



Weatherford®

**DUAL LATEROLOG
MICRO RESISTIVITY
LOG**

COMPANY		KINDER MORGAN C02 Co. L.P	
WELL		DOE CANYON #14	
FIELD		DOE CANYON	
PROVINCE/COUNTY		DOLORES	
COUNTRY/STATE		U.S.A. / COLORADO	
LOCATION		987' FSL & 2384' FEL	
SEC 9	TWP 40N	RGE 18W	Other Services MPD/MDN MIE MSG
API Number		05-033-06177-01	MSG
Permanent Datum GL, Elevation		7105 feet	
Log Measured From		KB	Elevations: KB 7130.00 DF 7130.00 GL 7105.00
Drilling Measured From		KB @ 25 FEET	
Date	17-AUG-2013		
Run Number	ONE		
Service Order	3529584		
Depth Driller	8502.00		feet
Depth Logger	8502.00		feet
First Reading	8500.00		feet
Last Reading	8360.00		feet
Casing Driller	8368.00		feet
Casing Logger	8364.00		feet
Bit Size	6.000		inches
Hole Fluid Type	H2O		
Density / Viscosity	8.40 g/cc		
PH / Fluid Loss			
Sample Source			
Rm @ Measured Temp	0.92 @ 72.0		ohm-m
Rmf @ Measured Temp	0.74 @ 72.0		ohm-m
Rmc @ Measured Temp	1.10 @ 72.0		ohm-m
Source Rmf / Rmc	CALC	CALC	
Rm @ BHT	0.39 @ 177.0		ohm-m
Time Since Circulation	8 HOURS		
Max Recorded Temp	177.00		deg F
Equipment / Base	13173		GJ/CO
Recorded By	S. LACKEY		P. BATES
Witnessed By	C. SLAUGH		

BOREHOLE RECORD					Last Edited: 01-JAN-2002 00:15
Bit Size inches		Depth From feet		Depth To feet	
6.000		8368.00		8503.00	
CASING RECORD					
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft	
INTERMED	7.000	0.00	8368.00	29.00	

REMARKS
WLS VERSION 13.06.9802
TOOLS IN THREE SEPERATE RUNS: 1ST RUN: SHA, MBE, MBE, MCG, MUG, MLE AND MMR 2ND RUN: SHA, MCG, MISD, MDN AND MPD 3RD RUN: SHA, MCG, MIM AND MIE 4TH RUN: SHA, MCG, MDM, MRD AND MTD 5TH RUM: SHA, MGC, ANS SGS
HARDWARE: MUG: 0.5" STANDOFF MMR: 0.5" STANDOFF MISD: ECCENTRALIZER BOWSPRINGS MDN: DUAL BOWSPRINGS MPD: 8" PROFILE PLATE MIM: NONMAGNETIC BASKET MIE: NONMAGNETIC BASKET, 1.0" STANDOFF

2.71 GM/CC DENSITY MATRIX USED TO CALCULATE POROSITY.

ALL INTERVALS LOGGED AND SCALED PER CUSTOMER'S REQUEST.

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

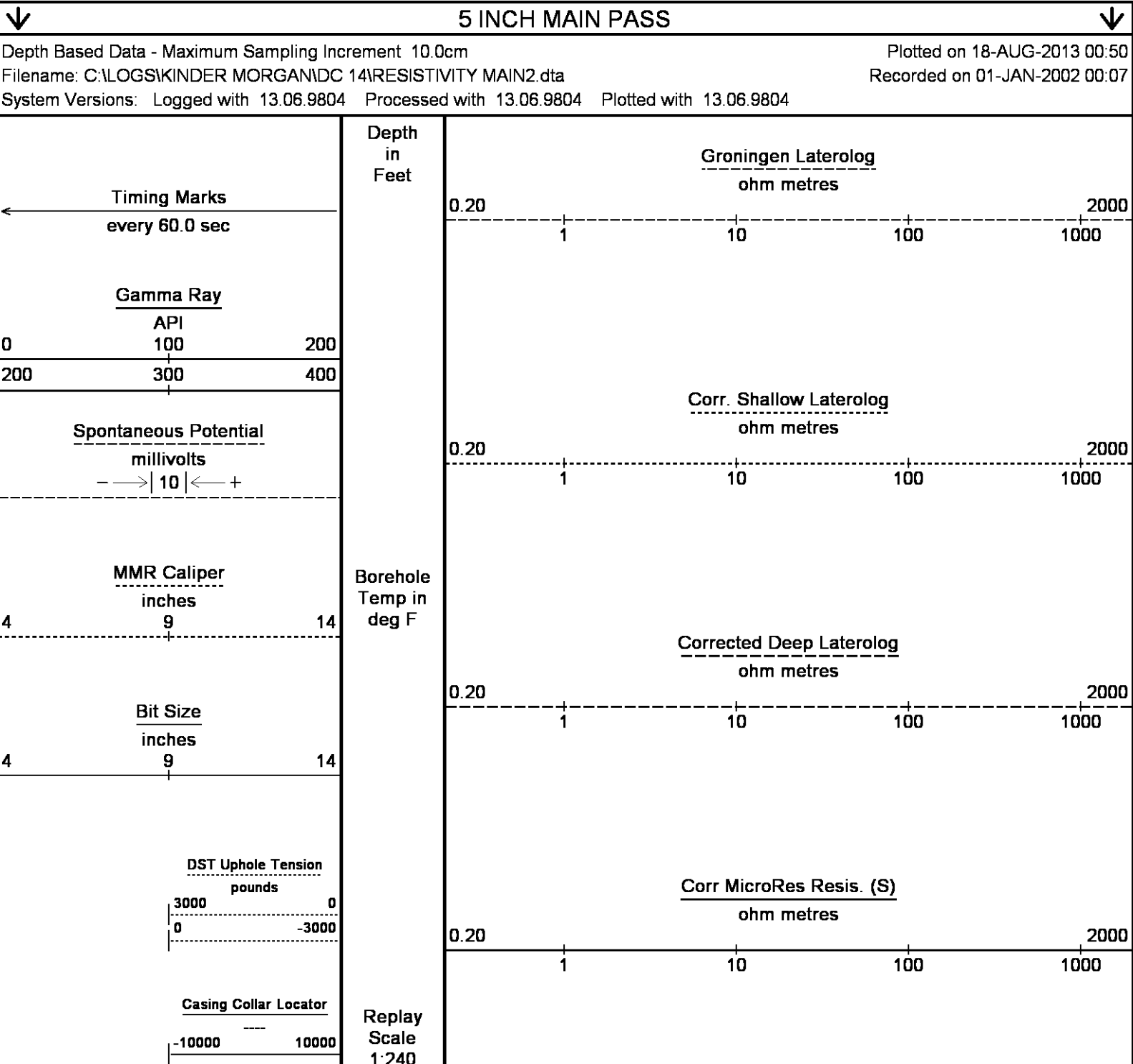
MIE CALIPERS CLOSED BEFORE CASING TO ALLOW FOR SAFE ENTRANCE.

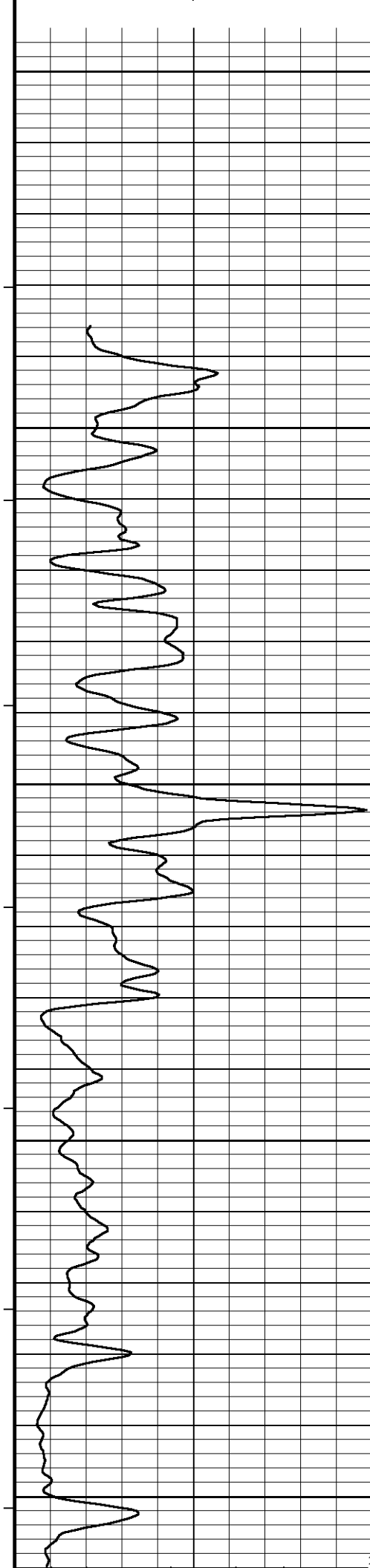
TOTAL HOLE VOLUME = 28 CUBIC FEET.

SERVICE ORDER: 3529584

RIG: NABORS 405

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.





8150

8200

171°

8250

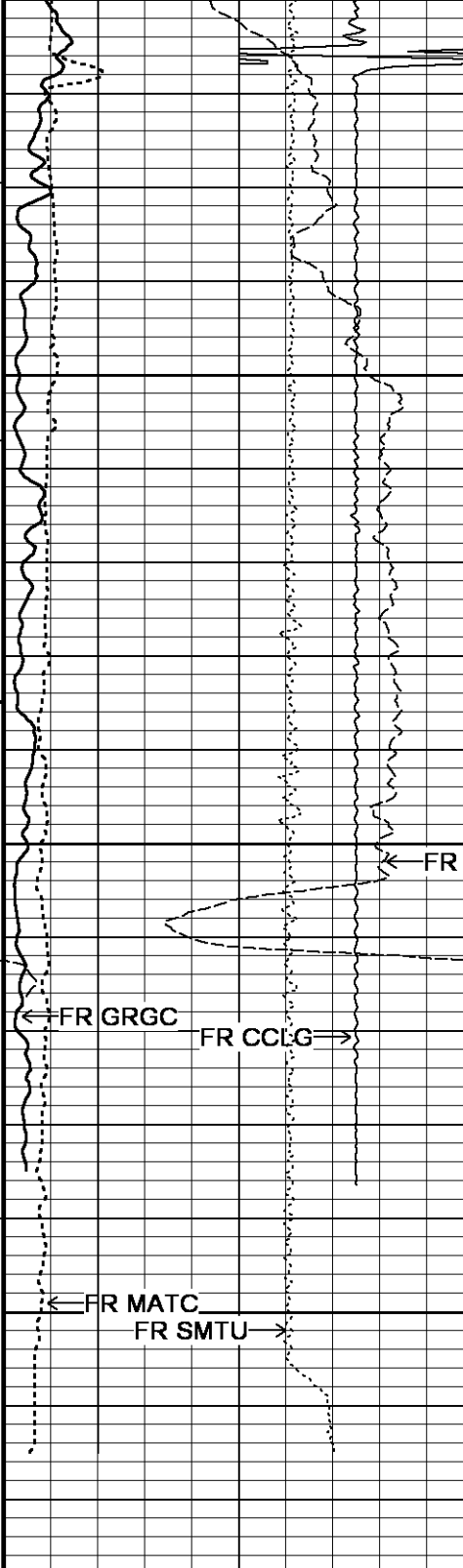
171°

8300

173°

8350

Casing



Shoe

175°

8400

177°

8450

FR SPDL

FR GRGC

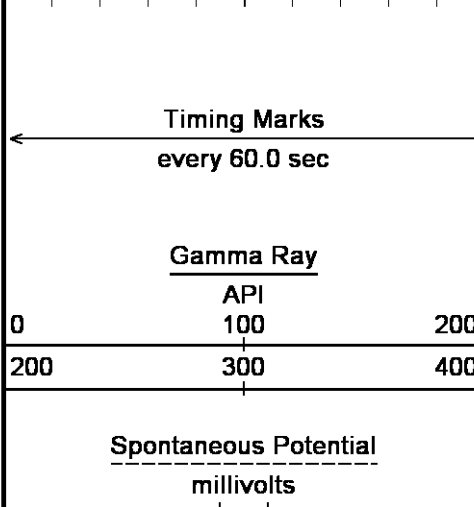
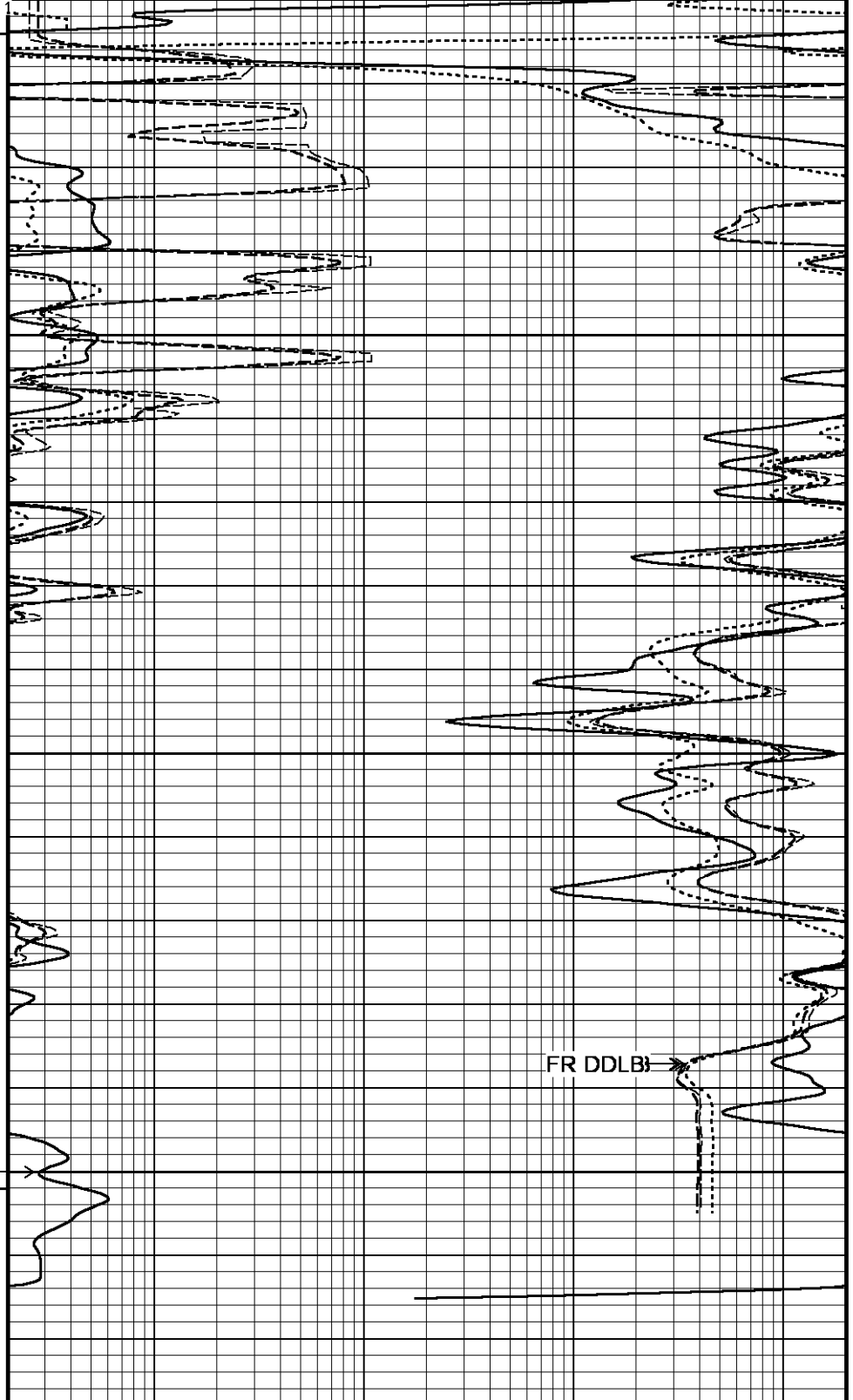
FR CCLG

FR MATC

FR SMTU

F8500B

Depth in Feet



Timing Marks
every 60.0 sec

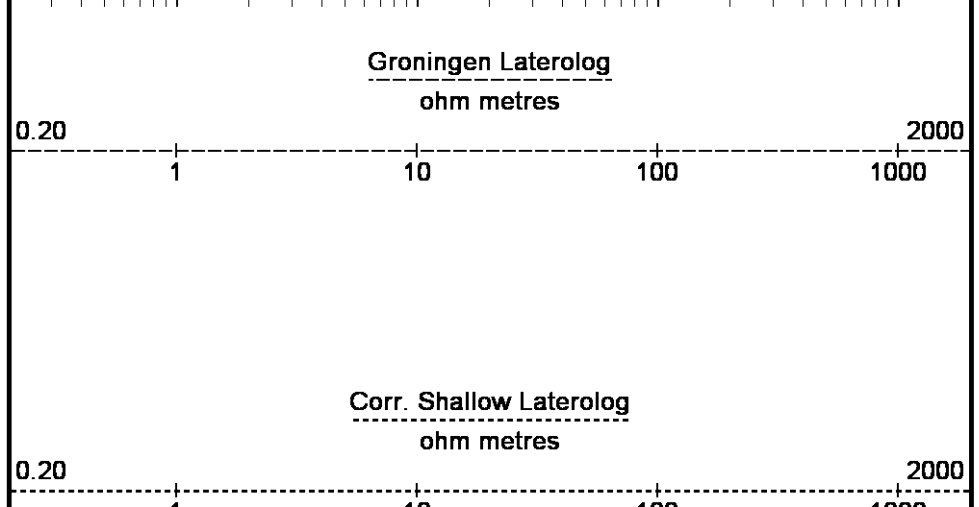
Gamma Ray

API

0 100 200

200 300 400

Spontaneous Potential
millivolts

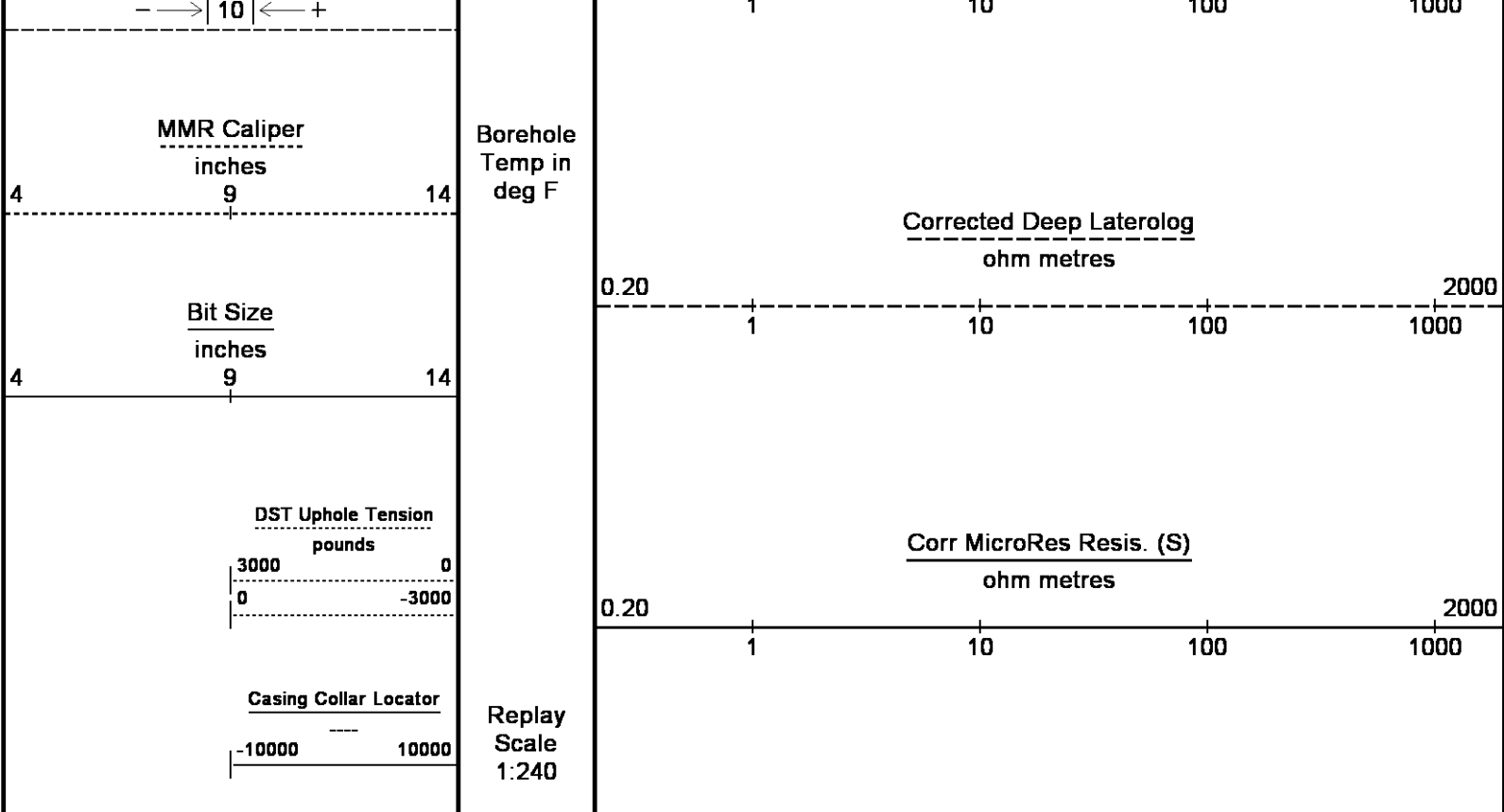


Groningen Laterolog
ohm metres

0.20 1 10 100 1000 2000

Corr. Shallow Laterolog
ohm metres

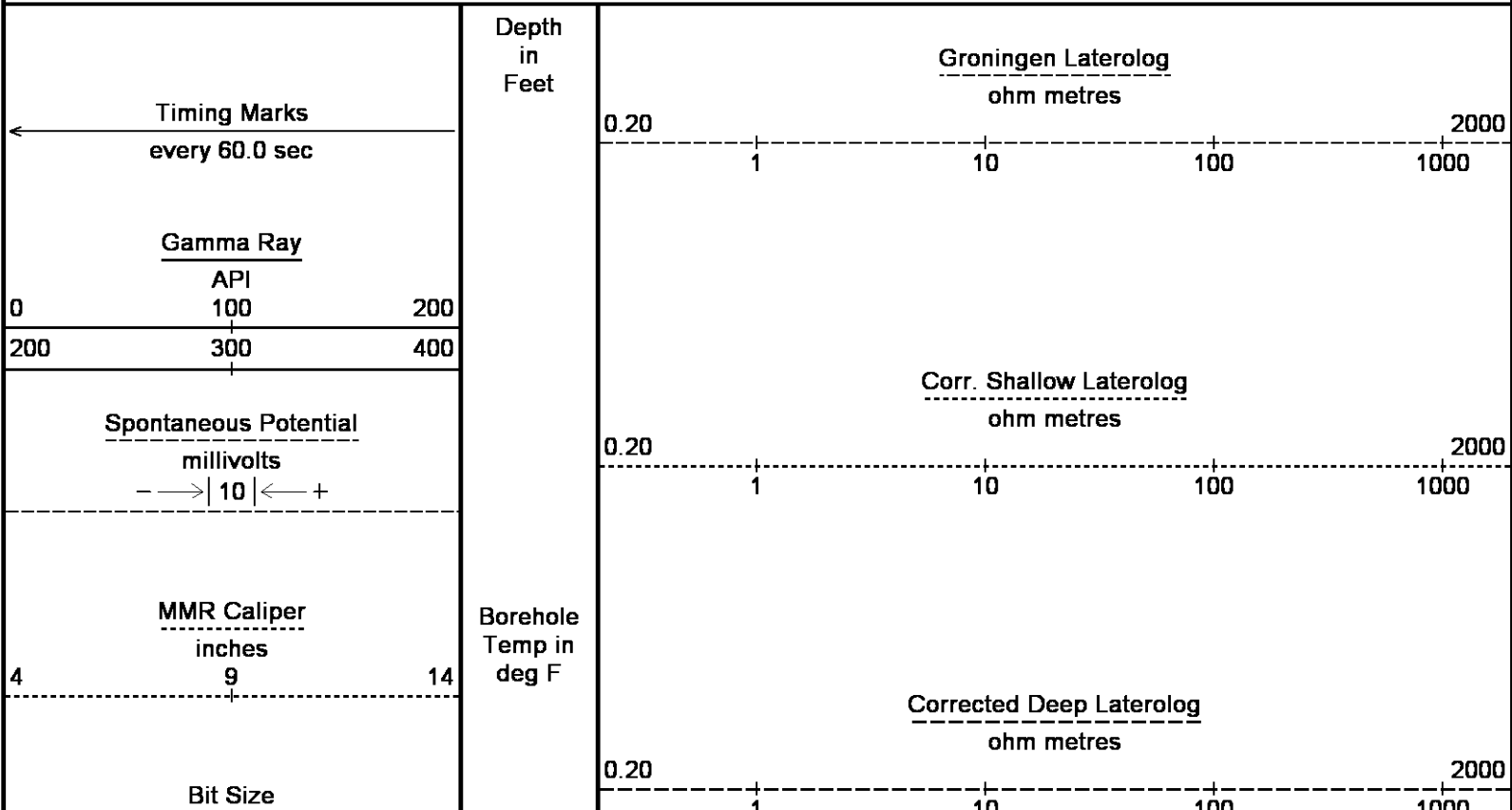
0.20 1 10 100 1000 2000



Depth Based Data - Maximum Sampling Increment 10.0cm	Plotted on 18-AUG-2013 00:50
Filename: C:\LOGS\KINDER MORGAN\DC 14\RESISTIVITY MAIN2.dta	Recorded on 01-JAN-2002 00:07
System Versions: Logged with 13.06.9804 Processed with 13.06.9804 Plotted with 13.06.9804	

↑	5 INCH MAIN PASS	↑
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↓	REPEAT OVERLAY	↓
Depth Based Data - Maximum Sampling Increment 10.0cm		
Plotted on 18-AUG-2013 00:50		
Filename: C:\LOGS\KINDER MORGAN\DC 14\RESISTIVITY MAIN2.dta		
Recorded on 01-JAN-2002 00:07		
Filename: C:\LOGS\KINDER MORGAN\DC 14\RESISTIVITY REPEAT 2.dta		
Recorded on 31-DEC-2001 23:55		
System Versions: Logged with 13.06.9804 Processed with 13.06.9804 Plotted with 13.06.9804		



inches

9

14

DST Uphole Tension

pounds

3000 0
0 -3000

Casing Collar Locator

-10000 10000

Replay
Scale
1:240

8350

Casing
Shoe

175°

8400

177°

8450

FR SPDL

FR GRGC

FR CCLG

FR DDLB

F8500B

Corr MicroRes Resis. (S)

ohm metres

0.20

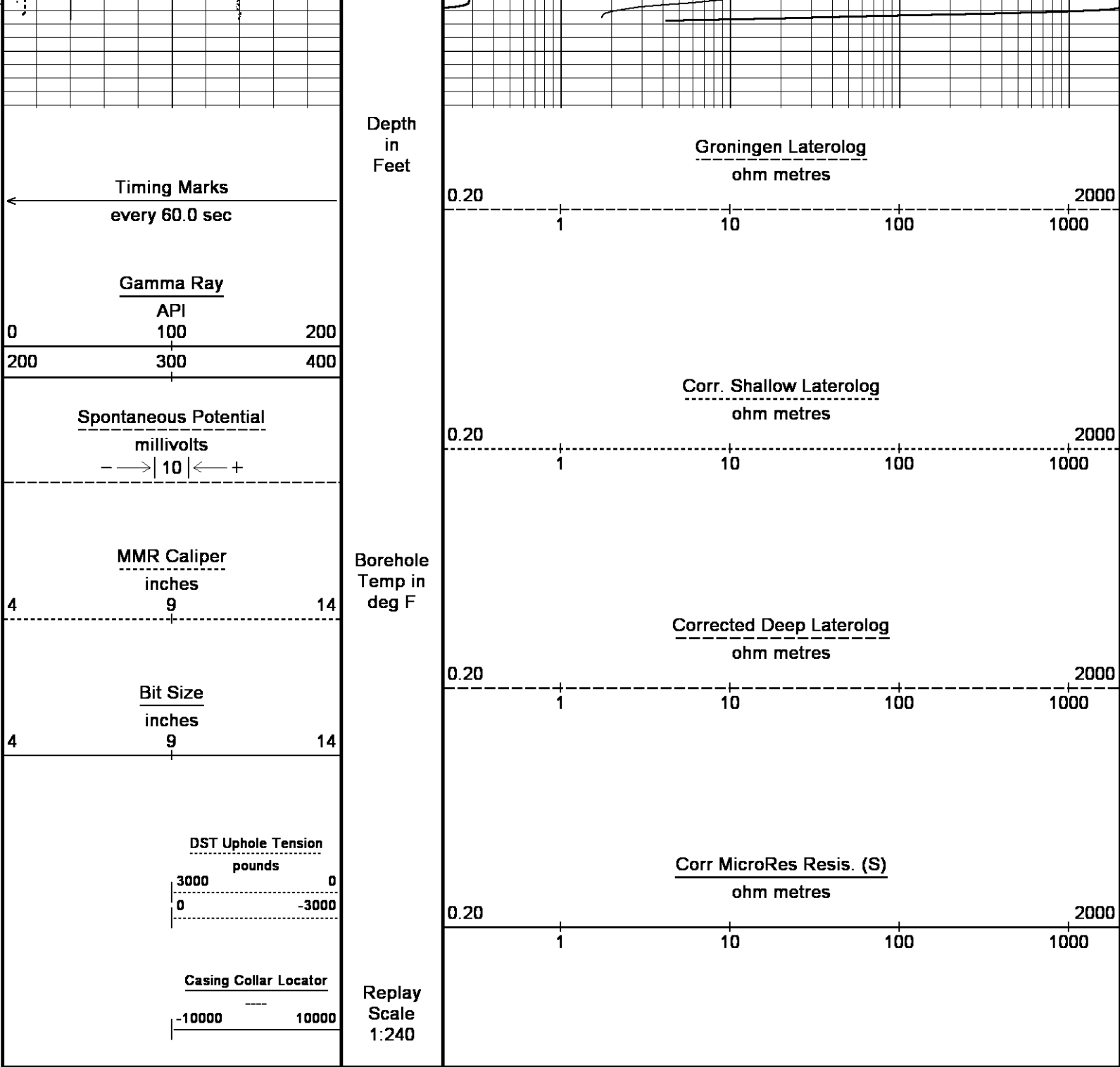
1

10

100

1000

2000



Depth Based Data - Maximum Sampling Increment 10.0cm	Plotted on 18-AUG-2013 00:50
Filename: C:\LOGS\KINDER MORGAN\DC 14\RESISTIVITY MAIN2.dta	Recorded on 01-JAN-2002 00:07
Filename: C:\LOGS\KINDER MORGAN\DC 14\RESISTIVITY REPEAT 2.dta	Recorded on 31-DEC-2001 23:55
System Versions: Logged with 13.06.9804 Processed with 13.06.9804 Plotted with 13.06.9804	

↑

REPEAT OVERLAY

↑

BEFORE SURVEY CALIBRATION

C:\LOGS\KINDER MORGAN\DC 14\RESISTIVITY MAIN2.dta

General Constants All 000			Last Edited on 17-AUG-2013,17:31		
General Parameters					
Mud Resistivity	0.920	ohm-metres			
Mud Resistivity Temperature	72.000	degrees F			
Water Level	0.000	feet			
Borehole Fluid Processing	Wet Hole				

Hole/Annular Volume and Differential Caliper Parameters				
HVOL Method	Single Caliper			
HVOL Caliper 1	None			
HVOL Caliper 2	N/A			
Annular Volume Diameter	0.000	inches		
Caliper for Differential Caliper	None			
Rwa Parameters				
Porosity used	N/A			
Resistivity used	N/A			
RWA Constant A	N/A			
RWA Constant M	N/A			
SW/APOR Tool Source	0.000			
Gamma Calibration MCG-E.A 479				
	Measured	Calibrated (API)	Field Calibration on 17-AUG-2013,17:25	
Background	43	28		
Calibrator (Gross)	1424	940		
Calibrator (Net)	1381	912		
Gamma Constants MCG-E.A 479				
			Last Edited on 17-AUG-2013,17:28	
Gamma Calibrator Number	GRC 072			
Mud Density	1.00	gm/cc		
Caliper Source for Processing	MMR Caliper			
Tool Position	Eccentred			
Concentration of KCl		kppm		
K Mud Type	Chloride			
K Mud Concentration	0.00	%		
High Resolution Temperature Calibration MCG-E.A 479				
	Measured	Calibrated(Deg F)	Field Calibration on 17-AUG-2013,17:26	
Lower	30.00	30.00		
Upper	150.00	150.00		
High Resolution Temperature Constants MCG-E.A 479				
			Last Edited on 17-AUG-2013,17:26	
Pre-filter Length	11			
SP Calibration MLE-D.A 258				
	Measured	Calibrated (mV)	Field Calibration on 09-MAY-2013 09:54	
Reference 1	99.5	88.7		
Reference 2	-100.8	-75.2		
Laterolog Calibration MLE-D.A 258				
Base Calibration on 17-AUG-2013,17:29				
Field Check on				
Base Calibration				
		Measured	Calibrated (ohm-m)	
Channel	Resistor 1	Resistor 2	Resistor 1	Resistor 2
Shallow	0.0	1007.2	0.0	1289.5
Deep	0.0	1006.7	0.0	809.8
Groningen	0.0	1006.6	0.0	838.7
Channel	Base Check (ohm-m)		Field Check (ohm-m)	
Shallow			0.0	
Deep			0.0	
Groningen			0.0	
Laterolog Constants MLE-D.A 258				
			Last Edited on 17-AUG-2013,17:29	
Squasher Start	40000	ohm-m		
Shallow Laterolog K Factor	1.2895			
Deep Laterolog K Factor	0.8098			
Groningen Laterolog K Factor	0.8387			
Interference Rejection	50 Hz			
SP Connection	SP Bridle Electrode (Lower)			
Groningen Connection	Groningen Electrode (Upper)			
Borehole Correction Constants				
Bridle Type	Short			
Stand off	0.50	inches		

Stand-off	0.50	inches
Caliper Source	Constant Value	
Hole Size	6.000	inches
Mud Resistivity Source	Temperature Corrected	
Temp. for Rm Corr.	MCG External Temperature	

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 MMR-C.A 242

Base Calibration on 01-JAN-2013 17:03
Field Calibration on 01-JAN-2013 17:05

Base Calibration

Reading No	Measured	Calibrator Size (in)
1	12878	4.00
2	14636	5.96
3	16704	7.98
4	18744	9.86
5	21106	11.88
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.96	7.98

Micro Laterolog Calibration MMR-C.A 242

Base Calibration on 01-JAN-2002 02:40
Field Check on 17-AUG-2013,17:31

Base Calibration

Measured		Calibrated (ohm-m)	
Ref 1	Ref 2	Ref 1	Ref 2
10.1	9933.2	0.1	128.0
Base Check (ohm-m)		Field Check (ohm-m)	
5.2		5.2	

Micro Laterolog Constants MMR-C.A 242

Last Edited on 01-JAN-2002,01:12

Pad Type	6 in Solid Nylon B23059
Micro Laterolog K Factor	0.0128
Standoff Offset	0.0000 inches

Mudcake Thickness Correction Constants

Mud Cake Source	Constant Value	
Mud Cake Thickness	0.4000	inches
Mud Cake Thickness Caliper	N/A	
Mud Cake Resistivity	0.1500	ohm-m
Mud Cake Resistivity Temp.	68.00	Deg F
Mud Cake Resistivity Source	Constant Value	
Temp. Source Rmc Correc.	N/A	

DOWNHOLE EQUIPMENT

C:\LOGS\KINDER MORGAN\DC 14\RESISTIVITY MAIN2.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

Compact Stiff Bridle Electrode Sub.
MBE-C.B 335 LG: 12.33 ft WT: 77.2 lb OD: 2.28 in

Compact Stiff Bridle Electrode Sub.
MBE-C.B 331 LG: 12.33 ft WT: 77.2 lb OD: 2.28 in



48.11 ft SPDL - Spontaneous Potential

SHA-J.A Compact Swivel Head Adaptor

SHA-J.A 214 LG: 2.30 ft WT: 22.0 lb OD: 2.24 in

Compact Comms Gamma

MCG-E.A 479 LG: 8.70 ft WT: 63.9 lb OD: 2.24 in

Compact Upper Guard sub

MUG-B.B 284 LG: 8.98 ft WT: 68.3 lb OD: 2.24 in

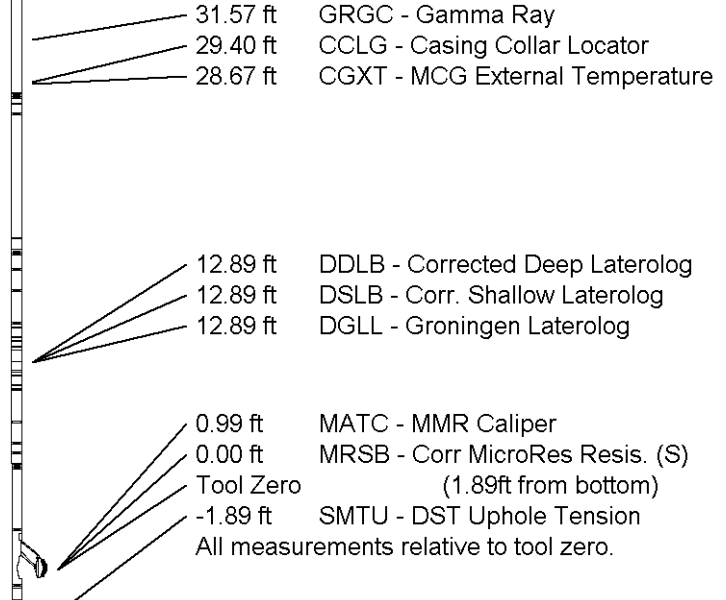
Compact Laterolog Electrode Sub.

MLE-D.A 258 LG: 12.34 ft WT: 92.6 lb OD: 2.24 in

Compact Micro-Resistivity

MMR-C.A 242 LG: 8.59 ft WT: 81.6 lb OD: 3.82 in

Total Length: 67.16 ft Weight: 498.2 lb



COMPANY KINDER MORGAN C02 Co. L.P
WELL DOE CANYON #14
FIELD DOE CANYON
PROVINCE/COUNTY DOLORES
COUNTRY/STATE U.S.A. / COLORADO

Elevation Kelly Bushing	7130.00	feet	First Reading	8500.00	feet
Elevation Drill Floor	7130.00	feet	Depth Driller	8502.00	feet
Elevation Ground Level	7105.00	feet	Depth Logger	8502.00	feet



Weatherford®

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MICRO RESISTIVITY
LOG