

PCGK: Pressure Case Gamma
PCDC: Pressure Case Directional

[illegible]

WELL INFORMATION

MWD Run Number	200	300			
Date run completed	09-Jul-14	11-Jul-14			
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)	658.00	5,351.65			
Log End Depth (TVD, ft)	5,350.65	6,055.30			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	08-Jul-14 10:15	09-Jul-14 06:50			
Drill/Wipe End Date and Time	08-Jul-14 23:45	09-Jul-14 20:00			
Min Inc (deg) @ Depth (TVD, ft)	0.07 @ 995.99	0.73 @ 5,384.64			
Max Inc (deg) @ Depth (TVD, ft)	10.87 @ 2,202.59	89.17 @ 6,055.30			
Bit TFA(in2) / Bit Type	0.74 / PDC	0.86 / PDC			
Flow Rate (gpm)	588.17	550.00			
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	N/A / N/A			
Fluid Type	Fresh Water Gel	Fresh Water Gel			
Density (ppg) / Viscosity (spqt)	9.10 / 27.00	10.40 / 35.00			
Filtrate CL (ppm)	200.00	200.00			
pH / Fluid Loss (mptm)	8.60 / 40	8.90 / 40			
PV (cP) / YP (lbf2)	1 / 1.00	5 / 2.00			
% Solids / % Sand	.9 / 0	.2 / .02			
% 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 (in F) / S	150.10 / PCM	120.00 / PCM			

Max Tool Temp (degF) / Source	150.10 / PCM	162.80 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A			
Lead MWD Engineer	Juan Pablo Centeno	Juan Pablo Centeno			
Customer Representative	Justin Fields	Justin Fields			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.93	5.93			
Sub Serial Number	245494	245494			
Insert Serial Number	11620315	11620315			
Date and Time Initialized	07-Jul-14 20:29	01-Jan-70 00:00			
Date and Time Read	10-Jul-14 01:01	10-Jul-14 01:06			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	53.91	52.03			
Software Version	6.21	6.21			
Sub Serial Number	245494	245494			
Sonde Serial Number	11638628	11638628			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	195.65	262.30			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	48.81	46.93			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	245494	245494			
Insert/Sonde Serial Number	11579806	11579806			

REMARKS

1. All depths are calibrated to the driller's pipe tally and are measured from the Rig 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.
 - ROPA: Average Rate of Penetration is real time data.
 - PGRC: Smooth Pressure Case Gamma Ray Borehole corrected is recorded data.
4. The following smoothing parameters have been applied to the data:
 - 2" (1:600) log - 1 ft. interval, 3 ft. coercion distance, 5 ft. gap fill.
 - 5" (1:240) log for ROP - 0.5 ft. interval, 1.2 ft. coercion distance, 3 ft. gap fill.
 - 5" (1:240) log for Gamma Ray - 0.5 ft. interval, 0.6 ft. coercion distance, 3 ft. gap fill.
5. INSITE version 8.0.20.

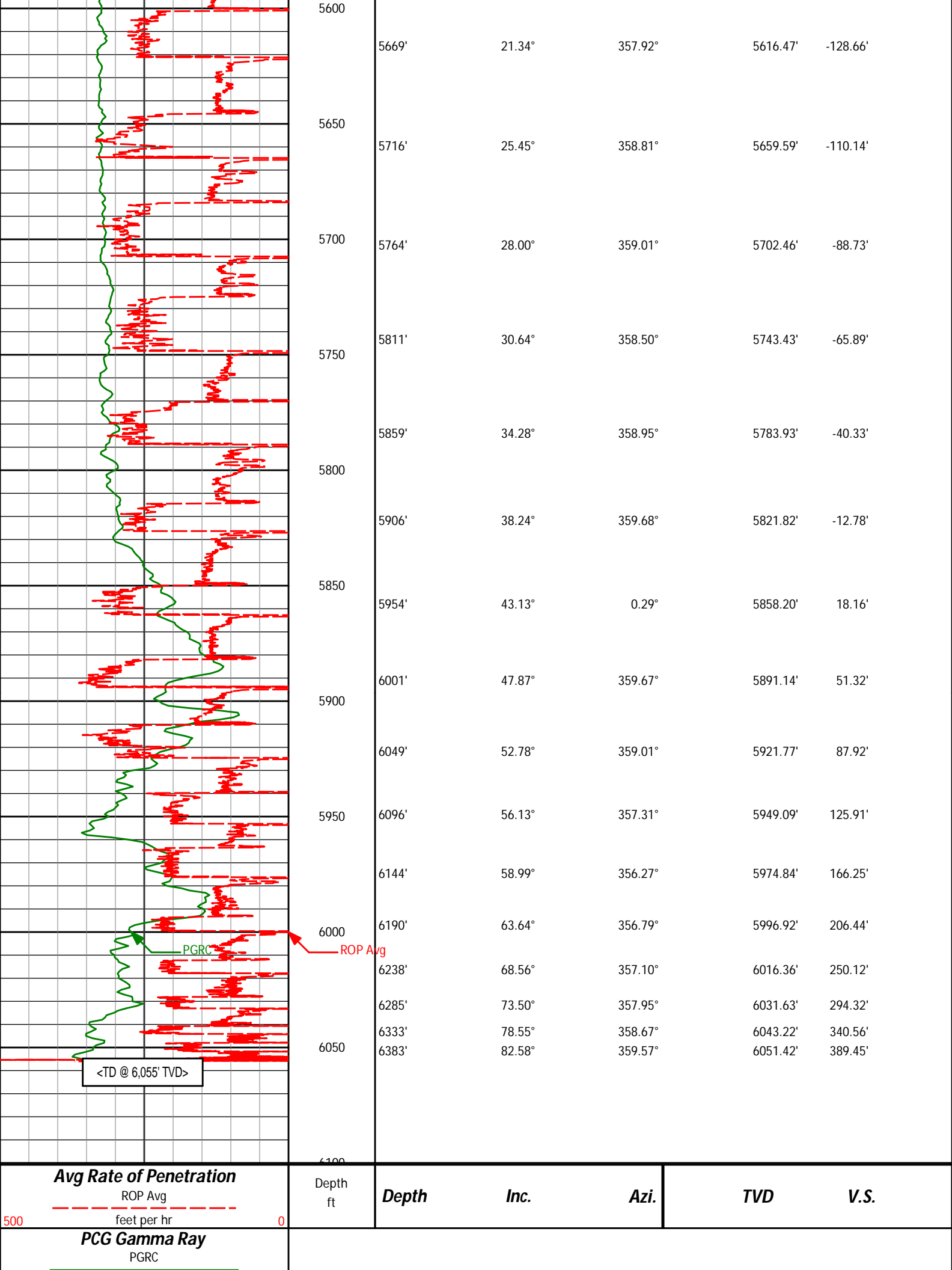
WARRANTY

HALLIBURTON WILL USE ITS BEST EFFORTS TO FURNISH CUSTOMERS WITH ACCURATE INFORMATION AND INTERPRETATIONS THAT ARE PART OF, AND INCIDENT TO, THE SERVICES PROVIDED. HOWEVER, HALLIBURTON CANNOT AND DOES NOT WARRANT THE ACCURACY OR CORRECTNESS OF SUCH INFORMATION AND INTERPRETATIONS. UNDER NO CIRCUMSTANCES SHOULD ANY SUCH INFORMATION OR INTERPRETATION BE RELIED UPON AS THE SOLE BASIS FOR ANY DRILLING, COMPLETION, PRODUCTION, OR FINANCIAL DECISION OR ANY PROCEDURE INVOLVING ANY RISK TO THE SAFETY OF ANY DRILLING VENTURE, DRILLING RIG OR ITS CREW OR ANY OTHER THIRD PARTY. THE CUSTOMER HAS FULL RESPONSIBILITY FOR ALL DRILLING, COMPLETION AND PRODUCTION OPERATION. HALLIBURTON MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO THE SERVICES RENDERED. IN NO EVENT WILL HALLIBURTON BE LIABLE FOR FAILURE TO OBTAIN ANY PARTICULAR RESULTS OR FOR ANY DAMAGES, INCLUDING, BUT NOT LIMITED TO, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES, RESULTING FROM THE USE OF ANY INFORMATION OR INTERPRETATION PROVIDED BY HALLIBURTON.

HALLIBURTON
Sperry Drilling Services
TVD Main Log 1:600

Noble Energy
Cutthroat LC28-75-1AHNB
H&P 273
T9N, R59W

PCG Gamma Ray PGRC 0 300 api						
Avg Rate of Penetration ROP Avg 500 0 feet per hr		Depth ft	Depth	Inc.	Azi.	TVD V.S.
		5300				
		5350				
		<Run 300>				
		5432'	5432'	0.73°	231.46°	5384.64' -168.95'
		5400				
		<KOP>				
		5480'	5480'	1.73°	354.27°	5432.64' -168.38'
		5450				
		5526'	5526'	7.43°	355.16°	5478.47' -164.72'
		5500				
		5574'	5574'	12.55°	353.92°	5525.73' -156.40'
		5550				
		5621'	5621'	17.11°	355.60°	5571.15' -144.39'



Avg Rate of Penetration

ROP Avg

feet per hr

PCG Gamma Ray

PGRC

Depth
ft

Depth

Inc.

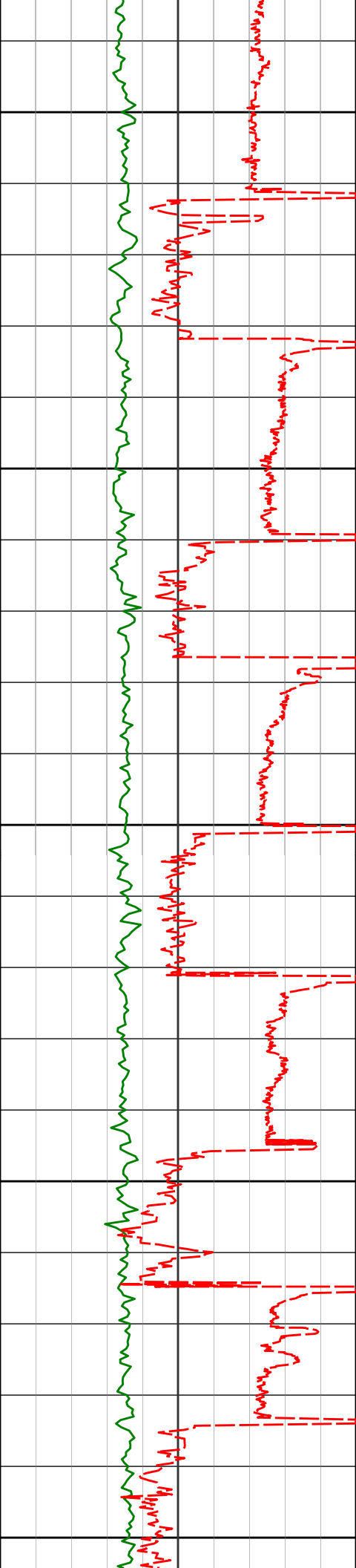
Azi.

TVD

V.S.

Noble Energy
Cutthroat LC28-75-1AHNB
H&P 273
T9N, R59W

PCG Gamma Ray PGRC							
0 300							
api							
Avg Rate of Penetration ROP Avg		Depth ft	Depth	Inc.	Azi.	TVD	V.S.
500 0							
feet per hr							
		5350 <Run 300>					
		<KOP>					
		5432'	0.73°	231.46°	5384.64'	-168.95'	
		5400					
		5480'	1.73°	354.27°	5432.64'	-168.38'	
		5450					
		5526'	7.43°	355.16°	5478.47'	-164.72'	



5500

5550

5600

5650

5700

5574'

12.55°

353.92°

5525.73'

-156.40'

5621'

17.11°

355.60°

5571.15'

-144.39'

5669'

21.34°

357.92°

5616.47'

-128.66'

5716'

25.45°

358.81°

5659.59'

-110.14'

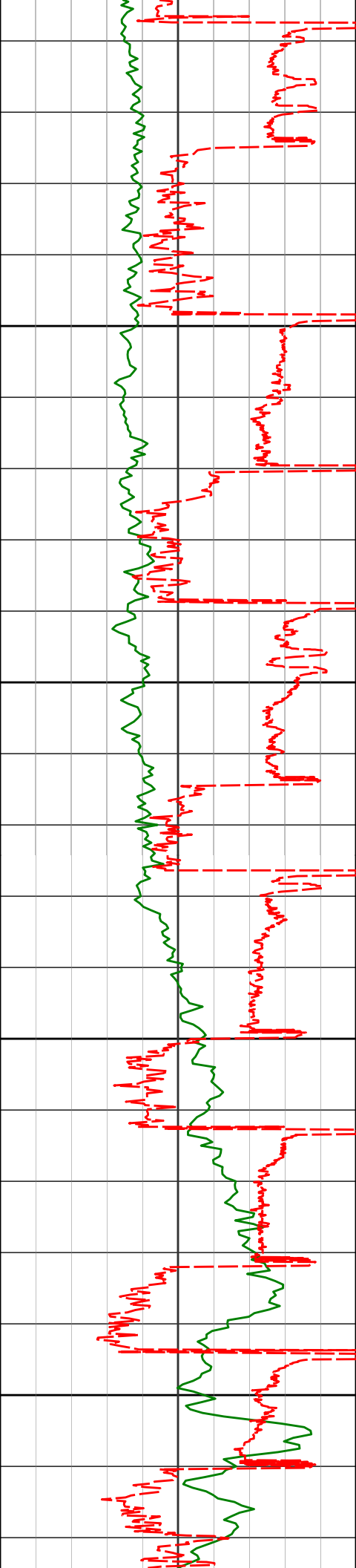
5764'

28.00°

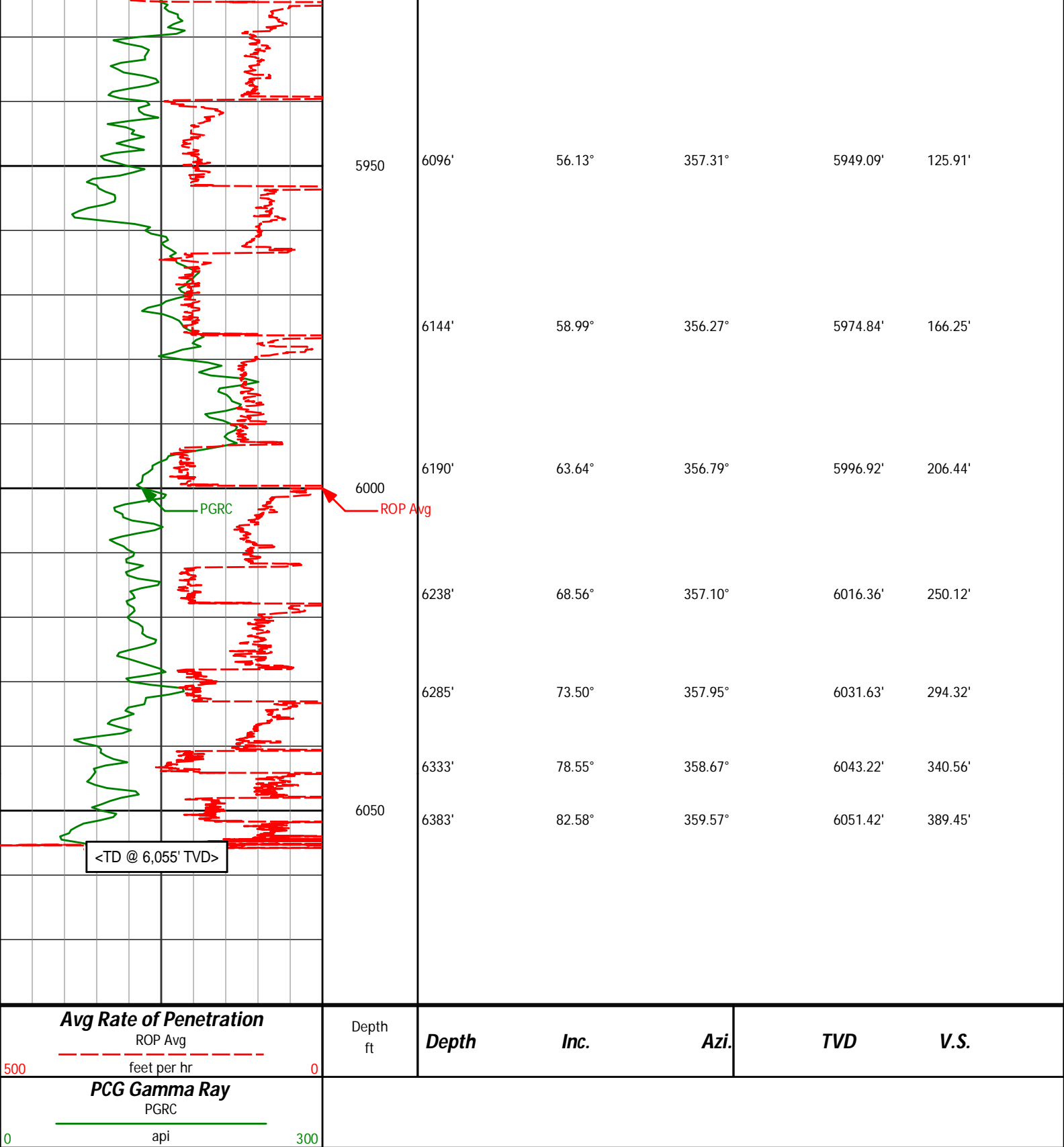
359.01°

5702.46'

-88.73'



5750	5811'	30.64°	358.50°	5743.43'	-65.89'
	5859'	34.28°	358.95°	5783.93'	-40.33'
5800					
	5906'	38.24°	359.68°	5821.82'	-12.78'
5850	5954'	43.13°	0.29°	5858.20'	18.16'
	6001'	47.87°	359.67°	5891.14'	51.32'
5900					
	6049'	52.78°	359.01°	5921.77'	87.92'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Cutthroat LC28-75-1AHNB
Wattenberg
Weld Colorado
USA
CA-XX-0901399595

0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
378.00	0.10	194.54	378.00	0.32 S	0.08 W	-0.30	0.03
654.00	0.40	300.34	654.00	0.07 S	0.97 W	0.08	0.16
717.00	0.28	317.55	717.00	0.16 N	1.27 W	0.34	0.24
810.00	0.28	325.21	810.00	0.51 N	1.55 W	0.74	0.04
996.00	0.07	55.22	995.99	0.95 N	1.72 W	1.19	0.15
1274.00	0.59	103.97	1273.99	0.70 N	0.19 W	0.72	0.20
1367.00	2.15	236.06	1366.97	0.39 S	1.17 W	-0.22	2.77
1460.00	3.87	231.90	1459.84	3.30 S	5.09 W	-2.52	1.87
1553.00	5.64	234.93	1552.52	7.86 S	11.30 W	-6.13	1.92
1646.00	8.00	245.72	1644.85	13.14 S	20.93 W	-9.95	2.88
1738.00	9.43	245.05	1735.79	18.96 S	33.60 W	-13.86	1.56
1833.00	9.10	246.50	1829.55	25.24 S	47.56 W	-18.04	0.43
1928.00	10.10	245.72	1923.22	31.66 S	62.04 W	-22.28	1.05
2022.00	9.68	244.55	2015.82	38.45 S	76.69 W	-26.86	0.49
2117.00	10.87	244.22	2109.30	45.77 S	91.96 W	-31.88	1.25
2212.00	10.87	244.71	2202.59	53.50 S	108.13 W	-37.17	0.10
2307.00	10.69	243.51	2295.92	61.25 S	124.11 W	-42.51	0.31
2402.00	10.43	243.82	2389.31	68.98 S	139.71 W	-47.88	0.28
2497.00	10.16	249.97	2482.78	75.64 S	155.30 W	-52.20	1.19
2686.00	10.10	251.45	2668.83	86.62 S	186.68 W	-58.49	0.14
2781.00	10.50	244.99	2762.30	92.93 S	202.43 W	-62.44	1.29
2876.00	10.43	244.63	2855.72	100.28 S	218.04 W	-67.43	0.10
2971.00	10.15	244.05	2949.20	107.62 S	233.33 W	-72.47	0.31
3066.00	9.69	243.26	3042.78	114.88 S	248.01 W	-77.51	0.50
3161.00	9.07	244.52	3136.51	121.70 S	261.91 W	-82.23	0.69
3256.00	9.96	242.64	3230.20	128.70 S	275.96 W	-87.11	0.99
3350.00	9.78	241.78	3322.81	136.21 S	290.21 W	-92.46	0.24
3445.00	10.00	240.68	3416.40	144.06 S	304.51 W	-98.14	0.31
3541.00	10.38	241.09	3510.88	152.32 S	319.35 W	-104.16	0.40
3636.00	10.12	247.51	3604.37	159.66 S	334.56 W	-109.19	1.23
3730.00	10.40	248.15	3696.86	165.97 S	350.07 W	-113.18	0.32
3825.00	9.43	245.33	3790.44	172.41 S	365.10 W	-117.36	1.14
3920.00	9.85	243.21	3884.10	179.33 S	379.43 W	-122.11	0.58
4015.00	9.19	243.30	3977.79	186.40 S	393.46 W	-127.07	0.70
4110.00	8.39	242.39	4071.68	193.02 S	406.38 W	-131.73	0.85
4205.00	8.96	245.18	4165.59	199.33 S	419.23 W	-136.11	0.75
4299.00	9.45	245.92	4258.38	205.55 S	432.91 W	-140.26	0.54
4394.00	8.96	246.52	4352.16	211.68 S	446.81 W	-144.30	0.53
4489.00	8.34	246.78	4446.08	217.34 S	459.93 W	-147.99	0.65
4584.00	7.85	246.28	4540.13	222.67 S	472.21 W	-151.48	0.52
4679.00	7.21	246.16	4634.31	227.69 S	483.60 W	-154.78	0.68
4773.00	6.48	247.41	4727.64	232.11 S	493.89 W	-157.65	0.79
4868.00	6.10	249.64	4822.07	235.93 S	503.57 W	-160.02	0.48
4963.00	5.58	246.23	4916.57	239.55 S	512.53 W	-162.29	0.66
5058.00	5.29	248.61	5011.15	243.01 S	520.84 W	-164.51	0.39
5153.00	3.79	244.98	5105.85	245.93 S	527.77 W	-166.39	1.60
5248.00	2.53	252.77	5200.70	247.88 S	532.62 W	-167.61	1.40
5342.00	0.95	233.39	5294.65	248.97 S	535.23 W	-168.30	1.77
5432.00	0.73	231.46	5384.64	249.77 S	536.28 W	-168.95	0.25
5480.00	1.73	354.27	5432.64	249.24 S	536.59 W	-168.38	4.60
5526.00	7.43	355.16	5478.47	245.59 S	536.91 W	-164.72	12.40
5574.00	12.55	353.92	5525.73	237.30 S	537.72 W	-156.40	10.69
5621.00	17.11	355.60	5571.15	225.32 S	538.79 W	-144.39	9.73
5669.00	21.34	357.92	5616.47	209.55 S	539.65 W	-128.66	8.96
5716.00	25.45	358.81	5659.59	190.90 S	540.17 W	-110.14	8.79
5764.00	28.00	359.01	5702.46	169.32 S	540.58 W	-88.73	5.32
5811.00	30.64	358.50	5743.43	146.31 S	541.09 W	-65.89	5.64
5859.00	34.28	358.95	5783.93	120.56 S	541.66 W	-40.33	7.60
5906.00	38.24	359.68	5821.82	92.76 S	541.98 W	-12.78	8.48
5954.00	43.13	0.29	5858.20	61.48 S	541.98 W	18.16	10.21
6001.00	47.87	359.67	5891.14	27.97 S	542.00 W	51.32	10.13
6049.00	52.78	359.01	5921.77	8.96 N	542.43 W	87.92	10.30
6096.00	56.13	357.31	5949.09	47.18 N	543.67 W	125.91	7.71
6144.00	58.99	356.27	5974.84	87.62 N	545.94 W	166.25	6.22
6190.00	63.64	356.79	5996.92	127.89 N	548.38 W	206.44	10.17
6238.00	68.56	357.10	6016.36	171.69 N	550.71 W	250.12	10.26
6285.00	73.50	357.95	6031.63	216.08 N	552.63 W	294.32	10.65
6333.00	78.55	358.67	6043.22	262.63 N	554.00 W	340.56	10.63
6383.00	82.58	359.57	6051.42	311.94 N	554.76 W	389.45	8.26

6437.00

89.17

359.57

6055.30

365.76 N

555.16 W

442.77

12.20

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 351.62 DEGREES (GRID)
A TOTAL CORRECTION OF 7.14 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 6437.00 FEET
IS 664.82 FEET ALONG 303.38 DEGREES (GRID)**

Surface surveys at 378 ft and 654 ft have had azimuths corrected to grid north, but were not taken by Halliburton.

Last survey is a projection from 6383 ft MD to TD at 6437 ft MD.

Date Printed:10 July 2014