

PCD-C Pressure Case Directional DGR Dual Gamma Ray



1 : 240

[illegible]

WELL INFORMATION

MWD Run Number	200	300			
Date run completed	27-Aug-13	30-Aug-13			
Rig Bit Number	0200	0300			
Bit Size (in)	6.125	6.125			
Tool Nominal OD (in)	4.750	4.750			
Log Start Depth (MD, ft)	7,519.00	9,197.00			
Log End Depth (MD, ft)	9,197.00	12,059.00			
Drill or Wipe	Drill	Drill			
Drill/Wipe Start Date and Time	27-Aug-13 04:22	28-Aug-13 07:10			
Drill/Wipe End Date and Time	27-Aug-13 17:00	29-Aug-13 22:15			
Min Inc (deg) @ Depth (MD, ft)	88.15 @ 8,137.00	87.77 @ 10,979.00			
Max Inc (deg) @ Depth (MD, ft)	92.16 @ 8,895.00	92.10 @ 10,220.00			
Bit TFA(in2) / Bit Type	.61 / PDC	.61 / PDC			
Flow Rate (gpm)	273.50	274.79			
Max AV (fpm) / CV (fpm) @ MWD	492.0 / N/A	492.0 / N/A			
Fluid Type	Fresh Water Gel	Fresh Water Gel			
Density (ppg) / Viscosity (spqt)	9.40 / 38.00	9.40 / 40.00			
Filtrate CL (ppm)	1,500.00	1,500.00			
pH / Fluid Loss (mptm)	9.40 / 9.40	7.90 / 7.90			
PV (cP) / YP (lbf2)	11 / 10.00	14 / 12.00			
% Solids / % Sand	4.7 / .25	5.7 / .25			
% 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) @ MWD	216.00 / N/A	222.10 / N/A			

Max Tool Temp (degF) / Source	212.00 / HCIM	233.18 / HCIM			
Rm @ Max Tool Temp (degF)	N/A @ 212.00	N/A @ 233.18			
Lead MWD Engineer	Patrick Lane	Ryan White			
Customer Representative	Travis Kruckenberg	Stan Walters			

SENSOR INFORMATION

Downhole Processor Information

Tool Type	HCIM	HCIM			
Software Version	88.56	88.56			
Sub Serial Number	123	123			
Insert Serial Number	123	123			
Date and Time Initialized	26-Aug-13 18:10	28-Aug-13 01:53			
Date and Time Read	01-Jan-70 00:00	01-Jan-70 00:00			
ECMB SW Version	N/A	N/A			

Directional Sensor Information

Tool Type	PCDC	PCDC			
Distance From Bit (ft)	67.65	67.66			
Software Version	6.21	6.21			
Sub Serial Number	12024220	12024220			
Sonde Serial Number	11638536	11062040			
Sensor ID Number	N/A	N/A			
Toolface Offset (deg)	82.44	310.74			

Gamma Ray Sensor Information

Tool Type	DGR	DGR			
Distance From Bit (ft)	52.75	52.76			
Recorded Sample Period (sec)	8	8			
Software Version	N/A	N/A			
Sub Serial Number	123	123			
Insert/Sonde Serial Number	123	123			

Resistivity Sensor Information

Tool Type	Slim P4	Slim P4			
Distance From Bit (ft)	45.77	45.78			
Recorded Sample Period (sec)	6	6			
Software Version	5.55	5.55			
Sub Serial Number	251282	251282			
Receiver Insert Serial Number	269725	269725			
Transmitter Insert Serial Number	255819	255819			
Receiver Orientation	Down	Down			

Pulser Controller Sensor Information

Tool Type	PCM	PCM			
Software Version	8.17	8.17			
PIC Software Version					
Sub/HOC Serial Number	12024220	12024220			
Insert/Probe/Module SN	11680772	11145558			
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			

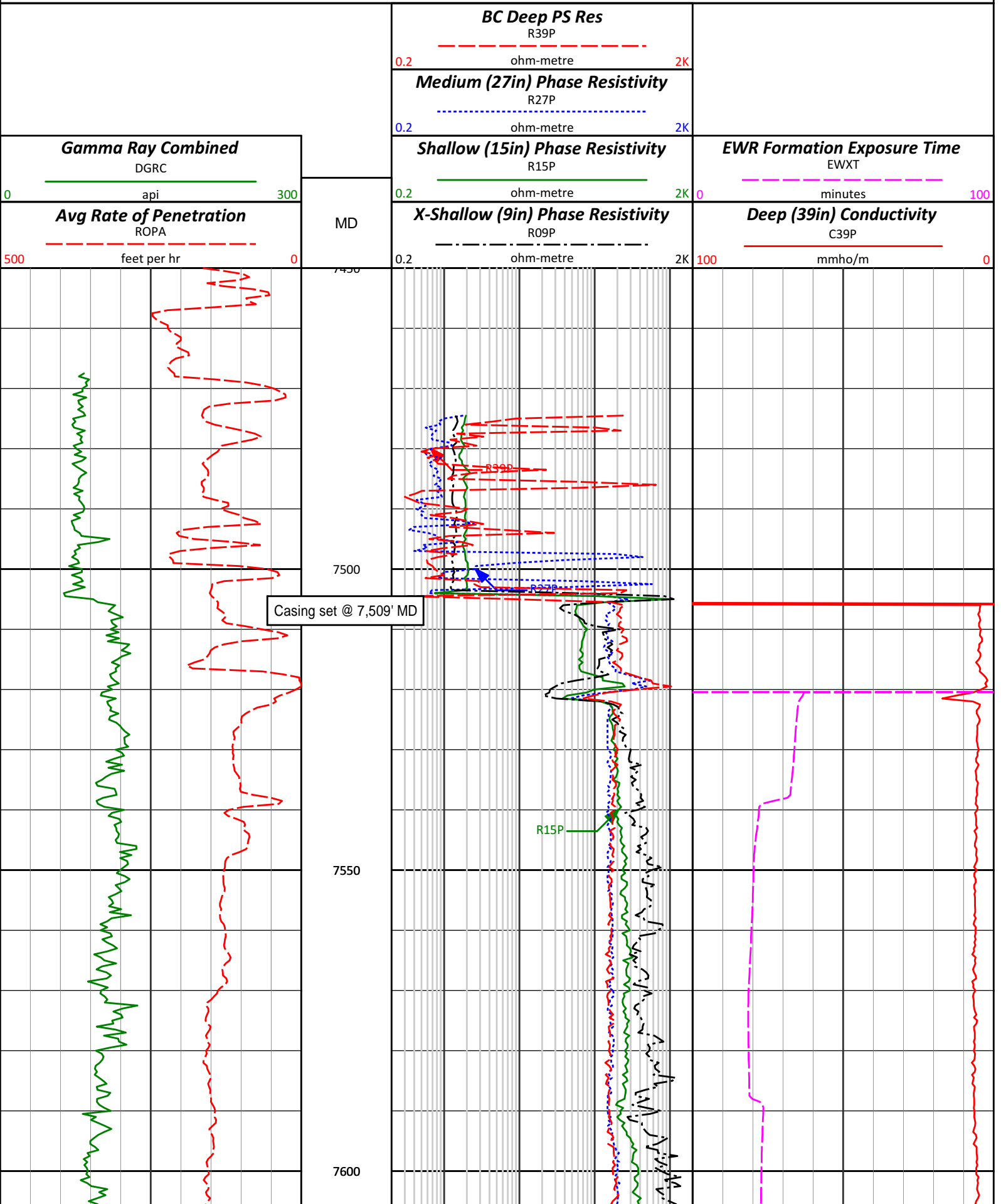
Boot Strap Version					
DDSr-DGR Sensor Information					
Tool Type	DDSr-DGR	DDSr-DGR			
Distance From Bit (ft)	55.67	55.68			
Recorded Sample Period (sec)	12	12			
Software Version	10.49	10.49			
Sub Serial Number	123	123			
Insert Serial Number	11270399	11270399			
Sensor ID Number	7025	7025			

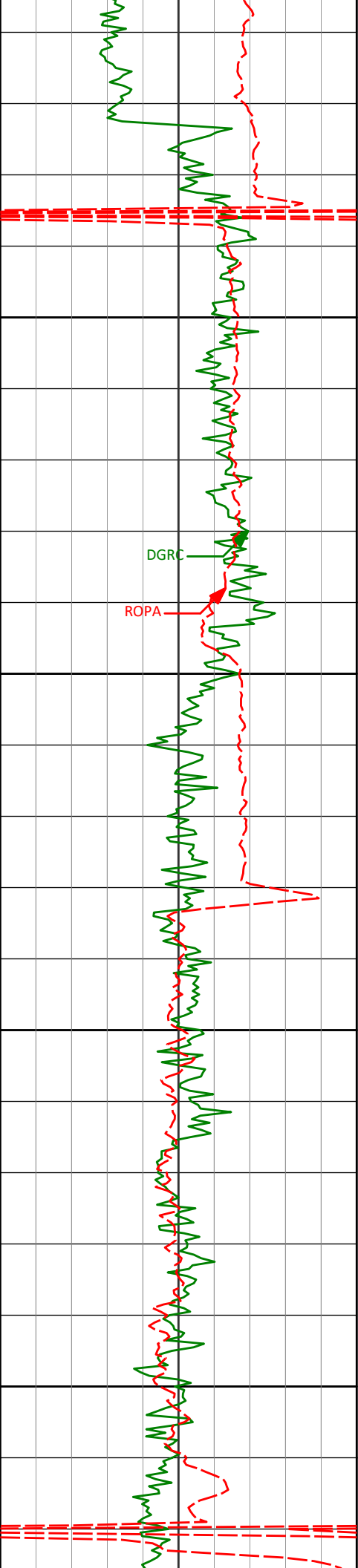
REMARKS
<p>1. All depths are measured bit depths referenced to the Driller's pipe tally and are measured from the Drill Floor, unless otherwise specified.</p> <p>2. No depth corrections have been made for pipe stretch or compression.</p> <p>3. All data presented is recorded data unless otherwise specified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

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





7650

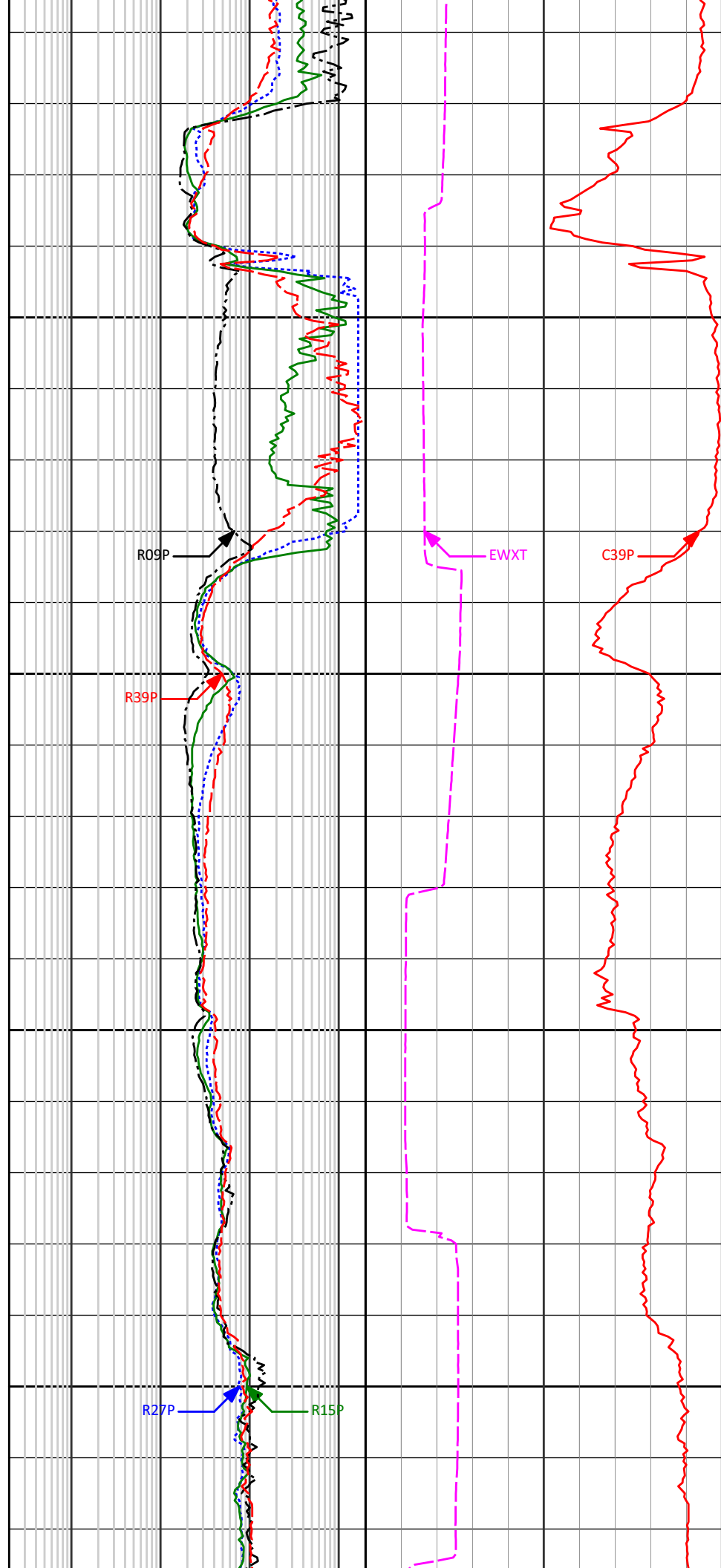
7700

7750

7800

DGRC

ROPA



R09P

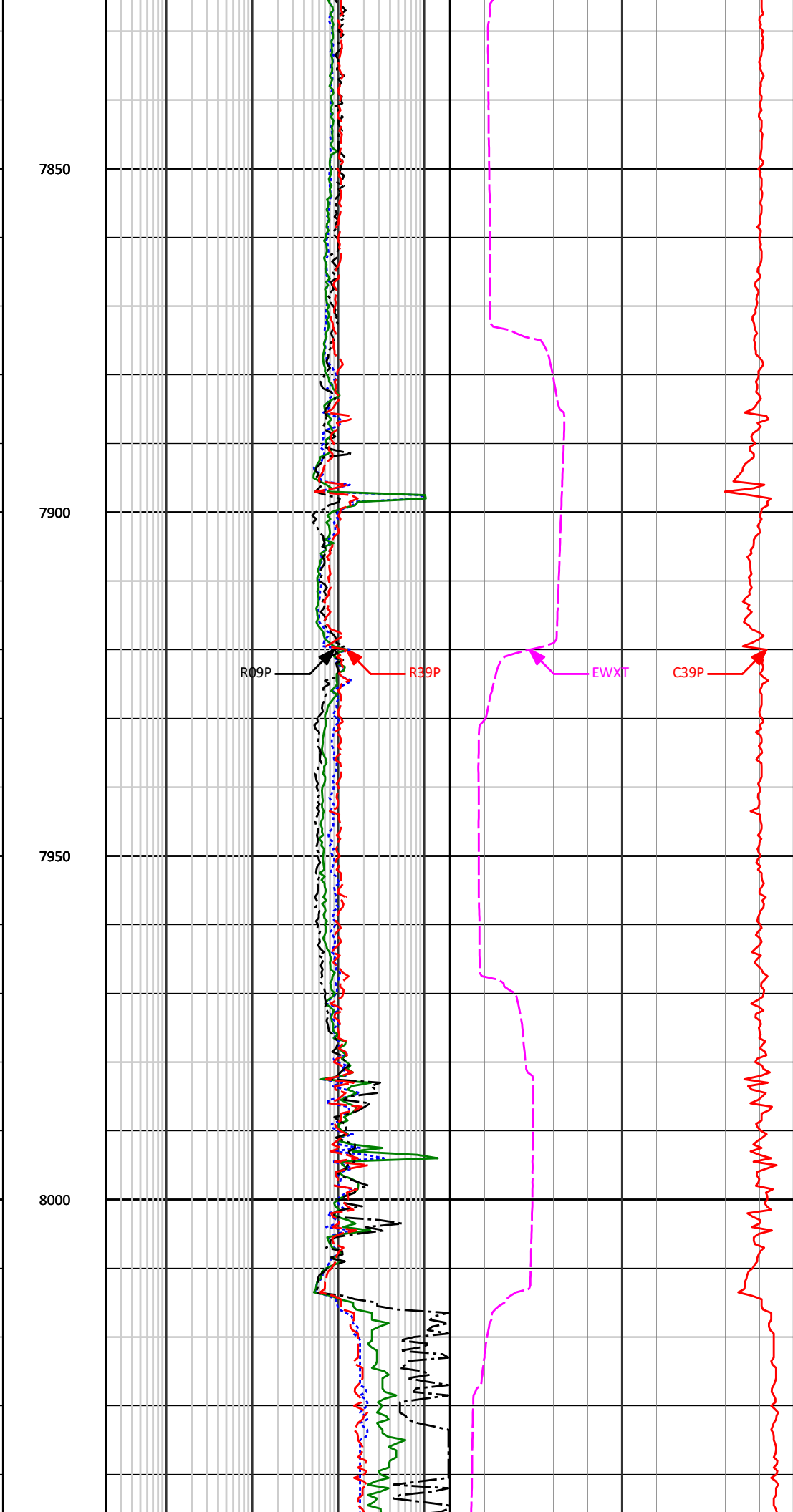
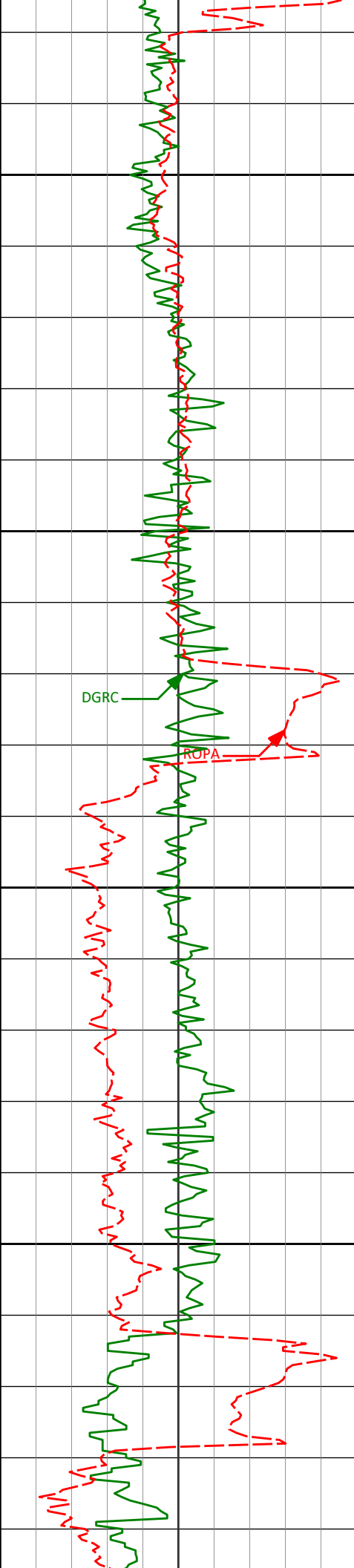
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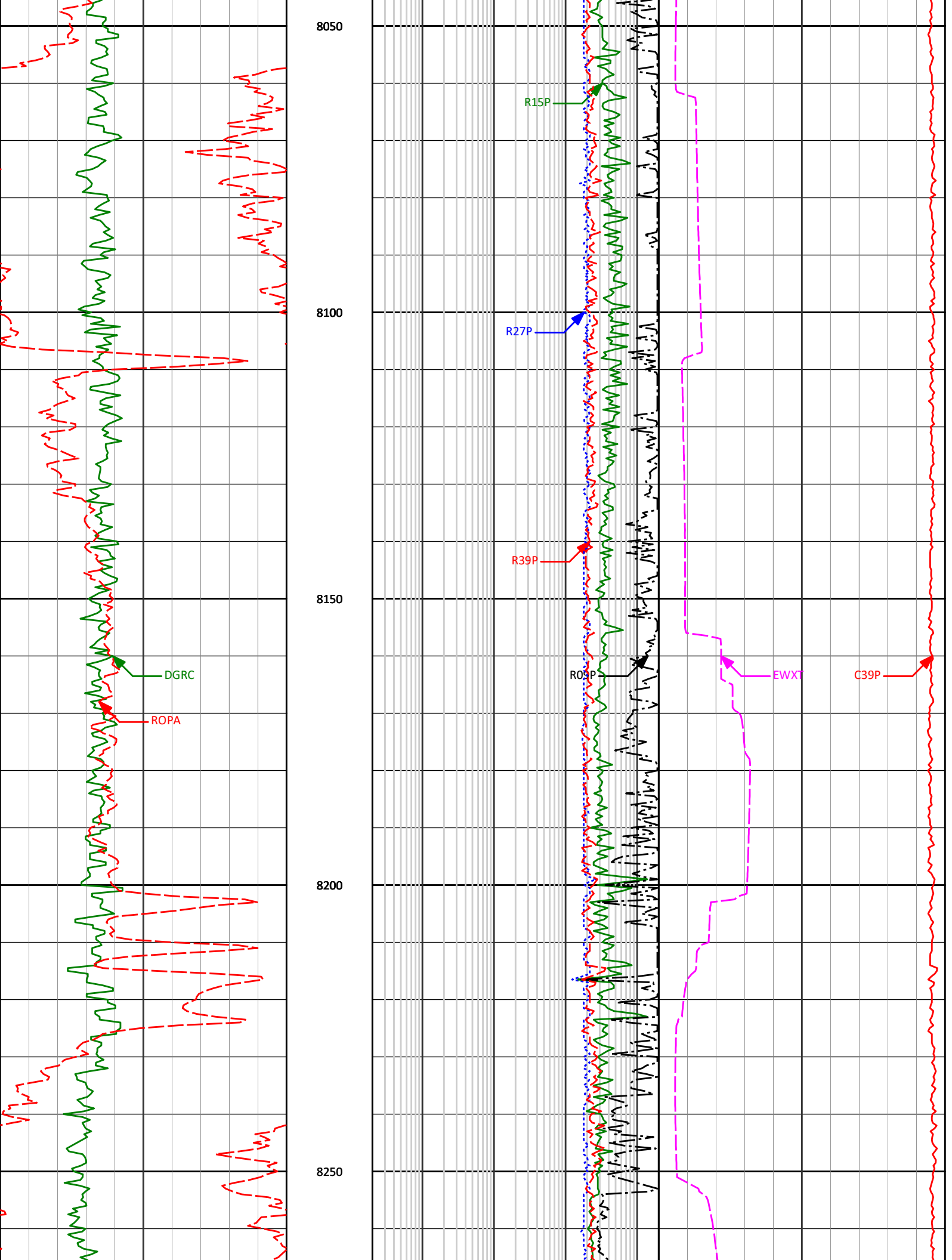
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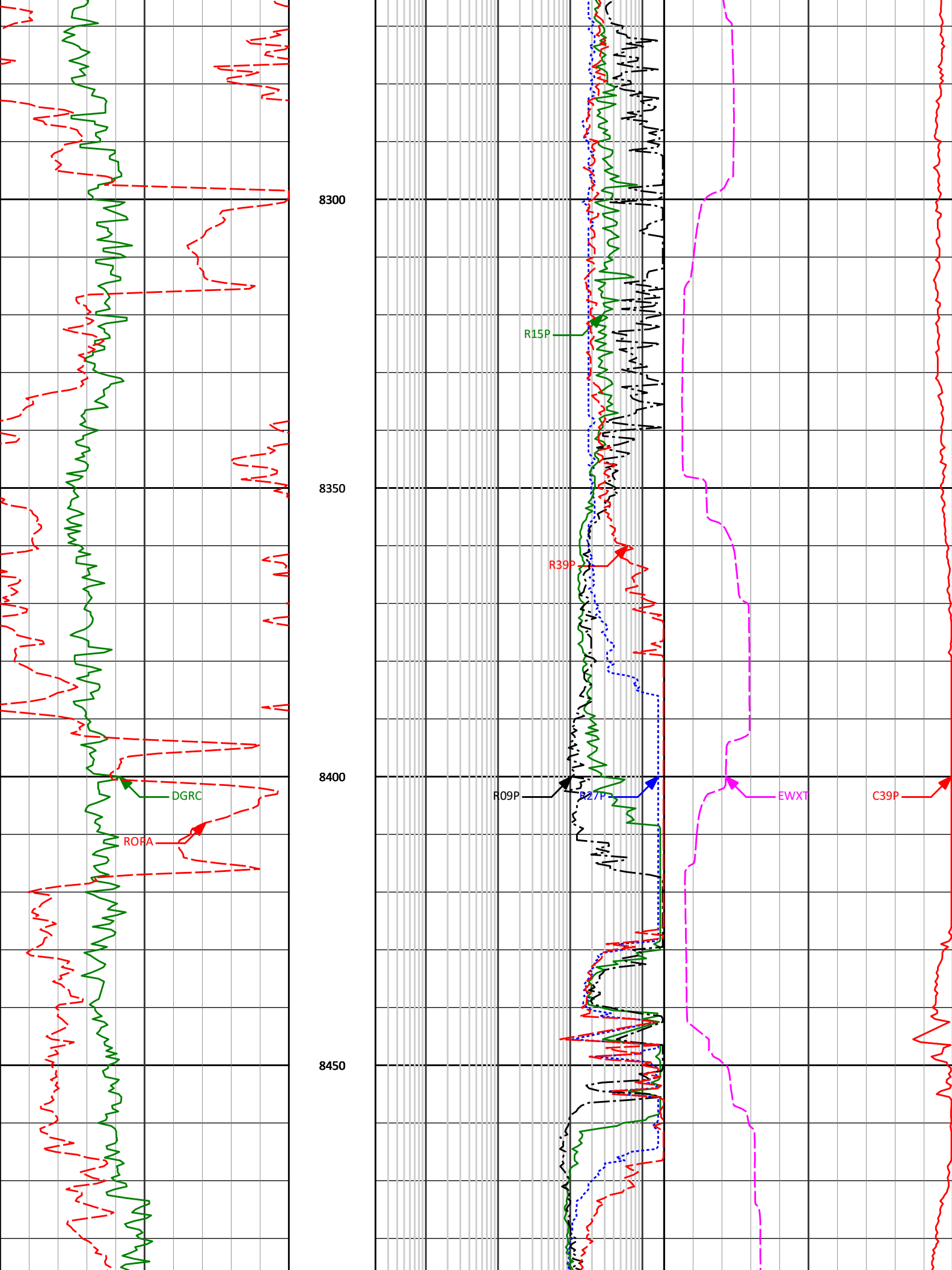
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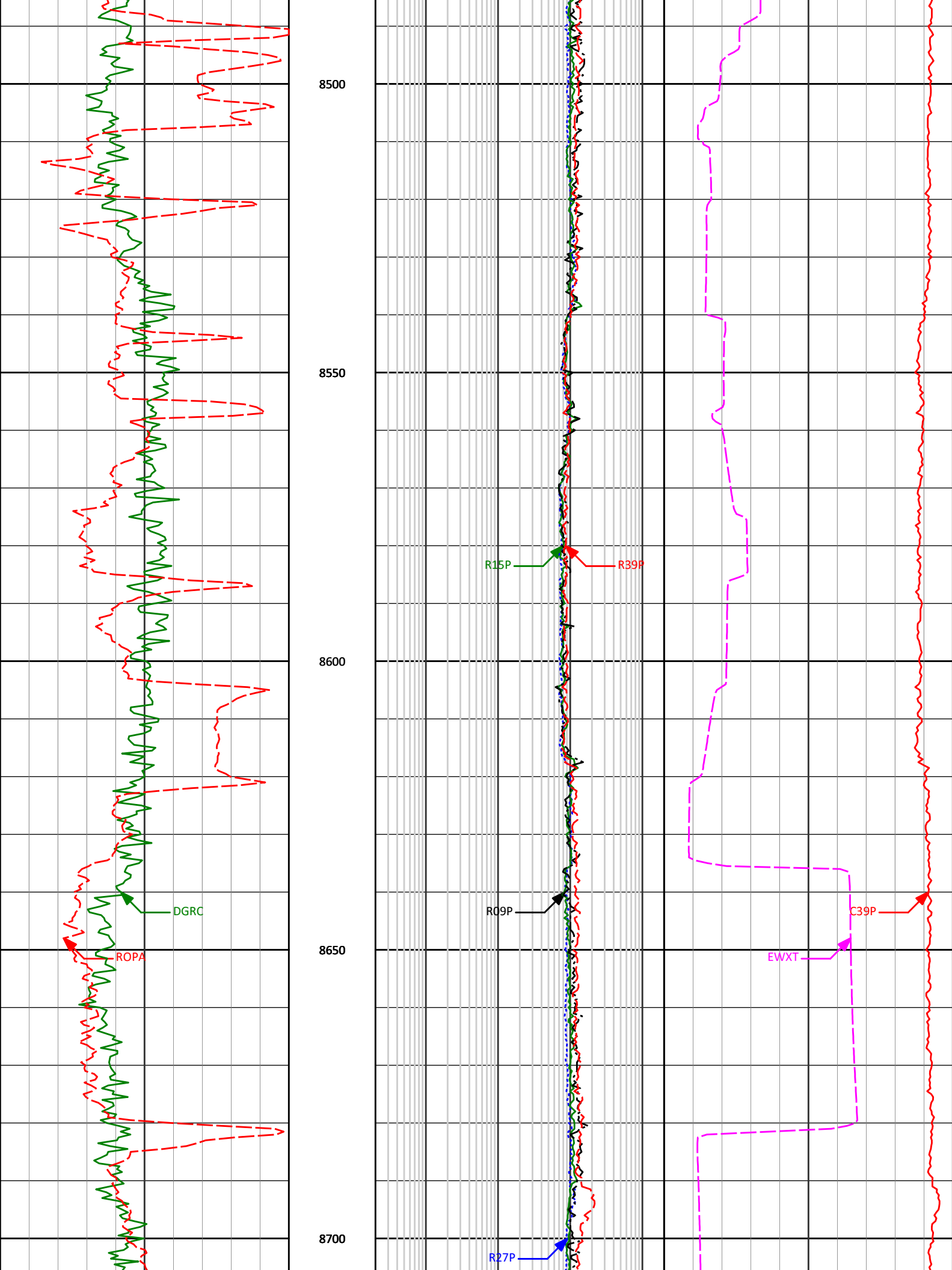
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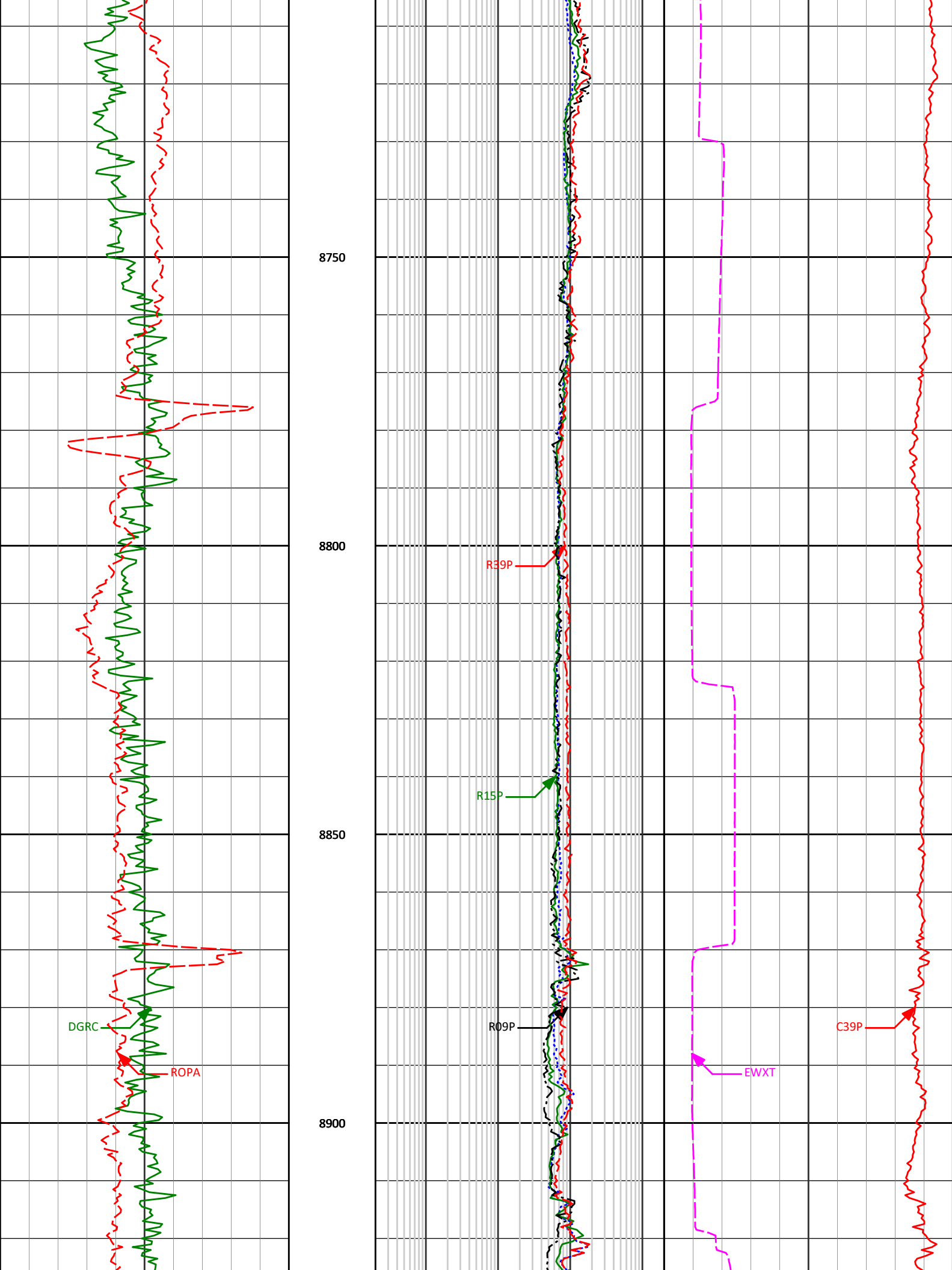
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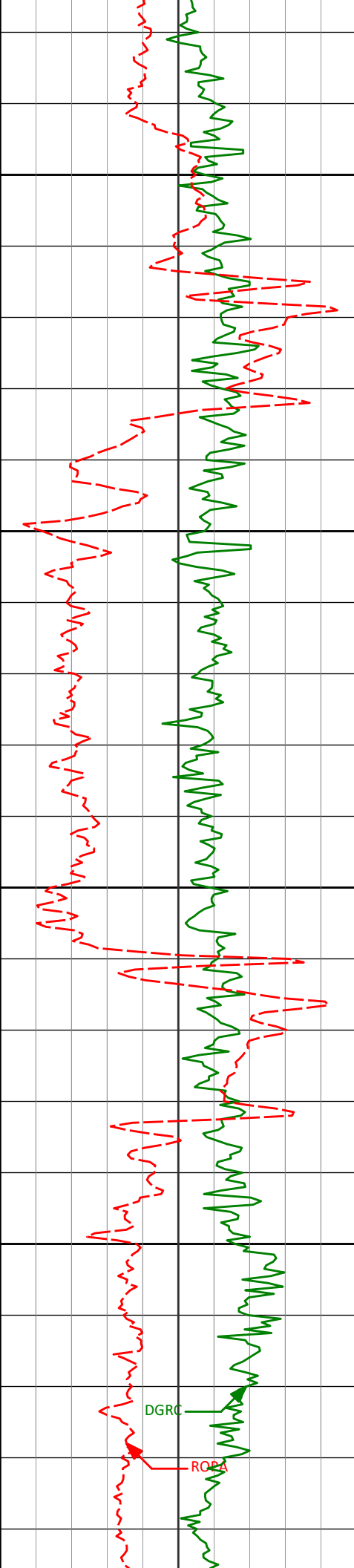










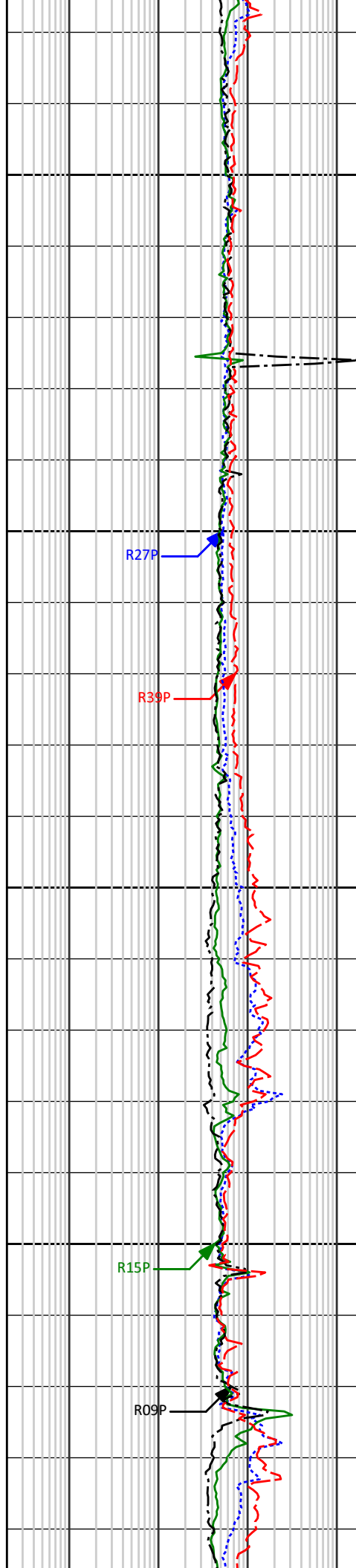


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9000

9050

9100

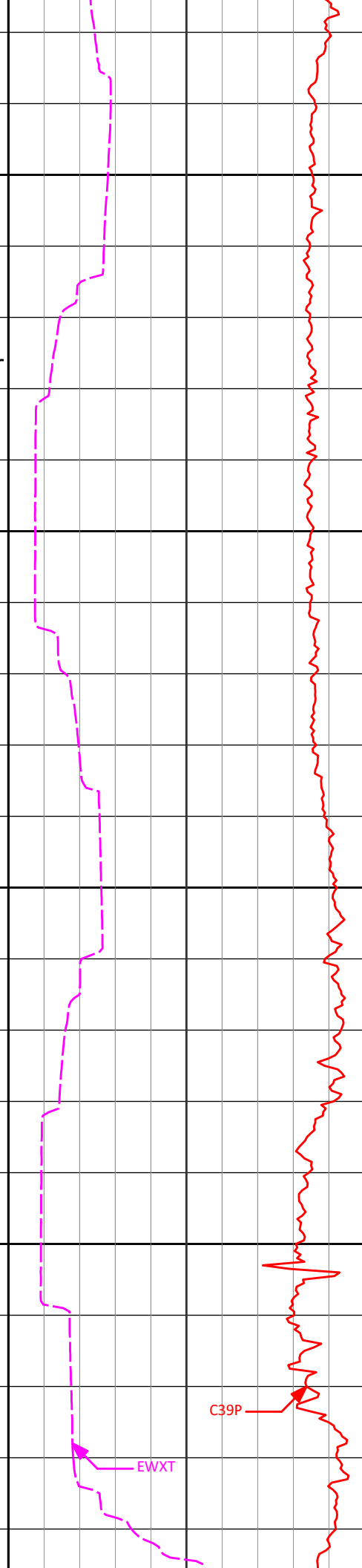


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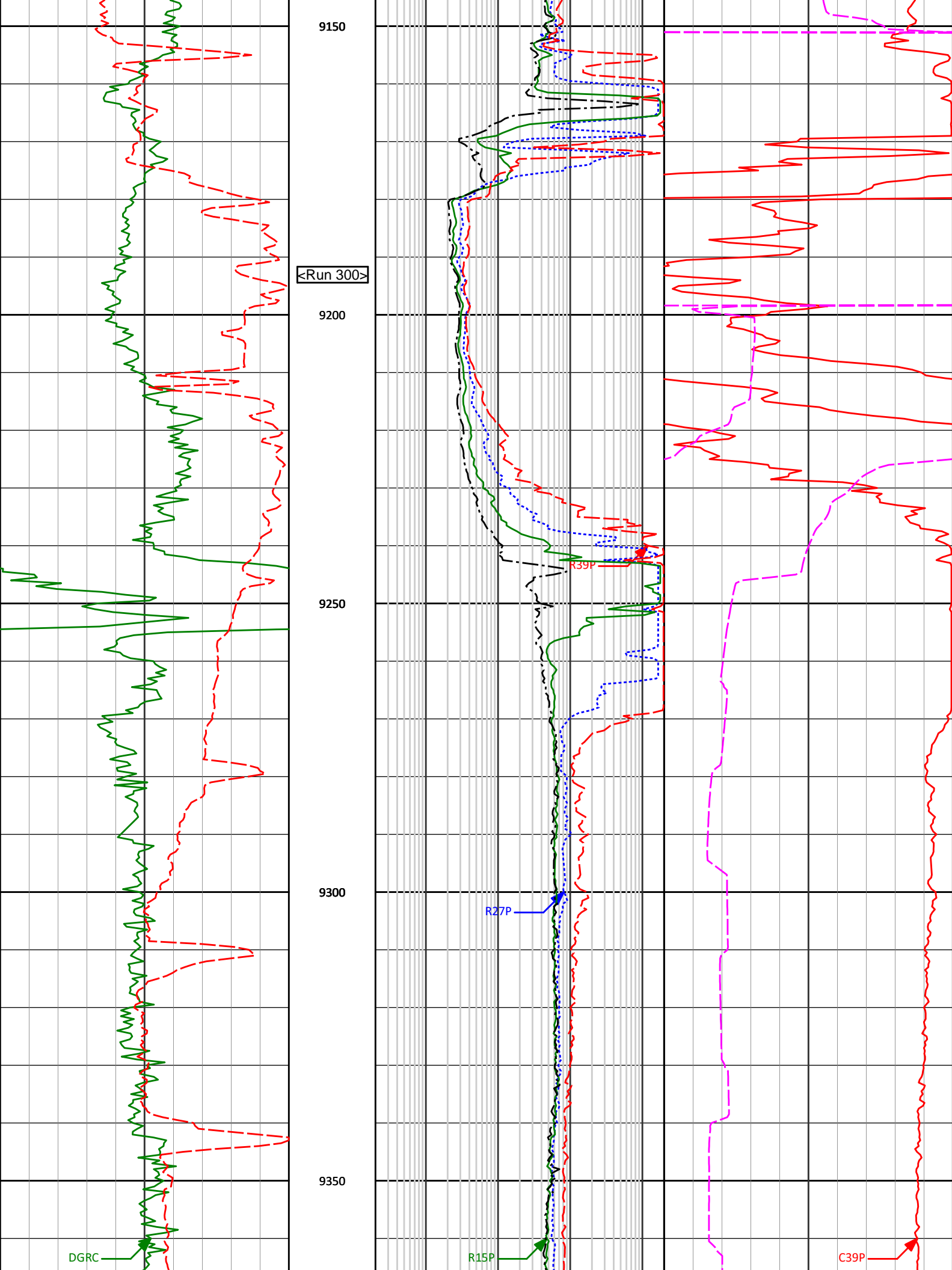
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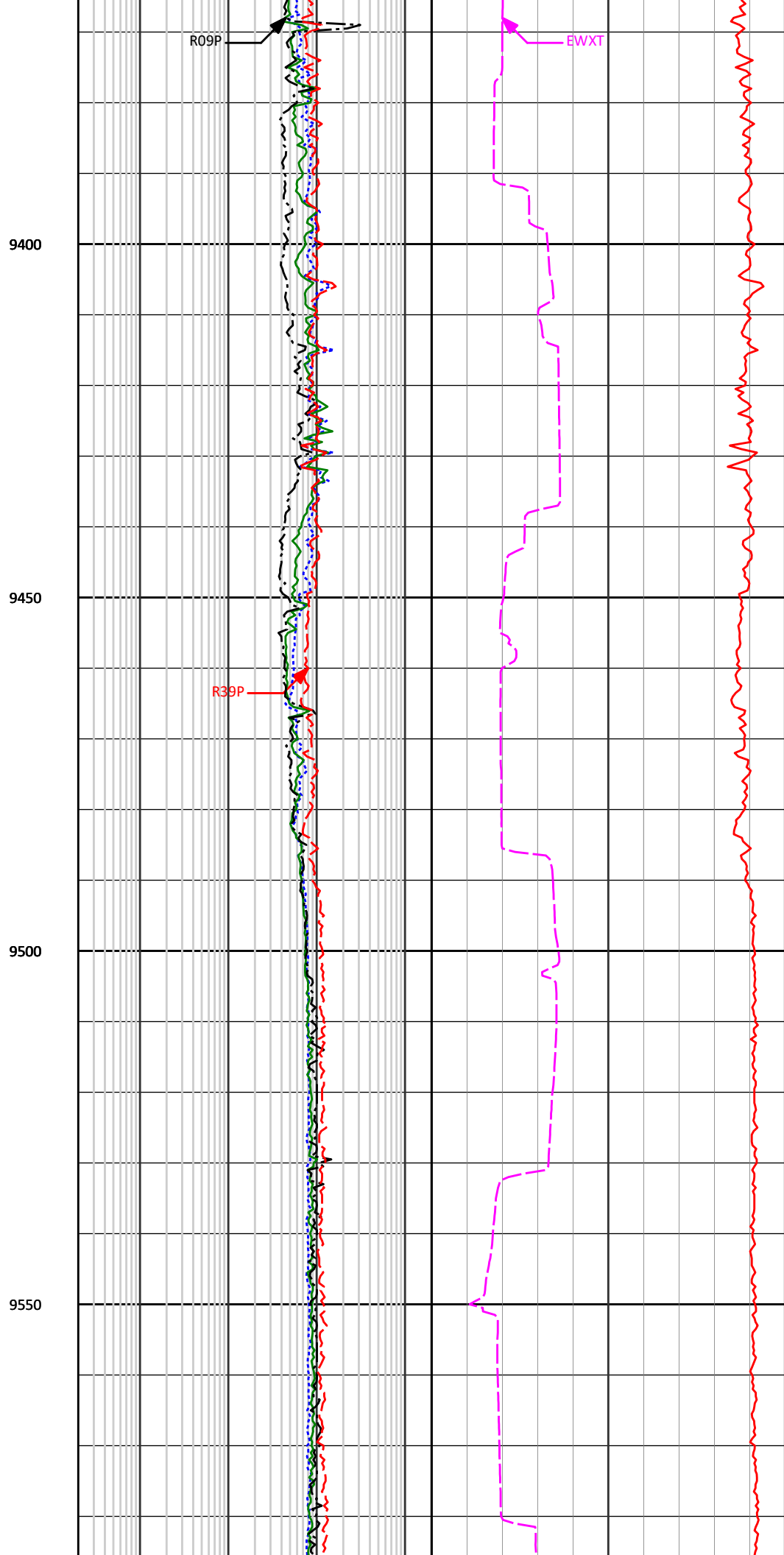
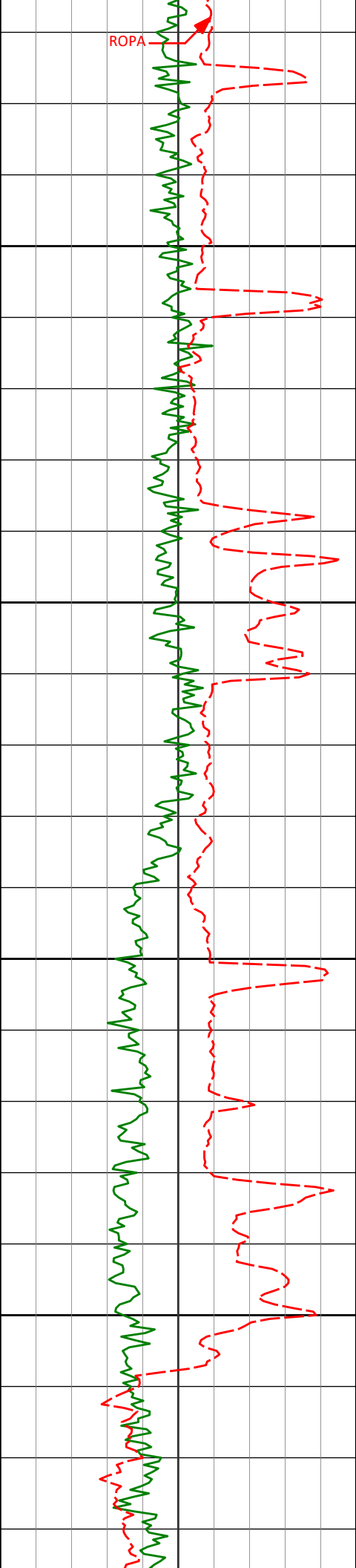
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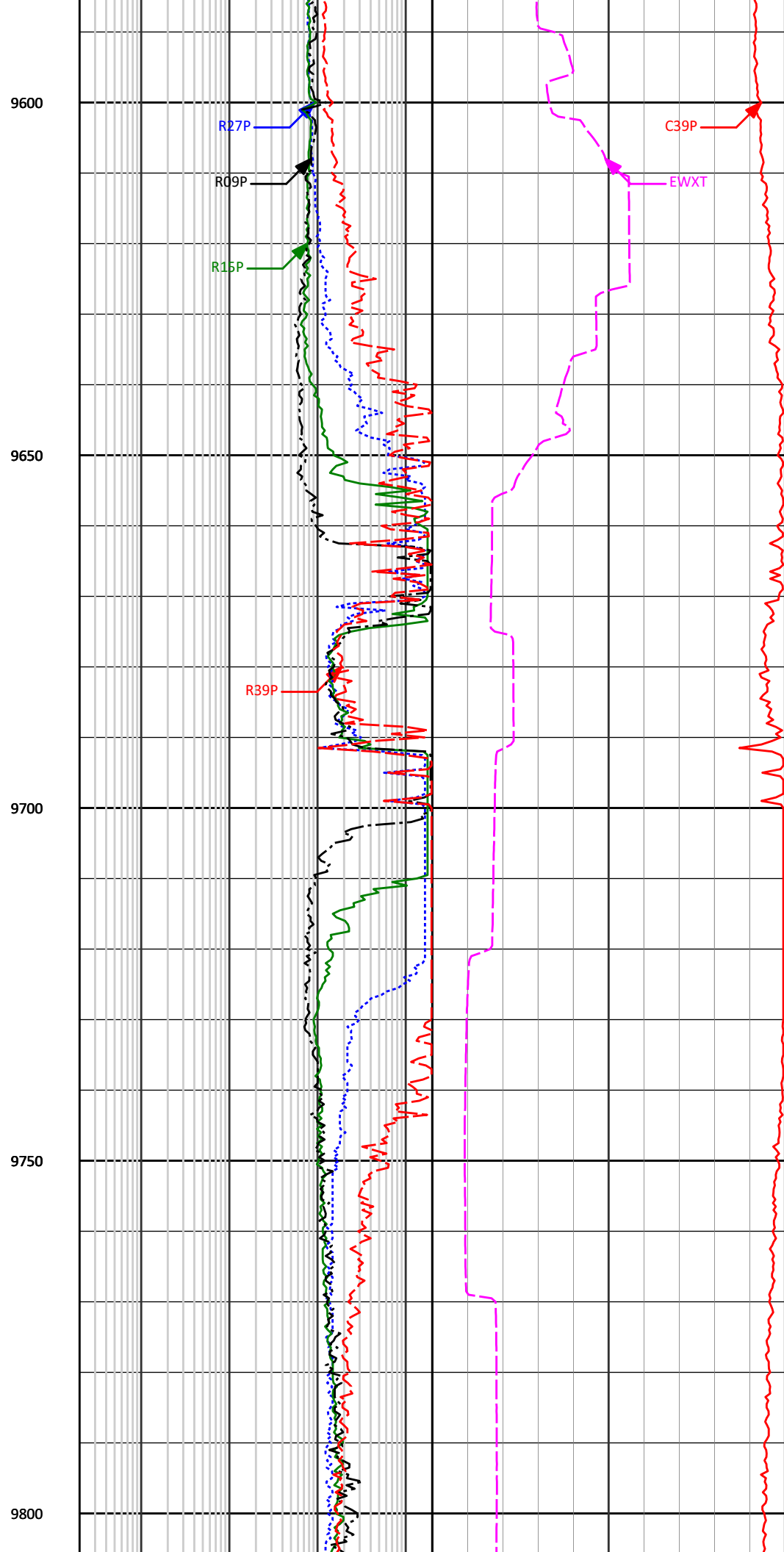
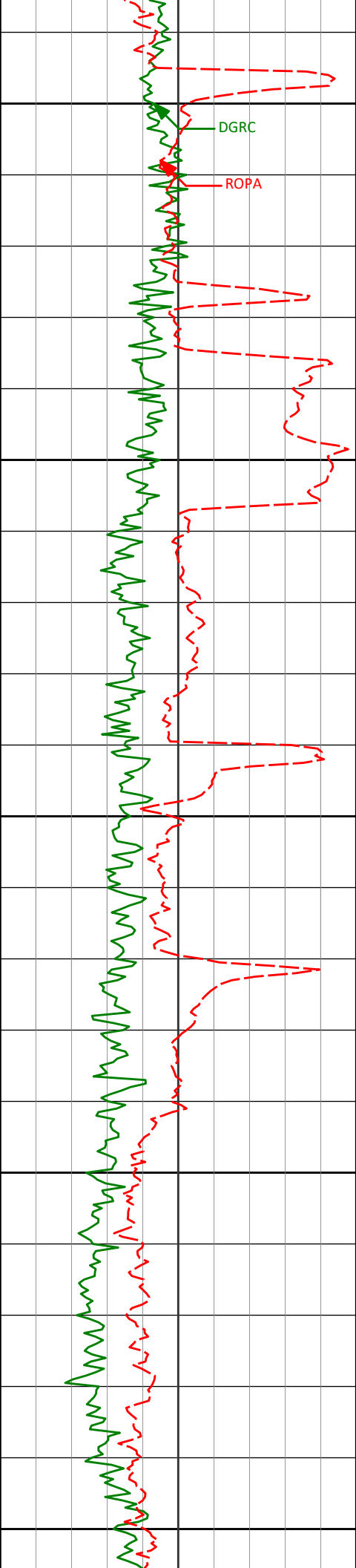


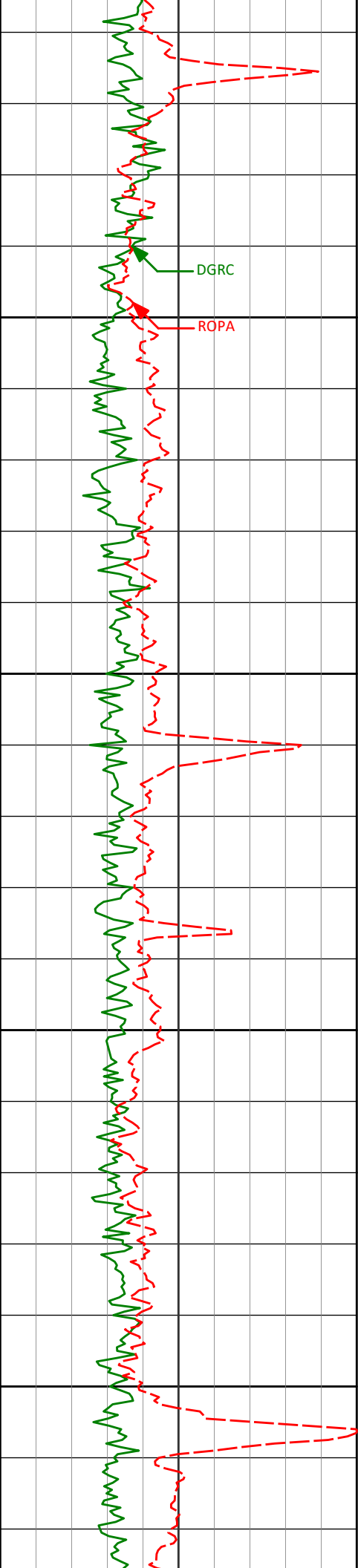
EWXT

C39P







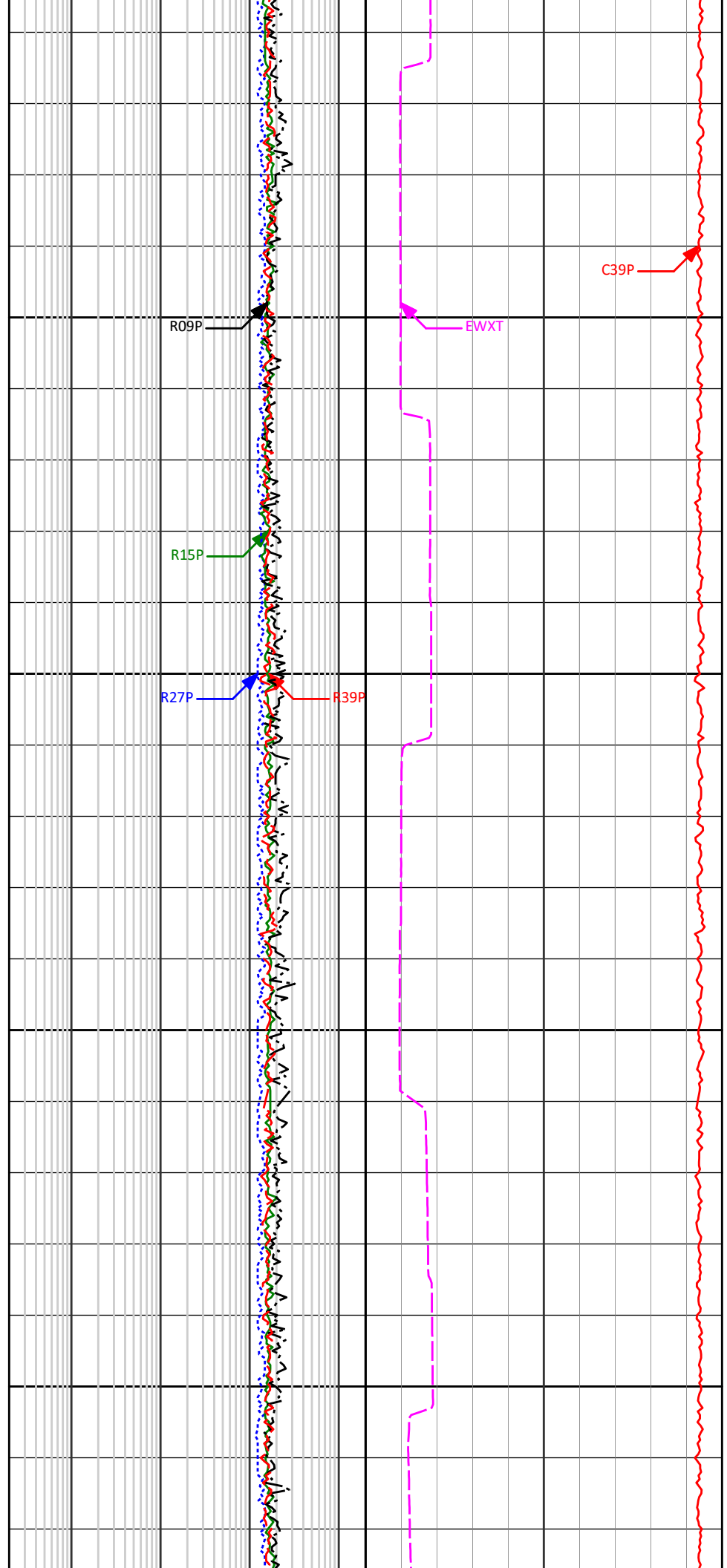


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9900

9950

10000



R09P

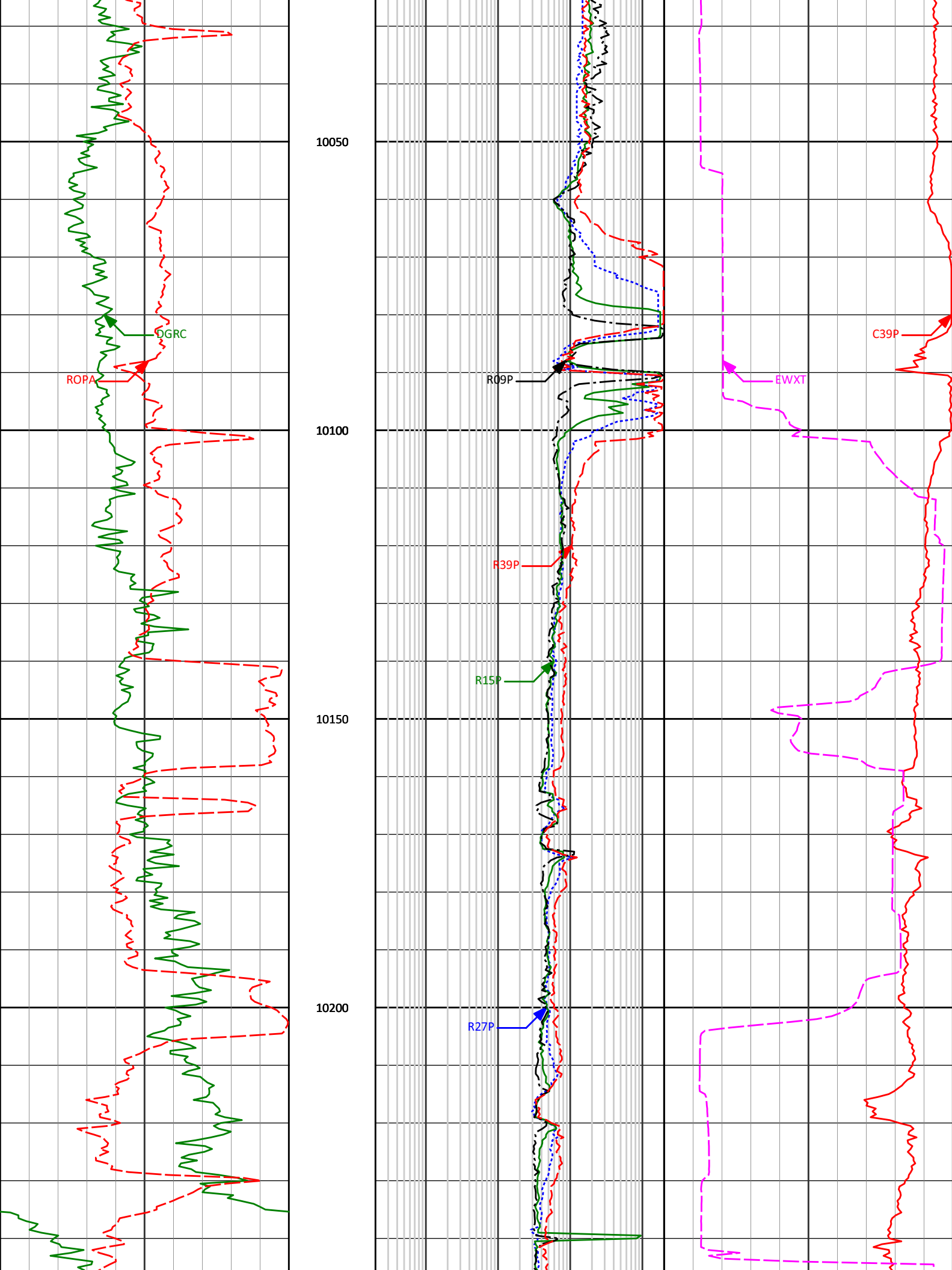
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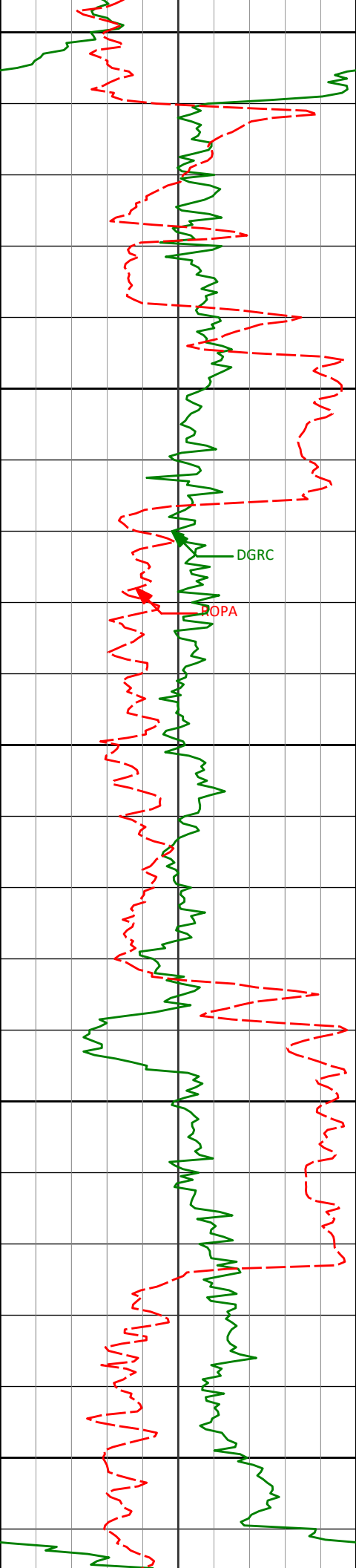
R27P

R39P

EWXT

C39P





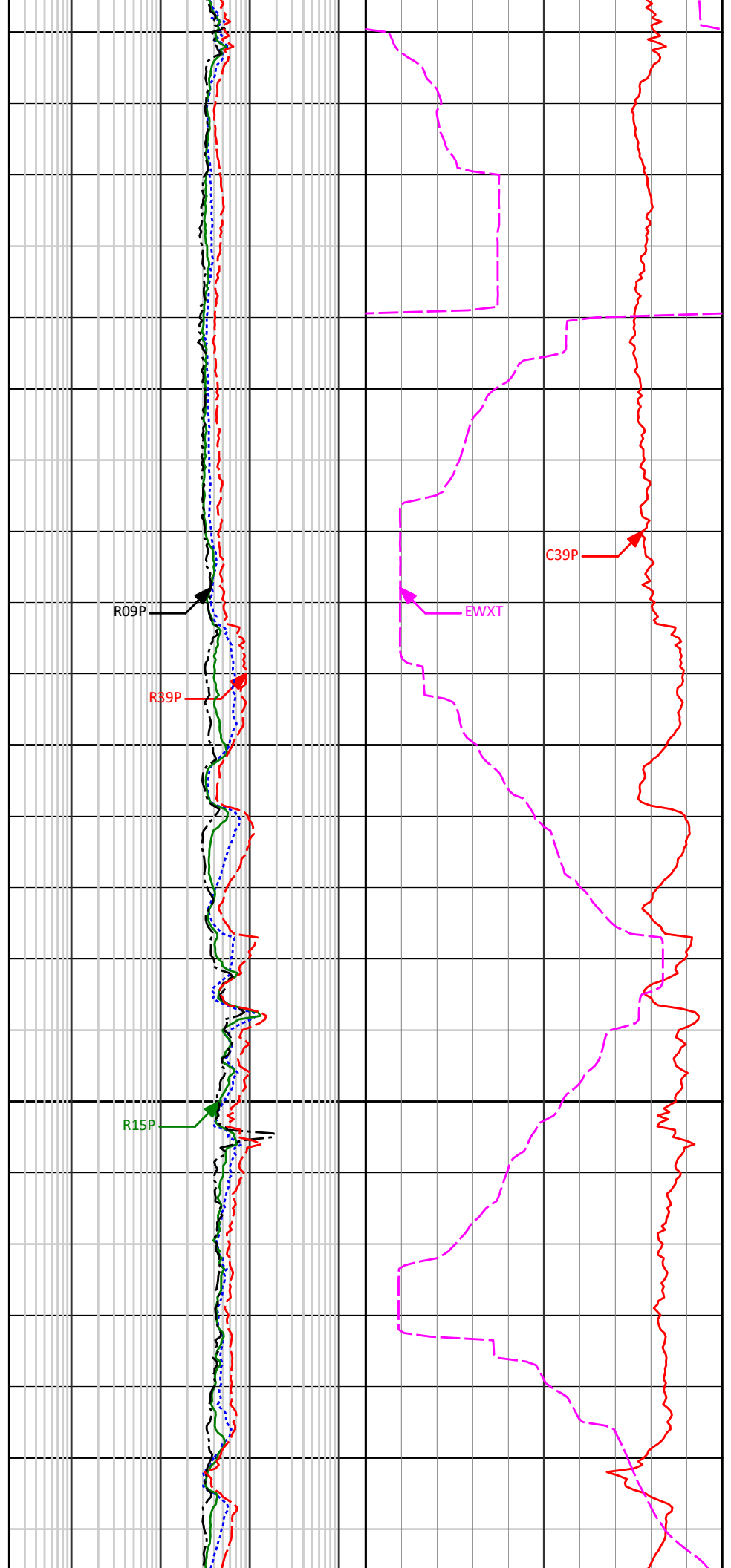
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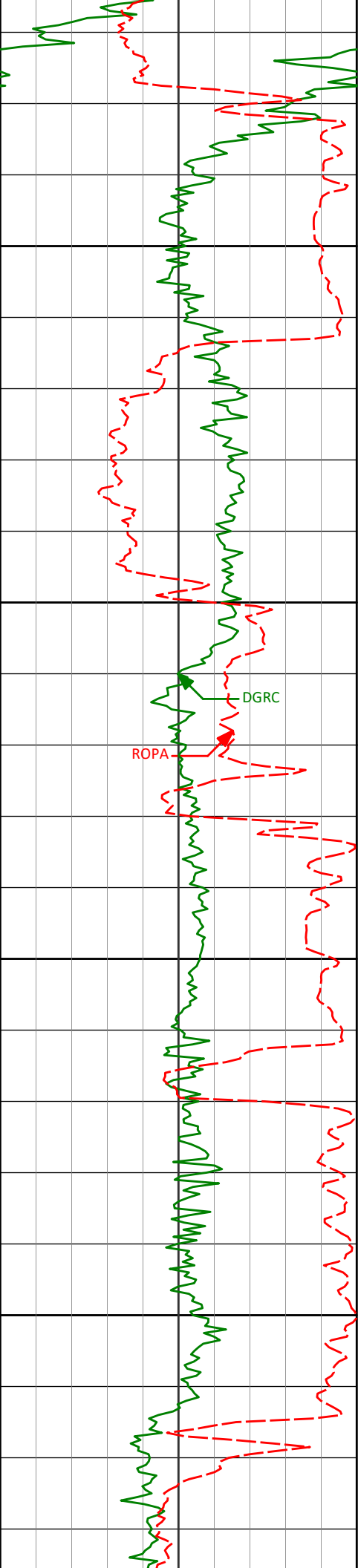
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10350

10400

10450





10500

R27P

10550

R39P

C39P

ROPA

DGRC

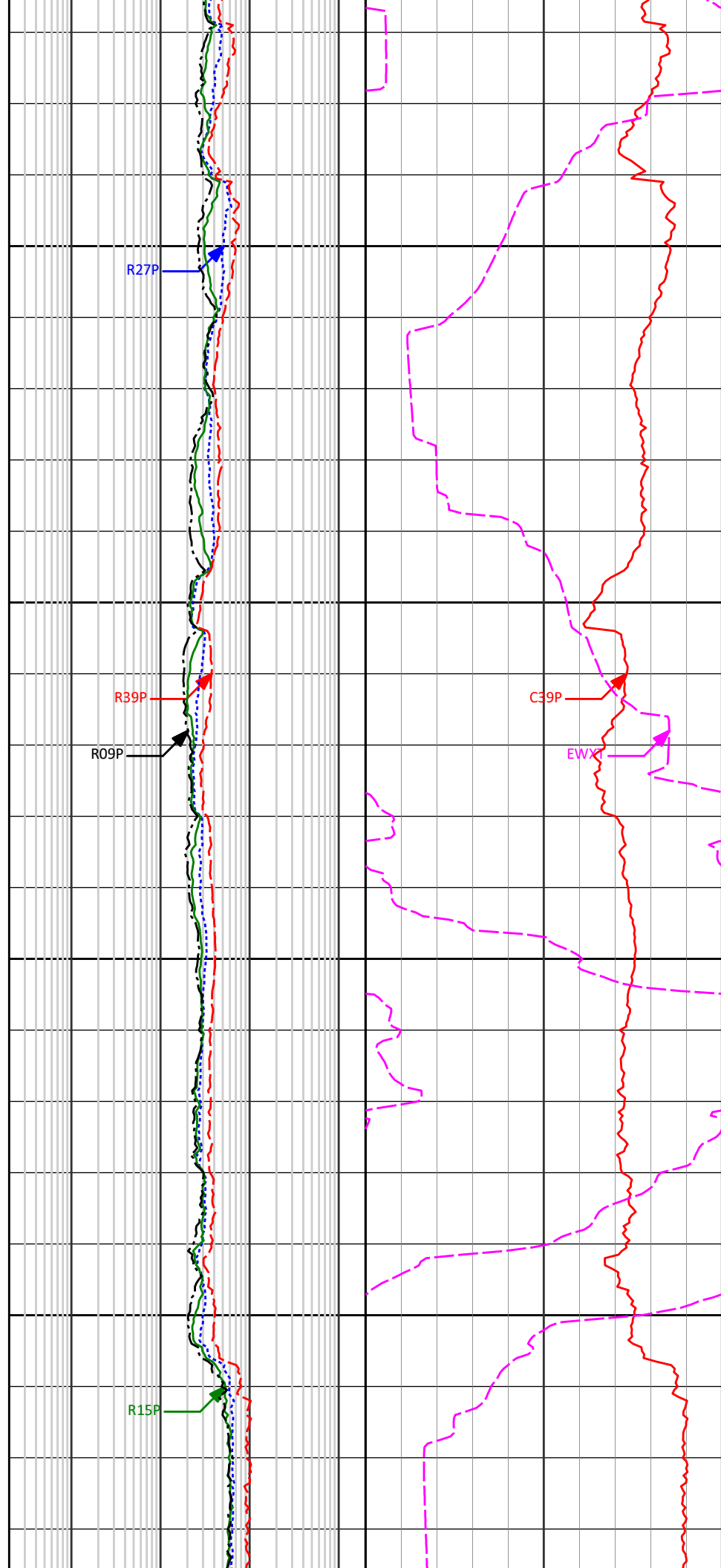
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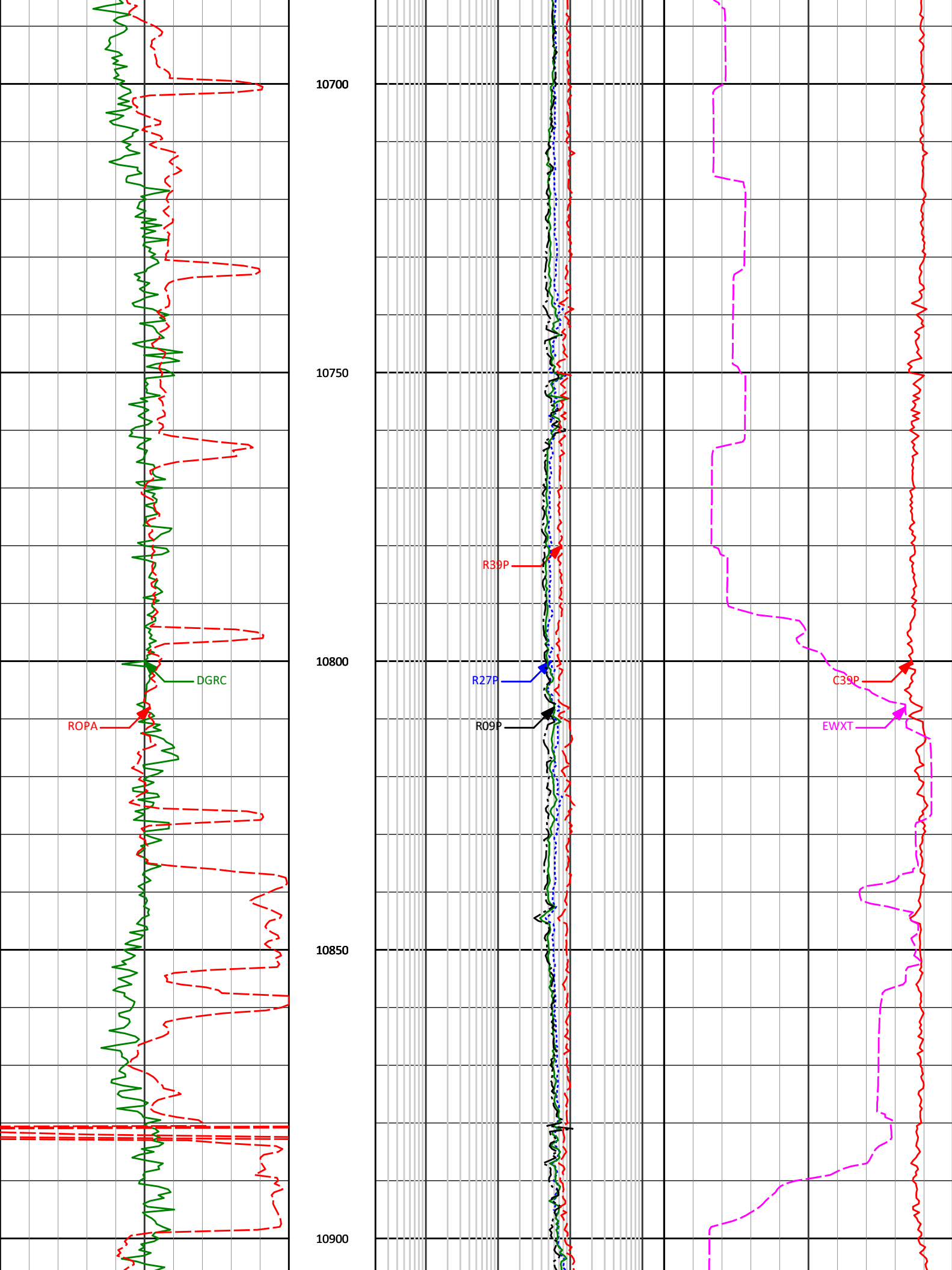
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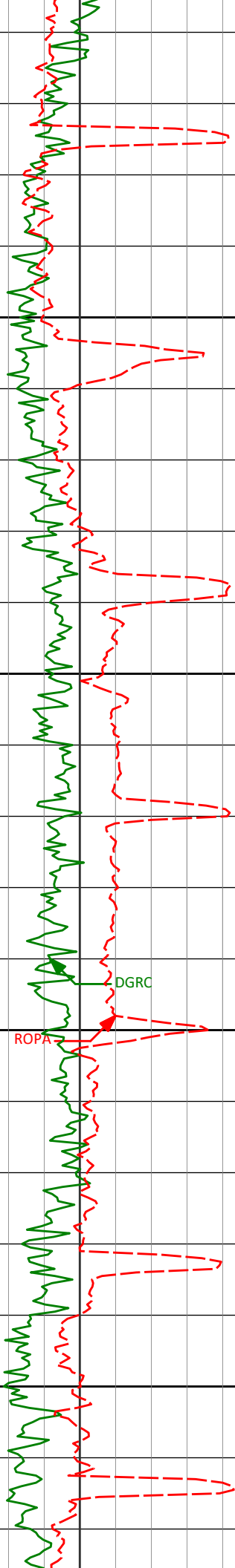
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10650

R15P







10950

11000

11050

11100

R15P

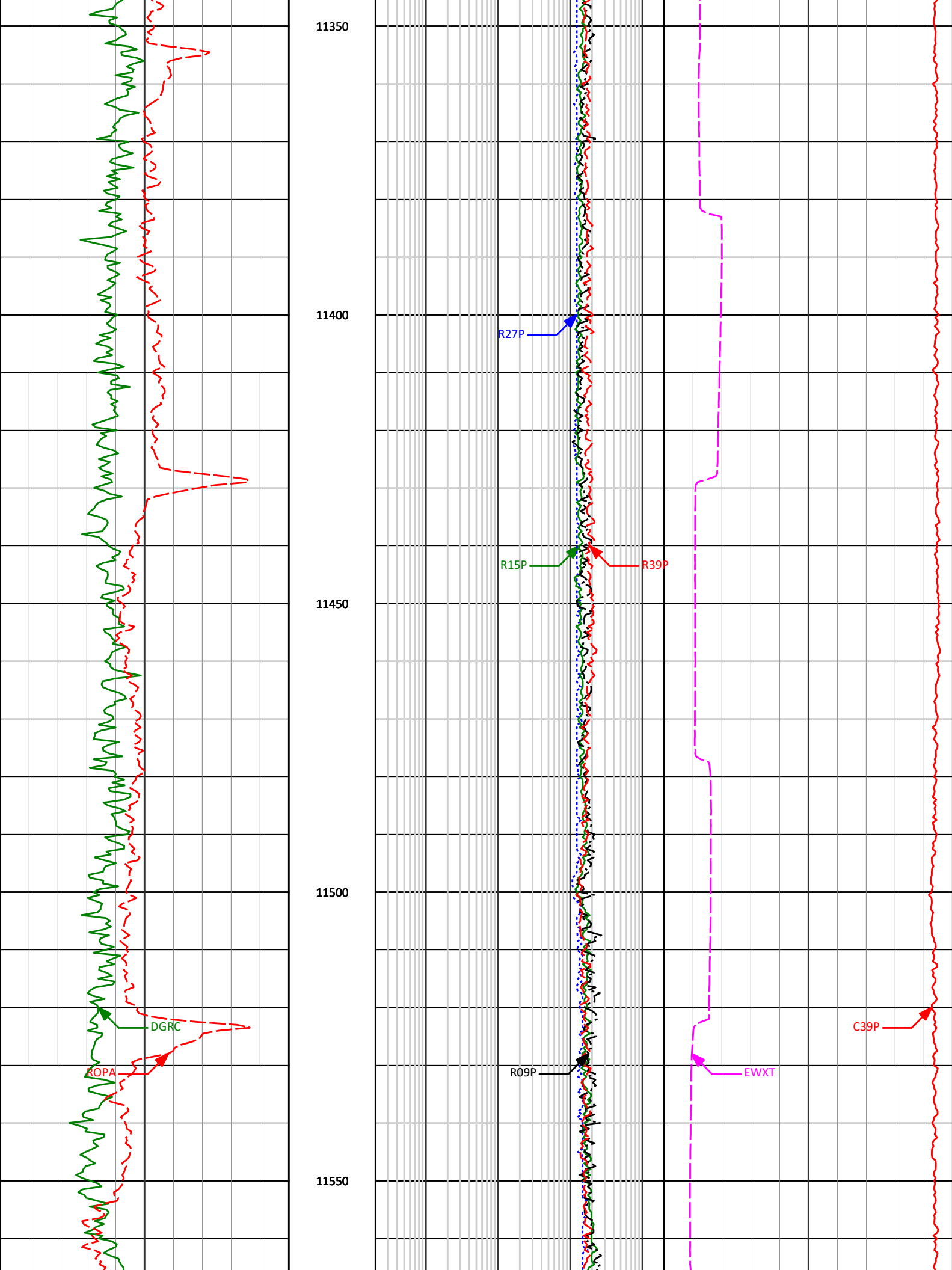
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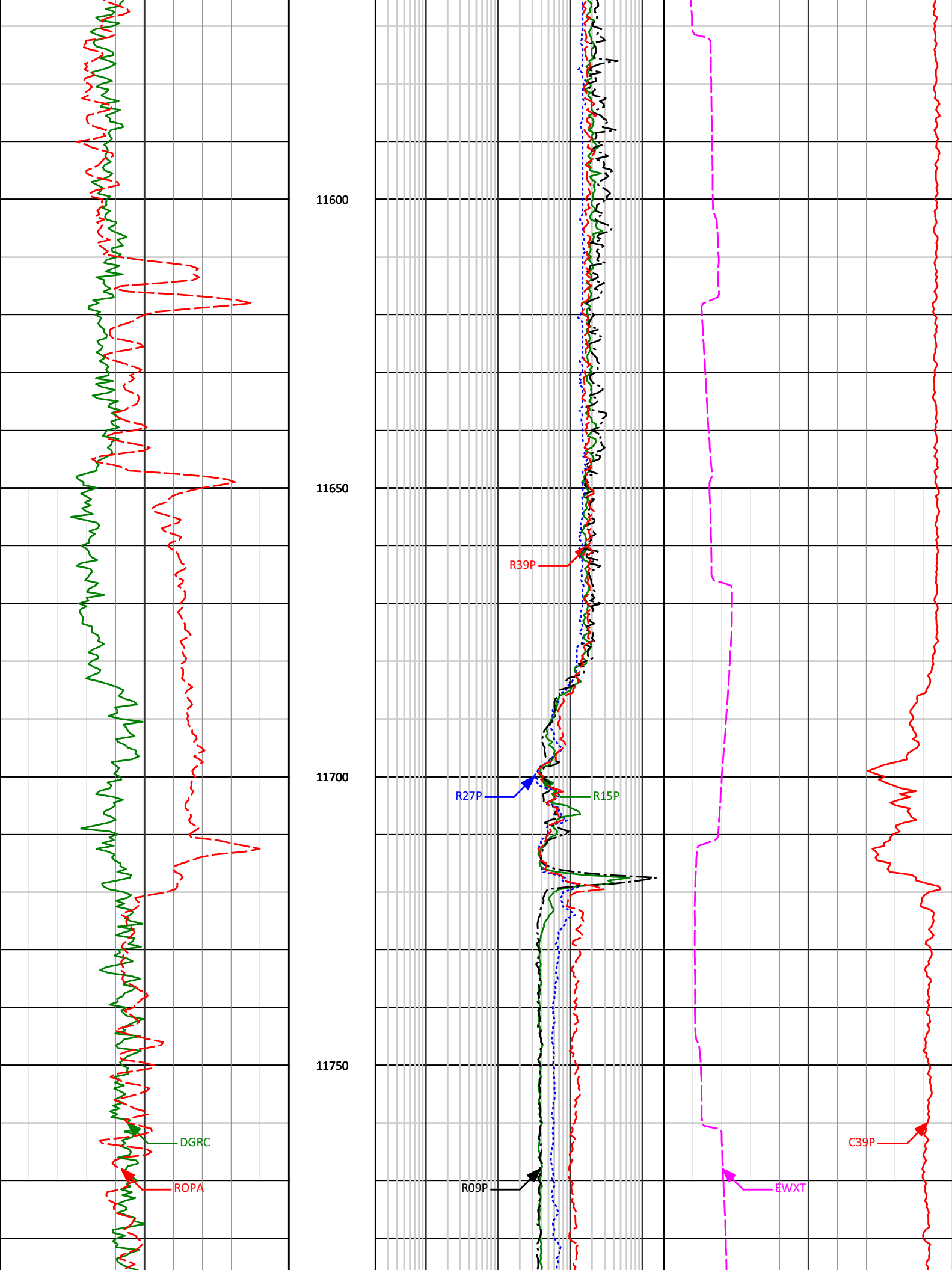
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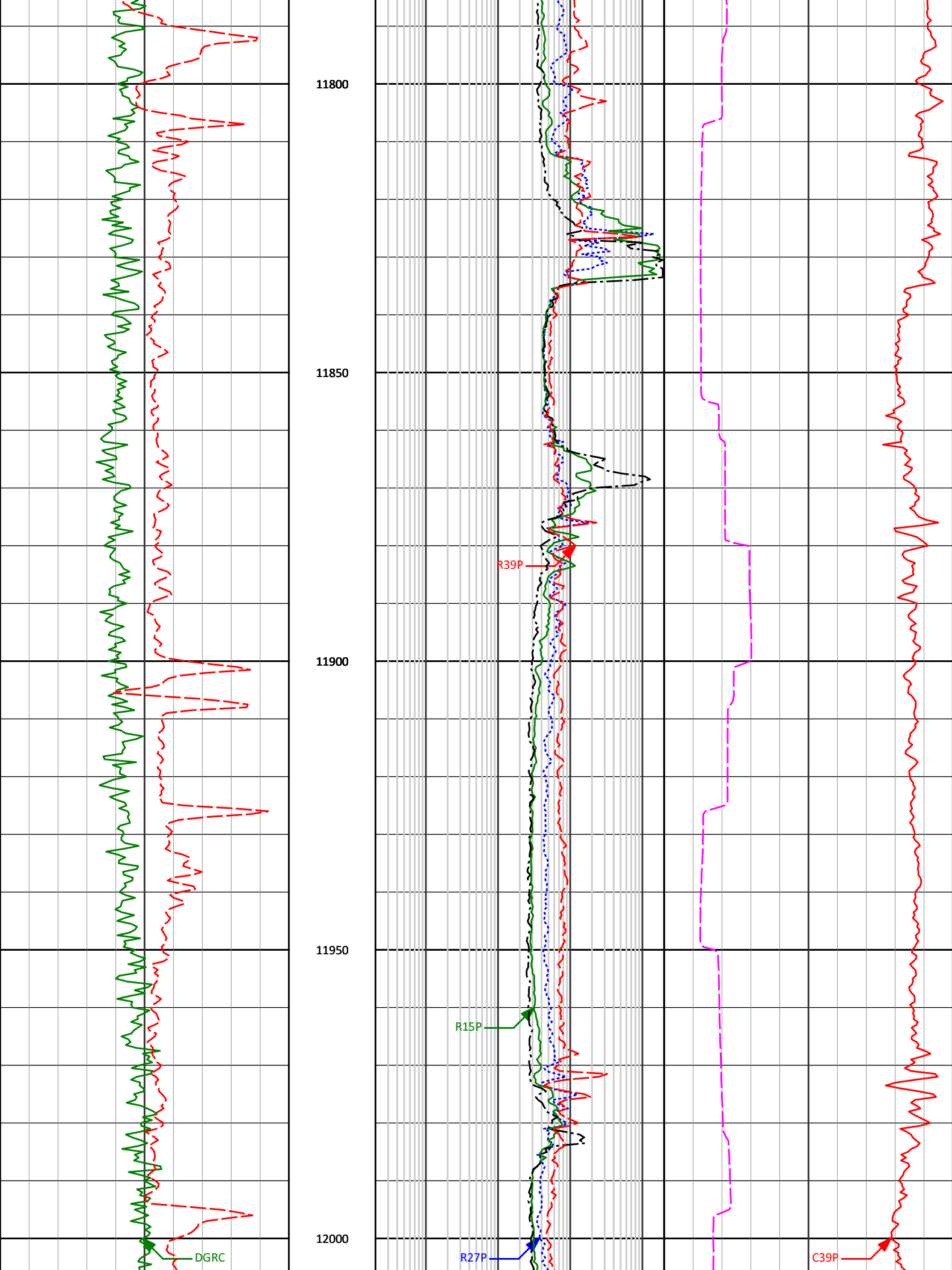
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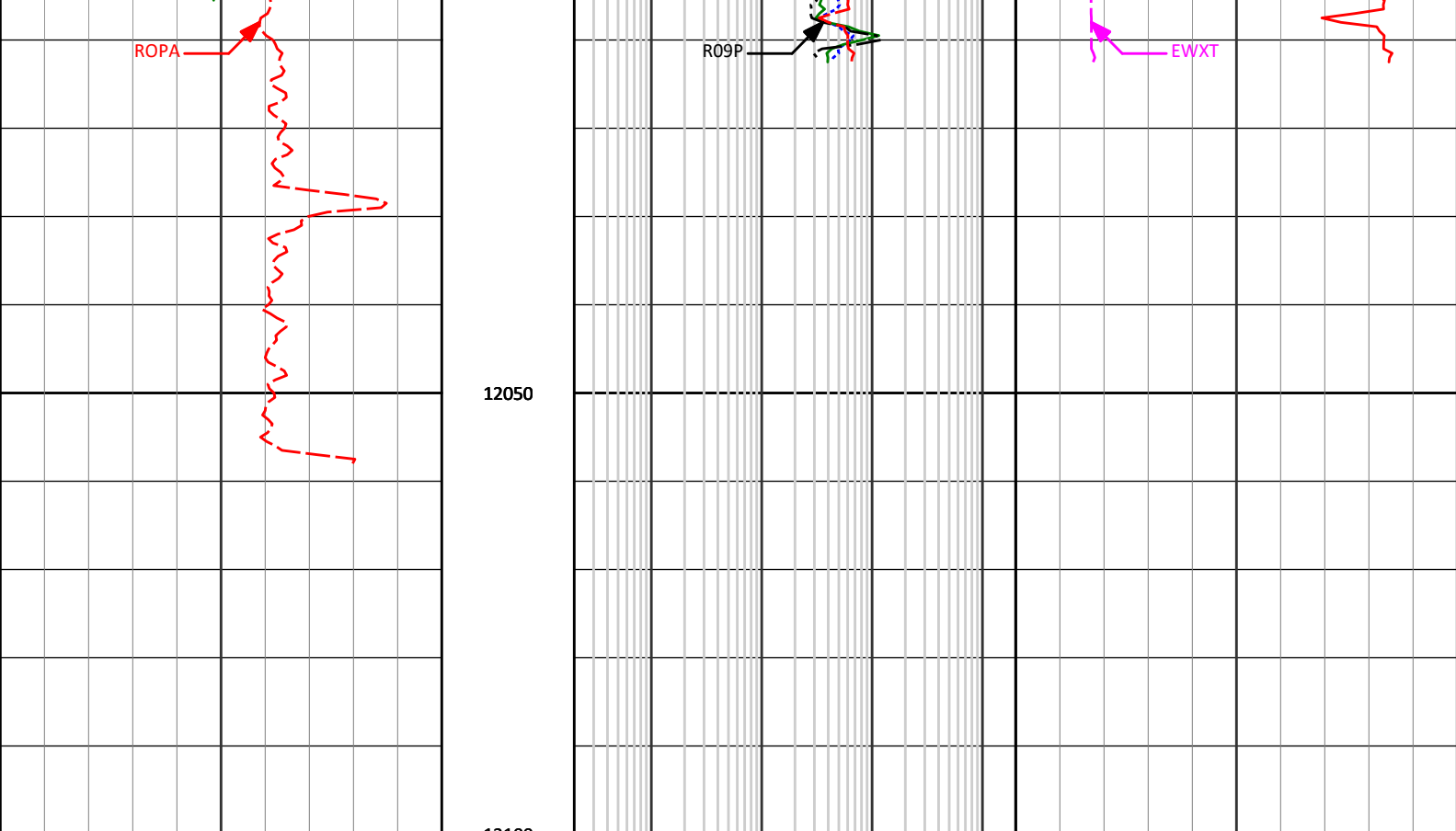
C39P

EWXT









Avg Rate of Penetration ROPA 500 feet per hr 0	MD	X-Shallow (9in) Phase Resistivity R09P 0.2 ohm-metre 2K	Deep (39in) Conductivity C39P 100 mmho/m 0
		Shallow (15in) Phase Resistivity R15P 0.2 ohm-metre 2K	EWR Formation Exposure Time EWXT 0 minutes 100
Gamma Ray Combined DGRC 0 api 300		Medium (27in) Phase Resistivity R27P 0.2 ohm-metre 2K	
		BC Deep PS Res R39P 0.2 ohm-metre 2K	

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MD Detail Log 1:240



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DIRECTIONAL SURVEY REPORT

Anadarko Petroleum Corp.

Eisenach Federal 5N-8HZ

Wattenberg

Weld County Colorado

USA

CA-XX-0900582952

Surveys have IFR Corrections applied.

<i>Measured Depth (feet)</i>	<i>Inclination (degrees)</i>	<i>Direction (degrees)</i>	<i>Vertical Depth (feet)</i>	<i>Latitude (feet)</i>	<i>Departure (feet)</i>	<i>Vertical Section (feet)</i>	<i>Dogleg (deg/100ft)</i>
603.00	1.15	186.84	602.97	2.85 S	1.85 E	-1.88	TIE-IN
733.00	2.14	200.64	732.92	6.42 S	0.84 E	-0.92	0.81
828.00	2.26	204.04	827.85	9.79 S	0.55 W	0.43	0.19
919.00	2.35	198.68	918.77	13.19 S	1.88 W	1.72	0.26
1011.00	2.29	203.69	1010.70	16.66 S	3.22 W	3.02	0.23
1103.00	2.44	168.09	1102.62	20.26 S	3.55 W	3.31	1.58
1195.00	2.51	125.06	1194.54	23.34 S	1.50 W	1.22	1.97
1286.00	4.32	111.92	1285.38	25.76 S	3.31 E	-3.62	2.15
1377.00	5.65	125.43	1376.04	29.64 S	10.14 E	-10.50	1.94
1469.00	6.46	116.52	1467.53	34.57 S	18.46 E	-18.88	1.35
1561.00	5.95	114.16	1558.99	38.84 S	27.44 E	-27.91	0.62
1653.00	6.47	95.24	1650.46	41.26 S	36.96 E	-37.45	2.28
1745.00	7.19	84.04	1741.81	41.14 S	47.85 E	-48.34	1.64
1837.00	5.90	80.23	1833.21	39.74 S	58.23 E	-58.71	1.48
1928.00	6.33	62.64	1923.70	36.64 S	67.30 E	-67.73	2.10
2020.00	7.17	49.60	2015.06	30.59 S	76.17 E	-76.54	1.89
2112.00	7.32	46.82	2106.33	22.85 S	84.82 E	-85.09	0.41
2203.00	8.06	50.10	2196.51	14.79 S	93.94 E	-94.11	0.95
2295.00	5.90	48.26	2287.82	7.51 S	102.42 E	-102.50	2.36
2386.00	6.31	50.71	2378.31	1.23 S	109.78 E	-109.79	0.53
2481.00	7.07	52.95	2472.66	5.60 N	118.49 E	-118.41	0.85
2575.00	8.31	59.77	2565.81	12.51 N	128.97 E	-128.81	1.64
2669.00	9.21	65.48	2658.72	19.05 N	141.69 E	-141.45	1.33
2764.00	9.18	65.25	2752.50	25.38 N	155.49 E	-155.17	0.05
2858.00	9.20	64.28	2845.29	31.78 N	169.07 E	-168.67	0.17
2952.00	8.79	63.27	2938.13	38.27 N	182.25 E	-181.78	0.47
3047.00	7.50	62.79	3032.17	44.37 N	194.25 E	-193.70	1.36
3141.00	7.23	60.39	3125.40	50.10 N	204.85 E	-204.23	0.44
3236.00	6.27	59.55	3219.74	55.68 N	214.52 E	-213.83	1.02
3331.00	5.06	57.96	3314.27	60.53 N	222.54 E	-221.79	1.28
3425.00	3.86	52.60	3407.99	64.65 N	228.57 E	-227.77	1.35
3520.00	3.00	54.97	3502.82	68.02 N	233.14 E	-232.31	0.92
3614.00	2.01	43.74	3596.73	70.62 N	236.30 E	-235.43	1.17
3709.00	1.60	54.64	3691.68	72.60 N	238.53 E	-237.64	0.56
3804.00	1.68	51.58	3786.64	74.23 N	240.70 E	-239.79	0.12
3898.00	2.11	59.81	3880.59	75.95 N	243.28 E	-242.35	0.54
3993.00	2.20	69.64	3975.52	77.47 N	246.50 E	-245.55	0.40
4087.00	2.09	66.55	4069.46	78.78 N	249.76 E	-248.80	0.17
4182.00	0.41	210.36	4164.44	79.17 N	251.18 E	-250.21	2.56
4277.00	1.20	225.77	4259.43	78.19 N	250.30 E	-249.34	0.85
4371.00	1.36	234.46	4353.40	76.85 N	248.68 E	-247.74	0.27
4466.00	1.30	233.47	4448.38	75.56 N	246.90 E	-245.97	0.07
4560.00	1.55	218.94	4542.35	73.93 N	245.24 E	-244.34	0.47
4655.00	1.47	226.34	4637.32	72.09 N	243.56 E	-242.67	0.22
4750.00	0.93	289.45	4732.30	71.51 N	241.95 E	-241.07	1.41
4844.00	1.24	342.53	4826.28	72.73 N	240.92 E	-240.03	1.07
4939.00	1.44	340.75	4921.26	74.84 N	240.22 E	-239.30	0.22
5128.00	0.87	340.12	5110.22	78.43 N	238.95 E	-237.99	0.30
5222.00	0.42	336.16	5204.21	79.42 N	238.57 E	-237.59	0.48
5317.00	0.35	325.33	5299.21	79.97 N	238.26 E	-237.28	0.11
5411.00	0.13	347.88	5393.21	80.31 N	238.08 E	-237.09	0.25
5600.00	0.50	156.55	5582.21	79.77 N	238.36 E	-237.38	0.33
5695.00	0.50	137.77	5677.20	79.08 N	238.80 E	-237.83	0.17
5790.00	0.63	155.26	5772.20	78.30 N	239.30 E	-238.34	0.23
5885.00	0.60	126.24	5867.19	77.53 N	239.92 E	-238.97	0.33
5980.00	0.83	127.42	5962.19	76.82 N	240.87 E	-239.92	0.24
6075.00	0.99	107.35	6057.18	76.16 N	242.20 E	-241.26	0.37
6169.00	0.99	115.04	6151.16	75.57 N	243.71 E	-242.78	0.14
6264.00	1.49	80.48	6246.14	75.43 N	245.67 E	-244.74	0.92
6359.00	1.68	91.33	6341.10	75.60 N	248.28 E	-247.35	0.37
6454.00	2.48	100.95	6436.04	75.18 N	251.69 E	-250.77	0.92
6501.00	2.84	107.63	6482.99	74.63 N	253.80 E	-252.88	1.01
6549.00	1.51	265.69	6530.97	74.22 N	254.30 E	-253.39	8.91
6596.00	5.23	277.47	6577.89	74.45 N	251.56 E	-250.64	8.01
6643.00	11.41	274.56	6624.37	75.10 N	244.79 E	-243.87	13.18
6690.00	15.48	275.08	6670.07	76.03 N	233.91 E	-232.97	8.66

6738.00	20.97	272.65	6715.65	76.99 N	218.93 E	-217.99	11.54
6785.00	23.88	268.30	6759.09	77.10 N	201.02 E	-200.08	7.12
6833.00	27.17	264.51	6802.40	75.76 N	180.39 E	-179.47	7.65
6880.00	31.33	263.41	6843.40	73.33 N	157.56 E	-156.67	8.92
6928.00	36.34	264.27	6883.26	70.48 N	131.00 E	-130.14	10.48
6975.00	41.60	264.97	6919.79	67.72 N	101.58 E	-100.76	11.23
7023.00	45.58	263.59	6954.55	64.41 N	68.66 E	-67.88	8.52
7070.00	50.43	264.98	6985.99	60.94 N	33.91 E	-33.17	10.55
7118.00	57.22	267.31	7014.30	58.38 N	4.72 W	5.43	14.68
7165.00	61.34	267.89	7038.31	56.69 N	45.08 W	45.76	8.83
7213.00	64.82	268.95	7060.04	55.51 N	87.86 W	88.52	7.51
7260.00	68.47	271.23	7078.67	55.59 N	131.00 W	131.66	8.95
7308.00	70.59	271.86	7095.45	56.81 N	175.95 W	176.62	4.58
7355.00	74.42	271.94	7109.58	58.29 N	220.74 W	221.43	8.15
7403.00	80.15	271.40	7120.14	59.66 N	267.52 W	268.22	11.99
7450.00	83.89	271.26	7126.67	60.74 N	314.05 W	314.76	7.96
7466.00	85.43	271.68	7128.15	61.14 N	329.97 W	330.68	9.97
7568.00	90.25	270.97	7132.00	63.50 N	431.84 W	432.57	4.78
7663.00	90.74	271.08	7131.18	65.20 N	526.82 W	527.57	0.53
7757.00	91.36	271.53	7129.45	67.34 N	620.78 W	621.55	0.81
7852.00	91.98	271.72	7126.69	70.03 N	715.70 W	716.49	0.68
7947.00	90.93	270.64	7124.27	71.99 N	810.65 W	811.46	1.59
8042.00	89.14	270.56	7124.22	72.98 N	905.64 W	906.45	1.89
8137.00	88.15	274.31	7126.46	77.02 N	1000.51 W	1001.36	4.08
8232.00	88.89	277.38	7128.92	86.69 N	1094.97 W	1095.94	3.32
8326.00	90.19	276.70	7129.67	98.21 N	1188.26 W	1189.35	1.56
8421.00	90.12	275.40	7129.41	108.22 N	1282.73 W	1283.94	1.37
8516.00	90.12	274.89	7129.22	116.74 N	1377.34 W	1378.65	0.54
8611.00	89.94	272.92	7129.17	123.21 N	1472.12 W	1473.49	2.08
8706.00	90.19	271.85	7129.06	127.16 N	1567.03 W	1568.45	1.16
8800.00	91.17	271.52	7127.94	129.92 N	1660.99 W	1662.43	1.10
8895.00	92.16	270.68	7125.18	131.75 N	1755.93 W	1757.39	1.37
8990.00	91.30	269.86	7122.31	132.19 N	1850.88 W	1852.34	1.25
9084.00	89.26	268.30	7121.85	130.68 N	1944.86 W	1946.29	2.73
9179.00	89.07	268.09	7123.24	127.69 N	2039.80 W	2041.19	0.30
9273.00	89.38	267.94	7124.51	124.44 N	2133.74 W	2135.08	0.37
9368.00	89.88	267.75	7125.12	120.86 N	2228.67 W	2229.96	0.56
9462.00	89.88	269.05	7125.32	118.24 N	2322.63 W	2323.88	1.38
9557.00	89.32	269.45	7125.98	117.00 N	2417.62 W	2418.85	0.72
9651.00	89.07	270.56	7127.31	117.00 N	2511.61 W	2512.83	1.21
9746.00	89.20	270.64	7128.74	118.00 N	2606.59 W	2607.82	0.16
9841.00	89.13	270.89	7130.12	119.27 N	2701.57 W	2702.81	0.27
9936.00	89.63	271.15	7131.15	120.96 N	2796.55 W	2797.80	0.59
10030.00	90.37	270.60	7131.15	122.39 N	2890.54 W	2891.80	0.98
10125.00	91.98	270.48	7129.20	123.29 N	2985.51 W	2986.78	1.70
10220.00	92.10	270.42	7125.82	124.03 N	3080.45 W	3081.72	0.14
10315.00	91.67	270.27	7122.70	124.61 N	3175.39 W	3176.66	0.48
10410.00	91.98	268.74	7119.67	123.79 N	3270.34 W	3271.59	1.64
10504.00	91.61	268.19	7116.73	121.27 N	3364.26 W	3365.48	0.70
10599.00	90.99	267.92	7114.57	118.05 N	3459.18 W	3460.35	0.71
10694.00	89.20	269.22	7114.41	115.68 N	3554.14 W	3555.28	2.33
10789.00	90.06	268.86	7115.03	114.08 N	3649.13 W	3650.24	0.98
10884.00	87.96	269.01	7116.67	112.32 N	3744.09 W	3745.17	2.22
10979.00	87.77	268.95	7120.21	110.63 N	3839.01 W	3840.06	0.21
11074.00	88.14	268.43	7123.60	108.46 N	3933.92 W	3934.95	0.67
11169.00	88.46	268.10	7126.42	105.58 N	4028.84 W	4029.82	0.48
11263.00	88.89	269.09	7128.59	103.28 N	4122.78 W	4123.73	1.15
11358.00	88.70	270.49	7130.59	102.93 N	4217.76 W	4218.69	1.49
11453.00	88.76	270.62	7132.69	103.85 N	4312.73 W	4313.67	0.15
11548.00	89.69	270.67	7133.98	104.92 N	4407.72 W	4408.66	0.98
11643.00	89.01	271.74	7135.06	106.92 N	4502.69 W	4503.65	1.33
11738.00	88.95	270.99	7136.75	109.18 N	4597.65 W	4598.63	0.79
11833.00	88.64	270.05	7138.75	110.04 N	4692.62 W	4693.60	1.04
11927.00	88.89	269.08	7140.77	109.33 N	4786.59 W	4787.56	1.07
11989.00	88.76	268.38	7142.04	107.95 N	4848.56 W	4849.51	1.15
12059.00	88.76	268.38	7143.56	105.97 N	4918.52 W	4919.44	0.00

TVD VALUES GIVEN RELATIVE TO DRILLING MEASUREMENT POINT

VERTICAL SECTION RELATIVE TO WELL HEAD
VERTICAL SECTION IS COMPUTED ALONG A DIRECTION OF 270.69 DEGREES (TRUE)
A TOTAL CORRECTION OF 8.60 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 12059.00 FEET
IS 4919.66 FEET ALONG 271.23 DEGREES (TRUE)

Surveys are tied onto surface gyro's.
Final survey is a projection to bit.

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