HALLIBURTON

COMPANY	NOBLE ENERGY INC.
WELL	KUMMER PC LE23-17
FIELD	WATTENBERG
COUNTY	WELD
STATE	CO

SPECTRAL DENSITY DUAL SPACED NEUTRON ARRAY COMPENSATED TRUE RESISTIVITY

COMPANY NOBLE ENERGY INC.

WELL KUMMER PC LE23-17

FIELD WATTENBERG

COUNTY WELD STATE CO

API No. 05123333020000

Location SHL: 2100' FNL & 1250' FEL SENE
LAT: 40.64898°
LONG: -104.16773°

Other Services:
RWCH
GTET
CSNG
IDT

Sect. 23 Twp. 8N Rge. 61W

Permanent Datum GL Elev. 4992.0 ft

Log measured from KB 13.0 ft above perm. Datum

Drilling measured from KB

Elev.: K.B. 5005.0 ft
D.F. 5005.0 ft
G.L. 4992.0 ft

Date	30-May-11		
Run No.	ONE		
Depth - Driller	7345.00 ft		
Depth - Logger	7335.0 ft		
Bottom - Logged Interval	7335 ft		
Top - Logged Interval	728 ft		
Casing - Driller	8.625 in @ 728.0 ft	@	@
Casing - Logger	728.0 ft		
Bit Size	7.875 in	@	@
Type Fluid in Hole	WATER BASED MUD		
Density / Viscosity	9.5 ppg / 36.00 s/qt		
PH / Fluid Loss	7.50 pH / 10.4 cptm		
Source of Sample	MUD CELL		
Rm @ Meas. Temperature	1.290 ohmm @ 85.40 degF	@	@
Rmf @ Meas. Temperature	1.26 ohmm @ 75.00 degF	@	@
Rmc @ Meas. Temperature	1.264 ohmm @ 75.00 degF	@	@
Source Rmf / Rmc	CHART / CHART		
Rm @ BHT	0.53 ohmm @ 217.0 degF	@	@
Time Since Circulation	6.0 hr		
Time on Bottom	31-May-11 00:43		
Max. Rec. Temperature	217.0 degF @ 7335.0 ft	@	@
Equipment / Location	11454566 / BRIGHTON		
Recorded By	C. BLUE		
Witnessed By	R. FOSTER		

Fold here

Service Ticket No.: 8207380 API Serial No.: 05123333020000 PGM Version: WL INSITE R3.2.5 (Build 2)

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 817-353	N/A	0.5" S.O.	N/A

EQUIPMENT DATA

GAMMA		ACOUSTIC		DENSITY		NEUTRON	
Run No.	ONE	Run No.		Run No.	ONE	Run No.	ONE
Serial No.	11277436	Serial No.		Serial No.	M335P470	Serial No.	11301132
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.	102A	Spacing		Log Type	GAM/GAM	Log Type	NEU/NEU
Type	SCINT			Source Type	Cs137	Source Type	Am241Be
Length	8"	LSA [Y/N]		Serial No.	2770GW	Serial No.	DSN434
Distance to Source	25'	FWDA [Y/N]		Strength	1.5 Ci	Strength	15 Ci

LOGGING DATA

GENERAL	GAMMA	ACOUSTIC	DENSITY	NEUTRON

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	7168	REC	0	250				20%	0%	2.65 g/cc	20%	0%	SAND
ONE	7168	6660	REC	0	250				20%	0%	2.68 g/cc	20%	0%	SAND
ONE	6660	6369	REC	0	250				20%	0%	2.71 g/cc	20%	0%	LIME
ONE	6369	CSG	REC	0	250				20%	0%	2.68 g/cc	20%	0%	SAND

DIRECTIONAL INFORMATION

Maximum Deviation	@	KOP	@

Remarks:

RWCH/GTET/CSNG/IDT/DSNT/SDLT/ACRT RAN IN COMBINATION

ANNULAR HOLE VOLUME CALCULATED FOR 4.5 INCH PRODUCTION CASING

TENSION PULLS, WASHOUTS, AND BOREHOLE RUGOSITY AFFECT TOOL RESPONSE

TOOL STRING RAN WITHOUT DECENTRALIZER AS PER CUSTOMER REQUEST

CREW: J. WALKER, N. GOULD, M. BURNETT RIG: CADE 21

THANK YOU FOR CHOOSING HALLIBURTON ENERGY SERVICES -- BRIGHTON, CO -- (303) 825-4346

HALLIBURTON

PARAMETERS REPORT

Depth (ft)	Tool Name	Description	Value	Units
TOP				
	DSNT	Neutron Lithology	Sandstone	
	SDLT	Formation Density Matrix	2.680	g/cc
6369.00				
	DSNT	Neutron Lithology	Limestone	
	SDLT	Formation Density Matrix	2.710	g/cc
6660.00				
	SDLT	Formation Density Matrix	2.680	g/cc
7168.00				
	SHARED	Bit Size	7.875	in
	SHARED	Use Bit Size instead of Caliper for all applications.	No	
	SHARED	Mud Base	Water	
	SHARED	Borehole Fluid Weight	9.500	ppg
	SHARED	Weighting Agent	Natural	
	SHARED	Borehole salinity	0.00	ppm
	SHARED	Formation Salinity NaCl	0.00	ppm
	SHARED	Percent K in Mud by Weight?	0.00	%
	SHARED	Mud Resistivity	1.290	ohmm
	SHARED	Temperature of Mud	85.4	degF
	SHARED	Logging Interval is Cased?	No	
	SHARED	AHV Casing OD	4.500	in
	SHARED	Surface Temperature	60.0	degF
	SHARED	Total Well Depth	7335.00	ft
	SHARED	Bottom Hole Temperature	217.0	degF

SHARED	Navigation and Survey Master Tool	IDT	
SHARED	High Res Z Accelerometer Master Tool	IDT	
SHARED	Temperature Master Tool	NONE	
SHARED	Borehole Size Master Tool	NONE	
GTET	Process Gamma Ray?	Yes	
GTET	Gamma Tool Standoff	0.000	in
GTET	Process Gamma Ray EVR?	No	
GTET	Tool Position	Eccentered	
CSNG	Process CSNG Data?	Yes	
CSNG	Is Tool Centralized?	No	
CSNG	Gamma Enviromental Corrections?	Yes	
CSNG	Barite Correction Factor	1.00	
IDT	Survey Writing Interval	30	ft
IDT	Smoothing Option	None	
DSNT	Process DSN?	Yes	
DSNT	Process DSN EVR?	No	
DSNT	Neutron Lithology	Sandstone	
DSNT	DSN Standoff - 0.25 in (6.35 mm) Recommended	0.000	in
DSNT	Temperature Correction Type	None	
DSNT	DSN Pressure Correction Type	None	
DSNT	View More Correction Options	No	
DSNT	Use TVD for Gradient Corrections?	No	
DSNT	Logging Horizontal Water Tank?	No	
SDLT	Process Density?	Yes	
SDLT	Process Density EVR?	No	
SDLT	Logging Calibration Blocks?	No	
SDLT	SDLT Pad Temperature Valid?	Yes	
SDLT	Disable temperature warning	No	
SDLT	Formation Density Matrix	2.650	g/cc
SDLT	Formation Density Fluid	1.000	g/cc
SDLT	Process Caliper Outputs?	Yes	
SDLT	Process MicroLog Outputs?	Yes	
ACRt	Process ACRt?	Yes	
ACRt	Minimum Tool Standoff	0.50	in
ACRt	Temperature Correction Source	FP Lwr & FP Upr	
ACRt	Tool Position	Free Hanging	
ACRt	Rmud Source	Mud Cell	
ACRt	Minimum Resistivity for MAP	0.20	ohmm
ACRt	Maximum Resistivity for MAP	200.00	ohmm
ACRt	Threshold Quality	0.50	

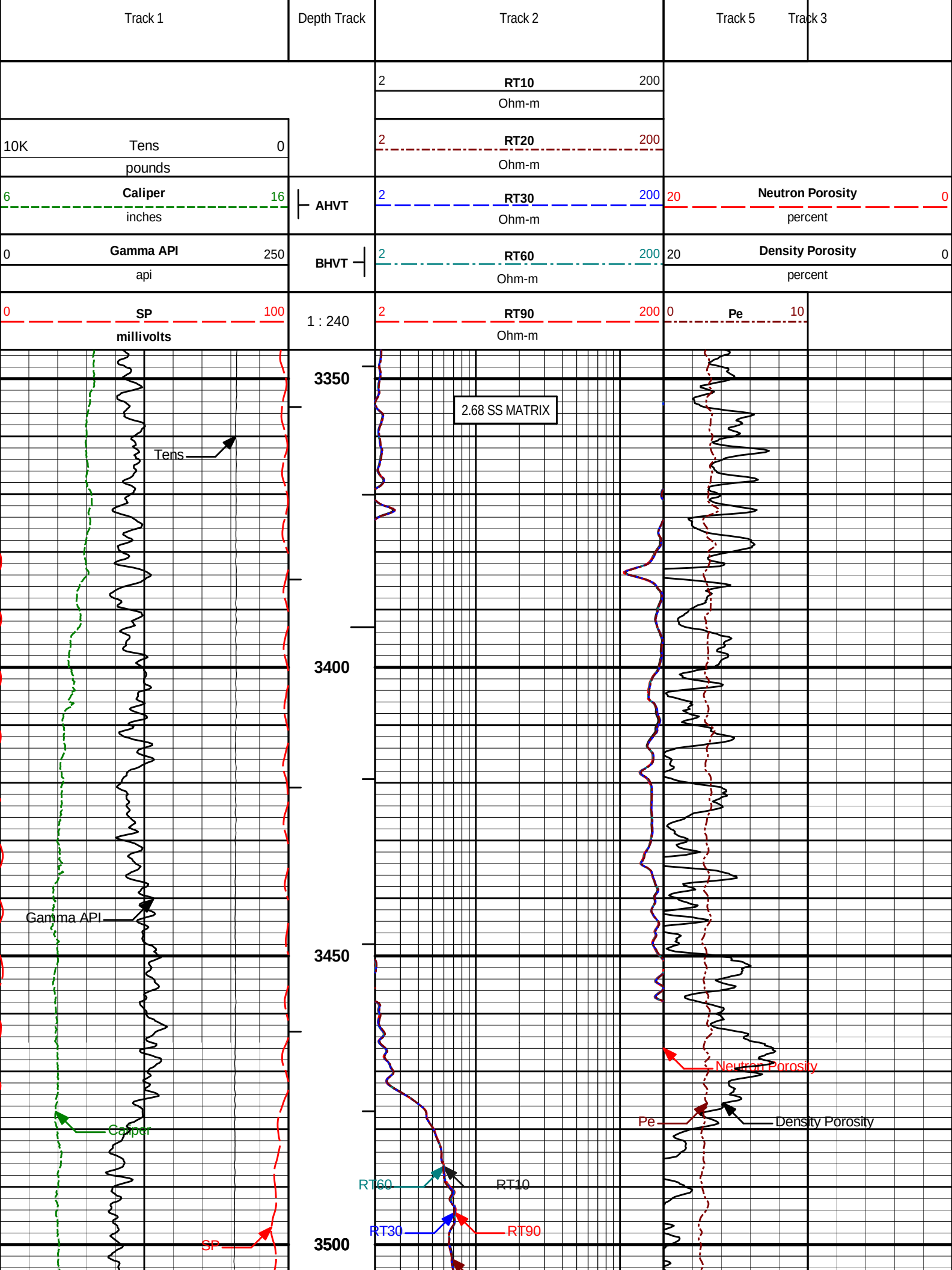
BOTTOM

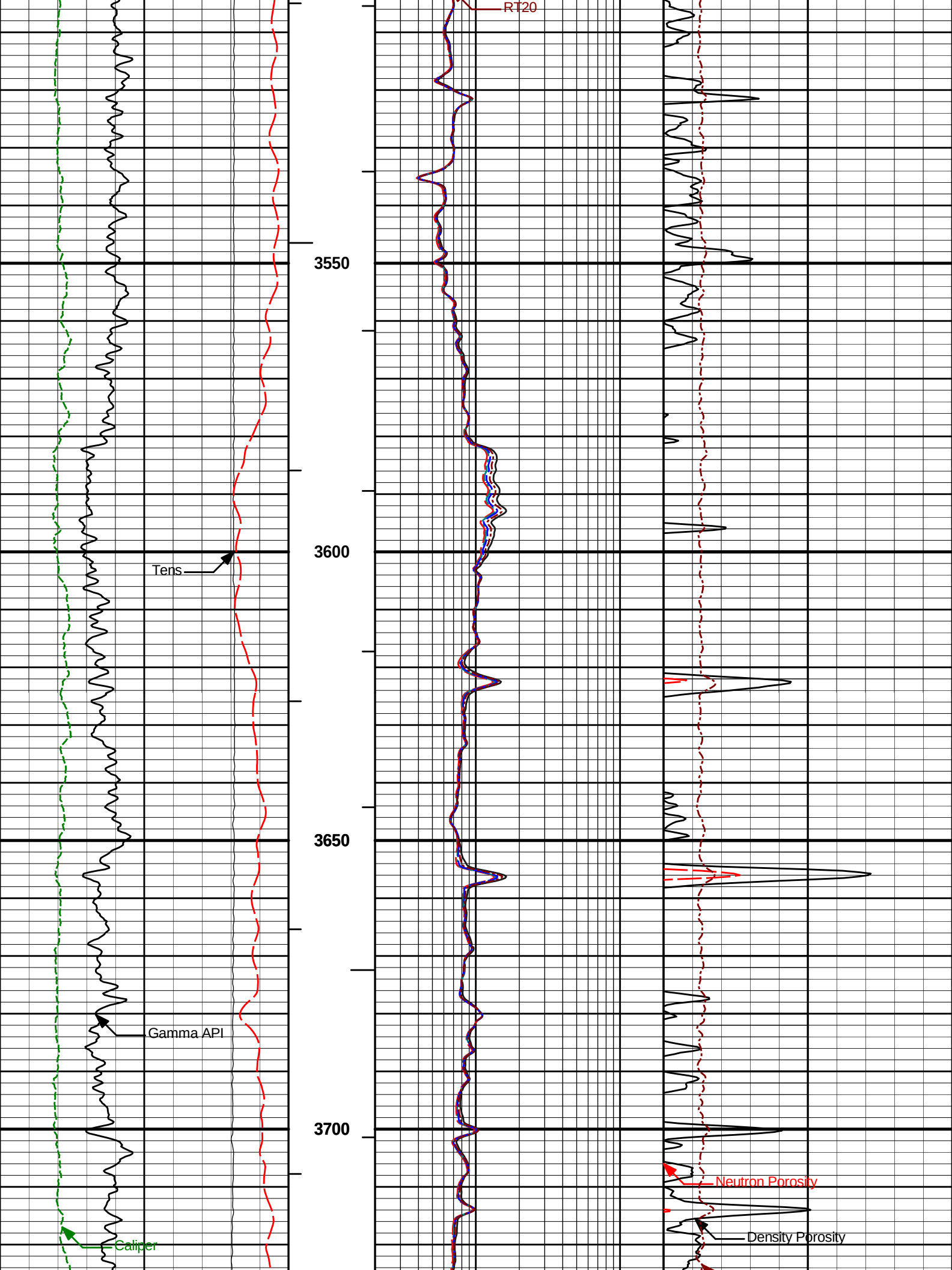
Data: KUM_PC_LE23_17\0001 TRIPLE_CSNG_IDT\005.02 31-May-11 02:24 Up **Date: 31-May-11 02:25:15**

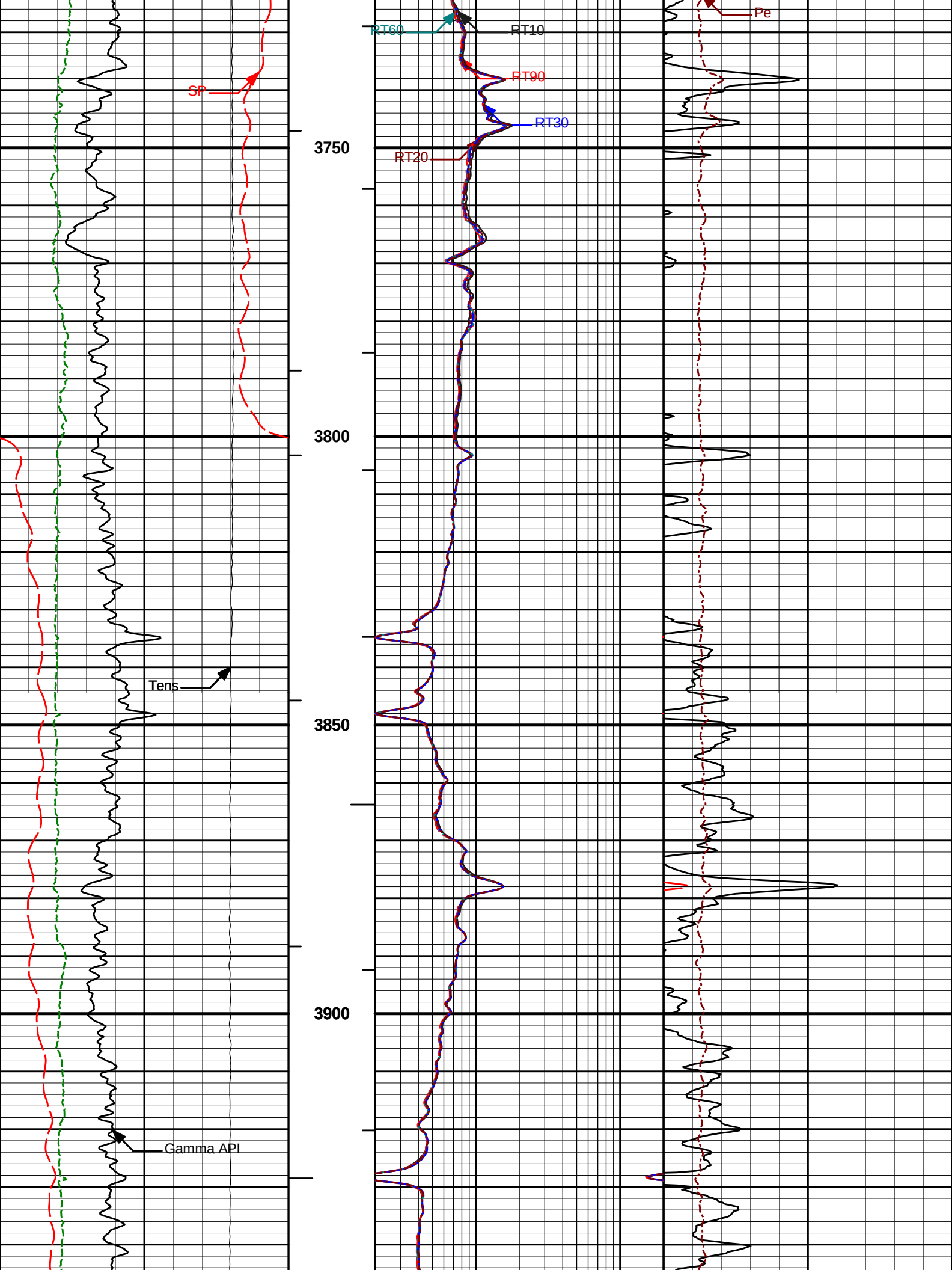
HALLIBURTON

Plot Time: 31-May-11 03:16:40
Plot Range: 3345 ft to 5305 ft
Data: KUM_PC_LE23_17\Well Based\MAIN*
Plot File: \\COMP\PARK_SUS

MAIN PASS 5" = 100'


Track 1
Depth Track
Track 2
Track 5
Track 3
2
RT10
200
Ohm-m
2
RT20
200
Ohm-m
10K
Tens
0
pounds
6
Caliper
16
inches
AHVT
2
RT30
200
Ohm-m
20
Neutron Porosity
0
percent
0
Gamma API
250
api
BHVT
2
RT60
200
Ohm-m
20
Density Porosity
0
percent
0
SP
100
millivolts
1 : 240
2
RT90
200
Ohm-m
0
Pe
10
3350
3400
3450
3500
2.68 SS MATRIX
Tens
Gamma API
Caliper
SP
RT60
RT10
RT30
RT90
Neutron Porosity
Pe
Density Porosity


RT20
3550
Tens
3600
3650
Gamma API
3700
Neutron Porosity
Density Porosity
Caliper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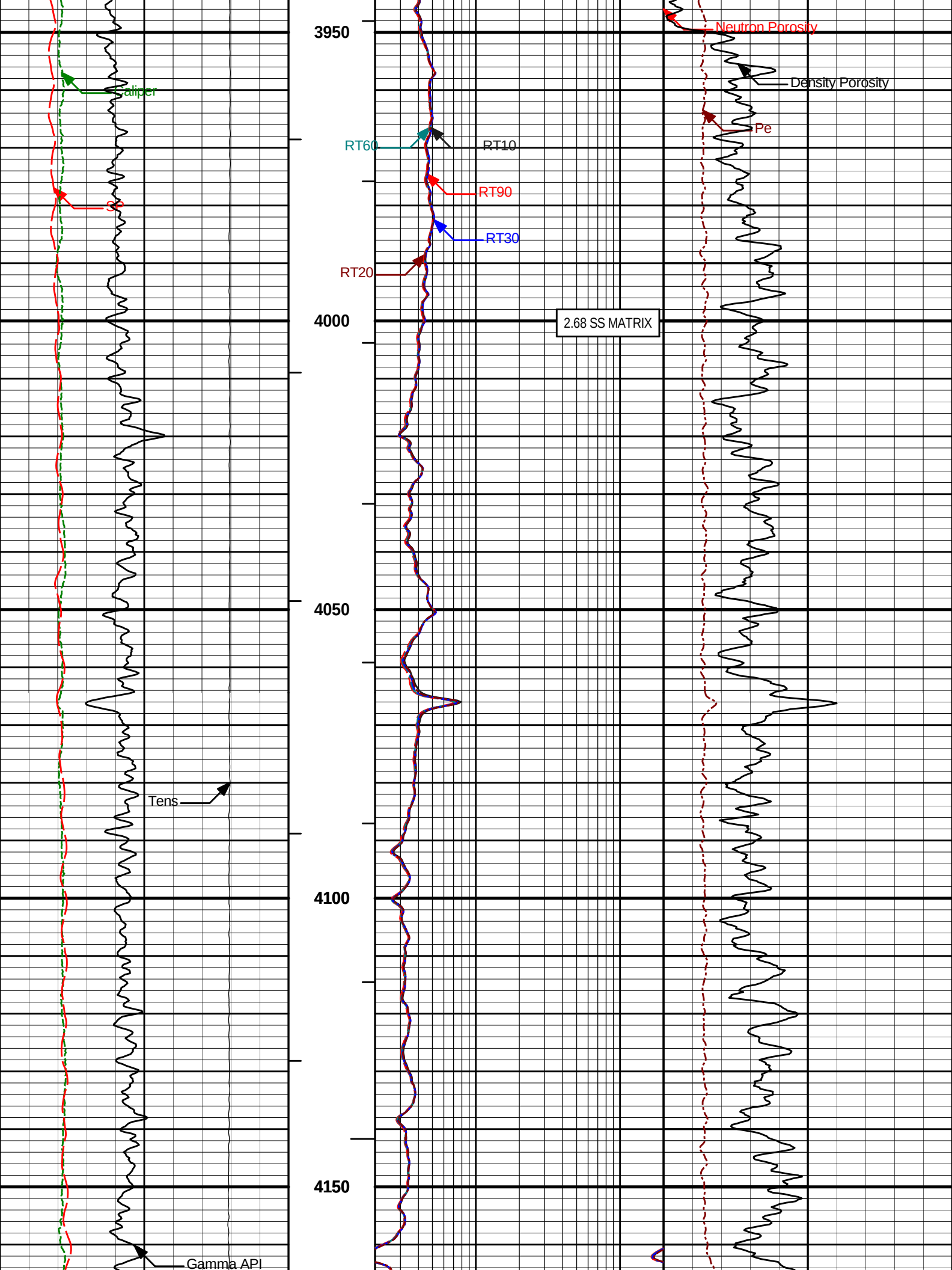
RT10
Pe
SP
RT90
RT30
RT20
3750
3800
Tens
3850
3900
Gamma API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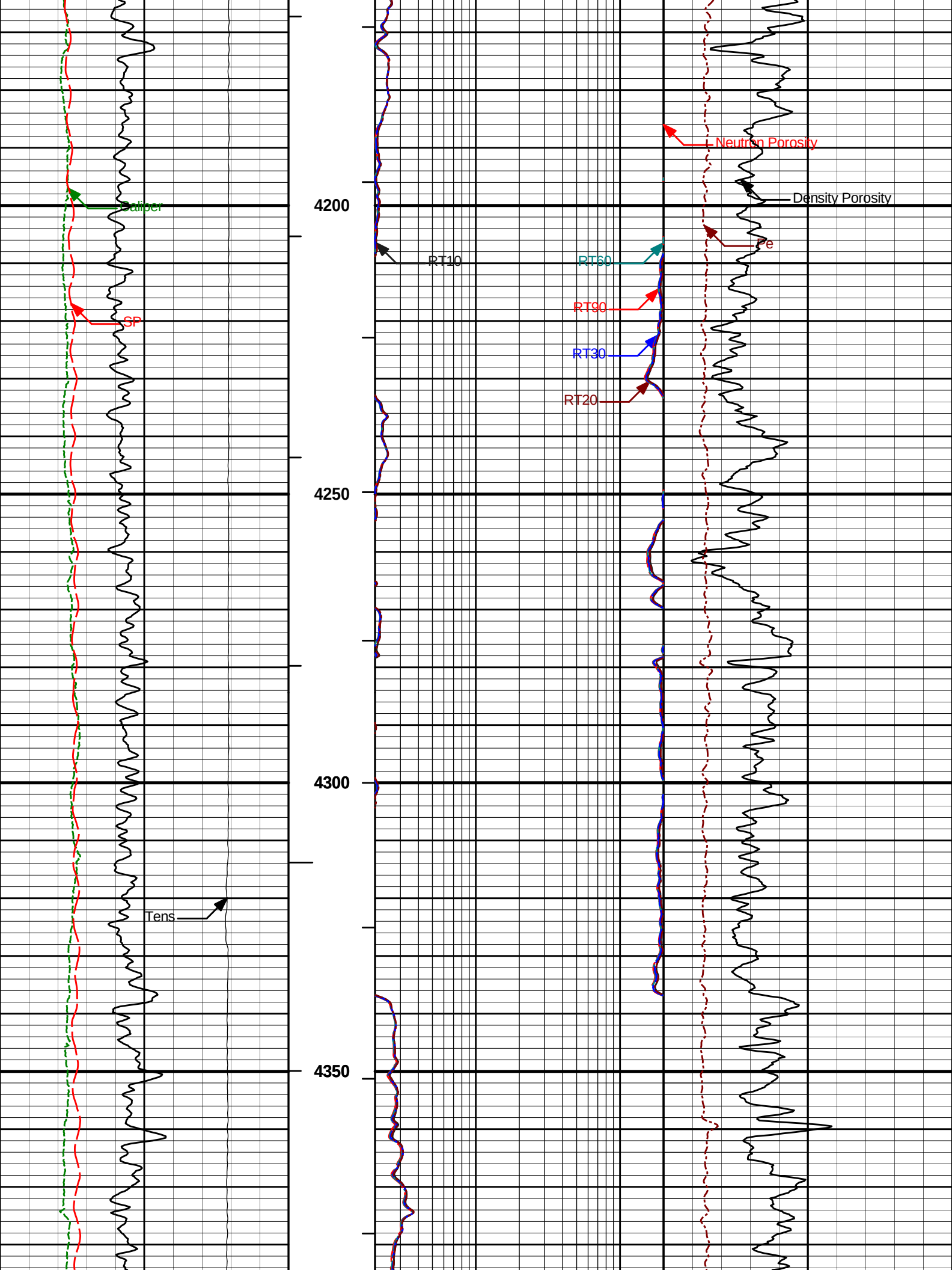
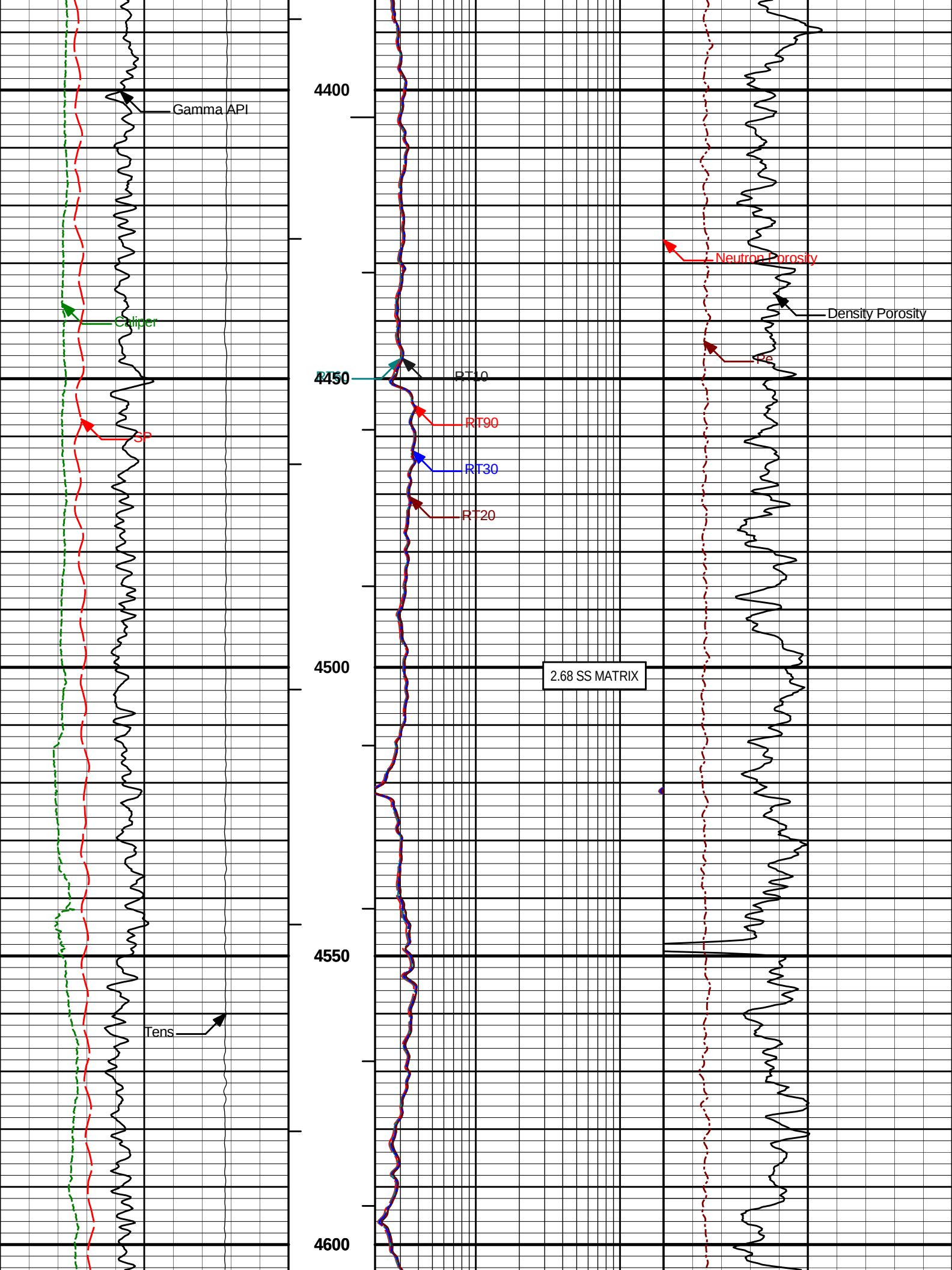
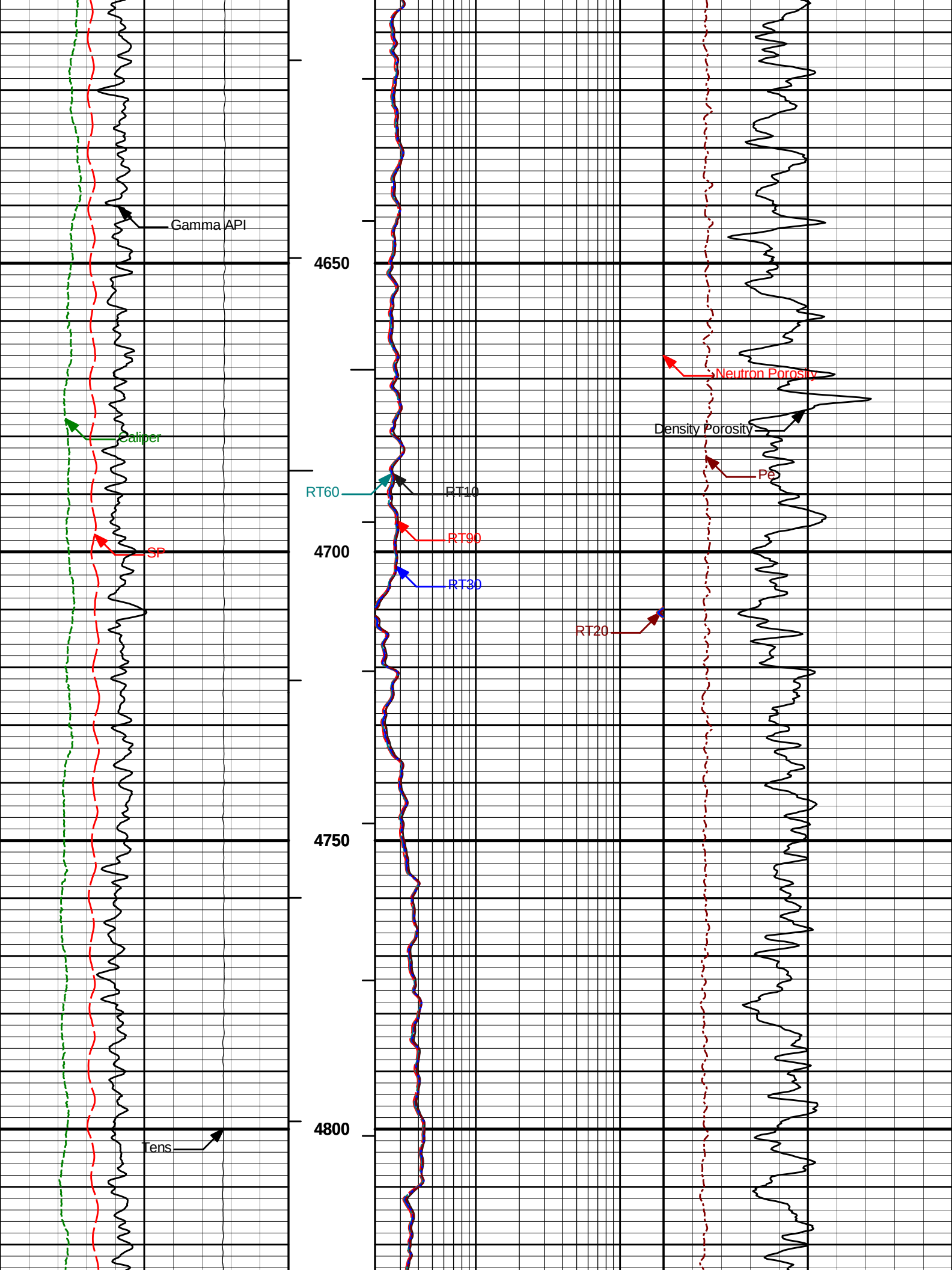
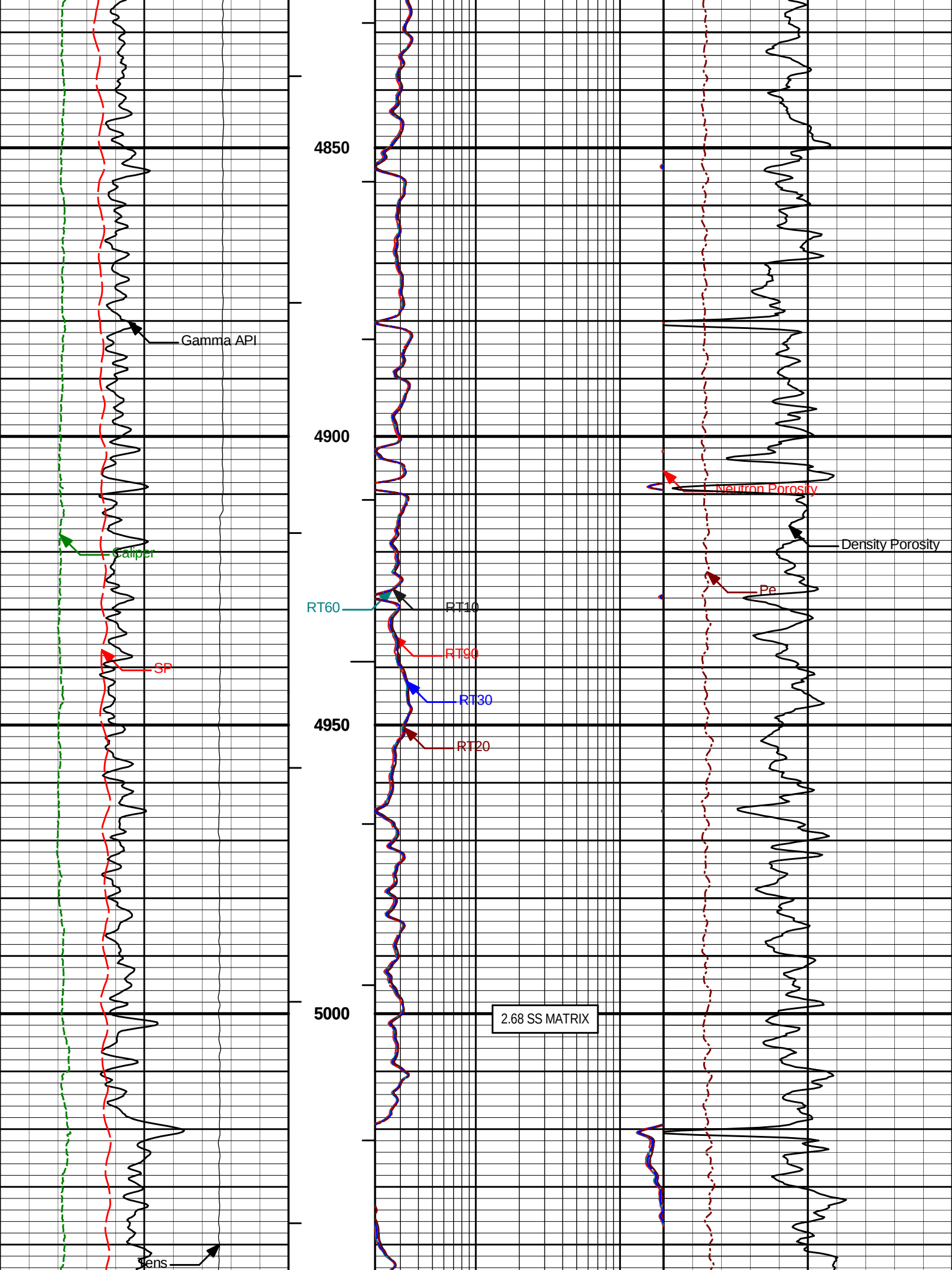
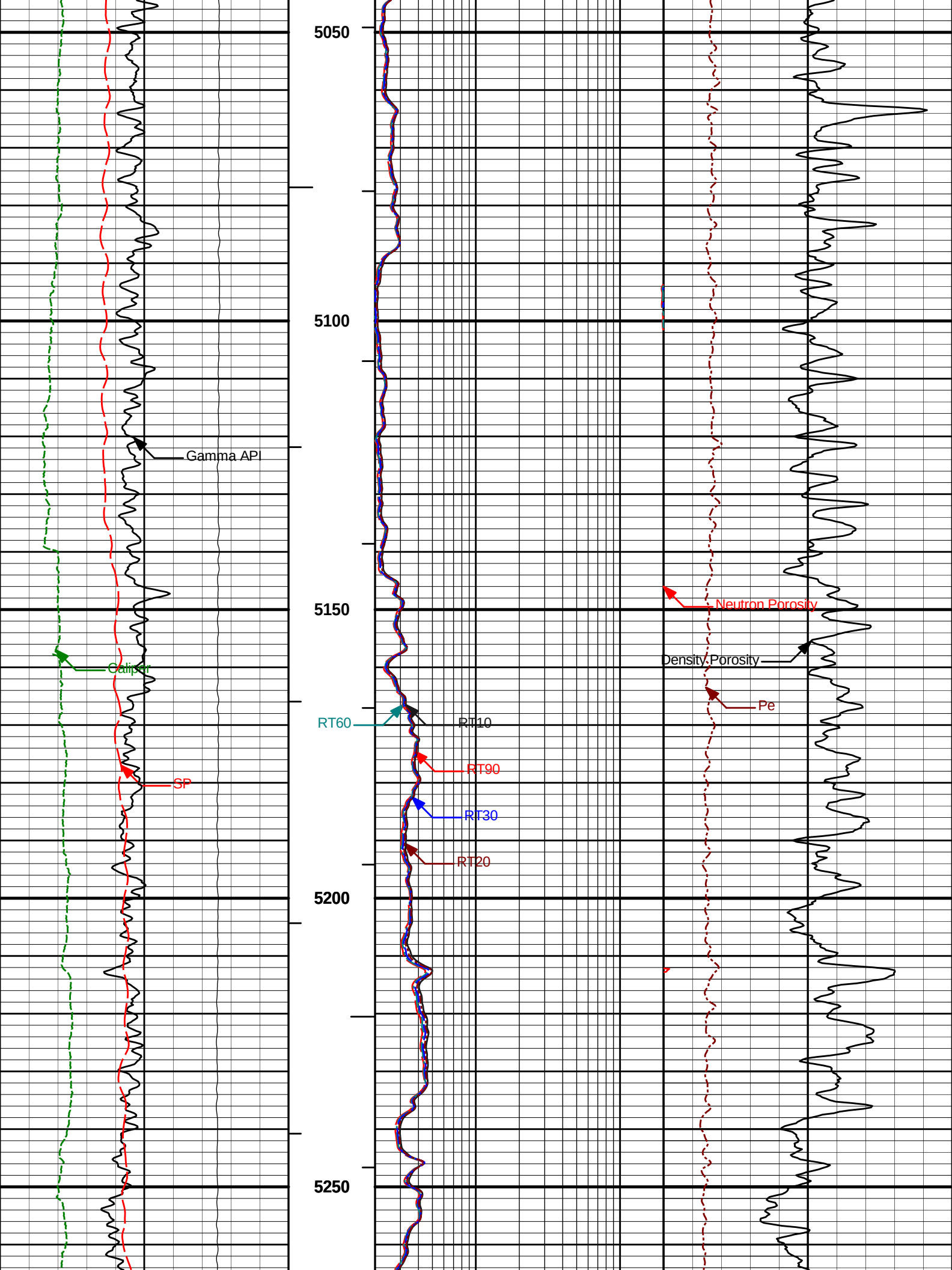
Tens
Gamma API
3950
4000
4050
4100
4150
RT60
RT10
RT90
RT30
RT20
2.68 SS MATRIX
Neutron Porosity
Density Porosity
Pe

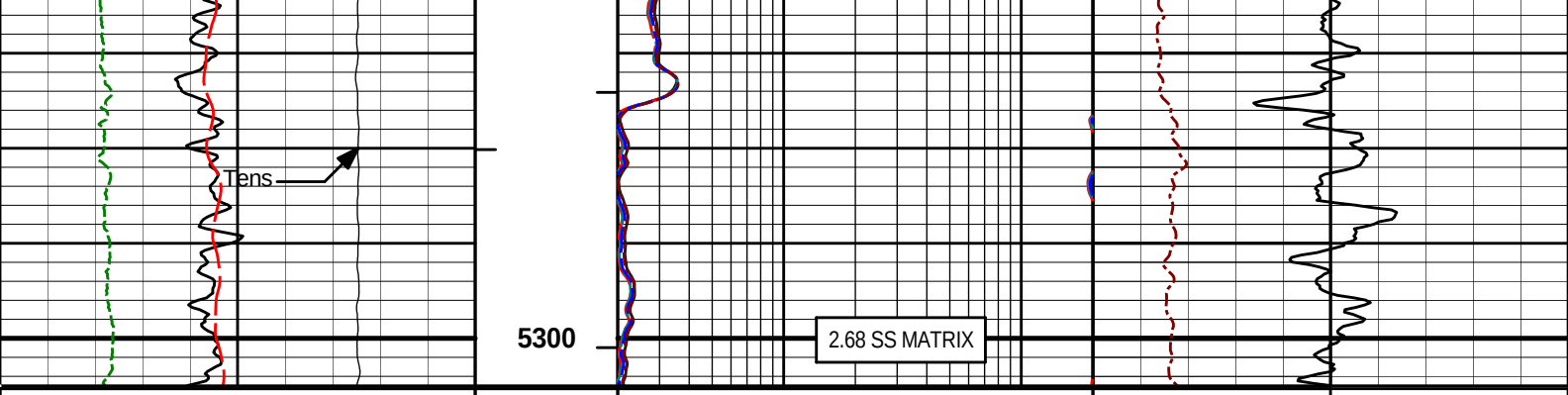

Caliber
SP
Tens
4200
4250
4300
4350
RT10
RT60
RT90
RT30
RT20
Neutron Porosity
Density Porosity
Pe


Gamma API
Caliper
SP
Tens
4400
4450
4500
4550
4600
RT10
RT90
RT30
RT20
2.68 SS MATRIX
Neutron Porosity
Density Porosity
Pe


Gamma API
Caliper
SP
Tens
4650
4700
4750
4800
RT60
RT10
RT90
RT30
RT20
Neutron Porosity
Density Porosity
Pe


4850
4900
4950
5000
Gamma API
Caliper
SP
Sens
RT60
RT10
RT90
RT30
RT20
Neutron Porosity
Density Porosity
Pe
2.68 SS MATRIX


5050
5100
5150
5200
5250
Gamma API
Caliper
SP
RT60
RT10
RT90
RT30
RT20
Neutron Porosity
Density Porosity
Pe



0 SP 100 millivolts		1 : 240	2 RT90 200 Ohm-m	0 Pe 10		
0 Gamma API 250 api		BHVT	2 RT60 200 Ohm-m	20 Density Porosity 0 percent		
6 Caliper 16 inches		AHVT	2 RT30 200 Ohm-m	20 Neutron Porosity 0 percent		
10K Tens 0 pounds			2 RT20 200 Ohm-m			
			2 RT10 200 Ohm-m			

HALLIBURTON

Plot Time: 31-May-11 03:16:44
Plot Range: 3345 ft to 5305 ft
Data: KUM_PC_LE23_17\Well Based\MAIN*
Plot File: \\COMP\PARK_SUS

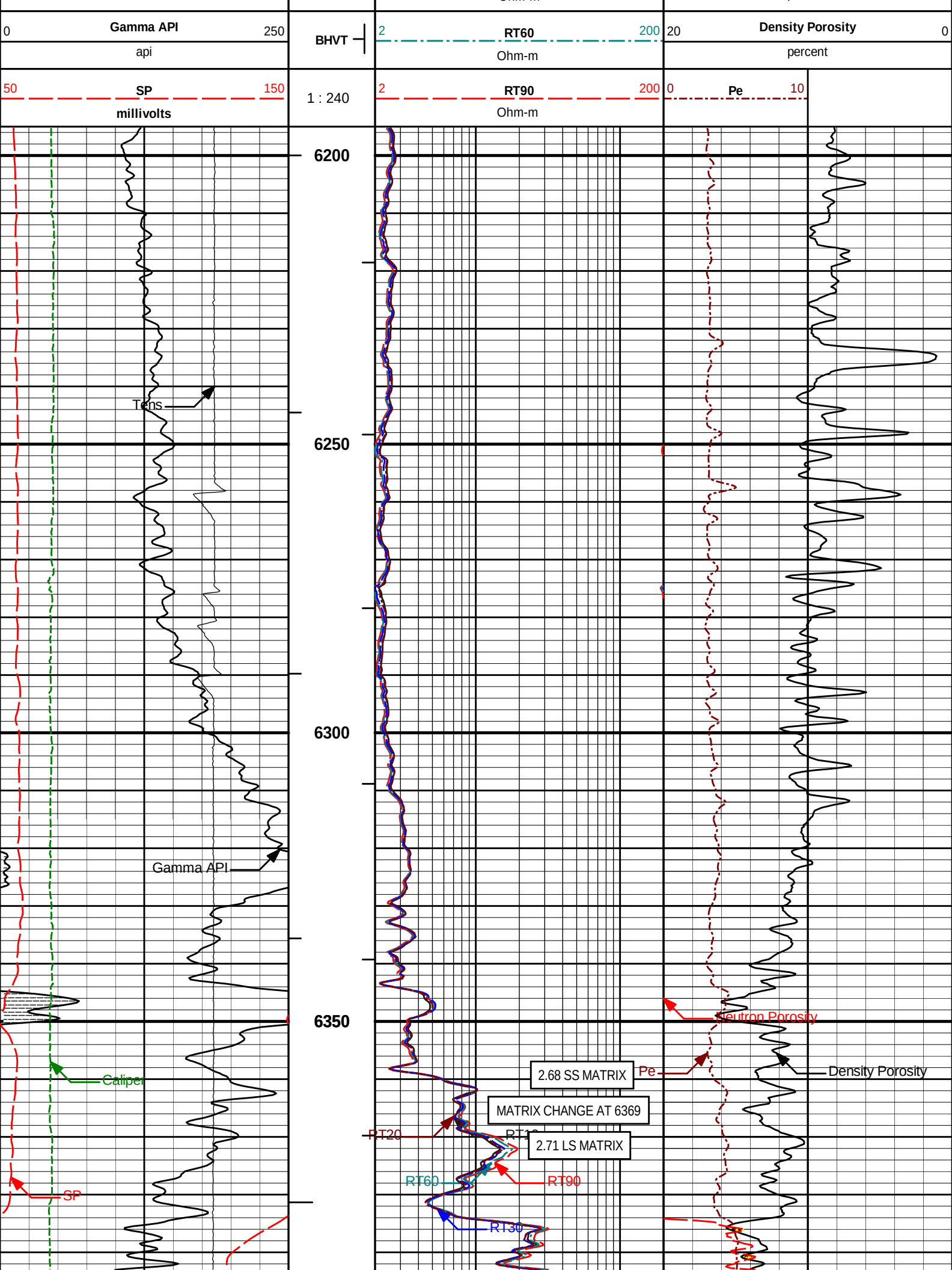
MAIN PASS 5" = 100'

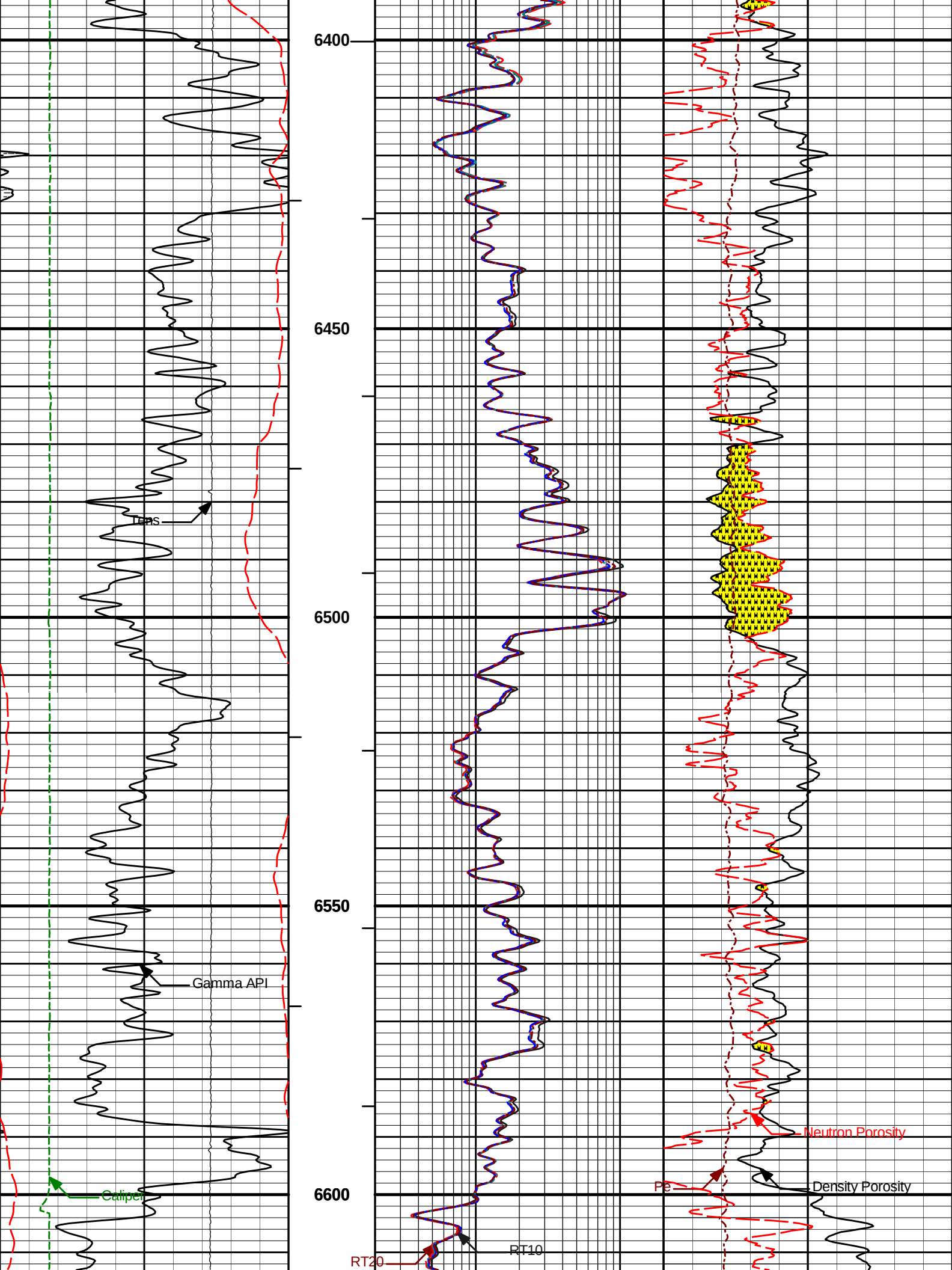
HALLIBURTON

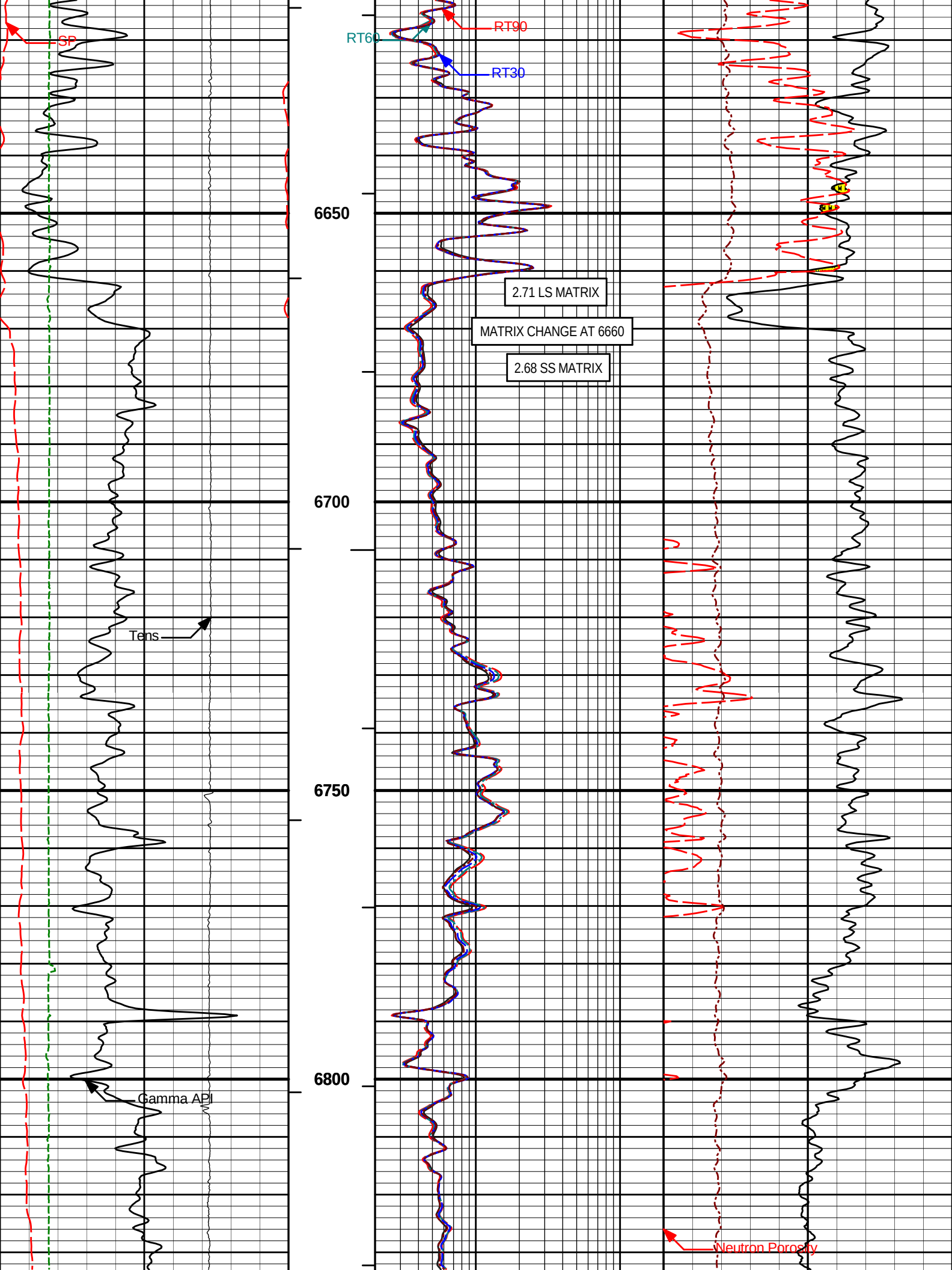
Plot Time: 31-May-11 03:16:44
Plot Range: 6195 ft to 7342.25 ft
Data: KUM_PC_LE23_17\Well Based\MAIN*
Plot File: \\COMP\NIO_COD

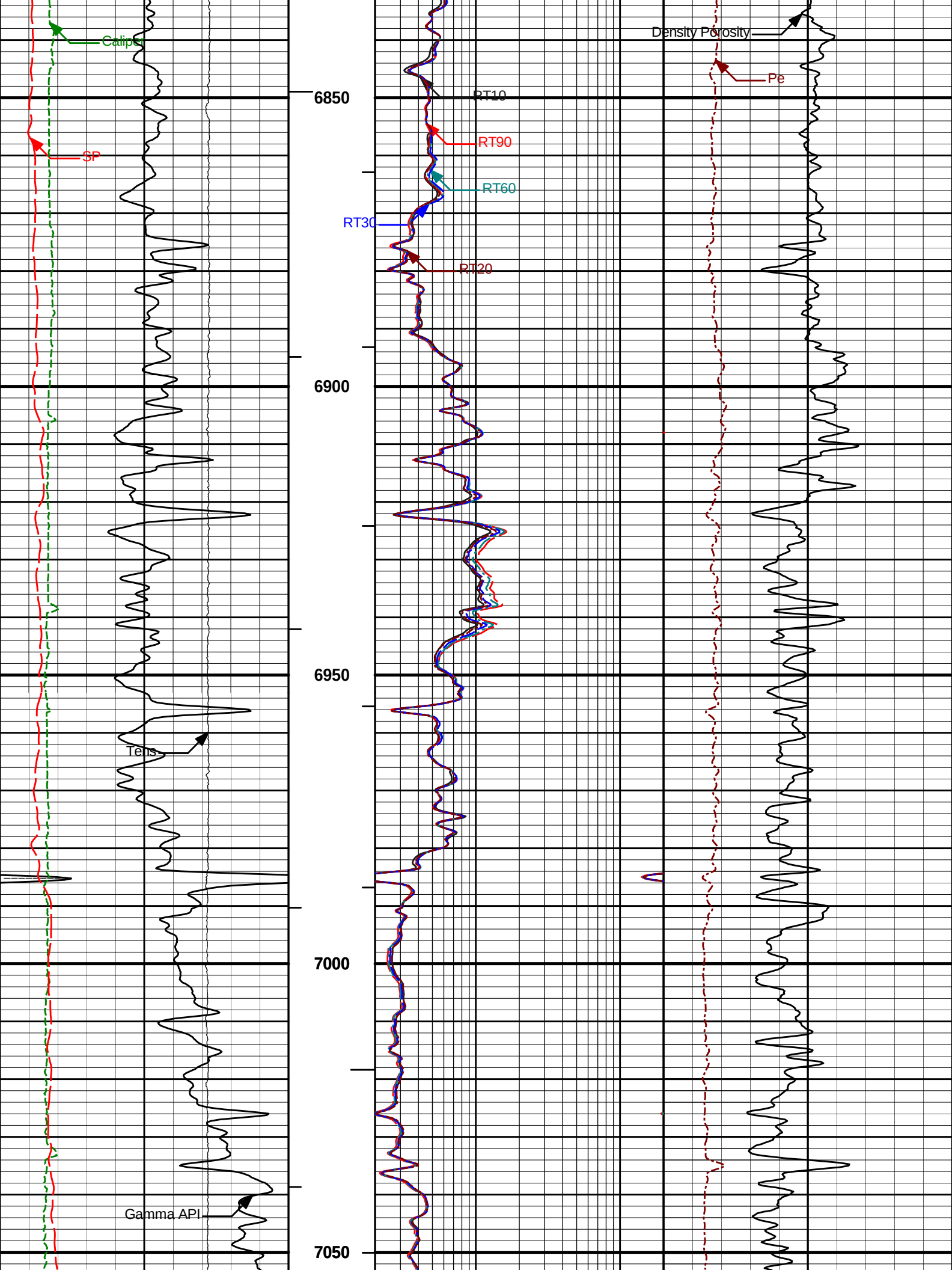
REPEAT SECTION 5" = 100'

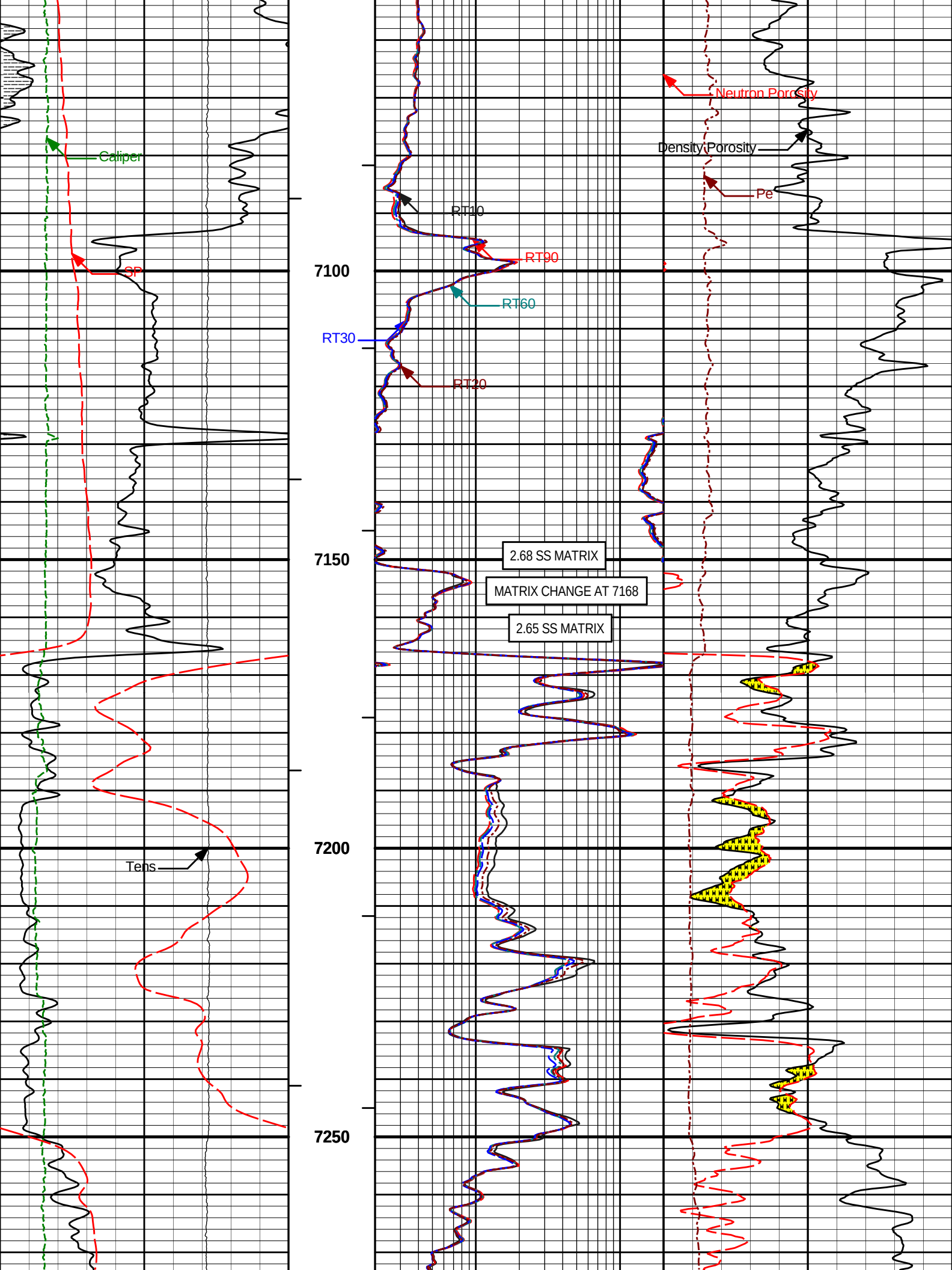
Track 1		Depth Track	Track 2	Track 5	Track 3	
			2 RT10 200 Ohm-m			
10K Tens 0 pounds			2 RT20 200 Ohm-m			
6 Caliper 16 inches		AHVT	2 RT30 200 Ohm-m	20 Neutron Porosity 0 percent		

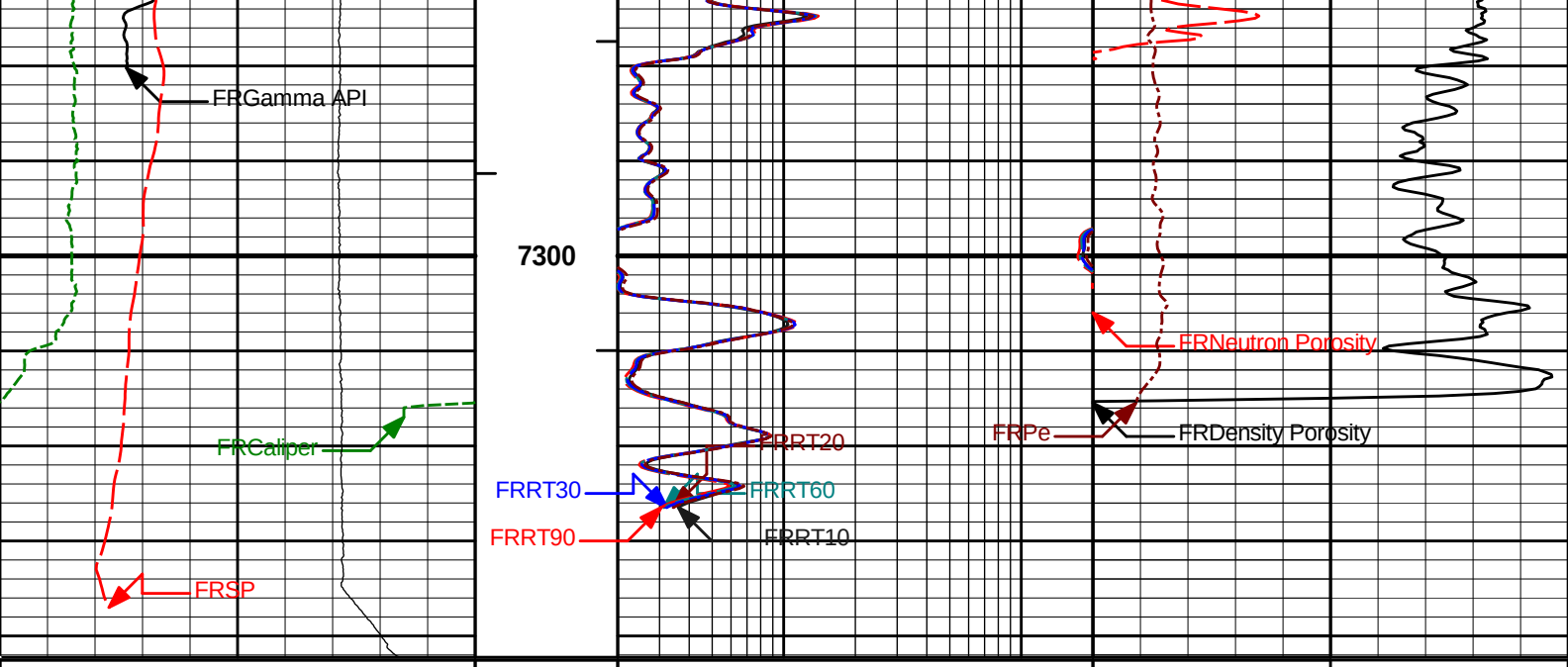

0
Gamma API
250
api
BHVT
2
RT60
200
Ohm-m
20
Density Porosity
0
percent
50
SP
150
millivolts
1 : 240
2
RT90
200
Ohm-m
0
Pe
10
6200
6250
6300
6350
Tens
Gamma API
Caliper
SP
RT20
RT60
RT30
RT90
2.68 SS MATRIX
MATRIX CHANGE AT 6369
2.71 LS MATRIX
Pe
Neutron Porosity
Density Porosity


6400
6450
6500
6550
6600
Tens
Gamma API
Caliper
RT20
RT10
Pe
Neutron Porosity
Density Porosity


SP
RT60
RT90
RT30
6650
2.71 LS MATRIX
MATRIX CHANGE AT 6660
2.68 SS MATRIX
6700
Tens
6750
6800
Gamma API
Neutron Porosity


Caliper
SP
Tens
Gamma API
6850
6900
6950
7000
7050
RT10
RT90
RT60
RT30
RT20
Density Porosity
Pe


Caliper
SP
Tens
RT10
RT90
RT60
RT30
RT20
Neutron Porosity
Density Porosity
Pe
7100
7150
7200
7250
2.68 SS MATRIX
MATRIX CHANGE AT 7168
2.65 SS MATRIX



50 **SP** 150 millivolts	1 : 240	2 **RT90** 200 Ohm-m	0 **Pe** 10	
0 **Gamma API** 250 api	**BHVT**	2 **RT60** 200 Ohm-m	20 **Density Porosity** 0 percent	
6 **Caliper** 16 inches	**AHVT**	2 **RT30** 200 Ohm-m	20 **Neutron Porosity** 0 percent	
10K Tens 0 pounds		2 **RT20** 200 Ohm-m		
		2 **RT10** 200 Ohm-m		

HALLIBURTON

Plot Time: 31-May-11 03:16:48
Plot Range: 6195 ft to 7342.25 ft
Data: KUM_PC_LE23_17\Well Based\MAIN*
Plot File: \\COMP\NIO_COD

REPEAT SECTION 5" = 100'

HALLIBURTON

CALIBRATION REPORT

NATURAL GAMMA RAY TOOL SHOP CALIBRATION

Tool Name:	**GTET - 11277436_BLACK**	**Reference Calibration Date:**	**28-May-11 04:41:06**
Engineer:	**R. TWEETEN**	**Calibration Date:**	**28-May-11 04:50:13**
Software Version:	**WL INSITE R3.2.5 (Build 2)**	**Calibration Version:**	**1**

Calibrator Source S/N: KW-290
Calibrator API Reference:230.00 api
Equivalent Calibrator API Reference:234.0 api

Measurement	Measured	Calibrated	Units
Background	70.3	72.6	api

Background + Calibrator	293.3	302.6	api
Calibrator	232.2	230.0	api

CSNG-FS SHOP CALIBRATION

Tool Name:	**CSNG - 11568970**	**Reference Calibration Date:**	**01-Jan-70 00:00:00**
Engineer:	**C. GULLETT**	**Calibration Date:**	**08-May-11 14:32:18**
Software Version:	**WL INSITE R3.2.3 (Build 5)**	**Calibration Version:**	**1**
Source SN:	**TB 289**		

TITANIUM CASE	Measured	Calibrated	Units
60 KEV Peak Channel #	48.0	48.0	Channel #
239 KEV Peak Channel #	23.6	23.6	Channel #
583 KEV Peak Channel #	53.2	53.2	Channel #
2614 KEV Peak Channel #	219.6	219.6	Channel #
Calibrate Temperature	88.2	88.2	degF

Pass/Fail Summary	Centroid
239 KEV Peak	Passed
583 KEV Peak	Passed
2614 KEV Peak	Passed

Blanket Reference Value: 264.00 API
Calibrator Value: 299.8 API

	Counts	Units	Measured	Calibrated	Units
Thorium Blanket	1672.1	CPS	358.7	358.7	API
Background	274.5	CPS	58.9	58.9	API

Gamma Ray Gain: 1.08
Expected Gain Range: 0.85 - 1.15
Gamma Gain Check: Passed

ACCELEROMETER AND MAGNETOMETER SHOP CALIBRATION

Tool Name:	**IDT - 11277451**	**Reference Calibration Date:**	**01-Jan-70 00:00:00**
Engineer:	**D. CULVER**	**Calibration Date:**	**24-Sep-09 17:06:23**
Software Version:	**WL INSITE R2.4 (Build 20)**	**Calibration Version:**	**1**

Reference Gravity Field: 1.0000 g
Reference Magnetic Field: 55994.0000 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
0.1676	-0.7125	-0.0079	1.0000	99.9997	1
-0.7322	0.1230	-0.0082	1.0002	99.9789	1
-0.0110	0.7450	-0.0087	1.0000	99.9964	1
0.7269	-0.0595	-0.0081	1.0002	99.9832	1
-0.0103	0.7450	-0.0049	1.0000	99.9992	1
0.2102	-0.6870	0.0633	0.9998	99.9835	1
-0.0604	0.7430	-0.0041	0.9999	99.9949	1
0.7289	-0.0254	-0.0040	0.9999	99.9869	1
-0.0798	-0.7297	-0.0040	1.0002	99.9823	1
-0.7412	0.0059	-0.0040	0.9998	99.9775	1

-0.0076	0.0093	0.3605	1.0000	99.9983	1
-0.3018	-0.4744	-0.2406	1.0000	99.9972	1

ACCELEROMETER QUALITY SUMMARY		
Average Calculated Gravity Field	1.0000	g
Standard Deviation Calculated Gravity Field	0.0001	g

ACCELEROMETER GAIN AND OFFSET		
	GAIN	OFFSET
ACC X	1.3595970869	0.0079148794
ACC Y	1.3528423309	-0.0079145515
ACC Z	2.7367222309	0.0134505993

* 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
0.1371	1.2942	-0.2881	55939.9609	99.9035	1
1.1390	-0.6282	-0.2948	56089.8672	99.8288	1
-0.4145	-1.2301	-0.2982	55995.0508	99.9981	1
-1.1685	0.5394	-0.2986	56032.2539	99.9317	1
-0.2675	-1.2299	0.4239	55829.6523	99.7065	1
-0.6910	1.1249	-0.1632	56065.5234	99.8723	1
0.4274	-1.2052	-0.3930	56125.2305	99.7656	1
-1.2260	-0.2774	-0.3959	55964.3672	99.9471	1
-0.1983	1.2572	-0.3937	56015.4570	99.9617	1
1.2236	0.3221	-0.3978	55872.0313	99.7822	1
0.2992	0.4173	1.2146	56042.7422	99.9130	1
0.1171	0.7045	-1.1086	55952.1523	99.9253	1

MAGNETOMETER QUALITY SUMMARY		
Average Calculated Magnetic Field	55993.6914	nT
Standard Deviation Calculated Magnetic Field	87.0022	nT

MAGNETOMETER GAIN AND OFFSET		
	GAIN	OFFSET
MAG X	42277.2382812500	-246.5993804932
MAG Y	41929.9687500000	23.0720367432
MAG Z	42631.0039062500	-11.1096525192

Noise Level Value: 0.000207 cnts

Noise Level Cal Value: 0.0006 g

DUAL SPACED NEUTRON SHOP CALIBRATION

Tool Name:	**DSNT - 11301132_BLACK**	**Reference Calibration Date:**	**11-Apr-11 13:37:18**
Engineer:	**C. GULLETT**	**Calibration Date:**	**19-May-11 08:30:38**
Software Version:	**WL INSITE R3.2.5 (Build 2)**	**Calibration Version:**	**1**

Logging Source S/N: DSN-434

Tank Serial Number: 11068236

Reference value assigned to Tank: 53.720

Snow Block S/N: BRIGHTON

Calibration Tank Water Temperature: 60 degF

Min. Tool Housing Outside Diameter: 3.625 in

CALIBRATION CONSTANTS

Measurement	Prev. Value	New Value	Control Limit On New Value
Gain:	1.001	1.000	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):	0.2227	0.2223	0.0003	+/- 0.0020
Calibrated Ratio:	10.12	10.11	0.010	+/- 0.050

VERIFIER

Measurement	Value	Control Limit
Snow-Block Porosity (decp):	0.0654	0.02000 - 0.09000

PASS/FAIL SUMMARY

Background Check:	Passed
Gain-Range Check:	Passed
Snow-Block Check:	Passed

SPECTRAL DENSITY SHOP CALIBRATION

Tool Name:	**SDLT - M335_P470_BLACK**	**Reference Calibration Date:**	**07-Apr-11 09:56:54**
Engineer:	**C. GULLETT**	**Calibration Date:**	**19-May-11 09:01:44**
Software Version:	**WL INSITE R3.2.5 (Build 2)**	**Calibration Version:**	**1**

Logging Source S/N: 2770GW

Aluminum Block S/N: BRIGHTON_AL	Density: 2.600g/cc	Pe: 3.100
Magnesium Block S/N: BRIGHTON_MG	Density: 1.680g/cc	Pe: 2.594

DENSITY CALIBRATION SUMMARY

Measurement	Previous Value	New Value	Control Limit
Near Bar Gain	1.0482	1.0474	0.90 - 1.10
Near Dens Gain	1.0296	1.0380	0.90 - 1.10
Near Peak Gain	1.0113	1.0142	0.90 - 1.10
Near Lith Gain	0.9992	0.9894	0.90 - 1.10
Far Bar Gain	1.0178	1.0180	0.90 - 1.10
Far Dens Gain	1.0058	1.0056	0.90 - 1.10
Far Peak Gain	0.9995	1.0003	0.90 - 1.10
Far Lith Gain	0.9796	0.9733	0.90 - 1.10
Near Bar Offset	-0.1921	-0.1927	NONE
Near Dens Offset	0.0104	-0.0702	NONE
Near Peak Offset	0.1676	0.1377	NONE
Near Lith Offset	0.2442	0.3214	NONE
Far Bar Offset	0.0405	0.0368	NONE
Far Dens Offset	0.1298	0.1288	NONE
Far Peak Offset	0.1688	0.1573	NONE
Far Lith Offset	0.2915	0.3333	NONE
Near Bar Background	1064.75	1060.25	700 - 1450
Near Dens Background	350.16	349.19	230 - 480
Near Peak Background	152.22	151.60	100 - 210
Near Lith Background	184.66	184.77	125 - 260
Far Bar Background	555.30	553.68	450 - 900
Far Dens Background	218.57	217.00	175 - 345

Far Peak Background	84.65	84.14	70 - 140
Far Lith Background	89.54	88.47	75 - 145

CALIBRATION BLOCK SUMMARY

Measurement	Current Reading (Previous Coef)	Calibrated (New Coef)	Change	Control Limit On Change
MAGNESIUM				
Density (g/cc)	1.684	1.680	-0.004	+/- 0.015
Pe	2.550	2.546	-0.004	+/- 0.150
ALUMINUM				
Density (g/cc)	2.602	2.600	-0.002	+/- 0.01500
Pe	3.080	3.054	-0.026	+/- 0.150

TOOL SUMMARY

Measurement	Near Detector		Far Detector	
	Value	Control Limits	Value	Control Limits
QUALITY				
Background	-0.0004	+/- 0.0110	-0.0018	+/- 0.0140
Magnesium Block	0.0000	+/- 0.0110	-0.0013	+/- 0.0140
Aluminum Block	0.0004	+/- 0.0110	-0.0003	+/- 0.0140
Resolution	9.17	6.00 - 11.50	9.63	6.00 - 11.50
Internal Verifier(B+D+P+L)	1746	1200 - 2700	943	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

DENSITY CALIPER SHOP CALIBRATION

Tool Name: SDLT - M335_P470_BLACK
Reference Calibration Date: 07-Apr-11 13:19:01
Engineer: R. TWEETEN
Calibration Date: 28-May-11 04:55:58
Software Version: WL INSITE R3.2.5 (Build 2)
Calibration Version: 1

CALIBRATION COEFFICIENTS

Measurement	Previous Value	New Value	Control Limit On New Value
Pad Offset	-2043.18	-1936.01	-7000.00 - -1000.00
Pad Gain	0.0004037	0.0003951	0.000200 - 0.000600
Arm Offset	-2756.65	-2433.58	-5000.00 - 3000.00
Arm Gain	0.0005924	0.0005642	0.000300 - 0.000700
Arm Power	-0.000007443	-0.000005774	-0.000010 - 0.000010

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)	3.79	3.75	-0.04	+/- 0.20
RING DIAMETER:				
Small Ring (in)	6.36	6.50	0.14	+/- 0.20
Medium Ring (in)	8.18	8.25	0.07	+/- 0.20
Large Ring (in)	14.90	15.00	0.10	+/- 0.20

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

PASS/FAIL SUMMARY	
Calibration-Coefficients Range Check:	Passed

ARRAY COMPENSATED TRUE RESISTIVITY SHOP CALIBRATION

Tool Name: ACRt - E2817-S4353_RED
Reference Calibration Date: 13-Aug-10 20:06:47
Engineer: F. LODER
Calibration Date: 30-Mar-11 18:36:19
Software Version: WL INSITE R3.2.3 (Build 5)
Calibration Version: 1

TYPICAL GAIN RANGE

Subarray	R12KHz			R36KHz			R72KHz		
	Lower	(mmho/m)	Upper	Lower	(mmho/m)	Upper	Lower	(mmho/m)	Upper
A1 (80")	0.95	1.0059	1.05	0.95	1.0075	1.05	0.95	1.0051	1.05
A2 (50")	0.95	1.0076	1.05	0.95	1.0107	1.05	0.95	1.0110	1.05
A3 (29")	0.95	1.0065	1.05	0.95	1.0088	1.05	0.95	1.0066	1.05
A4 (17")	0.95	1.0010	1.05	0.95	1.0019	1.05	0.95	1.0026	1.05
A5 (10")	N/A	N/A	N/A	0.95	0.9944	1.05	0.95	0.9930	1.05
A6 (6")	N/A	N/A	N/A	0.95	0.9793	1.05	0.95	0.9785	1.05

TYPICAL SONDE OFFSET RANGE

Subarray	R12KHz			R36KHz			R72KHz		
	Lower	(mmho/m)	Upper	Lower	(mmho/m)	Upper	Lower	(mmho/m)	Upper
A1 (80")	-5	-1.036	2	-6	-4.390	-2	-8	-4.791	-2
A2 (50")	-7	-1.751	-1	-6	-2.896	-2	-7	-4.731	-2
A3 (29")	-27	-12.778	-9	-9	-3.452	-3	-7	-3.636	-1
A4 (17")	-180	-88.705	-60	-45	-28.593	-15	-39	-24.648	-13
A5 (10")	N/A	N/A	N/A	-150	-91.844	-50	-80	-44.230	-10
A6 (6")	N/A	N/A	N/A	175	331.191	525	90	166.676	270

TRANSMITTER CURRENT GAIN

Signal	Lower	R	Upper
12K	0.6	0.8814	1.3
36K	1.0	1.8411	2.0
72K	1.0	1.1239	2.0

R-MUD VERIFICATION

Signal	Lower (ohm-m)	Measured (ohm-m)	Upper (ohm-m)
Mud Cell	0.95	0.997	1.05

CALIBRATION SUMMARY

Sensor	Shop	Field	Post	Difference	Tolerance	Units
GTET-11277436_BLACK						
Gamma Ray Calibrator	230.0	----------	----------	0.0	+/- 9.00	api
CSNG-11568970						
60 KEV Peak Channel #	48.0	----------	----------	0.0	----------	Channel #
239 KEV Peak Channel #	23.6	----------	----------	0.0	----------	Channel #
583 KEV Peak Channel #	53.2	----------	----------	0.0	----------	Channel #

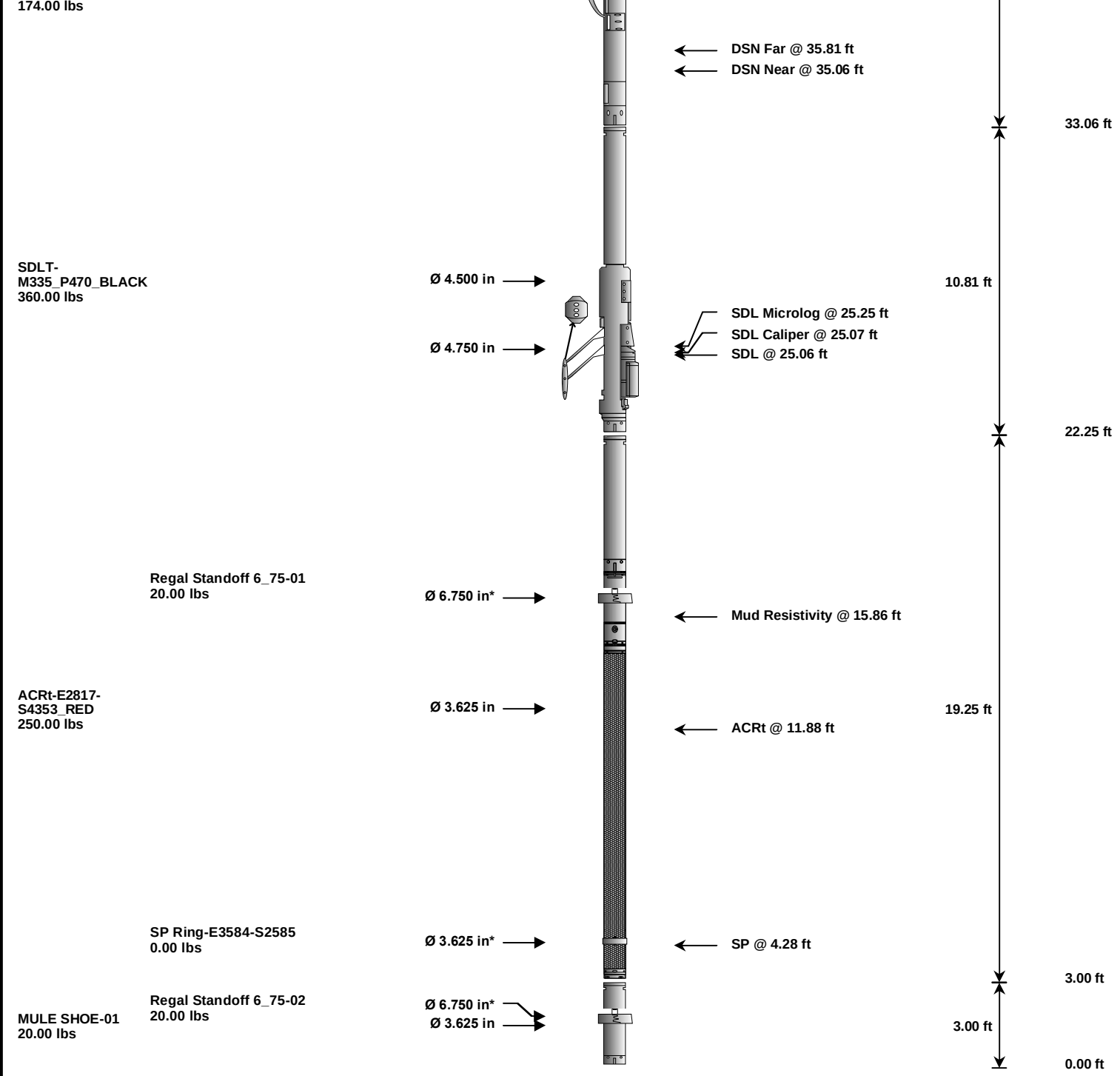
2614 KEV Peak Channel #	219.6	----------	----------	0.0	----------	Channel #
DSNT-11301132_BLACK						
Snow-Block Porosity	0.0654	----------	----------	0.0000	+/- -.--	decp
SDLT-M335_P470_BLACK						
Near(B+D+P+L)	1745.804	----------	----------	0.000	+/-14.646	cps
Far(B+D+P+L)	943.289	----------	----------	0.000	+/-15.031	cps
Pad Extension	3.75	----------	----------	0.00	+/-0.20	in
Ring Diameter	8.25	----------	----------	0.00	+/-0.20	in
ACRt-E2817-S4353_RED						
Mud Cell	0.997	----------	----------	0.000	----------	ohm-m

Data: KUM_PC_LE23_17\0001 TRIPLE_CSNG_IDT\IDLE **Date: 31-May-11 00:28:55**

HALLIBURTON

TOOL STRING DIAGRAM REPORT

Description	Overbody Description	O.D.	Diagram	Sensors @ Delays	Length	Accumulated Length
						73.27 ft
RWCH-10347226 135.00 lbs		Ø 3.625 in		Load Cell @ 69.59 ft BH Temperature @ 69.02 ft	6.25 ft	
						67.02 ft
GTET-11277436_BLACK 165.00 lbs		Ø 3.625 in		GammaRay @ 60.96 ft	8.52 ft	
						58.50 ft
CSNG-11568970 114.00 lbs		Ø 3.625 in		CSNG @ 52.87 ft	8.17 ft	
						50.33 ft
IDT-11277451 150.00 lbs		Ø 3.625 in			7.58 ft	
						42.75 ft
DSNT-11301132_BLACK	DSN Decentralizer-10958655_RED 6.60 lbs	Ø 3.625 in* Ø 3.625 in			9.69 ft	



Mnemonic	Tool Name	Serial Number	Weight (lbs)	Length (ft)		Accumulated Length (ft)	Max.Log. Speed (fpm)
RWCH	Releasable Wireline Cable Head	10347226	135.00	6.25		67.02	300.00
GTET	Gamma Telemetry Tool	11277436_BLACK	165.00	8.52		58.50	60.00
CSNG	Compensated Spectral Natural Gamma	11568970	114.00	8.17		50.33	15.00
IDT	Insite Directional Tool	11277451	150.00	7.58		42.75	30.00
DSNT	Dual Spaced Neutron	11301132 BLACK	174.00	9.69		33.06	60.00
DCNT	DSN Decentralizer	10958655_RED	6.60	5.13	*	36.39	300.00
SDLT	Spectral Density Tool	M335 P470 BLACK	360.00	10.81		22.25	60.00
ACRt	Array Compensated True Resistivity	E2817-S4353_RED	250.00	19.25		3.00	300.00
SP	SP Ring	E3584-S2585	0.00	0.25	*	4.28	300.00
RSOF	Regal Standoff 6.75in	01	20.00	0.52	*	16.29	300.00
MS	MULE SHOE	01	20.00	3.00		0.00	300.00
RSOF	Regal Standoff 6.75in	02	20.00	0.52	*	1.50	300.00
Total			**1,414.60**	**73.27**			

* Not included in Total Length and Length Accumulation.

Data: KUM_PC_LE23_17\0001 TRIPLE_CSNG_IDT\IDLE

Date: 30-May-11 23:06:17

COMPANY	**NOBLE ENERGY INC.**		
WELL	**KUMMER PC LE23-17**		
FIELD	**WATTENBERG**		
COUNTY	**WELD**	STATE	**CO**

HALLIBURTON

SPECTRAL DENSITY
DUAL SPACED NEUTRON
ARRAY COMPENSATED
TRUE RESISTIVITY