



# Compensated Sonic Log

Company	Pronghorn Operating, LLC	Company	Pronghorn Operating, LLC
Well	Nattie #1	Well	Nattie #1
Field	Cheyenne Wells	Field	Cheyenne Wells
County	Cheyenne	County	Cheyenne
State	Colorado	State	Colorado
Location:	SEC 6 TWP 14 S RGE 44 W 620' FSL & 660' FEL	API # : 05-017-07751	Other Services IAT, SGR, CNL, LDT
Permanent Datum	GL	Elevation	4309 ft.
Log Measured From	KB		17 ft. above perm. datum
Drilling Measured From	KB		G.L. 4309 ft.
Date	24-July-13		
Run Number	One		
Depth Driller	5622'		
Depth Logger	5624'		
Bottom Logged Interval	5599'		
Top Log Interval	4000'		
Casing Driller	13.375" @ 464'		@
Casing Logger	464'		
Bit Size	7.875"		@
Type Fluid in Hole	WBM		@
Density / Viscosity	9.2/55		
pH / Fluid Loss	9.8/6.9		
Source of Sample	Mud Pit		
Rm @ Meas. Temp	1.2 @ 75°F		@
Rmf @ Meas. Temp	0.9 @ 75°F		@
Rmc @ Meas. Temp	1.5 @ 75°F		@
Source of Rmf / Rmc	Calculated		
Rm @ BHT	0.7 @ 129°F		@
Time Circulation Stopped	9:00		
Time Logger on Bottom	15:30		
Maximum Recorded Temperature	129 °F		
Equipment Number	10002		
Location	Brighton		
Recorded By	L. Schubert		
Witnessed By	J. Thorson/F. Rabbio		

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## Equipment and Log Data

Service Order:

Gamma		Density		Neutron		Sonic		IAT	
Run No.	One	Run No.	One	Run No.	One	Run No.	One	Run No.	One
Serial No.	9990	Serial No.	0872	Serial No.	7985	Serial No.	0072	Serial No.	0110
O.D.	3.375 in.	Source No.	50130B	Source No.	66010B	Centralizers	0	Standoffs	1 @ 1.5"
		O.D.	4.5 in.	O.D.	3.375 in.	O.D.	3.375 in.	O.D.	3.875 in.

## Logging Pass Data

General		Gamma		Density		Neutron		Sonic		IAT	
		Scales		Scales		Scales		Scales		Scales	
Run	Depths	Left	Right	Left	Right	Matrix	Left	Right	Matrix	Left	Right
One	TD 4000'	0	150	0.3	-0.1	2.71 g/cc	0.3	-0.1	Lime	0.3	-0.1

All interpretations are opinions based on inferences from electrical or other measurements and we cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to our general terms and conditions set out in our current Price Schedule.

## Comments

First run in hole  
Tools ran slick due to hole conditions  
LCM = 10lb/br  
5.5" production casing used to calculate annular hole volumes  
Chlorides reported at: 1600ppm

YOUR CREW TODAY: A. Hughes / E. Soto

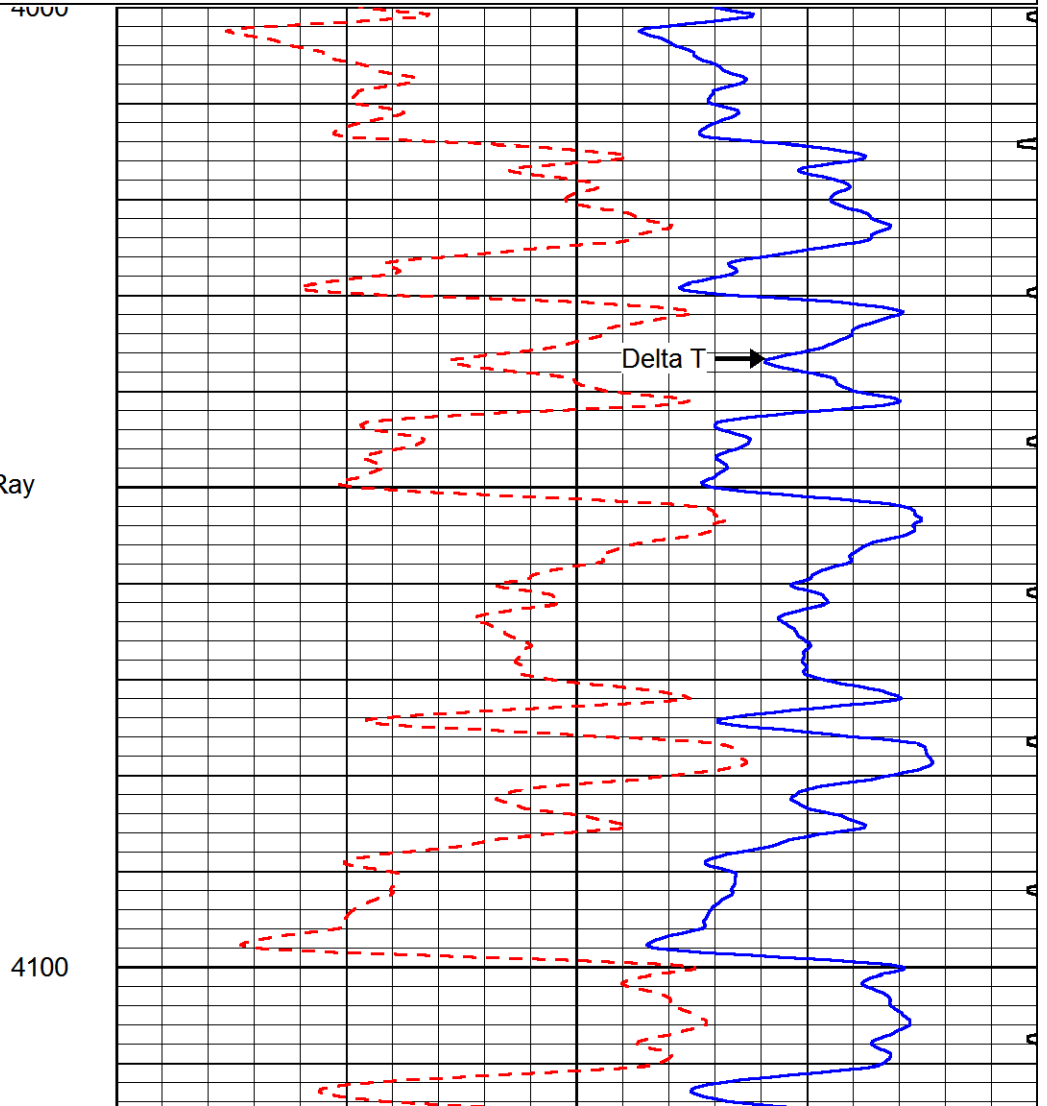
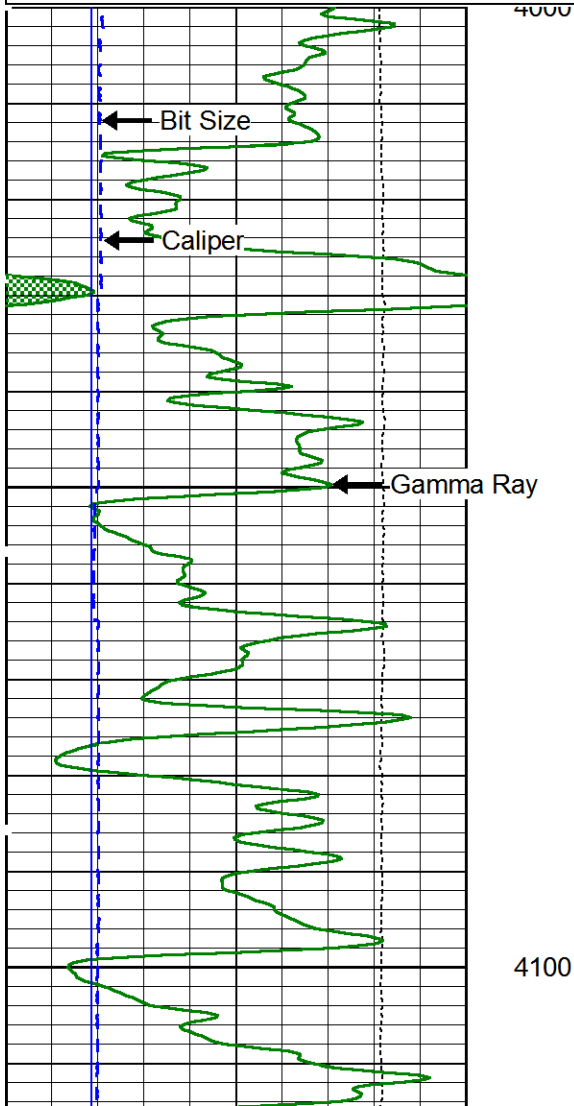


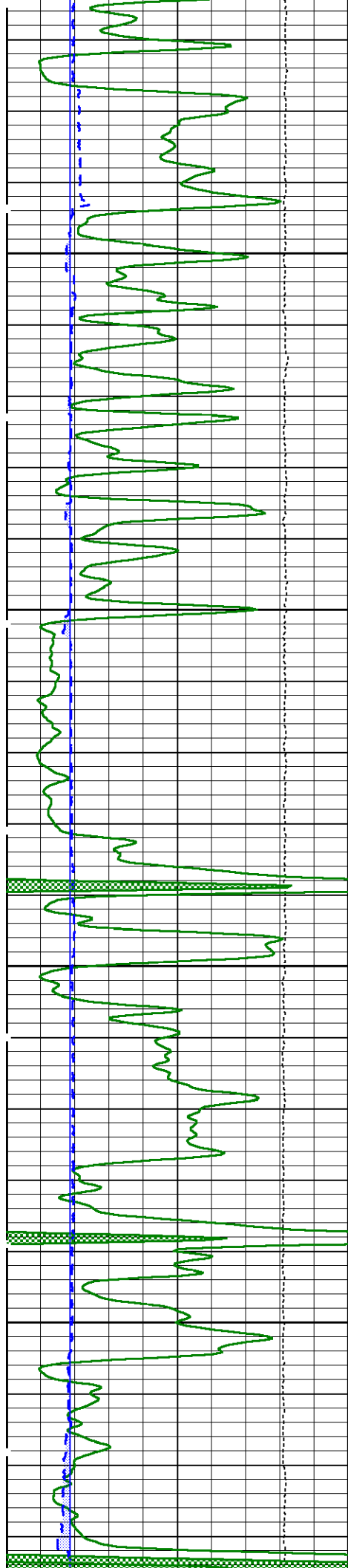
# Main Pass

Database File: proghorn\_nattie\_1.db  
Dataset Pathname: Main  
Presentation Format: ph\_sonic  
Dataset Creation: Thu Jul 25 11:07:30 2013  
Charted by: Depth in Feet scaled 1:240

0	Gamma Ray (GAPI)	150
6	Caliper (in)	16
6	Bit Size (in)	16
Tension		
5000	(lb)	0

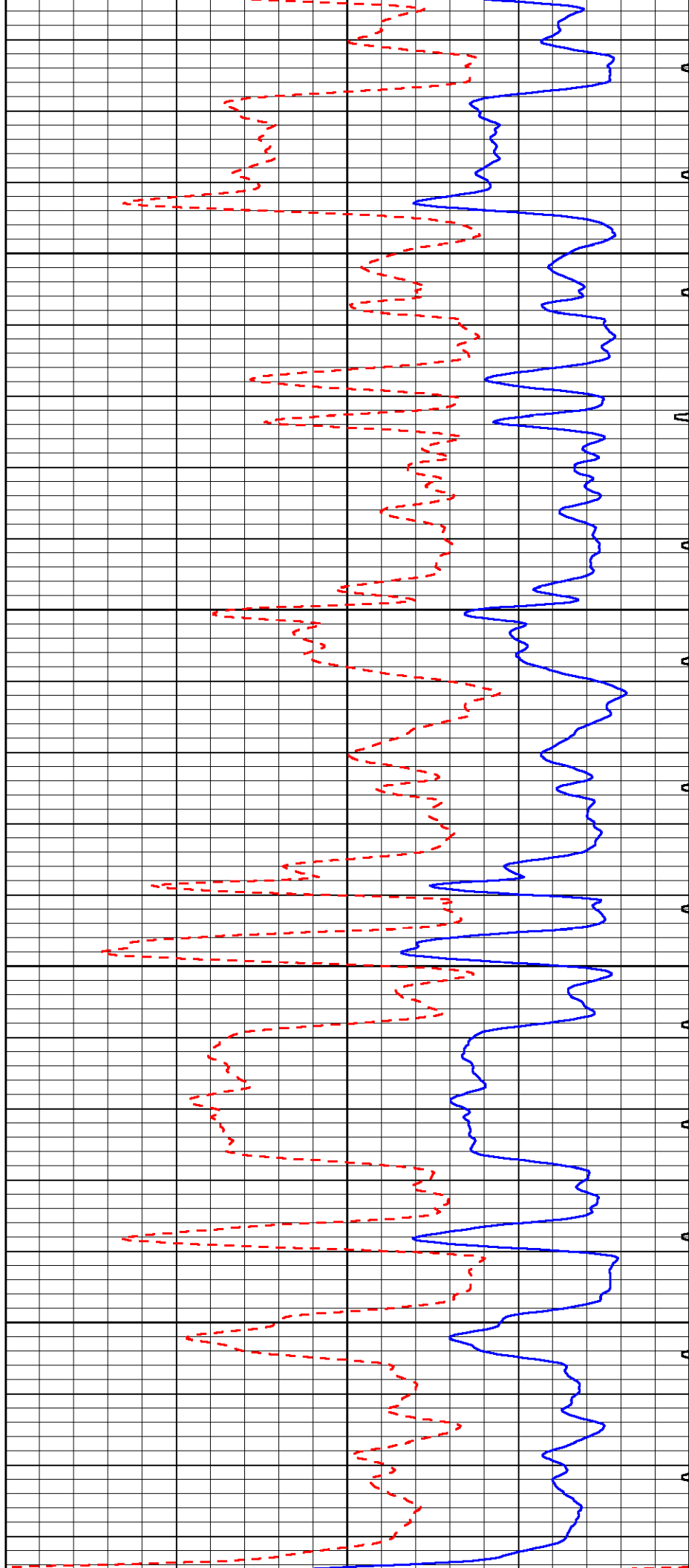
140	Delta T (usec/ft)	40
0.3	Sonic Porosity	-0.1

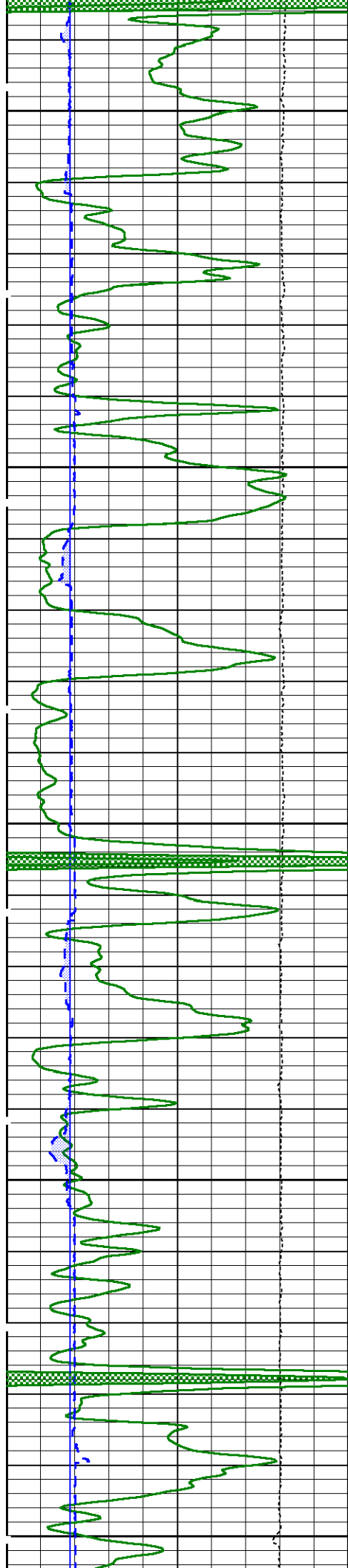




4200

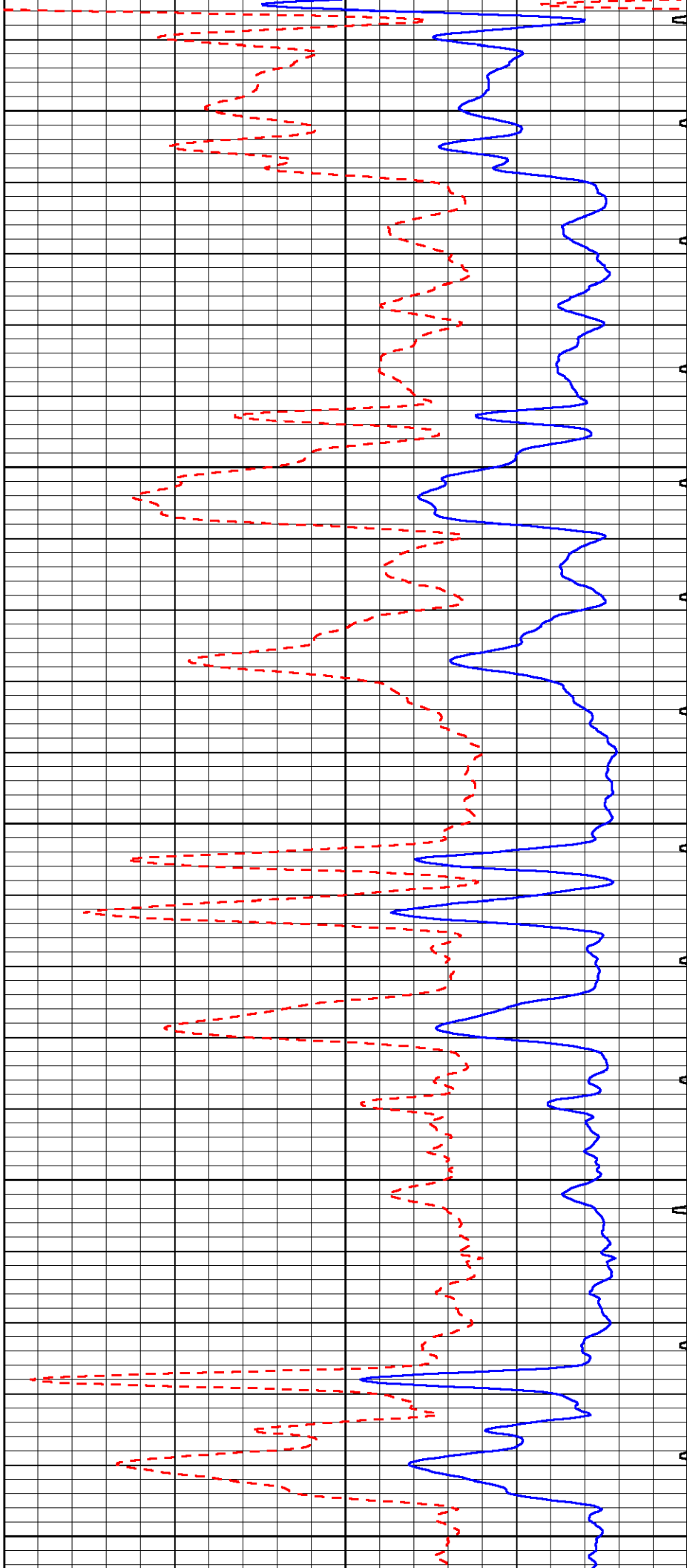
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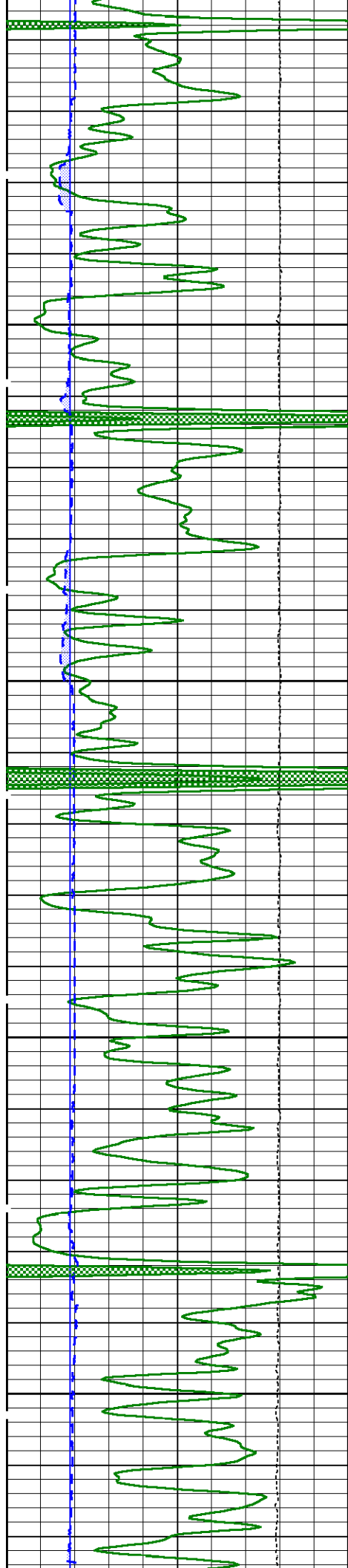




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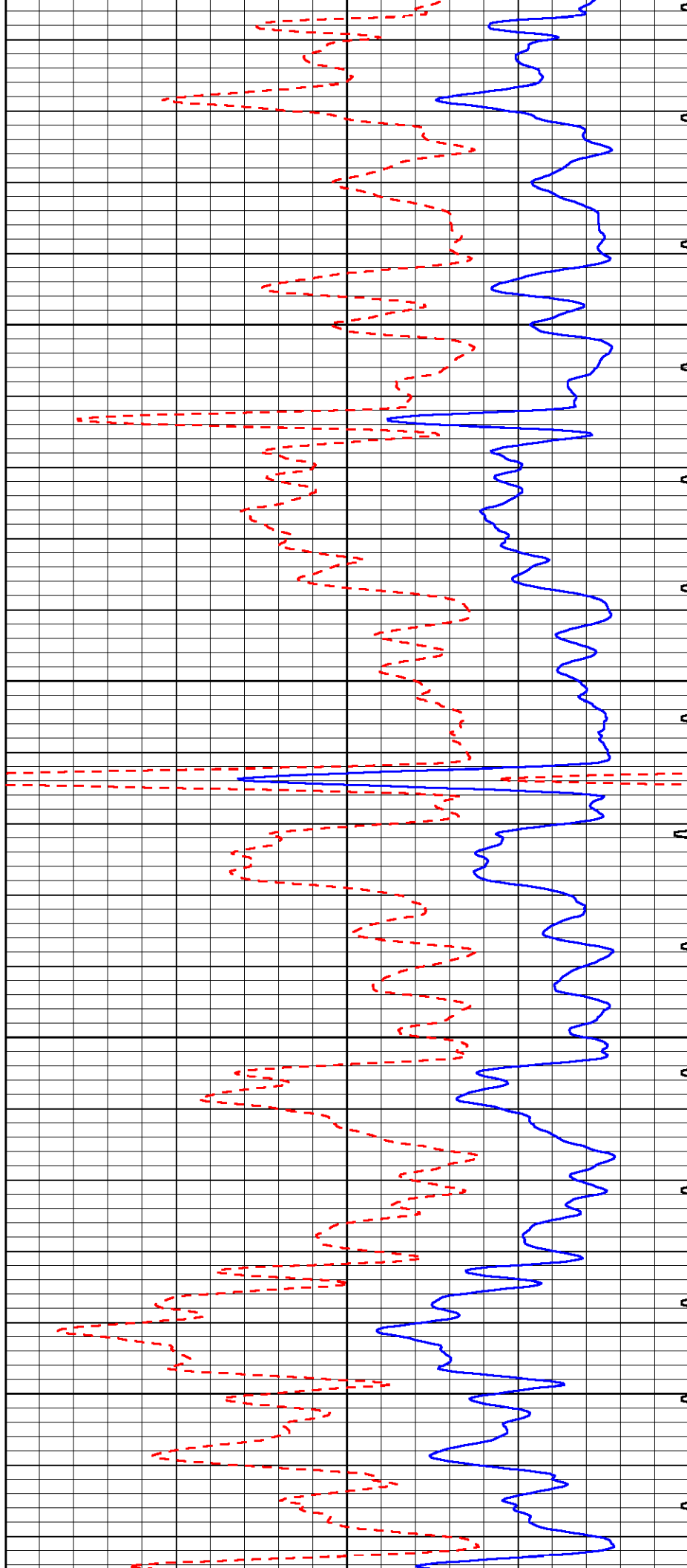
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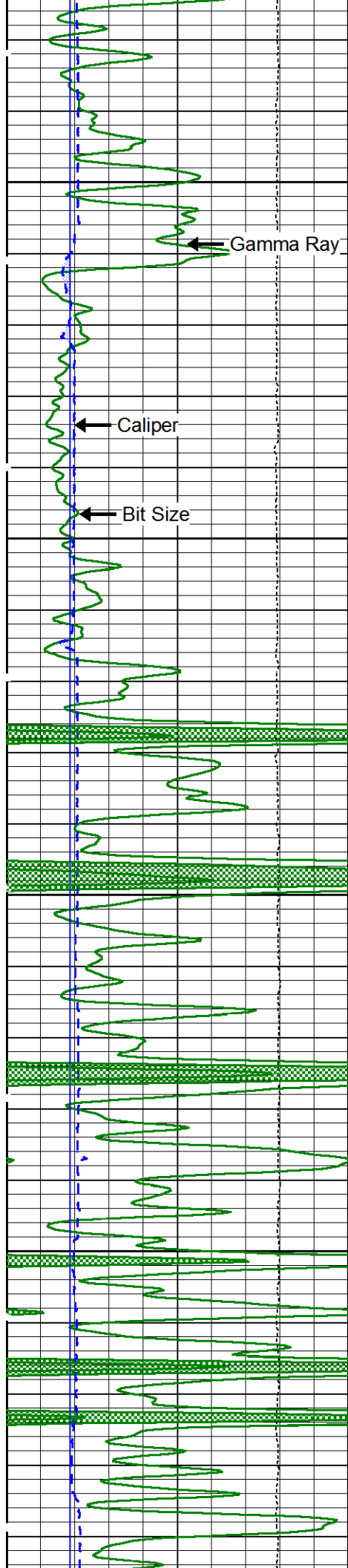




4600

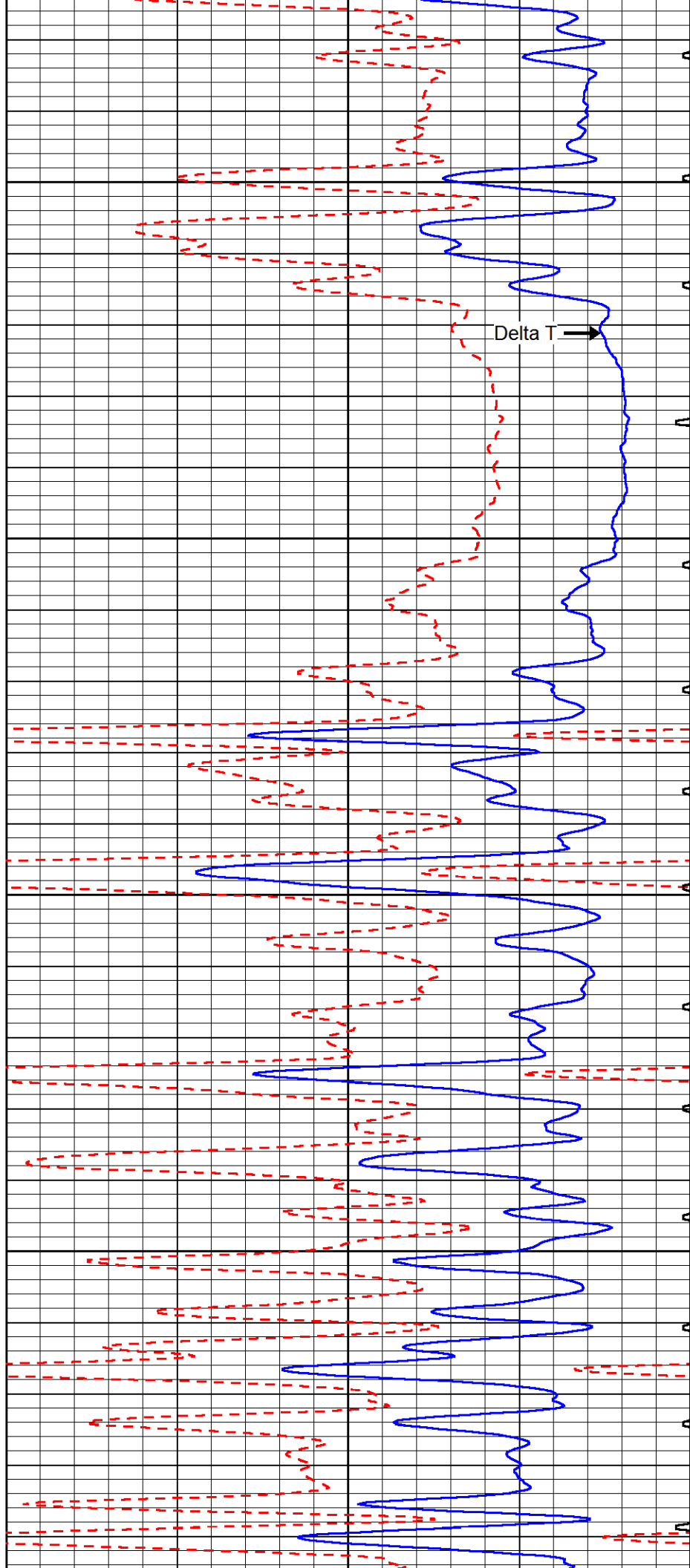
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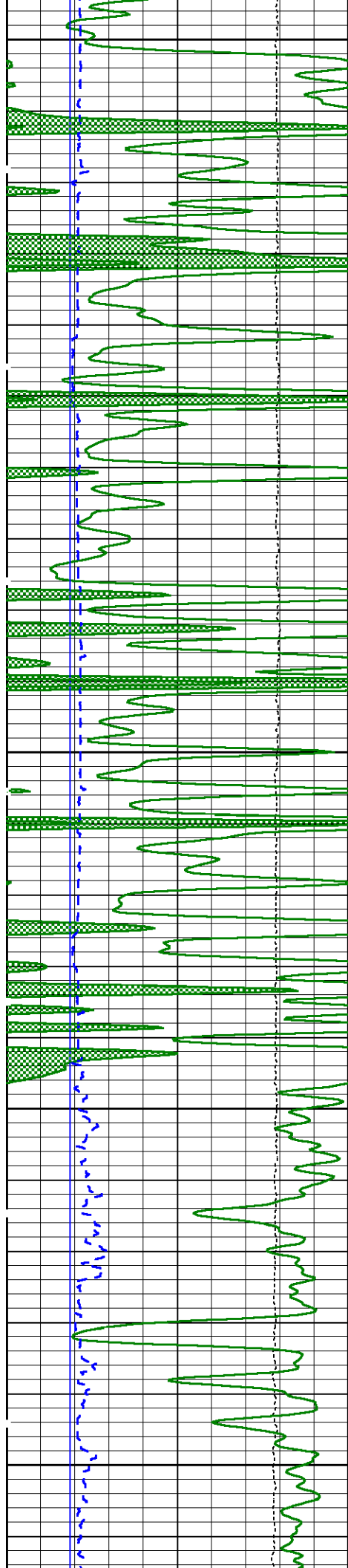




4800

4900

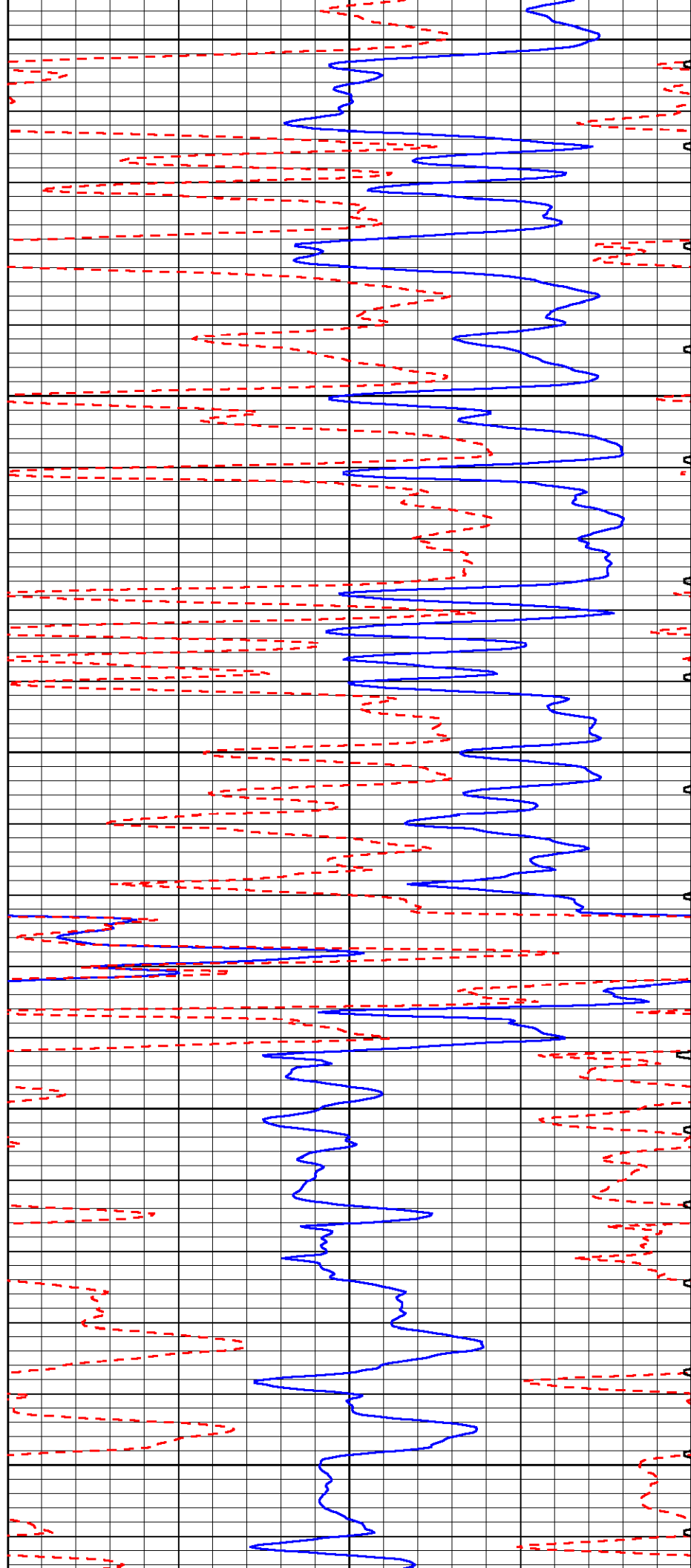


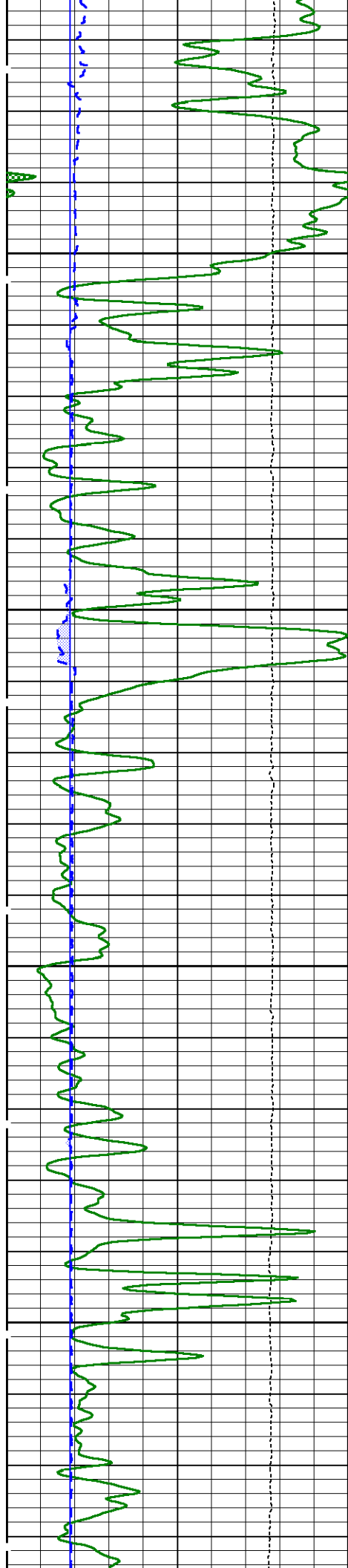


5000

5100

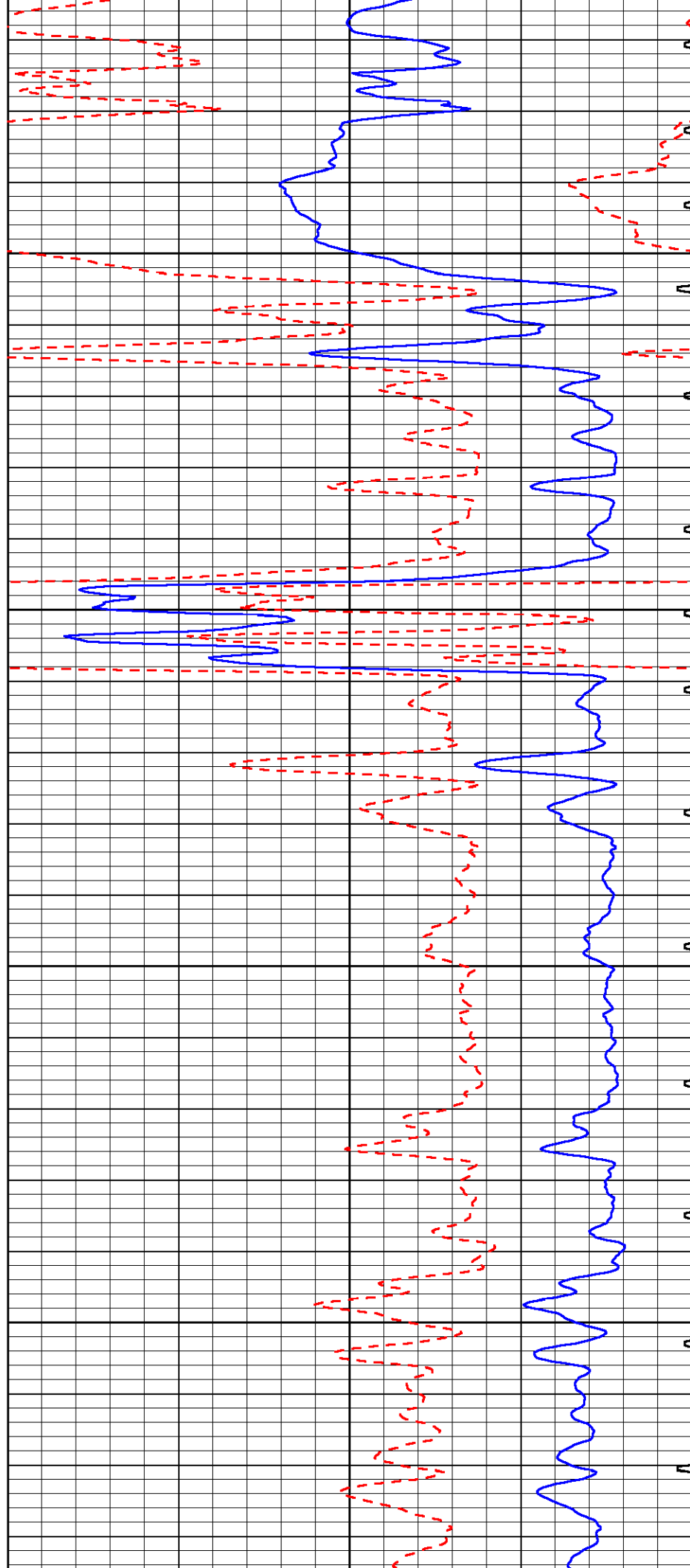
5200



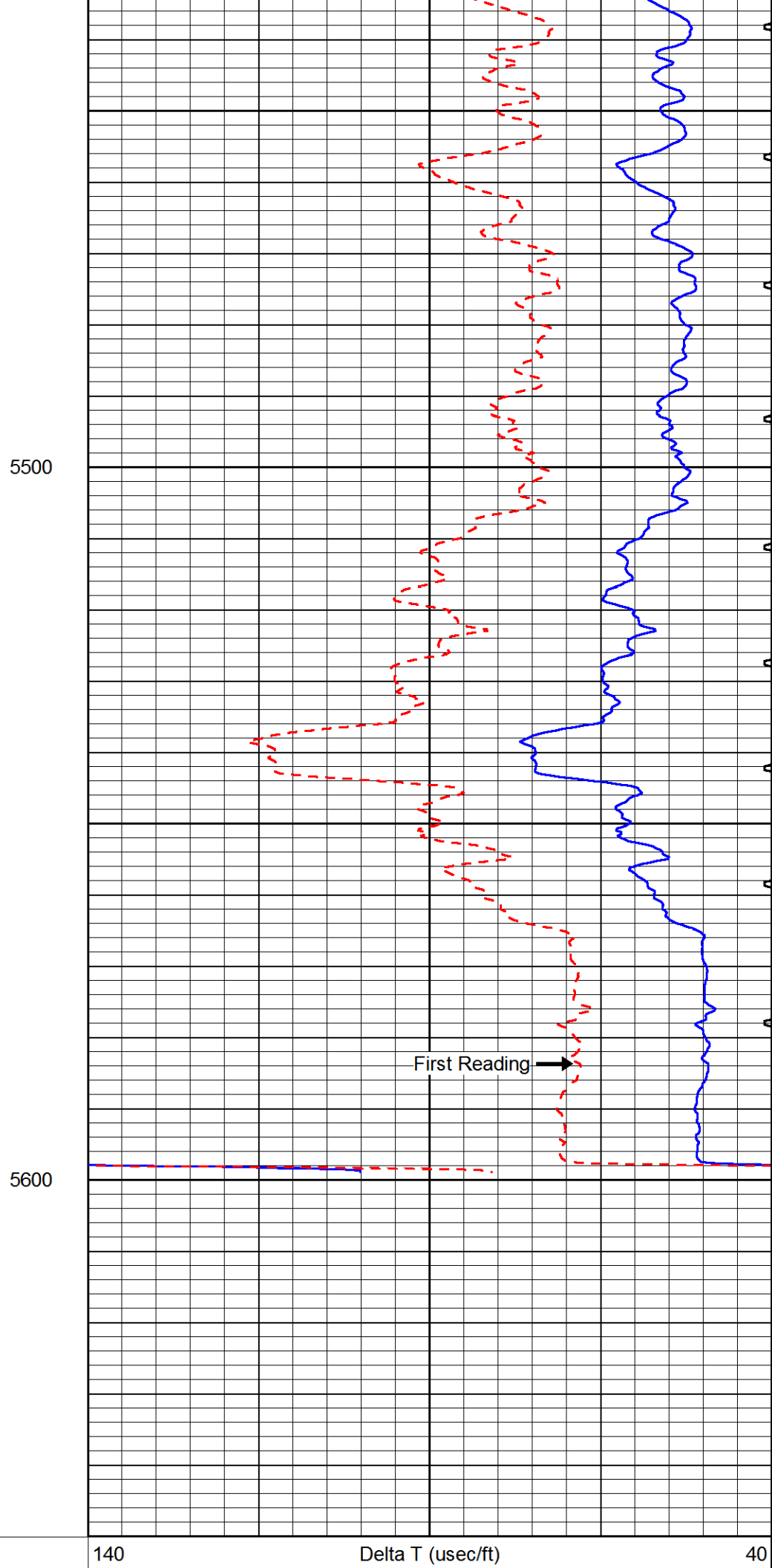
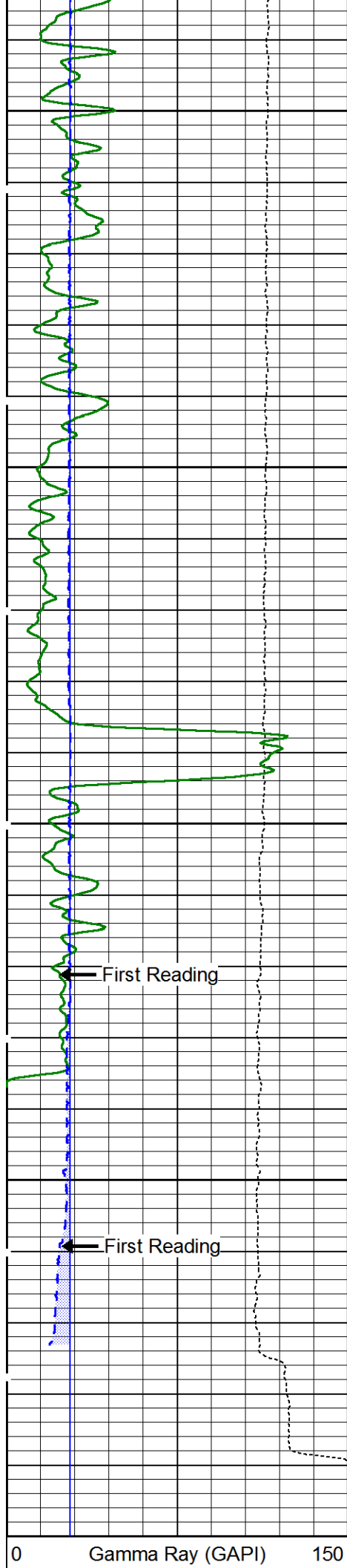


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6	Caliper (in)	16
6	Bit Size (in)	16
Tension		
5000	(lb)	0

0.3	Sonic Porosity	-0.1
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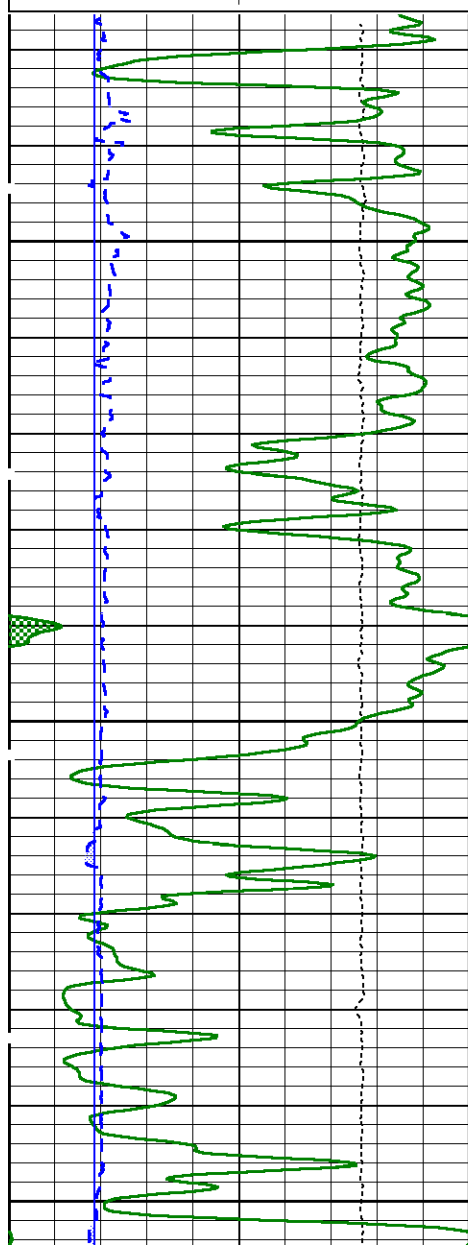


# Repeat Pass

Database File: proghorn\_nattie\_1.db  
 Dataset Pathname: pass3  
 Presentation Format: ph\_sonic  
 Dataset Creation: Wed Jul 24 15:26:37 2013 by Log Sondex V7.03  
 Charted by: Depth in Feet scaled 1:240

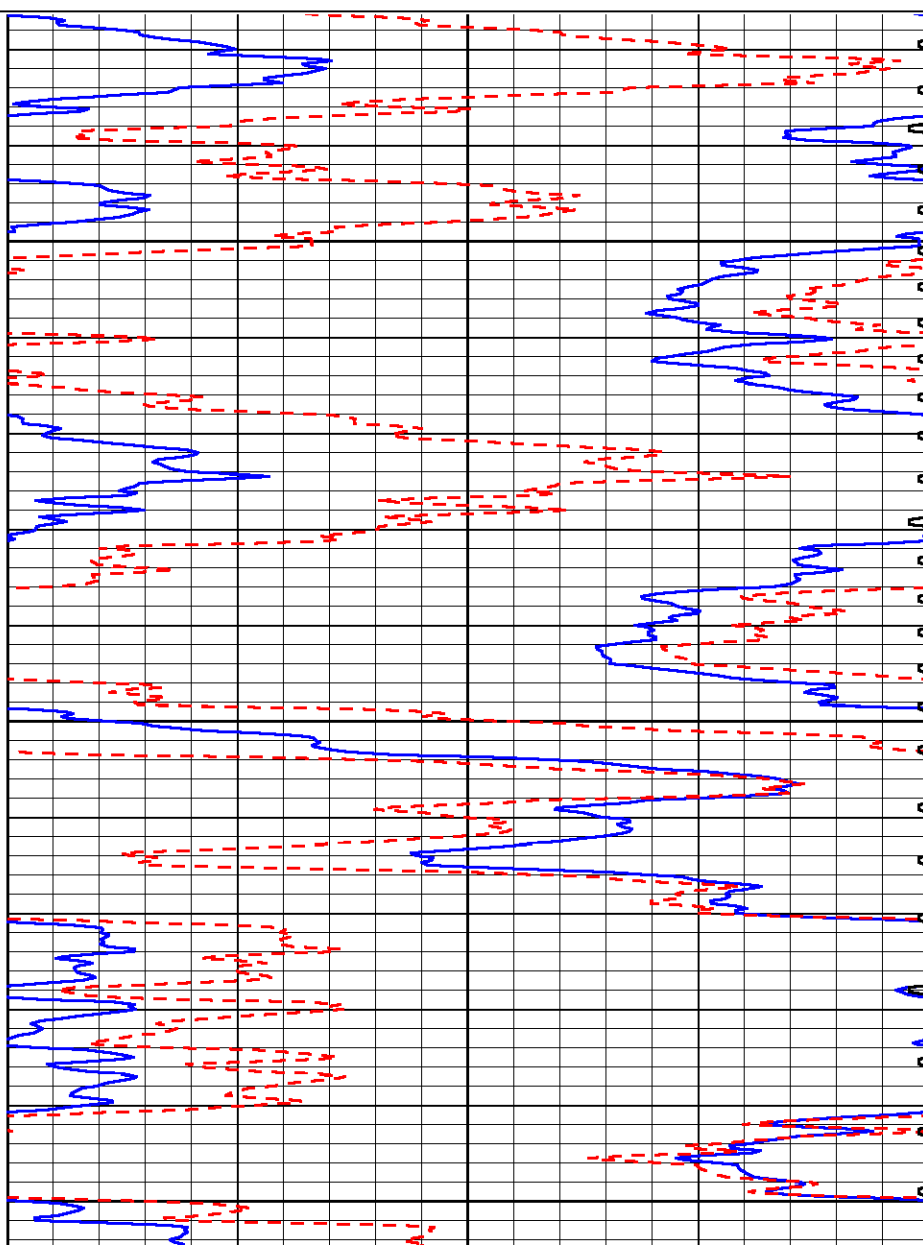
0	Gamma Ray (GAPI)	150
6	Caliper (in)	16
6	Bit Size (in)	16
Tension		
5000	(lb)	0

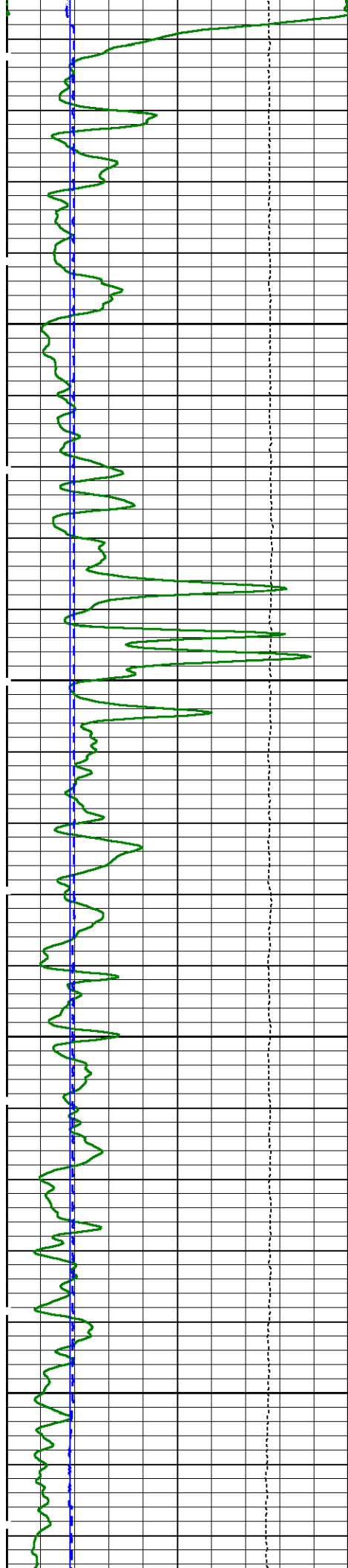
140	Delta T (usec/ft)	40
0.3	Sonic Porosity	-0.1



5200

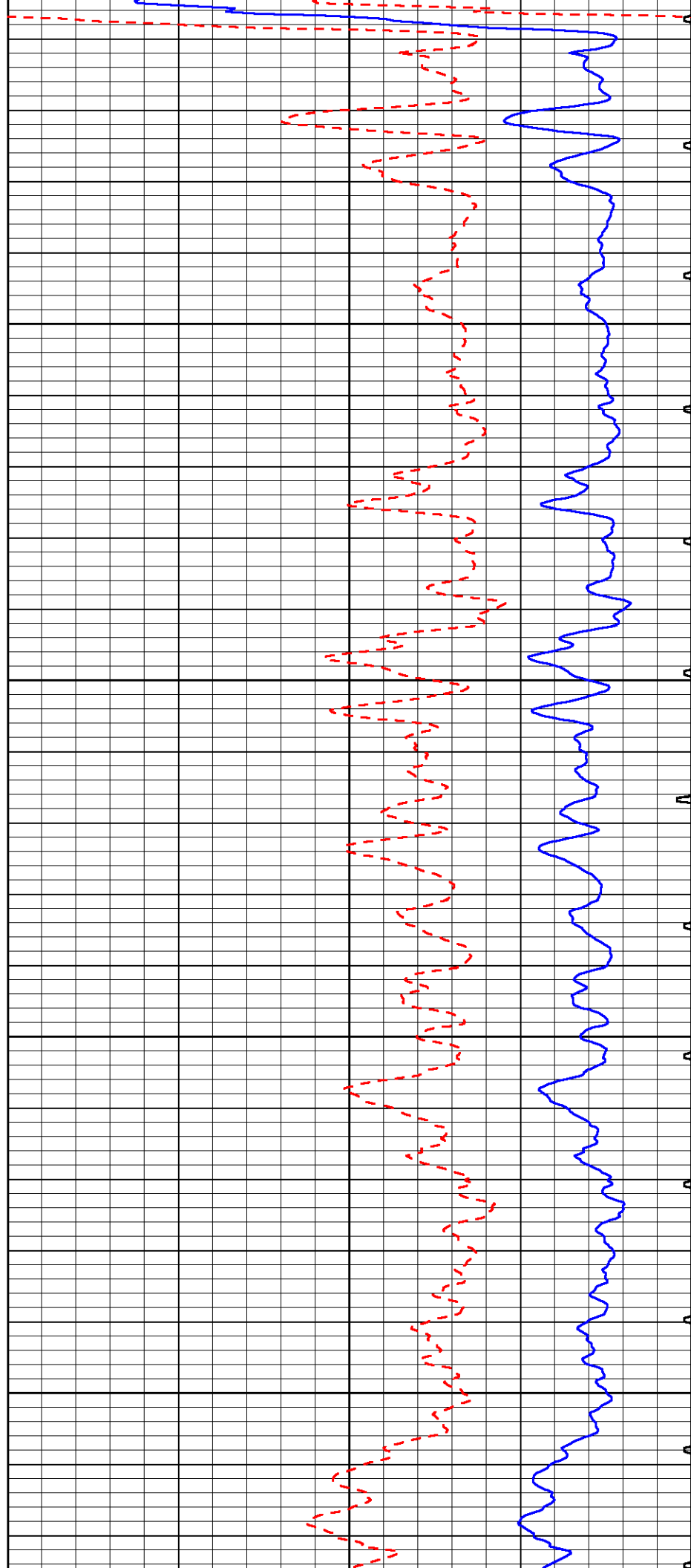
5300

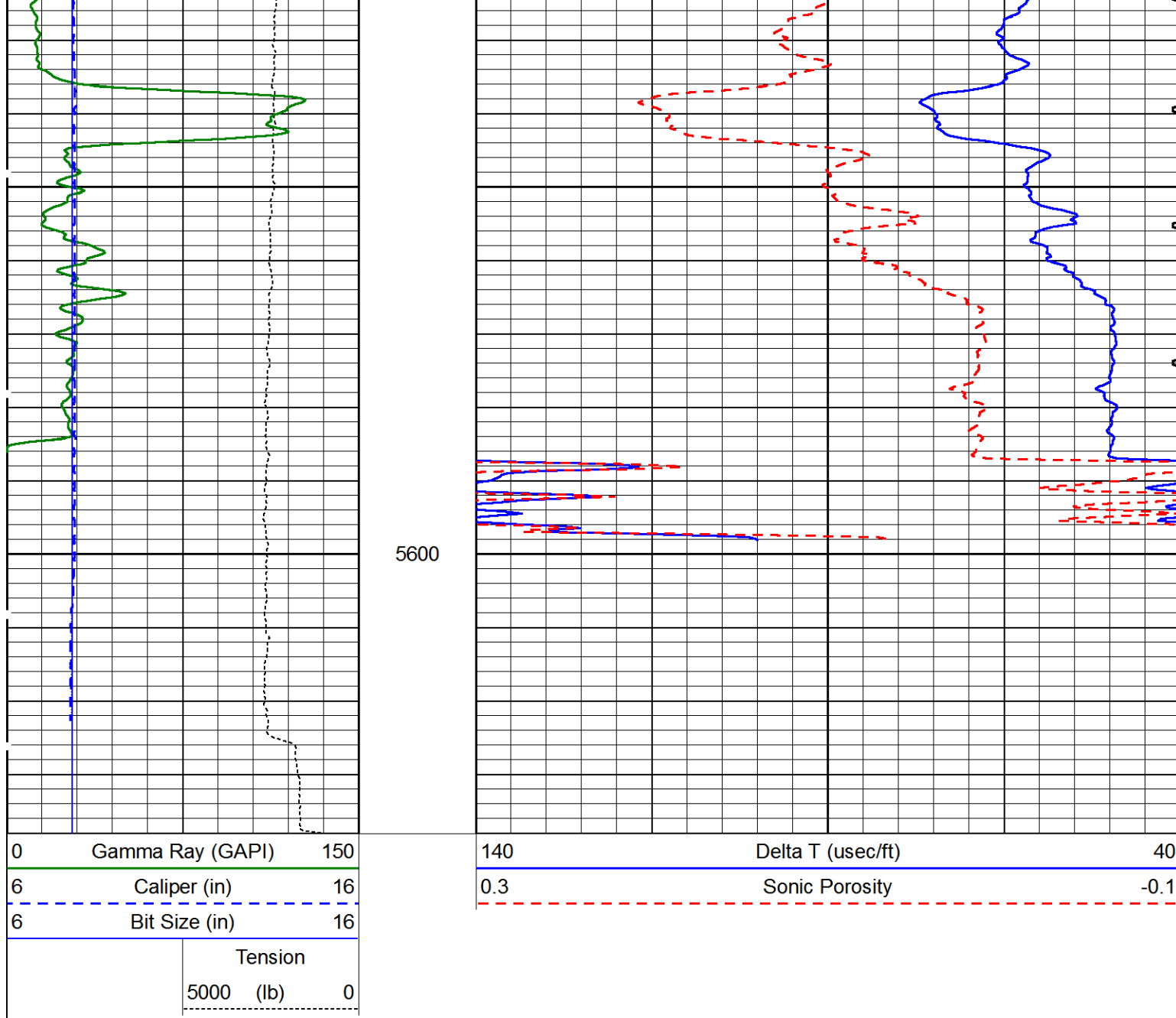




5400

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## Log Variables

Database: C:\Warrior\Data\proghorn\_nattie\_1.db

Dataset: field/well/run1/pass4

### Top - 464.00 ft

MAXAMPL mV 0	MINAMPL mV 1	MINATTN db/ft 0.8	COMPACT  1	SVFLUID usec/ft 189	SVMATRIX usec/ft 47.6	FRMSALIN kppm 0	MUDSALIN kppm 0
DEVI ° 0	SRFTEMP degF 68	SO in 1.5	DE-CENT  Yes	<b>CASED?</b>  <b>Yes</b>	CASEWGHT lb/ft 11.5	NPORSEL  Limestone	AIR_HOLE?  No
MudWgt lb/gal 9	FLUIDDEN g/cc 1	MATRXDEN g/cc 2.71	SPSHIFT mV 0	CASEOD in 5.5	PERFS  0	TDEPTH ft 5622	BOTTEMP degF 100
BOREID in 7.875	A  1	M  2					

MAXAMPL mV 0	MINAMPL mV 1	MINATTN db/ft 0.8	COMPACT  1	SVFLUID usec/ft 189	SVMATRIX usec/ft 47.6	FRMSALIN kppm 0	MUDSALIN kppm 0
DEVI ° 0	SRFTEMP degF 68	SO in 1.5	DE-CENT  Yes	CASED?  No	CASEWGHT lb/ft 11.5	NPORSEL  Limestone	AIR_HOLE?  No
MudWgt lb/gal 9	FLUIDDEN g/cc 1	MATRXDEN g/cc 2.71	SPSHIFT mV 0	CASEOD in 5.5	PERFS  0	TDEPTH ft 5622	BOTTEMP degF 100
BOREID in 7.875	A  1	M  2					

## Calibration Report

Database File: proghorn\_nattie\_1.db  
Dataset Pathname: pass4  
Dataset Creation: Wed Jul 24 15:50:51 2013 by Log Sondex V7.03

## Induction Array Tool Calibration Report

Serial Number: B10110  
Tool Model: 002

Master Calibration Performed: Wed Aug 24 08:34:17 2011  
Temperature: 74.0 degF

## Sonde Error:

Array	1	2	3	4	5	6	7	
Real	191.9	-13.8	-40.9	-15.9	-3.1	0.7	3.4	mmho/m
Imaginary	33.1	-17.8	-19.8	-16.7	-24.3	-1.9	5.8	mmho/m

## Loop Gain:

Array	1	2	3	4	5	6	7	
Loop (real)	537.7	678.5	1295.3	1394.1	1144.8	712.8	404.8	mmho/m
Loop (imaginary)	73.3	92.5	389.8	419.5	344.5	214.5	121.8	mmho/m
Real	762.6	736.2	1247.9	1380.3	1164.3	741.8	425.4	mmho/m
Imaginary	109.3	84.7	369.6	408.4	328.0	221.5	135.1	mmho/m
Gain (real)	0.942	0.905	1.005	0.999	0.981	0.962	0.959	
Gain (imaginary)	0.961	0.902	1.001	0.987	0.978	0.960	0.942	

Before Survey Verification Performed: Thu Oct 04 13:29:32 2012  
Sonde 1 Temperature: 83.1 degF  
Sonde 2 Temperature: 86.7 degF  
Array 1 Temperature: 83.1 degF

Array	1	2	3	4	5	6	7	
TxIR	-0.0	-0.0	0.1	0.1	0.1	0.1	0.1	
TxIX	-0.0	-0.0	-0.2	-0.2	-0.2	-0.2	-0.2	
Tx Magnitude	0.0	0.0	0.2	0.2	0.2	0.2	0.2	
Gain	121.5	180.0	190.0	190.0	190.0	190.0	190.0	
RxCX	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	
RxCX	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
RxC Magnitude	0.2	0.2	0.2	0.2	0.2	0.2	0.2	

## Tool Module Parameters

Software Version: 1.9.3.0  
Borehole Size Source: CALL

Borehole Size Source:	CALI
Mud Resistivity Source:	Hilchie
Mud Resistivity At Surface:	1.20 Ohm-m
Mud Resistivity Surface Temperature:	75.0 degF
Borehole Corrections:	Automatic
Minimum Standoff:	0.4 in

### Litho Density Tool Calibration Report

Serial Number:	B0872S50130B
Tool Model:	002

Caliper Calibration Performed:	Wed Jun 26 11:30:27 2013
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	Diameter		Reading	
Small Ring:	6.000	in	1355.300	cps
Large Ring:	13.000	in	2004.700	cps
Gain:	0.0108			
Offset:	-8.6090			

Master Calibration Performed:	Wed Jun 26 11:01:57 2013
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Source Number:	50103
Medium:	Water
Al Block Density:	2.5982 g/cc

	Background	Al Block	Al Block + Fe	
SS1	822.8	4393.2	3697.5	cps
SS2	2307.7	29712.2	25027.5	cps
SSTOTAL	5405.6	47464.6	39740.1	cps
LITH	95.7	489.9	293.8	cps
LL	188.5	811.2	710.8	cps
LU	538.1	1063.3	983.9	cps
LS	726.6	1874.5	1694.7	cps
LSTOTAL	1375.4	4558.6	3691.5	cps
SSHV	1470.6	1473.6	1474.1	V
LSHV	1403.7	1405.6	1406.1	V
SSFF	0.010	0.007	0.002	
LSFF	0.010	0.002	-0.002	

Before Survey Verification Performed:

After Survey Verification Performed:

	Master Background	Before Survey Background	After Survey Background	
SS1	822.8			cps
SS2	2307.7			cps
SSTOTAL	5405.6			cps
LITH	95.7			cps
LL	188.5			cps
LU	538.1			cps
LS	726.6			cps
LSTOTAL	1375.4			cps
SSHV	1470.6			V
LSHV	1403.7			V
SSFF	0.010			
LSFF	0.010			

### Tool Module Parameters

Software Version:	2.5.1.0
Borehole Size Source:	CALI

## Compensated Neutron Tool Calibration Report

Serial Number: C7985S66010B  
Tool Model: 009

Master Calibration Performed: Wed Jun 26 13:58:43 2013

Source Number: 66010B

Short Spacing Counts: 6360.43 cps  
Long Spacing Counts: 264.66 cps  
High Voltage: 1375.16 V

Target Ratio: 23.9200  
Ratio: 24.0320  
K-Factor: 0.9953

Before Survey Verification Performed:  
After Survey Verification Performed:

Verifier Number: 6494

Verifier Values	Master Cal	Before Survey	After Survey	
Short Spacing Counts:	235.02			cps
Long Spacing Counts:	257.56			cps
High Voltage:	1375.14			V
Ratio:	0.9125			

## Tool Module Parameters

Software Version: 1.5.0.0  
Borehole Size Source: CALI  
Clip Crossplot Porosity: YES

## Spectral Gamma Ray Tool Calibration Report

Serial Number: 220344  
Tool Model: 002

Performed: Wed Jun 26 13:25:33 2013

Source Number: Th Blanket #12  
Calibrator Value: 217.0 API

Background Reading: 477.0 cps  
Calibrator Reading: 2090.4 cps

Sensitivity: 0.135 API / cps

Performed:

Verifier Number:

Concentrations	K %	U ppm	T ppm
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K Peak:  
U Peak:  
T Peak:

Before Survey Verification Performed:  
After Survey Verification Performed:

	Before Survey	After Survey	
Background Reading:			cps

Background Reading:		cps
Verifier Reading:		cps
K Peak:		
U Peak:		
T Peak:		
Tool Module Parameters		
Software Version:		1.8.9.5
Gamma Ray Calibration Report		
Serial Number:		10009990
Tool Model:		001
Performed:		Wed Mar 27 09:56:46 2013
Calibrator Value:		236.0 GAPI
Background Reading:		205.7 cps
Calibrator Reading:		961.5 cps
Sensitivity:		0.3122 GAPI/cps

Sensor	Offset (ft)	Schematic	Description	Len (ft)	OD (in)	Wt (lb)	
CHD	58.19		CHD-001 (000004) Cable Head	2.19	3.38	35.00	
GR	53.31		XTU-008 (10007730) Crossover Ultrawire Toolbus to Ultralink	2.08	3.38	47.00	
			GRT-001 (10009990) Gamma Ray Tool	3.22	3.38	69.00	
SGR	47.63		SGR-002 (220344) Spectral Gamma Ray Tool	4.94	3.88	120.00	
WVFUTRF	39.56		MAS-001SS (10010072SS) Multi Array Sonic Tool (SS)	14.28	3.38	242.00	
WVFUTRN	38.56						
WVFLTRF	38.56						
WVFLTRN	37.56						
KJT	31.48		KJT-001 (000001) Knuckle Joint	2.86	3.38	72.00	
CNLSC	25.59		CNL-009 (C7985S66010B) Compensated Neutron Logging Tool	5.27	3.38	125.00	
CNSSC	25.09						
			LDT-000 (B00700501000)	0.75	4.50	240.00	



Tool Joint	Length (ft)	Weight (lb)	O.D. (in)
LDT	15.44	9.75	4.50
IAT	8.44	13.22	3.88
SP	0.42	0.38	6.88
BN	0.38		6.00
Dataset: proghorn_nattie_1.db: field/well/run1/pass4 Total Length: 58.19 ft Total Weight: 1222.00 lb O.D.: 6.88 in			