



# SP4 - Slim Phase 4

1 : 240

Country		: USA			
Field		: Wattenburg			
Location		: Lat: 40° 3' 20.51" North Long: 104°54' 58.43" West			
Well		: Griffiths 36C-20HZ			
Company		: Anadarko Petroleum Corp.			
Rig		: Xtreme 22			
LOCATION		Company : Anadarko Petroleum Corp.			
		Rig : Xtreme 22			
UTM Easting = 3,163,410.357 ft UTM Northing = 1,263,673.819 ft		Well : Griffiths 36C-20HZ			
		Field : Wattenburg			
API Number : 05-123-36622		Country : USA			
Latitude : 40° 3' 20.51" North Longitude : 104°54' 58.43" West					
Elevation : 5060.00 ft		Unit No. : 11610117			
16.00 ft Above Permanent Datum		Job No. :CA-XX-0900382957			
MD LOG					
Permanent Datum : Ground Level		Depth Logged : 1,005.00 ft To 16,774.00 ft			
Log Measured From : Kelly Bushing		Date Logged : 06-Jul-13 To 23-Jul-13			
Drilling Measured From : Kelly Bushing		Total Depth MD : 16,774.00 ft TVD : 7,812.27 ft			
		Spud Date : 06-Jul-13			
		Plot Type : Final			
		Plot Date : 23-Jul-13			

## WELL INFORMATION

<b>MWD Run Number</b>	300	400	500		
<b>Date run completed</b>	14-Jul-13	18-Jul-13	23-Jul-13		
<b>Rig Bit Number</b>	0300	0400	0500		
<b>Bit Size (in)</b>	6.125	6.125	6.125		
<b>Tool Nominal OD (in)</b>	4.750	4.750	4.750		
<b>Log Start Depth (MD, ft)</b>	8,080.00	11,097.00	14,798.00		
<b>Log End Depth (MD, ft)</b>	11,097.00	14,798.00	16,774.00		
<b>Drill or Wipe</b>	Drill	Drill	Drill		
<b>Drill/Wipe Start Date and Time</b>	12-Jul-13 02:40	15-Jul-13 15:10	19-Jul-13 15:20		
<b>Drill/Wipe End Date and Time</b>	14-Jul-13 04:45	18-Jul-13 05:15	21-Jul-13 17:45		
<b>Min Inc (deg) @ Depth (MD, ft)</b>	88.52 @ 10,001.00	87.65 @ 13,110.00	87.10 @ 15,680.00		
<b>Max Inc (deg) @ Depth (MD, ft)</b>	91.85 @ 8,201.00	91.79 @ 12,081.00	90.62 @ 16,774.00		
<b>Bit TFA(in2) / Bit Type</b>	.98 / PDC	.98 / PDC	1.24 / N/A		
<b>Flow Rate (gpm)</b>	277.89	252.99	248.33		
<b>Max AV (fpm) / CV (fpm) @ MWD</b>	336.6 / N/A	0 / N/A	262.0 / N/A		
<b>Fluid Type</b>	Mineral Oil Bas	Mineral Oil Bas	Mineral Oil Bas		
<b>Density (ppg) / Viscosity (spqt)</b>	10.15 / 58.00	10.45 / 70.00	10.47 / 62.00		
<b>Filtrate CL (ppm)</b>	50,000.00	55,000.00	253,593.00		
<b>pH / Fluid Loss (mptm)</b>	N/A / 6	N/A / N/A	N/A / N/A		
<b>PV (cP) / YP (lbf2)</b>	14 / 13.00	29 / 9.00	29 / 9.00		
<b>% Solids / % Sand</b>	13.00 / 0.15	16.00 / 0.15	15.30 / 0.25		
<b>% Oil / Oil:Water Ratio</b>	63.00 / 73:27	58.5 / 74:26	60.80 / 72:28		
<b>Rm @ Measured Temp (degF)</b>	N/A @ N/A	N/A @ N/A	N/A @ N/A		
<b>Rmf @ Measured Temp (degF)</b>	N/A @ N/A	N/A @ N/A	N/A @ N/A		
<b>Rmc @ Measured Temp (degF)</b>	N/A @ N/A	N/A @ N/A	N/A @ N/A		
<b>Max Tool Temp (deg F) @ MWD</b>	222.40 / N/A	251.05 / N/A	251.05 / N/A		

Max Tool Temp (degF) / Source	226.12 / HCIM	254.35 / HCIM	254.35 / HCIM		
Rm @ Max Tool Temp (degF)	N/A @ 226.12	N/A @ 254.35	N/A @ 254.35		
Lead MWD Engineer	Clay Wass	Clay Wass	Clay Wass		
Customer Representative	David Cornett	Luke Rains	Scott Hancock		

## SENSOR INFORMATION

### Downhole Processor Information

Tool Type	HCIM	HCIM	HCIM		
Software Version	88.47	88.56	88.47		
Sub Serial Number	240135	10537450	240135		
Insert Serial Number	11473656	10990340	11473656		
Date and Time Initialized	12-Jul-13 14:29	14-Jul-13 14:52	18-Jul-13 21:57		
Date and Time Read	01-Jan-70 00:00	01-Jan-70 00:00	23-Jul-13 11:40		
ECMB SW Version	N/A	N/A	N/A		

### Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC		
Distance From Bit (ft)	48.50	48.47	48.55		
Software Version	6.21	6.21	6.21		
Sub Serial Number	12121249	12121249	12121249		
Sonde Serial Number	11478019	11638477	11478019		
Sensor ID Number	N/A	N/A	N/A		
Toolface Offset (deg)	252.61	288.15	49.47		

### Gamma Ray Sensor Information

Tool Type	DGR	DGR	DGR		
Distance From Bit (ft)	69.72	70.48	69.77		
Recorded Sample Period (sec)	8	8	8		
Software Version	N/A	N/A	N/A		
Sub Serial Number	240135	268169	240135		
Insert/Sonde Serial Number	094063	11219152	094063		

### Resistivity Sensor Information

Tool Type	Slim P4	Slim P4	Slim P4		
Distance From Bit (ft)	63.22	63.48	63.27		
Recorded Sample Period (sec)	10	10	10		
Software Version	5.55	5.55	5.55		
Sub Serial Number	240135	251278	240135		
Receiver Insert Serial Number	265025	10537450	265025		
Transmitter Insert Serial Number	243460	271830	243460		
Receiver Orientation	Down	Down	Down		

## REMARKS

1. All depths are true vertical depths, referenced to the Driller's pipe tally and are measured from the Kelly Bushing, unless otherwise specified.
2. No depth corrections have been made for pipe stretch or compression.
3. Critical annular velocities are calculated using the "Power Law" model for water based fluids and the "Bingham Plastic" model for oil and synthetic based fluids.
4. all data presented is recorded data unless otherwise specified.
5. The following smoothing parameters have been applied to the data:

SP4 (Slim Phase 4 Resistivity):  
Interval Resolution: 0.5 ft  
Interval Distance: 0.6 ft  
Gap Fill: 3.0 ft

PGRC (Corrected Gamma Ray):  
Interval Resolution: 0.5 ft  
Interval Distance: 0.6 ft  
Gap Fill: 3.0 ft

ROPA (Average Rate Of Penetration):  
Interval Resolution: 0.5 ft  
Interval Distance: 1.2 ft  
Gap Fill: 3.0 ft

Insite version: 7.4.20

WARRANTY

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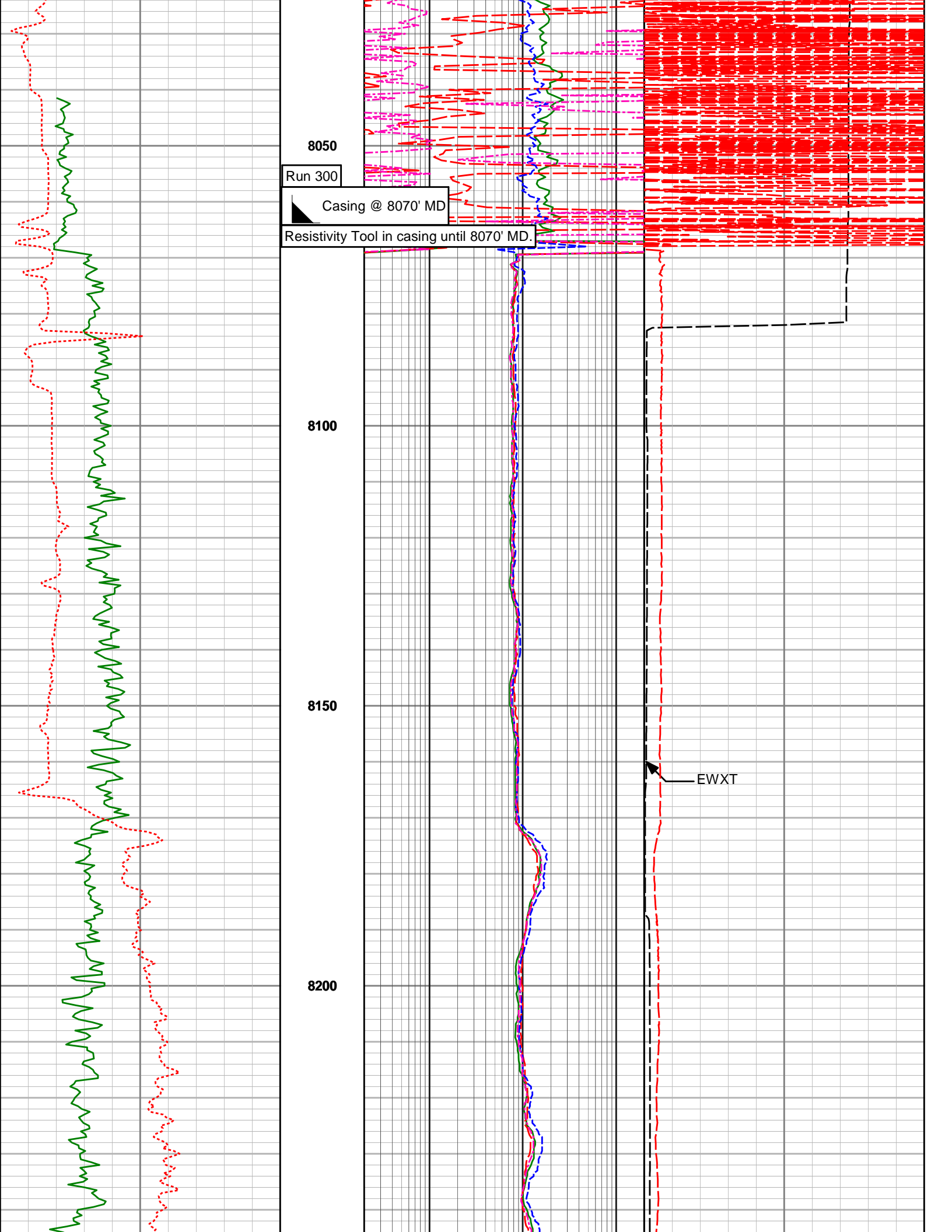
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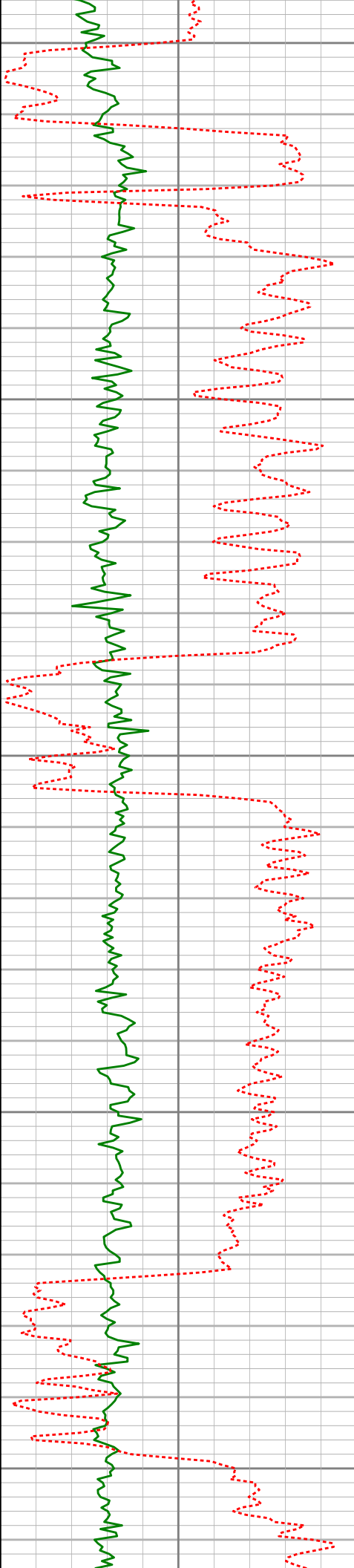
Anadarko

Xtreme 22

Wishbone 3C-24HZ

<div>Dual Gamma Ray (DGRC) <div>0300</div><div>api</div></div>		<div>9in Phase Resistivity BC (R09P) <div>0.2200</div><div>ohm-m</div></div>	
		<div>15in Phase Resistivity BC (R15P) <div>0.2200</div><div>ohm-m</div></div>	
		<div>27in Phase Resistivity BC (R27P) <div>0.2200</div><div>ohm-m</div></div>	<div>39in Ph Conductivity BC <div>02K</div></div>
<div>Avg Rate of Penetration (ROPA) <div>0500</div><div>feet per hr</div></div>	Depth	<div>39in Phase Resistivity BC (R39P) <div>0.2200</div><div>ohm-m</div></div>	<div>SP4 Formation Exp Time (EWXT) <div>05K</div><div>hours</div></div>





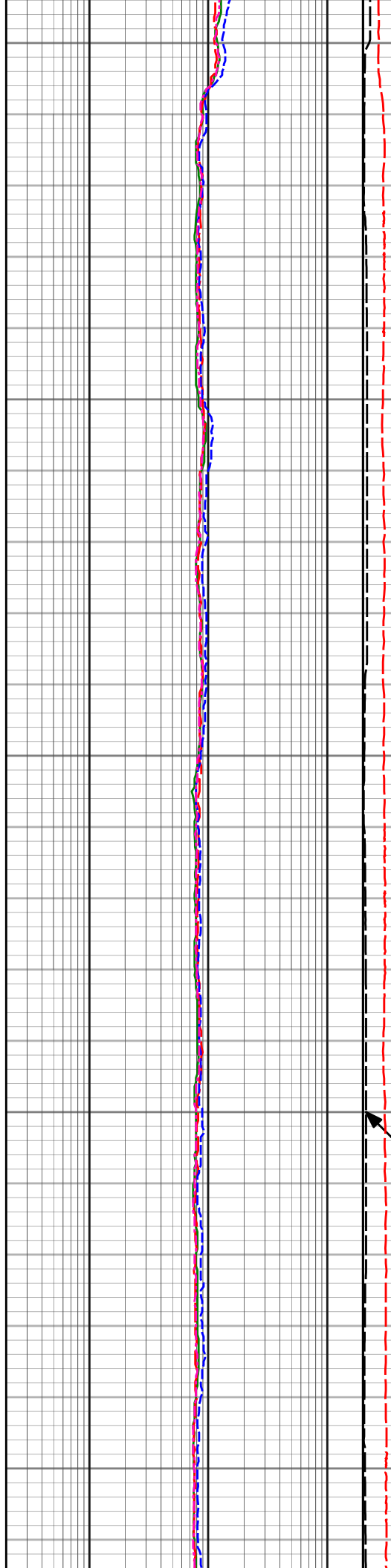
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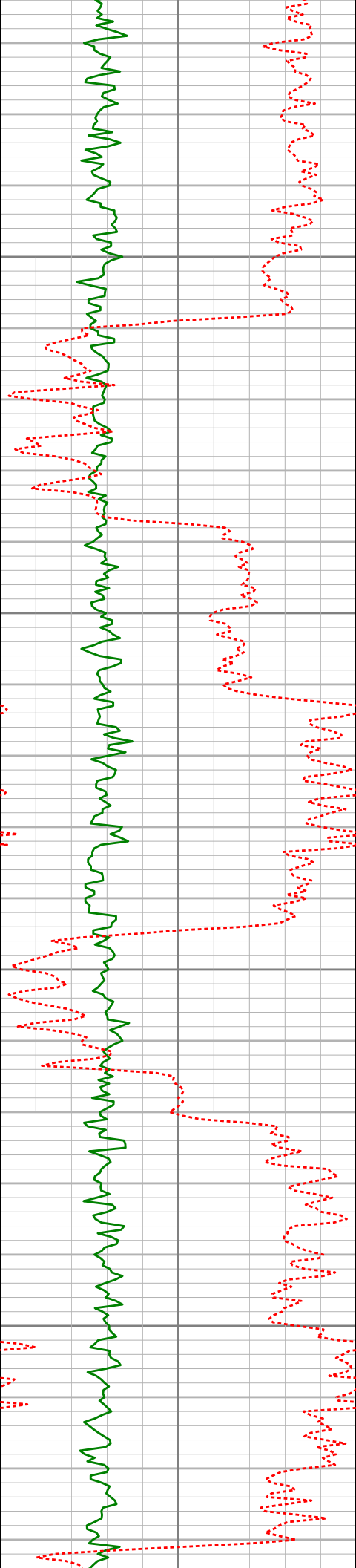
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8400

8450



EWXT

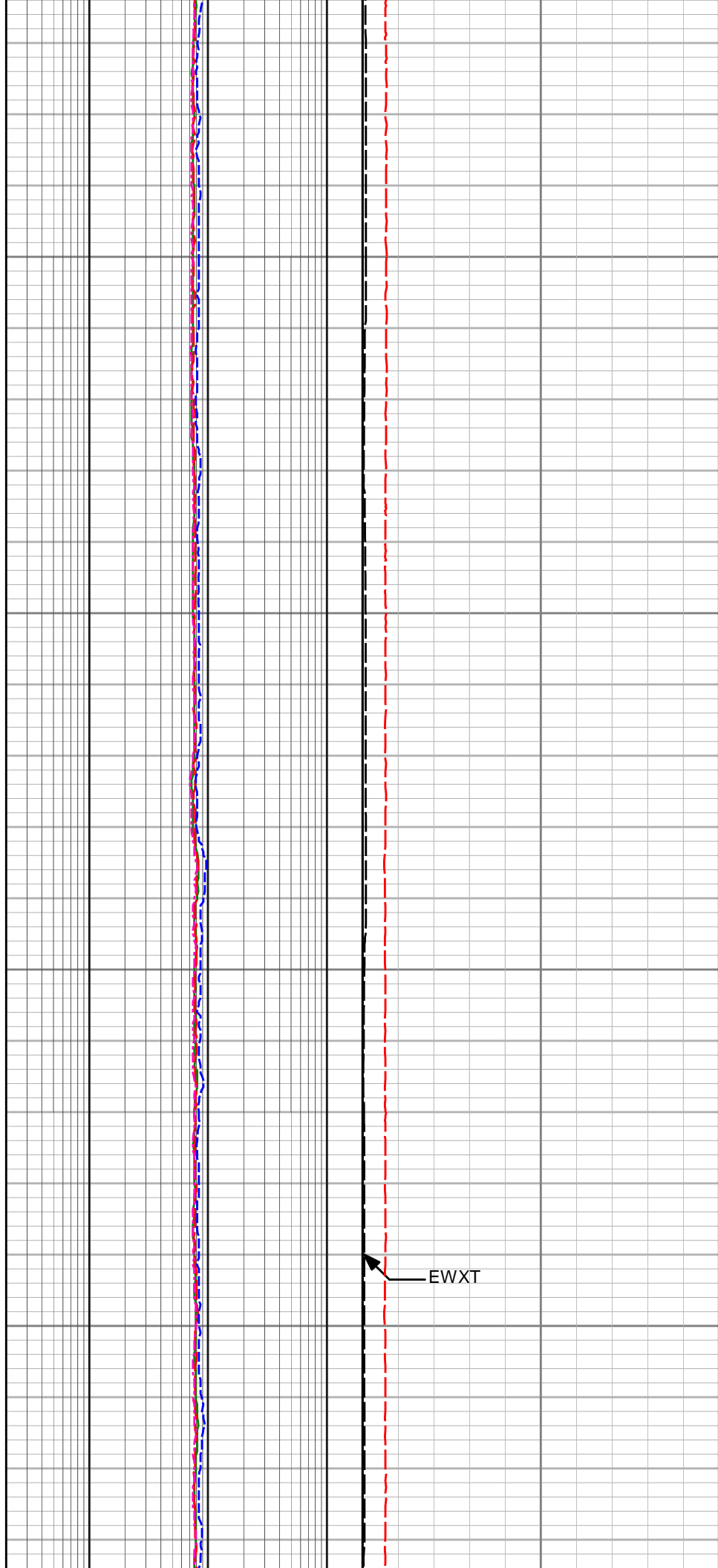


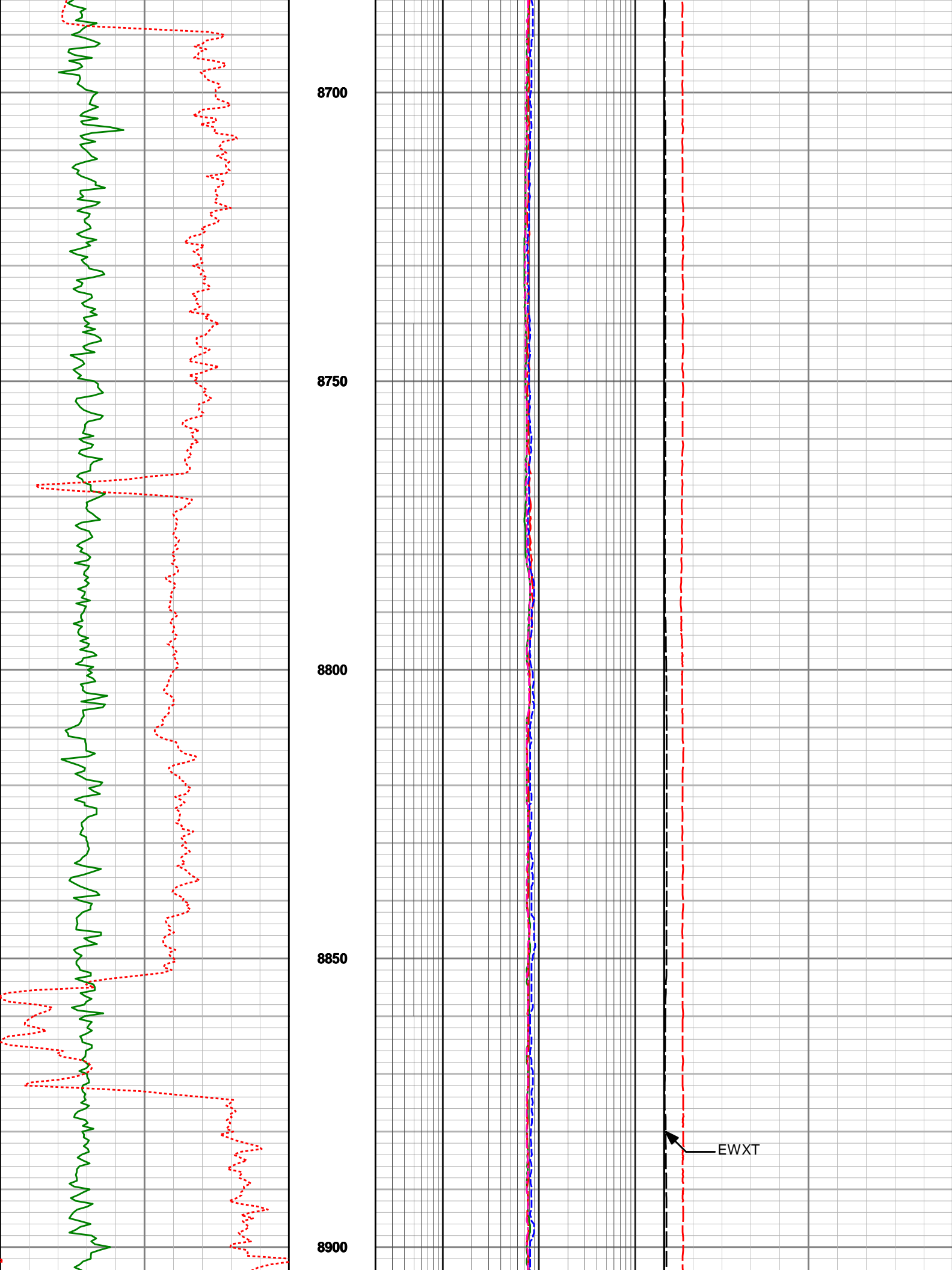
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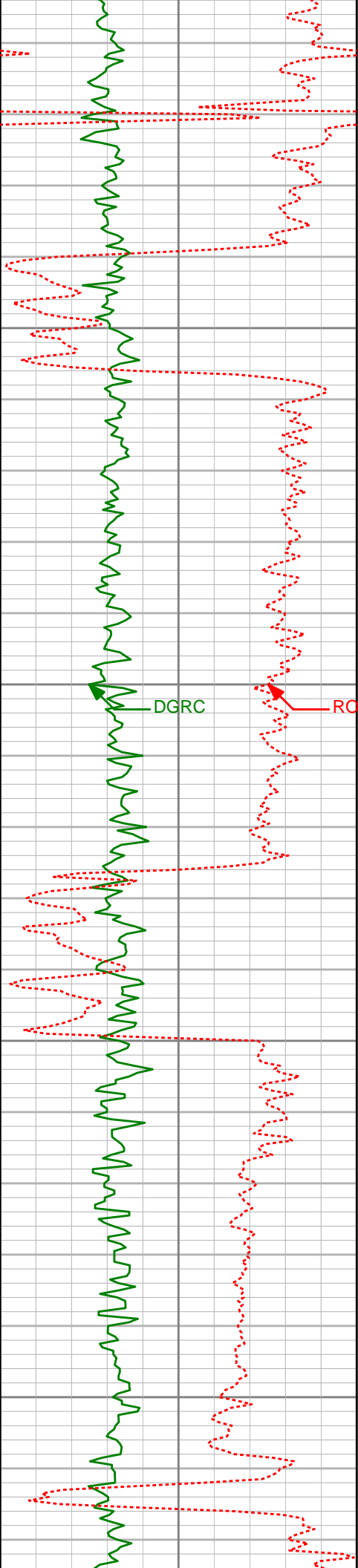
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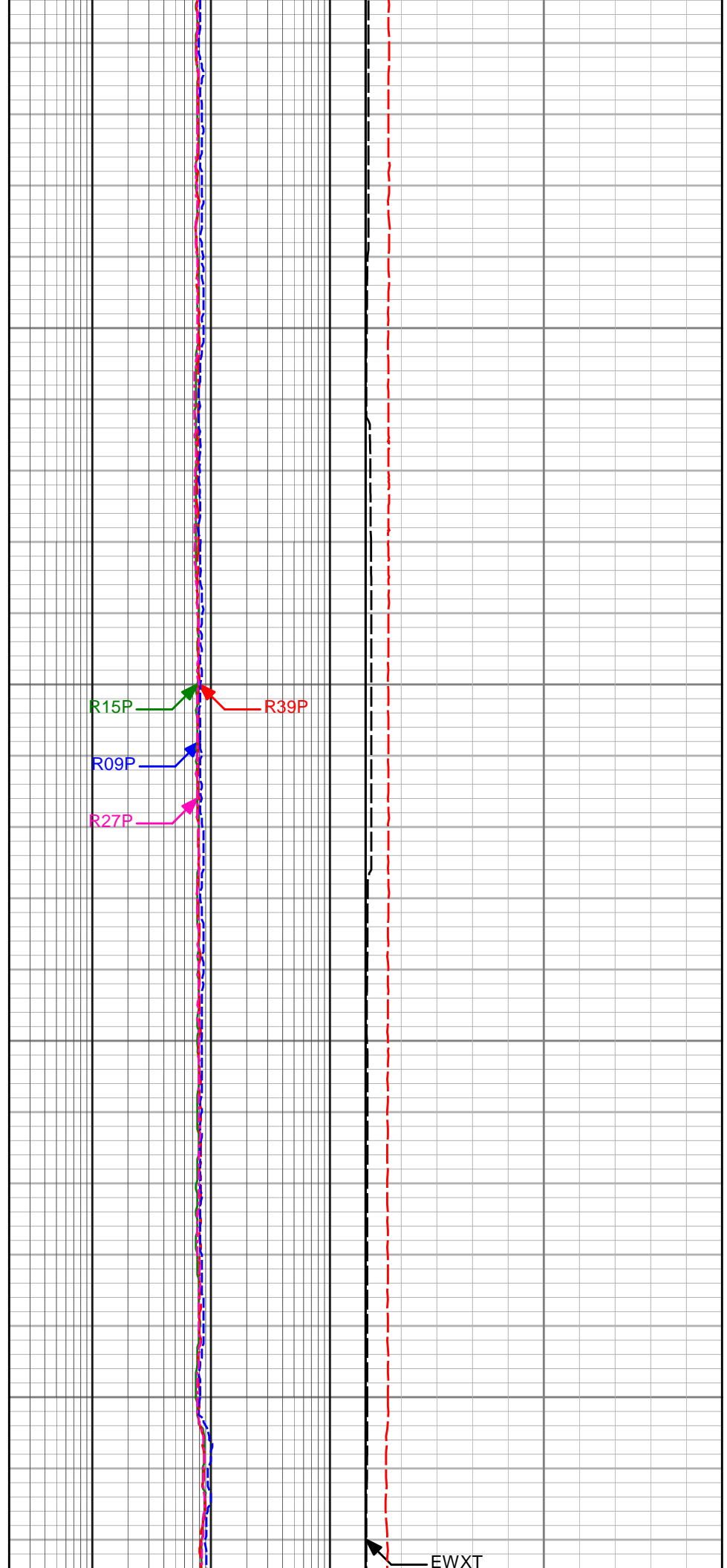


8950

9000

9050

9100



R15P

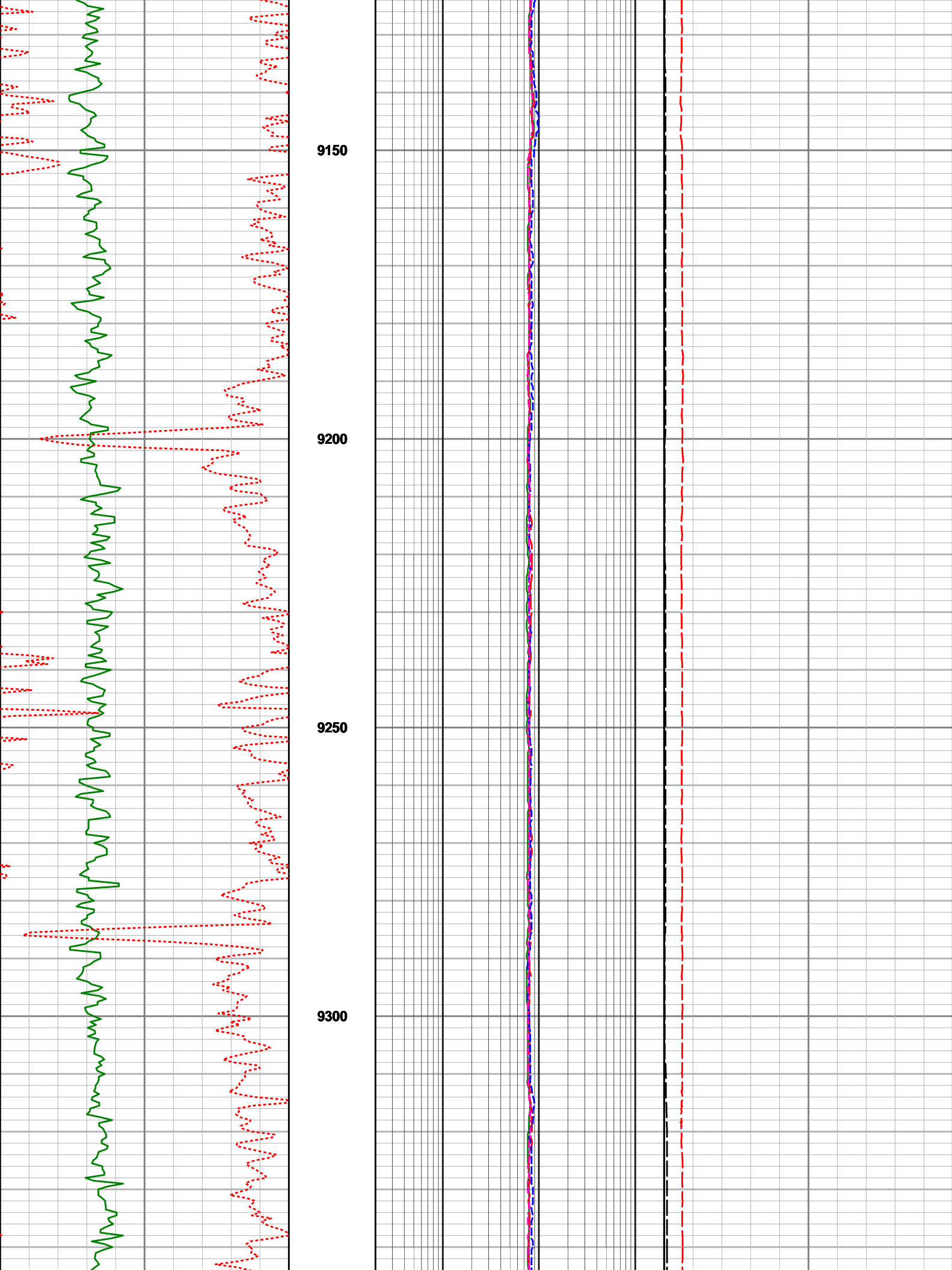
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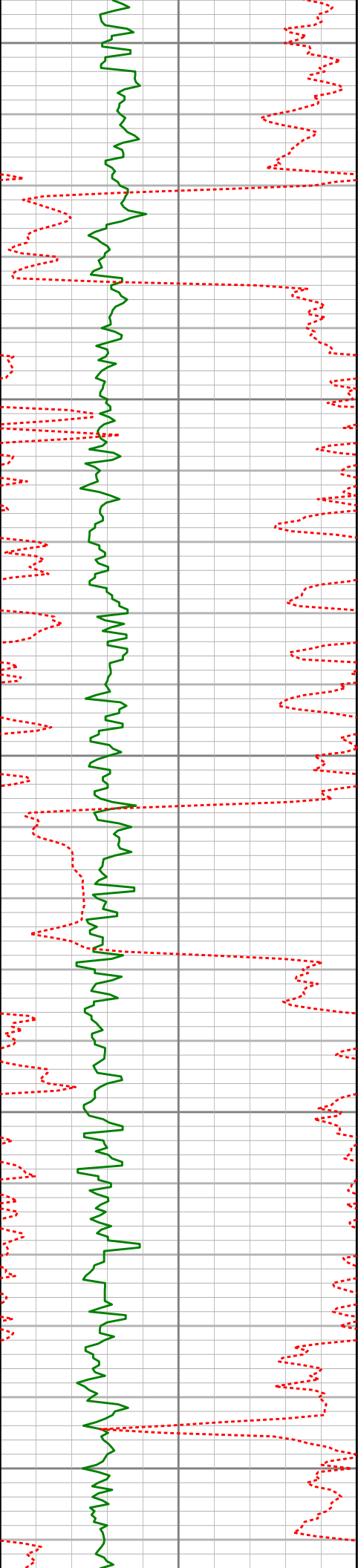
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R39P

EWXT







9350

9400

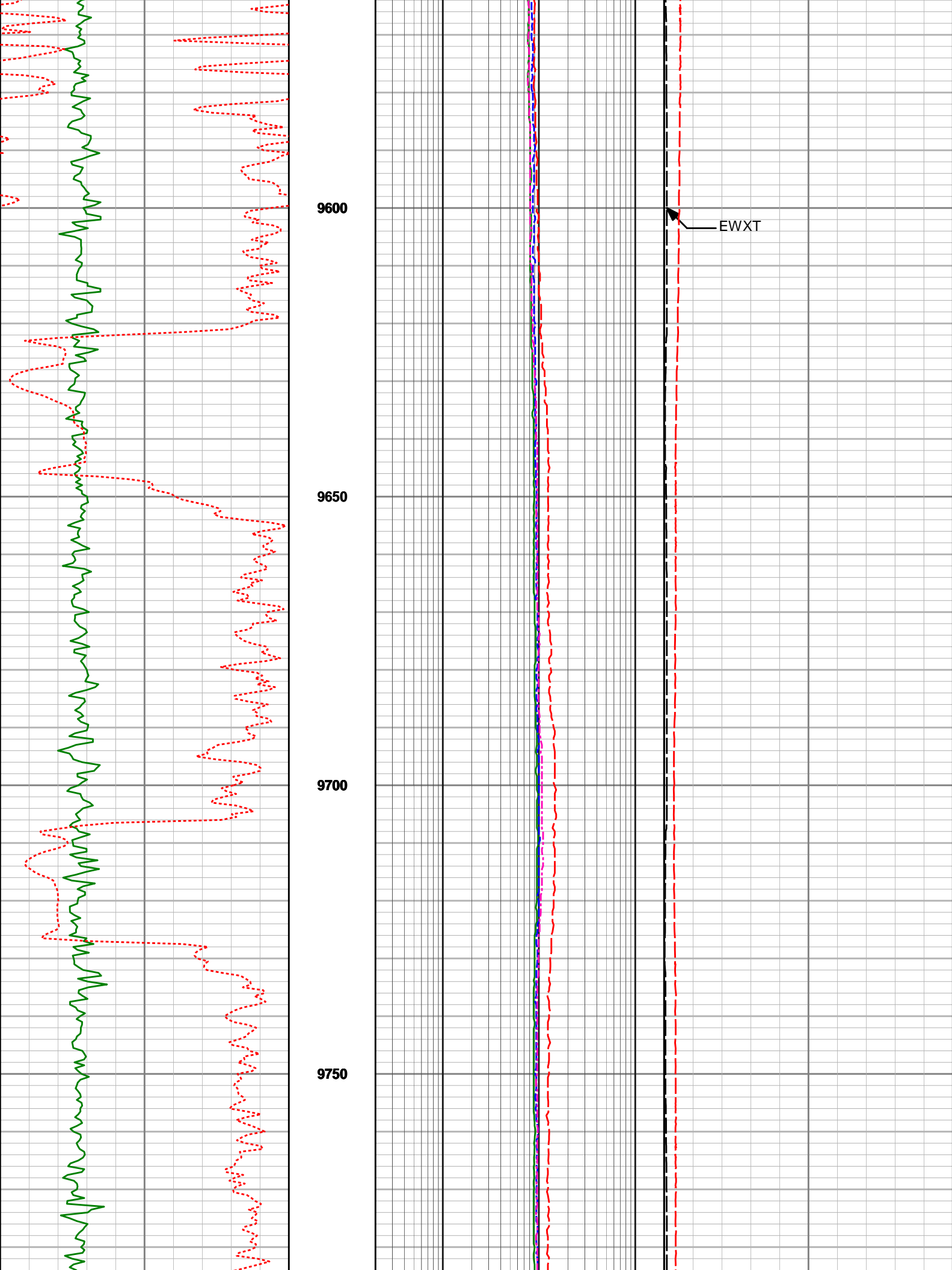
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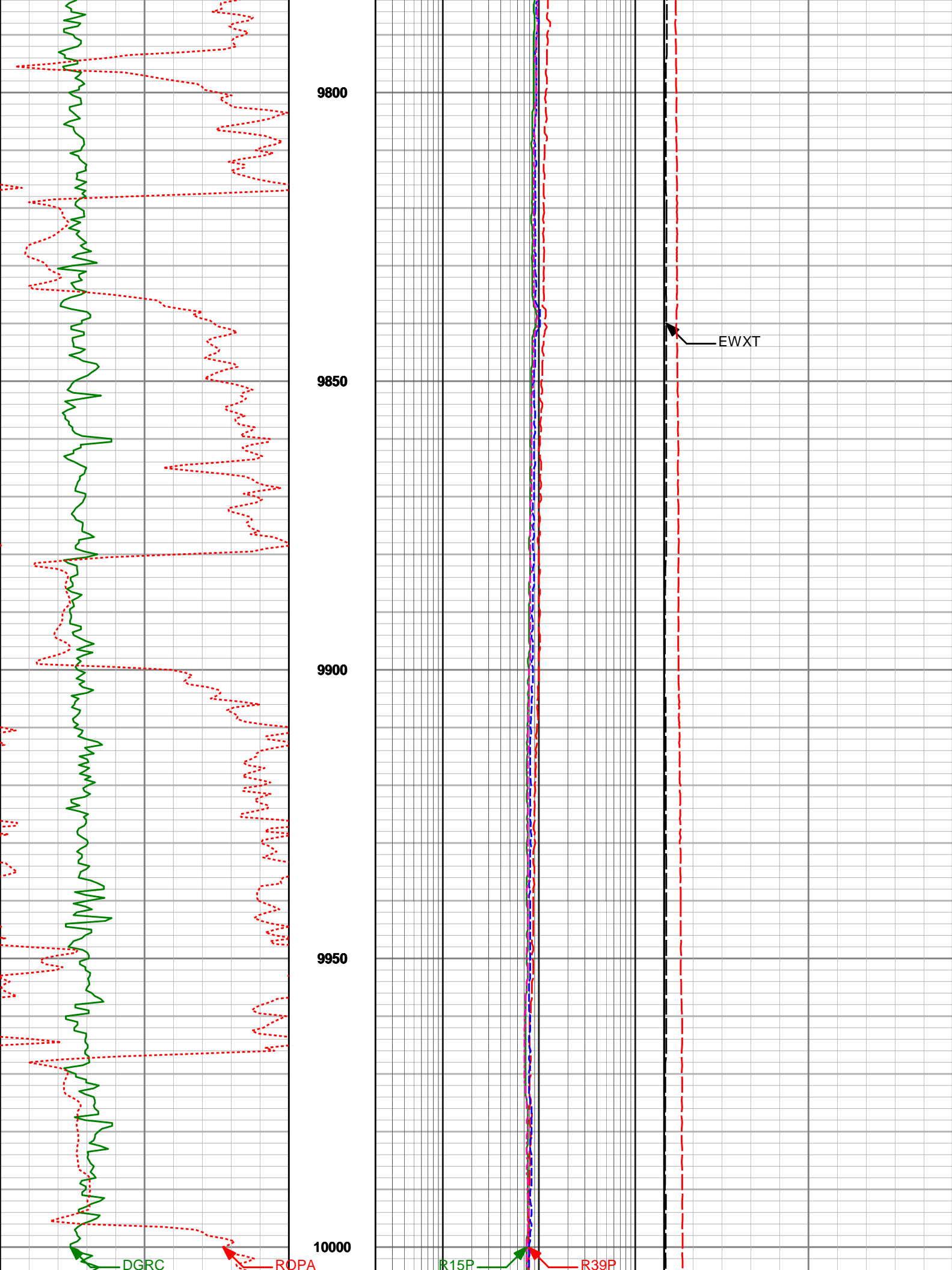
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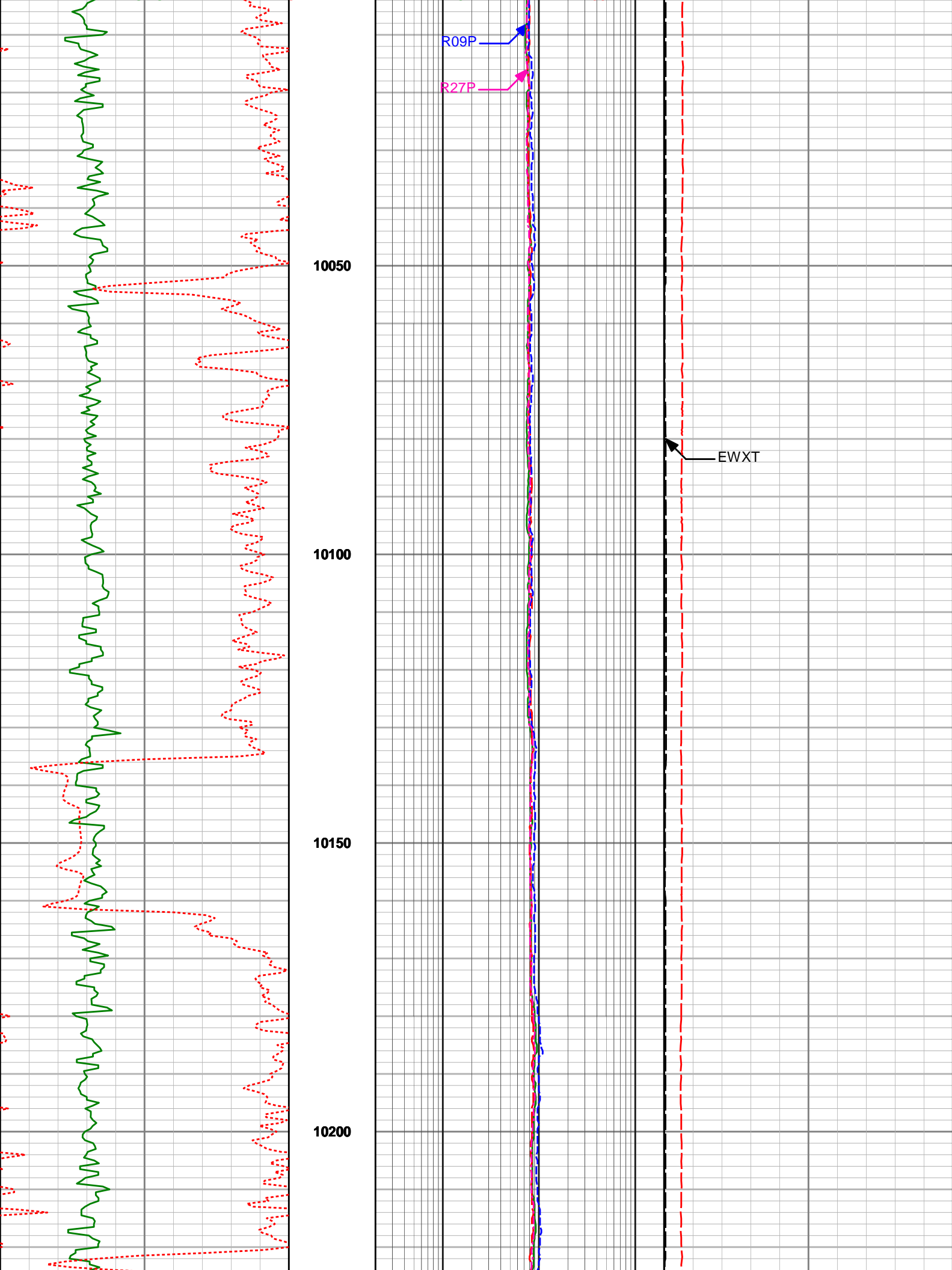
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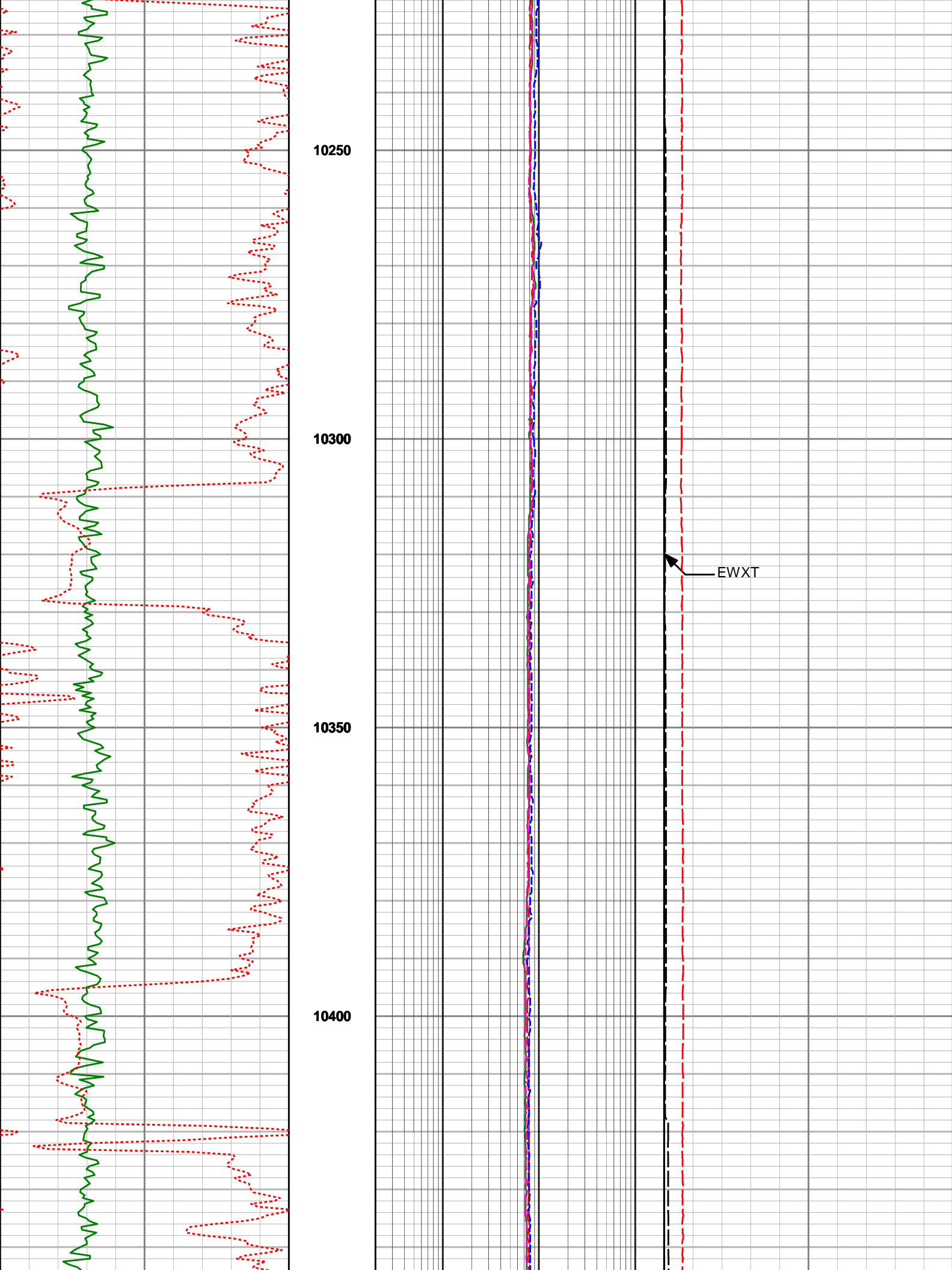


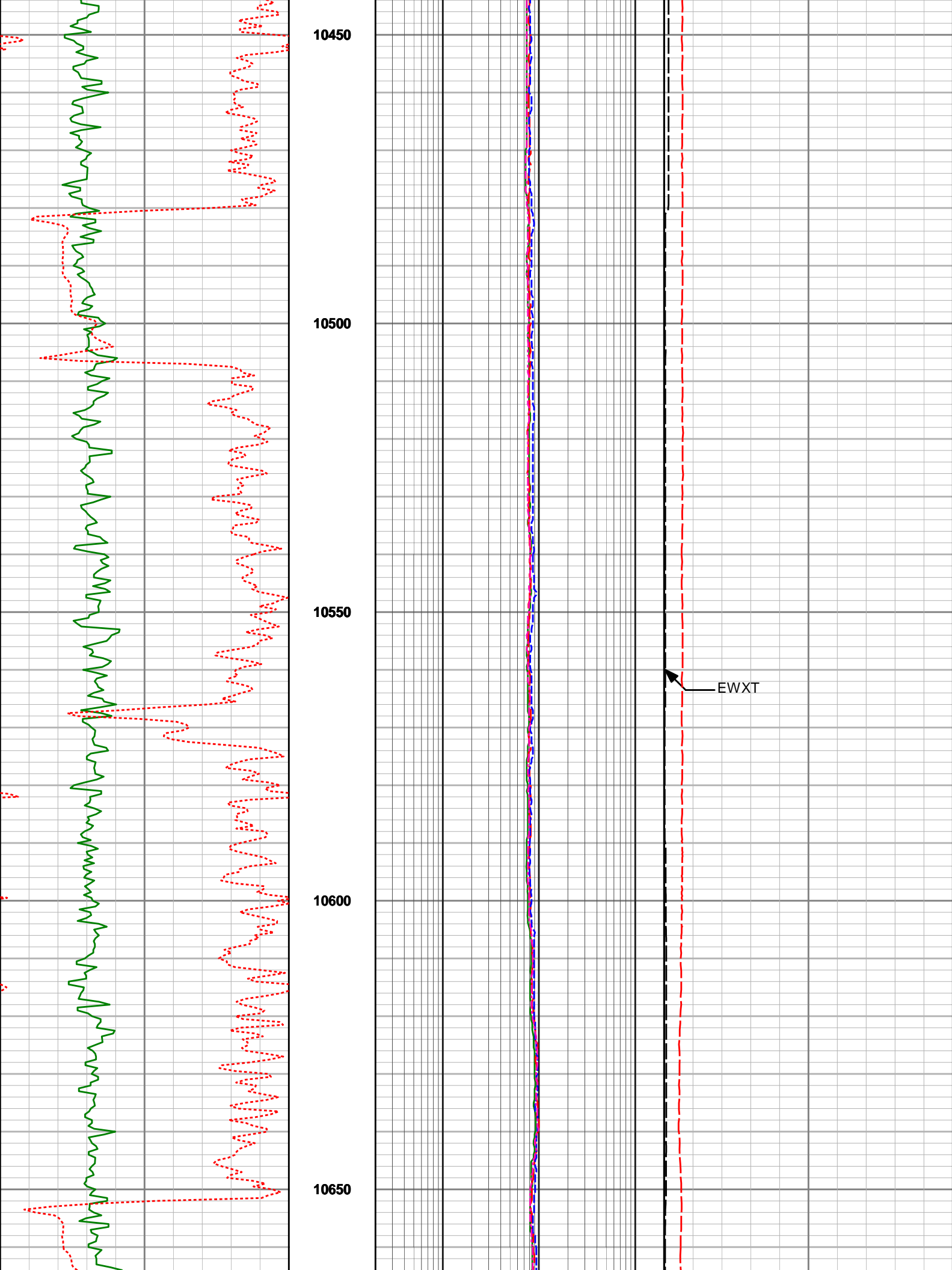
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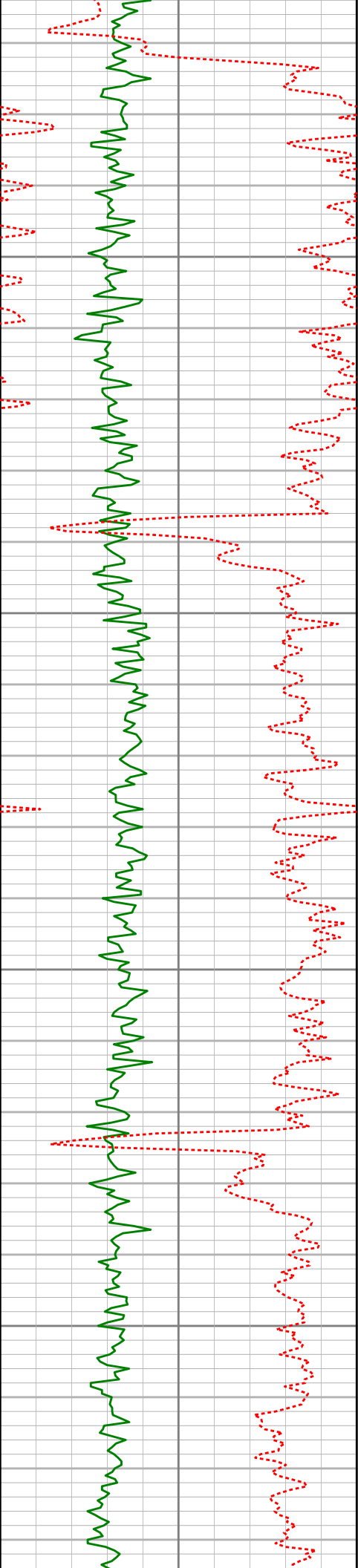










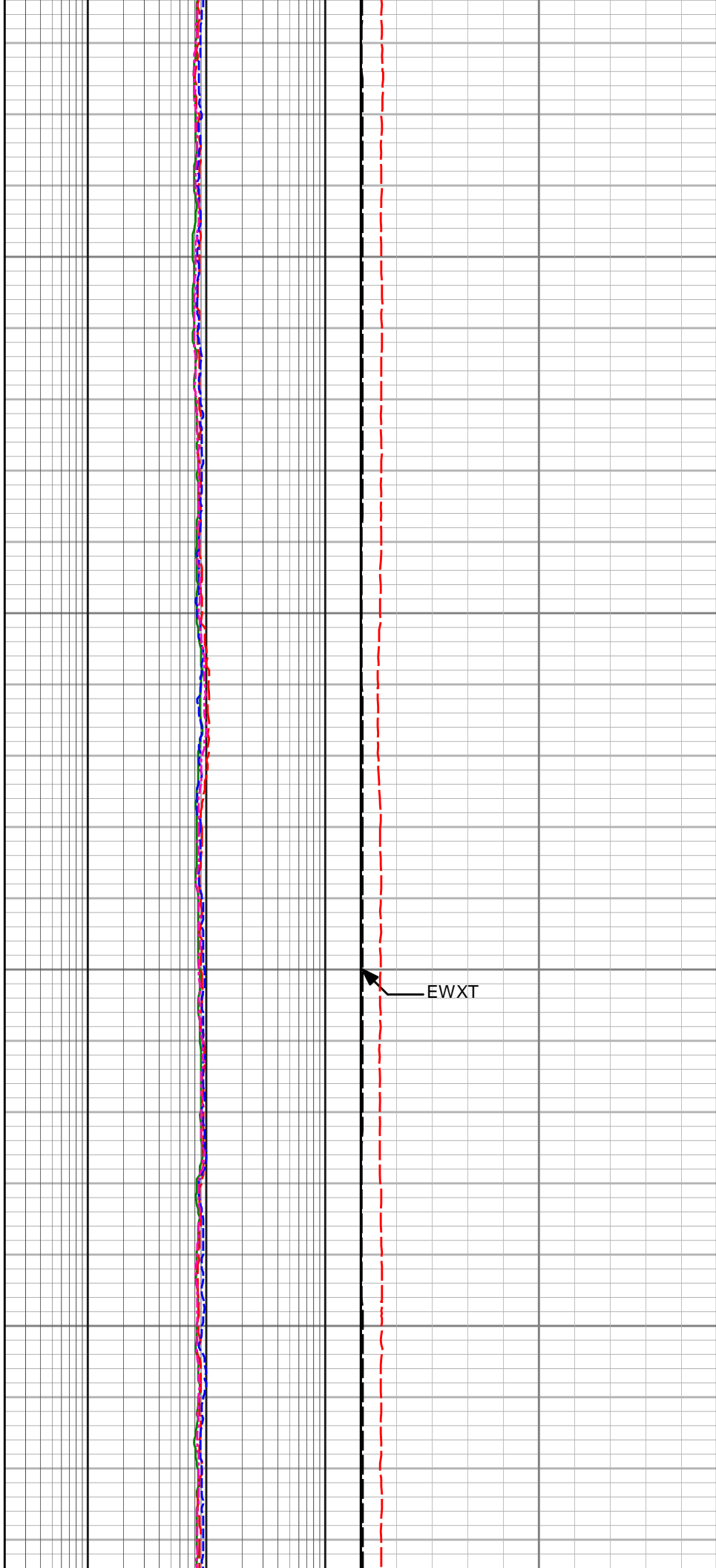


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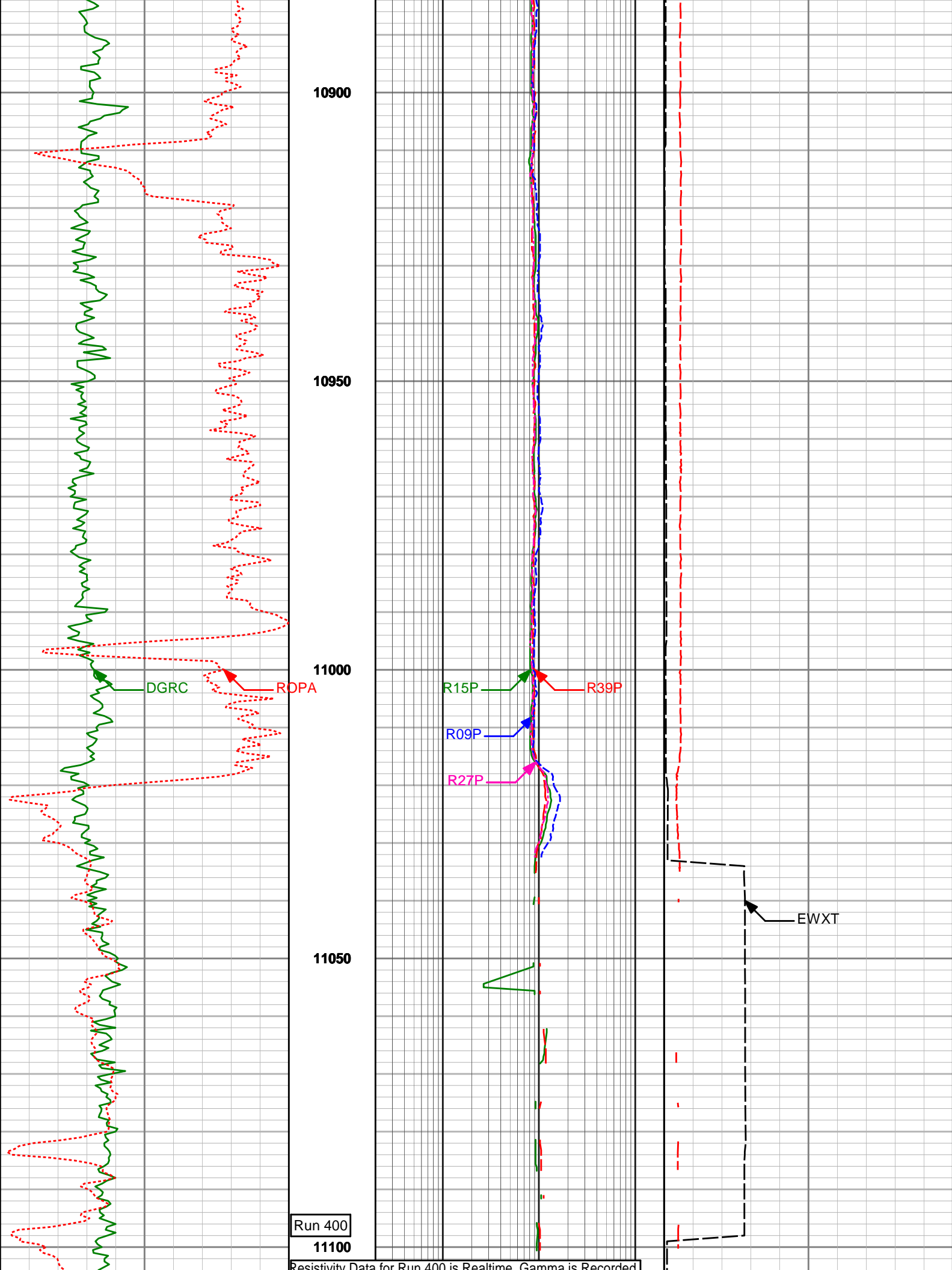
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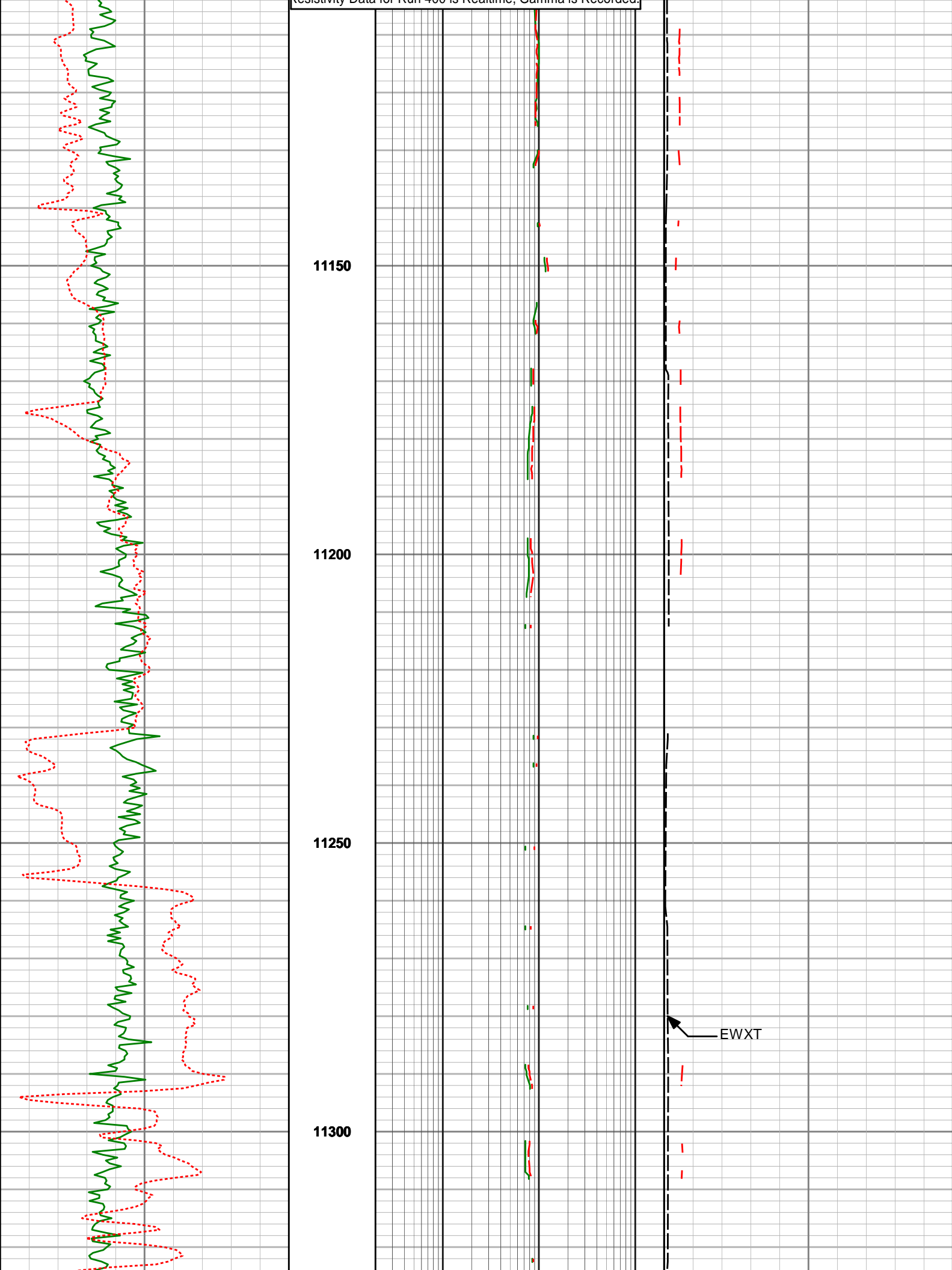
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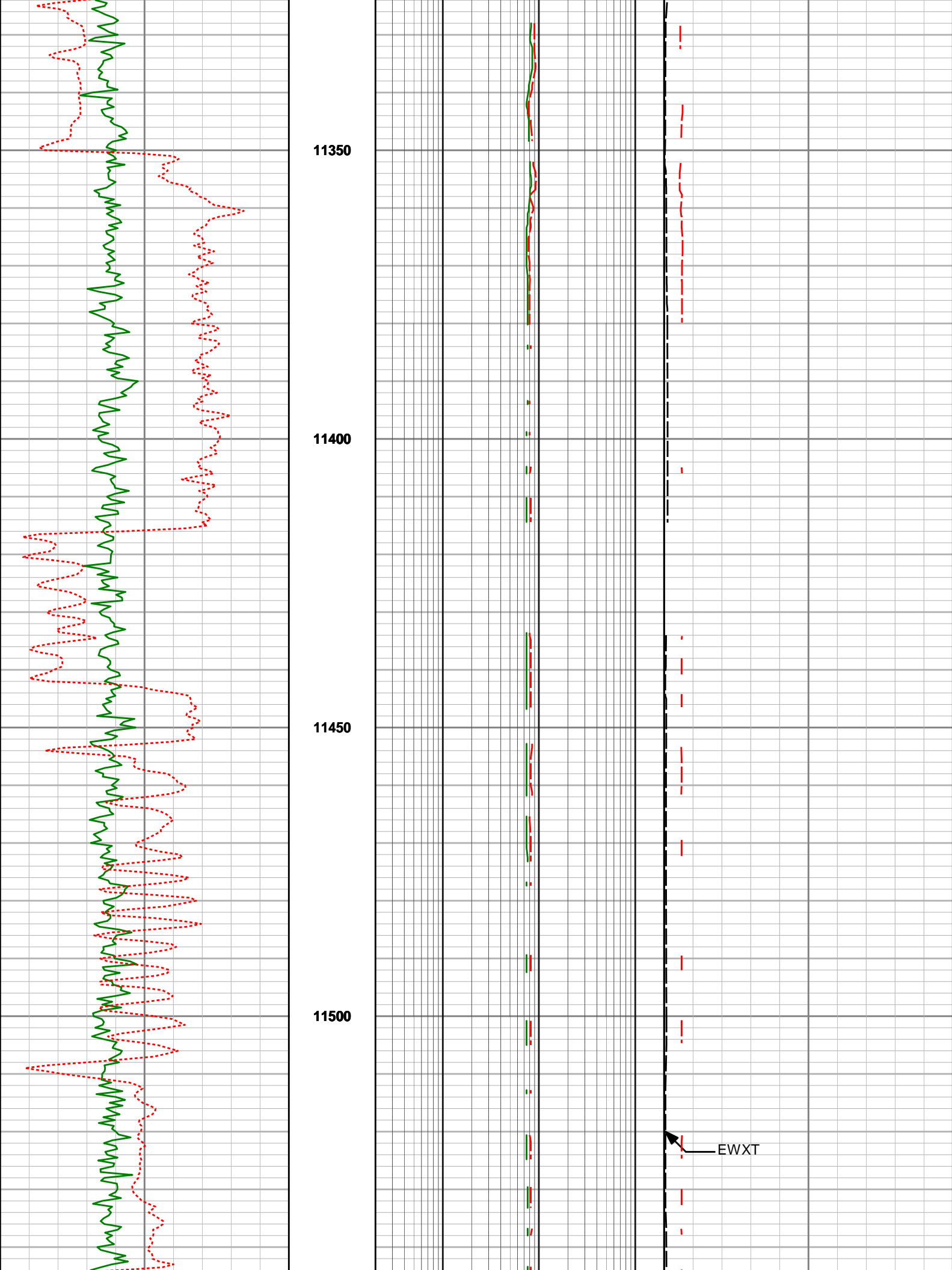


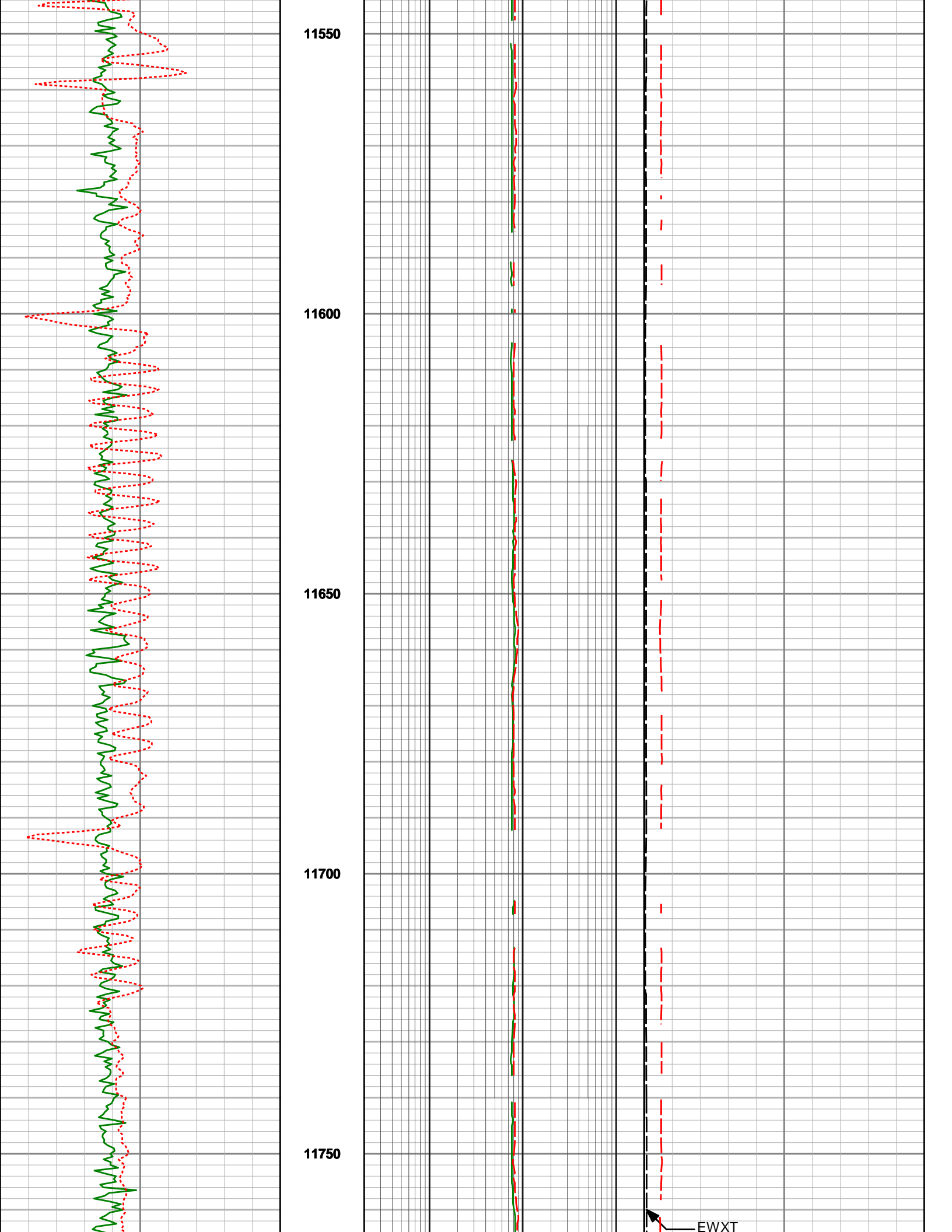


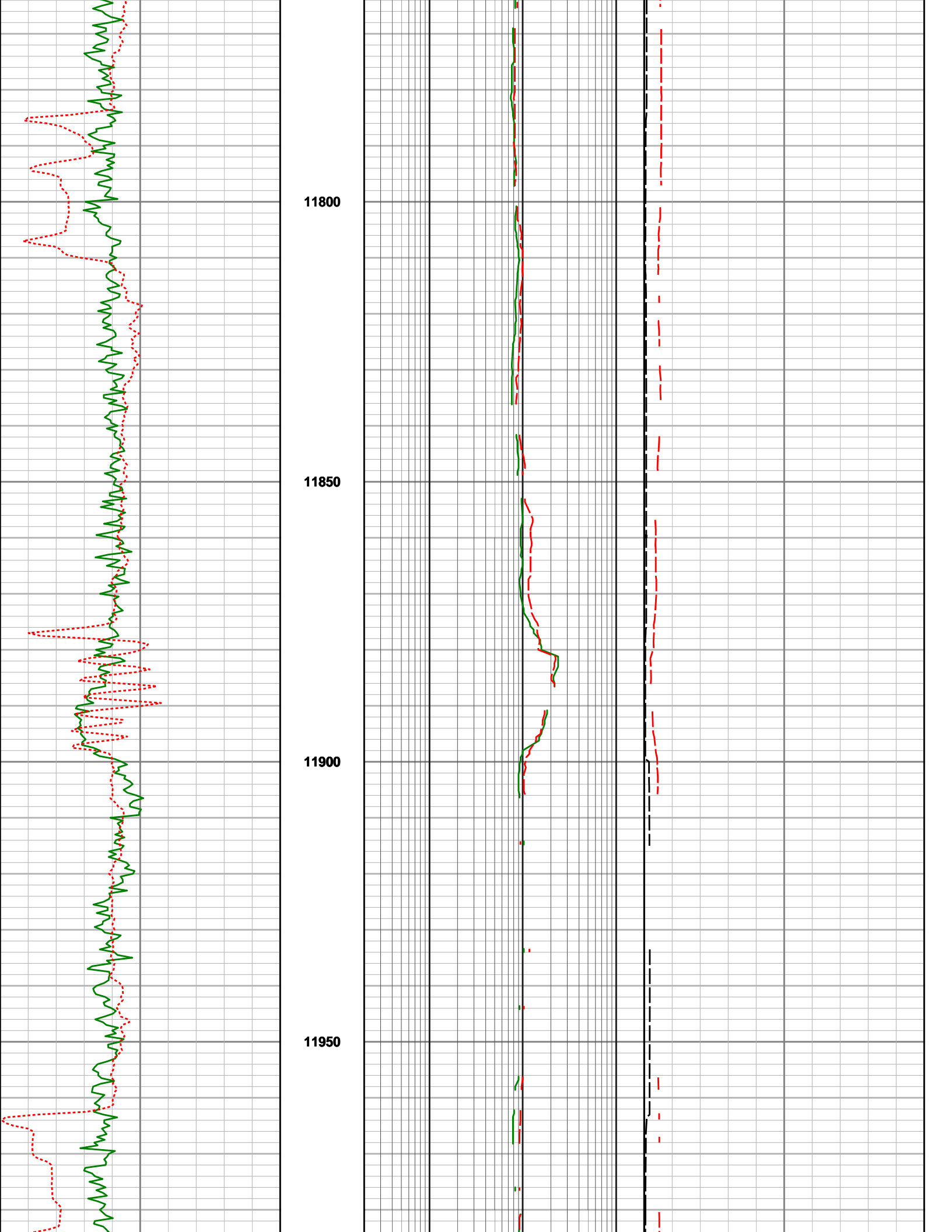


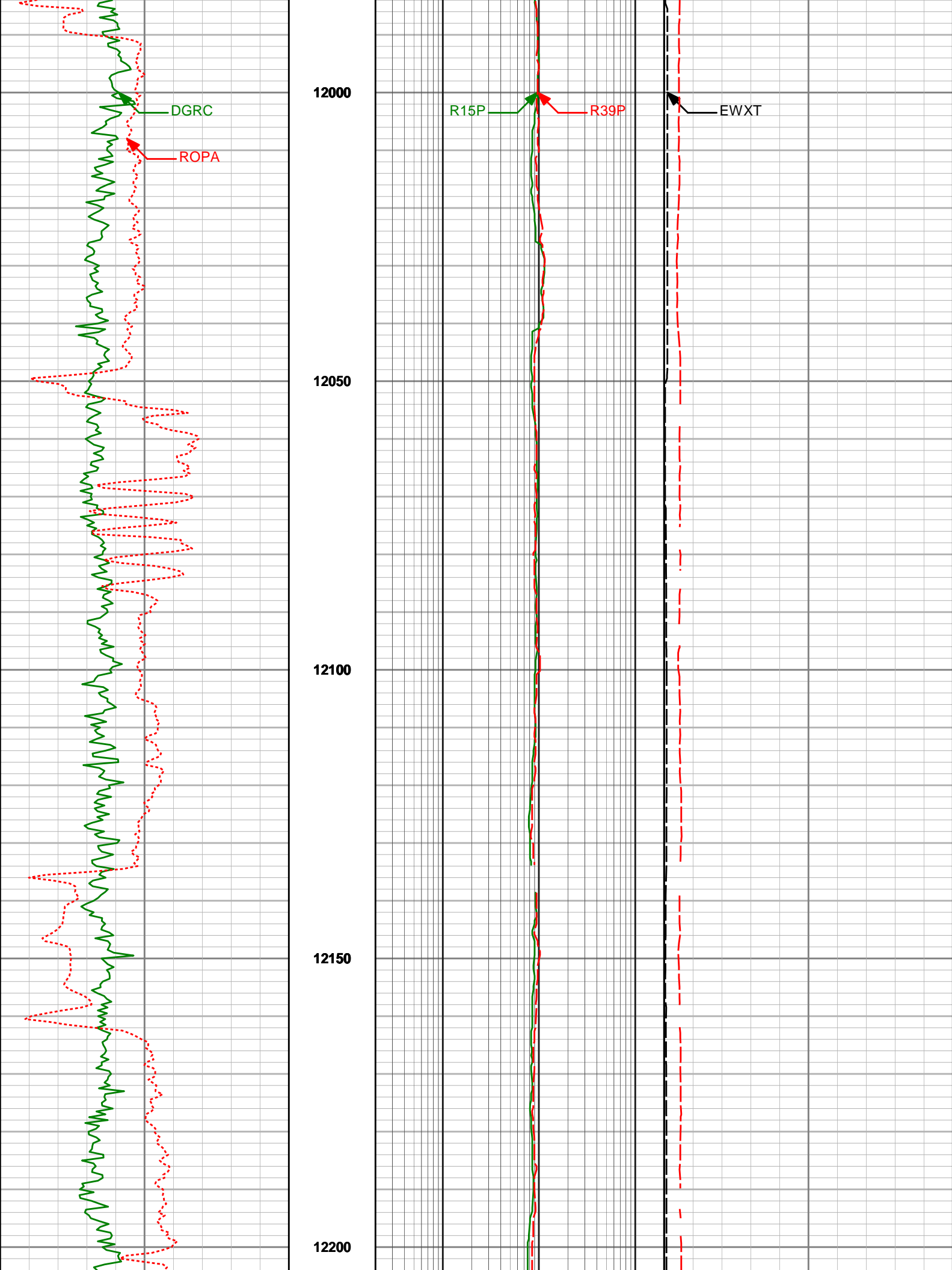
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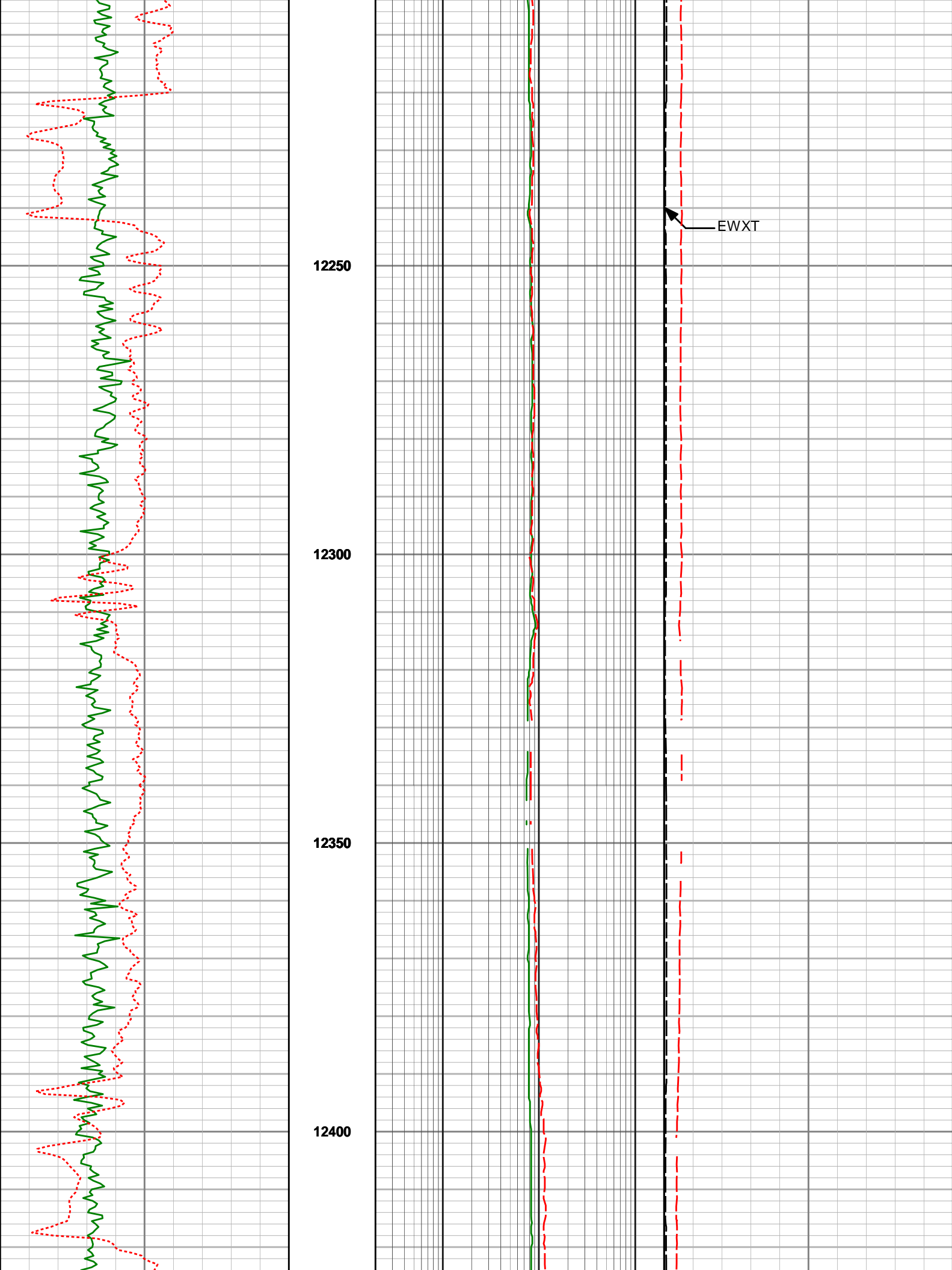


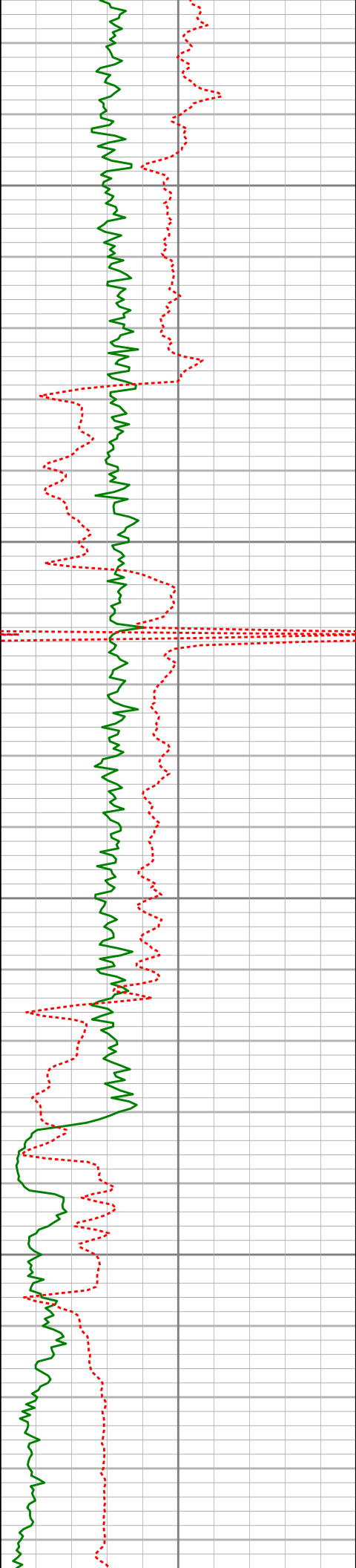










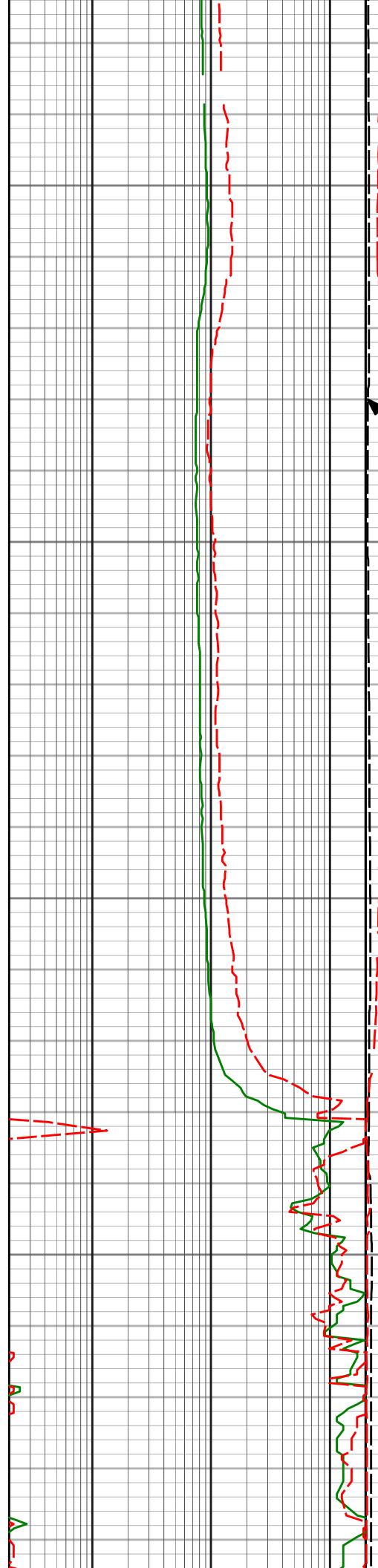


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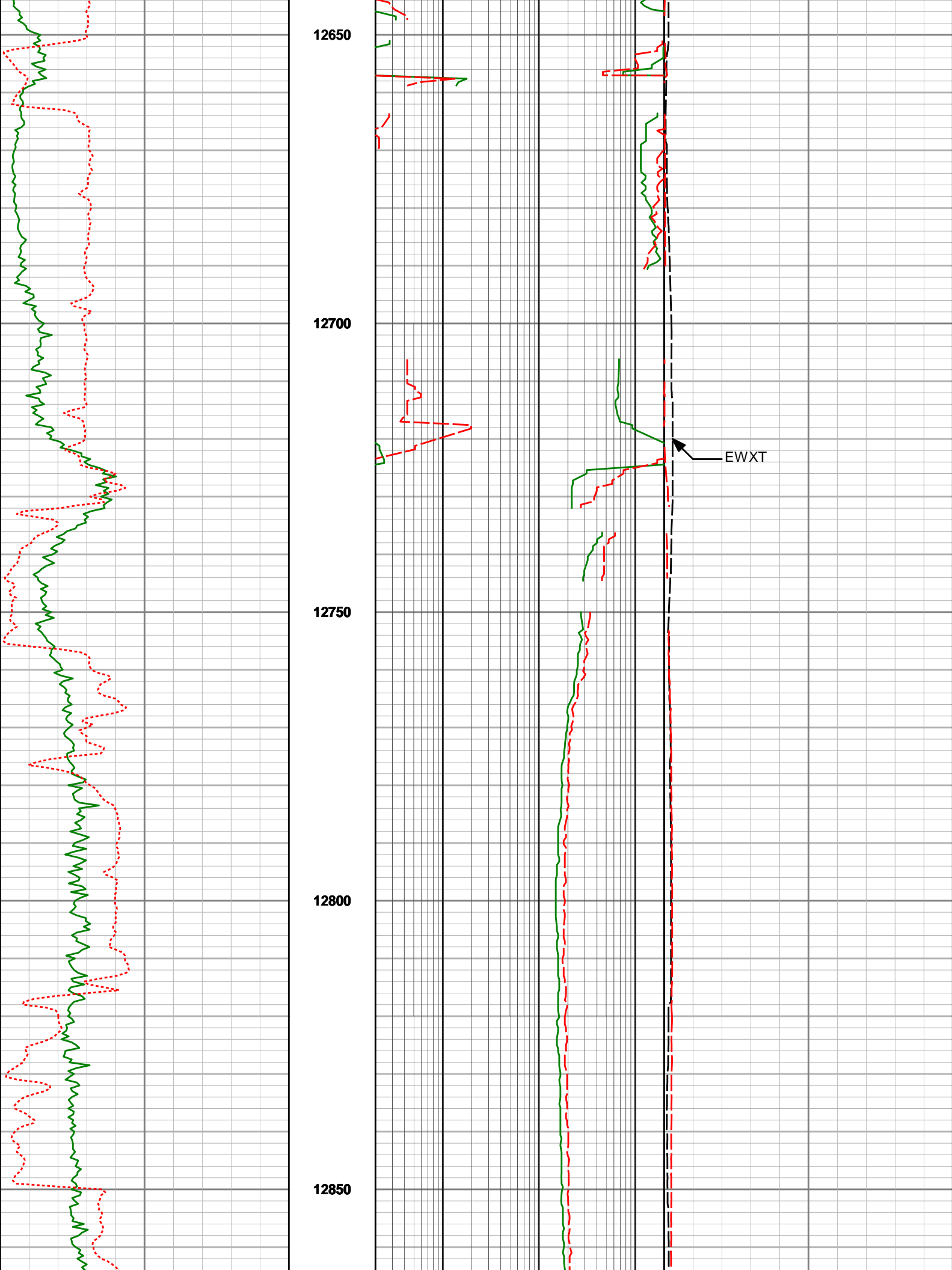
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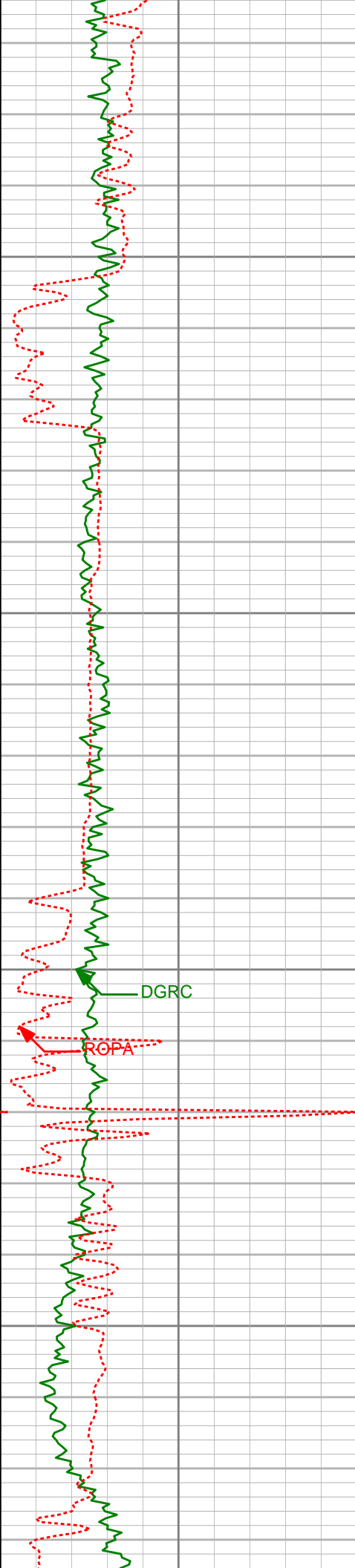
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EWXT





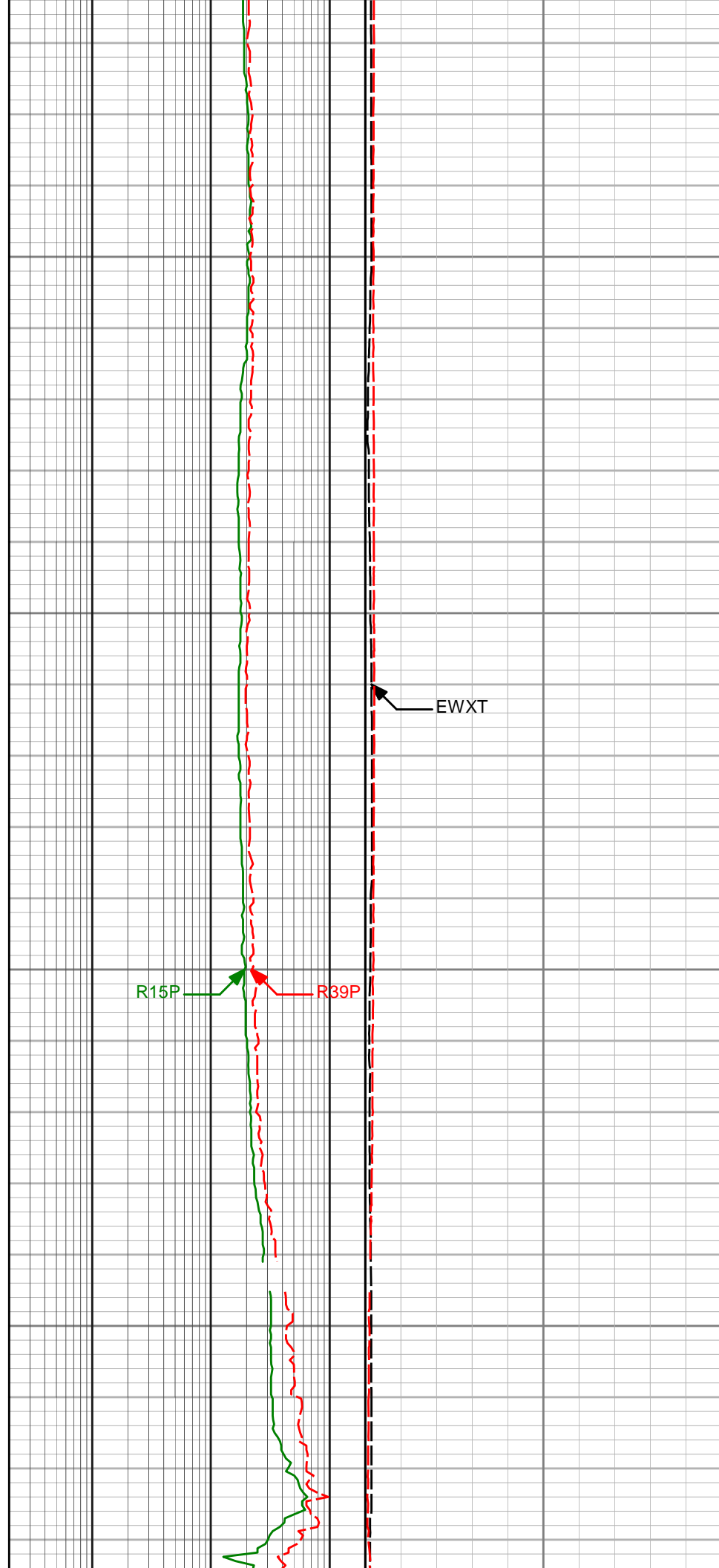


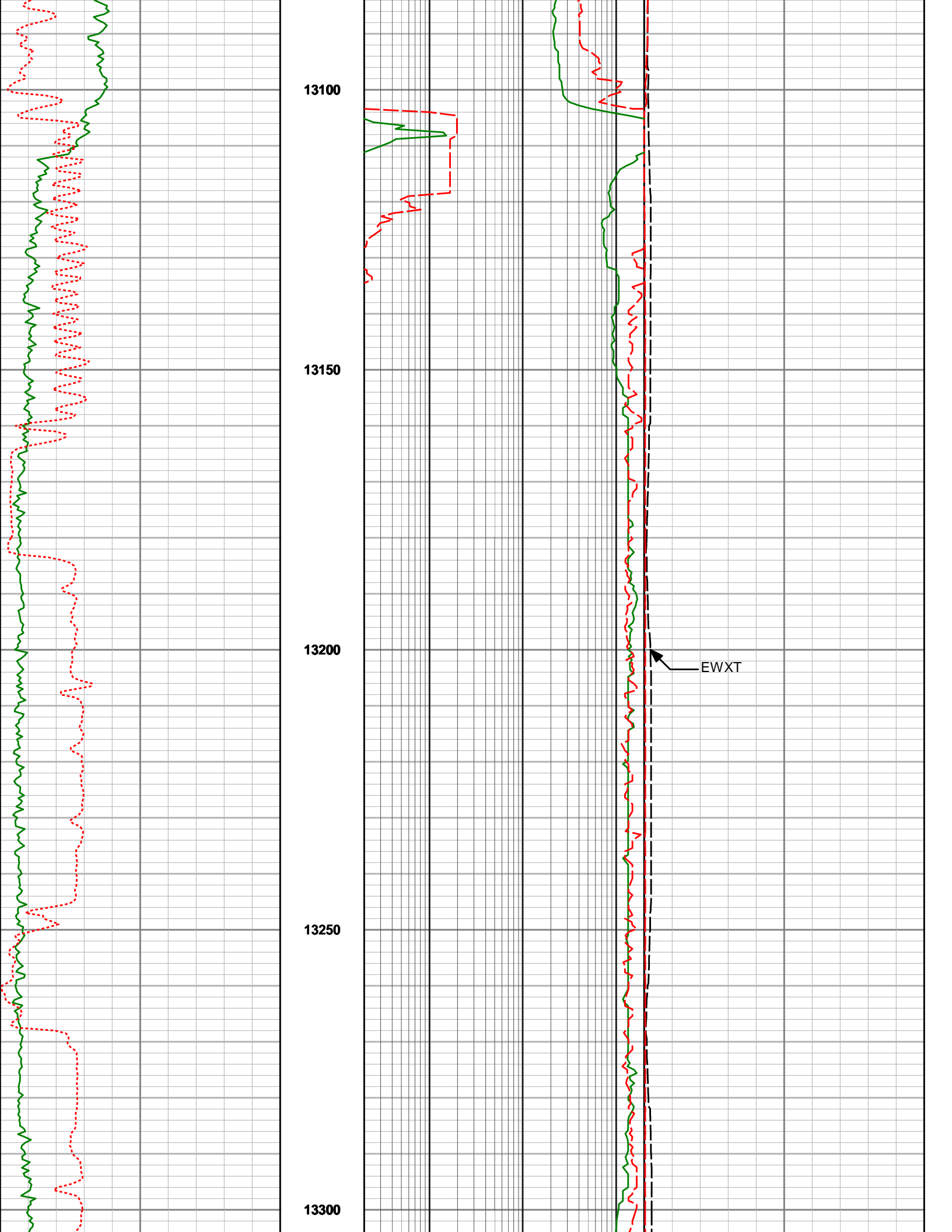
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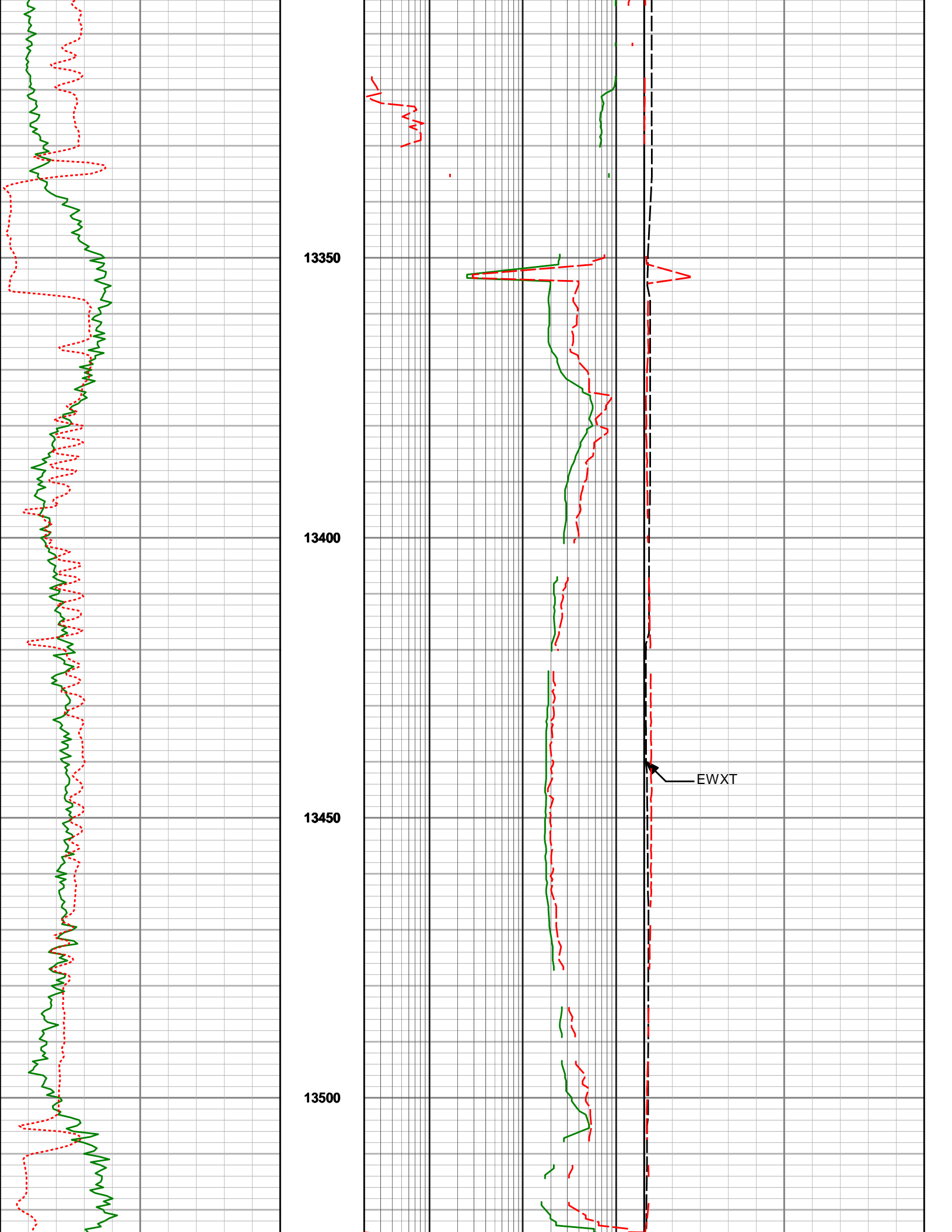
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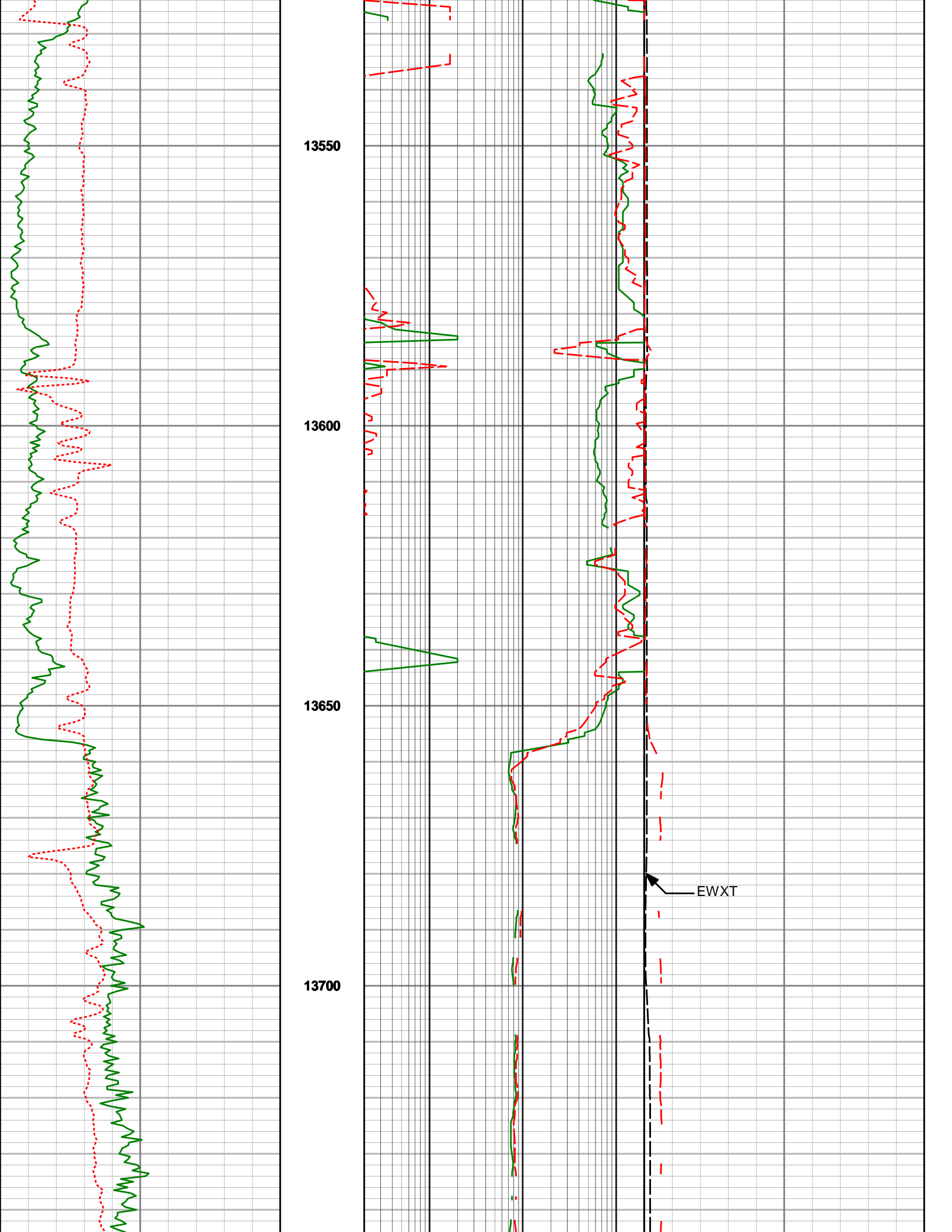
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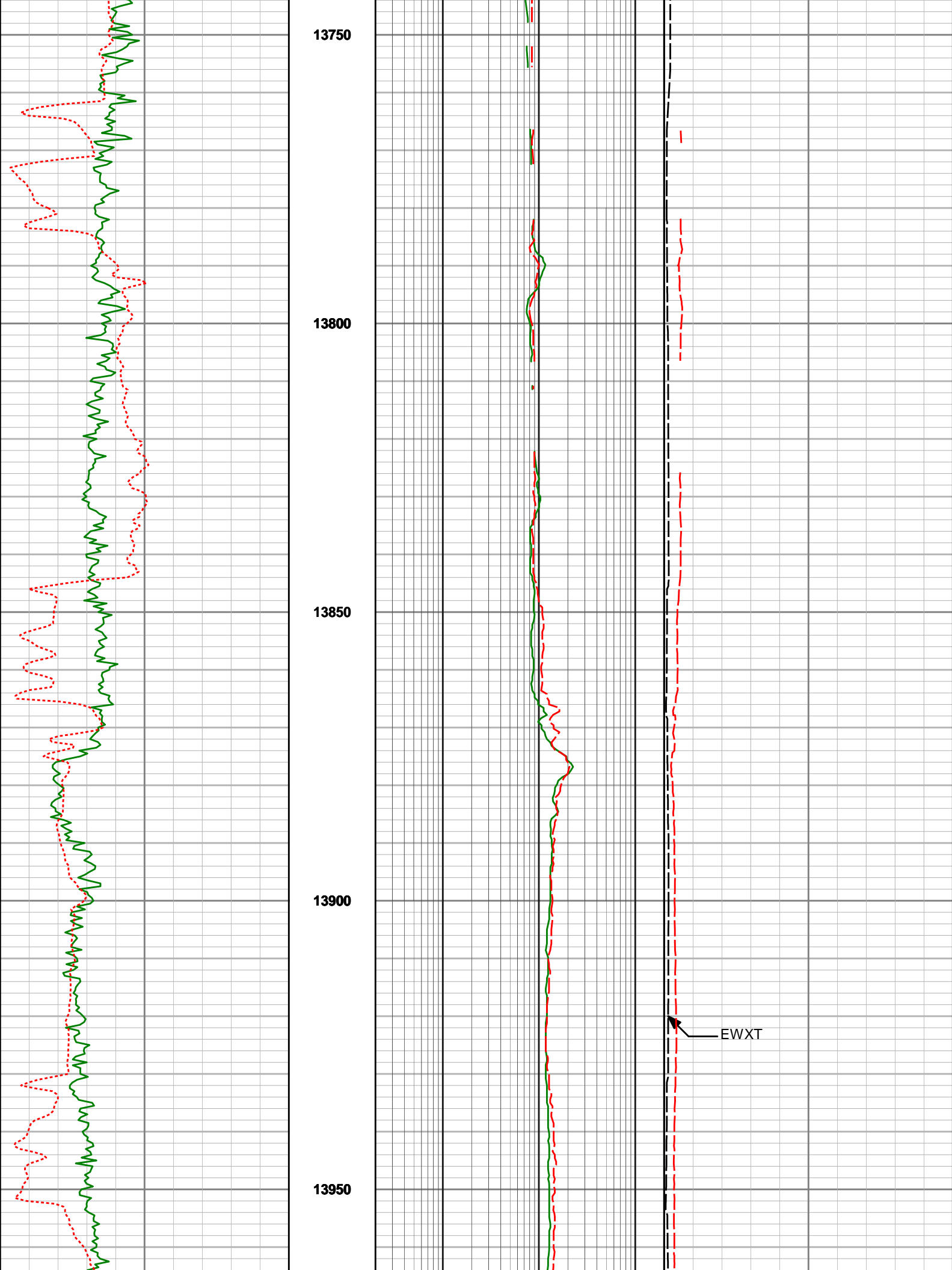
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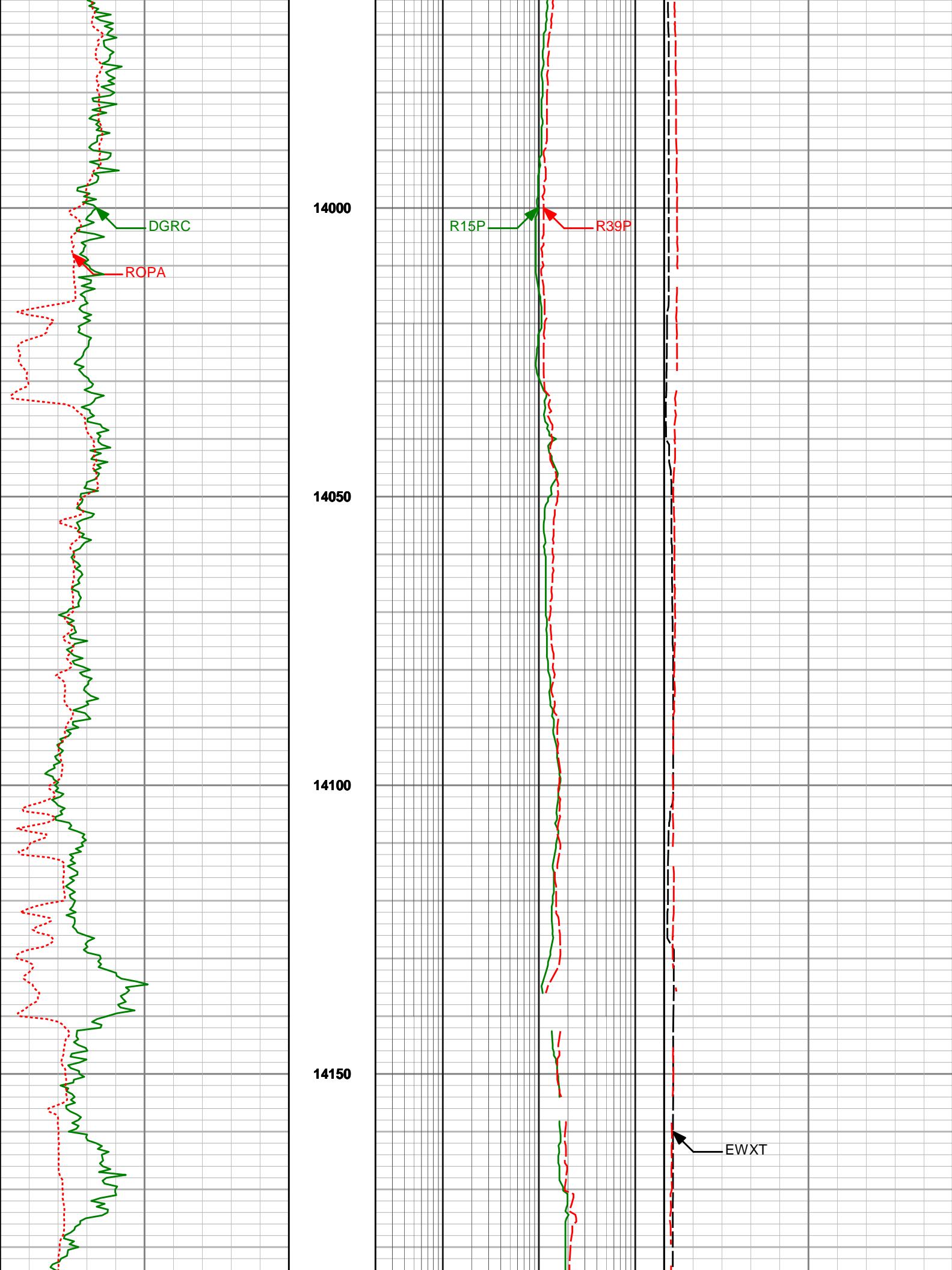


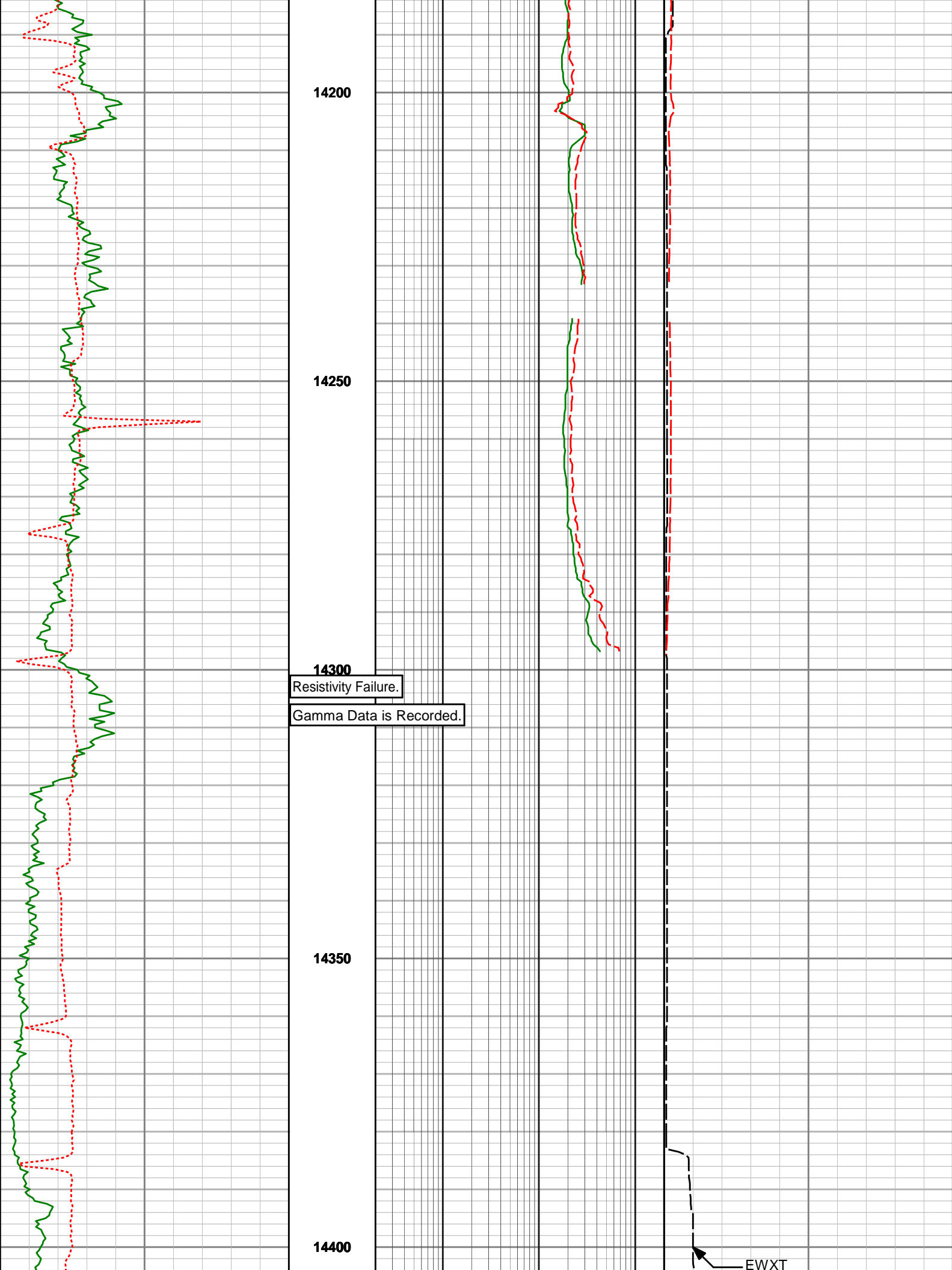












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14250

14300

Resistivity Failure.

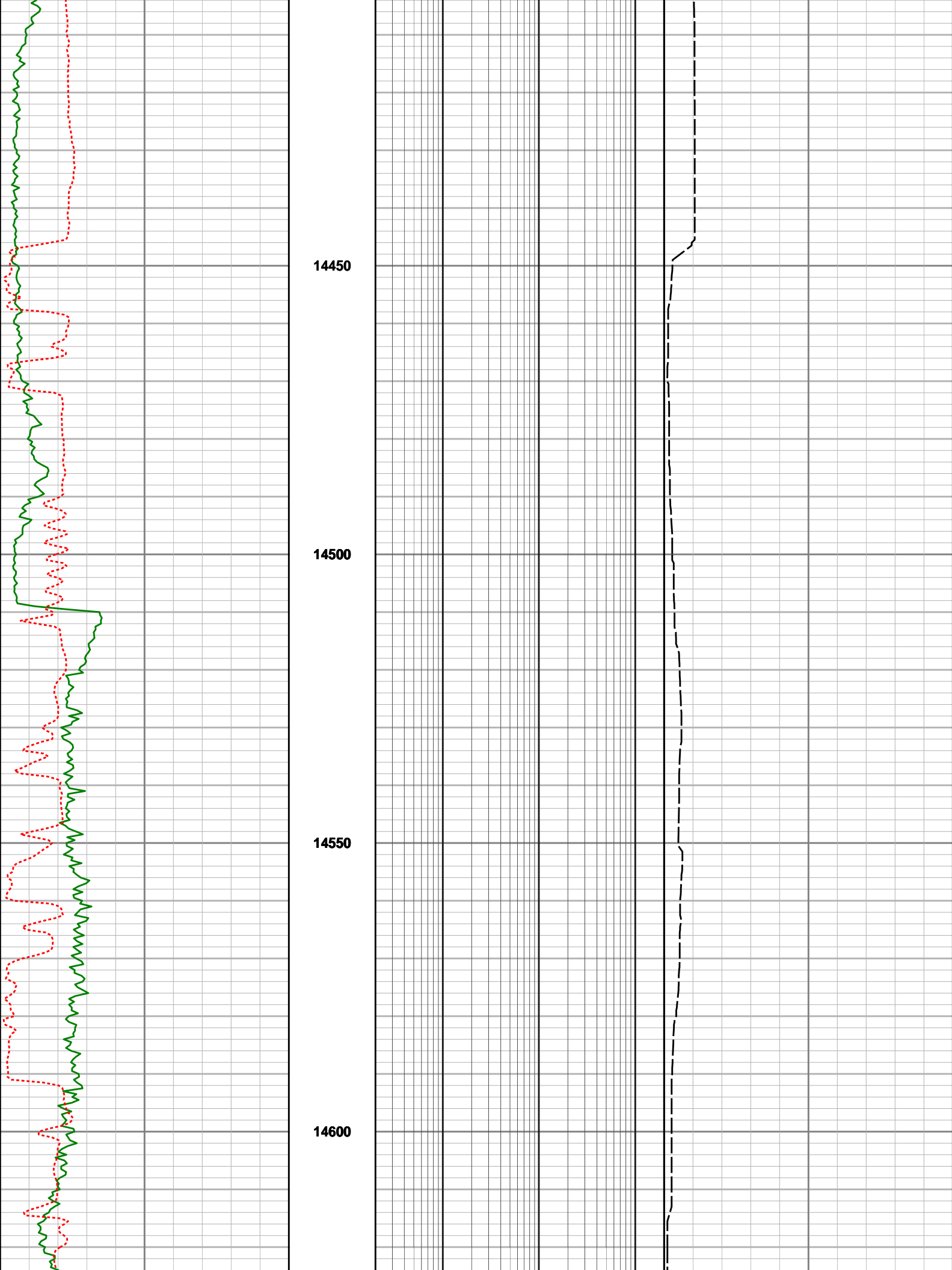
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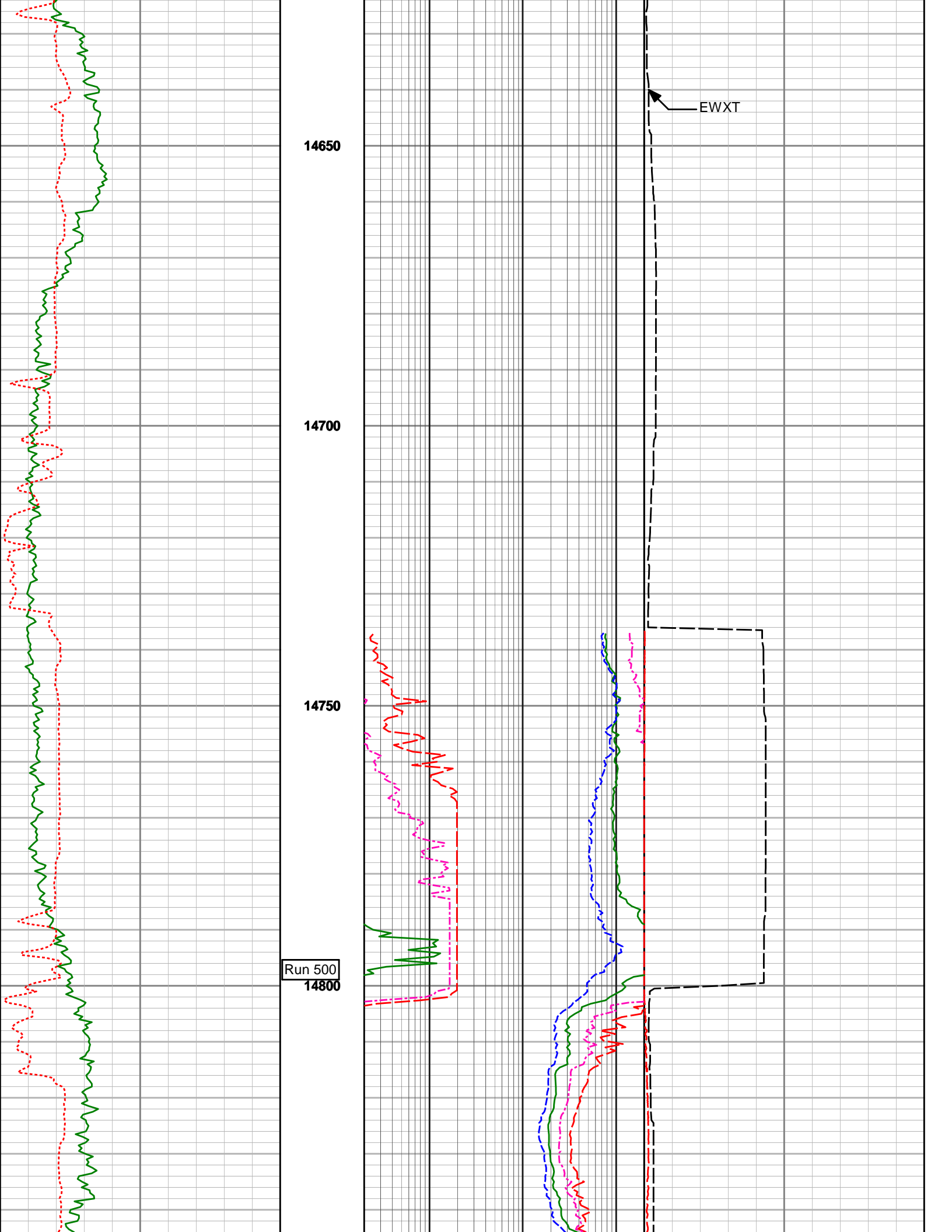
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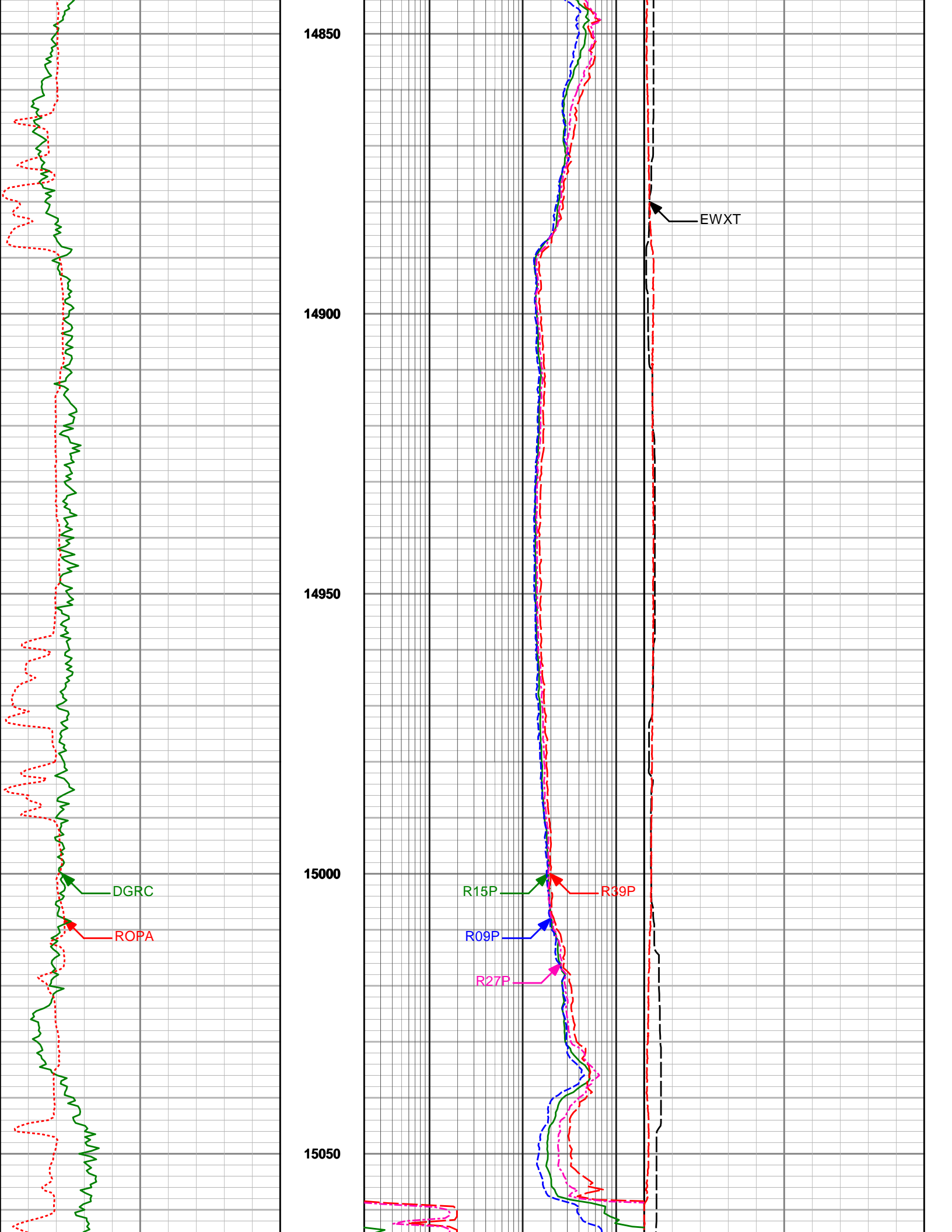
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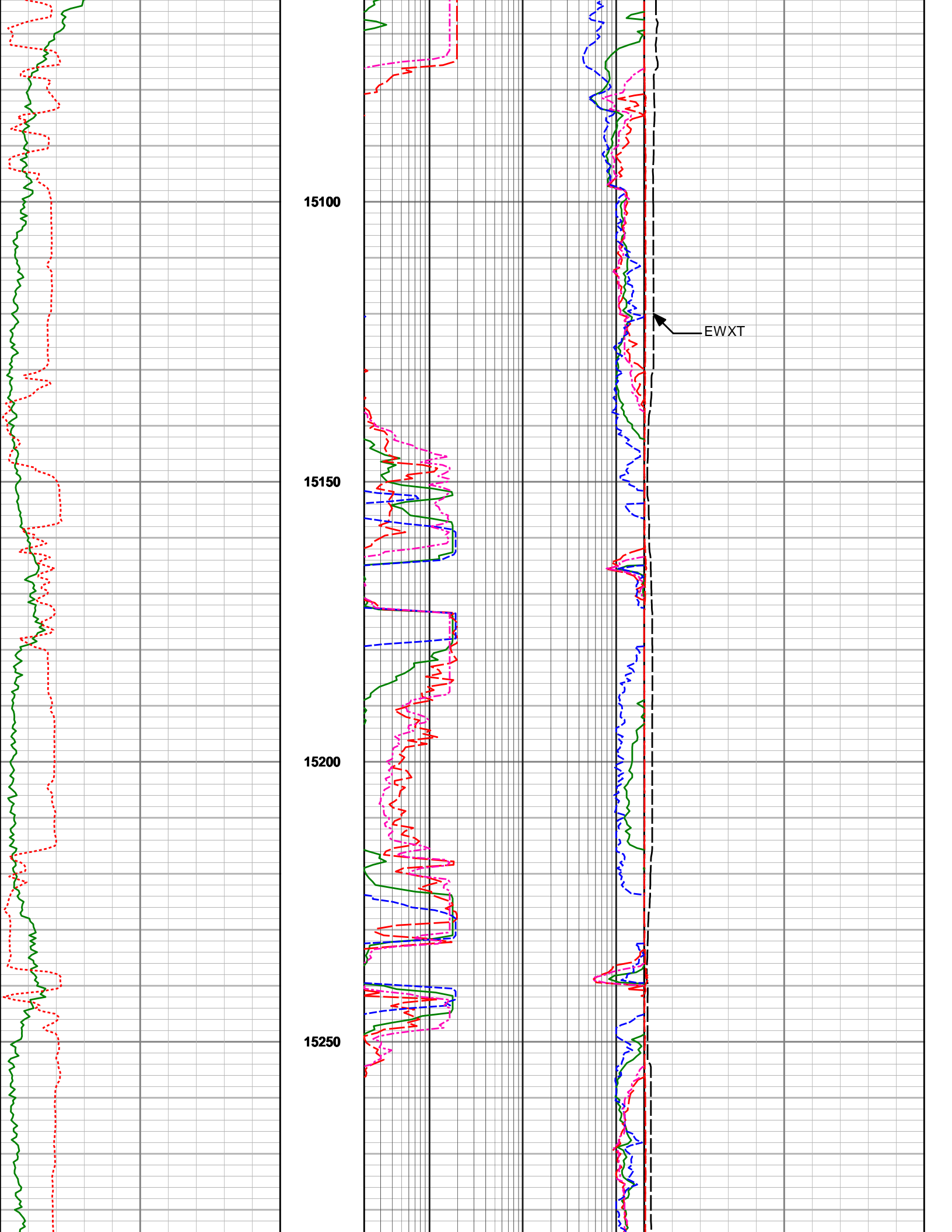
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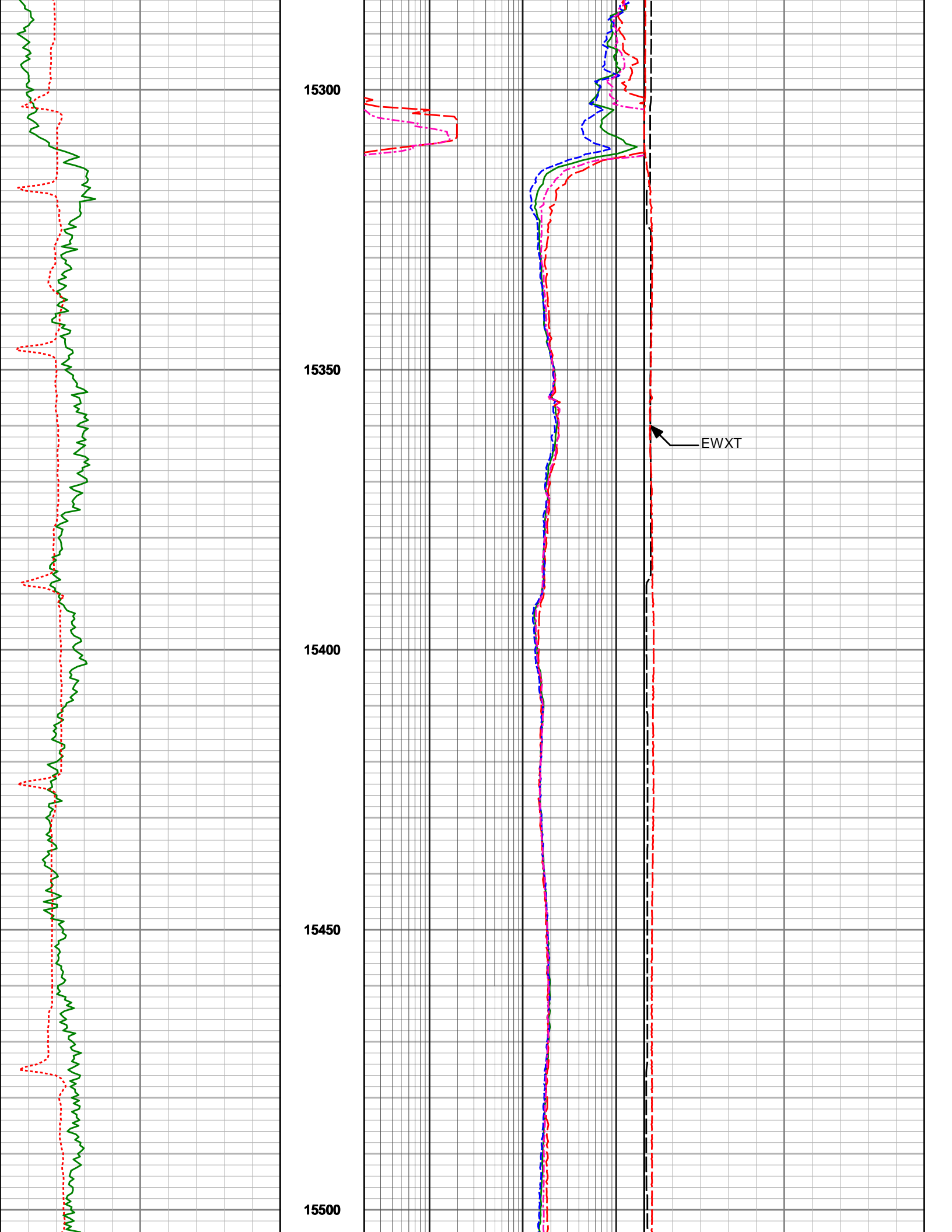


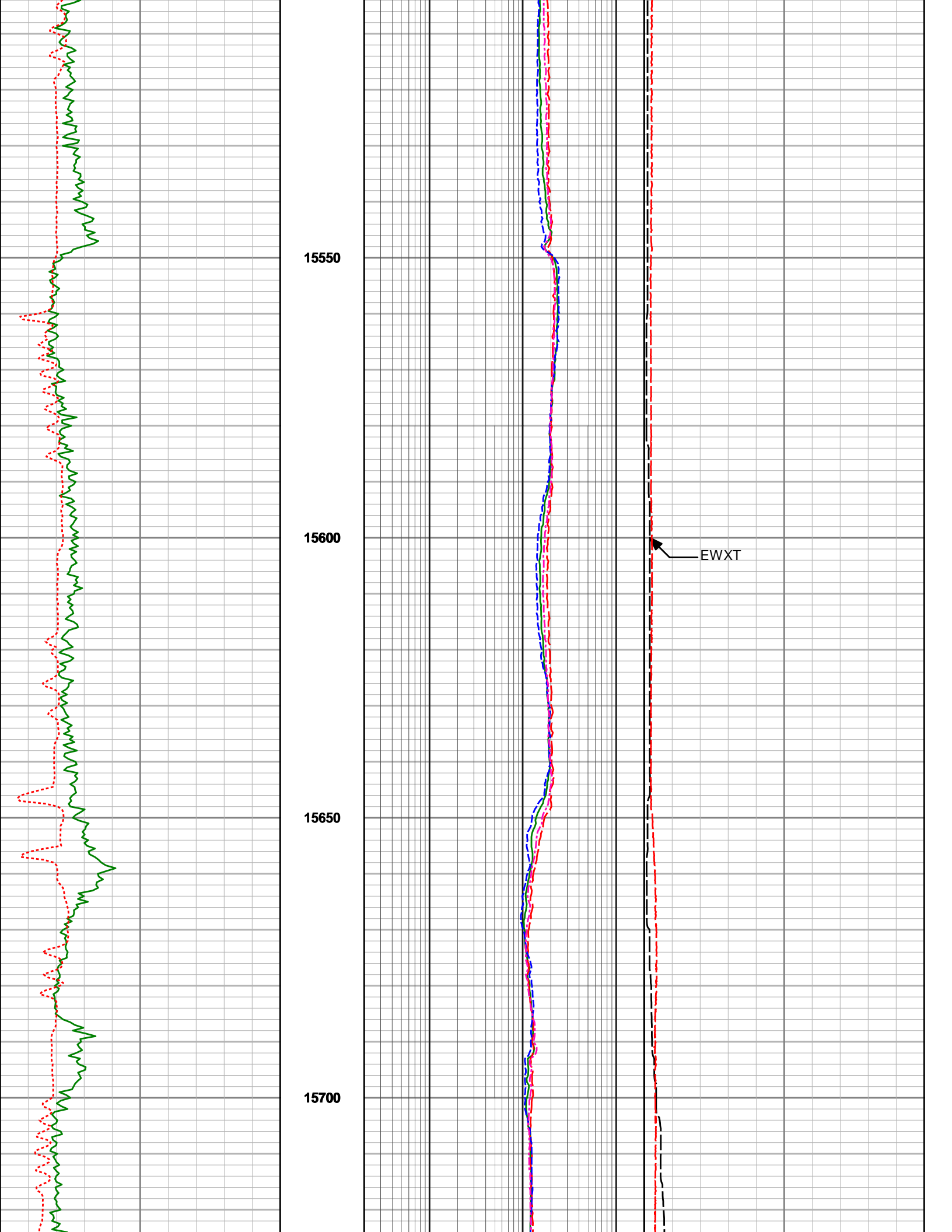


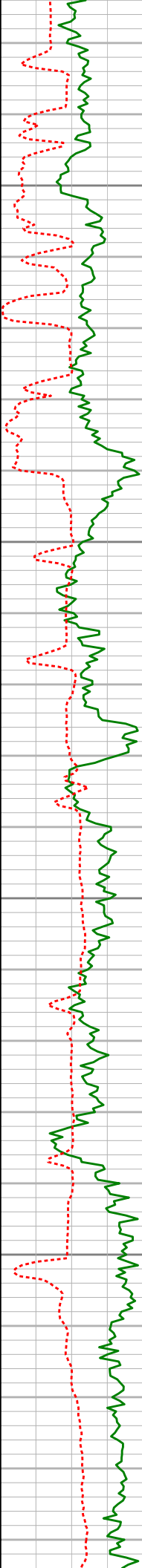










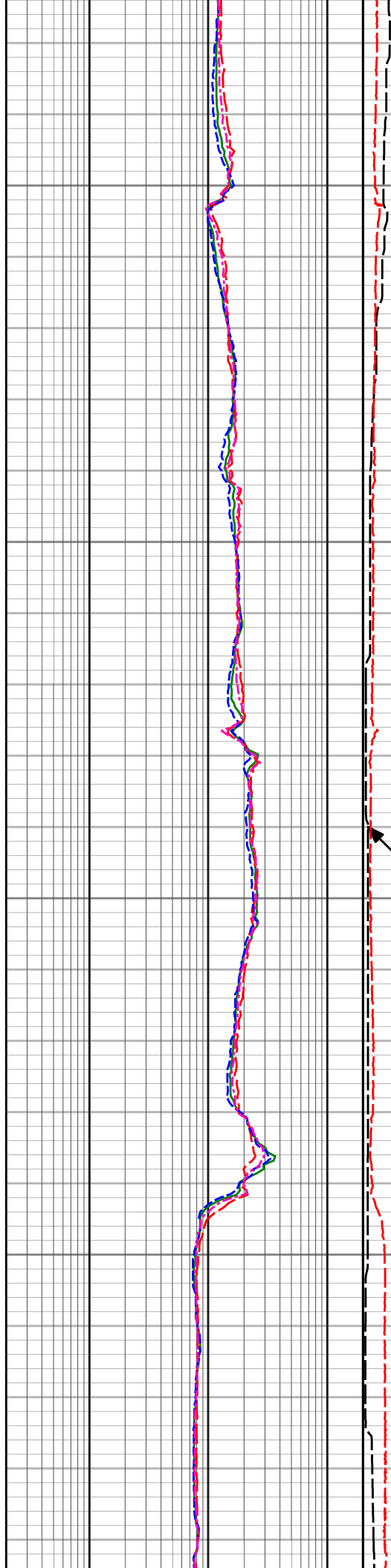


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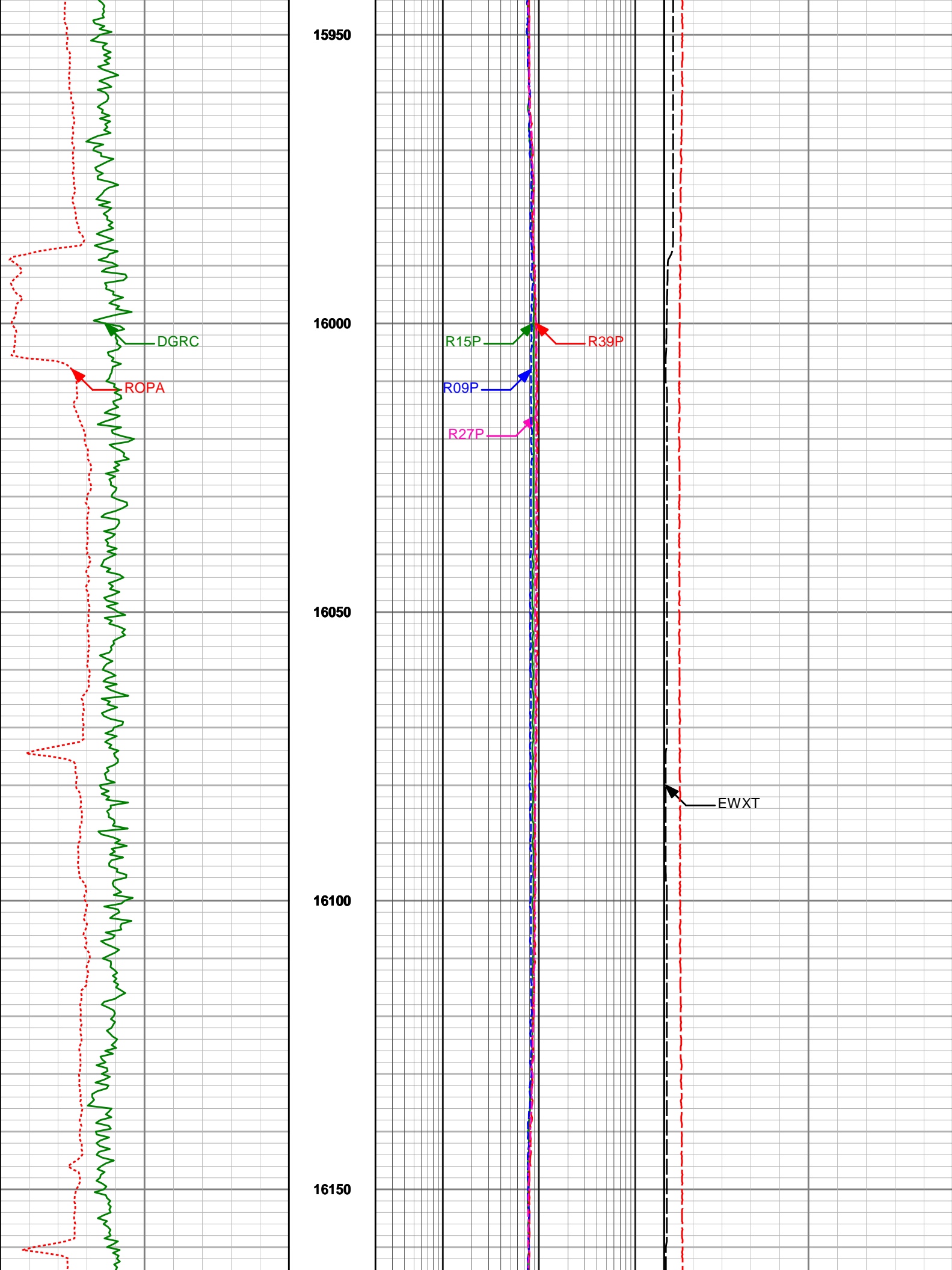
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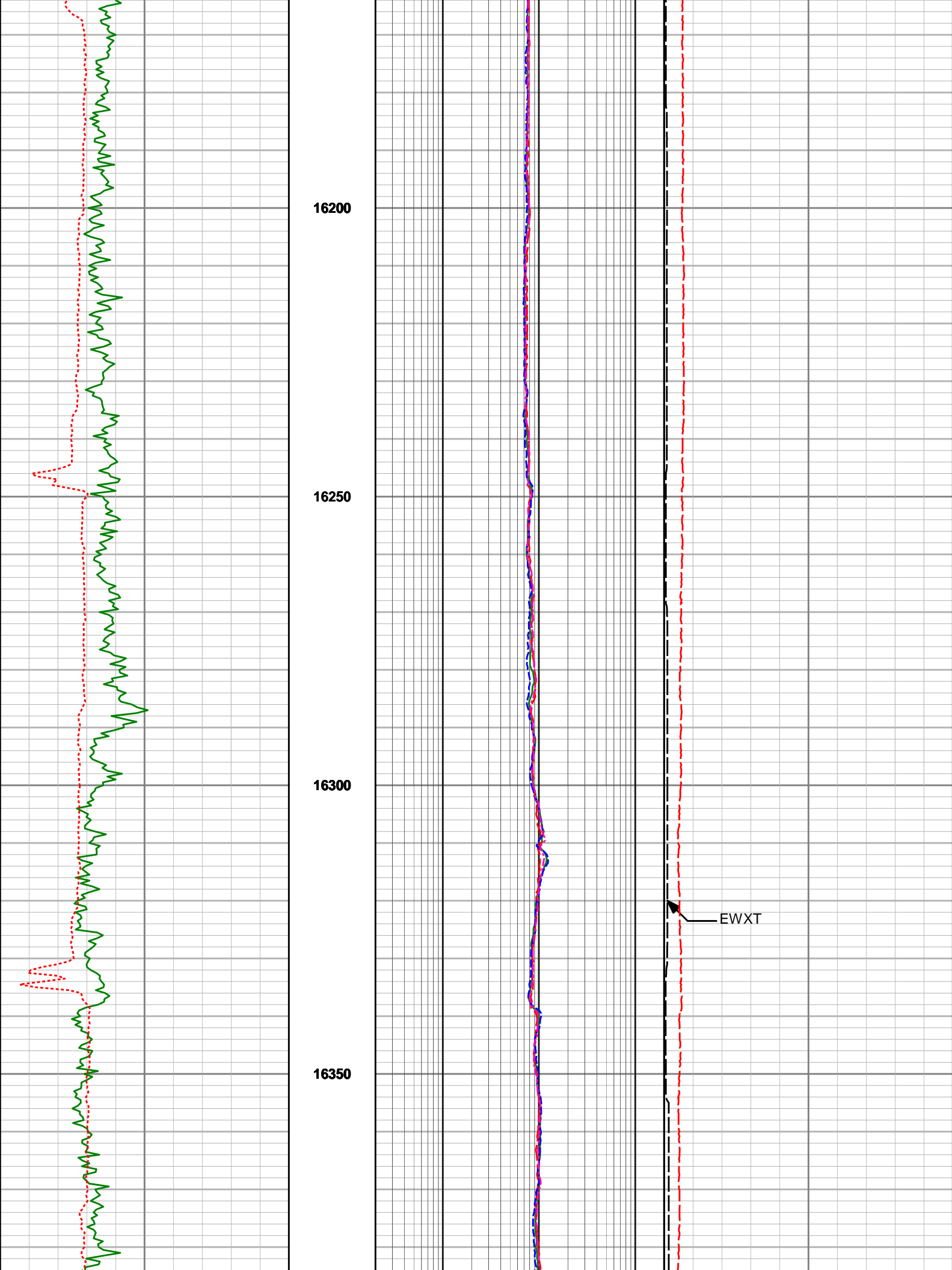
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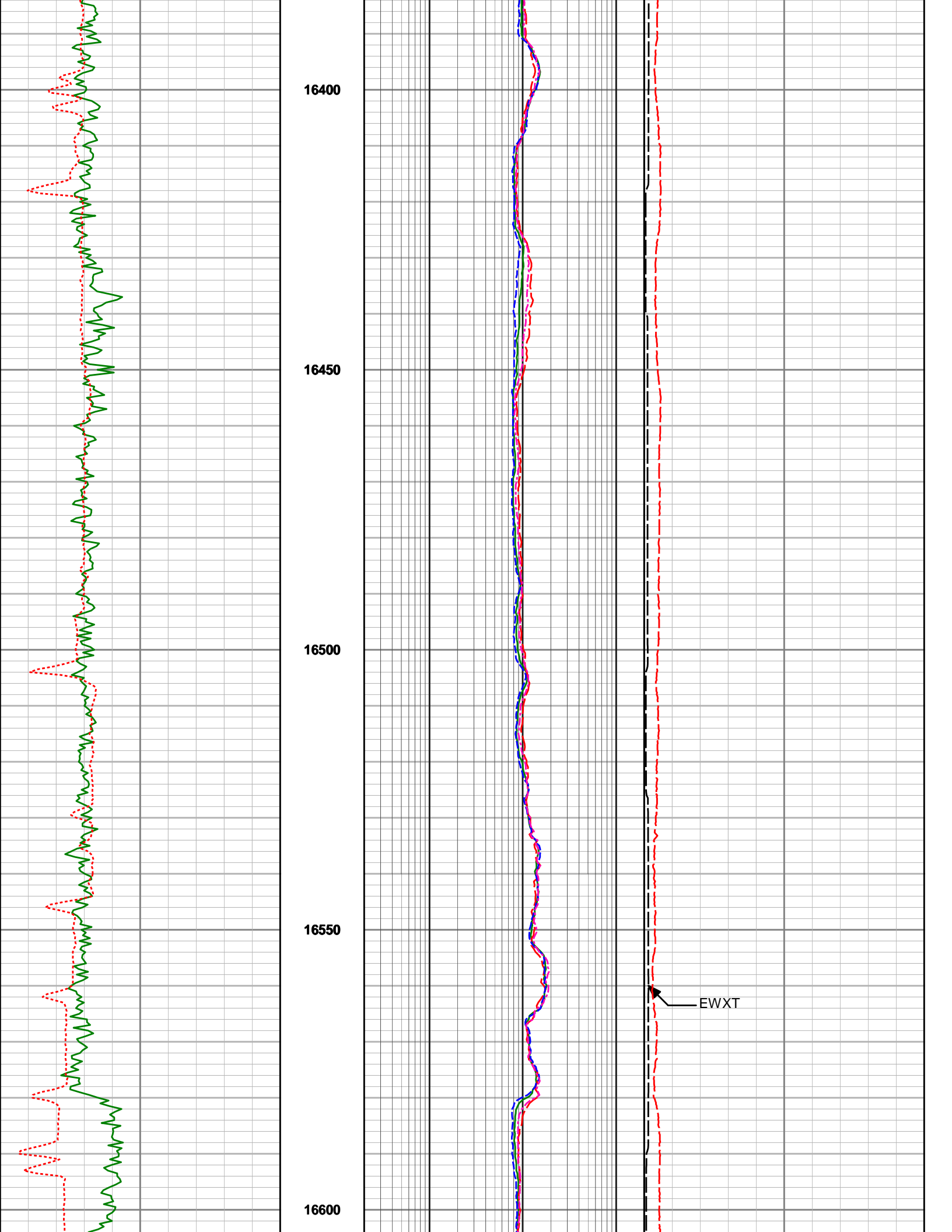


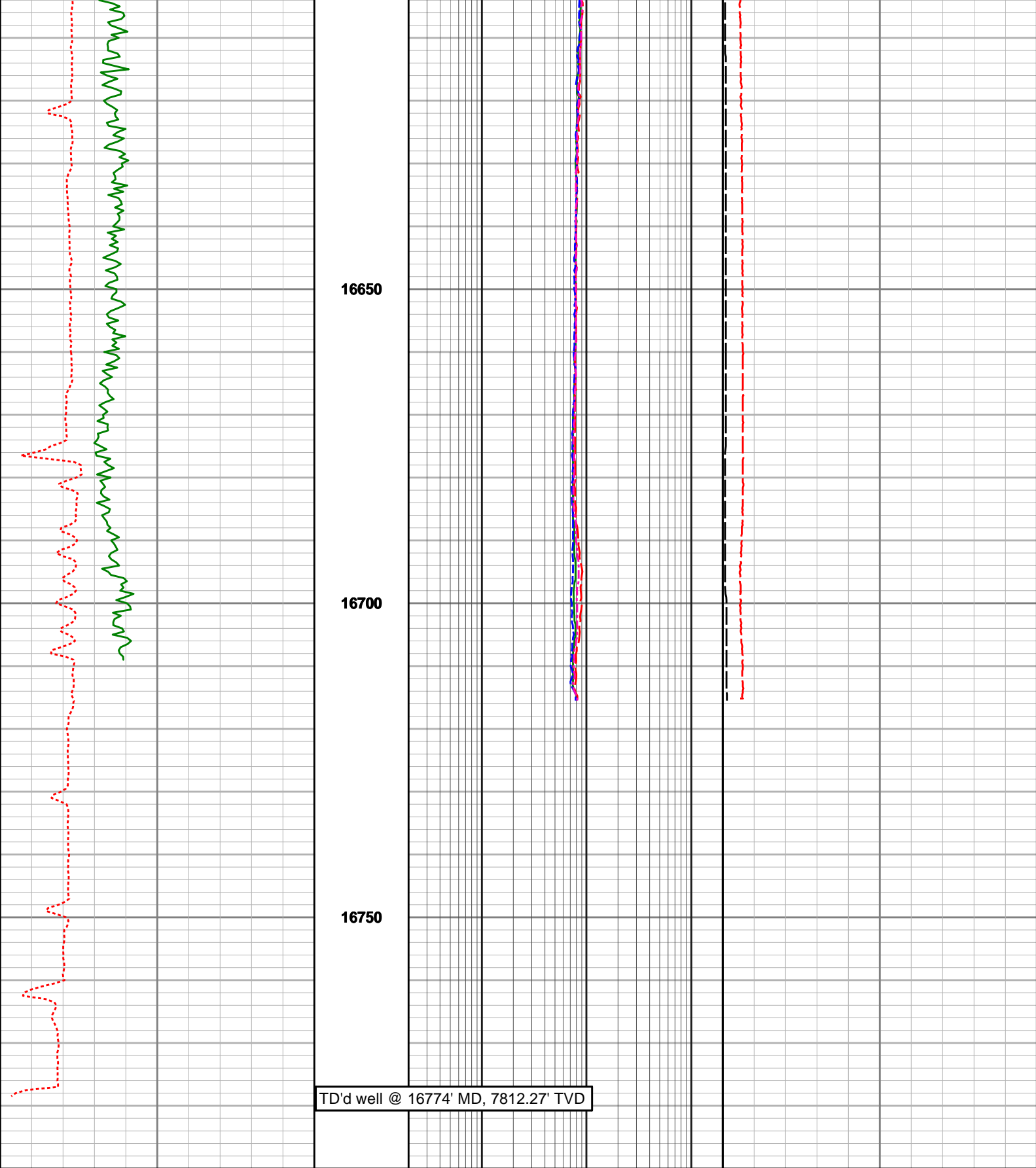
EWXT













<b>Avg Rate of Penetration</b> (ROPA) feet per hr	<b>Depth</b>	<b>39in Phase Resistivity BC</b> (R39P) ohm-m	<b>SP4 Formation Exp Time</b> (EWXT) hours
0500		0.2200	05K
<b>Dual Gamma Ray</b> (DGRC) api		<b>27in Phase Resistivity BC</b> (R27P) ohm-m	<b>39in Ph Conductivity BC</b>
0300		0.2200	02K
		<b>15in Phase Resistivity BC</b>	

	<b>10m Phase Resistivity BC</b>	
	(R15P)	
		
	0.2	200
	ohm-m	
	<b>9in Phase Resistivity BC</b>	
	(R09P)	
		
	0.2	200
	ohm-m	



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Anadarko Petroleum Corp.  
Griffiths 36C-20HZ  
Wattenburg  
Weld Colorado  
USA  
CA-XX-0900382957

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
1001.00	1.46	107.44	1000.81	1.13 N	17.20 E	-1.02	TIE-IN
1206.00	1.80	123.63	1205.73	1.43 S	22.37 E	1.57	0.28
1492.00	2.73	161.14	1491.52	10.37 S	28.30 E	10.54	0.60
1587.00	5.23	160.36	1586.28	16.59 S	30.49 E	16.78	2.63
1682.00	7.45	171.37	1680.70	26.76 S	32.87 E	26.96	2.65
1773.00	10.44	171.07	1770.58	40.73 S	35.04 E	40.95	3.29
1865.00	10.00	154.12	1861.14	56.16 S	39.82 E	56.40	3.29
1957.00	8.69	140.34	1951.93	68.69 S	47.74 E	68.98	2.81
2048.00	8.00	118.82	2041.99	77.04 S	57.67 E	77.39	3.49
2140.00	8.72	97.48	2133.03	81.03 S	70.20 E	81.46	3.44
2232.00	7.66	75.49	2224.11	80.40 S	83.06 E	80.91	3.57
2414.00	6.59	74.21	2404.71	74.52 S	104.85 E	75.16	0.60
2506.00	5.77	80.54	2496.17	72.33 S	114.49 E	73.02	1.15
2689.00	6.06	62.85	2678.21	66.41 S	132.16 E	67.21	1.00
2872.00	7.61	54.94	2859.91	55.04 S	150.68 E	55.96	0.99
3054.00	8.02	53.19	3040.22	40.51 S	170.70 E	41.55	0.26
3238.00	7.81	40.82	3222.48	23.36 S	189.15 E	24.51	0.93
3421.00	9.88	45.40	3403.30	2.92 S	208.46 E	4.20	1.19
3696.00	11.78	43.15	3673.39	34.13 N	244.47 E	-32.64	0.71
3880.00	9.12	59.04	3854.35	55.35 N	269.84 E	-53.70	2.12
4062.00	7.04	67.96	4034.54	66.96 N	292.55 E	-65.17	1.33
4245.00	5.94	95.84	4216.41	70.21 N	312.36 E	-68.30	1.80
4422.00	4.02	94.10	4392.74	68.83 N	327.66 E	-66.83	1.09
4594.00	2.66	60.73	4564.46	70.35 N	337.16 E	-68.29	1.35
4851.00	2.42	48.42	4821.21	76.87 N	346.42 E	-74.75	0.23
5022.00	2.16	43.18	4992.07	81.61 N	351.32 E	-79.46	0.19
5193.00	2.34	27.31	5162.94	87.06 N	355.12 E	-84.89	0.38
5365.00	1.95	40.12	5334.82	92.42 N	358.62 E	-90.23	0.36
5536.00	2.03	112.07	5505.74	93.51 N	363.31 E	-91.29	1.37
5708.00	1.67	102.92	5677.65	91.80 N	368.59 E	-89.55	0.27
5879.00	1.21	104.62	5848.60	90.79 N	372.78 E	-88.51	0.27
6051.00	1.04	97.77	6020.56	90.12 N	376.09 E	-87.82	0.13
6222.00	0.95	95.10	6191.54	89.78 N	379.04 E	-87.46	0.06
6479.00	0.57	58.84	6448.52	90.25 N	382.24 E	-87.91	0.23
6736.00	0.72	65.31	6705.50	91.58 N	384.80 E	-89.23	0.07
6908.00	0.80	63.95	6877.48	92.56 N	386.86 E	-90.19	0.05
6993.00	0.94	64.84	6962.47	93.12 N	388.03 E	-90.74	0.17
7036.00	1.10	72.84	7005.47	93.39 N	388.74 E	-91.01	0.50
7079.00	2.34	111.89	7048.45	93.18 N	389.95 E	-90.80	3.81
7122.00	4.52	136.51	7091.37	91.63 N	391.93 E	-89.23	6.00
7162.00	6.76	147.22	7131.18	88.51 N	394.29 E	-86.09	6.18
7205.00	8.10	154.21	7173.81	83.65 N	396.98 E	-81.22	3.75
7251.00	8.80	148.13	7219.32	77.74 N	400.25 E	-75.30	2.46
7293.00	11.46	136.65	7260.66	71.98 N	404.81 E	-69.50	7.92
7337.00	15.05	133.55	7303.48	64.86 N	411.96 E	-62.34	8.31

7380.00	17.44	141.03	7344.77	56.00 N	420.06 E	-53.43	7.38
7423.00	17.09	154.87	7385.85	45.27 N	426.80 E	-42.66	9.57
7466.00	20.74	160.65	7426.52	32.36 N	432.00 E	-29.72	9.53
7508.00	23.45	162.87	7465.43	17.35 N	436.93 E	-14.68	6.76
7551.00	28.05	165.39	7504.15	0.62 S	442.01 E	3.32	10.97
7594.00	33.59	166.47	7541.07	21.98 S	447.34 E	24.71	12.95
7637.00	38.52	167.31	7575.82	46.62 S	453.07 E	49.39	11.54
7680.00	43.81	169.10	7608.18	74.32 S	458.83 E	77.12	12.59
7723.00	49.95	170.01	7637.56	105.18 S	464.51 E	108.01	14.37
7765.00	55.56	171.92	7662.97	138.18 S	469.74 E	141.05	13.84
7808.00	61.46	174.75	7685.43	174.58 S	473.96 E	177.48	14.82
7851.00	64.01	179.76	7705.14	212.74 S	475.77 E	215.64	11.93
7894.00	68.18	182.04	7722.56	252.04 S	475.14 E	254.93	10.86
7937.00	73.55	181.73	7736.65	292.62 S	473.80 E	295.51	12.49
7980.00	79.55	181.52	7746.65	334.41 S	472.62 E	337.29	13.96
8032.00	87.63	182.38	7752.45	386.01 S	470.86 E	388.88	15.63
8115.00	91.30	182.99	7753.23	468.90 S	466.97 E	471.74	4.48
8201.00	91.85	182.68	7750.87	554.76 S	462.71 E	557.58	0.74
8287.00	91.73	182.04	7748.19	640.64 S	459.17 E	643.44	0.76
8372.00	91.73	181.51	7745.62	725.56 S	456.54 E	728.34	0.62
8458.00	91.29	182.18	7743.35	811.49 S	453.77 E	814.25	0.93
8544.00	90.37	181.85	7742.10	897.43 S	450.75 E	900.16	1.14
8629.00	89.69	182.35	7742.05	982.37 S	447.63 E	985.08	0.99
8715.00	89.69	181.24	7742.52	1068.32 S	444.94 E	1071.02	1.29
8801.00	89.63	180.16	7743.03	1154.31 S	443.89 E	1157.00	1.25
8887.00	90.00	180.21	7743.30	1240.31 S	443.61 E	1243.00	0.43
8972.00	89.81	181.11	7743.44	1325.31 S	442.63 E	1327.99	1.09
9058.00	89.57	181.59	7743.90	1411.28 S	440.60 E	1413.95	0.63
9144.00	90.00	181.01	7744.23	1497.26 S	438.64 E	1499.91	0.84
9230.00	90.00	180.43	7744.23	1583.25 S	437.56 E	1585.89	0.68
9315.00	90.25	180.14	7744.04	1668.25 S	437.15 E	1670.89	0.44
9401.00	90.99	179.22	7743.12	1754.24 S	437.63 E	1756.88	1.37
9487.00	90.06	179.45	7742.33	1840.23 S	438.62 E	1842.88	1.11
9572.00	90.74	178.69	7741.73	1925.22 S	440.00 E	1927.87	1.20
9658.00	90.25	178.90	7740.99	2011.19 S	441.80 E	2013.86	0.63
9744.00	89.38	179.64	7741.27	2097.19 S	442.89 E	2099.85	1.32
9830.00	89.94	179.64	7741.78	2183.18 S	443.43 E	2185.85	0.64
9915.00	89.44	179.73	7742.23	2268.18 S	443.90 E	2270.85	0.59
10001.00	88.52	181.37	7743.77	2354.16 S	443.08 E	2356.82	2.19
10087.00	89.44	180.68	7745.30	2440.13 S	441.54 E	2442.78	1.34
10172.00	89.44	181.74	7746.12	2525.10 S	439.75 E	2527.74	1.25
10258.00	90.31	181.04	7746.31	2611.08 S	437.66 E	2613.70	1.29
10344.00	90.87	181.73	7745.42	2697.05 S	435.58 E	2699.66	1.04
10429.00	90.19	181.69	7744.64	2782.01 S	433.04 E	2784.60	0.80
10515.00	89.32	181.91	7745.02	2867.96 S	430.34 E	2870.54	1.04
10601.00	89.75	181.55	7745.71	2953.92 S	427.74 E	2956.48	0.65
10687.00	88.70	180.75	7746.87	3039.89 S	426.01 E	3042.44	1.54
10772.00	89.20	180.31	7748.43	3124.87 S	425.22 E	3127.41	0.77
10858.00	89.63	179.52	7749.31	3210.87 S	425.35 E	3213.41	1.05
10944.00	90.31	179.14	7749.35	3296.86 S	426.35 E	3299.40	0.90
11029.00	88.70	177.86	7750.09	3381.82 S	428.57 E	3384.38	2.42
11093.00	89.14	178.14	7751.29	3445.77 S	430.81 E	3448.34	0.81
11184.00	89.13	175.83	7752.67	3536.63 S	435.59 E	3539.23	2.55
11276.00	87.96	177.41	7755.00	3628.44 S	441.02 E	3631.06	2.14
11368.00	88.82	179.55	7757.58	3720.36 S	443.46 E	3723.00	2.51
11458.00	89.81	180.38	7758.65	3810.35 S	443.51 E	3812.99	1.43
11549.00	90.00	179.94	7758.80	3901.35 S	443.25 E	3903.99	0.52
11641.00	90.06	180.01	7758.75	3993.35 S	443.29 E	3995.99	0.09
11733.00	90.19	178.77	7758.55	4085.35 S	444.27 E	4087.98	1.35
11824.00	91.11	180.16	7757.52	4176.33 S	445.12 E	4178.97	1.83
11910.00	91.73	179.36	7755.39	4262.30 S	445.48 E	4264.95	1.17
11996.00	91.42	181.27	7753.02	4348.27 S	445.00 E	4350.90	2.25
12081.00	91.79	180.65	7750.64	4433.22 S	443.58 E	4435.85	0.85
12167.00	89.75	180.76	7749.48	4519.20 S	442.52 E	4521.82	2.37
12253.00	90.93	181.66	7748.97	4605.18 S	440.71 E	4607.79	1.72
12338.00	91.17	180.93	7747.41	4690.14 S	438.78 E	4692.73	0.90
12424.00	90.00	181.33	7746.53	4776.12 S	437.08 E	4778.70	1.44
12510.00	90.37	182.11	7746.25	4862.08 S	434.50 E	4864.64	1.00
12595.00	90.37	183.00	7745.70	4946.99 S	430.71 E	4949.53	1.05
12681.00	90.56	183.08	7745.01	5032.87 S	426.15 E	5035.38	0.23
12767.00	90.43	183.52	7744.27	5118.72 S	421.20 E	5121.20	0.53

12853.00	90.19	182.28	7743.80	5204.61 S	416.86 E	5207.06	1.47
12938.00	89.20	181.39	7744.26	5289.56 S	414.14 E	5291.99	1.56
13024.00	88.21	181.50	7746.21	5375.51 S	411.97 E	5377.93	1.15
13110.00	87.65	180.92	7749.32	5461.44 S	410.15 E	5463.84	0.93
13195.00	89.44	182.74	7751.47	5546.36 S	407.44 E	5548.74	3.00
13281.00	90.62	183.47	7751.42	5632.23 S	402.78 E	5634.59	1.61
13367.00	90.37	183.94	7750.68	5718.05 S	397.22 E	5720.37	0.62
13453.00	90.49	182.89	7750.03	5803.89 S	392.10 E	5806.18	1.24
13538.00	88.21	181.51	7751.00	5888.81 S	388.84 E	5891.08	3.14
13624.00	88.27	180.84	7753.64	5974.76 S	387.08 E	5977.01	0.78
13709.00	88.89	180.33	7755.75	6059.72 S	386.21 E	6061.97	0.95
13793.00	89.44	180.47	7756.98	6143.71 S	385.62 E	6145.95	0.69
13881.00	88.82	180.83	7758.31	6231.70 S	384.62 E	6233.93	0.81
13966.00	90.00	182.27	7759.18	6316.66 S	382.33 E	6318.87	2.19
14052.00	90.25	182.42	7758.99	6402.58 S	378.81 E	6404.78	0.34
14137.00	89.38	180.86	7759.26	6487.55 S	376.38 E	6489.72	2.10
14223.00	88.52	179.70	7760.84	6573.53 S	375.97 E	6575.70	1.68
14309.00	87.90	178.92	7763.53	6659.48 S	377.00 E	6661.66	1.15
14395.00	88.03	178.36	7766.58	6745.40 S	379.04 E	6747.59	0.67
14481.00	88.52	178.25	7769.17	6831.32 S	381.58 E	6833.53	0.58
14566.00	88.77	177.29	7771.19	6916.23 S	384.88 E	6918.46	1.17
14652.00	88.21	177.81	7773.46	7002.12 S	388.56 E	7004.37	0.88
14738.00	89.81	177.76	7774.95	7088.04 S	391.88 E	7090.31	1.87
14823.00	90.56	178.80	7774.67	7173.00 S	394.43 E	7175.28	1.51
14909.00	90.06	180.65	7774.21	7259.00 S	394.84 E	7261.27	2.22
14995.00	88.33	181.15	7775.42	7344.98 S	393.49 E	7347.24	2.10
15080.00	88.02	180.13	7778.12	7429.93 S	392.54 E	7432.19	1.26
15166.00	88.76	180.75	7780.53	7515.89 S	391.88 E	7518.14	1.12
15252.00	88.76	183.08	7782.39	7601.81 S	389.00 E	7604.05	2.70
15337.00	89.13	183.15	7783.95	7686.67 S	384.39 E	7688.88	0.44
15423.00	88.76	183.34	7785.52	7772.52 S	379.52 E	7774.70	0.48
15509.00	88.33	183.00	7787.70	7858.36 S	374.77 E	7860.51	0.64
15594.00	87.96	181.26	7790.45	7943.26 S	371.62 E	7945.38	2.09
15680.00	87.10	181.29	7794.16	8029.15 S	369.71 E	8031.26	1.01
15766.00	87.90	183.19	7797.92	8115.00 S	366.35 E	8117.09	2.39
15852.00	88.27	182.41	7800.79	8200.85 S	362.15 E	8202.91	1.01
15938.00	87.22	182.76	7804.18	8286.70 S	358.28 E	8288.73	1.29
16023.00	88.83	183.66	7807.11	8371.51 S	353.52 E	8373.51	2.16
16109.00	88.83	185.00	7808.87	8457.24 S	347.03 E	8459.21	1.56
16195.00	89.20	185.76	7810.35	8542.85 S	338.97 E	8544.76	0.99
16280.00	89.32	186.75	7811.45	8627.34 S	329.71 E	8629.19	1.17
16366.00	89.20	186.77	7812.57	8712.73 S	319.59 E	8714.52	0.14
16452.00	89.51	188.18	7813.54	8797.99 S	308.40 E	8799.71	1.69
16537.00	89.69	189.02	7814.14	8882.03 S	295.69 E	8883.67	1.01
16623.00	90.62	190.33	7813.90	8966.81 S	281.23 E	8968.36	1.86
16724.00	90.62	191.12	7812.81	9066.04 S	262.44 E	9067.47	0.79
16774.00	90.62	191.12	7812.27	9115.09 S	252.79 E	9116.47	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 179.65 DEGREES (TRUE)  
A TOTAL CORRECTION OF 8.67 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.  
HORIZONTAL DISPLACEMENT(CLOSURE) AT 16774.00 FEET  
IS 9118.60 FEET ALONG 178.41 DEGREES (TRUE)**

**All directional surveys tied onto surface casing at 1001' MD. Final survey is a straight line projection to bit.**