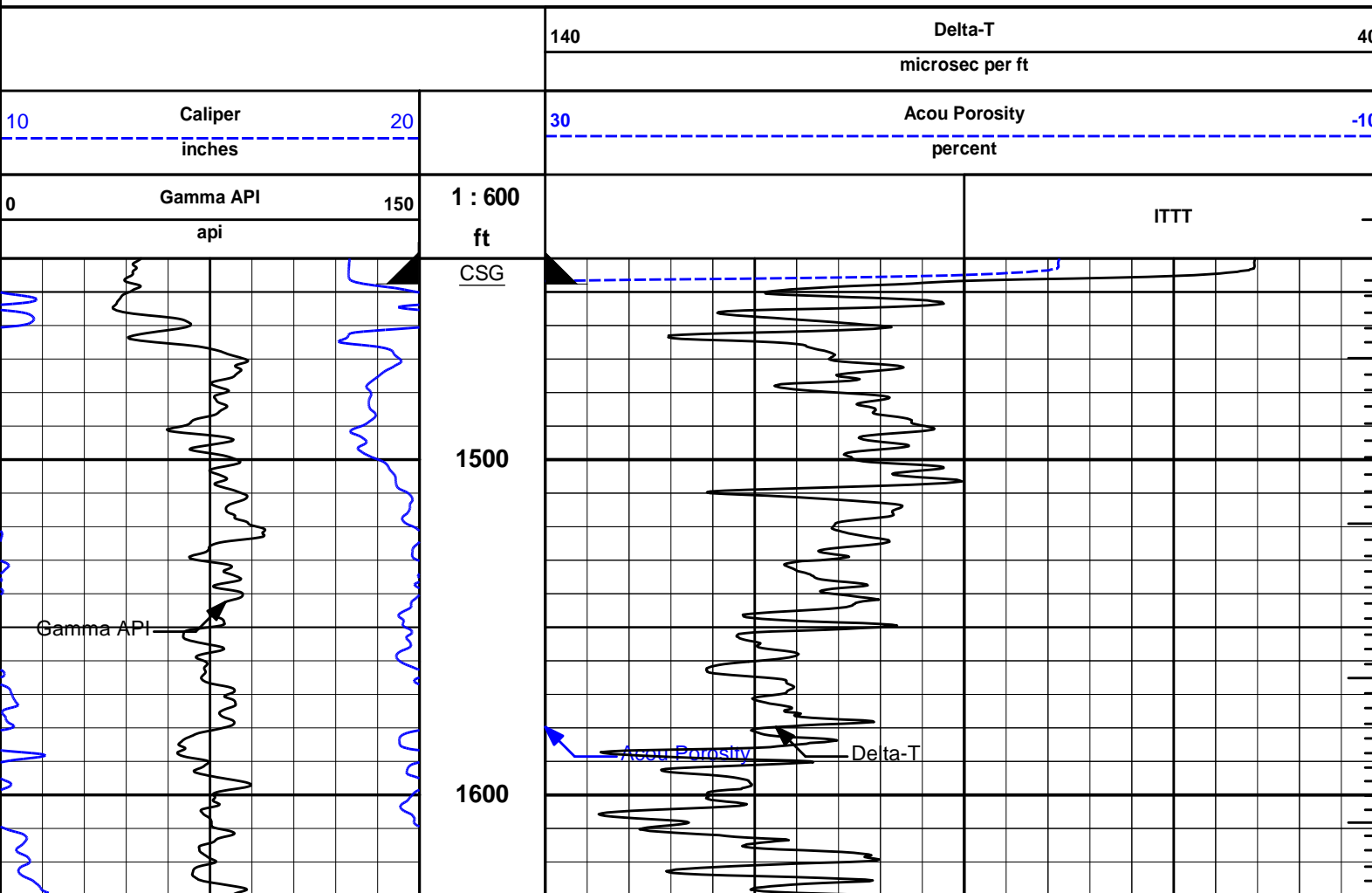
HALLIBURTON DOES NOT GUARANTEE THE ACCURACY OF ANY INTERPRETATION OF THE LOG DATA, CONVERSION OF LOG DATA TO PHYSICAL ROCK PARAMETERS OR RECOMMENDATIONS WHICH MAY BE GIVEN BY HALLIBURTON PERSONNEL OR WHICH APPEAR ON THE LOG OR IN ANY OTHER FORM. ANY USER OF SUCH DATA, INTERPRETATIONS, CONVERSIONS, OR 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.

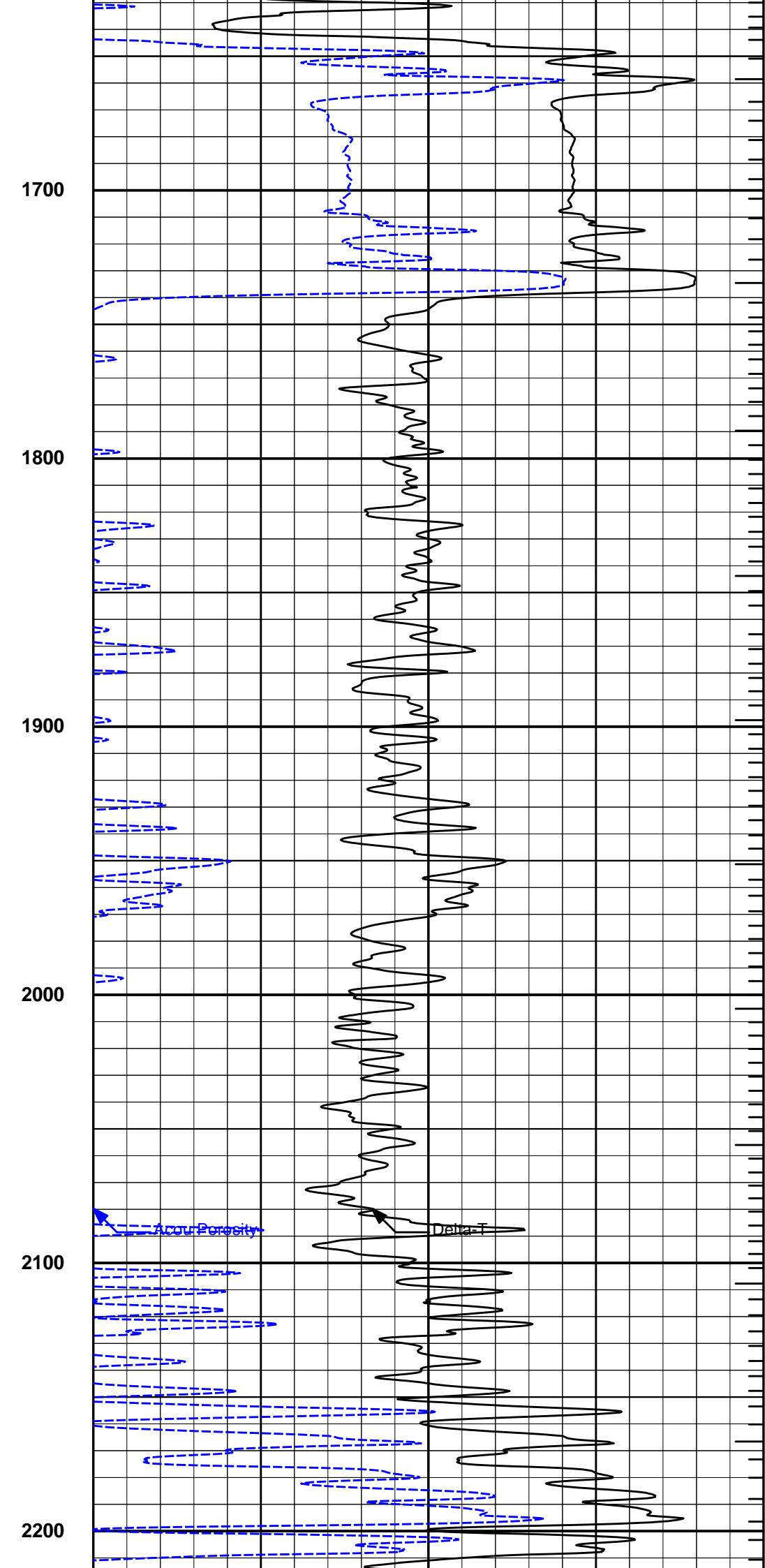
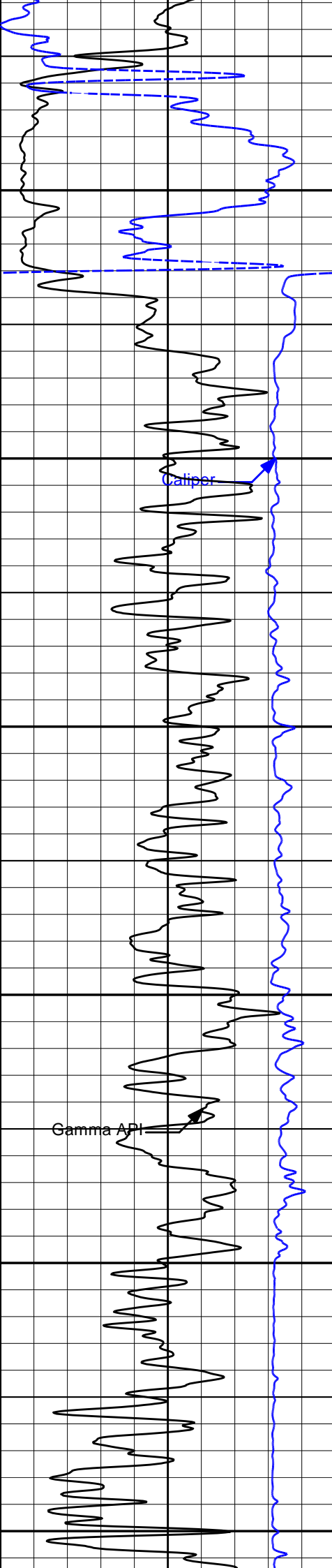
HALLIBURTON

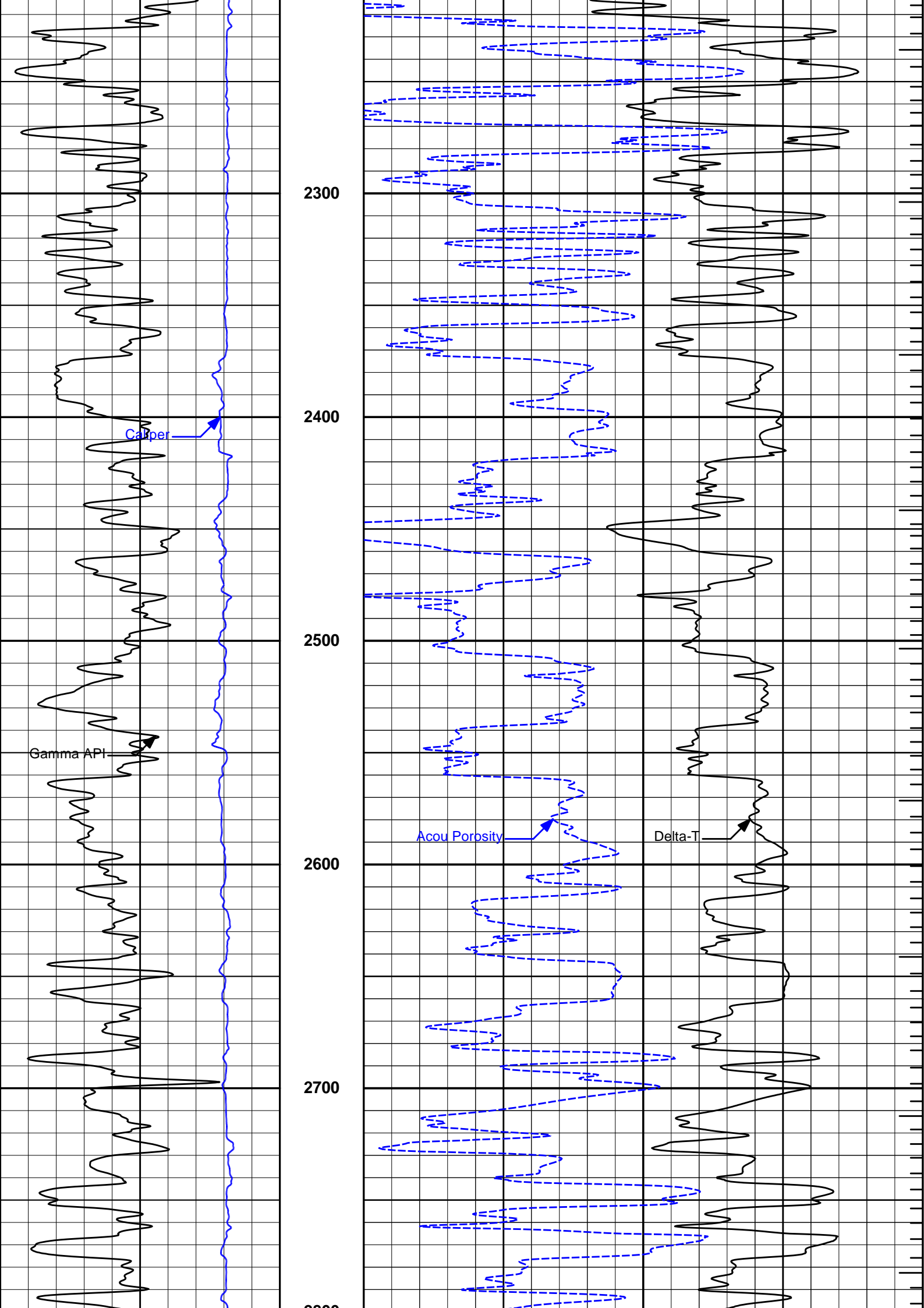


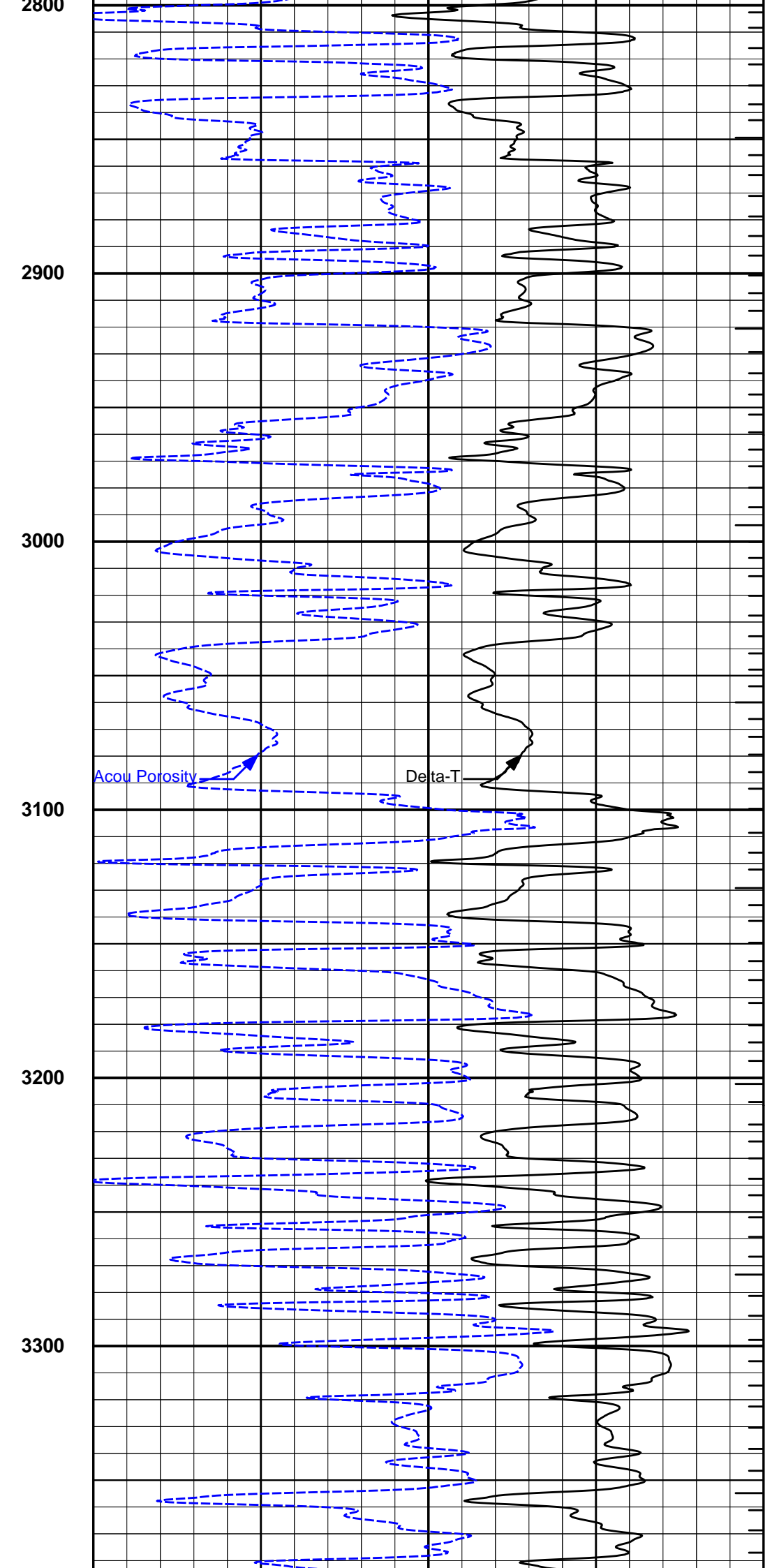
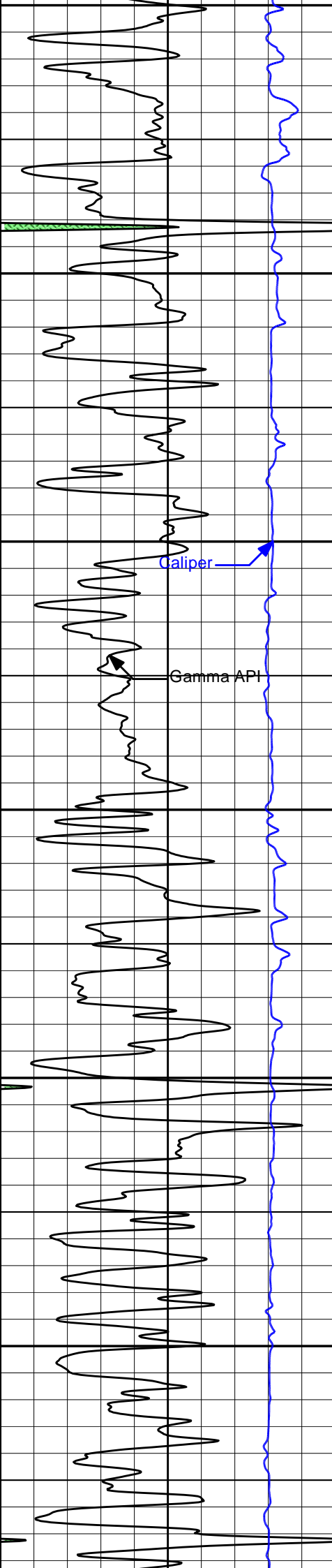
Plot Time: 18-Oct-17 04:51:55
 Plot Range: 1440 ft to 6579.75 ft
 Data: MERIT_LCSLU 108\Well Based\MAIN\
 Plot File: \BSAT1_BSAT_2inx

2 INCH MAIN LOG









2800

2900

3000

3100

3200

3300

Caliper

Gamma API

Acou Porosity

Delta-T



3400

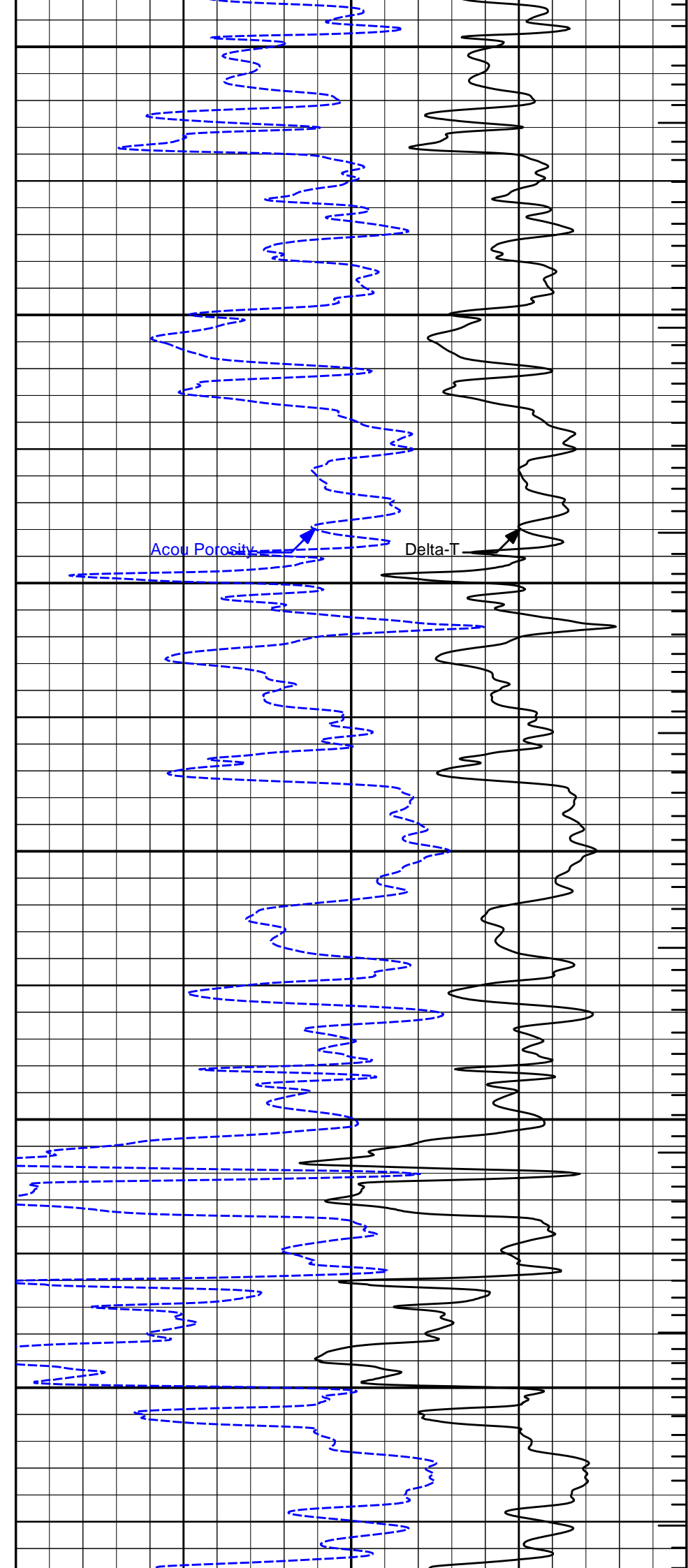
3500

3600

3700

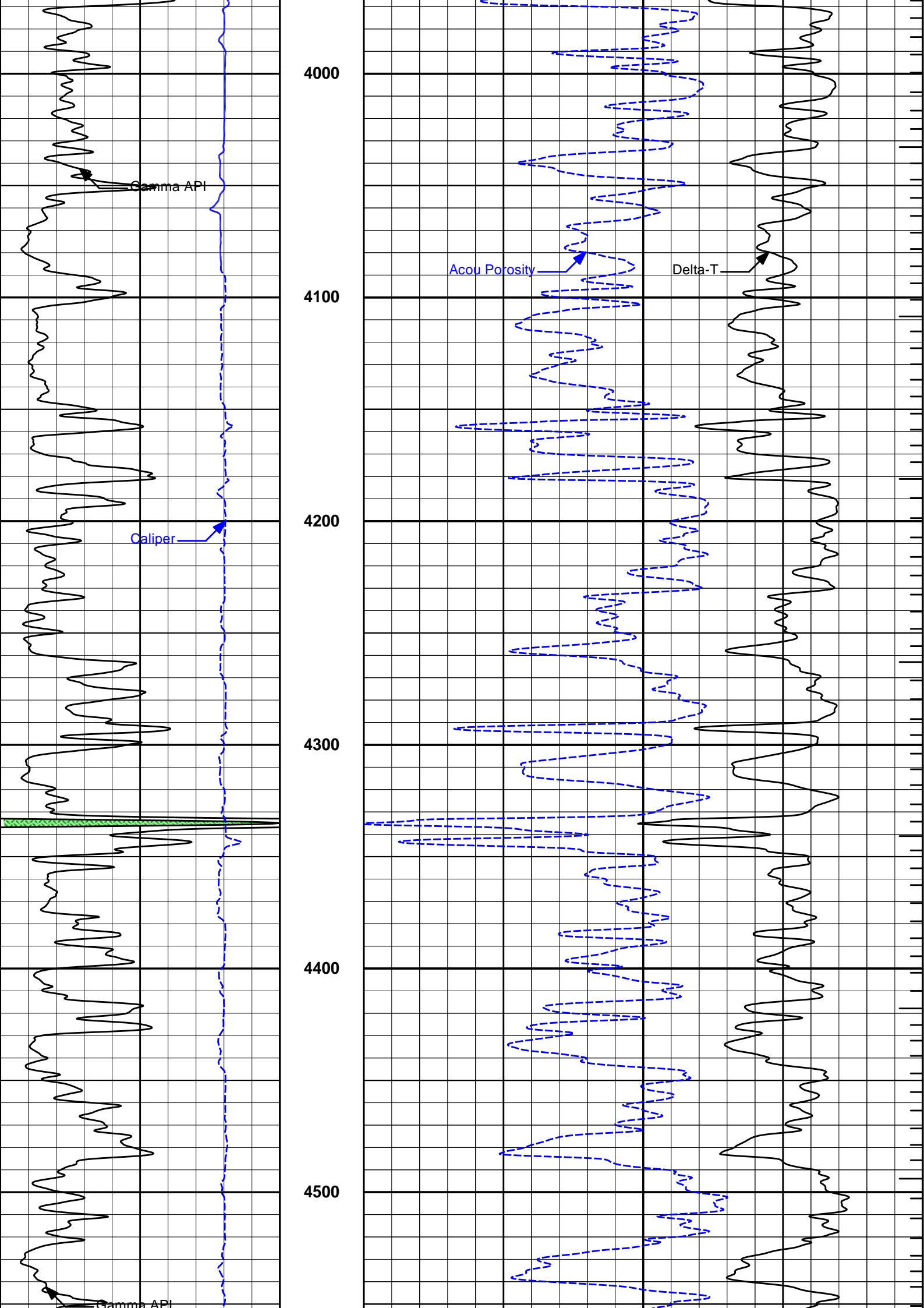
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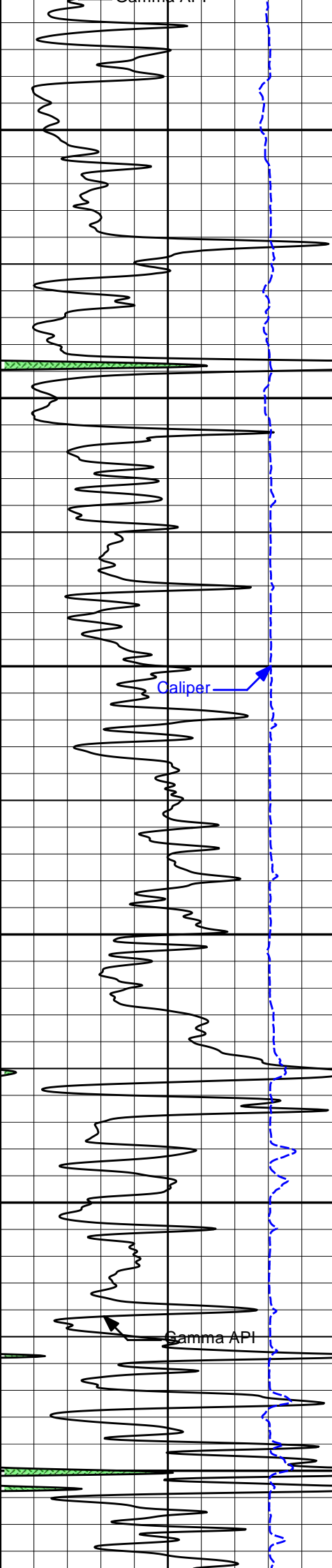
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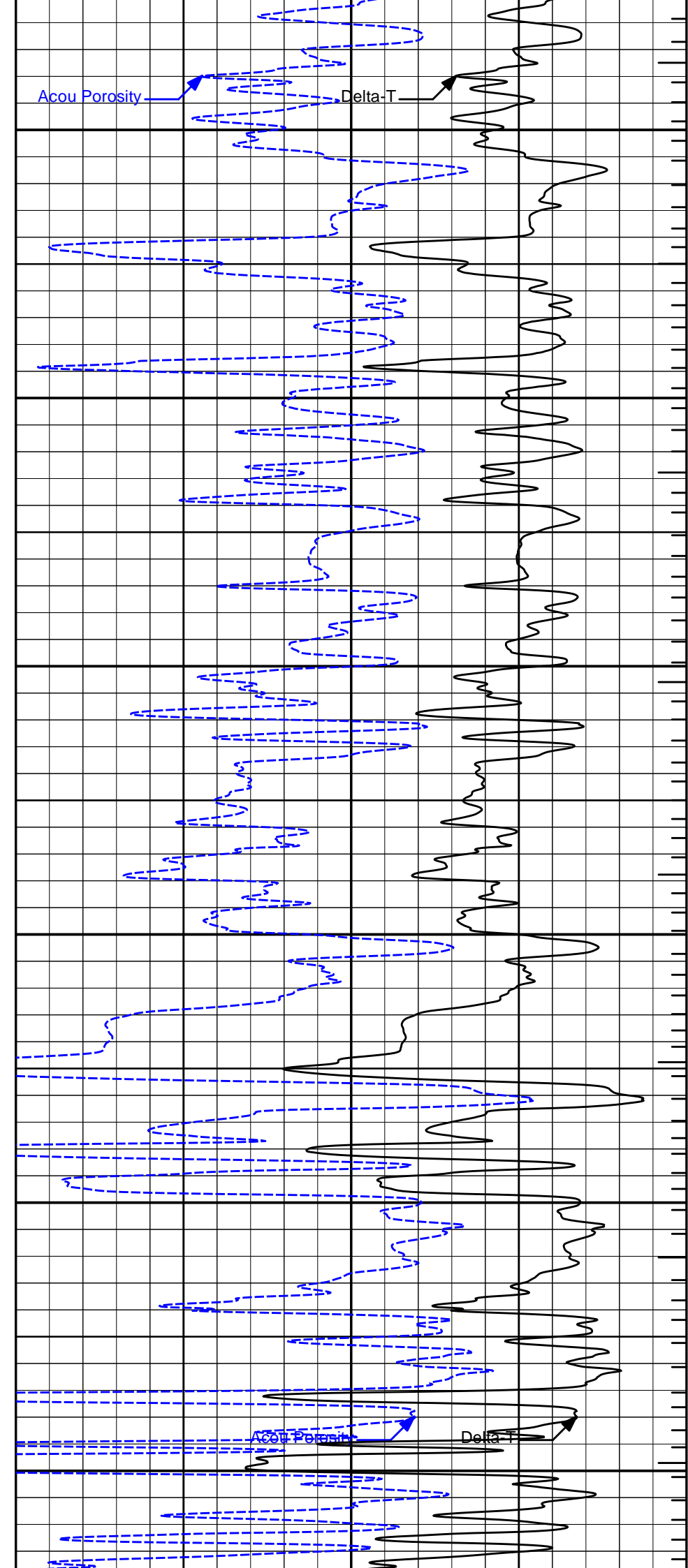
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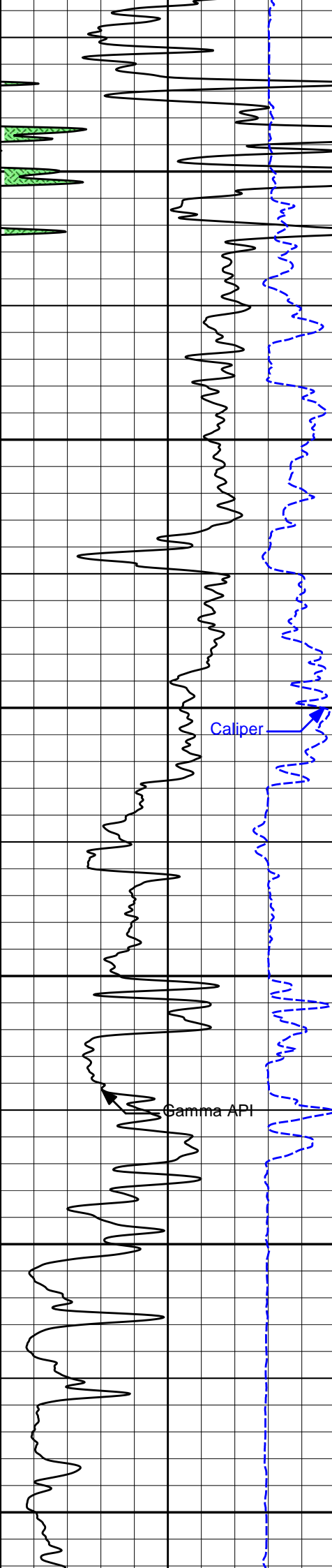
Delta-T





4600
4700
4800
4900
5000
5100





5200

5300

5400

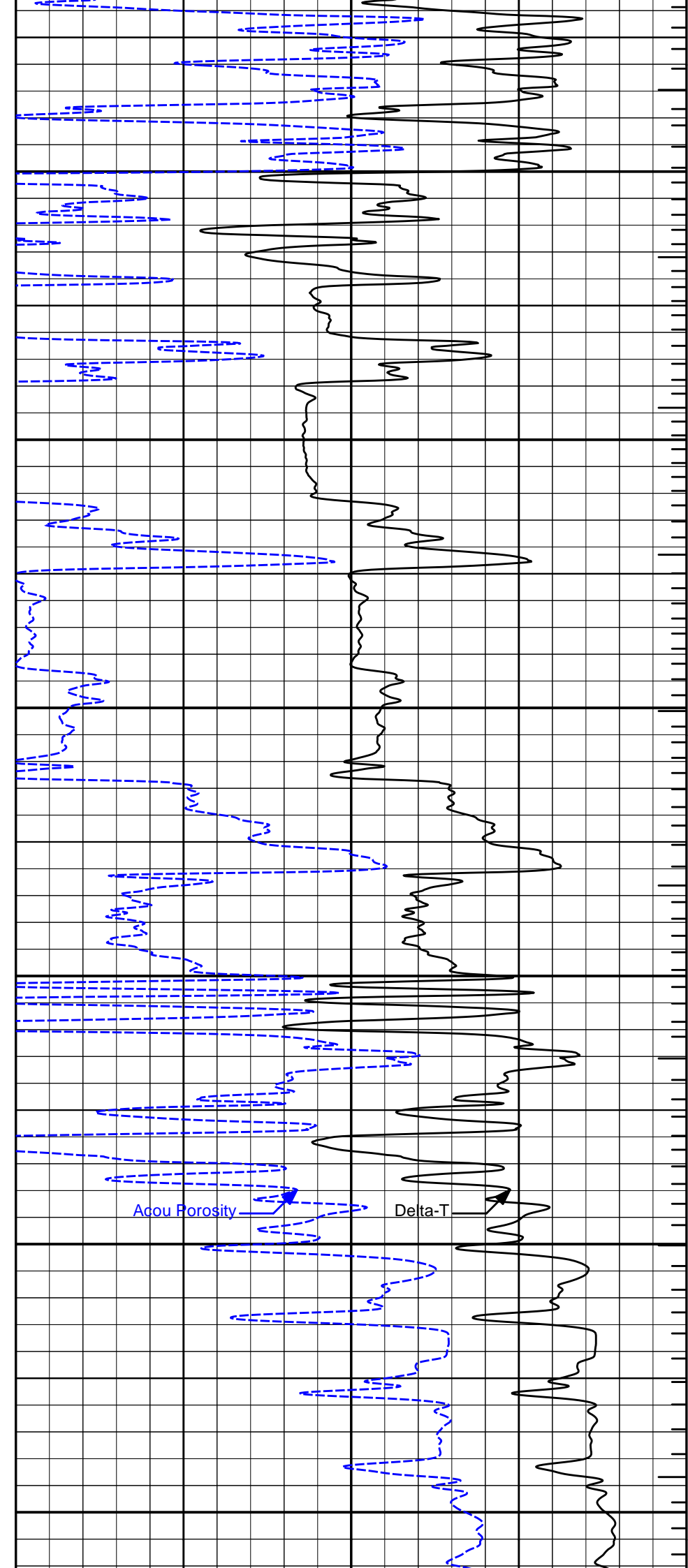
5500

5600

5700

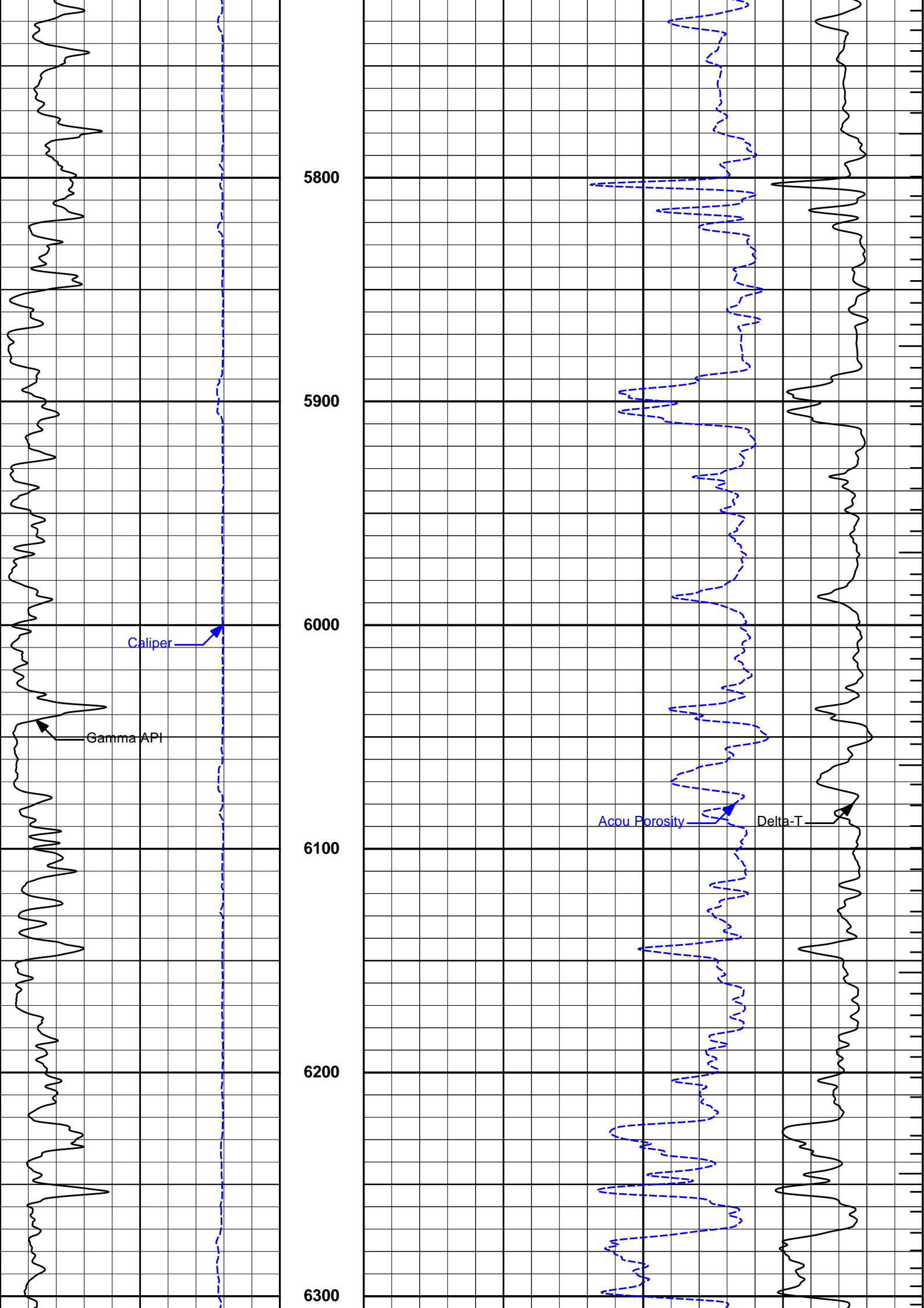
Caliper

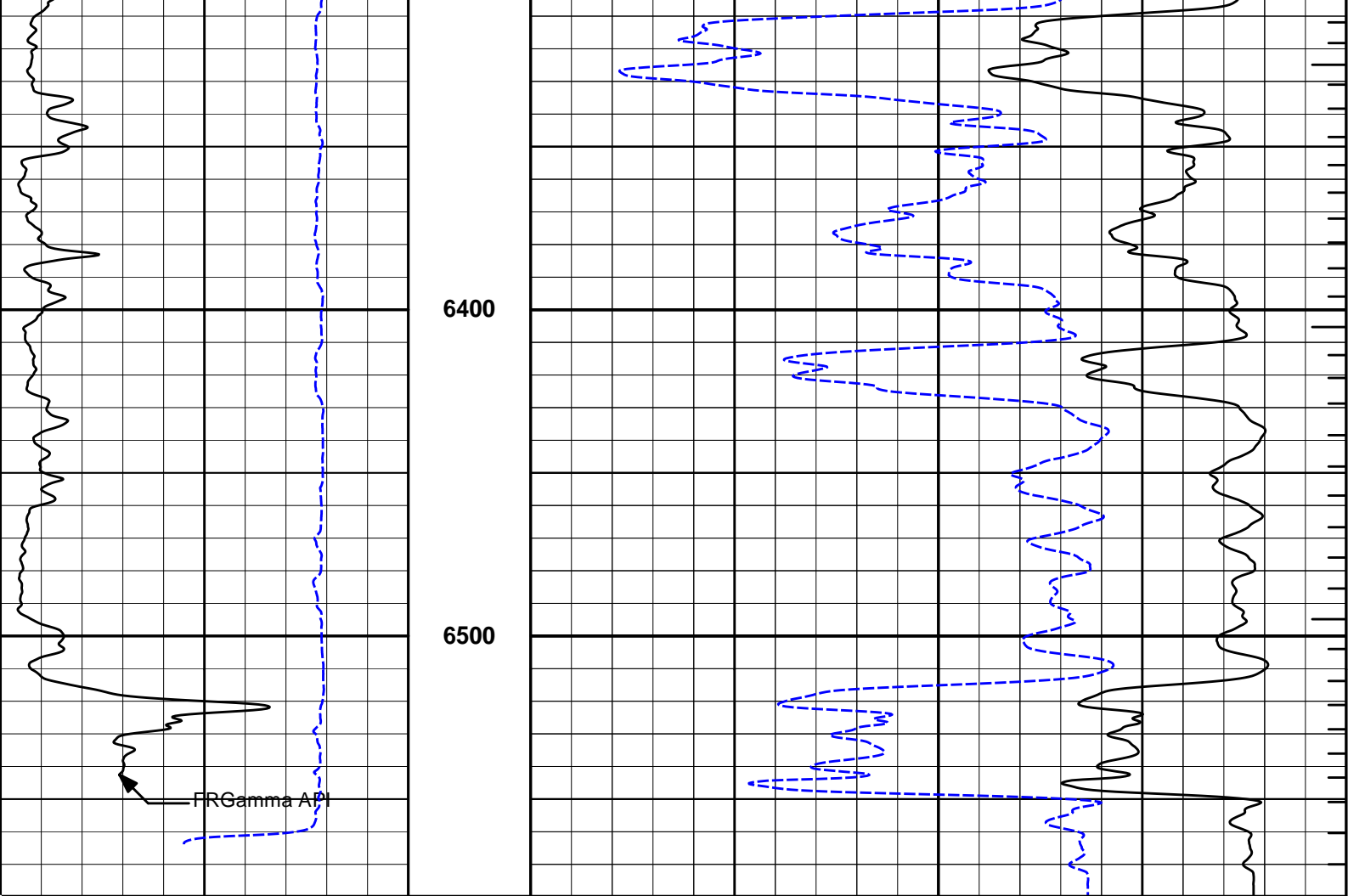
Gamma API



Acou Porosity

Delta-T





0	Gamma API	150	1 : 600 ft		ITTT	
	api					
10	Caliper	20		30	Acou Porosity	-10
	inches				percent	
				140	Delta-T	40
					microsec per ft	

HALLIBURTON Plot Time: 18-Oct-17 04:51:59
 Plot Range: 1440 ft to 6579.75 ft
 Data: MERIT_LCSLU 108\Well Based\MAIN\
 Plot File: \\BSAT1_BSAT_2inx

2 INCH MAIN LOG

HALLIBURTON Plot Time: 18-Oct-17 04:51:59
 Plot Range: 1440 ft to 6607.5 ft
 Data: MERIT_LCSLU 108\Well Based\MAIN\
 Plot File: \\BSAT1_BSAT_5_mainx

5 INCH MAIN LOG

				30	Acou Porosity	-10
					percent	

140

Delta-T

40

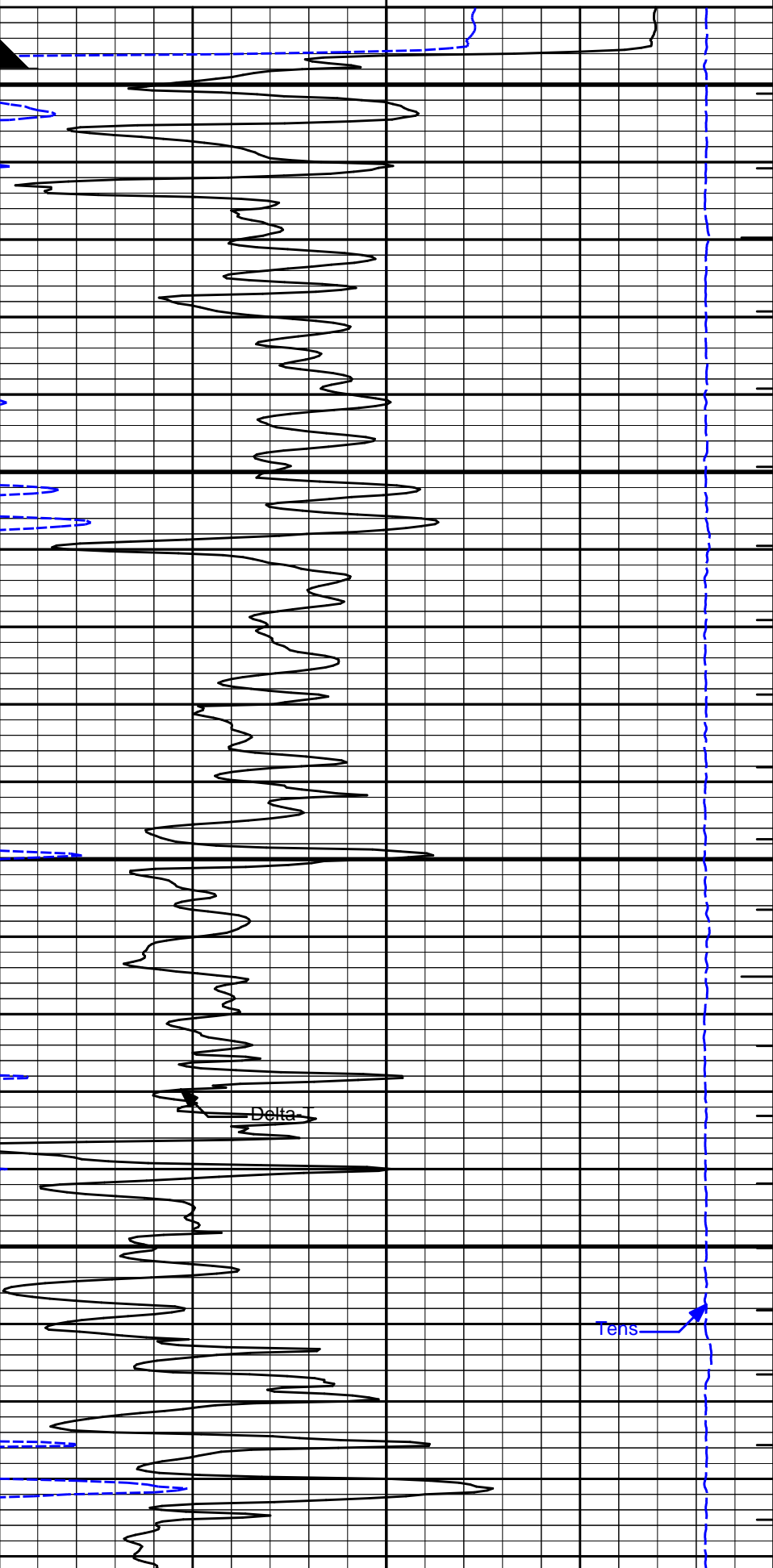
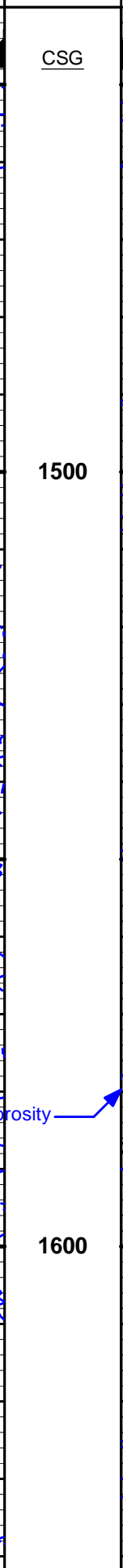
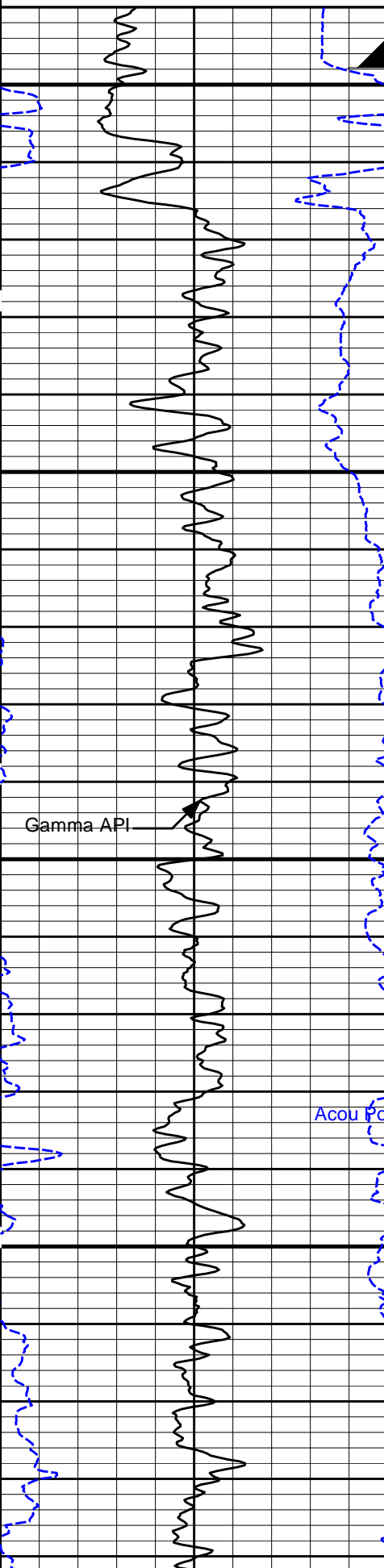
microsec per ft

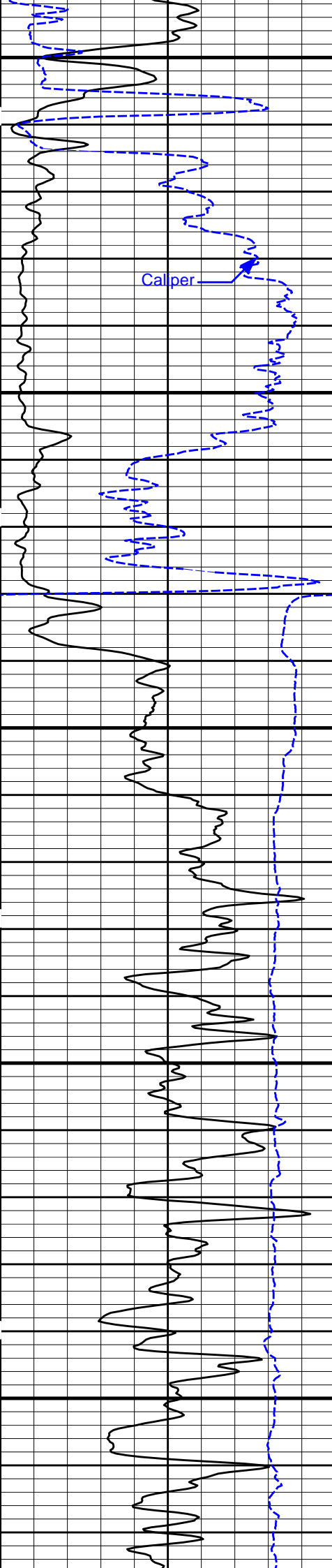
10 Caliper inches 20

0 Gamma API 150 api

1 : 240 ft

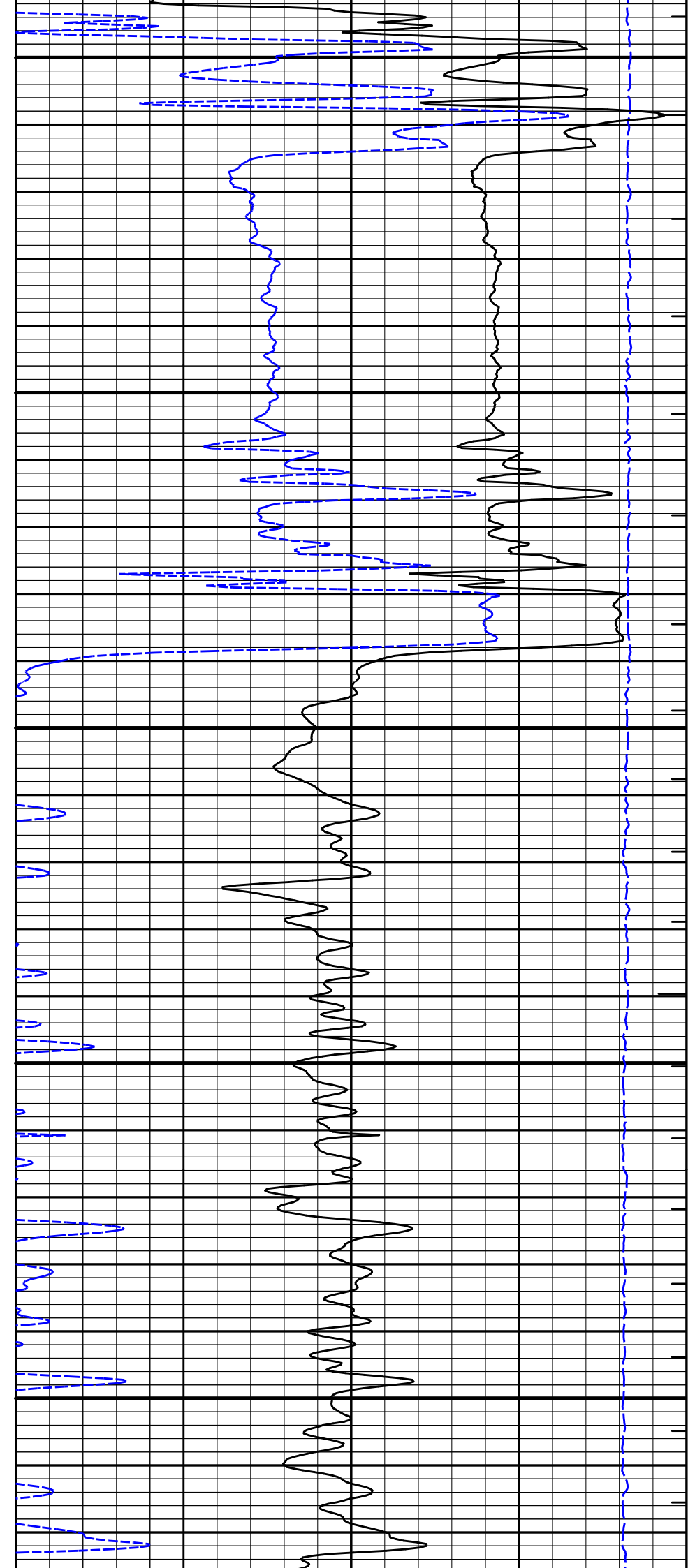
ITTT
15K Tens pounds 0

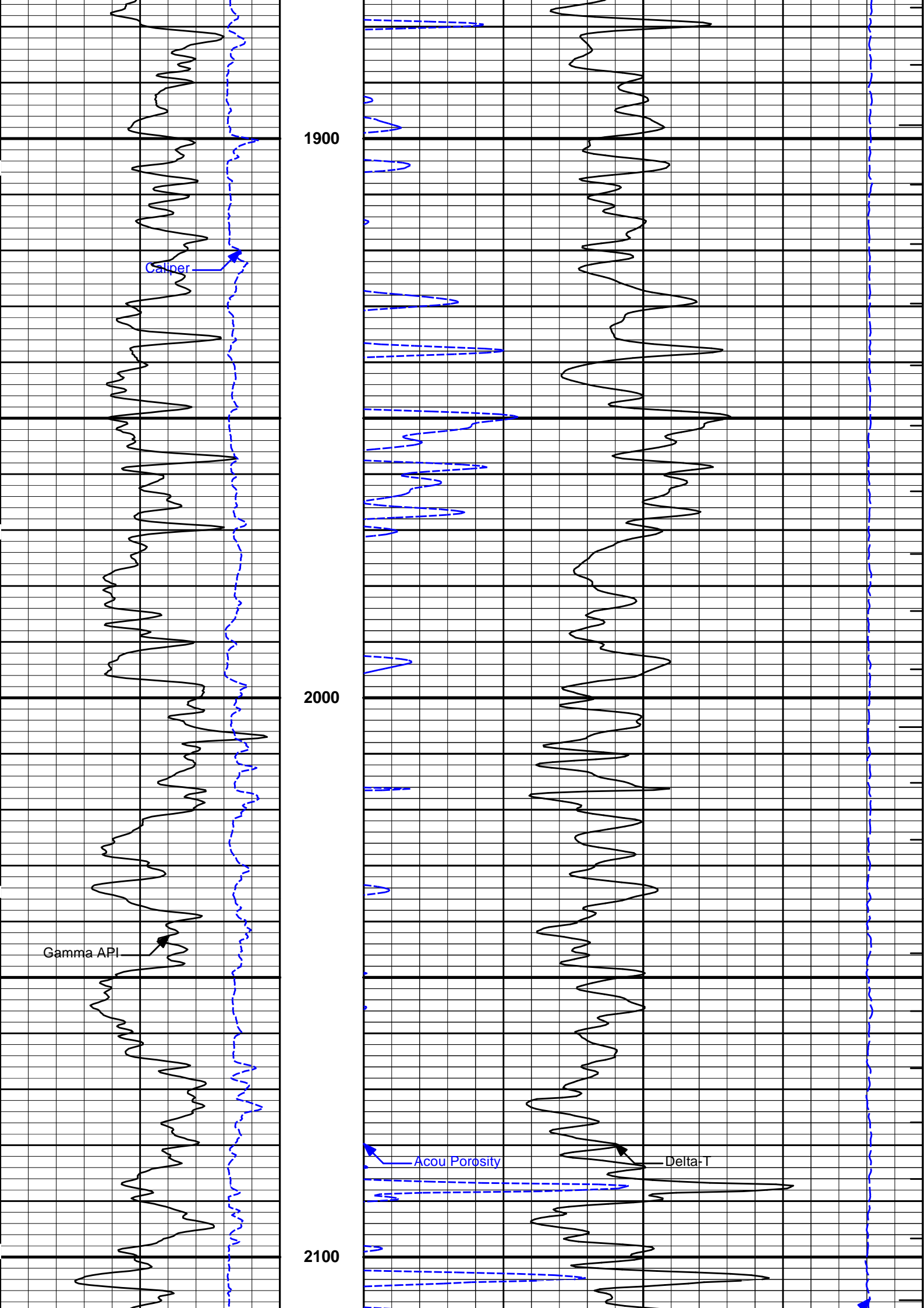


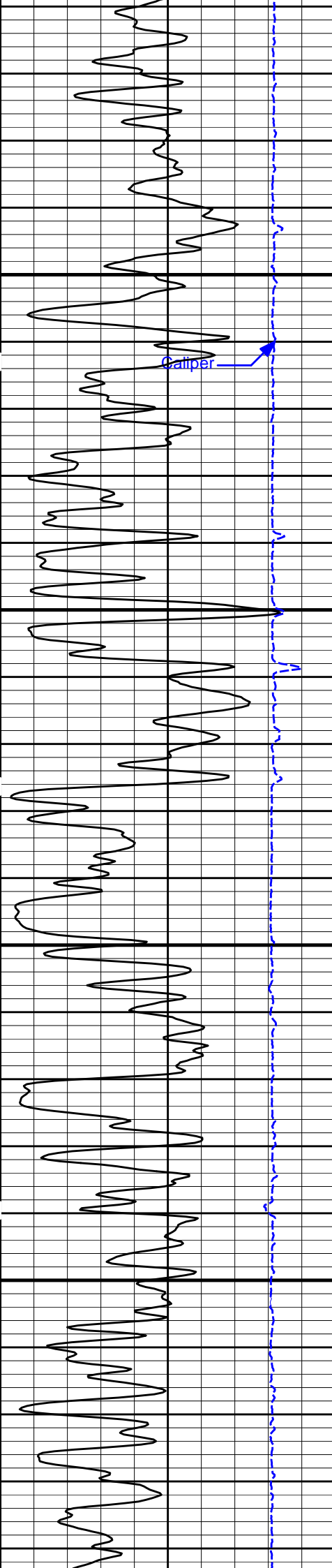


1700

1800

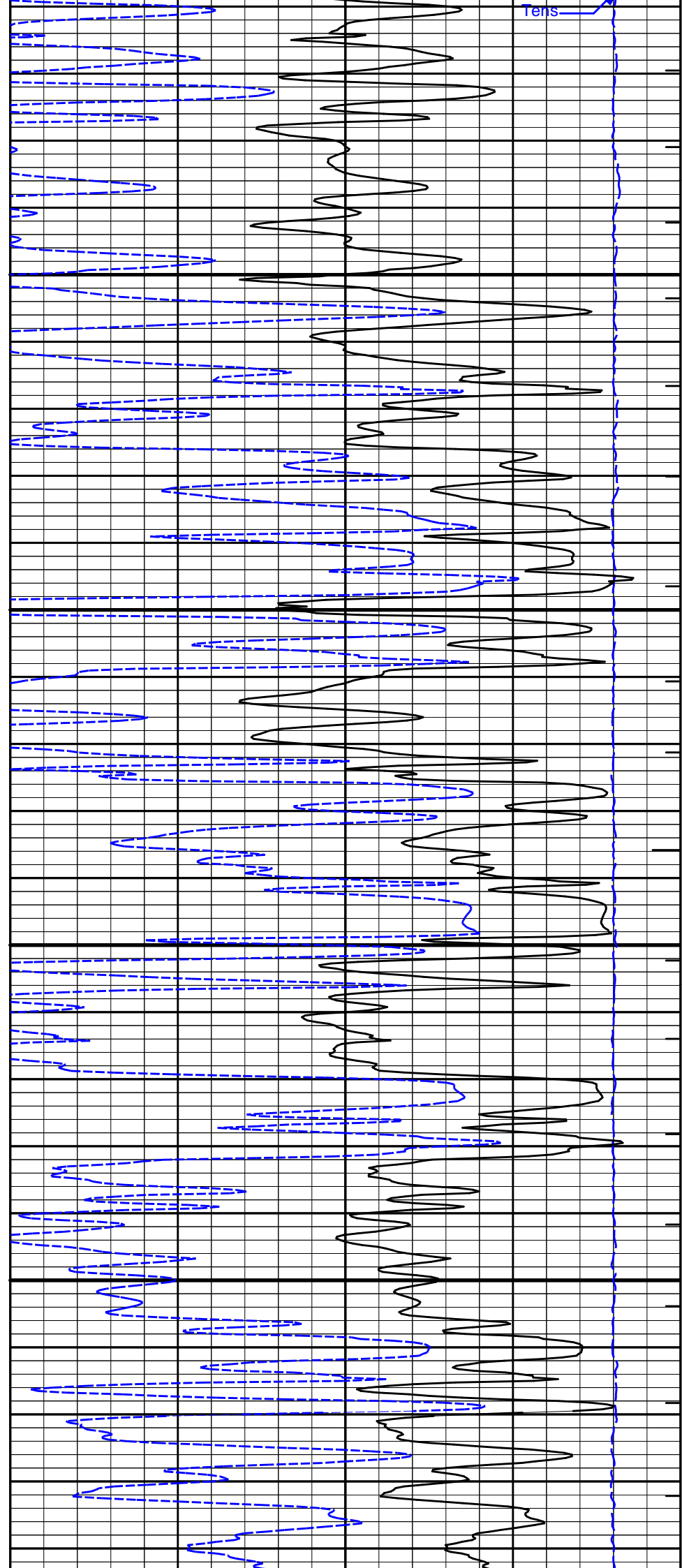


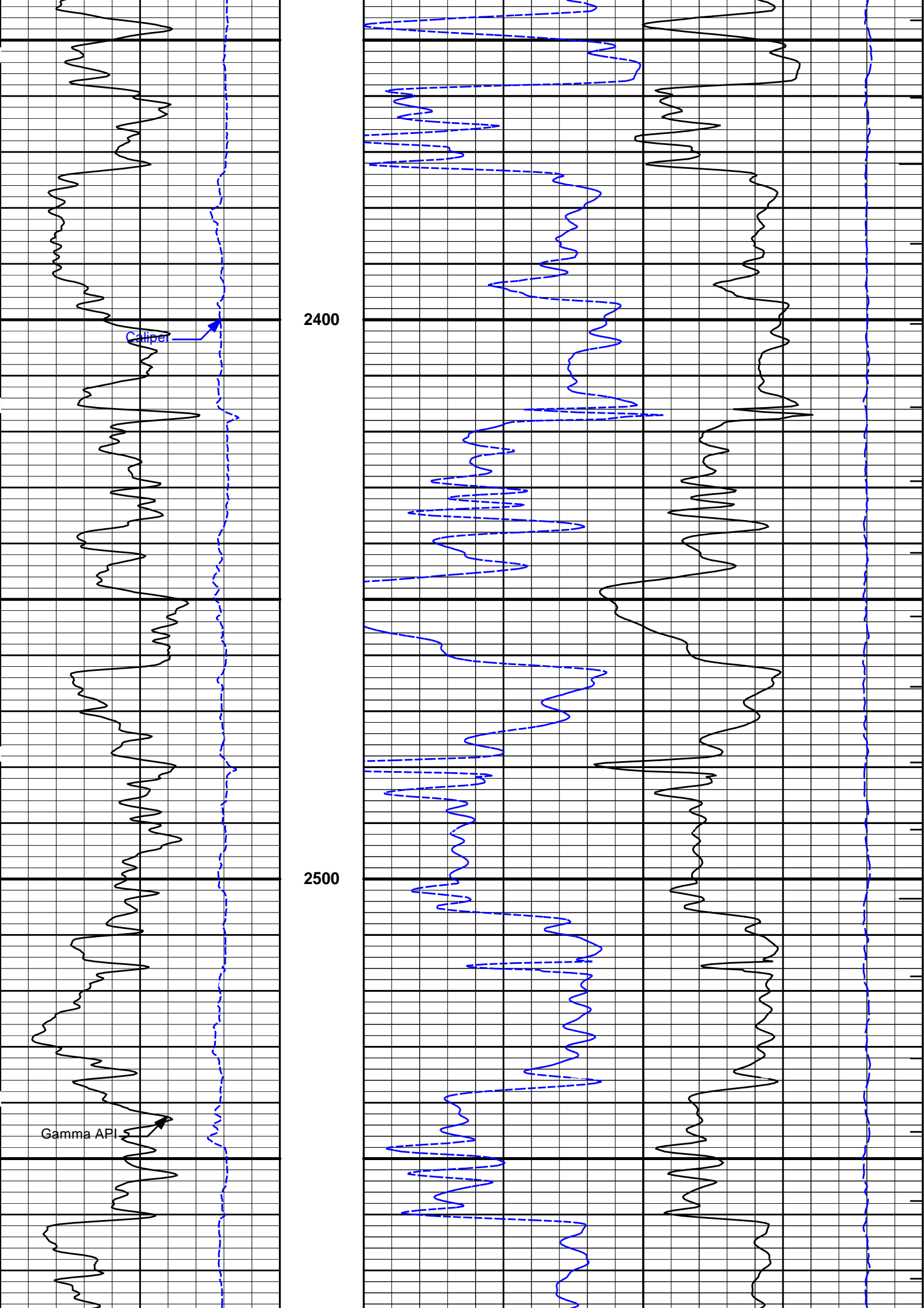


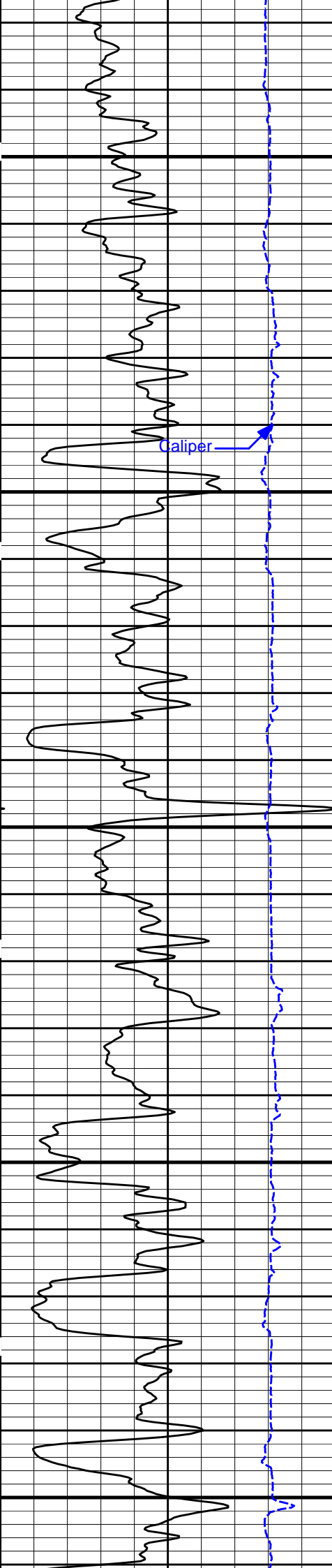


2200

2300



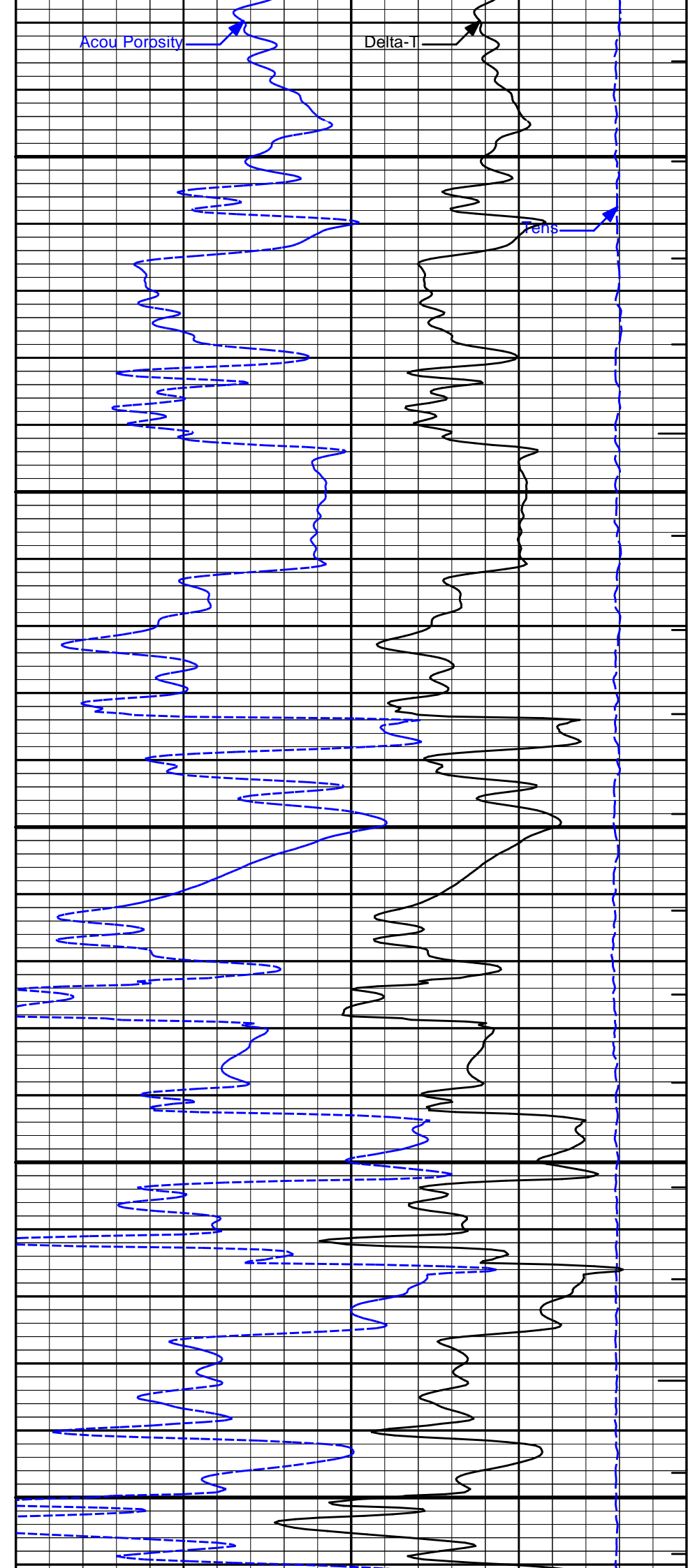




2600

2700

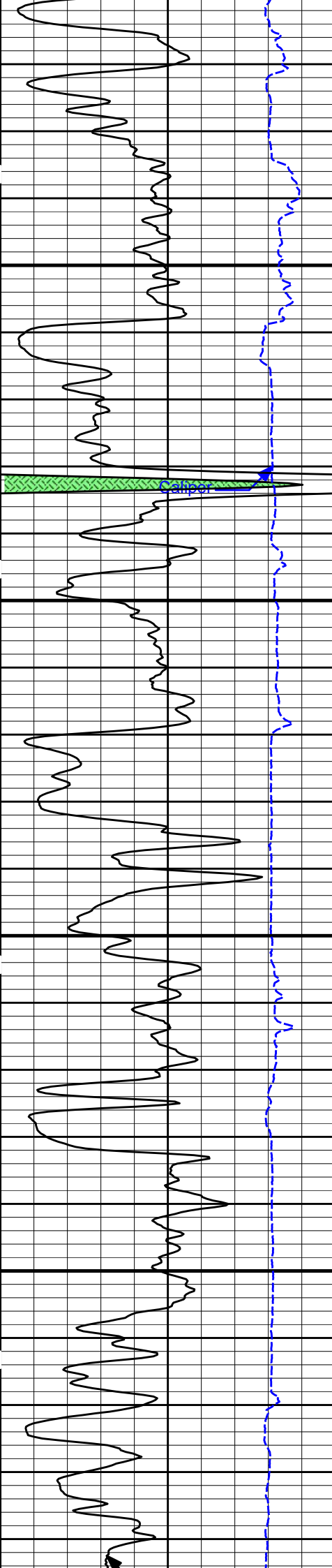
2800



Acou Porosity

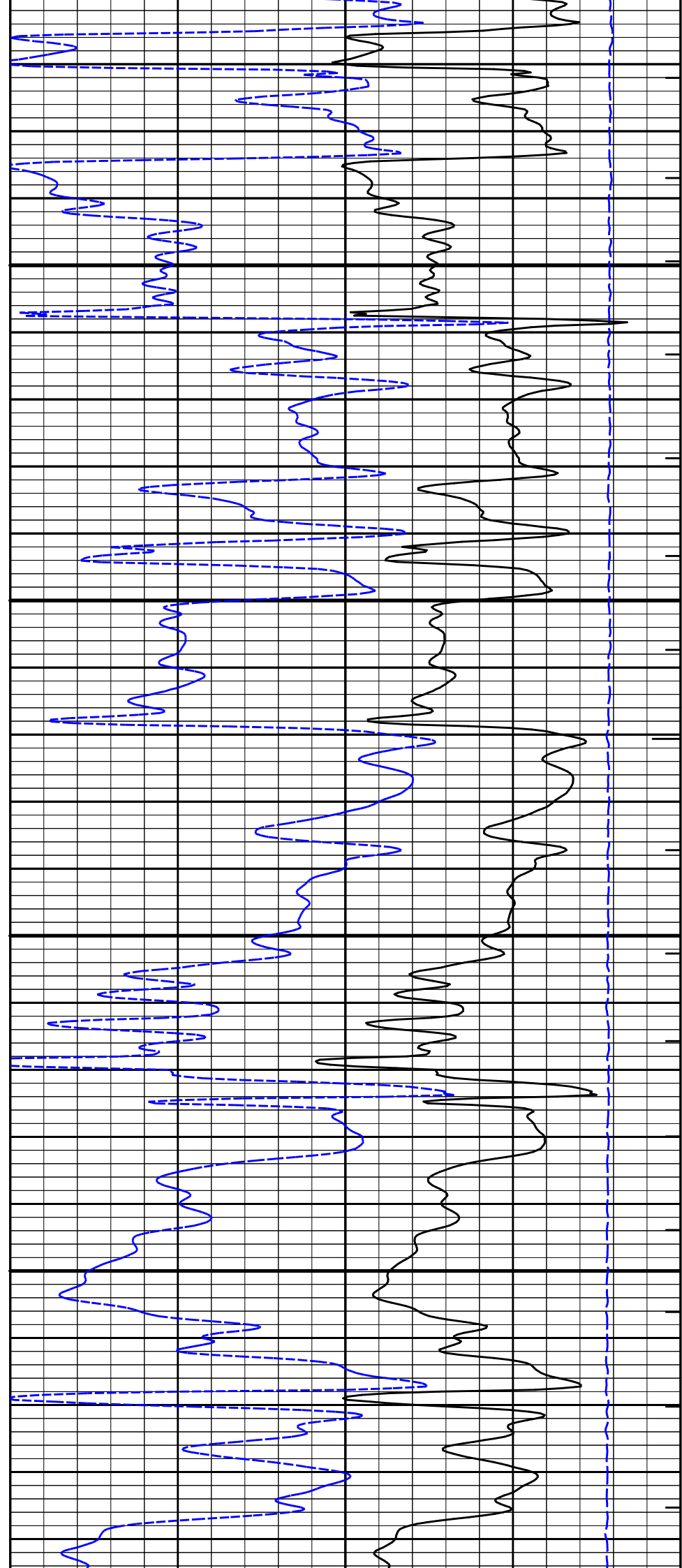
Delta-T

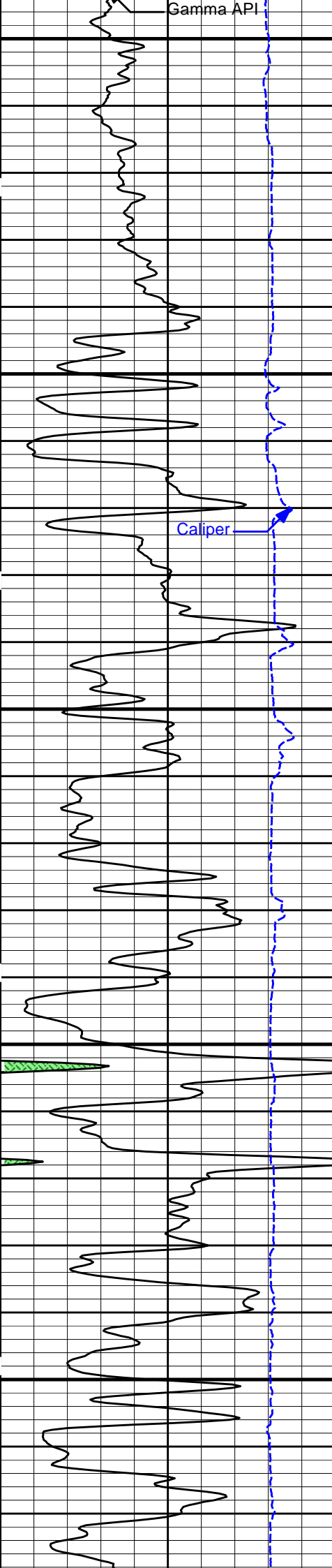
Dens



2900

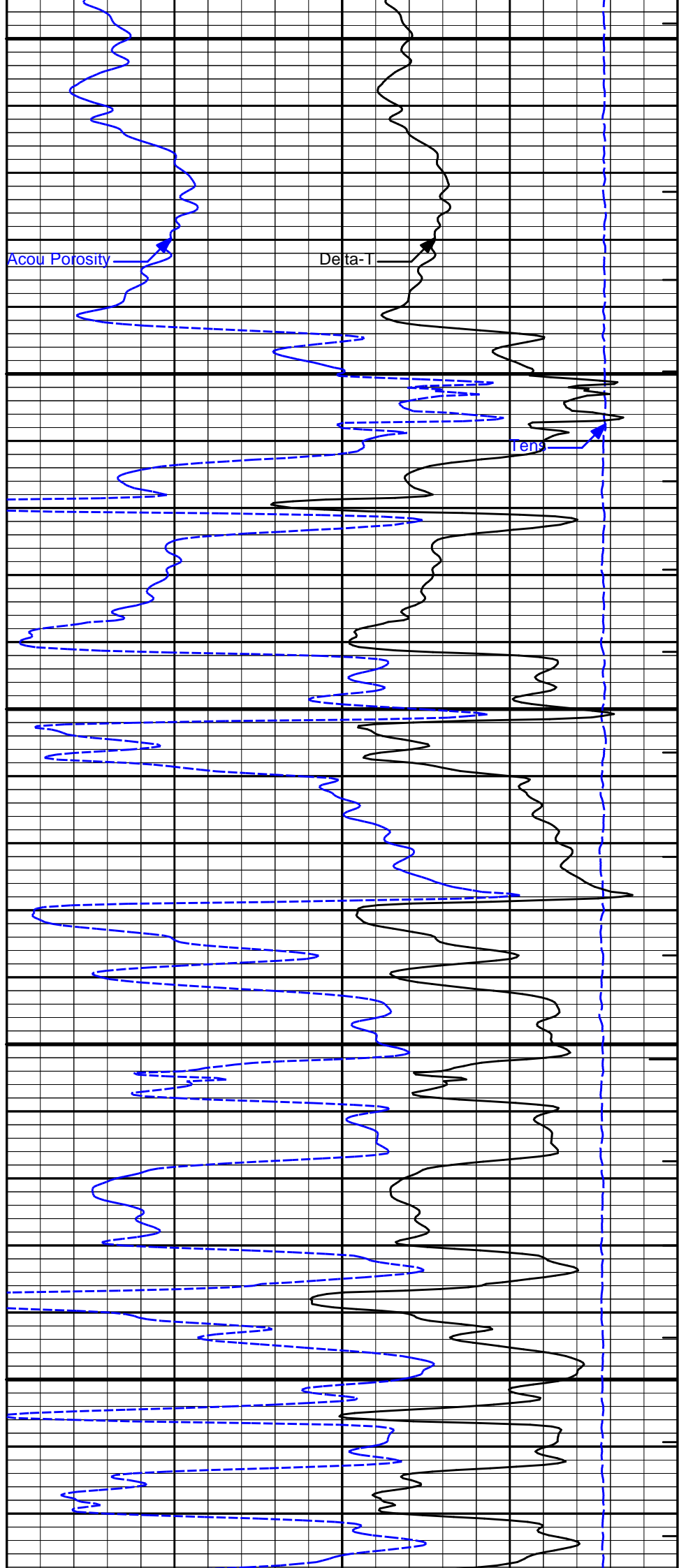
3000

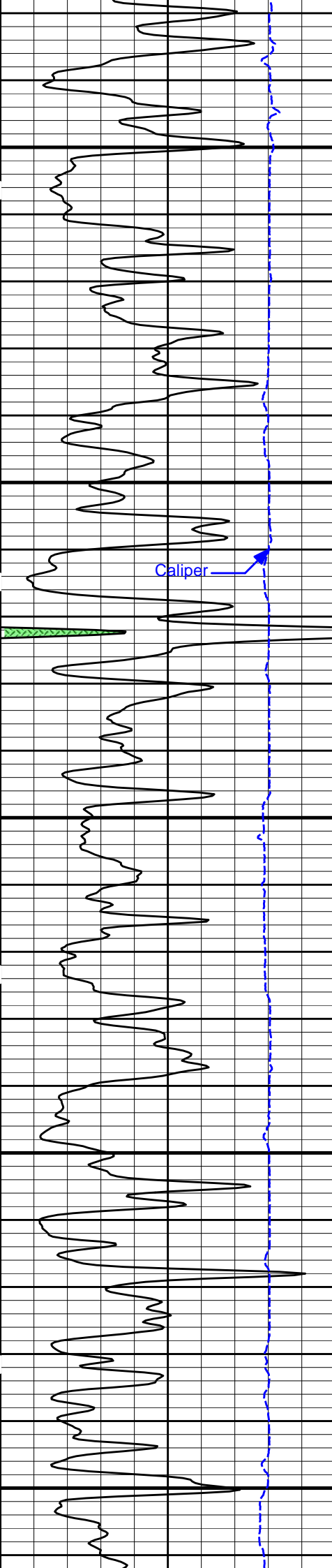




3100

3200

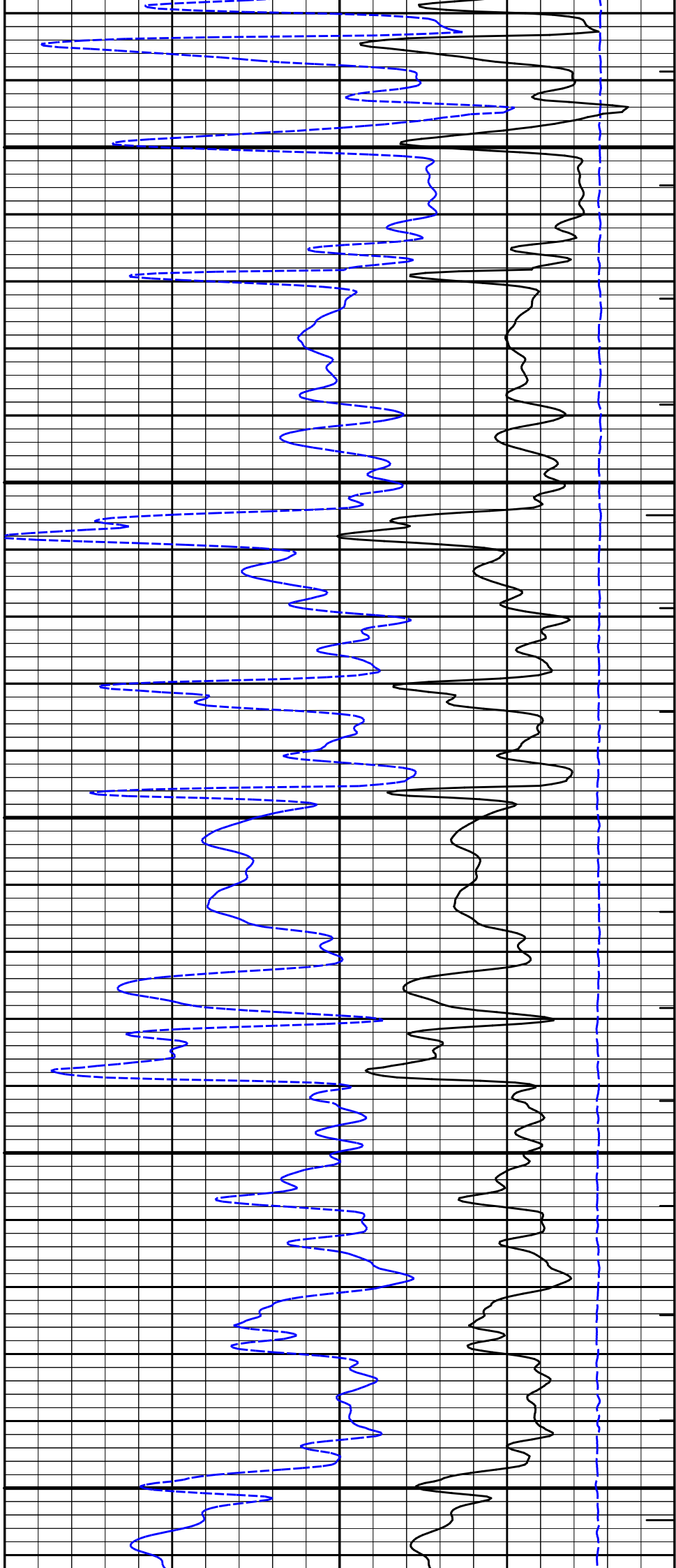


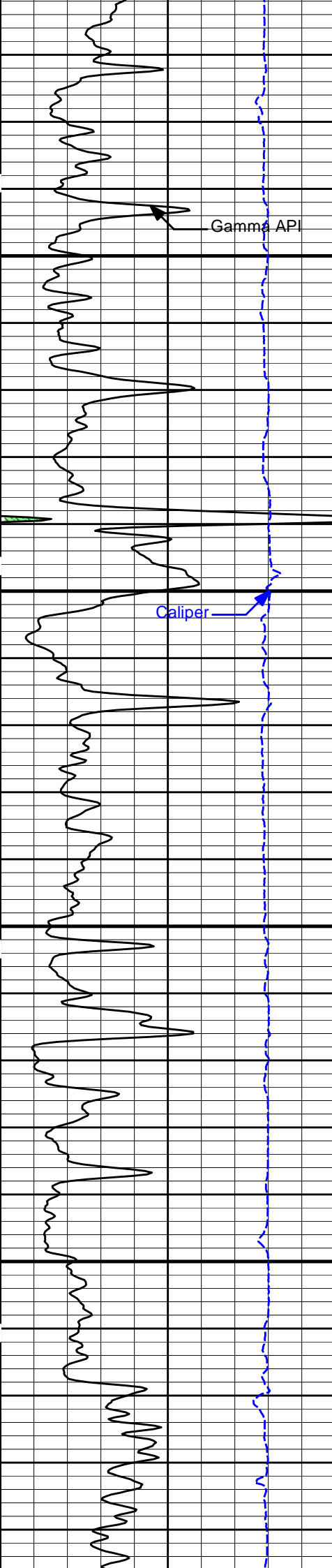


3300

3400

3500



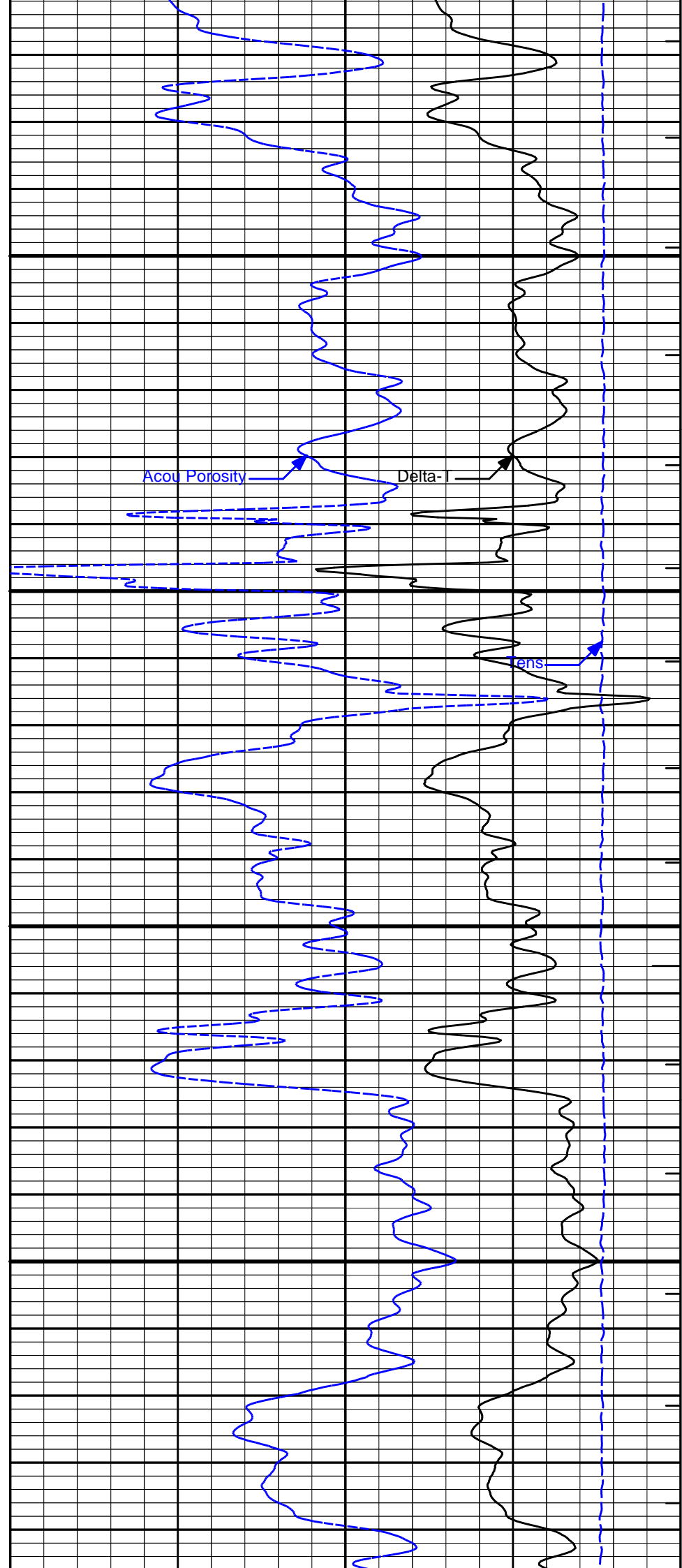


Gamma API

Caliper

3600

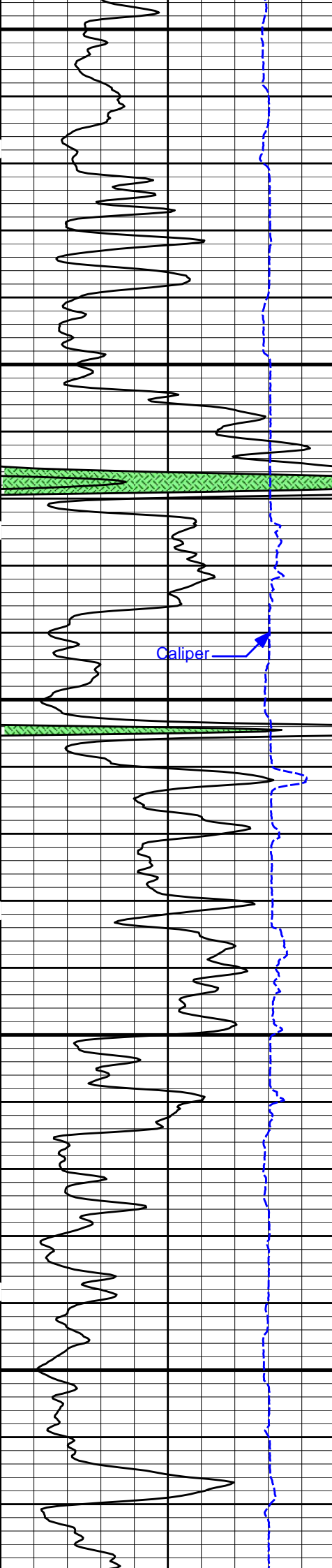
3700



Acou Porosity

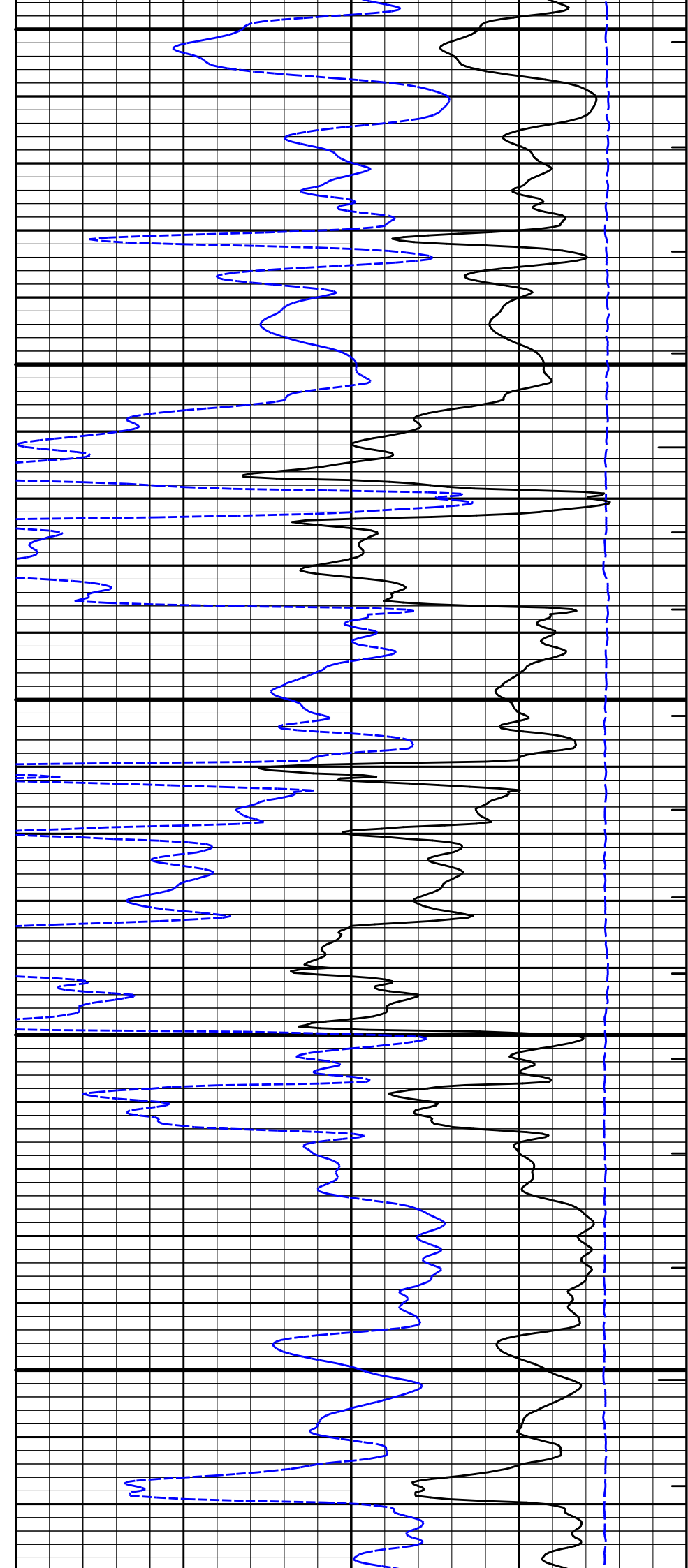
Delta-I

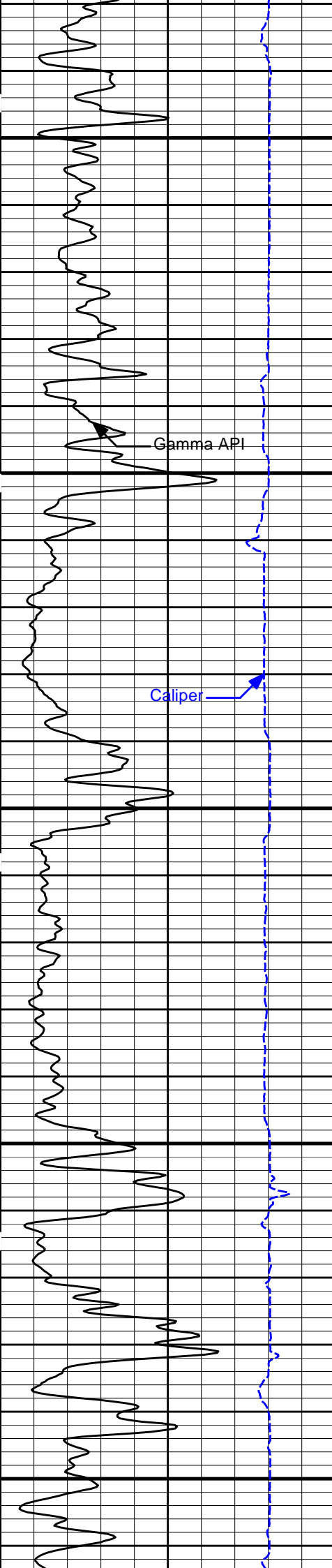
Density



3800

3900





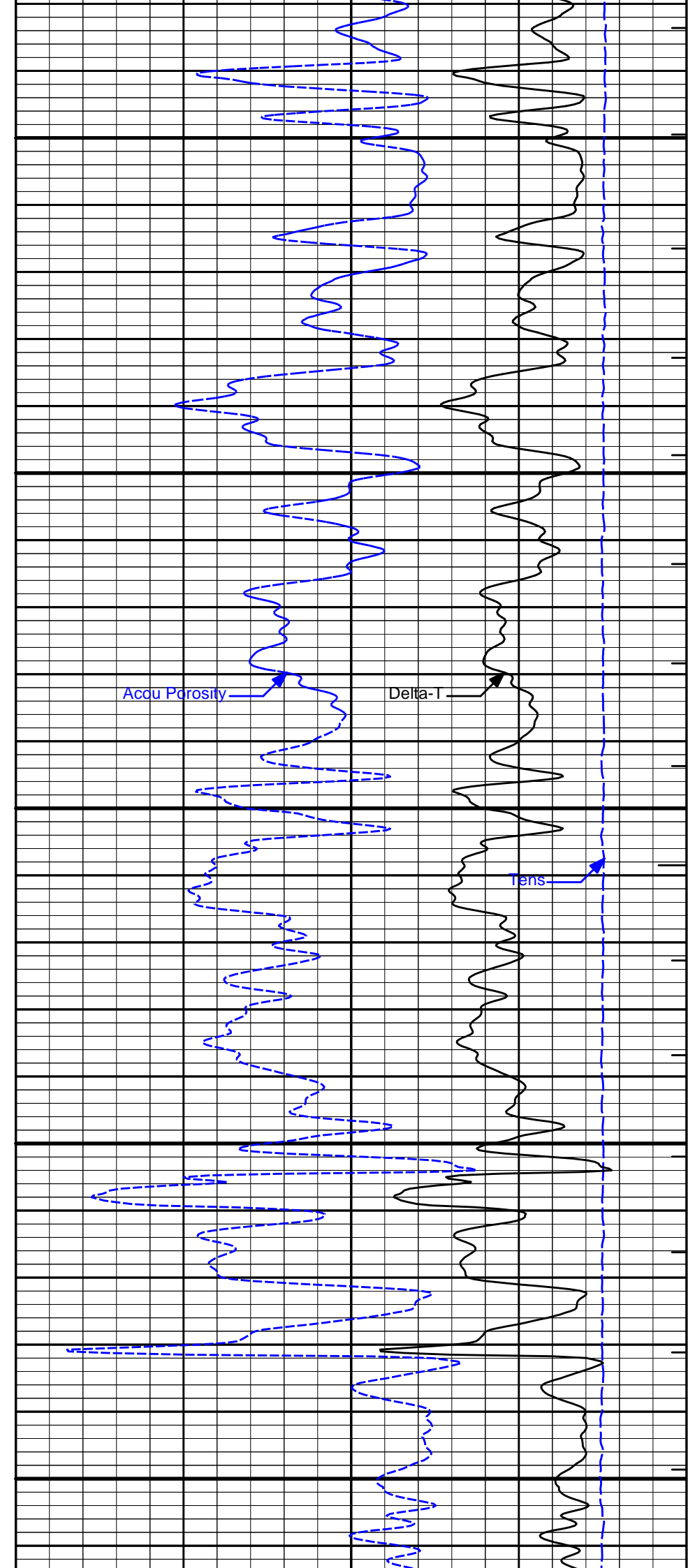
4000

Gamma API

Caliper

4100

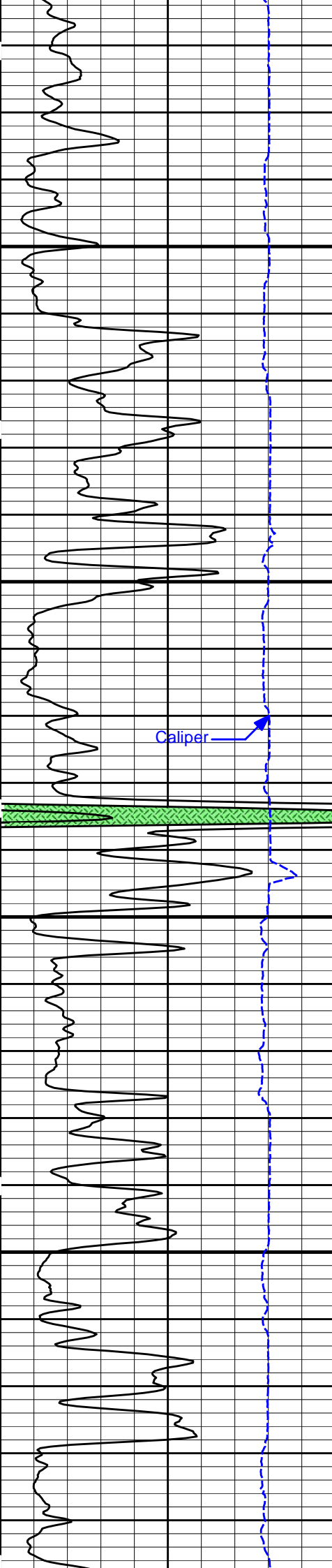
4200



Accu Porosity

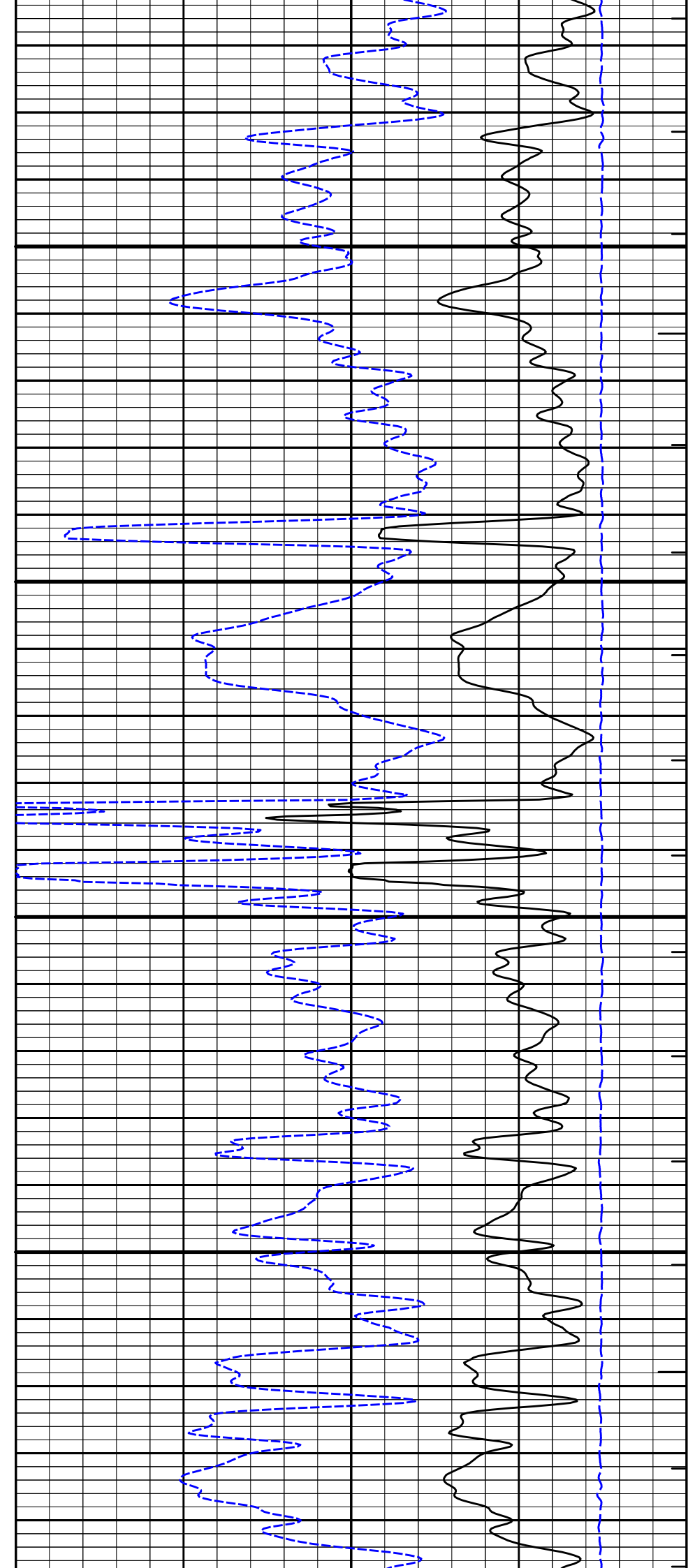
Delta-T

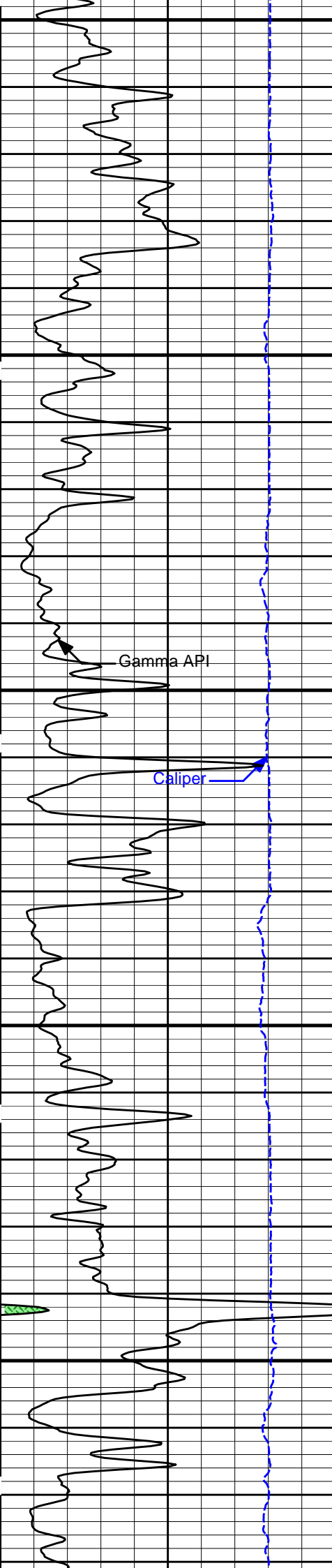
Tens



4300

4400





4500

Gamma API

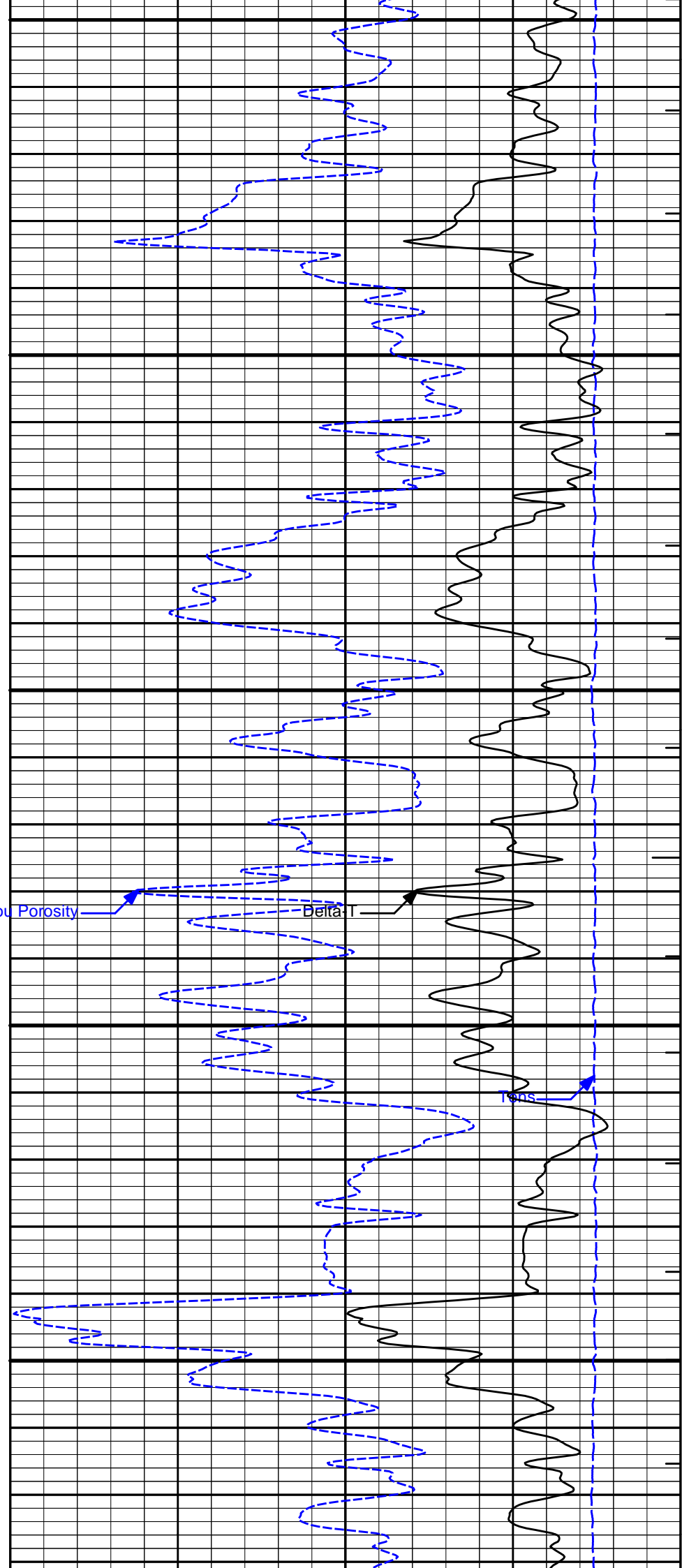
Caliper

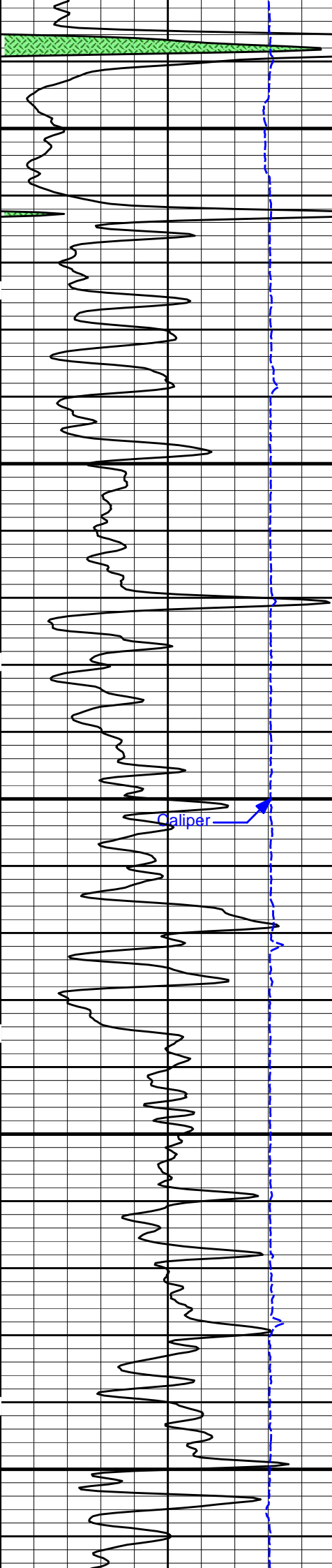
4600

Acou Porosity

Delta T

True



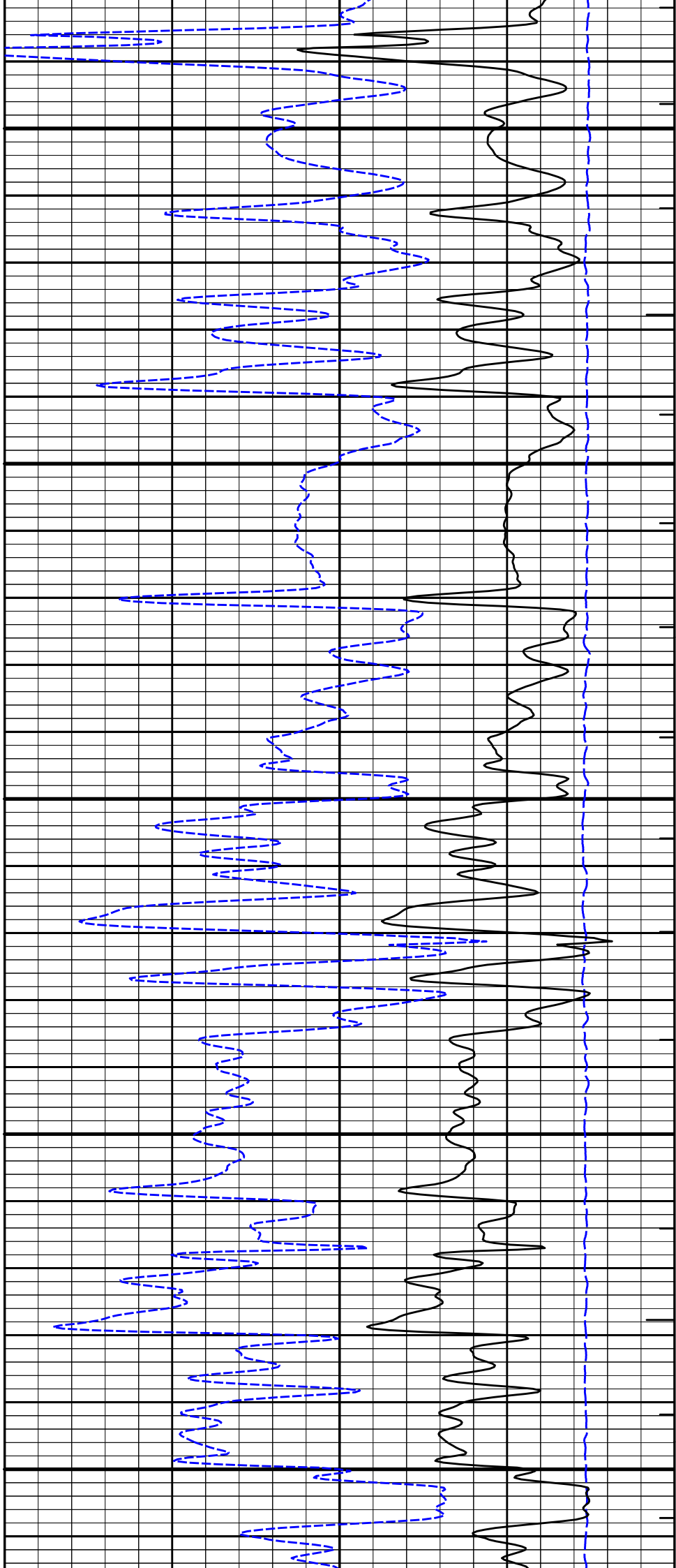


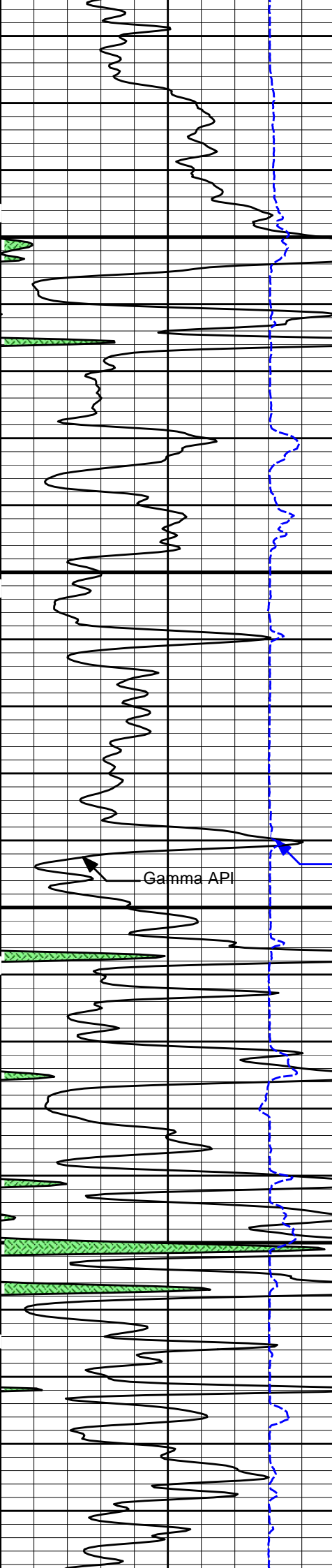
4700

4800

4900

Caliper



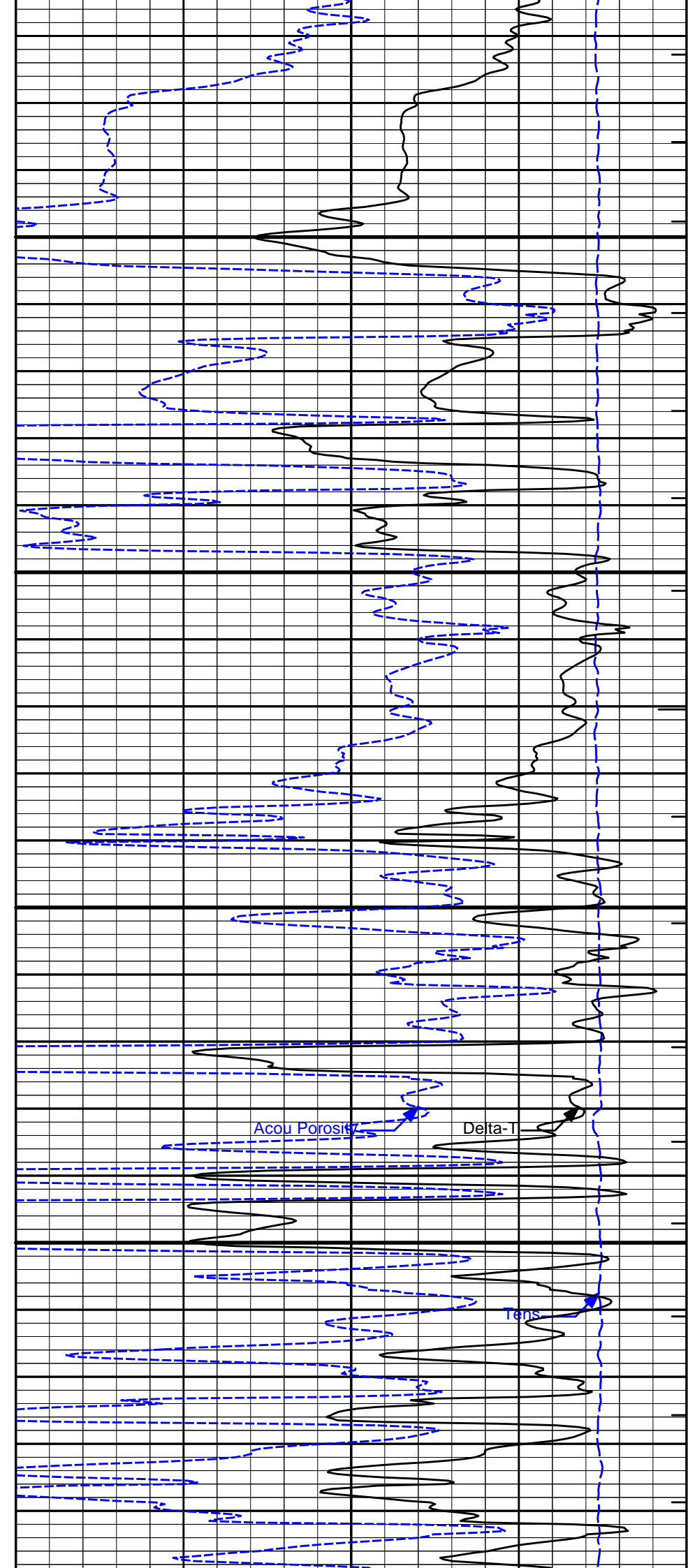


5000

Gamma API

Caliper

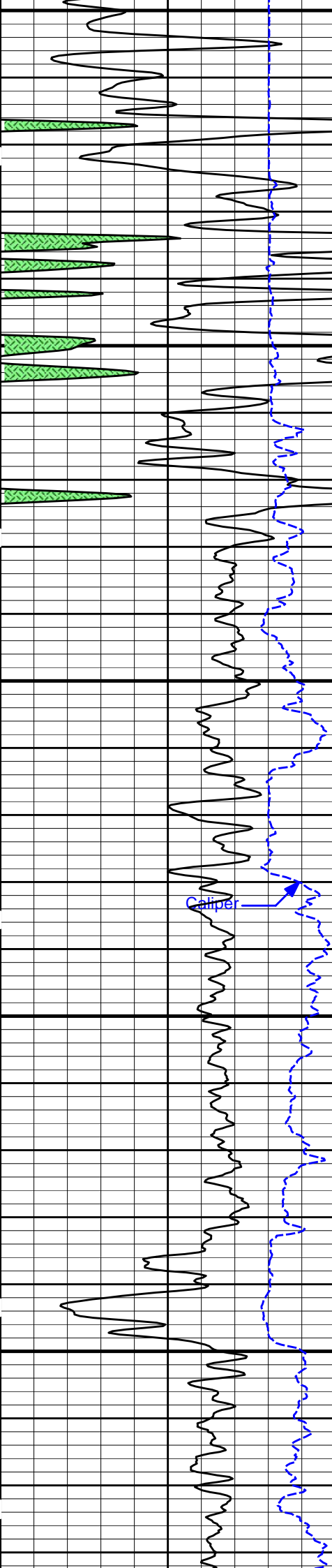
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Acou Porosity

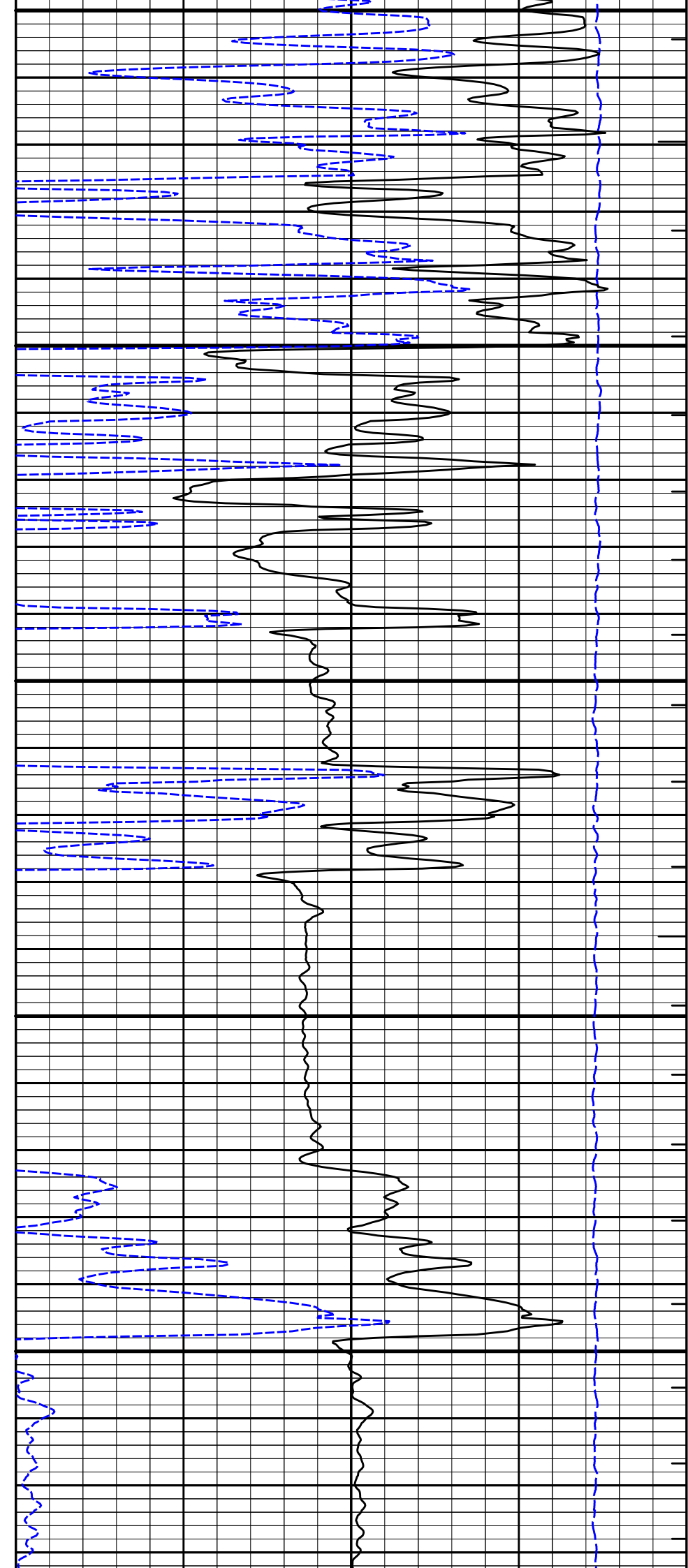
Delta-T

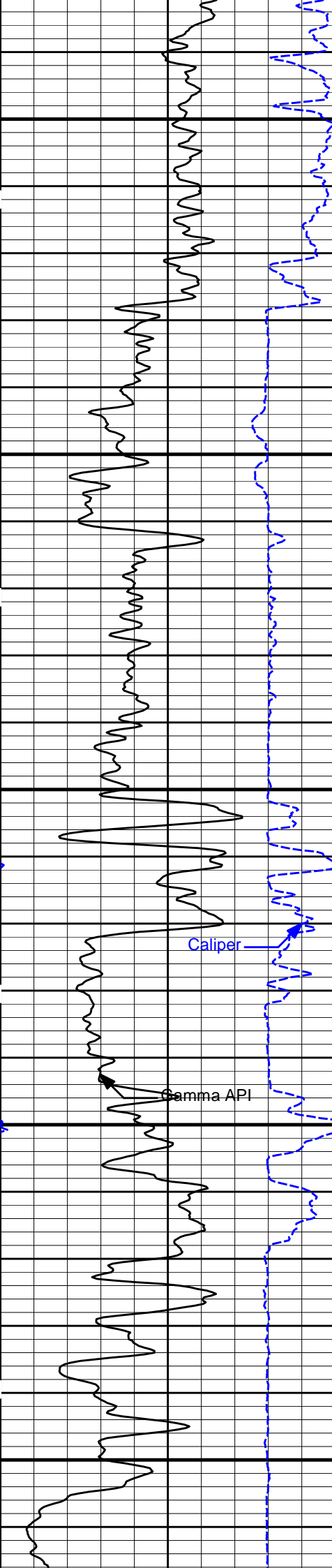
Tens



5200

5300





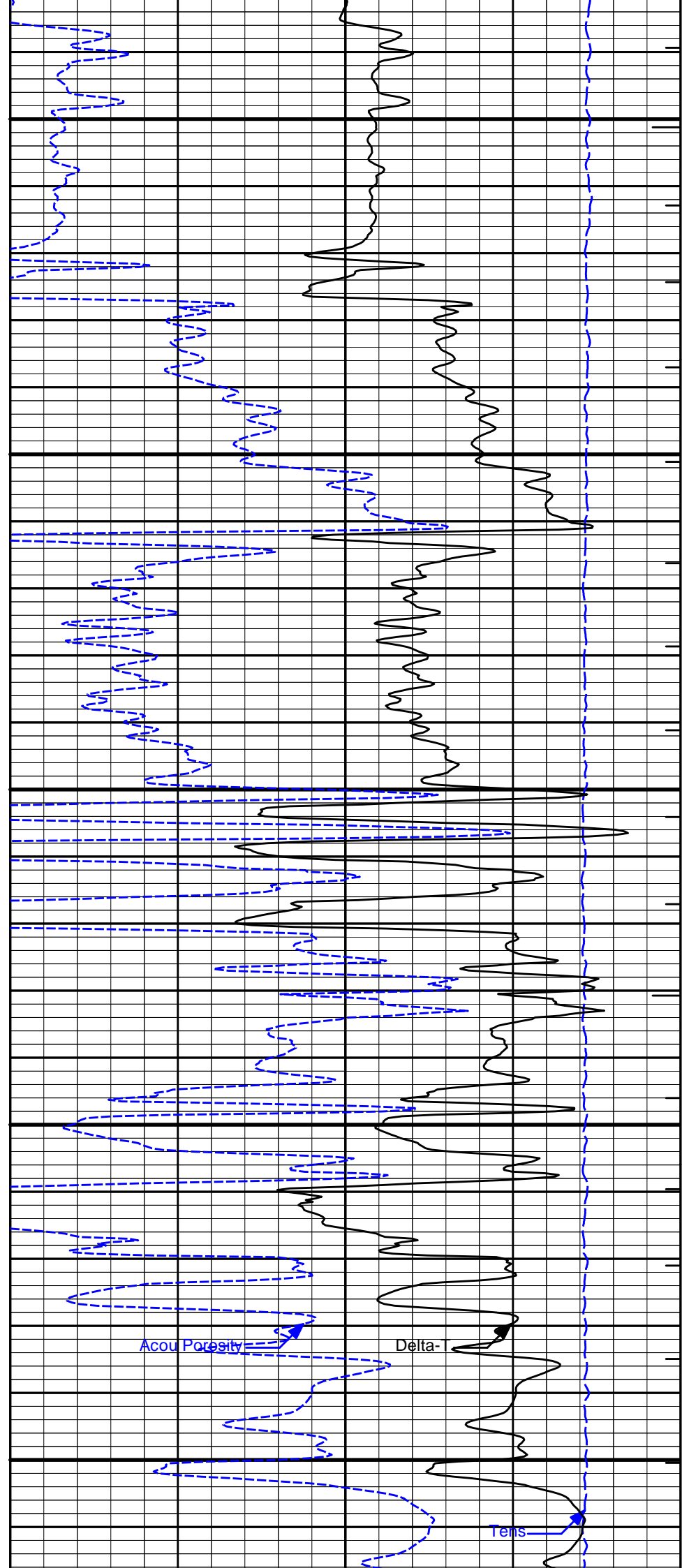
5400

5500

5600

Caliper

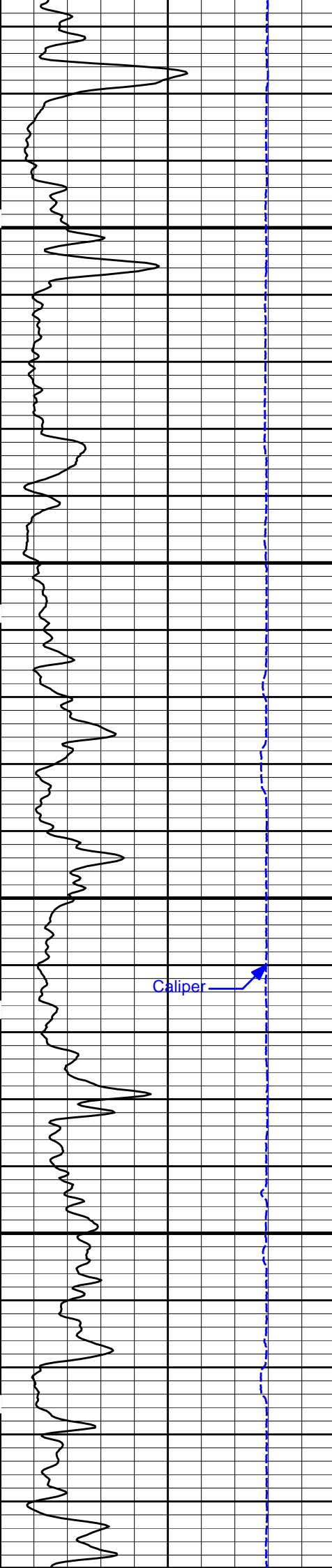
Gamma API



Acou Porosity

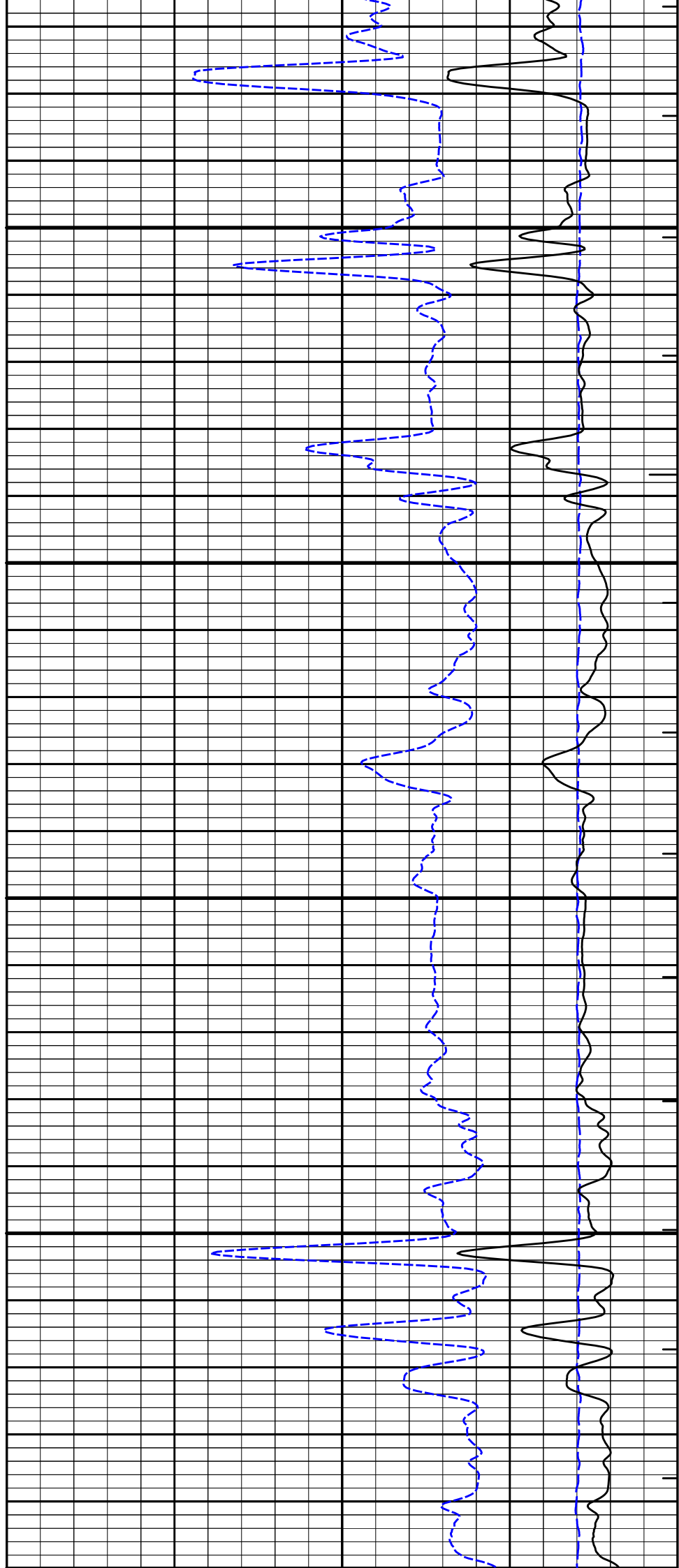
Delta

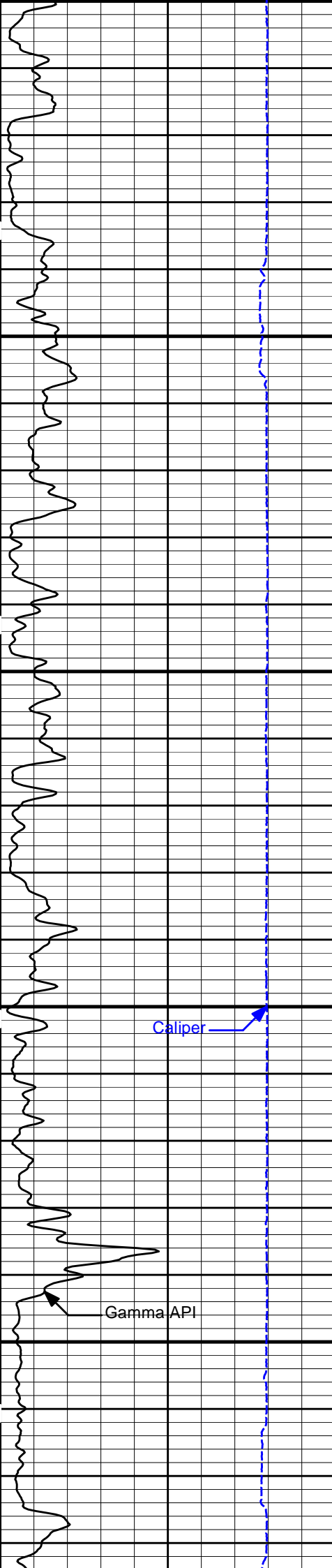
Tens



5700

5800



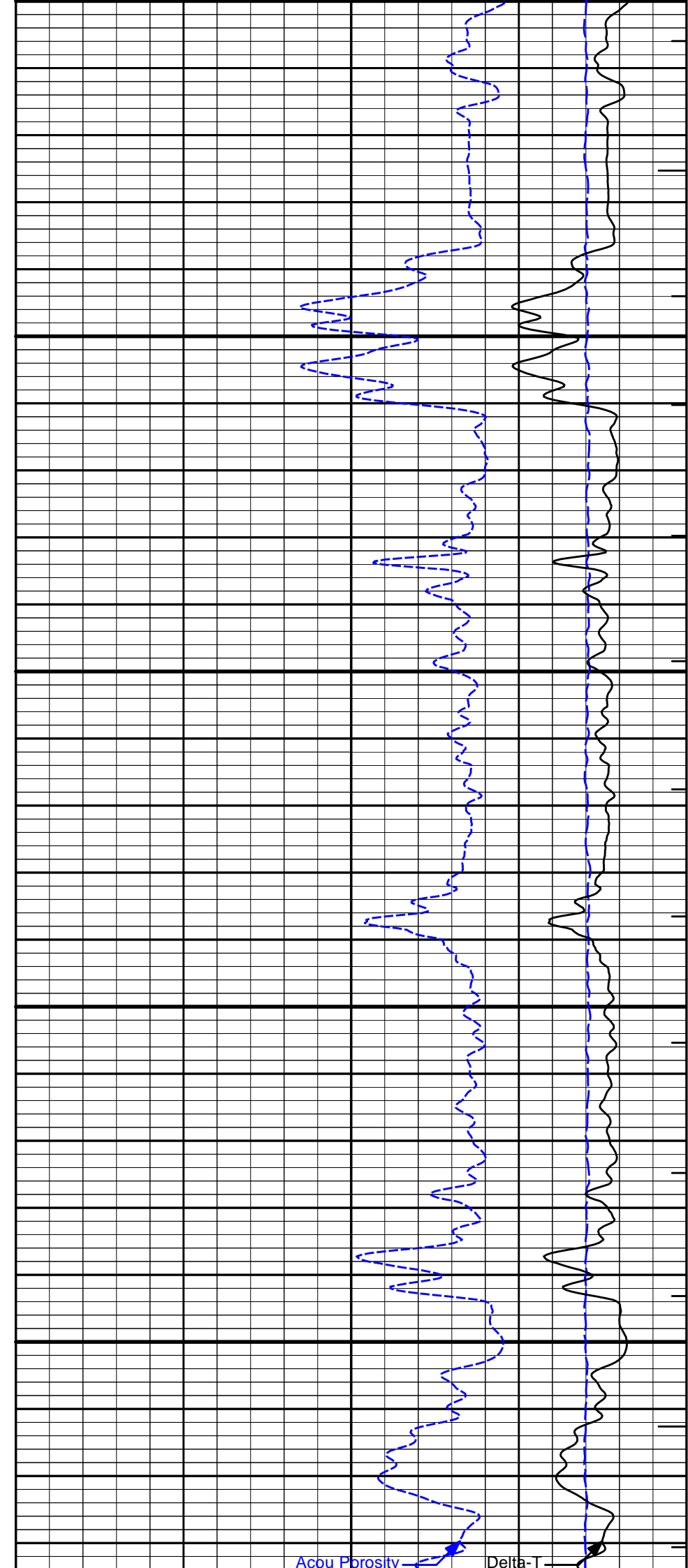


5900

6000

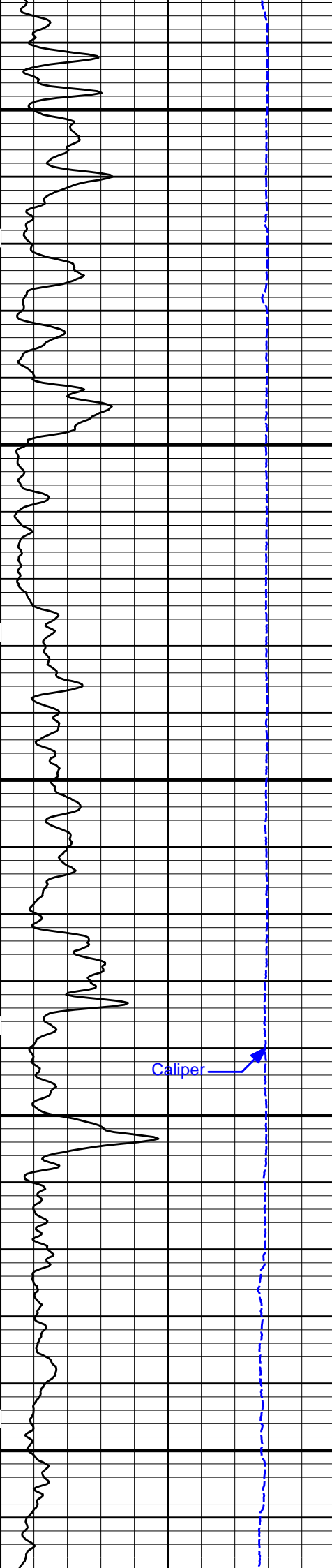
Gamma API

Caliper



Acou Porosity

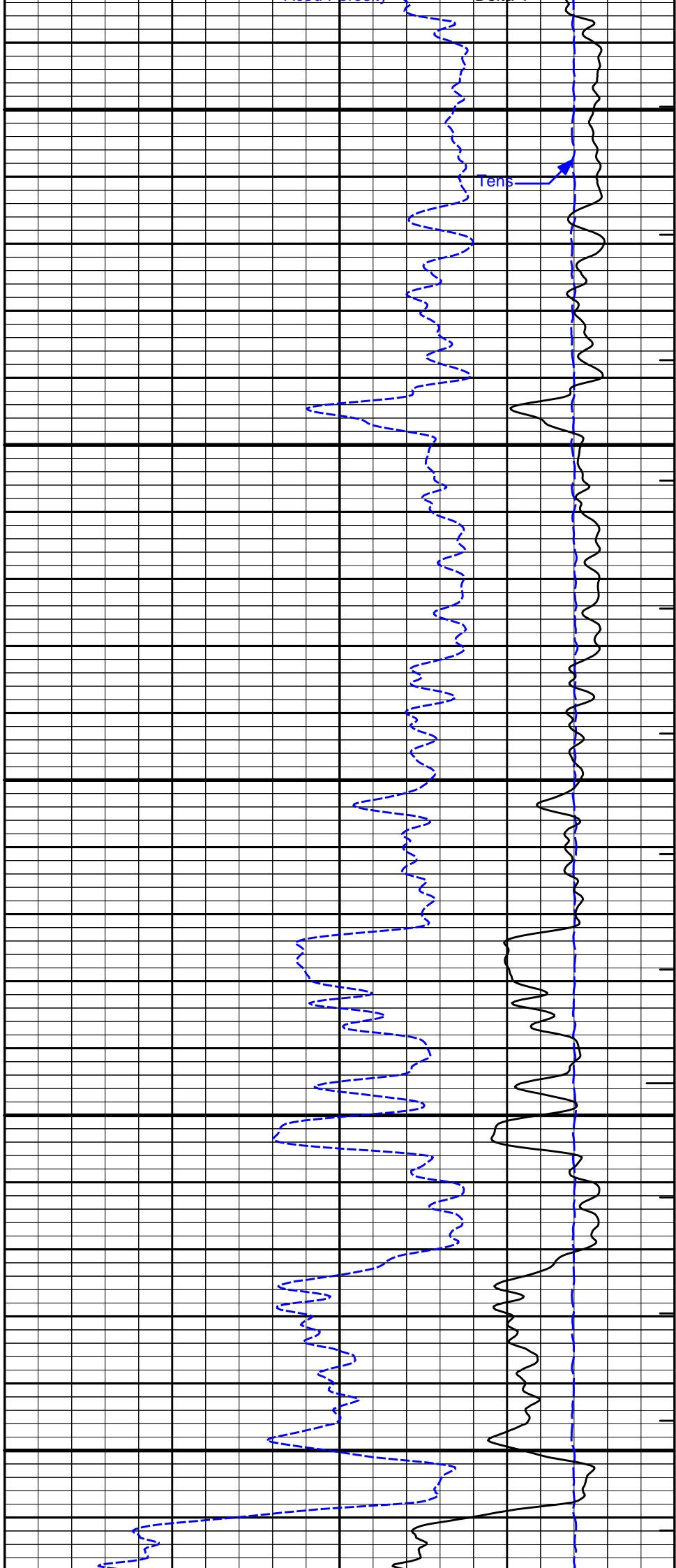
Delta-T



6100

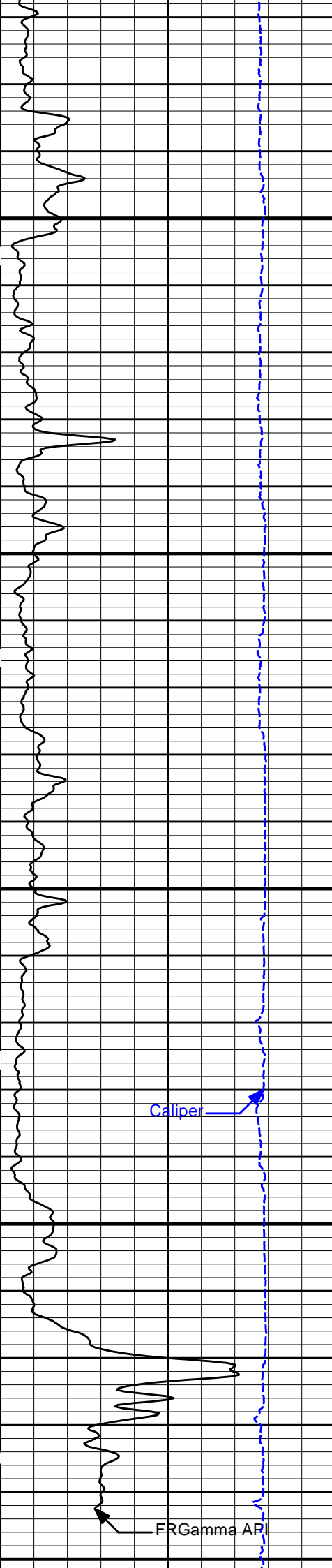
6200

6300



Tens

Caliper

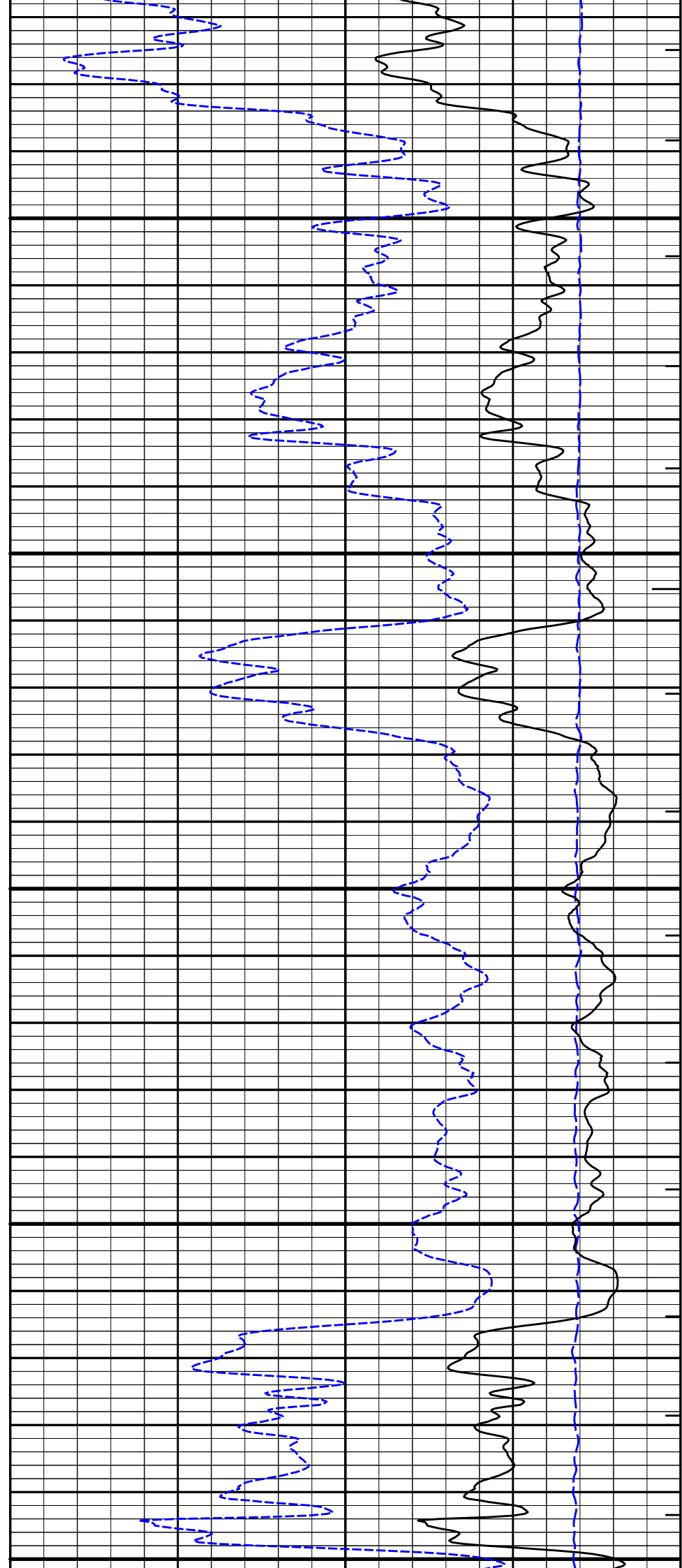


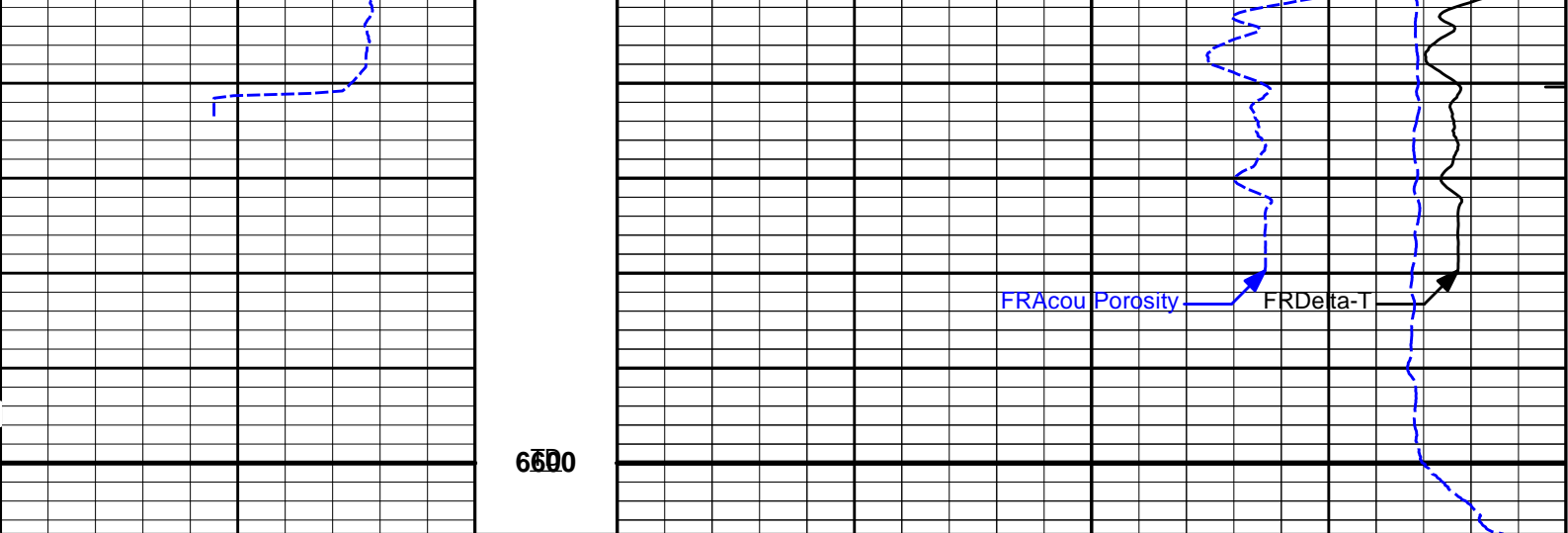
6400

6500

Caliper

FRGamma API





6600

0	Gamma API	150
	api	
10	Caliper	20
	inches	

1 : 240
ft

15K	Tens	0
	pounds	
	ITTT	

140	Delta-T	40
	microsec per ft	
30	Acou Porosity	-10
	percent	

HALLIBURTON

Plot Time: 18-Oct-17 04:52:05
 Plot Range: 1440 ft to 6607.5 ft
 Data: MERIT_LCSLU 108\Well Based\MAIN\
 Plot File: \\BSAT1_BSAT_5_mainx

5 INCH MAIN LOG

HALLIBURTON

Plot Time: 18-Oct-17 04:52:05
 Plot Range: 6250 ft to 6605.67 ft
 Data: MERIT_LCSLU 108\Well Based\REPEAT\
 Plot File: \\BSAT1_BSAT_5_rptx

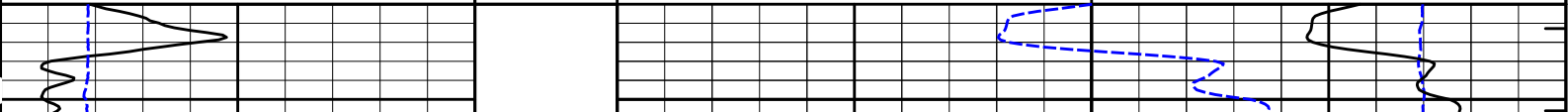
REPEAT SECTION

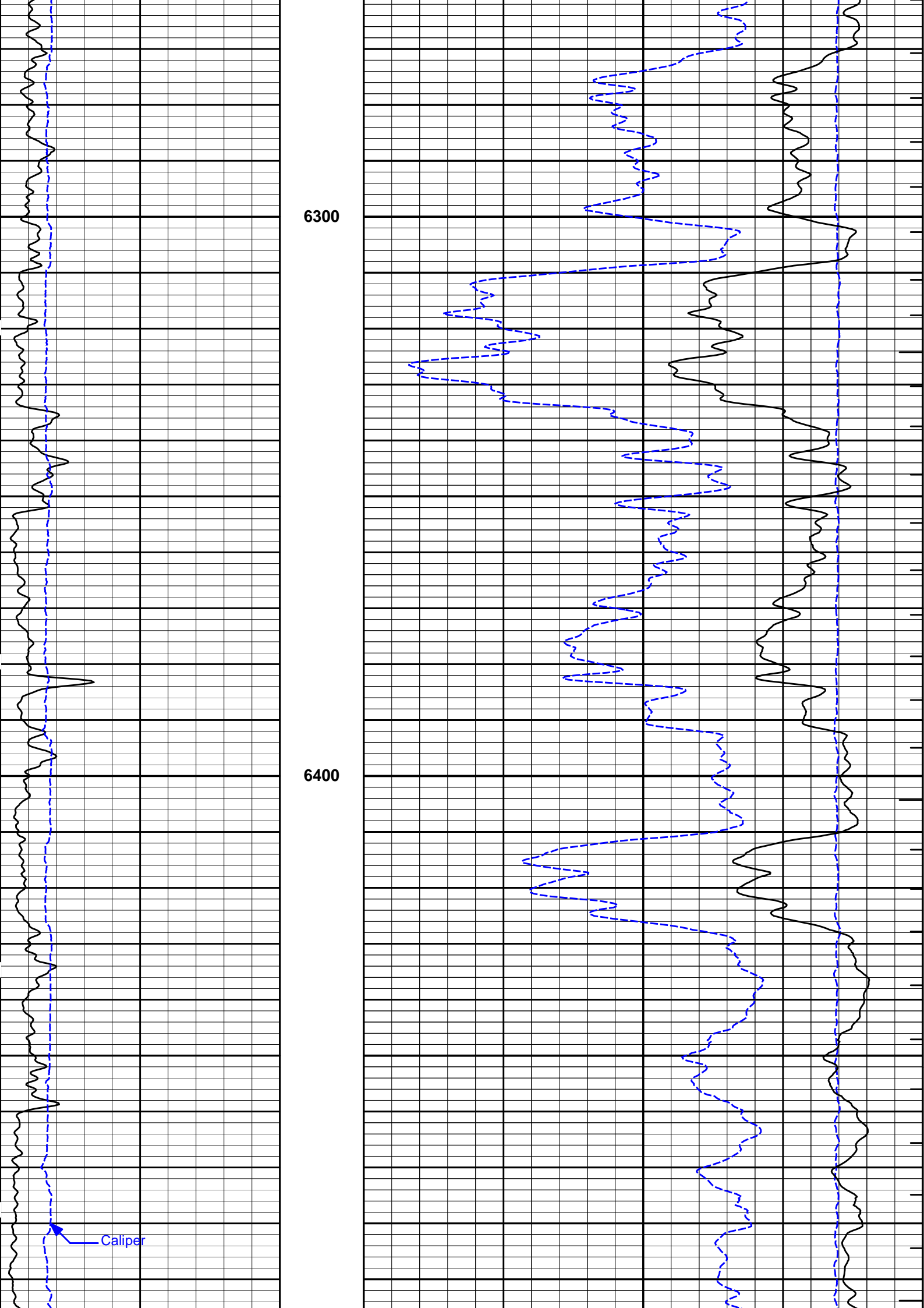
6	Caliper	16
	inches	
0	Gamma API	150
	api	

1 : 240
ft

30	Acou Porosity	-10
	percent	
140	Delta-T	40
	microsec per ft	

	ITTT	
15K	Tens	0
	pounds	

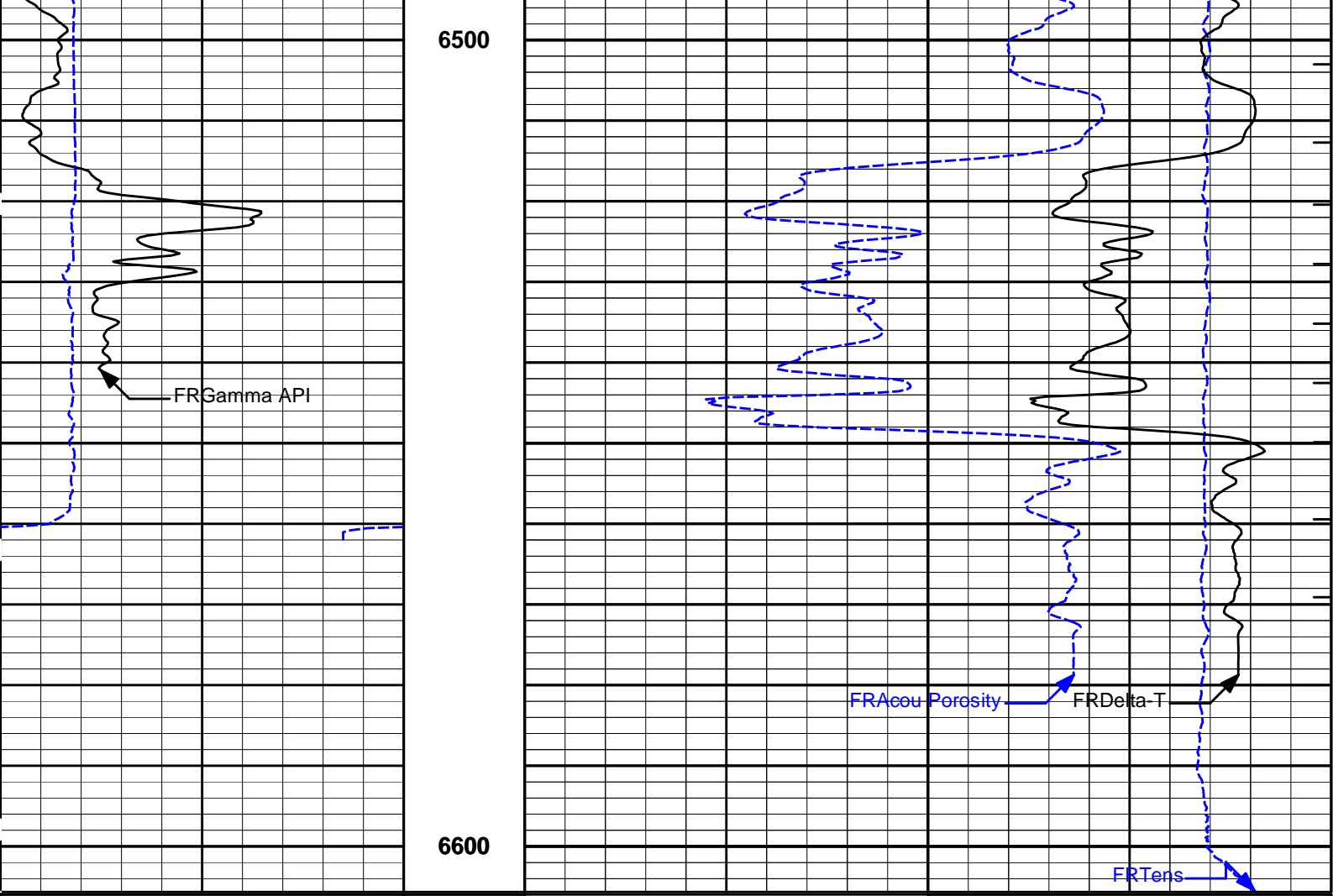




6300

6400

Caliper



0	Gamma API	150
	api	
6	Caliper	16
	inches	

1 : 240
ft

140	Delta-T	40
	microsec per ft	
30	Acou Porosity	-10
	percent	

15K	Tens	0
	pounds	
	ITTT	

HALLIBURTON Plot Time: 18-Oct-17 04:52:07
 Plot Range: 6250 ft to 6605.67 ft
 Data: MERIT_LCSLU 108\Well Based\REPEAT\
 Plot File: \\BSAT1_BSAT_5_rptx

REPEAT SECTION

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	9.100	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	0.700	ohmm
SHARED	TRM	Temperature of Mud	75.0	degF
SHARED	CSD	Logging Interval is Cased?	No	
SHARED	ICOD	AHV Casing OD	5.500	in
SHARED	CSTR	Compressive Strength	1000.00	psia
SHARED	ST	Surface Temperature	75.0	degF
SHARED	TD	Total Well Depth	6603.00	ft
SHARED	BHT	Bottom Hole Temperature	145.0	degF
SHARED	SVTM	Navigation and Survey Master Tool	NONE	
SHARED	AZTM	High Res Z Accelerometer Master Tool	GTET	
SHARED	TEMM	CBM Temperature Master Tool	GTET	
Rwa / CrossPlot	XPOK	Process Crossplot?	Yes	
Rwa / CrossPlot	FCHO	Select Source of F	Density	
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	
Rwa / CrossPlot	ROIN	Input for RO Calculation	Rwa	
GTET	GROK	Process Gamma Ray?	Yes	
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	Limestone	
DSNT	DNSO	DSN Standoff - 0.25 in (6.35 mm) Recommended	0.250	in
DSNT	DNTT	Temperature Correction Type	Gradient	
DSNT	DNTT	Top Zone Temperature Value	75.0	degF
DSNT	DNBT	DSN Bottom Zone Temperature Value	145.0	degF
DSNT	DTDT	Top Depth for Temperature Gradient Calculation (Measured Depth)	0	ft
DSNT	DBDT	Bottom Zone Temperature Depth (Measured Depth)	6603	ft
DSNT	DPRS	DSN Pressure Correction Type	Gradient	
DSNT	DNTP	DSN Top Zone Pressure Value	14.70	psia
DSNT	DNBP	DSN Bottom Zone Pressure Value	3125.00	psia
DSNT	DTDP	Top Depth for Pressure Gradient Calculation (Measured Depth)	0	ft
DSNT	DNDP	Bottom Zone Pressure Depth (Measured Depth)	6603	ft
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	
Microlog Pad	MLOK	Process MicroLog 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	2.710	g/cc
SDLT Pad	DFL	Formation Density Fluid	1.000	g/cc
SDLT Pad	BHSM	Borehole Size Source Tool	SDLT	
BSAT	MBOK	Compute BCAS Results?	Yes	
BSAT	FLLO	Frequency Filter Low Pass Value?	5000	Hz
BSAT	FLHI	Frequency Filter High Pass Value?	27000	Hz
BSAT	DTFL	Delta -T Pore Fluid	189.00	uspf
BSAT	DTMT	Delta -T Matrix Type	User define	
BSAT	DTMA	Delta -T Matrix	47.60	uspf
BSAT	DTSH	Delta -T Shale	100.00	uspf
BSAT	SPEQ	Acoustic Porosity Equation	Wylie	
ACRt Sonde	RTOK	Process ACRt?	Yes	
ACRt Sonde	MNSO	Minimum Tool Standoff	1.19	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	RMAX	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	
ACRt Sonde	MBFL	Apply Corkscrew Effect?	No	

BOTTOM

Data: MERIT_LCCLU 108\0001 GTET-DSN-SDL-FLX-BSAT-ACRTIDLE

Date: 18-Oct-17 02:57:13

HALLIBURTON

CALIBRATION REPORT

NATURAL GAMMA RAY TOOL SHOP CALIBRATION

Tool Name: GTET - 11021139

Reference Calibration Date: 23-Sep-17 12:22:06

Engineer: WHITLOCK

Calibration Date: 06-Oct-17 11:06:34

Software Version: WL INSITE R5.0.5 (Build 8)

Calibration Version: 1

Calibrator Source S/N: TB79

Calibrator API Reference:222.00 api

Equivalent Calibrator API Reference:225.9 api

Measurement	Measured	Calibrated	Units
Background	25.7	25.8	api
Background + Calibrator	250.7	251.7	api
Calibrator	225.0	225.9	api

NATURAL GAMMA RAY TOOL FIELD CALIBRATION

Tool Name: GTET - 11021139

Reference Calibration Date: 06-Oct-17 11:06:34

Engineer: WHITLOCK

Calibration Date: 06-Oct-17 11:10:24

Software Version: WL INSITE R5.0.5 (Build 8)

Calibration Version: 1

Calibrator Source S/N: TB79

Calibrator API Reference:222.00 api

Equivalent Calibrator API Reference:225.9 api

Field Verification	Shop	Field	Units
Background	25.8	24.9	api
Background + Calibrator	251.7	254.1	api
Calibrator	225.9	229.3	api

Shop	Field	Difference	Tolerance
225.9	229.3	-3.4	+/- 9.00

DUAL SPACED NEUTRON SHOP CALIBRATION

Tool Name: DSNT - 11020487 **Reference Calibration Date:** 05-Jun-17 14:14:28
Engineer: MICHAEL RICHTER **Calibration Date:** 03-Aug-17 01:56:12
Software Version: WL INSITE R5.0.5 (Build 8) **Calibration Version:** 1

Logging Source S/N: DSN-436
 Tank Serial Number: EL RENO
 Reference value assigned to Tank: 56.100
 Snow Block S/N: 12156883
 Calibration Tank Water Temperature: 72 degF
 Min. Tool Housing Outside Diameter: 3.625 in

CALIBRATION CONSTANTS			
Measurement	Prev. Value	New Value	Control Limit On New Value
Gain:	0.99837	0.99685	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):	0.2363	0.2358	0.0005	+/- 0.0020
Calibrated Ratio:	10.5757	10.5596	0.016	+/- 0.050

VERIFIER		
Measurement	Value	Control Limit
Snow-Block Porosity (decp):	0.0746	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 - 11020487 **Reference Calibration Date:** 03-Aug-17 01:56:12
Engineer: WHITLOCK **Calibration Date:** 06-Oct-17 10:54:23
Software Version: WL INSITE R5.0.5 (Build 8) **Calibration Version:** 1

Logging Source S/N: DSN-436
 Snow Block S/N: 12156883

NEUTRON FIELD-CHECK SUMMARY				
	Shop	Field	Difference	Control Limit On Change
Snow-Block Porosity (decp):	0.0746	0.0623	-0.0122	+/- 0.0150

PASS/FAIL SUMMARY	
Block Change Check:	Passed
Snow Block Stat Check:	Passed
Temperature Check:	Passed

DENSITY CALIPER SHOP CALIBRATION

Tool Name: SDLT - 11014296 **Reference Calibration Date:** 06-Nov-16 12:09:13
Engineer: MICHAEL RICHTER **Calibration Date:** 15-Mar-17 09:33:53
Software Version: WL INSITE R5.0.5 (Build 8) **Calibration Version:** 1

Host Tool Name: DSNT - 11020487

CALIBRATION COEFFICIENTS

Measurement	Previous Value	New Value	Control Limit On New Value
Pad Offset	-4335.63	-4512.85	-7000.00 - -1000.00
Pad Gain	0.0003910	0.0004190	0.0002000 - 0.0006000
Arm Offset	-3121.03	-2559.45	-5000.00 - 3000.00
Arm Gain	0.0005117	0.0005078	0.000300 - 0.000700
Arm Power	-0.000003980	-0.000003959	-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)	1.94	2.00	0.06	+/- 0.20
Medium Ring (in)	3.57	3.75	0.18	+/- 0.20
RING DIAMETER:				
Small Ring (in)	6.31	6.50	0.19	+/- 0.20
Medium Ring (in)	8.08	8.25	0.17	+/- 0.20
Large Ring (in)	14.92	15.00	0.08	+/- 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 - 11014296	Reference Calibration Date: 15-Mar-17 09:33:53
Engineer: WHITLOCK	Calibration Date: 04-Oct-17 10:11:22
Software Version: WL INSITE R5.0.5 (Build 8)	Calibration Version: 1

MEASURED CALIPER VALUES

Measurement	Shop	Field	Change	Control Limit On New Value
Pad Extension	3.75	3.84	0.09	+/- 0.10
Ring Diameter	8.25	8.31	0.06	+/- 0.15

PASS/FAIL SUMMARY

Pad Extension Check: Passed
 Diameter Check: Passed

MICRO LOG SHOP CALIBRATION

Tool Name: Microlog Pad - 11014296	Reference Calibration Date: 03-Aug-17 02:26:45
Engineer: WHITLOCK	Calibration Date: 06-Oct-17 11:43:41
Software Version: WL INSITE R5.0.5 (Build 8)	Calibration Version: 1
Host Tool Name: DSNT - 11020487	

CALIBRATION COEFFICIENT SUMMARY

Measurement	Micro Log Normal		Micro Log Lateral		Units
	Measured	Calibrated	Measured	Calibrated	
Tool Zero	-0.43	-0.13	0.01	-0.00	ohmm
Calibration Point #1	-0.31	0.00	0.01	0.00	ohmm
Calibration Point #2	19.73	20.00	19.97	20.00	ohmm
Internal Reference	19.55	19.82	19.97	20.00	ohmm

Measurement	Micro Log Normal	Micro Log Lateral	Units
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Measurement	Tool Value	Tool Value	Units
Tool Zero	0.08	0.12	V
Calibration Point #1	33.72	1.57	V
Calibration Point #2	5375.96	6898.02	V
Internal Reference	5327.65	6899.00	V

MICRO LOG FIELD CHECK

Tool Name: Microlog Pad - 11014296 **Reference Calibration Date:** 06-Oct-17 11:43:41
Engineer: WHITLOCK **Calibration Date:** 06-Oct-17 11:44:30
Software Version: WL INSITE R5.0.5 (Build 8) **Calibration Version:** 1

Measurement	Micro Log Normal		Micro Log Lateral		Units
	Shop	Field	Shop	Field	
Tool Zero	-0.13	-0.13	-0.00	-0.00	ohmm
Internal Reference	19.82	19.82	20.00	20.01	ohmm

Summary				
Signal	Shop	Field	Difference	Tolerance
Microlog Normal	19.82	19.82	0.00	+/- 0.80
Microlog Lateral	20.00	20.01	-0.01	+/- 0.80

SPECTRAL DENSITY SHOP CALIBRATION

Tool Name: SDLT Pad - 10809130 **Reference Calibration Date:** 25-May-17 12:11:12
Engineer: MICHAEL RICHTER **Calibration Date:** 03-Aug-17 02:19:19
Software Version: WL INSITE R5.0.5 (Build 8) **Calibration Version:** 1

Logging Source S/N: 5155GW

Aluminum Block S/N: EL RENO

Density: 2.581g/cc

Pe: 3.170

Magnesium Block S/N: EL RENO MG

Density: 1.687g/cc

Pe: 2.594

DENSITY CALIBRATION SUMMARY

Measurement	Previous Value	New Value	Control Limit
Near Bar Gain	1.0466	0.9648	0.90 - 1.10
Near Dens Gain	1.0202	0.9664	0.90 - 1.10
Near Peak Gain	1.0587	0.9808	0.90 - 1.10
Near Lith Gain	1.0474	0.9899	0.90 - 1.10
Far Bar Gain	1.0144	1.0063	0.90 - 1.10
Far Dens Gain	1.0018	0.9910	0.90 - 1.10
Far Peak Gain	0.9968	0.9885	0.90 - 1.10
Far Lith Gain	0.9703	0.9595	0.90 - 1.10
Near Bar Offset	-0.1512	0.5881	NONE
Near Dens Offset	0.0840	0.5517	NONE
Near Peak Offset	-0.2272	0.4091	NONE
Near Lith Offset	-0.1986	0.2702	NONE
Far Bar Offset	0.0686	0.1331	NONE
Far Dens Offset	0.1508	0.2380	NONE
Far Peak Offset	0.1449	0.2044	NONE
Far Lith Offset	0.2786	0.3450	NONE
Near Bar Background	815.93	813.79	700 - 1450
Near Dens Background	269.20	265.74	230 - 480
Near Peak Background	115.80	115.36	100 - 210
Near Lith Background	146.10	144.32	125 - 260
Far Bar Background	479.68	477.53	450 - 900
Far Dens Background	184.50	185.37	175 - 345
Far Peak Background	72.51	72.20	70 - 140
Far Lith Background	76.60	75.50	75 - 145

CALIBRATION BLOCK SUMMARY				
Measurement	Current Reading (Previous Coef)	Calibrated (New Coef)	Change	Control Limit On Change
MAGNESIUM				
Density (g/cc)	1.689	1.687	-0.002	+/- 0.015
Pe	2.521	2.561	0.040	+/- 0.150
ALUMINUM				
Density (g/cc)	2.574	2.580	0.006	+/- 0.01500
Pe	3.085	3.134	0.049	+/- 0.150

TOOL SUMMARY				
Measurement	Near Detector		Far Detector	
	Value	Control Limits	Value	Control Limits
QUALITY				
Background	0.0002	+/- 0.0110	-0.0029	+/- 0.0140
Magnesium Block	-0.0013	+/- 0.0110	-0.0010	+/- 0.0140
Aluminum Block	-0.0009	+/- 0.0110	-0.0014	+/- 0.0140
Resolution	8.91	6.00 - 11.50	9.49	6.00 - 11.50
Internal Verifier(B+D+P+L)	1339	1200 - 2700	811	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 - 10809130	Reference Calibration Date:	03-Aug-17 02:19:19
Engineer:	WHITLOCK	Calibration Date:	06-Oct-17 11:43:04
Software Version:	WL INSITE R5.0.5 (Build 8)	Calibration Version:	1

Pad Temperature: 78.1 degF

DENSITY FIELD CALIBRATION SUMMARY				
Measurement	Shop	Field	Change	Control Limit +/-
Near (B+D+P+L) cps	1339.219	1336.718	-2.501	14.801
Far (B+D+P+L) cps	810.608	811.972	1.364	15.737
Near Resolution	8.91	8.90	-0.010	0.50
Far Resolution	9.49	9.48	-0.010	1.00

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

BSAT FIELD CASING CHECK			
Tool Name:	BSAT - 10939049	Calibration Date:	30-Mar-17 10:01:32
Engineer:	HARRIS		
Software Version:	WL INSITE R5.0.5 (Build 8)	Calibration Version:	1

Pre-Log Check	Check Depth	Shop	Field	Difference	Tolerance	Units
Delta-T Compensated	147.01	57.00	56.56	0.4400	1.00	uspf

ARRAY COMPENSATED TRUE RESISTIVITY SHOP CALIBRATION

Tool Name:	ACRt Sonde - 11038385	Reference Calibration Date:	12-Sep-17 13:48:00
Engineer:	JORGE ORLANDO PEREZ	Calibration Date:	12-Sep-17 13:58:19
Software Version:	WL INSITE R5.0.5 (Build 8)	Calibration Version:	1
Host Tool Name:	ACRt Instrument - 11055059		

TYPICAL GAIN RANGE									
Subarray	R12KHz			R36KHz			R72KHz		
	Lower	(mmho/m)	Upper	Lower	(mmho/m)	Upper	Lower	(mmho/m)	Upper
A1 (80")	0.95	1.0395	1.05	0.95	1.0229	1.05	0.95	1.0146	1.05
A2 (50")	0.95	1.0409	1.05	0.95	1.0225	1.05	0.95	1.0165	1.05
A3 (29")	0.95	1.0384	1.05	0.95	1.0194	1.05	0.95	1.0115	1.05
A4 (17")	0.95	1.0343	1.05	0.95	1.0133	1.05	0.95	1.0069	1.05
A5 (10")	N/A	N/A	N/A	0.95	1.0083	1.05	0.95	0.9989	1.05
A6 (6")	N/A	N/A	N/A	0.95	1.0000	1.05	0.95	0.9929	1.05

SONDE OFFSET									
Subarray	R12KHz			R36KHz			R72KHz		
	(mmho/m)			(mmho/m)			(mmho/m)		
A1 (80")	0.702			-4.637			-5.501		
A2 (50")	-0.771			-4.034			-5.172		
A3 (29")	-13.230			-3.699			-3.350		
A4 (17")	-110.240			-33.969			-26.356		
A5 (10")	N/A			-83.665			-41.621		
A6 (6")	N/A			333.771			173.557		

TRANSMITTER CURRENT GAIN					R-MUD VERIFICATION			
Signal	Lower	R	Upper		Signal	Lower (ohm-m)	Measured (ohm-m)	Upper (ohm-m)
12K	0.6	0.90	1.3		Mud Cell	0.95	1.00	1.05
36K	1.0	1.36	2.0					
72K	1.0	1.62	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
GTET-11021139						
Gamma Ray Calibrator	225.9	229.3	-----	-3.4	+/- 9.00	api
DSNT-11020487						
Snow-Block Porosity	0.0746	0.0623	-----	0.0123	+/- 0.0150	decp
SDLT-11014296						
Pad Extension	3.75	3.84	-----	-0.09	+/-0.10	in
Ring Diameter	8.25	8.31	-----	-0.06	+/-0.15	in
Microlog Pad-11014296						
MicroLog Normal	19.82	19.82	-----	0.00	+/-0.80	ohmm
MicroLog Lateral	20.00	20.01	-----	-0.01	+/-0.80	ohmm
SDLT Pad-10809130						
Near(B+D+P+L)	1339.219	1336.718	-----	2.501	+/-14.801	cps
Far(B+D+P+L)	810.608	811.972	-----	-1.364	+/-15.737	cps
ACRt Sonde-11038385						
Mud Cell	1.00	-----	-----	0	-----	ohm-m



TOOL STRING DIAGRAM REPORT

Description	Overbody Description	O.D.	Diagram	Sensors @ Delays	Length	Accumulated Length
CH_HOS_I 37.50 lbs		Ø 2.750 in →		← Temperature @ 76.74 ft	2.25 ft	76.99 ft
XOHD-11021555 20.00 lbs		Ø 2.750 in → Ø 3.625 in →			0.95 ft	74.74 ft
SP Sub-10904995 60.00 lbs		Ø 3.625 in →		← SP @ 72.01 ft	3.74 ft	73.79 ft
				← Z-Accelerometer @ 69.60 ft		70.05 ft
GTET-11021139 165.00 lbs		Ø 3.625 in →			8.52 ft	
				← GammaRay @ 63.99 ft		61.53 ft
DSNT-11020487 174.00 lbs	DSN Decentralizer-11023947 6.60 lbs	Ø 5.000 in* → Ø 3.625 in →			9.69 ft	
				← DSN Far @ 54.59 ft ← DSN Near @ 53.84 ft		51.84 ft
SDLT-11014296 360.00 lbs	SDLT Pad-10809130 65.00 lbs Microlog Pad-11014296 8.00 lbs RAM-Cs137-10948154 1.00 lbs	Ø 4.500 in → Ø 4.500 in* → Ø 4.750 in* → Ø 0.800 in* →			10.81 ft	
				← Microlog @ 44.03 ft ← SDL Caliper @ 43.84 ft ← SDL @ 43.83 ft		41.03 ft
IQ Flex-10973274 140.00 lbs		Ø 3.625 in →		5.67 ft		
	Centralizer 25-00000002 8.00 lbs	Ø 3.750 in* →			35.36 ft	

BSAT-10939049
300.00 lbs

Ø 3.625 in →

Receiver Array @ 26.84 ft
Sonic Receivers @ 26.84 ft

15.77 ft

ACRt Instrument-
11055059
50.00 lbs

Centralizer 25-00000001
8.00 lbs

Ø 3.625 in →
Ø 3.750 in* →

5.03 ft

19.58 ft

ALAT Standoff OD 6-
12345678
11.60 lbs

Ø 6.000 in* →

Mud Resistivity @ 13.19 ft

14.55 ft

ACRt Sonde-
11038385
200.00 lbs

Ø 3.625 in →

ACRt @ 9.21 ft

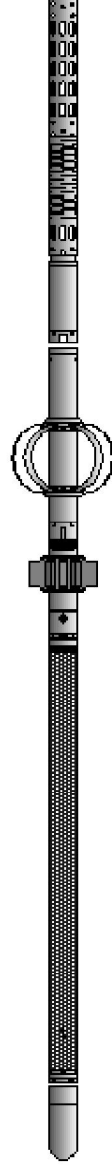
14.22 ft

Bull Nose-12345678
5.00 lbs

Ø 2.750 in →

0.33 ft
0.33 ft

0.33 ft
0.00 ft



Mnemonic	Tool Name	Serial Number	Weight (lbs)	Length (ft)	Accumulated Length (ft)	Max. Log. Speed (fpm)
CH_HOS	Hostile Cable Head with Load Cell	CH_HOS_I	37.50	2.25	74.74	300.00
XOHD	Hostile to Dits Cross Over	11021555	20.00	0.95	73.79	300.00
SP	SP Sub	10904995	60.00	3.74	70.05	300.00
GTET	Gamma Telemetry Tool	11021139	165.00	8.52	61.53	60.00
DSNT	Dual Spaced Neutron	11020487	174.00	9.69	51.84	60.00
DCNT	DSN Decentralizer	11023947	6.60	5.13 *	55.17	300.00
SDLT	Spectral Density Tool	11014296	360.00	10.81	41.03	60.00
SDLP	Density Insite Pad	10809130	65.00	2.55 *	43.24	60.00
Cs137	Logging Source, SDLT-I, 1.78 Ci - Cs137	10948154	1.00	0.80 *	43.47	300.00
MICP	Microlog Pad	11014296	8.00	1.00 *	43.53	60.00
IQF	IQ Flex tool	10973274	140.00	5.67	35.36	300.00
BSAT	Borehole Sonic Array Tool	10939049	300.00	15.77	19.58	60.00
OBCEN	Centralizer - 25 in. Overbody	00000002	8.00	2.08 *	32.44	300.00
ACRt	Array Compensated True Resistivity Instrument Section	11055059	50.00	5.03	14.55	120.00
OBCEN	Centralizer - 25 in. Overbody	00000001	8.00	2.08 *	15.70	300.00
ACRt	Array Compensated True Resistivity Sonde Section	11038385	200.00	14.22	0.33	120.00
ALATS	Array Laterolog Tool OD 6 Standoff	12345678	11.60	1.00 *	13.19	60.00
BLNS	Bull Nose	12345678	5.00	0.33	0.00	300.00
Total			1,619.70	76.99		

* Not included in Total Length and Length Accumulation.

Data: MERIT_LCSLU 108\0001 GTET-DSN-SDL-FLX-BSAT-ACRTIDLE

Date: 18-Oct-17 02:56:43

COMPANY	MERIT ENERGY COMPANY, LLC
WELL	LCSLU 108 (WSW)

FIELD	BIG SKY	STATE	KANSAS
COUNTY	GRANT		
HALLIBURTON		BOREHOLE SONIC ARRAY LOG	