

**Weatherford**<sup>®</sup>**COMPACT TRIPLE COMBO  
QUICKLOOK  
LOGS**

COMPANY EAST CHEYENNE GAS STORAGE LLC  
WELL ECGS No 6-15 WPD002-1  
FIELD PEETZ WEST  
PROVINCE/COUNTY LOGAN  
COUNTRY/STATE US/COLORADO  
LOCATION 1611' FNL & 999' FWL

SEC TWP RGE Other Services  
6 11N 52W CMI  
API Number 05-075-09401  
Permit Number

Permanent Datum GL, Elevation 4556 feet  
Log Measured From KB  
Drilling Measured From KB

Elevations:  
KB 4570.00  
DF 4569.00  
GL 4556.00

Date 13-NOV-2012

Run Number ONE

Depth Driller 5270.00 feet

Depth Logger 5265.00 feet

First Reading 5262.00 feet

Last Reading 4200.00 feet

Casing Driller 1228.00 feet

Casing Logger 1226.00 feet

Bit Size 8.750 inches

Hole Fluid Type WBM

Density / Viscosity 9.90 g/cc 53.00 CP

PH / Fluid Loss 9.00 7.20 ml/30Min

Sample Source FLOWLINE

Rm @ Measured Temp 3.10 @ 85.7 ohm-m

Rmf @ Measured Temp 2.48 @ 85.7 ohm-m

Rmc @ Measured Temp 3.72 @ 85.7 ohm-m

Source Rmf / Rmc CALC CALC

Rm @ BHT 1.70 @159.0 ohm-m

Time Since Circulation 4 HOURS

Max Recorded Temp 159.00 deg F

Equipment Name COMPACT

Equipment / Base 13037 RK SPR

Recorded By B.ROSSER

Witnessed By A. ASHBY

L. CARRASCO

**BOREHOLE RECORD**

Last Edited: 13-NOV-2012 08:43

Bit Size inches	Depth From feet	Depth To feet
8.750	1226.00	5270.00

**CASING RECORD**

Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	9.625	0.00	1226.00	36.00

**REMARKS**

SOFTWARE VERSION 13.02.6600  
TOOLS RUN: MCG, MDN, MPD, MIM, MIE, MFE, MAI RUN IN COMBINATION.

HARDWARE: MPD: 8" PROFILE PLATE USED.  
MAI: TWO 1 INCH STANDOFFS USED.  
MDN: DUAL BOWSPRING USED.  
MIM: CENTRALIZER BOWSPRING USED.

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

IMAGE LOG RAN OVER BOTTOM 500 FT.

LATITUDE: 40.95937  
LONGITUDE: -103.22532

TOTAL HOLE VOLUME FROM TD TO SURFACE CASING =1720 CUBIC FEET

ANNULAR VOLUME WITH 7 INCH PRODUCTION CASING FROM TD TO SURFACE CASING =652 CUBIC FEET

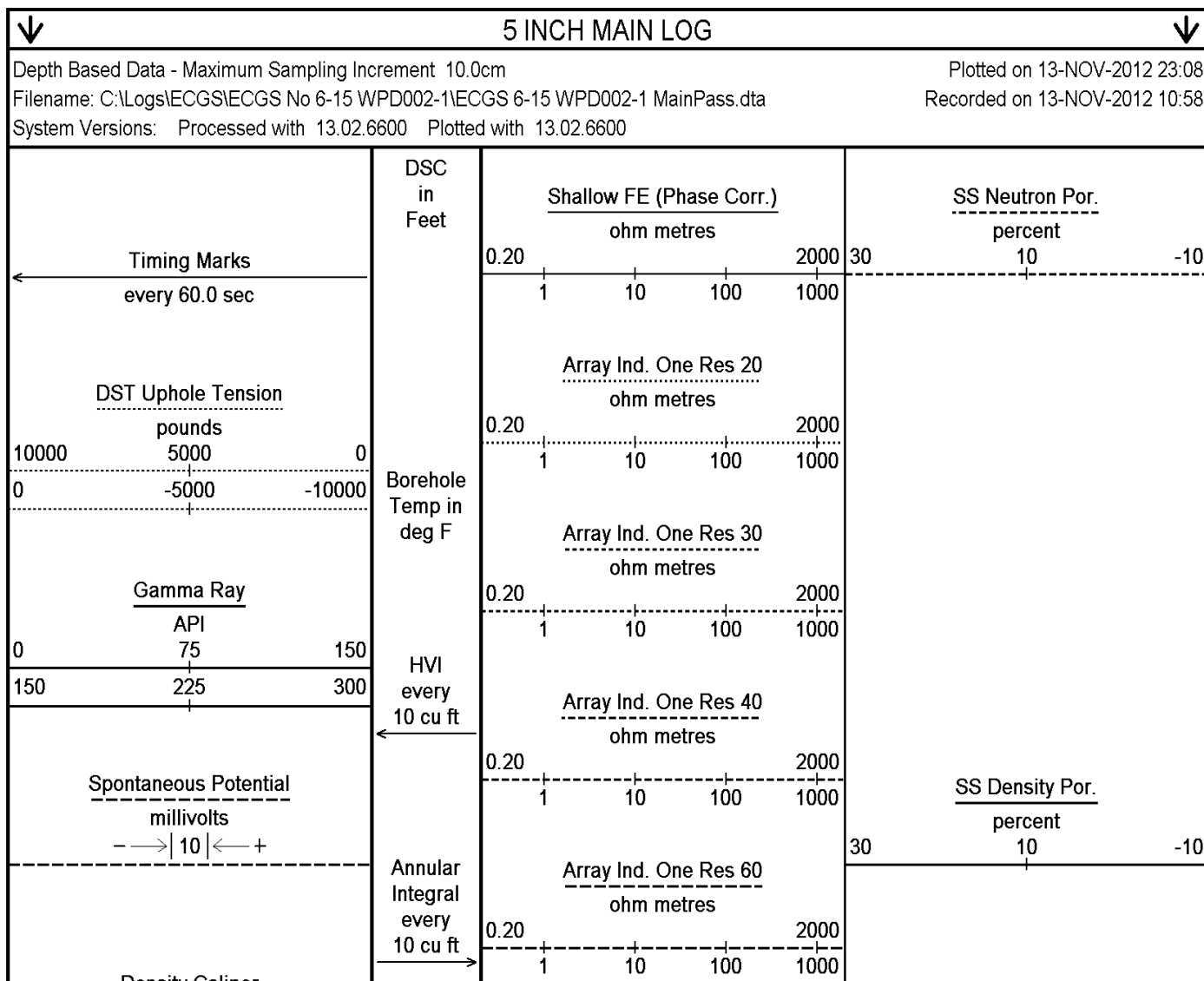
TOTAL VOLUME FROM TD TO 4200 FT =415 CUBIC FEET

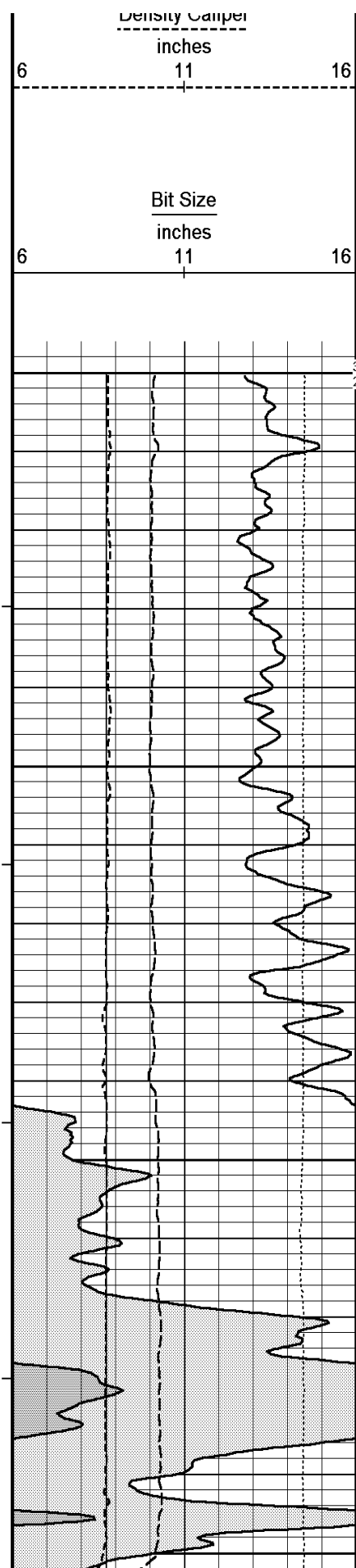
ANNULAR VOLUME WITH 7 INCH PRODUCTION CASING FROM TD TO 4200 FT =145 CUBIC FEET

SERVICE ORDER: 3535305

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.





Replay  
Scale  
1:240

4200

400 144°

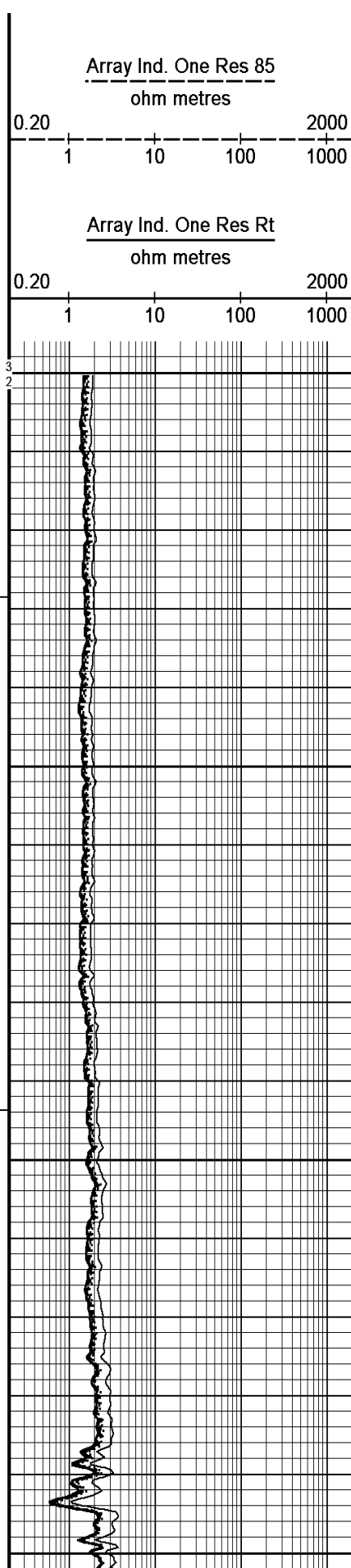
4250

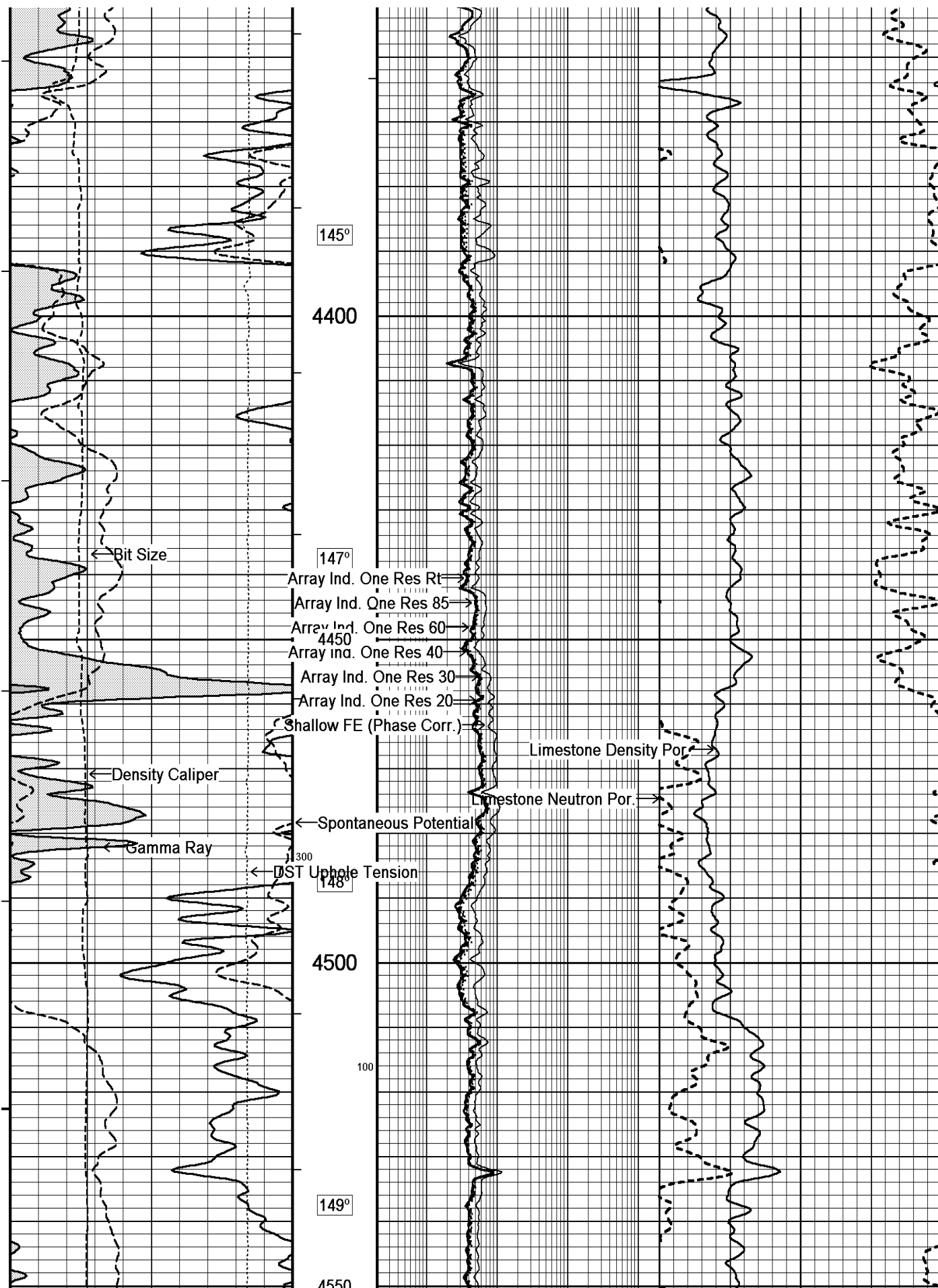
144°

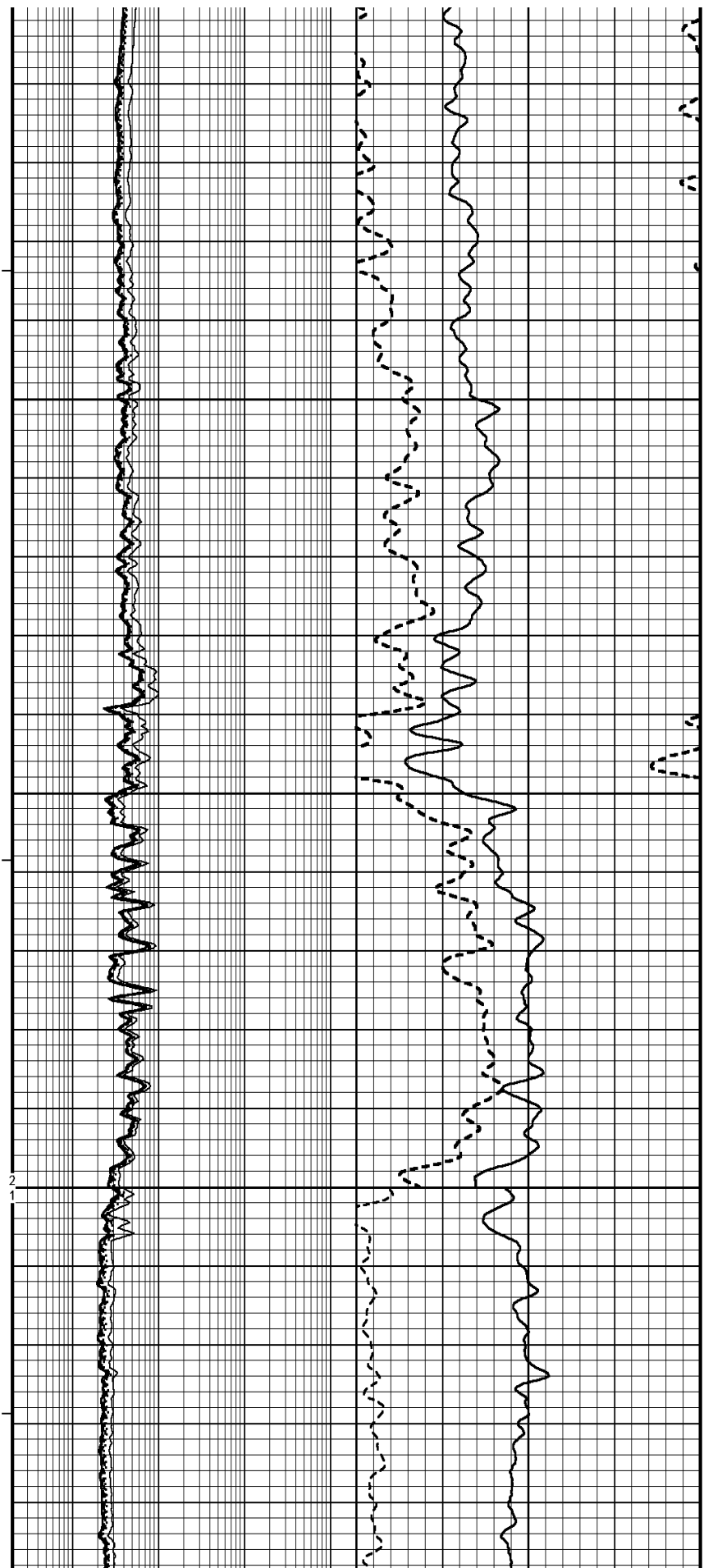
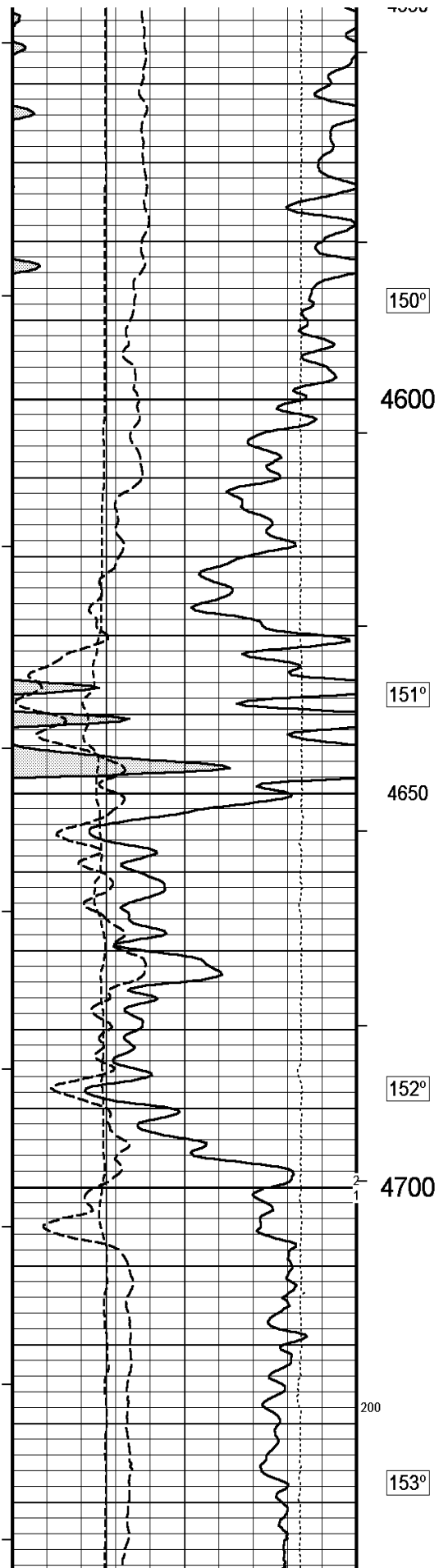
4300

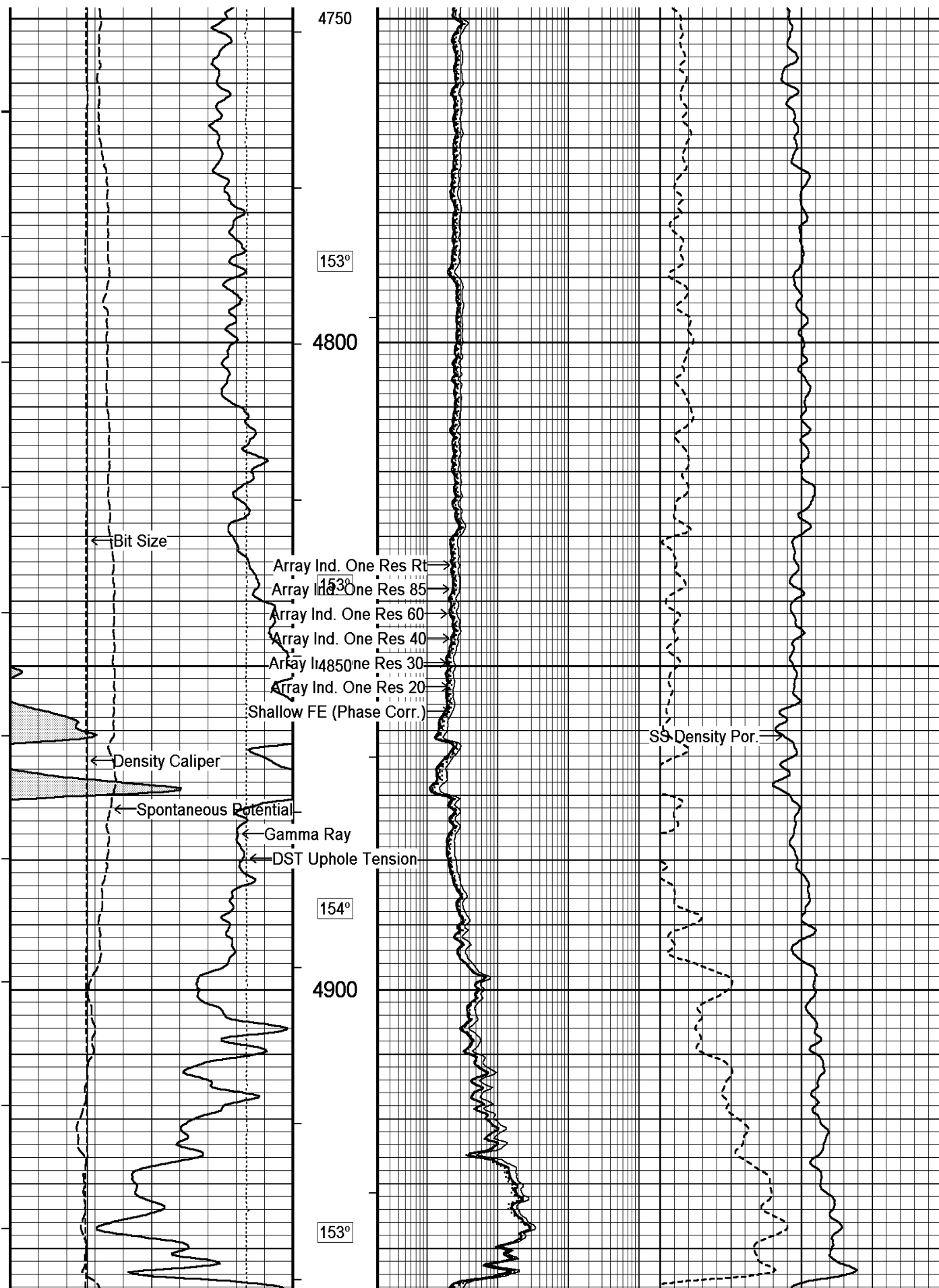
143°

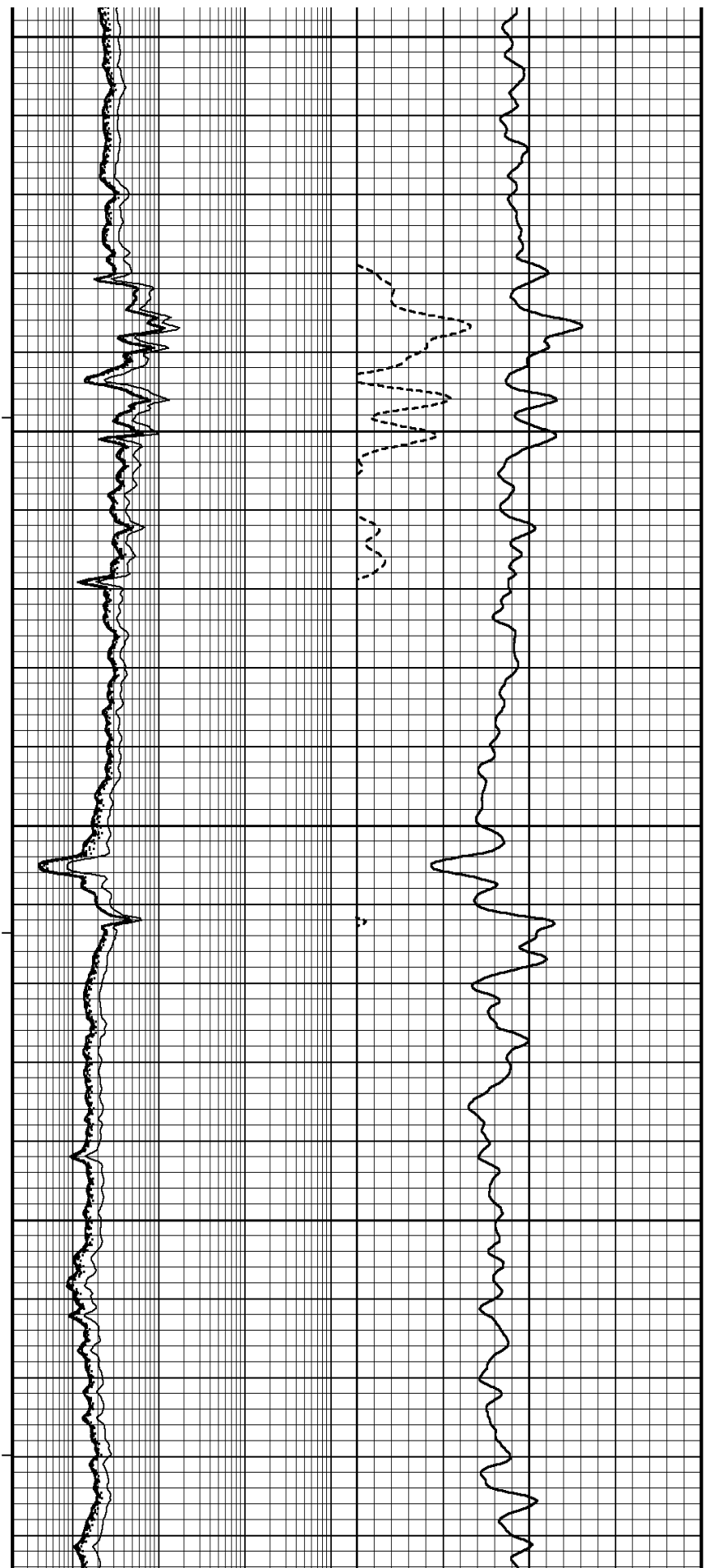
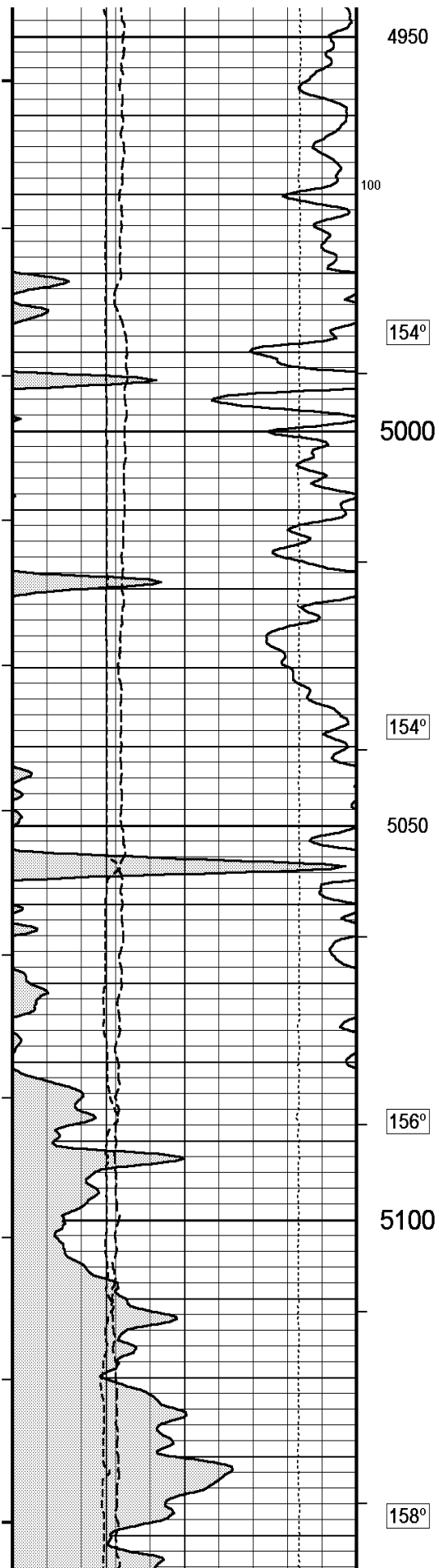
4350

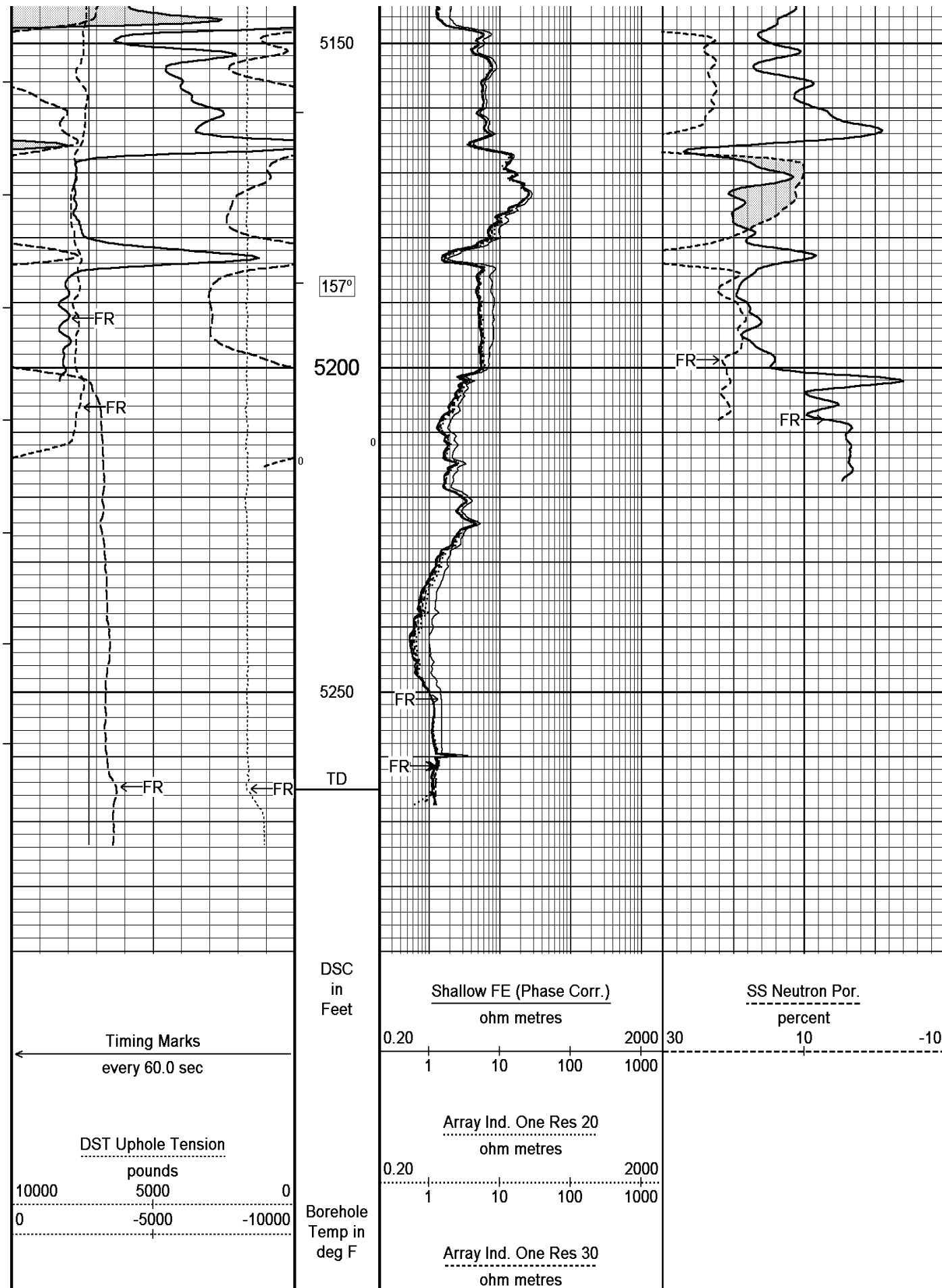




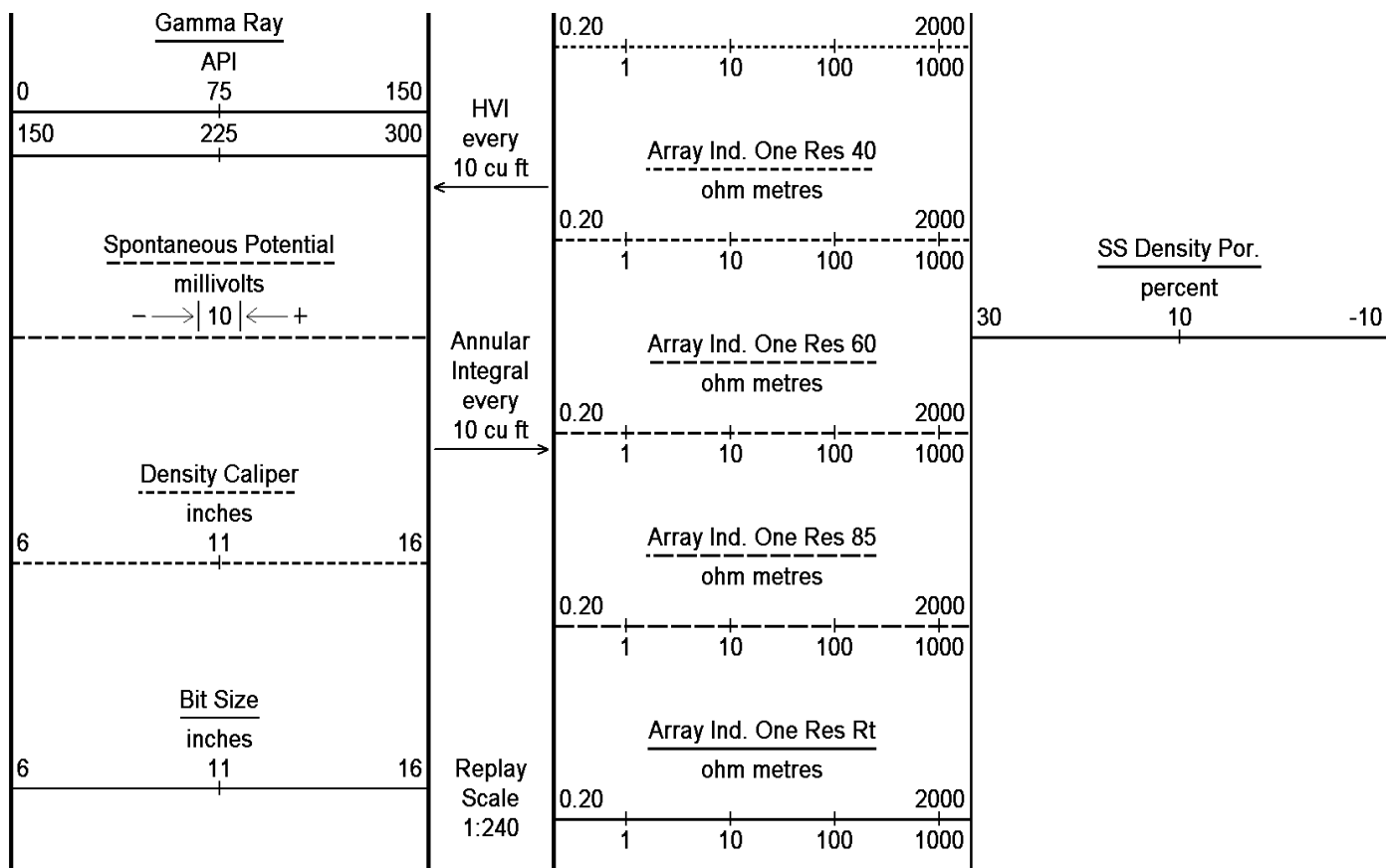












Depth Based Data - Maximum Sampling Increment 10.0cm

Filename: C:\Logs\ECGS\ECGS No 6-15 WPD002-1\ECGS 6-15 WPD002-1 MainPass.dta

System Versions: Processed with 13.02.6600 Plotted with 13.02.6600

Plotted on 13-NOV-2012 23:08

Recorded on 13-NOV-2012 10:58

↑ 5 INCH MAIN LOG ↑

## BEFORE SURVEY CALIBRATION

C:\Logs\ECGS\ECGS No 6-15 WPD002-1\ECGS 6-15 WPD002-1 Repeat.dta

### Down-hole Tension Calibration All 000

Field Calibration on 24-OCT-2010 03:34

Reading No	Measured	0
1	15659.85	0.00
2	15734.68	370.00

### General Constants All 000

Last Edited on 13-NOV-2012,08:47

#### General Parameters

Mud Resistivity	3.100	ohm-metres
Mud Resistivity Temperature	85.700	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
DWA Constant A	0.610

RWA Constant A		0.010	
RWA Constant M		2.150	
Down-hole Tension Calibration SMS 0			Field Calibration on 13-NOV-2012 08:18
Reading No	Measured	Calibrated (lbs)	
1	15164.23	0.00	
2	16641.18	500.00	
High Resolution Temperature Calibration MCG-D.K 483			Field Calibration on 06-JUL-2012 14:06
	Measured	Calibrated(Deg F)	
Lower	0.00	0.00	
Upper	0.00	0.00	
High Resolution Temperature Constants MCG-D.K 483			Last Edited on
Pre-filter Length	11		
SP Calibration MCG-D.K 483			Field Calibration on 06-JUL-2012 14:06
	Measured	Calibrated (mV)	
Reference 1	100.6	100.1	
Reference 2	-98.9	-100.1	
Gamma Calibration MCG-D.K 483			Field Calibration on 12-NOV-2012 13:13
	Measured	Calibrated (API)	
Background	74	50	
Calibrator (Gross)	786	530	
Calibrator (Net)	712	480	
Gamma Constants MCG-D.K 483			Last Edited on 13-NOV-2012,04:36
Gamma Calibrator Number	GRCC-112		
Mud Density	1.00	gm/cc	
Caliper Source for Processing	Density Caliper		
Tool Position	Eccentred		
Concentration of KCl	0.00	kppm	
Neutron Calibration MDN-B.A 227			Base Calibration on 15-OCT-2012 15:48 Field Check on 12-NOV-2012 13:22
Base Calibration			
	Measured	Calibrated (cps)	
	Near Far	Near Far	
	2896 90	3714 110	
Ratio	32.069	33.764	
Field Calibrator at Base			
		Calibrated (cps)	
		1658 2365	
Ratio		0.701	
Field Check			
		Calibrated (cps)	
		1633 2356	
Ratio		0.693	
Neutron Constants MDN-B.A 227			Last Edited on 13-NOV-2012,04:35
Neutron Source Id	P44382B		
Neutron Jig Number	NEC43		
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	None			
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.A 174		Last Edited on 29-MAR-2010,02:58		
Magnetic Declination	0.00	degrees	East	
Magnetometer Parameters MIE-A.A 174				
Date Of Last Magnetometer Calibration	01-JAN-1998			
	X Magnetometer	Y Magnetometer	Z Magnetometer	
Slope	-1.000000	-1.010750	-0.999300	
Offset	0.009287	-0.020140	0.013025	
Magnetometer Constants MIE-A.A 174		Last Edited on		
Magnetometer Calibrator Number	000			
Accelerometer Parameters MIE-A.A 174				
Date Of Last Accelerometer Calibration	01-JAN-1998			
	X Accelerometer	Y Accelerometer	Z Accelerometer	
Slope	-1.108610	-1.104030	-1.096720	
Offset	0.005796	-0.001009	0.012654	
Accelerometer Constants MIE-A.A 174		Last Edited on 23-APR-2009,07:34		
Accelerometer Calibrator Number	000			
Accelerometer Temperature Characterisation				
X Accelerometer				
Serial Number	644			
Calibration Date	19-Aug-2008			
	B0	B1	B2	B3
Bias(g)	0.00000e+000	8.97681e-006	-1.88894e-008	1.27694e-010
	SF0	SF1	SF2	SF3
Scale Factor(mA/g)	3.00000e+000	2.72633e-004	2.24457e-007	1.11567e-009
Y Accelerometer				
Serial Number	679			
Calibration Date	24-Aug-2008			
	B0	B1	B2	B3
Bias(g)	0.00000e+000	2.76667e-005	-1.48113e-008	9.65949e-011
	SF0	SF1	SF2	SF3
Scale Factor(mA/g)	3.00000e+000	2.60693e-004	5.14448e-007	-1.83309e-010
Z Accelerometer				
Serial Number	687			
Calibration Date	30-Aug-2008			
	B0	B1	B2	B3
Bias(g)	0.00000e+000	-2.68884e-005	4.88649e-009	-1.07028e-011
	SF0	SF1	SF2	SF3
Scale Factor(mA/g)	3.00000e+000	2.65798e-004	2.86695e-007	9.16986e-010
Caliper Calibration MIE-A.A 174		Base Calibration on 13-NOV-2012 03:57 Field Calibration on 13-NOV-2012 03:58		
Base Calibration				
Reading No	Pads 1-5 Meas.	Pads 3-7 Meas.	Calibrator Size (in)	
1	26539	26547	5.96	


2	36989	37140	7.99		
3	46454	46711	9.86		
4	55567	58265	11.93		
5	0	0	0.00		
Reading No	Pad 2 Meas.	Pad 4 Meas.	Pad 6 Meas.	Pad 8 Meas.	Calibrator Size (in)
1	26424	25773	25566	25741	5.96
2	35767	34710	33739	34118	7.99
3	43766	42899	41717	42151	9.86
4	51706	54174	52590	50282	11.93
5	0	0	0	0	0.00
Field Calibration					
	Measured	Measured	Actual		
	Pads 1-5 Caliper(in)	Pads 3-7 Caliper(in)	Caliper(in)		
	8.02	7.97	7.99		
	Measured	Measured	Measured	Measured	Actual
	Pad 2 Caliper(in)	Pad 4 Caliper(in)	Pad 6 Caliper(in)	Pad 8 Caliper(in)	Caliper(in)
	4.00	3.96	3.99	4.05	7.99
Caliper Constants MIE-A.A 174			Last Edited on 13-NOV-2012,03:53		
Caliper Difference for BRKT		0.120	inches		
Imager Pad Check MIE-A.A 174					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.A 174			Last Edited on 13-NOV-2012,04:35		
Sonde Configuration	Imager Mode	degrees			
Arm-Pad Kit	Normal Pads (12.25 in)				
Centre Pad 1 Rotational Offset	0.00				
Image/Borehole Ovality Reference	Azimuth of Pad 1	degrees			
Non Active Buttons	Omit	feet			
Search Angle	0.00	feet			
Correlation Interval	3.28	mAmp			
Correlation Step	1.64	mAmp			
Current Offset	0.0000				
Squasher Start	N/A				
Image Processing	Enabled				
FE Calibration MFE-A.A 66			Base Calibration on 15-OCT-2012 13:42		
			Field Check on 12-NOV-2012 13:15		
Base Calibration					
	Measured	Calibrated (ohm-m)			
Reference 1	0.0	0.0			
Reference 2	997.0	126.8			
Base Check		272.6			
Field Check		272.7			
FE Constants MFE-A.A 66			Last Edited on 13-NOV-2012,04:34		
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			

FE Calibration MAI-A.A 165			Base Calibration on 12-FEB-2009 10:30 Field Check on 04-APR-2009 14:52	
Base Calibration				
	Measured	Calibrated (ohm-m)		
Reference 1	0.0	0.0		
Reference 2	976.9	126.8		
Base Check		277.9		
Field Check		278.3		
FE Constants MAI-A.A 165			Last Edited on 04-APR-2009,15:12	
Running Mode	0			
MFE K Factor	0.0000			
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-A.A 165			Field Calibration on 10-OCT-2011,15:43	
	Measured	Calibrated(Deg F)		
Lower	50.00	50.00		
Upper	75.00	75.00		
High Resolution Temperature Constants MAI-A.A 165			Last Edited on 15-OCT-2012,13:33	
Pre-filter Length	11			
Induction Calibration MAI-A.A 165			Base Calibration on 15-OCT-2012,13:08 Field Check on 12-NOV-2012 13:09	
Base Calibration				
Test Loop Calibration		Measured	Calibrated (mmho/m)	
Channel	Low	High	Low	High
1	17.2	469.6	9.3	966.2
2	6.7	392.8	7.6	821.4
3	4.2	262.3	5.2	566.0
4	1.6	136.6	2.6	279.2
Array Temperature		75.0	Deg F	
Channel	Base Check (mmho/m)		Field Check (mmho/m)	
	Low	High	Low	High
1	12.9	3869.0	11.7	3869.6
2	28.4	3433.8	28.0	3434.9
3	26.7	3021.4	26.5	3022.8
4	19.7	2016.0	19.6	2017.1
Deep	17.3	2011.3	17.2	2012.6
Medium	37.6	3970.8	37.4	3972.6
Shallow	41.2	5011.9	40.6	5012.9
Array Temperature		69.2	53.8	Deg F
Induction Constants MAI-A.A 165			Last Edited on 13-NOV-2012,04:34	
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	0.0500	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.A 195			Base Calibration on 15-OCT-2012 13:53 Field Calibration on 12-NOV-2012 13:26
Base Calibration			
Reading No	Measured	Calibrator Size (in)	
1	15007	4.00	
2	23645	5.96	
3	32400	7.99	
4	40464	9.86	
5	49760	11.93	
6	N/A	N/A	
Field Calibration			
	Measured Caliper (in)	Actual Caliper (in)	
	7.94	7.99	
Photo Density Calibration MPD-C.A 195			Base Calibration on 15-OCT-2012 14:12 Field Check on 12-NOV-2012 13:30
Density Calibration			
Base Calibration		Measured	Calibrated (sdu)
	Near	Far	Near Far
Reference 1	38135	13267	52994 19128
Reference 2	18092	1824	25188 2558
Field Check at Base			
	670.1	775.1	
Field Check			
	670.6	777.0	
PE Calibration			
Base Calibration		Measured	Calibrated
	WS	WH	Ratio
Background	122	602	Ratio
Reference 1	13157	38045	0.348 0.309

Reference 2	5216	18018	0.292	0.274
Field Check at Base	122.4	602.2		
Field Check	121.8	604.5		
Density Constants MPD-C.A 195				Last Edited on 13-NOV-2012,08:48
Density Source Id	2859GW			
Nylon Calibrator Number	527			
Aluminium Calibrator Number	527			
Density Shoe Profile	8 inch			
Caliper Source for Processing	Density Caliper			
PE Correction to Density	Not Applied			
Mud Density	1.18		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)			
2.68	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	0.00			

DOWNHOLE EQUIPMENT	
C:\Logs\IEGS\IEGS No 6-15 WPD002-1\IEGS 6-15 WPD002-1 Repeat.dta	
SHA-J.B Compact Swivel Head Adaptor SHA-J.B 511 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.A 227 LG: 5.04 ft WT: 50.7 lb OD: 2.24 in	
Compact Density/Caliper MPD-C.A 195 LG: 9.59 ft WT: 90.4 lb OD: 2.45 in	
MIS-D.B Compact Inline Bowspring sub MIS-D.B 696 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	



72.44 ft GRGC - Gamma Ray

65.98 ft NPRS - Sandstone Neutron Por.

65.98 ft NPRL - Limestone Neutron Por.

58.74 ft CLDC - Density Caliper

56.81 ft DPRS - Sandstone Density Por.

56.81 ft DPRL - Limestone Density Por.

56.81 ft DEN - Compensated Density

56.81 ft DEN - Compensated Density

56.81 ft DCOR - Density Correction

56.75 ft PDPE - PE

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

SHA-J.B Compact Swivel Head Adaptor  
SHA-J.B 510 LG: 2.30 ft WT: 22.0 lb OD: 2.24 in

Compact MMI Memory Section  
MIM-A.A 174 LG: 4.65 ft WT: 26.5 lb OD: 2.24 in

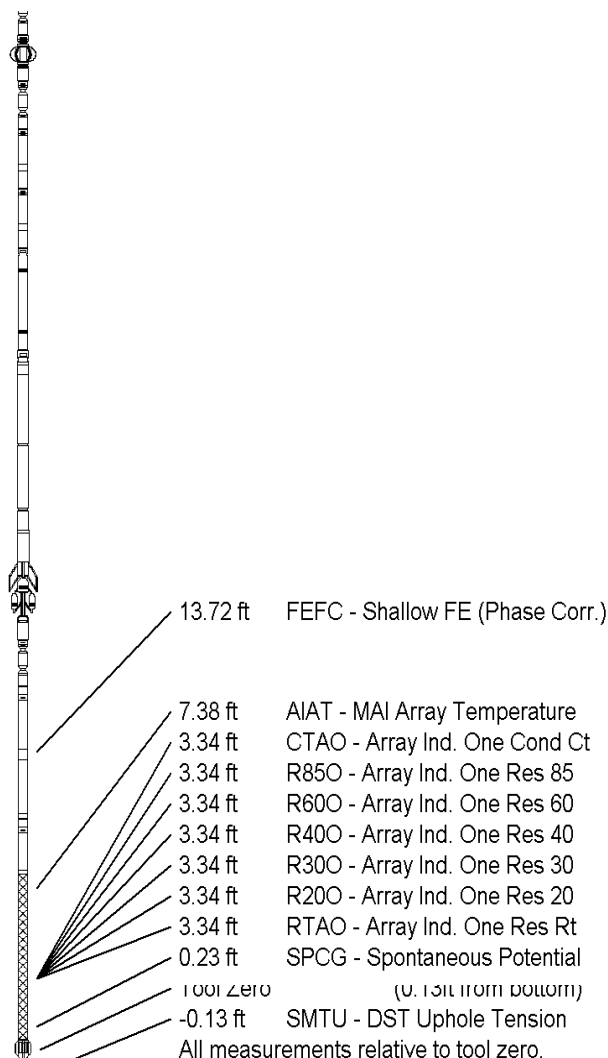
Compact MMI Electrode Section  
MIE-A.A 174 LG: 13.96 ft WT: 99.2 lb OD: 4.09 in

SKJ-D.A Compact Knuckle Joint  
SKJ-D.A 66 LG: 2.17 ft WT: 24.3 lb OD: 2.24 in

Compact Focussed Electric  
MFE-A.A 66 LG: 6.05 ft WT: 48.5 lb OD: 2.24 in

Compact Induction  
MAI-A.A 165 LG: 10.81 ft WT: 48.5 lb OD: 2.24 in

Total Length: 80.03 ft Weight: 615.1 lb



COMPANY	EAST CHEYENNE GAS STORAGE LLC
WELL	ECGS No 6-15 WPD002-1
FIELD	PEETZ WEST
PROVINCE/COUNTY	LOGAN
COUNTRY/STATE	USA/COLORADO

Elevation Kelly Bushing	4570.00	feet	First Reading	5262.00	feet
Elevation Drill Floor	4569.00	feet	Depth Driller	5270.00	feet
Elevation Ground Level	4556.00	feet	Depth Logger	5265.00	feet



**Weatherford®**

COMPACT TRIPLE COMBO  
QUICKLOOK  
LOGS



