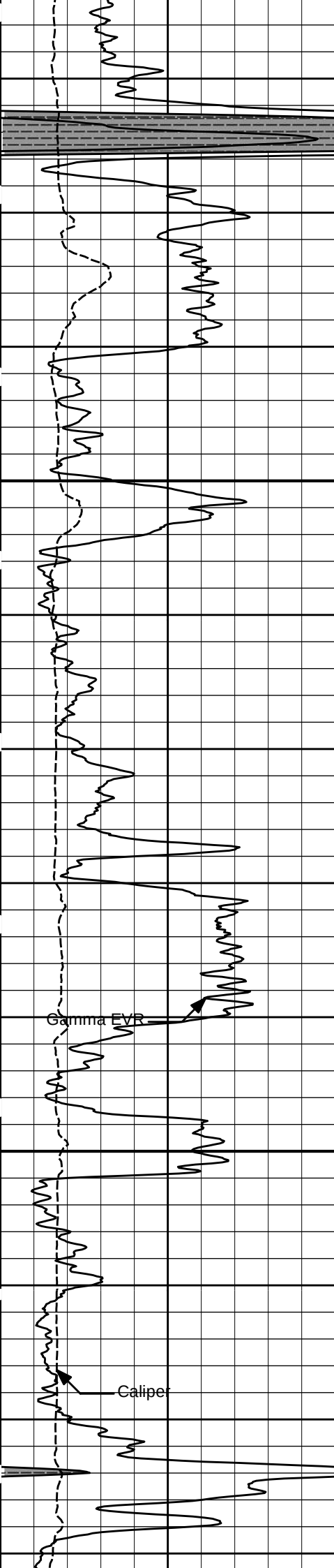


HALLIBURTON

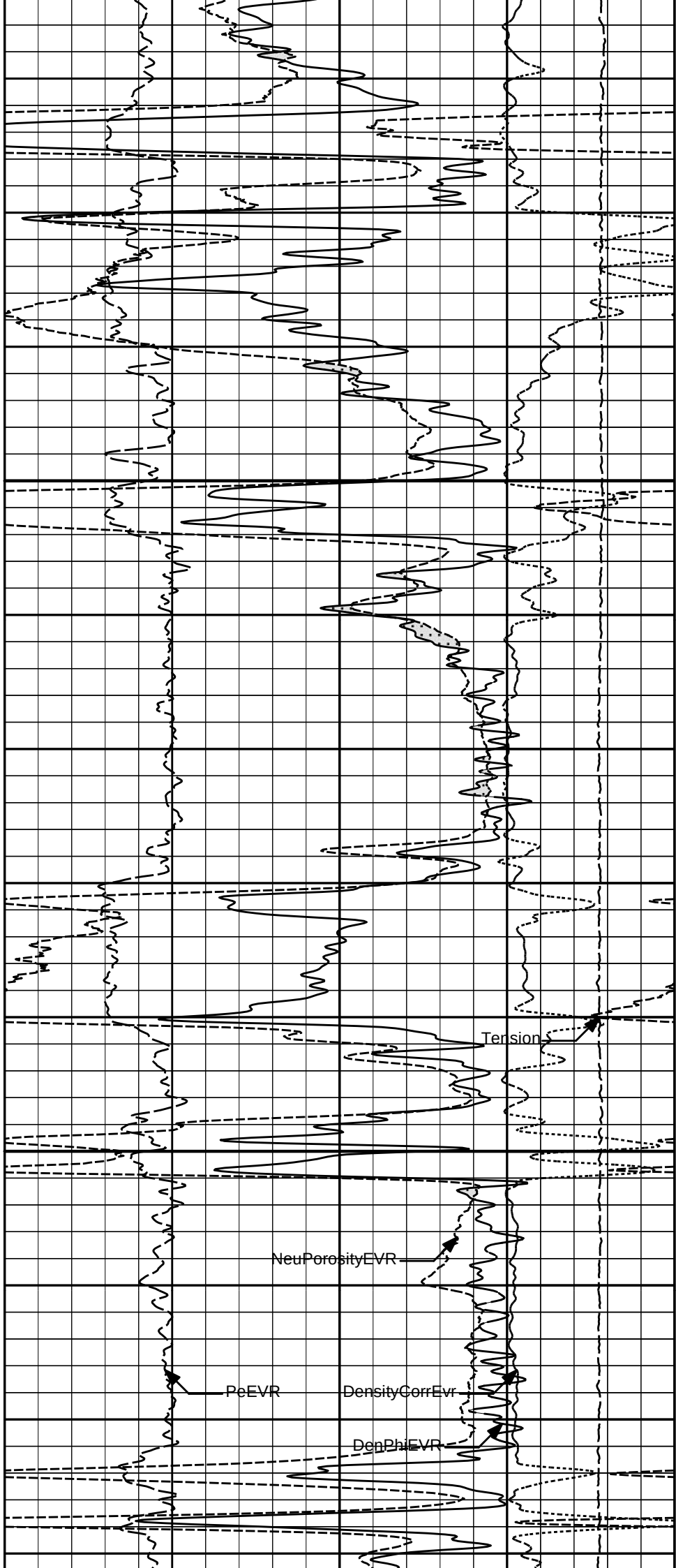
HIGH RESOLUTION SPECTRAL DENSITY DUAL SPACED NEUTRON EVR LOG

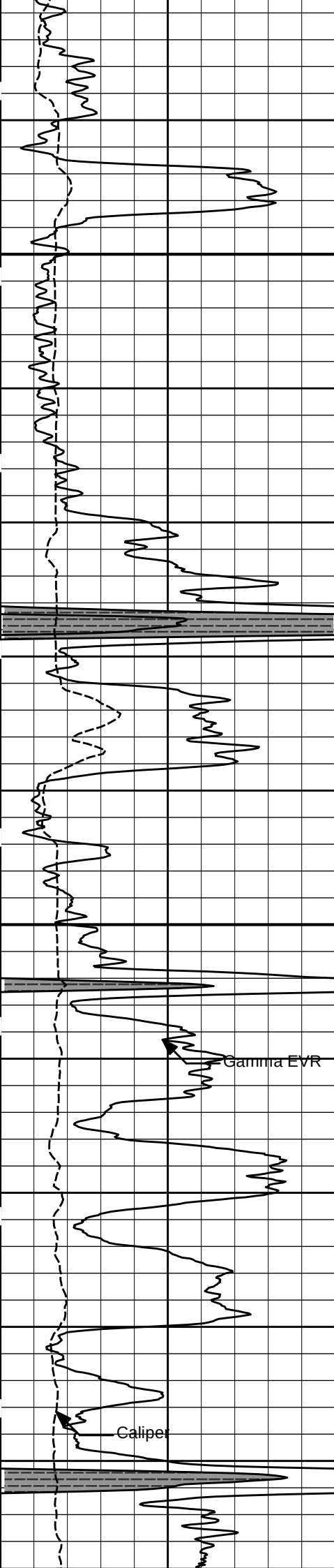
CULBREATH OIL & GAS				COMPANY				CULBREATH OIL & GAS			
MINIUM 1-19				WELL				MINIUM 1-19			
KANACO-MORELAND				FIELD/BLOCK				KANACO-MORELAND			
SHERIDAN				COUNTY				SHERIDAN			
KANSAS				STATE				STATE KANSAS			
COMPANY		WELL		FIELD/BLOCK		COUNTY		STATE		KANSAS	
Permanent Datum		Log measured from		Drilling measured from		Date		Run No.		Depth - Driller	
GL		KB		KB		18-Apr-18		ONE		4146.0 ft	
Elev. 2654.0 ft		, 2664.0 ft above perm. Datum								4145.0 ft	
										4107.0 ft	
										3750.0 ft	
										8.625 in	
										@ 266.0 ft	
										265.0 ft	
										7.875 in	
										Water Based Mud	
										9.2 ppg	
										53.00 slqt	
										10.00 pH	
										7.2 cpm	
										MUD PIT	
										1.18 ohmm	
										@ 75.00 degF	
										0.94 ohmm	
										@ 75.00 degF	
										1.42 ohmm	
										@ 75.00 degF	
										MEAS	
										@ 125.0 degF	
										05:25 hr	
										18-Apr-18 03:55	
										125.00 degF	
										@ 4145.0 ft	
										12147634	
										EL RENO	
										SEAN WOLTEMATH	
										HAROLD BELLERIVE	
										LARRY NICHOLSON	

Service Ticket No.: 904783727						API No.: 15-179-21448-00-00						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 in 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.		10865873				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.		GTET				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.		DSN-424									
Distance to Source		10'				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			
ONE		TD		CSG		PEC		0		150		30		10		47.6 usec/ft		30		10		2.71 g/cc		30		10		TIME	

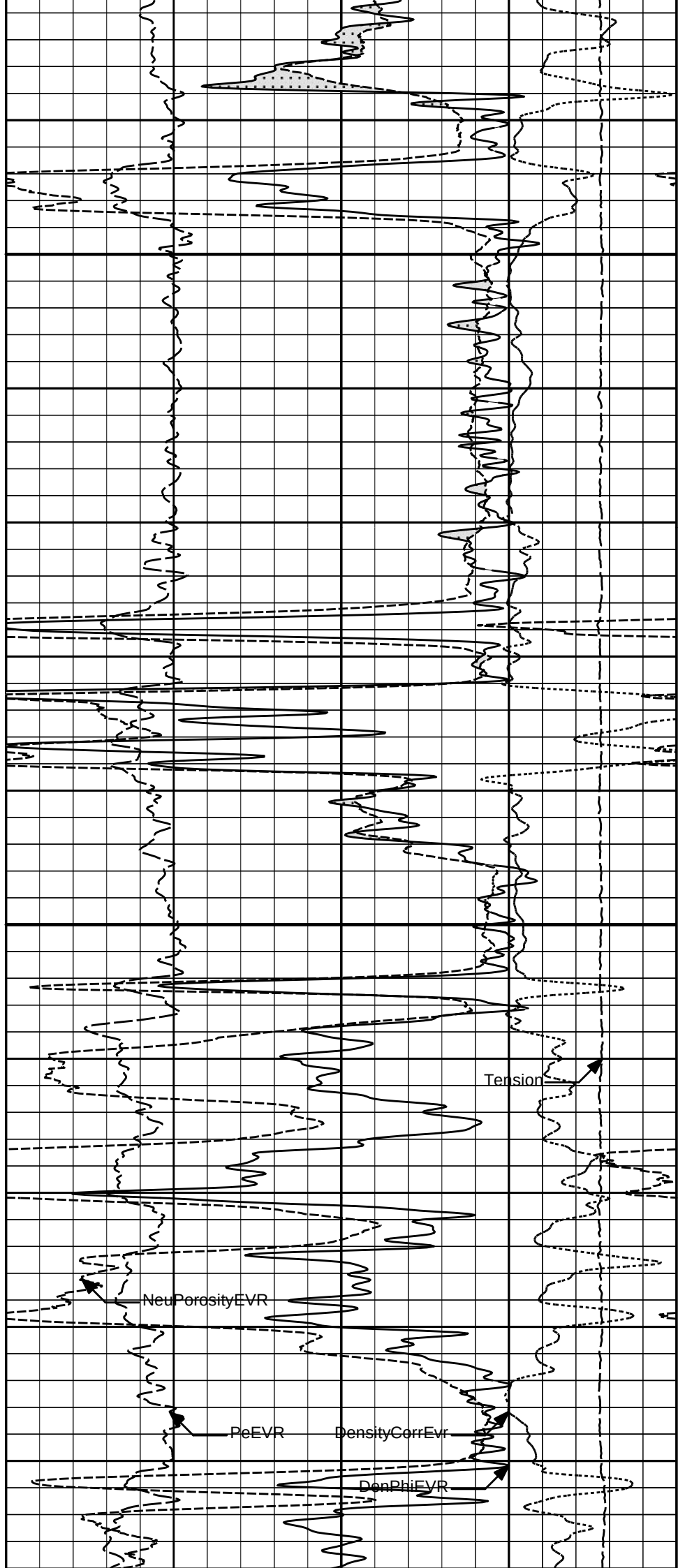


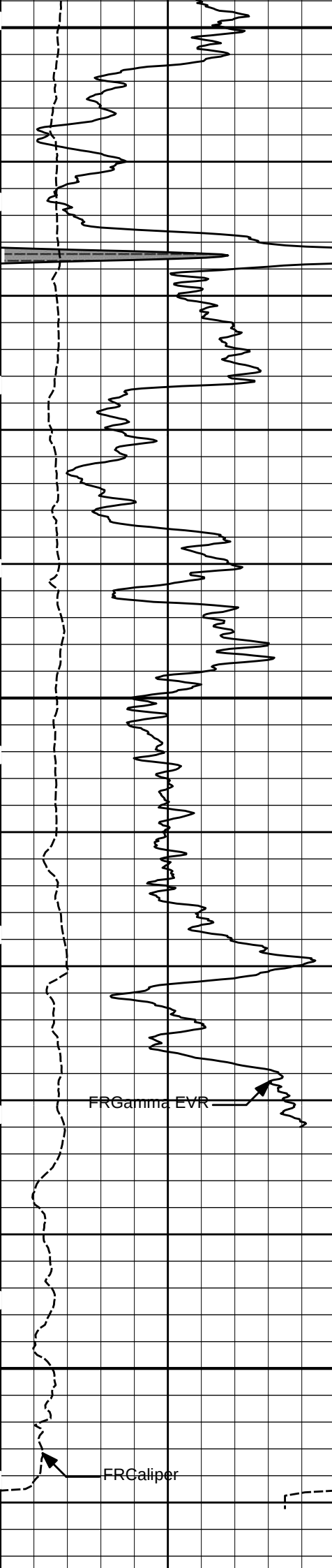
3800





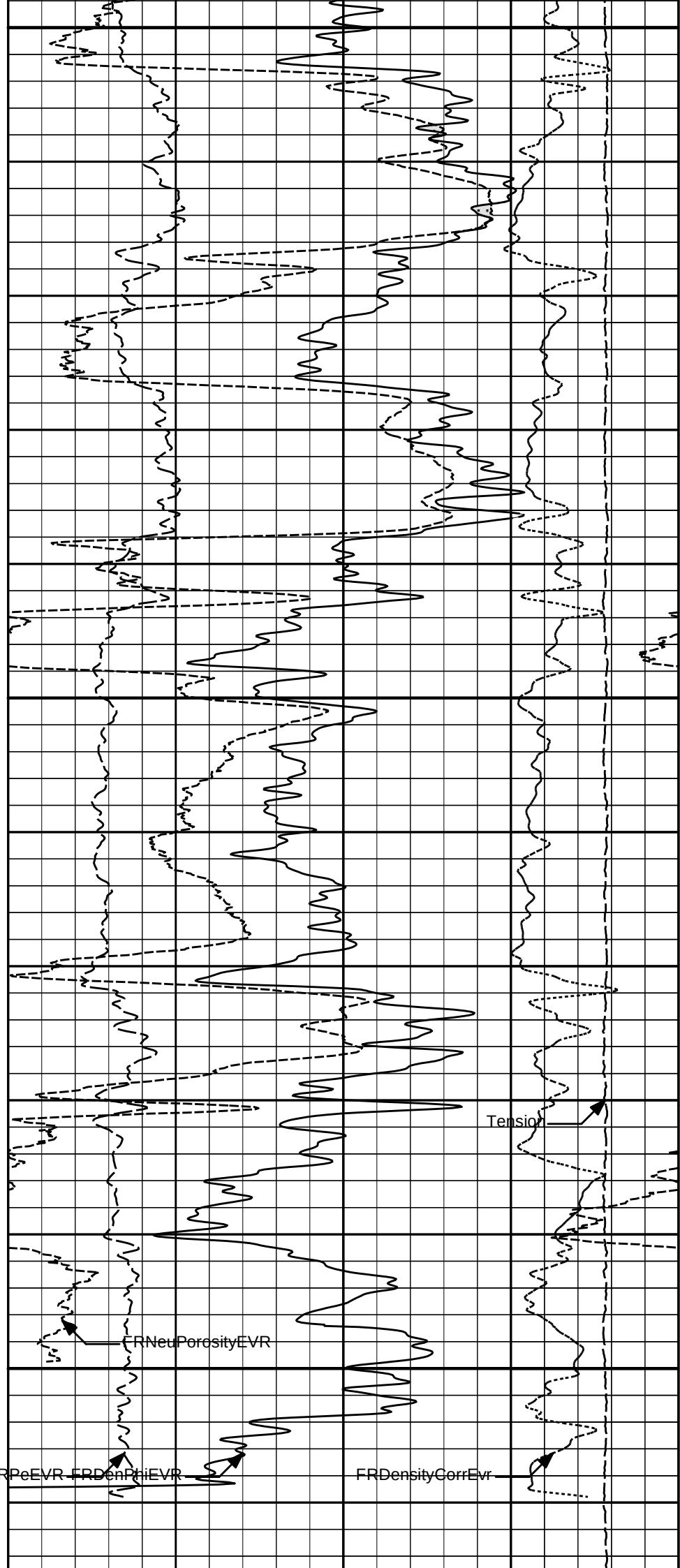
3900





4000

4100



FRGamma EVR

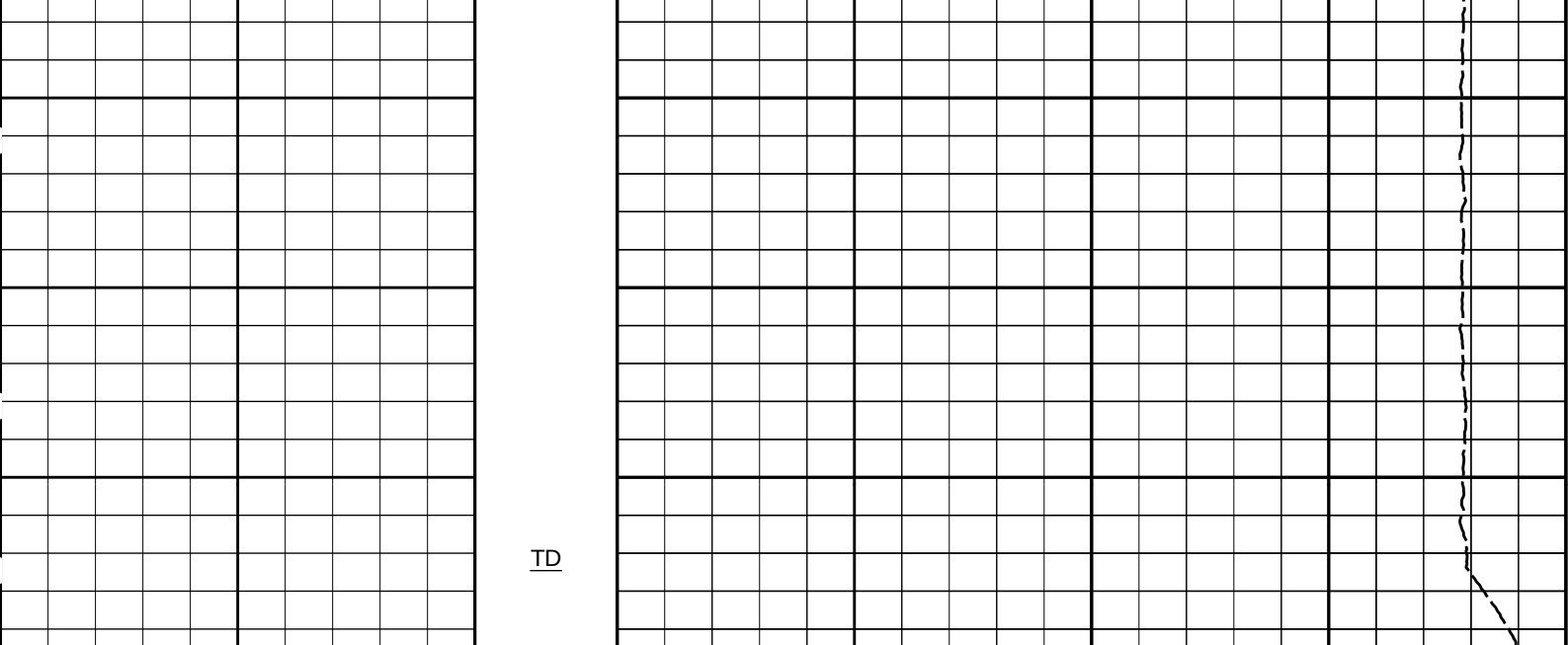
Tension

FRNeuPorosityEVR

FRPeEVR FRDenPhiEVR

FRDensityCorrEvr

FRGaliper



6	Caliper	16	1 : 120	0	PeEVR	10	-0.25	DensityCorrEvr	0.25
	inches		ft					gram per cc	
0	Gamma EVR	150					15K	Tension	0
	api							pounds	
				30	DenPhiEVR				-10
					%				
				30	NeuPorosityEVR				-10
					%				

HALLIBURTON

Plot Time: 18-Apr-18 08:27:50
Plot Range: 3740 ft to 4148.92 ft
Data: MINIMUM_1-19\Well Based\MAIN\
Plot File: \\PORO_EVRDETAILS\PorosityEVR

5 INCH MAIN LOG

POROSITY EVR DISPLAY 10" = 100'

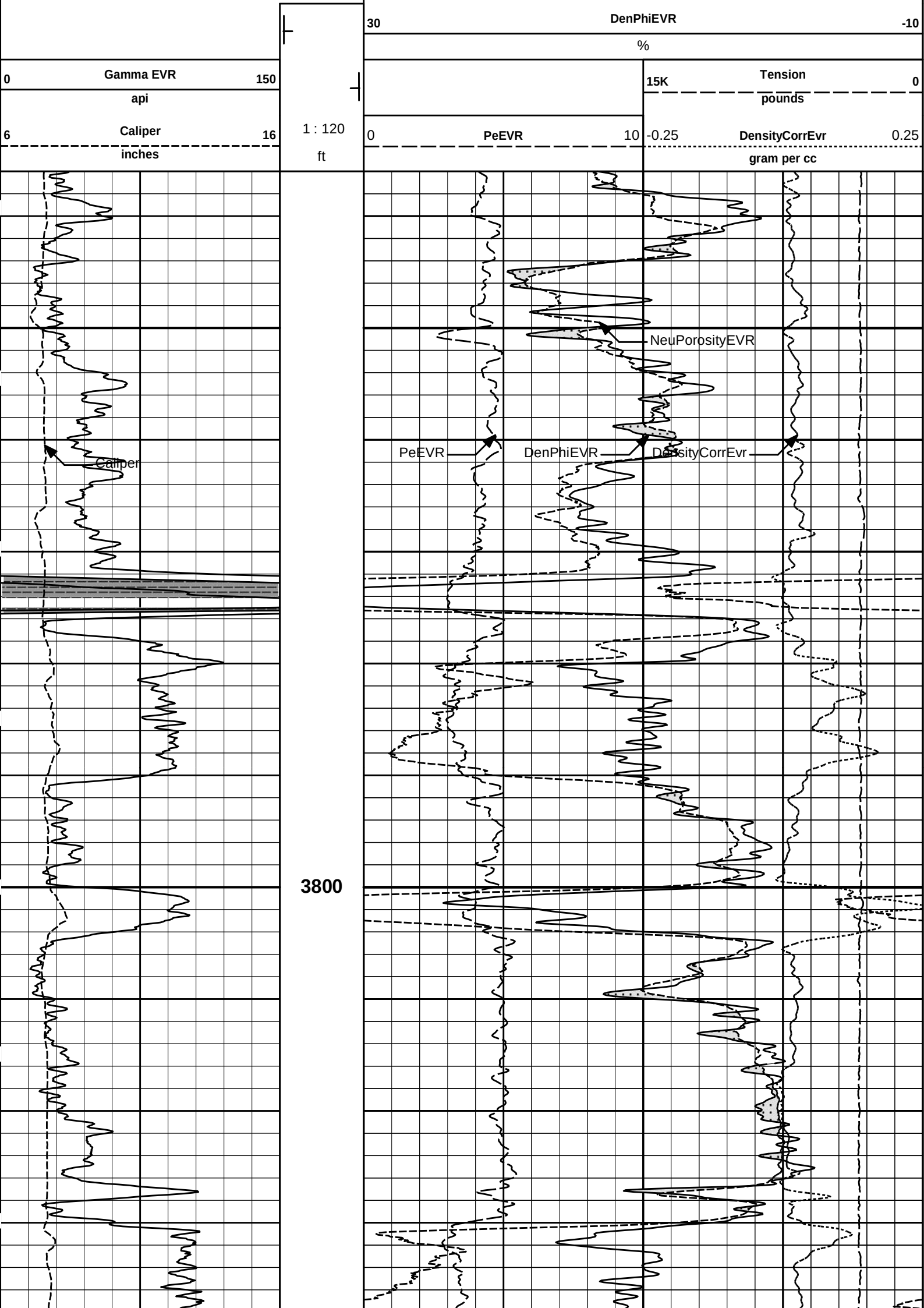
HALLIBURTON

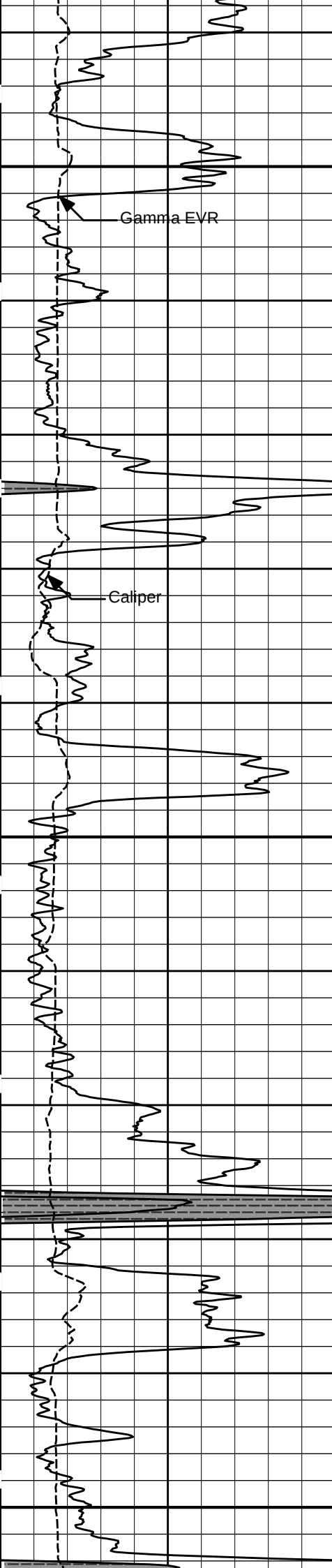
Plot Time: 18-Apr-18 08:27:51
Plot Range: 3736 ft to 4157.25 ft
Data: MINIMUM_1-19\Well Based\REPEAT\
Plot File: \\PORO_EVRDETAILS\PorosityEVR

REPEAT SECTION

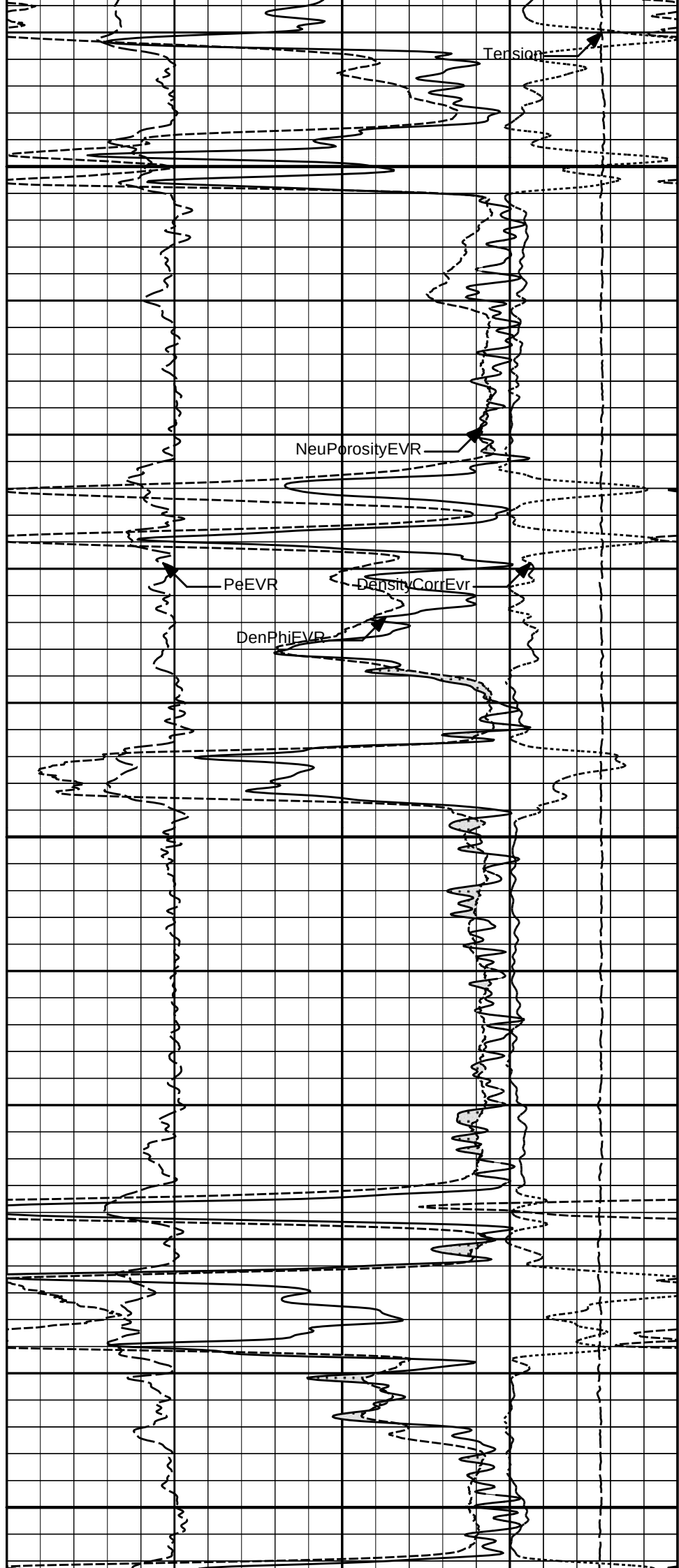
REPEAT SECTION 10" = 100'

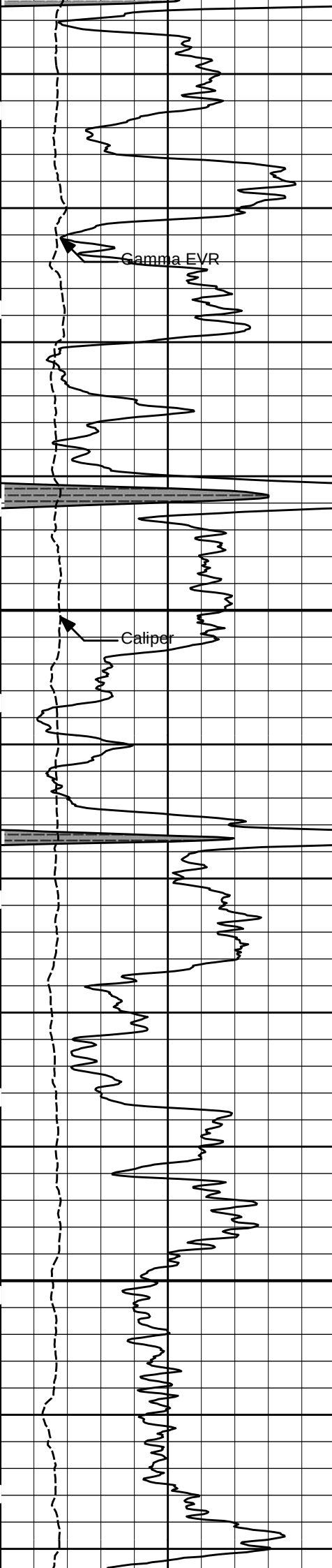
				30	NeuPorosityEVR				-10
					%				



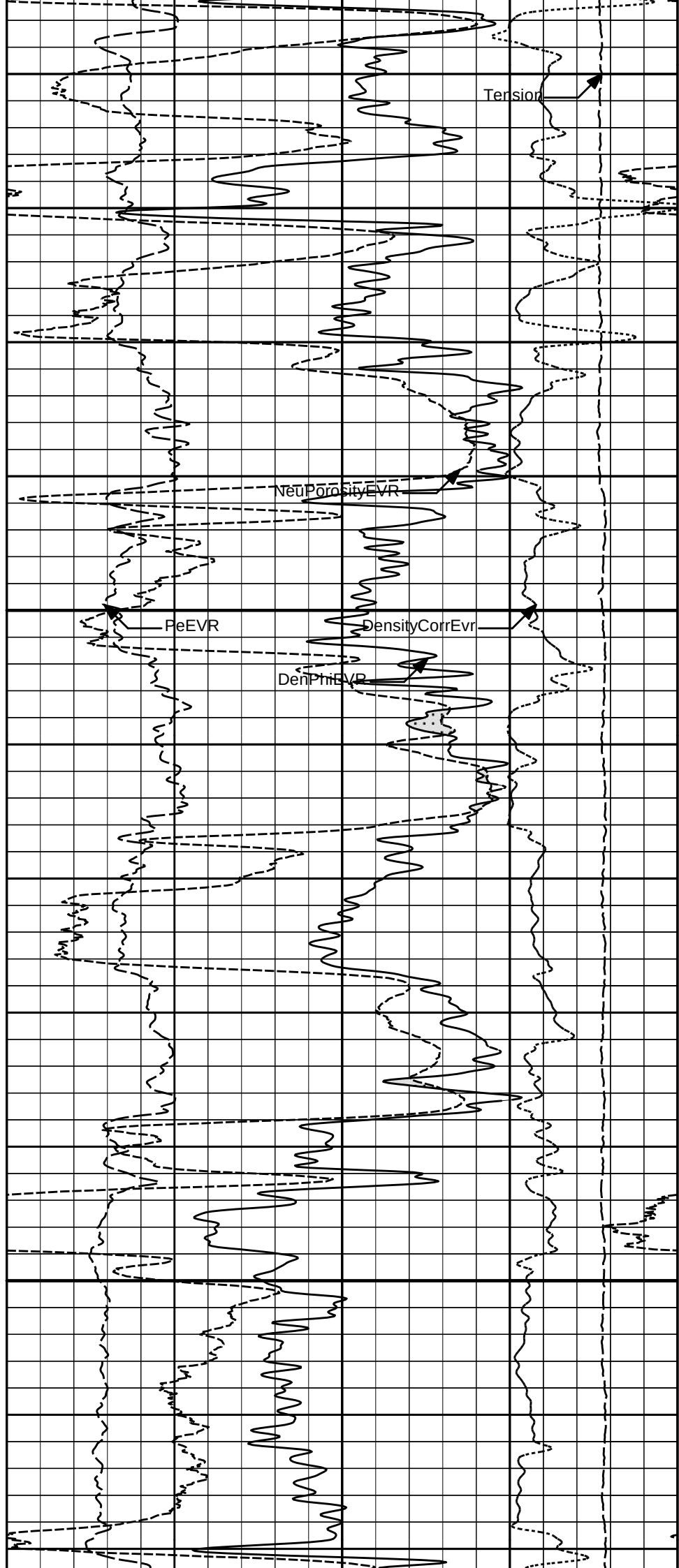


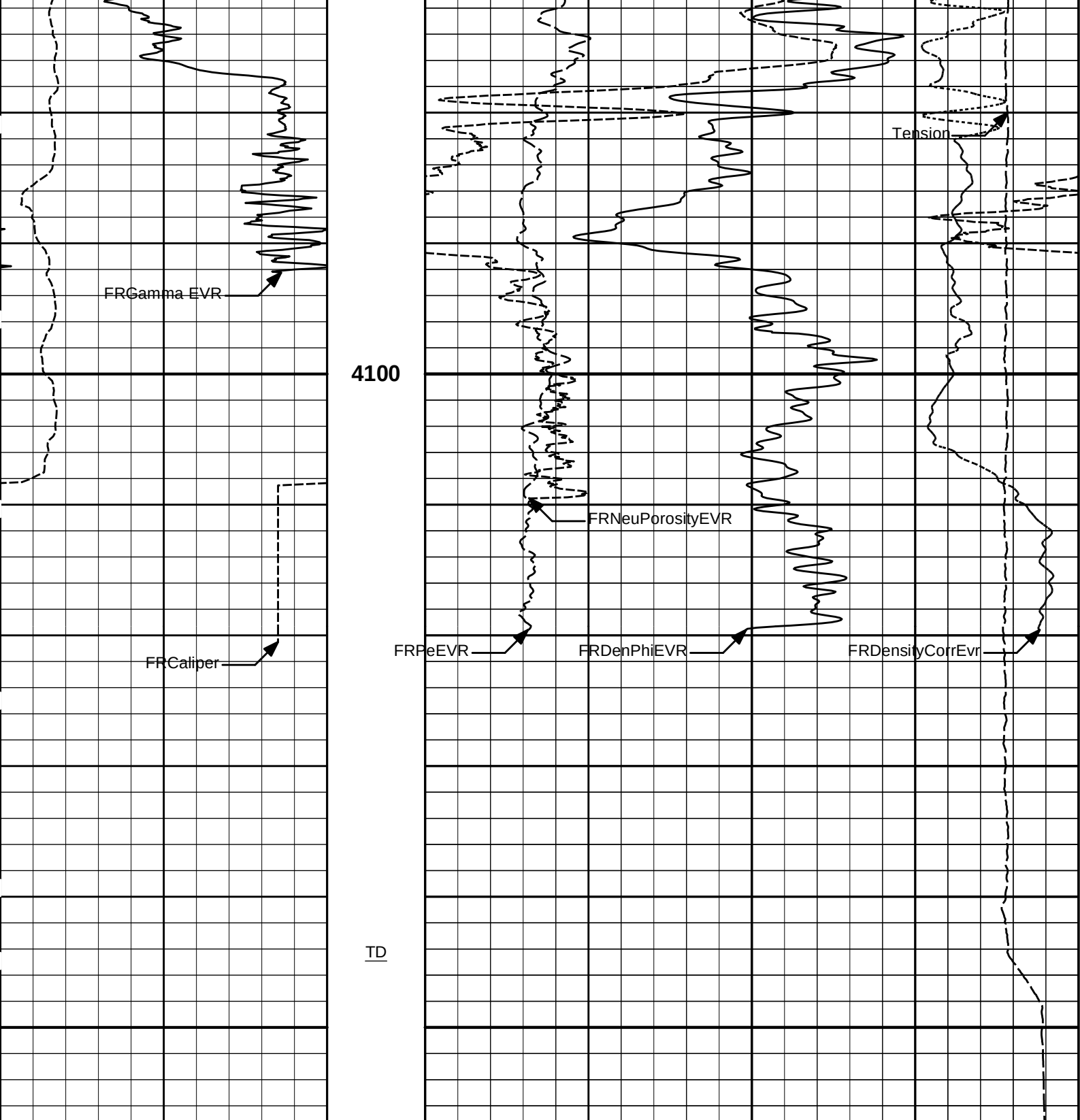
3900





4000





6	Caliper	16	1 : 120	0	PeEVR	10	-0.25	DensityCorrEvr	0.25
	inches		ft					gram per cc	
0	Gamma EVR	150					15K	Tension	0
	api							pounds	
				30	DenPhiEVR				-10
					%				
				30	NeuPorosityEVR				-10
					%				

HALLIBURTON

Plot Time: 18-Apr-18 08:27:52
Plot Range: 3736 ft to 4157.25 ft
Data: MINIMUM_1-19\Well Based\REPEAT\
Plot File: \\PORO_EVRDETAILS\Porosity_EVR

REPEAT SECTION

REPEAT SECTION

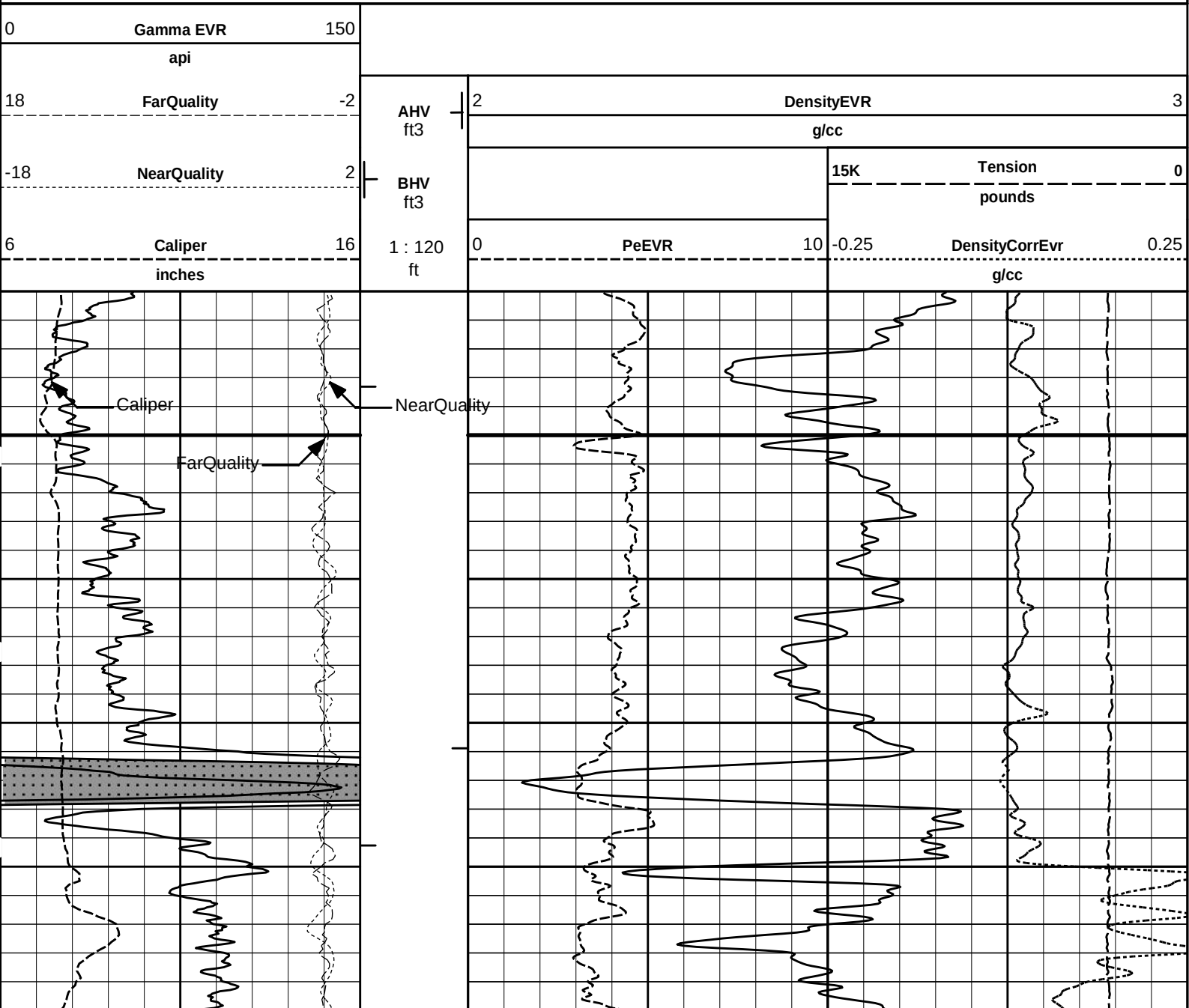
REPEAT SECTION 10" = 100'

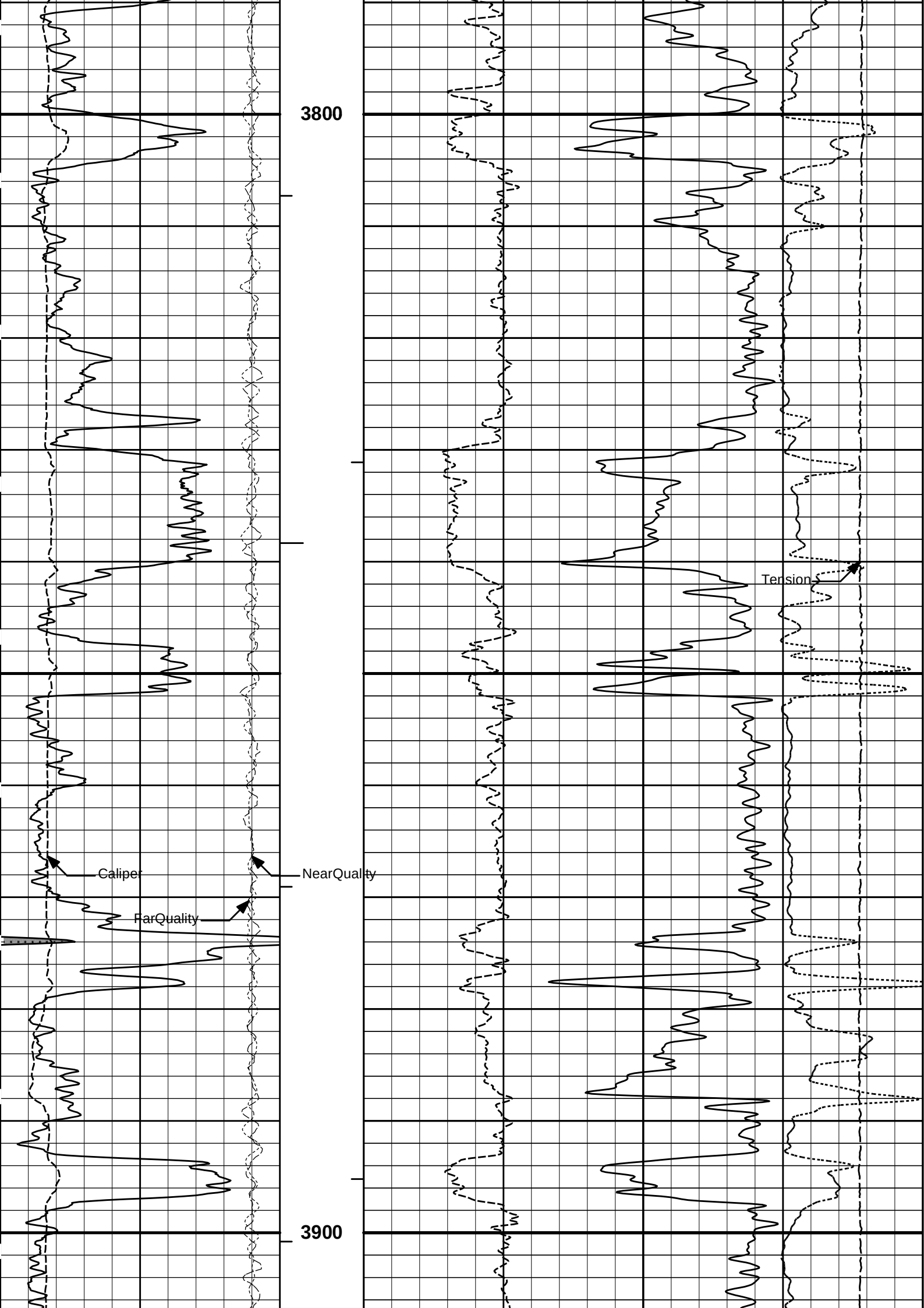
HALLIBURTON

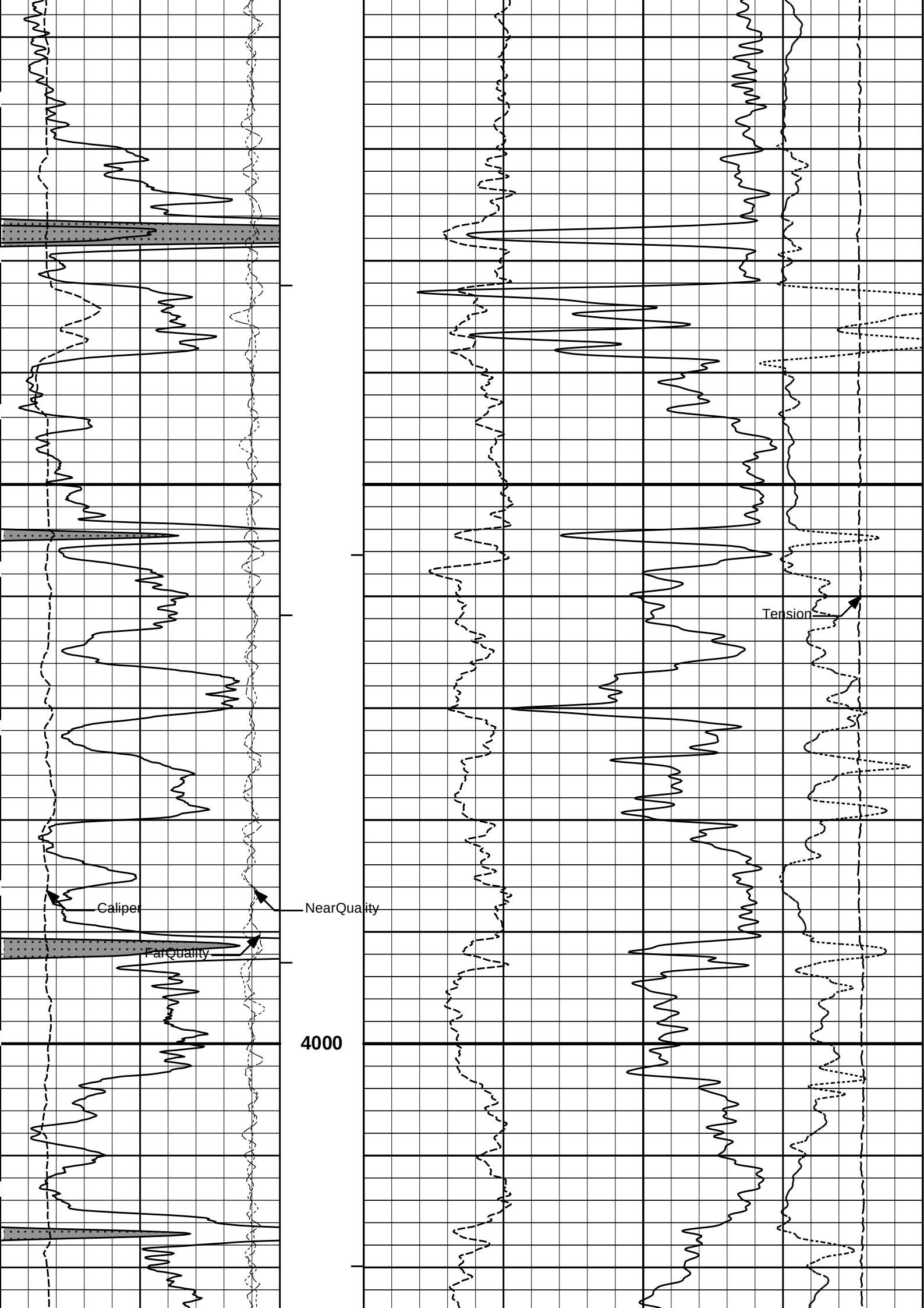
Plot Time: 18-Apr-18 08:27:52
Plot Range: 3740 ft to 4148.92 ft
Data: MINIMUM_1-19\Well Based\MAIN\
Plot File: \\-LOCAL-MINIMUM_1-19\Well Based\PORO_EVRDETAILS\BULKD_5_IQ_EVR

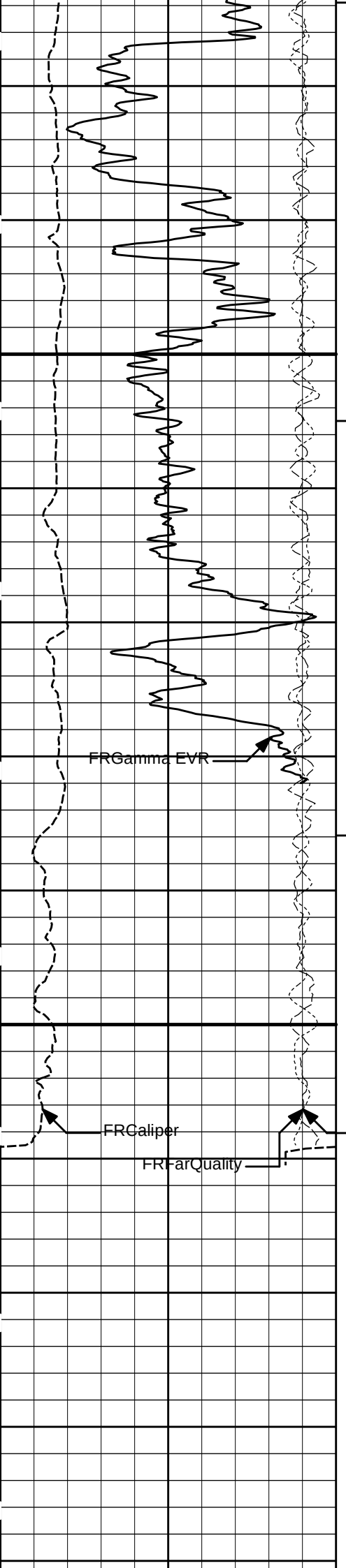
5 INCH MAIN LOG

MAIN SECTION 5" PER 100'

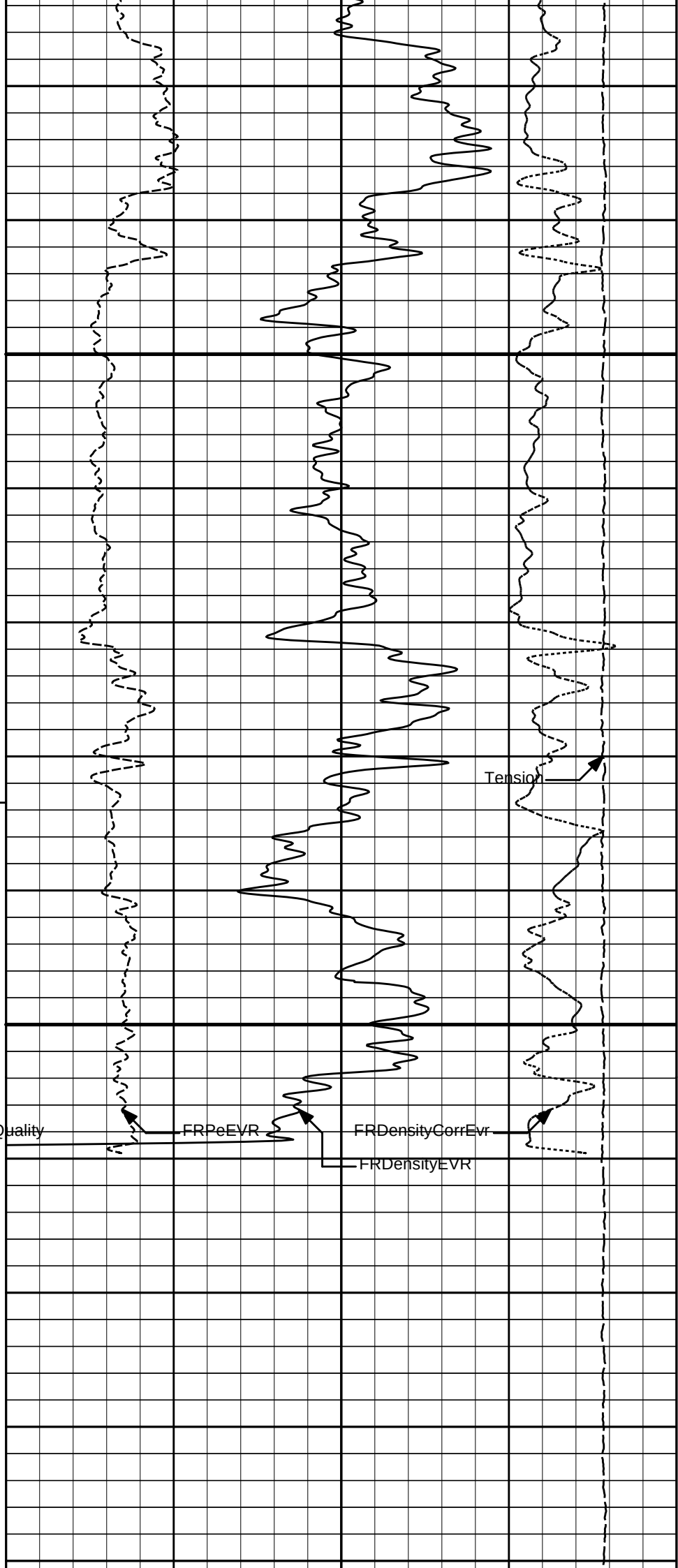


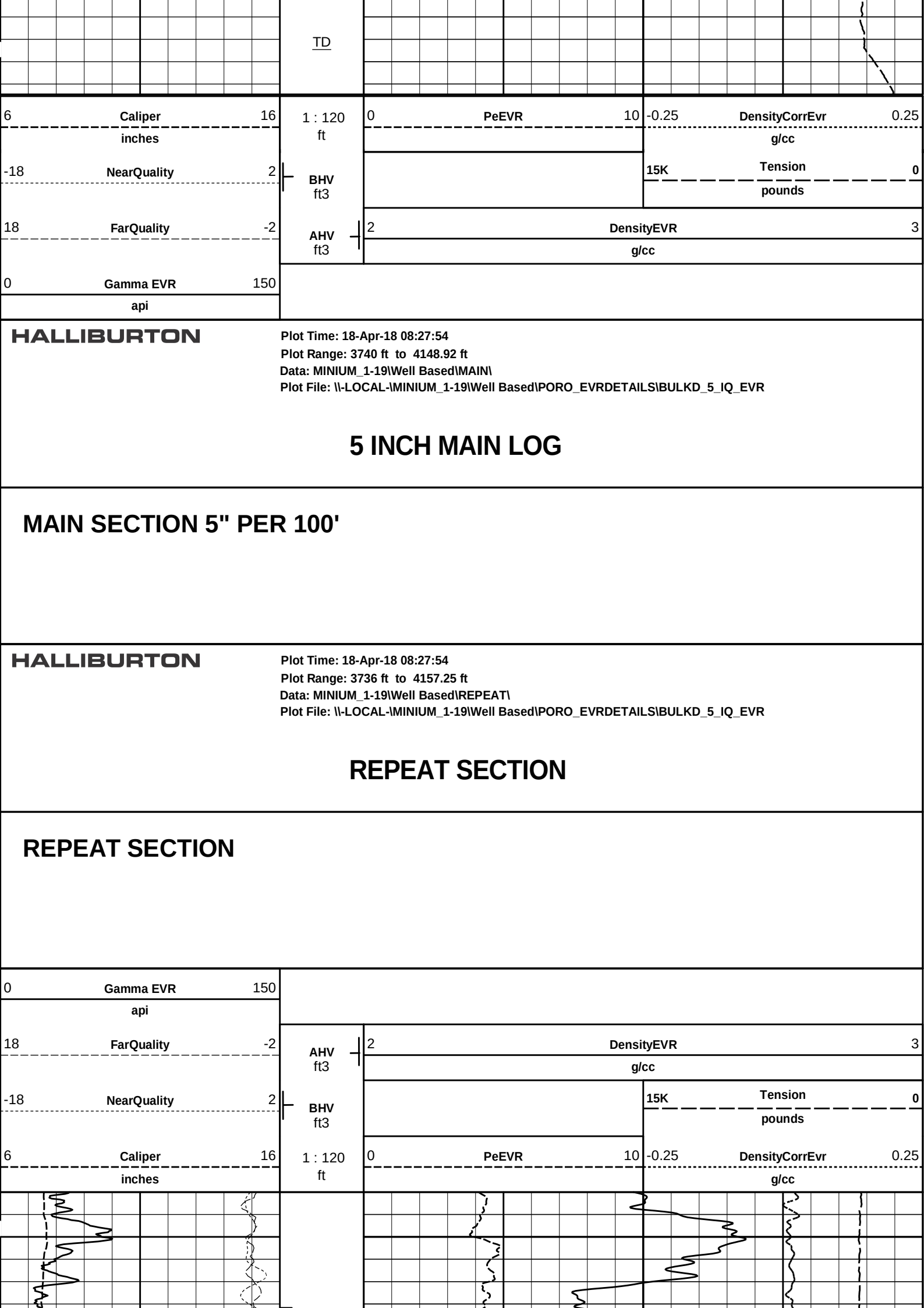


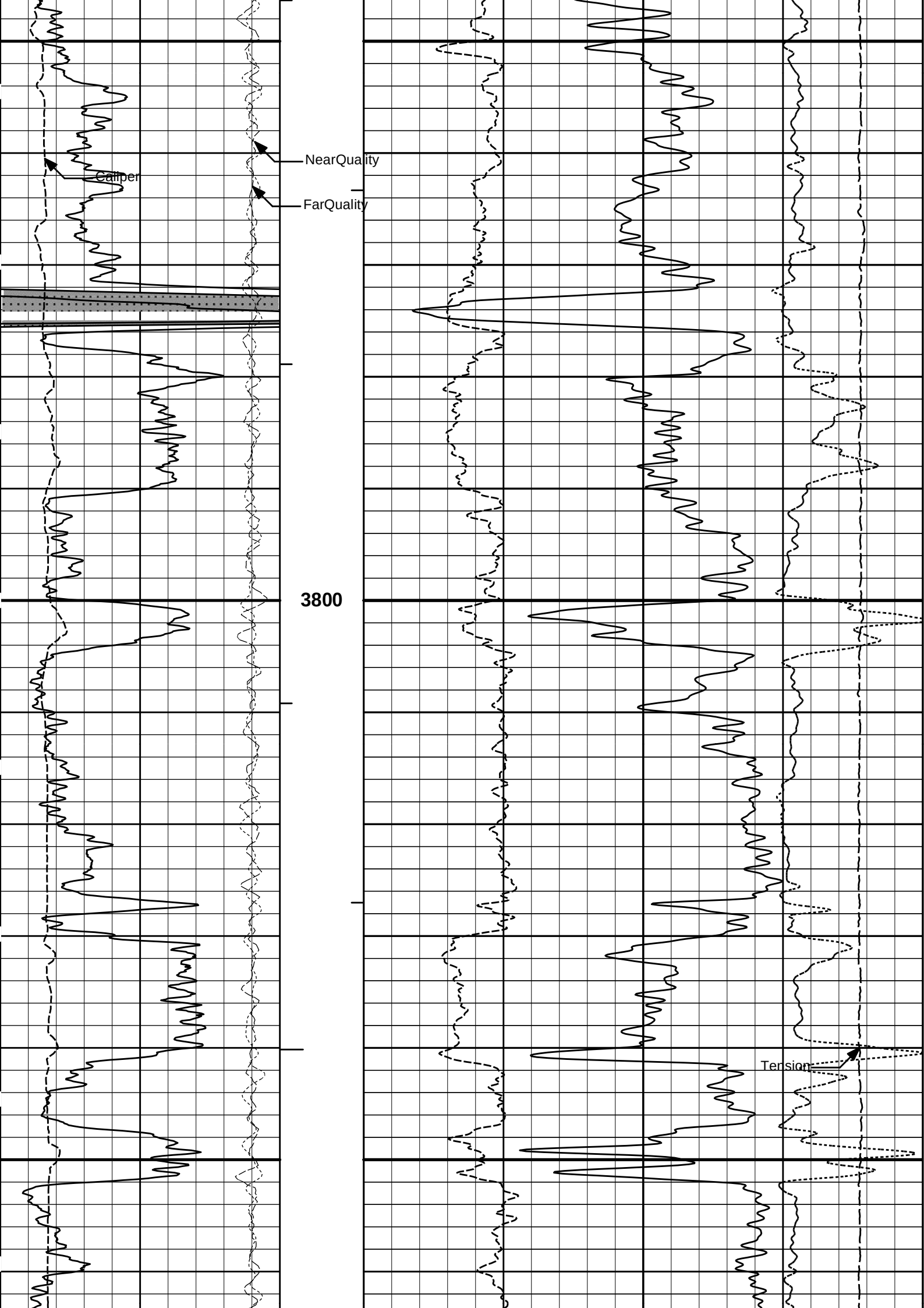


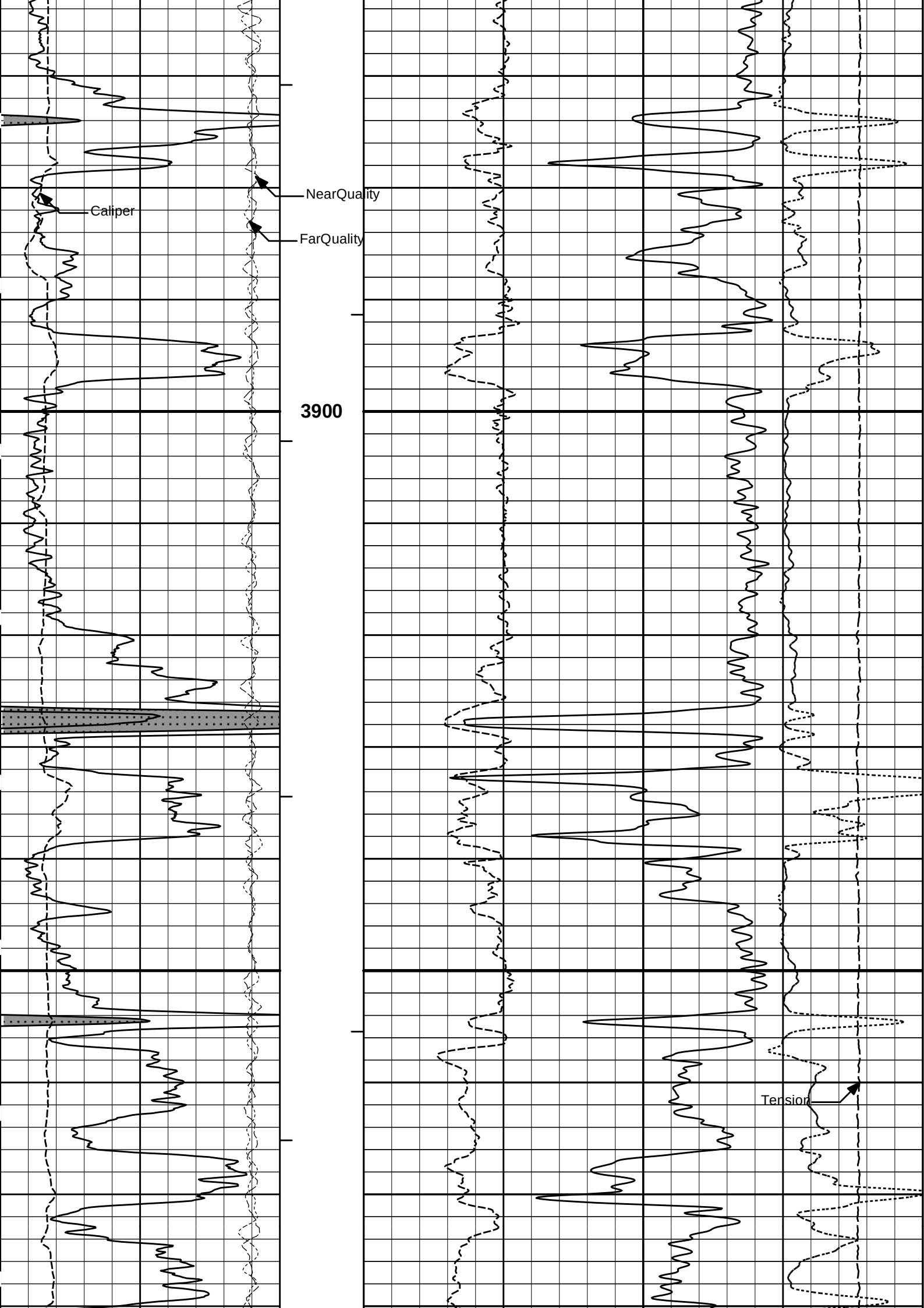


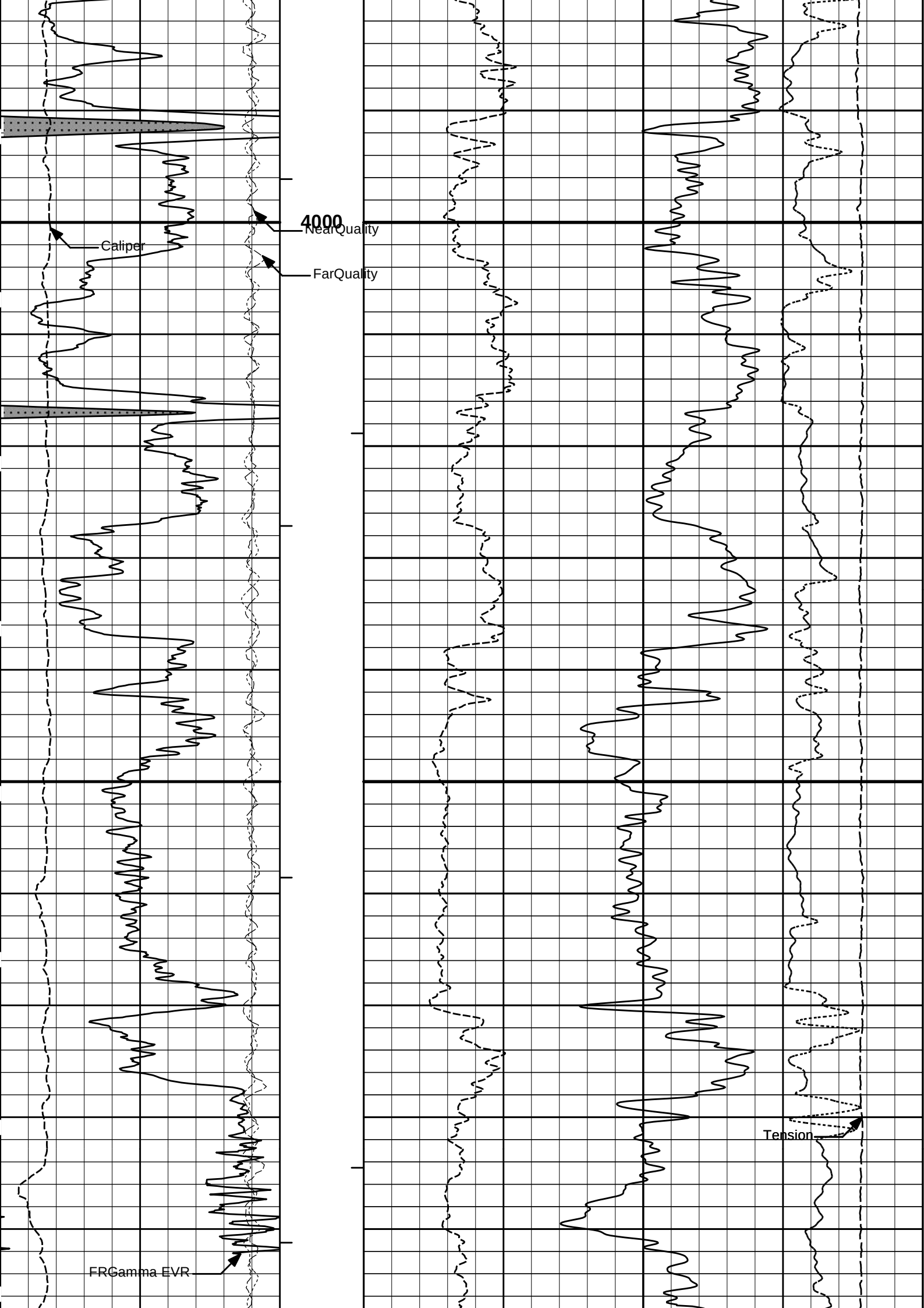
4100

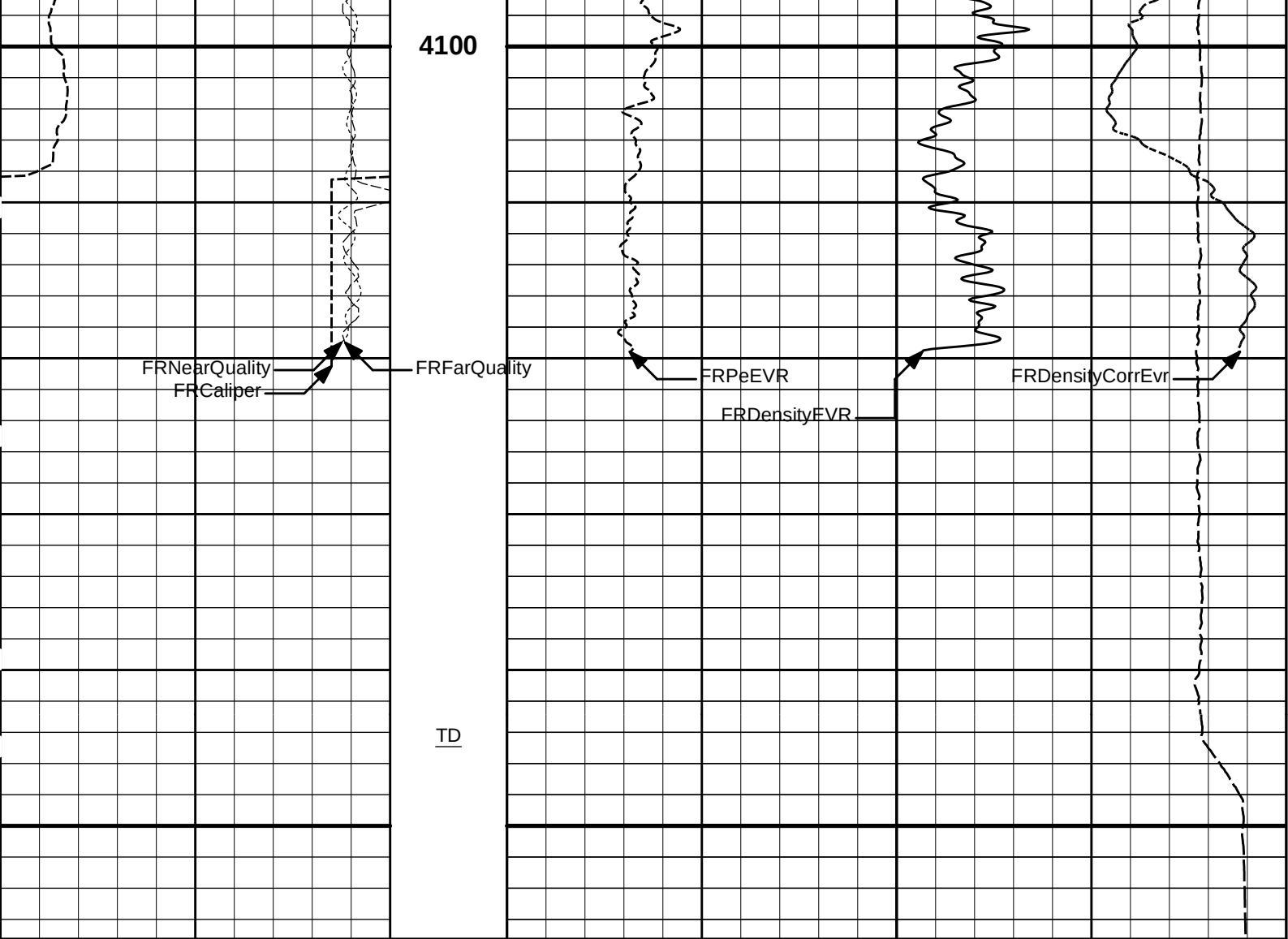












6	Caliper	16	1 : 120	0	PeEVR	10	-0.25	DensityCorrEvr	0.25
	inches		ft					g/cc	
-18	NearQuality	2	BHV				15K	Tension	0
			ft3					pounds	
18	FarQuality	-2	AHV	2	DensityEVR	3			
			ft3		g/cc				
0	Gamma EVR	150							
	api								

HALLIBURTON

Plot Time: 18-Apr-18 08:27:56
Plot Range: 3736 ft to 4157.25 ft
Data: MINIMUM_1-19\Well Based\REPEAT\
Plot File: \\-LOCAL-MINIMUM_1-19\Well Based\PORO_EVRDETAILS\BULKD_5_IQ_EVR

REPEAT SECTION

REPEAT SECTION

HALLIBURTON

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:	SEAN WOLTEMATH	Calibration Date:	16-Apr-18 14:43:49	
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	33.3	api	
Background + Calibrator	258.4	260.7	api	
Calibrator	228.9	227.5	api	
Shop	Field	Difference	Tolerance	
228.9	227.5	1.4	+/- 9.00	

ACCELEROMETER AND MAGNETOMETER SHOP CALIBRATION					
Tool Name:	IDT - 10967514	Reference Calibration Date:	10-Jun-15 12:26:23		
Engineer:	T. HYDE	Calibration Date:	29-Oct-17 13:11:14		
Software Version:	WL INSITE R5.0.5 (Build 8)	Calibration Version:	1		
Reference Gravity Field: 1.0000 g					
Reference Magnetic Field: 50307.0000 nT					
* QF : value of 0 is shown for bad quality if data - reference > (2 * standard deviation) and > (0.5% of reference value)					
ACCELEROMETER CALIBRATION RAW DATA VALUE					
Raw Acc X	Raw Acc Y	Raw Acc Z	Quality(Gravity)	Quality Error(%)	QF
0.4483	-0.5559	-0.0095	0.9981	99.8100	1
-0.5039	-0.5331	-0.0099	1.0031	99.6915	1
-0.5654	0.4850	-0.0091	0.9981	99.8106	1
0.4775	0.5551	-0.0083	1.0016	99.8382	1
-0.0462	0.7421	-0.0092	0.9990	99.9012	1
0.0175	0.6700	0.1486	1.0019	99.8056	1
-0.0354	0.7429	-0.0080	0.9995	99.9454	1
0.7161	-0.0146	-0.0080	1.0001	99.9879	1
-0.1158	-0.7139	-0.0106	0.9983	99.8349	1
-0.7361	0.0867	-0.0094	0.9996	99.9608	1
0.0201	0.0033	0.3515	0.9995	99.9502	1
-0.0882	-0.6750	-0.1350	1.0010	99.8970	1
ACCELEROMETER QUALITY SUMMARY					
Average Calculated Gravity Field			1.0000	g	
Standard Deviation Calculated Gravity Field			0.0016	g	

ACCELEROMETER GAIN AND OFFSET

	GAIN	OFFSET
ACC X	1.3729314804	0.0163711496
ACC Y	1.3640266657	-0.0144008221
ACC Z	2.7541277409	0.0303100925

* QF : value of 0 is shown for bad quality if | data - reference | > (3 * standard deviation) and > (1% of reference value)

MAGNETOMETER CALIBRATION RAW DATA VALUE

Raw Mag X	Raw Mag Y	Raw Mag Z	Quality(Magnetic)	Quality Error(%)	QF
-0.2521	1.2321	-0.0673	50269.6523	99.9258	1
1.1777	0.4363	-0.0659	50414.2500	99.7868	1
0.4808	-1.1763	-0.0661	50405.3398	99.8045	1
-1.1602	-0.4497	-0.0670	50424.7813	99.7659	1
-0.0176	-1.1284	0.5517	49826.3203	99.0445	1
0.0313	-1.2770	-0.0348	50608.3594	99.4010	1
0.0788	-1.1358	-0.5676	50331.3359	99.9516	1
-1.1041	0.0010	-0.5685	50178.7305	99.7450	1
0.1428	1.1184	-0.5672	50183.2461	99.7540	1
1.1165	-0.0921	-0.5669	50159.5469	99.7069	1
-0.2703	0.5710	1.0944	50460.0742	99.6957	1
0.1696	0.8462	-0.9311	50400.3164	99.8145	1

MAGNETOMETER QUALITY SUMMARY

Average Calculated Magnetic Field	50305.1641	nT
Standard Deviation Calculated Magnetic Field	201.0230	nT

MAGNETOMETER GAIN AND OFFSET

	GAIN	OFFSET
MAG X	40363.0234375000	-313.7065734863
MAG Y	39727.5820312500	148.1569976807
MAG Z	39703.6484375000	123.7606582642

Noise Level Value: 0.000229 cnts

Noise Level Cal Value: 0.0006 g

DUAL SPACED NEUTRON SHOP CALIBRATION

Tool Name:	DSNT - 11055304	Reference Calibration Date:	13-Mar-18 15:42:08
Engineer:	JORGE ORLANDO PEREZ	Calibration Date:	13-Mar-18 16:05:22
Software Version:	WL INSITE R5.0.5 (Build 8)	Calibration Version:	1

Logging Source S/N: DSN-424
 Tank Serial Number: 12345678
 Reference value assigned to Tank: 56.100
 Snow Block S/N: 12345678
 Calibration Tank Water Temperature: 68 degF
 Min. Tool Housing Outside Diameter: 3.625 in

CALIBRATION CONSTANTS

Measurement	Prev. Value	New Value	Control Limit On New Value
Gain:	1.04035	1.03906	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):	0.2362	0.2358	0.0004	+/- 0.0020
Calibrated Ratio:	10.5726	10.5595	0.013	+/- 0.050

VERIFIER

Measurement	Value	Control Limit
-------------	-------	---------------

Measurement	Value	Control Limit
Snow-Block Porosity (decp):	0.0642	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 - 11055304	Reference Calibration Date:	13-Mar-18 16:05:22
Engineer:	SEAN WOLTEMATH	Calibration Date:	16-Apr-18 15:07:38
Software Version:	WL INSITE R5.0.5 (Build 8)	Calibration Version:	1

Logging Source S/N: DSN-424
Snow Block S/N: 12345678

NEUTRON FIELD-CHECK SUMMARY				
	Shop	Field	Difference	Control Limit On Change
Snow-Block Porosity (decp):	0.0642	0.0509	-0.0133	+/- 0.0150
PASS/FAIL SUMMARY				
Block Change Check:				Passed
Snow Block Stat Check:				Passed
Temperature Check:				Passed

DENSITY CALIPER SHOP CALIBRATION			
Tool Name:	SDLT - 10951315	Reference Calibration Date:	07-Mar-18 09:39:58
Engineer:	JORGE ORLANDO PEREZ	Calibration Date:	07-Mar-18 09:48:53
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	-3522.85	-3549.59	-7000.00 - -1000.00
Pad Gain	0.0003722	0.0003749	0.0002000 - 0.0006000
Arm Offset	-3023.66	-2454.88	-5000.00 - 3000.00
Arm Gain	0.0005295	0.0004796	0.000300 - 0.000700
Arm Power	-0.000006101	-0.000003067	-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)	3.73	3.75	0.02	+/- 0.20
RING DIAMETER:				
Small Ring (in)	6.40	6.50	0.10	+/- 0.20
Medium Ring (in)	8.27	8.25	-0.02	+/- 0.20
Large Ring (in)	15.00	15.00	0.00	+/- 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 - 10951315		Reference Calibration Date: 07-Mar-18 09:48:53		
Engineer: JORGE ORLANDO PEREZ		Calibration Date: 07-Mar-18 09:51:03		
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 - 10951315		Reference Calibration Date: 13-Mar-18 17:22:52			
Engineer: JORGE ORLANDO PEREZ		Calibration Date: 21-Mar-18 12:30:09			
Software Version: WL INSITE R5.0.5 (Build 8)		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	-0.11	-0.12	-0.00	-0.00	ohmm
Calibration Point #1	0.00	0.00	0.00	0.00	ohmm
Calibration Point #2	19.76	20.00	19.93	20.00	ohmm
Internal Reference	19.83	20.07	19.91	19.98	ohmm
Measurement	Micro Log Normal Tool Value		Micro Log Lateral Tool Value		Units
Tool Zero	-2.57		0.53		V
Calibration Point #1	27.78		2.13		V
Calibration Point #2	5286.93		6884.80		V
Internal Reference	5306.57		6879.42		V

MICRO LOG FIELD CHECK					
Tool Name: Microlog Pad - 10951315		Reference Calibration Date: 21-Mar-18 12:30:09			
Engineer: SEAN WOLTEMATH		Calibration Date: 16-Apr-18 14:34:38			
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	-0.12	-0.10	-0.00	-0.01	ohmm
Internal Reference	20.07	20.10	19.98	20.01	ohmm
Summary					
Signal	Shop	Field	Difference		Tolerance
Microlog Normal	20.07	20.10	-0.03		+/- 0.80
Microlog Lateral	19.98	20.01	-0.03		+/- 0.80

SPECTRAL DENSITY SHOP CALIBRATION			
Tool Name: SDLT Pad - 10865873		Reference Calibration Date: 13-Mar-18 10:51:36	
Engineer: JORGE ORLANDO PEREZ		Calibration Date: 13-Mar-18 11:16:20	
Software Version: WL INSITE R5.0.5 (Build 8)		Calibration Version: 1	
Logging Source S/N: 5168GW			
Aluminum Block S/N: EL RENO STD ALUMINUM		Density: 2.581g/cc	Pe: 3.170
Magnesium Block S/N: EL RENO		Density: 1.687g/cc	Pe: 2.594

DENSITY CALIBRATION SUMMARY

Measurement	Previous Value	New Value	Control Limit
Near Bar Gain	1.0157	1.0357	0.90 - 1.10
Near Dens Gain	1.0196	1.0142	0.90 - 1.10
Near Peak Gain	1.0395	1.0317	0.90 - 1.10
Near Lith Gain	1.0541	1.0327	0.90 - 1.10
Far Bar Gain	1.0110	1.0122	0.90 - 1.10
Far Dens Gain	1.0025	1.0022	0.90 - 1.10
Far Peak Gain	0.9984	0.9998	0.90 - 1.10
Far Lith Gain	0.9749	0.9761	0.90 - 1.10
Near Bar Offset	0.1609	-0.0201	NONE
Near Dens Offset	0.1178	0.1665	NONE
Near Peak Offset	-0.0532	0.0109	NONE
Near Lith Offset	-0.1910	-0.0138	NONE
Far Bar Offset	0.1786	0.1672	NONE
Far Dens Offset	0.2184	0.2226	NONE
Far Peak Offset	0.2132	0.2040	NONE
Far Lith Offset	0.3427	0.3343	NONE
Near Bar Background	823.98	821.51	700 - 1450
Near Dens Background	269.05	269.15	230 - 480
Near Peak Background	119.85	118.90	100 - 210
Near Lith Background	144.86	144.31	125 - 260
Far Bar Background	600.14	599.08	450 - 900
Far Dens Background	236.51	236.11	175 - 345
Far Peak Background	92.88	92.59	70 - 140
Far Lith Background	96.04	96.48	75 - 145

CALIBRATION BLOCK SUMMARY

Measurement	Current Reading (Previous Coef)	Calibrated (New Coef)	Change	Control Limit On Change
MAGNESIUM				
Density (g/cc)	1.687	1.687	0.000	+/- 0.015
Pe	2.525	2.551	0.026	+/- 0.150
ALUMINUM				
Density (g/cc)	2.580	2.581	0.001	+/- 0.01500
Pe	3.157	3.123	-0.034	+/- 0.150

TOOL SUMMARY

Measurement	Near Detector		Far Detector	
	Value	Control Limits	Value	Control Limits
QUALITY				
Background	0.0003	+/- 0.0110	-0.0014	+/- 0.0140
Magnesium Block	-0.0011	+/- 0.0110	-0.0013	+/- 0.0140
Aluminum Block	-0.0011	+/- 0.0110	-0.0008	+/- 0.0140
Resolution	10.05	6.00 - 11.50	9.01	6.00 - 11.50
Internal Verifier(B+D+P+L)	1354	1200 - 2700	1024	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

Gains Check:			Passed						
Changes in Calibration Blocks:			Passed						
SPECTRAL DENSITY FIELD CHECK									
Tool Name:	SDLT Pad - 10865873		Reference Calibration Date:	13-Mar-18 11:16:20					
Engineer:	SEAN WOLTEMATH		Calibration Date:	16-Apr-18 14:33:22					
Software Version:	WL INSITE R5.0.5 (Build 8)		Calibration Version:	1					
Pad Temperature: 64.7 degF									
DENSITY FIELD CALIBRATION SUMMARY									
Measurement	Shop	Field	Change	Control Limit +/-					
Near (B+D+P+L) cps	1353.863	1352.738	-1.125	14.876					
Far (B+D+P+L) cps	1024.257	1025.271	1.014	17.069					
Near Resolution	10.05	9.91	-0.140	0.50					
Far Resolution	9.01	9.03	0.020	1.00					
PASS/FAIL SUMMARY									
Bkg Quality Check:			Passed						
Bkg Resolution Check:			Passed						
Bkg Verification Check:			Passed						
ARRAY COMPENSATED TRUE RESISTIVITY SHOP CALIBRATION									
Tool Name:	ACRt Sonde - 11005908		Reference Calibration Date:	24-Jan-18 11:50:13					
Engineer:	JORGE ORLANDO PEREZ		Calibration Date:	16-Mar-18 10:34:00					
Software Version:	WL INSITE R5.0.5 (Build 8)		Calibration Version:	1					
Host Tool Name:	ACRt Instrument - 11026095								
TYPICAL GAIN RANGE									
Subarray	R12KHz			R36KHz		R72KHz			
	Lower	(mmho/m)	Upper	Lower	(mmho/m)	Upper	Lower	(mmho/m)	Upper
A1 (80")	0.95	1.0415	1.05	0.95	1.0202	1.05	0.95	1.0109	1.05
A2 (50")	0.95	1.0485	1.05	0.95	1.0233	1.05	0.95	1.0144	1.05
A3 (29")	0.95	1.0353	1.05	0.95	1.0139	1.05	0.95	1.0048	1.05
A4 (17")	0.95	1.0423	1.05	0.95	1.0194	1.05	0.95	1.0121	1.05
A5 (10")	N/A	N/A	N/A	0.95	1.0134	1.05	0.95	1.0048	1.05
A6 (6")	N/A	N/A	N/A	0.95	1.0044	1.05	0.95	0.9956	1.05
SONDE OFFSET									
Subarray	R12KHz			R36KHz		R72KHz			
	(mmho/m)			(mmho/m)		(mmho/m)			
A1 (80")	1.428			-4.149		-5.990			
A2 (50")	-0.217			-4.118		-5.417			
A3 (29")	-14.051			-4.501		-3.906			
A4 (17")	-92.668			-28.984		-24.290			
A5 (10")	N/A			-111.115		-48.871			
A6 (6")	N/A			354.229		183.875			
TRANSMITTER CURRENT GAIN						R-MUD VERIFICATION			
Signal	Lower	R	Upper	Signal	Lower (ohm-m)	Measured (ohm-m)	Upper (ohm-m)		
12K	0.6	0.92	1.3	Mud Cell	0.95	1.00	1.05		
36K	1.0	1.93	2.0						
72K	1.0	1.27	2.0						
PASS/FAIL SUMMARY									
GAIN RANGE CHK			PASS						

TOOL OK TO LOG

QUALITY CHECK SHOP CALIBRATION

Tool Name:	ACRt Sonde - 11005908	Reference Calibration Date:	16-Mar-18 10:35:27
Engineer:	JORGE ORLANDO PEREZ	Calibration Date:	16-Mar-18 10:36:37
Software Version:	WL INSITE R5.0.5 (Build 8)	Calibration Version:	1
Host Tool Name:	ACRt Instrument - 11026095		

STANDARD DEVIATIONS

	R12KHz			R36KHz			R72KHz		
	Measured (mmho/m)	Expected (mmho/m)	Pass/Fail	Measured (mmho/m)	Expected (mmho/m)	Pass/Fail	Measured (mmho/m)	Expected (mmho/m)	Pass/Fail
A1 (80")	0.000	< 0.750	Pass	0.000	< 0.750	Pass	0.000	< 0.750	Pass
A2 (50")	0.000	< 0.750	Pass	0.000	< 0.750	Pass	0.000	< 0.750	Pass
A3 (29")	0.000	< 0.750	Pass	0.000	< 0.750	Pass	0.000	< 0.750	Pass
A4 (17")	0.000	< 0.750	Pass	0.000	< 0.750	Pass	0.000	< 0.750	Pass
A5 (10")	0.000	< 0.750	Pass	0.000	< 0.750	Pass	0.000	< 0.750	Pass
A6 (6")	0.000	< 0.750	Pass	0.000	< 0.750	Pass	0.000	< 0.750	Pass

AVERAGES

	R12KHz			R36KHz			R72KHz		
	Measured (mmho/m)	Expected (mmho/m)	Pass/Fail	Measured (mmho/m)	Expected (mmho/m)	Pass/Fail	Measured (mmho/m)	Expected (mmho/m)	Pass/Fail
A1 (80")	0.000	< 0.500	Pass	-0.001	> -0.500	Pass	-0.006	> -0.500	Pass
A2 (50")	0.000	< 0.500	Pass	-0.001	> -0.500	Pass	-0.005	> -0.500	Pass
A3 (29")	-0.000	< 0.500	Pass	-0.001	> -0.500	Pass	-0.004	> -0.500	Pass
A4 (17")	-0.002	> -0.500	Pass	-0.007	> -0.500	Pass	-0.024	> -0.500	Pass
A5 (10")	-0.013	> -0.500	Pass	-0.026	> -0.500	Pass	-0.049	> -0.500	Pass
A6 (6")	0.016	< 0.500	Pass	0.078	< 0.500	Pass	0.169	< 0.500	Pass

GAIN TOLERANCE

R12KHz

	Measured (mmho/m)	Last Month (mmho/m)	Difference (mmho/m)	Tolerance (mmho/m)	Pass/Fail
A1 (80")	-212634064.000	-212633888.000	176.000	10631694.400	Pass
A2 (50")	-209134528.000	-209132944.000	1584.000	10456647.200	Pass
A3 (29")	-209198784.000	-209198864.000	80.000	10459943.200	Pass
A4 (17")	-212472320.000	-212469504.000	2816.000	10623475.200	Pass
A5 (10")	-215806928.000	-215805120.000	1808.000	10790256.000	Pass
A6 (6")	-216964560.000	-217024160.000	59600.000	10851208.000	Pass

R36KHz

	Measured (mmho/m)	Last Month (mmho/m)	Difference (mmho/m)	Tolerance (mmho/m)	Pass/Fail
A1 (80")	45945148.000	45942224.000	2924.000	2297111.200	Pass
A2 (50")	42617908.000	42614540.000	3368.000	2130727.000	Pass
A3 (29")	35212352.000	35209964.000	2388.000	1760498.200	Pass
A4 (17")	36200304.000	36198396.000	1908.000	1809919.800	Pass
A5 (10")	42031348.000	42028092.000	3256.000	2101404.600	Pass
A6 (6")	42711908.000	42592740.000	119168.000	2129637.000	Pass

R72KHz

	Measured (mmho/m)	Last Month (mmho/m)	Difference (mmho/m)	Tolerance (mmho/m)	Pass/Fail
A1 (80")	-93057816.000	-93058472.000	656.000	4652923.600	Pass
A2 (50")	-87051256.000	-87047392.000	3864.000	4352369.600	Pass
A3 (29")	-89096656.000	-89095584.000	1072.000	4454779.200	Pass

A4 (17")	-87151120.000	-87148272.000	2848.000	4357413.600	Pass	
A5 (10")	-86683120.000	-86681608.000	1512.000	4334080.400	Pass	
A6 (6")	-87306328.000	-87322176.000	15848.000	4366108.800	Pass	
PASS/FAIL SUMMARY						
Std Deviation Verification			Pass			
Average Verification			Pass			
Gain Tolerance Verification			Pass			
CALIBRATION SUMMARY						
Sensor	Shop	Field	Post	Difference	Tolerance	Units
GTET-11958947						
Gamma Ray Calibrator	228.9	227.5	-----	1.4	+/- 9.00	api
DSNT-11055304						
Snow-Block Porosity	0.0642	0.0509	-----	0.0133	+/- 0.0150	decp
SDLT-10951315						
Pad Extension	3.75	3.75	-----	0.00	+/-0.10	in
Ring Diameter	8.25	8.25	-----	0.00	+/-0.15	in
Microlog Pad-10951315						
MicroLog Normal	20.07	20.10	-----	-0.03	+/-0.80	ohmm
MicroLog Lateral	19.98	20.01	-----	-0.03	+/-0.80	ohmm
SDLT Pad-10865873						
Near(B+D+P+L)	1353.863	1352.738	-----	1.125	+/-14.876	cps
Far(B+D+P+L)	1024.257	1025.271	-----	-1.014	+/-17.069	cps
ACRt Sonde-11005908						
Mud Cell	1.00	-----	-----	0	-----	ohm-m
Data: MINIU_1-19\0001 GTET-IDT-DSN-SDL-BSAT-ACRT\IDLE						
Date: 18-Apr-18 05:08:05						

HALLIBURTON					
PARAMETERS REPORT					
Depth (ft)	Tool Name	Mnemonic	Description	Value	Units
TOP_____					
	SHARED	TD	Total Well Depth	4146.00	ft
0.00_____					
	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	1.180	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	4438.00	ft
	SHARED	BHT	Bottom Hole Temperature	140.0	degF
	SHARED	SVTM	Navigation and Survey Master Tool	IDT	

SHARED	AZTM	High Res Z Accelerometer Master Tool	IDT	
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	SDLT	
Rwa / CrossPlot	ROIN	Input for RO Calculation	Rwa	
GTET	GROK	Process Gamma Ray?	Yes	
GTET	GEOK	Process Gamma Ray EVR?	Yes	
GTET	TPOS	Tool Position for Gamma Ray Tools.	Eccentered	
GTET	BHSM	Borehole Size Source Tool	SDLT	
IDT	WRTI	Survey Writing Interval	30	ft
IDT	SOPT	Smoothing Option	None	
DSNT	DNOK	Process DSN?	Yes	
DSNT	DEOK	Process DSN EVR?	Yes	
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?	Yes	
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	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	Eccentered	
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
ACRt Sonde

BHSM
MBFL

Borehole Size Source Tool
Apply Corkscrew Effect?

SDLT
No

BOTTOM

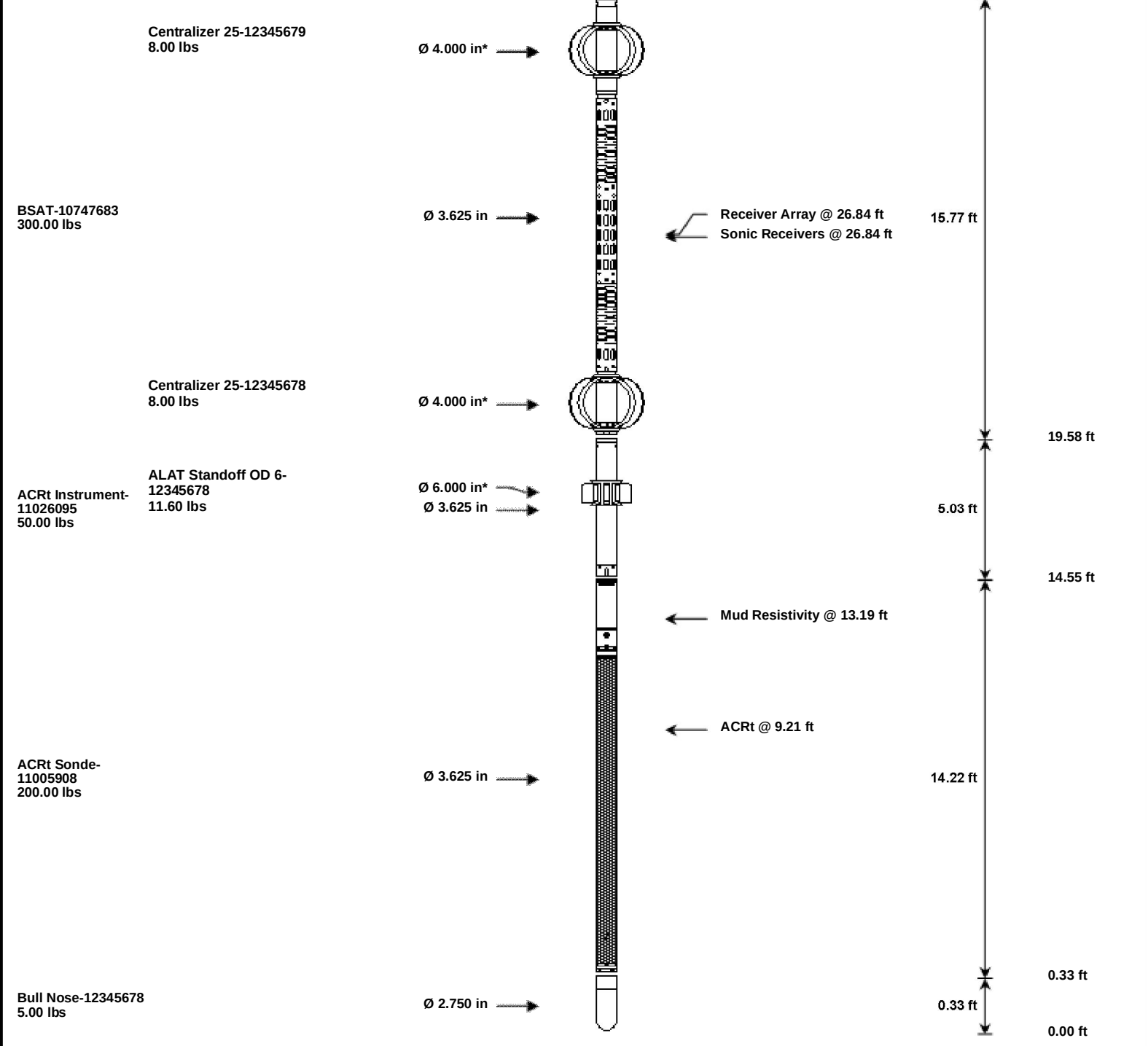
Data: MINIU1-1910001 GTET-IDT-DSN-SDL-BSAT-ACRT005 18-Apr-18 04:55 Up @4153.0f

Date: 18-Apr-18 08:02:17

HALLIBURTON

TOOL STRING DIAGRAM REPORT

Description	Overbody Description	O.D.	Diagram	Sensors @ Delays	Length	Accumulated Length
CH_HOS-11459024 37.50 lbs		Ø 2.750 in		← Temperature @ 78.65 ft	2.50 ft	79.15 ft
XOHD-11569312 20.00 lbs		Ø 2.750 in Ø 3.625 in			0.95 ft	76.65 ft
SP Sub-11153357 60.00 lbs		Ø 3.625 in		← SP @ 73.92 ft	3.74 ft	75.70 ft
				← Z-Accelerometer @ 71.51 ft		71.96 ft
GTET-11958947 165.00 lbs		Ø 3.625 in			8.52 ft	
				← GammaRay @ 65.90 ft		63.44 ft
IDT-10967514 150.00 lbs		Ø 3.625 in			7.58 ft	55.86 ft
DSNT-11055304 174.00 lbs	DSN Decentralizer- 11055304 6.60 lbs	Ø 5.000 in* Ø 3.625 in		← DSN Far @ 48.92 ft ← DSN Near @ 48.17 ft	9.69 ft	46.17 ft
SDLT-10951315 360.00 lbs	SDLT Pad-10865873 65.00 lbs Microlog Pad-10951315 8.00 lbs RAM-Cs137-10951315 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	35.36 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	76.65	300.00
XOHD	Hostile to Dits Cross Over	11569312	20.00	0.95	75.70	300.00
SP	SP Sub	11153357	60.00	3.74	71.96	300.00
GTET	Gamma Telemetry Tool	11958947	165.00	8.52	63.44	60.00
IDT	Insite Directional Tool	10967514	150.00	7.58	55.86	60.00
DSNT	Dual Spaced Neutron	11055304	174.00	9.69	46.17	60.00
DCNT	DSN Decentralizer	11055304	6.60	5.13	* 49.50	300.00
SDLT	Spectral Density Tool	10951315	360.00	10.81	35.36	60.00
SDLP	Density Insite Pad	10865873	65.00	2.55	* 37.57	60.00
Cs137	Logging Source, SDLT-I, 1.78 Ci - Cs137	10951315	1.00	0.80	* 37.80	300.00
MICP	Microlog Pad	10951315	8.00	1.00	* 37.86	60.00
BSAT	Borehole Sonic Array Tool	10747683	300.00	15.77	19.58	60.00
OBCEN	Centralizer - 25 in. Overbody	12345678	8.00	2.08	* 19.79	300.00
OBCEN	Centralizer - 25 in. Overbody	12345679	8.00	2.08	* 32.41	300.00
ACRt	Array Compensated True Resistivity Instrument Section	11026095	50.00	5.03	14.55	120.00
ALATS	Array Laterolog Tool OD 6 Standoff	12345678	11.60	1.00	* 17.12	60.00
ACRt	Array Compensated True Resistivity Sonde Section	11005908	200.00	14.22	0.33	120.00
BLNS	Bull Nose	12345678	5.00	0.33	0.00	300.00

Total		1,629.70	79.15
* Not included in Total Length and Length Accumulation.			
Data: MINIU1-19\0001 GTET-IDT-DSN-SDL-BSAT-ACRT\005 18-Apr-18 04:55 Up @4153.0f			Date: 18-Apr-18 05:13:44

COMPANY	CULBREATH OIL & GAS		
WELL	MINIUM 1-19		
FIELD	KANACO-MORELAND		
COUNTY	SHERIDAN	STATE	KANSAS

HALLIBURTON

HIGH RESOLUTION
SPECTRAL DENSITY
DUAL SPACED NEUTRON
EVR LOG