

# Schlumberger

Company: Lamont Doherty

Well: Expedition 324 Site U1348A

Field: Shatsky Rise

Rig: JOIDES Resolution Ocean: Pacific

Rig: JOIDES Resolution Field: Shatsky Rise Location: Latitude: N 34* 24.94' Well: Expedition 324 Site U1348A Company: Lamont Doherty	Dual Induction (DITE)			
	Natural Gamma Spectroscopy (HNCS)			
	Latitude: N 34* 24.94'		Elev.: K.B. 11.00 m	
	Longitude: E 159* 22.91'		G.L. -3275.00 m	
LOCATION	Permanent Datum: Mean Sea Level		Elev.: 0.00 m	
	Log Measured From: Drill Floor		11.00 m above Perm. Datum	
	Drilling Measured From: Drill Floor			
API Serial No.		Max. Hole Devi. 0 deg	Longitude	Latitude

Logging Date	5-Oct-2009				
Run Number	1				
Depth Driller	3599 m				
Schlumberger Depth	3596 m				
Bottom Log Interval	3596 m				
Top Log Interval	3267 m				
Casing Driller Size @ Depth	4.500 in @ 3372 m				
Casing Schlumberger	3368 m				
Bit Size	9.875 in				
Type Fluid In Hole	Seawater Gel				
MUD Density	Viscosity	1.258 g/cm3			
MUD Fluid Loss	PH				
MUD Source Of Sample	N/A				
RM @ Measured Temperature	@	@			
RMF @ Measured Temperature	@	@			
RMC @ Measured Temperature	@	@			
Source RMF	RMC	N/A	N/A		
RM @ MRT	RMF @ MRT	@ 4	@ 4	@	@
Maximum Recorded Temperatures		4 degC			
Circulation Stopped	Time	5-Oct-2009	18:00		
Logger On Bottom	Time	6-Oct-2009	1:00		
Unit Number	Location	625003	Houston		
Recorded By	K. Swain				
Witnessed By	Gerardo Iturrino, Helen Evans				

	Run 1	Run 2	Run 3
Logging Date			
Run Number			
Depth Driller			
Schlumberger Depth			
Bottom Log Interval			
Top Log Interval			
Casing Driller Size @ Depth		@	
Casing Schlumberger			
Bit Size			
Type Fluid In Hole			
MUD Density			
MUD Viscosity			
MUD Fluid Loss			
MUD PH			
MUD Source Of Sample			
RM @ Measured Temperature		@	
RMF @ Measured Temperature		@	
RMC @ Measured Temperature		@	
Source RMF			
RMC			
RM @ MRT		@	@
RMF @ MRT			
Maximum Recorded Temperatures			
Circulation Stopped	Time		
Logger On Bottom	Time		
Unit Number	Location		
Recorded By			
Witnessed By			

**DISCLAIMER**  
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**OTHER SERVICES1**  
 OS1: DITE  
 OS2: HLDS  
 OS3:  
 OS4: FMS/DSI  
 OS5:

**OTHER SERVICES2**  
 OS1:  
 OS2:  
 OS3:  
 OS4:  
 OS5:

**REMARKS: RUN NUMBER 1**  
 Logging tools deployed inside drillpipe with wireline.  
 BHA consisted of RCB Drilling Bit and collars with mechanical bit release.  
 HLDS caliper calibration used 12 inch and 15.19" diameter rings as reference to improve large hole size accuracy.  
 Depths referenced from drill floor which is 11m above sea level.

**REMARKS: RUN NUMBER 2**

**RUN 1**

SERVICE ORDER #: \_\_\_\_\_  
 PROGRAM VERSION: 17C0-154  
 FLUID LEVEL: \_\_\_\_\_

LOGGED INTERVAL	START	STOP

**RUN 2**

SERVICE ORDER #: \_\_\_\_\_  
 PROGRAM VERSION: \_\_\_\_\_  
 FLUID LEVEL: \_\_\_\_\_

LOGGED INTERVAL	START	STOP

## EQUIPMENT DESCRIPTION


**RUN 1**


**SURFACE EQUIPMENT**

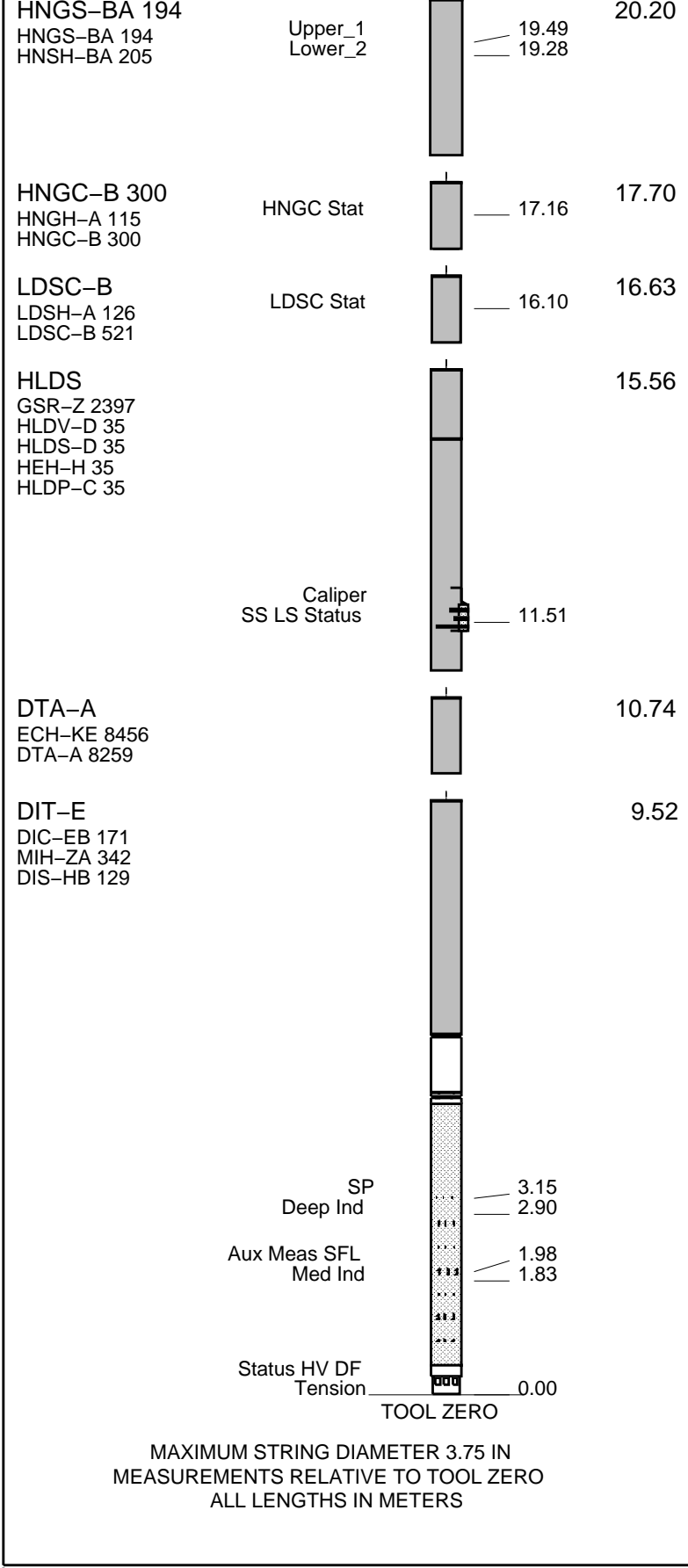
GSR-U 616008  
 WITM (DTS)-A

**RUN 2**

**DOWNHOLE EQUIPMENT**

LEH-QT  22.00  
 LEH-QT 301

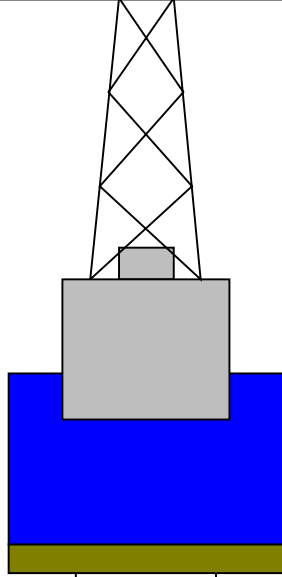
DTC-H  20.83 21.11  
 ECH-KC 1777 CTEM  
 DTCH0-A 8798 TelStatus  
 ToolStatu \_\_\_\_\_ 20.20



Production String	(in)	(M)	Well Schematic	(M)	(in)	Casing String
	OD	ID		MD	MD	

Kelly Bushing Elevation  
Derrick Floor Elevation  
  
Mean Sea Level

11.0  
11.0  
  
0.0



3275 4.20

Sea Floor



3275 9.875

3257 3.80

Borehole Segment

Open Hole

3599

### Output DLIS Files

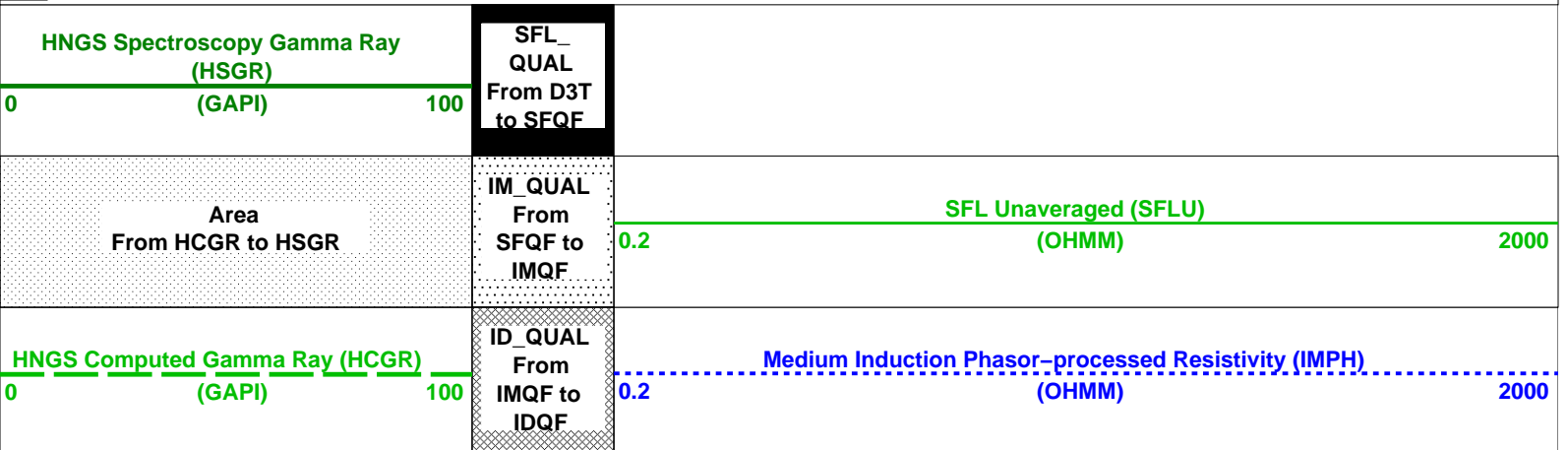
DEFAULT	PI_LDL_NGS_007LUP	FN:9	PRODUCER	06-Oct-2009 02:23	3593.6 M	3230.9 M
BACKUPDLISDATA	PI_LDL_NGS_007LUP	FN:10	PRODUCER	05-Oct-2009 17:24	3593.6 M	3230.9 M

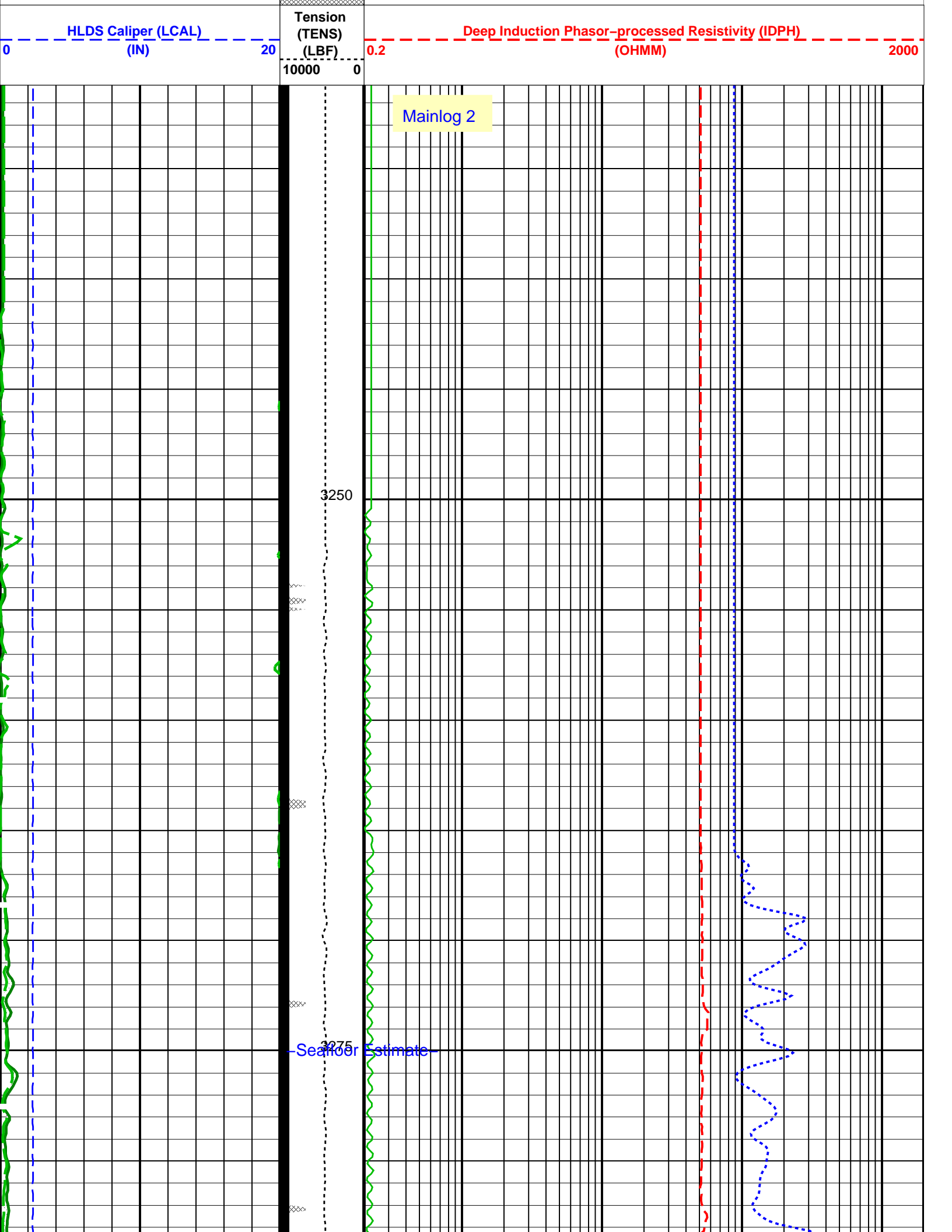
### OP System Version: 17C0-154

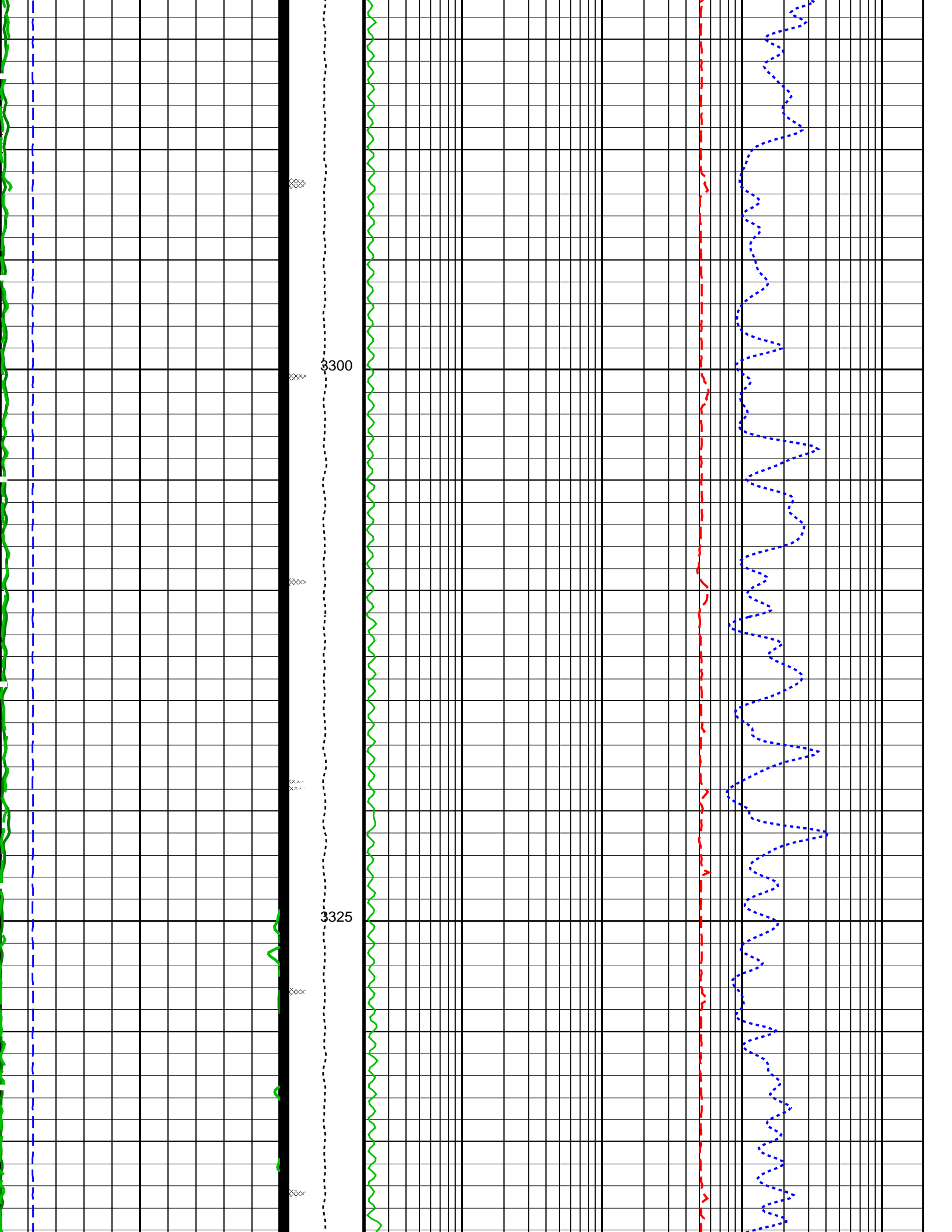
DIT-E	17C0-154	DTA-A	17C0-154
HLDS	17C0-154	LDSC-B	17C0-154
HNGC-B	17C0-154	HNGS-BA	17C0-154
DTC-H	17C0-154		

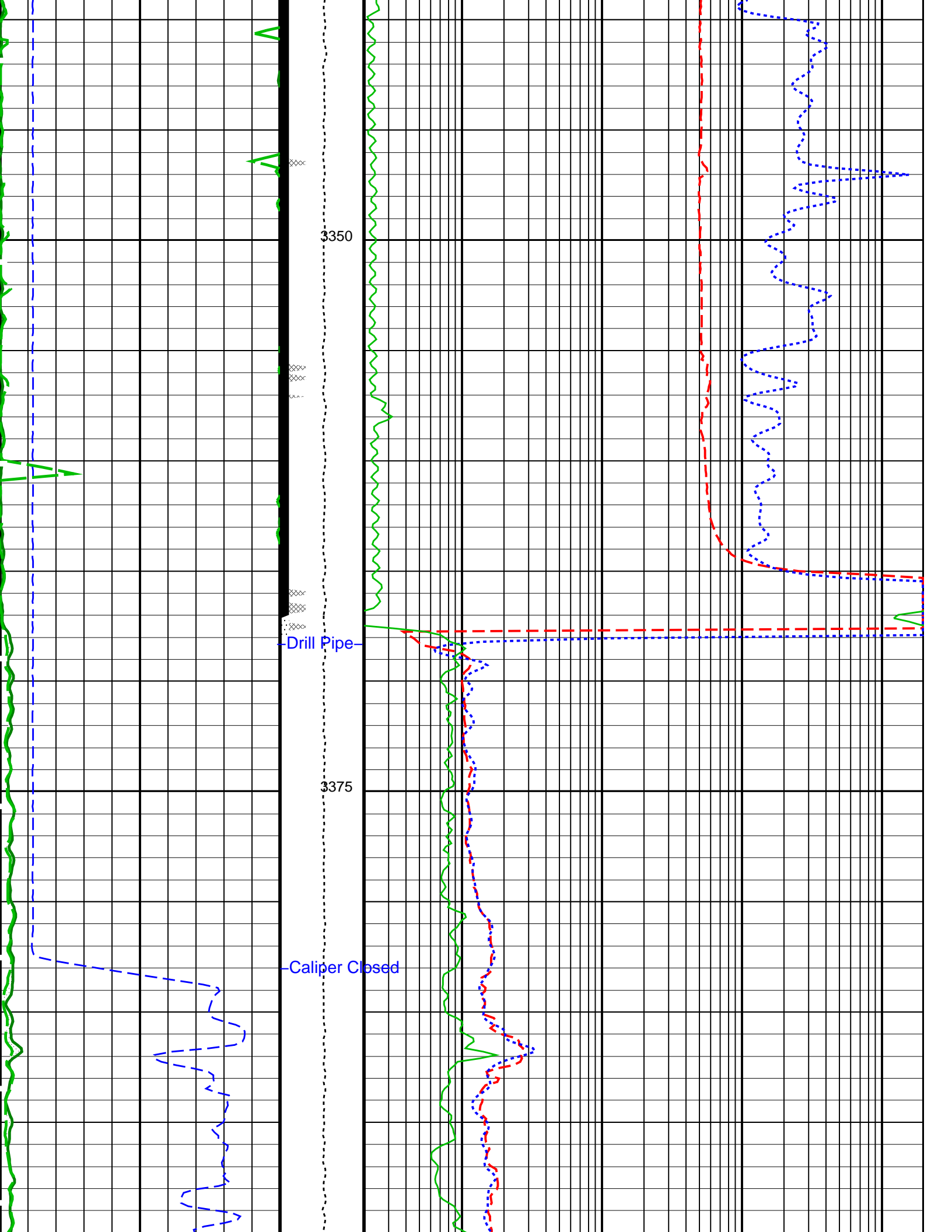
### PIP SUMMARY

Time Mark Every 60 S

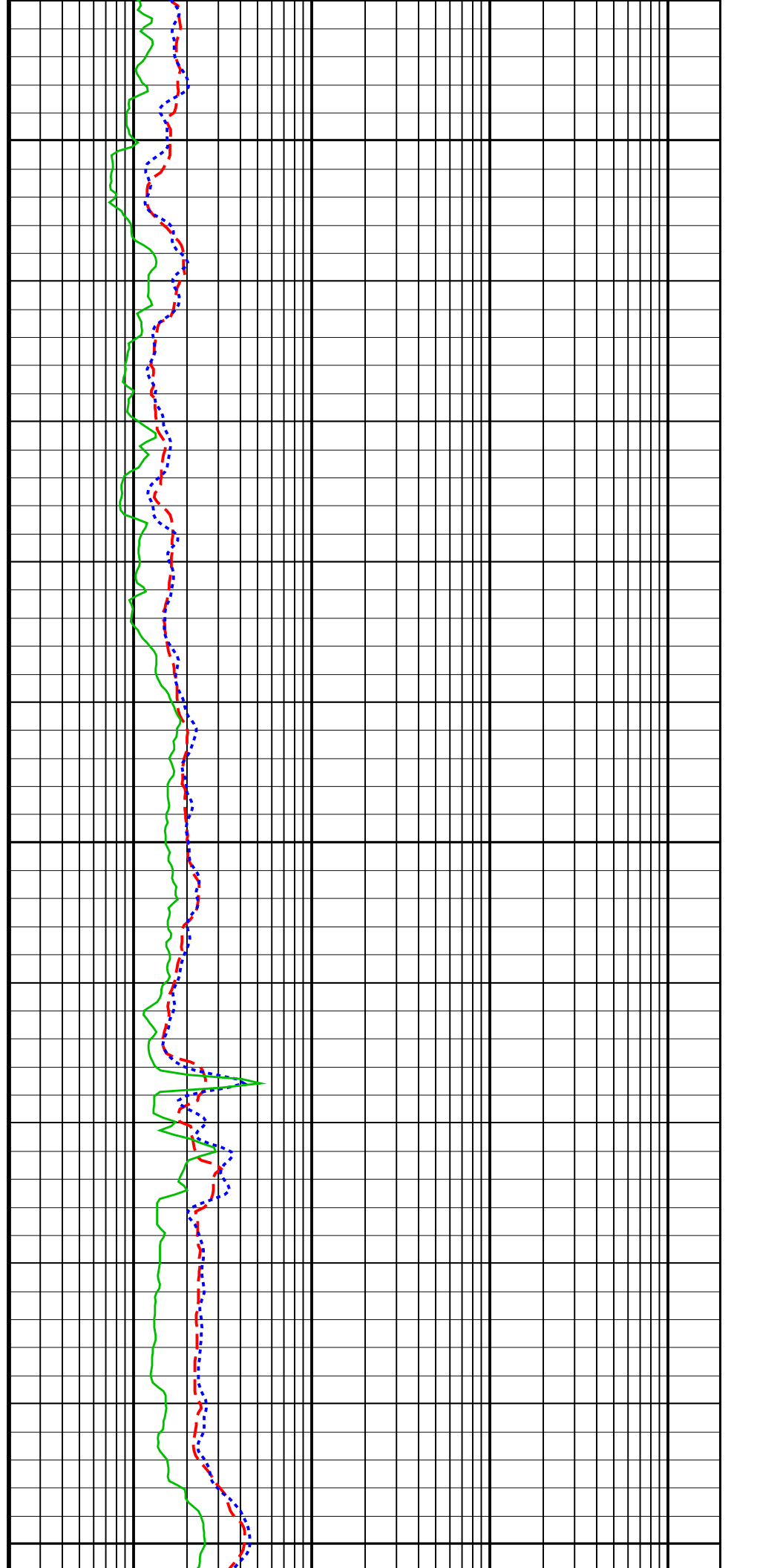
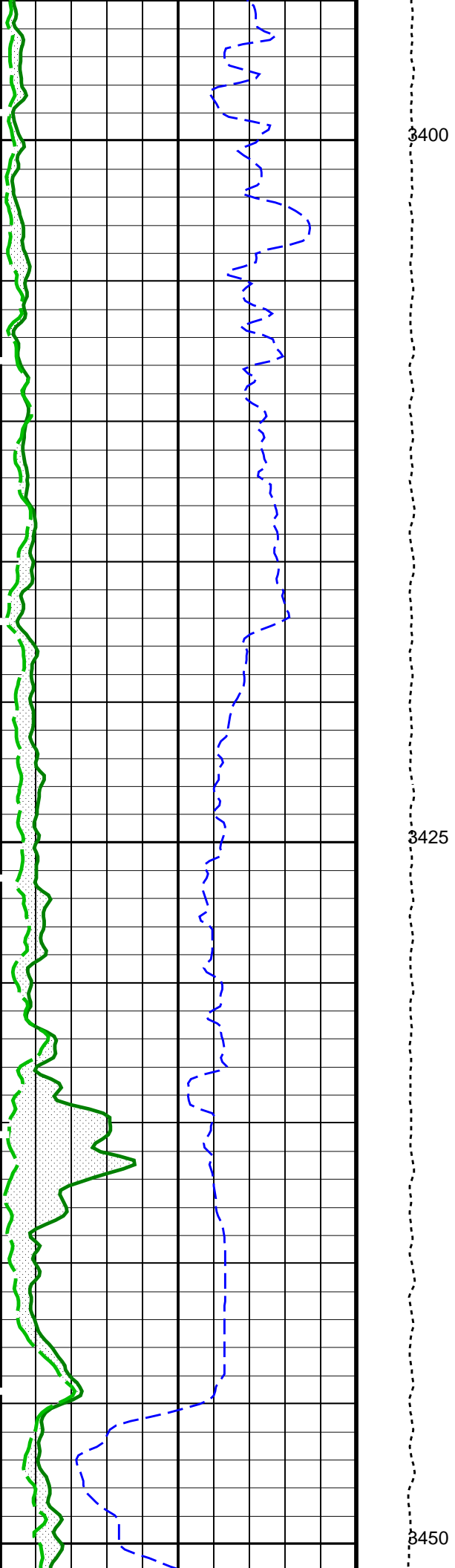


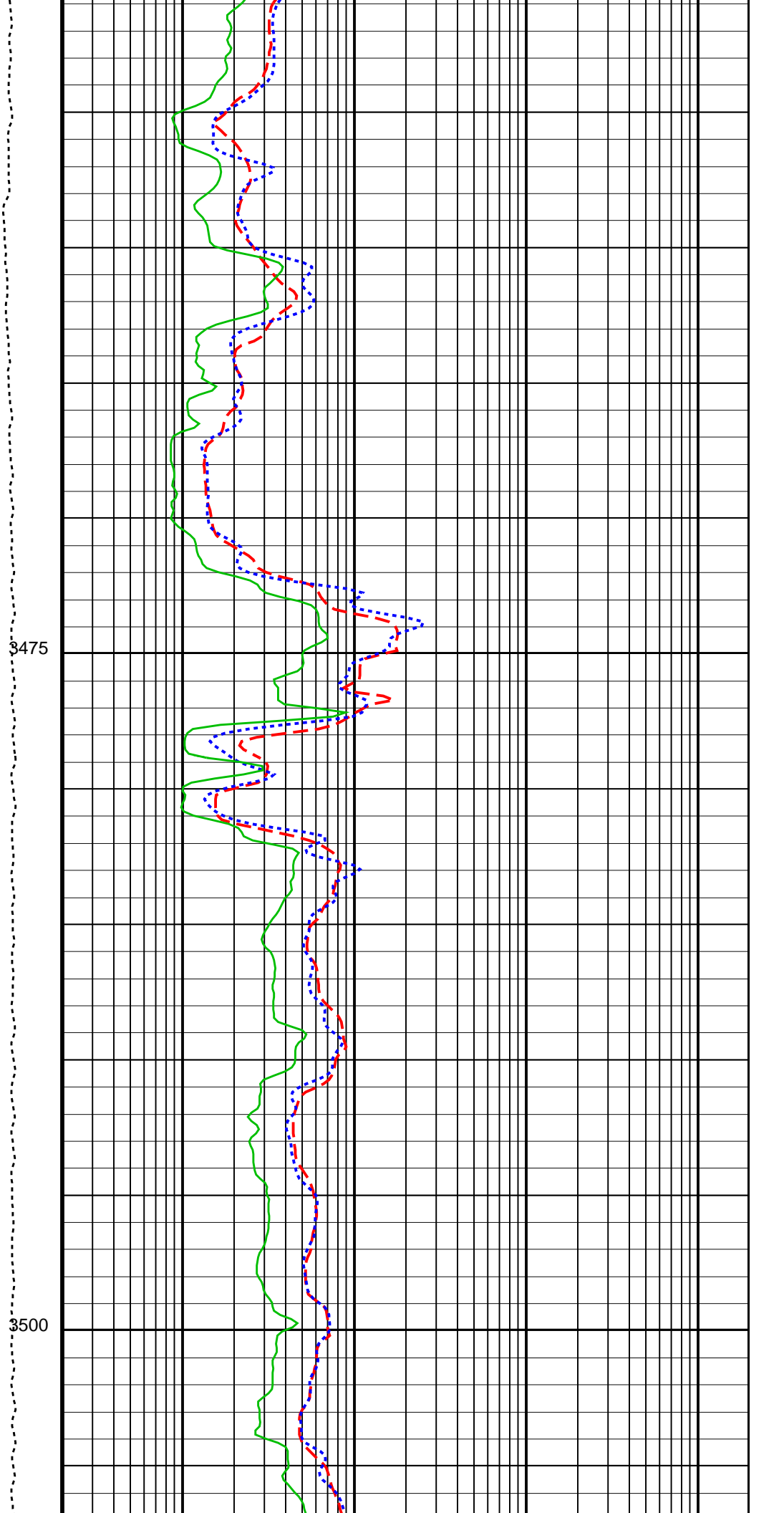
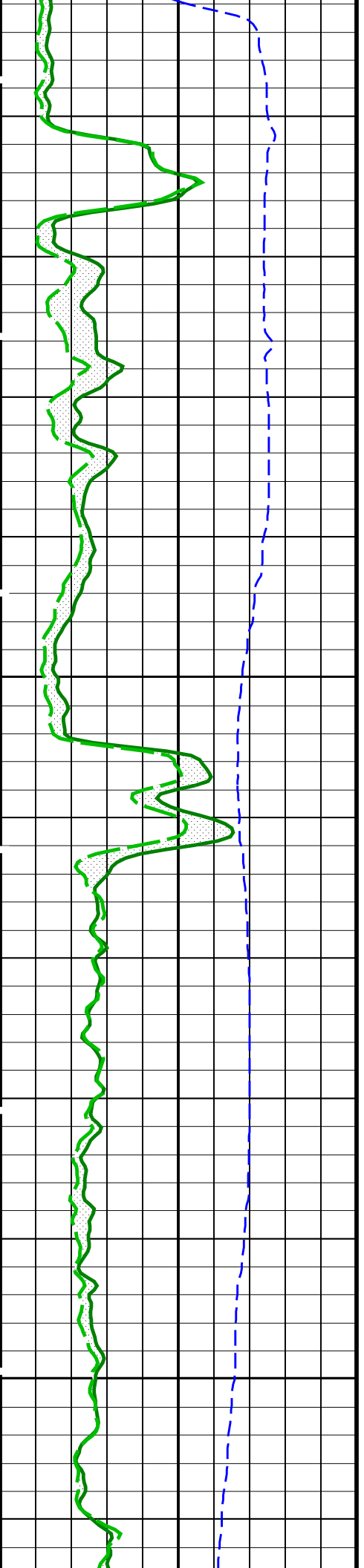






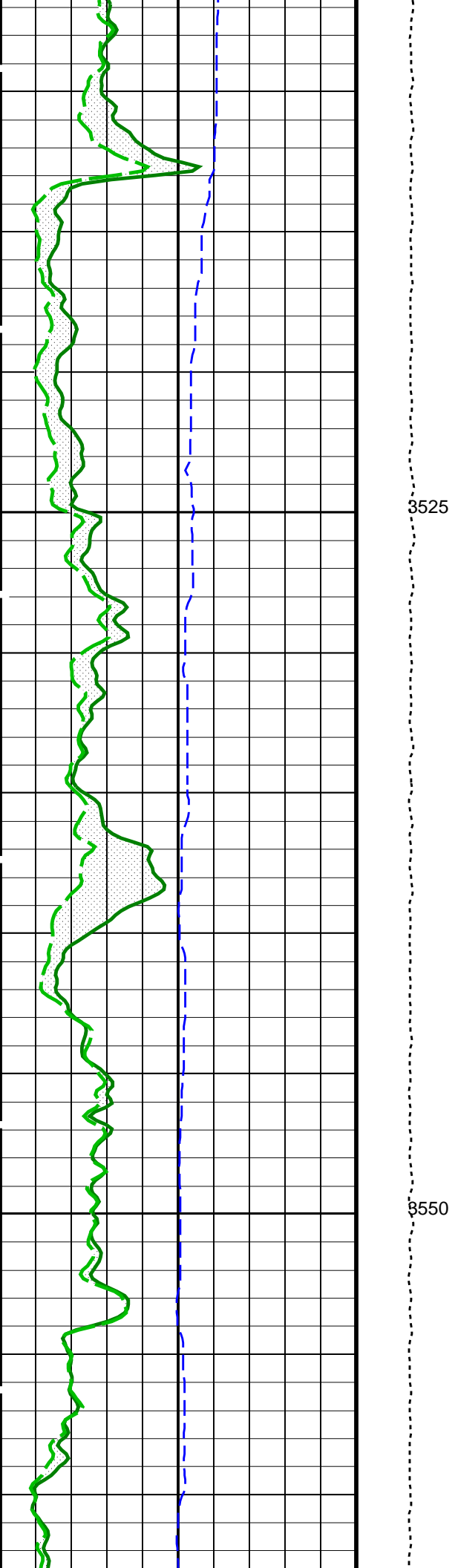






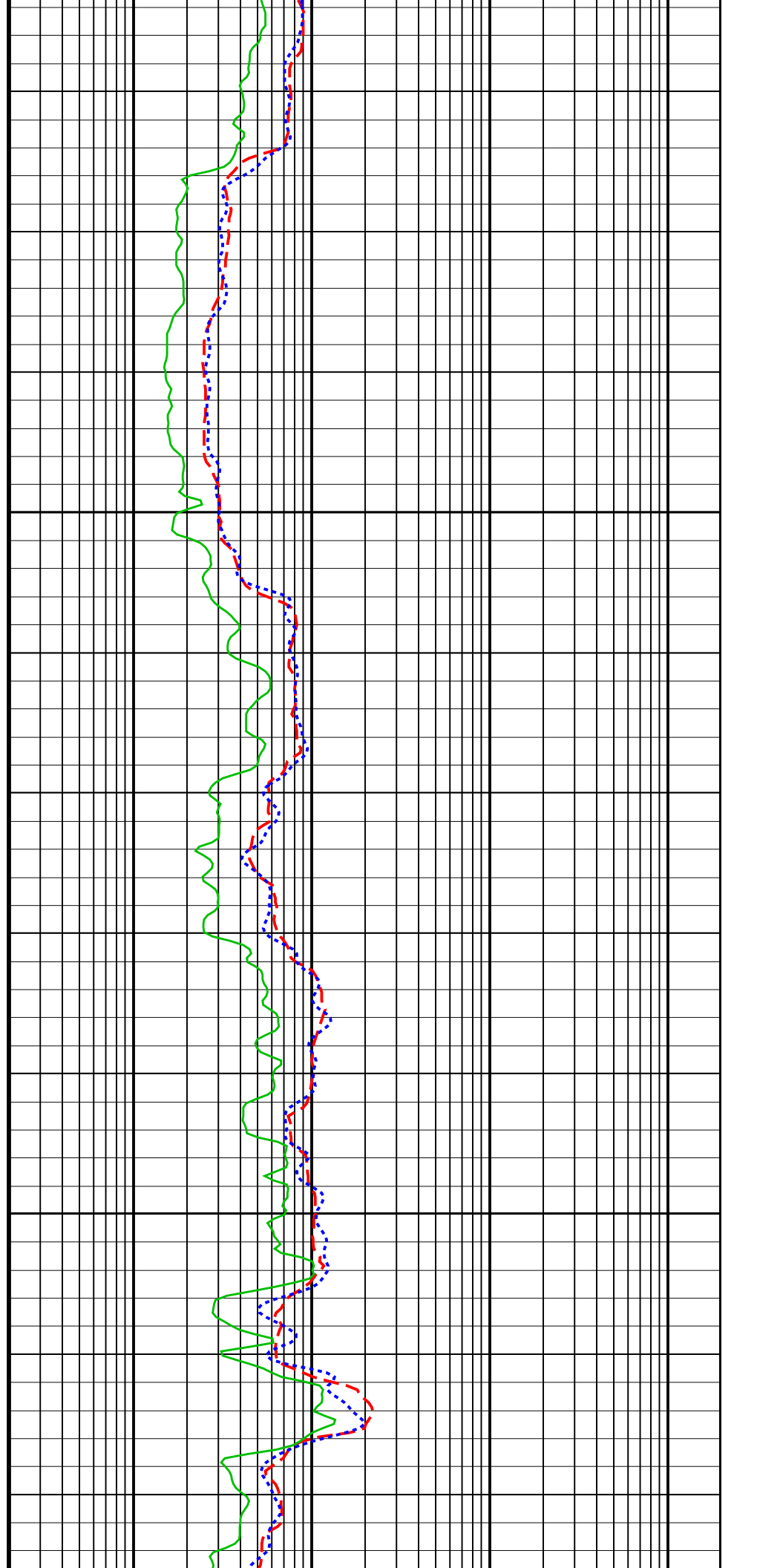
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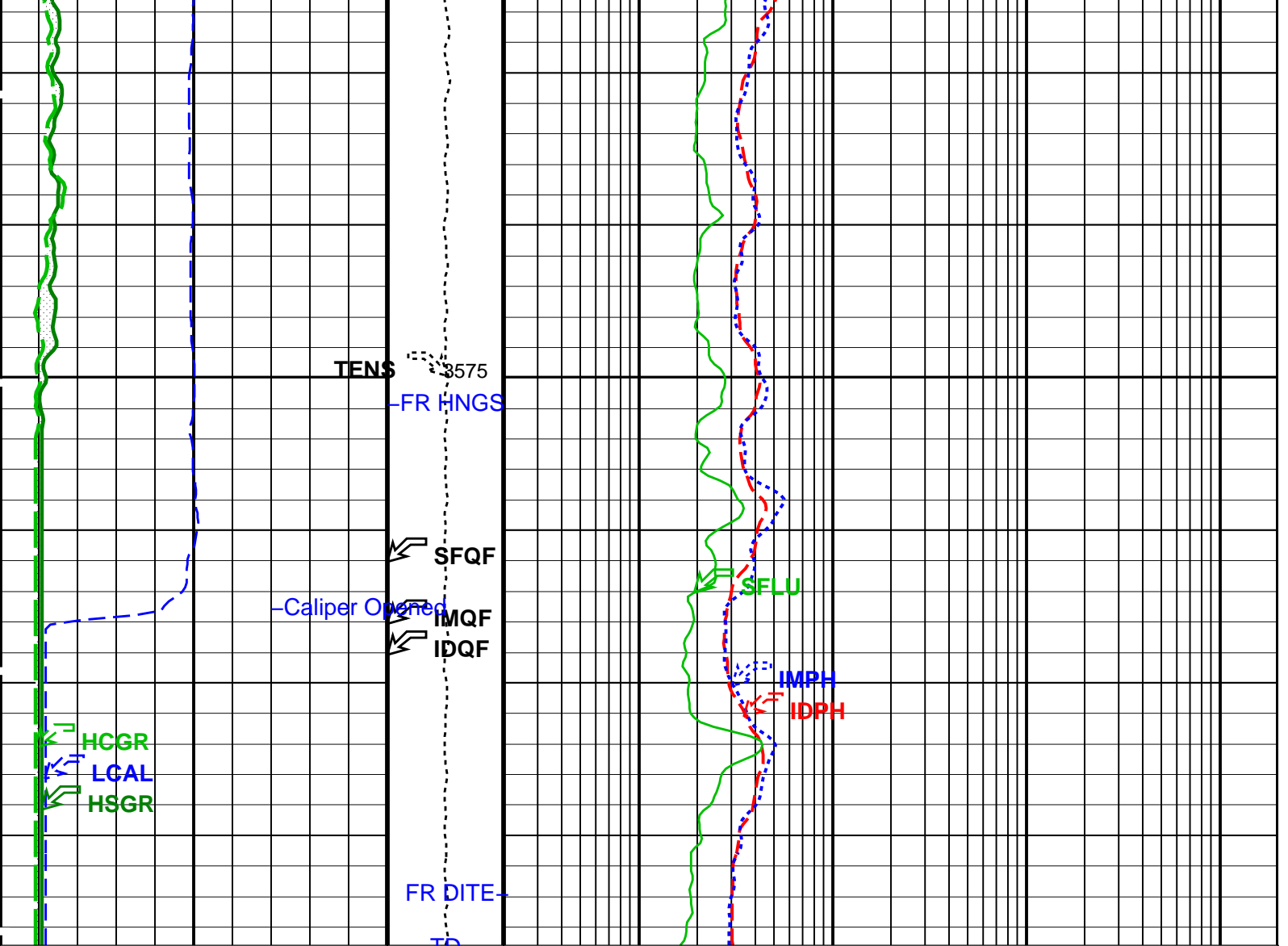
3500



3525

3550





<p>HLDS Caliper (LCAL) (IN)</p> <p>0 20</p>	<p>Tension (TENS) (LBF)</p> <p>10000 0</p>	<p>Deep Induction Phasor-processed Resistivity (IDPH) (OHMM)</p> <p>0.2 2000</p>
<p>HNGS Computed Gamma Ray (HCGR) (GAPI)</p> <p>0 100</p>	<p>ID_QUAL From IMQF to IDQF</p>	<p>Medium Induction Phasor-processed Resistivity (IMPH) (OHMM)</p> <p>0.2 2000</p>
<p>Area From HCGR to HSGR</p>	<p>IM_QUAL From SFQF to IMQF</p>	<p>SFL Unaveraged (SFLU) (OHMM)</p> <p>0.2 2000</p>
<p>HNGS Spectroscopy Gamma Ray (HSGR) (GAPI)</p> <p>0 100</p>	<p>SFL_QUAL From D3T to SFQF</p>	<p>Mainlog 2</p>

PIP SUMMARY

Time Mark Every 60 S

Parameters

DLIS Name	Description	Value
DIT-E: Dual Induction - E		
BHS	Borehole Status	OPEN
BHT	Bottom Hole Temperature (used in calculations)	45 DEGF
DGF2	Deep 20 kHz Gain Factor	0.979119
DPH2	Deep 20 kHz Phase Shift	0.0159963 DEG

DRE2	Deep Real 20 kHz Sonde Error Correction	17.0457	MM/M
DSR2	Deep Sigma Reference (20 kHz)	1843	MM/M
DXE2	Deep Quad 20 kHz Sonde Error Correction	136.154	MM/M
GCSE	Generalized Caliper Selection	BS	
GDEV	Average Angular Deviation of Borehole from Normal	0	DEG
GGRD	Geothermal Gradient	0.01	DF/F
GRSE	Generalized Mud Resistivity Selection	CHART_GEN_9	
GTSE	Generalized Temperature Selection	LINEAR_ESTIMATE	
IFRS	DIT-E Induction Frequency Selector	20	
IPHA	DIT-E Phasor Processing Mode	ALL	
IPRO	DIT-E Induction Processing Selector	PHASOR	
ISSBAR	Barite Mud Switch	NOBARITE	
ITEN	DIT-E Temperature Enable	ENABLE	
MATR	Rock Matrix for Neutron Porosity Corrections	LIMESTONE	
MGF2	Medium 20 kHz Gain Factor	0.974788	
MPH2	Medium 20 kHz Phase Shift	-0.199528	DEG
MRE2	Medium Real 20 kHz Sonde Error Correction	11.3259	MM/M
MSR2	Medium Sigma Reference (20 kHz)	3250	MM/M
MXE2	Medium Quad 20 kHz Sonde Error Correction	172.606	MM/M
SBR	Shoulder Bed Resistivity Factor	1	OHMM
SFCR	SFL Channel Ratio	1000	
SFLE	SFL Enable	ENABLE	
SHT	Surface Hole Temperature	68	DEGF
SPAE	DIT-E SPARC Processing Enable	ENABLE	
SPNV	SP Next Value	0	MV
HLDS: Hostile Litho-Density Sonde			
CLCL	HLDS LS Control Loop Controller Mode	AUTO_DEFAULT	
CLCS	HLDS SS Control Loop Controller Mode	AUTO_DEFAULT	
CLLS	HLDS Mode Loop Long Spacing	AUTO	
CLSS	HLDS Mode Loop Short Spacing	AUTO	
DHC	Density Hole Correction	BS	
DPPM	Density Porosity Processing Mode	HIRS	
FD	Fluid Density	1	G/C3
LATC	HLDS Activation Correction	ON	
LLDL	HLDS LS Low Level Discriminator DAC	14000	
LLDS	HLDS SS Low Level Discriminator DAC	14000	
LLML	HLDS LS Low Level Discriminator Mode	AUTO	
LLMS	HLDS SS Low Level Discriminator Mode	AUTO	
MDEN	Matrix Density	2.71	G/C3
PHVL	HLDS Long Spacing High Voltage Setting	1000	V
PHVS	HLDS Short Spacing High Voltage Setting	1000	V
PSDL	HLDS LS Pulse Shape Compensation DAC	30000	
PSDS	HLDS SS Pulse Shape Compensation DAC	30000	
PSML	HLDS LS Pulse Shape Compensation Mode	AUTO	
PSMS	HLDS SS Pulse Shape Compensation Mode	AUTO	
HNGS-BA: Hostile Natural Gamma Ray Sonde			
BAR1	HNGS Detector 1 Barite Constant	1	
BAR2	HNGS Detector 2 Barite Constant	1	
BHK	HNGS Borehole Potassium Correction Concentration	0	
BHS	Borehole Status	OPEN	
BHT	Bottom Hole Temperature (used in calculations)	45	DEGF
CSD1	Inner Casing Outer Diameter	0	IN
CSD2	Outer Casing Outer Diameter	0	IN
CSW1	Inner Casing Weight	0	LB/F
CSW2	Outer Casing Weight	0	LB/F
DBCC	HNGS Barite Constant Correction Flag	NONE	
GCSE	Generalized Caliper Selection	BS	
GDEV	Average Angular Deviation of Borehole from Normal	0	DEG
GGRD	Geothermal Gradient	0.01	DF/F
GRSE	Generalized Mud Resistivity Selection	CHART_GEN_9	
GTSE	Generalized Temperature Selection	LINEAR_ESTIMATE	
H1P	HNGS Detector 1 Allow/Disallow In Processing	ALLOW	
H2P	HNGS Detector 2 Allow/Disallow In Processing	ALLOW	
HABK	HNGS Borehole Potassium Running Average	-0.000849183	
HALF	HNGS Alpha Filter Length	60	IN
HCRB	HNGS Apply Borehole Potassium Correction	NONE	
HMWM	Mud Weighting Material	NATU	
HNPE	HNGS Processing Enable	YES	
ISSBAR	Barite Mud Switch	NOBARITE	
MATR	Rock Matrix for Neutron Porosity Corrections	LIMESTONE	
S1BI	HNGS Detector 1 Calibration Bismuth Count Rate	1.3	CPS
S2BI	HNGS Detector 2 Calibration Bismuth Count Rate	1.3	CPS
SGRC	HNGS Standard Gamma-Ray Correction Flag	YES	
SHT	Surface Hole Temperature	68	DEGF
TPOS	Tool Position	ECCE	
VBA1	HNGS Detector 1 Variable Barite Factor Running Average	1.01745	
VBA2	HNGS Detector 2 Variable Barite Factor Running Average	0.986824	

System and Miscellaneous

ALTDPCAN	Name of alternate depth channel	SpeedCorrectedDepth	
BS	Bit Size	9.875	IN
BSAL	Borehole Salinity	-50000.00	PPM
CSIZ	Current Casing Size	0.000	IN
CWEI	Casing Weight	0.00	LB/F
DFD	Drilling Fluid Density	1.26	G/C3
FLEV	Fluid Level	50000.00	M

LEV	Fluid Level	-50000.00	M
MST	Mud Sample Temperature	-50000.00	DEGC
PBVSADP	Use alternate depth channel for playback	NO	
RMFS	Resistivity of Mud Filtrate Sample	-50000.0000	OHMM
RW	Resistivity of Connate Water	1.0000	OHMM
TD	Total Depth	11811	FT
TDD	Total Depth - Driller	-50000.00	M
TDL	Total Depth - Logger	-50000.00	M
TWS	Temperature of Connate Water Sample	37.78	DEGC

Format: DITE\_LogPhasor    Vertical Scale: 1:200    Graphics File Created: 06-Oct-2009 02:23

### OP System Version: 17C0-154

DIT-E	17C0-154	DTA-A	17C0-154
HLDS	17C0-154	LDSC-B	17C0-154
HNGC-B	17C0-154	HNGS-BA	17C0-154
DTC-H	17C0-154		

### Output DLIS Files

DEFAULT	PI_LDL_NGS_007LUP	FN:9	PRODUCER	06-Oct-2009 02:23
BACKUPDLISDATA	PI_LDL_NGS_007LUP	FN:10	PRODUCER	05-Oct-2009 17:24

### Output DLIS Files

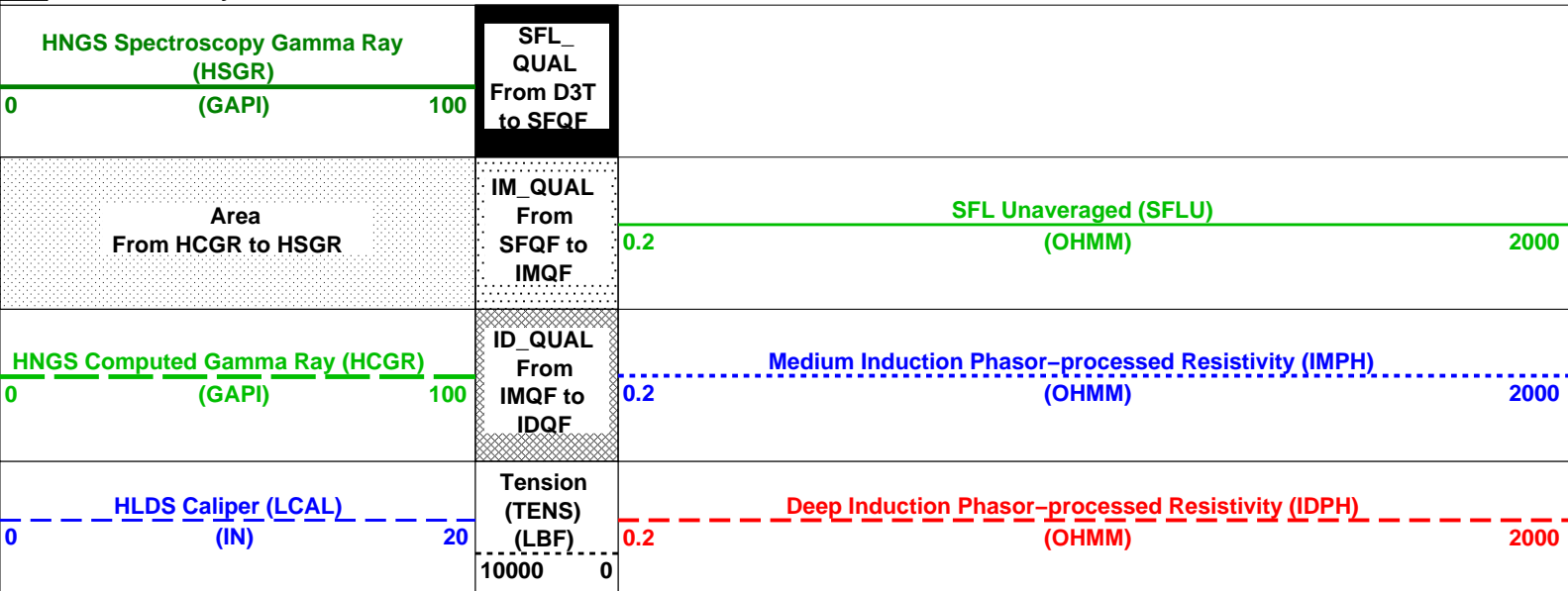
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BACKUPDLISDATA	PI_LDL_NGS_006LUP	FN:8	PRODUCER	05-Oct-2009 16:00	3595.9 M	3329.2 M

### OP System Version: 17C0-154

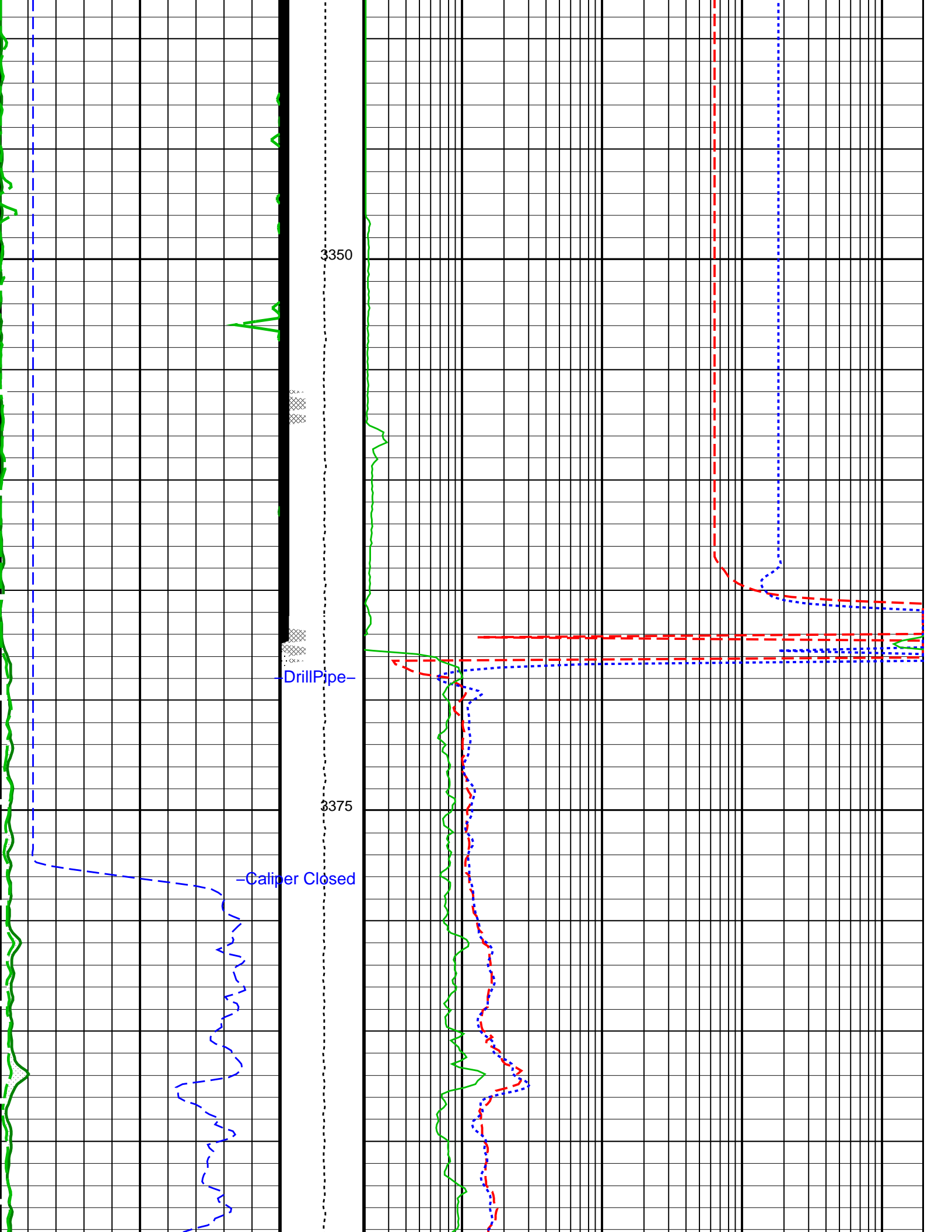
DIT-E	17C0-154	DTA-A	17C0-154
HLDS	17C0-154	LDSC-B	17C0-154
HNGC-B	17C0-154	HNGS-BA	17C0-154
DTC-H	17C0-154		

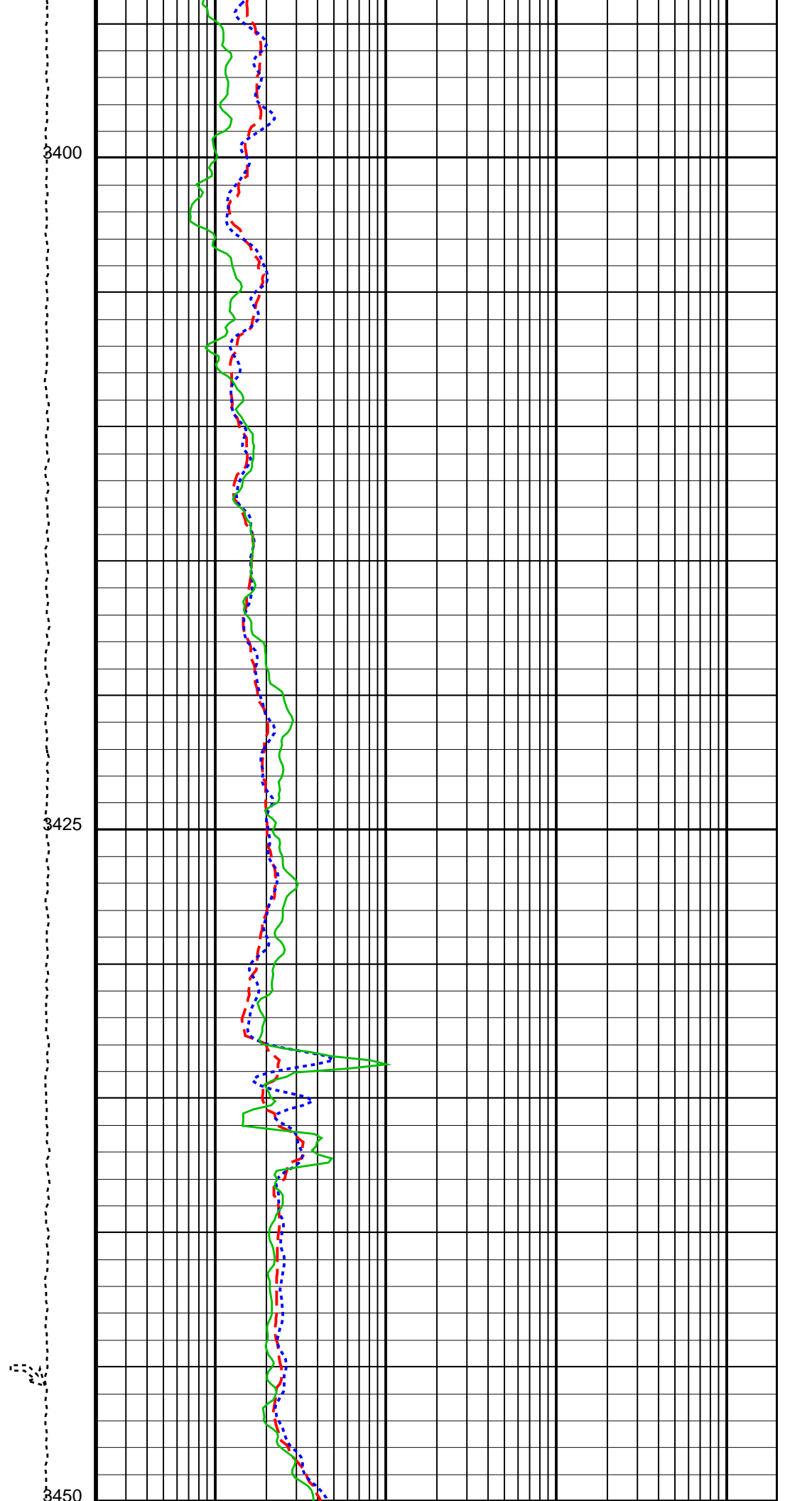
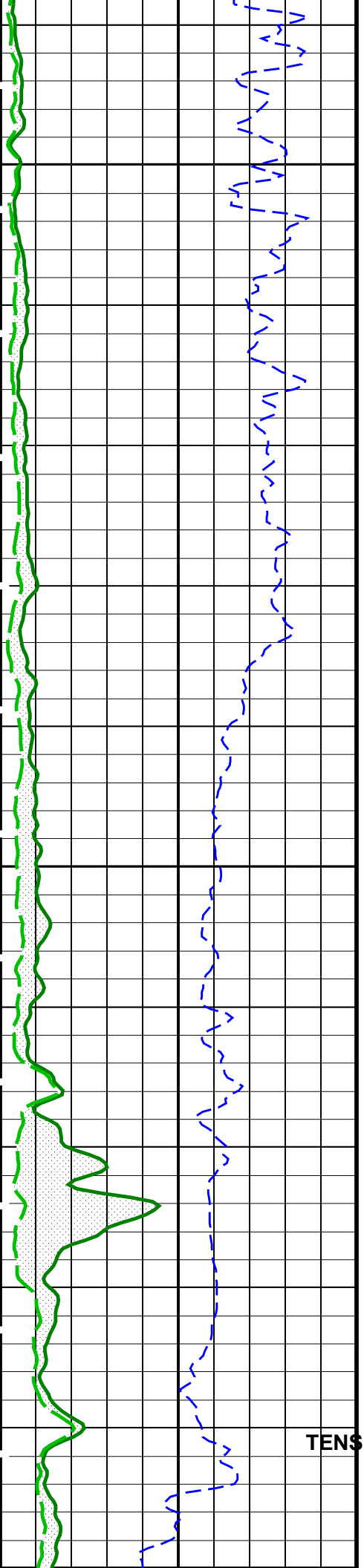
### PIP SUMMARY

Time Mark Every 60 S

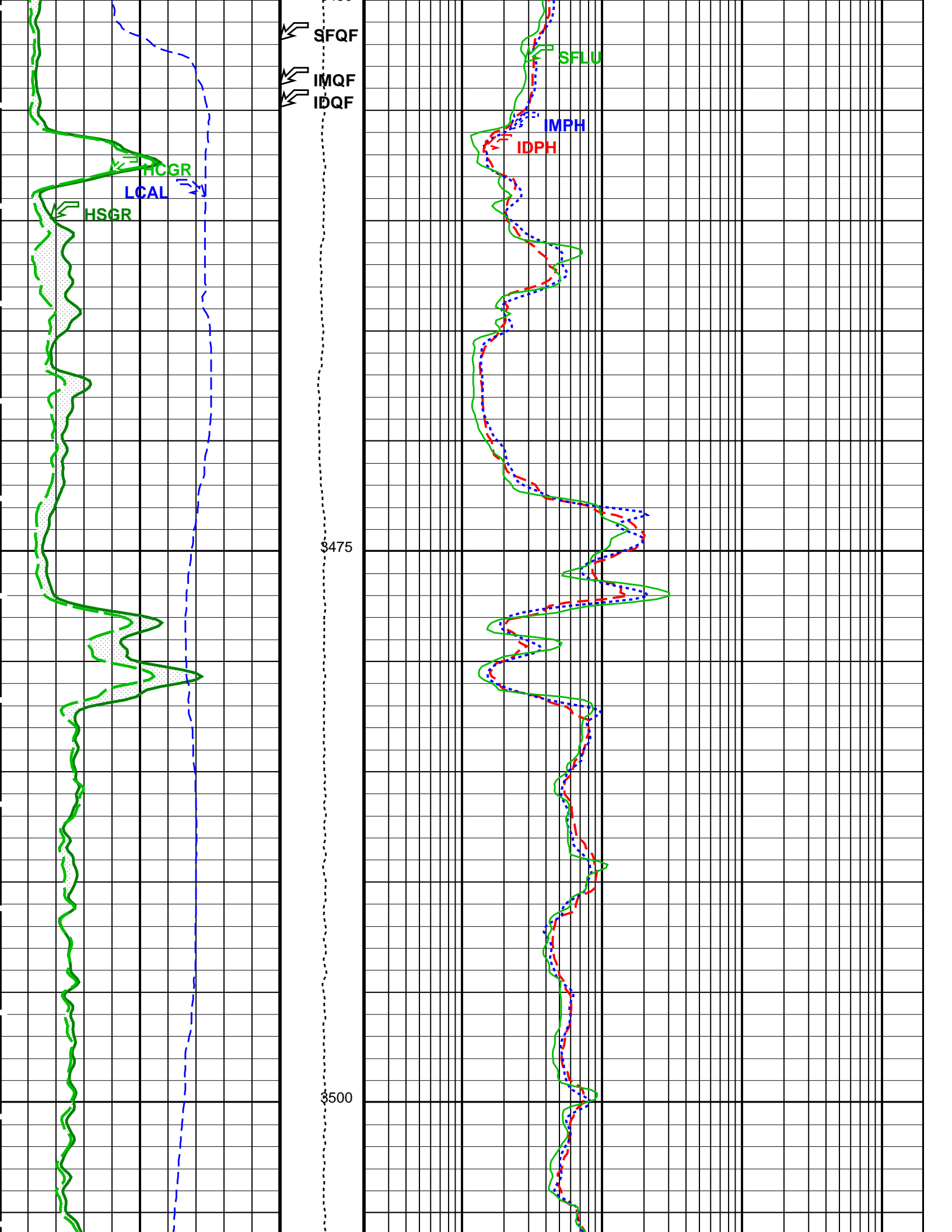


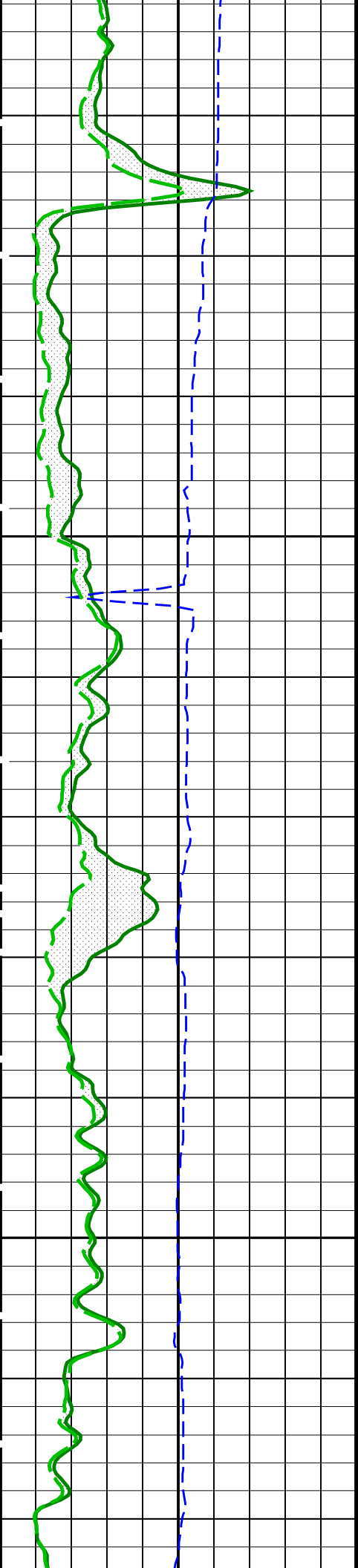
Main uplog 1





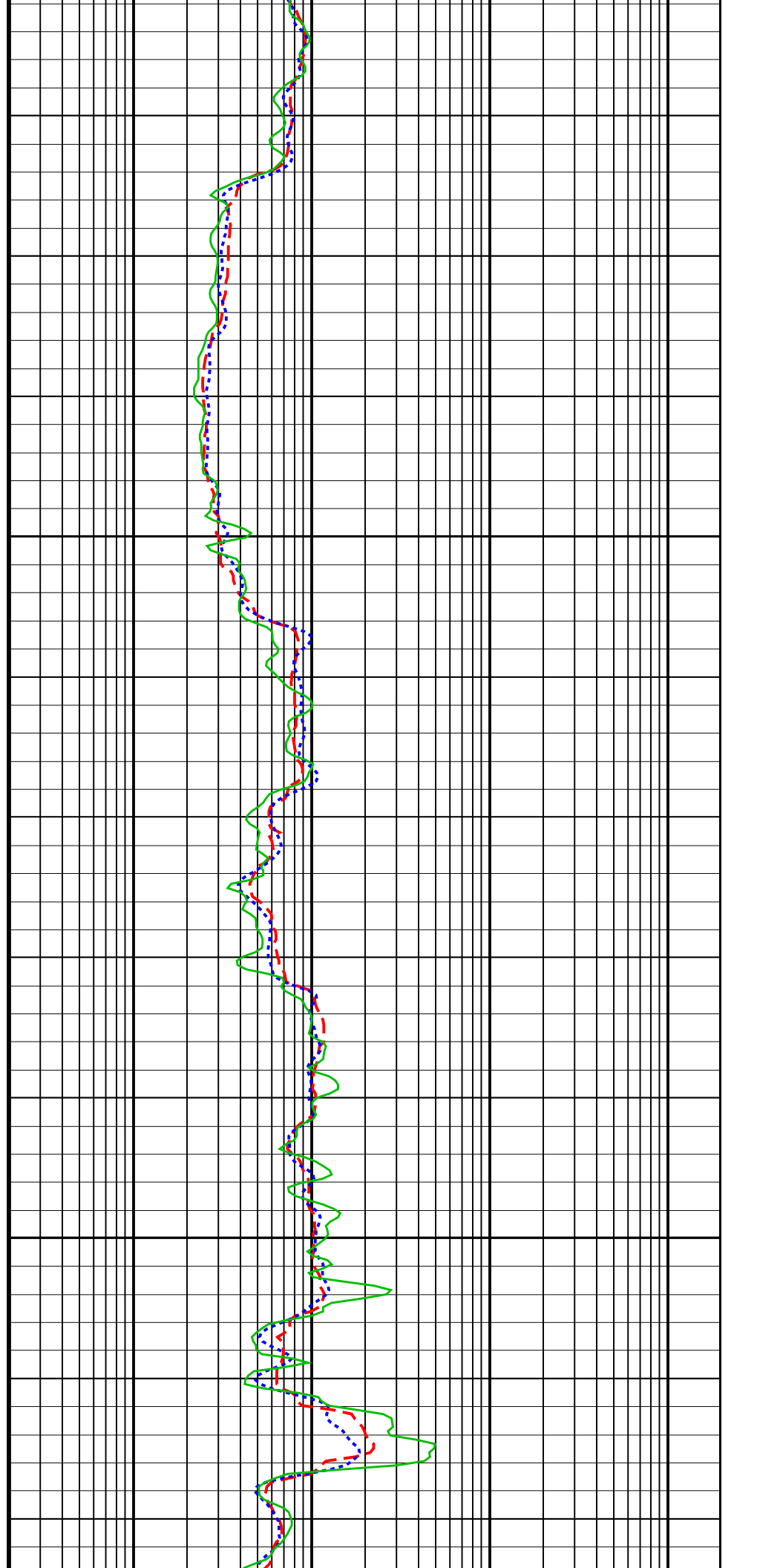


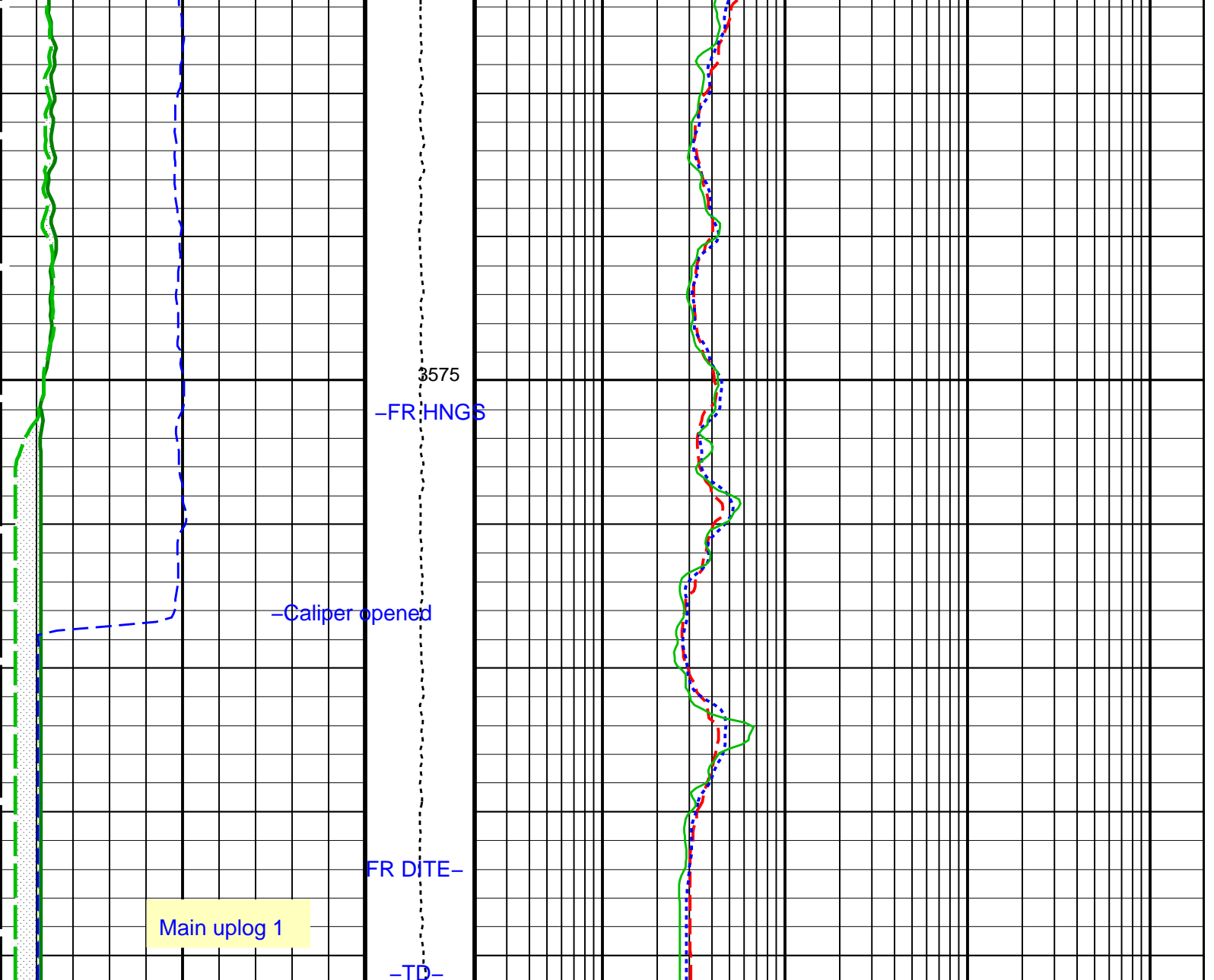




3525

3550





<p>HLDS Caliper (LCAL) (IN)</p> <p>0 20</p>	<p>Tension (TENS) (LBF)</p> <p>10000 0</p>	<p>Deep Induction Phasor-processed Resistivity (IDPH) (OHMM)</p> <p>0.2 2000</p>
<p>HNGS Computed Gamma Ray (HCGR) (GAPI)</p> <p>0 100</p>	<p>ID_QUAL From IMQF to IDQF</p>	<p>Medium Induction Phasor-processed Resistivity (IMPH) (OHMM)</p> <p>0.2 2000</p>
<p>Area From HCGR to HSGR</p>	<p>IM_QUAL From SFQF to IMQF</p>	<p>SFL Unaveraged (SFLU) (OHMM)</p> <p>0.2 2000</p>
<p>HNGS Spectroscopy Gamma Ray (HSGR) (GAPI)</p> <p>0 100</p>	<p>SFL_QUAL From D3T to SFQF</p>	

PIP SUMMARY

Time Mark Every 60 S

Parameters

DLIS Name	Description	Value
-----------	-------------	-------

## DIT-E: Dual Induction - E

BHS	Borehole Status	OPEN	
BHT	Bottom Hole Temperature (used in calculations)	45	DEGF
DGF2	Deep 20 kHz Gain Factor	0.979119	
DPH2	Deep 20 kHz Phase Shift	0.0159963	DEG
DRE2	Deep Real 20 kHz Sonde Error Correction	17.0457	MM/M
DSR2	Deep Sigma Reference (20 kHz)	1843	MM/M
DXE2	Deep Quad 20 kHz Sonde Error Correction	136.154	MM/M
GCSE	Generalized Caliper Selection	BS	
GDEV	Average Angular Deviation of Borehole from Normal	0	DEG
GGRD	Geothermal Gradient	0.01	DF/F
GRSE	Generalized Mud Resistivity Selection	CHART_GEN_9	
GTSE	Generalized Temperature Selection	LINEAR_ESTIMATE	
IFRS	DIT-E Induction Frequency Selector	20	
IPHA	DIT-E Phasor Processing Mode	ALL	
IPRO	DIT-E Induction Processing Selector	PHASOR	
ISSBAR	Barite Mud Switch	NOBARITE	
ITEN	DIT-E Temperature Enable	ENABLE	
MATR	Rock Matrix for Neutron Porosity Corrections	LIMESTONE	
MGF2	Medium 20 kHz Gain Factor	0.974788	
MPH2	Medium 20 kHz Phase Shift	-0.199528	DEG
MRE2	Medium Real 20 kHz Sonde Error Correction	11.3259	MM/M
MSR2	Medium Sigma Reference (20 kHz)	3250	MM/M
MXE2	Medium Quad 20 kHz Sonde Error Correction	172.606	MM/M
SBR	Shoulder Bed Resistivity Factor	1	OHMM
SFCR	SFL Channel Ratio	1000	
SFLE	SFL Enable	ENABLE	
SHT	Surface Hole Temperature	68	DEGF
SPAE	DIT-E SPARC Processing Enable	ENABLE	
SPNV	SP Next Value	0	MV

## HLDS: Hostile Litho-Density Sonde

CLCL	HLDS LS Control Loop Controller Mode	AUTO_DEFAULT	
CLCS	HLDS SS Control Loop Controller Mode	AUTO_DEFAULT	
CLLS	HLDS Mode Loop Long Spacing	AUTO	
CLSS	HLDS Mode Loop Short Spacing	AUTO	
DHC	Density Hole Correction	BS	
DPPM	Density Porosity Processing Mode	HIRS	
FD	Fluid Density	1	G/C3
LATC	HLDS Activation Correction	ON	
LLDL	HLDS LS Low Level Discriminator DAC	14000	
LLDS	HLDS SS Low Level Discriminator DAC	14000	
LLML	HLDS LS Low Level Discriminator Mode	AUTO	
LLMS	HLDS SS Low Level Discriminator Mode	AUTO	
MDEN	Matrix Density	2.71	G/C3
PHVL	HLDS Long Spacing High Voltage Setting	1000	V
PHVS	HLDS Short Spacing High Voltage Setting	1000	V
PSDL	HLDS LS Pulse Shape Compensation DAC	30000	
PSDS	HLDS SS Pulse Shape Compensation DAC	30000	
PSML	HLDS LS Pulse Shape Compensation Mode	AUTO	
PSMS	HLDS SS Pulse Shape Compensation Mode	AUTO	

## HNGBA: Hostile Natural Gamma Ray Sonde

BAR1	HNGBA Detector 1 Barite Constant	1	
BAR2	HNGBA Detector 2 Barite Constant	1	
BHK	HNGBA Borehole Potassium Correction Concentration	0	
BHS	Borehole Status	OPEN	
BHT	Bottom Hole Temperature (used in calculations)	45	DEGF
CSD1	Inner Casing Outer Diameter	0	IN
CSD2	Outer Casing Outer Diameter	0	IN
CSW1	Inner Casing Weight	0	LB/F
CSW2	Outer Casing Weight	0	LB/F
DBCC	HNGBA Barite Constant Correction Flag	NONE	
GCSE	Generalized Caliper Selection	BS	
GDEV	Average Angular Deviation of Borehole from Normal	0	DEG
GGRD	Geothermal Gradient	0.01	DF/F
GRSE	Generalized Mud Resistivity Selection	CHART_GEN_9	
GTSE	Generalized Temperature Selection	LINEAR_ESTIMATE	
H1P	HNGBA Detector 1 Allow/Disallow In Processing	ALLOW	
H2P	HNGBA Detector 2 Allow/Disallow In Processing	ALLOW	
HABK	HNGBA Borehole Potassium Running Average	-0.000875068	
HALF	HNGBA Alpha Filter Length	60	IN
HCRB	HNGBA Apply Borehole Potassium Correction	NONE	
HMWM	Mud Weighting Material	NATU	
HNPE	HNGBA Processing Enable	YES	
ISSBAR	Barite Mud Switch	NOBARITE	
MATR	Rock Matrix for Neutron Porosity Corrections	LIMESTONE	
S1BI	HNGBA Detector 1 Calibration Bismuth Count Rate	1.3	CPS
S2BI	HNGBA Detector 2 Calibration Bismuth Count Rate	1.3	CPS
SGRC	HNGBA Standard Gamma-Ray Correction Flag	YES	
SHT	Surface Hole Temperature	68	DEGF
TPOS	Tool Position	ECCE	
VBA1	HNGBA Detector 1 Variable Barite Factor Running Average	1.27313	
VBA2	HNGBA Detector 2 Variable Barite Factor Running Average	1.08009	

## System and Miscellaneous

ALTDCHAN	Name of alternate depth channel	SpeedCorrectedDepth	
BS	Bit Size	9.875	IN

BSAL	Borehole Salinity	-50000.00	PPM
CSIZ	Current Casing Size	0.000	IN
CWEI	Casing Weight	0.00	LB/F
DFD	Drilling Fluid Density	1.26	G/C3
FLEV	Fluid Level	-50000.00	M
MST	Mud Sample Temperature	-50000.00	DEGC
PBVSADP	Use alternate depth channel for playback	NO	
RMFS	Resistivity of Mud Filtrate Sample	-50000.0000	OHMM
RW	Resistivity of Connate Water	1.0000	OHMM
TD	Total Depth	11811	FT
TDD	Total Depth - Driller	-50000.00	M
TDL	Total Depth - Logger	-50000.00	M
TWS	Temperature of Connate Water Sample	37.78	DEGC

Format: DITE\_LogPhasor      Vertical Scale: 1:200      Graphics File Created: 06-Oct-2009 00:59

<b>OP System Version: 17C0-154</b>			
DIT-E	17C0-154	DTA-A	17C0-154
HLDS	17C0-154	LDSC-B	17C0-154
HNGC-B	17C0-154	HNGS-BA	17C0-154
DTC-H	17C0-154		

<b>Output DLIS Files</b>				
DEFAULT	PI_LDL_NGS_006LUP	FN:7	PRODUCER	06-Oct-2009 00:59
BACKUPDLISDATA	PI_LDL_NGS_006LUP	FN:8	PRODUCER	05-Oct-2009 16:00

Calibration and Check Summary								
Measurement	Nominal	Master	Before	After	Change	Limit	Units	
Hostile Litho-Density Sonde Wellsite Calibration - Background Measurement								
Master: 18-Sep-2009 2:55    Before: 18-Sep-2009 5:19    After: 6-Oct-2009 5:12								
SS Cs Resolution Bkg	9.000	8.452	8.363	8.426	0.06246	1.800	%	
LS Cs Resolution Bkg	9.000	8.580	8.651	8.599	-0.05205	1.800	%	
LSW1 Background	100.0	76.04	75.16	74.56	-0.5994	0.03000	CPS	
LSW2 Background	100.0	69.08	67.85	68.84	0.9836	0.03000	CPS	
LSW3 Background	200.0	155.5	152.7	154.5	1.819	0.03000	CPS	
LSW4 Background	250.0	187.6	187.4	187.2	-0.1870	0.03000	CPS	
LSW5 Background	600.0	426.9	426.3	426.5	0.2204	0.03000	CPS	
SSW1 Background	100.0	74.38	73.61	74.87	1.256	0.03000	CPS	
SSW2 Background	200.0	130.0	127.5	128.7	1.249	0.03000	CPS	
SSW3 Background	500.0	340.0	341.3	343.6	2.380	0.03000	CPS	
SSW4 Background	270.0	181.2	184.1	184.1	-0.01787	0.03000	CPS	
SSW5 Background	200.0	132.4	130.8	132.1	1.332	0.03000	CPS	
Hostile Litho-Density Sonde Wellsite Calibration - Aluminum Measurement								
Master: 18-Sep-2009 4:05								
LSW1 Aluminum	600.0	539.9	N/A	N/A	N/A	N/A	CPS	
LSW2 Aluminum	900.0	806.6	N/A	N/A	N/A	N/A	CPS	
LSW3 Aluminum	1100	986.0	N/A	N/A	N/A	N/A	CPS	
LSW4 Aluminum	580.0	501.1	N/A	N/A	N/A	N/A	CPS	
LSW5 Aluminum	570.0	458.2	N/A	N/A	N/A	N/A	CPS	
SSW1 Aluminum	2800	2369	N/A	N/A	N/A	N/A	CPS	
SSW2 Aluminum	8000	6795	N/A	N/A	N/A	N/A	CPS	
SSW3 Aluminum	11600	9808	N/A	N/A	N/A	N/A	CPS	
SSW4 Aluminum	5000	4129	N/A	N/A	N/A	N/A	CPS	
SSW5 Aluminum	660.0	554.7	N/A	N/A	N/A	N/A	CPS	
Hostile Litho-Density Sonde Wellsite Calibration - Lithology Measurement								
Master: 18-Sep-2009 3:57								
LSW1 Iron	400.0	366.5	N/A	N/A	N/A	N/A	CPS	
LSW2 Iron	730.0	642.8	N/A	N/A	N/A	N/A	CPS	
LSW3 Iron	1000	862.0	N/A	N/A	N/A	N/A	CPS	
LSW4 Iron	520.0	447.6	N/A	N/A	N/A	N/A	CPS	
LSW5 Iron	470.0	414.9	N/A	N/A	N/A	N/A	CPS	
SSW1 Iron	2100	1749	N/A	N/A	N/A	N/A	CPS	
SSW2 Iron	6800	5618	N/A	N/A	N/A	N/A	CPS	
SSW3 Iron	10800	8869	N/A	N/A	N/A	N/A	CPS	
SSW4 Iron	4600	3733	N/A	N/A	N/A	N/A	CPS	
SSW5 Iron	580.0	484.8	N/A	N/A	N/A	N/A	CPS	
Hostile Litho-Density Sonde Wellsite Calibration - Caliper Calibration								

Before: 18-Sep-2009 5:08

HLDS Caliper Small Ring	12.00	N/A	14.59	N/A	N/A	N/A	IN
HLDS Caliper Large Ring	15.19	N/A	18.14	N/A	N/A	N/A	IN

Hostile Natural Gamma Ray Sonde Wellsite Calibration – Detector 1 Check

Master: 5-Sep-2009 7:01 Before: 13-Sep-2009 22:15 After: 6-Oct-2009 5:15

Na 511 Peak Loc	40.00	39.55	39.60	39.55	-0.04499	1.000	
Na 511 Peak Res	15.50	15.65	16.19	16.19	-0.001600	2.000	%
High Voltage	1150	1146	1180	1180	-0.04395	N/A	V
Na 1785 Peak Loc	142.6	142.8	142.7	141.7	-1.018	7.000	
Na 1785 Peak Res	8.500	7.849	8.372	8.356	-0.01615	2.000	%
Temperature	15.50	14.91	32.53	30.76	-1.774	N/A	DEGC
Na Count Rate	45.00	36.92	35.51	35.28	-0.2280	8.000	CPS

Hostile Natural Gamma Ray Sonde Wellsite Calibration – Detector 2 Check

Master: 5-Sep-2009 7:01 Before: 13-Sep-2009 22:15 After: 6-Oct-2009 5:15

Na 511 Peak Loc	40.00	39.62	39.55	39.54	-0.007183	1.000	
Na 511 Peak Res	15.50	15.06	16.55	16.18	-0.3718	2.000	%
High Voltage	1150	1080	1113	1113	-0.2059	N/A	V
Na 1785 Peak Loc	142.6	141.3	142.3	141.9	-0.4169	7.000	
Na 1785 Peak Res	8.500	8.437	9.484	8.502	-0.9824	2.000	%
Temperature	15.50	15.08	32.86	32.67	-0.1886	N/A	DEGC
Na Count Rate	45.00	36.97	36.00	35.45	-0.5474	8.000	CPS

Hostile Natural Gamma Ray Sonde Wellsite Calibration – Ratio Of Detector 1 To Detector 2

Master: 5-Sep-2009 7:01 Before: 13-Sep-2009 22:15 After: 6-Oct-2009 5:15

Coincidence Count Rate Ratio	1.000	0.9992	0.9853	0.9952	0.009893	0.05000
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Hostile Natural Gamma Ray Sonde Master Calibration – Detector 1 Calibration

Master: 5-Sep-2009 7:01

Na 511 Peak Set Point	40.00	41.00	--	--	--	--
Th Peak Loc	209.6	210.4	--	--	--	--
Th Peak Res	7.000	6.417	--	--	--	%
Background Count Rate	142.5	18.75	--	--	--	CPS
Gain Ratio	1.000	1.012	--	--	--	--

Hostile Natural Gamma Ray Sonde Master Calibration – Detector 2 Calibration

Master: 5-Sep-2009 7:01

Na 511 Peak Set Point	40.00	41.00	--	--	--	--
Th Peak Loc	209.6	209.5	--	--	--	--
Th Peak Res	7.000	7.001	--	--	--	%
Background Count Rate	142.5	18.87	--	--	--	CPS
Gain Ratio	1.000	1.006	--	--	--	--

Dual Induction – E / Equipment Identification

Primary Equipment:

Dual Induction Sonde	DIS – HB	129
Dual Induction Cartridge	DIC – EB	171

Auxiliary Equipment:

Mass Isolated Housing	MIH – ZA	342
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Dual Induction – E Wellsite Calibration

Induction Electronics (10 kHz)

Phase	ID Elect Real Offset 10 kHz MM/M	Value	Phase	ID Elect Real Gain 10 kHz	Value	Phase	ID Elect Phase 10 kHz DEG	Value
Before		31.39	Before		0.9358	Before		9.281
	-267.4 (Minimum) 32.65 (Nominal) 332.6 (Maximum)			0.7960 (Minimum) 0.9460 (Nominal) 1.124 (Maximum)			-0.5967 (Minimum) 9.403 (Nominal) 19.40 (Maximum)	
Phase	ID Elect Quad Offset 10 kHz MM/M	Value	Phase	ID Elect Quad Gain 10 kHz	Value	Phase	IM Elect Phase 10 kHz DEG	Value
Before		23.30	Before		0.9522	Before		9.135
	-278.5 (Minimum) 21.47 (Nominal) 321.5 (Maximum)			0.8109 (Minimum) 0.9609 (Nominal) 1.145 (Maximum)			-0.7277 (Minimum) 9.272 (Nominal) 19.27 (Maximum)	
Phase	IM Elect Real Offset 10 kHz MM/M	Value	Phase	IM Elect Real Gain 10 kHz	Value			
Before		83.78	Before		0.9447			
	-465.7 (Minimum) 84.34 (Nominal) 634.3 (Maximum)			0.8034 (Minimum) 0.9534 (Nominal) 1.134 (Maximum)				
Phase	IM Elect Quad Offset 10 kHz MM/M	Value	Phase	IM Elect Quad Gain 10 kHz	Value			
Before		44.07	Before		0.9251			
	-505.4 (Minimum) 44.57 (Nominal) 594.6 (Maximum)			0.7864 (Minimum) 0.9364 (Nominal) 1.110 (Maximum)				

Before: 15-Sep-2009 3:59



After	0	0	0.7500	0.005000	After	0	0	2.000	0.0003729
	(Minimum)	(Nominal)	(Maximum)			(Minimum)	(Nominal)	(Maximum)	
After: 6-Oct-2009 3:08									
Dual Induction – E Master Calibration									
Test Loop Calibration: Calibration of Internal Reference to Test Loop Standard									
Phase	Deep 10 kHz Gain Factor			Value	Phase	Deep 20 kHz Gain Factor			Value
Master				0.9686	Master				0.9791
	0.9000	1.000	1.100			0.9000	1.000	1.100	
	(Minimum)	(Nominal)	(Maximum)			(Minimum)	(Nominal)	(Maximum)	
Phase	Medium 10 kHz Gain Factor			Value	Phase	Medium 20 kHz Gain Factor			Value
Master				0.9696	Master				0.9748
	0.9000	1.000	1.100			0.9000	1.000	1.100	
	(Minimum)	(Nominal)	(Maximum)			(Minimum)	(Nominal)	(Maximum)	
Phase	Deep 10 kHz Phase Shift			Value	Phase	Deep 20 kHz Phase Shift			Value
Master				0.2636	Master				0.01600
	-1.500	0	1.500			-2.000	0	2.000	
	(Minimum)	(Nominal)	(Maximum)			(Minimum)	(Nominal)	(Maximum)	
Phase	Medium 10 kHz Phase Shift			Value	Phase	Medium 20 kHz Phase Shift			Value
Master				0.07870	Master				-0.1995
	-1.500	0	1.500			-3.000	-1.000	1.000	
	(Minimum)	(Nominal)	(Maximum)			(Minimum)	(Nominal)	(Maximum)	
Master: Calibration out of date 30-Apr-2008 14:59									

Dual Induction – E Master Calibration									
Sonde Error Corrections: Correction for sonde response in zero conductivity environment. (Normalized to 25C).									
Phase	Real Deep 10 kHz S.E. Corr.			Value	Phase	Real Deep 20 kHz S.E. Corr.			Value
Master				39.58	Master				17.05
	-50.00	0	125.0			-30.00	0	30.00	
	(Minimum)	(Nominal)	(Maximum)			(Minimum)	(Nominal)	(Maximum)	
Phase	Quad Deep 10 kHz S.E. Corr.			Value	Phase	Quad Deep 20 kHz S.E. Corr.			Value
Master				245.8	Master				136.2
	-250.0	0	350.0			-125.0	0	200.0	
	(Minimum)	(Nominal)	(Maximum)			(Minimum)	(Nominal)	(Maximum)	
Phase	Real Medium 10 kHz S.E. Corr.			Value	Phase	Real Medium 20 kHz S.E. Corr.			Value
Master				31.10	Master				11.33
	-50.00	0	140.0			-50.00	0	50.00	
	(Minimum)	(Nominal)	(Maximum)			(Minimum)	(Nominal)	(Maximum)	
Phase	Quad Medium 10 kHz S.E. Corr.			Value	Phase	Quad Medium 20 kHz S.E. Corr.			Value
Master				328.1	Master				172.6
	-1300	0	1300			-650.0	0	650.0	
	(Minimum)	(Nominal)	(Maximum)			(Minimum)	(Nominal)	(Maximum)	
Master: Calibration out of date 30-Apr-2008 15:24									

### Hostile Litho-Density Sonde / Equipment Identification

**Primary Equipment:**

Hostile Litho Density Sonde	HLDS – D	35
Hostile Litho Density High Voltage	HLDV – D	35
Gamma Source Radioactive	GSR – Z	2397

**Auxiliary Equipment:**

Hostile Litho Density Pad	HLDP – C	35
Hostile Litho Density High Voltage Housi	HEH – H	35

### Litho-Density Spectroscopy Cartridge – B / Equipment Identification

**Primary Equipment:**

LDSC Cartridge	LDSC – B	521
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**Auxiliary Equipment:**

LDSC Housing	LDSH – A	126
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Hostile Natural Gamma Ray Cartridge – B / Equipment Identification

Primary Equipment: HNGC Cartridge	HNGC – B	300
Auxiliary Equipment: HNGC Housing	HNGH – A	115

Hostile Natural Gamma Ray Sonde / Equipment Identification

Primary Equipment: HNGS Sonde	HNGS – BA	194
Auxiliary Equipment: HNGS Sonde Housing Gamma Source Radioactive	HNSH – BA GSR – U	205 616008

Hostile Natural Gamma Ray Sonde Wellsite Calibration




Detector 1 Check



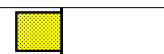
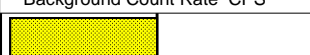

Phase	Na 511 Peak Loc	Value	Phase	Na 511 Peak Res %	Value	Phase	High Voltage V	Value
Master		39.55	Master		15.65	Master		1146
Before		39.60	Before		16.19	Before		1180
After		39.55	After		16.19	After		1180
	37.50 (Minimum) 40.00 (Nominal) 43.50 (Maximum)			12.00 (Minimum) 15.50 (Nominal) 19.00 (Maximum)			900.0 (Minimum) 1150 (Nominal) 1600 (Maximum)	
Phase	Na 1785 Peak Loc	Value	Phase	Na 1785 Peak Res %	Value	Phase	Temperature DEGC	Value
Master		142.8	Master		7.849	Master		14.91
Before		142.7	Before		8.372	Before		32.53
After		141.7	After		8.356	After		30.76
	135.0 (Minimum) 142.6 (Nominal) 150.3 (Maximum)			7.000 (Minimum) 8.500 (Nominal) 11.00 (Maximum)			-28.89 (Minimum) 15.50 (Nominal) 60.00 (Maximum)	
Phase	Na Count Rate CPS	Value						
Master		36.92						
Before		35.51						
After		35.28						
	10.00 (Minimum) 45.00 (Nominal) 100.0 (Maximum)							
Master: 5-Sep-2009 7:01			Before: 13-Sep-2009 22:15			After: 6-Oct-2009 5:15		

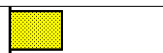

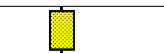


Hostile Natural Gamma Ray Sonde Wellsite Calibration

Detector 2 Check

Phase	Na 511 Peak Loc	Value	Phase	Na 511 Peak Res %	Value	Phase	High Voltage V	Value
Master		39.62	Master		15.06	Master		1080
Before		39.55	Before		16.55	Before		1113
After		39.54	After		16.18	After		1113
	37.50 (Minimum) 40.00 (Nominal) 43.50 (Maximum)			12.00 (Minimum) 15.50 (Nominal) 19.00 (Maximum)			900.0 (Minimum) 1150 (Nominal) 1600 (Maximum)	
Phase	Na 1785 Peak Loc	Value	Phase	Na 1785 Peak Res %	Value	Phase	Temperature DEGC	Value
Master		141.3	Master		8.437	Master		15.08
Before		142.3	Before		9.484	Before		32.86
After		141.9	After		8.502	After		32.67
	135.0 (Minimum) 142.6 (Nominal) 150.3 (Maximum)			7.000 (Minimum) 8.500 (Nominal) 11.00 (Maximum)			-28.89 (Minimum) 15.50 (Nominal) 60.00 (Maximum)	
Phase	Na Count Rate CPS	Value						
Master		36.97						
Before		36.00						
After		35.45						
	10.00 (Minimum) 45.00 (Nominal) 100.0 (Maximum)							

Hostile Natural Gamma Ray Sonde Wellsite Calibration		
Ratio Of Detector 1 To Detector 2		
Phase	Coincidence Count Rate Ratio	Value
Master		0.9992
Before		0.9853
After		0.9952
	0.9500 (Minimum)      1.000 (Nominal)      1.050 (Maximum)	
Master: 5-Sep-2009 7:01		
Before: 13-Sep-2009 22:15		
After: 6-Oct-2009 5:15		

Hostile Natural Gamma Ray Sonde Master Calibration								
Detector 1 Calibration								
Phase	Na 511 Peak Set Point	Value	Phase	Th Peak Loc	Value	Phase	Th Peak Res %	Value
Master		41.00	Master		210.4	Master		6.417
	38.00 (Minimum)      40.00 (Nominal)      43.00 (Maximum)			201.0 (Minimum)      209.6 (Nominal)      218.3 (Maximum)			5.000 (Minimum)      7.000 (Nominal)      9.000 (Maximum)	
Phase	Background Count Rate CPS	Value	Phase	Gain Ratio	Value			
Master		18.75	Master		1.012			
	10.00 (Minimum)      142.5 (Nominal)      265.0 (Maximum)			0.9400 (Minimum)      1.000 (Nominal)      1.060 (Maximum)				
Master: 5-Sep-2009 7:01								

Hostile Natural Gamma Ray Sonde Master Calibration								
Detector 2 Calibration								
Phase	Na 511 Peak Set Point	Value	Phase	Th Peak Loc	Value	Phase	Th Peak Res %	Value
Master		41.00	Master		209.5	Master		7.001
	38.00 (Minimum)      40.00 (Nominal)      43.00 (Maximum)			201.0 (Minimum)      209.6 (Nominal)      218.3 (Maximum)			5.000 (Minimum)      7.000 (Nominal)      9.000 (Maximum)	
Phase	Background Count Rate CPS	Value	Phase	Gain Ratio	Value			
Master		18.87	Master		1.006			
	10.00 (Minimum)      142.5 (Nominal)      265.0 (Maximum)			0.9400 (Minimum)      1.000 (Nominal)      1.060 (Maximum)				
Master: 5-Sep-2009 7:01								

DTS Telemetry Tool / Equipment Identification		
Primary Equipment:		
DTC-H Auxiliary Cartridge	DTCH - A	8798
DTC-H Telemetry Cartridge	DTCH - A	8798
Auxiliary Equipment:		
DTCH Telemetry Cartridge Housing	ECH - KC	1777

Ocean: **Pacific**

Dual Induction (DITE)

Natural Gamma Spectroscopy (HNGS)