HALLIBURTON

DUAL SPACED NEUTRON SPECTRAL DENSITY LOG

TGT PETROLEUM CORPORATION
END WRENCH #5
EINSEL
KIOWA
KANSAS

COMPANY WELL FIELD COUNTY STATE

COMPANY **TGT PETROLEUM CORPORATION**

WELL **END WRENCH #5**

FIELD **EINSEL**

COUNTY **KIOWA** STATE **KANSAS**

API No. 15-097-21737

Location (SHL) 978' FSL & 1316' FEL
SW NW SE SE

Sect. 25 Twp. 27S Rge. 19W

Other Services:
DSN/SDL
MICROLOG
ACRT
BSAT
XRMI

Permanent Datum	GL	Elev. 2206.0 ft	Elev.: K.B. 2216.0 ft
Log measured from	KB	, 10.0 ft above perm. Datum	D.F. 2215.0 ft
Drilling measured from	KB		G.L. 2206.0 ft

Date		27-Nov-12					
Run No.		ONE					
Depth - Driller		4940.00 ft					
Depth - Logger		4930.0 ft					
Bottom - Logged Interval		4860					
Top - Logged Interval		3300					
Casing - Driller		8.625 in	@ 477.0 ft	@		@	
Casing - Logger		479.0 ft					
Bit Size		7.875 in		@		@	
Type Fluid in Hole		WATER BASED MUD					
Density	Viscosity	9.5 ppg	75.00 s/qt				
PH	Fluid Loss	10.50 pH	12.8 cptm				
Source of Sample		MUD PIT					
Rm @ Meas. Temperature		0.400 ohmm	@ 82.00 degF	@		@	
Rmf @ Meas. Temperature		0.34 ohmm	@ 82.00 degF	@		@	
Rmc @ Meas. Temperature		0.460 ohmm	@ 82.00 degF	@		@	
Source Rmf	Rmc	CALCULATED	CALCULATED				
Rm @ BHT		0.28 ohmm	@ 120.0 degF	@		@	
Time Since Circulation		5.5 hr					
Time on Bottom		27-Nov-12 17:52					
Max. Rec. Temperature		120.0 degF	@ 4930.0 ft	@		@	
Equipment	Location	10800785	LIBERAL				
Recorded By		S. INGERSOLL					
Witnessed By		J. CHRISTIAN					

Fold here

PGM Version: WL INSITE R3.6.0 (Build 3)

Service Ticket No.: 900033352 API Serial No.: 15-097-21737

RESISTIVITY SCALE CHANGES

CHANGE IN MUD TYPE OR ADDITIONAL SAMPLE

	Type Log	Depth	Scale Up Hole	Scale Down Hole
Date				
Sample No.				
Depth-Driller				
Type Fluid in Hole				
Density / Viscosity				
Ph / Fluid Loss				
Source of Sample				
Rm @ Meas. Temp				
Rmf @ Meas. Temp.				
Rmc @ Meas. Temp.				
Source Rmf / Rmc				
Rm @ BHT				
Rmf @ BHT				
Rmc @ BHT				

RESISTIVITY EQUIPMENT DATA

	Run No.	Tool Type & No.	Pad Type	Tool Pos.	Other
@					
@	ONE	ACRT 10929775	N/A	CENT.	
@					
@					
@					
@					

EQUIPMENT DATA

GAMMA		ACOUSTIC		DENSITY		NEUTRON	
Run No.	ONE	Run No.	ONE	Run No.	ONE	Run No.	ONE
Serial No.	10811258	Serial No.	10747683	Serial No.	10950489	Serial No.	10755066
Model No.	GTET	Model No.	BSAT	Model No.	SDLT	Model No.	DSNT
Diameter	3.625"	No. of Cent.	2	Diameter	4.5"	Diameter	3.625"
Detector Model No.	GTET	Spacing	.5'	Log Type	GAM-GAM	Log Type	NEU-NEU
Type	SCINT			Source Type	CS-137	Source Type	AM-241BE
Length	8"	LSA [Y/N]		Serial No.		Serial No.	
Distance to Source		FWDA [Y/N]		Strength	1.5 CI	Strength	15 CI

LOGGING DATA

GENERAL GAMMA ACOUSTIC DENSITY NEUTRON

GENERAL			GAMMA		ACOUSTIC			DENSITY			NEUTRON		
Run	Depth		Speed	Scale		Scale		Matrix	Scale		Matrix	Scale		Matrix
No.	From	To	ft/min	L	R	L	R		L	R		L	R	
ONE	4930	479	REC	0	150	30	-10	47.6 ft/us	30	-10	2.71 gm/cc	30	-10	LIME

DIRECTIONAL INFORMATION

Maximum Deviation	@	KOP	@

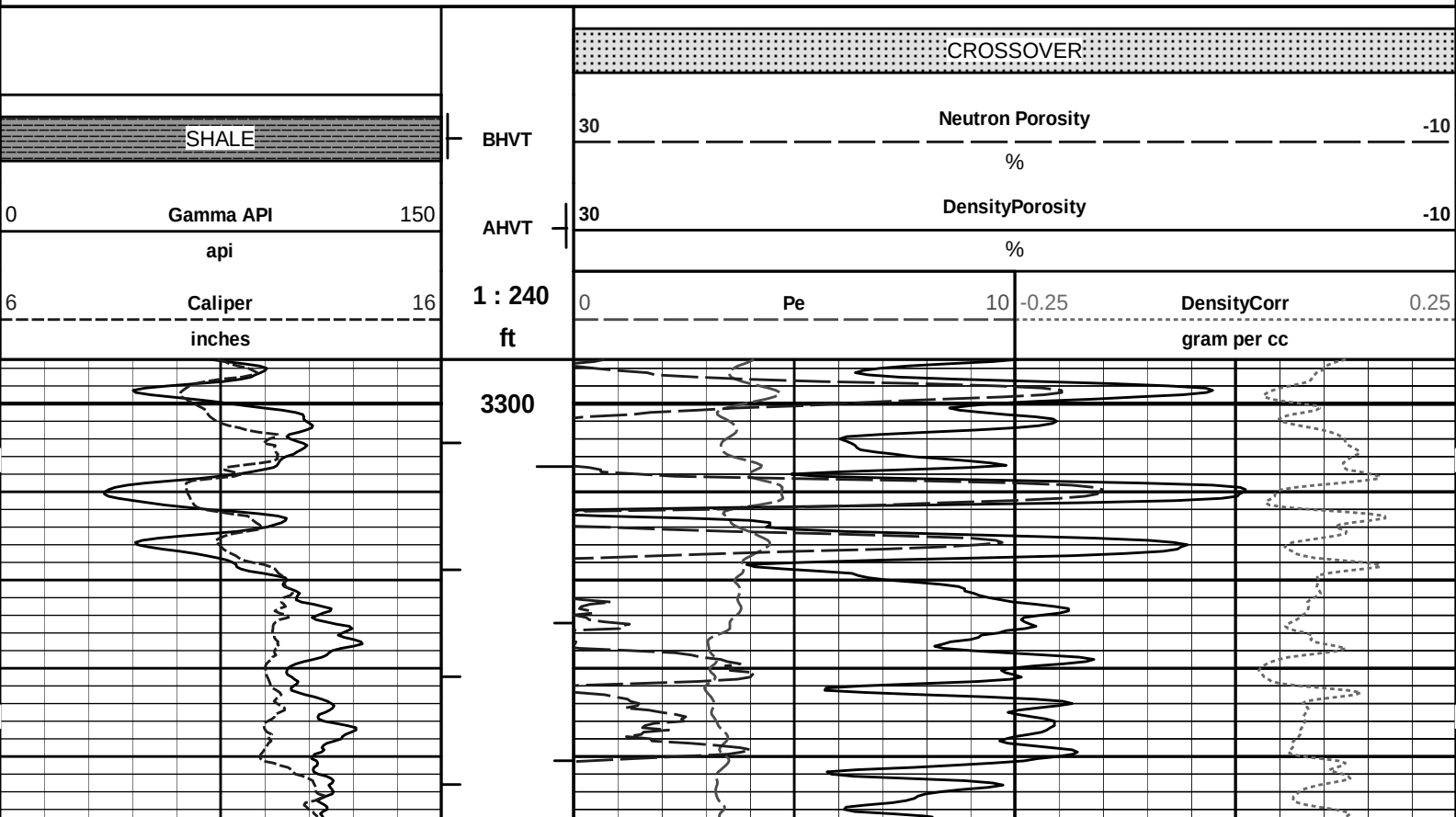
Remarks: ANNULAR HOLE VOLUME CALCULATED FOR 5.5 INCH CASING.

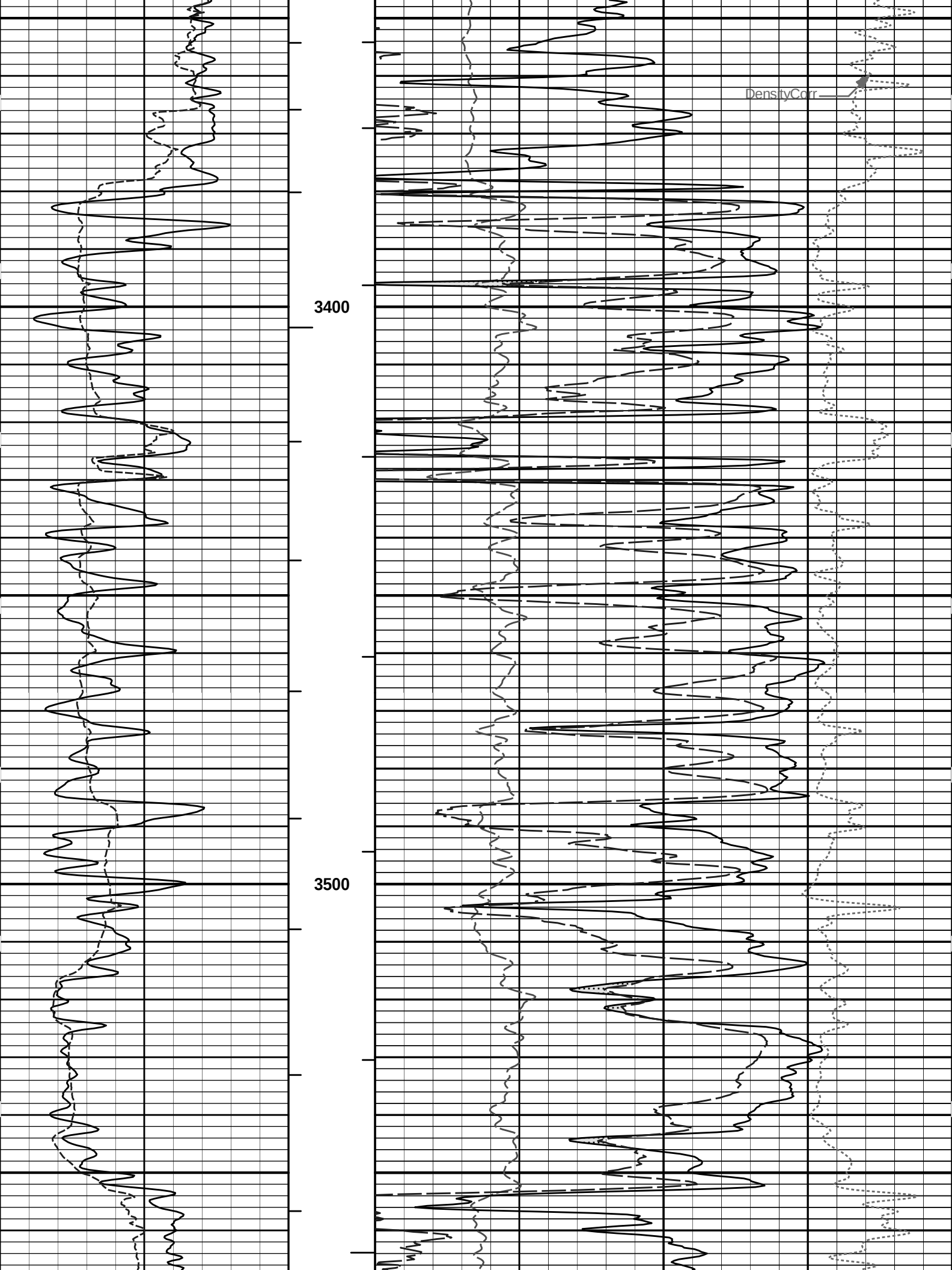
CHLORIDES REPORTED AT 12,000 ppm.

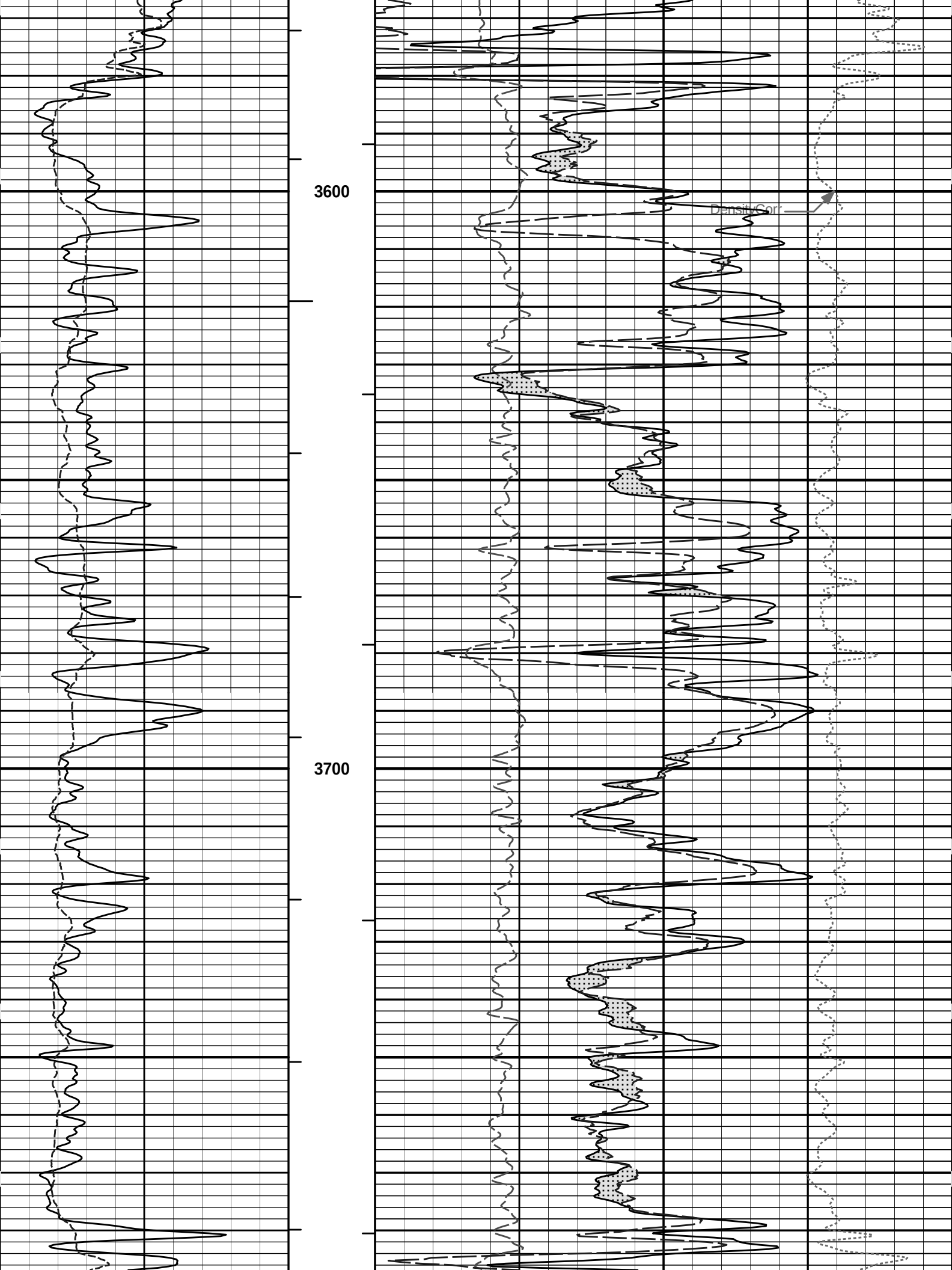
HALLIBURTON

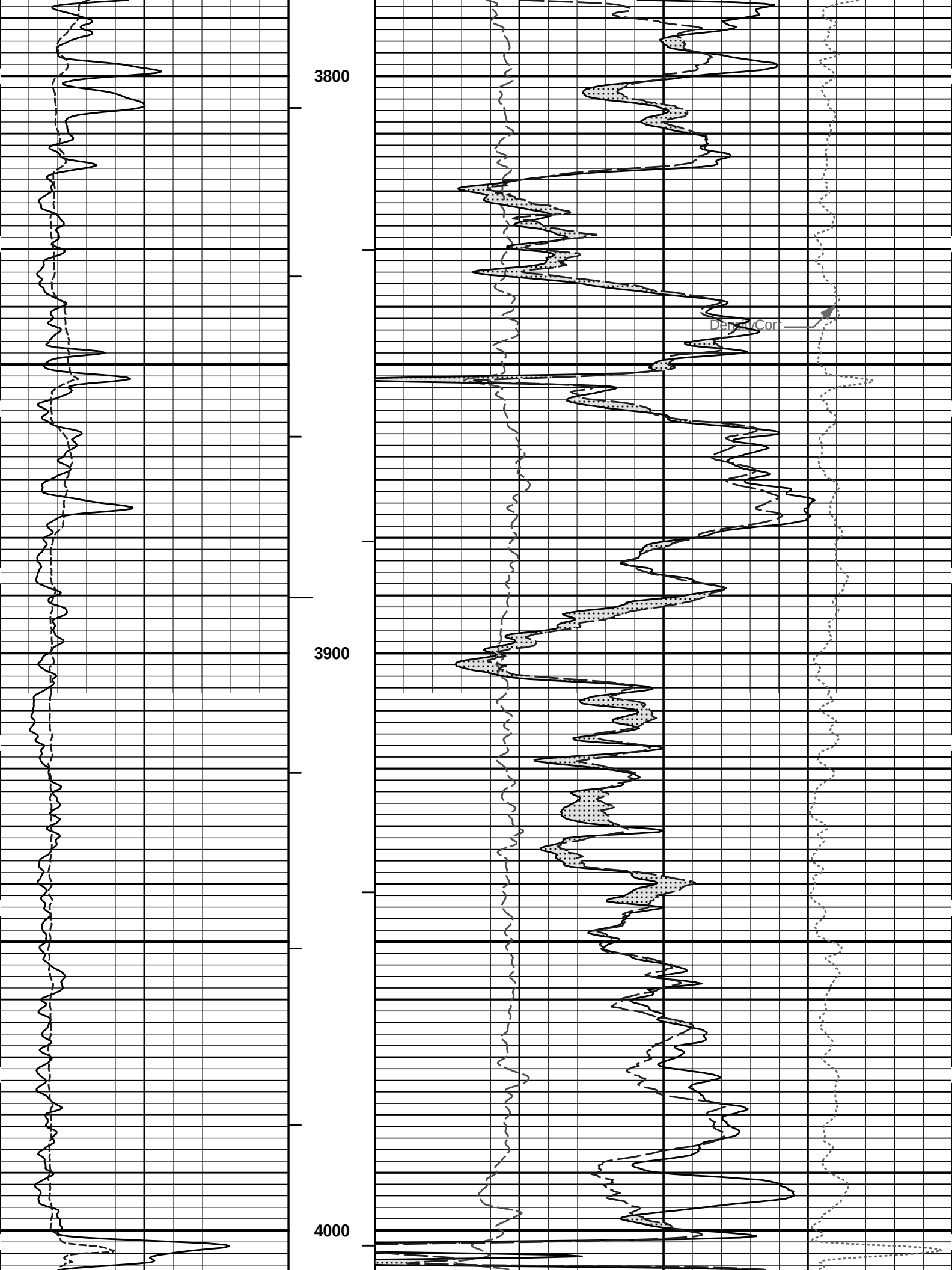
Plot Time: 27-Nov-12 22:05:01
Plot Range: 3295 ft to 4931 ft
Data: END_WRENCH#5\Well Based\POROSITY
Plot File: \\PORO\Poro_IQ_5_MAIN_LIB

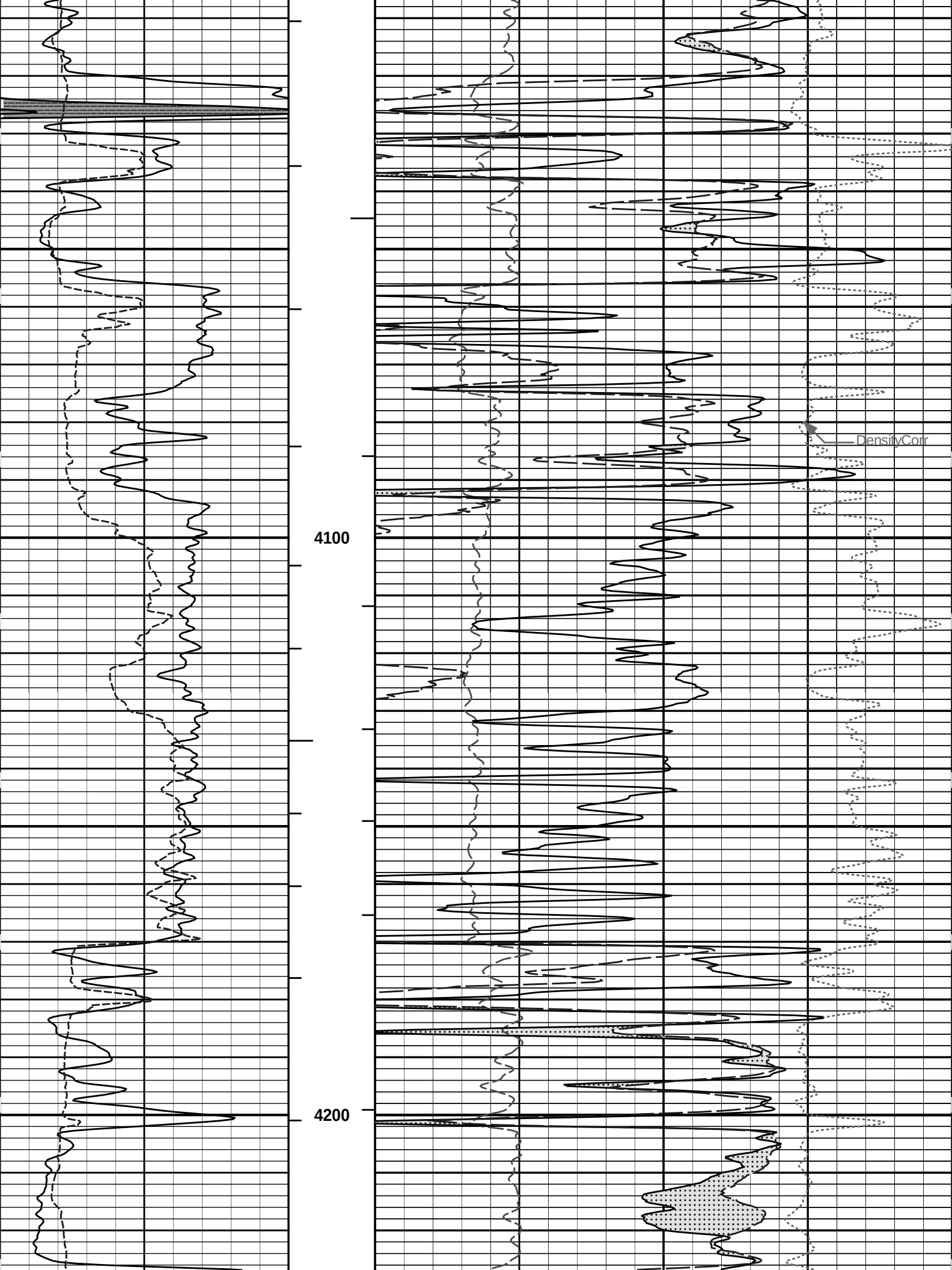
5 INCH MAIN LOG

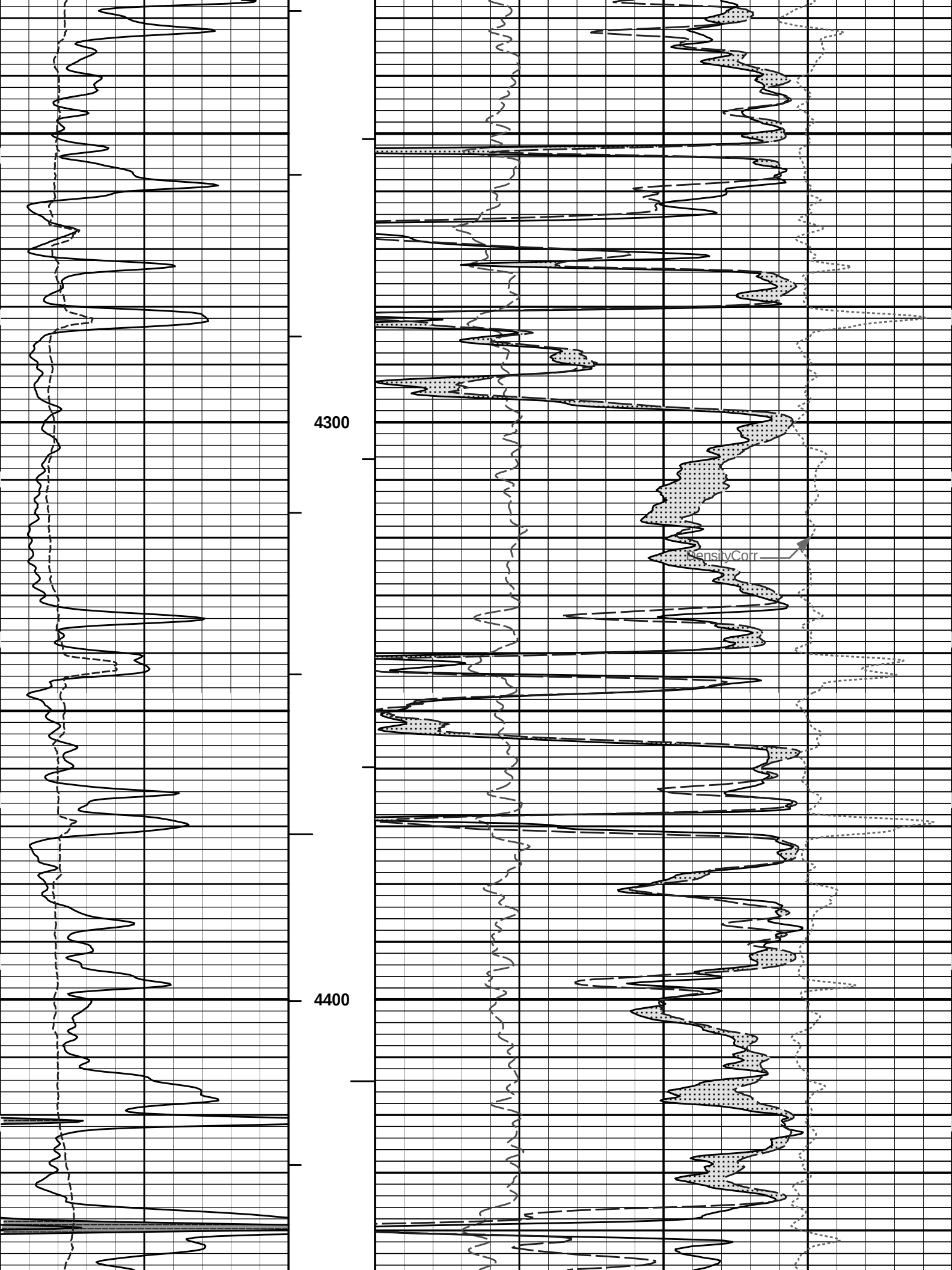


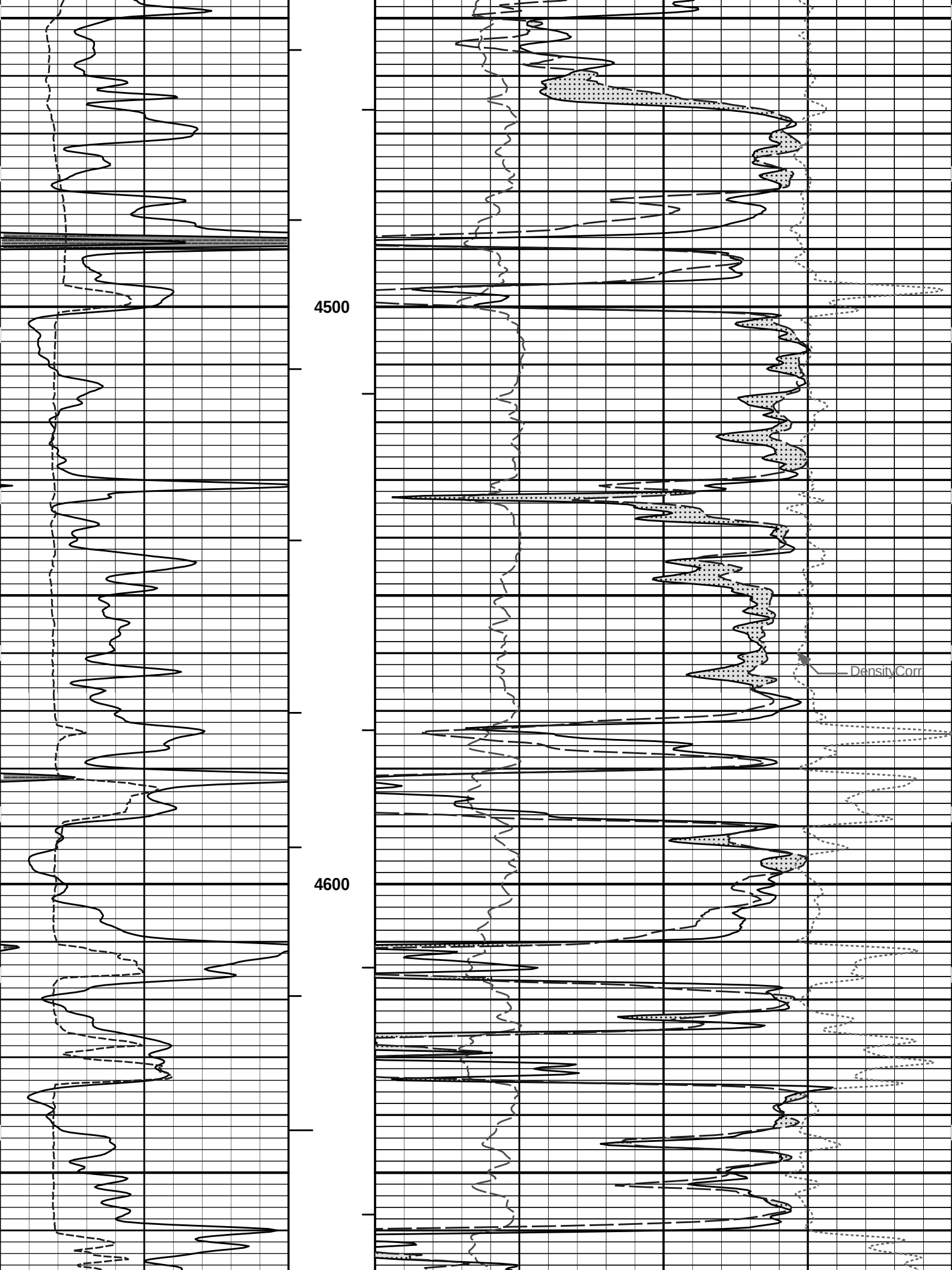

DensityCorr
3400
3500

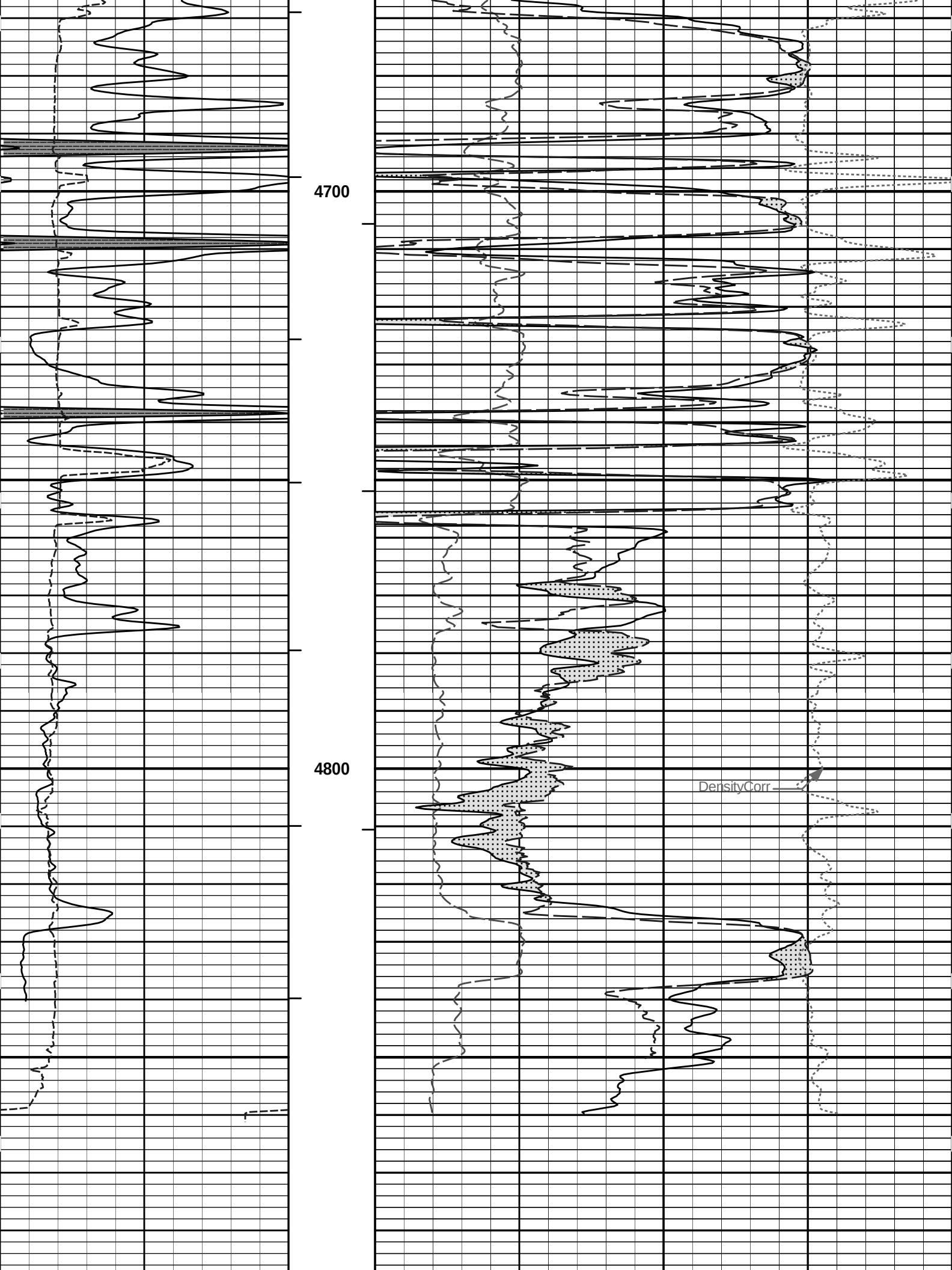

3600
3700
DensityCorr

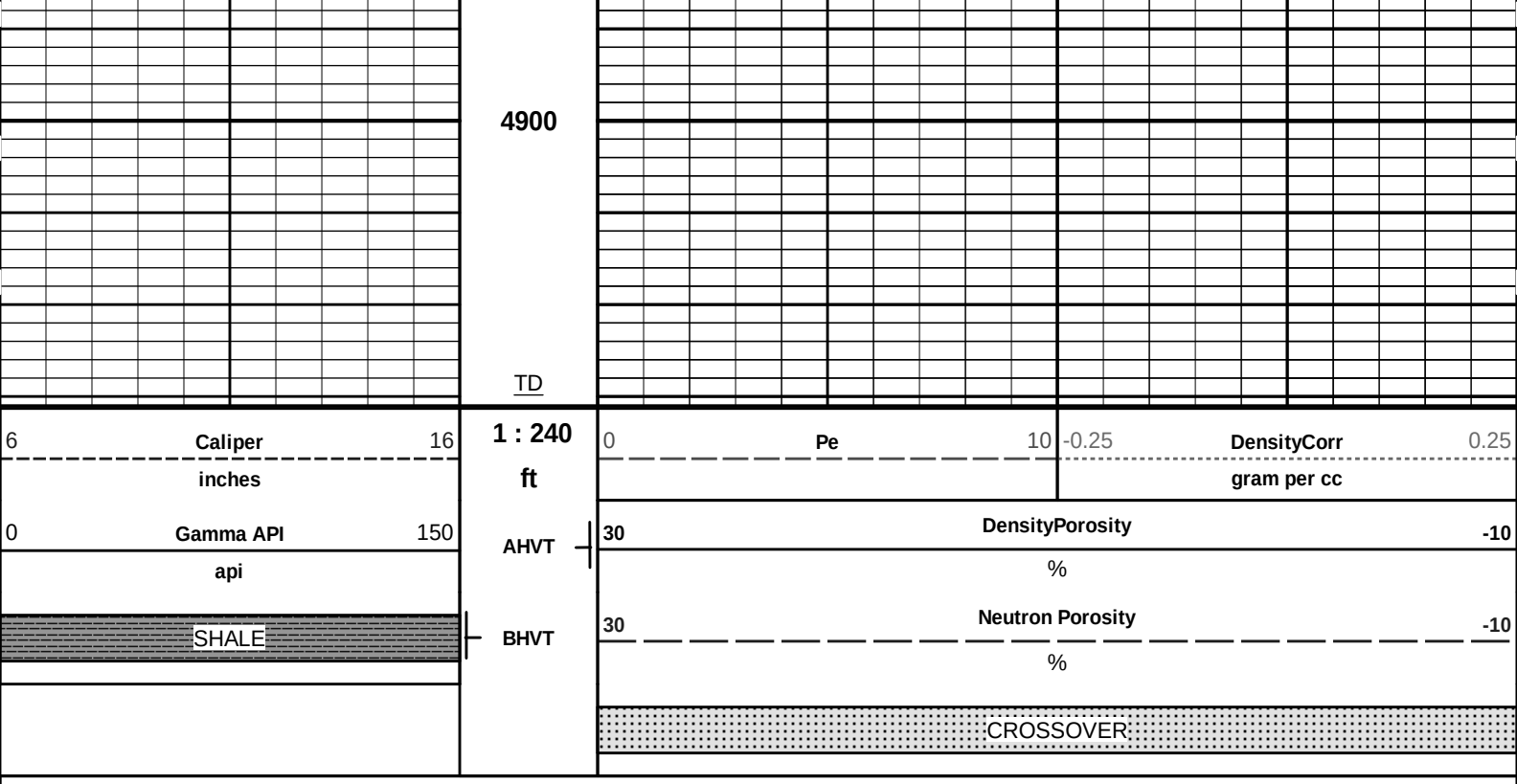

3800
3900
4000
DensityCorr


DensityCorr
4100
4200


4300
4400
DensityCorr


4500
4600
DensityCorr


4700
4800
DensityCorr



HALLIBURTON

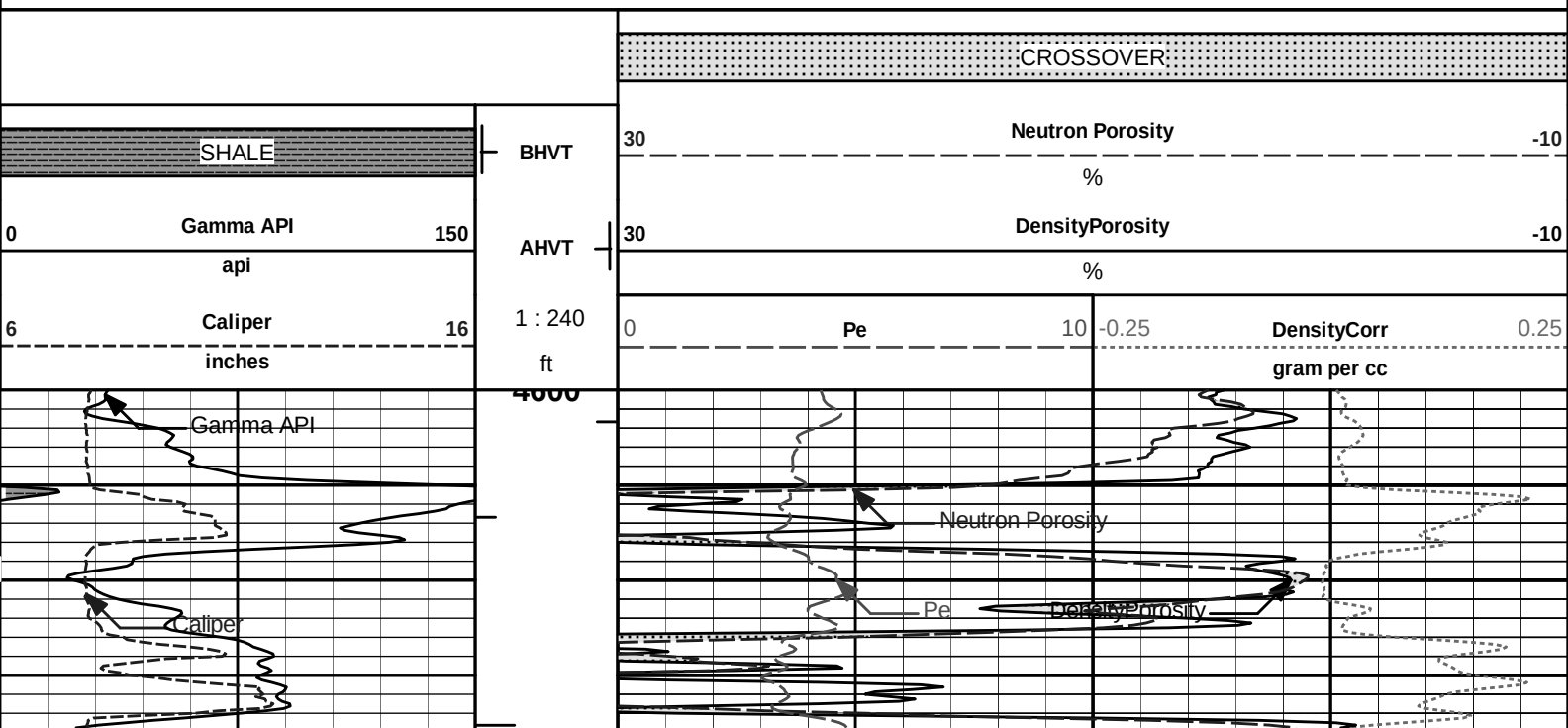
Plot Time: 27-Nov-12 22:05:15
Plot Range: 3295 ft to 4931 ft
Data: END_WRENCH#5\Well Based\POROSITY
Plot File: \\PORO\Poro_IQ_5_MAIN_LIB

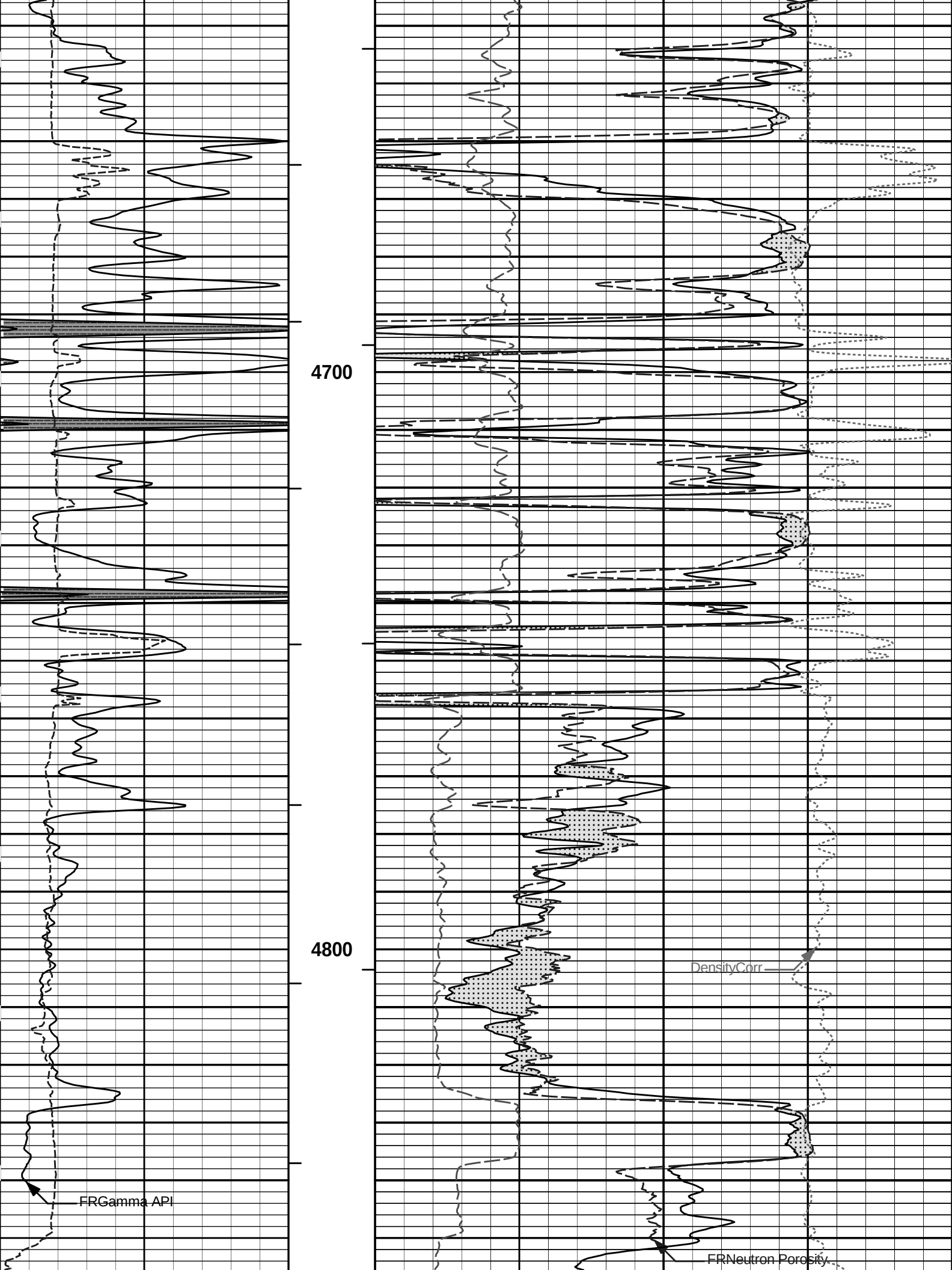
5 INCH MAIN LOG

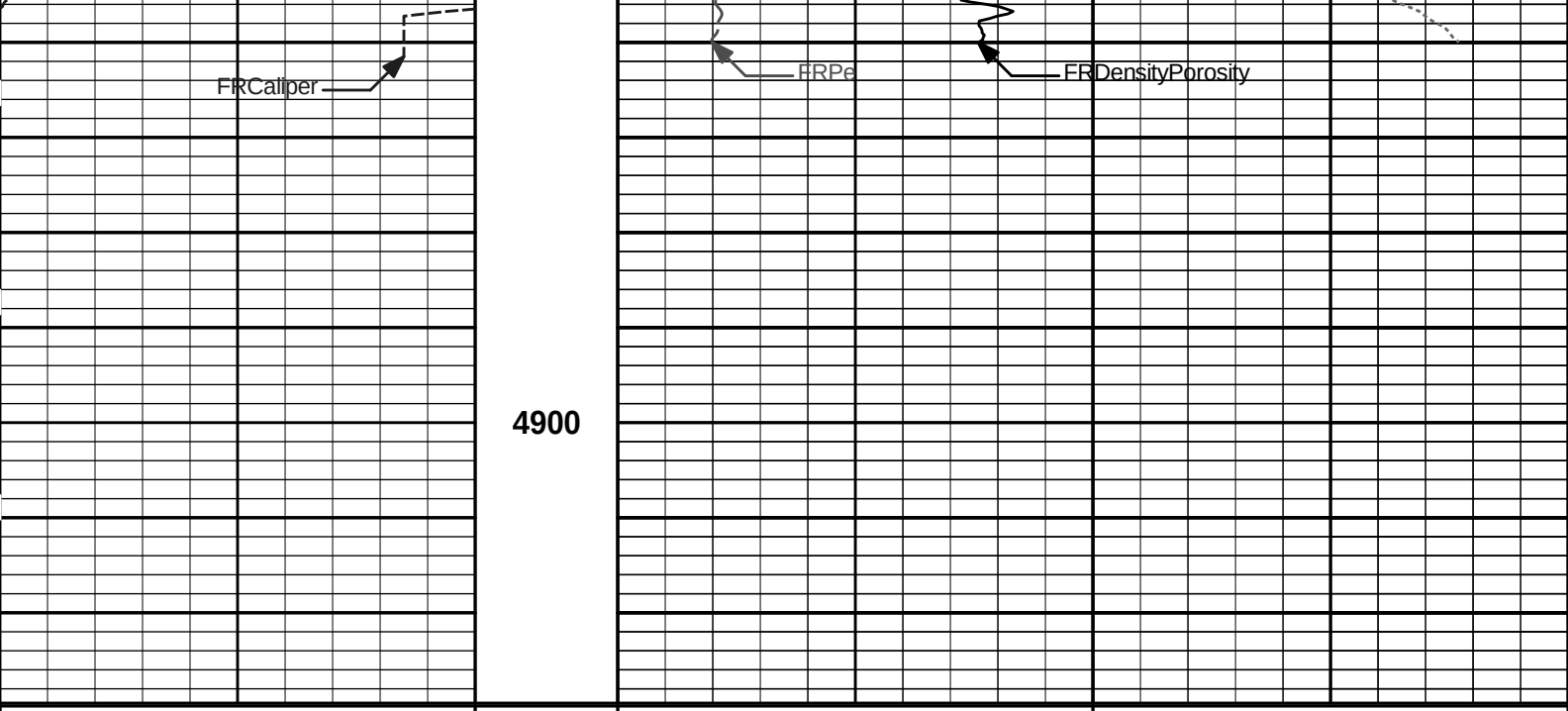
HALLIBURTON

Plot Time: 27-Nov-12 22:05:15
Plot Range: 4600 ft to 4929.5 ft
Data: END_WRENCH#5\Well Based\REPEAT
Plot File: \\PORO\Poro_IQ_5_REP_LIB

REPEAT SECTION




4700
4800
DensityCorr
FRGamma API
FRNeutron Porosity



6 Caliper 16	1 : 240	0 Pe 10 / -0.25 DensityCorr 0.25
inches	ft	gram per cc
0 Gamma API 150	AHVT	30 DensityPorosity -10
api		%
SHALE	BHVT	30 Neutron Porosity -10
		%
		CROSSOVER

HALLIBURTON

Plot Time: 27-Nov-12 22:05:18
Plot Range: 4600 ft to 4929.5 ft
Data: END_WRENCH#5\Well Based\REPEAT\
Plot File: \\PORO\Poro_IQ_5_REP_LIB

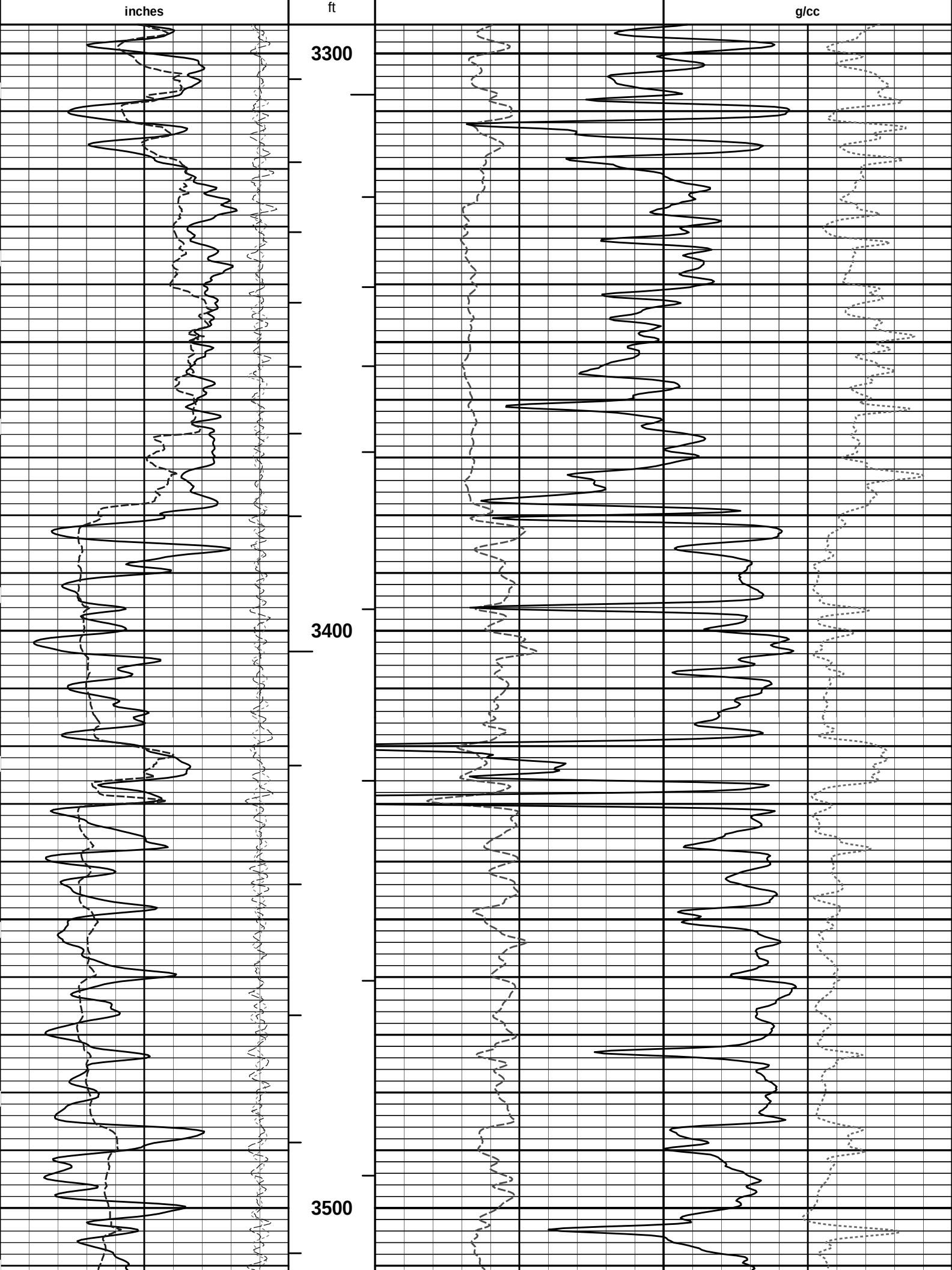
REPEAT SECTION

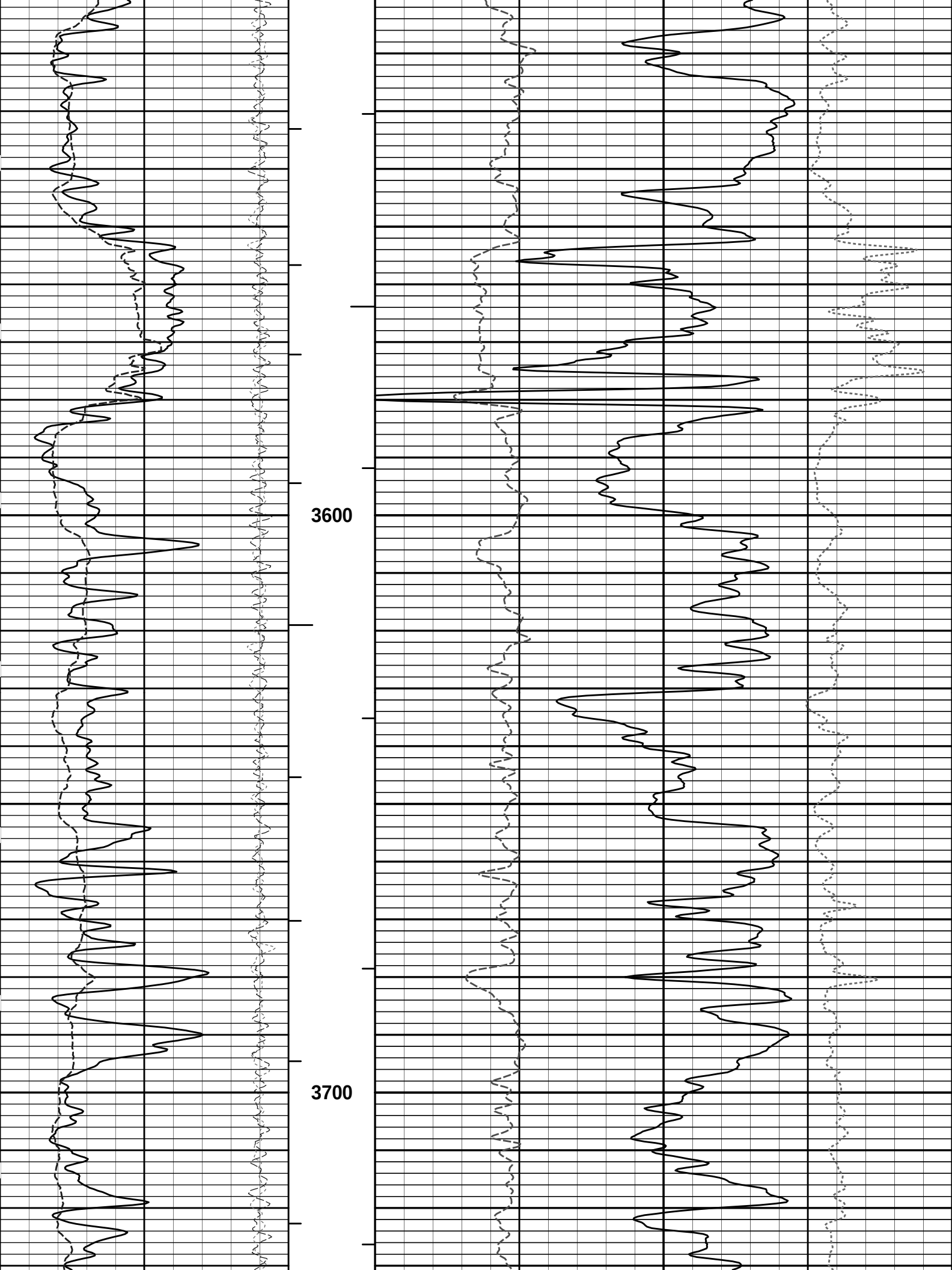
HALLIBURTON

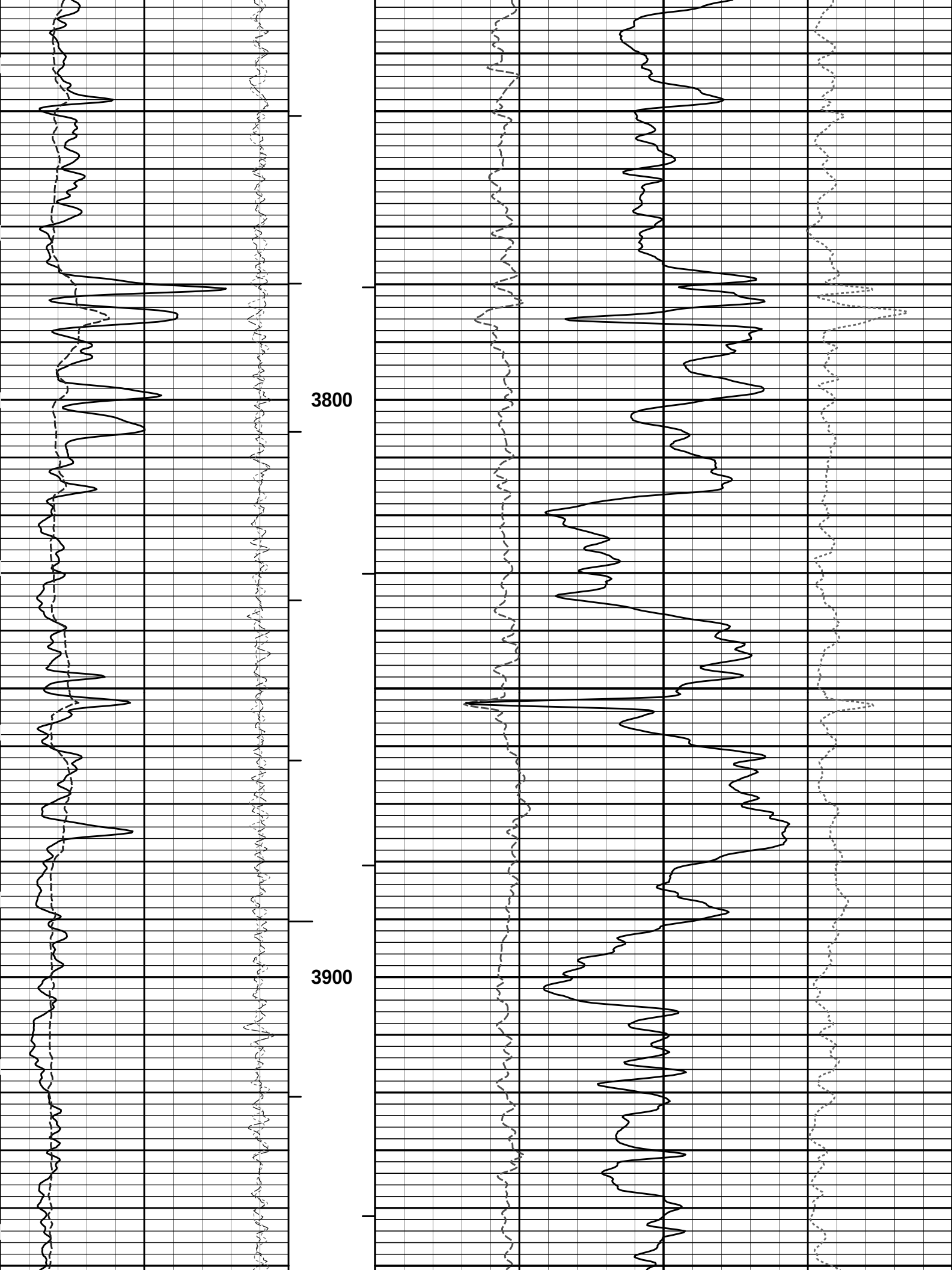
Plot Time: 27-Nov-12 22:05:19
Plot Range: 3295 ft to 4931 ft
Data: END_WRENCH#5\Well Based\POROSITY\
Plot File: \\-LOCAL-\DEBES_29_1H\0001 bsat lab test\PORO\BULKD_5_MAIN_LIB

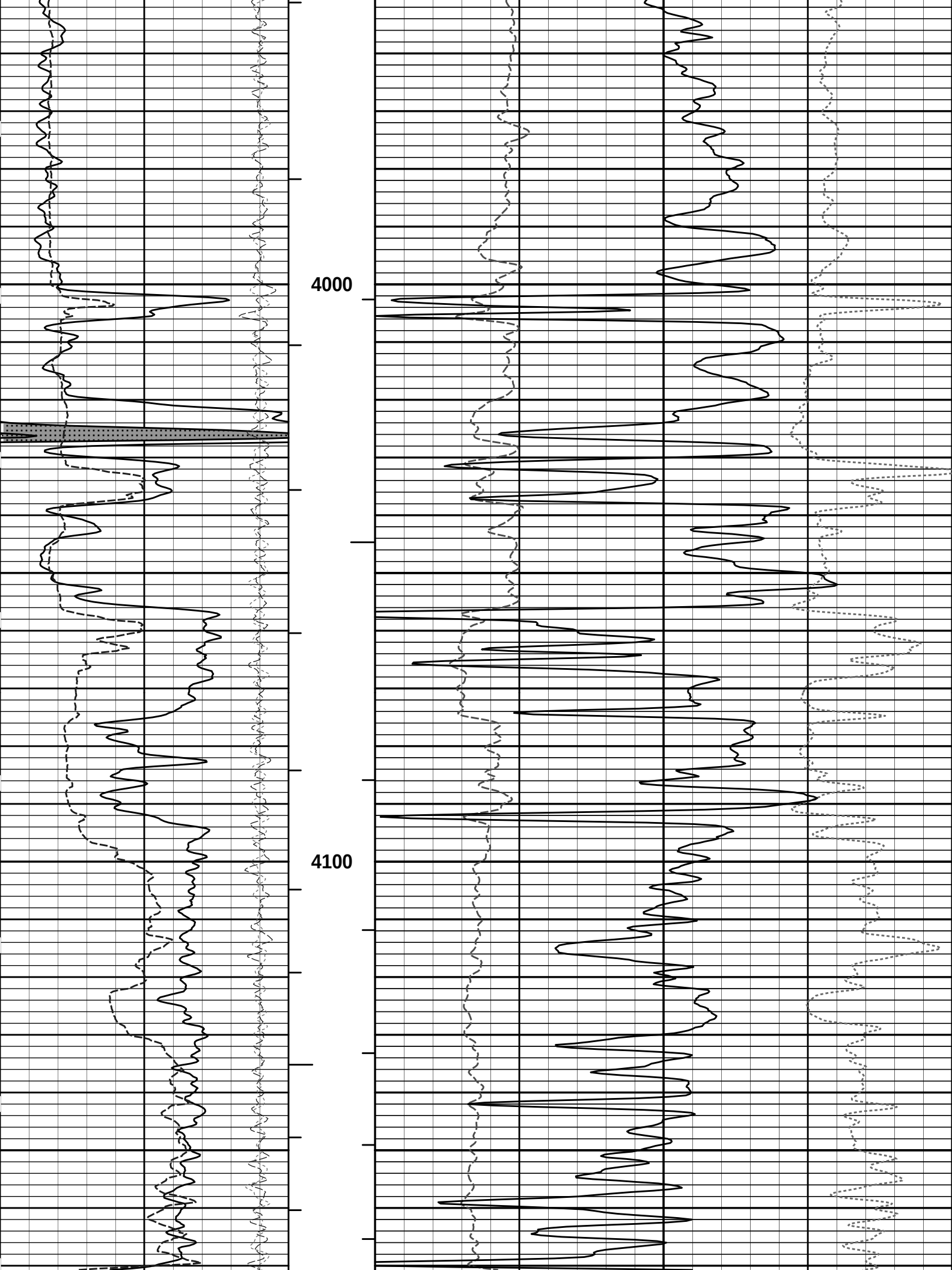
5 INCH MAIN LOG

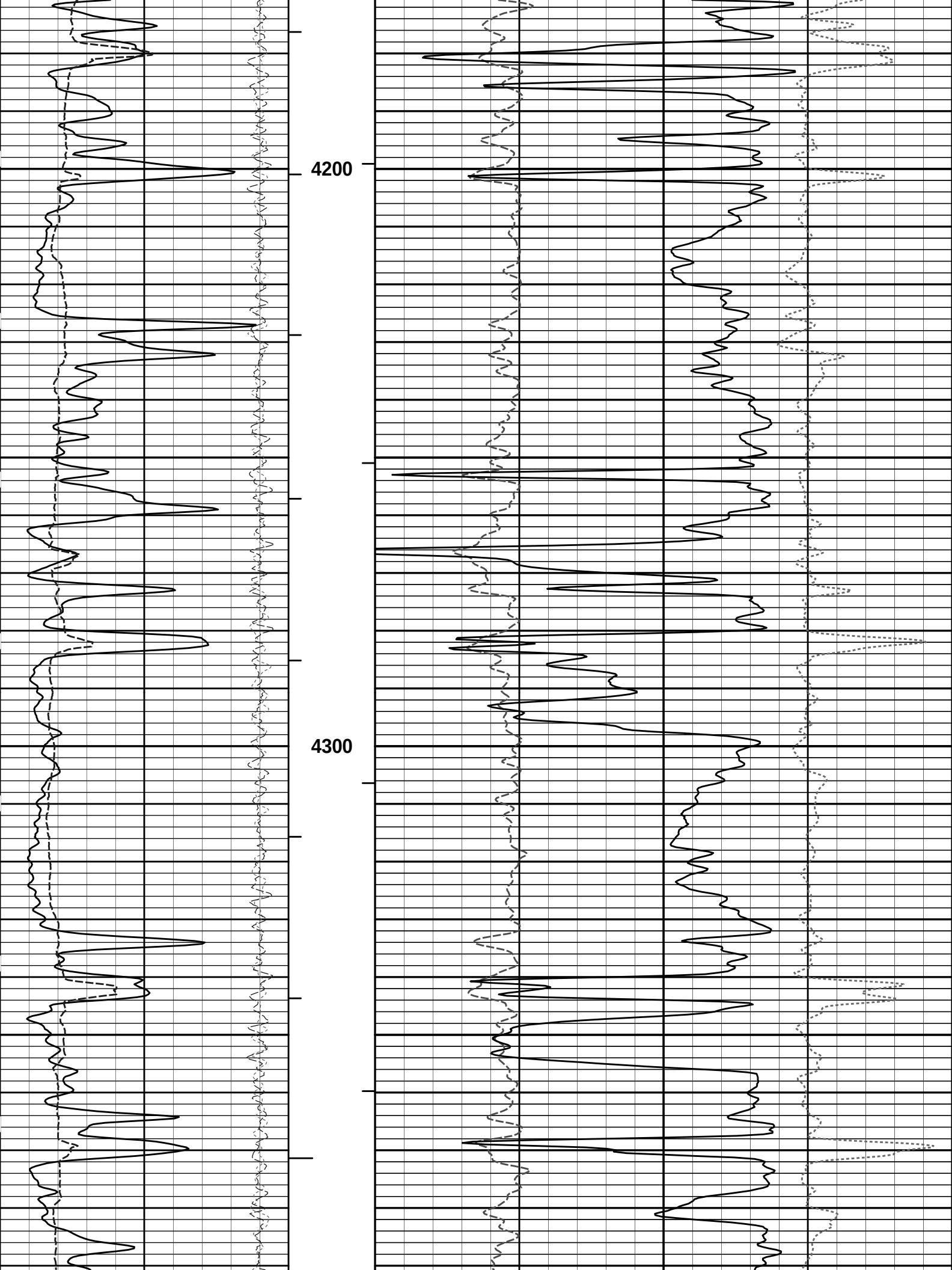
SHALE		
0 Gamma Ray 150		
api		
18 FarQuality -2	AHV ft3	
-18 NearQuality 2	BHV ft3	2 Bulk Density 3
		g/cc
6 Caliper 16	1 : 240	0 Pe 10 / -0.25 DensityCorr 0.25

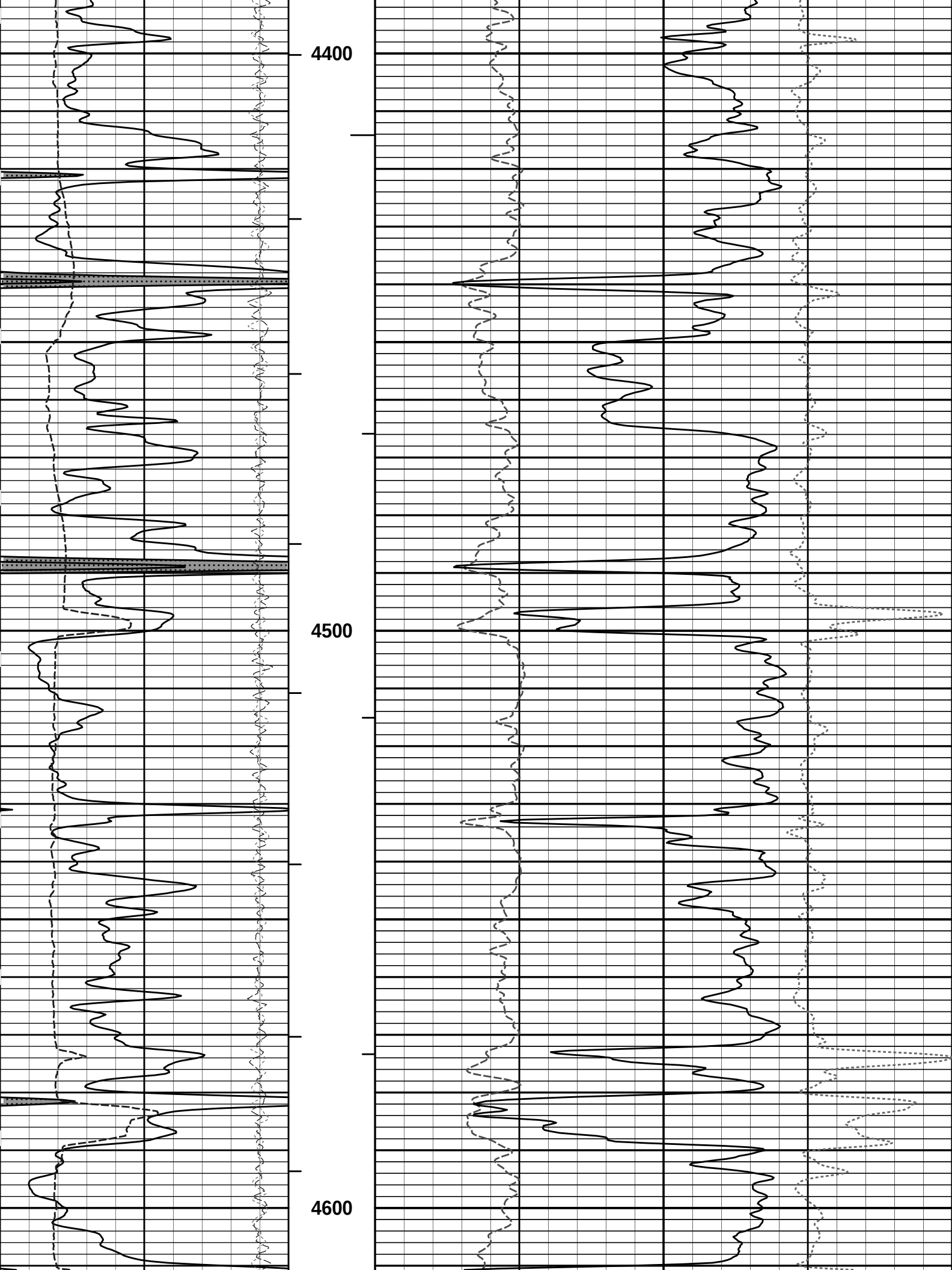

inches
ft
g/cc
3300
3400
3500

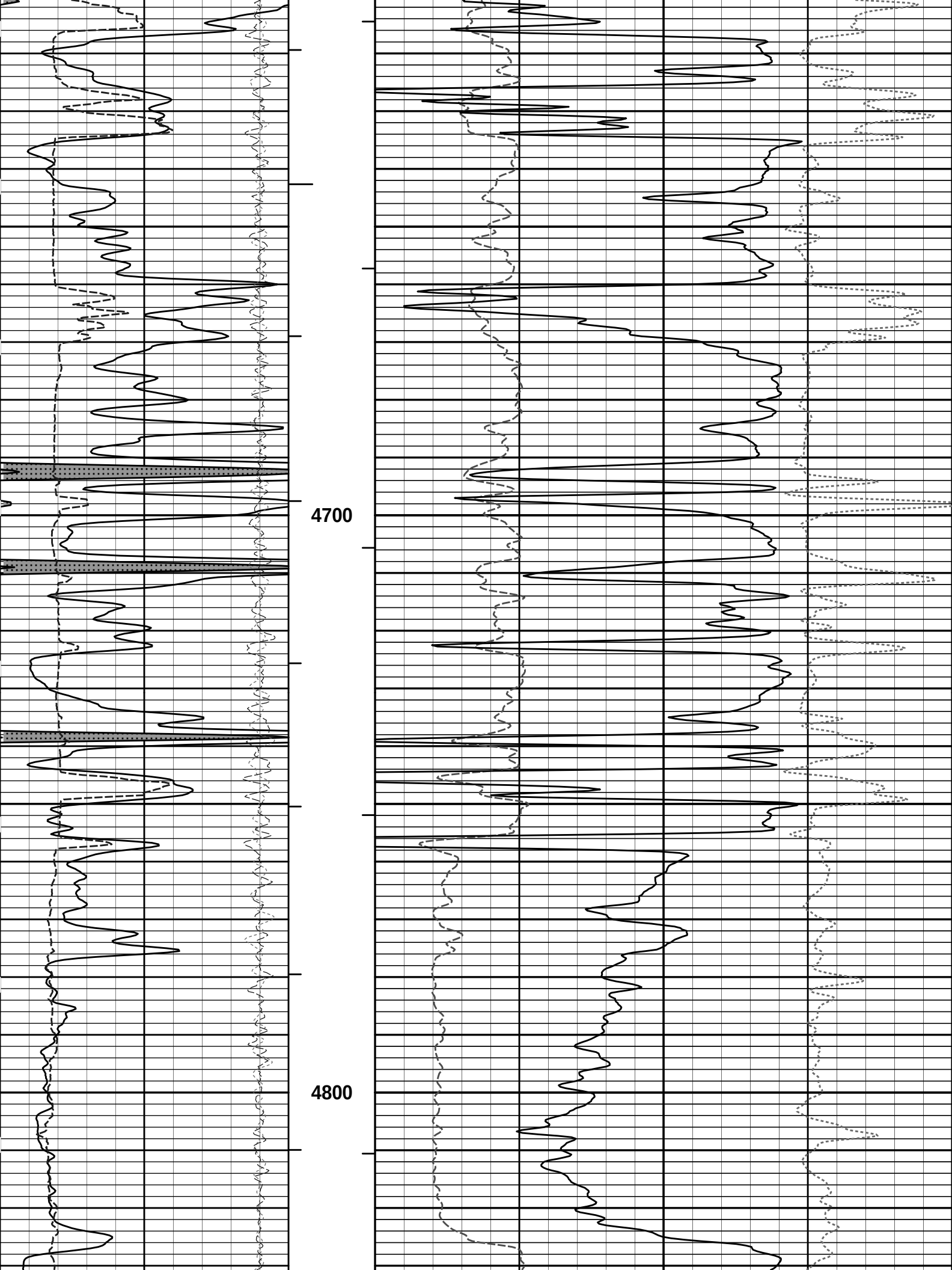

3600
3700

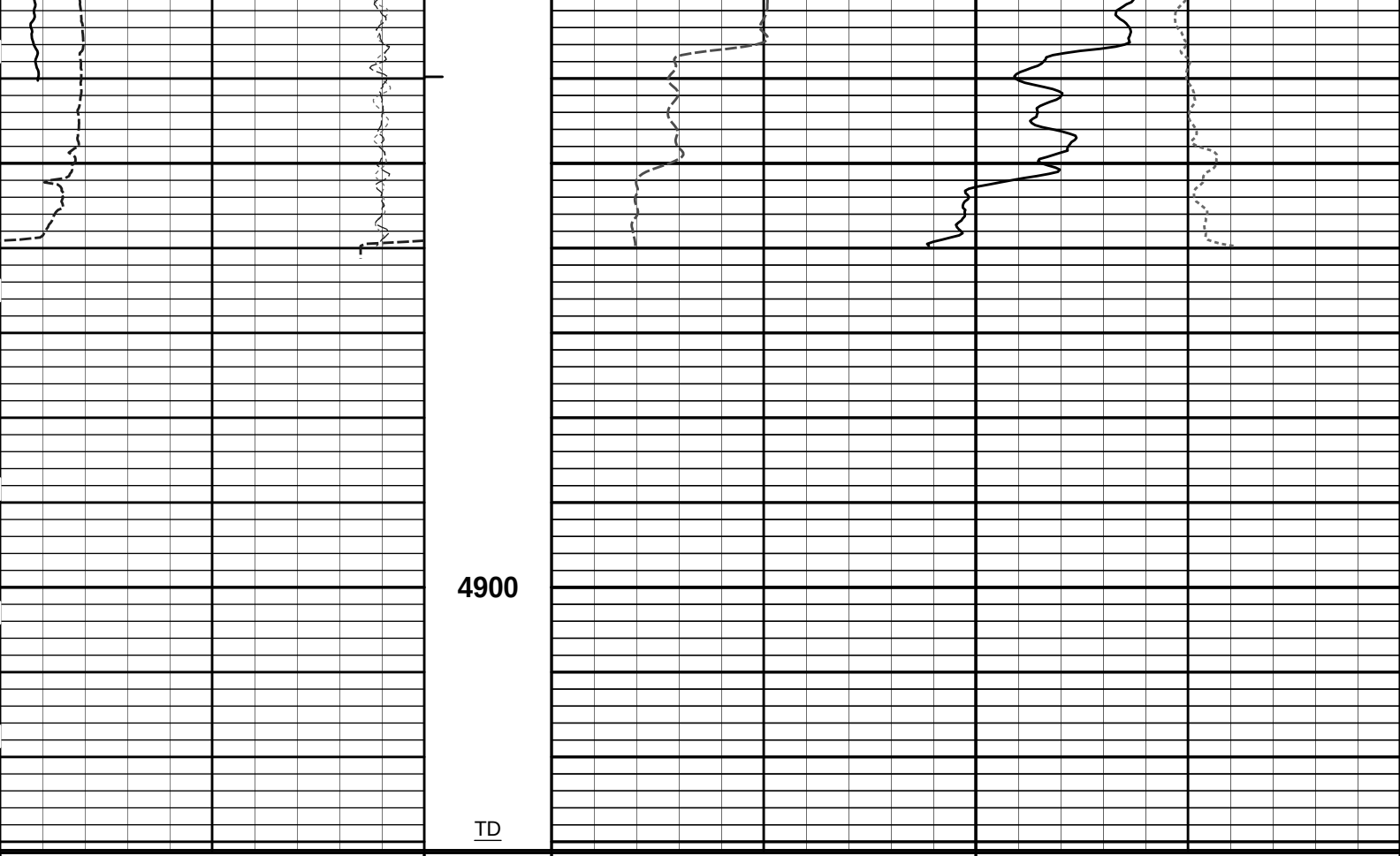

3800
3900


4000
4100


4200
4300


4400
4500
4600


4700
4800



6 Caliper 16	1 : 240 ft	0 Pe 10 | -0.25 DensityCorr 0.25
inches		g/cc
-18 NearQuality 2	BHV ft3	2 Bulk Density 3
		g/cc
18 FarQuality -2	AHV ft3	
0 Gamma Ray 150		
api		
SHALE		

HALLIBURTON

Plot Time: 27-Nov-12 22:05:24
Plot Range: 3295 ft to 4931 ft
Data: END_WRENCH#5\Well Based\POROSITY\
Plot File: \\-LOCAL-\DEBES_29_1H\0001 bsat lab test\PORO\BULKD_5_MAIN_LIB

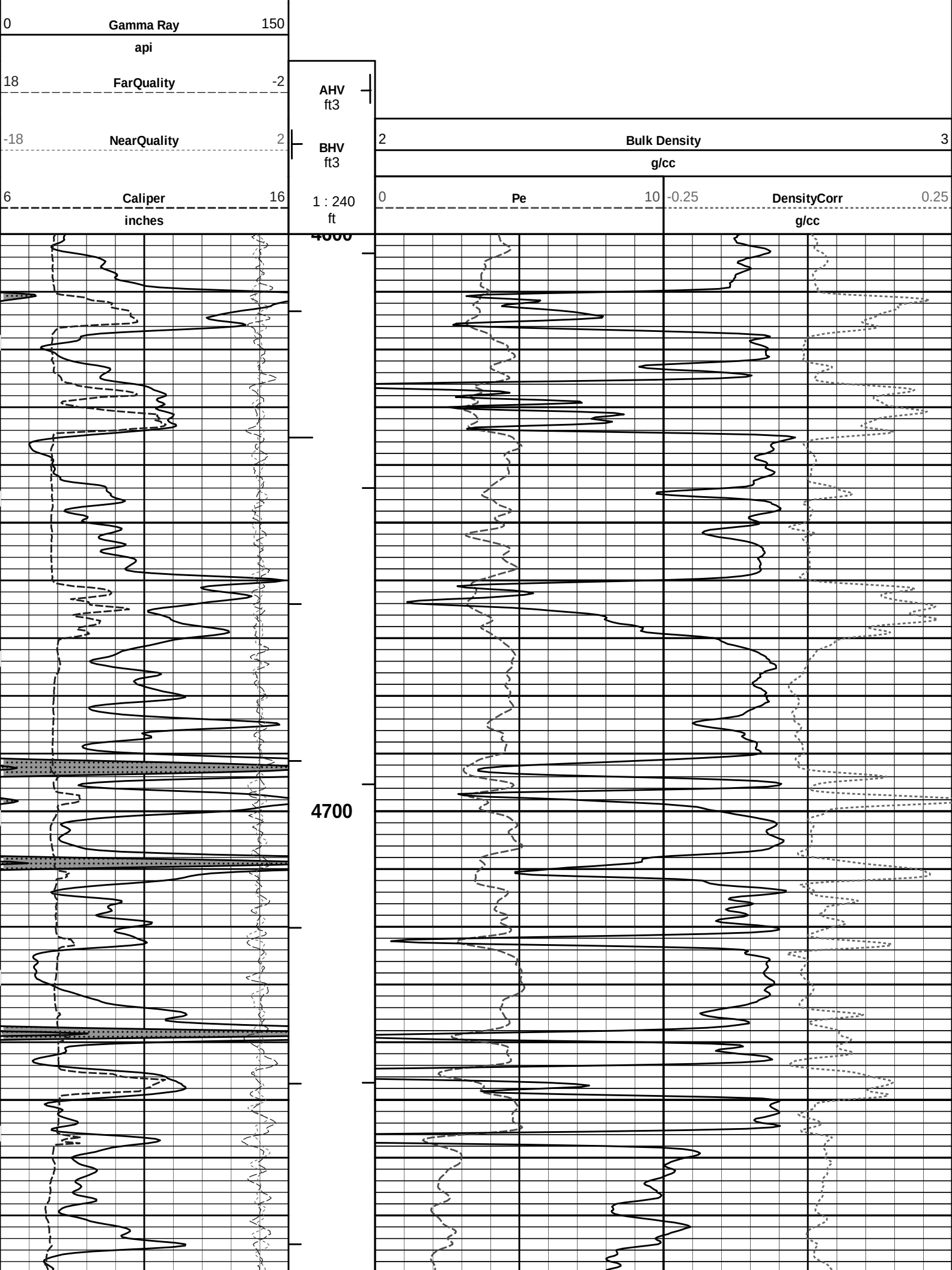
5 INCH MAIN LOG

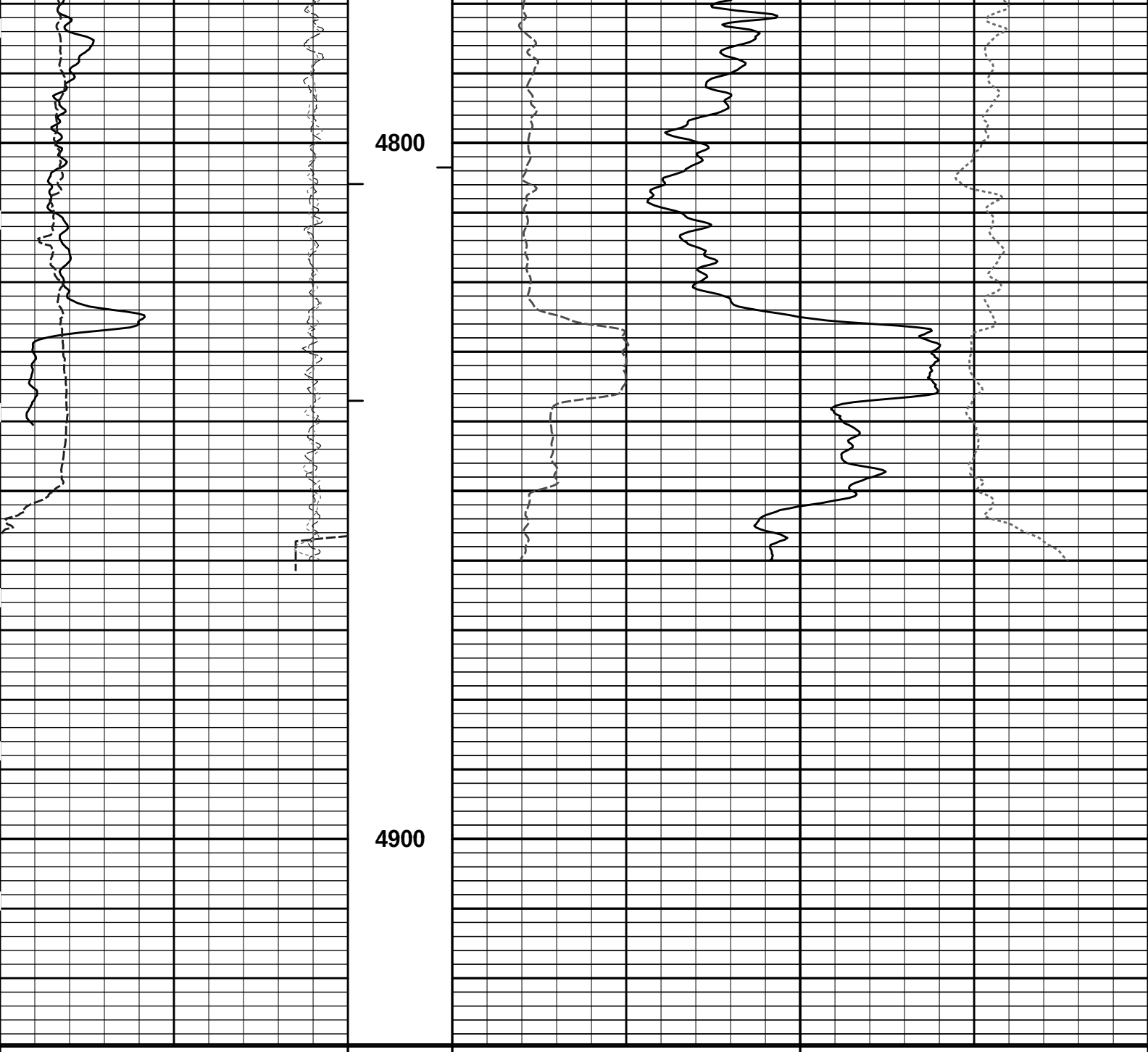
HALLIBURTON

Plot Time: 27-Nov-12 22:05:25
Plot Range: 4600 ft to 4929.5 ft
Data: END_WRENCH#5\Well Based\REPEAT\
Plot File: \\-LOCAL-\DEBES_29_1H\0001 bsat lab test\PORO\BULKD_5_REP_LIB

REPEAT SECTION

SHALE


0
Gamma Ray
150
api
18
FarQuality
-2
-18
NearQuality
2
6
Caliper
16
inches
AHV
ft3
BHV
ft3
1 : 240
ft
2
Bulk Density
3
g/cc
0
Pe
10
-0.25
DensityCorr
0.25
g/cc
4700



6	Caliper	16	1 : 240 ft	0 Pe 10	-0.25 DensityCorr 0.25
	inches				g/cc
-18	NearQuality	2	BHV ft3	2 Bulk Density 3	
				g/cc	
18	FarQuality	-2	AHV ft3		
0	Gamma Ray	150			
	api				
	SHALE				

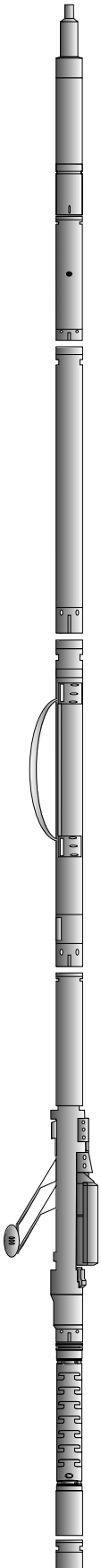
HALLIBURTON

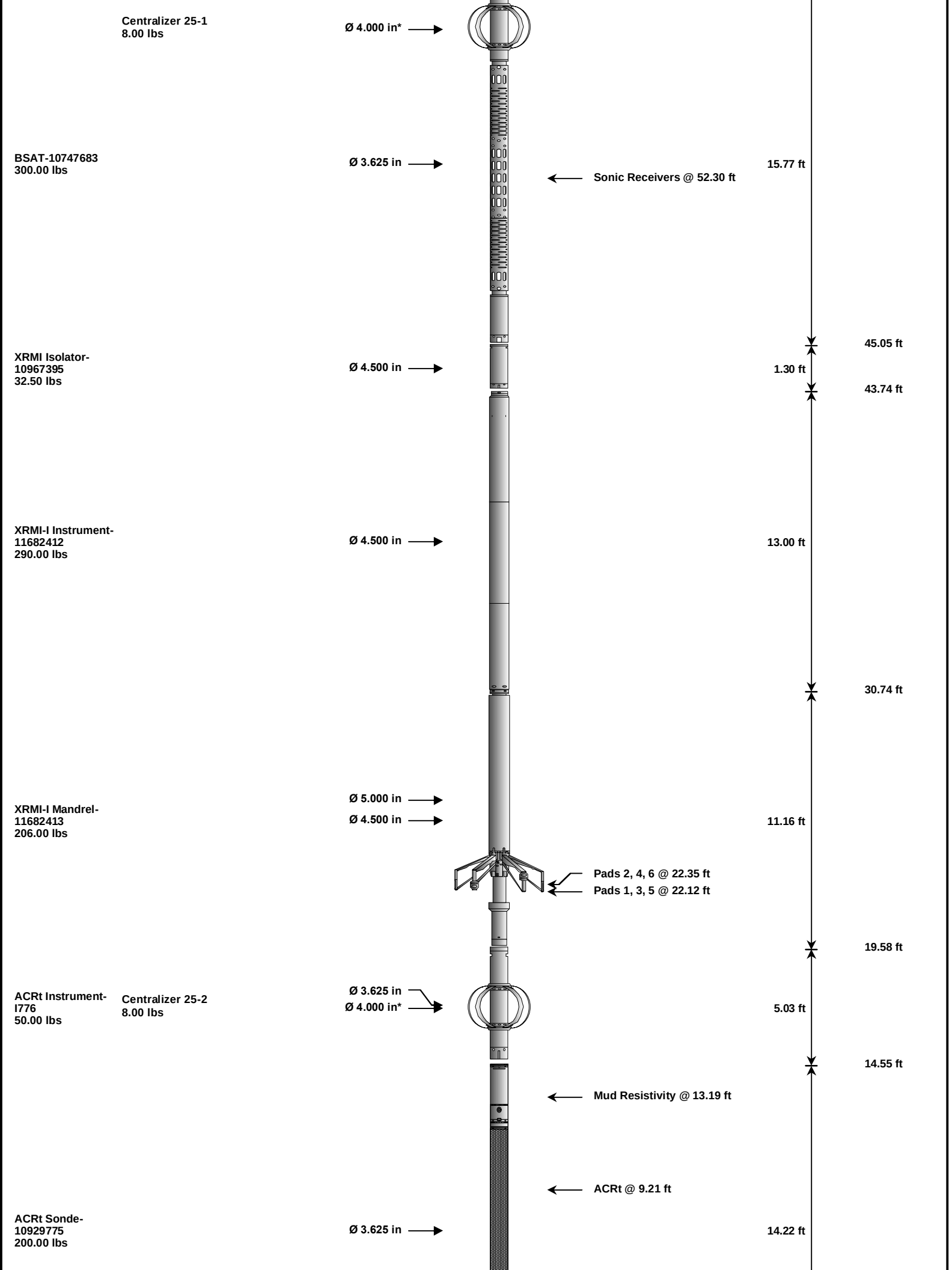
Plot Time: 27-Nov-12 22:05:29
Plot Range: 4600 ft to 4929.5 ft
Data: END_WRENCH#5\Well Based\REPEAT\
Plot File: \\-LOCAL-\DEBES_29_1H\0001 bsat lab test\PORO\BULKD_5_REP_LIB

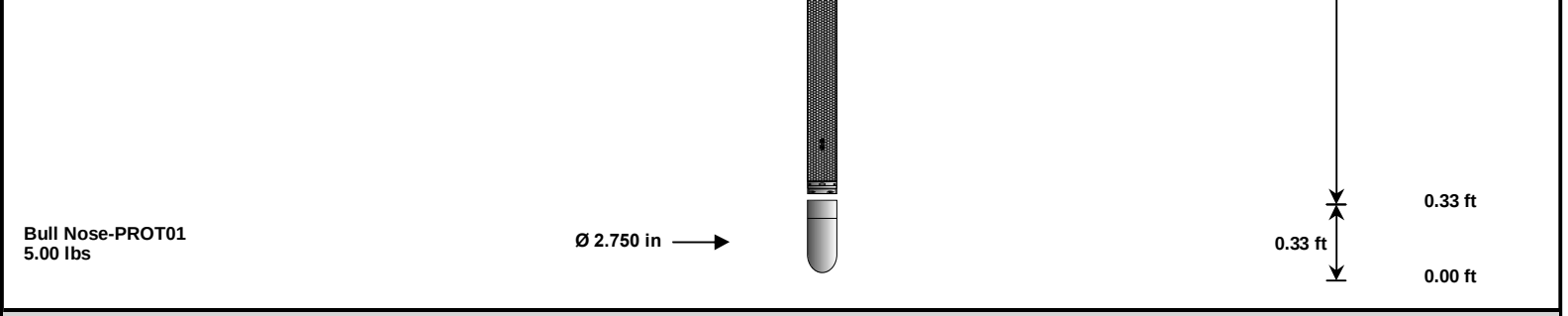
REPEAT SECTION

HALLIBURTON

TOOL STRING DIAGRAM REPORT

Description	Overbody Description	O.D.	Diagram	Sensors @ Delays	Length	Accumulated Length
						105.50 ft
RWCH-B097 135.00 lbs		Ø 3.625 in		Load Cell @ 101.82 ft BH Temperature @ 101.25 ft	6.25 ft	
						99.25 ft
SP Sub-PROT01 60.00 lbs		Ø 3.625 in		SP @ 97.47 ft	3.74 ft	
						95.51 ft
GTET-10811258 165.00 lbs		Ø 3.625 in		GammaRay @ 89.45 ft	8.52 ft	
						86.99 ft
DSNT-10755066 174.00 lbs	DSN Decentralizer-PROT01 6.60 lbs	Ø 5.000 in* Ø 3.625 in		DSN Far @ 80.05 ft DSN Near @ 79.30 ft	9.69 ft	
						77.30 ft
SDLT-10950489 360.00 lbs	SDLT Pad-10844781 65.00 lbs Microlog Pad-10950489 8.00 lbs	Ø 4.500 in Ø 4.750 in* Ø 4.750 in*		Microlog @ 69.49 ft SDL Caliper @ 69.31 ft SDL @ 69.30 ft	10.81 ft	
						66.49 ft
IQ Flex-954 140.00 lbs		Ø 3.625 in			5.67 ft	
						60.82 ft


Centralizer 25-1
8.00 lbs
Ø 4.000 in*
BSAT-10747683
300.00 lbs
Ø 3.625 in
Sonic Receivers @ 52.30 ft
15.77 ft
45.05 ft
XRMI Isolator-
10967395
32.50 lbs
Ø 4.500 in
1.30 ft
43.74 ft
XRMI-I Instrument-
11682412
290.00 lbs
Ø 4.500 in
13.00 ft
30.74 ft
Ø 5.000 in
XRMI-I Mandrel-
11682413
206.00 lbs
Ø 4.500 in
11.16 ft
Pads 2, 4, 6 @ 22.35 ft
Pads 1, 3, 5 @ 22.12 ft
19.58 ft
Ø 3.625 in
ACRt Instrument-
I776
50.00 lbs
Centralizer 25-2
8.00 lbs
Ø 4.000 in*
5.03 ft
14.55 ft
Mud Resistivity @ 13.19 ft
ACRt @ 9.21 ft
ACRt Sonde-
10929775
200.00 lbs
Ø 3.625 in
14.22 ft



Mnemonic	Tool Name	Serial Number	Weight (lbs)	Length (ft)		Accumulated Length (ft)	Max.Log. Speed (fpm)
RWCH	Releasable Wireline Cable Head	B097	135.00	6.25		99.25	300.00
SP	SP Sub	PROT01	60.00	3.74		95.51	300.00
GTET	Gamma Telemetry Tool	10811258	165.00	8.52		86.99	60.00
DSNT	Dual Spaced Neutron	10755066	174.00	9.69		77.30	60.00
DCNT	DSN Decentralizer	PROT01	6.60	5.13	*	80.63	300.00
SDLT	Spectral Density Tool	10950489	360.00	10.81		66.49	60.00
MICP	Microlog Pad	10950489	8.00	1.00	*	68.99	60.00
SDLP	Density Insite Pad	10844781	65.00	2.55	*	68.70	60.00
IQF	IQ Flex tool	954	140.00	5.67		60.82	300.00
BSAT	Borehole Sonic Array Tool	10747683	300.00	15.77		45.05	60.00
OBCEN	Centralizer - 25 in. Overbody	1	8.00	2.08	*	57.73	300.00
	Isolator for the XRMI tool	10967395	32.50	1.30		43.74	300.00
XRMI	XRMI Navigation - Insite	11682412	290.00	13.00		30.74	30.00
XRMI-I	XRMI Imager - Insite	11682413	206.00	11.16		19.58	30.00
ACRt	Array Compensated True Resistivity Instrument Section	I776	50.00	5.03		14.55	300.00
OBCEN	Centralizer - 25 in. Overbody	2	8.00	2.08	*	15.98	300.00
ACRt	Array Compensated True Resistivity Sonde Section	10929775	200.00	14.22		0.33	300.00
BLNS	Bull Nose	PROT01	5.00	0.33		0.00	300.00
Total			**2,213.10**	**105.50**			

* Not included in Total Length and Length Accumulation.

Data: END_WRENCH#5\0001 SP-GTET-DSN-SDL-BSAT-XRMI-ACRT-BN\005 27-Nov-12 17:52 Up @4930.5f **Date: 27-Nov-12 18:44:52**

HALLIBURTON

CALIBRATION REPORT

NATURAL GAMMA RAY TOOL SHOP CALIBRATION

Tool Name:	**GTET - 10811258**	**Reference Calibration Date:**	**30-Sep-12 14:49:28**
Engineer:	**S. INGERSOLL**	**Calibration Date:**	**27-Nov-12 15:00:28**
Software Version:	**WL INSITE R3.6.0 (Build 3)**	**Calibration Version:**	**1**

Calibrator Source S/N: TB-185

Calibrator API Reference:228.00 api

Equivalent Calibrator API Reference:232.0 api

Measurement	Measured	Calibrated	Units
Background	37.3	37.1	api
Background + Calibrator	270.7	269.1	api
Calibrator	233.3	232.0	api

NATURAL GAMMA RAY TOOL FIELD CALIBRATION

Tool Name:	**GTET - 10811258**	**Reference Calibration Date:**	**27-Nov-12 15:00:28**
Engineer:	**S. INGERSOLL**	**Calibration Date:**	**27-Nov-12 15:04:17**
Software Version:	**WL INSITE R3.6.0 (Build 3)**	**Calibration Version:**	**1**

Calibrator Source S/N: TB-185

Calibrator API Reference:228.00 api

Equivalent Calibrator API Reference:232.0 api

Equivalent Calibrator API Reference:232.0 api

Field Verification	Shop	Field	Units
Background	37.1	36.3	api
Background + Calibrator	269.1	264.7	api
Calibrator	232.0	228.4	api

Shop	Field	Difference	Tolerance
232.0	228.4	3.6	+/- 9.00

DUAL SPACED NEUTRON SHOP CALIBRATION

Tool Name: DSNT - 10755066 **Reference Calibration Date:** 23-Oct-12 20:41:52

Engineer: T. HYDE **Calibration Date:** 21-Nov-12 10:09:07

Software Version: WL INSITE R3.6.0 (Build 3) **Calibration Version:** 1

Logging Source S/N: DSN-436

Tank Serial Number: 105060

Reference value assigned to Tank: 51.680

Snow Block S/N: TRK_954

Calibration Tank Water Temperature: 68 degF

Min. Tool Housing Outside Diameter: 3.620 in

CALIBRATION CONSTANTS			
Measurement	Prev. Value	New Value	Control Limit On New Value
Gain:	0.952	0.950	0.900 - 1.100

WATER TANK SUMMARY (Horizontal Water Tank)				
Measurement	Current Reading (Previous Coef.)	Calibrated (New Coef.)	Change	Control Limit On Change
Porosity (decp):	0.2115	0.2107	0.0009	+/- 0.0020
Calibrated Ratio:	9.75	9.72	0.029	+/- 0.050

VERIFIER		
Measurement	Value	Control Limit
Snow-Block Porosity (decp):	0.0658	0.02000 - 0.09000

PASS/FAIL SUMMARY	
Background Check:	Passed
Gain-Range Check:	Passed
Snow-Block Check:	Passed

DUAL SPACED NEUTRON FIELD CALIBRATION

Tool Name: DSNT - 10755066 **Reference Calibration Date:** 21-Nov-12 10:09:07

Engineer: S. INGERSOLL **Calibration Date:** 27-Nov-12 15:07:29

Software Version: WL INSITE R3.6.0 (Build 3) **Calibration Version:** 1

Logging Source S/N: DSN-436

Snow Block S/N: TRK_954

NEUTRON FIELD-CHECK SUMMARY				
	Shop	Field	Difference	Control Limit On Change
Snow-Block Porosity (decp):	0.0658	0.0582	-0.0076	+/- 0.0150

PASS/FAIL SUMMARY	
Block Change Check:	Passed

Snow Block Stat Check:	Passed
Temperature Check:	Passed

DENSITY CALIPER SHOP CALIBRATION

Tool Name:	**SDLT - 10950489**	**Reference Calibration Date:**	**21-Nov-12 15:43:37**
Engineer:	**T. HYDE**	**Calibration Date:**	**21-Nov-12 15:49:09**
Software Version:	**WL INSITE R3.6.0 (Build 3)**	**Calibration Version:**	**1**
Host Tool Name:	**DSNT - 10755066**		

CALIBRATION COEFFICIENTS

Measurement	Previous Value	New Value	Control Limit On New Value
Pad Offset	-2121.95	-2217.79	-7000.00 - -1000.00
Pad Gain	0.0004026	0.0004063	0.000200 - 0.000600
Arm Offset	-329.10	265.37	-5000.00 - 3000.00
Arm Gain	0.0004901	0.0004564	0.000300 - 0.000700
Arm Power	-0.000003223	-0.000001154	-0.000010000 - 0.000010000

The ring diameter is computed from: DIAMETER = PAD EXTENSION + ARM EXTENSION + TOOL DIAMETER

Tool Diameter: 4.50 in

CALIBRATION RINGS

Measurement	Current Reading (Previous Coeff.)	Calibrated (New Coeff.)	Change	Control Limit On New Value
PAD EXTENSION:				
Small Ring (in)	2.02	2.00	-0.02	+/- 0.20
Medium Ring (in)	3.75	3.75	0.00	+/- 0.20
RING DIAMETER:				
Small Ring (in)	6.40	6.50	0.10	+/- 0.20
Medium Ring (in)	8.22	8.25	0.03	+/- 0.20
Large Ring (in)	15.00	15.00	0.00	+/- 0.20

PASS/FAIL SUMMARY

Calibration-Coefficients Range Check:	Passed
Ring-Measurement Check:	Passed

PASS/FAIL SUMMARY

Calibration-Coefficients Range Check:	Passed

SPECTRAL DENSITY SHOP CALIBRATION

Tool Name:	**SDLT Pad - 10844781**	**Reference Calibration Date:**	**21-Nov-12 14:51:25**
Engineer:	**T. HYDE**	**Calibration Date:**	**21-Nov-12 15:35:41**
Software Version:	**WL INSITE R3.6.0 (Build 3)**	**Calibration Version:**	**1**

Logging Source S/N: 5073GW

Aluminum Block S/N: 63061 Density: 2.591g/cc Pe: 3.170

Magnesium Block S/N: 63393 Density: 1.690g/cc Pe: 2.594

DENSITY CALIBRATION SUMMARY

Measurement	Previous Value	New Value	Control Limit
Near Bar Gain	0.9959	0.9366	0.90 - 1.10
Near Dens Gain	0.9848	0.9479	0.90 - 1.10
Near Peak Gain	1.0078	0.9320	0.90 - 1.10
Near Lith Gain	0.9875	0.9365	0.90 - 1.10
Far Bar Gain	0.9864	0.9851	0.90 - 1.10
Far Dens Gain	0.9786	0.9760	0.90 - 1.10
Far Peak Gain	0.9725	0.9713	0.90 - 1.10
Far Lith Gain	0.9546	0.9493	0.90 - 1.10

Far Lith Gain	0.9546	0.9493	0.90 - 1.10
Near Bar Offset	0.2346	0.7806	NONE
Near Dens Offset	0.3150	0.6431	NONE
Near Peak Offset	0.1108	0.7434	NONE
Near Lith Offset	0.2701	0.6938	NONE
Far Bar Offset	0.2556	0.2732	NONE
Far Dens Offset	0.3121	0.3422	NONE
Far Peak Offset	0.3261	0.3411	NONE
Far Lith Offset	0.4330	0.4801	NONE
Near Bar Background	810.37	809.82	700 - 1450
Near Dens Background	265.01	264.61	230 - 480
Near Peak Background	115.45	116.31	100 - 210
Near Lith Background	143.35	143.17	125 - 260
Far Bar Background	531.89	528.34	450 - 900
Far Dens Background	205.07	206.14	175 - 345
Far Peak Background	82.91	82.49	70 - 140
Far Lith Background	85.39	86.19	75 - 145

CALIBRATION BLOCK SUMMARY

Measurement	Current Reading (Previous Coef)	Calibrated (New Coef)	Change	Control Limit On Change
MAGNESIUM				
Density (g/cc)	1.697	1.690	-0.007	+/- 0.015
Pe	2.526	2.553	0.027	+/- 0.150
ALUMINUM				
Density (g/cc)	2.584	2.591	0.007	+/- 0.01500
Pe	3.098	3.127	0.029	+/- 0.150

TOOL SUMMARY

Measurement	Near Detector		Far Detector	
	Value	Control Limits	Value	Control Limits
QUALITY				
Background	0.0001	+/- 0.0110	-0.0007	+/- 0.0140
Magnesium Block	-0.0002	+/- 0.0110	-0.0001	+/- 0.0140
Aluminum Block	-0.0007	+/- 0.0110	-0.0009	+/- 0.0140
Resolution	9.45	6.00 - 11.50	9.07	6.00 - 11.50
Internal Verifier(B+D+P+L)	1334	1200 - 2700	903	800 - 1700

PASS/FAIL SUMMARY

Background Quality Check:	Passed
Background Range Check:	Passed
Background Resolution Check:	Passed
Background Verification Check:	Passed
Magnesium Quality Check:	Passed
Aluminum Quality Check:	Passed
Gains Check:	Passed
Changes in Calibration Blocks:	Passed

SPECTRAL DENSITY FIELD CHECK

Tool Name: SDLT Pad - 10844781 **Reference Calibration Date:** 21-Nov-12 15:35:41

Engineer: S. INGERSOLL **Calibration Date:** 27-Nov-12 15:11:59

Software Version: WL INSITE R3.6.0 (Build 3) **Calibration Version:** 1

Pad Temperature: 58.1 degF

DENSITY FIELD CALIBRATION SUMMARY

Measurement	Shop	Field	Change	Control Limit +/-
Near (B+D+P+L) cps	1333.904	1337.414	3.510	14.774
Far (B+D+P+L) cps	903.153	904.768	1.615	16.334
Near Resolution	9.45	9.49	0.040	0.50
Far Resolution	9.07	9.07	0.000	1.00

PASS/FAIL SUMMARY

Bkg Quality Check:	Passed
Bkg Resolution Check:	Passed
Bkg Verification Check:	Passed

MICRO LOG SHOP CALIBRATION

Tool Name: Microlog Pad - 10950489 **Reference Calibration Date:** 21-Nov-12 14:26:41

Engineer: T. HYDE **Calibration Date:** 21-Nov-12 14:27:45

Software Version: WL INSITE R3.6.0 (Build 3) **Calibration Version:** 1

Host Tool Name: DSNT - 10755066

CALIBRATION COEFFICIENT SUMMARY

Measurement	Micro Log Normal		Micro Log Lateral		
	Measured	Calibrated	Measured	Calibrated	Units
Tool Zero	-0.05	-0.06	-0.02	-0.01	ohmm
Calibration Point #1	0.01	0.00	-0.01	0.00	ohmm
Calibration Point #2	20.01	20.00	20.01	20.00	ohmm
Internal Reference	19.93	19.92	20.00	19.99	ohmm

Measurement	Micro Log Normal Tool Value	Micro Log Lateral Tool Value	Units
Tool Zero	0.01	0.06	V
Calibration Point #1	17.03	3.47	V
Calibration Point #2	5302.42	6877.29	V
Internal Reference	5281.52	6874.41	V

MICRO LOG FIELD CHECK

Tool Name: Microlog Pad - 10950489 **Reference Calibration Date:** 21-Nov-12 14:27:45

Engineer: S. INGERSOLL **Calibration Date:** 27-Nov-12 15:13:05

Software Version: WL INSITE R3.6.0 (Build 3) **Calibration Version:** 1

Measurement	Micro Log Normal		Micro Log Lateral		
	Shop	Field	Shop	Field	Units
Tool Zero	-0.06	-0.06	-0.01	-0.01	ohmm
Internal Reference	19.92	19.88	19.99	19.95	ohmm

Summary

Signal	Shop	Field	Difference	Tolerence
Microlog Normal	19.92	19.88	0.04	+/- 0.80
Microlog Lateral	19.99	19.95	0.04	+/- 0.80

CALIBRATION SUMMARY

Sensor	Shop	Field	Post	Difference	Tolerance	Units

GTET-10811258						
Gamma Ray Calibrator	232.0	228.4	----------	3.6	+/- 9.00	api
DSNT-10755066						
Snow-Block Porosity	0.0658	0.0582	----------	0.0076	+/- 0.0150	decp
SDLT-10950489						
Pad Extension	3.75	----------	----------	0.00	+/-0.20	in
Ring Diameter	8.25	----------	----------	0.00	+/-0.20	in
SDLT Pad-10844781						
Near(B+D+P+L)	1333.904	1337.414	----------	-3.510	+/-14.774	cps
Far(B+D+P+L)	903.153	904.768	----------	-1.615	+/-16.334	cps
Microlog Pad-10950489						
MicroLog Normal	19.92	19.88	----------	0.04	+/-0.80	ohmm
MicroLog Lateral	19.99	19.95	----------	0.04	+/-0.80	ohmm

Data: END_WRENCH#5\0001 SP-GTET-DSN-SDL-BSAT-XRMI-ACRT-BN\005 27-Nov-12 17:52 Up @4930.5f **Date: 27-Nov-12 18:47:16**

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PARAMETERS REPORT

Depth (ft)	Tool Name	Mnemonic	Description	Value	Units
TOP					
	SHARED	BS	Bit Size	7.875	in
	SHARED	UBS	Use Bit Size instead of Caliper for all applications.	No	
	SHARED	MDBS	Mud Base	Water	
	SHARED	MDWT	Borehole Fluid Weight	9.500	ppg
	SHARED	WAGT	Weighting Agent	Natural	
	SHARED	BSAL	Borehole salinity	0.00	ppm
	SHARED	FSAL	Formation Salinity NaCl	0.00	ppm
	SHARED	KPCT	Percent K in Mud by Weight?	0.00	%
	SHARED	RMUD	Mud Resistivity	1.000	ohmm
	SHARED	TRM	Temperature of Mud	75.0	degF
	SHARED	CSD	Logging Interval is Cased?	No	
	SHARED	ICOD	AHV Casing OD	5.500	in
	SHARED	ST	Surface Temperature	75.0	degF
	SHARED	TD	Total Well Depth	4940.00	ft
	SHARED	BHT	Bottom Hole Temperature	130.0	degF
	SHARED	SVTM	Navigation and Survey Master Tool	XRMI-I Instrument	
	SHARED	AZTM	High Res Z Accelerometer Master Tool	XRMI-I Instrument	
	SHARED	TEMM	Temperature Master Tool	NONE	
	SHARED	BHSM	Borehole Size Master Tool	NONE	
	Rwa / CrossPlot	XPOK	Process Crossplot?	Yes	
	Rwa / CrossPlot	FCHO	Select Source of F	Automatic	
	Rwa / CrossPlot	AFAC	Archie A factor	0.6200	
	Rwa / CrossPlot	MFAC	Archie M factor	2.1500	
	Rwa / CrossPlot	RMFR	Rmf Reference	0.10	ohmm
	Rwa / CrossPlot	TMFR	Rmf Ref Temp	75.00	degF
	Rwa / CrossPlot	RWA	Resistivity of Formation Water	0.05	ohmm
	Rwa / CrossPlot	ADP	Use Air Porosity to calculate CrossplotPhi	No	
	GTET	GROK	Process Gamma Ray?	Yes	
	GTET	GRSO	Gamma Tool Standoff	0.000	in

GTET	GEOK	Process Gamma Ray EVR?	No	
GTET	TPOS	Tool Position for Gamma Ray Tools.	Eccentered	
DSNT	DNOK	Process DSN?	Yes	
DSNT	DEOK	Process DSN EVR?	No	
DSNT	NLIT	Neutron Lithology	Limestone	
DSNT	DNSO	DSN Standoff - 0.25 in (6.35 mm) Recommended	0.250	in
DSNT	DNTP	Temperature Correction Type	None	
DSNT	DPRS	DSN Pressure Correction Type	None	
DSNT	SHCO	View More Correction Options	No	
DSNT	UTVD	Use TVD for Gradient Corrections?	No	
DSNT	LHWT	Logging Horizontal Water Tank?	No	
SDLT	CLOK	Process Caliper Outputs?	Yes	
SDLT Pad	DNOK	Process Density?	Yes	
SDLT Pad	DNOK	Process Density EVR?	No	
SDLT Pad	CB	Logging Calibration Blocks?	No	
SDLT Pad	SPVT	SDLT Pad Temperature Valid?	Yes	
SDLT Pad	DTWN	Disable temperature warning	No	
SDLT Pad	DMA	Formation Density Matrix	2.710	g/cc
SDLT Pad	DFL	Formation Density Fluid	1.000	g/cc
Microlog Pad	MLOK	Process MicroLog Outputs?	Yes	
BSAT	MBOK	Compute BCAS Results?	Yes	
BSAT	FLLO	Frequency Filter Low Pass Value?	5000	Hz
BSAT	FLHI	Frequency Filter High Pass Value?	27000	Hz
BSAT	DTFL	Delta -T Fluid	189.00	uspf
BSAT	DTMT	Delta -T Matrix Type	User define	
BSAT	DTMA	Delta -T Matrix	47.60	uspf
BSAT	DTSH	Delta -T Shale	100.00	uspf
BSAT	SPEQ	Acoustic Porosity Equation	Wylie	
XRMI-I Instrument	WRTI	Survey Writing Interval	30	ft
XRMI-I Instrument	SOPT	Smoothing Option	None	
XRMI-I Mandrel	DIMG	Process XRMI?	Yes	
XRMI-I Mandrel	ROTI	Rotate Image (N-E-S-W-N)?	Yes	
XRMI-I Mandrel	AGN	Use Button Auto Gain?	Yes	
XRMI-I Mandrel	BCLR	Button Auto Gain Color	127	
XRMI-I Mandrel	BFIL	Button Auto Gain Filter	0.020	
XRMI-I Mandrel	BGAN	Button Gain Value	0.001	
XRMI-I Mandrel	BOFF	Button Offset	0	
XRMI-I Mandrel	DIPE	Process Dipmeter Calculations?	Yes	
XRMI-I Mandrel	BHCS	Process Borehole Corrections?	Yes	
XRMI-I Mandrel	CLOK	Process Caliper Outputs?	Yes	
XRMI-I Mandrel	CMAX	Caliper Maximum Limit	100.0	in
XRMI-I Mandrel	CMIN	Caliper Mimimum Limit	3.5	in
XRMI-I Mandrel	NAVS	Navigation Source Tool	XRMI-I Instrument	
ACRt Sonde	RTOK	Process ACRt?	Yes	
ACRt Sonde	MNSO	Minimum Tool Standoff	1.50	in
ACRt Sonde	TCS1	Temperature Correction Source	FP Lwr & FP Upr	
ACRt Sonde	TPOS	Tool Position	Free Hanging	
ACRt Sonde	RMOP	Rmud Source	Mud Cell	

ACRt Sonde	RMIN	Minimum Resistivity for MAP	0.20	ohmm
ACRt Sonde	RMIN	Maximum Resistivity for MAP	200.00	ohmm

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INPUTS, DELAYS AND FILTERS TABLE

Mnemonic	Input Description	Delay (ft)	Filter Type	Filter Length (ft)
Depth Panel				
TENS	Tension	0.00	NO	
RWCH				
DHTN	DownholeTension	0.00	BLK	0.000
SP Sub				
PLTC	Plot Control Mask	97.47	NO	
SP	Spontaneous Potential	97.47	BLK	1.250
SPR	Raw Spontaneous Potential	97.47	NO	
SPO	Spontaneous Potential Offset	97.47	NO	
GTET				
TPUL	Tension Pull	89.45	NO	
GR	Natural Gamma Ray API	89.45	TRI	1.750
GRU	Unfiltered Natural Gamma Ray API	89.45	NO	
EGR	Natural Gamma Ray API with Enhanced Vertical Resolution	89.45	W	1.416 , 0.750
ACCZ	Accelerometer Z	0.00	BLK	0.083
DEVI	Inclination	0.00	NO	
DSNT				
TPUL	Tension Pull	79.20	NO	
RNDS	Near Detector Telemetry Counts	79.30	BLK	1.417
RFDS	Far Detector Telemetry Counts	80.05	TRI	0.583
DNTT	DSN Tool Temperature	79.30	NO	
DSNS	DSN Tool Status	79.20	NO	
ERND	Near Detector Telemetry Counts EVR	79.30	BLK	0.000
ERFD	Far Detector Telemetry Counts EVR	80.05	BLK	0.000
ENTM	DSN Tool Temperature EVR	79.30	NO	
SDLT				
TPUL	Tension Pull	69.31	NO	
PCAL	Pad Caliper	69.31	TRI	0.250
ACAL	Arm Caliper	69.31	TRI	0.250
BSAT				
TPUL	Tension Pull	52.30	NO	
STAT	Status	52.30	NO	
DLYT	Delay Time	52.30	NO	
SI	Sample Interval	52.30	NO	
TXRX	Raw Telemetry 10 Receivers	52.30	NO	
FRMC	Tool Frame Count	52.30	NO	
GMOD	Gain processing mode	45.05	NO	
XRMI-I Mandrel				
TPUL	Tension Pull	22.35	NO	
PAD1	XRMI Pad 1 values	22.12	NO	
PAD2	XRMI Pad 2 values	22.12	NO	

PAD3	XRMI Pad 3 values	22.12	NO	
PAD4	XRMI Pad 4 values	22.12	NO	
PAD5	XRMI Pad 5 values	22.12	NO	
PAD6	XRMI Pad 6 values	22.12	NO	
OD1	EMI Odd Button Values Pad 1	22.12	NO	
OD2	EMI Odd Button Values Pad 2	22.35	NO	
OD3	EMI Odd Button Values Pad 3	22.12	NO	
OD4	EMI Odd Button Values Pad 4	22.35	NO	
OD5	EMI Odd Button Values Pad 5	22.12	NO	
OD6	EMI Odd Button Values Pad 6	22.35	NO	
EV1	EMI Even Button Values Pad 1	22.14	NO	
EV2	EMI Even Button Values Pad 2	22.32	NO	
EV3	EMI Even Button Values Pad 3	22.14	NO	
EV4	EMI Even Button Values Pad 4	22.32	NO	
EV5	EMI Even Button Values Pad 5	22.14	NO	
EV6	EMI Even Button Values Pad 6	22.32	NO	
ITMP	Instrument Temperature	19.58	NO	
EMIM	Tool Mode	19.58	NO	
HAZI	Hole Azimuth	21.87	NO	
HAZI	Hole Azimuth - Down Delay	22.37	NO	
ZACC	Accelerometer Z	22.12	NO	
TPUL	Tension Pull	22.35	NO	
FIR1	Current Button R - Pad 1	22.12	NO	
FIR2	Current Button R - Pad 2	22.35	NO	
FIR3	Current Button R - Pad 3	22.12	NO	
FIR4	Current Button R - Pad 4	22.35	NO	
FIR5	Current Button R - Pad 5	22.12	NO	
FIR6	Current Button R - Pad 6	22.35	NO	
FIX1	Current Button X - Pad 1	22.12	NO	
FIX2	Current Button X - Pad 2	22.35	NO	
FIX3	Current Button X - Pad 3	22.12	NO	
FIX4	Current Button X - Pad 4	22.35	NO	
FIX5	Current Button X - Pad 5	22.12	NO	
FIX6	Current Button X - Pad 6	22.35	NO	
SIR1	Current Slow Button R - Pad 1	22.12	BLK	3.000
SIR2	Current Slow Button R - Pad 2	22.35	BLK	3.000
SIR3	Current Slow Button R - Pad 3	22.12	BLK	3.000
SIR4	Current Slow Button R - Pad 4	22.35	BLK	3.000
SIR5	Current Slow Button R - Pad 5	22.12	BLK	3.000
SIR6	Current Slow Button R - Pad 6	22.35	BLK	3.000
SIX1	Current Slow Button X - Pad 1	22.12	BLK	3.000
SIX2	Current Slow Button X - Pad 2	22.35	BLK	3.000
SIX3	Current Slow Button X - Pad 3	22.12	BLK	3.000
SIX4	Current Slow Button X - Pad 4	22.35	BLK	3.000
SIX5	Current Slow Button X - Pad 5	22.12	BLK	3.000
SIX6	Current Slow Button X - Pad 6	22.35	BLK	3.000
EMMR	Phasor Voltage - Real Part	22.12	NO	
EMMX	Phasor Voltage - Imaginary Part	22.12	NO	
PADV	Pad Voltage	19.58	BLK	0.250
ITMP	Instrument Temperature	19.58	BLK	0.000
CON1	Conductivity Pad 1	22.12	BLK	3.000
CON2	Conductivity Pad 2	22.35	BLK	3.000
CON3	Conductivity Pad 3	22.12	BLK	3.000
CON4	Conductivity Pad 4	22.35	BLK	3.000
CON5	Conductivity Pad 5	22.12	BLK	3.000
CON6	Conductivity Pad 6	22.35	BLK	3.000

UIR2	Current Button R No Delay - Pad 2	22.12	NO	
UIR4	Current Button R No Delay - Pad 4	22.12	NO	
UIR6	Current Button R No Delay - Pad 6	22.12	NO	
UIX2	Current Button X No Delay - Pad 2	22.12	NO	
UIX4	Current Button X No Delay - Pad 4	22.12	NO	
UIX6	Current Button X No Delay - Pad 6	22.12	NO	
TPUL	Tension Pull	22.35	NO	
ARM1	Caliper 1 measurement	22.12	BLK	0.000
ARM2	Caliper 2 measurement	22.12	BLK	0.000
ARM3	Caliper 3 measurement	22.12	BLK	0.000
ARM4	Caliper 4 measurement	22.12	BLK	0.000
ARM5	Caliper 5 measurement	22.12	BLK	0.000
ARM6	Caliper 6 measurement	22.12	BLK	0.000
MOTV	Motor Voltage Monitor 1	22.12	BLK	0.000
PRES	Caliper percentage of total compression of the spring	19.58	BLK	0.000
HAZI	Hole Azimuth	22.12	NO	
RB	Relative Bearing	22.12	NO	
AZI1	PAD1 Azimuth	22.12	NO	
DEVI	Inclination	22.12	NO	

ACRt Sonde				
TPUL	Tension Pull	2.73	NO	
F1R1	ACRT 12KHz - 80in R value	8.98	BLK	0.000
F1X1	ACRT 12KHz - 80in X value	8.98	BLK	0.000
F1R2	ACRT 12KHz - 50in R value	6.48	BLK	0.000
F1X2	ACRT 12KHz - 50in X value	6.48	BLK	0.000
F1R3	ACRT 12KHz - 29in R value	4.98	BLK	0.000
F1X3	ACRT 12KHz - 29in X value	4.98	BLK	0.000
F1R4	ACRT 12KHz - 17in R value	3.98	BLK	0.000
F1X4	ACRT 12KHz - 17in X value	3.98	BLK	0.000
F1R5	ACRT 12KHz - 10in R value	3.48	BLK	0.000
F1X5	ACRT 12KHz - 10in X value	3.48	BLK	0.000
F1R6	ACRT 12KHz - 6in R value	3.23	BLK	0.000
F1X6	ACRT 12KHz - 6in X value	3.23	BLK	0.000
F2R1	ACRT 36KHz - 80in R value	8.98	BLK	0.000
F2X1	ACRT 36KHz - 80in X value	8.98	BLK	0.000
F2R2	ACRT 36KHz - 50in R value	6.48	BLK	0.000
F2X2	ACRT 36KHz - 50in X value	6.48	BLK	0.000
F2R3	ACRT 36KHz - 29in R value	4.98	BLK	0.000
F2X3	ACRT 36KHz - 29in X value	4.98	BLK	0.000
F2R4	ACRT 36KHz - 17in R value	3.98	BLK	0.000
F2X4	ACRT 36KHz - 17in X value	3.98	BLK	0.000
F2R5	ACRT 36KHz - 10in R value	3.48	BLK	0.000
F2X5	ACRT 36KHz - 10in X value	3.48	BLK	0.000
F2R6	ACRT 36KHz - 6in R value	3.23	BLK	0.000
F2X6	ACRT 36KHz - 6in X value	3.23	BLK	0.000
F3R1	ACRT 72KHz - 80in R value	8.98	BLK	0.000
F3X1	ACRT 72KHz - 80in X value	8.98	BLK	0.000
F3R2	ACRT 72KHz - 50in R value	6.48	BLK	0.000
F3X2	ACRT 72KHz - 50in X value	6.48	BLK	0.000
F3R3	ACRT 72KHz - 29in R value	4.98	BLK	0.000
F3X3	ACRT 72KHz - 29in X value	4.98	BLK	0.000
F3R4	ACRT 72KHz - 17in R value	3.98	BLK	0.000
F3X4	ACRT 72KHz - 17in X value	3.98	BLK	0.000
F3R5	ACRT 72KHz - 10in R value	3.48	BLK	0.000
F3X5	ACRT 72KHz - 10in X value	3.48	BLK	0.000

F3R6	ACRT 72KHz - 6in R value	3.23	BLK	0.000
F3X6	ACRT 72KHz - 6in X value	3.23	BLK	0.000
RMUD	Mud Resistivity	12.52	BLK	0.000
F1RT	Transmitter Reference 12 KHz Real Signal	2.73	BLK	0.000
F1XT	Transmitter Reference 12 KHz Imaginary Signal	2.73	BLK	0.000
F2RT	Transmitter Reference 36 KHz Real Signal	2.73	BLK	0.000
F2XT	Transmitter Reference 36 KHz Imaginary Signal	2.73	BLK	0.000
F3RT	Transmitter Reference 72 KHz Real Signal	2.73	BLK	0.000
F3XT	Transmitter Reference 72 KHz Imaginary Signal	2.73	BLK	0.000
TFPU	Upper Feedpipe Temperature Calculated	2.73	BLK	0.000
TFPL	Lower Feedpipe Temperature Calculated	2.73	BLK	0.000
ITMP	Instrument Temperature	2.73	BLK	0.000
TCVA	Temperature Correction Values Loop Off	2.73	NO	
TIDV	Instrument Temperature Derivative	2.73	NO	
TUDV	Upper Temperature Derivative	2.73	NO	
TLDV	Lower Temperature Derivative	2.73	NO	
TRBD	Receiver Board Temperature	2.73	NO	

SDLT Pad

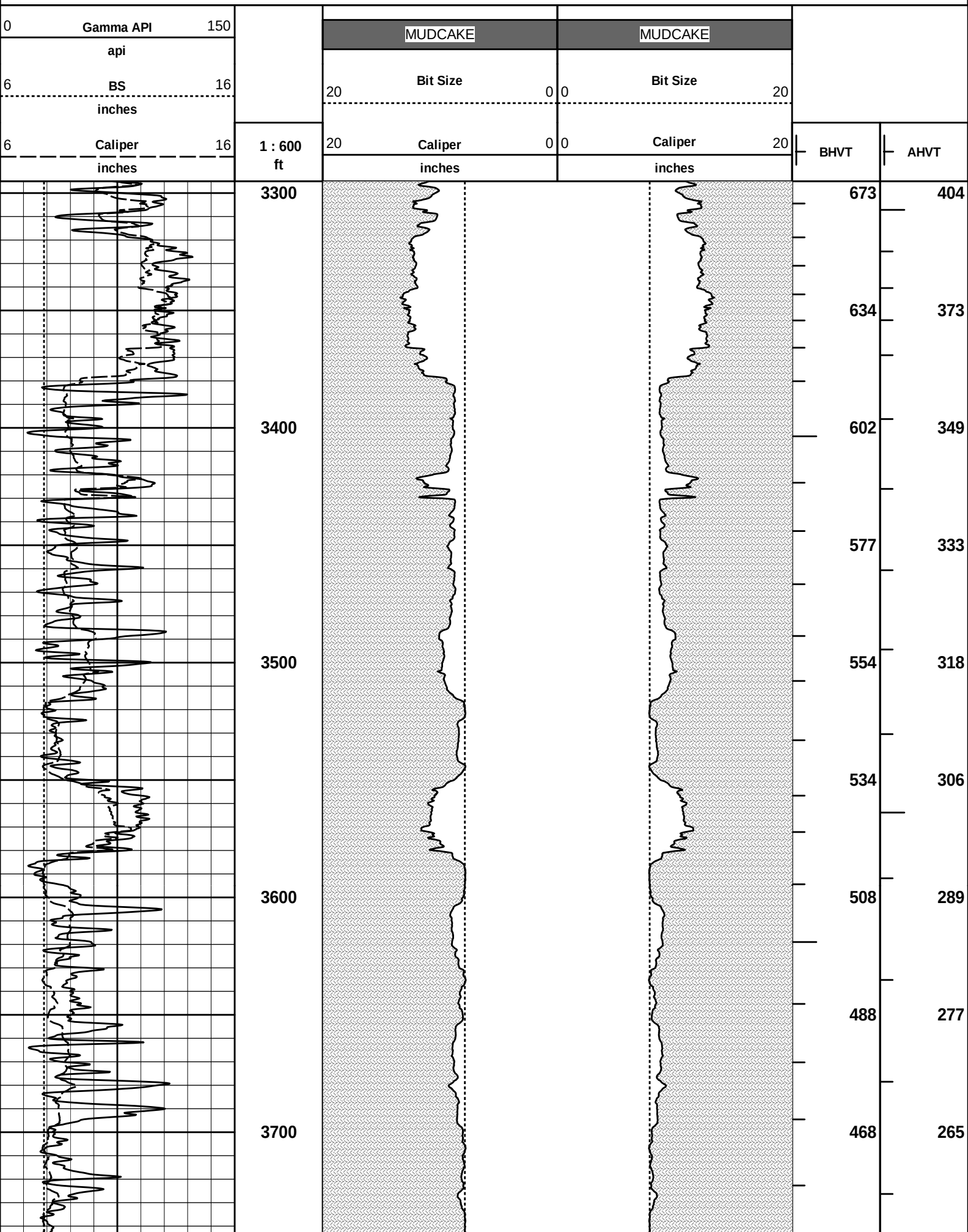
TPUL	Tension Pull	69.30	NO	
NAB	Near Above	69.12	BLK	0.920
NHI	Near Cesium High	69.12	BLK	0.920
NLO	Near Cesium Low	69.12	BLK	0.920
NVA	Near Valley	69.12	BLK	0.920
NBA	Near Barite	69.12	BLK	0.920
NDE	Near Density	69.12	BLK	0.920
NPK	Near Peak	69.12	BLK	0.920
NLI	Near Lithology	69.12	BLK	0.920
NBAU	Near Barite Unfiltered	69.12	BLK	0.250
NLIU	Near Lithology Unfiltered	69.12	BLK	0.250
FAB	Far Above	69.47	BLK	0.250
FHI	Far Cesium High	69.47	BLK	0.250
FLO	Far Cesium Low	69.47	BLK	0.250
FVA	Far Valley	69.47	BLK	0.250
FBA	Far Barite	69.47	BLK	0.250
FDE	Far Density	69.47	BLK	0.250
FPK	Far Peak	69.47	BLK	0.250
FLI	Far Lithology	69.47	BLK	0.250
PTMP	Pad Temperature	69.31	BLK	0.920
NHV	Near Detector High Voltage	68.70	NO	
FHV	Far Detector High Voltage	68.70	NO	
ITMP	Instrument Temperature	68.70	NO	
DDHV	Detector High Voltage	68.70	NO	

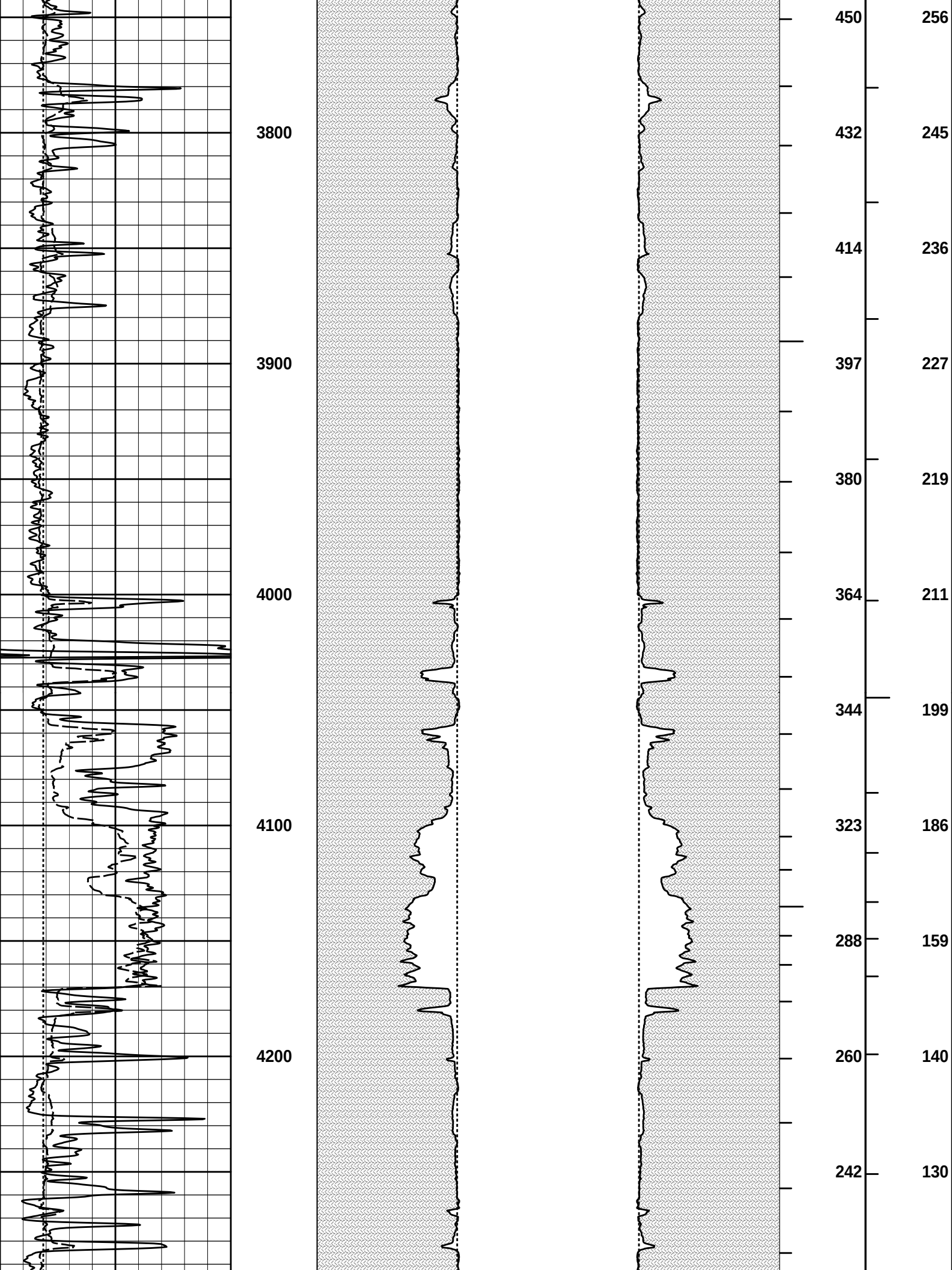
Microlog Pad

TPUL	Tension Pull	69.49	NO	
MINV	Microlog Lateral	69.49	BLK	0.750
MNOR	Microlog Normal	69.49	BLK	0.750

Data: END_WRENCH#5\0001 SP-GTET-DSN-SDL-BSAT-XRMI-ACRT-BN\005 27-Nov-12 17:52 Up @4930.5f **Date: 27-Nov-12 20:03:52**

ANNULAR HOLE VOLUME PLOT (5.5 INCH)

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450
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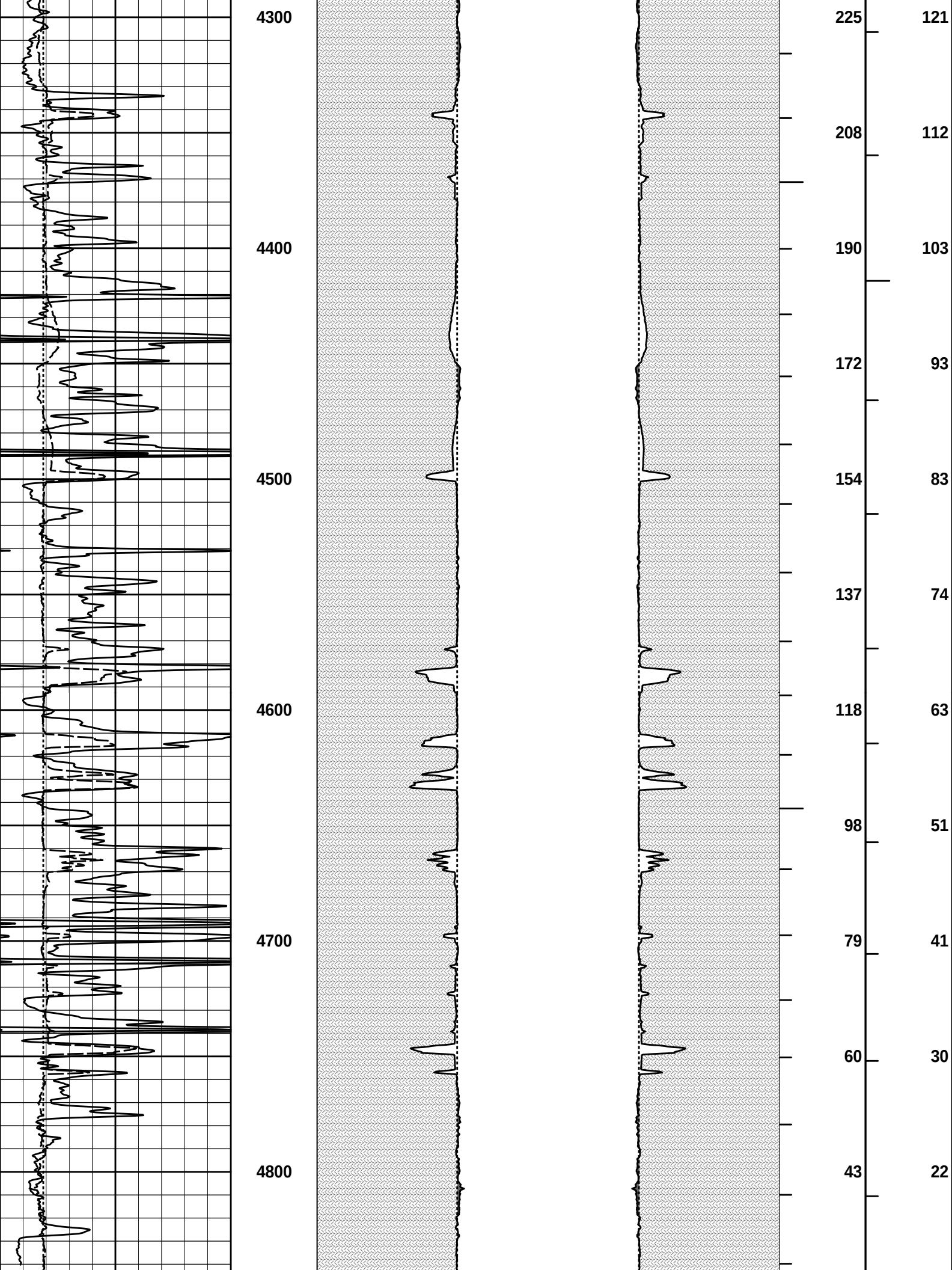
130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4700
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93
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63
51
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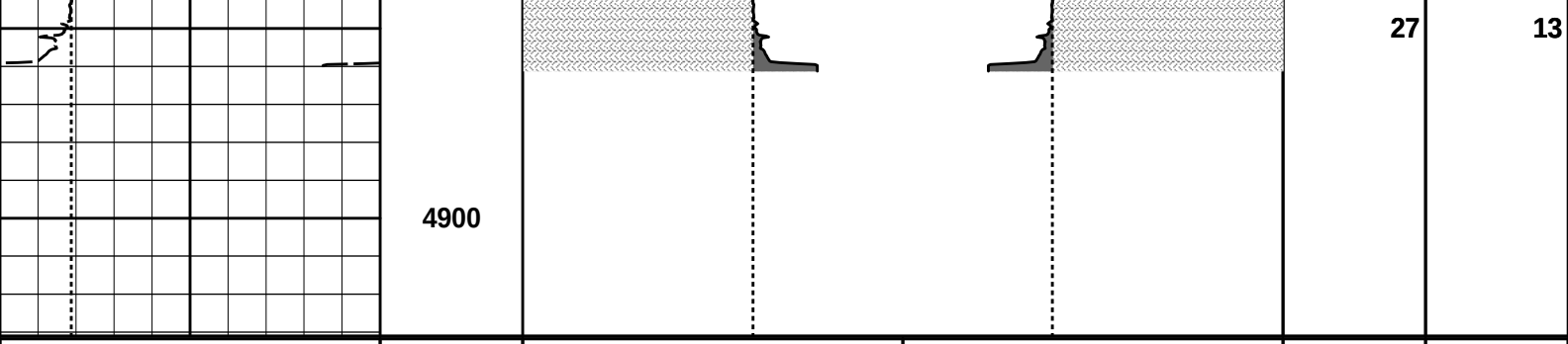
22



HALLIBURTON

Plot Time: 27-Nov-12 22:07:38
Plot Range: 3295 ft to 4931 ft
Data: END_WRENCH#5\Well Based\POROSITY
Plot File: \\-LOCAL-\DEBES_29_1H\0001 bsat lab test\PORO\AHV_7_INCH_2_IQ_LIB

ANNULAR HOLE VOLUME PLOT (5.5 INCH)

COMPANY	**TGT PETROLEUM CORPORATION**		
WELL	**END WRENCH #5**		
FIELD	**EINSEL**		
COUNTY	**KIOWA**	STATE	**KANSAS**

HALLIBURTON

DUAL SPACED NEUTRON
SPECTRAL DENSITY
LOG