HALLIBURTON | Sperry Drilling

DGR Dual Gamma Ray
SP4 - Slim Phase 4
PCDC - Pressure Case Directional Current

1 : 240

Country	: **USA**
Field	: **Wattenburg**
Location	: **Lat: 40° 7' 2.68" North** **Long: 104° 43' 40.93" West**
Well	: **Wishbone 29N-E24HZ**
Company	: **Anadarko Petroleum Corporation**
Rig	: **Xtreme 22**

LOCATION

Company : **Anadarko Petroleum Corporation**
Rig : **Xtreme 22**
Well : **Wishbone 29N-E24HZ**
Field : **Wattenburg**
Country : **USA**
API Number : **05-123-37149**

Latitude : **40° 7' 2.68" North**
Longitude : **104° 43' 40.93" West**
UTM Easting = **980,204.30 m**
UTM Northing = **392,142.46 m**

Other Services
Directional Drilling

Elev. KB **5100.00 ft**
DF **5099.00 ft**
GL **5084.00 ft**
WD **N/A**

Permanent Datum : **Ground Level** Elevation : **5084.00 ft**
Log Measured From : **Kelly Bushing** **16.00 ft** Above Permanent Datum
Drilling Measured From : **Kelly Bushing**

MD LOG

Depth Logged : **1,042.00 ft** To **11,910.00 ft**
Date Logged : **01-Jun-13** To **30-Jun-13**
Total Depth MD : **11,910.00 ft** TVD: **7,419.03 ft**
Spud Date : **01-Jun-13**

Unit No. : **11610117**
Plot Type : **Final**
Plot Date : **02-Jul-13**

Job No. :**CA-XX-0900382955**

Borehole Record (MD)

Run No.	Size	From	To
0100	8.750 in	1042.00 ft	6850.00 ft
0200	8.750 in	6850.00 ft	7778.00 ft
0300	6.125 in	7778.00 ft	9196.00 ft
0400	6.125 in	9196.00 ft	11910.00 ft

Casing Record (MD)

Run No.	Size	Weight	From	To
	9.625 in	36.00 lbpf	SURFACE	1,042.00 ft
	7.000	24.00	0.00	7780.00

Borehole Record (MD)

Run No.	Size	From	To

WELL INFORMATION

MWD Run Number	100	200	300	400	
Date run completed	03-Jun-13	04-Jun-13	28-Jun-13	30-Jun-13	
Rig Bit Number	0100	0200	0300	0400	
Bit Size (in)	8.750	8.750	6.125	6.125	
Tool Nominal OD (in)	6.860	6.750	4.750	4.750	
Log Start Depth (MD, ft)	1,042.00	6,850.00	7,778.00	9,196.00	
Log End Depth (MD, ft)	6,850.00	7,778.00	9,195.00	11,910.00	
Drill or Wipe	Drill	Drill	Drill	Drill	
Drill/Wipe Start Date and Time	01-Jun-13 12:45	03-Jun-13 07:40	27-Jun-13 15:21	28-Jun-13 19:19	
Drill/Wipe End Date and Time	02-Jun-13 19:00	04-Jun-13 00:34	28-Jun-13 06:38	29-Jun-13 23:16	
Min Inc (deg) @ Depth (MD, ft)	.40 @ 1,531.00	3.20 @ 6,876.00	86.54 @ 7,860.00	87.47 @ 9,575.00	
Max Inc (deg) @ Depth (MD, ft)	11.02 @ 3,087.00	90.00 @ 7,778.00	92.23 @ 8,117.00	95.20 @ 10,517.00	
Bit TFA(in2) / Bit Type	1.49 / N/A	1.49 / N/A	0.9817 / N/A	.9817 / N/A	
Flow Rate (gpm)	613.61	525.33	293.04	304.00	
Max AV (fpm) / CV (fpm) @ MWD	349.2 / 214.2	272.5 / 252.9	282.86 / 233.95	324.34 / 320.48	
Fluid Type	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel	
Density (ppg) / Viscosity (spqt)	8.70 / 38.00	10.00 / 40.00	9.75 / 39.00	9.65 / 43.00	
Filtrate CL (ppm)	1,500.00	1,700.00	1,467.00	1,467.00	
pH / Fluid Loss (mptm)	8.50 / 6	9.00 / 4	9.00 / 5	9.00 / 4	
PV (cP) / YP (lhf2)	6 / 6.00	9 / 8.00	7 / 6.00	13 / 10.00	
% Solids / % Sand	2.70 / 0.20	9.00 / 0.25	8.00 / 0.25	7.00 / 0.25	
% Oil / Oil:Water Ratio	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	
Rm @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	
Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	

Max Tool Temp (degF) / Source	172.78 / PCM	172.78 / PCM	229.65 / HCIM	229.65 / HCIM	
Rm @ Max Tool Temp (degF)	N/A @ 172.78	N/A @ 172.78	N/A @ 229.65	N/A @ 229.65	
Lead MWD Engineer	Matt Busche	Matt Busche	Caleb Jones	Caleb Jones	
Customer Representative	David Cornett	David Cornett	Pete Perry	Pete Perry	

SENSOR INFORMATION

Downhole Processor Information

Tool Type	PCM	PCM	HCIM	HCIM	
Software Version	5.84	5.84	88.47	88.56	
Sub Serial Number	11305516	11305516	90359967	90366768	
Insert Serial Number	11400878	11400878	123	11425818	
Date and Time Initialized	31-May-13 10:53	31-May-13 10:53	27-Jun-13 08:08	28-Jun-13 14:11	
Date and Time Read	04-Jun-13 11:42	04-Jun-13 11:35	28-Jun-13 12:08	30-Jun-13 07:47	
ECMB SW Version	N/A	N/A	N/A	N/A	

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC	PCDC	
Distance From Bit (ft)	50.88	46.55	47.30	47.50	
Software Version	6.21	6.21	6.21	6.21	
Sub Serial Number	11305516	11305516	11426049	11122424	
Sonde Serial Number	11181531	11181531	11478096	11297491	
Sensor ID Number	N/A	N/A	N/A	N/A	
Toolface Offset (deg)	170.89	23.70	222.06	182.65	

Gamma Ray Sensor Information

Tool Type	PCG	PCG	DGR	DGR	
Distance From Bit (ft)	55.83	51.50	69.08	69.41	
Recorded Sample Period (sec)	10	10	12	8	
Software Version	8.15	8.15	N/A	N/A	
Sub Serial Number	11305516	11305516	90359967	90366768	
Insert/Sonde Serial Number	11579809	11579809	Legacy 88720	10436112	

Resistivity Sensor Information

Tool Type			Slim P4	Slim P4	
Distance From Bit (ft)			62.10	62.43	
Recorded Sample Period (sec)			12	12	
Software Version			5.55	5.55	
Sub Serial Number			240135	108711	
Receiver Insert Serial Number			265025	228747	
Transmitter Insert Serial Number			243460	175830	
Receiver Orientation			Down	Down	

REMARKS

1. 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:

DGR (Dual Gamma Ray):
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

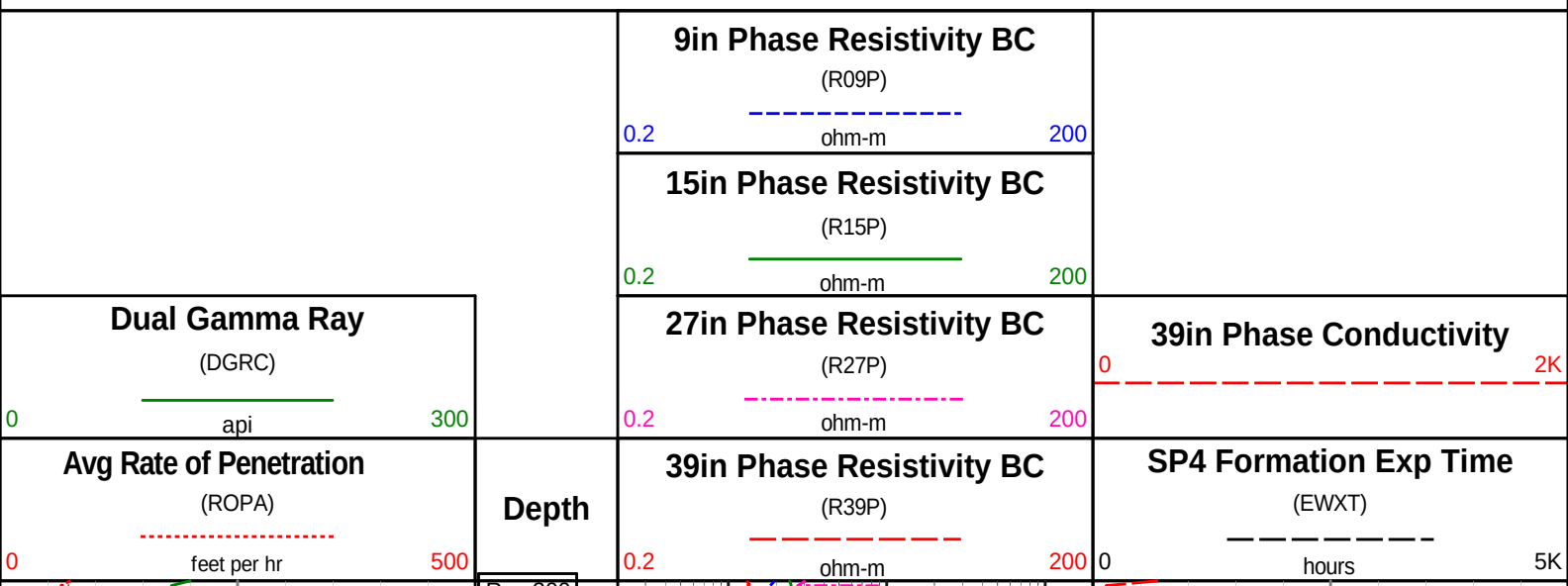
HALLIBURTON

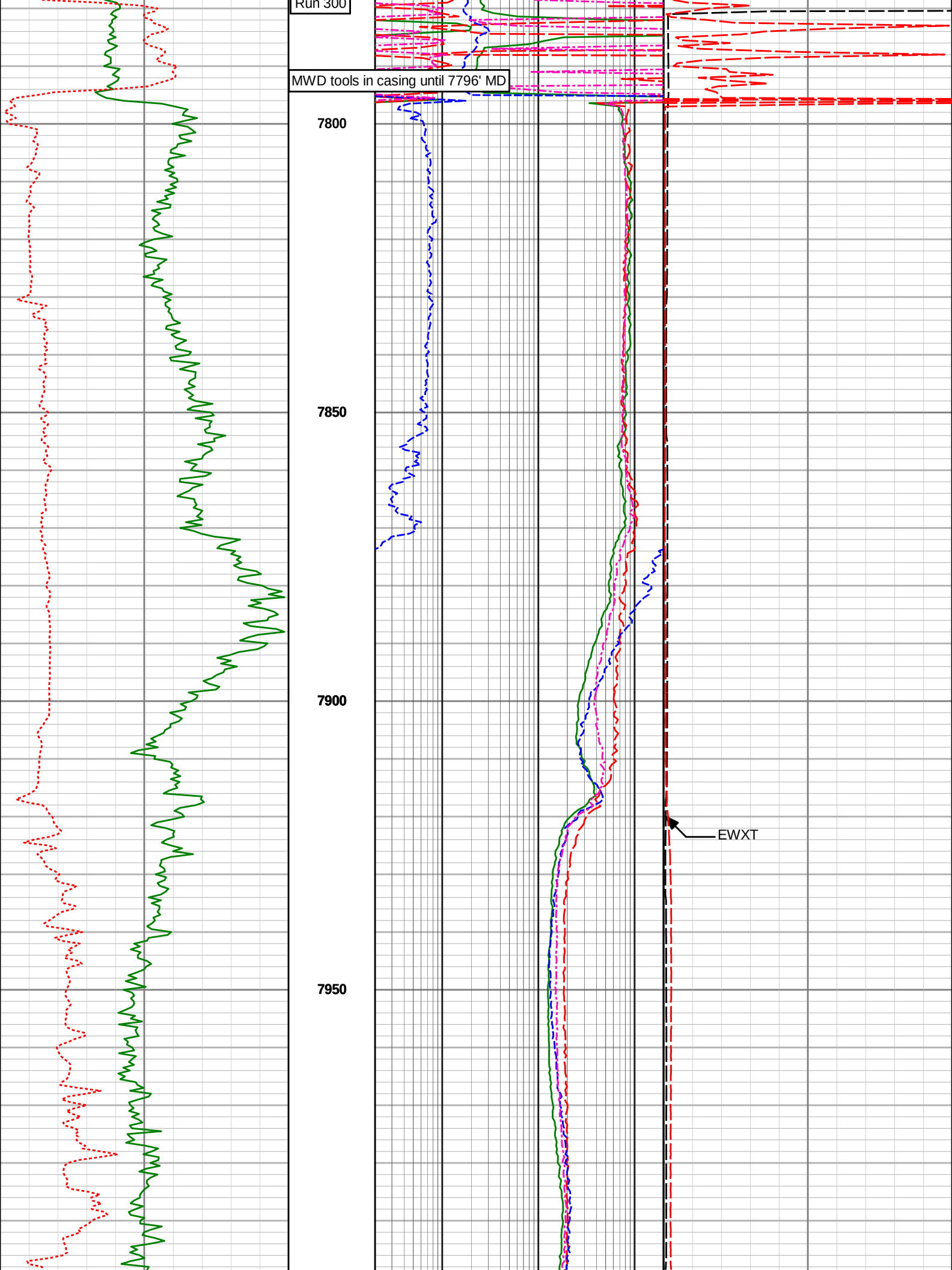
MD Main Log 1:240

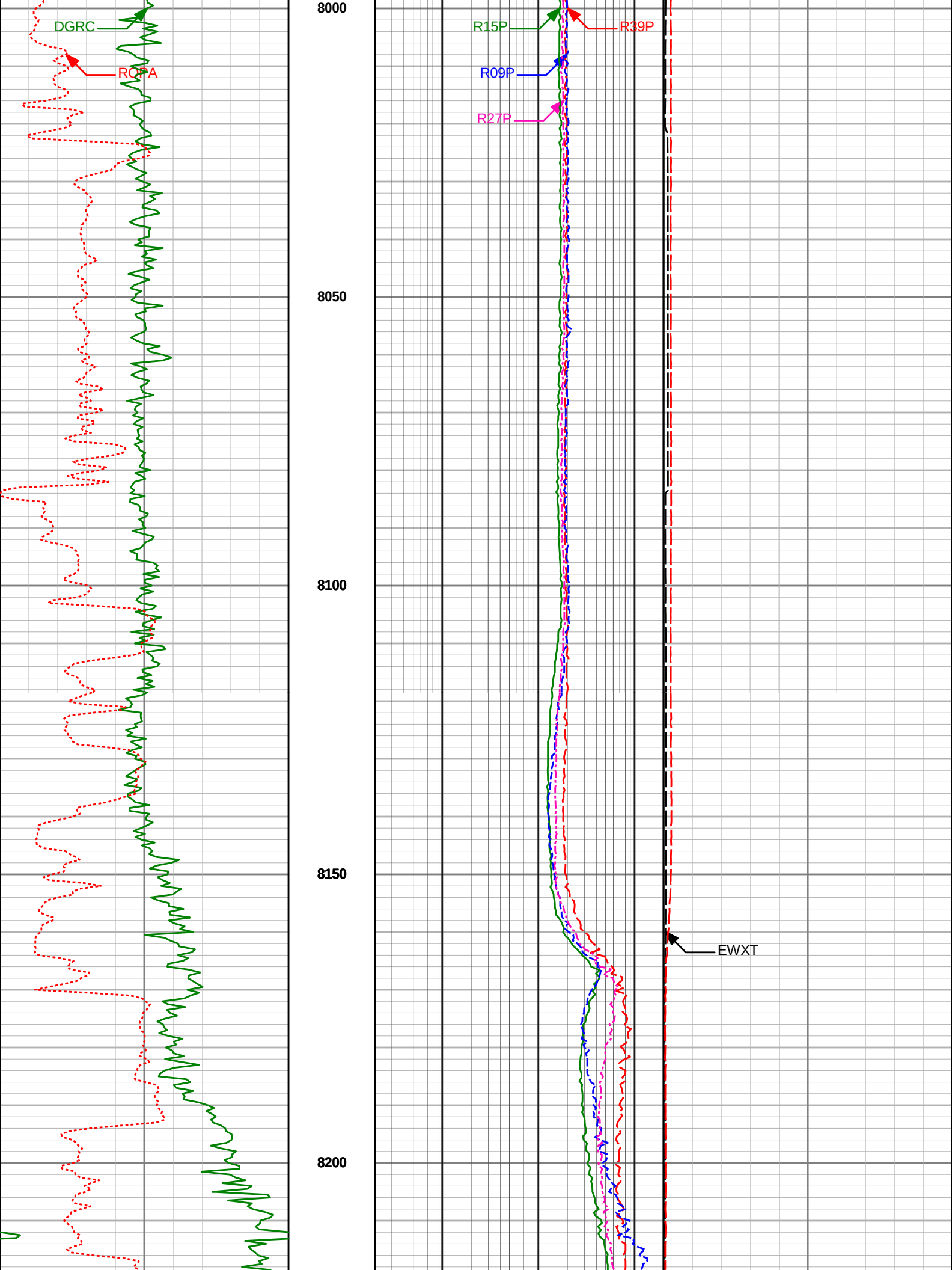
Anadarko

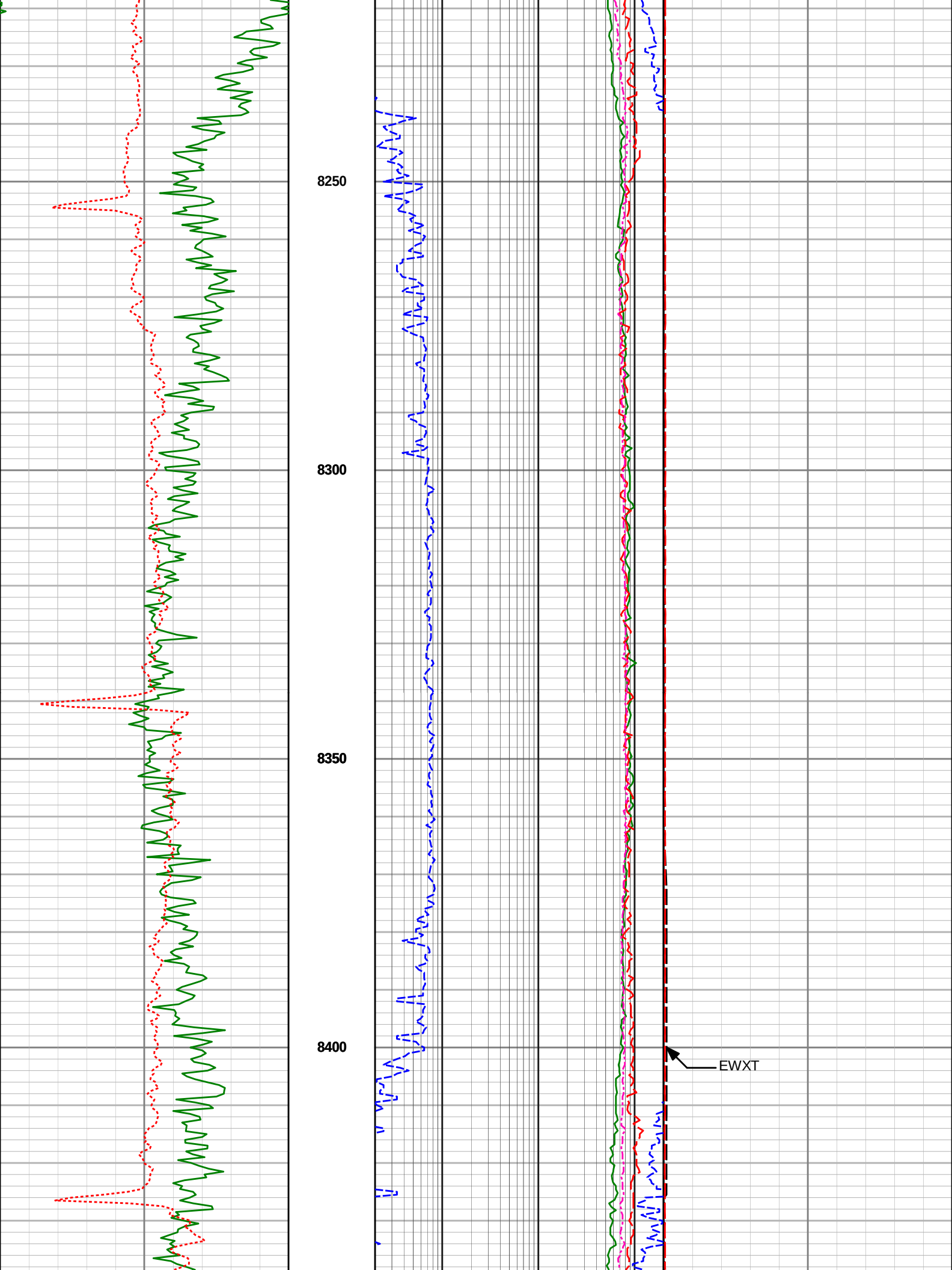
Xtreme 22

Wishbone 3C-24HZ




Run 300
MWD tools in casing until 7796' MD
7800
7850
7900
7950
EWXT


DGRC
ROPA
8000
R15P
R39P
R09P
R27P
8050
8100
8150
EWXT
8200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8350
8400
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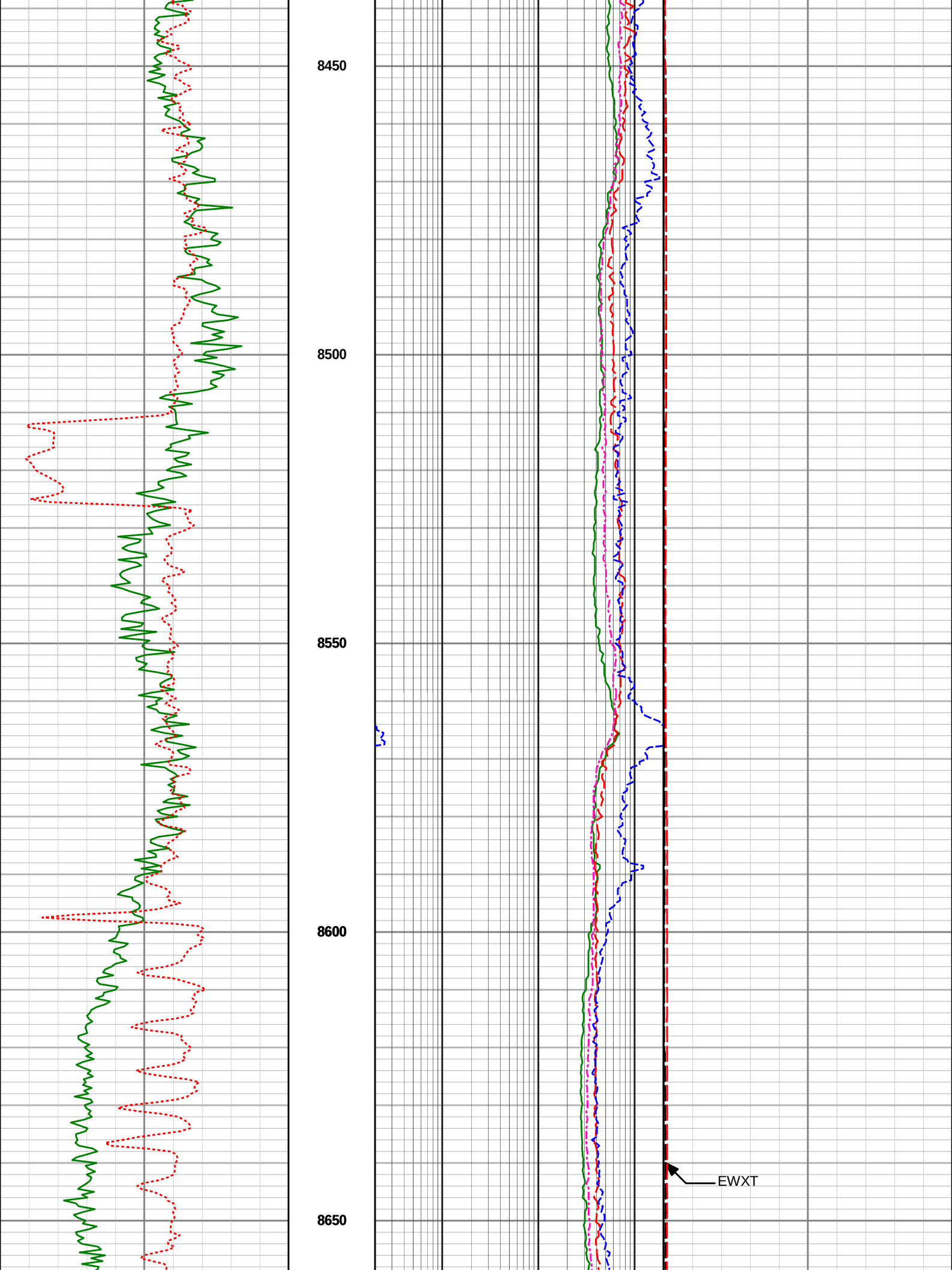
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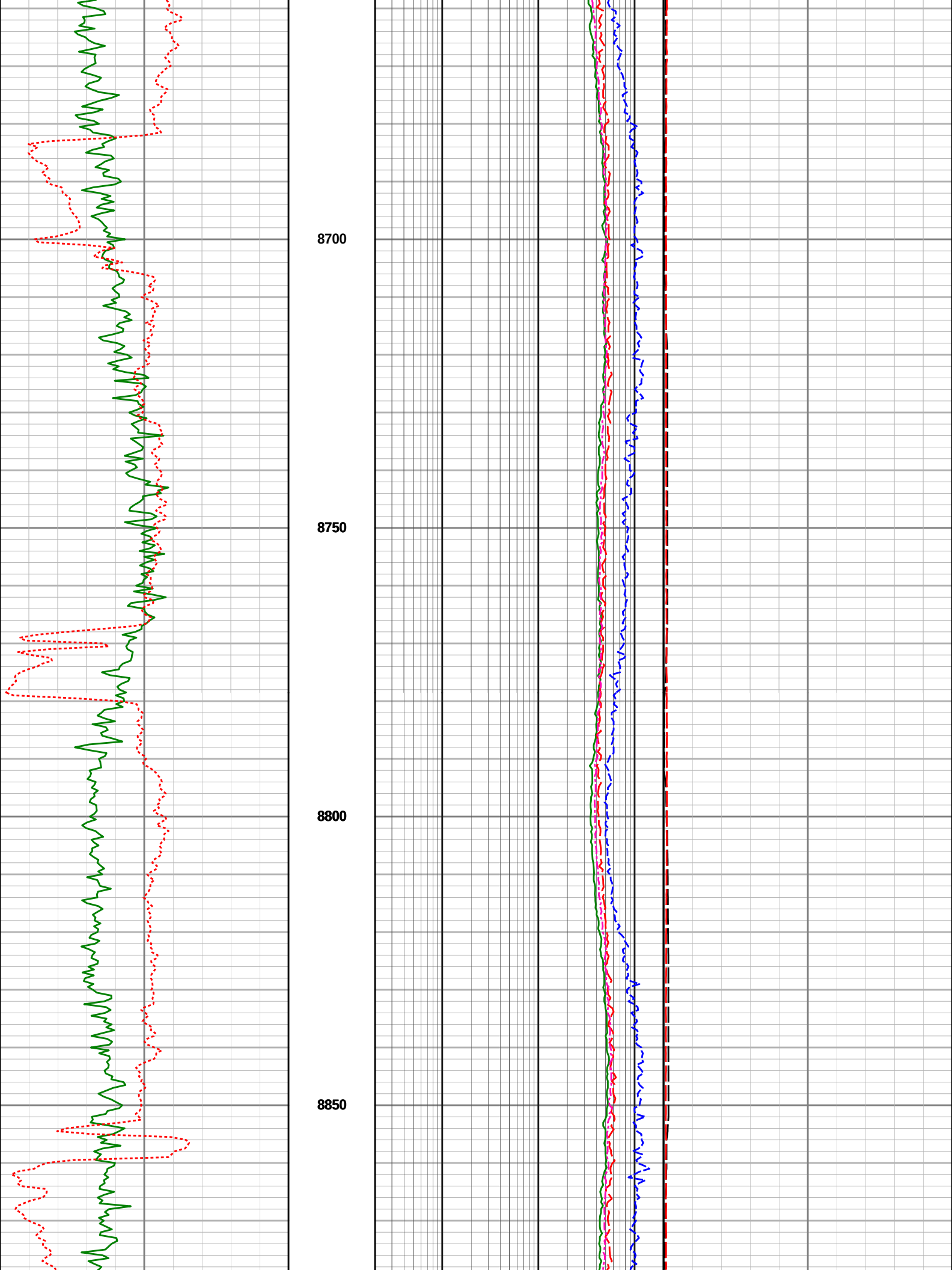
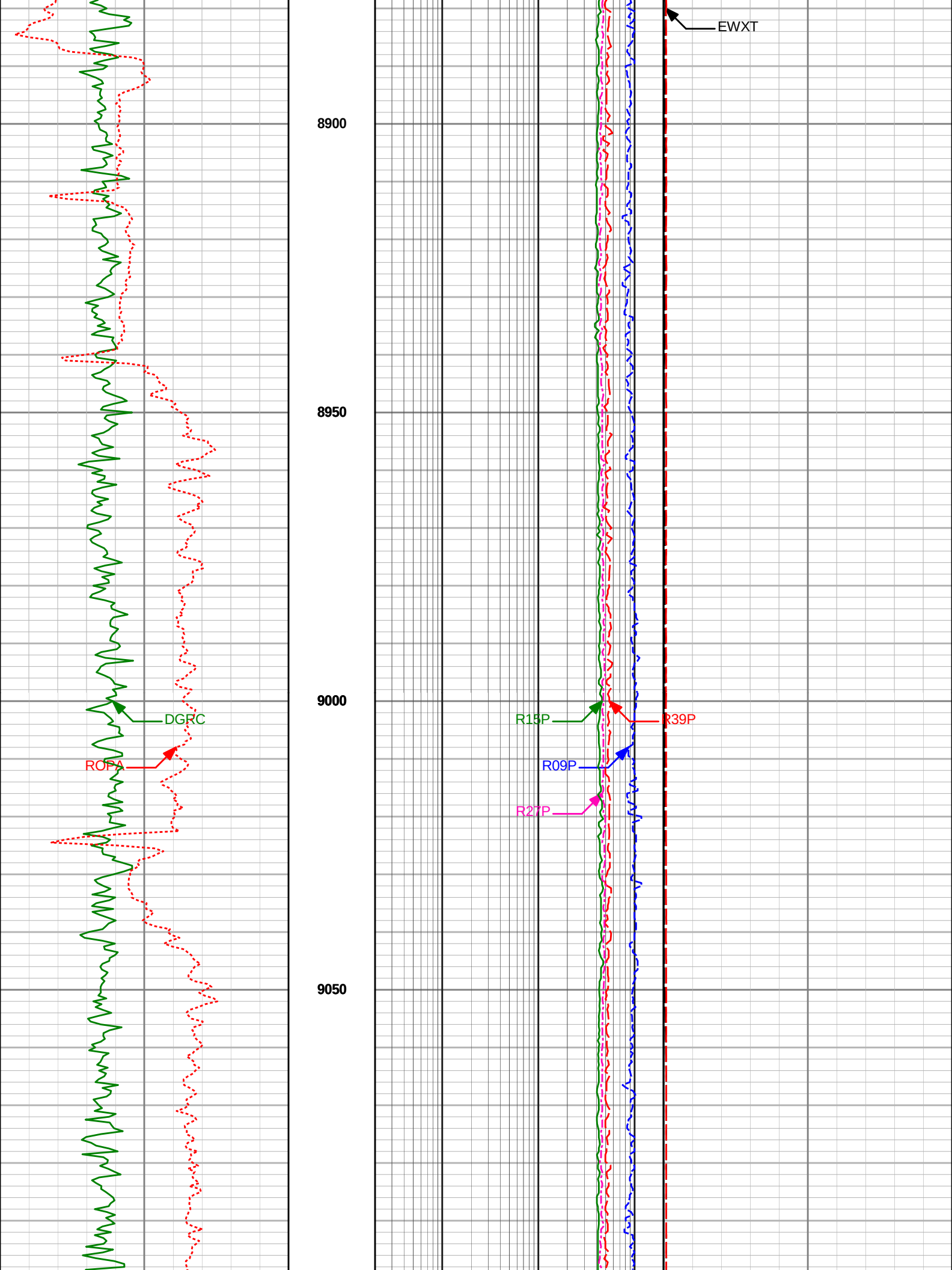
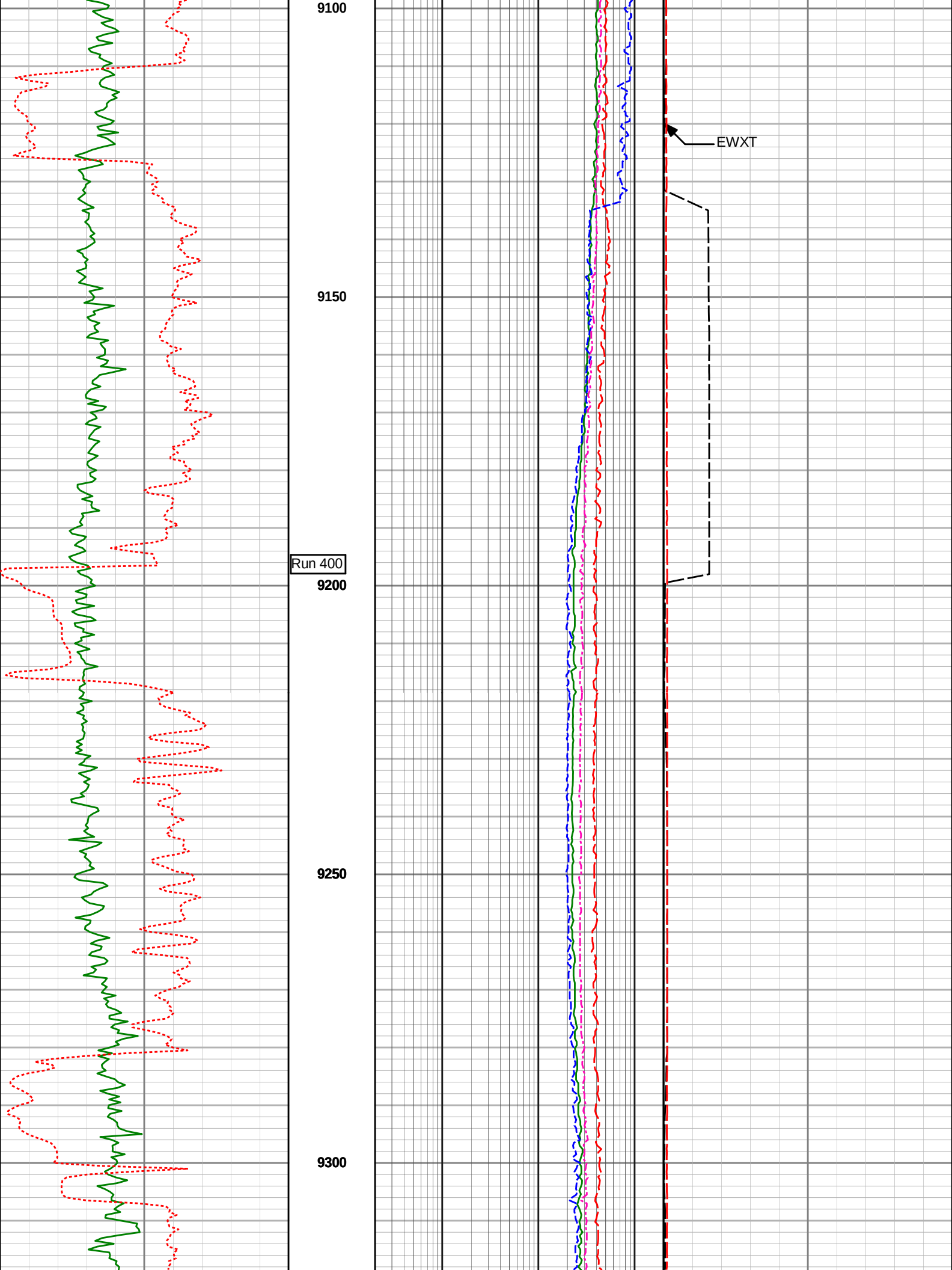
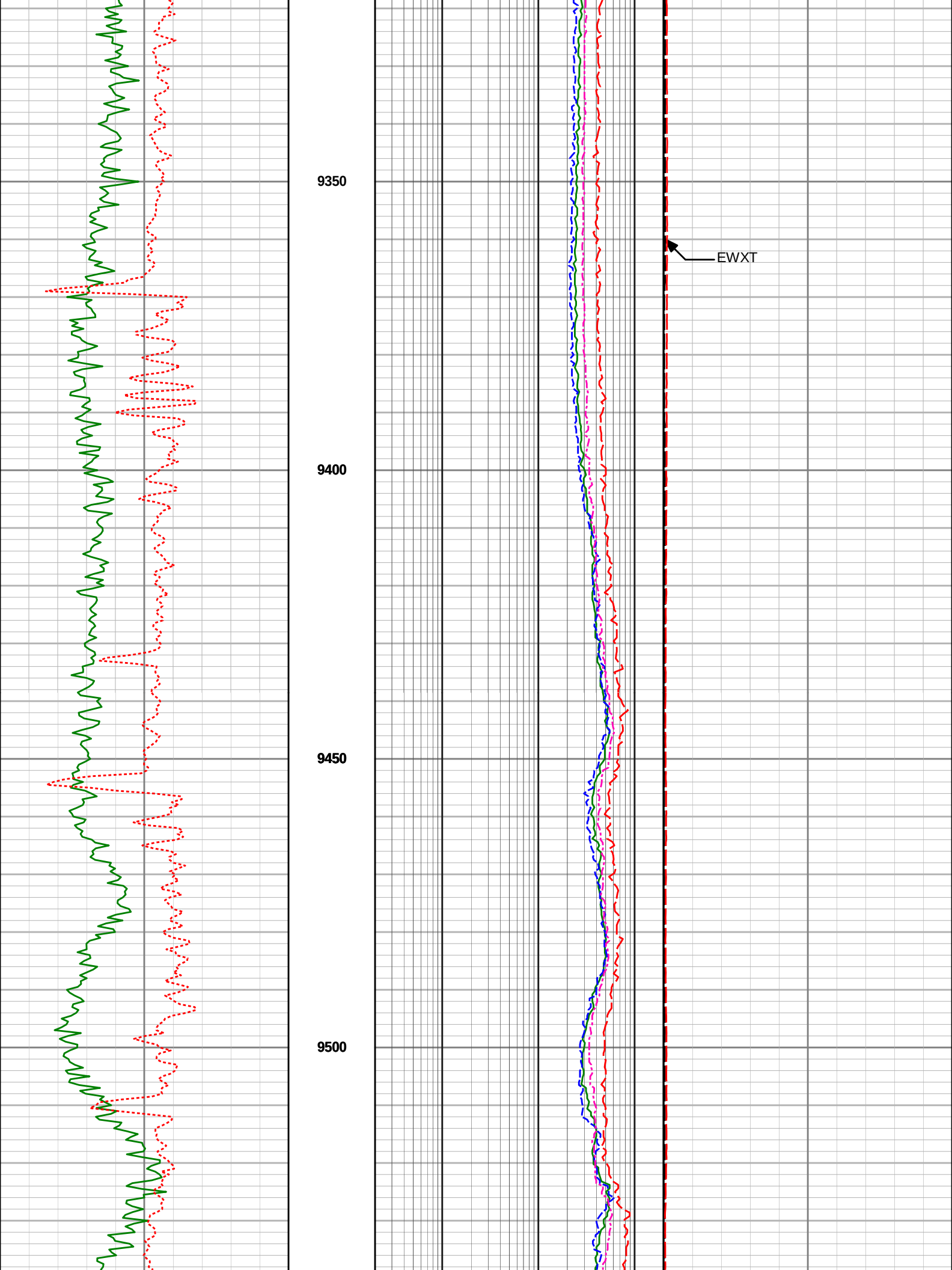
8500
8550
8600
8650
EWXT


8700
8750
8800
8850


EWXT
8900
8950
9000
9050
DGRC
ROPA
R15P
R39P
R09P
R27P


9100
9150
Run 400
9200
9250
9300
EWXT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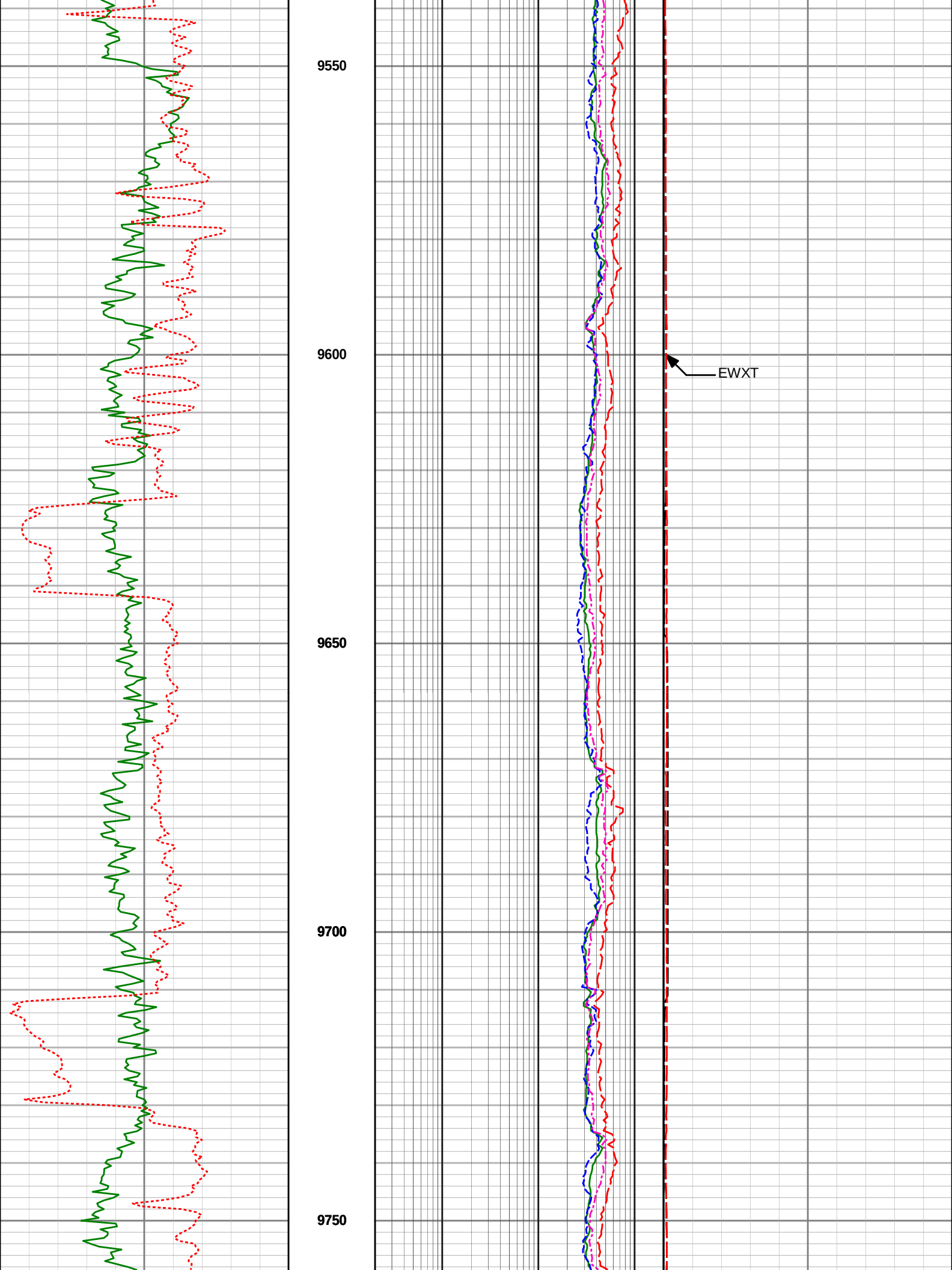
9400
9450
9500
EWXT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9600
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9700
9750
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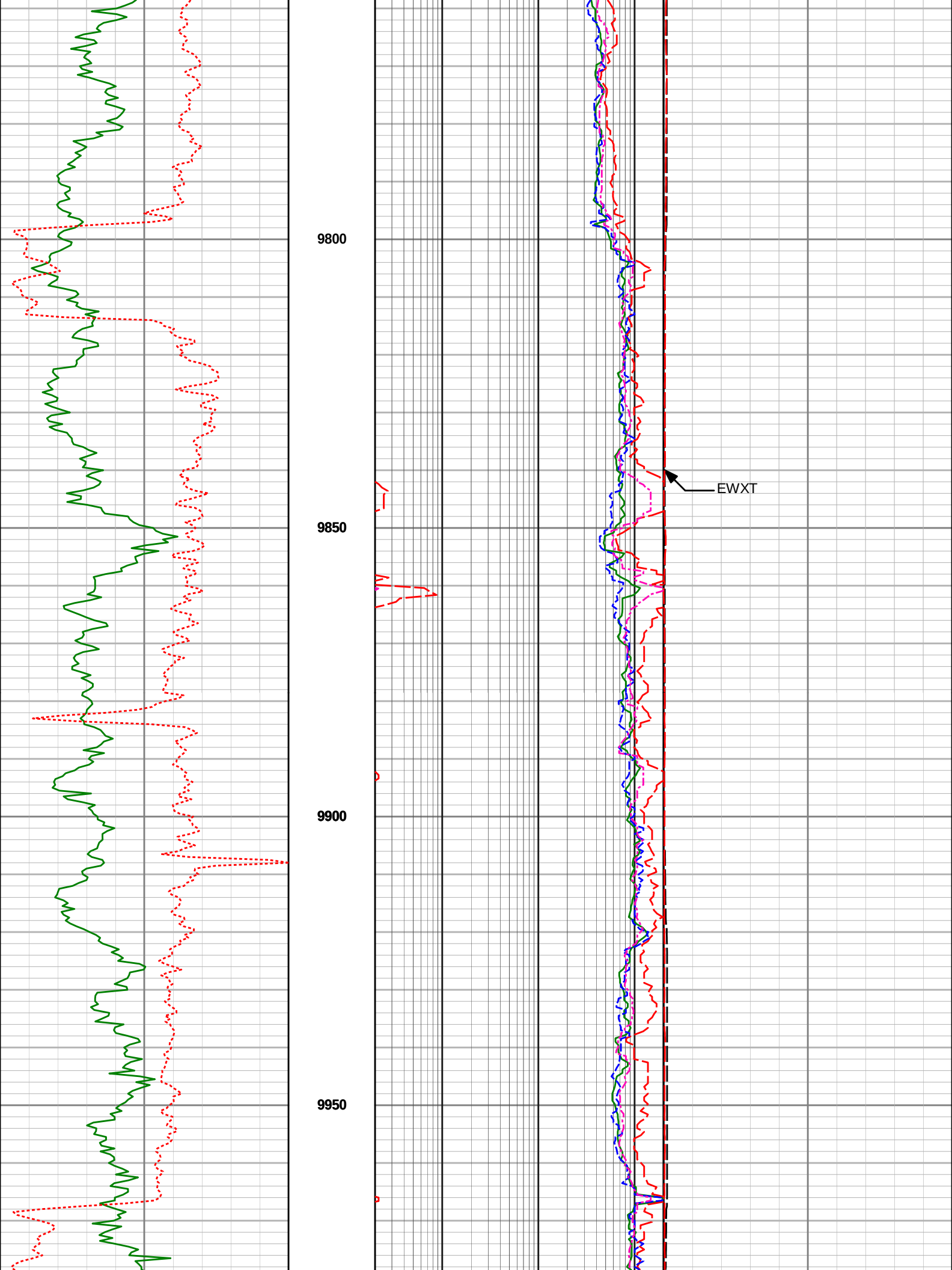
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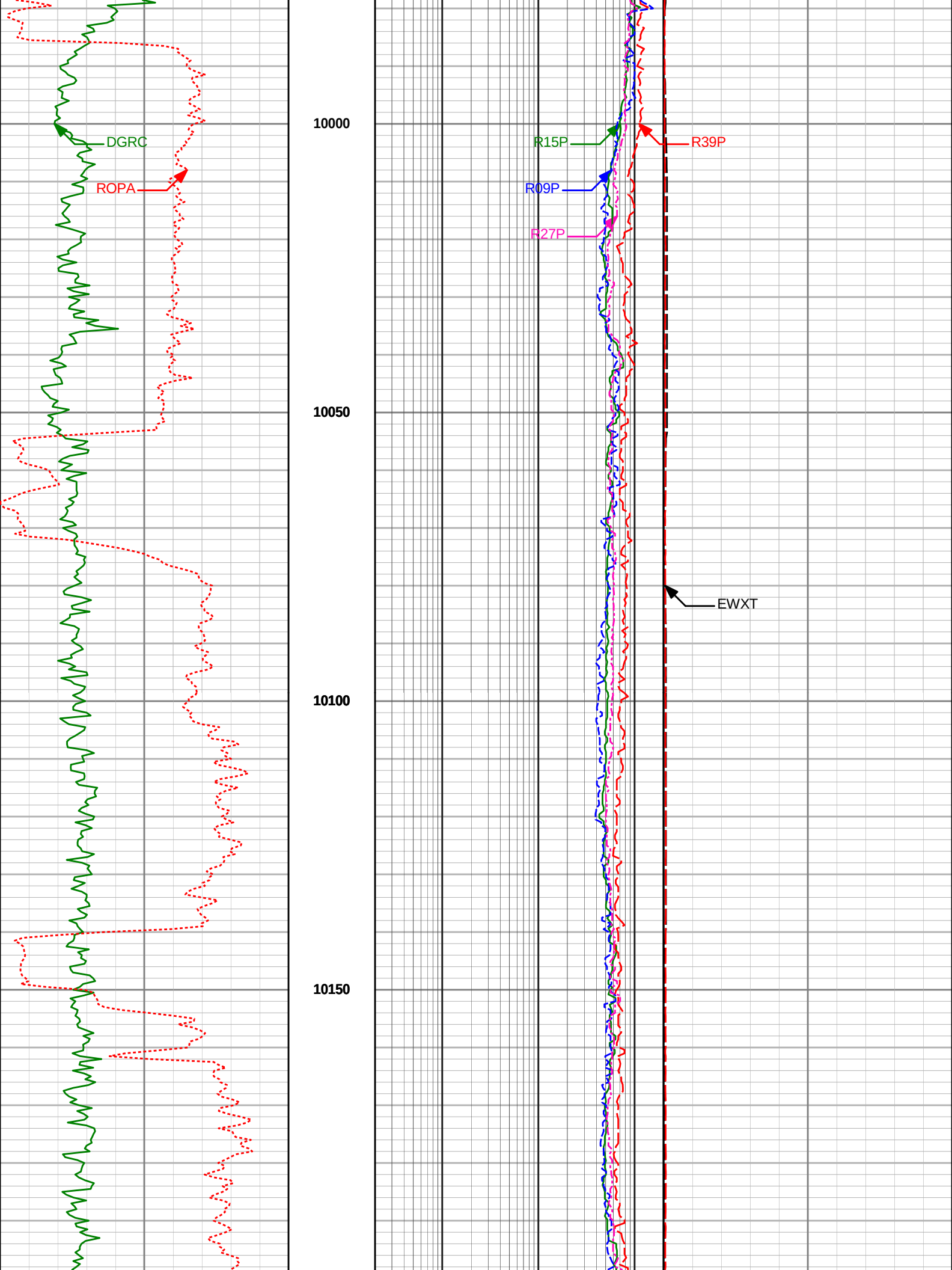
9850
9900
9950
EWXT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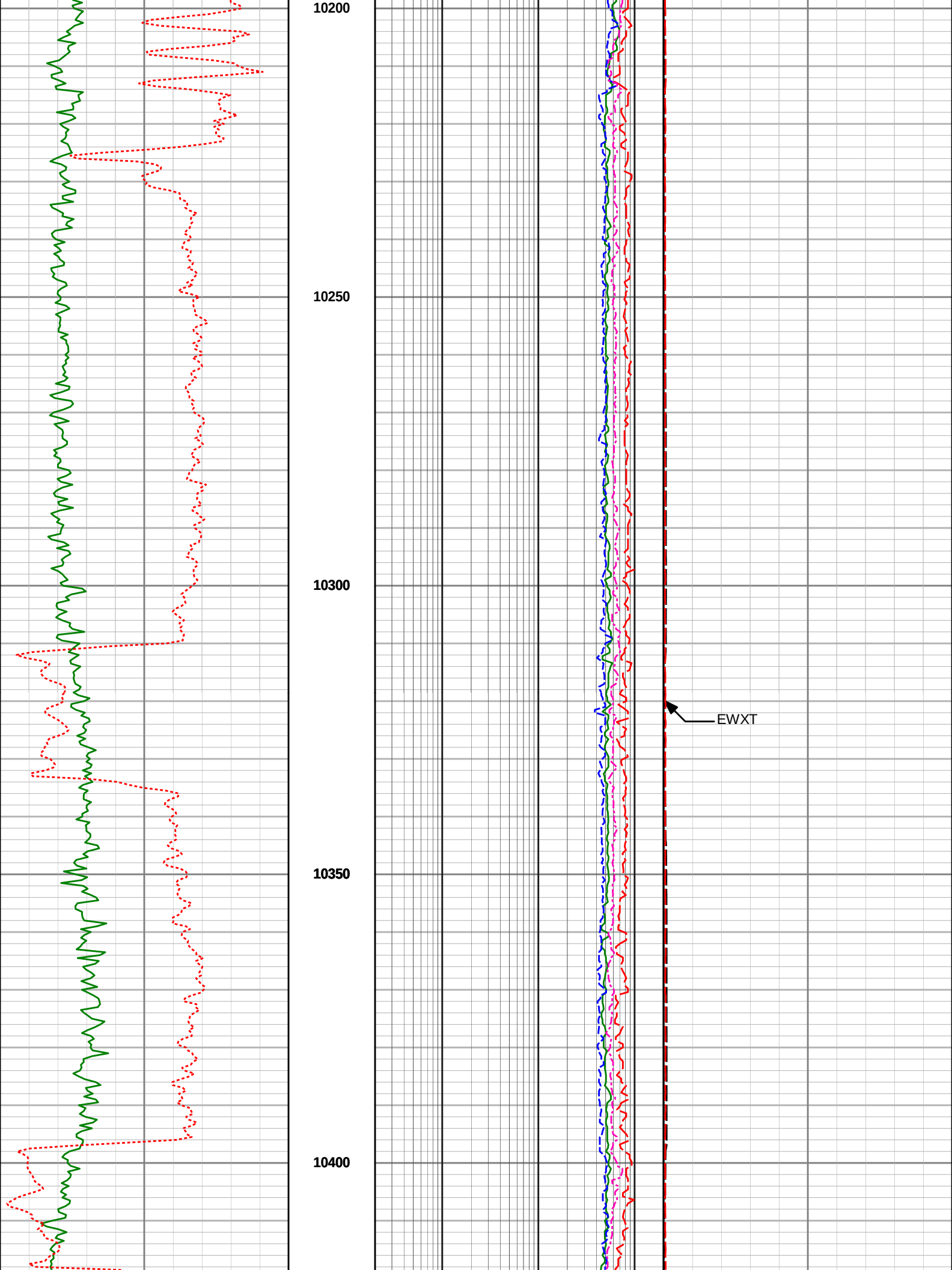
ROPA
10000
10050
10100
10150
R15P
R39P
R09P
R27P
EWXT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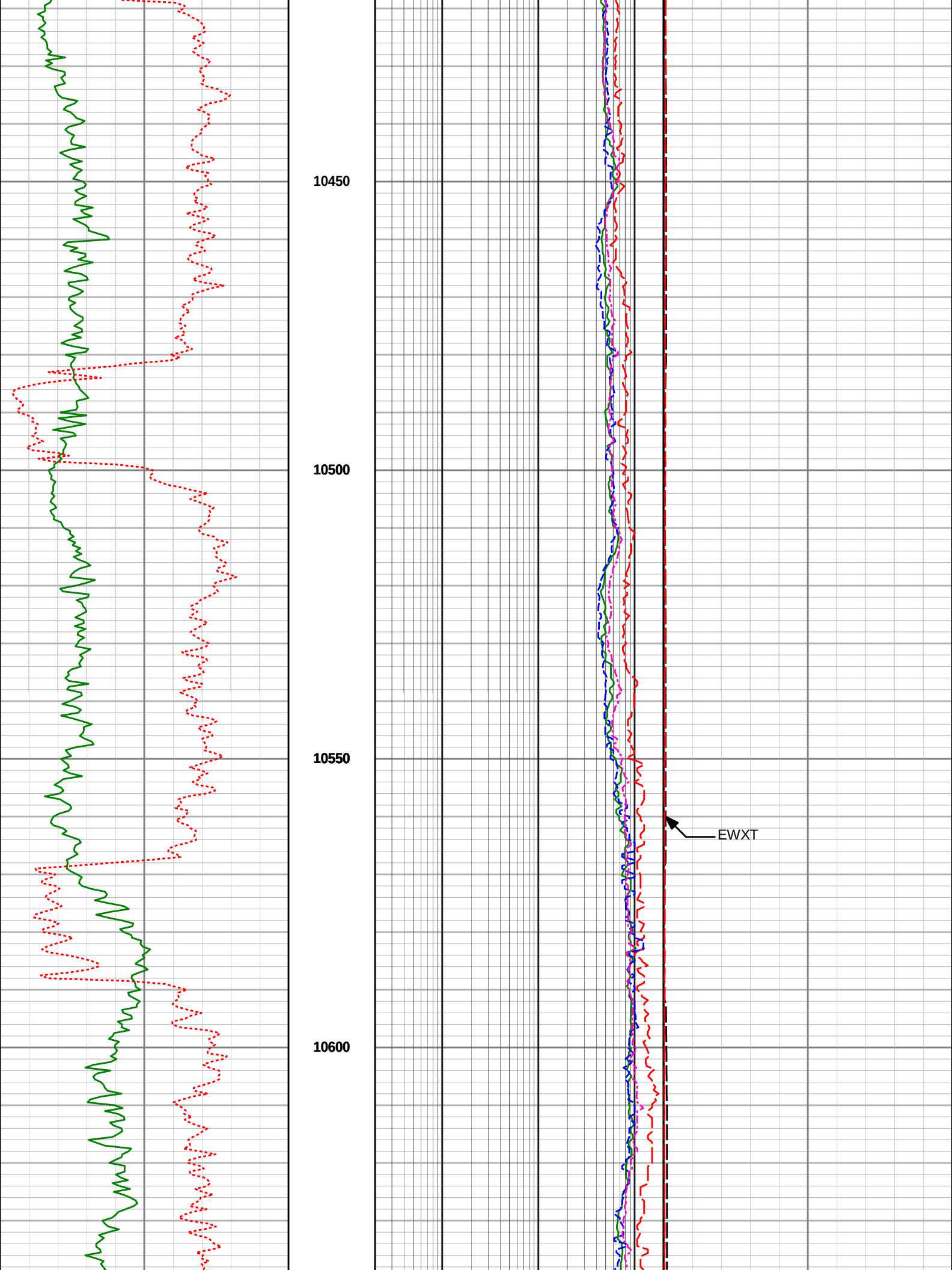
10250
10300
10350
10400
EWXT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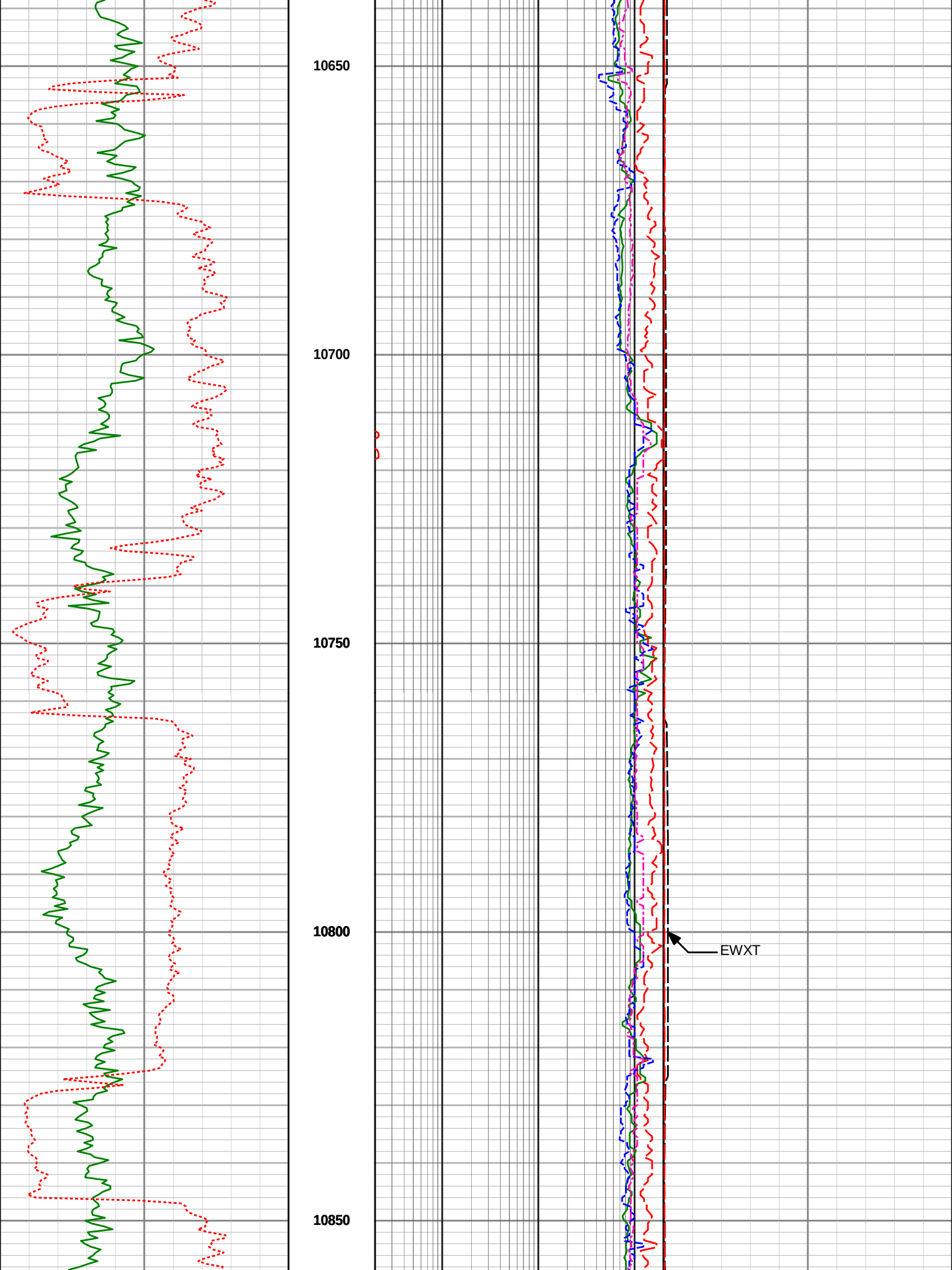
10500
10550
10600
EWXT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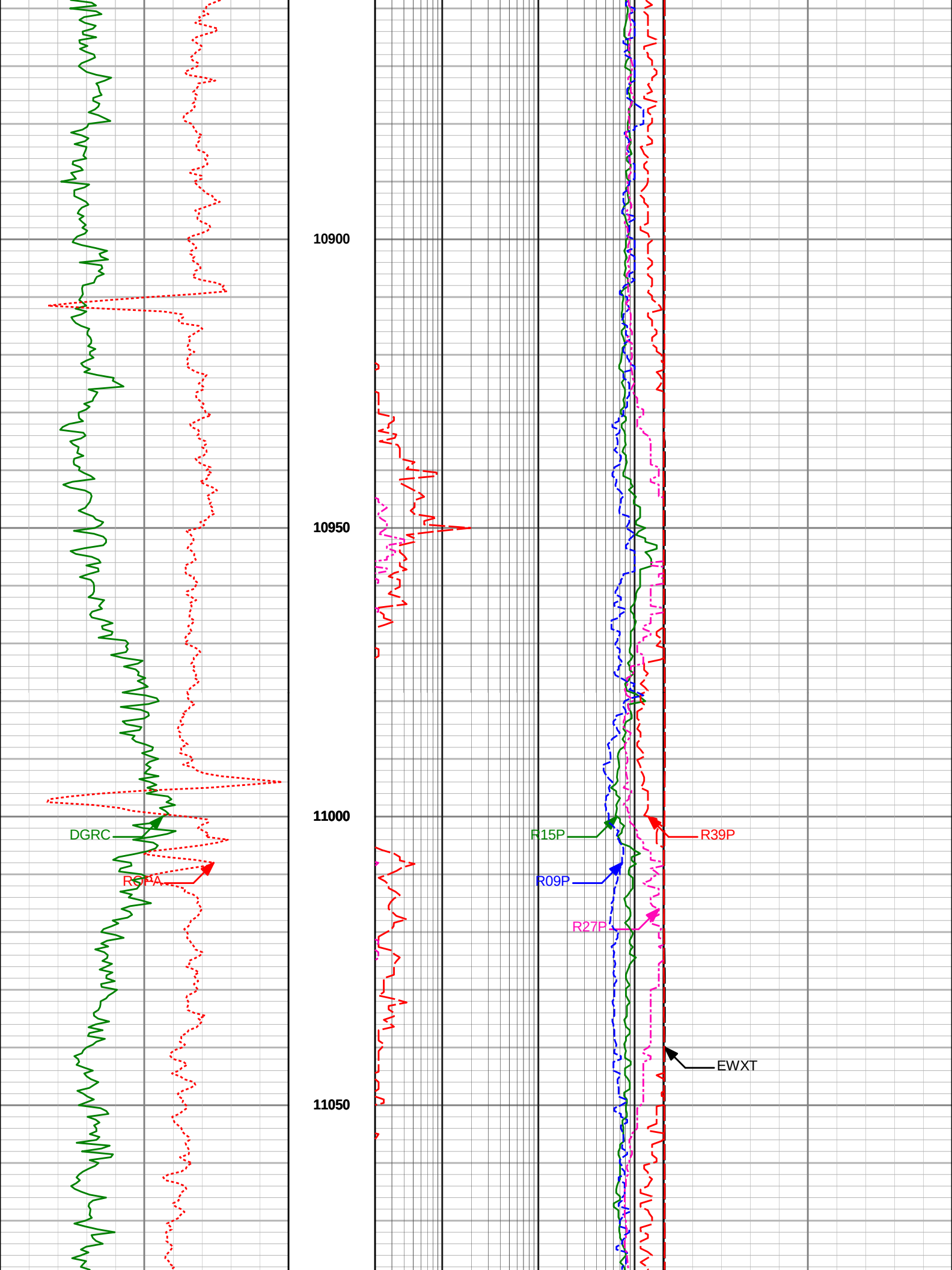
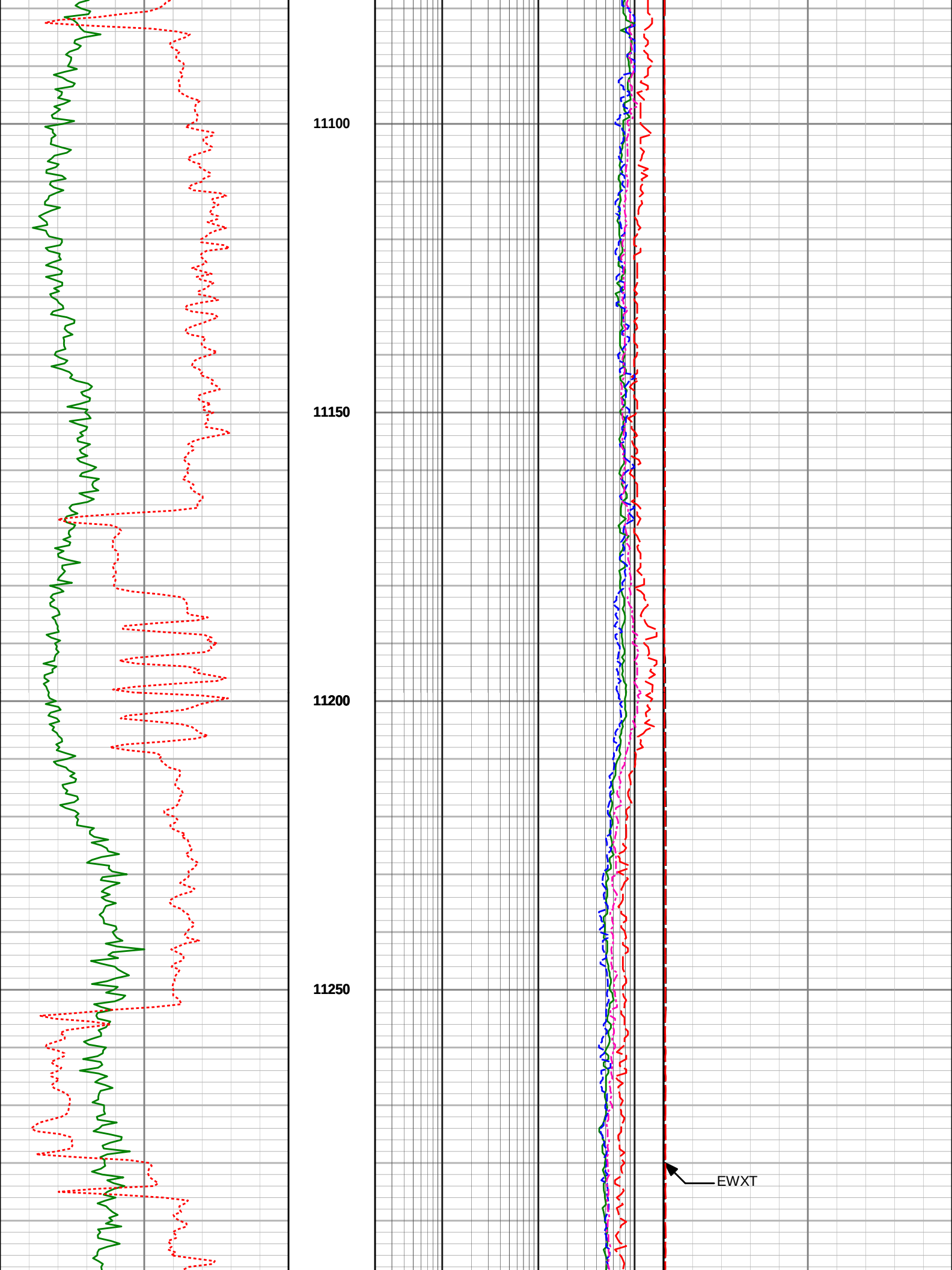
10700
10750
10800
10850
EWXT


10900
10950
11000
11050
DGRC
R15P
R39P
R09P
R27P
EWXT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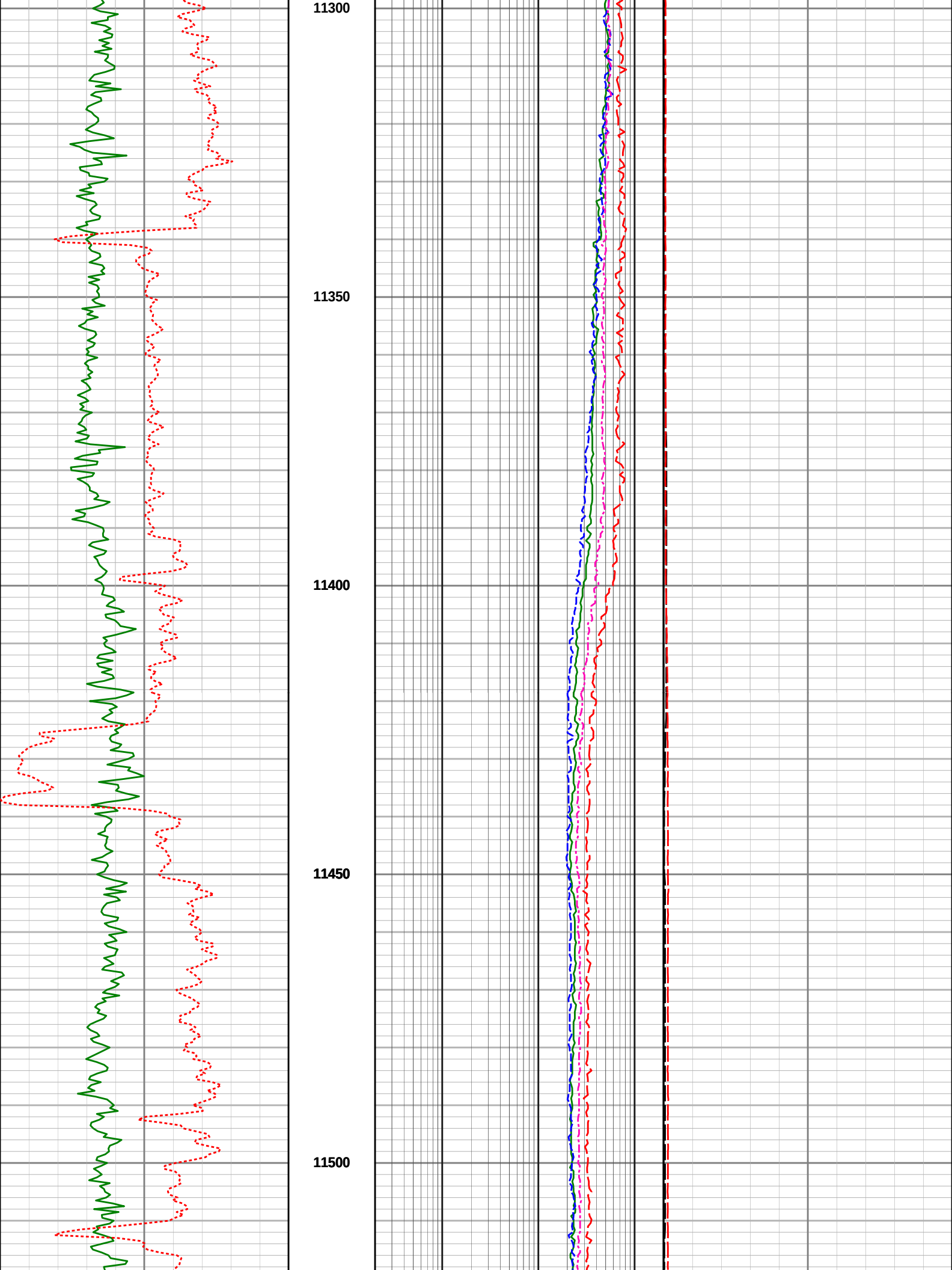
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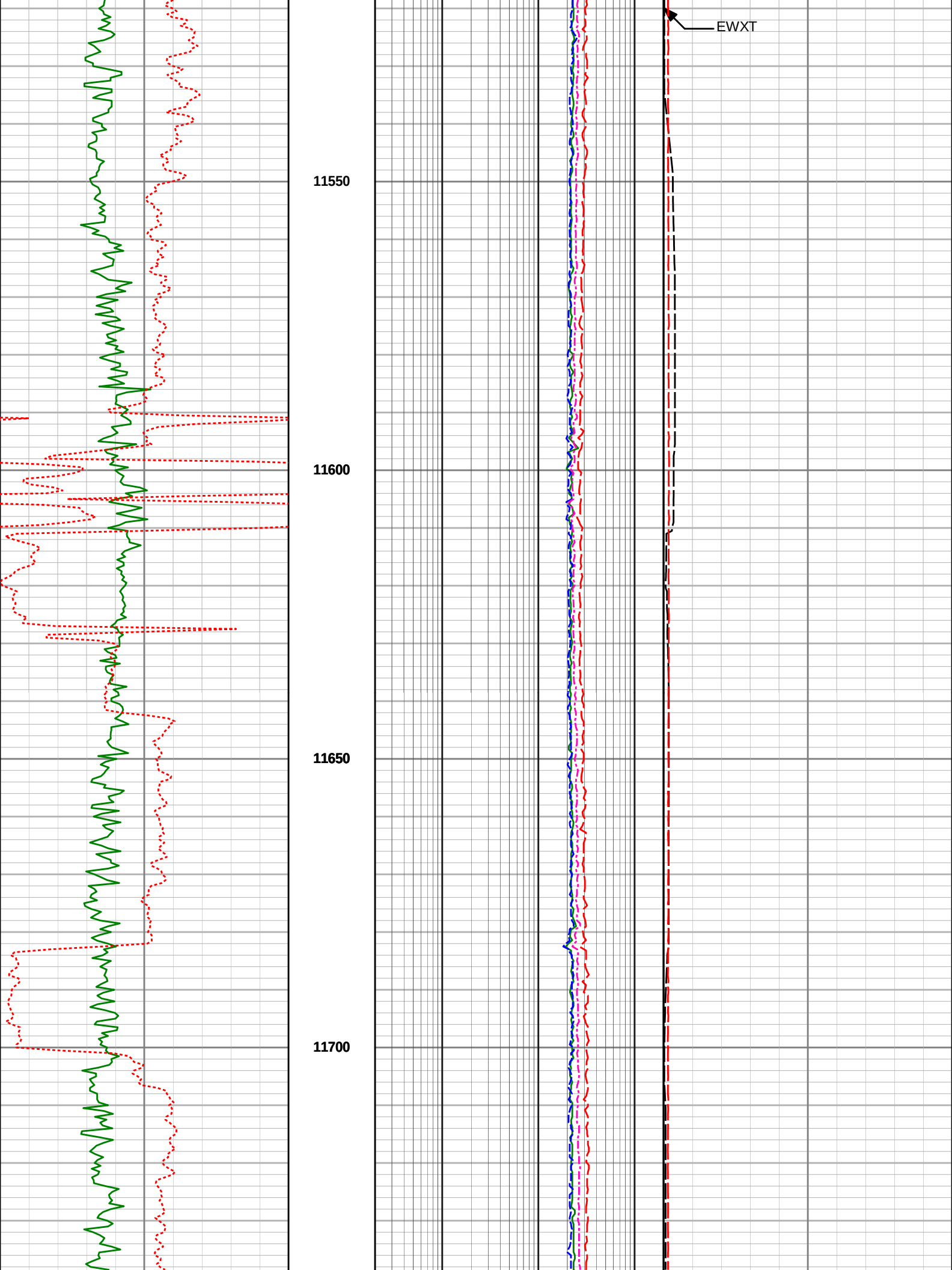
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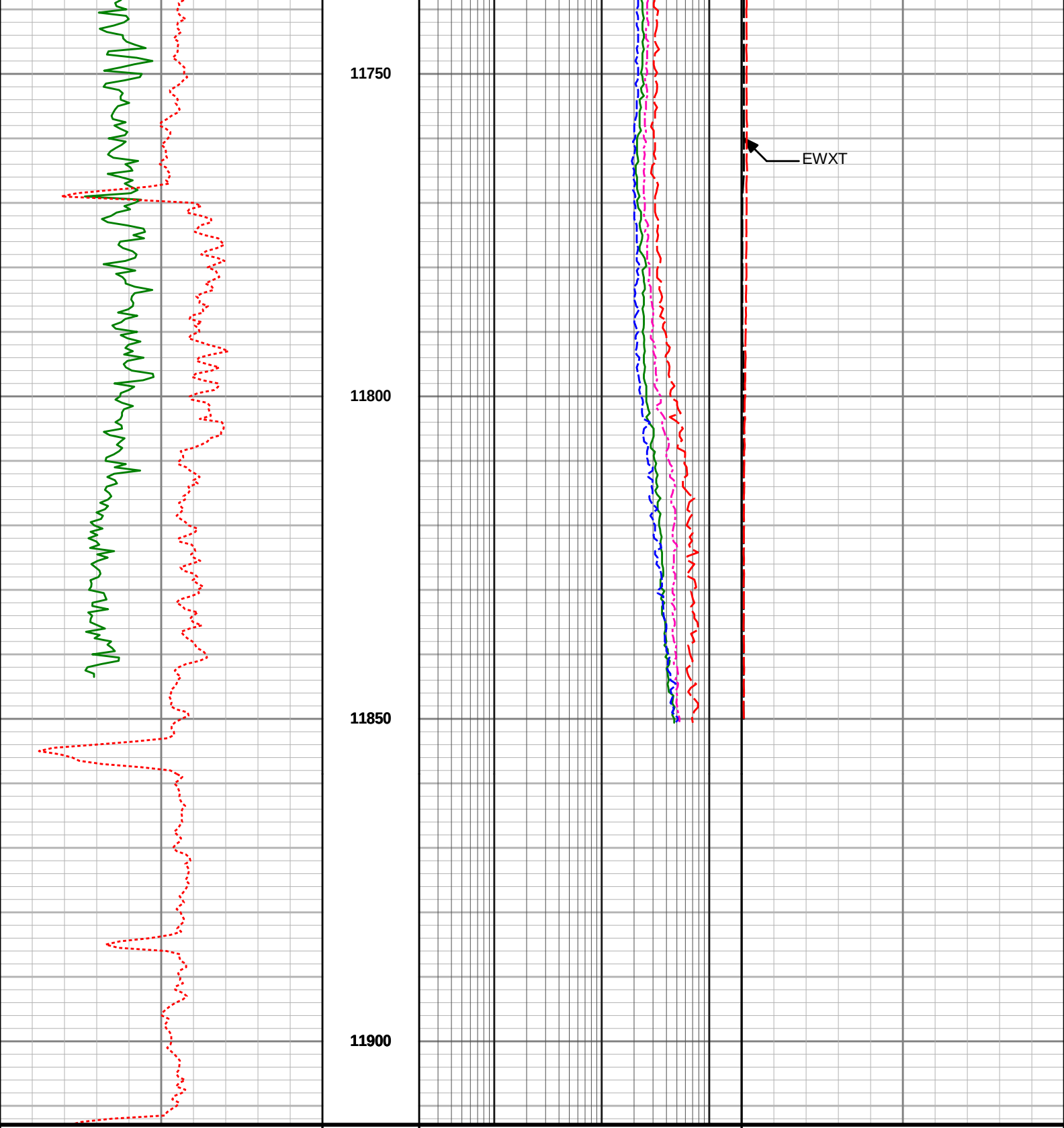
11600
11650
11700



Avg Rate of Penetration
(ROPA)
0 feet per hr 500

Depth

39in Phase Resistivity BC
(R39P)
0.2 ohm-m 200

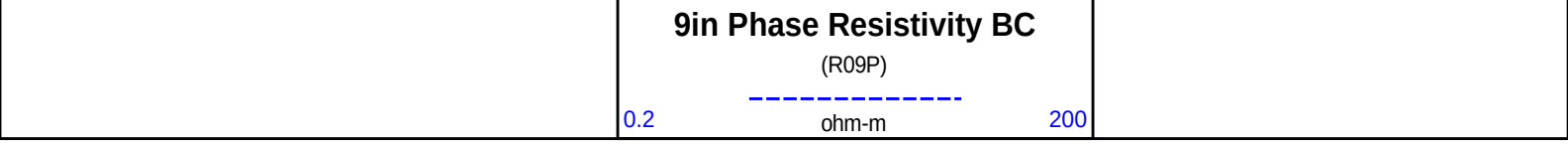
SP4 Formation Exp Time
(EWXT)
0 hours 5K

Dual Gamma Ray
(DGRC)
0 api 300

27in Phase Resistivity BC
(R27P)
0.2 ohm-m 200

39in Phase Conductivity
0 2K

15in Phase Resistivity BC
(R15P)
0.2 ohm-m 200



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Anadarko Petroleum Corporation
Wishbone 29N-E24HZ
Wattenburg
Weld Colorado
USA
CA-XX-0900382955

Measured Depth (feet)	*Inclination (degrees)*	*Direction (degrees)*	*Vertical Depth (feet)*	*Latitude (feet)*	*Departure (feet)*	*Vertical Section (feet)*	*Dogleg (deg/100ft)*
1001.00	0.90	195.46	1000.97	5.08 S	0.05 W	-5.08	TIE-IN
1256.00	0.63	191.93	1255.95	8.39 S	0.88 W	-8.39	0.11
1531.00	0.40	227.85	1530.94	10.53 S	1.90 W	-10.52	0.14
1804.00	0.98	219.82	1803.92	12.97 S	4.11 W	-12.95	0.22
1896.00	0.95	235.32	1895.90	14.01 S	5.24 W	-13.99	0.29
1988.00	2.45	224.90	1987.86	15.83 S	7.26 W	-15.80	1.66
2080.00	3.18	216.33	2079.75	19.29 S	10.16 W	-19.24	0.92
2171.00	4.12	202.25	2170.56	24.35 S	12.89 W	-24.29	1.42
2263.00	5.58	188.92	2262.24	31.83 S	14.84 W	-31.76	1.99
2355.00	6.71	175.36	2353.71	41.60 S	15.10 W	-41.53	1.99
2447.00	8.24	167.59	2444.93	53.40 S	13.24 W	-53.34	1.99
2538.00	7.61	161.49	2535.06	65.48 S	9.93 W	-65.44	1.15
2630.00	9.27	160.77	2626.06	78.26 S	5.55 W	-78.23	1.81
2721.00	10.43	149.00	2715.73	92.24 S	1.10 E	-92.24	2.54
2812.00	9.99	147.99	2805.29	105.99 S	9.53 E	-106.03	0.52
2904.00	9.52	165.91	2895.98	120.14 S	15.61 E	-120.21	3.33
2995.00	10.92	182.08	2985.55	136.06 S	17.13 E	-136.13	3.49
3087.00	11.02	187.40	3075.87	153.48 S	15.68 E	-153.55	1.11
3173.00	10.87	187.66	3160.31	169.67 S	13.54 E	-169.73	0.19
3259.00	10.26	188.99	3244.85	185.27 S	11.26 E	-185.32	0.77
3344.00	8.70	180.17	3328.69	199.17 S	10.06 E	-199.21	2.50
3430.00	6.94	188.33	3413.89	210.81 S	9.29 E	-210.85	2.41
3516.00	6.23	189.92	3499.32	220.55 S	7.73 E	-220.58	0.84
3602.00	4.81	188.84	3584.92	228.72 S	6.37 E	-228.74	1.66
3687.00	4.04	186.51	3669.67	235.21 S	5.48 E	-235.23	0.94
3773.00	3.52	185.31	3755.48	240.85 S	4.90 E	-240.87	0.61
3859.00	2.86	169.01	3841.35	245.58 S	5.06 E	-245.60	1.30
3945.00	1.70	185.38	3927.28	248.95 S	5.35 E	-248.97	1.54
4030.00	2.00	205.05	4012.24	251.55 S	4.60 E	-251.57	0.82
4116.00	1.88	243.00	4098.19	253.56 S	2.71 E	-253.57	1.48
4202.00	2.24	271.58	4184.14	254.15 S	0.23 W	-254.15	1.25
4287.00	1.83	279.77	4269.08	253.88 S	3.23 W	-253.86	0.59
4373.00	1.93	270.04	4355.04	253.64 S	6.03 W	-253.61	0.39
4459.00	1.17	289.75	4441.01	253.34 S	8.30 W	-253.30	1.06
4545.00	1.02	35.36	4527.00	252.42 S	8.69 W	-252.38	2.03
4631.00	1.19	20.97	4612.98	250.97 S	7.93 W	-250.93	0.38
4717.00	1.18	16.59	4698.96	249.29 S	7.35 W	-249.25	0.11
4802.00	1.38	10.44	4783.94	247.44 S	6.92 W	-247.41	0.29
5060.00	0.83	323.99	5041.90	242.86 S	7.46 W	-242.83	0.39
5317.00	0.39	231.42	5298.89	241.90 S	9.24 W	-241.86	0.36
5574.00	1.68	221.08	5555.84	245.28 S	12.40 W	-245.23	0.50
5830.00	1.69	217.41	5811.73	251.10 S	17.15 W	-251.02	0.04
5915.00	1.94	165.53	5896.69	253.49 S	17.55 W	-253.41	1.89
6001.00	1.83	156.82	5982.64	256.17 S	16.64 W	-256.09	0.36
6086.00	1.73	153.66	6067.60	258.56 S	15.54 W	-258.49	0.17
6172.00	0.83	142.13	6153.58	260.21 S	14.58 W	-260.15	1.08
6428.00	0.28	129.44	6409.57	262.07 S	12.96 W	-262.01	0.22
6685.00	0.04	20.45	6666.57	262.39 S	12.44 W	-262.33	0.12
6797.00	0.18	301.57	6778.57	262.25 S	12.57 W	-262.20	0.16
6833.00	0.07	207.69	6814.57	262.24 S	12.63 W	-262.19	0.55
6876.00	3.20	354.20	6857.54	261.07 S	12.76 W	-261.02	7.57

6919.00	8.52	1.95	6900.31	256.69 S	12.77 W	-256.64	12.49
6962.00	14.65	3.97	6942.41	248.08 S	12.29 W	-248.02	14.27
7004.00	19.81	4.64	6982.51	235.68 S	11.35 W	-235.63	12.31
7047.00	22.79	5.87	7022.57	220.12 S	9.90 W	-220.08	7.00
7090.00	26.01	7.69	7061.72	202.49 S	7.79 W	-202.45	7.69
7133.00	31.07	4.53	7099.49	182.07 S	5.65 W	-182.04	12.28
7175.00	36.58	3.73	7134.36	158.76 S	3.98 W	-158.74	13.16
7218.00	41.92	2.75	7167.65	131.60 S	2.46 W	-131.59	12.49
7261.00	47.09	1.35	7198.31	101.49 S	1.40 W	-101.49	12.24
7304.00	51.78	0.76	7226.27	68.84 S	0.80 W	-68.84	10.95
7346.00	54.82	2.20	7251.36	35.19 S	0.07 E	-35.19	7.74
7389.00	58.04	1.93	7275.14	0.61 N	1.36 E	0.61	7.51
7432.00	60.16	1.66	7297.22	37.49 N	2.51 E	37.48	4.95
7475.00	62.97	1.91	7317.69	75.28 N	3.69 E	75.26	6.56
7517.00	66.21	1.13	7335.71	113.20 N	4.70 E	113.18	7.89
7559.00	68.31	0.58	7351.95	151.93 N	5.27 E	151.90	5.15
7603.00	69.08	359.55	7367.94	192.92 N	5.31 E	192.89	2.79
7645.00	71.33	0.43	7382.16	232.43 N	5.31 E	232.41	5.71
7688.00	76.04	0.67	7394.24	273.69 N	5.70 E	273.66	10.97
7729.00	82.68	1.28	7401.81	313.95 N	6.39 E	313.92	16.25
7860.00	86.54	358.58	7414.11	444.34 N	6.22 E	444.30	3.59
7946.00	88.33	359.46	7417.96	530.23 N	4.75 E	530.21	2.32
8032.00	90.25	358.30	7419.03	616.20 N	3.07 E	616.19	2.61
8117.00	92.23	358.83	7417.19	701.15 N	0.94 E	701.14	2.41
8203.00	92.10	358.11	7413.95	787.06 N	1.35 W	787.06	0.85
8289.00	91.98	357.55	7410.89	872.95 N	4.60 W	872.96	0.67
8374.00	91.92	357.21	7408.00	957.81 N	8.48 W	957.83	0.42
8460.00	91.61	357.16	7405.35	1043.66 N	12.71 W	1043.71	0.37
8545.00	91.98	357.74	7402.70	1128.54 N	16.49 W	1128.60	0.82
8631.00	91.48	357.18	7400.10	1214.41 N	20.30 W	1214.49	0.87
8717.00	91.11	359.17	7398.15	1300.34 N	23.03 W	1300.43	2.35
8803.00	91.42	357.67	7396.25	1386.29 N	25.40 W	1386.38	1.78
8888.00	90.62	0.29	7394.74	1471.25 N	26.92 W	1471.35	3.22
8974.00	90.25	359.13	7394.09	1557.25 N	27.35 W	1557.35	1.42
9060.00	90.49	358.52	7393.53	1643.23 N	29.12 W	1643.34	0.76
9146.00	91.05	356.89	7392.37	1729.14 N	32.56 W	1729.27	2.01
9232.00	89.07	357.72	7392.28	1815.04 N	36.61 W	1815.19	2.50
9317.00	88.52	0.79	7394.07	1900.01 N	37.71 W	1900.15	3.67
9403.00	88.95	1.01	7395.97	1985.98 N	36.36 W	1986.12	0.57
9489.00	88.08	359.92	7398.19	2071.94 N	35.66 W	2072.08	1.62
9575.00	87.47	359.22	7401.53	2157.87 N	36.31 W	2158.01	1.08
9660.00	88.76	359.54	7404.33	2242.82 N	37.22 W	2242.96	1.57
9746.00	90.99	359.30	7404.51	2328.81 N	38.09 W	2328.96	2.60
9832.00	93.03	359.50	7401.50	2414.75 N	38.98 W	2414.90	2.38
9918.00	91.61	358.52	7398.03	2500.66 N	40.46 W	2500.82	2.01
10003.00	92.22	358.45	7395.18	2585.59 N	42.71 W	2585.75	0.73
10089.00	93.09	358.24	7391.20	2671.46 N	45.20 W	2671.63	1.04
10175.00	93.33	358.97	7386.38	2757.29 N	47.29 W	2757.47	0.89
10260.00	92.53	358.02	7382.03	2842.15 N	49.52 W	2842.34	1.46
10346.00	91.36	358.03	7379.11	2928.05 N	52.48 W	2928.25	1.36
10432.00	94.21	359.10	7374.93	3013.91 N	54.64 W	3014.12	3.54
10517.00	95.20	359.98	7367.96	3098.62 N	55.32 W	3098.83	1.55
10603.00	93.71	0.18	7361.29	3184.36 N	55.20 W	3184.57	1.75
10689.00	93.40	0.72	7355.96	3270.19 N	54.53 W	3270.40	0.72
10775.00	91.85	1.46	7352.02	3356.08 N	52.90 W	3356.28	1.99
10860.00	90.86	2.39	7350.00	3441.01 N	50.05 W	3441.19	1.60
10946.00	91.36	1.70	7348.34	3526.94 N	46.98 W	3527.11	0.98
11032.00	90.93	0.91	7346.62	3612.90 N	45.01 W	3613.06	1.05
11118.00	91.36	0.38	7344.91	3698.87 N	44.04 W	3699.03	0.80
11203.00	91.85	359.41	7342.53	3783.84 N	44.20 W	3783.99	1.27
11289.00	90.74	359.25	7340.59	3869.81 N	45.20 W	3869.97	1.30
11375.00	90.80	358.36	7339.43	3955.78 N	47.00 W	3955.95	1.04
11461.00	90.62	358.91	7338.36	4041.75 N	49.04 W	4041.93	0.68
11546.00	90.43	358.12	7337.58	4126.72 N	51.24 W	4126.90	0.96
11632.00	89.01	358.75	7338.00	4212.68 N	53.60 W	4212.88	1.81
11718.00	88.77	0.23	7339.67	4298.66 N	54.36 W	4298.86	1.75
11803.00	87.90	359.24	7342.15	4383.62 N	54.75 W	4383.82	1.54
11860.00	87.65	359.09	7344.36	4440.57 N	55.58 W	4440.77	0.50
11910.00	87.65	359.09	7346.41	4490.52 N	56.37 W	4490.73	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 359.75 DEGREES (TRUE)
A TOTAL CORRECTION OF 8.57 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED

HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 11910.00 FEET
IS 4490.88 FEET ALONG 359.28 DEGREES (TRUE)

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

Date Printed:02 July 2013