

PCGC: Pressure Case Gamma



Country		: USA				Company		: Noble Energy	
Field		: Wattenberg				Rig		: H&P 273	
Location		: Lat: 40° 45' 38.88" North Long: 103° 51' 39.85" West				Well		: Rohn State LD10-62HN	
Well		: Rohn State LD10-62HN				Country		: Wattenberg	
Company		: Noble Energy				Field		: Wattenberg	
Rig		: H&P 273				Country		: USA	
LOCATION						API Number		: 05-123-37624	
		Latitude : 40° 45' 38.88" North Longitude : 103° 51' 39.85" West				UTM Easting = 3,454,003.710 ft UTM Northing = 1,524,200.440 ft		Other Services Directional Drilling	
Permanent Datum		: Ground Level		Elevation : 4719.00 ft		Elev.		KB N/A	
Log Measured From		: Drill Floor		24.00 ft Above Permanent Datum		DF		4743.00 ft	
Drilling Measured From		: Drill Floor		TVD LOG		GL		4719.00 ft	
						WD		N/A	
Depth Logged		: 124.00 ft To 5,626.04 ft		Unit No. : 11703717		Job No. : CA-XX-0901742658			
Date Logged		: 23-Oct-14 To 27-Oct-14		Plot Type : Final					
Total Depth MD		: 5,990.00 ft TVD : 5,626.04 ft		Plot Date : 24-Oct-14					
Spud Date		: 22-Oct-14							
Run No.		Borehole Record (TVD)		Run No.		Borehole Record (TVD)			
		Size From To				Size From To			
2		8,750 in 1,212.98 ft 5,626.04 ft							

WELL INFORMATION

MWD Run Number	100				
Date run completed	24-Oct-14				
Rig Bit Number	2				
Bit Size (in)	8.750				
Tool Nominal OD (in)	6.750				
Log Start Depth (TVD, ft)	1,212.98				
Log End Depth (TVD, ft)	5,626.04				
Drill or Wipe	Drill				
Drill/Wipe Start Date and Time	23-Oct-14 02:11				
Drill/Wipe End Date and Time	24-Oct-14 01:45				
Min Inc (deg) @ Depth (TVD, ft)	0.07 @ 3,711.74				
Max Inc (deg) @ Depth (TVD, ft)	81.81 @ 5,619.84				
Bit TFA(in2) / Bit Type	0.91 / PDC				
Flow Rate (gpm)	502.14				
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A				
Fluid Type	Fresh Water Gel				
Density (ppg) / Viscosity (spqt)	10.80 / 34.00				
Filtrate CL (ppm)	200.00				
pH / Fluid Loss (mptm)	9.50 / 7				
PV (cP) / YP (lbf2)	11 / 8.00				
% Solids / % Sand	11.00 / 0.15				
% Oil / Oil:Water Ratio	N/A / N/A				
Rm @ Measured Temp (degF)	N/A @ N/A				
Rmf @ Measured Temp (degF)	N/A @ N/A				
Rmc @ Measured Temp (degF)	N/A @ N/A				
Min Temp (degF) / Max Temp (degF)	122.00 / 123.00				

Max Tool Temp (degF) / Source	163.20 / PCM				
Rm @ Max Tool Temp (degF)	N/A @ N/A				
Lead MWD Engineer	Paul Kock				
Customer Representative	Justin Field				

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM				
Software Version	5.93				
Sub Serial Number	11404267				
Insert Serial Number	11400845				
Date and Time Initialized	22-Oct-14 20:36				
Date and Time Read	24-Oct-14 07:07				
ECMB SW Version	N/A				

Directional Sensor Information

Tool Type	PCDC				
Distance From Bit (ft)	52.48				
Software Version	6.21				
Sub Serial Number	11404267				
Sonde Serial Number	11062073				
Sensor ID Number	N/A				
Toolface Offset (deg)	82.82				

Gamma Ray Sensor Information

Tool Type	PCG				
Distance From Bit (ft)	47.38				
Recorded Sample Period (sec)	10				
Software Version	8.15				
Sub Serial Number	11404267				
Insert/Sonde Serial Number	11579773				

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

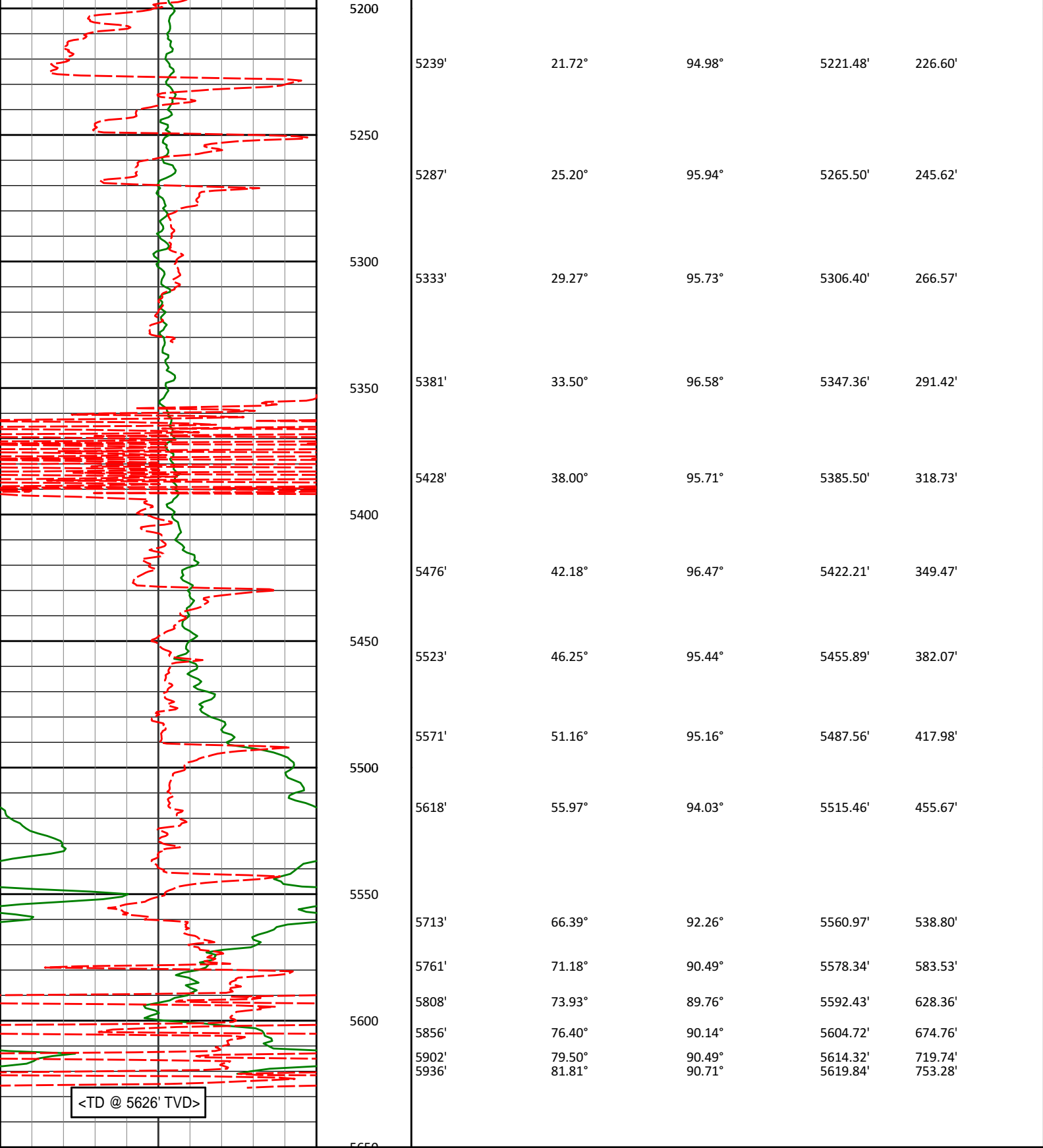
WARRANTY

Sperry Drilling Services

TVD Detail Log 1:600

Noble Energy, Inc.
Rohn State LD10-62HN
H&P 273
T9N R58W

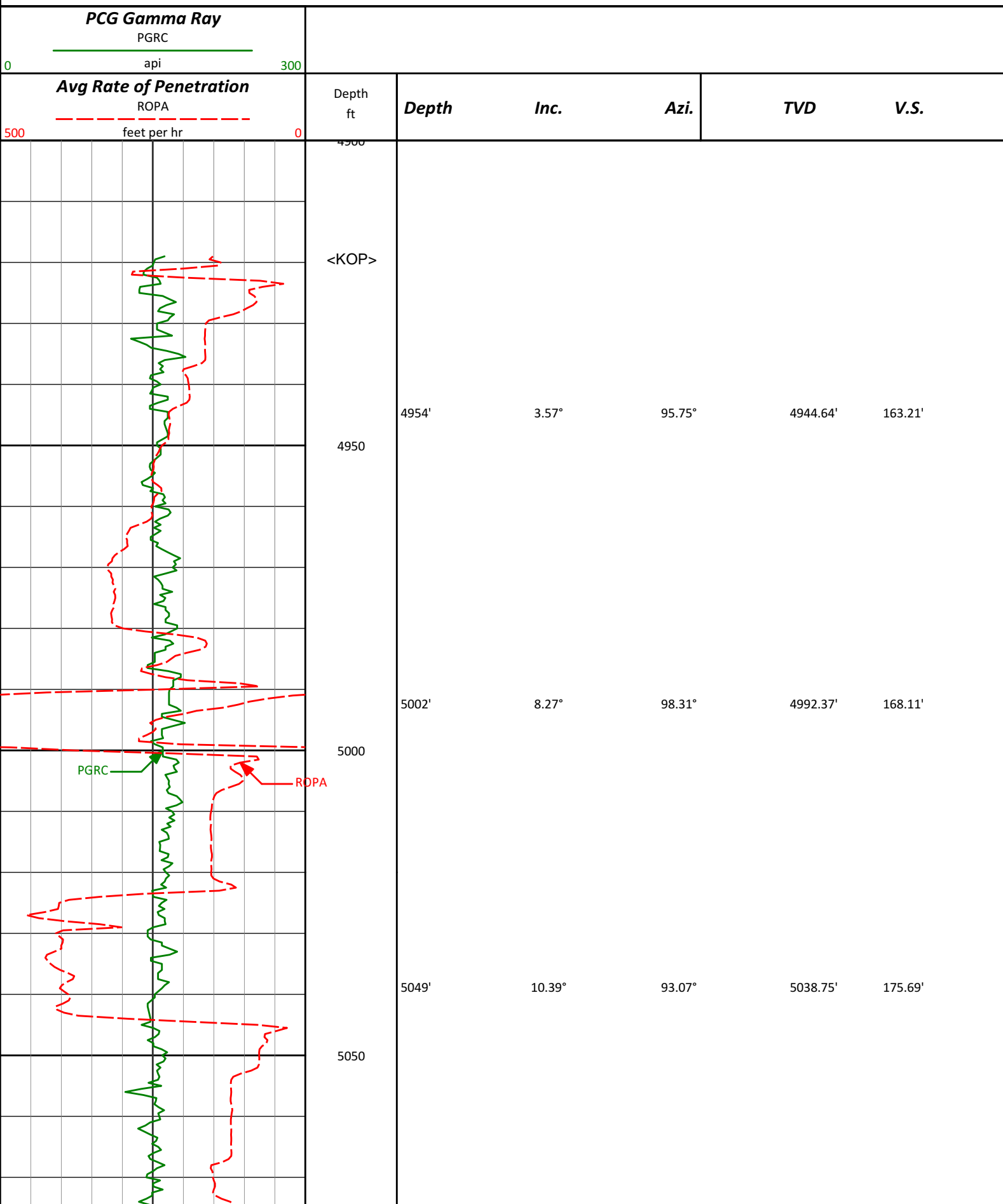
<div><div>PCG Gamma Ray</div><div>PGRC</div><div>0300</div><div>api</div></div>															
<div><div>Avg Rate of Penetration</div><div>ROP Avg</div><div>5000</div><div>feet per hr</div></div>										Depth ft	Depth	Inc.	Azi.	TVD	V.S.
										4950					
											<KOP>				
										4950	4954'	3.57°	95.75°	4944.64'	163.21'
										5000	5002'	8.27°	98.31°	4992.37'	168.11'
<div><div>PGRC</div><div>ROPA</div></div>															
										5050	5049'	10.39°	93.07°	5038.75'	175.69'
										5100	5097'	12.83°	87.11°	5085.77'	185.34'
										5150	5144'	15.39°	90.16°	5131.35'	196.79'
											5192'	18.14°	93.71°	5177.30'	210.62'

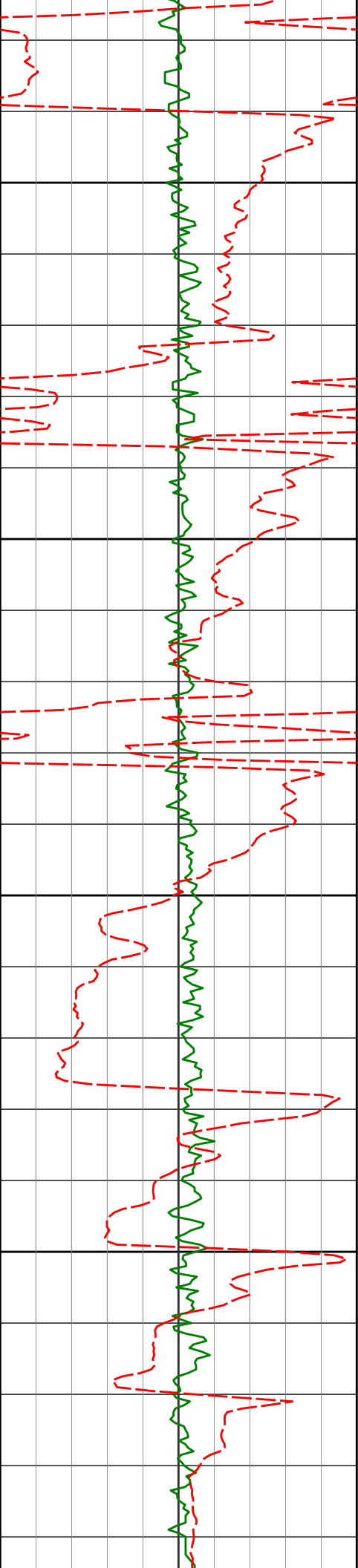


Avg Rate of Penetration ROP Avg feet per hr		Depth ft	Depth	Inc.	Azi.	TVD	V.S.
PCG Gamma Ray PGRC api							

TVD Detail Log 1:240

Noble Energy, Inc
Rohn State LD10-62HN
H&P 273
T9N R58W





5097'

12.83°

87.11°

5085.77'

185.34'

5100

5144'

15.39°

90.16°

5131.35'

196.79'

5150

5192'

18.14°

93.71°

5177.30'

210.62'

5200

5239'

21.72°

94.98°

5221.48'

226.60'

5250

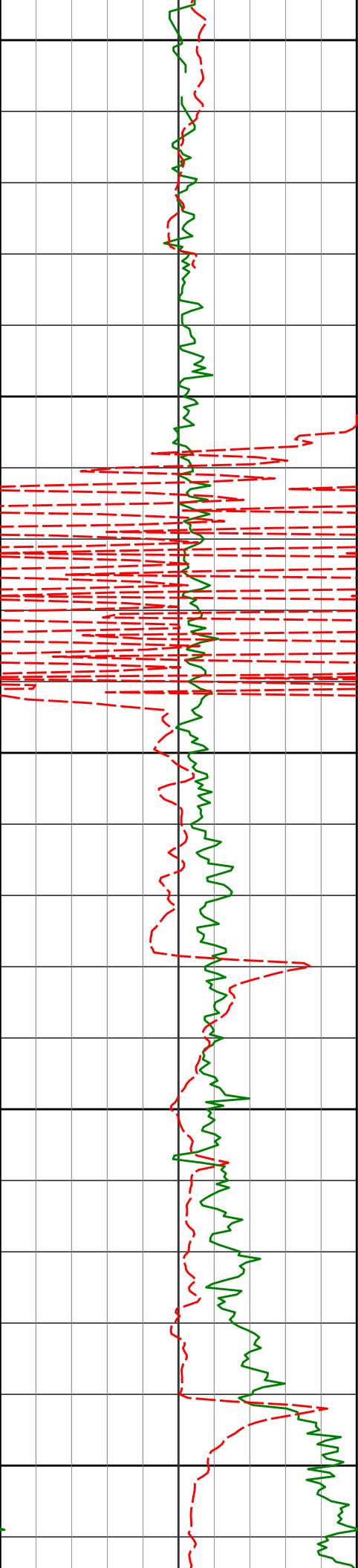
5287'

25.20°

95.94°

5265.50'

245.62'



5300

5333'

29.27°

95.73°

5306.40'

266.57'

5350

5381'

33.50°

96.58°

5347.36'

291.42'

5400

5428'

38.00°

95.71°

5385.50'

318.73'

5450

5476'

42.18°

96.47°

5422.21'

349.47'

5500

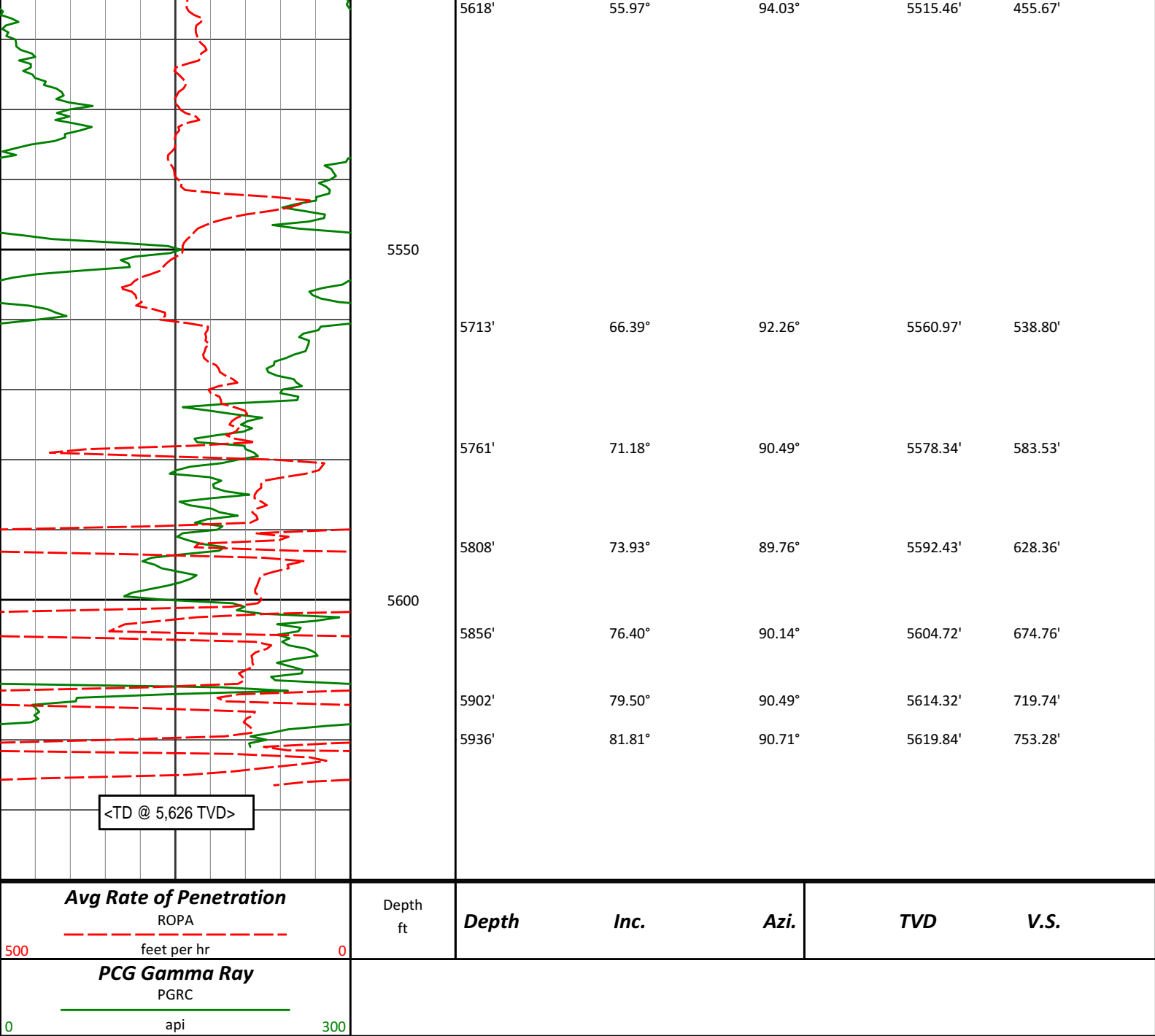
5571'

51.16°

95.16°

5487.56'

417.98'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Rohn State LD10-62HN
Wattenberg
Weld Colorado
USA
CA-XX-0901742658

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
380.00	0.20	293.17	380.00	0.26 N	0.61 W	-0.61	0.05
745.00	0.30	253.77	745.00	0.24 N	2.11 W	-2.11	0.05
1209.00	0.80	337.77	1208.98	2.90 N	4.50 W	-4.51	0.18
1283.00	0.36	55.39	1282.98	3.51 N	4.51 W	-4.52	1.09
1376.00	0.40	85.40	1375.97	3.71 N	3.94 W	3.96	0.22

1376.00	0.40	83.49	1373.97	3.71 N	3.94 W	-3.90	0.22
1469.00	0.56	47.38	1468.97	4.04 N	3.29 W	-3.30	0.37
1562.00	0.41	27.93	1561.97	4.64 N	2.79 W	-2.81	0.24
1747.00	0.29	218.33	1746.97	4.86 N	2.78 W	-2.79	0.38
1840.00	2.07	139.62	1839.94	3.39 N	1.84 W	-1.85	2.18
1933.00	3.23	112.73	1932.85	1.10 N	1.67 E	1.66	1.80
2026.00	5.82	110.02	2025.55	1.52 S	8.52 E	8.52	2.79
2119.00	7.63	111.40	2117.91	5.39 S	18.70 E	18.72	1.96
2212.00	8.24	102.66	2210.02	9.11 S	30.95 E	30.98	1.45
2305.00	7.81	101.49	2302.11	11.83 S	43.65 E	43.69	0.49
2398.00	7.20	98.49	2394.31	13.95 S	55.60 E	55.65	0.78
2582.00	8.18	96.60	2576.65	17.15 S	80.01 E	80.07	0.55
2677.00	7.76	97.01	2670.73	18.71 S	93.09 E	93.16	0.44
2772.00	7.10	97.05	2764.94	20.22 S	105.29 E	105.36	0.70
2867.00	5.92	91.83	2859.32	21.09 S	116.02 E	116.09	1.39
2962.00	5.31	88.60	2953.87	21.14 S	125.31 E	125.38	0.72
3057.00	5.08	83.43	3048.48	20.55 S	133.88 E	133.96	0.55
3152.00	4.83	84.05	3143.12	19.66 S	142.04 E	142.11	0.27
3246.00	3.17	61.70	3236.89	18.01 S	148.27 E	148.33	2.39
3436.00	0.87	44.49	3426.76	14.49 S	153.92 E	153.97	1.24
3531.00	0.92	45.60	3521.75	13.44 S	154.97 E	155.02	0.06
3721.00	0.07	18.00	3711.74	12.26 S	156.10 E	156.14	0.45
4005.00	0.55	111.28	3995.74	12.59 S	157.42 E	157.47	0.20
4100.00	0.55	117.36	4090.73	12.96 S	158.25 E	158.30	0.06
4290.00	0.39	84.90	4280.73	13.32 S	159.71 E	159.75	0.16
4574.00	0.90	343.36	4564.72	11.11 S	160.05 E	160.08	0.37
4669.00	0.51	26.22	4659.71	10.02 S	160.02 E	160.05	0.66
4764.00	0.34	1.19	4754.71	9.36 S	160.21 E	160.24	0.26
4859.00	0.35	2.09	4849.70	8.79 S	160.23 E	160.26	0.01
4954.00	3.57	95.75	4944.64	8.79 S	163.18 E	163.21	3.80
5002.00	8.27	98.31	4992.37	9.44 S	168.08 E	168.11	9.80
5049.00	10.39	93.07	5038.75	10.16 S	175.66 E	175.69	4.86
5097.00	12.83	87.11	5085.77	10.12 S	185.30 E	185.34	5.66
5144.00	15.39	90.16	5131.35	9.88 S	196.75 E	196.79	5.68
5192.00	18.14	93.71	5177.30	10.38 S	210.59 E	210.62	6.11
5239.00	21.72	94.98	5221.48	11.61 S	226.56 E	226.60	7.67
5287.00	25.20	95.94	5265.50	13.43 S	245.58 E	245.62	7.28
5333.00	29.27	95.73	5306.40	15.57 S	266.52 E	266.57	8.86
5381.00	33.50	96.58	5347.36	18.26 S	291.36 E	291.42	8.85
5428.00	38.00	95.71	5385.50	21.18 S	318.66 E	318.73	9.64
5476.00	42.18	96.47	5422.21	24.47 S	349.39 E	349.47	8.77
5523.00	46.25	95.44	5455.89	27.86 S	381.98 E	382.07	8.79
5571.00	51.16	95.16	5487.56	31.18 S	417.88 E	417.98	10.23
5618.00	55.97	94.03	5515.46	34.20 S	455.56 E	455.67	10.43
5666.00	61.54	93.17	5540.35	36.76 S	496.50 E	496.63	11.70
5713.00	66.39	92.26	5560.97	38.76 S	538.67 E	538.80	10.46
5761.00	71.18	90.49	5578.34	39.82 S	583.39 E	583.53	10.55
5808.00	73.93	89.76	5592.43	39.91 S	628.22 E	628.36	6.04
5856.00	76.40	90.14	5604.72	39.87 S	674.62 E	674.76	5.20
5902.00	79.50	90.49	5614.32	40.12 S	719.60 E	719.74	6.78
5936.00	81.81	90.71	5619.84	40.47 S	753.15 E	753.28	6.82
5990.00	85.00	90.71	5626.04	41.14 S	806.78 E	806.92	5.91

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 90.20 DEGREES (GRID)
A TOTAL CORRECTION OF 6.97 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 5990.00 FEET
IS 807.83 FEET ALONG 92.92 DEGREES (GRID)**

Surface surveys at 380 ft, 745 ft and 1209 ft have had azimuths corrected to grid north, but were not taken by Halliburton.

Last survey is a projection from 5936 ft MD to TD at 5990 ft MD.