HALLIBURTON

DUAL SPACED NEUTRON SPECTRAL DENSITY LOG

COMPANY	HARTMAN OIL COMPANY, INC
WELL	WARD #4 TWIN
FIELD/BLOCK	DAMME
COUNTY	FINNEY
STATE	KANSAS

COMPANY **HARTMAN OIL COMPANY, INC**
WELL **WARD #4 TWIN**
FIELD/BLOCK **DAMME**
COUNTY **FINNEY** STATE **KANSAS**

API No. 15-055-22481-00-00
Location (SHL) 330' FSL & 1475' FEL
E2 SE SW SE

Other Services:
DSNT/SDLT
MICROLOG
ACRT

Sect. 16 Twp. 22S Rge. 33W

Permanent Datum	GL	Elev. 2889.0 ft	Elev.: K.B.	2897.0 ft
Log measured from	KB	, 8.0 ft above perm. Datum	D.F.	2897.0 ft
Drilling measured from	KB		G.L.	2889.0 ft

Date		21-Mar-18				
Run No.		ONE				
Depth - Driller		4800.0 ft				
Depth - Logger		4803.0 ft				
Bottom - Logged Interval		4781.00 ft				
Top - Logged Interval		3700.00 ft				
Casing - Driller		8.625 in @ 344.0 ft		@		@
Casing - Logger		342.0 ft				
Bit Size		7.875 in		@		@
Type Fluid in Hole		Water Based Mud				
Density	Viscosity	9.1 ppg	51.00 s/qt			
PH	Fluid Loss	9.00 pH	8.0 cptm			
Source of Sample		MUD PIT				
Rm @ Meas. Temperature		0.86 ohmm @ 75.00 degF		@		@
Rmf @ Meas. Temperature		0.86 ohmm @ 75.00 degF		@		@
Rmc @ Meas. Temperature		1.02 ohmm @ 75.00 degF		@		@
Source Rmf	Rmc	MEAS	MEAS			
Rm @ BHT		0.56 ohmm @ 118.0 degF		@		@
Time Since Circulation		5.0 hr				
Time on Bottom		21-Mar-18 12:25				
Max. Rec. Temperature		118.00 degF @ 4803.0 ft		@		@
Equipment	Location	12147634	EL RENO			
Recorded By		JORGE ORLANDO PEREZ				
Witnessed By		KITT NOAH				

Fold here

Service Ticket No.: 904699315	API No.: 15-055-22481-00-00	PGM Version: WL INSITE R5.0.5 (Build 8)

CHANGE IN MUD TYPE OR ADDITIONAL SAMPLE					
Date	Sample No.				
Depth-Driller					
Type Fluid in Hole					
Density	Viscosity				
Ph	Fluid Loss				
Source of Sample					
Rm @ Meas. Temp		@		@	
Rmf @ Meas. Temp.		@		@	
Rmc @ Meas. Temp.		@		@	
Source Rmf	Rmc				
Rm @ BHT		@		@	
Rmf @ BHT		@		@	
Rmc @ BHT		@		@	

RESISTIVITY SCALE CHANGES

Type Log	Depth	Scale Up Hole	Scale Down Hole

RESISTIVITY EQUIPMENT DATA

Run No.	Tool Type & No.	Pad Type	Tool Pos.	Other
ONE	ACRT	N/A	1.5 S.O.	N/A
	I-11026095			
	S-11005908			

EQUIPMENT DATA

GAMMA		ACOUSTIC		DENSITY		NEUTRON	
Run No.	ONE	Run No.		Run No.	ONE	Run No.	ONE
Serial No.	11958947	Serial No.		Serial No.	10951315	Serial No.	11055304
Model No.	GTET	Model No.		Model No.	SDLT	Model No.	DSNT
Diameter	3.625"	No. of Cent.		Diameter	5.5"	Diameter	3.625"
Detector Model No.	T-102	Spacing		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	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	2.71 gr/cc	30	10	LIME

ONE	TD	CSG	REC	0	150				30	-10	2.71 gr/cc	30	-10	LIME

DIRECTIONAL INFORMATION

Maximum Deviation	@	KOP	@

Remarks: ANNULAR HOLE VOLUME CALCULATED FOR 5.5 INCH CASING

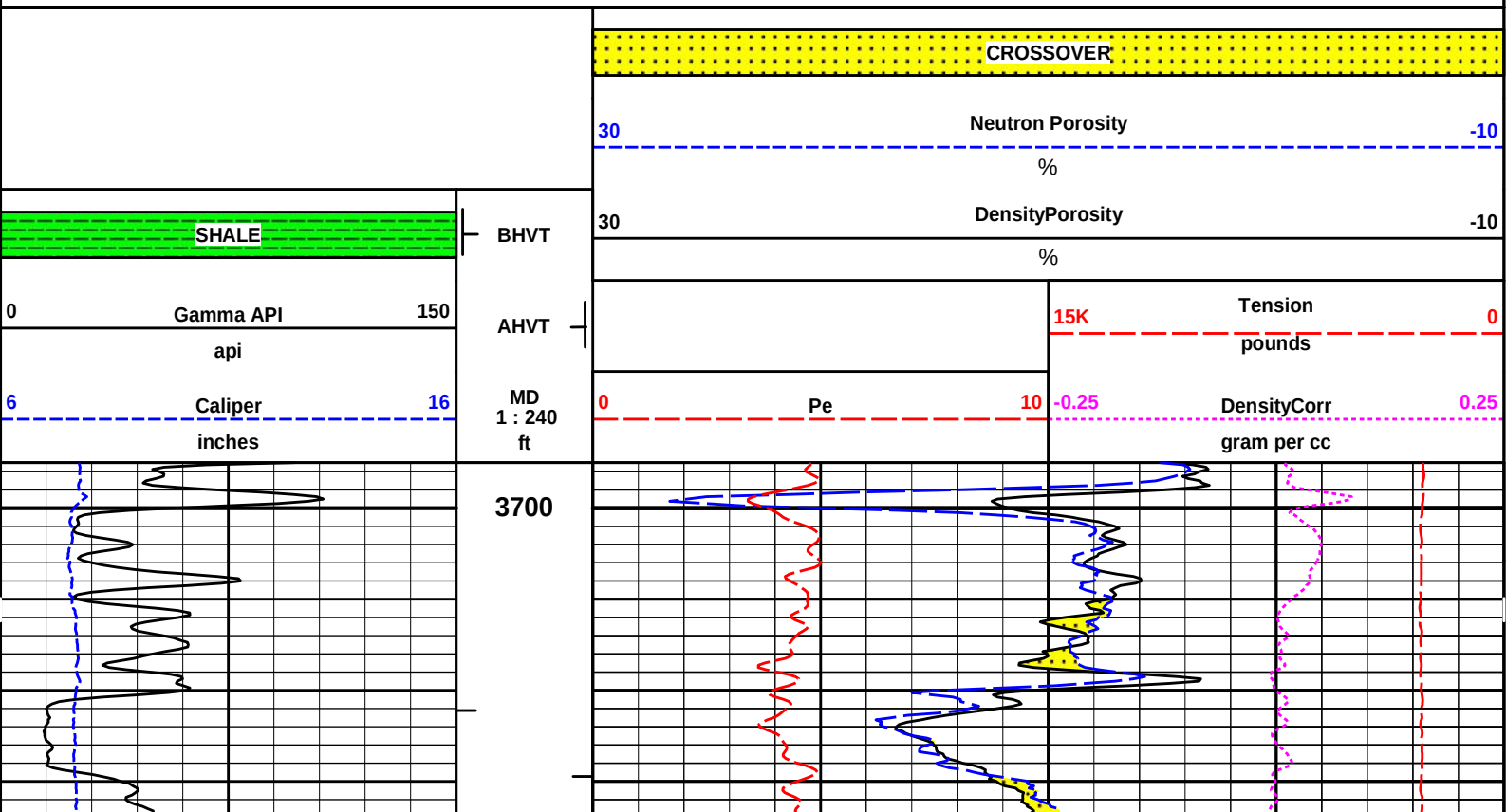
CHLORIDES REPORTED AT 2250 ppm

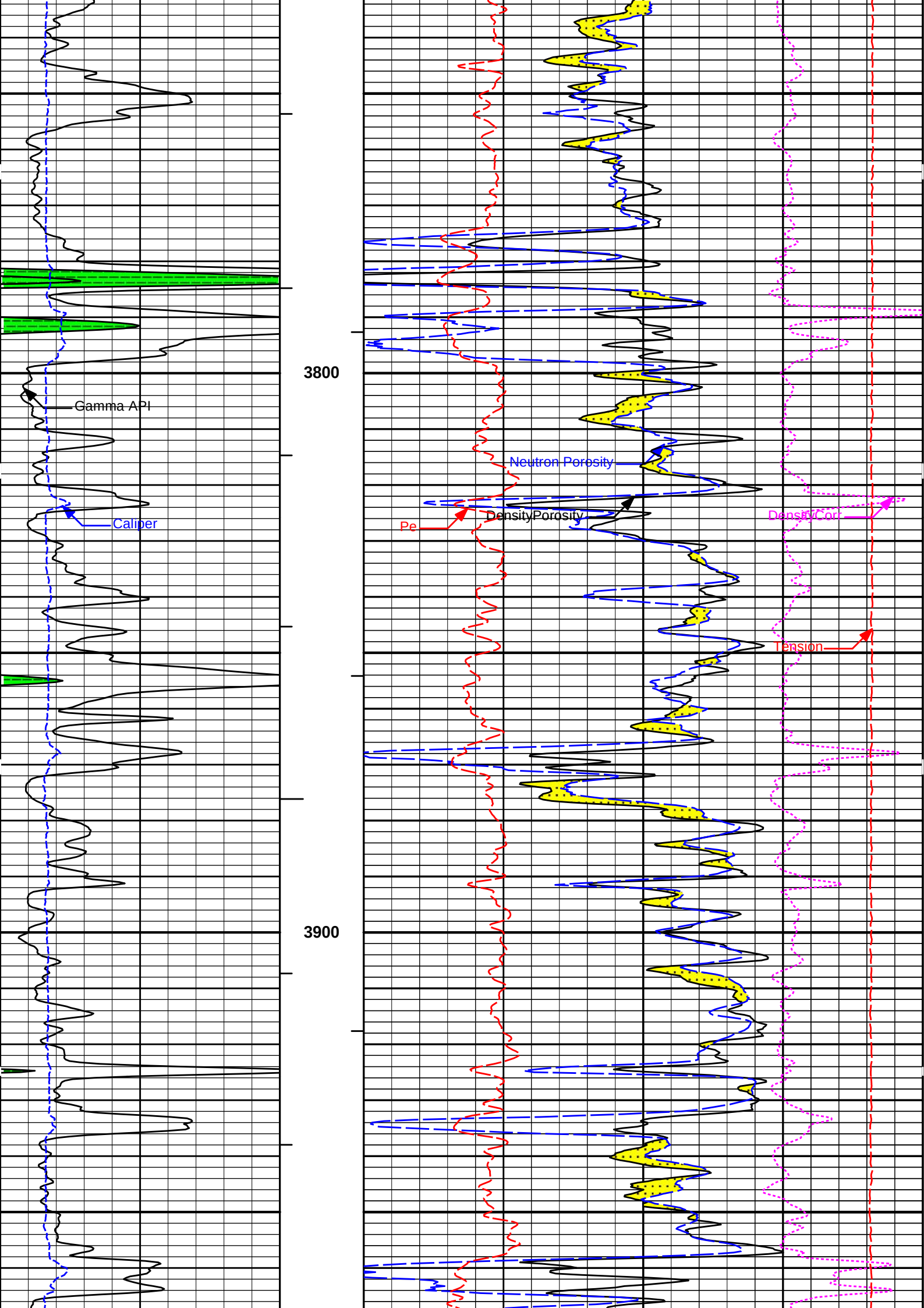
HALLIBURTON

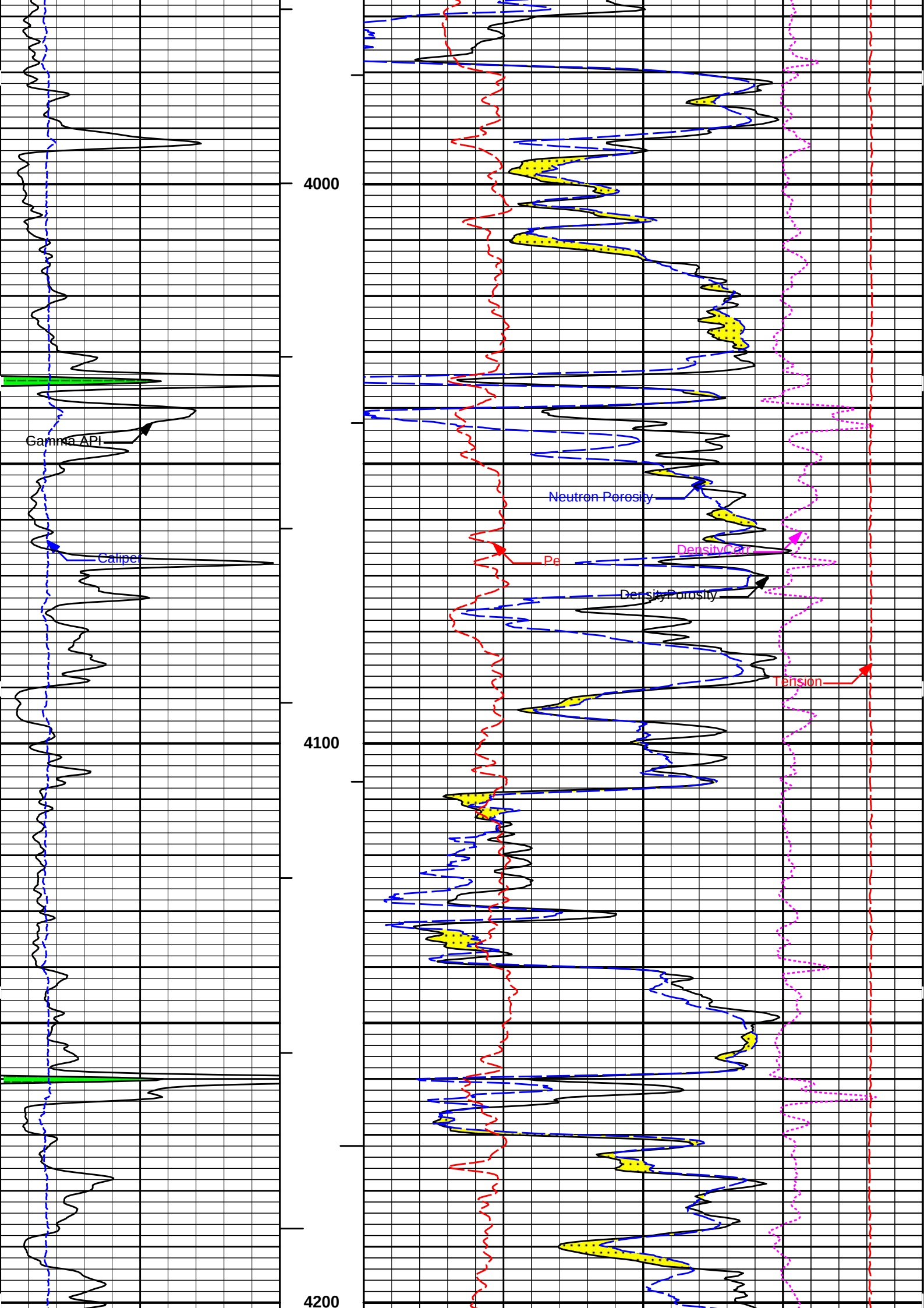
Plot Time: 21-Mar-18 15:07:18
Plot Range: 3695 ft to 4805.75 ft
Data: WARD_4-TWIN\Well Based\DETAILS
Plot File: \\POROSITY\Poro_IQ_5_MAIN_LIB

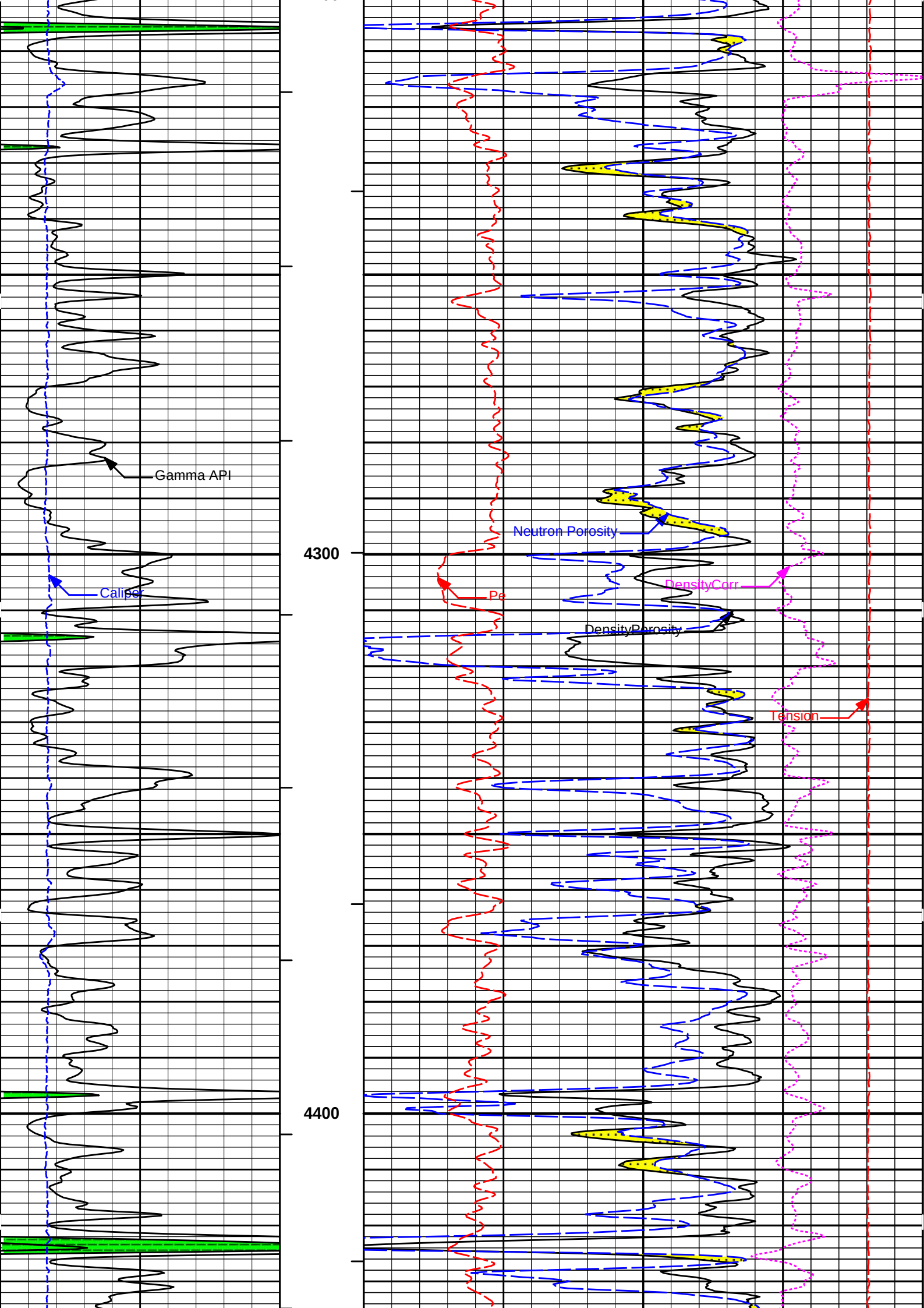
5 INCH MAIN LOG

MEASURED DEPTH
MAIN SECTION 5" PER 100'




3800
3900
Gamma API
Caliper
Neutron Porosity
DensityPorosity
Pe
DensityCorr
Tension


4000
4100
4200
Gamma API
Caliper
Neutron Porosity
Pe
DensityCorr
DensityPorosity
Tension


Gamma API
Caliper
Neutron Porosity
Pe
DensityCorr
DensityPorosity
Tension
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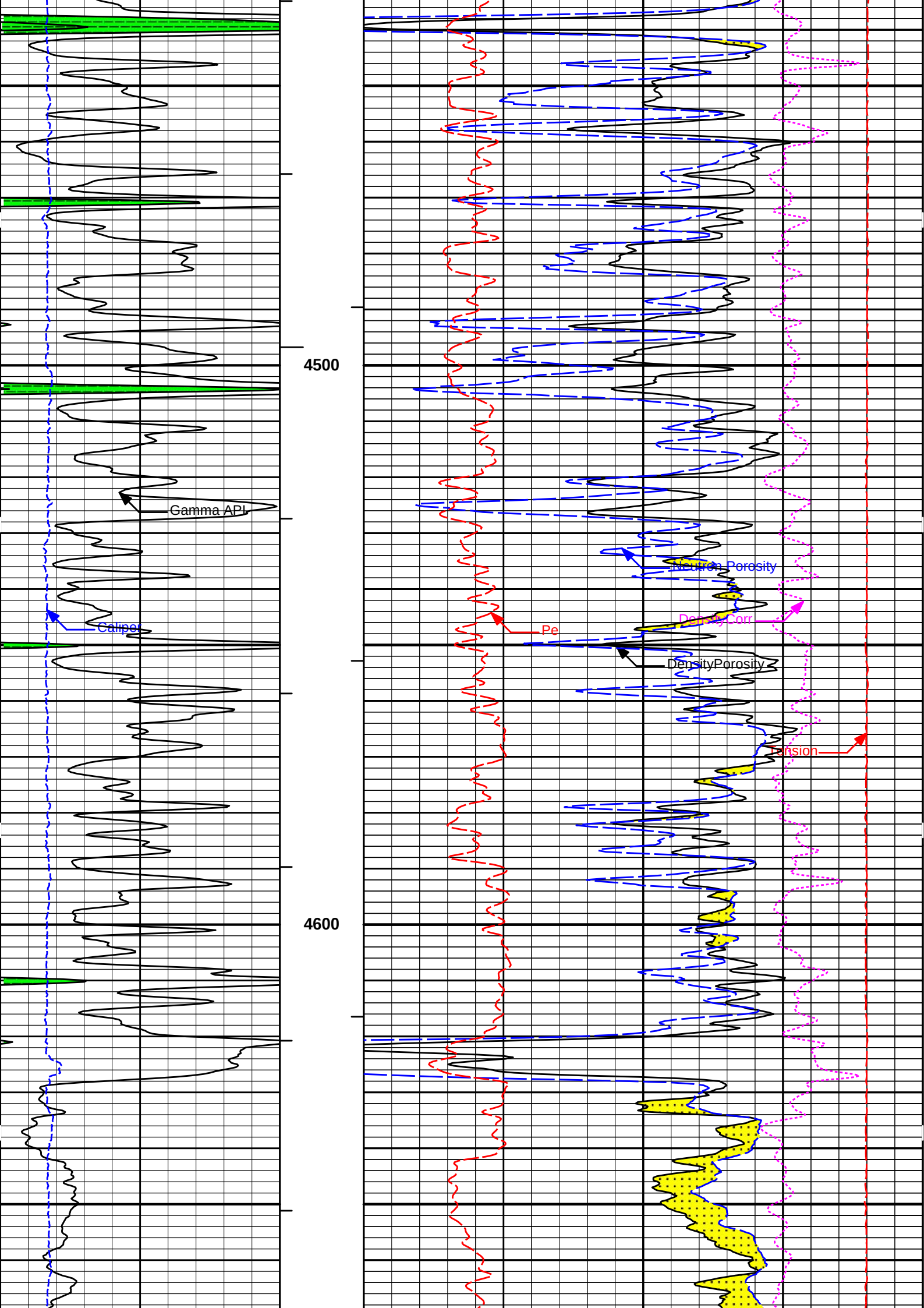
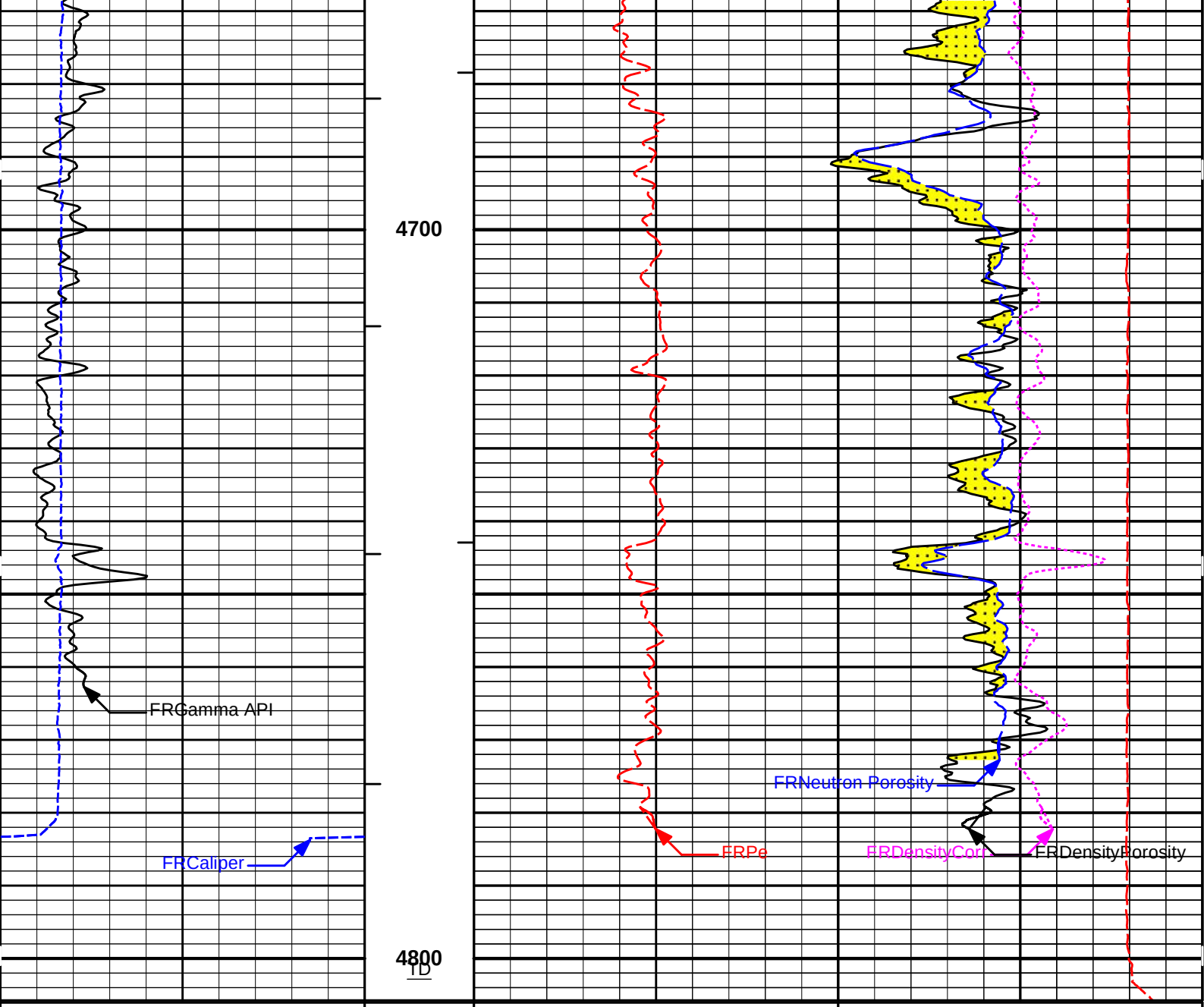
4400


4500
4600
Gamma API
Caliper
Neutron Porosity
Pe
DensityCorr
DensityPorosity
Tension



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

HALLIBURTON

Plot Time: 21-Mar-18 15:07:26
Plot Range: 3695 ft to 4805.75 ft
Data: WARD_4-TWIN\Well Based\DETAILS\
Plot File: \\POROSITY\Poro_IQ_5_MAIN_LIB

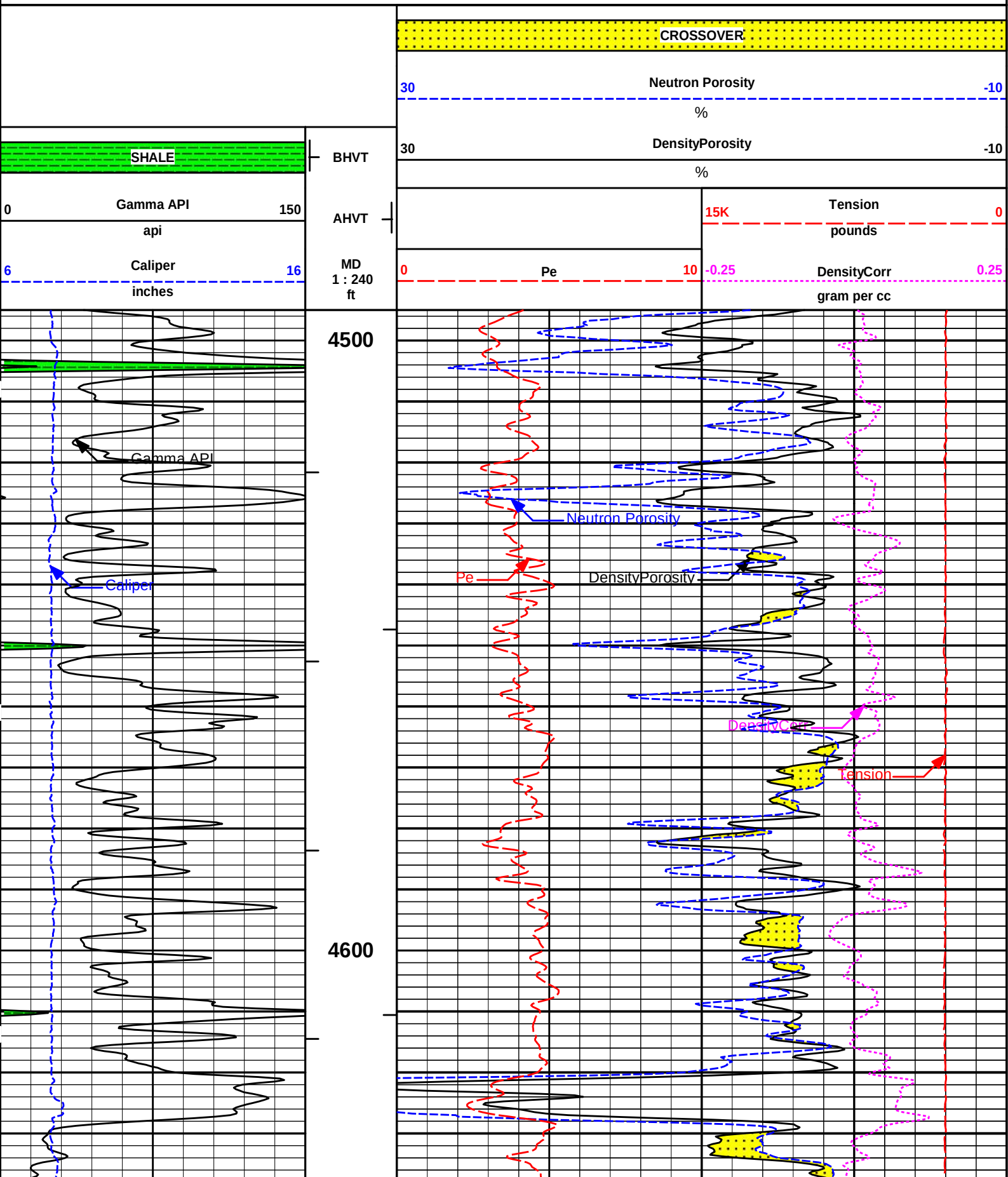
5 INCH MAIN LOG

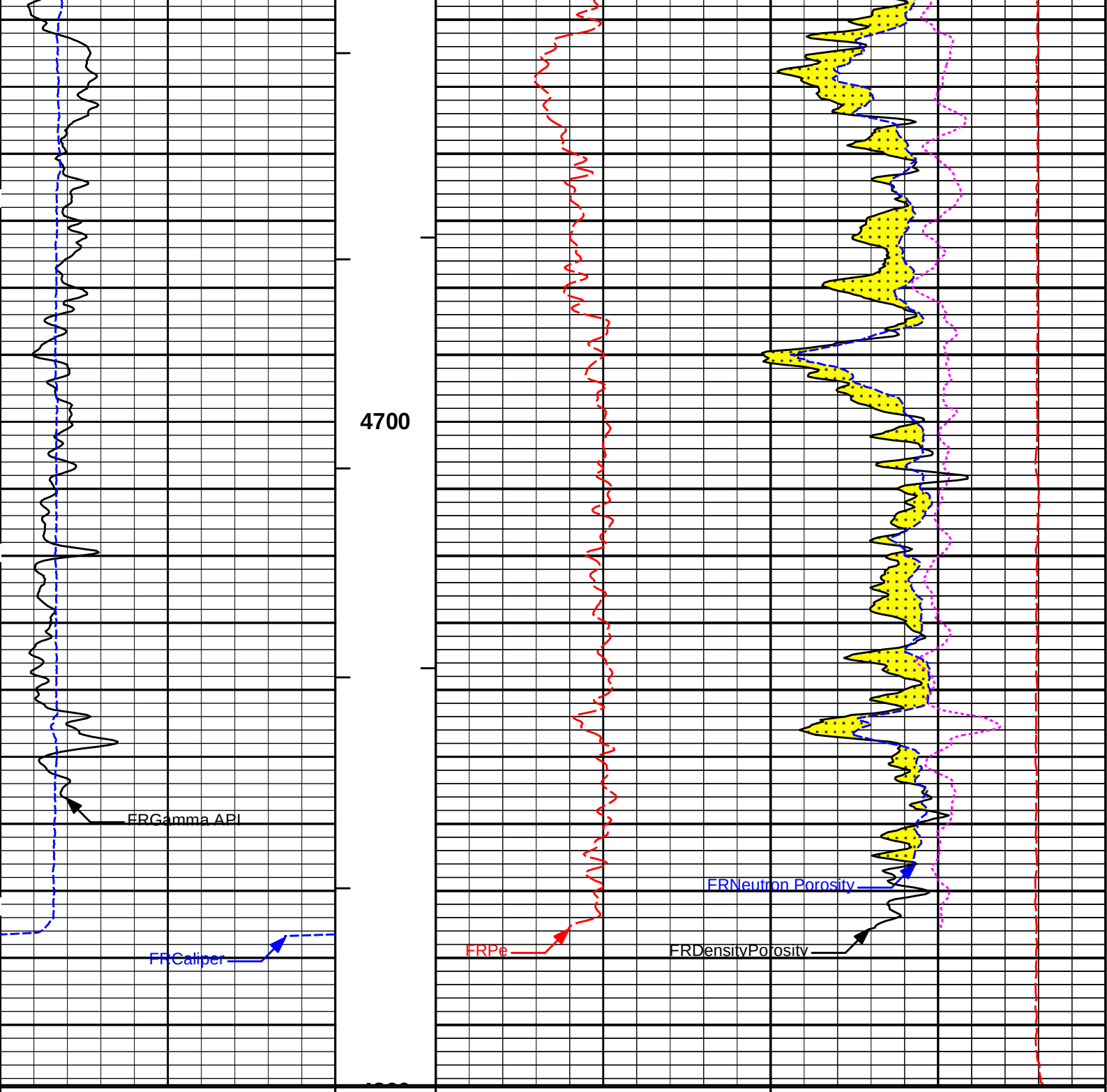
MEASURED DEPTH
MAIN SECTION 5" PER 100'

HALLIBURTON

Plot Time: 21-Mar-18 15:07:26
Plot Range: 4495 ft to 4799 ft
Data: WARD_4-TWIN\Well Based\REPEAT\
Plot File: \\POROSITY\Poro_IQ_5_REP_LIB

REPEAT SECTION





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

HALLIBURTON

Plot Time: 21-Mar-18 15:07:30
Plot Range: 4495 ft to 4799 ft
Data: WARD_4-TWIN\Well Based\REPEAT\
Plot File: \\POROSITY\Poro_IQ_5_REP_LIB

REPEAT SECTION

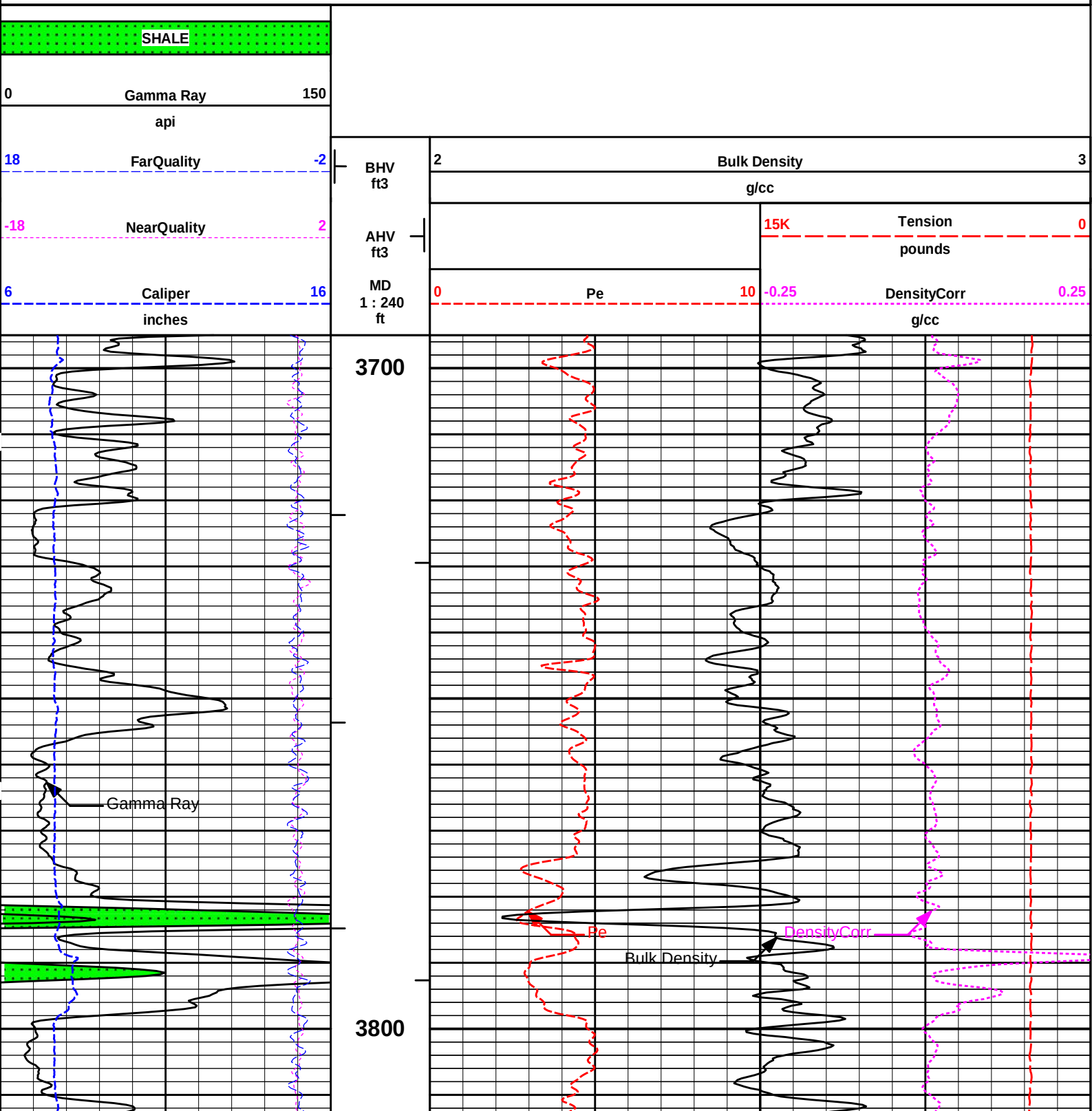
REPEAT SECTION

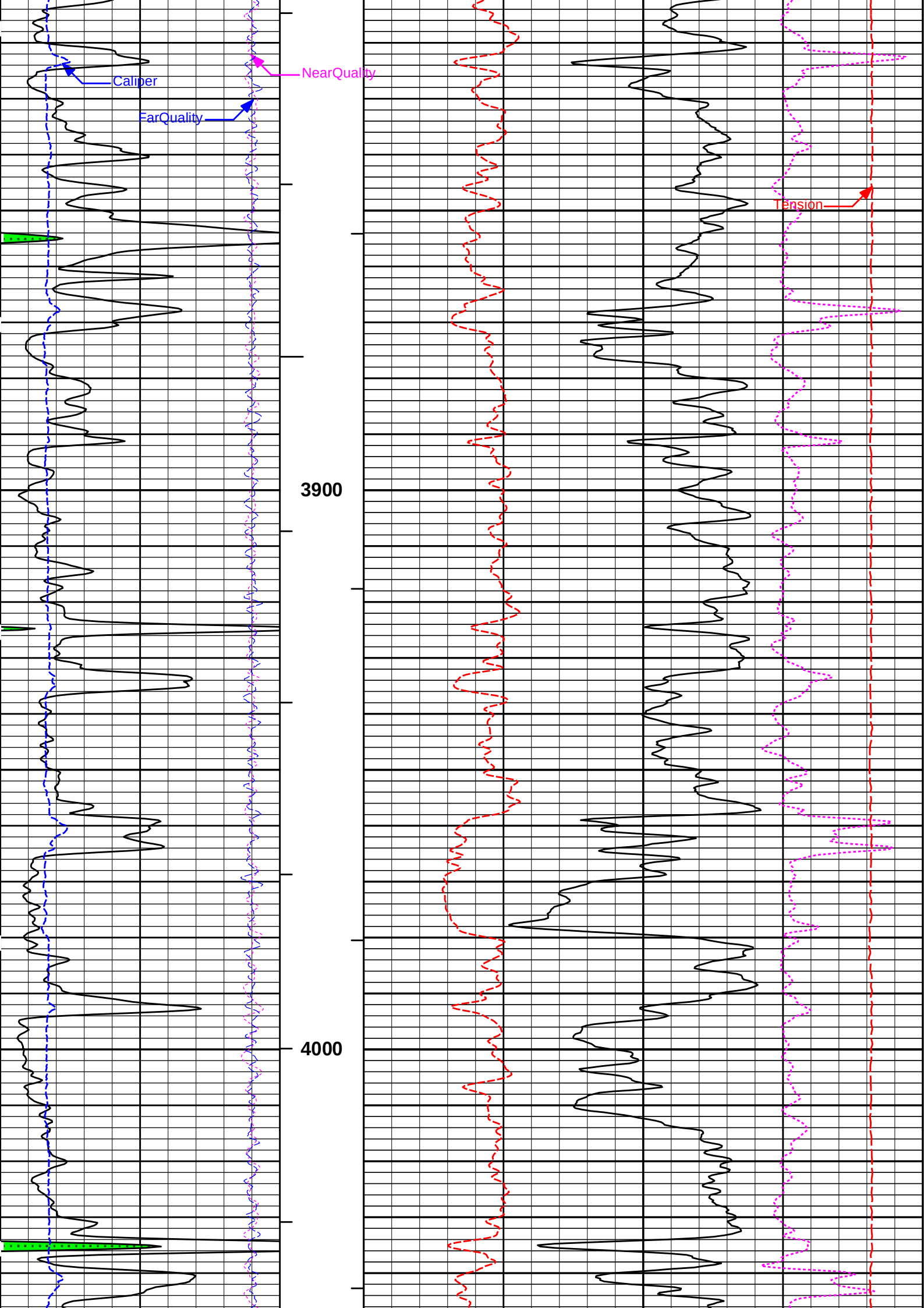
HALLIBURTON

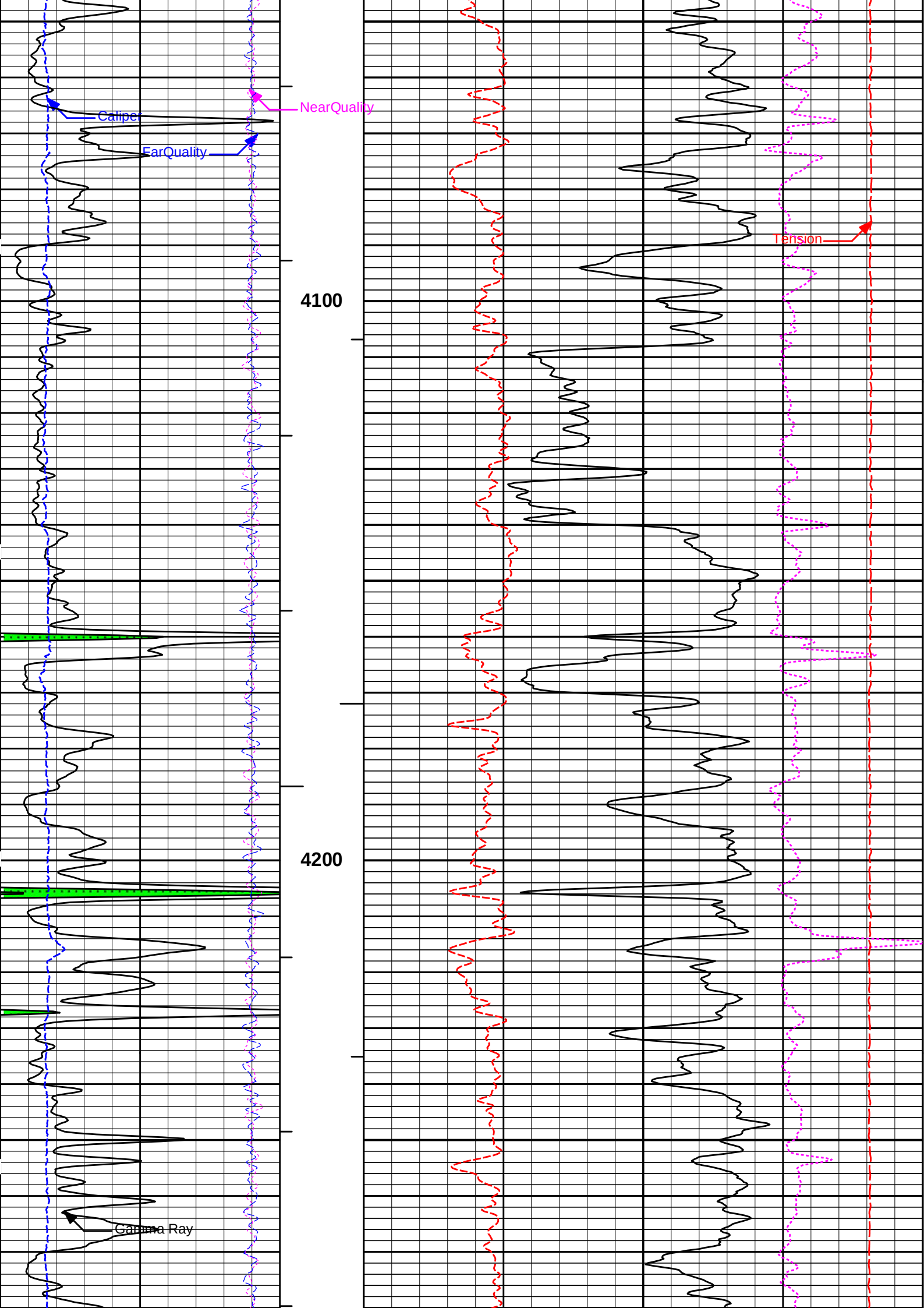
Plot Time: 21-Mar-18 15:07:31
Plot Range: 3695 ft to 4805.75 ft
Data: WARD_4-TWIN\Well Based\DETAILS\
Plot File: \\-LOCAL-\WARD_4-TWIN\Well Based\POROSITY\BULKD_5_MAIN_LIB

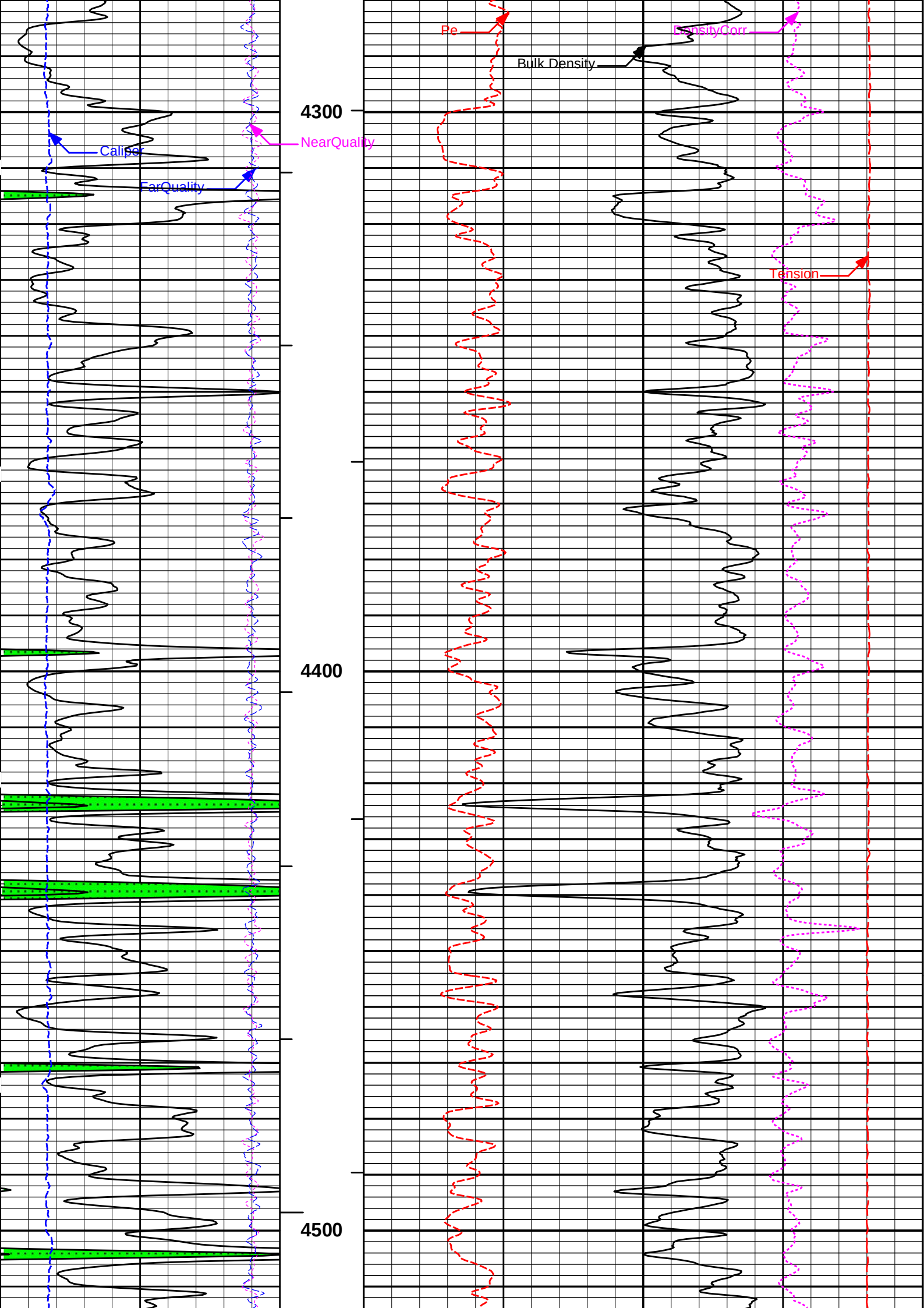
5 INCH MAIN LOG

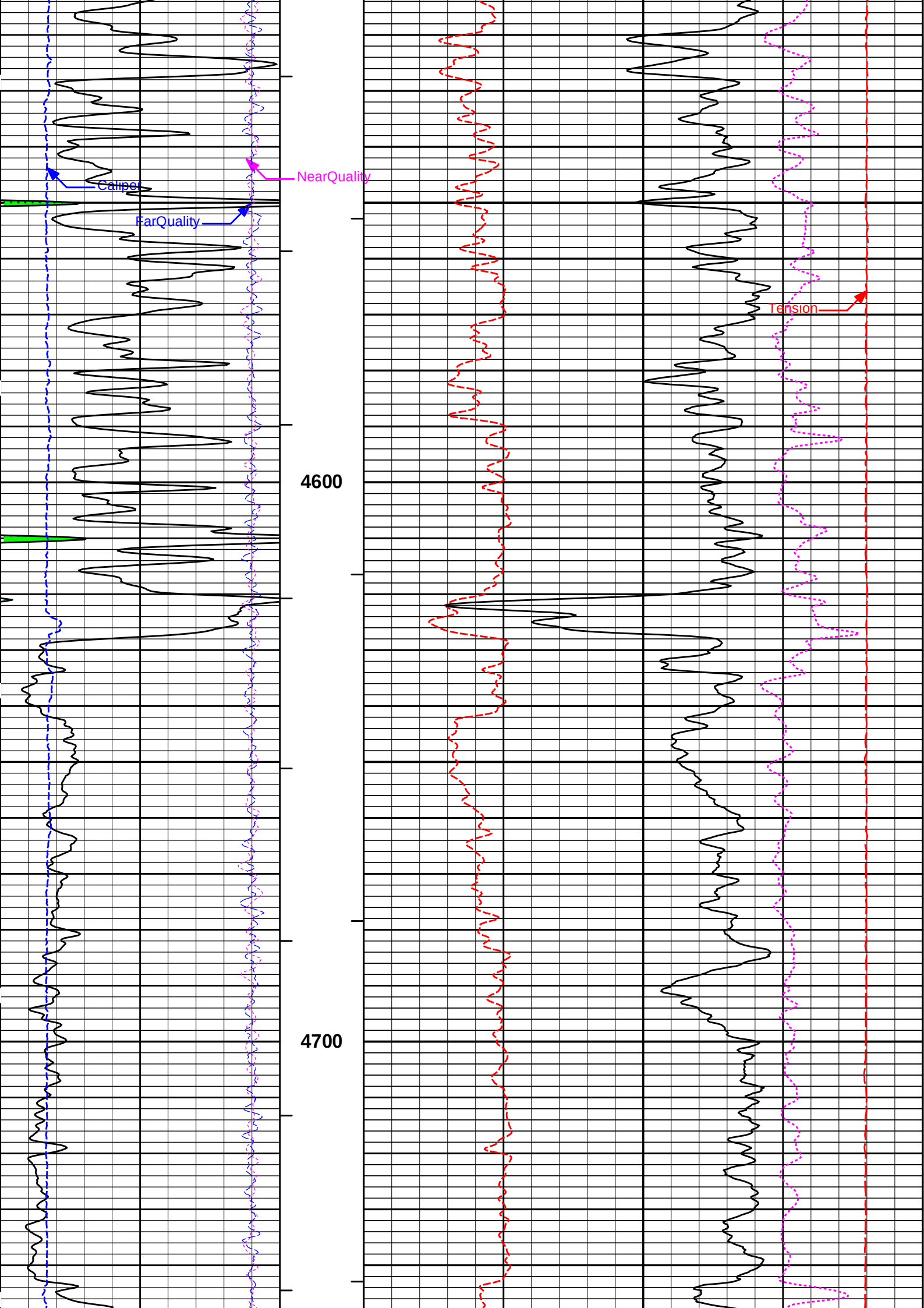
MEASURED DEPTH
MAIN SECTION 5" PER 100'

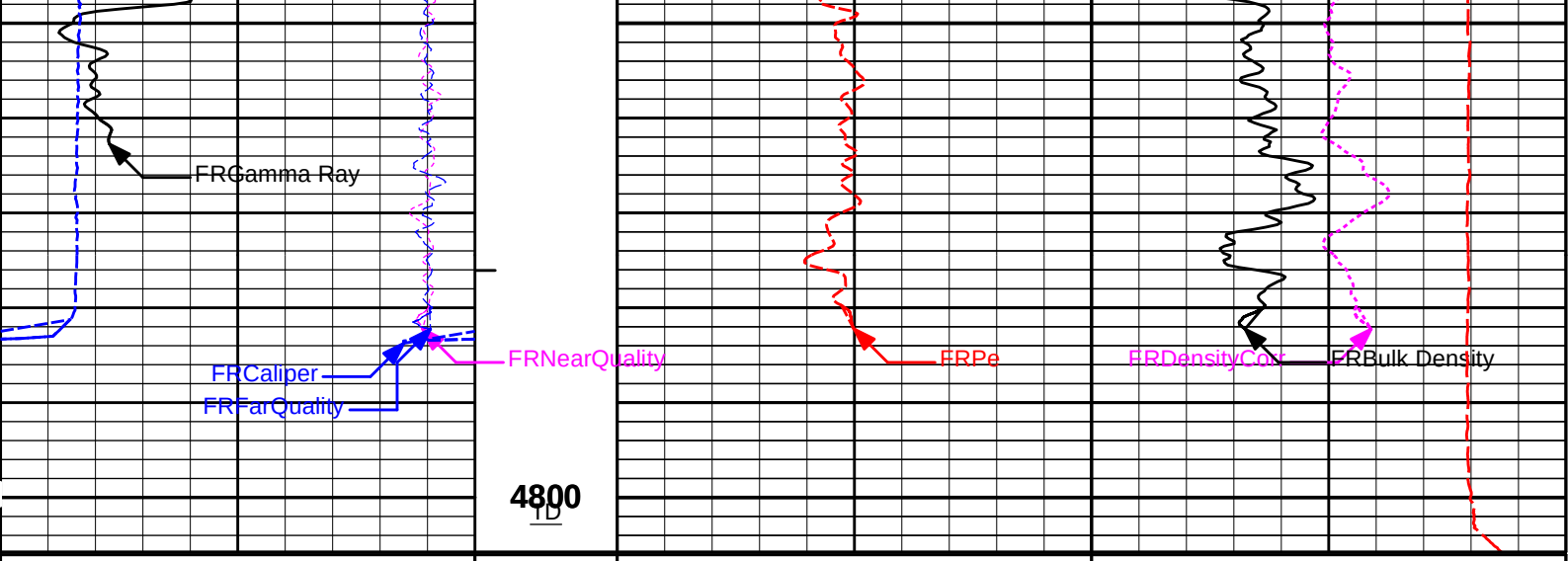



Caliper
NearQuality
FarQuality
Tension
3900
4000


Caliper
NearQuality
FarQuality
Tension
4100
4200
Gamma Ray


Pe
DensityCorr
Bulk Density
4300
Caliper
NearQuality
FarQuality
Tension
4400
4500


Caliper
NearQuality
FarQuality
Tension
4600
4700



6 Caliper 16 (inches)	MD 1 : 240 ft	0 Pe 10 | -0.25 DensityCorr 0.25 (g/cc)
-18 NearQuality 2	AHV ft3	15K Tension 0 (pounds)
18 FarQuality -2	BHV ft3	2 Bulk Density 3 (g/cc)
0 Gamma Ray 150 (api)		
SHALE		

HALLIBURTON

Plot Time: 21-Mar-18 15:07:38
Plot Range: 3695 ft to 4805.75 ft
Data: WARD_4-TWIN\Well Based\DETAILS\
Plot File: \\-LOCAL-\WARD_4-TWIN\Well Based\POROSITY\BULKD_5_MAIN_LIB

5 INCH MAIN LOG

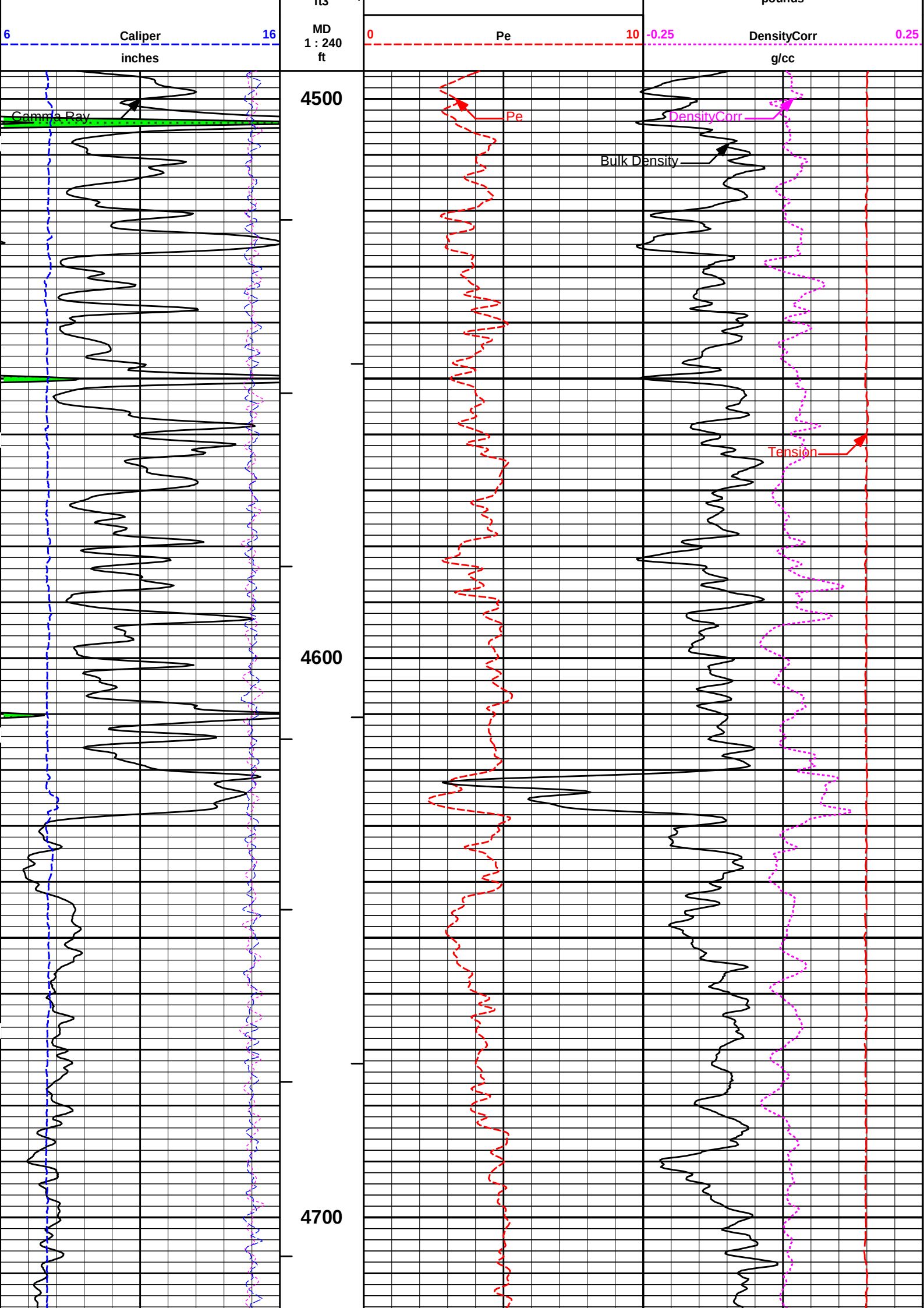
MEASURED DEPTH
MAIN SECTION 5" PER 100'

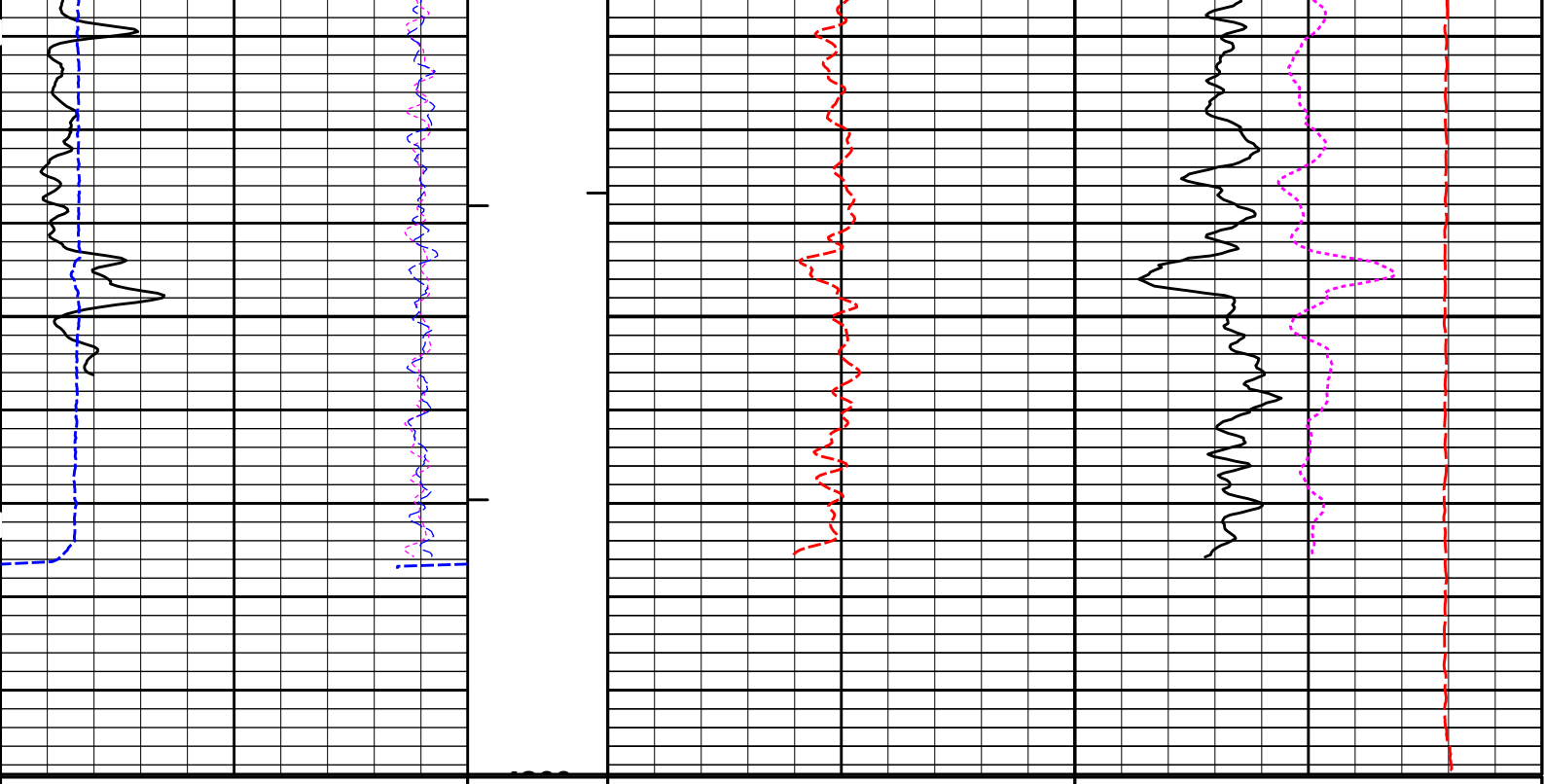
HALLIBURTON

Plot Time: 21-Mar-18 15:07:38
Plot Range: 4495 ft to 4799 ft
Data: WARD_4-TWIN\Well Based\REPEAT\
Plot File: \\-LOCAL-\WARD_4-TWIN\Well Based\POROSITY\BULKD_5_REP_LIB

REPEAT SECTION

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


ft3
6
Caliper
16
inches
MD
1 : 240
ft
0
Pe
10
-0.25
DensityCorr
0.25
g/cc
pounds
Gamma Ray
Pe
DensityCorr
Bulk Density
Tension
4500
4600
4700



HALLIBURTON

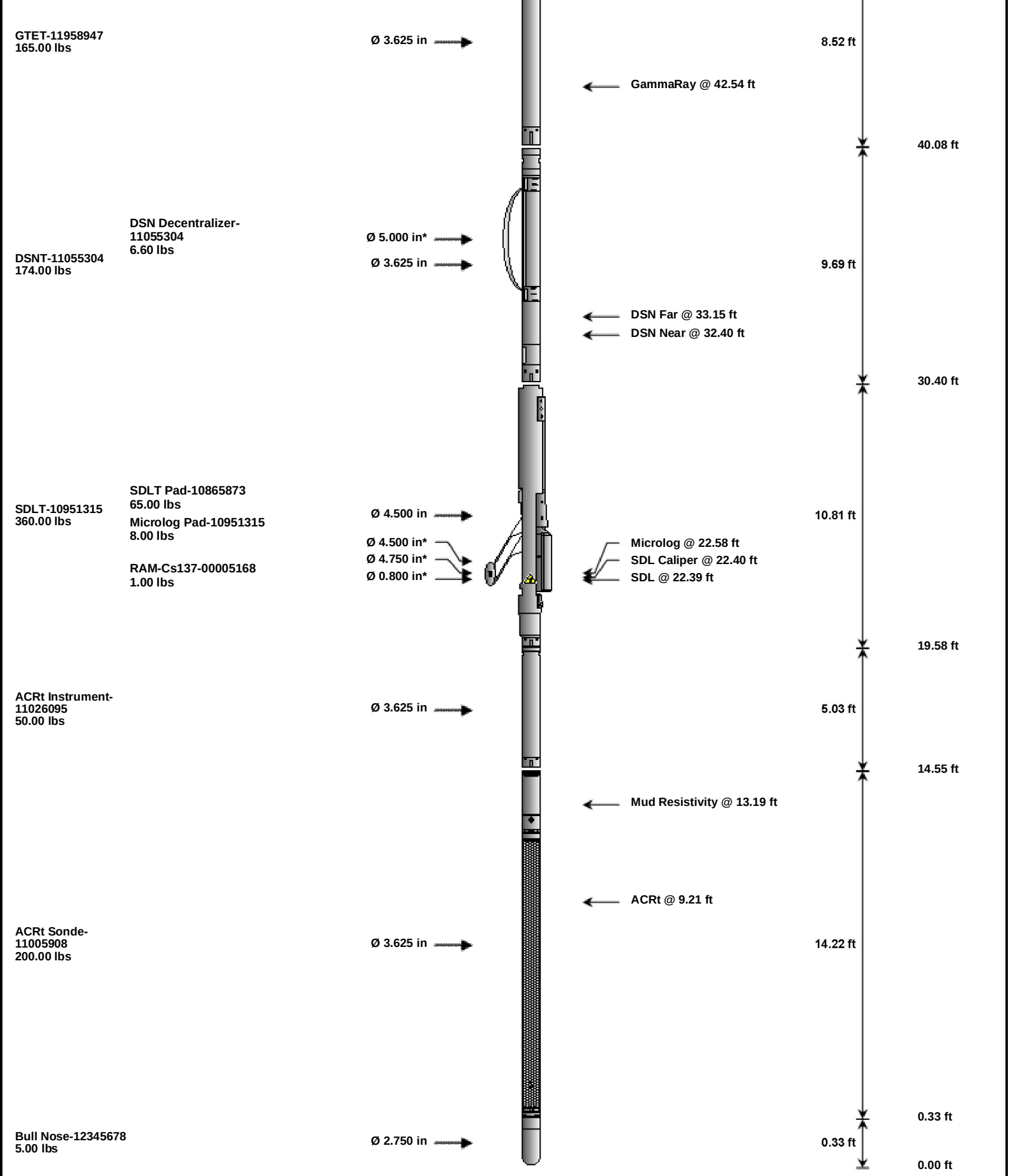
Plot Time: 21-Mar-18 15:07:41
Plot Range: 4495 ft to 4799 ft
Data: WARD_4-TWIN\Well Based\REPEAT\
Plot File: \\-LOCAL-\WARD_4-TWIN\Well Based\POROSITY\BULKD_5_REP_LIB

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 @ 55.29 ft	2.50 ft	55.79 ft
XOHD-11569312 20.00 lbs		Ø 2.750 in Ø 3.625 in			0.95 ft	53.29 ft
SP Sub-11153357 60.00 lbs		Ø 3.625 in		SP @ 50.56 ft	3.74 ft	52.34 ft
				Z-Accelerometer @ 48.15 ft		48.60 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		53.29	300.00
WP7K	Weak Point 7000 lbs	00000025	0.01	0.01	*	54.09	300.00
XOHD	Hostile to Dits Cross Over	11569312	20.00	0.95		52.34	300.00
SP	SP Sub	11153357	60.00	3.74		48.60	300.00
GTET	Gamma Telemetry Tool	11958947	165.00	8.52		40.08	60.00
DSNT	Dual Spaced Neutron	11055304	174.00	9.69		30.40	60.00
DCNT	DSN Decentralizer	11055304	6.60	5.13	*	33.73	300.00
SDLT	Spectral Density Tool	10951315	360.00	10.81		19.58	60.00
SDLP	Density Insite Pad	10865873	65.00	2.55	*	21.79	60.00
Cs137	Logging Source, SDLT-I, 1.78 Ci - Cs137	00005168	1.00	0.80	*	22.02	300.00

MICP	Microlog Pad	10951315	8.00	1.00	*	22.08	60.00
ACRt	Array Compensated True Resistivity Instrument Section	11026095	50.00	5.03		14.55	120.00
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			**1,152.11**	**55.79**			

* Not included in Total Length and Length Accumulation.

Data: WARD_4-TWIN\0001 GTET-DSNT-SDLT-ACRT-634-DRIVERS\IDLE **Date: 21-Mar-18 13:31:38**

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	9.100	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	0.865	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	4800.00	ft
	SHARED	BHT	Bottom Hole Temperature	118.0	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	0.71	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	
ACRt Sonde	RTOK	Process ACRt?	Yes	
ACRt Sonde	MNSO	Minimum Tool Standoff	1.50	in
ACRt Sonde	TCS1	Temperature Correction Source	FP Lwr & FP Upr	
ACRt Sonde	TPOS	Tool Position	Free Hanging	
ACRt Sonde	RMOP	Rmud Source	Mud Cell	
ACRt Sonde	RMIN	Minimum Resistivity for MAP	0.20	ohmm
ACRt Sonde	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: WARD_4-TWIN\0001 GTET-DSNT-SDLT-ACRT-634-DRIVERS\IDLE **Date: 21-Mar-18 14:52:19**

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:	**JORGE ORLANDO PEREZ**	**Calibration Date:**	**07-Mar-18 09:29:45**
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	23.3	api

Background + Calibrator	258.4	253.5	api
Calibrator	228.9	230.1	api

Shop	Field	Difference	Tolerance
228.9	230.1	-1.2	+/- 9.00

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
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: JORGE ORLANDO PEREZ **Calibration Date:** 13-Mar-18 16:06:43

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	0.0649	0.0007	+/- 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

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 Rock Gain	1.0295	1.0217	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
Changes in Calibration Blocks:	Passed

SPECTRAL DENSITY FIELD CHECK

Tool Name: SDLT Pad - 10865873 **Reference Calibration Date:** 13-Mar-18 11:16:20

Engineer:	**JORGE ORLANDO PEREZ**	**Calibration Date:**	**13-Mar-18 11:19:41**
Software Version:	**WL INSITE R5.0.5 (Build 8)**	**Calibration Version:**	**1**

Pad Temperature: 68.2 degF

DENSITY FIELD CALIBRATION SUMMARY

Measurement	Shop	Field	Change	Control Limit +/-
Near (B+D+P+L) cps	1353.863	1357.958	4.095	14.876
Far (B+D+P+L) cps	1024.257	1029.378	5.121	17.069
Near Resolution	10.05	9.94	-0.110	0.50
Far Resolution	9.01	8.96	-0.050	1.00

PASS/FAIL SUMMARY

Bkg Quality Check:	Passed
Bkg Resolution Check:	Passed
Bkg Verification Check:	Passed

CALIBRATION SUMMARY

Sensor	Shop	Field	Post	Difference	Tolerance	Units
GTET-11958947						
Gamma Ray Calibrator	228.9	230.1	----------	-1.2	+/- 9.00	api
DSNT-11055304						
Snow-Block Porosity	0.0642	0.0649	----------	-0.0007	+/- 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
SDLT Pad-10865873						
Near(B+D+P+L)	1353.863	1357.958	----------	-4.095	+/-14.876	cps
Far(B+D+P+L)	1024.257	1029.378	----------	-5.121	+/-17.069	cps

Data: WARD_4-TWIN\0001 GTET-DSNT-SDLT-ACRT-634-DRIVERS\IDLE **Date: 21-Mar-18 14:52:43**

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INPUTS, DELAYS AND FILTERS TABLE

Mnemonic	Input Description	Delay (ft)	Filter Type	Filter Length (ft)
Depth Panel				
TENS	Tension	0.00	NO	
Rwa / CrossPlot				
TPUL	Tension Pull	55.79	NO	
BS	Bit Size	55.79	NO	
HDIA	Measured Hole Diameter	0.00	NO	
CH_HOS				
DHTN	DownholeTension	0.00	BLK	0.000
SP Sub				
PLTC	Plot Control Mask	50.56	NO	
SP	Spontaneous Potential	50.56	BLK	1.250
SPR	Raw Spontaneous Potential	50.56	NO	
SPO	Spontaneous Potential Offset	50.56	NO	
GTET				
TPUL	Tension Pull	42.54	NO	
GR	Natural Gamma Ray API	42.54	TRI	1.750
GRU	Unfiltered Natural Gamma Ray API	42.54	NO	
EGR	Natural Gamma Ray API with Enhanced Vertical Resolution	42.54	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	32.30	NO	
RNDS	Near Detector Telemetry Counts	32.40	BLK	1.417
RFDS	Far Detector Telemetry Counts	33.15	TRI	0.583
DNTT	DSN Tool Temperature	32.40	NO	
DSNS	DSN Tool Status	32.30	NO	
ERND	Near Detector Telemetry Counts EVR	32.40	BLK	0.000
ERFD	Far Detector Telemetry Counts EVR	33.15	BLK	0.000
ENTM	DSN Tool Temperature EVR	32.40	NO	
HDIA	Measured Hole Diameter	0.00	NO	
	SDLT			
TPUL	Tension Pull	22.40	NO	
PCAL	Pad Caliper	22.40	TRI	0.250
ACAL	Arm Caliper	22.40	TRI	0.250
	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
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

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	22.58	NO	
MINV	Microlog Lateral	22.58	BLK	0.750
MNOR	Microlog Normal	22.58	BLK	0.750

SDLT Pad

TPUL	Tension Pull	22.39	NO	
NAB	Near Above	22.21	BLK	0.920
NHI	Near Cesium High	22.21	BLK	0.920
NLO	Near Cesium Low	22.21	BLK	0.920
NVA	Near Valley	22.21	BLK	0.920
NBA	Near Barite	22.21	BLK	0.920
NDE	Near Density	22.21	BLK	0.920
NPK	Near Peak	22.21	BLK	0.920
NLI	Near Lithology	22.21	BLK	0.920
NBAU	Near Barite Unfiltered	22.21	BLK	0.250
NLIU	Near Lithology Unfiltered	22.21	BLK	0.250
FAB	Far Above	22.56	BLK	0.250
FHI	Far Cesium High	22.56	BLK	0.250
FLO	Far Cesium Low	22.56	BLK	0.250
FVA	Far Valley	22.56	BLK	0.250
FBA	Far Barite	22.56	BLK	0.250
FDE	Far Density	22.56	BLK	0.250
FPK	Far Peak	22.56	BLK	0.250
FLI	Far Lithology	22.56	BLK	0.250
PTMP	Pad Temperature	22.40	BLK	0.920
NHV	Near Detector High Voltage	21.79	NO	
FHV	Far Detector High Voltage	21.79	NO	
ITMP	Instrument Temperature	21.79	NO	
DDHV	Detector High Voltage	21.79	NO	
HDIA	Measured Hole Diameter	0.00	NO	

Data: WARD_4-TWIN\0001 GTET-DSNT-SDLT-ACRT-634-DRIVERS\IDLE **Date: 21-Mar-18 14:54:03**

COMPANY	**HARTMAN OIL COMPANY, INC**
WELL	**WARD #4 TWIN**
FIELD	**DAMME**
COUNTY	**FINNEY** STATE **KANSAS**

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DUAL SPACED NEUTRON SPECTRAL DENSITY LOG

	LOG