HALLIBURTON

BOREHOLE COMPENSATED SONIC ARRAY LOG

COMPANY **OXY USA INC**

WELL **SMU #320**

FIELD **SMU**

COUNTY **FINNEY** STATE **KANSAS**

OXY USA INC
COMPANY
SMU #320
WELL
SMU
FIELD
FINNEY
COUNTY
KANSAS
STATE

API No. 22-23S-34W

Location 1215' FSL & 2400' FWL

Other Services:
ACRT
DSNT- SDLT
MICROLOG

Sect. 22 Twp. 23S Rge. 34W

Permanent Datum	GL	Elev. 2948.0 ft	Elev.: K.B. 2959.0 ft
Log measured from	KB	, 11.0 ft above perm. Datum	D.F. 2958.0 ft
Drilling measured from	KB		G.L. 2948.0 ft

Date		02-Jul-12					
Run No.		ONE					
Depth - Driller		4920.00 ft					
Depth - Logger		4904.0 ft					
Bottom - Logged Interval		4877.0 ft					
Top - Logged Interval		1809.0 ft					
Casing - Driller		8.625 in @ 1811.0 ft		@		@	
Casing - Logger		1809.0 ft					
Bit Size		7.875 in		@		@	
Type Fluid in Hole		WATER BASED MUD					
Density	Viscosity	9.2 ppg	39.00 s/qt				
PH	Fluid Loss	8.60 pH	9.2 cptm				
Source of Sample		FLOW LINE					
Rm @ Meas. Temperature		0.660 ohmm @ 75.00 degF		@		@	
Rmf @ Meas. Temperature		0.50 ohmm @ 75.00 degF		@		@	
Rmc @ Meas. Temperature		0.800 ohmm @ 75.00 degF		@		@	
Source Rmf	Rmc	MEAS	MEAS				
Rm @ BHT		0.39 ohmm @ 130.0 degF		@		@	
Time Since Circulation		8.0 hr					
Time on Bottom		02-Jul-12 23:04					
Max. Rec. Temperature		130.0 degF @ 4904.0 ft		@		@	
Equipment	Location	10546696	LIBERAL				
Recorded By		J. BOLLOM					
Witnessed By		C. WYLIE					

Fold here

Service Ticket No.: 9625518 API Serial No.: 22-23S-34W PGM Version: WL INSITE R3.6.0 (Build 3)

CHANGE IN MUD TYPE OR ADDITIONAL SAMPLE

RESISTIVITY SCALE CHANGES

	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 EQUIPMENT DATA

	Run No.	Tool Type & No.	Pad Type	Tool Pos.	Other
Run No.					
Serial No.					
Model No.					
Diameter					
Log Type					
Source Type					
Serial No.					
Strength					

EQUIPMENT DATA

GAMMA		ACOUSTIC		DENSITY		NEUTRON	
Run No.	ONE	Run No.	ONE	Run No.		Run No.	
Serial No.	11039640	Serial No.	10747684	Serial No.		Serial No.	
Model No.	GTET	Model No.	BSAT	Model No.		Model No.	
Diameter	3.625"	No. of Cent.	2	Diameter		Diameter	
Detector Model No.	GTET	Spacing	0.5"	Log Type		Log Type	
Type	SCINT	LSA [Y/N]	NO	Source Type		Source Type	
Length	8'	FWDA [Y/N]	NO	Serial No.		Serial No.	
Distance to Source	10'			Strength		Strength	

LOGGING DATA

GENERAL GAMMA ACOUSTIC DENSITY NEUTRON

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	4904	1809	REC	0	150	30	-10	47.6						

DIRECTIONAL INFORMATION

Maximum Deviation @	KOP @

Remarks: ANNULAR HOLE VOLUME CALCULATED FOR 5.5-INCH CASING

CHLORIDES REPORTED AT 5700 MG/L

LCM REPORTED AT 3 LB/BBL

GTET-DSNT-SDLT-BSAT-ACRT RUN IN COMBINATION

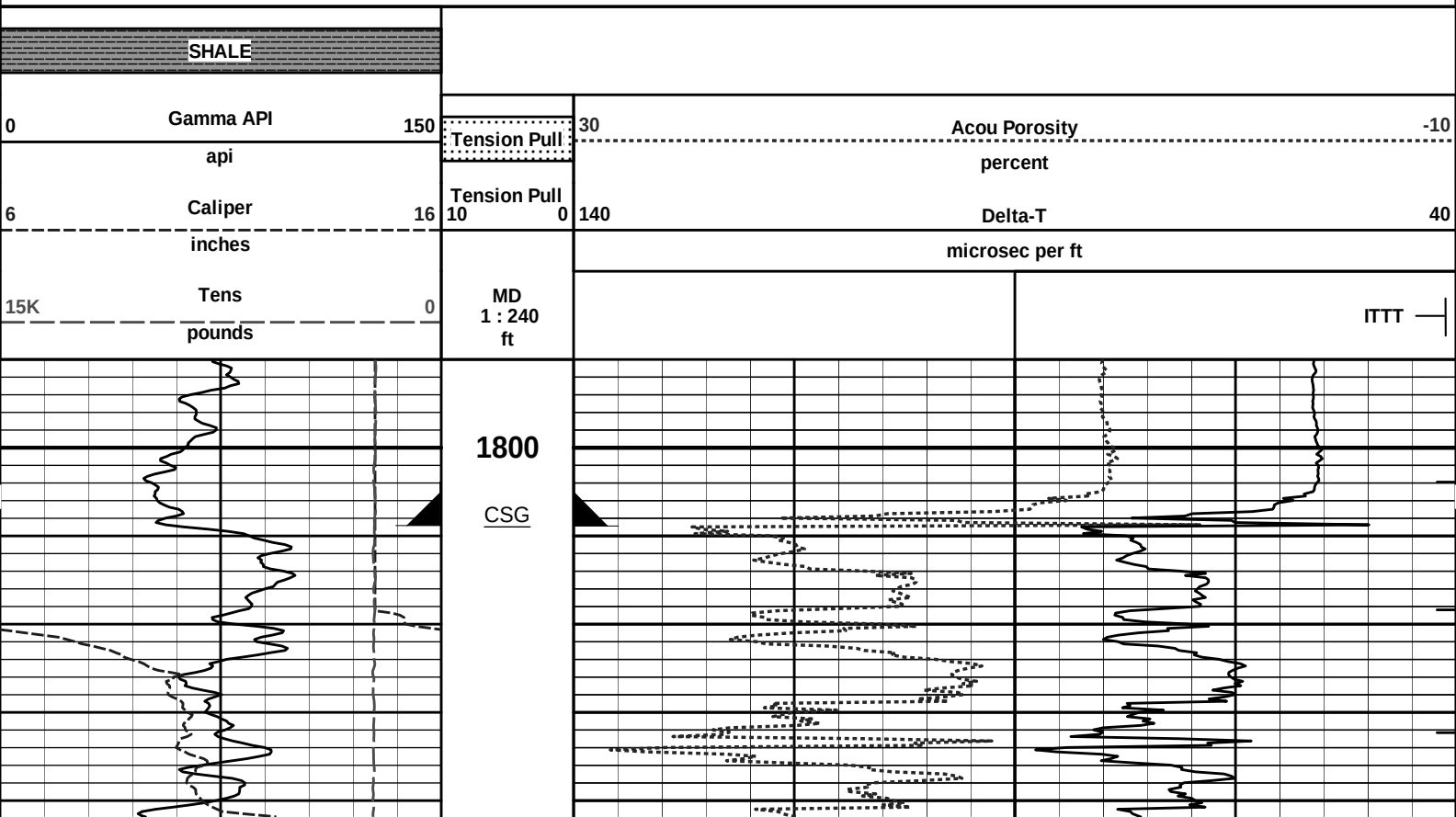
TODAY'S CREW: P. COBLE & V. JAIME

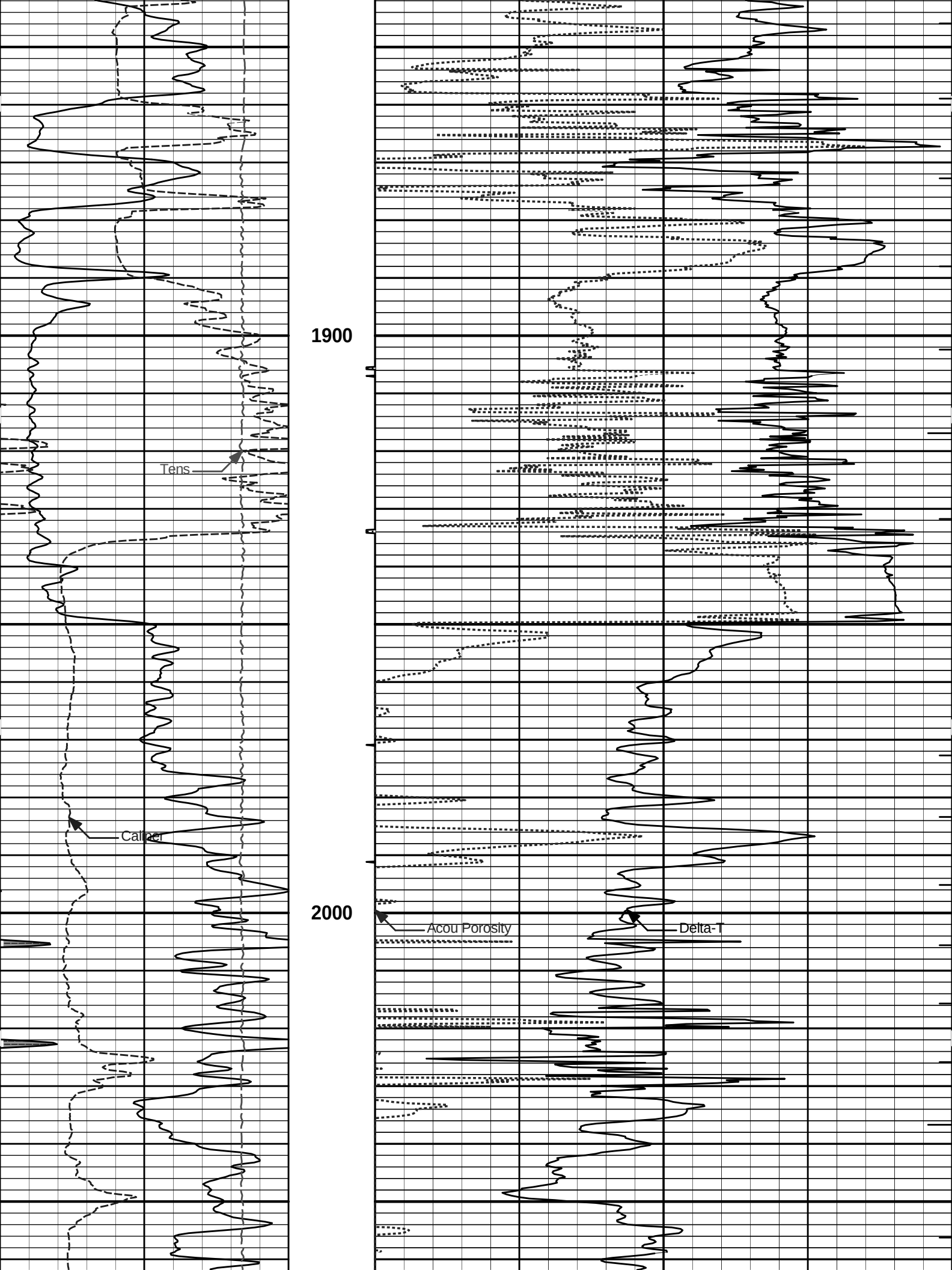
THANK YOU FOR CHOOSING HALLIBURTON ENERGY SERVICES LIBERAL, KS. 620-624-8123

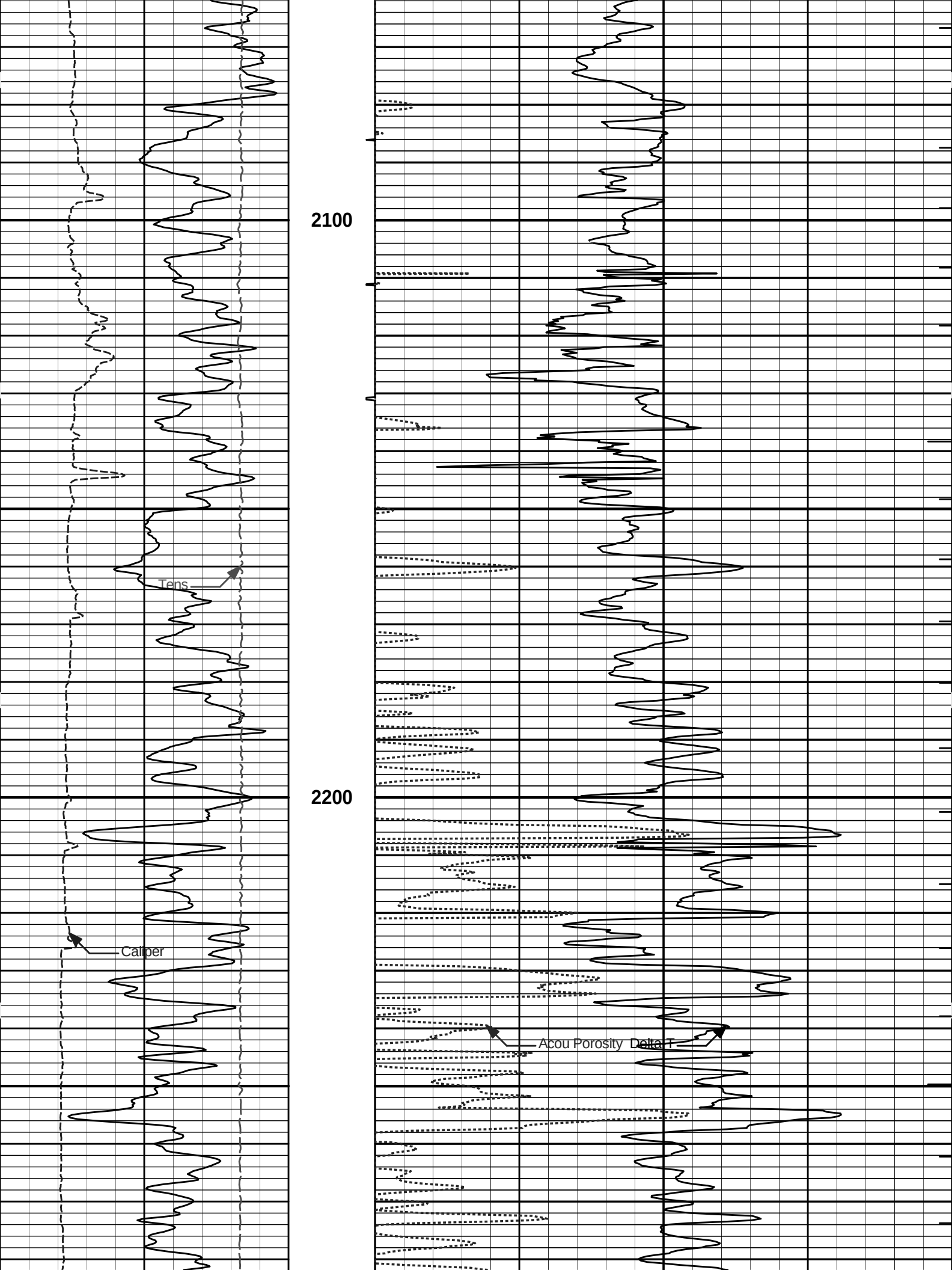
HALLIBURTON

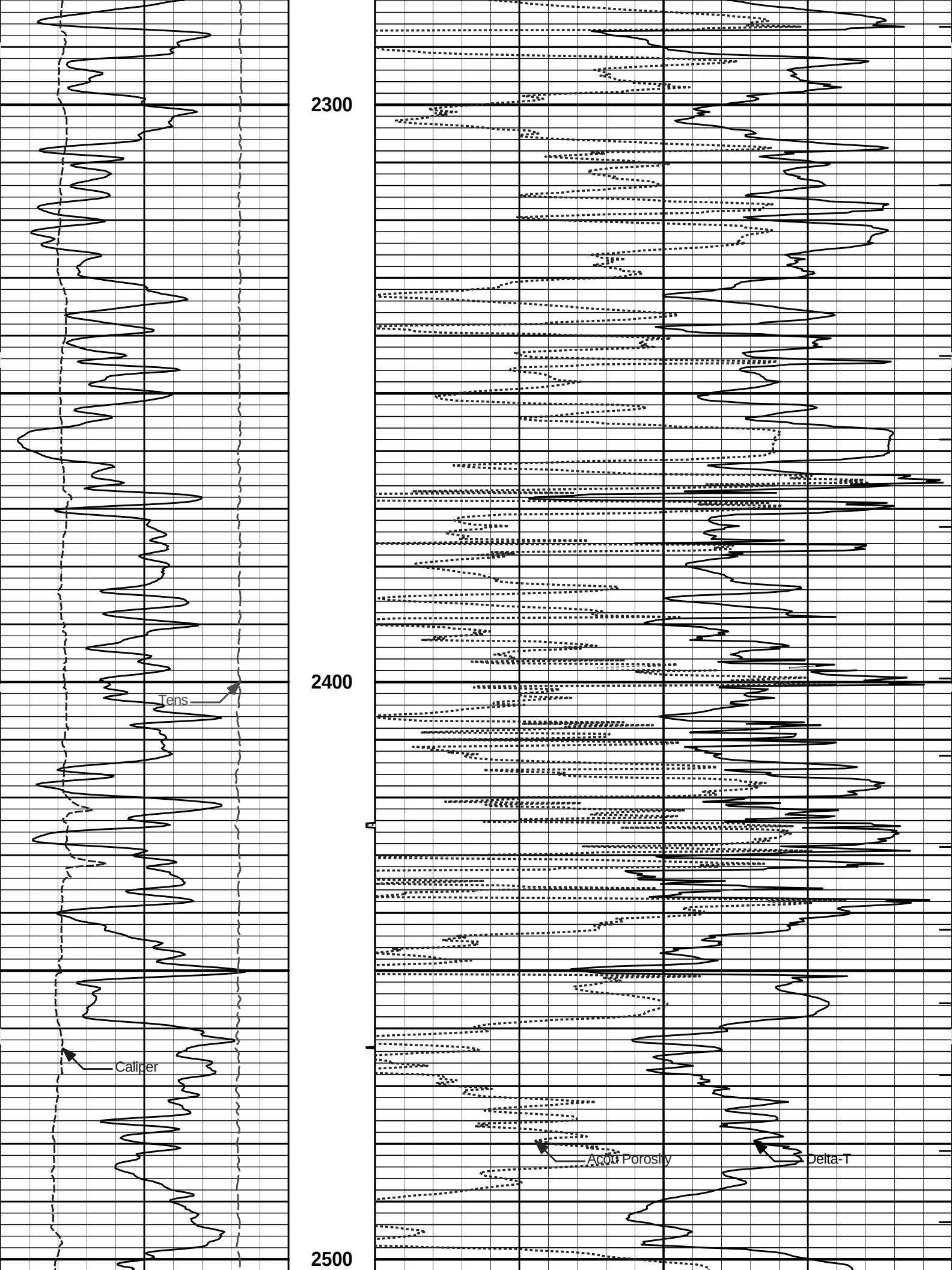
Plot Time: 03-Jul-12 02:22:21
Plot Range: 1790 ft to 4907.75 ft
Data: SMU_320\Well Based\CASING
Plot File: \\BSAT\BSAT_5_MAIN_LIB

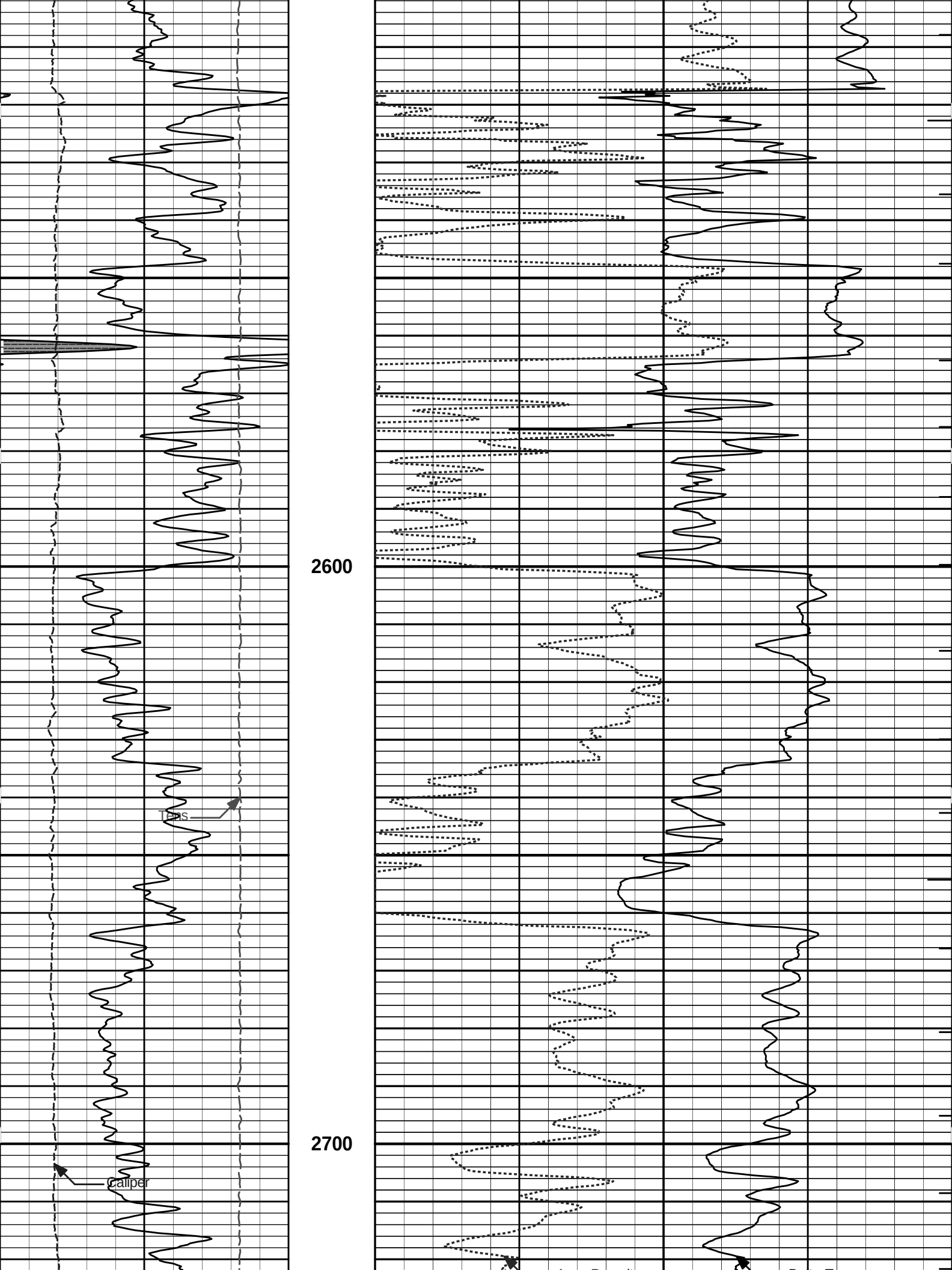
5 INCH MAIN LOG

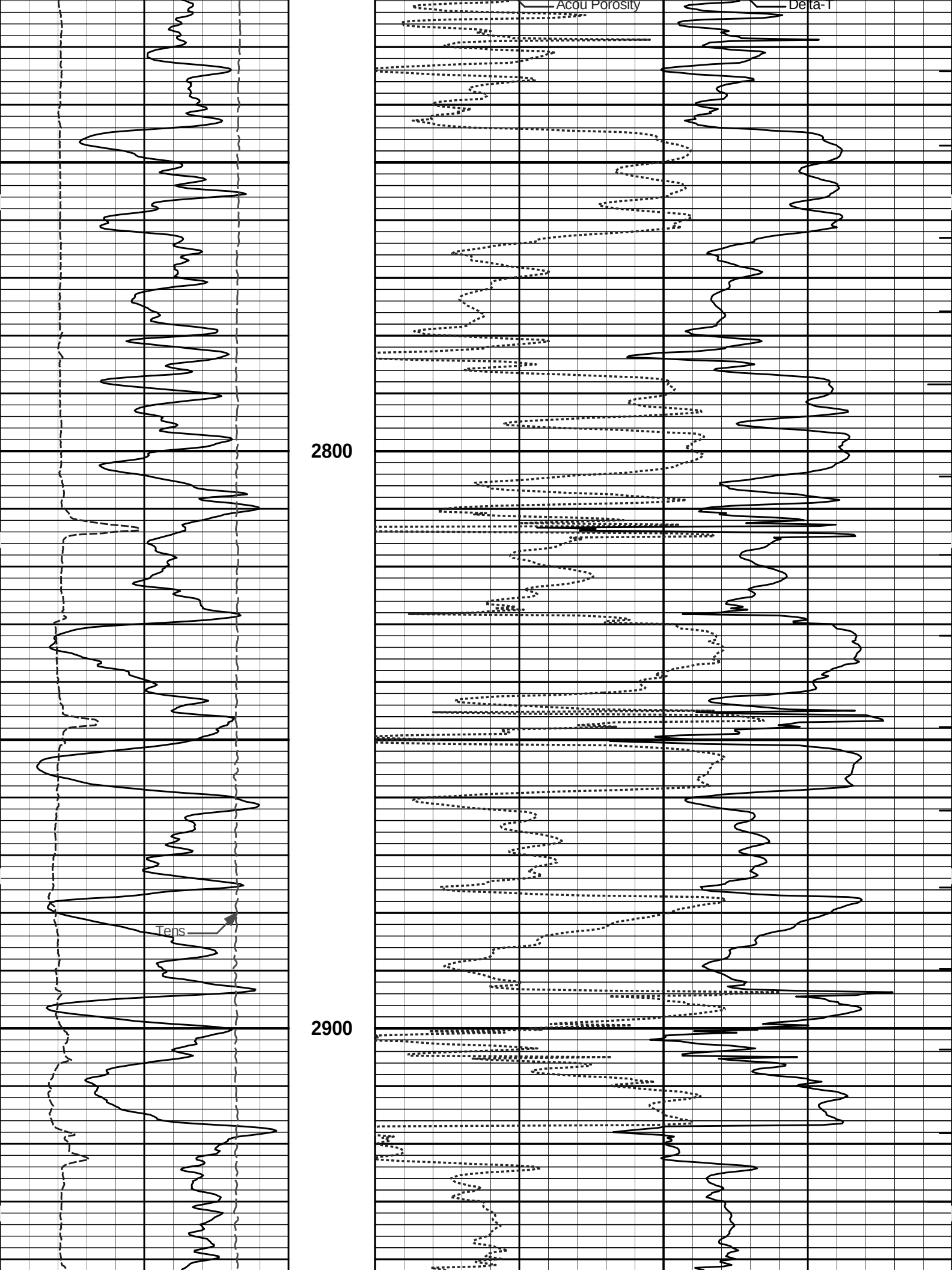


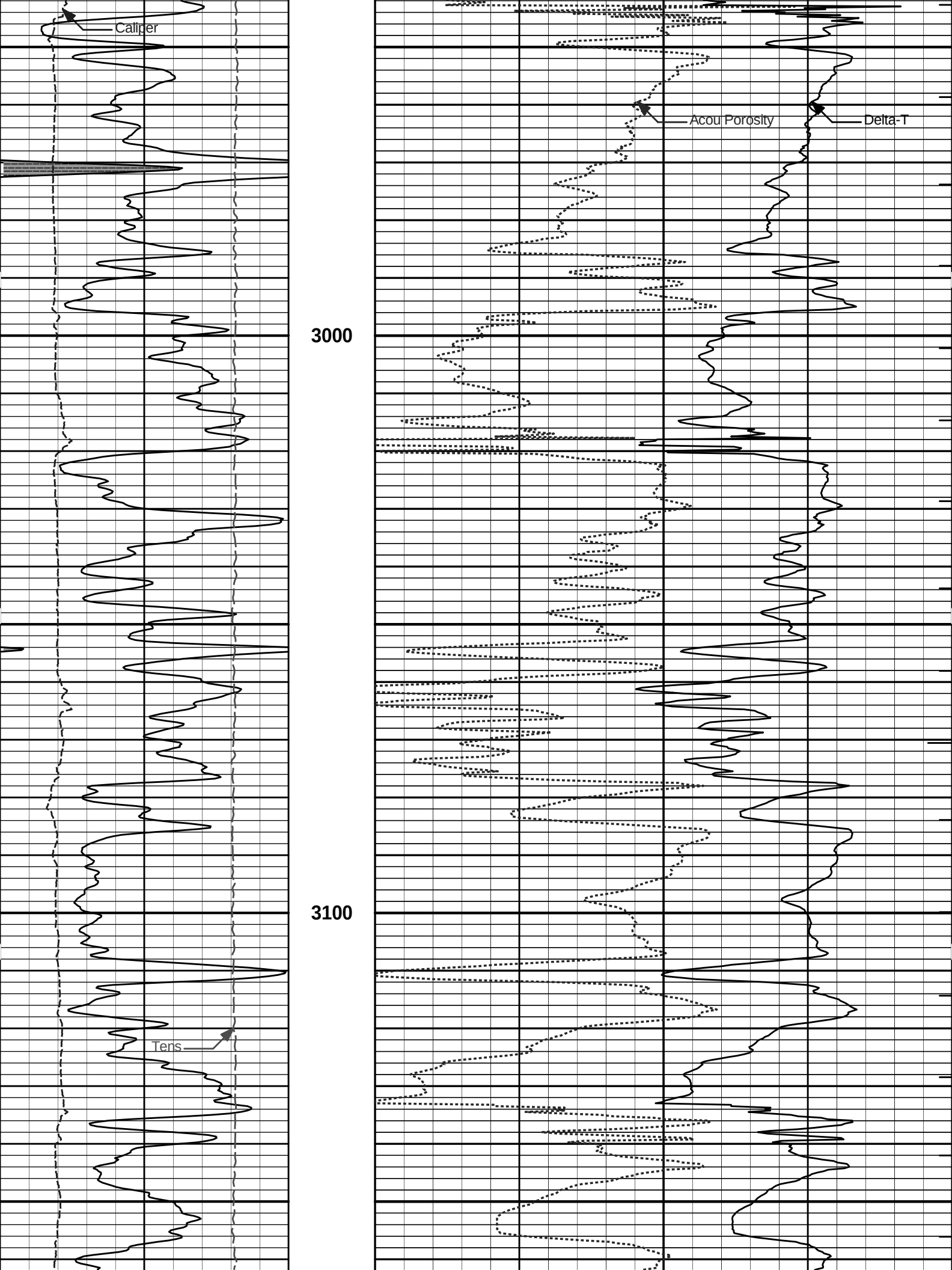

1900
Tens
Caliper
2000
Acou Porosity
Delta-T

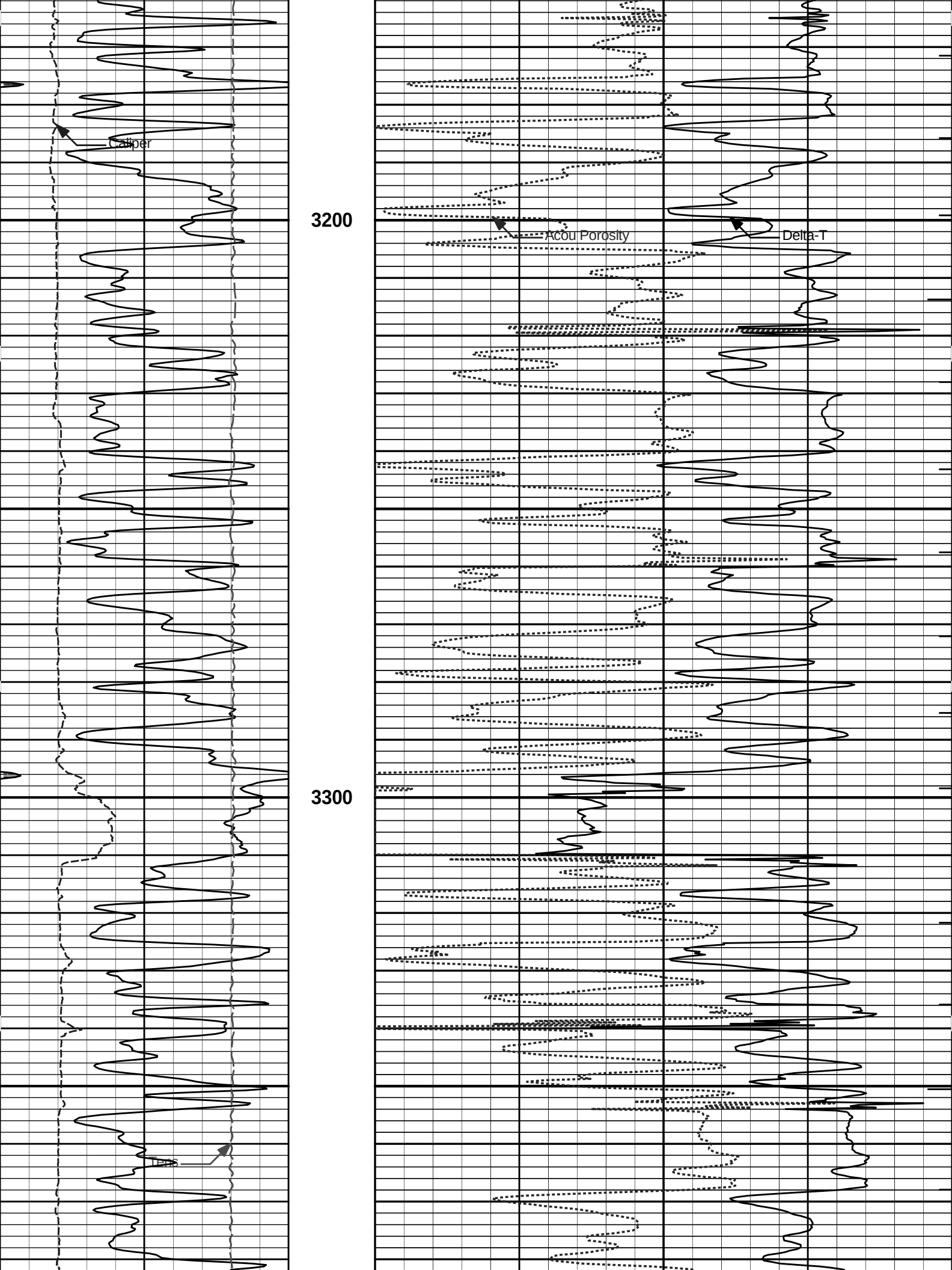

2100
Tens
2200
Caliper
Acou Porosity
Delta-T

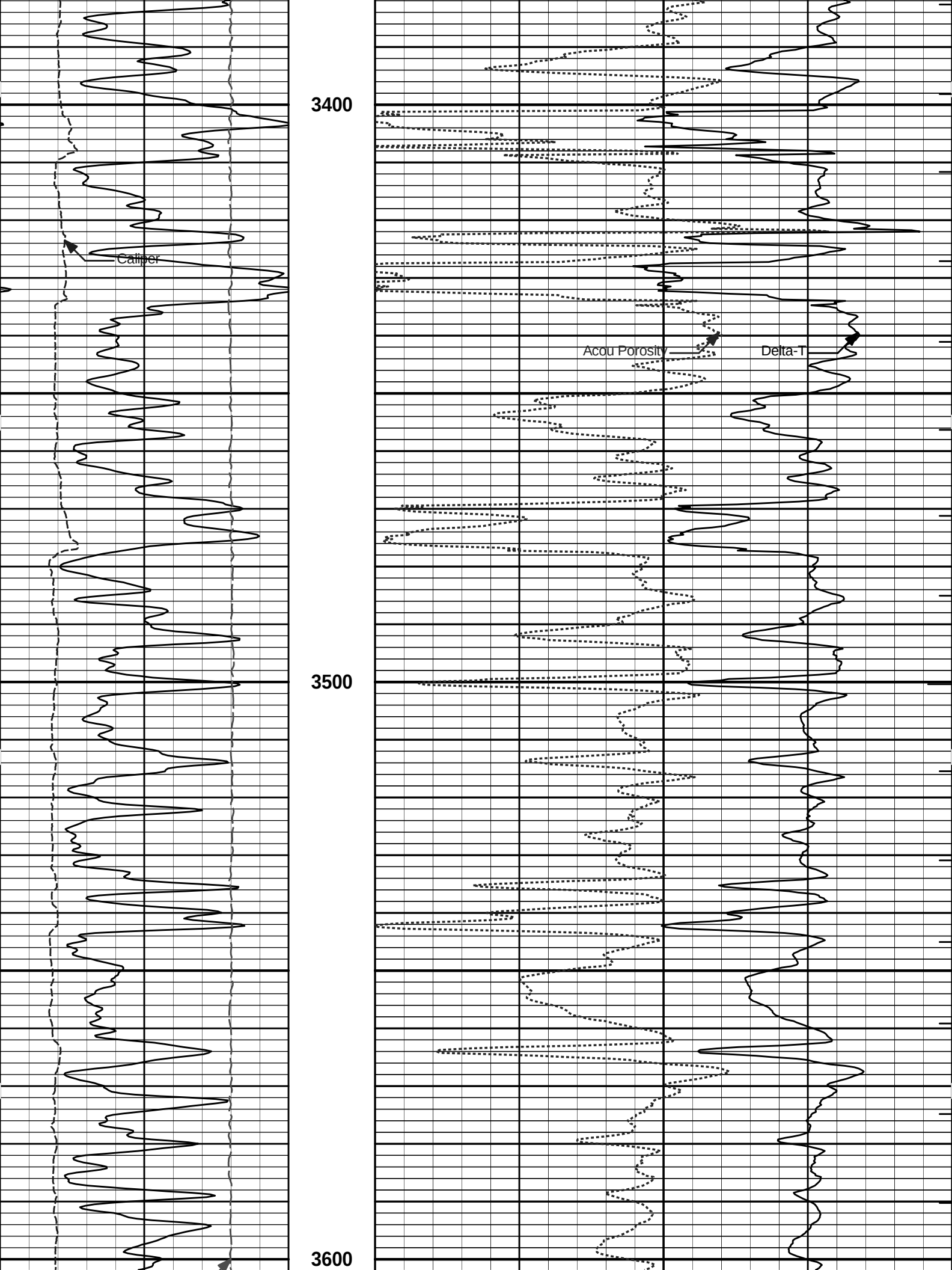

2300
2400
2500
Tens
Caliper
Acou Porosity
Delta-T

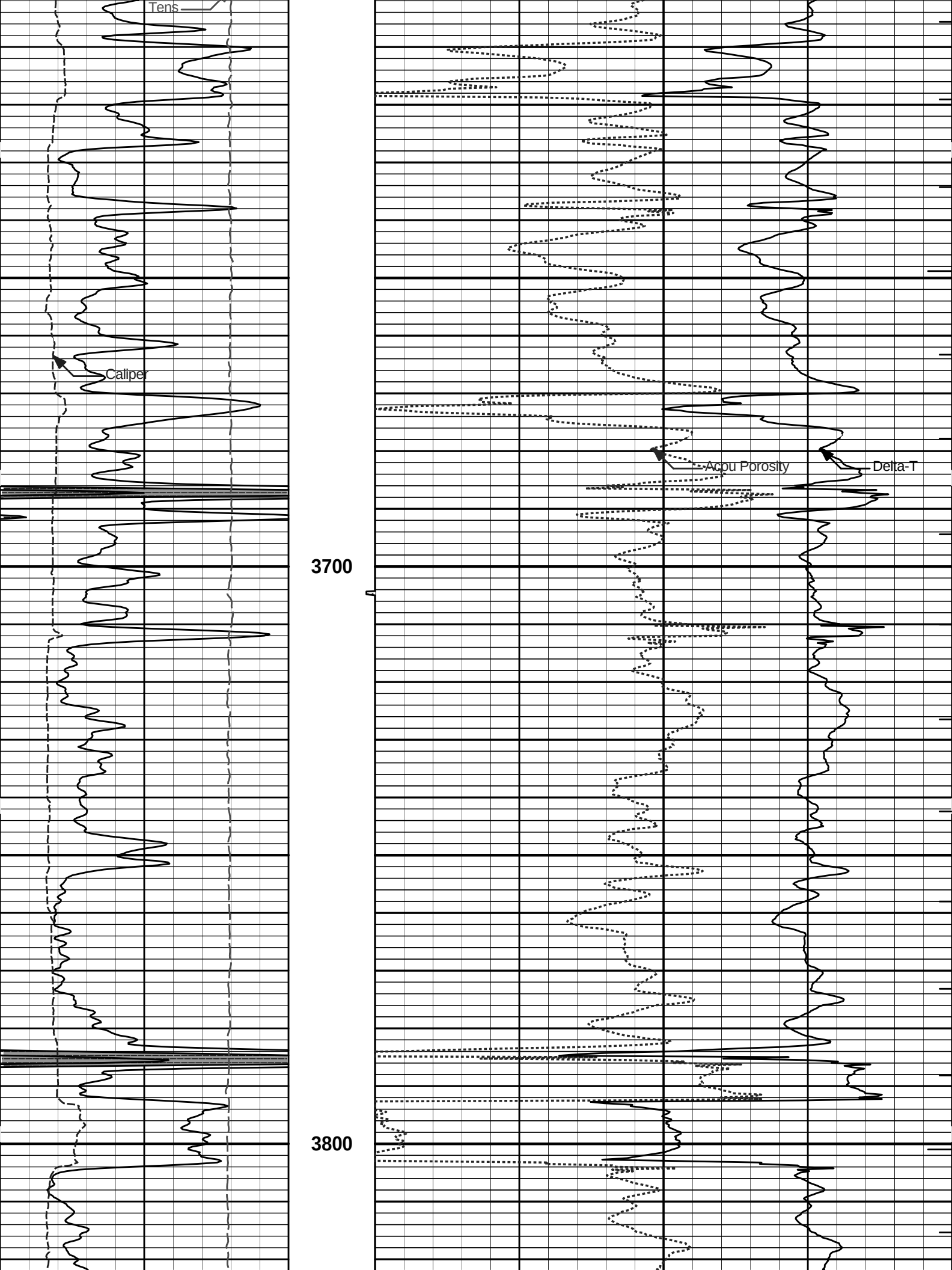

2600
Tens
2700
Caliper

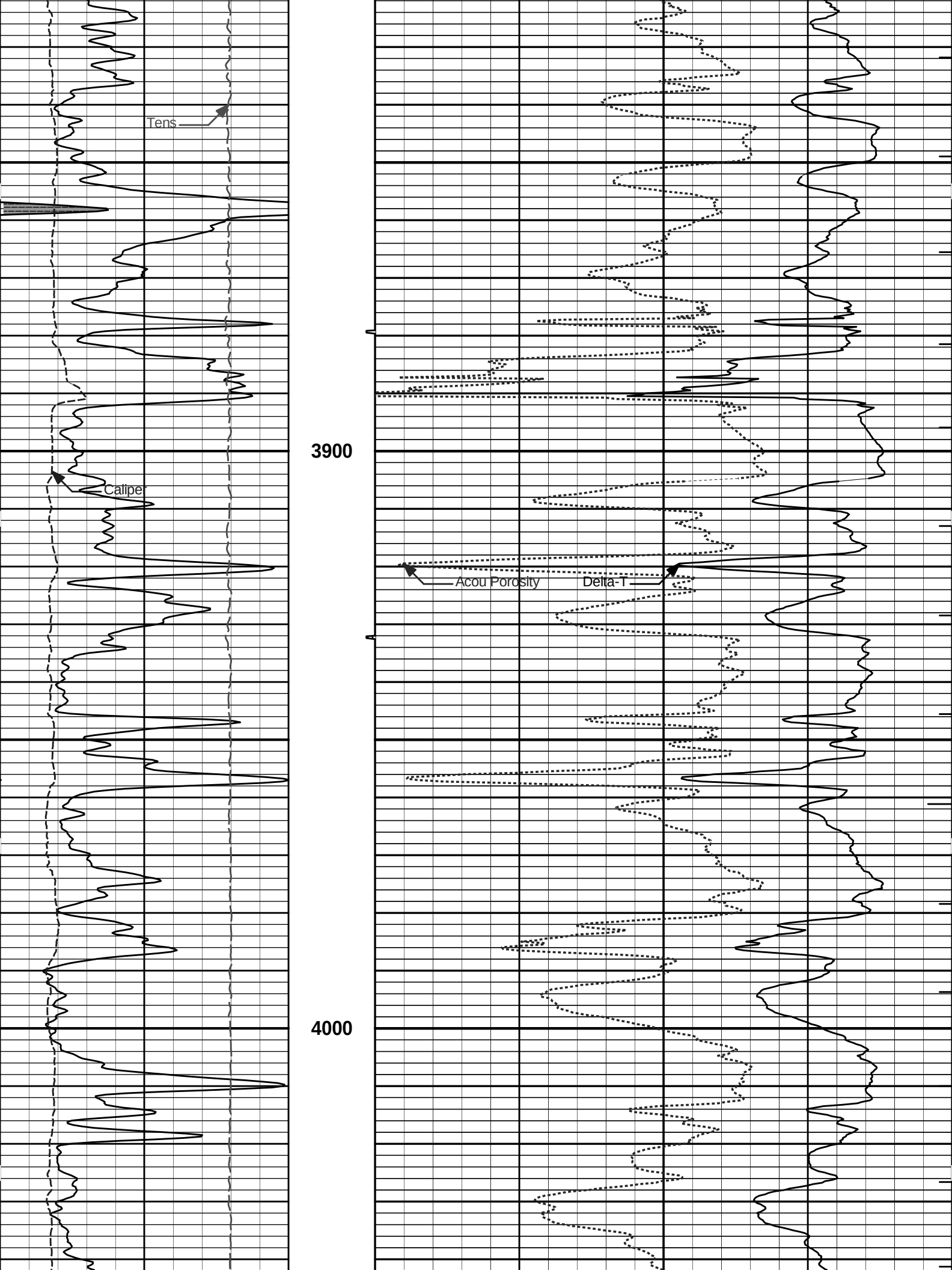

Acou Porosity
Delta-T
2800
Tens
2900

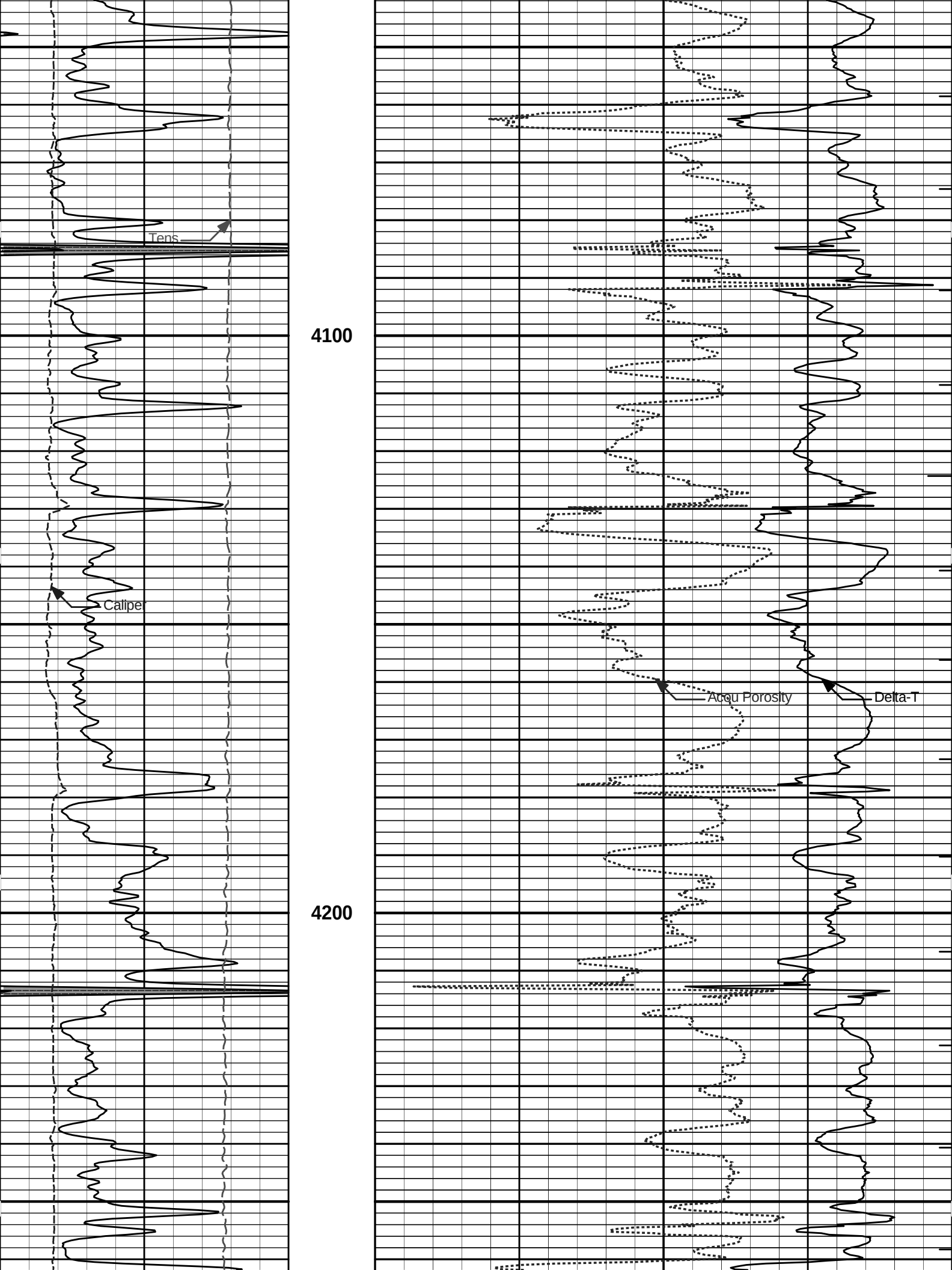

Caliper
Acou Porosity
Delta-T
3000
3100
Tens

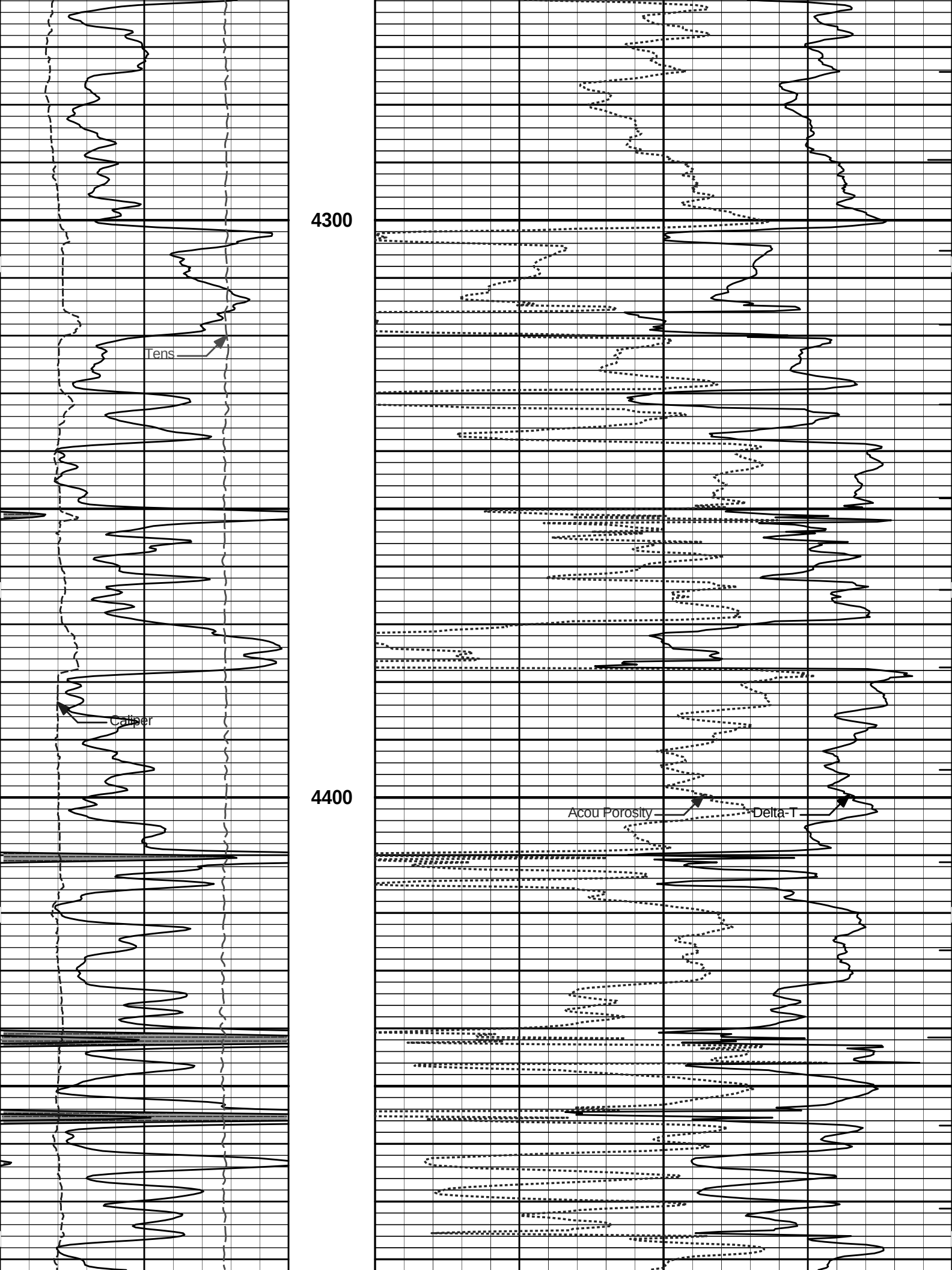

Caliper
3200
Acou Porosity
Delta-T
3300
Tens

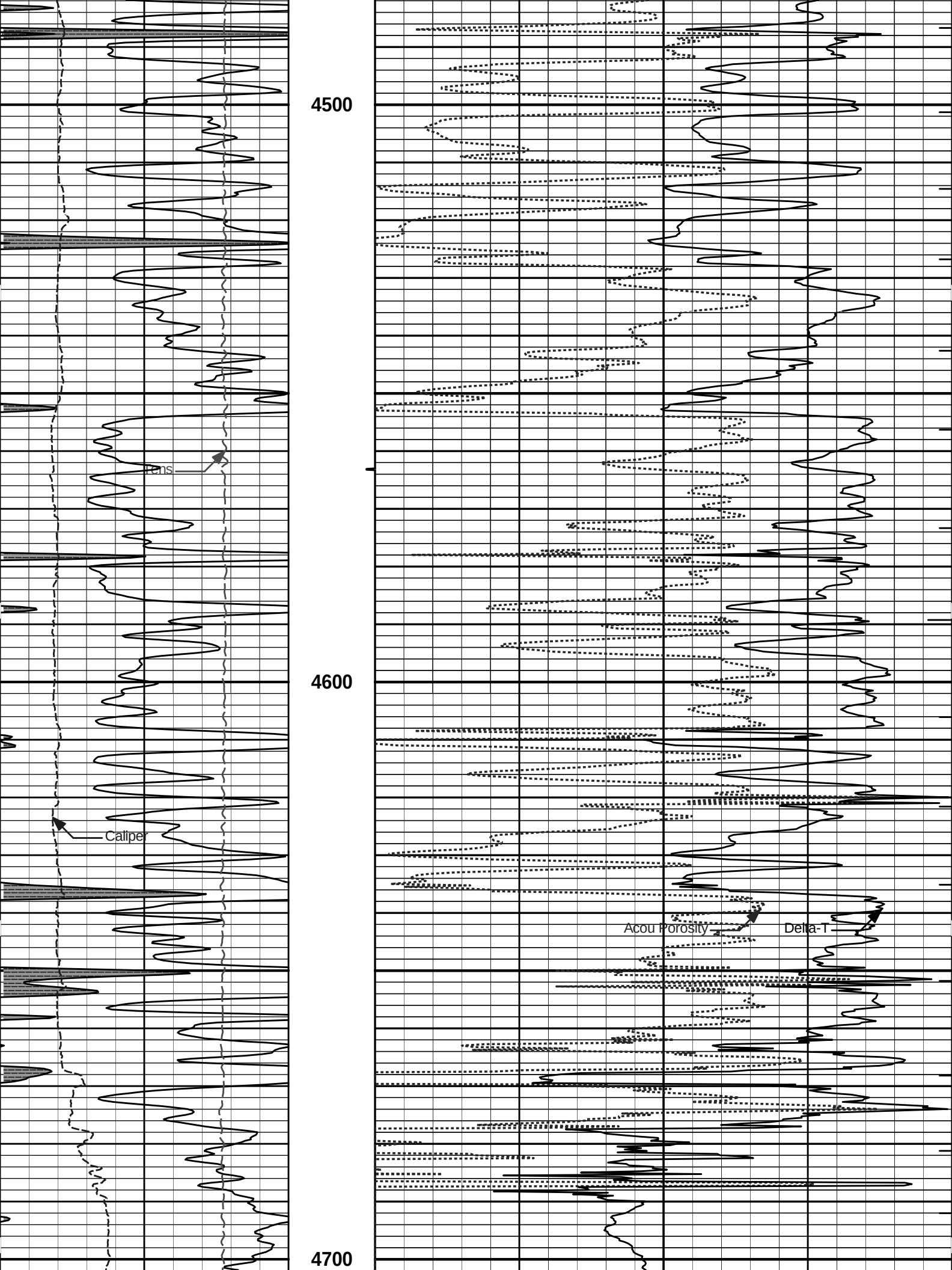

3400
Caliper
Acou Porosity
Delta-T
3500
3600

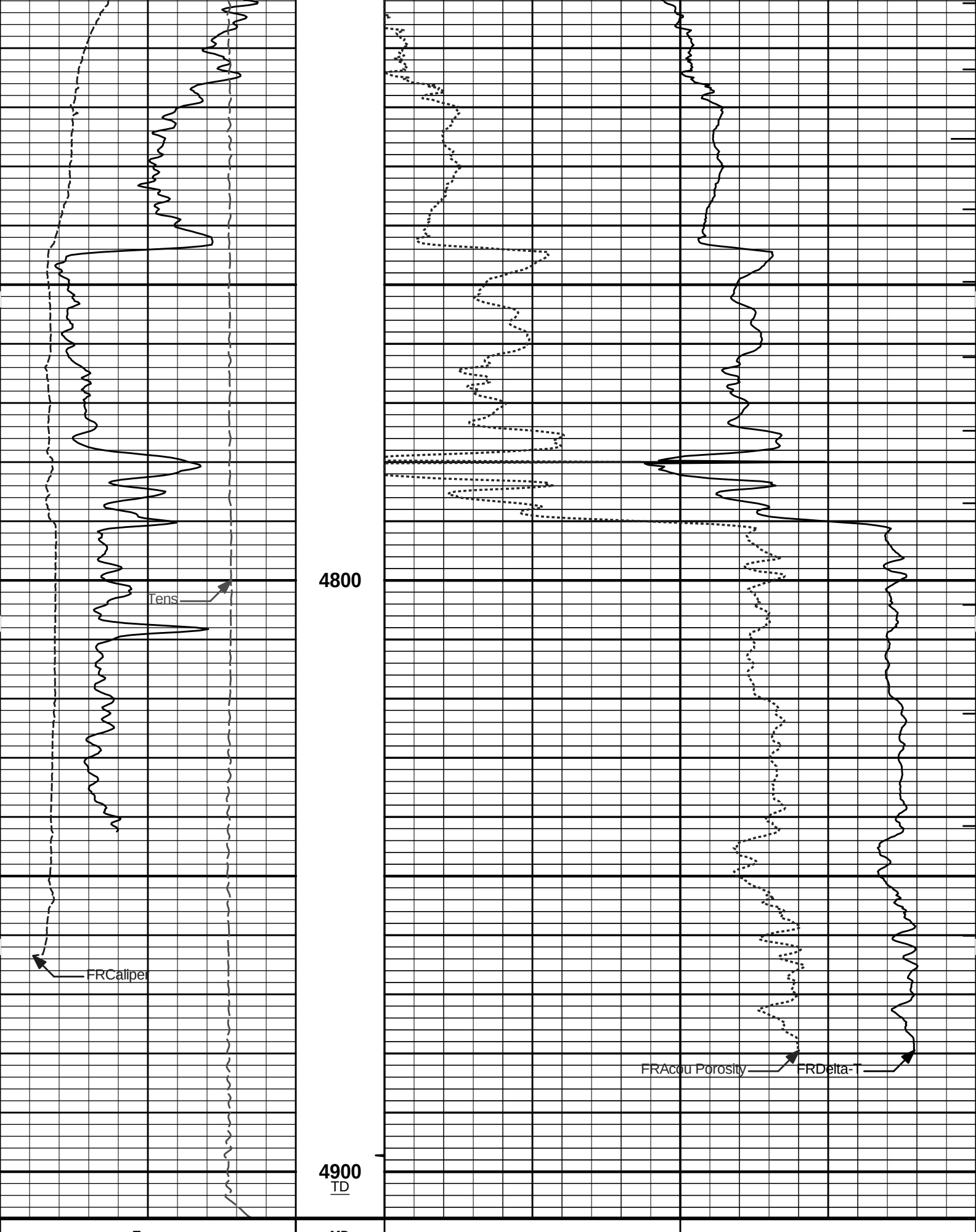

Tens
Caliper
Acou Porosity
Delta-T
3700
3800


Tens
Caliper
3900
Acou Porosity
Delta-T
4000


Tens
4100
Caliper
Accu Porosity
Delta-T
4200


4300
Tens
Caliper
4400
Acou Porosity
Delta-T


4500
Tens
4600
Caliper
Acou Porosity
Delta-T
4700



15K Tens 0	MD 1 : 240 ft	ITTT
pounds		
6 Caliper 16	Tension Pull 10 0	140 Delta-T 40

inches

0 Gamma API 150

api

SHALE

Tension Pull

microsec per ft

30 Acou Porosity -10

percent

HALLIBURTON

Plot Time: 03-Jul-12 02:22:29
Plot Range: 1790 ft to 4907.75 ft
Data: SMU_320\Well Based\CASING\
Plot File: \\BSAT\BSAT_5_MAIN_LIB

5 INCH MAIN LOG

HALLIBURTON

Plot Time: 03-Jul-12 02:22:29
Plot Range: 4500 ft to 4908.92 ft
Data: SMU_320\Well Based\REPEAT\
Plot File: \\BSAT\BSAT_5_REP_LIB

REPEAT SECTION

SHALE

0 Gamma API 150

api

6 Caliper 16

inches

15K Tension 0

pounds

MD
1 : 240
ft

4500

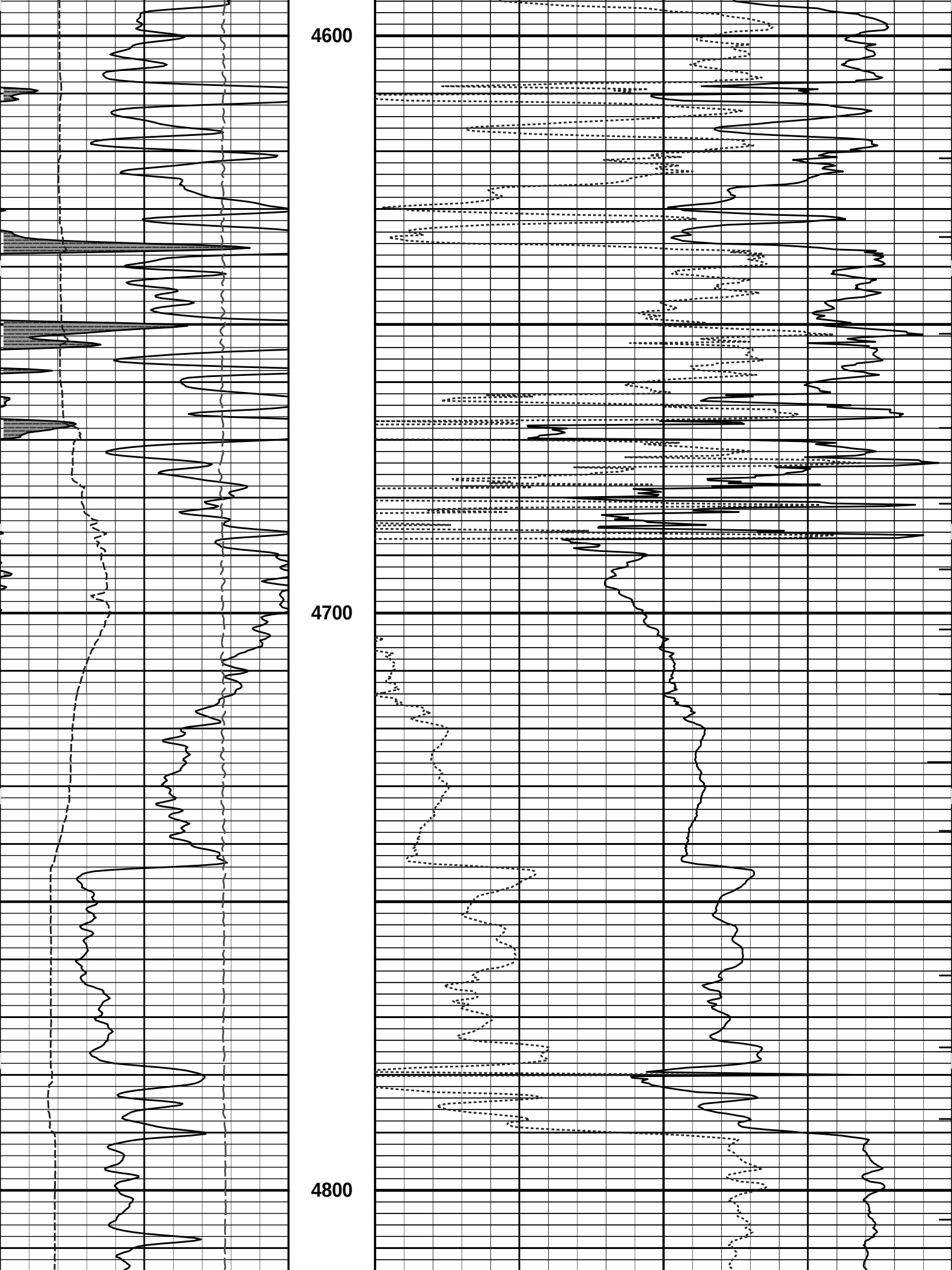
30 Acou Porosity -10

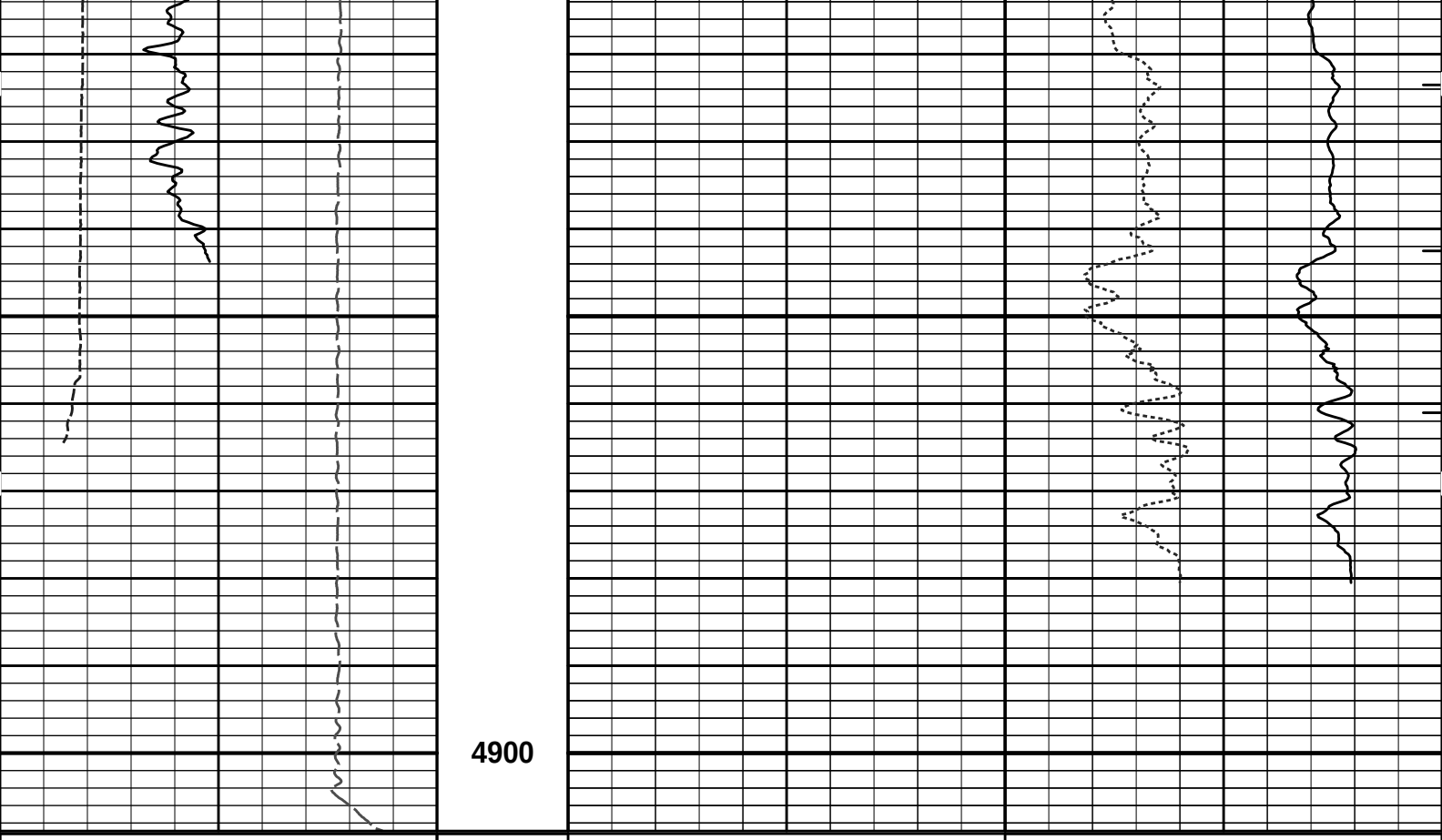
percent

140 Delta-T 40

microsec per ft

ITTT


4600
4700
4800



15K Tension 0
pounds

6 Caliper 16
inches

0 Gamma API 150
api

SHALE

MD
1 : 240
ft

ITTT

140 Delta-T 40
microsec per ft

30 Acou Porosity -10
percent

HALLIBURTON

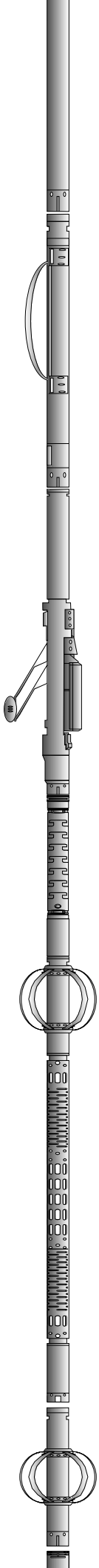
Plot Time: 03-Jul-12 02:22:31
Plot Range: 4500 ft to 4908.92 ft
Data: SMU_320\Well Based\REPEAT\
Plot File: \\BSAT\BSAT_5_REP_LIB

REPEAT SECTION

HALLIBURTON

TOOL STRING DIAGRAM REPORT

Description	Overbody Description	O.D.	Diagram	Sensors @ Delays	Length	Accumulated Length
Cable Head-PROT01 30.00 lbs		Ø 3.625 in →			1.92 ft	75.95 ft
SP Sub-001 60.00 lbs		Ø 3.625 in →		← SP @ 72.26 ft	3.74 ft	74.03 ft
						70.30 ft



GTET-11039640
165.00 lbs

Ø 3.625 in

8.52 ft

GammaRay @ 64.23 ft

61.78 ft

DSN Decentralizer-11005605
6.60 lbs

Ø 5.000 in*

DSNT-11055304
174.00 lbs

Ø 3.625 in

9.69 ft

DSN Far @ 54.84 ft

DSN Near @ 54.09 ft

52.09 ft

SDLT-I04_M296
360.00 lbs

Ø 4.500 in

10.81 ft

SDLT Pad-P84
65.00 lbs

Microlog Pad-M296
8.00 lbs

Ø 4.750 in*

Ø 4.750 in*

Microlog @ 44.28 ft

SDL Caliper @ 44.09 ft

SDL @ 44.08 ft

41.28 ft

IQ Flex-696
140.00 lbs

Ø 3.625 in

5.67 ft

35.61 ft

Centralizer 29-2
12.00 lbs

Ø 4.000 in*

BSAT-10747684
300.00 lbs

Ø 3.625 in

15.77 ft

Sonic Receivers @ 27.09 ft

19.83 ft

ACRt Instrument-I962
50.00 lbs

Centralizer 25-002
8.00 lbs

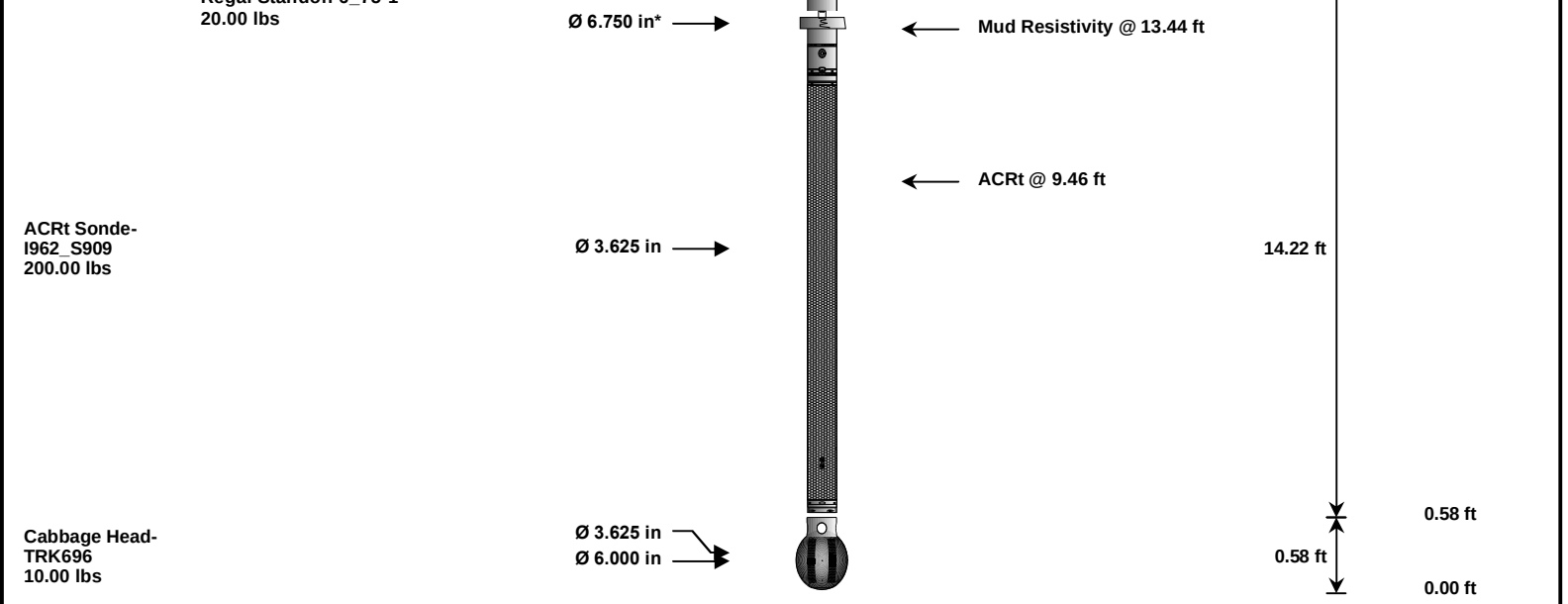
Ø 4.000 in*

Ø 3.625 in

5.03 ft

14.80 ft

Regal Standoff 6_75-1



Mnemonic	Tool Name	Serial Number	Weight (lbs)	Length (ft)		Accumulated Length (ft)	Max.Log. Speed (fpm)
CH	Standard OH Cable Head	PROT01	30.00	1.92		74.03	300.00
SP	SP Sub	001	60.00	3.74		70.30	300.00
GTET	Gamma Telemetry Tool	11039640	165.00	8.52		61.78	60.00
DSNT	Dual Spaced Neutron	11055304	174.00	9.69		52.09	60.00
DCNT	DSN Decentralizer	11005605	6.60	5.13	*	55.42	300.00
SDLT	Spectral Density Tool	I04_M296	360.00	10.81		41.28	60.00
SDLP	Density Insite Pad	P84	65.00	2.55	*	43.49	60.00
MICP	Microlog Pad	M296	8.00	1.00	*	43.78	60.00
IQF	IQ Flex tool	696	140.00	5.67		35.61	300.00
BSAT	Borehole Sonic Array Tool	10747684	300.00	15.77		19.83	60.00
OBCEN	Centralizer - 29 in.Overbody	2	12.00	2.42	*	32.88	300.00
ACRt	Array Compensated True Resistivity Instrument Section	I962	50.00	5.03		14.80	300.00
OBCEN	Centralizer - 25 in. Overbody	002	8.00	2.08	*	16.30	300.00
ACRt	Array Compensated True Resistivity Sonde Section	I962_S909	200.00	14.22		0.58	300.00
RSOF	Regal Standoff 6.75in	1	20.00	0.52	*	13.38	300.00
CBHD	Cabbage Head	TRK696	10.00	0.58		0.00	300.00
Total			**1,608.60**	**75.95**			

* Not included in Total Length and Length Accumulation.

Data: SMU_320\0001 SP-GTET-DSN-SDL-FLEX-BSAT-ACRT-CH\IDLE **Date: 02-Jul-12 17:50:41**

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	9.200	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	2.000	ohmm
	SHARED	TRM	Temperature of Mud	75.0	degF
	SHARED	CSD	Logging Interval is Cased?	No	

SHARED	CSD	Logging Interval is Cased?	No	
SHARED	ICOD	AHV Casing OD	5.500	in
SHARED	ST	Surface Temperature	75.0	degF
SHARED	TD	Total Well Depth	4920.00	ft
SHARED	BHT	Bottom Hole Temperature	200.0	degF
SHARED	SVTM	Navigation and Survey Master Tool	NONE	
SHARED	AZTM	High Res Z Accelerometer Master Tool	GTET	
SHARED	TEMM	Temperature Master Tool	NONE	
SHARED	BHSM	Borehole Size Master Tool	NONE	
Rwa / CrossPlot	XPOK	Process Crossplot?	Yes	
Rwa / CrossPlot	FCHO	Select Source of F	Automatic	
Rwa / CrossPlot	AFAC	Archie A factor	0.6200	
Rwa / CrossPlot	MFAC	Archie M factor	2.1500	
Rwa / CrossPlot	RMFR	Rmf Reference	0.10	ohmm
Rwa / CrossPlot	TMFR	Rmf Ref Temp	75.00	degF
Rwa / CrossPlot	RWA	Resistivity of Formation Water	0.05	ohmm
Rwa / CrossPlot	ADP	Use Air Porosity to calculate CrossplotPhi	No	
GTET	GROK	Process Gamma Ray?	Yes	
GTET	GRSO	Gamma Tool Standoff	0.000	in
GTET	GEOK	Process Gamma Ray EVR?	No	
GTET	TPOS	Tool Position for Gamma Ray Tools.	Eccentered	
DSNT	DNOK	Process DSN?	Yes	
DSNT	DEOK	Process DSN EVR?	No	
DSNT	NLIT	Neutron Lithology	Limestone	
DSNT	DNSO	DSN Standoff - 0.25 in (6.35 mm) Recommended	0.250	in
DSNT	DNTP	Temperature Correction Type	None	
DSNT	DPRS	DSN Pressure Correction Type	None	
DSNT	SHCO	View More Correction Options	No	
DSNT	UTVD	Use TVD for Gradient Corrections?	No	
DSNT	LHWT	Logging Horizontal Water Tank?	No	
SDLT	CLOK	Process Caliper Outputs?	Yes	
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
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 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	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

BOTTOM

Data: SMU_320\0001 SP-GTET-DSN-SDL-FLEX-BSAT-ACRT-CH\IDLE **Date: 02-Jul-12 23:50:10**

HALLIBURTON

INPUTS, DELAYS AND FILTERS TABLE

Mnemonic	Input Description	Delay (ft)	Filter Type	Filter Length (ft)
	Depth Panel			
TENS	Tension	0.00	NO	
	SP Sub			
PLTC	Plot Control Mask	72.25	NO	
SP	Spontaneous Potential	72.25	BLK	1.250
SPR	Raw Spontaneous Potential	72.25	NO	
SPO	Spontaneous Potential Offset	72.25	NO	
	GTET			
TPUL	Tension Pull	64.23	NO	
GR	Natural Gamma Ray API	64.23	TRI	1.750
GRU	Unfiltered Natural Gamma Ray API	64.23	NO	
EGR	Natural Gamma Ray API with Enhanced Vertical Resolution	64.23	W	1.416 , 0.750
ACCZ	Accelerometer Z	0.00	BLK	0.083
DEVI	Inclination	0.00	NO	
	DSNT			
TPUL	Tension Pull	53.99	NO	
RNDS	Near Detector Telemetry Counts	54.09	BLK	1.417
RFDS	Far Detector Telemetry Counts	54.84	TRI	0.583
DNTT	DSN Tool Temperature	54.09	NO	
DSNS	DSN Tool Status	53.99	NO	
ERND	Near Detector Telemetry Counts EVR	54.09	BLK	0.000
ERFD	Far Detector Telemetry Counts EVR	54.84	BLK	0.000
ENTM	DSN Tool Temperature EVR	54.09	NO	
	SDLT			
TPUL	Tension Pull	44.09	NO	
PCAL	Pad Caliper	44.09	TRI	0.250
ACAL	Arm Caliper	44.09	TRI	0.250
	BSAT			
TPUL	Tension Pull	27.09	NO	
STAT	Status	27.09	NO	
DLYT	Delay Time	27.09	NO	
SI	Sample Interval	27.09	NO	
TXRX	Raw Telemetry 10 Receivers	27.09	NO	
FRMC	Tool Frame Count	27.09	NO	
GMOD	Gain processing mode	19.83	NO	
	ACRt Sonde			

TPUL	Tension Pull	2.97	NO	
F1R1	ACRT 12KHz - 80in R value	9.22	BLK	0.000
F1X1	ACRT 12KHz - 80in X value	9.22	BLK	0.000
F1R2	ACRT 12KHz - 50in R value	6.72	BLK	0.000
F1X2	ACRT 12KHz - 50in X value	6.72	BLK	0.000
F1R3	ACRT 12KHz - 29in R value	5.22	BLK	0.000
F1X3	ACRT 12KHz - 29in X value	5.22	BLK	0.000
F1R4	ACRT 12KHz - 17in R value	4.22	BLK	0.000
F1X4	ACRT 12KHz - 17in X value	4.22	BLK	0.000
F1R5	ACRT 12KHz - 10in R value	3.72	BLK	0.000
F1X5	ACRT 12KHz - 10in X value	3.72	BLK	0.000
F1R6	ACRT 12KHz - 6in R value	3.47	BLK	0.000
F1X6	ACRT 12KHz - 6in X value	3.47	BLK	0.000
F2R1	ACRT 36KHz - 80in R value	9.22	BLK	0.000
F2X1	ACRT 36KHz - 80in X value	9.22	BLK	0.000
F2R2	ACRT 36KHz - 50in R value	6.72	BLK	0.000
F2X2	ACRT 36KHz - 50in X value	6.72	BLK	0.000
F2R3	ACRT 36KHz - 29in R value	5.22	BLK	0.000
F2X3	ACRT 36KHz - 29in X value	5.22	BLK	0.000
F2R4	ACRT 36KHz - 17in R value	4.22	BLK	0.000
F2X4	ACRT 36KHz - 17in X value	4.22	BLK	0.000
F2R5	ACRT 36KHz - 10in R value	3.72	BLK	0.000
F2X5	ACRT 36KHz - 10in X value	3.72	BLK	0.000
F2R6	ACRT 36KHz - 6in R value	3.47	BLK	0.000
F2X6	ACRT 36KHz - 6in X value	3.47	BLK	0.000
F3R1	ACRT 72KHz - 80in R value	9.22	BLK	0.000
F3X1	ACRT 72KHz - 80in X value	9.22	BLK	0.000
F3R2	ACRT 72KHz - 50in R value	6.72	BLK	0.000
F3X2	ACRT 72KHz - 50in X value	6.72	BLK	0.000
F3R3	ACRT 72KHz - 29in R value	5.22	BLK	0.000
F3X3	ACRT 72KHz - 29in X value	5.22	BLK	0.000
F3R4	ACRT 72KHz - 17in R value	4.22	BLK	0.000
F3X4	ACRT 72KHz - 17in X value	4.22	BLK	0.000
F3R5	ACRT 72KHz - 10in R value	3.72	BLK	0.000
F3X5	ACRT 72KHz - 10in X value	3.72	BLK	0.000
F3R6	ACRT 72KHz - 6in R value	3.47	BLK	0.000
F3X6	ACRT 72KHz - 6in X value	3.47	BLK	0.000
RMUD	Mud Resistivity	12.76	BLK	0.000
F1RT	Transmitter Reference 12 KHz Real Signal	2.97	BLK	0.000
F1XT	Transmitter Reference 12 KHz Imaginary Signal	2.97	BLK	0.000
F2RT	Transmitter Reference 36 KHz Real Signal	2.97	BLK	0.000
F2XT	Transmitter Reference 36 KHz Imaginary Signal	2.97	BLK	0.000
F3RT	Transmitter Reference 72 KHz Real Signal	2.97	BLK	0.000
F3XT	Transmitter Reference 72 KHz Imaginary Signal	2.97	BLK	0.000
TFPU	Upper Feedpipe Temperature Calculated	2.97	BLK	0.000
TFPL	Lower Feedpipe Temperature Calculated	2.97	BLK	0.000
ITMP	Instrument Temperature	2.97	BLK	0.000
TCVA	Temperature Correction Values Loop Off	2.97	NO	
TIDV	Instrument Temperature Derivative	2.97	NO	
TUDV	Upper Temperature Derivative	2.97	NO	
TLDV	Lower Temperature Derivative	2.97	NO	
TRBD	Receiver Board Temperature	2.97	NO	

Microlog Pad

TPUL	Tension Pull	44.28	NO	
MINV	Microlog Lateral	44.28	BLK	0.750

MNOR	Microlog Normal	44.28	BLK	0.750

SDLT Pad				
TPUL	Tension Pull	44.08	NO	
NAB	Near Above	43.90	BLK	0.920
NHI	Near Cesium High	43.90	BLK	0.920
NLO	Near Cesium Low	43.90	BLK	0.920
NVA	Near Valley	43.90	BLK	0.920
NBA	Near Barite	43.90	BLK	0.920
NDE	Near Density	43.90	BLK	0.920
NPK	Near Peak	43.90	BLK	0.920
NLI	Near Lithology	43.90	BLK	0.920
NBAU	Near Barite Unfiltered	43.90	BLK	0.250
NLIU	Near Lithology Unfiltered	43.90	BLK	0.250
FAB	Far Above	44.26	BLK	0.250
FHI	Far Cesium High	44.26	BLK	0.250
FLO	Far Cesium Low	44.26	BLK	0.250
FVA	Far Valley	44.26	BLK	0.250
FBA	Far Barite	44.26	BLK	0.250
FDE	Far Density	44.26	BLK	0.250
FPK	Far Peak	44.26	BLK	0.250
FLI	Far Lithology	44.26	BLK	0.250
PTMP	Pad Temperature	44.09	BLK	0.920
NHV	Near Detector High Voltage	43.49	NO	
FHV	Far Detector High Voltage	43.49	NO	
ITMP	Instrument Temperature	43.49	NO	
DDHV	Detector High Voltage	43.49	NO	

Data: SMU_320\0001 SP-GTET-DSN-SDL-FLEX-BSAT-ACRT-CH\IDLE **Date: 03-Jul-12 01:13:50**

COMPANY	**OXY USA INC**		
WELL	**SMU #320**		
FIELD	**SMU**		
COUNTY	**FINNEY**	STATE	**KANSAS**

HALLIBURTON

BOREHOLE COMPENSATED SONIC ARRAY LOG