HALLIBURTON

BOREHOLE COMPENSATED SONIC ARRAY LOG

COMPANY **CMX, INC.**

WELL **LEGHORN #1-22**

FIELD/BLOCK **CHASE-SILICA**

COUNTY **BARTON** STATE **KANSAS**

API No. 15-009-26165-00-00

Location 2310' FSL & 2610' FEL

Other Services:
ACRT
BSAT
MICRO
DSNT/SDLT

Sect. 22 Twp. 20S Rge. 11W

Permanent Datum	GL	Elev. 1759.0 ft	Elev.: K.B. 1767.0 ft
Log measured from	KB	, 8.0 ft above perm. Datum	D.F. 1767.0 ft
Drilling measured from	KB		G.L. 1759.0 ft

Date		08-Mar-17					
Run No.		ONE					
Depth - Driller		3312.0 ft					
Depth - Logger		3310.0 ft					
Bottom - Logged Interval		3307.0 ft					
Top - Logged Interval		252.0 ft					
Casing - Driller		8.625 in	@ 256.0 ft	@		@	
Casing - Logger		252.0 ft					
Bit Size		7.875 in		@		@	
Type Fluid in Hole		Water Based Mud					
Density	Viscosity	9.1 ppg	57.00 s/qt				
PH	Fluid Loss	9.20 pH	7.6 cptm				
Source of Sample		FLOWLINE					
Rm @ Meas. Temperature		0.54 ohmm	@ 75.00 degF	@		@	
Rmf @ Meas. Temperature		0.45 ohmm	@ 75.00 degF	@		@	
Rmc @ Meas. Temperature		0.63 ohmm	@ 75.00 degF	@		@	
Source Rmf	Rmc	CALC	CALC				
Rm @ BHT		0.42 ohmm	@ 103.0 degF	@		@	
Time Since Circulation		15:52 hr					
Time on Bottom		08-Mar-17 11:52					
Max. Rec. Temperature		103.00 degF	@ 3310.0 ft	@		@	
Equipment	Location	11072142	EL RENO, OK				
Recorded By		THOMAS HYDE		JORGE ORLANDO PEREZ			
Witnessed By		K. LEBLANC					

Fold here

Service Ticket No.: 903889174

API No.: 15-009-26165-00-00

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

CHANGE IN MUD TYPE OR ADDITIONAL SAMPLE

		Sample No.			Type Log	Depth	Scale Up Hole	Scale Down Hole
Date								
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 SCALE CHANGES

RESISTIVITY EQUIPMENT DATA

	Run No.	Tool Type & No.	Pad Type	Tool Pos.	Other
				CENT.	N/A
Run No.	ONE	ACRT	N/A		
Serial No.		I-11026094			
Model No.		S-11024142			
Diameter					
Log Type					
Source Type					
Serial No.					
Strength					

EQUIPMENT DATA

GAMMA		ACOUSTIC		DENSITY		NEUTRON	
Run No.	ONE	Run No.	ONE	Run No.	ONE	Run No.	ONE
Serial No.	11013114	Serial No.	10939050	Serial No.	10960494	Serial No.	10993115
Model No.	GTET	Model No.	BSAT	Model No.	SDLT	Model No.	DSNT
Diameter	3.625"	No. of Cent.	2	Diameter	5.5"	Diameter	3.625"
Detector Model No.	T-102	Spacing	EVEN	Log Type	GAM-GAM	Log Type	NEU-NEU
Type	SCINT			Source Type	Cs137	Source Type	Am241Be
Length	8"	LSA [Y/N]		Serial No.	5168GW	Serial No.	DSD-424
Distance to Source	N/A	FWDA [Y/N]		Strength	1.5 Ci	Strength	15 Ci

LOGGING DATA

GENERAL				GAMMA		ACOUSTIC		DENSITY		NEUTRON	
Run No.	Depth From	Depth To	Speed ft/min	Scale L	Scale R	Scale L	Scale R	Matrix	Scale L	Scale R	Matrix
ONE	3310	252	REC	0	150	30	130	147.6	30	130	171.1

ONE	3310	252	REC	0	150	30	-10	47.6	30	-10	2.71	30	310	LIME

DIRECTIONAL INFORMATION

Maximum Deviation	@	KOP	@

Remarks: RUN 1: GTET

RUN 2: GTET-DSNT-SDLT

RUN 3: GTET-BSAT-ACRT

TOOLS RUN PER CUSTOMER REQUEST

ANNULAR HOLE VOLUME CALCULATED FOR 5.5 INCH CASING

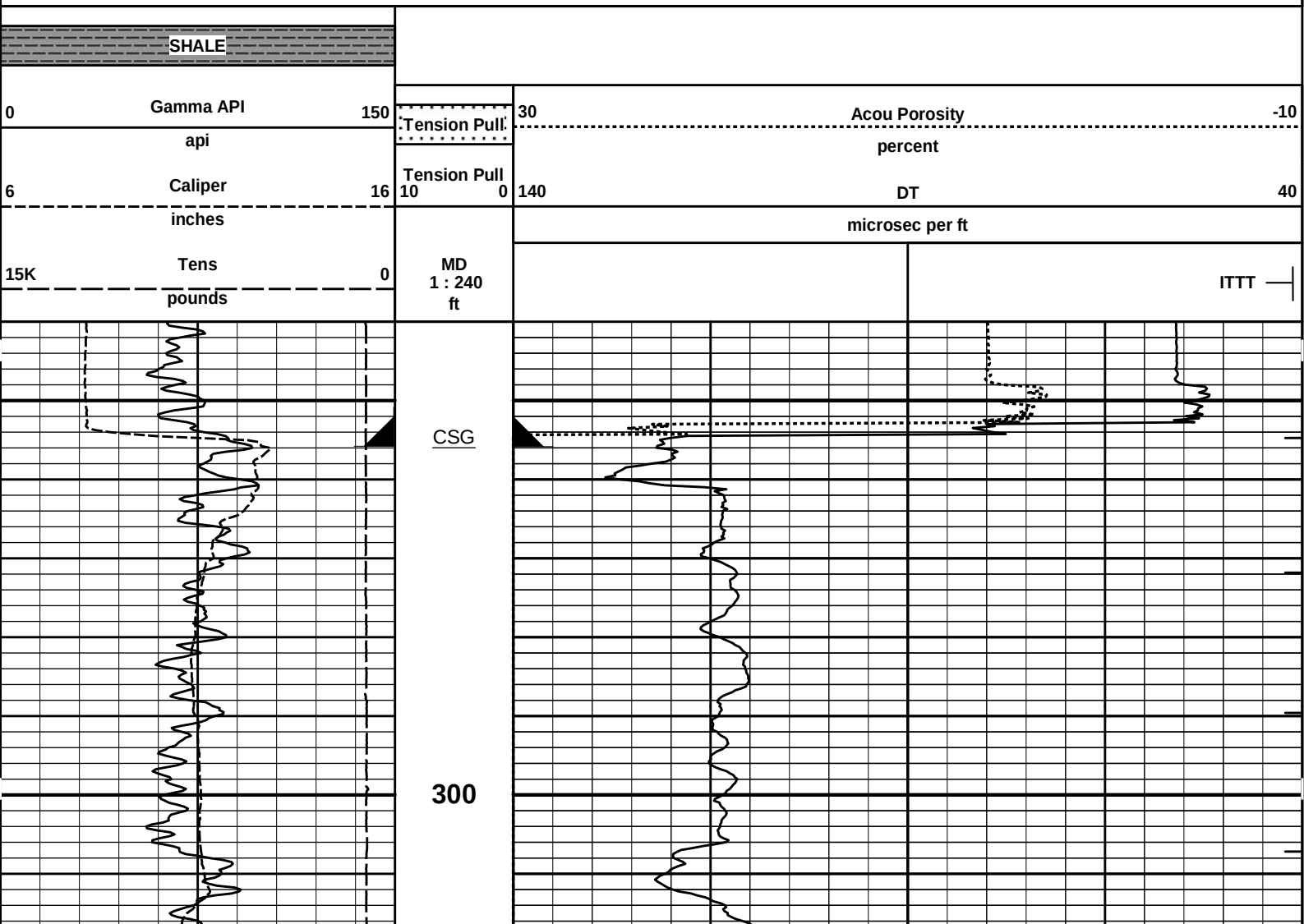
TODAY'S CREW K. KING T. SUMNER

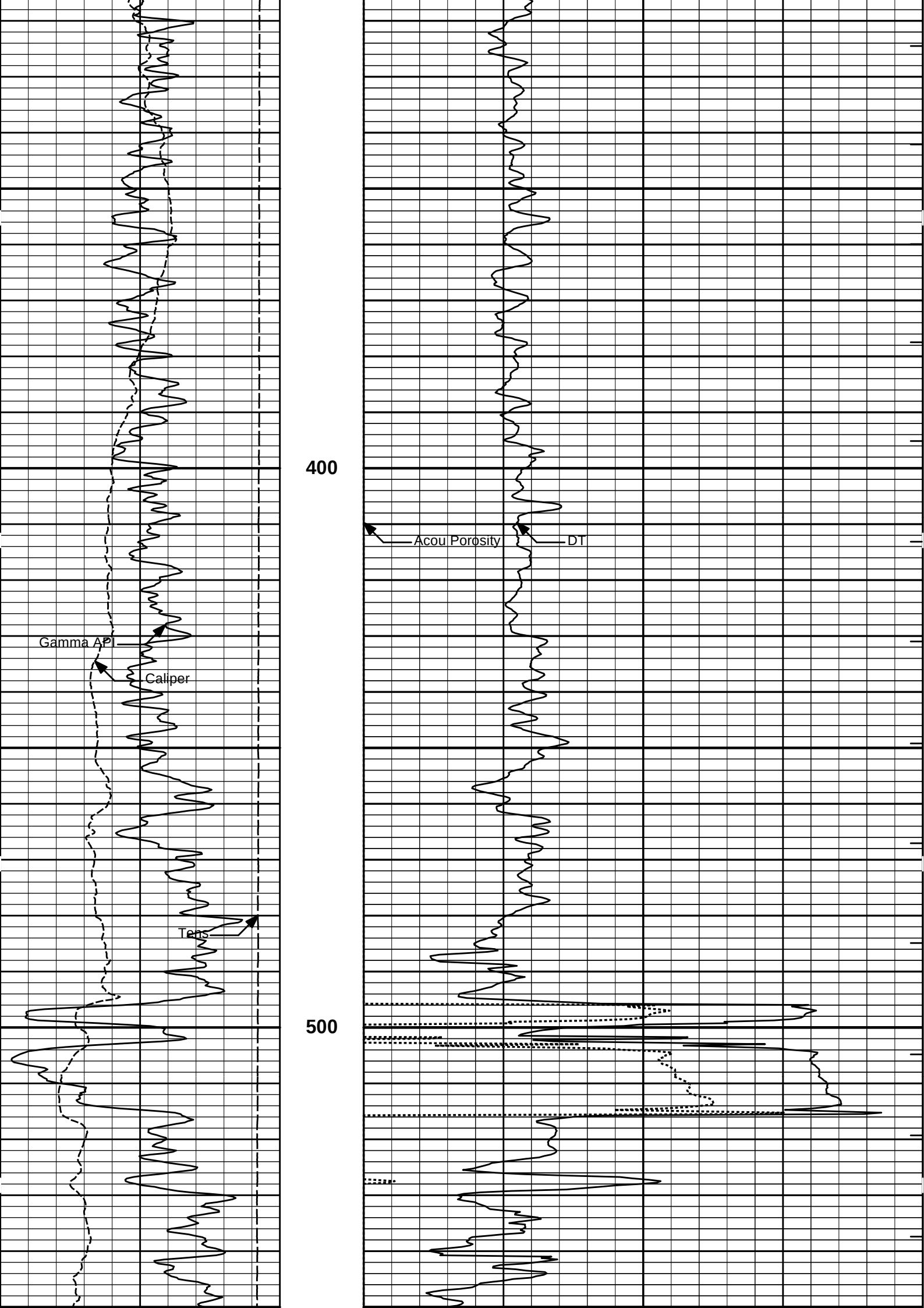
THANK YOU FOR CHOOSING HALLIBURTON ENERGY SERVICES EL RENO, OK 405-278-9685

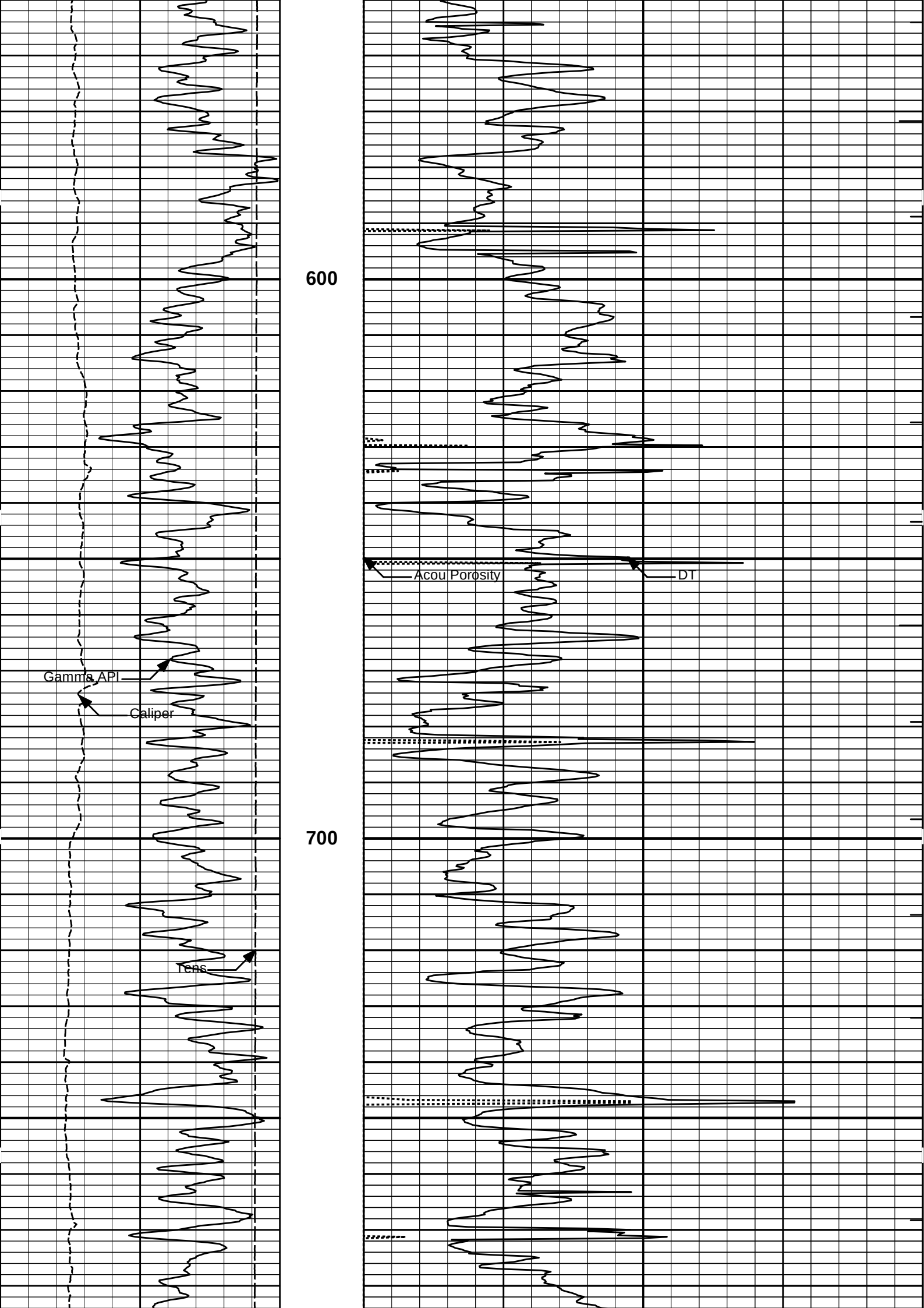
HALLIBURTON

Plot Time: 08-Mar-17 13:55:51
Plot Range: 240 ft to 3317.25 ft
Data: LEGHORN_1-22\Well Based*
Plot File: \\BSAT\BSAT_5_MAIN_LIB

5 INCH MAIN LOG




400
Acou Porosity
DT
Gamma API
Caliper
Tens
500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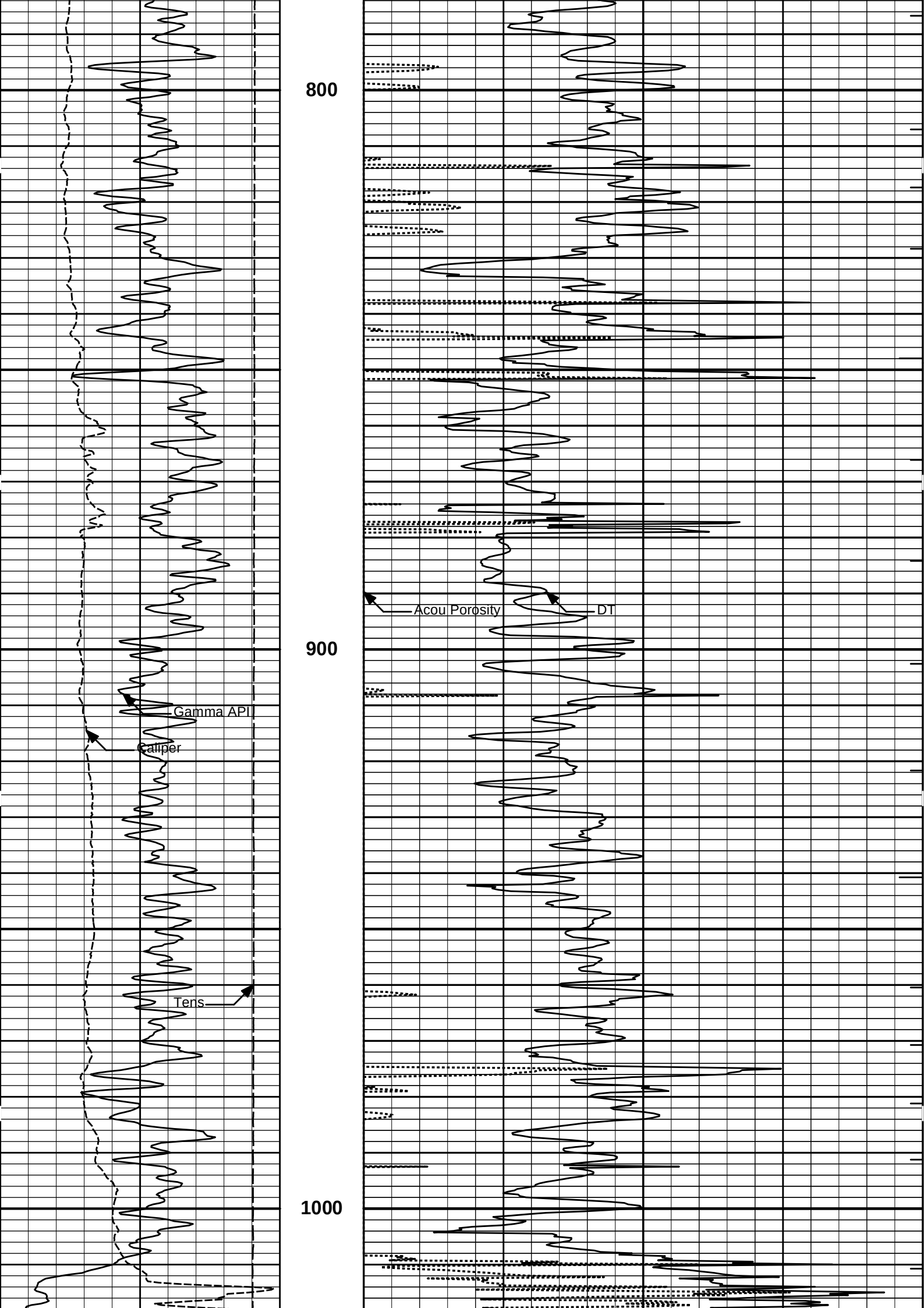
DT
Gamma API
Caliper
700
Tens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DT
900
Gamma API
Caliper
Tens
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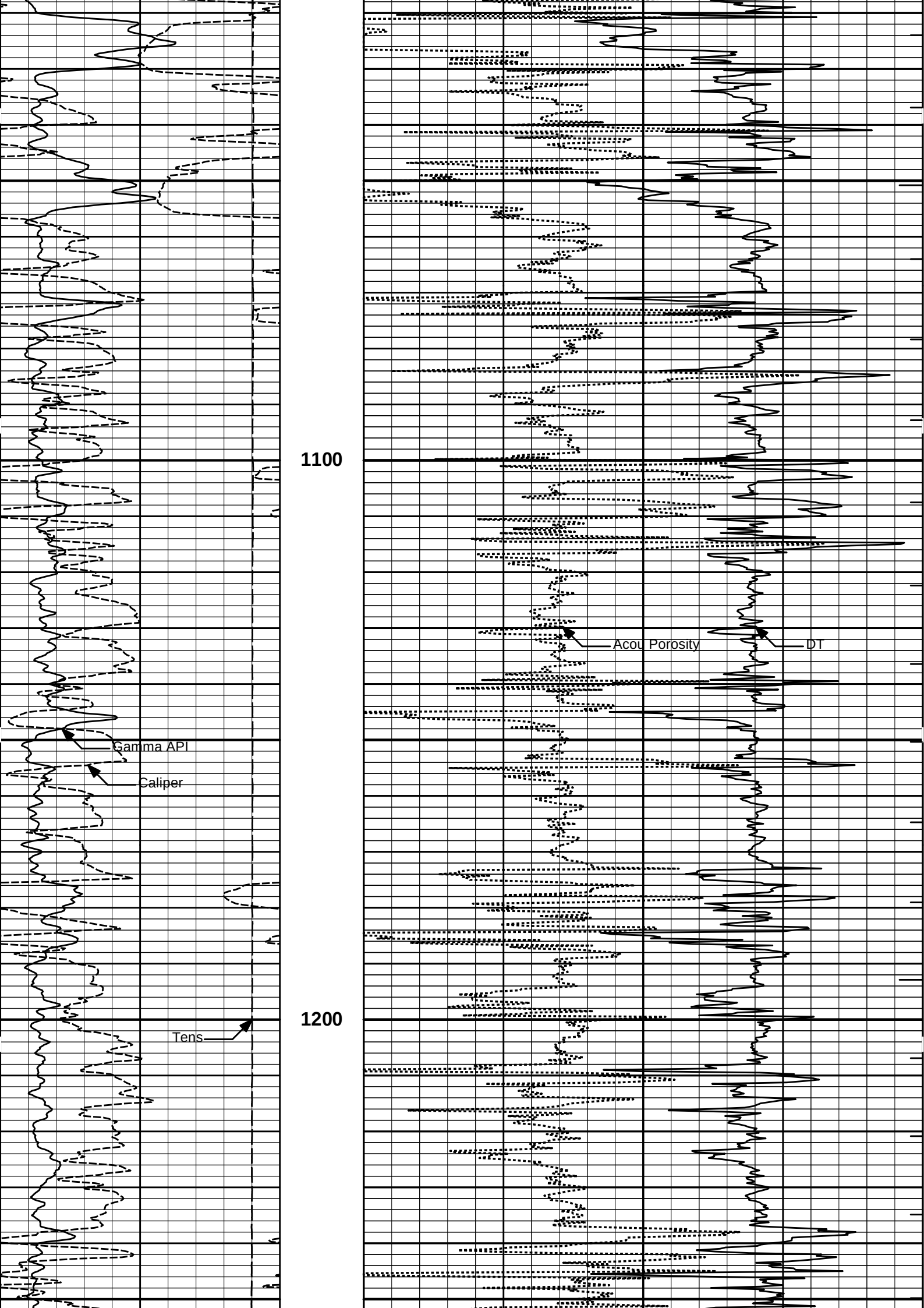
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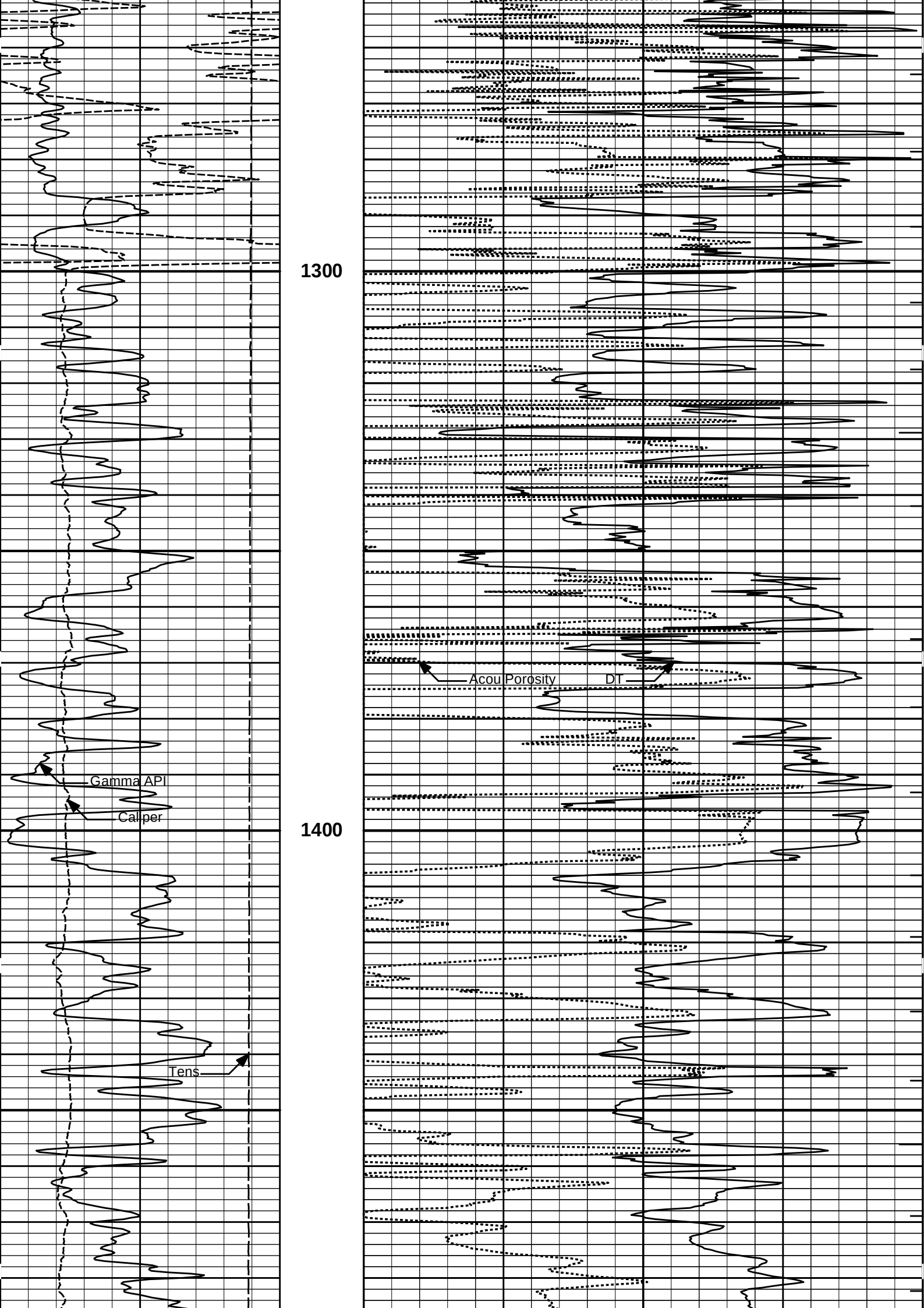
DT
Gamma API
Caliper
1200
Tens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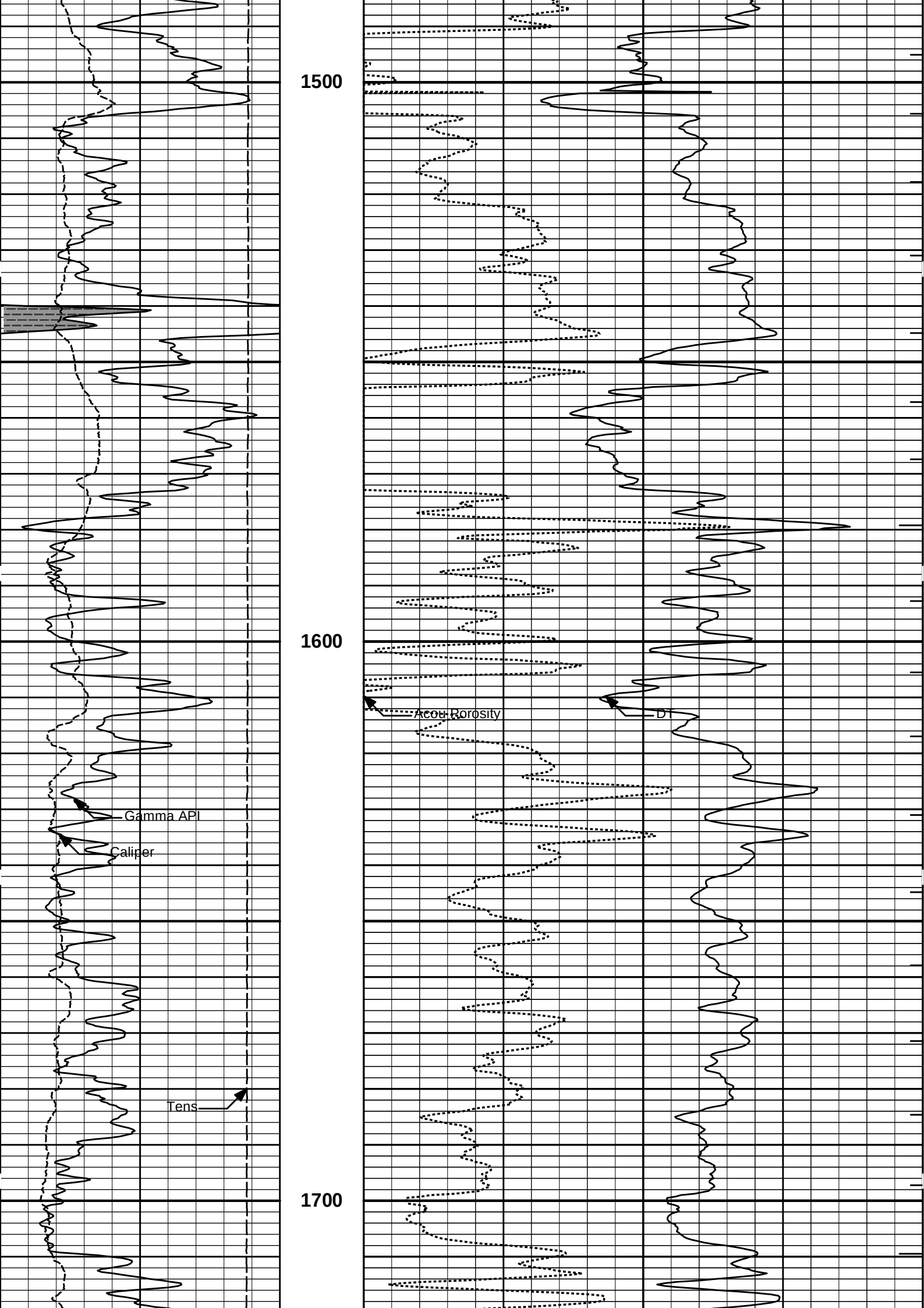
DT
Gamma API
Caliper
1400
Tens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1600
1700
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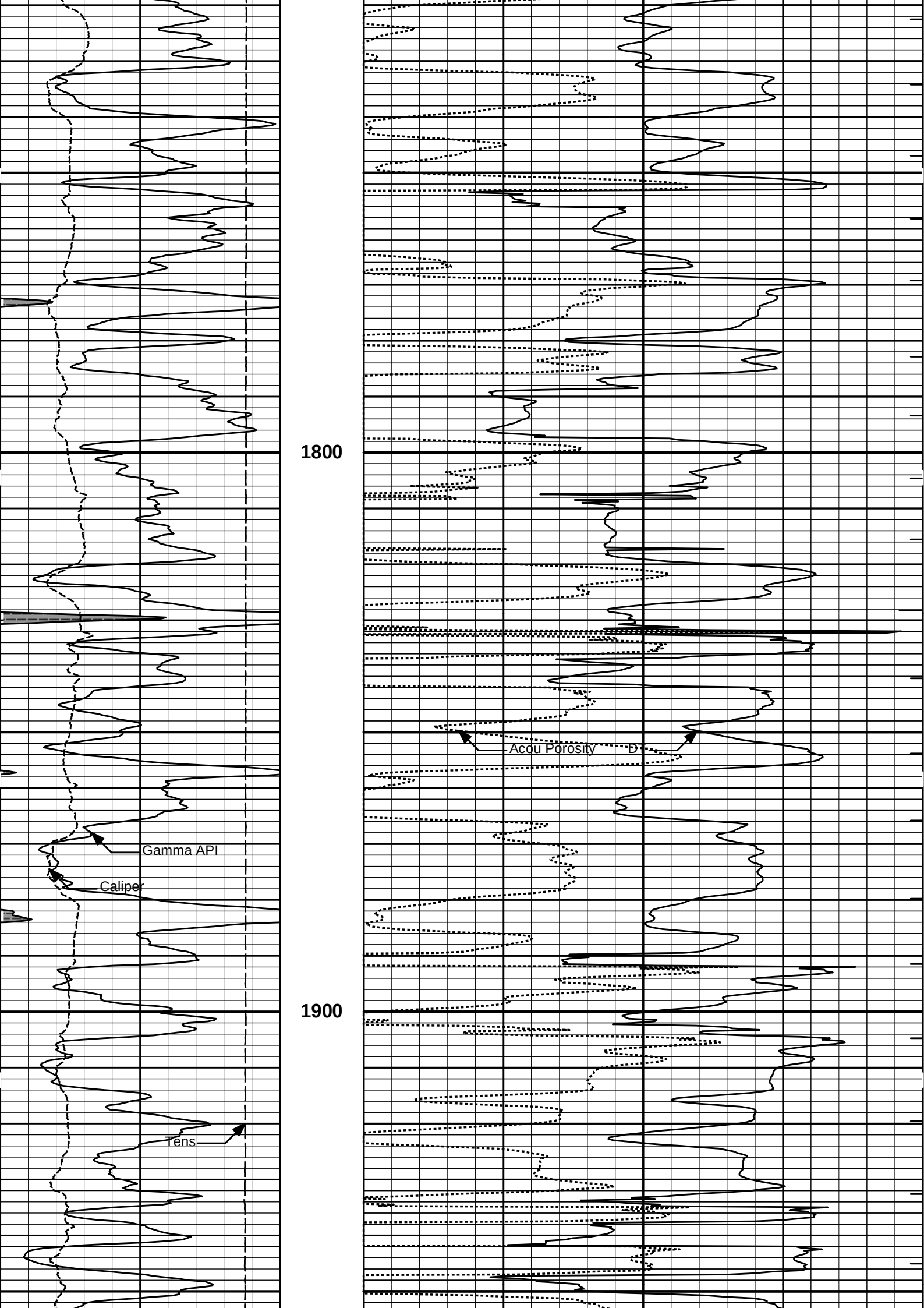
DT
Gamma API
Caliper
Tens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DT
Gamma API
Caliper
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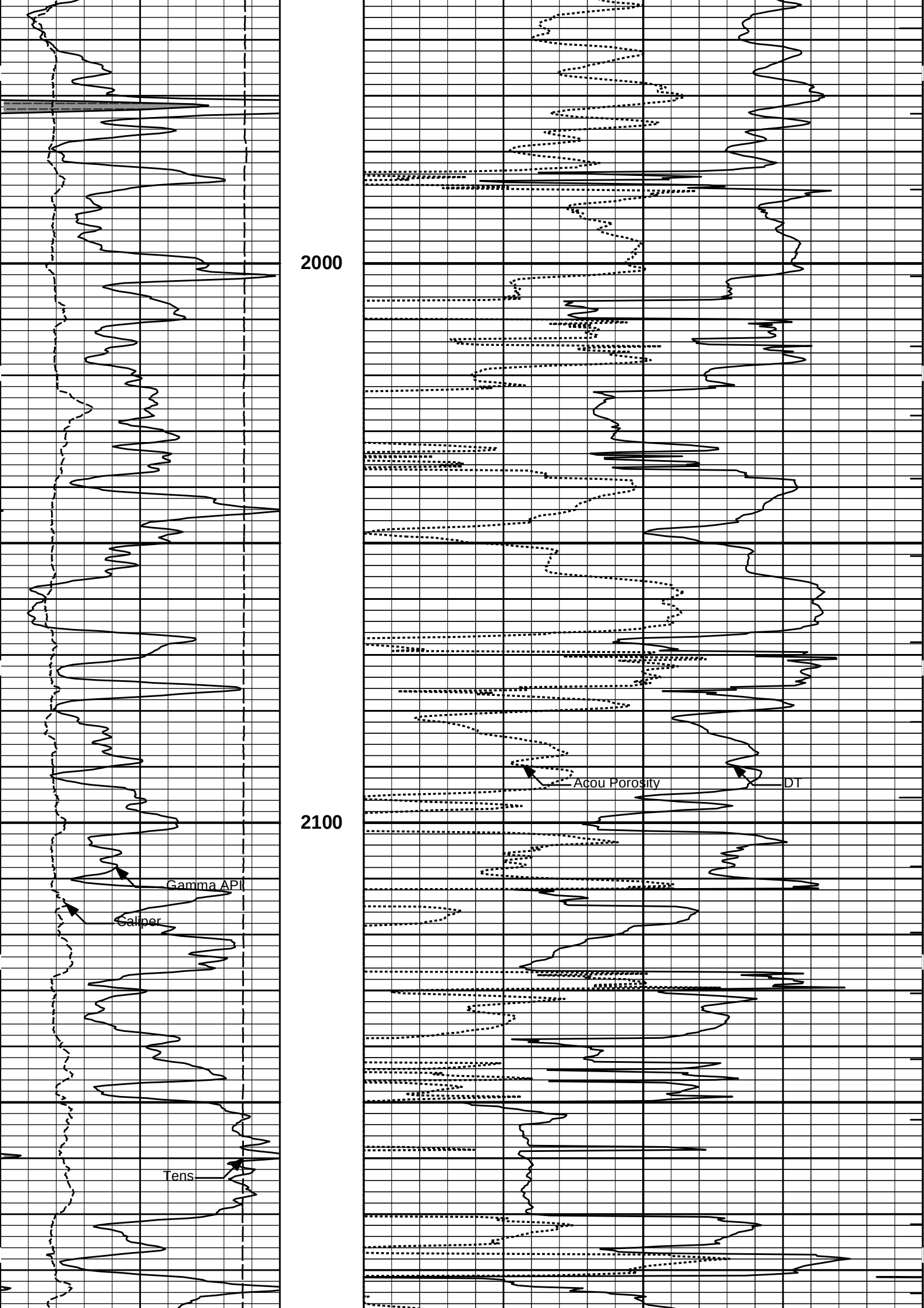
Tens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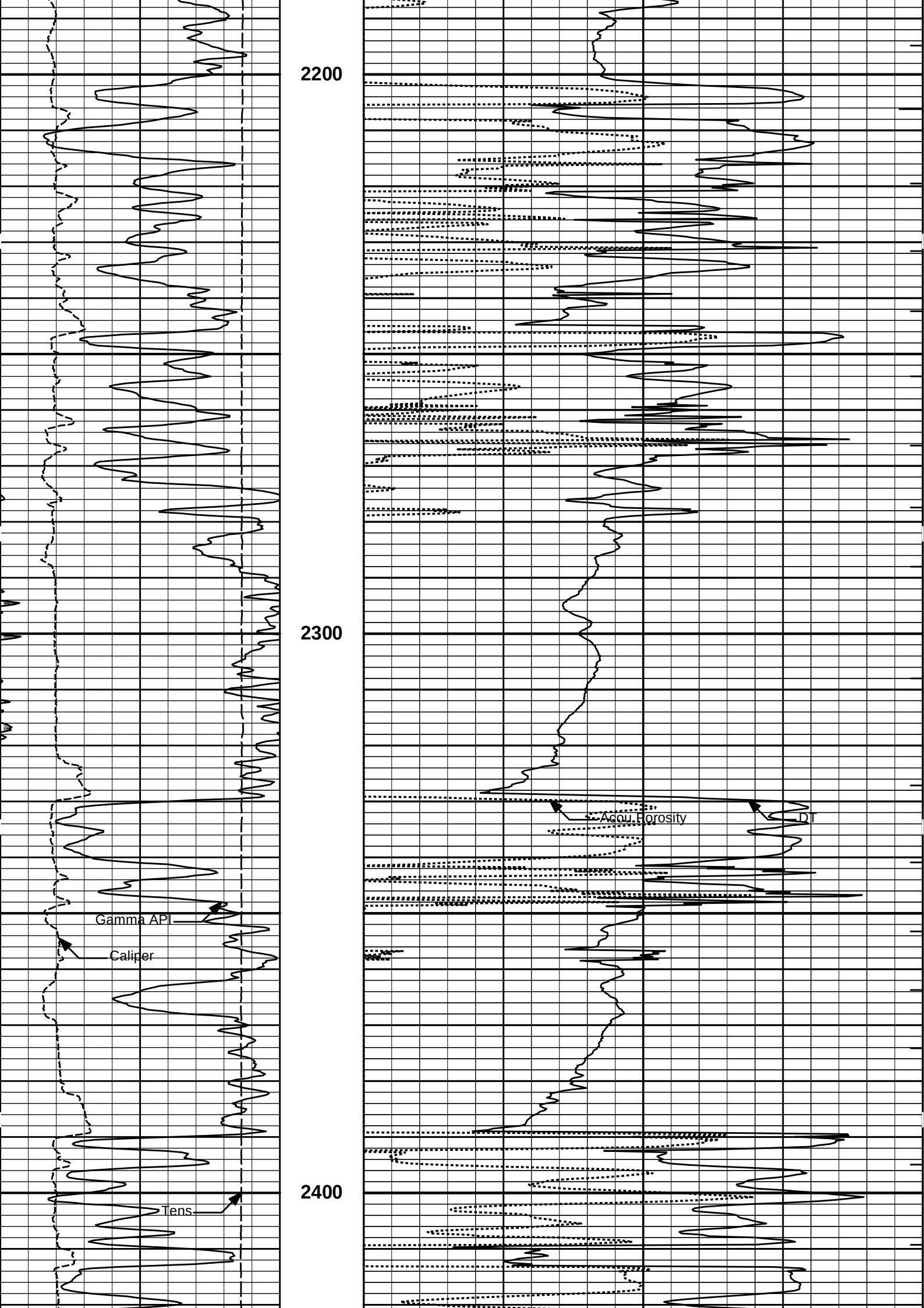
2100
Acou Porosity
DT
Gamma API
Caliper
Tens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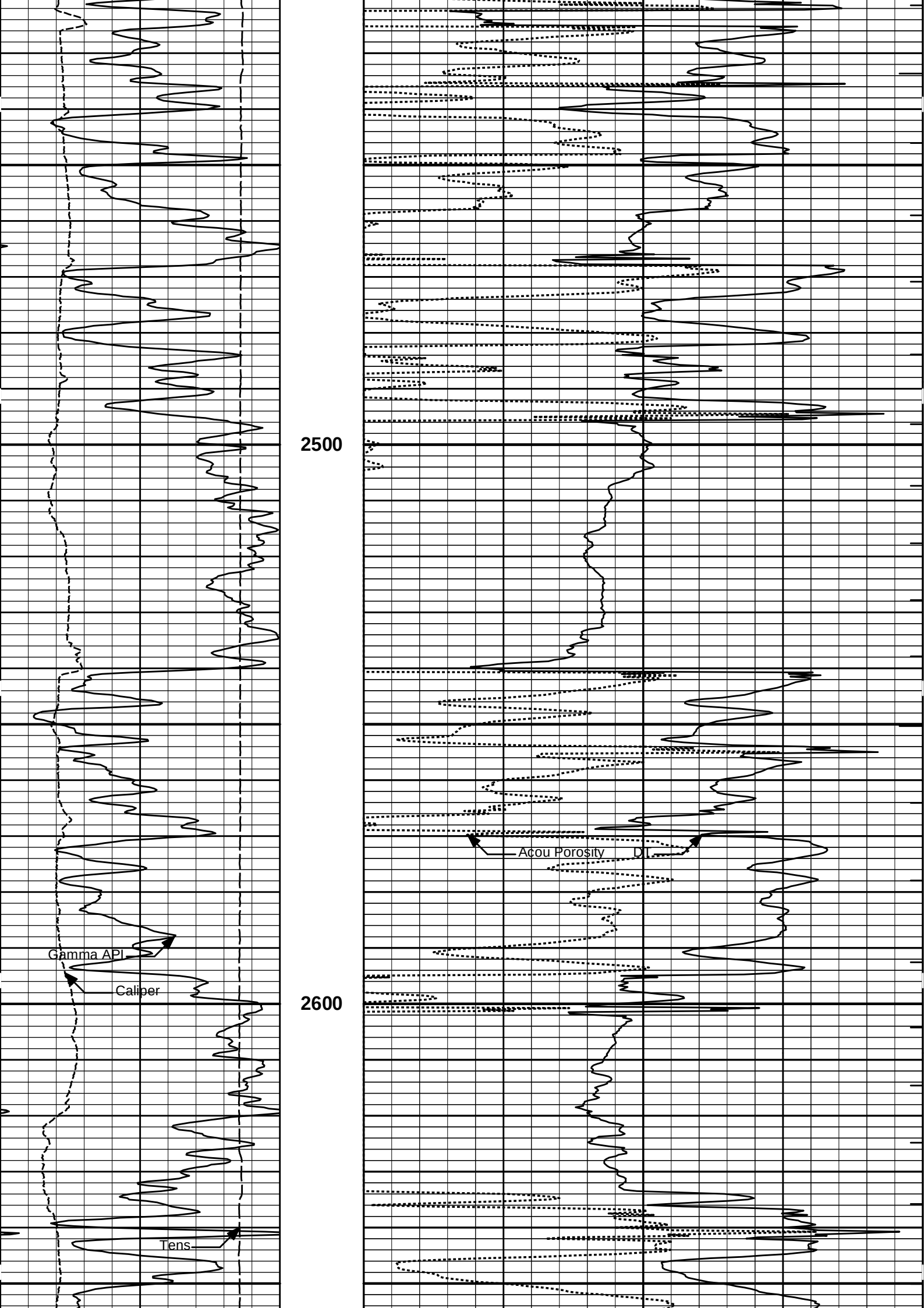
2300
2400
Gamma API
Caliper
Tens
Accou.Porosity
DT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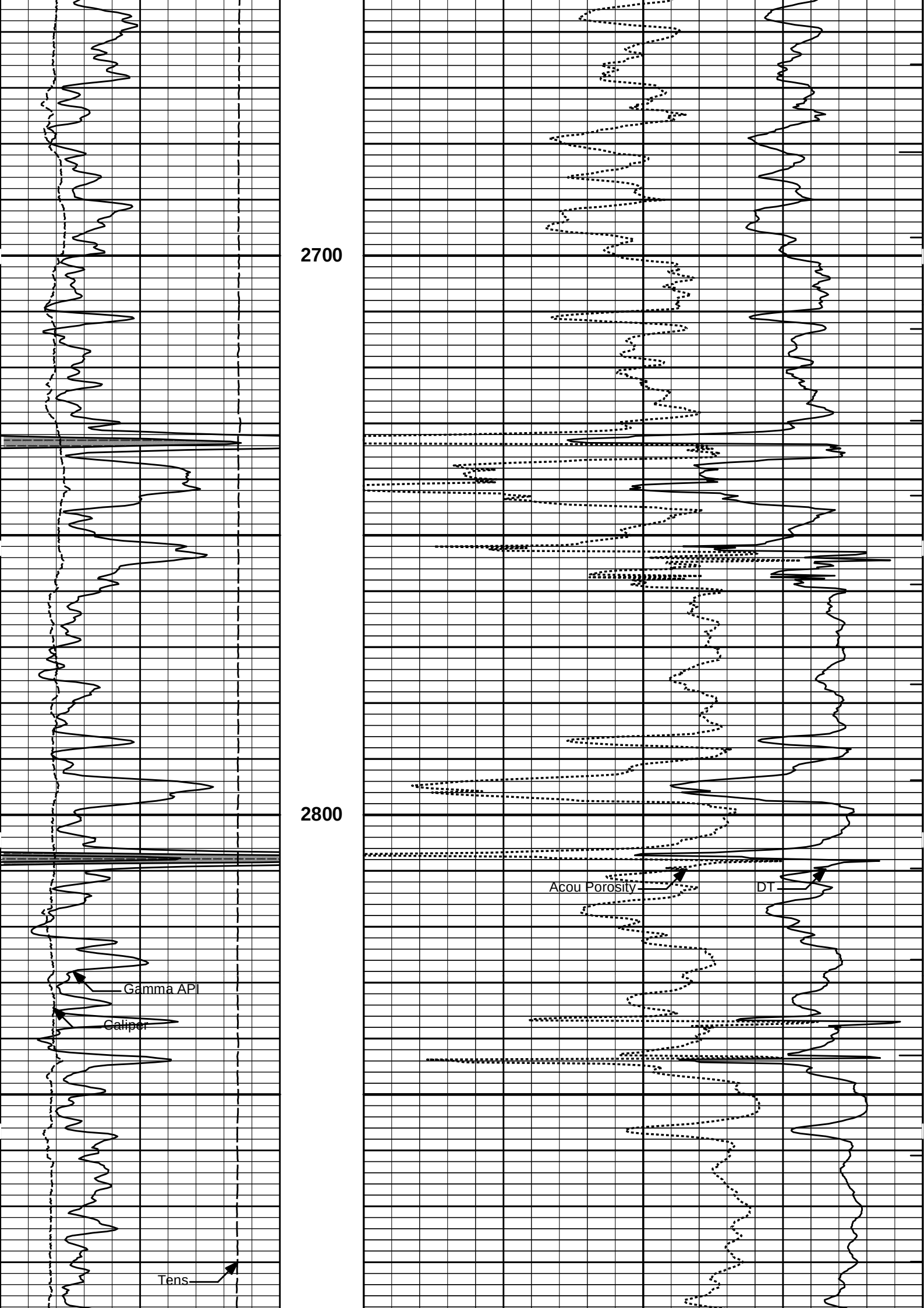
DT
Gamma API
Caliper
2600
Tens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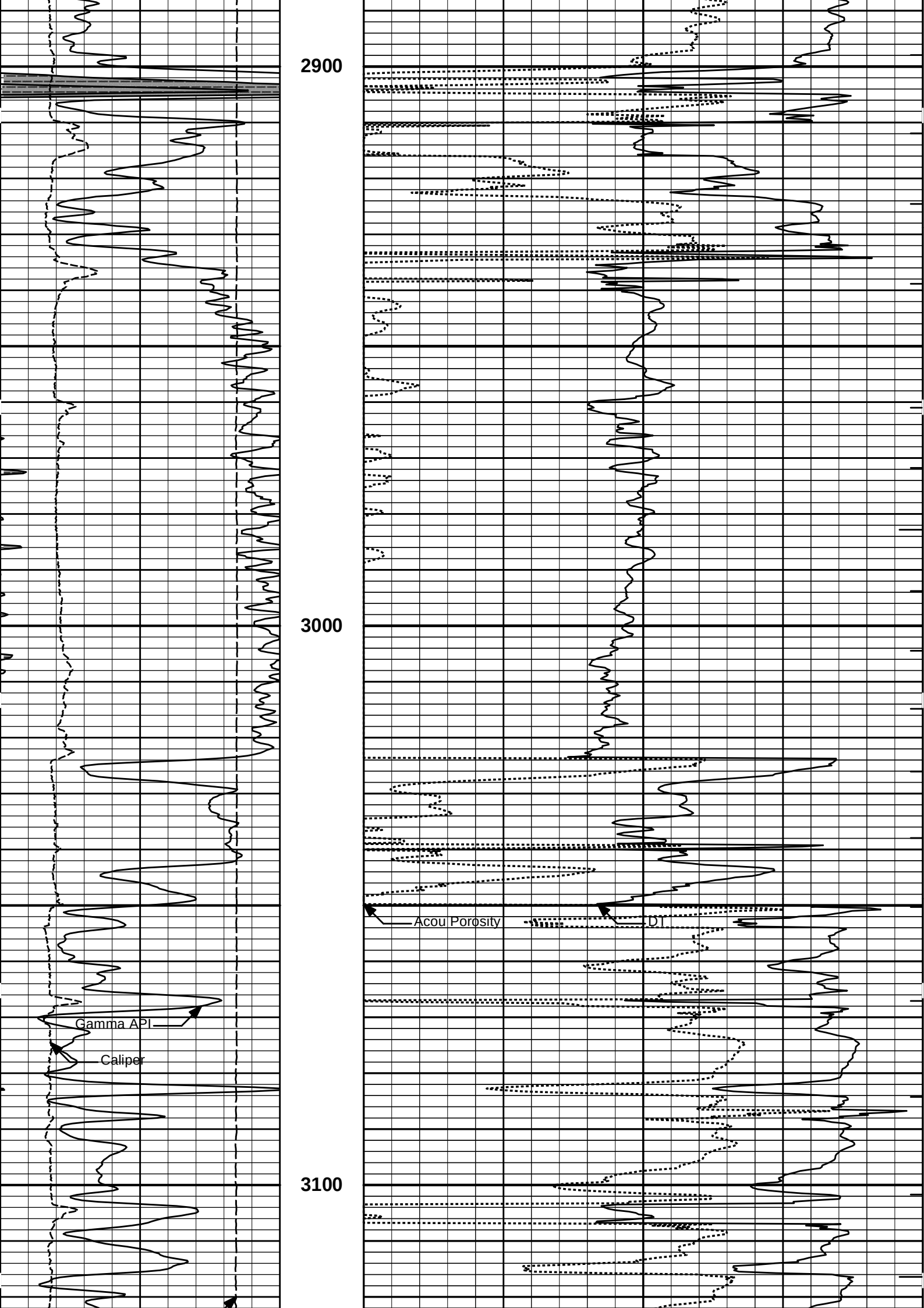
DT
Gamma API
Caliper
Tens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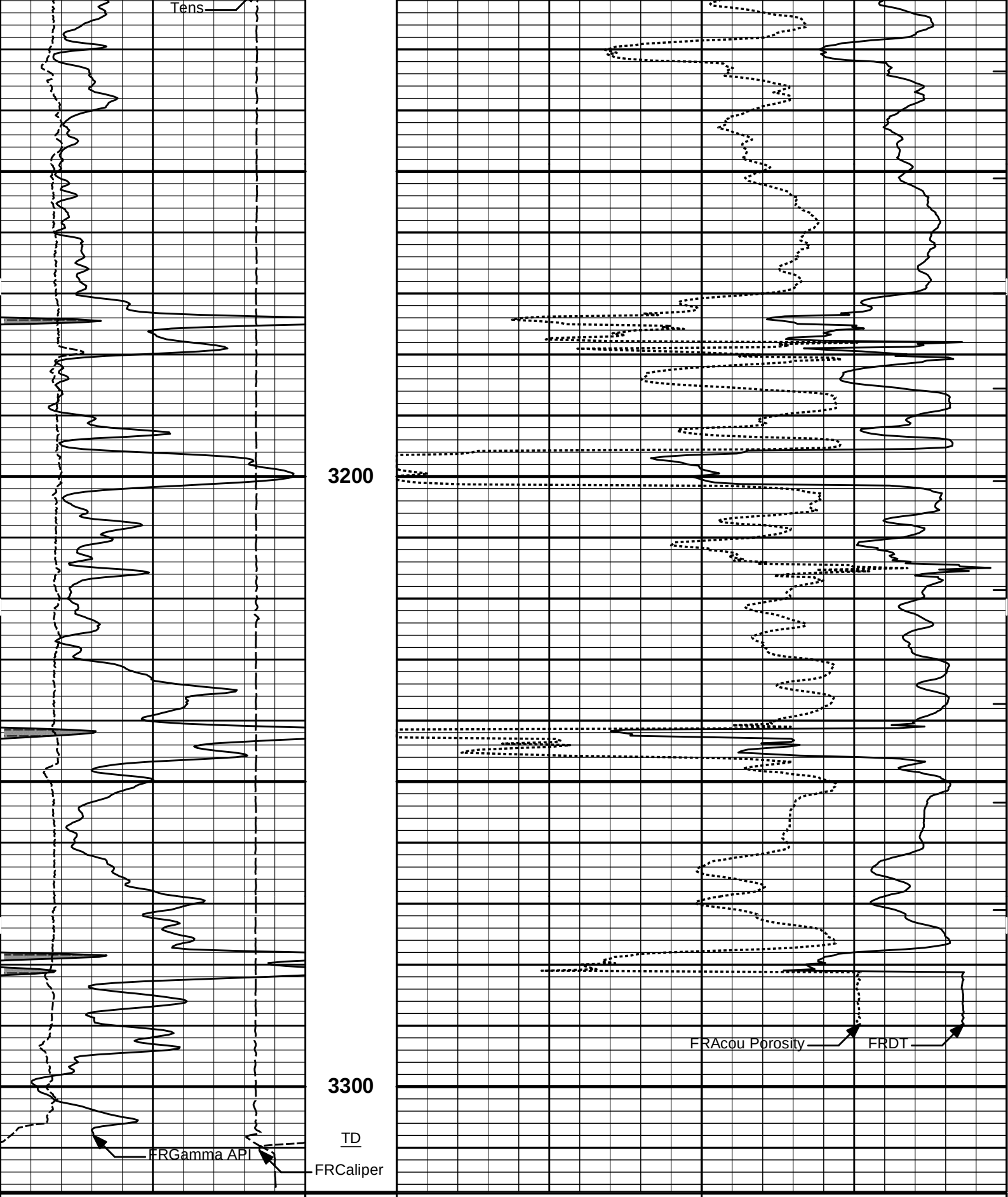
3000
3100
Acou Porosity
DT
Gamma API
Caliper



15K Tens 0	MD 1 : 240 ft		ITTT
pounds			
6 Caliper 16	Tension Pull 10 0	140 DT 40	
inches		microsec per ft	
0 Gamma API 150	Tension Pull	30 Acou Porosity -10	
api		percent	
SHALE			

HALLIBURTON

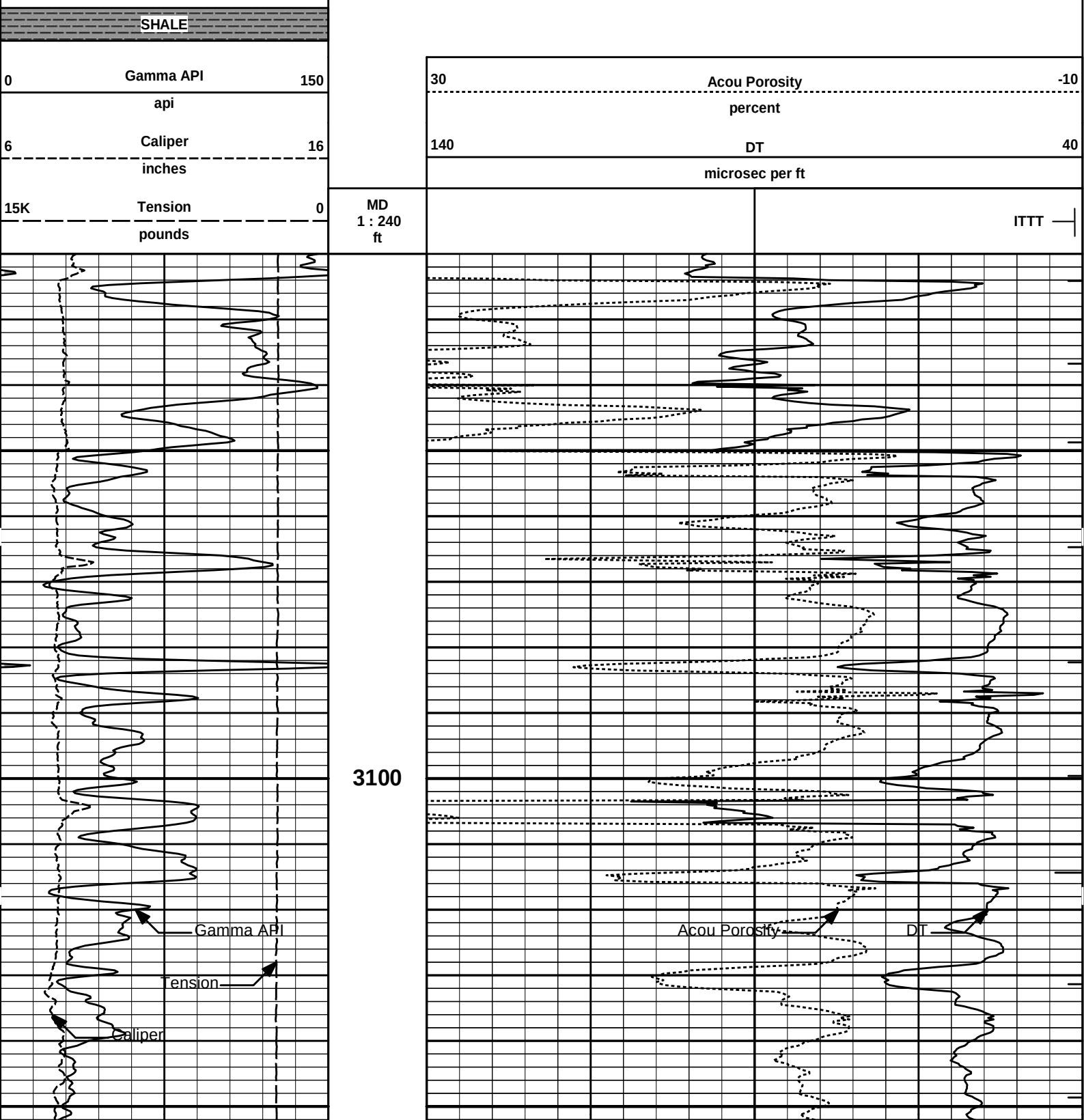
Plot Time: 08-Mar-17 13:55:53
Plot Range: 240 ft to 3317.25 ft
Data: LEGHORN_1-22\Well Based*\
Plot File: \\BSAT\BSAT_5_MAIN_LIB

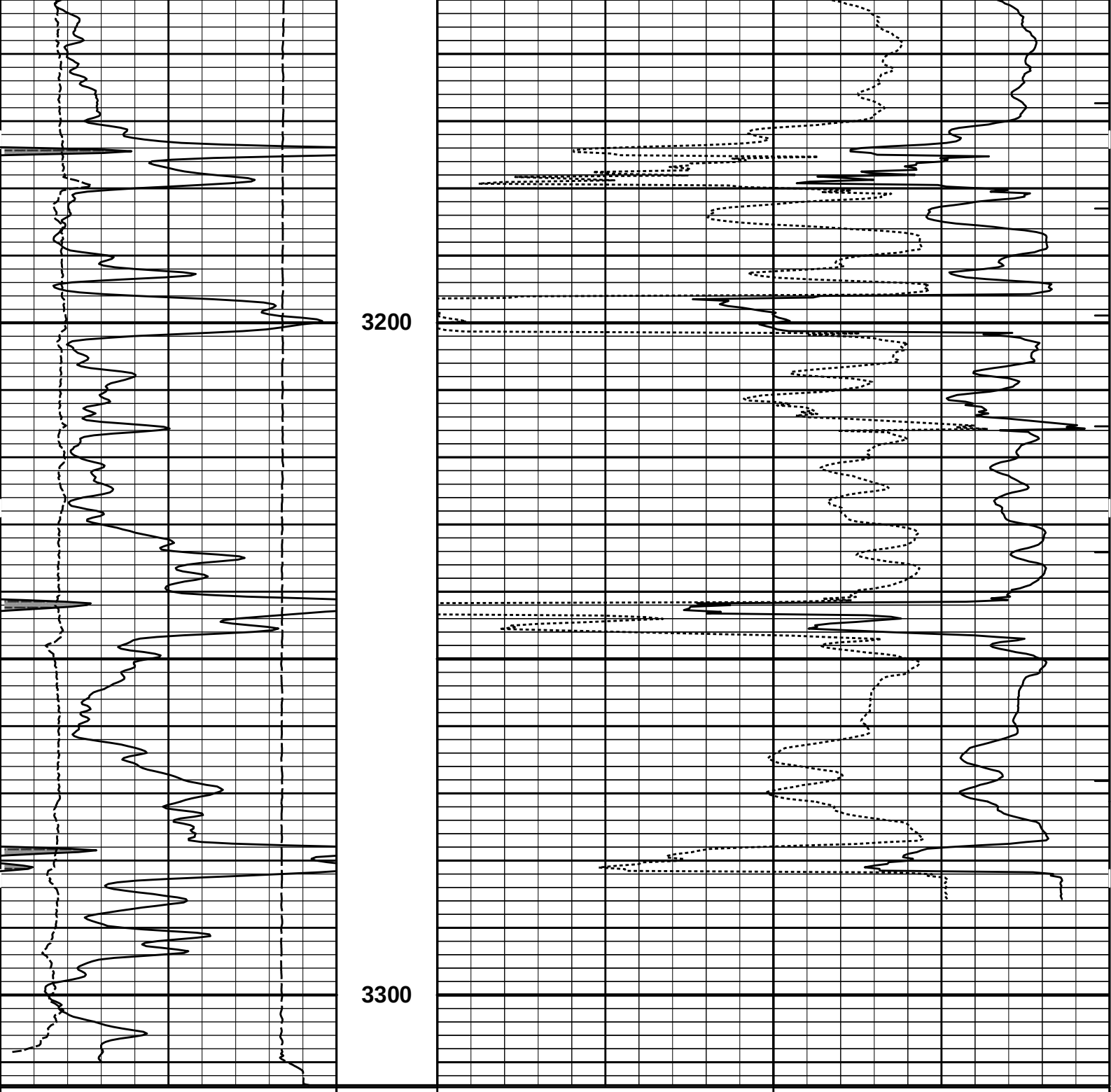
5 INCH MAIN LOG

HALLIBURTON

Plot Time: 08-Mar-17 13:55:54
Plot Range: 3020 ft to 3313.42 ft
Data: LEGHORN_1-22\Well Based*\
Plot File: \\BSAT\BSAT_5_REP_LIB

REPEAT SECTION





15K Tension 0
pounds

6 Caliper 16
inches

0 Gamma API 150
api

SHALE

MD
1 : 240
ft

ITTT

140 DT 40
microsec per ft

30 Acou Porosity -10
percent

HALLIBURTON

Plot Time: 08-Mar-17 13:55:55
Plot Range: 3020 ft to 3313.42 ft
Data: LEGHORN_1-22\Well Based*\
Plot File: \\BSAT\BSAT_5_REP_LIB

REPEAT SECTION

HALLIBURTON

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	0.540	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	3310.00	ft
	SHARED	BHT	Bottom Hole Temperature	103.0	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	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	Bit Size	
	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	Bit Size	
	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	1.50	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	Bit Size	
ACRt Sonde	MBFL	Apply Corkscrew Effect?	No	

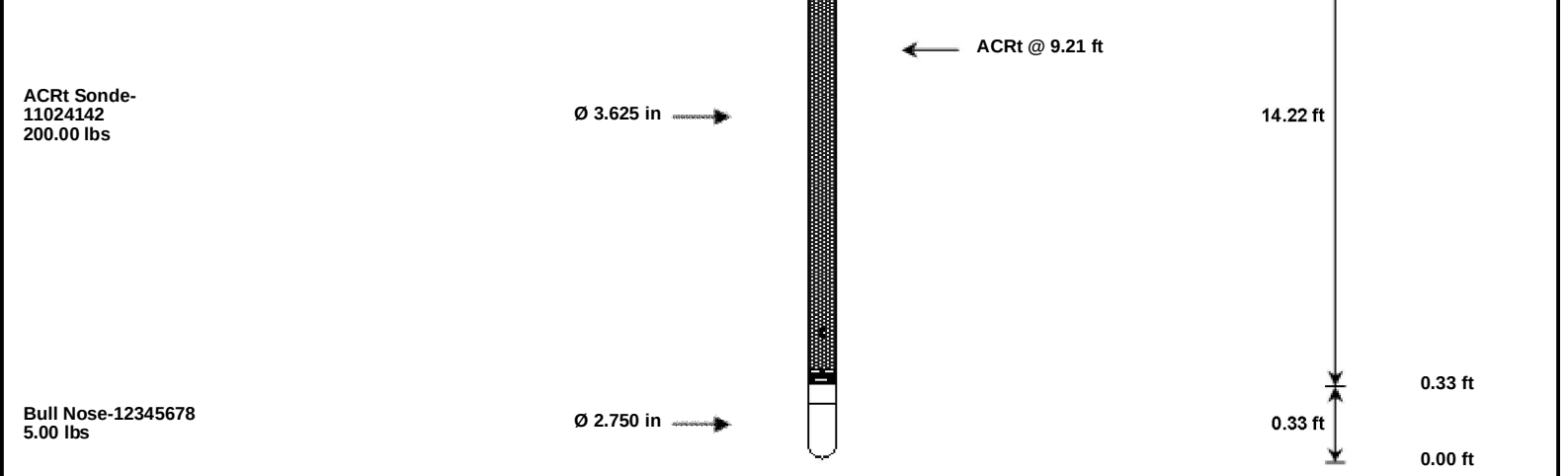
BOTTOM

Data: LEGHORN_1-22\0003 GTET-BSAT-ACRT\IDLE **Date: 08-Mar-17 12:34:40**

HALLIBURTON

TOOL STRING DIAGRAM REPORT

Description	Overbody Description	O.D.	Diagram	Sensors @ Delays	Length	Accumulated Length
				Temperature @ 50.57 ft		51.07 ft
CH_HOS-11459024 37.50 lbs		Ø 2.750 in			2.50 ft	
		Ø 2.750 in				48.57 ft
XOHD-11569312 20.00 lbs		Ø 3.625 in			0.95 ft	
						47.62 ft
SP Sub-11441455 60.00 lbs		Ø 3.625 in		SP @ 45.84 ft	3.74 ft	
				Z-Accelerometer @ 43.43 ft		43.88 ft
GTET-11013114 165.00 lbs		Ø 3.625 in			8.52 ft	
				GammaRay @ 37.82 ft		
						35.36 ft
	Centralizer 25-12345678 8.00 lbs	Ø 4.000 in*				
BSAT-10939050 300.00 lbs		Ø 3.625 in		Receiver Array @ 26.84 ft Sonic Receivers @ 26.84 ft	15.77 ft	
						19.58 ft
	Centralizer 25-12345679 8.00 lbs	Ø 4.000 in*				
ACRt Instrument-11026094 50.00 lbs		Ø 3.625 in			5.03 ft	
	ALAT Standoff OD 6-12345678 11.60 lbs	Ø 6.000 in*				
						14.55 ft
				Mud Resistivity @ 13.19 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	11459024	37.50	2.50		48.57	300.00
XOHD	Hostile to Dits Cross Over	11569312	20.00	0.95		47.62	300.00
SP	SP Sub	11441455	60.00	3.74		43.88	300.00
GTET	Gamma Telemetry Tool	11013114	165.00	8.52		35.36	60.00
BSAT	Borehole Sonic Array Tool	10939050	300.00	15.77		19.58	60.00
OBCEN	Centralizer - 25 in. Overbody	12345678	8.00	2.08	*	32.63	300.00
ACRt	Array Compensated True Resistivity Instrument Section	11026094	50.00	5.03		14.55	120.00
ALATS	Array Laterolog Tool OD 6 Standoff	12345678	11.60	1.00	*	15.53	60.00
OBCEN	Centralizer - 25 in. Overbody	12345679	8.00	2.08	*	17.01	300.00
ACRt	Array Compensated True Resistivity Sonde Section	11024142	200.00	14.22		0.33	120.00
BLNS	Bull Nose	12345678	5.00	0.33		0.00	300.00
Total			**865.10**	**51.07**			

* Not included in Total Length and Length Accumulation.

Data: LEGHORN_1-22\0003 GTET-BSAT-ACRT\IDLE **Date: 08-Mar-17 11:46:40**

COMPANY	**CMX, INC.**		
WELL	**LEGHORN #1-22**		
FIELD	**CHASE-SILICA**		
COUNTY	**BARTON**	STATE	**KANSAS**

HALLIBURTON

BOREHOLE COMPENSATED SONIC ARRAY LOG