HALLIBURTON

SPECTRAL DENSITY
DUAL SPACED NEUTRON
ARRAY COMPENSATED
TRUE RESISTIVITY

COMPANY	NOBLE ENERGY INC.
WELL	FOSS 10-2-21
FIELD	WATTENBERG
COUNTY	WELD
STATE	CO

COMPANY **NOBLE ENERGY INC.**

WELL **FOSS 10-2-21**

FIELD **WATTENBERG**

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

API No. 05123297840000

Location SURFACE HOLE LOCATION:
2501' FNL & 1414' FWL
LATITUDE:40.501090
LONGITUDE:-104540570

Other Services:
RWCH
CSNG
BSAT

Sect. 10 Twp. 6N Rge. 64W

Permanent Datum	GL	Elev. 4799.0 ft	Elev.: K.B. 4812.0 ft
Log measured from	KB	13.0 ft above perm. Datum	D.F. 4811.0 ft
Drilling measured from	KB		G.L. 4799.0 ft

Date	08-Feb-12		
Run No.	ONE		
Depth - Driller	7185.00 ft		
Depth - Logger	7188.0 ft		
Bottom - Logged Interval	7181.0 ft		
Top - Logged Interval	691.0 ft		
Casing - Driller	8.625 in @ 691.0 ft	@	@
Casing - Logger	691.0 ft		
Bit Size	7.875 in	@	@
Type Fluid in Hole	WBM		
Density / Viscosity	9.3 ppg / 37.00 s/qt		
PH / Fluid Loss	9.00 pH / 9.6 cptm		
Source of Sample	MUD TANK		
Rm @ Meas. Temperature	1.740 ohmm @ 51.70 degF	@	@
Rmf @ Meas. Temperature	0.89 ohmm @ 75.00 degF	@	@
Rmc @ Meas. Temperature	1.480 ohmm @ 75.00 degF	@	@
Source Rmf / Rmc	CHART / CHART		
Rm @ BHT	0.46 ohmm @ 198.0 degF	@	@
Time Since Circulation	8.0 hr		
Time on Bottom	08-Feb-12 15:50		
Max. Rec. Temperature	198.0 degF @ 7188.0 ft	@	@
Equipment / Location	11170614 / ROCK SPRINC		
Recorded By	J. MAYNE		
Witnessed By	M. SITTON		

Fold here

Service Ticket No.: 9262768 API Serial No.: 05123297840000 PGM Version: WL INSITE R3.4.2 (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-	N/A	1.5" S.O.	N/A
	E104_S103			

EQUIPMENT DATA

GAMMA		ACOUSTIC		DENSITY		NEUTRON	
Run No.	ONE	Run No.	ONE	Run No.	ONE	Run No.	ONE
Serial No.	10843477	Serial No.	10939067	Serial No.	11014275	Serial No.	10860047
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	N/A	Log Type	GAM/GAM	Log Type	THERM/THERM
Type	SCINT			Source Type	Cs137	Source Type	Am241Be
Length	8"	LSA [Y/N]		Serial No.	5235GW	Serial No.	08-018
Distance to Source	10'	FWDA [Y/N]		Strength	1.5Ci	Strength	15Ci

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	7188'	6996'	REC	0	250				20%	0%	2.68 g/cc	20%	0%	SAND
ONE	6996'	6696'	REC	0	250				20%	0%	2.71 g/cc	20%	0%	LIME
ONE	6696'	CSG	REC	0	250				20%	0%	2.68 g/cc	20%	0%	SAND

DIRECTIONAL INFORMATION

Maximum Deviation	@	KOP	@

Remarks: RWCH-GTET-CSNG-DSNT-SDLT-BSAT-ACRT RAN IN COMBINATION

ANNULAR HOLE VOLUME CALCULATED FOR 4.5" CASING

BOREHOLE RUGOSITY, TENSION PULLS AND WASHOUTS MAY EFFECT LOG QUALITY

LATITUDE: 40.501090

LONGITUDE: -104.540570

TODAY'S CREW: G. HOOD, B. DAVIS, A. FULGHUM, D. HOLTON RIG: CADE 21

*** THANK YOU FOR CHOOSING HALLIBURTON ENERGY SERVICES, ROCK SPRINGS, WY (307) 352-8600 ***

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	9.300	ppg
	SHARED	WAGT	Weighting Agent	Barite	
	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	2.000	ohmm
	SHARED	TRM	Temperature of Mud	75.0	degF
	SHARED	CSD	Logging Interval is Cased?	No	
	SHARED	ICOD	AHV Casing OD	4.500	in
	SHARED	ST	Surface Temperature	75.0	degF
	SHARED	TD	Total Well Depth	7185.00	ft
	SHARED	BHT	Bottom Hole Temperature	200.0	degF
	SHARED	SVTM	Navigation and Survey Master Tool	NONE	
	SHARED	AZTM	High Res Z Accelerometer Master Tool	GTET	
	SHARED	TEMM	Temperature Master Tool	NONE	
	SHARED	BHSM	Borehole Size Master Tool	NONE	
	Rwa / CrossPlot	XPOK	Process Crossplot?	Yes	
	Rwa / CrossPlot	FCHO	Select Source of F	Automatic	
	Rwa / CrossPlot	AFAC	Archie A factor	0.6200	

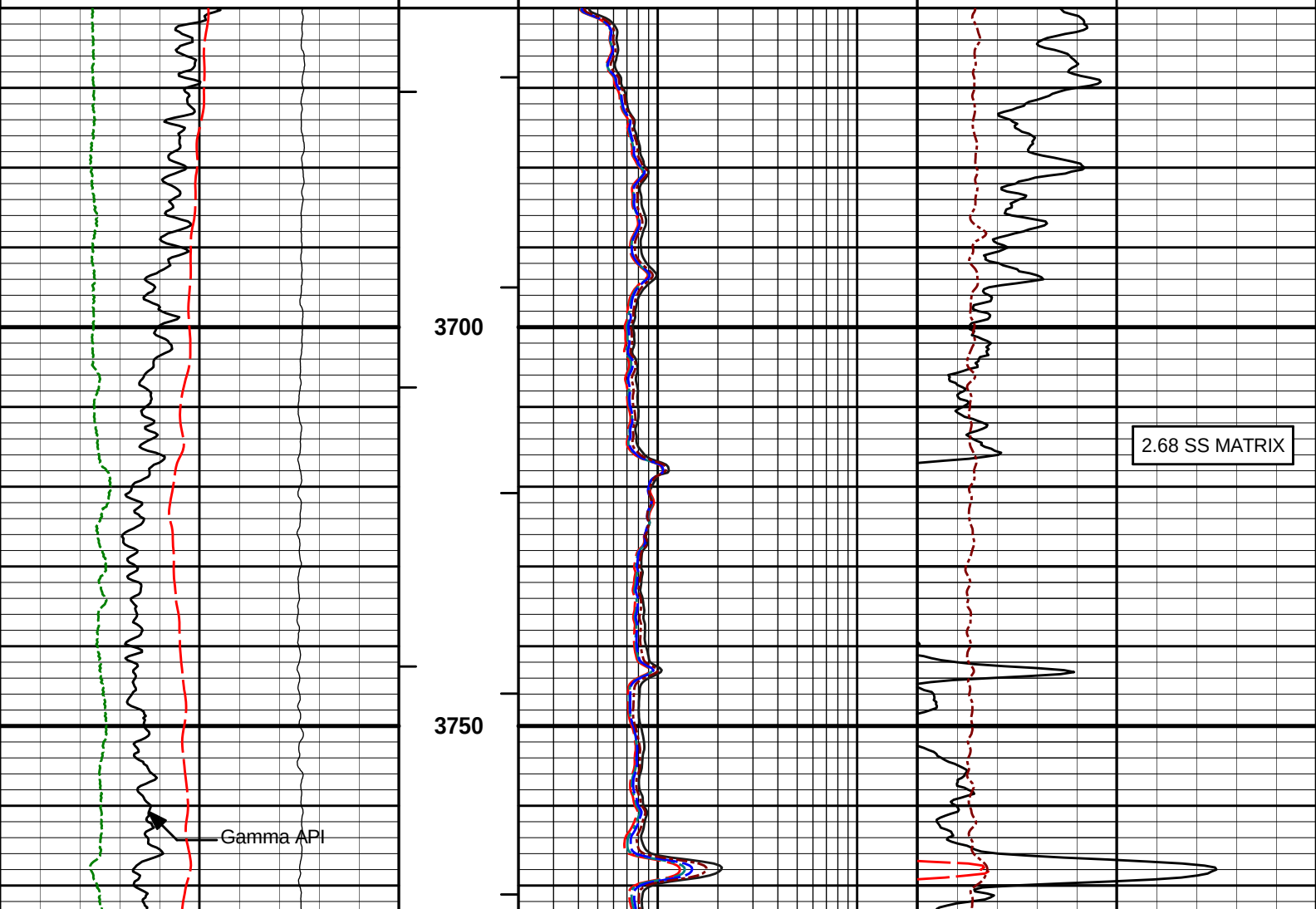
	Rwa / CrossPlot	MFAC	Archie M factor	2.1500	
	Rwa / CrossPlot	RMFR	Rmf Reference	0.10	ohmm
	Rwa / CrossPlot	TMFR	Rmf Ref Temp	75.00	degF
	Rwa / CrossPlot	RWA	Resistivity of Formation Water	0.05	ohmm
	Rwa / CrossPlot	ADP	Use Air Porosity to calculate CrossplotPhi	No	
	GTET	GROK	Process Gamma Ray?	Yes	
	GTET	GRSO	Gamma Tool Standoff	0.000	in
	GTET	GEOK	Process Gamma Ray EVR?	No	
	GTET	TPOS	Tool Position for Gamma Ray Tools.	Eccentered	
	CSNG	CGOK	Process CSNG Data?	Yes	
	CSNG	CENT	Is Tool Centralized?	No	
	CSNG	GBOK	Gamma Enviromental Corrections?	Yes	
	CSNG	BARF	Barite Correction Factor	1.00	
	CSNG	ORDG	Use Fixed Gain	No	
	CSNG	ORDO	Use Fixed Offset	No	
	CSNG	ORDR	Use Fixed Resolution Degradation Factor	No	
	DSNT	DNOK	Process DSN?	Yes	
	DSNT	DEOK	Process DSN EVR?	No	
	DSNT	NLIT	Neutron Lithology	Sandstone	
	DSNT	DNSO	DSN Standoff - 0.25 in (6.35 mm) Recommended	0.000	in
	DSNT	DNTP	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	
	SDLT	CLOK	Process Caliper 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	2.680	g/cc
	SDLT Pad	DFL	Formation Density Fluid	1.000	g/cc
	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 Fluid	189.00	uspf
	BSAT	DTMT	Delta -T Matrix Type	Sandstone 55.5	
	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	0.00	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	RMIN	Maximum Resistivity for MAP	200.00	ohmm
	ACRt Sonde	THQY	Threshold Quality	0.50	
BOTTOM					

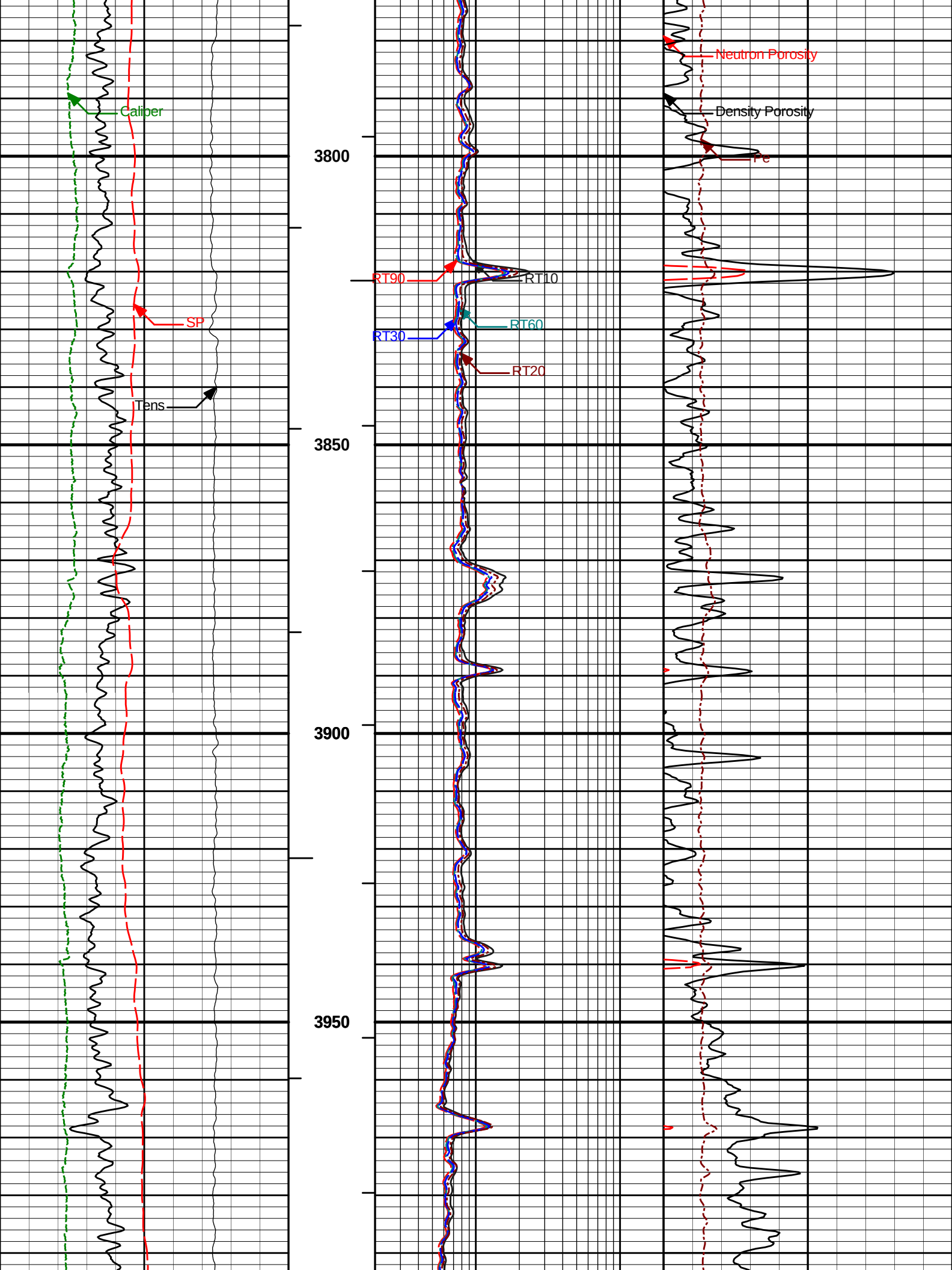
HALLIBURTON

Plot Time: 08-Feb-12 19:00:37
Plot Range: 3660 ft to 4892 ft
Data: NO_FOSS_10_2_21\Well Based\DAQ-0001-005*
Plot File: \\COMP\NOBLE_PARK_SUS

MAIN PASS 5" = 100'

Track 1	Depth Track	Track 2	Track 5	Track 3
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	

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Tens
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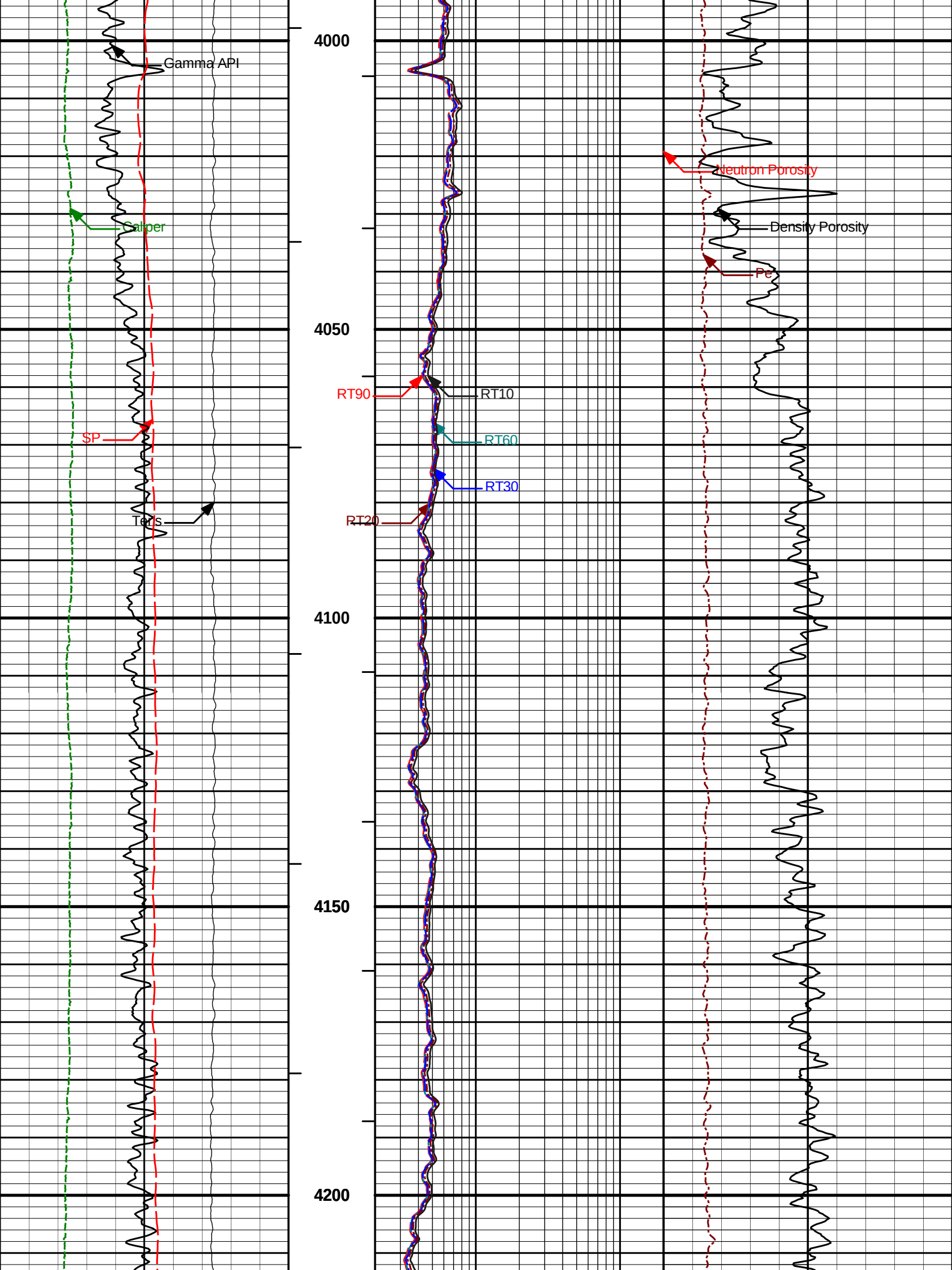
3850
3900
3950
RT90
RT10
RT60
RT30
RT20
Neutron Porosity
Density Porosity
Pe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Density Porosity
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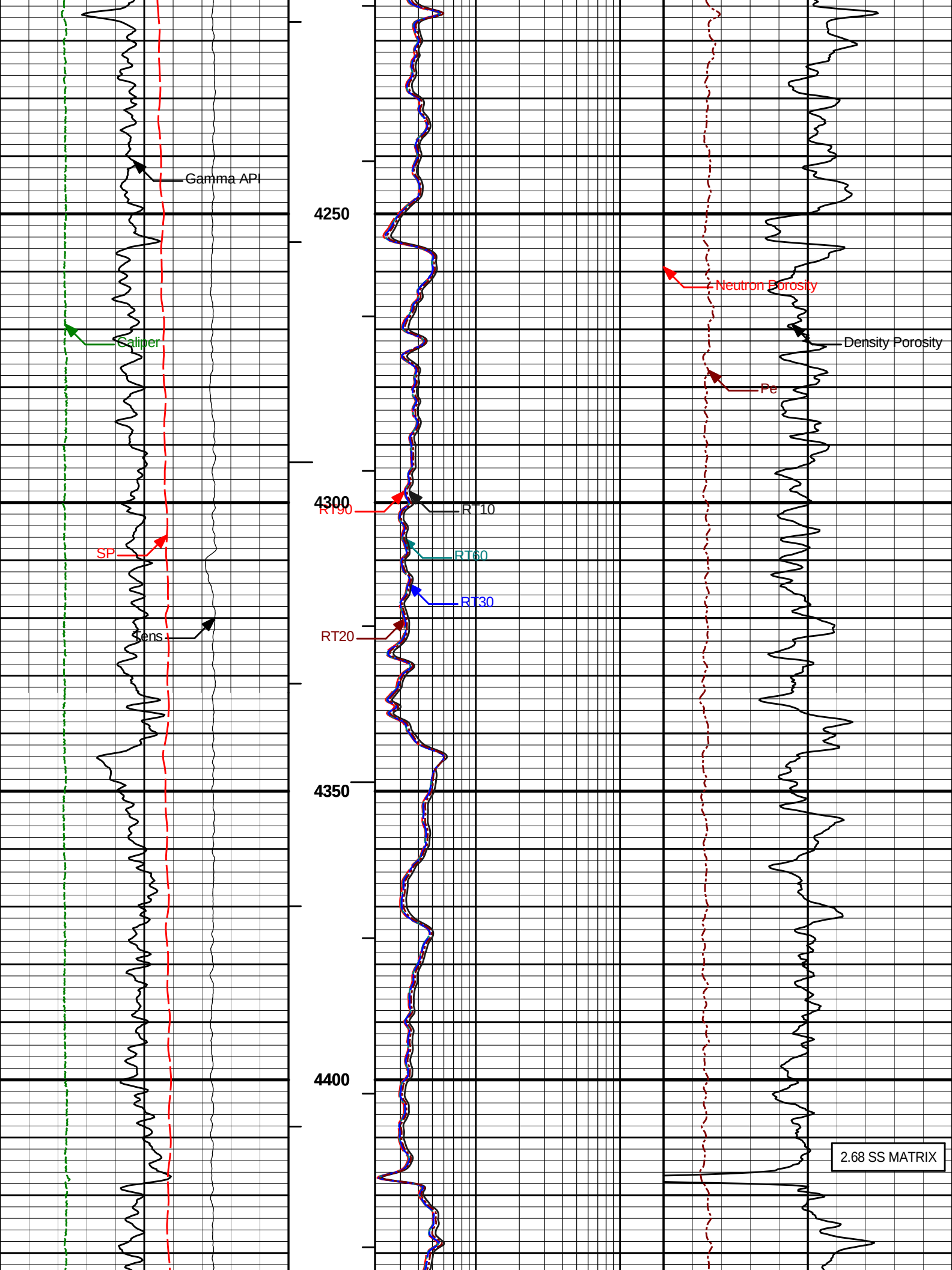
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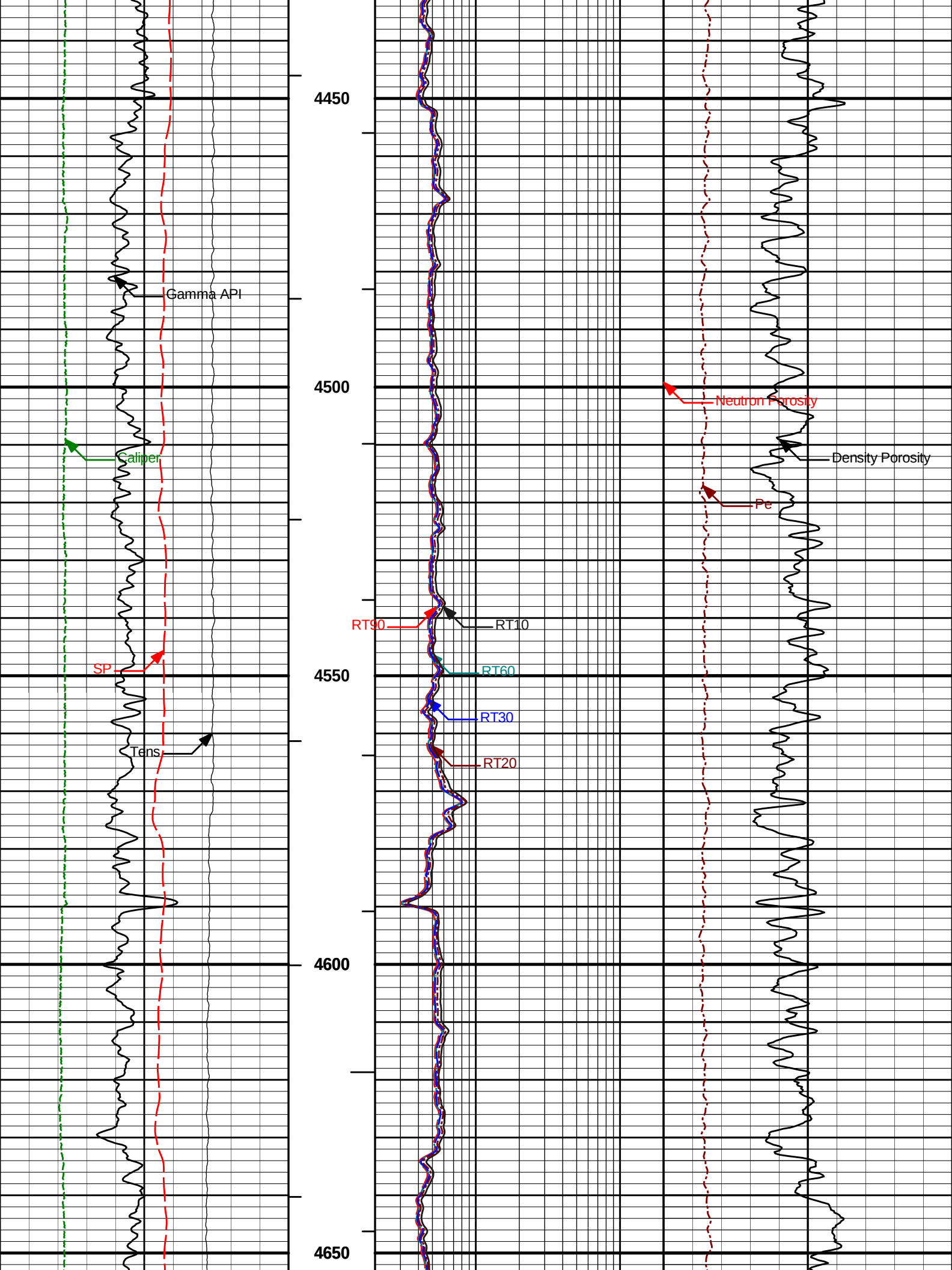
2.68 SS MATRIX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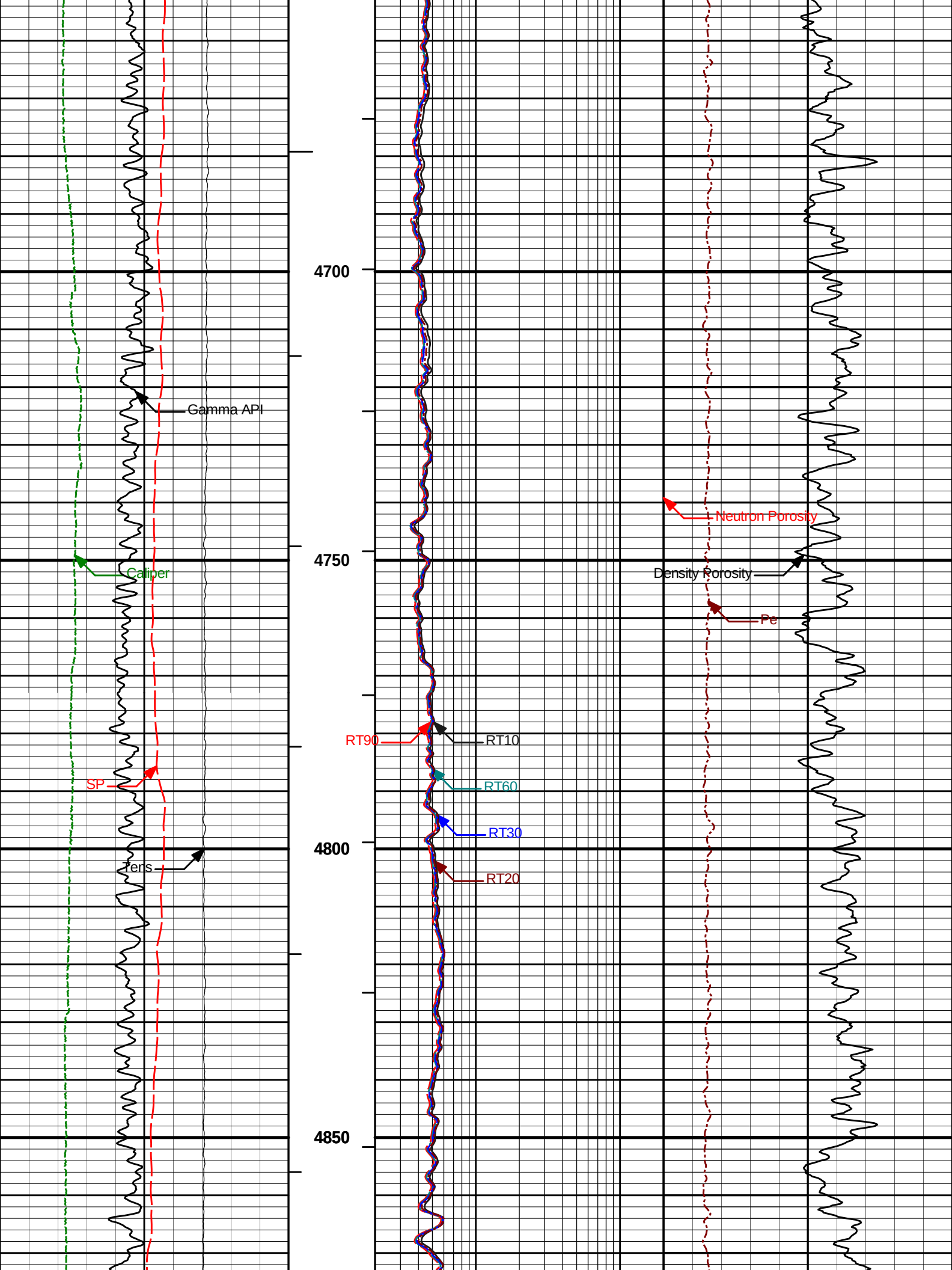
Density Porosity
Pe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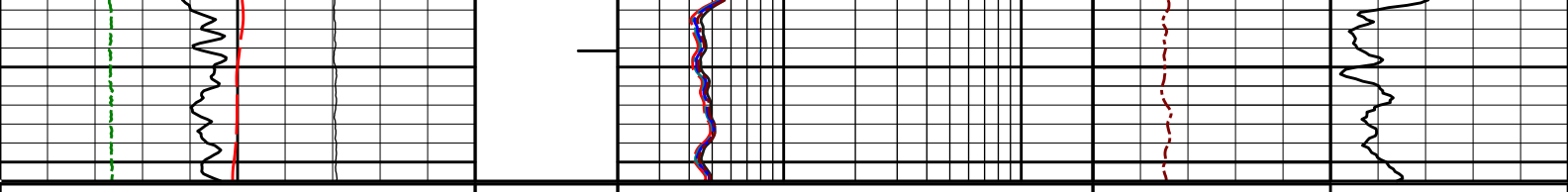
Density Porosity
Pe



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: 08-Feb-12 19:00:49
Plot Range: 3660 ft to 4892 ft
Data: NO_FOSS_10_2_21\Well Based\DAQ-0001-005*
Plot File: \\COMP\NOBLE_PARK_SUS

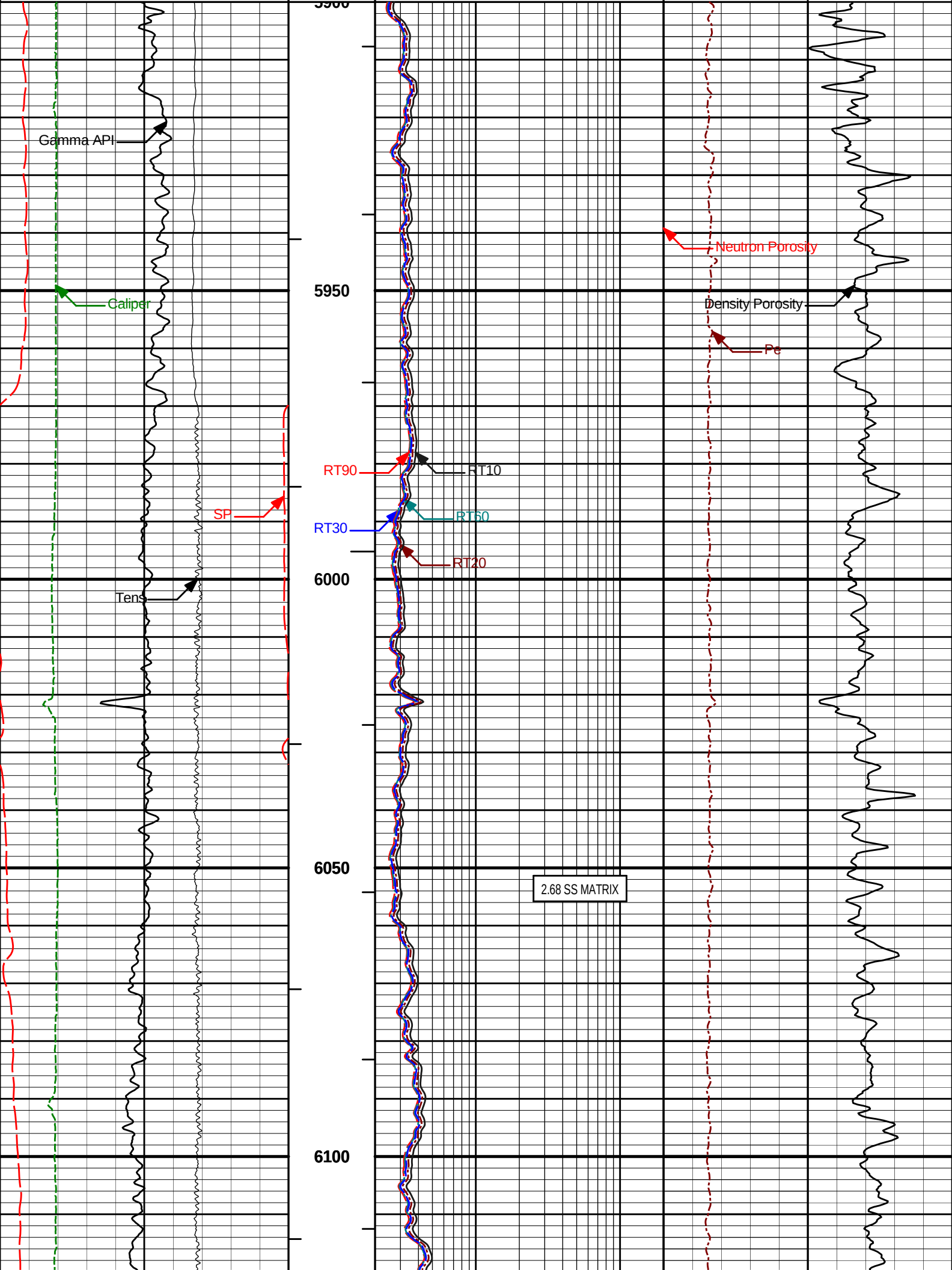
MAIN PASS 5" = 100'

HALLIBURTON

Plot Time: 08-Feb-12 19:00:49
Plot Range: 5900 ft to 7194.58 ft
Data: NO_FOSS_10_2_21\Well Based\MAIN*
Plot File: \\COMP\NOBLE_NIO_COD

MAIN PASS 5" = 100'

Track 1	Depth Track	Track 2	Track 5 Track 3
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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Caliper
SP
Tens
RT90
RT10
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RT60
RT20
Neutron Porosity
Density Porosity
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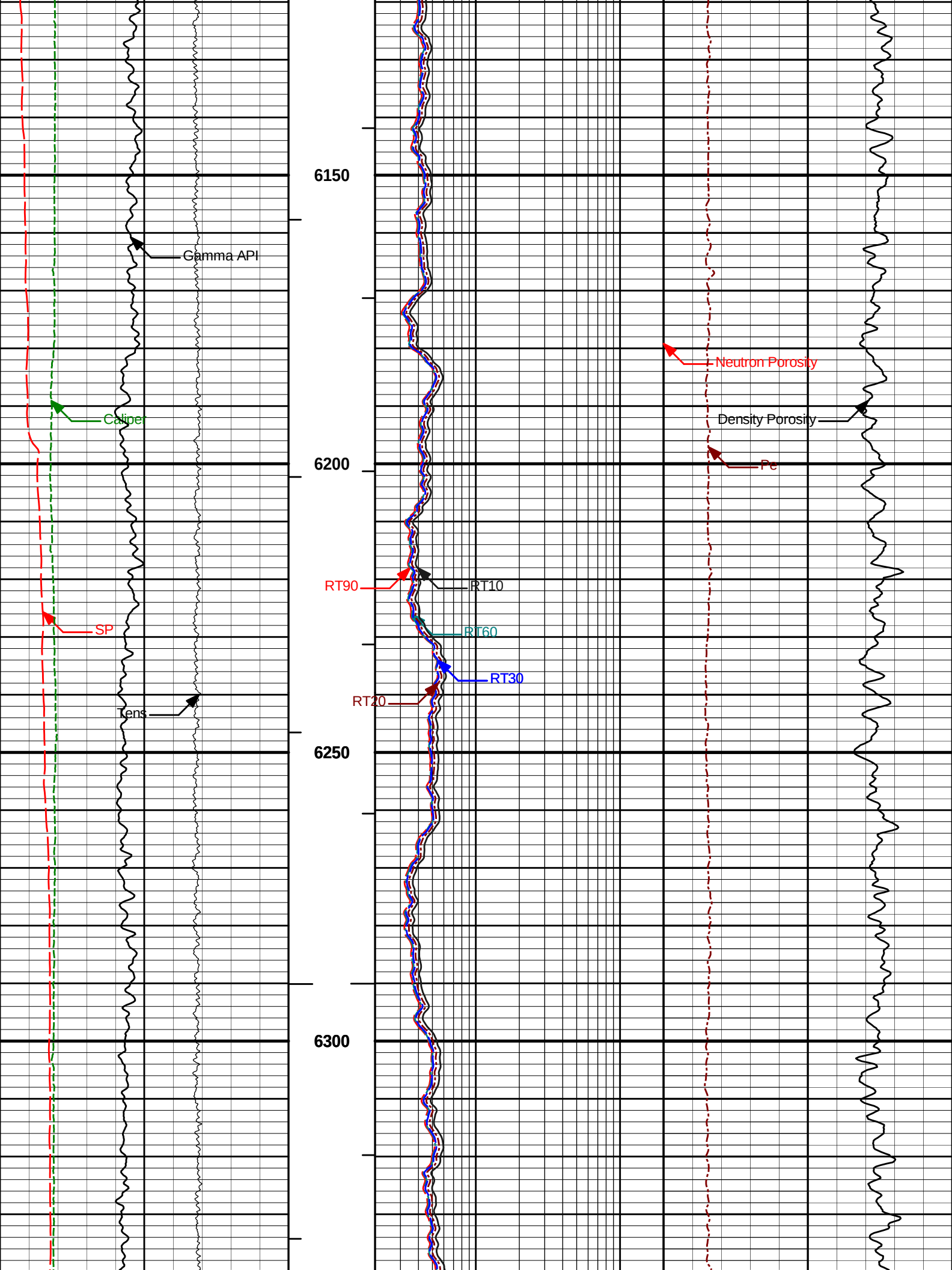
2.68 SS MATRIX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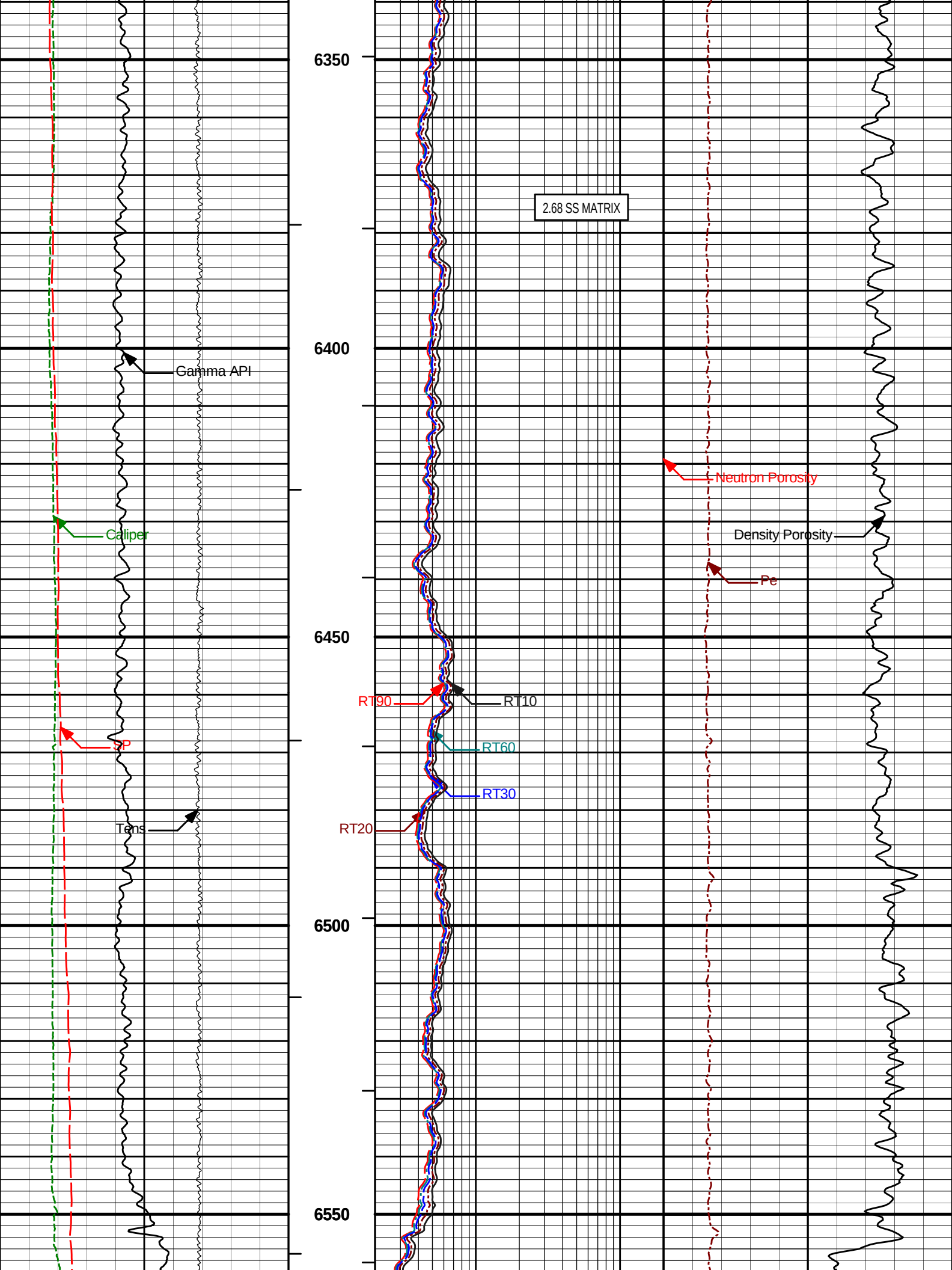
Density Porosity
Pe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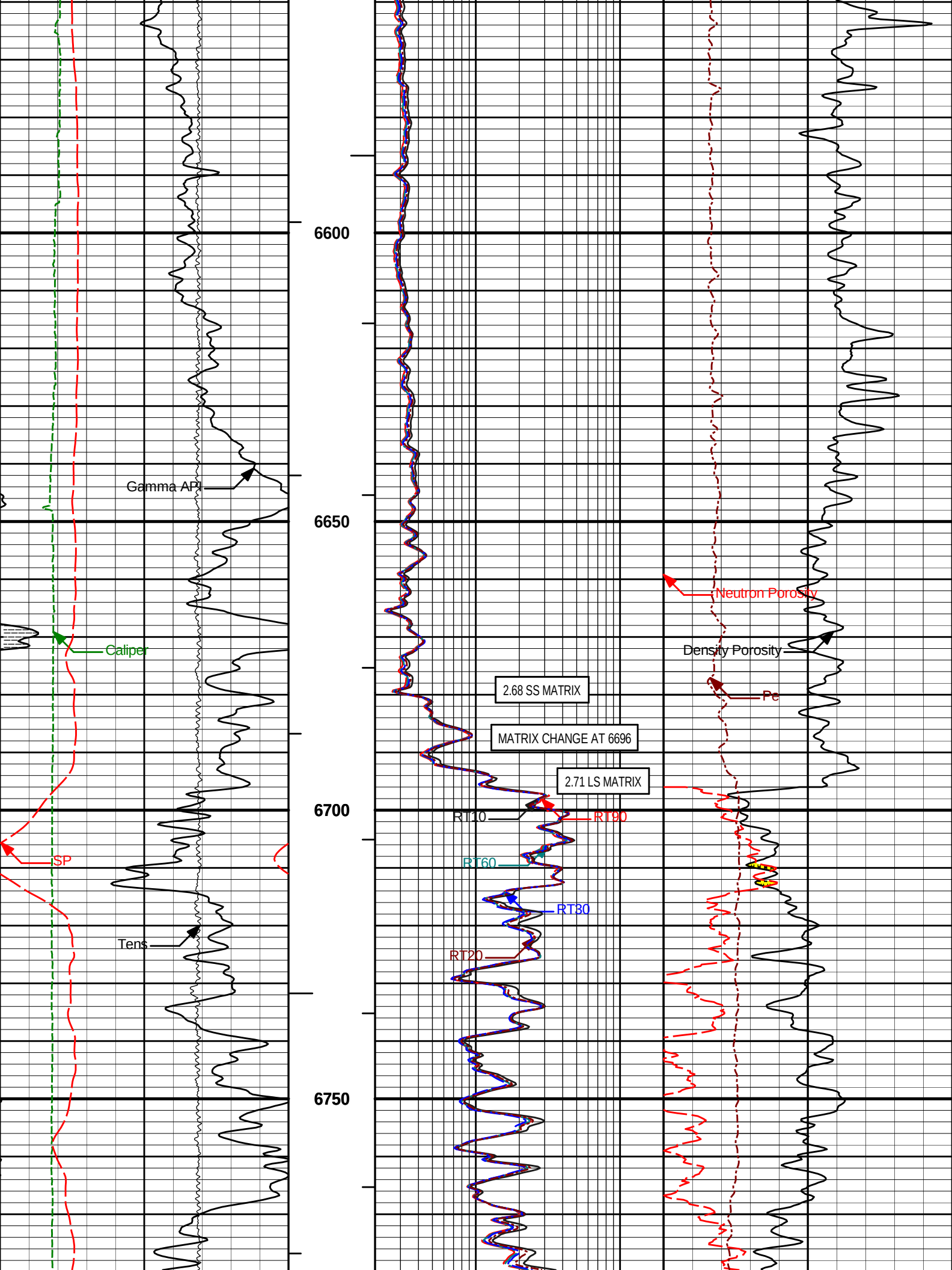
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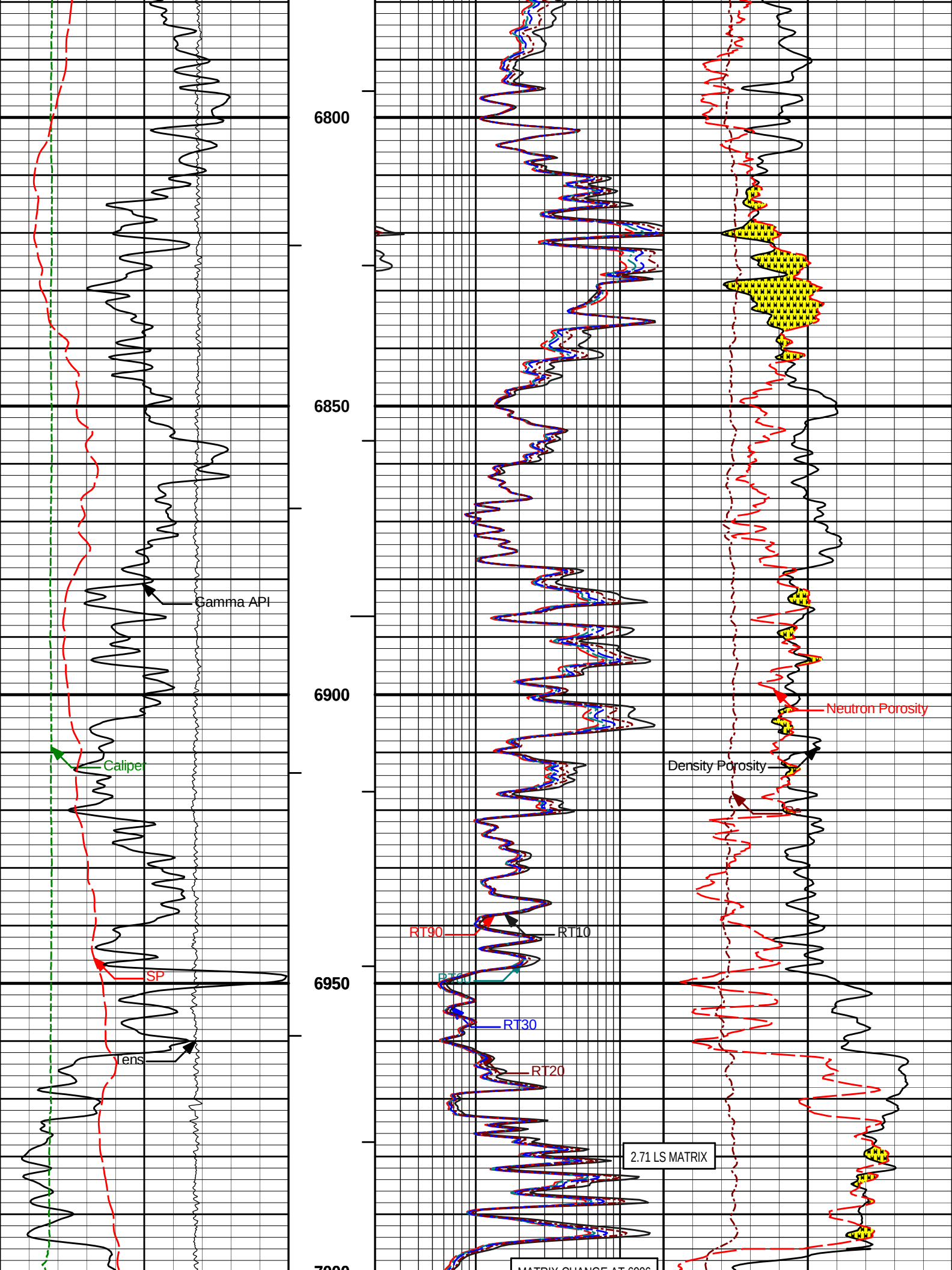
RT20
Neutron Porosity
Density Porosity
Pe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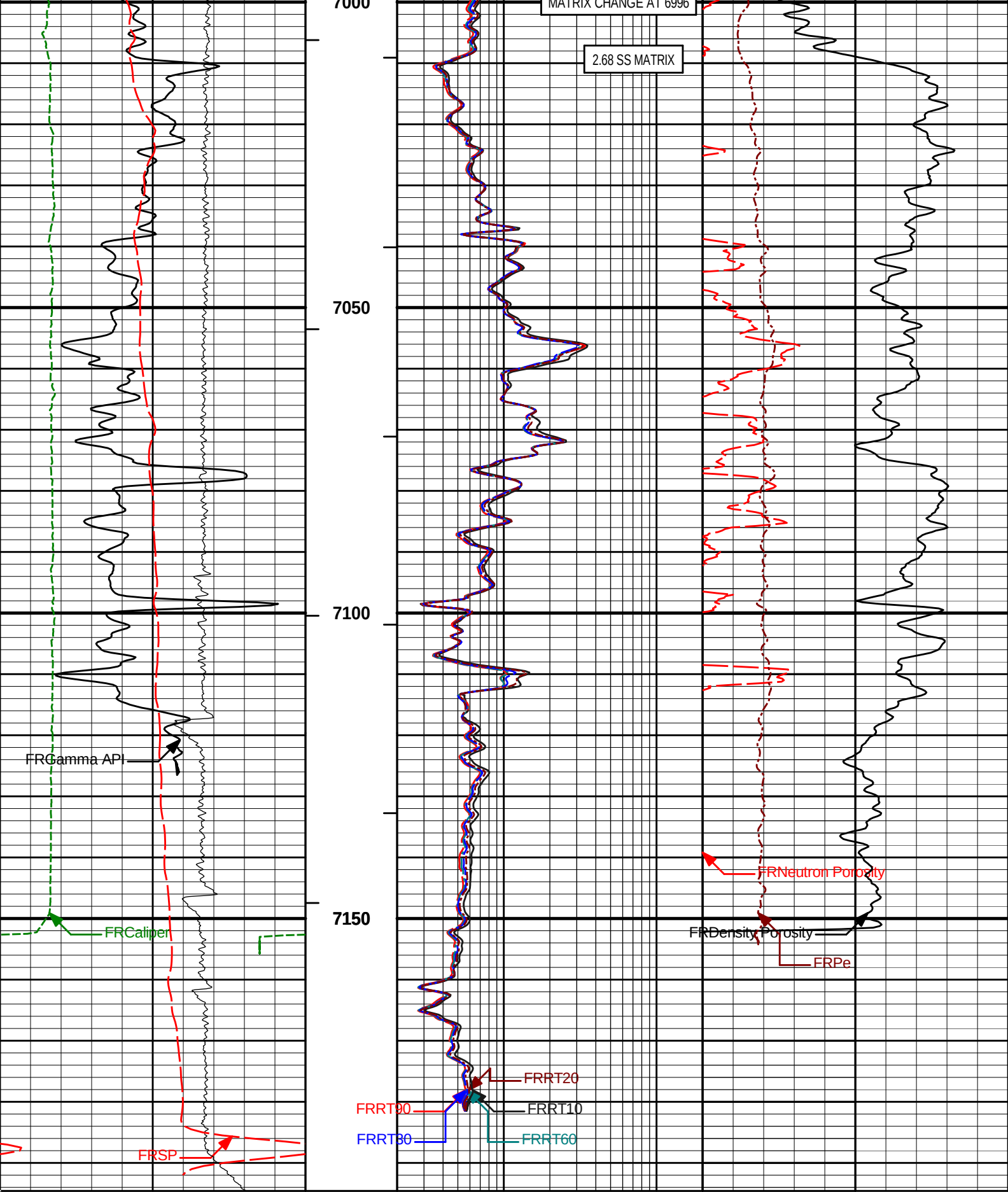
Density Porosity
2.71 LS MATRIX



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			2 RT30 200		20 Neutron Porosity 0

inches	AHVT	Ohm-m		percent
10K Tens 0		2 RT20 200		
pounds		Ohm-m		
Annular Volume Total		2 RT10 200		
		Ohm-m		

HALLIBURTON

Plot Time: 08-Feb-12 19:01:05
Plot Range: 5900 ft to 7194.58 ft
Data: NO_FOSS_10_2_21\Well Based\MAIN*
Plot File: \\COMP\NOBLE_NIO_COD

MAIN PASS 5" = 100'

HALLIBURTON

CALIBRATION REPORT

NATURAL GAMMA RAY TOOL SHOP CALIBRATION

Tool Name:	**GTET - 10843477**	**Reference Calibration Date:**	**03-Jan-12 15:51:16**
Engineer:	**B. PEDERSEN**	**Calibration Date:**	**02-Feb-12 09:13:58**
Software Version:	**WL INSITE R3.4.2 (Build 2)**	**Calibration Version:**	**1**

Calibrator Source S/N: TB-270
Calibrator API Reference:259.00 api
Equivalent Calibrator API Reference:263.5 api

Measurement	Measured	Calibrated	Units
Background	45.9	46.1	api
Background + Calibrator	308.5	309.6	api
Calibrator	262.6	263.5	api

NATURAL GAMMA RAY TOOL FIELD CALIBRATION

Tool Name:	**GTET - 10843477**	**Reference Calibration Date:**	**02-Feb-12 09:13:58**
Engineer:	**J. MAYNE**	**Calibration Date:**	**07-Feb-12 12:52:43**
Software Version:	**WL INSITE R3.4.2 (Build 2)**	**Calibration Version:**	**1**

Calibrator Source S/N: TB-270
Calibrator API Reference:259.00 api
Equivalent Calibrator API Reference:263.5 api

Field Verification	Shop	Field	Units
Background	46.1	38.3	api
Background + Calibrator	309.6	309.9	api
Calibrator	263.5	271.6	api

Shop	Field	Difference	Tolerance
263.5	271.6	-8.1	+/- 9.00

CSNG-FS SHOP CALIBRATION

Tool Name:	**CSNG - 11568970**	**Reference Calibration Date:**	**16-Dec-11 10:50:03**
Engineer:	**D. CULVER**	**Calibration Date:**	**04-Jan-12 14:03:35**
Software Version:	**WL INSITE R3.4.2 (Build 2)**	**Calibration Version:**	**1**

Source SN: **TB-270**

TITANIUM CASE	Measured	Calibrated	Units
60 KEV Peak Channel #	48.0	48.0	Channel #
239 KEV Peak Channel #	23.5	23.4	Channel #
583 KEV Peak Channel #	53.0	52.7	Channel #
2614 KEV Peak Channel #	219.1	218.5	Channel #
Calibrate Temperature	64.9	67.2	degF

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

Blanket Reference Value: 259.00 API

Calibrator Value: 294.2 API

	Counts	Units	Measured	Calibrated	Units
Thorium Blanket	1555.1	CPS	327.7	334.1	API
Background	185.8	CPS	33.6	39.9	API

Gamma Ray Gain: 1.08

Expected Gain Range: 0.85 - 1.15

Gamma Gain Check: Passed

DUAL SPACED NEUTRON SHOP CALIBRATION

Tool Name: **DSNT - 10860047** **Reference Calibration Date:** **03-Jan-12 15:42:11**

Engineer: **B. PEDERSEN** **Calibration Date:** **02-Feb-12 09:07:32**

Software Version: **WL INSITE R3.4.2 (Build 2)** **Calibration Version:** **1**

Logging Source S/N: 08-018

Tank Serial Number: 105039

Reference value assigned to Tank: 49.230

Snow Block S/N: 11170614

Calibration Tank Water Temperature: 67 degF

Min. Tool Housing Outside Diameter: 3.625 in

CALIBRATION CONSTANTS			
Measurement	Prev. Value	New Value	Control Limit On New Value
Gain:	0.930	0.933	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):	0.1966	0.1974	0.0008	+/- 0.0020
Calibrated Ratio:	9.24	9.27	0.026	+/- 0.050

VERIFIER		
Measurement	Value	Control Limit
Snow-Block Porosity (decp):	0.0685	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 - 10860047**	**Reference Calibration Date:**	**02-Feb-12 09:07:32**
Engineer:	**J. MAYNE**	**Calibration Date:**	**07-Feb-12 13:04:47**
Software Version:	**WL INSITE R3.4.2 (Build 2)**	**Calibration Version:**	**1**

Logging Source S/N: 08-018

Snow Block S/N: 11170614

NEUTRON FIELD-CHECK SUMMARY

	Shop	Field	Difference	Control Limit On Change
Snow-Block Porosity (decp):	0.0685	0.0650	-0.0035	+/- 0.0150

PASS/FAIL SUMMARY

Block Change Check:	Passed
Snow Block Stat Check:	Passed
Temperature Check:	Passed

DENSITY CALIPER SHOP CALIBRATION

Tool Name:	**SDLT - 11014275**	**Reference Calibration Date:**	**03-Jan-12 15:15:41**
Engineer:	**B. PEDERSEN**	**Calibration Date:**	**02-Feb-12 08:40:52**
Software Version:	**WL INSITE R3.4.2 (Build 2)**	**Calibration Version:**	**1**

CALIBRATION COEFFICIENTS

Measurement	Previous Value	New Value	Control Limit On New Value
Pad Offset	-2027.74	-1960.18	-7000.00 - -1000.00
Pad Gain	0.0003857	0.0003818	0.000200 - 0.000600
Arm Offset	-2794.18	-2818.53	-5000.00 - 3000.00
Arm Gain	0.0005338	0.0005236	0.000300 - 0.000700
Arm Power	-0.000002579	-0.000001860	-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)	1.99	2.00	0.01	+/- 0.20
Medium Ring (in)	3.76	3.75	-0.01	+/- 0.20
RING DIAMETER:				
Small Ring (in)	6.52	6.50	-0.02	+/- 0.20
Medium Ring (in)	8.29	8.25	-0.04	+/- 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

SDLT CALIPER FIELD CALIBRATION

Tool Name:	**SDLT - 11014275**	**Reference Calibration Date:**	**02-Feb-12 08:40:52**

Engineer:	**J. MAYNE**	**Calibration Date:**	**07-Feb-12 12:57:07**
Software Version:	**WL INSITE R3.4.2 (Build 2)**	**Calibration Version:**	**1**

MEASURED CALIPER VALUES

Measurement	Shop	Field	Change	Control Limit On New Value
Pad Extension	3.75	3.77	0.02	+/- 0.10
Ring Diameter	8.25	8.19	-0.06	+/- 0.15

PASS/FAIL SUMMARY

Pad Extension Check:	Passed
Diameter Check:	Passed

BSAT FIELD CASING CHECK

Tool Name:	**BSAT - 10939067**	**Calibration Date:**	**08-Feb-12 15:28:40**
Engineer:	**J. MAYNE**		
Software Version:	**WL INSITE R3.4.2 (Build 2)**	**Calibration Version:**	**1**

Pre-Log Check	Check Depth	Shop	Field	Difference	Tolerance	Units
Delta-T Compensated	479.43	57.00	56.84	0.1600	1.00	uspf

ARRAY COMPENSATED TRUE RESISTIVITY SHOP CALIBRATION

Tool Name:	**ACRt Sonde - E104_S103**	**Reference Calibration Date:**	**06-Jan-12 14:06:22**
Engineer:	**D. CULVER**	**Calibration Date:**	**06-Jan-12 14:25:03**
Software Version:	**WL INSITE R3.4.2 (Build 2)**	**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	1.0138	1.05	0.95	1.0149	1.05	0.95	1.0104	1.05
A2 (50")	0.95	1.0120	1.05	0.95	1.0138	1.05	0.95	1.0112	1.05
A3 (29")	0.95	1.0190	1.05	0.95	1.0203	1.05	0.95	1.0151	1.05
A4 (17")	0.95	1.0100	1.05	0.95	1.0086	1.05	0.95	1.0073	1.05
A5 (10")	N/A	N/A	N/A	0.95	0.9928	1.05	0.95	0.9900	1.05
A6 (6")	N/A	N/A	N/A	0.95	0.9822	1.05	0.95	0.9799	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	-0.377	2	-6	-3.733	-2	-8	-4.985	-2
A2 (50")	-7	-2.068	-1	-6	-3.549	-2	-7	-4.543	-2
A3 (29")	-27	-12.270	-9	-9	-3.469	-3	-7	-2.959	-1
A4 (17")	-180	-101.858	-60	-45	-32.209	-15	-39	-26.097	-13
A5 (10")	N/A	N/A	N/A	-150	-83.927	-50	-80	-39.784	-10
A6 (6")	N/A	N/A	N/A	175	286.181	525	90	143.335	270

TRANSMITTER CURRENT GAIN

Signal	Lower	R	Upper
12K	0.6	0.8830	1.3
36K	1.0	1.8952	2.0
72K	1.0	1.1233	2.0

R-MUD VERIFICATION

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

SPECTRAL DENSITY SHOP CALIBRATION

Tool Name:	**SDLT Pad - 11014275**	**Reference Calibration Date:**	**03-Jan-12 14:39:52**

Engineer:	**B. PEDERSEN**	**Calibration Date:**	**02-Feb-12 08:11:16**
Software Version:	**WL INSITE R3.4.2 (Build 2)**	**Calibration Version:**	**1**

Logging Source S/N: 5235GW

Aluminum Block S/N: ROCK SPRINGS Density: 2.602g/cc Pe: 3.110

Magnesium Block S/N: ROCK SPRINGS Density: 1.690g/cc Pe: 2.610

DENSITY CALIBRATION SUMMARY

Measurement	Previous Value	New Value	Control Limit
Near Bar Gain	1.0424	1.0441	0.90 - 1.10
Near Dens Gain	1.0111	1.0067	0.90 - 1.10
Near Peak Gain	1.0128	1.0131	0.90 - 1.10
Near Lith Gain	1.0077	1.0033	0.90 - 1.10
Far Bar Gain	1.0102	1.0107	0.90 - 1.10
Far Dens Gain	0.9986	1.0015	0.90 - 1.10
Far Peak Gain	0.9947	0.9989	0.90 - 1.10
Far Lith Gain	0.9716	0.9770	0.90 - 1.10
Near Bar Offset	-0.3569	-0.3952	NONE
Near Dens Offset	-0.0805	-0.0661	NONE
Near Peak Offset	-0.1015	-0.1294	NONE
Near Lith Offset	-0.0614	-0.0498	NONE
Far Bar Offset	-0.1370	-0.1604	NONE
Far Dens Offset	-0.0319	-0.0763	NONE
Far Peak Offset	-0.0487	-0.1038	NONE
Far Lith Offset	0.0614	0.0053	NONE
Near Bar Background	921.90	923.07	700 - 1450
Near Dens Background	305.88	304.74	230 - 480
Near Peak Background	132.99	131.62	100 - 210
Near Lith Background	161.43	161.31	125 - 260
Far Bar Background	486.51	486.36	450 - 900
Far Dens Background	193.54	192.07	175 - 345
Far Peak Background	76.59	75.31	70 - 140
Far Lith Background	79.53	79.10	75 - 145

CALIBRATION BLOCK SUMMARY

Measurement	Current Reading (Previous Coef)	Calibrated (New Coef)	Change	Control Limit On Change
MAGNESIUM				
Density (g/cc)	1.699	1.690	-0.009	+/- 0.015
Pe	2.480	2.560	0.080	+/- 0.150
ALUMINUM				
Density (g/cc)	2.602	2.602	-0.000	+/- 0.01500
Pe	3.037	3.065	0.028	+/- 0.150

TOOL SUMMARY

Measurement	Near Detector		Far Detector	
	Value	Control Limits	Value	Control Limits
QUALITY				
Background	-0.0007	+/- 0.0110	0.0007	+/- 0.0140
Magnesium Block	0.0002	+/- 0.0110	-0.0006	+/- 0.0140
Aluminum Block	0.0006	+/- 0.0110	0.0001	+/- 0.0140
Resolution	8.97	6.00 - 11.50	10.13	6.00 - 11.50

Internal Verifier(B+D+P+L)	1521	1200 - 2700	833	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 - 11014275 **Reference Calibration Date:** 02-Feb-12 08:11:16

Engineer: J. MAYNE **Calibration Date:** 07-Feb-12 12:45:35

Software Version: WL INSITE R3.4.2 (Build 2) **Calibration Version:** 1

Pad Temperature: 57.6 degF

DENSITY FIELD CALIBRATION SUMMARY				
Measurement	**Shop**	**Field**	**Change**	**Control Limit +/-**
Near (B+D+P+L) cps	1520.740	1511.619	-9.121	15.707
Far (B+D+P+L) cps	832.849	834.055	1.206	15.883
Near Resolution	8.97	8.92	-0.050	0.50
Far Resolution	10.13	9.97	-0.160	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-10843477						
Gamma Ray Calibrator	263.5	271.6	----------	-8.1	+/- 9.00	api
CSNG-11568970						
60 KEV Peak Channel #	48.0	----------	----------	0.0	----------	Channel #
239 KEV Peak Channel #	23.4	----------	----------	0.0	----------	Channel #
583 KEV Peak Channel #	52.7	----------	----------	0.0	----------	Channel #
2614 KEV Peak Channel #	218.5	----------	----------	0.0	----------	Channel #
DSNT-10860047						
Snow-Block Porosity	0.0685	0.0650	----------	0.0035	+/- 0.0150	decp
SDLT-11014275						
Pad Extension	3.75	3.77	----------	-0.02	+/-0.10	in
Ring Diameter	8.25	8.19	----------	0.060	+/-0.15	in
ACRt Sonde-E104_S103						
Mud Cell	0.997	----------	----------	0.000	----------	ohm-m
SDLT Pad-11014275						
Near(B+D+P+L)	1520.740	1511.619	----------	9.121	+/-15.707	cps
Far(B+D+P+L)	832.849	834.055	----------	-1.206	+/-15.883	cps

Data: NO_FOSS_10_2_21\0001 QUAD_BSAT\IDLE **Date: 08-Feb-12 18:07:49**

HALLIBURTON

CUSTOMER EVENT LOG

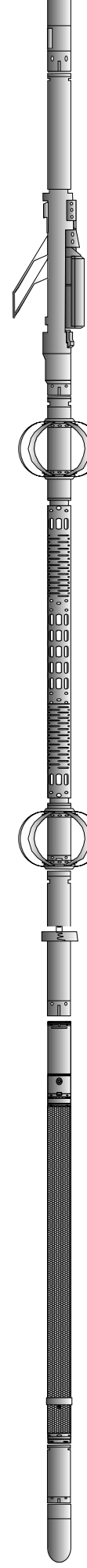
Event Type	Time & Date	Depth (ft)	Event Description
	08-Feb-12 15:14:15	900.75	Logging 001 08-Feb-12 15:14 Up @900.8f
	08-Feb-12 15:27:32	490.93	Halting 001 08-Feb-12 15:14 Up @900.8f
	08-Feb-12 15:28:03	381.75	Logging 002 08-Feb-12 15:28 Dn @381.8f
	08-Feb-12 15:28:15	479.43	Halting 002 08-Feb-12 15:28 Dn @381.8f
	08-Feb-12 15:28:54	399.25	Logging 003 08-Feb-12 15:28 Dn @399.3f
	08-Feb-12 15:54:04	7104.30	Halting 003 08-Feb-12 15:28 Dn @399.3f
	08-Feb-12 15:56:18	7197.25	Logging 004 08-Feb-12 15:56 Up @7197.3f
	08-Feb-12 16:17:44	6756.89	Halting 004 08-Feb-12 15:56 Up @7197.3f
	08-Feb-12 16:21:49	7195.00	Logging 005 08-Feb-12 16:21 Up @7195.0f
	08-Feb-12 17:38:30	7019.50	Relogging 005.01 08-Feb-12 17:37 Up
	08-Feb-12 17:41:37	6565.40	Halting 005.01 08-Feb-12 17:37 Up

Data: NO_FOSS_10_2_21\0001 QUAD_BSAT\HW11182 **Date: 08-Feb-12 18:08:20**

HALLIBURTON

TOOL STRING DIAGRAM REPORT

Description	Overbody Description	O.D.	Diagram	Sensors @ Delays	Length	Accumulated Length
						79.75 ft
RWCH-11280120 135.00 lbs		Ø 3.625 in		Load Cell @ 76.07 ft BH Temperature @ 75.50 ft	6.25 ft	
						73.50 ft
GTET-10843477 165.00 lbs		Ø 3.625 in		GammaRay @ 67.44 ft	8.52 ft	
						64.98 ft
CSNG-11568970 114.00 lbs		Ø 3.625 in		CSNG @ 59.36 ft	8.17 ft	
						56.82 ft
DSNT-10860047 174.00 lbs		Ø 3.625 in		DSN Far @ 49.88 ft	9.69 ft	



DSN Near @ 49.13 ft

47.13 ft

SDLT-11014275
360.00 lbs

Ø 4.500 in

10.81 ft

SDLT Pad-11014275
65.00 lbs

Ø 4.750 in*

SDL Caliper @ 39.13 ft
SDL @ 39.12 ft

36.32 ft

Centralizer 25-1
8.00 lbs

Ø 4.000 in*

BSAT-10939067
300.00 lbs

Ø 3.625 in

15.77 ft

Sonic Receivers @ 27.80 ft

Centralizer 25-2
8.00 lbs

Ø 4.000 in*

20.54 ft

Regal Standoff 6_75-1
20.00 lbs

Ø 6.750 in*

ACRt Instrument-E104_S103
50.00 lbs

Ø 3.625 in

5.03 ft

15.51 ft

Mud Resistivity @ 14.15 ft

ACRt @ 10.17 ft

ACRt Sonde-E104_S103
200.00 lbs

Ø 3.625 in

14.22 ft

SP Ring-1
0.00 lbs

Ø 3.625 in*

SP @ 2.57 ft

1.29 ft

Temperature Sub-TEMP
15.00 lbs

Ø 3.625 in

0.96 ft

0.33 ft

Bull Nose-BULL
5.00 lbs

Ø 2.750 in

0.33 ft

0.00 ft

Mnemonic	Tool Name	Serial Number	Weight (lbs)	Length (ft)	Accumulated Length (ft)	Max.Log. Speed (fpm)

RWCH	Releasable Wireline Cable Head	11280120	135.00	6.25		73.50	300.00
GTET	Gamma Telemetry Tool	10843477	165.00	8.52		64.98	60.00
CSNG	Compensated Spectral Natural Gamma	11568970	114.00	8.17		56.82	15.00
DSNT	Dual Spaced Neutron	10860047	174.00	9.69		47.13	60.00
SDLT	Spectral Density Tool	11014275	360.00	10.81		36.32	60.00
SDLP	Density Insite Pad	11014275	65.00	2.55	*	38.53	60.00
BSAT	Borehole Sonic Array Tool	10939067	300.00	15.77		20.54	60.00
OBCEN	Centralizer - 25 in. Overbody	1	8.00	2.08	*	33.48	300.00
ACRt	Array Compensated True Resistivity Instrument Section	E104 S103	50.00	5.03		15.51	300.00
RSOF	Regal Standoff 6.75in	1	20.00	0.52	*	18.08	300.00
OBCEN	Centralizer - 25 in. Overbody	2	8.00	2.08	*	20.45	300.00
ACRt	Array Compensated True Resistivity	E104_S103	200.00	14.22		1.29	300.00
SP	SP Ring	1	0.00	0.25	*	2.57	300.00
TMAX	Temperature Sub - 3_625 OD	TEMP	15.00	0.96		0.33	300.00
BLNS	Bull Nose	BULL	5.00	0.33		0.00	300.00
Total			**1,619.00**	**79.75**			

* Not included in Total Length and Length Accumulation.

Data: NO_FOSS_10_2_21\0001 QUAD_BSAT\IDLE **Date: 08-Feb-12 15:11:45**

COMPANY	**NOBLE ENERGY INC.**		
WELL	**FOSS 10-2-21**		
FIELD	**WATTENBERG**		
COUNTY	**WELD**	STATE	**CO**

HALLIBURTON

SPECTRAL DENSITY
DUAL SPACED NEUTRON
ARRAY COMPENSATED
TRUE RESISTIVITY