

PCGK: Pressure Case Gamma
PCDC: Pressure Case Directional

[illegible]

WELL INFORMATION

MWD Run Number	200	300			
Date run completed	15-Jul-14	16-Jul-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)	628.00	4,285.62			
Log End Depth (TVD, ft)	4,285.62	6,114.21			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	14-Jul-14 12:40	15-Jul-14 01:33			
Drill/Wipe End Date and Time	14-Jul-14 23:00	15-Jul-14 01:33			
Min Inc (deg) @ Depth (TVD, ft)	0.06 @ 1,273.98	0.65 @ 5,312.56			
Max Inc (deg) @ Depth (TVD, ft)	8.61 @ 2,776.04	88.00 @ 6,131.52			
Bit TFA(in2) / Bit Type	0.74 / PDC	0.86 / PDC			
Flow Rate (gpm)	588.00	420.00			
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)	8.70 / 27.00	10.20 / 37.00			
Filtrate CL (ppm)	200.00	200.00			
pH / Fluid Loss (mptm)	8.90 / 10	8.40 / 0			
PV (cP) / YP (lbf2)	1 / 1.00	12 / 9.00			
% Solids / % Sand	2.7 / 0	10.6 / .1			
% 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 (in F) / S	149.05 / PGM	170.70 / PGM			

Max Tool Temp (degF) / Source	142.25 / PCM	172.78 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A			
Lead MWD Engineer	Juan Pablo Centeno	Juan Pablo Centeno			
Customer Representative	Justin Fields	Justin Fields			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM			
Software Version	5.93	5.93			
Sub Serial Number	245494	245494			
Insert Serial Number	11620315	12001048			
Date and Time Initialized	13-Jul-14 23:29	15-Jul-14 01:49			
Date and Time Read	15-Jul-14 15:34	16-Jul-14 10:20			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	53.97	57.72			
Software Version	6.21	6.21			
Sub Serial Number	245494	245494			
Sonde Serial Number	11638628	11297623			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	121.49	36.00			

Gamma Ray Sensor Information

Tool Type	PCG	PCG			
Distance From Bit (ft)	48.87	52.62			
Recorded Sample Period (sec)	10	10			
Software Version	8.15	8.15			
Sub Serial Number	245494	245494			
Insert/Sonde Serial Number	11579806	11293276			

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

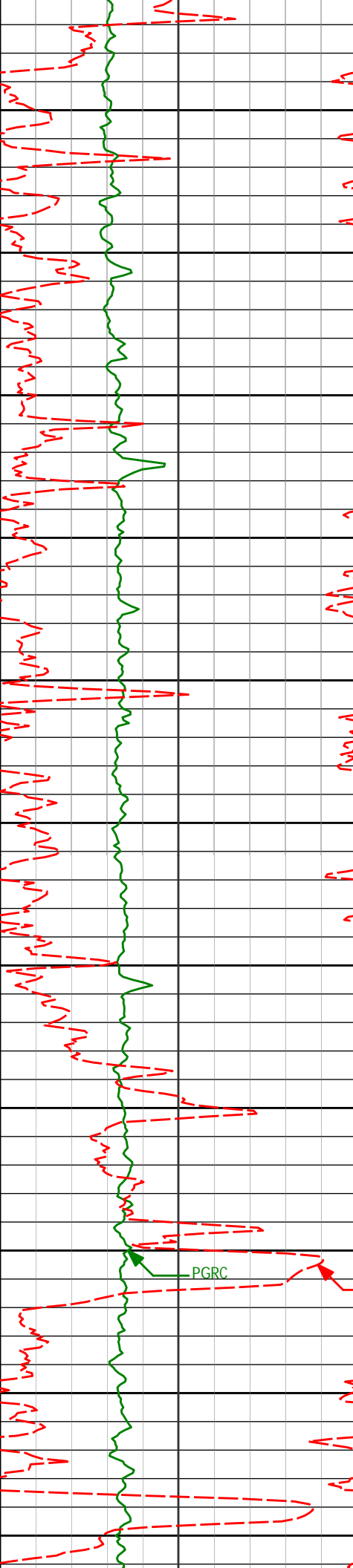
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HALLIBURTON
Sperry Drilling Services
TVD Detail Log 1:600

Noble Energy, Inc
Brook LC28-75-1BHN
H&P 273
T9N R59W

PCG Gamma Ray PGRC 0 300 api						
Avg Rate of Penetration ROP Avg 500 0 feet per hr		Depth ft	Depth	Inc.	Azi.	TVD V.S.
		<Run 300>	4293'	7.41°	237.38°	4274.71' -140.80'
		4300				
		4350				
			4388'	7.45°	233.65°	4368.91' -146.94'
		4400				
		4450				
			4483'	6.99°	230.41°	4463.16' -153.50'
		4500				
		4550				
			4578'	8.58°	232.86°	4557.28' -160.64'



4600

4650

4700

4750

4800

4850

4900

4950

5000

5050

5100

4673'

8.01°

234.28°

4651.29'

-167.88'

4768'

7.44°

235.27°

4745.43'

-174.40'

4863'

6.70°

236.59°

4839.70'

-180.17'

4957'

6.24°

233.19°

4933.10'

-185.55'

5052'

4.03°

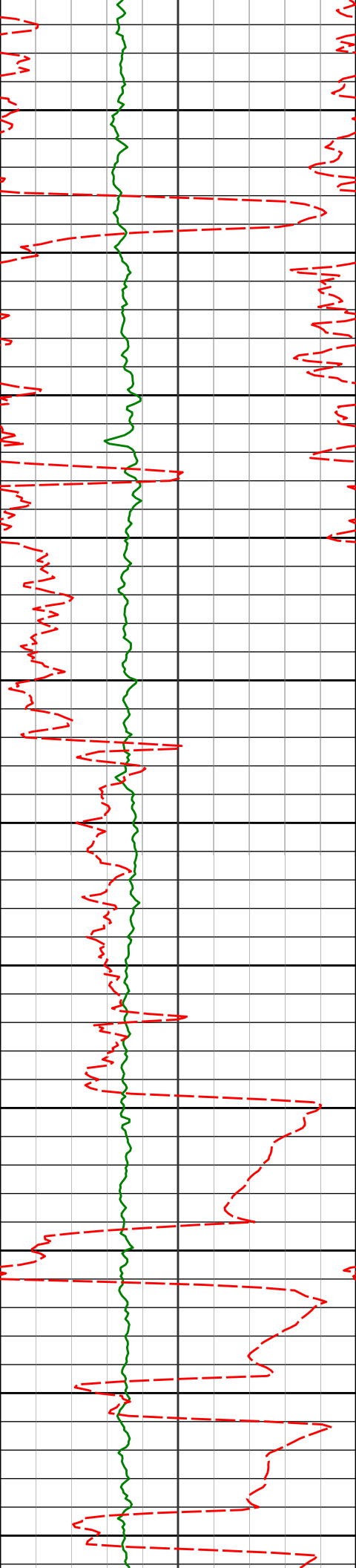
228.96°

5027.72'

-190.29'

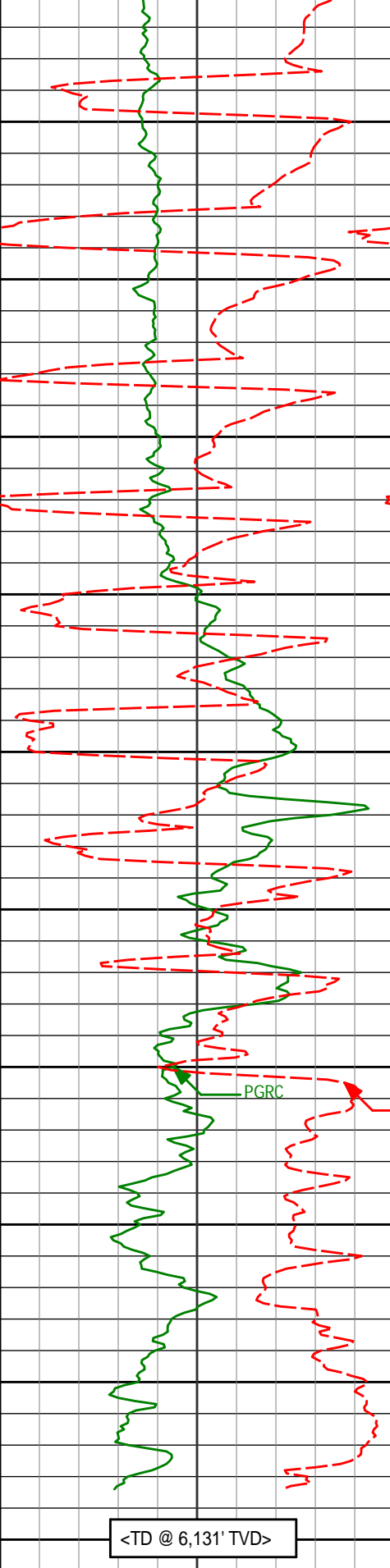
PGRC

ROPA



5500
<KOP>

5147'	1.83°	199.70°	5122.59'	-193.66'
5150				
5200				
5242'	0.86°	105.09°	5217.57'	-195.29'
5250				
5300				
5337'	0.65°	97.79°	5312.56'	-195.64'
5350				
5400				
5431'	0.88°	102.09°	5406.56'	-195.96'
5450				
5500				
5526'	2.05°	41.74°	5501.53'	-195.00'
5550				
5573'	6.91°	27.43°	5548.37'	-192.02'
5600				
5621'	11.09°	18.21°	5595.77'	-185.31'
5668'	16.00°	18.15°	5641.45'	-175.16'
5650				



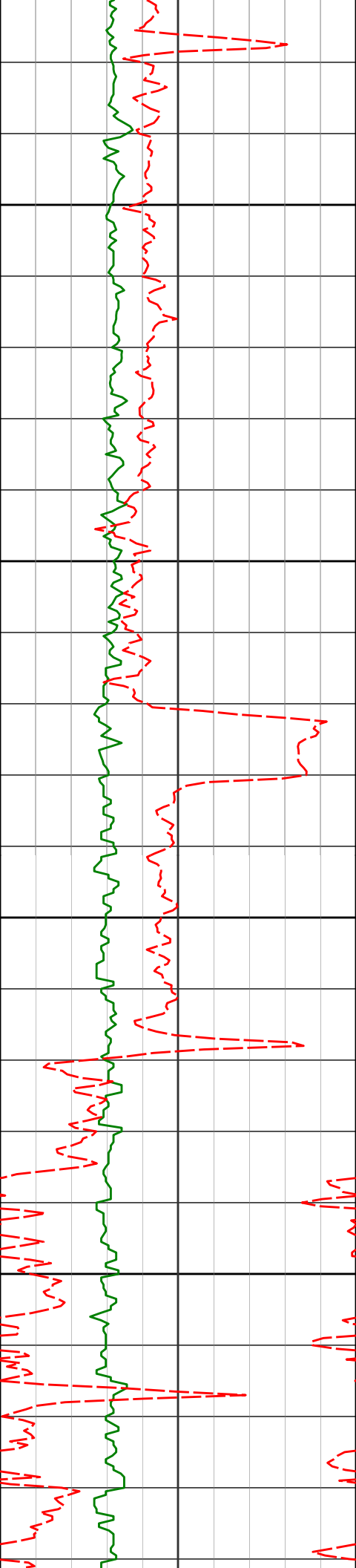
5716'	20.10°	16.24°	5687.08'	-161.34'
5700				
5763'	24.26°	11.98°	5730.60'	-144.52'
5750				
5811'	27.03°	2.99°	5773.88'	-124.24'
5800				
5858'	31.65°	357.72°	5814.85'	-101.32'
5850				
5906'	35.22°	357.38°	5854.90'	-74.89'
5900				
5953'	36.63°	0.34°	5892.96'	-47.37'
6000'	40.49°	1.87°	5929.71'	-18.23'
5950				
6047'	44.41°	1.21°	5964.38'	13.31'
6000				
6095'	48.69°	0.63°	5997.38'	47.99'
6142'	51.61°	359.34°	6027.50'	83.96'
6050				
6190'	58.32°	356.97°	6055.04'	123.19'
6237'	64.27°	355.69°	6077.61'	164.39'
6100				
6285'	69.32°	356.82°	6096.52'	208.48'
6380'	80.49°	0.14°	6121.23'	299.92'
6446'	86.55°	0.59°	6128.67'	365.23'
6150				

Avg Rate of Penetration		Depth ft	Depth	Inc.	Azi.	TVD	V.S.
ROP Avg							
500	feet per hr	0					
PCG Gamma Ray							
PGRC							
0	api	200					

HALLIBURTON
Sperry Drilling Services
TVD Detail Log 1:240

Noble Energy, Inc.
Brook LC28-75-1BHNC
H&P 273
T9N R59W

<div>PCG Gamma Ray</div> <div>PGRC</div> <div>0<div>api</div>300</div>								
<div>Avg Rate of Penetration</div> <div>ROP Avg</div> <div>500<div>feet per hr</div>0</div>			Depth ft	Depth	Inc.	Azi.	TVD	V.S.
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4450

4500

4550

4600

4483'

6.99°

230.41°

4463.16'

-153.50'

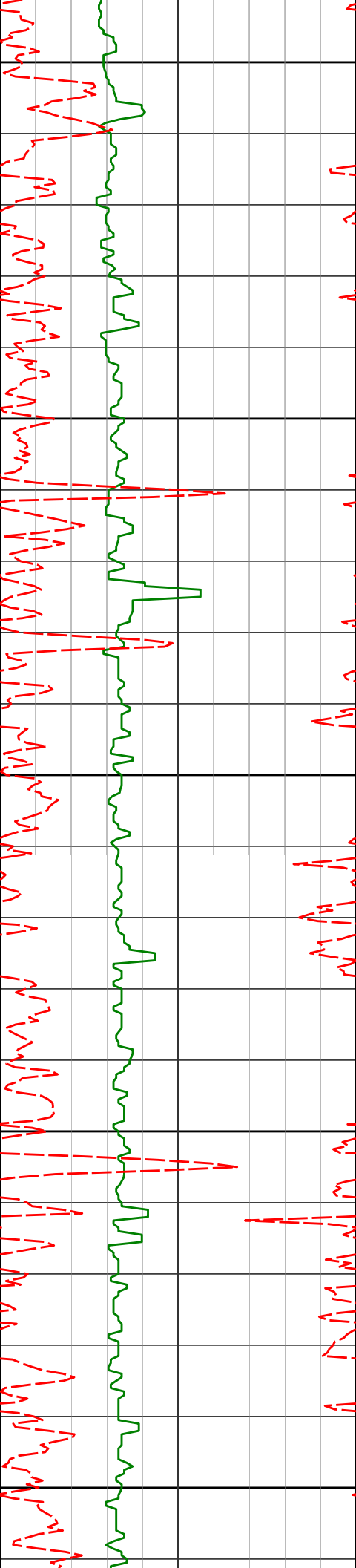
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8.58°

232.86°

4557.28'

-160.64'



4650

4673'

8.01°

234.28°

4651.29'

-167.88'

4700

4750

4768'

7.44°

235.27°

4745.43'

-174.40'

4800

4850

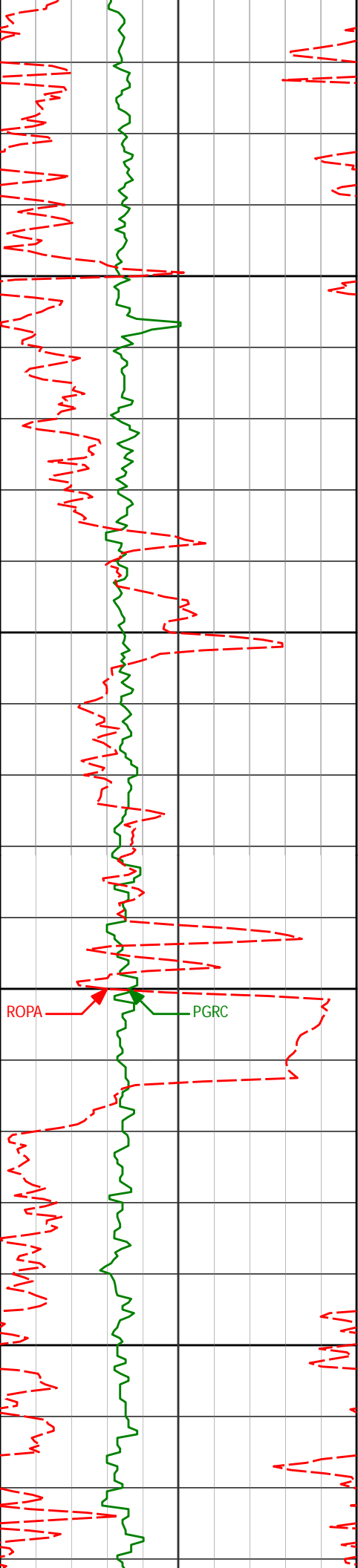
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6.70°

236.59°

4839.70'

-180.17'



4900

4957'

6.24°

233.19°

4933.10'

-185.55'

4950

5000

ROPA

PGRC

5052'

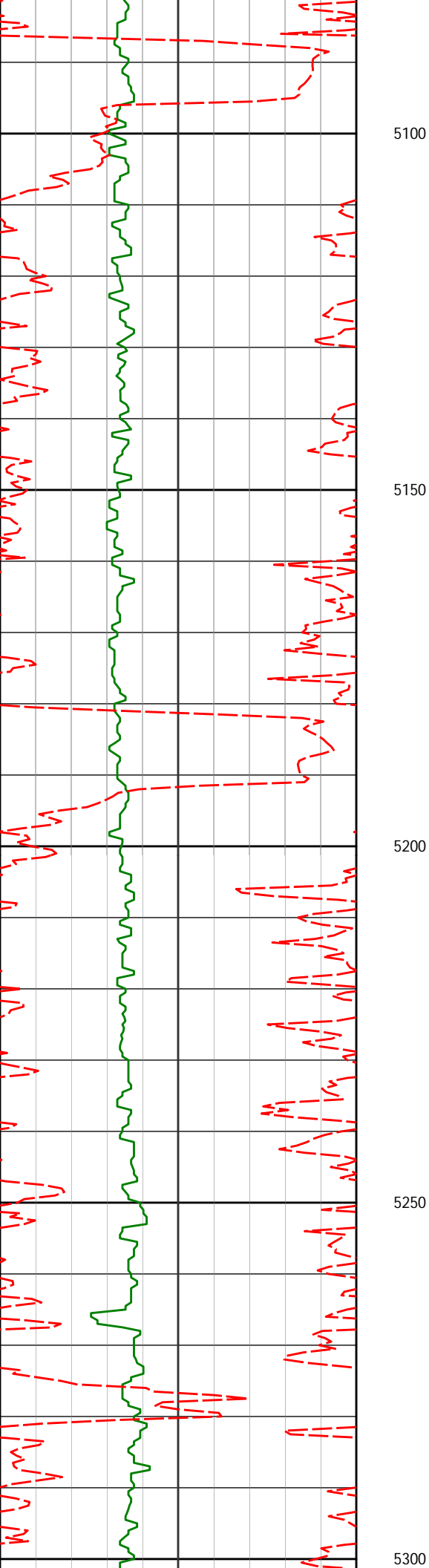
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228.96°

5027.72'

-190.29'

5050



5147'

1.83°

199.70°

5122.59'

-193.66'

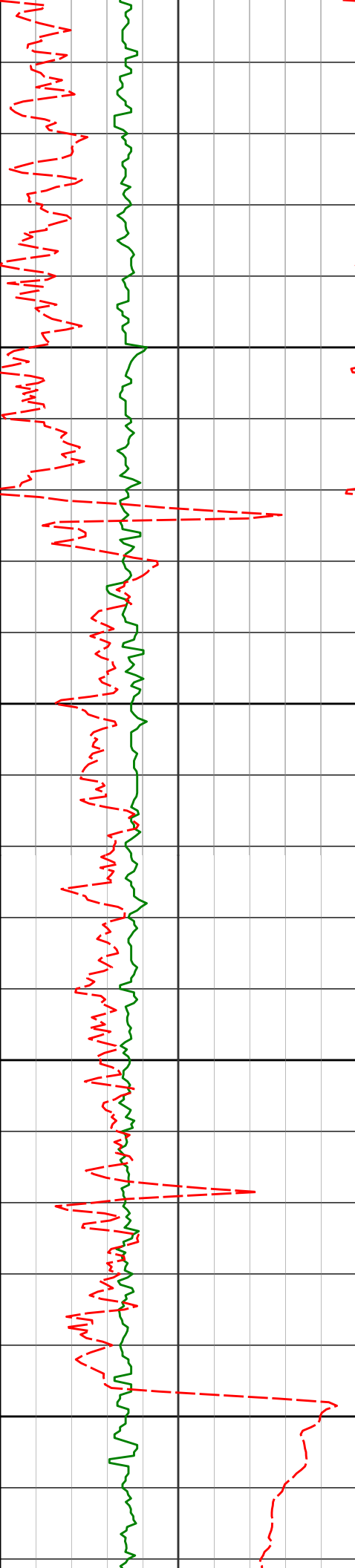
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105.09°

5217.57'

-195.29'



<KOP>

5337'

0.65°

97.79°

5312.56'

-195.64'

5350

5400

5431'

0.88°

102.09°

5406.56'

-195.96'

5450

5500

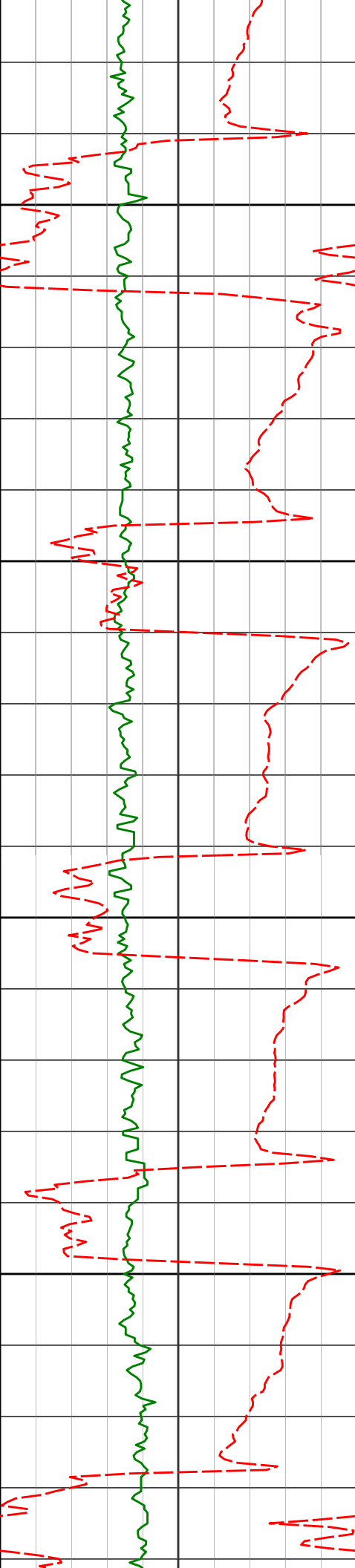
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41.74°

5501.53'

-195.00'



5550

5573'

6.91°

27.43°

5548.37'

-192.02'

5600

5621'

11.09°

18.21°

5595.77'

-185.31'

5650

5668'

16.00°

18.15°

5641.45'

-175.16'

5700

5716'

20.10°

16.24°

5687.08'

-161.34'

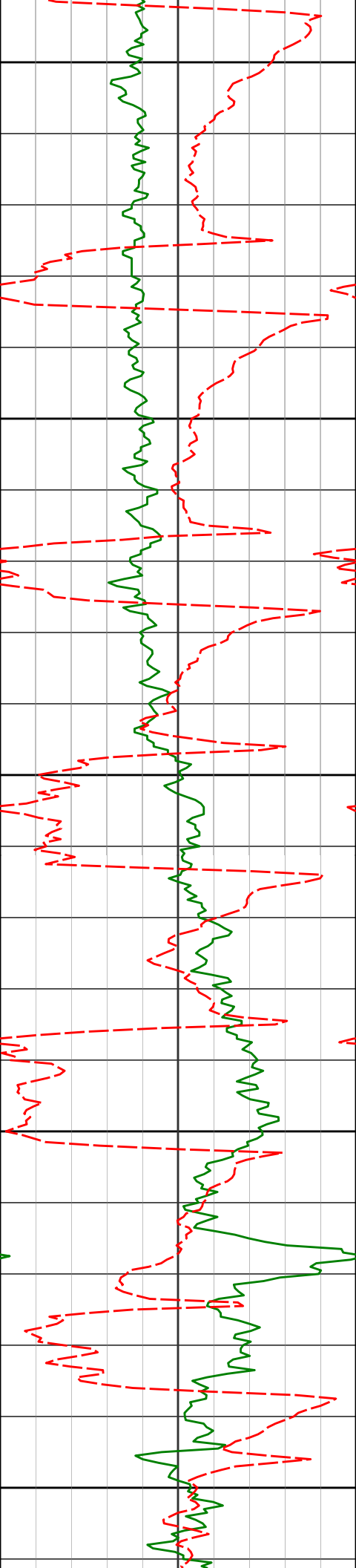
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11.98°

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-144.52'



5750

5811'

27.03°

2.99°

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-124.24'

5800

5858'

31.65°

357.72°

5814.85'

-101.32'

5850

5906'

35.22°

357.38°

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-74.89'

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5953'

36.63°

0.34°

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-47.37'

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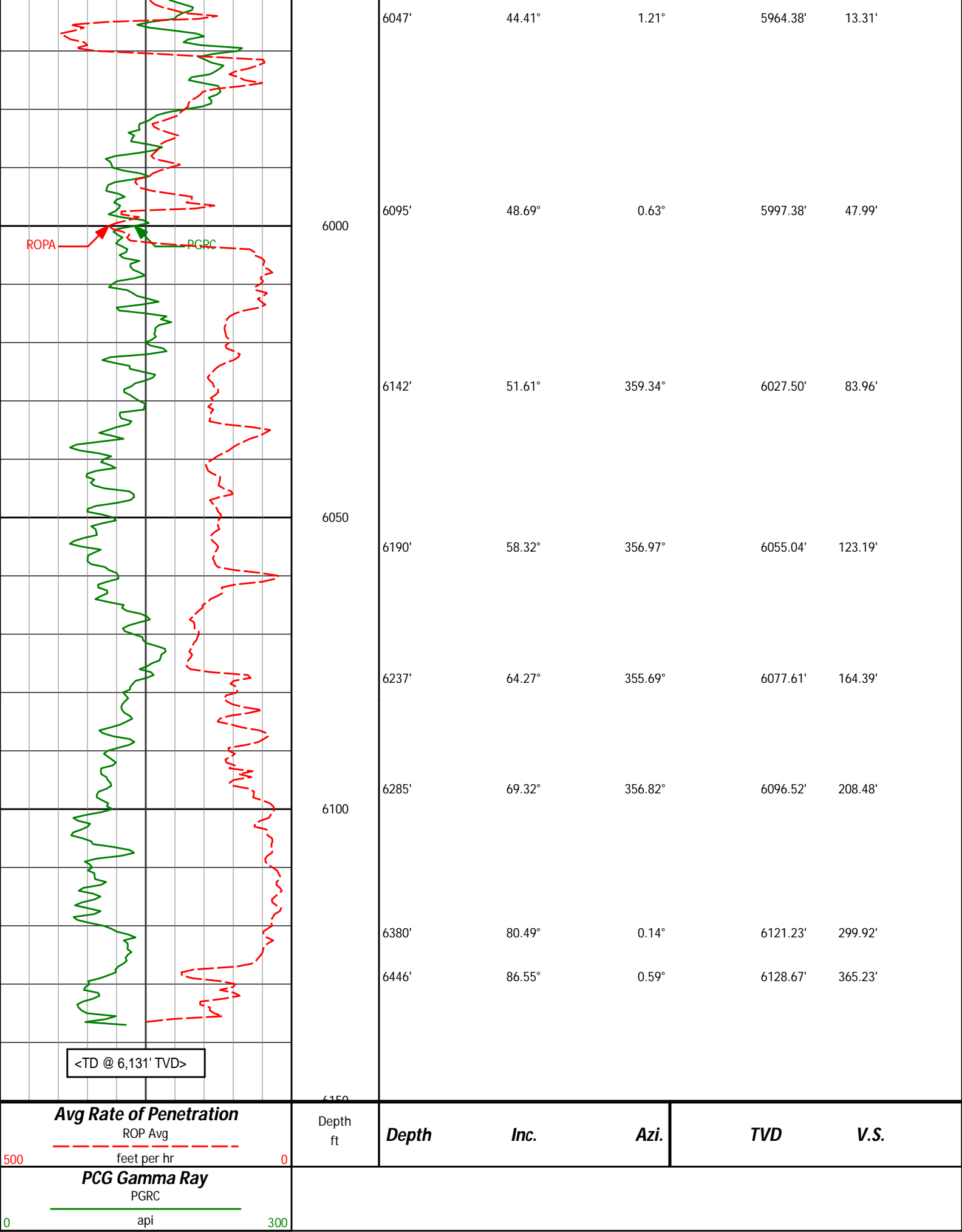
6000'

40.49°

1.87°

5929.71'

-18.23'



Avg Rate of Penetration

ROP Avg

feet per hr

PCG Gamma Ray

PGRC

api

Depth
ft

Depth

Inc.

Azi.

TVD

V.S.

HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Brook LC28-75-1BHNC
Wattenberg
Weld Colorado
USA
CA-XX-0901399781

<i>Measured Depth (feet)</i>	<i>Inclination (degrees)</i>	<i>Direction (degrees)</i>	<i>Vertical Depth (feet)</i>	<i>Latitude (feet)</i>	<i>Departure (feet)</i>	<i>Vertical Section (feet)</i>	<i>Dogleg (deg/100ft)</i>
0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
350.00	0.30	297.34	350.00	0.42 N	0.81 W	0.48	0.09
575.00	0.30	110.14	575.00	0.49 N	0.78 W	0.55	0.27
717.00	0.45	104.18	716.99	0.22 N	0.10 E	0.22	0.11
809.00	0.60	117.43	808.99	0.08 S	0.88 E	-0.15	0.21
1088.00	0.07	79.85	1087.98	0.73 S	2.34 E	-0.91	0.20
1274.00	0.06	181.03	1273.98	0.81 S	2.44 E	-1.00	0.05
1553.00	0.39	95.77	1552.98	1.05 S	3.40 E	-1.32	0.14
1646.00	0.37	74.62	1645.98	1.01 S	4.01 E	-1.32	0.15
1737.00	0.07	33.47	1736.98	0.88 S	4.32 E	-1.22	0.35
1927.00	0.18	190.18	1926.98	1.08 S	4.33 E	-1.42	0.13
2022.00	2.14	253.28	2021.96	1.74 S	2.61 E	-1.94	2.17
2117.00	4.00	243.53	2116.82	3.72 S	2.06 W	-3.55	2.02
2212.00	4.60	239.75	2211.55	7.12 S	8.31 W	-6.44	0.70
2307.00	5.98	241.37	2306.14	11.40 S	15.94 W	-10.11	1.46
2401.00	6.78	235.17	2399.56	16.92 S	24.79 W	-14.91	1.13
2496.00	7.47	235.07	2493.83	23.66 S	34.45 W	-20.86	0.73
2591.00	8.11	236.06	2587.95	30.94 S	45.08 W	-27.28	0.68
2686.00	7.88	235.43	2682.03	38.37 S	56.00 W	-33.83	0.25
2781.00	8.61	233.94	2776.04	46.25 S	67.11 W	-40.81	0.80
2876.00	8.23	231.51	2870.02	54.67 S	78.18 W	-48.32	0.55
2971.00	7.44	231.06	2964.13	62.76 S	88.28 W	-55.60	0.83
3065.00	7.69	236.06	3057.32	70.10 S	98.23 W	-62.12	0.75
3160.00	8.13	246.44	3151.42	76.34 S	109.66 W	-67.44	1.57
3255.00	6.85	241.63	3245.60	81.72 S	120.81 W	-71.92	1.50
3350.00	8.00	233.60	3339.81	88.33 S	131.13 W	-77.70	1.63
3445.00	7.90	233.90	3433.89	96.11 S	141.72 W	-84.61	0.12
3540.00	7.82	234.99	3528.00	103.66 S	152.29 W	-91.31	0.18
3635.00	7.56	234.05	3622.15	111.04 S	162.65 W	-97.85	0.30
3730.00	7.43	233.87	3716.34	118.33 S	172.67 W	-104.32	0.14
3825.00	7.29	233.53	3810.55	125.54 S	182.48 W	-110.73	0.16
3920.00	6.83	231.70	3904.83	132.62 S	191.76 W	-117.06	0.54
4015.00	7.10	238.04	3999.13	139.22 S	201.17 W	-122.90	0.86
4109.00	8.38	236.42	4092.27	146.09 S	211.81 W	-128.90	1.37
4204.00	7.03	234.25	4186.42	153.31 S	222.29 W	-135.28	1.44
4293.00	7.41	237.38	4274.71	159.59 S	231.55 W	-140.80	0.61
4388.00	7.45	233.65	4368.91	166.54 S	241.67 W	-146.94	0.51
4483.00	6.99	230.41	4463.16	173.88 S	251.08 W	-153.50	0.65
4578.00	8.58	232.86	4557.28	181.84 S	261.18 W	-160.64	1.71
4673.00	8.01	234.28	4651.29	189.98 S	272.20 W	-167.88	0.64
4768.00	7.44	235.27	4745.43	197.34 S	282.63 W	-174.40	0.62
4863.00	6.70	236.59	4839.70	203.90 S	292.31 W	-180.17	0.79
4957.00	6.24	233.19	4933.10	209.98 S	300.98 W	-185.55	0.64
5052.00	4.03	228.96	5027.72	215.26 S	307.63 W	-190.29	2.36
5147.00	1.83	199.70	5122.59	218.88 S	310.66 W	-193.66	2.72
5242.00	0.86	105.09	5217.57	220.50 S	310.48 W	-195.29	2.19
5337.00	0.65	97.79	5312.56	220.76 S	309.26 W	-195.64	0.24
5431.00	0.88	102.09	5406.56	220.98 S	308.03 W	-195.96	0.25
5526.00	2.05	41.74	5501.53	219.87 S	306.18 W	-195.00	1.88
5573.00	6.91	27.43	5548.37	216.73 S	304.32 W	-192.02	10.53
5621.00	11.09	18.21	5595.77	209.78 S	301.55 W	-185.31	9.18
5668.00	16.00	18.15	5641.45	199.33 S	298.12 W	-175.16	10.45
5716.00	20.10	16.24	5687.08	185.12 S	293.75 W	-161.34	8.63
5763.00	24.26	11.98	5730.60	167.91 S	289.48 W	-144.52	9.49
5811.00	27.03	2.99	5773.88	147.36 S	286.86 W	-124.24	9.93
5858.00	31.65	357.72	5814.85	124.36 S	286.80 W	-101.32	11.25

5906.00	35.22	357.38	5854.90	97.94 S	287.93 W	-74.89	7.45
5953.00	36.63	0.34	5892.96	70.38 S	288.47 W	-47.37	4.76
6000.00	40.49	1.87	5929.71	41.09 S	287.89 W	-18.23	8.47
6047.00	44.41	1.21	5964.38	9.39 S	287.04 W	13.31	8.40
6095.00	48.69	0.63	5997.38	25.45 N	286.49 W	47.99	8.95
6142.00	51.61	359.34	6027.50	61.52 N	286.50 W	83.96	6.56
6190.00	58.32	356.97	6055.04	100.77 N	287.80 W	123.19	14.55
6237.00	64.27	355.69	6077.61	141.89 N	290.45 W	164.39	12.88
6285.00	69.32	356.82	6096.52	185.90 N	293.32 W	208.48	10.75
6380.00	80.49	0.14	6121.23	277.43 N	295.68 W	299.92	12.23
6446.00	86.55	0.59	6128.67	342.98 N	295.26 W	365.23	9.21
6506.00	88.00	0.59	6131.52	402.90 N	294.64 W	424.92	2.42

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 355.47 DEGREES (GRID)
A TOTAL CORRECTION OF 7.14 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 6506.00 FEET
IS 499.15 FEET ALONG 323.82 DEGREES (GRID)**

Surface surveys at 350 ft and 575 ft have had azimuths corrected to grid north, but were not taken by Halliburton.

Last survey is a projection from 6446 ft MD to TD at 6506 ft MD.