HALLIBURTON | Sperry Drilling

PCGK: Pressure Case Gamma
PCDC: Pressure Case Directional

Powered by INSITE™

Country	USA
Field	Wattenburg
Location	Lat: 40° 46' 30.25" North Long: 103° 51' 40.46" West
Well	Rohn State LD03-62-1HN
Company	Noble Energy
Rig	H & P 273

Company : **Noble Energy**
Rig : **H & P 273**
Well : **Rohn State LD03-62-1HN**
Field : **Wattenburg**
Country : **USA**
API Number : **05-123-37452**

LOCATION

Latitude : **40° 46' 30.25" North**
Longitude : **103° 51' 40.46" West**

UTM Easting = **3,453,860.550 ft**
UTM Northing = **1,529,397.730 ft**

Other Services
Directional Drilling

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

Elev. KB **N/A**
DF **4730.00 ft**
GL **4706.00 ft**
WD **N/A**

Depth Logged : **1,220.99 ft** To **5,667.25 ft**
Date Logged : **15-Sep-14** To **16-Sep-14**
Total Depth MD : **6,047.00 ft** TVD : **5,667.25 ft**
Spud Date : **22-Sep-14**

Unit No. : **11703717**
Job No. : **CA-XX-0901675298**

Plot Type : **Final**
Plot Date : **24-Sep-14**

Run No.	Borehole Record (TVD) Size	From	To
2	8.750 in	1,220.99 ft	5,667.25 ft

Run No.	Borehole Record (TVD) Size	From	To

Casing Record (TVD) Size	Weight	From	To
7.000 in	26.00 lbpf	SURFACE	5,666.36 ft

WELL INFORMATION

MWD Run Number	100
Date run completed	24-Sep-14
Rig Bit Number	2
Bit Size (in)	8.750
Tool Nominal OD (in)	6.750
Log Start Depth (TVD, ft)	1,220.99
Log End Depth (TVD, ft)	5,667.25
Drill or Wipe	Drill
Drill/Wipe Start Date and Time	22-Sep-14 23:58
Drill/Wipe End Date and Time	23-Sep-14 20:35
Min Inc (deg) @ Depth (TVD, ft)	0.57 @ 4,926.93
Max Inc (deg) @ Depth (TVD, ft)	81.46 @ 5,661.14
Bit TFA(in2) / Bit Type	0.91 / PDC
Flow Rate (gpm)	558.63
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A
Fluid Type	Fresh Water Gel
Density (ppg) / Viscosity (spqt)	10.90 / 40.00
Filtrate CL (ppm)	150.00
pH / Fluid Loss (mptm)	9.70 / 8
PV (cP) / YP (lhf2)	13 / 6.00
% Solids / % Sand	11.60 / 0.25
% 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

Max Tool Temp (degF) / Source	167.00 / PCM				
Rm @ Max Tool Temp (degF)	N/A @ N/A				
Lead MWD Engineer	Paul Kock				
Customer Representative	Dave Nielson				

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM				
Software Version	5.93				
Sub Serial Number	11404274				
Insert Serial Number	11055866				
Date and Time Initialized	22-Sep-14 18:02				
Date and Time Read	24-Sep-14 06:12				
ECMB SW Version	N/A				

Directional Sensor Information

Tool Type	PCDC				
Distance From Bit (ft)	50.99				
Software Version	6.21				
Sub Serial Number	11404274				
Sonde Serial Number	11833253				
Sensor ID Number	N/A				
Toolface Offset (deg)	63.81				

Gamma Ray Sensor Information

Tool Type	PCG				
Distance From Bit (ft)	45.89				
Recorded Sample Period (sec)	10				
Software Version	8.15				
Sub Serial Number	11404274				
Insert/Sonde Serial Number	11293339				

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.

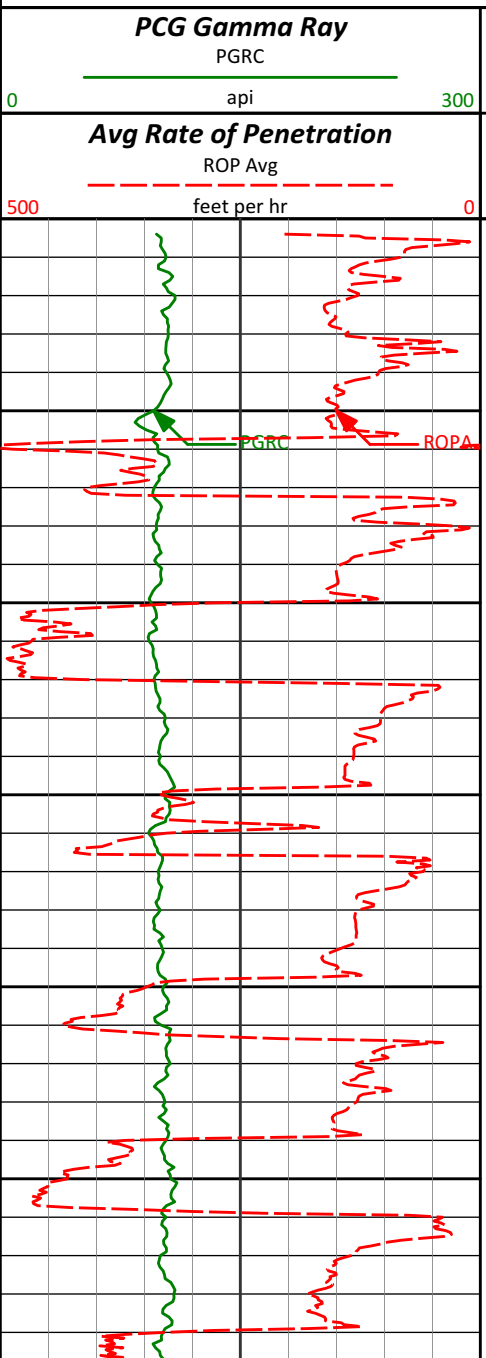
5. INSITE version 8.0.20

WARRANTY

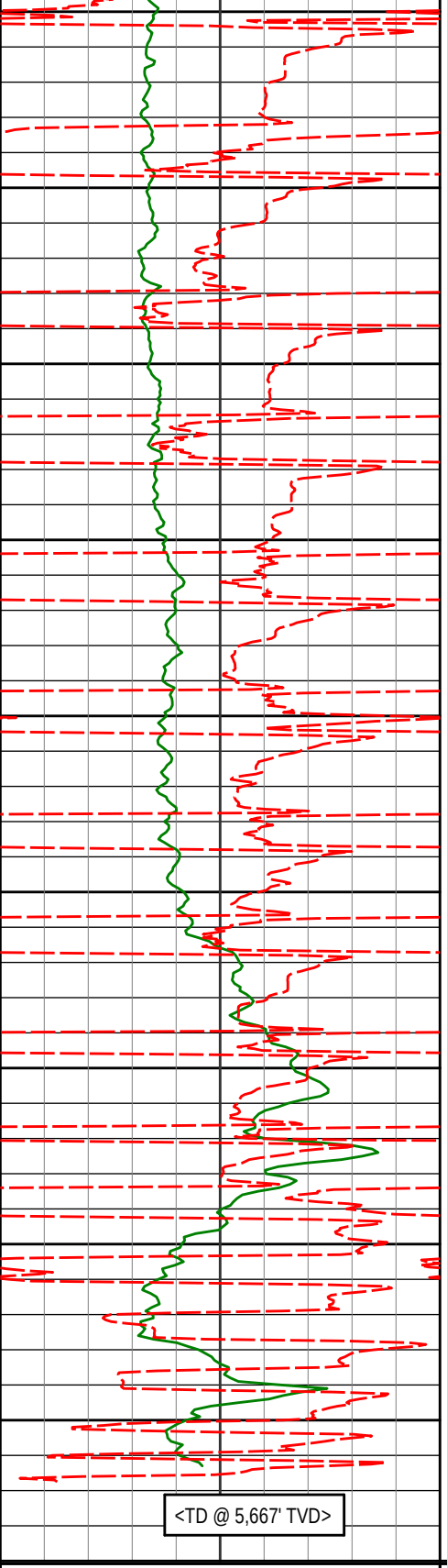
HALLIBURTON
Sperry Drilling Services

TVD Detail Log 1:600

Noble Energy, Inc
Rohn State LD03-62-1HN
H&P 273
T9N R58W



Depth ft	Depth	Inc.	Azi.	TVD	V.S.
4950	<KOP>				
	5001'	3.25°	99.41°	4974.90'	184.33'
5000					
	5048'	7.27°	104.37°	5021.70'	188.57'
5050					
	5096'	9.85°	104.96°	5069.16'	195.56'
5100					
	5143'	12.77°	96.10°	5115.24'	204.68'
5150					
	5191'	16.20°	93.01°	5161.71'	216.67'
5200					
	5238'	19.01°	94.72°	5206.51'	230.88'



Depth	Inc.	Azi.	TVD	V.S.
5286'	22.32°	93.30°	5251.41'	247.82'
5333'	25.99°	91.61°	5294.29'	267.04'
5381'	30.49°	91.26°	5336.56'	289.74'
5428'	34.45°	90.19°	5376.21'	314.95'
5476'	38.41°	89.39°	5414.82'	343.41'
5522'	42.45°	89.18°	5449.83'	373.18'
5570'	46.38°	90.49°	5484.11'	406.72'
5617'	50.02°	91.31°	5515.43'	441.74'
5665'	54.95°	90.77°	5544.65'	479.78'
5712'	60.92°	89.92°	5569.59'	519.55'
5760'	65.05°	89.04°	5591.39'	562.23'
5807'	68.23°	87.73°	5610.02'	605.24'
5855'	71.11°	87.46°	5626.70'	650.06'
5902'	73.65°	89.01°	5640.92'	694.71'
5949'	77.13°	91.00°	5652.78'	740.13'
5994'	81.46°	91.70°	5661.14'	784.32'

Avg Rate of Penetration
ROP Avg
500 feet per hr 0

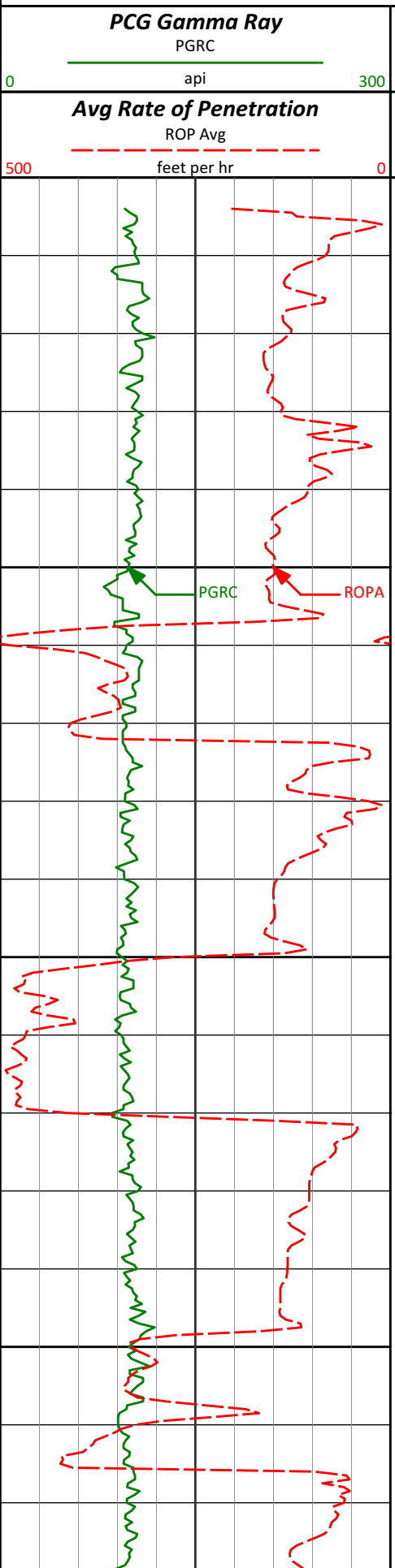
PCG Gamma Ray
PGRC
0 api 300

Depth
ft

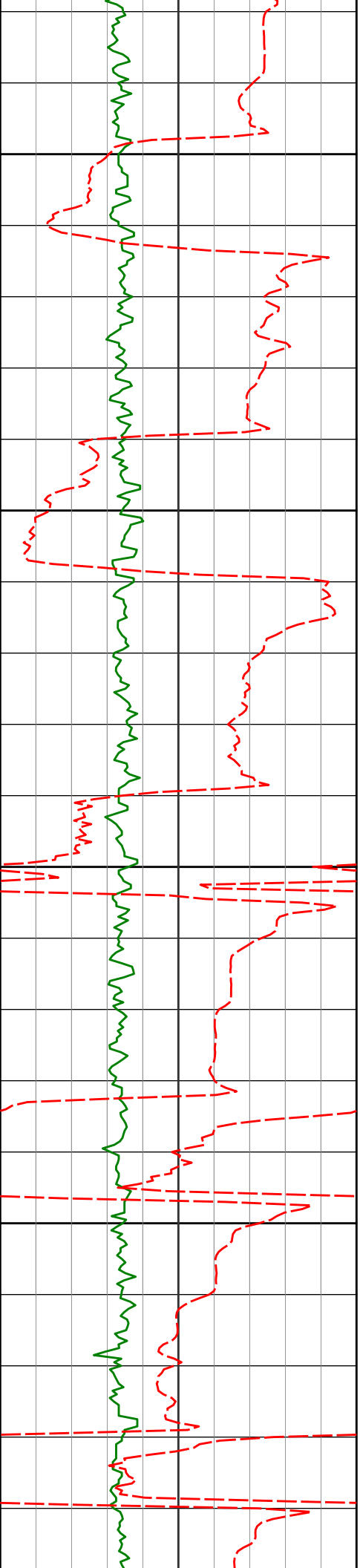
HALLIBURTON
Sperry Drilling Services
TVD Detail Log 1:240

TVD Detail Log 1:240

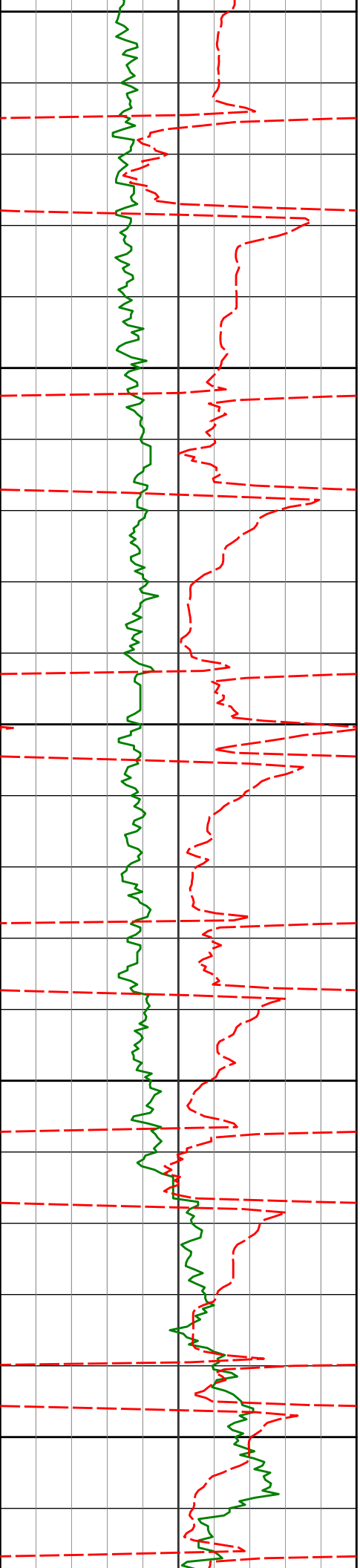
Noble Energy, Inc
Rohn State LD03-62-1HN
H&P 273
T9N R58W



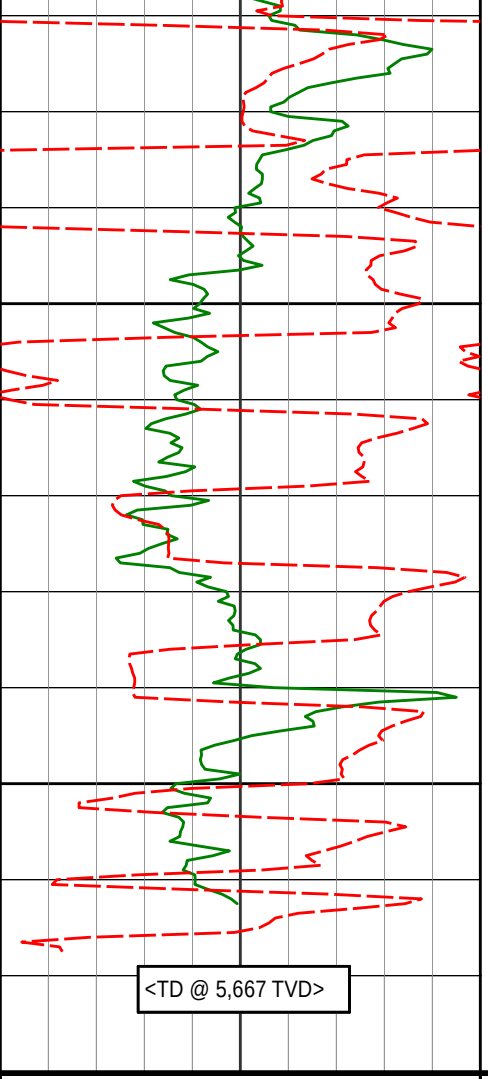
Depth ft	Depth	Inc.	Azi.	TVD	V.S.
<KOP>					
	5001'	3.25°	99.41°	4974.90'	184.33'
	5048'	7.27°	104.37°	5021.70'	188.57'
	5096'	9.85°	104.96°	5069.16'	195.56'
	5143'	12.77°	96.10°	5115.24'	204.68'



5191'	16.20°	93.01°	5161.71'	216.67'
5238'	19.01°	94.72°	5206.51'	230.88'
5286'	22.32°	93.30°	5251.41'	247.82'
5333'	25.99°	91.61°	5294.29'	267.04'
5381'	30.49°	91.26°	5336.56'	289.74'



5428'	34.45°	90.19°	5376.21'	314.95'
5476'	38.41°	89.39°	5414.82'	343.41'
5522'	42.45°	89.18°	5449.83'	373.18'
5570'	46.38°	90.49°	5484.11'	406.72'
5617'	50.02°	91.31°	5515.43'	441.74'
5665'	54.95°	90.77°	5544.65'	479.78'



5712'	60.92°	89.92°	5569.59'	519.55'	
5760'	65.05°	89.04°	5591.39'	562.23'	
5807'	68.23°	87.73°	5610.02'	605.24'	
5855'	71.11°	87.46°	5626.70'	650.06'	
5902'	73.65°	89.01°	5640.92'	694.71'	
5949'	77.13°	91.00°	5652.78'	740.13'	
5994'	81.46°	91.70°	5661.14'	784.32'	

5600

5650

Avg Rate of Penetration
ROP Avg
500 feet per hr 0

PCG Gamma Ray
PGRC
0 api 300

Depth
ft

Depth	Inc.	Azi.	TVD	V.S.

HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Rohn State LD03-62-1HN
Wattenburg
Weld Colorado
USA
CA-XX-0901675298

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
910.00	0.40	299.58	909.99	1.57 N	2.76 W	-2.84	0.04
1200.00	0.20	336.78	1199.99	2.53 N	3.84 W	-3.96	0.09
1288.00	0.64	79.50	1287.99	2.76 N	3.42 W	-3.55	0.81
1381.00	0.87	69.90	1380.98	3.10 N	2.24 W	-2.39	0.28
1473.00	6.58	180.73	1472.78	1.94 S	1.65 W	-1.56	7.54
1566.00	6.61	182.91	1565.17	12.61 S	1.99 W	-1.37	0.27
1659.00	8.43	168.37	1657.37	24.63 S	0.89 W	0.32	2.82
1752.00	9.28	158.21	1749.27	38.27 S	3.27 E	5.14	1.91
1845.00	9.58	150.21	1841.02	51.95 S	9.90 E	12.43	1.44

1938.00	9.14	150.00	1932.78	65.06 S	17.43 E	20.60	0.47
2030.00	7.88	159.86	2023.77	77.31 S	23.25 E	27.01	2.09
2122.00	7.83	159.29	2114.91	89.09 S	27.64 E	31.97	0.10
2402.00	7.75	154.90	2392.33	124.01 S	42.39 E	48.42	0.21
2679.00	7.44	154.43	2666.90	157.10 S	58.05 E	65.68	0.11
2774.00	7.52	155.00	2761.09	168.28 S	63.33 E	71.50	0.11
2963.00	6.96	153.43	2948.58	189.74 S	73.68 E	82.90	0.31
3058.00	7.01	154.15	3042.87	200.11 S	78.79 E	88.50	0.10
3247.00	6.82	153.39	3230.50	220.52 S	88.84 E	99.54	0.11
3436.00	7.79	155.92	3417.96	242.24 S	99.09 E	110.85	0.54
3531.00	8.10	157.95	3512.05	254.32 S	104.23 E	116.57	0.44
3626.00	7.87	156.07	3606.13	266.47 S	109.38 E	122.31	0.36
3721.00	7.57	155.58	3700.27	278.11 S	114.61 E	128.10	0.32
3816.00	6.95	156.80	3794.51	289.10 S	119.46 E	133.49	0.68
4100.00	7.16	152.45	4076.36	320.57 S	134.41 E	149.97	0.20
4195.00	7.02	154.33	4170.63	331.06 S	139.67 E	155.73	0.29
4289.00	6.35	142.07	4264.00	340.34 S	145.35 E	161.86	1.67
4384.00	6.26	142.44	4358.42	348.59 S	151.74 E	168.65	0.10
4479.00	2.87	129.41	4453.11	354.21 S	156.74 E	173.92	3.71
4574.00	2.37	131.42	4548.01	357.02 S	160.05 E	177.36	0.54
4764.00	0.87	44.38	4737.95	358.58 S	164.00 E	181.38	1.30
4859.00	0.78	36.60	4832.94	357.55 S	164.88 E	182.21	0.15
4953.00	0.57	37.66	4926.93	356.67 S	165.55 E	182.84	0.22
5001.00	3.25	99.41	4974.90	356.70 S	167.04 E	184.33	6.29
5048.00	7.27	104.37	5021.70	357.65 S	171.24 E	188.57	8.60
5096.00	9.85	104.96	5069.16	359.47 S	178.15 E	195.56	5.39
5143.00	12.77	96.10	5115.24	361.06 S	187.20 E	204.68	7.21
5191.00	16.20	93.01	5161.71	361.98 S	199.17 E	216.67	7.32
5238.00	19.01	94.72	5206.51	362.95 S	213.35 E	230.88	6.08
5286.00	22.32	93.30	5251.41	364.12 S	230.24 E	247.82	6.97
5333.00	25.99	91.61	5294.29	364.92 S	249.45 E	267.04	7.96
5381.00	30.49	91.26	5336.56	365.48 S	272.15 E	289.74	9.36
5428.00	34.45	90.19	5376.21	365.79 S	297.38 E	314.95	8.52
5476.00	38.41	89.39	5414.82	365.68 S	325.87 E	343.41	8.32
5522.00	42.45	89.18	5449.83	365.31 S	355.70 E	373.18	8.78
5570.00	46.38	90.49	5484.11	365.22 S	389.29 E	406.72	8.40
5617.00	50.02	91.31	5515.43	365.78 S	424.31 E	441.74	7.85
5665.00	54.95	90.77	5544.65	366.46 S	462.37 E	479.78	10.30
5712.00	60.92	89.92	5569.59	366.69 S	502.18 E	519.55	12.80
5760.00	65.05	89.04	5591.39	366.30 S	544.93 E	562.23	8.76
5807.00	68.23	87.73	5610.02	365.07 S	588.05 E	605.24	7.23
5855.00	71.11	87.46	5626.70	363.19 S	633.02 E	650.06	6.02
5902.00	73.65	89.01	5640.92	361.81 S	677.79 E	694.71	6.25
5949.00	77.13	91.00	5652.78	361.82 S	723.26 E	740.13	8.46
5994.00	81.46	91.70	5661.14	362.86 S	767.45 E	784.32	9.74
6047.00	85.30	91.00	5667.25	364.10 S	820.07 E	836.94	7.36

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 92.81 DEGREES (GRID)
A TOTAL CORRECTION OF 6.98 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 6047.00 FEET
IS 897.27 FEET ALONG 113.94 DEGREES (GRID)

Surface surveys at 910 ft and 1200 ft have had azimuths corrected to grid north, but were not taken by Halliburton.

Last survey is a projection from 5994 ft MD to TD at 6047 ft MD.

Date Printed:24 September 2014