GAMMA RAY

Scientific Drilling

5" = 100' FEET TVD

COMPANY : ENCANA OIL AND GAS (U.S.A.) INC
WELL : RUHL 1E-32H-B264
FIELD : WATTENBERG
COUNTY : WELD
STATE : COLORADO
COUNTRY : U.S.A.
UWI : 05-123-40277

COMPANY : ENCANA OIL AND GAS (U.S.A.) INC
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FIELD : WATTENBERG
COUNTY : WELD
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WELL LOCATION
LAT:40°6'5.177"N LONG:104°34'24.953"W
N:1281151.90 ft E:3259144.10 ft
SEC:32 TWP:2N RANGE:64W

OTHER SERVICES
DIRECTIONAL
ROP

DEPTH REF. : RKB
REF. HEIGHT : 25.000 ft RKB to Ground Level
GROUND LEVEL : 4979.000 ft G.L. to MEAN SEA LEVEL

BOREHOLE RECORD

HOLE SIZE in	FROM ft	TO ft
12.25	0	1226
8.75	1226	7344
6.125	7344	11530

CASING RECORD

CASING SIZE in	FROM ft	TO ft
16	0	149
9.625	0	1216
7	0	7328

DEVIATION RECORD

INCLINATION deg	FROM ft	TO ft
0 - 13	0	3637
13 - 0	3637	4961
0 - 88	4961	7344
88 - 92	7344	11530

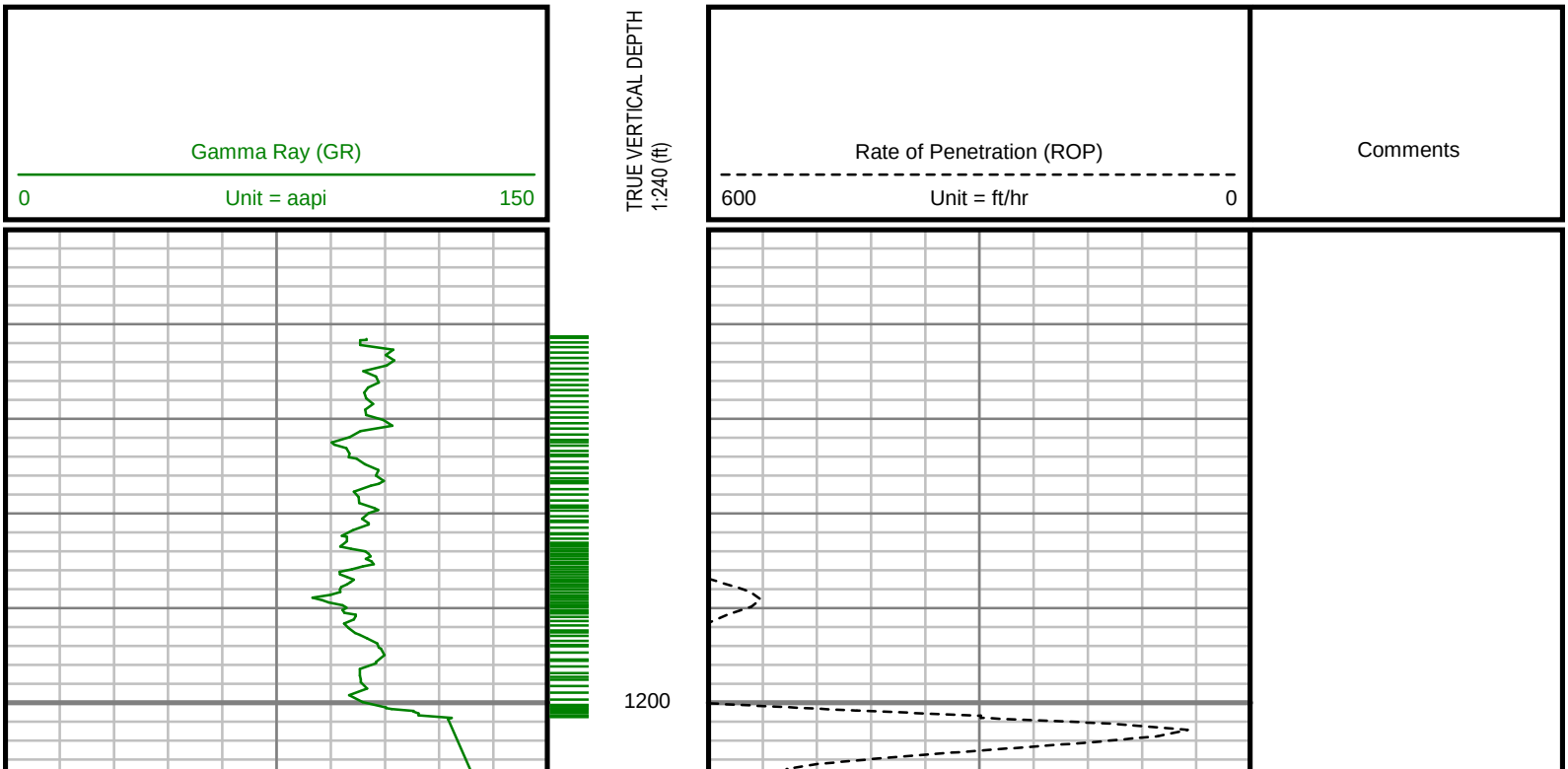
DRILLING CO. : H&P
RIG : 278
LWD UNIT NO. : MWD-00046-DISTRICT : CASPER, CASPE
SPUD DATE : 12/12/2014
LWD START DATE : 12/26/2014 DEPTH : 5000 ft
LWD END DATE : 01/02/2015 DEPTH : 11530 ft
TOTAL DEPTH : 11530 ft

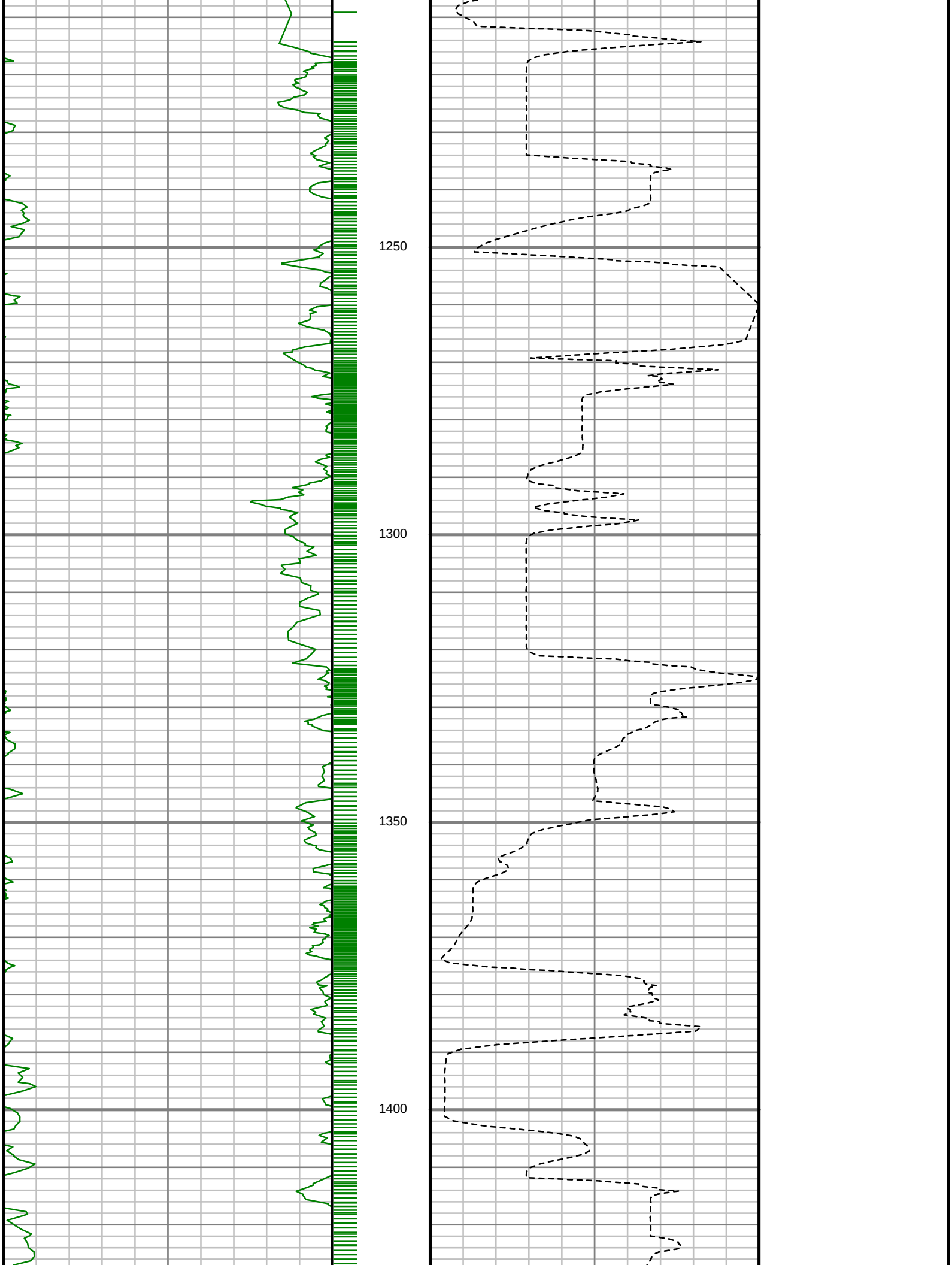
Run Data

RUN NUMBER	1	2	3																					
START DATE	12/12/2014	12/27/2014	12/31/2014																					
START TIME	1700	0600	0100																					
END DATE	12/13/2014	12/29/2014	01/02/2015																					
END TIME	0145	1030	1215																					
DEPTH IN (ft)	150	1226	7344																					
DEPTH OUT (ft)	1226	7344	11530																					
LOG TOP (ft)	-	5000	7291																					
LOG BOTTOM (ft)	-	7291	11530																					
HOLE SIZE (in)	12.25	8.75	6.125																					
MUD DATA @ (ft)	1226	7344	11530																					
MUD TYPE	WATER-BASED	WATER-BASED	WATER-BASED																					
DENSITY (lb / gal)	8.7	10.6	11																					
VISCOSITY (s / qt)	27	37	39																					
pH	-	8	8																					
FLUID LOSS (cm3 / 30)	-	-	-																					
SALINITY (ppm)	-	-	-																					
Rm (ohmm @ deg F)	-	-	-																					
Rmf (ohmm @ deg F)	-	-	-																					
MAX TEMP (deg F)	95	162	225																					
Rm @ MAX TEMP (ohmm)	-	-	-																					
LWD ENGINEER #1	C. WILSON	S. WAXLER	S. WAXLER																					
LWD ENGINEER #2	T. LE	T. LE	C. WILSON																					
LWD ENGINEER #3	-	D. PADULA	D. PADULA																					
LOG WITNESS #1	-	J. SILVEY	J. SILVEY																					
LOG WITNESS #2	-	C. PESICKA	C. PESICKA																					

Remarks
ENCANA OIL AND GAS (U.S.A.) INC PRODUCTION AFE# 13179005
SCIENTIFIC DRILLING INTERNATIONAL JOB# 232827, 238972
ALL REFERENCES IN THE DEPTH TRACK ARE AT BIT DEPTH.
ALL DATA IS MEMORY DATA UNLESS STATED OTHERWISE.
FLAT AVERAGE FILTER OF 1.00 FT APPLIED TO GAMMA RAY CURVE
FLAT AVERAGE FILTER OF 1.00 FT APPLIED TO RATE OF PENETRATION CURVE
RUN #1: MWD / DIRECTIONAL RUN
SENSORS S/N: EM5 = 1154 / MWD EYE = 0645
BIT TO SENSOR OFFSET: SURVEY = 63.00 FT.
RUN #2: MWD / GAMMA RAY LOGGING RUN
SENSORS S/N: PULSER = 128-082 / CONT = 126 / MWD EYE = 0522 / GAMMA RAY = 1076
BIT TO SENSOR OFFSETS: SURVEY = 61.22 FT. / GAMMA RAY = 52.57 FT.
RUN #3: MWD / GAMMA RAY LOGGING RUN
SENSORS S/N: PULSER = 78-095 / CONT = 858 / MWD EYE = 0645 / GAMMA RAY = 1271
BIT TO SENSOR OFFSETS: SURVEY = 62.18 FT. / GAMMA RAY = 53.53 FT.
REMARK #1: GAMMA RAY FROM 7291 FT. - 7328 FT. WAS LOGGED BEHIND CASING.
MNEMONICS LIST:
GR = GAMMA RAY
ROP = RATE OF PENETRATION

ENCANA OIL AND GAS (U.S.A.) INC
RUHL 1E-32H-B264
WATTENBERG FIELD
WELD COUNTY, COLORADO
05-123-40277

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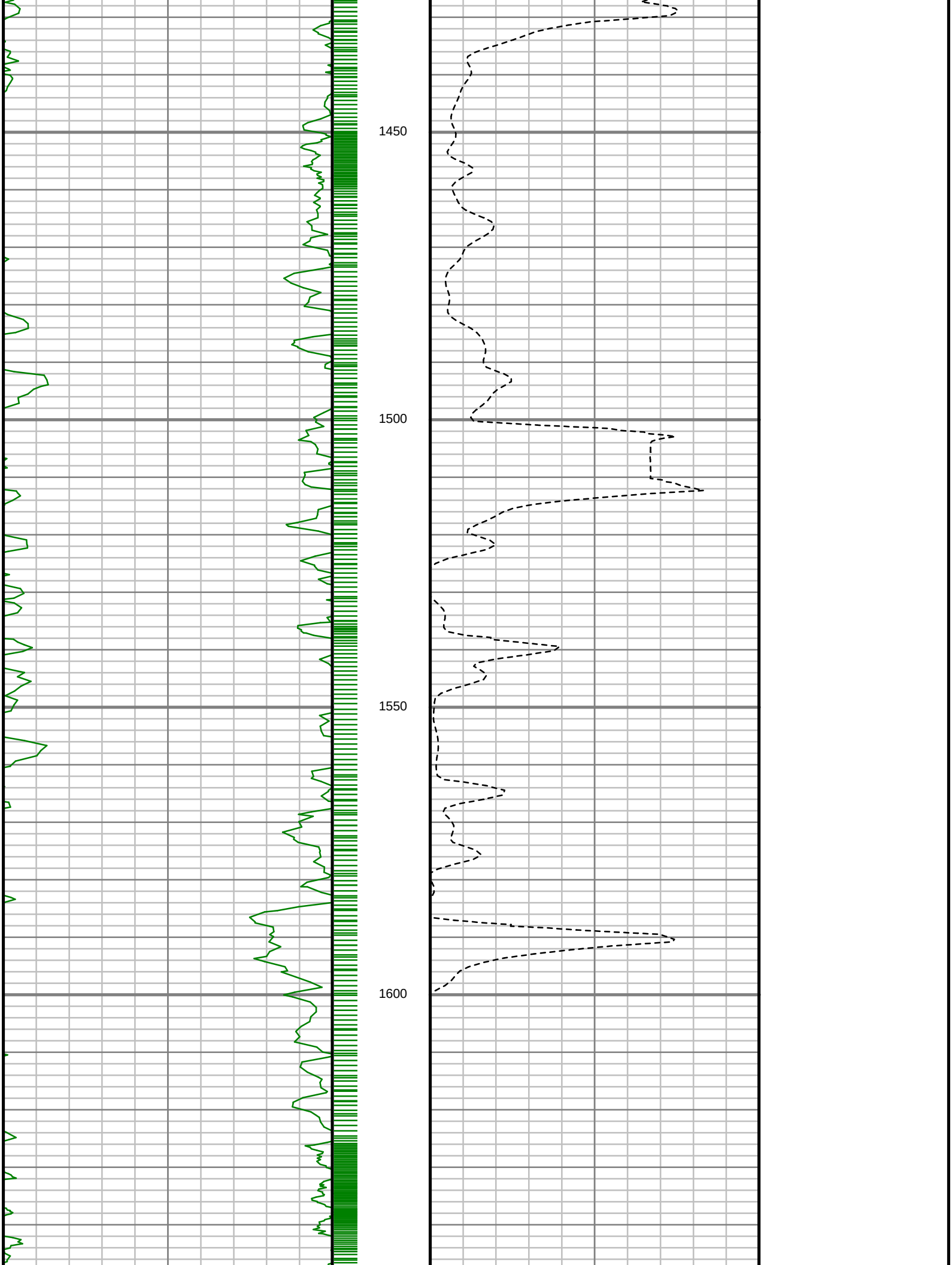
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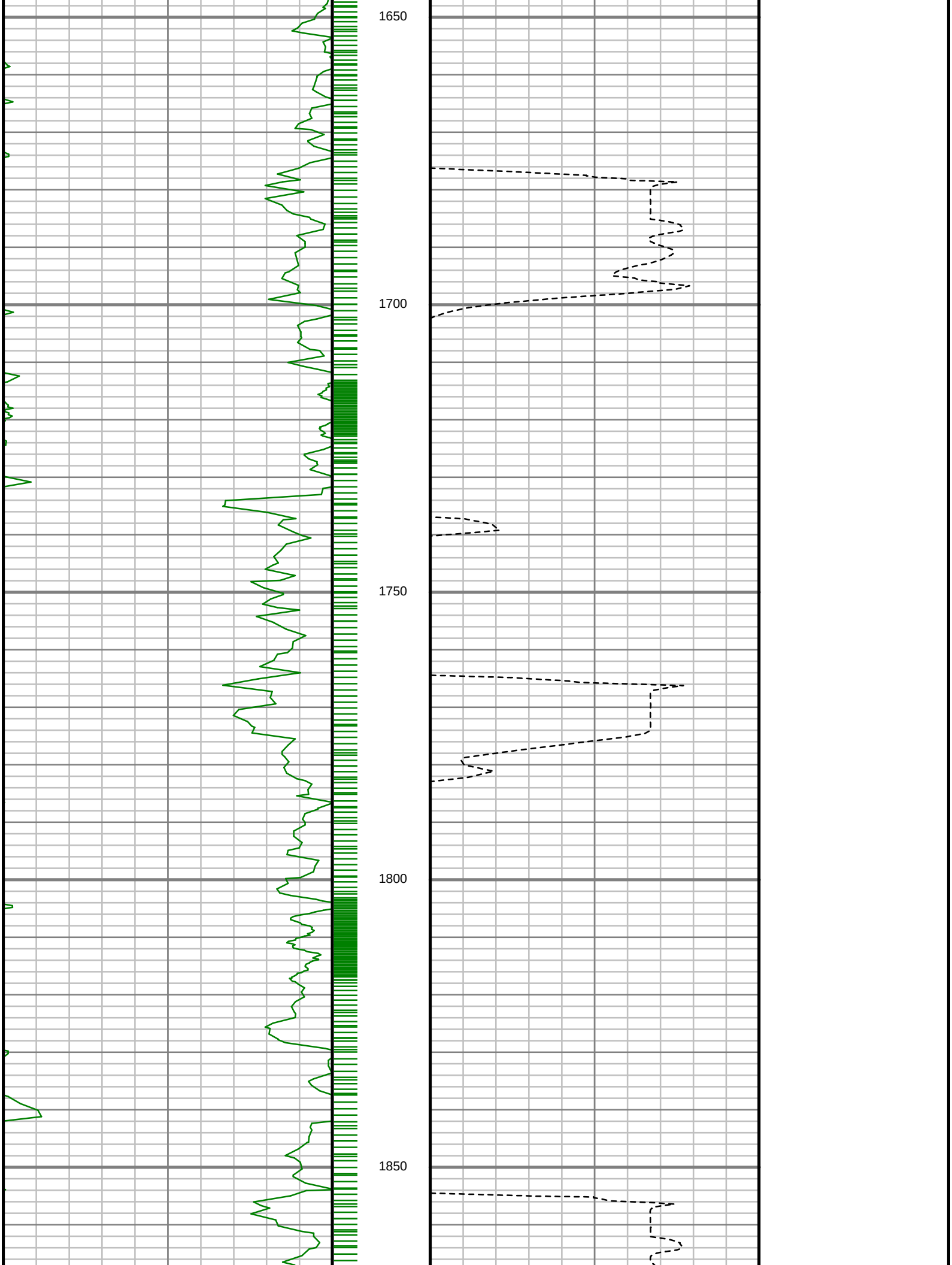
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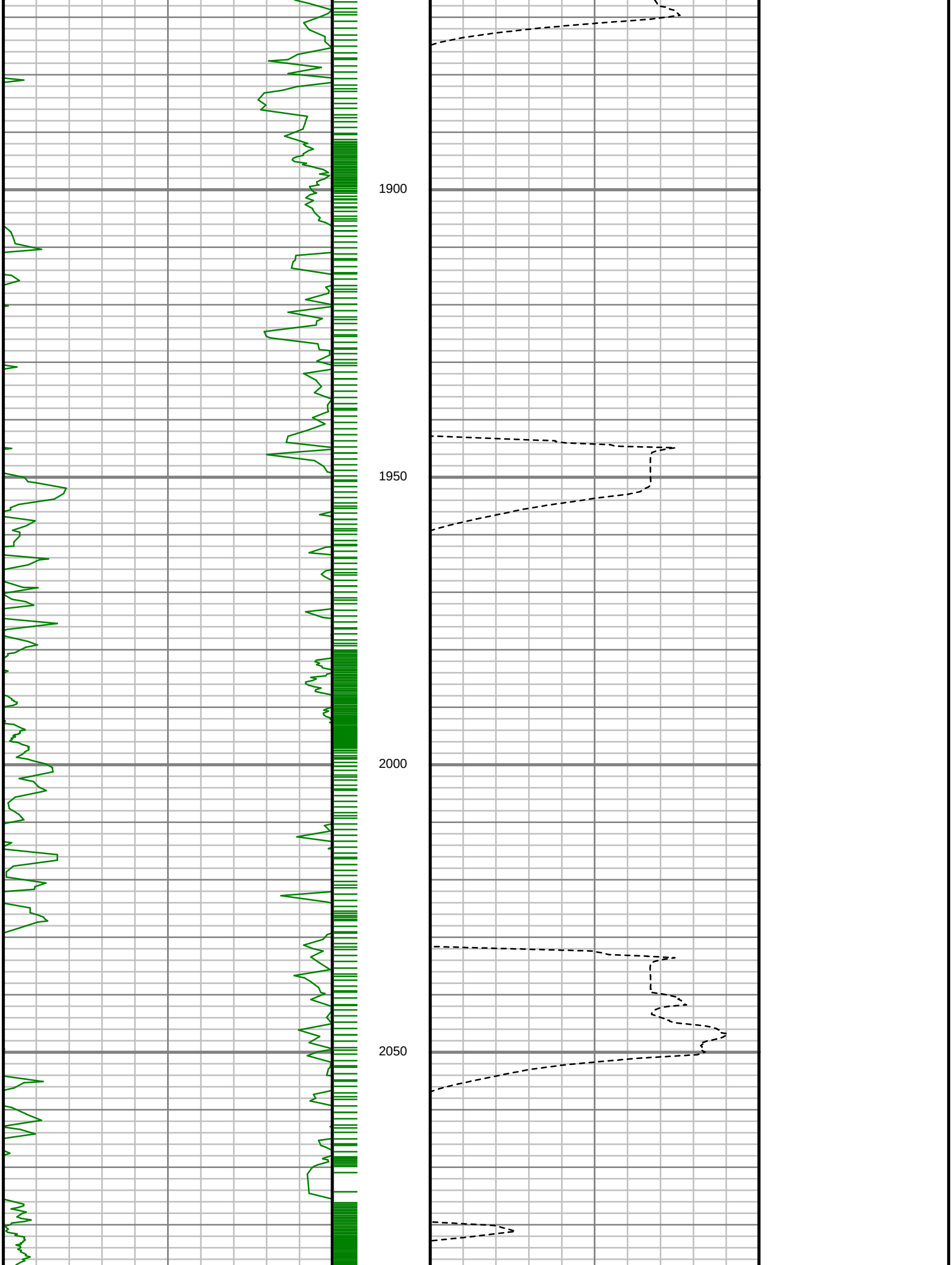
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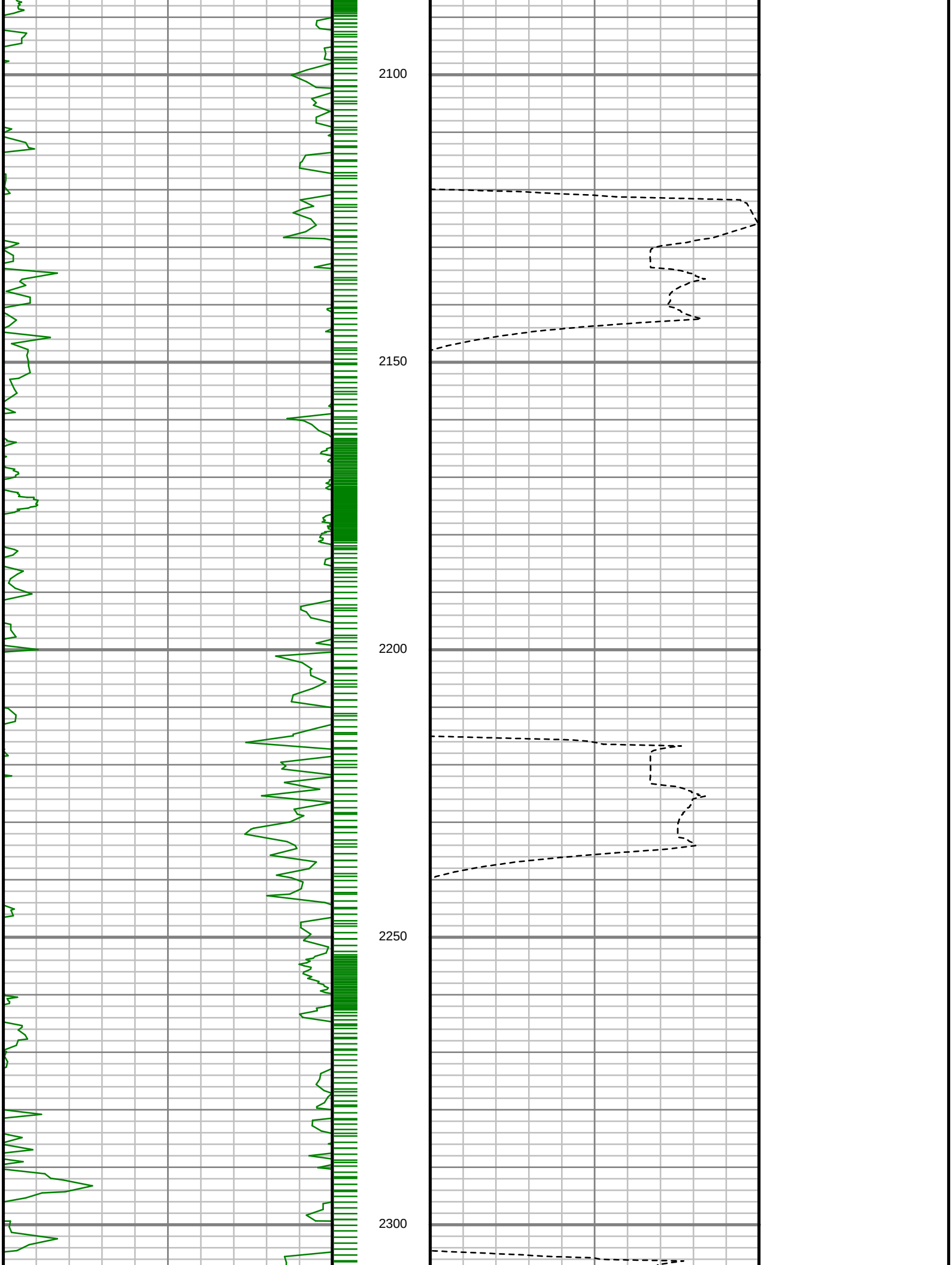
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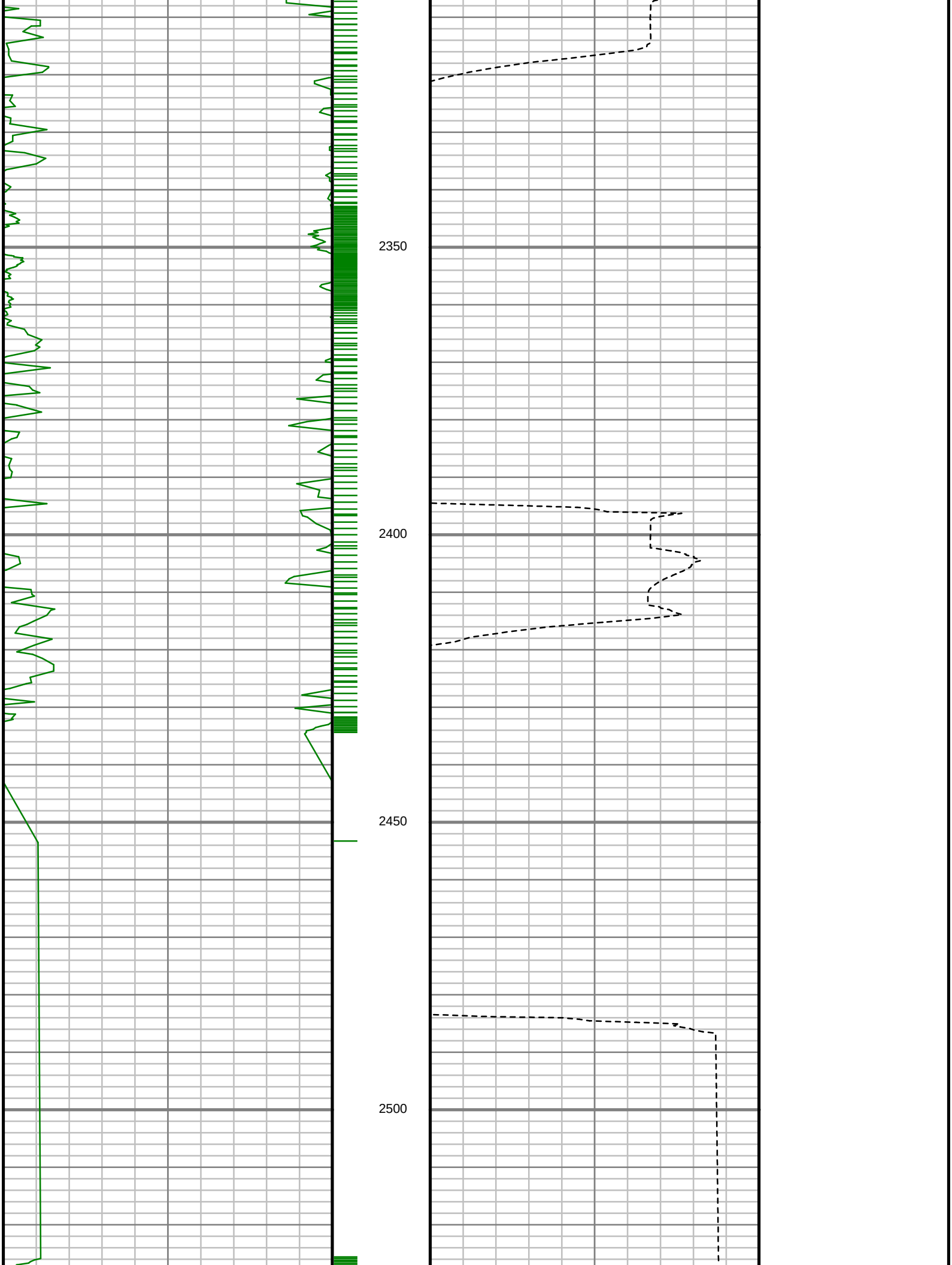
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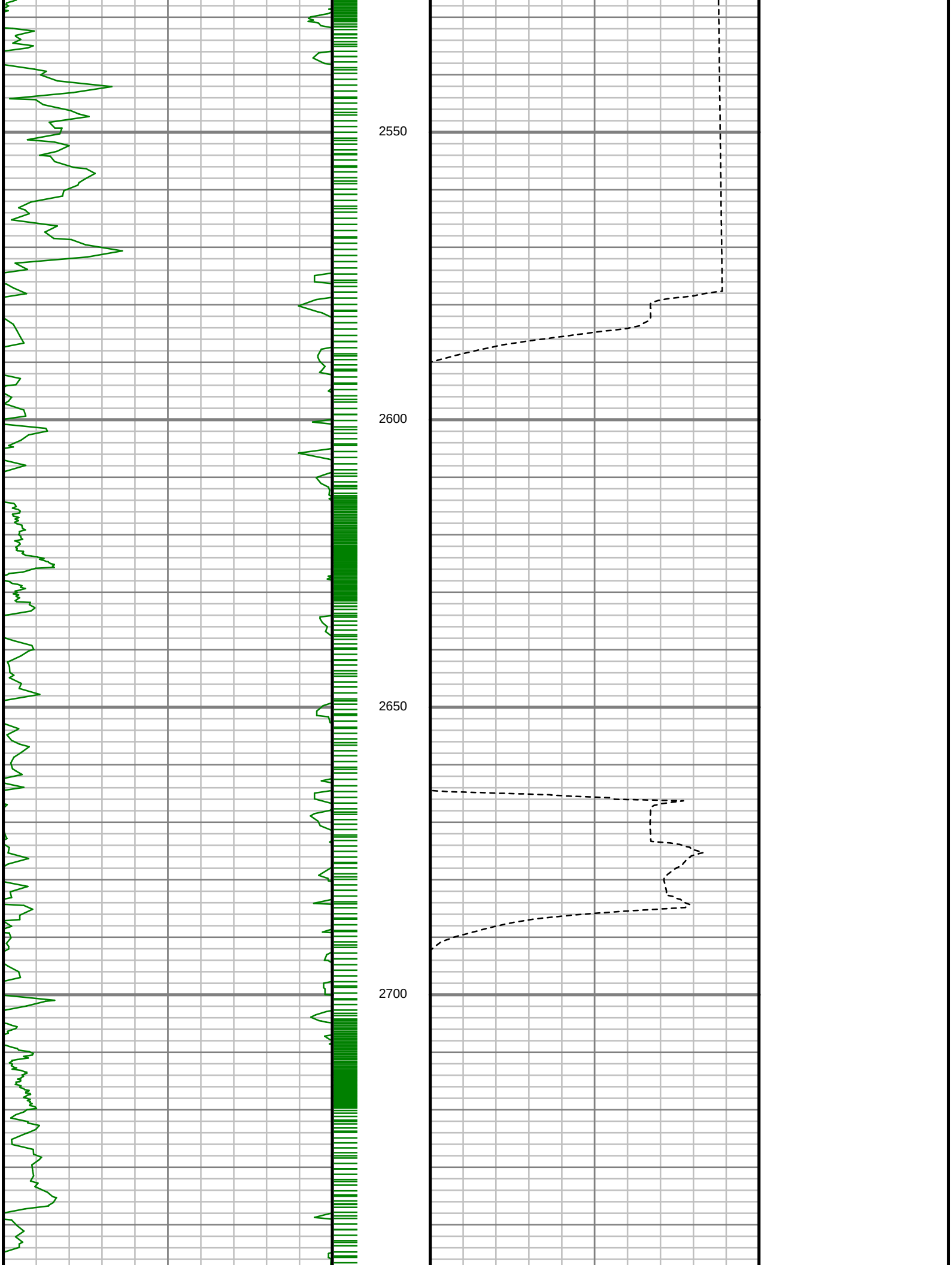
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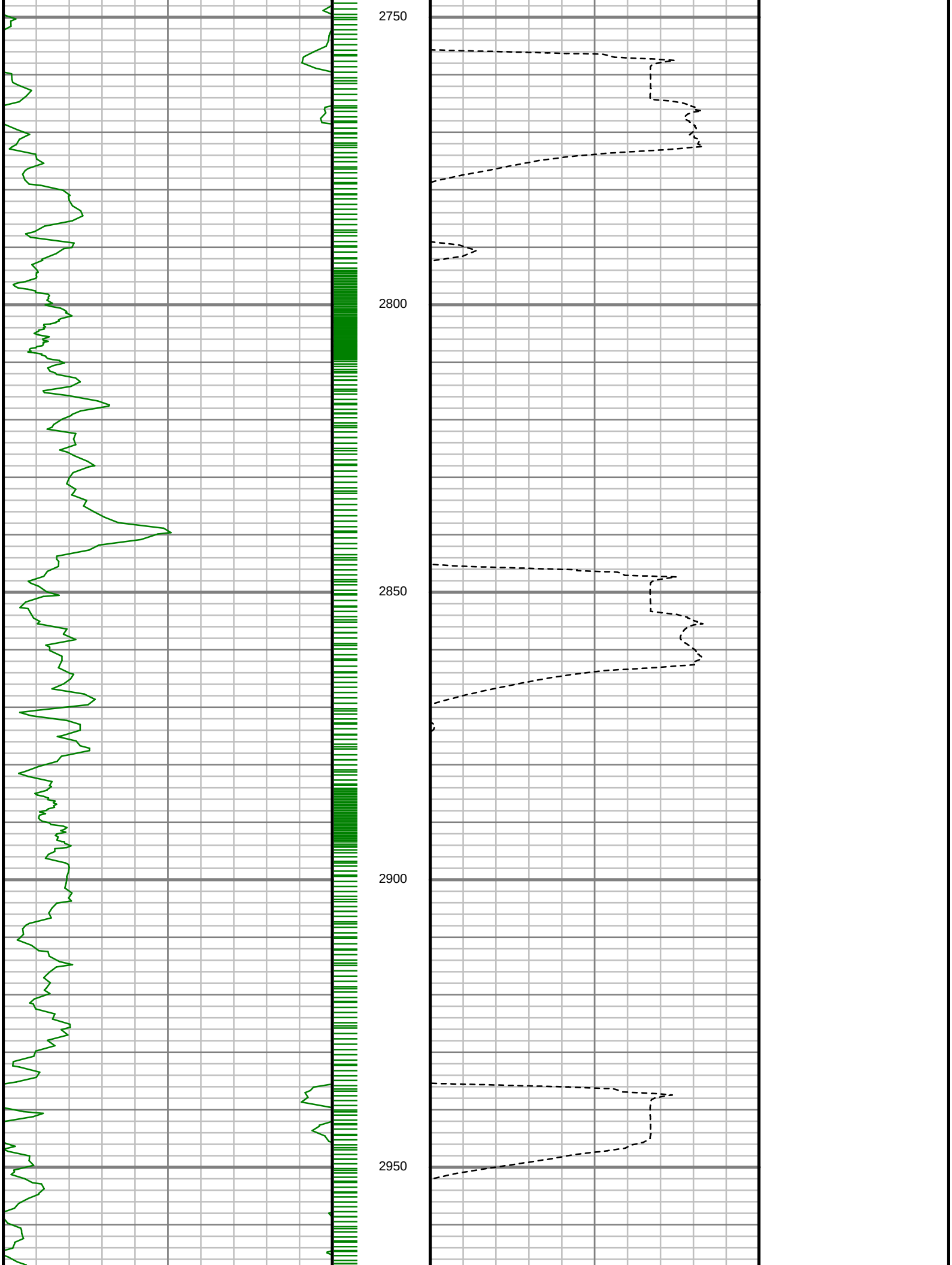
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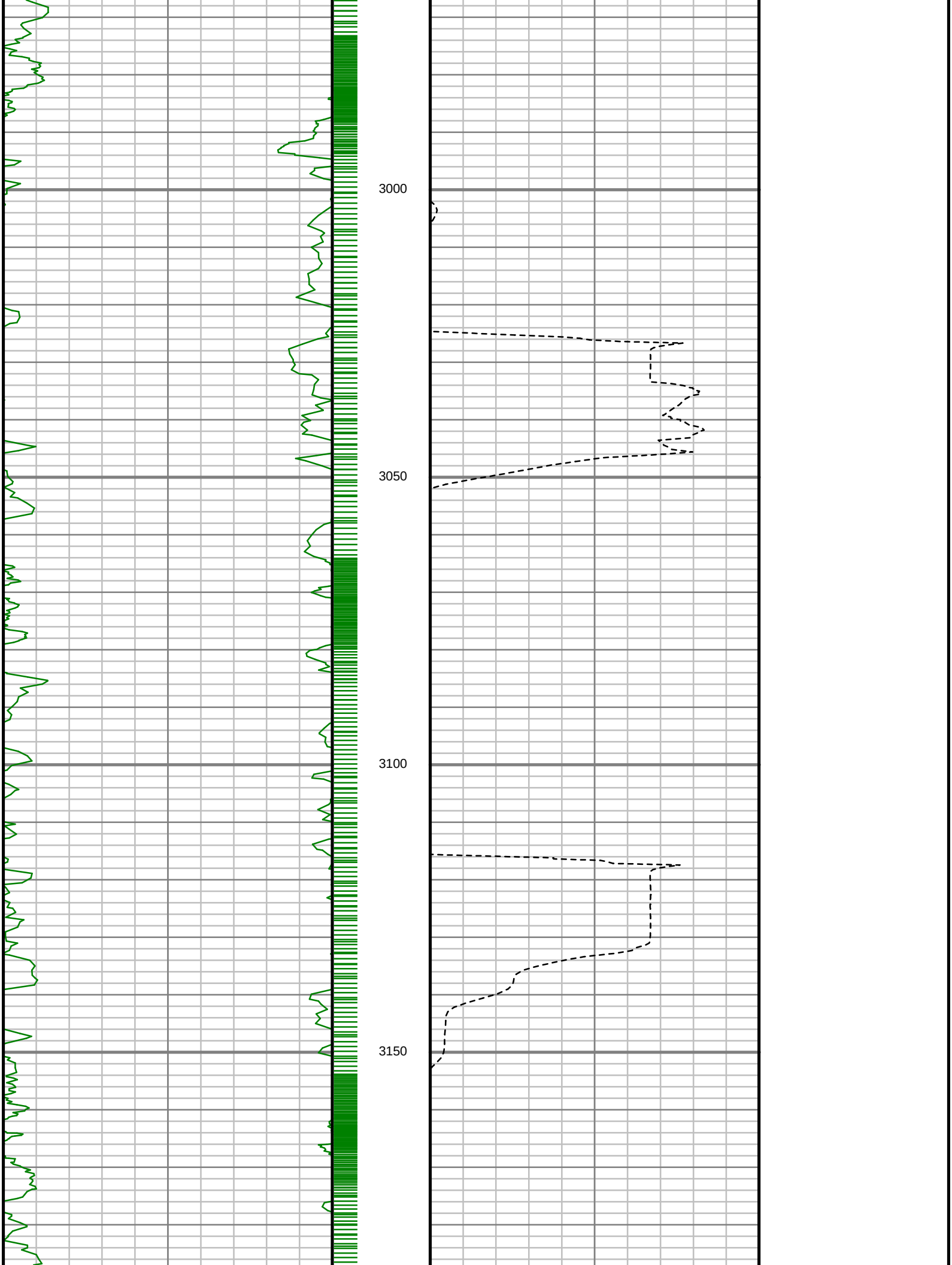
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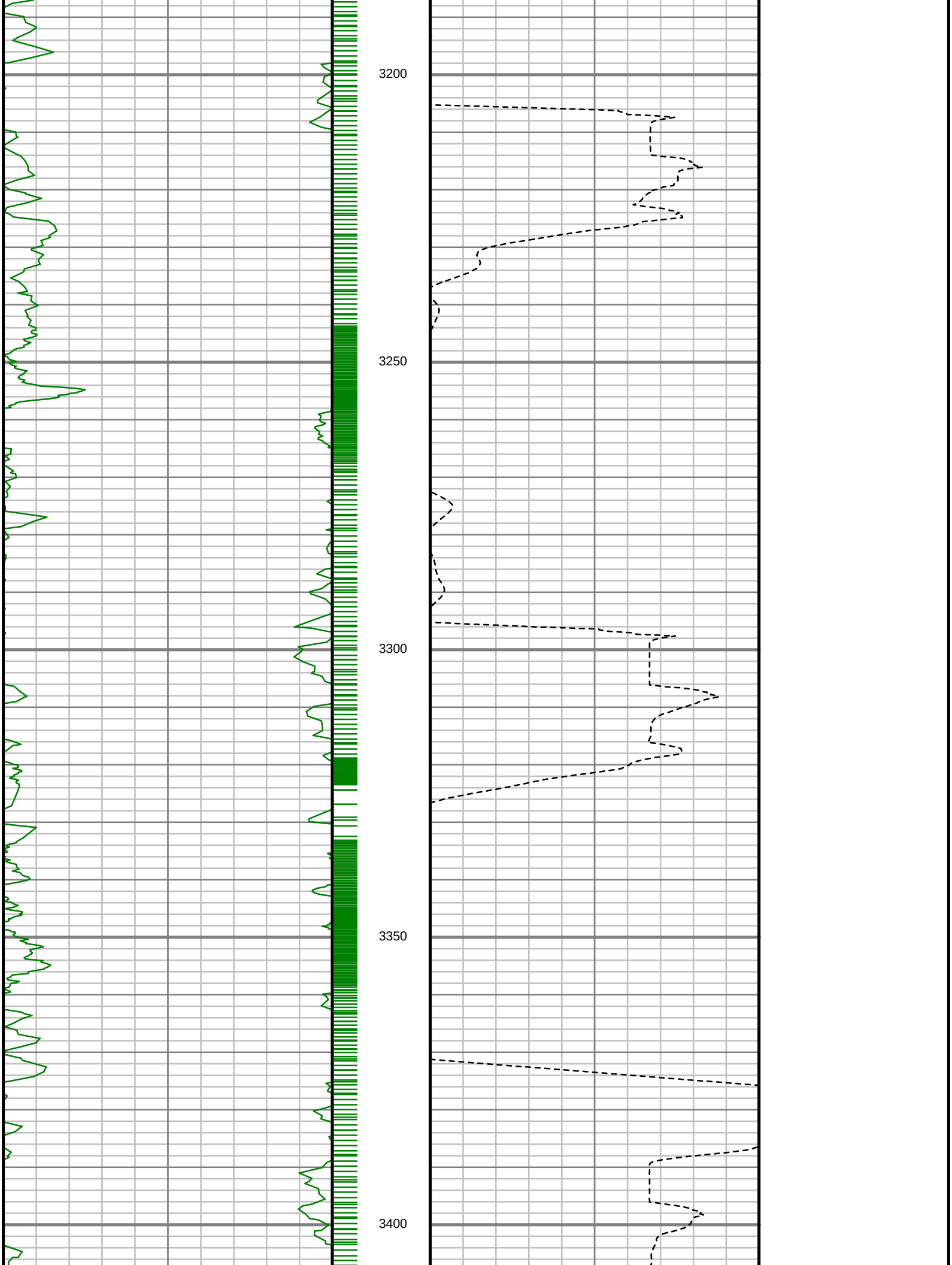
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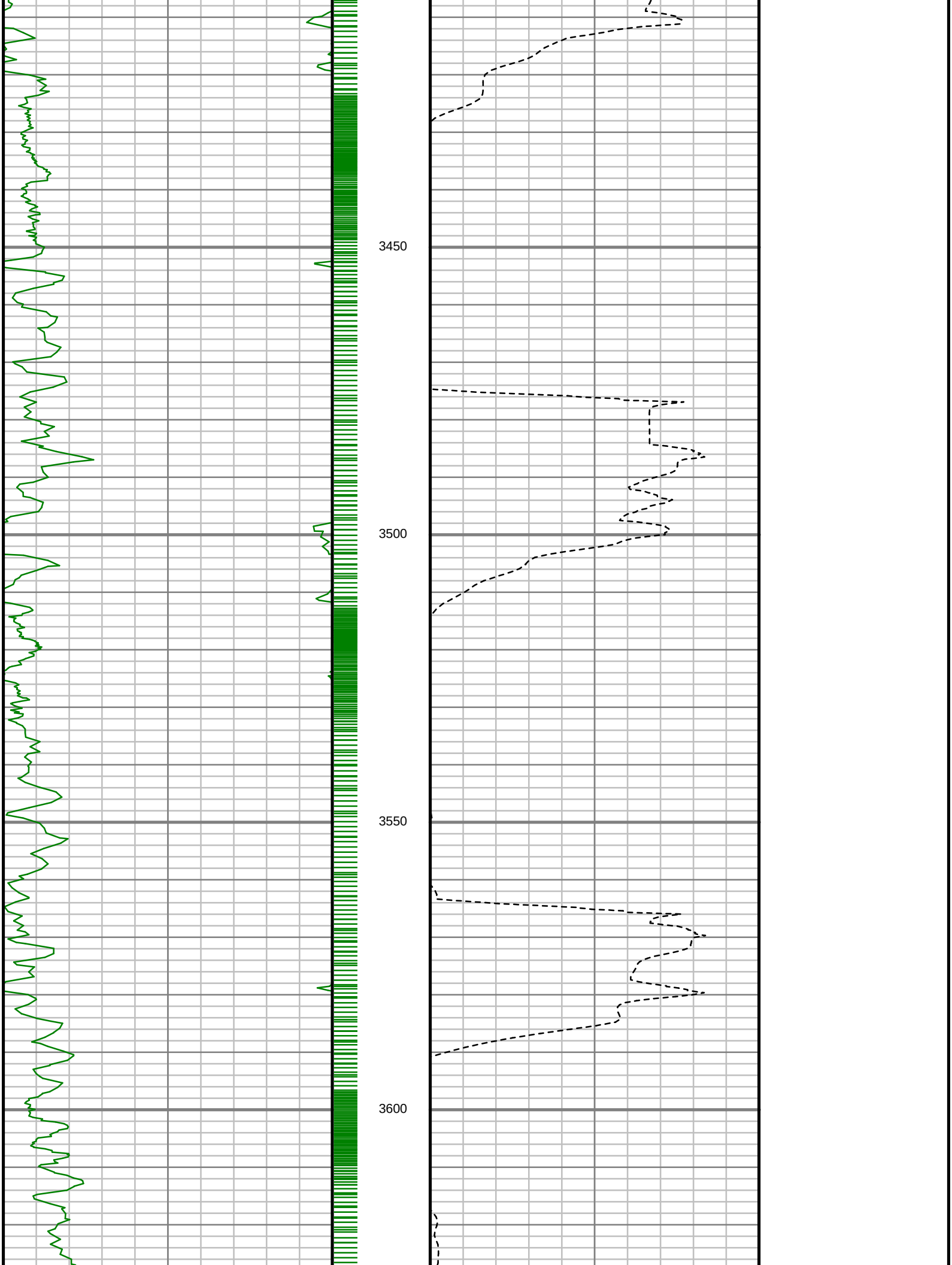
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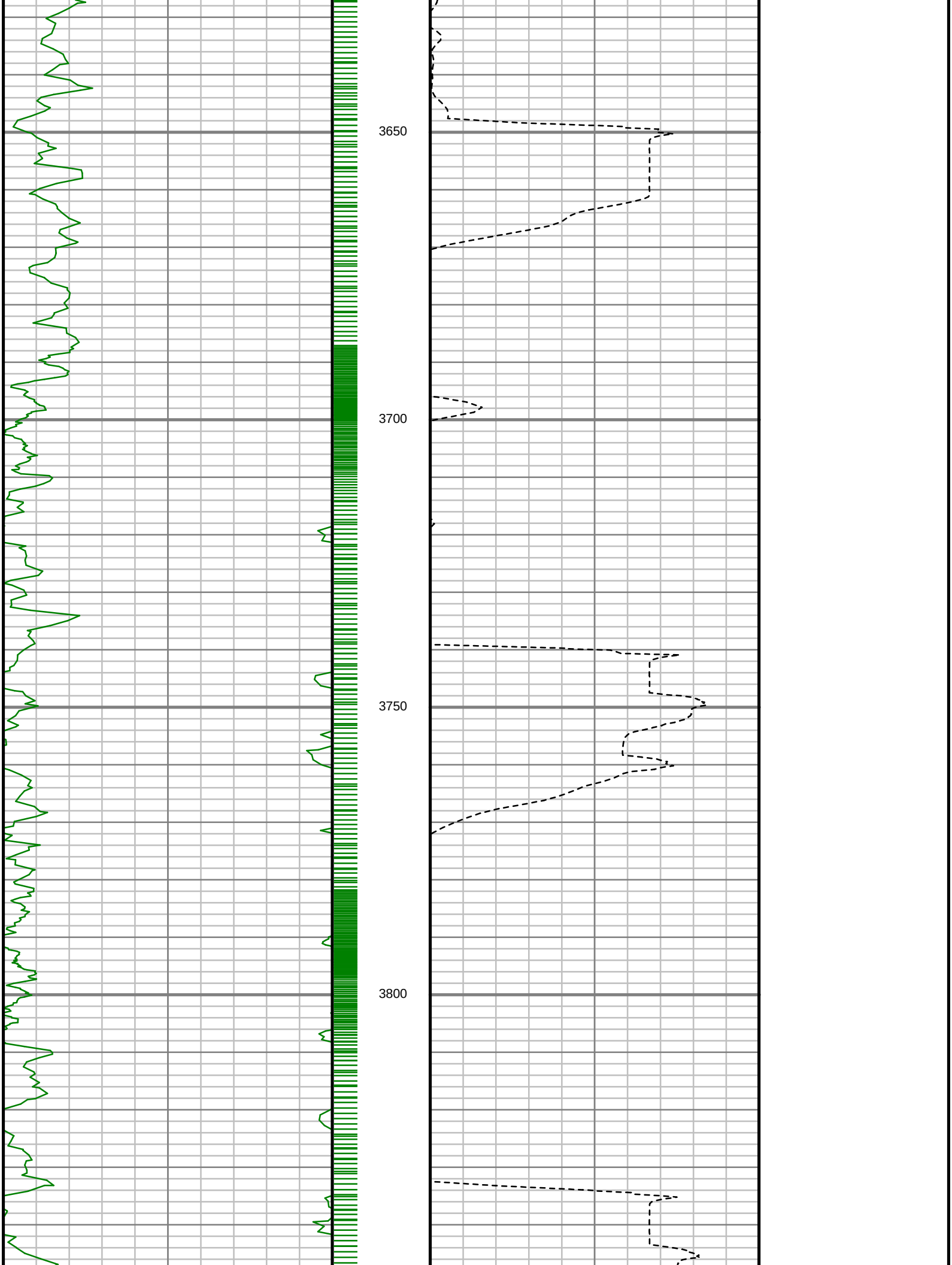
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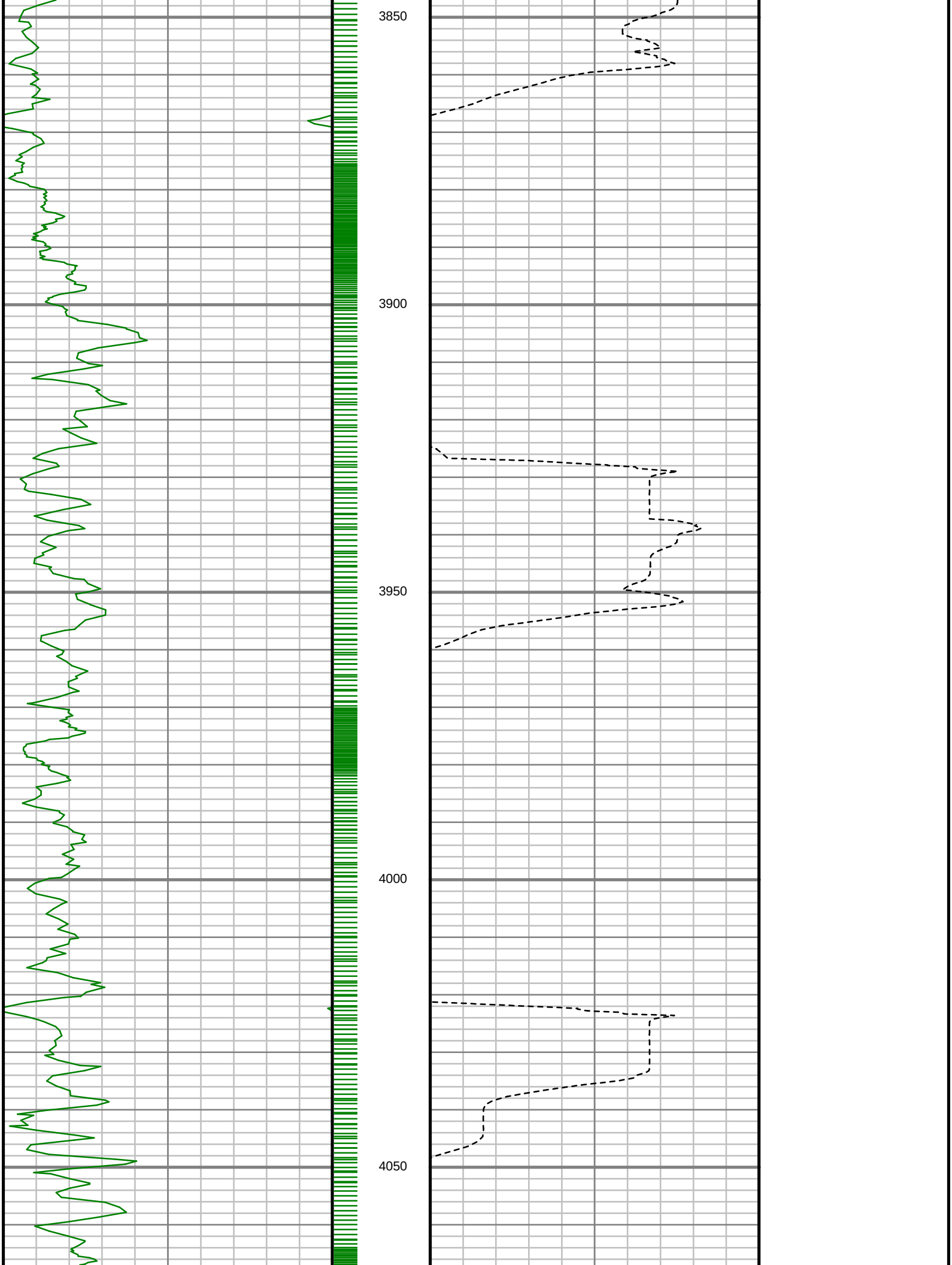
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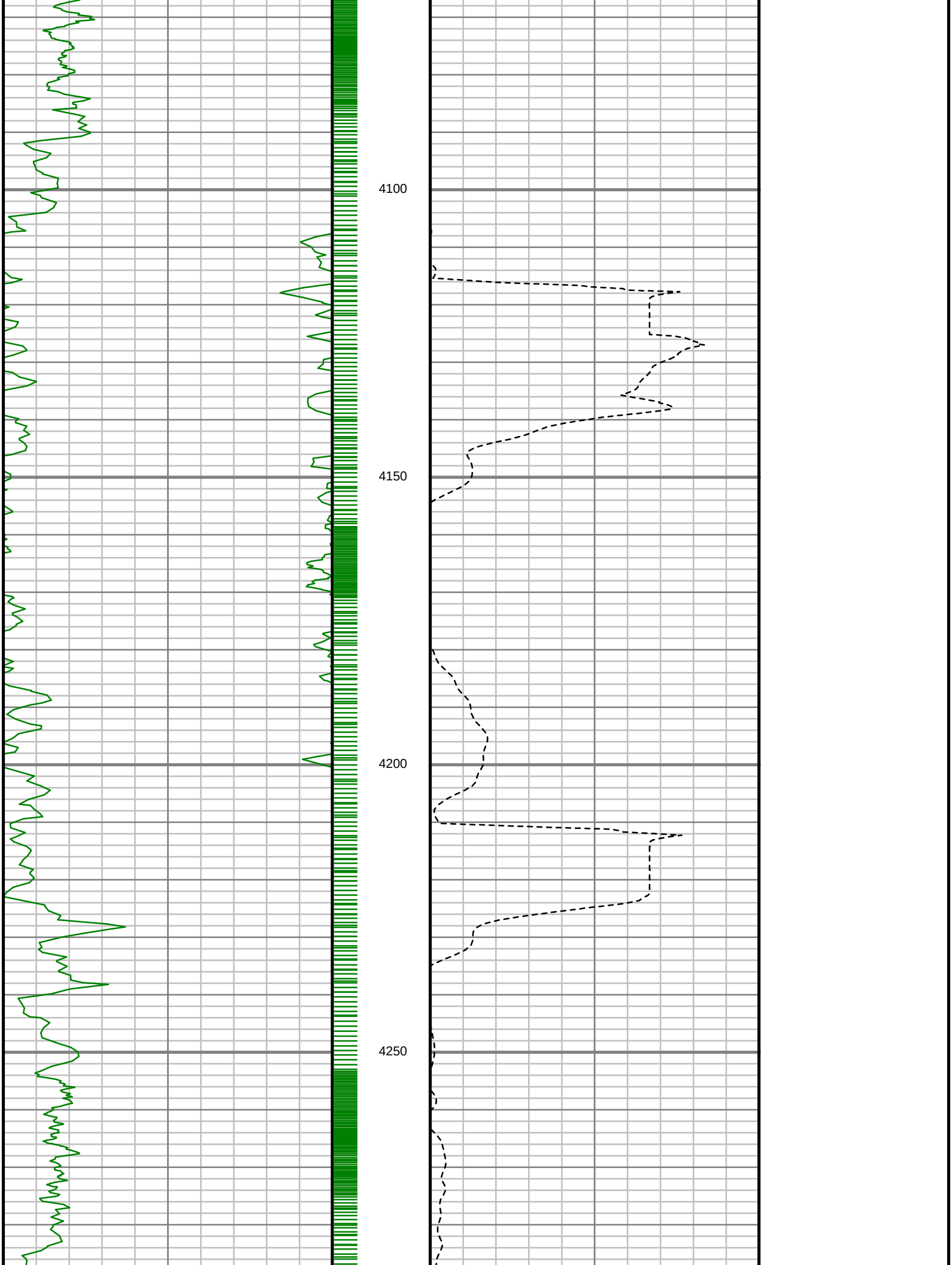
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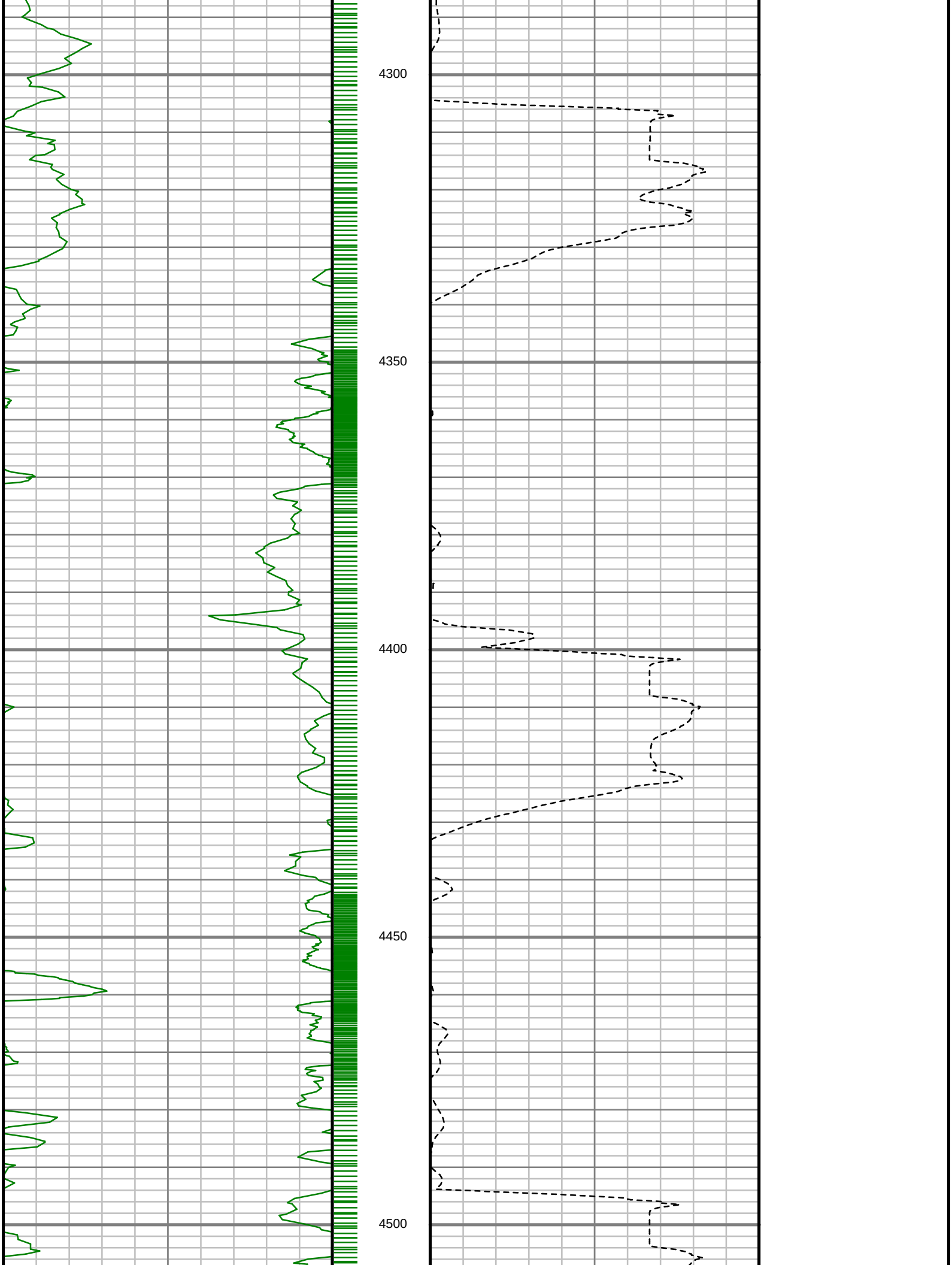
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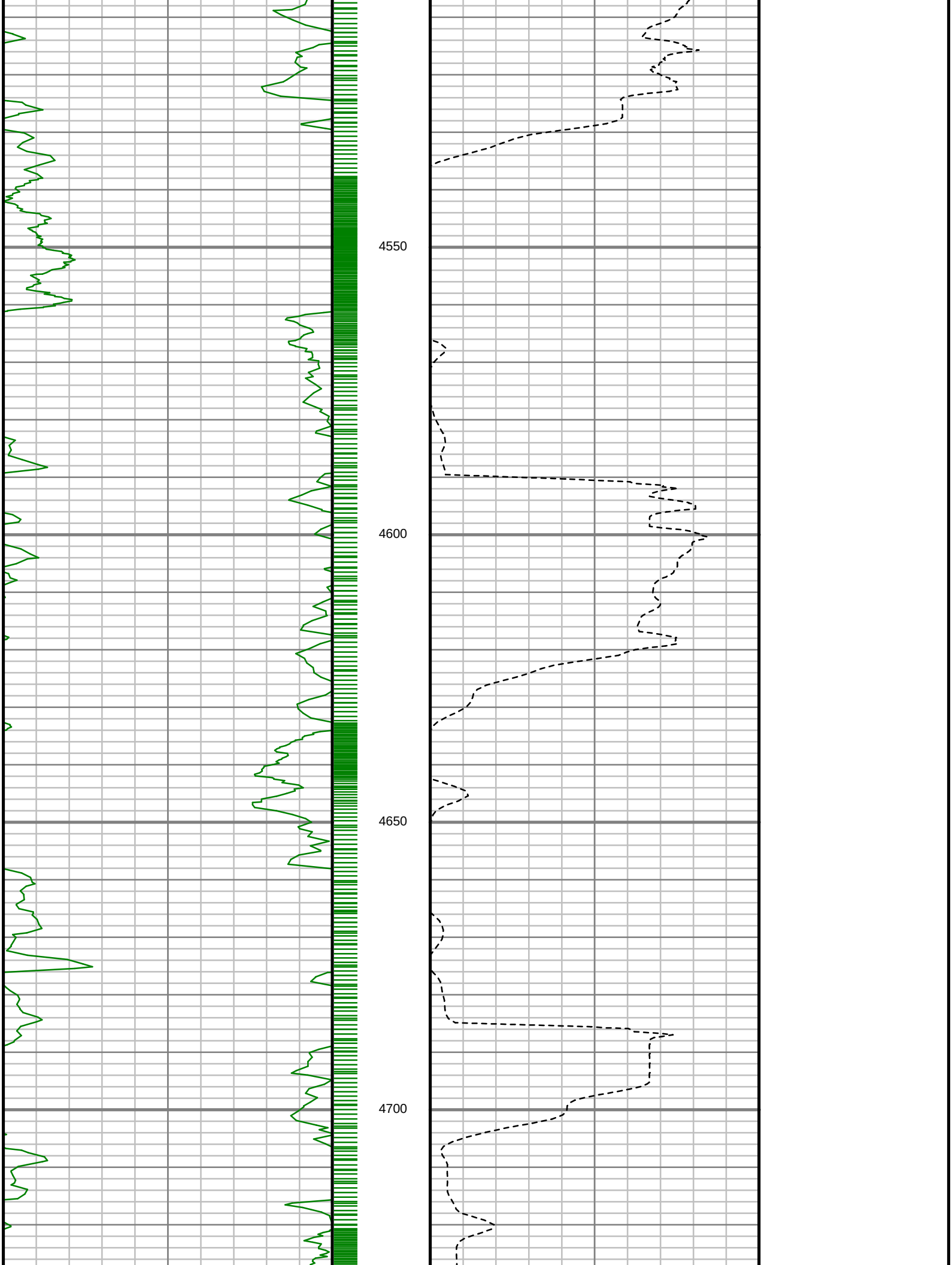
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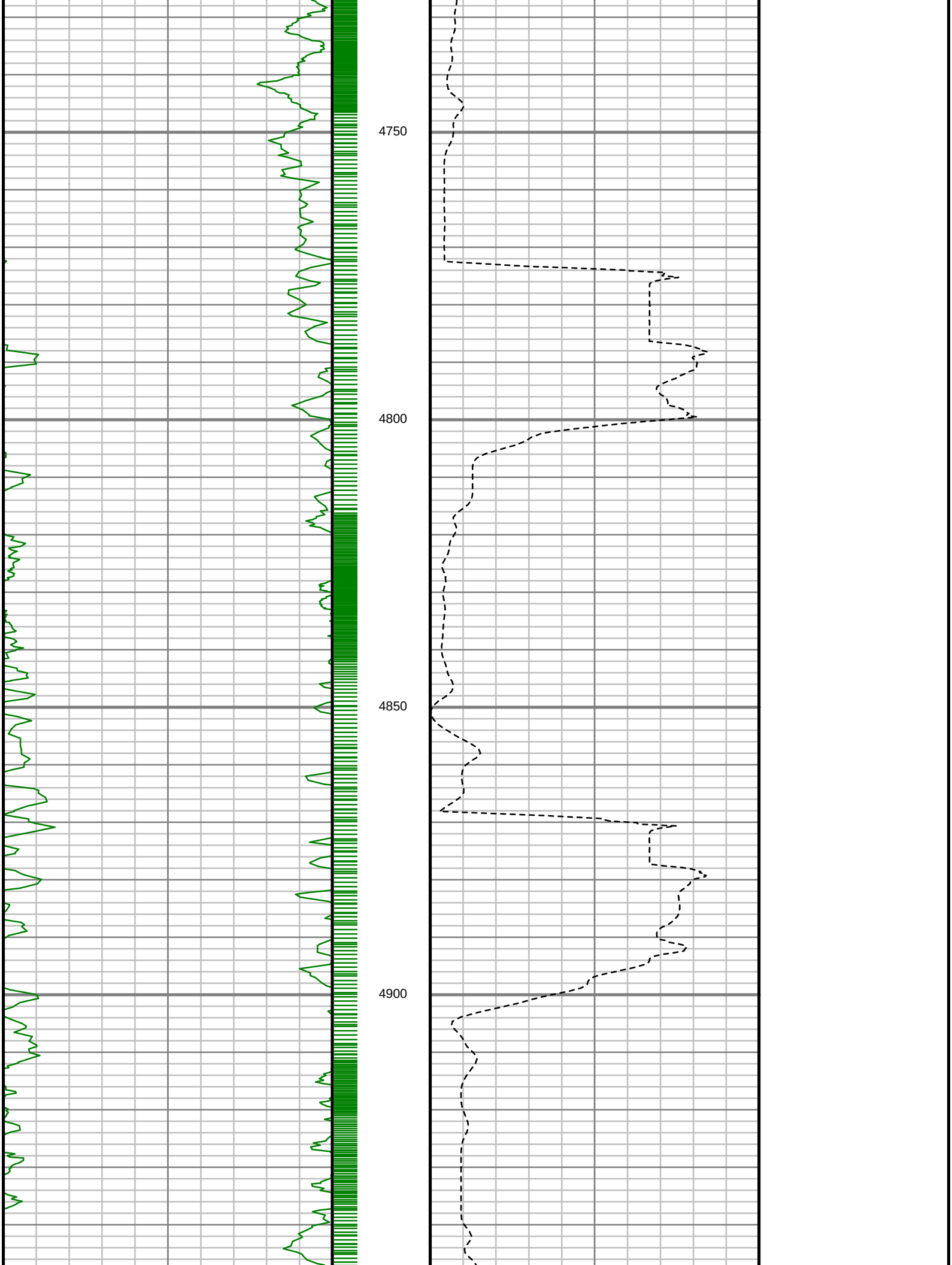
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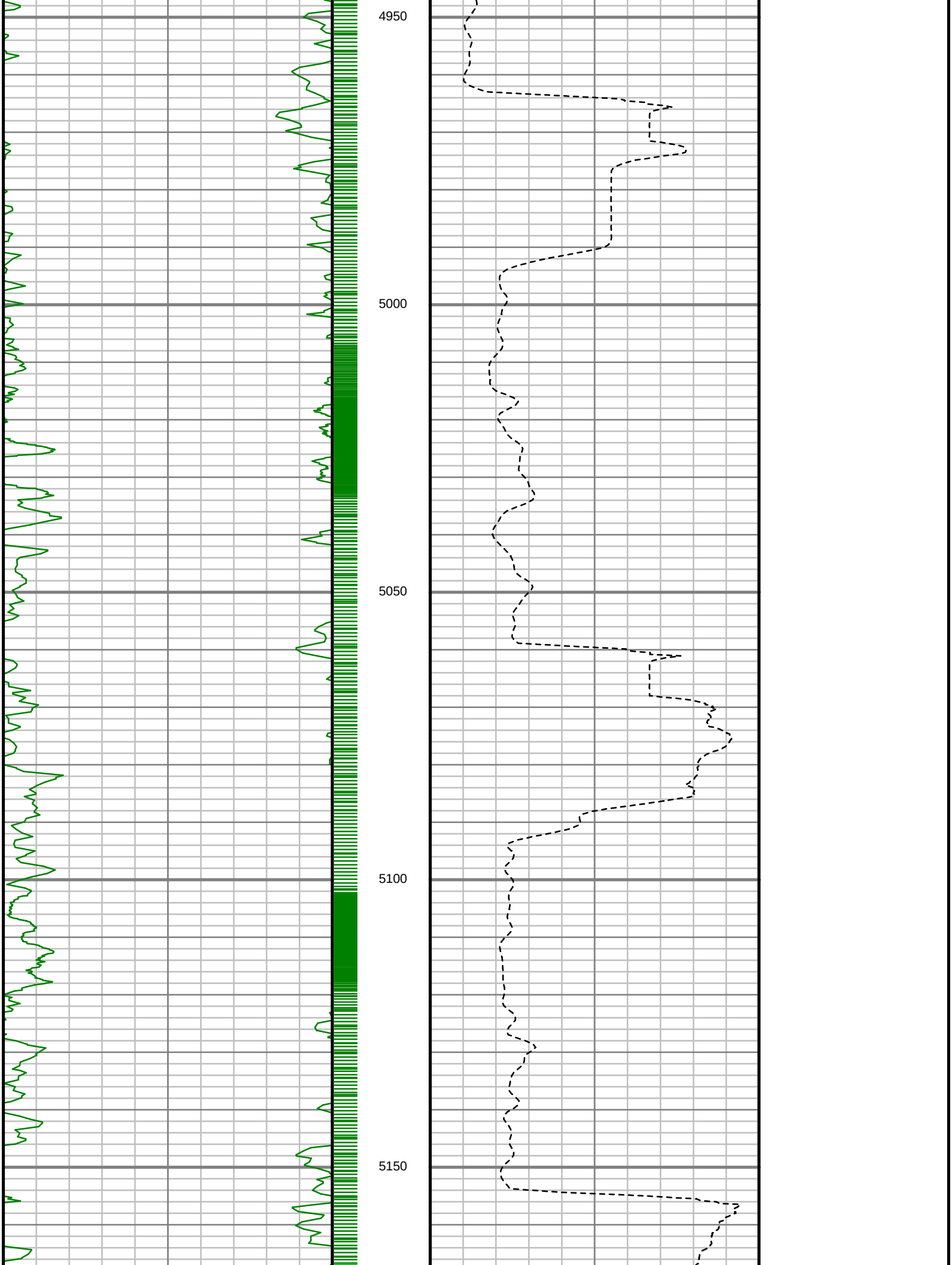
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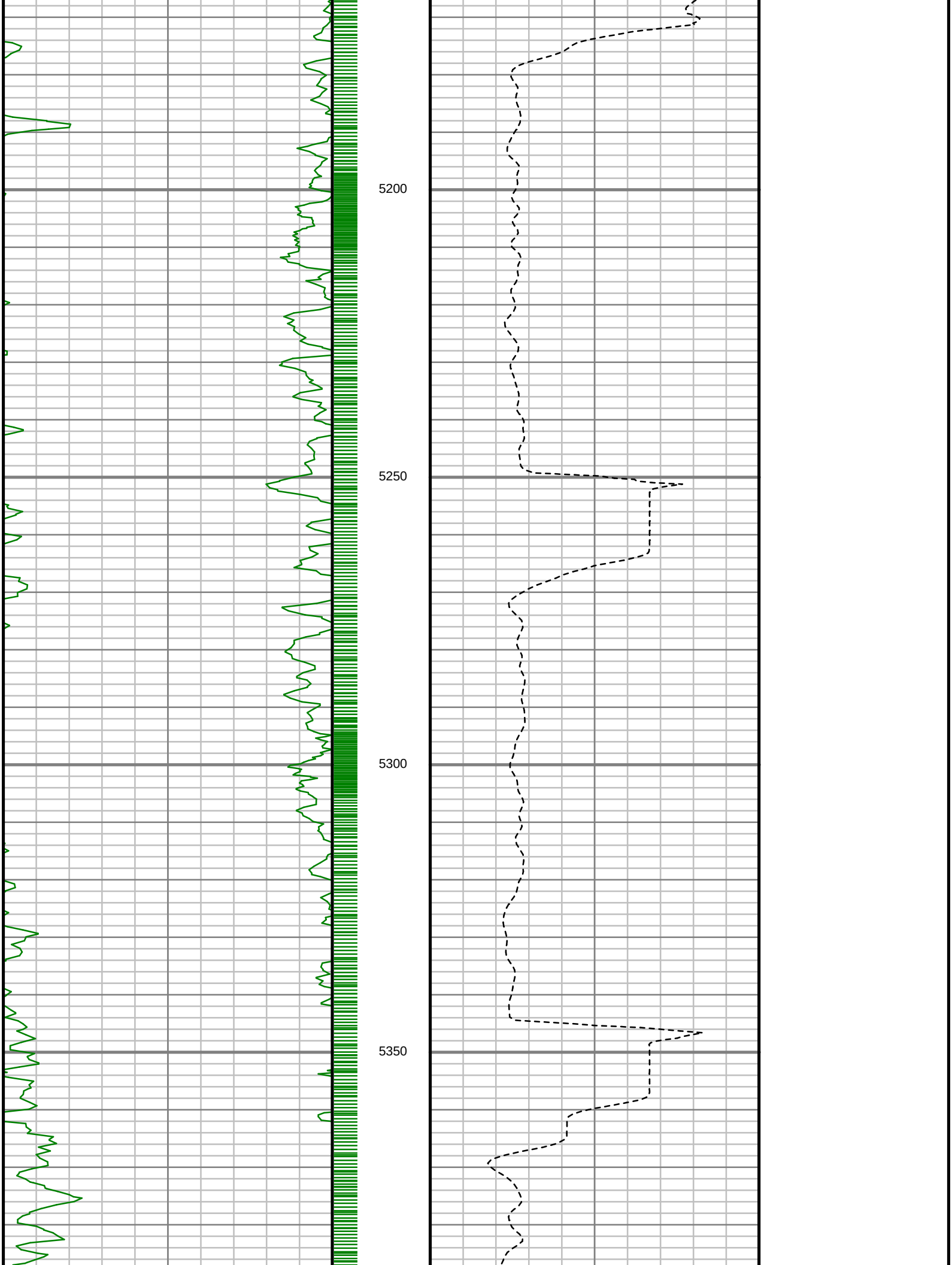
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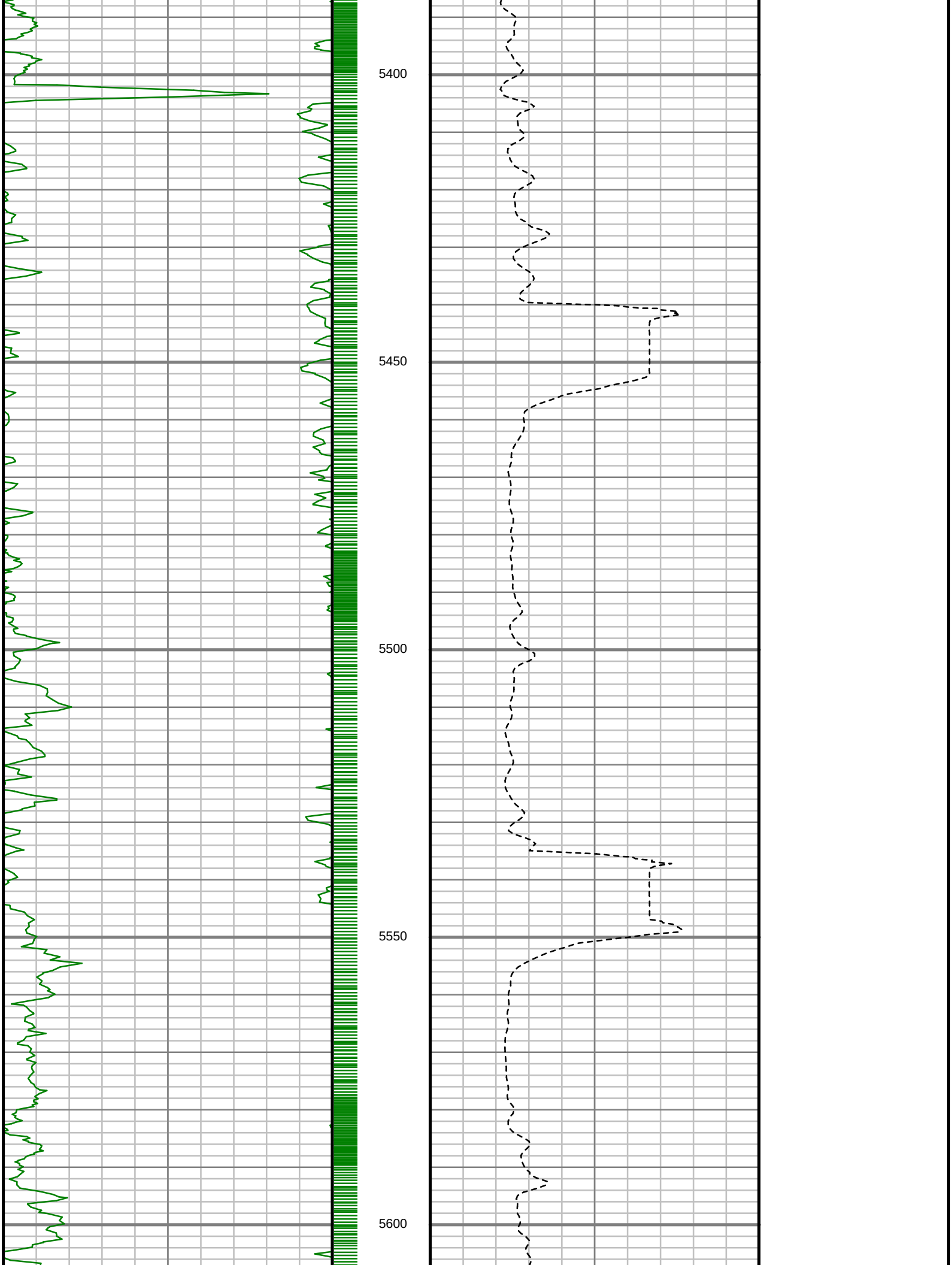
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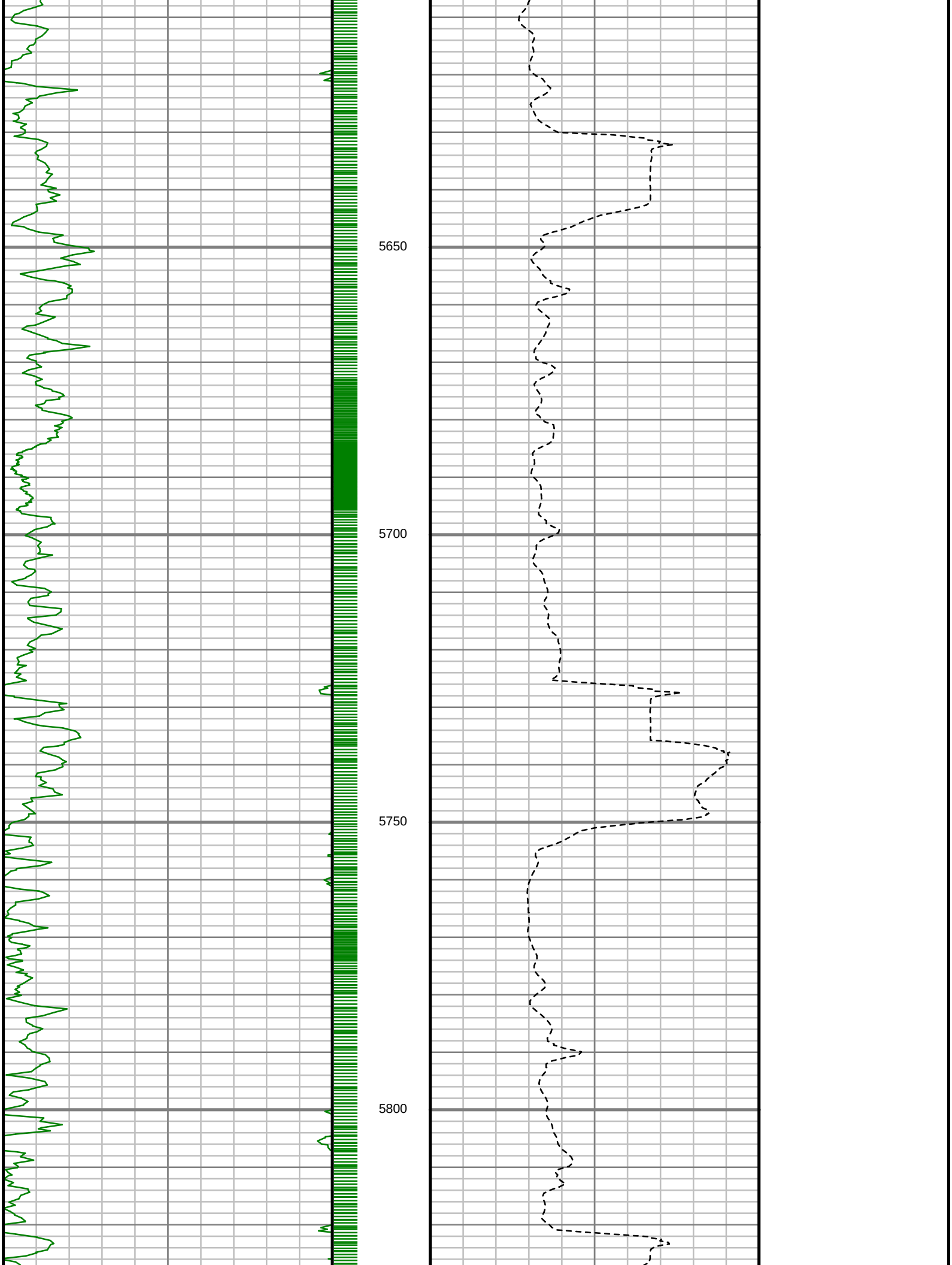
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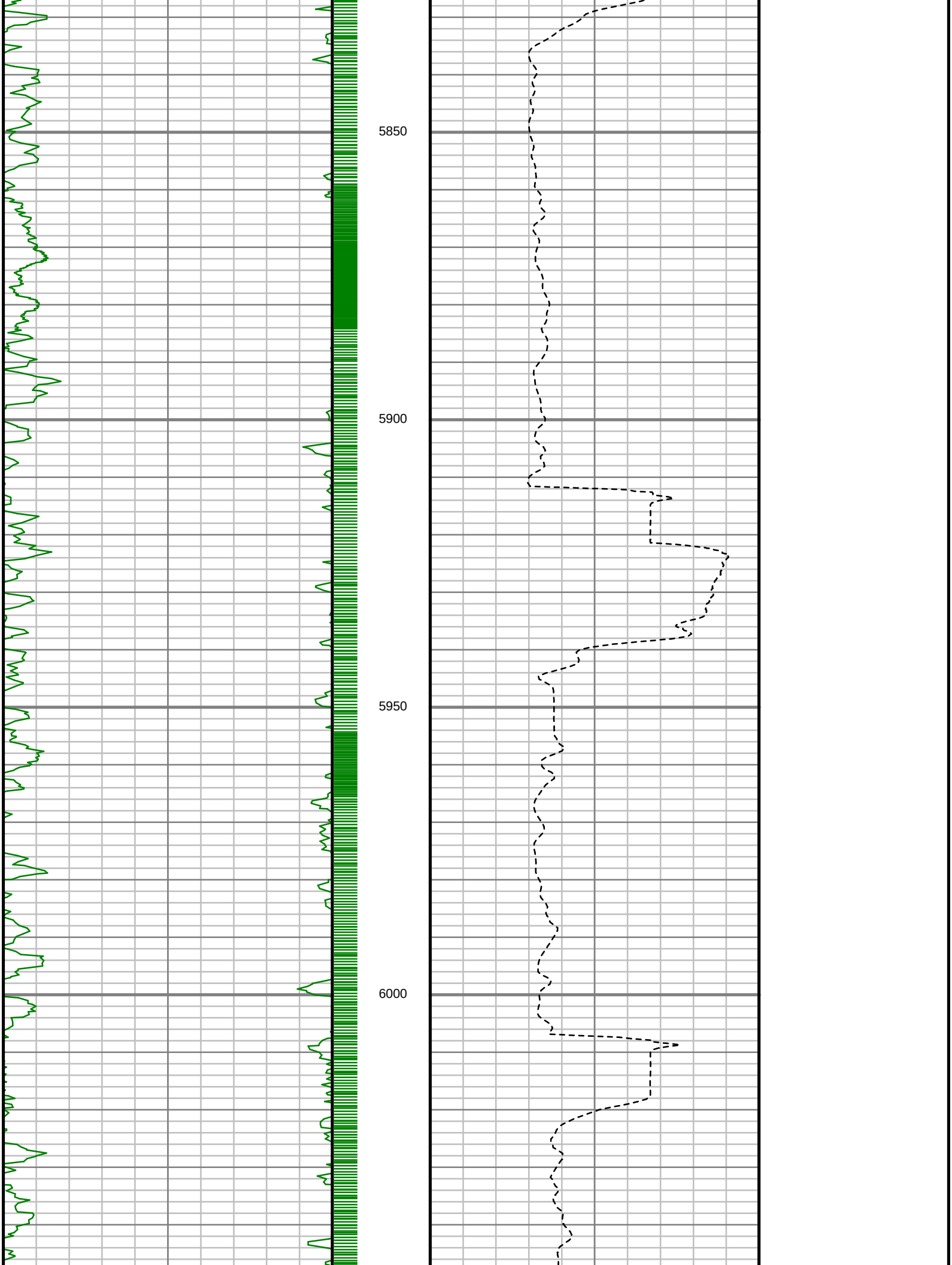
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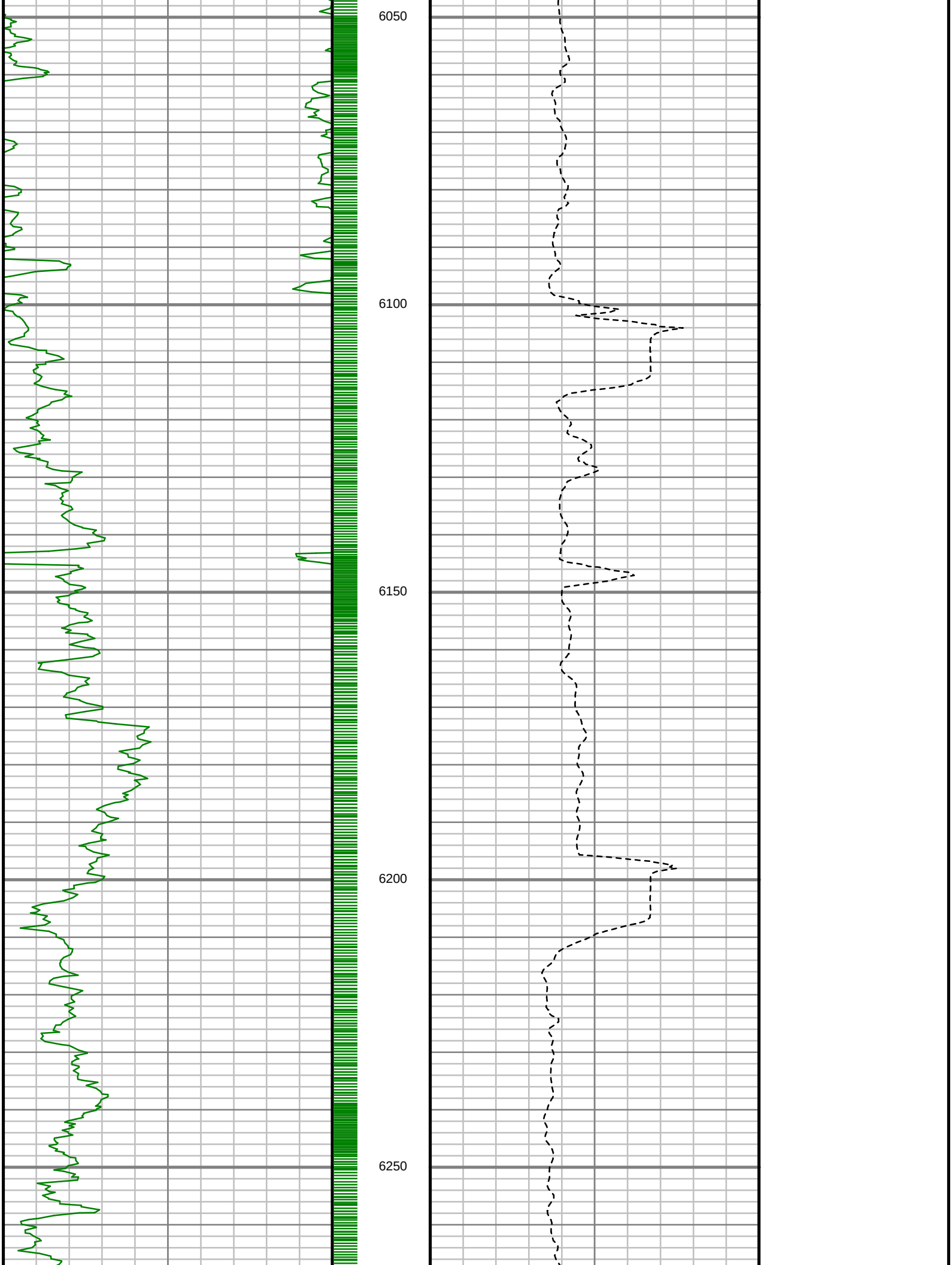
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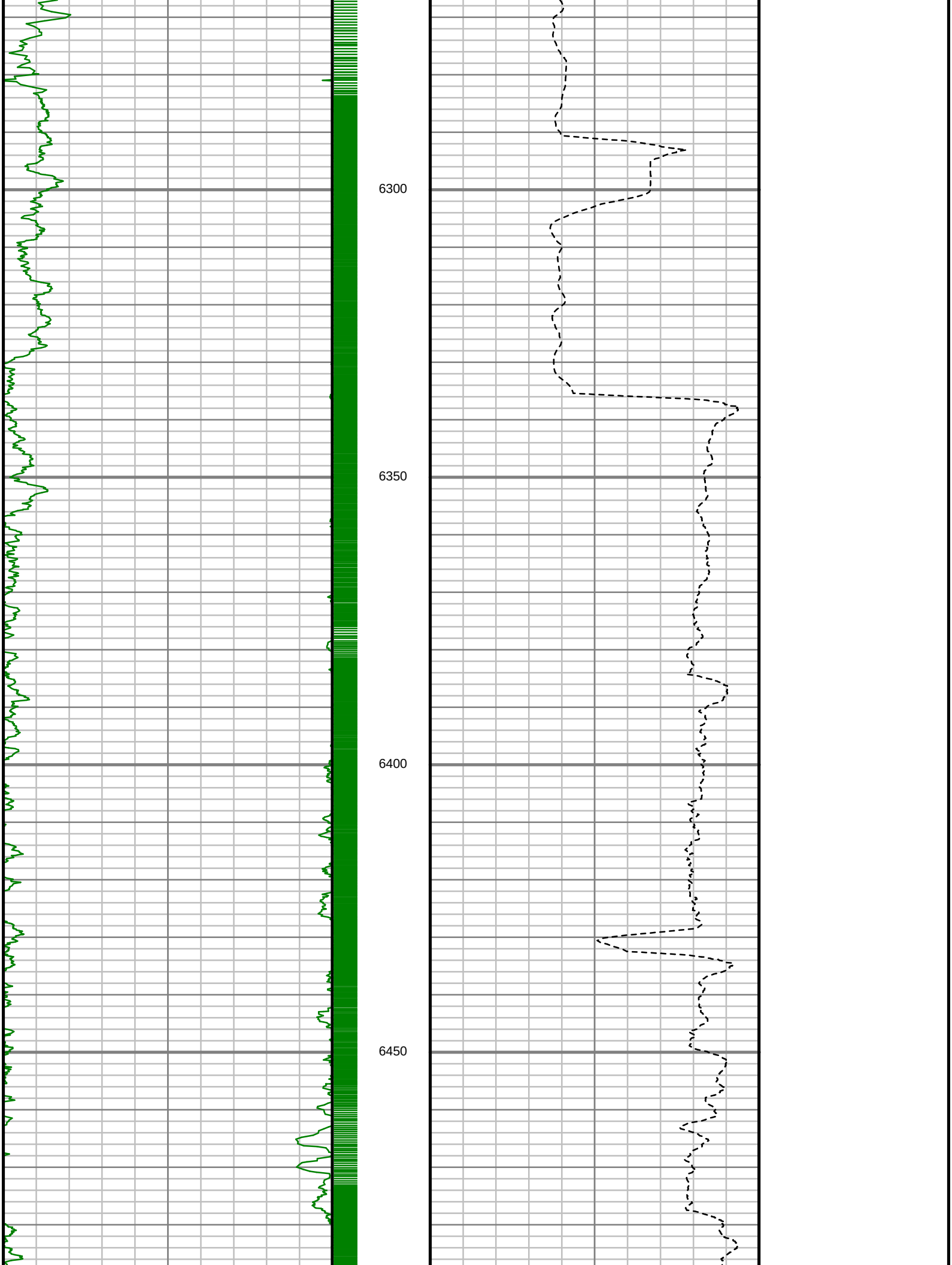
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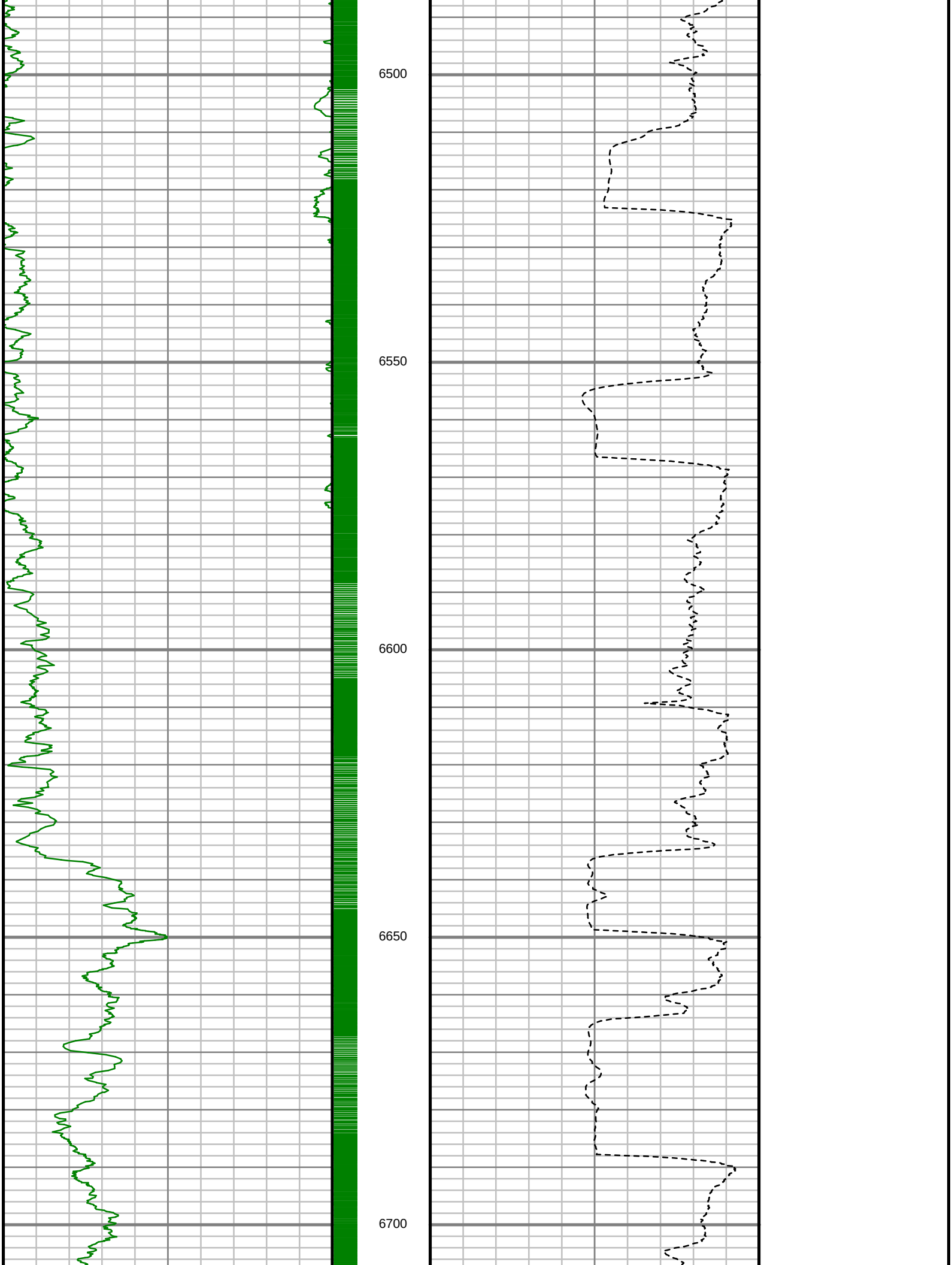
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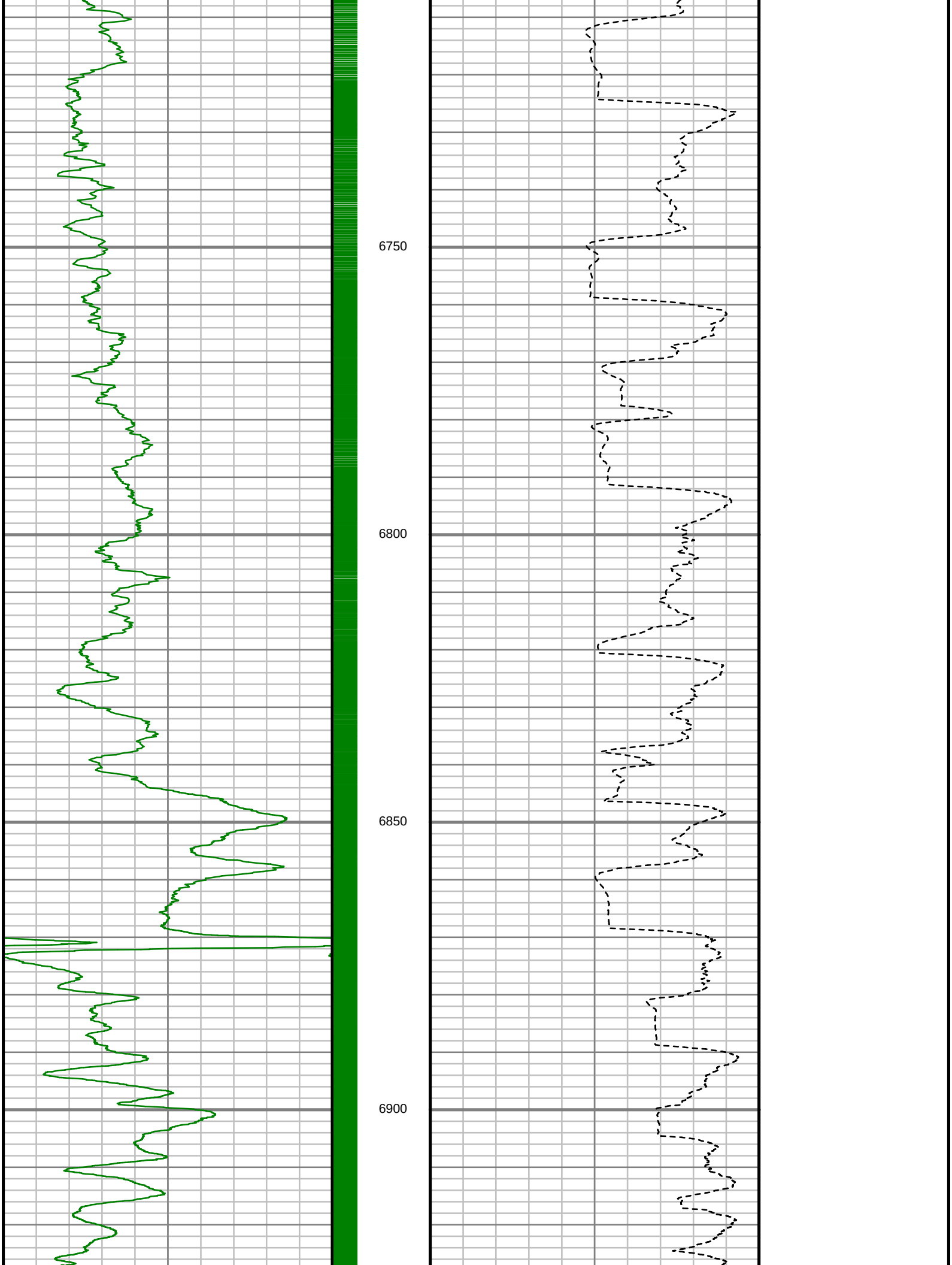
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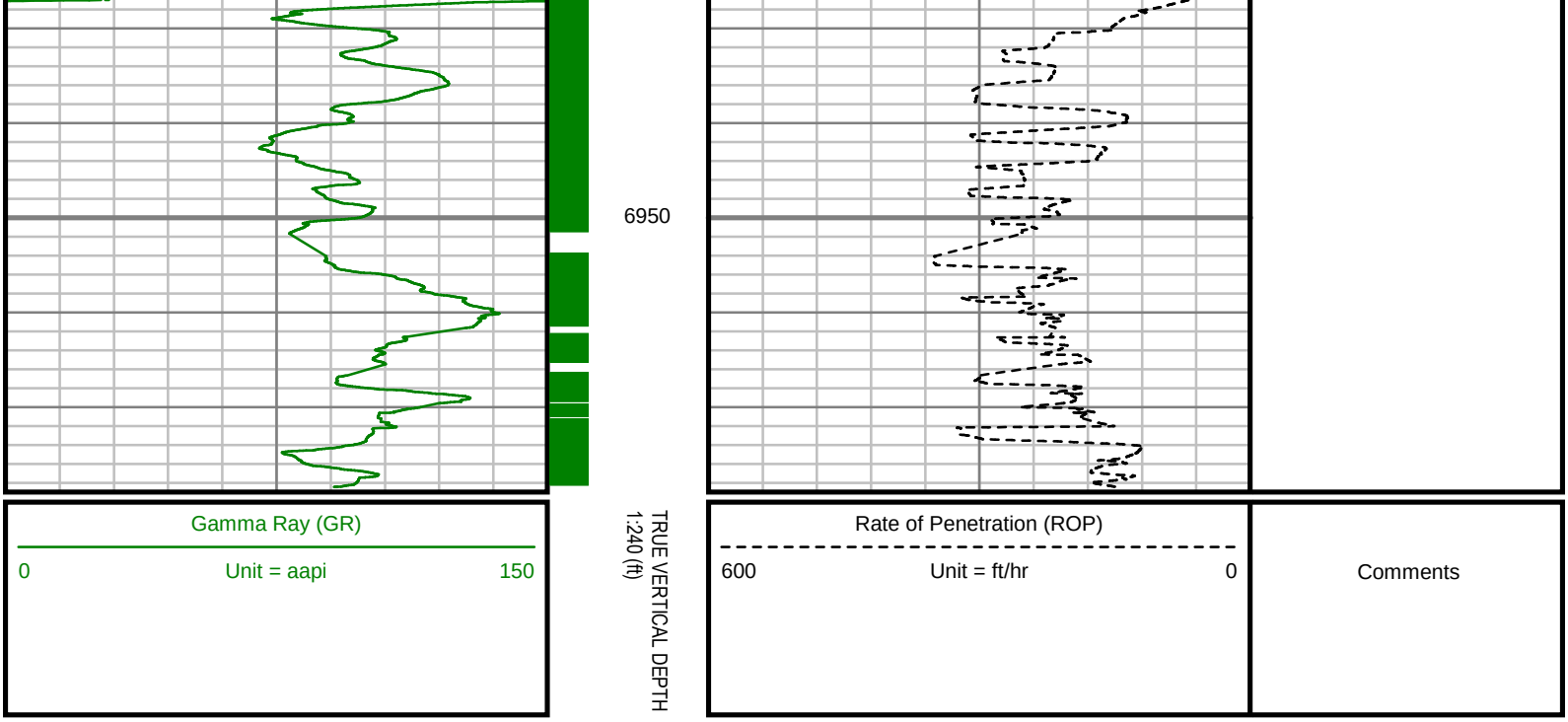

Gamma Ray (GR)

0 Unit = aapi 150

TRUE VERTICAL DEPTH
1:240 (ft)

Rate of Penetration (ROP)

600 Unit = ft/hr 0

Comments

Scientific Drilling

MWD Survey Report

Well Location	RUHL
Well Name	RUHL 1E-32H-B264
Survey Date	12/12/2014
Latitude	40°6'5.177"N
Longitude	104°34'24.953"W
Btotal	52506, 52514 nT
Dip	66.71 deg
Magnetic Declination	8.36, 8.37 deg
North Reference	True North
Grid Correction	None
Depth Reference	RKB (25.00 ft)
Calculation Method	Minimum Curvature
Section (VS) Ref	0.00N (ft), 0.00E (ft), 180.00Azim (deg)
Operator(s)	C. WILSON, D. PADULA, S. WAXLER, T. LE

Well Notes

MD	Inc	Azim	TVD	VS	+N/-S	+E/-W	Closure Distance	Closure Direction	DLS
ft	deg	deg	ft	ft	ft	ft	ft	deg	°/100ft
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Invalid
245.00	3.39	44.53	244.86	-5.17	5.17	5.09	7.25	44.53	1.39
336.00	4.71	48.80	335.63	-9.55	9.55	9.79	13.68	45.70	1.48
427.00	5.96	58.30	426.23	-14.49	14.49	16.62	22.05	48.90	1.68
519.00	7.27	65.92	517.62	-19.38	19.38	25.99	32.42	53.30	1.72
608.00	7.80	73.68	605.85	-23.37	23.37	36.93	43.71	57.67	1.29
698.00	9.22	77.55	694.86	-26.64	26.64	49.83	56.51	61.87	1.70
789.00	10.92	78.70	784.46	-29.91	29.91	65.40	71.92	65.43	1.88
879.00	11.48	74.01	872.75	-34.04	34.04	82.37	89.13	67.55	1.19
970.00	11.30	68.16	961.96	-39.85	39.85	99.35	107.04	68.14	1.28
1060.00	11.37	64.41	1050.20	-46.97	46.97	115.54	124.72	67.88	0.82
1152.00	10.93	66.12	1140.47	-54.41	54.41	131.69	142.49	67.55	0.60
1277.00	10.19	63.44	1263.35	-64.16	64.16	152.42	165.37	67.17	0.71
1459.00	11.85	66.74	1441.99	-78.73	78.73	183.99	200.13	66.83	0.98
1641.00	12.70	62.82	1619.83	-95.25	95.25	218.96	238.78	66.49	0.65
1822.00	10.90	64.05	1797.00	-111.83	111.83	252.04	275.73	66.07	1.01
2003.00	9.85	65.01	1975.04	-125.86	125.86	281.46	308.31	65.91	0.59
2183.00	8.05	72.10	2152.84	-136.24	136.24	307.41	336.25	66.10	1.17
2366.00	9.04	67.15	2333.81	-145.76	145.76	332.86	363.38	66.35	0.67

MD	Inc	Azim	TVD	VS	+N/-S	+E/-W	Closure Distance	Closure Direction	DLS
ft	deg	deg	ft	ft	ft	ft	ft	deg	°/100ft
2549.00	9.43	68.45	2514.44	-156.85	156.85	360.06	392.74	66.46	0.24
2731.00	10.13	69.63	2693.79	-167.90	167.90	388.93	423.63	66.65	0.40
2912.00	10.45	70.75	2871.88	-178.86	178.86	419.36	455.91	66.90	0.21
3092.00	9.96	66.97	3049.03	-190.33	190.33	449.10	487.77	67.03	0.46
3275.00	8.65	63.99	3229.62	-202.56	202.56	476.05	517.35	66.95	0.76
3457.00	9.29	72.03	3409.40	-213.10	213.10	502.32	545.66	67.01	0.77
3637.00	10.37	58.78	3586.78	-225.99	225.99	530.01	576.17	66.91	1.39
3824.00	8.82	60.94	3771.15	-241.68	241.68	556.94	607.12	66.54	0.85
4013.00	9.22	67.31	3957.82	-254.56	254.56	583.59	636.69	66.43	0.57
4203.00	7.12	71.25	4145.88	-264.22	264.22	608.79	663.66	66.54	1.14
4392.00	6.80	66.79	4333.49	-272.40	272.40	630.17	686.53	66.62	0.33
4581.00	3.24	66.45	4521.73	-278.95	278.95	645.37	703.07	66.62	1.88
4771.00	0.72	2.94	4711.61	-282.28	282.28	650.36	708.98	66.54	1.57
4961.00	0.12	296.77	4901.61	-283.56	283.56	650.24	709.38	66.44	0.36
5151.00	0.89	265.82	5091.60	-283.55	283.55	648.59	707.86	66.39	0.41
5341.00	1.13	192.28	5281.58	-281.61	281.61	646.73	705.38	66.47	0.64
5530.00	0.27	273.95	5470.56	-279.82	279.82	645.89	703.90	66.58	0.59
5720.00	1.02	12.97	5660.55	-281.50	281.50	645.82	704.51	66.45	0.58

MD	Inc	Azim	TVD	VS	+N/-S	+E/-W	Closure Distance	Closure Direction	DLS
ft	deg	deg	ft	ft	ft	ft	ft	deg	°/100ft
5910.00	0.45	244.86	5850.54	-282.84	282.84	645.53	704.77	66.34	0.71
6099.00	1.04	134.76	6039.53	-281.31	281.31	646.08	704.66	66.47	0.67
6289.00	0.51	110.14	6229.52	-279.81	279.81	648.09	705.92	66.65	0.33
6384.00	0.67	52.27	6324.51	-280.00	280.00	648.93	706.76	66.66	0.62
6431.00	5.70	180.75	6371.44	-277.83	277.83	649.12	706.08	66.83	13.08
6478.00	12.73	182.09	6417.80	-270.32	270.32	648.90	702.95	67.38	14.94
6525.00	13.75	183.17	6463.55	-259.57	259.57	648.40	698.43	68.18	2.24
6573.00	17.89	183.07	6509.73	-246.50	246.50	647.69	693.02	69.16	8.62
6620.00	22.64	180.55	6553.81	-230.24	230.24	647.22	686.95	70.42	10.27
6668.00	28.77	180.07	6597.04	-209.44	209.44	647.12	680.17	72.07	12.78
6715.00	34.02	181.50	6637.14	-184.97	184.97	646.76	672.69	74.04	11.28
6763.00	35.64	181.28	6676.54	-157.56	157.56	646.10	665.03	76.30	3.40
6810.00	39.97	181.97	6713.67	-128.77	128.77	645.27	658.00	78.71	9.24
6858.00	44.74	180.87	6749.13	-96.45	96.45	644.48	651.66	81.49	10.07
6905.00	46.47	179.16	6782.01	-62.87	62.87	644.48	647.54	84.43	4.51
6952.00	53.20	178.81	6812.31	-26.98	26.98	645.12	645.69	87.61	14.33
6999.00	58.53	179.68	6838.67	11.91	-11.91	645.63	645.74	91.06	11.45
7047.00	61.94	181.73	6862.50	53.56	-53.56	645.10	647.32	94.75	8.00

MD	Inc	Azim	TVD	VS	+N/-S	+E/-W	Closure Distance	Closure Direction	DLS
ft	deg	deg	ft	ft	ft	ft	ft	deg	°/100ft
7094.00	66.03	182.10	6883.11	95.76	-95.76	643.69	650.77	98.46	8.74
7142.00	70.84	181.10	6900.75	140.37	-140.37	642.45	657.60	102.33	10.20
7189.00	75.75	180.44	6914.25	185.37	-185.37	641.84	668.08	106.11	10.53
7237.00	81.71	179.89	6923.63	232.42	-232.42	641.71	682.50	109.91	12.47
7281.00	87.98	179.61	6927.59	276.22	-276.22	641.90	698.81	113.28	14.29
7424.00	90.74	178.98	6929.18	419.19	-419.19	643.66	768.13	123.07	1.98
7514.00	88.89	177.47	6929.47	509.14	-509.14	646.44	822.87	128.22	2.65
7605.00	88.06	177.15	6931.89	600.01	-600.01	650.71	885.12	132.68	0.98
7696.00	87.11	176.46	6935.72	690.78	-690.78	655.78	952.48	136.49	1.29
7791.00	87.38	177.86	6940.28	785.55	-785.55	660.48	1026.32	139.94	1.50
7886.00	88.49	180.02	6943.70	880.47	-880.47	662.23	1101.72	143.05	2.56
7980.00	87.75	180.02	6946.78	974.42	-974.42	662.19	1178.13	145.80	0.79
8075.00	89.40	179.42	6949.15	1069.38	-1069.38	662.66	1258.05	148.21	1.85
8170.00	88.66	179.73	6950.76	1164.37	-1164.37	663.37	1340.08	150.33	0.85
8264.00	90.34	180.01	6951.59	1258.36	-1258.36	663.58	1422.60	152.20	1.81
8360.00	90.27	180.36	6951.08	1354.36	-1354.36	663.26	1508.05	153.91	0.37
8454.00	89.66	181.57	6951.14	1448.34	-1448.34	661.68	1592.33	155.45	1.43
8549.00	91.11	182.87	6950.50	1543.26	-1543.26	658.00	1677.68	156.91	2.05

MD	Inc	Azim	TVD	VS	+N/-S	+E/-W	Closure Distance	Closure Direction	DLS
ft	deg	deg	ft	ft	ft	ft	ft	deg	°/100ft
8643.00	89.46	182.16	6950.03	1637.17	-1637.17	653.87	1762.91	158.23	1.91
8737.00	88.89	182.02	6951.38	1731.09	-1731.09	650.44	1849.26	159.41	0.62
8832.00	87.92	182.22	6954.02	1825.99	-1825.99	646.92	1937.20	160.49	1.05
8927.00	89.09	183.64	6956.50	1920.83	-1920.83	642.07	2025.30	161.52	1.94
9021.00	89.77	181.11	6957.43	2014.74	-2014.74	638.18	2113.40	162.42	2.78
9116.00	88.86	181.63	6958.58	2109.70	-2109.70	635.90	2203.46	163.23	1.10
9211.00	89.19	180.79	6960.19	2204.67	-2204.67	633.90	2293.99	163.96	0.95
9305.00	89.53	180.80	6961.24	2298.65	-2298.65	632.59	2384.11	164.61	0.36
9400.00	90.03	180.66	6961.60	2393.64	-2393.64	631.39	2475.51	165.22	0.55
9495.00	88.86	181.10	6962.52	2488.63	-2488.63	629.93	2567.11	165.80	1.32
9590.00	88.79	179.73	6964.46	2583.60	-2583.60	629.24	2659.12	166.31	1.45
9685.00	90.03	179.85	6965.43	2678.59	-2678.59	629.59	2751.59	166.77	1.31
9779.00	90.13	179.54	6965.30	2772.59	-2772.59	630.10	2843.29	167.20	0.34
9874.00	90.57	178.54	6964.71	2867.57	-2867.57	631.69	2936.33	167.58	1.15
9969.00	89.46	178.52	6964.69	2962.54	-2962.54	634.13	3029.65	167.92	1.17
10064.00	88.22	178.55	6966.61	3057.49	-3057.49	636.55	3123.05	168.24	1.31
10158.00	89.16	179.31	6968.76	3151.45	-3151.45	638.31	3215.44	168.55	1.29
10253.00	89.90	179.98	6969.54	3246.44	-3246.44	638.90	3308.71	168.87	1.05

MD	Inc	Azim	TVD	VS	+N/-S	+E/-W	Closure Distance	Closure Direction	DLS
ft	deg	deg	ft	ft	ft	ft	ft	deg	°/100ft
10348.00	90.27	179.89	6969.40	3341.44	-3341.44	639.01	3401.99	169.17	0.40
10442.00	89.03	179.49	6969.98	3435.44	-3435.44	639.52	3494.45	169.45	1.39
10537.00	89.63	180.21	6971.09	3530.43	-3530.43	639.78	3587.93	169.73	0.99
10632.00	90.91	179.78	6970.65	3625.42	-3625.42	639.79	3681.44	169.99	1.42
10727.00	90.64	179.58	6969.36	3720.41	-3720.41	640.32	3775.11	170.23	0.35
10822.00	91.21	179.16	6967.83	3815.40	-3815.40	641.36	3868.93	170.46	0.74
10917.00	89.70	179.10	6967.08	3910.38	-3910.38	642.80	3962.86	170.66	1.59
11012.00	88.59	178.64	6968.50	4005.35	-4005.35	644.68	4056.90	170.86	1.26
11106.00	87.72	178.11	6971.53	4099.26	-4099.26	647.35	4150.06	171.03	1.08
11201.00	88.26	178.75	6974.86	4194.17	-4194.17	649.95	4244.23	171.19	0.88
11295.00	89.36	178.18	6976.81	4288.11	-4288.11	652.46	4337.46	171.35	1.32
11390.00	89.16	175.65	6978.04	4382.96	-4382.96	657.57	4432.01	171.47	2.67
11466.00	90.44	177.15	6978.31	4458.80	-4458.80	662.34	4507.73	171.55	2.59

MD	Inc	Azim	TVD	VS	+N/-S	+E/-W	Closure Distance	Closure Direction	DLS
ft	deg	deg	ft	ft	ft	ft	ft	deg	°/100ft

GAMMA RAY

Scientific Drilling

5" = 100' FEET TVD