

MICROLOG

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Service Ticket No.: 902195698						API Serial No.: 15-097-21817-00-00						PGM Version: WL INSITE R4.6.4 (Build 3)					
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	MICROLOG		RUBBER		ADJ		N/A		
Rmc @ Meas. Temp.			@		@				11014296								
Source Rmf	Rmc																
Rm @ BHT			@		@												
Rmf @ BHT			@		@												
Rmc @ BHT			@		@												
EQUIPMENT DATA																	
GAMMA				ACOUSTIC				DENSITY				NEUTRON					
Run No.		ONE		Run No.				Run No.		ONE		Run No.		ONE			
Serial No.		11048627		Serial No.				Serial No.		10865884		Serial No.		11055304			
Model No.		GTET		Model No.				Model No.		SDLT		Model No.		DSNT			
Diameter		3.625"		No. of Cent.				Diameter		4.5"		Diameter		3.625"			
Detector Model No.		T-102		Spacing				Log Type		GAM-GAM		Log Type		NEU-NEU			
Type		SCINT						Source Type		CS-137		Source Type		AM241BE			
Length		8"		LSA [Y/N]				Serial No.		5168 GW		Serial No.		DSN-424			
Distance to Source		10"		FWDA [Y/N]				Strength		1.5 CI		Strength		15 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	2.71	30	-10	LIME			

DIRECTIONAL INFORMATION														
Maximum Deviation @										KOP @				
Remarks: ANNULAR HOLE VOLUME CALCULATED FOR 5.5" CASING														
CHLORIES REPORTED AT 4500 PPM														
LCM REPORTED AT 2 PPM														
GTET- ACRT RUN IN COMBINATION IN THE FIRST RUN														
TODAY'S CREW:F.VILLA & M.GONZALEZ														
THANK YOU FOR CHOOSING HALLIBURTON ENERGY SERVICES LIBERAL,KS 620-624-8123														
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														

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Plot Time: 06-Mar-15 04:20:26

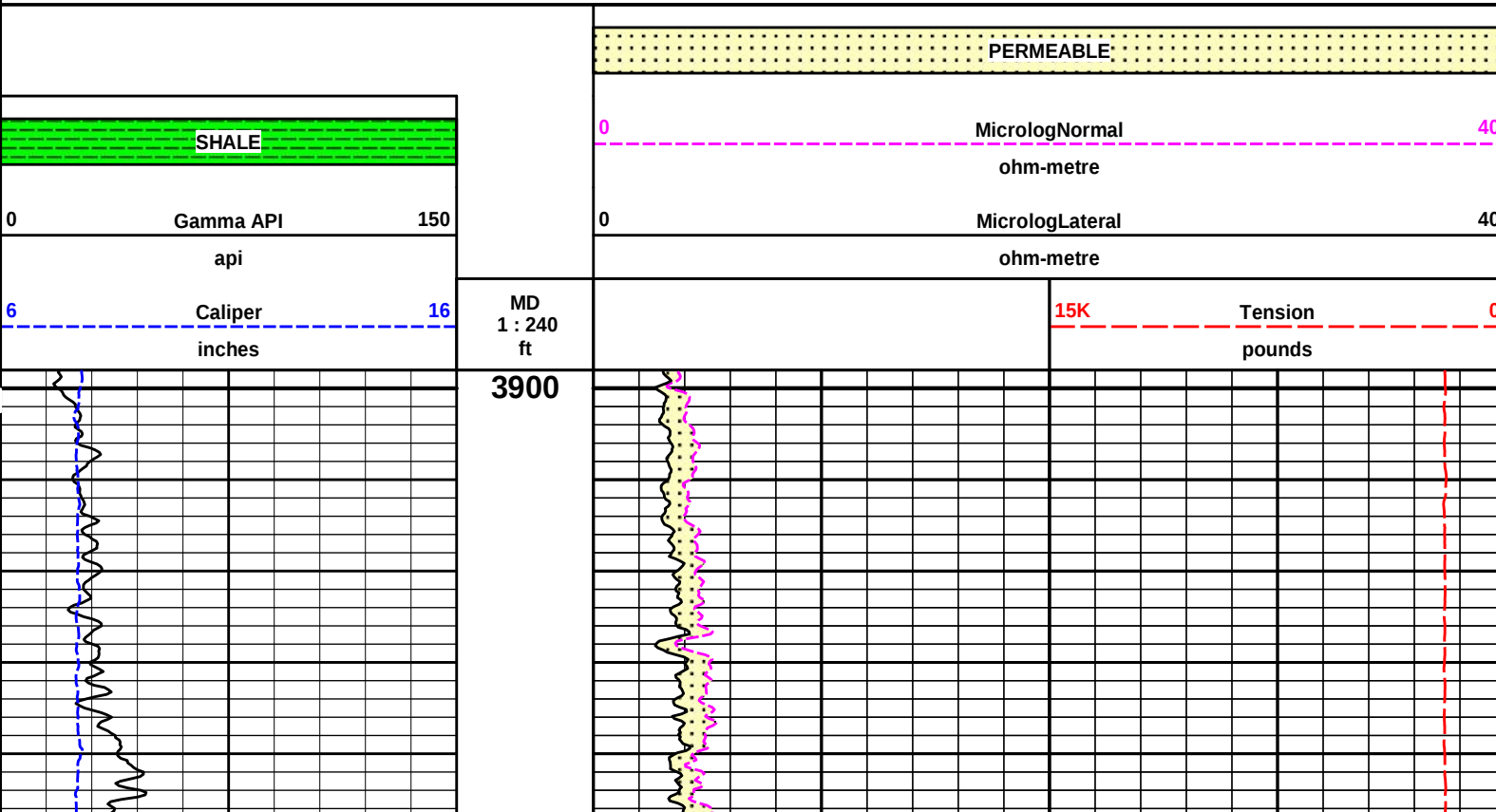
Plot Range: 3898 ft to 4827.25 ft

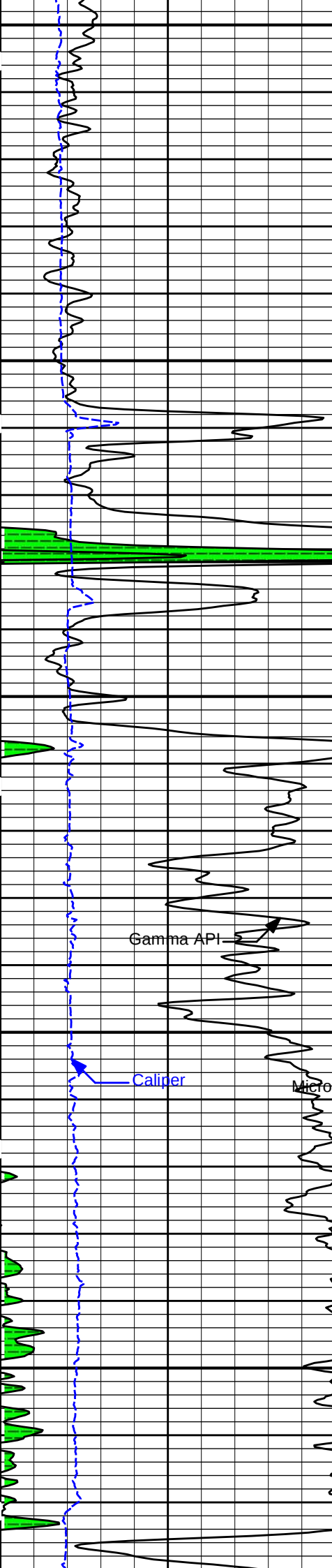
Data: UNRUH # 4-33\Well Based\DETAILS\

Plot File: \\-LOCAL-UNRUH # 4-33\Well Based\MICRO\Microlog_IQ_5_main_lib

5 INCH MAIN LOG

MEASURED DEPTH
MAIN LOG 5" PER 100'





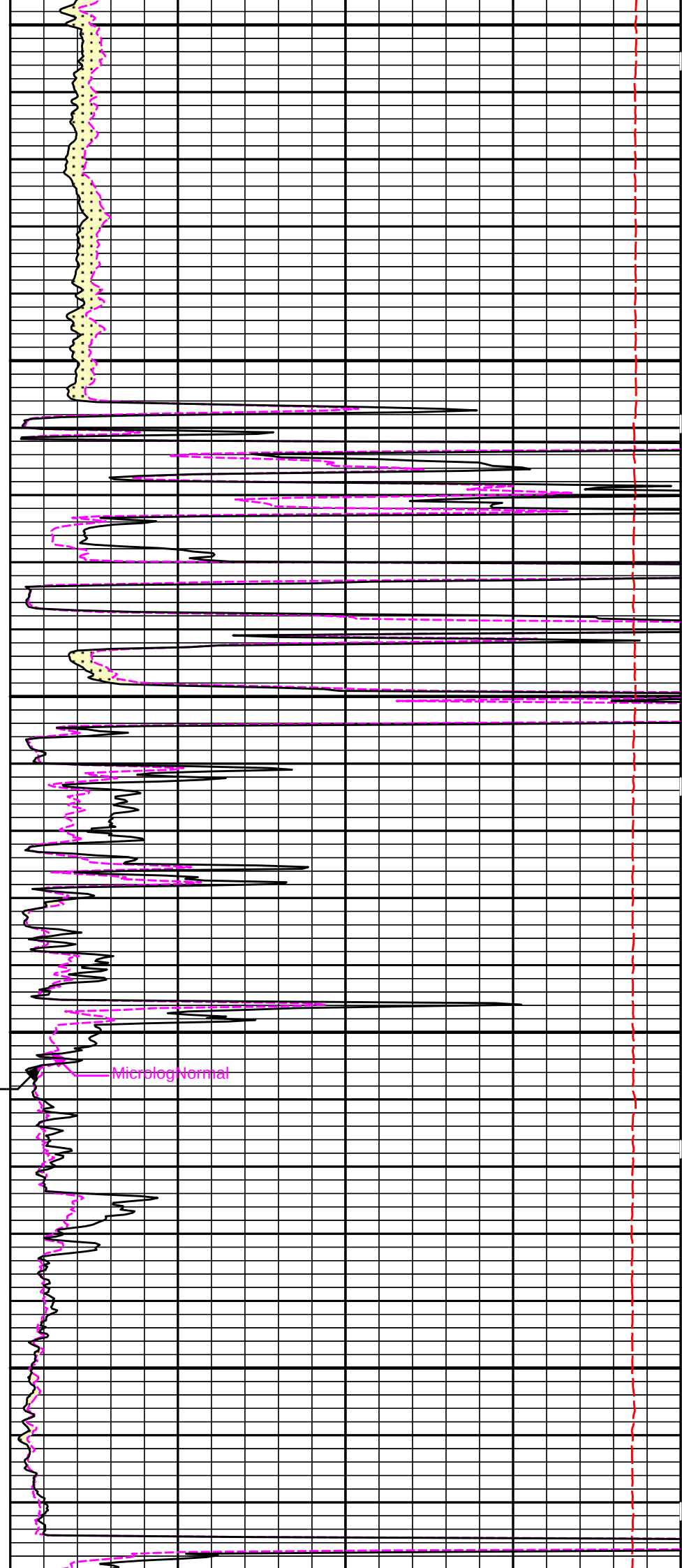
4000

Gamma API

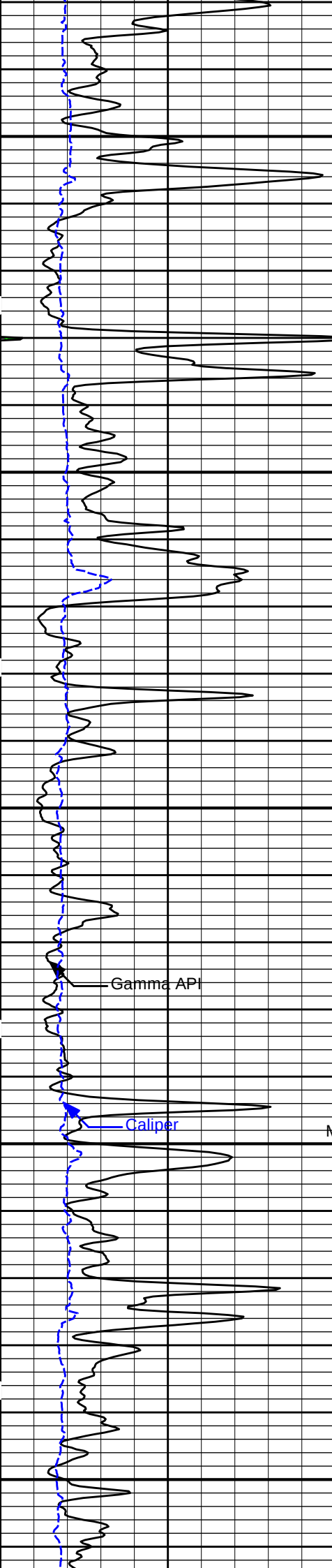
Caliper

Microlog Lateral

4100



Microlog Normal



4200

4300

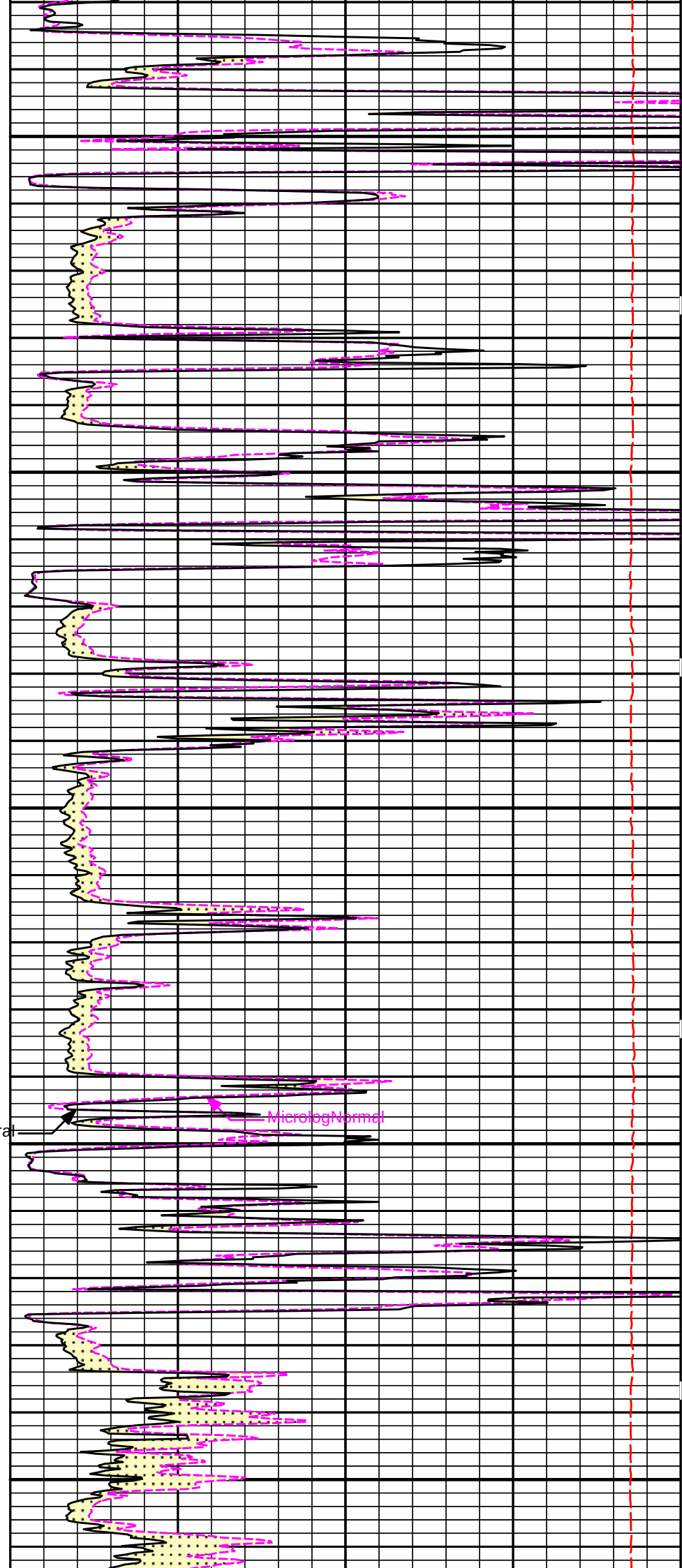
4400

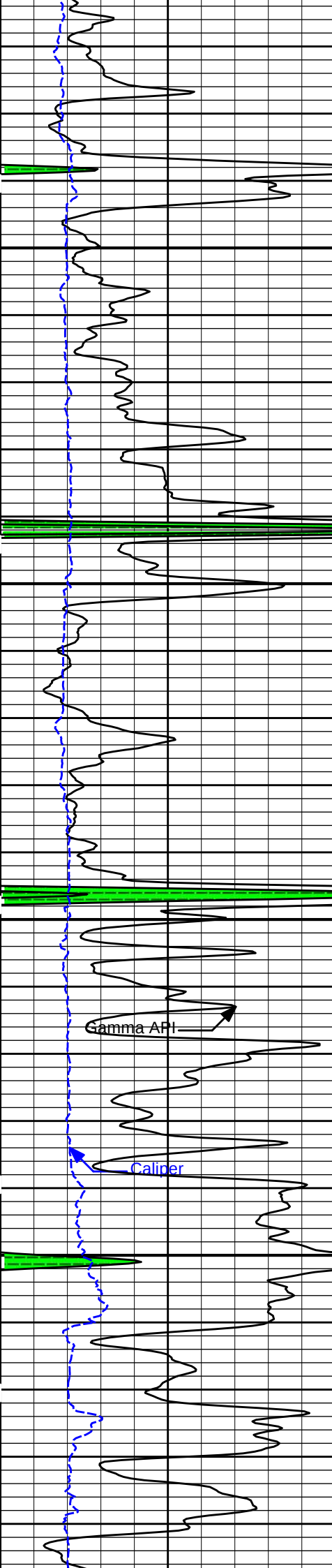
Gamma API

Caliper

MicrologLateral

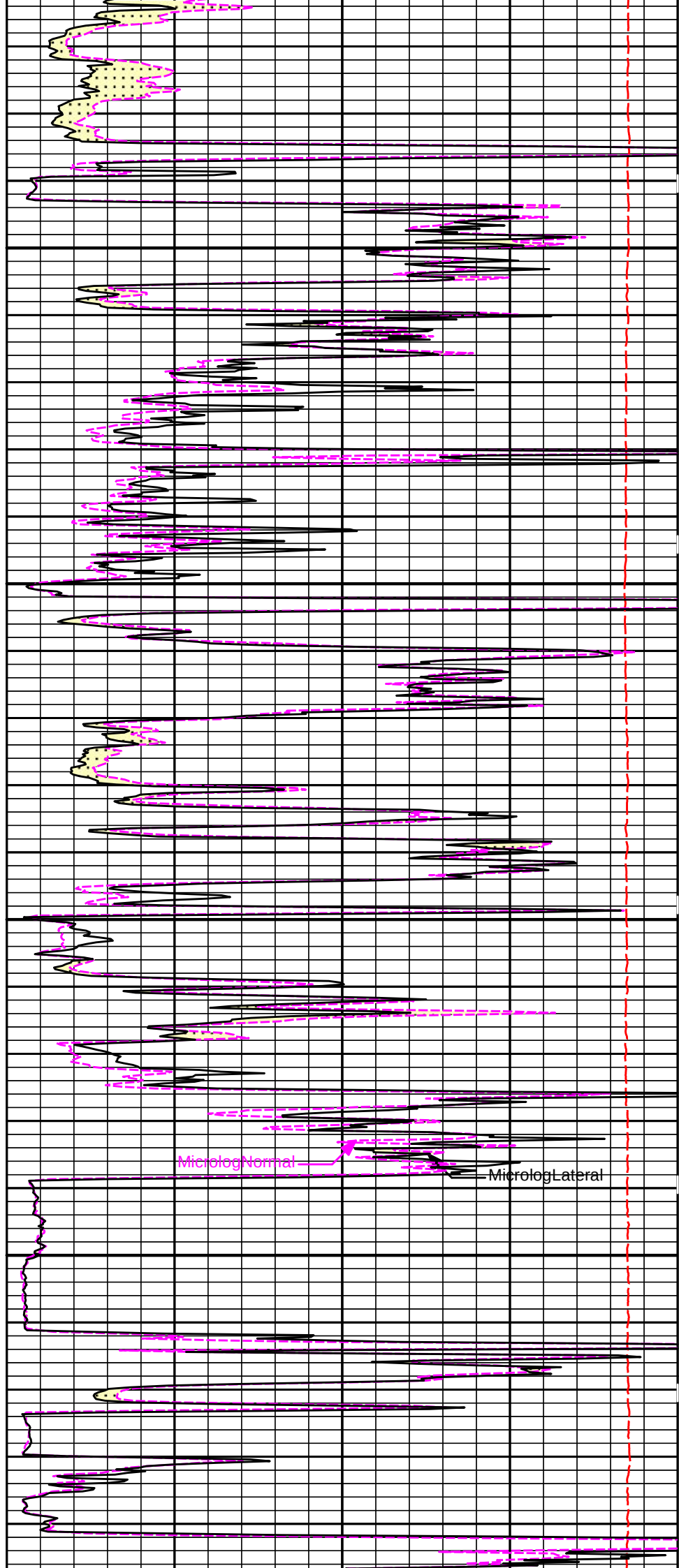
MicrologNormal





4500

4600

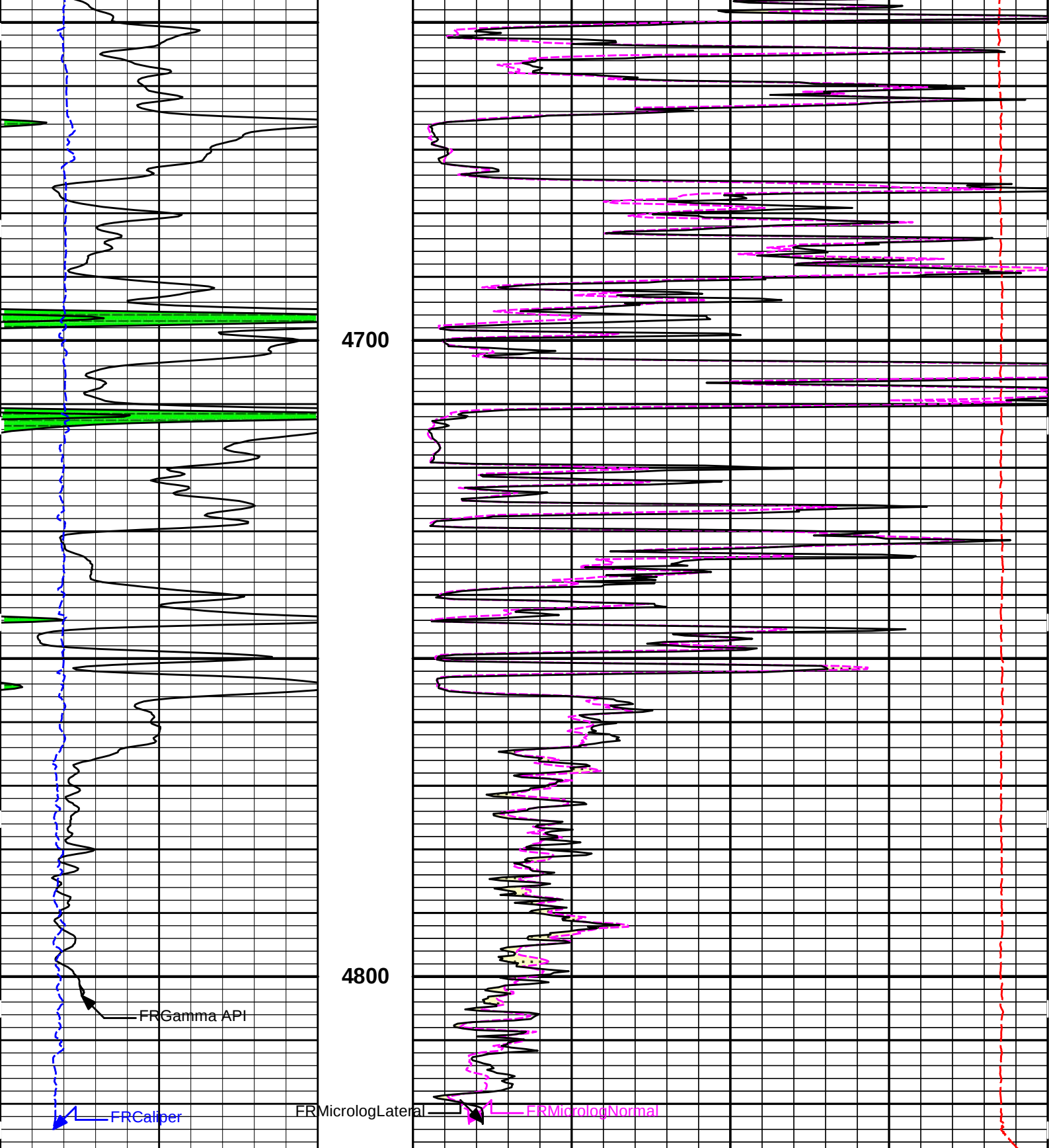


Gamma API

Caliper

MicrologNormal

MicrologLateral



6	Caliper	16	MD	15K	Tension	0
	inches		1 : 240		pounds	
0	Gamma API	150		0	MicrologLateral	40
	api				ohm-metre	
	SHALE			0	MicrologNormal	40
					ohm-metre	
					PERMEABLE	

HALLIBURTON

Plot Time: 06-Mar-15 04:20:29
Plot Range: 3898 ft to 4827.25 ft
Data: UNRUH # 4-33\Well Based\DETAILS\
Plot File: \\LOCAL\UNRUH # 4-33\Well Based\MICRO\Microlog_IO_5_main.lib

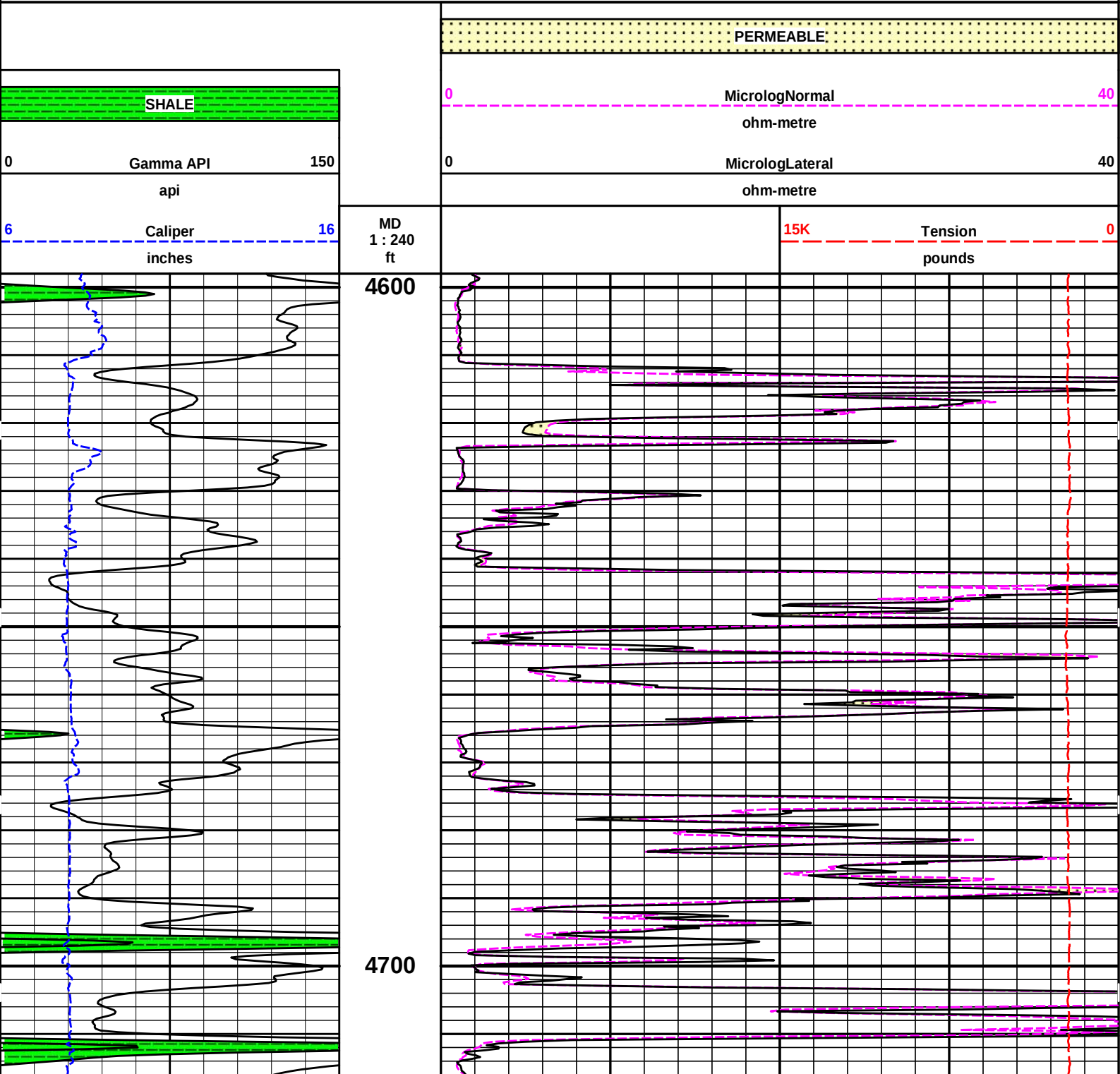
5 INCH MAIN LOG

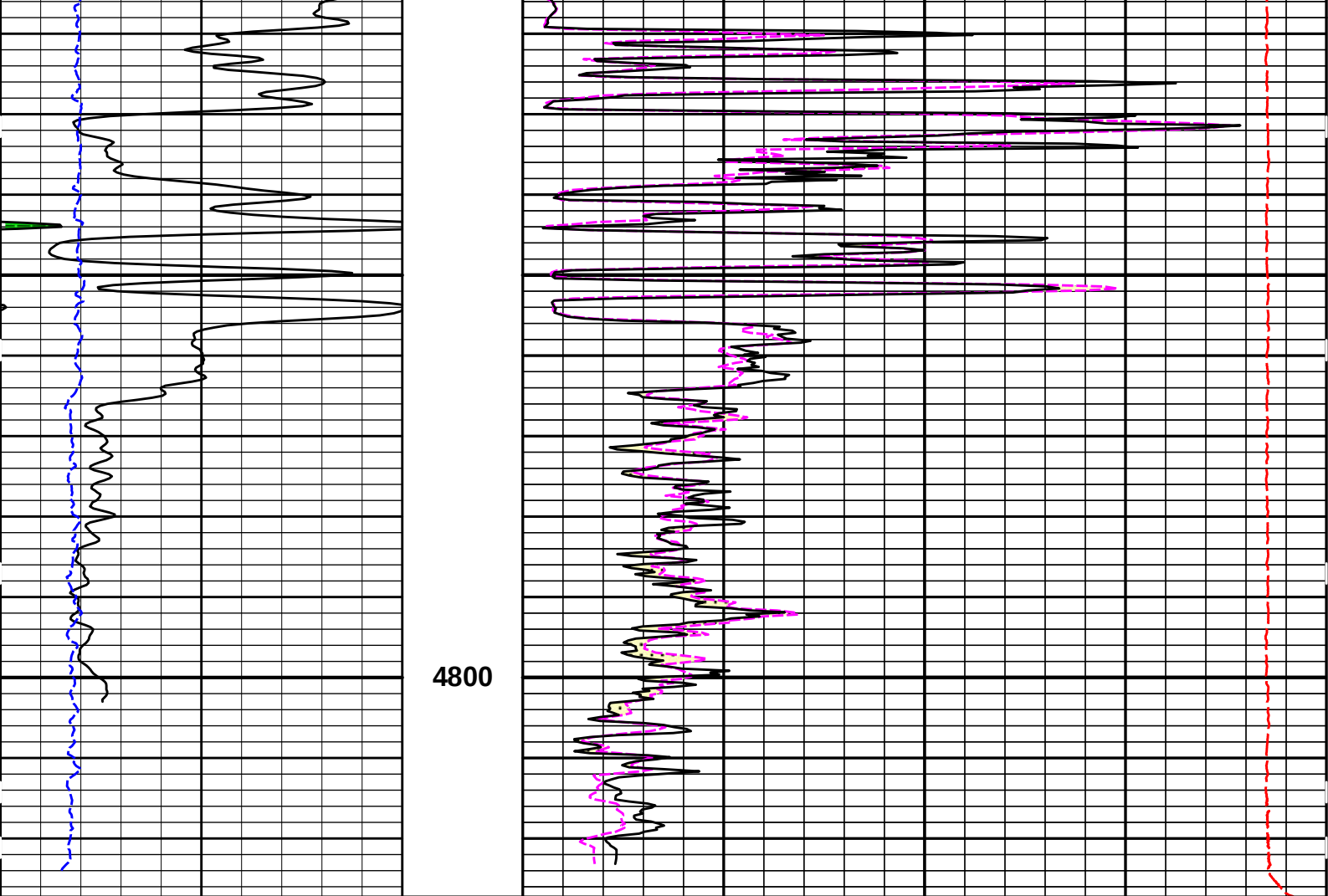
MEASURED DEPTH
MAIN LOG 5" PER 100'

HALLIBURTON

Plot Time: 06-Mar-15 04:20:29
Plot Range: 4598 ft to 4827.25 ft
Data: UNRUH # 4-33\\Well Based\\REPEAT\\
Plot File: \\LOCAL-UNRUH # 4-33\\Well Based\\MICRO\\Microlog_IQ_5_rep.lib

REPEAT SECTION





6	Caliper	16	MD 1 : 240 ft	0	15K	Tension	0
	inches					pounds	
0	Gamma API	150		0	MicrologLateral		40
	api				ohm-metre		
	SHALE			0	MicrologNormal		40
					ohm-metre		
					PERMEABLE		

HALLIBURTON

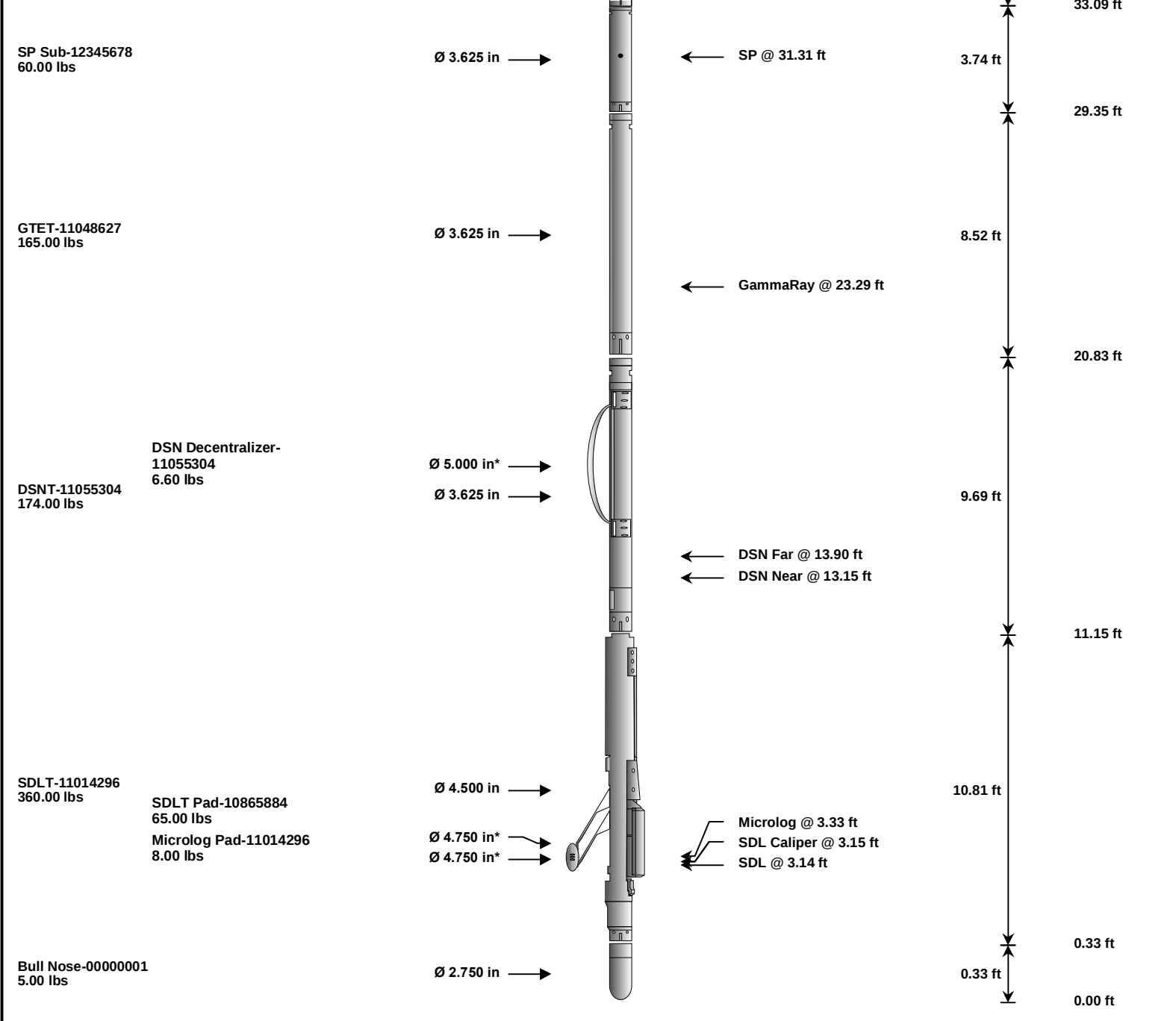
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Plot Range: 4598 ft to 4827.25 ft
Data: UNRUH # 4-33\Well Based\REPEAT\
Plot File: \\-LOCAL-UNRUH # 4-33\Well Based\MICRO\Microlog_IQ_5_rep_lib

REPEAT SECTION

HALLIBURTON

TOOL STRING DIAGRAM REPORT

Description	Overbody Description	O.D.	Diagram	Sensors @ Delays	Length	Accumulated Length
RWCH-12156658 135.00 lbs		Ø 3.625 in →		← Load Cell @ 35.66 ft ← BH Temperature @ 35.09 ft	6.25 ft	39.34 ft



Mnemonic	Tool Name	Serial Number	Weight (lbs)	Length (ft)	Accumulated Length (ft)	Max.Log. Speed (fpm)
RWCH	Releasable Wireline Cable Head	12156658	135.00	6.25	33.09	300.00
SP	SP Sub	12345678	60.00	3.74	29.35	300.00
GTET	Gamma Telemetry Tool	11048627	165.00	8.52	20.83	60.00
DSNT	Dual Spaced Neutron	11055304	174.00	9.69	11.15	60.00
DCNT	DSN Decentralizer	11055304	6.60	5.13 *	14.48	300.00
SDLT	Spectral Density Tool	11014296	360.00	10.81	0.33	60.00
SDLP	Density Insite Pad	10865884	65.00	2.55 *	2.54	60.00
MICP	Microlog Pad	11014296	8.00	1.00 *	2.83	60.00
BLNS	Bull Nose	00000001	5.00	0.33	0.00	300.00
Total			978.60	39.34		

* Not included in Total Length and Length Accumulation.

Data: UNRUH # 4-33\0002 SP-GTET-DSN-SDL-BN\IDLE Date: 06-Mar-15 02:52:50

HALLIBURTON			
CALIBRATION REPORT			
NATURAL GAMMA RAY TOOL SHOP CALIBRATION			
Tool Name:	GTET - 11048627	Reference Calibration Date:	06-Jan-15 09:40:45
Engineer:	SUHAIL BISHTI	Calibration Date:	27-Jan-15 10:59:27

Software Version: WL INSITE R4.4.3 (Build 6)		Calibration Version: 1		
Calibrator Source S/N: Error				
Calibrator API Reference:265.00 api				
Equivalent Calibrator API Reference:269.6 api				
	Measurement	Measured	Calibrated	Units
	Background	54.4	54.7	api
	Background + Calibrator	322.3	324.4	api
	Calibrator	267.9	269.6	api

NATURAL GAMMA RAY TOOL FIELD CALIBRATION			
Tool Name:	GTET - 11048627	Reference Calibration Date:	27-Jan-15 10:59:27
Engineer:	J. BOLLLOM	Calibration Date:	05-Mar-15 19:56:32
Software Version:	WL INSITE R4.6.4 (Build 3)	Calibration Version:	1

Calibrator Source S/N: Error				
Calibrator API Reference:265.00 api				
Equivalent Calibrator API Reference:269.6 api				
	Field Verification	Shop	Field	Units
	Background	54.7	50.7	api
	Background + Calibrator	324.4	322.9	api
	Calibrator	269.6	272.2	api
	Shop	Field	Difference	Tolerance
	269.6	272.2	-2.6	+/- 9.00

MICRO LOG SHOP CALIBRATION			
Tool Name:	Microlog Pad - 11014296	Reference Calibration Date:	17-Dec-14 13:44:59
Engineer:	J. BOLLLOM	Calibration Date:	25-Feb-15 19:34:32
Software Version:	WL INSITE R4.6.4 (Build 3)	Calibration Version:	1
Host Tool Name:	DSNT - 11055304		

	CALIBRATION COEFFICIENT SUMMARY				
Measurement	Micro Log Normal		Micro Log Lateral		Units
	Measured	Calibrated	Measured	Calibrated	
Tool Zero	-0.06	-0.07	0.03	-0.01	ohmm
Calibration Point #1	0.01	0.00	0.03	0.00	ohmm
Calibration Point #2	19.84	20.00	20.11	20.00	ohmm
Internal Reference	19.92	20.09	19.97	19.86	ohmm
Measurement	Micro Log Normal Tool Value		Micro Log Lateral Tool Value		Units
Tool Zero	0.64		0.52		V
Calibration Point #1	19.54		2.45		V
Calibration Point #2	5240.29		6900.67		V
Internal Reference	5262.73		6852.03		V

MICRO LOG FIELD CHECK			
Tool Name:	Microlog Pad - 11014296	Reference Calibration Date:	25-Feb-15 19:34:32
Engineer:	J. BOLLLOM	Calibration Date:	05-Mar-15 19:53:59
Software Version:	WL INSITE R4.6.4 (Build 3)	Calibration Version:	1

	Measurement	Micro Log Normal		Micro Log Lateral		
		Shop	Field	Shop	Field	Units
	Tool Zero	-0.07	-0.08	-0.01	-0.01	ohmm
	Internal Reference	20.09	20.07	19.86	19.84	ohmm
	Summary					
	Signal	Shop	Field	Difference	Tolerance	

Signal		Shop	Field	Difference	Tolerance	
Microlog Normal		20.09	20.07	0.02	+/- 0.80	
Microlog Lateral		19.86	19.84	0.02	+/- 0.80	
CALIBRATION SUMMARY						
Sensor	Shop	Field	Post	Difference	Tolerance	Units
GTET-11048627						
Gamma Ray Calibrator	269.6	272.2	-----	-2.6	+/- 9.00	api
Microlog Pad-11014296						
MicroLog Normal	20.09	20.07	-----	0.02	+/-0.80	ohmm
MicroLog Lateral	19.86	19.84	-----	0.02	+/-0.80	ohmm
Data: UNRUH # 4-33\0002 SP-GTET-DSN-SDL-BN\IDLE				Date: 06-Mar-15 02:59:32		
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	9.400	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	ICOD	AHV Casing OD	5.500	in	
	SHARED	ST	Surface Temperature	75.0	degF	
	SHARED	TD	Total Well Depth	4826.00	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		
	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	SDLT		
	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		
	GTET	BHSM	Borehole Size Source Tool	SDLT		
	DSNT	DNOK	Process DSN?	Yes		

Mnemonic	Input Description	Delay (ft)	Filter Type	Filter Length (ft)
Depth Panel				
TENS	Tension	0.00	NO	
Rwa / CrossPlot				
TPUL	Tension Pull	39.34	NO	
BS	Bit Size	39.34	NO	
HDIA	Measured Hole Diameter	0.00	NO	
RWCH				
DHTN	DownholeTension	0.00	BLK	0.000
SP Sub				
PLTC	Plot Control Mask	31.31	NO	
SP	Spontaneous Potential	31.31	BLK	1.250
SPR	Raw Spontaneous Potential	31.31	NO	
SPO	Spontaneous Potential Offset	31.31	NO	
GTET				
TPUL	Tension Pull	23.29	NO	
GR	Natural Gamma Ray API	23.29	TRI	1.750
GRU	Unfiltered Natural Gamma Ray API	23.29	NO	
EGR	Natural Gamma Ray API with Enhanced Vertical Resolution	23.29	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	13.05	NO	
RNDS	Near Detector Telemetry Counts	13.15	BLK	1.417
RFDS	Far Detector Telemetry Counts	13.90	TRI	0.583

DNTT	DSN Tool Temperature	13.15	NO	
DSNS	DSN Tool Status	13.05	NO	
ERND	Near Detector Telemetry Counts EVR	13.15	BLK	0.000
ERFD	Far Detector Telemetry Counts EVR	13.90	BLK	0.000
ENTM	DSN Tool Temperature EVR	13.15	NO	
HDIA	Measured Hole Diameter	0.00	NO	
SDLT				
TPUL	Tension Pull	3.15	NO	
PCAL	Pad Caliper	3.15	TRI	0.250
ACAL	Arm Caliper	3.15	TRI	0.250
SDLT Pad				
TPUL	Tension Pull	3.14	NO	
NAB	Near Above	2.96	BLK	0.920
NHI	Near Cesium High	2.96	BLK	0.920
NLO	Near Cesium Low	2.96	BLK	0.920
NVA	Near Valley	2.96	BLK	0.920
NBA	Near Barite	2.96	BLK	0.920
NDE	Near Density	2.96	BLK	0.920
NPK	Near Peak	2.96	BLK	0.920
NLI	Near Lithology	2.96	BLK	0.920
NBAU	Near Barite Unfiltered	2.96	BLK	0.250
NLIU	Near Lithology Unfiltered	2.96	BLK	0.250
FAB	Far Above	3.31	BLK	0.250
FHI	Far Cesium High	3.31	BLK	0.250
FLO	Far Cesium Low	3.31	BLK	0.250
FVA	Far Valley	3.31	BLK	0.250
FBA	Far Barite	3.31	BLK	0.250
FDE	Far Density	3.31	BLK	0.250
FPK	Far Peak	3.31	BLK	0.250
FLI	Far Lithology	3.31	BLK	0.250
PTMP	Pad Temperature	3.15	BLK	0.920
NHV	Near Detector High Voltage	2.54	NO	
FHV	Far Detector High Voltage	2.54	NO	
ITMP	Instrument Temperature	2.54	NO	
DDHV	Detector High Voltage	2.54	NO	
HDIA	Measured Hole Diameter	0.00	NO	
Microlog Pad				
TPUL	Tension Pull	3.33	NO	
MINV	Microlog Lateral	3.33	BLK	0.750
MNOR	Microlog Normal	3.33	BLK	0.750
Data: UNRUH # 4-33\0002 SP-GTET-DSN-SDL-BN\IDLE			Date: 06-Mar-15 02:58:21	

COMPANY	HERMAN L. LOEB, LLC		
WELL	UNRUH # 4-33		
FIELD	EINSEL		
COUNTY	KIOWA	STATE	KANSAS
HALLIBURTON		MICROLOG	