

**Weatherford****CALIPER
LOG**

COMPANY	EAST CHEYENNE GAS STORAGE LLC									
WELL	ECGS No 6-18 WPD011-2									
FIELD	PEETZ WEST									
PROVINCE/COUNTY	LOGAN									
COUNTRY/STATE	USA/COLORADO									
LOCATION	NESE 2372' FSL AND 1539' FEL									
SEC	TWP	RGE	Other Services				CMI			
6	11N	52W	MAI							
API Number	05-075-09406		MPD/MDN							
Permit Number										
Permanent Datum GL, Elevation 4550 feet										
Log Measured From KB										
Drilling Measured From KB										
Date	12-OCT-2012									
Run Number	ONE									
Depth Driller	5260.00						feet			
Depth Logger	5264.00						feet			
First Reading	5208.00						feet			
Last Reading	1214.00						feet			
Casing Driller	1215.00						feet			
Casing Logger	1214.00						feet			
Bit Size	8.750						inches			
Hole Fluid Type	WBM									
Density / Viscosity	9.80		lb/USg		38.00		CP			
PH / Fluid Loss	9.00				7.40		ml/30Min			
Sample Source	FLOWLINE									
Rm @ Measured Temp	3.75 @ 80.0						ohm-m			
Rmf @ Measured Temp	3.0 @ 80.0						ohm-m			
Rmc @ Measured Temp	4.50 @ 80.0						ohm-m			
Source Rmf / Rmc	CALC				CALC					
Rm @ BHT	2.115 @144.0						ohm-m			
Time Since Circulation	4 HOURS									
Max Recorded Temp	144.00						deg F			
Equipment Name	COMPACT									
Equipment / Base	13144				RK SPR					
Recorded By	J. LIU						T.BENICH			
Witnessed By	A. ASHBY						L. CARRASCO			

BOREHOLE RECORD

Last Edited: 12-OCT-2012 07:18

Bit Size inches	Depth From feet	Depth To feet
8.750	1214.00	5260.00

CASING RECORD

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	9.625	0.00	1214.00	36.00

REMARKS

SOFTWARE VERSION 13.03.7779
TOOLS RUN: SHA, MCG, MDN, MPD, MIS-A, SKJ, MIS-E, SKJ, SHA, MIM, MIE, SKJ, MFE, MAI RUN IN COMBINATION.

HARDWARE: MPD: 8" PROFILE PLATE USED.
MAI: TWO 1 INCH STANDOFFS USED.
MDN: DUAL BOWSPRING USED.
MIM: ONE NONMETALIC CENTRALIZING BASKET USED.
MIE: ONE 1 INCH STANDOFF USED

2.65 G/CC DENSITY MATRIX USED TO CALCULATE POROSITY FROM TD TO BOTTOM OF FORT HAYES FORMATION(5264FT TO 4700FT).

2.71 G/CC DENSITY MATRIX USED TO CALCULATE POROSITY IN FORT HAYES FORMATION (4700 FT TO 4200 FT).

TIGHT PULLS, BOREHOLE SIZE AND RUGOSITY WILL AFFECT REPEATABILITY AND DATA QUALITY.

ALL INTERVALS LOGGED AND SCALED PER CUSTOMER'S REQUEST.

LAT/ LONG: 40.95546 N / 103.21529 W

TOTAL HOLE VOLUME FROM TD TO SURFACE CASING =1770 CUBIC FEET

ANNULAR VOLUME WITH 7 INCH PRODUCTION CASING FROM TD TO SURFACE CASING = 700 CUBIC FEET

TOTAL VOLUME FROM TD TO 4200 FT = 410 CUBIC FEET

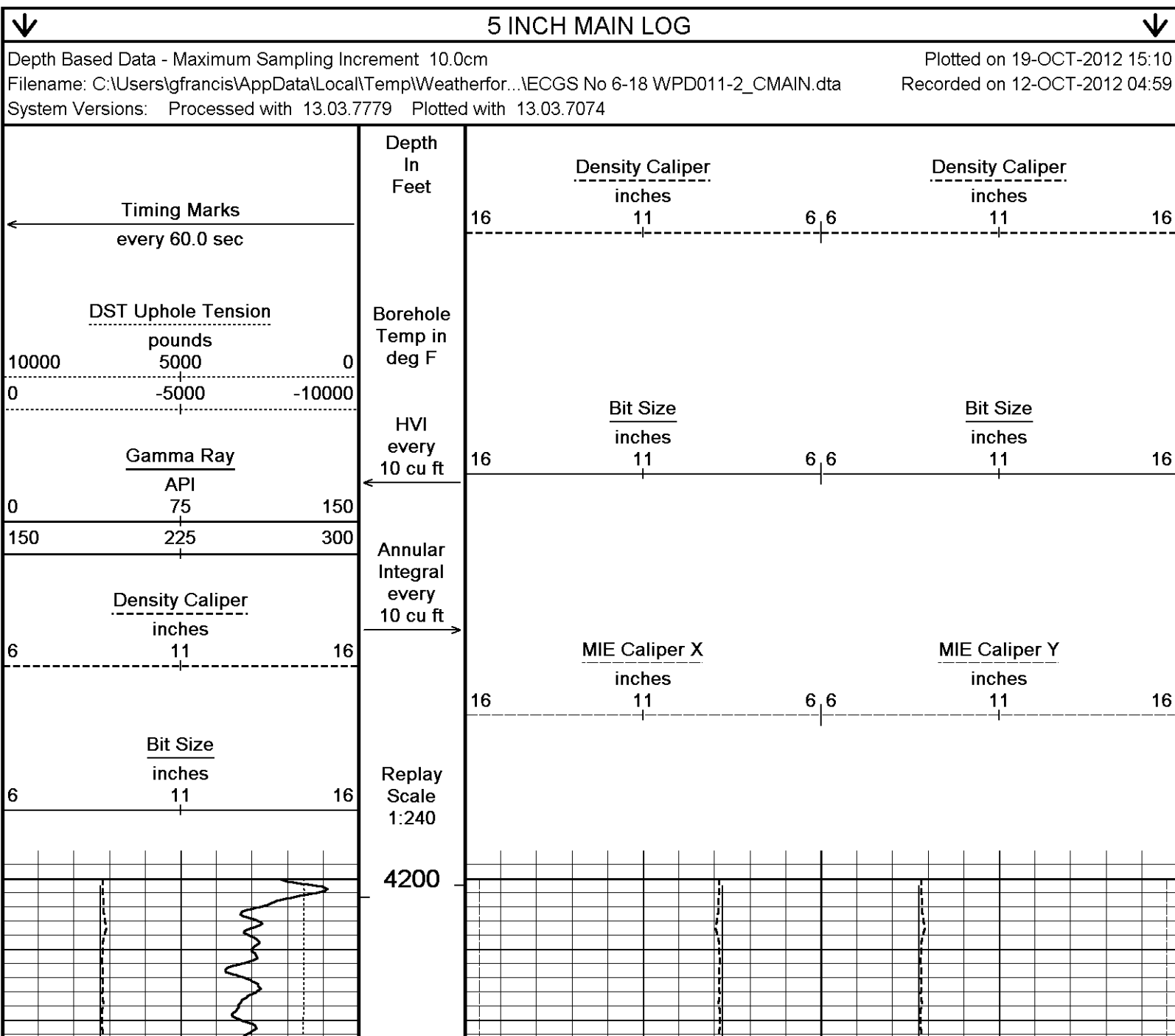
ANNULAR VOLUME WITH 7 INCH PRODUCTION CASING FROM TD TO 4200 FT = 140 CUBIC FEET

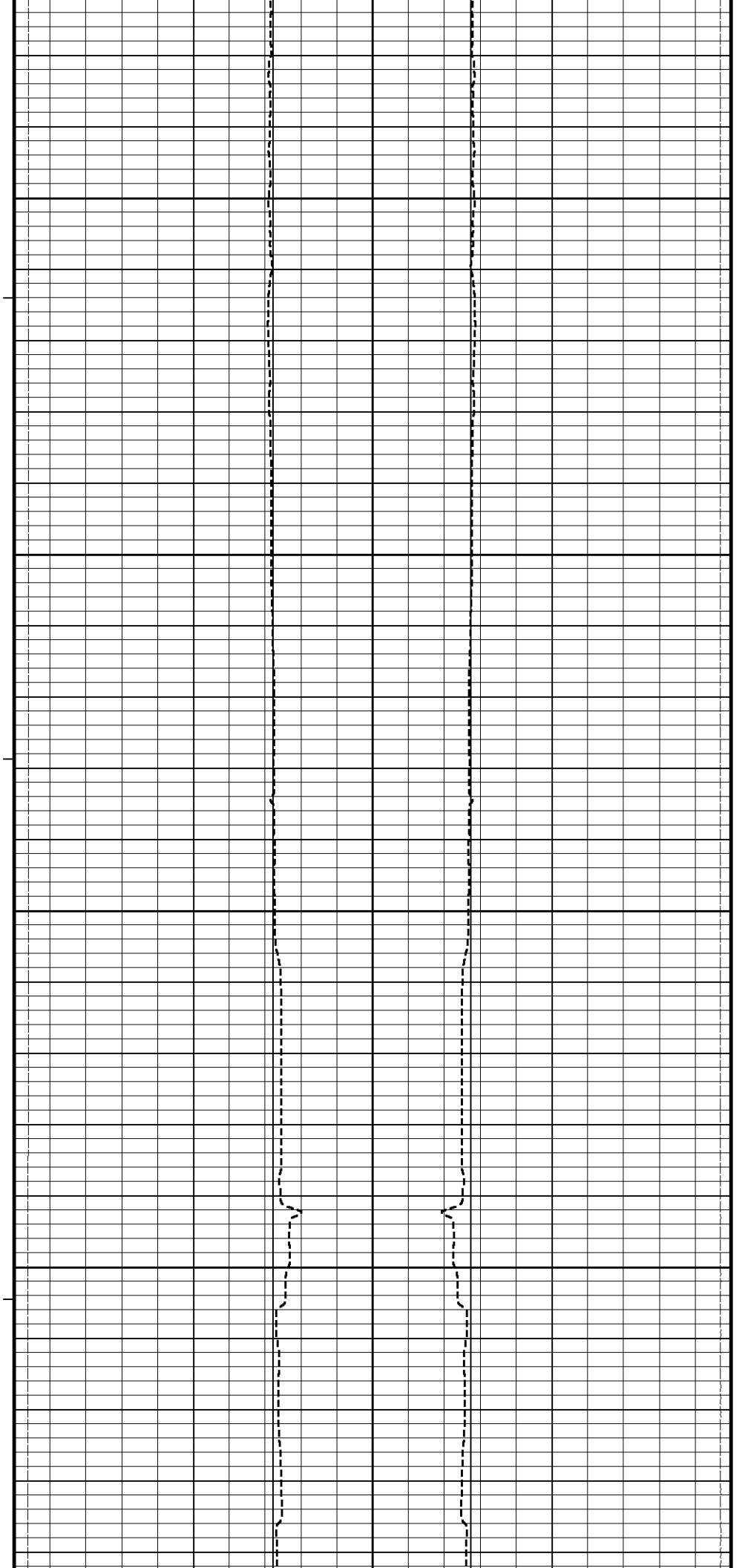
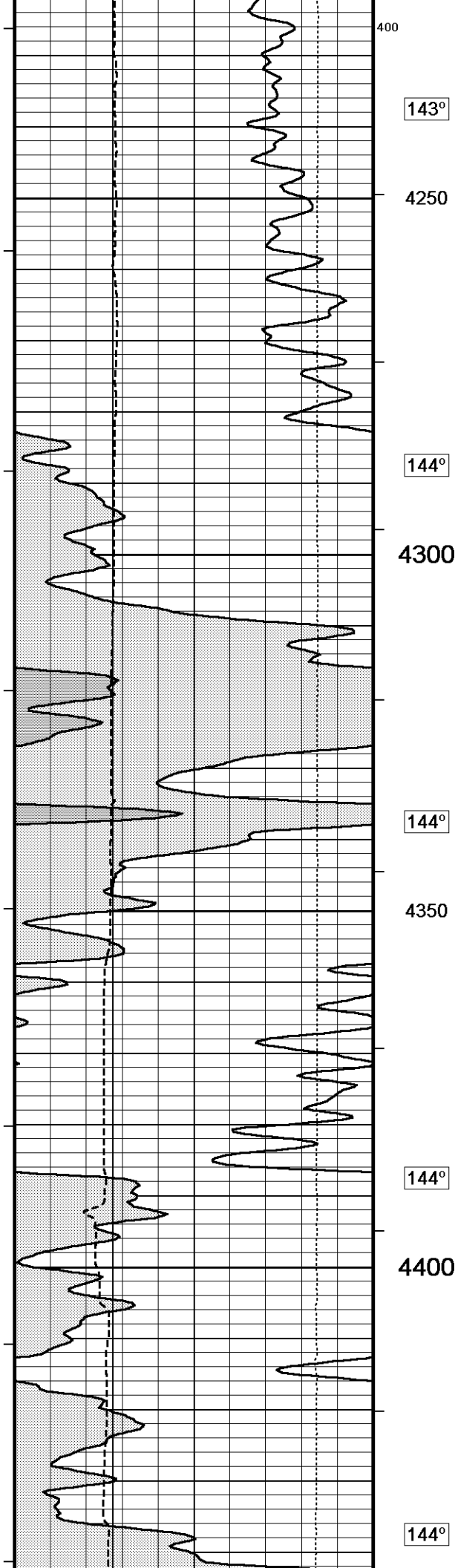
SERVICE ORDER: 3531931

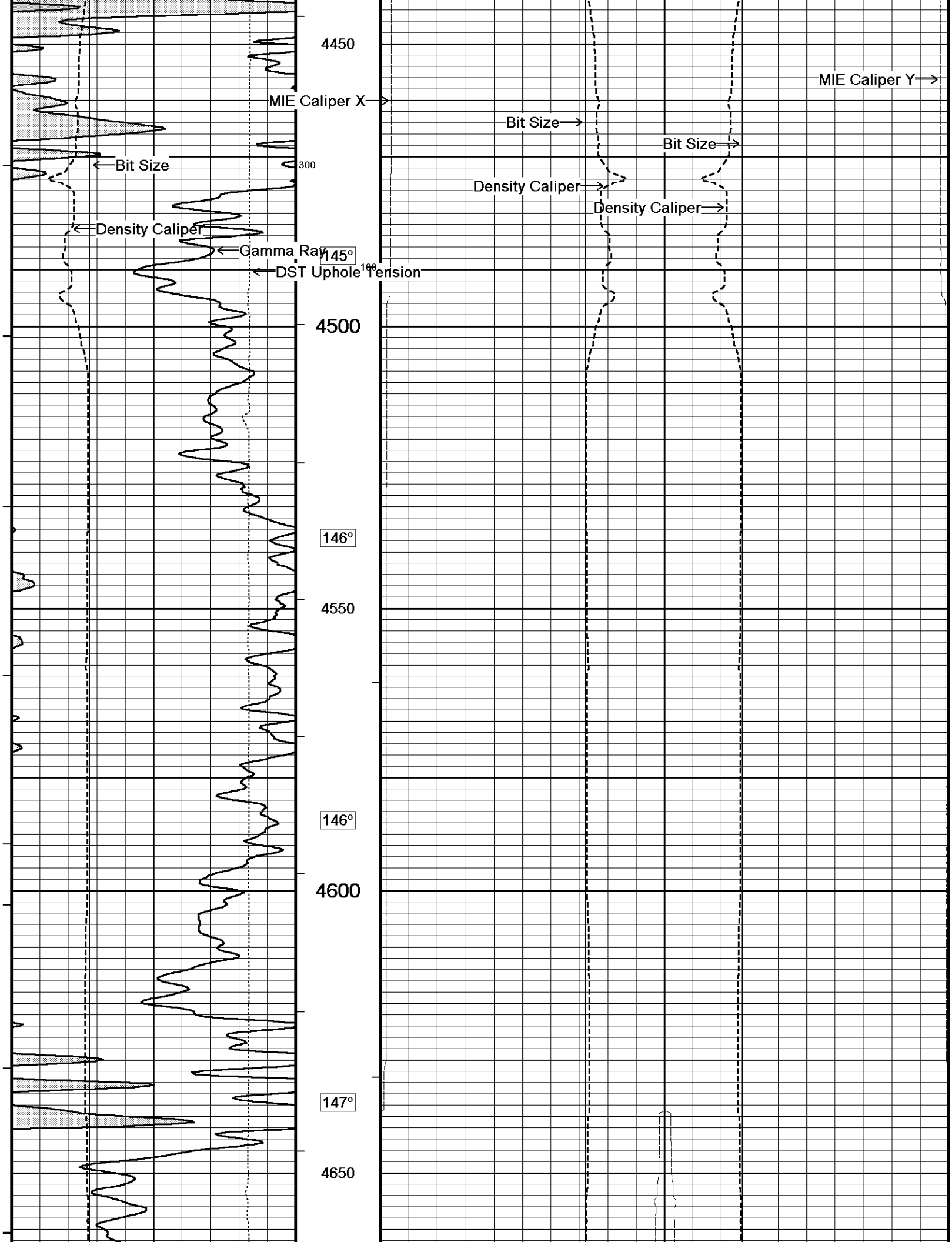
OPERATOR: D. SMITH
J. BAASSIRI

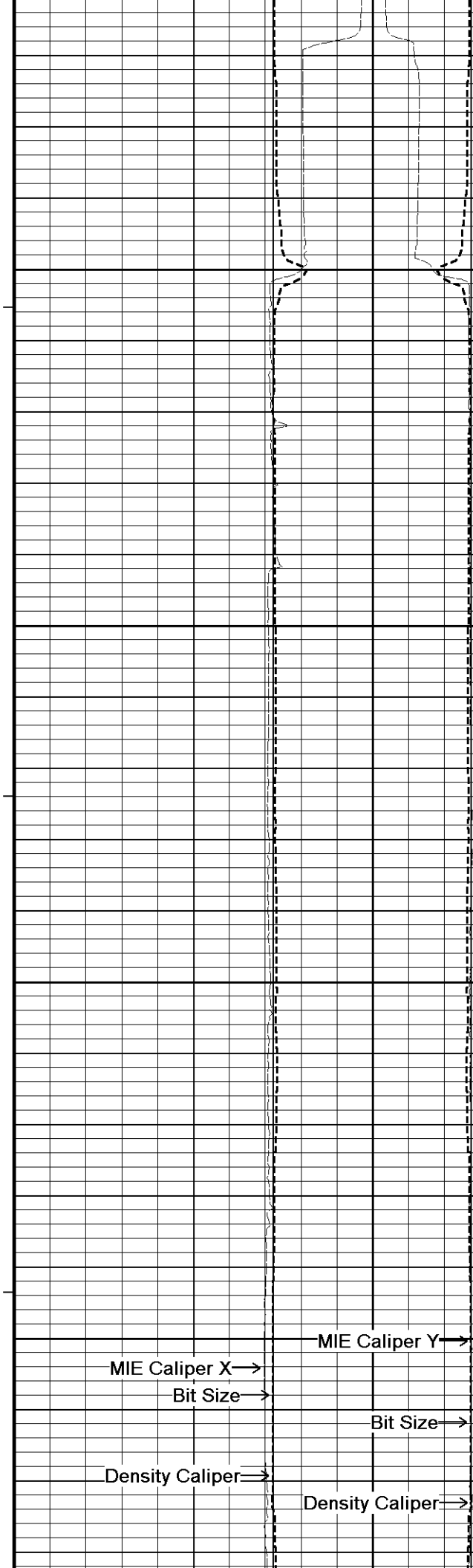
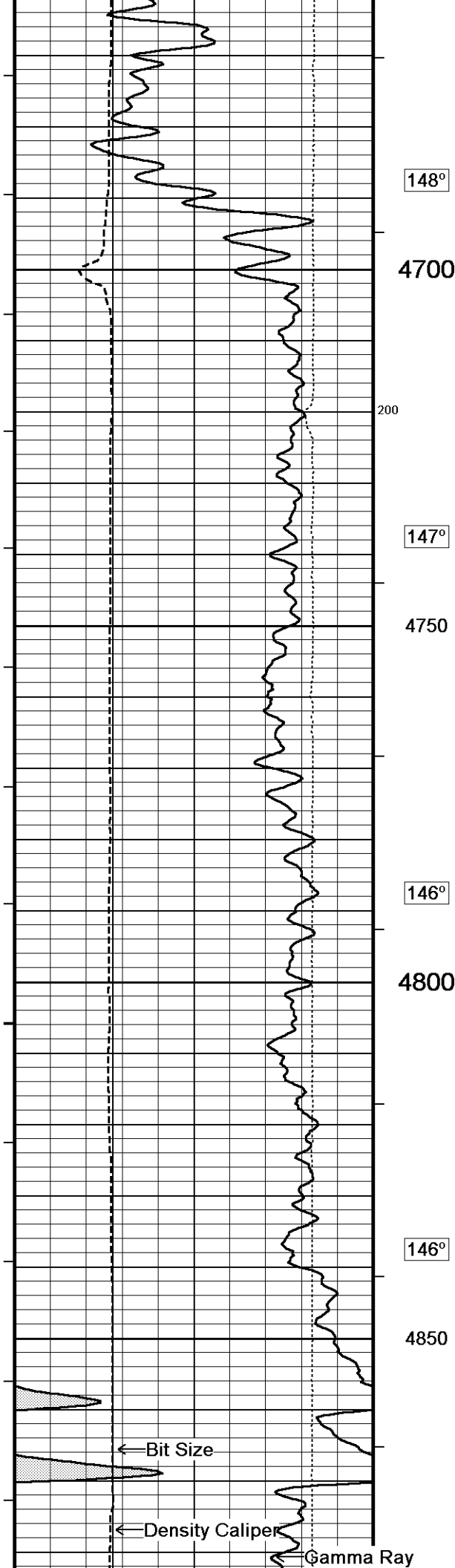
RIG: CADE 22

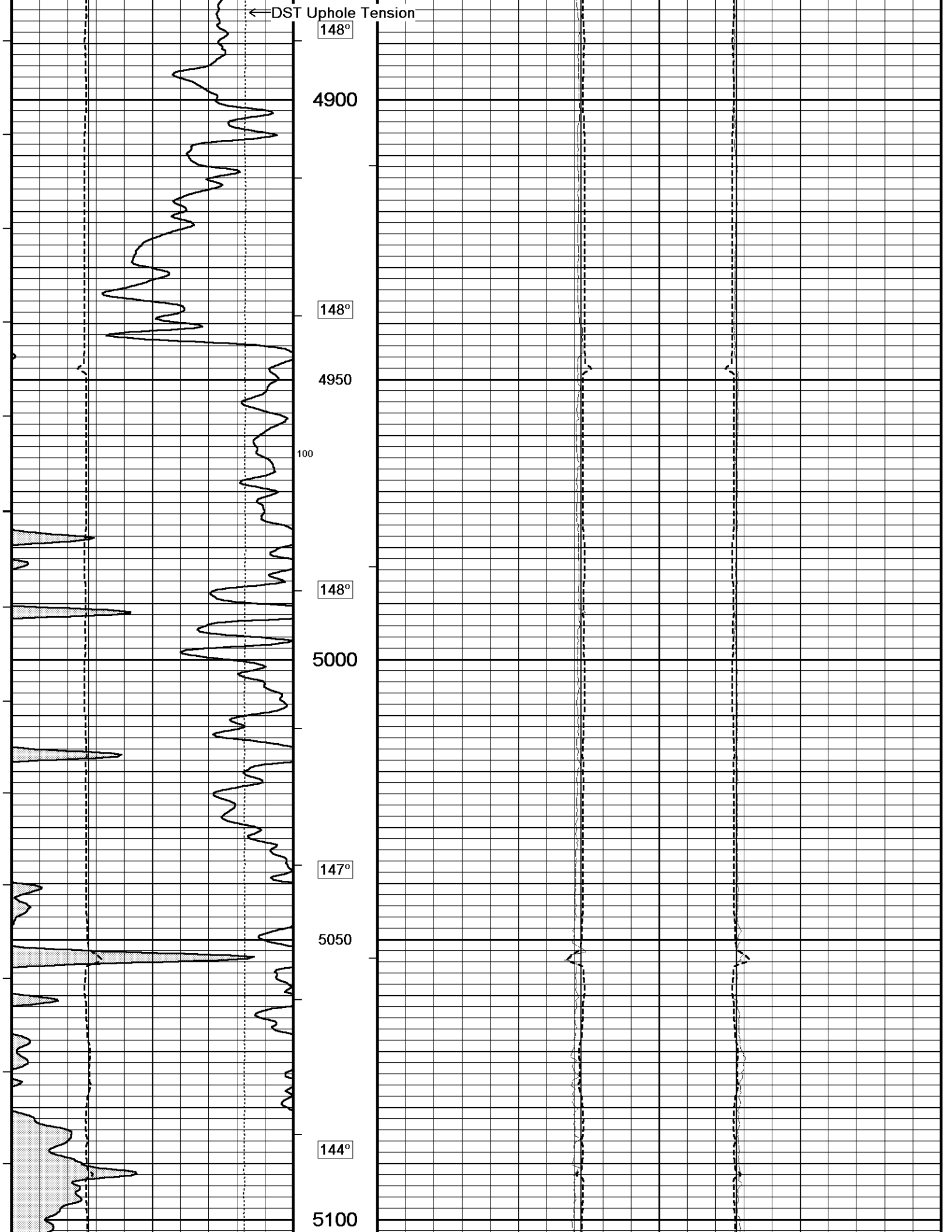
All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not, guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or wilful negligence on our part, be liable or responsible for any loss, costs, 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 in our price schedule.

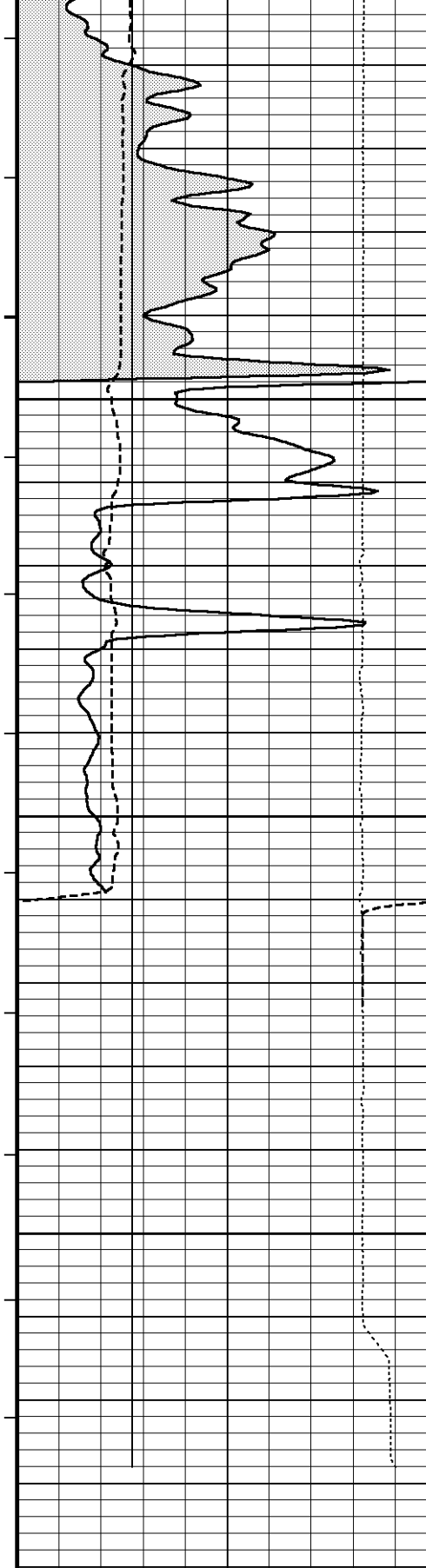












138°

5150

144°

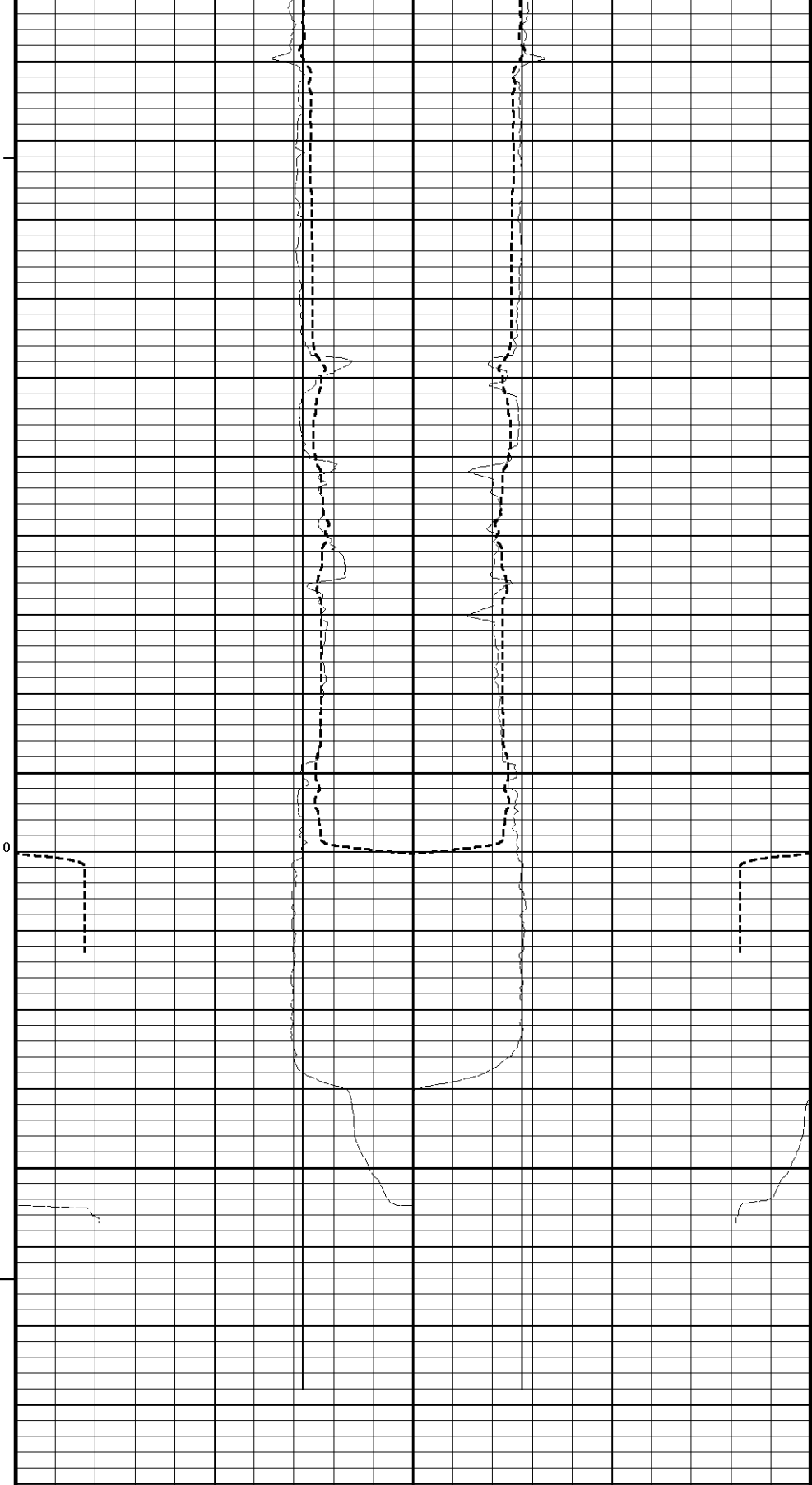
5200

5250

TD

Depth
In
Feet

Borehole
Temp in



Density Caliper
inches

Density Caliper
inches

16

11

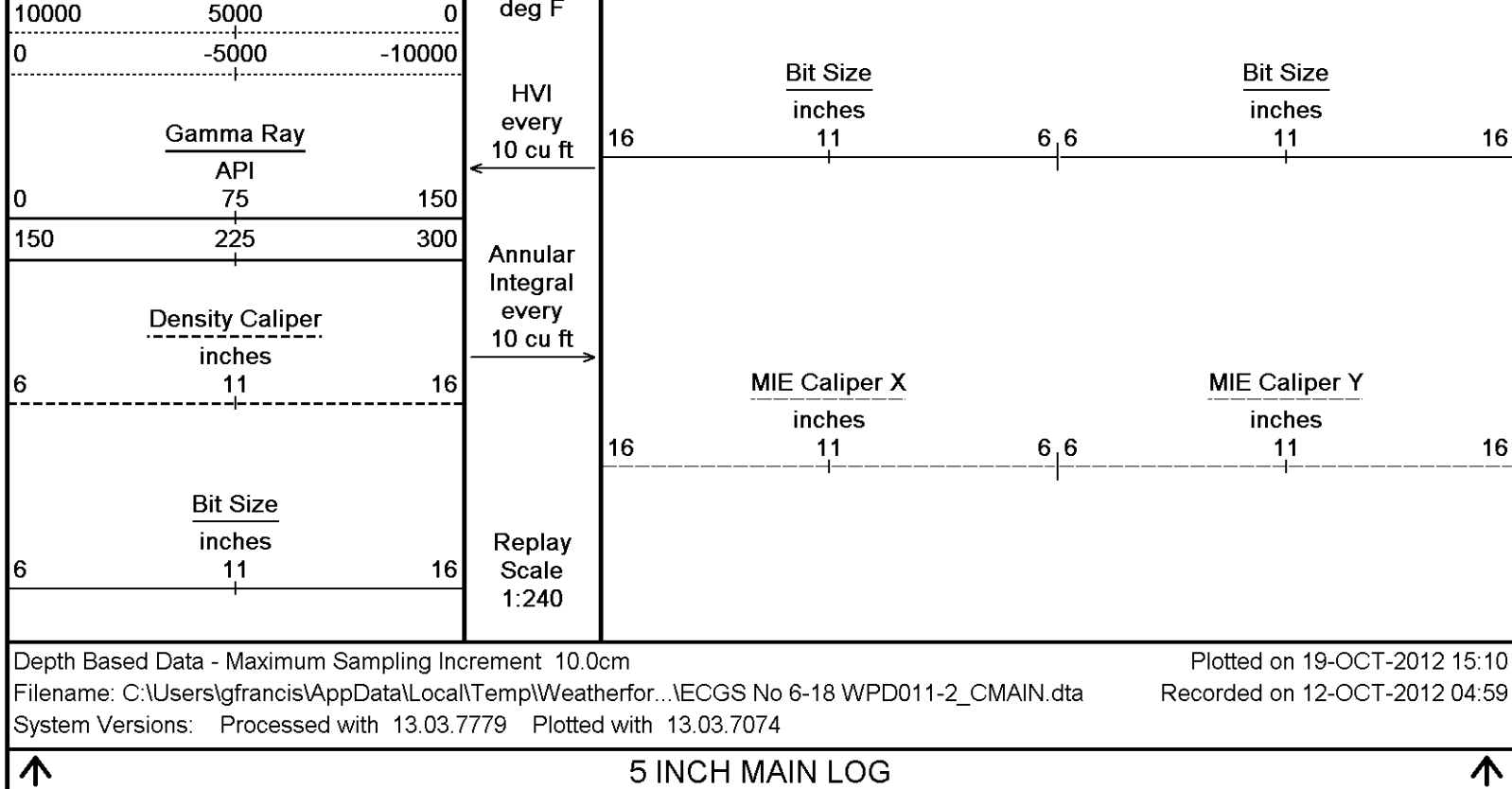
6.6

11

16

Timing Marks
every 60.0 sec

DST Uphole Tension
pounds



BEFORE SURVEY CALIBRATION			
C:\Users\gfrancis\AppData\Local\Temp\Weatherford PreView\0\ECGS No 6-18 WPD011-2_CMAIN.dta			
Down-hole Tension Calibration All 000			Field Calibration on 24-OCT-2010 03:34
Reading No	Measured		
1	15659.85	0.00	
2	15734.68	370.00	
General Constants All 000			Last Edited on 12-OCT-2012,04:36
General Parameters			
Mud Resistivity	3.750	ohm-metres	
Mud Resistivity Temperature	80.000	degrees F	
Water Level	0.000	feet	
Density/Neutron Processing	Wet Hole		
Hole/Annular Volume and Differential Caliper Parameters			
HVOL Method	Single Caliper		
HVOL Caliper 1	Density Caliper		
HVOL Caliper 2	N/A		
Annular Volume Diameter	7.000	inches	
Caliper for Differential Caliper	Density Caliper		
Rwa Parameters			
Porosity used	Base Density Porosity		
Resistivity used	Array Ind. One Res Rt		
RWA Constant A	0.610		
RWA Constant M	2.150		
Down-hole Tension Calibration SMS 0			Field Calibration on 12-OCT-2012 03:42
Reading No	Measured	Calibrated (lbs)	
1	15453.02	0.00	
2	16669.25	532.00	
Gamma Calibration MCG-D.K 483			Field Calibration on 10-OCT-2012 11:48
	Measured	Calibrated (API)	
Background	71	48	
Calibrator (Gross)	839	567	
Calibrator (Net)	767	519	

Gamma Constants MCG-D.K 483				Last Edited on 05-OCT-2012,14:10
Gamma Calibrator Number	GRCC119			
Mud Density	1.00	gm/cc		
Caliper Source for Processing	Density Caliper			
Tool Position	Eccentred			
Concentration of KCl	0.00	kppm		

SP Calibration MCG-D.K 483				Field Calibration on 23-SEP-2012,10:15
	Measured	Calibrated (mV)		
Reference 1	100.0	100.0		
Reference 2	-100.0	-100.0		

High Resolution Temperature Calibration MCG-D.K 483				Field Calibration on 30-SEP-2012,04:09
	Measured	Calibrated(Deg F)		
Lower	50.00	50.00		
Upper	75.00	75.00		

High Resolution Temperature Constants MCG-D.K 483				Last Edited on 02-OCT-2012,09:19
Pre-filter Length	11			

Neutron Calibration MDN-B.J 372				Base Calibration on 09-OCT-2012 10:28	
				Field Check on 10-OCT-2012 11:57	
Base Calibration					
		Measured		Calibrated (cps)	
		Near	Far	Near	Far
		2898	88	3714	110
Ratio		32.889		33.764	
Field Calibrator at Base				Calibrated (cps)	
				2351	3475
Ratio				0.677	
Field Check				Calibrated (cps)	
Ratio					

Neutron Constants MDN-B.J 372				Last Edited on 12-OCT-2012,01:28
Neutron Source Id	P31115B			
Neutron Jig Number	NJ5299			
Epithermal Neutron	No			
Caliper Source for Processing	Density Caliper			
Stand-off	0.00	inches		
Mud Density	1.00	gm/cc		
Limestone Sigma	7.10	cu		
Sandstone Sigma	7.00	cu		
Dolomite Sigma	4.70	cu		
Formation Pressure Source	None			
Formation Pressure	N/A	kpsi		
Temperature Source	MCG External Temperature			
Temperature	N/A	degrees F		
Mud Salinity	0.00	kppm		
Salinity Correction	Not Applied			
Formation Fluid Salinity Source	None			
Formation Fluid Salinity	N/A	kppm		
Barite Mud Correction	Not Applied			

Navigation Constants MIE-A.J 244				Last Edited on 12-OCT-2012,01:34
Magnetic Declination	7.96	degrees	East	

Accelerometer Parameters MIE-A.J 244				
Date Of Last Accelerometer Calibration	11-OCT-2012,10:31			
	X Accelerometer	Y Accelerometer	Z Accelerometer	
Slope	-1.102009	-1.105650	-1.102611	
Offset	-0.007164	0.006376	-0.004580	

Accelerometer Calibrator Number 000

Accelerometer Temperature Characterisation

X Accelerometer

Serial Number	1016			
Calibration Date	12-Apr-2011			
	B0	B1	B2	B3
Bias(g)	0.00000e+000	1.93698e-005	-7.60293e-010	6.54727e-011
	SF0	SF1	SF2	SF3
Scale Factor(mA/g)	3.00000e+000	2.59257e-004	6.13375e-007	-3.90888e-010

Y Accelerometer

Serial Number	973			
Calibration Date	19-Jan-2011			
	B0	B1	B2	B3
Bias(g)	0.00000e+000	1.95276e-005	-1.88058e-008	2.74122e-010
	SF0	SF1	SF2	SF3
Scale Factor(mA/g)	3.00000e+000	2.75268e-004	3.53140e-007	7.52116e-010

Z Accelerometer

Serial Number	1032			
Calibration Date	18-Apr-2011			
	B0	B1	B2	B3
Bias(g)	0.00000e+000	-1.14960e-005	3.94288e-009	8.97135e-011
	SF0	SF1	SF2	SF3
Scale Factor(mA/g)	3.00000e+000	2.88058e-004	2.44833e-007	8.38007e-010

Imager Pad Check MIE-A.J 244

Field Check on

Pad 1	Pad Not Tested	Pad 5	Pad Not Tested
Pad 2	Pad Not Tested	Pad 6	Pad Not Tested
Pad 3	Pad Not Tested	Pad 7	Pad Not Tested
Pad 4	Pad Not Tested	Pad 8	Pad Not Tested

Compact Micro Imager Constants MIE-A.J 244

Last Edited on 11-OCT-2012,10:00

Sonde Configuration	Imager Mode
Arm-Pad Kit	Normal Pads (12.25 in)
Arm-Pad Kit Serial Number	
Centre Pad 1 Rotational Offset	0.00 degrees
Image/Borehole Ovality Reference	Azimuth of Pad 1
Non Active Buttons	Omit
Search Angle	0.00 degrees
Correlation Interval	3.28 feet
Correlation Step	1.64 feet
Current Offset	0.0000 mAmp
Squasher Start	N/A mAmp
Image Processing	Enabled

Caliper Calibration MIE-A.J 244

Base Calibration on 11-OCT-2012 10:08

Field Calibration on 11-OCT-2012 10:27

Base Calibration

Reading No	Pads 1-5 Meas.	Pads 3-7 Meas.	Calibrator Size (in)
1	26777	25896	5.97
2	36873	36467	7.96
3	45055	46131	9.87
4	50842	56738	11.92
5	0	0	0.00

Reading No	Pad 2 Meas.	Pad 4 Meas.	Pad 6 Meas.	Pad 8 Meas.	Calibrator Size (in)
1	24919	26114	24194	25099	5.97
2	34321	34565	32478	34129	7.96
3	41481	44009	41829	41403	9.87
4	47591	57263	54975	47514	11.92
5	0	0	0	0	0.00

Field Calibration

Measured	Measured	Actual
Pads 1-5 Caliper(in)	Pads 3-7 Caliper(in)	Caliper(in)
7.87	7.93	7.96

	Measured Pad 2 Caliper(in) 3.93	Measured Pad 4 Caliper(in) 4.02	Measured Pad 6 Caliper(in) 4.01	Measured Pad 8 Caliper(in) 3.93	Actual Caliper(in) 7.96
Caliper Constants MIE-A.J 244					Last Edited on 11-OCT-2012,09:58
Caliper Difference for BRKT		0.120	inches		
Magnetometer Parameters MIE-A.J 244					
Date Of Last Magnetometer Calibration		12-OCT-2012,01:37			
	X Magnetometer	Y Magnetometer		Z Magnetometer	
Slope	-1.000000	-1.000925		-0.993497	
Offset	0.008903	-0.008749		0.009457	
Magnetometer Constants MIE-A.J 244					Last Edited on
Magnetometer Calibrator Number		000			
FE Calibration MFE-A.A 76					Base Calibration on 08-OCT-2012 10:03 Field Check on 10-OCT-2012 12:57
Base Calibration					
		Measured	Calibrated (ohm-m)		
Reference 1		0.0	0.0		
Reference 2		965.4	126.8		
Base Check		279.7			
Field Check		279.9			
FE Constants MFE-A.A 76					Last Edited on 12-OCT-2012,01:38
Running Mode		No Sleeve			
MFE K Factor		0.1268			
Caliper Source for FE correction		Density Caliper			
Caliper Value for FE correction		N/A		inches	
Rm Source for FE correction		Temperature Corr			
Temp. for Rm Corr.		MCG External Temperature			
Stand-off		1.0		inches	
High Resolution Temperature Calibration MAI-B.A 248					Field Calibration on 04-DEC-2010,07:58
		Measured	Calibrated(Deg C)		
Lower		10.00	10.00		
Upper		100.00	100.00		
High Resolution Temperature Constants MAI-B.A 248					Last Edited on
Pre-filter Length		11			
Induction Calibration MAI-B.A 248					Base Calibration on 04-DEC-2010,07:57 Field Check on 10-OCT-2012 11:18
Base Calibration					
Test Loop Calibration		Measured		Calibrated (mmho/m)	
Channel	Low	High	Low	High	
1	16.8	468.4	9.3	966.2	
2	5.9	377.9	7.6	821.4	
3	3.4	262.7	5.2	566.0	
4	1.4	135.2	2.6	279.2	
Array Temperature		23.8	Deg F		
Channel		Base Check (mmho/m)		Field Check (mmho/m)	
	Low	High	Low	High	
1	13.6	3891.2	13.7	3892.5	
2	30.9	3583.5	31.0	3583.8	
3	28.6	3026.5	28.6	3026.4	
4	20.3	2044.8	20.3	2044.9	
Deep	17.4	1910.3	17.4	1910.2	
Medium	41.3	4021.3	41.3	4021.0	
Shallow	46.4	5394.9	46.5	5395.5	
Array Temperature		63.5	65.5	Deg F	

Induction Model	RtAP-WBM		
Caliper for Borehole Corr.	Density Caliper		
Hole Size for Borehole Correction	N/A	inches	
Tool Centred	No		
Stand-off Type	Fins		
Stand-off	1.00	inches	
Number of Fins on Stand-off	6.0000		
Stand-off Fin Angle	60.00	degrees	
Stand-off Fin Width	0.5000	inches	
Borehole Corr. Rm Source	Temperature Corr		
Temp. for Rm Corr.	MCG External Temperature		
Squasher Start	0.0020	mhos/metre	
Squasher Offset	N/A	mhos/metre	

Borehole Normalisation

DRM1	0.0000	DRC1	0.0000
DRM2	0.0000	DRC2	0.0000
MRM1	0.0000	MRC1	0.0000
MRM2	0.0000	MRC2	0.0000
SRM1	0.0000	SRC1	0.0000
SRM2	0.0000	SRC2	0.0000

Calibration Site Corrections

Channel 1	0.00	mmhos/metre
Channel 2	0.00	mmhos/metre
Channel 3	0.00	mmhos/metre
Channel 4	0.00	mmhos/metre

Apparent Porosity and Water Saturation Constants

Archie Constant (A)	1.00	
Cementation Exponent (M)	2.00	
Saturation Exponent (N)	2.00	
Saturation of Water for Apor	100.00	percent
Resistivity of Water for Apor and Sw	0.05	ohm-m
Resistivity of Mud Filtrate for Sw	0.00	ohm-m
Source for Rt	0.00	
Source for Rxo	0.00	

Caliper Calibration MPD-C.J 378

Base Calibration on 08-OCT-2012 11:28

Field Calibration on 10-OCT-2012 11:35

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	14064	3.99
2	22752	5.97
3	31206	7.96
4	39310	9.87
5	48416	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.90	7.96

Photo Density Calibration MPD-C.J 378

Base Calibration on 08-OCT-2012 11:54

Field Check on 10-OCT-2012 11:42

Density Calibration

Base Calibration	Measured		Calibrated (sdu)	
	Near	Far	Near	Far
Reference 1	39256	12407	52994	19128
Reference 2	18793	2214	25185	2558

Field Check at Base

1202.8	1285.3
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Field Check

1197.1	1283.5
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PE Calibration

Base Calibration	Measured	Calibrated
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	WS	WH	Ratio	Ratio
Background	217	1077		
Reference 1	13471	39095	0.349	0.309
Reference 2	5343	18659	0.292	0.274

Field Check at Base
217.1 1076.8

Field Check
220.8 1070.2

Density Constants MPD-C.J 378

Last Edited on 12-OCT-2012,01:29

Density Source Id P15771B
Nylon Calibrator Number DNC-D-527
Aluminium Calibrator Number DAC-D-527
Density Shoe Profile 8 inch
Caliper Source for Processing Density Caliper
PE Correction to Density Not Applied
Mud Density 1.17 gm/cc
Mud Density Z/A Multiplier 1.11
Mud Filtrate Density 1.00 gm/cc
Dry Hole Mud Filtrate Density 1.00 gm/cc
DNCT 0.00 gm/cc
CRCT 0.00 gm/cc
Density Z/A Correction Hybrid

Matrix Density (gm/cc)	Depth (ft)
2.65	
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00
0.00	0.00

DOWNHOLE EQUIPMENT

C:\Users\gfrancis\AppData\Local\Temp\Weatherford PreView\0\ECGS No 6-18 WPD011-2_CMAIN.dta

3/8" Triple Cone Cable Head (MCB C A)
MCB-C.A 5 LG: 1.58 ft WT: 15.4 lb OD: 2.24 in

SHA-H Compact Swivel Head Adaptor
SHA-H 142 LG: 2.30 ft WT: 22.0 lb OD: 2.24 in

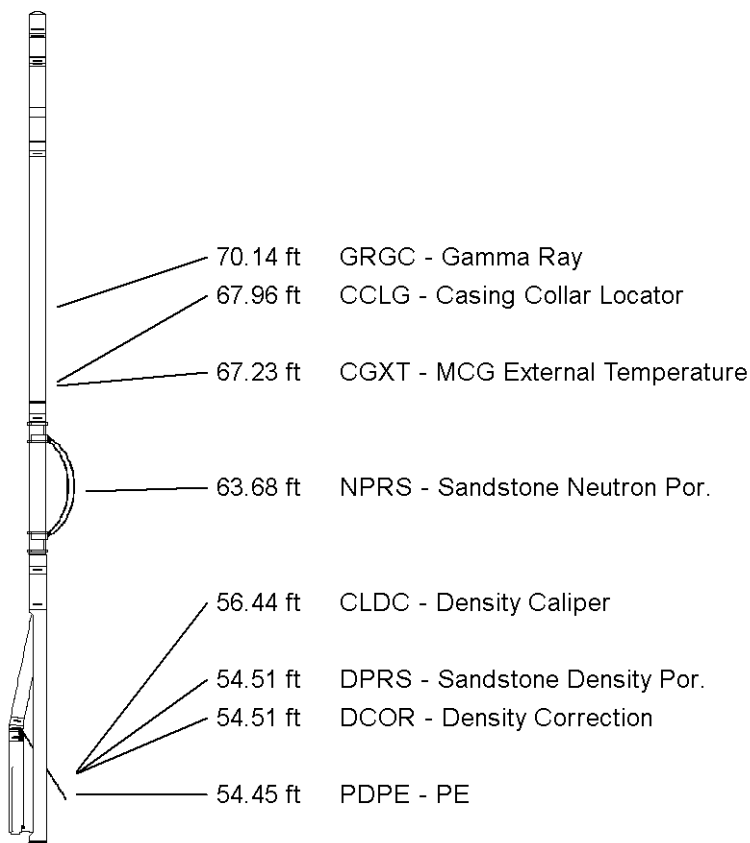
Compact Comms Gamma
MCG-D.K 483 LG: 8.70 ft WT: 63.9 lb OD: 2.24 in

Compact Neutron
MDN-B.J 372 LG: 5.04 ft WT: 50.7 lb OD: 2.24 in

Compact Density/Caliper
MPD-C.J 378 LG: 9.59 ft WT: 90.4 lb OD: 2.45 in

MIS-A.A Compact Inline Bowspring sub
MIS-A.A 70 LG: 5.70 ft WT: 33.1 lb OD: 2.24 in

SKJ-D.A Compact Knuckle Joint



SKJ-D.A 112 LG: 2.17 ft WT: 24.3 lb OD: 2.24 in

MIS-E.A Compact Inline Standoff sub

MIS-E.A 334 LG: 2.14 ft WT: 15.4 lb OD: 2.24 in

SKJ-D.A Compact Knuckle Joint

SKJ-D.A 143 LG: 2.17 ft WT: 24.3 lb OD: 2.24 in

SHA-J.B Compact Swivel Head Adaptor

SHA-J.B 574 LG: 2.30 ft WT: 22.0 lb OD: 2.24 in

Compact MMI Memory Section

MIM-A.J 244 LG: 4.65 ft WT: 26.5 lb OD: 2.24 in

Compact MMI Electrode Section

MIE-A.J 244 LG: 13.96 ft WT: 99.2 lb OD: 4.09 in

SKJ-E.B Compact Knuckle Joint

SKJ-E.B 583 LG: 2.17 ft WT: 24.3 lb OD: 2.24 in

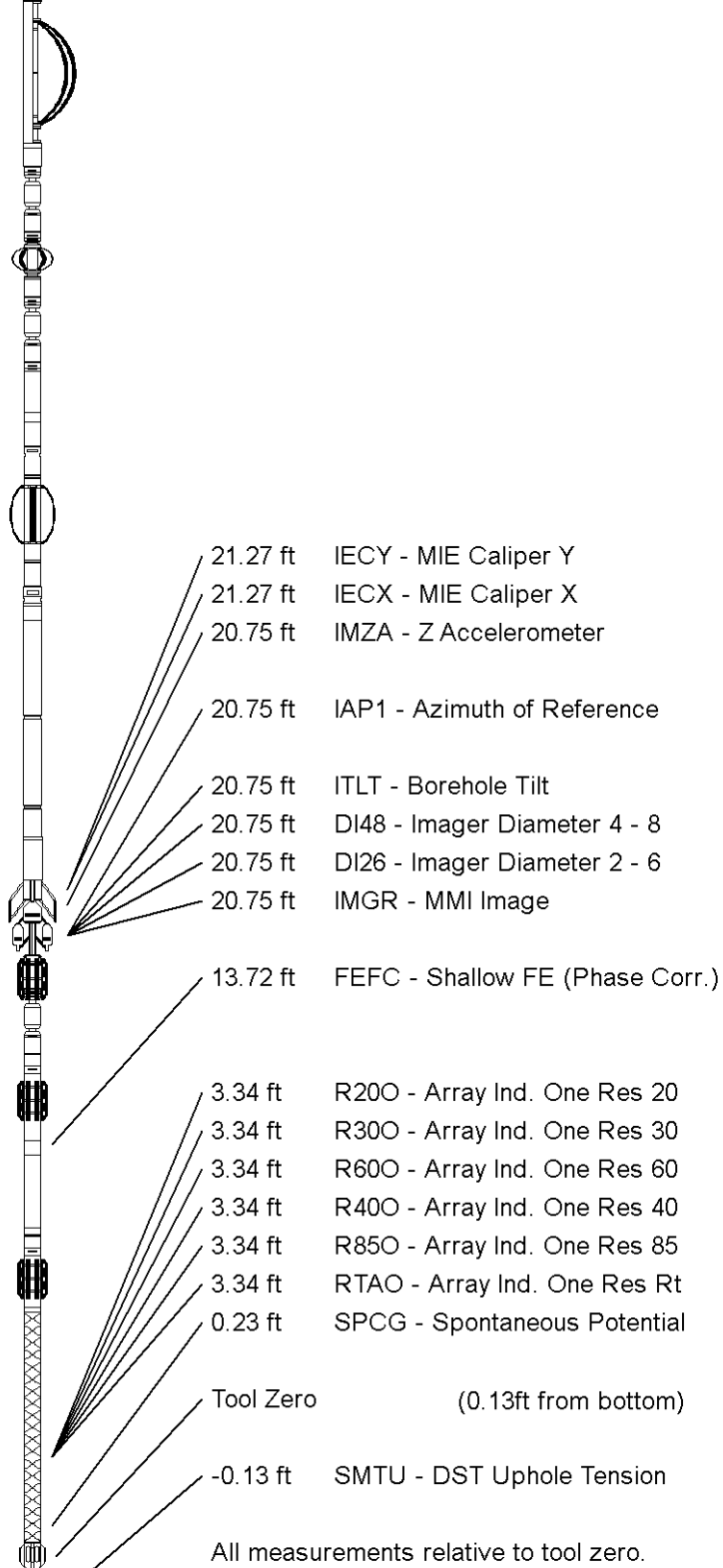
Compact Focussed Electric

MFE-A.A 76 LG: 6.05 ft WT: 48.5 lb OD: 2.24 in

Compact Induction

MAI-B.A 248 LG: 10.81 ft WT: 48.5 lb OD: 2.24 in

Total Length: 79.30 ft Weight: 608.5 lb



COMPANY

EAST CHEYENNE GAS STORAGE LLC

WELL

ECGS No 6-18 WPD011-2

FIELD

PEETZ WEST

PROVINCE/COUNTY

LOGAN

COUNTRY/STATE

USA/COLORADO

Elevation Kelly Bushing 4564.00 feet

Elevation Drill Floor 4563.00 feet

Elevation Ground Level 4550.00 feet

First Reading 5208.00 feet

Depth Driller 5260.00 feet

Depth Logger 5264.00 feet



CALIBER

