

**PCDC - Pressure Case Directional
PCGK - Pressure Case Gamma**

1 : 240

Country : USA			
Field : Wattenberg			
Location : Lat: 40° 27' 18.58" North Long: 104° 23' 38.76" West			
Well : Wells Ranch AA26-65HN			
Company : Noble Energy			
Rig : H&P 322		<div>Company : Noble Energy</div> <div>Rig : H&P 322</div> <div>Well : Wells Ranch AA26-65HN</div> <div>Field : Wattenberg</div> <div>Country : USA</div> <div>API Number : 0512337568</div>	
LOCATION			
Latitude : 40° 27' 18.58" North Longitude : 104° 23' 38.76" West			
UTM Easting = 3307746.010 ft UTM Northing = 1410574.573 ft			
Permanent Datum : Ground Level		Elevation : 4791.00 ft	
Log Measured From : Drill Floor		24.00 ft Above Permanent Datum	
Drilling Measured From : Drill Floor		TVD LOG	
Depth Logged : 983.98 ft To 6,654.84 ft		Unit No. : 11210425	
Date Logged : 19-Sep-13 To 21-Sep-13		Job No. : CA-XX-0900758833	
Total Depth MD : 7,068.00 ft TVD: 6,654.84 ft		Plot Type : Final	
Spud Date : 18-Sep-13		Plot Date : 24-Sep-13	
Run No.	Borehole Record (TVD)		Run No.
	Size	To	
2	8.750 in	983.98 ft	
	6,038.32 ft	6,654.84 ft	
3	8.750 in	6,038.32 ft	
	Casing Record (TVD)		
	Size	Weight	
	9.625 in	36.00 lbpf	
	7.000 in	26.00 lbpf	
	SURFACE		
	6,653.69 ft		

WELL INFORMATION

MWD Run Number	100	200		
Date run completed	20-Sep-13	21-Sep-13		
Rig Bit Number	2	3		
Bit Size (in)	8.750	8.750		
Tool Nominal OD (in)	6.750	6.750		
Log Start Depth (TVD, ft)	983.98	6,037.93		
Log End Depth (TVD, ft)	6,037.93	6,654.84		
Drill or Wipe	Drill	Drill		
Drill/Wipe Start Date and Time	19-Sep-13 14:30	20-Sep-13 23:30		
Drill/Wipe End Date and Time	20-Sep-13 15:00	21-Sep-13 13:45		
Min Inc (deg) @ Depth (TVD, ft)	0.83 @ 1,013.98	9.25 @ 6,040.89		
Max Inc (deg) @ Depth (TVD, ft)	12.22 @ 1,664.03	80.47 @ 6,646.98		
Bit TFA(in2) / Bit Type	0.75 / PDC	0.90 / PDC		
Flow Rate (gpm)	574.15	560.55		
Max AV (fpm) / CV (fpm) @ MWD	98.1 / 98.1	98.1 / 98.1		
Fluid Type	Fresh Water Gel	Fresh Water Gel		
Density (ppg) / Viscosity (spqt)	8.85 / 30.00	10.50 / 36.00		
Filtrate CL (ppm)	25.00	2,500.00		
pH / Fluid Loss (mptm)	11.20 / N/A	9.50 / N/A		
PV (cP) / YP (lhf2)	1 / 3.00	10 / 8.00		
% Solids / % Sand	1.00 / 0.25	10.5 / 0.35		
% Oil / Oil:Water Ratio	N/A / N/A	N/A / N/A		
Rm @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A		
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A		
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A		

Max Tool Temp (degF) / Source	154.30 / PCM	171.20 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A			
Lead MWD Engineer	Robert Ley	Robert Ley			
Customer Representative	Charles Collver	Charles Collver			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.84	5.84			
Sub Serial Number	11404284	11404284			
Insert Serial Number	10997273	10997273			
Date and Time Initialized	19-Sep-13 06:35	01-Jan-70 00:00			
Date and Time Read	21-Sep-13 18:54	21-Sep-13 19:47			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	54.00	57.00			
Software Version	6.21	6.21			
Sub Serial Number	11404284	11404284			
Sonde Serial Number	11145692	11145692			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	223.03	236.52			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	47.61	50.08			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11404284	11404284			
Insert/Sonde Serial Number	11293312	11293312			

REMARKS

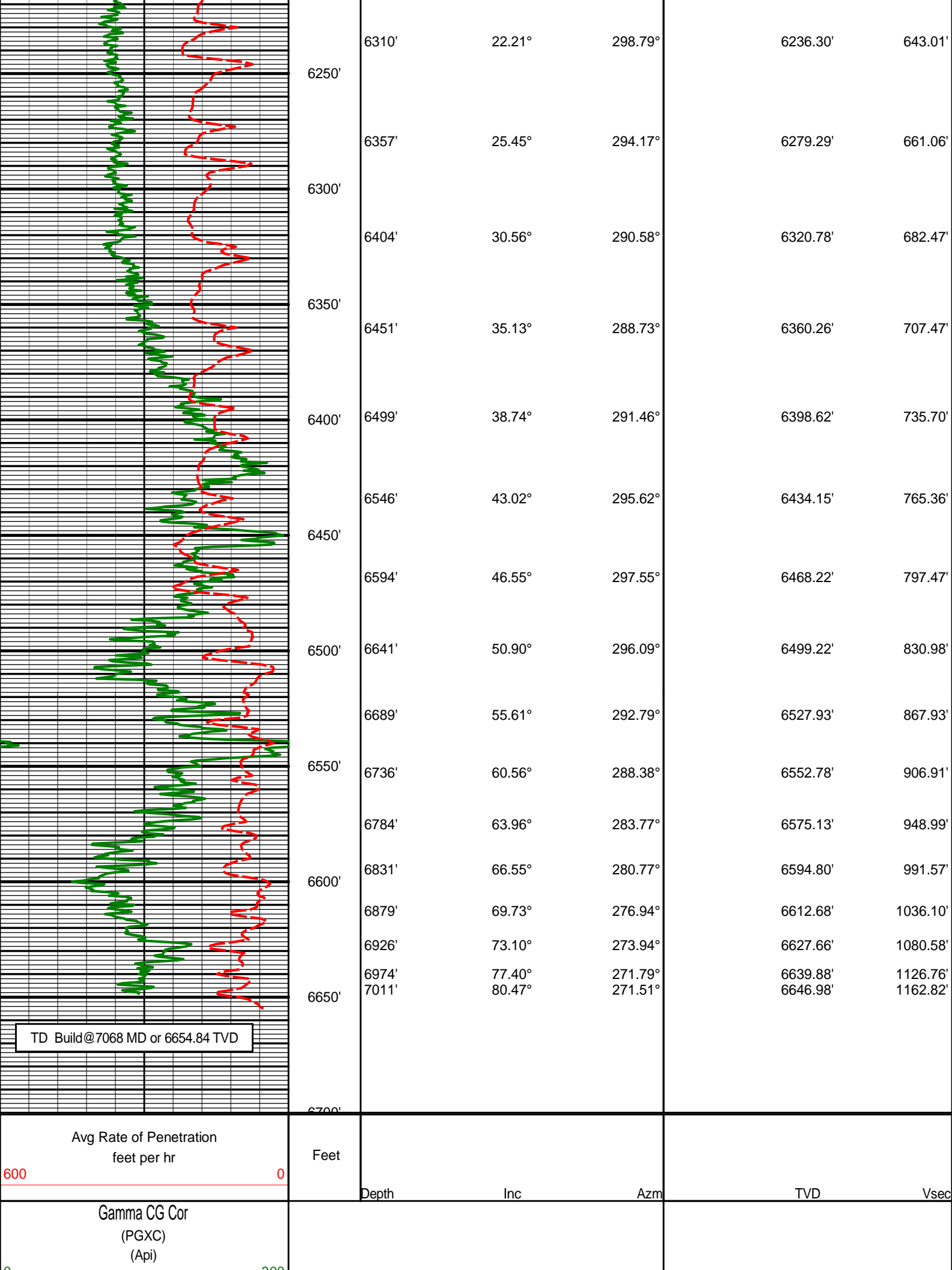
1. All depths are true vertical depths and are calibrated to the driller' pipe tally and are measured from the drill floor.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded (memory data) unless otherwise stated.
4. The Following smoothing parameters have been applied to the data"

PGXR (Gamma Ray CG):
Interval Resolution: 0.5 feet
Coercion Distance: 0.6 feet
Gap Fill: 3.0 feet

ROPA (Rate of Penetration):
Interval Resolution: 0.5 feet
Coercion Distance: 1.2 feet

WARRANTY

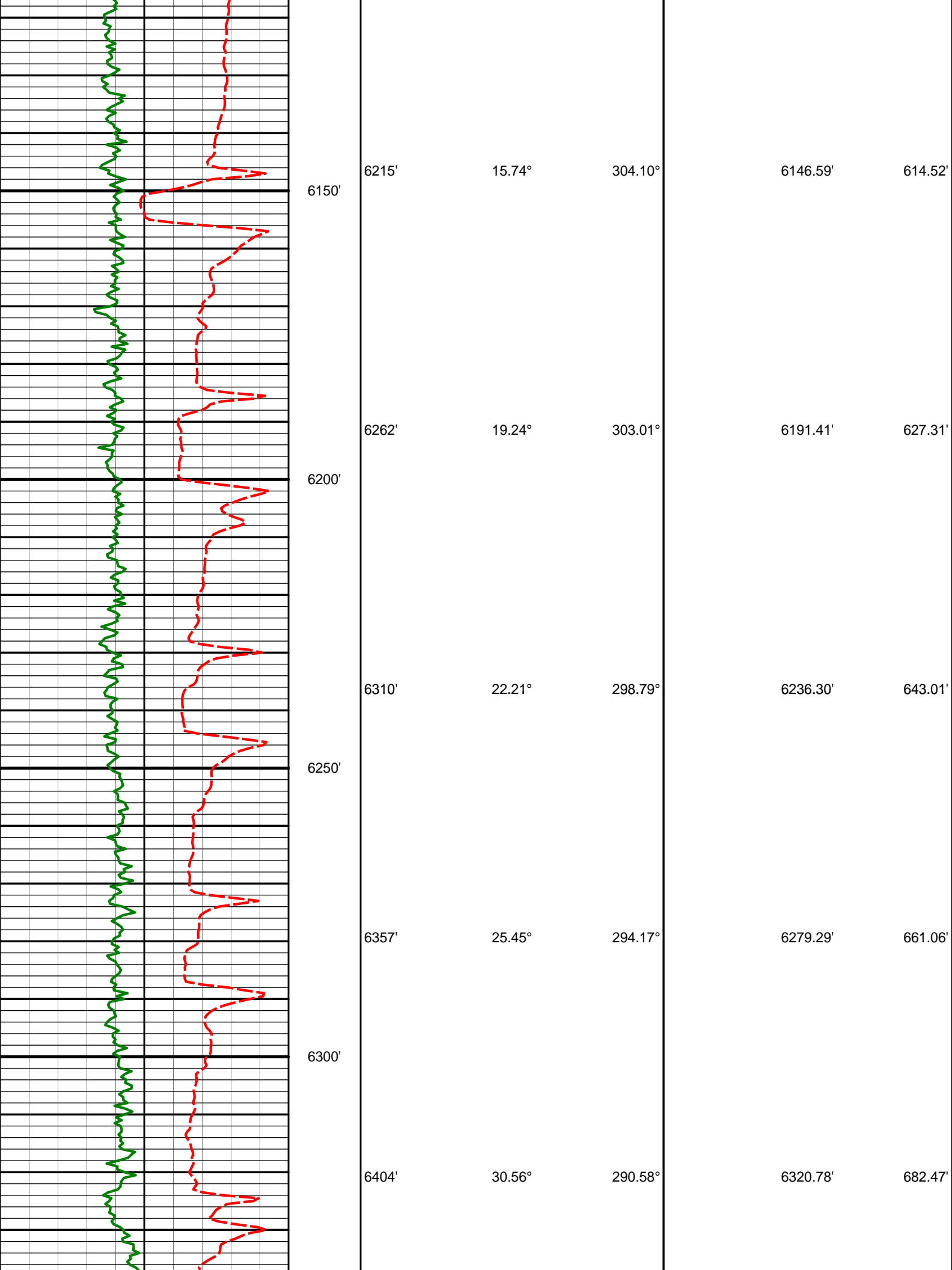
HALLIBURTON WILL USE ITS BEST EFFORTS TO FURNISH CUSTOMERS WITH ACCURATE INFORMATION AND INTERPRETATIONS

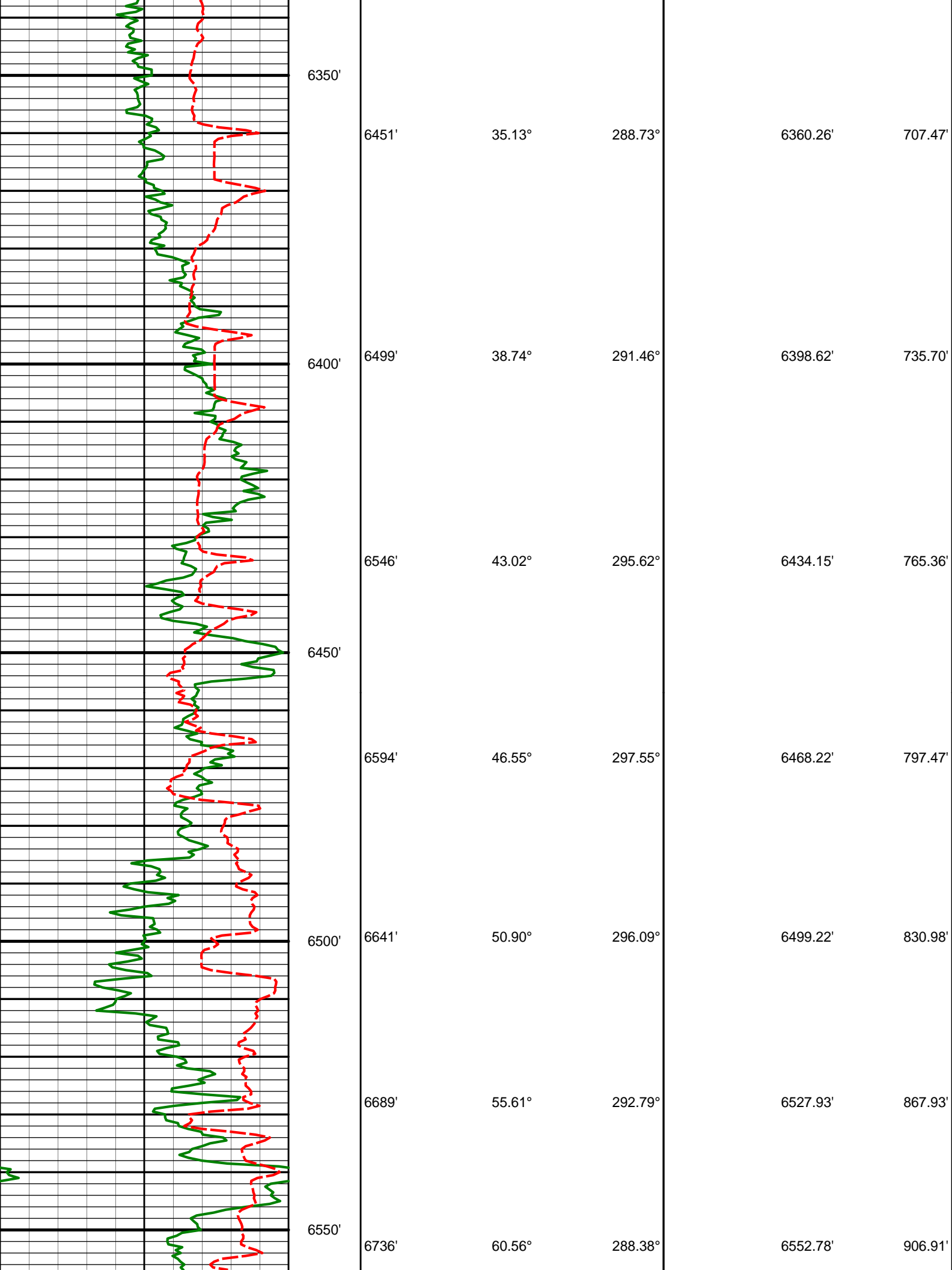


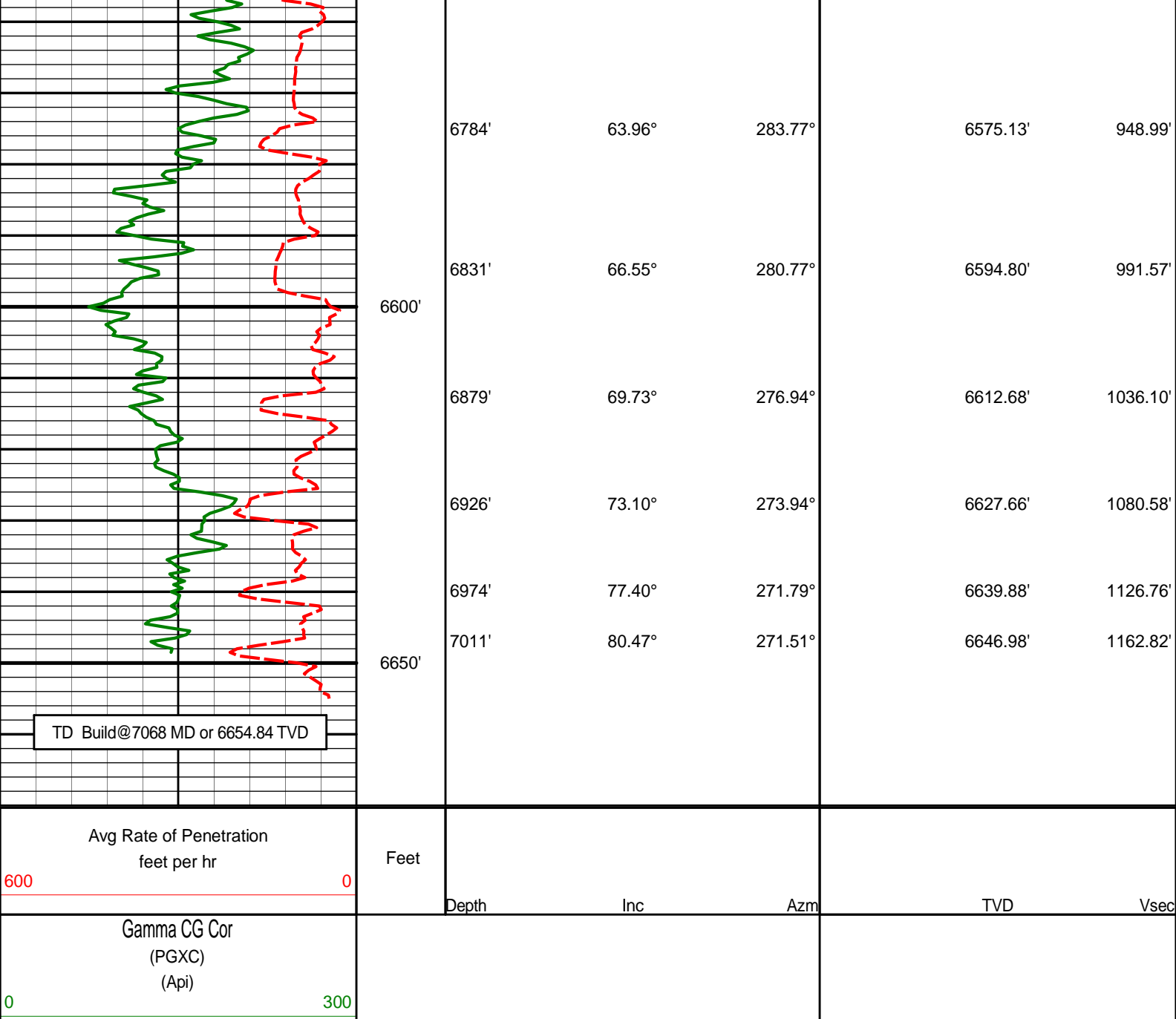
HALLIBURTON

TVD Detail Log 1:240

Gamma CG Cor (PGXC) (Api)							
0300							
Avg Rate of Penetration feet per hr		Feet	Depth	Inc	Azm	TVD	Vsec
6000							
		</					







HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Wells Ranch AA26-65HN
Wattenberg
Weld Colorado
USA
CA-XX-0900758833

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
250.00	0.50	92.70	250.00	0.05 S	1.09 E	-1.09	0.20
500.00	0.40	56.10	499.99	0.38 N	2.90 E	-2.82	0.12
750.00	0.30	129.80	749.99	0.45 N	4.13 E	-4.02	0.17
982.00	0.20	229.50	981.98	0.20 S	4.29 E	-4.27	0.17
1014.00	0.83	304.92	1013.98	0.10 S	4.06 E	-4.03	2.51
1107.00	1.58	302.44	1106.96	0.97 N	2.42 E	-2.25	0.81
1200.00	1.44	331.64	1199.93	2.69 N	0.79 E	-0.38	0.83

1200.00	1.44	331.04	1199.93	2.09 N	0.79 E	0.38	0.83
1293.00	4.30	315.82	1292.81	6.22 N	2.20 W	3.08	3.16
1386.00	7.77	312.57	1385.28	12.97 N	9.26 W	11.06	3.75
1479.00	11.16	316.31	1477.00	23.73 N	20.11 W	23.36	3.70
1575.00	11.71	321.01	1571.09	38.02 N	32.66 W	37.86	1.13
1670.00	12.22	323.51	1664.03	53.60 N	44.70 W	52.05	0.77
1764.00	11.29	322.46	1756.06	68.90 N	56.23 W	65.69	1.02
1859.00	10.11	323.03	1849.40	82.93 N	66.91 W	78.31	1.25
1953.00	11.36	314.05	1941.76	95.96 N	78.52 W	91.70	2.22
2048.00	10.62	313.81	2035.02	108.53 N	91.57 W	106.44	0.78
2143.00	9.43	309.75	2128.57	119.56 N	103.87 W	120.22	1.46
2238.00	9.79	314.60	2222.24	130.21 N	115.60 W	133.38	0.93
2332.00	10.21	322.74	2314.82	142.45 N	126.34 W	145.79	1.57
2427.00	9.09	321.11	2408.47	155.00 N	136.15 W	157.33	1.21
2522.00	10.30	321.79	2502.11	167.51 N	146.11 W	169.02	1.28
2617.00	9.54	321.73	2595.69	180.37 N	156.24 W	180.91	0.80
2712.00	10.02	318.23	2689.31	192.71 N	166.62 W	192.99	0.80
2807.00	9.80	314.89	2782.89	204.58 N	177.86 W	205.83	0.65
2902.00	10.42	318.14	2876.42	216.69 N	189.32 W	218.94	0.89
2997.00	11.16	317.91	2969.74	229.91 N	201.21 W	232.64	0.78
3092.00	10.51	316.61	3063.04	243.03 N	213.33 W	246.54	0.73
3186.00	8.74	317.70	3155.72	254.54 N	224.02 W	258.80	1.89
3281.00	8.83	317.10	3249.60	265.22 N	233.85 W	270.08	0.14
3376.00	8.18	314.17	3343.56	275.27 N	243.66 W	281.25	0.82
3471.00	8.31	315.36	3437.58	284.86 N	253.33 W	292.22	0.23
3565.00	8.79	324.19	3530.54	295.52 N	262.30 W	302.66	1.49
3660.00	9.52	321.90	3624.33	307.59 N	271.40 W	313.42	0.86
3755.00	11.09	321.83	3717.79	320.96 N	281.89 W	325.76	1.65
3850.00	12.08	320.02	3810.85	335.76 N	293.93 W	339.82	1.11
3945.00	11.75	317.26	3903.81	350.48 N	306.88 W	354.79	0.69
4039.00	10.03	316.20	3996.11	363.42 N	319.04 W	368.71	1.84
4134.00	9.81	322.31	4089.69	375.79 N	329.72 W	381.08	1.13
4229.00	8.79	322.28	4183.44	387.94 N	339.10 W	392.14	1.07
4324.00	7.70	319.89	4277.46	398.55 N	347.65 W	402.14	1.20
4419.00	8.17	319.99	4371.55	408.59 N	356.09 W	411.95	0.49
4513.00	8.03	318.13	4464.61	418.59 N	364.76 W	422.00	0.32
4608.00	8.90	319.15	4558.58	429.09 N	374.00 W	432.67	0.93
4703.00	9.17	315.11	4652.40	440.01 N	384.15 W	444.30	0.73
4798.00	9.78	315.58	4746.10	451.14 N	395.14 W	456.80	0.65
4893.00	7.58	315.96	4840.01	461.41 N	405.14 W	468.20	2.32
4988.00	8.33	316.40	4934.09	470.90 N	414.24 W	478.59	0.79
5083.00	9.66	320.55	5027.92	482.03 N	424.05 W	489.92	1.56
5178.00	9.90	320.11	5121.54	494.45 N	434.36 W	501.93	0.26
5273.00	8.21	316.76	5215.36	505.66 N	444.24 W	513.34	1.86
5368.00	8.43	327.49	5309.36	516.48 N	452.63 W	523.22	1.65
5463.00	7.83	324.15	5403.41	527.60 N	460.16 W	532.30	0.80
5558.00	8.10	325.10	5497.49	538.33 N	467.78 W	541.40	0.32
5653.00	9.55	326.83	5591.37	550.42 N	475.92 W	551.22	1.55
5748.00	7.53	327.72	5685.31	562.28 N	483.56 W	560.51	2.13
5843.00	7.37	331.20	5779.51	572.88 N	489.82 W	568.25	0.50
5938.00	7.11	326.81	5873.75	583.14 N	495.97 W	575.84	0.64
6050.00	9.18	315.32	5984.62	595.29 N	506.05 W	587.59	2.34
6107.00	9.25	308.19	6040.89	601.36 N	512.85 W	595.20	2.01
6120.00	9.63	306.58	6053.71	602.65 N	514.54 W	597.06	3.56
6167.00	11.28	307.47	6099.93	607.79 N	521.35 W	604.55	3.53
6215.00	15.74	304.10	6146.59	614.30 N	530.47 W	614.52	9.43
6262.00	19.24	303.01	6191.41	622.10 N	542.25 W	627.31	7.48
6310.00	22.21	298.79	6236.30	630.78 N	556.84 W	643.01	6.92
6357.00	25.45	294.17	6279.29	639.19 N	573.84 W	661.06	7.95
6404.00	30.56	290.58	6320.78	647.53 N	594.25 W	682.47	11.44
6451.00	35.13	288.73	6360.26	656.08 N	618.26 W	707.47	9.95
6499.00	38.74	291.46	6398.62	666.01 N	645.33 W	735.70	8.26
6546.00	43.02	295.62	6434.15	678.33 N	673.49 W	765.36	10.79
6594.00	46.55	297.55	6468.22	693.48 N	703.71 W	797.47	7.88
6641.00	50.90	296.09	6499.22	709.40 N	735.23 W	830.98	9.54
6689.00	55.61	292.79	6527.93	725.27 N	770.24 W	867.93	11.25
6736.00	60.56	288.38	6552.78	739.25 N	807.58 W	906.91	13.20
6784.00	63.96	283.77	6575.13	750.98 N	848.39 W	948.99	11.06
6831.00	66.55	280.77	6594.80	760.04 N	890.09 W	991.57	8.00
6879.00	69.73	276.94	6612.68	766.88 N	934.09 W	1036.10	9.94
6926.00	73.10	273.94	6627.66	771.09 N	978.43 W	1080.58	9.38
6974.00	77.40	271.79	6639.88	773.40 N	1024.78 W	1126.76	9.95
7011.00	80.47	271.51	6646.98	774.45 N	1061.07 W	1162.82	8.33
7143.00	87.87	269.24	6660.38	775.29 N	1192.29 W	1292.75	5.86

CALCULATION BASED ON MINIMUM CURVATURE METHOD

**SURVEY COORDINATES RELATIVE TO WELL SYSTEM REFERENCE POINT
TVD VALUES GIVEN RELATIVE TO DRILLING MEASUREMENT POINT**

**VERTICAL SECTION RELATIVE TO WELL HEAD
VERTICAL SECTION IS COMPUTED ALONG A DIRECTION OF 278.40 DEGREES (GRID)
A TOTAL CORRECTION OF 7.68 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 7143.00 FEET
IS 1422.19 FEET ALONG 303.03 DEGREES (GRID)**

Tie-In @ Surface

Surveys at 250 ft, 500 ft, 750 ft and 982 ft were taken and provided by HP 322 while they were drilling the surface hole.

Date Printed: 24 September 2013