

PCGC: Pressure Case Gamma

[illegible]

WELL INFORMATION

MWD Run Number	100	200			
Date run completed	01-Apr-14	02-Apr-14			
Rig Bit Number	0200	0300			
Bit Size (in)	8.750	8.750			
Tool Nominal OD (in)	6.750	6.750			
Log Start Depth (TVD, ft)	629.98	5,831.09			
Log End Depth (TVD, ft)	5,831.09	6,553.04			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	31-Mar-14 06:00	01-Apr-14 17:30			
Drill/Wipe End Date and Time	01-Apr-14 05:30	02-Apr-14 07:35			
Min Inc (deg) @ Depth (TVD, ft)	0.06 @ 808.98	20.68 @ 5,892.44			
Max Inc (deg) @ Depth (TVD, ft)	15.96 @ 3,692.59	88.48 @ 6,553.04			
Bit TFA(in2) / Bit Type	0.77 / PDC	0.86 / PDC			
Flow Rate (gpm)	591.23	570.59			
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	N/A / N/A			
Fluid Type	Polymer	Polymer			
Density (ppg) / Viscosity (spqt)	8.90 / 31.00	10.80 / 37.00			
Filtrate CL (ppm)	2,400.00	2,100.00			
pH / Fluid Loss (mptm)	9.10 / 9	8.00 / 8			
PV (cP) / YP (lbf2)	5 / 4.00	13 / 13.00			
% Solids / % Sand	5.2 / 0.25	11.7 / 0.25			
% 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 (deg F) @ 100 ft	152.50 / PDM	122.00 / PDM			

Max Tool Temp (degF) / Source	153.79 / PCM	160.83 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A			
Lead MWD Engineer	Henry Schmeidler	Henry Schmeidler			
Customer Representative	Steve Record	Steve Record			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.84	5.84			
Sub Serial Number	11404274	11404274			
Insert Serial Number	11680783	11680102			
Date and Time Initialized	30-Mar-14 18:48	01-Apr-14 09:24			
Date and Time Read	01-Apr-14 13:53	02-Apr-14 14:27			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	55.32	52.37			
Software Version	6.21	6.21			
Sub Serial Number	11404274	11404274			
Sonde Serial Number	11478196	11638618			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	137.87	275.95			

Gamma Ray Sensor Information

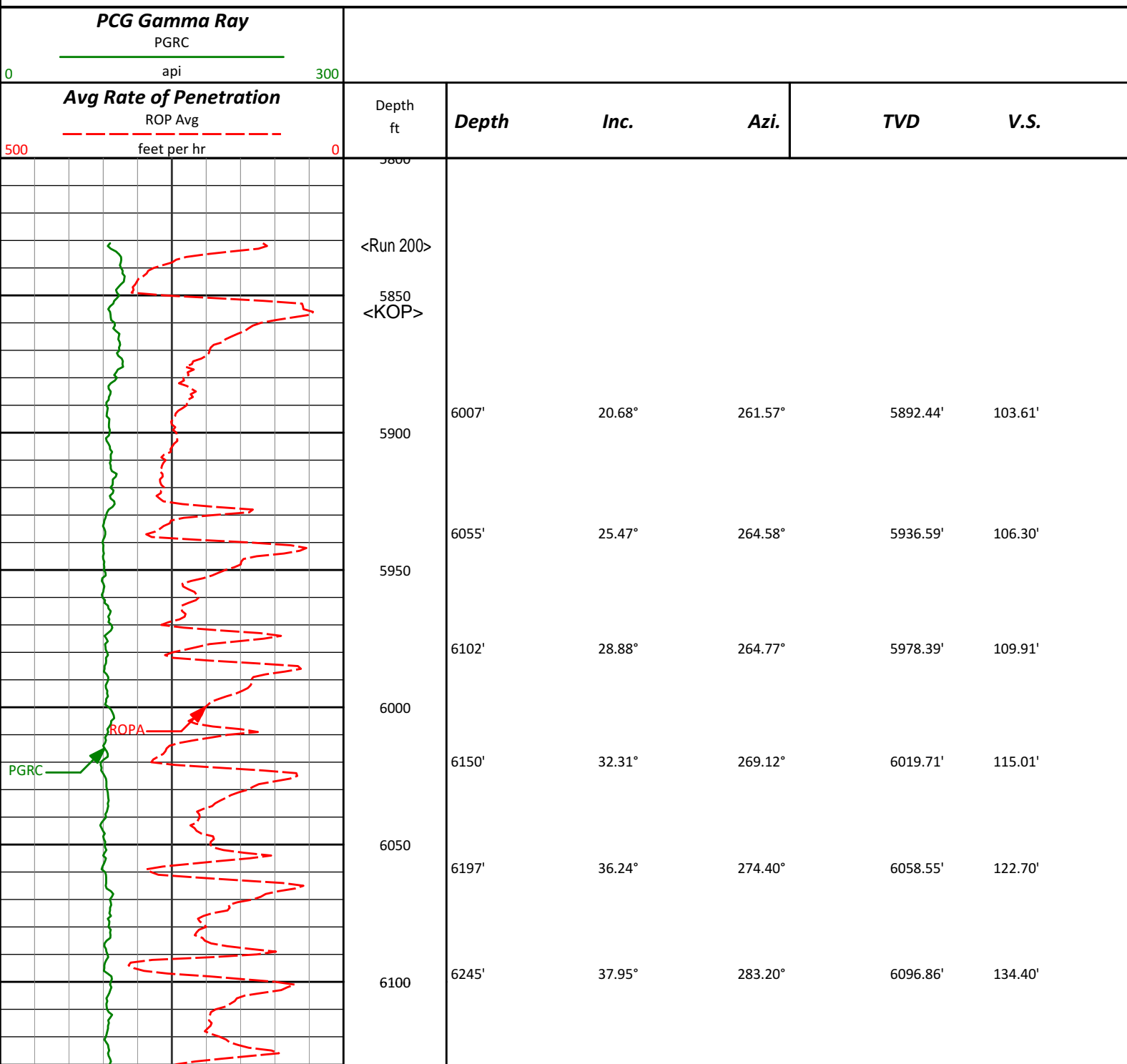
Tool Type	PCG	PCG			
Distance From Bit (ft)	50.32	47.37			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11404274	11404274			
Insert/Sonde Serial Number	11293410	11293354			

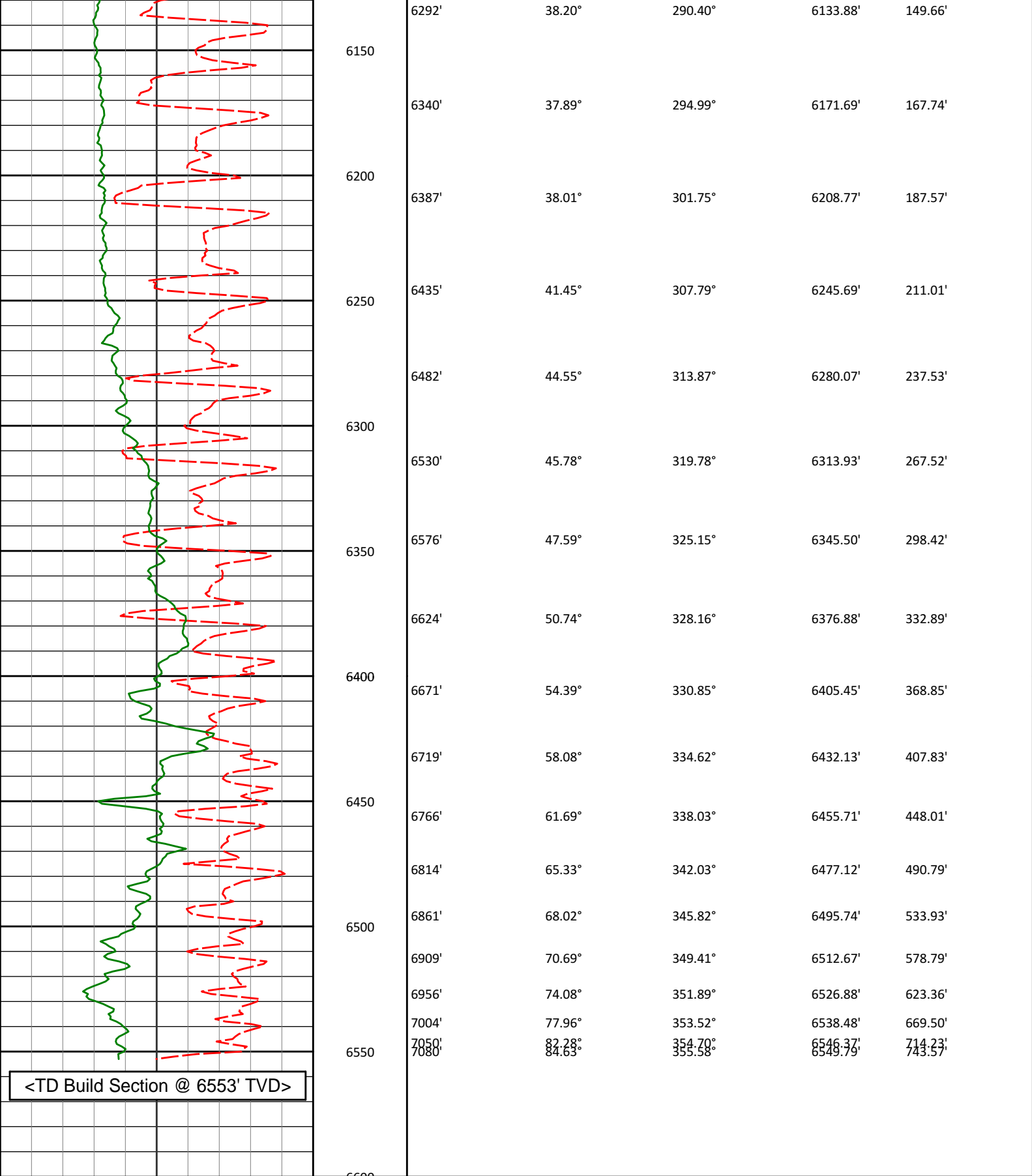
REMARKS

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:
 - All 2" (1:600) logs - 1 ft. interval, 3 ft. coercion distance.
 - All 5" (1:240) logs - .5 ft. interval, .6 ft. coercion distance.
5. INSITE version 8.0.0

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.





<div><div>Avg Rate of Penetration</div><div>ROP Avg</div><div>feet per hr</div></div>		Depth ft	Depth	Inc.	Azi.	TVD	V.S.
<div><div>PCG Gamma Ray</div><div>PGRC</div><div>api</div></div>							

Sperry Drilling Services

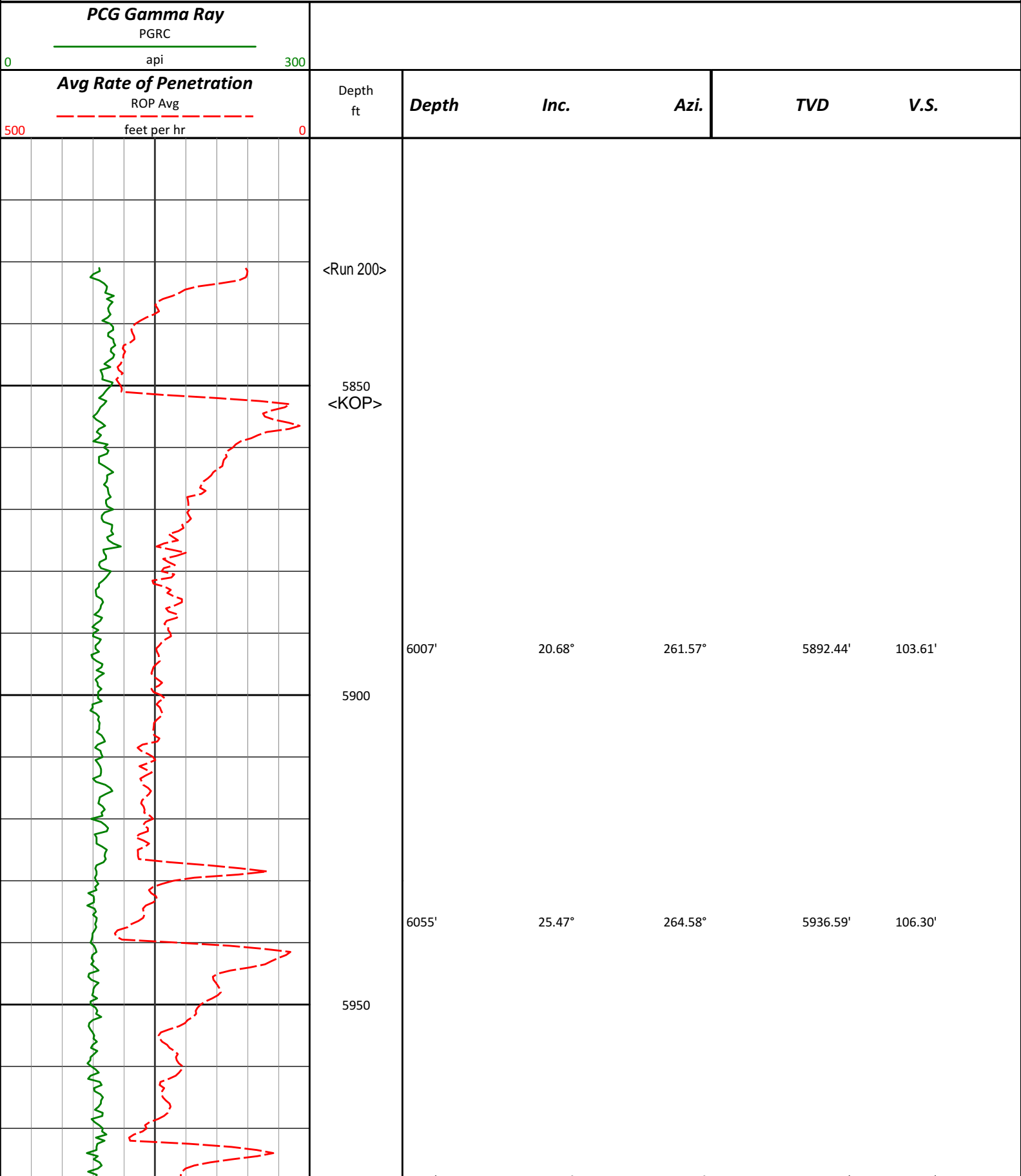
TVD Detail Log 1:240

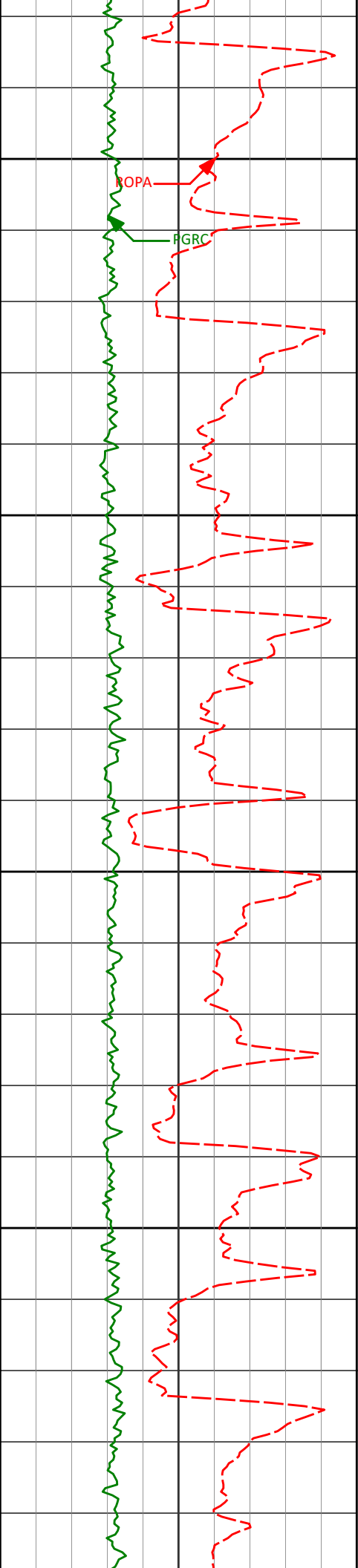
Noble Energy, Inc

Sater CC18-74-1HN

H&P 315

T4N R63W





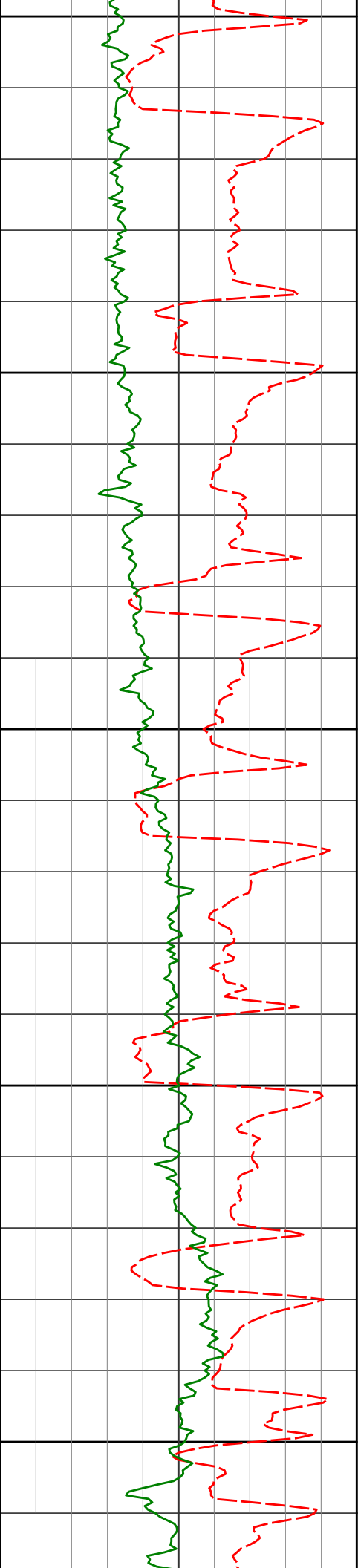
6000

6050

6100

6150

6102'	28.88°	264.77°	5978.39'	109.91'
6150'	32.31°	269.12°	6019.71'	115.01'
6197'	36.24°	274.40°	6058.55'	122.70'
6245'	37.95°	283.20°	6096.86'	134.40'
6292'	38.20°	290.40°	6133.88'	149.66'
6340'	37.89°	294.99°	6171.69'	167.74'



6200

6387'

38.01°

301.75°

6208.77'

187.57'

6250

6435'

41.45°

307.79°

6245.69'

211.01'

6300

6482'

44.55°

313.87°

6280.07'

237.53'

6350

6530'

45.78°

319.78°

6313.93'

267.52'

6400

6576'

47.59°

325.15°

6345.50'

298.42'

6624'

50.74°

328.16°

6376.88'

332.89'

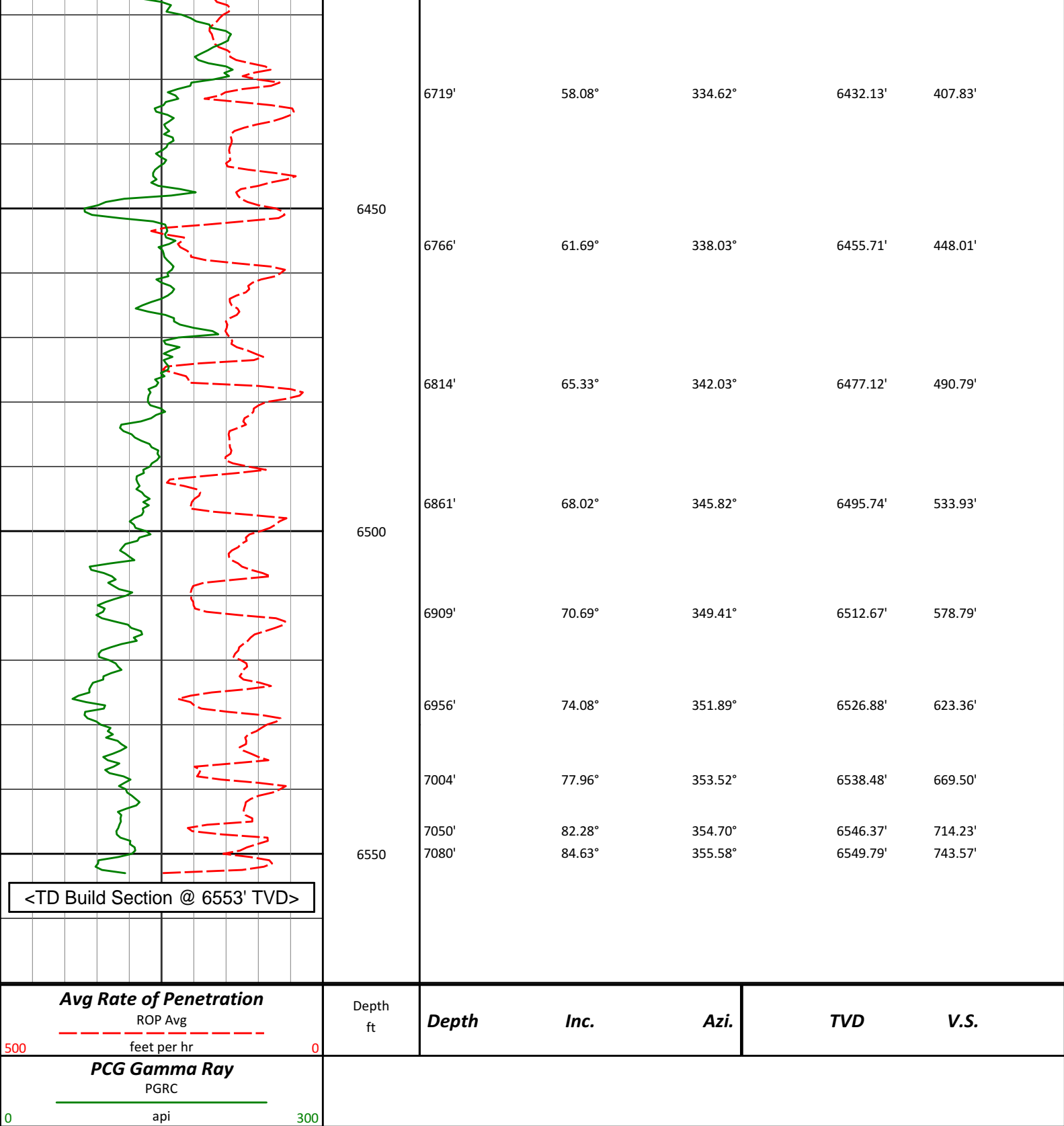
6671'

54.39°

330.85°

6405.45'

368.85'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

**Noble Energy
Sater CC18-74-1HN
Wattenberg
Weld Colorado
USA
CA-XX-0901120860**

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
271.00	0.60	284.70	271.00	0.36 N	1.37 W	0.70	0.22
611.00	0.50	319.50	610.98	1.94 N	4.06 W	2.92	0.10
715.00	0.26	307.30	714.98	2.43 N	4.54 W	3.52	0.24
809.00	0.06	127.05	808.98	2.53 N	4.68 W	3.66	0.35
902.00	0.07	271.12	901.98	2.50 N	4.69 W	3.63	0.13
1088.00	0.11	244.32	1087.98	2.43 N	4.97 W	3.63	0.03
1181.00	0.07	130.91	1180.98	2.35 N	5.01 W	3.57	0.16
1366.00	0.11	336.15	1365.98	2.44 N	4.99 W	3.65	0.10
1553.00	0.13	355.04	1552.98	2.82 N	5.09 W	4.04	0.02
1647.00	0.37	311.27	1646.98	3.13 N	5.33 W	4.40	0.31
1742.00	2.40	276.80	1741.94	3.57 N	7.53 W	5.40	2.21
1837.00	3.75	266.17	1836.81	3.60 N	12.61 W	6.74	1.54
1932.00	5.13	264.42	1931.52	2.98 N	19.93 W	8.04	1.46
2027.00	5.59	257.39	2026.10	1.56 N	28.67 W	8.93	0.84
2121.00	7.74	254.76	2119.46	1.11 S	39.25 W	9.09	2.32
2216.00	8.94	251.26	2213.46	5.16 S	52.42 W	8.59	1.37
2311.00	9.12	259.85	2307.28	8.86 S	66.82 W	8.75	1.43
2406.00	9.88	260.74	2400.98	11.50 S	82.28 W	10.20	0.81
2501.00	10.38	262.15	2494.50	13.98 S	98.80 W	12.08	0.59
2596.00	11.80	261.10	2587.72	16.65 S	116.87 W	14.18	1.51
2691.00	14.19	262.86	2680.28	19.60 S	138.03 W	16.81	2.55
2786.00	15.24	262.65	2772.17	22.65 S	161.97 W	20.07	1.10
2881.00	14.26	261.75	2864.03	25.92 S	185.93 W	23.12	1.06
2976.00	13.27	259.07	2956.31	29.67 S	208.21 W	25.27	1.24
3070.00	13.60	258.28	3047.73	33.96 S	229.62 W	26.67	0.41
3166.00	13.82	256.87	3141.00	38.86 S	251.85 W	27.69	0.42
3261.00	12.90	263.65	3233.43	42.61 S	273.44 W	29.66	1.91
3355.00	13.64	268.57	3324.92	44.05 S	294.96 W	33.85	1.44
3450.00	14.83	265.43	3417.00	45.29 S	318.28 W	38.68	1.49
3545.00	13.40	265.98	3509.14	47.03 S	341.37 W	42.99	1.51
3640.00	15.46	263.00	3601.14	49.35 S	364.92 W	46.85	2.30
3735.00	15.96	262.77	3692.59	52.53 S	390.44 W	50.38	0.53
3829.00	15.34	262.49	3783.10	55.78 S	415.59 W	53.75	0.66
3924.00	13.03	261.80	3875.20	58.95 S	438.66 W	56.66	2.44
4019.00	14.32	262.46	3967.50	62.02 S	460.90 W	59.46	1.36
4114.00	13.54	254.88	4059.72	66.46 S	483.28 W	60.97	2.09
4208.00	13.04	255.75	4151.20	71.94 S	504.19 W	61.09	0.57
4303.00	12.75	259.21	4243.81	76.54 S	524.87 W	62.01	0.87
4398.00	13.82	262.81	4336.26	79.93 S	546.43 W	64.32	1.42
4493.00	13.75	263.57	4428.53	82.61 S	568.91 W	67.55	0.20
4588.00	13.02	263.11	4520.95	85.16 S	590.75 W	70.74	0.77
4683.00	14.37	260.05	4613.24	88.48 S	612.99 W	73.30	1.61
4778.00	13.96	260.48	4705.36	92.41 S	635.90 W	75.43	0.44
4873.00	14.43	259.97	4797.45	96.37 S	658.86 W	77.56	0.51
4968.00	15.46	258.52	4889.24	100.95 S	682.93 W	79.37	1.16
5063.00	14.99	258.14	4980.90	105.99 S	707.36 W	80.82	0.51
5158.00	13.76	258.27	5072.93	110.82 S	730.45 W	82.14	1.29
5252.00	13.17	263.53	5164.35	114.30 S	752.04 W	84.37	1.44
5347.00	14.07	259.69	5256.68	117.58 S	774.15 W	86.92	1.34
5442.00	14.74	261.24	5348.69	121.49 S	797.45 W	89.19	0.82
5537.00	15.48	261.59	5440.41	125.18 S	821.93 W	91.96	0.78
5632.00	14.65	259.57	5532.14	129.21 S	846.28 W	94.38	1.03
5727.00	15.19	257.99	5623.94	133.97 S	870.27 W	95.99	0.71
5821.00	14.98	259.19	5714.70	138.82 S	894.25 W	97.52	0.40
5885.00	15.37	262.00	5776.47	141.55 S	910.78 W	99.16	1.30
6007.00	20.68	261.57	5892.44	146.96 S	948.13 W	103.61	4.35
6055.00	25.47	264.58	5936.59	149.18 S	966.80 W	106.30	10.27
6102.00	28.88	264.77	5978.39	151.17 S	988.17 W	109.91	7.25
6150.00	32.31	269.12	6019.71	152.43 S	1012.55 W	115.01	8.51
6197.00	36.24	274.40	6058.55	151.55 S	1038.98 W	122.70	10.49
6245.00	37.95	283.20	6096.86	147.09 S	1067.52 W	134.40	11.61
6292.00	38.20	290.40	6133.88	138.72 S	1095.22 W	149.66	9.46
6340.00	37.89	294.99	6171.69	127.32 S	1122.50 W	167.74	5.92
6387.00	38.01	301.75	6208.77	113.60 S	1147.90 W	187.57	8.84
6435.00	41.45	307.79	6245.69	96.07 S	1173.04 W	211.01	10.77
6482.00	44.55	313.87	6280.07	75.10 S	1197.23 W	237.53	11.00
6530.00	45.78	319.78	6313.93	50.29 S	1220.49 W	267.52	9.10
6578.00	47.59	325.15	6345.59	23.35 S	1248.85 W	299.12	8.23

6576.00	47.59	325.15	6345.50	23.75 S	1240.85 W	298.42	9.37
6624.00	50.74	328.16	6376.88	6.59 N	1260.78 W	332.89	8.09
6671.00	54.39	330.85	6405.45	38.74 N	1279.70 W	368.85	8.99
6719.00	58.08	334.62	6432.13	74.21 N	1297.94 W	407.83	10.09
6766.00	61.69	338.03	6455.71	111.44 N	1314.25 W	448.01	9.91
6814.00	65.33	342.03	6477.12	151.81 N	1328.89 W	490.79	10.64
6861.00	68.02	345.82	6495.74	193.27 N	1340.82 W	533.93	9.35
6909.00	70.69	349.41	6512.67	237.13 N	1350.44 W	578.79	8.95
6956.00	74.08	351.89	6526.88	281.32 N	1357.71 W	623.36	8.80
7004.00	77.96	353.52	6538.48	327.51 N	1363.62 W	669.50	8.71
7050.00	82.28	354.70	6546.37	372.58 N	1368.26 W	714.23	9.73
7080.00	84.63	355.58	6549.79	402.28 N	1370.79 W	743.57	8.37
7134.00	88.48	359.18	6553.04	456.10 N	1373.25 W	796.20	9.75

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 344.99 DEGREES (GRID)
A TOTAL CORRECTION OF 7.70 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 7134.00 FEET
IS 1447.01 FEET ALONG 288.37 DEGREES (GRID)**

Surface surveys at 271 ft and 611 ft have had azimuths corrected to grid north, but were not taken by Halliburton.

Last survey is a projection from 7080 ft MD to bit at 7134 ft MD.