

**SLIM PHASE 4**  
**DGR Dual Gamma Ray**

[illegible]

## WELL INFORMATION

<b>MWD Run Number</b>	200				
<b>Date run completed</b>	09-Aug-13				
<b>Rig Bit Number</b>	0200				
<b>Bit Size (in)</b>	6.125				
<b>Tool Nominal OD (in)</b>	4.750				
<b>Log Start Depth (MD, ft)</b>	8,170.00				
<b>Log End Depth (MD, ft)</b>	12,120.00				
<b>Drill or Wipe</b>	Drill				
<b>Drill/Wipe Start Date and Time</b>	06-Aug-13 20:45				
<b>Drill/Wipe End Date and Time</b>	08-Aug-13 20:00				
<b>Min Inc (deg) @ Depth (MD, ft)</b>	87.22 @ 9,228.00				
<b>Max Inc (deg) @ Depth (MD, ft)</b>	93.16 @ 10,260.00				
<b>Bit TFA(in2) / Bit Type</b>	.98 / PDC				
<b>Flow Rate (gpm)</b>	300.00				
<b>Max AV (fpm) / CV (fpm) @ MWD</b>	N/A / N/A				
<b>Fluid Type</b>	Native/Spud Mud				
<b>Density (ppg) / Viscosity (spqt)</b>	9.80 / 45.00				
<b>Filtrate CL (ppm)</b>	1,100.00				
<b>pH / Fluid Loss (mptm)</b>	8.00 / 4				
<b>PV (cP) / YP (lhf2)</b>	15 / 12.00				
<b>% Solids / % Sand</b>	9 / 0.1				
<b>% Oil / Oil:Water Ratio</b>	N/A / N/A				
<b>Rm @ Measured Temp (degF)</b>	N/A @ N/A				
<b>Rmf @ Measured Temp (degF)</b>	N/A @ N/A				
<b>Rmc @ Measured Temp (degF)</b>	N/A @ N/A				
<b>Max Tool Temp (degF) / Source</b>	222.59 / HCIM				
<b>Rm @ Max Tool Temp (degF)</b>	N/A @ 222.59				
<b>Lead MWD Engineer</b>	Clay Wass				
<b>Customer Representative</b>					

SENSOR INFORMATION					
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Downhole Processor Information					
Tool Type	HCIM				
Software Version	88.56				
Sub Serial Number	123				
Insert Serial Number	23				
Date and Time Initialized	06-Aug-13 10:59				
Date and Time Read	01-Jan-70 00:00				
ECMB SW Version	N/A				

Directional Sensor Information					
Tool Type	PCDC				
Distance From Bit (ft)	50.91				
Software Version	6.21				
Sub Serial Number	11917160				
Sonde Serial Number	11478086				
Sensor ID Number	N/A				
Toolface Offset (deg)	167.90				

Gamma Ray Sensor Information					
Tool Type	DGR				
Distance From Bit (ft)	72.81				
Recorded Sample Period (sec)	8				
Software Version	N/A				
Sub Serial Number	123				
Insert/Sonde Serial Number	12345				

Resistivity Sensor Information					
Tool Type	Slim P4				
Distance From Bit (ft)	65.84				
Recorded Sample Period (sec)	10				
Software Version	5.55				
Sub Serial Number	47296				
Receiver Insert Serial Number	260883				
Transmitter Insert Serial Number	11062260				
Receiver Orientation	Down				

Pulser Controller Sensor Information					
Tool Type	PCM				
Software Version					
PIC Software Version					
Sub/HOC Serial Number	11644599				
Insert/Probe/Module SN	11400950				
Battery Serial Number	N/A				
Valve Insert SN	N/A				
DC Insert Serial Number	N/A				
Choke Size (32nd)	N/A				
Driver Current (amps)	N/A				
Driver SMI Current (amps)	N/A				
Boot Strap Version					

DDSr-DGR Sensor Information					
Tool Type	DDSr-DGR				
Distance From Bit (ft)	75.74				
Recorded Sample Period (sec)	12				
Software Version	10.88				

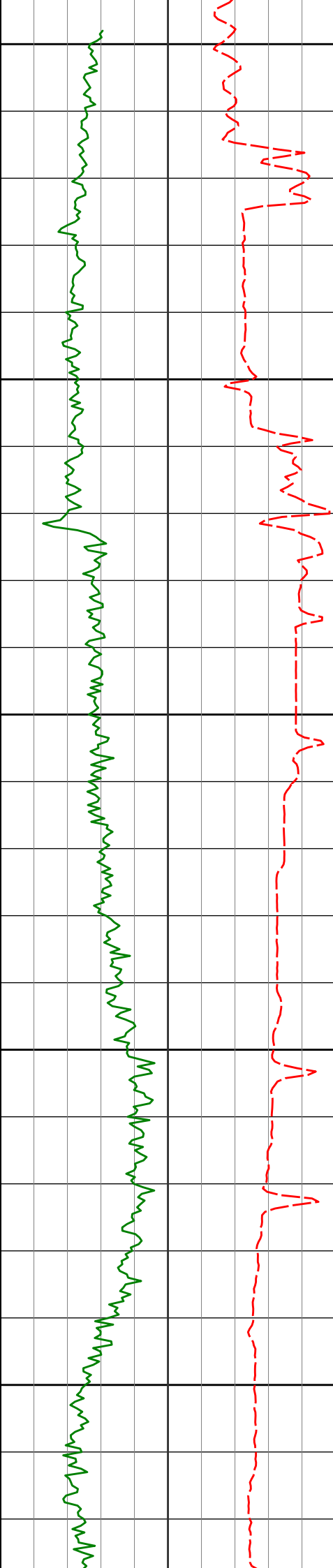
Sub Serial Number	90369351				
Insert Serial Number	11270370				
Sensor ID Number	7035				

REMARKS
<div>1. All depths are measured depths, referenced to the Driller's pipe tally and are measured from the Kelly Bushing, unless otherwise specified.</div> <div>2. No depth corrections have been made for pipe stretch or compression.</div> <div>3. Critical annular velocities are calculated using the "Power Law" model for water based fluids and the "Bingham Plastic" model for synthetic and oil based fluids.</div> <div>4. All data presented is recorded data unless otherwise specified. --ROPA is realtime data</div> <div>5. The following smoothing parameters have been applied to the data: ROPA: 0.5 ft interval, 1.2 ft coercion distance, 3 ft gap fill RXXP: 0.5 ft interval, 0.6 ft coercion distance, 3 ft gap fill C39P: 0.5 ft interval, 0.6 ft coercion distance, 3 ft gap fill DGRCC: 0.5 ft interval, 0.6 ft coercion distance, 3 ft gap fill</div> <div>6. Insite Version 7.4.20</div>

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<div>HALLIBURTON</div> <div>Sperry Drilling Services</div> <div>MD Detail Log 1:240</div> <div>Anadarko Underhill 28N-17HZ Xtreme 22 05123369160000</div>
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<div>DGR Comb Gamma Ray BCorr</div> <div>DGRCC</div> <div>0300</div> <div>api</div> <div>Avg Rate of Penetration</div> <div>ROPA</div> <div>5000</div> <div>feet per hr</div>	<div>Deep (39in) Phase Resistivity</div> <div>R39P</div> <div>0.22K</div> <div>ohm-metre</div>	<div>EWR Formation Exposure Time</div> <div>EWXT</div> <div>020</div> <div>hours</div>
	<div>Medium (27in) Phase Resistivity</div> <div>R27P</div> <div>0.22K</div> <div>ohm-metre</div>	
	<div>Shallow (15in) Phase Resistivity</div> <div>R15P</div> <div>0.22K</div> <div>ohm-metre</div>	
	<div>X-Shallow (9in) Phase Resistivity</div> <div>R09P</div> <div>0.22K</div> <div>ohm-metre</div>	
	<div>Deep (39in) Conductivity</div> <div>C39P</div> <div>1000</div> <div>mmho/m</div>	



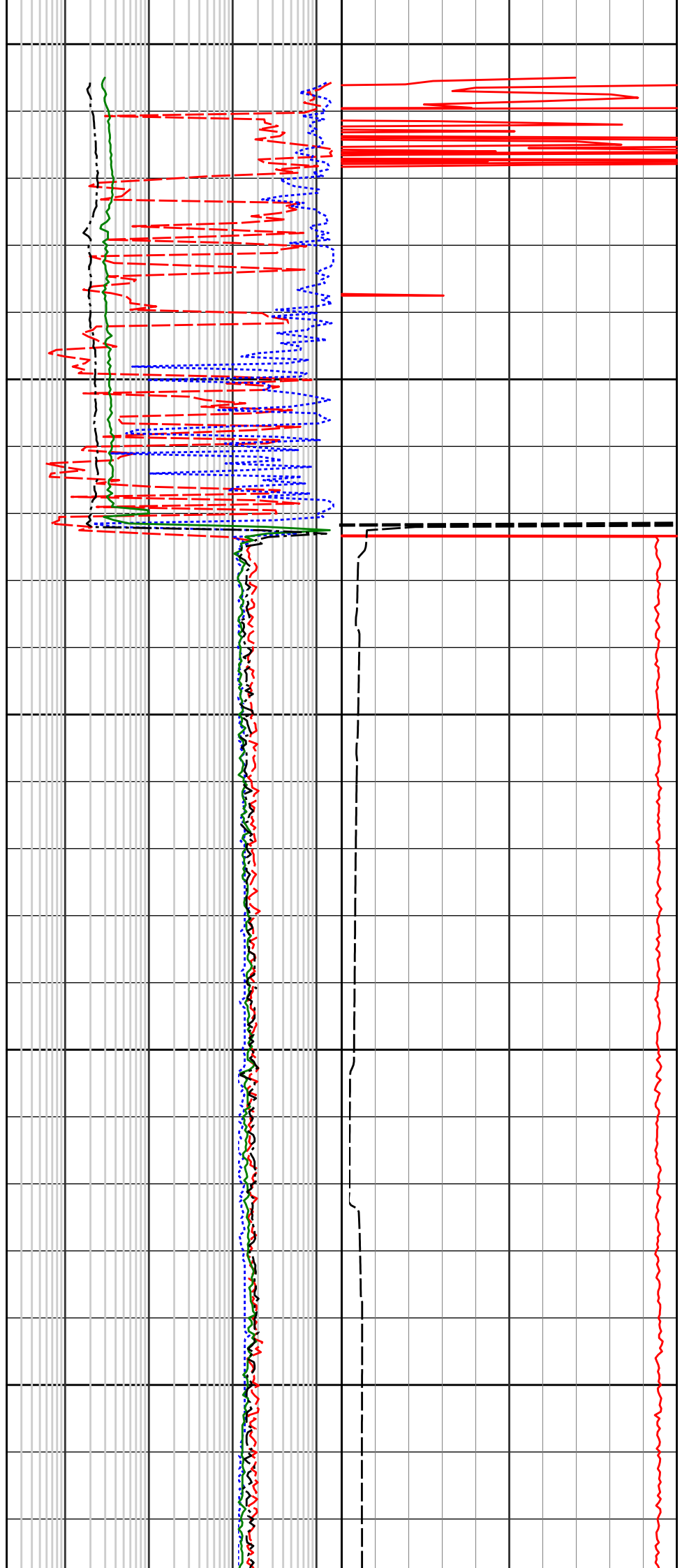
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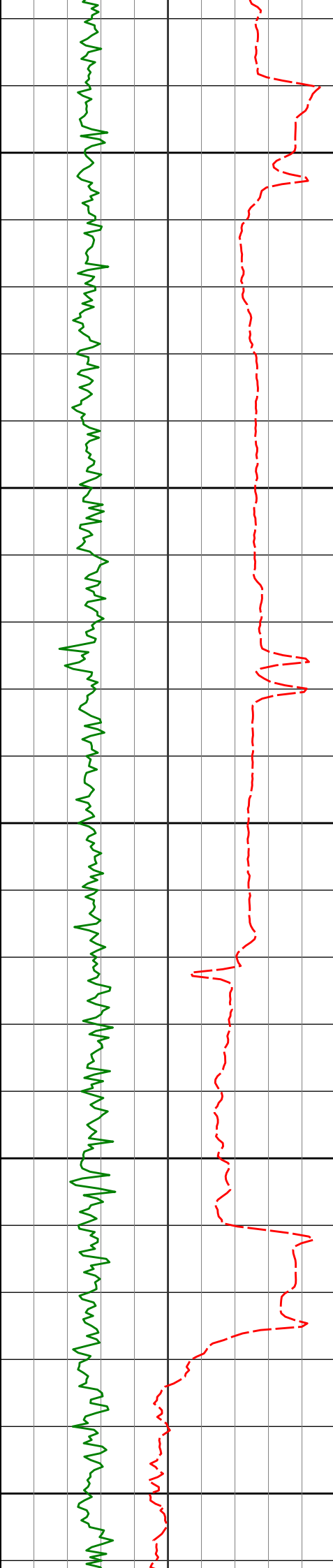
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8200

8250

8300





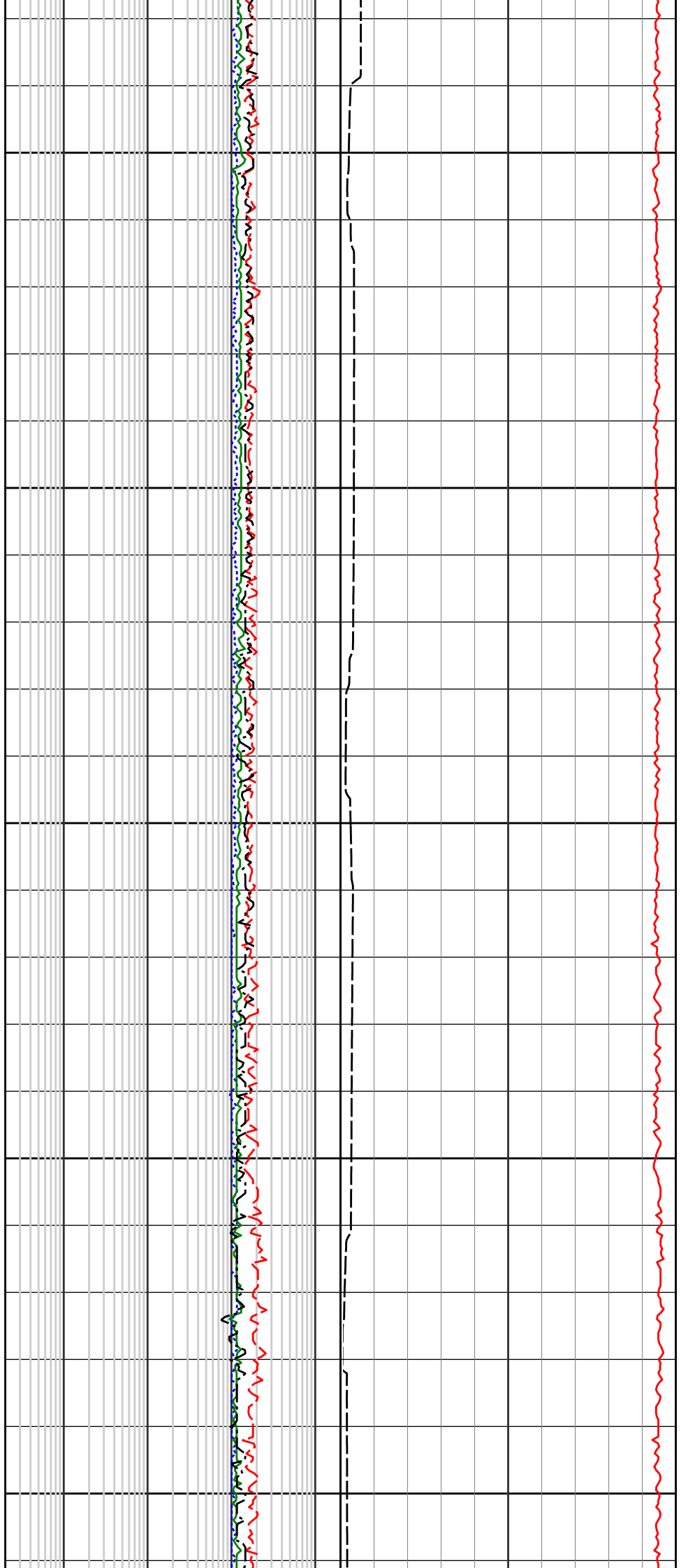
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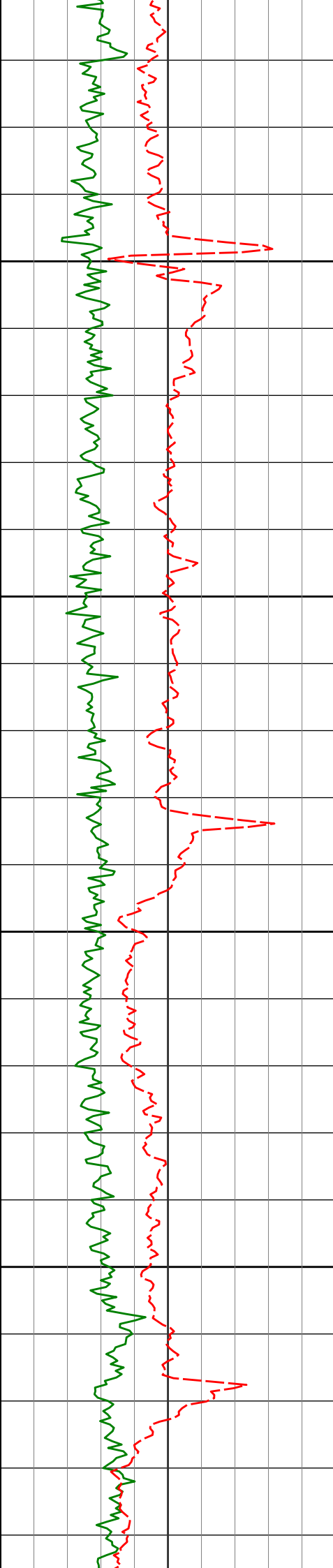
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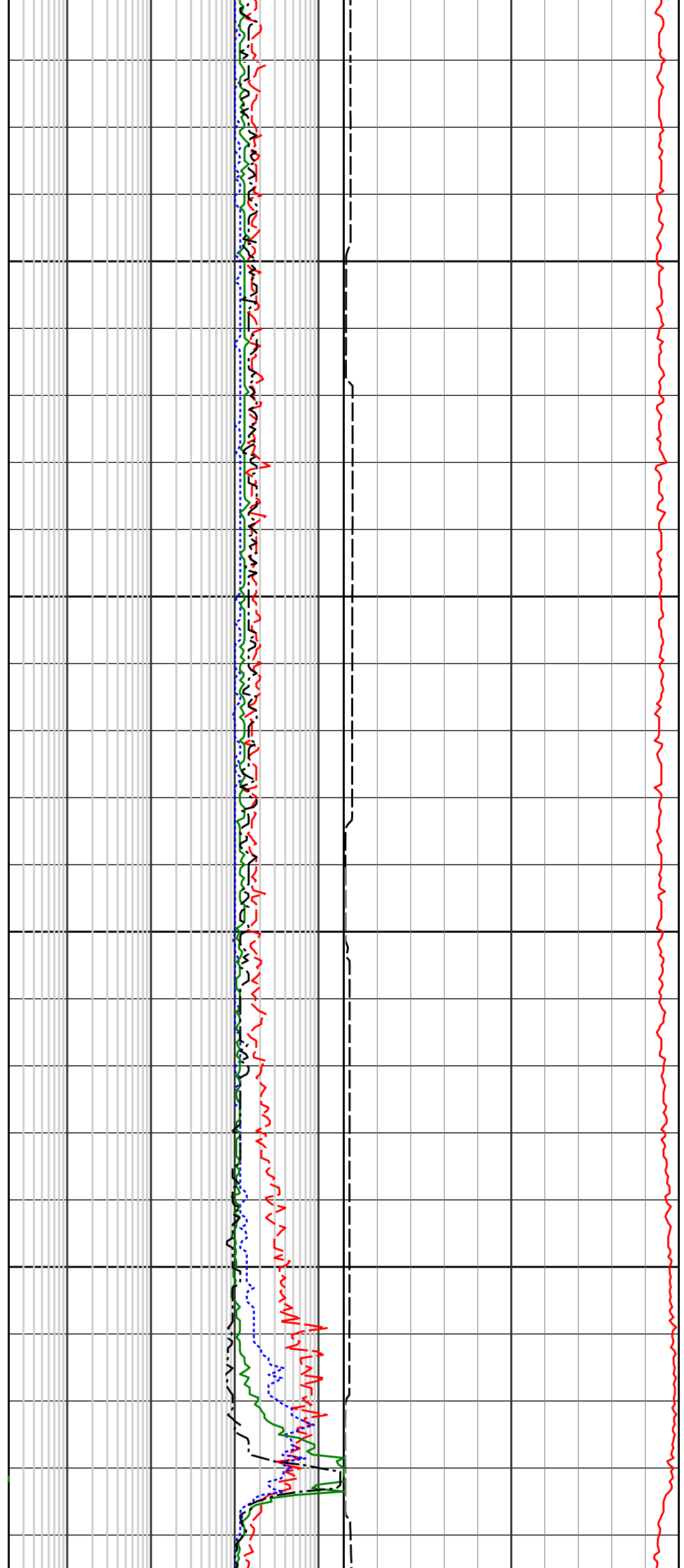


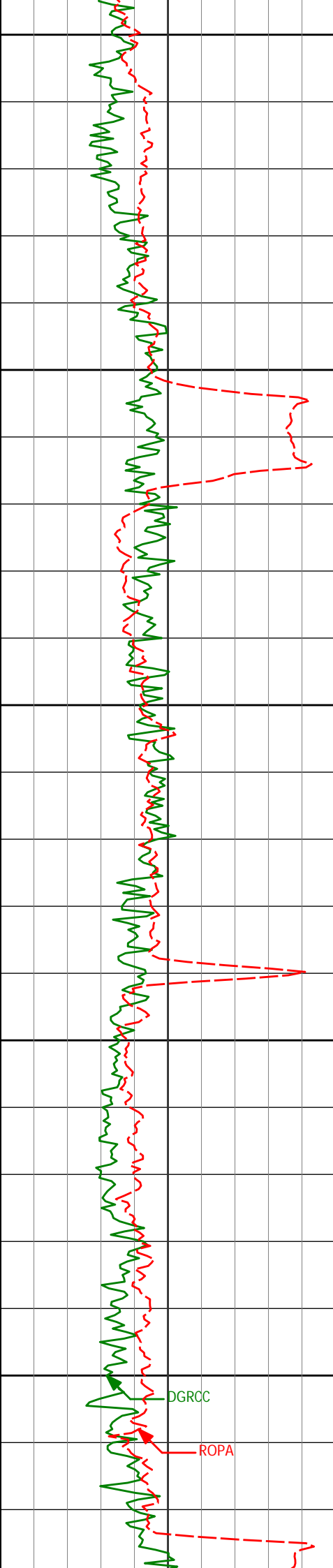
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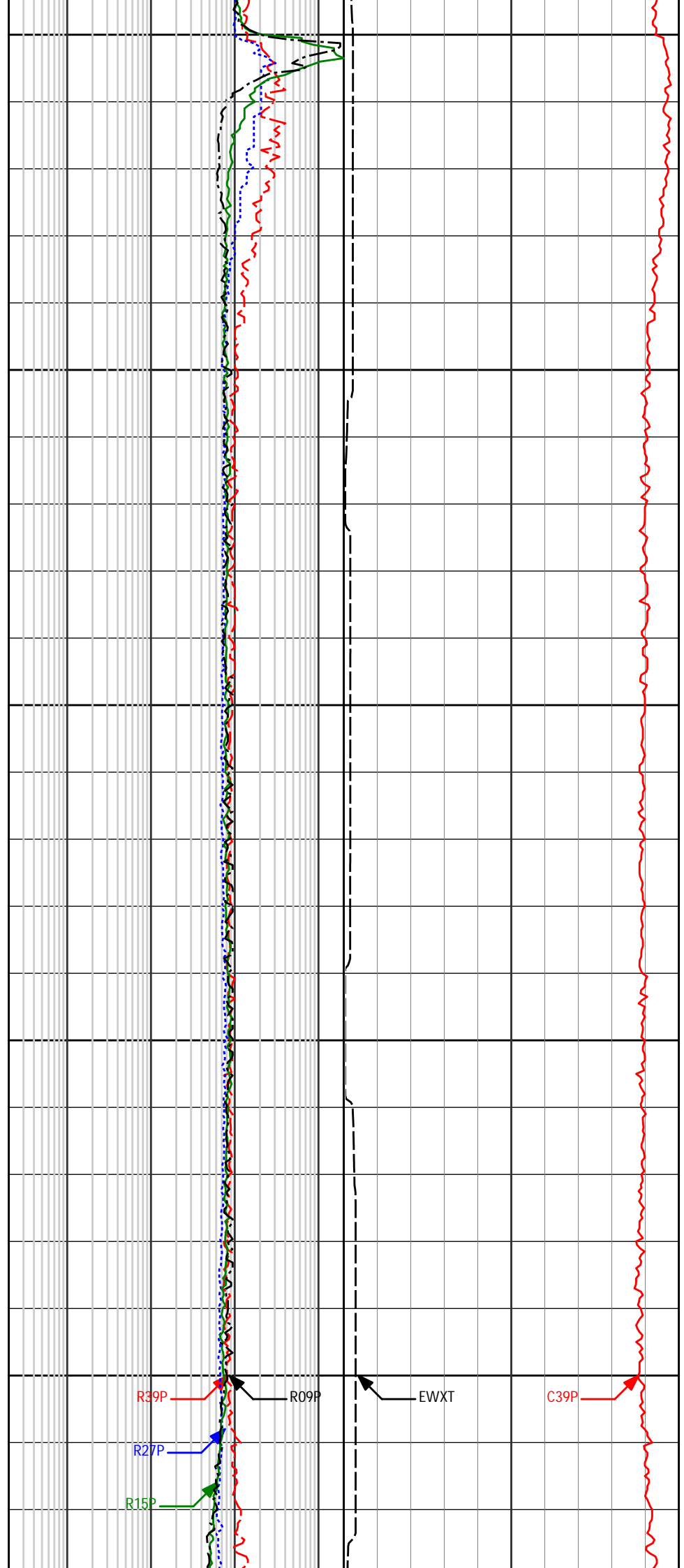
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DGRCC

ROPA



R39P

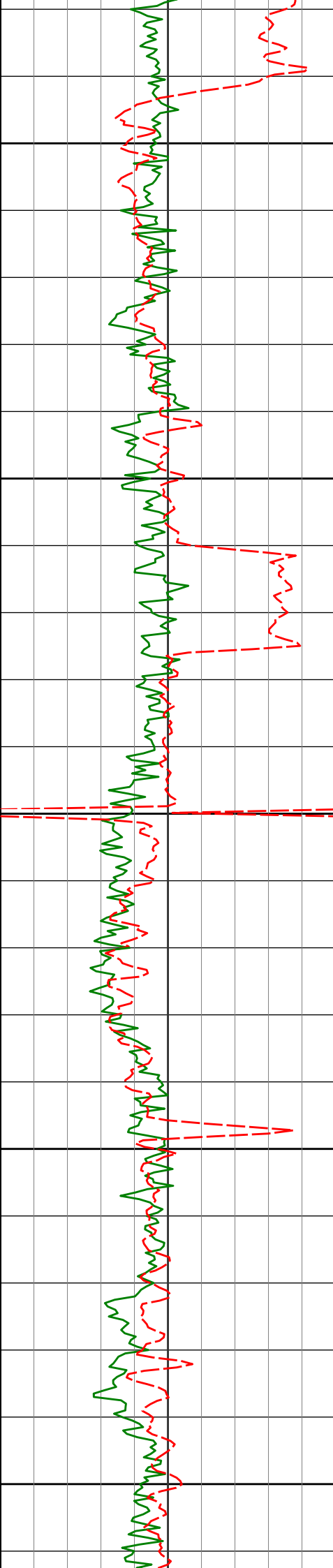
R27P

R15P

R09P

EWXT

C39P



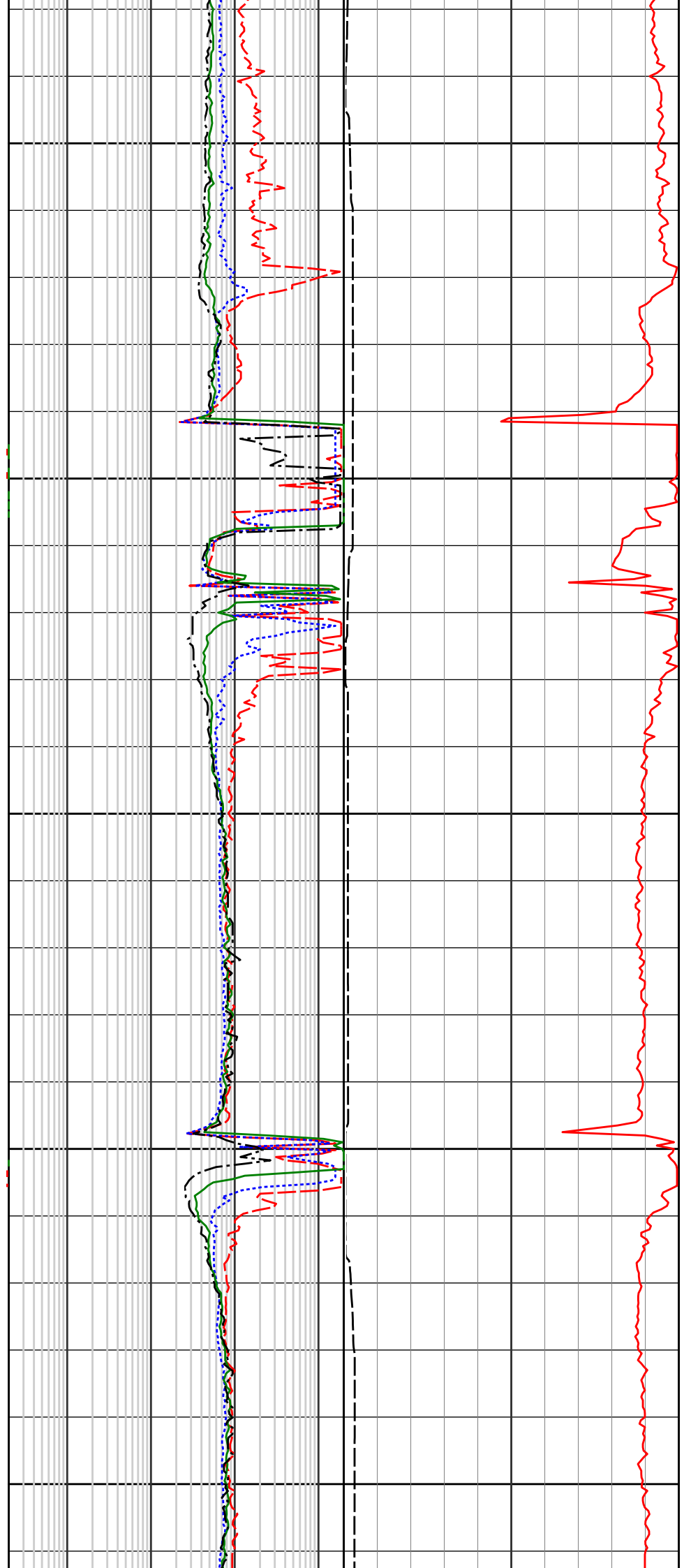
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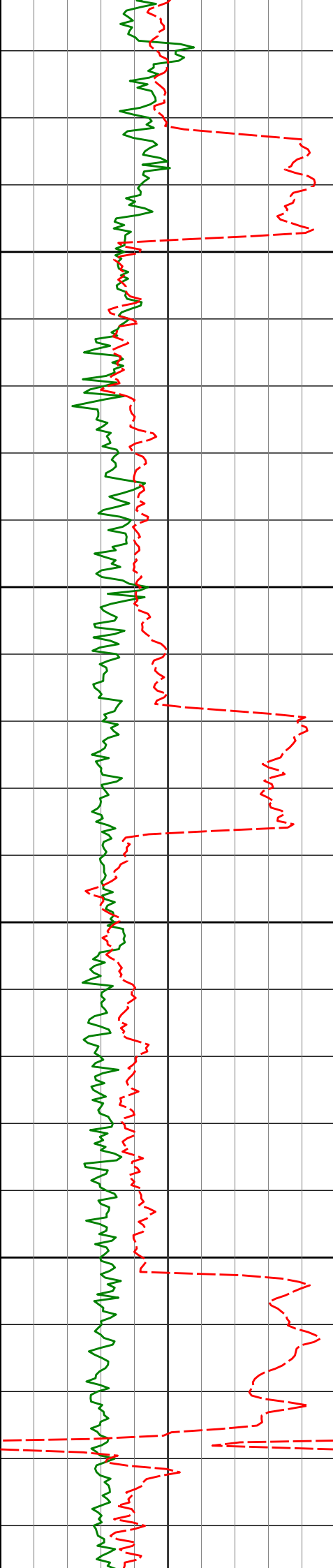
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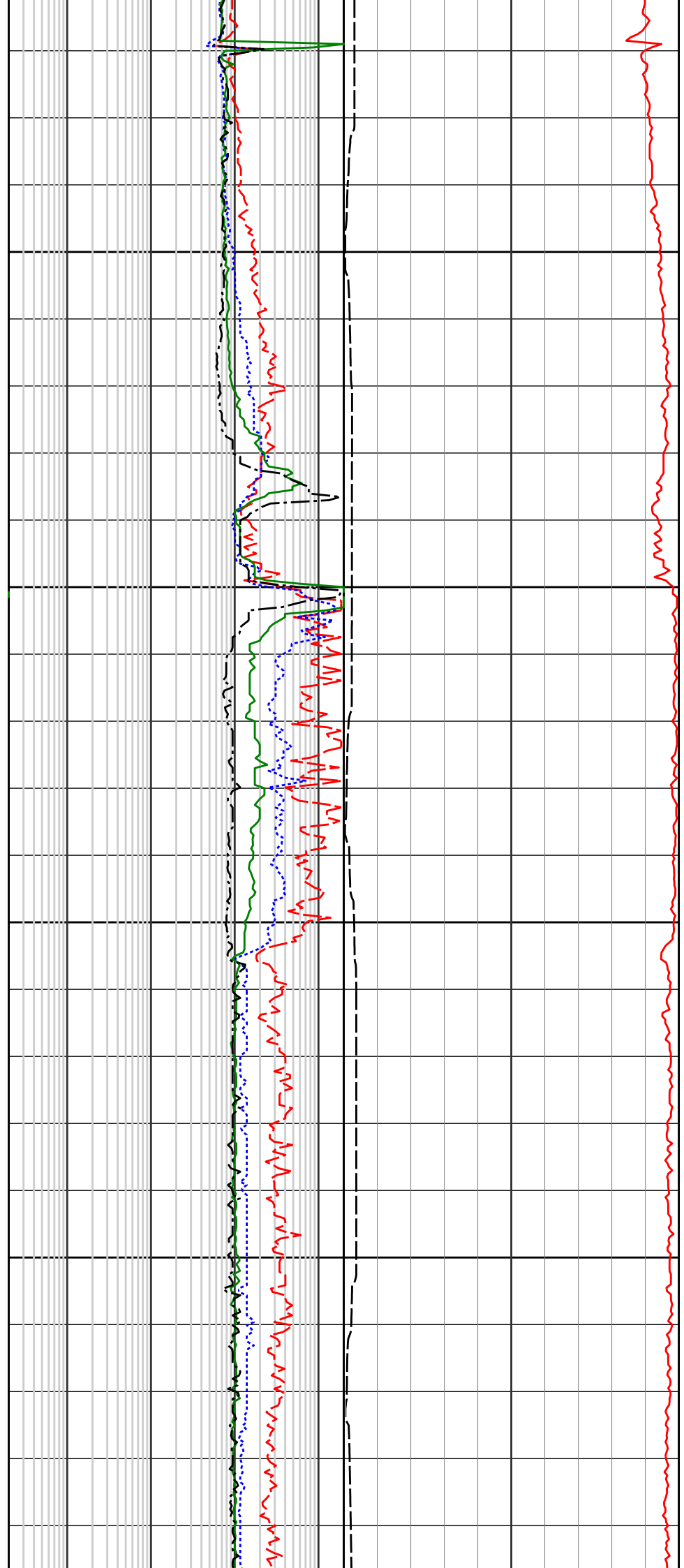


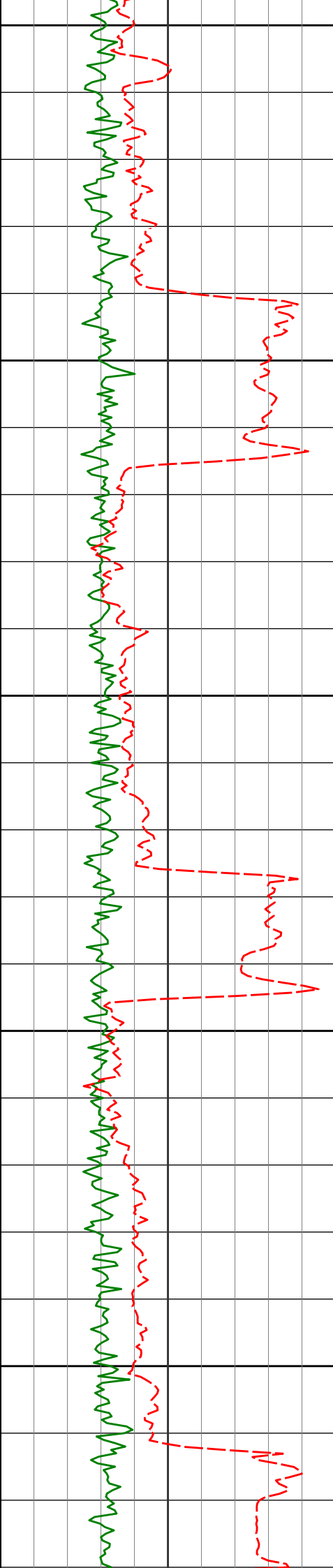
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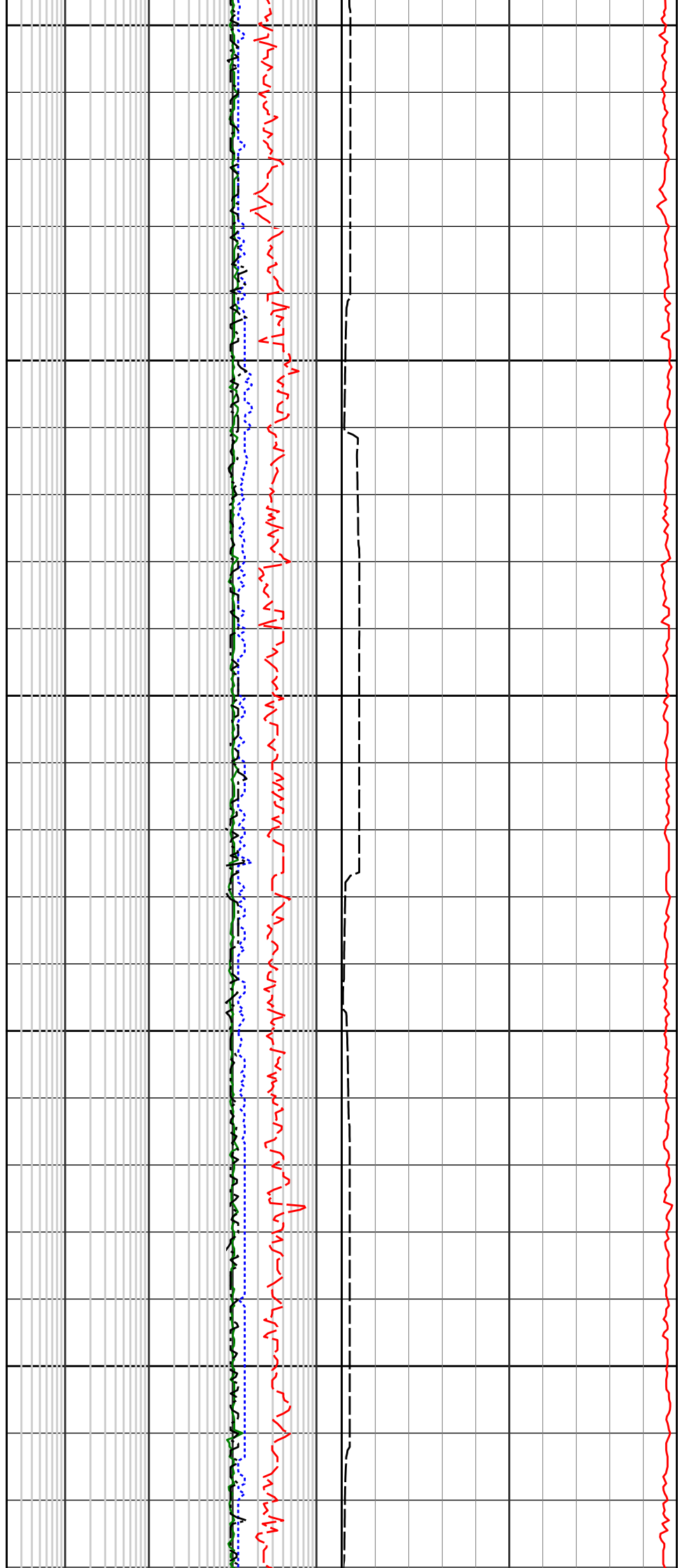
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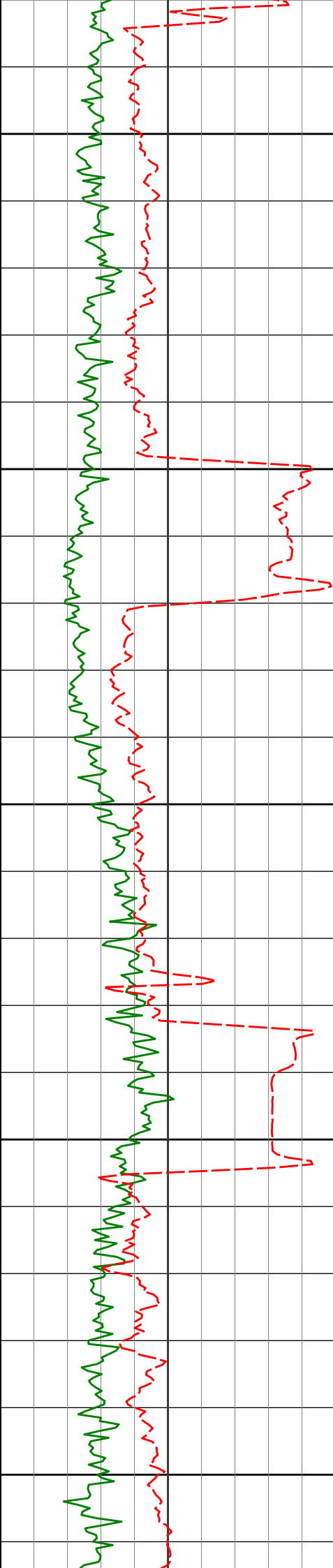
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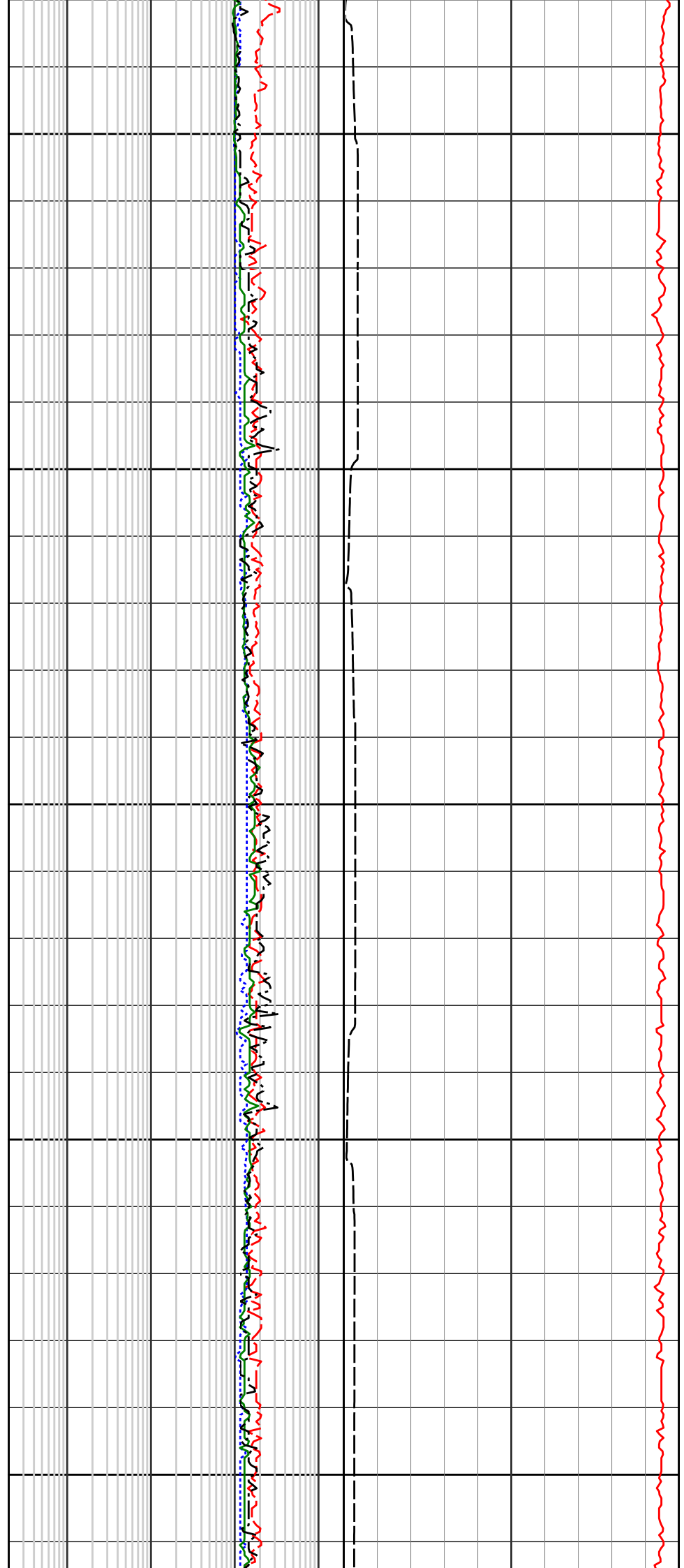
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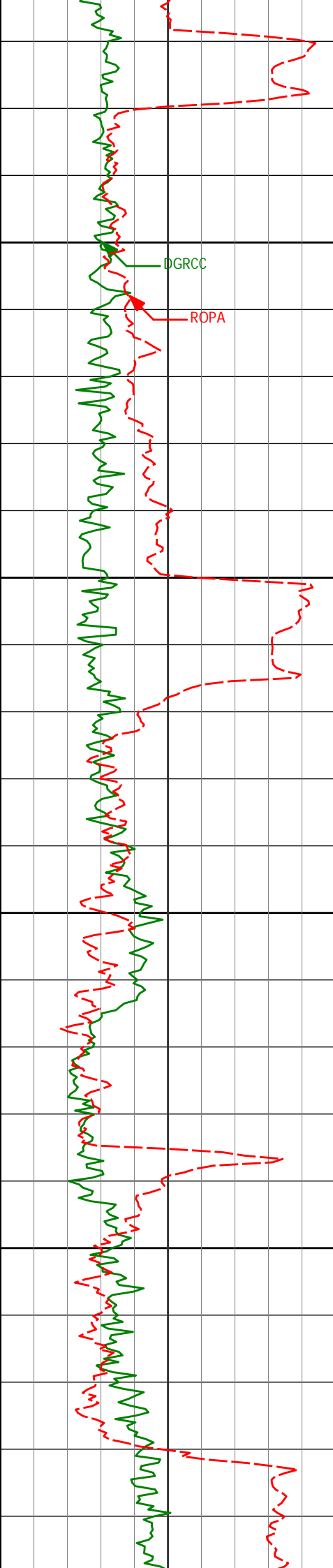
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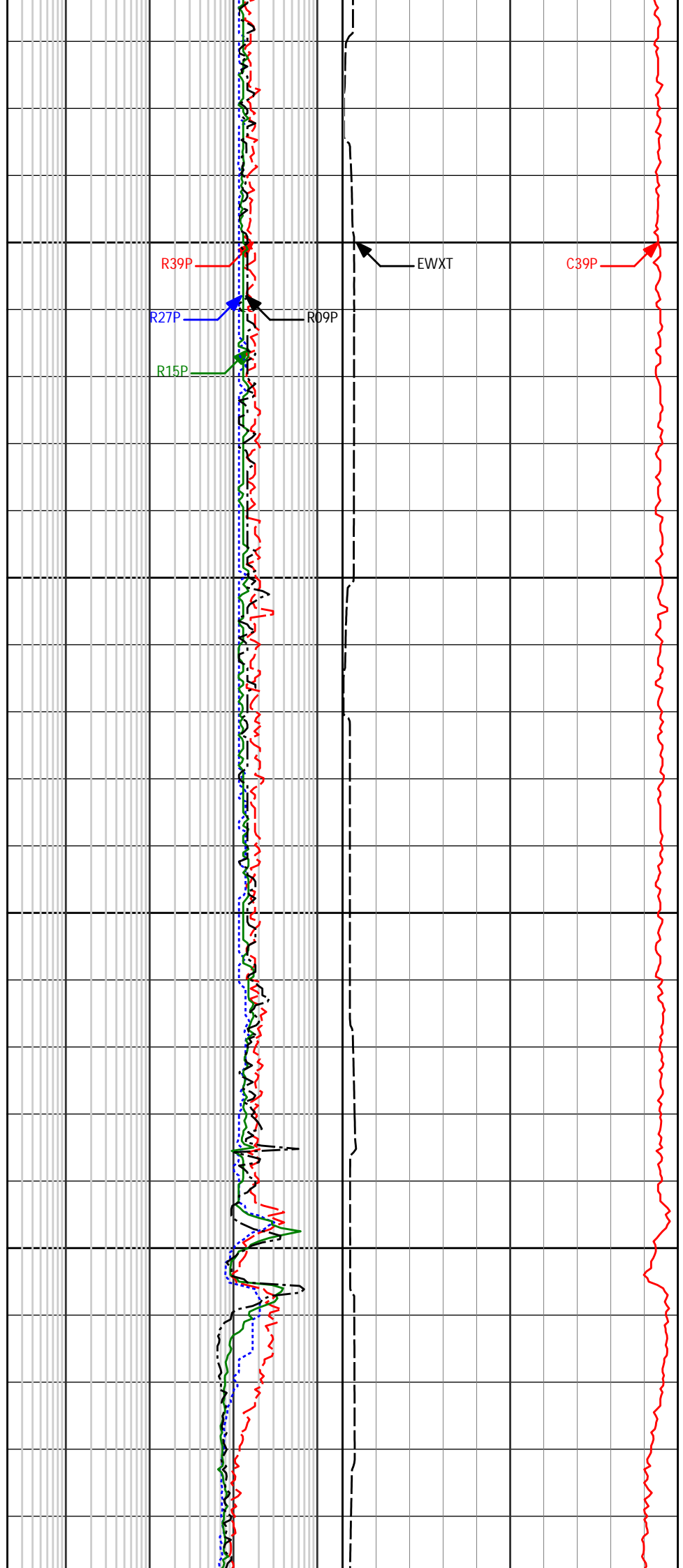


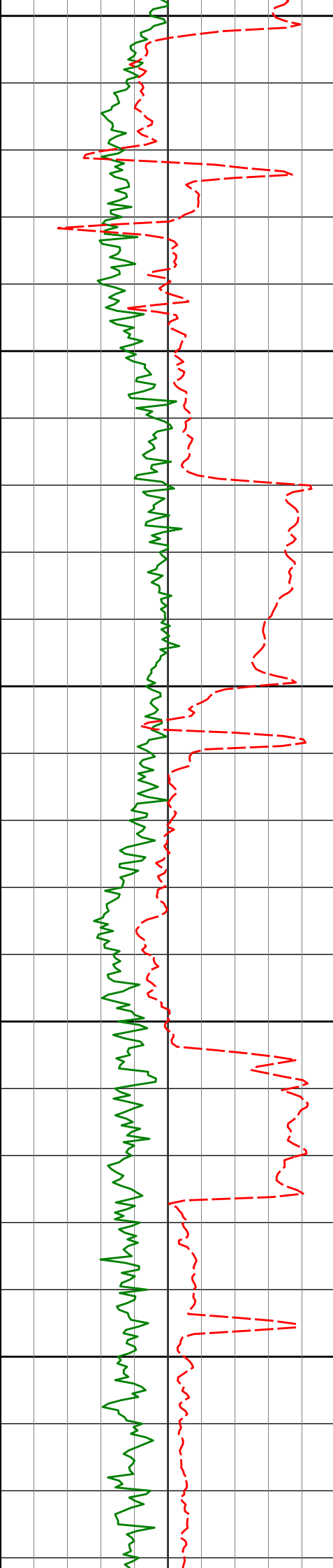
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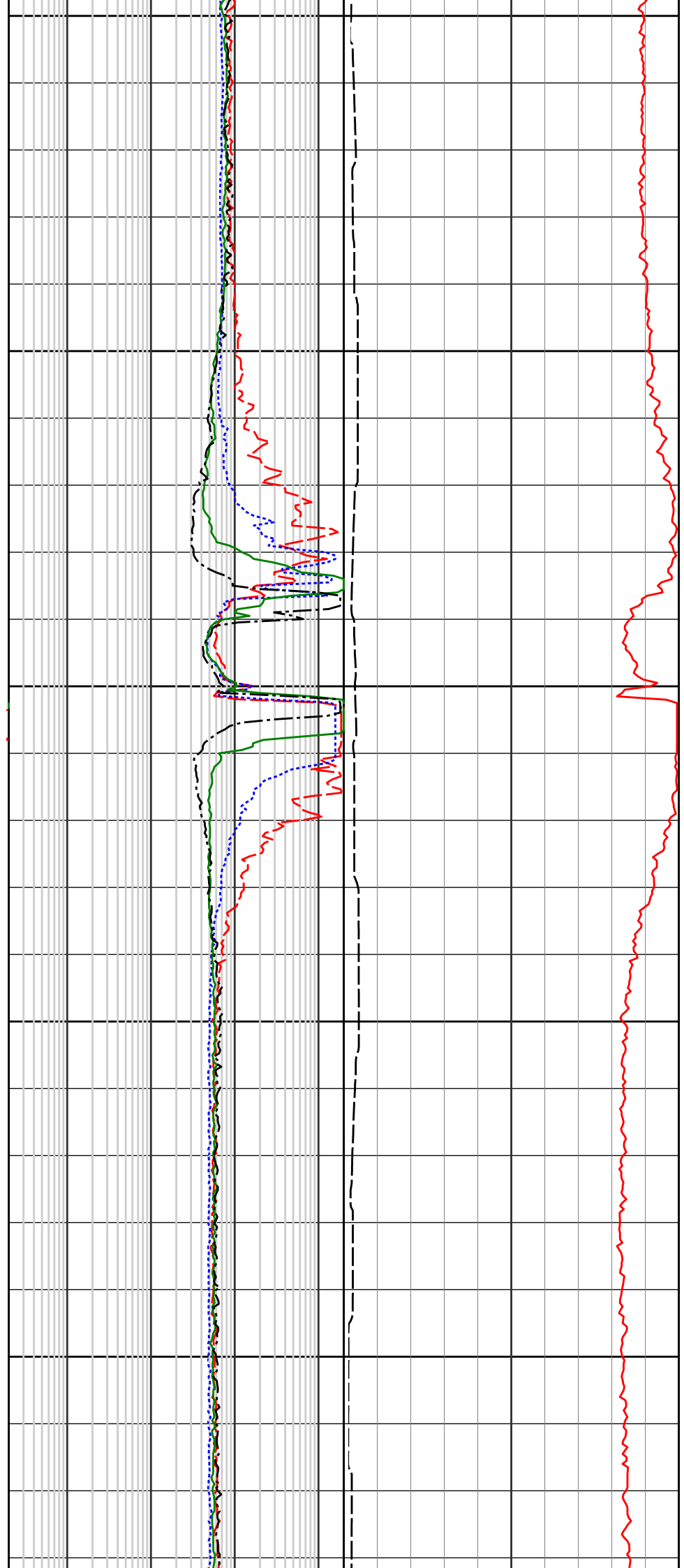
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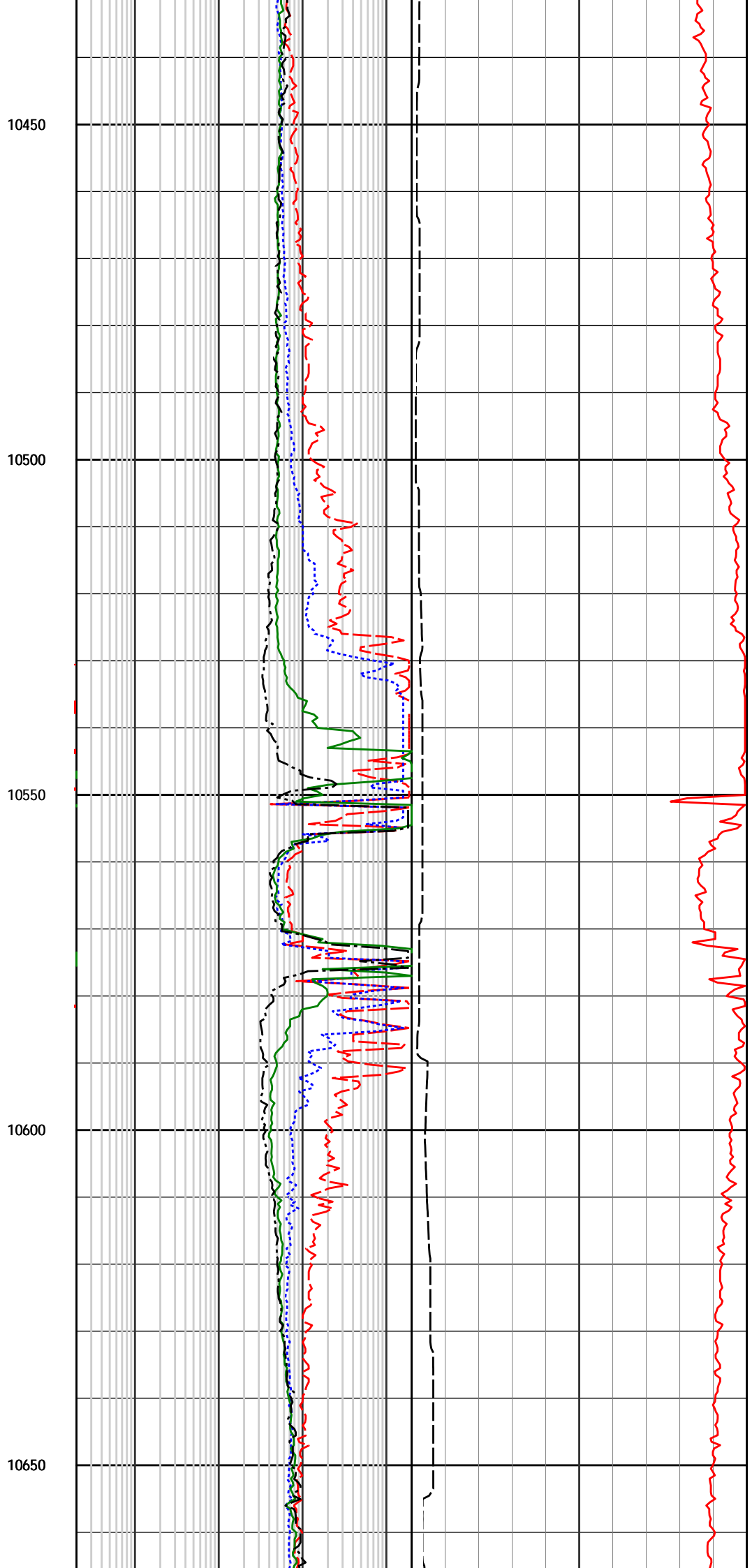
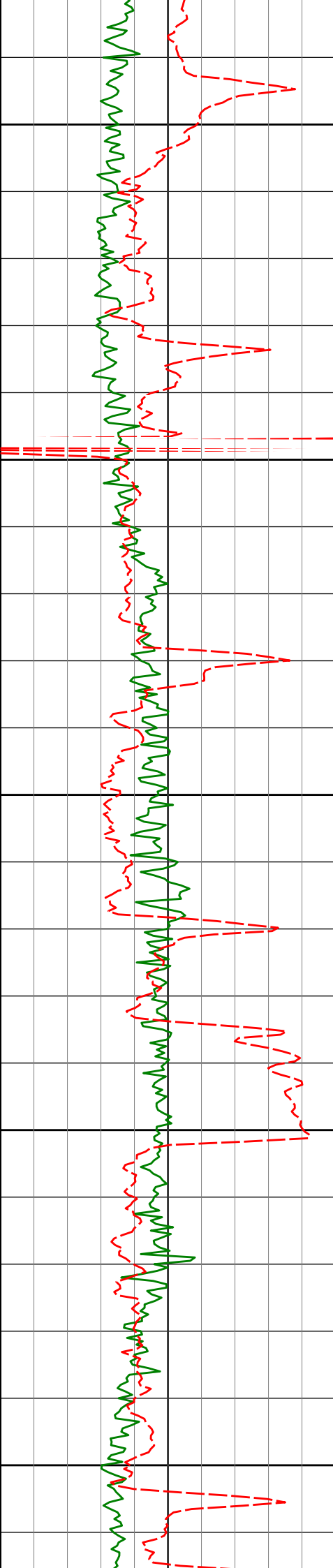
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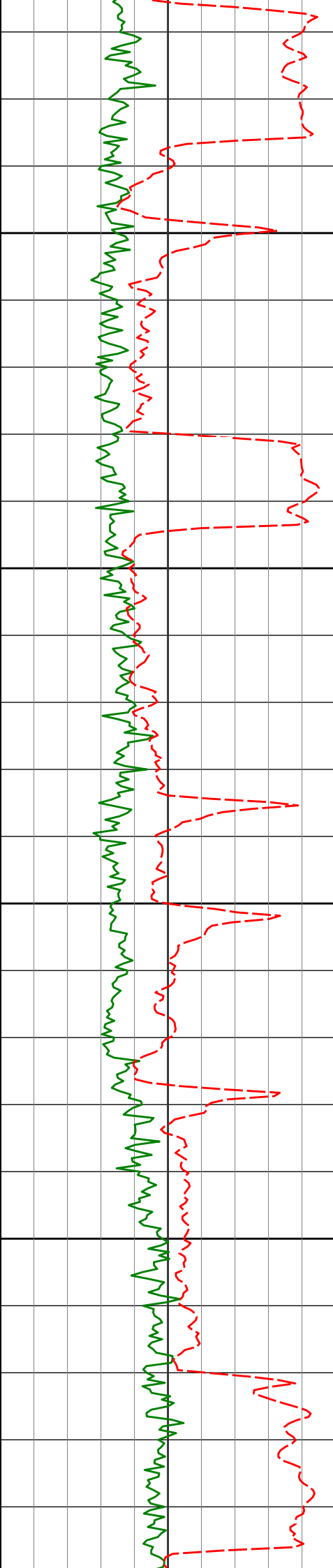
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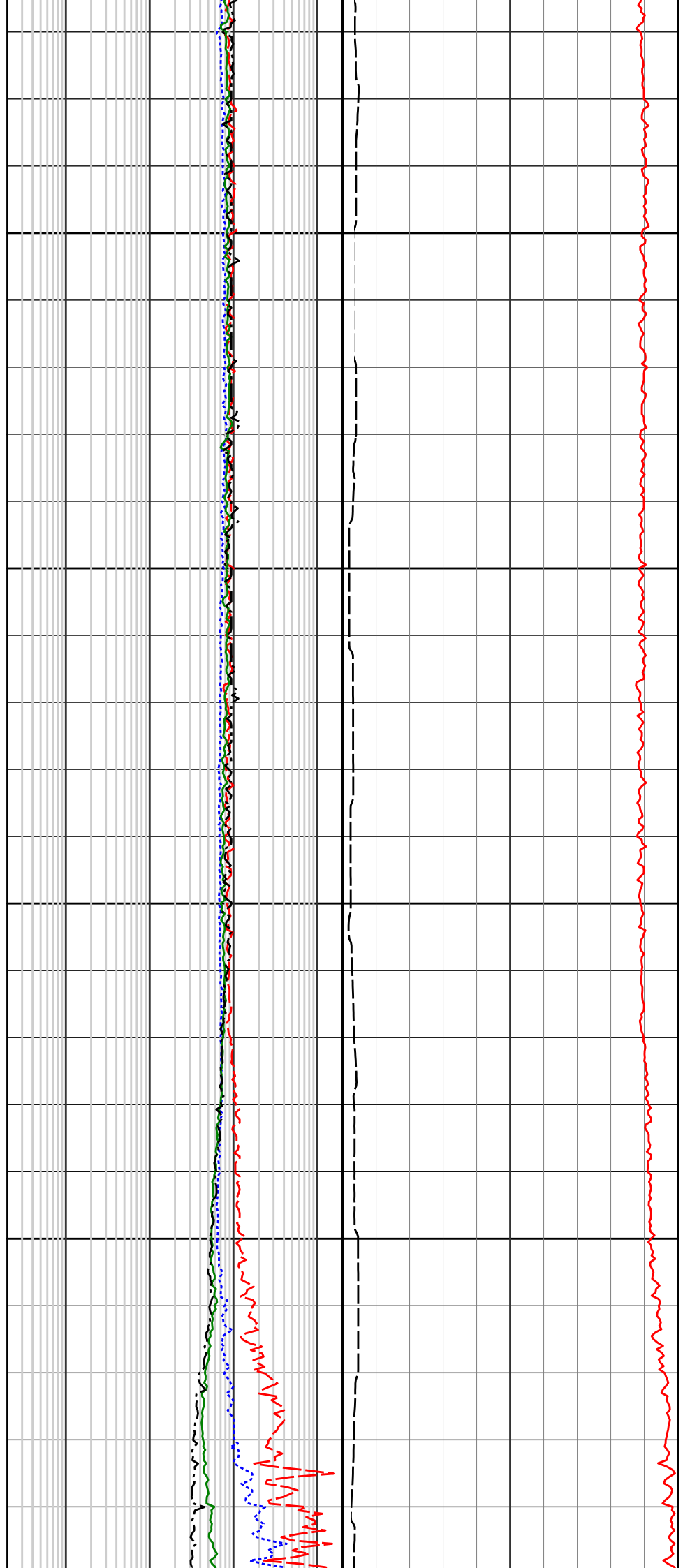


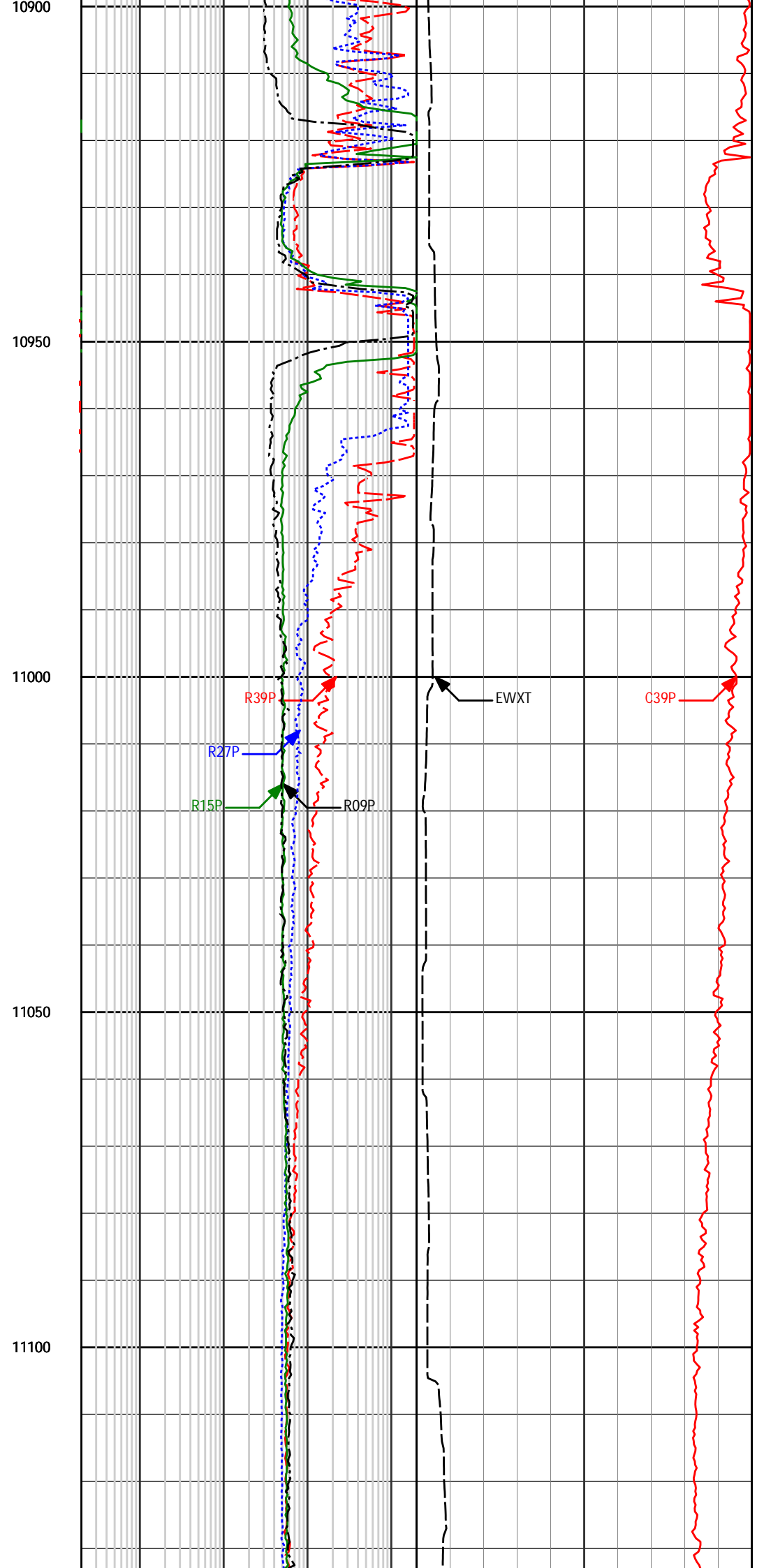
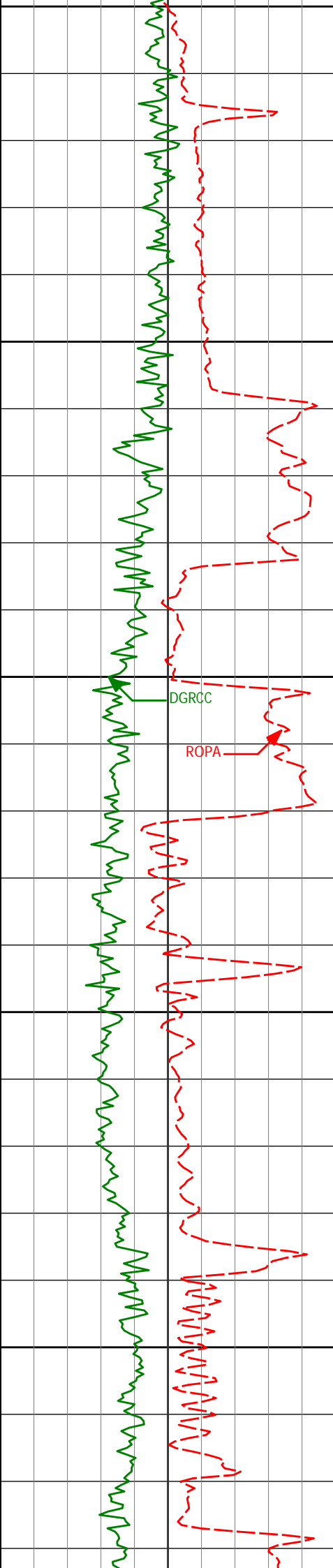
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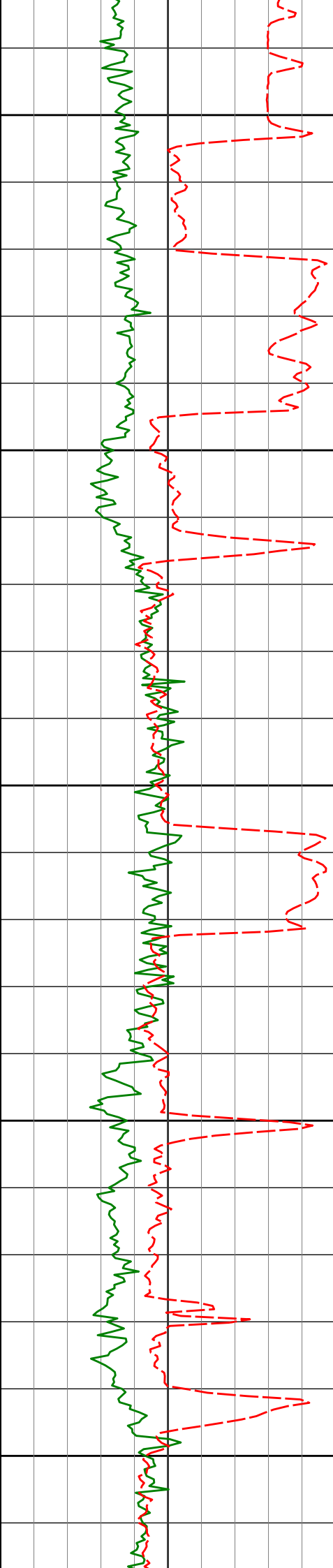
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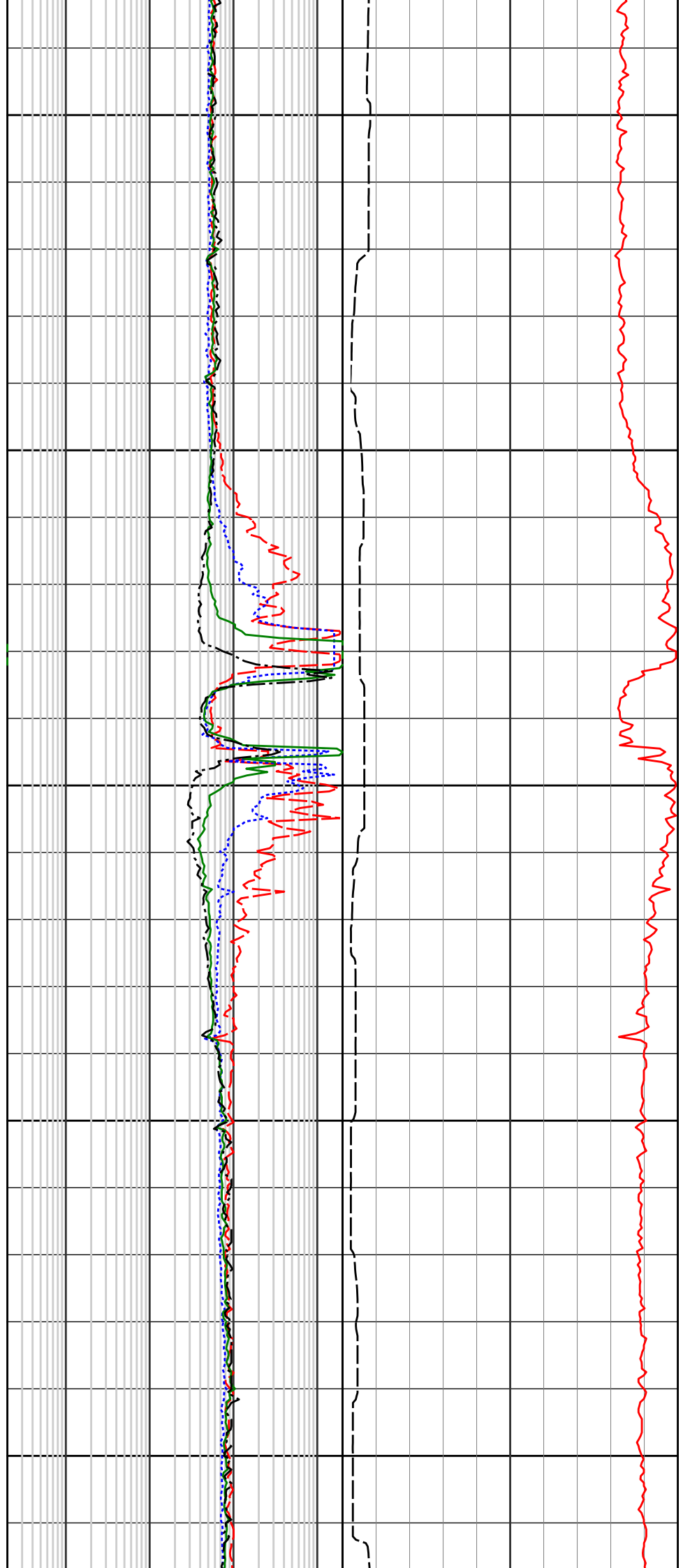
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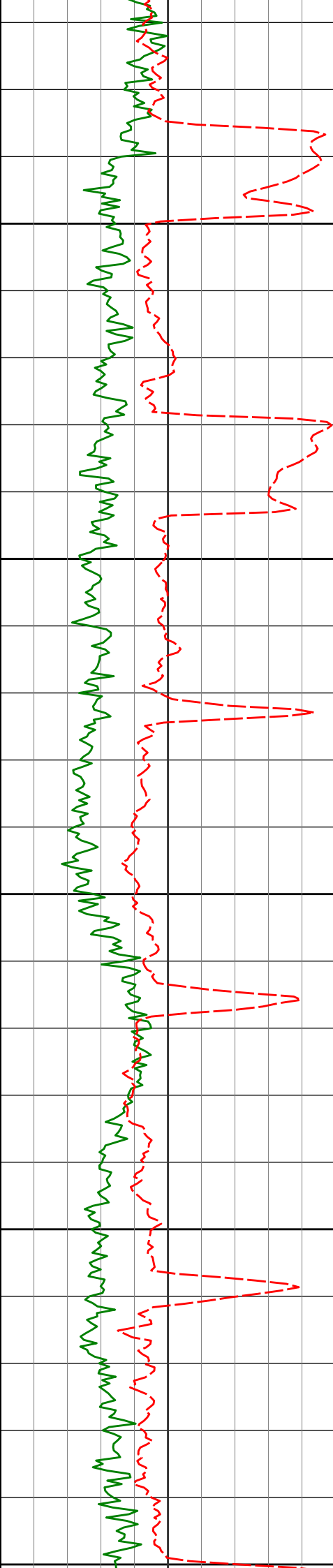
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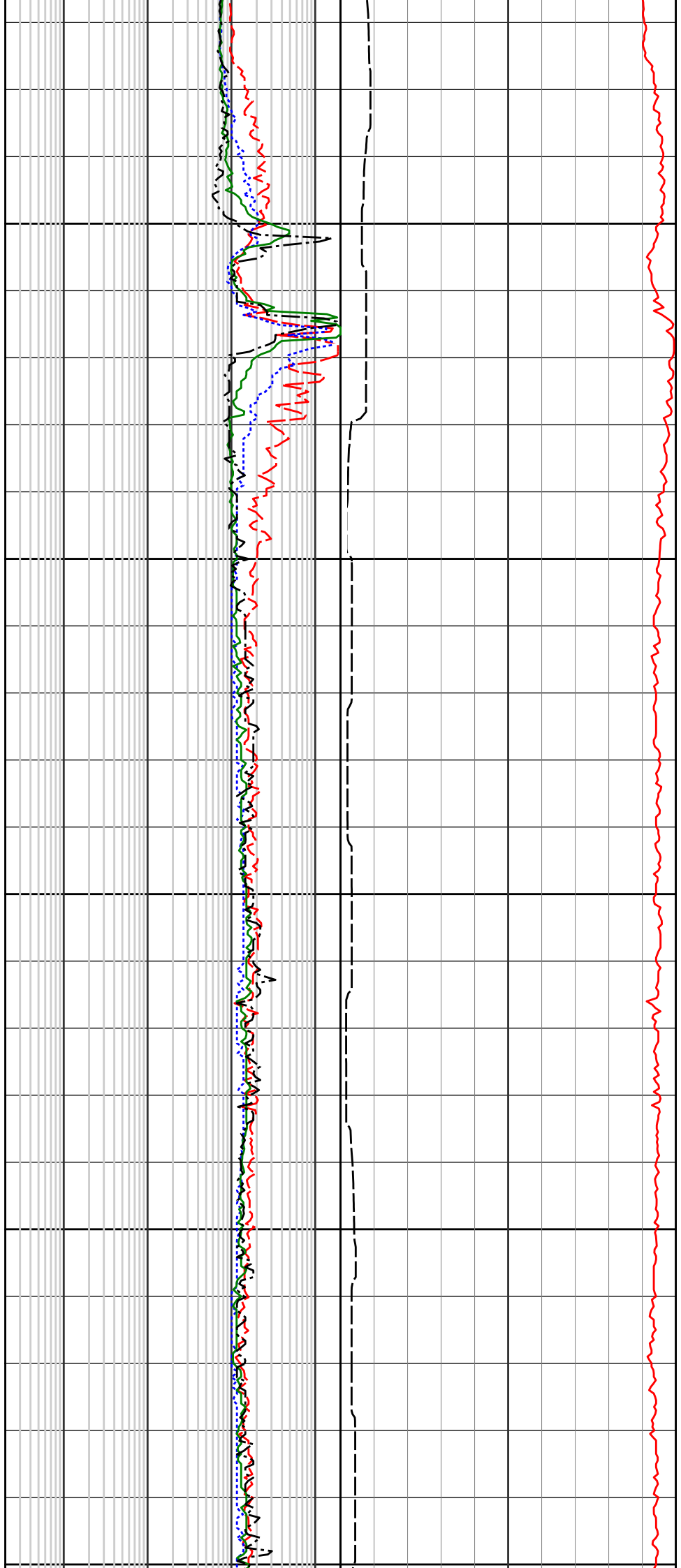
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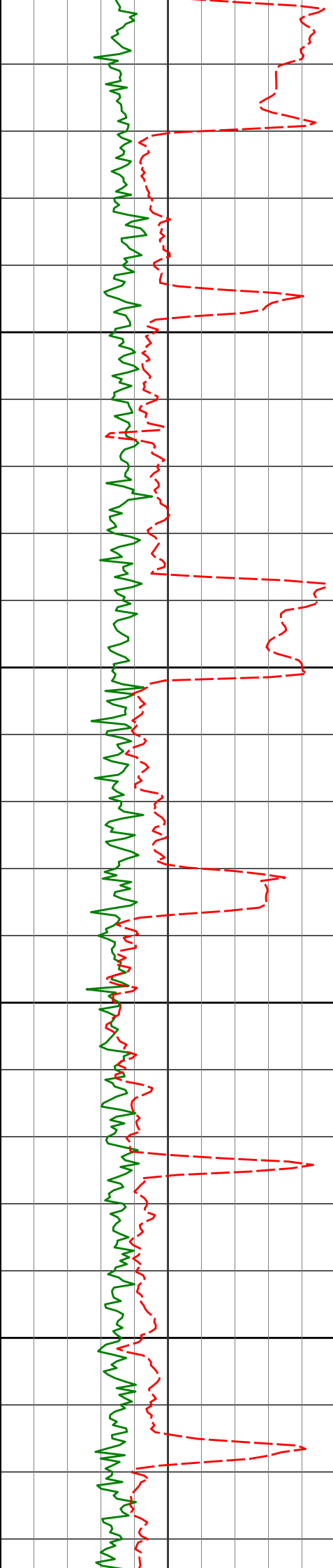
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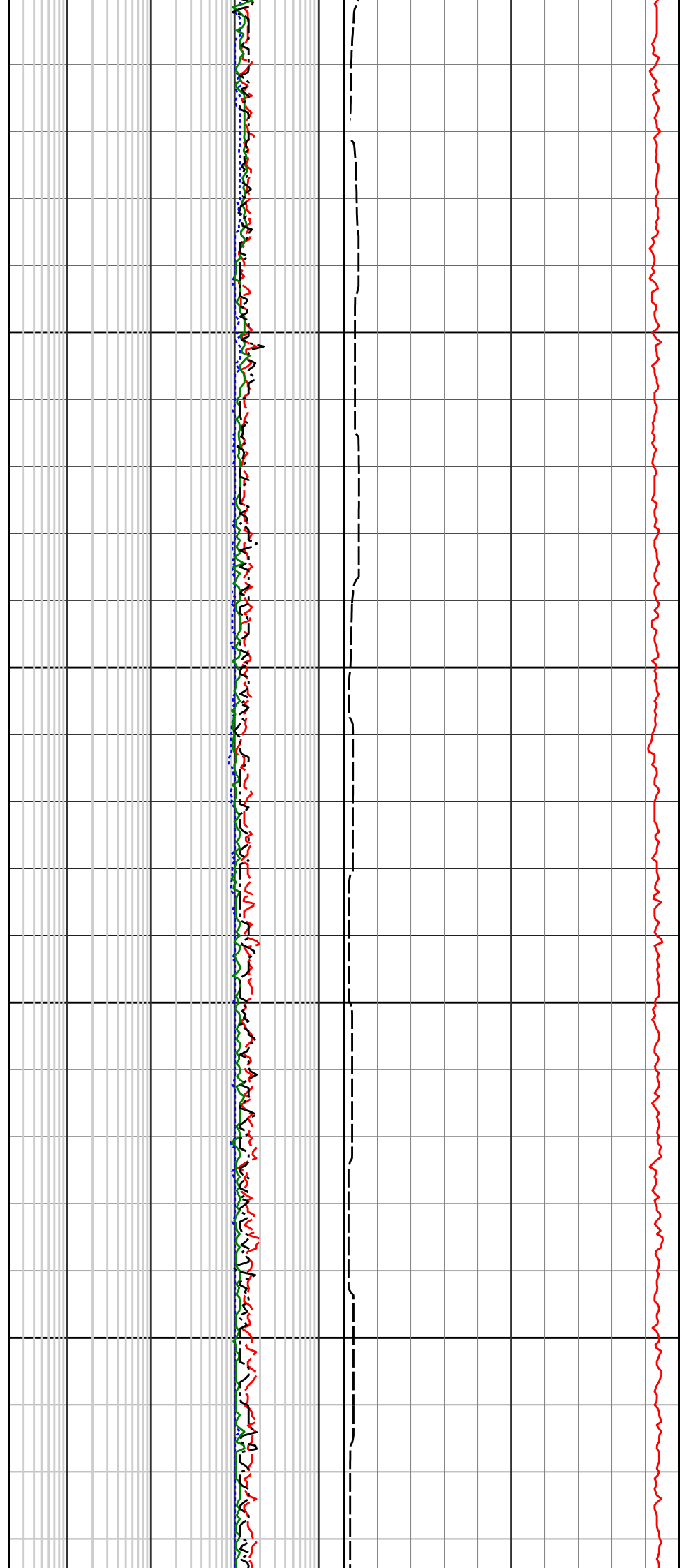
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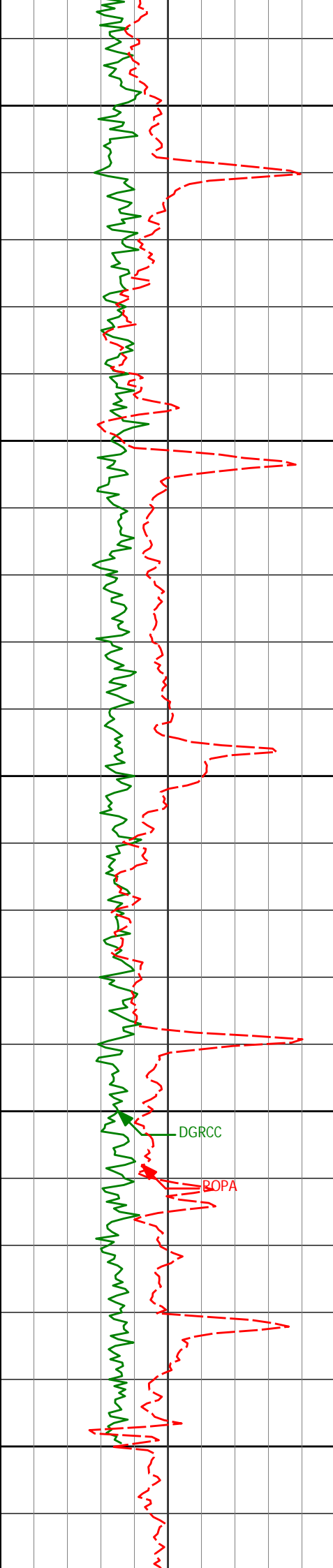
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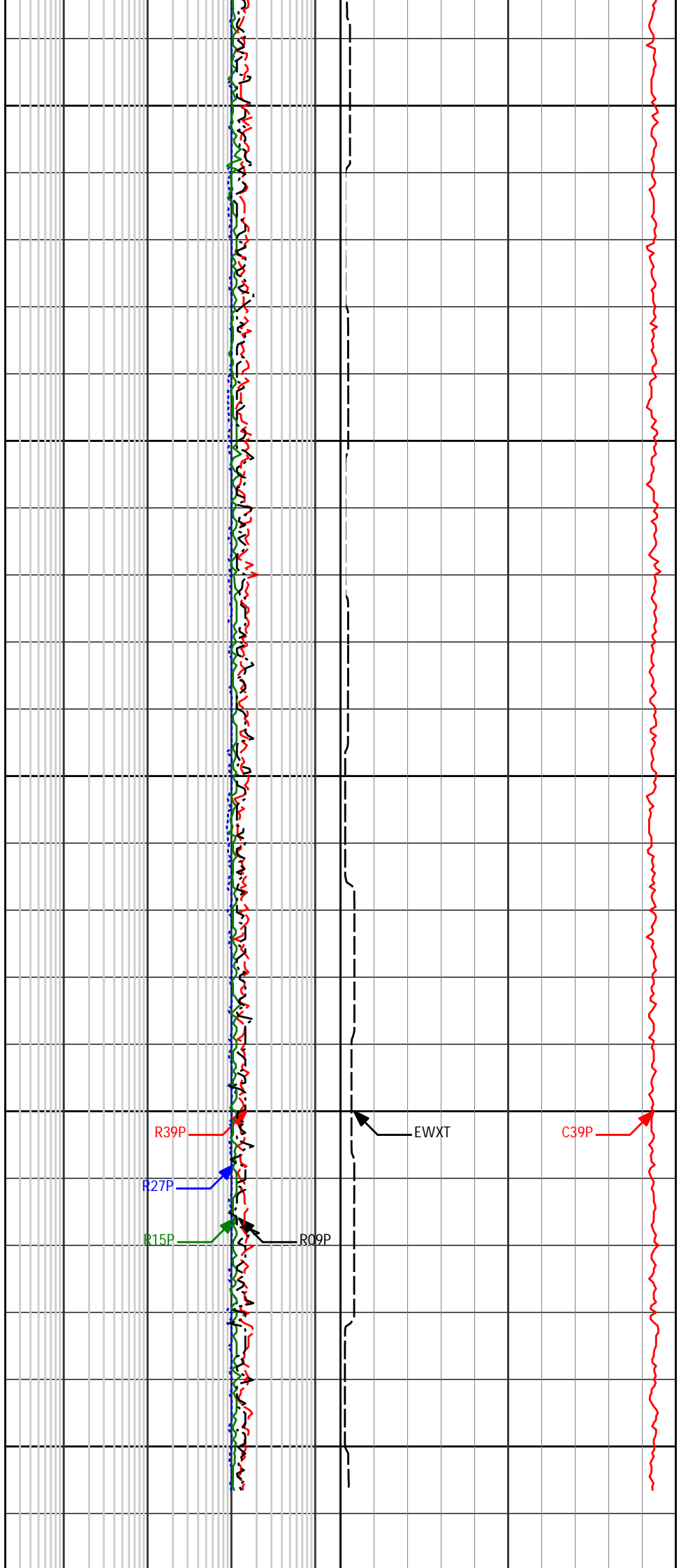
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R39P

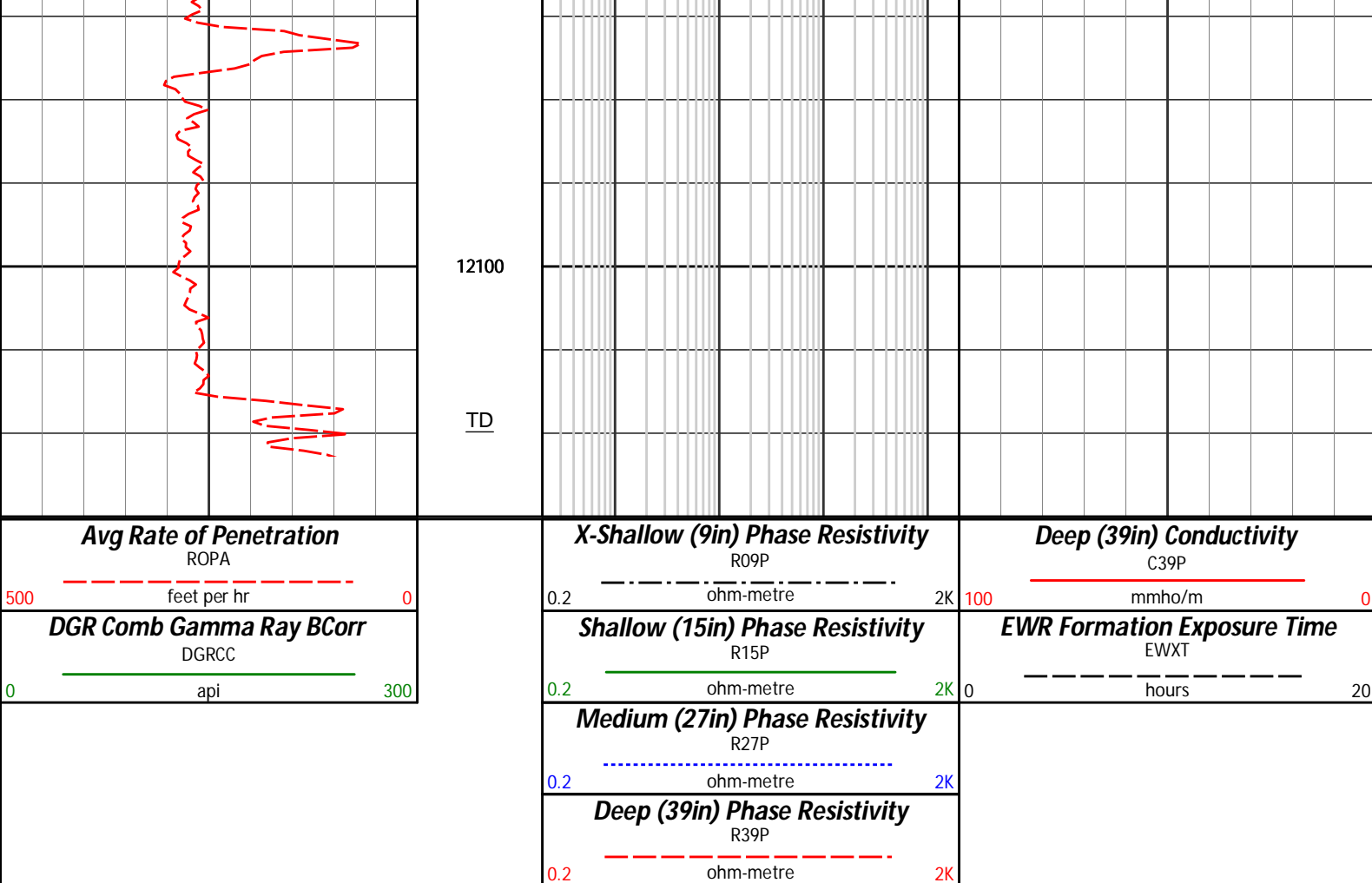
R27P

R15P

R09P

EWXT

C39P



## HALLIBURTON

### DIRECTIONAL SURVEY REPORT

Anadarko Petroleum Corporation  
Underhill 28N-17HZ  
Wattenberg  
Weld Colorado  
USA  
CA-XX-0900550718

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
795.00	0.45	307.68	794.99	2.06 N	2.74 W	2.07	TIE-IN
957.00	0.06	203.28	956.99	2.37 N	3.28 W	2.38	0.29
1020.00	0.11	323.16	1019.99	2.39 N	3.33 W	2.40	0.24
1211.00	0.22	314.93	1210.99	2.80 N	3.70 W	2.81	0.06
1305.00	1.77	255.53	1304.97	2.56 N	5.24 W	2.58	1.77
1401.00	3.02	248.37	1400.89	1.26 N	9.03 W	1.29	1.34
1591.00	7.07	240.64	1590.11	6.33 S	23.88 W	-6.25	2.15
1778.00	8.48	237.72	1775.39	19.34 S	45.57 W	-19.18	0.79
1961.00	10.60	221.03	1955.88	39.25 S	68.04 W	-39.02	1.89
2145.00	12.89	224.98	2136.02	66.54 S	93.67 W	-66.23	1.32
2327.00	12.98	224.00	2313.40	95.61 S	122.22 W	-95.20	0.13
2510.00	12.15	223.10	2492.01	124.46 S	149.66 W	-123.96	0.47
2694.00	12.91	230.42	2671.64	151.69 S	178.74 W	-151.10	0.96
2876.00	11.08	221.29	2849.67	177.79 S	205.95 W	-177.11	1.45
3059.00	13.05	232.16	3028.65	203.68 S	233.88 W	-202.90	1.64
3242.00	12.71	232.15	3207.04	228.71 S	266.10 W	-227.83	0.19
3425.00	11.73	228.15	3385.90	253.47 S	295.85 W	-252.49	0.71
3609.00	11.33	228.83	3566.18	277.85 S	323.38 W	-276.77	0.23
3792.00	12.99	226.20	3745.07	303.92 S	351.76 W	-302.75	0.95
3975.00	13.27	221.66	3923.29	333.85 S	380.57 W	-332.58	0.58
4158.00	14.60	222.33	4100.91	366.59 S	410.06 W	-365.23	0.73
4341.00	12.93	221.36	4278.65	399.00 S	439.11 W	-397.54	0.92
4513.00	14.42	223.73	4445.77	428.92 S	466.62 W	-427.37	0.92
4684.00	12.94	222.58	4611.92	458.40 S	494.30 W	-456.76	0.88

4855.00	12.99	220.02	4778.56	487.22 S	519.61 W	-485.49	0.34
5027.00	13.17	220.37	4946.10	516.94 S	544.72 W	-515.13	0.11
5198.00	12.28	219.19	5112.90	545.87 S	568.83 W	-543.98	0.54
5370.00	12.30	221.15	5280.96	573.84 S	592.44 W	-571.88	0.24
5541.00	11.93	217.80	5448.15	601.52 S	615.26 W	-599.47	0.46
5712.00	12.67	217.38	5615.23	630.38 S	637.47 W	-628.26	0.43
5969.00	14.30	232.18	5865.21	672.24 S	679.66 W	-669.98	1.48
6141.00	12.09	230.12	6032.66	696.81 S	710.26 W	-694.45	1.31
6312.00	9.81	229.14	6200.54	717.82 S	735.01 W	-715.38	1.34
6483.00	8.48	229.24	6369.37	735.58 S	755.58 W	-733.07	0.78
6655.00	6.20	230.65	6539.94	749.75 S	772.37 W	-747.19	1.33
6826.00	3.69	209.66	6710.31	760.39 S	782.23 W	-757.79	1.79
6997.00	2.39	229.96	6881.07	767.46 S	787.69 W	-764.84	0.97
7040.00	3.36	229.93	6924.01	768.85 S	789.34 W	-766.23	2.25
7083.00	3.94	318.93	6966.95	768.55 S	791.27 W	-765.92	11.93
7126.00	8.41	335.23	7009.70	764.58 S	793.56 W	-761.94	11.07
7169.00	16.34	346.38	7051.67	755.83 S	796.31 W	-753.18	19.19
7212.00	25.05	353.06	7091.86	740.88 S	798.84 W	-738.23	20.95
7254.00	26.00	355.88	7129.76	722.87 S	800.57 W	-720.21	3.67
7297.00	26.59	355.44	7168.31	703.87 S	802.02 W	-701.21	1.45
7340.00	28.83	357.45	7206.38	683.92 S	803.24 W	-681.25	5.64
7383.00	31.56	2.10	7243.55	662.31 S	803.29 W	-659.64	8.34
7426.00	35.24	3.33	7279.44	638.67 S	802.16 W	-636.01	8.72
7469.00	36.71	4.96	7314.23	613.48 S	800.33 W	-610.82	4.08
7511.00	42.27	4.85	7346.63	586.88 S	798.05 W	-584.22	13.22
7554.00	49.09	4.01	7376.66	556.22 S	795.69 W	-553.58	15.92
7597.00	50.93	4.04	7404.30	523.36 S	793.38 W	-520.73	4.28
7640.00	55.28	3.52	7430.11	489.06 S	791.12 W	-486.43	10.16
7683.00	58.69	1.94	7453.54	453.05 S	789.41 W	-450.43	8.52
7726.00	61.56	2.61	7474.95	415.80 S	787.93 W	-413.18	6.80
7769.00	63.80	2.84	7494.69	377.64 S	786.11 W	-375.03	5.23
7811.00	69.11	1.74	7511.46	339.18 S	784.58 W	-336.58	12.88
7854.00	73.08	0.24	7525.40	298.52 S	783.88 W	-295.92	9.80
7897.00	75.83	0.19	7536.92	257.10 S	783.72 W	-254.50	6.40
7940.00	77.92	359.89	7546.69	215.22 S	783.70 W	-212.62	4.91
7983.00	79.59	359.78	7555.07	173.05 S	783.82 W	-170.45	3.90
8026.00	81.75	359.40	7562.04	130.62 S	784.13 W	-128.02	5.09
8069.00	86.36	359.09	7566.50	87.87 S	784.69 W	-85.27	10.76
8122.00	88.70	358.86	7568.78	34.93 S	785.63 W	-32.33	4.44
8200.00	90.99	359.82	7568.99	43.06 N	786.53 W	45.67	3.18
8286.00	91.36	359.81	7567.22	129.04 N	786.81 W	131.65	0.43
8372.00	90.49	0.59	7565.83	215.03 N	786.51 W	217.63	1.36
8457.00	91.17	0.99	7564.60	300.01 N	785.34 W	302.61	0.93
8543.00	89.51	359.88	7564.09	386.00 N	784.68 W	388.60	2.33
8629.00	90.12	0.53	7564.37	472.00 N	784.37 W	474.60	1.04
8714.00	90.74	0.03	7563.73	556.99 N	783.95 W	559.59	0.94
8800.00	91.61	359.77	7561.97	642.97 N	784.11 W	645.57	1.05
8886.00	90.74	358.62	7560.21	728.94 N	785.32 W	731.55	1.67
8971.00	91.17	358.19	7558.79	813.90 N	787.68 W	816.51	0.71
9057.00	90.19	358.81	7557.77	899.86 N	789.93 W	902.48	1.35
9228.00	87.22	356.14	7561.64	1070.62 N	797.47 W	1073.26	2.33
9403.00	88.95	356.51	7567.49	1245.15 N	808.68 W	1247.83	1.01
9574.00	90.00	359.11	7569.06	1416.00 N	815.22 W	1418.70	1.64
9745.00	89.38	0.40	7569.98	1587.00 N	815.95 W	1589.69	0.84
9917.00	88.89	3.61	7572.57	1758.85 N	809.94 W	1761.53	1.89
10088.00	92.60	2.42	7570.36	1929.56 N	800.95 W	1932.21	2.28
10260.00	93.16	359.96	7561.73	2101.30 N	797.38 W	2103.93	1.46
10431.00	88.89	356.10	7558.68	2272.10 N	803.25 W	2274.75	3.37
10603.00	88.08	356.53	7563.23	2443.68 N	814.29 W	2446.37	0.53
10774.00	91.24	358.06	7564.25	2614.46 N	822.36 W	2617.17	2.05
10946.00	91.54	356.93	7560.07	2786.24 N	829.88 W	2788.98	0.68
11118.00	91.42	359.17	7555.62	2958.07 N	835.72 W	2960.83	1.31
11289.00	87.71	1.61	7556.92	3129.02 N	834.56 W	3131.77	2.59
11461.00	88.15	3.23	7563.13	3300.75 N	827.32 W	3303.48	0.97
11632.00	88.52	3.51	7568.11	3471.38 N	817.28 W	3474.07	0.27
11803.00	90.00	3.35	7570.32	3642.06 N	807.05 W	3644.71	0.87
11975.00	90.12	1.84	7570.14	3813.88 N	799.27 W	3816.51	0.88
12067.00	90.00	0.55	7570.04	3905.85 N	797.35 W	3908.48	1.40
12120.00	90.00	0.55	7570.04	3958.85 N	796.84 W	3961.47	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 DIRECTION OF 359.81 DEGREES (TRUE)  
A TOTAL CORRECTION OF 8.66 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 12120.00 FEET  
IS 4038.25 FEET ALONG 348.62 DEGREES (TRUE)

All directional surveys tied onto Gyro's @ 795'MD. Final survey is a straight line projection to bit.

Date Printed:05 September 2013