Schlumberger

Company: Noble Energy Inc

Well: Romero PC G10-79HN

Field: Wattenberg

County: Weld State: Colorado

Platform Express

AIT-PPC-GR

County: Weld
Field: Wattenberg
Location: SWNW, Sec. 3, T4N, R65W
Well: Romero PC G10-79HN
Company: Noble Energy Inc

Location:			
SWNW, Sec. 3, T4N, R65W SHL: 2235' FNL x 273' FWL	Elev.:	K.B.	4700.00 ft
		G.L.	4670.00 ft
		D.F.	4699.00 ft

Permanent Datum:	Ground Level	Elev.:	4670.00 f
Log Measured From:	Kelly Bushing	30.00 ft	above Perm.Datum
Drilling Measured From:	Kelly Bushing		

API Serial No.	Section:	Township:	Range:
05-123-34018-0000	3	4N	65W

Logging Date			23-Mar-2014			
Run Number			Run 1			
Depth Driller			6115.00 ft			
Schlumberger Depth			6123.00 ft			
Bottom Log Interval			6123.00 ft			
Top Log Interval			729.00 ft			
Casing Driller Size @ Depth			9.625 in @ 729.00 ft			
Casing Schlumberger			729 ft			
Bit Size			8.75 in			
Type Fluid In Hole			WBM LSND			
MUD	Density	Viscosity	9 lbm/gal	38 s		
	Fluid Loss	PH		9.6		
	Source of Sample		Active Tank			
RM @ Meas Temp			0.71 ohm.m @ 79.98 degF			
RMF @ Meas Temp			0.53 ohm.m @ 79.98 degF			
RMC @ Meas Temp			0.89 ohm.m @ 79.98 degF			
Source RMF	RMC		Calculated	Calculated		
RM @ BHT	RMF @ BHT		0.33 @ 180	0.25 @ 180		
Max Recorded Temperatures						
Circulation Stopped	Time		22-Mar-2014	18:25:00		
Logger on Bottom	Time		23-Mar-2014	02:50:00		
Unit Number	Location:		3022	Ft. Morgan, CO		
Recorded By			Aleksei Bekhterev/ Heather Hoffman			
Witnessed By			John Drahota			

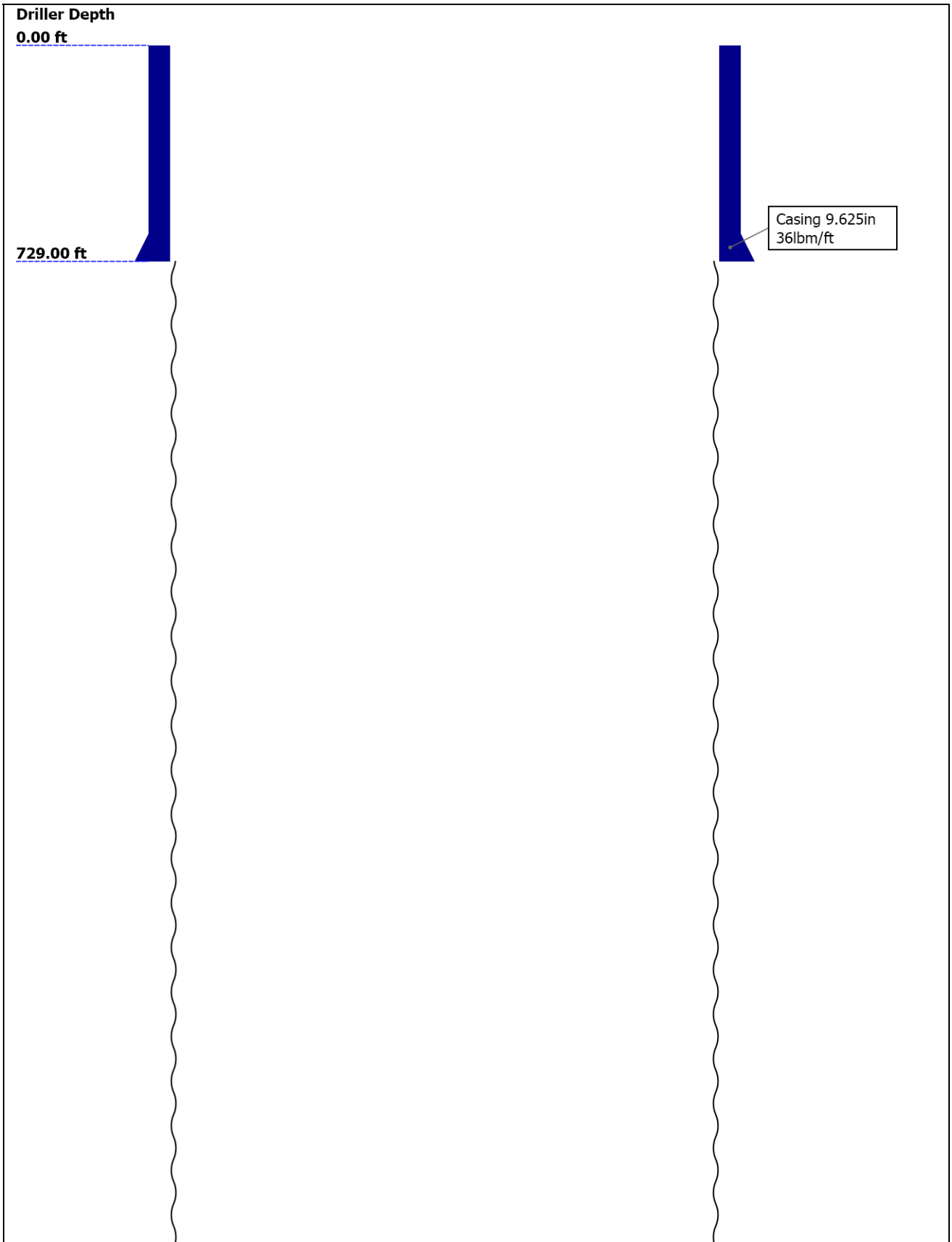
Disclaimer

THE USE OF AND RELIANCE UPON THIS RECORDED-DATA BY THE HEREIN NAMED COMPANY (AND ANY OF ITS AFFILIATES, PARTNERS, REPRESENTATIVES, AGENTS, CONSULTANTS AND EMPLOYEES) IS SUBJECT TO THE TERMS AND CONDITIONS AGREED UPON BETWEEN SCHLUMBERGER AND THE COMPANY, INCLUDING: (a) RESTRICTIONS ON USE OF THE RECORDED-DATA; (b) DISCLAIMERS AND WAIVERS OF WARRANTIES AND REPRESENTATIONS REGARDING COMPANY'S USE AND RELIANCE UPON THE RECORDED-DATA; AND (c) CUSTOMER'S FULL AND SOLE RESPONSIBILITY FOR ANY INFERENCE DRAWN OR DECISION MADE IN CONNECTION WITH THE USE OF THIS RECORDED-DATA.

Contents

11. Calibration Report
12. Tail

Well Sketch



Borehole Size/Casing/Tubing Record

Bit						
Bit Size (in)	8.75					
Top Driller (ft)	729					
Top Logger (ft)	729					
Bottom Driller (ft)	6115					
Bottom Logger (ft)	6123					
Casing						
Size (in)	9.625					
Weight (lbm/ft)	36					
Inner Diameter (in)	8.921					
Grade	N/A					
Top Driller (ft)	0					
Top Logger (ft)	0					
Bottom Driller (ft)	729					
Bottom Logger (ft)	729					

Remarks and Equipment Summary

Run 1: Toolstring

Equip name	Length	MP name	Offset
LEH-QT	**39.84**		
LEH-QT			
DTC-H	**36.92**		
ECH-KC		**CTEM**	**36.03**
DTC-H		**HV**	**0.00**
		ToolStatus	**33.92**
		TelStatus	**33.92**
PPC-B:8352	**33.92**		
PPC-B:8352			
		PPC-B Calipers	**32.78**

Run 1: Remarks

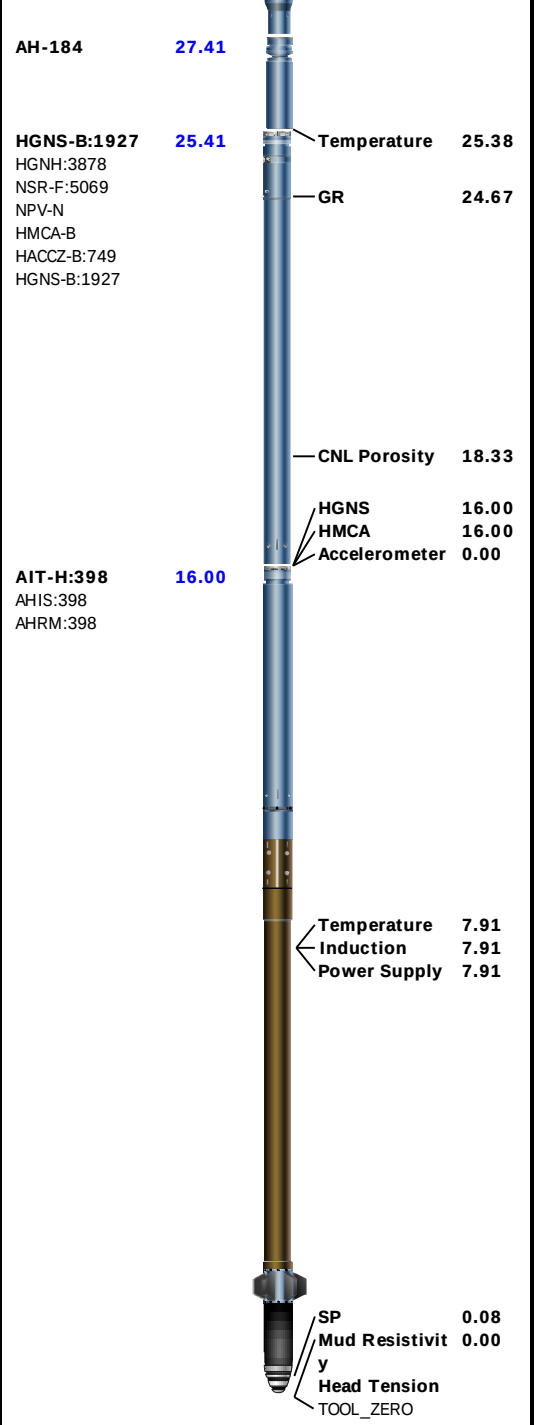
This is the first run in hole

Toolstring run as per toolsketch

Survey data provided by client

Rig: H&P326

Crew: Jay Musgrave



Lengths are in ft
Maximum Outer Diameter = 5.000 in
Line: Sensor Location, Value: Gating Offset
All measurements are relative to TOOL_ZERO

Depth Summary

	Run 1		
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	7-39P-LXS		
Serial Number			
Length	24000.00 ft		
Conveyance Type	Wireline		
Rig Type			

Run 1:Depth Control Parameters

Log Sequence	First Log In the Well
Rig Up Length At Surface	
Rig Up Length At Bottom	
Rig Up Length Correction	
Stretch Correction	
Tool Zero Check At Surface	

Depth Control Remarks

All Sclumberger depth control procedures followed

IDW used as primary depth reference

Z-chart used as secondary depth reference

Survey Record

Survey Calculation

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

Rig Location

Latitude :	0° 0' 0" N	Longitude :	0° 0' 0" E

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

9 : Manual

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
2	223.00	1.00	57.41	223.00	222.99	1.05	1.05	1.64	1.94	57.41	0.45	Other	9	0	0
3	410.00	0.40	177.81	187.00	409.98	1.27	1.27	3.04	3.28	67.25	0.67	Other	9	0	0
4	663.00	1.20	317.01	253.00	662.96	2.33	2.33	1.27	2.66	28.53	0.60	Other	9	0	0
5	705.00	0.70	356.70	42.00	704.96	2.91	2.91	0.95	3.05	18.13	1.90	Other	9	0	0
6	794.00	0.80	10.60	89.00	793.95	4.06	4.06	1.04	4.20	14.30	0.23	Other	9	0	0
7	884.00	0.90	7.30	90.00	883.94	5.38	5.38	1.24	5.51	12.98	0.12	Other	9	0	0
8	974.00	0.90	5.70	90.00	973.93	6.78	6.78	1.40	6.92	11.66	0.03	Other	9	0	0
9	1063.00	0.70	21.20	89.00	1062.92	7.99	7.99	1.67	8.17	11.79	0.33	Other	9	0	0
10	1140.00	0.40	115.60	77.00	1139.92	8.31	8.31	2.08	8.56	14.05	1.08	Other	9	0	0
11	1235.00	0.70	141.80	95.00	1234.91	7.71	7.71	2.74	8.17	19.54	0.40	Other	9	0	0
12	1332.00	0.80	145.60	97.00	1331.91	6.69	6.69	3.49	7.55	27.54	0.12	Other	9	0	0
13	1425.00	0.60	140.00	93.00	1424.90	5.78	5.78	4.17	7.12	35.79	0.23	Other	9	0	0
14	1517.00	0.70	127.20	92.00	1516.89	5.07	5.07	4.92	7.05	44.17	0.19	Other	9	0	0
15	1610.00	0.80	133.10	93.00	1609.89	4.28	4.28	5.85	7.25	53.80	0.14	Other	9	0	0
16	1703.00	0.70	137.40	93.00	1702.88	3.42	3.42	6.71	7.51	62.99	0.12	Other	9	0	0
17	1796.00	0.40	115.20	93.00	1795.87	2.86	2.86	7.39	7.91	68.81	0.39	Other	9	0	0
18	1889.00	2.60	321.80	93.00	1888.84	4.38	4.38	6.38	7.74	55.49	3.19	Other	9	0	0
19	1983.00	2.20	314.00	94.00	1982.76	7.31	7.31	3.76	8.23	27.21	0.55	Other	9	0	0
20	2075.00	3.40	316.30	92.00	2074.65	10.51	10.51	0.60	10.53	3.29	1.31	Other	9	0	0
21	2169.00	5.10	308.20	94.00	2168.39	15.11	15.11	-4.61	15.78	343.05	1.91	Other	9	0	0
22	2264.00	6.30	301.50	95.00	2262.92	20.44	20.44	-12.37	23.88	328.83	1.44	Other	9	0	0
23	2358.00	8.20	302.20	94.00	2356.16	26.71	26.71	-22.44	34.88	319.97	2.02	Other	9	0	0

24	2450.00	9.30	300.10	92.00	2447.09	33.94	33.94	-34.42	48.33	314.59	1.24	Other	9	0	0
25	2542.00	10.40	307.50	92.00	2537.74	42.72	42.72	-47.44	63.85	312.00	1.82	Other	9	0	0
26	2631.00	12.00	314.00	89.00	2625.04	54.04	54.04	-60.47	81.10	311.78	2.29	Other	9	0	0
27	2721.00	12.10	313.50	90.00	2713.06	67.03	67.03	-74.05	99.87	312.15	0.16	Other	9	0	0
28	2811.00	12.20	313.00	90.00	2801.04	80.01	80.01	-87.84	118.83	312.33	0.16	Other	9	0	0
29	2900.00	11.80	312.30	89.00	2888.10	92.55	92.55	-101.45	137.34	312.37	0.48	Other	9	0	0
30	2990.00	10.90	311.20	90.00	2976.34	104.35	104.35	-114.66	155.02	312.30	1.03	Other	9	0	0
31	3079.00	11.90	312.80	89.00	3063.58	116.12	116.12	-127.72	172.64	312.28	1.18	Other	9	0	0
32	3169.00	10.90	312.40	90.00	3151.80	128.17	128.17	-140.82	190.42	312.31	1.11	Other	9	0	0
33	3259.00	9.50	312.40	90.00	3240.38	138.91	138.91	-152.59	206.33	312.31	1.56	Other	9	0	0
34	3348.00	9.60	313.00	89.00	3328.15	148.93	148.93	-163.44	221.13	312.34	0.16	Other	9	0	0
35	3438.00	10.30	314.00	90.00	3416.79	159.64	159.64	-174.71	236.65	312.42	0.80	Other	9	0	0
36	3528.00	9.10	310.20	90.00	3505.51	169.82	169.82	-185.94	251.80	312.41	1.51	Other	9	0	0
37	3617.00	9.10	310.70	89.00	3593.39	178.95	178.95	-196.65	265.88	312.30	0.09	Other	9	0	0
38	3707.00	7.80	307.70	90.00	3682.41	187.33	187.33	-206.88	279.10	312.16	1.52	Other	9	0	0
39	3797.00	8.40	314.20	90.00	3771.51	195.65	195.65	-216.42	291.73	312.11	1.22	Other	9	0	0
40	3886.00	9.60	316.30	89.00	3859.41	205.54	205.54	-226.21	305.64	312.26	1.40	Other	9	0	0
41	3976.00	8.60	319.10	90.00	3948.28	216.05	216.05	-235.80	319.82	312.50	1.21	Other	9	0	0
42	4065.00	6.30	316.50	89.00	4036.52	224.63	224.63	-243.52	331.30	312.69	2.61	Other	9	0	0
43	4155.00	5.60	313.30	90.00	4126.04	231.22	231.22	-250.12	340.62	312.75	0.86	Other	9	0	0
44	4245.00	4.60	306.10	90.00	4215.68	236.36	236.36	-256.23	348.59	312.69	1.32	Other	9	0	0
45	4334.00	4.00	308.00	89.00	4304.43	240.37	240.37	-261.56	355.25	312.58	0.69	Other	9	0	0
46	4424.00	3.40	298.40	90.00	4394.24	243.58	243.58	-266.38	360.96	312.44	0.96	Other	9	0	0
47	4514.00	2.60	297.70	90.00	4484.12	245.79	245.79	-270.53	365.52	312.26	0.89	Other	9	0	0
48	4603.00	1.20	281.30	89.00	4573.07	246.91	246.91	-273.24	368.27	312.10	1.67	Other	9	0	0
49	4693.00	0.30	282.60	90.00	4663.06	247.15	247.15	-274.39	369.29	312.01	1.00	Other	9	0	0
50	4782.00	0.70	155.60	89.00	4752.06	246.71	246.71	-274.39	369.00	311.96	1.03	Other	9	0	0
51	4872.00	1.20	178.10	90.00	4842.05	245.26	245.26	-274.13	367.85	311.82	0.68	Other	9	0	0
52	4962.00	1.30	211.40	90.00	4932.03	243.45	243.45	-274.64	366.99	311.56	0.80	Other	9	0	0
53	5052.00	1.50	209.30	90.00	5022.00	241.55	241.55	-275.74	366.57	311.22	0.23	Other	9	0	0
54	5141.00	1.20	213.10	89.00	5110.97	239.76	239.76	-276.82	366.21	310.90	0.35	Other	9	0	0
55	5231.00	0.80	216.10	90.00	5200.96	238.46	238.46	-277.71	366.04	310.65	0.45	Other	9	0	0
56	5321.00	0.70	129.50	90.00	5290.95	237.60	237.60	-277.65	365.45	310.56	1.15	Other	9	0	0
57	5409.00	0.50	120.80	88.00	5378.95	237.06	237.06	-276.91	364.53	310.57	0.25	Other	9	0	0
58	5499.00	0.60	146.50	90.00	5468.95	236.47	236.47	-276.31	363.68	310.56	0.29	Other	9	0	0
59	5589.00	1.20	125.60	90.00	5558.93	235.53	235.53	-275.29	362.30	310.55	0.75	Other	9	0	0
60	5678.00	1.00	148.60	89.00	5647.92	234.32	234.32	-274.12	360.63	310.52	0.54	Other	9	0	0
61	5768.00	1.00	143.00	90.00	5737.90	233.02	233.02	-273.24	359.12	310.46	0.11	Other	9	0	0
62	5857.00	0.90	133.10	89.00	5826.89	231.93	231.93	-272.26	357.64	310.43	0.22	Other	9	0	0
63	5947.00	0.50	143.70	90.00	5916.89	231.13	231.13	-271.51	356.56	310.41	0.47	Other	9	0	0
64	6037.00	0.70	156.20	90.00	6006.88	230.31	230.31	-271.06	355.68	310.35	0.26	Other	9	0	0
65	6126.00	1.10	159.20	89.00	6095.87	229.01	229.01	-270.54	354.46	310.25	0.45	Other	9	0	0
66	6216.00	0.70	147.70	90.00	6185.86	227.74	227.74	-269.94	353.18	310.15	0.49	Other	9	0	0
67	6305.00	0.70	125.10	89.00	6274.85	226.97	226.97	-269.20	352.10	310.13	0.31	Other	9	0	0

Run 1

5" Triple Combo

Integration Summary

Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
ICV	Integrated Cement Volume	GCSE_UP_PASS, FCD	771.76	ft3
IHV	Integrated Hole Volume	GCSE_UP_PASS	2214.42	ft3

Software Version

Acquisition System	Version
MaxWell	4.0.9163.3000
Application Patch	Patch-SP-10767_13393-4.0.9163.3001

Computation	Description	Version
Borehole	Borehole Ensemble provides common Borehole Parameters and Channels	4.0.9213.3000

Tool Elements	Description	Software Version	Firmware Version
PPC-B	PPC-B Element is used for usual logging at wellsite and check/diagnostics.	4.0.9248.3000	1.0
AHIS	Array Induction Sonde - H	4.0.9247.3000	
HGNS-B	HILT Gamma-Ray and Neutron Sonde, 125 degC	4.0.9231.3000	2.0

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
Run 1	Log[3]:Up	Up	171.29 ft	6130.89 ft	23-Mar-2014 4:02:59 AM	23-Mar-2014 5:09:30 AM	ON	0.00 ft	Yes

All depths are referenced to toolstring zero

Log

Company:Noble Energy Inc Well:Romero PC G10-79HN

Run 1: Log[3]:Up:S010

Description: HGNS standard resolution porosities for Platform Express Format: Log (Import of KM 5in Triple Combo) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 23-Mar-2014 06:07:48

Channel	Source	Sampling
AT10	AIT-H:AHIS:AHIS	3in
AT20	AIT-H:AHIS:AHIS	3in
AT30	AIT-H:AHIS:AHIS	3in
AT60	AIT-H:AHIS:AHIS	3in
AT90	AIT-H:AHIS:AHIS	3in
BS	Borehole	6in
EHD1	PPC-B:PPC-B:PPC-B	6in
EHD2	PPC-B:PPC-B:PPC-B	6in
GR	HGNS-B:HGNS-B:HGNS-B	6in
GR_CAL	HGNS-B:HGNS-B:HGNS-B	6in
ICV	Borehole	6in
IHV	Borehole	6in
INCL	WLWorkflow	6in
SP	AIT-H:AHIS:AHIS	6in
TENS	WLWorkflow	6in
TIME_1900	WLWorkflow	0.1in

TIME_1900 - Time Marked every 60.00 (s)

IHV - Integrated Hole Volume every 10.00 (ft3)

ICV - Integrated Cement Volume every 10.00 (ft3)

Array Induction Two Foot Resistivity A20 (AT20) AIT-H

0.2 ohm.m 200

Array Induction Two Foot Resistivity A60 (AT60) AIT-H

0.2 ohm.m 200

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

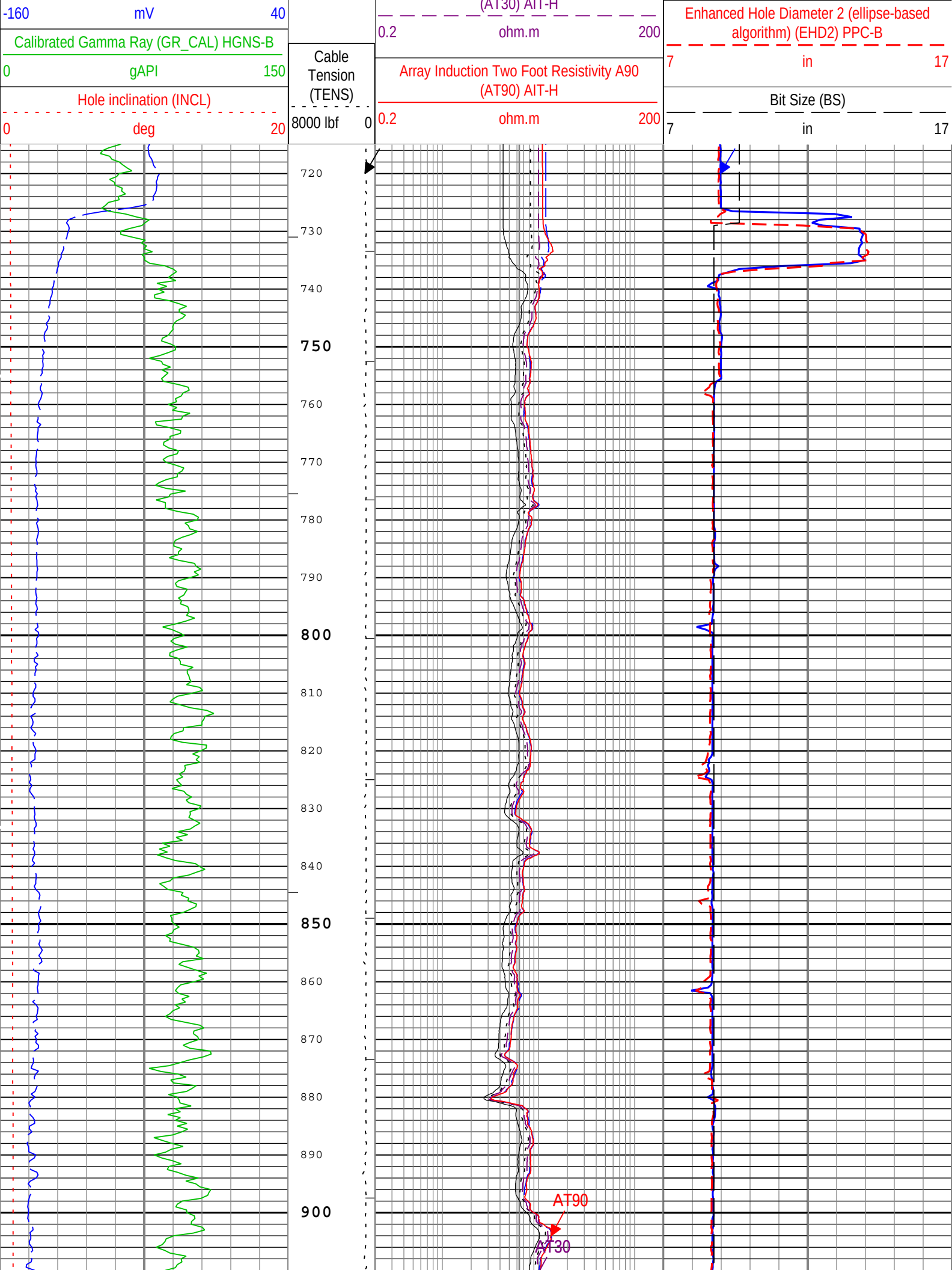
0.2 ohm.m 200

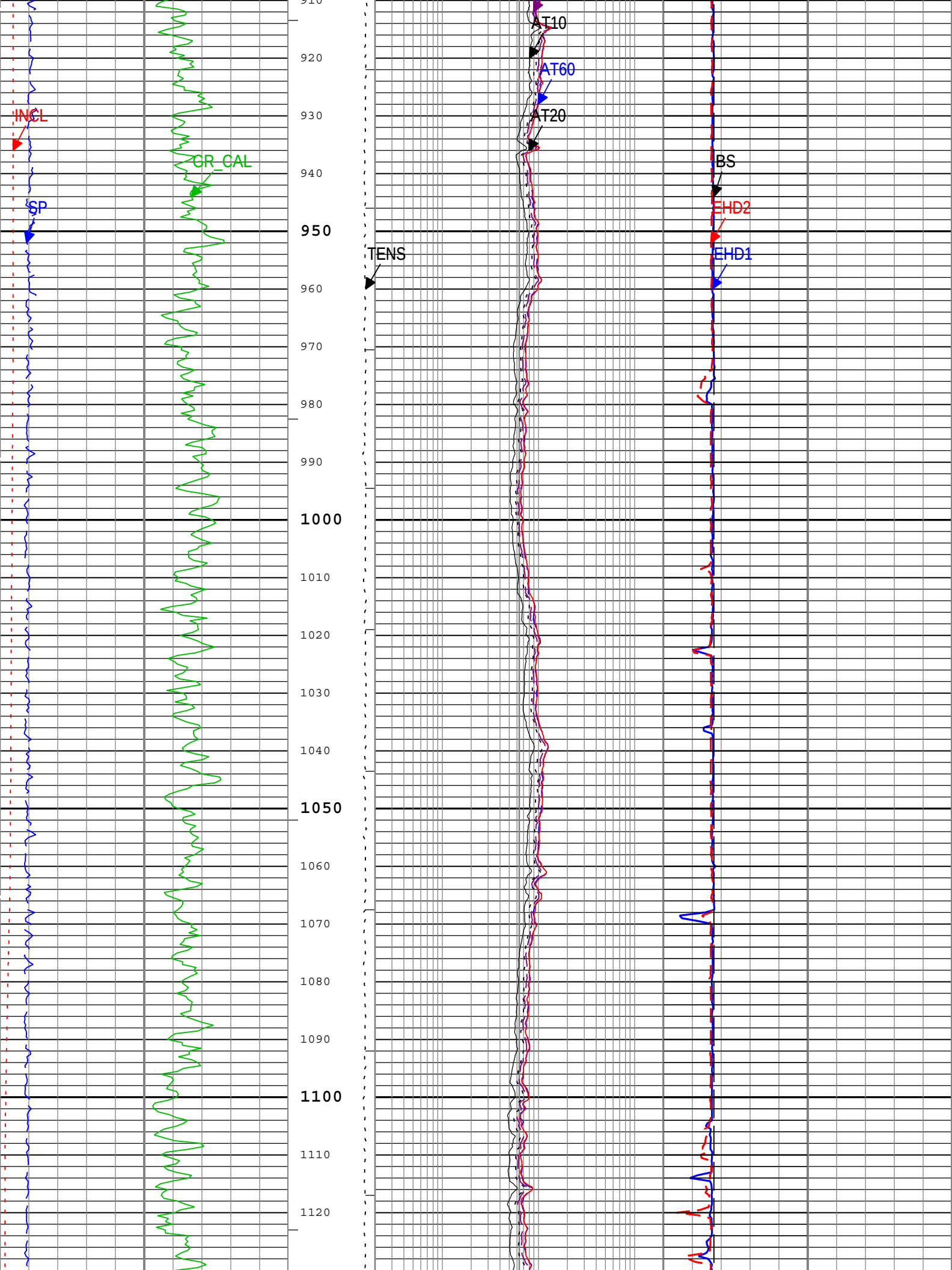
Enhanced Hole Diameter 1 (ellipse-based algorithm) (EHD1) PPC-B

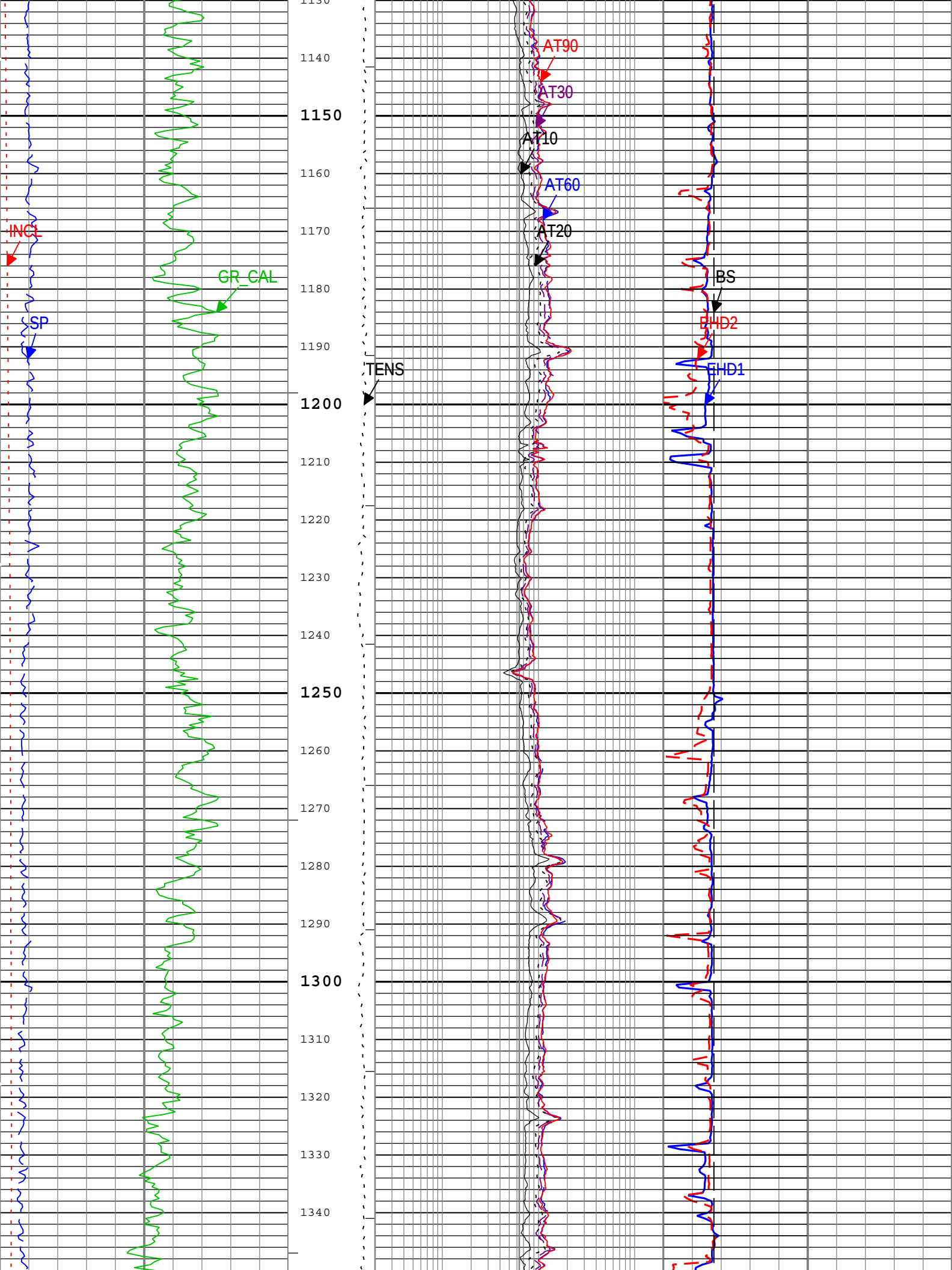
7 in 17

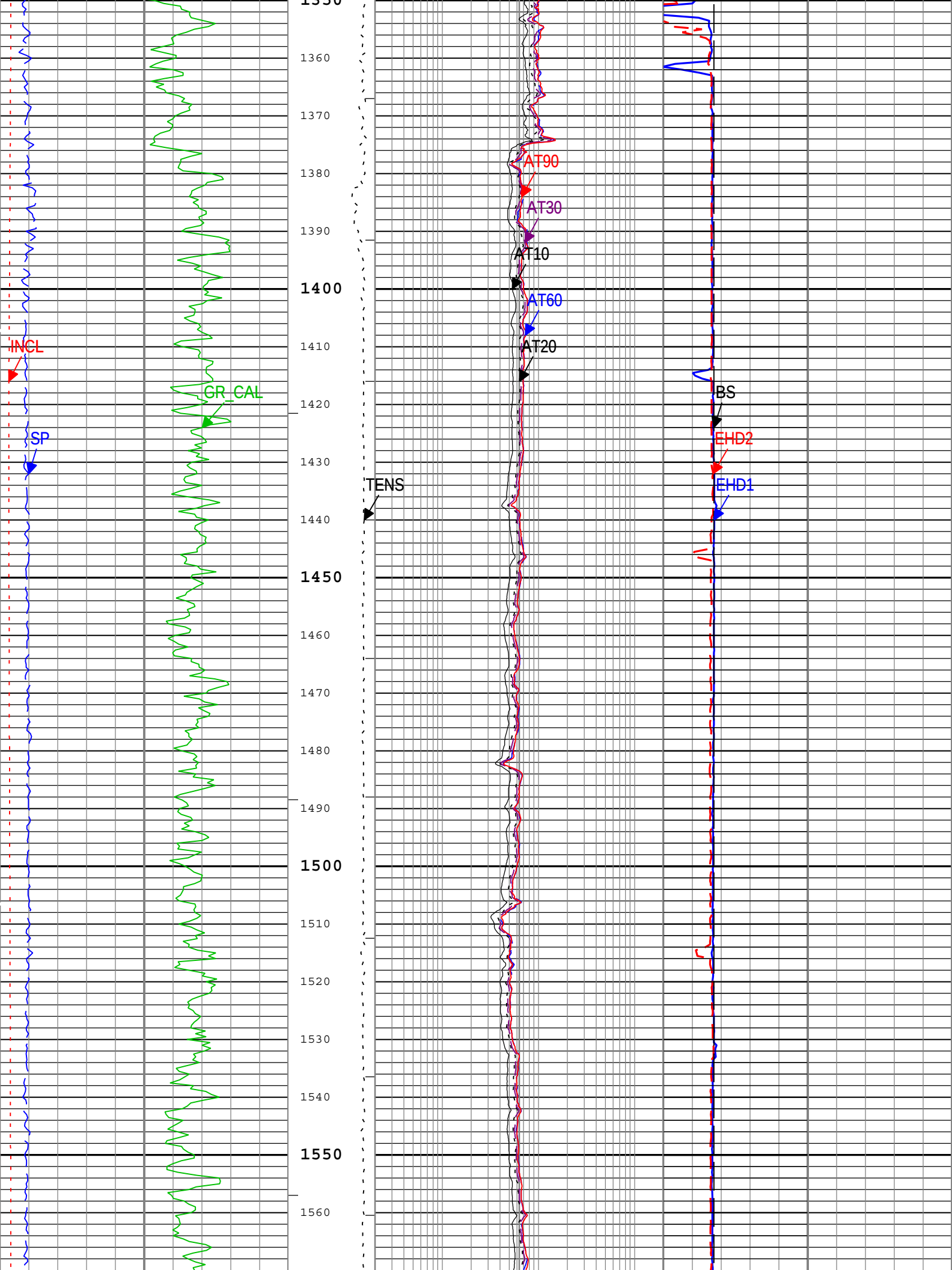
Spontaneous Potential (SP) AIT-H

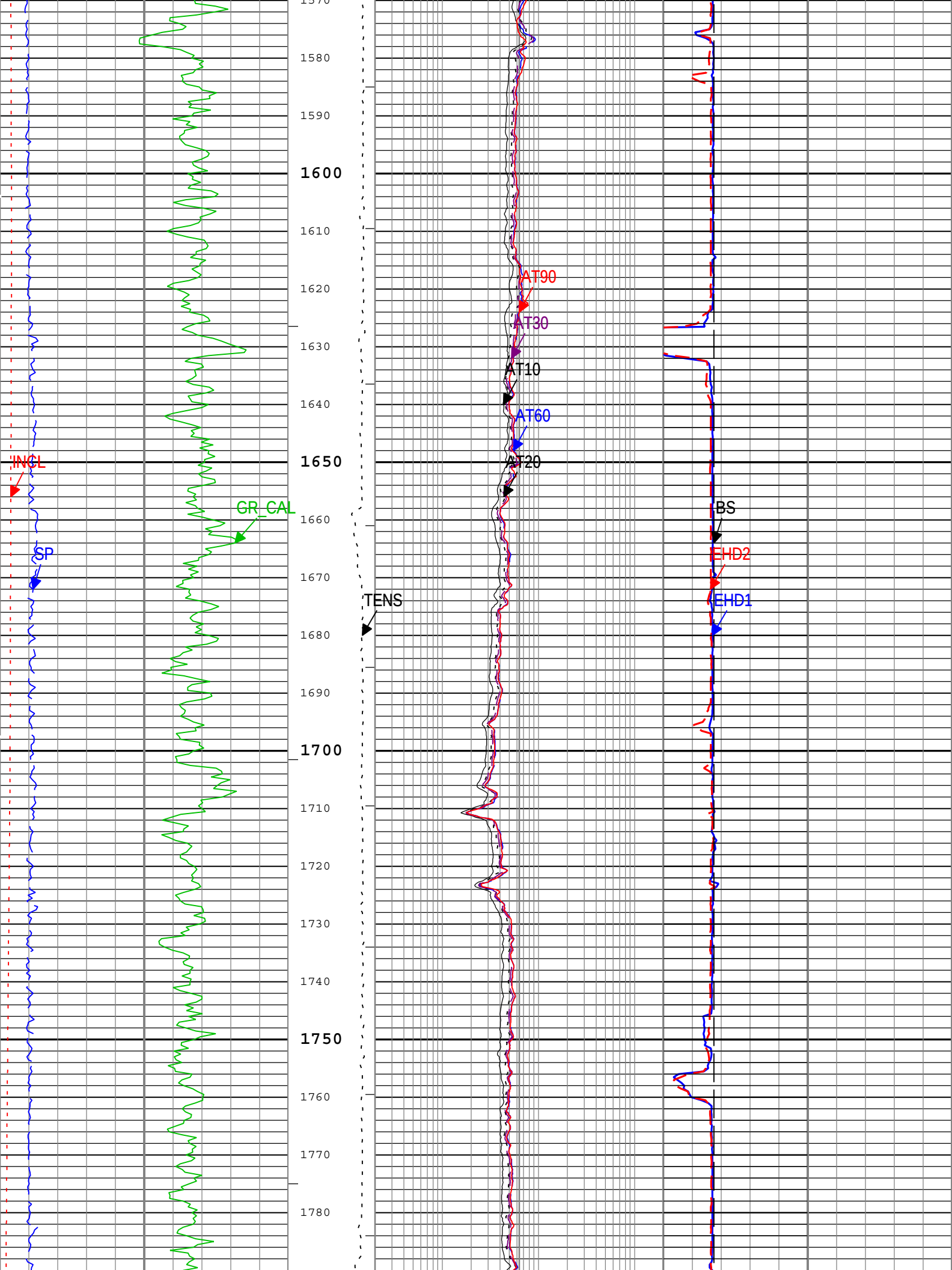
Array Induction Two Foot Resistivity A30

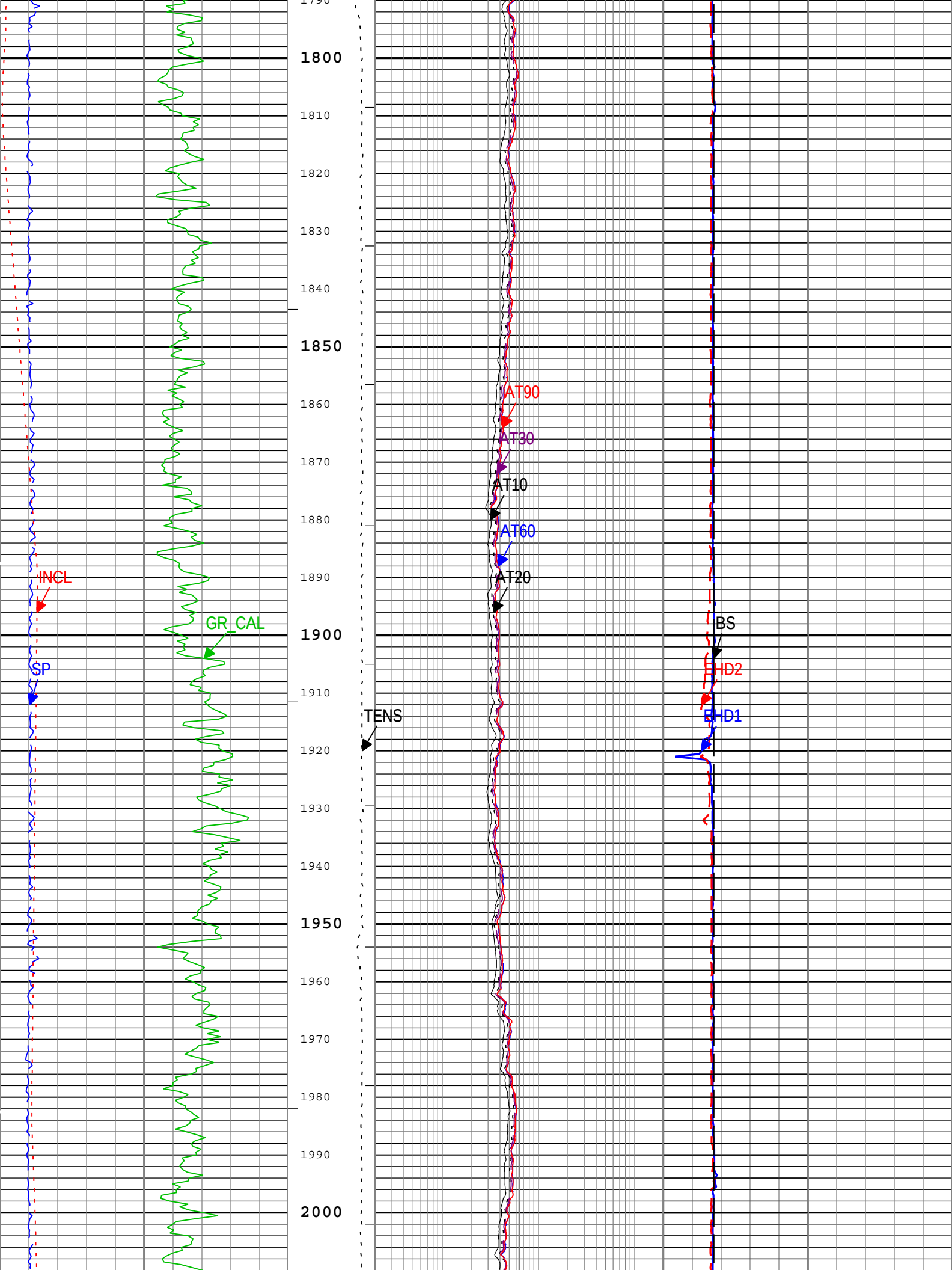

-160
mV
40
Calibrated Gamma Ray (GR_CAL) HGNS-B
0
gAPI
150
Hole inclination (INCL)
0
deg
20
Cable Tension (TENS)
8000 lbf
0
(AT30) AIT-H
0.2
ohm.m
200
Array Induction Two Foot Resistivity A90 (AT90) AIT-H
0.2
ohm.m
200
Enhanced Hole Diameter 2 (ellipse-based algorithm) (EHD2) PPC-B
7
in
17
Bit Size (BS)
7
in
17
720
730
740
750
760
770
780
790
800
810
820
830
840
850
860
870
880
890
900
AT90
AT30

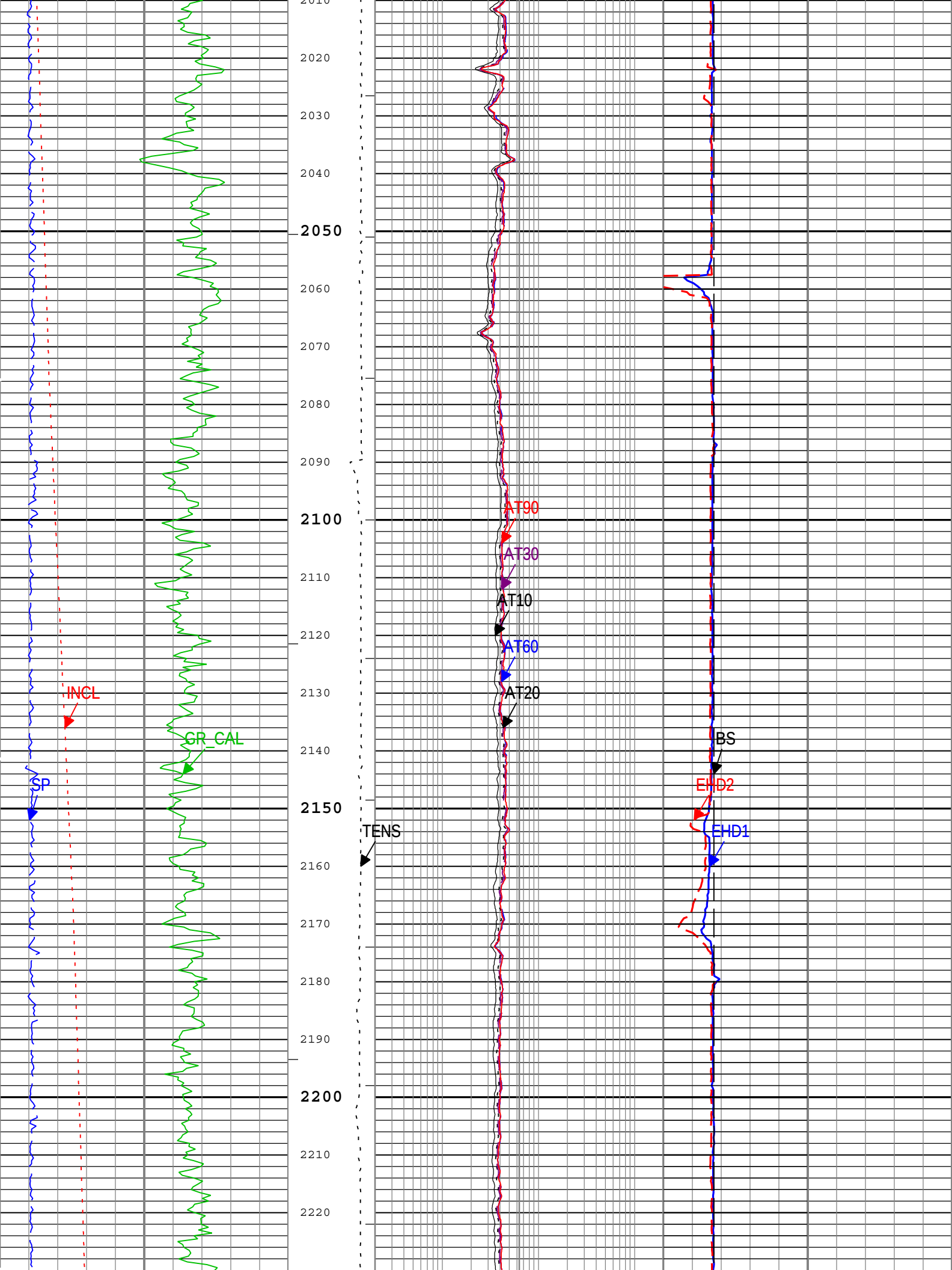

INCL
SP
CR_CAL
AT10
AT60
AT20
TENS
BS
EHD2
EHD1
910
920
930
940
950
960
970
980
990
1000
1010
1020
1030
1040
1050
1060
1070
1080
1090
1100
1110
1120

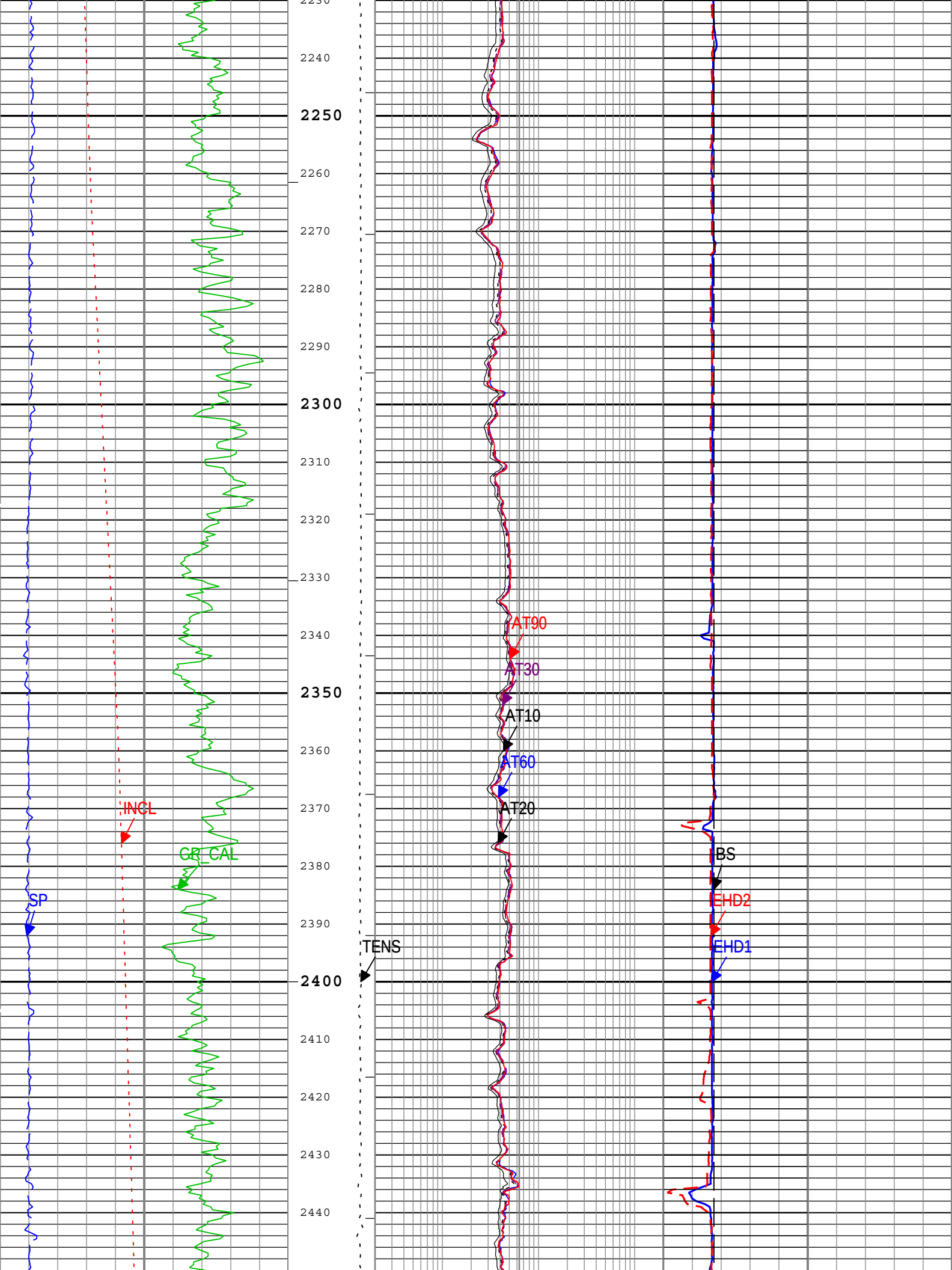

INCL
SP
GR_CAL
TENS
AT90
AT30
AT10
AT60
AT20
BS
EHD2
EHD1
1130
1140
1150
1160
1170
1180
1190
1200
1210
1220
1230
1240
1250
1260
1270
1280
1290
1300
1310
1320
1330
1340

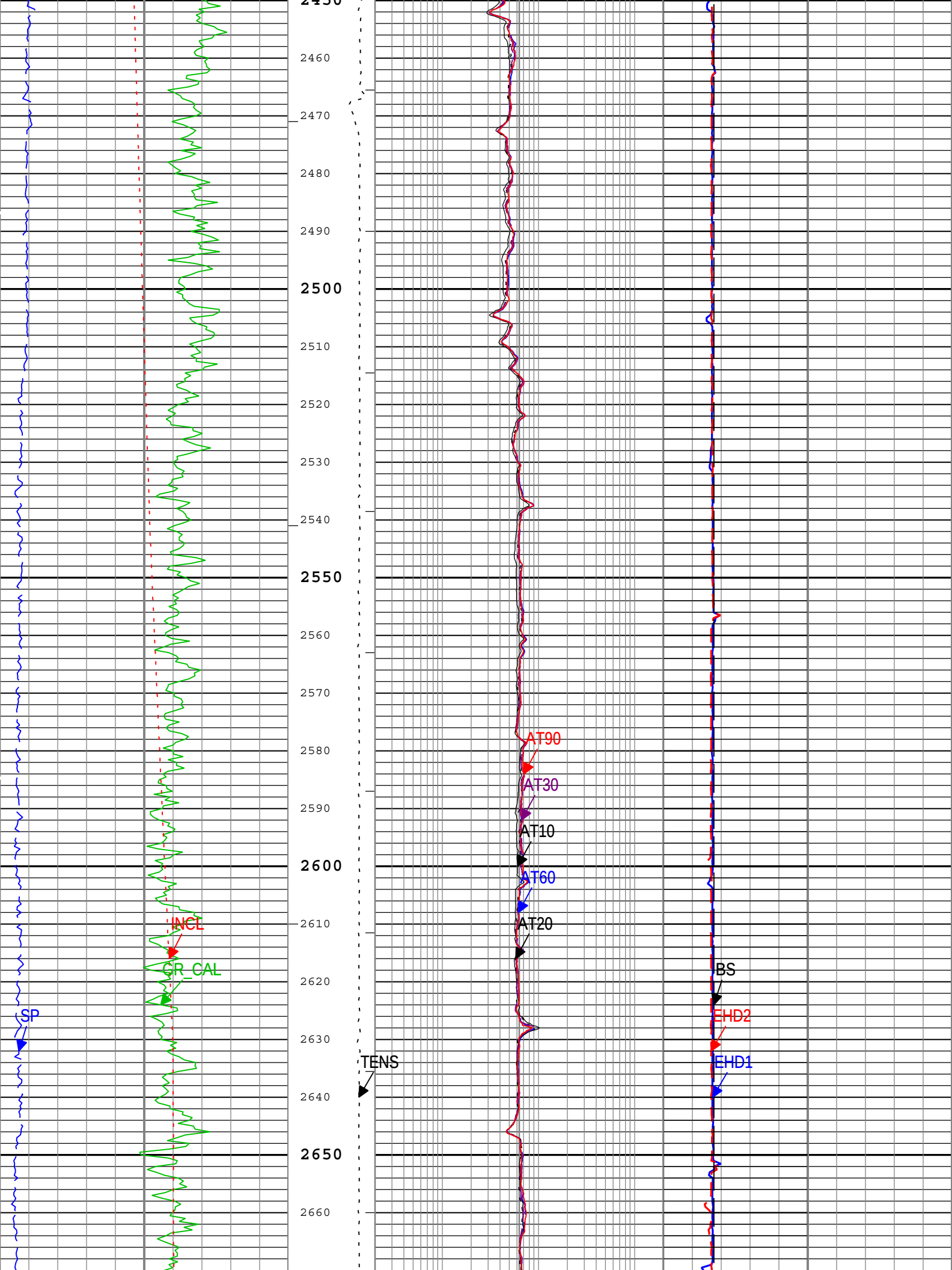

1350
1360
1370
1380
1390
1400
1410
1420
1430
1440
1450
1460
1470
1480
1490
1500
1510
1520
1530
1540
1550
1560
AT90
AT30
AT10
AT60
AT20
INCL
GR_CAL
SP
TENS
BS
EHD2
EHD1

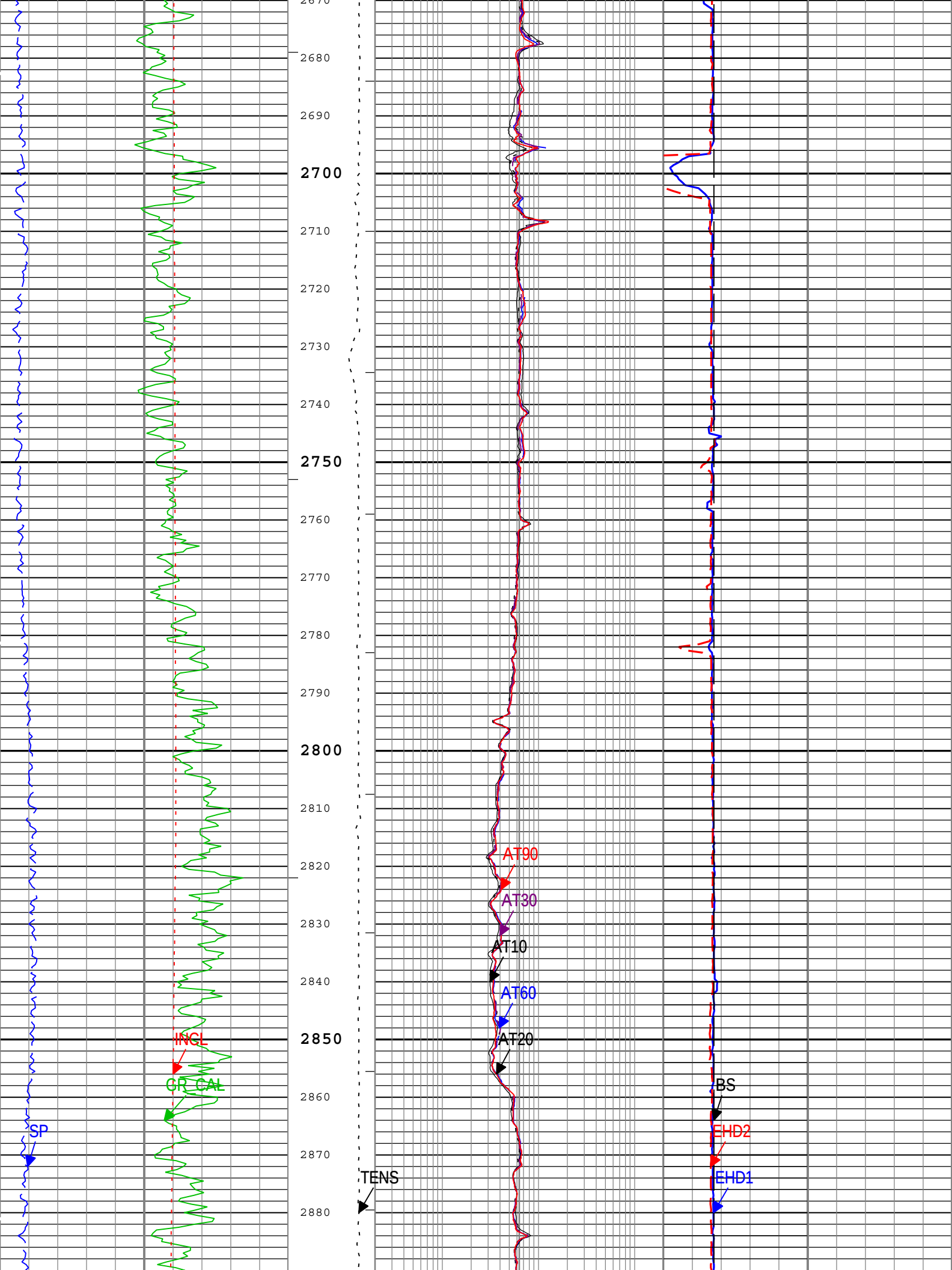

1580
1590
1600
1610
1620
1630
1640
1650
1660
1670
1680
1690
1700
1710
1720
1730
1740
1750
1760
1770
1780
INCL
SP
GR_CAL
TENS
AT90
AT30
AT10
AT60
AT20
BS
EHD2
EHD1

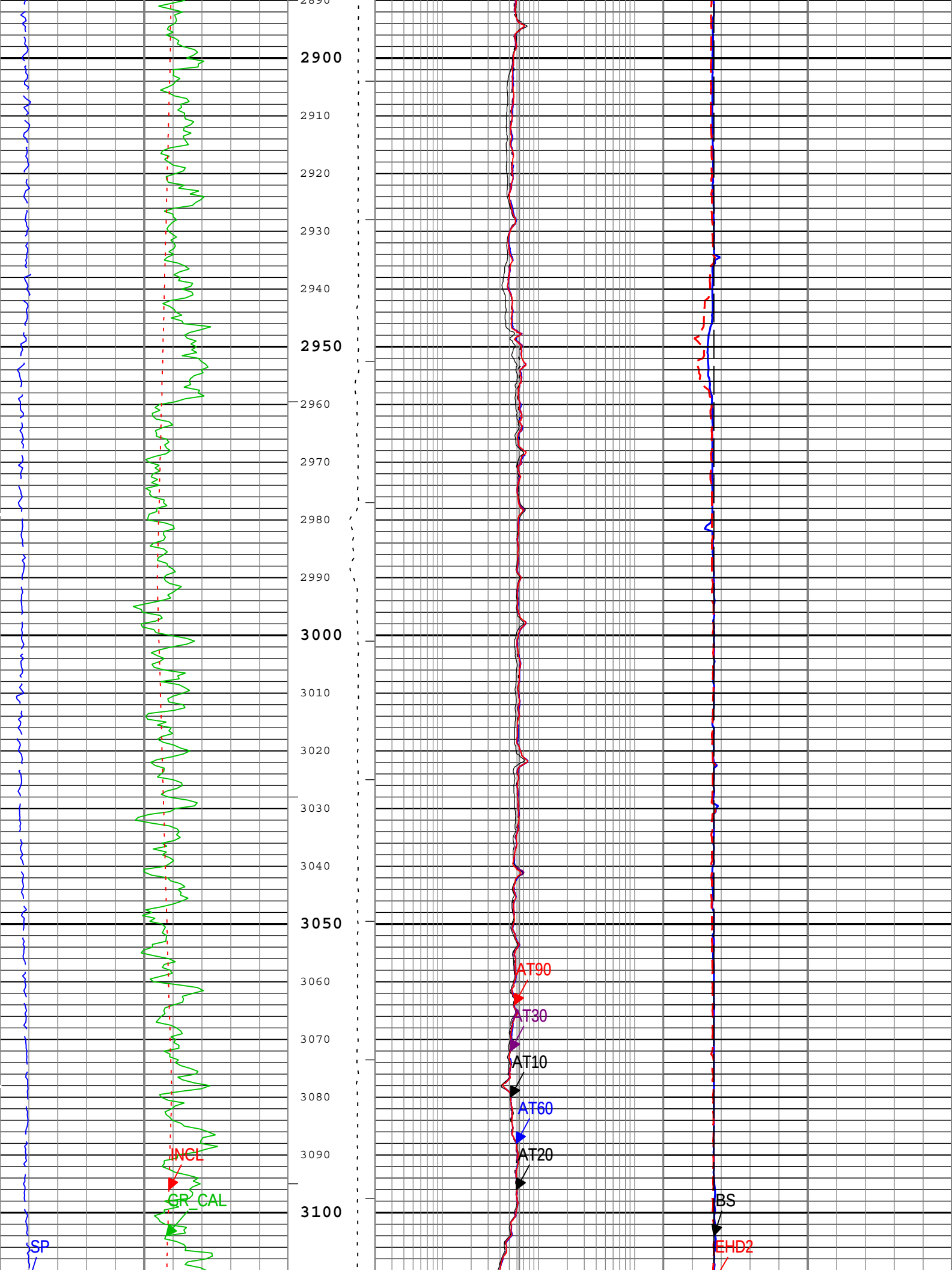

1790
1800
1810
1820
1830
1840
1850
1860
1870
1880
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
INCL
SP
GR_CAL
TENS
AT90
AT30
AT10
AT60
AT20
BS
BHD2
BHD1

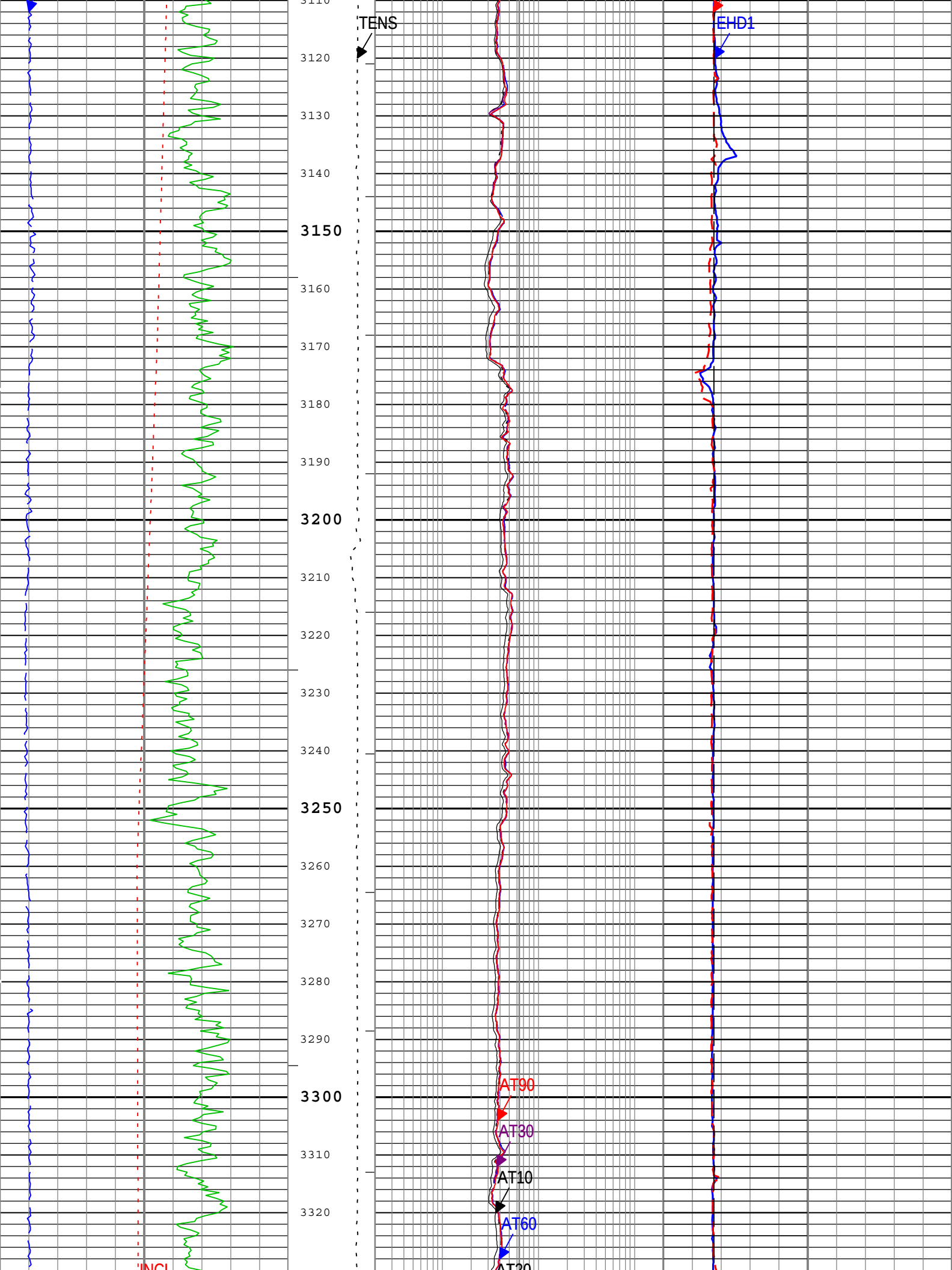

2020
2030
2040
2050
2060
2070
2080
2090
2100
2110
2120
2130
2140
2150
2160
2170
2180
2190
2200
2210
2220
AT90
AT30
AT10
AT60
AT20
INCL
GR_CAL
SP
TENS
BS
EHD2
EHD1

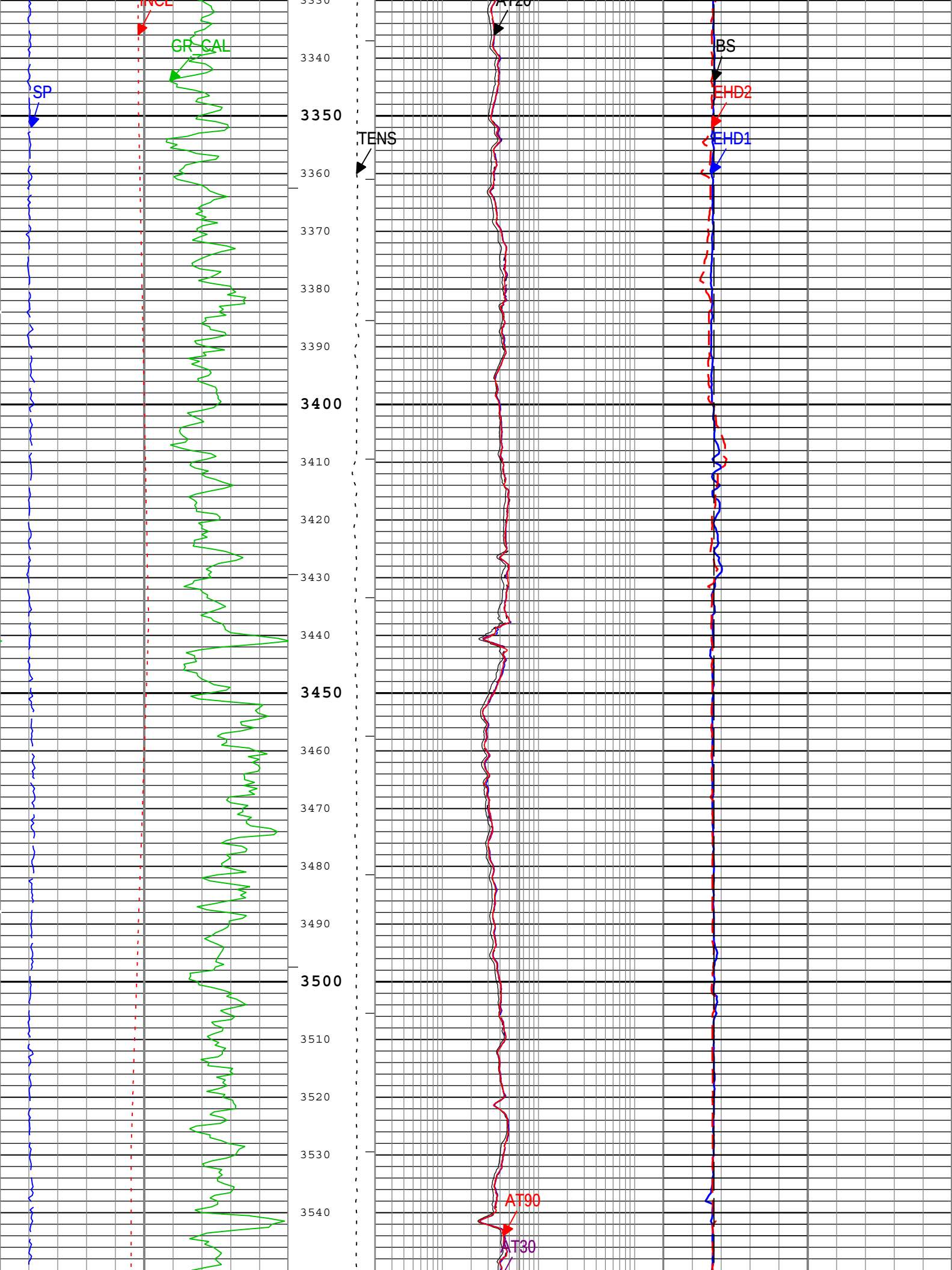

2230
2240
2250
2260
2270
2280
2290
2300
2310
2320
2330
2340
2350
2360
2370
2380
2390
2400
2410
2420
2430
2440
AT90
AT30
AT10
AT60
AT20
INCL
GR_CAL
SP
TENS
BS
EHD2
EHD1

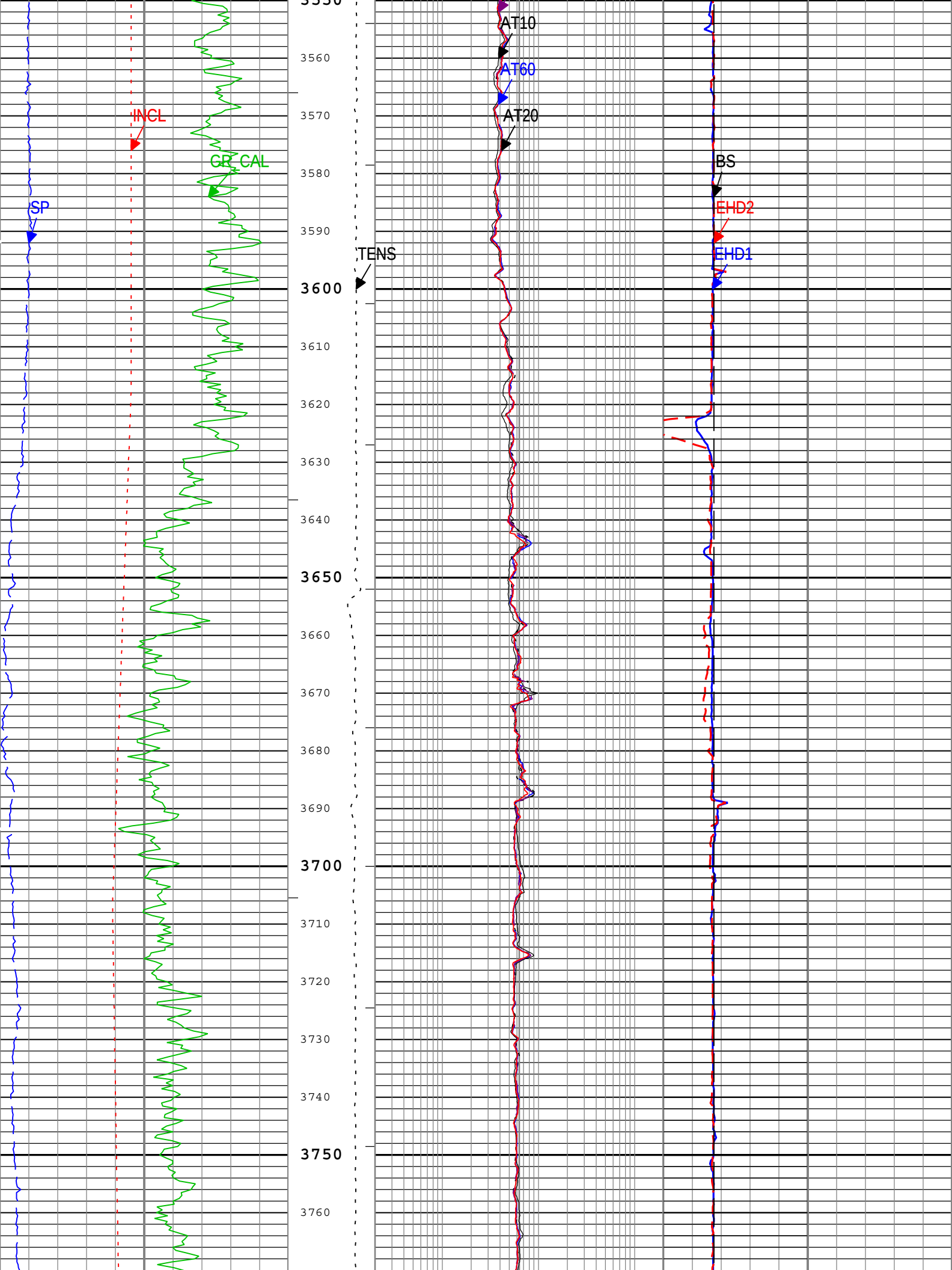

2460
2470
2480
2490
2500
2510
2520
2530
2540
2550
2560
2570
2580
2590
2600
2610
2620
2630
2640
2650
2660
AT90
AT30
AT10
AT60
AT20
INCL
CR_CAL
SP
TENS
BS
EHD2
EHD1

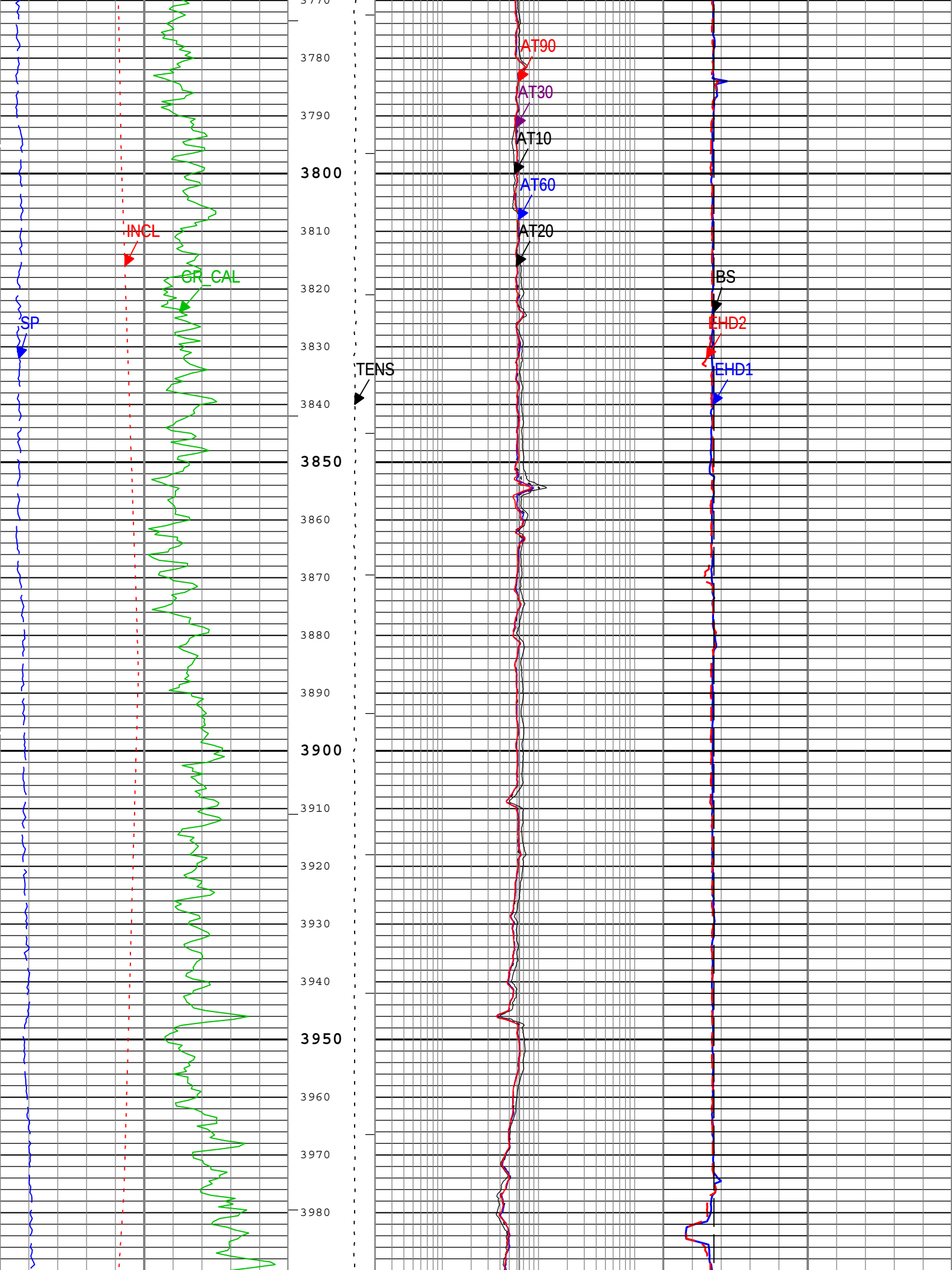

2680
2690
2700
2710
2720
2730
2740
2750
2760
2770
2780
2790
2800
2810
2820
2830
2840
2850
2860
2870
2880
AT90
AT30
AT10
AT60
AT20
INCL
GR_CAL
SP
TENS
BS
EHD2
EHD1

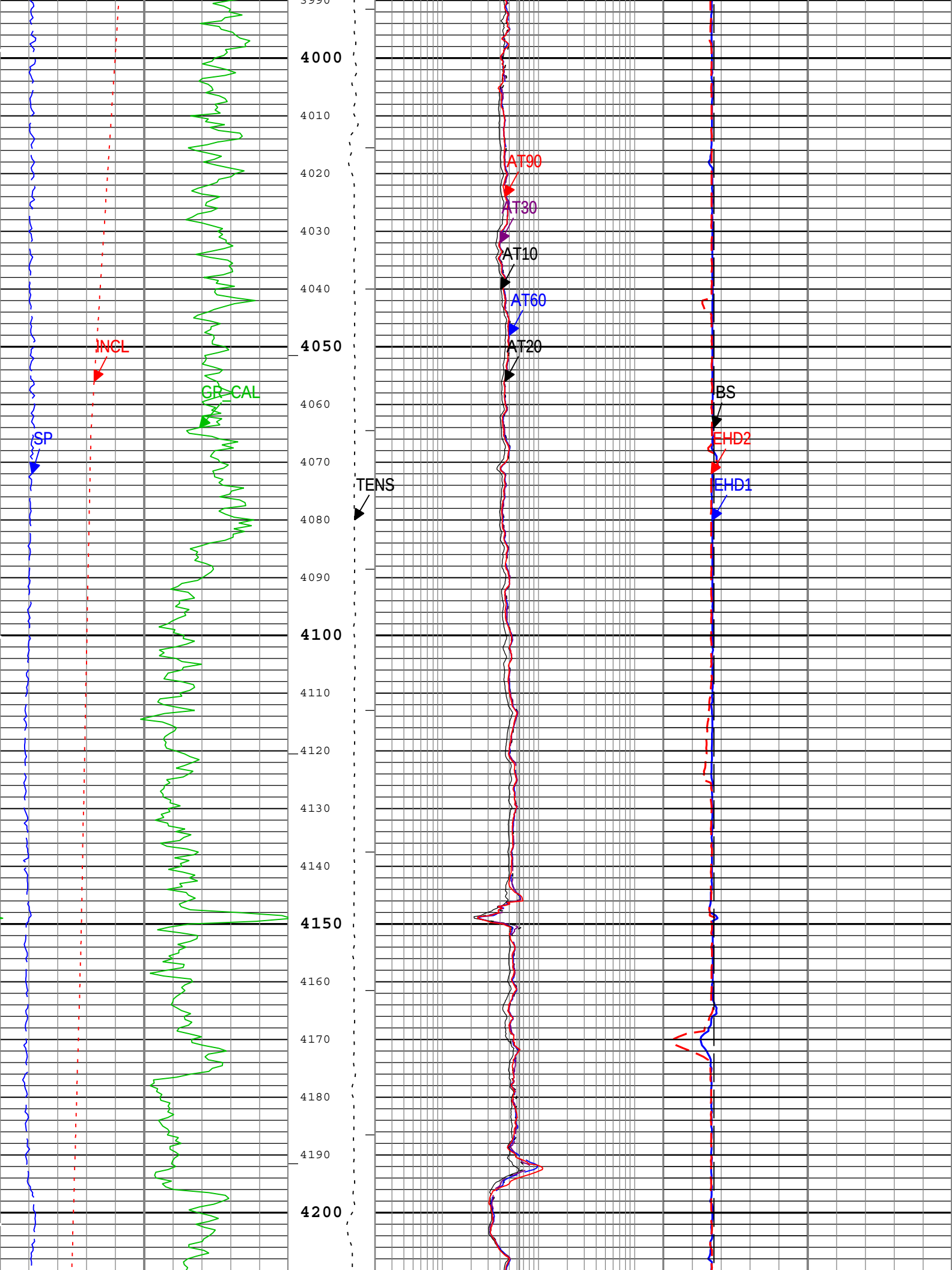

2900
2910
2920
2930
2940
2950
2960
2970
2980
2990
3000
3010
3020
3030
3040
3050
3060
3070
3080
3090
3100
AT90
AT30
AT10
AT60
AT20
INCL
GR_CAL
SP
BS
EHD2

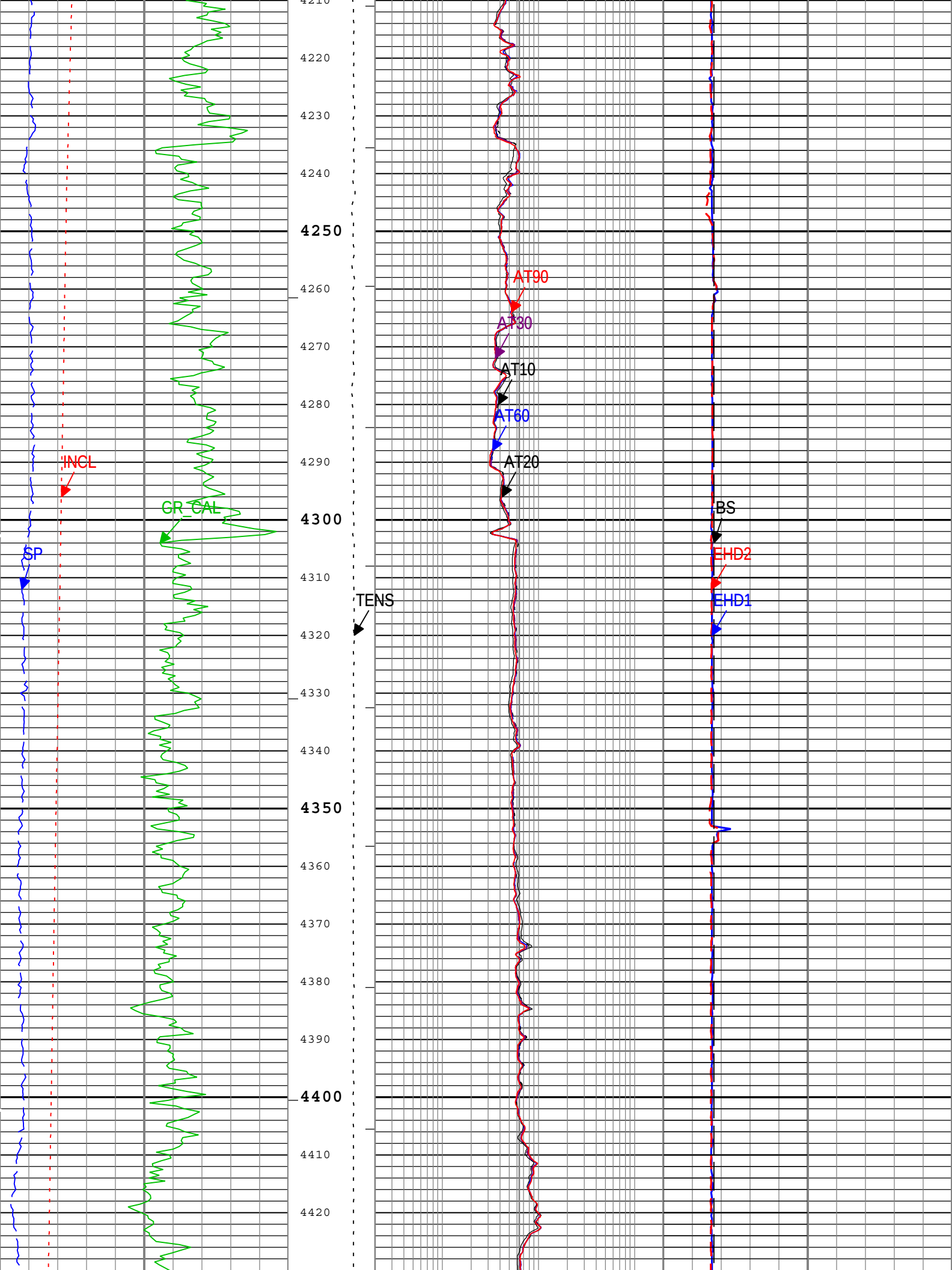

TENS
EHD1
3120
3130
3140
3150
3160
3170
3180
3190
3200
3210
3220
3230
3240
3250
3260
3270
3280
3290
3300
3310
3320
AT90
AT30
AT10
AT60

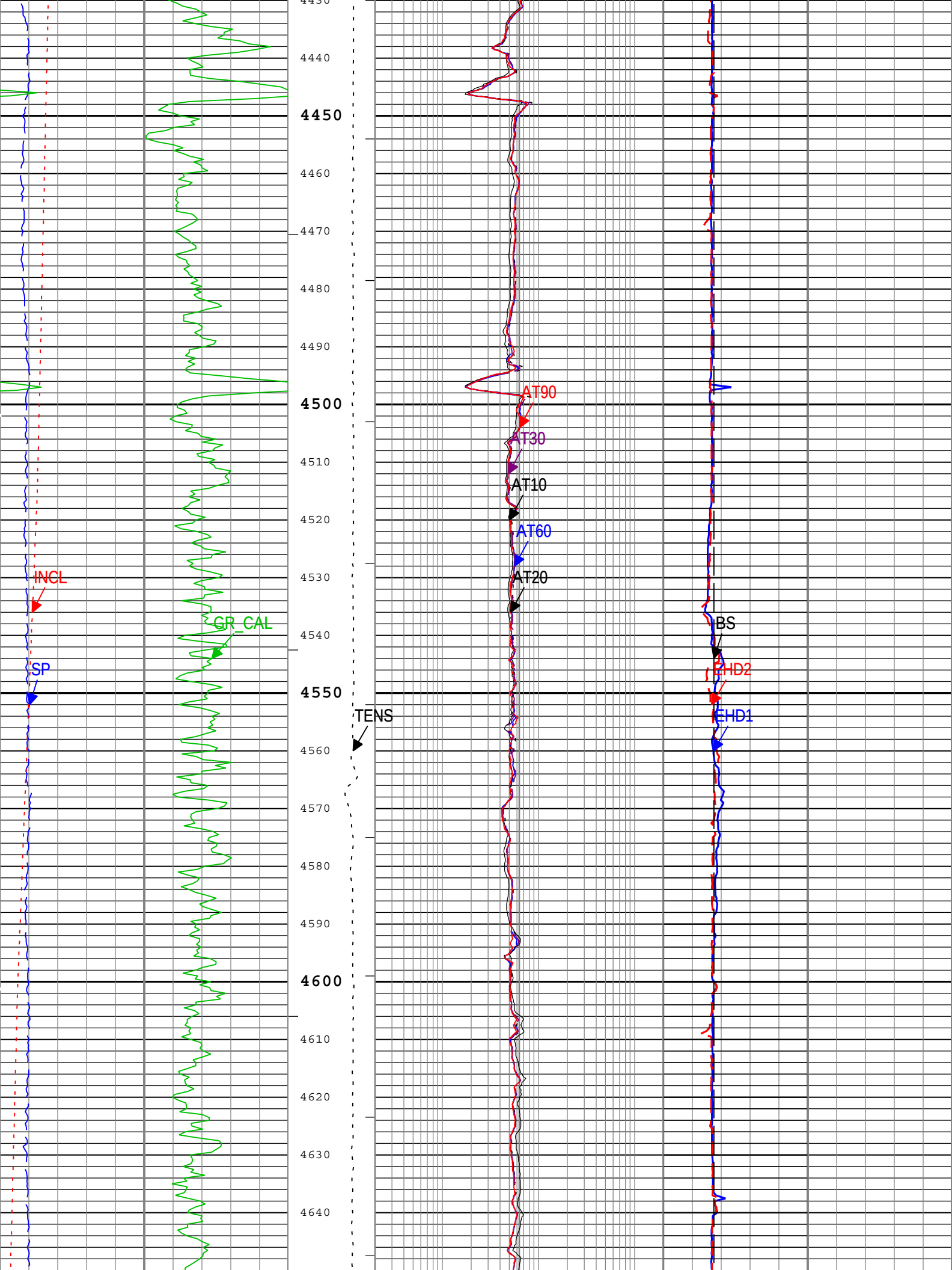

INCL
GR
CAL
SP
TENS
AT20
BS
EHD2
EHD1
AT90
AT30
3330
3340
3350
3360
3370
3380
3390
3400
3410
3420
3430
3440
3450
3460
3470
3480
3490
3500
3510
3520
3530
3540

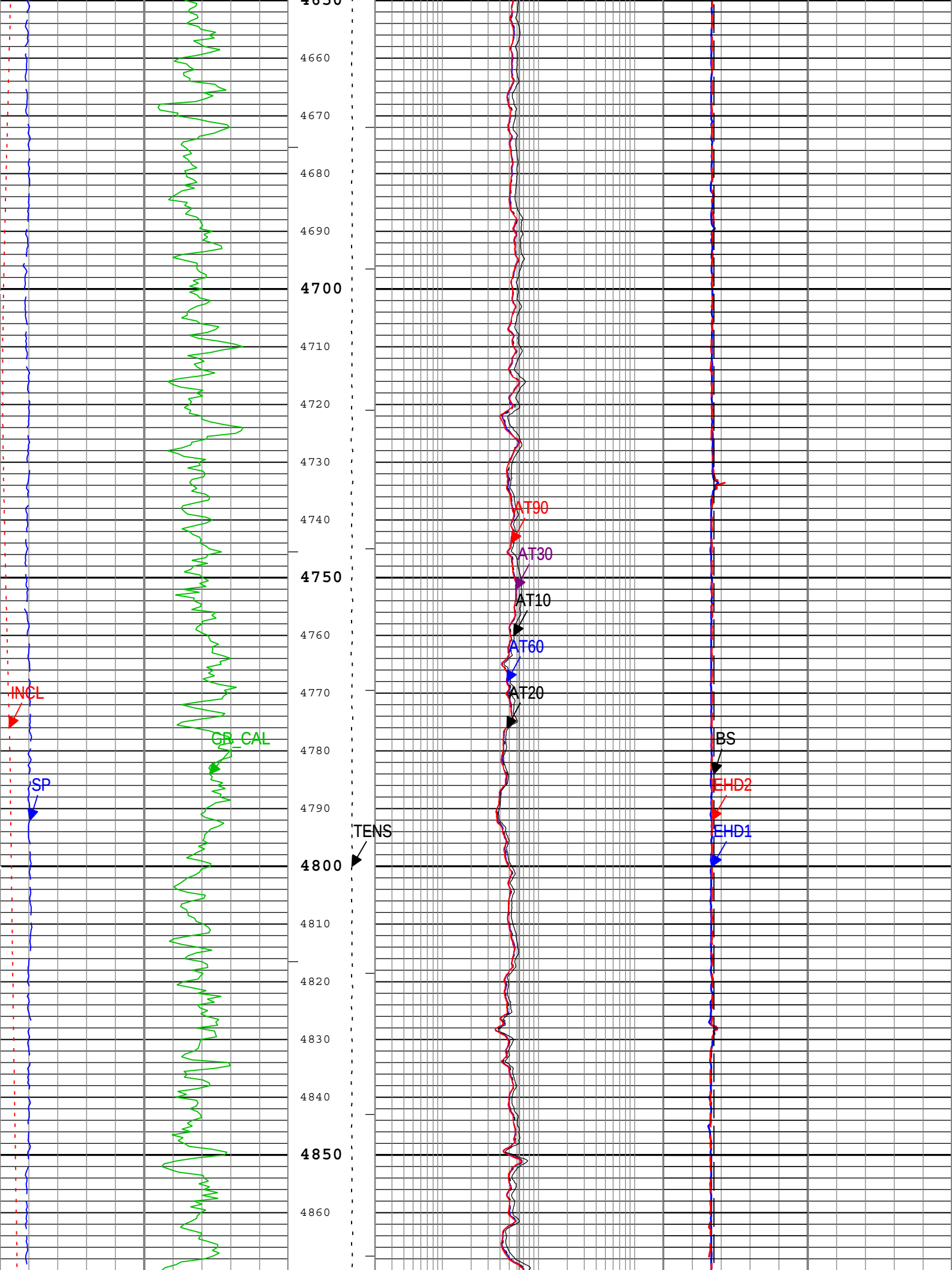

AT10
AT60
AT20
INCL
GR_CAL
SP
BS
EHD2
EHD1
TENS
3560
3570
3580
3590
3600
3610
3620
3630
3640
3650
3660
3670
3680
3690
3700
3710
3720
3730
3740
3750
3760

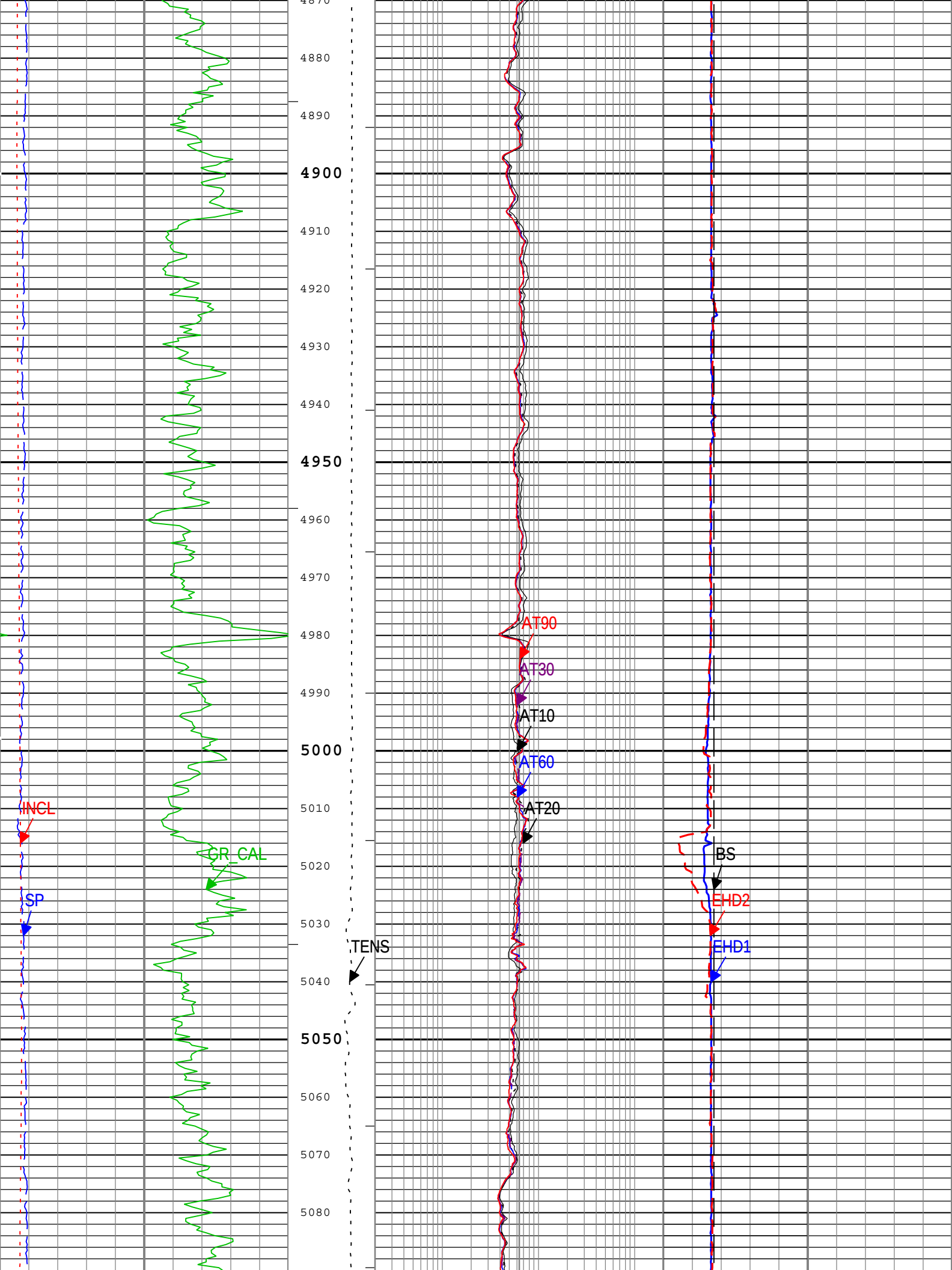

AT90
AT30
AT10
AT60
AT20
INCL
GR_CAL
SP
BS
EHD2
EHD1
TENS
3780
3790
3800
3810
3820
3830
3840
3850
3860
3870
3880
3890
3900
3910
3920
3930
3940
3950
3960
3970
3980

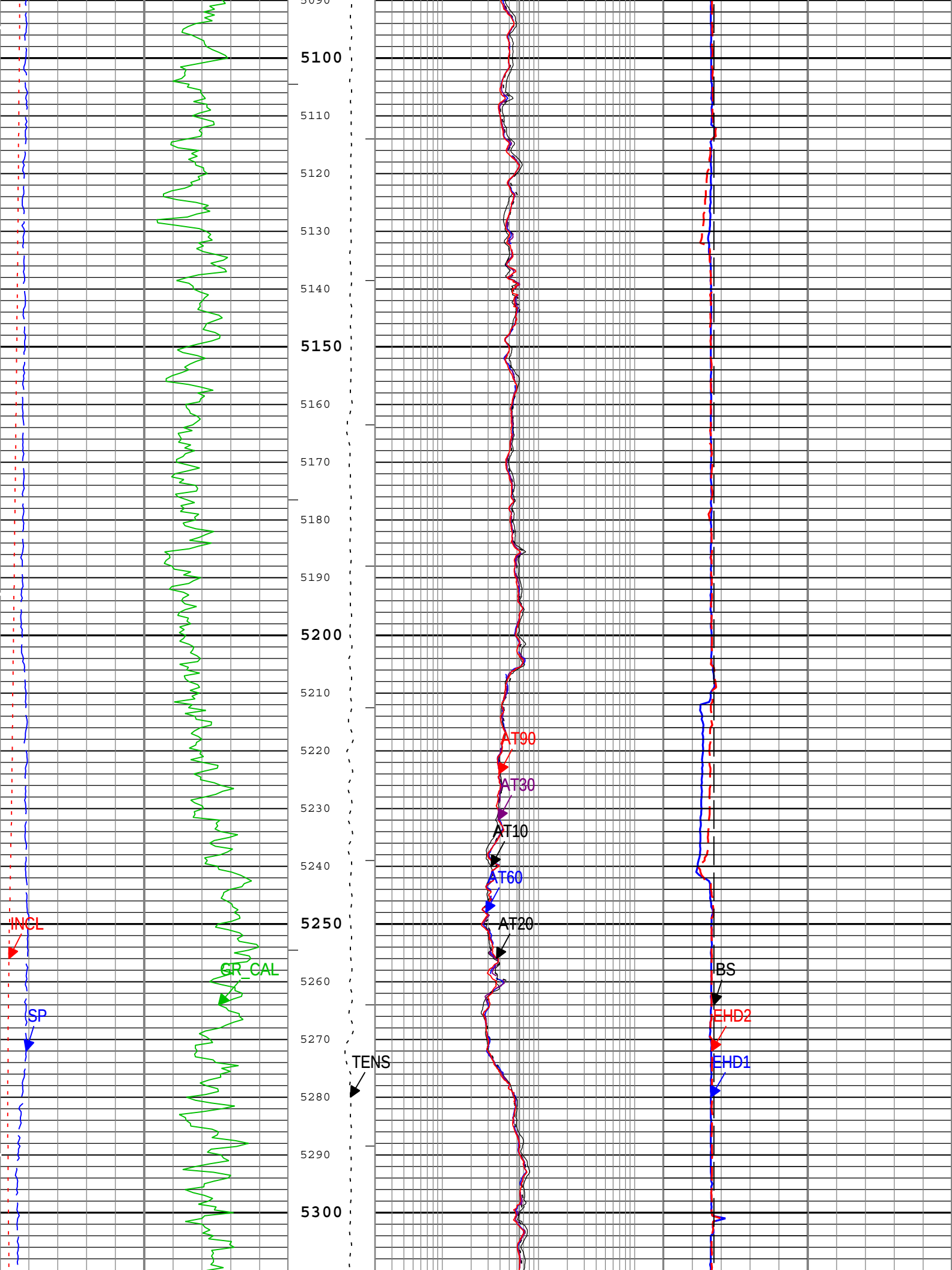

4000
4010
4020
4030
4040
4050
4060
4070
4080
4090
4100
4110
4120
4130
4140
4150
4160
4170
4180
4190
4200
AT90
AT30
AT10
AT60
AT20
INCL
GR_CAL
SP
TENS
BS
EHD2
EHD1

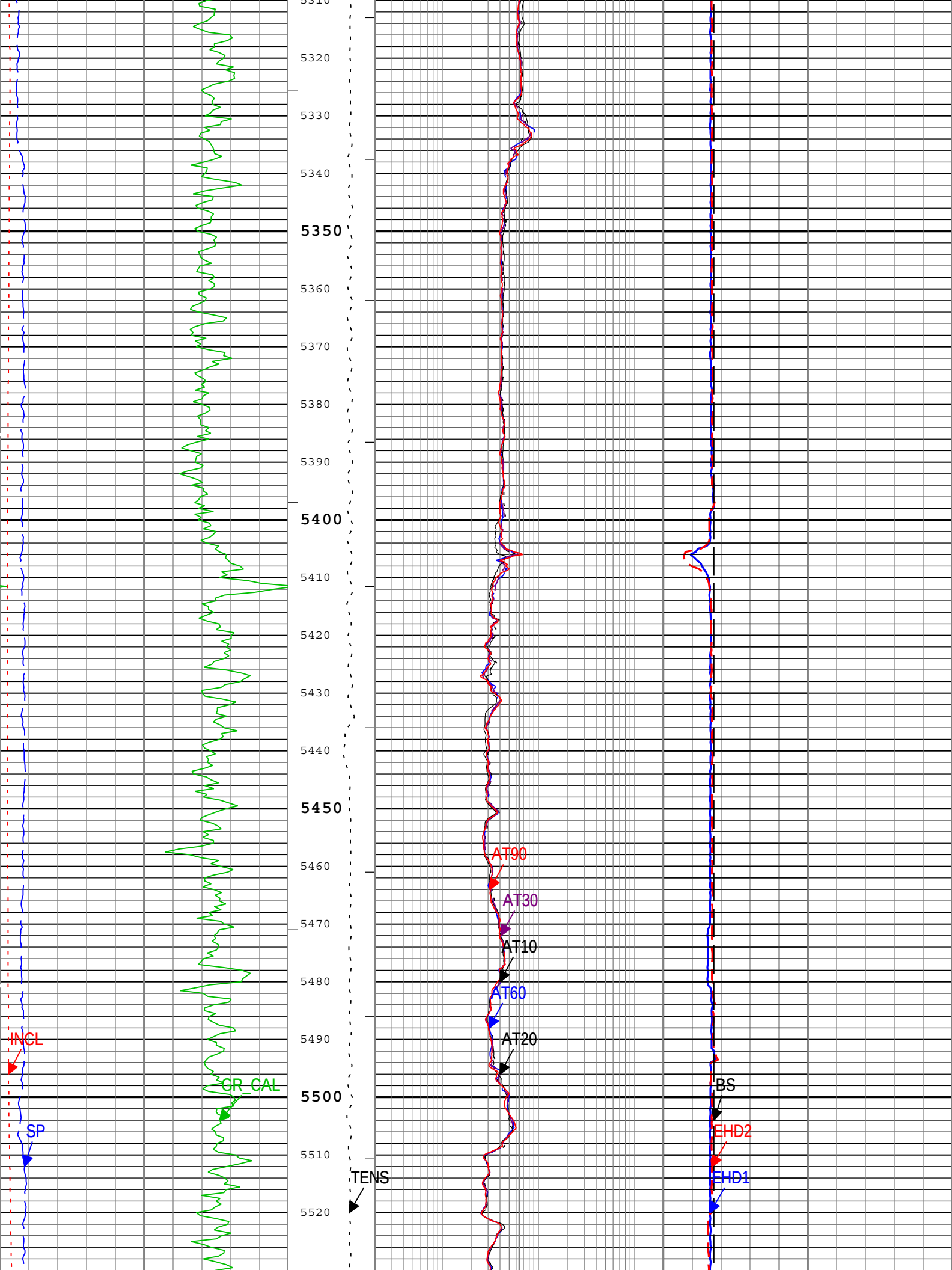

4210
4220
4230
4240
4250
4260
4270
4280
4290
4300
4310
4320
4330
4340
4350
4360
4370
4380
4390
4400
4410
4420
AT90
AT30
AT10
AT60
AT20
INCL
GR
CAL
SP
TENS
BS
EHD2
EHD1

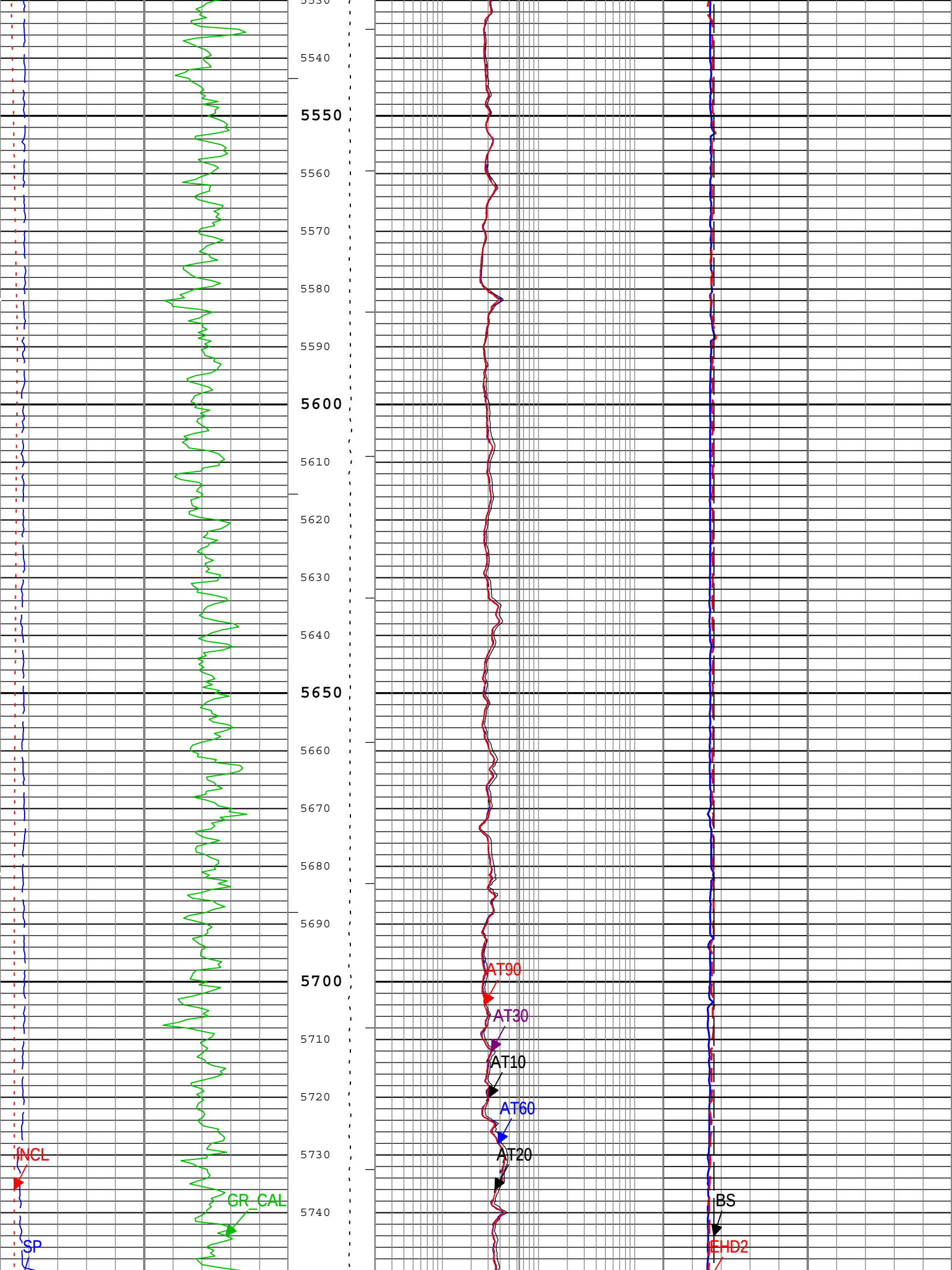

4430
4440
4450
4460
4470
4480
4490
4500
4510
4520
4530
4540
4550
4560
4570
4580
4590
4600
4610
4620
4630
4640
INCL
SP
GR_CAL
TENS
AT90
AT30
AT10
AT60
AT20
BS
EHD2
EHD1

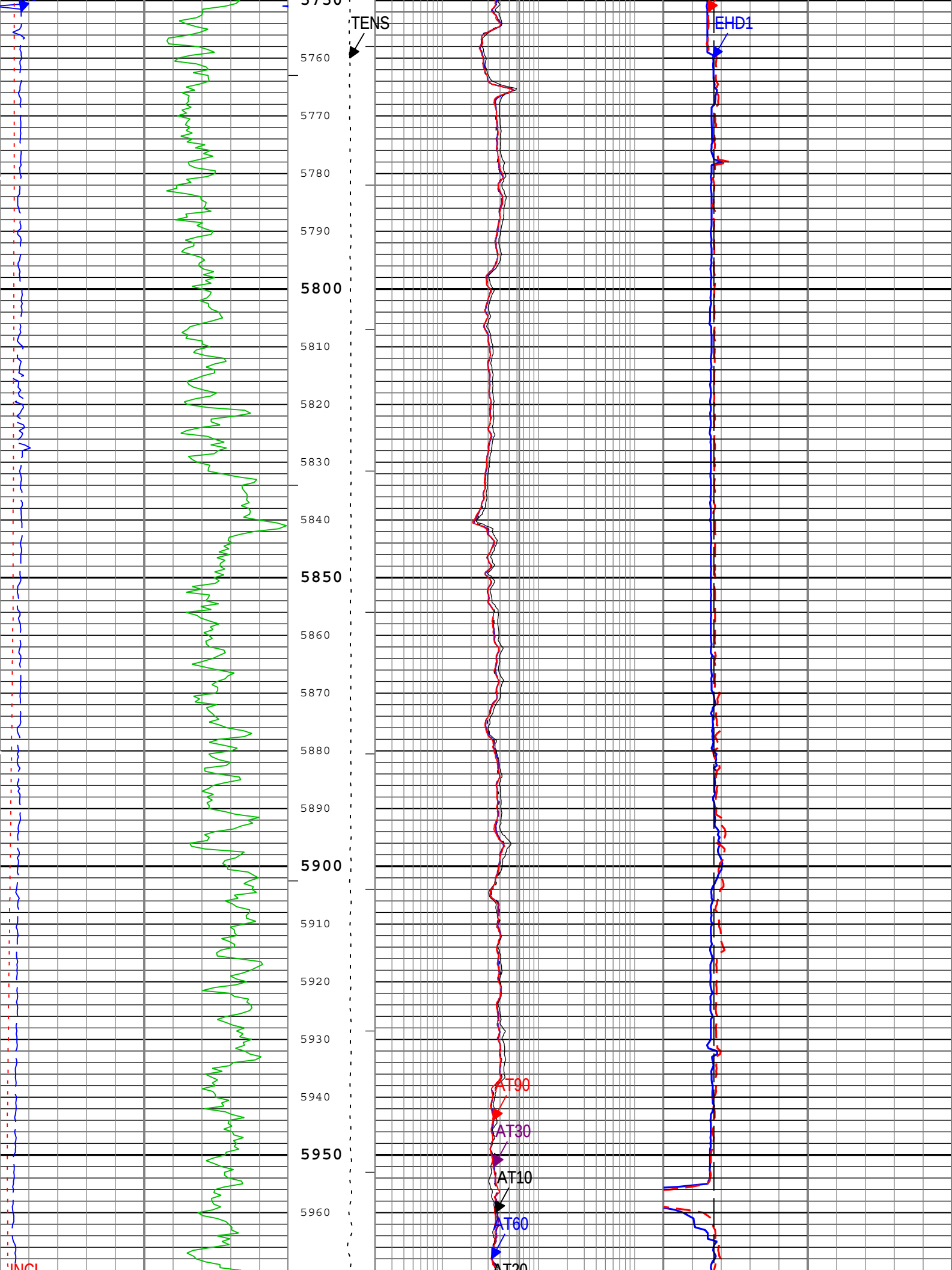

4650
4660
4670
4680
4690
4700
4710
4720
4730
4740
4750
4760
4770
4780
4790
4800
4810
4820
4830
4840
4850
4860
INCL
SP
GR_CAL
TENS
AT90
AT30
AT10
AT60
AT20
BS
EHD2
EHD1

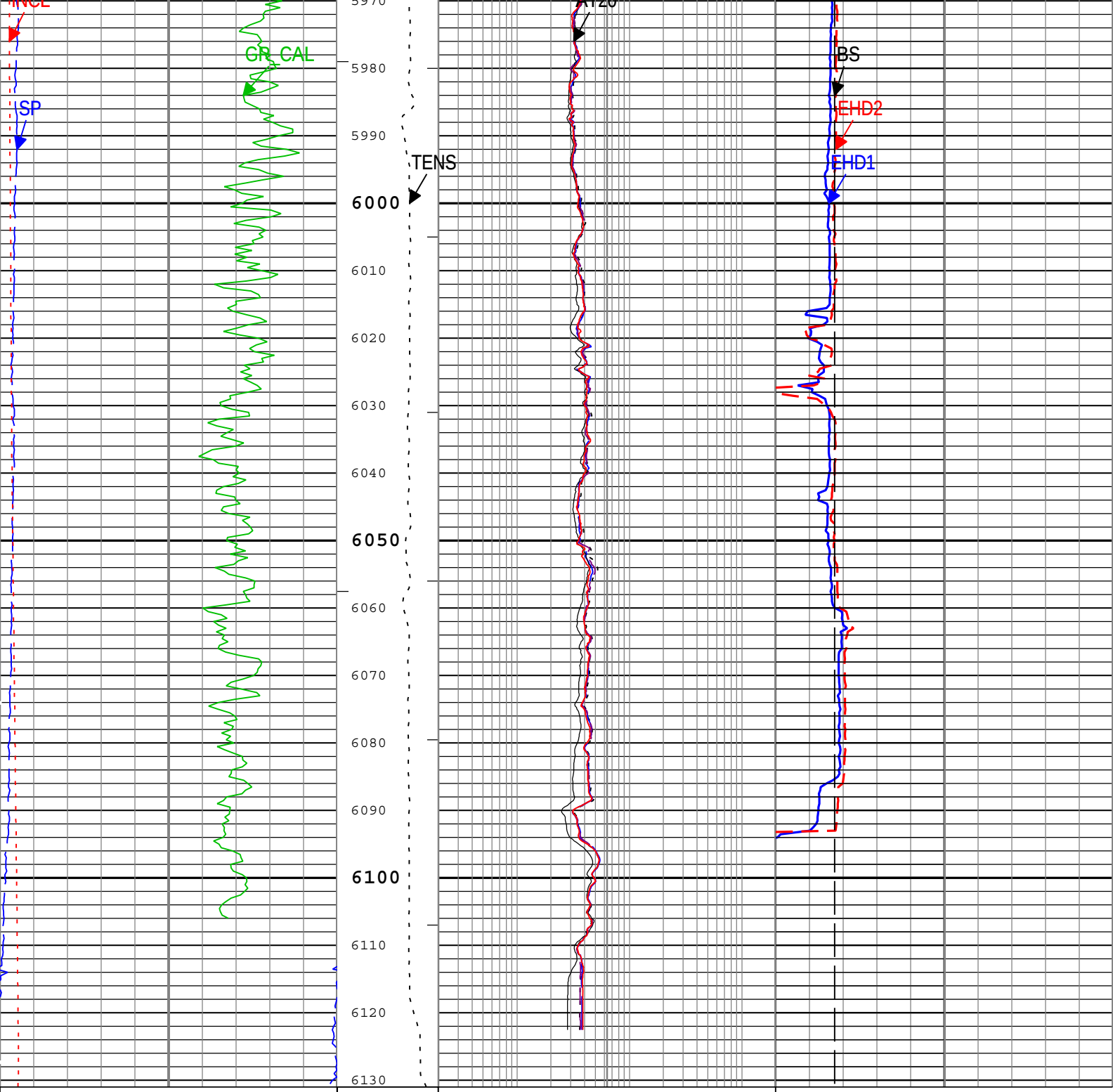

4870
4880
4890
4900
4910
4920
4930
4940
4950
4960
4970
4980
4990
5000
5010
5020
5030
5040
5050
5060
5070
5080
AT90
AT30
AT10
AT60
AT20
INCL
GR_CAL
SP
TENS
BS
EHD2
EHD1


5100
5110
5120
5130
5140
5150
5160
5170
5180
5190
5200
5210
5220
5230
5240
5250
5260
5270
5280
5290
5300
INCL
SP
GR_CAL
TENS
AT90
AT30
AT10
AT60
AT20
BS
EHD2
EHD1


5310
5320
5330
5340
5350
5360
5370
5380
5390
5400
5410
5420
5430
5440
5450
5460
5470
5480
5490
5500
5510
5520
AT90
AT30
AT10
AT60
AT20
INCL
SP
GR_CAL
TENS
BS
EHD2
EHD1


5540
5550
5560
5570
5580
5590
5600
5610
5620
5630
5640
5650
5660
5670
5680
5690
5700
5710
5720
5730
5740
AT90
AT30
AT10
AT60
AT20
INCL
GR_CAL
SP
BS
EHD2


TENS
EHD1
5760
5770
5780
5790
5800
5810
5820
5830
5840
5850
5860
5870
5880
5890
5900
5910
5920
5930
5940
5950
5960
AT90
AT30
AT10
AT60



Spontaneous Potential (SP) AIT-H
-160 mV 40

Calibrated Gamma Ray (GR_CAL) HGNS-B
0 gAPI 150

Hole inclination (INCL)
0 deg 20

Cable Tension (TENS)
8000 lbf 0

Array Induction Two Foot Resistivity A20 (AT20) AIT-H
0.2 ohm.m 200

Array Induction Two Foot Resistivity A60 (AT60) AIT-H
0.2 ohm.m 200

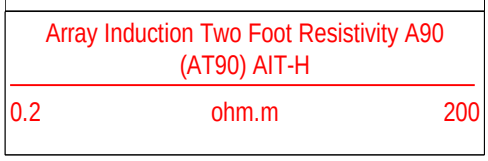
Array Induction Two Foot Resistivity A10 (AT10) AIT-H
0.2 ohm.m 200

Array Induction Two Foot Resistivity A30 (AT30) AIT-H
0.2 ohm.m 200

Enhanced Hole Diameter 1 (ellipse-based algorithm) (EHD1) PPC-B
7 in 17

Enhanced Hole Diameter 2 (ellipse-based algorithm) (EHD2) PPC-B
7 in 17

Bit Size (BS)
7 in 17



ICV - Integrated Cement Volume every 10.00 (ft3)

IHV - Integrated Hole Volume every 10.00 (ft3)

TIME_1900 - Time Marked every 60.00 (s)

Description: HGNS standard resolution porosities for Platform Express Format: Log (Import of KM 5in Triple Combo) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 23-Mar-2014 06:07:48

Channel Processing Parameters

Parameter	Description	Tool	Value	Unit
ABHM	Array Induction Borehole Correction Mode	AIT-H	Compute Standoff	
ACDE	Array Induction Casing Detection Enable	AIT-H	Yes	
ASTA	Array Induction Tool Standoff	AIT-H	1	in
BARI	Barite Mud Presence Flag	Borehole	No	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BS	Bit Size	WLSESSION	8.75	in
CBLO	Casing Bottom (Logger)	WLSESSION	729	ft
CDEN	Cement Density	HGNS-B	2	g/cm3
CSODDRL	Casing Outer Diameter - Zoned along driller depths	WLSESSION	9.625	in
DC_MODE	Depth Correction Mode	DepthCorrection	Real-time	
DFD	Drilling Fluid Density	Borehole	9	lbm/gal
ETIP	Elevation of the TIP above MSL	WLSESSION	4700	ft
FCD	Future Casing (Outer) Diameter	WLSESSION	7	in
GCSE_DOWN_PASS	Generalized Caliper Selection for WL Log Down Passes	Borehole	BS	
GCSE_UP_PASS	Generalized Caliper Selection for WL Log Up Passes	Borehole	HD1	
GRSE	Generalized Mud Resistivity Selection, from Measured or Computed Mud Resistivity	Borehole	AMF	
SOCO	Standoff Correction Option	HGNS-B	Yes	
SPDR	SP Drift Per Foot	AIT-H	0	mV/ft

Tool Control Parameters

Parameter	Description	Tool	Value	Unit
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	3600	ft/h

Run 1

5" Triple Combo

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
Run 1	Log[2]:Up	Up	5777.40 ft	6132.71 ft	23-Mar-2014 3:52:03 AM	23-Mar-2014 3:58:29 AM	ON	3.00 ft	Yes
Run 1	Log[3]:Up	Up	171.29 ft	6130.89 ft	23-Mar-2014 4:02:59 AM	23-Mar-2014 5:09:30 AM	ON	0.00 ft	Yes

All depths are referenced to toolstring zero

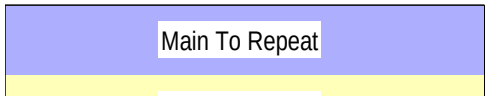
Log

Company:Noble Energy Inc Well:Romero PC G10-79HN

Run 1: Log[3]:Up:S010

Description: HGNS standard resolution porosities for Platform Express Format: Log (Import of KM 5in Triple Combo RA_1) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 23-Mar-2014 06:07:50

TIME_1900 - Time Marked every 60.00 (s)



Main To Repeat

Repeat To Main

Gamma Ray (GR) HGNS-B

200 gAPI 400

Main To Repeat

Repeat To Main

Hole inclination (INCL)

0 deg 10

Main To Repeat

Repeat To Main

Calibrated Gamma Ray (GR_CAL) HGNS-B

0 gAPI 150

Main To Repeat

Repeat To Main

Spontaneous Potential (SP) AIT-H

-160 mV 40

Main To Repeat

Repeat To Main

Cable Tension (TENS)

8000 lbf 0

Repeat To Main

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

0.2 ohm.m 200

Main To Repeat

Repeat To Main

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

0.2 ohm.m 200

Main To Repeat

Repeat To Main

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

0.2 ohm.m 200

Main To Repeat

Repeat To Main

Array Induction Two Foot Resistivity A20 (AT20) AIT-H

0.2 ohm.m 200

Main To Repeat

Repeat To Main

Array Induction Two Foot Resistivity A60 (AT60) AIT-H

0.2 ohm.m 200

Main To Repeat

Repeat To Main

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

-0.1 ft3/ft3 -0.5

Main To Repeat

Repeat To Main

Enhanced Hole Diameter 1 (ellipse-based algorithm) (EHD1) PPC-B

7 in 17

Main To Repeat

Repeat To Main

Enhanced Hole Diameter 2 (ellipse-based algorithm) (EHD2) PPC-B

7 in 17

Main To Repeat

Repeat To Main

Bit Size (BS)

7 in 17

5850

5860

5870

5880

5890

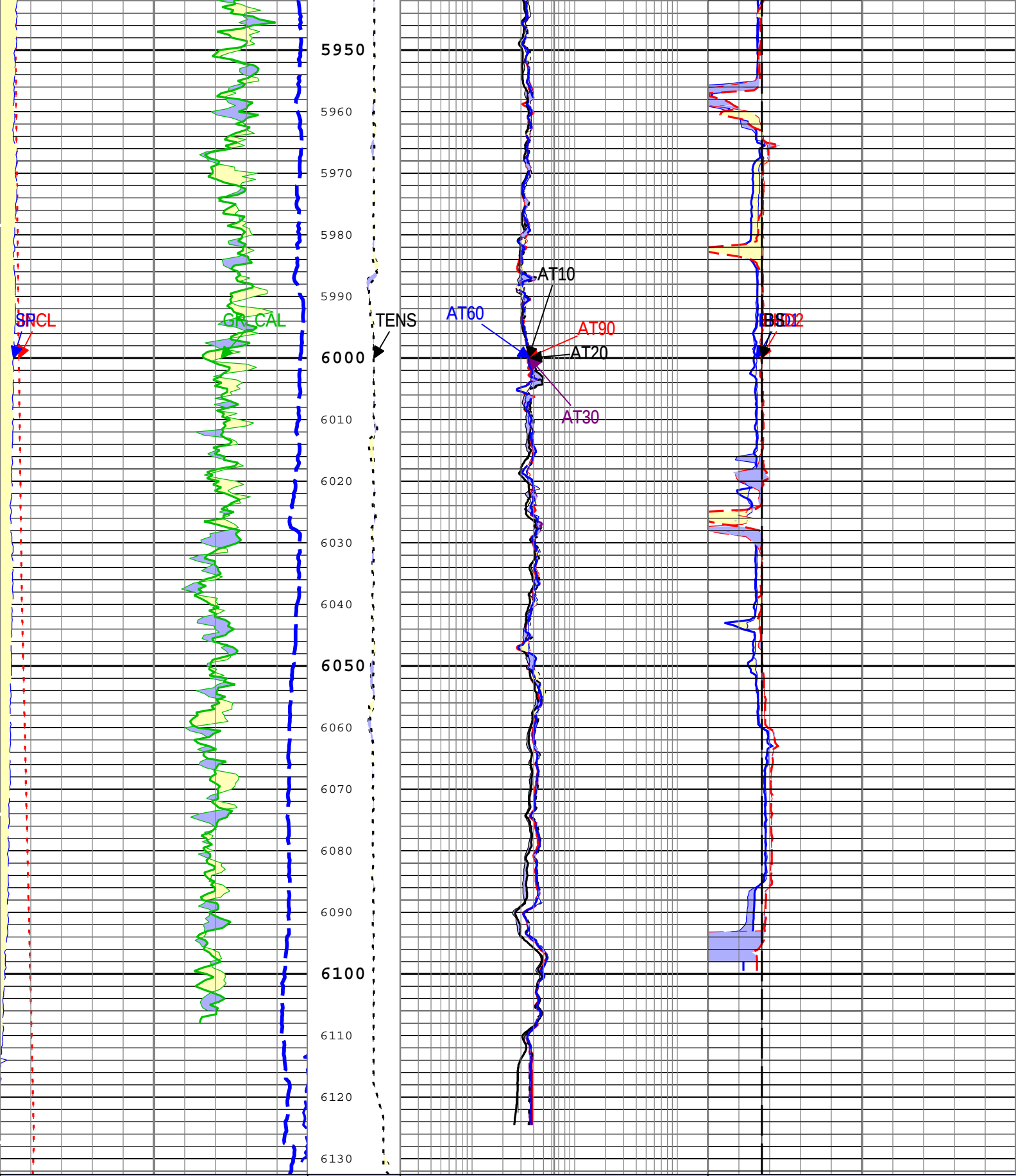
5900

5910

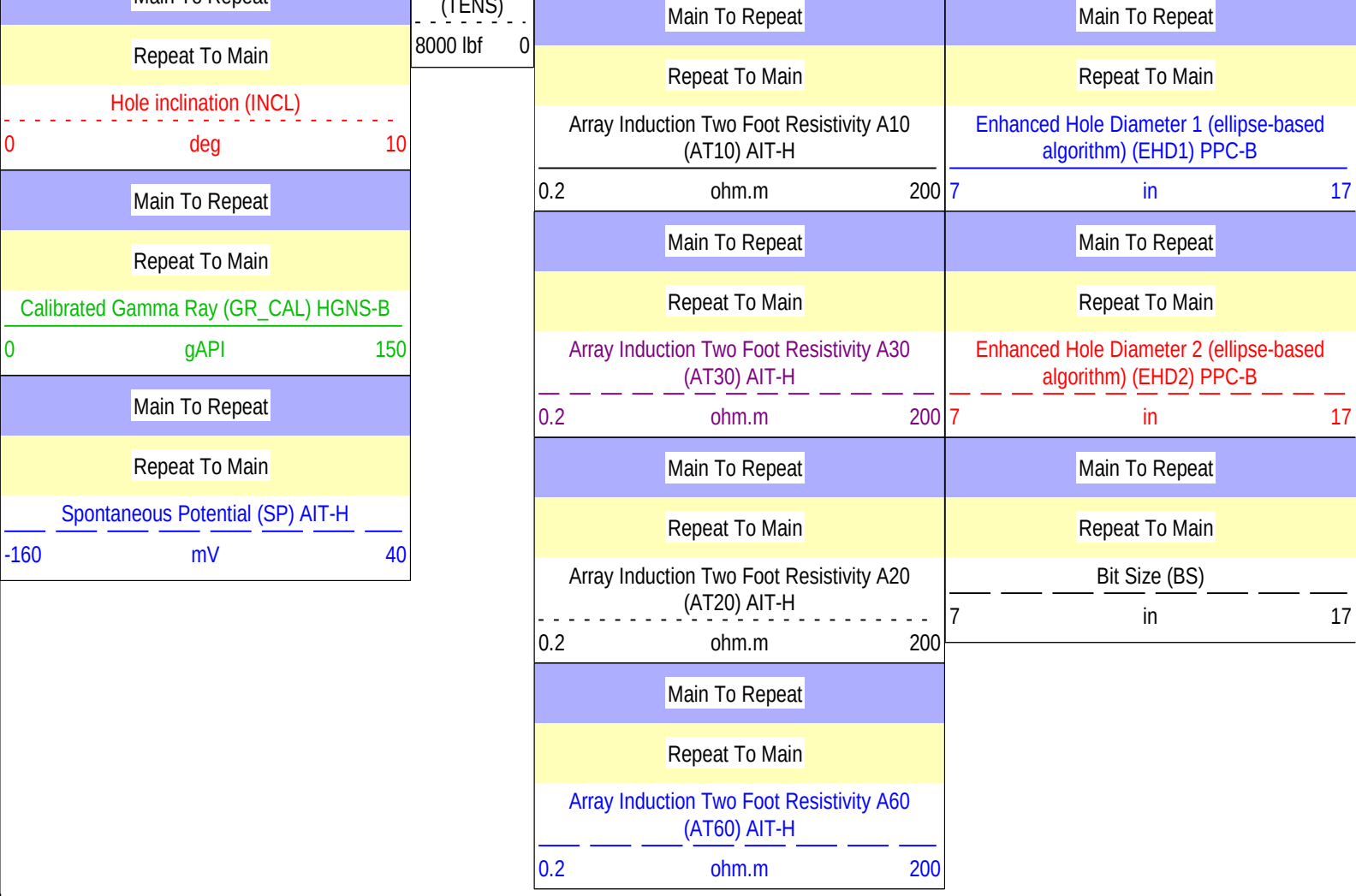
5920

5930

5940



Main To Repeat	Main To Repeat	Main To Repeat	Main To Repeat
Repeat To Main	Repeat To Main	Repeat To Main	Repeat To Main
Gamma Ray (GR) HGNS-B		Array Induction Two Foot Resistivity A90 (AT90) AIT-H	Enhanced Thermal Neutron Porosity in Selected Lithology (NPOR) HGNS-B
200 gAPI 400		0.2 ohm.m 200	-0.1 ft3/ft3 -0.5
Main To Repeat	Cable Tension (TENS)		



TIME_1900 - Time Marked every 60.00 (s)

Description: HGNS standard resolution porosities for Platform Express Format: Log (Import of KM 5in Triple Combo RA_1) Index Scale: 5 in per 100 ft
Index Unit: ft Index Type: Measured Depth Creation Date: 23-Mar-2014 06:07:50

Calibration Report

AIT-H (Array Induction Tool - H) Calibration - Run 1

Primary Equipment :

File code for AIT-HA Sonde Tool Element	AHIS	398

Auxiliary Equipment :

File code for AIT Bottom Nose Tool Element	AHRM	398

AIT Sonde Calibration - Test Loop Gain

Master (EEPROM): 11:29:18 04-Mar-2014

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Test Loop Gain - 0		Master	1.000	0.950	1.016	1.050
Test Loop Phase - 0	deg	Master	0	-3.000	0.415	3.000
Test Loop Gain - 1		Master	1.000	0.950	1.014	1.050
Test Loop Phase - 1	deg	Master	0	-3.000	0.538	3.000
Test Loop Gain - 2		Master	1.000	0.950	1.018	1.050
Test Loop Phase - 2	deg	Master	0	-3.000	-0.012	3.000
Test Loop Gain - 3		Master	1.000	0.950	1.016	1.050
Test Loop Phase - 3	deg	Master	0	-3.000	0.032	3.000
Test Loop Gain - 4		Master	1.000	0.950	0.998	1.050
Test Loop Phase - 4	deg	Master	0	-3.000	-0.041	3.000
Test Loop Gain - 5		Master	1.000	0.950	0.989	1.050
Test Loop Phase - 5	deg	Master	0	-3.000	-0.262	3.000
Test Loop Gain - 6		Master	1.000	0.950	0.997	1.050
Test Loop Phase - 6	deg	Master	0	-3.000	0.066	3.000
Test Loop Gain - 7		Master	1.000	0.950	1.013	1.050
Test Loop Phase - 7	deg	Master	0	-3.000	-0.290	3.000

AIT Sonde Calibration - Sonde Error Correction

Master (EEPROM): 11:29:18 04-Mar-2014

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Sonde Error Correction Real - 0	mS/m	Master	-----	-231.000	-85.683	119.000
Sonde Error Correction Quad - 0		Master	-----	-2250.000	107.989	2250.000
Sonde Error Correction Real - 1	mS/m	Master	-----	114.000	168.640	204.000
Sonde Error Correction Quad - 1		Master	-----	-625.000	138.061	625.000
Sonde Error Correction Real - 2	mS/m	Master	-----	66.000	112.616	156.000
Sonde Error Correction Quad - 2		Master	-----	-350.000	25.430	350.000
Sonde Error Correction Real - 3	mS/m	Master	-----	39.000	59.140	89.000
Sonde Error Correction Quad - 3		Master	-----	-250.000	51.811	250.000
Sonde Error Correction Real - 4	mS/m	Master	-----	15.000	22.684	35.000
Sonde Error Correction Quad - 4		Master	-----	-63.000	-10.829	63.000
Sonde Error Correction Real - 5	mS/m	Master	-----	4.000	13.485	24.000
Sonde Error Correction Quad - 5		Master	-----	-50.000	2.248	50.000
Sonde Error Correction Real - 6	mS/m	Master	-----	5.000	9.284	15.000
Sonde Error Correction Quad - 6		Master	-----	-30.000	5.817	30.000
Sonde Error Correction Real - 7	mS/m	Master	-----	-5.000	-1.291	5.000
Sonde Error Correction Quad - 7		Master	-----	-30.000	3.067	30.000

AIT Mud Calibration - Mud Calibration Gain

Master (EEPROM): 11:29:18 04-Mar-2014

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Coarse Gain		Master	1.000	0.800	0.805	1.200
Fine Gain		Master	1.000	0.800	0.805	1.200

AIT Electronics Check - Thru Calibration Check

Master (EEPROM): 11:29:18 04-Mar-2014 Before (Measured): 13:46:32 22-Mar-2014

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Thru Cal Mag - 0	V	Master	-----	0.363	0.624	0.847
		Before	-----	0.363	0.624	0.847
		Before-Master	-----	-----	0.000	-----
Thru Cal Phase - 0	deg	Master	-----	11.000	74.090	131.000
		Before	-----	11.000	74.726	131.000
		Before-Master	-----	-----	0.636	-----
Thru Cal Mag - 1	V	Master	-----	0.762	1.279	1.778
		Before	-----	0.762	1.280	1.778
		Before-Master	-----	-----	0.001	-----
Thru Cal Phase - 1	deg	Master	-----	10.000	73.061	130.000
		Before	-----	10.000	73.707	130.000
		Before-Master	-----	-----	0.646	-----
Thru Cal Mag - 2	V	Master	-----	0.374	0.634	0.872
		Before	-----	0.374	0.634	0.872
		Before-Master	-----	-----	0.000	-----
Thru Cal Phase - 2	deg	Master	-----	6.000	68.860	126.000
		Before	-----	6.000	69.534	126.000
		Before-Master	-----	-----	0.674	-----
Thru Cal Mag - 3	V	Master	-----	0.422	0.720	0.986
		Before	-----	0.422	0.720	0.986
		Before-Master	-----	-----	0.000	-----
Thru Cal Phase - 3	deg	Master	-----	5.000	67.958	125.000
		Before	-----	5.000	68.633	125.000
		Before-Master	-----	-----	0.675	-----
Thru Cal Mag - 4	V	Master	-----	0.802	1.341	1.872
		Before	-----	0.802	1.342	1.872
		Before-Master	-----	-----	0.001	-----
Thru Cal Phase - 4	deg	Master	-----	-1.000	60.978	119.000
		Before	-----	-1.000	61.690	119.000
		Before-Master	-----	-----	0.712	-----
Thru Cal Mag - 5	V	Master	-----	1.173	1.938	2.737
		Before	-----	1.173	1.939	2.737
		Before-Master	-----	-----	0.001	-----
Thru Cal Phase - 5	deg	Master	-----	-3.000	58.780	117.000
		Before	-----	-3.000	59.536	117.000
		Before-Master	-----	-----	0.756	-----
Thru Cal Mag - 6	V	Master	-----	1.173	1.934	2.737
		Before	-----	1.173	1.934	2.737
		Before-Master	-----	-----	0.000	-----

Thru Cal Phase - 6	deg	Master	-----	-3.000	58.846	117.000
		Before	-----	-3.000	59.602	117.000
		Before-Master	-----	-----	0.756	-----
Thru Cal Mag - 7	V	Master	-----	0.849	1.373	1.981
		Before	-----	0.849	1.377	1.981
		Before-Master	-----	-----	0.004	-----
Thru Cal Phase - 7	deg	Master	-----	-7.000	53.092	113.000
		Before	-----	-7.000	54.127	113.000
		Before-Master	-----	-----	1.035	-----
SPA Zero	mV	Master		-50.000	-0.034	50.000
		Before		-50.000	-0.060	50.000
		Before-Master	-----	-----	-0.026	-----
SPA Plus	mV	Master		941.000	992.609	1040.000
		Before		941.000	993.216	1040.000
		Before-Master	-----	-----	0.607	-----
Temperature Zero	V	Master		-0.050	0.000	0.050
		Before		-0.050	0.000	0.050
		Before-Master	-----	-----	0.000	-----
Temperature Plus	V	Master		0.870	0.920	0.960
		Before		0.870	0.920	0.960
		Before-Master	-----	-----	0.000	-----

HGNS-B (HILT Gamma-Ray and Neutron Sonde, 125 degC) Calibration - Run 1

Primary Equipment :

HILT Gamma-Ray and Neutron Sonde, 125 degC	HGNS-B	1927

Auxiliary Equipment :

HGNS Accelerometer, 125 degC	HACCZ-B	749
AmBe Neutron Logging Source	NSR-F	5069

Calibration Parameter :

Water Temperature	
Housing Size	
JIG-BKG (Jig minus background reference)	165

HGNS Accelerometer Calibration - Accelerometer Accumulations

Before (Measured): 03:14:31 23-Mar-2014

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
AZ Vertical Measurement	ft/s2	Before	32.2	31.5	32.2	32.8

HGNS Accelerometer EEPROM - Accelerometer EEPROM Read

Master (EEPROM): 00:00:00 15-Mar-2001

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Accelerometer Manufacturer		Master			Sunstrand	
Accelerometer Reference Temperature	degF	Master		30.2	68.0	122.0
Accelerometer Coefficients - 0		Master	-----	-----	-5693.000	-----
Accelerometer Coefficients - 1		Master	-----	-----	20.390	-----
Accelerometer Coefficients - 2		Master	-----	-----	-0.031	-----
Accelerometer Coefficients - 3		Master	-----	-----	0.000	-----
Accelerometer Coefficients - 4		Master	-----	-----	2.141	-----
Accelerometer Coefficients - 5		Master	-----	-----	0.000	-----
Accelerometer Coefficients - 6		Master	-----	-----	0.000	-----
Accelerometer Coefficients - 7		Master	-----	-----	0.000	-----
Accelerometer Coefficients - 8		Master	-----	-----	295.800	-----
Accelerometer Coefficients - 9		Master	-----	-----	1.031	-----

HGNS Neutron Calibration - HGNS Neutron Accumulations

Master (EEPROM): 13:47:48 13-Mar-2014 Before (Measured): 13:58:42 22-Mar-2014

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Near Zero Measurement	1/s	Master	0	5.0	26.5	40.0
		Before	0	5.0	26.6	40.0
		Before-Master	-----	-4.0	0.1	4.0
Far Zero Measurement	1/s	Master	0	5.0	28.3	40.0
		Before	0	5.0	28.3	40.0
		Before-Master	-----	-4.2	0.0	4.2

Near Plus Measurement	1/s	Master	6031.0	4700.0	4878.0	6900.0	
		Before	-----	-----	-----	-----	
		Before-Master	-----	-----	-----	-----	
Far Plus Measurement	1/s	Master	2793.0	1900.0	2053.0	2900.0	
		Before	-----	-----	-----	-----	
		Before-Master	-----	-----	-----	-----	
Near Corrected Plus Measurement	1/s	Master		4700.0	4935.0	6900.0	
		Before	-----	-----	-----	-----	
		Before-Master	-----	-----	-----	-----	
Far Corrected Plus Measurement	1/s	Master		1900.0	2077.0	2900.0	
		Before	-----	-----	-----	-----	
		Before-Master	-----	-----	-----	-----	

HGNS Gamma-Ray Calibration - Gamma-Ray Accumulations

Before (Measured): 13:56:48 22-Mar-2014

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
RGR Zero Measurement	gAPI	Before	30.0	0	77.9	120.0
RGR Plus Measurement	gAPI	Before	185.4	157.1	170.4	206.3
GR Calibration Gain		Before	0.89	0.80	0.97	1.05

PPC-B (Powered Positioning device and Caliper.) Calibration - Run 1

Primary Equipment :

PPC-B Element is used for usual logging at wellsite and check/diagnostics.	PPC-B	8352

Auxiliary Equipment :

PPC-B Element is used for usual logging at wellsite and check/diagnostics.	PPC-B	8352

Calibration Parameter :

ZERO_REF

PLUS_REF

Equipment Properties :

Caliper Arm Equipment Type for PPC	PPC_CAL_STD

PPC Check - Downhole Electronics Test

Before (Measured): 13:44:44 22-Mar-2014

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Positive Analog Voltage	V	Before		7	8.65488	9
Minus Analog Voltage	V	Before		-9	-8.72813	-7
Digital Voltage	V	Before		3.15	3.37646	3.45
Digital Voltage for Analog Digital Converter	V	Before		4.5	5.01182	5.5
Status Word of Analog Digital Converter Offset		Before		-8	1	8

PPC Check - Cartridge Temperature Test

Before (Measured): 13:44:44 22-Mar-2014

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Cartridge Temperature	degF	Before		-58	56.6874	482

PPC Check - Power Control LVDT Test

Before (Measured): 13:44:44 22-Mar-2014

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
LVDT5 Caliper Open Position	in	Before			-1.26538	
LVDT5 Full Power Position	in	Before			1.41431	

PPC Diagnostics - Arm Close Position Test

Master:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Caliper-arm 1, radius raw - 0	in	Master	-----	-----	-----	-----
Caliper-arm 2, radius raw - 0	in	Master	-----	-----	-----	-----
Caliper-arm 3, radius raw - 0	in	Master	-----	-----	-----	-----
Caliper-arm 4, radius raw - 0	in	Master	-----	-----	-----	-----
Power Control LVDT - 0	in	Master	-----	-----	-----	-----
LVDT excitation - 0	V	Master	-----	-----	-----	-----

PPC Diagnostics - Downhole Electronics Test

Master:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit

Positive Analog Voltage - 0	V	Master	-----	-----	-----	-----	
Minus Analog Voltage - 0	V	Master	-----	-----	-----	-----	
Digital Voltage - 0	V	Master	-----	-----	-----	-----	
Digital Voltage for Analog Digital Converter - 0	V	Master	-----	-----	-----	-----	
Status Word of Analog Digital Converter Offset - 0		Master	-----	-----	-----	-----	

PPC Diagnostics - RBS Test

Master:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Relative Bearing - 0	deg	Master	-----	-----	-----	-----	
Potentiometer Excitation - 0	V	Master	-----	-----	-----	-----	

PPC Diagnostics - Cartridge Temperature Test

Master:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Cartridge Temperature - 0	degF	Master	-----	-----	-----	-----	

PPC Diagnostics - Power Control LVDT Test

Master:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
LVDT5 Caliper Open Position - 0	in	Master	-----	-----	-----	-----	
LVDT5 Full Power Position - 0	in	Master	-----	-----	-----	-----	

PPC LVDT5 Master Calibration - PPC CaliCoefficients

Master (EEPROM): 13:56:00 22-Mar-2014

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
CCS	in	Master	-1.51		-1.47498		
COP	in	Master	-1.31		-1.26538		
CPW	in	Master	1.41		1.41431		

PPC Caliper Calibration - PPC CaliCoefficients

Before (Manual Entry): 05:44:46 23-Mar-2014

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
RD1_GAIN		Before	1	0.85	1.08717	1.15	
RD2_GAIN		Before	1	0.85	1.01853	1.15	
RD3_GAIN		Before	1	0.85	1.06258	1.15	
RD4_GAIN		Before	1	0.85	0.997322	1.15	
RD1_OFFSET	in	Before	0	-2.2	-2.1976	2.6	
RD2_OFFSET	in	Before	0	-2.2	-0.336791	2.6	
RD3_OFFSET	in	Before	0	-2.2	-2.16541	2.6	
RD4_OFFSET	in	Before	0	-2.2	0.288115	2.6	

PPC Caliper Calibration - PPC Accumulations

Before (Manual Entry): 05:44:46 23-Mar-2014

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Caliper 1 Zero Radius - 0	in	Before	-----	-----	-----	-----	
Caliper 2 Zero Radius - 0	in	Before	-----	-----	-----	-----	
Caliper 3 Zero Radius - 0	in	Before	-----	-----	-----	-----	
Caliper 4 Zero Radius - 0	in	Before	-----	-----	-----	-----	
Caliper 1 Plus Radius - 0	in	Before	-----	-----	-----	-----	
Caliper 2 Plus Radius - 0	in	Before	-----	-----	-----	-----	
Caliper 3 Plus Radius - 0	in	Before	-----	-----	-----	-----	
Caliper 4 Plus Radius - 0	in	Before	-----	-----	-----	-----	

Company:	Noble Energy Inc
Well:	Romero PC G10-79HN
Field:	Wattenberg
County:	Weld
State:	Colorado

Schlumberger

Platform Express

AIT-PPC-GR