HALLIBURTON

SPECTRAL DENSITY DUAL SPACED NEUTRON ARRAY COMPENSATED TRUE RESISTIVITY TIGHT HOLE

COMPANY **NOBLE**

WELL **MCKAY AB02-13**

FIELD **WATTENBERG**

COUNTY **WELD** STATE **CO**

COMPANY NOBLE
WELL MCKAY AB02-13
FIELD WATTENBERG
COUNTY WELD
STATE CO

API No. 05123302670000

Location SHL: 660' FSL & 660' FWL SEC 2
BHL: 660' FSL & 660' FWL SEC 2
LAT: 40.5967°
LONG: -104.52334°

Sect. 2 Twp. 7N Rge. 64W

Other Services:
RWCH
GTET
IDT
ICT
CSNG
BSAT

Permanent Datum	GL	Elev. 4881.0 ft	Elev.: K.B. 4894.0 ft
Log measured from	KB	, 13.0 ft above perm. Datum	D.F. 4894.0 ft
Drilling measured from	KB		G.L. 4881.0 ft

Date		12-Mar-10		@		@	
Run No.		ONE					
Depth - Driller		9085.00 ft					
Depth - Logger		9086.0 ft					
Bottom - Logged Interval		9076 ft					
Top - Logged Interval		777 ft					
Casing - Driller		9.625 in	@ 777.0 ft	@		@	
Casing - Logger		777.0 ft					
Bit Size		8.750 in		@		@	
Type Fluid in Hole		WBM					
Density	Viscosity	9.3 ppg	60.00 s/qt				
PH	Fluid Loss	10.50 pH	8.8 cptm				
Source of Sample		FLOWLINE					
Rm @ Meas. Temperature		0.52 ohmm	@ 96.80 degF	@		@	
Rmf @ Meas. Temperature		0.54 ohmm	@ 75.00 degF	@		@	
Rmc @ Meas. Temperature		0.63 ohmm	@ 75.00 degF	@		@	
Source Rmf	Rmc	CHART	CHART				
Rm @ BHT		0.22 ohmm	@ 242.0 degF	@		@	
Time Since Circulation		8.0 hr					
Time on Bottom		12-Mar-10 20:33					
Max. Rec. Temperature		242.0 degF	@ 9086.0 ft	@		@	
Equipment	Location	10549597	BRIGHTON				
Recorded By		C. BLUE					
Witnessed By		IRVING MCWHORTER					

Fold here

Service Ticket No.: 7229393 API Serial No.: 05123302670000 PGM Version: WL INSITE R2.4 (Build 20)

CHANGE IN MUD TYPE OR ADDITIONAL SAMPLE

RESISTIVITY SCALE CHANGES

	Sample No.				Type Log	Depth	Scale Up Hole	Scale Down Hole
Date								
Depth-Driller								
Type Fluid in Hole								
Density	Viscosity							
Ph	Fluid Loss							
Source of Sample								

RESISTIVITY EQUIPMENT DATA

	Run No.	Tool Type & No.	Pad Type	Tool Pos.	Other
Rm @ Meas. Temp	@				
Rmf @ Meas. Temp.	@	ONE	ACRT 817-353	N/A`	1.5" S.O.
Rmc @ Meas. Temp.	@				N/A
Source Rmf	Rmc				
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.	11277436	Serial No.	11105780	Serial No.	I132M275	Serial No.	11301132
Model No.	GTET	Model No.	BSAT	Model No.	SDLT	Model No.	DSNT
Diameter	3.625"	No. of Cent.	2	Diameter	4.5"	Diameter	3.625"
Detector Model No.	102A	Spacing	0.5'	Log Type	GAM/GAM	Log Type	NEU/NEU
Type	SCINT			Source Type	Cs137	Source Type	Am241Be
Length	8"	LSA [Y/N]	N	Serial No.	2770 GW	Serial No.	DSN 434
Distance to Source	10'	FWDA [Y/N]	N	Strength	1.5 Ci	Strength	15 Ci

LOGGING DATA

GENERAL				GAMMA		ACOUSTIC		DENSITY			NEUTRON			
Run No.	Depth From	Depth To	Speed ft/min	Scale L	Scale R	Scale L	Scale R	Matrix	Scale L	Scale R	Matrix	Scale L	Scale R	Matrix
ONE	9086	7510	REC	0	250	30%	-10%	55.5 us/ft	20%	0%	2.65 g/cc	20%	0%	SAND
ONE	7510	7053	REC	0	250	30%	-10%	55.5 us/ft	20%	0%	2.68 g/cc	20%	0%	SAND

ONE	7510	7053	REC	0	250	30%	-10%	55.5 us/ft	20%	0%	2.68 g/cc	20%	0%	SAND
ONE	7053	6769	REC	0	250	30%	-10%	47.6 us/ft	20%	0%	2.71 g/cc	20%	0%	LIME
ONE	6769	777	REC	0	250	30%	-10%	55.5 us/ft	20%	0%	2.68 g/cc	20%	0%	SAND

DIRECTIONAL INFORMATION

Maximum Deviation @ KOP @

Remarks:

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

ANNULAR HOLE VOLUME CALCULATED FOR 7 INCH PRODUCTION CASING

TENSION PULLS AFFECT TOOL RESPONSE

CREW: T. BINEAU, J. WALKER 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
	BSAT	Delta -T Matrix Type	Sandstone 55.5	
6769.00				
	DSNT	Neutron Lithology	Limestone	
	SDLT	Formation Density Matrix	2.710	g/cc
	BSAT	Delta -T Matrix Type	User define	
	BSAT	Delta -T Matrix	47.60	uspf
7053.00				
	SDLT	Formation Density Matrix	2.680	g/cc
7510.00				
	SHARED	Bit Size	8.750	in
	SHARED	Use Bit Size instead of Caliper for all applications.	No	
	SHARED	Borehole Fluid Weight	9.300	ppg
	SHARED	Mud Resistivity	0.520	ohmm
	SHARED	Temperature of Mud	96.8	degF
	SHARED	Oil Based Mud System?	No	
	SHARED	Logging Interval is Cased?	No	
	SHARED	AHV Casing OD	7.000	in
	SHARED	Surface Temperature	55.0	degF
	SHARED	Total Well Depth	9086.00	ft
	SHARED	Bottom Hole Temperature	242.0	degF
	GTET	Process Gamma Ray?	Yes	
	GTET	Gamma Tool Standoff	0.000	in
	GTET	Process Gamma Ray EVR?	No	
	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	Is Hole Air Drilled?	No	
SDLT	Use Calibration Blocks?	No	
SDLT	SDLT Pad Temperature Valid?	Yes	
SDLT	Disable temperature warning	No	
SDLT	Weighted Mud Correction Type?	None	
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	
IDT	Survey Writing Interval	30	ft
ICT	Process Caliper Outputs?	Yes	
CSNG	Process CSNG Data?	Yes	
CSNG	Is Tool Centralized?	No	
CSNG	Mud Type?	Natural	
CSNG	Percent K in Mud by Weight?	0.00	%
CSNG	Gamma Enviromental Corrections?	Yes	
CSNG	Barite Correction Factor	1.0	
BSAT	Compute BCAS Results?	Yes	
BSAT	Semblance Filter Low Pass Value?	5000	Hz
BSAT	Semblance Filter High Pass Value?	27000	Hz
BSAT	Delta -T Fluid	189.00	uspf
BSAT	Delta -T Matrix Type	Sandstone 55.5	
BSAT	Delta -T Shale	100.00	uspf
BSAT	Acoustic Porosity Equation	Wylie	
ACRt	Process ACRt?	Yes	
ACRt	Minimum Tool Standoff	1.50	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

BOTTOM

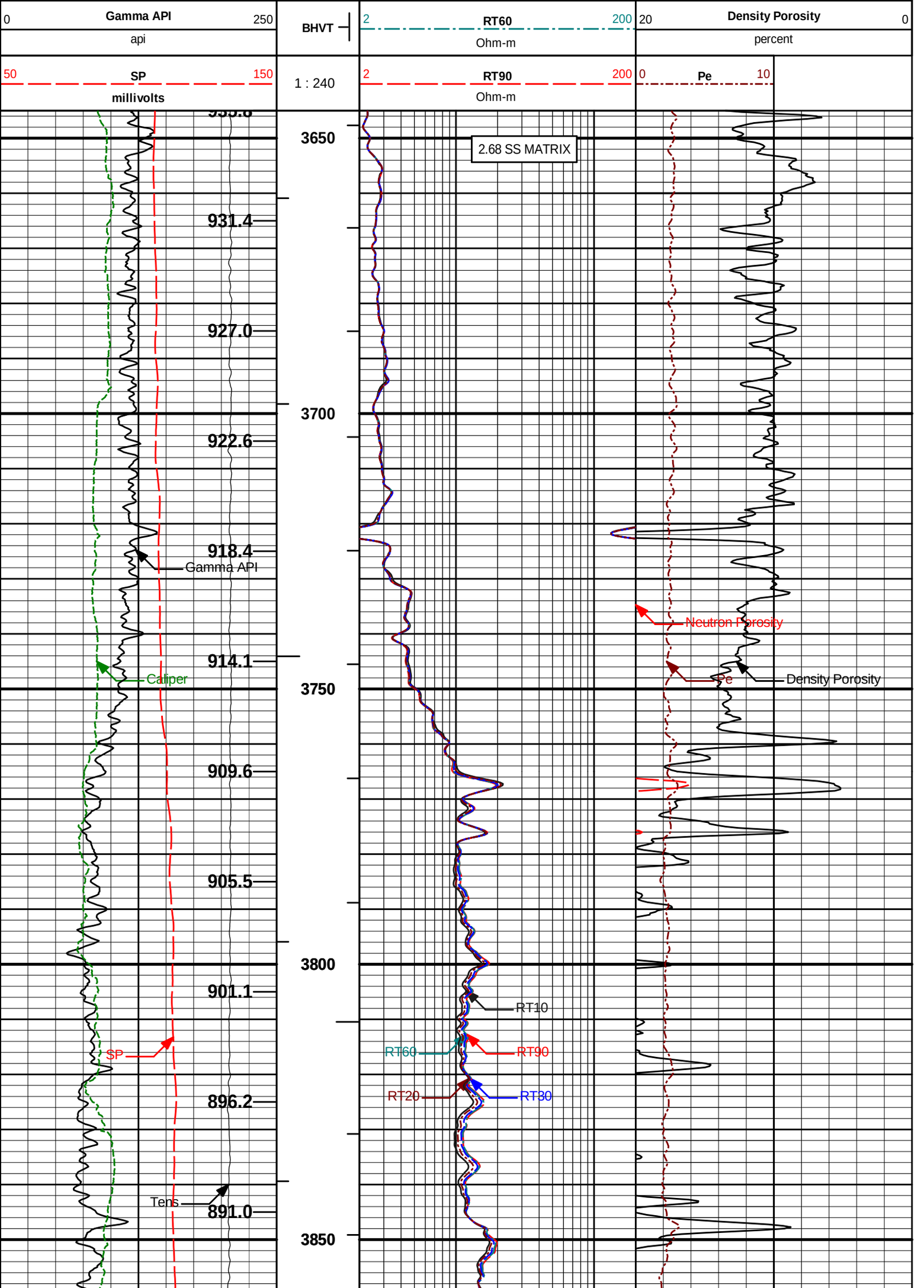
Data: MCKAY_AB02_13\0003 QUAD-IDT-ICT-CSNG\002.02 12-Mar-10 23:43 Up **Date: 12-Mar-10 23:47:24**

HALLIBURTON

Plot Time: 13-Mar-10 08:20:08
Plot Range: 3645 ft to 5255 ft
Data: MCKAY_AB02_13\Well Based\MAIN*
Plot File: \\COMP\PARK_SUS

MAIN PASS 5" = 100'

Annular Volume Total		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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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
3650
3700
3750
3800
3850
931.4
927.0
922.6
918.4
914.1
909.6
905.5
901.1
896.2
891.0
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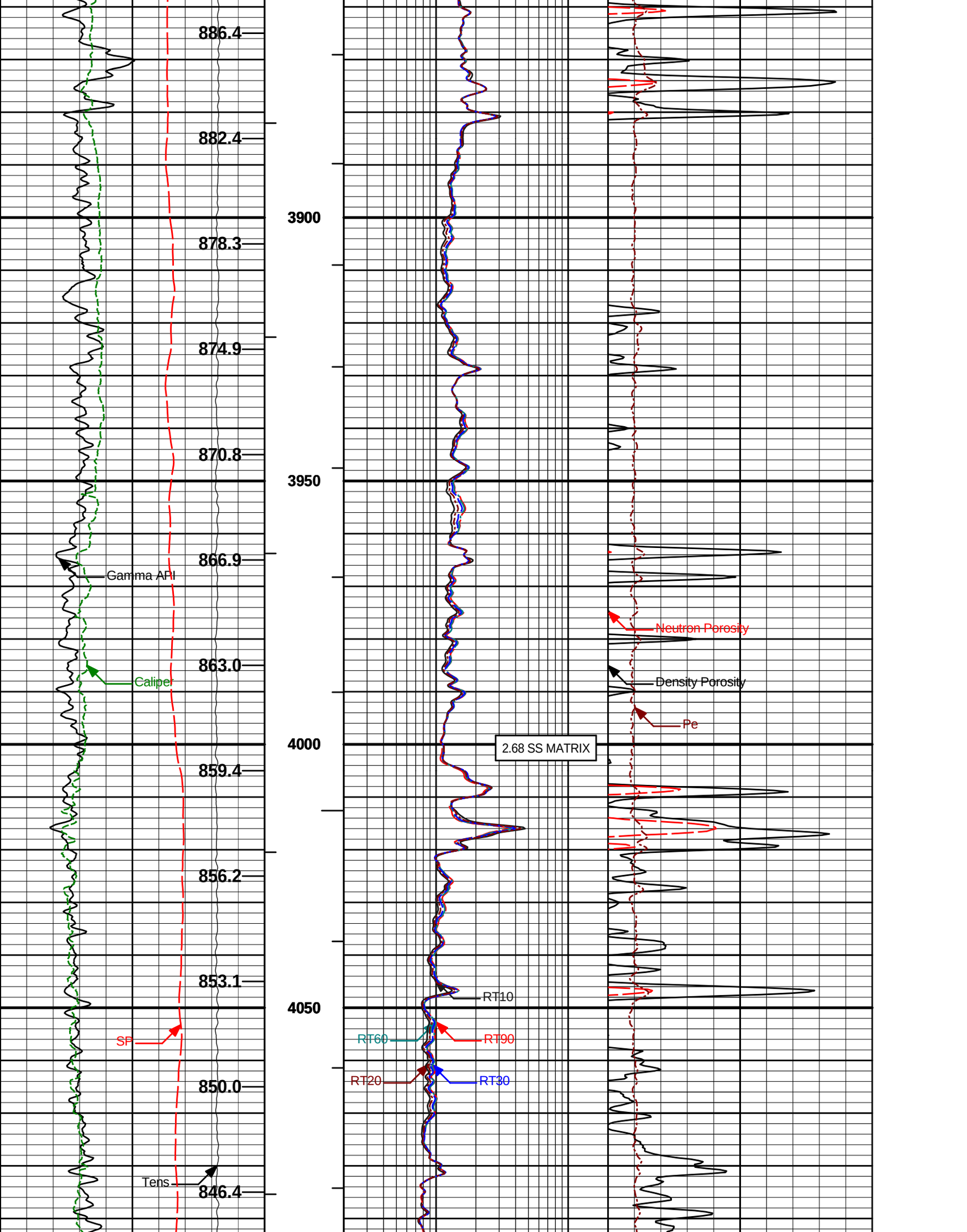
Caliper
SP
Tens
Neutron Porosity
Pe
Density Porosity
RT10
RT60
RT90
RT20
RT30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Density Porosity
Pe
4000
2.68 SS MATRIX
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853.1
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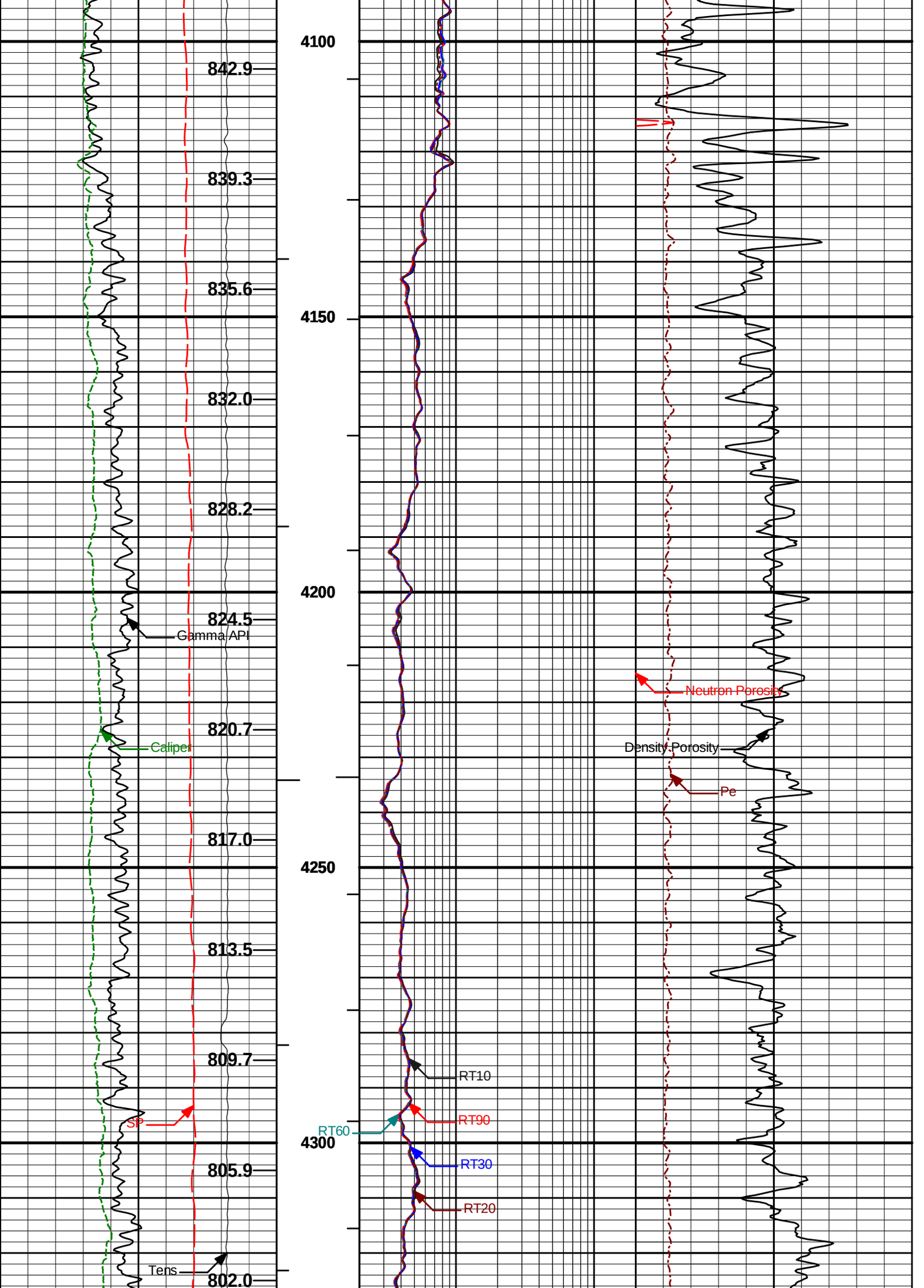
4050
SP
RT60
RT90
RT20
RT30
850.0
Tens
846.4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4100
4150
4200
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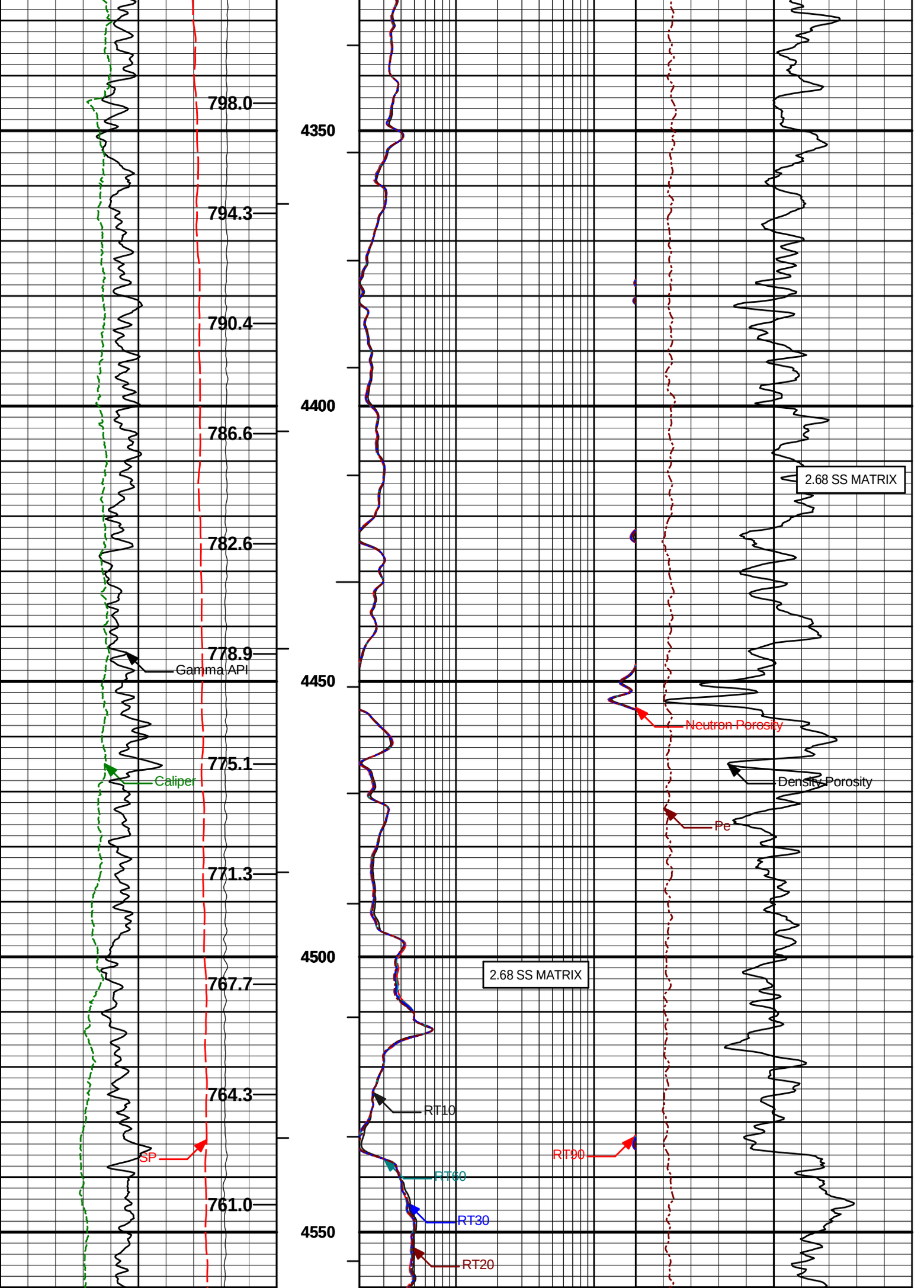
Caliper
SP
Tens
RT10
RT90
RT60
RT30
RT20
Neutron Porosity
Density Porosity
Pe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771.3
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761.0
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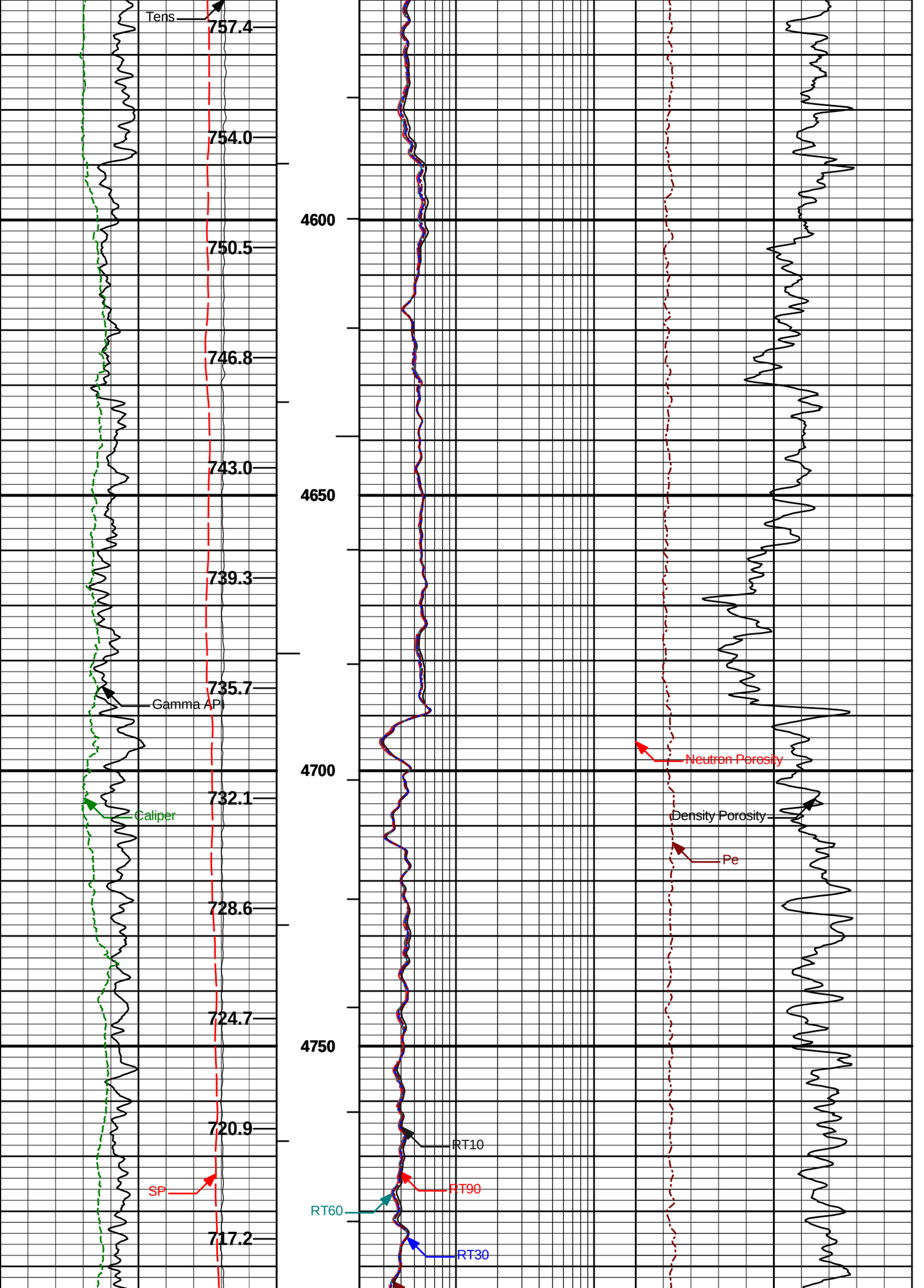
4400
4450
4500
4550
Gamma API
Caliper
SP
RT10
RT60
RT30
RT20
RT90
Neutron Porosity
Density Porosity
Pe
2.68 SS MATRIX
2.68 SS MATRIX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732.1
Caliper
Neutron Porosity
Density Porosity
Pe
728.6
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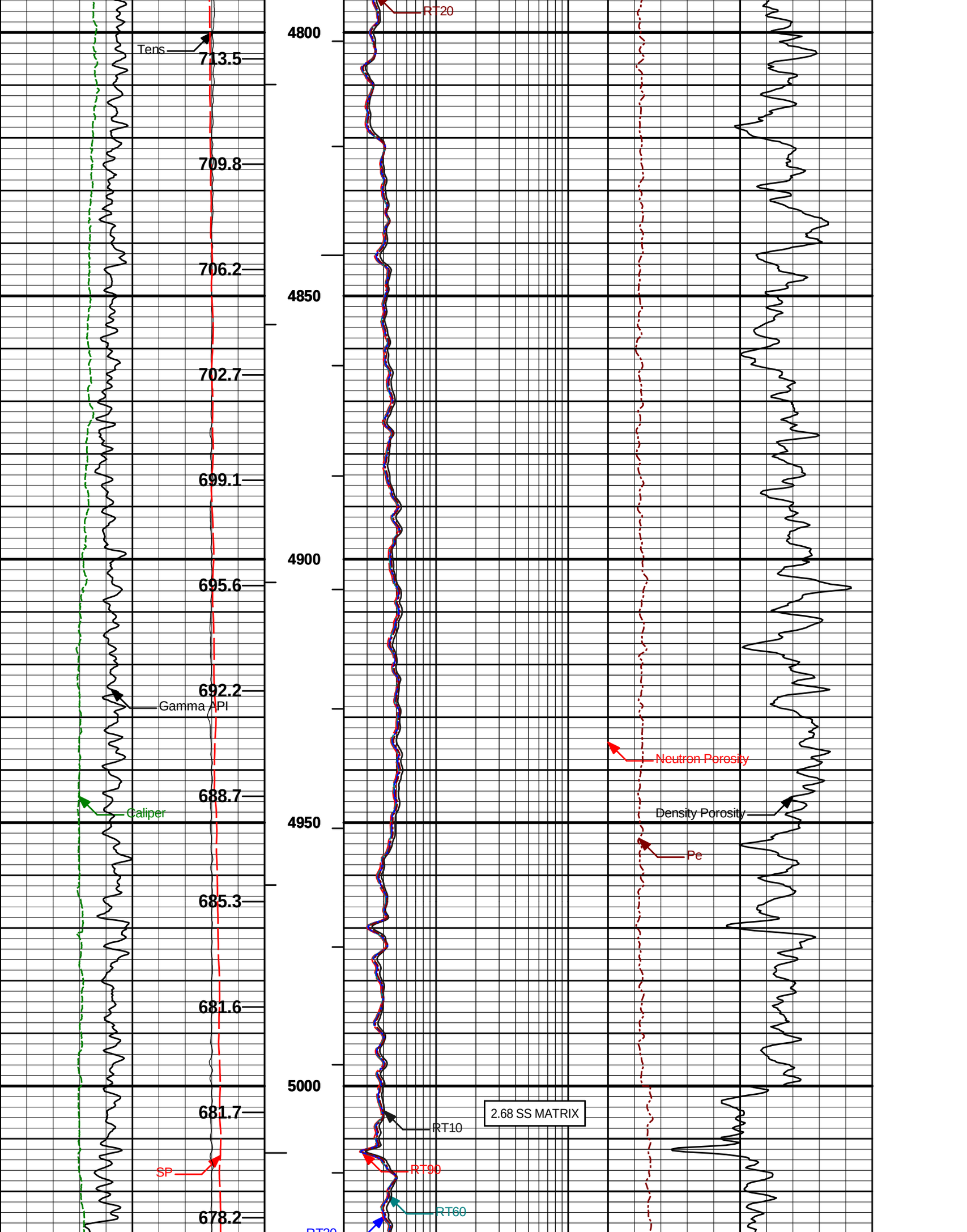
4750
720.9
RT10
SP
RT90
RT60
717.2
RT30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Tens
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706.2
702.7
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695.6
692.2
688.7
685.3
681.6
681.7
678.2
4800
4850
4900
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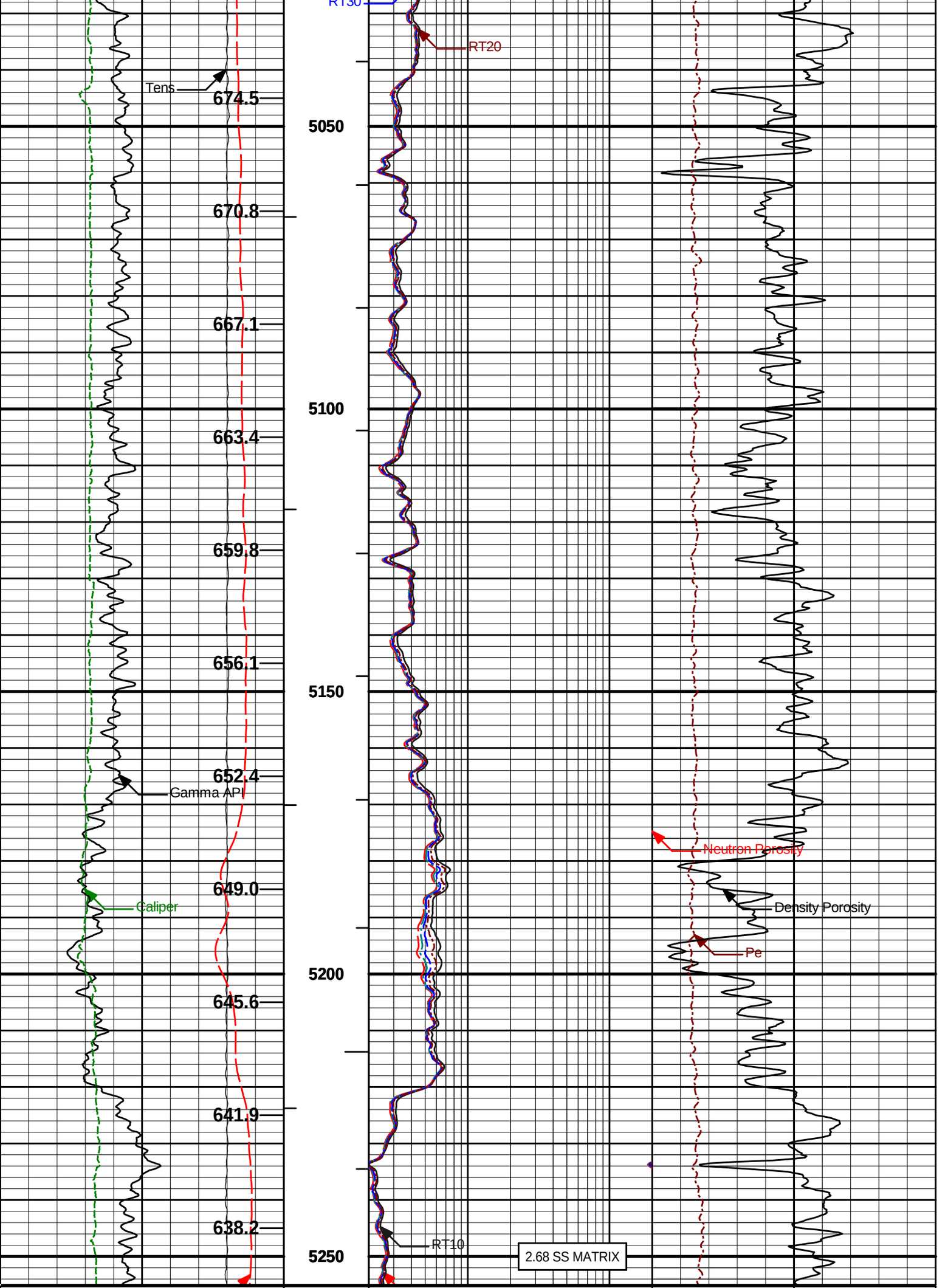
Caliper
SP
Neutron Porosity
Density Porosity
Pe
2.68 SS MATRIX
RT10
RT90
RT60
RT30


RT30
RT20
Tens
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670.8
667.1
5100
663.4
659.8
656.1
5150
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Gamma API
649.0
Caliper
5200
645.6
641.9
638.2
RT10
5250
2.68 SS MATRIX
Neutron Porosity
Density Porosity
Pe
50
SP
150
1 : 240
2
RT90
200
0
Pe
10

millivolts | Ohm-m

0 Gamma API 250		BHVT	2 RT60 200	20 Density Porosity 0	
api			Ohm-m	percent	
6 Caliper 16		AHVT	2 RT30 200	20 Neutron Porosity 0	
inches			Ohm-m	percent	
10K Tens 0			2 RT20 200		
pounds			Ohm-m		
Annular Volume Total			2 RT10 200		
			Ohm-m		

HALLIBURTON

Plot Time: 13-Mar-10 08:20:11
Plot Range: 3645 ft to 5255 ft
Data: MCKAY_AB02_13\Well Based\MAIN*
Plot File: \\COMP\PARK_SUS

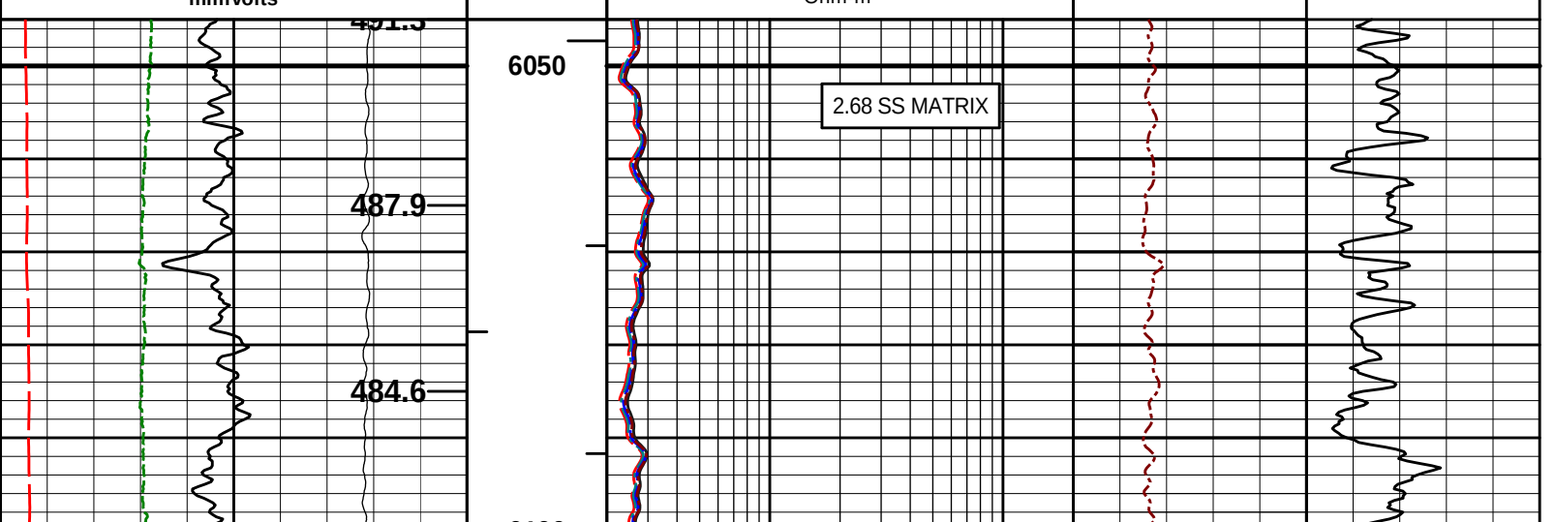
MAIN PASS 5" = 100'

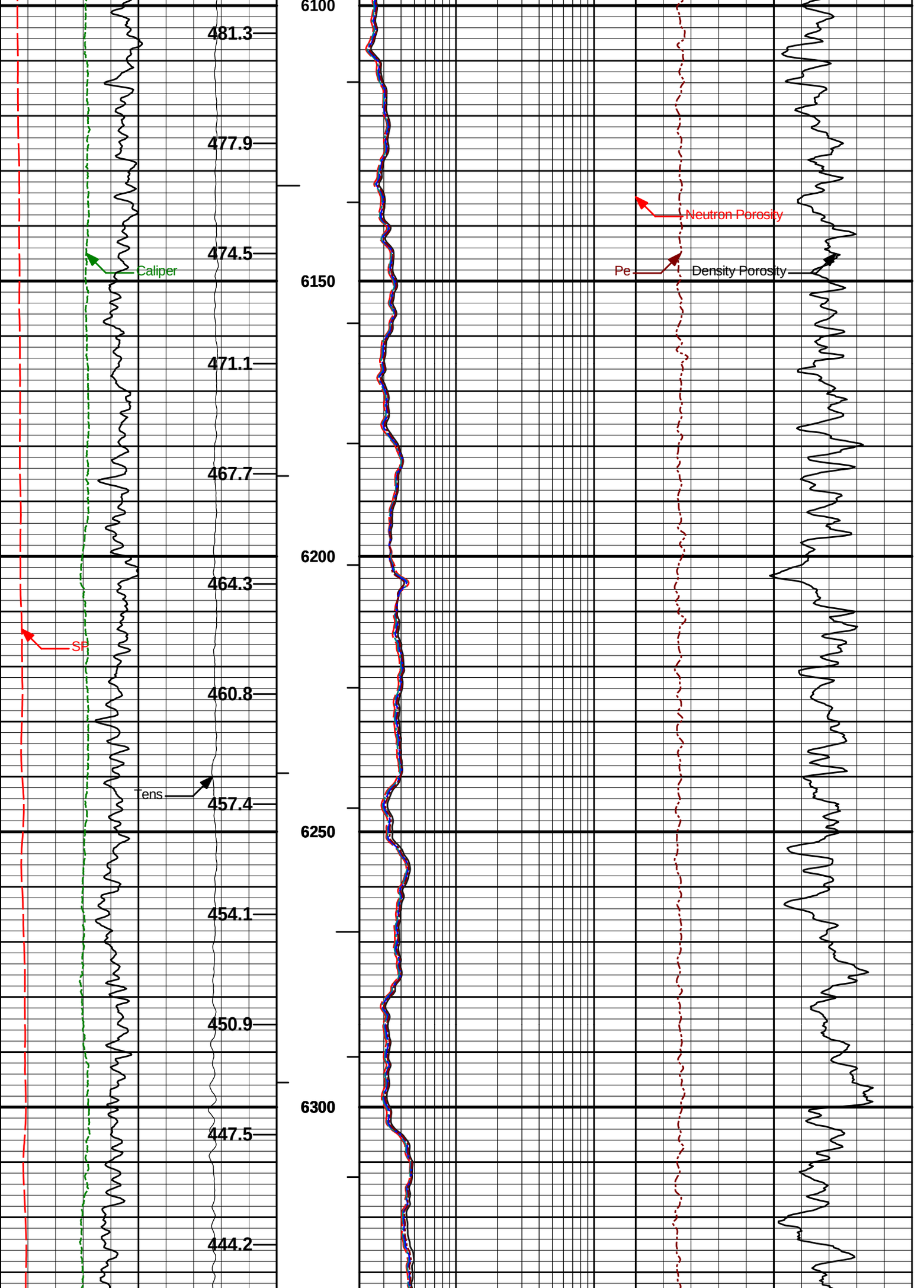
HALLIBURTON

Plot Time: 13-Mar-10 08:20:11
Plot Range: 6045 ft to 9097.92 ft
Data: MCKAY_AB02_13\Well Based**
Plot File: \\COMP\NIO_COD

MAIN PASS 5" = 100'

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

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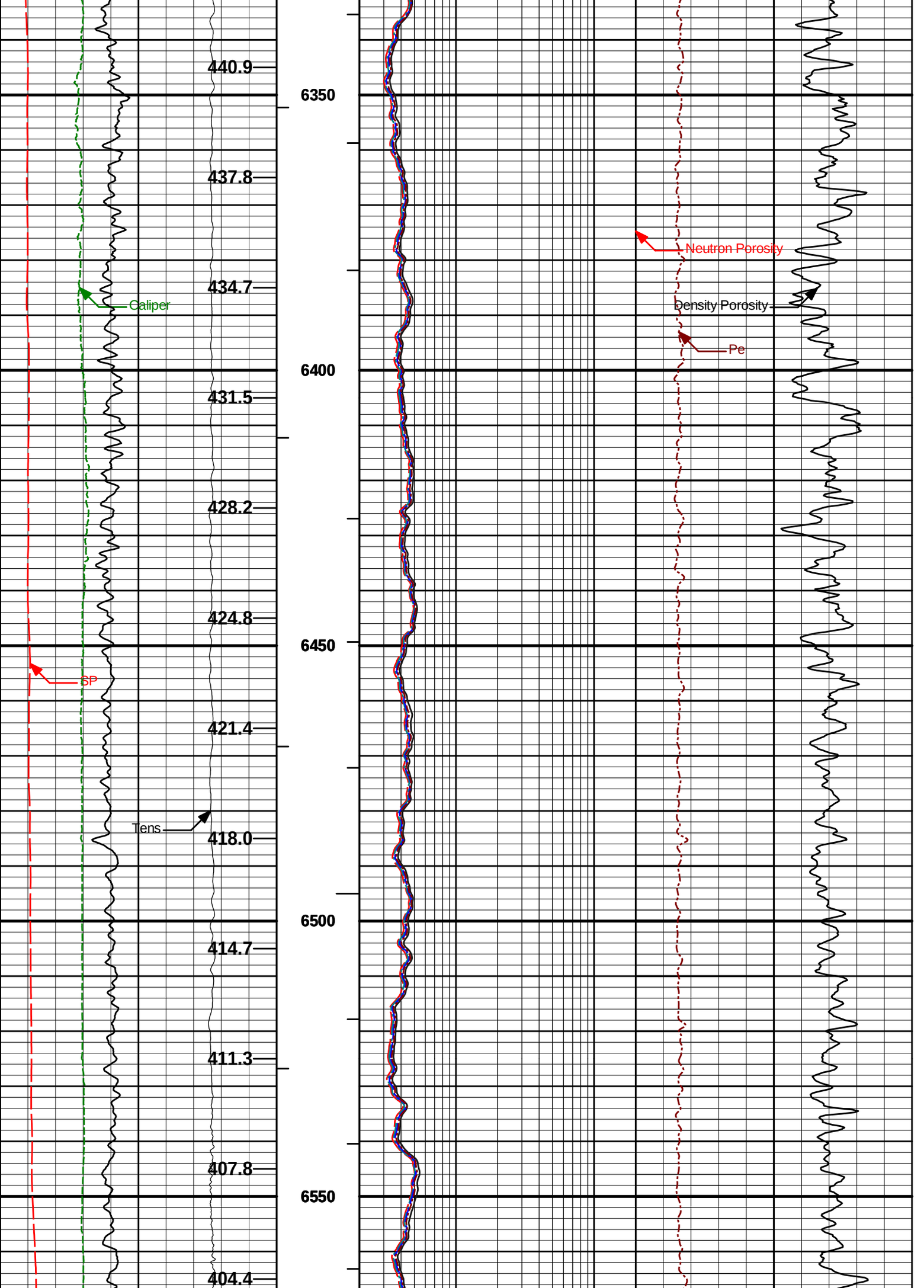
SP
Tens
Neutron Porosity
Pe
Density Porosity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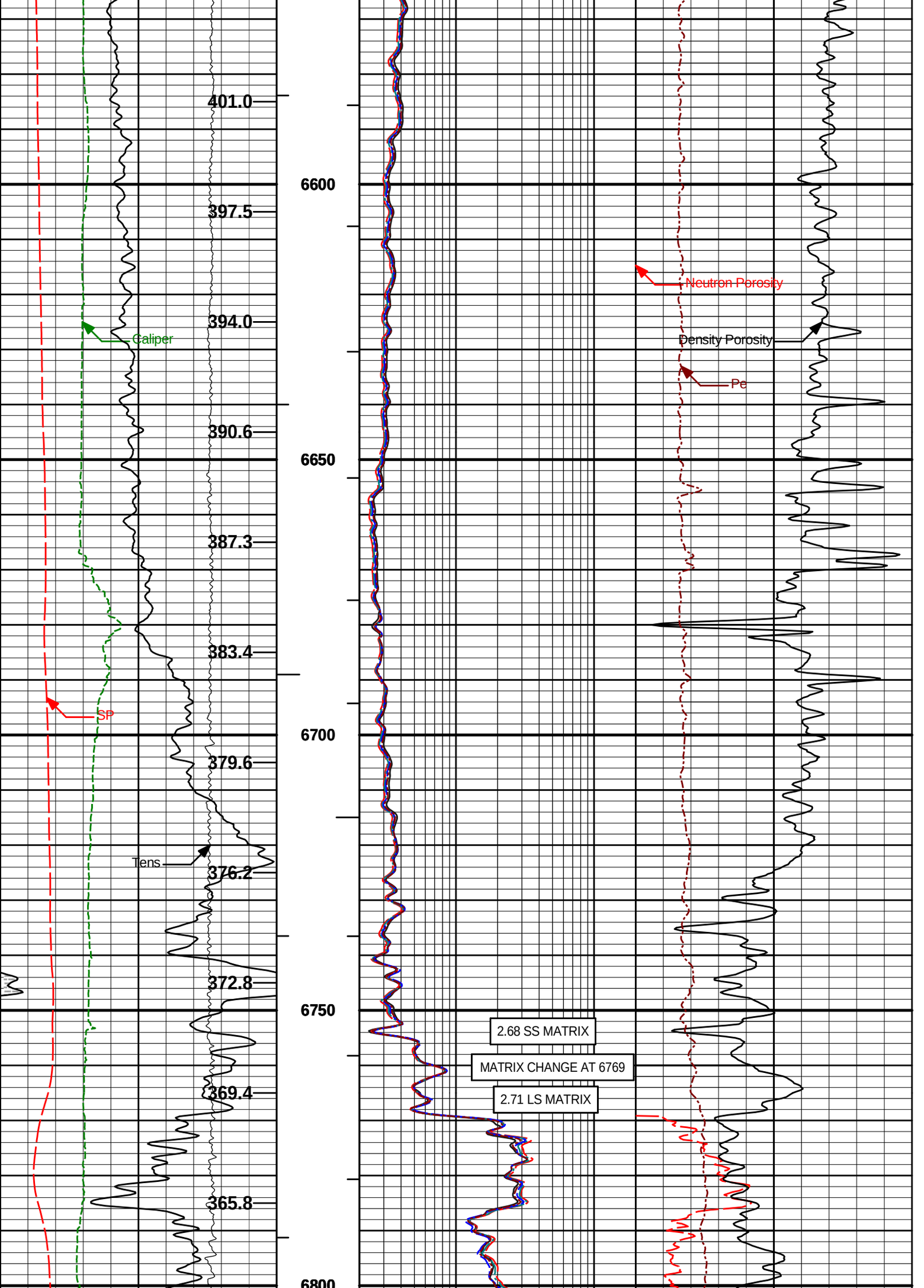
Density Porosity
Pe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6700
6750
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SP
Tens
Neutron Porosity
Density Porosity
Pe
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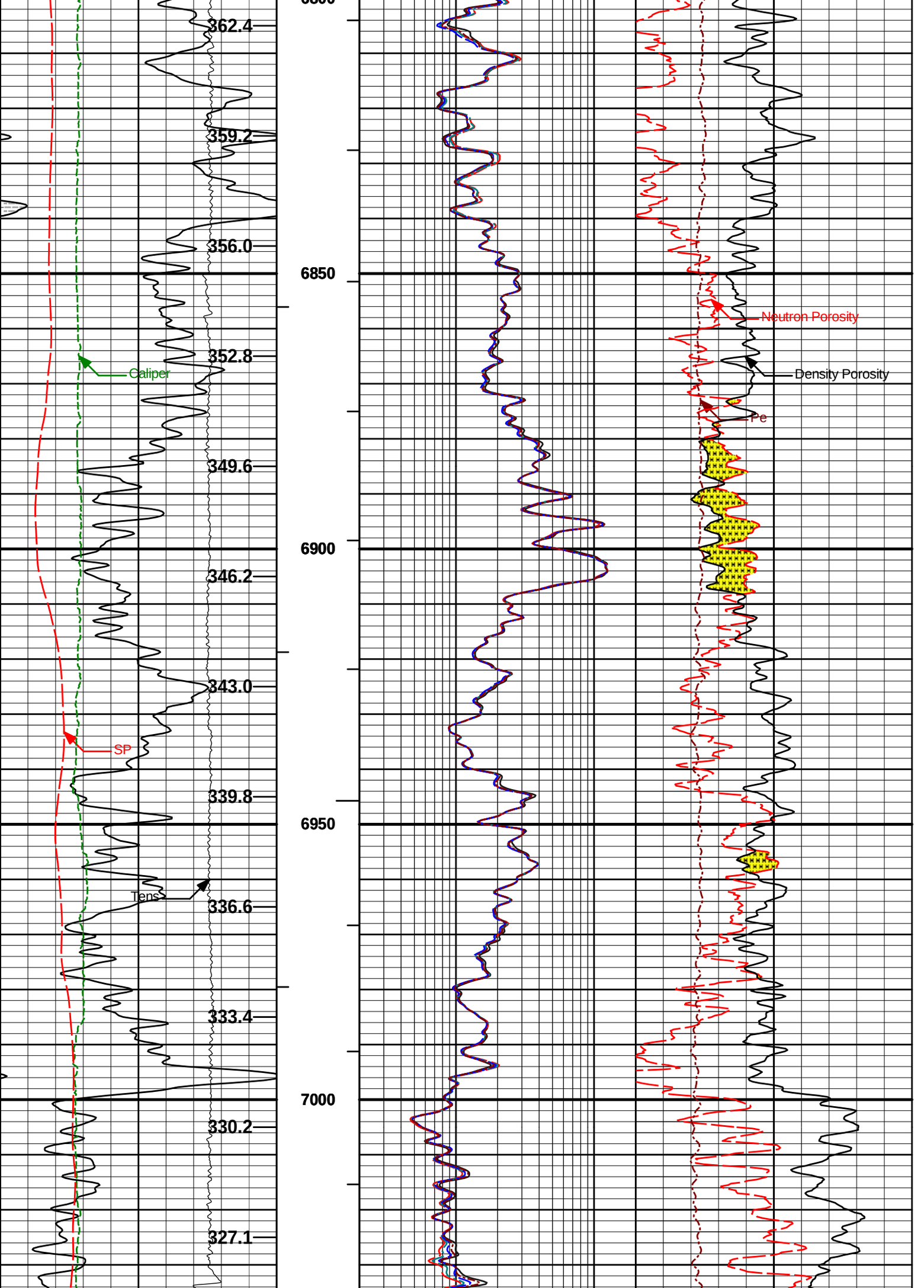
MATRIX CHANGE AT 6769
2.71 LS MATRIX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346.2
343.0
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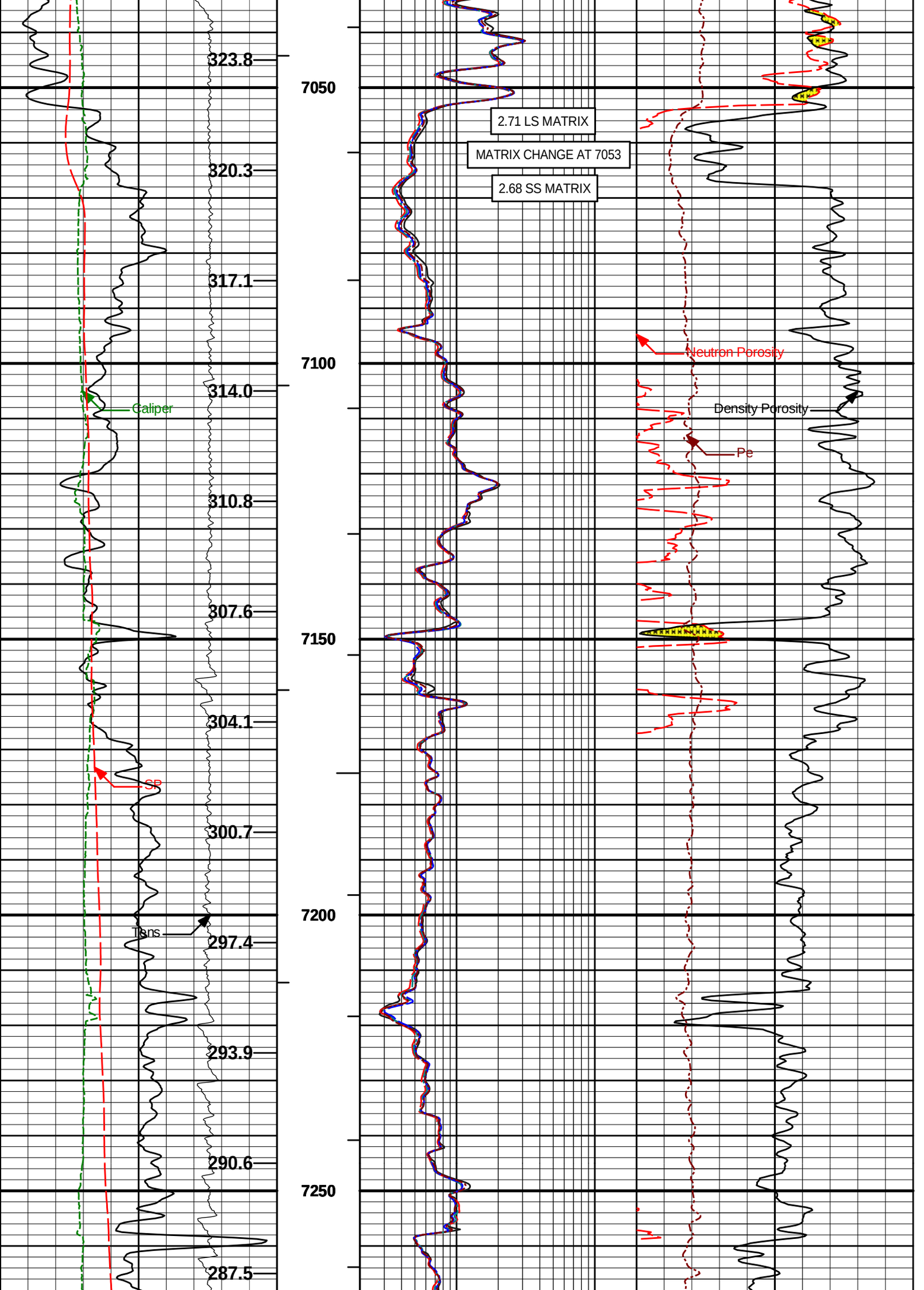
Caliper
SP
Tens
Neutron Porosity
Density Porosity
Pe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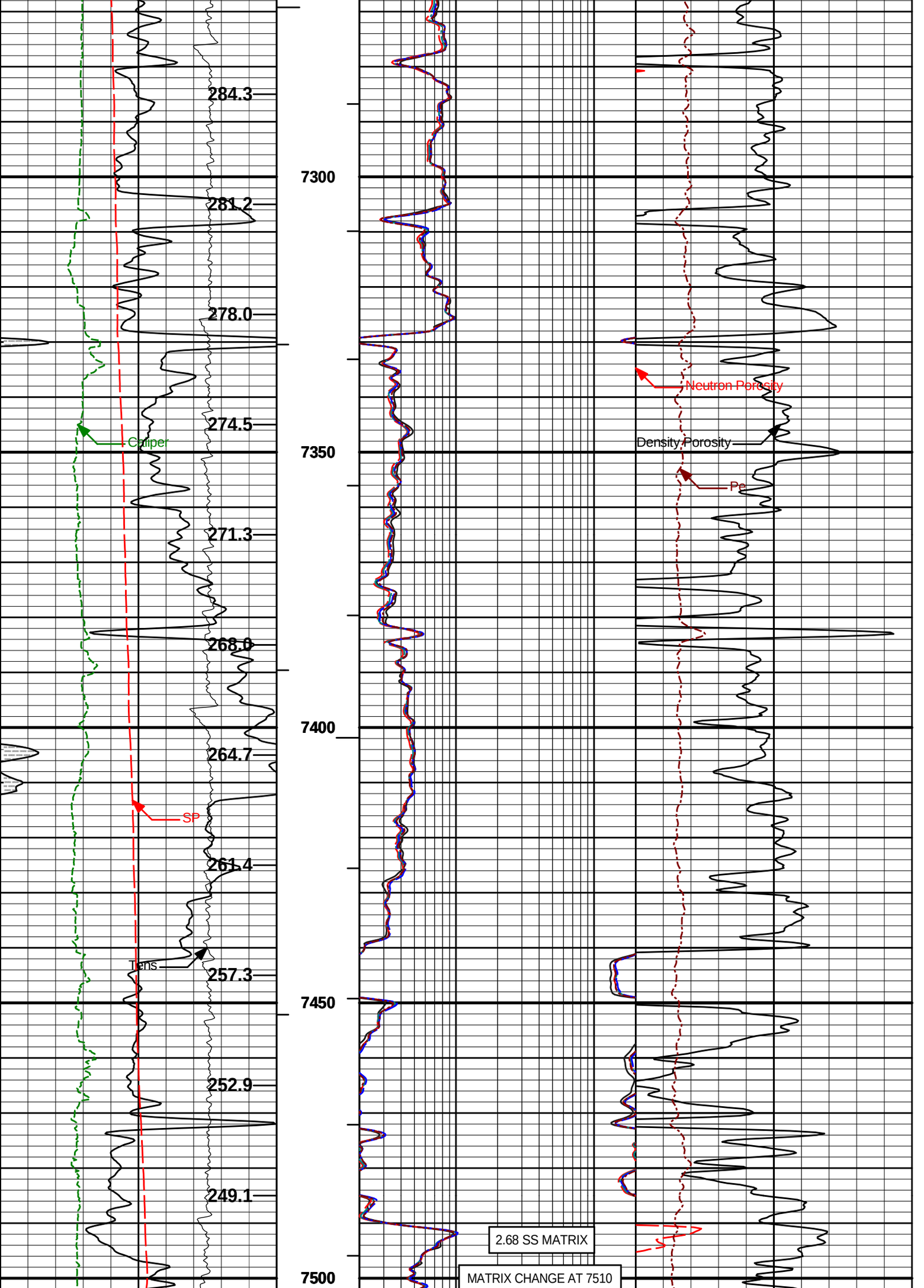
SP
Tsns
Neutron Porosity
Density Porosity
Pe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Caliper
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Pe
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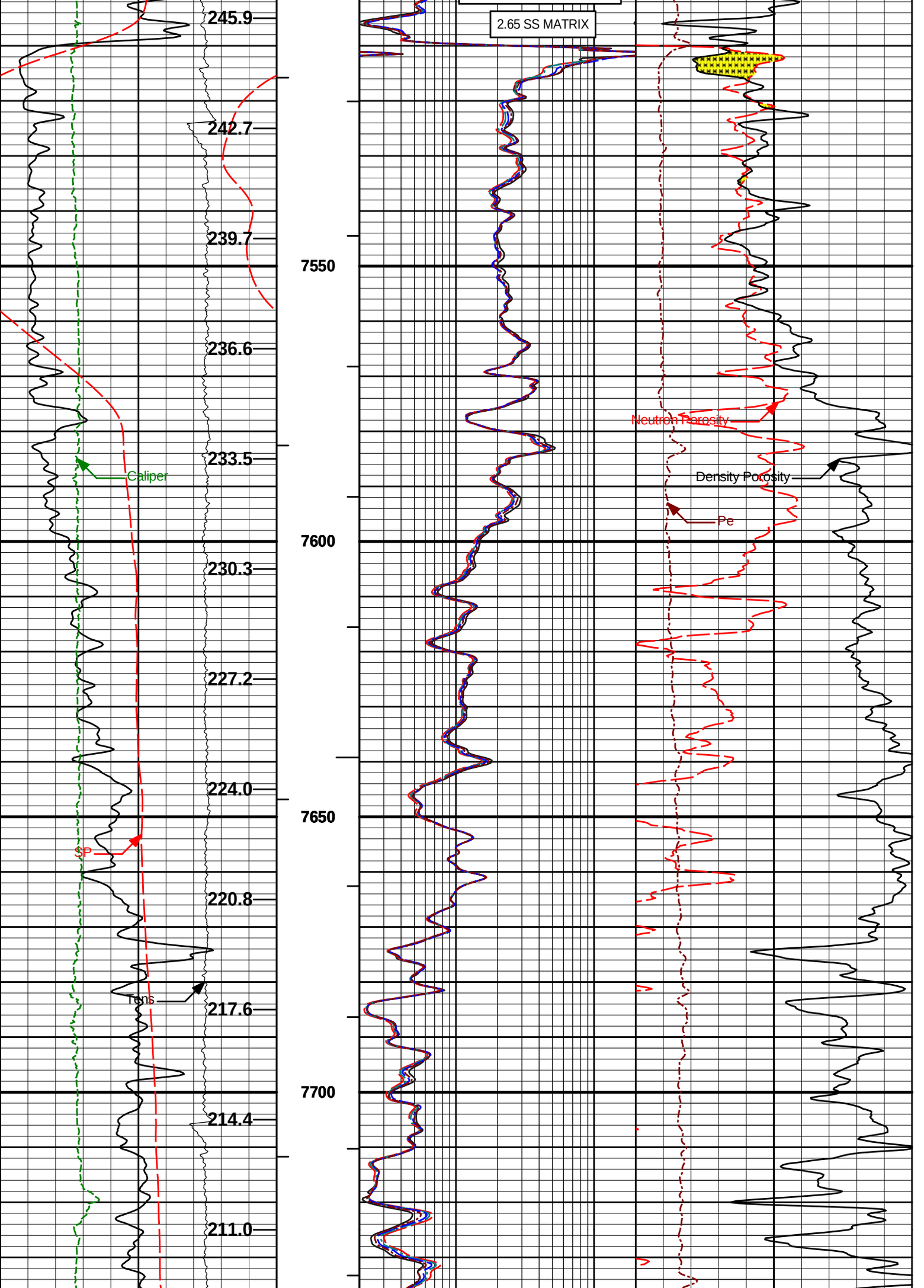
MATRIX CHANGE AT 7510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7600
7650
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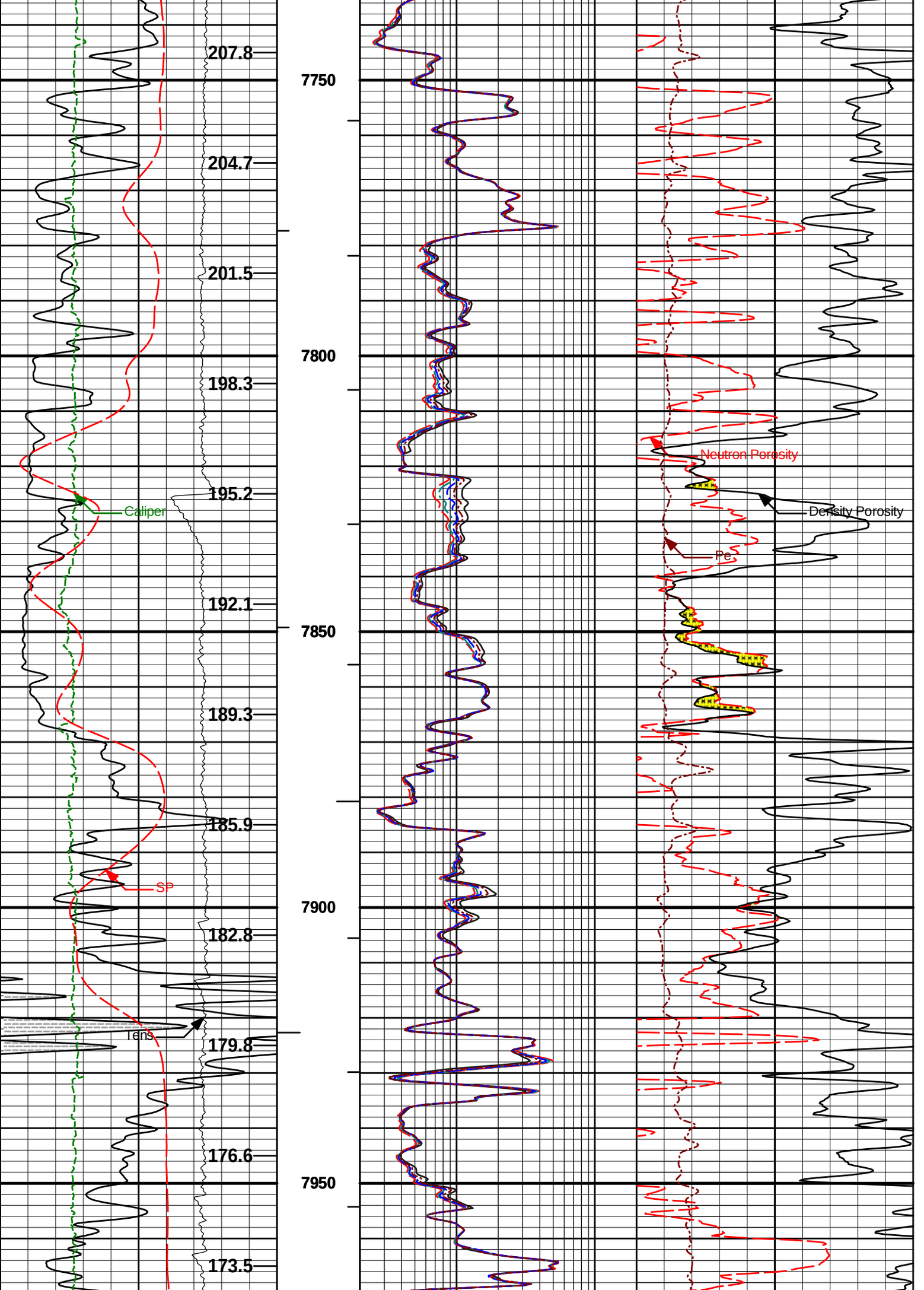
Caliper
SP
Tens
Neutron Porosity
Density Porosity
Pe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179.8
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7750
7800
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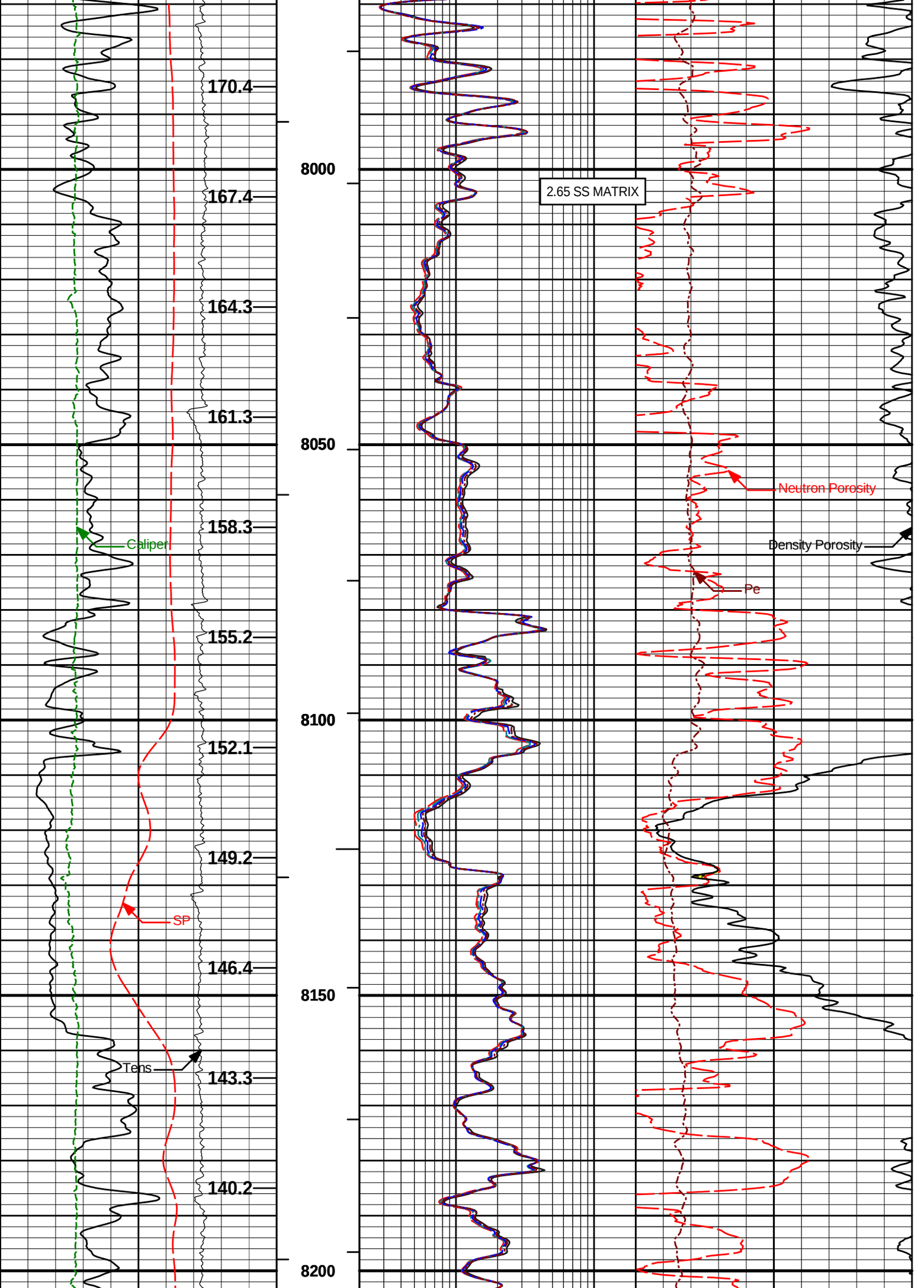
7900
7950
Caliper
SP
Tens
Neutron Porosity
Density Porosity
Pe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149.2
146.4
143.3
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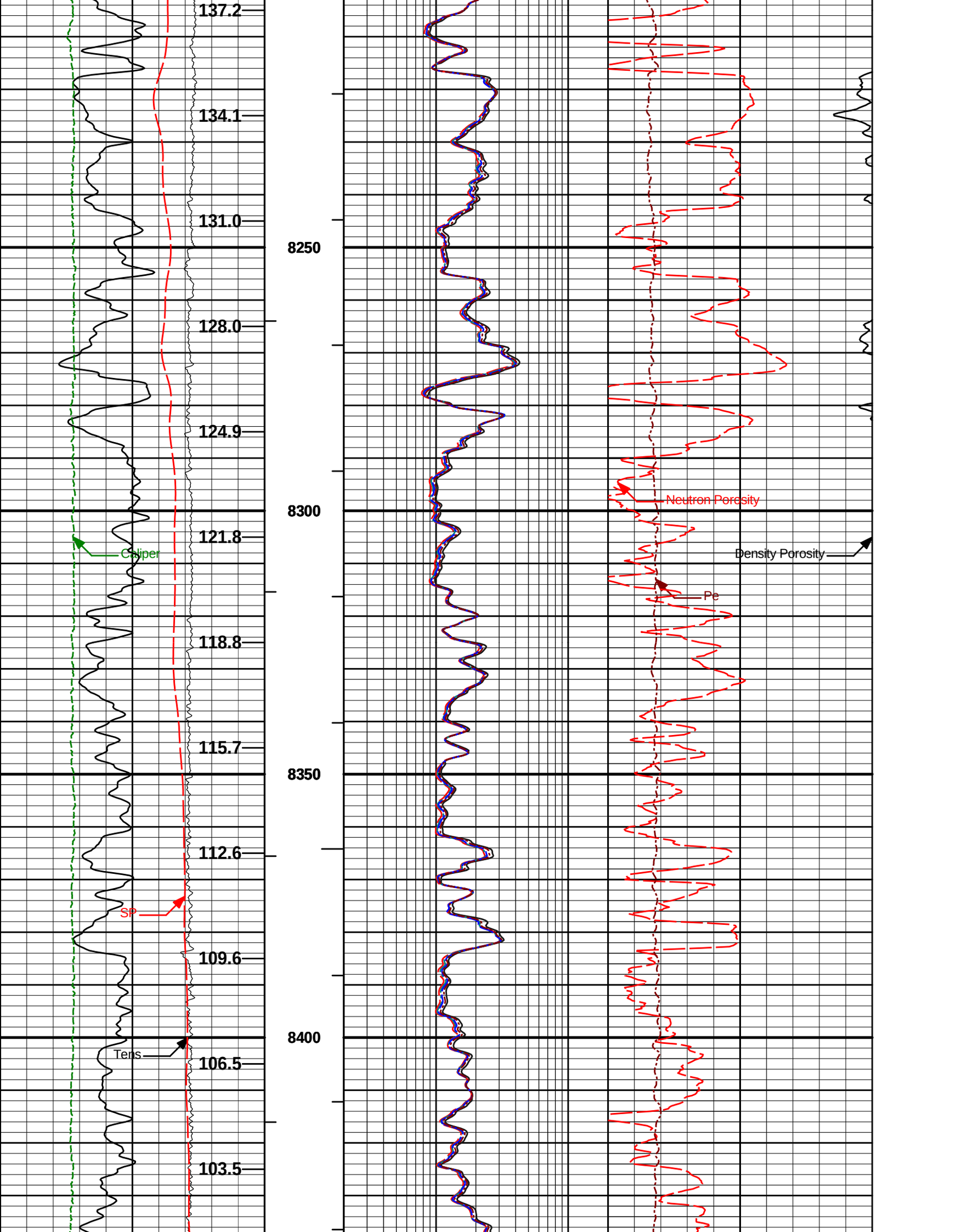
8100
8150
8200
2.65 SS MATRIX
Caliper
SP
Tens
Neutron Porosity
Density Porosity
Pe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8250
128.0
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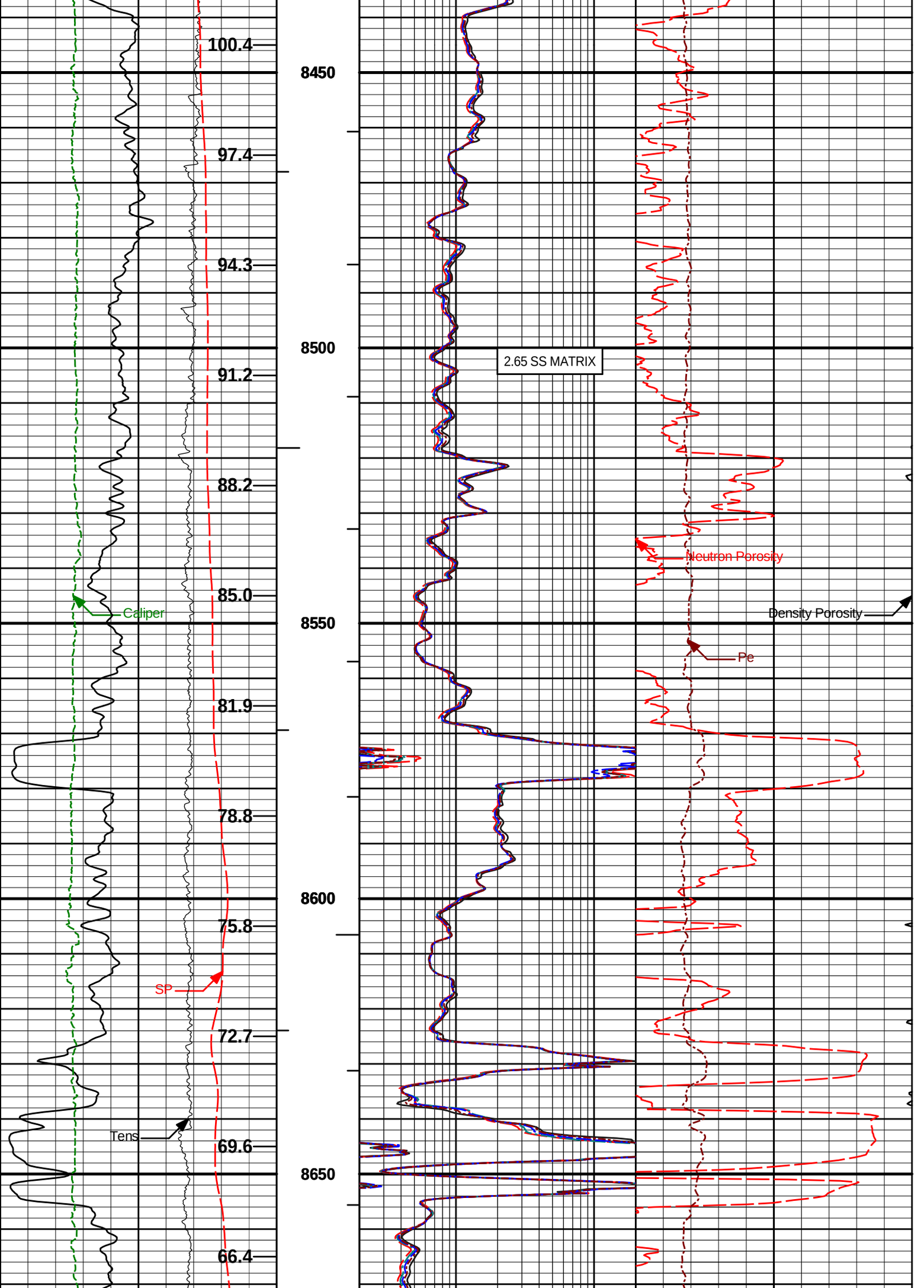
8300
121.8
Caliper
118.8
115.7
8350
112.6
SP
109.6
8400
Tens
106.5
103.5
Neutron Porosity
Density Porosity
Pe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81.9
78.8
75.8
72.7
69.6
66.4
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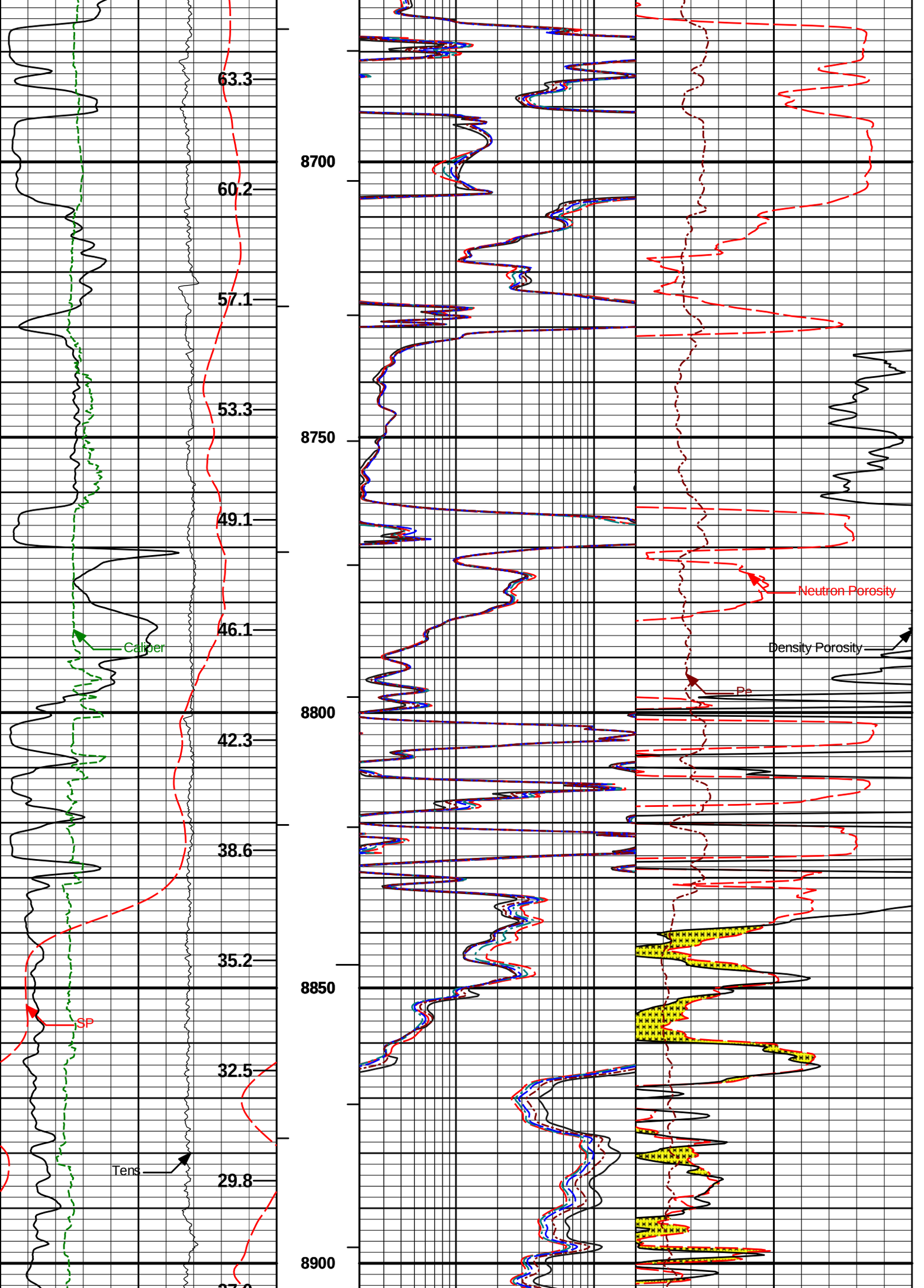
8500
8550
8600
8650
2.65 SS MATRIX
Caliper
SP
Tens
Neutron Porosity
Density Porosity
Pe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57.1
53.3
49.1
46.1
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38.6
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32.5
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8750
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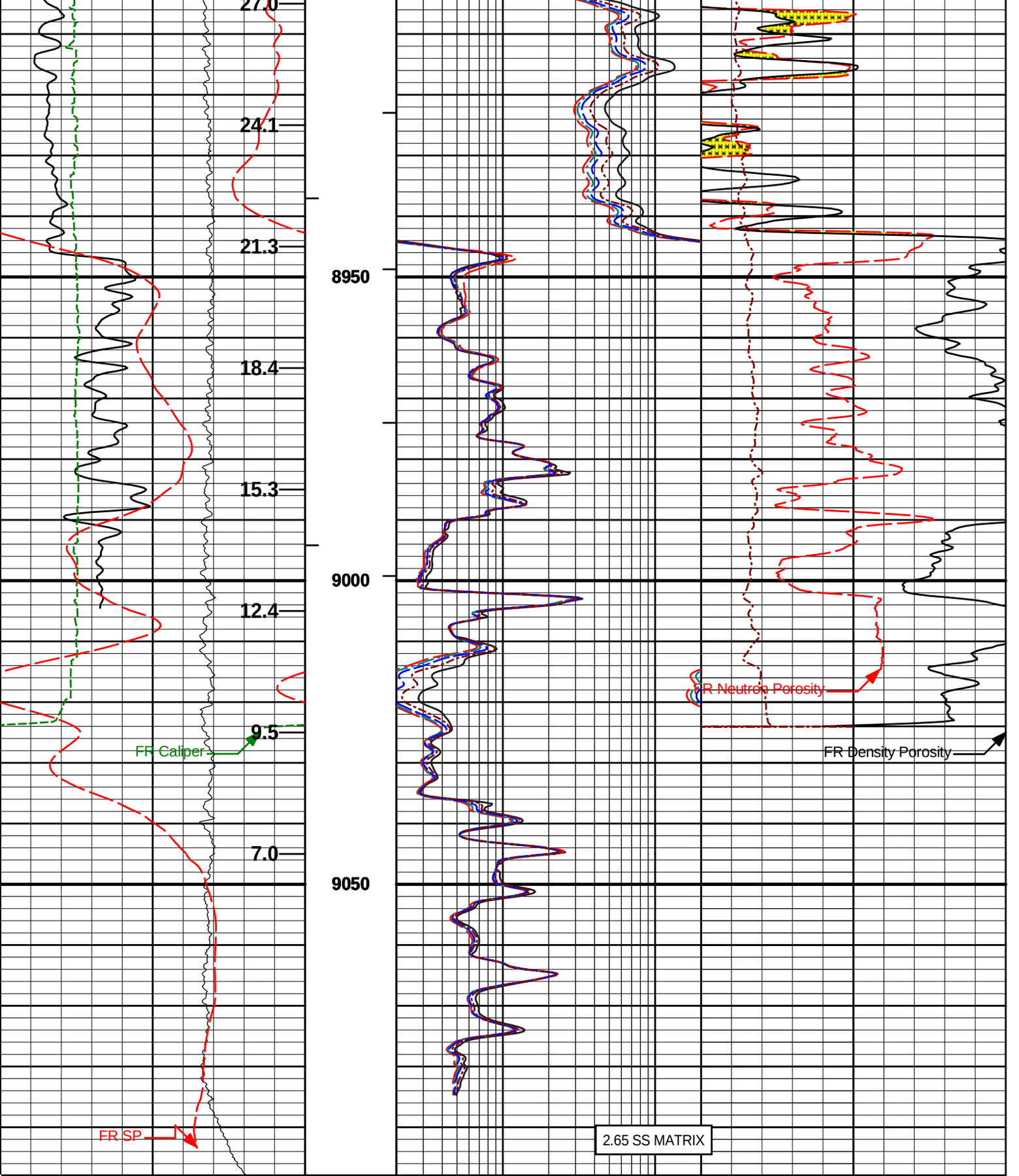
8900
Caliper
SP
Tens
Neutron Porosity
Density Porosity
Pe



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

Annular Volume Total		2 RT10 200 Ohm-m

HALLIBURTON

Plot Time: 13-Mar-10 08:20:15
Plot Range: 6045 ft to 9097.92 ft
Data: MCKAY_AB02_13\Well Based**
Plot File: \\COMP\NIO_COD

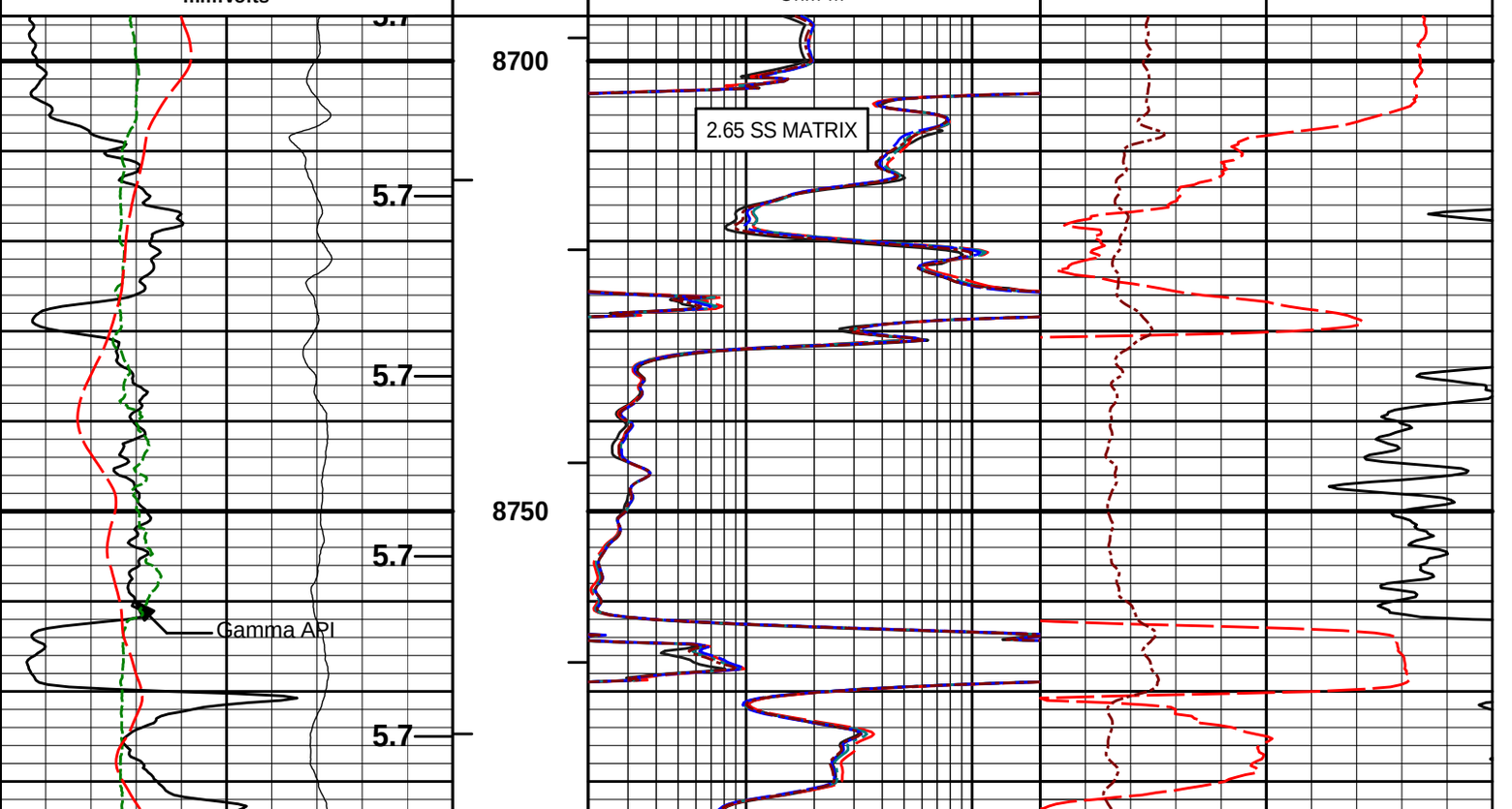
MAIN PASS 5" = 100'

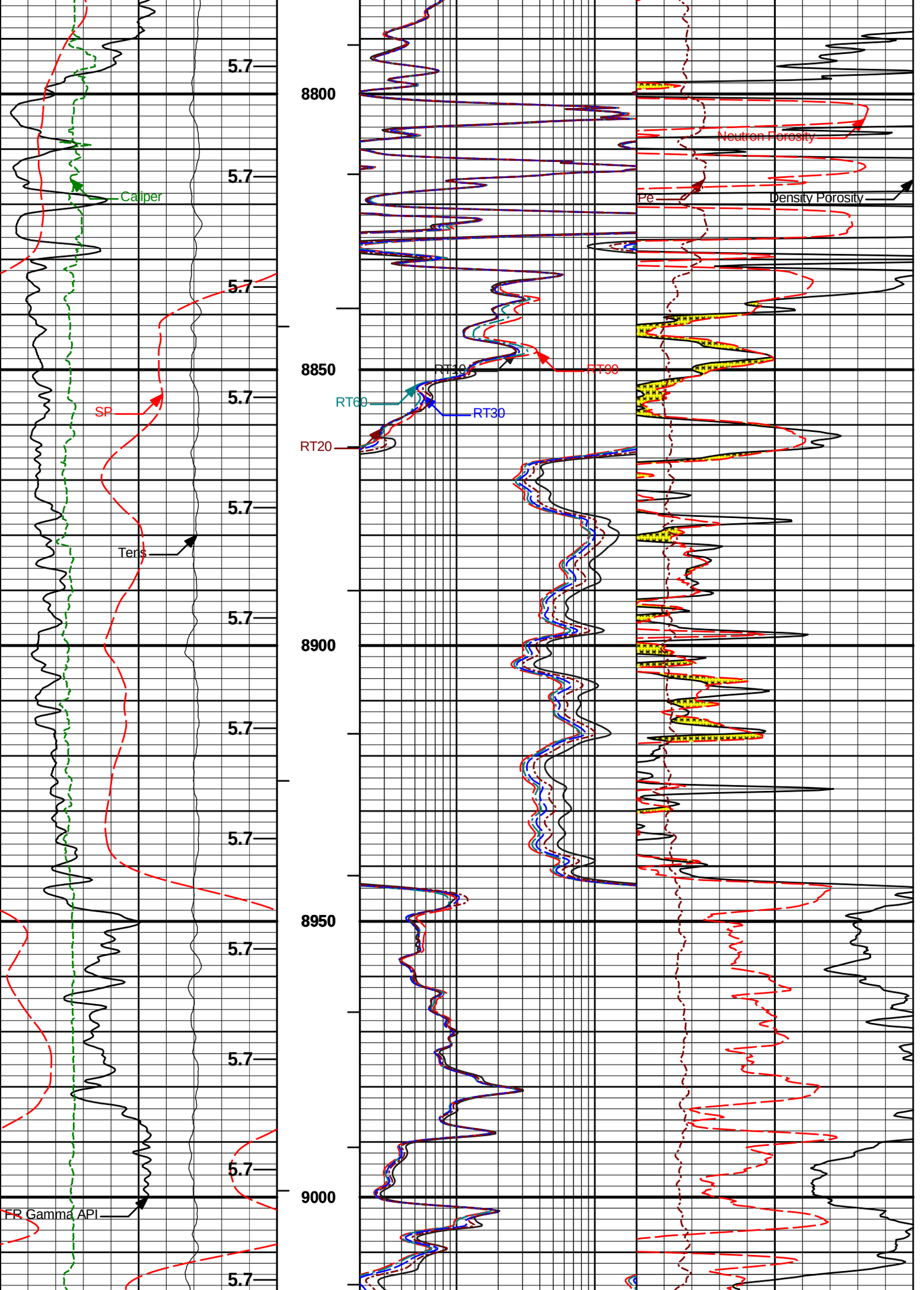
HALLIBURTON

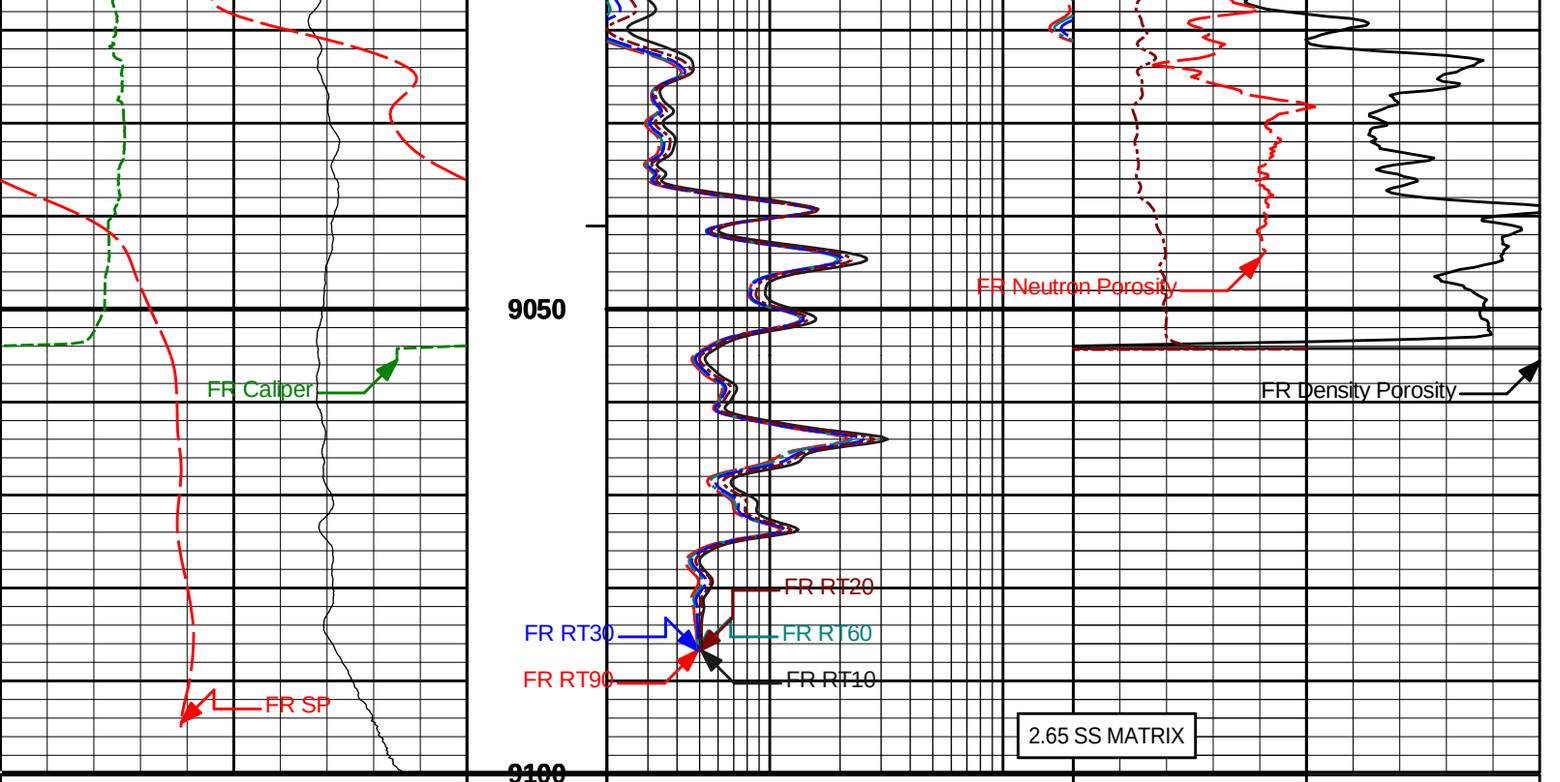
Plot Time: 13-Mar-10 08:20:15
Plot Range: 8695 ft to 9099.83 ft
Data: MCKAY_AB02_13\Well Based\REPEAT*
Plot File: \\COMP\REPEAT

REPEAT SECTION 5" = 100'

Annular Volume Total		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




5.7
8800
Caliper
Neutron Porosity
Pe
Density Porosity
8850
RT90
RT30
RT60
RT30
SP
RT20
Tens
8900
8950
9000
FR Gamma API



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
Annular Volume Total		2 **RT10** 200 Ohm-m

HALLIBURTON

Plot Time: 13-Mar-10 08:20:17
Plot Range: 8695 ft to 9099.83 ft
Data: MCKAY_AB02_13\Well Based\REPEAT*
Plot File: \\COMP\REPEAT

REPEAT SECTION 5" = 100'

HALLIBURTON

CALIBRATION REPORT

NATURAL GAMMA RAY TOOL SHOP CALIBRATION

Tool Name:	**GTET - 11277436**	**Reference Calibration Date:**	**09-Jan-10 15:29:07**
Engineer:	**F. LODER**	**Calibration Date:**	**12-Feb-10 13:50:04**
Software Version:	**WL INSITE R2.4 (Build 20)**	**Calibration Version:**	**1**

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

Measurement	Measured	Calibrated	Units
Background	130.2	134.0	api
Background + Calibrator	353.6	364.0	api

Calibrator	233.8	230.0	api

DUAL SPACED NEUTRON SHOP CALIBRATION

Tool Name:	**DSNT - 11301132**	**Reference Calibration Date:**	**12-Feb-10 15:32:42**
Engineer:	**F. LODER**	**Calibration Date:**	**12-Feb-10 15:54:49**
Software Version:	**WL INSITE R2.4 (Build 20)**	**Calibration Version:**	**1**

Logging Source S/N: CASPER 434
Tank Serial Number: 11068236
Reference value assigned to Tank: 53.720
Snow Block S/N: CASPER IQ
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:	1.004	0.999	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):	0.2238	0.2224	0.0015	+/- 0.0020
Calibrated Ratio:	10.16	10.11	0.050	+/- 0.050

VERIFIER

Measurement	Value	Control Limit
Snow-Block Porosity (decp):	0.0819	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 - I132M275**	**Reference Calibration Date:**	**12-Feb-10 14:33:37**
Engineer:	**F. LODER**	**Calibration Date:**	**12-Feb-10 14:59:24**
Software Version:	**WL INSITE R2.4 (Build 20)**	**Calibration Version:**	**1**

Logging Source S/N: 2770 GW
Aluminum Block S/N: BRIGHTON ALUMINUM BLOCK Density: 2.600g/cc
Magnesium Block S/N: BRIGHTON MAGNESIUM BLOCK Density: 1.680g/cc

DENSITY CALIBRATION SUMMARY

Measurement	Previous Value	New Value	Control Limit
Near Bar Gain	1.0846	1.0584	0.90 - 1.10
Near Dens Gain	1.0634	1.0341	0.90 - 1.10
Near Peak Gain	1.0699	1.0267	0.90 - 1.10
Near Lith Gain	1.0266	0.9952	0.90 - 1.10
Far Bar Gain	1.0212	1.0204	0.90 - 1.10
Far Dens Gain	1.0047	1.0063	0.90 - 1.10
Far Peak Gain	0.9973	0.9991	0.90 - 1.10
Far Lith Gain	0.9735	0.9743	0.90 - 1.10
Near Bar Offset	-0.5360	-0.2997	NONE
Near Dens Offset	-0.2992	-0.0476	NONE
Near Peak Offset	-0.3178	0.0332	NONE
Near Lith Offset	0.0214	0.2761	NONE

Far Bar Offset	0.0084	0.0130	NONE
Far Dens Offset	0.1425	0.1281	NONE
Far Peak Offset	0.2033	0.1898	NONE
Far Lith Offset	0.3601	0.3547	NONE

Near Bar Background	1091.00	1096.46	700 - 1450
Near Dens Background	359.40	358.10	230 - 480
Near Peak Background	156.34	155.52	100 - 210
Near Lith Background	189.56	190.65	125 - 260
Far Bar Background	573.78	569.68	450 - 900
Far Dens Background	223.61	222.99	175 - 345
Far Peak Background	86.23	86.69	70 - 140
Far Lith Background	92.06	90.73	75 - 145

CALIBRATION BLOCK SUMMARY

Measurement	Current Reading (Previous Coef)	Calibrated (New Coef)	Change	Control Limit On Change
MAGNESIUM				
Density (g/cc)	1.687	1.680	-0.007	+/- 0.015
Pe	2.548	2.594	0.046	+/- 0.150
ALUMINUM				
Density (g/cc)	2.600	2.600	0.000	+/- 0.01500
Pe	3.087	3.100	0.013	+/- 0.150

TOOL SUMMARY

Measurement	Near Detector		Far Detector	
	Value	Control Limits	Value	Control Limits
QUALITY				
Background	-0.0008	+/- 0.0110	0.0012	+/- 0.0140
Magnesium Block	0.0002	+/- 0.0110	-0.0004	+/- 0.0140
Aluminum Block	0.0006	+/- 0.0110	-0.0007	+/- 0.0140
Resolution	9.03	6.00 - 11.50	9.56	6.00 - 11.50
Internal Verifier(B+D+P+L)	1801	1200 - 2700	970	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 - I132M275 **Reference Calibration Date:** 13-Feb-10 12:39:38

Engineer: F. LODER **Calibration Date:** 13-Feb-10 12:46:38

Software Version: WL INSITE R2.4 (Build 20) **Calibration Version:** 1

CALIBRATION COEFFICIENTS

Measurement	Previous Value	New Value	Control Limit On New Value
Pad Offset	-1671.15	-1641.40	-7000.00 - -1000.00
Pad Gain	0.0003749	0.0003728	0.000200 - 0.000600
Arm Offset	-1023.85	-1071.69	-5000.00 - 3000.00
Arm Gain	0.0005189	0.0005221	0.000300 - 0.000700

Arm Power	-0.000005613	-0.000005891	-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)	3.76	3.75	-0.01	+/- 0.20
RING DIAMETER:				
Small Ring (in)	6.50	6.50	0.00	+/- 0.20
Medium Ring (in)	8.25	8.25	0.00	+/- 0.20
Large Ring (in)	15.02	15.00	-0.02	+/- 0.20

PASS/FAIL SUMMARY

Calibration-Coefficients Range Check:	Passed
Ring-Measurement Check:	Passed

PASS/FAIL SUMMARY

Calibration-Coefficients Range Check:	Passed

ACCELEROMETER AND MAGNETOMETER SHOP CALIBRATION

Tool Name:	**IDT - 11277453**	**Reference Calibration Date:**	**01-Jan-70 00:00:00**
Engineer:	**Lito**	**Calibration Date:**	**18-Dec-08 10:33:15**
Software Version:	**WL INSITE R2.2 (Build 9)**	**Calibration Version:**	**1**

Reference Gravity Field: 1.0000 g

Reference Magnetic Field: 42252.1719 nT

* QF : value of 0 is shown for bad quality if | data - reference | > (2 * standard deviation) or > (0.5% of reference value)

ACCELEROMETER CALIBRATION RAW DATA VALUE

Raw Acc X	Raw Acc Y	Raw Acc Z	Quality(Gravity)	Quality Error(%)	QF
0.5639	0.4499	-0.0254	0.9979	0.0021	1
0.0241	-0.7097	-0.0183	0.9995	0.0005	1
-0.7264	0.1572	-0.0198	0.9986	0.0014	1
0.0321	0.7394	-0.0273	1.0008	0.0008	1
0.0087	0.7385	-0.0409	0.9997	0.0003	1
-0.0193	0.7287	0.0487	1.0002	0.0002	1
-0.0188	0.7411	-0.0166	1.0006	0.0006	1
0.7038	-0.0854	0.0044	1.0015	0.0015	1
-0.0222	-0.7110	-0.0119	1.0000	0.0000	1
-0.7419	-0.0072	-0.0271	1.0012	0.0012	1
-0.0052	0.0177	0.3463	0.9999	0.0001	1
-0.1420	0.1556	-0.3685	1.0001	0.0001	1

ACCELEROMETER QUALITY SUMMARY

Average Calculated Gravity Field	1.0000	g
Standard Deviation Calculated Gravity Field	0.0010	g

ACCELEROMETER GAIN AND OFFSET

	GAIN	OFFSET
ACC X	1.3768593073	0.0210890602
ACC Y	1.3775787354	-0.0203358047
ACC Z	2.7496292591	0.0477359891

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

MAGNETOMETER CALIBRATION RAW DATA VALUE

Raw Mag X	Raw Mag Y	Raw Mag Z	Quality(Magnetic)	Quality Error(%)	QF
-0.4154	1.0229	-0.0950	42024.7539	0.0054	1

1.0528	-0.2167	0.2776	42074.7891	0.0042	1
-0.4415	-1.0055	0.2475	42539.5195	0.0068	1
-1.0086	0.3168	0.2225	41896.5000	0.0084	1
0.1035	0.2138	1.1679	42187.0156	0.0015	1
-0.2684	0.0751	-1.1534	43752.5820	0.0355	1
0.0233	0.2698	-1.1548	43518.4336	0.0300	1
0.2384	0.1877	-1.0735	40961.8242	0.0305	1
0.2729	-0.2633	-1.0552	41254.2813	0.0236	1
-0.2686	-0.2420	-1.0537	41232.5859	0.0241	1
1.0859	-0.1058	-0.2452	42784.8086	0.0126	1
-0.4976	-0.9440	0.3454	42315.6367	0.0015	1

MAGNETOMETER QUALITY SUMMARY

Average Calculated Magnetic Field	42211.8945	nT
Standard Deviation Calculated Magnetic Field	859.1619	nT

MAGNETOMETER GAIN AND OFFSET

	GAIN	OFFSET
MAG X	38687.1679687500	-510.5658569336
MAG Y	37591.9726562500	-65.9105224609
MAG Z	35998.0312500000	-764.1088867188

Noise Level Value: 0.000000 cnts

Noise Level Cal Value: 0.0000 g

ICT SHOP CALIBRATION

Tool Name: ICT - 11294350 **Reference Calibration Date:** 02-Dec-09 10:28:50

Engineer: C. BLUE **Calibration Date:** 21-Jan-10 09:21:06

Software Version: WL INSITE R2.4 (Build 20) **Calibration Version:** 1

CALIPERS AND RINGS

Ring	Measured	Calibrated	Units
CALIPER 1:			
Small Ring	3.86	3.63	in
Medium Ring	8.18	8.00	in
Large Ring	15.05	15.00	in
X-Large Ring	21.06	21.00	in
CALIPER 2:			
Small Ring	3.65	3.63	in
Medium Ring	7.96	8.00	in
Large Ring	14.95	15.00	in
X-Large Ring	20.92	21.00	in
CALIPER 3:			
Small Ring	3.49	3.63	in
Medium Ring	7.79	8.00	in
Large Ring	14.66	15.00	in
X-Large Ring	20.73	21.00	in
CALIPER 4:			
Small Ring	3.67	3.63	in
Medium Ring	7.98	8.00	in
Large Ring	14.86	15.00	in
X-Large Ring	20.85	21.00	in
CALIPER 5:			
Small Ring	3.79	3.63	in
Medium Ring	7.97	8.00	in
Large Ring	14.76	15.00	in
X-Large Ring	20.80	21.00	in
CALIPER 6:			

Small Ring	3.74	3.63	in
Medium Ring	8.16	8.00	in
Large Ring	15.07	15.00	in
X-Large Ring	20.89	21.00	in

CSNG-FS SHOP CALIBRATION

Tool Name: CSNG - 10965402 | **Reference Calibration Date:** 04-Feb-10 15:14:37

Engineer: C. BLUE | **Calibration Date:** 10-Mar-10 17:15:40

Software Version: WL INSITE R2.4 (Build 20) | **Calibration Version:** 1

Source SN: KW-290

TITANIUM CASE	Measured	Calibrated	Units
60 KEV Peak Channel #	48.0	48.0	Channel #
239 KEV Peak Channel #	22.8	22.8	Channel #
583 KEV Peak Channel #	51.4	51.6	Channel #
2614 KEV Peak Channel #	211.5	212.2	Channel #
Calibrate Temperature	88.2	68.9	degF

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

Blanket Reference Value: 230.00 API

Calibrator Value: 261.2 API

	Counts	Units	Measured	Calibrated	Units
Thorium Blanket	1895.4	CPS	327.5	365.4	API
Background	540.5	CPS	66.3	104.2	API

Gamma Ray Gain: 0.97

ARRAY COMPENSATED TRUE RESISTIVITY SHOP CALIBRATION

Tool Name: ACRt - 90199477-E2817-S4353 | **Reference Calibration Date:** 01-Mar-10 16:49:24

Engineer: C. BLUE | **Calibration Date:** 01-Mar-10 17:10:17

Software Version: WL INSITE R2.4 (Build 20) | **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	1.0108	1.05	0.95	1.0081	1.05	0.95	1.0053	1.05
A2 (50")	0.95	1.0128	1.05	0.95	1.0126	1.05	0.95	1.0123	1.05
A3 (29")	0.95	1.0103	1.05	0.95	1.0097	1.05	0.95	1.0065	1.05
A4 (17")	0.95	1.0150	1.05	0.95	1.0115	1.05	0.95	1.0107	1.05
A5 (10")	N/A	N/A	N/A	0.95	1.0006	1.05	0.95	0.9982	1.05
A6 (6")	N/A	N/A	N/A	0.95	0.9849	1.05	0.95	0.9828	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	-0.456	2	-6	-4.440	-2	-8	-4.912	-2
A2 (50")	-7	-1.315	-2	-6	-2.980	-2	-7	-4.771	-2
A3 (29")	-27	-12.500	-9	-9	-3.480	-3	-7	-3.582	-1
A4 (17")	-180	-91.426	-60	-45	-29.292	-15	-39	-24.971	-13
A5 (10")	N/A	N/A	N/A	-150	-86.835	-50	-80	-42.215	-10
A6 (6")	N/A	N/A	N/A	175	315.054	525	90	160.162	270

TRANSMITTER CURRENT GAIN

Signal	Lower	R	Upper
12K	0.6	0.8796	1.3
36K	1.0	1.8251	2.0
72K	1.0	1.1212	2.0

R-MUD VERIFICATION

Signal	Lower (ohm-m)	Measured (ohmm)	Upper (ohm-m)
Mud Cell	0.95	500.498	1.05

CALIBRATION SUMMARY

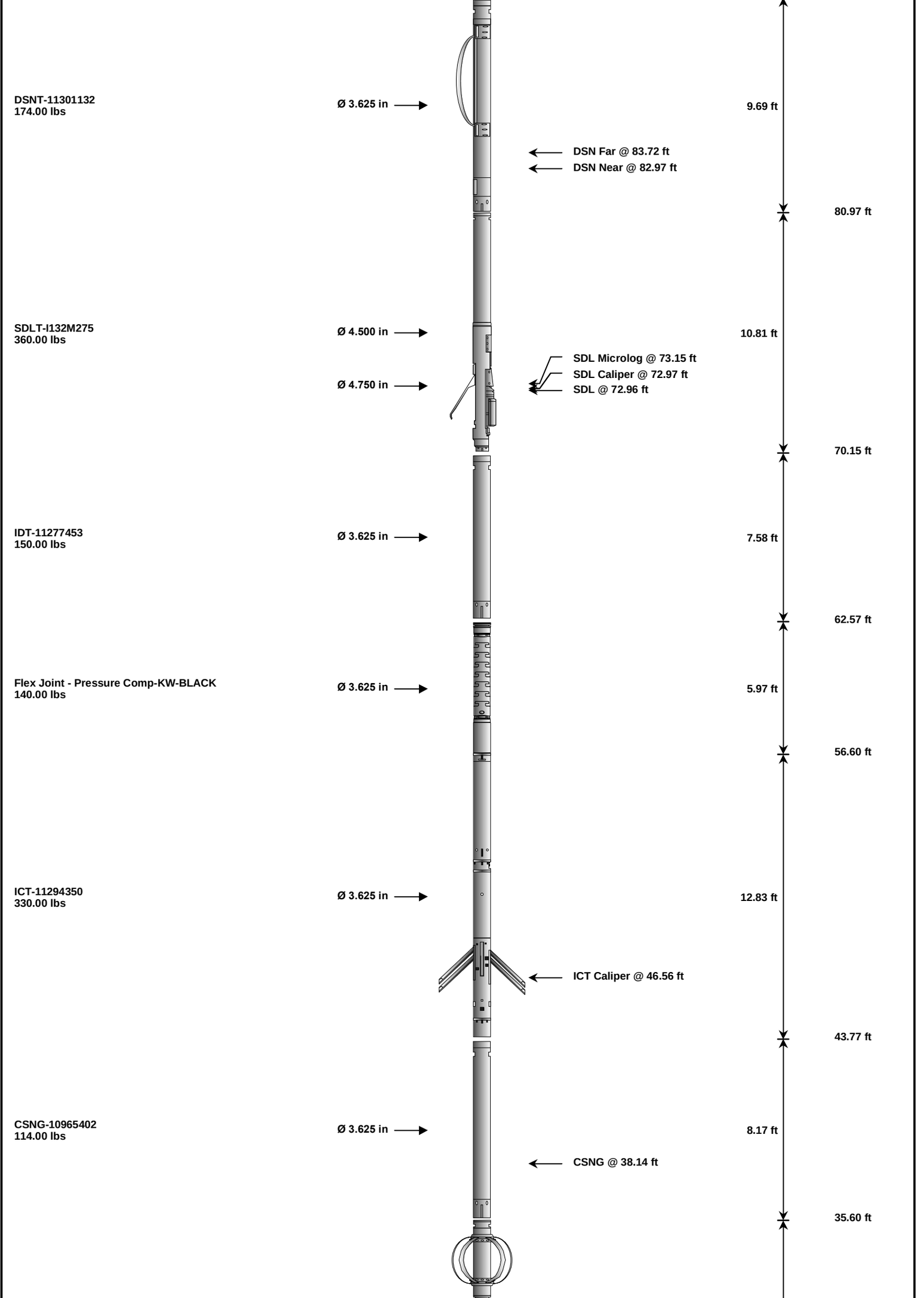
Sensor	Shop	Field	Post	Difference	Tolerance	Units
GTET-11277436						
Gamma Ray Calibrator	230.0	----------	----------	0.0	+/- 9.00	api
DSNT-11301132						
Snow-Block Porosity	0.0819	----------	----------	0.0000	+/- -.--	decp
SDLT-I132M275						
Near(B+D+P+L)	1800.727	----------	----------	0.000	+/-14.859	cps
Far(B+D+P+L)	970.079	----------	----------	0.000	+/-15.172	cps
Pad Extension	3.75	----------	----------	0.00	+/-0.20	in
Ring Diameter	8.25	----------	----------	0.00	+/-0.20	in
ICT-11294350						
Caliper 1	8.00	----------	----------	0.00	----------	in
Caliper 2	8.00	----------	----------	0.00	----------	in
Caliper 3	8.00	----------	----------	0.00	----------	in
Caliper 4	8.00	----------	----------	0.00	----------	in
Caliper 5	8.00	----------	----------	0.00	----------	in
Caliper 6	8.00	----------	----------	0.00	----------	in
CSNG-10965402						
60 KEV Peak Channel #	48.0	----------	----------	0.0	----------	Channel #
239 KEV Peak Channel #	22.8	----------	----------	0.0	----------	Channel #
583 KEV Peak Channel #	51.6	----------	----------	0.0	----------	Channel #
2614 KEV Peak Channel #	212.2	----------	----------	0.0	----------	Channel #
ACRt-90199477-E2817-S4353						
Mud Cell	500.498	----------	----------	0.000	----------	ohmm

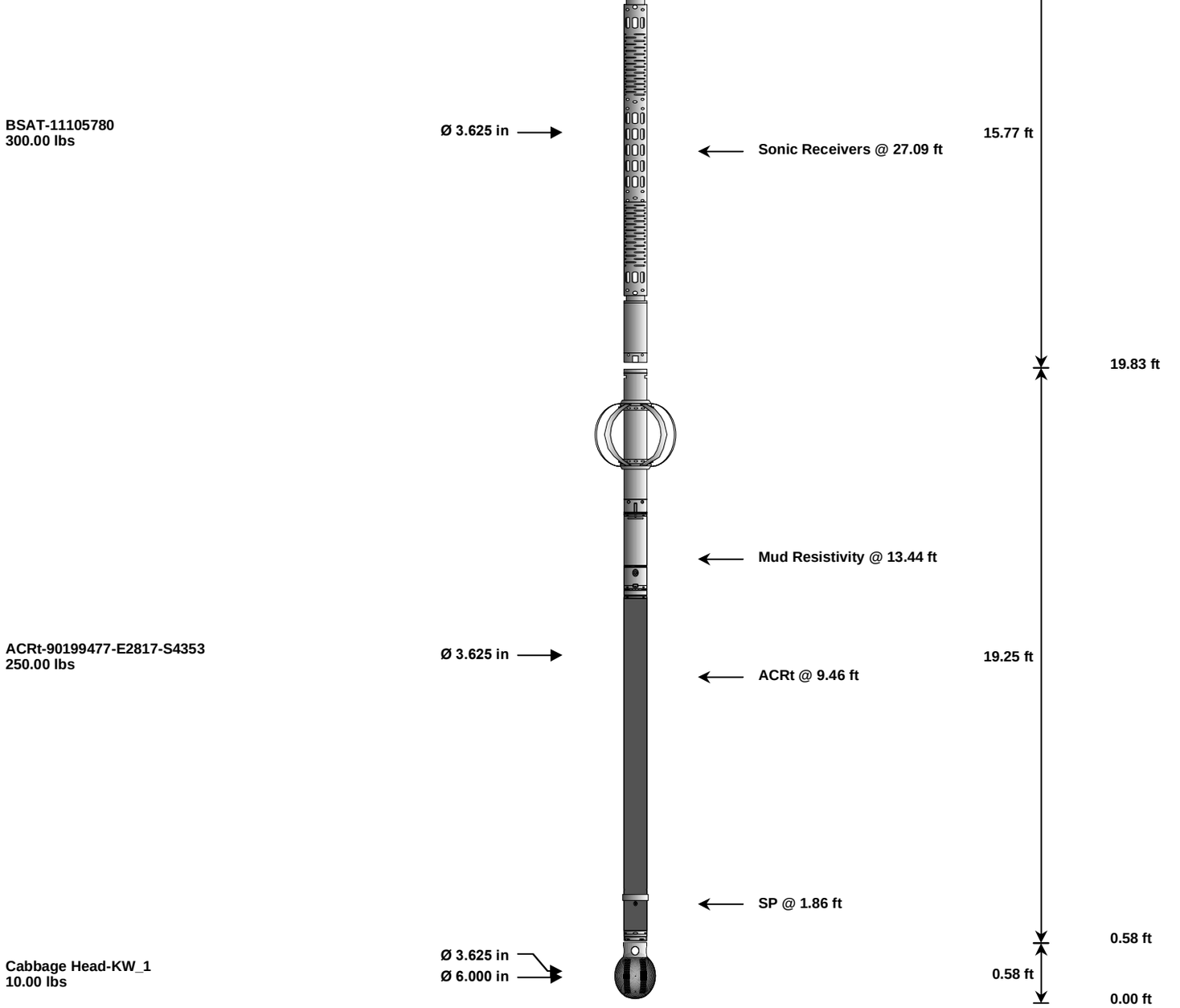
Data: MCKAY_AB02_13\0003 QUAD-IDT-ICT-CSNG\IDLE **Date: 12-Mar-10 23:18:32**

HALLIBURTON

TOOL STRING DIAGRAM REPORT

Description	O.D.	Diagram	Sensors @ Delays	Length	Accumulated Length
RWCH-B097 135.00 lbs	Ø 3.625 in		Load Cell @ 101.74 ft BH Temperature @ 101.17 ft	6.25 ft	105.42 ft 99.17 ft
GTET-11277436 165.00 lbs	Ø 3.625 in		GammaRay @ 93.11 ft	8.52 ft	90.65 ft


DSNT-11301132
174.00 lbs
Ø 3.625 in
9.69 ft
DSN Far @ 83.72 ft
DSN Near @ 82.97 ft
80.97 ft
SDLT-I132M275
360.00 lbs
Ø 4.500 in
Ø 4.750 in
10.81 ft
SDL Microlog @ 73.15 ft
SDL Caliper @ 72.97 ft
SDL @ 72.96 ft
70.15 ft
IDT-11277453
150.00 lbs
Ø 3.625 in
7.58 ft
62.57 ft
Flex Joint - Pressure Comp-KW-BLACK
140.00 lbs
Ø 3.625 in
5.97 ft
56.60 ft
ICT-11294350
330.00 lbs
Ø 3.625 in
12.83 ft
ICT Caliper @ 46.56 ft
43.77 ft
CSNG-10965402
114.00 lbs
Ø 3.625 in
8.17 ft
CSNG @ 38.14 ft
35.60 ft



Mnemonic	Tool Name	Serial Number	Weight (lbs)	Length (ft)		Accumulated Length (ft)	Max.Log. Speed (fpm)
RWCH	Releasable Wireline Cable Head	B097	135.00	6.25		99.17	300.00
GTET	Natural Gamma Ray Tool	11277436	165.00	8.52		90.65	60.00
DSNT	Dual Spaced Neutron	11301132	174.00	9.69		80.97	60.00
DCNT	DSN Decentralizer	10860047	50.00	5.13	*	84.30	300.00
SDLT	Spectral Density Tool	I132M275	360.00	10.81		70.15	60.00
IDT	Insite Directional Tool	11277453	150.00	7.58		62.57	30.00
FLEX	Flex Joint	KW-BLACK	140.00	5.97		56.60	300.00
ICT	Six Independent Arm Caliper	11294350	330.00	12.83		43.77	30.00
CSNG	Compensated Spectral Natural Gamma	10965402	114.00	8.17		35.60	15.00
BCAS	Borehole Sonic Array Tool	11105780	300.00	15.77		19.83	60.00
OBCEN	Centralizer - 29 in.Overbody	A	12.00	2.42	*	32.55	300.00
ACRt	Array Compensated True Resistivity	90199477-E2817-S4353	250.00	19.25		0.58	300.00
SP	SP Ring	PROTO1	0.00	0.25	*	1.86	300.00
OBCEN	Centralizer - 29 in.Overbody	B	12.00	2.42	*	16.33	300.00
CBHD	Cabbage Head	KW_1	10.00	0.58		0.00	300.00
Total			**2,202.00**	**105.42**			

* Not included in Total Length and Length Accumulation.

Data: MCKAY_AB02_13\0003 QUAD-IDT-ICT-CSNG\IDLE **Date: 12-Mar-10 19:54:54**

COMPANY	**NOBLE**
WELL	**MCKAY AB02-13**

FIELD	**WATTENBERG**		
COUNTY	**WELD**	STATE	**CO**

HALLIBURTON

SPECTRAL DENSITY
DUAL SPACED NEUTRON
ARRAY COMPENSATED
TRUE RESISTIVITY
TIGHT HOLE