MUD	County: Weld

Schlumberger

Company: **Kerr−McGee Oil & Gas Onshore, LP**

Well: **Frank 3−5**

Field: **Wattenberg**

County: **Weld** State: **Colorado**

Field: Wattenberg
Location: SENW Sec. 5 , T 5N , R 67W
Well: Frank 3−5
Company: Kerr−McGee Oil & Gas Onshore,

Platform Express
Array Induction
with Linear Correlation

LOCATION

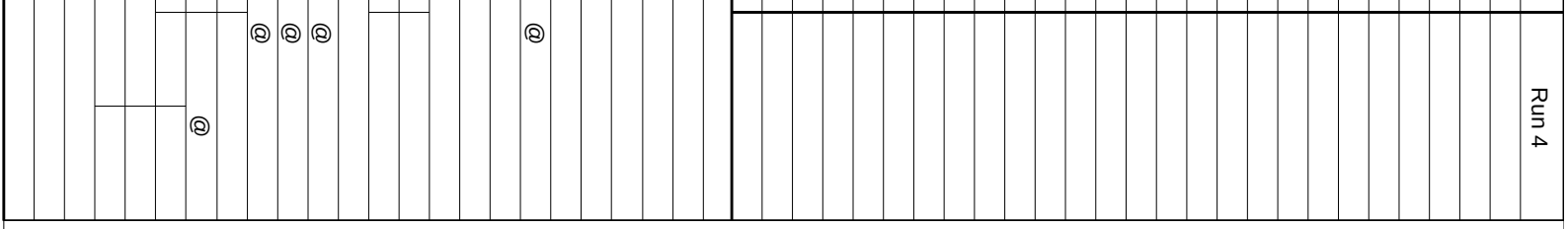
SENW Sec. 5 , T 5N , R 67W
SHL: 2408' FNL / 2318' FWL SENW
BHL: 672' FNL / 2114' FWL NENW (est.)

Elev.: K.B. 4895.00 ft
G.L. 4880.00 ft
D.F. 4894.00 ft

Permanent Datum: Ground Level Elev.: 4880.00 ft
Log Measured From: Kelly Bushing 15.00 ft above Perm. Datum
Drilling Measured From: Kelly Bushing

API Serial No.	Section	Township	Range
05−123−29626−0000	5	5N	67W

	Run 1	Run 2	Run 3
Logging Date	27−Feb−2010		
Run Number	1		
Depth Driller	8177 ft		
Schlumberger Depth	8138 ft		
Bottom Log Interval	8130 ft		
Top Log Interval	771 ft		
Casing Driller Size @ Depth	8.625 in @ 771 ft	@	
Casing Schlumberger	771 ft		
Bit Size	7.875 in		
Type Fluid In Hole	Fresh Water		
MUD Density / Viscosity	8.33 lbm/gal / 25 s		
MUD Fluid Loss / PH	/		
MUD Source Of Sample	Flowline		
RM @ Measured Temperature	1.130 ohm.m @ 55 degF	@	
RMF @ Measured Temperature	0.848 ohm.m @ 55 degF	@	
RMC @ Measured Temperature	1.695 ohm.m @ 55 degF	@	
Source RMF / RMC	Calculated / Calculated	/	
RM @ MRT / RMF @ MRT	0.310 @ 220 / 0.232 @ 220	@ / @	@ / @ / @
Maximum Recorded Temperatures	220 degF		
Circulation Stopped Time	27−Feb−2010 19:00		
Logger On Bottom Time	28−Feb−2010 0:20		
Unit Number / Location	3055 / Fort Morgan, CO	/	
Recorded By	Jared R. Hoskins		
Witnessed By	Marvin Hackworth, Tekabe Gedamu		



DEPTH SUMMARY LISTING

Date Created: 28−FEB−2010 0:50:11

Depth System Equipment

Depth Measuring Device		Tension Device		Logging Cable	
Type:	IDW−B	Type:	CMTD−B/A	Type:	7−39P LXS
Serial Number:	799	Serial Number:	1223	Serial Number:	708273
Calibration Date:	1−Oct−2009	Calibration Date:	11−Feb−10	Length:	12240 FT
Calibrator Serial Number:	33	Calibrator Serial Number:	100513		
Calibration Cable Type:	7−46P	Number of Calibration Points:	0	Conveyance Method:	Wireline
Wheel Correction 1:	−4			Rig Type:	LAND
Wheel Correction 2:	−5				

Depth Control Parameters

Log Sequence:	First Log In the Well
Rig Up Length At Surface:	0.00 FT
Rig Up Length At Bottom:	0.00 FT
Rig Up Length Correction:	0.00 FT
Stretch Correction:	11.00 FT
Tool Zero Check At Surface:	0.00 FT

Depth Control Remarks

1. All Schlumberger depth policy procedures applied
2. This is the primary depth reference
3.
4.
5.
6.

OTHER SERVICES1	OTHER SERVICES2
OS1: None	OS1:
OS2:	OS2:
OS3:	OS3:
OS4:	OS4:
OS5:	OS5:
REMARKS: RUN NUMBER 1	REMARKS: RUN NUMBER 2
1. This is the first run in hole.	
2. Tool run as per tool sketch.	
3. Matrix changes as noted on the porosity logs	
4. Rmf and Rmc calculated using GEN−7	
5. Do to hole conditions main pass was made first	
6. Caliper closed between 7993−8117 ft.	
7. Abnormal S−curve well according to directional survey	

Rig: Xtreme 11

Crew: Tim Ludgate, Dave Marquez

RUN 1			RUN 2		
SERVICE ORDER #:	BCEK−00007		SERVICE ORDER #:		
PROGRAM VERSION:	17C0−154		PROGRAM VERSION:		
FLUID LEVEL:			FLUID LEVEL:		
LOGGED INTERVAL	START	STOP	LOGGED INTERVAL	START	STOP

EQUIPMENT DESCRIPTION

RUN 1

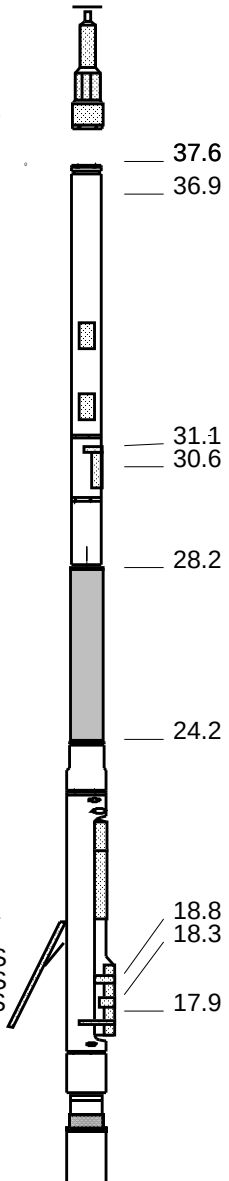
SURFACE EQUIPMENT

WITM (CTS)−A
GSR−U/Y
NCT−B
CNB−AB
NCS−VB

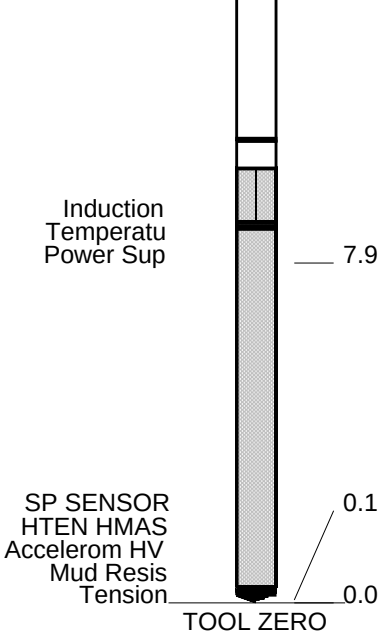
DOWNHOLE EQUIPMENT

LEH−QT 40.6
LEH−QT

HILTB−CTS 37.6
HGNSC−B
HMCA
TCC−B
HGNH
NLS−KL
NSR−F 5168
HACCZ 419
HCNT
HGR
HRCC−B
HRMS−B
HRGD−B
GLS−VJ 5363
MCFL Device
HILT Nucl. LS 42767
HILT Nucl. SS 42767
HILT Nucl. BS 42767
AIT−H
AHIS−BA 397
AHRM−A
NPV−N

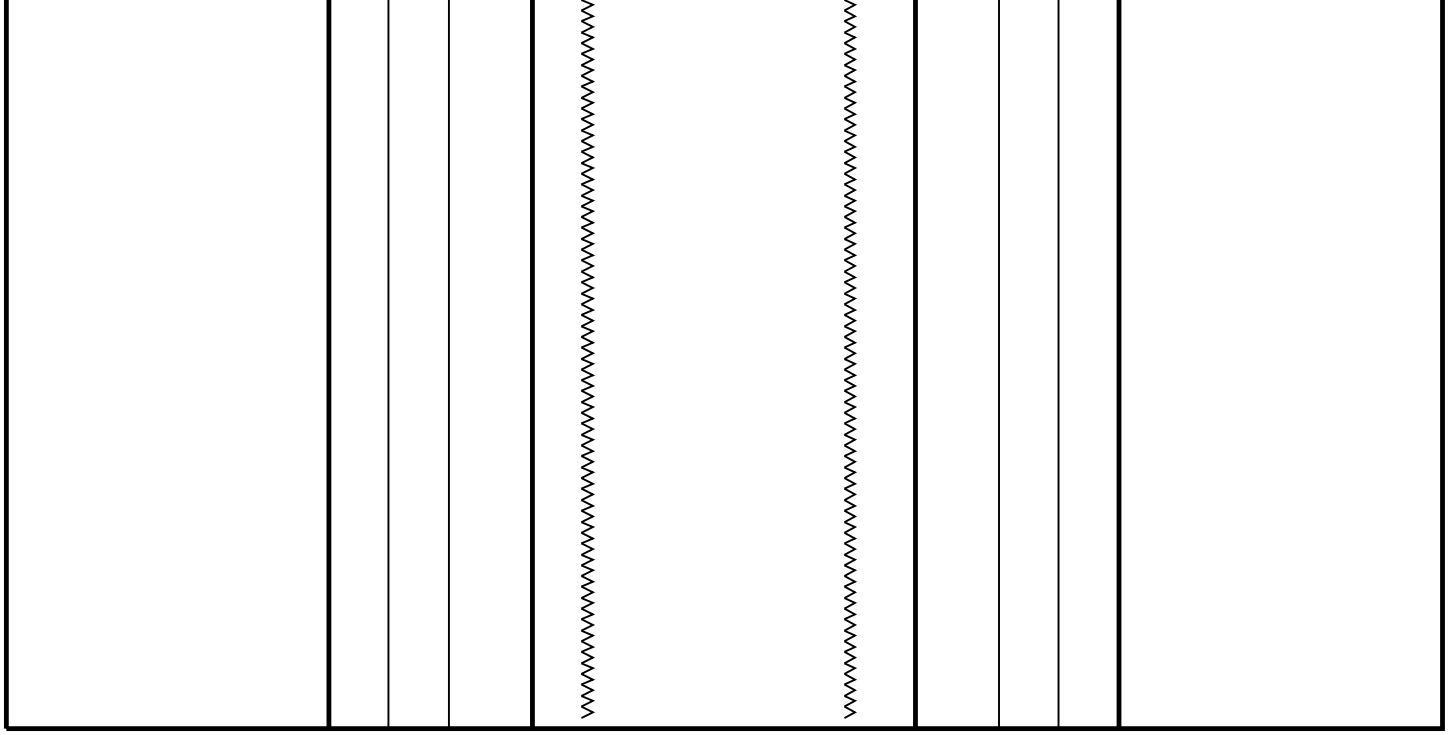


RUN 2



MAXIMUM STRING DIAMETER 4.63 IN
MEASUREMENTS RELATIVE TO TOOL ZERO
ALL LENGTHS IN FEET

Production String	(in) OD	(in) ID	(ft) MD	Well Schematic	(ft) MD	(in) OD	(in) ID	Casing String
					0.0	8.625	8.097	Casing String
					771.0	8.625	8.097	Casing Shoe
					771.0	7.875		Borehole Segment



All depths are driller’s depths

Schlumberger

RESISTIVITY LINEAR 2" = 100’

MAXIS Field Log

Input DLIS Files

	HILTC .020	FN:19		28−Feb−2010 02:16	8201.0 FT	750.0 FT

Output DLIS Files

DEFAULT	AIT_TLD_MCFL_CNL_024PUP	FN:24	PRODUCER	28−Feb−2010 02:34	8201.0 FT	750.0 FT

Integrated Hole/Cement Volume Summary

Hole Volume = 2612.94 F3

Cement Volume = 1799.22 F3 (assuming 4.50 IN casing O.D.)

Computed from 8138.0 FT to 771.0 FT using data channel(s) HCAL

OP System Version: 17C0−154

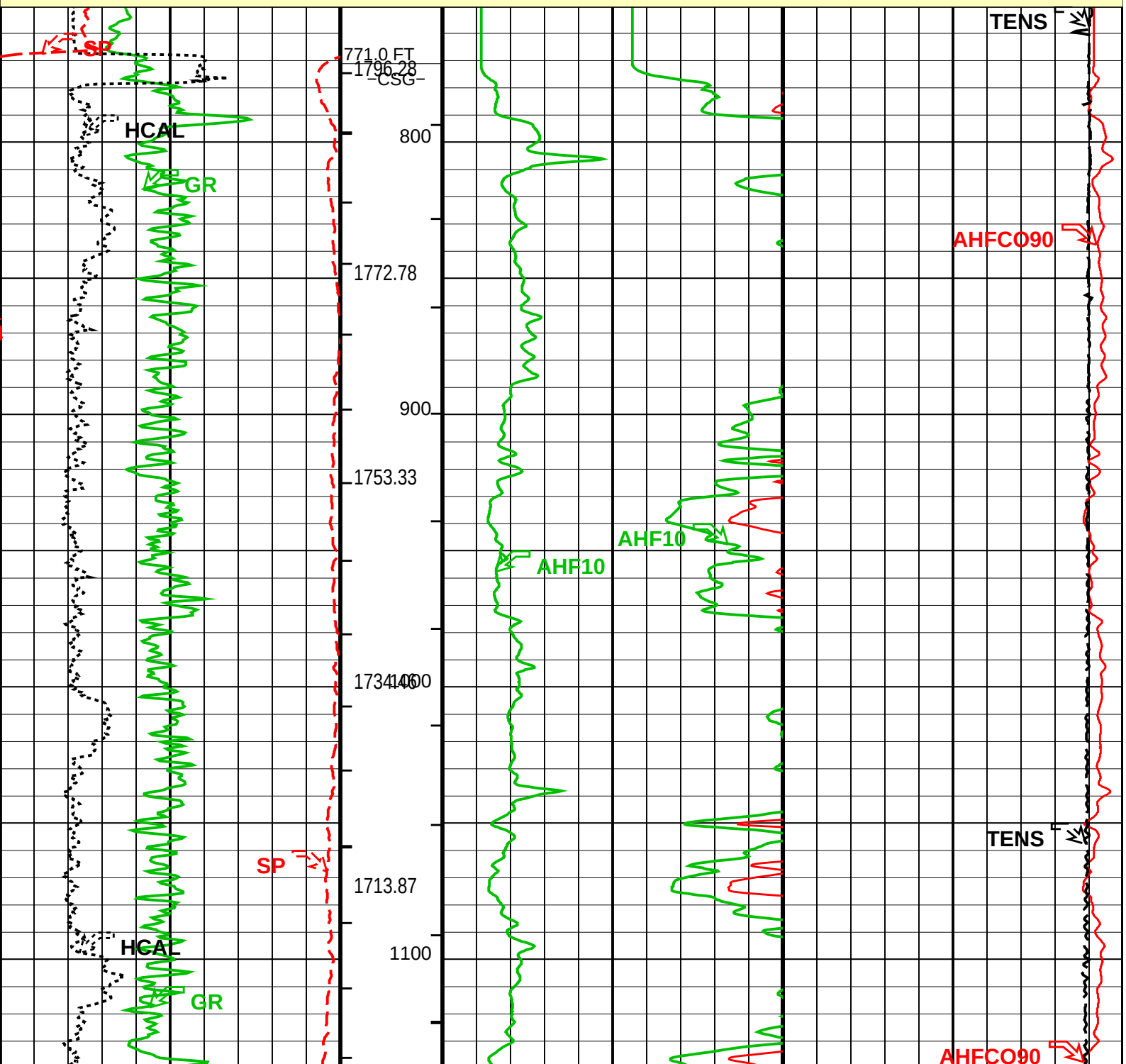
HILTB−CTS	17C0−154

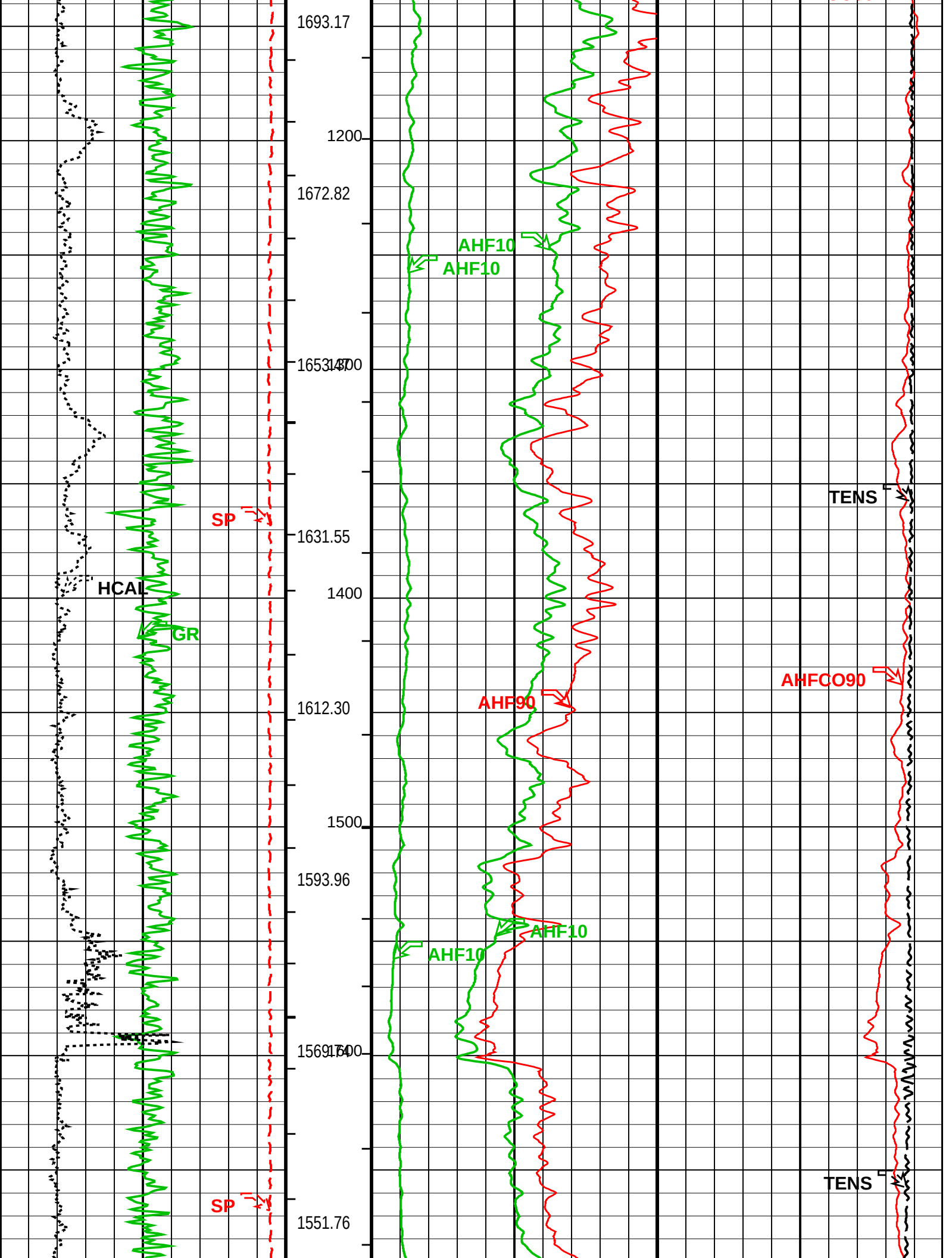
PIP SUMMARY

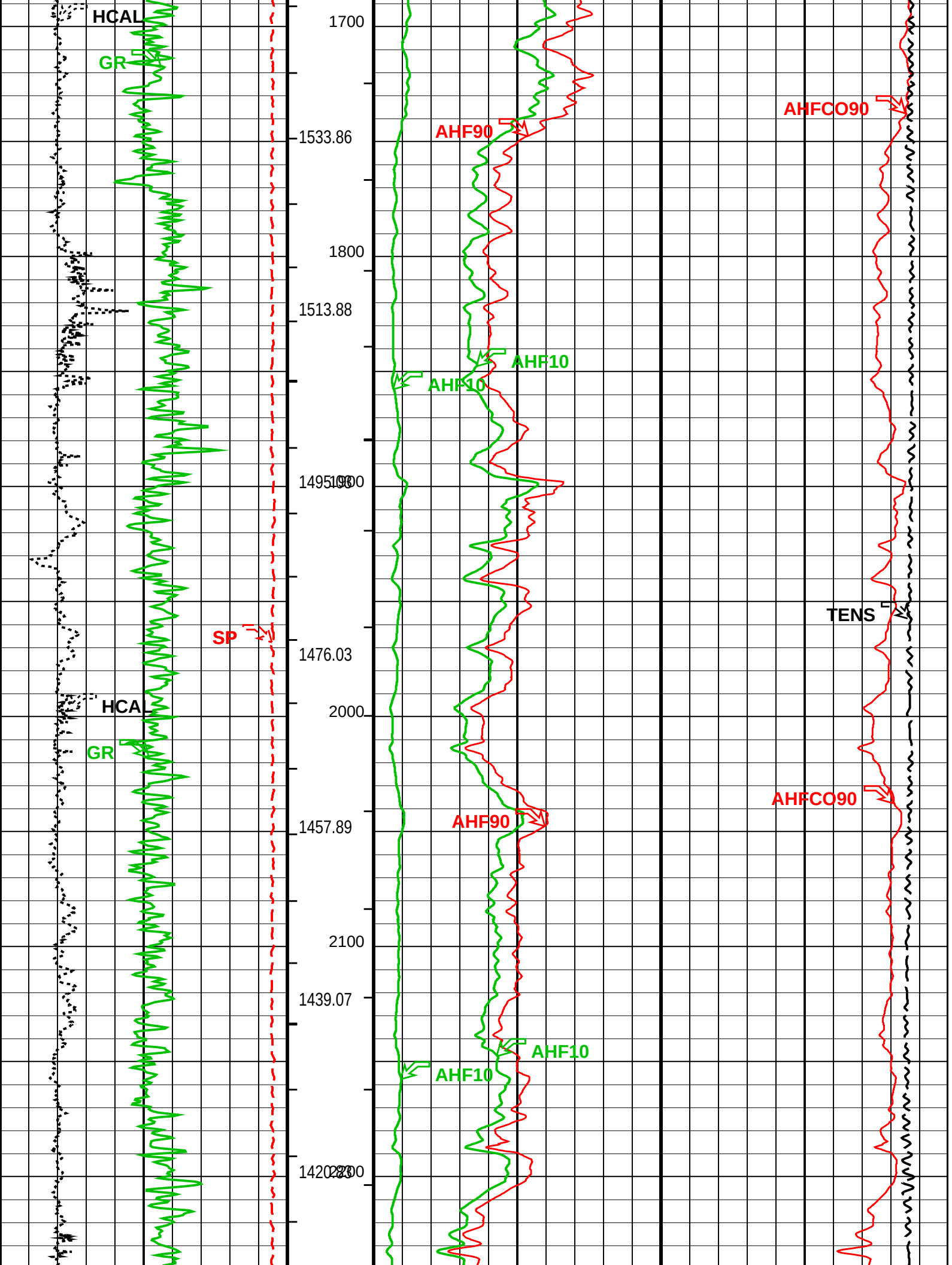
Integrated Cement Volume Major Pip Every 100 F3
Integrated Cement Volume Minor Pip Every 10 F3
Integrated Hole Volume Major Pip Every 100 F3
Integrated Hole Volume Minor Pip Every 10 F3

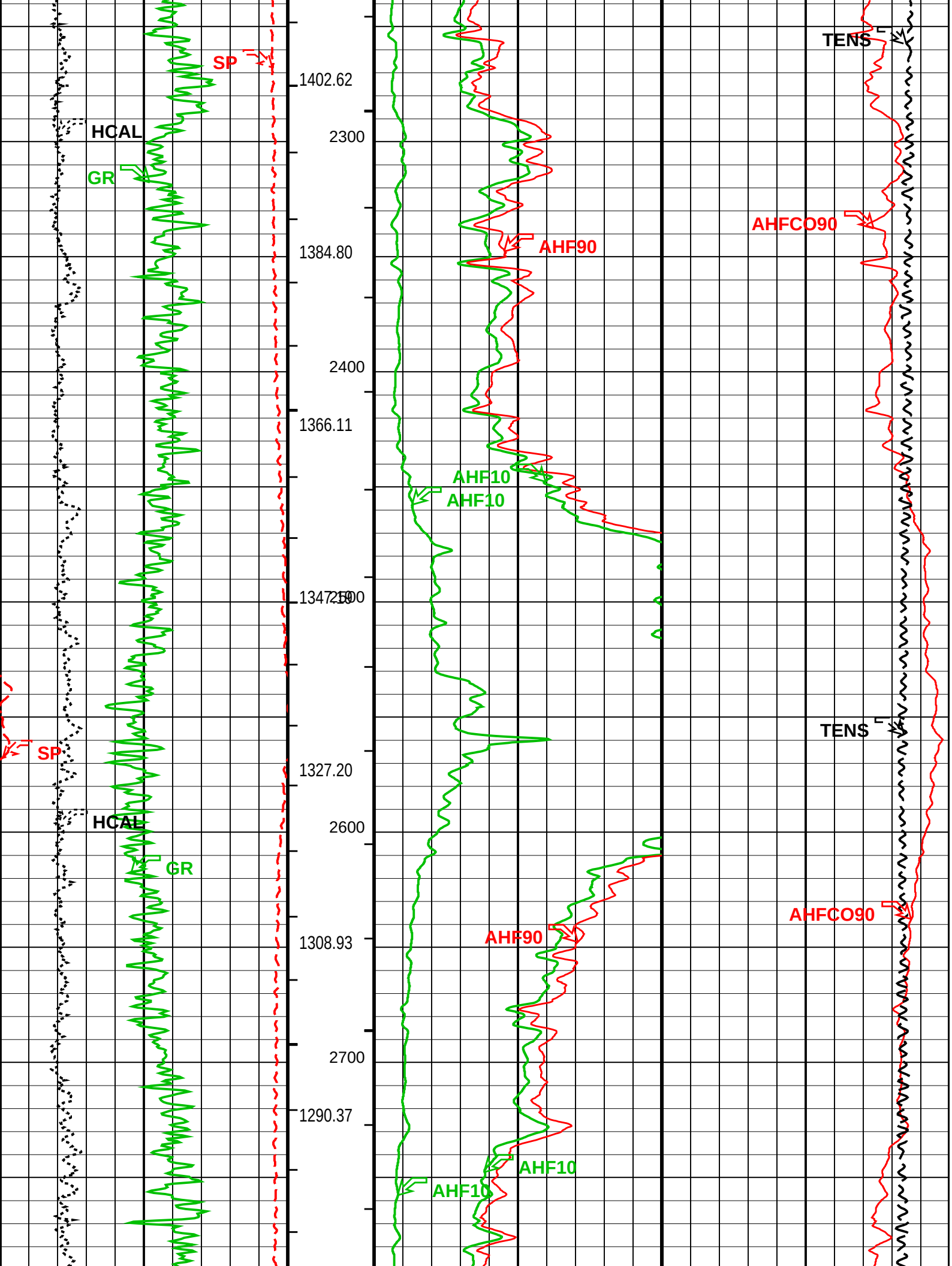
SP (SP) −160 (MV) 40			
Caliper (HCAL) 6 (IN) 16		AIT−H 90 Inch Investigation (AHF90) 0 (OHMM) 10	
Gamma Ray (GR) 0 (GAPI) 200		AIT−H 10 Inch Investigation (AHF10) 0 (OHMM) 10	Tension (TENS) 10000 (LBF) 0
Gamma Ray Backup	Cement Volume (ICV) (F3)	AIT−H 10 Inch Investigation (AHF10) 0 (OHMM) 50	AIT−H 90 Inch Investigation Conductivity (AHFCO90) 1000 (MM/M) 0

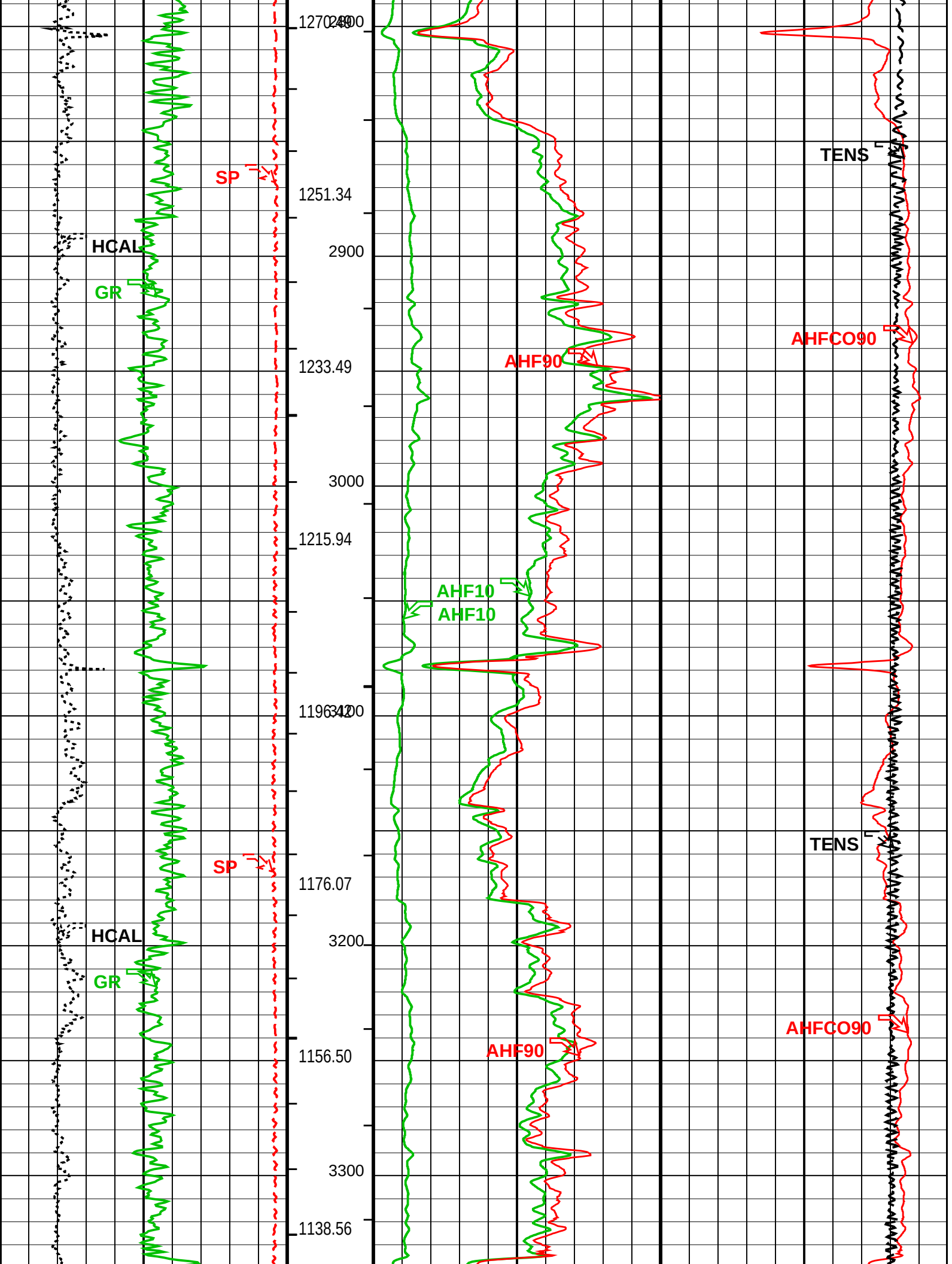
MAIN PASS: *** PLATFORM EXPRESS − ARRAY INDUCTION ***

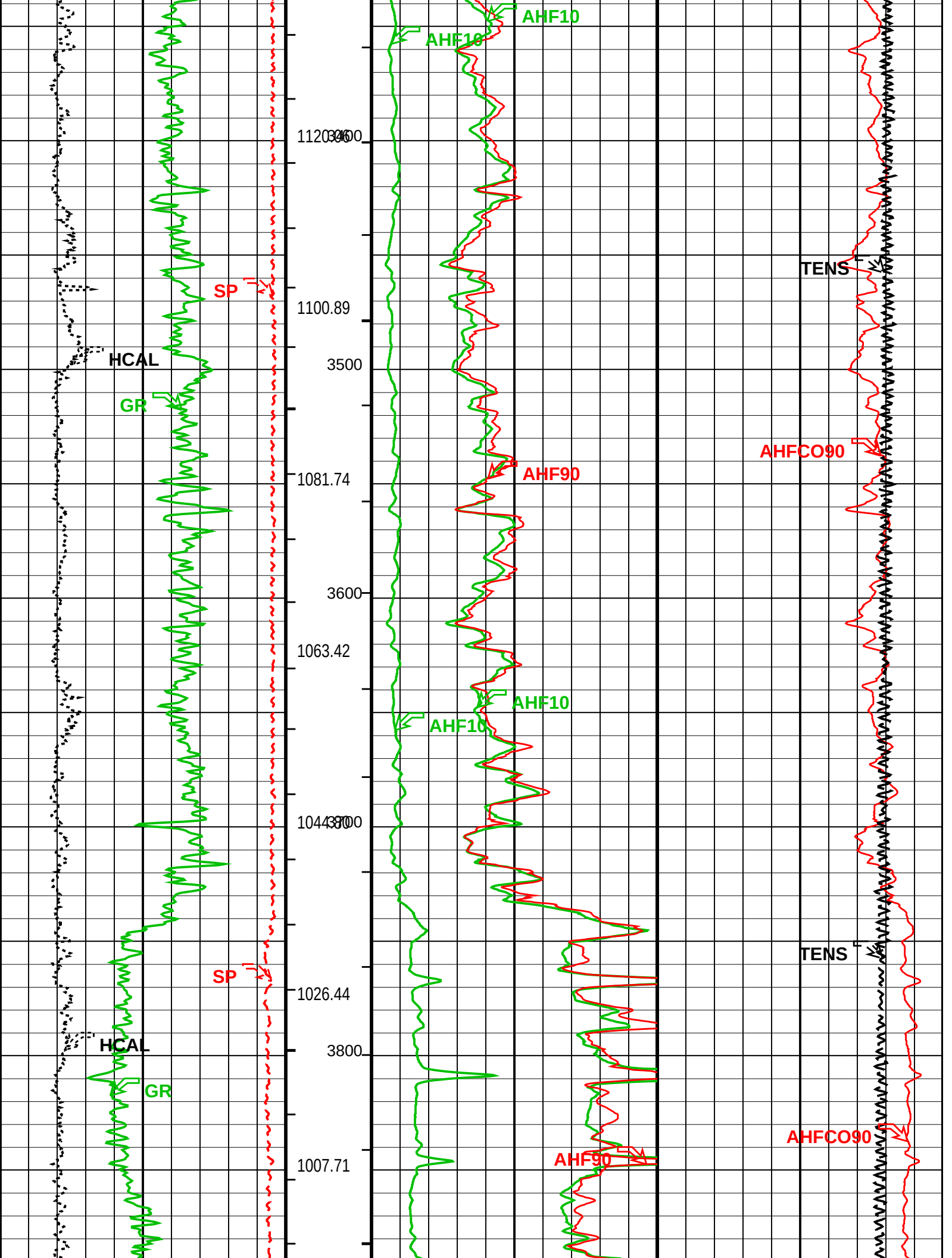


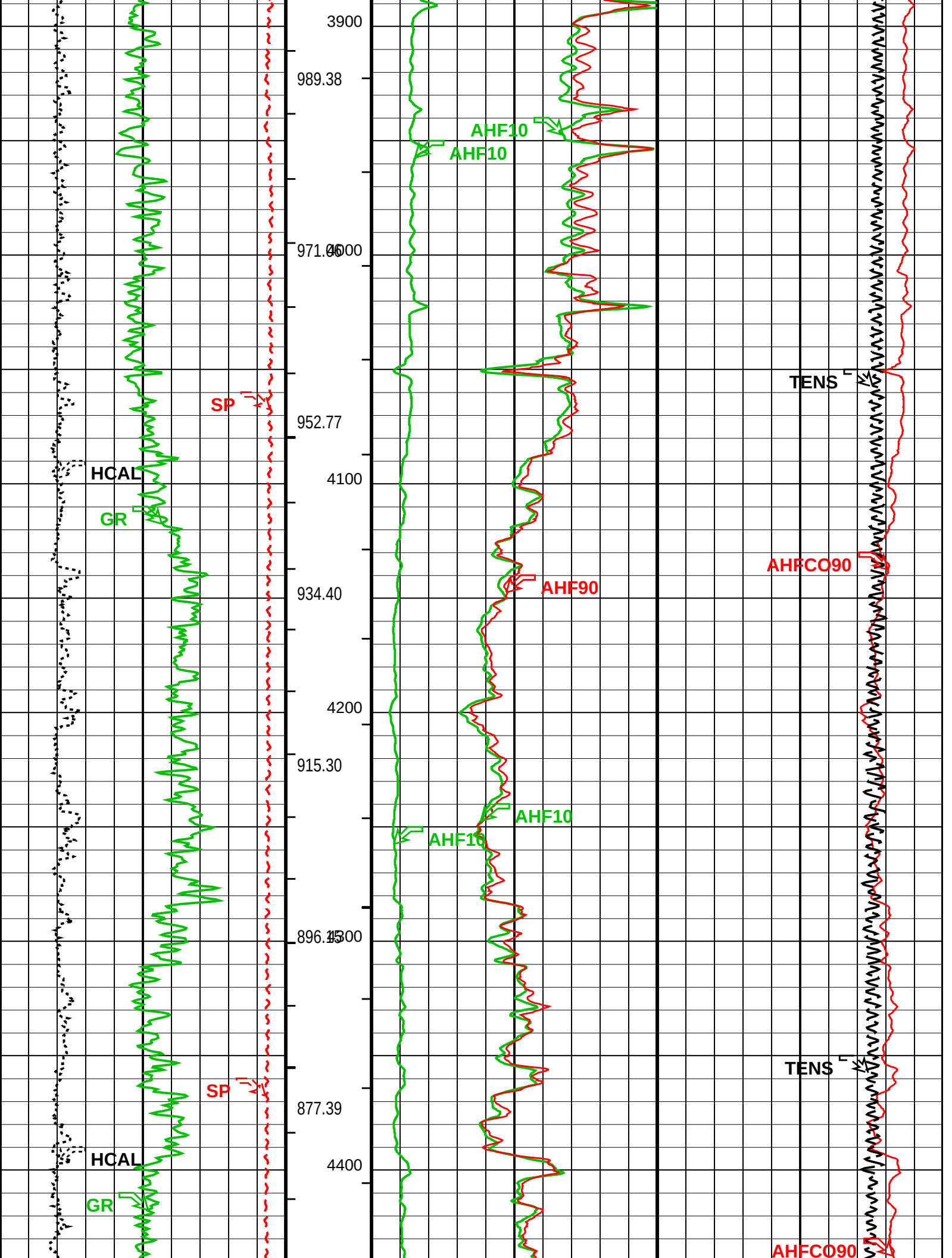

1693.17
1200
1672.82
AHF10
AHF10
1653.47
1700
TENS
SP
1631.55
HCAL
1400
GR
AHFCO90
AHF90
1612.30
1500
1593.96
AHF10
AHF10
1569.64
1600
TENS
SP
1551.76

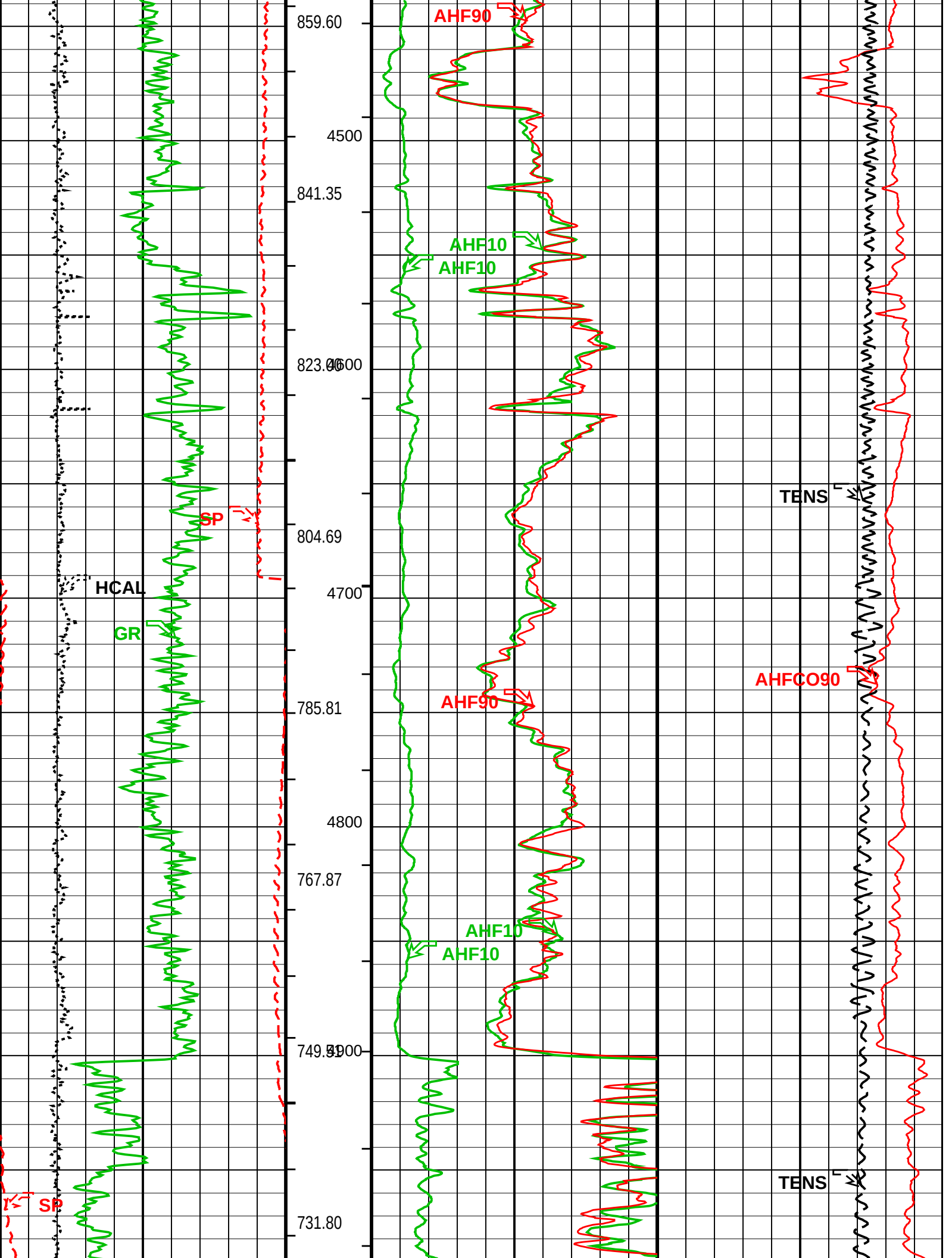

HCAL
GR
SP
HCAL
GR
1700
1533.86
1800
1513.88
1495.98
1900
1476.03
2000
1457.89
2100
1439.07
1420.23
2200
AHF90
AHF10
AHF10
AHF90
AHF10
AHF10
AHFCO90
TENS
AHFCO90

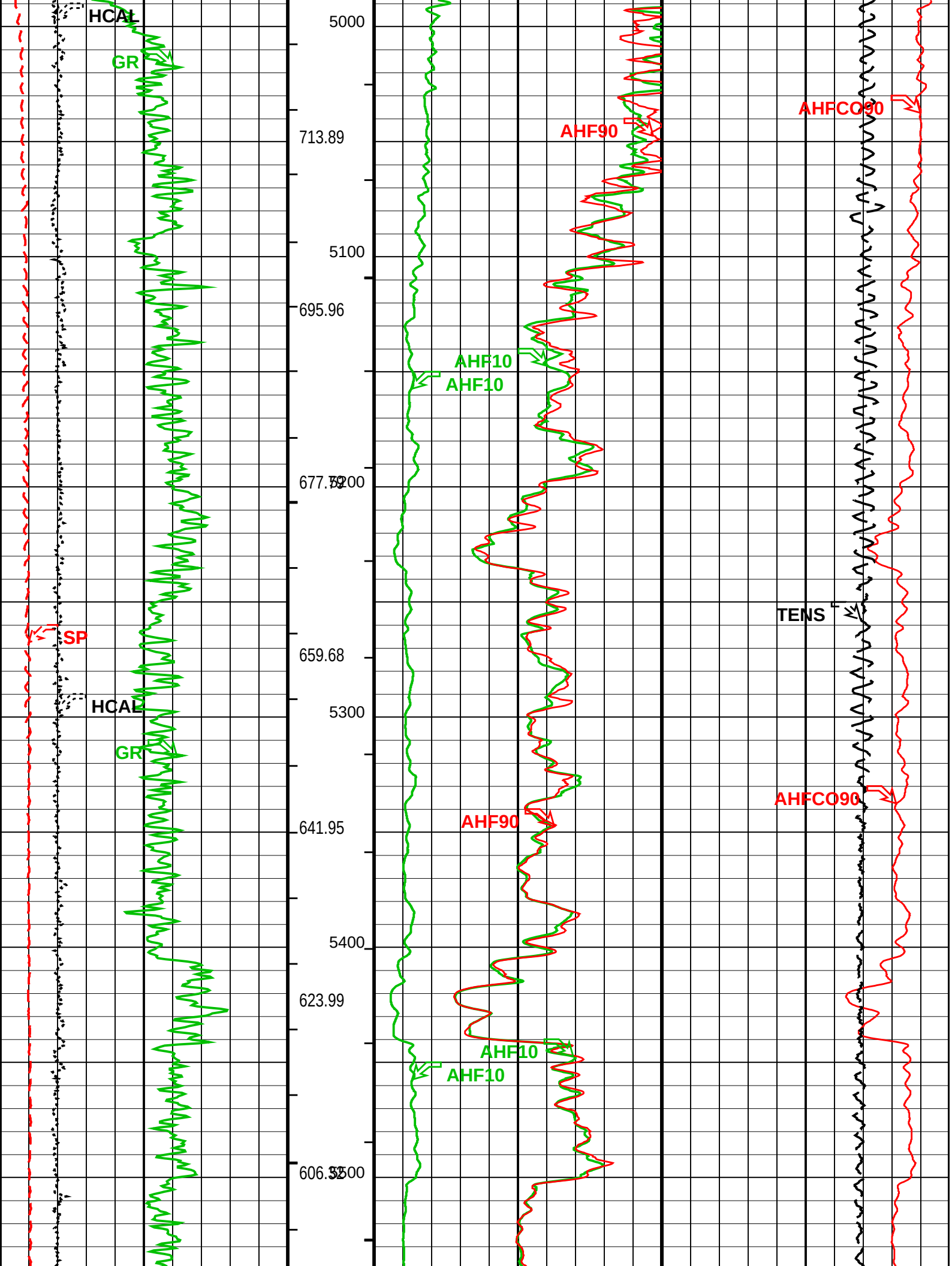

SP
HCAL
GR
1402.62
2300
1384.80
2400
1366.11
1347.59
2500
1327.20
2600
1308.93
2700
1290.37
TENS
AHFCO90
AHF90
AHF10
AHF10
SP
HCAL
GR
TENS
AHFCO90
AHF90
AHF10
AHF10

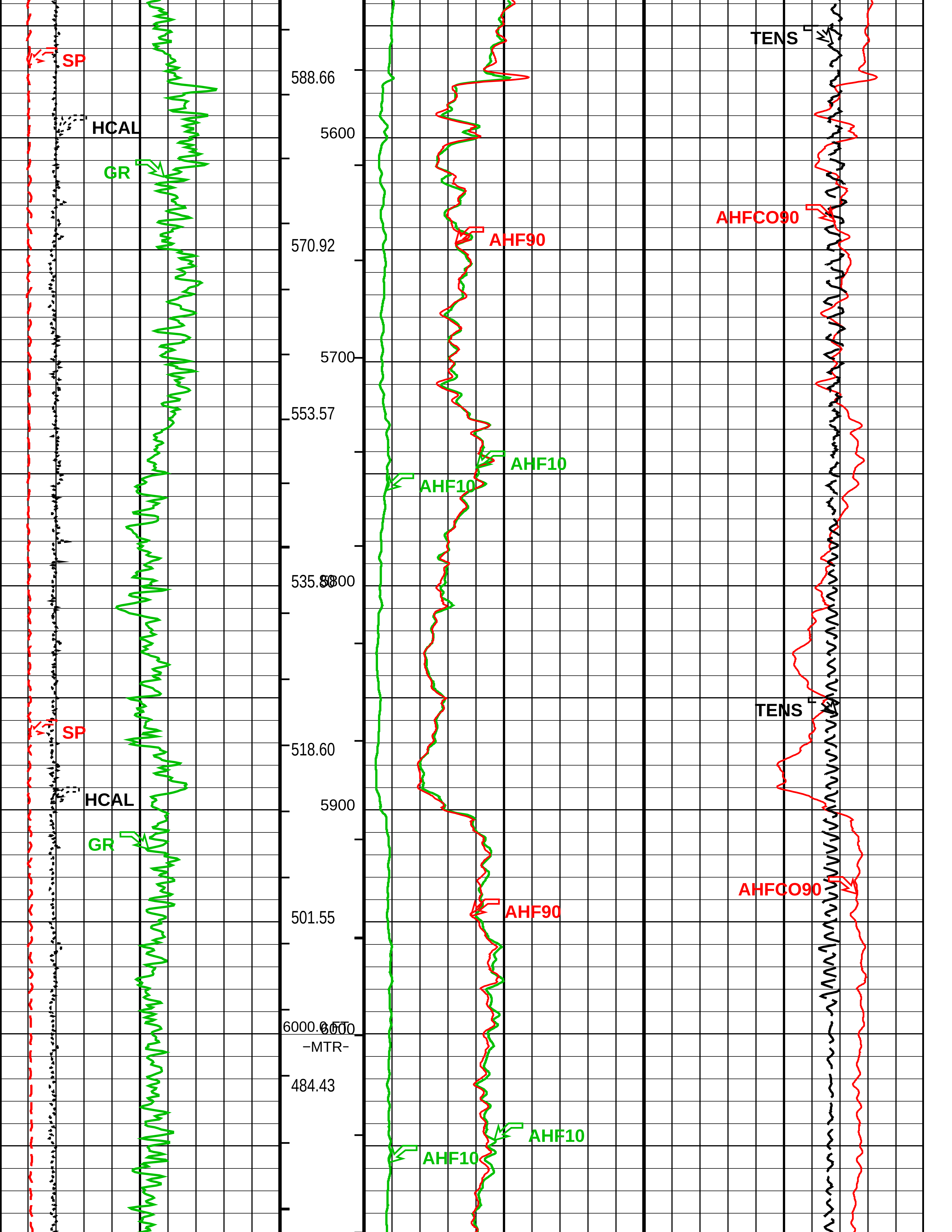

1270.49
2900
1251.34
2900
1233.49
3000
1215.94
3100
1196.42
3200
1176.07
3200
1156.50
3300
1138.56
SP
HCAL
GR
SP
HCAL
GR
AHF10
AHF10
AHF90
AHF90
TENS
AHFCO90
TENS
AHFCO90

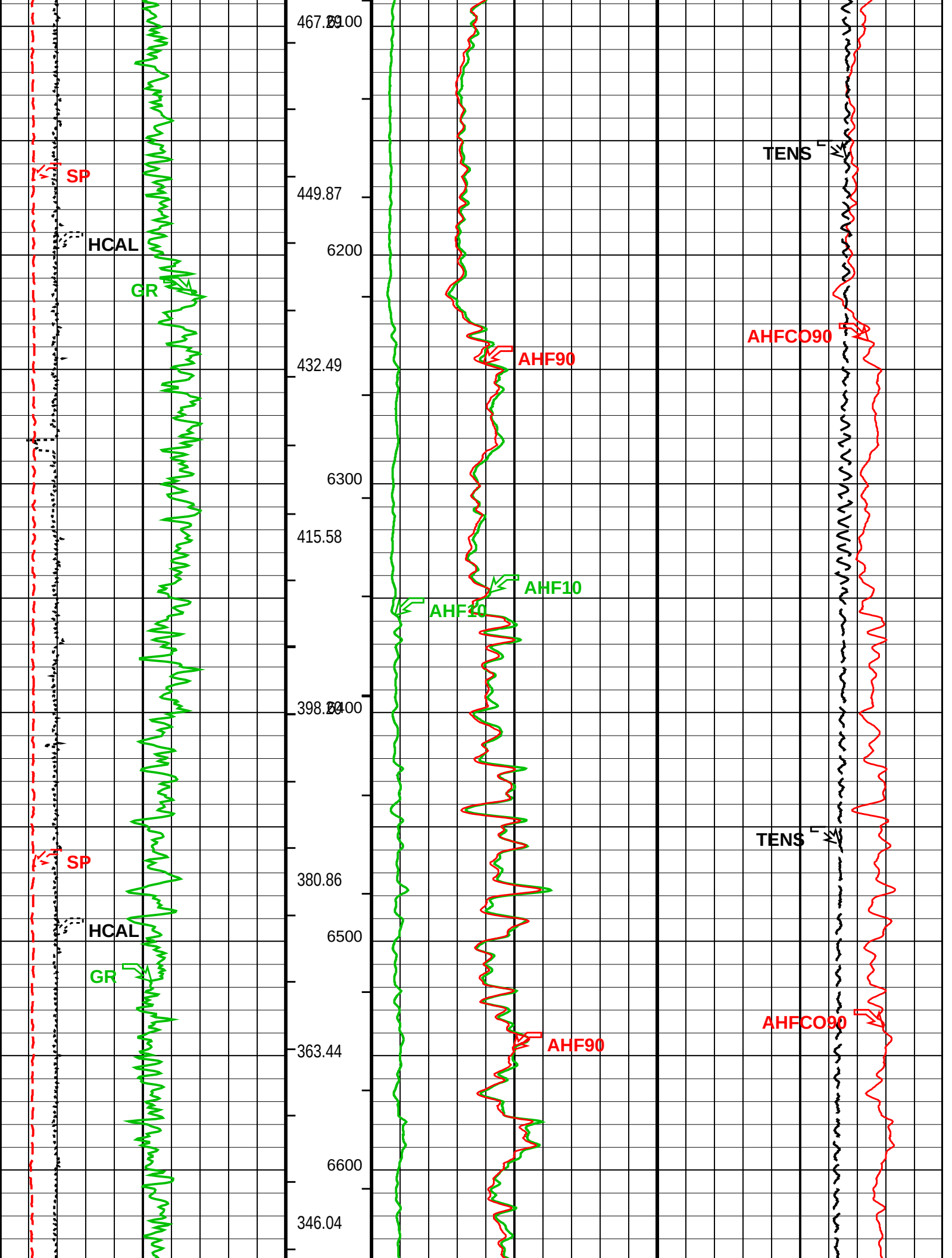

AHF10
AHF10
1120.46
3400
SP
1100.89
HCAL
3500
GR
AHF90
1081.74
3600
1063.42
AHF10
AHF10
1044.30
3700
SP
1026.44
HCAL
3800
GR
1007.71
AHF90
TENS
AHFCO90
TENS
AHFCO90

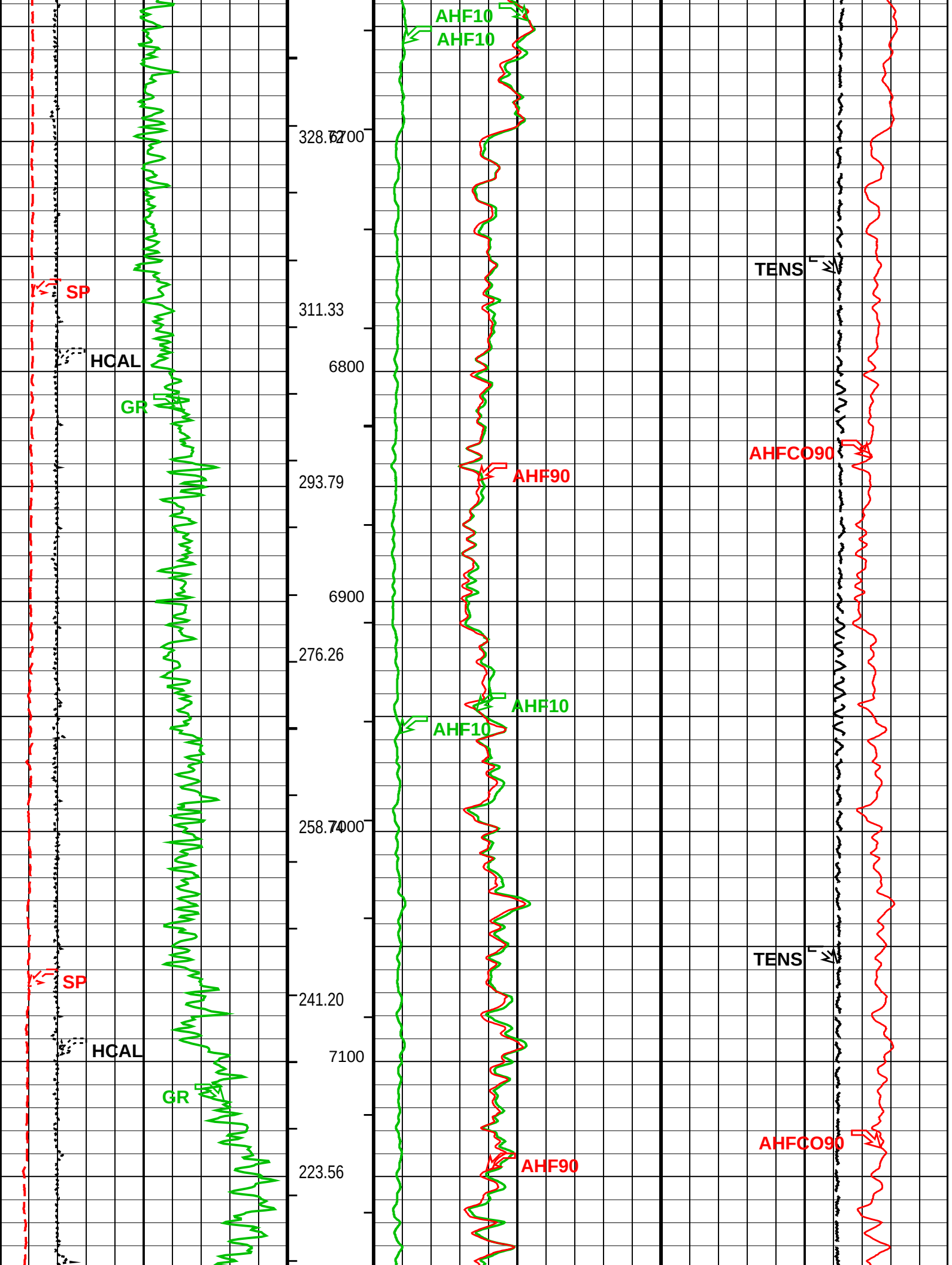

3900
989.38
AHF10
AHF10
971.46
4000
TENS
SP
952.77
HCAL
4100
GR
AHFCO90
AHF90
934.40
4200
915.30
AHF10
AHF10
896.15
4300
TENS
SP
877.39
HCAL
4400
GR
AHFCO90


AHF90
859.60
4500
841.35
AHF10
AHF10
823.06
4600
SP
804.69
HCAL
4700
GR
AHF90
785.81
4800
767.87
AHF10
AHF10
749.93
4900
731.80
SP
TENS
AHFCO90
TENS


HCAL
GR
SP
HCAL
GR
5000
713.89
5100
695.96
AHF10
AHF10
677.72
5200
659.68
5300
641.95
AHF90
5400
623.99
AHF10
AHF10
606.32
5500
AHF90
AHFCO90
TENS
AHFCO90


SP
HCAL
GR
TENS
588.66
5600
AHFCO90
AHF90
570.92
5700
553.57
AHF10
AHF10
535.88
5800
TENS
SP
518.60
HCAL
5900
GR
AHFCO90
AHF90
501.55
6000.0 FT
6000
−MTR−
484.43
AHF10
AHF10


SP
HCAL
GR
SP
HCAL
GR
467.29
6100
449.87
6200
432.49
6300
415.58
6400
398.24
380.86
6500
363.44
6600
346.04
AHF90
AHF10
AHF10
AHF90
TENS
AHFCO90
TENS
AHFCO90


AHF10
AHF10
328.67
6700
TENS
SP
311.33
HCAL
6800
GR
AHFCO90
AHF90
293.79
6900
276.26
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AHF10
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TENS
SP
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HCAL
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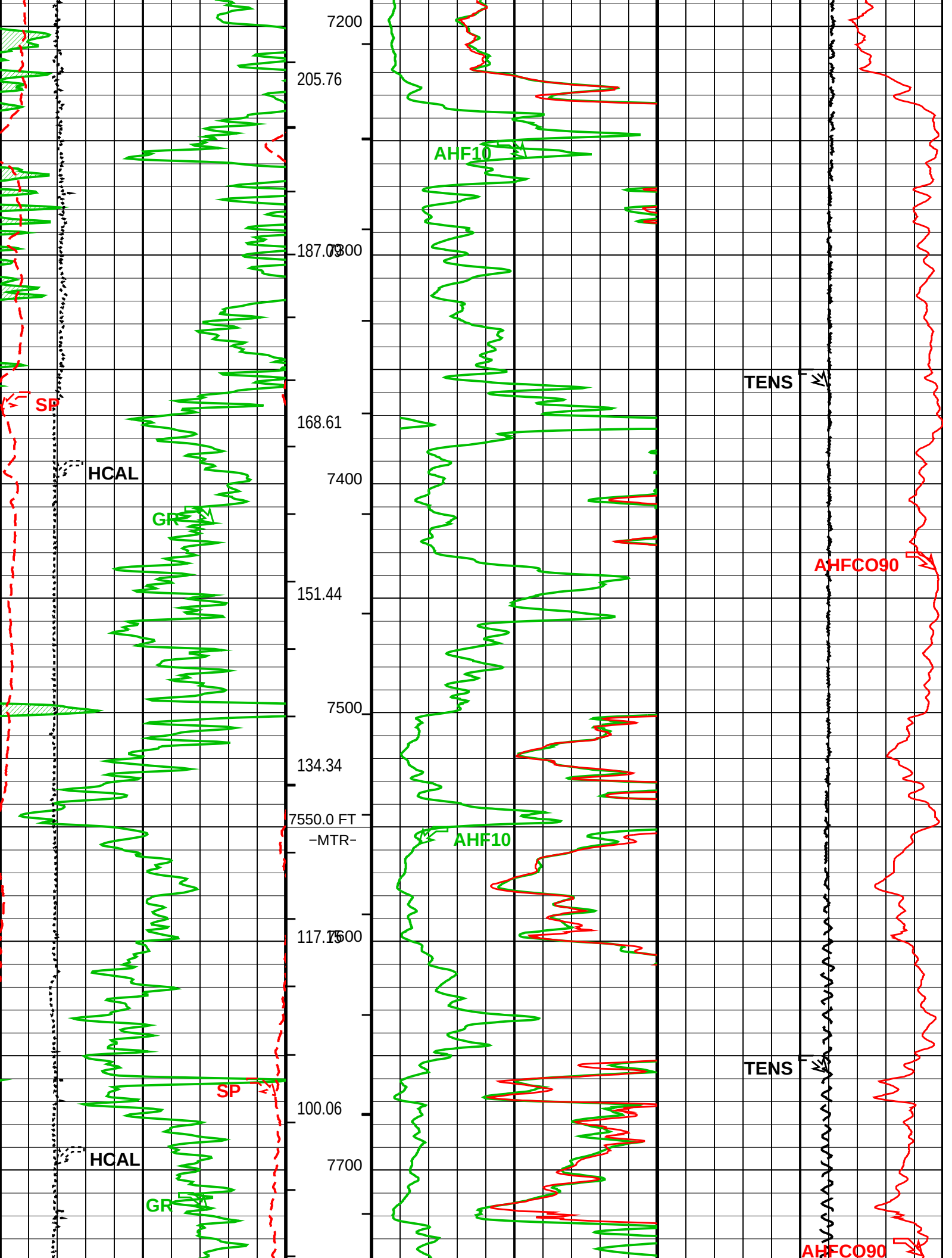
GR
AHFCO90
AHF90
223.56


7200
205.76
AHF10
187.07
7300
TENS
SP
168.61
HCAL
7400
GR
AHFCO90
151.44
7500
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-MTR-
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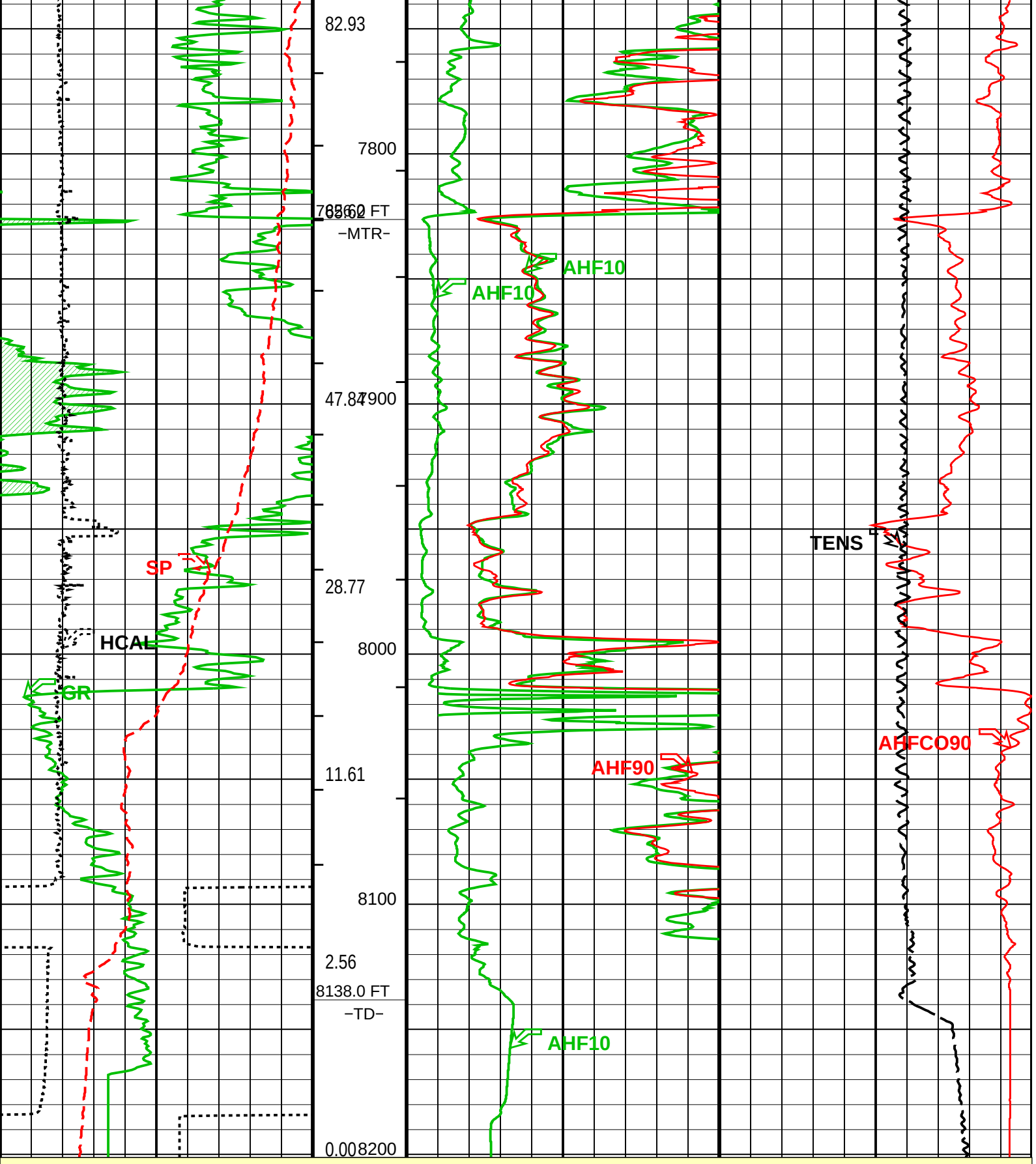
GR
AHFCO90



MAIN PASS: * PLATFORM EXPRESS − ARRAY INDUCTION ***

Gamma Ray Backup	Cement Volume (ICV) (F3)	AIT−H 10 Inch Investigation (AHF10) 0 (OHMM) 50	AIT−H 90 Inch Investigation Conductivity (AHFCO90) 1000 (MM/M) 0
Gamma Ray (GR) 0 (GAPI) 200		AIT−H 10 Inch Investigation (AHF10) 0 (OHMM) 10	Tension (TENS) 10000 (LBF) 0
Caliper (HCAL) 6 (IN) 16		AIT−H 90 Inch Investigation (AHF90) 0 (OHMM) 10	

SP (SP)
−160 (MV) 40

PIP SUMMARY

Integrated Cement Volume Major Pip Every 100 F3
Integrated Cement Volume Minor Pip Every 10 F3
Integrated Hole Volume Major Pip Every 100 F3
Integrated Hole Volume Minor Pip Every 10 F3

Parameters

DLIS Name	Description	Value	
	HILTB−CTS: High resolution Integrated Logging Tool−CTS		
AHBHM	Array Induction Borehole Correction Mode	2_ComputeStandoff	
AHBHV	Array Induction Borehole Correction Code Version Number	900	
AHBLM	Array Induction Basic Logs Mode	6_One_Two_and_Four	
AHBLV	Array Induction Basic Logs Code Version Number	223	
AHCDE	Array Induction Casing Detection Enable	Yes	
AHCEN	Array Induction Tool Centering Flag (in Borehole)	Eccentered	
AHFRSV	Array Induction Response Set Version for Four ft Resolution	41.70.24.20	
AHMRF	Array Induction Mud Resistivity Factor	1	
AHORSV	Array Induction Response Set Version for One ft Resolution	41.70.24.20	
AHRFV	Array Induction Radial Profiling Code Version Number	701	
AHRPV	Array Induction Radial Parametrization Code Version Number	232	
AHSTA	Array Induction Tool Standoff	0.125	IN
AHTRSV	Array Induction Response Set Version for Two ft Resolution	41.70.24.20	
BHT	Bottom Hole Temperature (used in calculations)	220	DEGF
FEXP	Form Factor Exponent	2	
FNUM	Form Factor Numerator	1	
GCSE	Generalized Caliper Selection	HCAL	
GDEV	Average Angular Deviation of Borehole from Normal	0	DEG
GGRD	Geothermal Gradient	0.01	DF/F
GRSE	Generalized Mud Resistivity Selection	AITH_RESIST	
GTSE	Generalized Temperature Selection	HSTS_HTEM	
SHT	Surface Hole Temperature	68	DEGF
SPNV	SP Next Value	0	MV
	FEQL: Formation Evaluation Quick Look		
FEXP	Form Factor Exponent	2	
FNUM	Form Factor Numerator	1	
	HOLEV: Integrated Hole/Cement Volume		
BHT	Bottom Hole Temperature (used in calculations)	220	DEGF
FCD	Future Casing (Outer) Diameter	4.5	IN
GCSE	Generalized Caliper Selection	HCAL	
GDEV	Average Angular Deviation of Borehole from Normal	0	DEG
GGRD	Geothermal Gradient	0.01	DF/F
GRSE	Generalized Mud Resistivity Selection	AITH_RESIST	
GTSE	Generalized Temperature Selection	HSTS_HTEM	
HVCS	Integrated Hole Volume Caliper Selection	AUTOMATIC	
SHT	Surface Hole Temperature	68	DEGF
	PERT: Preliminary Evaluation − Real Time		
BHT	Bottom Hole Temperature (used in calculations)	220	DEGF
FEXP	Form Factor Exponent	2	
FNUM	Form Factor Numerator	1	
GCSE	Generalized Caliper Selection	HCAL	
GDEV	Average Angular Deviation of Borehole from Normal	0	DEG
GGRD	Geothermal Gradient	0.01	DF/F
GRSE	Generalized Mud Resistivity Selection	AITH_RESIST	
GTSE	Generalized Temperature Selection	HSTS_HTEM	
SHT	Surface Hole Temperature	68	DEGF
	System and Miscellaneous		
BS	Bit Size	7.875	IN
DFD	Drilling Fluid Density	8.33	LB/G
DO	Depth Offset for Playback	0.0	FT
DORL	Depth Offset for Repeat Analysis	0.0	FT
FLEV	Fluid Level	−50000.00	FT
PP	Playback Processing	NORMAL	
TD	Total Depth	8138	FT

Format: ERES_S2 Vertical Scale: 2" per 100' Graphics File Created: 28−Feb−2010 02:34

OP System Version: 17C0−154

HILTB−CTS 17C0−154

Input DLIS Files

HILTC .020 FN:19 28−Feb−2010 02:16 8201.0 FT 750.0 FT

Output DLIS Files

DEFAULT	AIT_TLD_MCFL_CNL_024PUP	FN:24	PRODUCER	28−Feb−2010 02:34	

Schlumberger

UPPER RESISTIVITY LOG 5" = 100’

MAXIS Field Log

Input DLIS Files

	HILTC .020	FN:19		28−Feb−2010 02:16	8201.0 FT	750.0 FT
DEFAULT	AIT_TLD_MCFL_CNL_018LUP	FN:16	PRODUCER	28−Feb−2010 02:06	2712.0 FT	2267.5 FT

Output DLIS Files

HILTC .025	FN:25		28−Feb−2010 02:35	5000.0 FT	2484.5 FT
HILTC .025	FN:26		28−Feb−2010 02:35	5000.0 FT	2484.5 FT

Integrated Hole/Cement Volume Summary

Hole Volume = 899.68 ft3

Cement Volume = 622.84 ft3 (assuming 4.50 in casing O.D.)

Computed from 4999.5 ft to 2493.5 ft

OP System Version: 17C0−154

HILTC	17C0−154

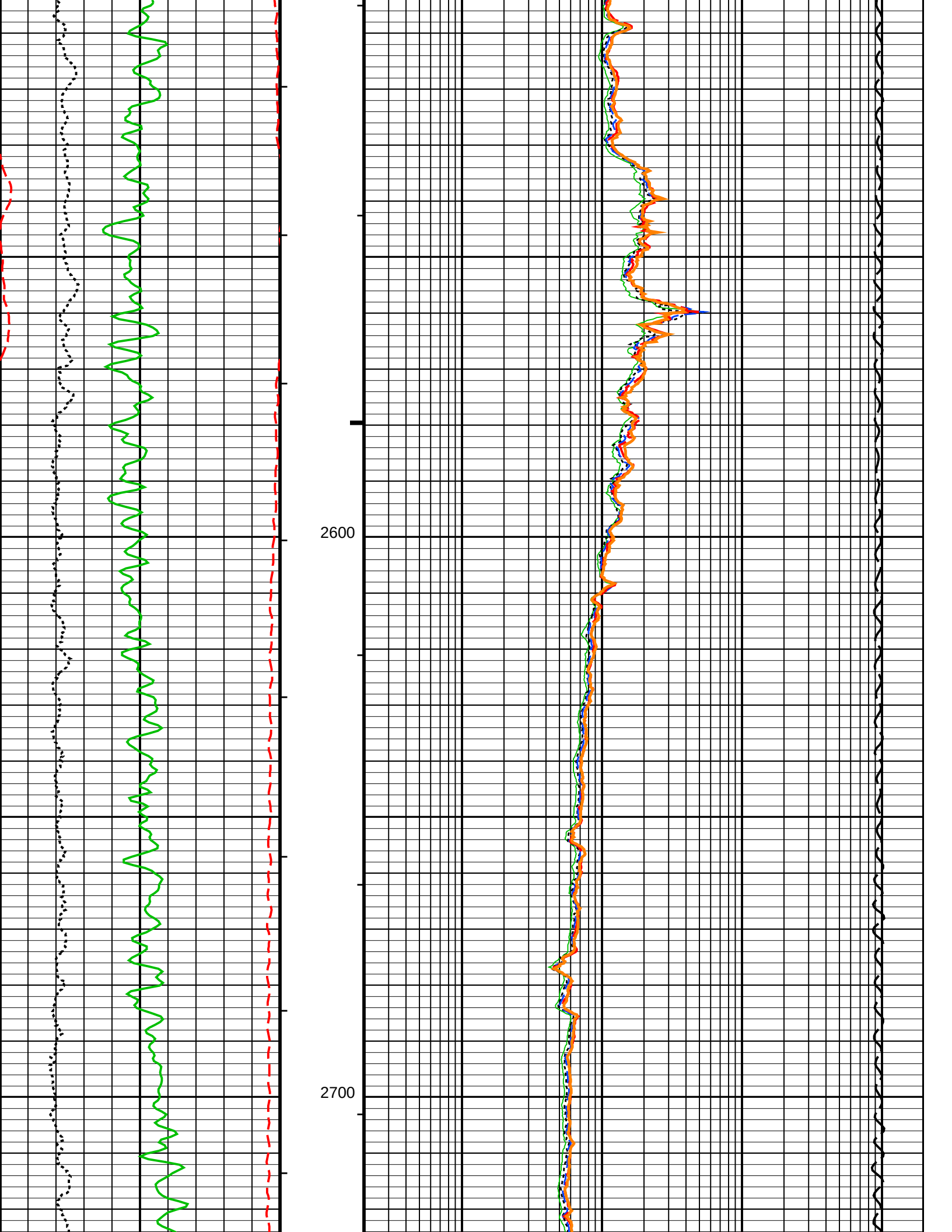
PIP SUMMARY

- Integrated Hole Volume Minor Pip Every 10 F3
- Integrated Hole Volume Major Pip Every 100 F3
- Integrated Cement Volume Minor Pip Every 10 F3
- Integrated Cement Volume Major Pip Every 100 F3
- Time Mark Every 60 S

Tension (TENS)		
10000	(LBF)	0
AIT−H 90 Inch Investigation (AHT90)		
0.2	(OHMM)	2000
SP (SP)		
−160	(MV)	40
AIT−H 60 Inch Investigation (AHT60)		
0.2	(OHMM)	2000
Caliper (HCAL)		
6	(IN)	16
AIT−H 30 Inch Investigation (AHT30)		
0.2	(OHMM)	2000
Gamma Ray (GR)		
0	(GAPI)	200
AIT−H 20 Inch Investigation (AHT20)		
0.2	(OHMM)	2000
Gamma Ray Backup		
AIT−H 10 Inch Investigation (AHT10)		
0.2	(OHMM)	2000

MAIN PASS: * PLATFORM EXPRESS − ARRAY INDUCTION ***

2500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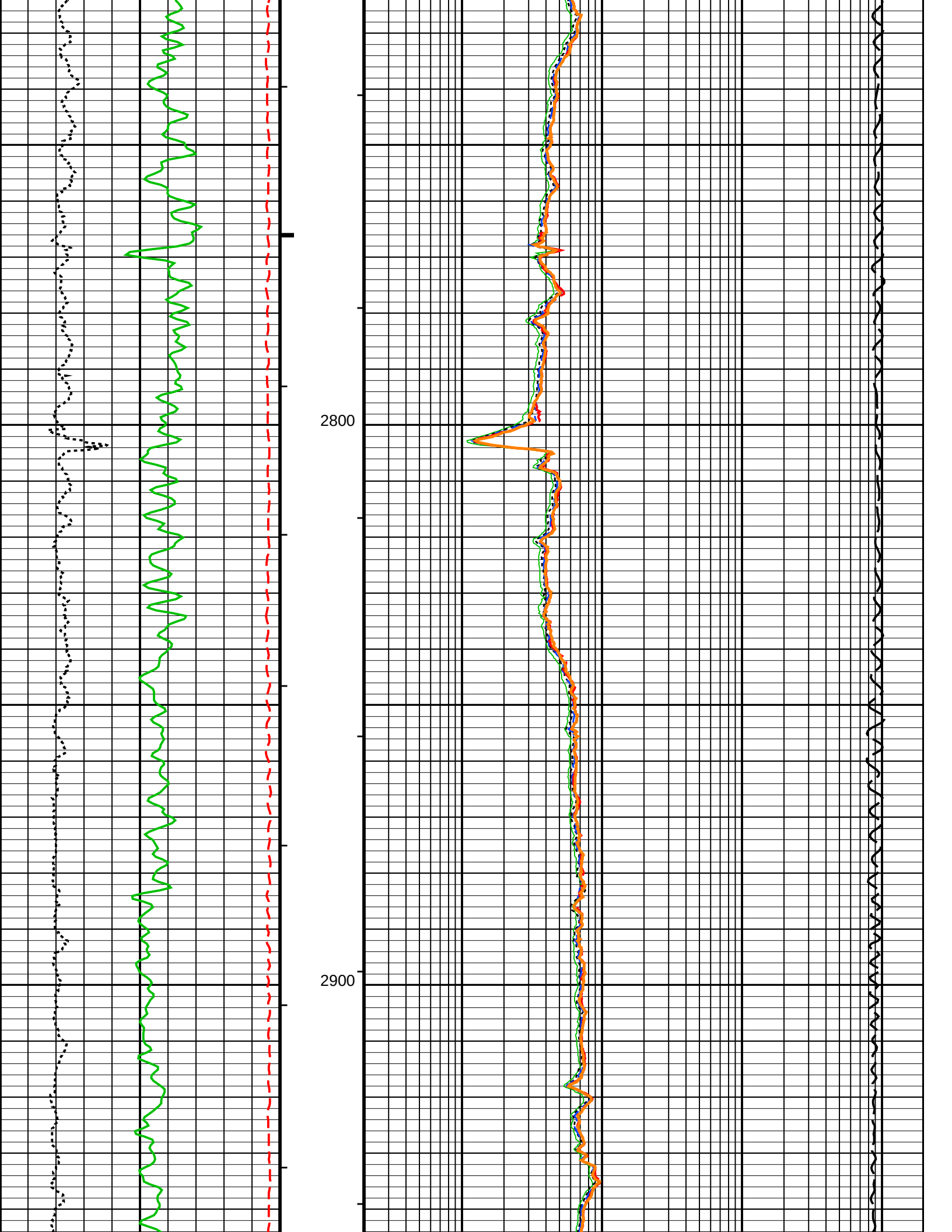
2700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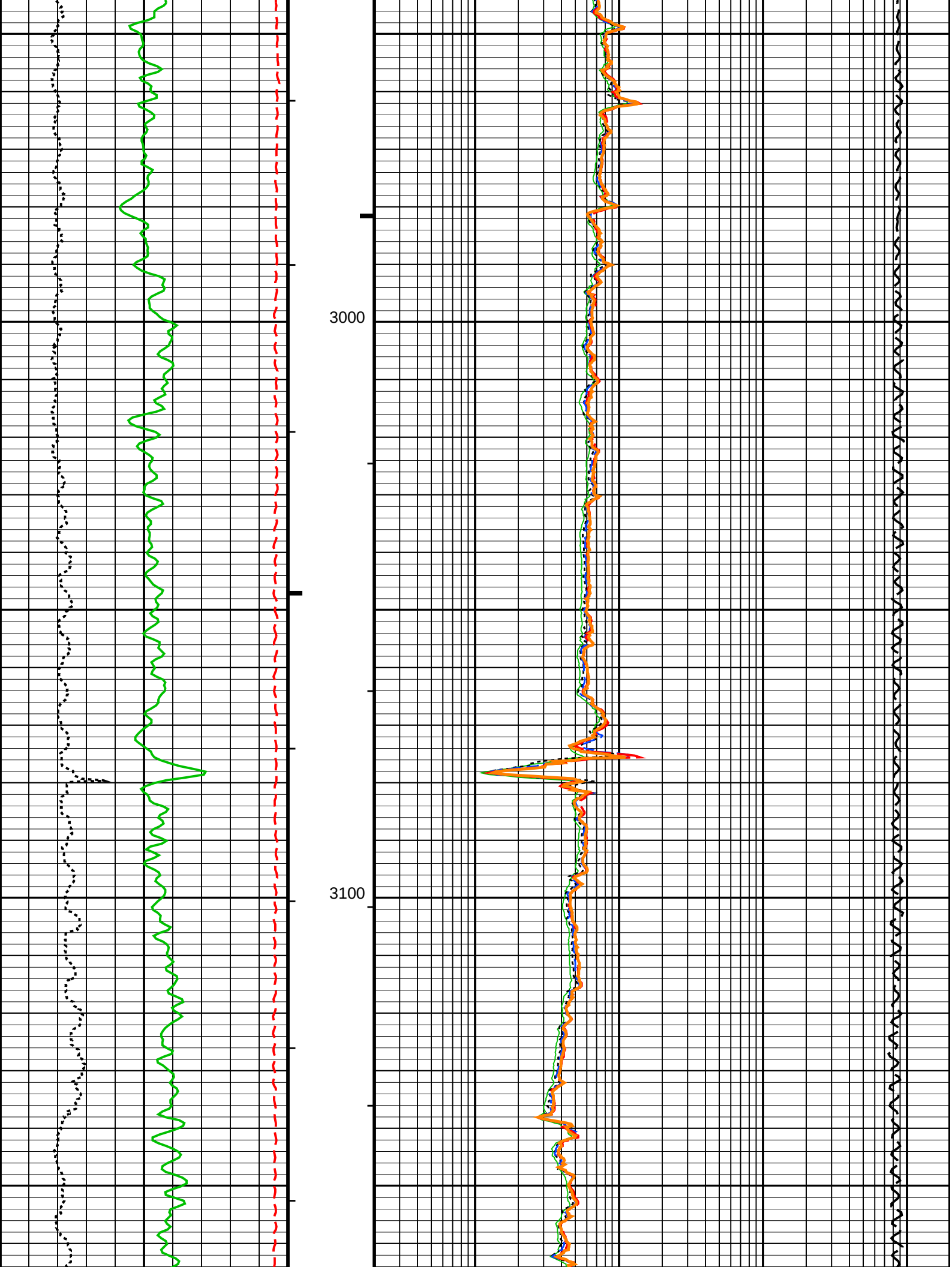
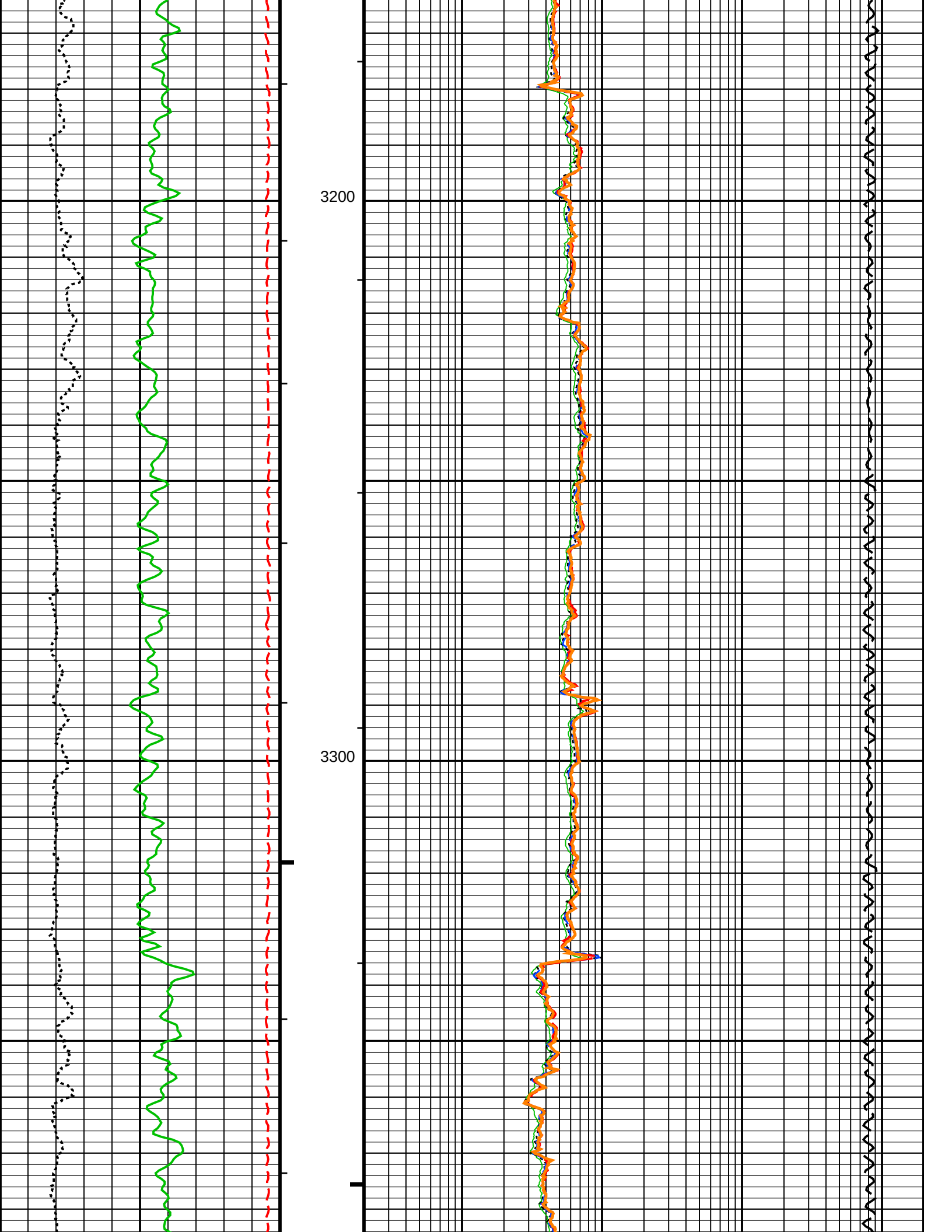

3000
3100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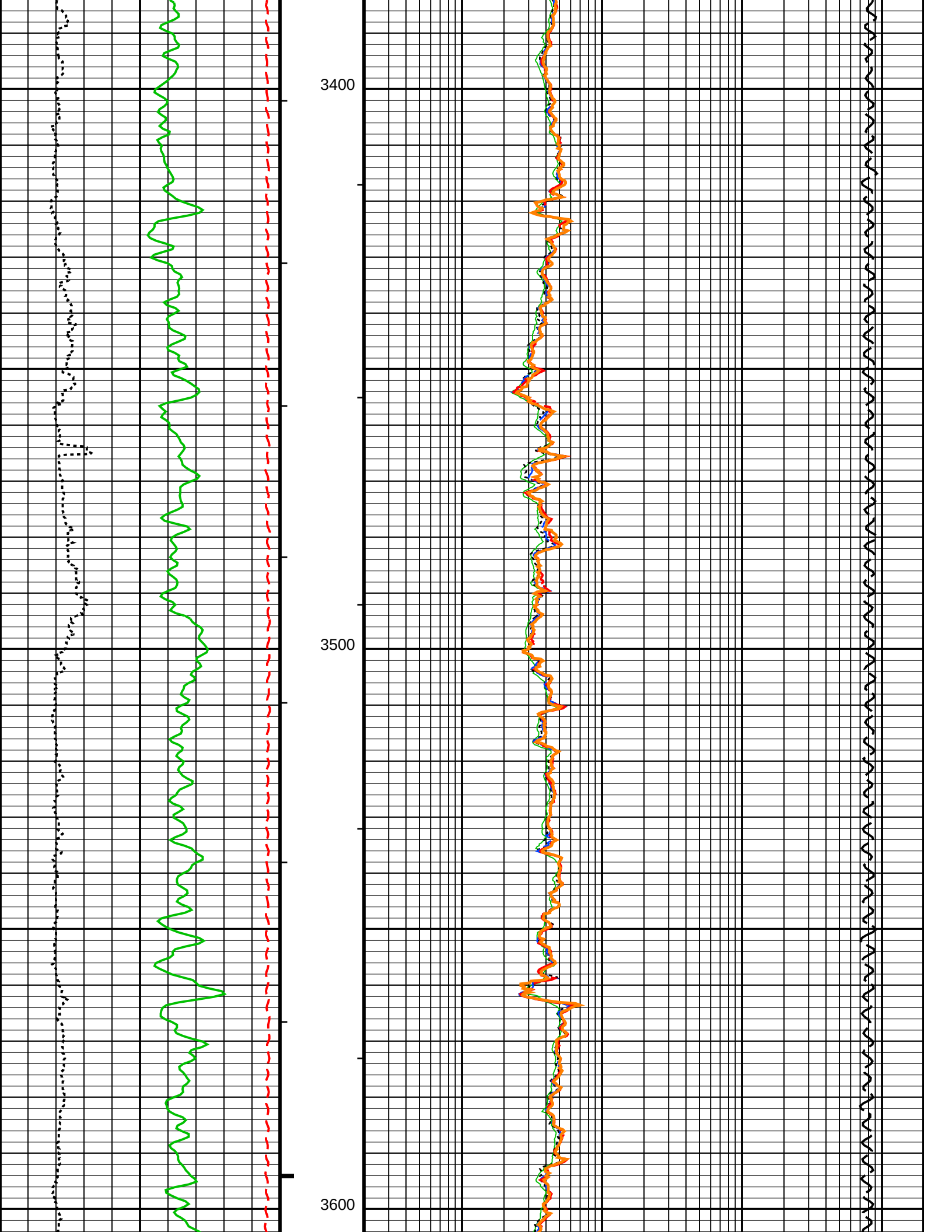
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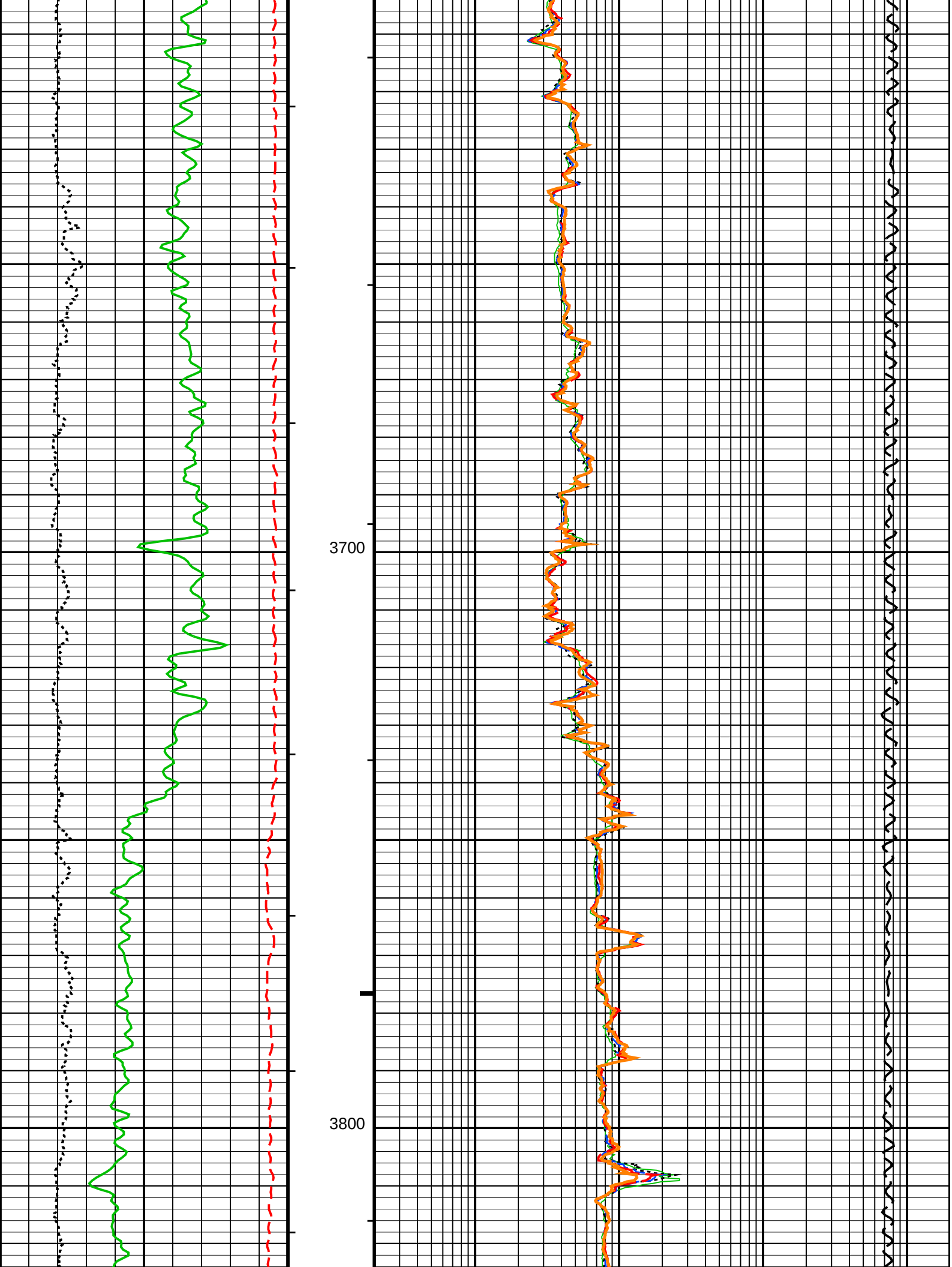
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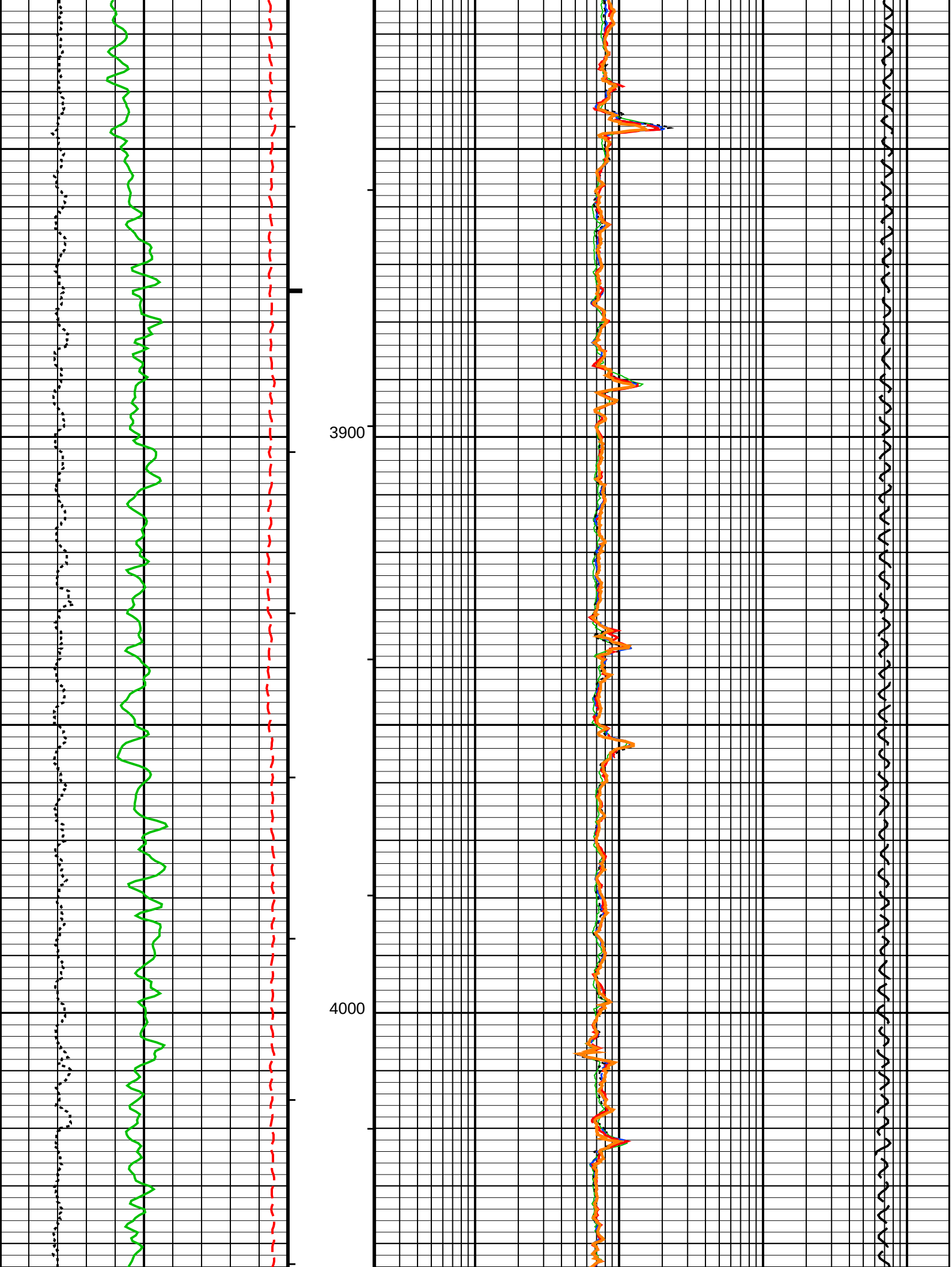
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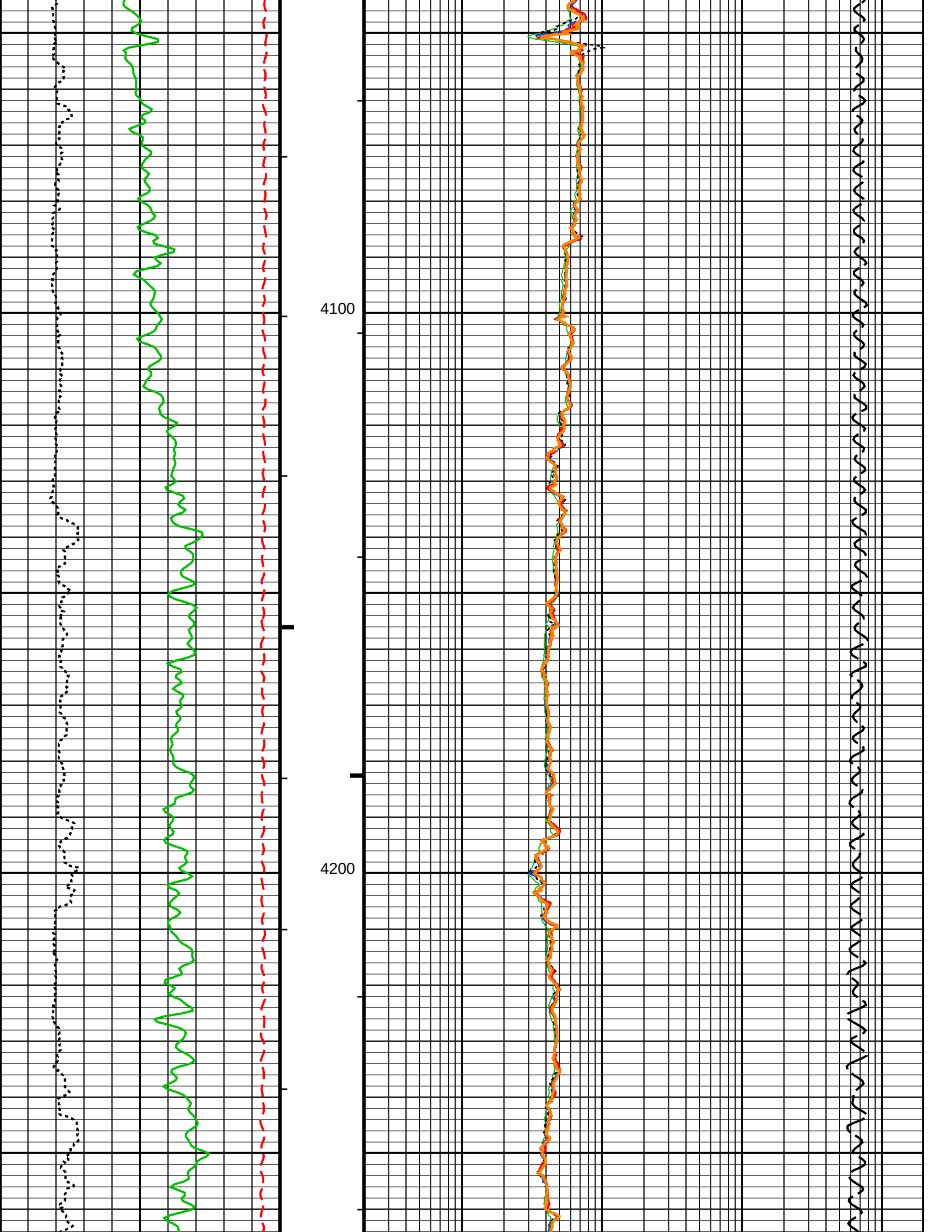
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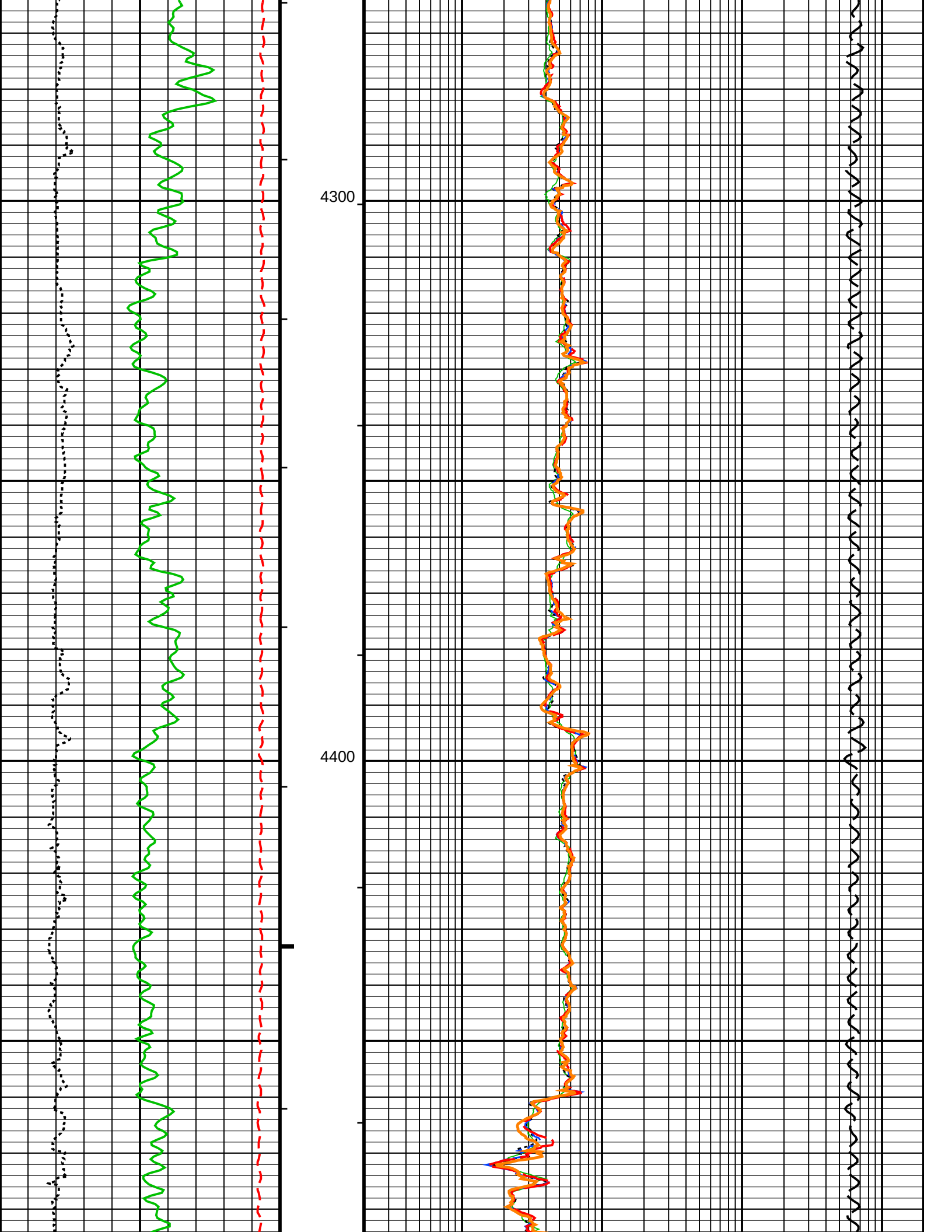
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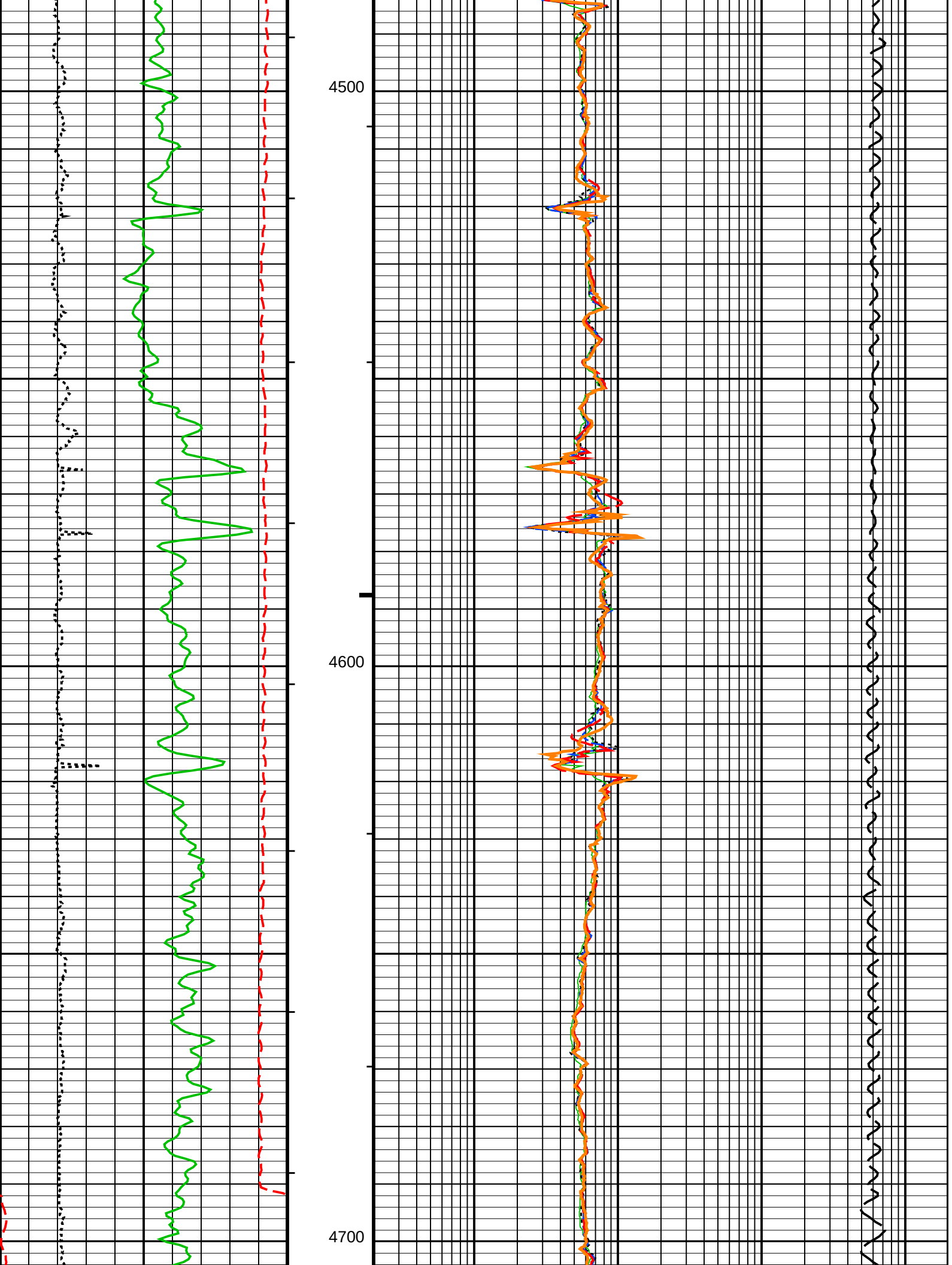
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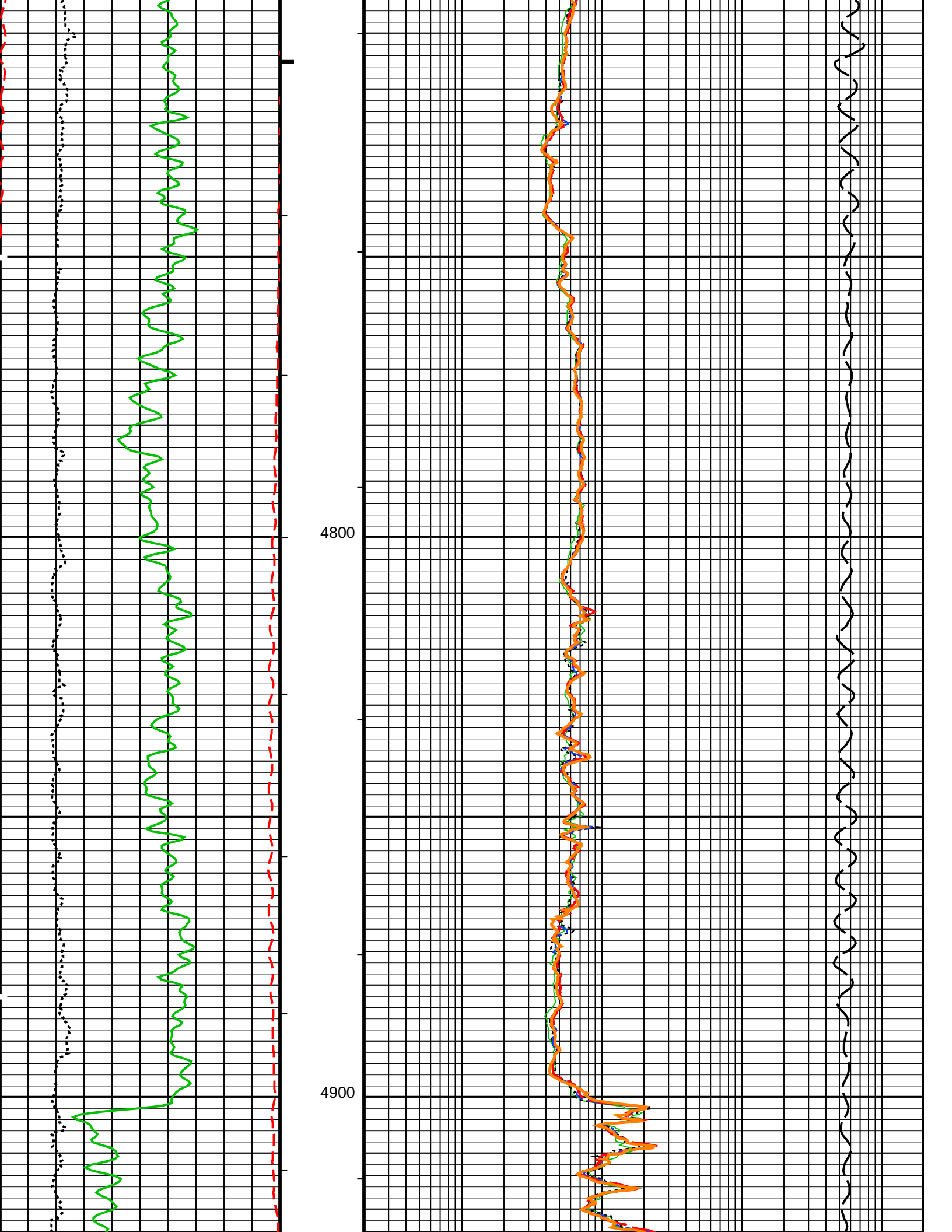
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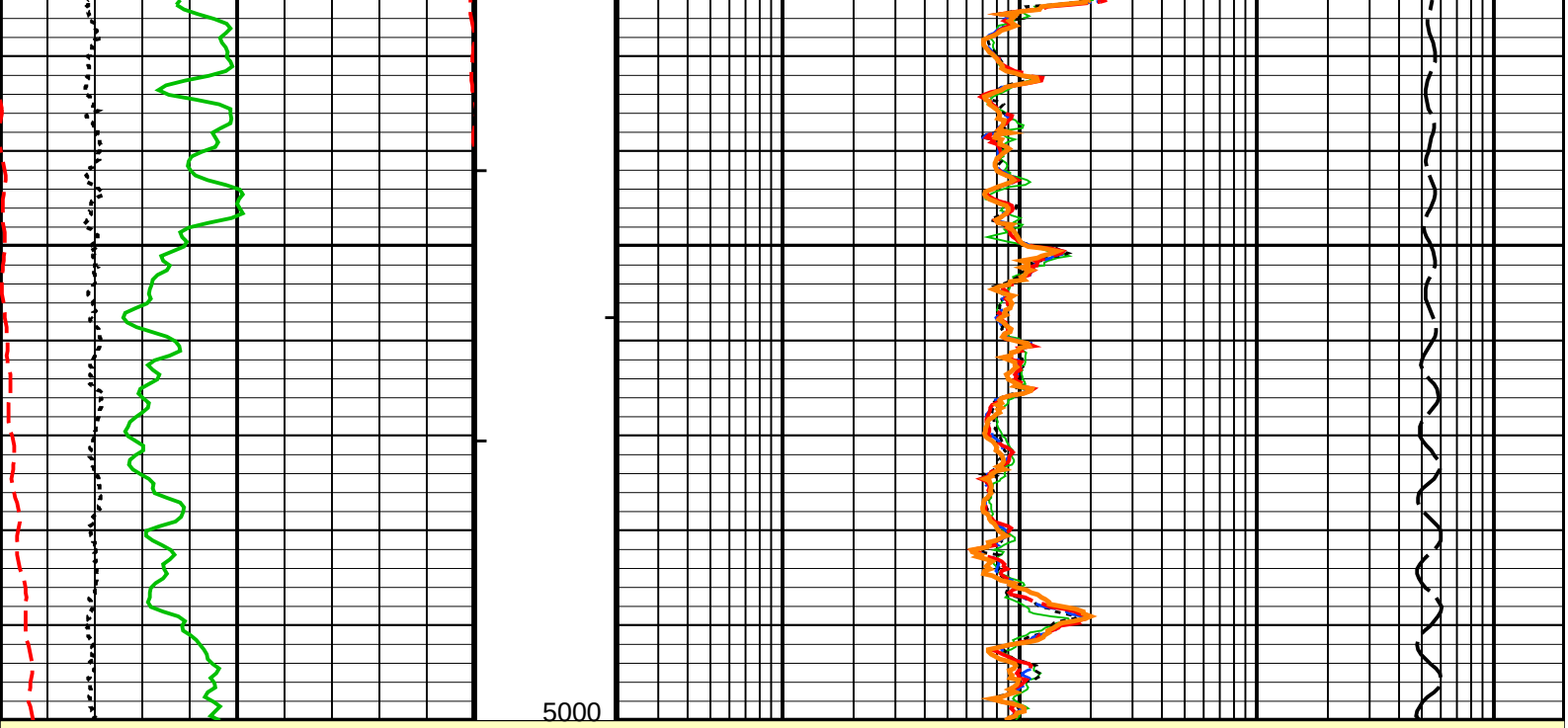


MAIN PASS: *** PLATFORM EXPRESS − ARRAY INDUCTION ***

Gamma Ray Backup		
Gamma Ray (GR)		
0	(GAPI)	200
Caliper (HCAL)		
6	(IN)	16
SP (SP)		
−160	(MV)	40

AIT−H 10 Inch Investigation (AHT10)		
0.2	(OHMM)	2000
AIT−H 20 Inch Investigation (AHT20)		
0.2	(OHMM)	2000
AIT−H 30 Inch Investigation (AHT30)		
0.2	(OHMM)	2000
AIT−H 60 Inch Investigation (AHT60)		
0.2	(OHMM)	2000
AIT−H 90 Inch Investigation (AHT90)		
0.2	(OHMM)	2000

Tension (TENS)		
10000	(LBF)	0

PIP SUMMARY

- Integrated Hole Volume Minor Pip Every 10 F3
- Integrated Hole Volume Major Pip Every 100 F3
- Integrated Cement Volume Minor Pip Every 10 F3
- Integrated Cement Volume Major Pip Every 100 F3

Time Mark Every 60 S

Parameters

DLIS Name	Description	Value	
	HILTB−CTS: High resolution Integrated Logging Tool−CTS		
AHBHM	Array Induction Borehole Correction Mode	2_COMPUTESTANDOFF	
AHBHV	Array Induction Borehole Correction Code Version Number	900	
AHBLM	Array Induction Basic Logs Mode	6_ONE_TWO_AND_FOUR	
AHBLV	Array Induction Basic Logs Code Version Number	223	
AHCDE	Array Induction Casing Detection Enable	YES	
AHCEN	Array Induction Tool Centering Flag (in Borehole)	ECCENTERED	
AHFRSV	Array Induction Response Set Version for Four ft Resolution	41.70.24.20	
AHMRF	Array Induction Mud Resistivity Factor	1.000	
AHORSV	Array Induction Response Set Version for One ft Resolution	41.70.24.20	
AHRFV	Array Induction Radial Profiling Code Version Number	701	
AHRPV	Array Induction Radial Parametrization Code Version Number	232	
AHSAP	Array Induction Suspend Answer Product Processing	0_NOSUSPENSION	
AHSTA	Array Induction Tool Standoff	0.125	in
AHTRSV	Array Induction Response Set Version for Two ft Resolution	41.70.24.20	
BHT	Bottom Hole Temperature (used in calculations)	220.0	degF
FEXP	Form Factor Exponent	2.000	
FNUM	Form Factor Numerator	1.000	

FNUM	Form Factor Numerator	1.000	
GCSE	Generalized Caliper Selection	HCAL	
GDEV	Average Angular Deviation of Borehole from Normal	0.000	deg
GGRD	Geothermal Gradient	0.010	degF/ft
GRSE	Generalized Mud Resistivity Selection	AHMF	
GTSE	Generalized Temperature Selection	HSTS_HTEM	
SHT	Surface Hole Temperature	68.000	degF
SPDR	SP Drift	0.000	mV/ft
SPNV	SP Next Value	0.000	mV
FEQL: Formation Evaluation Quick Look			
FEXP	Form Factor Exponent	2.000	
FNUM	Form Factor Numerator	1.000	
HOLEV: Integrated Hole/Cement Volume			
BHT	Bottom Hole Temperature (used in calculations)	220.0	degF
GCSE	Generalized Caliper Selection	HCAL	
GDEV	Average Angular Deviation of Borehole from Normal	0.000	deg
GGRD	Geothermal Gradient	0.010	degF/ft
GRSE	Generalized Mud Resistivity Selection	AHMF	
GTSE	Generalized Temperature Selection	HSTS_HTEM	
SHT	Surface Hole Temperature	68.000	degF
PERT: Preliminary Evaluation − Real Time			
BHT	Bottom Hole Temperature (used in calculations)	220.0	degF
FEXP	Form Factor Exponent	2.000	
FNUM	Form Factor Numerator	1.000	
GCSE	Generalized Caliper Selection	HCAL	
GDEV	Average Angular Deviation of Borehole from Normal	0.000	deg
GGRD	Geothermal Gradient	0.010	degF/ft
GRSE	Generalized Mud Resistivity Selection	AHMF	
GTSE	Generalized Temperature Selection	HSTS_HTEM	
SHT	Surface Hole Temperature	68.000	degF
System and Miscellaneous			
BS	Bit Size	7.875	in
DFD	Drilling Fluid Density	8.330	lbm/gal
FLEV	Fluid Level		
TD	Total Depth	8138.0	ft

Format: UPPER_GRES **Vertical Scale: 5" per 100'** **Graphics File Created: 28−Feb−2010 02:36**

OP System Version: 17C0−154

HILTC	17C0−154

Input DLIS Files

	HILTC .020	FN:19		28−Feb−2010 02:16	8201.0 FT	750.0 FT
DEFAULT	AIT_TLD_MCFL_CNL_018LUP	FN:16	PRODUCER	28−Feb−2010 02:06	2712.0 FT	2267.5 FT

Output DLIS Files

HILTC .025	FN:25	28−Feb−2010 02:35	
HILTC .025	FN:26	28−Feb−2010 02:35	

Schlumberger

LOWER RESISTIVITY LOG 5" = 100'

MAXIS Field Log

Input DLIS Files

HILTC .020	FN:19	28−Feb−2010 02:16	8201.0 FT	750.0 FT	

Output DLIS Files

DEFAULT	AIT_TLD_MCFL_CNL_024PUP	FN:24	PRODUCER	28−Feb−2010 02:34	

OP System Version: 17C0−154

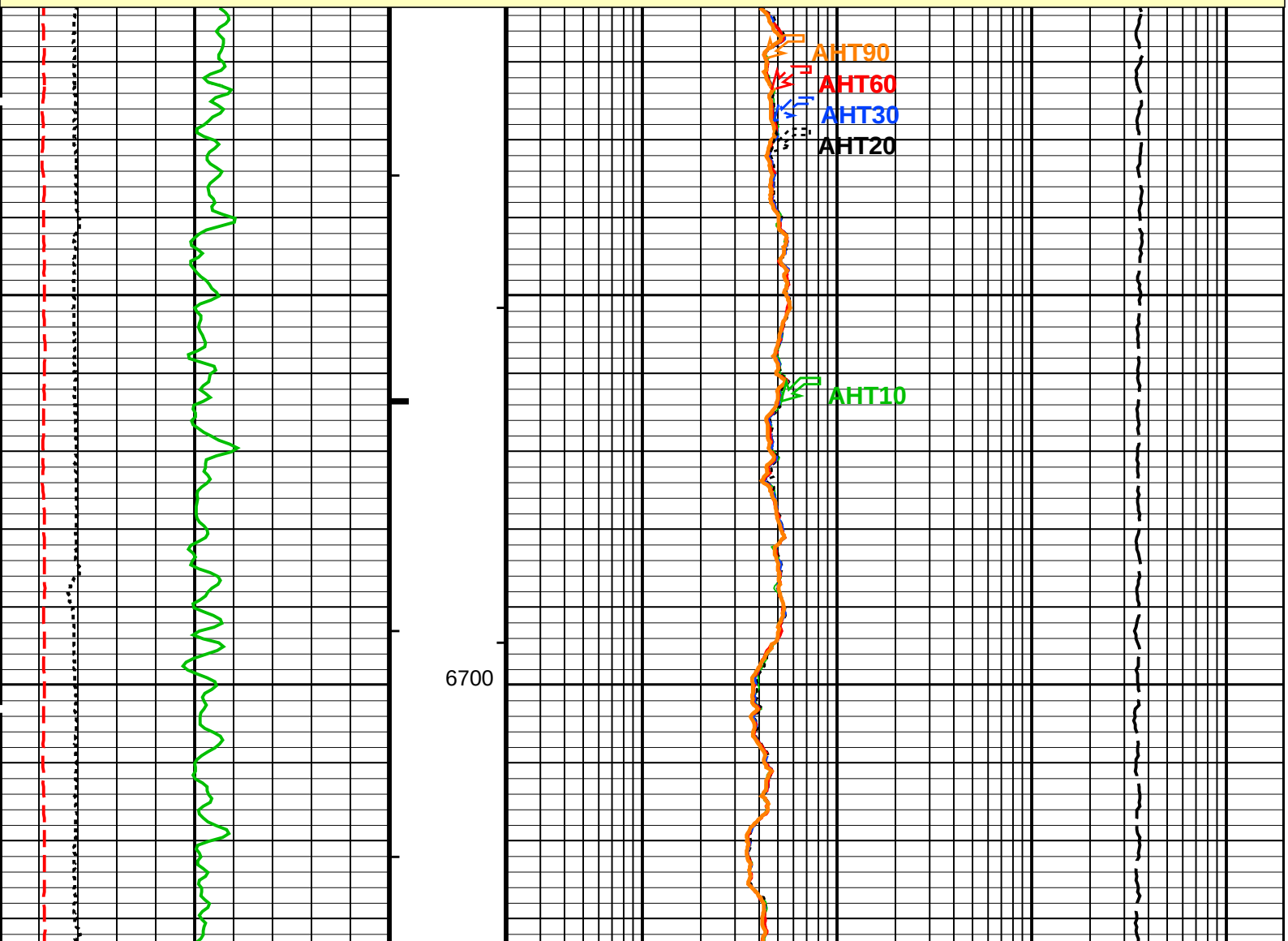
HILTB−CTS 17C0−154

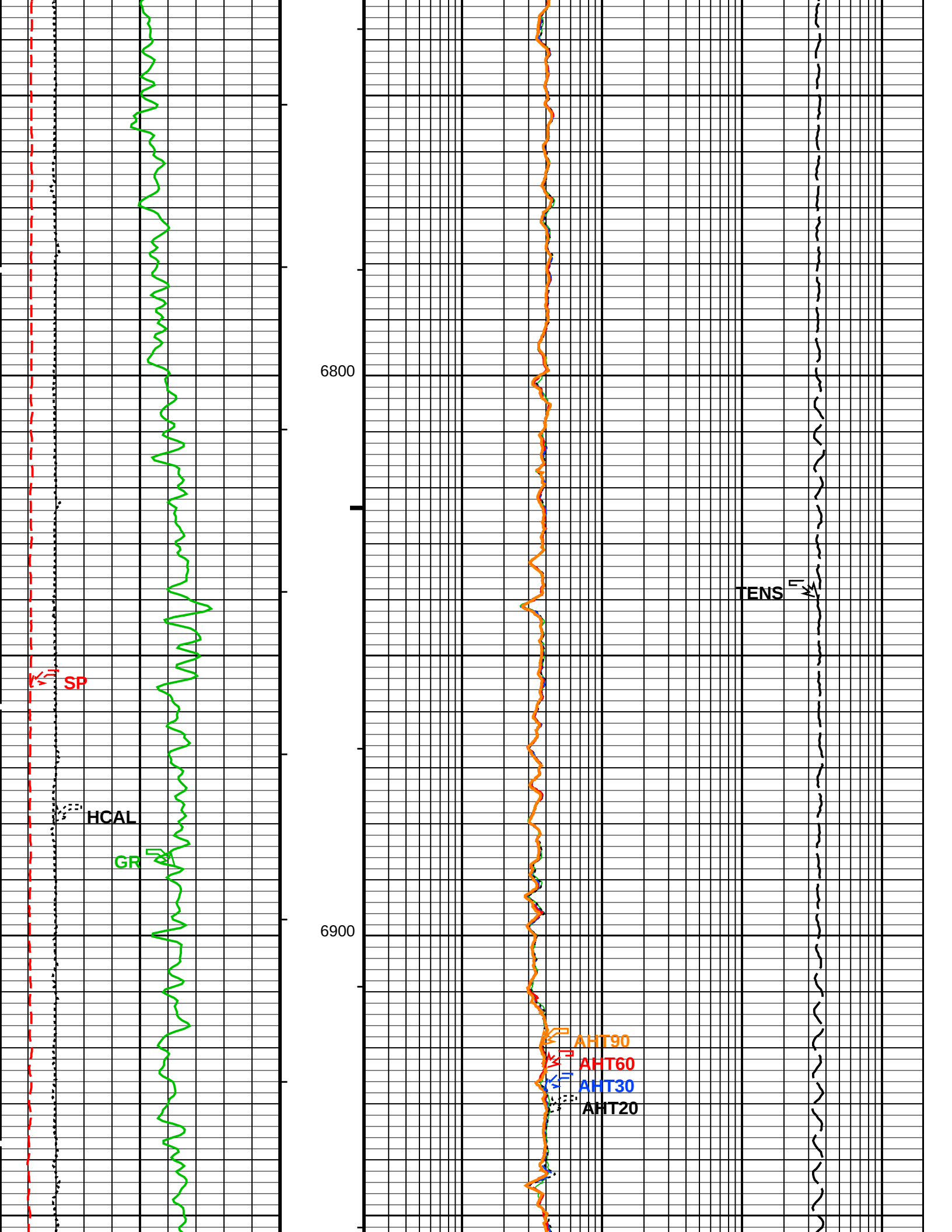
PIP SUMMARY

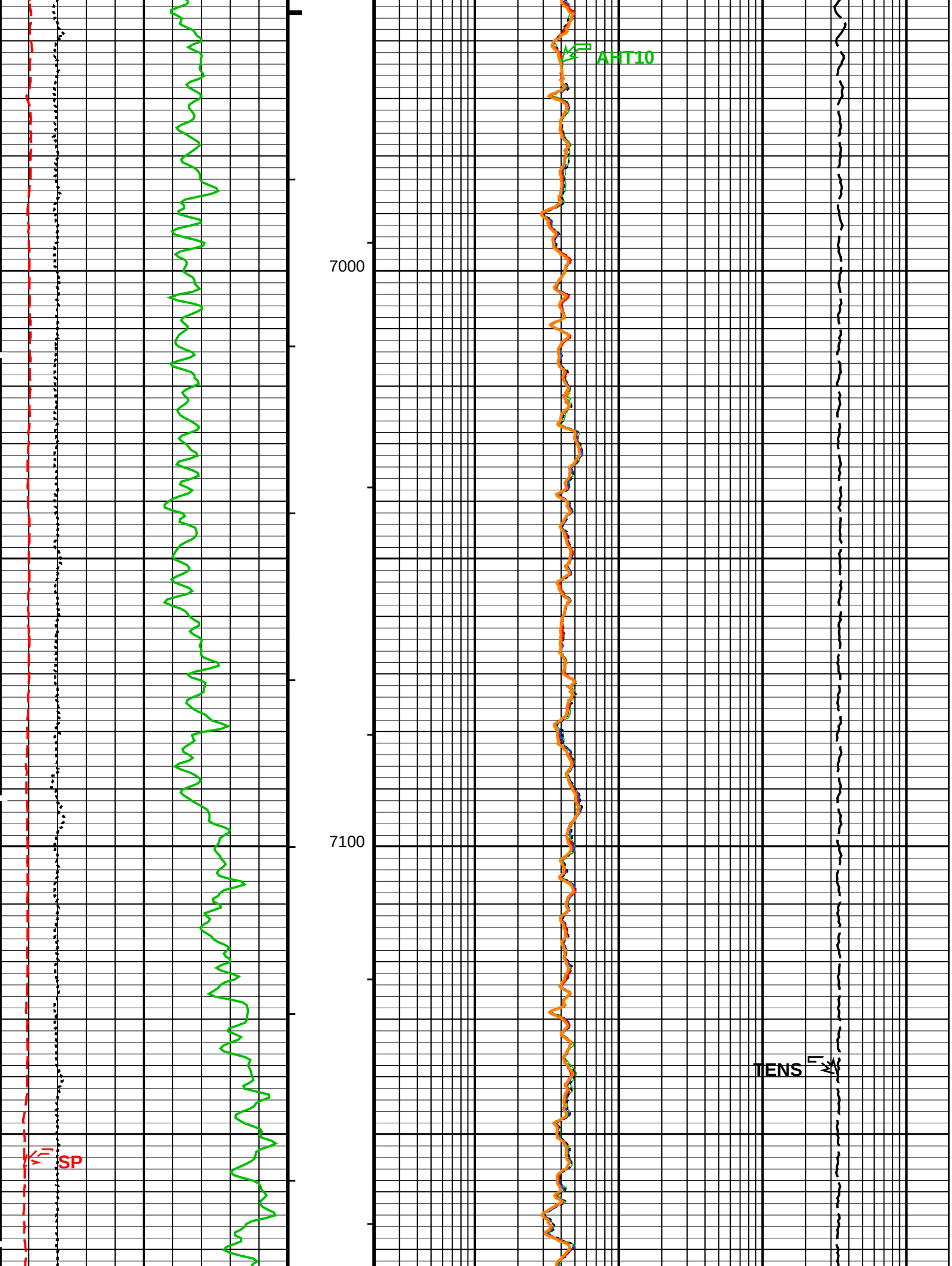
- Integrated Hole Volume Minor Pip Every 10 F3
- Integrated Hole Volume Major Pip Every 100 F3
- Integrated Cement Volume Minor Pip Every 10 F3
- Integrated Cement Volume Major Pip Every 100 F3
- Time Mark Every 60 S

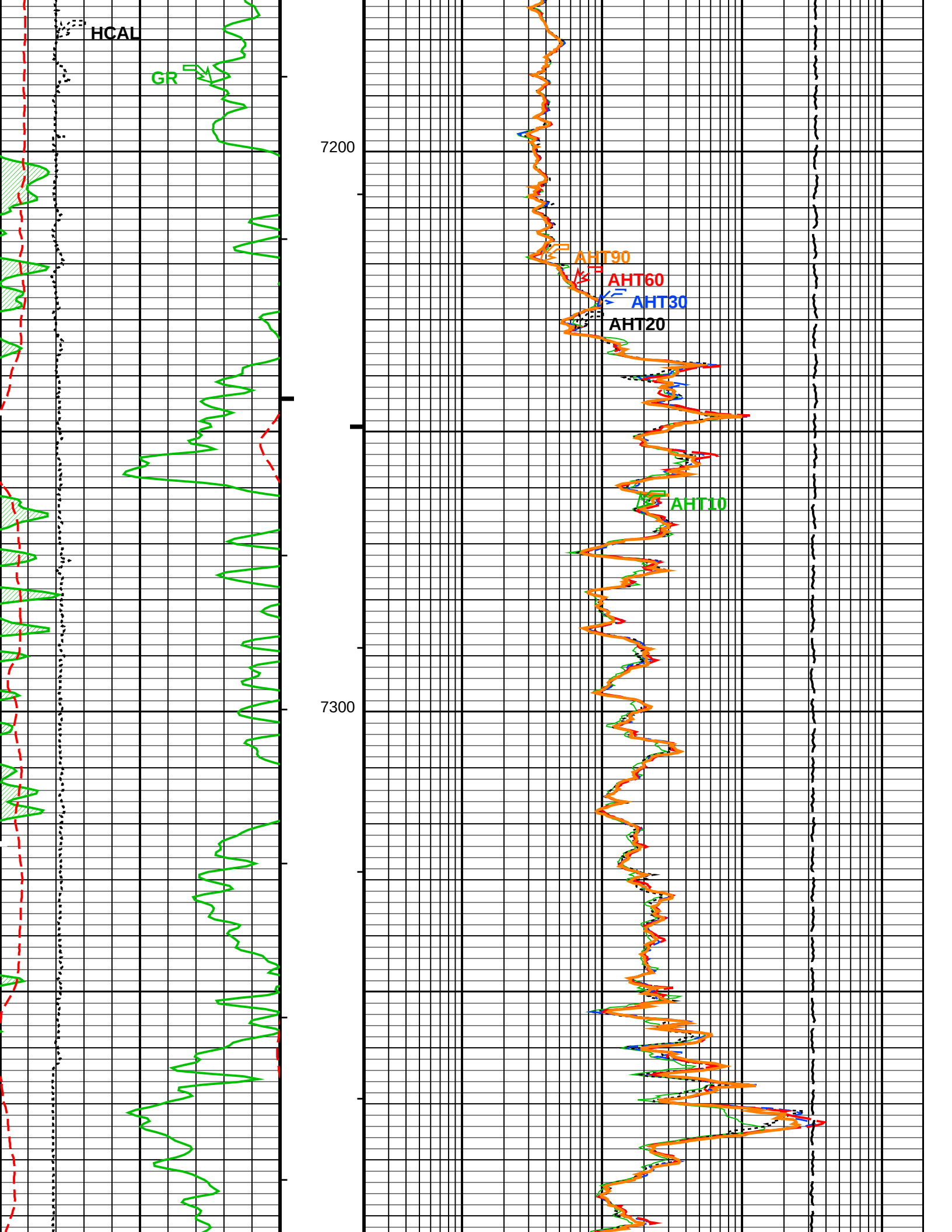
		Tension (TENS) 10000 (LBF) 0
		AIT−H 90 Inch Investigation (AHT90) 0.2 (OHMM) 2000
SP (SP) −160 (MV) 40		AIT−H 60 Inch Investigation (AHT60) 0.2 (OHMM) 2000
Caliper (HCAL) 6 (IN) 16	Stuck Stretch (STIT) 0 (F) 50	AIT−H 30 Inch Investigation (AHT30) 0.2 (OHMM) 2000
Gamma Ray (GR) 0 (GAPI) 200	Tool/Tot. Drag	AIT−H 20 Inch Investigation (AHT20) 0.2 (OHMM) 2000
Gamma Ray Backup	Cable Drag	AIT−H 10 Inch Investigation (AHT10) 0.2 (OHMM) 2000

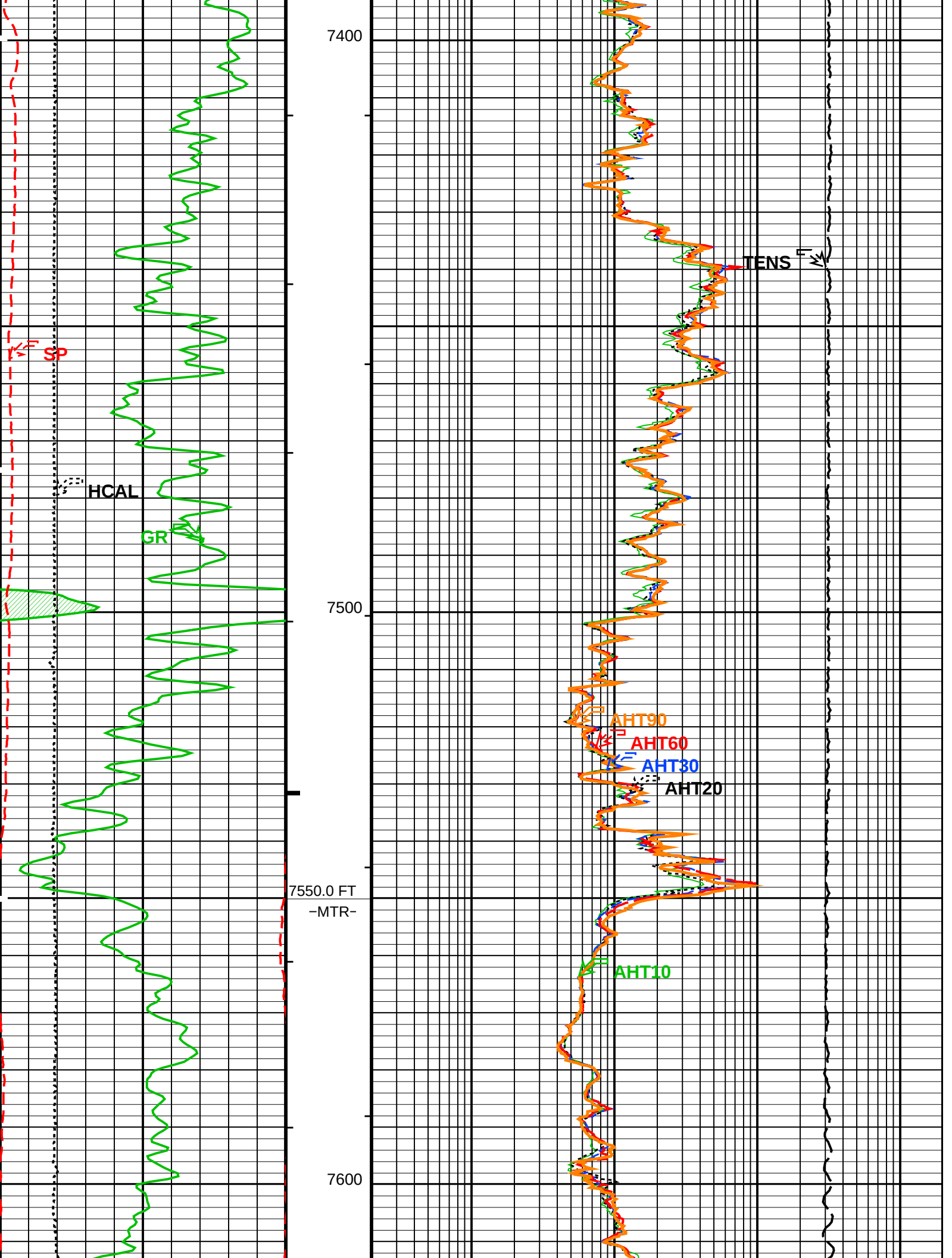
MAIN PASS: * PLATFORM EXPRESS − ARRAY INDUCTION ***

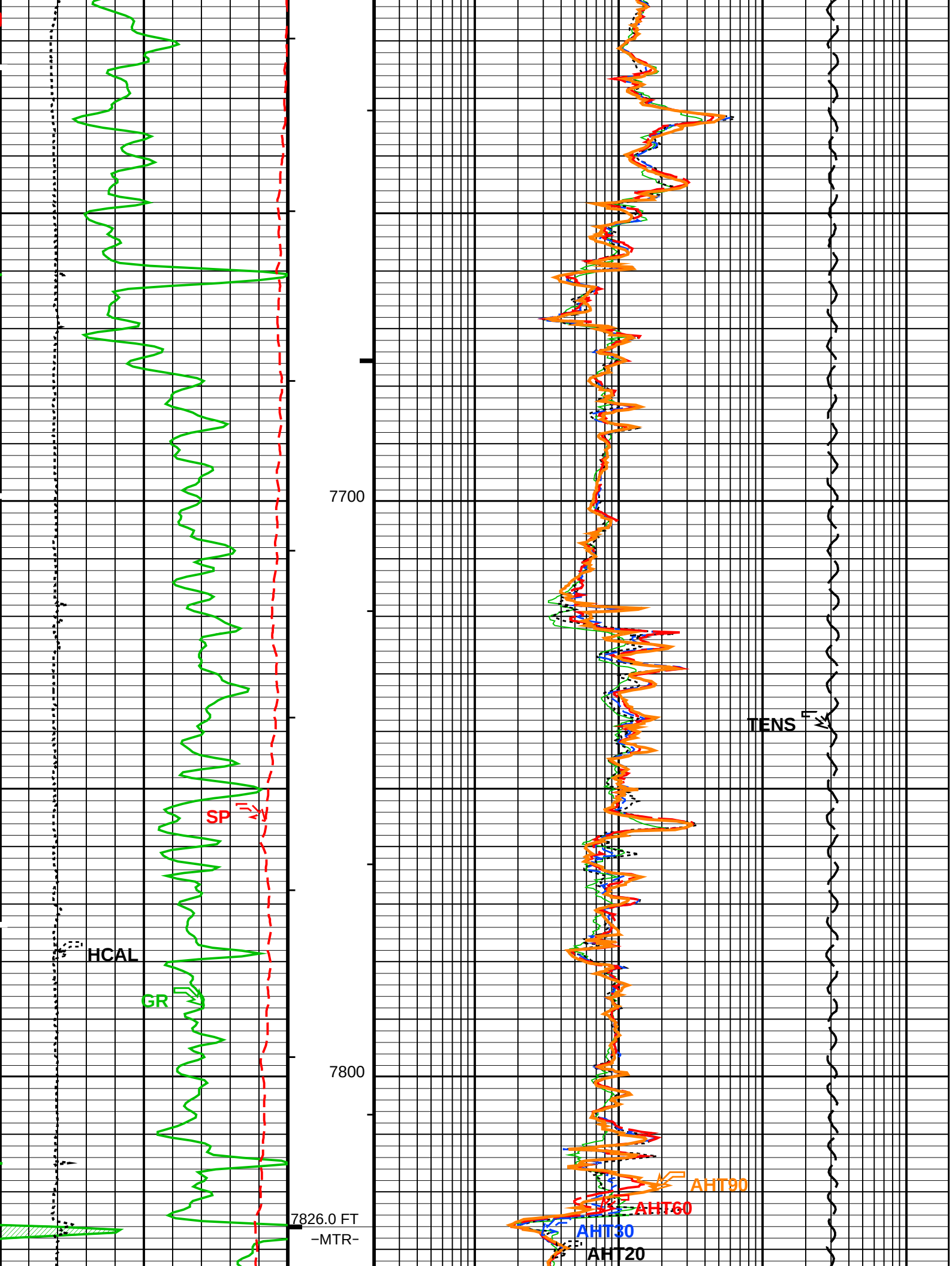


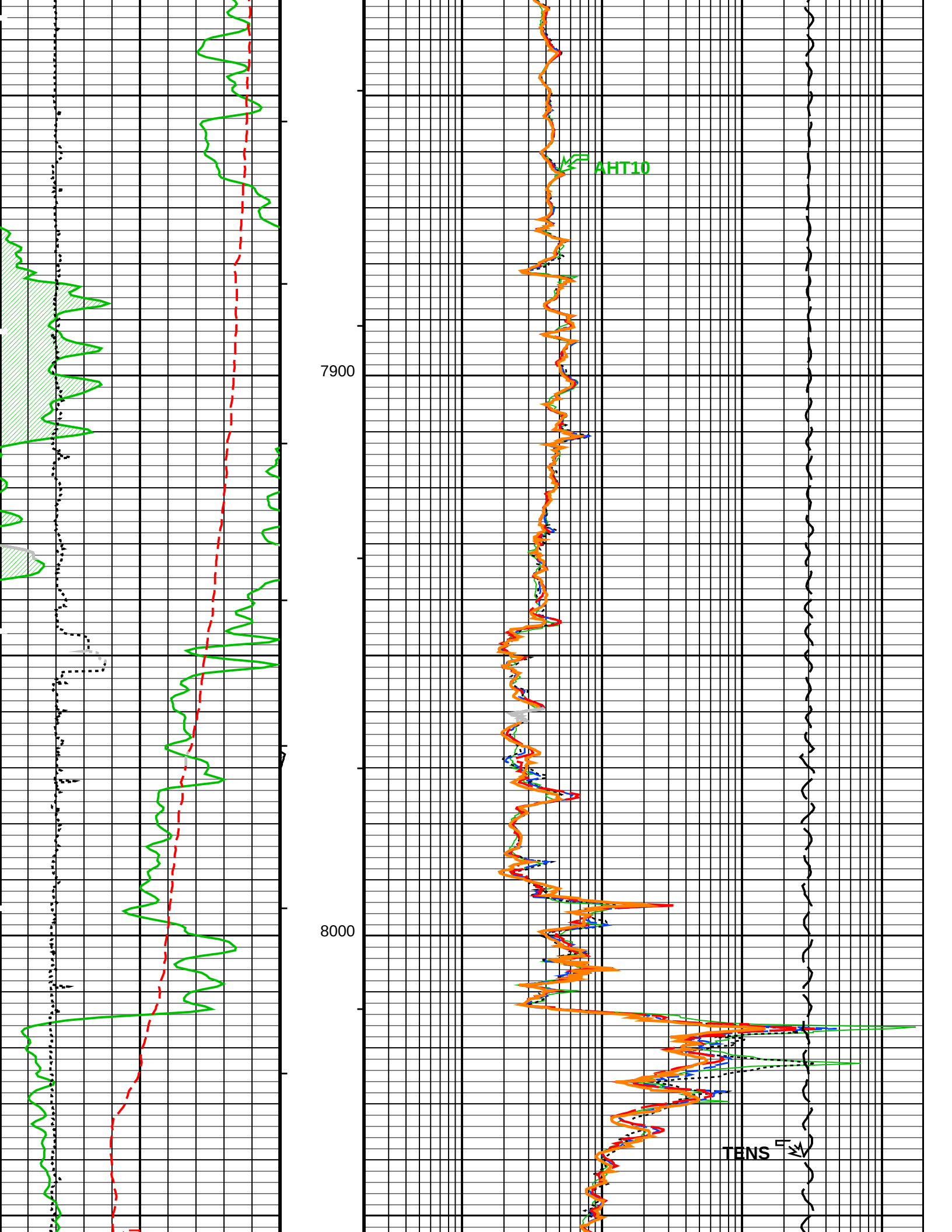

6800
6900
SP
HCAL
GR
TENS
AHT90
AHT60
AHT30
AHT20

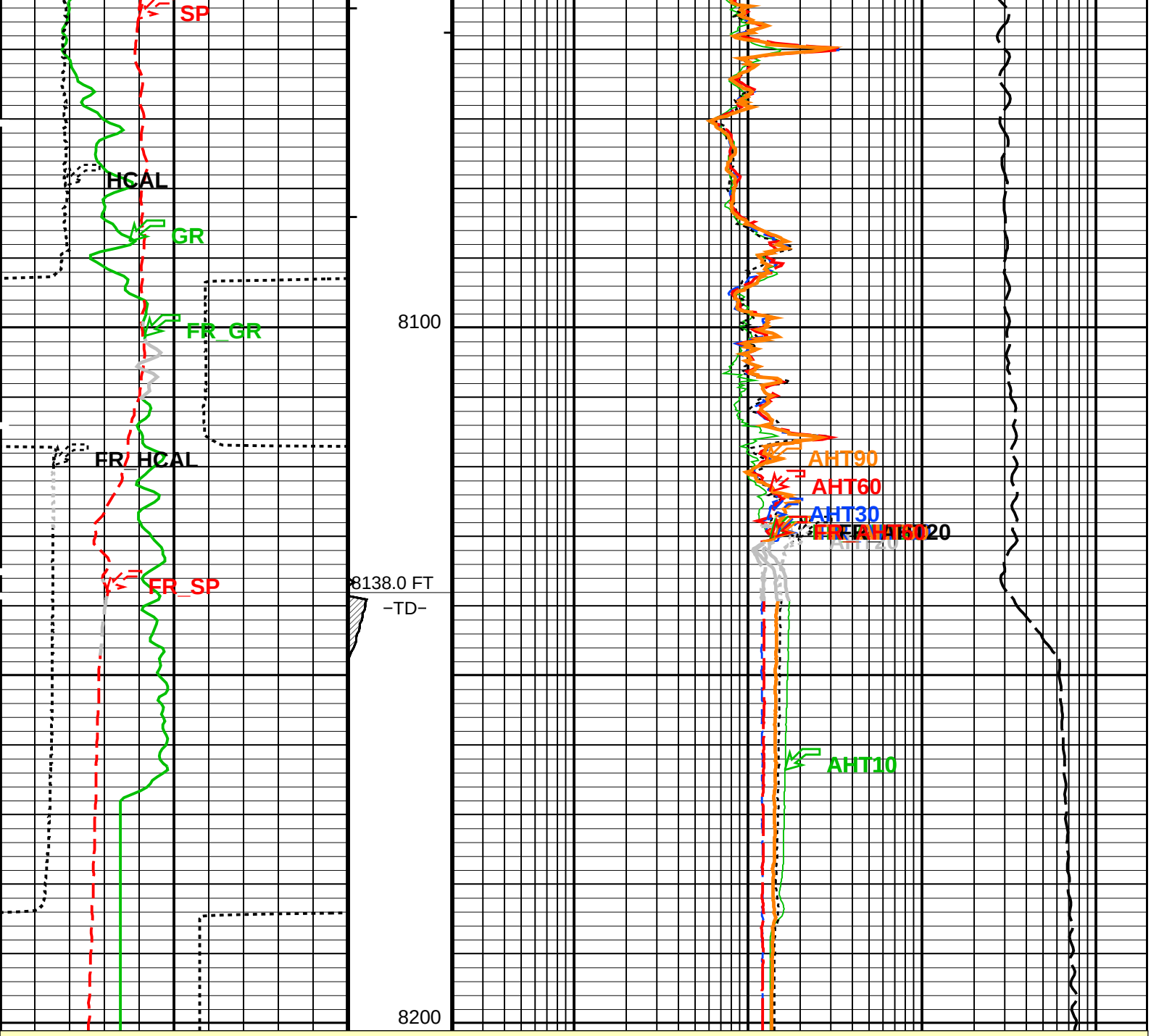

AHT10
7000
7100
TENS
SP


HCAL
GR
7200
AHT90
AHT60
AHT30
AHT20
AHT10
7300


7400
7500
7600
SP
HCAL
GR
TENS
AHT90
AHT60
AHT30
AHT20
AHT10
7550.0 FT
−MTR−


7700
7800
SP
HCAL
GR
TENS
AHT90
AHT60
AHT30
AHT20
7826.0 FT
−MTR−


AHT10
7900
8000
TENS



MAIN PASS: * PLATFORM EXPRESS − ARRAY INDUCTION *****

Gamma Ray Backup	**Cable Drag**	**AIT−H 10 Inch Investigation (AHT10)** 0.2 (OHMM) 2000
Gamma Ray (GR) 0 (GAPI) 200	**Tool/Tot. Drag**	**AIT−H 20 Inch Investigation (AHT20)** 0.2 (OHMM) 2000
Caliper (HCAL) 6 (IN) 16	**Stuck Stretch (STIT)** 0 (F) 50	**AIT−H 30 Inch Investigation (AHT30)** 0.2 (OHMM) 2000
SP (SP) −160 (MV) 40		**AIT−H 60 Inch Investigation (AHT60)** 0.2 (OHMM) 2000
		AIT−H 90 Inch Investigation (AHT90) 0.2 (OHMM) 2000
		Tension (TENS) 10000 (LBF) 0

PIP SUMMARY

Integrated Hole Volume Minor Pip Every 10 F3
Integrated Hole Volume Major Pip Every 100 F3
Integrated Cement Volume Minor Pip Every 10 F3
Integrated Cement Volume Major Pip Every 100 F3
Time Mark Every 60 S

AIT−H Answer Product Processing Summary. Data taken with Tool # 397 (AHTNO)

...Acquired data from HILT/HAIT

***** Borehole Correction *****

Effective Tool Standoff computed. Borehole diameter and mud res. taken as input (see GCSE and GRSE parameters)

Tool is run in ECCENTERED mode with a tool stand−off of 0.13 IN. Bit Size is 7.88 IN.

***** Input Selections to AIT−H Answer Product Processing *****

Caliper (GCSE): HCAL Mud Resistivity (GRSE): AHMF Temperature (GTSE): HTEM Porosity (FPHI): DPHZ

***** Other Parameters used by AIT−H Answer Product Processing *****

Form Factor Exponent (FEXP)	2.000		Form Factor Numerator (FNUM)	1.000	
Mud Filtrate Sample Resistivity (RMFS)	0.848	OHMM	Mud Filtrate Sample Temperature (MFST)	55.400	DEGF
Resitivity Connate Water (RW)	1.000	OHMM			

***** AIT−H Answer Product Processing Control Parameters *****

Playback Mode: NORMAL

Parameters

DLIS Name	Description	Value	
	HILTB−CTS: High resolution Integrated Logging Tool−CTS		
AHBHM	Array Induction Borehole Correction Mode	2_ComputeStandoff	
AHBHV	Array Induction Borehole Correction Code Version Number	900	
AHBLM	Array Induction Basic Logs Mode	6_One_Two_and_Four	
AHBLV	Array Induction Basic Logs Code Version Number	223	
AHCDE	Array Induction Casing Detection Enable	Yes	
AHCEN	Array Induction Tool Centering Flag (in Borehole)	Eccentered	
AHFRSV	Array Induction Response Set Version for Four ft Resolution	41.70.24.20	
AHMRF	Array Induction Mud Resistivity Factor	1	
AHORSV	Array Induction Response Set Version for One ft Resolution	41.70.24.20	
AHRFV	Array Induction Radial Profiling Code Version Number	701	
AHRPV	Array Induction Radial Parametrization Code Version Number	232	
AHSTA	Array Induction Tool Standoff	0.125	IN
AHTRSV	Array Induction Response Set Version for Two ft Resolution	41.70.24.20	
BHT	Bottom Hole Temperature (used in calculations)	220	DEGF
FEXP	Form Factor Exponent	2	
FNUM	Form Factor Numerator	1	
GCSE	Generalized Caliper Selection	HCAL	
GDEV	Average Angular Deviation of Borehole from Normal	0	DEG
GGRD	Geothermal Gradient	0.01	DF/F
GRSE	Generalized Mud Resistivity Selection	AITH_RESIST	
GTSE	Generalized Temperature Selection	HSTS_HTEM	
SHT	Surface Hole Temperature	68	DEGF
SPNV	SP Next Value	0	MV
	FEQL: Formation Evaluation Quick Look		
FEXP	Form Factor Exponent	2	
FNUM	Form Factor Numerator	1	
	HOLEV: Integrated Hole/Cement Volume		
BHT	Bottom Hole Temperature (used in calculations)	220	DEGF
FCD	Future Casing (Outer) Diameter	4.5	IN
GCSE	Generalized Caliper Selection	HCAL	
GDEV	Average Angular Deviation of Borehole from Normal	0	DEG
GGRD	Geothermal Gradient	0.01	DF/F
GRSE	Generalized Mud Resistivity Selection	AITH_RESIST	
GTSE	Generalized Temperature Selection	HSTS_HTEM	
HVCS	Integrated Hole Volume Caliper Selection	AUTOMATIC	
SHT	Surface Hole Temperature	68	DEGF
	PERT: Preliminary Evaluation − Real Time		
BHT	Bottom Hole Temperature (used in calculations)	220	DEGF
FEXP	Form Factor Exponent	2	
FNUM	Form Factor Numerator	1	
GCSE	Generalized Caliper Selection	HCAL	
GDEV	Average Angular Deviation of Borehole from Normal	0	DEG
GGRD	Geothermal Gradient	0.01	DF/F
GRSE	Generalized Mud Resistivity Selection	AITH_RESIST	
GTSE	Generalized Temperature Selection	HSTS_HTEM	
SHT	Surface Hole Temperature	68	DEGF
	STI: Stuck Tool Indicator		
LBFR	Trigger for MAXIS First Reading Label	TDI	

STKT	STI Stuck Threshold	2.5	FT
TDD	Total Depth − Driller	8177.00	FT
TDL	Total Depth − Logger	8138.00	FT
	System and Miscellaneous		
BS	Bit Size	7.875	IN
DFD	Drilling Fluid Density	8.33	LB/G
DO	Depth Offset for Playback	0.0	FT
DORL	Depth Offset for Repeat Analysis	0.0	FT
FLEV	Fluid Level	−50000.00	FT
PP	Playback Processing	NORMAL	
TD	Total Depth	8138	FT

Format: LOWER_GRES **Vertical Scale: 5" per 100'** **Graphics File Created: 28−Feb−2010 02:34**

OP System Version: 17C0−154

HILTB−CTS	17C0−154

Input DLIS Files

	HILTC .020	FN:19	28−Feb−2010 02:16	8201.0 FT	750.0 FT

Output DLIS Files

DEFAULT	AIT_TLD_MCFL_CNL_024PUP	FN:24	PRODUCER	28−Feb−2010 02:34	

Schlumberger

REPEAT ANALYSIS

MAXIS Field Log

Input DLIS Files

	HILTC .020	FN:19		28−Feb−2010 02:16	8201.0 FT	750.0 FT
DEFAULT	AIT_TLD_MCFL_CNL_021PUP	FN:21	PRODUCER	28−Feb−2010 02:20	2724.0 FT	2279.5 FT

Output DLIS Files

DEFAULT	AIT_TLD_MCFL_CNL_024PUP	FN:24	PRODUCER	28−Feb−2010 02:34	

OP System Version: 17C0−154

HILTB−CTS	17C0−154

PIP SUMMARY

Integrated Hole Volume Minor Pip Every 10 F3
Integrated Hole Volume Major Pip Every 100 F3
Integrated Cement Volume Minor Pip Every 10 F3
Integrated Cement Volume Major Pip Every 100 F3
Time Mark Every 60 S

TENS_REP Curve (TENS_REP)
10000 (LBF) 0

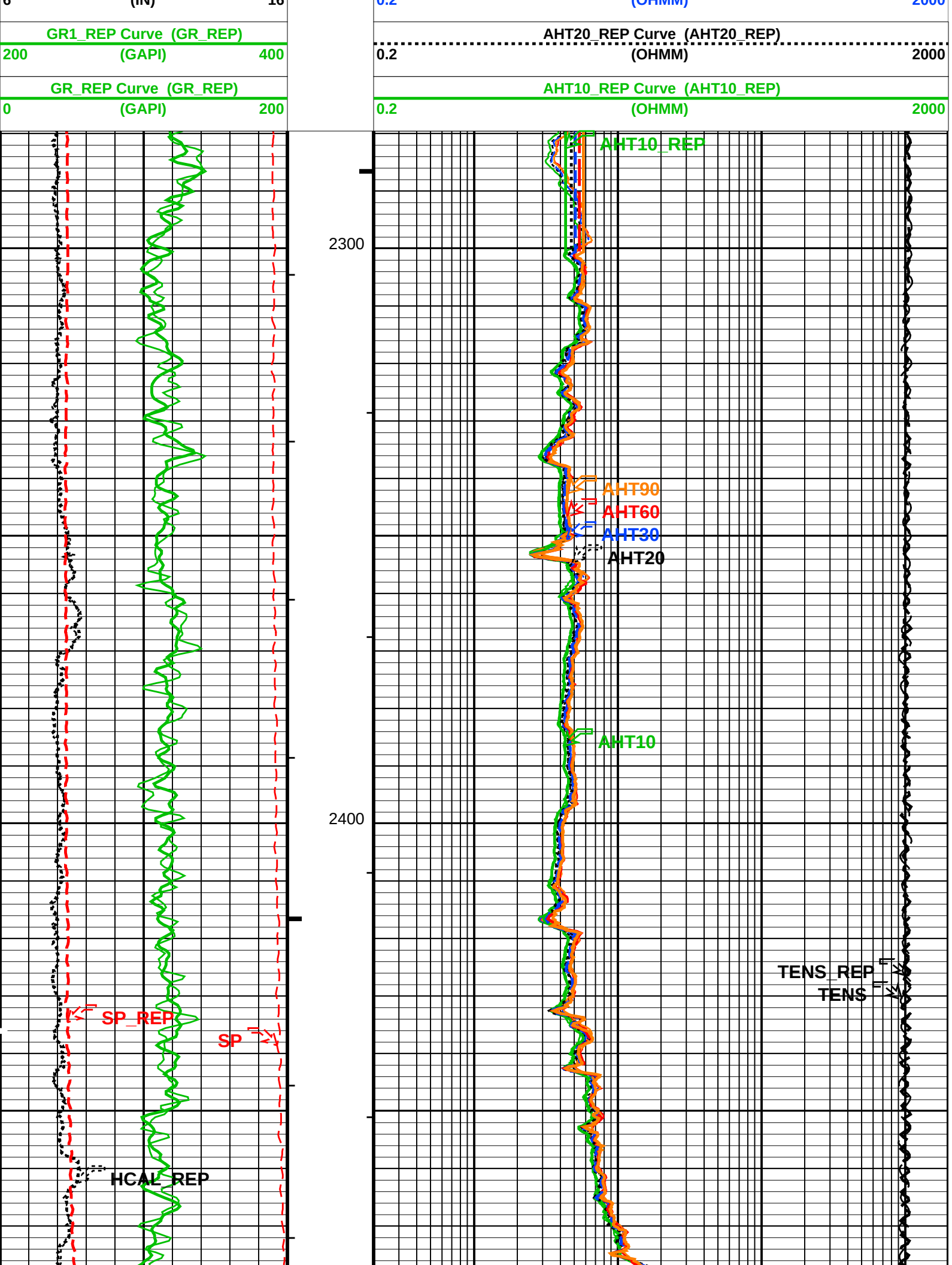
AHT90_REP Curve (AHT90_REP)
0.2 (OHMM) 2000

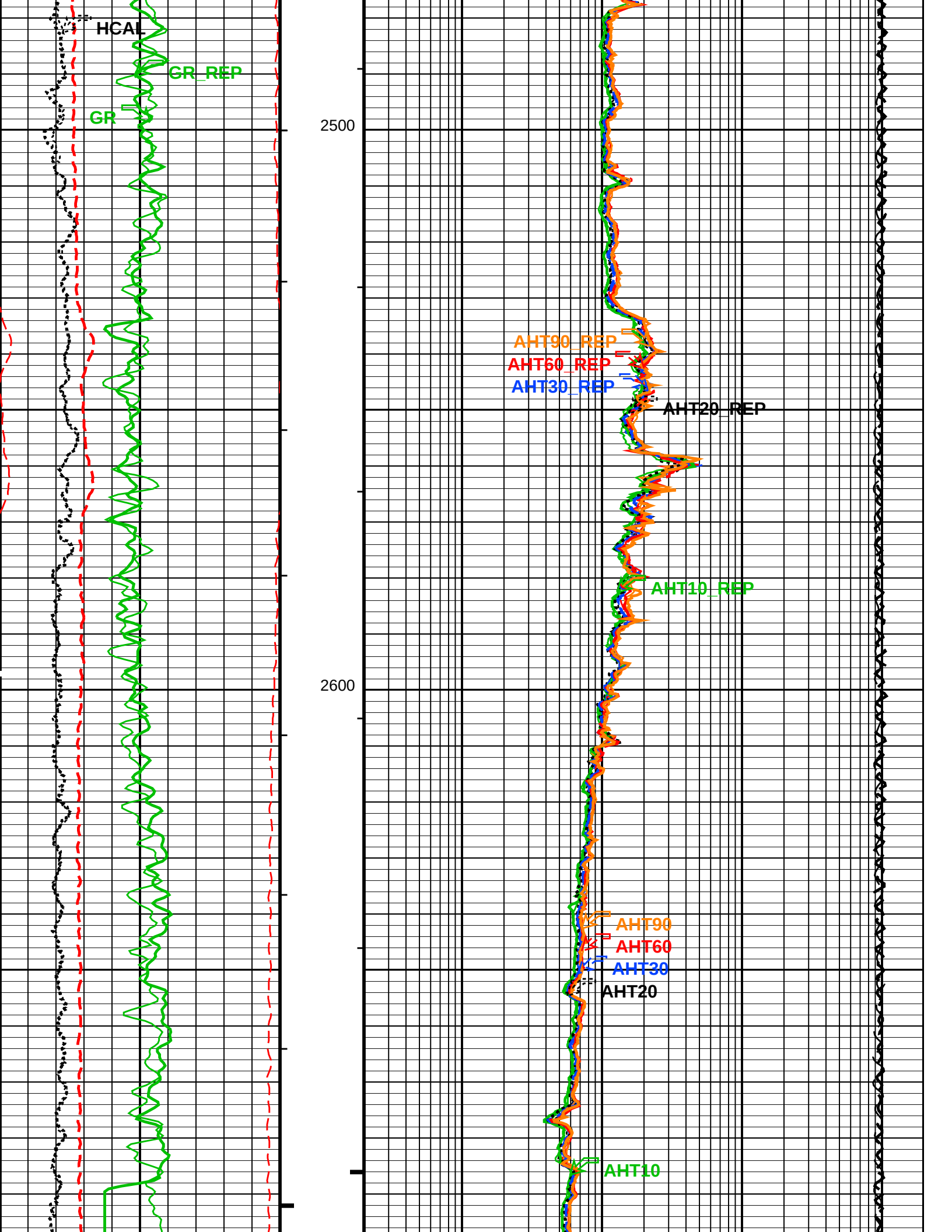
SP_REP Curve (SP_REP)
−160 (MV) 40

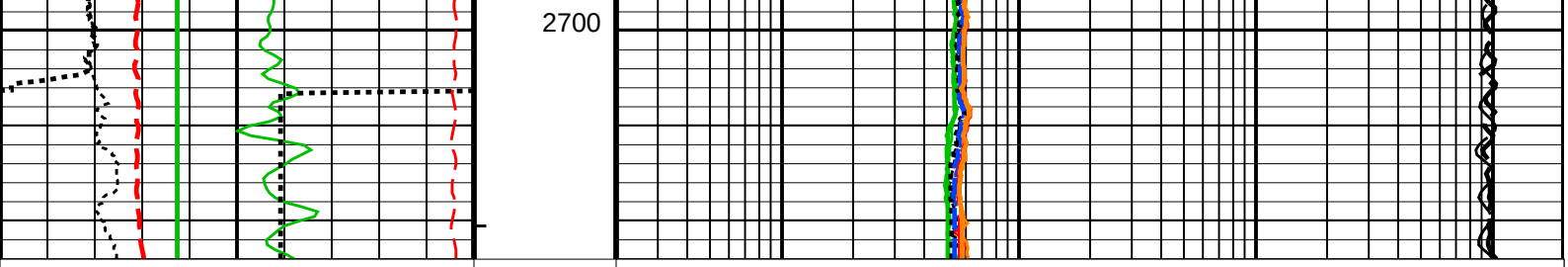
AHT60_REP Curve (AHT60_REP)
0.2 (OHMM) 2000

HCAL_REP Curve (HCAL_REP)
6 (IN) 16

AHT30_REP Curve (AHT30_REP)
0.2 (OHMM) 2000


6
(IN)
16
GR1_REP Curve (GR_REP)
200
(GAPI)
400
GR_REP Curve (GR_REP)
0
(GAPI)
200
0.2
(OHMM)
2000
AHT20_REP Curve (AHT20_REP)
0.2
(OHMM)
2000
AHT10_REP Curve (AHT10_REP)
0.2
(OHMM)
2000
2300
2400
AHT10_REP
AHT90
AHT60
AHT30
AHT20
AHT10
TENS_REP
TENS
SP_REP
SP
HCAL_REP


HCAL
GR_REP
GR
2500
AHT90_REP
AHT60_REP
AHT30_REP
AHT20_REP
AHT10_REP
2600
AHT90
AHT60
AHT30
AHT20
AHT10



GR_REP Curve (GR_REP)
0 (GAPI) 200

GR1_REP Curve (GR_REP)
200 (GAPI) 400

HCAL_REP Curve (HCAL_REP)
6 (IN) 16

SP_REP Curve (SP_REP)
−160 (MV) 40

AHT10_REP Curve (AHT10_REP)
0.2 (OHMM) 2000

AHT20_REP Curve (AHT20_REP)
0.2 (OHMM) 2000

AHT30_REP Curve (AHT30_REP)
0.2 (OHMM) 2000

AHT60_REP Curve (AHT60_REP)
0.2 (OHMM) 2000

AHT90_REP Curve (AHT90_REP)
0.2 (OHMM) 2000

TENS_REP Curve (TENS_REP)
10000 (LBF) 0

PIP SUMMARY

Integrated Hole Volume Minor Pip Every 10 F3
Integrated Hole Volume Major Pip Every 100 F3
Integrated Cement Volume Minor Pip Every 10 F3
Integrated Cement Volume Major Pip Every 100 F3
Time Mark Every 60 S

AIT−H Answer Product Processing Summary. Data taken with Tool # 397 (AHTNO)
...Acquired data from HILT/HAIT
***** Borehole Correction *****
Effective Tool Standoff computed. Borehole diameter and mud res. taken as input (see GCSE and GRSE parameters)
Tool is run in ECCENTERED mode with a tool stand−off of 0.13 IN. Bit Size is 7.88 IN.
***** Input Selections to AIT−H Answer Product Processing *****
Caliper (GCSE): HCAL Mud Resistivity (GRSE): AHMF Temperature (GTSE): HTEM Porosity (FPHI): DPHZ
***** Other Parameters used by AIT−H Answer Product Processing *****

Form Factor Exponent (FEXP)	2.000	Form Factor Numerator (FNUM)	1.000
Mud Filtrate Sample Resistivity (RMFS)	0.848 OHMM	Mud Filtrate Sample Temperature (MFST)	55.400 DEGF
Resitivity Connate Water (RW)	1.000 OHMM		

***** AIT−H Answer Product Processing Control Parameters *****
Playback Mode: NORMAL

Parameters

HILTB−CTS: High resolution Integrated Logging Tool−CTS

DLIS Name	Description	Value	
AHBHM	Array Induction Borehole Correction Mode	2_ComputeStandoff	
AHBHV	Array Induction Borehole Correction Code Version Number	900	
AHBLM	Array Induction Basic Logs Mode	6_One_Two_and_Four	
AHBLV	Array Induction Basic Logs Code Version Number	223	
AHCDE	Array Induction Casing Detection Enable	Yes	
AHCEN	Array Induction Tool Centering Flag (in Borehole)	Eccentered	
AHFRSV	Array Induction Response Set Version for Four ft Resolution	41.70.24.20	
AHMRF	Array Induction Mud Resistivity Factor	1	
AHORSV	Array Induction Response Set Version for One ft Resolution	41.70.24.20	
AHRFV	Array Induction Radial Profiling Code Version Number	701	
AHRPV	Array Induction Radial Parametrization Code Version Number	232	
AHSTA	Array Induction Tool Standoff	0.125	IN
AHTRSV	Array Induction Response Set Version for Two ft Resolution	41.70.24.20	
BHT	Bottom Hole Temperature (used in calculations)	220	DEGF
FEXP	Form Factor Exponent	2	

FNUM	Form Factor Numerator	1	
GCSE	Generalized Caliper Selection	HCAL	
GDEV	Average Angular Deviation of Borehole from Normal	0	DEG
GGRD	Geothermal Gradient	0.01	DF/F
GRSE	Generalized Mud Resistivity Selection	AITH_RESIST	
GTSE	Generalized Temperature Selection	HSTS_HTEM	
SHT	Surface Hole Temperature	68	DEGF
SPNV	SP Next Value	0	MV
FEQL: Formation Evaluation Quick Look			
FEXP	Form Factor Exponent	2	
FNUM	Form Factor Numerator	1	
HOLEV: Integrated Hole/Cement Volume			
BHT	Bottom Hole Temperature (used in calculations)	220	DEGF
FCD	Future Casing (Outer) Diameter	4.5	IN
GCSE	Generalized Caliper Selection	HCAL	
GDEV	Average Angular Deviation of Borehole from Normal	0	DEG
GGRD	Geothermal Gradient	0.01	DF/F
GRSE	Generalized Mud Resistivity Selection	AITH_RESIST	
GTSE	Generalized Temperature Selection	HSTS_HTEM	
HVCS	Integrated Hole Volume Caliper Selection	AUTOMATIC	
SHT	Surface Hole Temperature	68	DEGF
PERT: Preliminary Evaluation − Real Time			
BHT	Bottom Hole Temperature (used in calculations)	220	DEGF
FEXP	Form Factor Exponent	2	
FNUM	Form Factor Numerator	1	
GCSE	Generalized Caliper Selection	HCAL	
GDEV	Average Angular Deviation of Borehole from Normal	0	DEG
GGRD	Geothermal Gradient	0.01	DF/F
GRSE	Generalized Mud Resistivity Selection	AITH_RESIST	
GTSE	Generalized Temperature Selection	HSTS_HTEM	
SHT	Surface Hole Temperature	68	DEGF
System and Miscellaneous			
BS	Bit Size	7.875	IN
DFD	Drilling Fluid Density	8.33	LB/G
DO	Depth Offset for Playback	0.0	FT
DORL	Depth Offset for Repeat Analysis	0.0	FT
FLEV	Fluid Level	−50000.00	FT
PP	Playback Processing	NORMAL	
TD	Total Depth	8138	FT

Format: GRES_REP **Vertical Scale: 5" per 100'** **Graphics File Created: 28−Feb−2010 02:34**

OP System Version: 17C0−154

HILTB−CTS **17C0−154**

Input DLIS Files

	HILTC .020	FN:19		28−Feb−2010 02:16	8201.0 FT	750.0 FT
DEFAULT	AIT_TLD_MCFL_CNL_021PUP	FN:21	PRODUCER	28−Feb−2010 02:20	2724.0 FT	2279.5 FT

Output DLIS Files

DEFAULT	AIT_TLD_MCFL_CNL_024PUP	FN:24	PRODUCER	28−Feb−2010 02:34

Schlumberger

BEFORE CALIBRATIONS

MAXIS Field Log

Calibration and Check Summary

Measurement	Nominal	Master	Before	After	Change	Limit	Units
High resolution Integrated Logging Tool−CTS Wellsite Calibration − Electronics Calibration Check − Thru Cal Mag. & Phase							

High resolution Integrated Logging Tool−CTS Wellsite Calibration − Electronics Calibration Check − Thru Cal Magn & Phase
Master: 30−Nov−2009 14:59 Before: 27−Feb−2010 17:50

Thru Cal Magnitude − 0	0	0.6193	0.6199	N/A	N/A	N/A	V
Thru Cal Magnitude − 1	0	1.271	1.273	N/A	N/A	N/A	V
Thru Cal Magnitude − 2	0	0.6293	0.6297	N/A	N/A	N/A	V
Thru Cal Magnitude − 3	0	0.7116	0.7125	N/A	N/A	N/A	V
Thru Cal Magnitude − 4	0	1.330	1.332	N/A	N/A	N/A	V
Thru Cal Magnitude − 5	0	1.924	1.927	N/A	N/A	N/A	V
Thru Cal Magnitude − 6	0	1.927	1.930	N/A	N/A	N/A	V
Thru Cal Magnitude − 7	0	1.353	1.357	N/A	N/A	N/A	V
Phase − 0	0	68.36	69.31	N/A	N/A	N/A	DEG
Phase − 1	0	67.36	68.32	N/A	N/A	N/A	DEG
Phase − 2	0	63.29	64.28	N/A	N/A	N/A	DEG
Phase − 3	0	62.43	63.42	N/A	N/A	N/A	DEG
Phase − 4	0	55.68	56.70	N/A	N/A	N/A	DEG
Phase − 5	0	53.53	54.58	N/A	N/A	N/A	DEG
Phase − 6	0	53.50	54.55	N/A	N/A	N/A	DEG
Phase − 7	0	48.00	49.30	N/A	N/A	N/A	DEG

High resolution Integrated Logging Tool−CTS Wellsite Calibration − Electronics Calibration Check − Auxilliary
Master: 30−Nov−2009 14:59 Before: 27−Feb−2010 17:50

Array Induction SPA Plus	990.5	992.6	991.9	N/A	N/A	N/A	MV
Array Induction SPA Zero	0	−0.2184	−0.2093	N/A	N/A	N/A	MV
Array Induction Temperature Pl	0.9150	0.9194	0.9187	N/A	N/A	N/A	V
Array Induction Temperature Ze	0	−0.0002118	−0.0002148	N/A	N/A	N/A	V

High resolution Integrated Logging Tool−CTS Wellsite Calibration − Test Loop Gain Correction
Master: 30−Nov−2009 14:59

Test Loop Gain Magnitude − 0	0	1.013	N/A	N/A	N/A	N/A	V
Test Loop Gain Magnitude − 1	0	1.015	N/A	N/A	N/A	N/A	V
Test Loop Gain Magnitude − 2	0	1.016	N/A	N/A	N/A	N/A	V
Test Loop Gain Magnitude − 3	0	1.012	N/A	N/A	N/A	N/A	V
Test Loop Gain Magnitude − 4	0	0.9923	N/A	N/A	N/A	N/A	V
Test Loop Gain Magnitude − 5	0	0.9870	N/A	N/A	N/A	N/A	V
Test Loop Gain Magnitude − 6	0	0.9920	N/A	N/A	N/A	N/A	V
Test Loop Gain Magnitude − 7	0	1.003	N/A	N/A	N/A	N/A	V
Phase − 0	0	−2.469	N/A	N/A	N/A	N/A	DEG
Phase − 1	0	−0.1516	N/A	N/A	N/A	N/A	DEG
Phase − 2	0	0.9347	N/A	N/A	N/A	N/A	DEG
Phase − 3	0	0.1802	N/A	N/A	N/A	N/A	DEG
Phase − 4	0	0.1003	N/A	N/A	N/A	N/A	DEG
Phase − 5	0	−0.09392	N/A	N/A	N/A	N/A	DEG
Phase − 6	0	0.2377	N/A	N/A	N/A	N/A	DEG
Phase − 7	0	−0.1620	N/A	N/A	N/A	N/A	DEG

High resolution Integrated Logging Tool−CTS Wellsite Calibration − Sonde Error Correction
Master: 30−Nov−2009 14:59

R Sonde Error Correction − 0	0	−76.56	N/A	N/A	N/A	N/A	MM/M
R Sonde Error Correction − 1	0	170.5	N/A	N/A	N/A	N/A	MM/M
R Sonde Error Correction − 2	0	110.7	N/A	N/A	N/A	N/A	MM/M
R Sonde Error Correction − 3	0	61.12	N/A	N/A	N/A	N/A	MM/M
R Sonde Error Correction − 4	0	24.14	N/A	N/A	N/A	N/A	MM/M
R Sonde Error Correction − 5	0	14.16	N/A	N/A	N/A	N/A	MM/M
R Sonde Error Correction − 6	0	9.674	N/A	N/A	N/A	N/A	MM/M
R Sonde Error Correction − 7	0	−1.714	N/A	N/A	N/A	N/A	MM/M
X Sonde Error Correction − 0	0	−228.6	N/A	N/A	N/A	N/A	MM/M
X Sonde Error Correction − 1	0	141.0	N/A	N/A	N/A	N/A	MM/M
X Sonde Error Correction − 2	0	−31.72	N/A	N/A	N/A	N/A	MM/M
X Sonde Error Correction − 3	0	−44.12	N/A	N/A	N/A	N/A	MM/M
X Sonde Error Correction − 4	0	2.293	N/A	N/A	N/A	N/A	MM/M
X Sonde Error Correction − 5	0	17.99	N/A	N/A	N/A	N/A	MM/M
X Sonde Error Correction − 6	0	−4.867	N/A	N/A	N/A	N/A	MM/M
X Sonde Error Correction − 7	0	−0.3559	N/A	N/A	N/A	N/A	MM/M

High resolution Integrated Logging Tool−CTS Wellsite Calibration − Mud Gain Correction
Master: 30−Nov−2009 14:59

Coarse − Mag, Real, Imag − 0	0	1.073	N/A	N/A	N/A	N/A	
Coarse − Mag, Real, Imag − 1	0	1.073	N/A	N/A	N/A	N/A	
Coarse − Mag, Real, Imag − 2	0	1.073	N/A	N/A	N/A	N/A	
Fine − Mag, Real, Imag − 0	0	1.072	N/A	N/A	N/A	N/A	
Fine − Mag, Real, Imag − 1	0	1.072	N/A	N/A	N/A	N/A	
Fine − Mag, Real, Imag − 2	0	1.072	N/A	N/A	N/A	N/A	

High resolution Integrated Logging Tool−CTS Wellsite Calibration − Stab Measurement Summary
Before: 27−Feb−2010 17:47

BS Window Ratio	0.7600	N/A	0.7621	N/A	N/A	N/A	
BS Window Sum	10410	N/A	10390	N/A	N/A	N/A	CPS
SS Window Ratio	0.4998	N/A	0.4968	N/A	N/A	N/A	
SS Window Sum	9832	N/A	9815	N/A	N/A	N/A	CPS
LS Window Ratio	0.2927	N/A	0.2917	N/A	N/A	N/A	
LS Window Sum	1029	N/A	1025	N/A	N/A	N/A	CPS

High resolution Integrated Logging Tool−CTS Wellsite Calibration − Photo−multiplier High Voltages Calibrations
Before: 27−Feb−2010 17:47

BS PM High Voltage (Command)	1363	N/A	1385	N/A	N/A	N/A	V
SS PM High Voltage (Command)	1401	N/A	1419	N/A	N/A	N/A	V
LS PM High Voltage (Command)	1517	N/A	1530	N/A	N/A	N/A	V

High resolution Integrated Logging Tool−CTS Wellsite Calibration − Crystal Quality Resolutions Calibration
Before: 27−Feb−2010 17:47

BS Crystal Resolution	10.64	N/A	10.70	N/A	N/A	N/A	%
SS Crystal Resolution	9.215	N/A	9.428	N/A	N/A	N/A	%
LS Crystal Resolution	10.18	N/A	9.821	N/A	N/A	N/A	%

High resolution Integrated Logging Tool−CTS Wellsite Calibration − MCFL Calibration
Before: 27−Feb−2010 17:48

Raw B0 Resistivity	3875	N/A	3876	N/A	N/A	N/A	OHMM
Raw B1 Resistivity	3830	N/A	3823	N/A	N/A	N/A	OHMM
Raw B2 Resistivity	3830	N/A	3827	N/A	N/A	N/A	OHMM

High resolution Integrated Logging Tool−CTS Wellsite Calibration − HILT Caliper Calibration
Before: 27−Feb−2010 17:42

HILT Caliper Zero Measurement	8.000	N/A	9.888	N/A	N/A	N/A	IN
HILT Caliper Plus Measurement	12.00	N/A	13.98	N/A	N/A	N/A	IN

High resolution Integrated Logging Tool−CTS Wellsite Calibration − Detector Calibration
Before: 27−Feb−2010 17:42

Gamma Ray Background	30.00	N/A	91.33	N/A	N/A	N/A	GAPI
Gamma Ray (Jig − Bkgd)	165.0	N/A	167.2	N/A	N/A	15.00	GAPI

High resolution Integrated Logging Tool−CTS Wellsite Calibration − Zero Measurement
Master: 10−Jan−2010 18:39 Before: 27−Feb−2010 17:43

CNTC Background	26.69	26.69	27.47	N/A	N/A	4.004	CPS
CFTC Background	33.46	33.46	29.03	N/A	N/A	5.019	CPS

High resolution Integrated Logging Tool−CTS Wellsite Calibration − Ratio Measurement
Master: 10−Jan−2010 18:39

Thermal Near Corr. (Tank)	5800	5102	N/A	N/A	N/A	N/A	CPS
Thermal Far Corr. (Tank)	2400	2170	N/A	N/A	N/A	N/A	CPS
CNTC/CFTC (Tank)	2.159	2.351	N/A	N/A	N/A	N/A	

High resolution Integrated Logging Tool−CTS Wellsite Calibration − Accelerometer Calibration
Before: 27−Feb−2010 23:58

Z−Axis Acceleration	32.19	N/A	31.68	N/A	N/A	N/A	F/S2

High resolution Integrated Logging Tool−CTS Master Calibration − Inversion results
Master: 16−Feb−2010 14:22

Rho Aluminum	2.596	2.600	−−	−−	−−	−−	G/C3
Rho Magnesium	1.686	1.686	−−	−−	−−	−−	G/C3
Pe Aluminum	2.570	2.554	−−	−−	−−	−−	
Pe Magnesium	2.650	2.639	−−	−−	−−	−−	

High resolution Integrated Logging Tool−CTS Master Calibration − Deviation Summary
Master: 16−Feb−2010 14:22

BS Average Deviation	0	0.3068	−−	−−	−−	−−	%
BS Max Deviation	0	0.7997	−−	−−	−−	−−	%
SS Average Deviation	0	0.2497	−−	−−	−−	−−	%
SS Max Deviation	0	1.017	−−	−−	−−	−−	%
LS Average Deviation	0	0.5285	−−	−−	−−	−−	%
LS Max Deviation	0	1.602	−−	−−	−−	−−	%

The GLS−VJ source activity is acceptable.

The HGNS Neutron Master Calibration was done with the following parameters :

NCT−B Water Temperature 57.6 DEGF.
Thermal Housing Size 3.357 IN.
NSR−F serial number 5168

High resolution Integrated Logging Tool−CTS / Equipment Identification

Primary Equipment:

Array Induction Tool − H	AIT − H	
Rm/SP Bottom Nose	AHRM − A	
Array Induction Sonde	AHIS − BA	397
HILT high−Resolution Mechanical Sonde	HRMS − B	

HILT Rxo Gamma−ray Device	HRGD − B	
HILT Micro Cylindrically Focused Log Dev	MCFL −	
GR Logging Source	GLS − VJ	5363
HILT High Res. Control Cartridge	HRCC − B	

Auxiliary Equipment:

High resolution Integrated Logging Tool−CTS Wellsite Calibration

Electronics Calibration Check − Thru Cal Mag. & Phase

Idx	Phase	Value	Thru Cal Magnitude V	Nominal	Value	Phase DEG	Nominal
0	Master	0.6193		0.6050	68.36		71.00
	Before	0.6199			69.31		
1	Master	1.271		1.270	67.36		70.00
	Before	1.273			68.32		
2	Master	0.6293		0.6230	63.29		66.00
	Before	0.6297			64.28		
3	Master	0.7116		0.7040	62.43		65.00
	Before	0.7125			63.42		
4	Master	1.330		1.337	55.68		59.00
	Before	1.332			56.70		
5	Master	1.924		1.955	53.53		57.00
	Before	1.927			54.58		
6	Master	1.927		1.955	53.50		57.00
	Before	1.930			54.55		
7	Master	1.353		1.415	48.00		53.00
	Before	1.357			49.30		
		60.00 % (Minimum)	140.0 % (Maximum)		Nom −60.00 (Minimum)	Nom + 60.00 (Maximum)	

Master: 30−Nov−2009 14:59 Before: 27−Feb−2010 17:50

High resolution Integrated Logging Tool−CTS Wellsite Calibration

Electronics Calibration Check − Auxilliary

Phase	Array Induction SPA Plus MV	Value
Master		992.6
Before		991.9
	941.0 (Minimum) 990.5 (Nominal) 1040 (Maximum)	

Phase	Array Induction SPA Zero MV	Value
Master		−0.2184
Before		−0.2093
	−50.00 (Minimum) 0 (Nominal) 50.00 (Maximum)	

Phase	Array Induction Temperature Plus V	Value
Master		0.9194
Before		0.9187
	0.8700 (Minimum) 0.9150 (Nominal) 0.9600 (Maximum)	

Phase	Array Induction Temperature Zero V	Value
Master		−0.0002118
Before		−0.0002148
	−0.05000 (Minimum) 0 (Nominal) 0.05000 (Maximum)	

Master: 30−Nov−2009 14:59 Before: 27−Feb−2010 17:50

High resolution Integrated Logging Tool−CTS Wellsite Calibration

Test Loop Gain Correction

Idx	Value	Test Loop Gain Magnitude V	Value	Phase DEG
0	1.013		−2.469	
	0.9500 (Minimum) 1.000 (Nominal) 1.050 (Maximum)		−3.000 (Minimum) 0 (Nominal) 3.000 (Maximum)	
1	1.015		−0.1516	
	0.9500 (Minimum) 1.000 (Nominal) 1.050 (Maximum)		−3.000 (Minimum) 0 (Nominal) 3.000 (Maximum)	
2	1.016		0.9347	
	0.9500 (Minimum) 1.000 (Nominal) 1.050 (Maximum)		−3.000 (Minimum) 0 (Nominal) 3.000 (Maximum)	
3	1.012		0.1802	

		0.9500 (Minimum)	1.000 (Nominal)	1.050 (Maximum)		−3.000 (Minimum)	0 (Nominal)	3.000 (Maximum)
4	0.9923				0.1003			
		0.9500 (Minimum)	1.000 (Nominal)	1.050 (Maximum)		−3.000 (Minimum)	0 (Nominal)	3.000 (Maximum)
5	0.9870				−0.09392			
		0.9500 (Minimum)	1.000 (Nominal)	1.050 (Maximum)		−3.000 (Minimum)	0 (Nominal)	3.000 (Maximum)
6	0.9920				0.2377			
		0.9500 (Minimum)	1.000 (Nominal)	1.050 (Maximum)		−3.000 (Minimum)	0 (Nominal)	3.000 (Maximum)
7	1.003				−0.1620			
		0.9500 (Minimum)	1.000 (Nominal)	1.050 (Maximum)		−3.000 (Minimum)	0 (Nominal)	3.000 (Maximum)

Master: 30−Nov−2009 14:59

High resolution Integrated Logging Tool−CTS Wellsite Calibration

Sonde Error Correction

Idx	Value	R Sonde Error Correction MM/M			Value	X Sonde Error Correction MM/M		
0	−76.56				−228.6			
		−231.0 (Minimum)	−56.00 (Nominal)	119.0 (Maximum)		−2250 (Minimum)	0 (Nominal)	2250 (Maximum)
1	170.5				141.0			
		114.0 (Minimum)	159.0 (Nominal)	204.0 (Maximum)		−625.0 (Minimum)	0 (Nominal)	625.0 (Maximum)
2	110.7				−31.72			
		66.00 (Minimum)	111.0 (Nominal)	156.0 (Maximum)		−350.0 (Minimum)	0 (Nominal)	350.0 (Maximum)
3	61.12				−44.12			
		39.00 (Minimum)	64.00 (Nominal)	89.00 (Maximum)		−250.0 (Minimum)	0 (Nominal)	250.0 (Maximum)
4	24.14				2.293			
		15.00 (Minimum)	25.00 (Nominal)	35.00 (Maximum)		−63.00 (Minimum)	0 (Nominal)	63.00 (Maximum)
5	14.16				17.99			
		4.000 (Minimum)	14.00 (Nominal)	24.00 (Maximum)		−50.00 (Minimum)	0 (Nominal)	50.00 (Maximum)
6	9.674				−4.867			
		5.000 (Minimum)	10.00 (Nominal)	15.00 (Maximum)		−30.00 (Minimum)	0 (Nominal)	30.00 (Maximum)
7	−1.714				−0.3559			
		−5.000 (Minimum)	0 (Nominal)	5.000 (Maximum)		−30.00 (Minimum)	0 (Nominal)	30.00 (Maximum)

Master: 30−Nov−2009 14:59

High resolution Integrated Logging Tool−CTS Wellsite Calibration

Mud Gain Correction

Idx	Value	Coarse − Mag, Real, Imag			Value	Fine − Mag, Real, Imag		
0	1.073				1.072			
		0.8000 (Minimum)	1.000 (Nominal)	1.200 (Maximum)		0.8000 (Minimum)	1.000 (Nominal)	1.200 (Maximum)
1	1.073				1.072			
		0.8000 (Minimum)	1.000 (Nominal)	1.200 (Maximum)		0.8000 (Minimum)	1.000 (Nominal)	1.200 (Maximum)
2	1.073				1.072			
		0.8000 (Minimum)	1.000 (Nominal)	1.200 (Maximum)		0.8000 (Minimum)	1.000 (Nominal)	1.200 (Maximum)

Master: 30−Nov−2009 14:59

High resolution Integrated Logging Tool−CTS Wellsite Calibration

Stab Measurement Summary

Phase	BS Window Ratio	Value	Phase	SS Window Ratio	Value	Phase	LS Window Ratio	Value
Before		0.7621	Before		0.4968	Before		0.2917
0.7220 (Minimum)	0.7600 (Nominal)	0.7980 (Maximum)	0.4748 (Minimum)	0.4998 (Nominal)	0.5248 (Maximum)	0.2780 (Minimum)	0.2927 (Nominal)	0.3073 (Maximum)
Phase	BS Window Sum CPS	Value	Phase	SS Window Sum CPS	Value	Phase	LS Window Sum CPS	Value

Phase		Value
Before		10390
	9887 (Minimum) 10410 (Nominal) 10930 (Maximum)	

Phase		Value
Before		9815
	9341 (Minimum) 9832 (Nominal) 10320 (Maximum)	

Phase		Value
Before		1025
	977.6 (Minimum) 1029 (Nominal) 1081 (Maximum)	

Before: 27−Feb−2010 17:47

High resolution Integrated Logging Tool−CTS Wellsite Calibration

Photo−multiplier High Voltages Calibrations

Phase	BS PM High Voltage (Command) V	Value
Before		1385
	1263 (Minimum) 1363 (Nominal) 1463 (Maximum)	

Phase	SS PM High Voltage (Command) V	Value
Before		1419
	1301 (Minimum) 1401 (Nominal) 1501 (Maximum)	

Phase	LS PM High Voltage (Command) V	Value
Before		1530
	1417 (Minimum) 1517 (Nominal) 1617 (Maximum)	

Before: 27−Feb−2010 17:47

High resolution Integrated Logging Tool−CTS Wellsite Calibration

Crystal Quality Resolutions Calibration

Phase	BS Crystal Resolution %	Value
Before		10.70
	9.637 (Minimum) 10.64 (Nominal) 11.64 (Maximum)	

Phase	SS Crystal Resolution %	Value
Before		9.428
	8.215 (Minimum) 9.215 (Nominal) 10.21 (Maximum)	

Phase	LS Crystal Resolution %	Value
Before		9.821
	9.176 (Minimum) 10.18 (Nominal) 11.18 (Maximum)	

Before: 27−Feb−2010 17:47

High resolution Integrated Logging Tool−CTS Wellsite Calibration

MCFL Calibration

Phase	Raw B0 Resistivity OHMM	Value
Before		3876
	3565 (Minimum) 3875 (Nominal) 4185 (Maximum)	

Phase	Raw B1 Resistivity OHMM	Value
Before		3823
	3524 (Minimum) 3830 (Nominal) 4136 (Maximum)	

Phase	Raw B2 Resistivity OHMM	Value
Before		3827
	3524 (Minimum) 3830 (Nominal) 4136 (Maximum)	

Before: 27−Feb−2010 17:48

High resolution Integrated Logging Tool−CTS Wellsite Calibration

HILT Caliper Calibration

Phase	HILT Caliper Zero Measurement IN	Value
Before		9.888
	6.000 (Minimum) 8.000 (Nominal) 10.00 (Maximum)	

Phase	HILT Caliper Plus Measurement IN	Value
Before		13.98
	9.000 (Minimum) 12.00 (Nominal) 15.00 (Maximum)	

Before: 27−Feb−2010 17:42

High resolution Integrated Logging Tool−CTS Wellsite Calibration

Detector Calibration

Phase	Gamma Ray Background GAPI	Value
Before		91.33
	0 (Minimum) 30.00 (Nominal) 120.0 (Maximum)	

Phase	Gamma Ray (Jig − Bkgd) GAPI	Value
Before		167.2
	157.1 (Minimum) 165.0 (Nominal) 206.3 (Maximum)	

Before: 27−Feb−2010 17:42

High resolution Integrated Logging Tool−CTS Wellsite Calibration

Zero Measurement

Phase	CNTC Background CPS	Value
Master		26.69
Before		27.47
	5.000 (Minimum) 26.69 (Nominal) 40.00 (Maximum)	

Phase	CFTC Background CPS	Value
Master		33.46
Before		29.03
	5.000 (Minimum) 33.46 (Nominal) 40.00 (Maximum)	

Master: 10−Jan−2010 18:39 Before: 27−Feb−2010 17:43

High resolution Integrated Logging Tool−CTS Wellsite Calibration

Ratio Measurement

Phase	Thermal Near Corr. (Tank) CPS	Value
Master		5102
	4700 (Minimum) 5800 (Nominal) 6900 (Maximum)	

Phase	Thermal Far Corr. (Tank) CPS	Value
Master		2170
	1900 (Minimum) 2400 (Nominal) 2900 (Maximum)	

Phase	CNTC/CFTC (Tank)	Value
Master		2.351
	2.120 (Minimum) 2.159 (Nominal) 2.540 (Maximum)	

Master: 10−Jan−2010 18:39

High resolution Integrated Logging Tool−CTS

Wellsite Calibration

Accelerometer Calibration

Phase	Z−Axis Acceleration F/S2	Value
Before		31.68
	31.53 (Minimum) 32.19 (Nominal) 32.84 (Maximum)	

Before: 27−Feb−2010 23:58

High resolution Integrated Logging Tool−CTS Master Calibration

Electronics Calibration Check − Thru Cal Mag. & Phase

Idx	Phase	Value	Thru Cal Magnitude V	Nominal	Value	Phase DEG	Nominal
0	Master	0.6193		0.6050	68.36		71.00
1	Master	1.271		1.270	67.36		70.00
2	Master	0.6293		0.6230	63.29		66.00
3	Master	0.7116		0.7040	62.43		65.00
4	Master	1.330		1.337	55.68		59.00
5	Master	1.924		1.955	53.53		57.00
6	Master	1.927		1.955	53.50		57.00
7	Master	1.353		1.415	48.00		53.00
		60.00 % (Minimum) (Nominal)		140.0 % (Maximum)	Nom −60.00 (Minimum)	Nom + 60.00 (Nominal) (Maximum)	

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High resolution Integrated Logging Tool−CTS Master Calibration

Electronics Calibration Check − Auxilliary

Phase	Array Induction SPA Plus MV	Value
Master		992.6
	941.0 (Minimum) 990.5 (Nominal) 1040 (Maximum)	

Phase	Array Induction SPA Zero MV	Value
Master		−0.2184
	−50.00 (Minimum) 0 (Nominal) 50.00 (Maximum)	

Phase	Array Induction Temperature Plus V	Value
Master		0.9194
	0.8700 (Minimum) 0.9150 (Nominal) 0.9600 (Maximum)	

Phase	Array Induction Temperature Zero V	Value
Master		−0.0002118
	−0.05000 (Minimum) 0 (Nominal) 0.05000 (Maximum)	

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Test Loop Gain Correction

Idx	Value	Test Loop Gain Magnitude V	Value	Phase DEG
0	1.013		−2.469	
	0.9500 (Minimum) 1.000 (Nominal) 1.050 (Maximum)		−3.000 (Minimum) 0 (Nominal) 3.000 (Maximum)	
1	1.015		−0.1516	
	0.9500 (Minimum) 1.000 (Nominal) 1.050 (Maximum)		−3.000 (Minimum) 0 (Nominal) 3.000 (Maximum)	
2	1.016		0.9347	
	0.9500 (Minimum) 1.000 (Nominal) 1.050 (Maximum)		−3.000 (Minimum) 0 (Nominal) 3.000 (Maximum)	
3	1.012		0.1802	
	0.9500 (Minimum) 1.000 (Nominal) 1.050 (Maximum)		−3.000 (Minimum) 0 (Nominal) 3.000 (Maximum)	
4	0.9923		0.1003	
	0.9500 (Minimum) 1.000 (Nominal) 1.050 (Maximum)		−3.000 (Minimum) 0 (Nominal) 3.000 (Maximum)	
5	0.9870		−0.09392	
	0.9500 (Minimum) 1.000 (Nominal) 1.050 (Maximum)		−3.000 (Minimum) 0 (Nominal) 3.000 (Maximum)	
6	0.9920		0.2377	
	0.9500 (Minimum) 1.000 (Nominal) 1.050 (Maximum)		−3.000 (Minimum) 0 (Nominal) 3.000 (Maximum)	
7	1.003		−0.1620	
	0.9500 (Minimum) 1.000 (Nominal) 1.050 (Maximum)		−3.000 (Minimum) 0 (Nominal) 3.000 (Maximum)	

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High resolution Integrated Logging Tool−CTS Master Calibration

Sonde Error Correction

Idx	Value	R Sonde Error Correction MM/M			Value	X Sonde Error Correction MM/M		
0	−76.56				−228.6			
		−231.0 (Minimum)	−56.00 (Nominal)	119.0 (Maximum)		−2250 (Minimum)	0 (Nominal)	2250 (Maximum)
1	170.5				141.0			
		114.0 (Minimum)	159.0 (Nominal)	204.0 (Maximum)		−625.0 (Minimum)	0 (Nominal)	625.0 (Maximum)
2	110.7				−31.72			
		66.00 (Minimum)	111.0 (Nominal)	156.0 (Maximum)		−350.0 (Minimum)	0 (Nominal)	350.0 (Maximum)
3	61.12				−44.12			
		39.00 (Minimum)	64.00 (Nominal)	89.00 (Maximum)		−250.0 (Minimum)	0 (Nominal)	250.0 (Maximum)
4	24.14				2.293			
		15.00 (Minimum)	25.00 (Nominal)	35.00 (Maximum)		−63.00 (Minimum)	0 (Nominal)	63.00 (Maximum)
5	14.16				17.99			
		4.000 (Minimum)	14.00 (Nominal)	24.00 (Maximum)		−50.00 (Minimum)	0 (Nominal)	50.00 (Maximum)
6	9.674				−4.867			
		5.000 (Minimum)	10.00 (Nominal)	15.00 (Maximum)		−30.00 (Minimum)	0 (Nominal)	30.00 (Maximum)
7	−1.714				−0.3559			
		−5.000 (Minimum)	0 (Nominal)	5.000 (Maximum)		−30.00 (Minimum)	0 (Nominal)	30.00 (Maximum)

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High resolution Integrated Logging Tool−CTS Master Calibration

Mud Gain Correction

Idx	Value	Coarse − Mag, Real, Imag			Value	Fine − Mag, Real, Imag		
0	1.073				1.072			
		0.8000 (Minimum)	1.000 (Nominal)	1.200 (Maximum)		0.8000 (Minimum)	1.000 (Nominal)	1.200 (Maximum)
1	1.073				1.072			
		0.8000 (Minimum)	1.000 (Nominal)	1.200 (Maximum)		0.8000 (Minimum)	1.000 (Nominal)	1.200 (Maximum)
2	1.073				1.072			
		0.8000 (Minimum)	1.000 (Nominal)	1.200 (Maximum)		0.8000 (Minimum)	1.000 (Nominal)	1.200 (Maximum)

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High resolution Integrated Logging Tool−CTS Master Calibration

Inversion results

Phase	Rho Aluminum G/C3			Value	Phase	Rho Magnesium G/C3			Value
Master				2.600	Master				1.686
	2.586 (Minimum)	2.596 (Nominal)	2.606 (Maximum)			1.676 (Minimum)	1.686 (Nominal)	1.696 (Maximum)	
Phase	Pe Aluminum			Value	Phase	Pe Magnesium			Value
Master				2.554	Master				2.639
	2.470 (Minimum)	2.570 (Nominal)	2.670 (Maximum)			2.550 (Minimum)	2.650 (Nominal)	2.750 (Maximum)	

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High resolution Integrated Logging Tool−CTS Master Calibration

Deviation Summary

Phase	BS Average Deviation %			Value	Phase	SS Average Deviation %			Value	Phase	LS Average Deviation %			Value
Master				0.3068	Master				0.2497	Master				0.5285
	−0.6000 (Minimum)	0 (Nominal)	0.6000 (Maximum)			−1.000 (Minimum)	0 (Nominal)	1.000 (Maximum)			−1.500 (Minimum)	0 (Nominal)	1.500 (Maximum)	
Phase	BS Max Deviation %			Value	Phase	SS Max Deviation %			Value	Phase	LS Max Deviation %			Value
Master				0.7997	Master				1.017	Master				1.602
	−1.600 (Minimum)	0 (Nominal)	1.600 (Maximum)			−2.500 (Minimum)	0 (Nominal)	2.500 (Maximum)			−3.500 (Minimum)	0 (Nominal)	3.500 (Maximum)	

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High resolution Integrated Logging Tool−CTS Master Calibration					
Zero Measurement					
Phase	CNTC Background CPS	Value	Phase	CFTC Background CPS	Value
Master		26.69	Master		33.46
5.000 (Minimum) / 26.69 (Nominal) / 40.00 (Maximum)			5.000 (Minimum) / 33.46 (Nominal) / 40.00 (Maximum)		

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High resolution Integrated Logging Tool−CTS Master Calibration								
Tank Measurement								
Phase	Thermal Near Corr. (Tank) CPS	Value	Phase	Thermal Far Corr. (Tank) CPS	Value	Phase	CNTC/CFTC (Tank)	Value
Master		5102	Master		2170	Master		2.351
4700 (Minimum) / 5800 (Nominal) / 6900 (Maximum)			1900 (Minimum) / 2400 (Nominal) / 2900 (Maximum)			2.120 (Minimum) / 2.159 (Nominal) / 2.540 (Maximum)		

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Company: **Kerr−McGee Oil & Gas Onshore, LP**

Schlumberger

Well: **Frank 3−5**
Field: **Wattenberg**
County: **Weld**
State: **Colorado**

Platform Express
Array Induction
with Linear Correlation