



1 : 240

WELL INFORMATION					
MWD Run Number	100	200			
Date run completed	17-Apr-13	20-Apr-13			
Rig Bit Number	100	200			
Bit Size (in)	8.750	6.125			
Tool Nominal OD (in)	6.750	4.750			
Log Start Depth (MD, ft)	1,079.00	7,728.00			
Log End Depth (MD, ft)	7,728.00	11,583.00			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	14-Apr-13 01:45	17-Apr-13 10:12			
Drill/Wipe End Date and Time	17-Apr-13 06:50	17-Apr-13 10:12			
Min Inc (deg) @ Depth (MD, ft)	.36 @ 5,987.00	88.02 @ 8,681.00			
Max Inc (deg) @ Depth (MD, ft)	85.27 @ 7,678.00	92.04 @ 8,112.00			
Bit TFA(in2) / Bit Type	.86 / PDC	.61 / PDC			
Flow Rate (gpm)	552.78	300.00			
Max AV (fpm) / CV (fpm) @ MWD	400.0 / 400.0	530.0 / 530			
Fluid Type	Fresh Water Gel	Fresh Water Gel			
Density (ppg) / Viscosity (spqt)	9.60 / 50.00	9.50 / 41.00			
Filtrate CL (ppm)	1,400.00	1,400.00			
pH / Fluid Loss (mptm)	9.00 / 4	9.00 / 5			
PV (cP) / YP (Ihf2)	19 / 19.00	16 / 10.00			
% Solids / % Sand	8.42 / .50	7.9 / .5			
% Oil / Oil:Water Ratio	N/A / N/A	N/A / N/A			
Rm @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A			
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A			
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A			
Max Tool Temp (deg F) / S	107.07 / PDC	200.00 / LOGMA			

Max Tool Temp (degF) / Source	167.97 / PCM	208.90 / HCIM			
Rm @ Max Tool Temp (degF)	N/A @ 167.97	N/A @ 208.90			
Lead MWD Engineer	Patrick Lane	Patrick Lane			
Customer Representative	Stan Walters	Stan Walters			

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	PCM	HCIM			
Software Version	5.76	88.56			
Sub Serial Number	11404300	11425571			
Insert Serial Number	11680766	11287070			
Date and Time Initialized	13-Apr-13 17:37	18-Apr-13 15:28			
Date and Time Read	17-Apr-13 13:07	20-Apr-13 23:37			
ECMB SW Version	N/A	N/A			

### Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	50.00	45.00			
Software Version	6.21	6.21			
Sub Serial Number	11404300	123			
Sonde Serial Number	11297574	11477975			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	302.59	113.97			

### Gamma Ray Sensor Information

Tool Type	PCG	DGR			
Distance From Bit (ft)	53.35	64.78			
Recorded Sample Period (sec)	10	8			
Software Version	8.15	N/A			
Sub Serial Number	11404300	11408221			
Insert/Sonde Serial Number	11681021	11399929			

### Resistivity Sensor Information

Tool Type		Slim P4			
Distance From Bit (ft)		57.76			
Recorded Sample Period (sec)		6			
Software Version		5.55			
Sub Serial Number		11514650			
Receiver Insert Serial Number		266706			
Transmitter Insert Serial Number		11287070			
Receiver Orientation		Down			

### Pulser Controller Sensor Information

Tool Type	PCM	PCM			
Software Version	5.76	8.17			
PIC Software Version	1.40				
Sub/HOC Serial Number	11404300	11153208			
Insert/Probe/Module SN	11680766	11619990			
Battery Serial Number	N/A	N/A			
Valve Insert SN	N/A	N/A			
DC Insert Serial Number	N/A	N/A			
Choke Size (32nd)	N/A	N/A			
Driver Current (amps)	N/A	N/A			
Driver SMI Current (amps)	N/A	N/A			

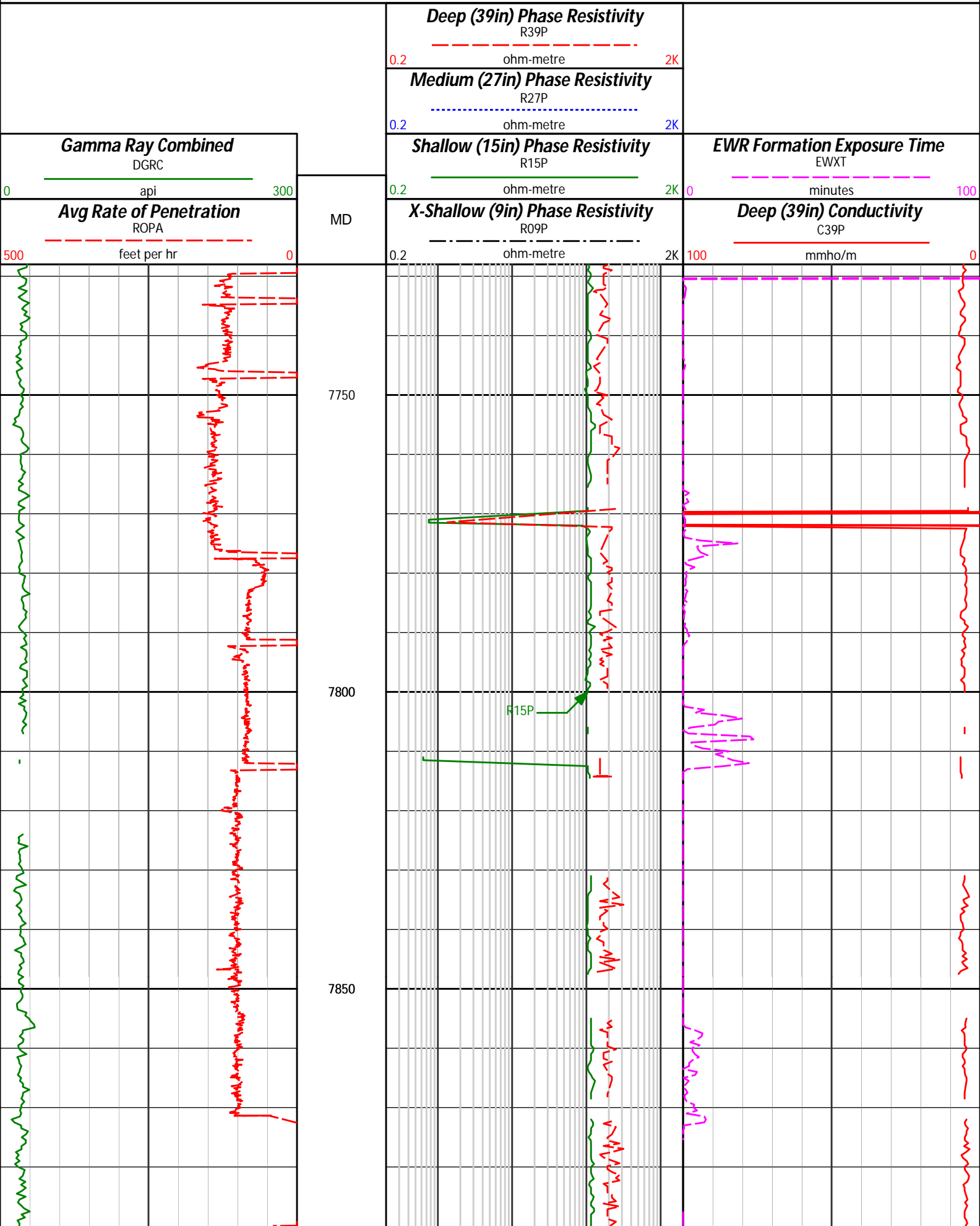
Boot Strap Version	4,130.00				
DDSr-DGR Sensor Information					
Tool Type		DDSr-DGR			
Distance From Bit (ft)		67.66			
Recorded Sample Period (sec)		12			
Software Version		10.49			
Sub Serial Number		123			
Insert Serial Number		11270399			
Sensor ID Number		7025			

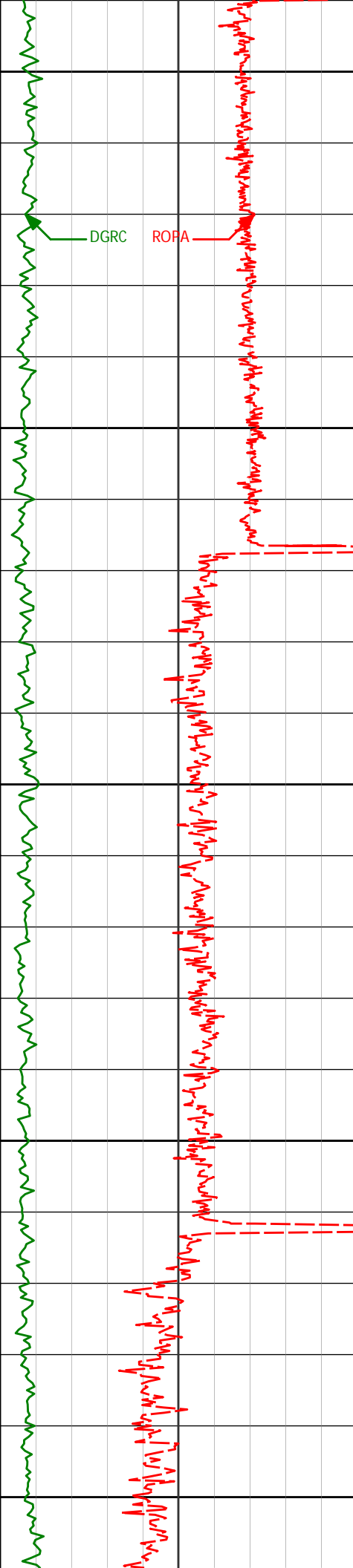
REMARKS
<p>1. All depths are measured bit depths referenced to the Driller's pipe tally and are measured from the Drill Floor, unless otherwise specified.</p> <p>2. No depth corrections have been made for pipe stretch or compression.</p> <p>3. All data presented is recorded data unless otherwise specified</p> <p>4. The following smoothing parameters have been applied to the data:</p> <div> Slim-Phase 4 (Electromagnetic Wave Resistivity): Interval Resolution: 0.5ft Interval Distance: 0.6ft Gap Fill: 3.0ft </div> <div> DGR (Corrected Gamma Ray): Interval Resolution: 0.5 ft Interval Distance: 0.6 ft Gap Fill: 3.0 ft </div> <div> ROPA (Average Rate of Penetration): Interval Resolution: 0.5 ft Interval Distance: 1.2 ft Gap Fill : 3.0 ft </div> <p>5. INSITE version 7.4.1</p>

WARRANTY
<p>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.</p>

<div> <div>HALLIBURTON</div> <div> <div>Sperry Drilling Services</div> </div> </div>
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# MD Detail Log 1:240





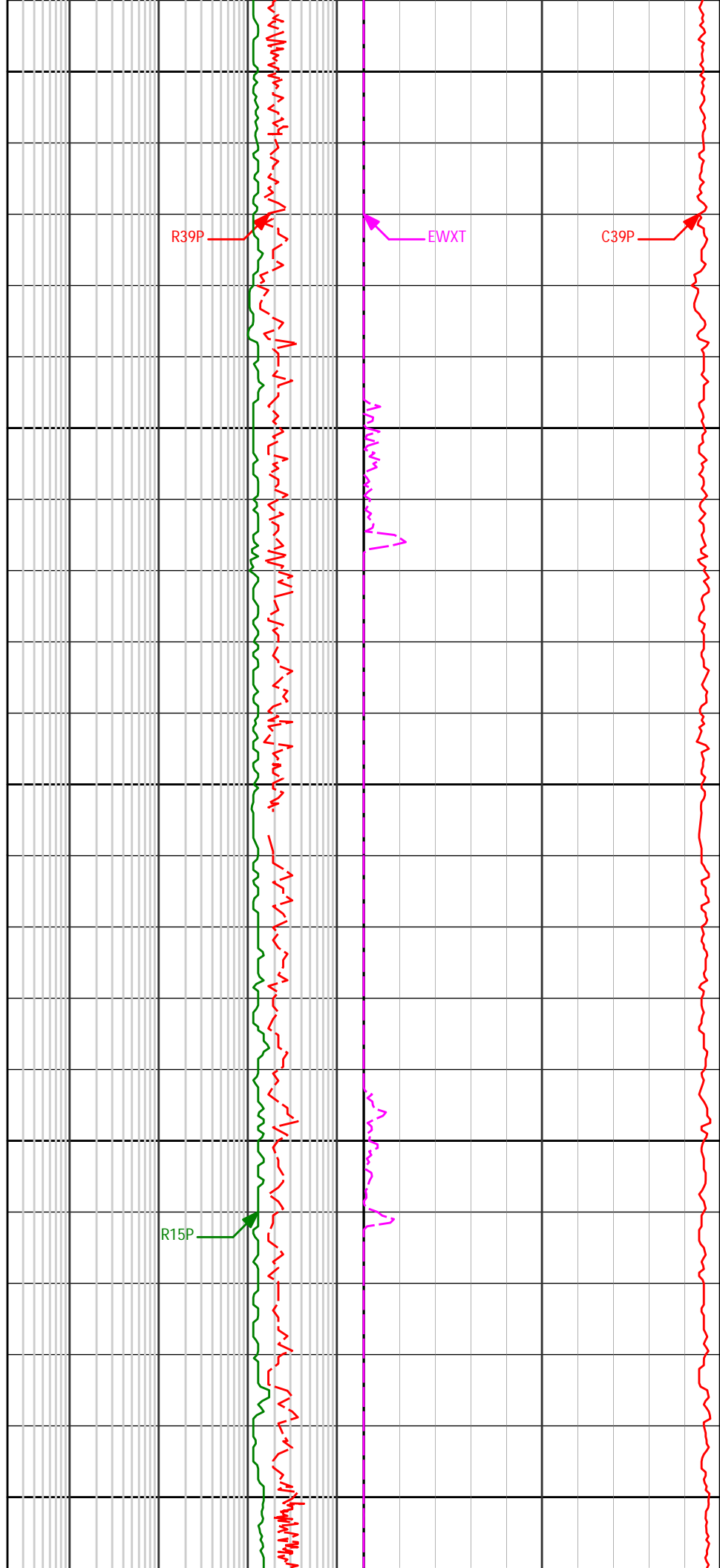
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7950

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8050

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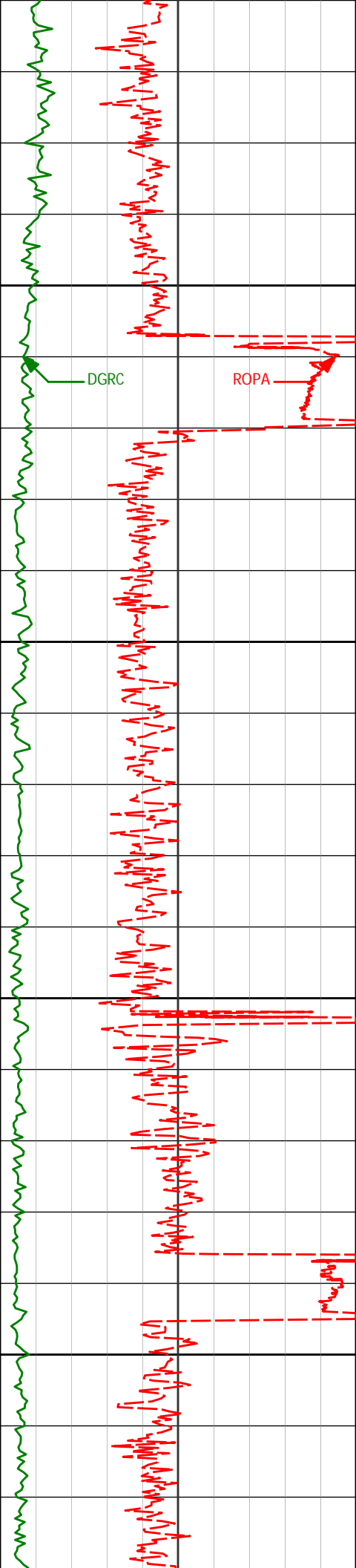


R39P

EWXT

C39P

R15P

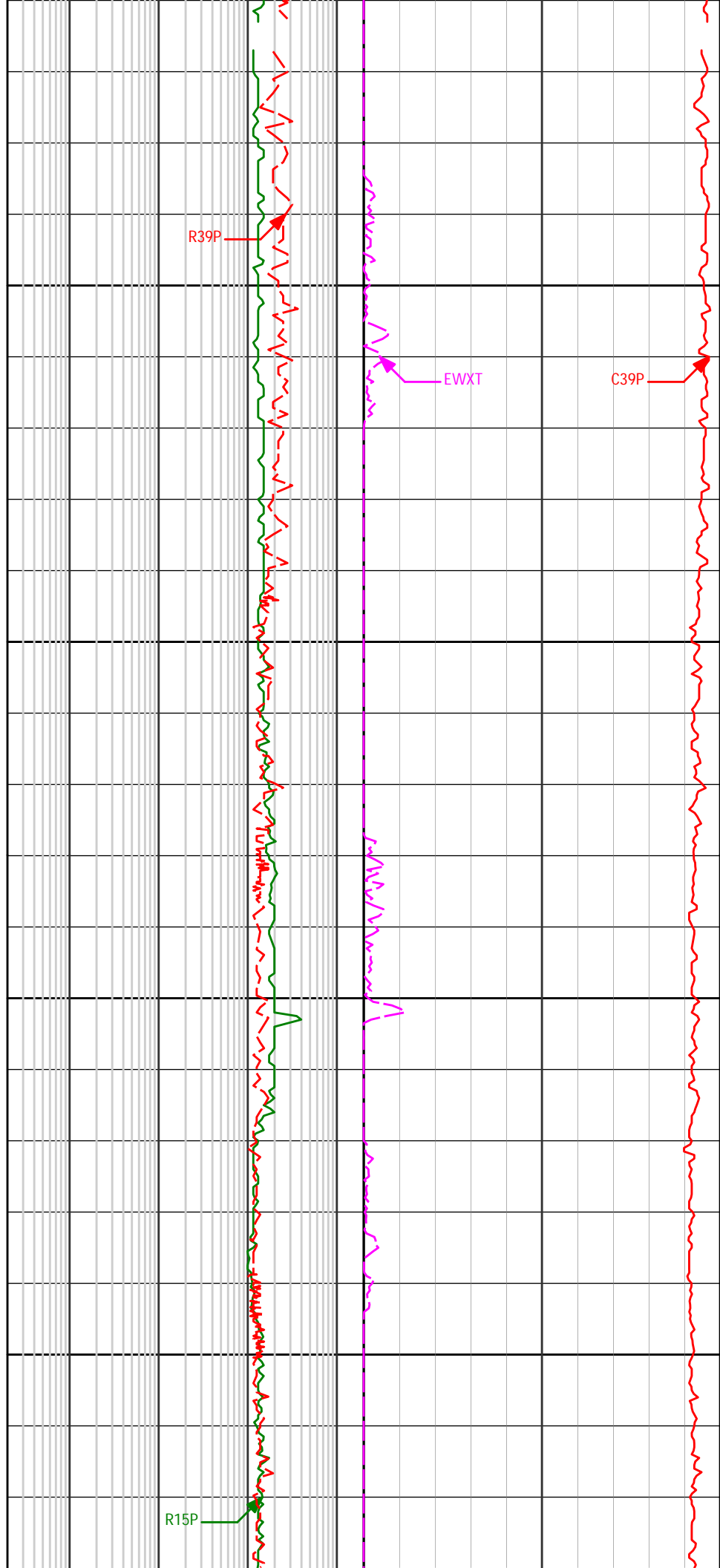


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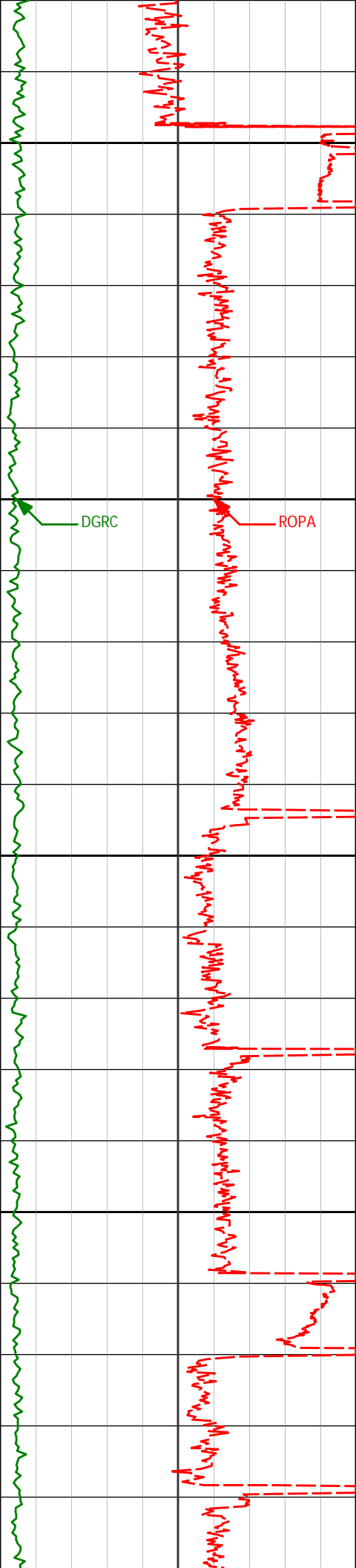
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8250

8300



R15P



8350

8400

8450

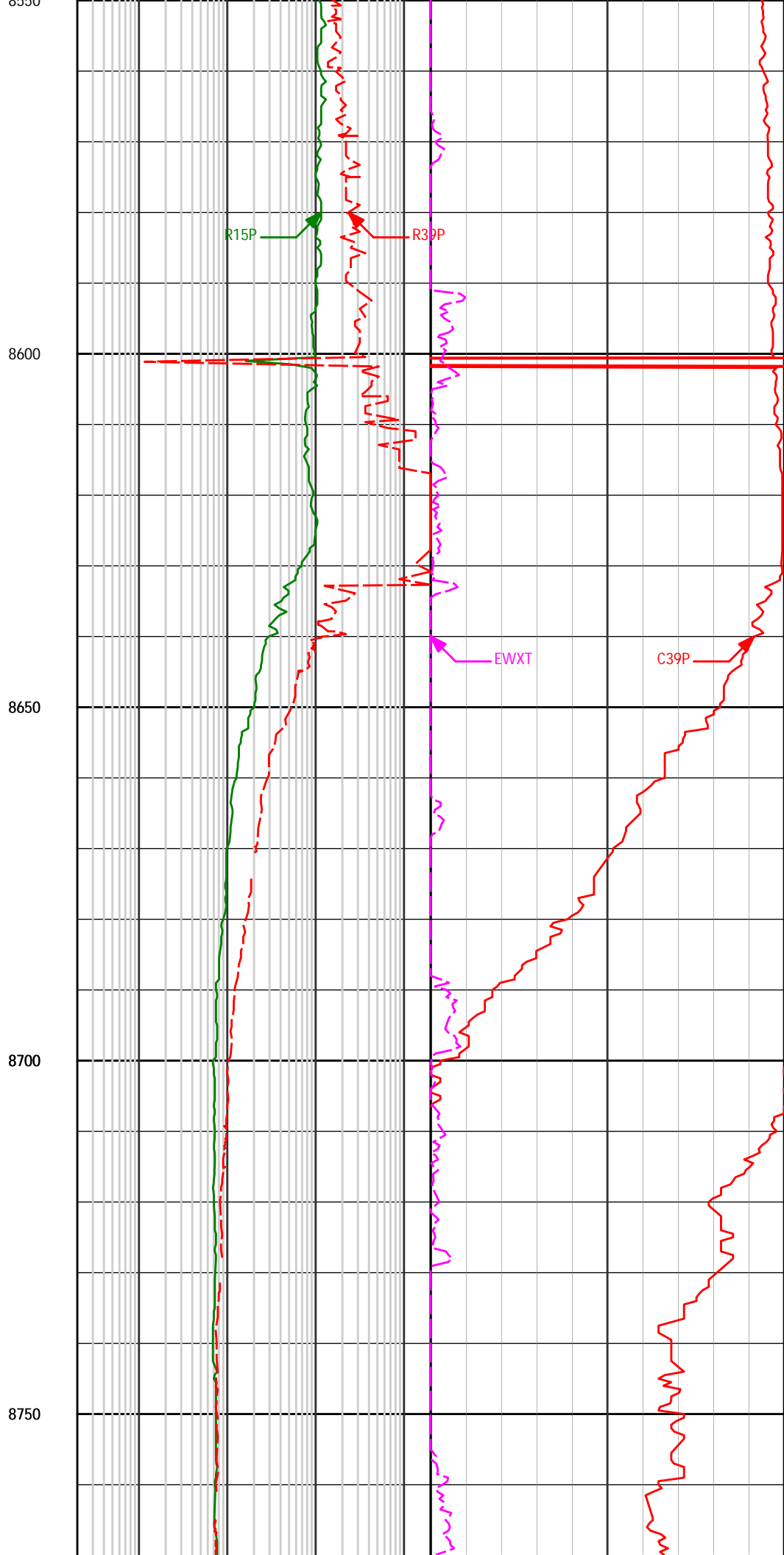
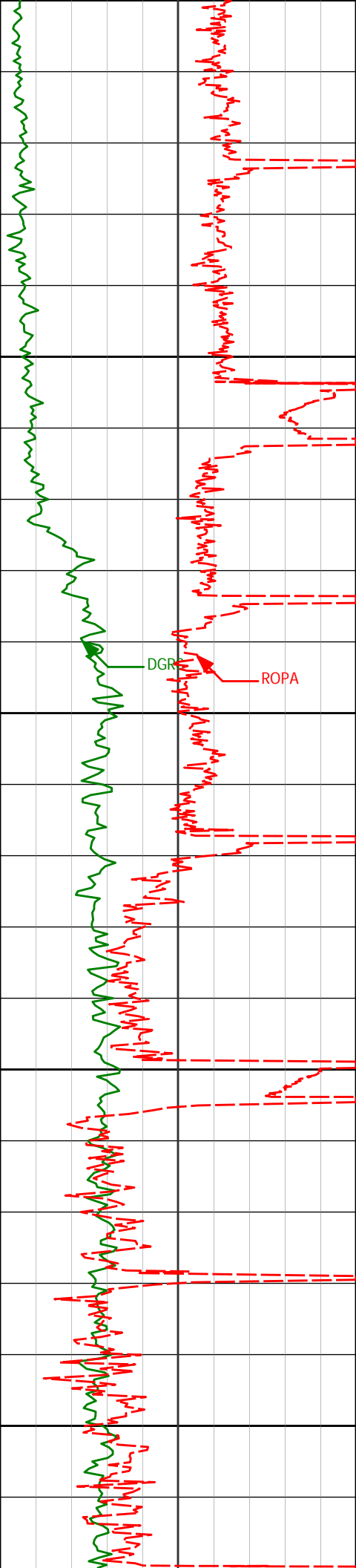
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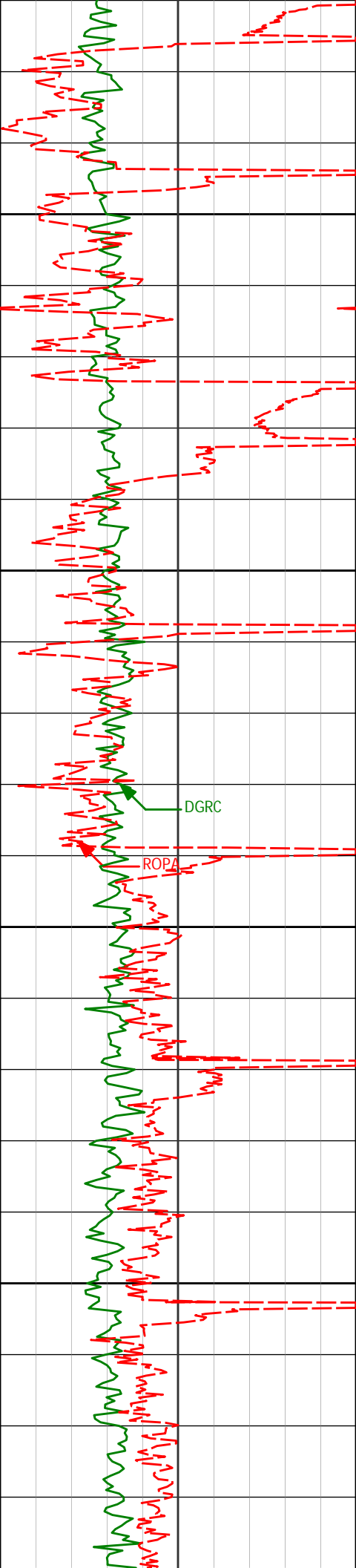
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EWXT

C39P





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8850

8900

8950

DGRC

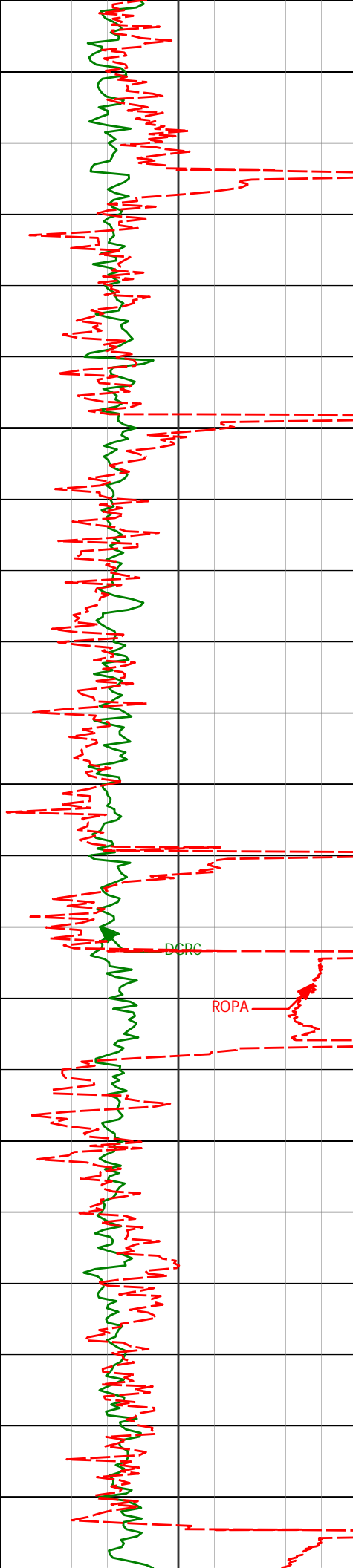
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R39P

R15P

EWXT

C39P



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9100

9150

9200

DCRC

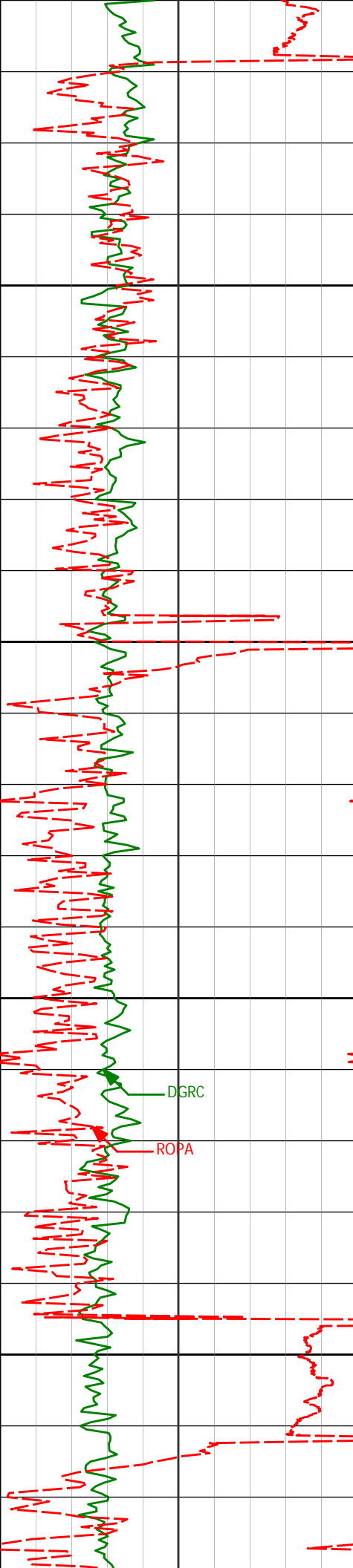
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R15P

EWXT

C39P



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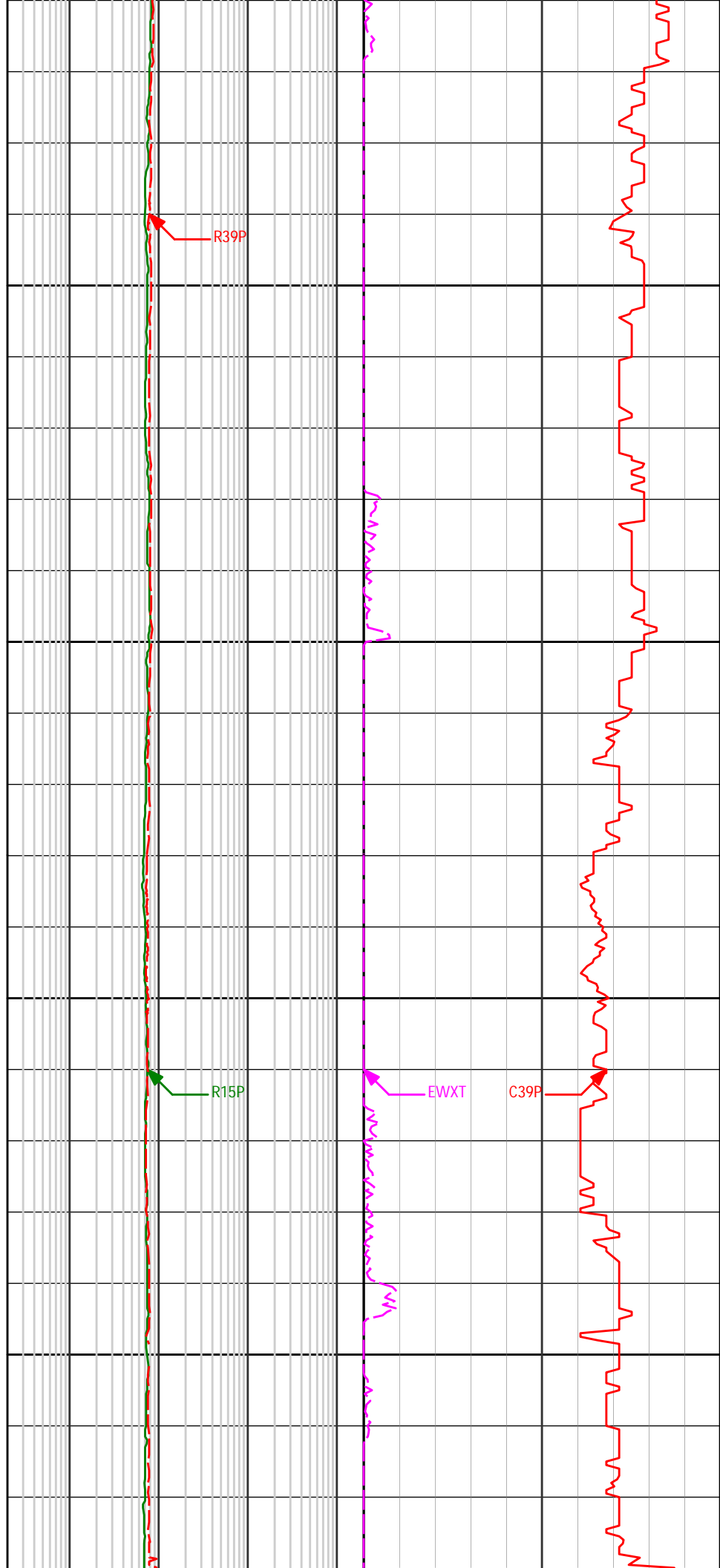
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9350

9400

DGRC

ROPA

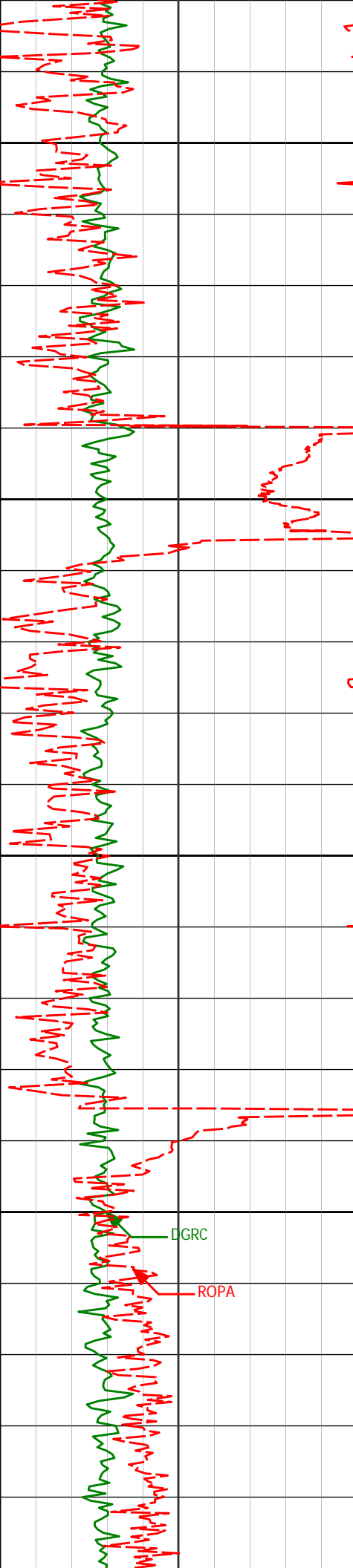


R39P

R15P

EWXT

C39P



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9500

9550

9600

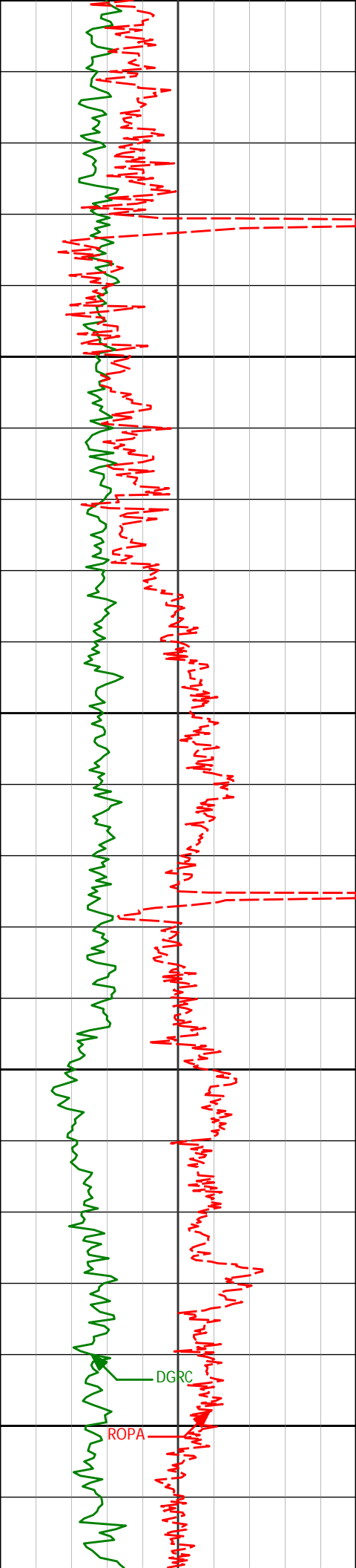
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Resistivity Tool Locked Up @ 9530' MD

R39P

DGRC

ROPA



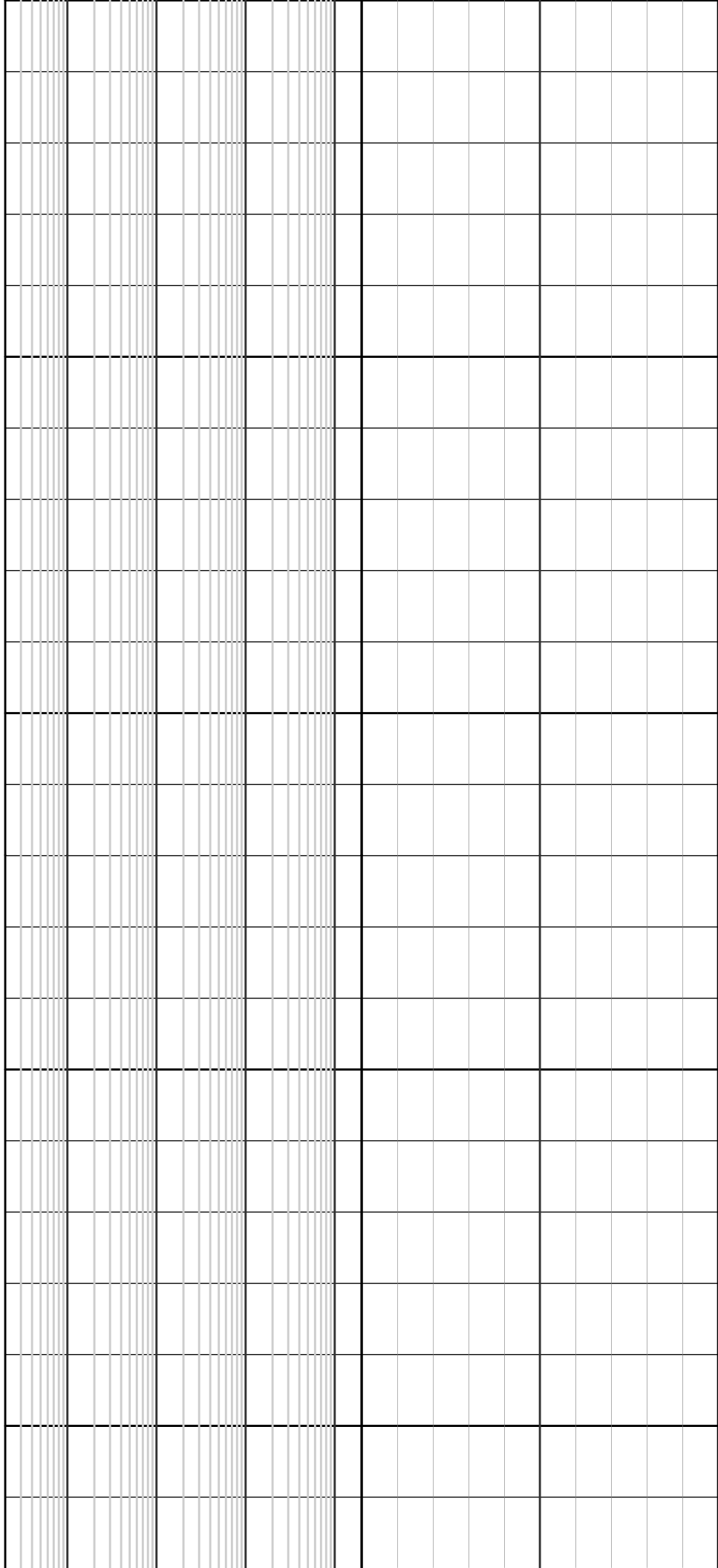
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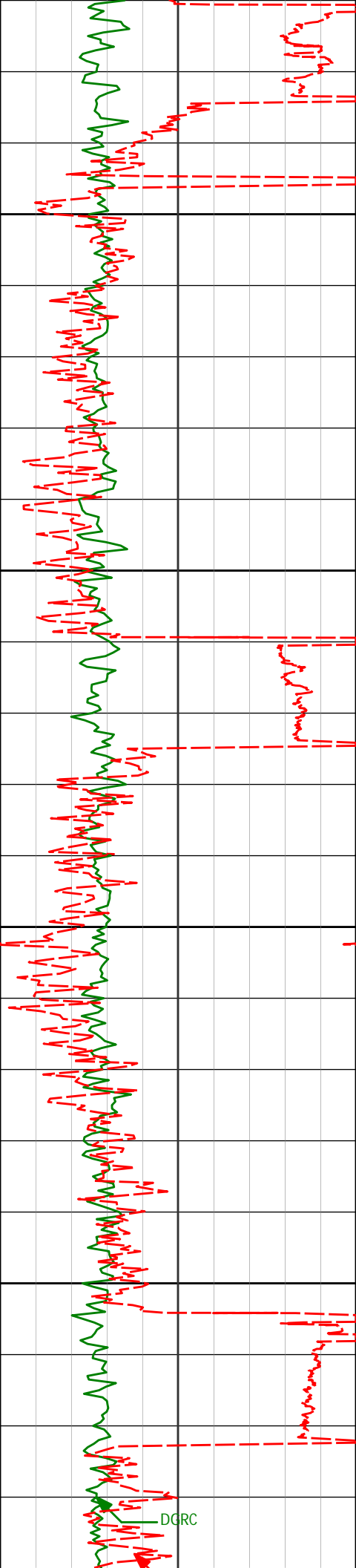
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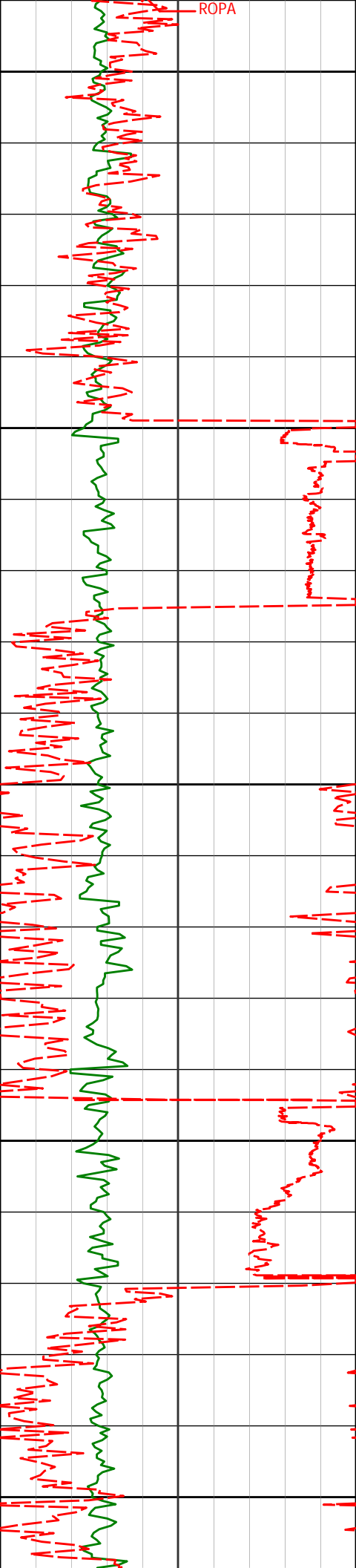
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10050

DGRC



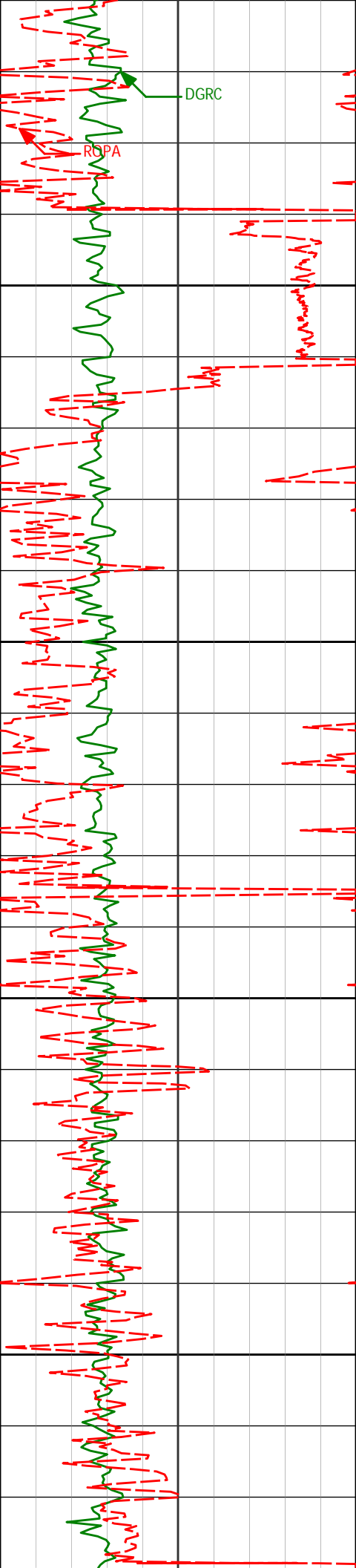
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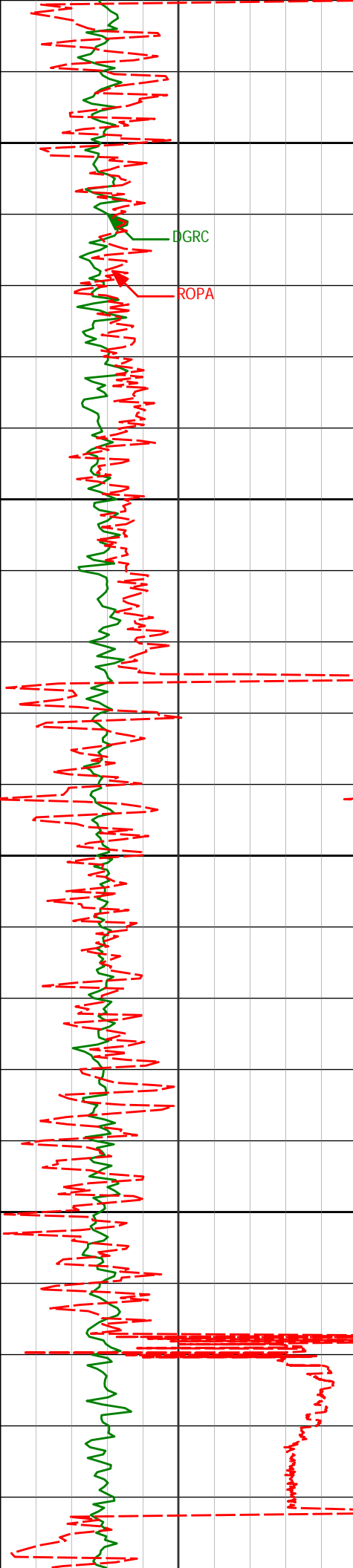


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10500



10550

10600

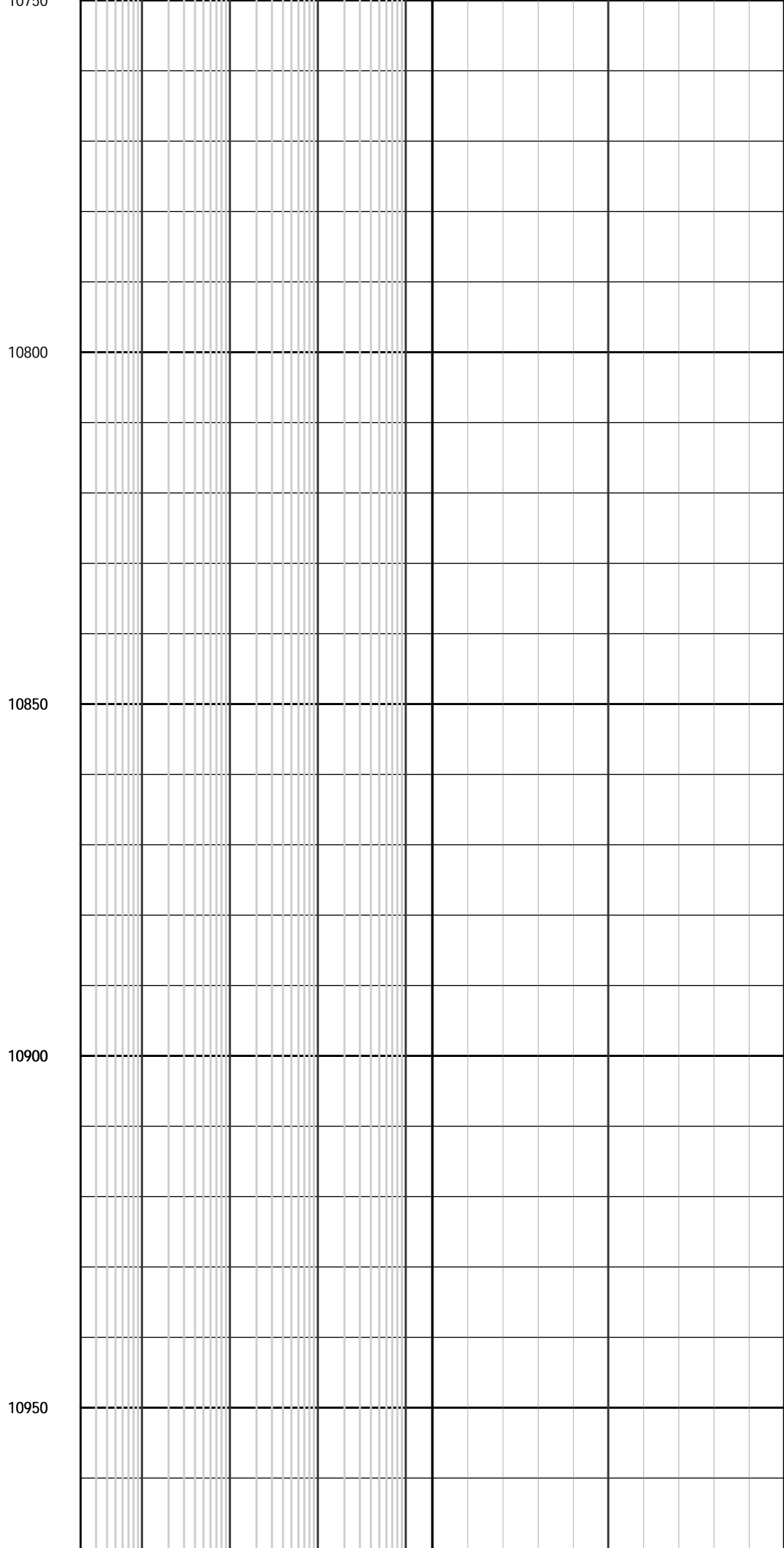
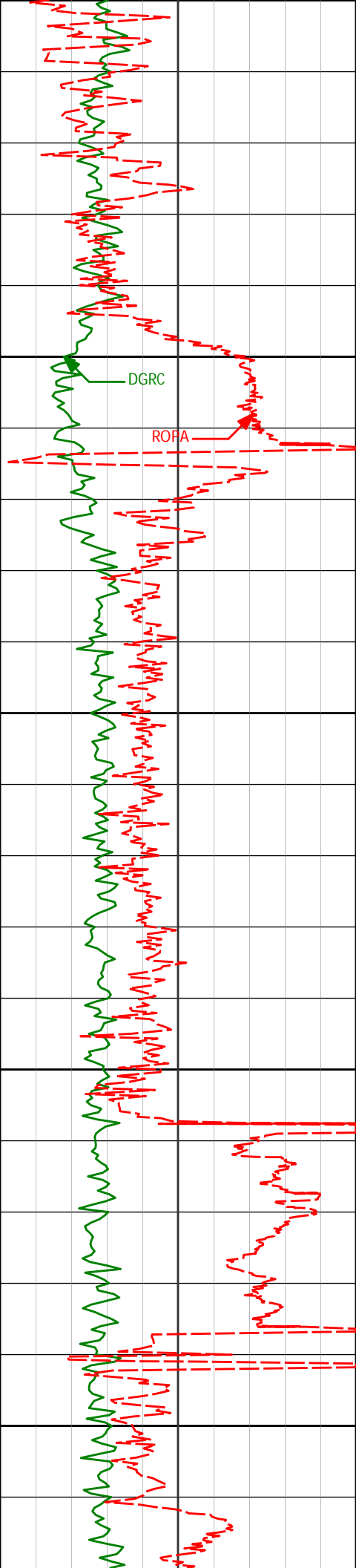
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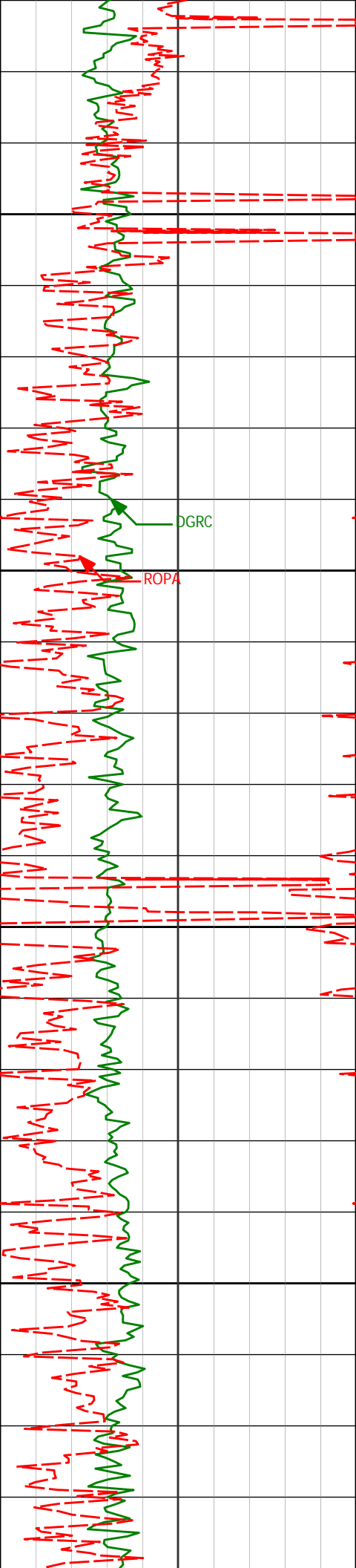
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ROPA



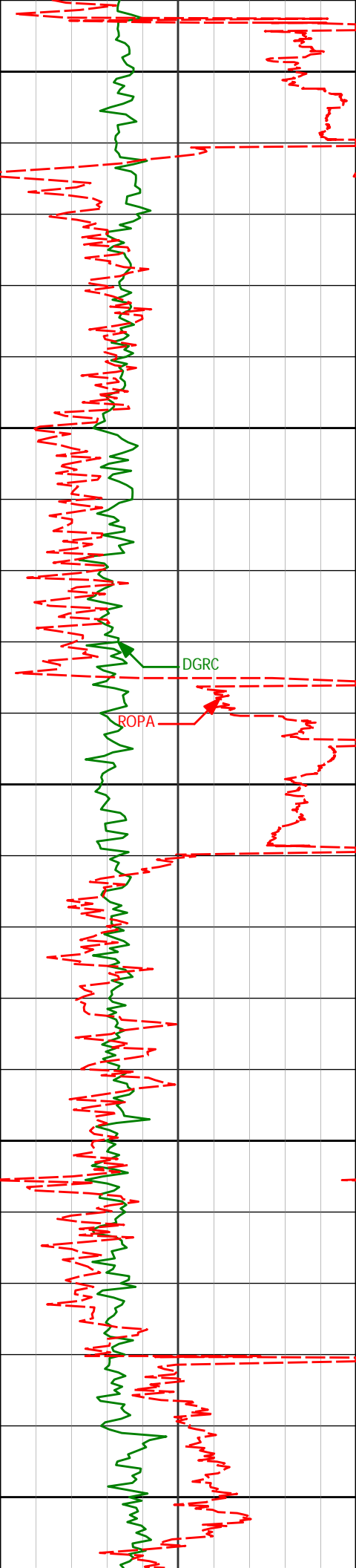


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11100

11150



11200

11250

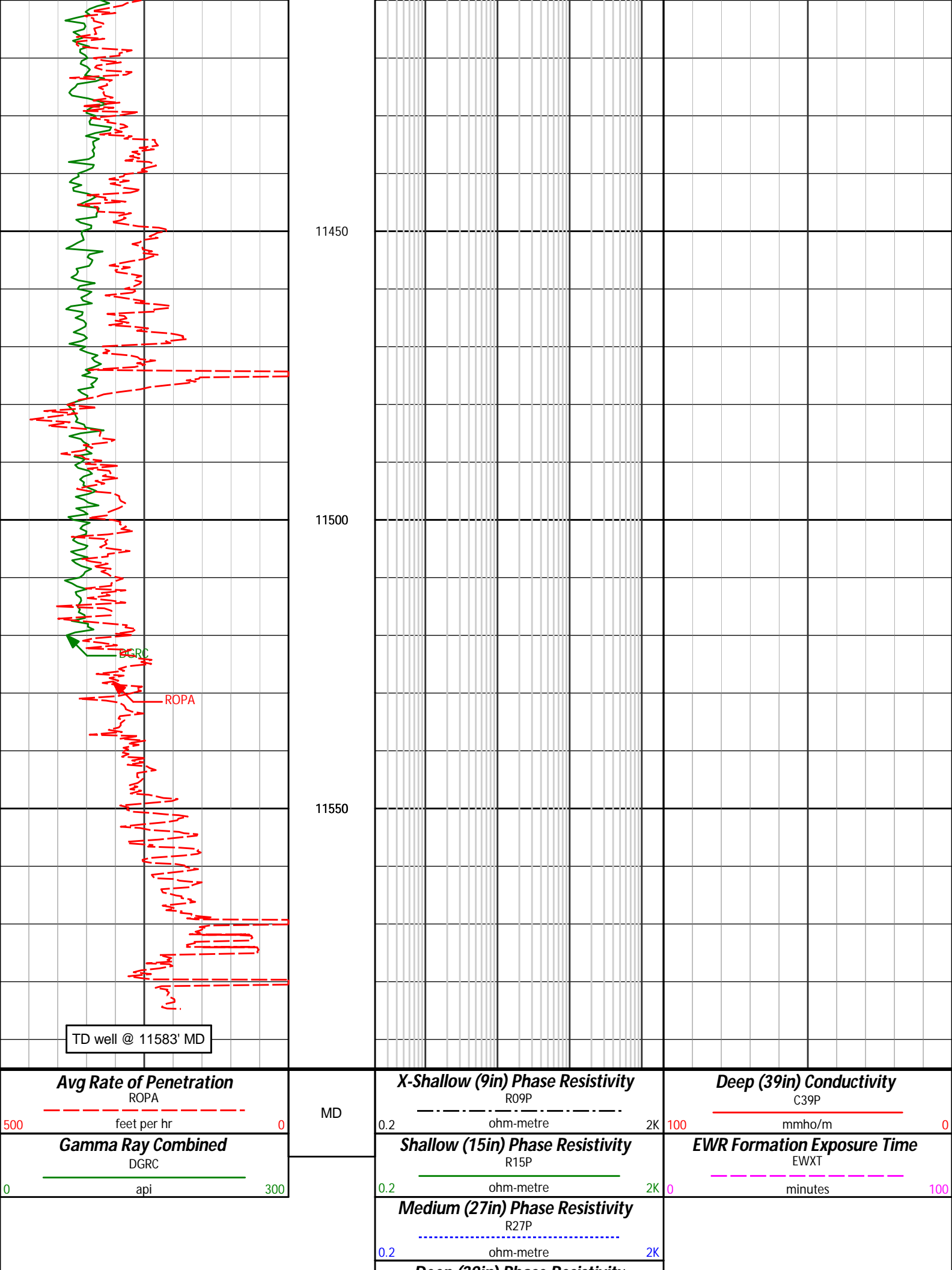
11300

11350

11400

DGRC

ROPA



# HALLIBURTON

Sperry Drilling Services

## MD Detail Log 1:240



### HALLIBURTON

#### DIRECTIONAL SURVEY REPORT

Anadarko Petroleum Corp.  
Crowder 15C-18HZ  
Wattenburg  
Weld Colorado  
USA  
CA-XX-0900217530

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
975.00	0.50	34.87	974.98	5.51 N	1.76 E	-5.53	TIE-IN
1171.00	0.49	349.75	1170.97	7.03 N	2.10 E	-7.06	0.19
1263.00	0.41	351.13	1262.97	7.74 N	1.98 E	-7.76	0.09
1355.00	0.62	39.85	1354.97	8.44 N	2.25 E	-8.47	0.50
1447.00	0.85	23.21	1446.96	9.45 N	2.83 E	-9.48	0.34
1631.00	1.05	10.51	1630.93	12.36 N	3.68 E	-12.41	0.16
1814.00	1.59	355.77	1813.89	16.55 N	3.80 E	-16.60	0.35
2004.00	1.20	343.14	2003.83	21.09 N	3.03 E	-21.12	0.26
2194.00	1.03	338.98	2193.79	24.59 N	1.83 E	-24.61	0.10
2383.00	1.62	328.44	2382.74	28.45 N	0.17 W	-28.45	0.33
2573.00	1.84	283.54	2572.66	31.45 N	4.53 W	-31.39	0.70
2763.00	1.50	251.66	2762.59	31.38 N	9.86 W	-31.26	0.51
2952.00	2.20	242.91	2951.49	28.95 N	15.44 W	-28.76	0.40
3047.00	3.18	269.61	3046.39	28.10 N	19.70 W	-27.86	1.65
3142.00	4.34	280.69	3141.18	28.75 N	25.87 W	-28.43	1.43
3237.00	4.77	285.49	3235.88	30.47 N	33.21 W	-30.06	0.60
3332.00	6.30	301.18	3330.44	34.22 N	41.47 W	-33.72	2.26
3427.00	6.58	308.24	3424.84	40.29 N	50.21 W	-39.68	0.88
3522.00	7.81	315.52	3519.09	48.26 N	59.00 W	-47.54	1.61
3617.00	9.43	313.65	3613.02	58.24 N	69.16 W	-57.39	1.73
3711.00	9.62	312.80	3705.72	68.89 N	80.49 W	-67.90	0.25
3806.00	8.21	306.79	3799.58	78.34 N	91.74 W	-77.22	1.77
3901.00	9.74	311.36	3893.41	87.72 N	103.21 W	-86.45	1.77
3996.00	10.60	307.65	3986.92	98.36 N	116.15 W	-96.93	1.14
4091.00	9.57	304.54	4080.45	108.17 N	129.57 W	-106.58	1.22
4186.00	11.83	305.38	4173.79	118.29 N	144.02 W	-116.52	2.39
4281.00	11.10	304.05	4266.90	129.05 N	159.54 W	-127.09	0.82
4375.00	9.93	304.38	4359.32	138.70 N	173.73 W	-136.56	1.25
4470.00	9.17	300.07	4453.00	147.12 N	187.04 W	-144.82	1.10
4565.00	10.88	303.92	4546.55	155.91 N	201.03 W	-153.44	1.94
4660.00	10.06	302.53	4639.97	165.38 N	215.47 W	-162.73	0.90
4755.00	9.18	304.03	4733.63	174.08 N	228.74 W	-171.27	0.97
4945.00	7.42	304.99	4921.63	189.59 N	251.34 W	-186.50	0.93
5134.00	5.21	316.75	5109.48	202.84 N	267.22 W	-199.56	1.35
5229.00	4.44	313.55	5204.15	208.51 N	272.84 W	-205.17	0.86
5324.00	3.46	310.65	5298.92	212.91 N	277.68 W	-209.51	1.05
5419.00	2.06	315.49	5393.81	216.00 N	281.05 W	-212.55	1.50
5514.00	2.20	307.66	5488.74	218.32 N	283.68 W	-214.84	0.34
5608.00	1.54	297.36	5582.69	220.01 N	286.24 W	-216.49	0.78
5703.00	1.04	295.85	5677.67	220.97 N	288.15 W	-217.44	0.53

5893.00	0.51	265.88	5867.65	221.67 N	290.55 W	-218.10	0.35
5987.00	0.36	174.23	5961.65	221.35 N	290.93 W	-217.77	0.67
6177.00	4.10	95.26	6151.48	220.13 N	284.10 W	-216.64	2.13
6272.00	3.23	104.29	6246.29	219.16 N	278.12 W	-215.74	1.10
6367.00	2.86	105.56	6341.15	217.86 N	273.25 W	-214.51	0.39
6556.00	0.68	196.82	6530.07	215.52 N	269.03 W	-212.21	1.56
6651.00	0.90	216.47	6625.06	214.38 N	269.64 W	-211.07	0.36
6745.00	1.62	184.13	6719.04	212.46 N	270.17 W	-209.15	1.05
6777.00	4.92	180.84	6750.98	210.64 N	270.22 W	-207.33	10.33
6808.00	6.75	179.47	6781.82	207.49 N	270.23 W	-204.18	5.93
6840.00	9.21	179.34	6813.51	203.05 N	270.18 W	-199.73	7.69
6872.00	12.81	180.20	6844.92	196.94 N	270.16 W	-193.63	11.27
6903.00	16.64	179.14	6874.89	189.06 N	270.11 W	-185.75	12.39
6935.00	20.03	180.40	6905.26	179.00 N	270.08 W	-175.69	10.65
6966.00	23.61	181.36	6934.04	167.48 N	270.26 W	-164.17	11.62
6998.00	26.58	182.75	6963.01	153.92 N	270.76 W	-150.60	9.45
7030.00	29.20	183.42	6991.30	138.98 N	271.57 W	-135.65	8.26
7061.00	30.90	185.77	7018.13	123.50 N	272.82 W	-120.16	6.67
7093.00	32.91	182.99	7045.29	106.64 N	274.10 W	-103.29	7.76
7125.00	35.00	181.59	7071.84	88.79 N	274.81 W	-85.42	6.98
7156.00	37.49	179.76	7096.84	70.46 N	275.02 W	-67.10	8.75
7188.00	39.97	179.74	7121.80	50.45 N	274.93 W	-47.08	7.77
7219.00	41.93	178.87	7145.21	30.13 N	274.68 W	-26.77	6.56
7251.00	44.01	178.40	7168.63	8.33 N	274.16 W	-4.98	6.58
7283.00	45.95	178.55	7191.26	14.28 S	273.56 W	17.62	6.09
7314.00	48.00	178.39	7212.41	36.94 S	272.96 W	40.27	6.60
7346.00	50.93	178.09	7233.21	61.24 S	272.21 W	64.56	9.19
7377.00	54.29	178.76	7252.03	85.86 S	271.53 W	89.17	10.99
7409.00	57.50	179.37	7269.97	112.34 S	271.10 W	115.65	10.14
7441.00	60.67	180.56	7286.41	139.79 S	271.09 W	143.10	10.43
7472.00	63.37	181.73	7300.95	167.16 S	271.64 W	170.47	9.32
7504.00	66.95	182.78	7314.39	196.17 S	272.79 W	199.49	11.57
7535.00	70.10	182.44	7325.74	224.99 S	274.10 W	228.32	10.23
7567.00	73.57	182.19	7335.72	255.36 S	275.32 W	258.71	10.84
7599.00	75.62	183.59	7344.22	286.17 S	276.88 W	289.53	7.67
7630.00	78.43	183.83	7351.18	316.31 S	278.84 W	319.70	9.10
7678.00	85.27	182.93	7357.98	363.72 S	281.64 W	367.13	14.37
7733.00	89.44	181.54	7360.52	418.60 S	283.78 W	422.04	7.99
7828.00	89.38	181.67	7361.50	513.56 S	286.44 W	517.02	0.15
7923.00	89.63	181.79	7362.32	608.51 S	289.31 W	612.00	0.29
8017.00	90.37	181.75	7362.32	702.47 S	292.21 W	705.99	0.79
8112.00	92.04	181.49	7360.32	797.41 S	294.90 W	800.95	1.78
8207.00	90.31	181.27	7358.38	892.35 S	297.19 W	895.92	1.84
8302.00	90.37	181.16	7357.81	987.33 S	299.21 W	990.91	0.14
8397.00	89.69	181.51	7357.76	1082.31 S	301.41 W	1085.91	0.80
8492.00	90.74	181.61	7357.40	1177.27 S	304.00 W	1180.89	1.11
8587.00	89.94	182.93	7356.84	1272.19 S	307.75 W	1275.85	1.63
8681.00	88.02	182.86	7358.51	1366.05 S	312.50 W	1369.77	2.04
8776.00	88.70	182.72	7361.22	1460.90 S	317.13 W	1464.66	0.73
8871.00	89.63	183.58	7362.61	1555.74 S	322.35 W	1559.56	1.33
8966.00	89.88	184.04	7363.02	1650.53 S	328.67 W	1654.42	0.55
9061.00	90.12	184.32	7363.02	1745.28 S	335.59 W	1749.25	0.39
9156.00	89.81	183.28	7363.07	1840.07 S	341.88 W	1844.11	1.14
9250.00	90.86	182.59	7362.51	1933.94 S	346.69 W	1938.03	1.34
9345.00	91.23	182.45	7360.77	2028.83 S	350.87 W	2032.97	0.41
9440.00	90.74	181.22	7359.13	2123.77 S	353.92 W	2127.93	1.39
9535.00	90.80	179.90	7357.85	2218.75 S	354.85 W	2222.92	1.40
9630.00	90.68	179.29	7356.62	2313.74 S	354.18 W	2317.90	0.65
9724.00	90.43	178.28	7355.71	2407.72 S	352.19 W	2411.84	1.11
9819.00	88.33	176.72	7356.73	2502.61 S	348.05 W	2506.68	2.75
9914.00	88.64	176.41	7359.24	2597.41 S	342.36 W	2601.40	0.46
10009.00	90.06	176.83	7360.31	2692.23 S	336.76 W	2696.15	1.56
10104.00	89.94	177.64	7360.31	2787.12 S	332.17 W	2790.97	0.86
10198.00	89.38	177.85	7360.87	2881.05 S	328.47 W	2884.84	0.63
10293.00	89.57	179.66	7361.74	2976.02 S	326.40 W	2979.78	1.92
10388.00	90.19	180.83	7361.95	3071.01 S	326.81 W	3074.78	1.39
10483.00	90.37	180.58	7361.49	3166.00 S	327.98 W	3169.77	0.32
10577.00	90.31	179.92	7360.93	3260.00 S	328.39 W	3263.77	0.70
10672.00	89.75	179.00	7360.88	3355.00 S	327.50 W	3358.75	1.13
10767.00	89.57	180.46	7361.44	3449.99 S	327.05 W	3453.73	1.55
10861.00	88.08	179.28	7363.37	3543.97 S	326.85 W	3547.69	2.02
10956.00	89.38	180.84	7365.47	3638.94 S	326.95 W	3642.66	2.14
11051.00	89.57	180.95	7366.34	3733.92 S	328.43 W	3737.66	0.22
11145.00	89.32	180.45	7367.25	3827.91 S	329.57 W	3831.65	0.59

11241.00	89.51	180.64	7368.23	3923.90 S	330.49 W	3927.65	0.28
11336.00	91.18	180.62	7367.67	4018.89 S	331.53 W	4022.64	1.76
11430.00	91.05	180.07	7365.84	4112.87 S	332.09 W	4116.62	0.59
11538.00	91.11	179.42	7363.80	4220.85 S	331.62 W	4224.59	0.60
11583.00	91.11	179.42	7362.93	4265.84 S	331.16 W	4269.57	0.01

**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 180.70 DEGREES (TRUE)**  
**A TOTAL CORRECTION OF 8.62 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**  
  
**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.**  
**HORIZONTAL DISPLACEMENT(CLOSURE) AT 11583.00 FEET**  
**IS 4278.67 FEET ALONG 184.44 DEGREES (TRUE)**  
  
**Final survey is a projection to bit.**