

MICROLOG

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Service Ticket No.: 904653282						API No.: 15081221710000						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		N/A		1.5 S.O.		N/A	
Rmc @ Meas. Temp.			@			@				I-11026095							
Source Rmf	Rmc								S-11005908								
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.		11958947		Serial No.		10747683		Serial No.		10960494		Serial No.		11055304			
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-NEUI			
Type		SCINT						Source Type		CS137		Source Type		AM241BE			
Length		8"		LSA [Y/N]				Serial No.		5168GW		Serial No.		DSN-424			
Distance to Source		N/A		FWDA [Y/N]				Strength		1.5 Ci		Strength		15.0 Ci			
LOGGING DATA																	
GENERAL				GAMMA		ACOUSTIC			DENSITY			NEUTRON					
Run	Depth		Speed	Scale		Scale		Matrix	Scale		Matrix	Scale		Matrix			
No.	From	To	ft/min	L	R	L	R		L	R		L	R				
ONE	TD	CSG	REC	0	150	30	-10	47.6 uSec/ft	30	-10	2.71 gr/cc	30	-10	LIME			

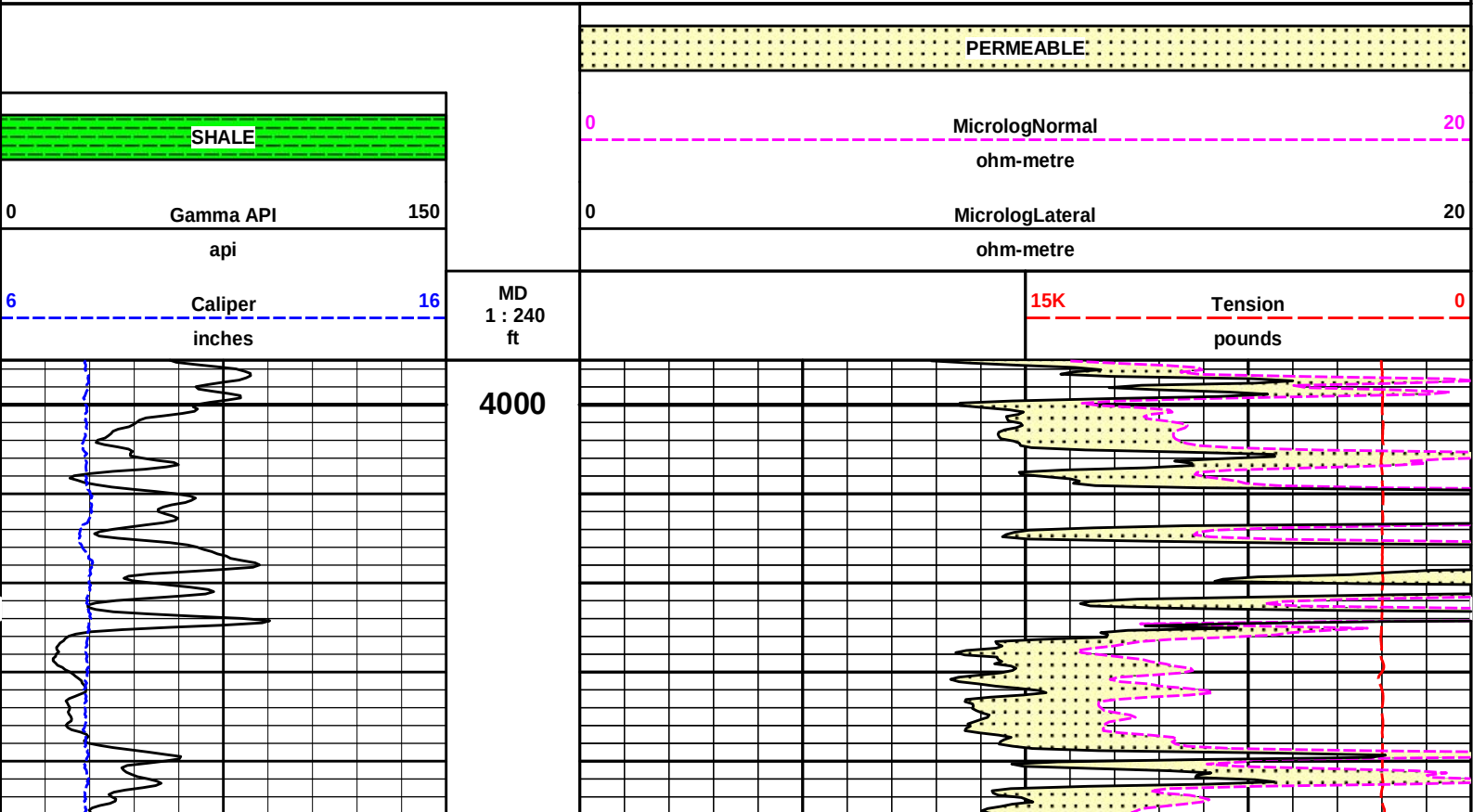
[illegible]

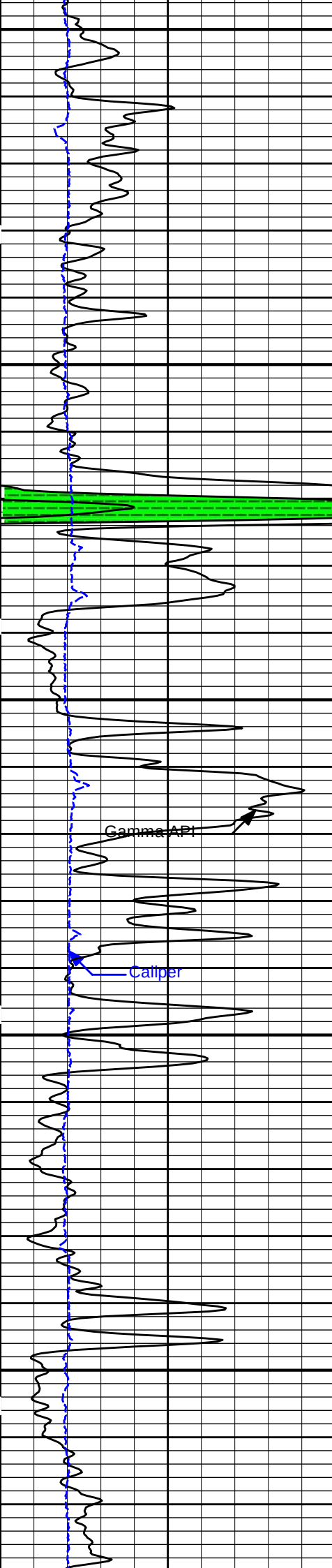
HALLIBURTON

Plot Time: 25-Feb-18 21:27:44
Plot Range: 3995 ft to 5665.42 ft
Data: BATMAN_B4\Well Based\DETAILS\
Plot File: \\-LOCAL-BATMAN_B4\Well Based\MICROLOG\Microlog_IQ_5_main.lib

5 INCH MAIN LOG

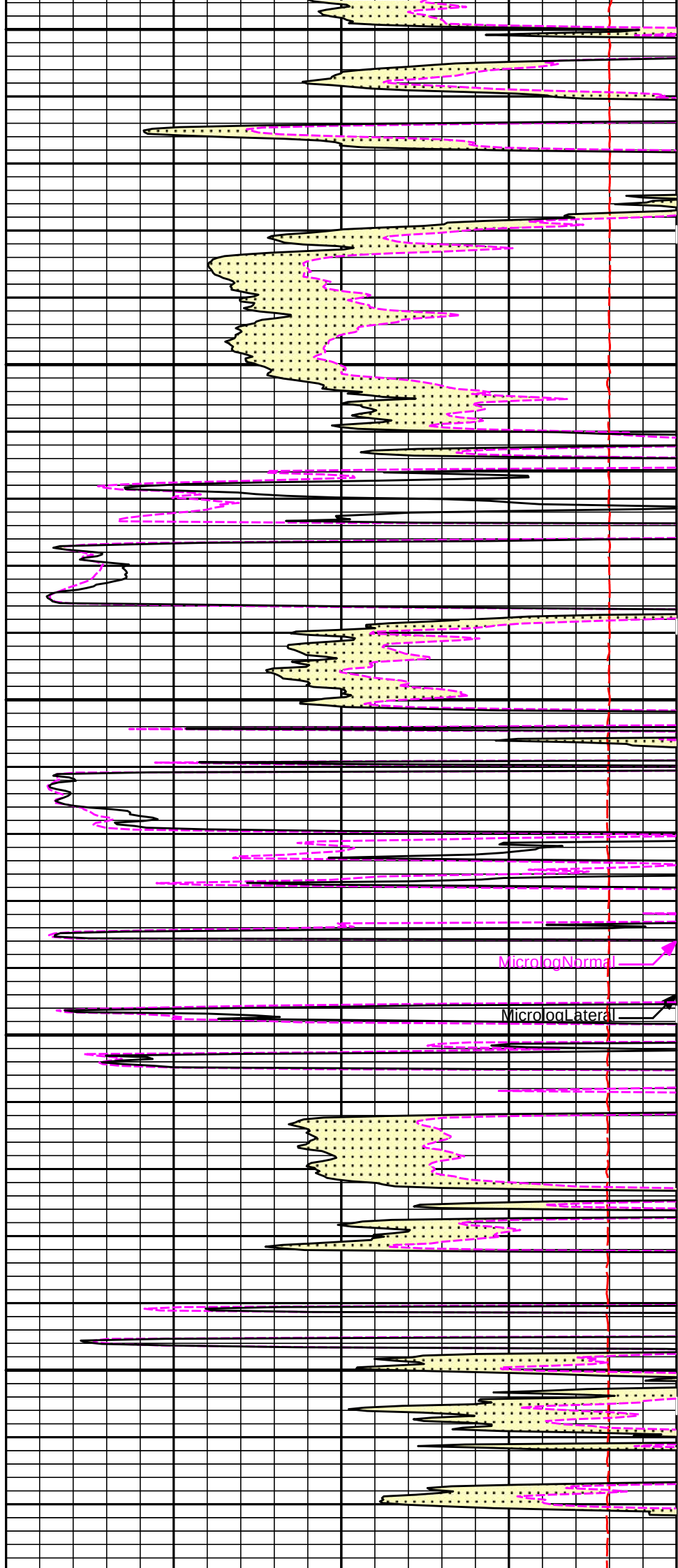
MEASURED DEPTH
MAIN LOG 5" PER 100'

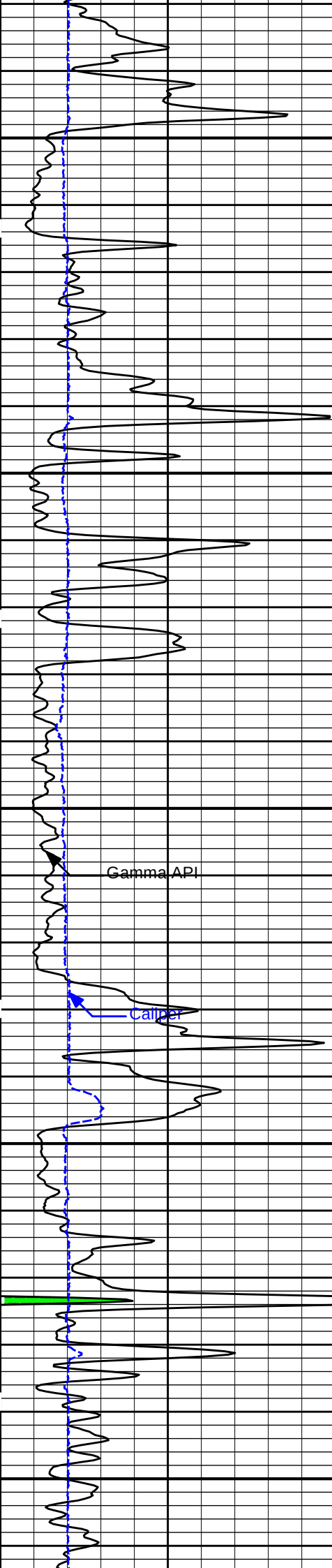




4100

4200

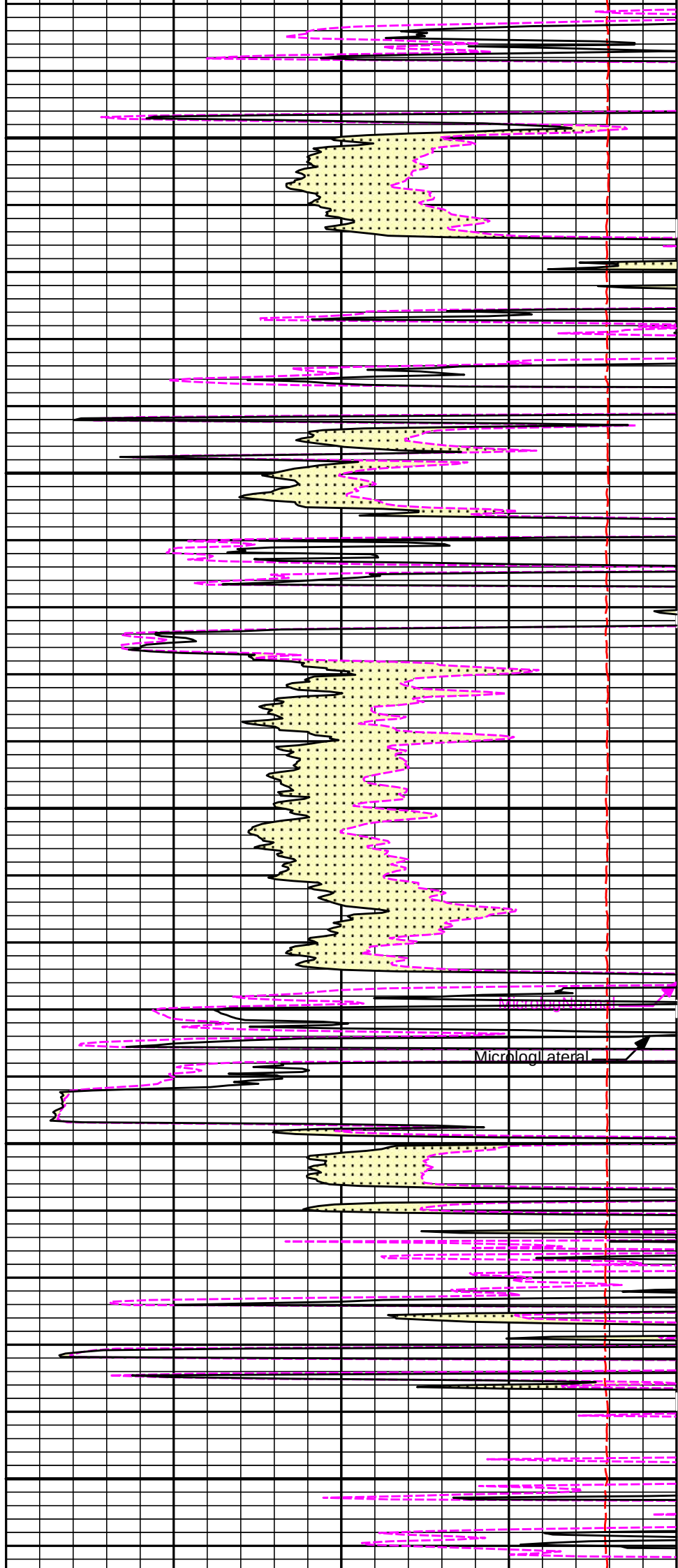


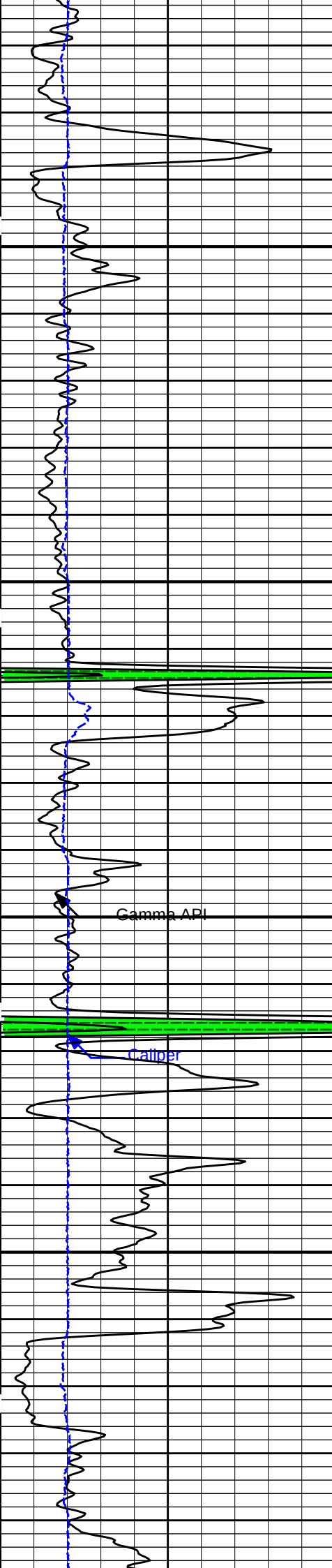


4300

4400

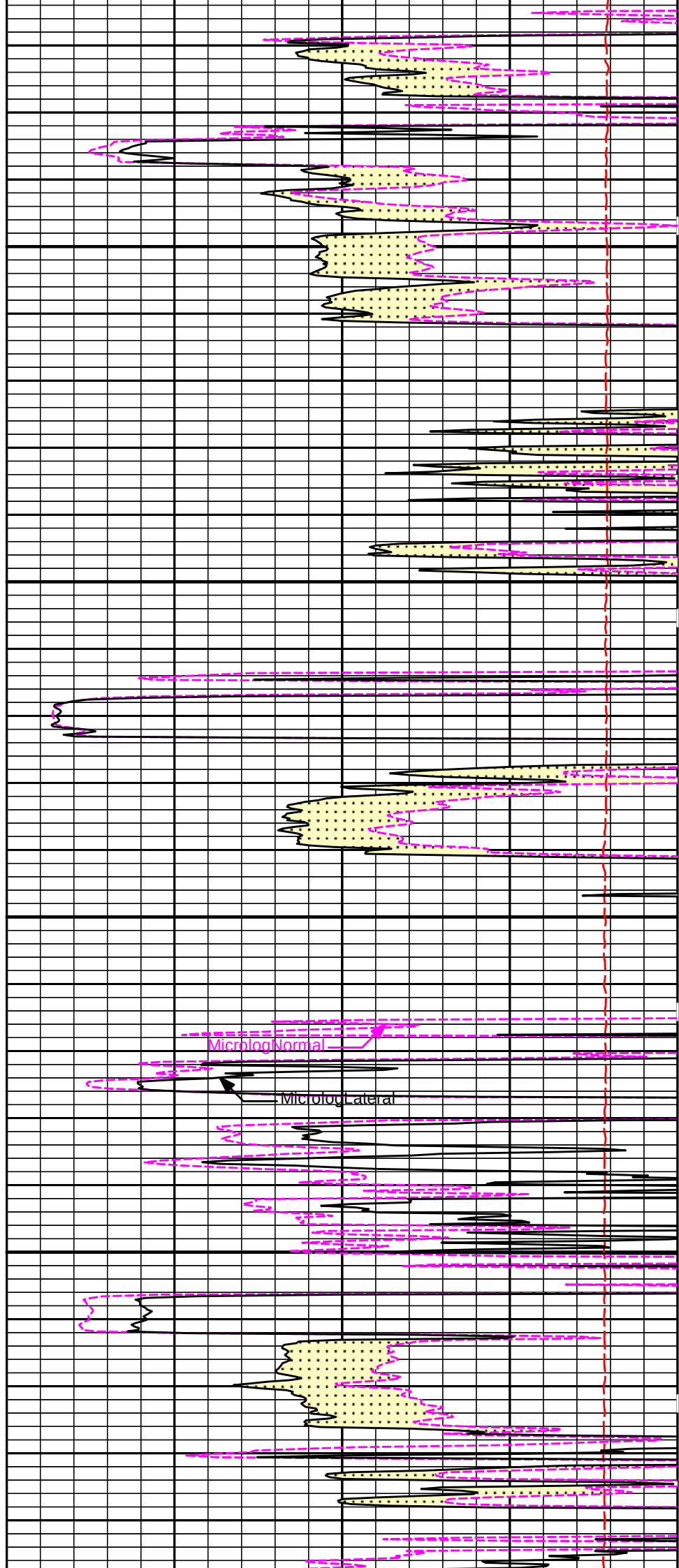
4500

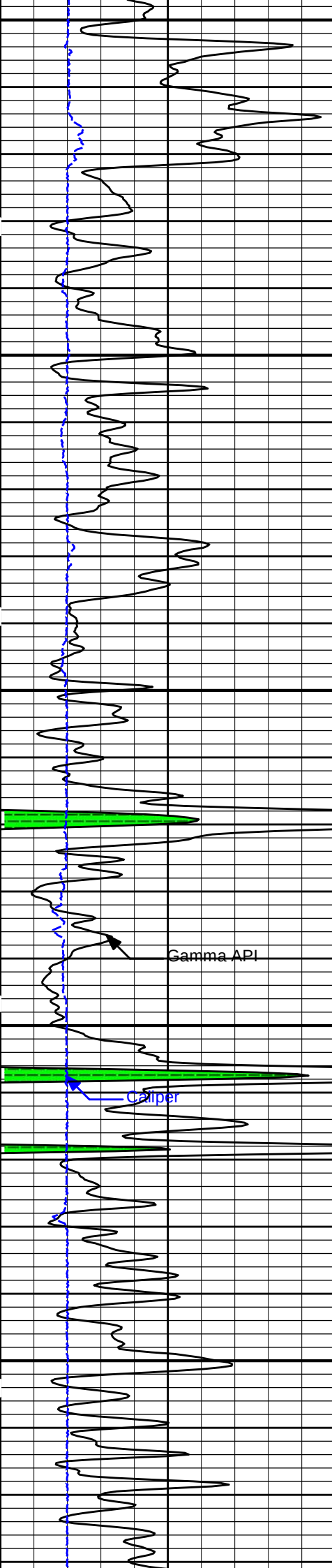




4600

4700



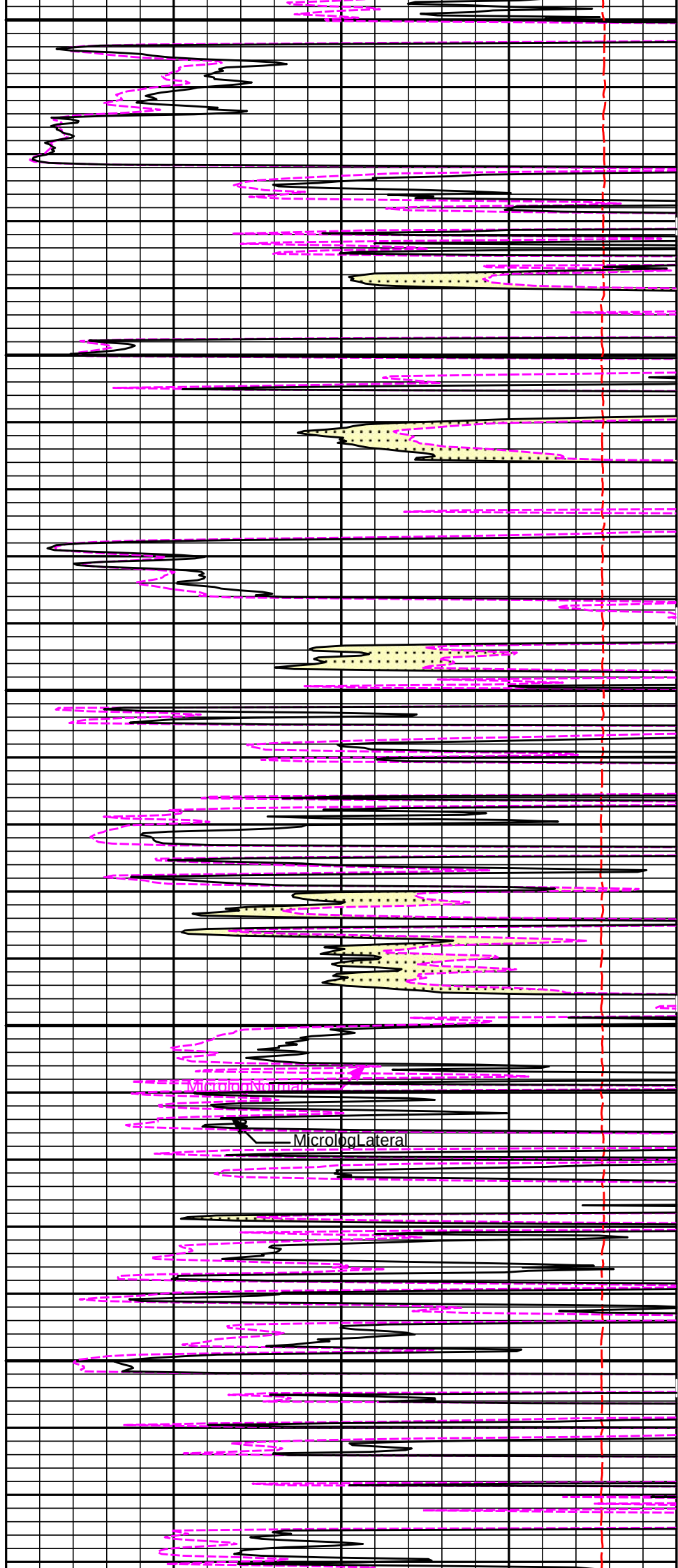


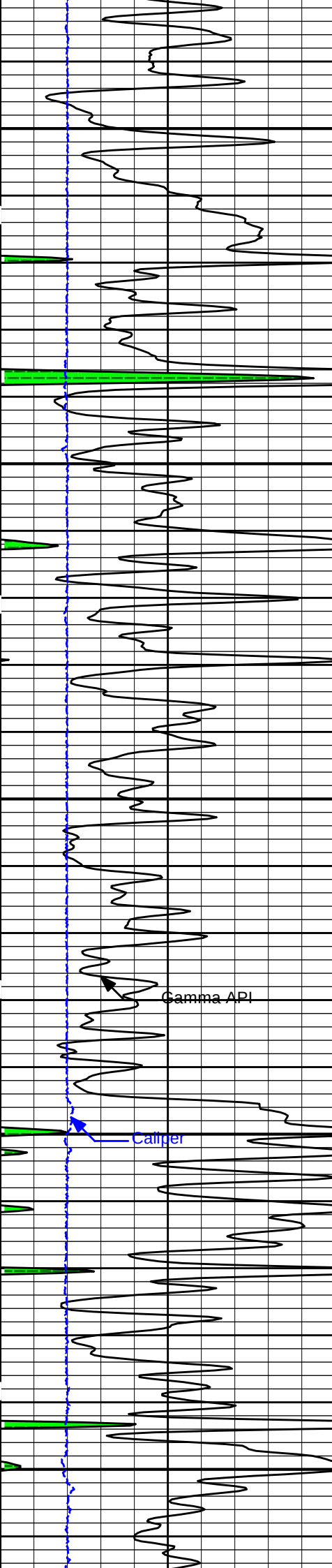
4800

4900

Gamma API

Caliper





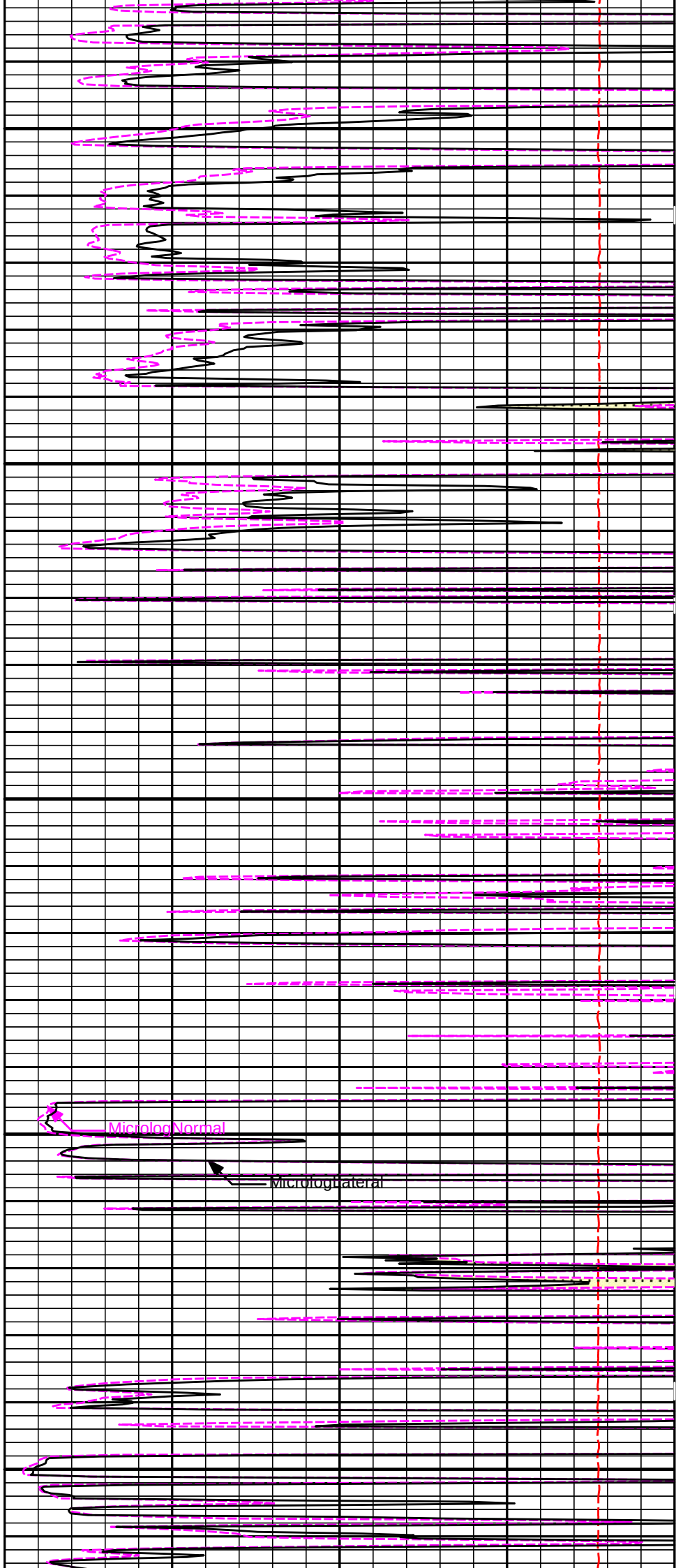
5000

5100

5200

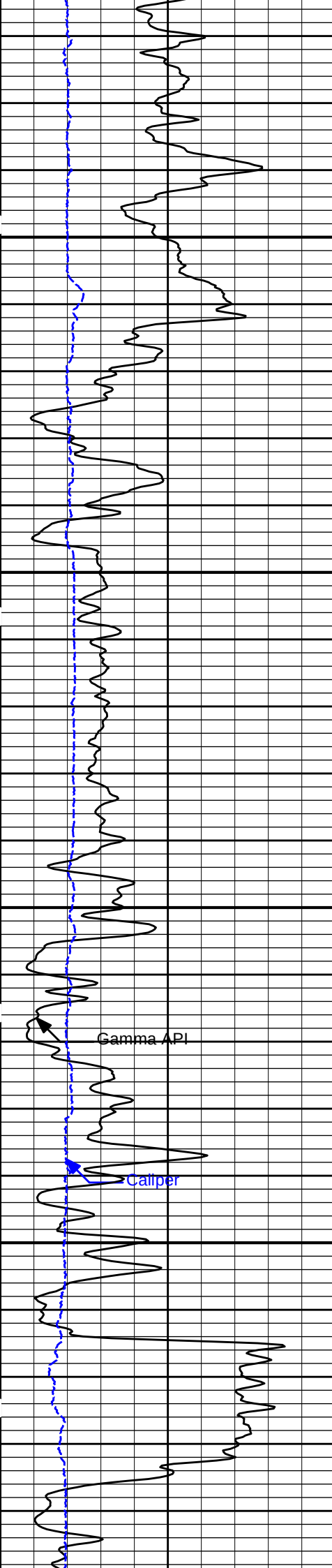
Gamma API

Caliper



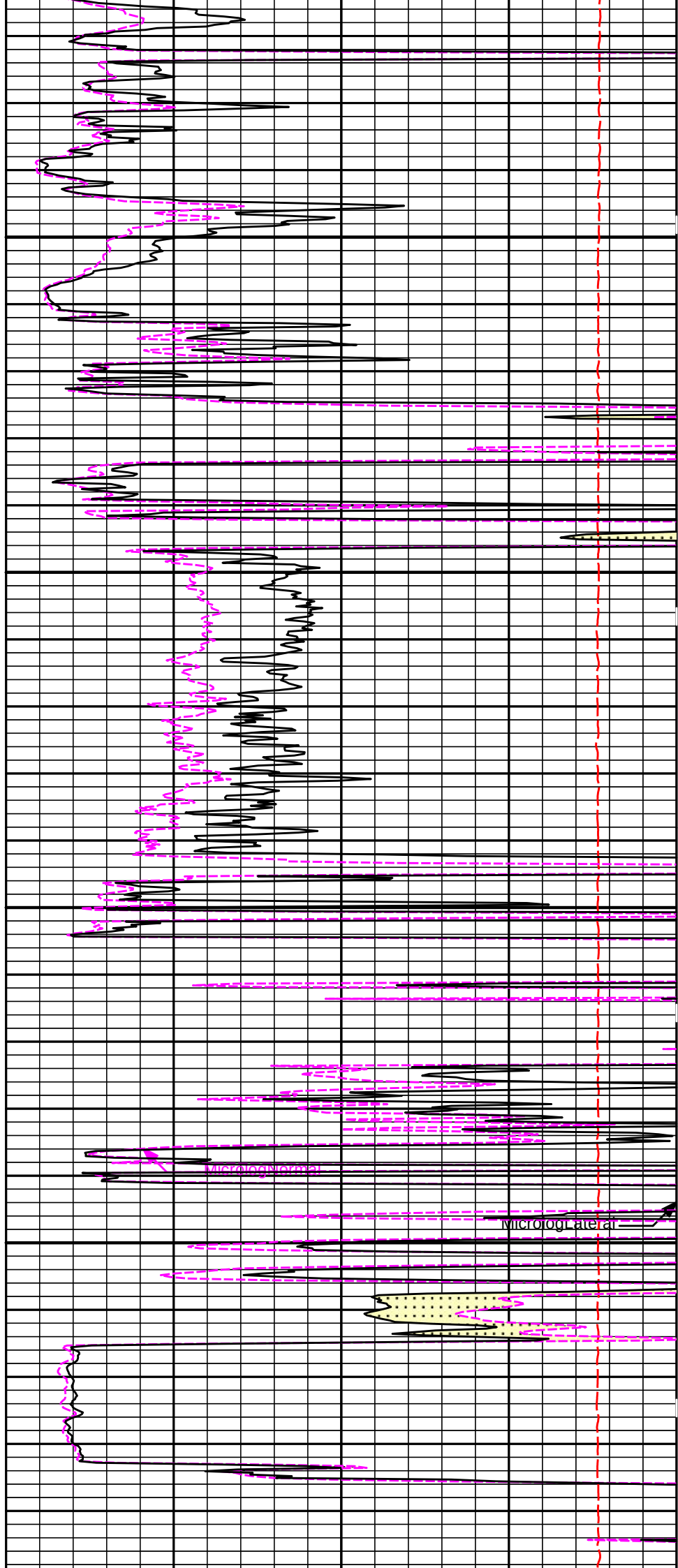
Microlog Normal

Microlog Lateral



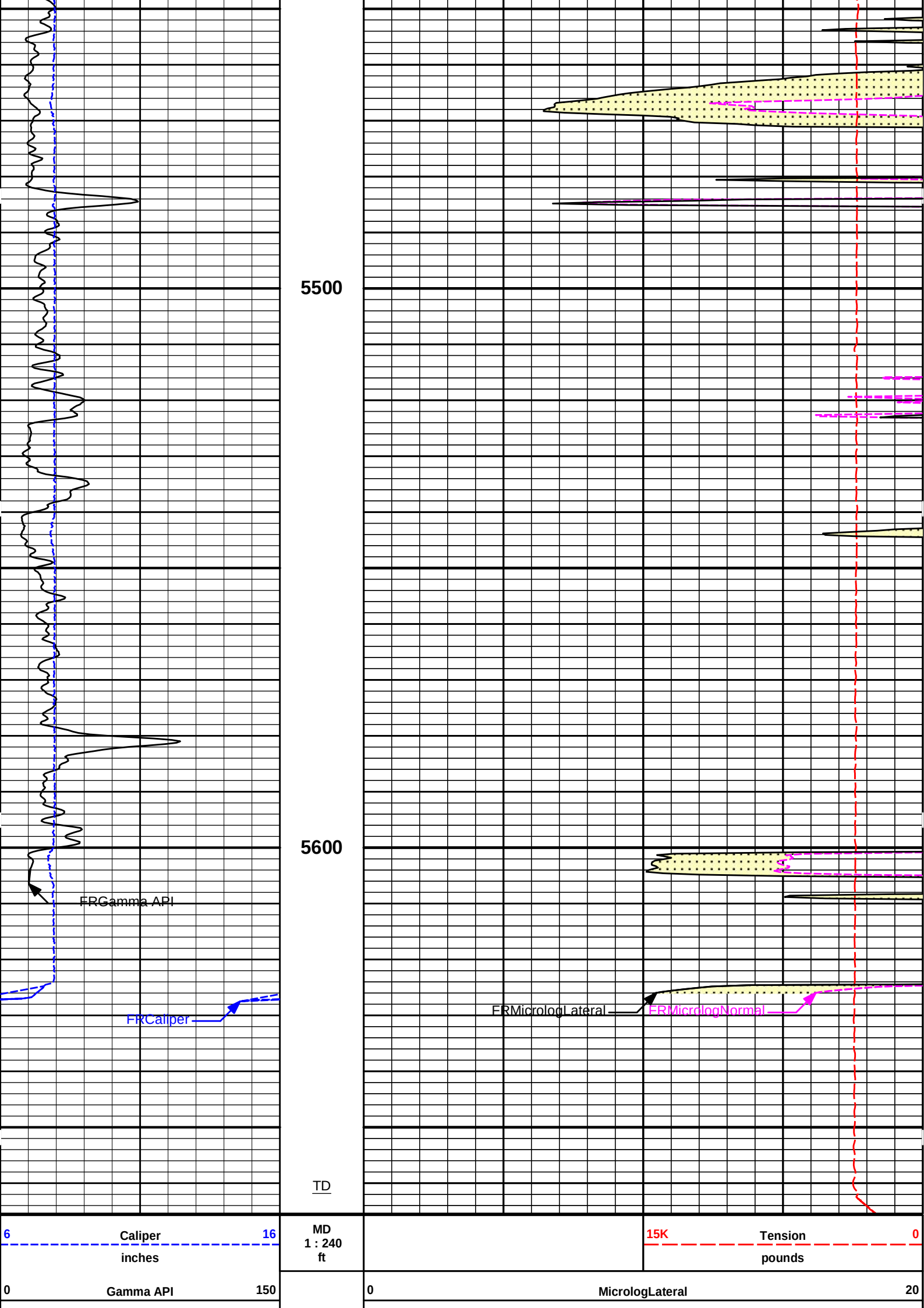
5300

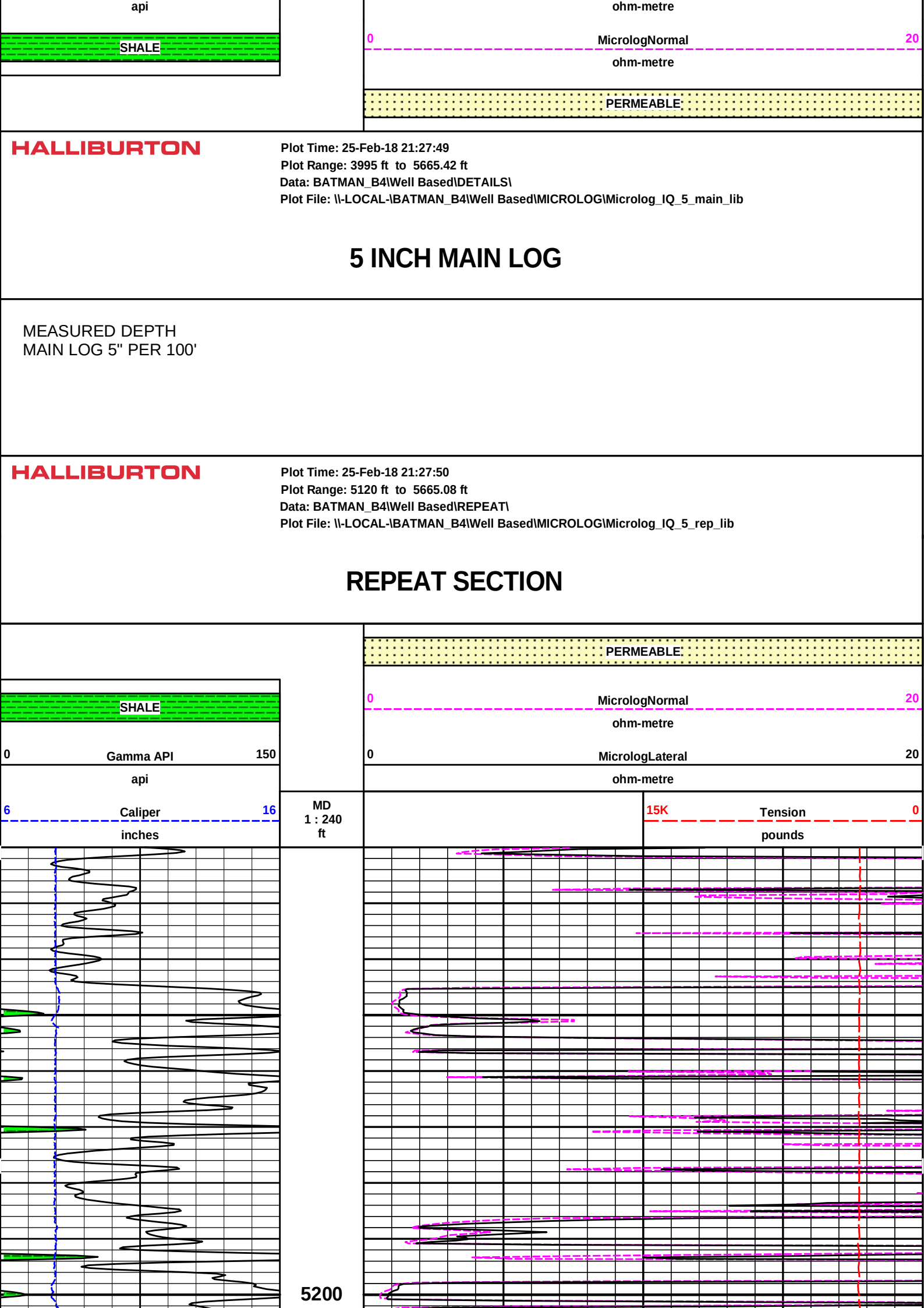
5400

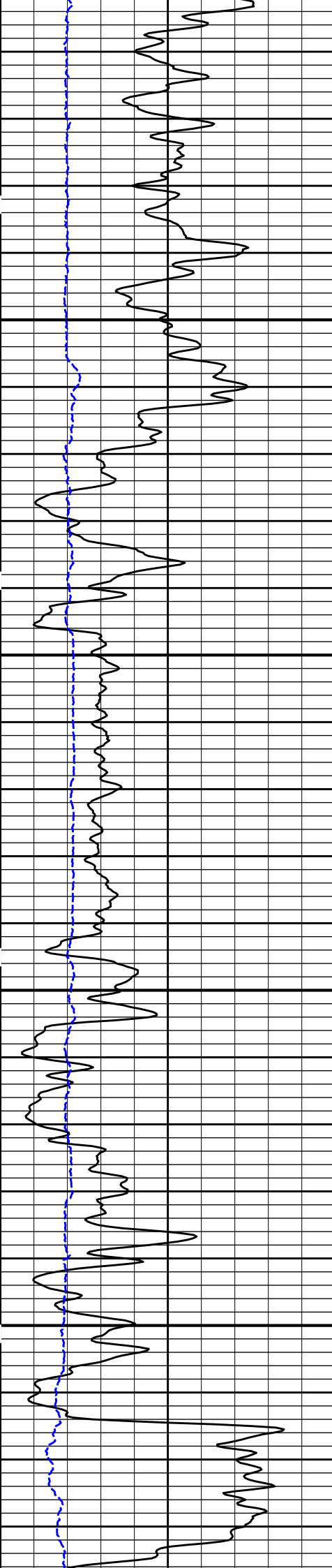


Microlog Lateral

Microlog Lateral

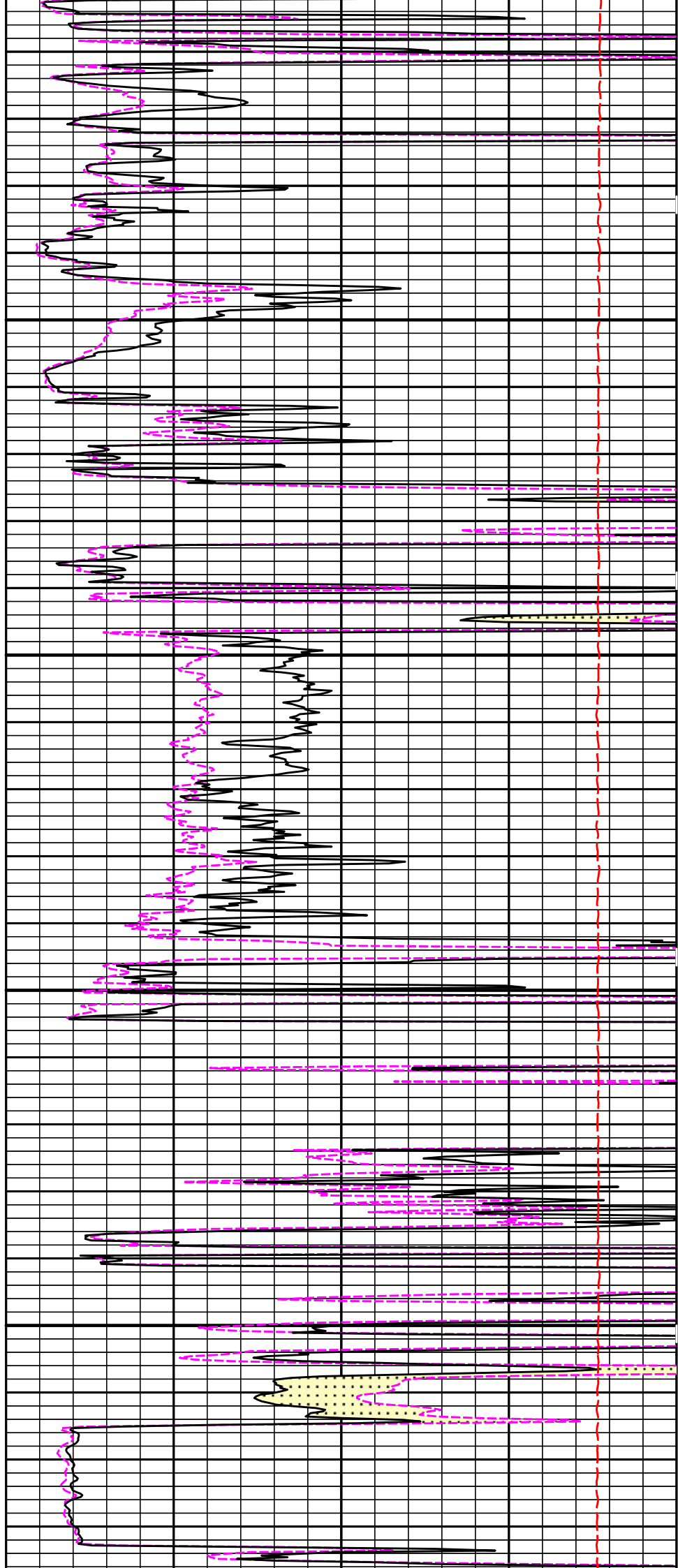


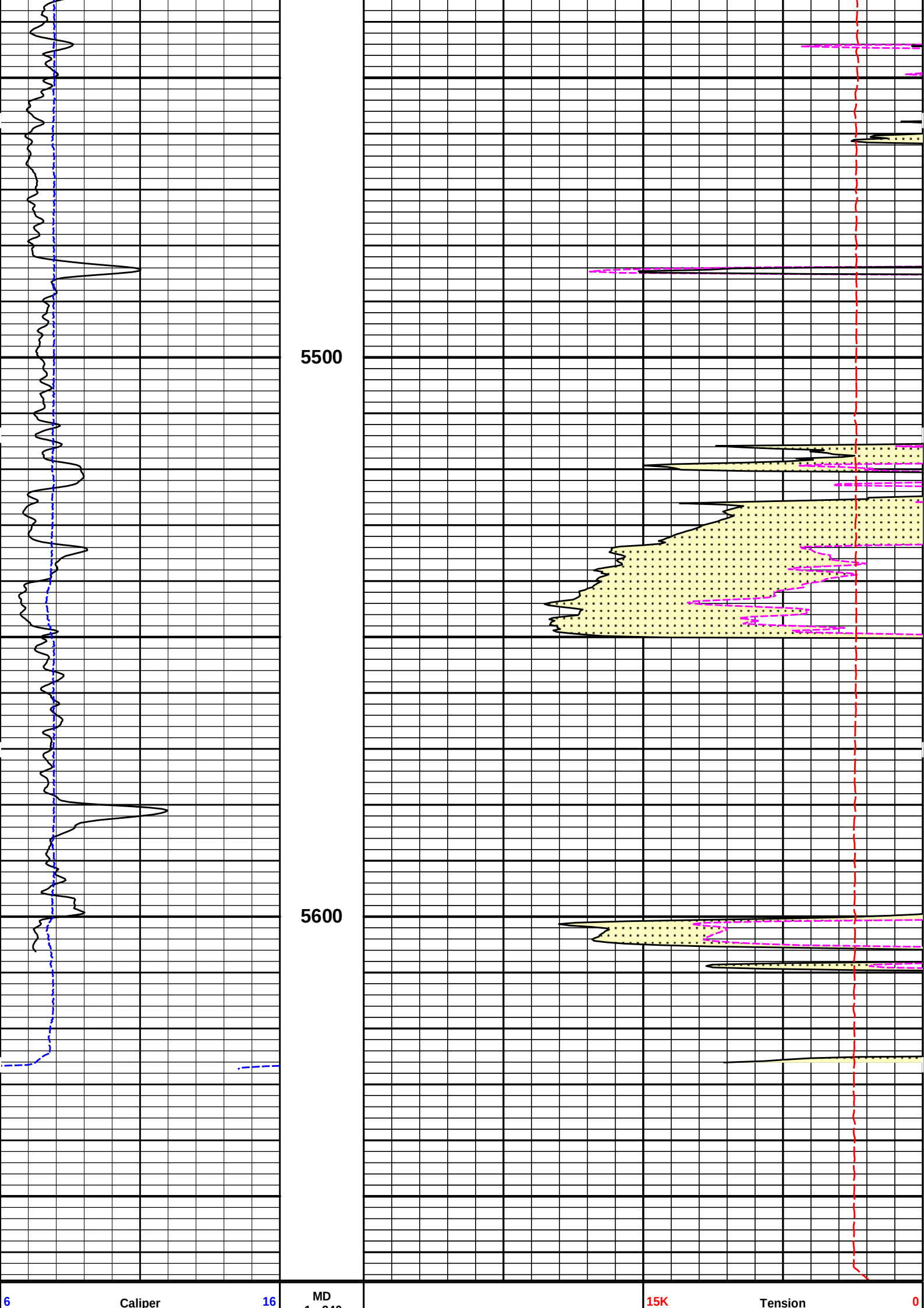




5300

5400





inches		1 : 240 ft		pounds	
0	Gamma API	150	0	MicrologLateral	20
api			ohm-metre		
SHALE			0	MicrologNormal	20
			ohm-metre		
			PERMEABLE		

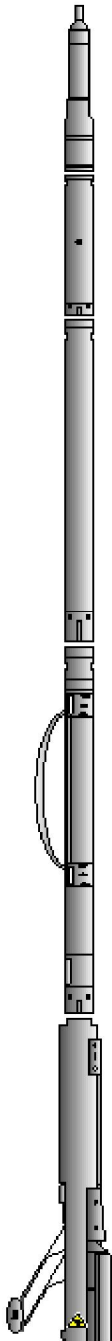
HALLIBURTON

Plot Time: 25-Feb-18 21:27:52
Plot Range: 5120 ft to 5665.08 ft
Data: BATMAN_B4\Well Based\REPEAT\
Plot File: \\-LOCAL-BATMAN_B4\Well Based\MICROLOG\Microlog_IQ_5_rep_lib

REPEAT SECTION

HALLIBURTON

TOOL STRING DIAGRAM REPORT

Description	Overbody Description	O.D.	Diagram	Sensors @ Delays	Length	Accumulated Length
CH_HOS-11459024 37.50 lbs	Weak Point 7000 lbs- 00000025 0.01 lbs	Ø 2.750 in Ø 0.010 in*		← Temperature @ 71.07 ft	2.50 ft	71.57 ft
XOHD-11569312 20.00 lbs		Ø 2.750 in Ø 3.625 in			0.95 ft	69.07 ft
SP Sub-11441455 60.00 lbs		Ø 3.625 in		← SP @ 66.34 ft	3.74 ft	68.12 ft
				← Z-Accelerometer @ 63.93 ft		64.38 ft
GTET-11958947 165.00 lbs		Ø 3.625 in			8.52 ft	
				← GammaRay @ 58.32 ft		55.86 ft
DSNT-11055304 174.00 lbs	DSN Decentralizer- 11055304 6.60 lbs	Ø 5.000 in* Ø 3.625 in			9.69 ft	
				← DSN Far @ 48.92 ft ← DSN Near @ 48.17 ft		46.17 ft
SDLT-10960494 360.00 lbs	SDLT Pad-10844781 65.00 lbs Microlog Pad-10960494 8.00 lbs RAM-Cs137-00005168 1.00 lbs	Ø 4.500 in Ø 4.500 in* Ø 4.750 in* Ø 0.800 in*		Microlog @ 38.36 ft SDL Caliper @ 38.17 ft SDL @ 38.16 ft	10.81 ft	

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	1.670	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	5655.00	ft
	SHARED	BHT	Bottom Hole Temperature	141.0	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	1.52	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	None	
	DSNT	DPRS	DSN Pressure Correction Type	None	
	DSNT	SHCO	View More Correction Options	No	
	DSNT	UTVD	Use TVD for Gradient Corrections?	No	
	DSNT	LHWT	Logging Horizontal Water Tank?	No	
	DSNT	BHSM	Borehole Size Source Tool	SDLT	
	SDLT	CLOK	Process Caliper Outputs?	Yes	
	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	Limestone 47.6	
BSAT	DTSH	Delta -T Shale	100.00	uspf
BSAT	SPEQ	Acoustic Porosity Equation	Wyllie	
ACRt Sonde	RTOK	Process ACRt?	Yes	
ACRt Sonde	MNSO	Minimum Tool Standoff	1.50	in
ACRt Sonde	TCS1	Temperature Correction Source	FP Lwr & FP Up	
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	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: BATMAN_B4\0001 GTET-DSNT-SDLT-BSAT-ACRTIDLE
Date: 25-Feb-18 19:46:39



CALIBRATION REPORT

NATURAL GAMMA RAY TOOL SHOP CALIBRATION

Tool Name: GTET - 11958947

Reference Calibration Date: 20-Feb-18 09:19:12

Engineer: JORGE ORLANDO PEREZ

Calibration Date: 20-Feb-18 09:23:22

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

Calibration Version: 1

Calibrator Source S/N: TB-146

Calibrator API Reference:225.00 api

Equivalent Calibrator API Reference:228.9 api

Measurement	Measured	Calibrated	Units
Background	29.2	29.5	api
Background + Calibrator	256.0	258.4	api
Calibrator	226.8	228.9	api

NATURAL GAMMA RAY TOOL FIELD CALIBRATION

Tool Name: GTET - 11958947

Reference Calibration Date: 20-Feb-18 09:23:22

Engineer: JORGE ORLANDO PEREZ

Calibration Date: 20-Feb-18 09:28:38

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

Calibration Version: 1

Calibrator Source S/N: TB-146

Calibrator API Reference:225.00 api

Equivalent Calibrator API Reference:228.9 api

Field Verification	Shop	Field	Units
Background	29.5	30.3	api
Background + Calibrator	258.4	262.2	api

Shop	Field	Difference	Tolerance
228.9	231.8	-2.9	+/- 9.00

DENSITY CALIPER SHOP CALIBRATION

Tool Name:	SDLT - 10960494	Reference Calibration Date:	20-Aug-17 12:41:21
Engineer:	JORGE ORLANDO PEREZ	Calibration Date:	09-Dec-17 12:48:22
Software Version:	WL INSITE R5.0.5 (Build 8)	Calibration Version:	1
Host Tool Name:	DSNT - 11055304		

CALIBRATION COEFFICIENTS			
Measurement	Previous Value	New Value	Control Limit On New Value
Pad Offset	-2993.12	-3003.48	-7000.00 - -1000.00
Pad Gain	0.0003799	0.0003806	0.0002000 - 0.0006000
Arm Offset	-746.82	-1647.28	-5000.00 - 3000.00
Arm Gain	0.0004486	0.0005279	0.000300 - 0.000700
Arm Power	-0.000001023	-0.000005848	-0.000010000 - 0.000010000

The ring diameter is computed from: DIAMETER = PAD EXTENSION + ARM EXTENSION + TOOL DIAMETER

Tool Diameter: 4.50 in

CALIBRATION RINGS				
Measurement	Current Reading (Previous Coeff.)	Calibrated (New Coeff.)	Change	Control Limit On New Value
PAD EXTENSION:				
Small Ring (in)	2.00	2.00	0.00	+/- 0.20
Medium Ring (in)	3.75	3.75	0.00	+/- 0.20
RING DIAMETER:				
Small Ring (in)	6.64	6.50	-0.14	+/- 0.20
Medium Ring (in)	8.21	8.25	0.04	+/- 0.20
Large Ring (in)	14.95	15.00	0.05	+/- 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 - 10960494	Reference Calibration Date:	09-Dec-17 12:48:22
Engineer:	JORGE ORLANDO PEREZ	Calibration Date:	20-Feb-18 09:50:40
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	3.75	-0.00	+/- 0.10
Ring Diameter	8.25	8.25	0.00	+/- 0.15

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

MICRO LOG SHOP CALIBRATION

Tool Name:	Microlog Pad - 10960494	Reference Calibration Date:	24-Nov-17 11:21:38
Engineer:	JORGE ORLANDO PEREZ	Calibration Date:	24-Nov-17 11:23:09
Software Version:	WL INSITE R5.0.5 (Build 8)	Calibration Version:	1

CH_HOS				
DHTN	DownholeTension	0.00	BLK	0.000
SP Sub				
PLTC	Plot Control Mask	66.34	NO	
SP	Spontaneous Potential	66.34	BLK	1.250
SPR	Raw Spontaneous Potential	66.34	NO	
SPO	Spontaneous Potential Offset	66.34	NO	
GTET				
TPUL	Tension Pull	58.32	NO	
GR	Natural Gamma Ray API	58.32	TRI	1.750
GRU	Unfiltered Natural Gamma Ray API	58.32	NO	
EGR	Natural Gamma Ray API with Enhanced Vertical Resolution	58.32	W	1.416 , 0.750
HDIA	Measured Hole Diameter	0.00	NO	
ACCZ	Accelerometer Z	0.00	BLK	0.083
DEVI	Inclination	0.00	NO	
DSNT				
TPUL	Tension Pull	48.07	NO	
RNDS	Near Detector Telemetry Counts	48.17	BLK	1.417
RFDS	Far Detector Telemetry Counts	48.92	TRI	0.583
DNTT	DSN Tool Temperature	48.17	NO	
DSNS	DSN Tool Status	48.07	NO	
ERND	Near Detector Telemetry Counts EVR	48.17	BLK	0.000
ERFD	Far Detector Telemetry Counts EVR	48.92	BLK	0.000
ENTM	DSN Tool Temperature EVR	48.17	NO	
HDIA	Measured Hole Diameter	0.00	NO	
SDLT				
TPUL	Tension Pull	38.17	NO	
PCAL	Pad Caliper	38.17	TRI	0.250
ACAL	Arm Caliper	38.17	TRI	0.250
BSAT				
TPUL	Tension Pull	26.84	NO	
STAT	Status	26.84	NO	
DLYT	Delay Time	26.84	NO	
SI	Sample Interval	26.84	NO	
TXRX	Raw Telemetry 10 Receivers	26.84	NO	
FRMC	Tool Frame Count	26.84	NO	
GMOD	Gain processing mode	19.58	NO	
ACRt Sonde				
TPUL	Tension Pull	2.73	NO	
F1R1	ACRT 12KHz - 80in R value	8.98	BLK	0.000
F1X1	ACRT 12KHz - 80in X value	8.98	BLK	0.000
F1R2	ACRT 12KHz - 50in R value	6.48	BLK	0.000
F1X2	ACRT 12KHz - 50in X value	6.48	BLK	0.000
F1R3	ACRT 12KHz - 29in R value	4.98	BLK	0.000
F1X3	ACRT 12KHz - 29in X value	4.98	BLK	0.000
F1R4	ACRT 12KHz - 17in R value	3.98	BLK	0.000
F1X4	ACRT 12KHz - 17in X value	3.98	BLK	0.000
F1R5	ACRT 12KHz - 10in R value	3.48	BLK	0.000
F1X5	ACRT 12KHz - 10in X value	3.48	BLK	0.000
F1R6	ACRT 12KHz - 6in R value	3.23	BLK	0.000
F1X6	ACRT 12KHz - 6in X value	3.23	BLK	0.000
F2R1	ACRT 36KHz - 80in R value	8.98	BLK	0.000
F2X1	ACRT 36KHz - 80in X value	8.98	BLK	0.000
F2R2	ACRT 36KHz - 50in R value	6.48	BLK	0.000
F2X2	ACRT 36KHz - 50in X value	6.48	BLK	0.000

F2X2	ACRT 36KHz - 50in X value	6.48	BLK	0.000
F2R3	ACRT 36KHz - 29in R value	4.98	BLK	0.000
F2X3	ACRT 36KHz - 29in X value	4.98	BLK	0.000
F2R4	ACRT 36KHz - 17in R value	3.98	BLK	0.000
F2X4	ACRT 36KHz - 17in X value	3.98	BLK	0.000
F2R5	ACRT 36KHz - 10in R value	3.48	BLK	0.000
F2X5	ACRT 36KHz - 10in X value	3.48	BLK	0.000
F2R6	ACRT 36KHz - 6in R value	3.23	BLK	0.000
F2X6	ACRT 36KHz - 6in X value	3.23	BLK	0.000
F3R1	ACRT 72KHz - 80in R value	8.98	BLK	0.000
F3X1	ACRT 72KHz - 80in X value	8.98	BLK	0.000
F3R2	ACRT 72KHz - 50in R value	6.48	BLK	0.000
F3X2	ACRT 72KHz - 50in X value	6.48	BLK	0.000
F3R3	ACRT 72KHz - 29in R value	4.98	BLK	0.000
F3X3	ACRT 72KHz - 29in X value	4.98	BLK	0.000
F3R4	ACRT 72KHz - 17in R value	3.98	BLK	0.000
F3X4	ACRT 72KHz - 17in X value	3.98	BLK	0.000
F3R5	ACRT 72KHz - 10in R value	3.48	BLK	0.000
F3X5	ACRT 72KHz - 10in X value	3.48	BLK	0.000
F3R6	ACRT 72KHz - 6in R value	3.23	BLK	0.000
F3X6	ACRT 72KHz - 6in X value	3.23	BLK	0.000
RMUD	Mud Resistivity	12.52	BLK	0.000
F1RT	Transmitter Reference 12 KHz Real Signal	2.73	BLK	0.000
F1XT	Transmitter Reference 12 KHz Imaginary Signal	2.73	BLK	0.000
F2RT	Transmitter Reference 36 KHz Real Signal	2.73	BLK	0.000
F2XT	Transmitter Reference 36 KHz Imaginary Signal	2.73	BLK	0.000
F3RT	Transmitter Reference 72 KHz Real Signal	2.73	BLK	0.000
F3XT	Transmitter Reference 72 KHz Imaginary Signal	2.73	BLK	0.000
TFPU	Upper Feedpipe Temperature Calculated	2.73	BLK	0.000
TFPL	Lower Feedpipe Temperature Calculated	2.73	BLK	0.000
ITMP	Instrument Temperature	2.73	BLK	0.000
TCVA	Temperature Correction Values Loop Off	2.73	NO	
TIDV	Instrument Temperature Derivative	2.73	NO	
TUDV	Upper Temperature Derivative	2.73	NO	
TLDV	Lower Temperature Derivative	2.73	NO	
TRBD	Receiver Board Temperature	2.73	NO	
HDIA	Measured Hole Diameter	0.00	NO	
Microlog Pad				
TPUL	Tension Pull	38.36	NO	
MINV	Microlog Lateral	38.36	BLK	0.750
MNOR	Microlog Normal	38.36	BLK	0.750
SDLT Pad				
TPUL	Tension Pull	38.16	NO	
NAB	Near Above	37.99	BLK	0.920
NHI	Near Cesium High	37.99	BLK	0.920
NLO	Near Cesium Low	37.99	BLK	0.920
NVA	Near Valley	37.99	BLK	0.920
NBA	Near Barite	37.99	BLK	0.920
NDE	Near Density	37.99	BLK	0.920
NPK	Near Peak	37.99	BLK	0.920
NLI	Near Lithology	37.99	BLK	0.920
NBAU	Near Barite Unfiltered	37.99	BLK	0.250
NLIU	Near Lithology Unfiltered	37.99	BLK	0.250
FAB	Far Above	38.34	BLK	0.250
FHI	Far Cesium High	38.34	BLK	0.250
FLO	Far Cesium Low	38.34	BLK	0.250
FVA	Far Valley	38.34	BLK	0.250
FBA	Far Barite	38.34	BLK	0.250

FBA	Far Barite	38.34	BLK	0.250
FDE	Far Density	38.34	BLK	0.250
FPK	Far Peak	38.34	BLK	0.250
FLI	Far Lithology	38.34	BLK	0.250
PTMP	Pad Temperature	38.17	BLK	0.920
NHV	Near Detector High Voltage	37.57	NO	
FHV	Far Detector High Voltage	37.57	NO	
ITMP	Instrument Temperature	37.57	NO	
DDHV	Detector High Voltage	37.57	NO	
HDIA	Measured Hole Diameter	0.00	NO	
Data: BATMAN_B4I0001 GTET-DSNT-SDLT-BSAT-ACRTIDLE				Date: 25-Feb-18 19:47:03

COMPANY	MERIT ENERGY COMPANY		
WELL	BATMAN B4		
FIELD	SANTA FE NORTH		
COUNTY	HASKELL	STATE	KANSAS
HALLIBURTON		MICROLOG	