

PCDC - Pressure Case Directional
PCGK - Pressure Case Gamma

1 : 240

Country : USA				
Field : Wattenberg				
Location : Lat: 40° 27' 48.35" North Long: 104° 40' 37.09" West				
Well : FiveM E28-69HN				
Company : Noble Energy				
Rig : H&P 322				
LOCATION		Other Services		
Latitude : 40° 27' 48.35" North Longitude : 104° 40' 37.09" West		Directional Drilling		
UTM Easting = 3232461.599 ft UTM Northing = 1412956.483 ft				
Permanent Datum : Ground Level		Elev. KB N/A		
Log Measured From : Drill Floor		DF 4736.00 ft GL 4712.00 ft WD N/A		
Drilling Measured From : Drill Floor		MD LOG		
Depth Logged : 790.00 ft To 14,060.00 ft		Unit No. : 11210425		
Date Logged : 20-Nov-12 To 29-Nov-12		Job No. : CA-XX-0009939842		
Total Depth MD : 14,060.00 ft TVD: 7,008.42 ft		Plot Type : Final		
Spud Date : 19-Nov-12		Plot Date : 30-Nov-12		
Run No.	Borehole Record (MD)		Borehole Record (MD)	
	Size	From	To	Run No.
	100	8.750 in	790.00 ft	6,266.00 ft
	200	8.750 in	6,266.00 ft	7,385.00 ft
300	6.125 in	7,385.00 ft	14,060.00 ft	
	Casing Record (MD)			
	Size	Weight	From	To
			9.625 in	36.00 lbpf
			7.000 in	24.00 lbpf
			SURFACE	
			SURFACE	
			7,381.00 ft	

WELL INFORMATION

MWD Run Number	100	200	300		
Date run completed	22-Nov-12	23-Nov-12	29-Nov-12		
Rig Bit Number	100	200	300		
Bit Size (in)	8.750	8.750	6.125		
Tool Nominal OD (in)	6.750	6.750	4.750		
Log Start Depth (MD, ft)	790.00	6,266.00	7,385.00		
Log End Depth (MD, ft)	6,266.00	7,385.00	14,060.00		
Drill or Wipe	Drill	Drill	Drill		
Drill/Wipe Start Date and Time	21-Nov-12 07:00	22-Nov-12 15:08	24-Nov-12 07:41		
Drill/Wipe End Date and Time	22-Nov-12 06:30	23-Nov-12 13:13	29-Nov-12 05:30		
Min Inc (deg) @ Depth (MD, ft)	.04 @ 915.00	1.05 @ 6,298.00	84.91 @ 7,419.00		
Max Inc (deg) @ Depth (MD, ft)	11.58 @ 1,941.00	77.12 @ 7,329.00	94.54 @ 10,451.00		
Bit TFA(in2) / Bit Type	.75 / PDC	.86 / PDC	.46 / PDC		
Flow Rate (gpm)	550.00	590.00	268.00		
Max AV (fpm) / CV (fpm) @ MWD	405.9 / 405.9	477.1 / 477.1	469.6 / 469.6		
Fluid Type	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel		
Density (ppg) / Viscosity (spqt)	8.40 / 27.00	10.20 / 36.00	9.50 / 38.00		
Filtrate CL (ppm)	400.00	550.00	550.00		
pH / Fluid Loss (mptm)	8.00 / N/A	9.80 / N/A	9.90 / N/A		
PV (cP) / YP (Ihf2)	1 / 4.00	10 / 9.00	10 / 10.00		
% Solids / % Sand	0.5 / 0.05	8.1 / 0.3	6 / .25		
% Oil / Oil:Water Ratio	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		
Rmf @ Measured Temp (degF)	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		
MWD Run Number	100	200	300		
Date run completed	22-Nov-12	23-Nov-12	29-Nov-12		
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PV (cP) / YP (Ihf2)	1 / 4.00	10 / 9.00	10 / 10.00		
% Solids / % Sand	0.5 / 0.05	8.1 / 0.3	6 / .25		
% Oil / Oil:Water Ratio	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		
Rmf @ Measured Temp (degF)	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		

Max Tool Temp (degF) / Source	150.10 / PCM	175.21 / PCM	245.03 / PCM		
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A		
Lead MWD Engineer	Robert Ley	Robert Ley	Robert Ley		
Customer Representative	Charles Culver	Charles Culver	Charles Culver		

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.76	5.76	5.76		
Sub Serial Number	11404261	11404261	11734654		
Insert Serial Number	11680789	11680740	11680789		
Date and Time Initialized	20-Nov-12 10:02	20-Nov-12 12:46	24-Nov-12 09:20		
Date and Time Read	22-Nov-12 13:30	23-Nov-12 18:22	29-Nov-12 20:42		
ECMB SW Version	N/A	N/A	N/A		

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	56.00	56.00	63.00		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11404261	11404261	11734654		
Sonde Serial Number	10993273	11062120	10993273		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	19.64	305.36	63.66		

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	49.11	49.01	55.86		
Recorded Sample Period (sec)	10	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11404261	11404261	11734654		
Insert/Sonde Serial Number	11293393	11680942	11293393		

REMARKS

1. All depths are measured depths and are calibrated to the driller's pipe tally and are measured from the 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.

4. The Following smoothing parameters have been applied to the data"

PGRC (Gamma Ray Corrected):

Interval Resolution: 0.5 feet

Coercion Distance: 0.6 feet

Gap Fill: 3.0 feet

ROPA (Rate of Penetration):

Interval Resolution: 0.5 feet

Coercion Distance: 1.2 feet

Gap Fill: 3.0 feet

Insite Version 7.3.40 build 25

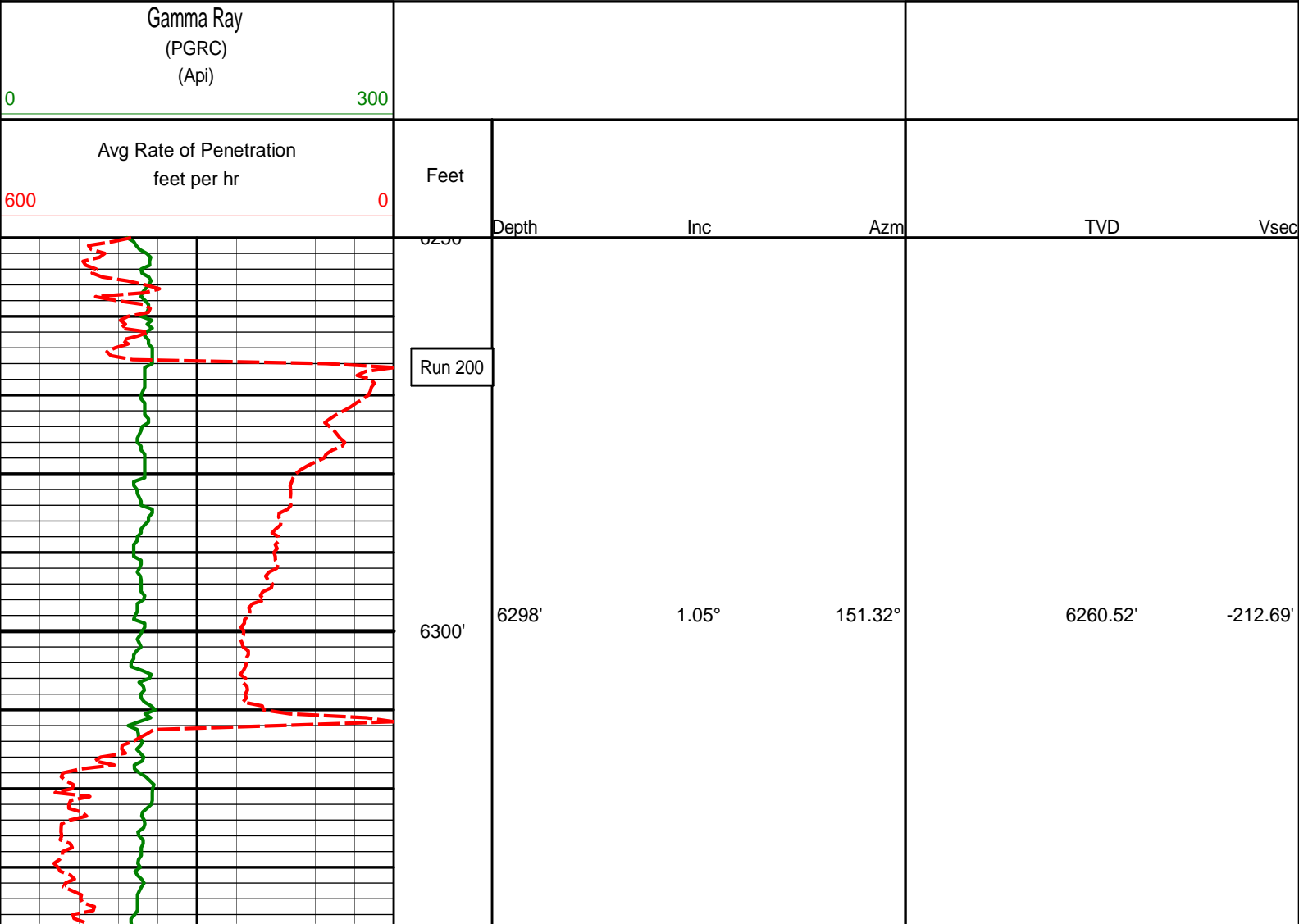
5. Survey at TD is projected to the bit

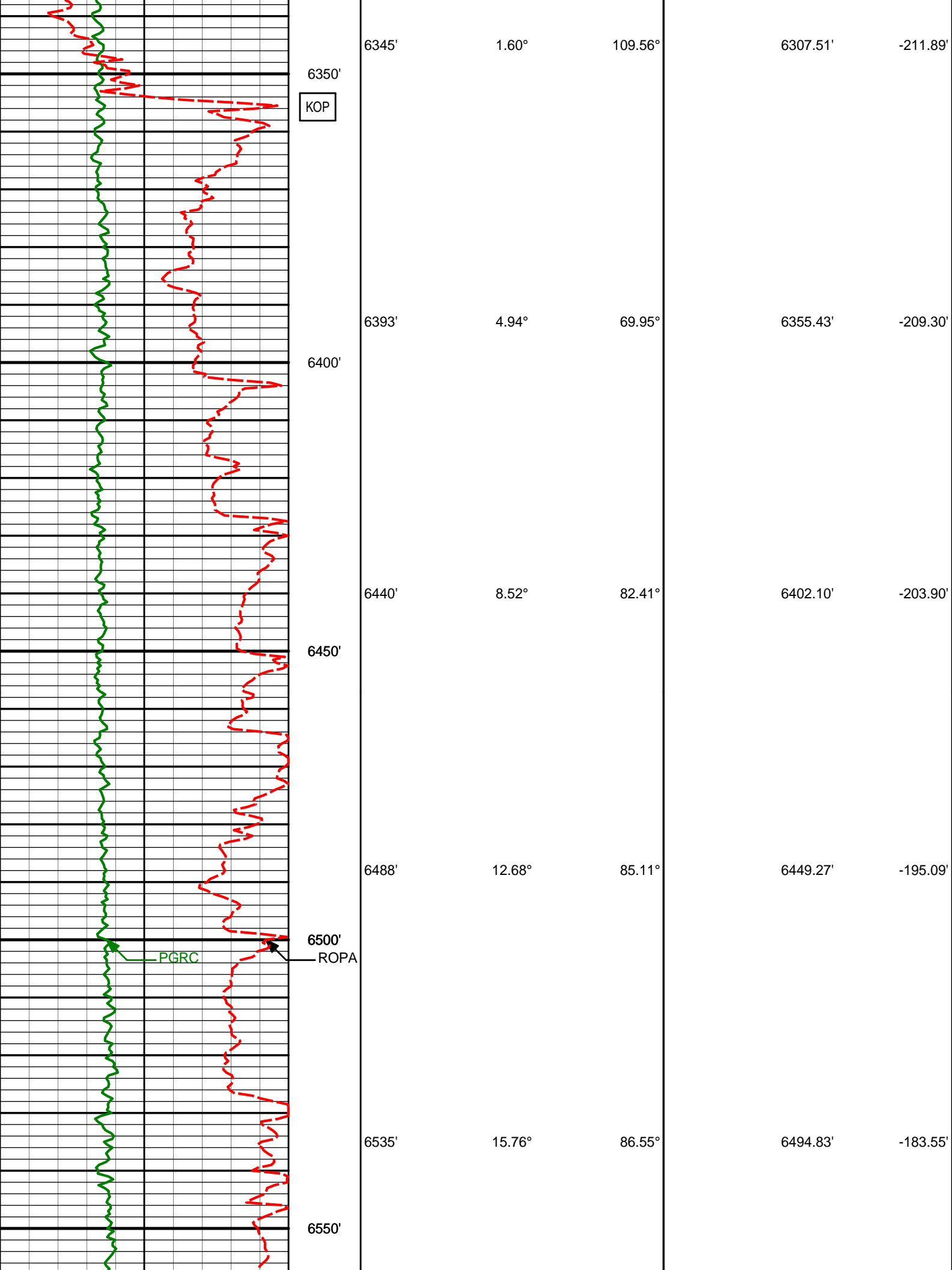
WARRANTY

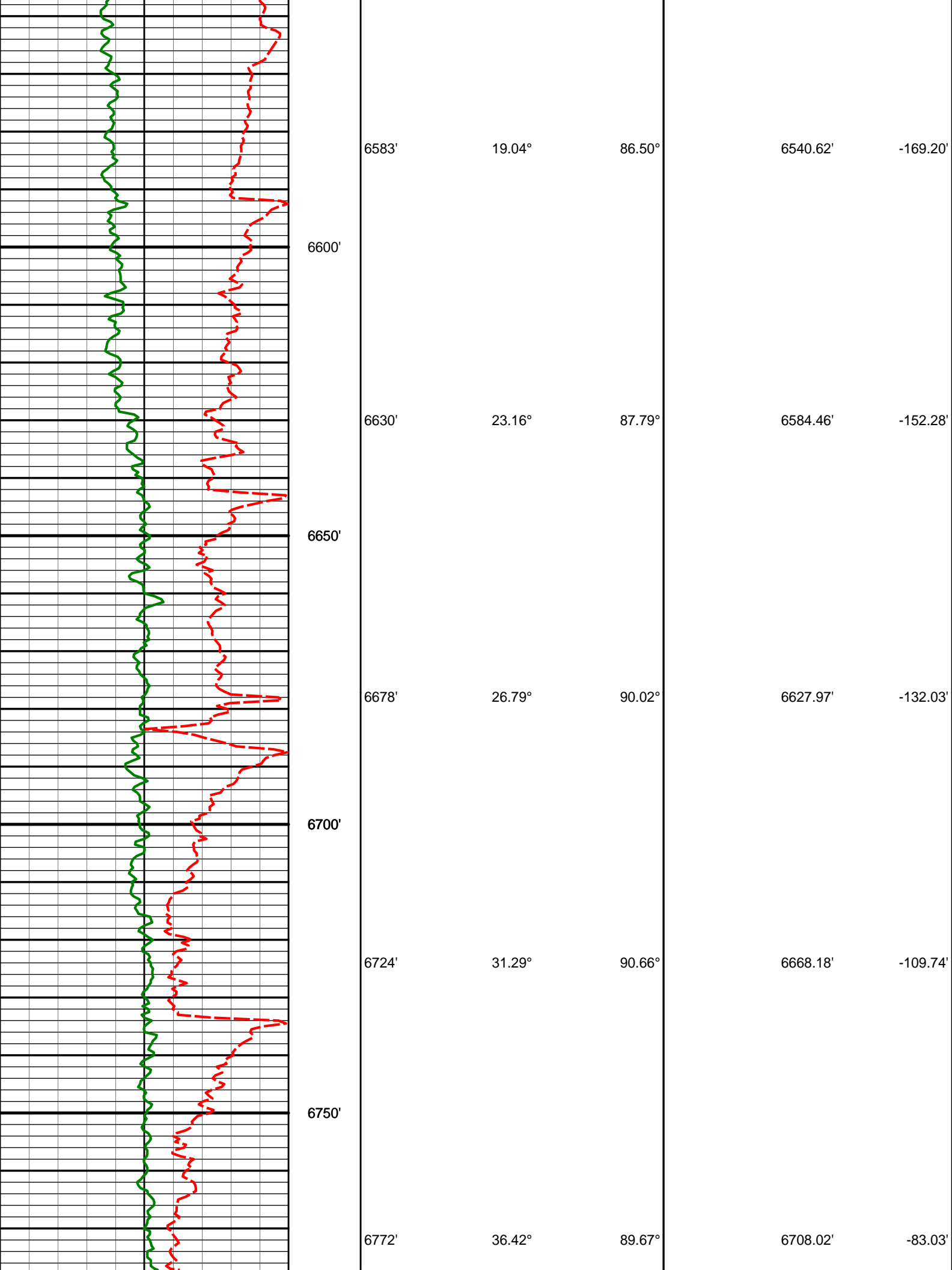
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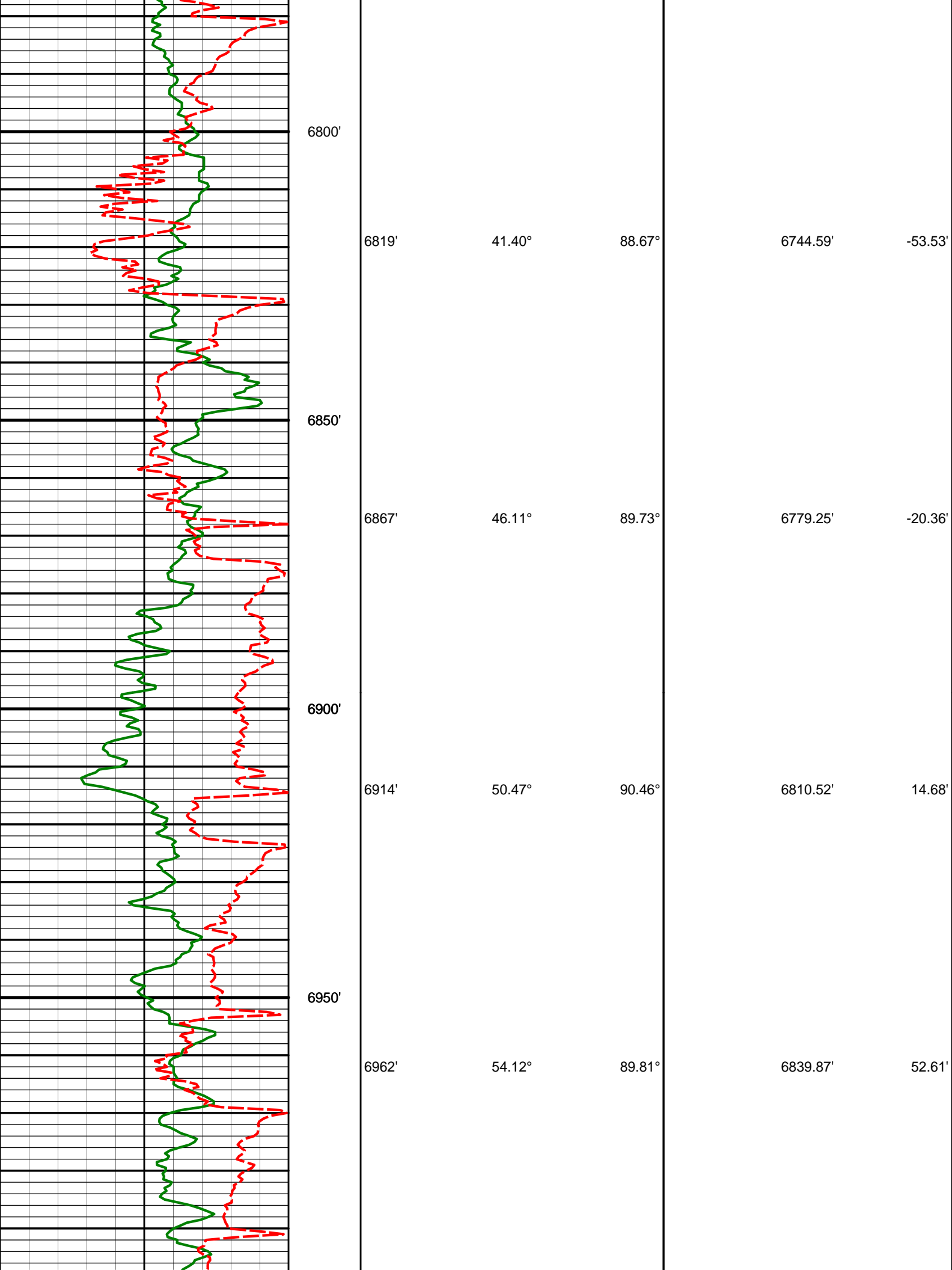
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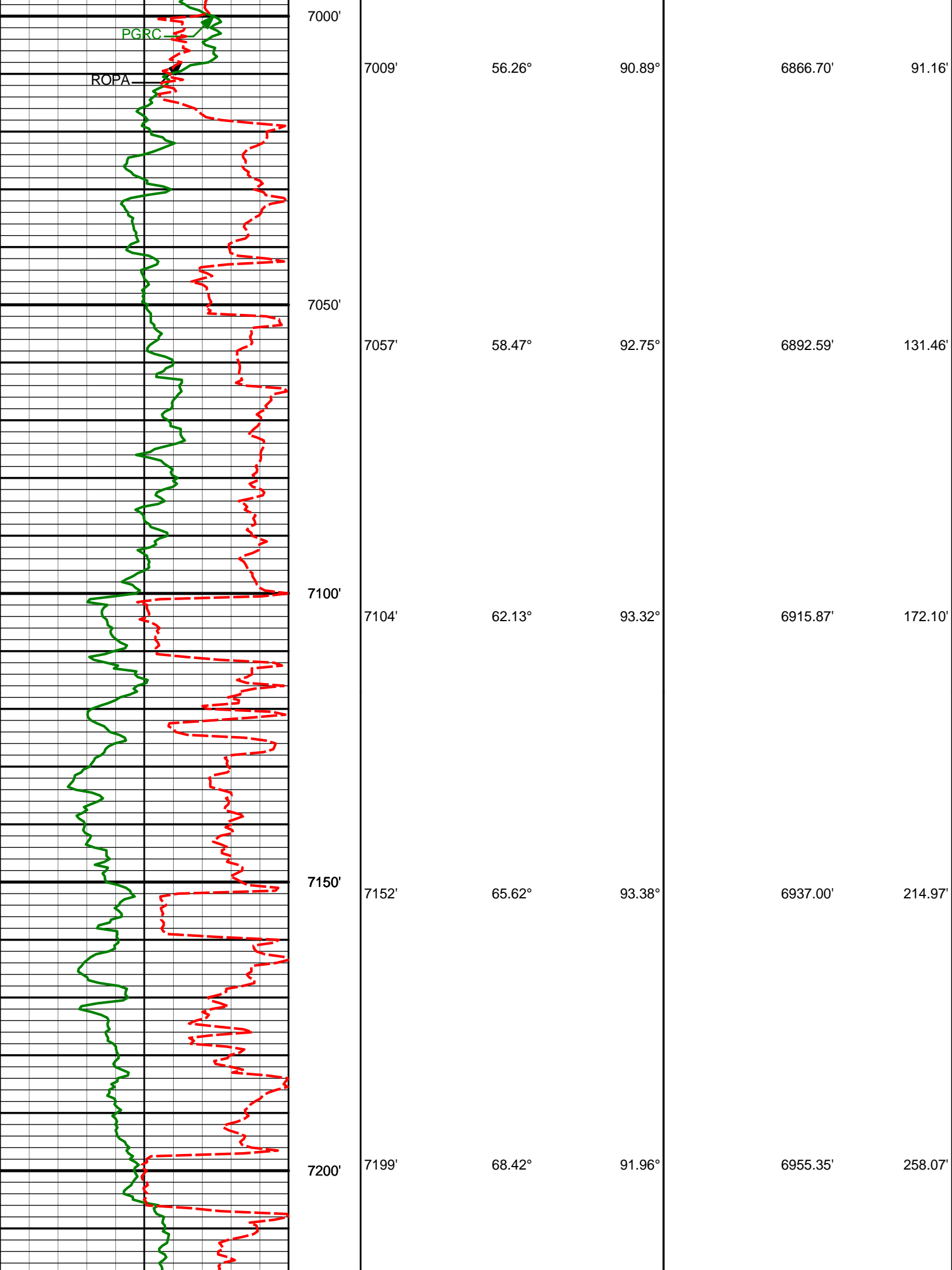
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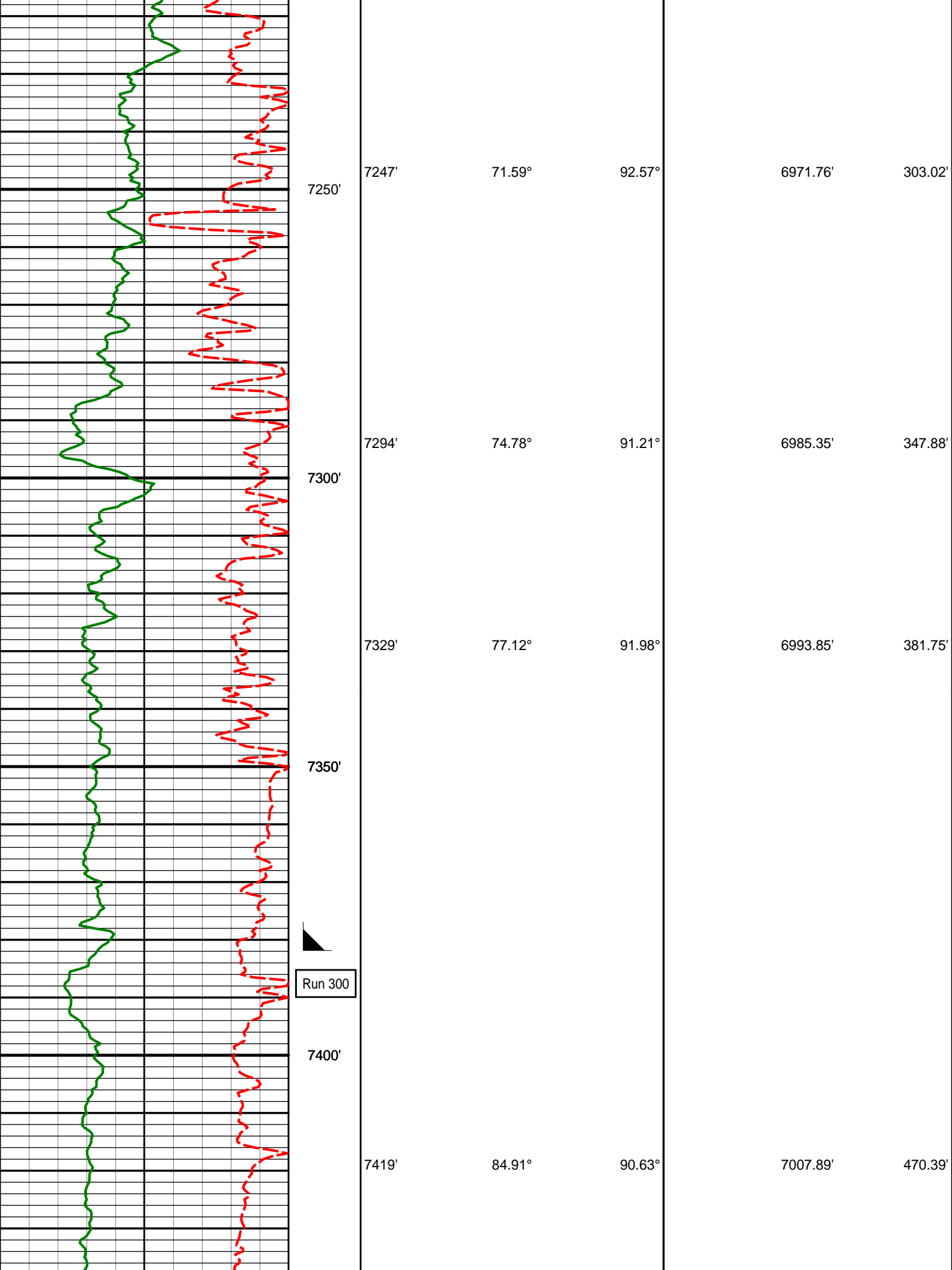


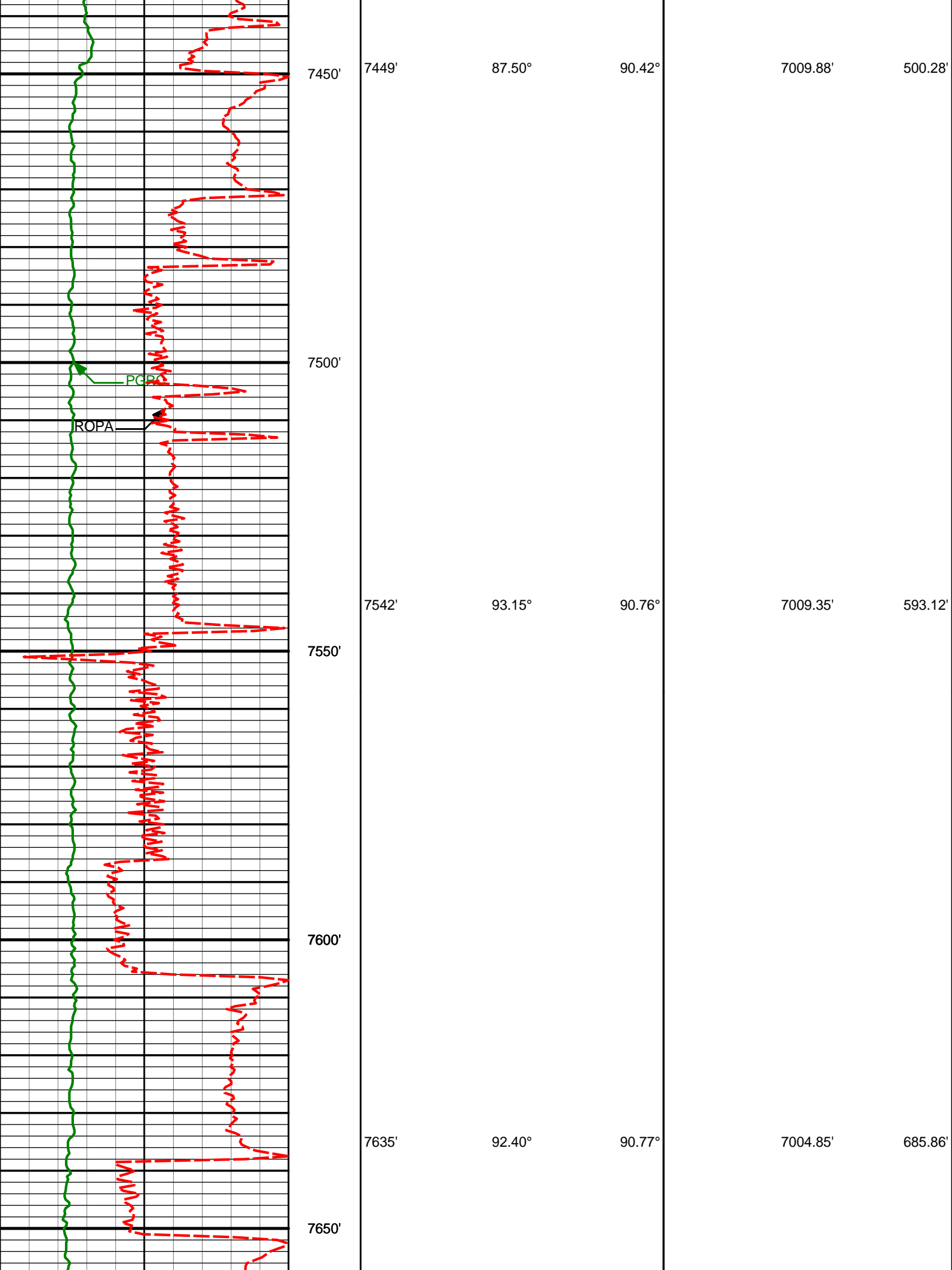


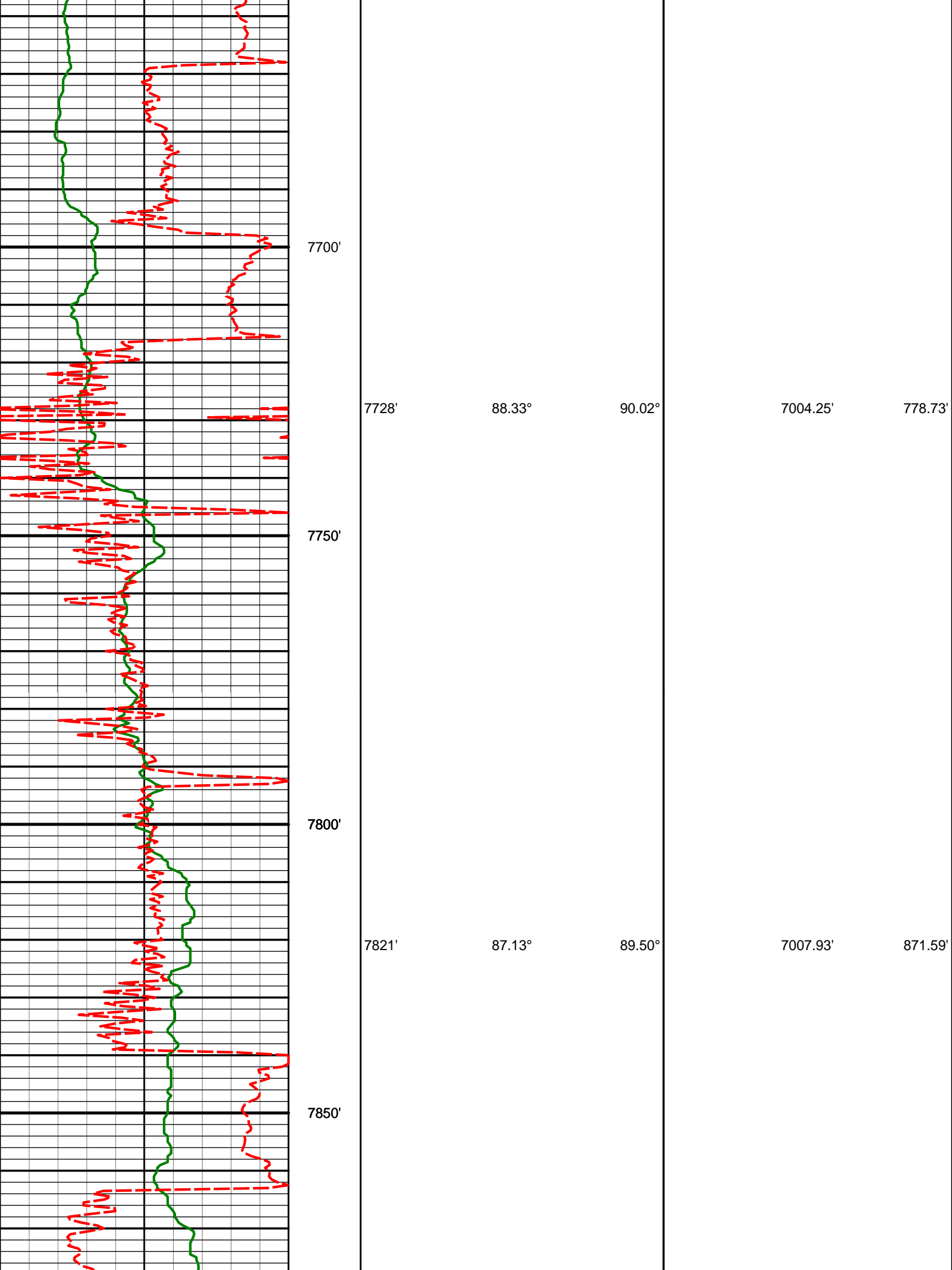


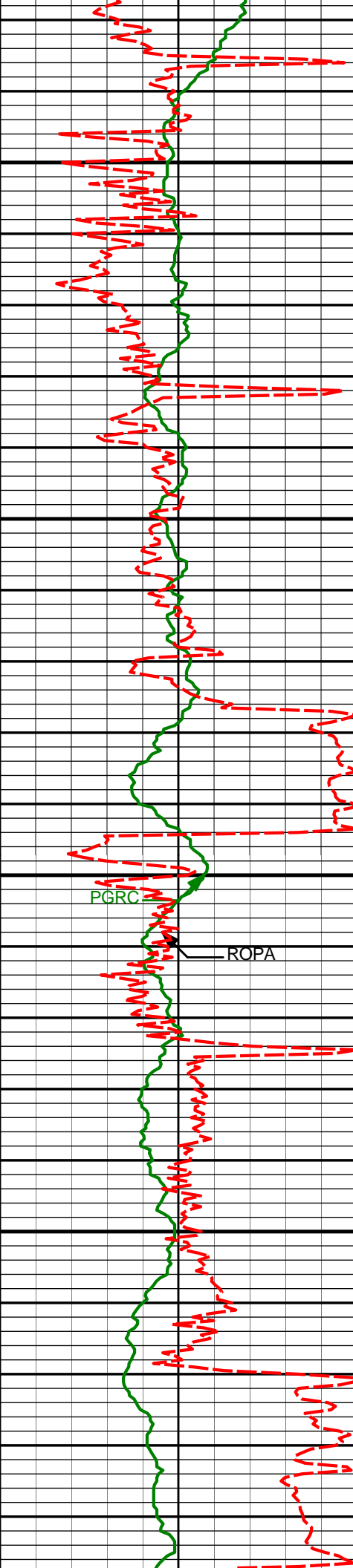












7900'

7914'

88.43°

89.47°

7011.53'

964.47'

7950'

8000'

8007'

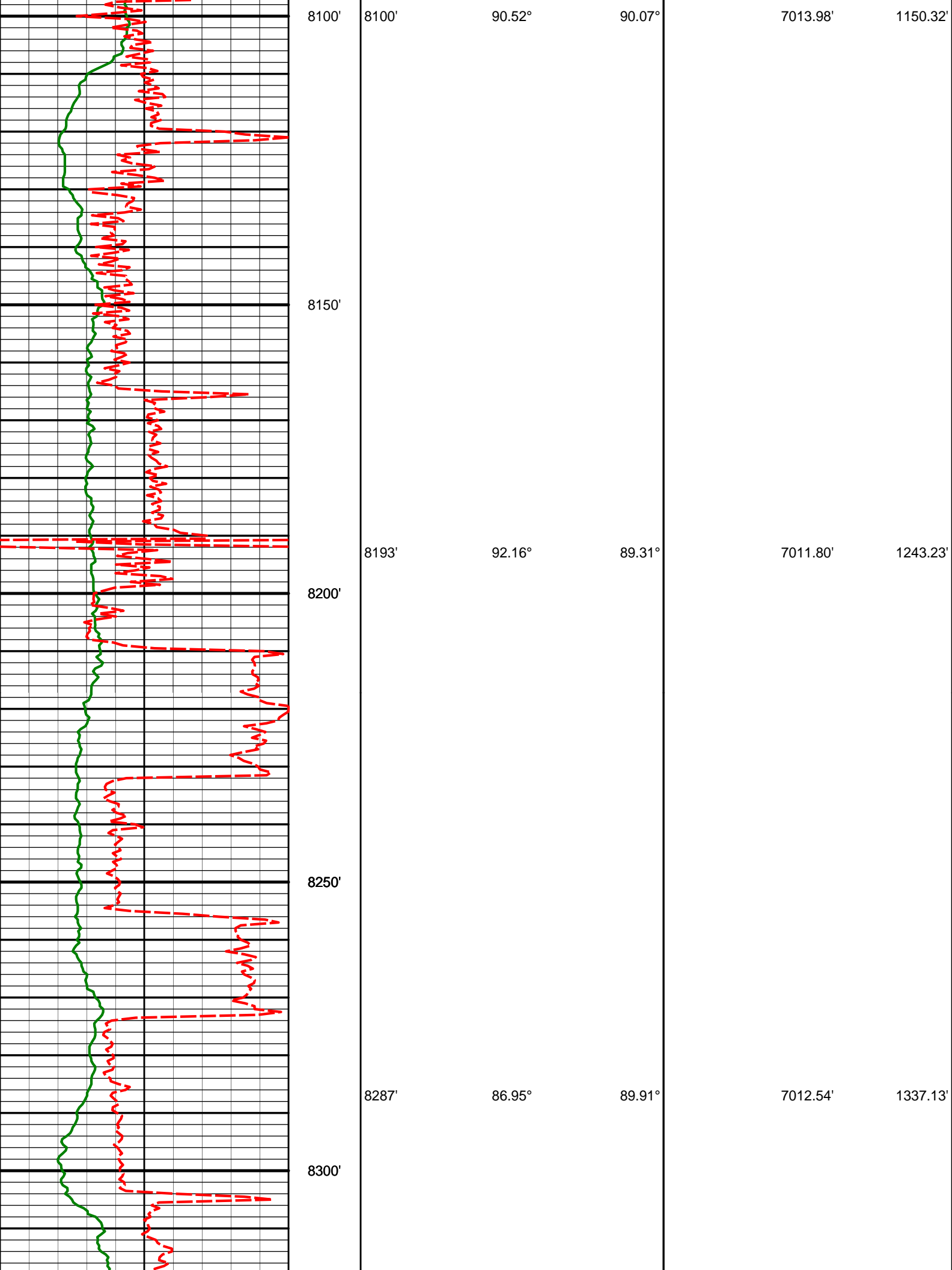
89.01°

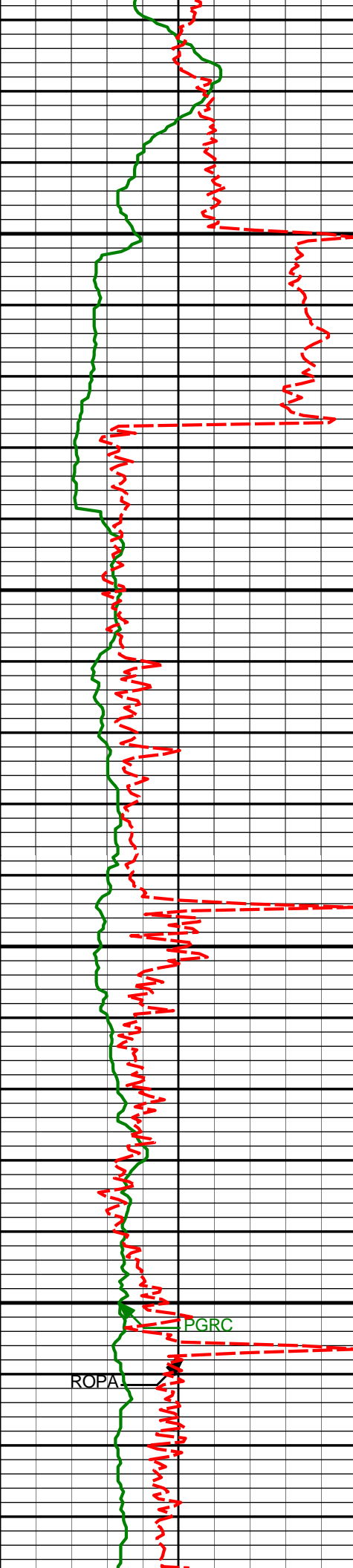
89.69°

7013.60'

1057.39'

8050'





8350'

8380'

89.01°

90.75°

7015.81'

1429.96'

8400'

8450'

8473'

88.34°

89.62°

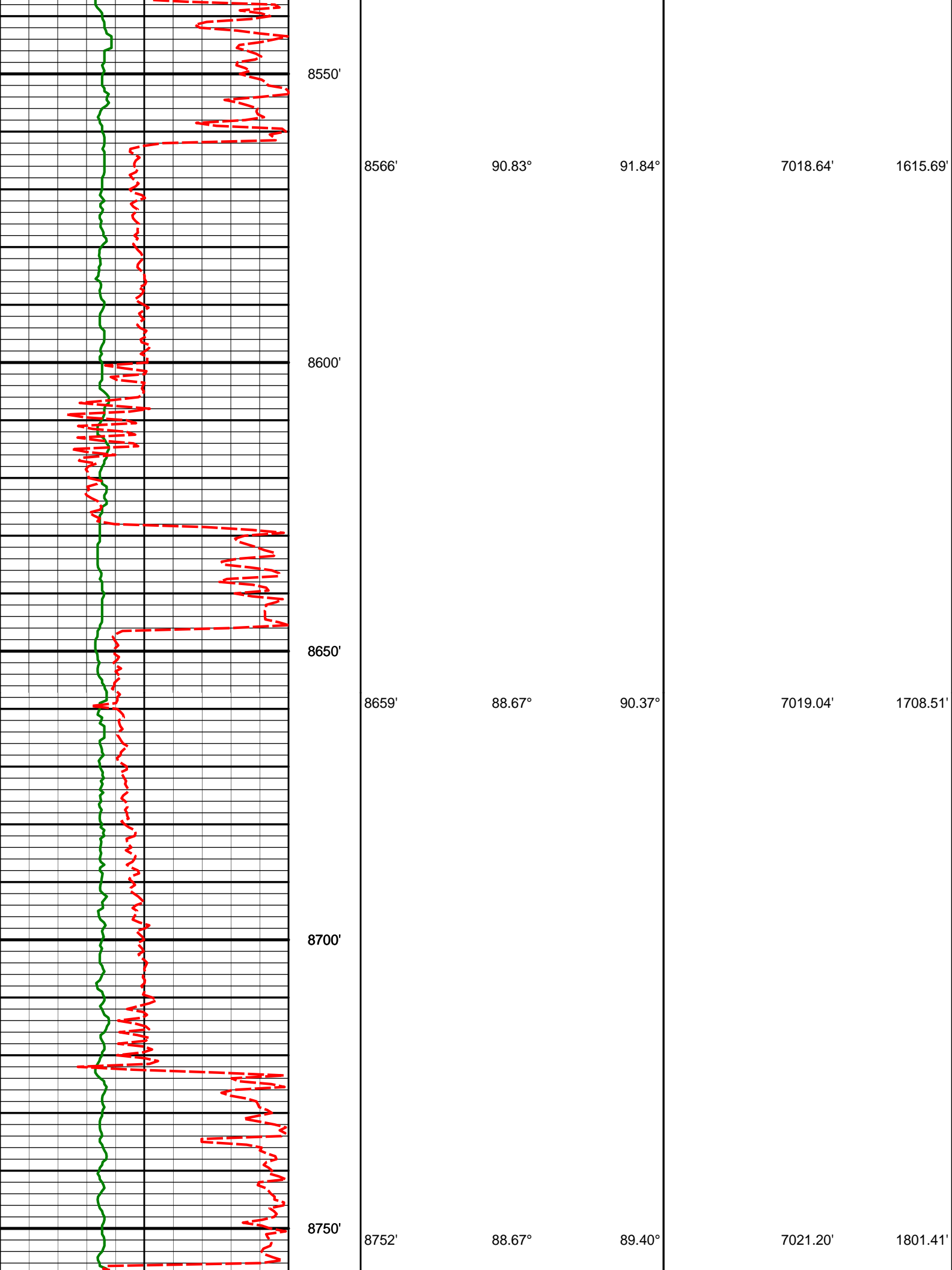
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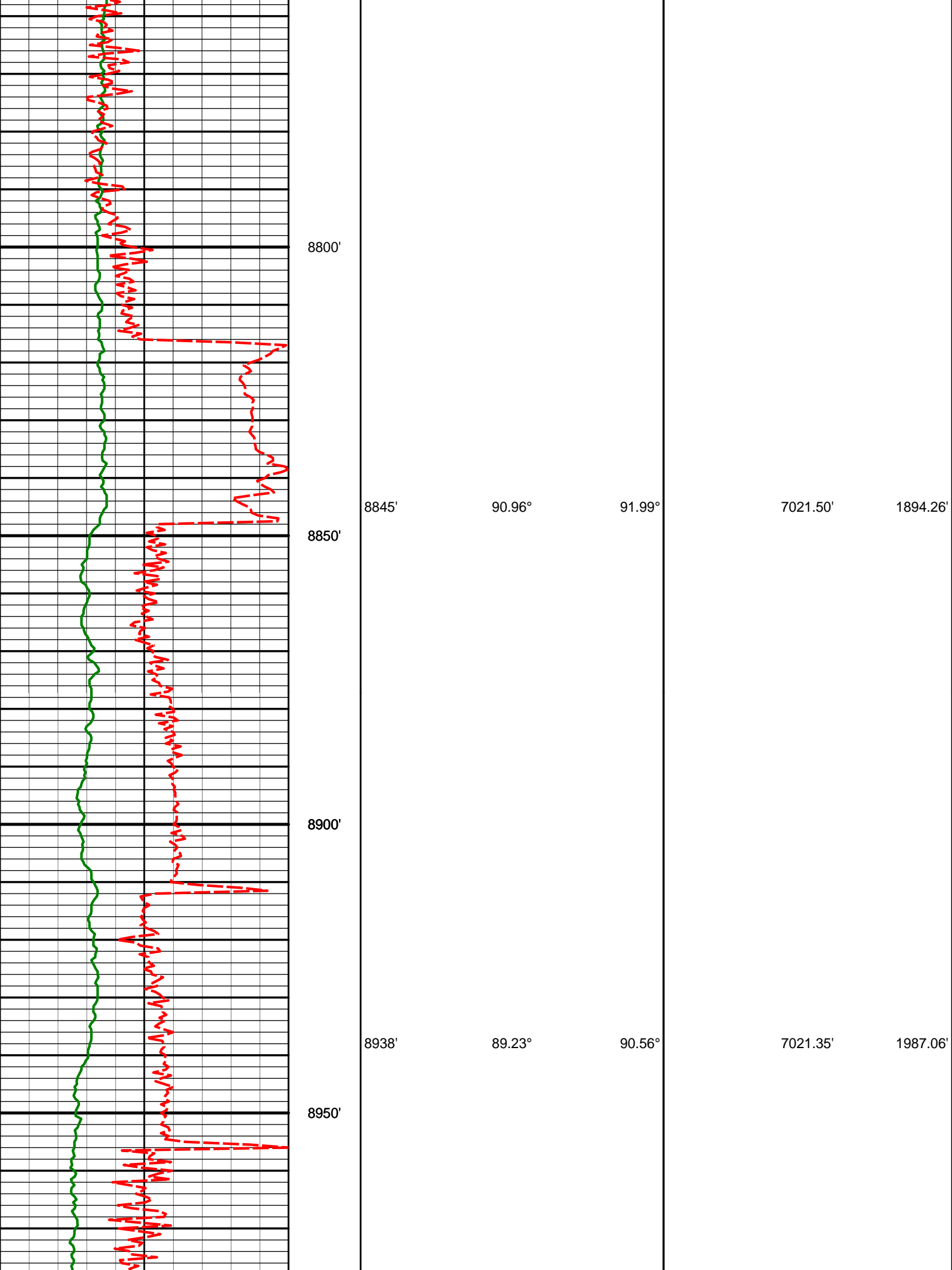
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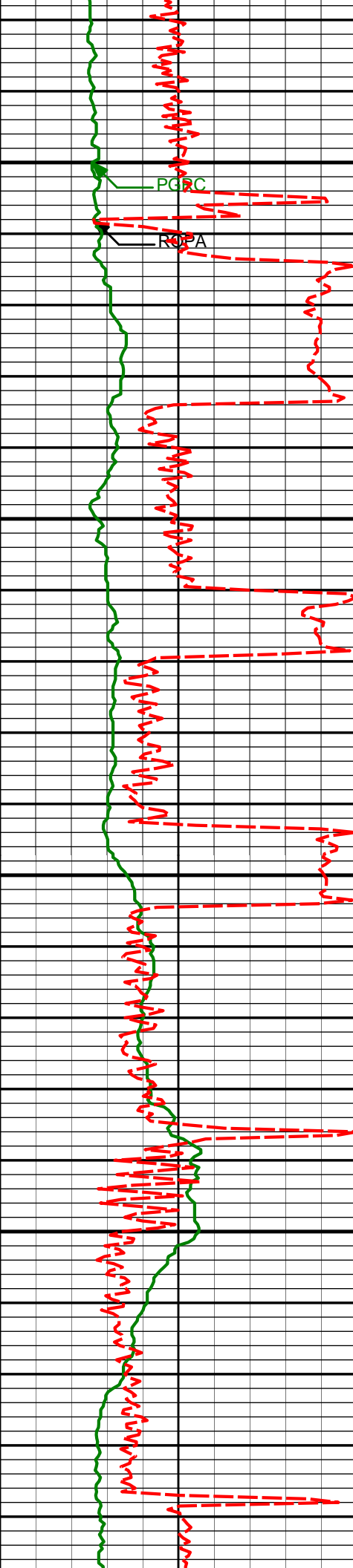
8500'

PGRC

ROPA







9000'

9031'

89.32°

90.47°

7022.52'

2079.94'

9050'

9100'

9124'

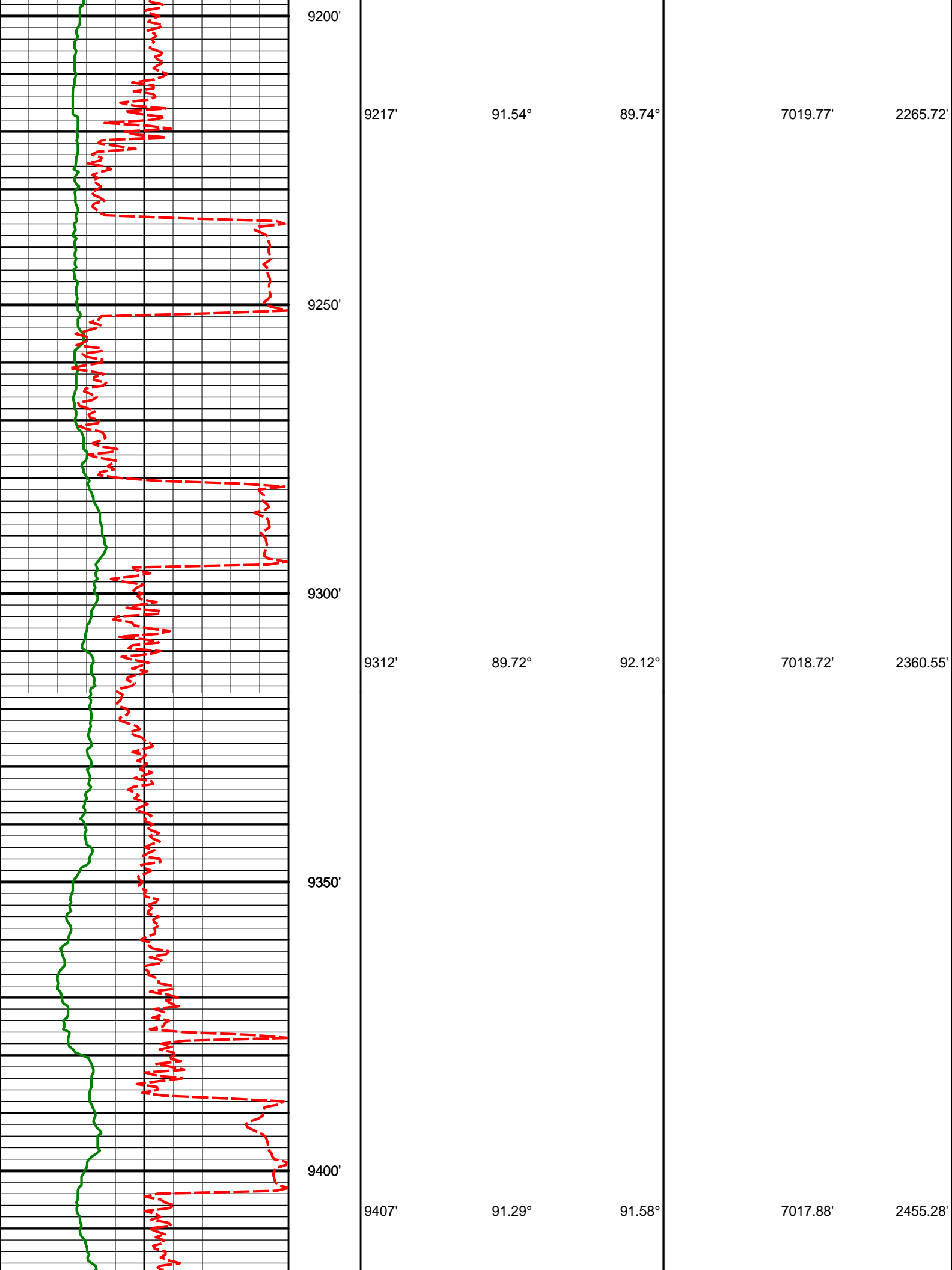
91.27°

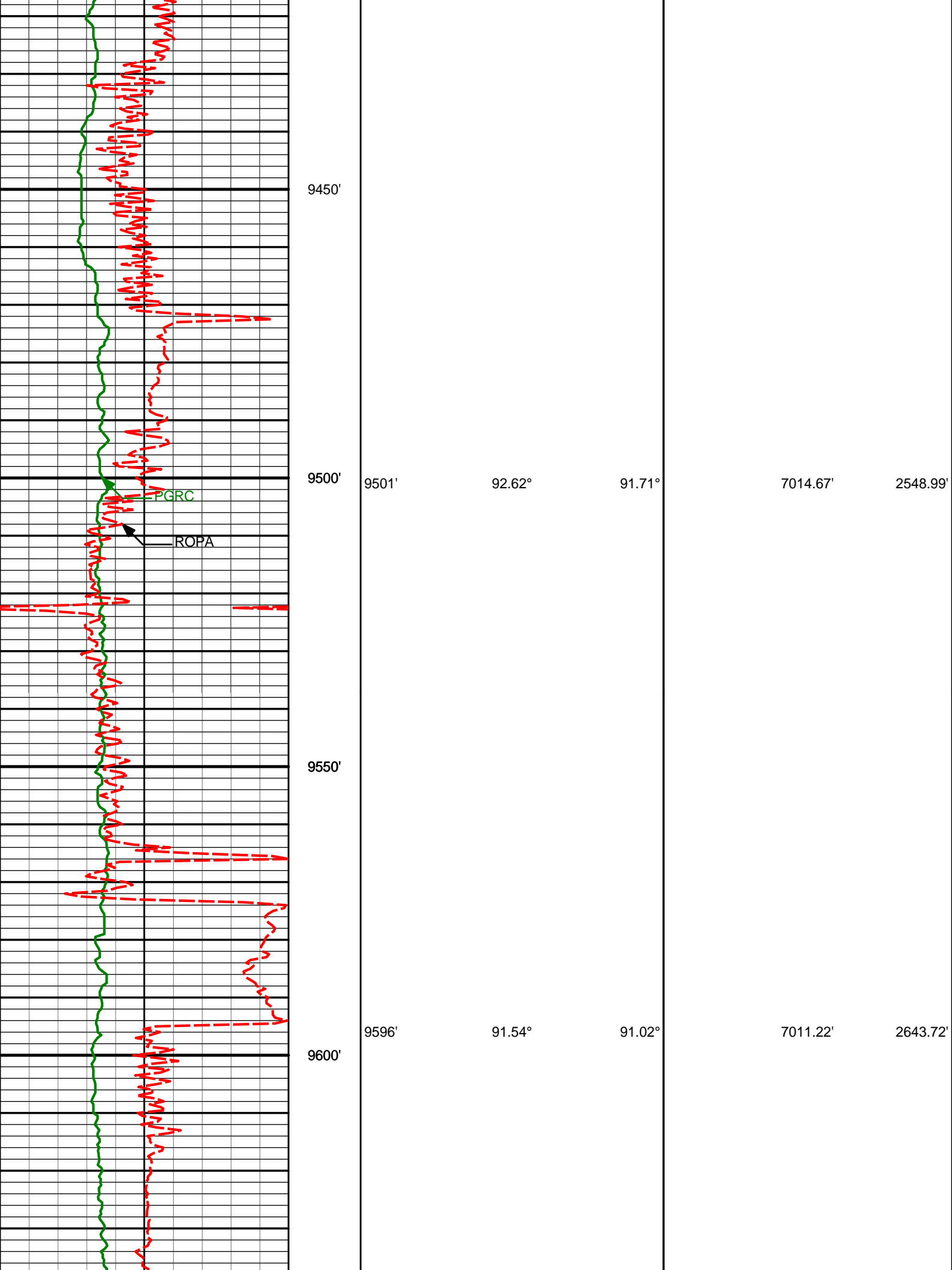
90.10°

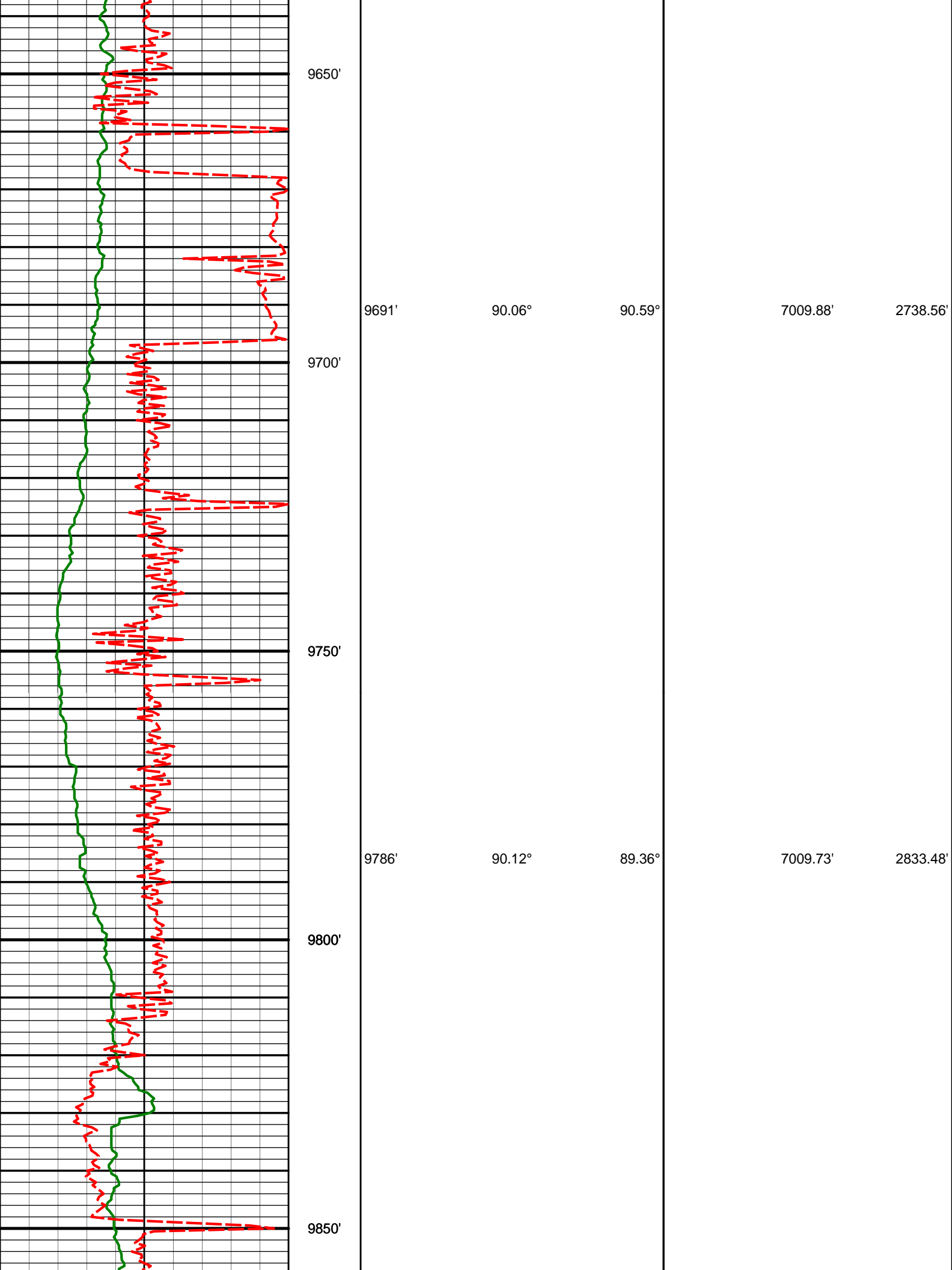
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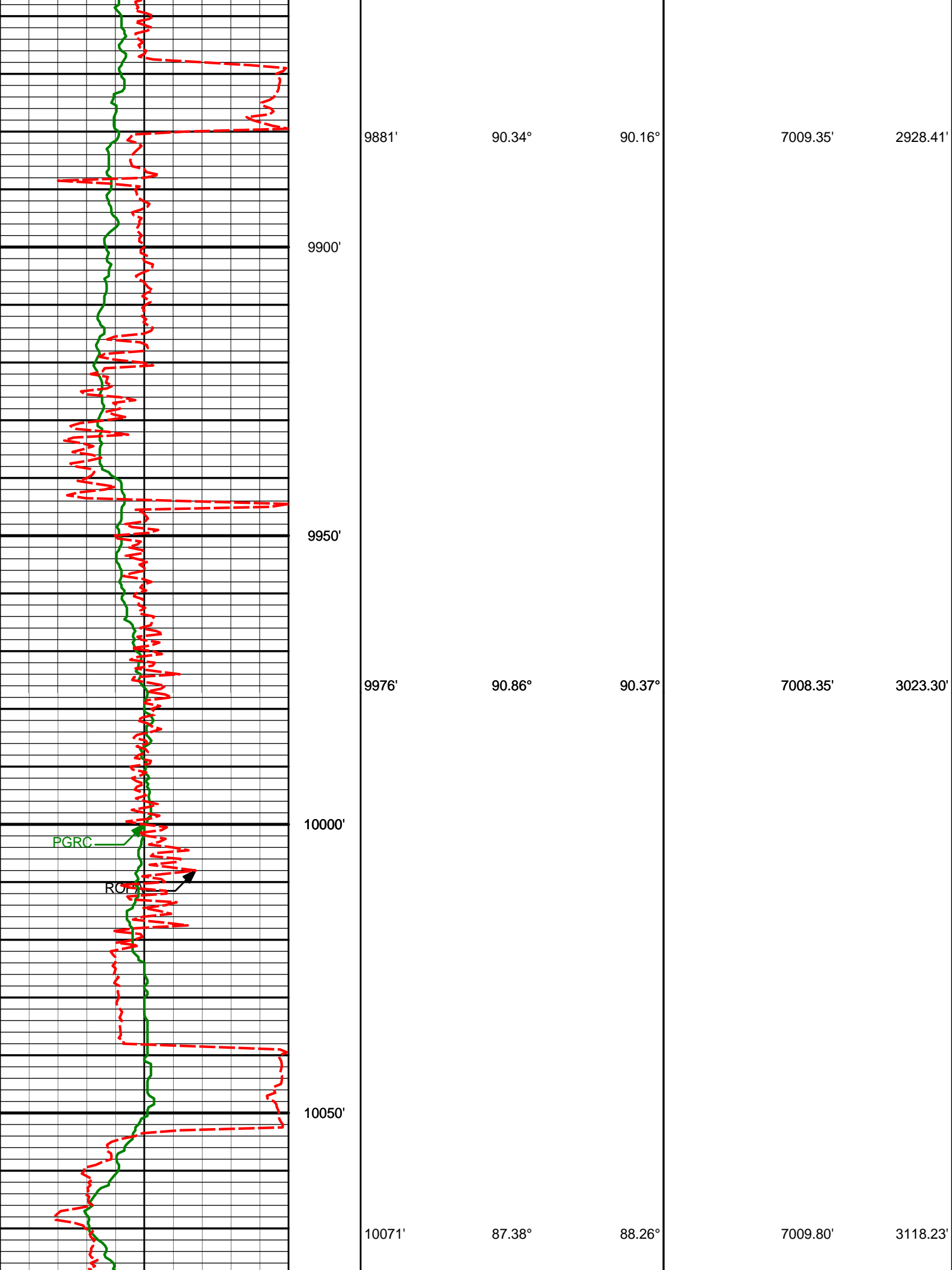
2172.83'

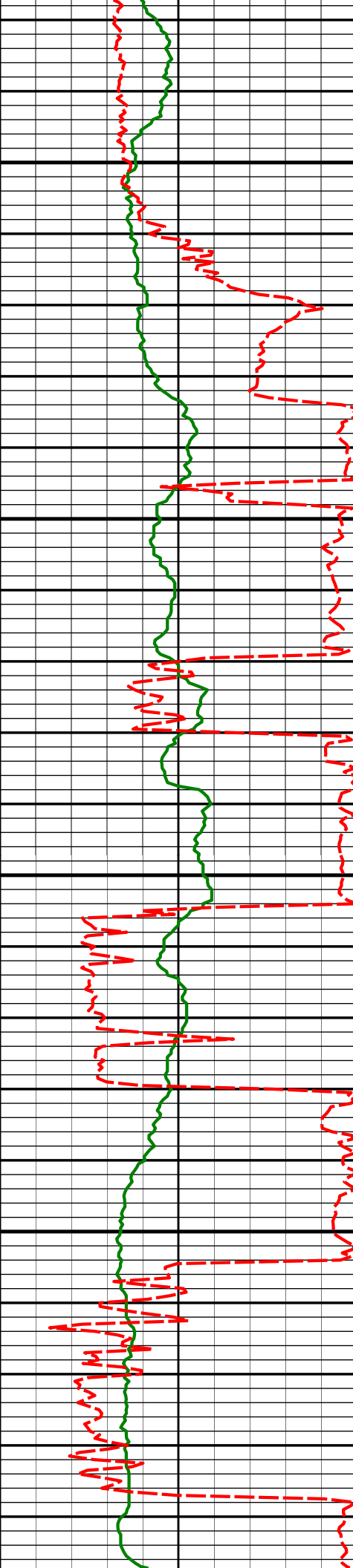
9150'











10100'

10150'

10200'

10250'

10166'

87.28°

89.80°

7014.23'

3213.10'

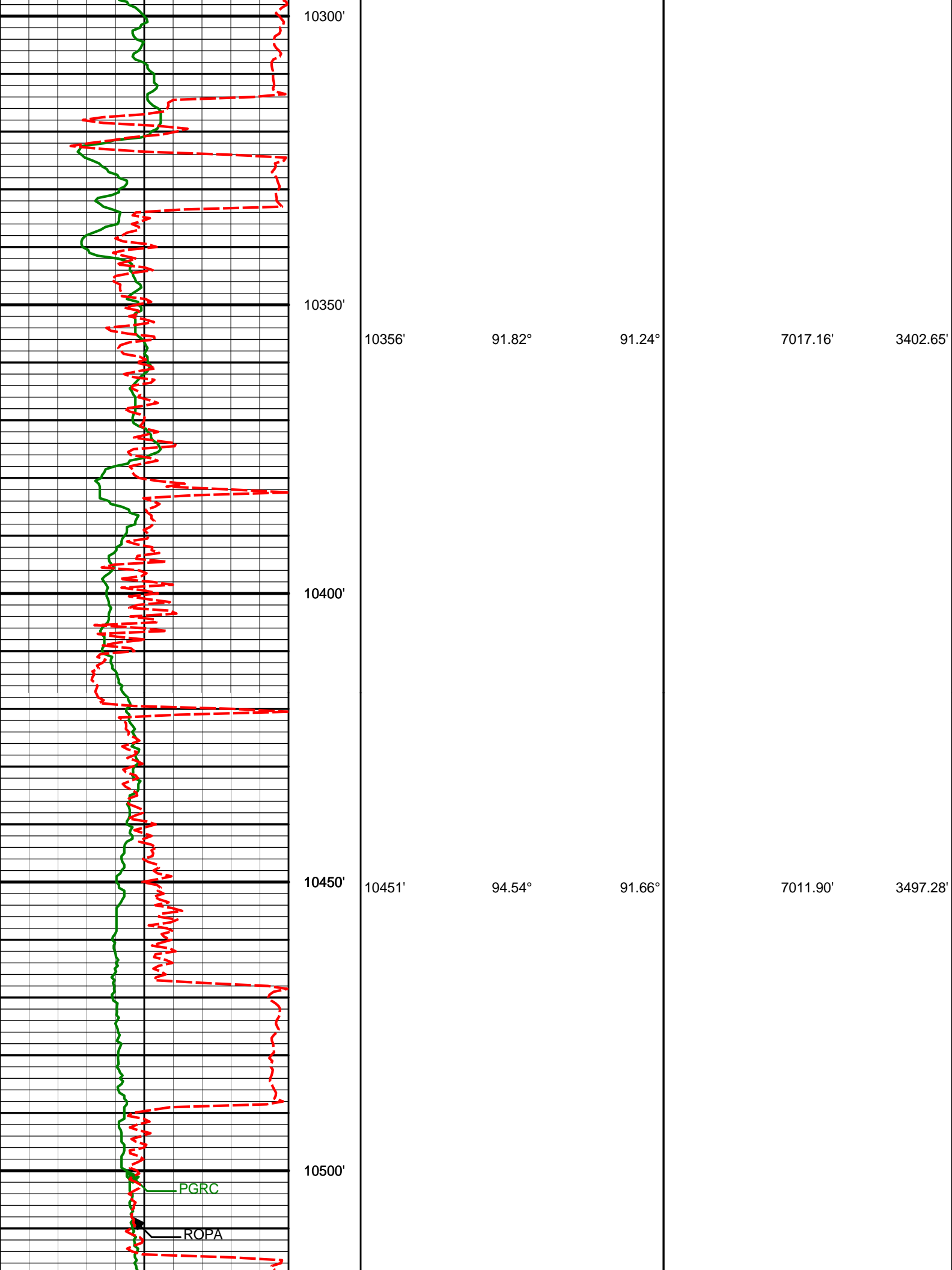
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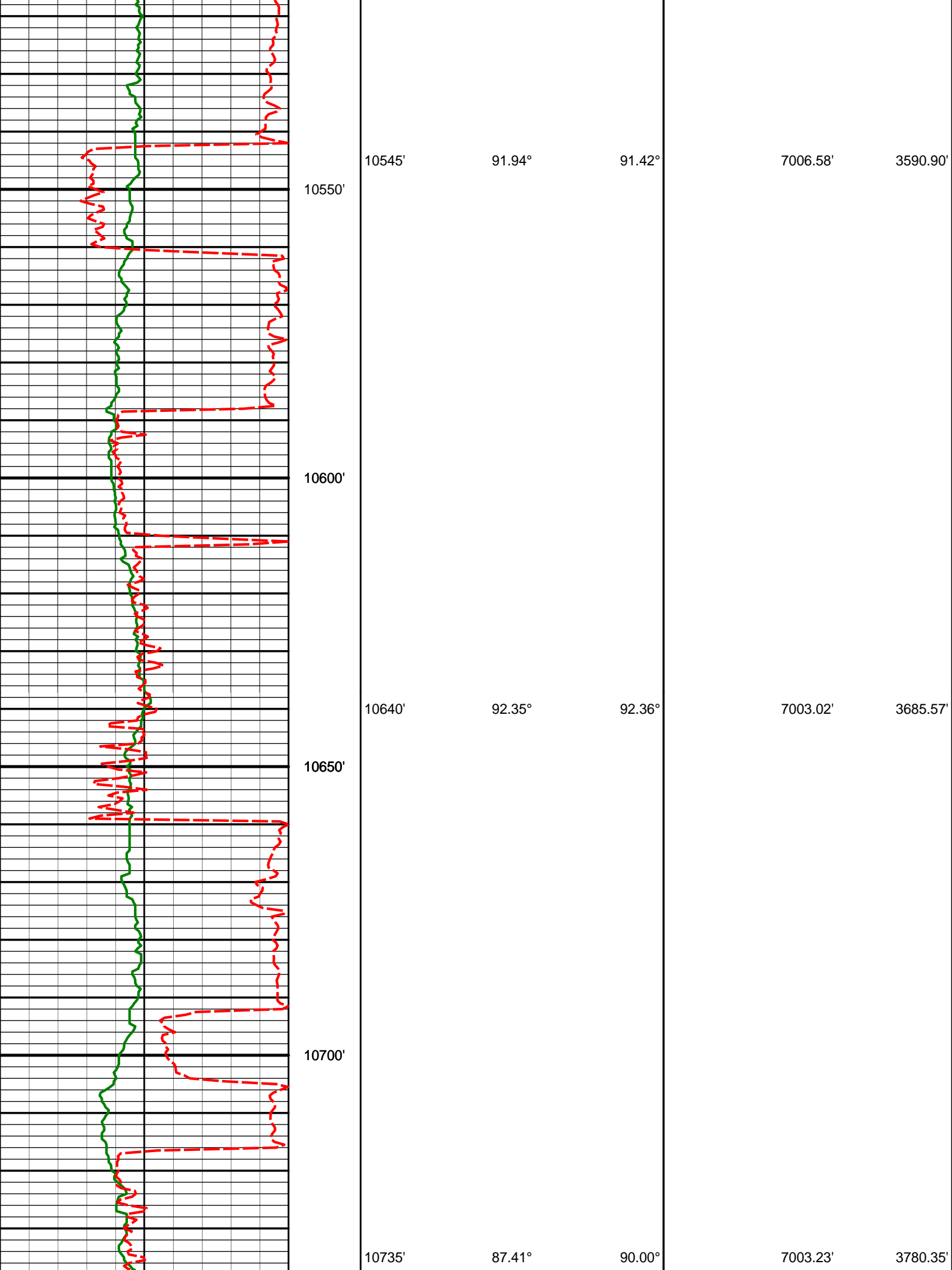
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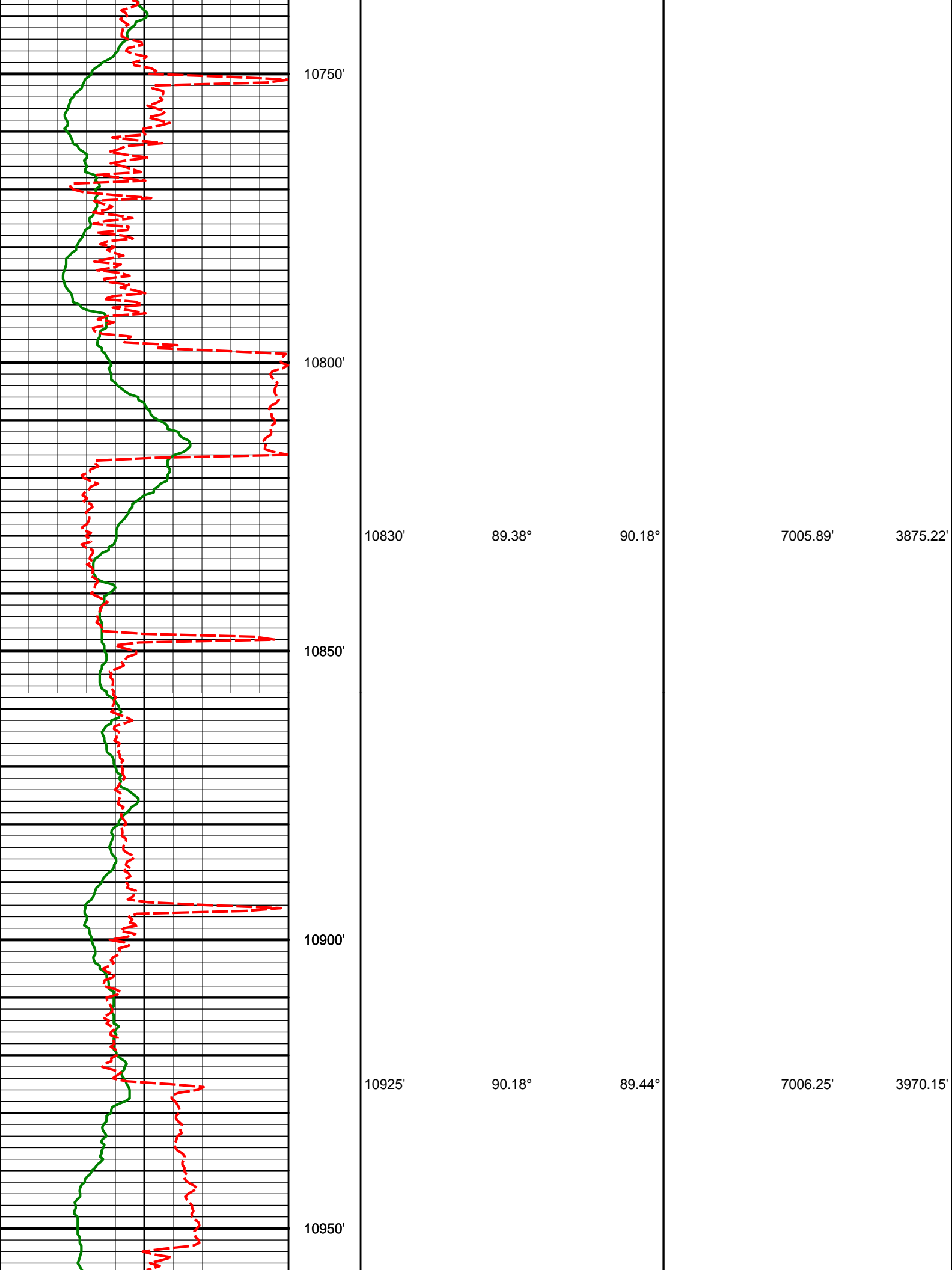
91.77°

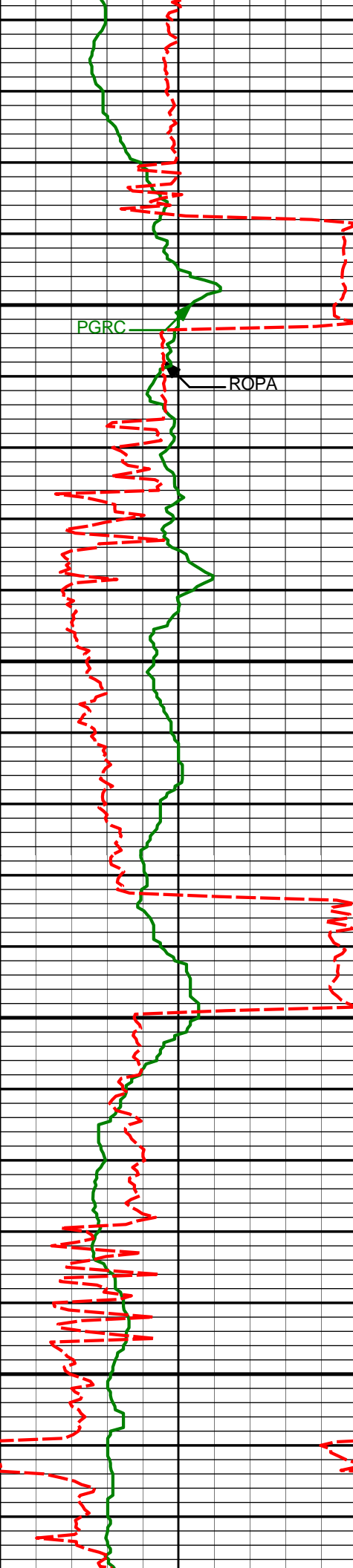
7017.57'

3307.88'









11000'

PGRC

ROPA

11020'

88.74°

89.77°

7007.14'

4065.08'

11050'

11100'

11116'

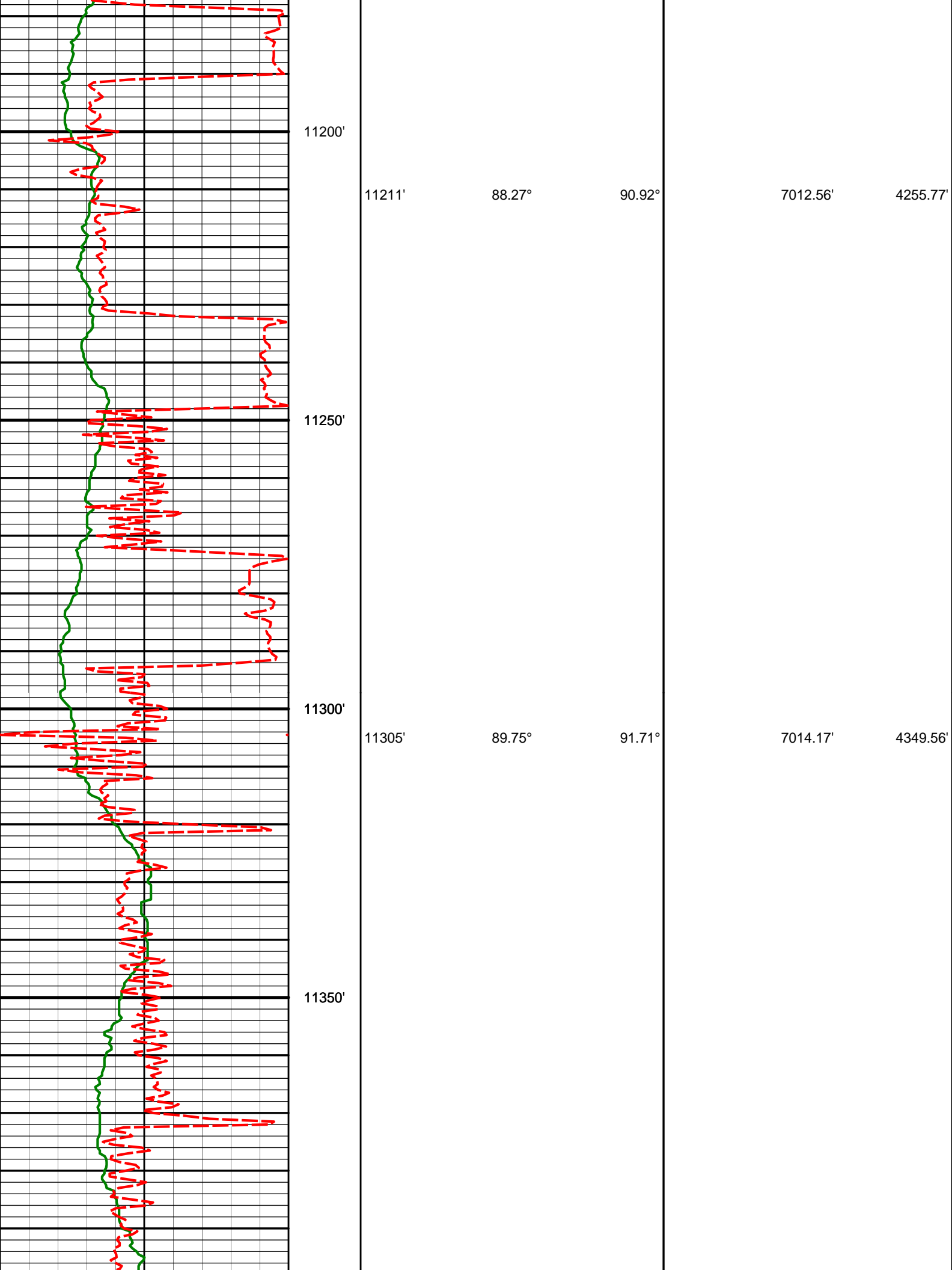
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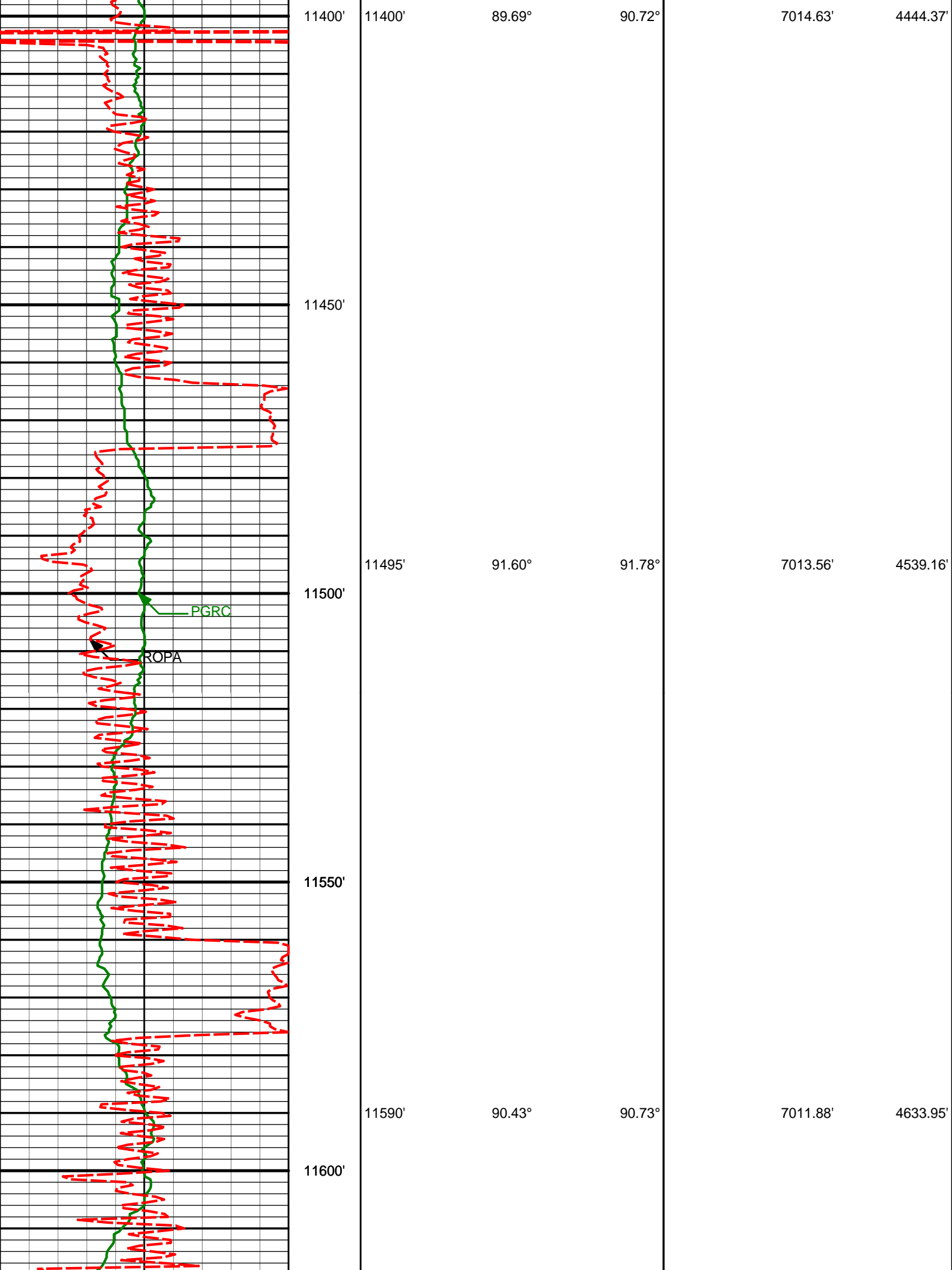
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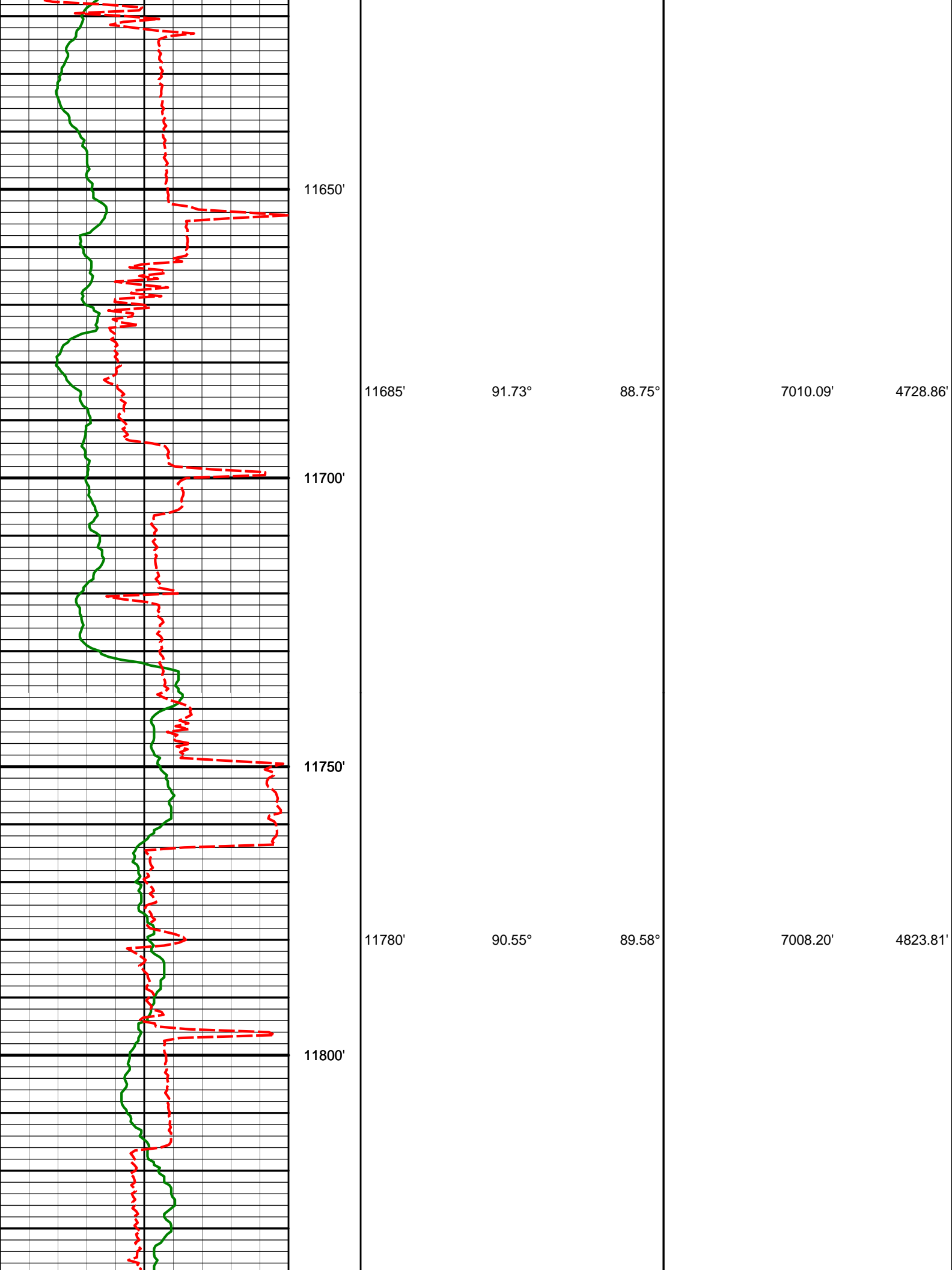
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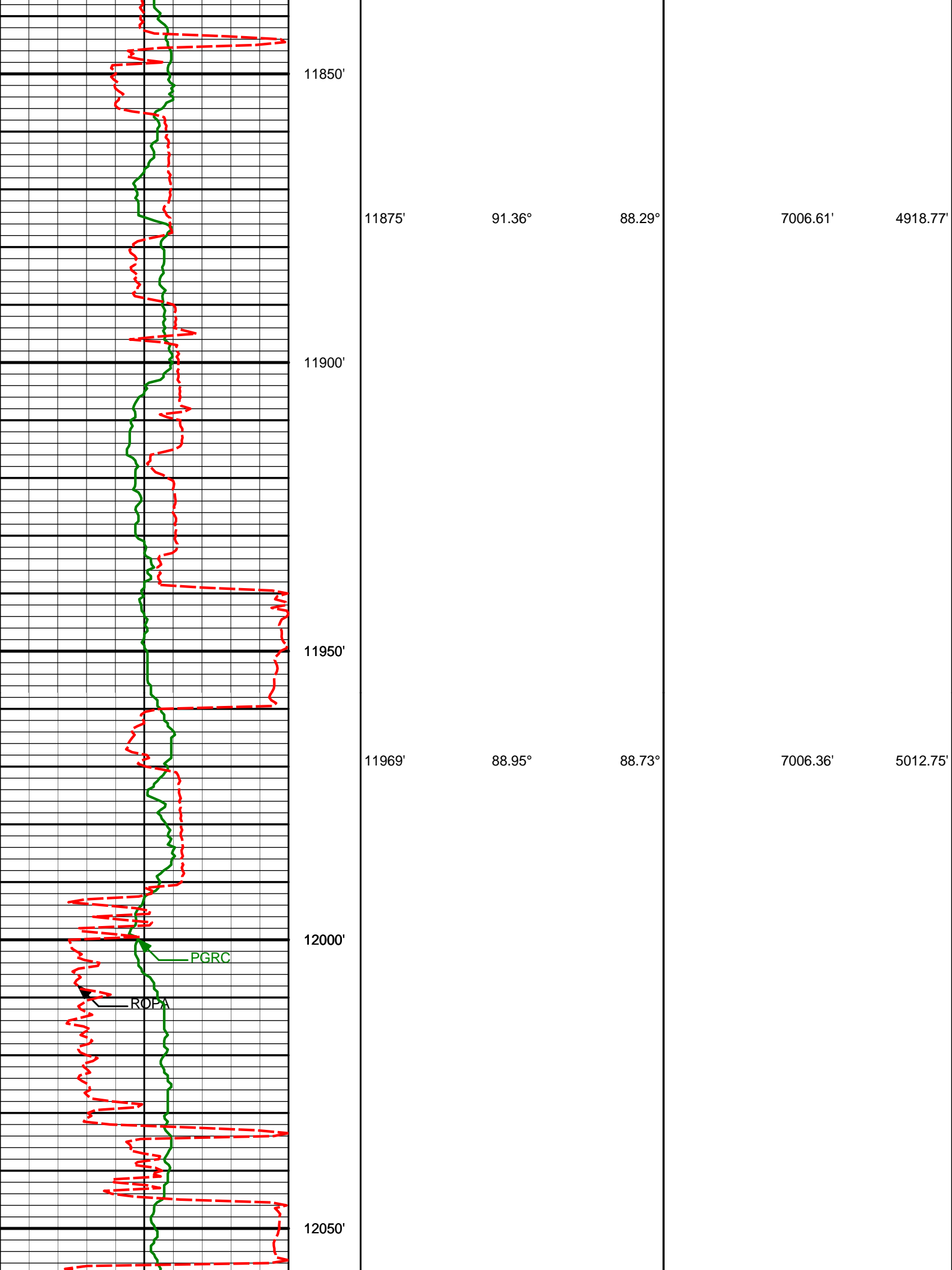
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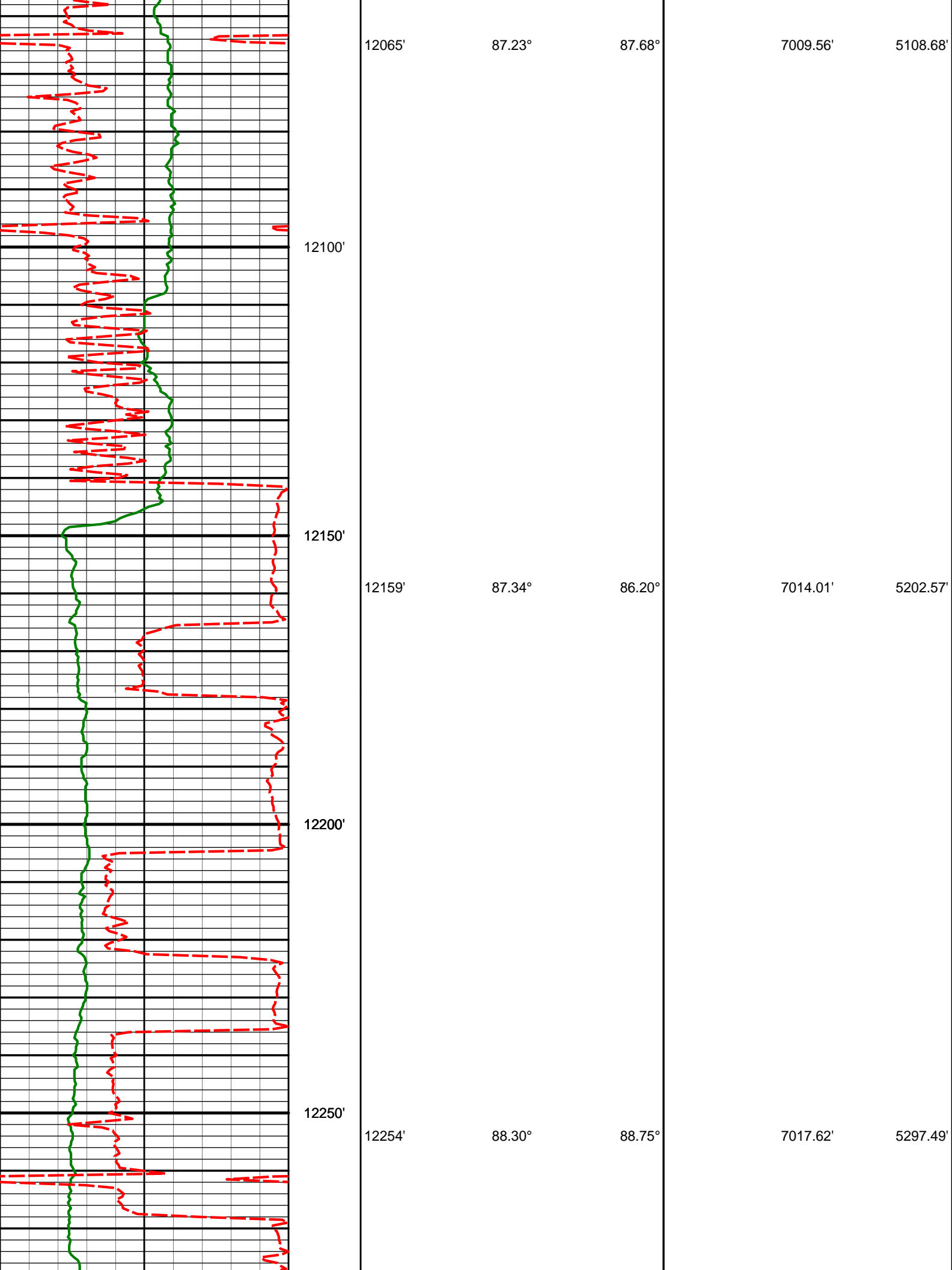
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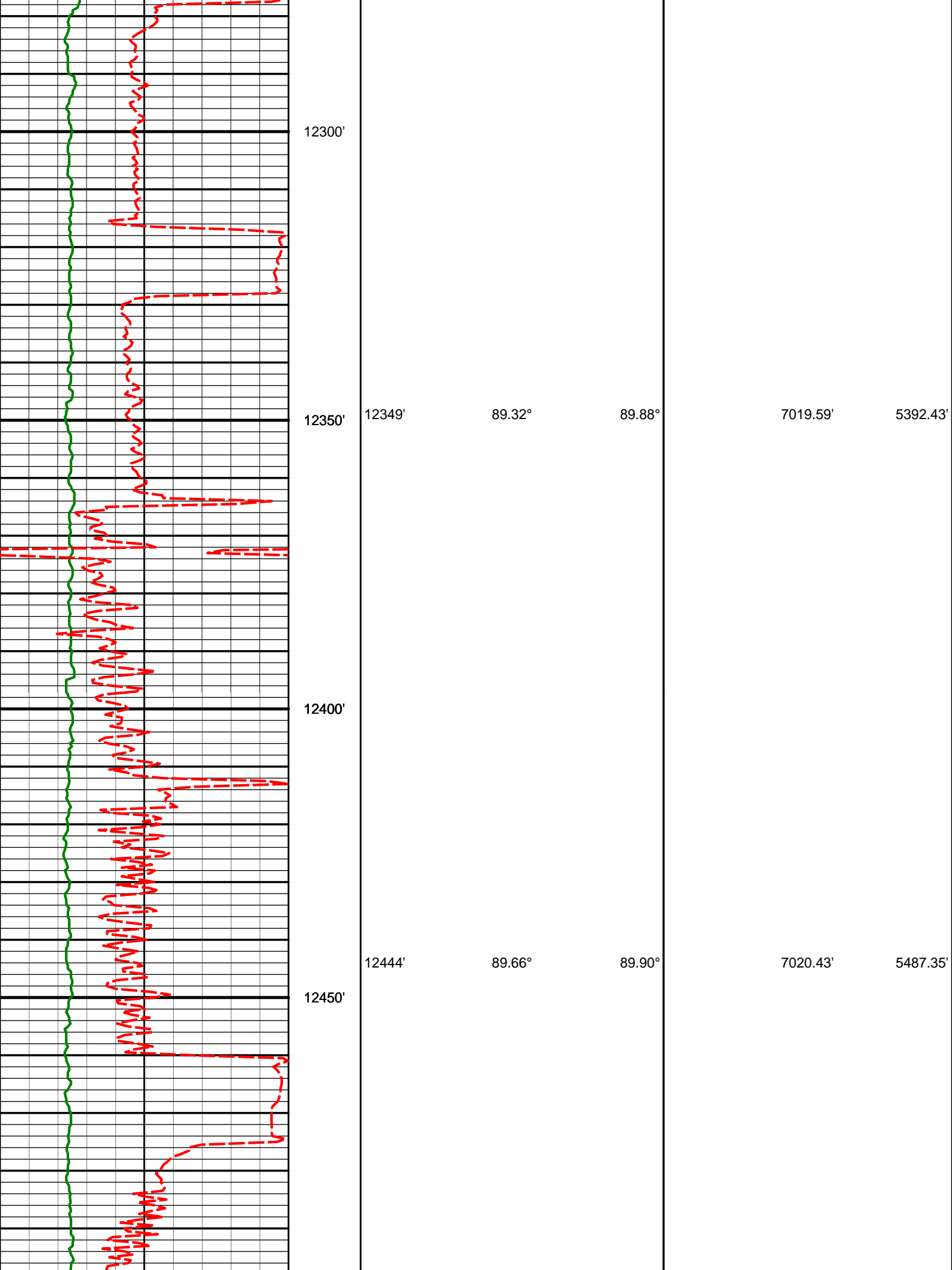


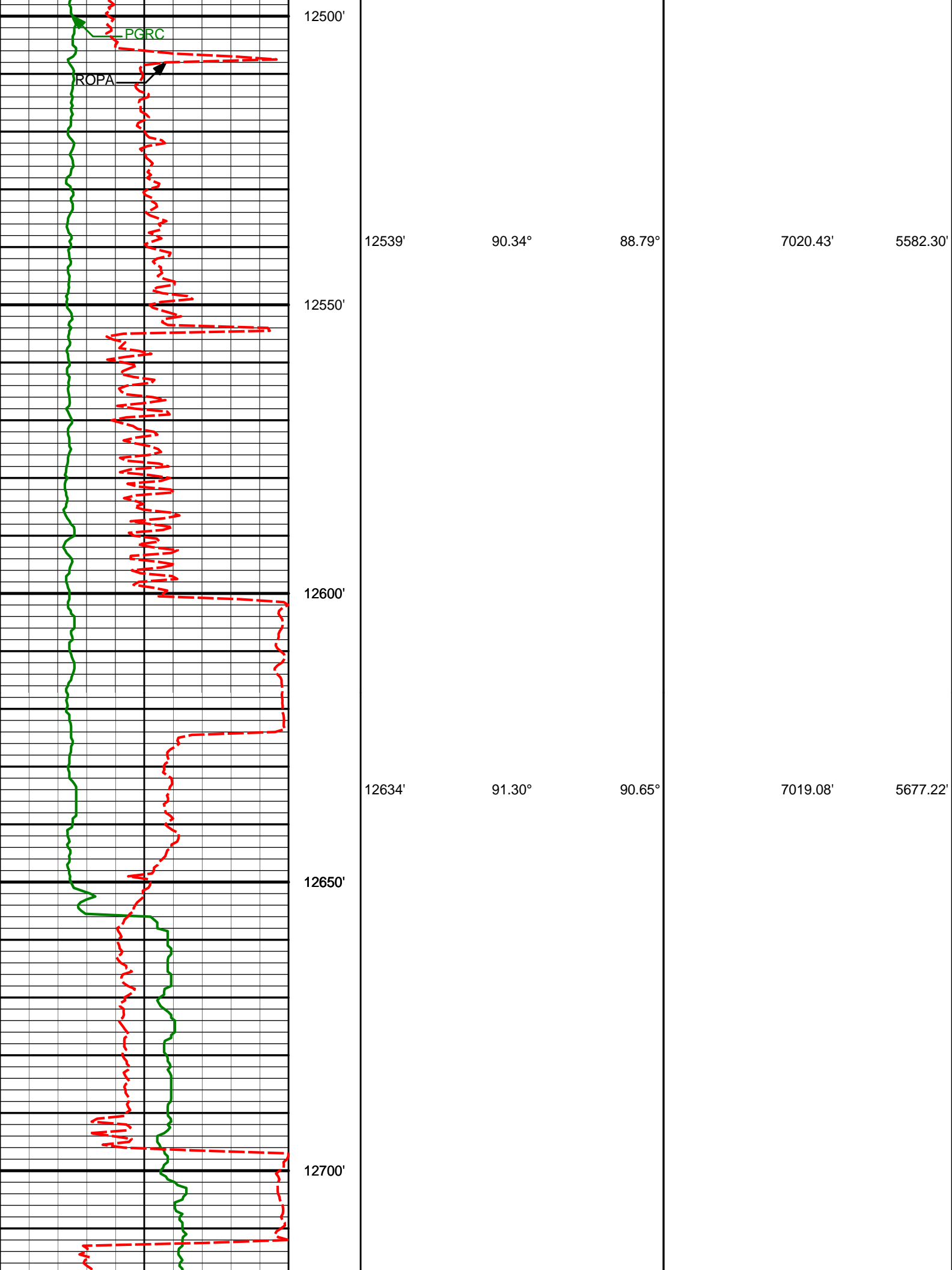


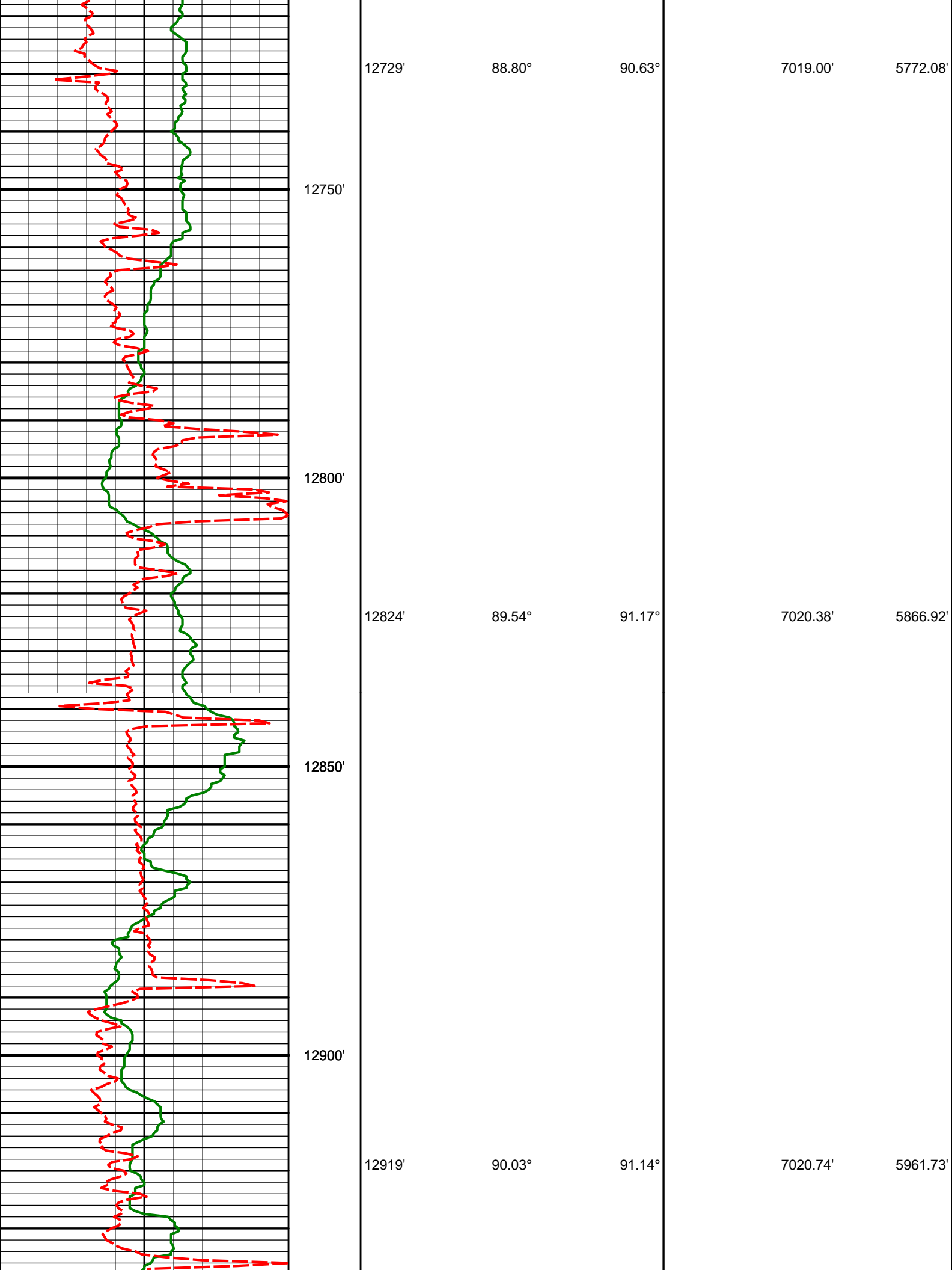


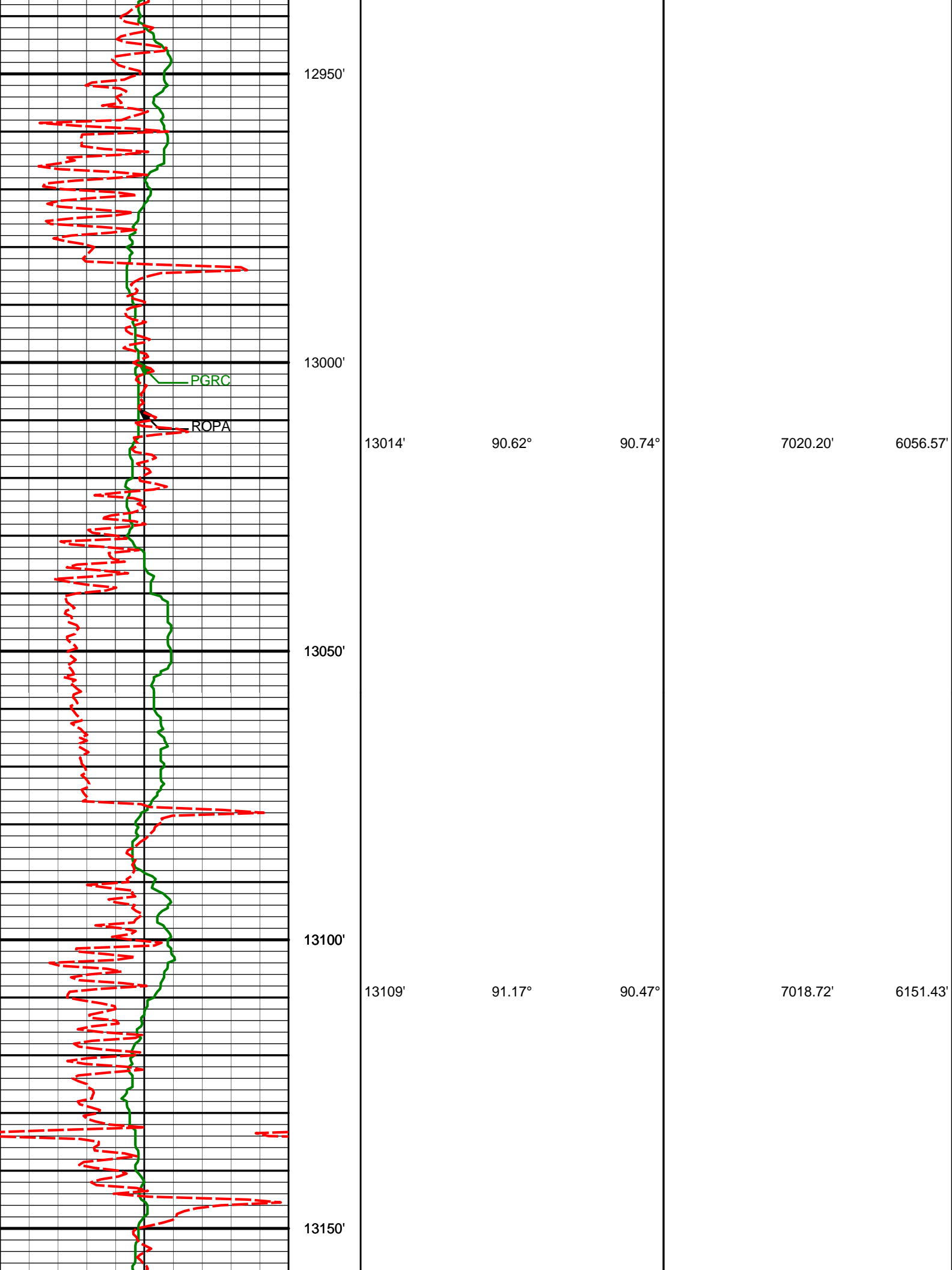


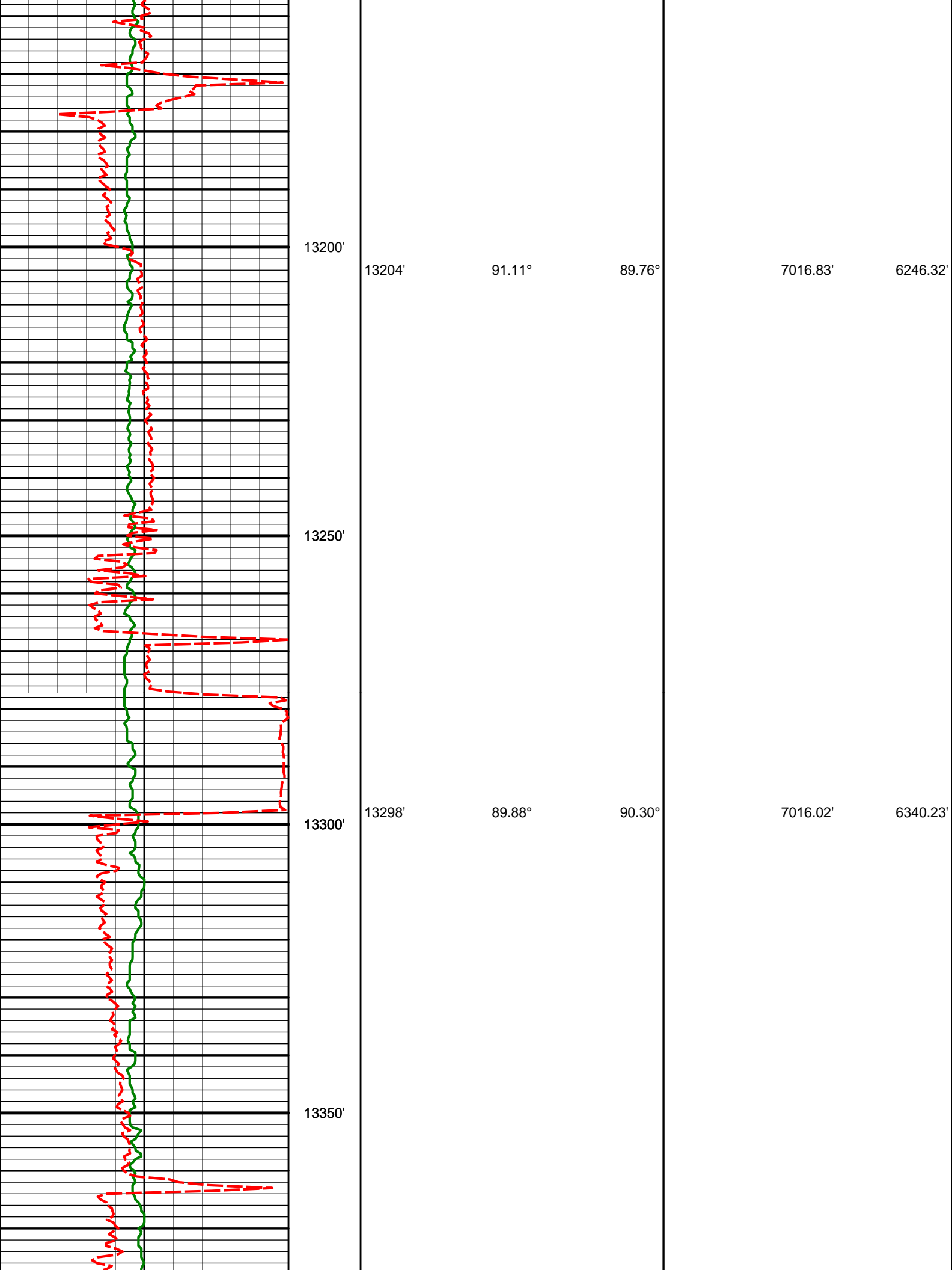


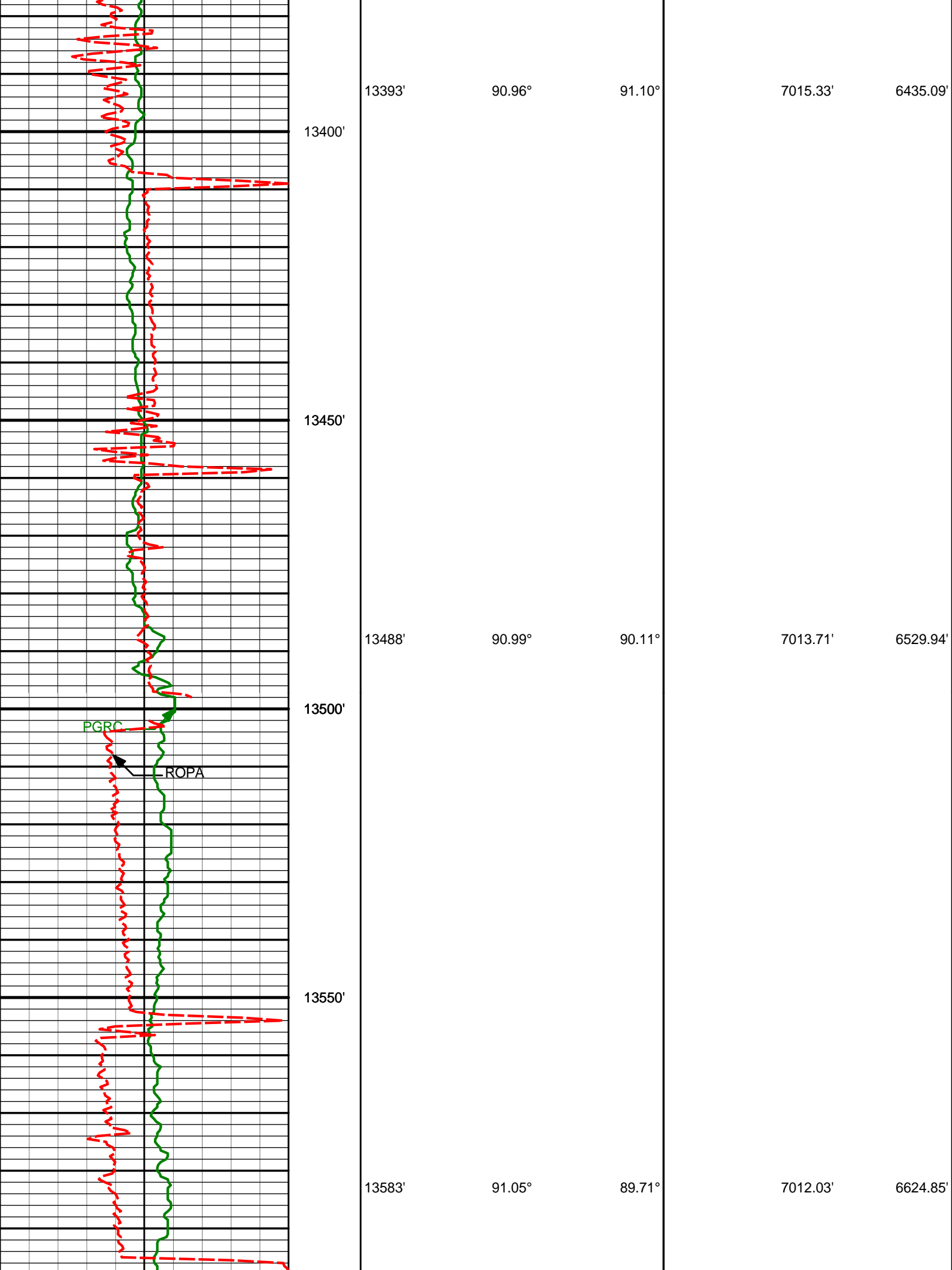


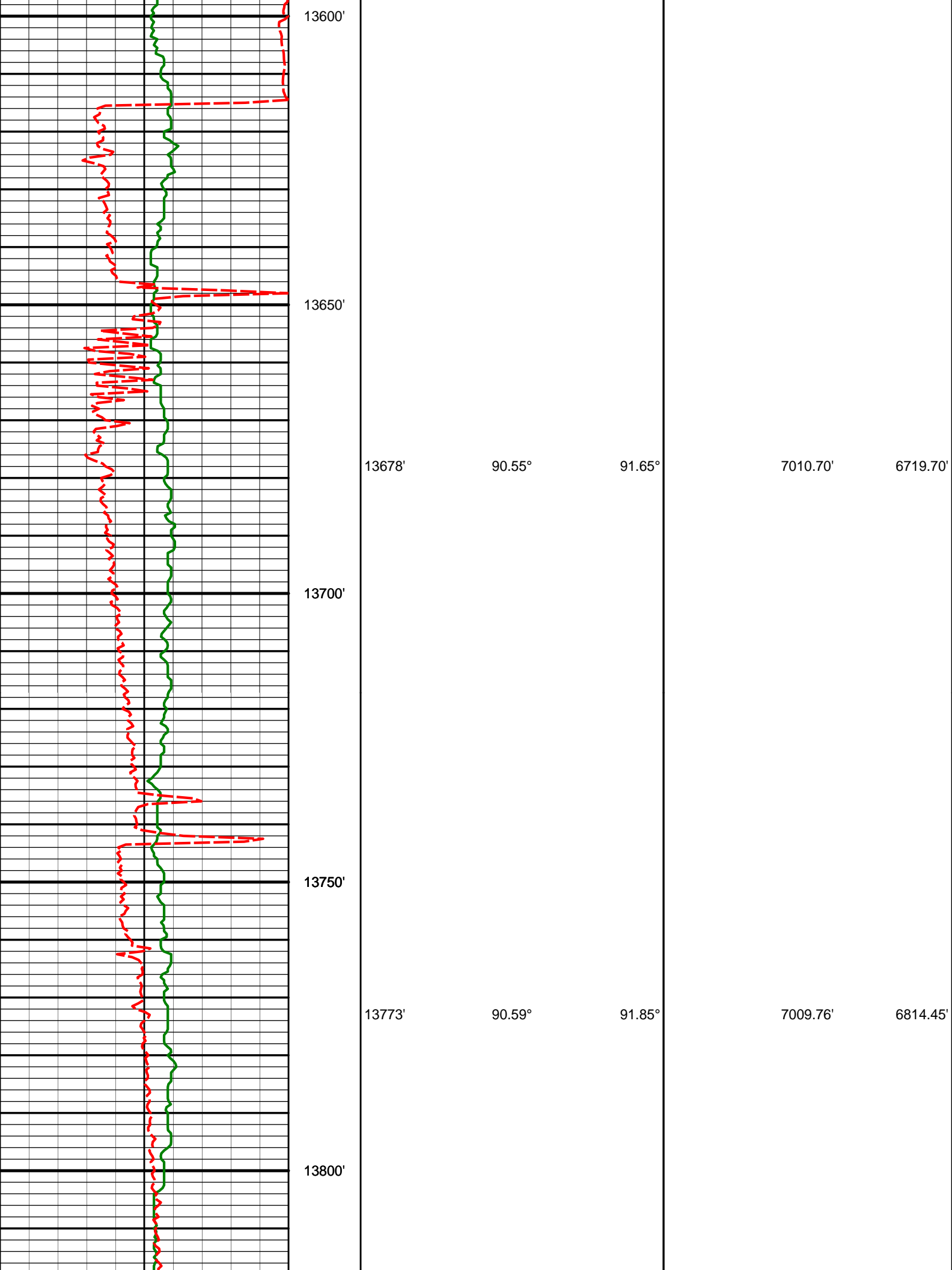


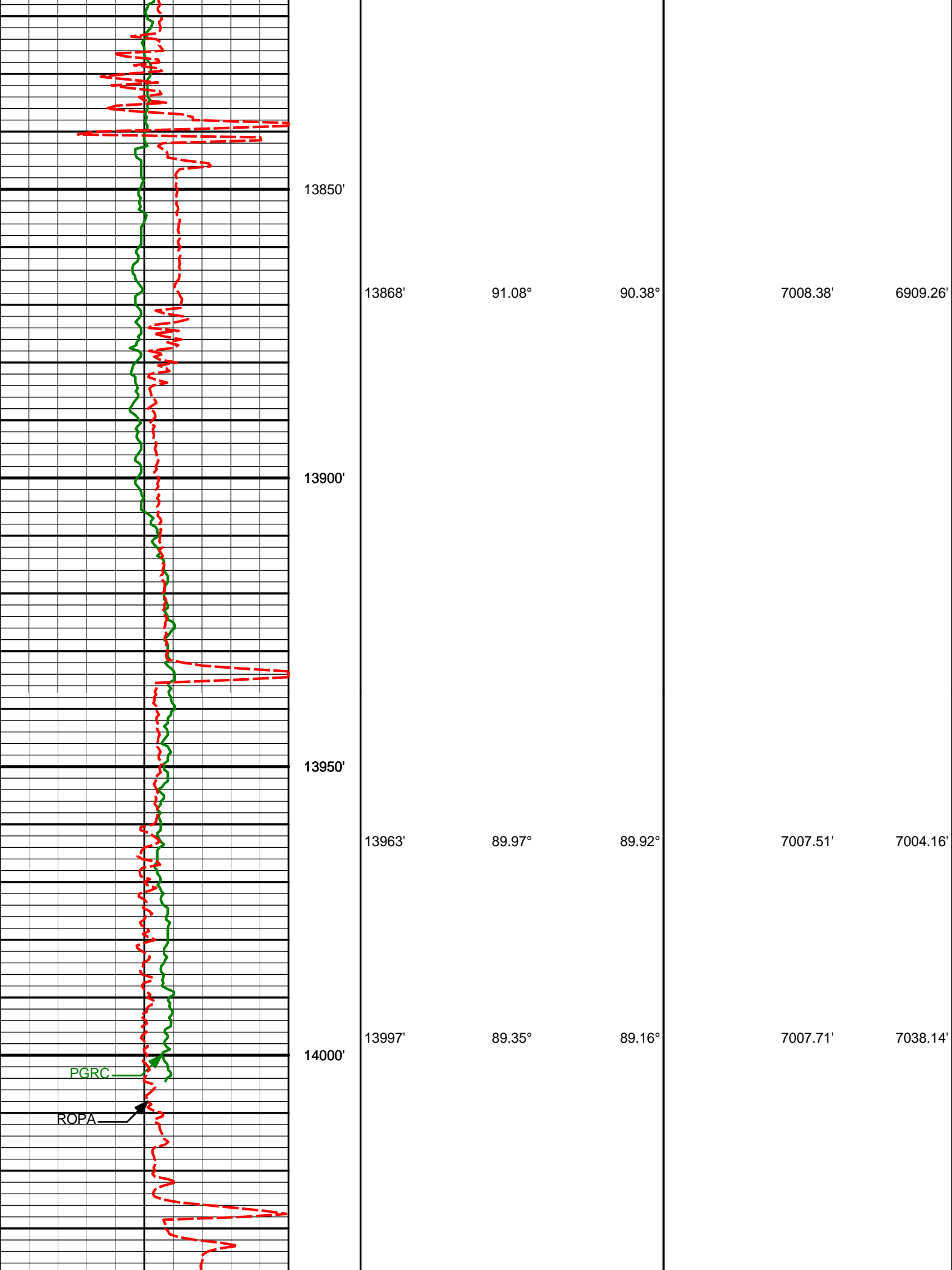


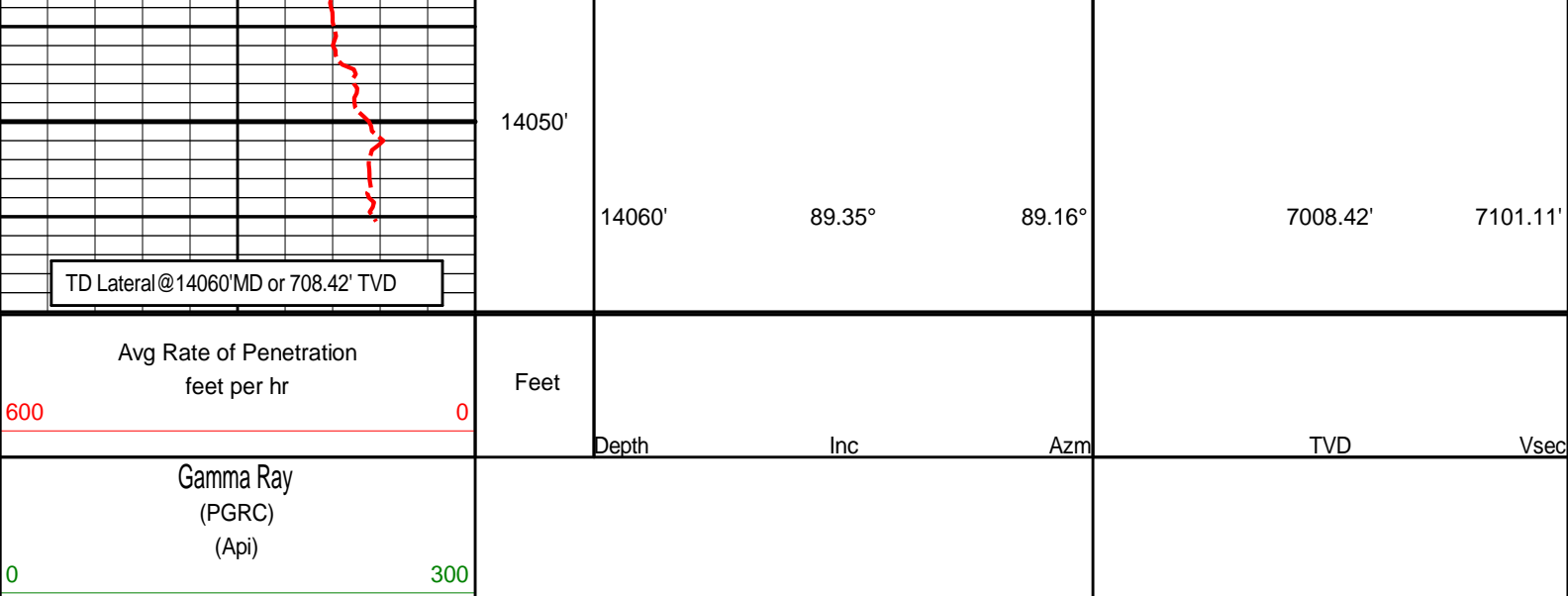












HALLIBURTON

DIRECTIONAL SURVEY REPORT

Noble Energy
FiveM E28-69HN
Wattenberg
Weld Colorado
USA
CA-XX-0009939842

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
790.00	0.00	0.00	790.00	0.00 N	0.00 E	0.00	TIE-IN
915.00	0.04	162.90	915.00	0.05 S	0.01 E	0.01	0.03
1102.00	0.71	110.60	1101.99	0.52 S	1.12 E	1.10	0.37
1195.00	1.07	86.08	1194.98	0.66 S	2.52 E	2.49	0.55
1288.00	1.21	76.14	1287.97	0.37 S	4.34 E	4.32	0.26
1381.00	1.22	105.97	1380.95	0.41 S	6.25 E	6.22	0.67
1474.00	1.43	90.04	1473.92	0.68 S	8.36 E	8.33	0.46
1567.00	2.25	286.68	1566.90	0.16 S	7.77 E	7.76	3.92
1660.00	3.33	328.75	1659.80	2.67 N	4.63 E	4.73	2.41
1753.00	6.45	335.59	1752.45	9.74 N	1.07 E	1.47	3.41
1846.00	8.89	329.59	1844.61	20.69 N	4.73 W	-3.86	2.76
1941.00	11.58	329.92	1938.09	35.28 N	13.22 W	-11.74	2.83
2036.00	10.51	327.30	2031.33	50.82 N	22.69 W	-20.55	1.24
2131.00	9.16	325.42	2124.93	64.34 N	31.66 W	-28.95	1.47
2226.00	9.83	326.75	2218.63	77.34 N	40.39 W	-37.13	0.74
2320.00	10.46	328.34	2311.17	91.31 N	49.27 W	-45.42	0.73
2415.00	9.59	330.23	2404.72	105.51 N	57.72 W	-53.27	0.98
2510.00	10.44	326.59	2498.27	119.56 N	66.39 W	-61.34	1.12
2605.00	9.02	328.01	2591.90	133.06 N	75.07 W	-69.46	1.51
2699.00	10.32	329.29	2684.56	146.55 N	83.28 W	-77.10	1.40
2794.00	11.44	326.00	2777.85	161.68 N	92.89 W	-86.07	1.35
2889.00	11.49	326.11	2870.96	177.35 N	103.44 W	-95.95	0.06
2984.00	10.14	324.42	2964.27	192.00 N	113.58 W	-105.48	1.46
3079.00	11.01	331.14	3057.66	206.75 N	122.83 W	-114.10	1.59
3173.00	9.79	330.06	3150.11	221.54 N	131.15 W	-121.80	1.32
3268.00	9.66	326.09	3243.75	235.16 N	139.63 W	-129.70	0.72
3363.00	9.00	326.81	3337.49	247.99 N	148.14 W	-137.67	0.70
3458.00	10.20	329.96	3431.16	261.50 N	156.42 W	-145.38	1.38
3553.00	10.00	329.46	3524.68	275.89 N	164.83 W	-153.18	0.24
3648.00	8.42	328.60	3618.46	288.92 N	172.64 W	-160.44	1.67
3743.00	9.81	328.46	3712.25	301.76 N	180.50 W	-167.76	1.47
3838.00	10.89	329.63	3805.71	316.40 N	189.27 W	-175.91	1.15
3933.00	10.97	329.15	3898.98	331.90 N	198.44 W	-184.43	0.13
4028.00	9.40	328.07	3992.48	346.25 N	207.18 W	-192.56	1.66
4123.00	6.87	318.66	4086.52	357.10 N	215.04 W	-199.96	3.01

4217.00	4.85	323.91	4180.03	364.54 N	221.10 W	-205.70	2.22
4312.00	2.36	297.51	4274.84	368.69 N	225.20 W	-209.63	3.09
4407.00	1.36	270.62	4369.79	369.60 N	228.06 W	-212.44	1.37
4502.00	1.42	195.35	4464.77	368.48 N	229.49 W	-213.93	1.79
4597.00	1.35	207.61	4559.74	366.36 N	230.32 W	-214.84	0.32
4882.00	0.53	35.53	4844.72	364.46 N	231.11 W	-215.71	0.66
4976.00	0.04	312.96	4938.72	364.83 N	230.88 W	-215.47	0.56
5071.00	0.22	337.20	5033.72	365.03 N	230.98 W	-215.56	0.19
5166.00	0.46	174.28	5128.72	364.82 N	231.01 W	-215.60	0.71
5261.00	0.34	120.17	5223.72	364.29 N	230.73 W	-215.34	0.40
5356.00	0.96	167.84	5318.71	363.37 N	230.32 W	-214.97	0.81
5451.00	1.07	122.57	5413.70	362.12 N	229.40 W	-214.10	0.83
5546.00	0.58	130.69	5508.69	361.32 N	228.29 W	-213.02	0.53
5641.00	0.68	134.51	5603.68	360.61 N	227.52 W	-212.29	0.12
5735.00	0.54	105.39	5697.68	360.10 N	226.70 W	-211.48	0.36
5830.00	0.72	106.86	5792.67	359.81 N	225.70 W	-210.50	0.19
5925.00	0.85	132.88	5887.66	359.16 N	224.61 W	-209.44	0.39
6020.00	1.03	165.81	5982.65	357.86 N	223.89 W	-208.77	0.59
6115.00	1.38	201.88	6077.63	355.97 N	224.10 W	-209.06	0.86
6210.00	2.81	229.23	6172.57	353.39 N	226.29 W	-211.36	1.80
6298.00	1.05	151.32	6260.52	351.28 N	227.54 W	-212.69	3.16
6345.00	1.60	109.56	6307.51	350.68 N	226.71 W	-211.89	2.28
6393.00	4.94	69.95	6355.43	351.17 N	224.14 W	-209.30	8.02
6440.00	8.52	82.41	6402.10	352.32 N	218.78 W	-203.90	8.18
6488.00	12.68	85.11	6449.27	353.24 N	210.00 W	-195.09	8.71
6535.00	15.76	86.55	6494.83	354.06 N	198.49 W	-183.55	6.61
6583.00	19.04	86.50	6540.62	354.93 N	184.16 W	-169.20	6.83
6630.00	23.16	87.79	6584.46	355.76 N	167.27 W	-152.28	8.80
6678.00	26.79	90.02	6627.97	356.12 N	147.01 W	-132.03	7.82
6724.00	31.29	90.66	6668.18	355.98 N	124.69 W	-109.74	9.81
6772.00	36.42	89.67	6708.02	355.92 N	97.96 W	-83.03	10.75
6819.00	41.40	88.67	6744.59	356.36 N	68.45 W	-53.53	10.67
6867.00	46.11	89.73	6779.25	356.81 N	35.27 W	-20.36	9.93
6914.00	50.47	90.46	6810.52	356.75 N	0.20 W	14.68	9.35
6962.00	54.12	89.81	6839.87	356.66 N	37.77 E	52.61	7.69
7009.00	56.26	90.89	6866.70	356.42 N	76.36 E	91.16	4.92
7057.00	58.47	92.75	6892.59	355.13 N	116.75 E	131.46	5.64
7104.00	62.13	93.32	6915.87	352.96 N	157.52 E	172.10	7.87
7152.00	65.62	93.38	6937.00	350.45 N	200.53 E	214.97	7.26
7199.00	68.42	91.96	6955.35	348.44 N	243.75 E	258.07	6.57
7247.00	71.59	92.57	6971.76	346.65 N	288.81 E	303.02	6.71
7294.00	74.78	91.21	6985.35	345.17 N	333.77 E	347.88	7.33
7329.00	77.12	91.98	6993.85	344.23 N	367.71 E	381.75	7.02
7419.00	84.91	90.63	7007.89	342.22 N	456.51 E	470.39	8.79
7449.00	87.50	90.42	7009.88	341.94 N	486.44 E	500.28	8.65
7542.00	93.15	90.76	7009.35	340.99 N	579.40 E	593.12	6.08
7635.00	92.40	90.77	7004.85	339.74 N	672.28 E	685.86	0.80
7728.00	88.33	90.02	7004.25	339.10 N	765.26 E	778.73	4.45
7821.00	87.13	89.50	7007.93	339.49 N	858.18 E	871.59	1.41
7914.00	88.43	89.47	7011.53	340.33 N	951.11 E	964.47	1.40
8007.00	89.01	89.69	7013.60	341.01 N	1044.08 E	1057.39	0.67
8100.00	90.52	90.07	7013.98	341.20 N	1137.08 E	1150.32	1.68
8193.00	92.16	89.31	7011.80	341.70 N	1230.05 E	1243.23	1.94
8287.00	86.95	89.91	7012.54	342.34 N	1324.01 E	1337.13	5.58
8380.00	89.01	90.75	7015.81	341.80 N	1416.94 E	1429.96	2.40
8473.00	88.34	89.62	7017.97	341.50 N	1509.92 E	1522.84	1.42
8566.00	90.83	91.84	7018.64	340.31 N	1602.89 E	1615.69	3.59
8659.00	88.67	90.37	7019.04	338.52 N	1695.87 E	1708.51	2.81
8752.00	88.67	89.40	7021.20	338.71 N	1788.84 E	1801.41	1.04
8845.00	90.96	91.99	7021.50	337.58 N	1881.82 E	1894.26	3.71
8938.00	89.23	90.56	7021.35	335.51 N	1974.79 E	1987.06	2.41
9031.00	89.32	90.47	7022.52	334.68 N	2067.78 E	2079.94	0.14
9124.00	91.27	90.10	7022.04	334.21 N	2160.77 E	2172.83	2.13
9217.00	91.54	89.74	7019.77	334.34 N	2253.74 E	2265.72	0.49
9312.00	89.72	92.12	7018.72	332.80 N	2348.71 E	2360.55	3.15
9407.00	91.29	91.58	7017.88	329.73 N	2443.66 E	2455.28	1.75
9501.00	92.62	91.71	7014.67	327.04 N	2537.56 E	2548.99	1.42
9596.00	91.54	91.02	7011.22	324.77 N	2632.47 E	2643.72	1.34
9691.00	90.06	90.59	7009.88	323.43 N	2727.45 E	2738.56	1.62
9786.00	90.12	89.36	7009.73	323.47 N	2822.45 E	2833.48	1.30
9881.00	90.34	90.16	7009.35	323.87 N	2917.44 E	2928.41	0.87
9976.00	90.86	90.37	7008.35	323.43 N	3012.44 E	3023.30	0.59
10071.00	87.38	88.26	7009.80	324.56 N	3107.40 E	3118.23	4.29
10166.00	87.28	89.80	7014.23	326.16 N	3202.28 E	3213.10	1.63
10261.00	88.68	91.77	7017.57	324.86 N	3297.20 E	3307.88	2.53

10201.00	88.88	91.77	7017.97	324.88 N	3297.28 E	3397.88	2.35
10356.00	91.82	91.24	7017.16	322.37 N	3392.16 E	3402.65	3.35
10451.00	94.54	91.66	7011.90	319.97 N	3486.97 E	3497.28	2.90
10545.00	91.94	91.42	7006.58	317.45 N	3580.78 E	3590.90	2.77
10640.00	92.35	92.36	7003.02	314.31 N	3675.66 E	3685.57	1.08
10735.00	87.41	90.00	7003.23	312.36 N	3770.60 E	3780.35	5.76
10830.00	89.38	90.18	7005.89	312.21 N	3865.56 E	3875.22	2.09
10925.00	90.18	89.44	7006.25	312.52 N	3960.56 E	3970.15	1.15
11020.00	88.74	89.77	7007.14	313.18 N	4055.55 E	4065.08	1.56
11116.00	88.24	90.51	7009.67	312.94 N	4151.52 E	4160.96	0.93
11211.00	88.27	90.92	7012.56	311.75 N	4246.46 E	4255.77	0.43
11305.00	89.75	91.71	7014.17	309.59 N	4340.42 E	4349.56	1.78
11400.00	89.69	90.72	7014.63	307.58 N	4435.40 E	4444.37	1.05
11495.00	91.60	91.78	7013.56	305.51 N	4530.36 E	4539.16	2.30
11590.00	90.43	90.73	7011.88	303.43 N	4625.32 E	4633.95	1.66
11685.00	91.73	88.75	7010.09	303.87 N	4720.30 E	4728.86	2.49
11780.00	90.55	89.58	7008.20	305.26 N	4815.27 E	4823.81	1.51
11875.00	91.36	88.29	7006.61	307.02 N	4910.24 E	4918.77	1.59
11969.00	88.95	88.73	7006.36	309.46 N	5004.20 E	5012.75	2.60
12065.00	87.23	87.68	7009.56	312.46 N	5100.09 E	5108.68	2.11
12159.00	87.34	86.20	7014.01	317.48 N	5193.85 E	5202.57	1.58
12254.00	88.30	88.75	7017.62	321.67 N	5288.68 E	5297.49	2.87
12349.00	89.32	89.88	7019.59	322.81 N	5383.65 E	5392.43	1.60
12444.00	89.66	89.90	7020.43	322.99 N	5478.64 E	5487.35	0.36
12539.00	90.34	88.79	7020.43	324.07 N	5573.64 E	5582.30	1.37
12634.00	91.30	90.65	7019.08	324.54 N	5668.62 E	5677.22	2.19
12729.00	88.80	90.63	7019.00	323.48 N	5763.61 E	5772.08	2.63
12824.00	89.54	91.17	7020.38	321.99 N	5858.58 E	5866.92	0.96
12919.00	90.03	91.14	7020.74	320.08 N	5953.56 E	5961.73	0.52
13014.00	90.62	90.74	7020.20	318.51 N	6048.55 E	6056.57	0.75
13109.00	91.17	90.47	7018.72	317.51 N	6143.53 E	6151.43	0.65
13204.00	91.11	89.76	7016.83	317.32 N	6238.51 E	6246.32	0.74
13298.00	89.88	90.30	7016.02	317.27 N	6332.51 E	6340.23	1.43
13393.00	90.96	91.10	7015.33	316.11 N	6427.49 E	6435.09	1.42
13488.00	90.99	90.11	7013.71	315.10 N	6522.47 E	6529.94	1.04
13583.00	91.05	89.71	7012.03	315.25 N	6617.46 E	6624.85	0.43
13678.00	90.55	91.65	7010.70	314.12 N	6712.44 E	6719.70	2.11
13773.00	90.59	91.85	7009.76	311.22 N	6807.39 E	6814.45	0.21
13868.00	91.08	90.38	7008.38	309.38 N	6902.36 E	6909.26	1.63
13963.00	89.97	89.92	7007.51	309.13 N	6997.35 E	7004.16	1.26
13997.00	89.35	89.16	7007.71	309.41 N	7031.35 E	7038.14	2.87
14060.00	89.35	89.16	7008.42	310.33 N	7094.34 E	7101.11	0.00

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 CLOSURE OF 87.50 DEGREES (GRID)
A TOTAL CORRECTION OF 8.14 DEG FROM MAGNETIC NORTH TO GRID NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 14060.00 FEET
IS 7101.12 FEET ALONG 87.50 DEGREES (GRID)