Company : NOBLE ENERGY INC
Well : WELLS RANCH AE19-615
Field : WATTENBERG

Date : 09-Dec-2014
Time : 13:44

PATHFINDER

A Schlumberger Company

GAMMA-RAY

2" = 100'
FEET TVD

COMPANY : NOBLE ENERGY INC
WELL : WELLS RANCH AE19-615
FIELD : WATTENBERG
COUNTY : WELD
STATE : CO
COUNTRY : USA
API No.: 05-123-39633

COMPANY : NOBLE ENERGY INC
WELL : WELLS RANCH AE19-615
FIELD : WATTENBERG
COUNTY : WELD
STATE : CO
COUNTRY : USA
API No.: 05-123-39633

WELL LOCATION
LAT:47°28'9"N LON:104°21'21"
X:3318318' Y:1415812'
SEC: 24 TWP: 6N 63W RANGE:

OTHER SERVICES
DIRECTIONAL
ROP

DEPTH REF. : ROTARY TABLE
ELEVATION : 4816.00 ft (ROTARY TABLE - GROUND LEVEL)
ALTITUDE : 4786.00 ft (GROUND LEVEL - MEAN SEA LEVEL)

BOREHOLE RECORD

HOLE SIZE in	FROM ft	TO ft
13 1/2	0	733
8 3/4	733	7105
6 1/8	7105	12022

CASING RECORD

CASING SIZE in	FROM ft	TO ft
9 5/8	0	723
7	723	7100

DEVIATION RECORD

INCLINATION deg	FROM ft	TO ft
00 +/-2	0	1665
13 +/-2	1665	6178
13-90	6178	7105
90 +/-5	7105	12022

DRILLING Co.: H&P
RIG : 330
LWD UNIT No.: N/A DISTRICT : CCO
SPUD DATE : 1-DEC-14
LWD START DATE : 3-DEC-14 DEPTH : 1200 ft
LWD END DATE : 9-DEC-14 DEPTH : 12022 ft
TOTAL DEPTH : 12022 ft

RUN DATA

RUN NUMBER	#1	#2	#3																
START DATE	2-DEC-14	04-DEC-14	06-DEC-14																
START TIME	21:30	18:30	14:00																
END DATE	4-DEC-14	05-DEC-14	9-DEC																
END TIME	18:15	18:15	00:00																
DEPTH IN ft	1200	6532	7105																
DEPTH OUT ft	6532	7105	12022																
LOG TOP ft	1200	6490	7062																
LOG BOTTOM ft	6490	7062	11982																
HOLE SIZE in	8 3/4	8 3/4	4 3/4																
MUD DATA @ ft	2920	6532	9253																
MUD TYPE	WATER BASED	WATER BASED	WATER BASED																
DENSITY lb/gal	8.40	10.50	9.20																
VISCOSITY s/qt	26	36	37																
pH	8.1	9.5	8.8																
FLUID LOSS cm3/30																			
SALINITY ppm	1900	1800	1500																
Rm ohmm @ deg F	@	@	@																
Rmf ohmm @ deg F	@	@	@																

MAX REC TEMP deg F	97	120	120			
Rm @ MAX TEMP ohmm						
LWD ENGINEER #1	N.COOPER	N.COOPER	N.COOPER			
LWD ENGINEER #2	D.LIPCOVSKI	D.LIPCOVSKI	D.LIPCOVSKI			
LWD ENGINEER #3						

REMARKS

PATHFINDER JOB #: 14CCO0716

ALL LOGGING DATA IS TRANSMITTED ONLY UNLESS STATED OTHERWISE.

ALL REFERENCES TO LOG TOP, LOG BOTTOM, OR LOGGING TOOL DEPTH REFER TO THE GAMMA-RAY SENSOR UNLESS STATED OTHERWISE.

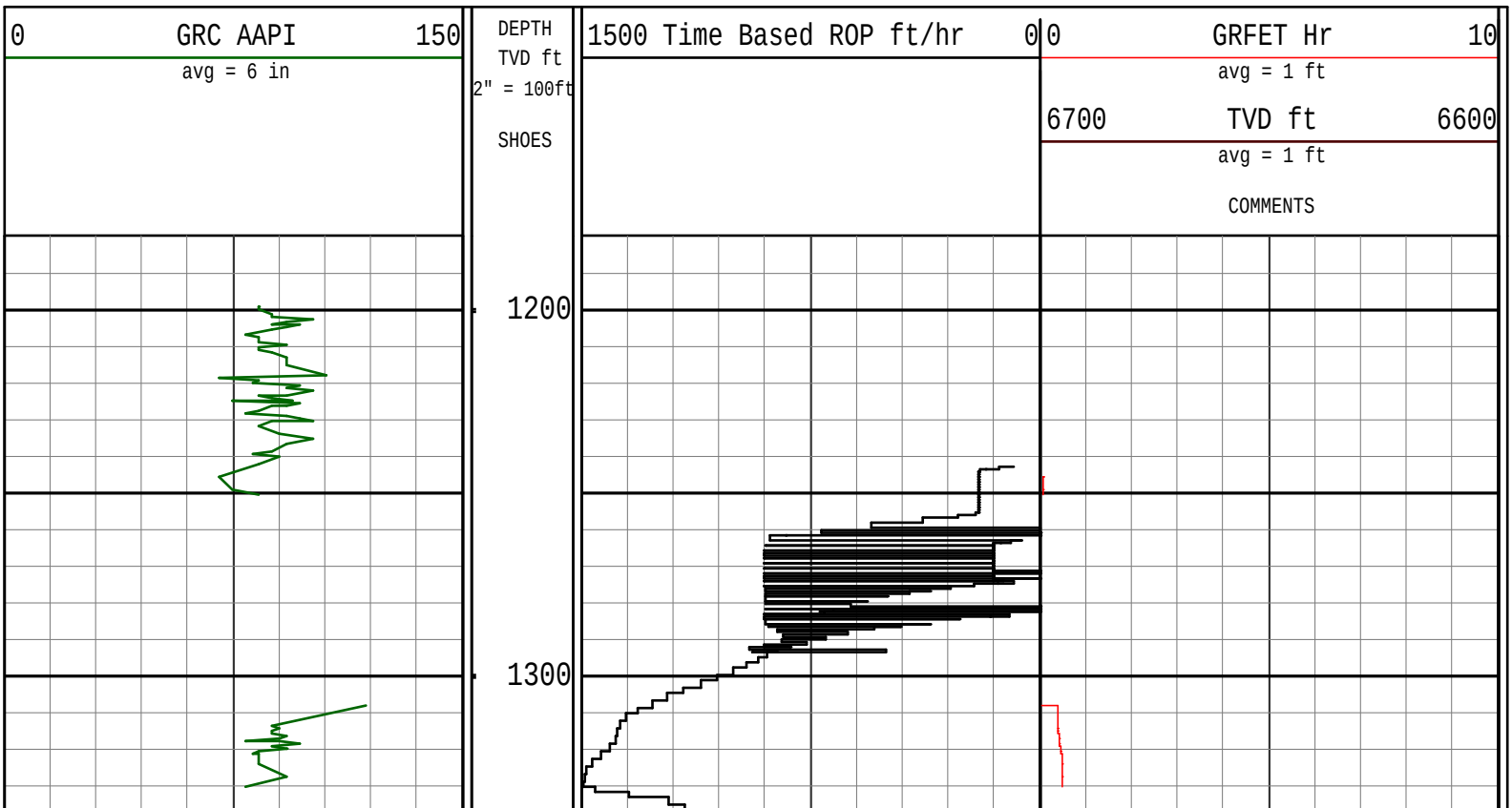
ALL ANNOTATIONS IN THE DEPTH TRACK ARE REFERENCED TO BIT DEPTH.

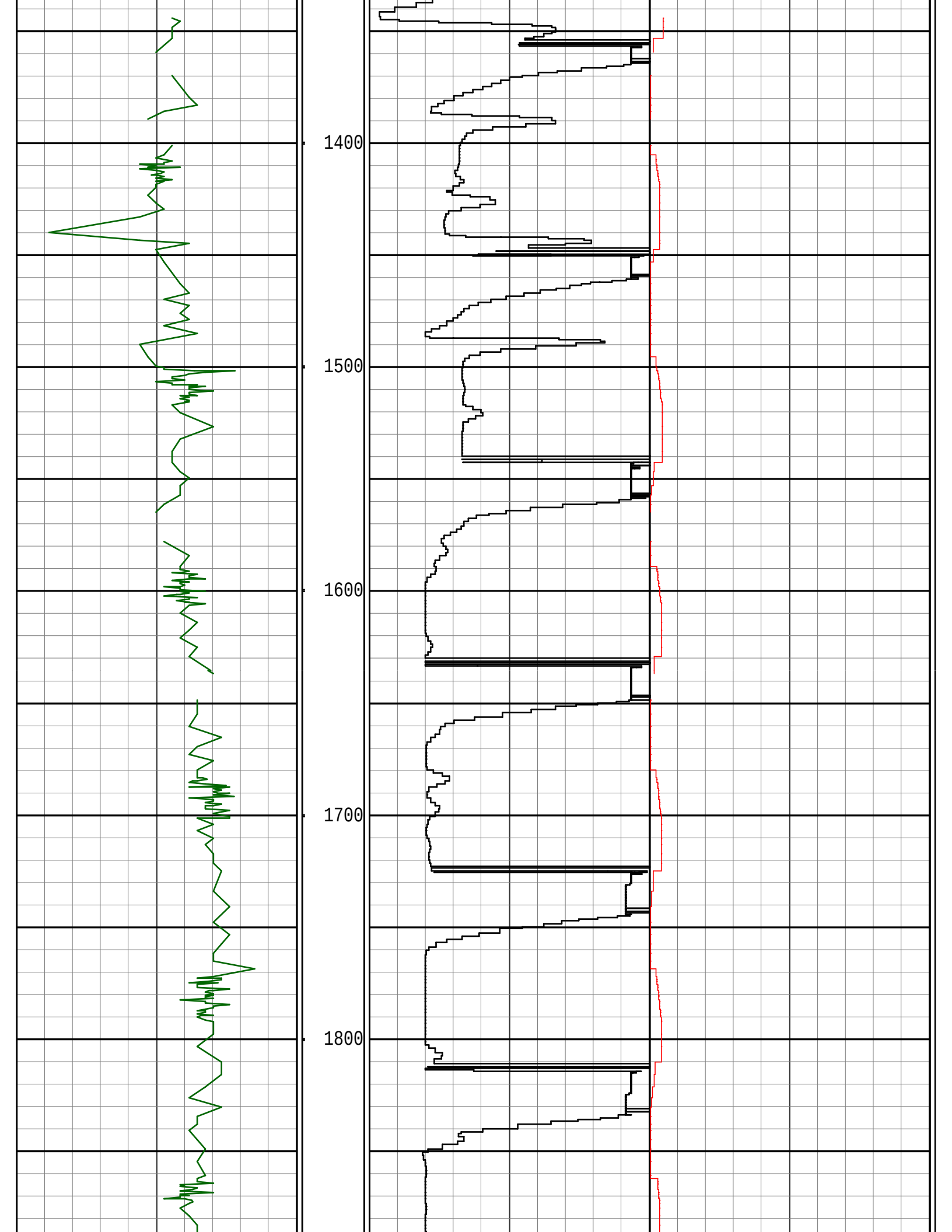
THIRD PARTY DEPTH TRACKING SERVICES ARE PROVIDED BY PASON.

RUN #1: 6 3/4" HDS1-R/GAMMA LOGGING RUN.
RUN #2: 6 3/4" HDS1-R/GAMMA LOGGING RUN.
RUN #3: 4 3/4" HDS1-R/GAMMA LOGGING RUN.

PATHFINDER - A Schlumberger Company

Version No : RX5 V6.05B Release 20Jun2014
Plot Time : 09-Dec-2014 13:39

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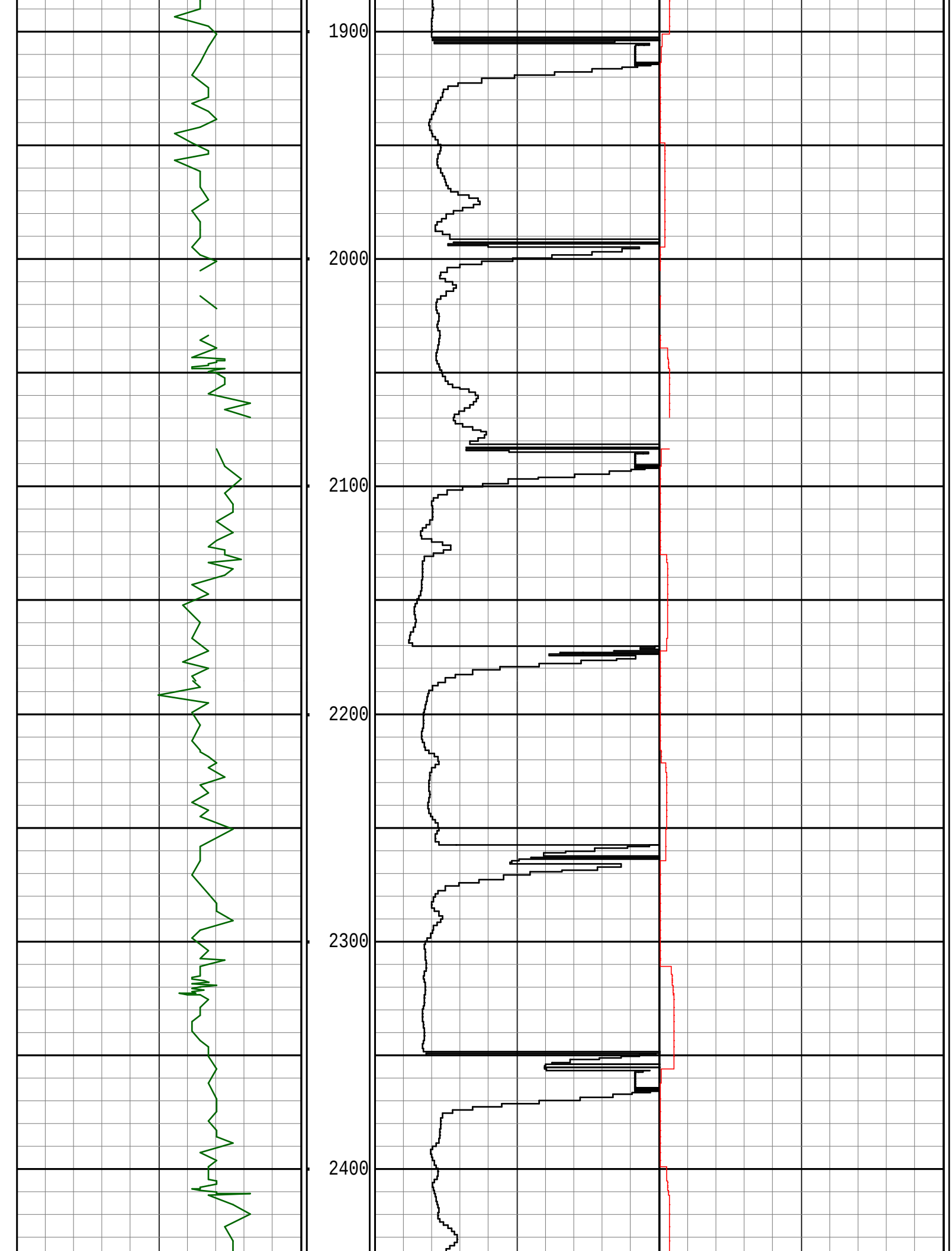
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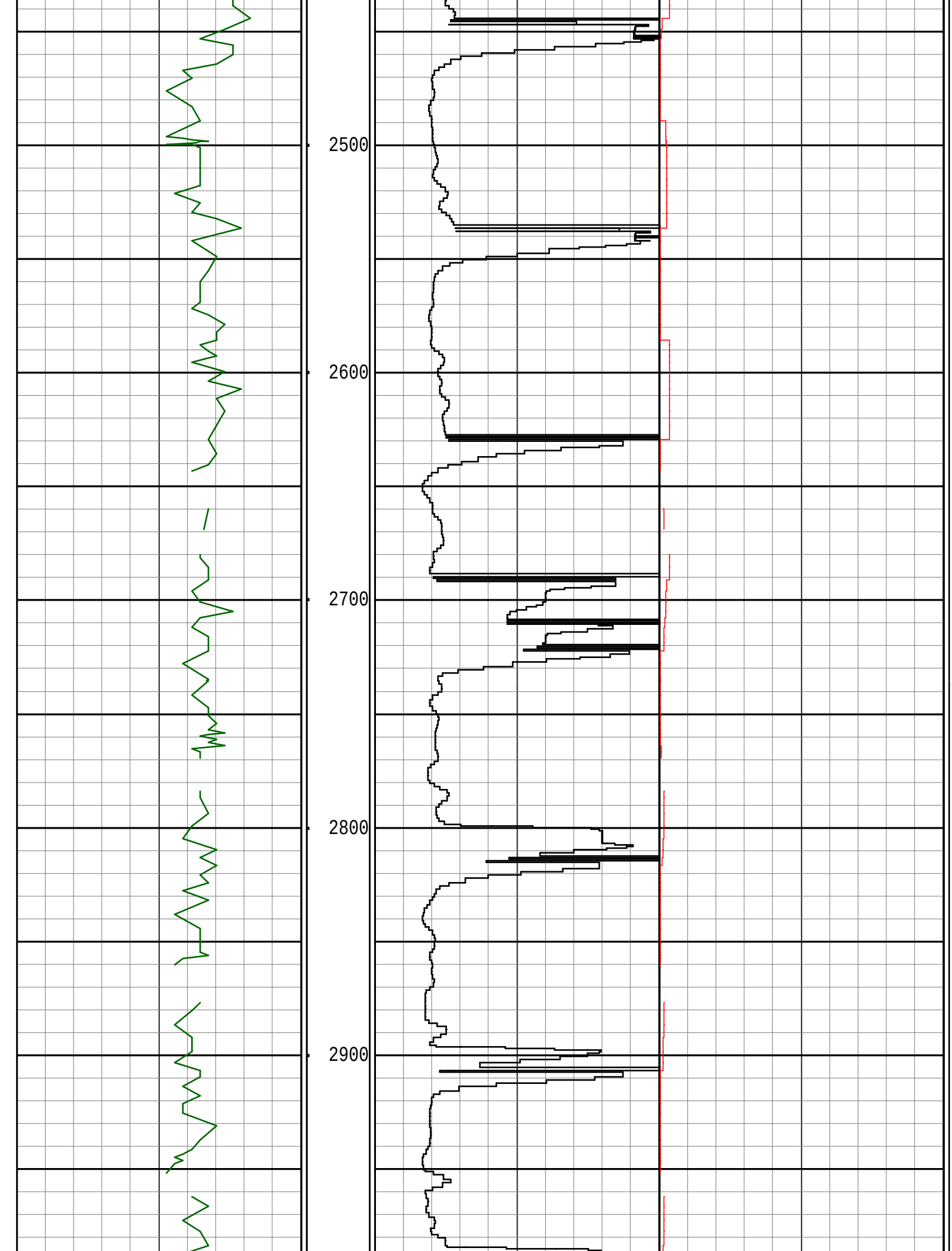
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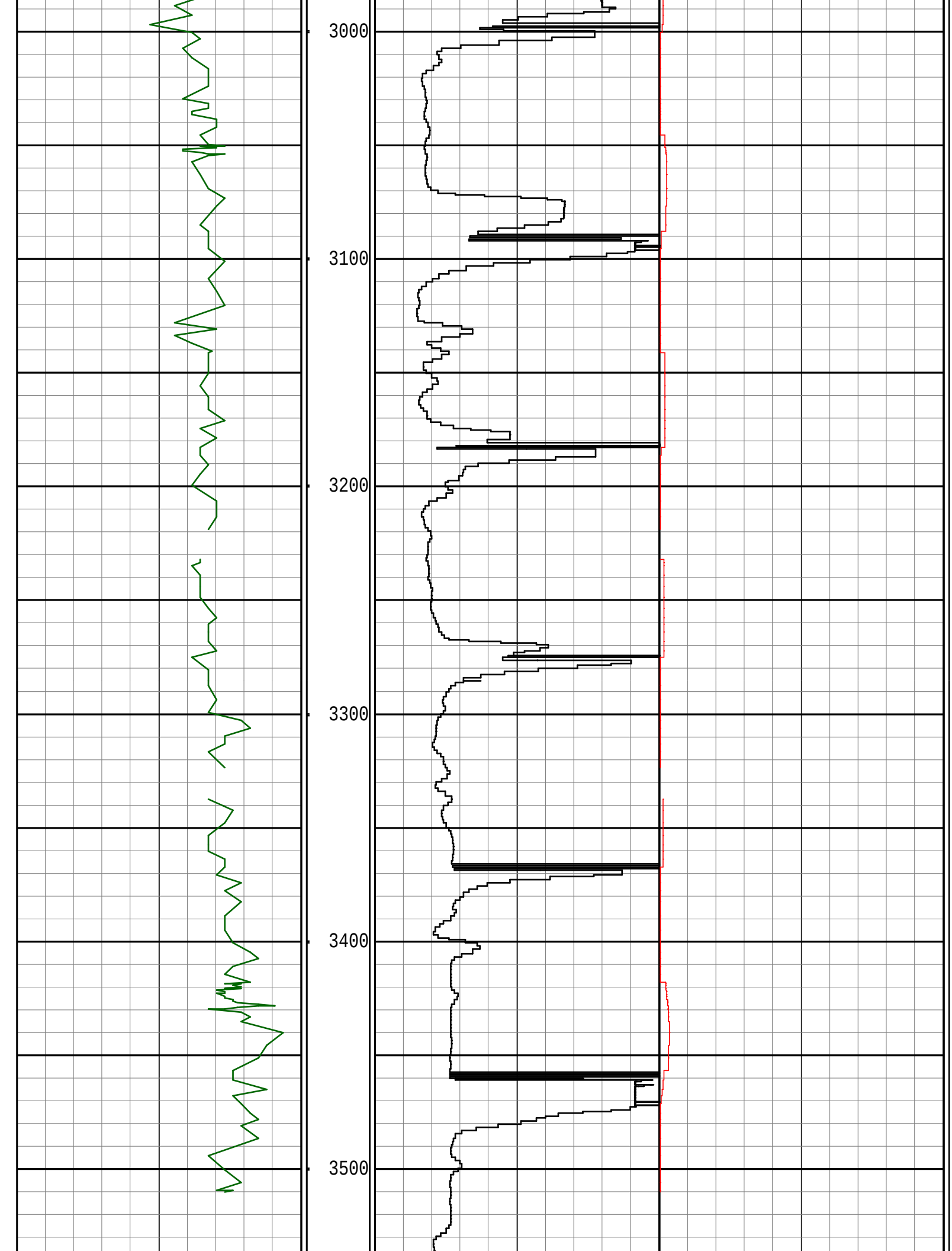
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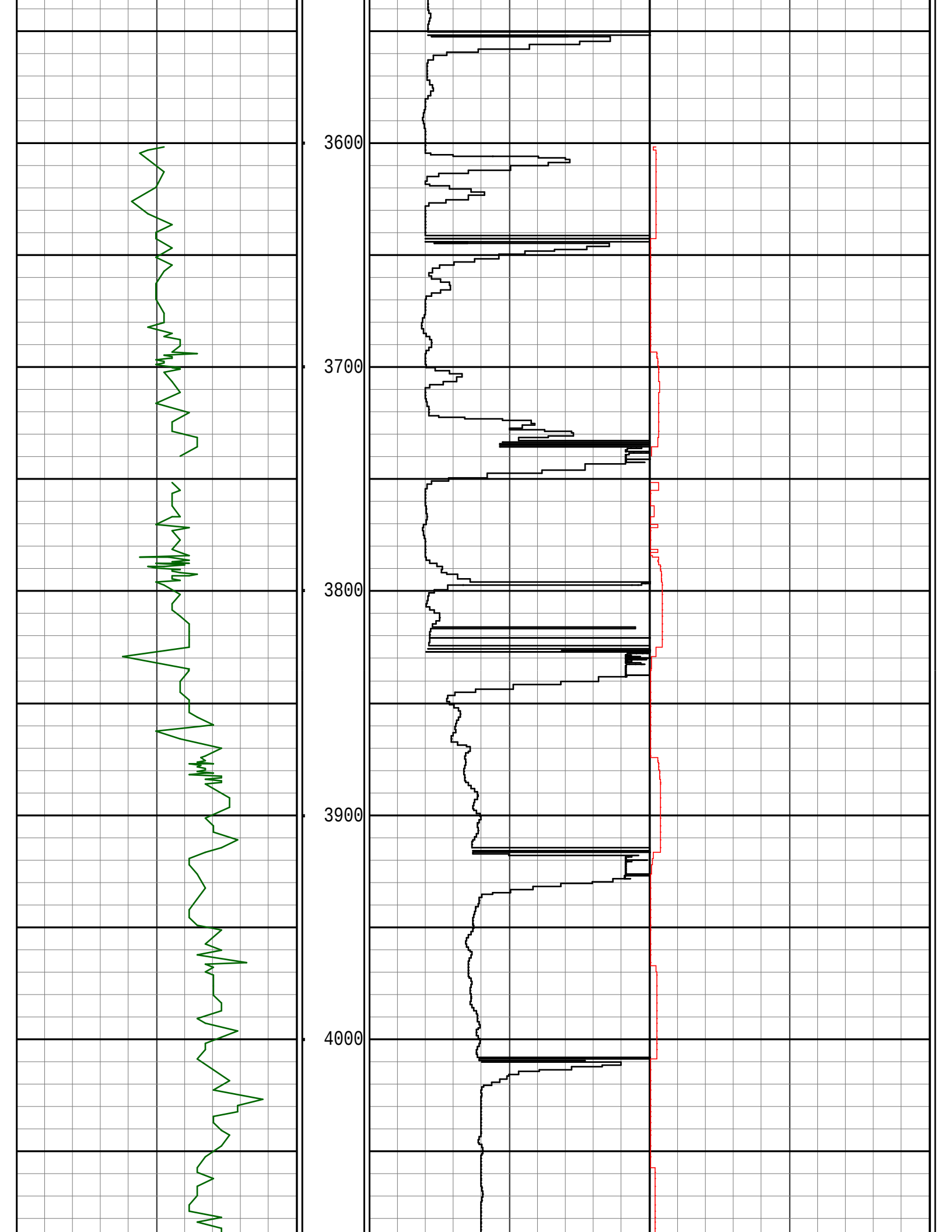
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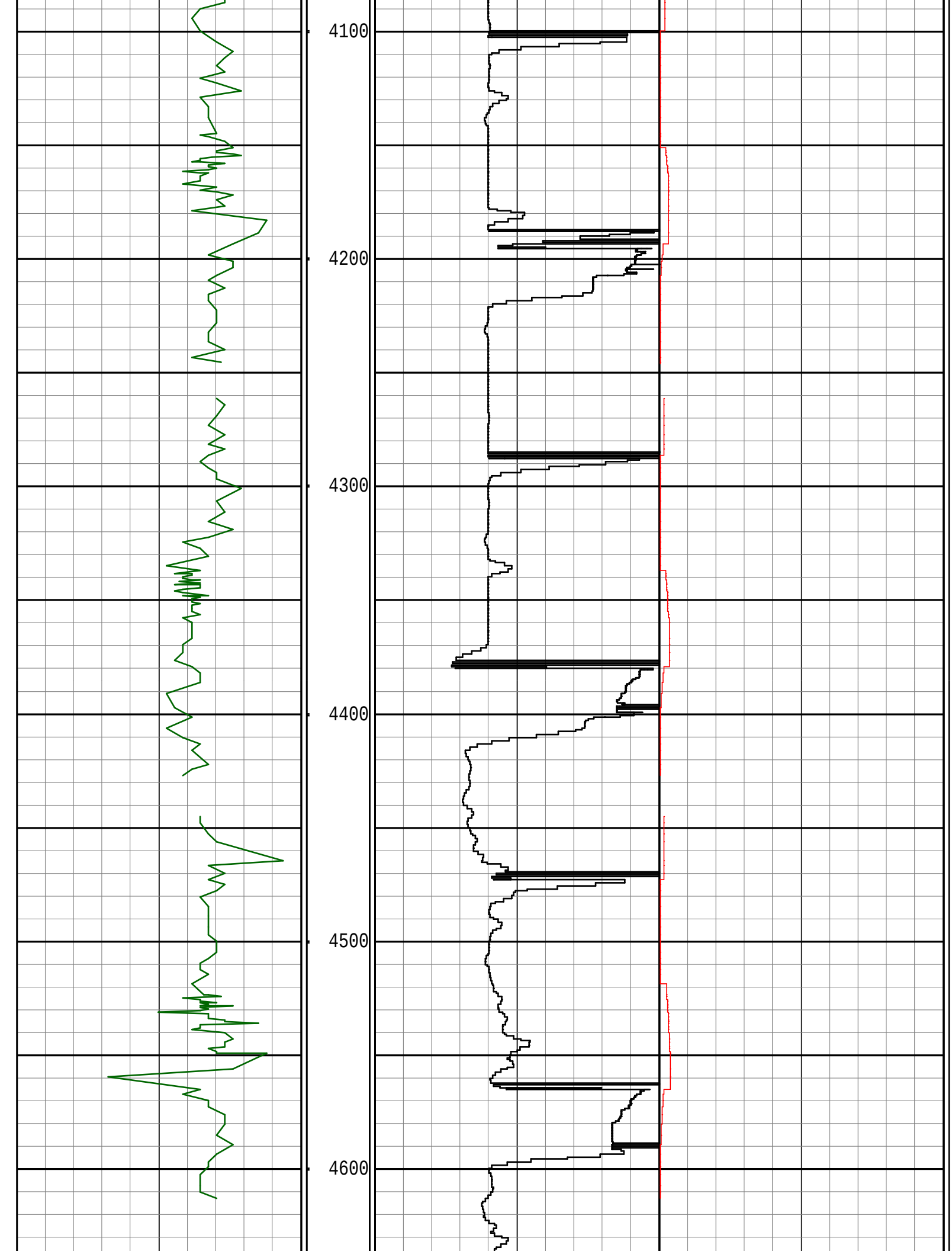
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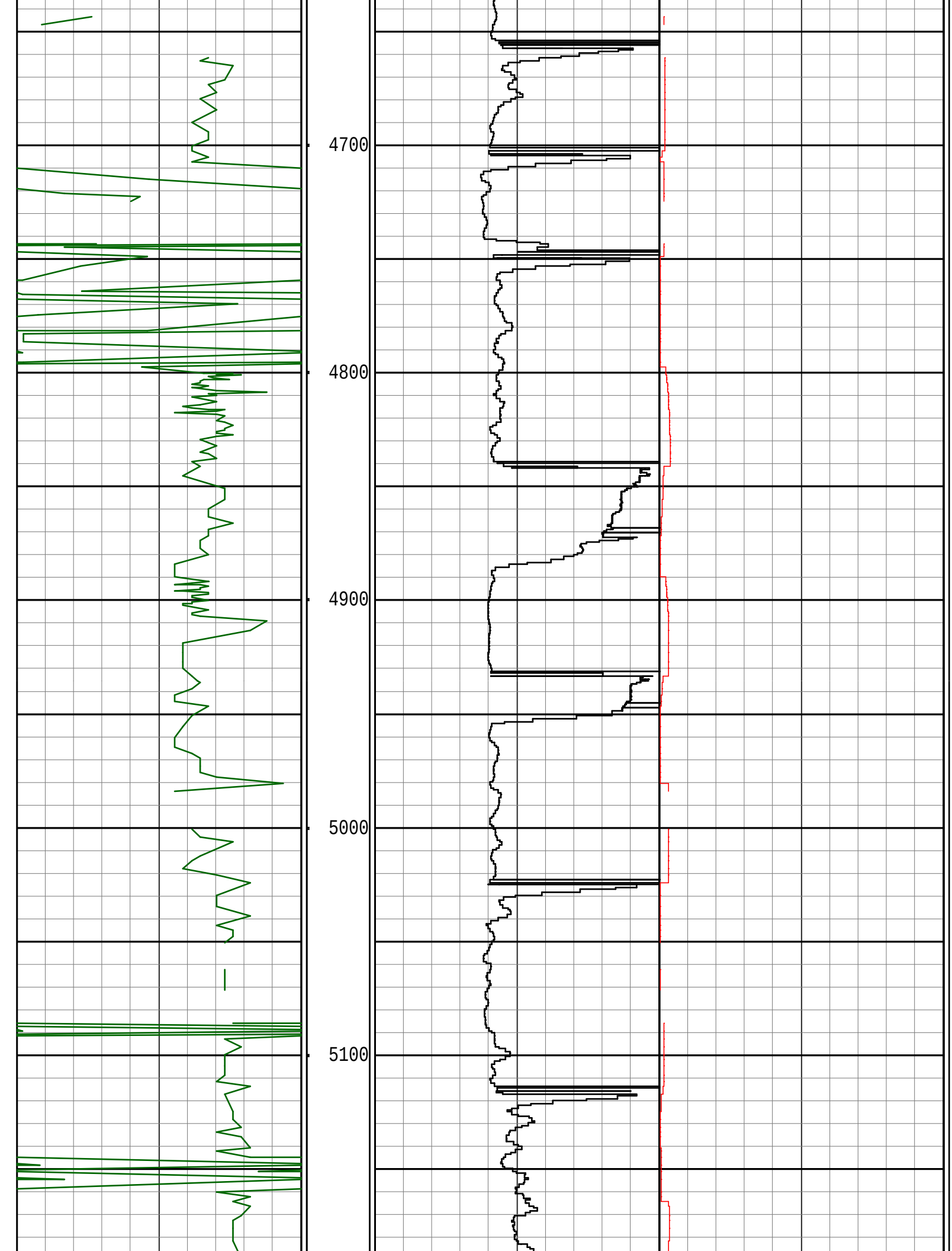
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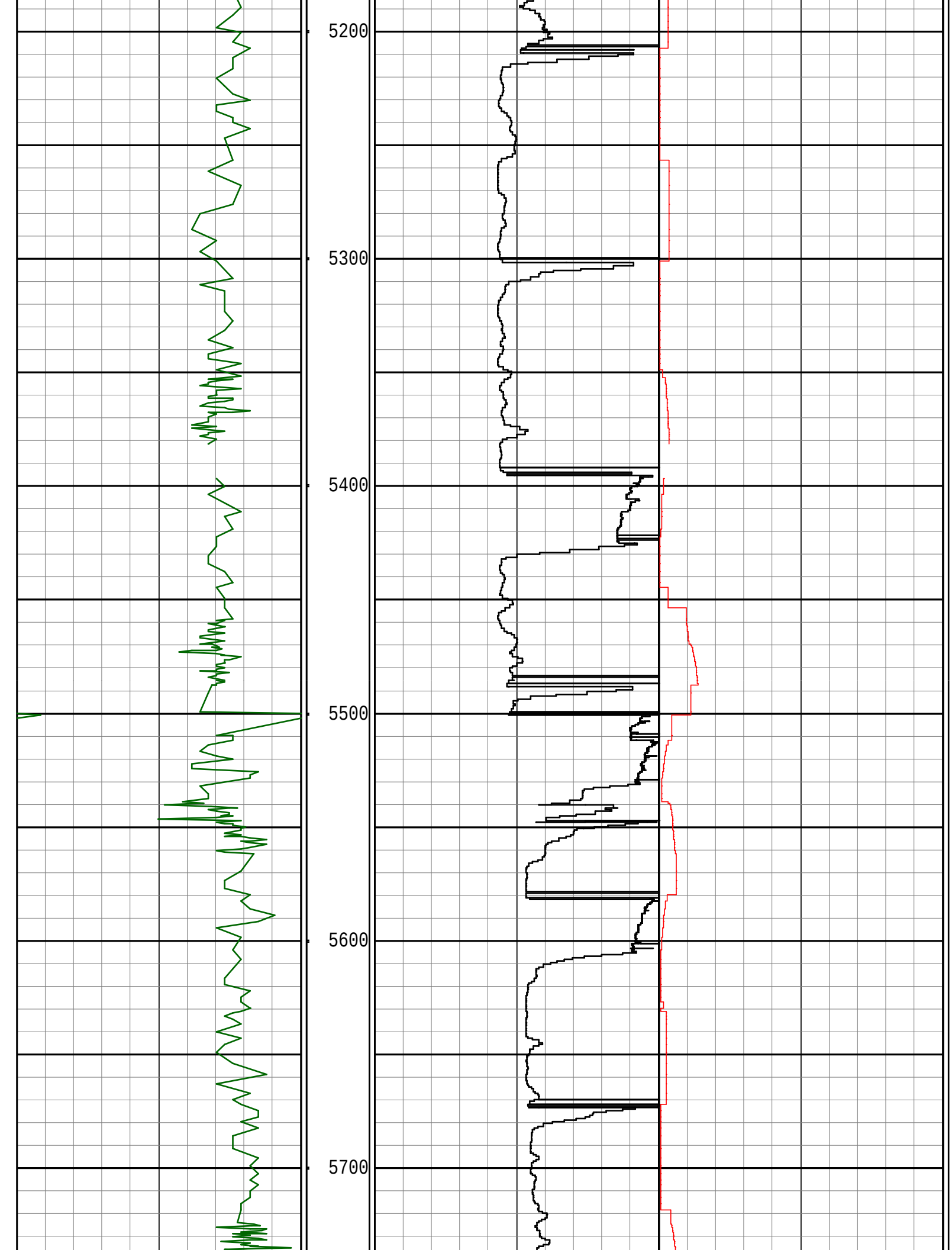
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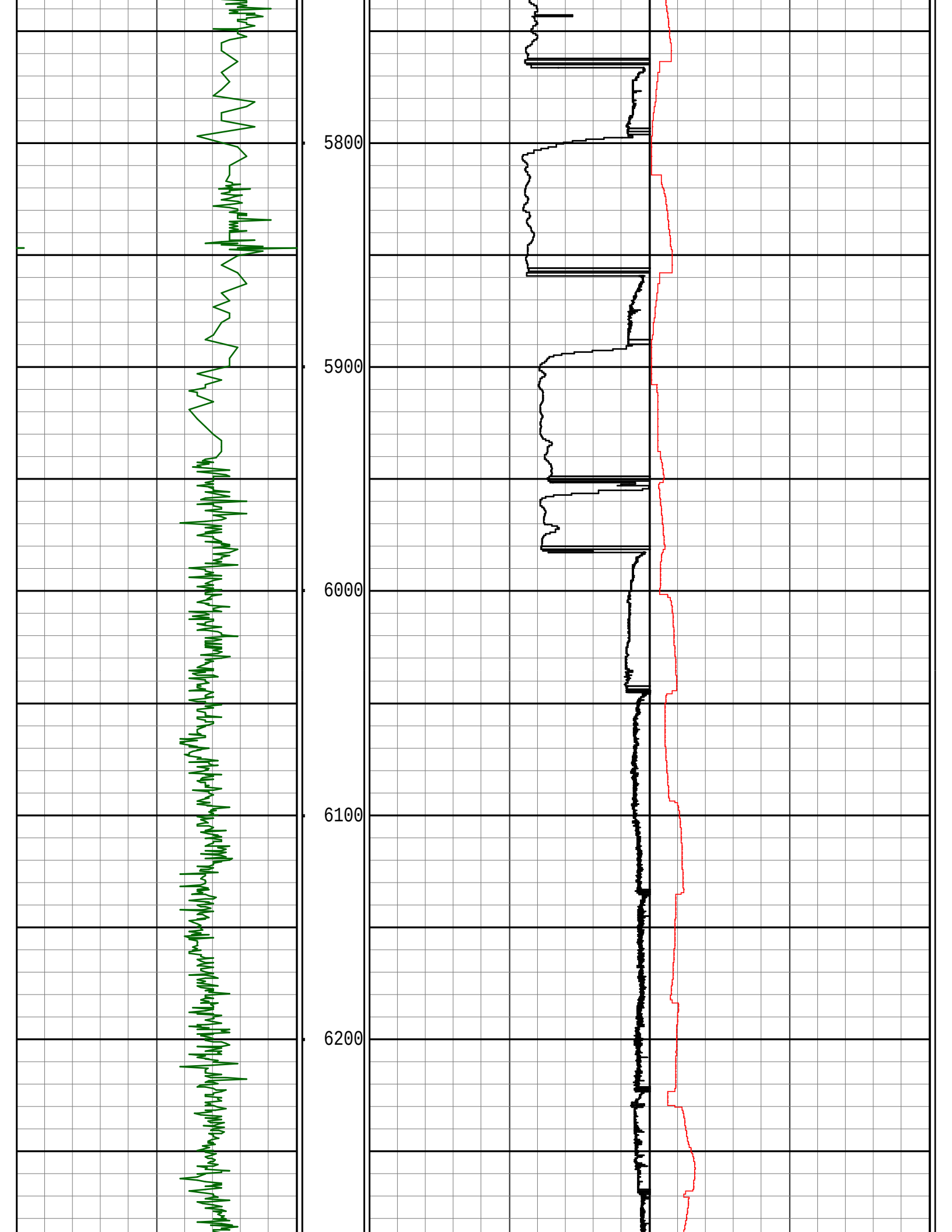
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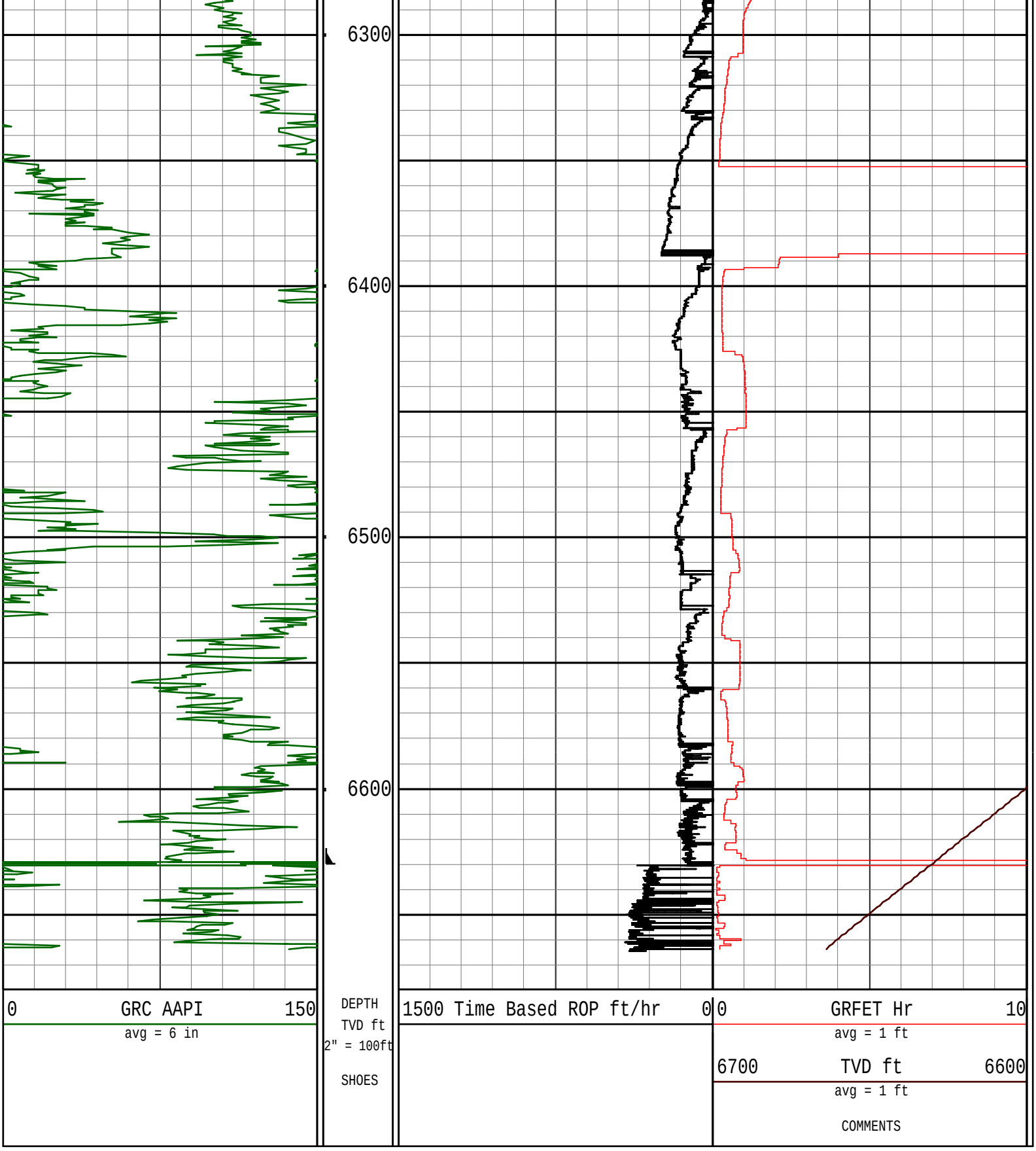

Survey Report

Vertical Section Plane: 256.52°	Total Correction: 7.39° East to Grid
Calculation Method: Minimum Curvature	Survey Reference: Wellhead
North Aligned to: Grid North	Well: WELLS RANCH AE19-615

Measured Depth (ft)	Inclination (deg)	Azimuth (deg)	TVD (ft)	Sub Sea TVD (ft)	Vertical Section (ft)	Rect Co-ord North (ft)	Rect Co-ord East (ft)	Closure Distance (ft)	Closure Direction (deg)	Dog-leg Severity (dg/hft)	Temp (deg F)

TIED-IN TO SURFACE.												
0.00	0.00	190.00	0.00	0.00	-0.00	0.00	N	0.00	E	0.00	0.00	
370.00	0.60	210.20	369.99	369.99	1.34	1.67	S	0.97	W	1.94	210.20	0.16
THE FOLLOWING ARE PATHFINDER MWD SURVEYS												
811.00	0.88	230.32	810.96	810.96	5.97	5.83	S	4.74	W	7.52	219.12	0.09	75.72
903.00	0.97	230.94	902.94	902.94	7.31	6.77	S	5.89	W	8.98	221.01	0.10	75.72
995.00	0.88	262.93	994.93	994.93	8.71	7.35	S	7.20	W	10.29	224.39	0.56	75.72
1087.00	0.88	250.19	1086.92	1086.92	10.12	7.68	S	8.56	W	11.50	228.12	0.21	79.34
1181.00	1.14	225.93	1180.91	1180.91	11.64	8.57	S	9.91	W	13.11	229.15	0.53	79.34
1294.00	2.46	220.13	1293.85	1293.85	14.56	11.21	S	12.28	W	16.63	227.62	1.18	75.72
1388.00	3.17	203.34	1387.74	1387.74	17.74	15.14	S	14.61	W	21.04	223.99	1.15	75.72
1480.00	4.31	188.05	1479.54	1479.54	20.53	20.90	S	16.11	W	26.38	217.62	1.64	75.72
1571.00	5.89	180.32	1570.18	1570.18	22.90	28.95	S	16.61	W	33.38	209.84	1.89	79.34
1664.00	7.56	182.34	1662.54	1662.54	25.71	39.84	S	16.89	W	43.27	202.97	1.81	79.34
1757.00	10.20	184.36	1754.41	1754.41	29.90	54.16	S	17.76	W	57.00	198.16	2.86	79.34
1851.00	12.22	192.88	1846.62	1846.62	36.87	72.16	S	20.61	W	75.05	195.94	2.77	82.95
1942.00	13.89	190.42	1935.27	1935.27	45.57	92.30	S	24.74	W	95.55	195.00	1.93	82.95
2035.00	14.25	190.95	2025.48	2025.48	54.83	114.51	S	28.93	W	118.11	194.18	0.41	86.57
2128.00	13.37	186.64	2115.79	2115.79	63.26	136.43	S	32.35	W	140.21	193.34	1.45	86.57
2221.00	13.72	186.64	2206.20	2206.20	70.75	158.07	S	34.87	W	161.87	192.44	0.38	86.57
2314.00	13.81	187.96	2296.53	2296.53	78.60	180.01	S	37.68	W	183.92	191.82	0.35	90.18
2407.00	11.87	186.82	2387.20	2387.20	85.98	200.51	S	40.35	W	204.53	191.38	2.10	90.18
2500.00	12.22	191.83	2478.16	2478.16	93.51	219.64	S	43.51	W	223.90	191.20	1.19	90.18
2594.00	13.01	190.07	2569.89	2569.89	101.99	239.79	S	47.40	W	244.43	191.18	0.93	90.18
2689.00	13.10	190.69	2662.43	2662.43	110.67	260.90	S	51.26	W	265.89	191.12	0.17	90.18
2784.00	13.01	190.69	2754.98	2754.98	119.45	281.99	S	55.24	W	287.35	191.08	0.09	93.80
2879.00	13.10	190.33	2847.52	2847.52	128.18	303.09	S	59.16	W	308.81	191.04	0.13	93.80
2973.00	13.45	190.16	2939.01	2939.01	136.86	324.33	S	63.00	W	330.39	190.99	0.38	97.41
3068.00	13.63	189.98	3031.37	3031.37	145.75	346.23	S	66.88	W	352.63	190.93	0.19	97.41
3162.00	12.49	189.98	3122.94	3122.94	154.21	367.15	S	70.57	W	373.87	190.88	1.21	101.02
3256.00	12.49	189.46	3214.71	3214.71	162.21	387.18	S	74.00	W	394.19	190.82	0.12	101.02
3350.00	12.05	187.79	3306.57	3306.57	169.73	406.93	S	77.00	W	414.15	190.71	0.60	101.02
3444.00	11.52	185.50	3398.59	3398.59	176.35	426.00	S	79.23	W	433.30	190.54	0.75	104.64
3633.00	13.10	187.61	3583.23	3583.23	190.19	466.01	S	83.87	W	473.50	190.20	0.87	104.64
3727.00	14.25	188.40	3674.57	3674.57	198.34	488.02	S	86.97	W	495.71	190.11	1.24	104.64
3822.00	14.42	190.86	3766.61	3766.61	207.57	511.20	S	90.91	W	519.22	190.08	0.67	104.64
3916.00	13.81	190.69	3857.77	3857.77	216.99	533.72	S	95.20	W	542.15	190.11	0.65	104.64
4011.00	12.57	186.47	3950.27	3950.27	225.16	555.14	S	98.47	W	563.80	190.06	1.65	108.25
4105.00	12.49	186.82	4042.03	4042.03	232.18	575.39	S	100.83	W	584.16	189.94	0.12	111.87
4200.00	11.87	187.87	4134.89	4134.89	239.30	595.27	S	103.38	W	604.18	189.85	0.69	111.87
4295.00	11.87	189.02	4227.86	4227.86	246.59	614.60	S	106.25	W	623.72	189.81	0.25	115.48
4389.00	11.43	188.67	4319.92	4319.92	253.80	633.35	S	109.17	W	642.69	189.78	0.47	115.48
4484.00	12.31	195.17	4412.89	4412.89	262.21	652.44	S	113.24	W	662.19	189.85	1.68	119.09
4579.00	11.78	193.67	4505.80	4505.80	271.49	671.63	S	118.18	W	681.95	189.98	0.65	119.09
4673.00	13.28	197.28	4597.56	4597.56	281.39	691.27	S	123.66	W	702.24	190.14	1.80	122.71
4863.00	12.13	197.37	4782.91	4782.91	302.79	731.16	S	136.10	W	743.72	190.54	0.61	126.32
4957.00	13.98	196.31	4874.47	4874.47	313.50	751.48	S	142.24	W	764.83	190.72	1.98	126.32
5052.00	15.83	192.36	4966.28	4966.28	324.85	775.16	S	148.24	W	789.20	190.83	2.22	126.32
5241.00	12.66	187.61	5149.45	5149.45	343.54	820.88	S	156.50	W	835.66	190.79	1.79	129.94
5431.00	9.32	186.12	5335.94	5335.94	356.20	856.82	S	160.90	W	871.80	190.64	1.76	133.55
5525.00	10.64	186.82	5428.51	5428.51	361.76	873.01	S	162.74	W	888.05	190.56	1.41	133.55
5620.00	10.90	194.02	5521.84	5521.84	368.95	890.43	S	165.96	W	905.77	190.56	1.44	133.55
5714.00	12.75	192.12	5613.84	5613.84	377.54	909.20	S	170.29	W	925.01	190.61	2.01	137.17
5809.00	9.76	191.84	5707.01	5707.01	385.51	927.33	S	174.14	W	943.54	190.64	3.15	140.78
5903.00	10.90	190.45	5799.48	5799.48	392.52	943.87	S	177.39	W	960.40	190.64	1.24	144.39
5998.00	12.13	190.96	5892.57	5892.57	400.30	962.50	S	180.92	W	979.36	190.65	1.30	144.39
6091.00	10.73	194.49	5983.72	5983.72	408.40	980.48	S	184.94	W	997.77	190.68	1.68	148.01
6185.00	14.86	218.21	6075.43	6075.43	421.98	998.44	S	194.60	W	1017.23	191.03	7.02	148.01
6280.00	19.96	226.44	6166.06	6166.06	445.59	1019.21	S	213.90	W	1041.41	191.85	5.95	151.62
6375.00	25.50	230.09	6253.65	6253.65	477.96	1043.52	S	241.35	W	1071.07	193.02	6.01	151.62
6469.00	31.57	232.20	6336.20	6336.20	518.54	1071.61	S	276.35	W	1106.67	194.46	6.55	155.24
6564.00	40.01	241.55	6413.25	6413.25	570.84	1101.48	S	322.97	W	1147.85	196.34	10.56	144.39
6659.00	51.35	247.28	6479.54	6479.54	637.20	1130.46	S	384.27	W	1193.98	198.77	12.68	151.62
6753.00	60.23	255.58	6532.40	6532.40	714.47	1154.87	S	457.87	W	1242.33	201.63	11.93	155.24
6848.00	65.16	263.05	6576.01	6576.01	798.66	1170.38	S	540.74	W	1289.26	204.80	8.70	155.24
6942.00	74.22	268.05	6608.63	6608.63	885.58	1177.10	S	628.51	W	1334.39	208.10	10.85	162.46
7043.00	84.33	269.90	6627.40	6627.40	982.35	1178.85	S	727.60	W	1385.31	211.68	10.17	162.46
7115.00	89.96	271.24	6630.98	6630.98	1052.08	1178.13	S	799.47	W	1423.78	214.16	8.04	166.08
7207.00	91.54	267.16	6629.78	6629.78	1141.80	1179.41	S	891.43	W	1478.40	217.08	4.76	169.69
7300.00	92.42	266.06	6626.57	6626.57	1233.31	1184.91	S	984.21	W	1540.35	219.71	1.51	169.69
7394.00	91.45	266.84	6623.39	6623.39	1325.85	1190.73	S	1077.98	W	1606.20	222.15	1.32	169.69

Survey Report

Vertical Section Plane: 256.52°	Total Correction: 7.39° East to Grid
Calculation Method: Minimum Curvature	Survey Reference: Wellhead
North Aligned to: Grid North	Well: WELLS RANCH AE19-615

Measured Depth (ft)	Inclination (deg)	Azimuth (deg)	TVD (ft)	Sub Sea TVD (ft)	Vertical Section (ft)	Rect Co-ord North (ft)	Rect Co-ord East (ft)	Closure Distance (ft)	Closure Direction (deg)	Dog-leg Severity (dg/hft)	Temp (deg F)
7486.00	91.28	266.78	6621.20	6621.20	1416.34	1195.85 S	1169.81 W	1672.87	224.37	0.20	173.31
7579.00	88.11	266.29	6621.70	6621.70	1507.91	1201.47 S	1262.62 W	1742.91	226.42	3.45	162.46
7674.00	89.34	267.34	6623.81	6623.81	1601.35	1206.74 S	1357.45 W	1816.29	228.36	1.70	162.46

7769.00	88.11	267.17	6625.92	6625.92	1694.67	1211.29 S	1452.32 W	1891.15	230.17	1.31	166.08
7864.00	87.23	267.23	6629.79	6629.79	1787.94	1215.93 S	1547.12 W	1967.76	231.84	0.93	169.69
7958.00	88.02	267.28	6633.68	6633.68	1880.22	1220.42 S	1640.93 W	2045.02	233.36	0.84	173.31
8053.00	88.46	267.80	6636.60	6636.60	1973.42	1224.50 S	1735.80 W	2124.24	234.80	0.72	176.92
8148.00	88.02	267.90	6639.52	6639.52	2066.53	1228.06 S	1830.69 W	2204.44	236.15	0.48	180.54
8242.00	88.20	268.36	6642.62	6642.62	2158.55	1231.13 S	1924.59 W	2284.67	237.39	0.53	184.15
8337.00	89.08	268.30	6644.87	6644.87	2251.51	1233.90 S	2019.52 W	2366.64	238.58	0.93	180.54
8431.00	90.75	267.63	6645.01	6645.01	2343.64	1237.23 S	2113.46 W	2448.97	239.65	1.91	184.15
8526.00	92.07	268.75	6642.67	6642.67	2436.65	1240.23 S	2208.38 W	2532.81	240.68	1.82	187.76
8620.00	91.71	265.92	6639.57	6639.57	2528.92	1244.60 S	2302.21 W	2617.10	241.60	3.03	187.76
8715.00	91.71	265.39	6636.74	6636.74	2622.67	1251.80 S	2396.90 W	2704.09	242.42	0.56	187.76
8810.00	89.87	265.66	6635.43	6635.43	2716.49	1259.21 S	2491.60 W	2791.71	243.19	1.96	187.76
8904.00	90.04	265.23	6635.50	6635.50	2809.35	1266.67 S	2585.30 W	2878.93	243.90	0.49	191.38
8998.00	89.52	265.75	6635.86	6635.86	2902.20	1274.06 S	2679.01 W	2966.53	244.57	0.78	191.38
9092.00	89.34	268.85	6636.80	6636.80	2994.52	1278.49 S	2772.89 W	3053.43	245.25	3.30	194.99
9187.00	89.25	269.39	6637.97	6637.97	3087.23	1279.95 S	2867.87 W	3140.53	245.95	0.58	194.99
9281.00	89.96	269.34	6638.61	6638.61	3178.87	1280.99 S	2961.86 W	3227.00	246.61	0.76	198.61
9376.00	88.64	269.31	6639.78	6639.78	3271.50	1282.11 S	3056.84 W	3314.83	247.25	1.39	198.61
9470.00	89.60	269.19	6641.22	6641.22	3363.18	1283.34 S	3150.82 W	3402.15	247.84	1.03	202.22
9564.00	88.64	266.85	6642.66	6642.66	3455.27	1286.59 S	3244.75 W	3490.52	248.37	2.69	
9659.00	88.90	267.25	6644.70	6644.70	3548.65	1291.48 S	3339.60 W	3580.62	248.86	0.50	202.22
9753.00	89.96	267.25	6645.64	6645.64	3641.00	1295.99 S	3433.49 W	3669.93	249.32	1.13	205.83
9847.00	90.92	266.94	6644.92	6644.92	3733.40	1300.75 S	3527.36 W	3759.55	249.76	1.07	209.45
9941.00	90.40	266.07	6643.83	6643.83	3825.97	1306.48 S	3621.18 W	3849.65	250.16	1.08	209.45
10035.00	88.37	267.48	6644.84	6644.84	3918.45	1311.77 S	3715.02 W	3939.81	250.55	2.63	209.45
10129.00	88.72	268.06	6647.23	6647.23	4010.62	1315.42 S	3808.92 W	4029.66	250.95	0.72	213.06
10224.00	89.34	267.75	6648.84	6648.84	4103.73	1318.90 S	3903.84 W	4120.61	251.33	0.73	213.06
10318.00	90.66	267.79	6648.84	6648.84	4195.93	1322.55 S	3997.76 W	4210.85	251.69	1.40	216.68
10413.00	88.11	267.20	6649.86	6649.86	4289.18	1326.70 S	4092.66 W	4302.33	252.04	2.76	213.06
10507.00	88.72	267.79	6652.46	6652.46	4381.42	1330.81 S	4186.53 W	4392.96	252.37	0.90	216.68
10601.00	89.16	267.43	6654.19	6654.19	4473.65	1334.73 S	4280.44 W	4483.71	252.68	0.60	216.68
10695.00	88.02	269.10	6656.51	6656.51	4565.65	1337.58 S	4374.36 W	4574.29	253.00	2.15	216.68
10790.00	88.29	268.93	6659.57	6659.57	4658.35	1339.21 S	4469.30 W	4665.63	253.32	0.34	216.68
10884.00	89.43	268.57	6661.44	6661.44	4750.20	1341.26 S	4563.25 W	4756.28	253.62	1.27	216.68
11073.00	91.10	268.88	6660.56	6660.56	4934.92	1345.46 S	4752.20 W	4938.99	254.19	0.90	220.29
11168.00	89.78	267.01	6659.83	6659.83	5028.02	1348.87 S	4847.13 W	5031.31	254.45	2.41	220.29
11262.00	88.81	267.99	6660.99	6660.99	5120.29	1352.97 S	4941.03 W	5122.92	254.69	1.47	223.91
11357.00	89.87	268.07	6662.08	6662.08	5213.38	1356.24 S	5035.96 W	5215.39	254.93	1.12	223.91
11452.00	88.64	268.76	6663.32	6663.32	5306.33	1358.86 S	5130.92 W	5307.81	255.17	1.48	223.91
11546.00	90.04	269.19	6664.40	6664.40	5398.10	1360.54 S	5224.89 W	5399.13	255.40	1.56	223.91
11641.00	91.10	269.66	6663.46	6663.46	5490.70	1361.50 S	5319.88 W	5491.34	255.64	1.22	223.91
11736.00	92.33	270.02	6660.61	6660.61	5583.10	1361.76 S	5414.84 W	5583.45	255.88	1.35	223.91
11831.00	91.28	270.35	6657.62	6657.62	5675.36	1361.46 S	5509.79 W	5675.50	256.12	1.16	223.91
11926.00	89.69	270.77	6656.82	6656.82	5767.52	1360.53 S	5604.78 W	5767.54	256.36	1.73	223.91
11963.00	90.04	270.74	6656.90	6656.90	5803.38	1360.04 S	5641.77 W	5803.39	256.45	0.95	223.91
PROJECTION TO BIT.											
12022.00	90.04	270.74	6656.86	6656.86	5860.58	1359.28 S	5700.77 W	5860.58	256.59	0.00	

BOTTOM HOLE ASSEMBLY RECORD

RUN #1	ft	RUN #2	ft	RUN #3	ft		
8.75" PDC BIT	0.70	8.75" PDC BIT	0.65	6.13" PDC BIT	0.55		
1.75° MUD MOTOR	26.27	2.25° MUD MOTOR	26.20	1.50° MUD MOTOR	26.81		
FLOAT SUB	3.22	FLOAT SUB	3.22	MULESHOE SUB	2.97		
MULESHOE SUB	2.58	MULESHOE SUB	2.58	HDS1-R (DIR/GR)	31.11		
HDS1-R (DIR/GR)	29.50	HDS1-R (DIR/GR)	29.50	NMDC	30.97		
NM FLEX COLLAR	31.10	NM FLEX COLLAR	31.10	NMDC	30.74		
NM FLEX COLLAR	31.04	NM FLEX COLLAR	31.04	FLOAT SUB	3.49		
FILTER SUB	2.83	FILTER SUB	2.83	FILTER SUB	3.05		
X/O	3.54	DP	1040.06	X/O	3.07		
HWDP	1395.00	X/O	3.54	HWDP	31.58		
DP	31.00	HWDP	1392.51	REAMER	3.79		
				AGITATOR	11.56		
				SHOCK SUB	11.04		
				HWDP	1392.51		
==========		==========		==========			
TOTAL BHA	1556.78	TOTAL BHA	2563.23	TOTAL BHA	1583.24		

SENSOR OFFSETS:		SENSOR OFFSETS:		SENSOR OFFSETS:			
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GAMMA-RAY	42.98	GAMMA-RAY	59.96	GAMMA-RAY	39.39		
DIRECTIONAL	60.28	DIRECTIONAL	42.56	DIRECTIONAL	56.69		

PATHFINDER
A Schlumberger Company

GAMMA-RAY

2" = 100'
FEET TVD