

PCGK: Pressure Case Gamma
PCDC: Pressure Case Directional


Country : USA			
Field : Wattenberg			
Location : Lat: 40° 46' 31.01" North Long: 103° 51' 40.50" West			
Well : Rohn State LD03-63-1HN			
Company : Noble Energy			
Rig : H&P 273			
LOCATION			
Latitude : 40° 46' 31.01" North Longitude : 103° 51' 40.50" West		Other Services Directional Drilling	
UTM Easting = 3,453,856.370 ft UTM Northing = 1,529,474.170 ft			
Company : Noble Energy		: Noble Energy	
Rig : H&P 273		: H&P 273	
Well : Rohn State LD03-63-1HN		: Rohn State LD03-63-1HN	
Field : Wattenberg		: Wattenberg	
Country : USA		: USA	
API Number : 0512337471			
Permanent Datum : Ground Level		Elevation : 4706.00 ft	
Log Measured From : Drill Floor		24.00 ft Above Permanent Datum	
Drilling Measured From : Drill Floor		TVD LOG	
Depth Logged : 1,216.95 ft To 5,672.11 ft		Unit No. : 11703717	
Date Logged : 09-Sep-14 To 10-Sep-14		Job No. : CA-XX-0901647800	
Total Depth MD : 6,049.00 ft TVD : 5,672.11 ft		Plot Type : Final	
Spud Date : 08-Sep-14		Plot Date : 11-Sep-14	
Borehole Record (TVD)		Borehole Record (TVD)	
Run No.	Size From To	Run No.	Size From To
2	8.750 in 1,216.95 ft 4,891.35 ft		
3	8.750 in 4,891.35 ft 5,672.11 ft		
		Casing Record (TVD)	
	Size Weight From To		
	7.000 in 26.00 lbpft SURFACE 5,671.15 ft		

WELL INFORMATION				
MWD Run Number	100	200		
Date run completed	09-Sep-14	10-Sep-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)	1,216.95	4,891.35		
Log End Depth (TVD, ft)	4,891.35	5,672.11		
Drill or Wipe	Drill	Drill		
Drill/Wipe Start Date and Time	09-Sep-14 02:35	09-Sep-14 22:45		
Drill/Wipe End Date and Time	09-Sep-14 15:25	10-Sep-14 08:00		
Min Inc (deg) @ Depth (TVD, ft)	0.26 @ 4,836.35	0.19 @ 4,929.35		
Max Inc (deg) @ Depth (TVD, ft)	11.91 @ 2,478.13	80.08 @ 5,665.10		
Bit TFA(in2) / Bit Type	0.74 / PDC	0.86 / PDC		
Flow Rate (gpm)	596.50	563.11		
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)	8.90 / 37.00	10.50 / 37.00		
Filtrate CL (ppm)	200.00	200.00		
pH / Fluid Loss (mptm)	9.50 / 0	9.90 / 0		
PV (cP) / YP (lhf2)	11 / 7.00	12 / 8.00		
% Solids / % Sand	10 / .15	11.4 / .2		
% 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	154.30 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A			
Lead MWD Engineer	Paul Kock	Paul Kock			
Customer Representative	Justin Fields	Justin Fields			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.93	5.93			
Sub Serial Number	11404274	11404274			
Insert Serial Number	11400845	11400845			
Date and Time Initialized	08-Sep-14 15:51	08-Sep-14 15:51			
Date and Time Read	10-Sep-14 15:54	10-Sep-14 16:01			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	53.05	52.12			
Software Version	6.21	6.21			
Sub Serial Number	11404274	11404274			
Sonde Serial Number	11297588	11297588			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	192.04	148.58			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	47.95	47.02			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	11404274	11404274			
Insert/Sonde Serial Number	11680972	11680972			

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

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Sperry Drilling Services

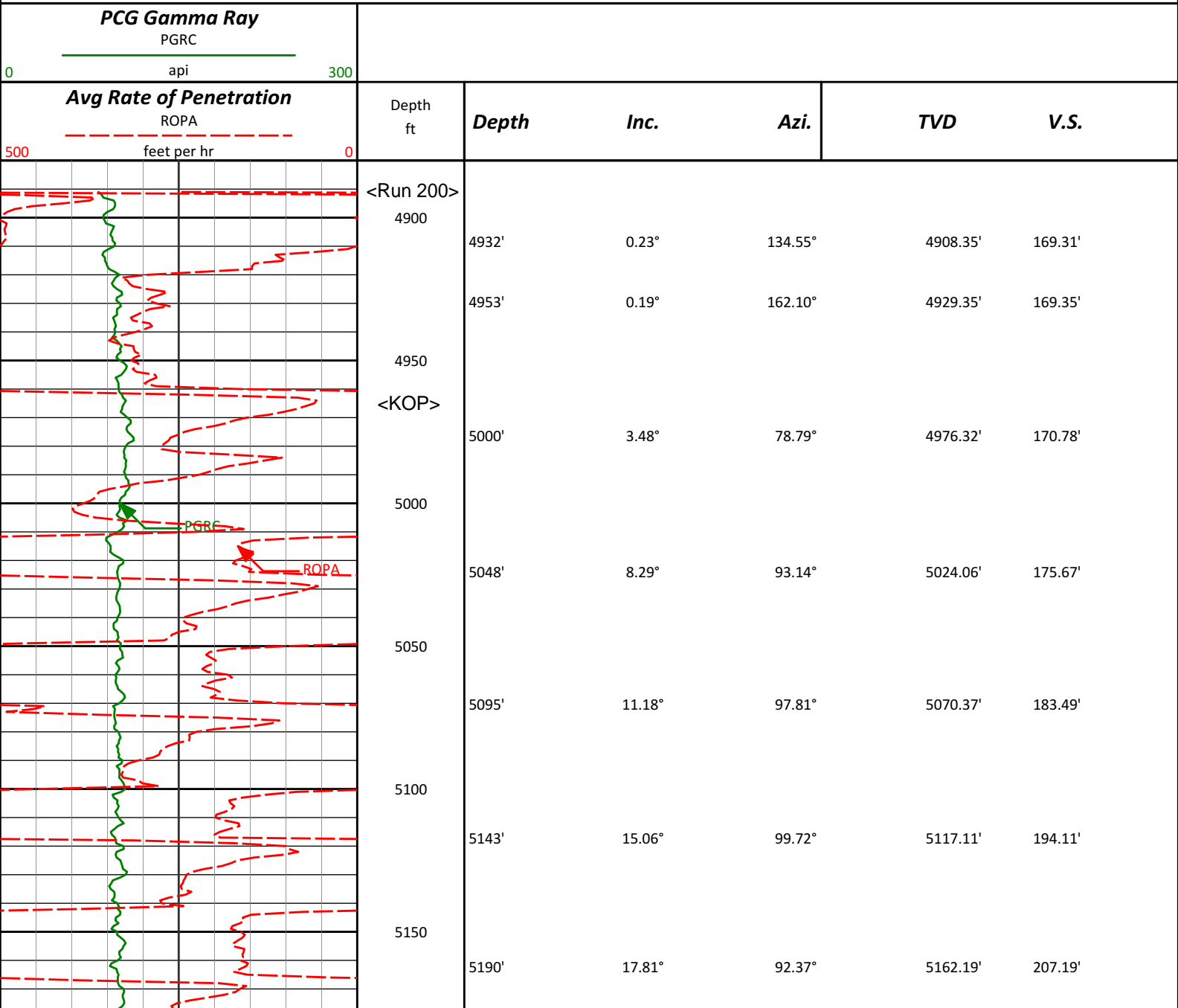
TVD Detail Log 1:600

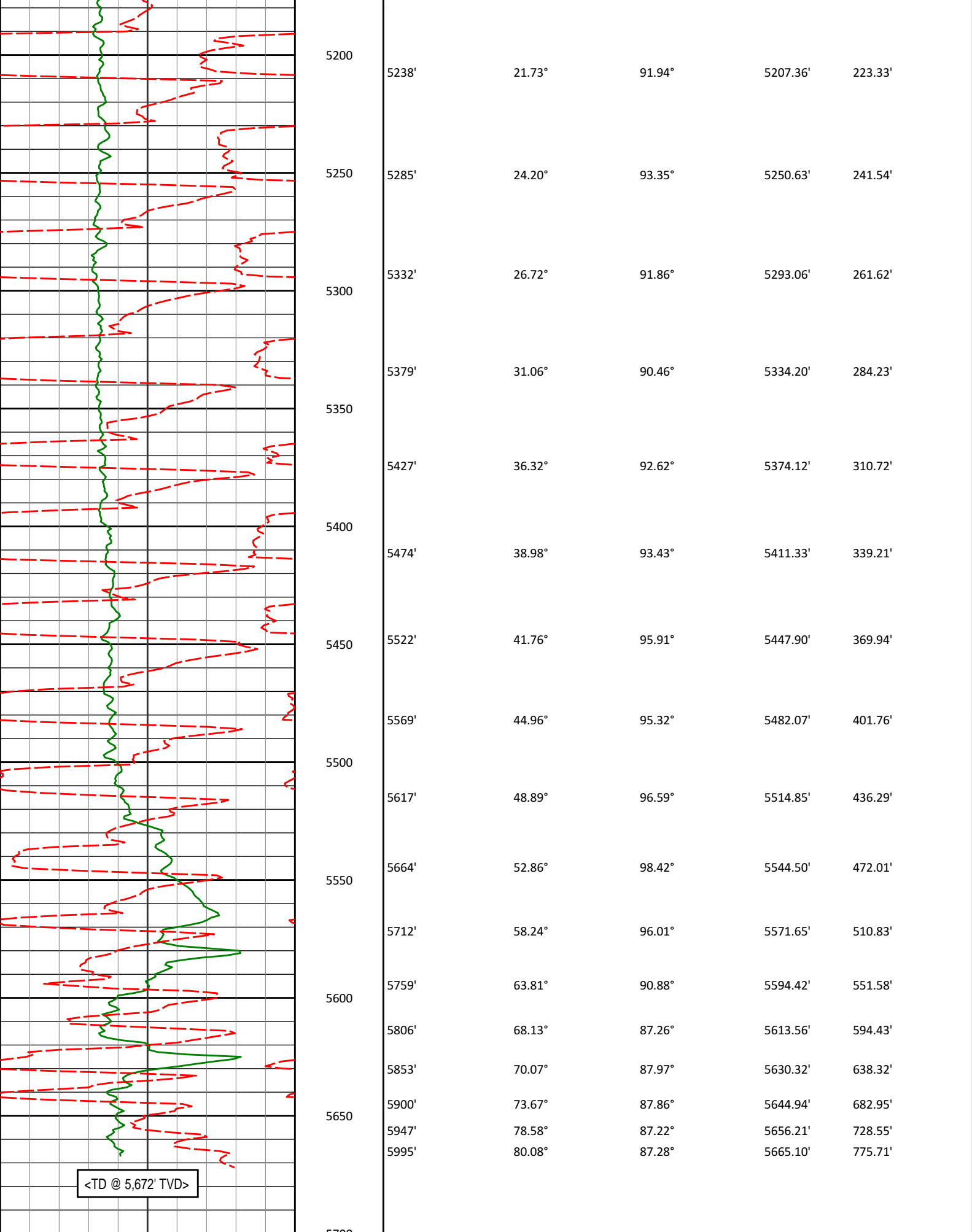
Noble Energy, Inc

Rohn State LD03-63-1HN

H&P 273

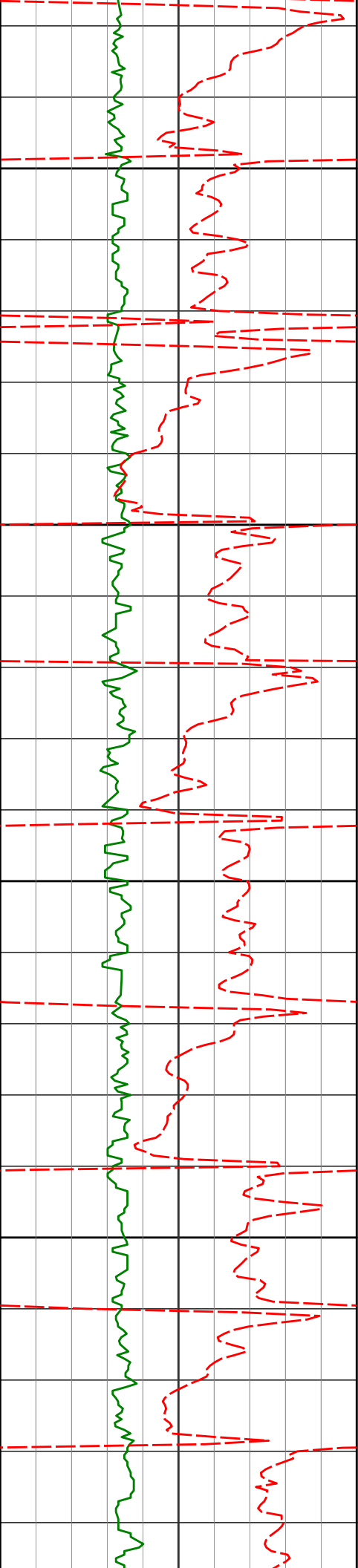
T9N R58W





<TD @ 5,672' TVD>

Avg Rate of Penetration		Depth ft	Depth	Inc.	Azi.	TVD	V.S.
500	0						
ROPA							
feet per hr							



5050

5095'

11.18°

97.81°

5070.37'

183.49'

5100

5143'

15.06°

99.72°

5117.11'

194.11'

5150

5190'

17.81°

92.37°

5162.19'

207.19'

5200

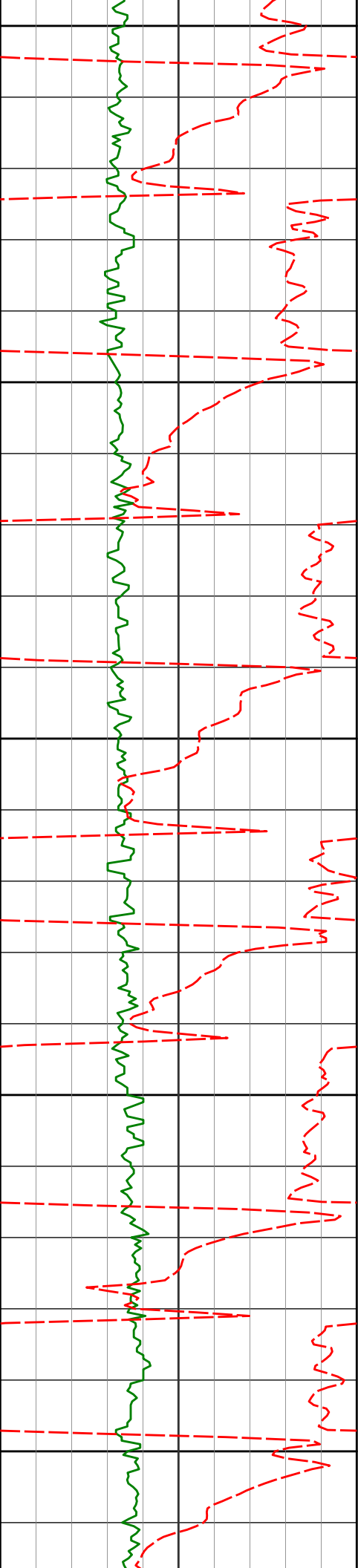
5238'

21.73°

91.94°

5207.36'

223.33'



5250

5285'

24.20°

93.35°

5250.63'

241.54'

5300

5332'

26.72°

91.86°

5293.06'

261.62'

5350

5379'

31.06°

90.46°

5334.20'

284.23'

5400

5427'

36.32°

92.62°

5374.12'

310.72'

5450

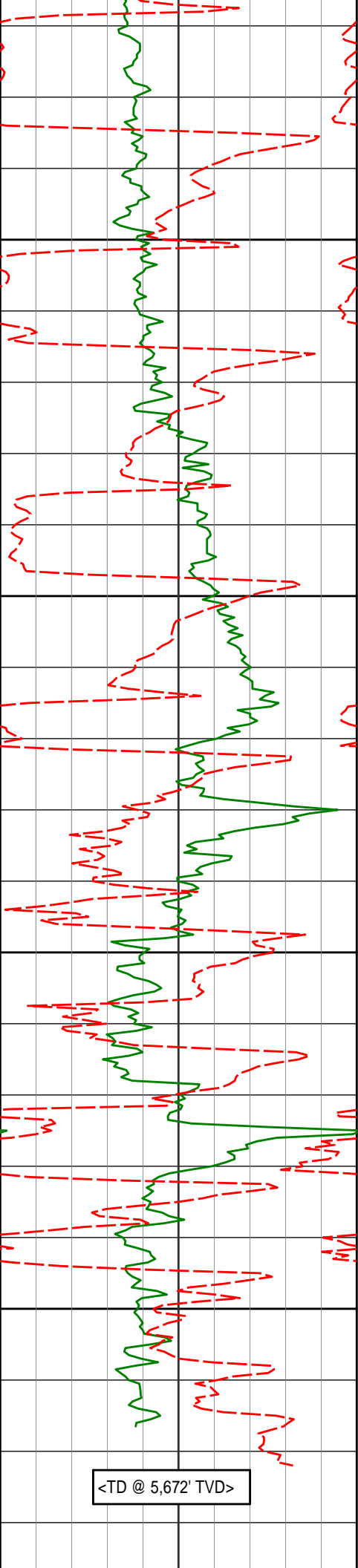
5522'

41.76°

95.91°

5447.90'

369.94'



5500

5550

5600

5650

<TD @ 5,672' TVD>

5569'	44.96°	95.32°	5482.07'	401.76'
5617'	48.89°	96.59°	5514.85'	436.29'
5664'	52.86°	98.42°	5544.50'	472.01'
5712'	58.24°	96.01°	5571.65'	510.83'
5759'	63.81°	90.88°	5594.42'	551.58'
5806'	68.13°	87.26°	5613.56'	594.43'
5853'	70.07°	87.97°	5630.32'	638.32'
5900'	73.67°	87.86°	5644.94'	682.95'
5947'	78.58°	87.22°	5656.21'	728.55'
5995'	80.08°	87.28°	5665.10'	775.71'

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HALLIBURTON

DIRECTIONAL SURVEY REPORT

**Noble Energy
Rohn State LD03-63-1HN
Wattenberg
Weld Colorado
USA
CA-XX-0901647800**

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
350.00	0.70	229.39	349.99	1.39 S	1.62 W	-1.71	0.20
800.00	0.70	142.99	799.97	5.38 S	2.05 W	-2.42	0.21
1200.00	1.00	294.19	1199.95	5.90 S	3.77 W	-4.16	0.41
1363.00	0.41	329.79	1362.94	4.81 S	5.36 W	-5.68	0.43
1456.00	0.58	344.16	1455.93	4.06 S	5.66 W	-5.92	0.23
1549.00	2.57	34.46	1548.90	1.89 S	4.61 W	-4.73	2.41
1642.00	5.14	37.46	1641.68	3.13 N	0.90 W	-0.68	2.77
1734.00	6.58	39.35	1733.20	10.48 N	4.95 E	5.66	1.58
1828.00	7.93	39.60	1826.44	19.64 N	12.50 E	13.82	1.43
1923.00	9.05	39.81	1920.40	30.43 N	21.46 E	23.50	1.17
2018.00	10.32	30.21	2014.05	43.52 N	30.53 E	33.44	2.16
2112.00	11.33	31.03	2106.38	58.71 N	39.52 E	43.46	1.09
2207.00	9.89	33.22	2199.75	73.53 N	48.80 E	53.74	1.58
2302.00	11.89	32.41	2293.04	88.62 N	58.52 E	64.47	2.11
2396.00	11.45	31.41	2385.09	104.75 N	68.57 E	75.61	0.51
2491.00	11.91	31.36	2478.13	121.17 N	78.58 E	86.72	0.48
2586.00	11.61	29.62	2571.13	137.85 N	88.41 E	97.67	0.48
2681.00	11.35	30.17	2664.23	154.24 N	97.83 E	108.20	0.30
2775.00	10.56	31.72	2756.52	169.57 N	107.01 E	118.41	0.89
2870.00	8.97	39.66	2850.14	182.67 N	116.31 E	128.59	2.20
2965.00	7.47	38.05	2944.16	193.24 N	124.85 E	137.83	1.59
3060.00	7.03	37.03	3038.40	202.75 N	132.16 E	145.78	0.49
3154.00	7.21	36.98	3131.68	212.05 N	139.17 E	153.41	0.19
3249.00	5.68	40.99	3226.08	220.36 N	145.84 E	160.63	1.68
3344.00	4.38	35.36	3320.71	226.86 N	151.02 E	166.25	1.46
3439.00	2.75	50.35	3415.52	231.27 N	154.87 E	170.39	1.96
3534.00	0.35	105.68	3510.49	232.65 N	156.90 E	172.51	2.70
3629.00	0.52	123.15	3605.48	232.33 N	157.54 E	173.13	0.23
3723.00	0.42	70.09	3699.48	232.21 N	158.22 E	173.80	0.46
3818.00	0.75	321.68	3794.48	232.82 N	158.17 E	173.79	1.01
3913.00	1.27	300.71	3889.46	233.84 N	156.88 E	172.57	0.67
4008.00	1.59	312.91	3984.43	235.27 N	155.01 E	170.81	0.46
4103.00	0.59	341.11	4079.41	236.63 N	153.88 E	169.78	1.17
4198.00	0.70	339.15	4174.41	237.63 N	153.52 E	169.48	0.12
4293.00	1.09	317.18	4269.40	238.84 N	152.70 E	168.75	0.54
4387.00	1.47	323.41	4363.37	240.47 N	151.37 E	167.53	0.43
4482.00	0.38	25.60	4458.36	241.73 N	150.78 E	167.03	1.41
4577.00	0.53	4.24	4553.36	242.45 N	150.95 E	167.25	0.23
4672.00	0.33	86.73	4648.36	242.90 N	151.25 E	167.59	0.62
4766.00	0.62	79.07	4742.35	243.02 N	152.02 E	168.36	0.31
4860.00	0.26	108.94	4836.35	243.04 N	152.72 E	169.06	0.44
4932.00	0.23	134.55	4908.35	242.89 N	152.98 E	169.31	0.16
4953.00	0.19	162.10	4929.35	242.82 N	153.02 E	169.35	0.52
5000.00	3.48	78.79	4976.32	243.02 N	154.45 E	170.78	7.38

5048.00	8.29	93.14	5024.06	243.12 N	159.34 E	175.67	10.39
5095.00	11.18	97.81	5070.37	242.31 N	167.24 E	183.49	6.36
5143.00	15.06	99.72	5117.11	240.63 N	177.99 E	194.11	8.14
5190.00	17.81	92.37	5162.19	239.30 N	191.20 E	207.19	7.33
5238.00	21.73	91.94	5207.36	238.69 N	207.42 E	223.33	8.17
5285.00	24.20	93.35	5250.63	237.84 N	225.74 E	241.54	5.39
5332.00	26.72	91.86	5293.06	236.93 N	245.92 E	261.62	5.53
5379.00	31.06	90.46	5334.20	236.49 N	268.62 E	284.23	9.34
5427.00	36.32	92.62	5374.12	235.74 N	295.22 E	310.72	11.23
5474.00	38.98	93.43	5411.33	234.22 N	323.88 E	339.21	5.75
5522.00	41.76	95.91	5447.90	231.67 N	354.86 E	369.94	6.70
5569.00	44.96	95.32	5482.07	228.52 N	386.97 E	401.76	6.85
5617.00	48.89	96.59	5514.85	224.87 N	421.84 E	436.29	8.42
5664.00	52.86	98.42	5544.50	220.09 N	457.97 E	472.01	8.97
5712.00	58.24	96.01	5571.65	215.15 N	497.23 E	510.83	11.95
5759.00	63.81	90.88	5594.42	212.73 N	538.23 E	551.58	15.21
5806.00	68.13	87.26	5613.56	213.45 N	581.14 E	594.43	11.57
5853.00	70.07	87.97	5630.32	215.28 N	625.00 E	638.32	4.36
5900.00	73.67	87.86	5644.94	216.90 N	669.63 E	682.95	7.66
5947.00	78.58	87.22	5656.21	218.86 N	715.20 E	728.55	10.53
5995.00	80.08	87.28	5665.10	221.12 N	762.32 E	775.71	3.13
6049.00	85.00	87.28	5672.11	223.66 N	815.79 E	829.23	9.11

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 86.06 DEGREES (GRID)
A TOTAL CORRECTION OF 6.99 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 6049.00 FEET
IS 845.89 FEET ALONG 74.67 DEGREES (GRID)

Surface surveys at 350 ft, 800 ft and 1200 ft have had azimuths corrected to grid north, but were not taken by Halliburton.

Last survey is a projection from 5995 ft MD to TD at 6049 ft MD.