

PCGC : Pressure Case Gamma
PCDC: Pressure Case Directional



1 : 600 / 1 : 240

Country		: USA		Company : Noble Energy			
Field		: Wattenberg		Rig : H&P 315			
Location		: Lat: 40° 26' 2.65" North Long: 104° 31' 27.12" West		Well : Cougar B02-68-1HN			
Well		: Cougar B02-68-1HN		Country : Wattenberg			
Company		: Noble Energy		Field : Wattenberg			
Rig		: H&P 315		Country : USA			
LOCATION		: 05-123-36407		API Number : 05-123-36407			
Latitude : 40° 26' 2.65" North Longitude : 104° 31' 27.12" West		UTM Easting = 3,271,628.340 ft UTM Northing = 1,402,466.570 ft		Other Services Directional Drilling			
Permanent Datum : Ground Level		Elevation : 4640.00 ft		Elev. KB N/A			
Log Measured From : Drill Floor		24.00 ft Above Permanent Datum		DF 4664.00 ft GL 4640.00 ft WD N/A			
Drilling Measured From : Drill Floor		MD LOG					
Depth Logged : 124.00 ft To 10,318.00 ft		Unit No. : 11610113		Job No. :CA-XX-0900918631			
Date Logged : 18-Jan-14 To 23-Jan-14		Plot Type : Final					
Total Depth MD : 10,318.00 ft TVD : 6,638.68 ft		Plot Date : 23-Jan-14					
Spud Date : 16-Jan-14							
Run No.	Borehole Record (MD)			Run No.	Borehole Record (MD)		
	Size	From	To		Size	From	To
1	13.500 in	124.00 ft	1.999.00 ft				
2	8.750 in	1.999.00 ft	5.981.00 ft				
3	8.750 in	5.981.00 ft	7.025.00 ft				
4	6.125 in	7.025.00 ft	10.318.00 ft				

WELL INFORMATION

MWD Run Number	100	200	300	400	
Date run completed	17-Jan-14	19-Jan-14	20-Jan-14	23-Jan-14	
Rig Bit Number	1	2	3	4	
Bit Size (in)	13.500	8.750	8.750	6.125	
Tool Nominal OD (in)	8.000	6.750	6.750	4.750	
Log Start Depth (MD, ft)	124.00	1,999.00	5,981.00	7,025.00	
Log End Depth (MD, ft)	1,999.00	5,981.00	7,025.00	10,318.00	
Drill or Wipe	Drill	Drill	Drill	Drill	
Drill/Wipe Start Date and Time	16-Jan-14 02:15	18-Jan-14 04:00	19-Jan-14 09:15	21-Jan-14 23:50	
Drill/Wipe End Date and Time	16-Jan-14 22:30	18-Jan-14 19:35	19-Jan-14 21:55	23-Jan-14 00:00	
Min Inc (deg) @ Depth (MD, ft)	0.44 @ 324.00	0.32 @ 2,322.00	0.79 @ 6,011.00	88.46 @ 8,928.00	
Max Inc (deg) @ Depth (MD, ft)	1.45 @ 879.00	13.03 @ 3,840.00	86.00 @ 6,971.00	92.37 @ 10,257.00	
Bit TFA(in2) / Bit Type	1.17 / PDC	.75 / PDC	0.98 / PDC	0.65 / PDC	
Flow Rate (gpm)	633.41	591.07	538.96	284.85	
Max AV (fpm) / CV (fpm) @ MWD	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	
Fluid Type	Native/Spud Mud	Polymer	Polymer	Polymer	
Density (ppg) / Viscosity (spqt)	8.52 / 29.00	8.80 / 30.00	10.83 / 42.00	9.20 / 31.00	
Filtrate CL (ppm)	1,600.00	1,600.00	1,600.00	1,600.00	
pH / Fluid Loss (mptm)	8.80 / 0	9.80 / 0	9.10 / 7	9.80 / 14	
PV (cP) / YP (lbf2)	5 / 4.00	4 / 6.00	19 / 15.00	6 / 6.00	
% Solids / % Sand	2.3 / 0.35	2.3 / 0.25	5.5 / 0.25	4.5 / 0.20	
% Oil / Oil:Water Ratio	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	
Rm @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	
Max Tool Temp (in) Temp (degF)	68.51 / 68M	151.83 / 68M	127.87 / 68M	200.77 / 68M	

Max Tool Temp (degF) / Source	98.51 / PCM	154.30 / PCM	167.97 / PCM	220.77 / PCM	
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	
Lead MWD Engineer	Paul Kock	Paul Kock	Paul Kock	Paul Kock	
Customer Representative	Martin Suarez	Martin Suarez	Martin Suarez	Martin Suarez	

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM	PCM	
Software Version	5.84	5.84	5.84	5.84	
Sub Serial Number	11812718	11331933	11331933	11671371	
Insert Serial Number	11680783	11680783	11680783	11620309	
Date and Time Initialized	15-Jan-14 22:03	17-Jan-14 10:29	17-Jan-14 10:29	20-Jan-14 11:12	
Date and Time Read	17-Jan-14 02:10	20-Jan-14 14:17	20-Jan-14 14:28	23-Jan-14 10:56	
ECMB SW Version	N/A	N/A	N/A	N/A	

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC	PCDC	
Distance From Bit (ft)	56.26	53.41	52.04	58.77	
Software Version	6.21	6.21	6.21	6.21	
Sub Serial Number	11812718	11331933	11331933	11671371	
Sonde Serial Number	12177532	12177532	12177532	11478014	
Sensor ID Number	N/A	N/A	N/A	N/A	
Toolface Offset (deg)	138.43	287.57	237.51	238.74	

Gamma Ray Sensor Information

Tool Type		PCG	PCG	PCG	
Distance From Bit (ft)		48.41	45.04	53.79	
Recorded Sample Period (sec)		10	10	10	
Software Version		8.15	8.15	8.15	
Sub Serial Number		11331933	11331933	11671371	
Insert/Sonde Serial Number		11681002	11681002	11292593	

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
6. Gamma presented inside casing/cement from 6979 ft. MD to 7025 ft. MD.

WARRANTY

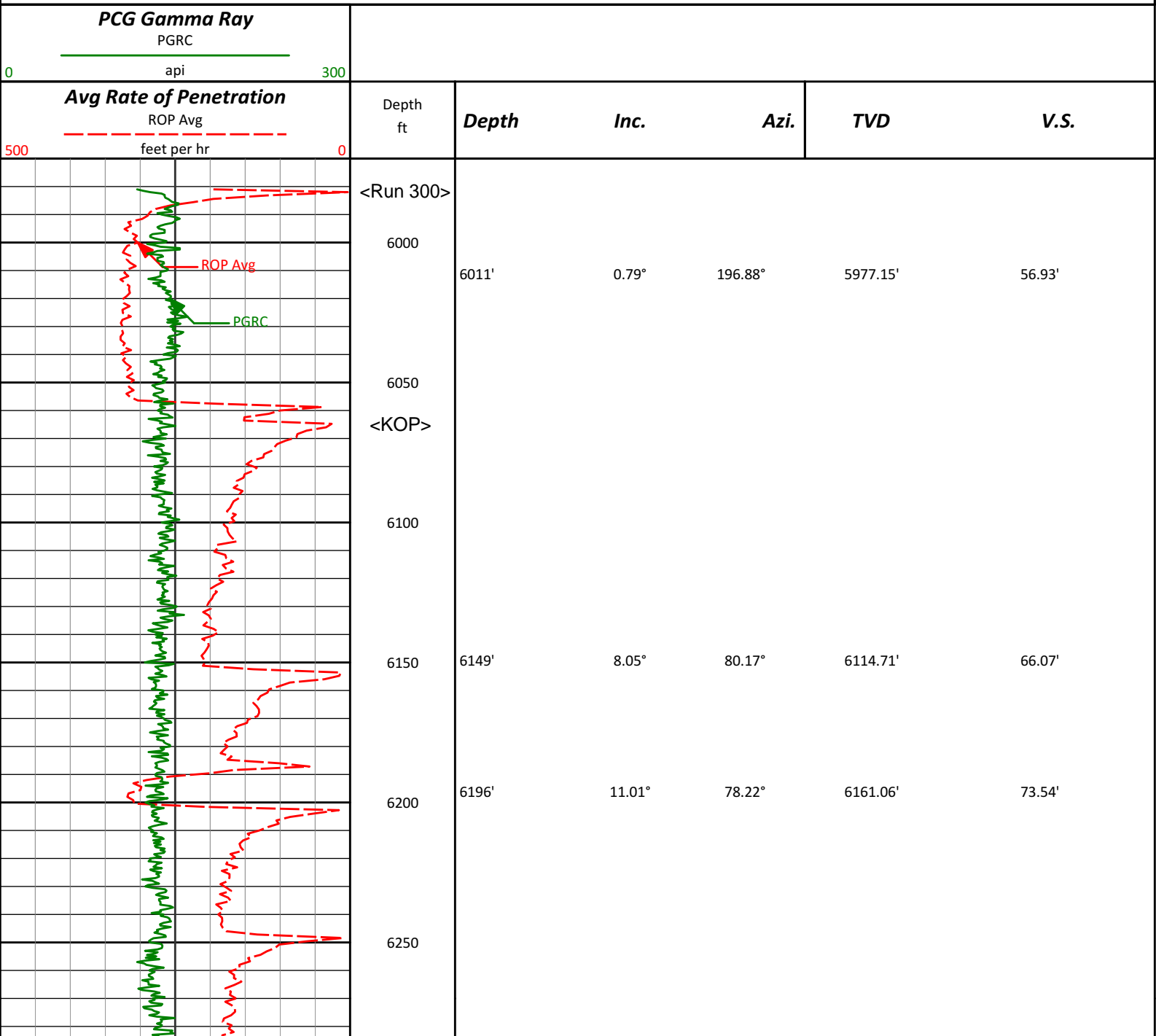
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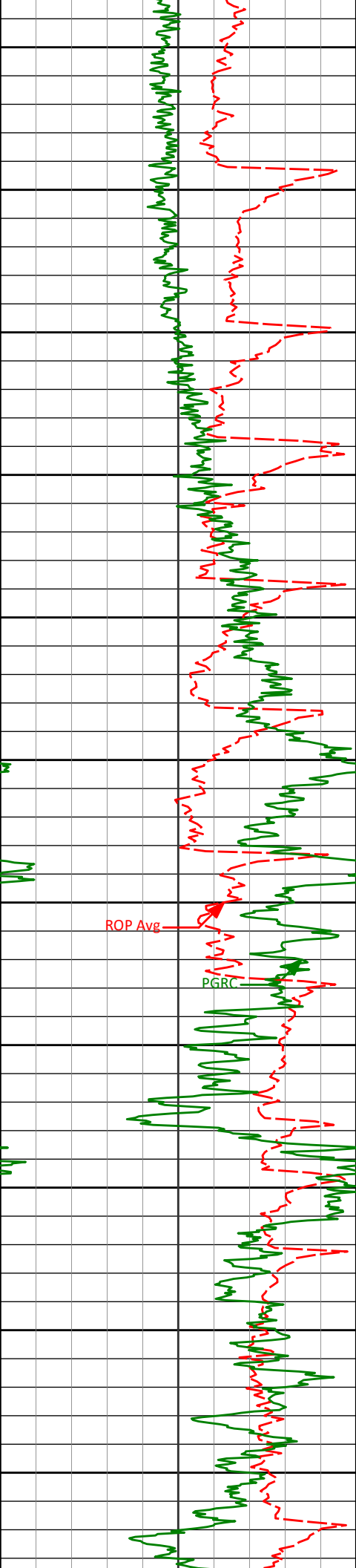
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HALLIBURTON
Sperry Drilling Services

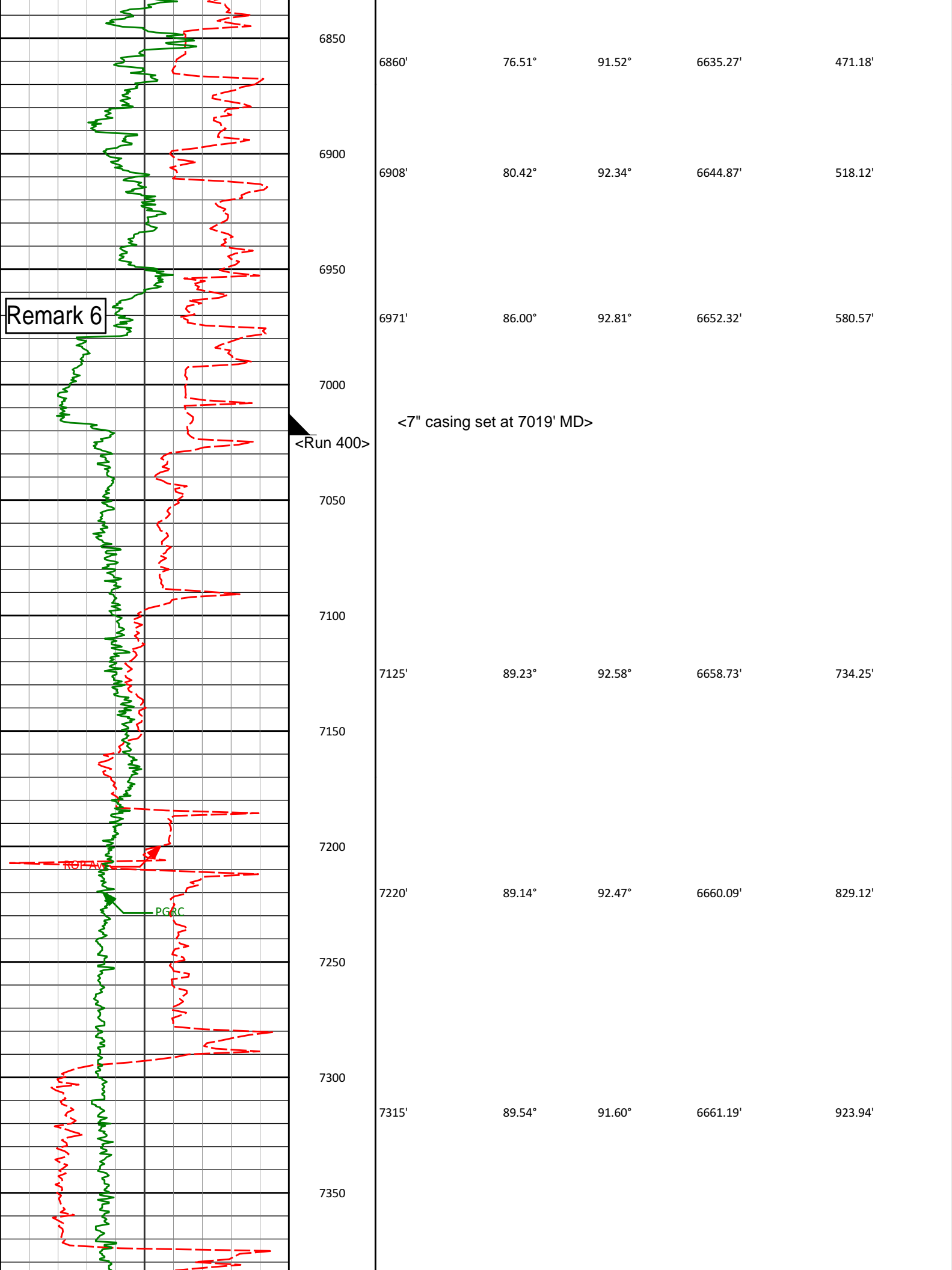
MD Main Log 1:600

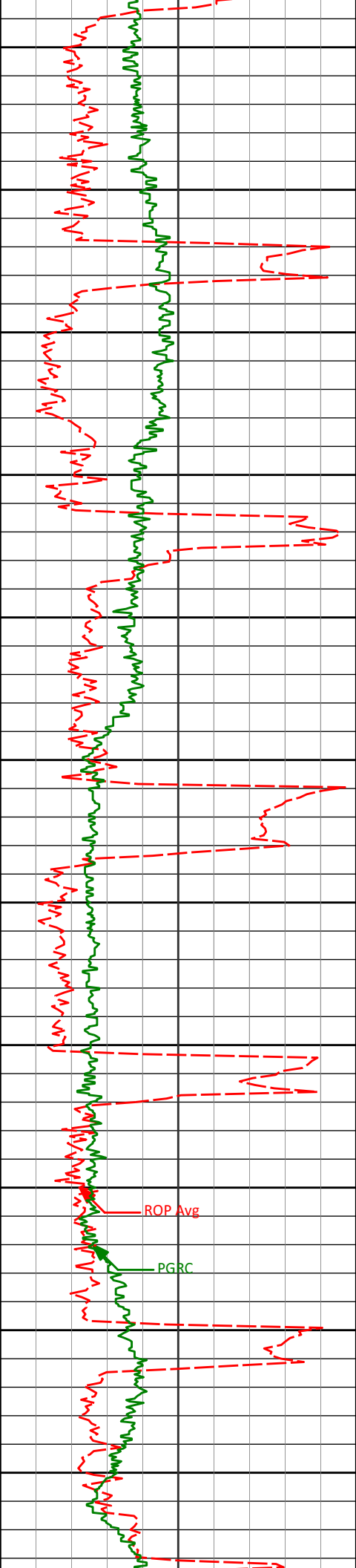
Noble Energy, Inc
Cougar B02-68-1HN
H&P 315
T5N R64W





6300	6291'	17.60°	84.14°	6253.06'	96.32'
6350					
6400	6386'	24.70°	82.02°	6341.61'	129.77'
6450	6434'	28.75°	80.57°	6384.47'	150.69'
6500	6480'	32.97°	80.52°	6423.95'	173.50'
6550	6528'	37.96°	82.08°	6463.03'	200.50'
6600	6575'	43.13°	81.58°	6498.73'	230.19'
6650	6623'	49.20°	80.79°	6531.96'	263.73'
6700	6670'	55.31°	81.28°	6560.72'	299.72'
6750	6765'	66.92°	87.25°	6606.56'	381.19'
6800	6813'	73.11°	90.37°	6622.96'	425.97'





7400

7410'

90.96°

91.07°

6660.78'

1018.70'

7450

7500

7505'

90.59°

90.35°

6659.50'

1113.37'

7550

7600

7600'

91.26°

90.19°

6657.97'

1207.98'

7650

7700

7695'

90.28°

88.51°

6656.69'

1302.43'

7750

7800

7790'

90.25°

88.77°

6656.25'

1396.77'

7850

7900

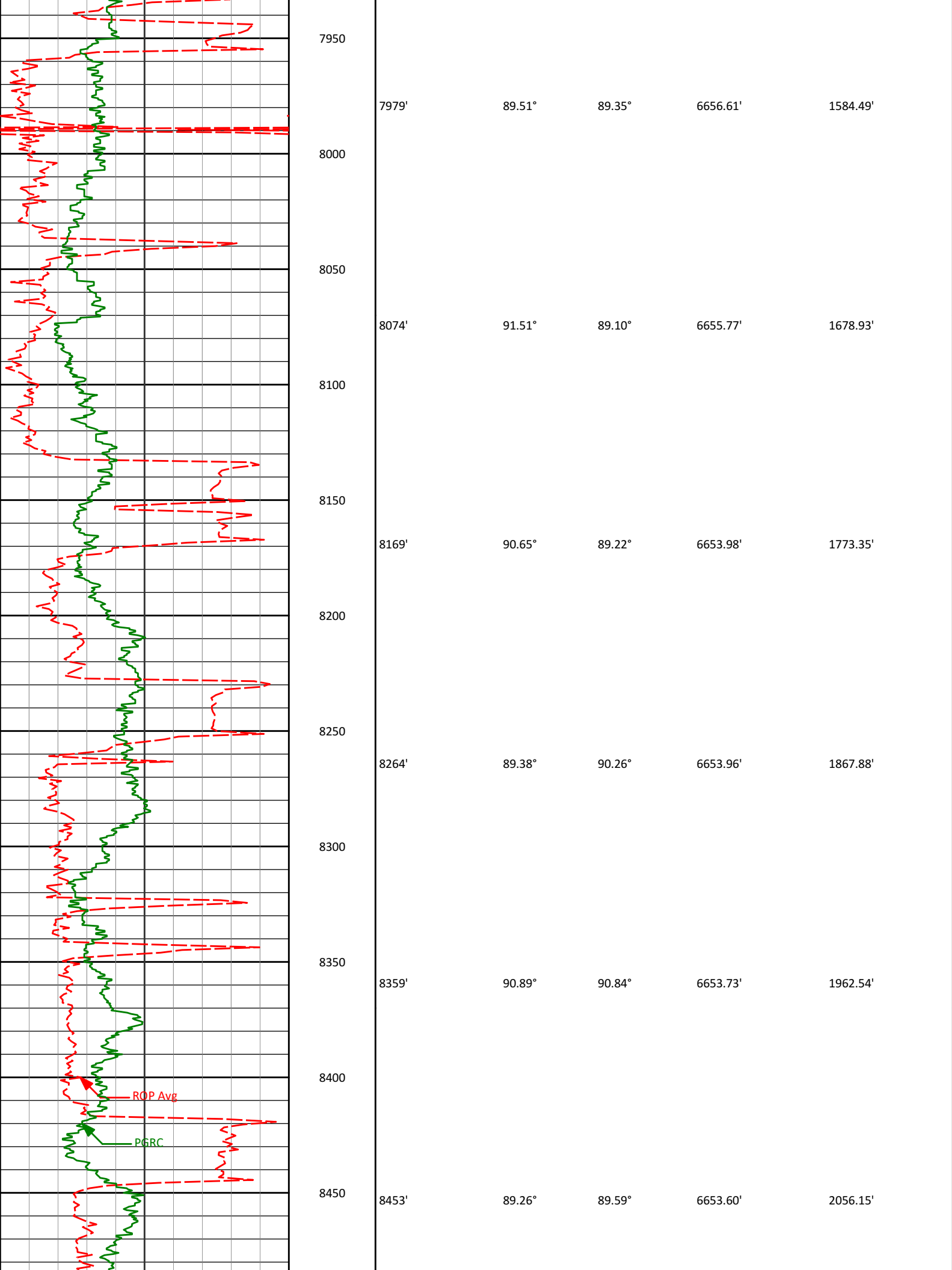
7884'

89.91°

88.45°

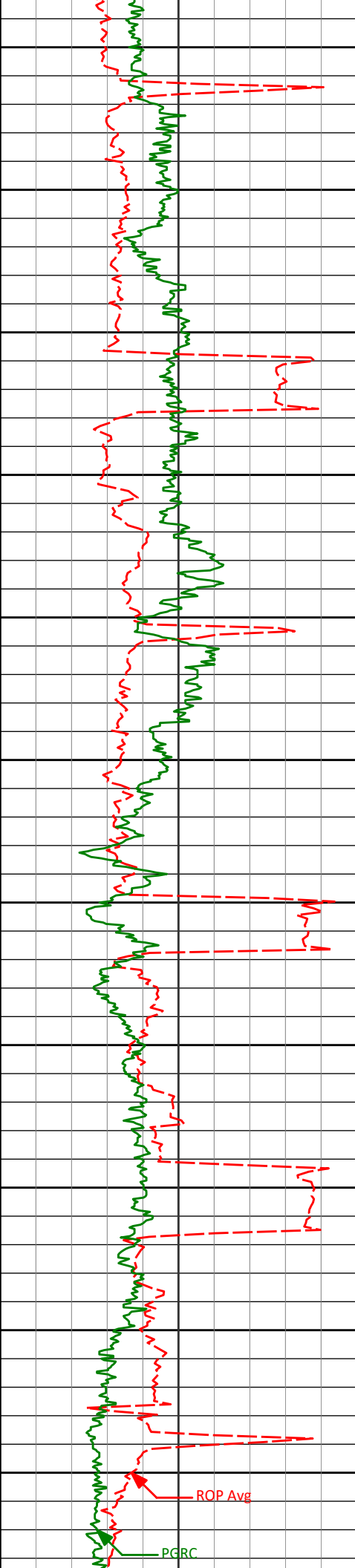
6656.13'

1490.11'



ROP Avg

PGRC



8500

8550

8600

8650

8700

8750

8800

8850

8900

8950

9000

8548'

90.40°

90.12°

6653.88'

2150.70'

8643'

89.66°

88.98°

6653.83'

2245.20'

8738'

90.86°

88.90°

6653.40'

2339.59'

8833'

90.43°

88.76°

6652.32'

2433.96'

8928'

88.46°

88.59°

6653.24'

2528.29'

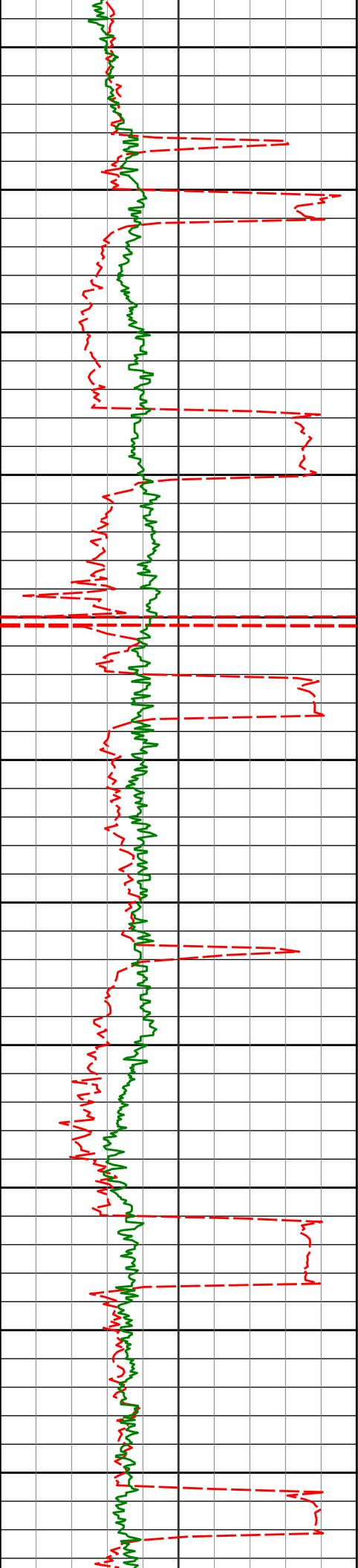
9022'

89.78°

88.80°

6654.69'

2621.64'



9050

9100

9150

9200

9250

9300

9350

9400

9450

9500

9550

9117'

90.89°

89.07°

6654.12'

2716.03'

9212'

89.78°

89.76°

6653.56'

2810.50'

9307'

89.45°

90.24°

6654.20'

2905.08'

9402'

91.29°

92.03°

6653.59'

2999.80'

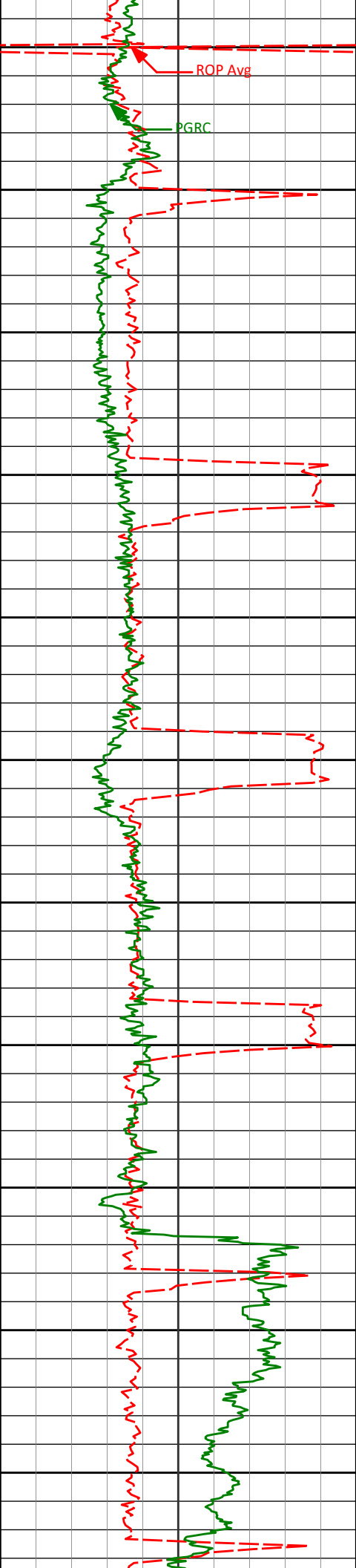
9497'

90.37°

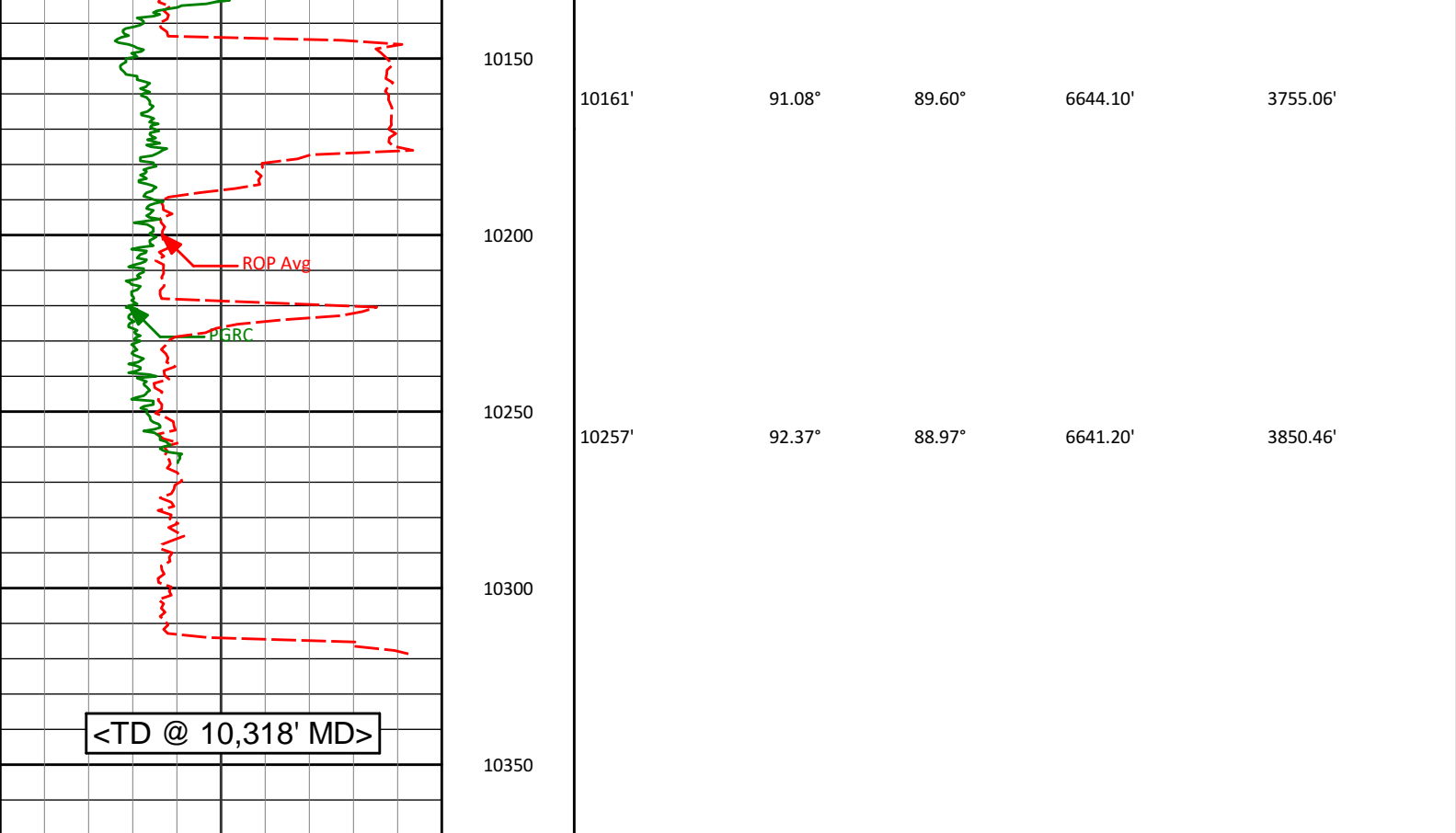
90.50°

6652.21'

3094.54'



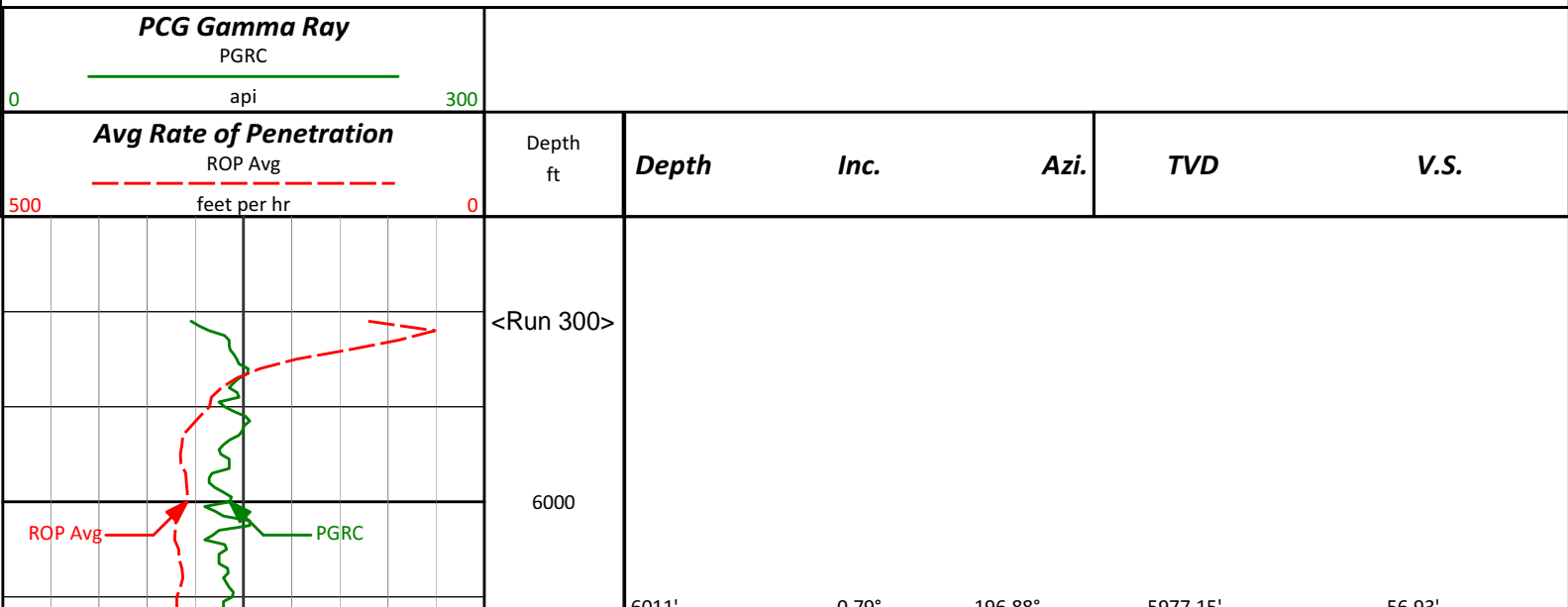
9591'	89.57°	89.65°	6652.26'	3188.13'
9600				
9650				
9686'	90.31°	90.44°	6652.36'	3282.71'
9700				
9750				
9781'	90.77°	89.00°	6651.46'	3377.24'
9800				
9850				
9876'	90.71°	88.98°	6650.24'	3471.64'
9900				
9950				
9971'	90.62°	89.20°	6649.14'	3566.05'
10000				
10050				
10066'	92.19°	90.11°	6646.81'	3660.54'
10100				

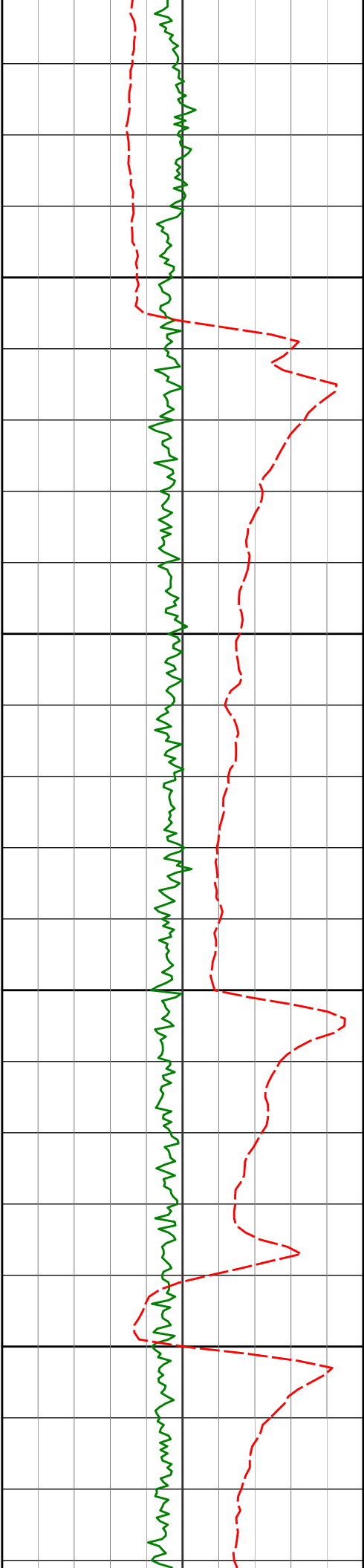


Avg Rate of Penetration ROP Avg feet per hr	Depth ft	Depth	Inc.	Azi.	TVD	V.S.
5000						
PCG Gamma Ray PGRC api						
0300						

HALLIBURTON
Sperry Drilling Services
MD Detail Log 1:240

Noble Energy, Inc
Cougar B02-68-1HN
H&P 315
T5N R64W





6050

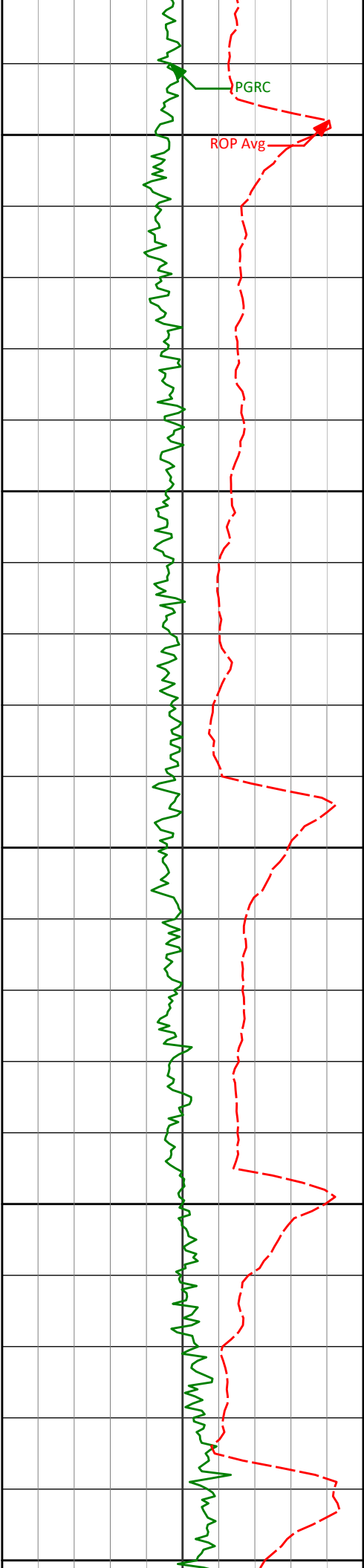
<KOP>

6100

6150

6200

6011	0.79	190.88	5977.15	50.95
6149'	8.05°	80.17°	6114.71'	66.07'
6196'	11.01°	78.22°	6161.06'	73.54'



6250

6291'

17.60°

84.14°

6253.06'

96.32'

6300

6350

6386'

24.70°

82.02°

6341.61'

129.77'

6400

6434'

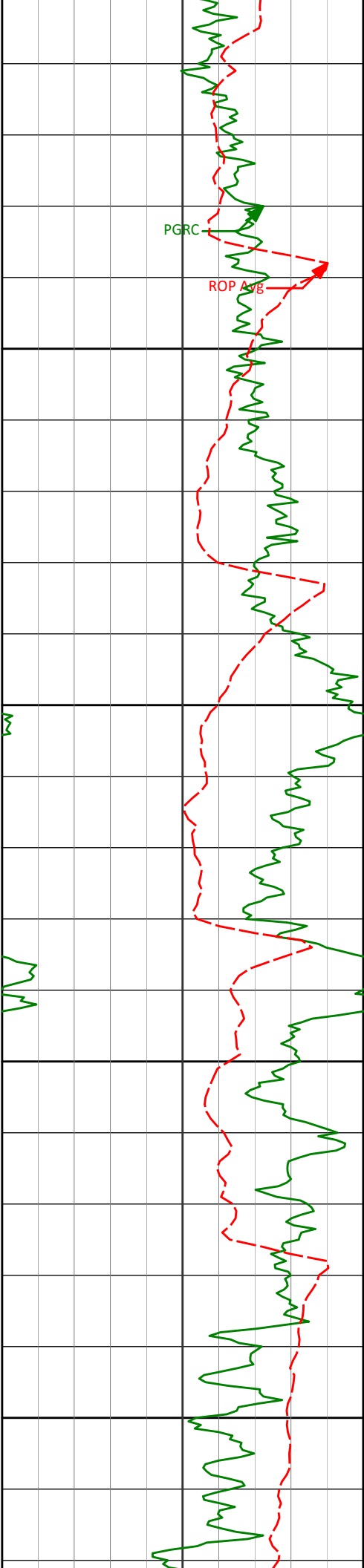
28.75°

80.57°

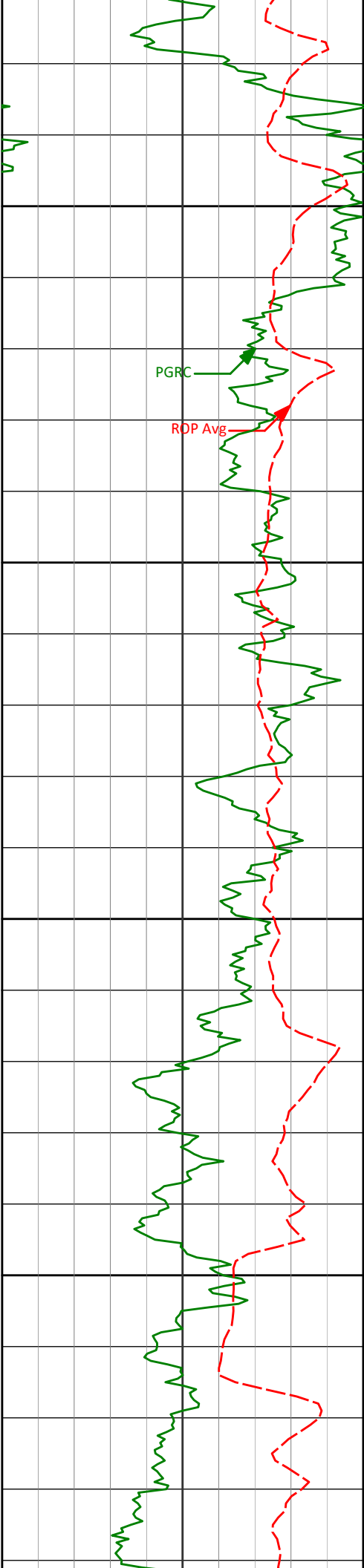
6384.47'

150.69'

6450



6480'	32.97°	80.52°	6423.95'	173.50'
6528'	37.96°	82.08°	6463.03'	200.50'
6575'	43.13°	81.58°	6498.73'	230.19'
6623'	49.20°	80.79°	6531.96'	263.73'
6670'	55.31°	81.28°	6560.72'	299.72'



6700

PGRC

ROP Avg

6750

6765'

66.92°

87.25°

6606.56'

381.19'

6800

6813'

73.11°

90.37°

6622.96'

425.97'

6850

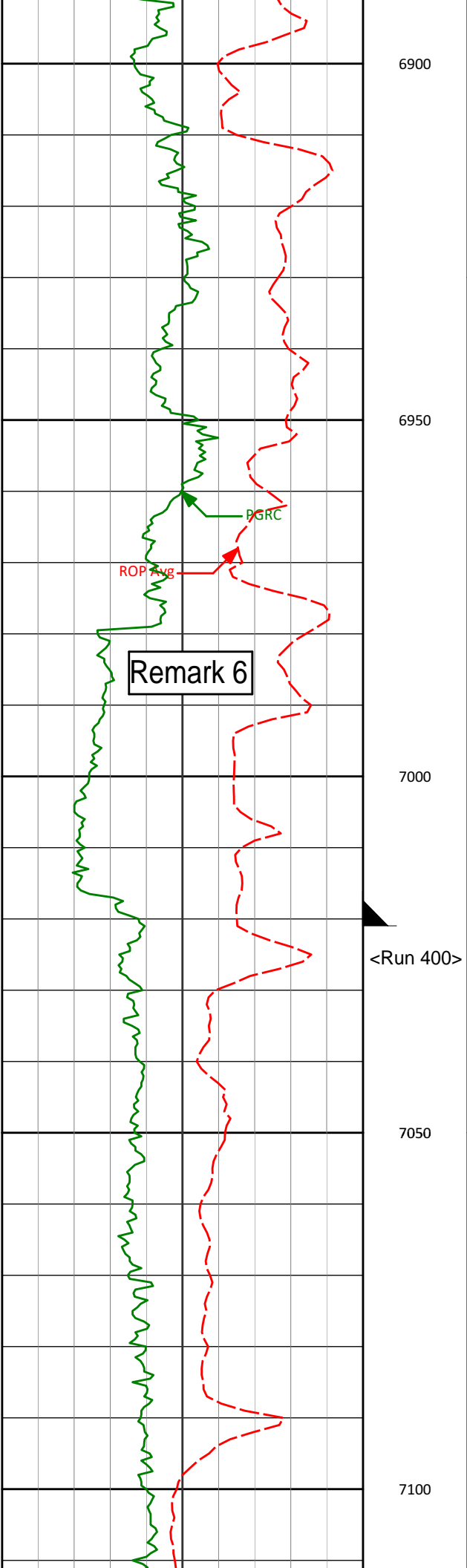
6860'

76.51°

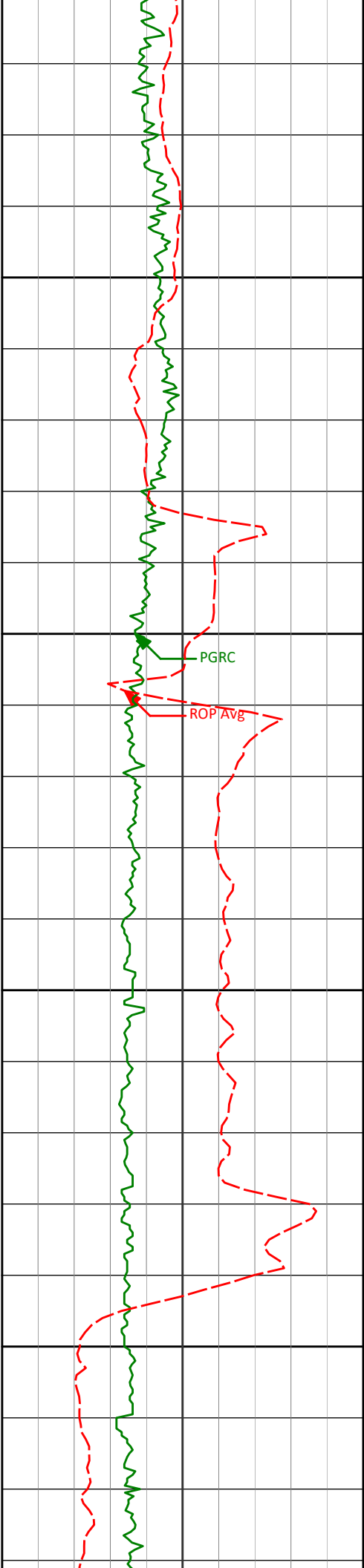
91.52°

6635.27'

471.18'



6900					
6908'	80.42°	92.34°	6644.87'	518.12'	
6950					
6971'	86.00°	92.81°	6652.32'	580.57'	
7000					
	<7" casing set at 7019' MD>				
	<Run 400>				
7050					
7100					



7125'

89.23°

92.58°

6658.73'

734.25'

7150

7200

PGRC

ROP Avg

7220'

89.14°

92.47°

6660.09'

829.12'

7250

7300

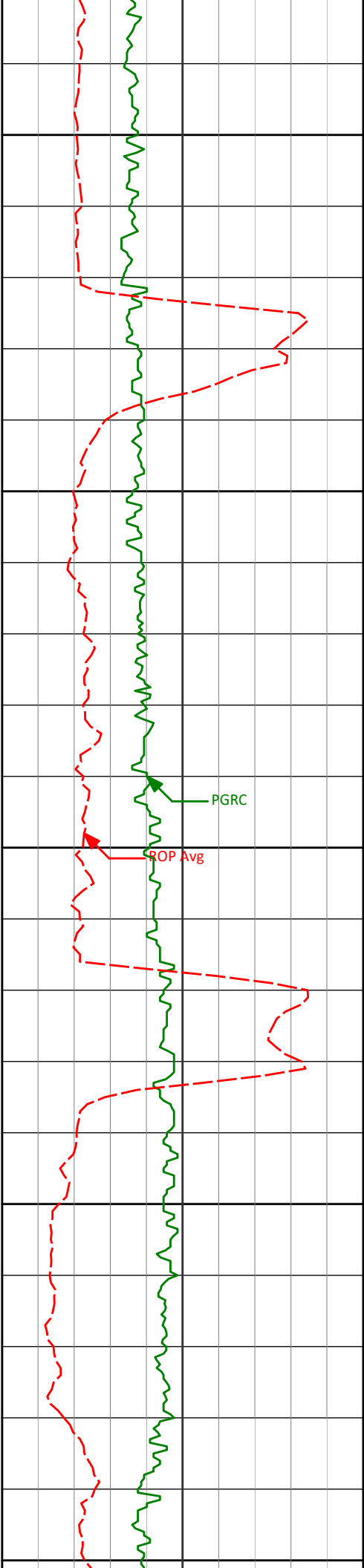
7315'

89.54°

91.60°

6661.19'

923.94'



7350

7400

7450

7500

7550

7410'

90.96°

91.07°

6660.78'

1018.70'

PGRC

ROP Avg

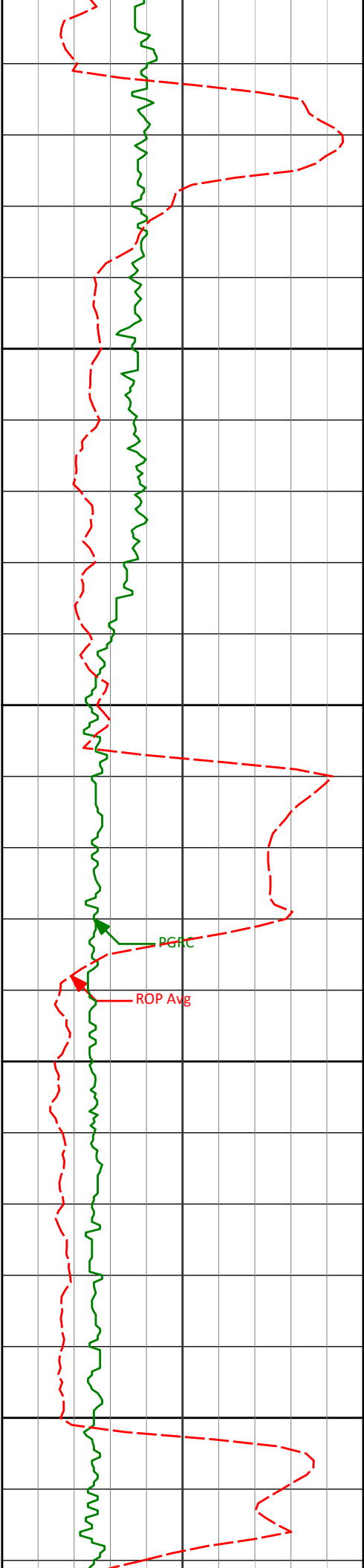
7505'

90.59°

90.35°

6659.50'

1113.37'



7600

7600'

91.26°

90.19°

6657.97'

1207.98'

7650

7700

7750

7695'

90.28°

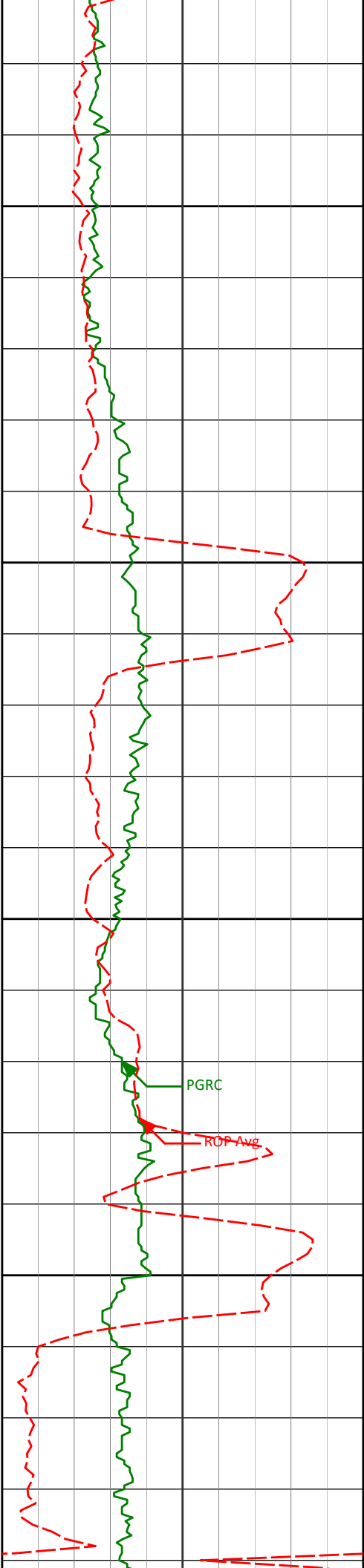
88.51°

6656.69'

1302.43'

PGRC

ROP Avg



7800

7850

7900

7950

7790'

90.25°

88.77°

6656.25'

1396.77'

7884'

89.91°

88.45°

6656.13'

1490.11'

7979'

89.51°

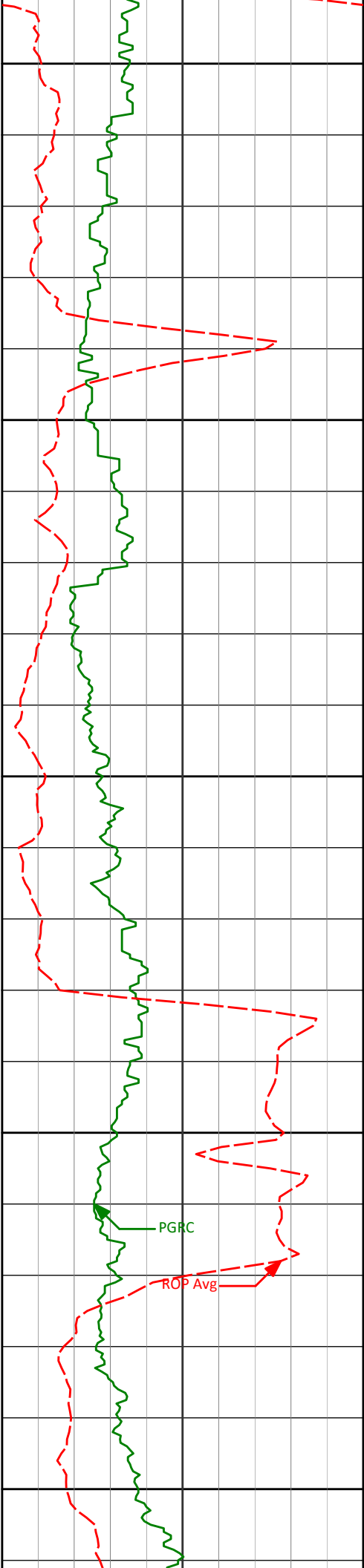
89.35°

6656.61'

1584.49'

PGRC

ROP AVG



8000

8050

8100

8150

8200

8074'

91.51°

89.10°

6655.77'

1678.93'

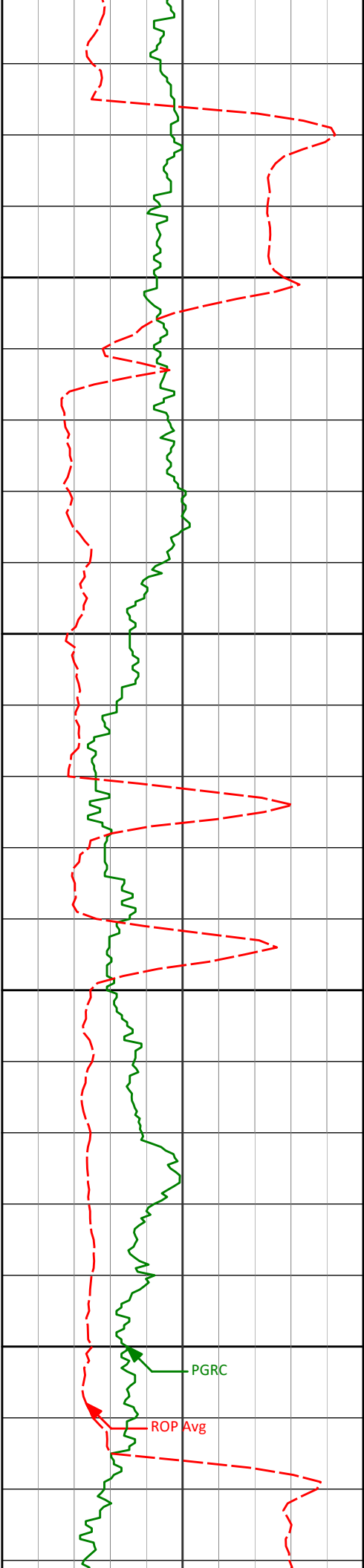
8169'

90.65°

89.22°

6653.98'

1773.35'



8250

8300

8350

8400

PGRC

ROP Avg

8264'

89.38°

90.26°

6653.96'

1867.88'

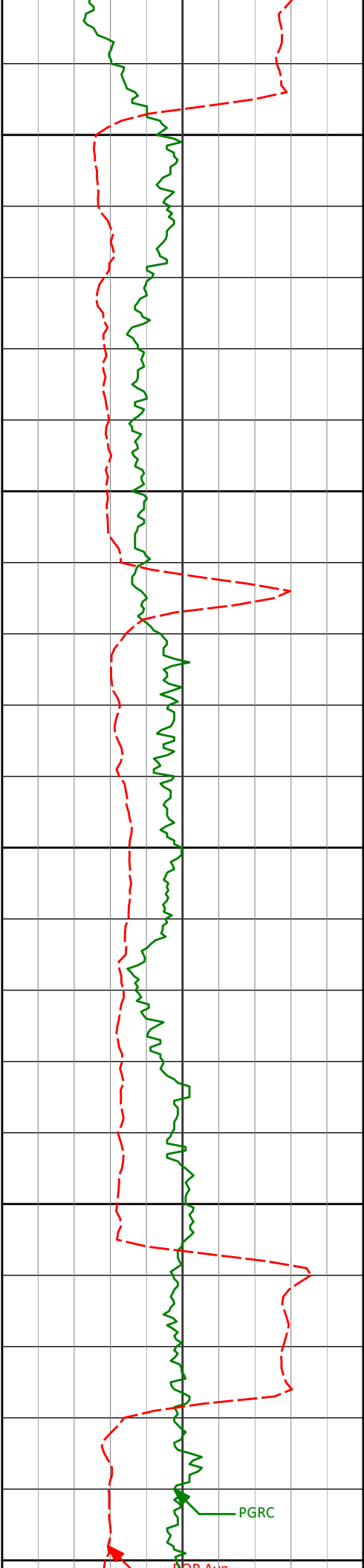
8359'

90.89°

90.84°

6653.73'

1962.54'



8450

8453'

89.26°

89.59°

6653.60'

2056.15'

8500

8550

8548'

90.40°

90.12°

6653.88'

2150.70'

8600

8650

8643'

89.66°

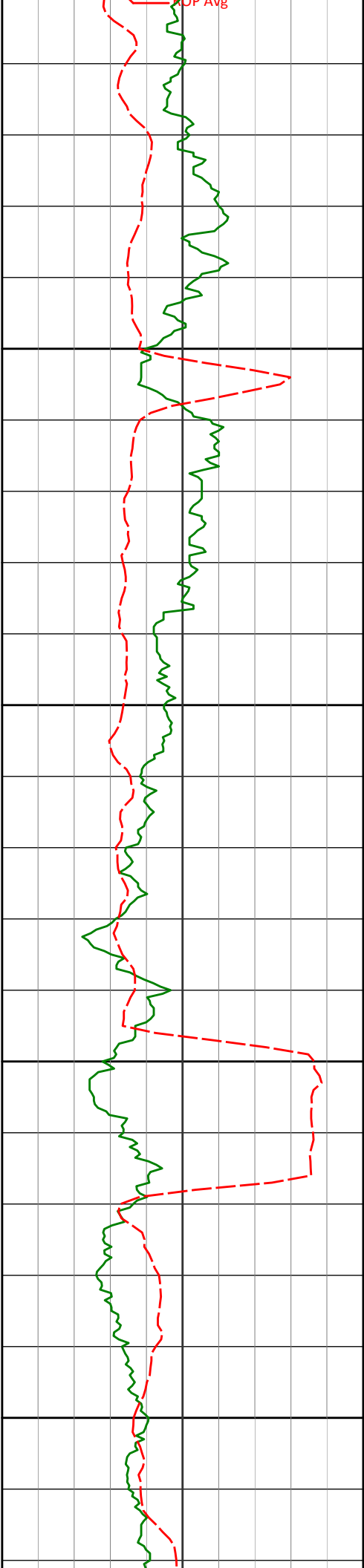
88.98°

6653.83'

2245.20'

PGRC

OP Arc



8700

8738'

90.86°

88.90°

6653.40'

2339.59'

8750

8800

8833'

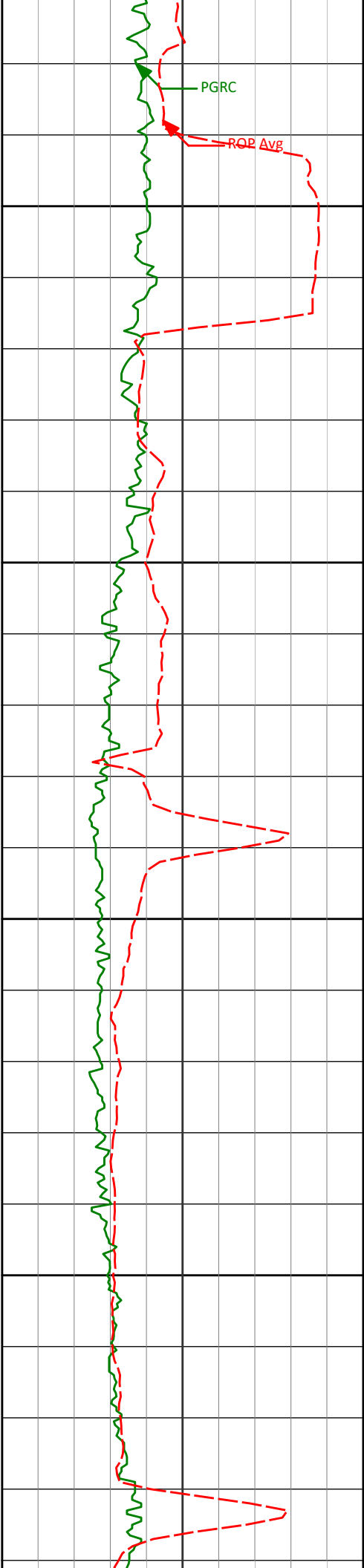
90.43°

88.76°

6652.32'

2433.96'

8850



PGRC

ROP Avg

8900

8950

9000

9050

8928'

88.46°

88.59°

6653.24'

2528.29'

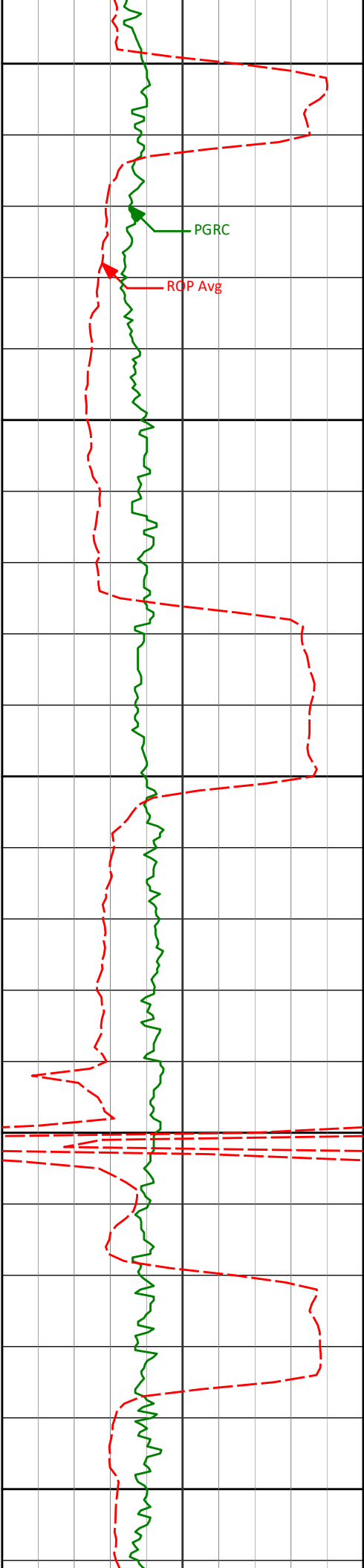
9022'

89.78°

88.80°

6654.69'

2621.64'



9100

9117'

90.89°

89.07°

6654.12'

2716.03'

9150

9200

9212'

89.78°

89.76°

6653.56'

2810.50'

9250

9300

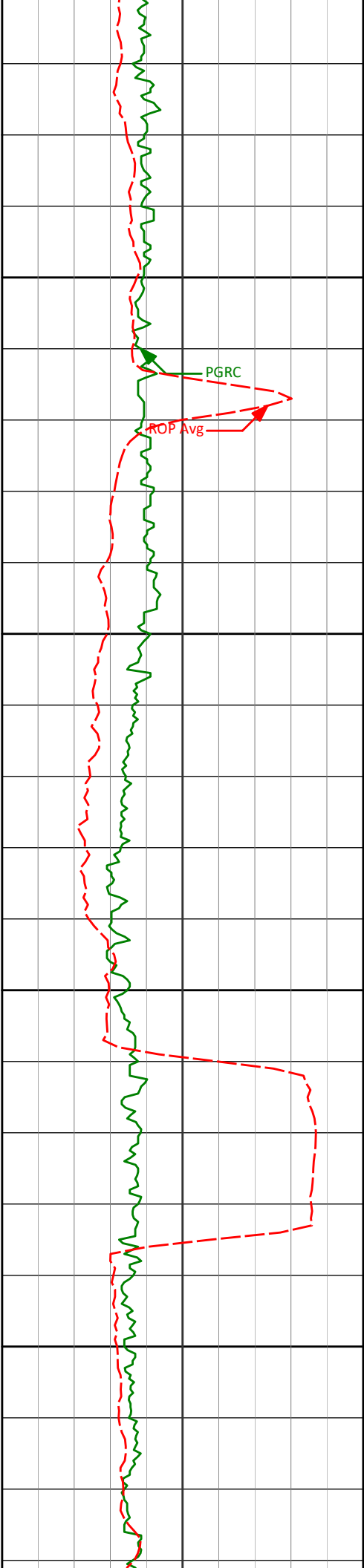
9307'

89.45°

90.24°

6654.20'

2905.08'



9350

PGRC

ROP Avg

9400

9402'

91.29°

92.03°

6653.59'

2999.80'

9450

9500

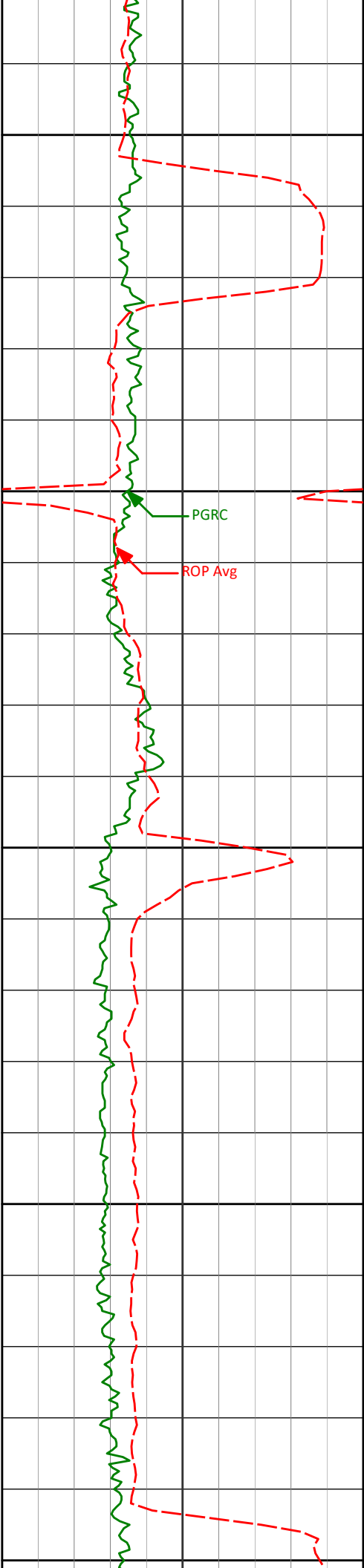
9497'

90.37°

90.50°

6652.21'

3094.54'



9550

9591'	89.57°	89.65°	6652.26'	3188.13'
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9600

PGRC

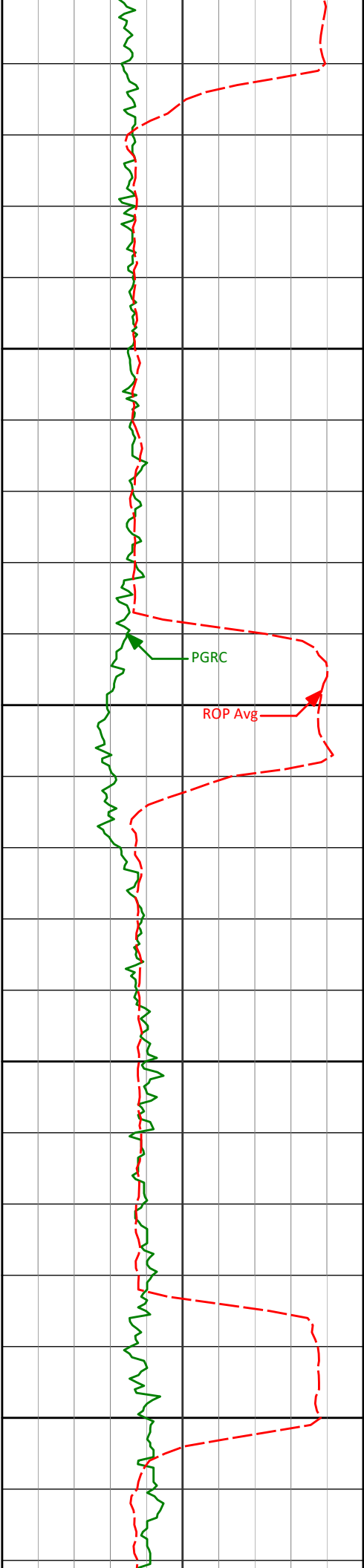
ROP Avg

9650

9686'	90.31°	90.44°	6652.36'	3282.71'
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9700

9750



9781'	90.77°	89.00°	6651.46'	3377.24'
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9800

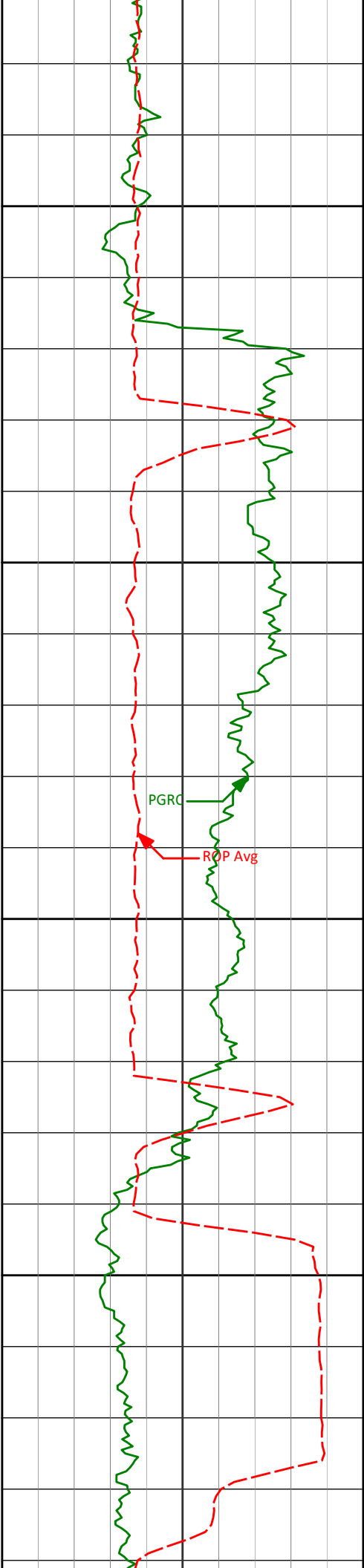
9850

9876'	90.71°	88.98°	6650.24'	3471.64'
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9900

9950

9971'	90.62°	89.20°	6649.14'	3566.05'
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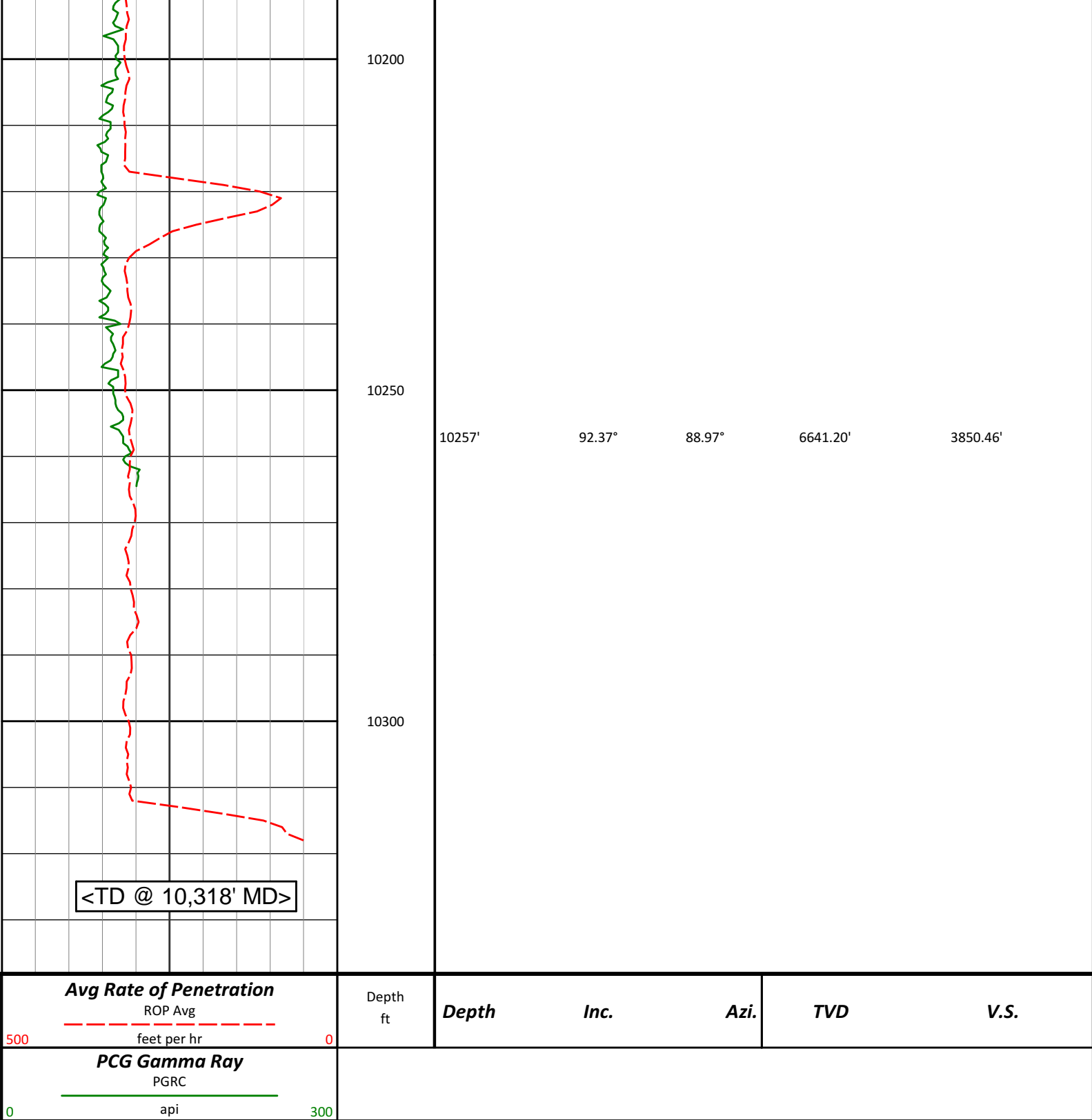
10000

10050

10100

10150

9971	90.62	89.20	6649.14	3566.03
10066'	92.19°	90.11°	6646.81'	3660.54'
10161'	91.08°	89.60°	6644.10'	3755.06'



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
Cougar B02-68-1HN
Wattenberg
Weld Colorado
USA
CA-XX-0900918631

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (degrees)	Departure (feet)	Vertical Section (feet)	Dogleg (degrees/100 feet)
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	(feet)	(degrees)	(degrees)	(feet)	(feet)	(feet)	(feet)	(deg/100ft)
	0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
	232.00	0.48	186.29	232.00	0.97 S	0.11 W	-0.01	0.21
	324.00	0.44	160.70	323.99	1.69 S	0.03 W	0.13	0.23
	417.00	0.64	156.17	416.99	2.50 S	0.30 E	0.53	0.21
	509.00	0.87	181.28	508.98	3.67 S	0.49 E	0.83	0.43
	601.00	0.93	179.37	600.97	5.11 S	0.48 E	0.96	0.08
	694.00	1.20	177.13	693.95	6.84 S	0.54 E	1.18	0.29
	786.00	1.43	162.89	785.93	8.91 S	0.92 E	1.76	0.43
	879.00	1.45	175.95	878.90	11.19 S	1.35 E	2.40	0.35
	972.00	0.69	173.88	971.88	12.92 S	1.49 E	2.70	0.82
	1064.00	0.55	155.28	1063.88	13.87 S	1.73 E	3.03	0.27
	1157.00	0.77	142.65	1156.87	14.77 S	2.30 E	3.68	0.29
	1251.00	1.06	172.36	1250.86	16.13 S	2.80 E	4.31	0.58
	1344.00	1.00	172.42	1343.85	17.79 S	3.02 E	4.68	0.06
	1436.00	1.43	183.32	1435.83	19.74 S	3.06 E	4.91	0.53
	1529.00	0.94	194.69	1528.81	21.64 S	2.80 E	4.82	0.58
	1623.00	1.03	201.80	1622.79	23.17 S	2.29 E	4.46	0.16
	1718.00	1.20	194.44	1717.77	24.93 S	1.72 E	4.07	0.24
	1813.00	0.91	203.78	1812.76	26.58 S	1.17 E	3.67	0.36
	1908.00	1.13	212.73	1907.74	28.07 S	0.36 E	3.00	0.29
	1941.00	1.38	199.23	1940.73	28.72 S	0.05 E	2.76	1.17
	2037.00	1.05	213.98	2036.71	30.54 S	0.82 W	2.06	0.48
	2132.00	0.99	205.38	2131.70	32.00 S	1.66 W	1.37	0.17
	2227.00	0.80	200.27	2226.69	33.36 S	2.24 W	0.92	0.21
	2322.00	0.32	225.22	2321.68	34.17 S	2.66 W	0.57	0.56
	2417.00	0.68	222.37	2416.68	34.78 S	3.23 W	0.06	0.38
	2512.00	2.90	185.56	2511.63	37.59 S	3.84 W	-0.28	2.52
	2607.00	4.24	160.46	2606.45	43.30 S	2.90 W	1.19	2.14
	2702.00	6.38	177.07	2701.04	51.89 S	1.46 W	3.44	2.75
	2796.00	7.57	173.85	2794.34	63.27 S	0.52 W	5.44	1.33
	2891.00	8.70	178.29	2888.38	76.67 S	0.36 E	7.59	1.36
	2986.00	9.74	177.14	2982.15	91.88 S	0.98 E	9.64	1.11
	3081.00	10.45	178.86	3075.68	108.52 S	1.55 E	11.77	0.81
	3176.00	11.64	179.95	3168.92	126.72 S	1.73 E	13.67	1.27
	3271.00	11.41	176.88	3262.01	145.68 S	2.25 E	15.97	0.69
	3366.00	12.46	177.54	3354.95	165.30 S	3.20 E	18.77	1.12
	3461.00	10.94	174.51	3447.98	184.52 S	4.50 E	21.88	1.73
	3555.00	10.46	174.64	3540.34	201.89 S	6.16 E	25.16	0.50
	3650.00	10.74	162.41	3633.73	218.92 S	9.64 E	30.24	2.38
	3745.00	11.54	168.09	3726.94	236.67 S	14.28 E	36.53	1.43
	3840.00	13.03	175.60	3819.77	256.65 S	17.06 E	41.18	2.30
	3935.00	12.21	183.51	3912.48	277.36 S	17.27 E	43.34	2.01
	4029.00	11.13	183.24	4004.54	296.34 S	16.15 E	44.02	1.16
	4124.00	9.82	182.04	4097.95	313.59 S	15.34 E	44.84	1.40
	4219.00	10.36	180.87	4191.48	330.22 S	14.92 E	45.99	0.61
	4314.00	8.88	179.17	4285.14	346.10 S	14.90 E	47.47	1.59
	4409.00	9.71	185.48	4378.90	361.41 S	14.24 E	48.25	1.38
	4504.00	8.33	186.06	4472.72	376.24 S	12.75 E	48.17	1.46
	4599.00	7.13	187.15	4566.85	388.93 S	11.29 E	47.91	1.28
	4694.00	6.38	174.51	4661.20	400.03 S	11.06 E	48.73	1.75
	4789.00	5.59	175.85	4755.68	409.91 S	11.90 E	50.49	0.85
	4884.00	3.80	162.87	4850.36	417.53 S	13.16 E	52.47	2.18
	4979.00	1.79	171.81	4945.24	422.00 S	14.30 E	54.02	2.16
	5073.00	1.89	162.27	5039.20	424.93 S	14.98 E	54.98	0.34
	5168.00	0.46	279.36	5134.18	426.36 S	15.08 E	55.22	2.25
	5453.00	0.62	60.20	5419.17	425.42 S	15.29 E	55.33	0.36
	5738.00	0.62	157.97	5704.16	426.08 S	17.20 E	57.29	0.33
	5926.00	0.58	216.93	5892.15	427.78 S	17.01 E	57.27	0.31
	6011.00	0.79	196.88	5977.15	428.68 S	16.58 E	56.93	0.37
	6149.00	8.05	80.17	6114.71	427.94 S	25.84 E	66.07	6.11
	6196.00	11.01	78.22	6161.06	426.46 S	33.48 E	73.54	6.35
	6291.00	17.60	84.14	6253.06	423.14 S	56.68 E	96.32	7.10
	6386.00	24.70	82.02	6341.61	418.91 S	90.67 E	129.77	7.51
	6434.00	28.75	80.57	6384.47	415.63 S	112.01 E	150.69	8.55
	6480.00	32.97	80.52	6423.95	411.75 S	135.28 E	173.50	9.17
	6528.00	37.96	82.08	6463.03	407.56 S	162.80 E	200.50	10.57
	6575.00	43.13	81.58	6498.73	403.22 S	193.03 E	230.19	11.01
	6623.00	49.20	80.79	6531.96	397.90 S	227.23 E	263.73	12.70
	6670.00	55.31	81.28	6560.72	392.12 S	263.93 E	299.72	13.04
	6765.00	66.92	87.25	6606.56	384.06 S	346.52 E	381.19	13.39

6813.00	73.11	90.37	6622.96	383.15 S	391.59 E	425.97	14.27
6860.00	76.51	91.52	6635.27	383.90 S	436.93 E	471.18	7.62
6908.00	80.42	92.34	6644.87	385.49 S	483.93 E	518.12	8.30
6971.00	86.00	92.81	6652.32	388.30 S	546.40 E	580.57	8.89
7125.00	89.23	92.58	6658.73	395.53 S	700.07 E	734.25	2.10
7220.00	89.14	92.47	6660.09	399.71 S	794.97 E	829.12	0.15
7315.00	89.54	91.60	6661.19	403.08 S	889.90 E	923.94	1.01
7410.00	90.96	91.07	6660.78	405.29 S	984.88 E	1018.70	1.59
7505.00	90.59	90.35	6659.50	406.47 S	1079.86 E	1113.37	0.85
7600.00	91.26	90.19	6657.97	406.92 S	1174.84 E	1207.98	0.73
7695.00	90.28	88.51	6656.69	405.85 S	1269.83 E	1302.43	2.05
7790.00	90.25	88.77	6656.25	403.60 S	1364.80 E	1396.77	0.27
7884.00	89.91	88.45	6656.13	401.32 S	1458.77 E	1490.11	0.50
7979.00	89.51	89.35	6656.61	399.49 S	1553.75 E	1584.49	1.04
8074.00	91.51	89.10	6655.77	398.21 S	1648.73 E	1678.93	2.13
8169.00	90.65	89.22	6653.98	396.82 S	1743.70 E	1773.35	0.92
8264.00	89.38	90.26	6653.96	396.38 S	1838.70 E	1867.88	1.73
8359.00	90.89	90.84	6653.73	397.29 S	1933.69 E	1962.54	1.70
8453.00	89.26	89.59	6653.60	397.65 S	2027.69 E	2056.15	2.18
8548.00	90.40	90.12	6653.88	397.41 S	2122.68 E	2150.70	1.32
8643.00	89.66	88.98	6653.83	396.66 S	2217.68 E	2245.20	1.43
8738.00	90.86	88.90	6653.40	394.90 S	2312.66 E	2339.59	1.27
8833.00	90.43	88.76	6652.32	392.96 S	2407.63 E	2433.96	0.48
8928.00	88.46	88.59	6653.24	390.77 S	2502.60 E	2528.29	2.09
9022.00	89.78	88.80	6654.69	388.62 S	2596.56 E	2621.64	1.43
9117.00	90.89	89.07	6654.12	386.86 S	2691.54 E	2716.03	1.20
9212.00	89.78	89.76	6653.56	385.89 S	2786.53 E	2810.50	1.37
9307.00	89.45	90.24	6654.20	385.89 S	2881.53 E	2905.08	0.62
9402.00	91.29	92.03	6653.59	387.78 S	2976.50 E	2999.80	2.71
9497.00	90.37	90.50	6652.21	389.88 S	3071.46 E	3094.54	1.88
9591.00	89.57	89.65	6652.26	390.00 S	3165.46 E	3188.13	1.25
9686.00	90.31	90.44	6652.36	390.06 S	3260.46 E	3282.71	1.14
9781.00	90.77	89.00	6651.46	389.60 S	3355.45 E	3377.24	1.58
9876.00	90.71	88.98	6650.24	387.93 S	3450.43 E	3471.64	0.07
9971.00	90.62	89.20	6649.14	386.43 S	3545.41 E	3566.05	0.25
10066.00	92.19	90.11	6646.81	385.85 S	3640.38 E	3660.54	1.92
10161.00	91.08	89.60	6644.10	385.62 S	3735.34 E	3755.06	1.29
10257.00	92.37	88.97	6641.20	384.42 S	3831.28 E	3850.46	1.50
10318.00	92.37	88.97	6638.68	383.32 S	3892.22 E	3911.02	0.01

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 95.41 DEGREES (GRID)
A TOTAL CORRECTION OF 7.79 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 10318.00 FEET
IS 3911.05 FEET ALONG 95.62 DEGREES (GRID)

Last survey is a projection from 10257 ft MD to TD at 10318 ft MD.

7 inch casing shoe depth set at 7019 ft MD.