

**DGR Dual Gamma Ray  
PCG Pressure Case Gamma**

**1 : 240**

Country : USA				
Field : Niobrara				
Location : Lat: 39° 42' 46.94" North Long: 104° 30' 34.19" West				
Well : Youngberg 10-11-1H				
Company : ConocoPhillips				
Rig : H&P 280				
LOCATION		Other Services Directional Drilling		
Latitude : 39° 42' 46.94" North Longitude : 104° 30' 34.19" West UTM Easting = 3,278,652.867 ft UTM Northing = 1,686,122.815 ft				
Permanent Datum : Ground Level		Elevation : 5673.00 ft		
Log Measured From : Drill Floor		24.00 ft Above Permanent Datum		
Drilling Measured From : Drill Floor		MD LOG		
Depth Logged : 1,968.00 ft To 16,539.00 ft		Unit No. : 11703717		
Date Logged : 10-Sep-13 To 03-Oct-13		Job No. : CA-XX-0900647295		
Total Depth MD : 16,539.00 ft TVD : 7,529.00 ft		Plot Type : Final		
Spud Date : 09-Sep-13		Plot Date : 05-Oct-13		
Run No.	Borehole Record (MD)		Borehole Record (MD)	
	Size	From	To	Run No.
2	8,750 in	1,958.00 ft	5,228.00 ft	Size
3	8,750 in	5,228.00 ft	7,816.00 ft	From
4	6,000 in	7,816.00 ft	7,948.00 ft	To
5	6,000 in	7,948.00 ft	14,564.00 ft	Size
6	6,000 in	14,564.00 ft	14,564.00 ft	Weight
7	6,000 in	14,564.00 ft	16,027.00 ft	From
8	6,000 in	16,027.00 ft	16,027.00 ft	To
9	6,000 in	16,027.00 ft	16,539.00 ft	From
				To
				From
				To

**WELL INFORMATION**

MWD Run Number	100	200	300	400	500
Date run completed	14-Sep-13	17-Sep-13	19-Sep-13	27-Sep-13	28-Sep-13
Rig Bit Number	2	3	4	5	6
Bit Size (in)	8.750	8.750	6.000	6.000	6.000
Tool Nominal OD (in)	6.750	6.750	4.750	4.750	4.750
Log Start Depth (MD, ft)	1,968.00	5,228.00	7,816.00	7,948.00	14,564.00
Log End Depth (MD, ft)	5,228.00	7,816.00	7,948.00	14,564.00	14,564.00
Drill or Wipe	Drill	Drill	Drill	Drill and Wipe	Drill
Drill/Wipe Start Date and Time	12-Sep-13 14:45	14-Sep-13 19:55	19-Sep-13 12:13	20-Sep-13 06:47	26-Sep-13 22:56
Drill/Wipe End Date and Time	14-Sep-13 03:20	16-Sep-13 22:05	19-Sep-13 16:10	26-Sep-13 18:05	26-Sep-13 22:56
Min Inc (deg) @ Depth (MD, ft)	.20 @ 4,777.00	.14 @ 5,821.00	0 @ 0	87.04 @ 10,753.00	0 @ 0
Max Inc (deg) @ Depth (MD, ft)	1.54 @ 2,973.00	87.77 @ 7,759.00	0 @ 0	91.05 @ 12,968.00	0 @ 0
Bit TFA(in2) / Bit Type	1.24 / PDC	1.24 / PDC	.98 / PDC	.98 / PDC	.98 / PDC
Flow Rate (gpm)	491.90	500.00	270.00	270.00	270.00
Max AV (fpm) / CV (fpm) @ MWD	398.0 / 200.0	381.0 / 200.0	255.0 / 105.0	327.0 / 456.0	327.0 / 456.0
Fluid Type	Diesel Mud Base	Diesel Mud Base	Polymer	Polymer	Polymer
Density (ppg) / Viscosity (spqt)	9.25 / 48.00	9.22 / 42.00	9.00 / 37.00	9.27 / 42.00	9.38 / 43.00
Filtrate CL (ppm)	69,000.00	82,000.00	1,900.00	2,300.00	2,300.00
pH / Fluid Loss (mptm)	N/A / 5	N/A / N/A	7.60 / 10	7.80 / 4	7.60 / 3
PV (cP) / YP (lhf2)	17 / 15.00	12 / 15.00	10 / 15.00	14 / 14.00	15 / 16.00
% Solids / % Sand	4.8 / 0	5.20 / 0	4.70 / 0.25	5.20 / 0.25	6.20 / 0.25
% Oil / Oil:Water Ratio	56.80 / 56:44	57.80 / 63:37	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	1.600 @ 72.00	1.600 @ 72.00
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	1.600 @ 68.00	1.600 @ 68.00
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	1.600 @ 71.00	1.600 @ 71.00

Max Tool Temp (degF) / Source	148.4 / HCIM	183.76 / HCIM	200.05 / PCM	236.71 / HCIM	231.40 / PCM
Rm @ Max Tool Temp (degF)	N/A @ 148.47	N/A @ 183.76	N/A @ 200.05	.5176 @ 236.71	.5292 @ 231.40
Lead MWD Engineer	Ryan Rogge	Ryan Rogge	Ryan Rogge	Christopher Befort	Christopher Befort
Customer Representative	Frank Holubec	Frank Holubec	Frank Holubec	Clint Goen	Clint Goen

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	HCIM	HCIM	PCM	HCIM	HCIM
Software Version	88.56	88.56	5.84	88.56	88.56
Sub Serial Number	11368221	11280190	11633645	11425887	90373281
Insert Serial Number	11400437	11720257	11680801	11754867	11324296
Date and Time Initialized	12-Sep-13 04:17	14-Sep-13 13:51	18-Sep-13 01:50	19-Sep-13 23:04	27-Sep-13 12:17
Date and Time Read	14-Sep-13 10:28	17-Sep-13 17:54	20-Sep-13 01:10	27-Sep-13 04:54	28-Sep-13 18:20
ECMB SW Version	N/A	N/A	N/A	generic 1.1.1 Linux 2.6.23.1	generic 1.1.1 Linux 2.6.23.1

### Directional Sensor Information

Tool Type	PCDC	PCDC		PCDC	PCDC
Distance From Bit (ft)	57.00	57.00		59.48	59.18
Software Version	6.21	6.21		6.21	6.21
Sub Serial Number	11211045	247633		11627568	11991621
Sonde Serial Number	11902178	11638570		12177550	11638570
Sensor ID Number	N/A	N/A		N/A	N/A
Toolface Offset (deg)	6.97	35.95		158.08	303.12

### Gamma Ray Sensor Information

Tool Type	DGR	DGR	PCG	PCG	PCG
Distance From Bit (ft)	31.48	31.27	40.49	50.95	50.31
Recorded Sample Period (sec)	8	8	10	20	15
Software Version	N/A	N/A	8.15	8.15	8.15
Sub Serial Number	11384996	11644708	11633645	11542793	11626952
Insert/Sonde Serial Number	11569813	11641057	11680918	11681020	11680918

### Density Sensor Information

Tool Type				ALD	ALD
Distance From Bit (ft)				111.64	112.75
Recorded Sample Period (sec)				8	8
Software Version				3.04	3.04
Sub Serial Number				11753031	11433528
Insert Serial Number				10909603	88128
Sensor ID Number				2	32767
Source Serial Number				50160B	39383B
Pin Orientation				Down	Down
Stabilizer Blade O.D. (in)				5.75	5.75
DPA Offset				125.85	184.56

### Pressure Sensor Information

Tool Type				PWD	PWD
Distance From Bit (ft)				126.98	127.95
Recorded Sample Period (sec)				1	1
Software Version				4.12	4.12
Collar Serial Number				11331212	0
Insert Serial Number				11665309	0

### Pulser Controller Sensor Information

Tool Controller Sensor Information					
Tool Type	PCM	PCM	PCM	PCM	PCM
Software Version	8.17	8.17	5.84	8.17	8.17
PIC Software Version	N/A	N/A	1.40	N/A	N/A
Sub/HOC Serial Number	11211045	247633	11633645	11163199	11426049
Insert/Probe/Module SN	11145509	11680801	11680801	11680772	11680801
Battery Serial Number	N/A	N/A	N/A	N/A	N/A
Valve Insert SN	N/A	N/A	N/A	N/A	N/A
DC Insert Serial Number	N/A	N/A	N/A	N/A	N/A
Choke Size (32nd)	N/A	N/A	N/A	N/A	N/A
Driver Current (amps)	N/A	N/A	N/A	N/A	N/A
Driver SMI Current (amps)	N/A	N/A	N/A	N/A	N/A
Boot Strap Version	N/A	N/A	4,130.00	N/A	N/A

AFR Sensor Information					
Tool Type				AFR	AFR
Tool ID				4035	4037
Distance From Bit (ft)				101.93	103.04
Software Version				40.35	40.35
Recorded Sample Period (sec)				0	0
Tool Size				4.75"	4.75"
Stabilizer Size (in)				5.90	5.90
Button Blade Size (in)				5.79	5.79
Collar S/N				N/A	N/A
Insert S/N				00-50-C2-23-F8-	00-50-C2-23-F7-
Shallow K Factor					
Medium K Factor					
Deep K Factor					
RAB K Factor					
Date & Time Initialized				19-Sep-13 23:04	27-Sep-13 12:17
Date & Time Read					

DDSr-DGR Sensor Information					
Tool Type	DDSr-DGR	DDSr-DGR			
Distance From Bit (ft)	0	0			
Recorded Sample Period (sec)	12	12			
Software Version	10.88	10.72			
Sub Serial Number	11384996	11630009			
Insert Serial Number	11718117	11661819			
Sensor ID Number	8733	8197			

DDSr-HCIM Sensor Information					
Tool Type	DDSr-HCIM			DDSr-HCIM	DDSr-HCIM
Distance From Bit (ft)	0			0	0
Recorded Sample Period (sec)	8			12	12
Software Version	20.49			20.87	20.87
Sub Serial Number	11368221			11425887	
Insert Serial Number	11458919			12116291	11592537
Sensor ID Number	7165			9971	8135

ADR SENSOR INFORMATION					
Tool Type				ADR	ADR
Tool Orientation				Deep Receiver Down	Deep Receiver Down
Distance From SWRO to Bit (ft)				83.57	84.65
Recorded Sample Period (sec)				10	10
Tool SAP				11425890	11138629
Receiver Insert SAP				11494003	11520696

Receiver Insert SAP				11494003	11520090
Transmitter Insert SAP				11911880	11557188
Antenna Collar SAP				11425890	11138629
App Firmware Version				415	415
Processor Board FirmWare Version				306	306
Processor FPGA FirmWare Version				4	4
Transmitter PIC SW Version				1,025	1,025
Tool Size				4.75"	4.75"
Processor SIDS No.				281475276960553	18446744073709551615
Processor PCB Rev.				0	0
Receiver Board Upper SIDS No.				16607023626346726	16607023626649716
Receiver Board Upper PCB Rev.				0	0
Receiver Board Lower SIDS No.				16607023626187859	16607023626662491
Receiver Board Lower PCB Rev.				0	0
Receiver Board Deep SIDS No.				16607023626346179	16607023626288623
Receiver Board Deep PCB Rev.				0	0
Receiver Insert SIDS No.				11258999110155558	11258999086719578
Transmitter Insert SIDS No.				4503634027976693	4503634022050133
Antenna Collar SIDS No.				12666373982990077	0

WELL INFORMATION					
MWD Run Number	600	700	800		
Date run completed	01-Oct-13	02-Oct-13	05-Oct-13		
Rig Bit Number	7	8	9		
Bit Size (in)	6.000	6.000	6.000		
Tool Nominal OD (in)	4.750	4.750	4.710		
Log Start Depth (MD, ft)	14,564.00	16,027.00	16,027.00		
Log End Depth (MD, ft)	16,027.00	16,027.00	16,539.00		
Drill or Wipe	Drill	Drill	Drill and Wipe		
Drill/Wipe Start Date and Time	29-Sep-13 08:51	01-Oct-13 12:56	03-Oct-13 01:30		
Drill/Wipe End Date and Time	30-Sep-13 23:30	01-Oct-13 12:56	03-Oct-13 22:00		
Min Inc (deg) @ Depth (MD, ft)	88.52 @ 14,582.00	0 @ 0	90.18 @ 16,323.00		
Max Inc (deg) @ Depth (MD, ft)	91.17 @ 14,867.00	0 @ 0	91.54 @ 16,164.00		
Bit TFA(in2) / Bit Type	.98 / PDC	.98 / PDC	.98 / PDC		
Flow Rate (gpm)	268.48	270.00	266.25		
Max AV (fpm) / CV (fpm) @ MWD	327.0 / 456.0	350.0 / 375.0	350.0 / 375.0		
Fluid Type	Polymer	Fresh Water Gel	Polymer		
Density (ppg) / Viscosity (spqt)	9.35 / 40.00	9.20 / 40.00	9.45 / 42.00		
Filtrate CL (ppm)	2,700.00	2,600.00	2,600.00		
pH / Fluid Loss (mptm)	8.40 / 0	8.40 / 0	7.90 / 0		
PV (cP) / YP (lbf2)	15 / 13.00	15 / 13.00	15 / 17.00		
% Solids / % Sand	6.20 / 0.25	6.7 / 0.25	6.20 / 0.25		
% Oil / Oil:Water Ratio	N/A / N/A	N/A / N/A	N/A / N/A		
Rm @ Measured Temp (degF)	1.600 @ 72.00	1.610 @ 71.00	N/A @ N/A		
Rmf @ Measured Temp (degF)	1.600 @ 68.00	1.610 @ 68.00	N/A @ N/A		
Rmc @ Measured Temp (degF)	1.600 @ 71.00	1.600 @ 71.00	N/A @ N/A		
Max Tool Temp (degF) / Source	243.76 / HCIM	204.94 / HCIM	239.54 / N/A		
Rm @ Max Tool Temp (degF)	.5031 @ 243.76	.5914 @ 204.94	N/A @ N/A		
Lead MWD Engineer	Christopher Befort	Christopher Befort	Christopher Befort		
Customer Representative	Clint Goen	Richard Perez	Richard Perez		

## SENSOR INFORMATION

Downhole Processor Information					
Tool Type	HCIM	HCIM	PCM		
Software Version	88.56	88.56	5.84		
Sub Serial Number	11425887	11862964	12187591		

Insert Serial Number	11754867	11324296	11680772		
Date and Time Initialized	28-Sep-13 21:38	01-Oct-13 17:35	02-Oct-13 06:27		
Date and Time Read	01-Oct-13 10:15	02-Oct-13 04:35	05-Oct-13 13:48		
ECMB SW Version	N/A	N/A	N/A		

### Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	59.92	61.00	64.26		
Software Version	6.21	6.21	6.21		
Sub Serial Number	11627568	11627569	12187591		
Sonde Serial Number	12177550	12177550	11297555		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	339.12	99.48	72.14		

### Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG		
Distance From Bit (ft)	50.93	50.20	59.22		
Recorded Sample Period (sec)	15	10	10		
Software Version	8.15	8.15	8.15		
Sub Serial Number	11542793	11542793	12187591		
Insert/Sonde Serial Number	11681020	11681020	11680985		

### Density Sensor Information

Tool Type	ALD				
Distance From Bit (ft)	113.46				
Recorded Sample Period (sec)	8				
Software Version	3.04				
Sub Serial Number	11753031				
Insert Serial Number	10909603				
Sensor ID Number	N/A				
Source Serial Number	50160B				
Pin Orientation	Down				
Stabilizer Blade O.D. (in)	5.75				
DPA Offset	195.25				

### Pressure Sensor Information

Tool Type	PWD	PWD			
Distance From Bit (ft)	128.80	113.78			
Recorded Sample Period (sec)	1	1			
Software Version	4.12	4.12			
Collar Serial Number	11331212	11331212			
Insert Serial Number	11665309	11665309			

### Pulser Controller Sensor Information

Tool Type	PCM	PCM	PCM		
Software Version	8.17	8.17	5.84		
PIC Software Version	N/A	N/A	1.40		
Sub/HOC Serial Number	11633645	11163199	12187591		
Insert/Probe/Module SN	N/A	11400845	11680772		
Battery Serial Number	N/A	N/A	N/A		
Valve Insert SN	N/A	N/A	N/A		
DC Insert Serial Number	N/A	N/A	N/A		
Choke Size (32nd)	N/A	N/A	N/A		
Driver Current (amps)	N/A	N/A	N/A		
Driver SMI Current (amps)	N/A	N/A	N/A		
Boot Stran Version	N/A	N/A	4 130 00		

AFR Sensor Information					
Tool Type	AFR	AFR			
Tool ID	4035	4034			
Distance From Bit (ft)	103.75	103.09			
Software Version	40.35	40.35			
Recorded Sample Period (sec)	0	0			
Tool Size	4.75"	4.75"			
Stabilizer Size (in)	5.78	5.78			
Button Blade Size (in)	5.67	5.67			
Collar S/N	N/A	N/A			
Insert S/N	00-50-C2-23-F8-	00-50-C2-23-F8-			
Shallow K Factor					
Medium K Factor					
Deep K Factor					
RAB K Factor					
Date & Time Initialized	28-Sep-13 21:38	01-Oct-13 17:35			
Date & Time Read					

DDSr-DGR Sensor Information					
Tool Type					
Distance From Bit (ft)					
Recorded Sample Period (sec)					
Software Version					
Sub Serial Number					
Insert Serial Number					
Sensor ID Number					

DDSr-HCIM Sensor Information					
Tool Type	DDSr-HCIM	DDSr-HCIM			
Distance From Bit (ft)	0	0			
Recorded Sample Period (sec)	12	8			
Software Version	20.87	20.87			
Sub Serial Number	90375827	11862964			
Insert Serial Number	12032226	270736			
Sensor ID Number	9971	6585			

ADR SENSOR INFORMATION					
Tool Type	ADR	ADR			
Tool Orientation	Deep Receiver Down	Deep Receiver Down			
Distance From SWRO to Bit (ft)	85.39	84.71			
Recorded Sample Period (sec)	10	10			
Tool SAP	11425890	11275905			
Receiver Insert SAP	11494003	11324296			
Transmitter Insert SAP	11911880	11661596			
Antenna Collar SAP	11425890	11275905			
App Firmware Version	415	415			
Processor Board FirmWare Version	306	306			
Processor FPGA FirmWare Version	4	4			
Transmitter PIC SW Version	1,025	1,025			
Tool Size	4.75"	4.75"			
Processor SIDS No.	281475276960553	281475276964646			
Processor PCB Rev.	0	0			
Receiver Board Upper SIDS No.	16607023626346726	16607023626211554			
Receiver Board Upper PCB Rev.	0	0			
Receiver Board Lower SIDS No.	16607023626187859	16607023626215284			

Receiver Board Lower SIDS No.	0	0			
Receiver Board Deep SIDS No.	16607023626346179	16607023626216721			
Receiver Board Deep PCB Rev.	0	0			
Receiver Insert SIDS No.	11258999110155558	11258999094197754			
Transmitter Insert SIDS No.	4503634027976693	4503634013587499			
Antenna Collar SIDS No.	12666373982990077	12666373982987984			

## REMARKS

1. All depths 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. Environmental parameters used to process gamma ray and density are as follows:  

Hole Size: 6"  
Matrix Density: 2.66 g/cc  
Mud Density: 9.25 to 9.45 ppg
5. Average Comp Density ALD data is presented.
6. The following smoothing parameters have been applied to the data:  

ROP: 0.5 ft interval, 1.2 ft coercion distance  
All other curves: 0.5 ft interval, 0.6 ft coercion distance
7. Run 300 was a gamma only drill out run and contains no surveys.
8. Run 500 Failed AFR and flat line pulse.
9. Run 600 ADR failed to respond from 15509' to 15603'
10. Run 700 Pulse flat line.

## WARRANTY

HALLIBURTON WILL USE ITS BEST EFFORTS TO FURNISH CUSTOMERS WITH ACCURATE INFORMATION AND INTERPRETATIONS THAT ARE PART OF, AND INCIDENT TO, THE SERVICES PROVIDED. HOWEVER, HALLIBURTON CANNOT AND DOES NOT WARRANT THE ACCURACY OR CORRECTNESS OF SUCH INFORMATION AND INTERPRETATIONS. UNDER NO CIRCUMSTANCES SHOULD ANY SUCH INFORMATION OR INTERPRETATION BE RELIED UPON AS THE SOLE BASIS FOR ANY DRILLING, COMPLETION, PRODUCTION, OR FINANCIAL DECISION OR ANY PROCEDURE INVOLVING ANY RISK TO THE SAFETY OF ANY DRILLING VENTURE, DRILLING RIG OR ITS CREW OR ANY OTHER THIRD PARTY. THE CUSTOMER HAS FULL RESPONSIBILITY FOR ALL DRILLING, COMPLETION AND PRODUCTION OPERATION. HALLIBURTON MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO THE SERVICES RENDERED. IN NO EVENT WILL HALLIBURTON BE LIABLE FOR FAILURE TO OBTAIN ANY PARTICULAR RESULTS OR FOR ANY DAMAGES, INCLUDING, BUT NOT LIMITED TO, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES, RESULTING FROM THE USE OF ANY INFORMATION OR INTERPRETATION PROVIDED BY HALLIBURTON.

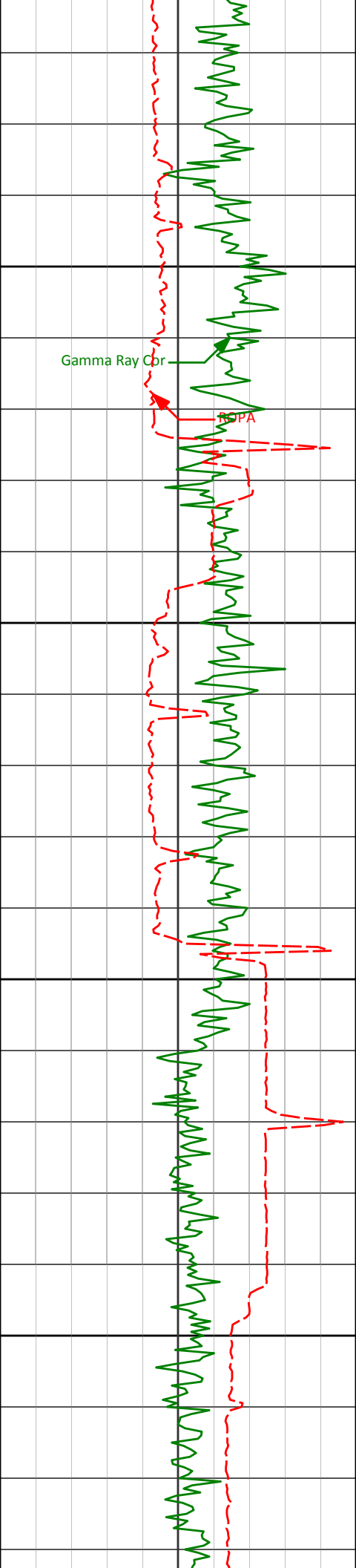
**HALLIBURTON**  
**Sperry Drilling Services**

MD Detail Log 1:240

Conoco Phillips Company







2119'

0.82°

186.03°

2118.82'

13.31'

2150

Gamma Ray Cpr

TPA

2200

2214'

0.91°

175.36°

2213.81'

13.16'

2250

2300

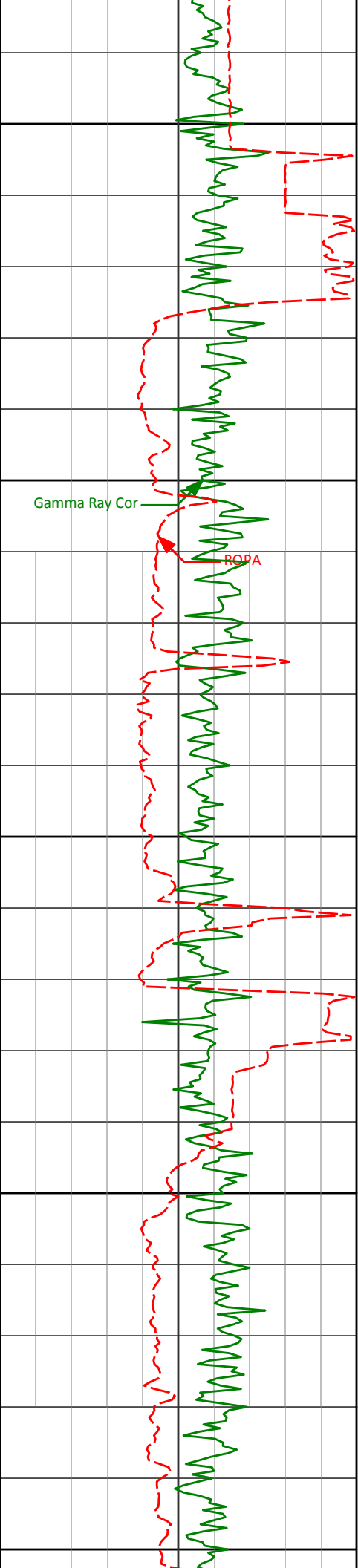
2309'

0.86°

179.80°

2308.80'

12.93'



2350

2400

2450

2500

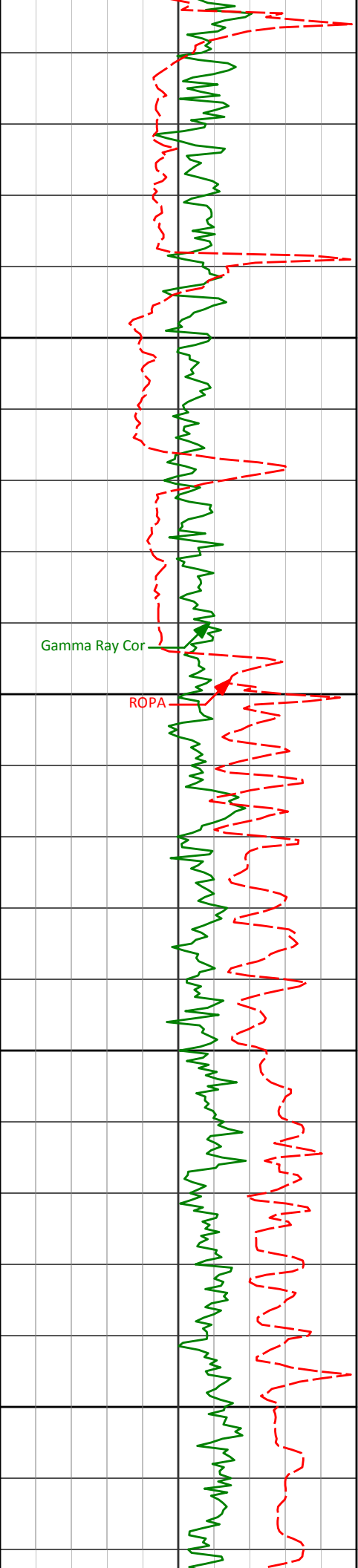
2550

Gamma Ray Cor

ROPA

2404'	0.56°	124.82°	2403.79'	12.44'
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2499'	1.11°	74.23°	2498.78'	11.18'
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2600

2650

2700

2750

2593'

1.14°

73.12°

2592.77'

9.48'

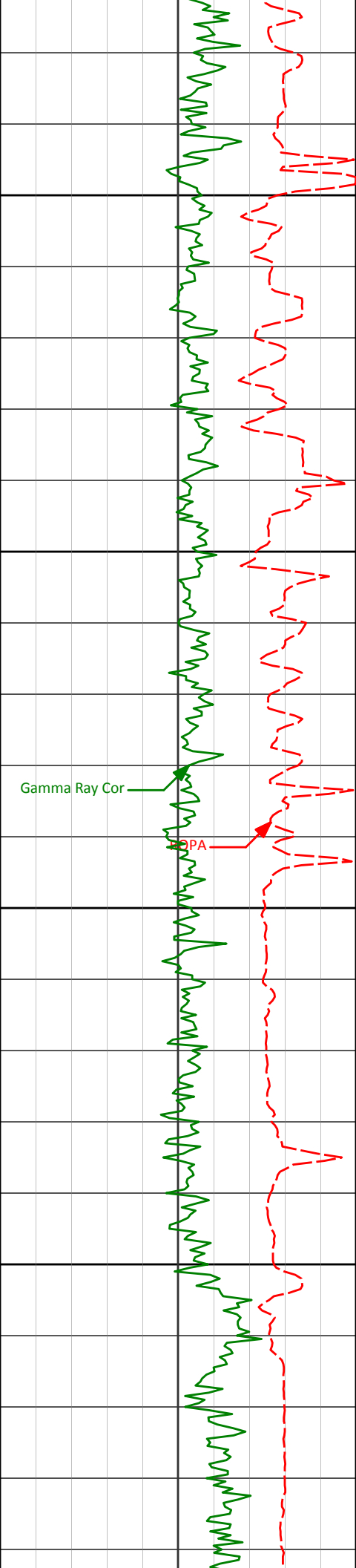
2688'

1.33°

69.13°

2687.74'

7.63'



2800

2850

2900

2950

2783'

1.41°

67.91°

2782.72'

5.63'

2878'

1.52°

72.62°

2877.69'

3.45'

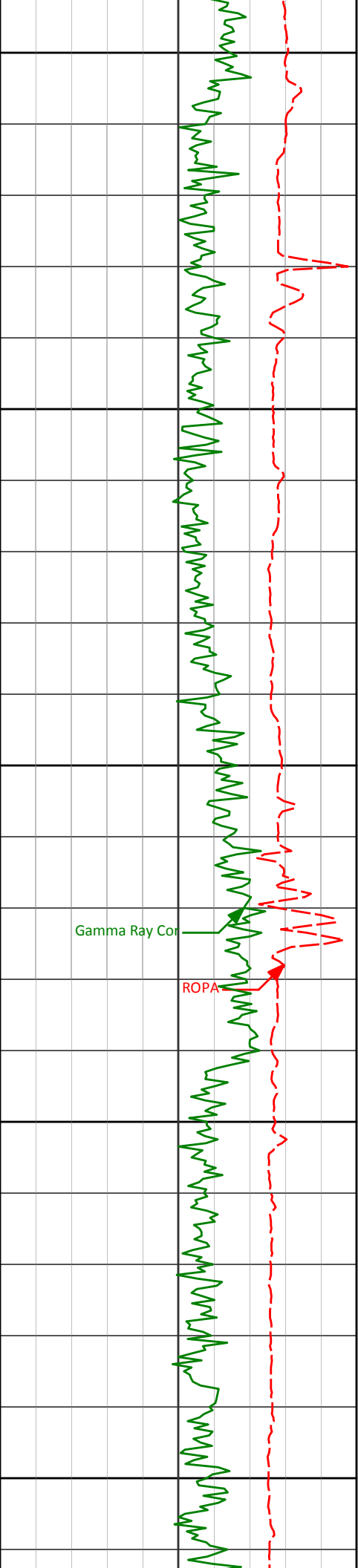
2973'

1.54°

71.38°

2972.65'

1.14'



3000

3050

3100

3150

3200

3068'

1.33°

73.17°

3067.62'

-1.02'

Gamma Ray Cor

ROPA

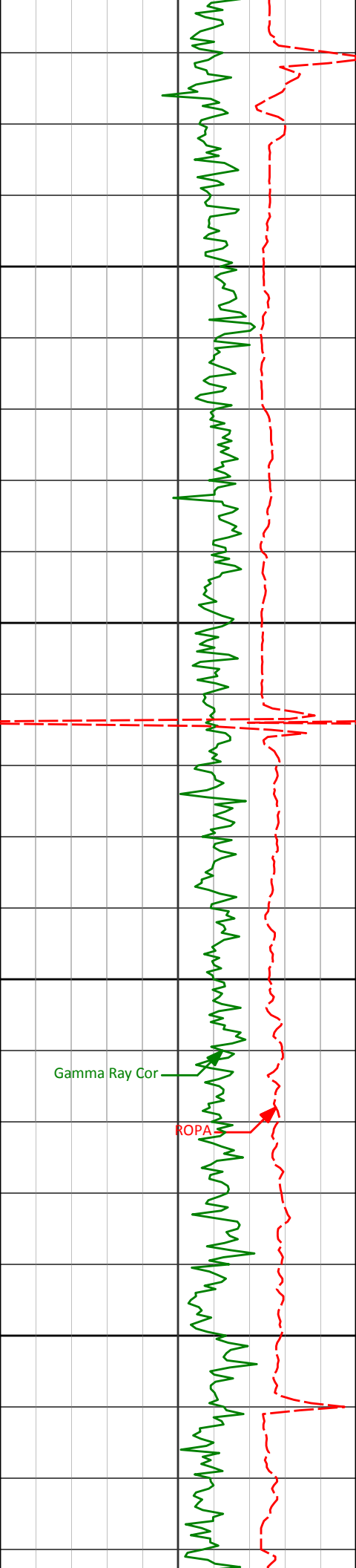
3163'

1.25°

82.92°

3162.60'

-3.04'



3250

3258'

1.25°

83.02°

3257.58'

-5.05'

3300

3350

3353'

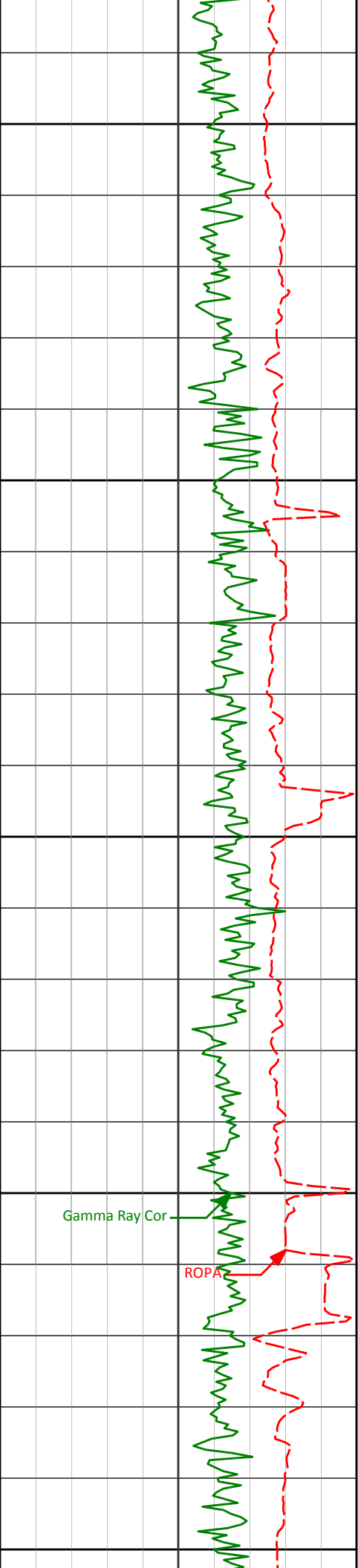
1.33°

86.20°

3352.55'

-7.15'

3400



3450

3500

3550

3600

3650

3448'

3543'

3638'

1.28°

1.00°

0.50°

80.65°

96.11°

345.13°

3447.53'

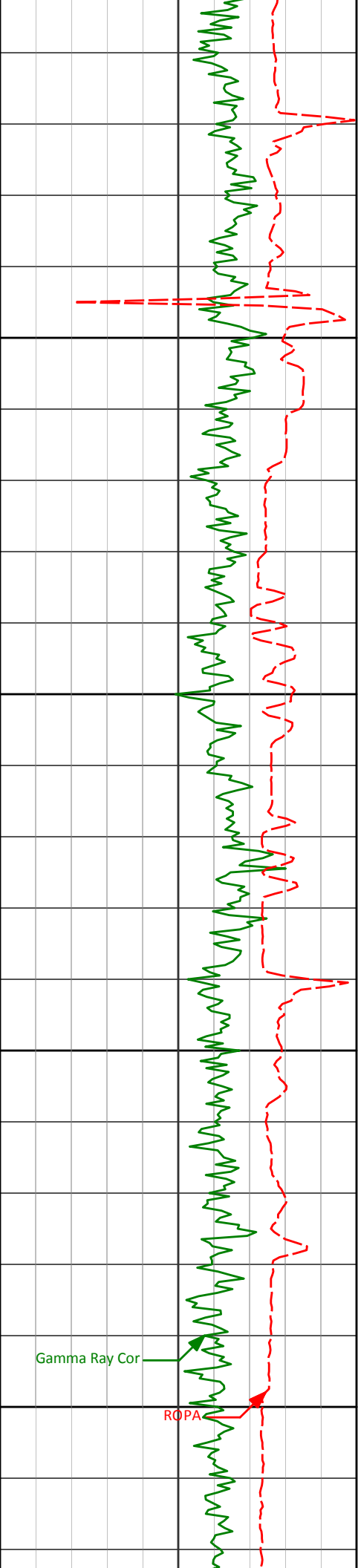
3542.51'

3637.50'

-9.26'

-11.11'

-11.78'



3700

3733'

1.05°

330.49°

3732.49'

-11.12'

3750

3800

3828'

1.25°

327.93°

3827.48'

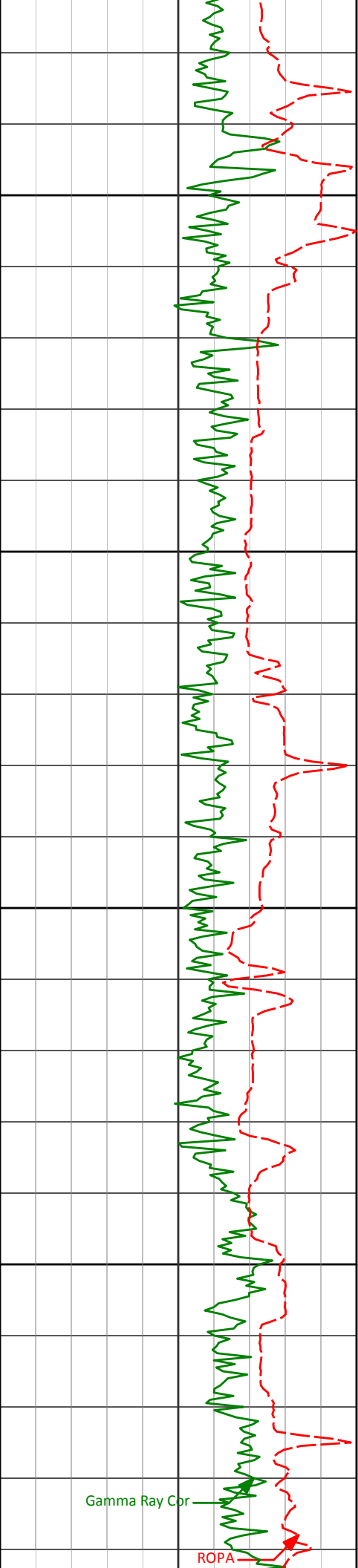
-9.96'

3850

Gamma Ray Cor

ROPA





3900

3950

4000

4050

3923'

0.25°

110.09°

3922.47'

-9.51'

4017'

0.69°

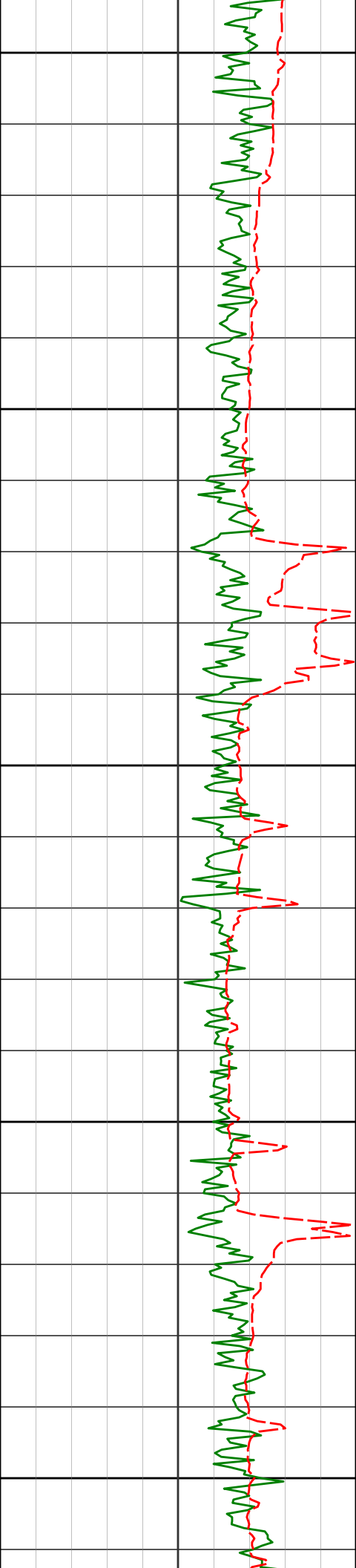
115.29°

4016.47'

-10.25'

Gamma Ray Cor

ROPA



4100

4112'

0.74°

101.39°

4111.46'

-11.41'

4150

4200

4207'

0.56°

285.22°

4206.46'

-11.57'

4250

4300

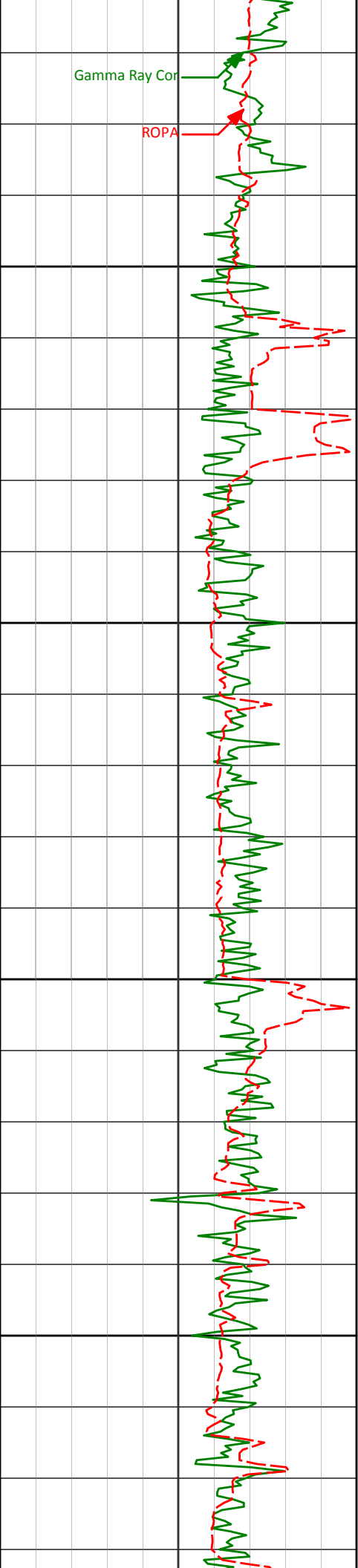
4302'

0.74°

310.71°

4301.45'

-10.60'



Gamma Ray Cor

ROPA

4350

4400

4450

4500

4397'

0.58°

8.90°

4396.44'

-10.11'

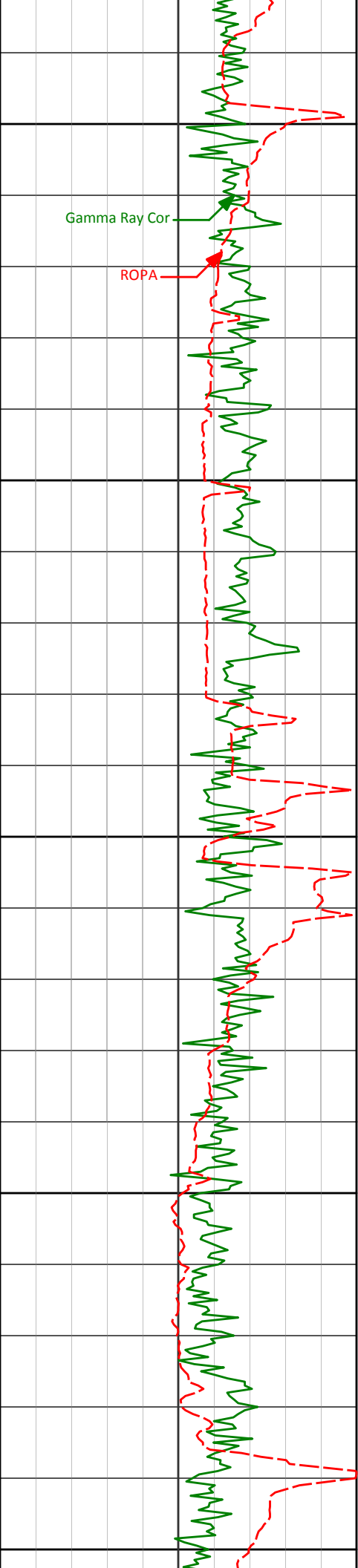
4492'

0.67°

21.35°

4491.44'

-10.27'



4550

Gamma Ray Cor

ROPA

4600

4650

4700

4750

4587'

1.00°

10.11°

4586.43'

-10.46'

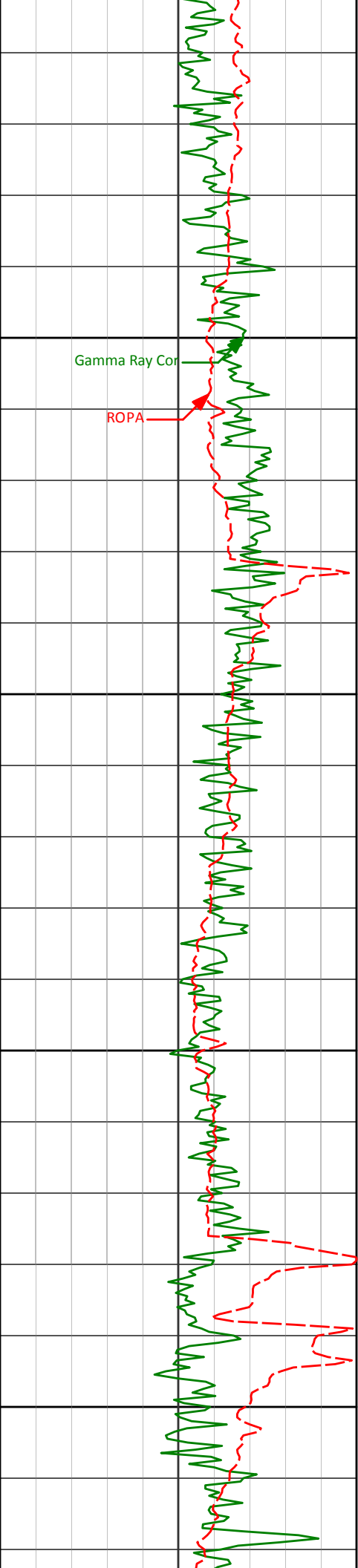
4682'

0.39°

6.37°

4681.42'

-10.51'



4800

4850

4900

4950

4777'

0.20°

313.07°

4776.42'

-10.38'

4872'

0.58°

256.00°

4871.42'

-9.79'

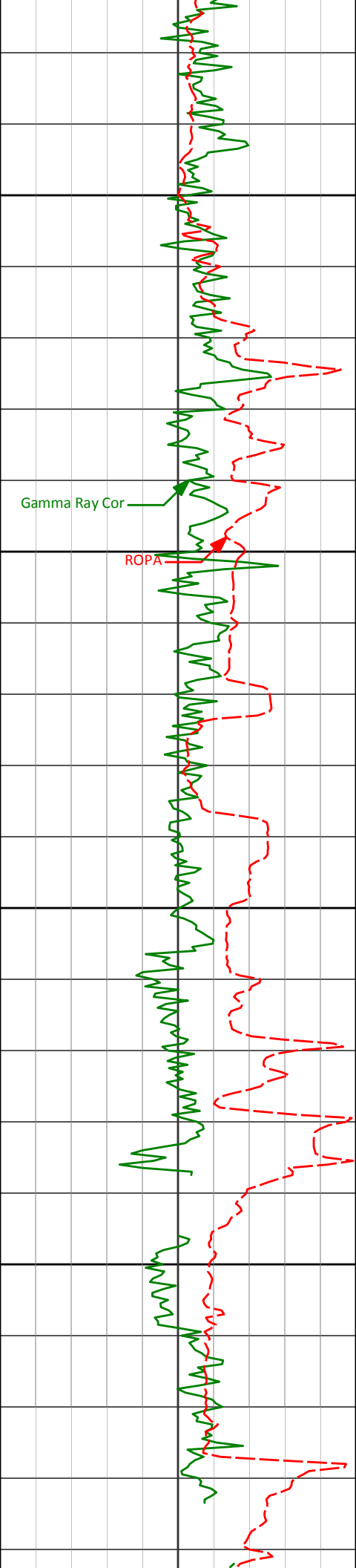
4967'

0.33°

261.38°

4966.41'

-9.08'



5000

5050

5100

5150

5062'

0.50°

256.75°

5061.41'

-8.42'

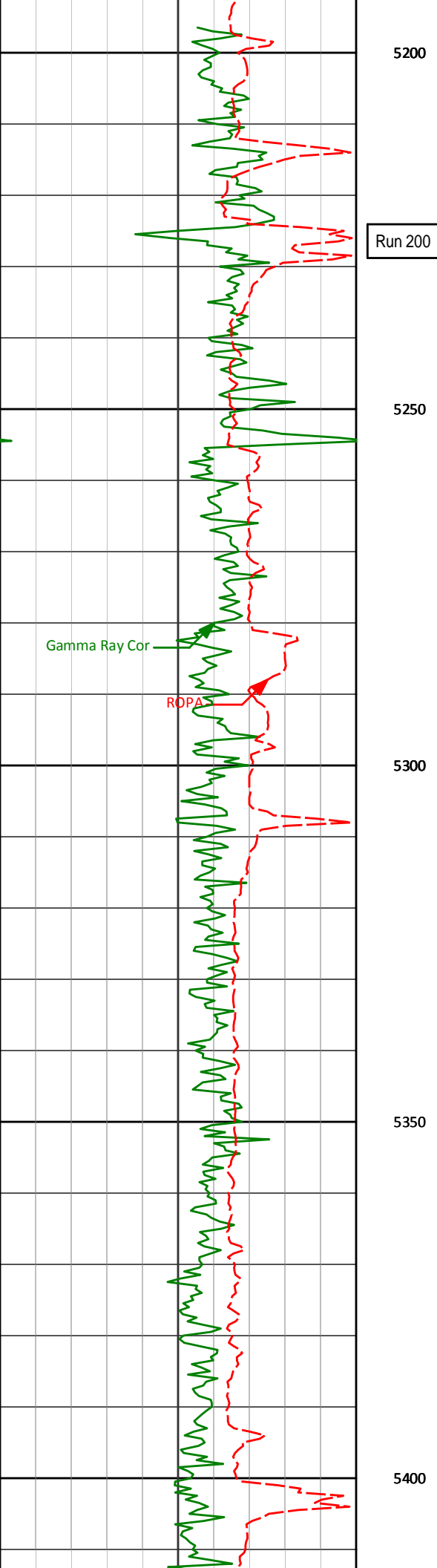
5157'

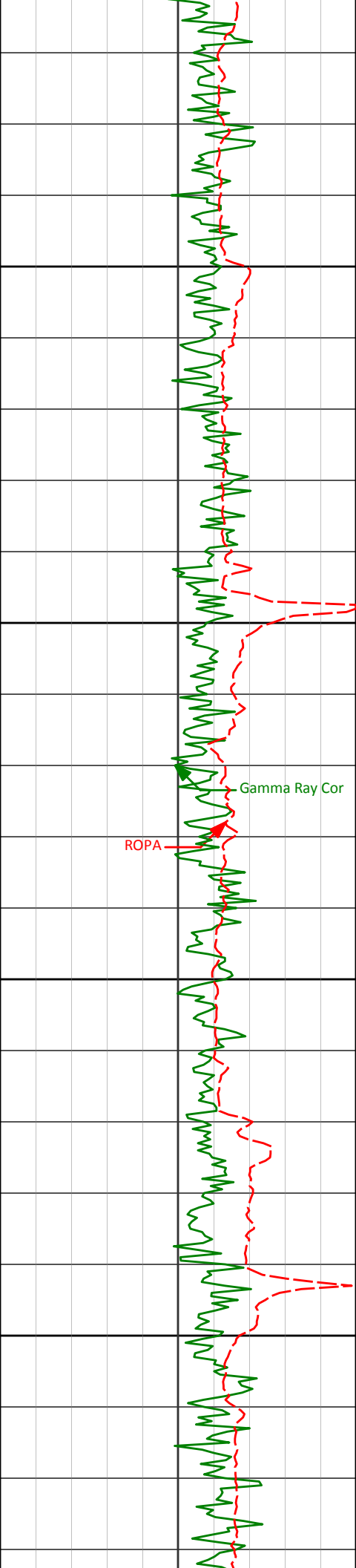
0.31°

235.53°

5156.41'

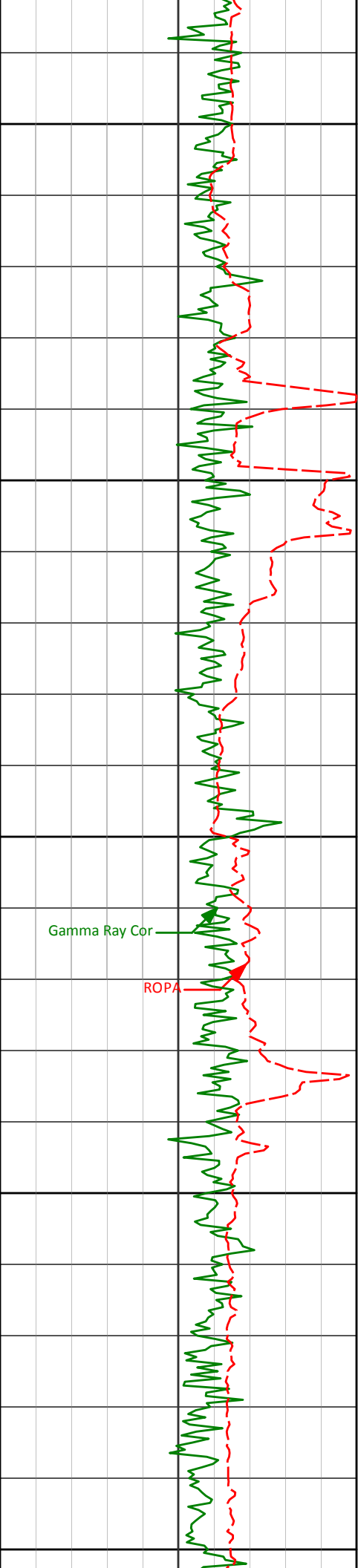
-7.84'





5441'	0.22°	277.31°	5440.41'	-7.17'
5450				
5500				
5536'	0.31°	340.70°	5535.41'	-6.87'
5550				
5600				
5631'	0.64°	340.75°	5630.40'	-6.53'





5650

5700

5726'

0.20°

27.58°

5725.40'

-6.35'

5750

Gamma Ray Cor

ROPA

5800

5821'

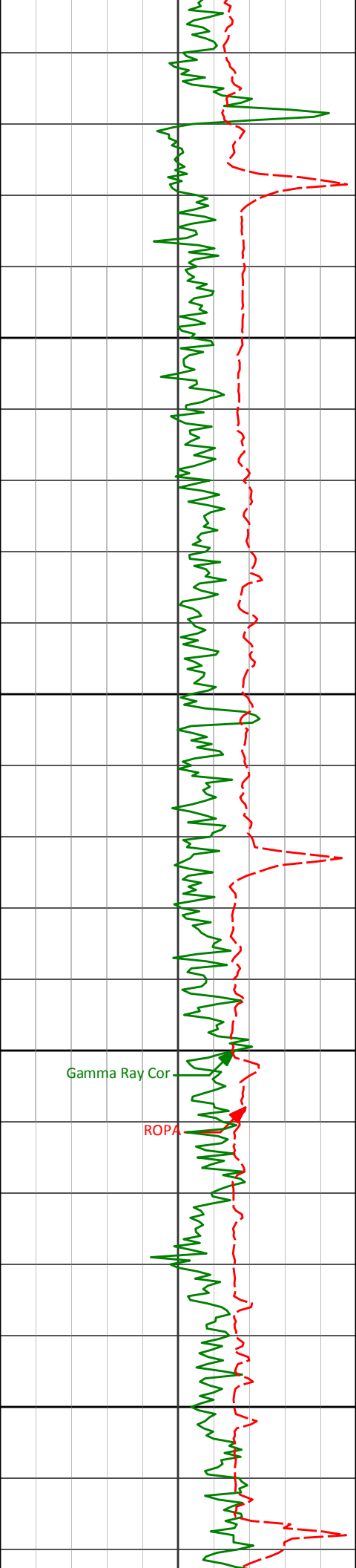
0.14°

34.39°

5820.40'

-6.47'

5850



5900

5916'

0.36°

38.58°

5915.40'

-6.68'

5950

6000

Gamma Ray Cor

ROPA

6011'

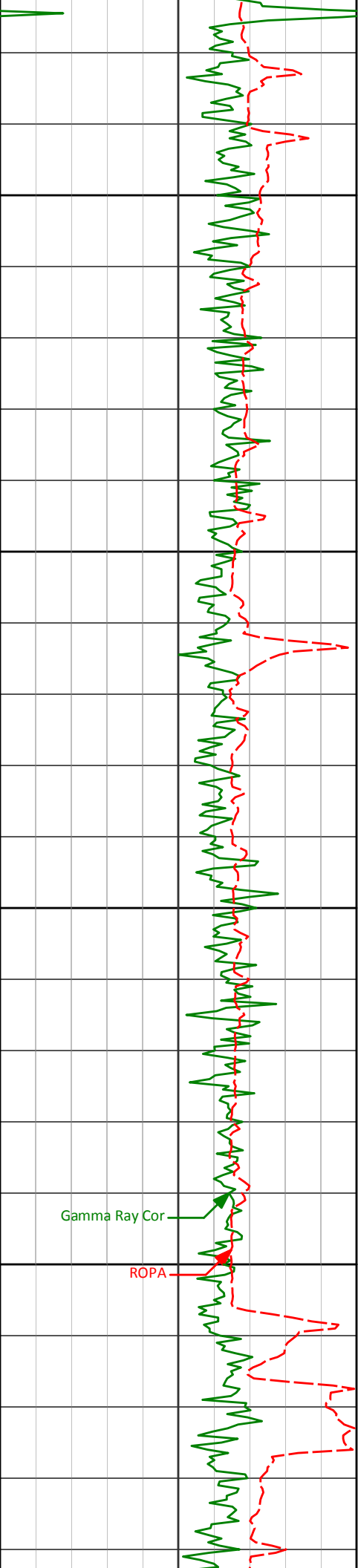
0.36°

29.13°

6010.40'

-6.95'

6050



6100

6106'

0.17°

34.46°

6105.40'

-7.13'

6150

6200

6201'

0.64°

63.64°

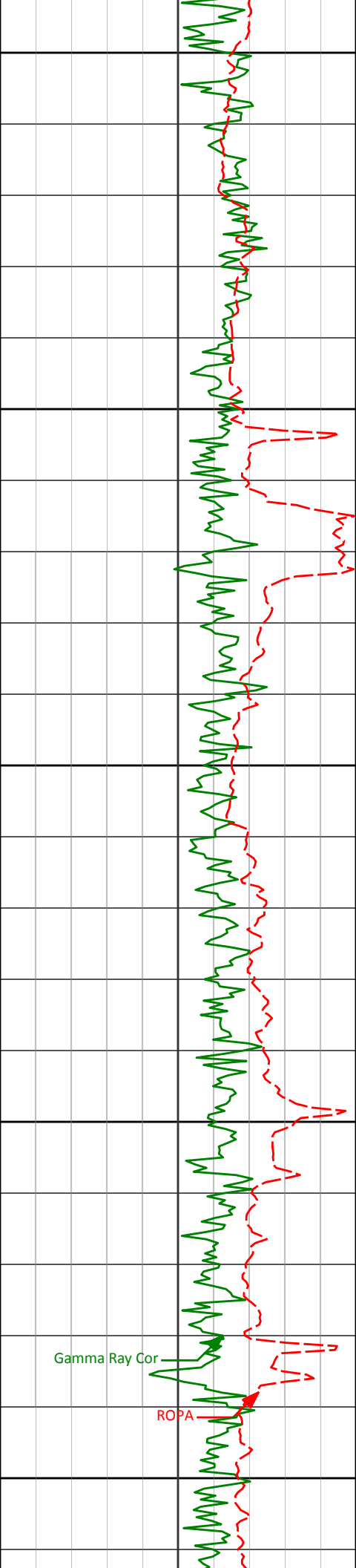
6200.39'

-7.64'

6250

Gamma Ray Cor

ROPA



6300

6350

6400

6450

6500

6296'

0.77°

42.33°

6295.39'

-8.46'

6391'

0.72°

350.30°

6390.38'

-8.66'

6486'

0.47°

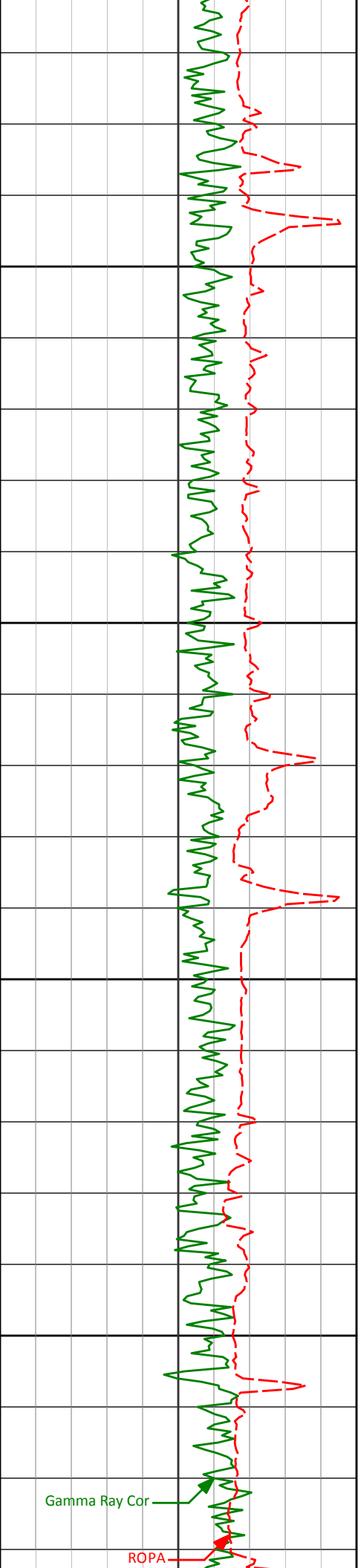
347.20°

6485.37'

-8.37'

Gamma Ray Cor

ROPA



6550

6600

6650

6700

6581'

0.19°

5.39°

6580.37'

-8.23'

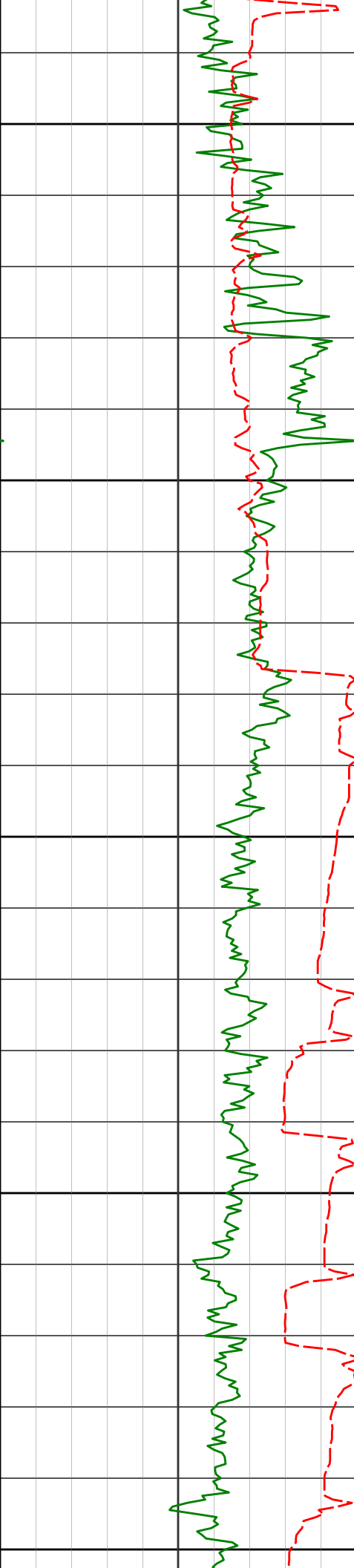
6676'

0.22°

8.11°

6675.37'

-8.23'



6750

6771'

0.31°

9.55°

6770.37'

-8.25'

6800

6834'

1.16°

297.83°

6833.37'

-7.67'

6850

6866'

5.15°

281.20°

6865.31'

-5.93'

6900

6897'

8.37°

284.90°

6896.09'

-2.31'

6950

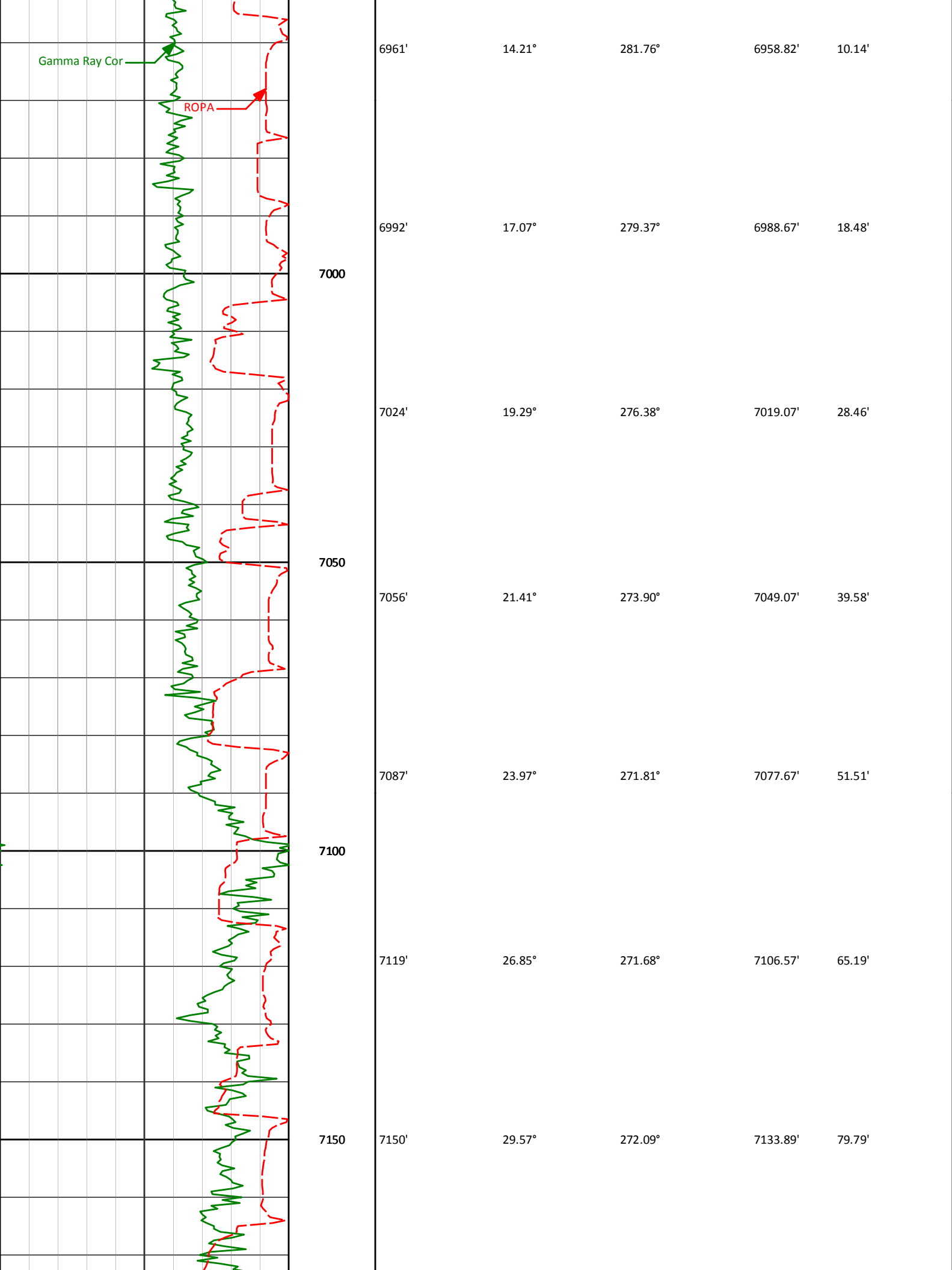
6929'

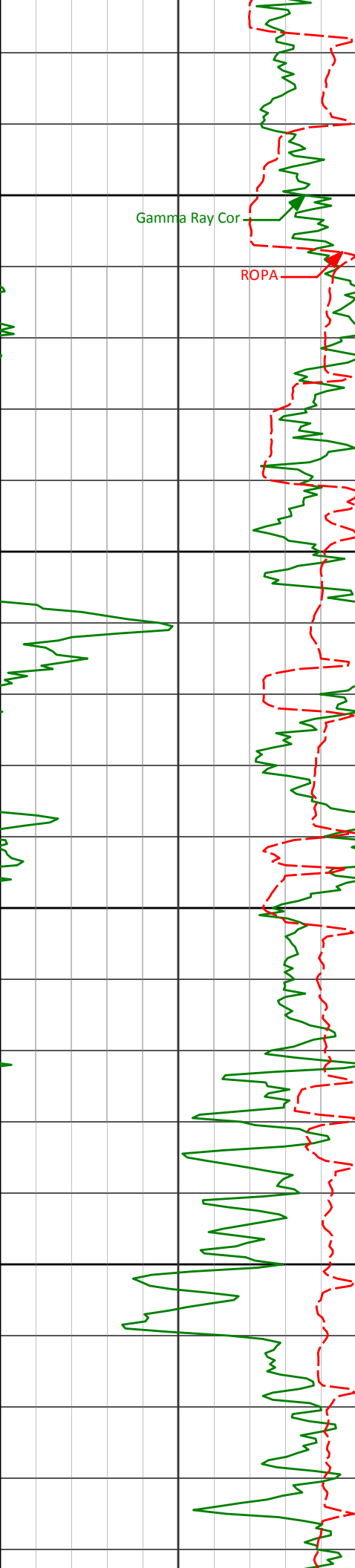
11.35°

284.71°

6927.62'

3.11'





7200

7250

7300

7350

7182'

31.96°

274.11°

7161.38'

96.12'

7214'

34.21°

275.26°

7188.19'

113.58'

7245'

36.28°

276.63°

7213.51'

131.47'

7277'

39.70°

278.02°

7238.73'

151.16'

7309'

42.95°

277.85°

7262.75'

172.28'

7340'

45.51°

277.47°

7284.97'

193.90'

7372'

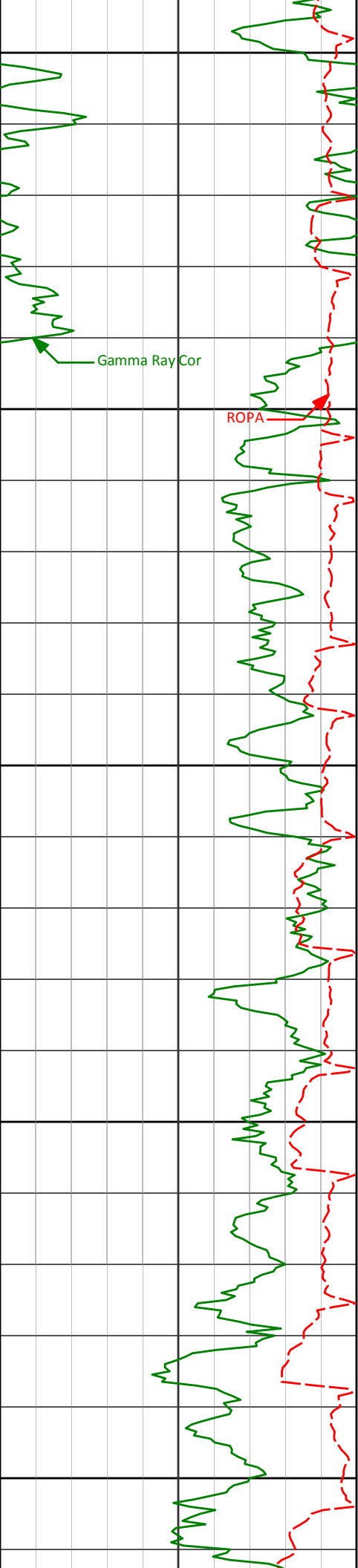
48.16°

276.41°

7306.86'

217.24'





7400

7404'	51.37°	276.15°	7327.52'	241.66'
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7435'	55.01°	276.00°	7346.10'	266.47'
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7450

7467'	58.62°	276.11°	7363.61'	293.25'
-------	--------	---------	----------	---------

7500

7499'	62.10°	276.04°	7379.43'	321.05'
-------	--------	---------	----------	---------

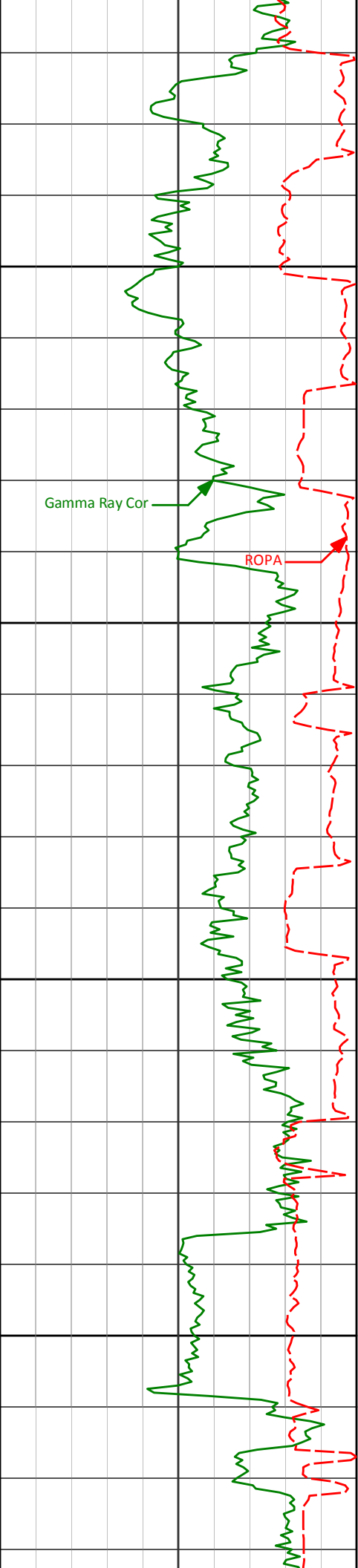
7530'	65.49°	276.41°	7393.12'	348.86'
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7550

7562'	68.76°	276.89°	7405.56'	378.34'
-------	--------	---------	----------	---------

7593'	71.67°	277.08°	7416.05'	407.51'
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7600



7650

7625'	74.04°	277.17°	7425.48'	438.09'
-------	--------	---------	----------	---------

7657'	76.60°	277.65°	7433.59'	469.03'
-------	--------	---------	----------	---------

7688'	79.56°	277.73°	7440.00'	499.36'
-------	--------	---------	----------	---------


7700

7720'	83.31°	277.32°	7444.76'	530.99'
-------	--------	---------	----------	---------

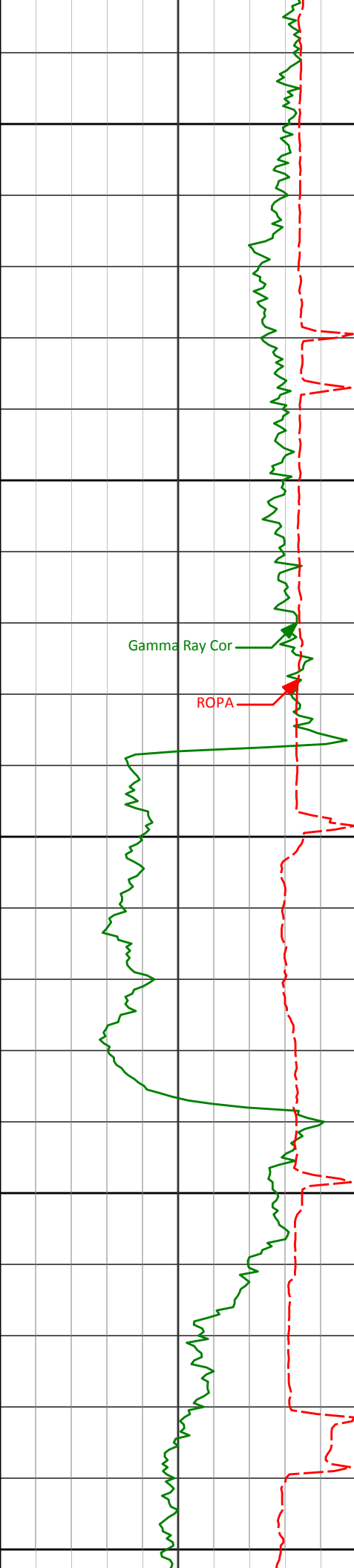
7750

7759'	87.77°	277.05°	7447.80'	569.86'
-------	--------	---------	----------	---------

7800

 Casing Set 7806' MD

Run 300



8050

Run 400

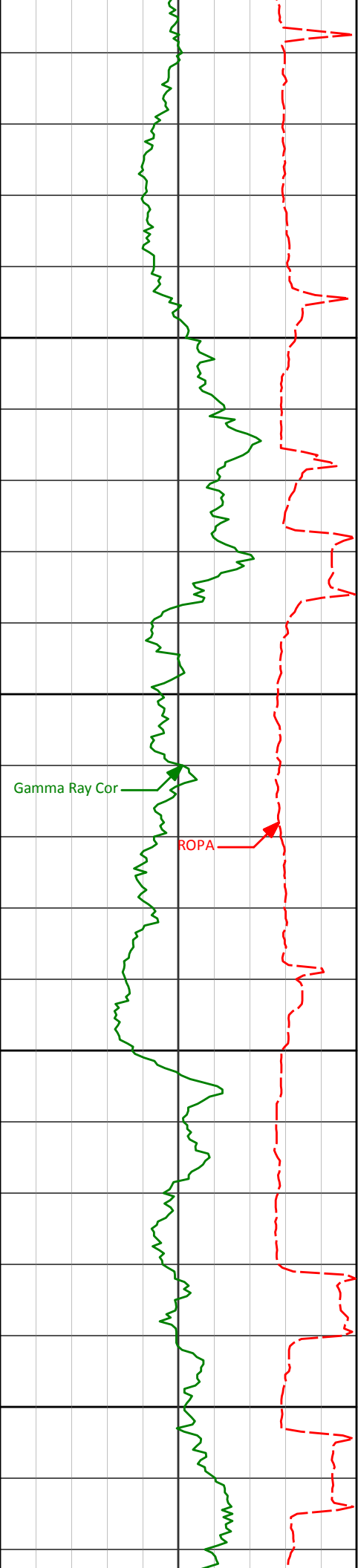
8032'

89.38°

278.21°

7451.11'

842.68'



8100

8064'

89.51°

278.05°

7451.42'

874.67'

8127'

89.38°

277.77°

7452.03'

937.65'

8150

8159'

89.14°

277.46°

7452.45'

969.64'

8190'

89.14°

277.45°

7452.92'

1000.64'

8200

8222'

89.07°

277.50°

7453.42'

1032.63'

8250

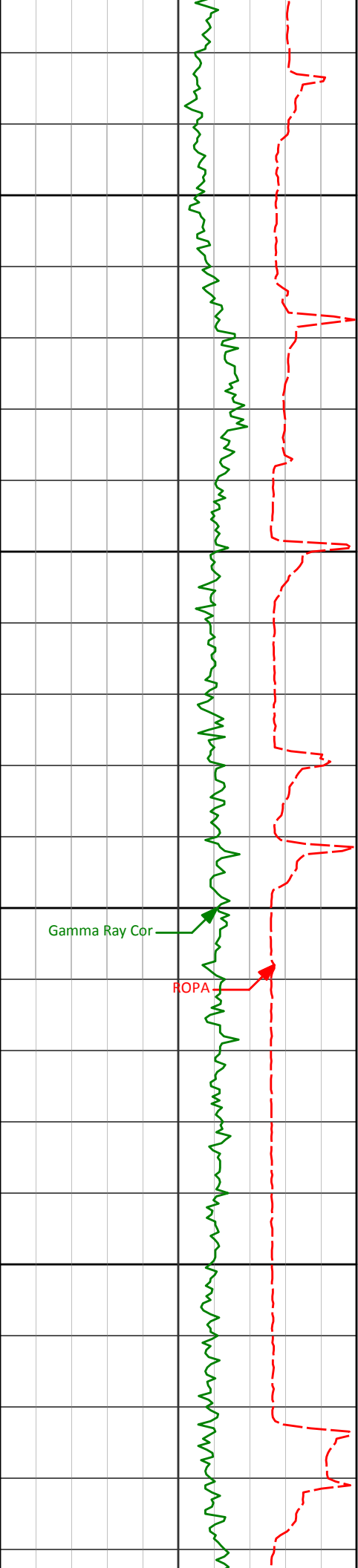
8253'

89.63°

276.30°

7453.77'

1063.63'



8300

8350

8400

8450

8285'

90.12°

276.23°

7453.83'

1095.63'

8317'

90.62°

276.30°

7453.63'

1127.62'

8412'

89.57°

275.56°

7453.47'

1222.61'

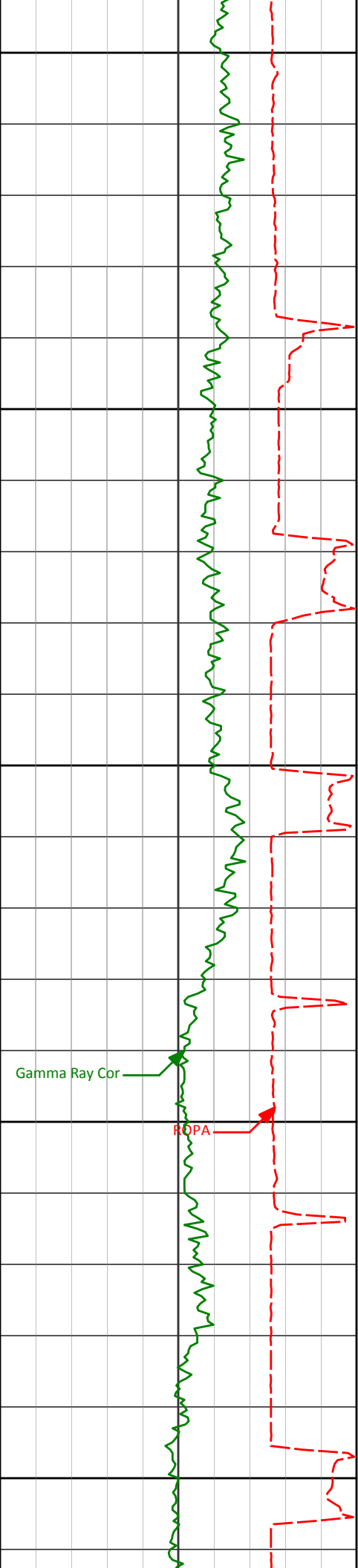
8475'

89.75°

275.08°

7453.85'

1285.60'



8500

8507'

89.38°

274.67°

7454.09'

1317.58'

8550

8600

8601'

89.75°

274.22°

7454.80'

1411.51'

8650

8700

8696'

89.94°

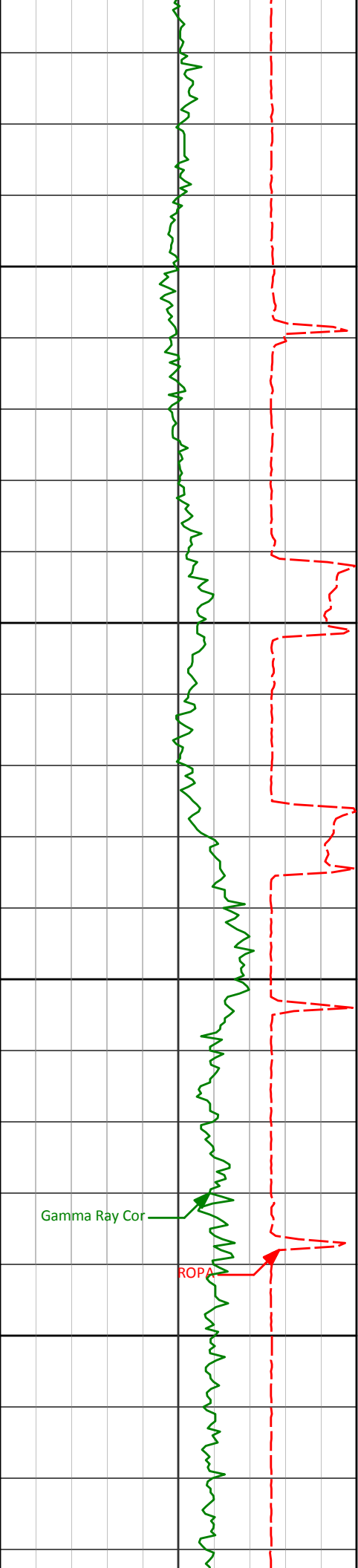
274.71°

7455.05'

1506.44'

Gamma Ray Cor

ROPA



8750

8791'

88.95°

275.52°

7455.97'

1601.40'

8800

8850

8900

Gamma Ray Cor

ROPA

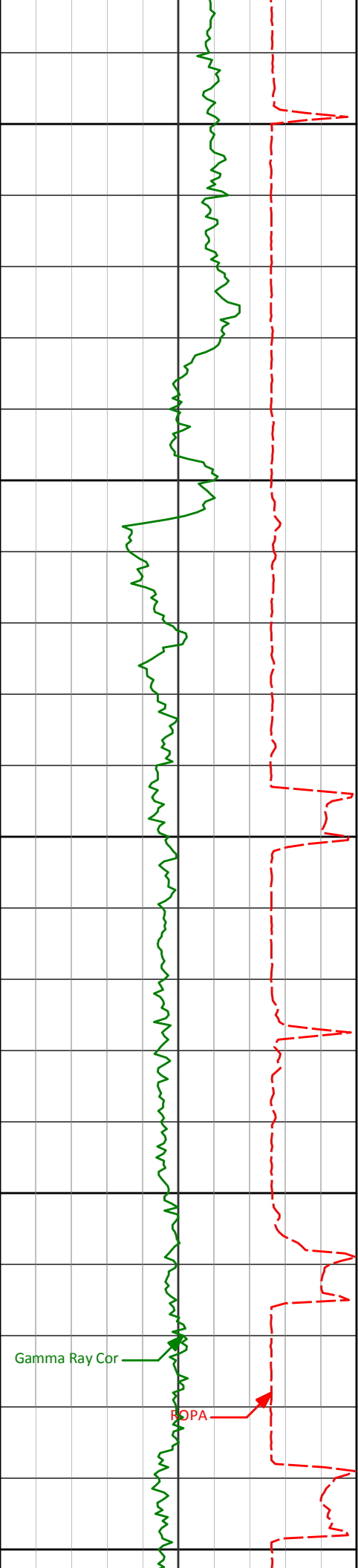
8886'

89.81°

275.94°

7457.00'

1696.39'



8950

8981'

90.25°

276.25°

7456.95'

1791.38'

9000

9050

9076'

90.43°

277.03°

7456.38'

1886.38'

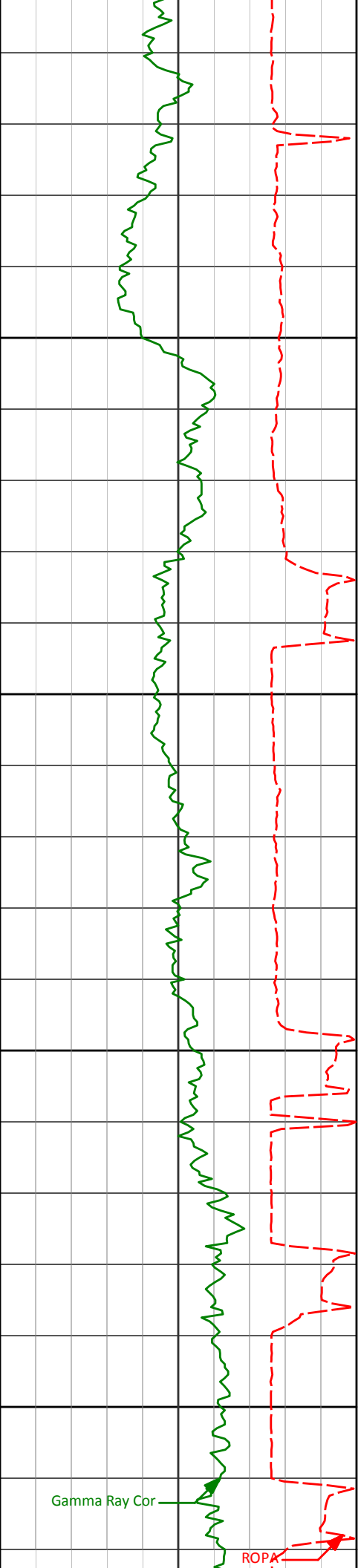
9100

9150

Gamma Ray Cor

ROPA





9200

9250

9300

9350

9171'

87.47°

276.57°

7458.13'

1981.35'

9266'

88.02°

276.91°

7461.86'

2076.28'

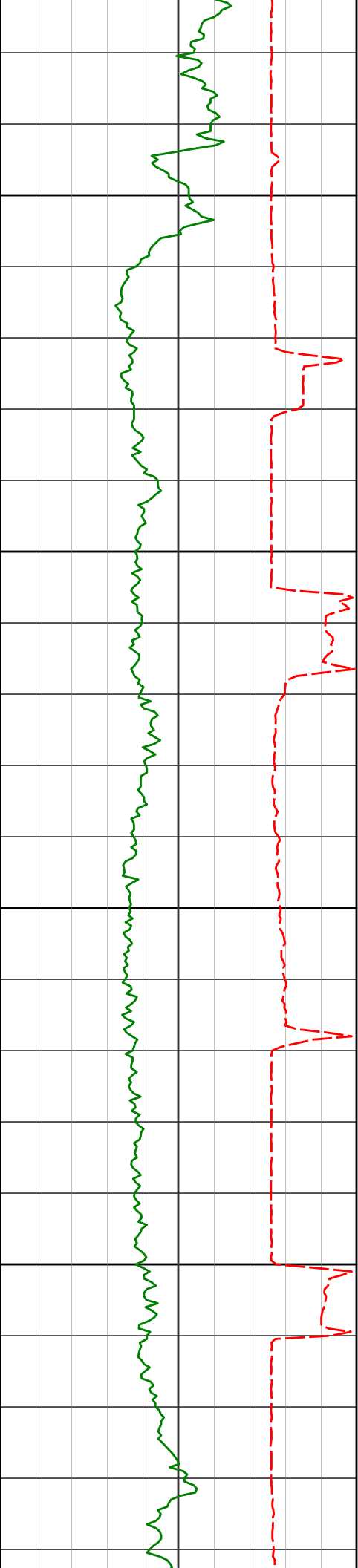
9298'

88.27°

276.88°

7462.90'

2108.26'



9400

9450

9500

9550

9393'

89.75°

276.43°

7464.53'

2203.24'

9456'

89.94°

276.15°

7464.70'

2266.24'

9487'

89.75°

275.98°

7464.79'

2297.24'

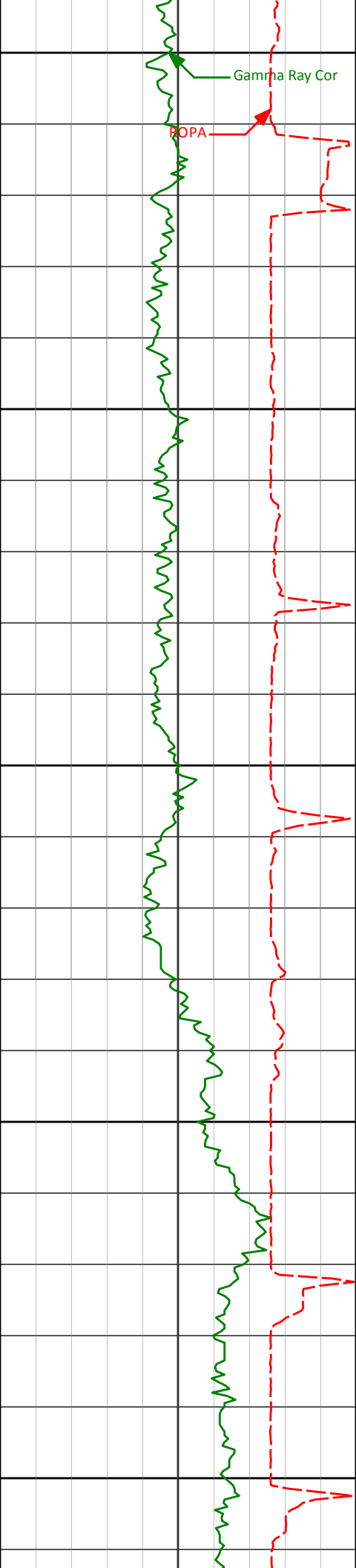
9551'

89.75°

275.62°

7465.06'

2361.23'



9600

9614'

90.37°

275.91°

7465.00'

2424.23'

9650

9646'

90.68°

276.20°

7464.70'

2456.22'

9700

9709'

90.49°

276.29°

7464.06'

2519.22'

9750

9741'

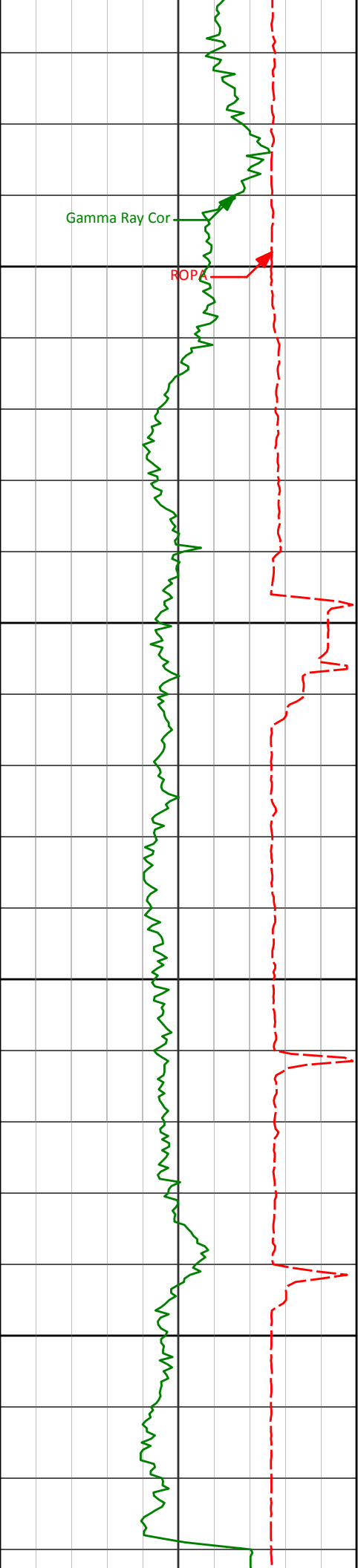
90.37°

276.35°

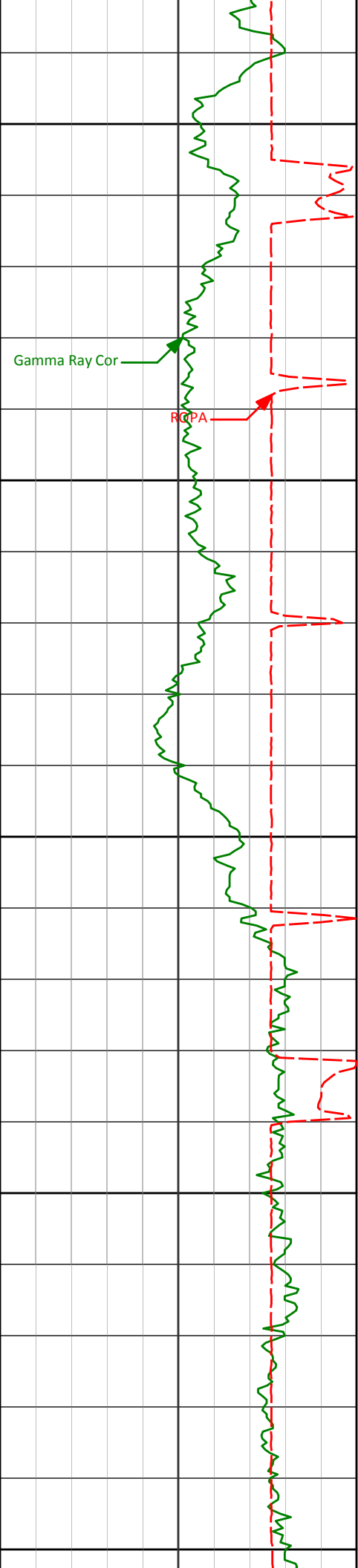
7463.82'

2551.22'

9800



9850	9836'	89.26°	276.23°	7464.12'	2646.21'
9900	9899'	89.38°	276.45°	7464.87'	2709.21'
9950	9931'	89.69°	276.63°	7465.13'	2741.21'
10000	9994'	89.94°	277.03°	7465.33'	2804.21'
	10025'	90.12°	277.02°	7465.31'	2835.20'



10050

10100

10150

10200

10250

10120'

89.07°

277.67°

7465.98'

2930.19'

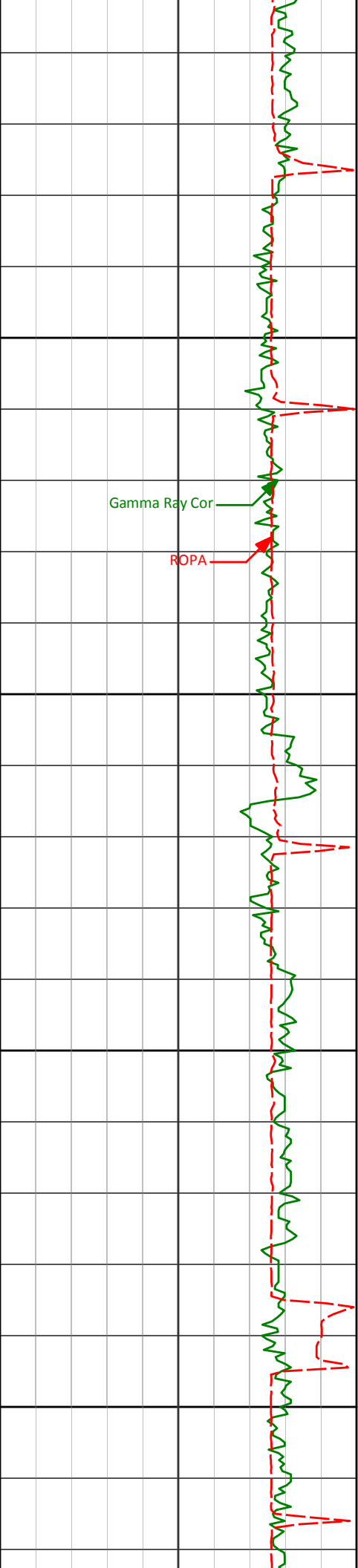
10215'

89.32°

277.53°

7467.31'

3025.17'



10300

10310'

89.51°

277.44°

7468.29'

3120.15'

Gamma Ray Cor

ROPA

10350

10400

10405'

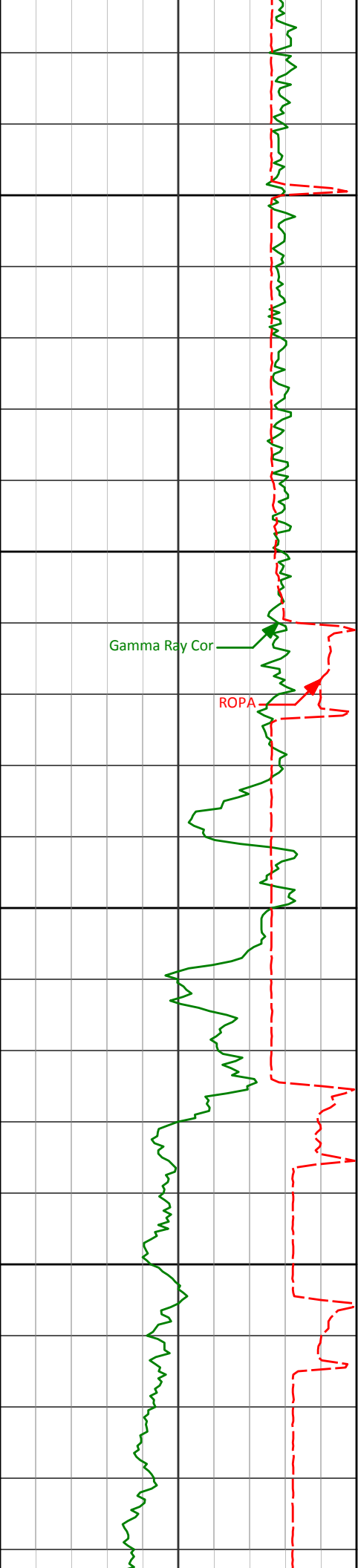
90.19°

277.78°

7468.54'

3215.14'

10450



10500

10550

10600

10650

10500'

10595'

10690'

89.69°

89.57°

87.04°

278.40°

279.52°

279.22°

7468.64'

7469.26'

7472.07'

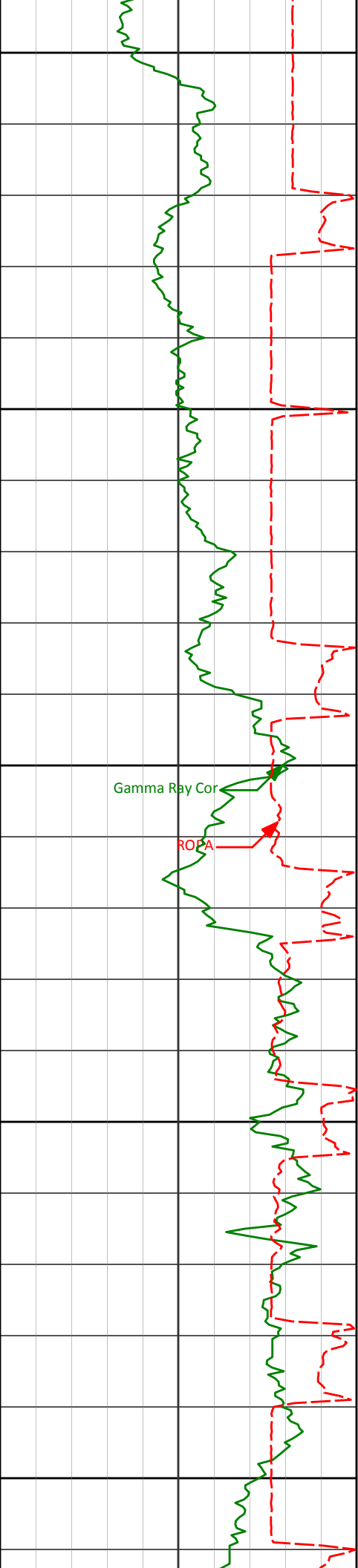
3310.11'

3405.02'

3499.87'

Gamma Ray Cor

ROPA



10700

10750

10800

10850

10900

10753'

87.04°

279.13°

7475.33'

3562.72'

10785'

87.16°

278.79°

7476.95'

3594.65'

10817'

87.53°

278.32°

7478.43'

3626.60'

10848'

87.78°

278.20°

7479.70'

3657.56'

10880'

87.71°

277.68°

7480.96'

3689.53'

10912'

87.71°

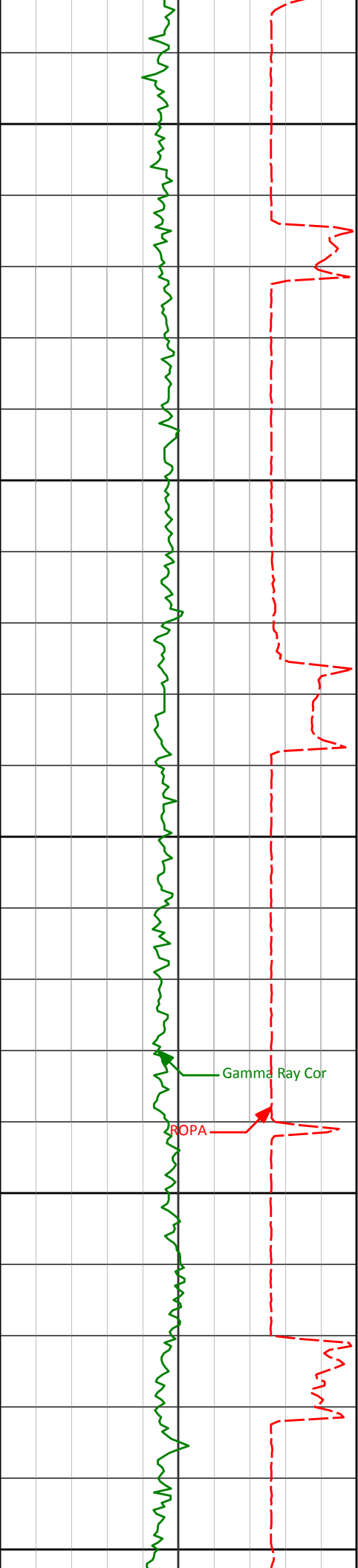
277.34°

7482.24'

3721.50'







11150

11165'

90.99°

276.20°

7483.67'

3974.44'

11200

11250

11260'

89.57°

275.83°

7483.21'

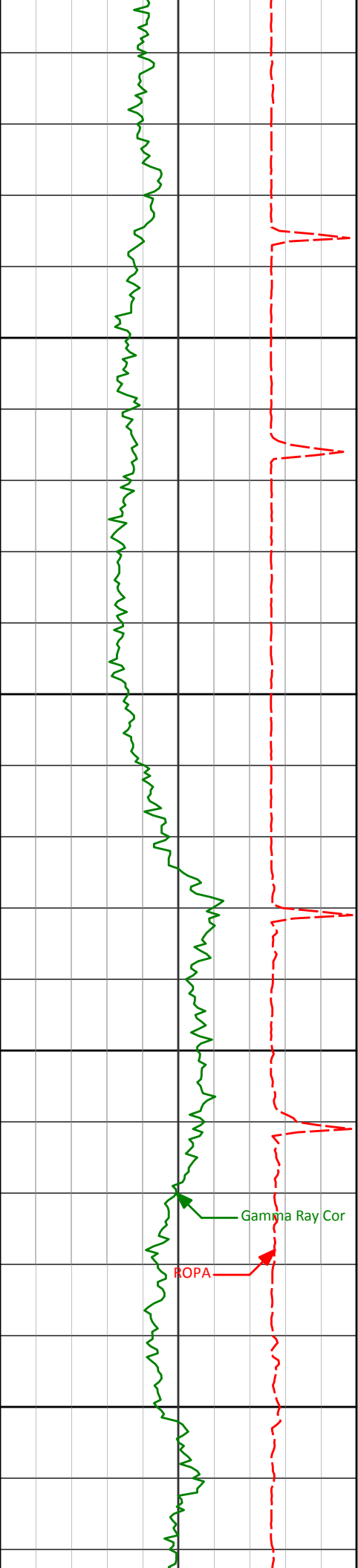
4069.43'

Gamma Ray Cor

ROPA

11300

11350



11400

11450

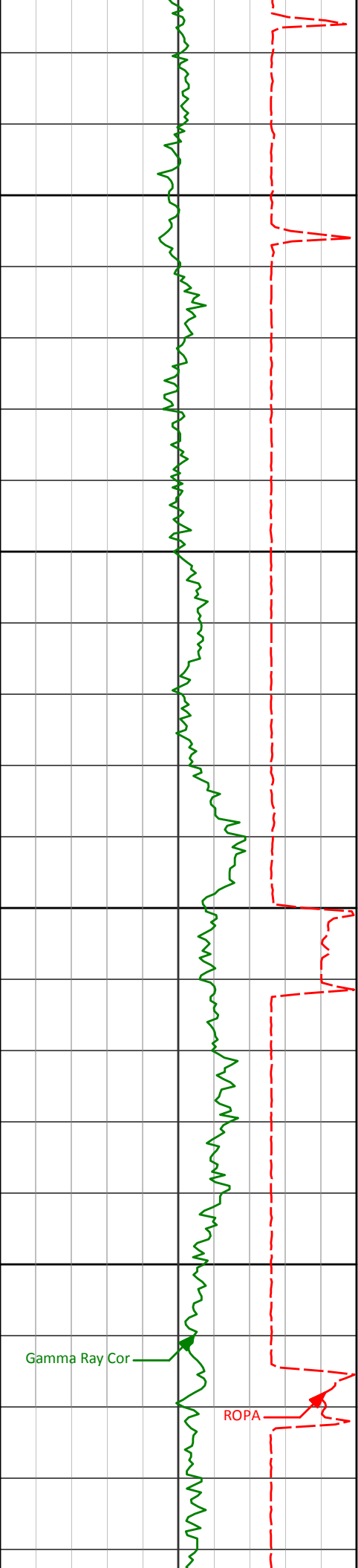
11500

11550

Gamma Ray Cor

ROPA

11355'	88.27°	275.81°	7485.00'	4164.40'
11449'	88.33°	276.04°	7487.78'	4258.35'
11544'	88.33°	276.11°	7490.55'	4353.31'



11600

11650

11700

11750

11639'

88.09°

276.45°

7493.52'

4448.26'

11734'

88.70°

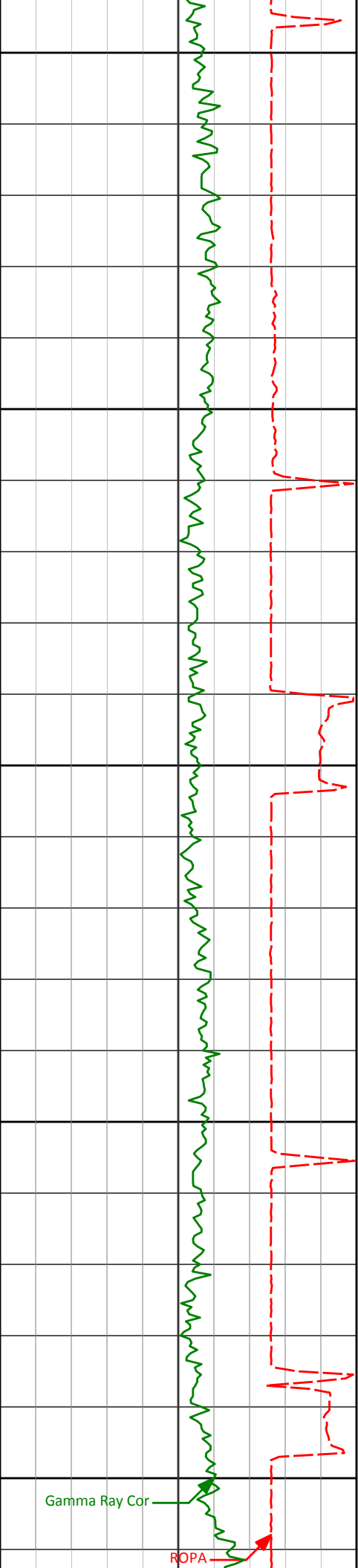
276.29°

7496.18'

4543.22'

Gamma Ray Cor

ROPA



11800

11850

11900

11950

12000

11798'

11829'

11924'

88.89°

88.39°

89.57°

275.99°

276.01°

275.90°

7497.53'

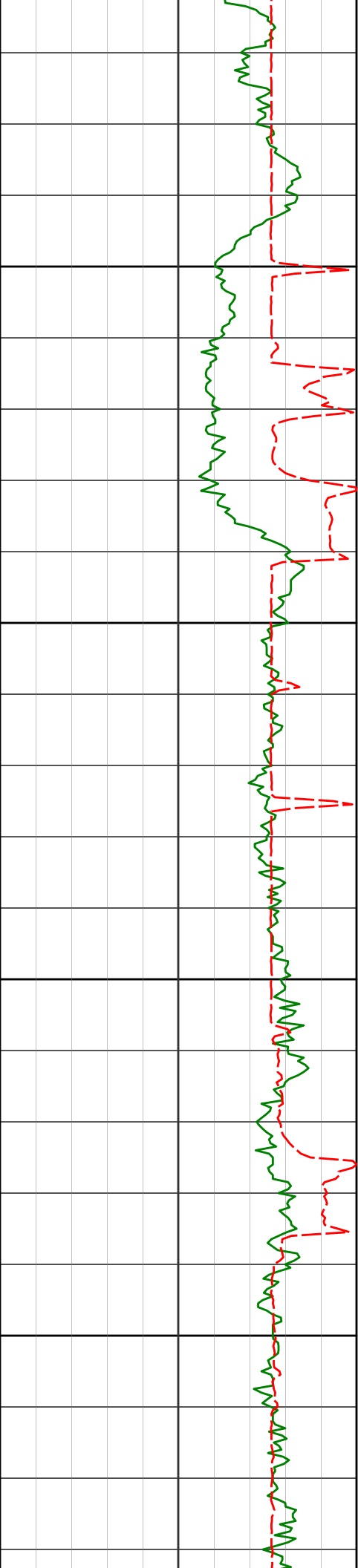
7498.26'

7499.95'

4607.20'

4638.19'

4733.17'



12019'

88.21°

276.28°

7501.80'

4828.14'

12050

12100

12114'

88.64°

276.40°

7504.41'

4923.11'

12150

12177'

88.83°

276.66°

7505.80'

4986.09'

12200

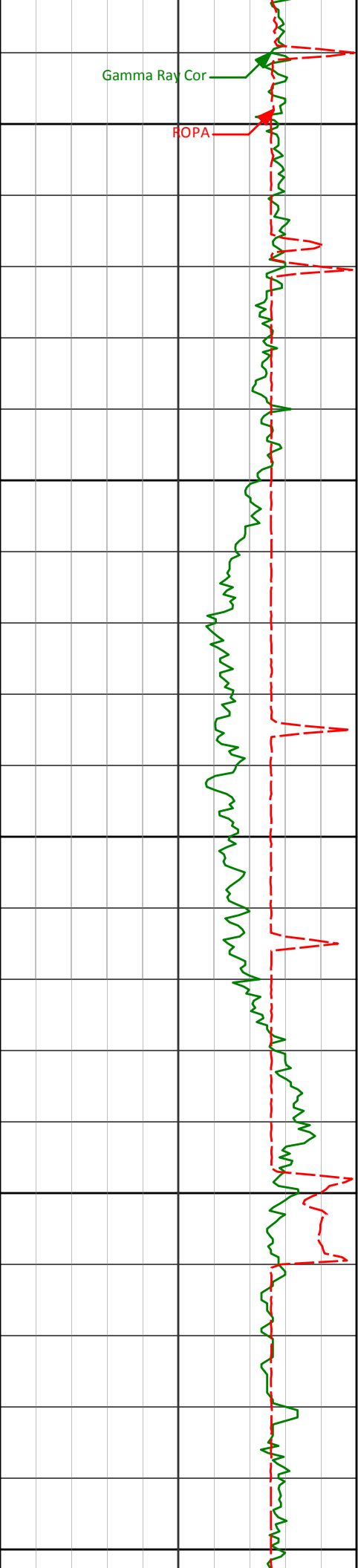
12209'

89.01°

276.83°

7506.40'

5018.09'



12250

12272'

88.83°

276.83°

7507.59'

5081.07'

12300

12304'

88.89°

276.90°

7508.23'

5113.07'

12350

12335'

89.14°

277.03°

7508.76'

5144.06'

12400

12398'

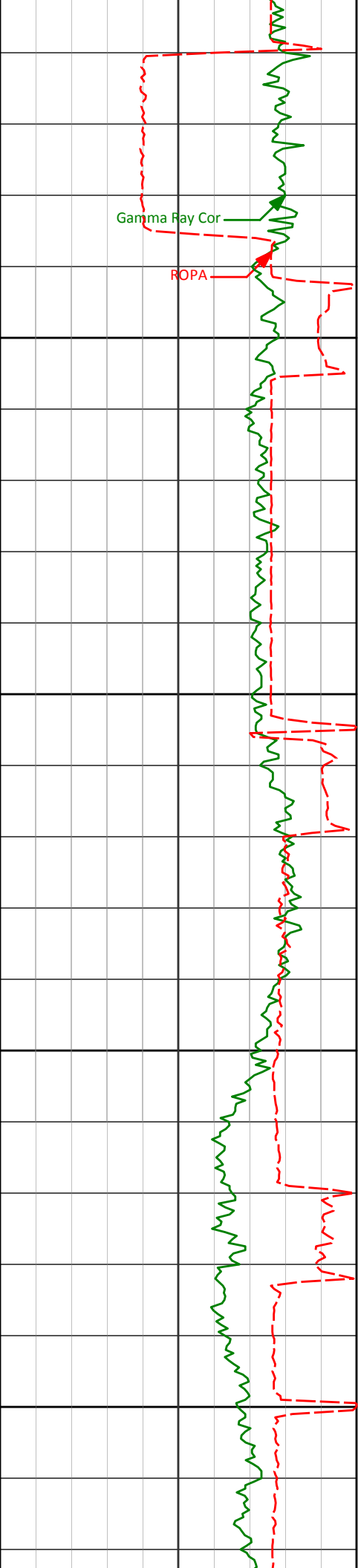
89.38°

276.72°

7509.58'

5207.06'

12450



12500

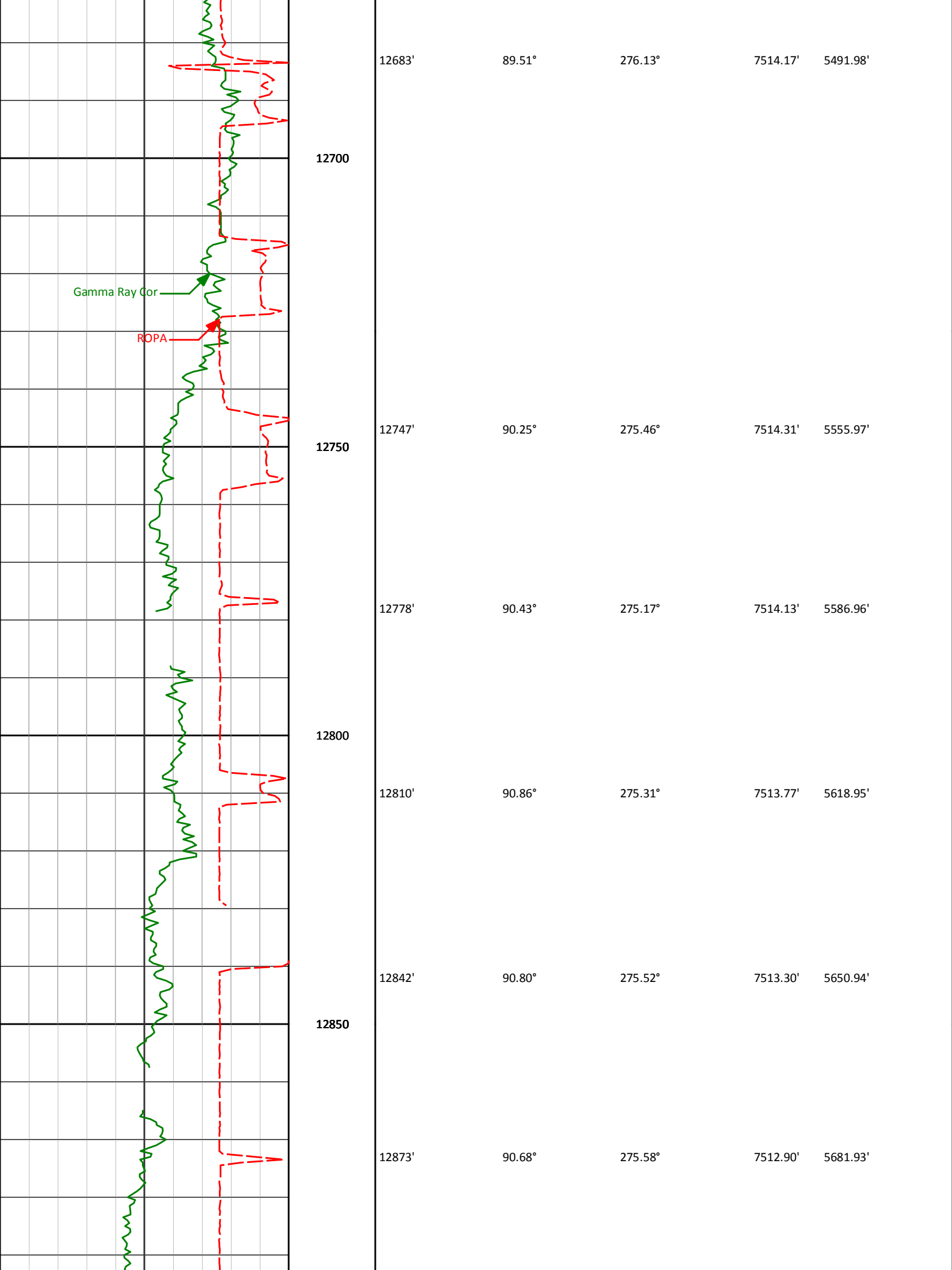
12550

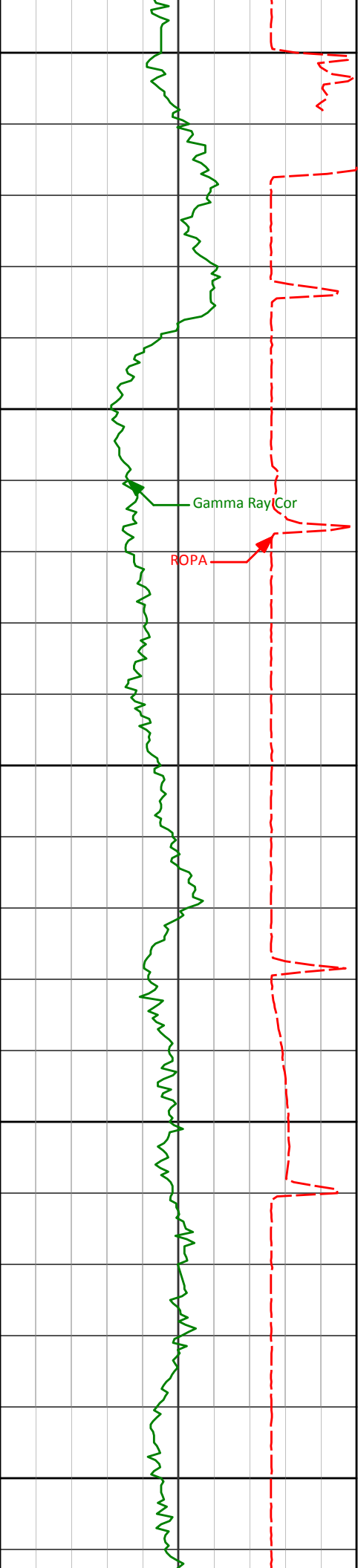
12600

12650

12493'	89.44°	278.36°	7510.55'	5302.04'
12588'	88.27°	276.79°	7512.44'	5397.00'
12620'	88.83°	276.47°	7513.26'	5428.99'







12900

12950

13000

13050

13100

Gamma Ray Cor

ROPA

12968'

91.05°

275.72°

7511.47'

5776.91'

13000'

90.80°

275.60°

7510.95'

5808.90'

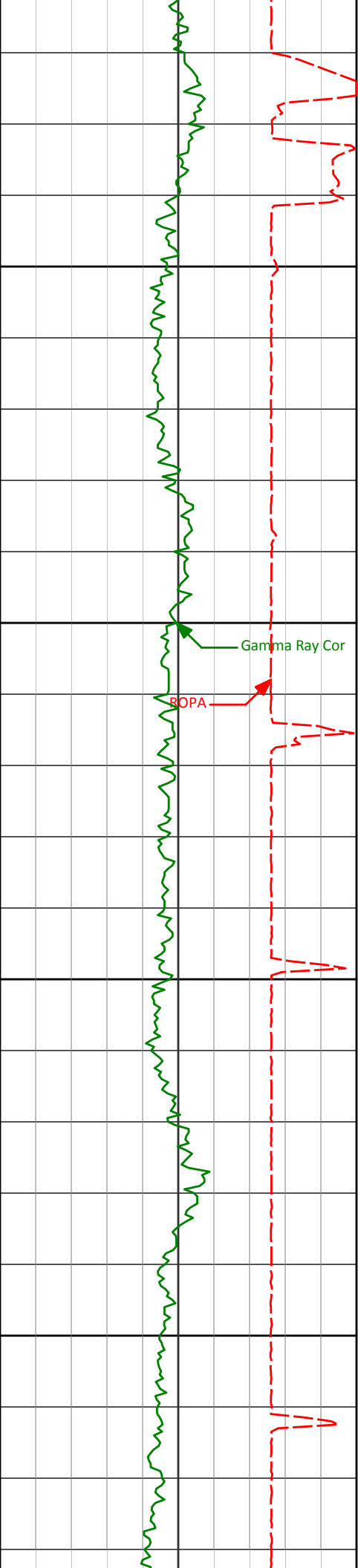
13063'

90.86°

275.64°

7510.04'

5871.88'



13150

13158'

88.21°

275.68°

7510.80'

5966.86'

13200

Gamma Ray Cor

BOPA

13250

13253'

88.09°

275.72°

7513.88'

6061.80'

13284'

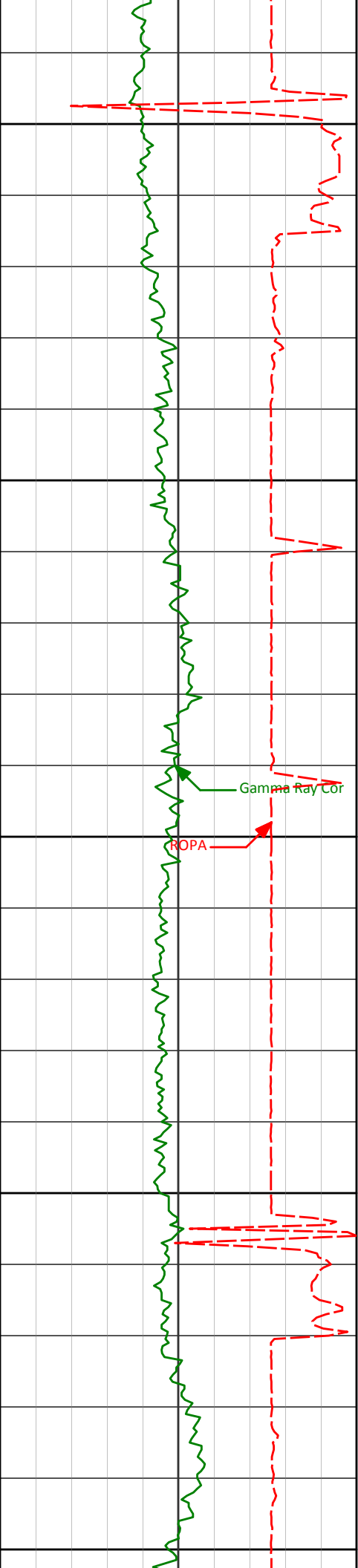
88.08°

275.82°

7514.91'

6092.78'

13300



13350

13400

13450

13500

13550

13347'

13442'

13537'

88.64°

88.70°

90.06°

275.69°

275.48°

276.08°

7516.71'

7518.92'

7519.94'

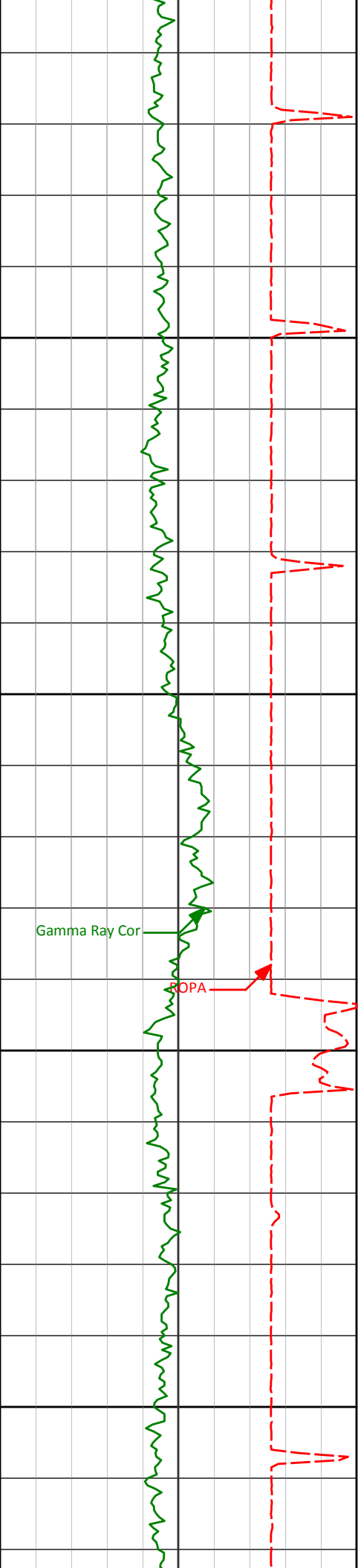
6155.74'

6250.70'

6345.68'

Gamma Ray Cor

ROPA



13600

13632'

89.20°

275.84°

7520.55'

6440.68'

13650

Gamma Ray Cor

ROPA

13700

13727'

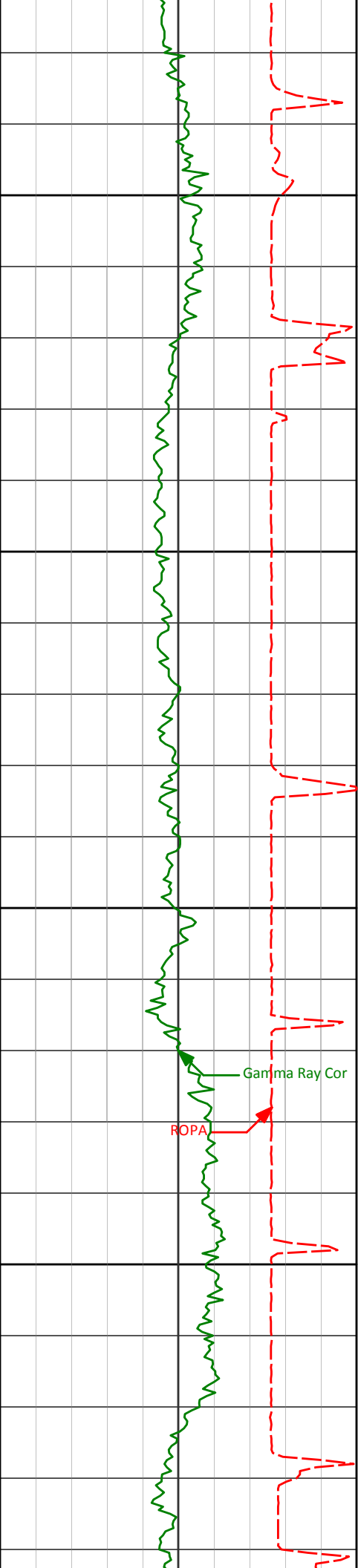
90.19°

276.27°

7521.07'

6535.67'

13750



13800

13850

13900

13950

13822'

90.62°

276.57°

7520.40'

6630.66'

13917'

90.12°

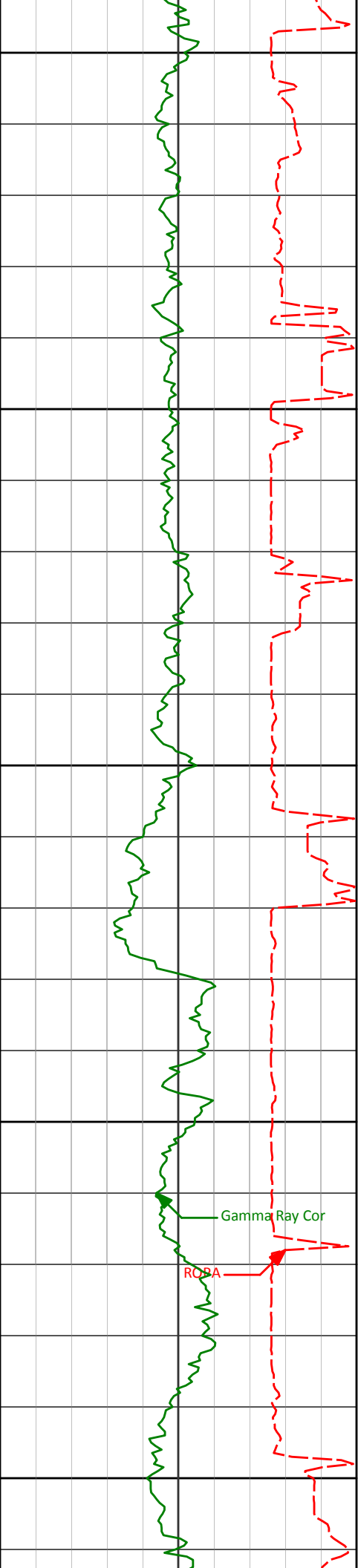
276.57°

7519.79'

6725.66'

Gamma Ray Cor

ROPA



14000

14012'

89.75°

277.22°

7519.89'

6820.66'

14050

14100

14107'

88.46°

278.00°

7521.37'

6915.63'

14150

Gamma Ray Cor

ROPA

14200

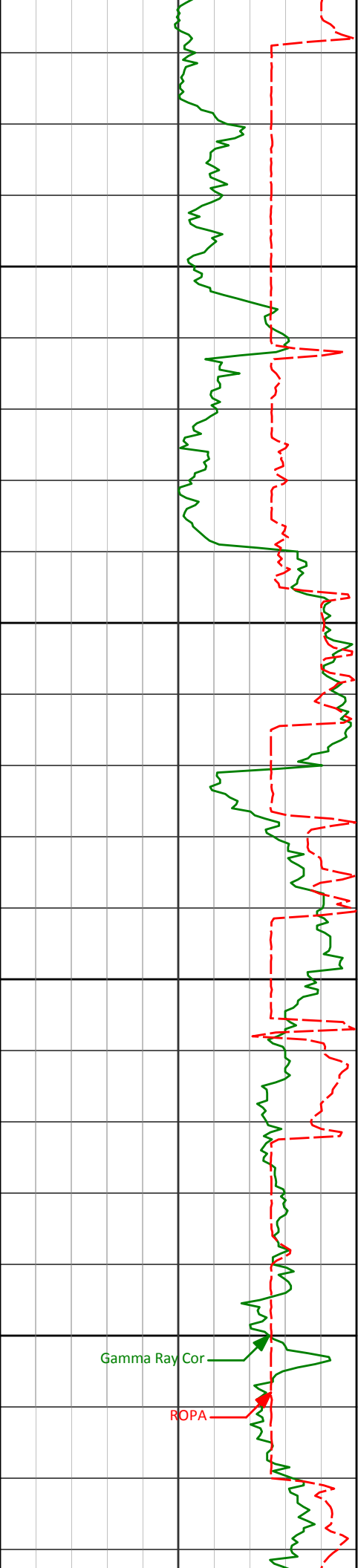
14202'

88.27°

278.62°

7524.09'

7010.55'



14250

14300

14350

14400

Gamma Ray Cor

ROPA

14297'

87.90°

279.02°

7527.26'

7105.43'

14360'

88.27°

278.55°

7529.36'

7168.35'

14423'

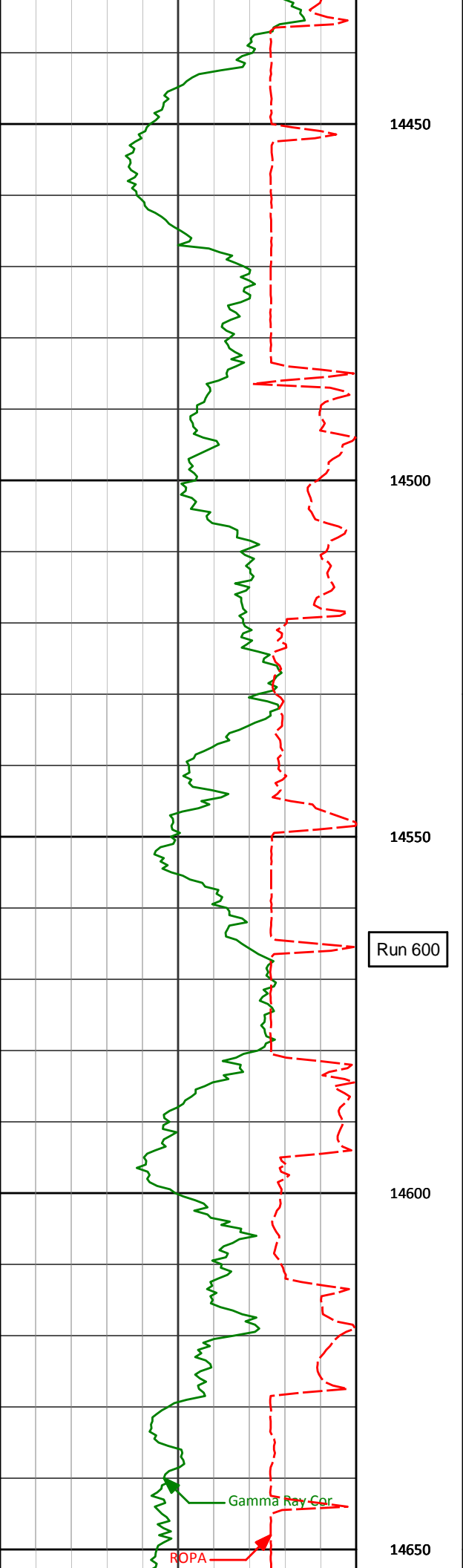
88.21°

278.32°

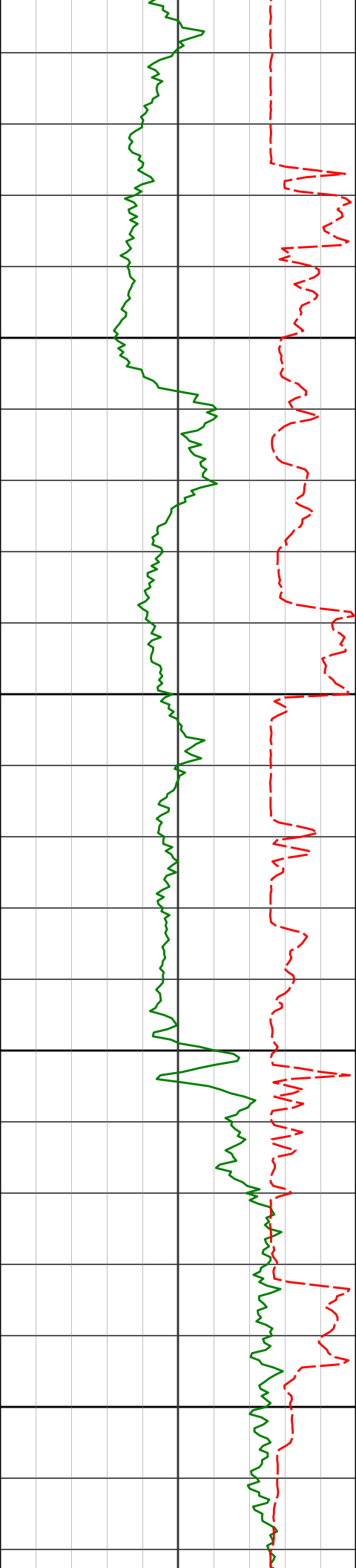
7531.30'

7231.29'





14450					
14486'	88.08°	277.93°	7533.34'	7294.23'	
14500					
14550	14551'	88.33°	276.92°	7535.37'	7359.19'
Run 600					
14582'	88.52°	276.74°	7536.22'	7390.18'	
14600					
14650					



14677'

89.38°

276.54°

7537.96'

7485.16'

14700

14750

14772'

90.12°

276.24°

7538.37'

7580.16'

14800

14850

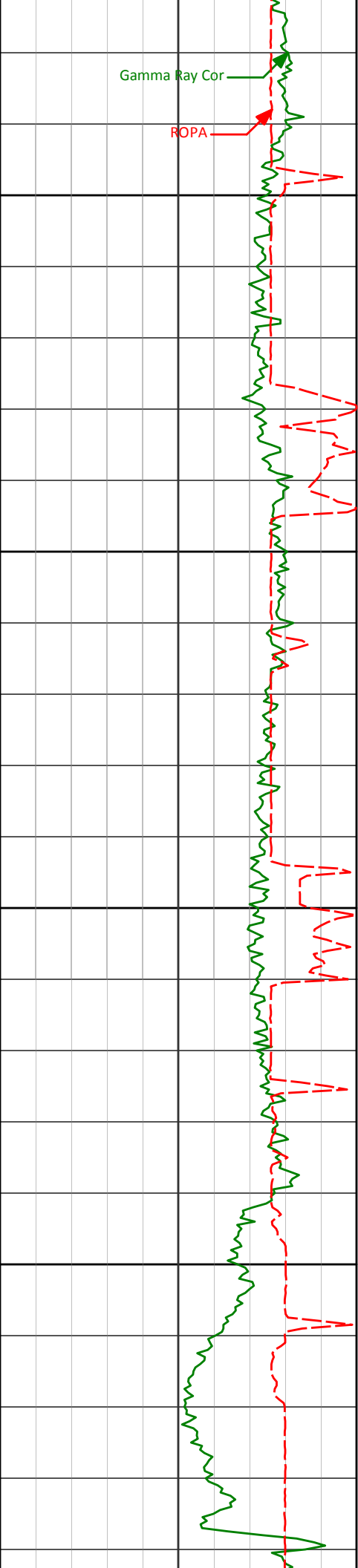
14867'

91.17°

276.90°

7537.29'

7675.15'



14900

14950

15000

15050

14962'

91.17°

276.19°

7535.35'

7770.13'

15057'

90.93°

276.49°

7533.61'

7865.12'

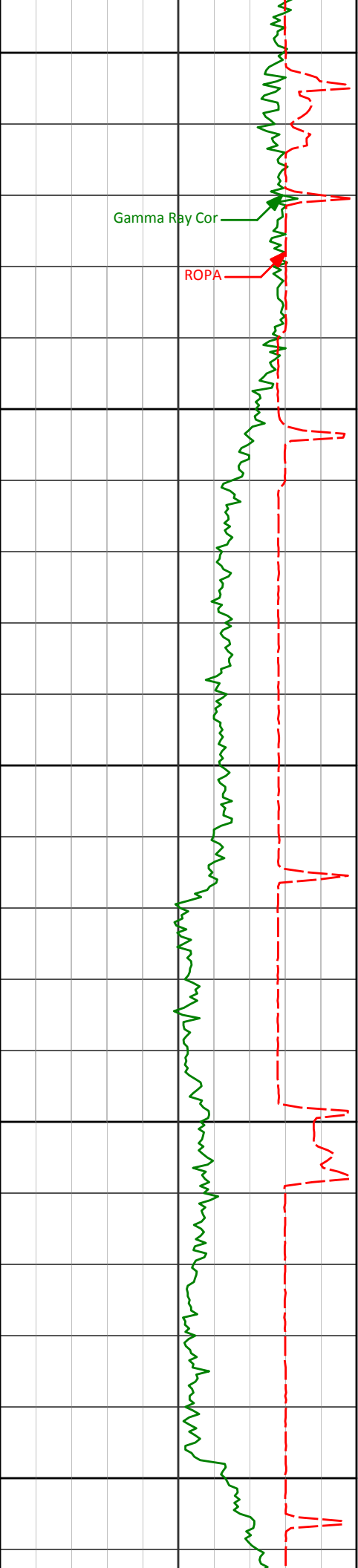
15089'

90.62°

276.66°

7533.18'

7897.11'



15100

Gamma Ray Cor

ROPA

15150

15152'

90.43°

276.94°

7532.60'

7960.11'

15200

15250

15247'

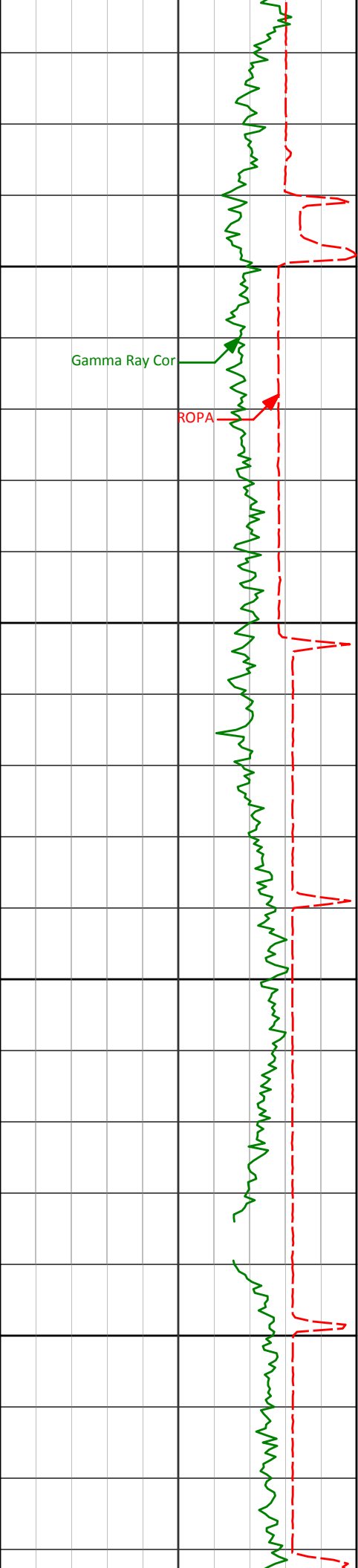
90.62°

276.58°

7531.73'

8055.10'

15300



15350

15400

15450

15500

15342'

90.68°

276.71°

7530.65'

8150.10'

15437'

90.62°

276.66°

7529.58'

8245.09'

15468'

90.31°

276.57°

7529.33'

8276.09'

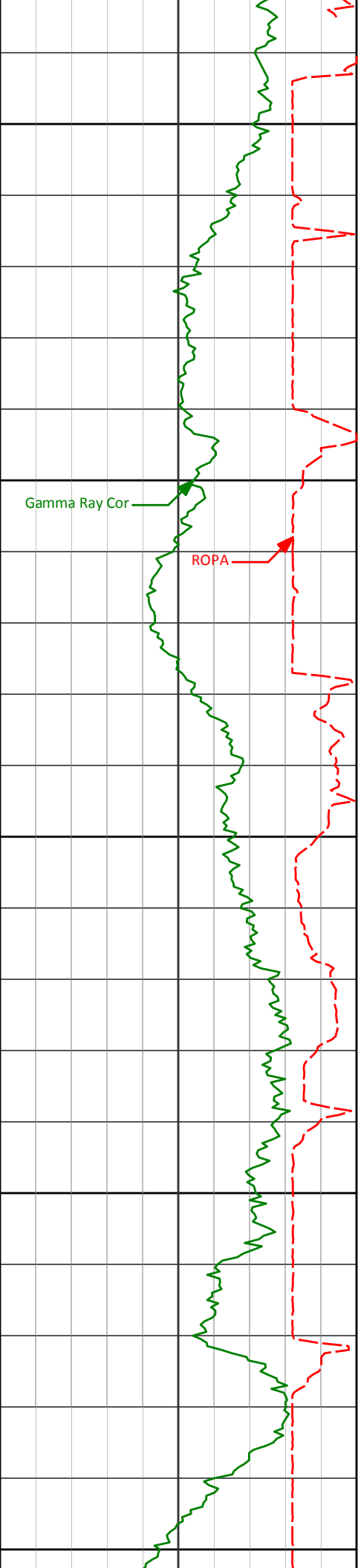
15532'

89.32°

276.66°

7529.54'

8340.09'



15550

15600

15650

15700

15750

Gamma Ray Cor

ROPA

15626'

89.07°

276.80°

7530.85'

8434.08'

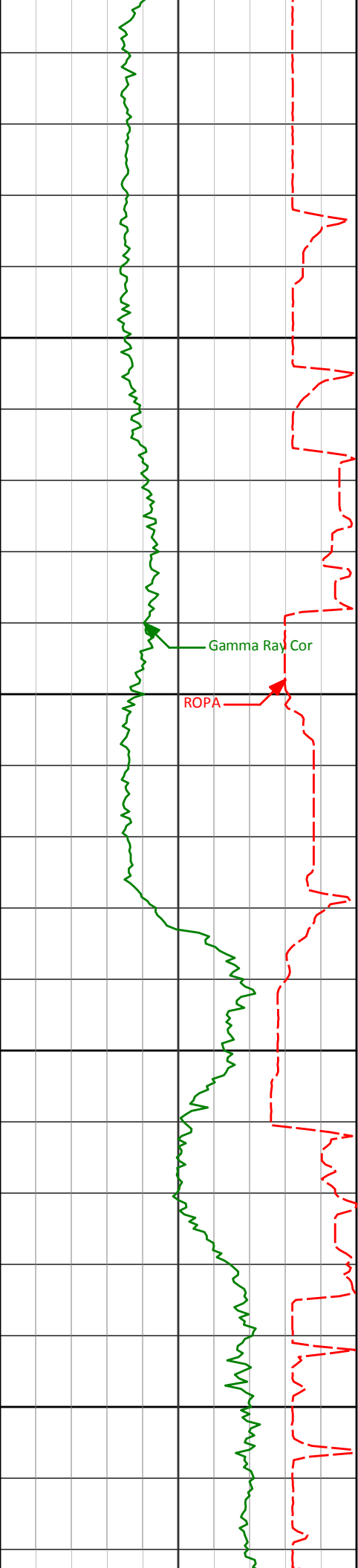
15721'

89.57°

276.96°

7531.98'

8529.07'



15800

15850

15900

15950

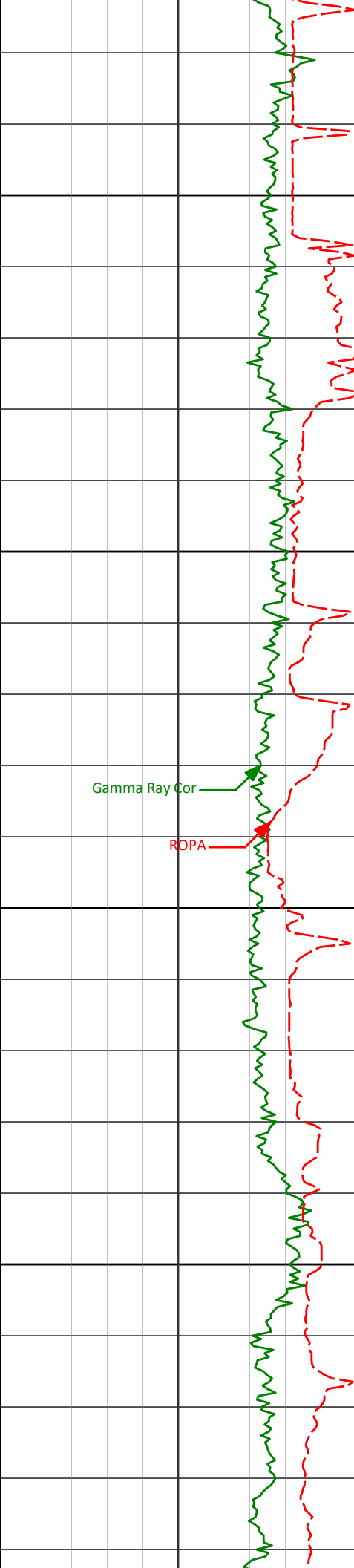
15816'

89.69°

277.26°

7532.59'

8624.07'



Run 800

16000

16050

16100

16150

16006'

89.35°

274.64°

7534.82'

8814.03'

16101'

90.71°

274.60°

7534.76'

8908.97'

16164'

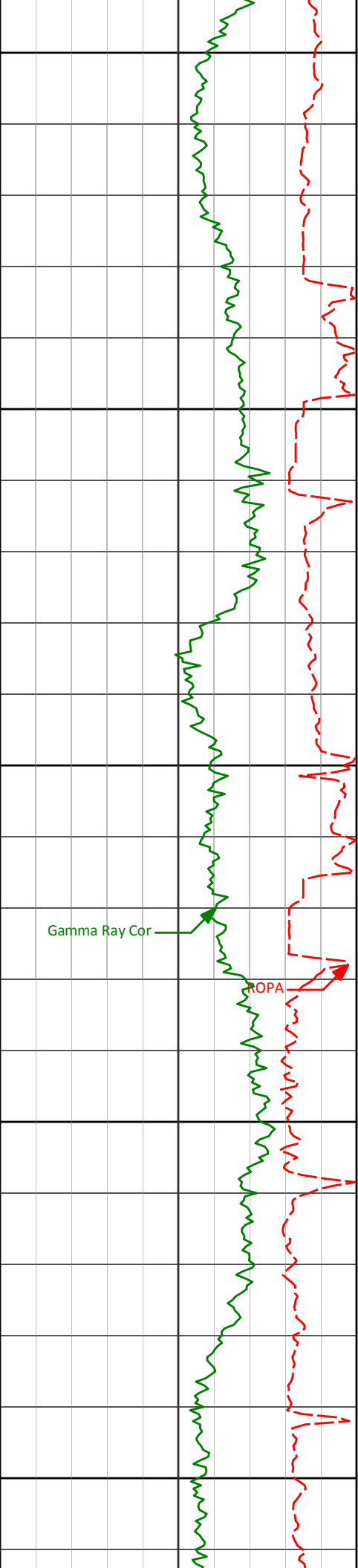
91.54°

275.06°

7533.53'

8971.93'





16200

16250

16300

16350

16400

16259'

90.61°

275.02°

7531.74'

9066.87'

16323'

90.18°

274.78°

7531.29'

9130.84'

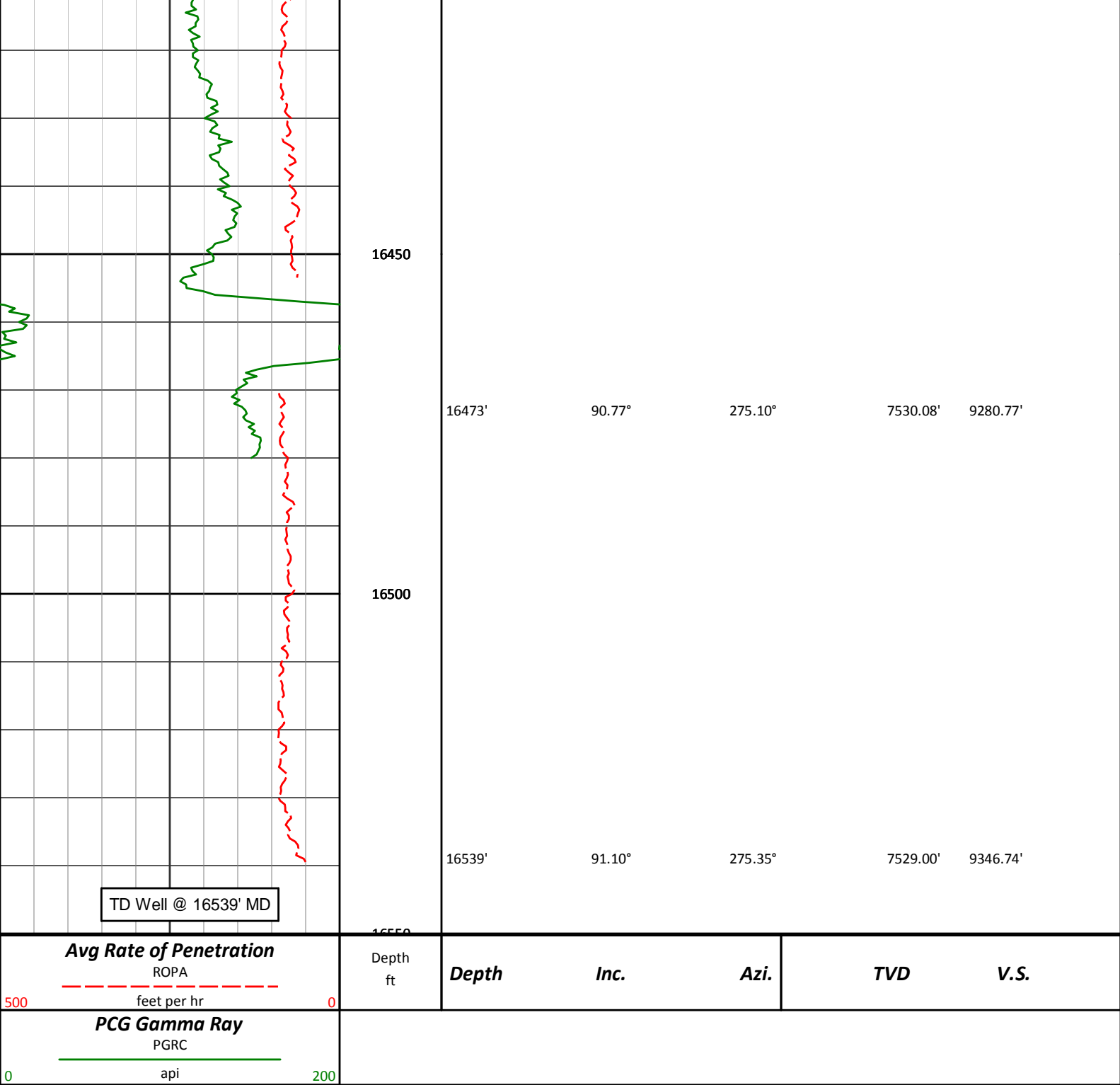
16386'

90.40°

274.88°

7530.97'

9193.81'



**HALLIBURTON**

**DIRECTIONAL SURVEY REPORT**

**ConocoPhillips**  
**Youngberg 10-11-1H**  
**Niobrara**  
**Arapahoe Colorado**  
**USA**  
**CA-XX-0900647295**

**Survey Depth 98.89 to 1947.45 are Gyro Surveys.**

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

98.89	0.45	255.05	98.89	0.10 S	0.38 W	0.36	0.46
194.54	0.59	251.66	194.54	0.35 S	1.21 W	1.16	0.15
287.42	0.59	249.83	287.41	0.67 S	2.11 W	2.02	0.02
380.95	0.60	248.70	380.94	1.01 S	3.02 W	2.88	0.02
472.45	0.58	247.79	472.43	1.36 S	3.89 W	3.71	0.02
564.36	0.53	241.77	564.34	1.74 S	4.70 W	4.47	0.08
656.21	0.53	242.88	656.18	2.13 S	5.45 W	5.17	0.01
748.46	0.58	255.35	748.43	2.44 S	6.28 W	5.96	0.14
840.38	0.66	235.55	840.34	2.86 S	7.17 W	6.79	0.25
932.65	0.71	230.99	932.61	3.52 S	8.05 W	7.59	0.08
1024.96	0.72	222.96	1024.91	4.31 S	8.89 W	8.33	0.11
1117.24	0.78	220.29	1117.18	5.21 S	9.69 W	9.03	0.08
1209.55	0.83	217.50	1209.48	6.22 S	10.50 W	9.72	0.07
1301.49	0.86	214.11	1301.41	7.32 S	11.30 W	10.38	0.06
1393.41	0.90	213.49	1393.32	8.49 S	12.08 W	11.02	0.04
1484.97	0.93	210.78	1484.87	9.73 S	12.86 W	11.65	0.06
1576.82	0.90	205.54	1576.71	11.02 S	13.55 W	12.19	0.10
1669.04	0.86	196.77	1668.92	12.34 S	14.06 W	12.55	0.15
1760.88	0.88	194.00	1760.75	13.68 S	14.43 W	12.76	0.05
1852.76	0.95	196.34	1852.61	15.10 S	14.82 W	12.98	0.09
1947.45	1.01	197.60	1947.29	16.65 S	15.29 W	13.27	0.07
2024.00	0.74	182.58	2023.83	17.79 S	15.52 W	13.36	0.46
2119.00	0.82	186.03	2118.82	19.08 S	15.62 W	13.31	0.10
2214.00	0.91	175.36	2213.81	20.51 S	15.63 W	13.16	0.19
2309.00	0.86	179.80	2308.80	21.98 S	15.56 W	12.93	0.09
2404.00	0.56	124.82	2403.79	22.95 S	15.18 W	12.44	0.74
2499.00	1.11	74.23	2498.78	22.97 S	13.92 W	11.18	0.92
2593.00	1.14	73.12	2592.77	22.45 S	12.14 W	9.48	0.04
2688.00	1.33	69.13	2687.74	21.78 S	10.21 W	7.63	0.22
2783.00	1.41	67.91	2782.72	20.95 S	8.09 W	5.63	0.09
2878.00	1.52	72.62	2877.69	20.13 S	5.81 W	3.45	0.17
2973.00	1.54	71.38	2972.65	19.35 S	3.40 W	1.14	0.04
3068.00	1.33	73.17	3067.62	18.62 S	1.13 W	-1.02	0.24
3163.00	1.25	82.92	3162.60	18.17 S	0.95 E	-3.04	0.24
3258.00	1.25	83.02	3257.58	17.92 S	3.01 E	-5.05	0.00
3353.00	1.33	86.20	3352.55	17.72 S	5.14 E	-7.15	0.12
3448.00	1.28	80.65	3447.53	17.47 S	7.29 E	-9.26	0.14
3543.00	1.00	96.11	3542.51	17.39 S	9.16 E	-11.11	0.44
3638.00	0.50	345.13	3637.50	17.08 S	9.88 E	-11.78	1.33
3733.00	1.05	330.49	3732.49	15.92 S	9.34 E	-11.12	0.61
3828.00	1.25	327.93	3827.48	14.29 S	8.36 E	-9.96	0.21
3923.00	0.25	110.09	3922.47	13.48 S	8.01 E	-9.51	1.53
4017.00	0.69	115.29	4016.47	13.80 S	8.72 E	-10.25	0.47
4112.00	0.74	101.39	4111.46	14.16 S	9.84 E	-11.41	0.19
4207.00	0.56	285.22	4206.46	14.16 S	10.00 E	-11.57	1.37
4302.00	0.74	310.71	4301.45	13.64 S	9.09 E	-10.60	0.36
4397.00	0.58	8.90	4396.44	12.76 S	8.69 E	-10.11	0.69
4492.00	0.67	21.35	4491.44	11.77 S	8.97 E	-10.27	0.17
4587.00	1.00	10.11	4586.43	10.43 S	9.32 E	-10.46	0.39
4682.00	0.39	6.37	4681.42	9.29 S	9.50 E	-10.51	0.65
4777.00	0.20	313.07	4776.42	8.86 S	9.42 E	-10.38	0.33
4872.00	0.58	256.00	4871.42	8.86 S	8.83 E	-9.79	0.53
4967.00	0.33	261.38	4966.41	9.02 S	8.09 E	-9.08	0.27
5062.00	0.50	256.75	5061.41	9.16 S	7.42 E	-8.42	0.18
5157.00	0.31	235.53	5156.41	9.40 S	6.80 E	-7.84	0.25
5251.00	0.19	191.75	5250.41	9.69 S	6.55 E	-7.63	0.24
5346.00	0.25	226.50	5345.41	9.99 S	6.37 E	-7.48	0.15
5441.00	0.22	277.31	5440.41	10.10 S	6.04 E	-7.17	0.21
5536.00	0.31	340.70	5535.41	9.84 S	5.78 E	-6.87	0.30
5631.00	0.64	340.75	5630.40	9.10 S	5.52 E	-6.53	0.35
5726.00	0.20	27.58	5725.40	8.45 S	5.42 E	-6.35	0.55
5821.00	0.14	34.39	5820.40	8.21 S	5.56 E	-6.47	0.06
5916.00	0.36	38.58	5915.40	7.89 S	5.81 E	-6.68	0.23
6011.00	0.36	29.13	6010.40	7.39 S	6.14 E	-6.95	0.06
6106.00	0.17	34.46	6105.40	7.01 S	6.37 E	-7.13	0.20
6201.00	0.64	63.64	6200.39	6.66 S	6.92 E	-7.64	0.52
6296.00	0.77	42.33	6295.39	5.95 S	7.82 E	-8.46	0.31
6391.00	0.72	350.30	6390.38	4.89 S	8.15 E	-8.66	0.69
6486.00	0.47	347.20	6485.37	3.92 S	7.97 E	-8.37	0.27
6581.00	0.19	5.39	6580.37	3.39 S	7.90 E	-8.23	0.32
6676.00	0.22	8.11	6675.37	3.05 S	7.94 E	-8.23	0.04
6771.00	0.31	9.55	6770.37	2.61 S	8.01 E	-8.25	0.10
6834.00	1.16	297.83	6833.37	2.14 S	7.47 E	-7.67	1.75
6866.00	5.15	281.20	6865.31	1.71 S	5.77 E	-5.93	12.68

6897.00	8.37	284.90	6896.09	0.86 S	2.22 E	-2.31	10.47
6929.00	11.35	284.71	6927.62	0.54 N	3.07 W	3.11	9.29
6961.00	14.21	281.76	6958.82	2.14 N	9.96 W	10.14	9.18
6992.00	17.07	279.37	6988.67	3.65 N	18.18 W	18.48	9.46
7024.00	19.29	276.38	7019.07	5.01 N	28.07 W	28.46	7.53
7056.00	21.41	273.90	7049.07	5.99 N	39.15 W	39.58	7.13
7087.00	23.97	271.81	7077.67	6.57 N	51.09 W	51.51	8.66
7119.00	26.85	271.68	7106.57	6.99 N	64.81 W	65.19	9.02
7150.00	29.57	272.09	7133.89	7.48 N	79.46 W	79.79	8.79
7182.00	31.96	274.11	7161.38	8.37 N	95.80 W	96.12	8.14
7214.00	34.21	275.26	7188.19	9.80 N	113.21 W	113.58	7.30
7245.00	36.28	276.63	7213.51	11.66 N	131.00 W	131.47	7.15
7277.00	39.70	278.02	7238.73	14.18 N	150.53 W	151.16	11.01
7309.00	42.95	277.85	7262.75	17.10 N	171.45 W	172.28	10.18
7340.00	45.51	277.47	7284.97	19.98 N	192.88 W	193.90	8.28
7372.00	48.16	276.41	7306.86	22.79 N	216.05 W	217.24	8.63
7404.00	51.37	276.15	7327.52	25.46 N	240.33 W	241.66	10.06
7435.00	55.01	276.00	7346.10	28.09 N	265.00 W	266.47	11.74
7467.00	58.62	276.11	7363.61	30.91 N	291.63 W	293.25	11.28
7499.00	62.10	276.04	7379.43	33.86 N	319.28 W	321.05	10.89
7530.00	65.49	276.41	7393.12	36.87 N	346.93 W	348.86	11.00
7562.00	68.76	276.89	7405.56	40.29 N	376.21 W	378.34	10.31
7593.00	71.67	277.08	7416.05	43.83 N	405.16 W	407.51	9.40
7625.00	74.04	277.17	7425.48	47.63 N	435.50 W	438.09	7.40
7657.00	76.60	277.65	7433.59	51.62 N	466.19 W	469.03	8.13
7688.00	79.56	277.73	7440.00	55.67 N	496.25 W	499.36	9.56
7720.00	83.31	277.32	7444.76	59.82 N	527.61 W	530.99	11.79
7759.00	87.77	277.05	7447.80	64.68 N	566.18 W	569.86	11.48
7887.00	89.81	278.95	7450.49	82.49 N	692.89 W	697.78	2.18
7937.00	90.00	278.94	7450.57	90.26 N	742.28 W	747.74	0.37
7969.00	89.75	278.72	7450.64	95.17 N	773.91 W	779.72	1.03
8032.00	89.38	278.21	7451.11	104.44 N	836.22 W	842.68	1.00
8064.00	89.51	278.05	7451.42	108.96 N	867.89 W	874.67	0.62
8127.00	89.38	277.77	7452.03	117.63 N	930.29 W	937.65	0.49
8159.00	89.14	277.46	7452.45	121.87 N	962.01 W	969.64	1.23
8190.00	89.14	277.45	7452.92	125.89 N	992.74 W	1000.64	0.03
8222.00	89.07	277.50	7453.42	130.06 N	1024.47 W	1032.63	0.24
8253.00	89.63	276.30	7453.77	133.78 N	1055.24 W	1063.63	4.26
8285.00	90.12	276.23	7453.83	137.27 N	1087.05 W	1095.63	1.56
8317.00	90.62	276.30	7453.63	140.76 N	1118.86 W	1127.62	1.56
8412.00	89.57	275.56	7453.47	150.58 N	1213.35 W	1222.61	1.35
8475.00	89.75	275.08	7453.85	156.43 N	1276.07 W	1285.60	0.82
8507.00	89.38	274.67	7454.09	159.15 N	1307.96 W	1317.58	1.73
8601.00	89.75	274.22	7454.80	166.43 N	1401.67 W	1411.51	0.62
8696.00	89.94	274.71	7455.05	173.83 N	1496.38 W	1506.44	0.56
8791.00	88.95	275.52	7455.97	182.30 N	1591.00 W	1601.40	1.34
8886.00	89.81	275.94	7457.00	191.79 N	1685.51 W	1696.39	1.01
8981.00	90.25	276.25	7456.95	201.88 N	1779.98 W	1791.38	0.56
9076.00	90.43	277.03	7456.38	212.86 N	1874.34 W	1886.38	0.84
9171.00	87.47	276.57	7458.13	224.10 N	1968.64 W	1981.35	3.16
9266.00	88.02	276.91	7461.86	235.25 N	2062.91 W	2076.28	0.69
9298.00	88.27	276.88	7462.90	239.08 N	2094.66 W	2108.26	0.78
9393.00	89.75	276.43	7464.53	250.09 N	2189.01 W	2203.24	1.63
9456.00	89.94	276.15	7464.70	256.99 N	2251.63 W	2266.24	0.53
9487.00	89.75	275.98	7464.79	260.27 N	2282.45 W	2297.24	0.82
9551.00	89.75	275.62	7465.06	266.73 N	2346.13 W	2361.23	0.56
9614.00	90.37	275.91	7465.00	273.06 N	2408.81 W	2424.23	1.08
9646.00	90.68	276.20	7464.70	276.43 N	2440.63 W	2456.22	1.33
9709.00	90.49	276.29	7464.06	283.28 N	2503.25 W	2519.22	0.33
9741.00	90.37	276.35	7463.82	286.80 N	2535.06 W	2551.22	0.43
9836.00	89.26	276.23	7464.12	297.21 N	2629.48 W	2646.21	1.18
9899.00	89.38	276.45	7464.87	304.17 N	2692.09 W	2709.21	0.40
9931.00	89.69	276.63	7465.13	307.82 N	2723.88 W	2741.21	1.10
9994.00	89.94	277.03	7465.33	315.30 N	2786.43 W	2804.21	0.75
10025.00	90.12	277.02	7465.31	319.09 N	2817.20 W	2835.20	0.60
10120.00	89.07	277.67	7465.98	331.24 N	2911.42 W	2930.19	1.30
10215.00	89.32	277.53	7467.31	343.80 N	3005.57 W	3025.17	0.30
10310.00	89.51	277.44	7468.29	356.17 N	3099.76 W	3120.15	0.22
10405.00	90.19	277.78	7468.54	368.75 N	3193.92 W	3215.14	0.80
10500.00	89.69	278.40	7468.64	382.11 N	3287.98 W	3310.11	0.83
10595.00	89.57	279.52	7469.26	396.91 N	3381.82 W	3405.02	1.19
10690.00	87.04	279.22	7472.07	412.36 N	3475.50 W	3499.87	2.68
10753.00	87.04	279.13	7475.33	422.39 N	3537.61 W	3562.72	0.14
10785.00	87.16	278.79	7476.95	427.37 N	3569.18 W	3594.65	1.13
10817.00	87.53	278.32	7478.43	432.12 N	3600.79 W	3626.60	1.86

10848.00	87.78	278.20	7479.70	436.57 N	3631.44 W	3657.56	0.88
10880.00	87.71	277.68	7480.96	440.99 N	3663.11 W	3689.53	1.63
10912.00	87.71	277.34	7482.24	445.17 N	3694.81 W	3721.50	1.08
10943.00	88.27	276.50	7483.33	448.90 N	3725.57 W	3752.48	3.25
10975.00	88.52	276.38	7484.22	452.49 N	3757.35 W	3784.46	0.86
11006.00	89.20	276.02	7484.84	455.84 N	3788.16 W	3815.46	2.48
11101.00	90.93	275.97	7484.74	465.76 N	3882.64 W	3910.45	1.82
11165.00	90.99	276.20	7483.67	472.55 N	3946.27 W	3974.44	0.38
11260.00	89.57	275.83	7483.21	482.50 N	4040.74 W	4069.43	1.55
11355.00	88.27	275.81	7485.00	492.13 N	4135.24 W	4164.40	1.37
11449.00	88.33	276.04	7487.78	501.83 N	4228.69 W	4258.35	0.24
11544.00	88.33	276.11	7490.55	511.88 N	4323.12 W	4353.31	0.08
11639.00	88.09	276.45	7493.52	522.27 N	4417.50 W	4448.26	0.44
11734.00	88.70	276.29	7496.18	532.81 N	4511.88 W	4543.22	0.67
11798.00	88.89	275.99	7497.53	539.66 N	4575.50 W	4607.20	0.55
11829.00	88.39	276.01	7498.26	542.90 N	4606.32 W	4638.19	1.60
11924.00	89.57	275.90	7499.95	552.75 N	4700.79 W	4733.17	1.24
12019.00	88.21	276.28	7501.80	562.83 N	4795.23 W	4828.14	1.49
12114.00	88.64	276.40	7504.41	573.31 N	4889.62 W	4923.11	0.47
12177.00	88.83	276.66	7505.80	580.47 N	4952.19 W	4986.09	0.52
12209.00	89.01	276.83	7506.40	584.23 N	4983.96 W	5018.09	0.78
12272.00	88.83	276.83	7507.59	591.72 N	5046.51 W	5081.07	0.29
12304.00	88.89	276.90	7508.23	595.54 N	5078.27 W	5113.07	0.29
12335.00	89.14	277.03	7508.76	599.30 N	5109.04 W	5144.06	0.90
12398.00	89.38	276.72	7509.58	606.84 N	5171.58 W	5207.06	0.63
12493.00	89.44	278.36	7510.55	619.30 N	5265.75 W	5302.04	1.73
12588.00	88.27	276.79	7512.44	631.81 N	5359.90 W	5397.00	2.06
12620.00	88.83	276.47	7513.26	635.51 N	5391.67 W	5428.99	2.01
12683.00	89.51	276.13	7514.17	642.42 N	5454.29 W	5491.98	1.21
12747.00	90.25	275.46	7514.31	648.88 N	5517.96 W	5555.97	1.55
12778.00	90.43	275.17	7514.13	651.75 N	5548.82 W	5586.96	1.12
12810.00	90.86	275.31	7513.77	654.68 N	5580.69 W	5618.95	1.41
12842.00	90.80	275.52	7513.30	657.69 N	5612.54 W	5650.94	0.67
12873.00	90.68	275.58	7512.90	660.69 N	5643.39 W	5681.93	0.45
12968.00	91.05	275.72	7511.47	670.04 N	5737.92 W	5776.91	0.42
13000.00	90.80	275.60	7510.95	673.20 N	5769.76 W	5808.90	0.85
13063.00	90.86	275.64	7510.04	679.37 N	5832.45 W	5871.88	0.12
13158.00	88.21	275.68	7510.80	688.73 N	5926.98 W	5966.86	2.80
13253.00	88.09	275.72	7513.88	698.16 N	6021.46 W	6061.80	0.14
13284.00	88.08	275.82	7514.91	701.28 N	6052.28 W	6092.78	0.30
13347.00	88.64	275.69	7516.71	707.59 N	6114.94 W	6155.74	0.91
13442.00	88.70	275.48	7518.92	716.83 N	6209.47 W	6250.70	0.23
13537.00	90.06	276.08	7519.94	726.40 N	6303.97 W	6345.68	1.57
13632.00	89.20	275.84	7520.55	736.26 N	6398.46 W	6440.68	0.95
13727.00	90.19	276.27	7521.07	746.28 N	6492.92 W	6535.67	1.14
13822.00	90.62	276.57	7520.40	756.91 N	6587.33 W	6630.66	0.55
13917.00	90.12	276.57	7519.79	767.78 N	6681.70 W	6725.66	0.52
14012.00	89.75	277.22	7519.89	779.18 N	6776.01 W	6820.66	0.79
14107.00	88.46	278.00	7521.37	791.77 N	6870.16 W	6915.63	1.59
14202.00	88.27	278.62	7524.09	805.50 N	6964.12 W	7010.55	0.68
14297.00	87.90	279.02	7527.26	820.06 N	7057.95 W	7105.43	0.57
14360.00	88.27	278.55	7529.36	829.67 N	7120.17 W	7168.35	0.95
14423.00	88.21	278.32	7531.30	838.91 N	7182.46 W	7231.29	0.38
14486.00	88.08	277.93	7533.34	847.80 N	7244.80 W	7294.23	0.64
14551.00	88.33	276.92	7535.37	856.20 N	7309.22 W	7359.19	1.60
14582.00	88.52	276.74	7536.22	859.88 N	7339.99 W	7390.18	0.82
14677.00	89.38	276.54	7537.96	870.86 N	7434.33 W	7485.16	0.93
14772.00	90.12	276.24	7538.37	881.43 N	7528.74 W	7580.16	0.84
14867.00	91.17	276.90	7537.29	892.30 N	7623.11 W	7675.15	1.31
14962.00	91.17	276.19	7535.35	903.13 N	7717.47 W	7770.13	0.74
15057.00	90.93	276.49	7533.61	913.62 N	7811.88 W	7865.12	0.41
15089.00	90.62	276.66	7533.18	917.28 N	7843.66 W	7897.11	1.10
15152.00	90.43	276.94	7532.60	924.74 N	7906.22 W	7960.11	0.53
15247.00	90.62	276.58	7531.73	935.91 N	8000.55 W	8055.10	0.43
15342.00	90.68	276.71	7530.65	946.91 N	8094.91 W	8150.10	0.16
15437.00	90.62	276.66	7529.58	957.97 N	8189.26 W	8245.09	0.09
15468.00	90.31	276.57	7529.33	961.54 N	8220.05 W	8276.09	1.03
15532.00	89.32	276.66	7529.54	968.91 N	8283.62 W	8340.09	1.55
15626.00	89.07	276.80	7530.85	979.93 N	8376.96 W	8434.08	0.30
15721.00	89.57	276.96	7531.98	991.31 N	8471.27 W	8529.07	0.55
15816.00	89.69	277.26	7532.59	1003.07 N	8565.54 W	8624.07	0.34
15911.00	89.14	276.49	7533.56	1014.44 N	8659.85 W	8719.06	1.00
16006.00	89.35	274.64	7534.82	1023.64 N	8754.39 W	8814.03	1.96
16101.00	90.71	274.60	7534.76	1031.29 N	8849.08 W	8908.97	1.43
16164.00	91.54	275.06	7533.53	1036.60 N	8911.84 W	8971.93	1.51

16259.00	90.61	275.02	7531.74	1044.94 N	9006.46 W	9066.87	0.98
16323.00	90.18	274.78	7531.29	1050.41 N	9070.22 W	9130.84	0.77
16386.00	90.40	274.88	7530.97	1055.71 N	9133.00 W	9193.81	0.38
16473.00	90.77	275.10	7530.08	1063.28 N	9219.66 W	9280.77	0.50
16539.00	91.10	275.35	7529.00	1069.29 N	9285.38 W	9346.74	0.63

**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 276.62 DEGREES (TRUE)  
A TOTAL CORRECTION OF 8.41 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 16539.00 FEET  
IS 9346.75 FEET ALONG 276.57 DEGREES (TRUE)**

**Last Survey is Projected to Bit**

**Date Printed:05 October 2013**