Schlumberger

Company: St. Croix Operating, Inc.

Well: Scout-Niebur #1

Field: Wildcat

County: Washington State: Colorado

Platform Express

Triple Combo

County:	Washington
Field:	Wildcat
Location:	SESE Sec. 35, T2S, R51W
Well:	Scout-Niebur #1
Company:	St. Croix Operating, Inc.

Location:				
SESE Sec. 35, T2S, R51W		Elev.:	K.B.	4560.00 ft
600' FSL & 600' FEL			G.L.	4554.00 ft
Lat: 39.832090, Long: -103.05210			D.F.	4560.00 ft
Permanent Datum:	Ground Level	Elev.:	4554.00 f	
Log Measured From:	Kelly Bushing	6.00 ft	above Perm.Datum	
Drilling Measured From:	Kelly Bushing			

API Serial No.	Section:	Township:	Range:
05-121-11030	35	2S	51W

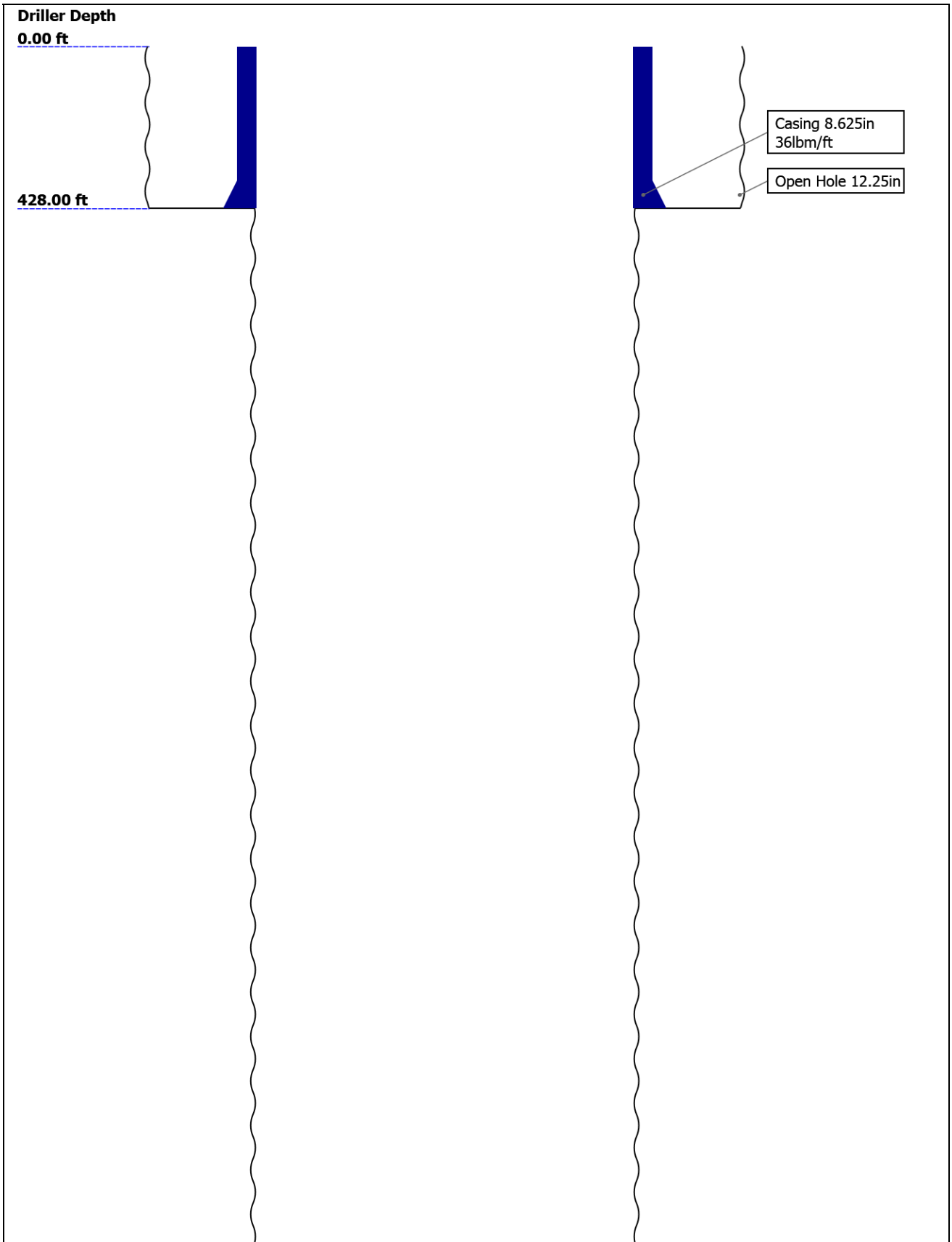
Logging Date			09-Nov-2017			
Run Number			ONE			
Depth Driller			4138.00 ft			
Schlumberger Depth			4138.00 ft			
Bottom Log Interval			4138.00 ft			
Top Log Interval			230.50 ft			
Casing Driller Size @ Depth			8.625 in @ 428.00 ft			
Casing Schlumberger			430.5 ft			
Bit Size			7.875 in			
Type Fluid In Hole			WBM			
MUD	Density	Viscosity	9.2 lbm/gal	52 s		
	Fluid Loss	PH	7.2 cm3	7.5		
	Source of Sample		Active Tank			
RM @ Meas Temp			3.16 ohm.m @ 62 degF			
RMF @ Meas Temp			2.69 ohm.m @ 62.3 degF			
RMC @ Meas Temp			3.63 ohm.m @ 61.4 degF			
Source RMF	RMC		Pressed	Pressed		
RM @ BHT	RMF @ BHT		1.61 @ 128	1.38 @ 128		
Max Recorded Temperatures			132 degF			
Circulation Stopped	Time		09-Nov-2017	14:00:00		
Logger on Bottom	Time		09-Nov-2017	21:30:00		
Unit Number	Location:		2161	Fort Morgan		
Recorded By			Camila Lang			
Witnessed By			Tom Thomson			

Disclaimer

Contents

12.2 Log (TripleCombo-5 RA)
13. Calibration Report
14. Tail

Well Sketch



Borehole Size/Casing/Tubing Record

Bit						
Bit Size (in)	12.25	7.875				
Top Driller (ft)	0	428				
Top Logger (ft)	0	428				
Bottom Driller (ft)	428	4138				
Bottom Logger (ft)	428	4138				
Casing						
Size (in)	8.625					
Weight (lbm/ft)	36					
Inner Diameter (in)	7.825					
Grade	N/A					
Top Driller (ft)	0					
Top Logger (ft)	0					
Bottom Driller (ft)	428					
Bottom Logger (ft)	430.5					

Operational Run Summary

Parameter (unit)	ONE					
Date Log Started	09-Nov-2017					
Time Log Started	22:57:58					
Date Log Finished	10-Nov-2017					
Time Log Finished	01:20:33					
Top Log Interval (ft)	230.50					
Bottom Log Interval (ft)	4138.00					
Total Depth (ft)	4138.00					
Max Hole Deviation (deg)	0.00					
Azimuth of Max Deviation (deg)	0.00					
Bit Size (in)	7.875					
Logging Unit Number	2161					
Logging Unit Location	Fort Morgan					
Recorded By	Camila Lang					

Witnessed By	Tom Thomson					
Service Order Number	DX2C-00022					

Borehole Fluids

Parameter(unit)	ONE					
Fluid Type	Water					
Fluid Name	WBM					
Max Recorded Temperatures (degF)	132					
Source of Sample	Active Tank					
Salinity (ppm)	0					
Density (lbm/gal)	9.2					
Funnel Viscosity (s)	52					
Fluid Loss (cm3)	7.2					
PH	7.5					
Date/Time Circulation Stopped	09-Nov-2017 14:00:00					
Date Logger on Bottom	09-Nov-2017					
Time Logger on Bottom	21:30:00					
Source RMF	Pressed					
RMC	Pressed					
RM @ Meas Temp (ohm.m@degF)	3.16 @ 62					
RMF @ Meas Temp (ohm.m@degF)	2.69 @ 62.3					
RMC @ Meas Temp (ohm.m@degF)	3.63 @ 61.4					
RM @ BHT (ohm.m@degF)	1.61 @ 128					
RMF @ BHT (ohm.m@degF)	1.38 @ 128					
RMC @ BHT (ohm.m@degF)	1.84 @ 128					
Total Solid (%)						
High Gravity Solids (%)						

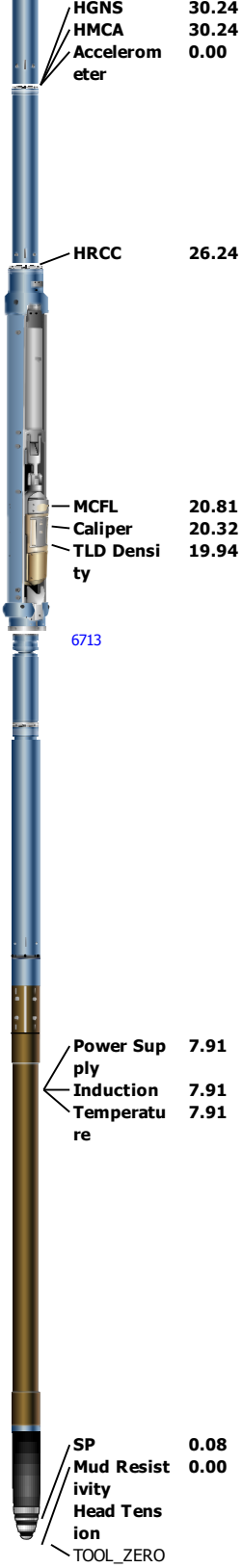
Remarks and Equipment Summary

ONE: Toolstring

Equip name	Length	MP name	Offset
LEH-QT:2672	**49.07**		
LEH-QT:2672			
EDTC-B:8102	**46.15**		
EDTH-B:9245			
EDTG-B:77004			
EDTC-B:8102			
		CTEM	**42.65**
		ACCZ	**0.00**
		HV	**0.00**
		Gamma Ray	**40.78**
		TelStatus	**39.65**
HGNS-H:3912	**39.65**	**Temperature**	**39.62**
HGNH:3875			
NSR-F:5070			
NPV-N			
HMCA-H			
HGNS-H:3912		**GR**	**38.91**
HACCZ-H			
		CNL Porosity	**32.58**

ONE: Remarks

First run in hole.
Tool run as per toolsketch.
Drilling Fluid: Water based mud @ 9.2 lb/gal
BHT: 128 deg F
Neutron corrections applied: Holesize, Standoff, and Pressure/Temperture
CS: 430.5' and TD:
Closed caliper at 2220'



Lengths are in ft
Maximum Outer Diameter = 4.770 in
Line: Sensor Location, Value: Gating Offset
All measurements are relative to TOOL_ZERO

Depth Summary

	ONE		
Depth Measuring Device			
Type	IDW-B		
Serial Number			
Calibration Date			
Calibrator Serial Number			
Calibration Cable Type			

Wheel Correction 1	0		
Wheel Correction 2	0		

Tension Device

Type	CMTD-B/A		
Serial Number			
Calibration Date			
Calibrator Serial Number			
Number of Calibration Points	0		

Logging Cable

Type	7-39PI-XXS		
Serial Number	F716048		
Length	20000.00 ft		
Conveyance Type	Wireline		
Rig Type	Land		

ONE:Depth Control Parameters		Depth Control Remarks
Log Sequence	First Log In the Well	All Schlumberger depth control policies were followed.
Rig Up Length At Surface		IDW used as primary depth reference.
Rig Up Length At Bottom		Z-Chart used as secondary depth reference.
Rig Up Length Correction		
Stretch Correction		
Tool Zero Check At Surface		

Survey Record

Survey Calculation

Method :	Minimum Radius of Curvature	DLS Method :	Lubinski
North Reference :	True North	Total Correction Formula :	Magnetic Dec

Rig Location

Latitude :	39.832090 degrees	Longitude :	-103.05021 degrees

Tie In Point

Measured Depth:	0.00 ft	Inclination:	0.00 deg	Azimuth:	0.00 deg
True Vertical Depth:	0.00 ft	North Displacement:	0.00 ft	East Displacement:	0.00 ft

Survey Quality Index

28 : Tie-In Point

Survey Correction Index

0 : No correction

Survey Description Index

0 : Not Flagged Survey

Seq	MD (ft)	Incl (deg)	Azim (deg)	Course (ft)	TVD (ft)	V Sec (ft)	N/ -S (ft)	E/ -W (ft)	Closure (ft)	at Azim (deg)	DLS deg/100ft	Tool Type	QI	CI	DI
1	0.00	0.00	0.00	- - - -	0.00	0.00	0.00	0.00	0.00	90.00	0.00	TIP	28	0	0

ONE

5" Triple Combo

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
ONE	Log[3]:Up	Up	228.99 ft	4158.68 ft	10-Nov-2017 12:07:51 AM	10-Nov-2017 1:20:17 AM	ON	1.18 ft	Yes

All depths are referenced to toolstring zero

Log

Company:St. Croix Operating, Inc. Well:Scout-Niebur #1

ONE: Log[3]:Up:S012

Description: HGNS standard resolution porosities for Platform Express Format: Log (TripleCombo-5) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 10-Nov-2017 01:54:00

Channel	Source	Sampling
AT10	AIT-M:AMIS:AMIS	3in
AT30	AIT-M:AMIS:AMIS	3in
AT90	AIT-M:AMIS:AMIS	3in
CALI	HDRS-H:HRCC-H:HRCC-H	1in
DPHZ	HDRS-H:HRMS-H:HRGD-H	2in
GR	HGNS-H:HGNS-H:HGNS-H	6in
NPOR	HGNS-H:HGNS-H:HGNS-H	6in
PEFZ	HDRS-H:HRMS-H:HRGD-H	2in
SP	AIT-M:AMIS:AMIS	6in
STIT	DepthCorrection	6in
TENS	WLWorkflow	6in
TIME_1900	WLWorkflow	0.1in

TIME_1900 - Time Marked every 60.00 (s)

Standard Resolution Formation Photoelectric Factor (PEFZ) HDRS-H

0 10

Gas Effect

NPOR Backup

Array Induction Two Foot Resistivity A10 (AT10) AIT-M

0.2 ohm.m 2000

Cable Tension (TENS)

5000 lbf 0

Gamma Ray Back up

Gamma Ray (ECGR) HGNS-H

0 gAPI 200

Array Induction Two Foot Resistivity A30 (AT30) AIT-M

0.2 ohm.m 2000

Standard Resolution Density Porosity (DPHZ) HDRS-H

0.3 ft3/ft3 -0.1

Caliper (HCAL) HDRS-H

6 in 16

Stuck Tool Indicator, Total (STIT)

0 ft 50

Array Induction Two Foot Resistivity A90 (AT90) AIT-M

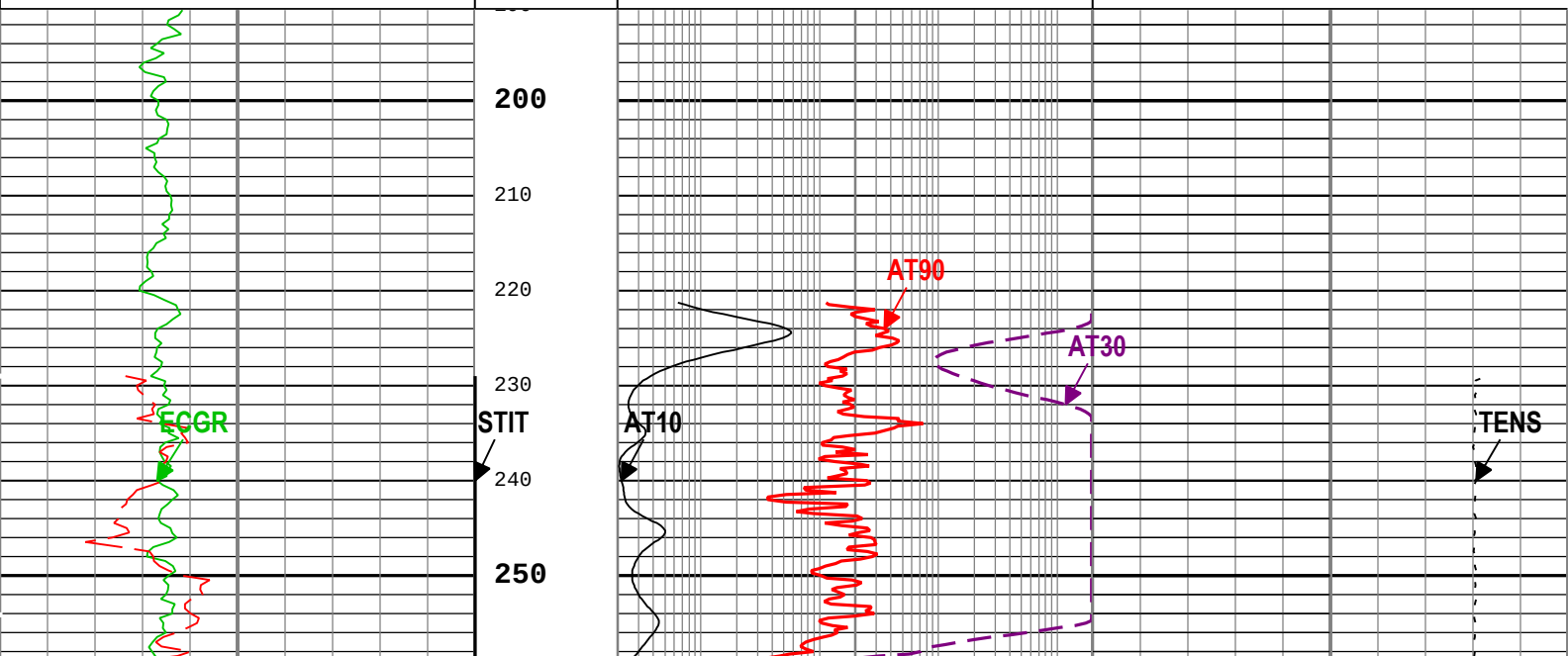
0.2 ohm.m 2000

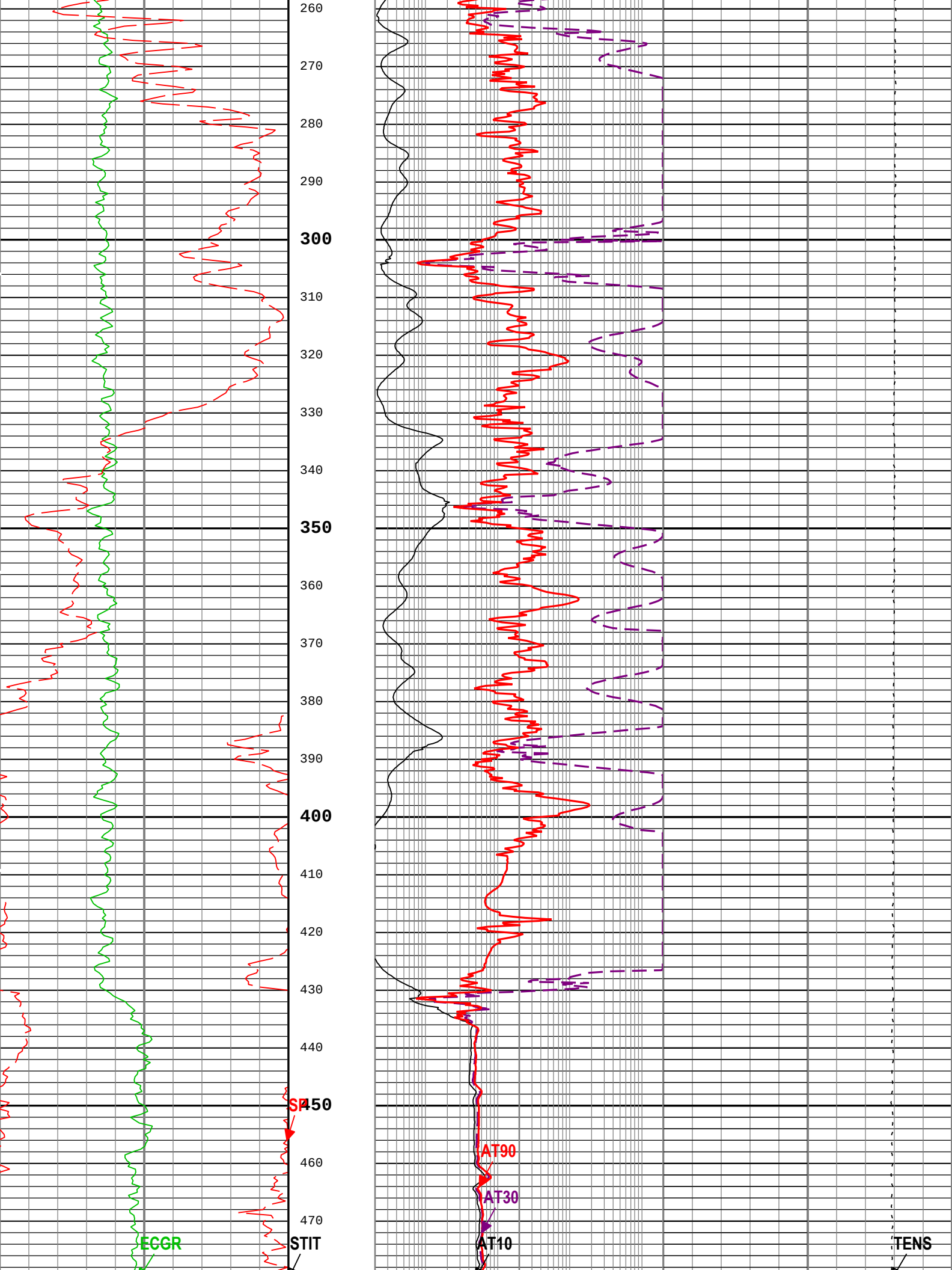
Enhanced Thermal Neutron Porosity in Selected Lithology (NPOR) HGNS-H

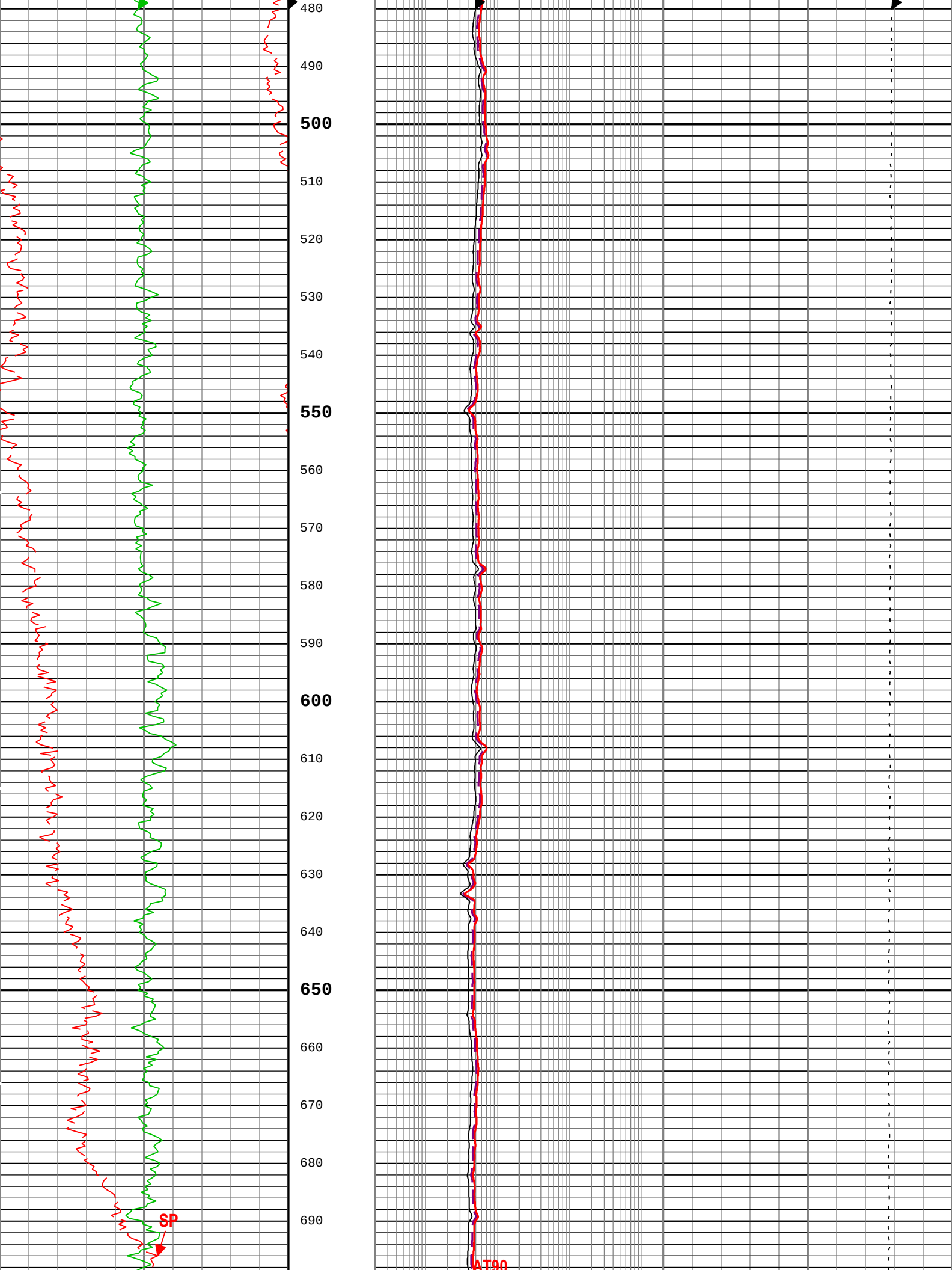
0.3 m3/m3 -0.1

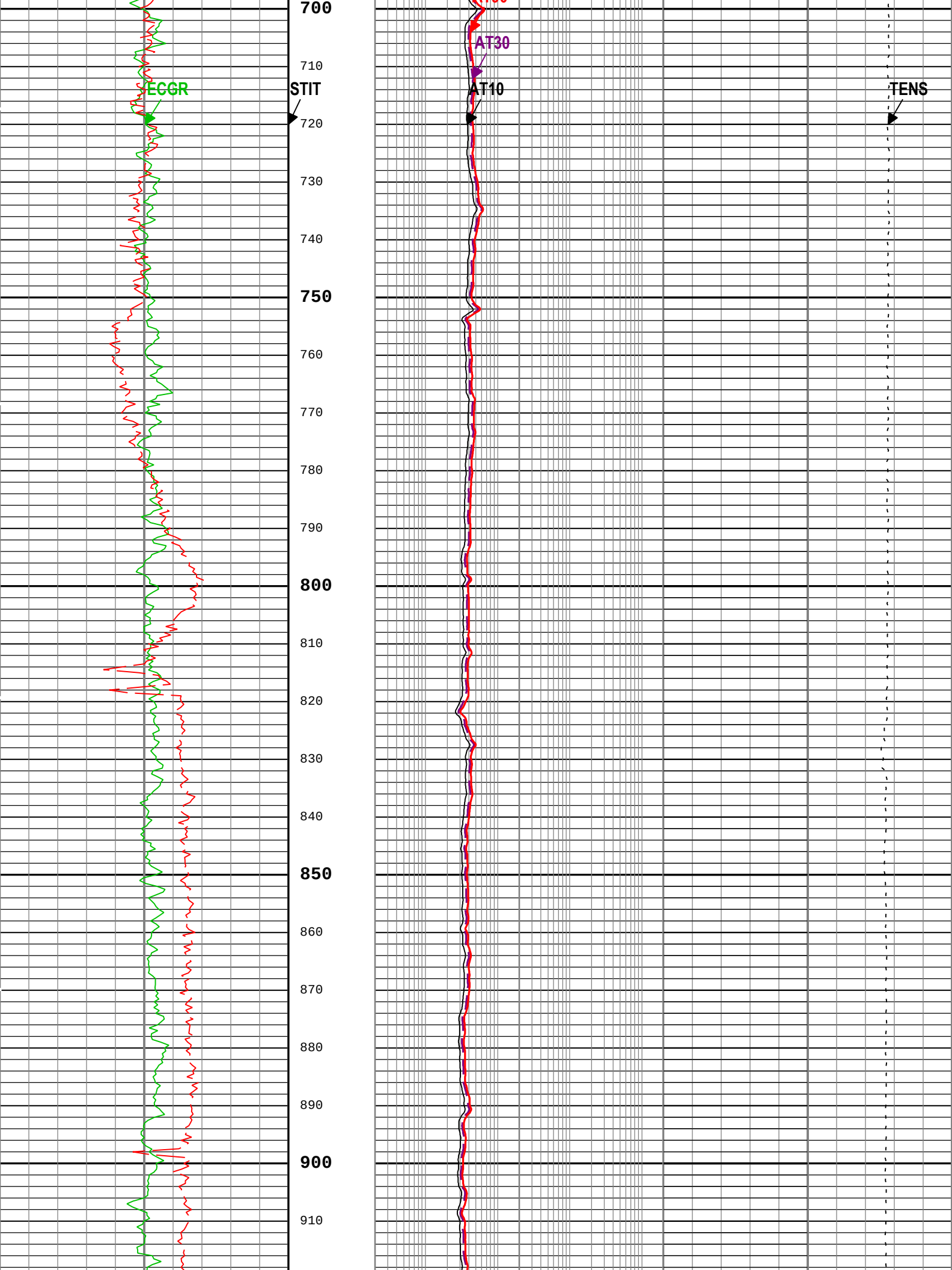
Spontaneous Potential (SP) AIT-M

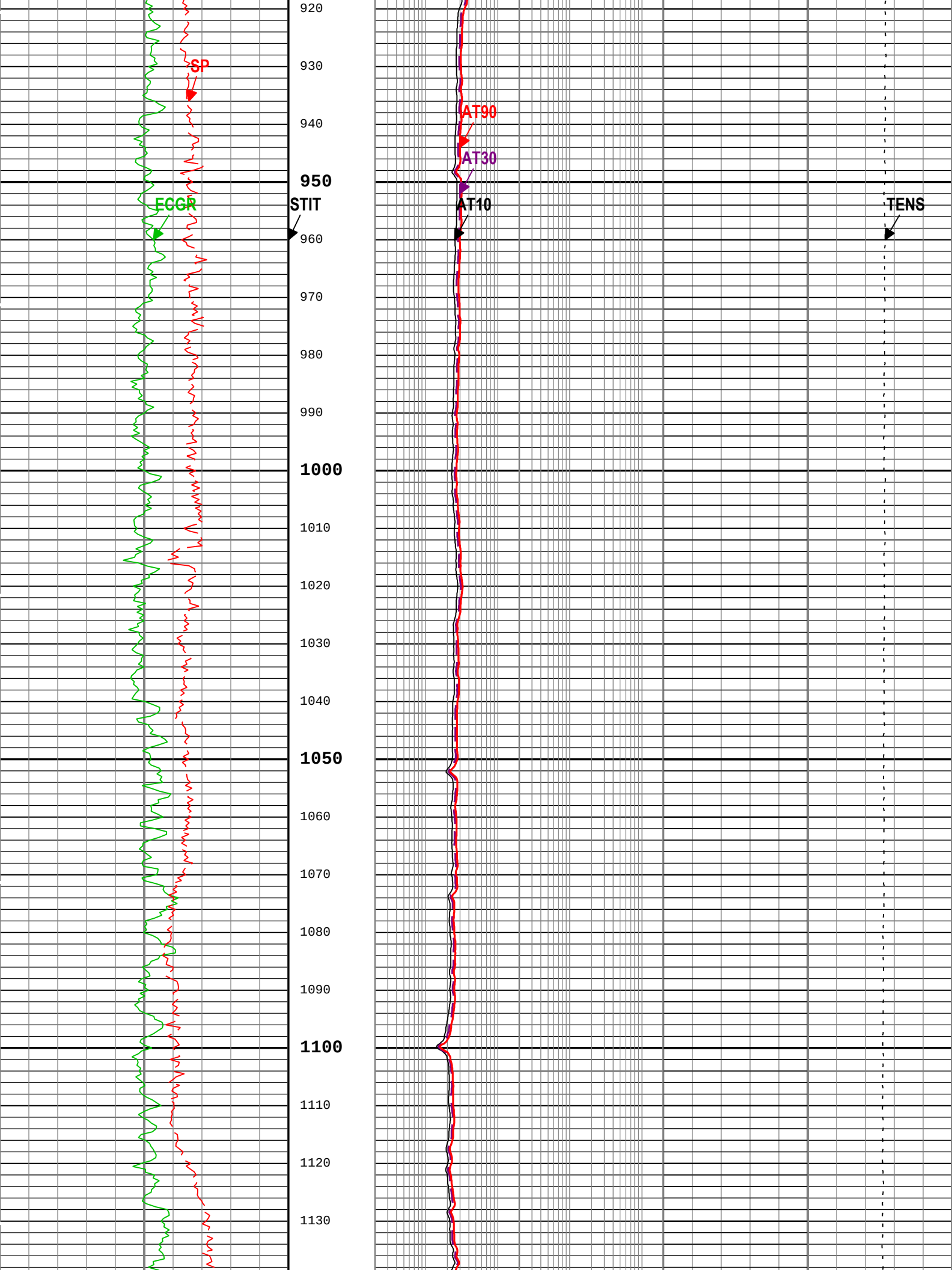
-100 mV 100

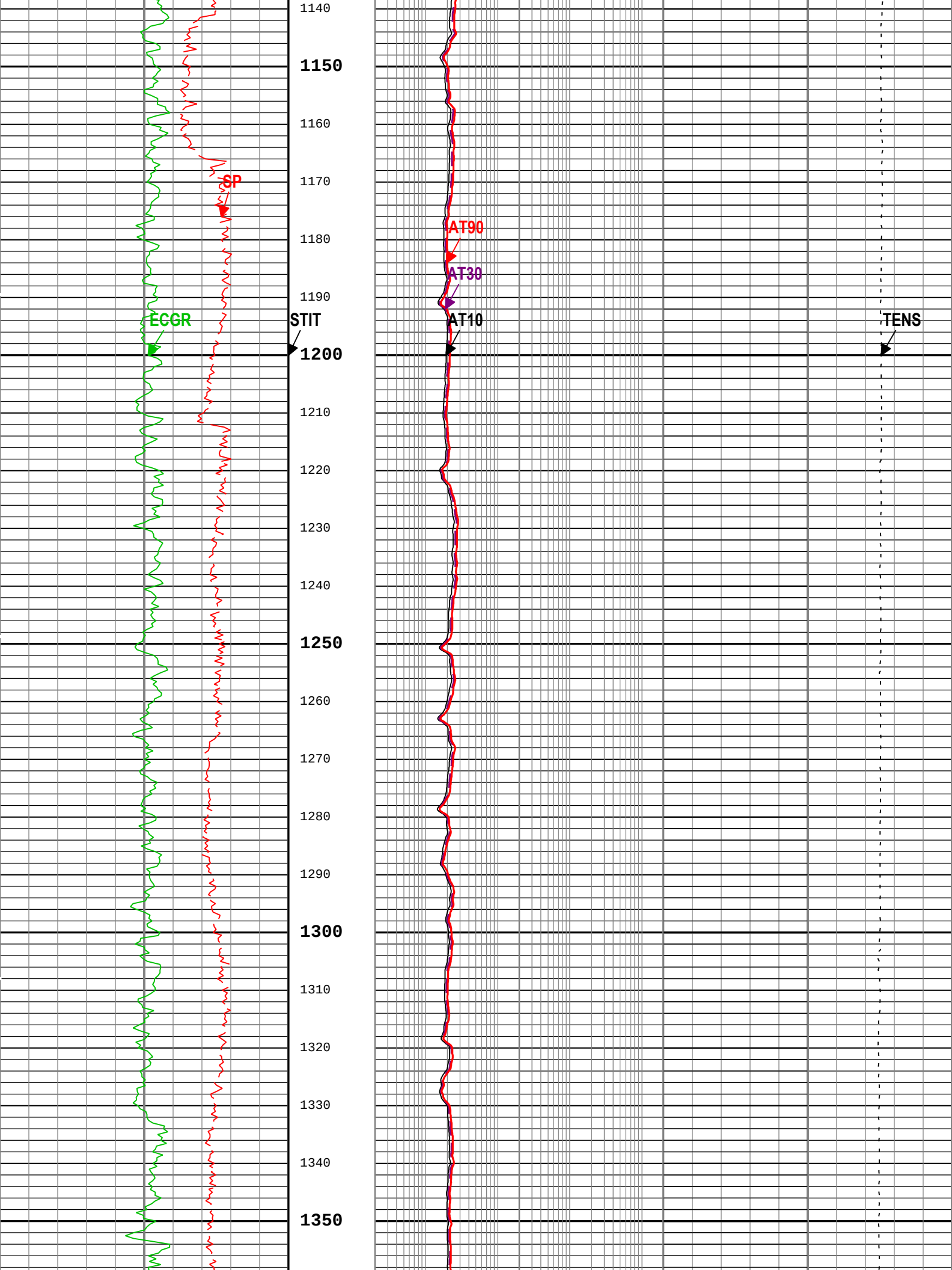


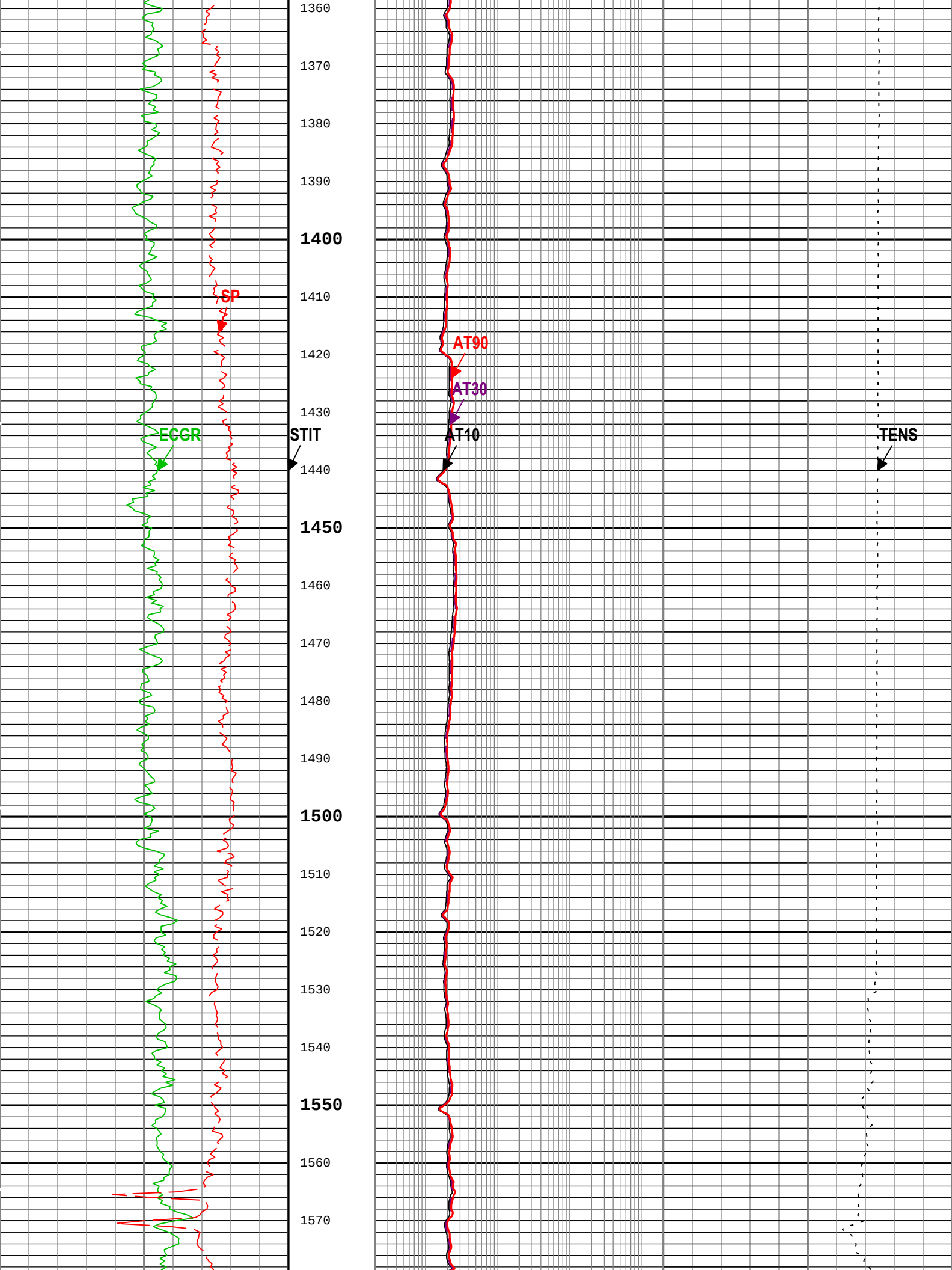

260
270
280
290
300
310
320
330
340
350
360
370
380
390
400
410
420
430
440
450
460
470
SP
ECGR
STIT
AT90
AT30
AT10
TENS

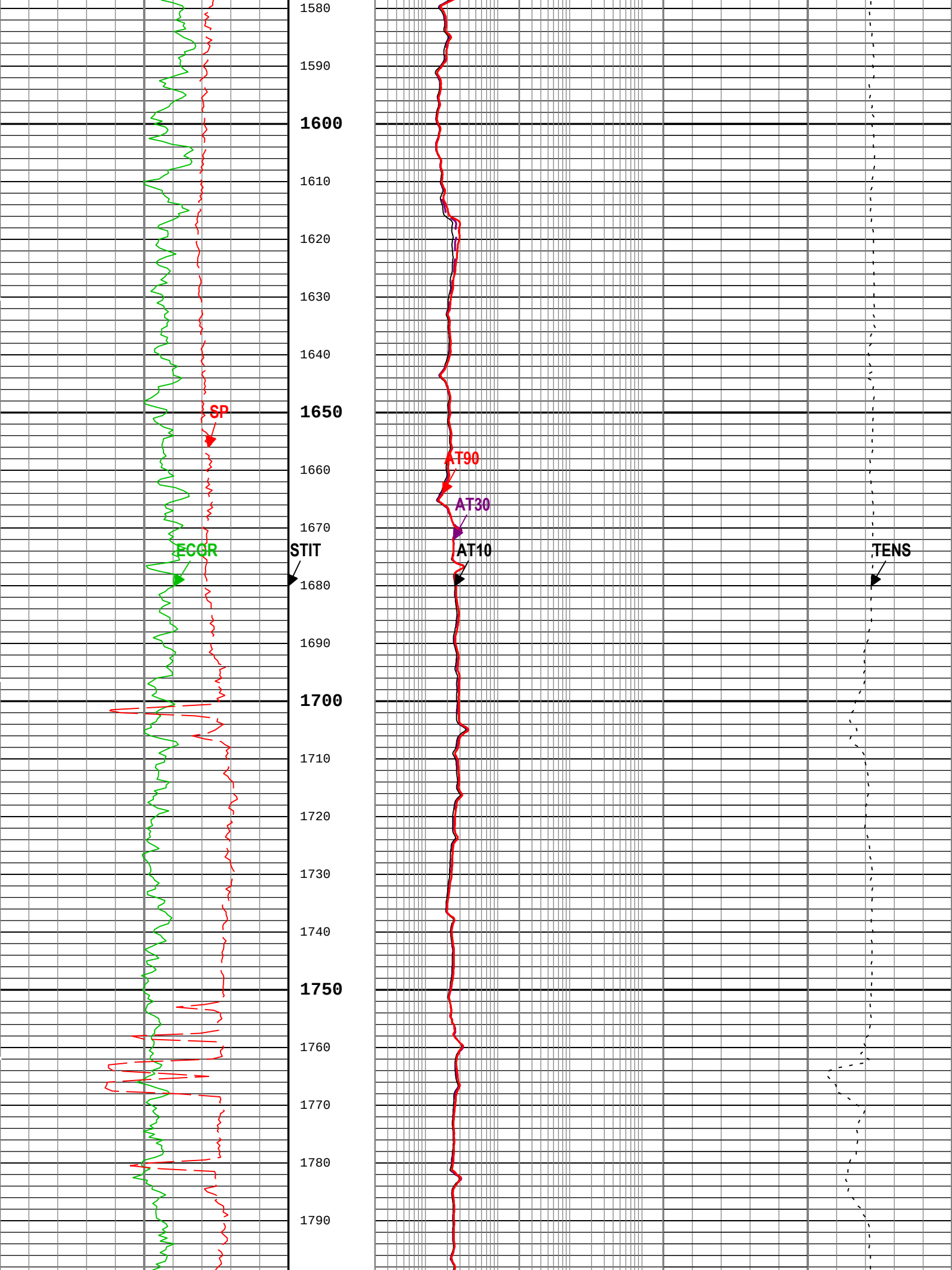

480
490
500
510
520
530
540
550
560
570
580
590
600
610
620
630
640
650
660
670
680
690
SP
AT90

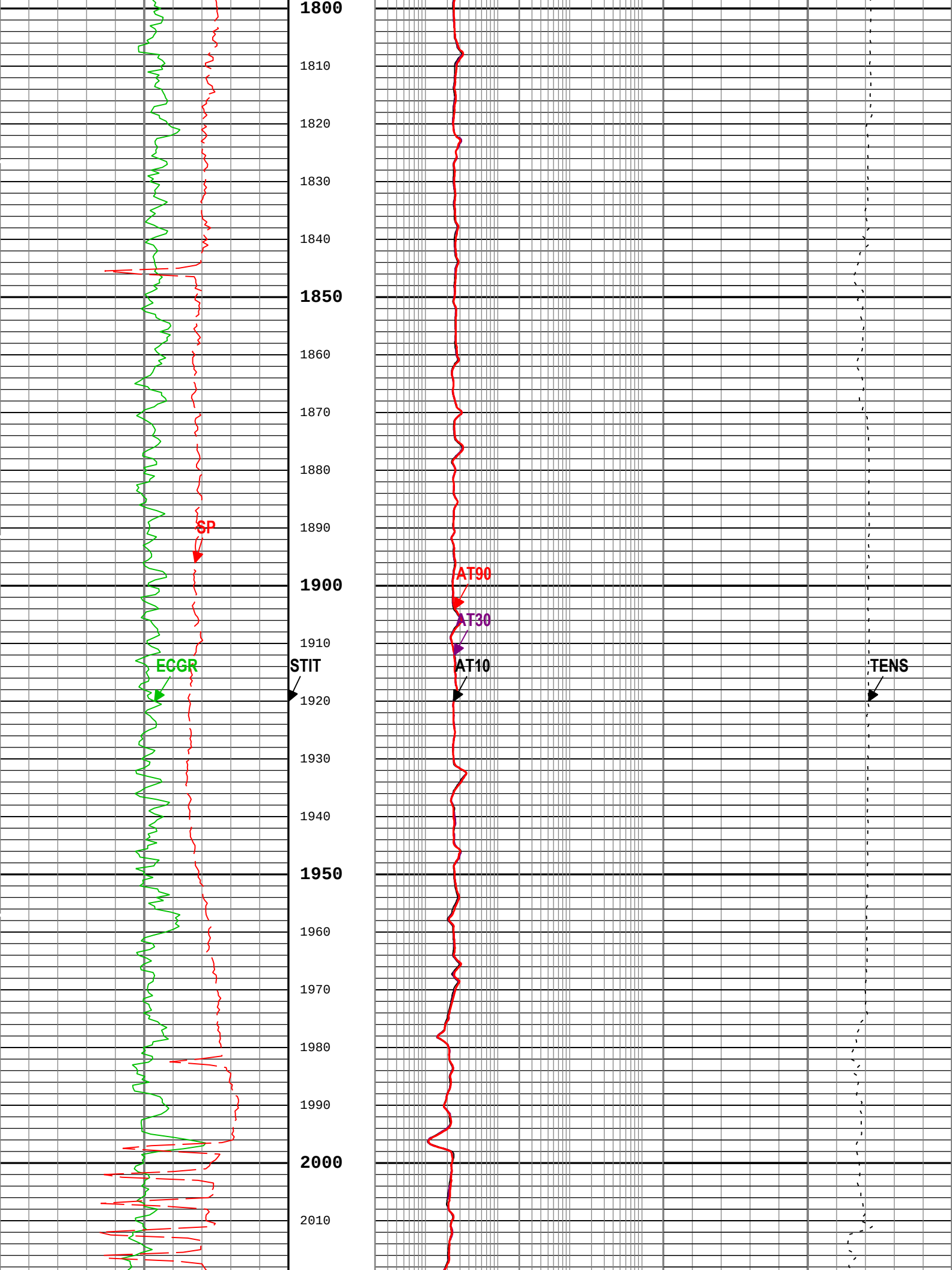

ECGR
STIT
AT30
AT10
TENS
700
710
720
730
740
750
760
770
780
790
800
810
820
830
840
850
860
870
880
890
900
910

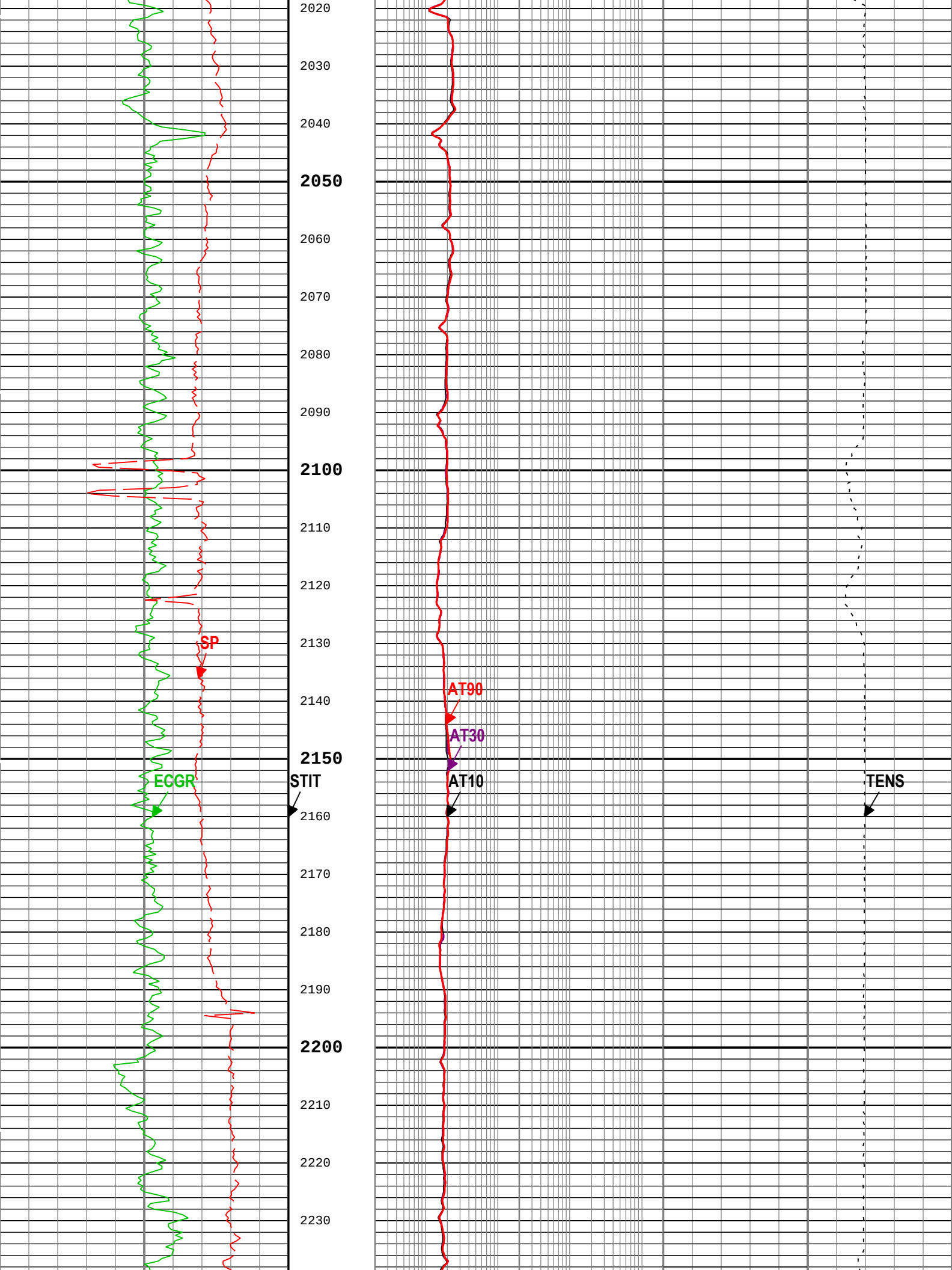

SP
ECGR
STIT
AT90
AT30
AT10
TENS
920
930
940
950
960
970
980
990
1000
1010
1020
1030
1040
1050
1060
1070
1080
1090
1100
1110
1120
1130

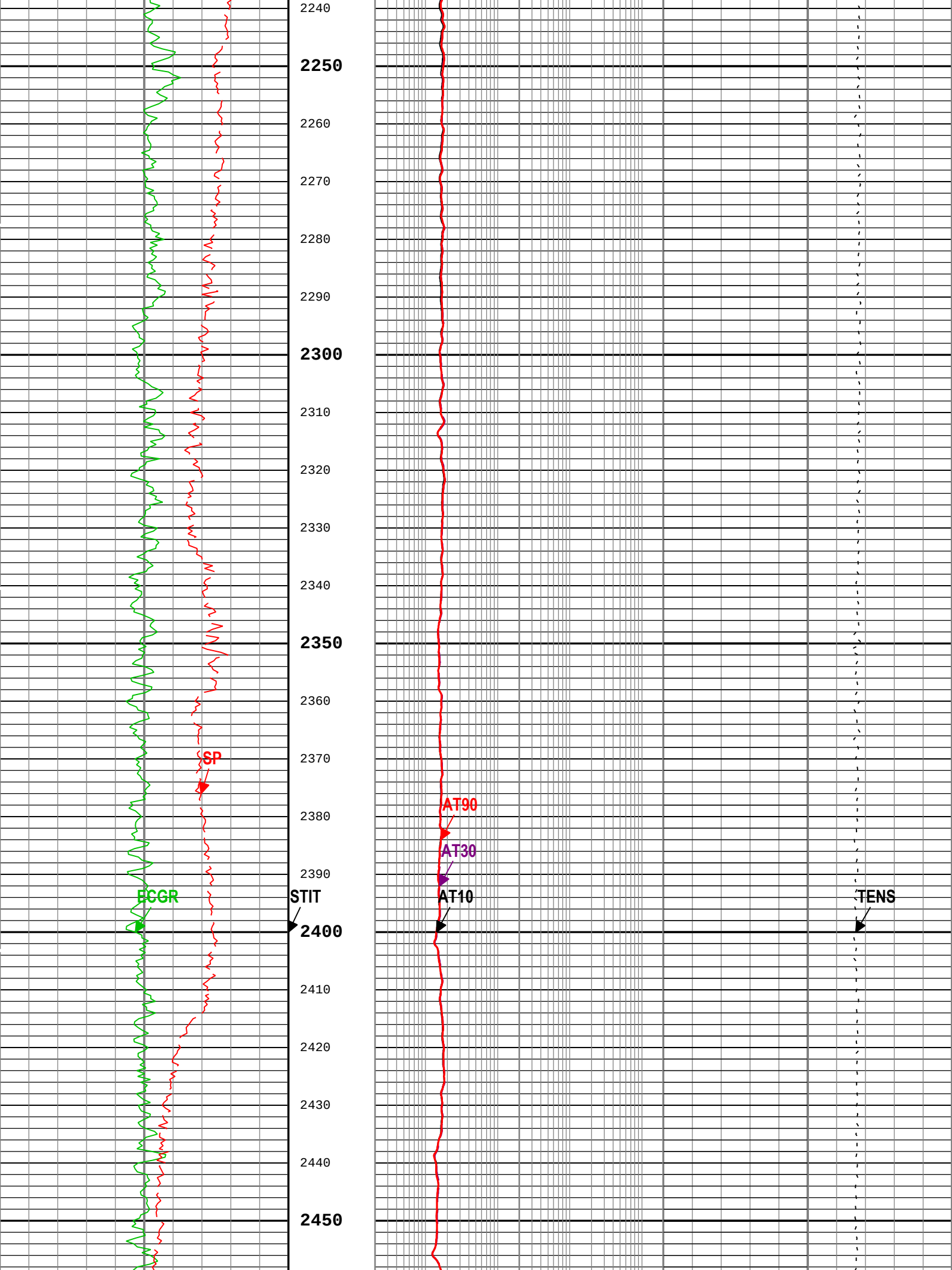

1140
1150
1160
1170
1180
1190
1200
1210
1220
1230
1240
1250
1260
1270
1280
1290
1300
1310
1320
1330
1340
1350
SP
ECGR
AT90
AT30
AT10
STIT
TENS

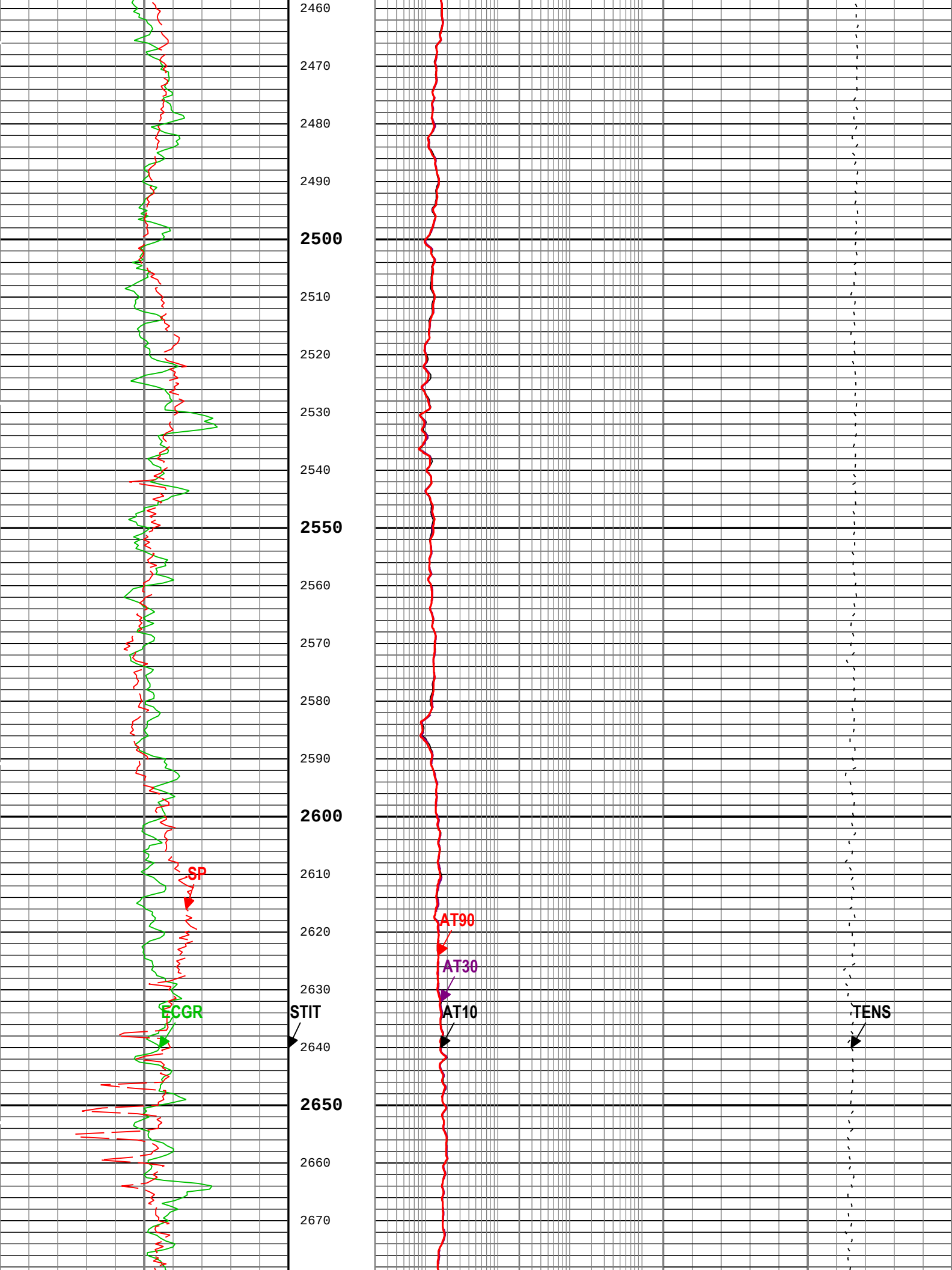

1360
1370
1380
1390
1400
1410
1420
1430
1440
1450
1460
1470
1480
1490
1500
1510
1520
1530
1540
1550
1560
1570
SP
ECGR
STIT
AT90
AT30
AT10
TENS

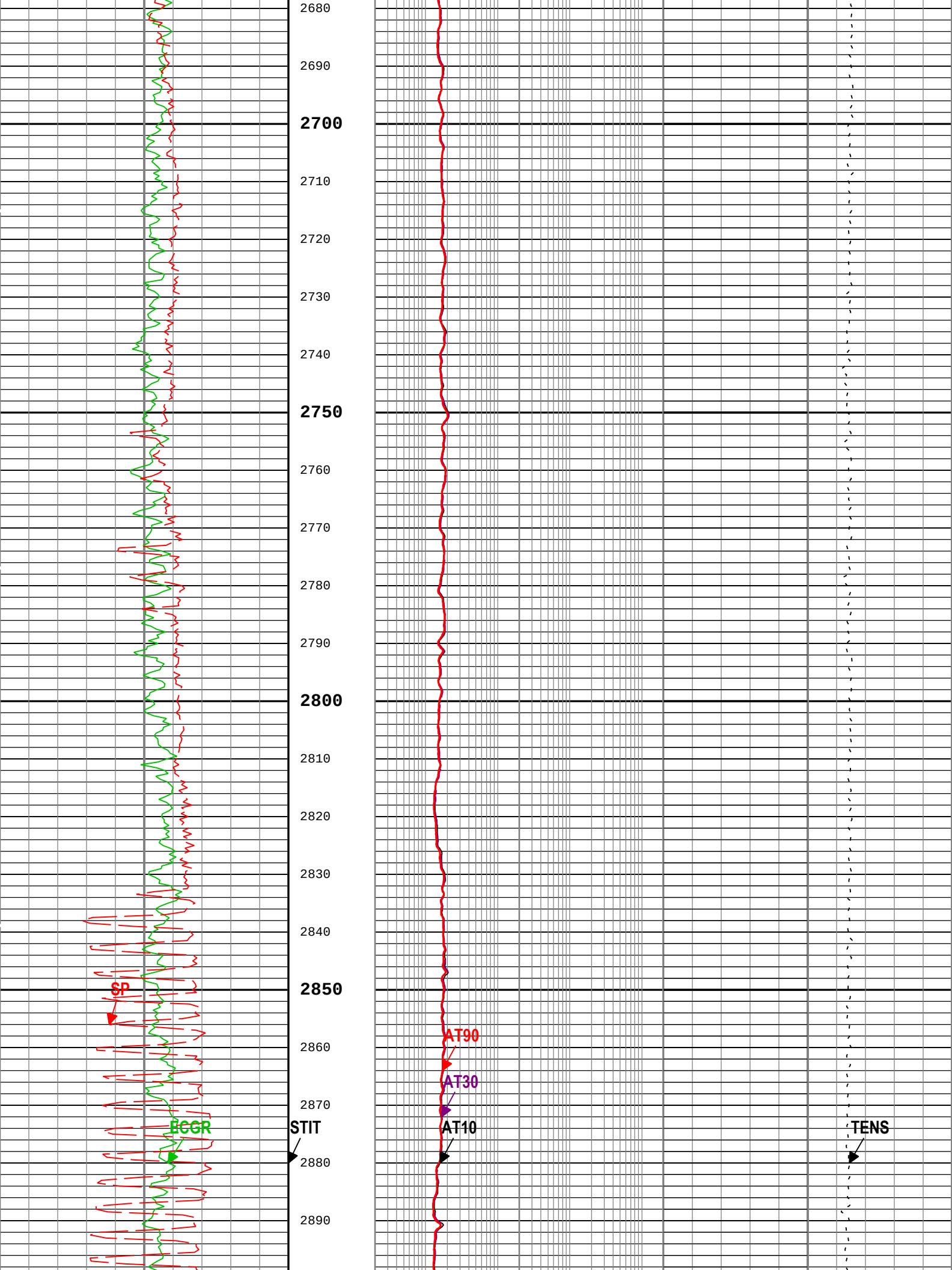

1580
1590
1600
1610
1620
1630
1640
1650
1660
1670
1680
1690
1700
1710
1720
1730
1740
1750
1760
1770
1780
1790
SP
ECGR
STIT
AT90
AT30
AT10
TENS

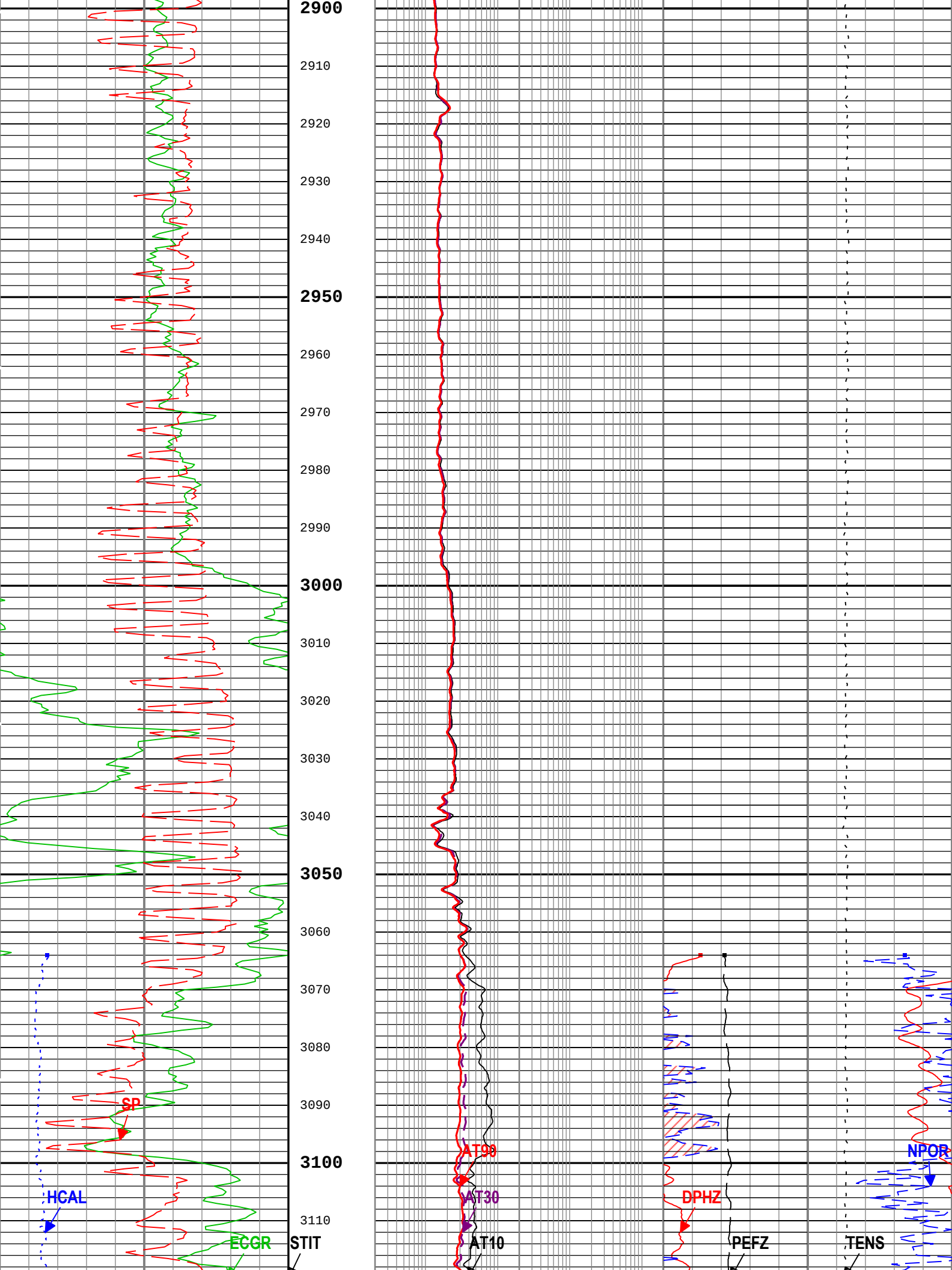

1800
1810
1820
1830
1840
1850
1860
1870
1880
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
SP
ECGR
STIT
AT90
AT30
AT10
TENS

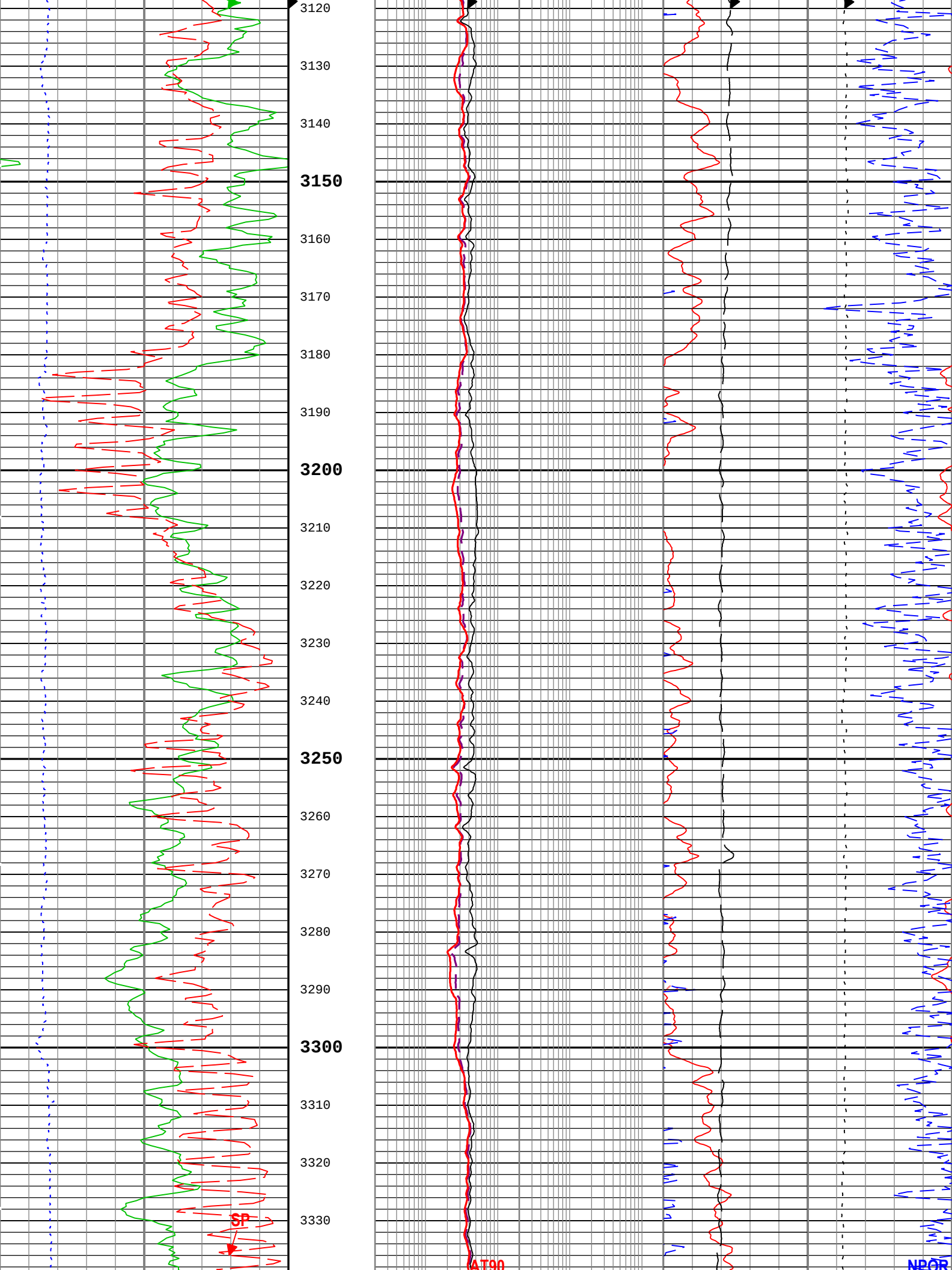

2020
2030
2040
2050
2060
2070
2080
2090
2100
2110
2120
2130
2140
2150
2160
2170
2180
2190
2200
2210
2220
2230
SP
AT90
AT30
AT10
ECGR
STIT
TENS

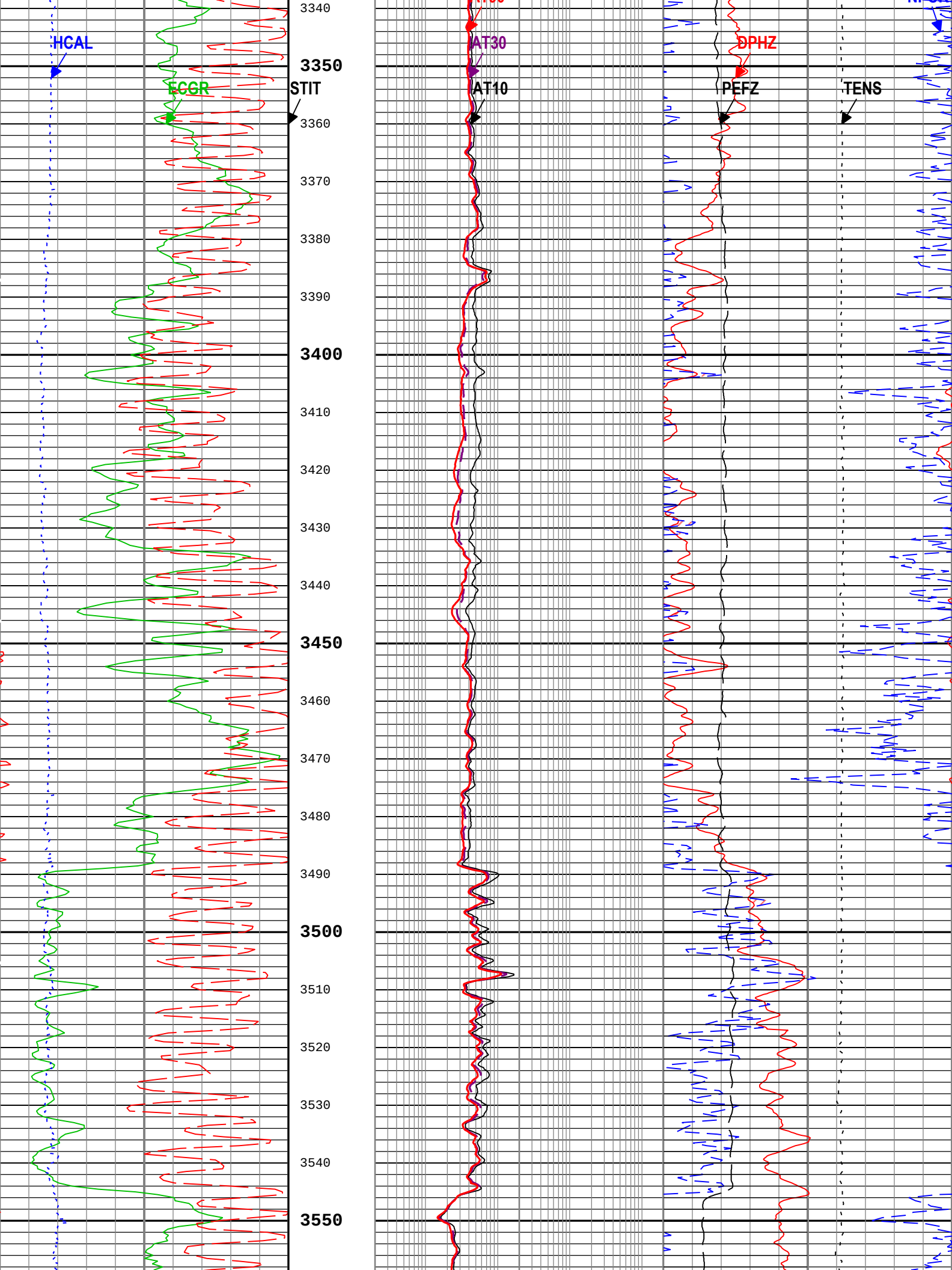

2240
2250
2260
2270
2280
2290
2300
2310
2320
2330
2340
2350
2360
2370
2380
2390
2400
2410
2420
2430
2440
2450
SP
AT90
AT30
AT10
ECGR
STIT
TENS

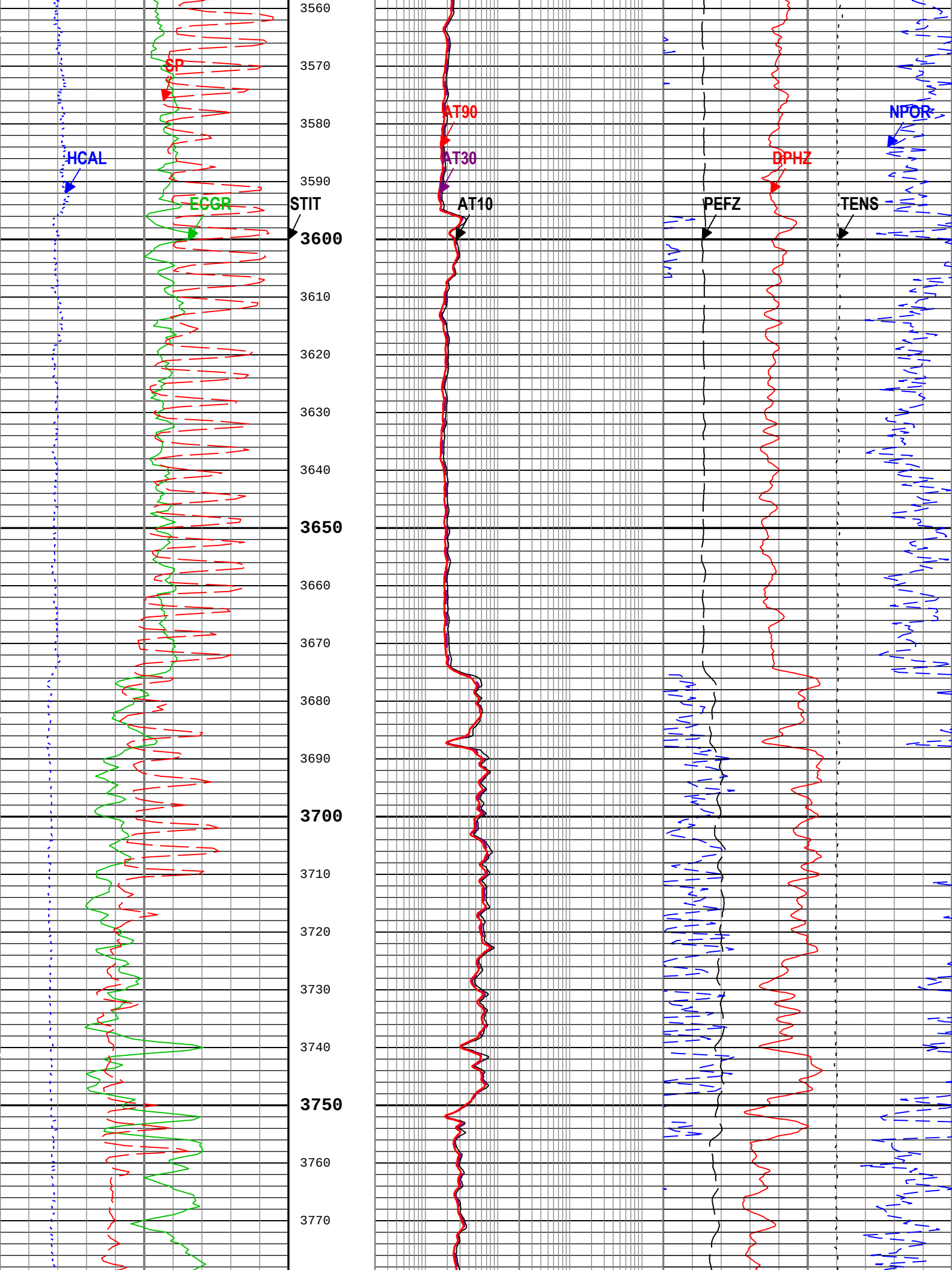

2460
2470
2480
2490
2500
2510
2520
2530
2540
2550
2560
2570
2580
2590
2600
2610
2620
2630
2640
2650
2660
2670
SP
ECGR
STIT
AT90
AT30
AT10
TENS

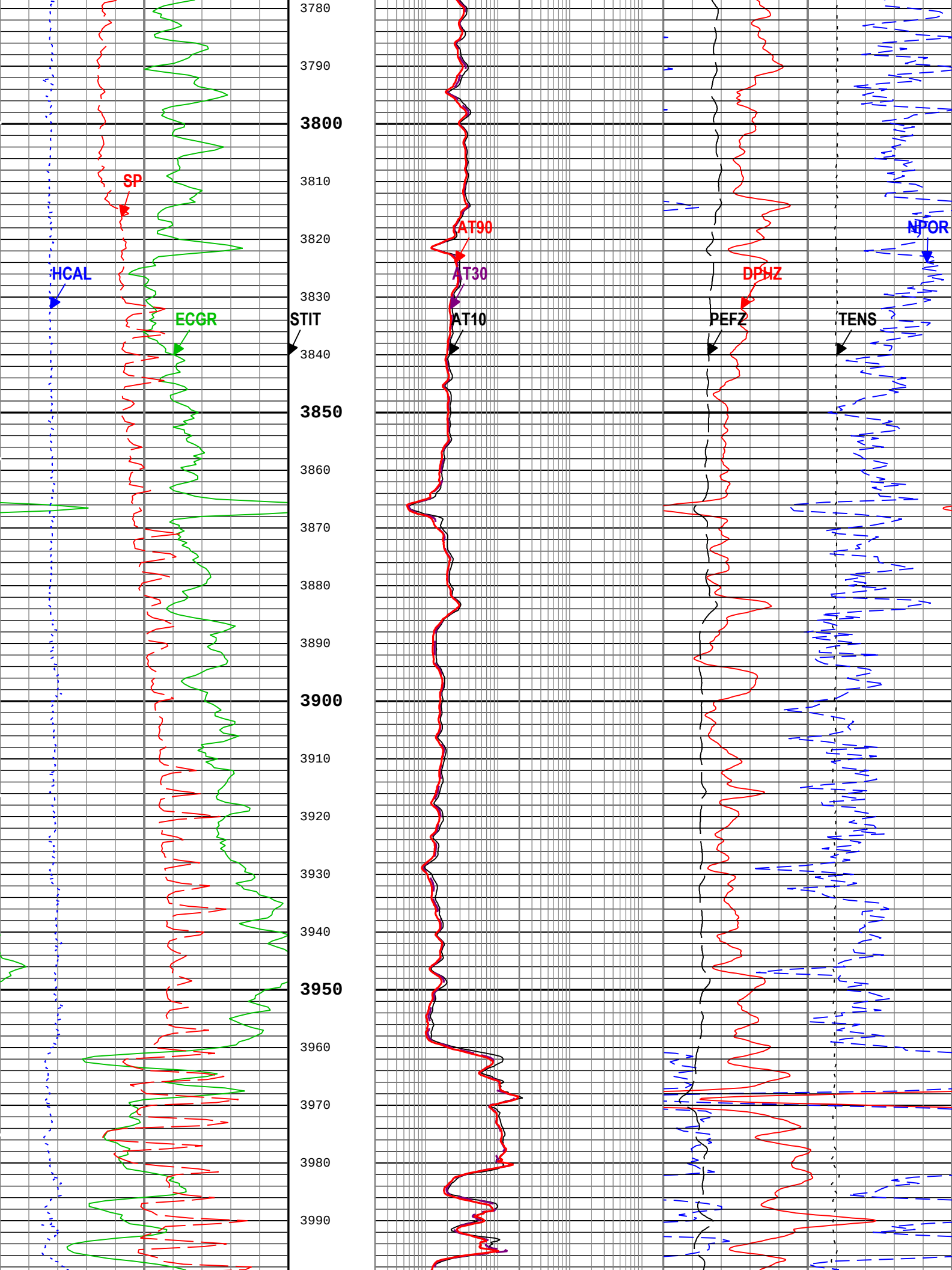

2680
2690
2700
2710
2720
2730
2740
2750
2760
2770
2780
2790
2800
2810
2820
2830
2840
2850
2860
2870
2880
2890
SP
ECGR
STIT
AT90
AT30
AT10
TENS

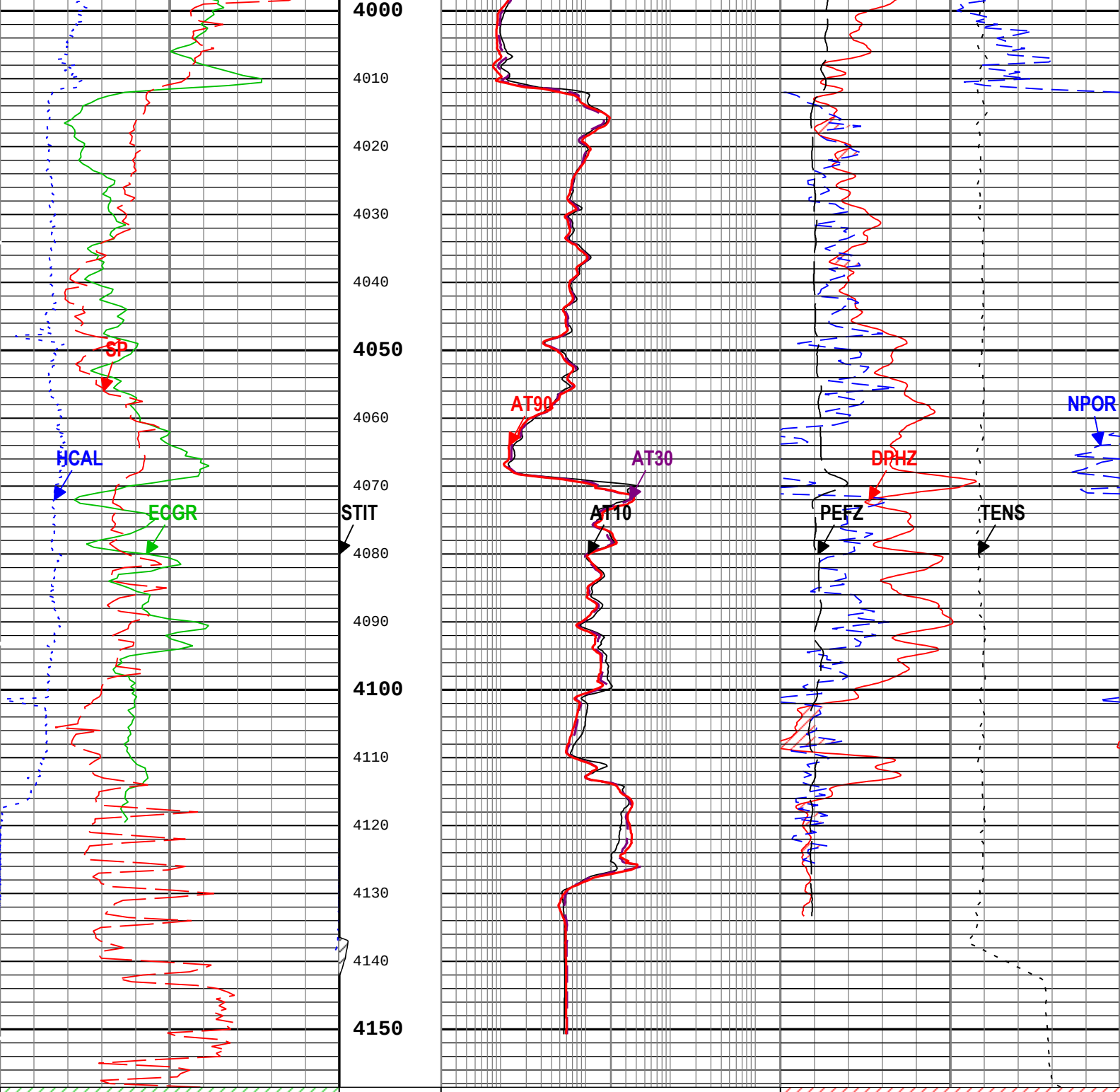

2900
2910
2920
2930
2940
2950
2960
2970
2980
2990
3000
3010
3020
3030
3040
3050
3060
3070
3080
3090
3100
3110
SP
HCAL
ECGR
STIT
AT90
AT30
AT10
DPHZ
PEFZ
NPOR
TENS


3120
3130
3140
3150
3160
3170
3180
3190
3200
3210
3220
3230
3240
3250
3260
3270
3280
3290
3300
3310
3320
3330
SP
AT90
NPOR


HCAL
ECGR
STIT
AT30
AT10
DPHZ
PEFZ
TENS
3340
3350
3360
3370
3380
3390
3400
3410
3420
3430
3440
3450
3460
3470
3480
3490
3500
3510
3520
3530
3540
3550


HCAL
SP
ECGR
STIT
AT90
AT30
AT10
PEFZ
DPHZ
NPOR
TENS
3560
3570
3580
3590
3600
3610
3620
3630
3640
3650
3660
3670
3680
3690
3700
3710
3720
3730
3740
3750
3760
3770


3780
3790
3800
3810
3820
3830
3840
3850
3860
3870
3880
3890
3900
3910
3920
3930
3940
3950
3960
3970
3980
3990
SP
HCAL
ECGR
STIT
AT90
AT30
AT10
DPHZ
PEFZ
NPOR
TENS



Gamma Ray Back up

Gamma Ray (ECGR) HGNS-H

0 gAPI 200

Caliper (HCAL) HDRS-H

6 in 16

Spontaneous Potential (SP) AIT-M

-100 mV 100

Stuck Tool Indicator, Total (STIT)

0 ft 50

Array Induction Two Foot Resistivity A10 (AT10) AIT-M

0.2 ohm.m 2000

Array Induction Two Foot Resistivity A30 (AT30) AIT-M

0.2 ohm.m 2000

Array Induction Two Foot Resistivity A90 (AT90) AIT-M

0.2 ohm.m 2000

Gas Effect

NPOR Backup

Cable Tension (TENS)

5000 lbf 0

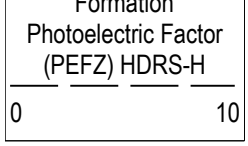
Standard Resolution Density Porosity (DPHZ) HDRS-H

0.3 ft3/ft3 -0.1

Enhanced Thermal Neutron Porosity in Selected Lithology (NPOR) HGNS-H

0.3 m3/m3 -0.1

Standard Resolution



TIME_1900 - Time Marked every 60.00 (s)

Description: HGNS standard resolution porosities for Platform Express Format: Log (TripleCombo-5) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 10-Nov-2017 01:54:00

Channel Processing Parameters

ONE: Parameters

Parameter	Description	Tool	Value	Unit
ABHM	Array Induction Borehole Correction Mode	AIT-M	Compute Standoff	
ASTA	Array Induction Tool Standoff	AIT-M	0.6	in
ISSBAR	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BHT	Bottom Hole Temperature	Borehole	128	degF
BS	Bit Size	WLSESSION	Depth Zoned	in
BSAL	Borehole Salinity	Borehole	0	ppm
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0	in
CBLO	Casing Bottom (Logger)	WLSESSION	430.5	ft
CDEN	Cement Density	HGNS-H	2	g/cm3
DC_MODE	Depth Correction Mode	DepthCorrection	Real-time	
DFD	Drilling Fluid Density	Borehole	9.2	lbm/gal
DFT_CATEGORY	Drilling Fluid Type	Borehole	Water	
DFT_WATER	Drilling Fluid Water Type	Borehole	WBM	
DHC	Density Hole Correction	HDRS-H	Bit Size	
FD	Fluid Density	Borehole	1	g/cm3
FSAL	Formation Salinity	Borehole	0	ppm
GCSE_DOWN_PASS	Generalized Caliper Selection for WL Log Down Passes	Borehole	BS(RT)	
GCSE_UP_PASS	Generalized Caliper Selection for WL Log Up Passes	Borehole	CALI	
GRSE	Generalized Mud Resistivity Selection, from Measured or Computed Mud Resistivity	Borehole	AMF	
GTSE	Generalized Temperature Selection, from Measured or Computed Temperature	Borehole	CTEM	
HSCO	Hole Size Correction Option	HGNS-H	Yes	
MATR	Rock Matrix for Neutron Porosity Corrections	Borehole	Depth Zoned	
MDEN	Matrix Density for Density Porosity	Borehole	Depth Zoned	g/cm3
MFST	Mud Filtrate Sample Temperature	Borehole	62.3	degF
NPRM	HRDD Nuclear Processing Mode	HDRS-H	Standard Resolution	
PTCO	Pressure Temperature Correction Option	HGNS-H	Yes	
RMFS	Resistivity of Mud Filtrate Sample	Borehole	2.69	ohm.m
SOCO	Standoff Correction Option	HGNS-H	Yes	
SPDR	SP Drift Per Foot	AIT-M	0	mV/ft
TD	Total Measured Depth	Borehole	4138	ft

Depth Zone Parameters

Parameter	Value	Start (ft)	Stop (ft)
BS	12.25	190.5	428
BS	7.875	428	4138
MATR	LIMESTONE	190.5	3517
MATR	SANDSTONE	3517	4158.5
MDEN	2.71	190.5	3517
MDEN	2.65	3517	4158.5

All depth are actual.

Tool Control Parameters

ONE: Parameters

Parameter	Description	Tool	Value	Unit
HMCA_BOARD_TYPE	HMCA Board Type	HGNS-H	1	
HRGD_BOARD_TYPE	HRGD Board Type	HDRS-H	WITH_HET	
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	3600	ft/h
NPUC	Nuclear Pile-Up Correction	HDRS-H	On	

ONE

5" Triple Combo

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
ONE	Log[2]:Up	Up	3672.98 ft	4154.56 ft	09-Nov-2017 11:56:03 PM	10-Nov-2017 12:04:27 AM	ON	1.22 ft	Yes
ONE	Log[3]:Up	Up	228.99 ft	4158.68 ft	10-Nov-2017 12:07:51 AM	10-Nov-2017 1:20:17 AM	ON	1.18 ft	Yes

All depths are referenced to toolstring zero

Log

Company:St. Croix Operating, Inc. Well:Scout-Niebur #1

ONE: Log[3]:Up:S012

Description: HGNS standard resolution porosities for Platform Express Format: Log (TripleCombo-5 RA) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 10-Nov-2017 01:54:04

TIME_1900 - Time Marked every 60.00 (s)

Main To Repeat

Repeat To Main

Caliper (HCAL) HDRS-H

6 in 16

Main To Repeat

Repeat To Main

Spontaneous Potential (SP) AIT-M

-80 mV 20

Main To Repeat

Repeat To Main

Gamma Ray (ECGR) HGNS-H

0 gAPI 200

Main To Repeat

Repeat To Main

Stuck Tool Indicator, Total (STIT)

0 ft 50

Main To Repeat

Repeat To Main

Array Induction Two Foot Resistivity A90 (AT90) AIT-M

0.2 ohm.m 2000

Main To Repeat

Repeat To Main

Array Induction Two Foot Resistivity A30 (AT30) AIT-M

0.2 ohm.m 2000

Main To Repeat

Repeat To Main

Array Induction Two Foot Resistivity A10 (AT10) AIT-M

0.2 ohm.m 2000

Main To Repeat

Repeat To Main

Standard Resolution Formation Photoelectric Factor (PEFZ) HDRS-H

0 10

Main To Repeat

Repeat To Main

Cable Tension (TENS)

5000 lbf 0

Main To Repeat

Repeat To Main

Standard Resolution Density Porosity (DPHZ) HDRS-H

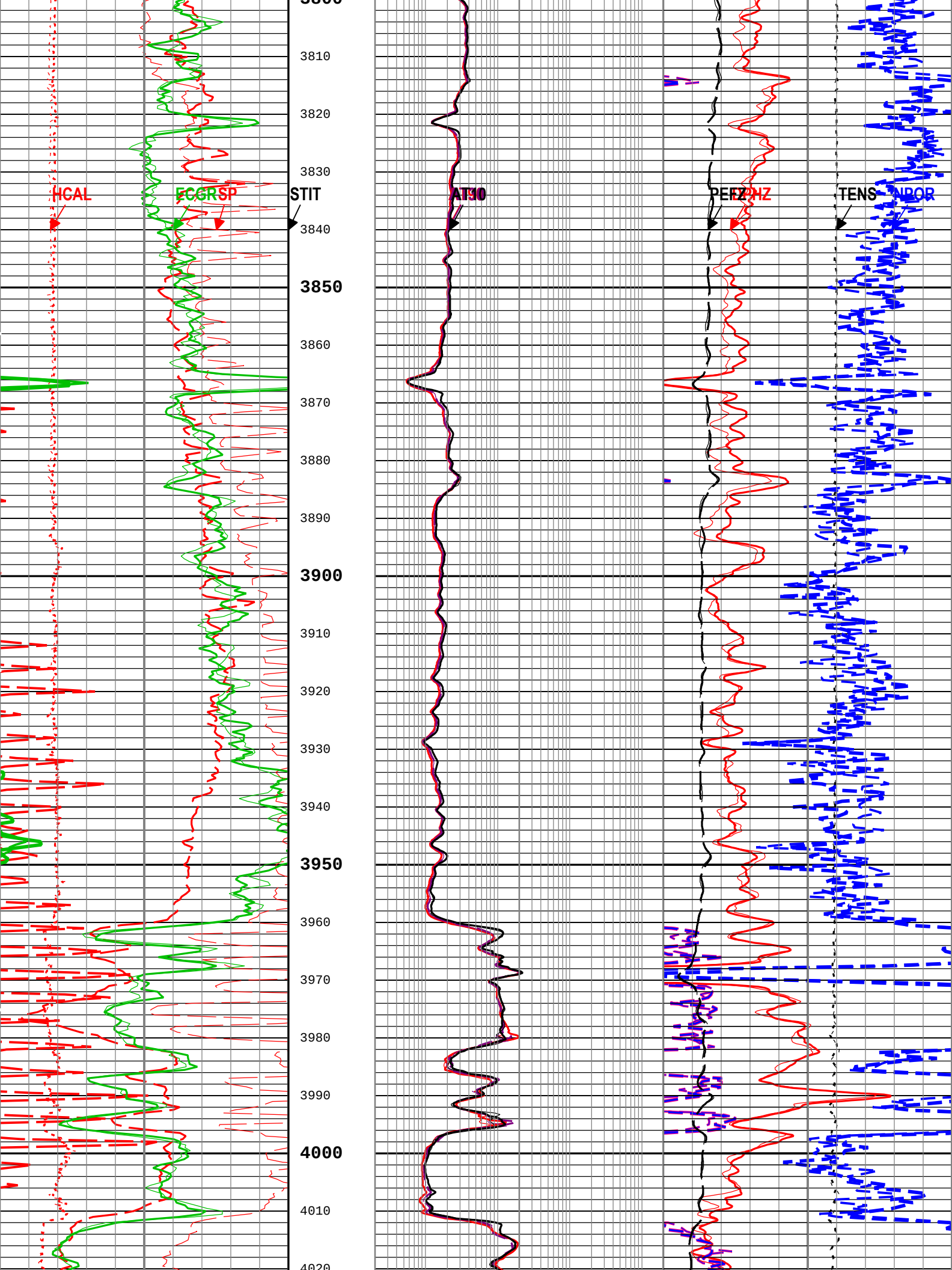
0.3 ft3/ft3 -0.1

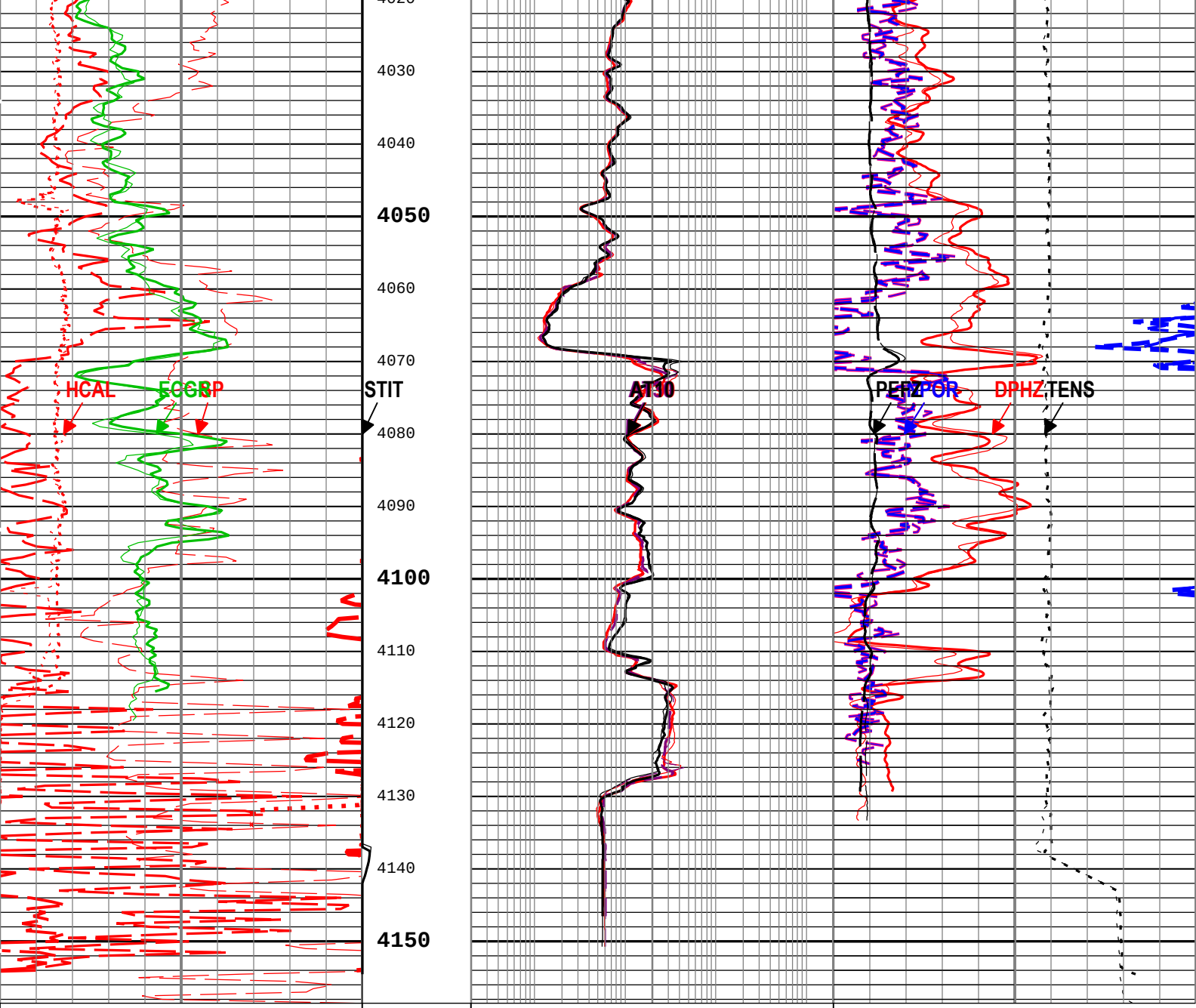
Main To Repeat

Repeat To Main

Enhanced Thermal Neutron Porosity in Selected Lithology (NPOR) HGNS-H

0.3 m3/m3 -0.1


HCAL
ECGRSP
STIT
AT10
PEFZ
PHZ
TENS
NPOR
3810
3820
3830
3840
3850
3860
3870
3880
3890
3900
3910
3920
3930
3940
3950
3960
3970
3980
3990
4000
4010
4020



Main To Repeat

Repeat To Main

Caliper (HCAL) HDRS-H

6 in 16

Main To Repeat

Repeat To Main

Spontaneous Potential (SP) AIT-M

-80 mV 20

Main To Repeat

Repeat To Main

Gamma Ray (ECGR) HGNS-H

0 gAPI 200

Main To Repeat

Repeat To Main

Stuck Tool Indicator, Total (STIT)

0 ft 50

Main To Repeat

Repeat To Main

Array Induction Two Foot Resistivity A90 (AT90) AIT-M

0.2 ohm.m 2000

Main To Repeat

Repeat To Main

Array Induction Two Foot Resistivity A30 (AT30) AIT-M

0.2 ohm.m 2000

Main To Repeat

Repeat To Main

Array Induction Two Foot Resistivity A10 (AT10) AIT-M

0.2 ohm.m 2000

Main To Repeat

Repeat To Main

Cable Tension (TENS)

5000 lbf 0

Main To Repeat

Repeat To Main

Standard Resolution Density Porosity (DPHZ) HDRS-H

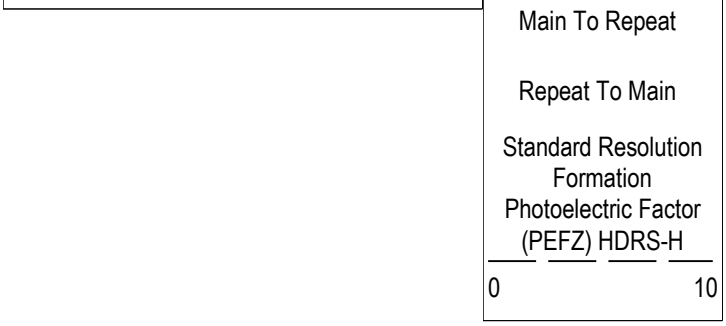
0.3 ft3/ft3 -0.1

Main To Repeat

Repeat To Main

Enhanced Thermal Neutron Porosity in Selected Lithology (NPOR) HGNS-H

0.3 m3/m3 -0.1



TIME_1900 - Time Marked every 60.00 (s)

Description: HGNS standard resolution porosities for Platform Express Format: Log (TripleCombo-5 RA) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 10-Nov-2017 01:54:04

Channel Processing Parameters

ONE: Parameters

Parameter	Description	Tool	Value	Unit
ABHM	Array Induction Borehole Correction Mode	AIT-M	Compute Standoff	
ASTA	Array Induction Tool Standoff	AIT-M	0.6	in
ISSBAR	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BHT	Bottom Hole Temperature	Borehole	128	degF
BS	Bit Size	WLSESSION	7.875	in
BSAL	Borehole Salinity	Borehole	0	ppm
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0	in
CBLO	Casing Bottom (Logger)	WLSESSION	430.5	ft
CDEN	Cement Density	HGNS-H	2	g/cm3
DC_MODE	Depth Correction Mode	DepthCorrection	Real-time	
DFD	Drilling Fluid Density	Borehole	9.2	lbm/gal
DFT_CATEGORY	Drilling Fluid Type	Borehole	Water	
DFT_WATER	Drilling Fluid Water Type	Borehole	WBM	
DHC	Density Hole Correction	HDRS-H	Bit Size	
FD	Fluid Density	Borehole	1	g/cm3
FSAL	Formation Salinity	Borehole	0	ppm
GCSE_DOWN_PASS	Generalized Caliper Selection for WL Log Down Passes	Borehole	BS(RT)	
GCSE_UP_PASS	Generalized Caliper Selection for WL Log Up Passes	Borehole	CALI	
GRSE	Generalized Mud Resistivity Selection, from Measured or Computed Mud Resistivity	Borehole	AMF	
GTSE	Generalized Temperature Selection, from Measured or Computed Temperature	Borehole	CTEM	
HSCO	Hole Size Correction Option	HGNS-H	Yes	
MATR	Rock Matrix for Neutron Porosity Corrections	Borehole	SANDSTONE	
MDEN	Matrix Density for Density Porosity	Borehole	2.65	g/cm3
MFST	Mud Filtrate Sample Temperature	Borehole	62.3	degF
NPRM	HRDD Nuclear Processing Mode	HDRS-H	Standard Resolution	
PTCO	Pressure Temperature Correction Option	HGNS-H	Yes	
RMFS	Resistivity of Mud Filtrate Sample	Borehole	2.69	ohm.m
SOCO	Standoff Correction Option	HGNS-H	Yes	
SPDR	SP Drift Per Foot	AIT-M	0	mV/ft
TD	Total Measured Depth	Borehole	4138	ft

Tool Control Parameters

ONE: Parameters

Parameter	Description	Tool	Value	Unit
HMCA_BOARD_TYPE	HMCA Board Type	HGNS-H	1	

HRGD_BOARD_TYPE	HRGD Board Type	HDRS-H	WITH_HET	
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	3600	ft/h
NPUC	Nuclear Pile-Up Correction	HDRS-H	On	

Calibration Report

AIT-M (Array Induction Tool - M) Calibration - Run ONE

Primary Equipment :

File code for AIT-MA Sonde Tool Element — AMIS — 275

Auxiliary Equipment :

AITM Rm/SP Bottom Nose — AMRM

AIT Sonde Calibration - Test Loop Gain

Master (EEPROM): 06:41:40 07-Sep-2017

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Test Loop Gain - 0		Master	1.000	0.950	1.014	1.050
Test Loop Phase - 0	deg	Master	0	-3.000	0.423	3.000
Test Loop Gain - 1		Master	1.000	0.950	1.023	1.050
Test Loop Phase - 1	deg	Master	0	-3.000	0.888	3.000
Test Loop Gain - 2		Master	1.000	0.950	1.017	1.050
Test Loop Phase - 2	deg	Master	0	-3.000	0.077	3.000
Test Loop Gain - 3		Master	1.000	0.950	1.012	1.050
Test Loop Phase - 3	deg	Master	0	-3.000	0.036	3.000
Test Loop Gain - 4		Master	1.000	0.950	0.993	1.050
Test Loop Phase - 4	deg	Master	0	-3.000	0.100	3.000
Test Loop Gain - 5		Master	1.000	0.950	0.993	1.050
Test Loop Phase - 5	deg	Master	0	-3.000	-0.116	3.000
Test Loop Gain - 6		Master	1.000	0.950	0.999	1.050
Test Loop Phase - 6	deg	Master	0	-3.000	0.210	3.000
Test Loop Gain - 7		Master	1.000	0.950	1.014	1.050
Test Loop Phase - 7	deg	Master	0	-3.000	-0.081	3.000

AIT Sonde Calibration - Sonde Error Correction

Master (EEPROM): 06:41:40 07-Sep-2017

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Sonde Error Correction Real - 0	mS/m	Master	-----	-231.000	-72.157	119.000
Sonde Error Correction Quad - 0		Master	-----	-2250.000	-537.739	2250.000
Sonde Error Correction Real - 1	mS/m	Master	-----	114.000	164.065	204.000
Sonde Error Correction Quad - 1		Master	-----	-625.000	-295.651	625.000
Sonde Error Correction Real - 2	mS/m	Master	-----	66.000	106.901	156.000
Sonde Error Correction Quad - 2		Master	-----	-350.000	-250.386	350.000
Sonde Error Correction Real - 3	mS/m	Master	-----	39.000	59.111	89.000
Sonde Error Correction Quad - 3		Master	-----	-250.000	-75.780	250.000
Sonde Error Correction Real - 4	mS/m	Master	-----	15.000	27.178	35.000
Sonde Error Correction Quad - 4		Master	-----	-63.000	-24.831	63.000
Sonde Error Correction Real - 5	mS/m	Master	-----	4.000	14.029	24.000
Sonde Error Correction Quad - 5		Master	-----	-50.000	-1.925	50.000
Sonde Error Correction Real - 6	mS/m	Master	-----	5.000	9.644	15.000
Sonde Error Correction Quad - 6		Master	-----	-30.000	-9.030	30.000
Sonde Error Correction Real - 7	mS/m	Master	-----	-5.000	-1.673	5.000
Sonde Error Correction Quad - 7		Master	-----	-30.000	8.568	30.000

AIT Mud Calibration - Mud Calibration Gain

Master (EEPROM): 06:41:40 07-Sep-2017

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Coarse Gain		Master	1.000	0.800	1.141	1.200
Fine Gain		Master	1.000	0.800	1.196	1.200

AIT Electronics Check - Thru Calibration Check

Master (EEPROM): 06:41:40 07-Sep-2017

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Thru Cal Mag - 0	V	Master	-----	0.366	0.617	0.854

Thru Cal Phase - 0	deg	Master	-----	137.000	-170.840	-103.000
Thru Cal Mag - 1	V	Master	-----	0.762	1.264	1.778
Thru Cal Phase - 1	deg	Master	-----	136.000	-171.920	-104.000
Thru Cal Mag - 2	V	Master	-----	0.372	0.627	0.868
Thru Cal Phase - 2	deg	Master	-----	132.000	-175.503	-108.000
Thru Cal Mag - 3	V	Master	-----	0.420	0.708	0.980
Thru Cal Phase - 3	deg	Master	-----	131.000	-176.260	-109.000
Thru Cal Mag - 4	V	Master	-----	0.804	1.325	1.876
Thru Cal Phase - 4	deg	Master	-----	125.000	177.560	-115.000
Thru Cal Mag - 5	V	Master	-----	1.176	1.928	2.744
Thru Cal Phase - 5	deg	Master	-----	122.000	175.930	-118.000
Thru Cal Mag - 6	V	Master	-----	1.176	1.927	2.744
Thru Cal Phase - 6	deg	Master	-----	121.000	175.944	-119.000
Thru Cal Mag - 7	V	Master	-----	0.846	1.388	1.974
Thru Cal Phase - 7	deg	Master	-----	115.000	175.253	-125.000
SPA Zero	mV	Master		-50.000	-0.169	50.000
SPA Plus	mV	Master		941.000	986.195	1040.000
Temperature Zero	V	Master		-0.050	0.000	0.050
Temperature Plus	V	Master		0.870	0.913	0.960

HDRS-H (HILT Density and Rxo Sonde, 150 degC) Calibration - Run ONE

Primary Equipment :

HILT High-Resolution Control Cartridge, 150 degC	HRCC-H	4823
HILT Resistivity Gamma-Ray Density Device, 150 degC	HRGD-H	3983

Auxiliary Equipment :

HRDD Backscatter Detector	Backscatter	
HRDD Long Spacing Detector	Long Spacing	
HRDD Short Spacing Detector	Short Spacing	
Cesium 137 Gamma-Ray Logging Source	GSR-J	5471
HILT High-Resolution Control Cartridge, 150 degC	HRCC-H	4823
HILT High-Resolution Mechanical Sonde, 150 degC	HRMS-H	4715

Calibration Parameter :

Small Ring Size

Large Ring Size

HDRS Density Calibration - Inversion Results

Master (EEPROM): 13:00:48 22-Oct-2017

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Rho Aluminum	g/cm3	Master	2.596	2.586	2.596	2.606
Rho Magnesium	g/cm3	Master	1.686	1.676	1.688	1.696
Pe Aluminum		Master	2.570	2.470	2.562	2.670
Pe Magnesium		Master	2.650	2.550	2.622	2.750

HDRS Density Calibration - Deviation Summary

Master (EEPROM): 13:00:48 22-Oct-2017

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS Average Deviation	%	Master	0	-0.6000	0.3904	0.6000
BS Max Deviation	%	Master	0	-1.6000	0.8286	1.6000
SS Average Deviation	%	Master	0	-1.0000	0.3968	1.0000
SS Max Deviation	%	Master	0	-2.5000	0.9875	2.5000
LS Average Deviation	%	Master	0	-1.5000	0.7003	1.5000
LS Max Deviation	%	Master	0	-3.5000	1.5015	3.5000

HDRS Density Calibration - Background Summary

Master (EEPROM): 13:00:48 22-Oct-2017

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS Window Ratio		Master	1.0000		0.7395	
BS Window Sum	1/s	Master	1		21830	

SS Window Ratio		Master	1.0000		0.4801		
SS Window Sum	1/s	Master	1		9649		
LS Window Ratio		Master	1.0000		0.2986		
LS Window Sum	1/s	Master	1		1169		

HDRS Density Calibration - Photo-multiplier High Voltages

Master (EEPROM): 13:00:48 22-Oct-2017

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS PM High Voltage	V	Master		1000	1340	2400
SS PM High Voltage	V	Master		1000	1413	2400
LS PM High Voltage	V	Master		1000	1544	2400

HDRS Density Calibration - Crystal Quality Resolutions

Master (EEPROM): 13:00:48 22-Oct-2017

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS Crystal Resolution	%	Master		5.00	10.38	25.00
SS Crystal Resolution	%	Master		5.00	10.04	20.00
LS Crystal Resolution	%	Master		5.00	9.13	20.00

Company: St. Croix Operating, Inc.

Schlumberger

Well: Scout-Niebur #1

Field: Wildcat

County: Washington

State: Colorado

Platform Express

Triple Combo