

PCGK : Pressure Case Gamma
PCDC: Pressure Case Directional

1 : 600 / 1 : 240

Country		: USA		<div>Company : Noble Energy</div> <div>Rig : H&P 315</div> <div>Well : Cockcroft B15-69-1HNM</div> <div>Field : Wattenberg</div> <div>Country : USA</div> <div>API Number : 0512337203</div>			
Field		: Wattenberg					
Location		: Lat: 40° 24' 16.74" North Long: 104° 31' 6.74" West					
Well		: Cockroft B15-69-1HNM					
Company		: Noble Energy					
Rig		: H&P 315					
Permanent Datum : Ground Level				Elevation : 4585.00 ft		Other Services Directional Drilling	
Log Measured From : Drill Floor				24.00 ft Above Permanent Datum			
Drilling Measured From :				TVD LOG			
Depth Logged : 639.95 ft To 6,564.14 ft				Unit No. : 11610113		Job No. :CA-XX-0900775413	
Date Logged : 28-Oct-13 To 29-Oct-13				Plot Type : Final			
Total Depth MD : 6,973.00 ft TVD : 6,564.14 ft				Plot Date : 31-Oct-13			
Spud Date : 26-Oct-13							
Run No.		Borehole Record (TVD)		Run No.		Borehole Record (TVD)	
	Size	From	To		Size	From	To
0100	8.750 in	639.95 ft	5,886.52 ft				
0200	8.750 in	5,886.52 ft	6,564.14 ft				
						</	

WELL INFORMATION

MWD Run Number	100	200		
Date run completed	29-Oct-13	30-Oct-13		
Rig Bit Number	0100	0200		
Bit Size (in)	8.750	8.750		
Tool Nominal OD (in)	6.750	6.750		
Log Start Depth (TVD, ft)	639.95	5,886.52		
Log End Depth (TVD, ft)	5,886.52	6,564.14		
Drill or Wipe	Drill	Drill		
Drill/Wipe Start Date and Time	28-Oct-13 02:00	29-Oct-13 06:15		
Drill/Wipe End Date and Time	28-Oct-13 19:45	29-Oct-13 19:00		
Min Inc (deg) @ Depth (TVD, ft)	0.07 @ 995.95	0.38 @ 5,877.52		
Max Inc (deg) @ Depth (TVD, ft)	15.85 @ 3,512.13	83.58 @ 6,560.27		
Bit TFA(in2) / Bit Type	0.77 / PDC	0.86 / PDC		
Flow Rate (gpm)	583.90	562.06		
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	N/A / N/A		
Fluid Type	Polymer	Polymer		
Density (ppg) / Viscosity (spqt)	8.75 / 28.00	10.50 / 36.00		
Filtrate CL (ppm)	1,300.00	1,200.00		
pH / Fluid Loss (mptm)	9.30 / 0	9.50 / 0		
PV (cP) / YP (lhf2)	5 / 3.00	13 / 10.00		
% Solids / % Sand	4.1 / 0.15	0.11 / 0.20		
% 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	145.90 / PCM	170.37 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A			
Lead MWD Engineer	Paul Kock	Paul Kock			
Customer Representative	Martin Suarez	Martin Suarez			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.84	5.84			
Sub Serial Number	11404274	11404274			
Insert Serial Number	11680789	11680789			
Date and Time Initialized	27-Oct-13 08:21	27-Oct-13 08:21			
Date and Time Read	30-Oct-13 02:41	30-Oct-13 02:47			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	53.99	51.63			
Software Version	6.21	6.21			
Sub Serial Number	11404274	11404274			
Sonde Serial Number	11638470	11638470			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	186.74	183.73			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	48.99	46.63			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11404274	11404274			
Insert/Sonde Serial Number	11681100	11681100			

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

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Sperry Drilling Services

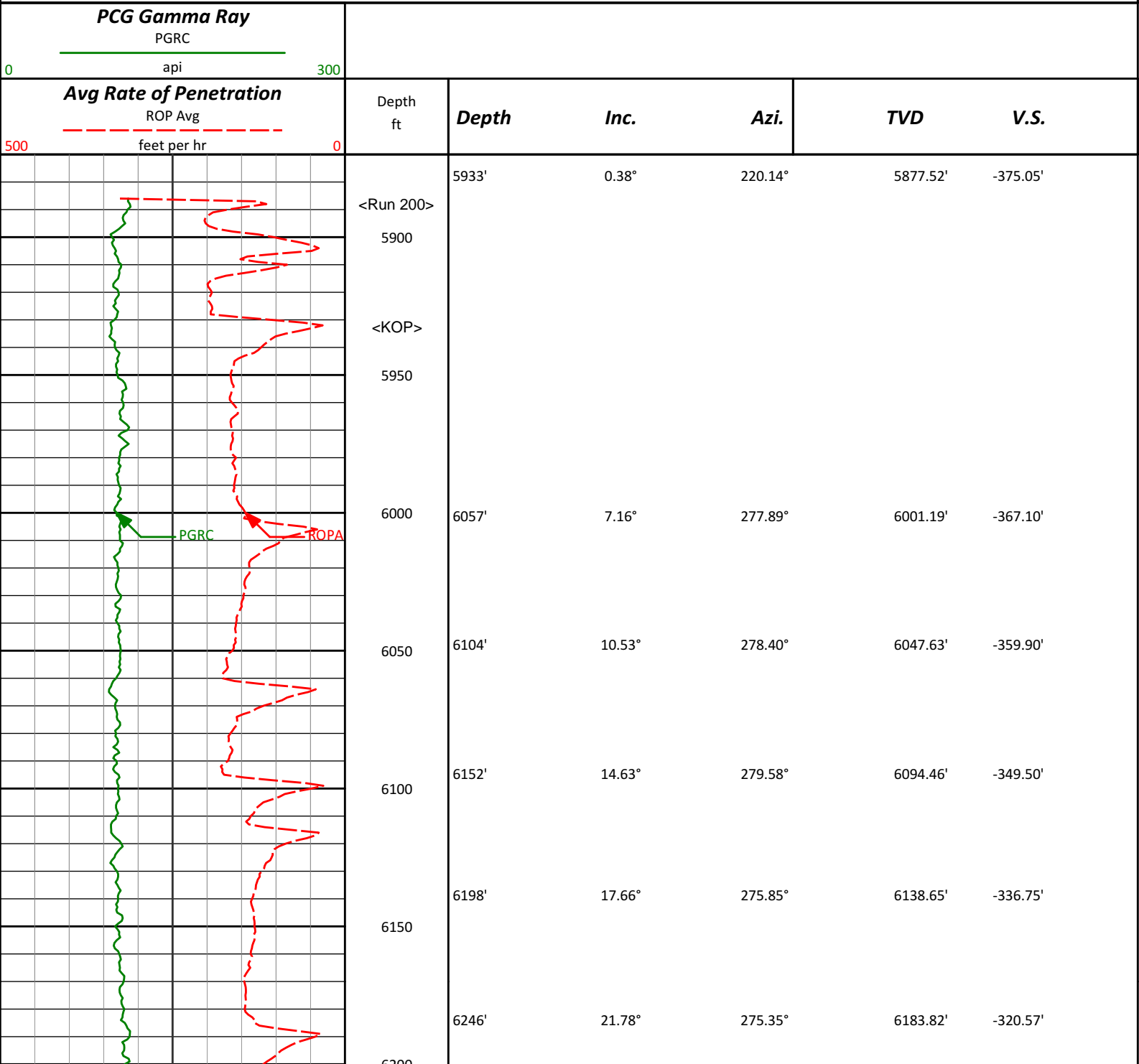
TVD Detail Log 1:600

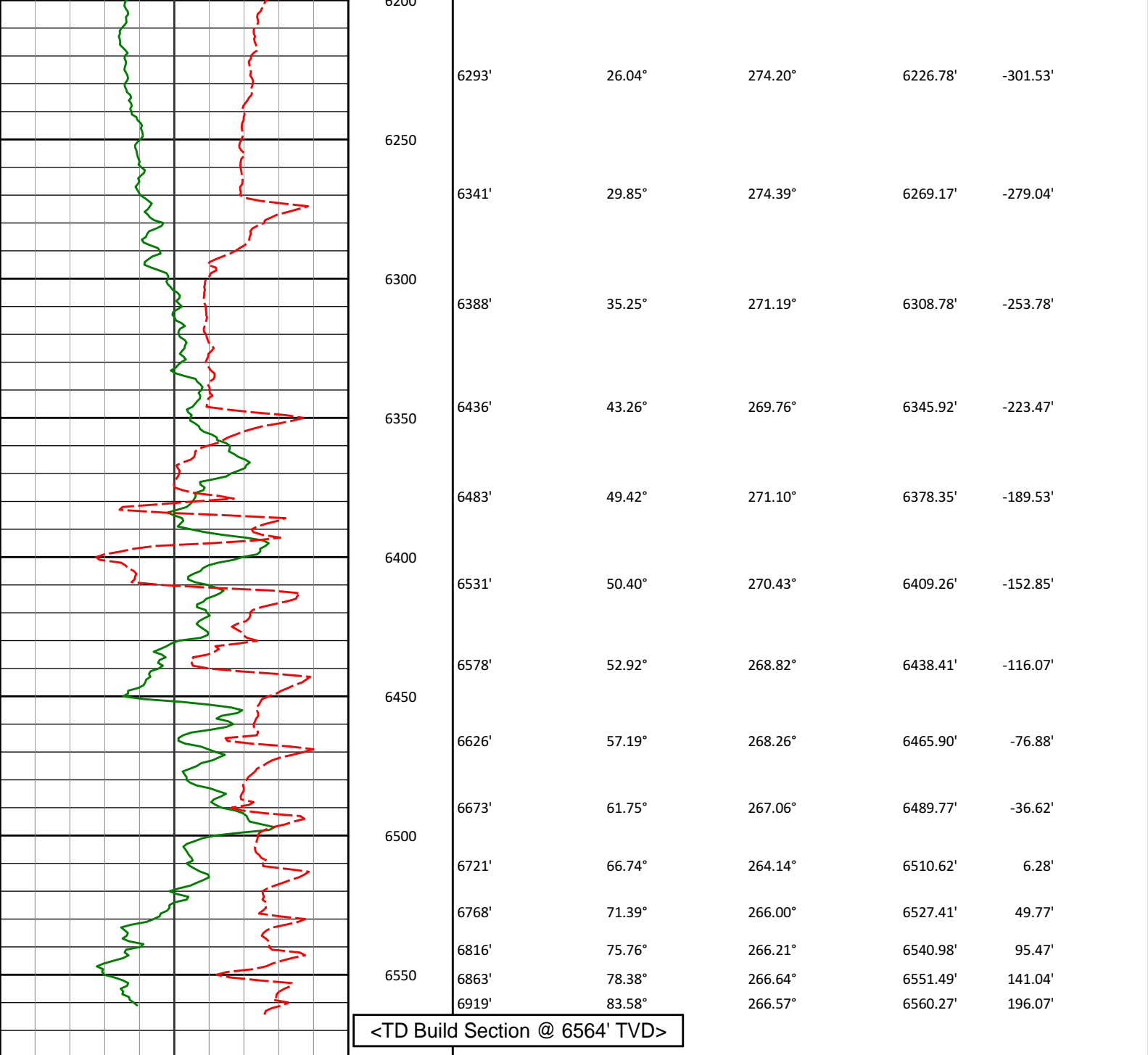
Noble Energy, Inc

Cockroft B15-69-1HNM

H&P 315

T5N R64W



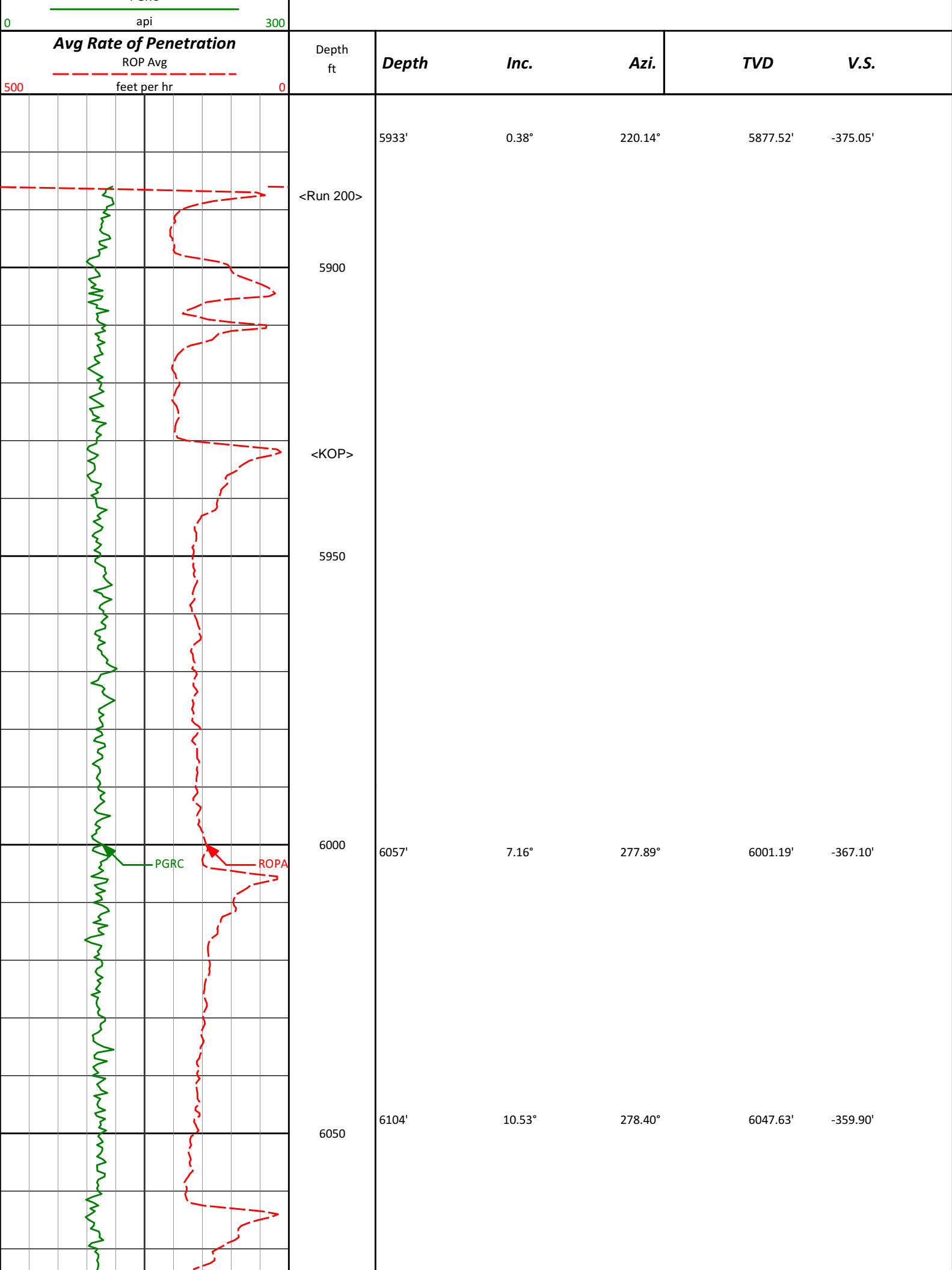


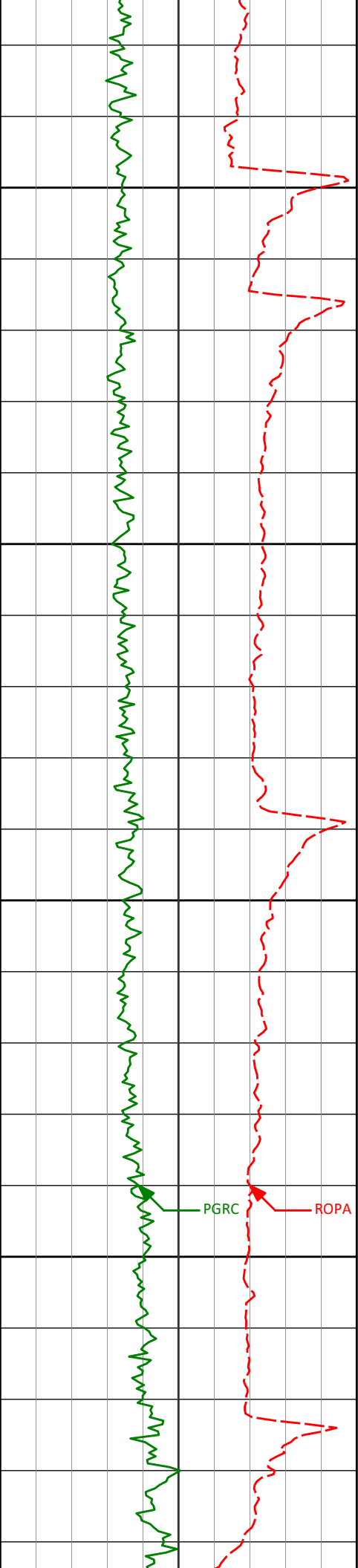
<div><div>Avg Rate of Penetration</div><div>ROP Avg</div><div>feet per hr</div></div>		Depth					
		ft	Depth	Inc.	Azi.	TVD	V.S.
<div><div>PCG Gamma Ray</div><div>PGRC</div><div>api</div></div>							

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Sperry Drilling Services
TVD Detail Log 1:240

Noble Energy, Inc
Cockroft B15-69-1HNM
H&P 315
T5N R64W

<div><div>PCG Gamma Ray</div><div>PGRC</div></div>
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6100

6152'

14.63°

279.58°

6094.46'

-349.50'

6150

6198'

17.66°

275.85°

6138.65'

-336.75'

6200

6246'

21.78°

275.35°

6183.82'

-320.57'

6250

6293'

26.04°

274.20°

6226.78'

-301.53'

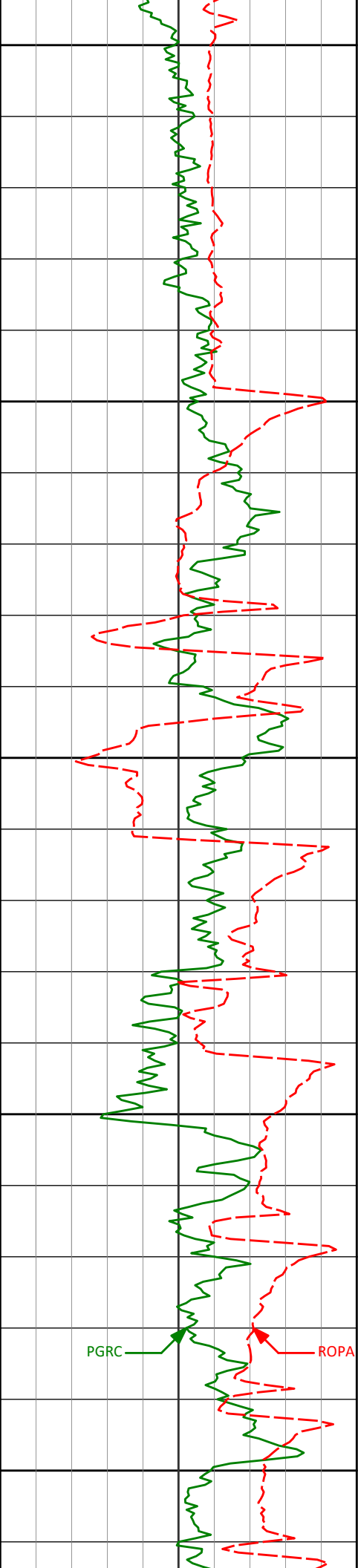
6341'

29.85°

274.39°

6269.17'

-279.04'



6300

6388'

35.25°

271.19°

6308.78'

-253.78'

6350

6436'

43.26°

269.76°

6345.92'

-223.47'

6400

6483'

49.42°

271.10°

6378.35'

-189.53'

6531'

50.40°

270.43°

6409.26'

-152.85'

6450

6578'

52.92°

268.82°

6438.41'

-116.07'

6450

6626'

57.19°

268.26°

6465.90'

-76.88'

6500

6673'

61.75°

267.06°

6489.77'

-36.62'

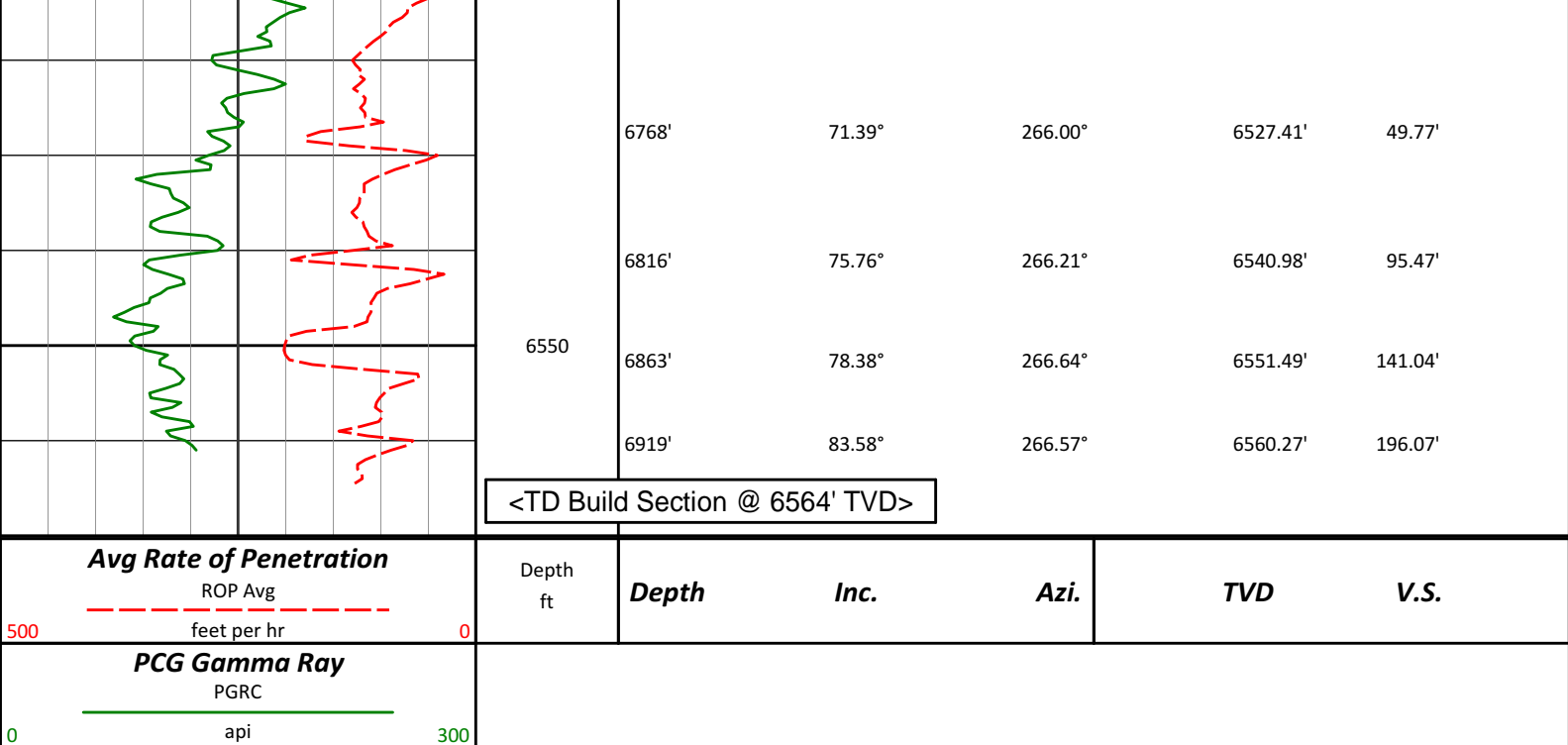
6721'

66.74°

264.14°

6510.62'

6.28'



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DIRECTIONAL SURVEY REPORT

Noble Energy
Cockroft B15-69-1HNM
Wattenberg
Weld Colorado
USA
CA-XX-0900775413

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
306.00	1.30	287.01	305.97	1.02 N	3.32 W	3.37	0.42
605.00	0.30	172.31	604.95	1.23 N	6.46 W	6.52	0.49
720.00	0.13	120.97	719.95	0.87 N	6.31 W	6.35	0.21
812.00	0.31	162.50	811.95	0.58 N	6.15 W	6.17	0.25
904.00	0.20	193.01	903.95	0.19 N	6.11 W	6.11	0.19
996.00	0.07	188.68	995.95	0.02 S	6.15 W	6.14	0.14
1088.00	0.19	243.09	1087.95	0.15 S	6.30 W	6.28	0.18
1179.00	0.17	167.86	1178.95	0.35 S	6.41 W	6.38	0.25
1272.00	0.10	267.47	1271.95	0.49 S	6.46 W	6.42	0.23
1365.00	0.22	235.26	1364.95	0.60 S	6.69 W	6.64	0.16
1458.00	0.33	212.49	1457.94	0.93 S	6.98 W	6.91	0.17
1553.00	0.17	174.70	1552.94	1.31 S	7.11 W	7.02	0.23
1648.00	0.18	288.39	1647.94	1.40 S	7.24 W	7.14	0.31
1743.00	0.47	286.29	1742.94	1.25 S	7.76 W	7.67	0.31
1838.00	0.64	229.42	1837.94	1.48 S	8.53 W	8.43	0.58
1932.00	0.68	170.30	1931.93	2.37 S	8.84 W	8.68	0.69
2027.00	1.69	79.28	2026.92	2.67 S	7.36 W	7.19	1.93
2122.00	3.45	54.43	2121.82	0.74 S	3.66 W	3.61	2.15
2217.00	5.23	53.37	2216.54	3.51 N	2.14 E	-1.93	1.87
2312.00	7.83	58.32	2310.92	9.49 N	11.13 E	-10.54	2.80
2407.00	9.54	55.47	2404.83	17.35 N	23.12 E	-22.04	1.86
2502.00	10.70	50.97	2498.35	27.37 N	36.46 E	-34.75	1.47
2597.00	12.20	53.72	2591.46	38.87 N	51.41 E	-48.98	1.69
2692.00	13.54	47.32	2684.07	52.34 N	67.68 E	-64.41	2.05
2787.00	13.42	51.12	2776.46	66.80 N	84.44 E	-80.26	0.94
2881.00	14.12	44.76	2867.76	81.79 N	101.00 E	-95.90	1.77
2976.00	14.63	43.53	2959.79	98.71 N	117.42 E	-111.27	0.62
3071.00	14.44	43.48	3051.78	115.03 N	134.12 E	-127.82	1.22

3071.00	14.41	48.13	3051.76	115.30 N	134.48 E	-127.30	1.23
3166.00	14.69	50.70	3143.71	130.81 N	152.60 E	-144.45	0.74
3261.00	15.47	45.66	3235.44	147.30 N	170.99 E	-161.81	1.61
3356.00	12.25	47.59	3327.67	162.95 N	187.49 E	-177.35	3.43
3451.00	13.62	48.45	3420.25	177.17 N	203.31 E	-192.28	1.46
3546.00	15.85	46.21	3512.13	193.57 N	221.04 E	-209.00	2.43
3641.00	14.66	43.44	3603.78	211.28 N	238.68 E	-225.53	1.47
3736.00	13.47	39.39	3695.93	228.56 N	253.97 E	-239.76	1.63
3830.00	12.69	40.92	3787.49	244.82 N	267.68 E	-252.47	0.91
3925.00	11.32	40.66	3880.41	259.78 N	280.59 E	-264.45	1.45
4020.00	10.87	52.05	3973.65	272.36 N	293.73 E	-276.81	2.35
4115.00	11.57	53.07	4066.83	283.59 N	308.41 E	-290.78	0.77
4210.00	9.15	53.93	4160.27	293.76 N	322.13 E	-303.87	2.56
4305.00	10.45	52.87	4253.89	303.41 N	335.10 E	-316.24	1.39
4400.00	9.72	50.78	4347.42	313.68 N	348.18 E	-328.68	0.86
4495.00	7.64	51.08	4441.33	322.72 N	359.31 E	-339.24	2.19
4590.00	6.97	48.47	4535.55	330.50 N	368.54 E	-347.98	0.79
4685.00	4.47	47.11	4630.07	336.85 N	375.56 E	-354.61	2.63
4779.00	4.15	68.38	4723.81	340.59 N	381.41 E	-360.22	1.72
4874.00	1.51	83.71	4818.69	342.00 N	385.85 E	-364.57	2.86
5159.00	0.94	35.52	5103.63	344.32 N	390.95 E	-369.52	0.40
5443.00	1.48	27.00	5387.57	349.50 N	393.98 E	-372.23	0.20
5728.00	0.47	79.30	5672.53	353.00 N	396.79 E	-374.83	0.44
5886.00	0.36	212.56	5830.52	352.70 N	397.16 E	-375.21	0.48
5933.00	0.38	220.14	5877.52	352.46 N	396.98 E	-375.05	0.11
6057.00	7.16	277.89	6001.19	353.21 N	389.06 E	-367.10	5.62
6104.00	10.53	278.40	6047.63	354.24 N	381.91 E	-359.90	7.17
6152.00	14.63	279.58	6094.46	355.89 N	371.59 E	-349.50	8.56
6198.00	17.66	275.85	6138.65	357.57 N	358.92 E	-336.75	6.97
6246.00	21.78	275.35	6183.82	359.15 N	342.80 E	-320.57	8.58
6293.00	26.04	274.20	6226.78	360.71 N	323.82 E	-301.53	9.11
6341.00	29.85	274.39	6269.17	362.40 N	301.40 E	-279.04	7.94
6388.00	35.25	271.19	6308.78	363.58 N	276.16 E	-253.78	12.06
6436.00	43.26	269.76	6345.92	363.80 N	245.81 E	-223.47	16.79
6483.00	49.42	271.10	6378.35	364.07 N	211.82 E	-189.53	13.26
6531.00	50.40	270.43	6409.26	364.56 N	175.11 E	-152.85	2.31
6578.00	52.92	268.82	6438.41	364.31 N	138.25 E	-116.07	5.99
6626.00	57.19	268.26	6465.90	363.30 N	98.92 E	-76.88	8.95
6673.00	61.75	267.06	6489.77	361.64 N	58.48 E	-36.62	9.95
6721.00	66.74	265.82	6510.62	358.95 N	15.35 E	6.28	10.65
6768.00	71.39	265.69	6527.41	355.70 N	28.41 W	49.77	9.90
6816.00	75.76	267.58	6540.98	353.00 N	74.36 W	95.47	9.86
6863.00	78.38	267.74	6551.49	351.13 N	120.13 W	141.04	5.58
6919.00	83.58	267.94	6560.27	349.05 N	175.38 W	196.07	9.29
6973.00	88.20	267.94	6564.14	347.12 N	229.19 W	249.66	8.56

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 273.45 DEGREES (GRID)
A TOTAL CORRECTION OF 7.81 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 6973.00 FEET
IS 415.95 FEET ALONG 326.56 DEGREES (GRID)**

Surface surveys at 306 ft and 605 ft have had azimuths corrected to grid north, but were not taken by Halliburton.

Last survey is a projection from 6919 ft MD to TD at 6973 ft MD.