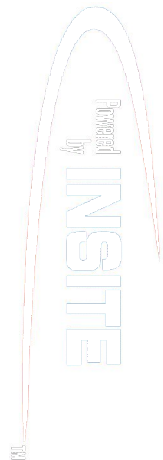


**PCDC: Pressure Case Directional**  
**PCGK: Pressure Case Gamma**

**1 : 240**

Country		: USA			
Field		: Red Tail			
Location		: Lat: 40° 49' 25.87" North Long: 103° 52' 9.68" West			
Well		: Razor 21 SWD 1			
Company		: Whiting Oil & Gas			
Rig		: Pioneer 54			
LOCATION					
		Latitude : 40° 49' 25.87" North Longitude : 103° 52' 9.68" West			
		UTM Easting = 3,451,286.354 ft UTM Northing = 1,547,126.688 ft			
API Number		: 05-123-40777-00			
Company		: Whiting Oil & Gas			
Rig		: Pioneer 54			
Well		: Razor 21 SWD 1			
Field		: Red Tail			
Country		: USA			
Permanent Datum		: Ground Level			
Log Measured From		: Drill Floor			
Drilling Measured From		: Drill Floor			
Elevation		: 4820.00 ft			
22.00 ft Above Permanent Datum					
TVD LOG					
Elev.		KB N/A			
		DF 4842.00 ft			
		GL 4820.00 ft			
		WD N/A			
Other Services					
Directional Drilling					
Unit No.		: 11852172		Job No. : CA-XX-0902097626	
Date Logged		: 02-Feb-15 To 10-Feb-15			
Total Depth MD		: 8,550.00 ft TVD : 8,549.28 ft			
Spud Date		: 04-Feb-15		Plot Type : Final	
		Plot Date : 10-Feb-15			
Run No.		Borehole Record (TVD)		Run No.	
		Size From To		Size From To	
0100		13.500 in SURFACE 1,599.98 ft			
0200		8.750 in 1,599.98 ft 6,890.38 ft			
0300		8.750 in 6,890.38 ft 8,499.29 ft			
				Casing Record (TVD)	
				Size Weight From To	
				9.625 in 36.00 lbpf SURFACE 1,587.98 ft	

Max Tool Temp (degF) / Source	94.33 / PCM	163.20 / PCM	188.1 / PCM		
Rm @ Max Tool Temp (degF)	N/A @ 94.33	N/A @ 163.20	N/A @ N/A		
Lead MWD Engineer	Ben Burkland	Ben Burkland	Brandon McNair		
Customer Representative	BJ Honeycut	BJ Honeycut	BJ Honeycut		

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	PCM	PCM	PCM		
Software Version	5.93	5.93	5.93		
Sub Serial Number	11342274	11342274	11342274		
Insert Serial Number	11680733	11400845	11680733		
Date and Time Initialized	03-Feb-15 12:53	05-Feb-15 05:40	07-Feb-15 08:49		
Date and Time Read	04-Feb-15 21:28	07-Feb-15 11:20	01-Jan-70 00:00		
ECMB SW Version	N/A	N/A	N/A		

### Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	61.00	51.00	51.00		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11342274	11342274	11342274		
Sonde Serial Number	11638590	11297563	11638590		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	272.97	67.50	63.85		

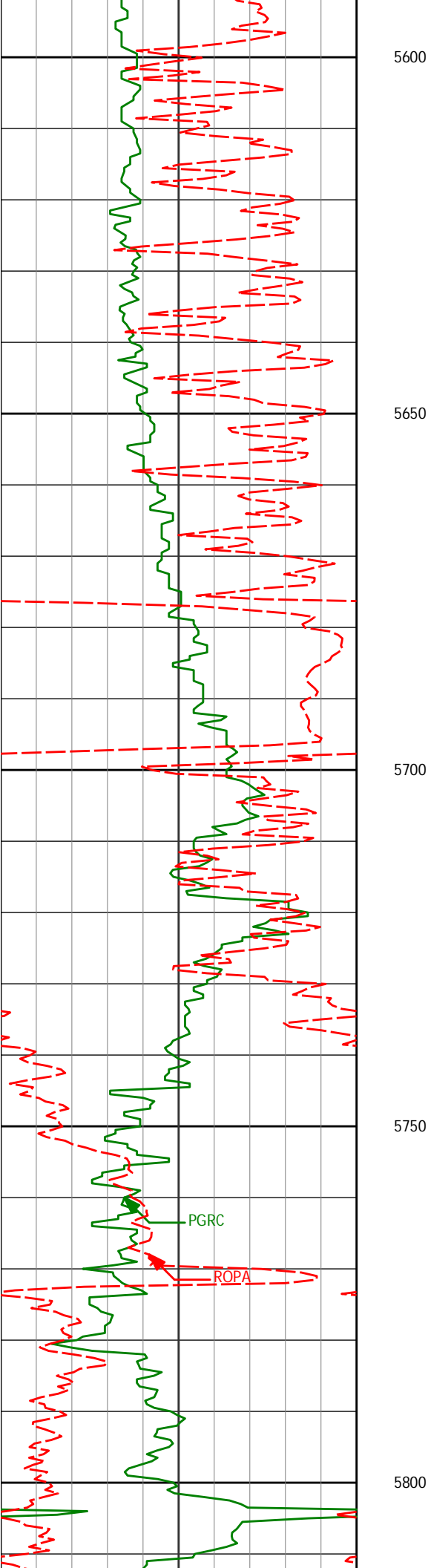
### Gamma Ray Sensor Information

Tool Type	N/A	PCG	PCG		
Distance From Bit (ft)	N/A	53.85	53.81		
Recorded Sample Period (sec)	N/A	10	10		
Software Version	N/A	8.15	8.15		
Sub Serial Number	N/A	11342274	11342274		
Insert/Sonde Serial Number	N/A	11579779	11579811		

## REMARKS

1. All depths are measured bit depths, referenced to the Driller's pipe tally and are measured from the drill floor, unless otherwise specified.
2. No depth corrections have been made for pipe stretch or compression.
3. Critical annular velocities are calculated using the "Power Law" model for water based fluids and the "Bingham Plastic" model for oil based fluids.
4. Run 100 was drilled with directional data only.
5. Logging started at 5500' per request of Geology.
6. All data presented is recorded (memory data) unless otherwise stated.
7. The following smoothing parameters have been applied to the 5" data:  
PGRC (Corrected Gamma Ray)  
Interval Resolution: 0.5 ft  
Interval Distance: 0.6 ft  
Gap Fill: 3.0 ft  
ROPA (Rate of Penetration Average)  
Interval Resolution: 0.5 ft  
Interval Distance: 0.6 ft  
Gap Fill: 3.0 ft
8. INSITE version 8.1.10





5628'

1.25°

244.72°

5627.58'

-2.17'

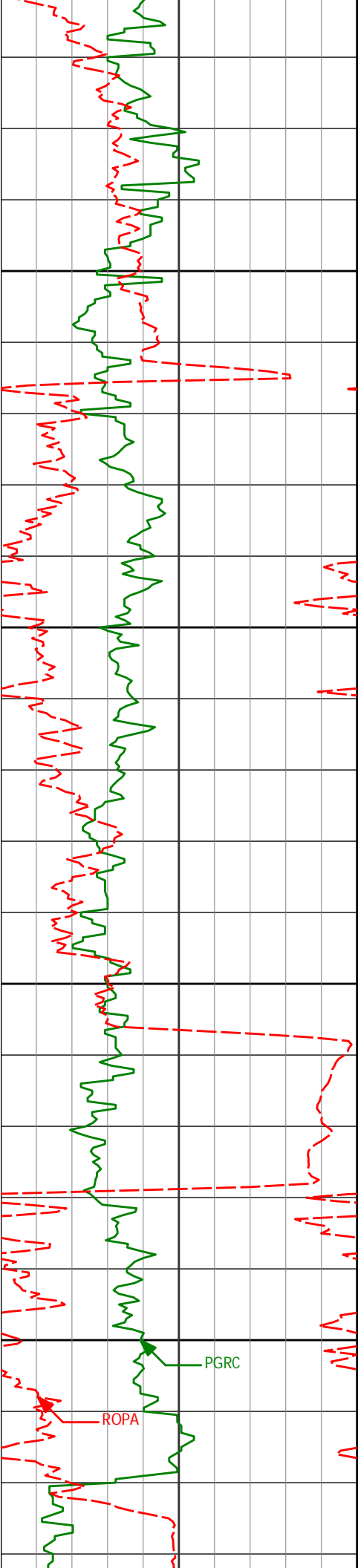
5721'

0.20°

234.33°

5720.57'

-2.69'



5850

5900

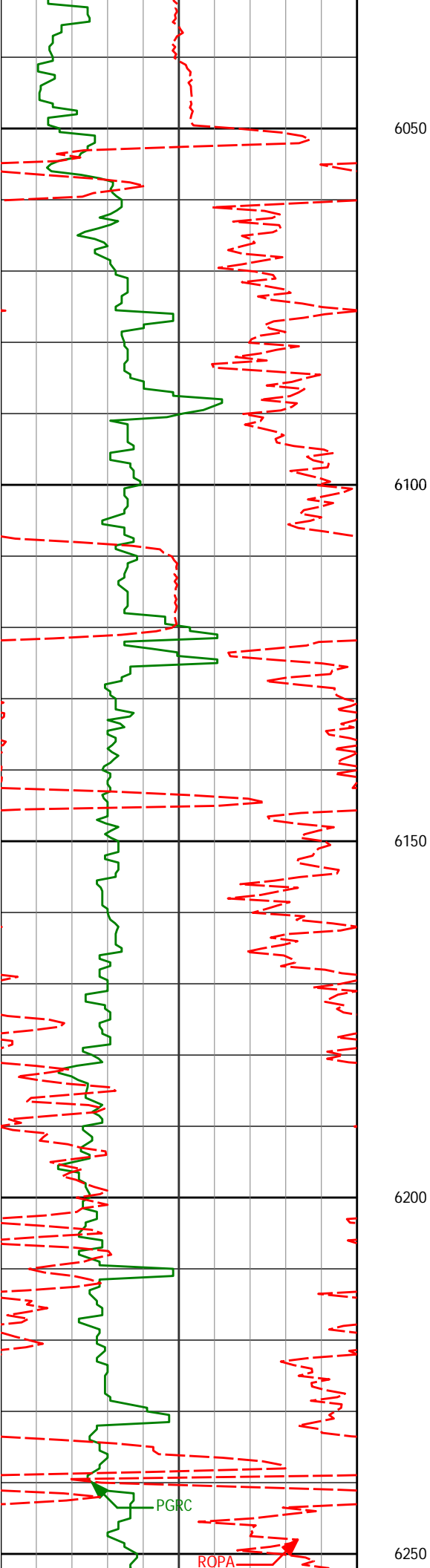
5950

6000

PGRC

ROPA

5814'	0.88°	218.90°	5813.56'	-3.34'
5908'	2.05°	212.49°	5907.53'	-5.33'
6001'	0.38°	307.55°	6000.51'	-6.54'



6093'

0.59°

19.45°

6092.51'

-5.91'

6186'

0.84°

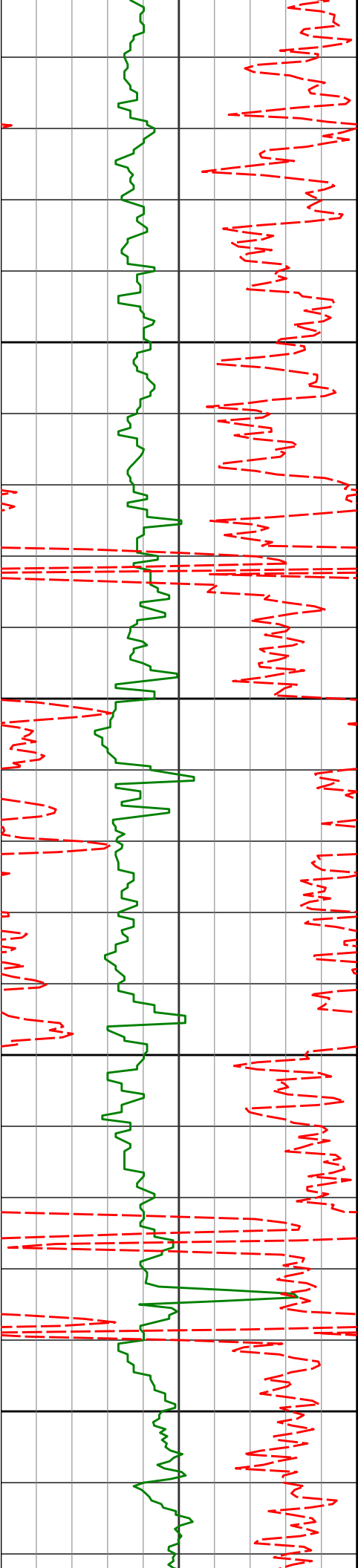
23.37°

6185.50'

-4.84'

PGRC

ROPA



6280'

1.08°

33.38°

6279.49'

-3.46'

6300

6350

6373'

1.20°

23.59°

6372.47'

-1.84'

6400

6450

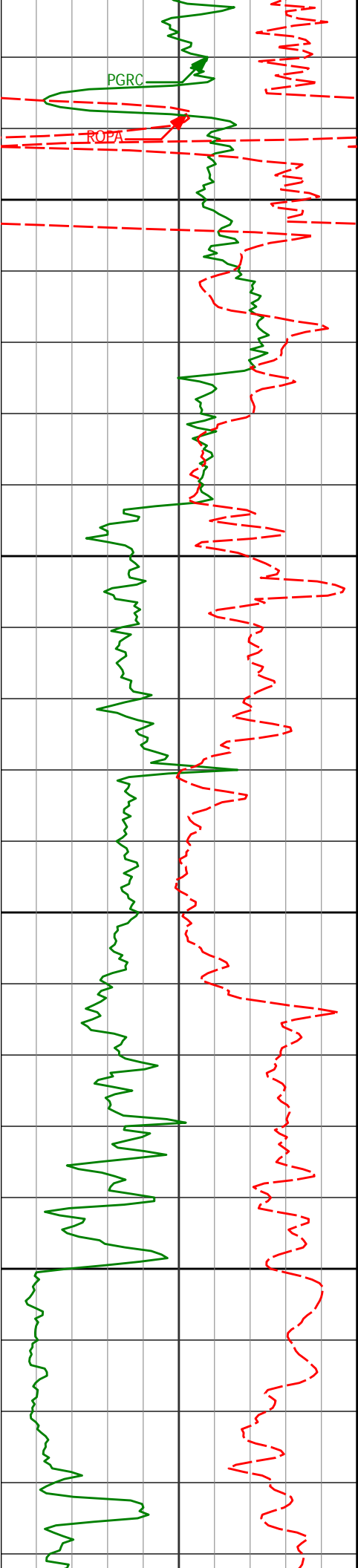
6466'

1.05°

33.05°

6465.45'

-0.23'



6500

6550

6600

6650

6559'

0.98°

48.19°

6558.44'

1.01'

6653'

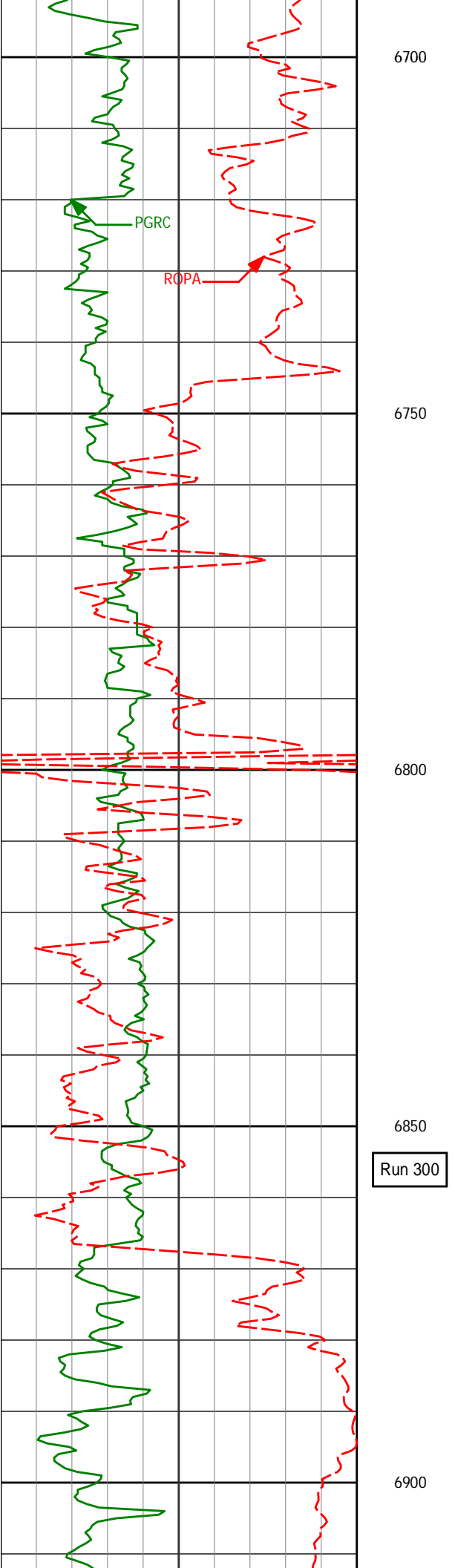
1.09°

67.64°

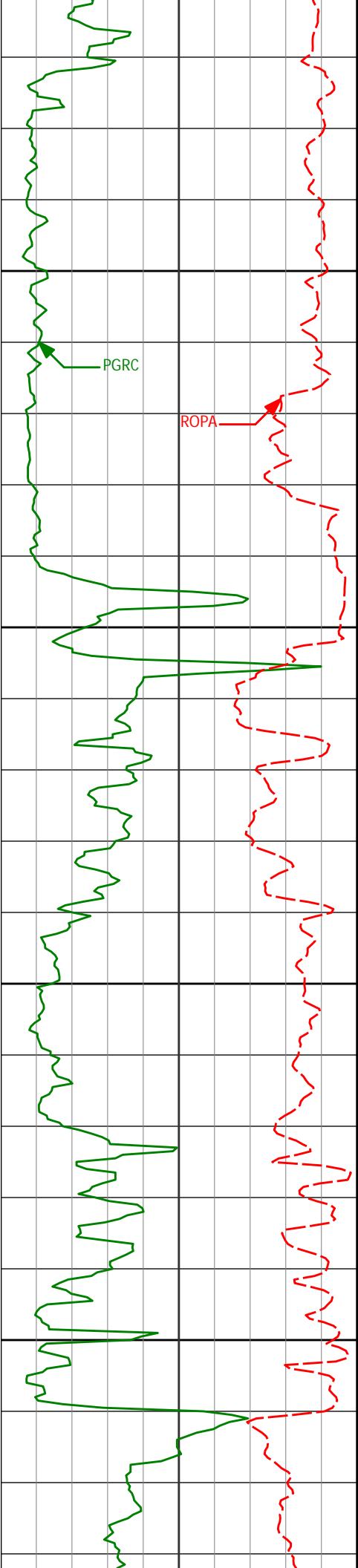
6652.42'

1.89'





6700				
6746'	0.86°	65.00°	6745.41'	2.52'
6750				
6800				
6839'	1.16°	74.26°	6838.40'	3.07'
6850				
6900				



6950

7000

7050

7100

6932'

1.37°

67.98°

6931.37'

3.74'

7026'

0.63°

54.67°

7025.36'

4.46'

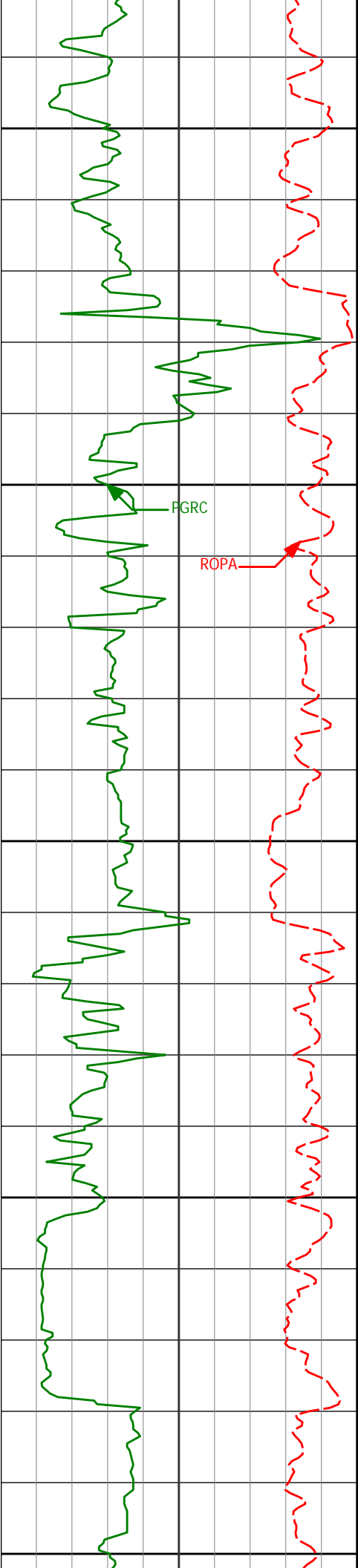
7119'

0.56°

51.83°

7118.35'

5.04'



7150

7200

7250

7300

7350

7212'

0.60°

65.39°

7211.35'

5.52'

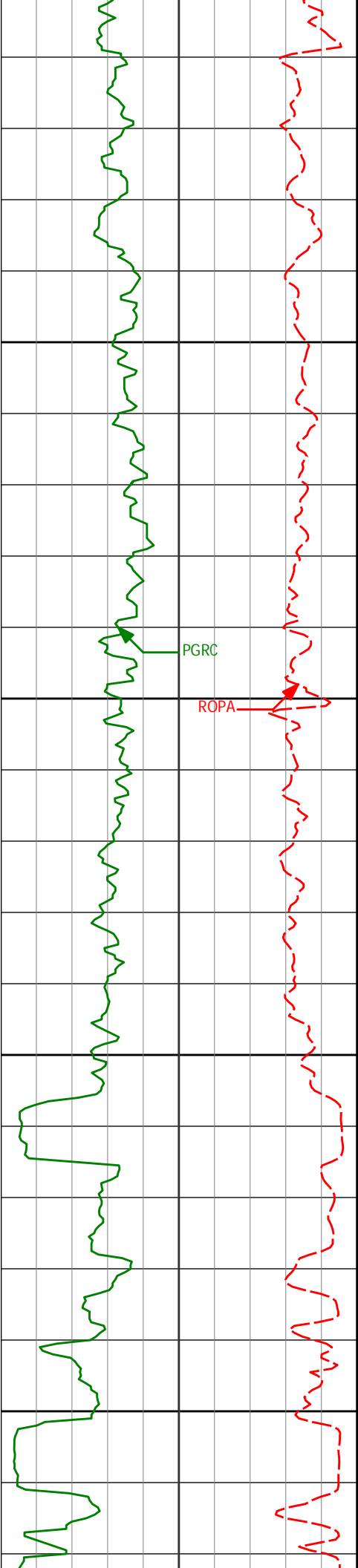
7305'

0.75°

67.72°

7304.34'

5.96'



7400

7399'

0.66°

79.26°

7398.33'

6.29'

7450

PGRC

ROPA

7492'

0.74°

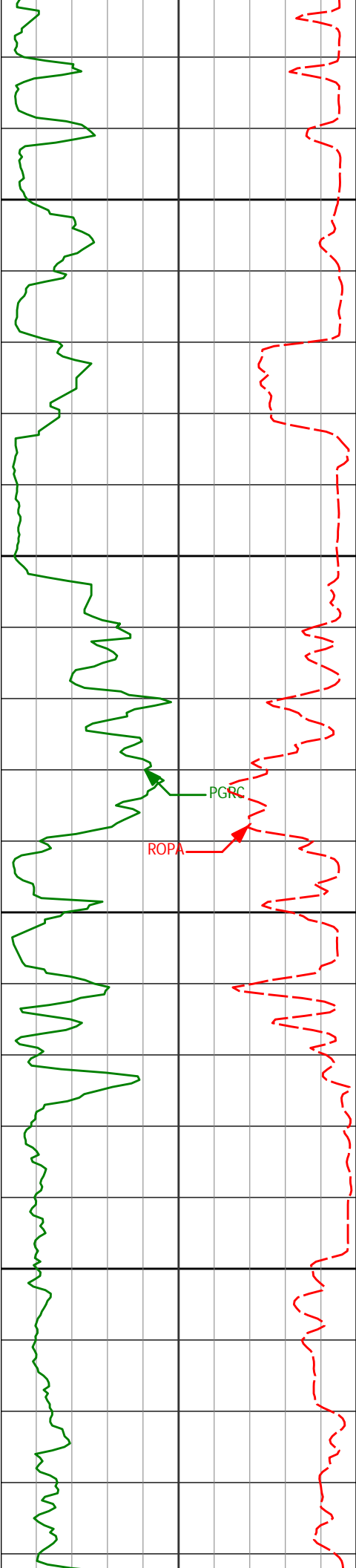
76.17°

7491.33'

6.54'

7500

7550



7585'

0.83°

86.45°

7584.32'

6.72'

7600

7650

7678'

0.73°

90.23°

7677.31'

6.76'

7700

7750

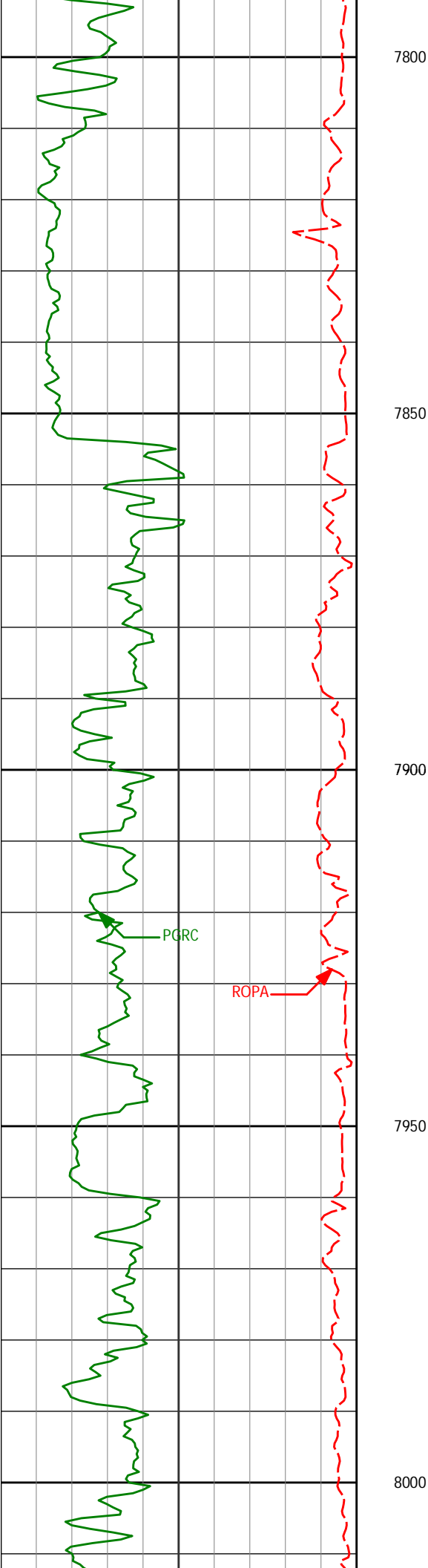
7771'

0.52°

112.47°

7770.30'

6.60'



7864'

0.21°

116.03°

7863.30'

6.36'

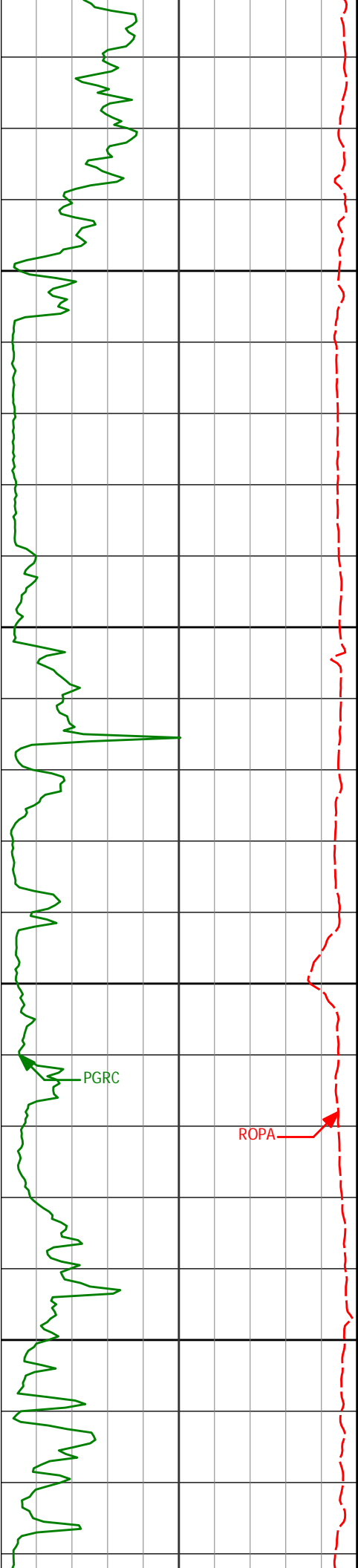
7958'

0.33°

135.86°

7957.30'

6.09'



8050

8051'

0.43°

119.41°

8050.30'

5.73'

8100

8150

8144'

0.44°

119.33°

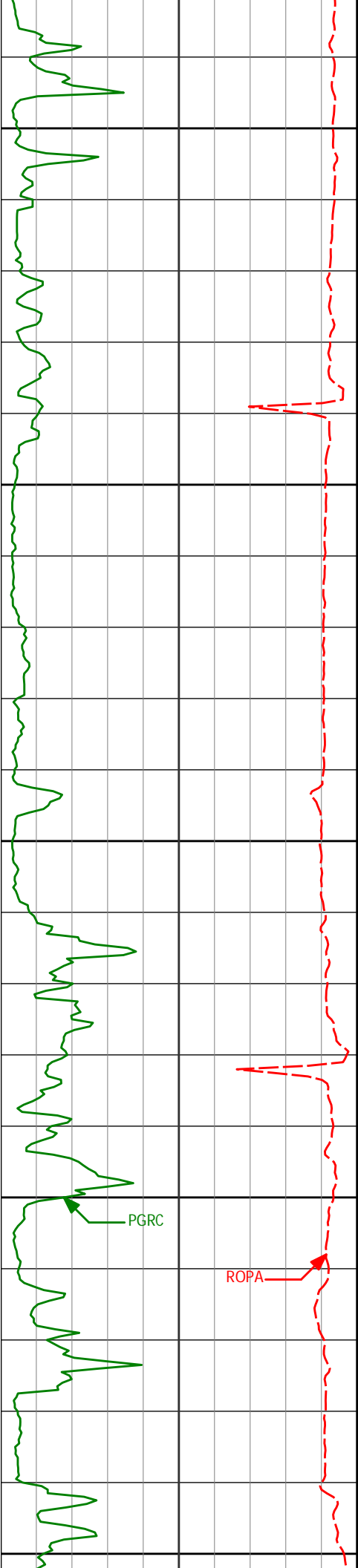
8143.30'

5.39'

8200

PGRC

ROPA



8236'

0.44°

112.64°

8235.29'

5.08'

8250

8300

8329'

0.49°

102.57°

8328.29'

4.86'

8350

8400

PGRC

ROPA

8423'

0.42°

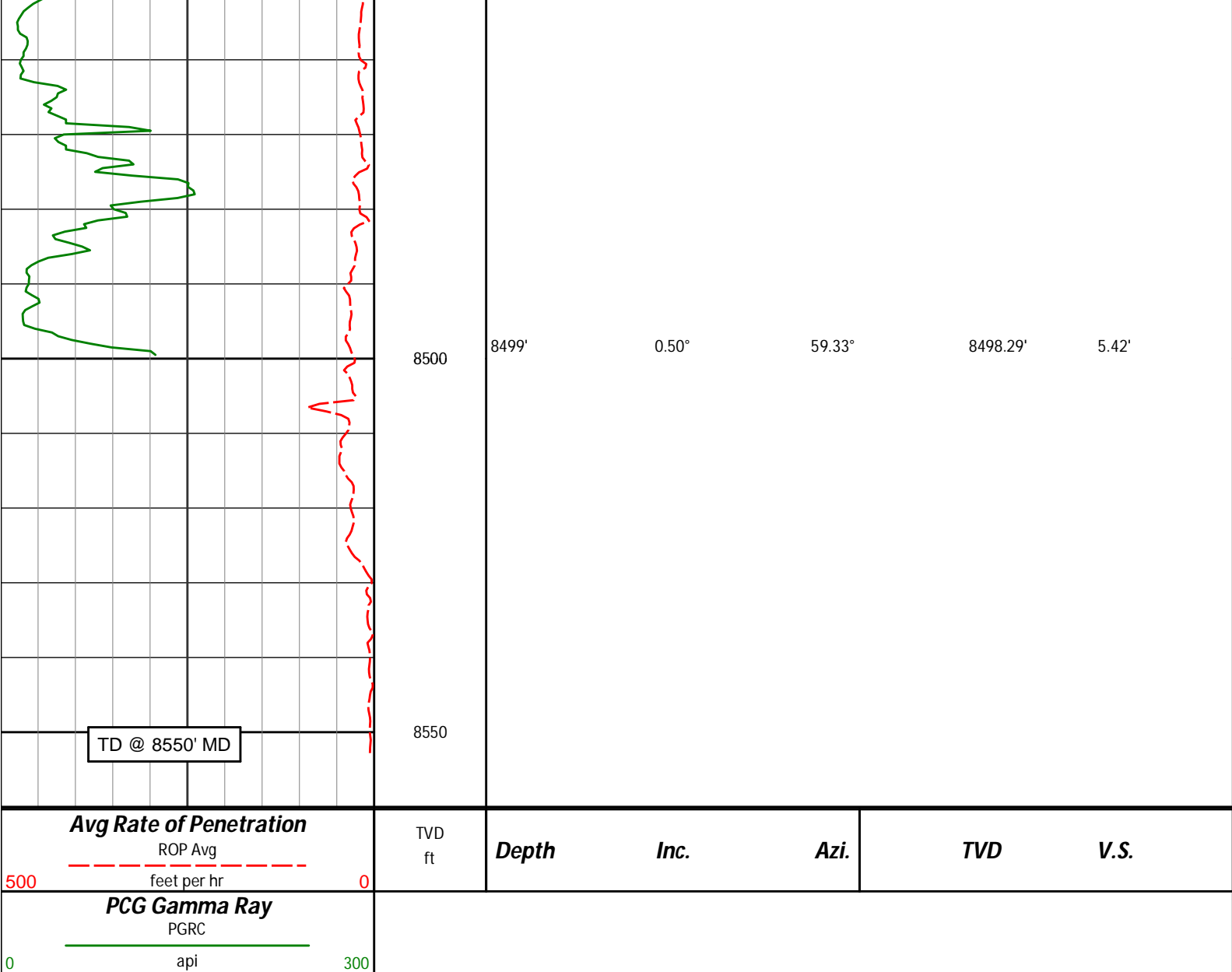
39.54°

8422.29'

5.04'

8450





## DIRECTIONAL SURVEY REPORT

Whiting Oil Gas

Razor 21 SWD 1

Red Tail

Weld Colorado

USA

CA-XX-0902097626

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
231.00	0.09	333.34	231.00	0.17 N	0.08 W	0.17	0.04
324.00	0.26	265.98	324.00	0.22 N	0.33 W	0.22	0.26
416.00	0.21	265.51	416.00	0.19 N	0.71 W	0.19	0.06
509.00	0.36	261.59	509.00	0.13 N	1.17 W	0.13	0.17
601.00	0.18	264.64	601.00	0.08 N	1.60 W	0.08	0.20
693.00	0.24	214.26	693.00	0.09 S	1.85 W	-0.09	0.20
785.00	0.50	183.86	784.99	0.66 S	1.98 W	-0.66	0.35
1062.00	0.28	193.61	1061.99	2.52 S	2.22 W	-2.52	0.08
1246.00	0.43	224.92	1245.98	3.44 S	2.82 W	-3.44	0.13
1338.00	0.39	251.98	1337.98	3.78 S	3.36 W	-3.78	0.21

1431.00	0.26	268.20	1430.98	3.89 S	3.87 W	-3.89	0.16
1524.00	0.43	247.76	1523.98	4.02 S	4.41 W	-4.02	0.22
1539.00	0.40	264.09	1538.98	4.05 S	4.51 W	-4.05	0.81
1710.00	0.44	247.74	1709.97	4.36 S	5.71 W	-4.36	0.07
1804.00	0.36	264.85	1803.97	4.53 S	6.34 W	-4.53	0.15
1896.00	0.28	340.66	1895.97	4.34 S	6.71 W	-4.34	0.43
1988.00	0.47	3.94	1987.97	3.76 S	6.75 W	-3.76	0.26
2080.00	0.52	15.83	2079.96	2.98 S	6.61 W	-2.98	0.13
2173.00	0.65	33.04	2172.96	2.13 S	6.21 W	-2.13	0.23
2265.00	0.37	20.00	2264.96	1.41 S	5.82 W	-1.41	0.33
2360.00	0.87	13.98	2359.95	0.42 S	5.54 W	-0.42	0.53
2453.00	1.00	11.47	2452.94	1.05 N	5.21 W	1.05	0.14
2547.00	1.37	6.34	2546.92	2.97 N	4.93 W	2.97	0.42
2640.00	0.49	67.94	2639.91	4.23 N	4.44 W	4.23	1.31
2733.00	0.56	69.14	2732.90	4.54 N	3.65 W	4.54	0.07
2827.00	0.53	78.52	2826.90	4.79 N	2.80 W	4.79	0.10
2920.00	0.53	106.93	2919.89	4.75 N	1.97 W	4.75	0.28
3013.00	0.51	59.99	3012.89	4.83 N	1.20 W	4.83	0.44
3107.00	0.70	30.12	3106.89	5.53 N	0.55 W	5.53	0.39
3202.00	0.98	2.40	3201.88	6.85 N	0.23 W	6.85	0.51
3296.00	1.09	0.99	3295.86	8.54 N	0.18 W	8.54	0.12
3388.00	0.17	195.08	3387.86	9.29 N	0.20 W	9.29	1.36
3481.00	0.18	177.94	3480.86	9.02 N	0.23 W	9.02	0.06
3574.00	0.19	136.89	3573.86	8.76 N	0.12 W	8.76	0.14
3668.00	0.12	354.97	3667.85	8.74 N	0.01 W	8.74	0.32
3761.00	0.83	13.51	3760.85	9.49 N	0.13 E	9.49	0.77
3854.00	1.20	27.35	3853.84	11.01 N	0.74 E	11.01	0.47
3948.00	1.39	89.91	3947.82	11.88 N	2.33 E	11.88	1.44
4041.00	1.33	90.43	4040.79	11.88 N	4.54 E	11.88	0.06
4134.00	0.83	135.49	4133.78	11.39 N	6.09 E	11.39	1.02
4227.00	0.90	161.31	4226.77	10.22 N	6.80 E	10.22	0.42
4321.00	0.70	171.36	4320.76	8.95 N	7.12 E	8.95	0.25
4413.00	0.96	171.59	4412.75	7.63 N	7.32 E	7.63	0.28
4507.00	1.27	163.57	4506.73	5.86 N	7.73 E	5.86	0.37
4600.00	1.77	139.86	4599.70	3.77 N	8.94 E	3.77	0.85
4693.00	1.28	190.73	4692.67	1.66 N	9.68 E	1.66	1.49
4787.00	0.89	270.41	4786.65	0.63 N	8.75 E	0.63	1.51
4881.00	0.88	233.64	4880.64	0.21 N	7.44 E	0.21	0.59
4974.00	1.14	237.67	4973.63	0.71 S	6.09 E	-0.71	0.28
5067.00	1.20	245.30	5066.61	1.61 S	4.42 E	-1.61	0.18
5161.00	0.53	3.34	5160.60	1.59 S	3.55 E	-1.59	1.62
5255.00	0.41	354.89	5254.60	0.82 S	3.54 E	-0.82	0.15
5348.00	0.16	245.07	5347.60	0.54 S	3.40 E	-0.54	0.52
5441.00	0.24	207.33	5440.60	0.77 S	3.19 E	-0.77	0.16
5535.00	0.89	237.14	5534.59	1.34 S	2.49 E	-1.34	0.74
5628.00	1.25	244.72	5627.58	2.17 S	0.96 E	-2.17	0.41
5721.00	0.20	234.33	5720.57	2.69 S	0.08 W	-2.69	1.13
5814.00	0.88	218.90	5813.56	3.34 S	0.66 W	-3.34	0.75
5908.00	2.05	212.49	5907.53	5.33 S	2.02 W	-5.33	1.25
6001.00	0.38	307.55	6000.51	6.54 S	3.16 W	-6.54	2.28
6093.00	0.59	19.45	6092.51	5.91 S	3.24 W	-5.91	0.65
6186.00	0.84	23.37	6185.50	4.84 S	2.81 W	-4.84	0.27
6280.00	1.08	33.38	6279.49	3.46 S	2.05 W	-3.46	0.31
6373.00	1.20	23.59	6372.47	1.84 S	1.18 W	-1.84	0.25
6466.00	1.05	33.05	6465.45	0.23 S	0.32 W	-0.23	0.26
6559.00	0.98	48.19	6558.44	1.01 N	0.74 E	1.01	0.30
6653.00	1.09	67.64	6652.42	1.89 N	2.16 E	1.89	0.39
6746.00	0.86	65.00	6745.41	2.52 N	3.61 E	2.52	0.26
6839.00	1.16	74.26	6838.40	3.07 N	5.15 E	3.07	0.37
6932.00	1.37	67.98	6931.37	3.74 N	7.09 E	3.74	0.27
7026.00	0.63	54.67	7025.36	4.46 N	8.56 E	4.46	0.82
7119.00	0.56	51.83	7118.35	5.04 N	9.33 E	5.04	0.09
7212.00	0.60	65.39	7211.35	5.52 N	10.13 E	5.52	0.16
7305.00	0.75	67.72	7304.34	5.96 N	11.14 E	5.96	0.16
7399.00	0.66	79.26	7398.33	6.29 N	12.25 E	6.29	0.18
7492.00	0.74	76.17	7491.33	6.54 N	13.36 E	6.54	0.09
7585.00	0.83	86.45	7584.32	6.72 N	14.62 E	6.72	0.18
7678.00	0.73	90.23	7677.31	6.76 N	15.89 E	6.76	0.12
7771.00	0.52	112.47	7770.30	6.60 N	16.87 E	6.60	0.34
7864.00	0.21	116.03	7863.30	6.36 N	17.42 E	6.36	0.34
7958.00	0.33	135.86	7957.30	6.09 N	17.76 E	6.09	0.16
8051.00	0.42	119.41	8050.29	5.72 N	18.24 E	5.72	0.16

8051.00	0.43	119.41	8050.30	5.73 N	18.24 E	5.73	0.16
8144.00	0.44	119.33	8143.30	5.39 N	18.86 E	5.39	0.01
8236.00	0.44	112.64	8235.29	5.08 N	19.49 E	5.08	0.06
8329.00	0.49	102.57	8328.29	4.86 N	20.20 E	4.86	0.10
8423.00	0.42	39.54	8422.29	5.04 N	20.81 E	5.04	0.51
8499.00	0.50	59.33	8498.29	5.42 N	21.27 E	5.42	0.23

**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 0.00 DEGREES (TRUE)**  
**A TOTAL CORRECTION OF 8.01 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**  
  
**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.**  
**HORIZONTAL DISPLACEMENT(CLOSURE) AT 8499.00 FEET**  
**IS 21.95 FEET ALONG 75.70 DEGREES (TRUE)**  
  
**DD Projection to Bit - Depth: 8550 Inc: 0.50 Azi: 59.33**