

SPECTRAL DENSITY DUAL SPACED NEUTRON LOG

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Service Ticket No.: 903952459				API No.: 15-109-21498-00-00				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	NONE	CENT	N/A			
Rmc @ Meas. Temp.		@		@			I-11055059						
Source Rmf	Rmc	CALC	CALC				S-11038385						
Rm @ BHT		0.62 ohmm @ 125 degF		@									
Rmf @ BHT		0.53 ohmm @ 125 degF		@									
Rmc @ BHT		0.71 ohmm @ 125 degF		@									
EQUIPMENT DATA													
GAMMA			ACOUSTIC			DENSITY			NEUTRON				
Run No.	ONE		Run No.	ONE		Run No.	ONE		Run No.	ONE			
Serial No.	11021139		Serial No.	10939049		Serial No.	10809130		Serial No.	11055304			
Model No.	GTET		Model No.	BSAT		Model No.	SDLT		Model No.	DSNT			
Diameter	3.625"		No. of Cent.	2		Diameter	4.6"		Diameter	3.625"			
Detector Model No.	GTET		Spacing	0.5"		Log Type	GAM-GAM		Log Type	NEU-NEU			
Type	SCINT					Source Type	Am241Be		Source Type	Cs-137			
Length	8"		LSA [Y/N]			Serial No.	5155GW		Serial No.	DSN-436			
Distance to Source	N/A		FWDA [Y/N]			Strength	1.5 Ci		Strength	15Ci			
LOGGING DATA													
GENERAL				GAMMA		ACOUSTIC		DENSITY			NEUTRON		
Run	Depth		Speed	Scale		Scale		Scale		Matrix	Scale		Matrix
No.	From	To	ft/min	L	R	L	R	L	R	Matrix	L	R	Matrix
ONE	TD	CSC	BEC	0	150	20	10	47.6 us/ft	20	2.71 g/cc	20	10	LIME

ONE	TD	CSG	REC	0	150	30	-10	47.0 us/ft	50	-10	2.71 g/cc	50	-10	TIME	
DIRECTIONAL INFORMATION															
Maximum Deviation									@	KOP					@
CLIENT REPORTED VERTICAL HOLE															
Remarks: GTET-IDT-DSNT-SDLT-BSAT-ACRT RUN IN COMBINATION															
ANNULAR HOLE VOLUME CALCULATED FOR 5.5 INCH CASING															
POROSITY & MICROLOG LOGGED TO 3700' AS PER CLIENT REQUEST															
CHLORIDES REPORTED AT 3000 ppm															
NO POST-CALS COMPLETED AS PER CLIENT REQUEST															
RIG: SOUTHWIND DRILLING RIG 8															
CREW: T. SUMNER, T. ROSS, T. COTHREN															
THANK YOU FOR CHOOSING HALLIBURTON ENERGY SERVICES -- EL RENO, OK -- 405.278.9685															
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HALLIBURTON															



Plot Time: 23-Apr-17 12:30:23

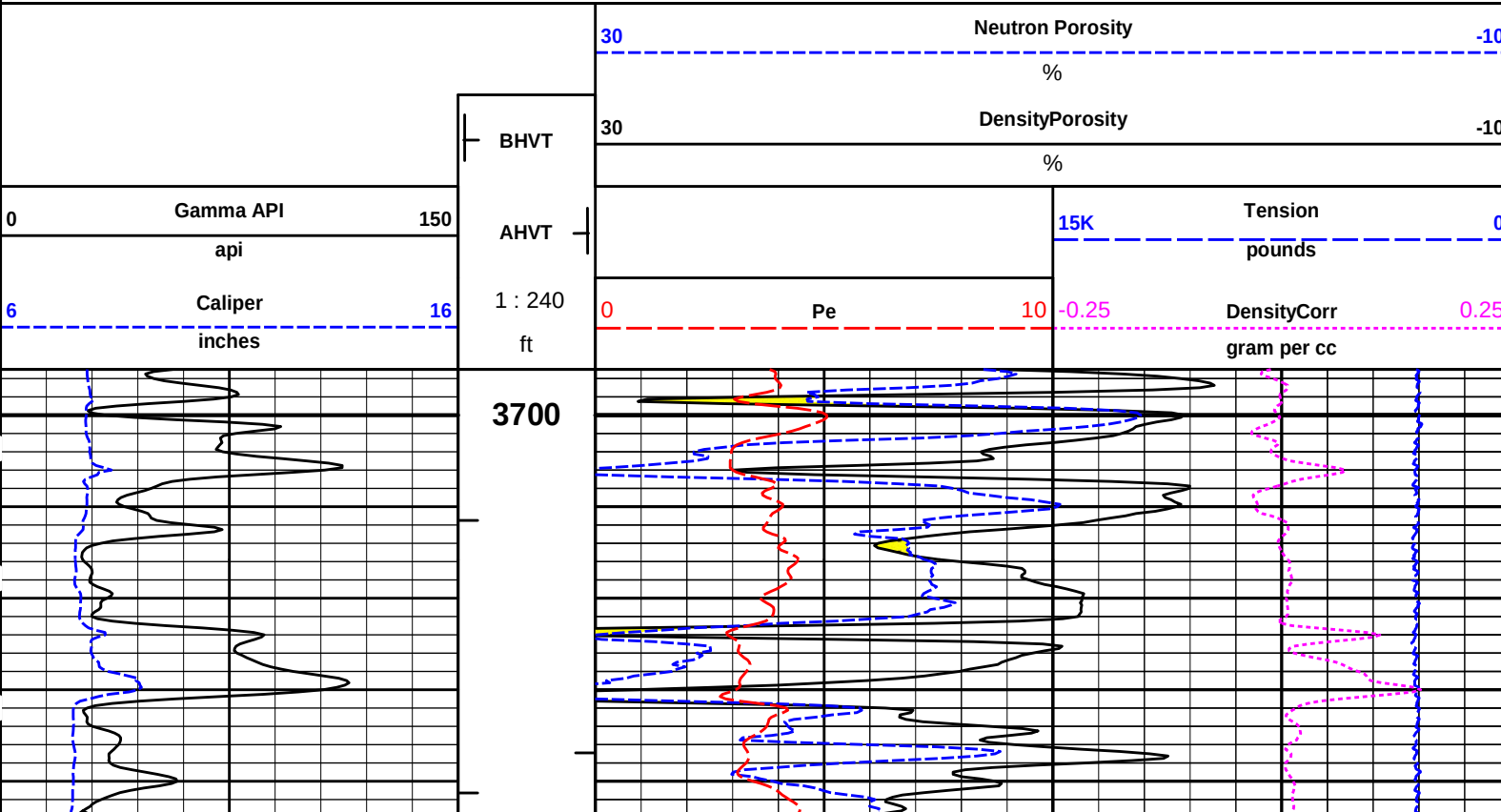
Plot Range: 3695 ft to 4774.33 ft

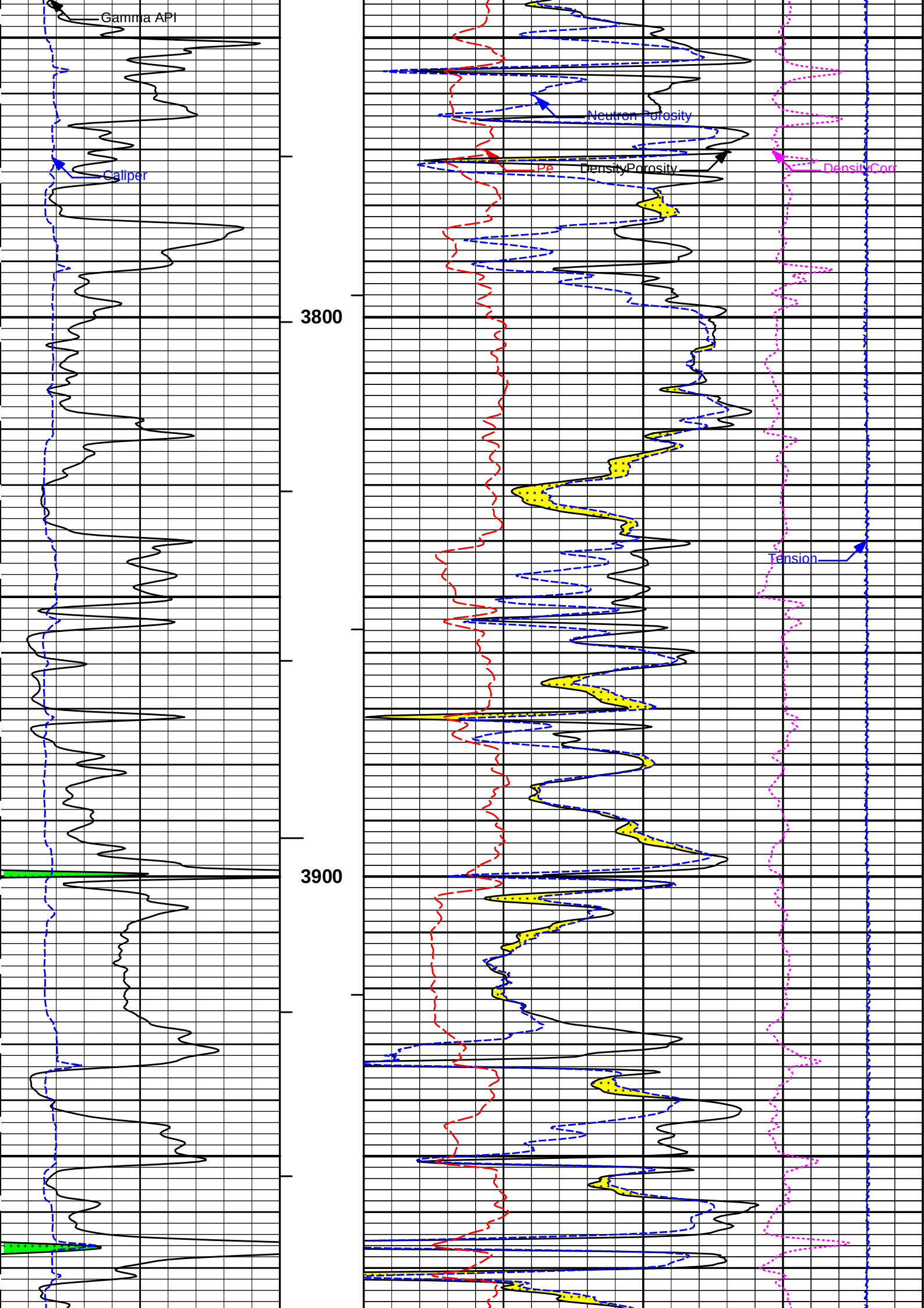
Data: CULBREATH-VOTH\Well Based\MAIN\

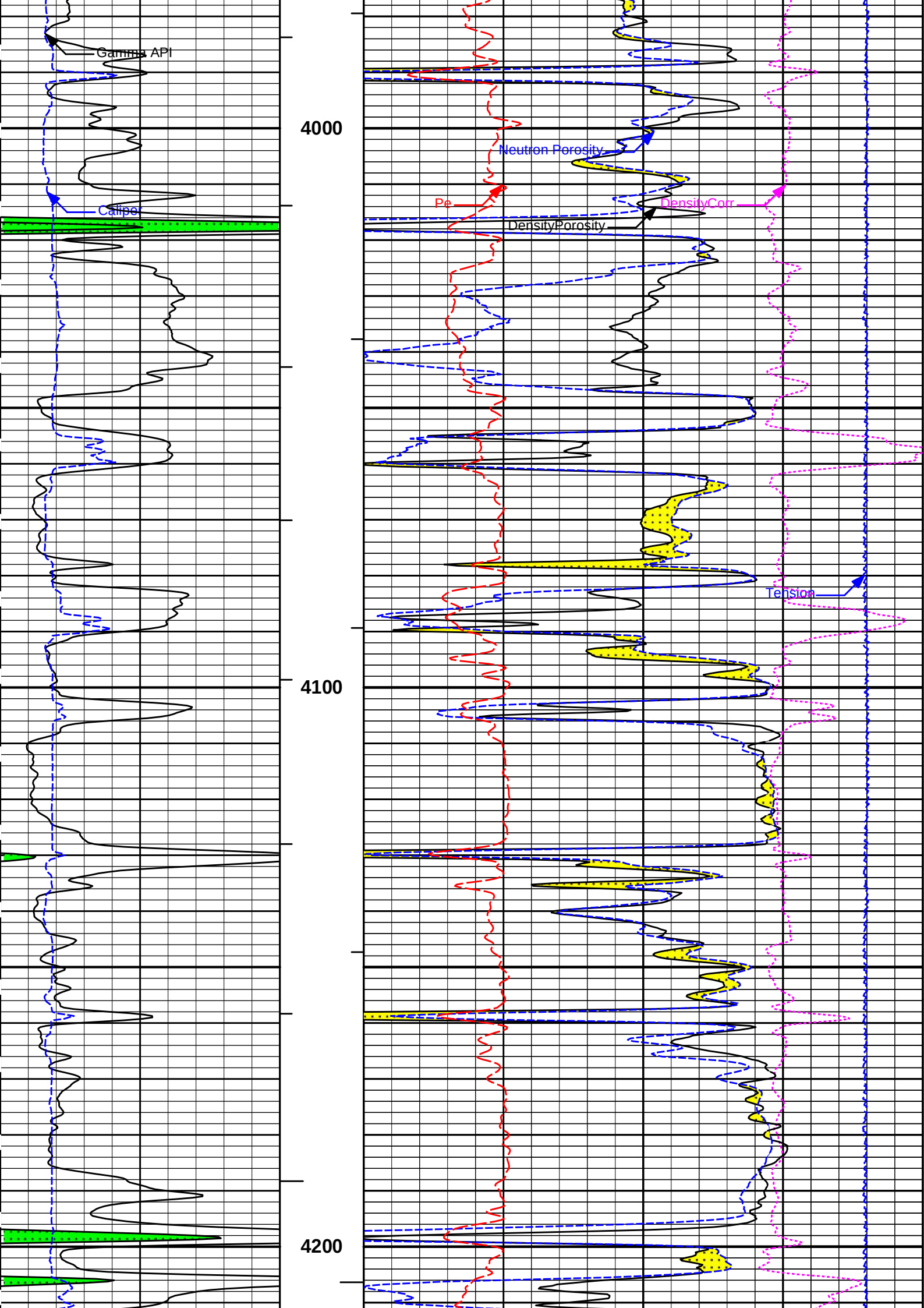
Plot File: \\PORO\Poros_IQ_5_MAIN

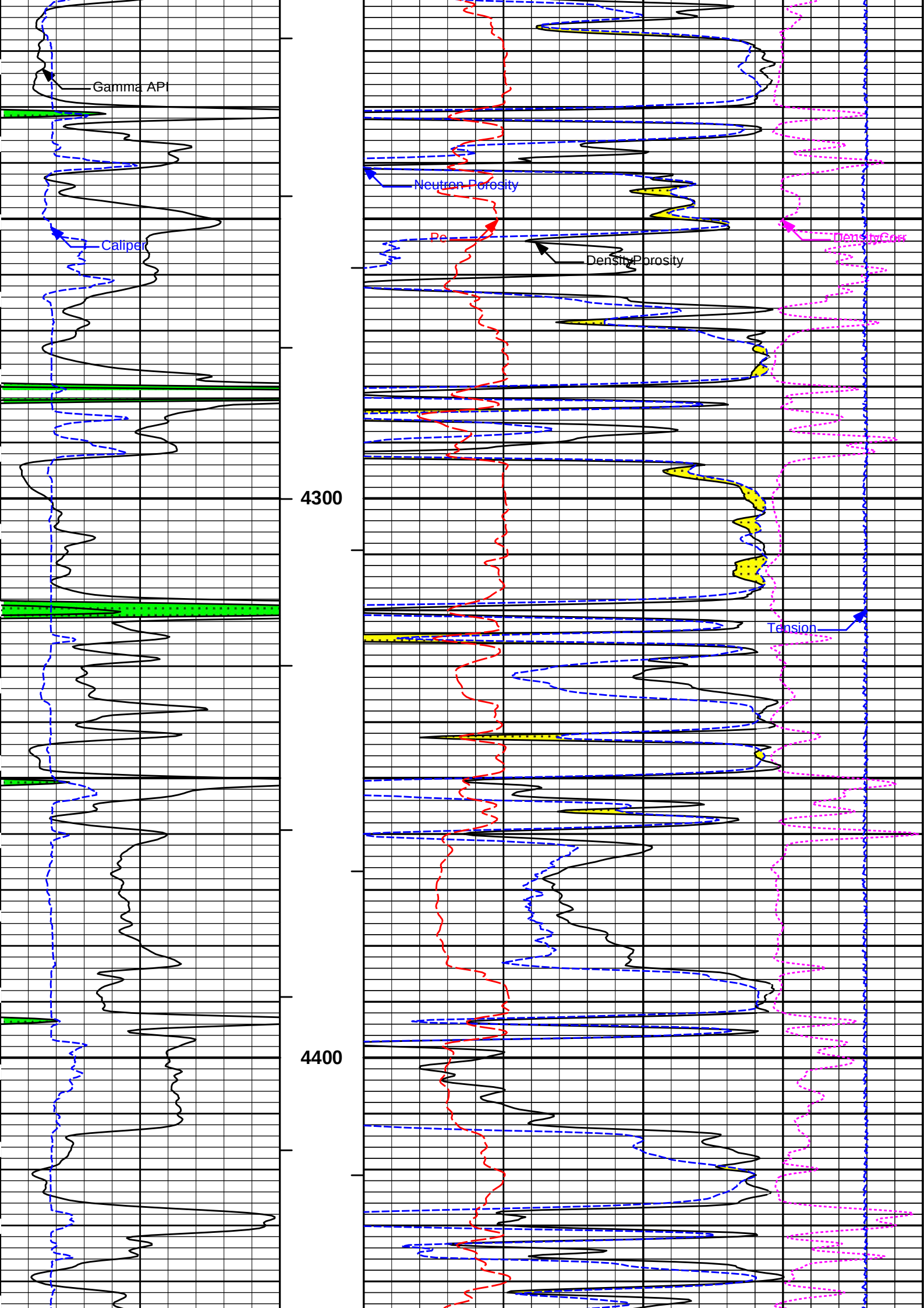
5 INCH MAIN LOG

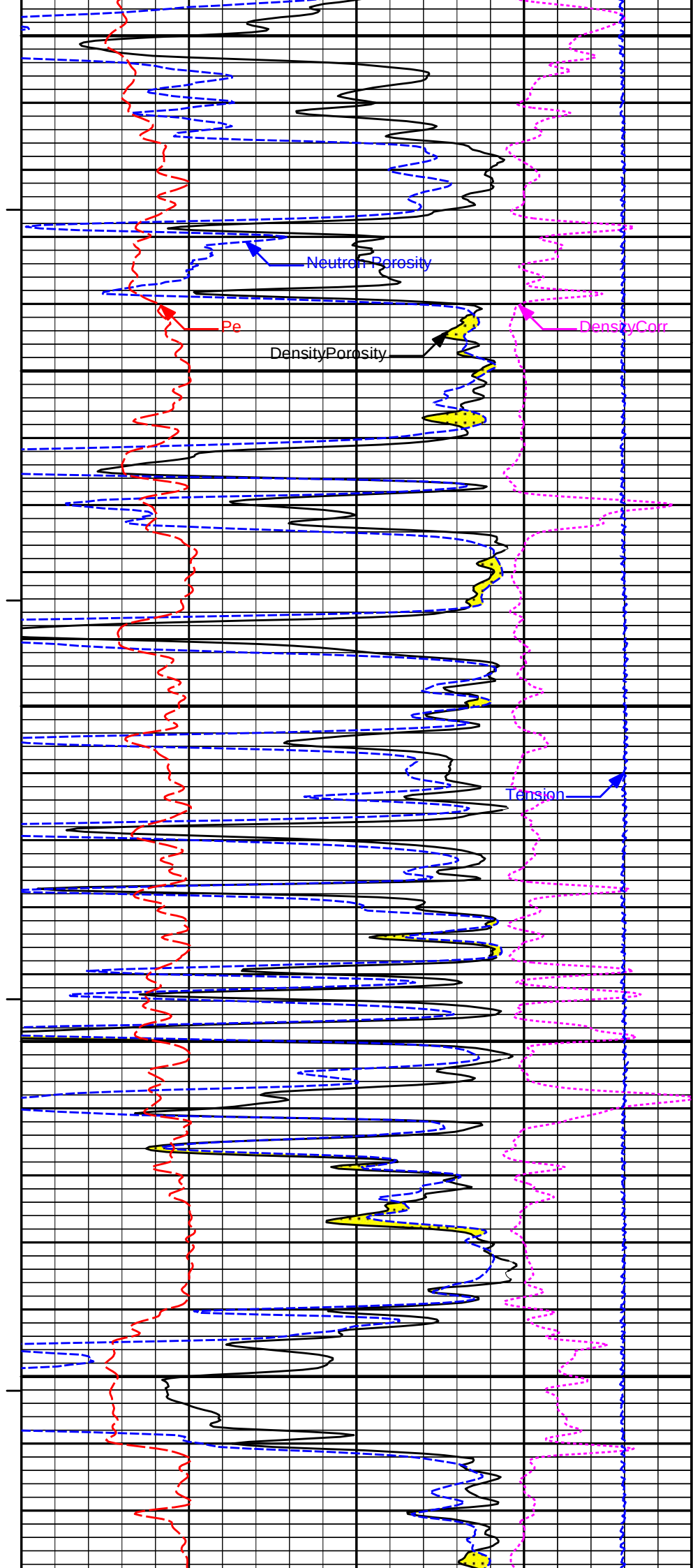
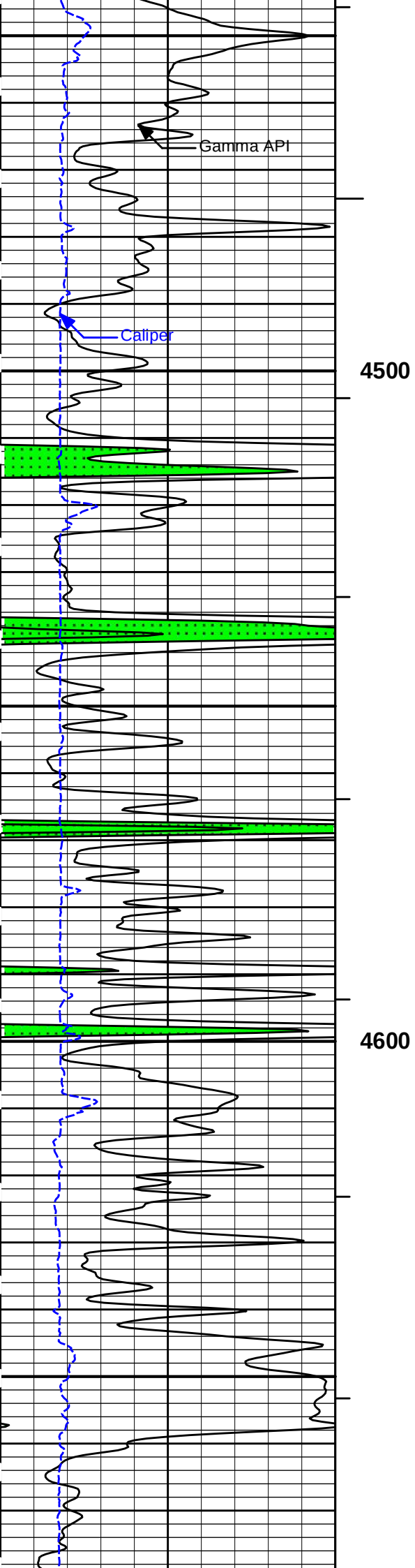
MAIN SECTION 5" PER 100'

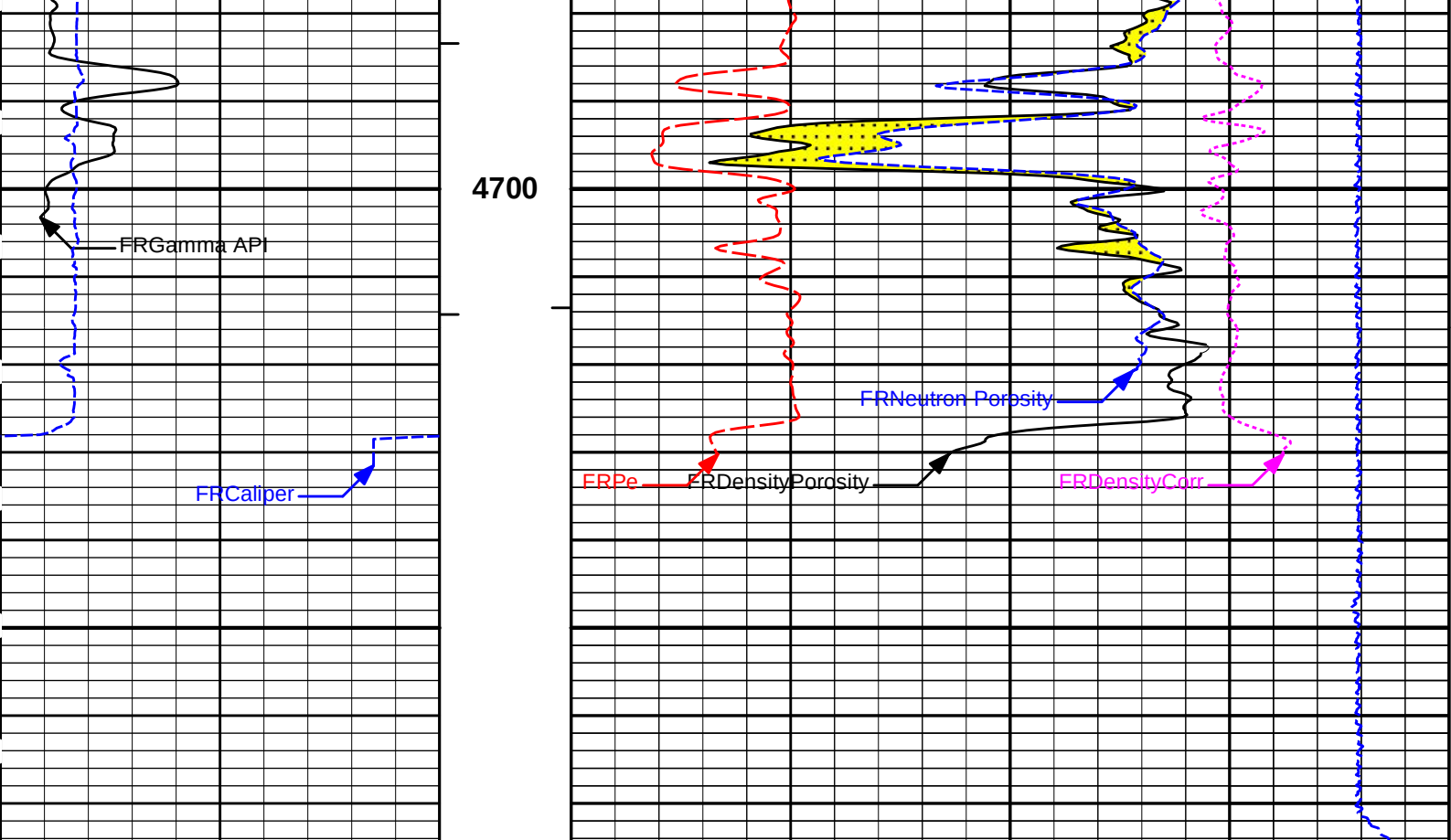












6	Caliper	16	1 : 240	0	Pe	10	-0.25	DensityCorr	0.25
	inches		ft					gram per cc	
0	Gamma API	150	AHVT				15K	Tension	0
	api							pounds	
			BHVT	30	DensityPorosity				-10
					%				
				30	Neutron Porosity				-10
					%				

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Plot Time: 23-Apr-17 12:30:25
Plot Range: 3695 ft to 4774.33 ft
Data: CULBREATH-VOTH\Well Based\MAIN\
Plot File: \\PORO\Poros_IQ_5_MAIN

5 INCH MAIN LOG

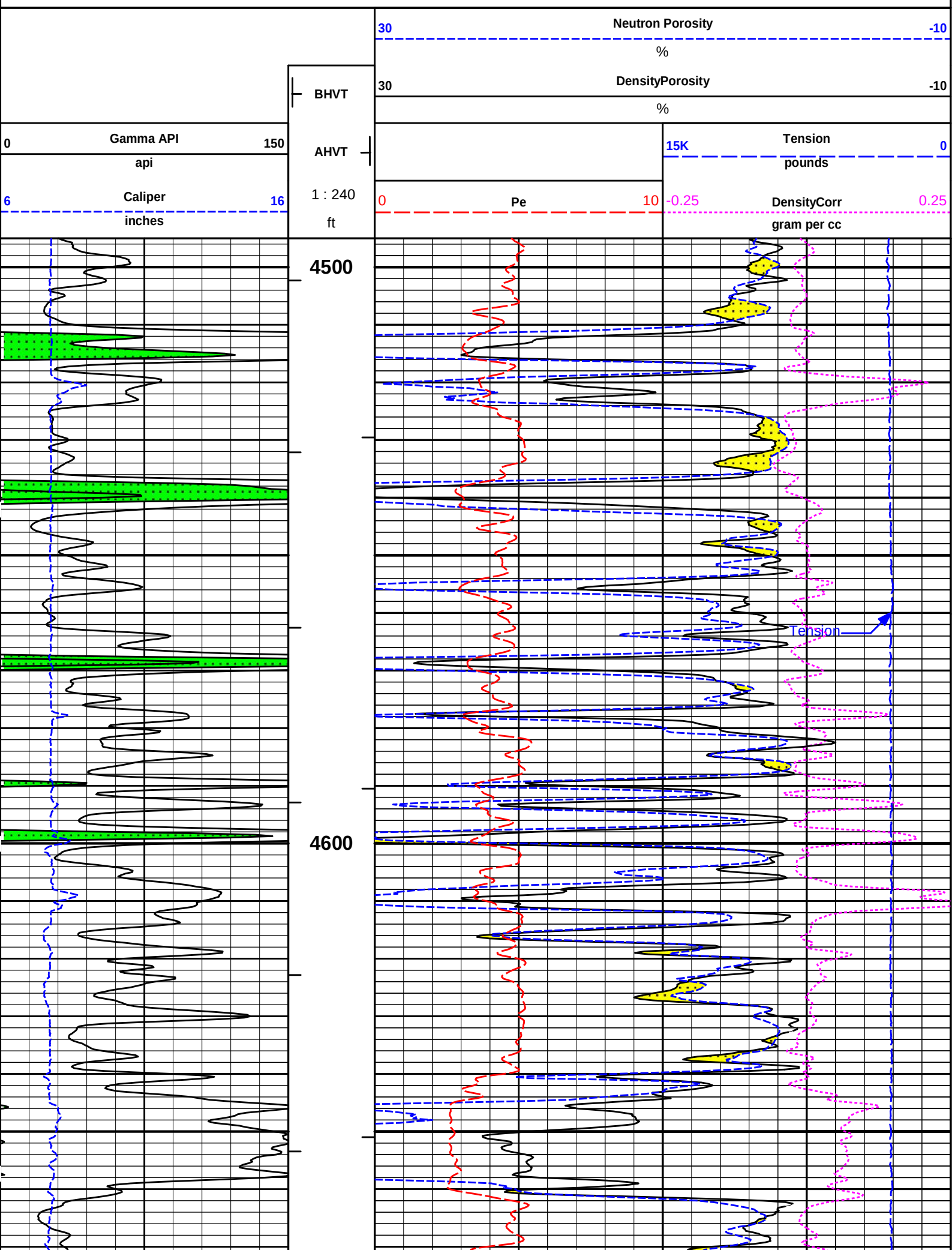
MAIN SECTION 5" PER 100'

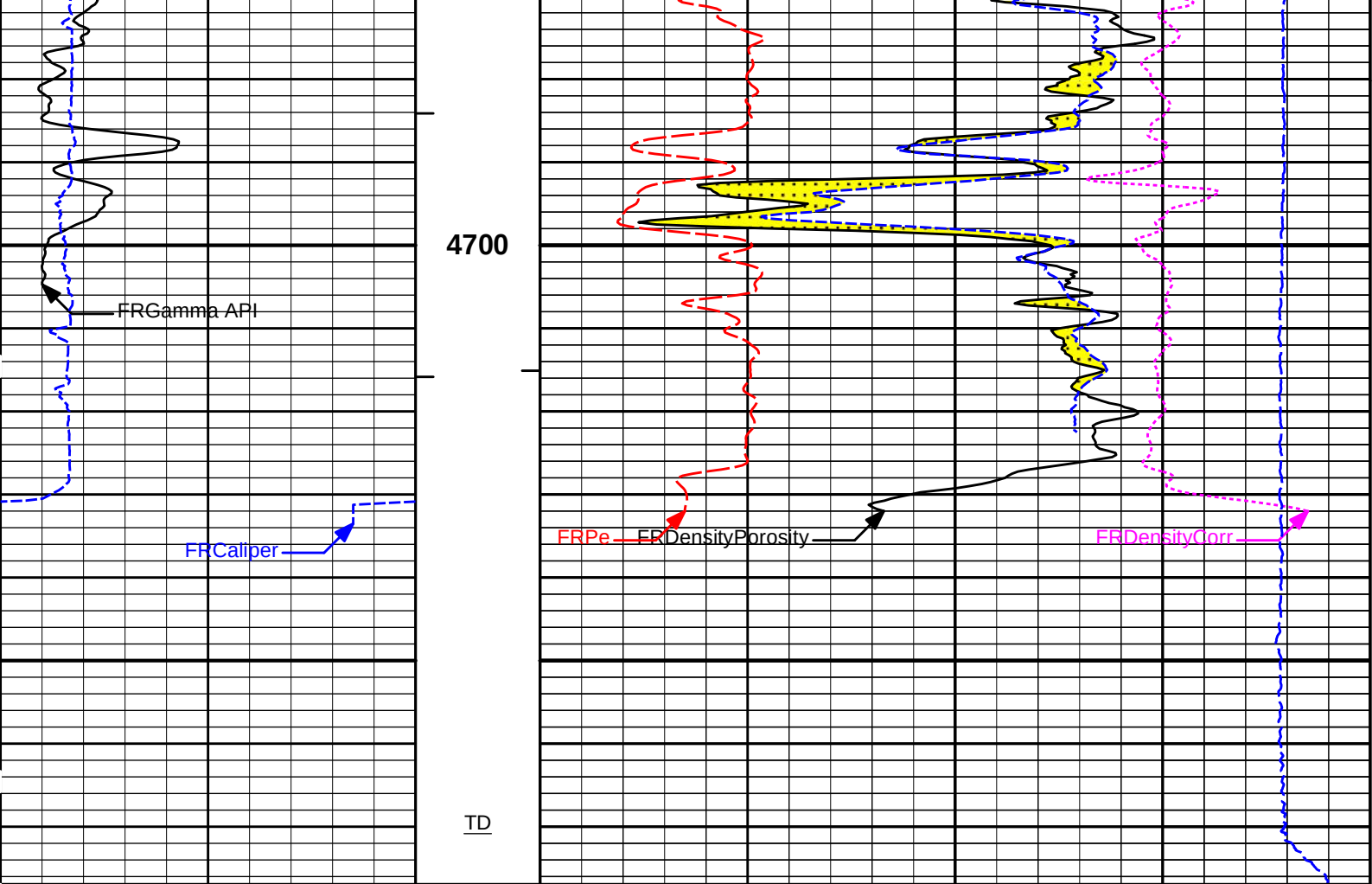
HALLIBURTON

Plot Time: 23-Apr-17 12:30:25
Plot Range: 4495 ft to 4776.92 ft
Data: CULBREATH-VOTH\Well Based\REPEAT\
Plot File: \\PORO\Poros_IQ_5_MAIN

5 INCH REPEAT LOG

REPEAT SECTION 5" PER 100'





6	Caliper	16	1 : 240	0	Pe	10	-0.25	DensityCorr	0.25
	inches		ft					gram per cc	
0	Gamma API	150	AHVT				15K	Tension	0
	api							pounds	
			BHVT	30	DensityPorosity				-10
					%				
				30	Neutron Porosity				-10
					%				

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Plot Time: 23-Apr-17 12:30:26
Plot Range: 4495 ft to 4776.92 ft
Data: CULBREATH-VOTH\Well Based\REPEAT\
Plot File: \\POROI\Poroi_Q_5_MAIN

5 INCH REPEAT LOG

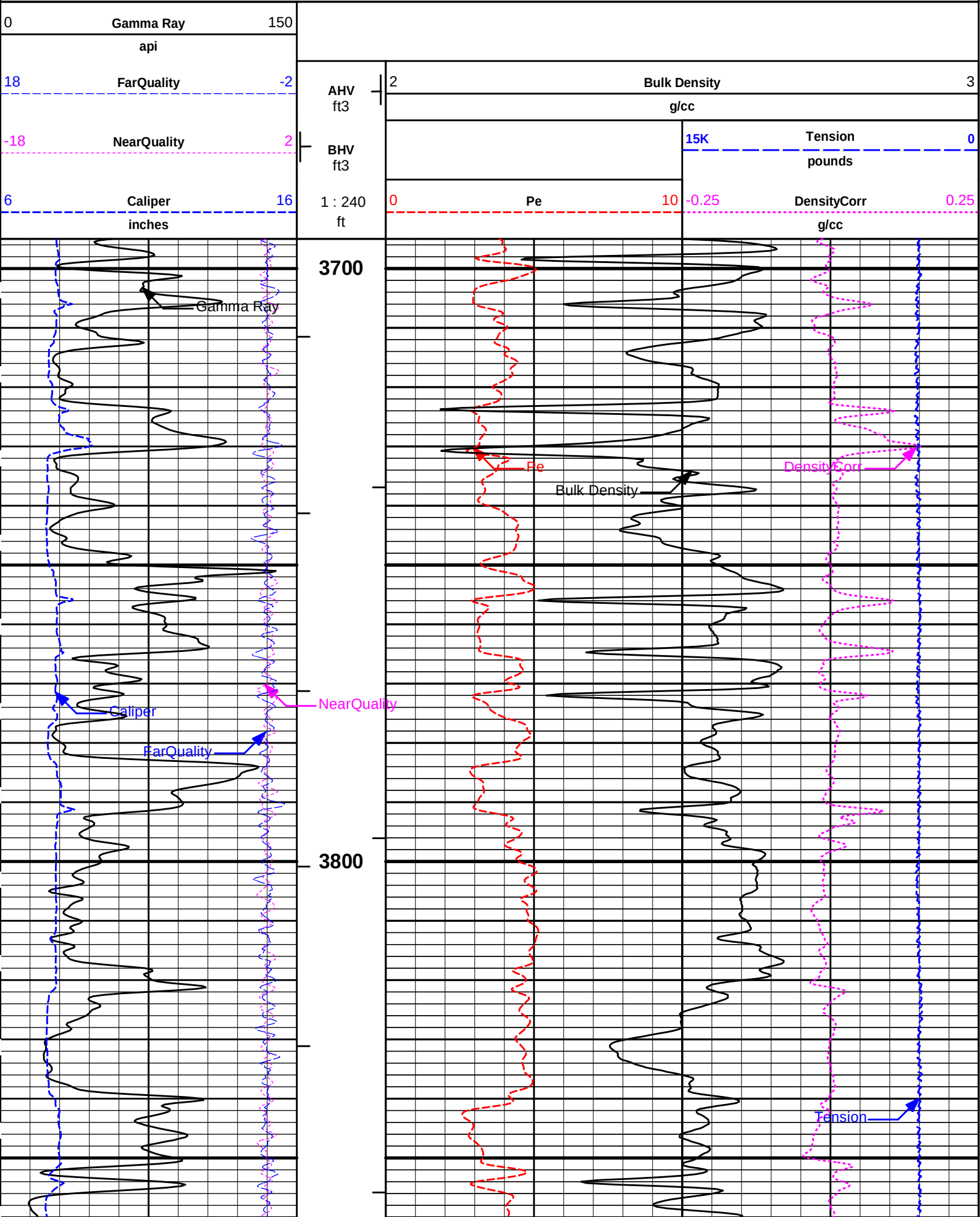
REPEAT SECTION 5" PER 100'

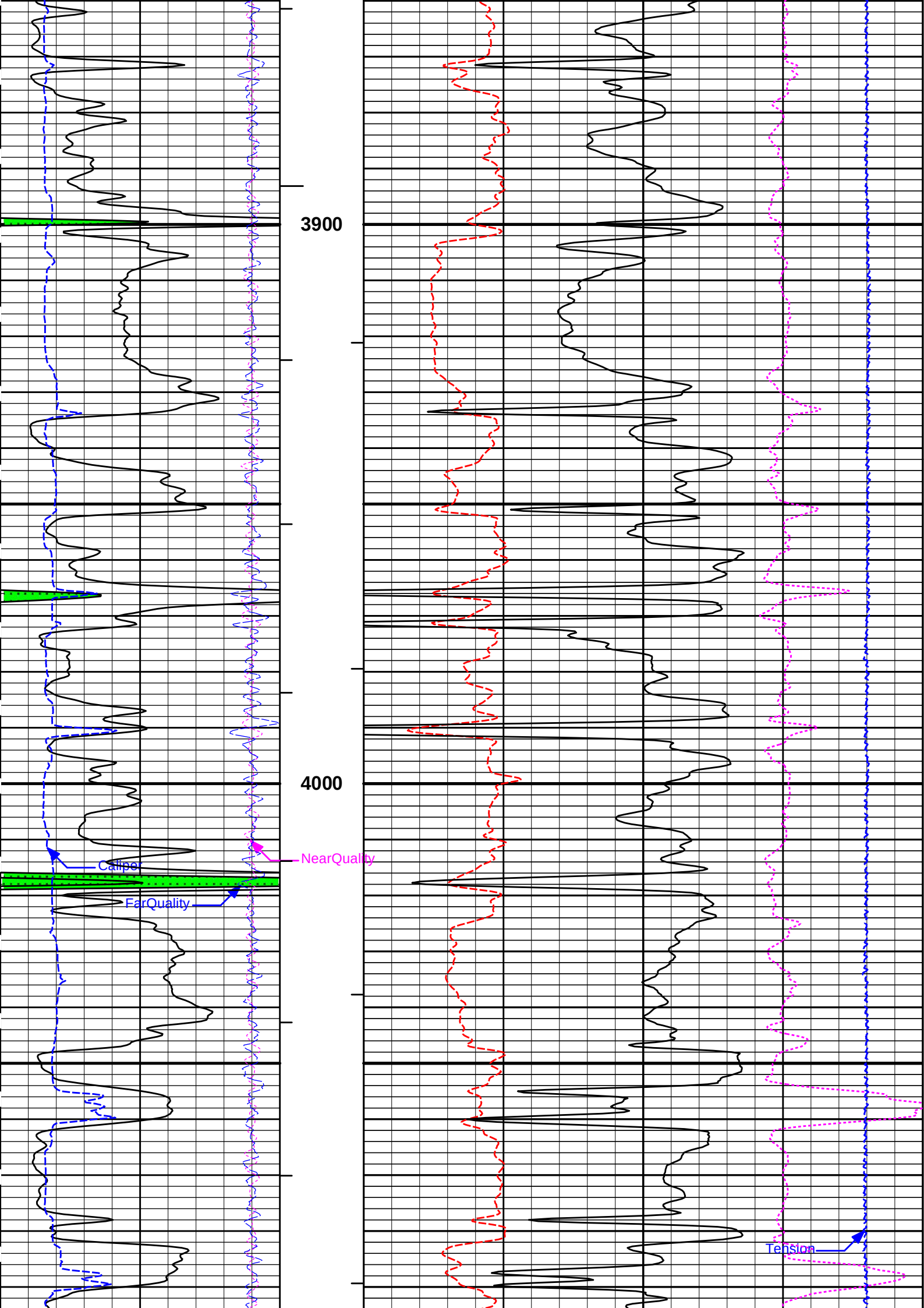
HALLIBURTON

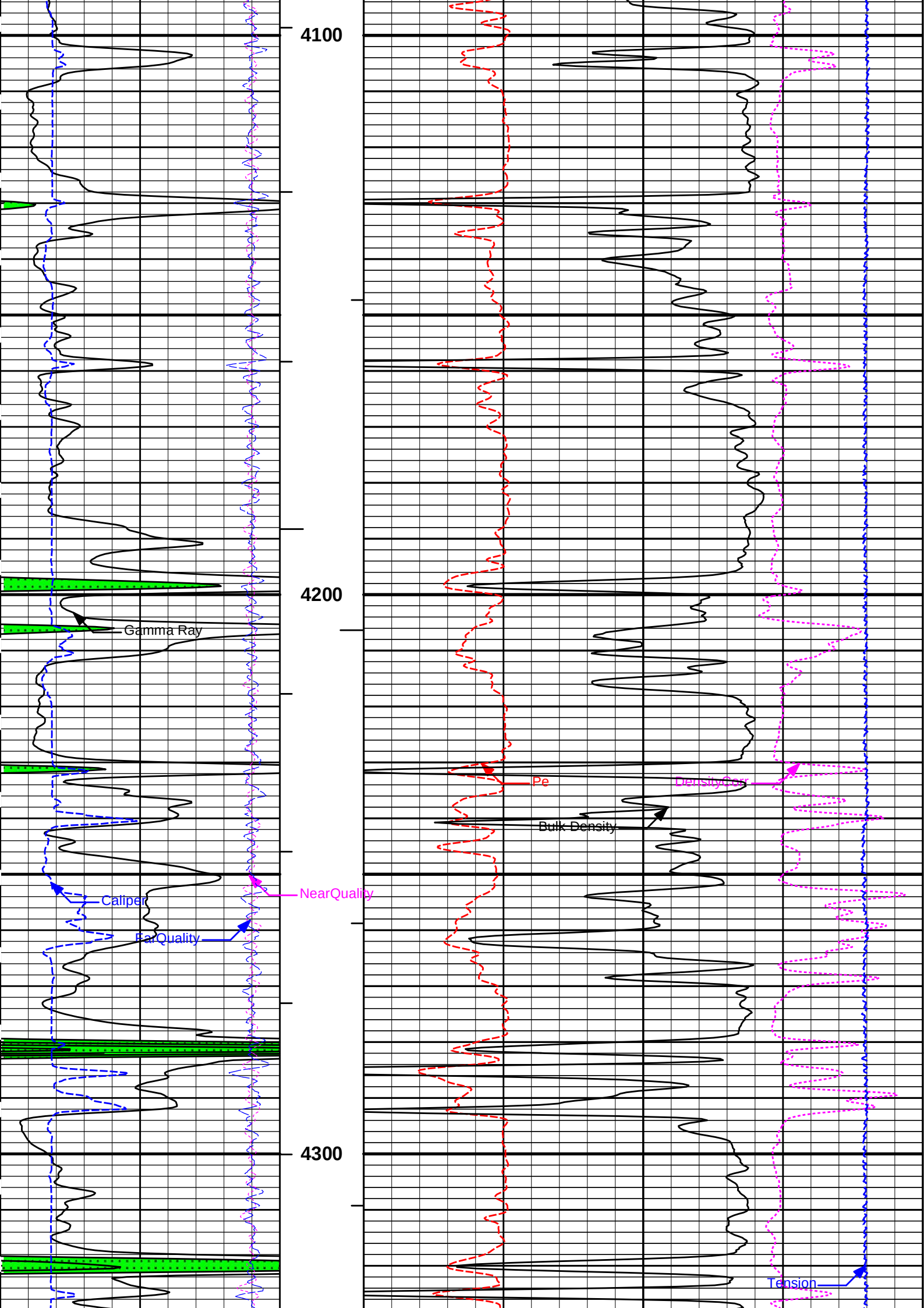
Plot Time: 23-Apr-17 12:30:27
Plot Range: 3695 ft to 4774.33 ft
Data: CULBREATH-VOTH\Well Based\MAIN\
Plot File: \\-LOCAL-\\CULBREATH-VOTH\0001 GTET-IDT-DSNT-SDLT-BSAT-ACR\I\POROI\BULKD_5_MAIN_IQ

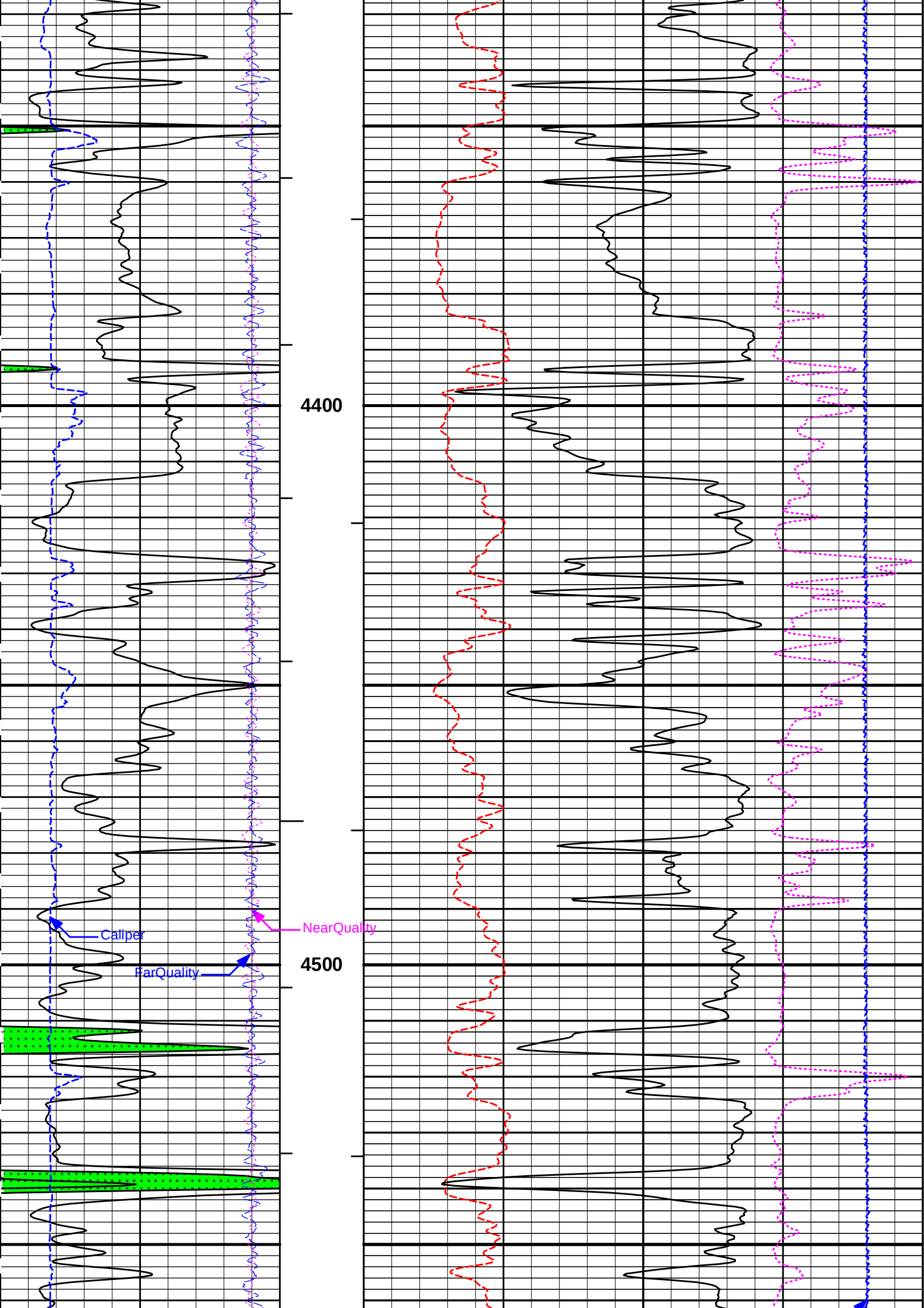
5 INCH MAIN LOG

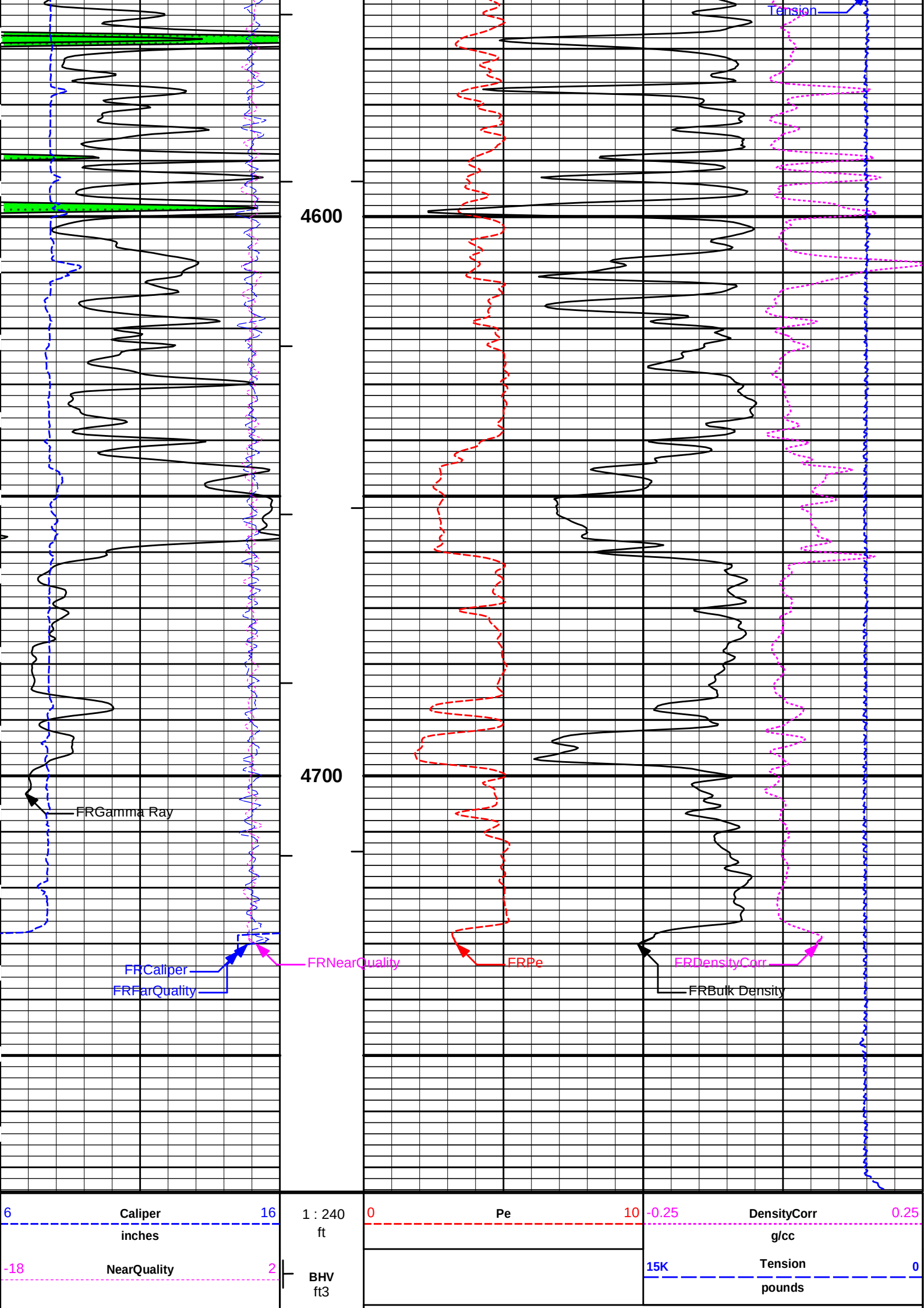
MAIN SECTION 5" PER 100'

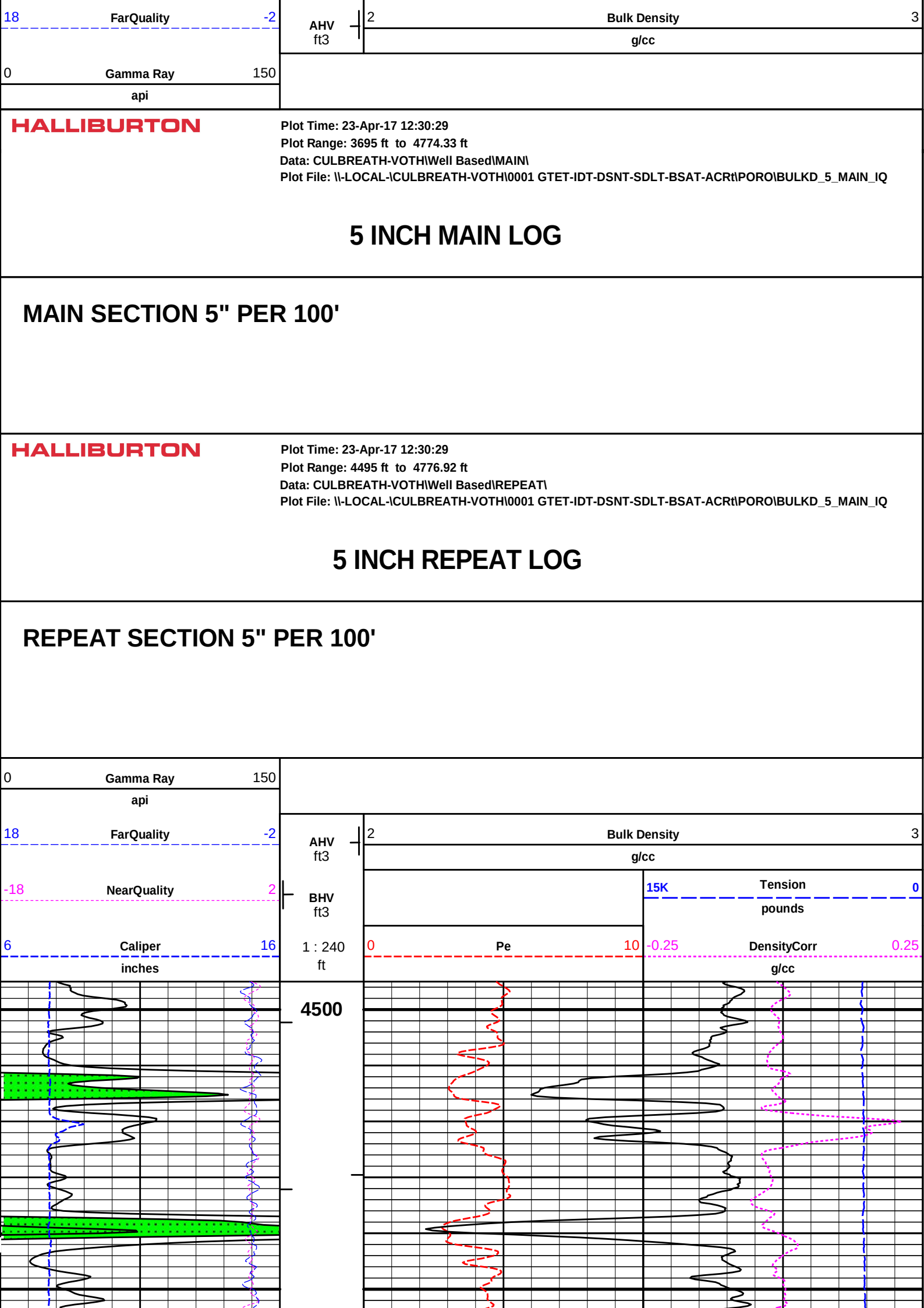


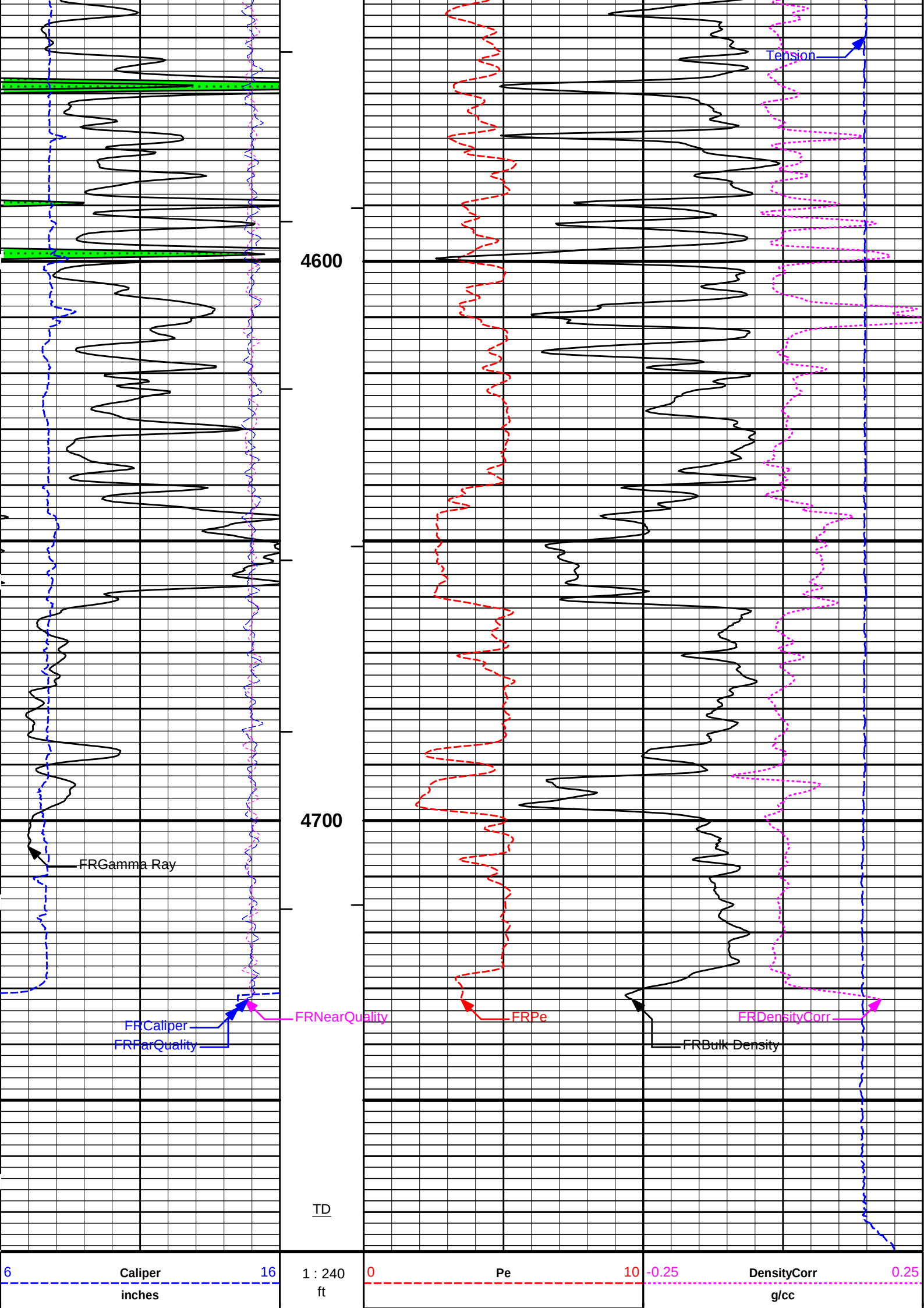












-18	NearQuality	2	BHV ft3		15K	Tension	0	
						pounds		
18	FarQuality	-2	AHV ft3	2	Bulk Density			3
					g/cc			
0	Gamma Ray	150						
	api							

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Plot Time: 23-Apr-17 12:30:30
 Plot Range: 4495 ft to 4776.92 ft
 Data: CULBREATH-VOTH\Well Based\REPEAT\
 Plot File: \\-LOCAL-\\CULBREATH-VOTH\0001 GTET-IDT-DSNT-SDLT-BSAT-ACRt\POROI\BULKD_5_MAIN_IQ

5 INCH REPEAT LOG

REPEAT SECTION 5" PER 100'

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PARAMETERS REPORT

Depth (ft)	Tool Name	Mnemonic	Description	Value	Units
TOP					
	GTET	GEOK	Process Gamma Ray EVR?	No	
	DSNT	DEOK	Process DSN EVR?	No	
	SDLT Pad	DNOK	Process Density EVR?	No	
2550.00					
	GTET	GEOK	Process Gamma Ray EVR?	Yes	
	DSNT	DEOK	Process DSN EVR?	Yes	
	SDLT Pad	DNOK	Process Density EVR?	Yes	
2650.00					
	GTET	GEOK	Process Gamma Ray EVR?	No	
	DSNT	DEOK	Process DSN EVR?	No	
	SDLT Pad	DNOK	Process Density EVR?	No	
3600.00					
	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	9.300	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	1.200	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	4470.00	ft
	SHARED	BHT	Bottom Hole Temperature	130.0	degF
	SHARED	CVTM	Navigation and Core Monitor Tool	IDT	

	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	Density	
	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	Gradient	
	DSNT	DNTT	Top Zone Temperature Value	75.0	degF
	DSNT	DNBT	DSN Bottom Zone Temperature Value	130.0	degF
	DSNT	DTDT	Top Depth for Temperature Gradient Calculation (Measured Depth)	0	ft
	DSNT	DBDT	Bottom Zone Temperature Depth (Measured Depth)	4470	ft
	DSNT	DPRS	DSN Pressure Correction Type	Gradient	
	DSNT	DNTP	DSN Top Zone Pressure Value	14.70	psia
	DSNT	DNBP	DSN Bottom Zone Pressure Value	2160.00	psia
	DSNT	DTDP	Top Depth for Pressure Gradient Calculation (Measured Depth)	0	ft
	DSNT	DNDP	Bottom Zone Pressure Depth (Measured Depth)	4470	ft
	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	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	1.19	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	SDLT	
	ACRt Sonde	MBFL	Apply Corkscrew Effect?	No	
BOTTOM_____					
Data: CULBREATH-VOTH\0001 GTET-IDT-DSNT-SDLT-BSAT-ACRt\IDLE				Date: 23-Apr-17 11:46:29	



CALIBRATION REPORT

NATURAL GAMMA RAY TOOL SHOP CALIBRATION					
Tool Name:	GTET - 11021139			Reference Calibration Date:	09-Mar-17 09:49:05
Engineer:	COTHREN			Calibration Date:	04-Apr-17 10:41:33
Software Version:	WL INSITE R5.0.5 (Build 8)			Calibration Version:	1

Calibrator Source S/N: TB-79			
Calibrator API Reference:222.00 api			
Equivalent Calibrator API Reference:225.9 api			
Measurement	Measured	Calibrated	Units
Background	57.8	57.3	api
Background + Calibrator	285.8	283.2	api
Calibrator	228.0	225.9	api

NATURAL GAMMA RAY TOOL FIELD CALIBRATION					
Tool Name:	GTET - 11021139			Reference Calibration Date:	04-Apr-17 10:41:33
Engineer:	MICHAEL RICHTER			Calibration Date:	22-Apr-17 14:55:37
Software Version:	WL INSITE R5.0.5 (Build 8)			Calibration Version:	1

Calibrator Source S/N: TB-79			
Calibrator API Reference:222.00 api			
Equivalent Calibrator API Reference:225.9 api			
Field Verification	Shop	Field	Units
Background	57.3	83.5	api
Background + Calibrator	283.2	306.3	api
Calibrator	225.9	222.8	api
Shop	Field	Difference	Tolerance
225.9	222.8	3.1	+/- 9.00

ACCELEROMETER AND MAGNETOMETER SHOP CALIBRATION					
Tool Name:	IDT - 10886210			Reference Calibration Date:	11-Sep-13 09:56:55
Engineer:	COTHREN			Calibration Date:	25-Jan-17 10:18:05
Software Version:	WL INSITE R3.8.11 (Build 5)			Calibration Version:	1

Reference Gravity Field: 1.0000 g					
Reference Magnetic Field: 50460.0000 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
0.1170	-0.7038	-0.0075	1.0006	99.9387	1
-0.6962	-0.2415	-0.0068	0.9999	99.9859	1
-0.3789	0.6500	-0.0068	1.0005	99.9500	1
0.6070	0.3883	-0.0070	1.0003	99.9672	1
-0.0450	0.7461	-0.0081	0.9995	99.9480	1
0.1237	0.6966	0.1005	0.9997	99.9726	1
0.0226	0.7461	-0.0080	1.0003	99.9719	1
0.7055	0.0732	-0.0078	0.9997	99.9705	1
-0.0955	-0.7114	-0.0079	0.9995	99.9469	1
-0.7405	0.0713	-0.0072	1.0001	99.9880	1
-0.0127	-0.0048	0.3525	1.0000	99.9962	1
-0.5825	0.4107	-0.1274	0.9999	99.9877	1

ACCELEROMETER QUALITY SUMMARY		
Average Calculated Gravity Field	1.0000	g
Standard Deviation Calculated Gravity Field	0.0004	g

ACCELEROMETER GAIN AND OFFSET		
	GAIN	OFFSET
ACC X	1.3786879778	0.0238322336
ACC Y	1.3669184446	-0.0211965907
ACC Z	2.7440507412	0.0323048159

* 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
0.3918	1.1389	0.0460	51269.4883	98.3958	1
1.2939	-0.1774	0.0442	53830.5352	93.3204	1
0.0457	-1.2198	0.0463	48418.7617	95.9547	1
-1.2987	-0.0637	0.0472	50465.0508	99.9900	1
0.1171	-1.0663	0.6452	51270.4609	98.3939	1
-0.4146	-1.2742	-0.7960	57316.0742	86.4128	1
-0.2399	-1.0723	-0.5925	45551.1289	90.2718	1
-1.1757	0.0689	-0.5913	48112.2813	95.3474	1
0.3050	1.0320	-0.5860	48321.9570	95.7629	1
1.1505	-0.2652	-0.5836	50830.0977	99.2666	1
0.4006	-0.2668	1.0640	49061.9805	97.2295	1
0.7989	-0.7410	-0.2535	43983.9492	87.1660	1

MAGNETOMETER QUALITY SUMMARY		
Average Calculated Magnetic Field	49869.3125	nT
Standard Deviation Calculated Magnetic Field	3540.2725	nT

MAGNETOMETER GAIN AND OFFSET		
	GAIN	OFFSET
MAG X	39723.9960937500	1662.5780029297
MAG Y	40483.8515625000	1636.6678466797
MAG Z	36978.4453125000	5536.4555664063

Noise Level Value: 0.000195 cnts

Noise Level Cal Value: 0.0005 g

DUAL SPACED NEUTRON SHOP CALIBRATION

Tool Name:	DSNT - 11055304	Reference Calibration Date:	09-Jan-16 12:37:16
Engineer:	JORGE ORLANDO PEREZ	Calibration Date:	28-Feb-16 11:55:56

Software Version: WL INSITE R4.6.0 (Build 4)

Calibration Version: 1

Logging Source S/N: DSN-424

Tank Serial Number: EL RENO TANK

Reference value assigned to Tank: 56.100

Snow Block S/N: 10013313

Calibration Tank Water Temperature: 54 degF

Min. Tool Housing Outside Diameter: 3.625 in

CALIBRATION CONSTANTS

Measurement	Prev. Value	New Value	Control Limit On New Value
Gain:	1.03943	1.04030	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):	0.2355	0.2358	0.0003	+/- 0.0020
Calibrated Ratio:	10.5504	10.5593	0.009	+/- 0.050

VERIFIER

Measurement	Value	Control Limit
Snow-Block Porosity (decp):	0.0722	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:	28-Feb-16 11:55:56
Engineer:	MICHAEL RICHTER	Calibration Date:	22-Apr-17 15:01:29
Software Version:	WL INSITE R5.0.5 (Build 8)	Calibration Version:	1

Logging Source S/N: DSN-424

Snow Block S/N: 10013313

NEUTRON FIELD-CHECK SUMMARY				
	Shop	Field	Difference	Control Limit On Change
Snow-Block Porosity (decp):	0.0722	0.0606	-0.0116	+/- 0.0150

PASS/FAIL SUMMARY	
Block Change Check:	Passed
Snow Block Stat Check:	Passed
Temperature Check:	Passed

DENSITY CALIPER SHOP CALIBRATION			
Tool Name:	SDLT - 11014296	Reference Calibration Date:	06-Nov-16 12:09:13
Engineer:	MICHAEL RICHTER	Calibration Date:	15-Mar-17 09:33:53
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	-4335.63	-4512.85	-7000.00 - -1000.00
Pad Gain	0.0003910	0.0004190	0.0002000 - 0.0006000
Arm Offset	-3121.03	-2559.45	-5000.00 - 3000.00
Arm Gain	0.0005117	0.0005078	0.0003000 - 0.0007000

Arm Gain0.000031170.000030780.0000300-0.0000700

Arm Power-0.000003980-0.000003959-0.000010000-0.000010000

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)	1.94	2.00	0.06	+/- 0.20
Medium Ring (in)	3.57	3.75	0.18	+/- 0.20
RING DIAMETER:				
Small Ring (in)	6.31	6.50	0.19	+/- 0.20
Medium Ring (in)	8.08	8.25	0.17	+/- 0.20
Large Ring (in)	14.92	15.00	0.08	+/- 0.20

PASS/FAIL SUMMARY	
Calibration-Coefficients Range Check:	Passed
Ring-Measurement Check:	Passed
PASS/FAIL SUMMARY	
Calibration-Coefficients Range Check:	Passed

MICRO LOG SHOP CALIBRATION

Tool Name:	Microlog Pad - 11014296	Reference Calibration Date:	20-Nov-15 12:51:13
Engineer:	WHITLOCK	Calibration Date:	11-Apr-17 09:44:13
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	-0.12	-0.11	-0.01	-0.00	ohmm
Calibration Point #1	-0.00	0.00	-0.00	0.00	ohmm
Calibration Point #2	20.05	20.00	20.04	20.00	ohmm
Internal Reference	19.92	19.87	20.02	19.98	ohmm
Measurement	Micro Log Normal Tool Value		Micro Log Lateral Tool Value		Units
Tool Zero	-0.06		0.27		V
Calibration Point #1	29.81		1.82		V
Calibration Point #2	5308.68		6876.40		V
Internal Reference	5273.83		6868.92		V

MICRO LOG FIELD CHECK

Tool Name:	Microlog Pad - 11014296	Reference Calibration Date:	11-Apr-17 09:44:13
Engineer:	WHITLOCK	Calibration Date:	11-Apr-17 09:45:42
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	-0.11	-0.11	-0.00	-0.00	ohmm
Internal Reference	19.87	19.88	19.98	19.99	ohmm
Summary					
Signal	Shop	Field	Difference		Tolerance
Microlog Normal	19.87	19.88	-0.01		+/- 0.80
Microlog Lateral	19.98	19.99	-0.01		+/- 0.80

SPECTRAL DENSITY SHOP CALIBRATION

Tool Name:	SDL T Pad - 10800120	Reference Calibration Date:	10-Apr-17 20:21:56
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Tool Name: SDET Pad - 10809130		Reference Calibration Date: 10-Apr-17 20:21:56	
Engineer:	WHITLOCK	Calibration Date:	10-Apr-17 20:40:54
Software Version:	WL INSITE R5.0.5 (Build 8)	Calibration Version:	1

Logging Source S/N: 20791B

Aluminum Block S/N: EL RENO ALUMINUM

Density: 2.581g/cc

Pe: 3.170

Magnesium Block S/N: EL RENO MAGNESIUM

Density: 1.687g/cc

Pe: 2.594

DENSITY CALIBRATION SUMMARY			
Measurement	Previous Value	New Value	Control Limit
Near Bar Gain	1.0252	1.0292	0.90 - 1.10
Near Dens Gain	1.0238	1.0238	0.90 - 1.10
Near Peak Gain	1.0569	1.0475	0.90 - 1.10
Near Lith Gain	1.0476	1.0347	0.90 - 1.10
Far Bar Gain	1.0089	1.0084	0.90 - 1.10
Far Dens Gain	1.0013	0.9990	0.90 - 1.10
Far Peak Gain	0.9955	0.9963	0.90 - 1.10
Far Lith Gain	0.9736	0.9684	0.90 - 1.10
Near Bar Offset	0.0255	-0.0107	NONE
Near Dens Offset	0.0342	0.0331	NONE
Near Peak Offset	-0.2392	-0.1586	NONE
Near Lith Offset	-0.2273	-0.1225	NONE
Far Bar Offset	0.1051	0.1103	NONE
Far Dens Offset	0.1495	0.1705	NONE
Far Peak Offset	0.1554	0.1474	NONE
Far Lith Offset	0.2525	0.2957	NONE
Near Bar Background	819.55	817.45	700 - 1450
Near Dens Background	269.04	267.82	230 - 480
Near Peak Background	115.15	117.34	100 - 210
Near Lith Background	145.84	146.21	125 - 260
Far Bar Background	482.13	483.93	450 - 900
Far Dens Background	184.89	185.04	175 - 345
Far Peak Background	72.17	74.10	70 - 140
Far Lith Background	76.41	76.31	75 - 145

CALIBRATION BLOCK SUMMARY				
Measurement	Current Reading (Previous Coef)	Calibrated (New Coef)	Change	Control Limit On Change
MAGNESIUM				
Density (g/cc)	1.686	1.687	0.001	+/- 0.015
Pe	2.536	2.559	0.023	+/- 0.150
ALUMINUM				
Density (g/cc)	2.580	2.581	0.002	+/- 0.01500
Pe	3.130	3.132	0.002	+/- 0.150

TOOL SUMMARY				
Measurement	Near Detector		Far Detector	
	Value	Control Limits	Value	Control Limits
QUALITY				
Background	-0.0012	+/- 0.0110	0.0004	+/- 0.0140
Magnesium Block	-0.0010	+/- 0.0110	0.0002	+/- 0.0140
Aluminum Block	-0.0004	+/- 0.0110	-0.0001	+/- 0.0140
Resolution	8.92	6.00 - 11.50	9.36	6.00 - 11.50
Internal Verifier(B+D+P+L)	1349	1200 - 2700	819	800 - 1700

PASS/FAIL SUMMARY				
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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
Changes in Calibration Blocks:	Passed

SPECTRAL DENSITY FIELD CHECK			
Tool Name:	SDLT Pad - 10809130	Reference Calibration Date:	10-Apr-17 20:40:54
Engineer:	MICHAEL RICHTER	Calibration Date:	22-Apr-17 14:49:18
Software Version:	WL INSITE R5.0.5 (Build 8)	Calibration Version:	1

Pad Temperature: 73.3 degF				
DENSITY FIELD CALIBRATION SUMMARY				
Measurement	Shop	Field	Change	Control Limit +/-
Near (B+D+P+L) cps	1348.818	1348.711	-0.107	14.850
Far (B+D+P+L) cps	819.384	813.523	-5.861	15.795
Near Resolution	8.92	8.92	0.000	0.50
Far Resolution	9.36	9.36	0.000	1.00
PASS/FAIL SUMMARY				
Bkg Quality Check:	Passed			
Bkg Resolution Check:	Passed			
Bkg Verification Check:	Passed			

BSAT FIELD CASING CHECK			
Tool Name:	BSAT - 10939049	Calibration Date:	30-Mar-17 10:01:32
Engineer:	HARRIS		
Software Version:	WL INSITE R5.0.5 (Build 8)	Calibration Version:	1

	Pre-Log Check	Check Depth	Shop	Field	Difference	Tolerance	Units	
	Delta-T Compensated	147.01	57.00	56.56	0.4400	1.00	uspf	

ARRAY COMPENSATED TRUE RESISTIVITY SHOP CALIBRATION			
Tool Name:	ACRt Sonde - 11038385	Reference Calibration Date:	05-May-16 10:57:48
Engineer:	JORGE ORLANDO PEREZ	Calibration Date:	10-Mar-17 15:21:18
Software Version:	WL INSITE R5.0.5 (Build 8)	Calibration Version:	1
Host Tool Name:	ACRt Instrument - 11055059		

TYPICAL GAIN RANGE									
Subarray	R12KHz			R36KHz			R72KHz		
	Lower	(mmho/m)	Upper	Lower	(mmho/m)	Upper	Lower	(mmho/m)	Upper
A1 (80")	0.95	1.0410	1.05	0.95	1.0202	1.05	0.95	1.0117	1.05
A2 (50")	0.95	1.0443	1.05	0.95	1.0232	1.05	0.95	1.0153	1.05
A3 (29")	0.95	1.0361	1.05	0.95	1.0144	1.05	0.95	1.0046	1.05
A4 (17")	0.95	1.0347	1.05	0.95	1.0107	1.05	0.95	1.0027	1.05
A5 (10")	N/A	N/A	N/A	0.95	0.9960	1.05	0.95	0.9856	1.05
A6 (6")	N/A	N/A	N/A	0.95	0.9843	1.05	0.95	0.9760	1.05

SONDE OFFSET									
Subarray	R12KHz			R36KHz			R72KHz		
	(mmho/m)			(mmho/m)			(mmho/m)		
A1 (80")	1.272			-4.467			-5.746		
A2 (50")	-0.054			-3.931			-5.308		

A3 (29")	-12.184	-3.611	-3.477
A4 (17")	-110.282	-33.686	-26.284
A5 (10")	N/A	-81.228	-40.047
A6 (6")	N/A	328.812	169.756

TRANSMITTER CURRENT GAIN				R-MUD VERIFICATION			
Signal	Lower	R	Upper	Signal	Lower (ohm-m)	Measured (ohm-m)	Upper (ohm-m)
12K	0.6	0.86	1.3	Mud Cell	0.95	1.00	1.05
36K	1.0	1.34	2.0				
72K	1.0	1.60	2.0				

PASS/FAIL SUMMARY	
GAIN RANGE CHK	PASS
SONDE OFFSET CHK	PASS

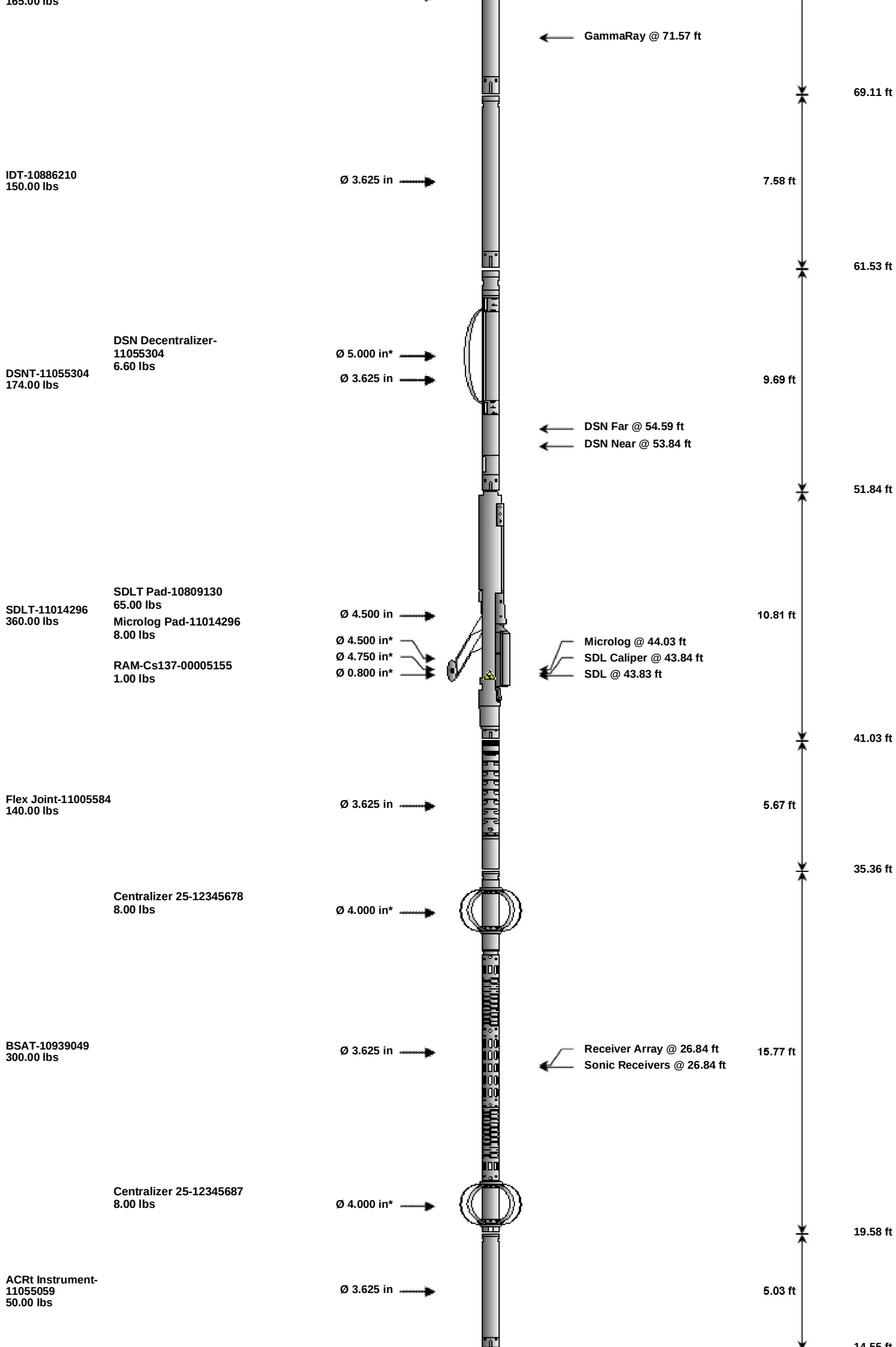
TOOL OK TO LOG

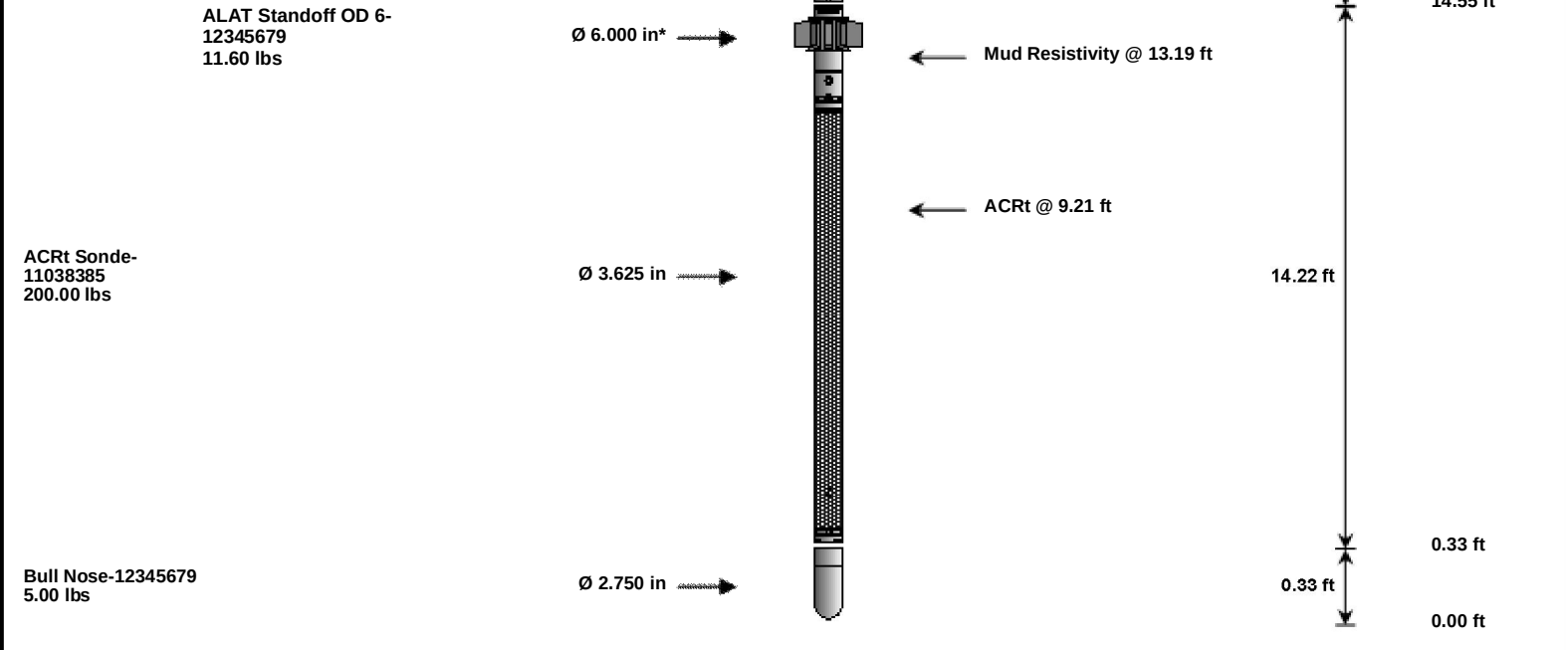
CALIBRATION SUMMARY						
Sensor	Shop	Field	Post	Difference	Tolerance	Units
GTET-11021139						
Gamma Ray Calibrator	225.9	222.8	-----	3.1	+/- 9.00	api
DSNT-11055304						
Snow-Block Porosity	0.0722	0.0606	-----	0.0116	+/- 0.0150	decp
SDLT-11014296						
Pad Extension	3.75	-----	-----	0.00	+/-0.20	in
Ring Diameter	8.25	-----	-----	0.00	+/-0.20	in
Microlog Pad-11014296						
MicroLog Normal	19.87	19.88	-----	-0.01	+/-0.80	ohmm
MicroLog Lateral	19.98	19.99	-----	-0.01	+/-0.80	ohmm
SDLT Pad-10809130						
Near(B+D+P+L)	1348.818	1348.711	-----	0.107	+/-14.850	cps
Far(B+D+P+L)	819.384	813.523	-----	5.861	+/-15.795	cps
ACRt Sonde-11038385						
Mud Cell	1.00	-----	-----	0	-----	ohm-m
Data: CULBREATH-VOTH\0001 GTET-IDT-DSNT-SDLT-BSAT-ACRt\IDLE					Date: 23-Apr-17 11:46:57	

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- 12345678 0.01 lbs	Ø 2.750 in Ø 0.010 in*		← Temperature @ 84.32 ft	2.50 ft	84.82 ft
XOHD-11569312 20.00 lbs		Ø 2.750 in Ø 3.625 in			0.95 ft	82.32 ft
						81.37 ft
SP Sub-10904995 60.00 lbs		Ø 3.625 in		← SP @ 79.59 ft	3.74 ft	
				← Z-Accelerometer @ 77.18 ft		77.63 ft
GTET-11021139 165.00 lbs		Ø 3.625 in			8.52 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	82.32	300.00
WP7K	Weak Point 7000 lbs		12345678	0.01	0.01	* 83.12	300.00
XOHD	Hostile to Dits Cross Over		11569312	20.00	0.95	81.37	300.00
SP	SP Sub		10904995	60.00	3.74	77.63	300.00
GTET	Gamma Telemetry Tool		11021139	165.00	8.52	69.11	60.00
IDT	Insite Directional Tool		10886210	150.00	7.58	61.53	60.00
DSNT	Dual Spaced Neutron		11055304	174.00	9.69	51.84	60.00
DCNT	DSN Decentralizer		11055304	6.60	5.13	* 55.17	300.00
SDLT	Spectral Density Tool		11014296	360.00	10.81	41.03	60.00
SDLP	Density Insite Pad		10809130	65.00	2.55	* 43.24	60.00
Cs137	Logging Source, SDLT-I, 1.78 Ci - Cs137		00005155	1.00	0.80	* 43.47	300.00
MICP	Microlog Pad		11014296	8.00	1.00	* 43.53	60.00
FLEX	Flex Joint		11005584	140.00	5.67	35.36	300.00
BSAT	Borehole Sonic Array Tool		10939049	300.00	15.77	19.58	60.00
OBCEN	Centralizer - 25 in. Overbody		12345687	8.00	2.08	* 19.74	300.00
OBCEN	Centralizer - 25 in. Overbody		12345678	8.00	2.08	* 32.51	300.00
ACRt	Array Compensated True Resistivity Instrument Section		11055059	50.00	5.03	14.55	120.00
ACRt	Array Compensated True Resistivity Sonde Section		11038385	200.00	14.22	0.33	120.00
ALATS	Array Laterolog Tool OD 6 Standoff		12345679	11.60	1.00	* 13.19	60.00
BLNS	Bull Nose		12345679	5.00	0.33	0.00	300.00
Total				1,769.71	84.82		
* Not included in Total Length and Length Accumulation.							
Data: CULBREATH-VOTH\0001 GTET-IDT-DSNT-SDLT-BSAT-ACRt\IDLE							
Date: 23-Apr-17 11:45:57							

COMPANY	CULBREATH OIL & GAS COMPANY, INC.		
WELL	VOTH #1-4		
FIELD	UNNAMED		
COUNTY	LOGAN	STATE	KANSAS
HALLIBURTON		SPECTRAL DENSITY DUAL SPACED NEUTRON LOG	