

Max Tool Temp (degF) / Source	226.12 / HCIM				
Rm @ Max Tool Temp (degF)	N/A @ 226.12				
Lead MWD Engineer	Christofer Befort				
Customer Representative	Wes Evans				

SENSOR INFORMATION

Downhole Processor Information

Tool Type	HCIM				
Software Version	88.56				
Sub Serial Number	11667863				
Insert Serial Number	11709704				
Date and Time Initialized	16-Nov-13 12:42				
Date and Time Read	19-Nov-13 21:49				
ECMB SW Version	N/A				

Directional Sensor Information

Tool Type	PCDC				
Distance From Bit (ft)	62.22				
Software Version	6.21				
Sub Serial Number	12122259				
Sonde Serial Number	11638621				
Sensor ID Number	N/A				
Tooface Offset (deg)	74.14				

Gamma Ray Sensor Information

Tool Type	PCG				
Distance From Bit (ft)	53.13				
Recorded Sample Period (sec)	10				
Software Version	8.15				
Sub Serial Number	11626952				
Insert/Sonde Serial Number	11680945				

Density Sensor Information

Tool Type	ALD				
Distance From Bit (ft)	115.72				
Recorded Sample Period (sec)	8				
Software Version	3.04				
Sub Serial Number	11433528				
Insert Serial Number	88128				
Sensor ID Number	32767				
Source Serial Number	39383B				
Pin Orientation	Down				
Stabilizer Blade O.D. (in)	5.75				
DPA Offset	266.94				

Pulser Controller Sensor Information

Tool Type	PCM				
Software Version	8.17				
PIC Software Version					
Sub/HOC Serial Number	1163199				
Insert/Probe/Module SN	11638621				
Battery Serial Number	N/A				
Valve Insert SN	N/A				
DC Insert Serial Number	N/A				

Choke Size (32nd)	N/A				
Driver Current (amps)	N/A				
Driver SMI Current (amps)	N/A				
Boot Strap Version					

AFR Sensor Information

Tool Type	AFR				
Tool ID	4029				
Distance From Bit (ft)	108.26				
Software Version	40.35				
Recorded Sample Period (sec)					
Tool Size	4.75"				
Stabilizer Size (in)	5.90				
Button Blade Size (in)	5.79				
Collar S/N					
Insert S/N	00-50-C2-23-F8-				
Shallow K Factor					
Medium K Factor					
Deep K Factor					
RAB K Factor					
Date & Time Initialized	16-Nov-13 12:42				
Date & Time Read					

DDSr-HCIM Sensor Information

Tool Type	DDSr-HCIM				
Distance From Bit (ft)	0.00				
Recorded Sample Period (sec)	8				
Software Version	20.87				
Sub Serial Number	11667863				
Insert Serial Number	11764852				
Sensor ID Number	9082				

ADR SENSOR INFORMATION

Tool Type	ADR				
Tool Orientation	Deep Receiver Down				
Distance From SWRO to Bit (ft)	87.63				
Recorded Sample Period (sec)	10				
Tool SAP	11747330				
Receiver Insert SAP	11765955				
Transmitter Insert SAP	11194191				
Antenna Collar SAP	11667863				
App Firmware Version	415				
Processor Board FirmWare Version	306				
Processor FPGA FirmWare Version	4				
Transmitter PIC SW Version	1,025				
Tool Size	4.75"				
Processor SIDS No.	281475251001671				
Processor PCB Rev.	0				
Receiver Board Upper SIDS No.	16607023626430957				
Receiver Board Upper PCB Rev.	0				
Receiver Board Lower SIDS No.	16607023626430021				
Receiver Board Lower PCB Rev.	0				
Receiver Board Deep SIDS No.	16607023626430958				
Receiver Board Deep PCB Rev.	0				
Receiver Insert SIDS No.	11258999116240610				
Transmitter Insert SIDS No.	4503634027976693				
Antenna Collar SIDS No.	12666373986404322				

REMARKS

1. All depths are calibrated to the driller's pipe tally and are measured from the drill floor.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded (memory data) unless otherwise stated.
4. All data presented was logged while drilling
5. The following smoothing parameters have been applied to the data:
 ROPA: 0.5 ft interval, 1.2 ft coersion, 3ft gap fill
 All other curves: 0.5ft interval, 0.6ft coersion, 3ft gap fill

WARRANTY

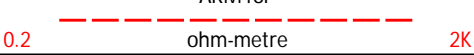
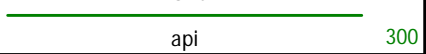
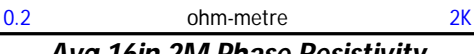
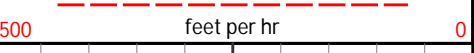
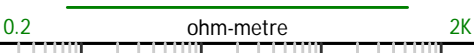
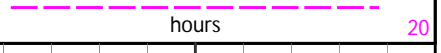
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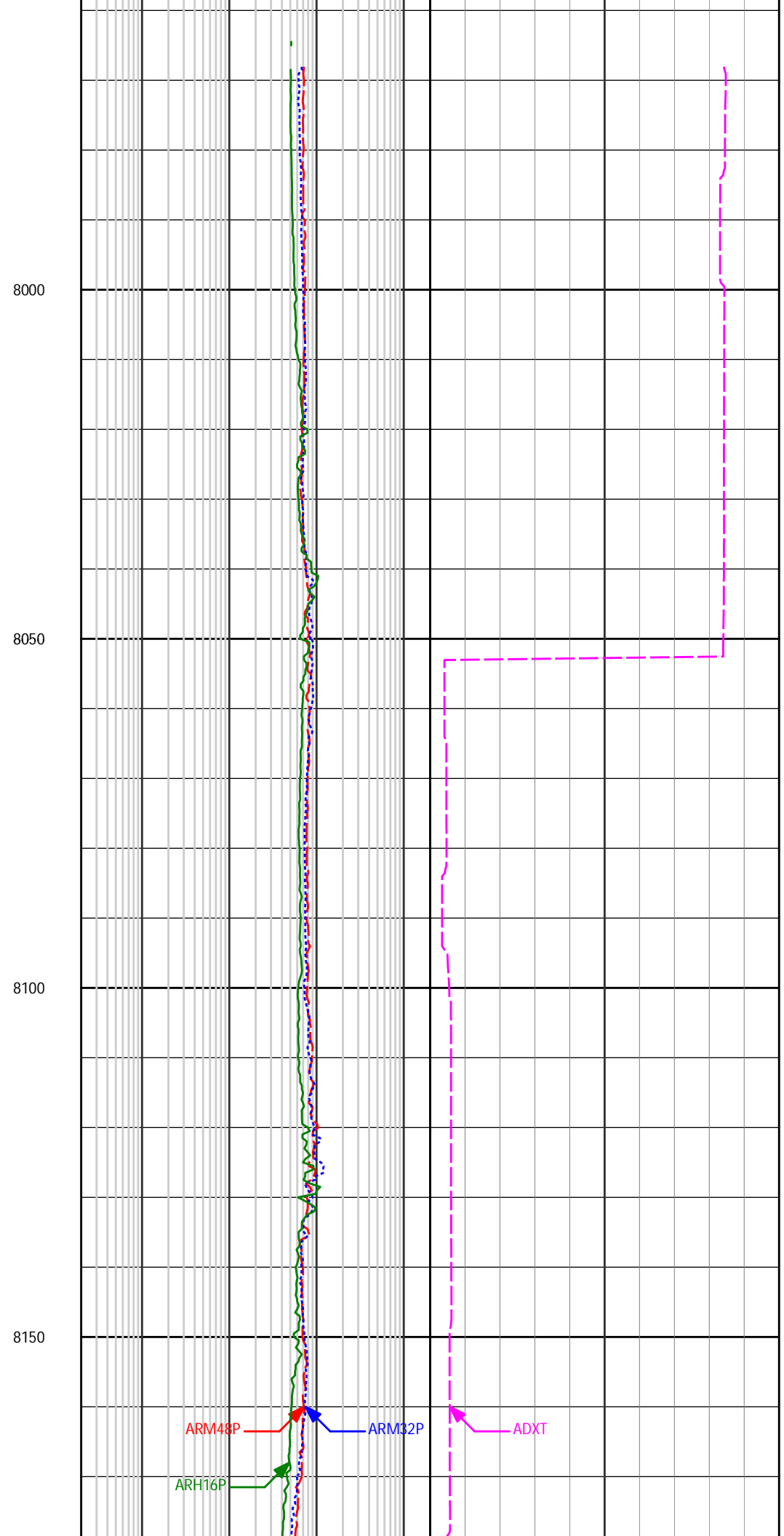
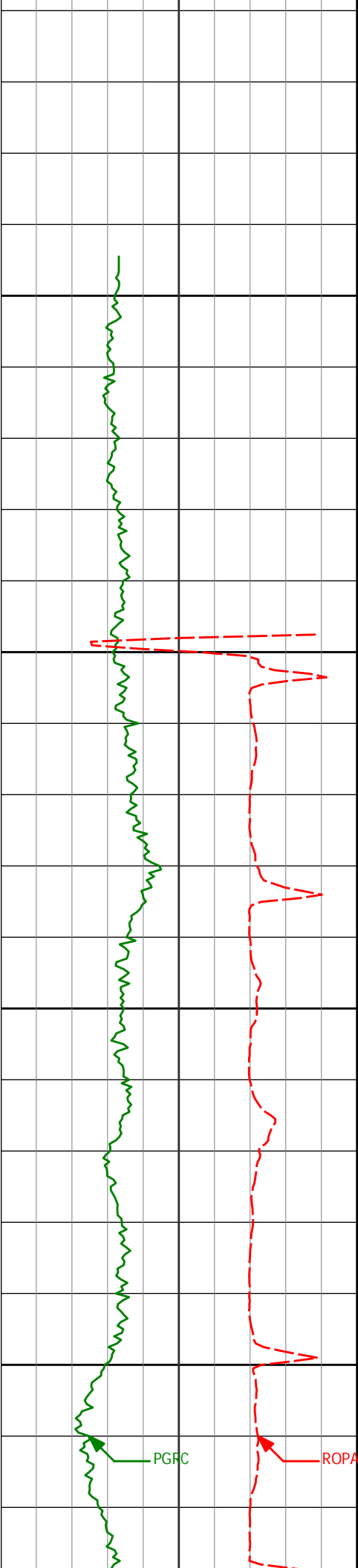
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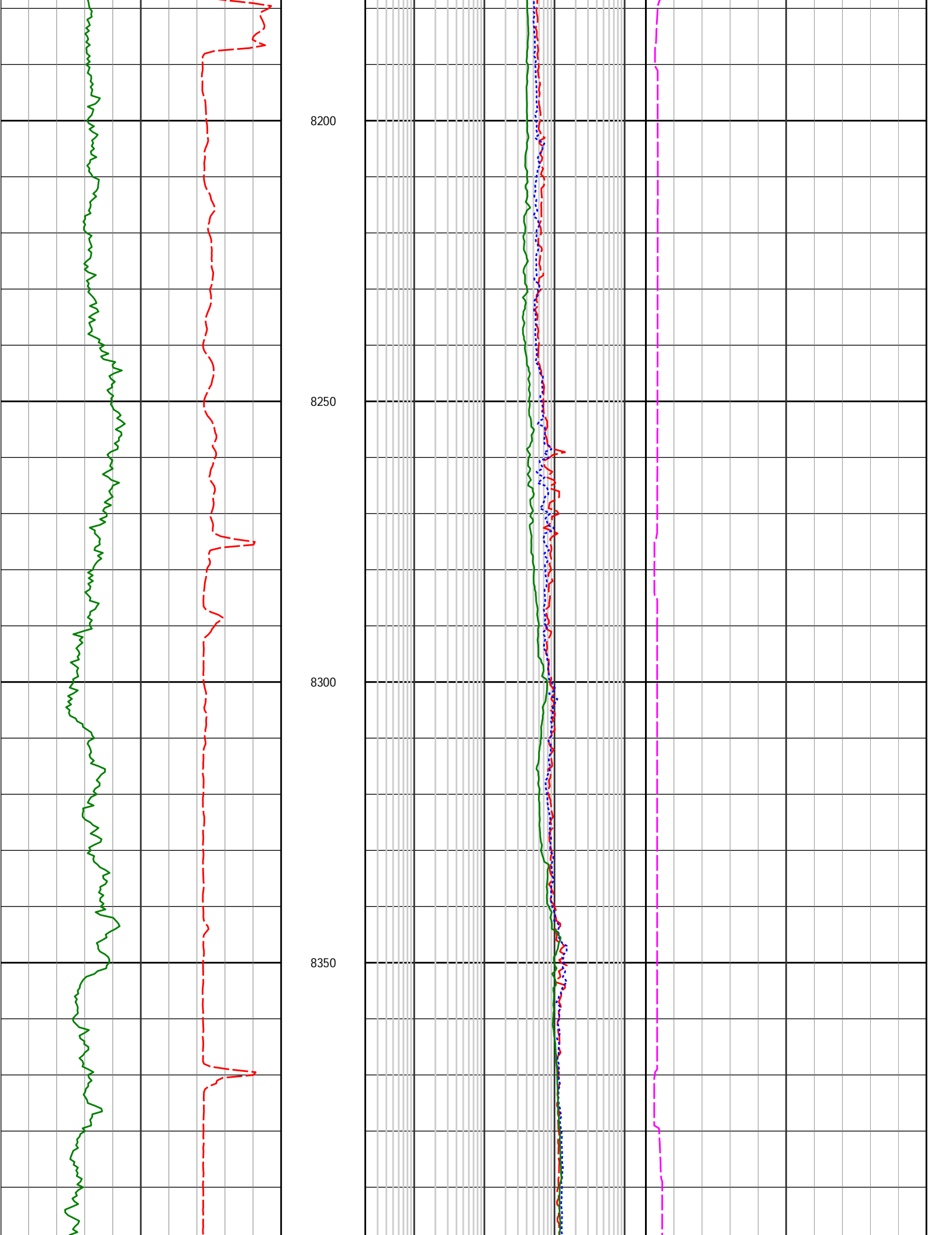
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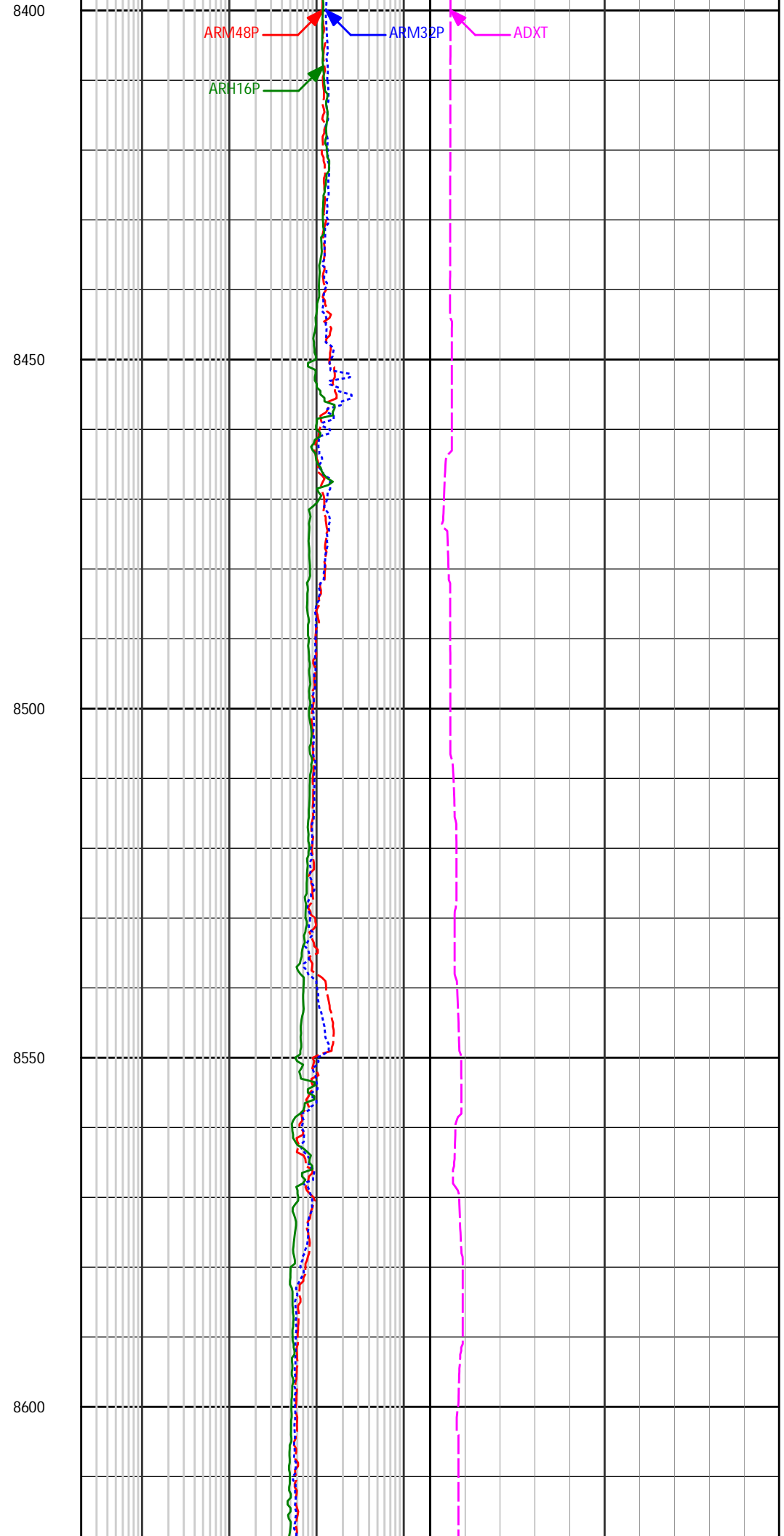
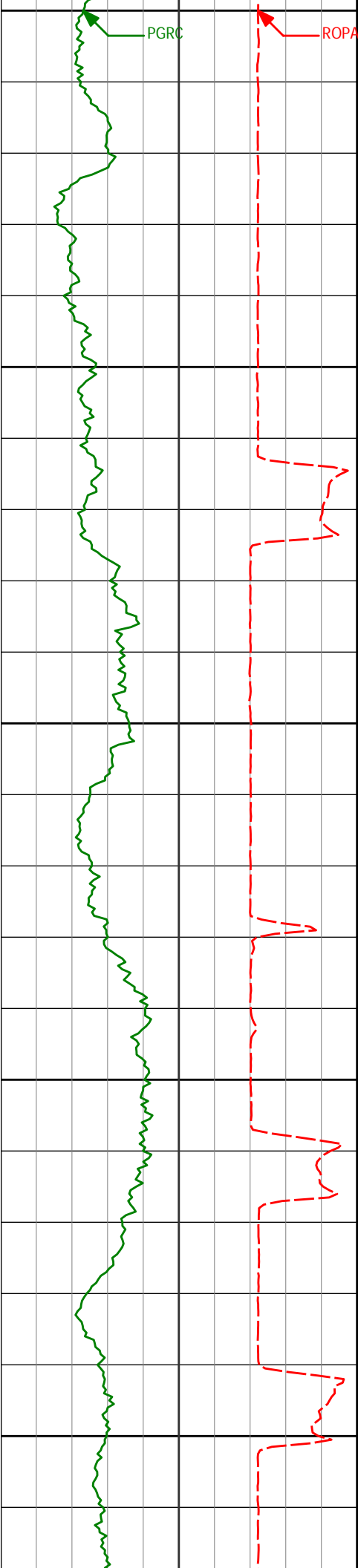
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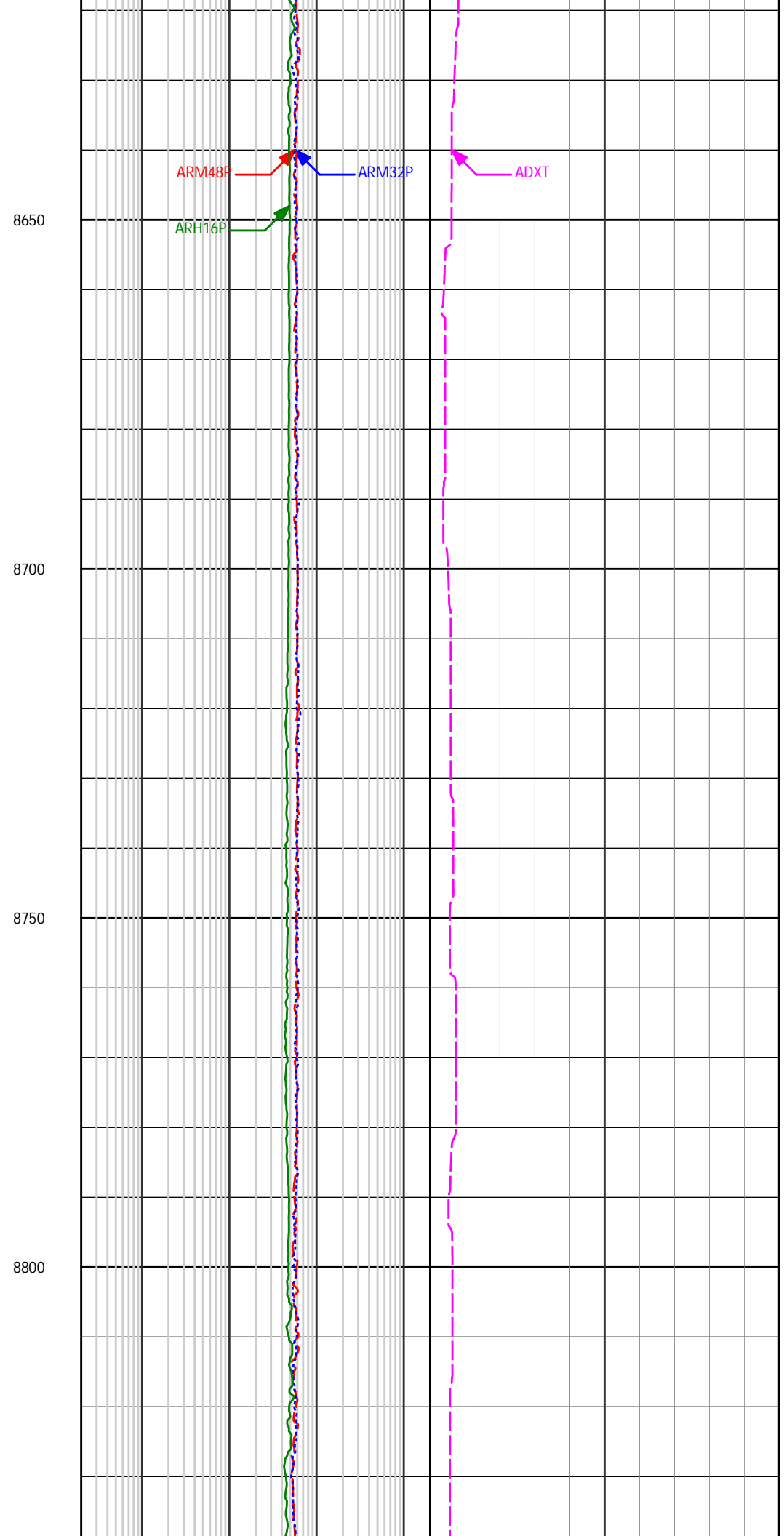
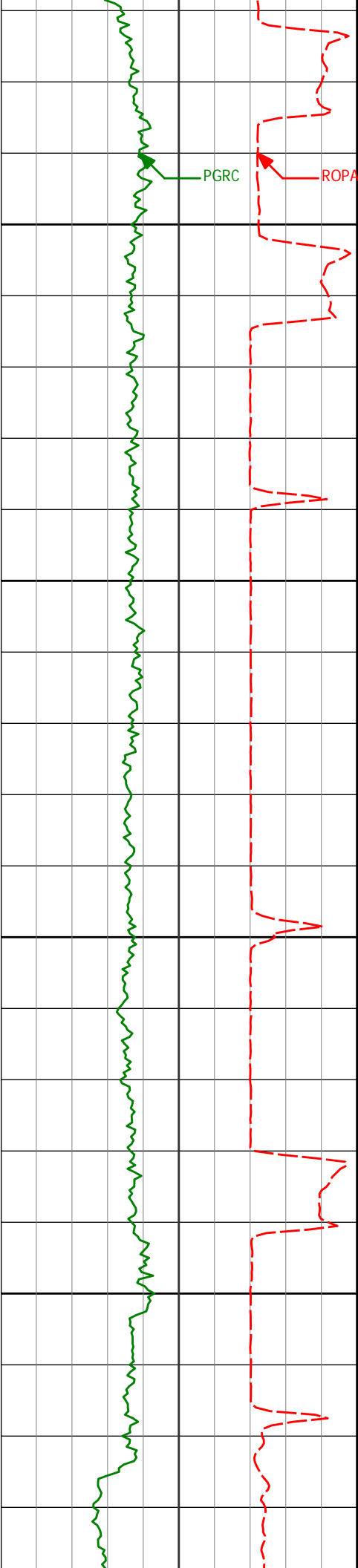
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 Bomhoff 5-8H
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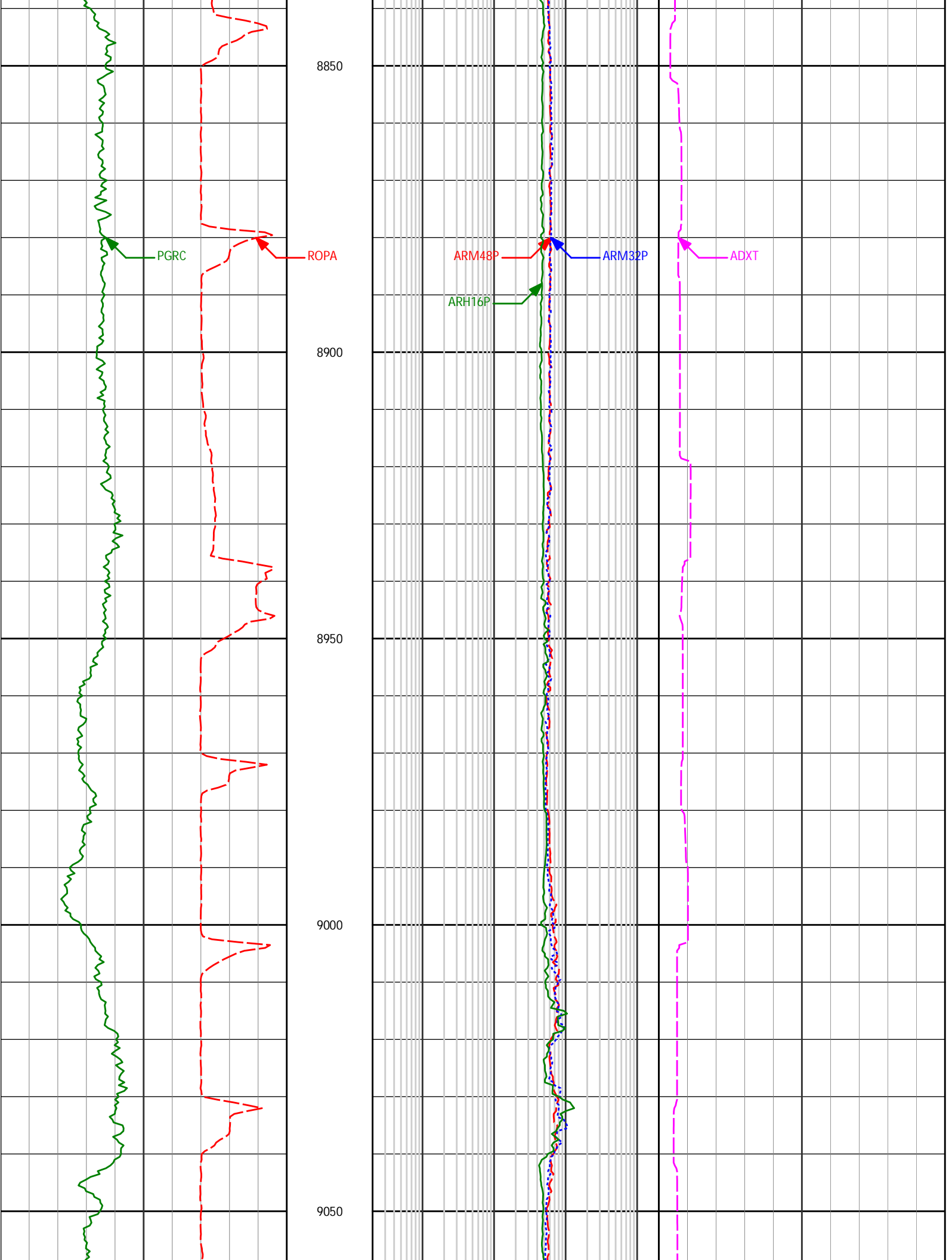
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PCG Gamma Ray <small>PGRC</small> 		Avg 32in 500k Phase Resistivity <small>ARM32P</small> 	
Avg Rate of Penetration <small>ROPA</small> 	Depth ft	Avg 16in 2M Phase Resistivity <small>ARH16P</small> 	ADR Formation Exposure Time <small>ADXT</small> 
	7950		

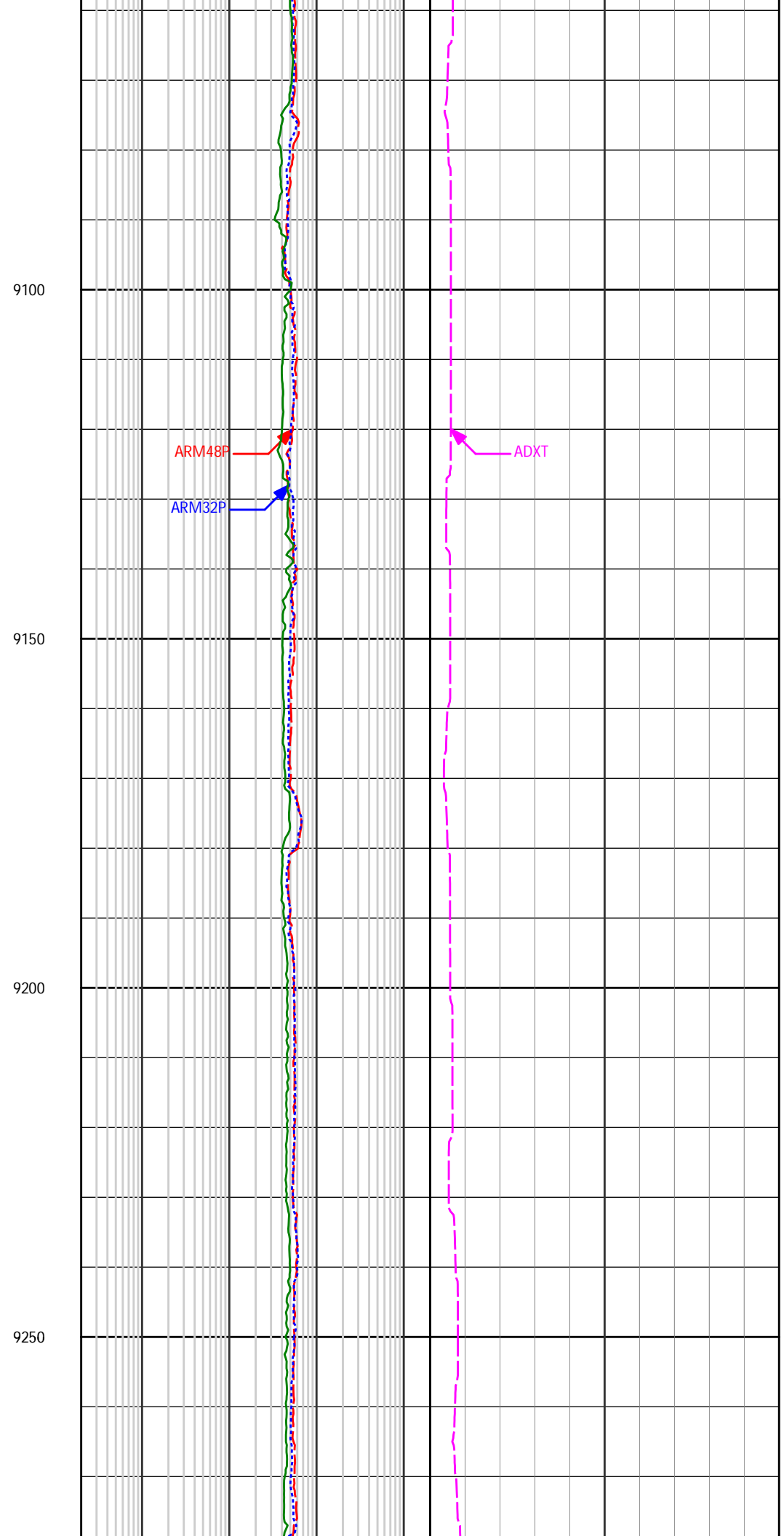
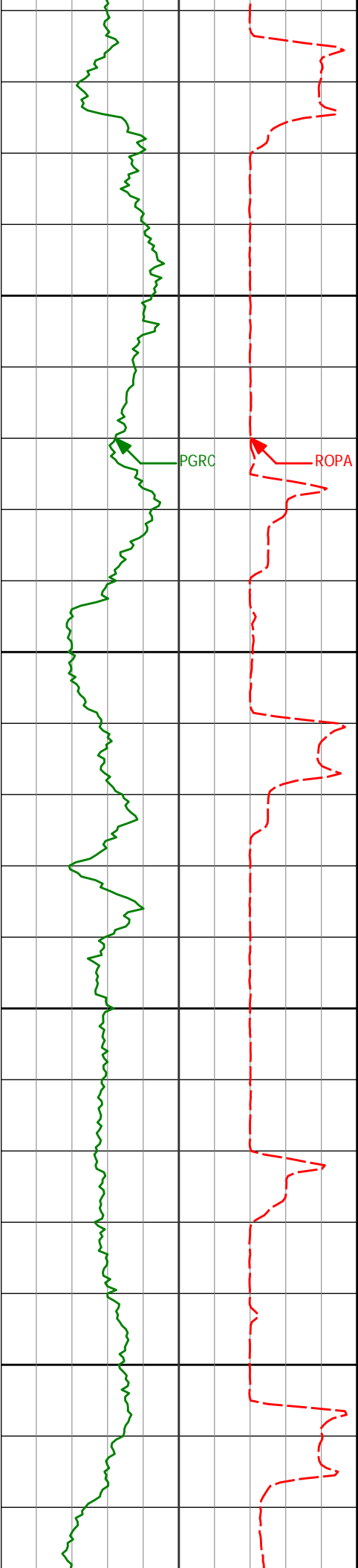


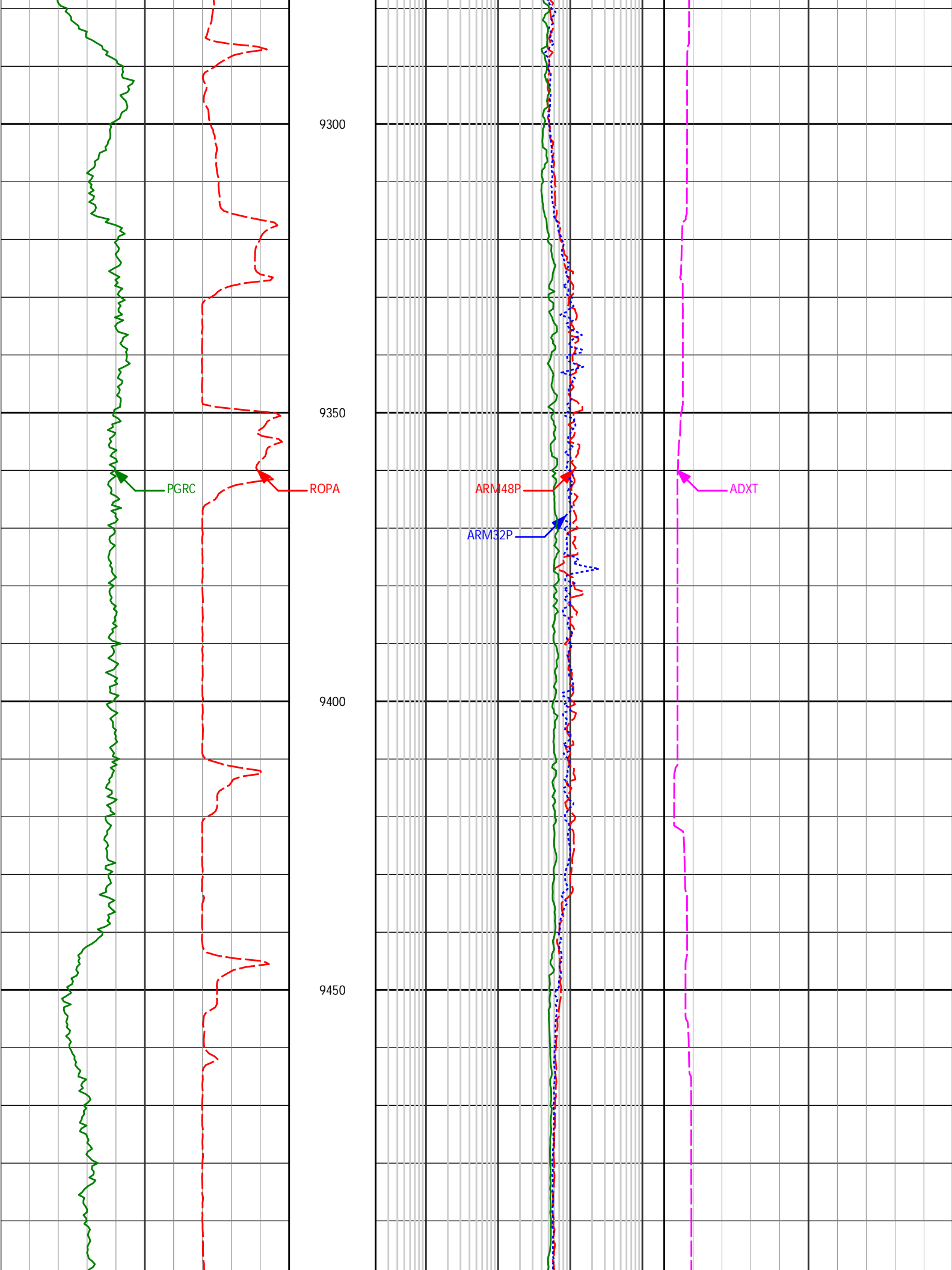


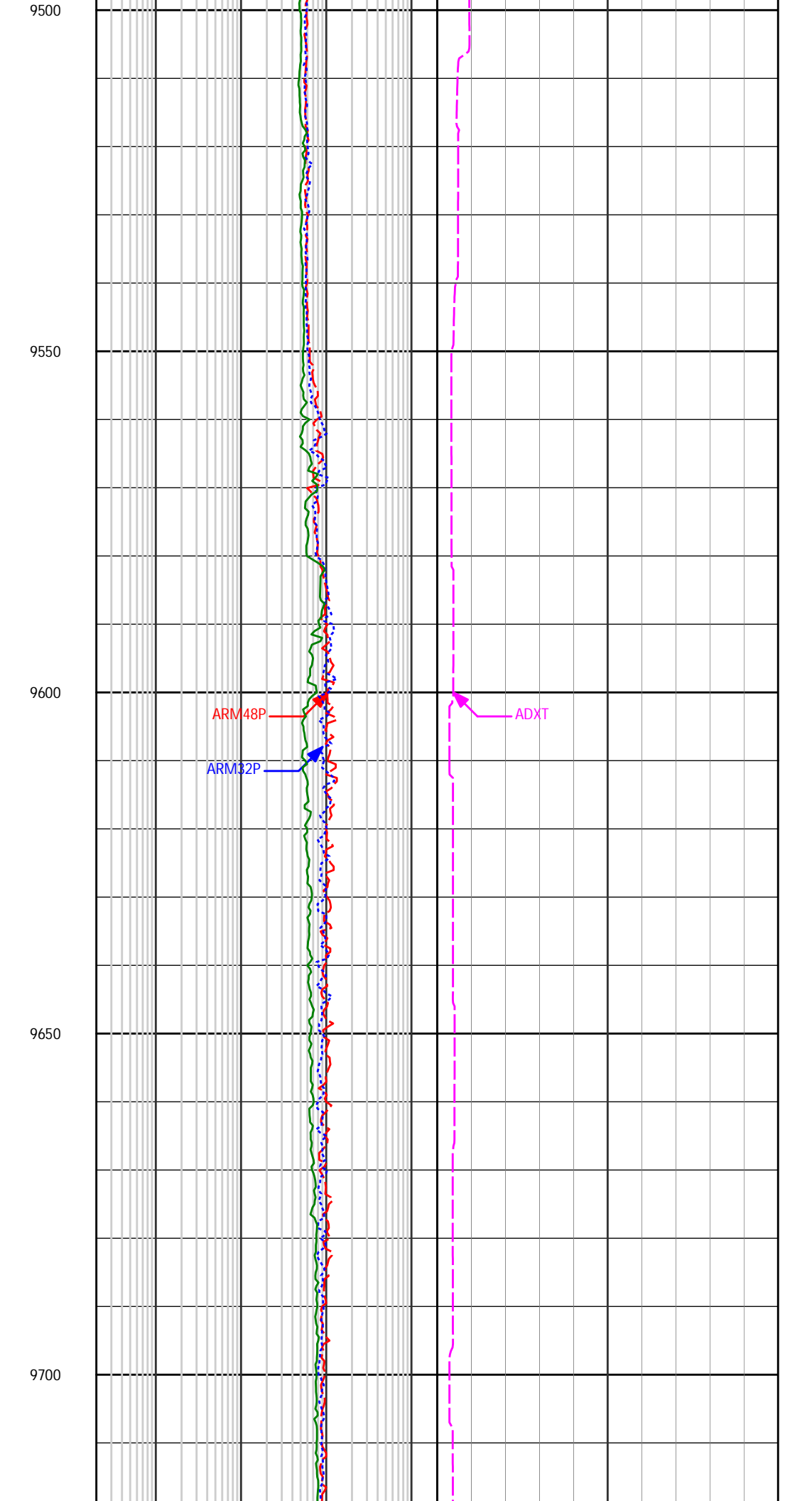
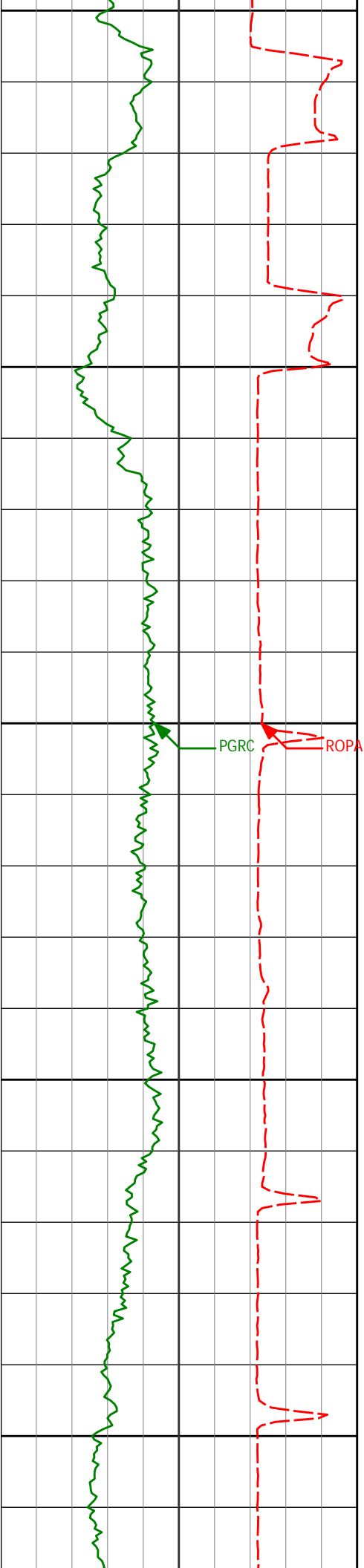


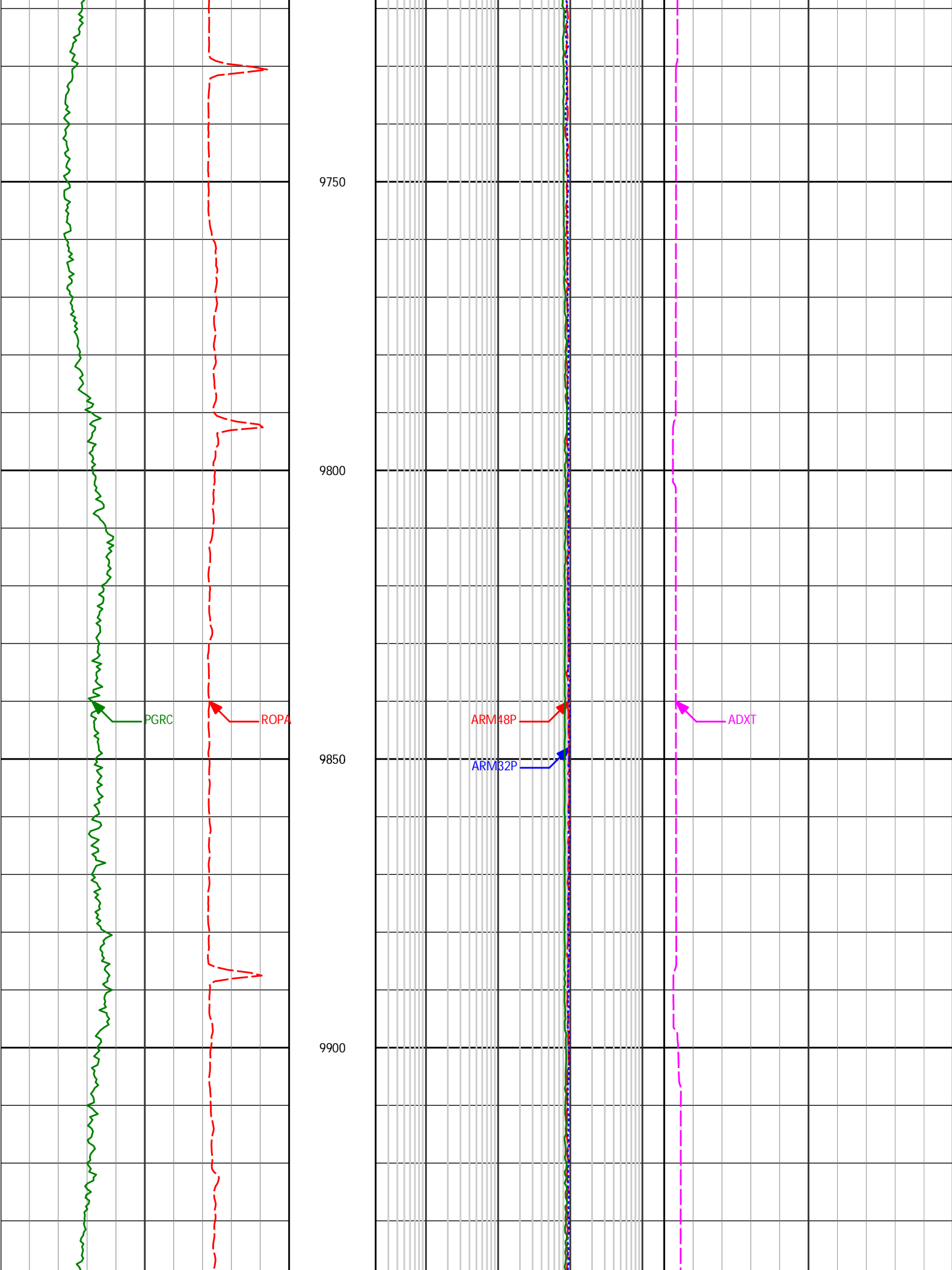


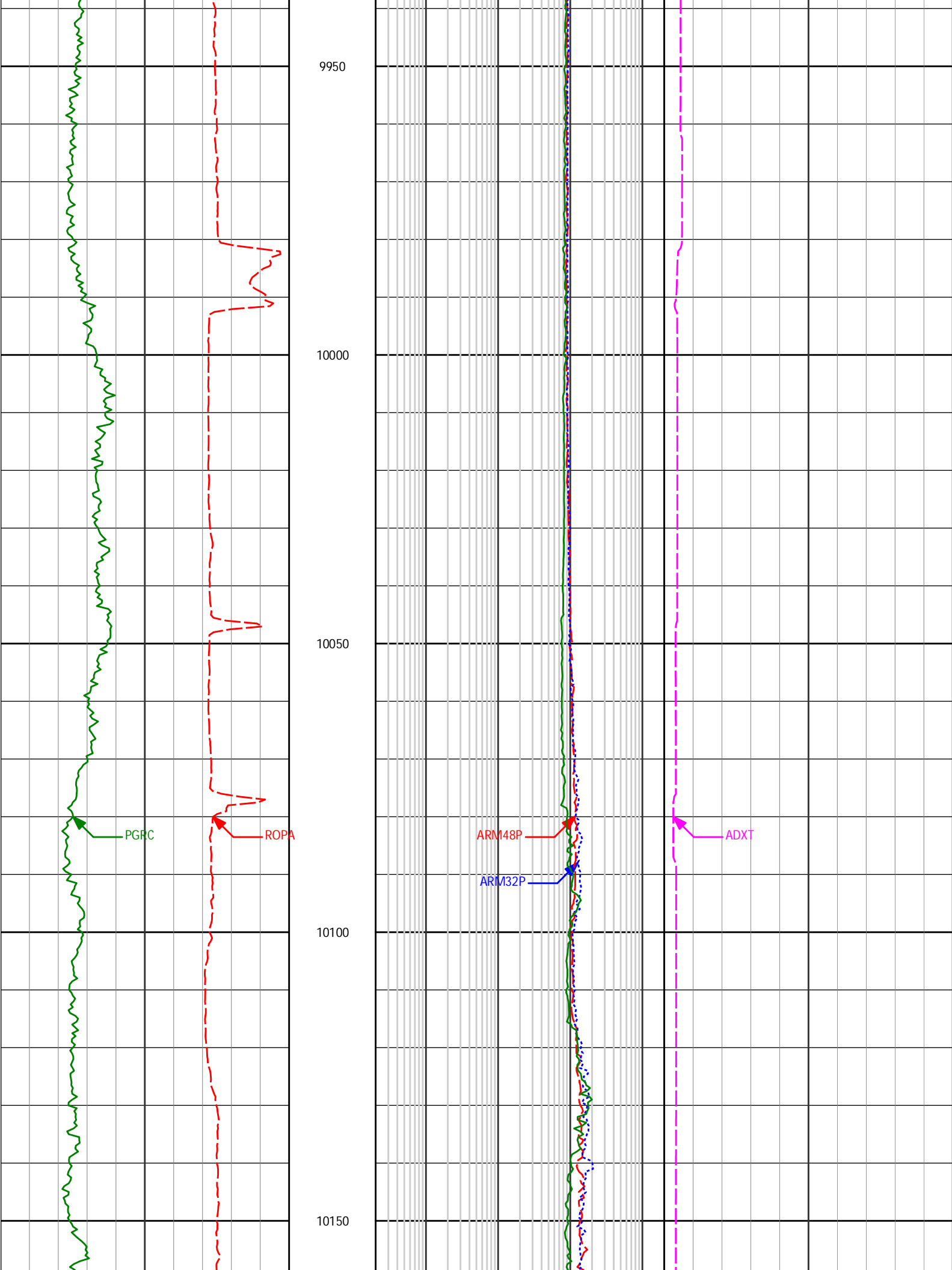


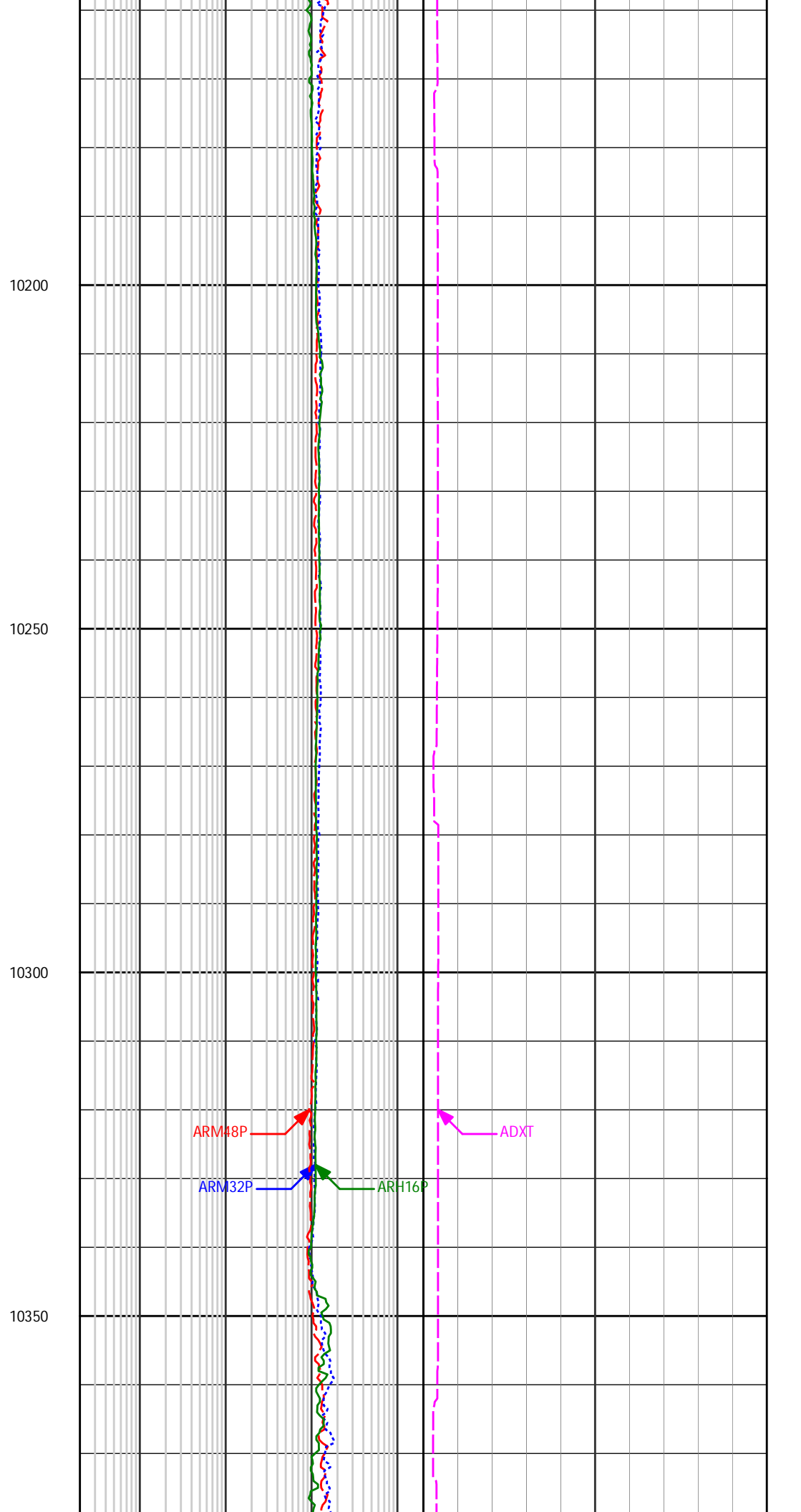
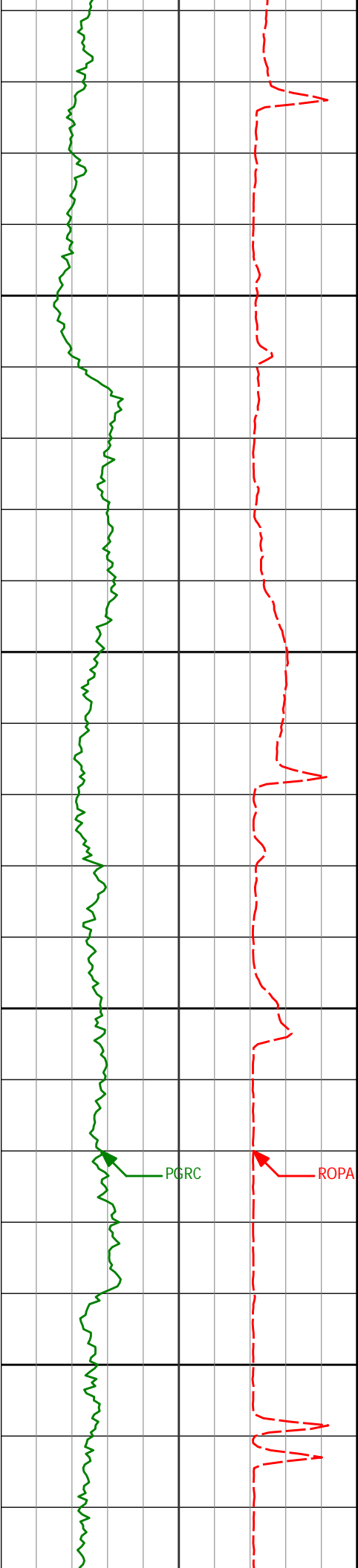


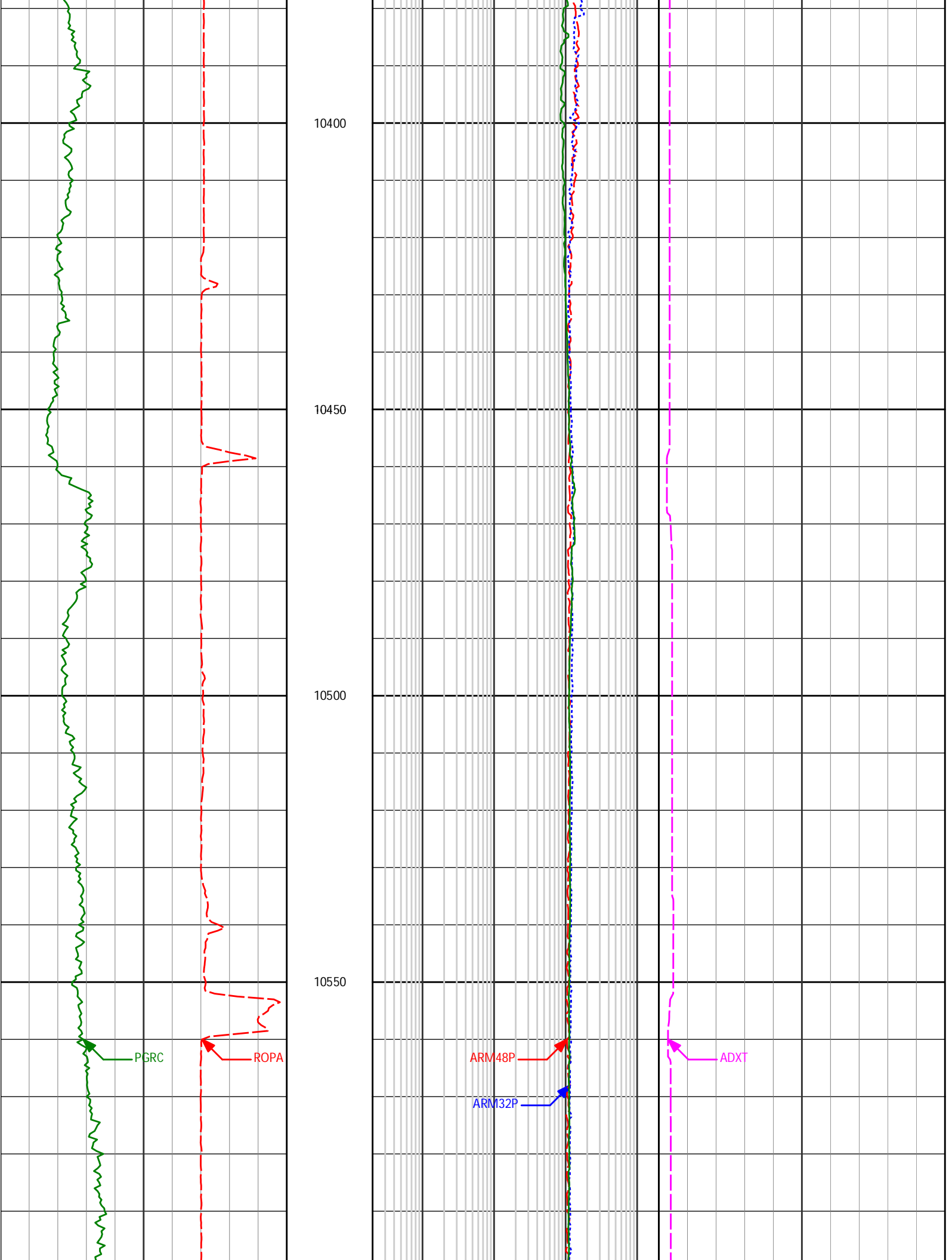


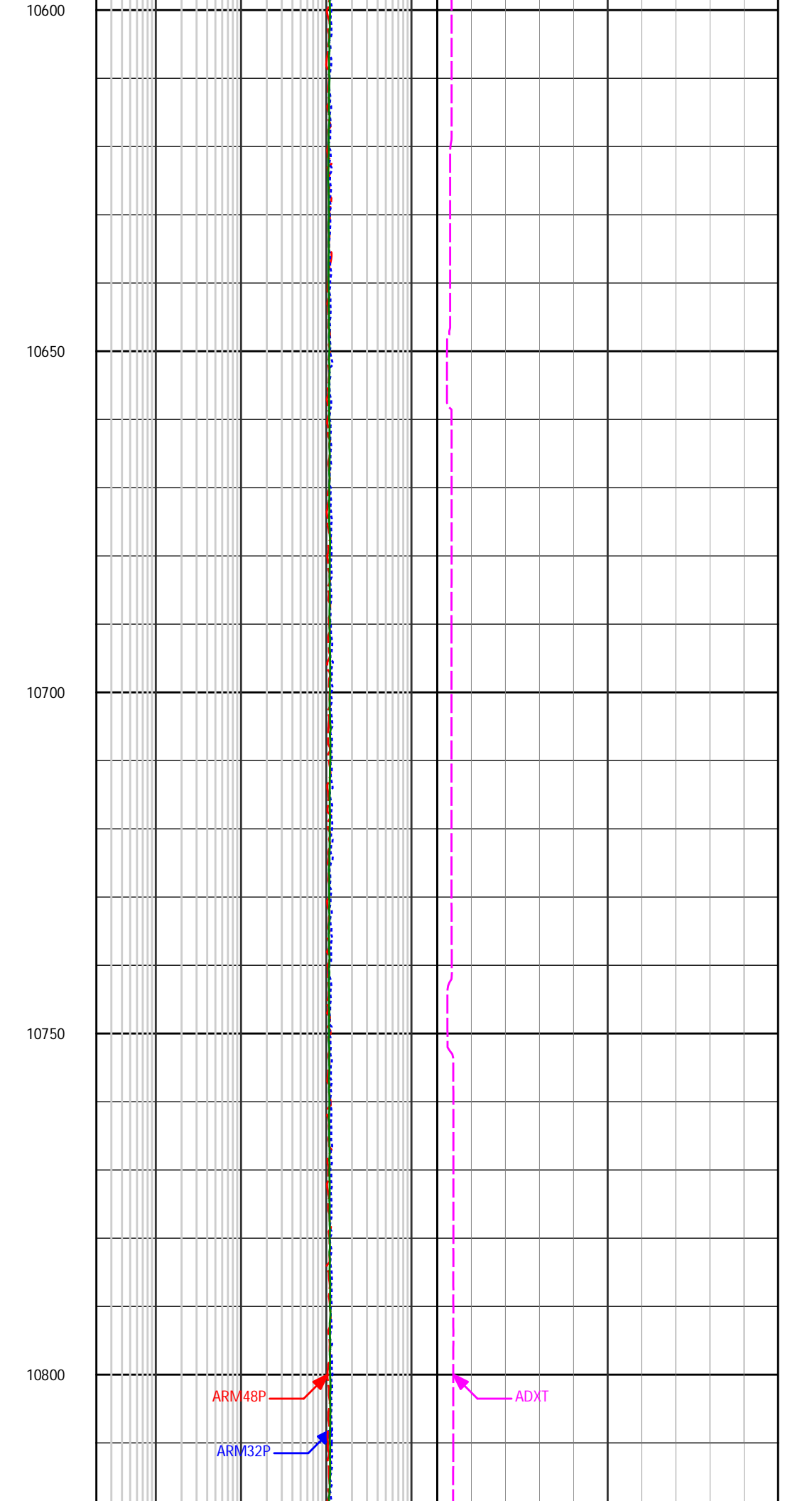
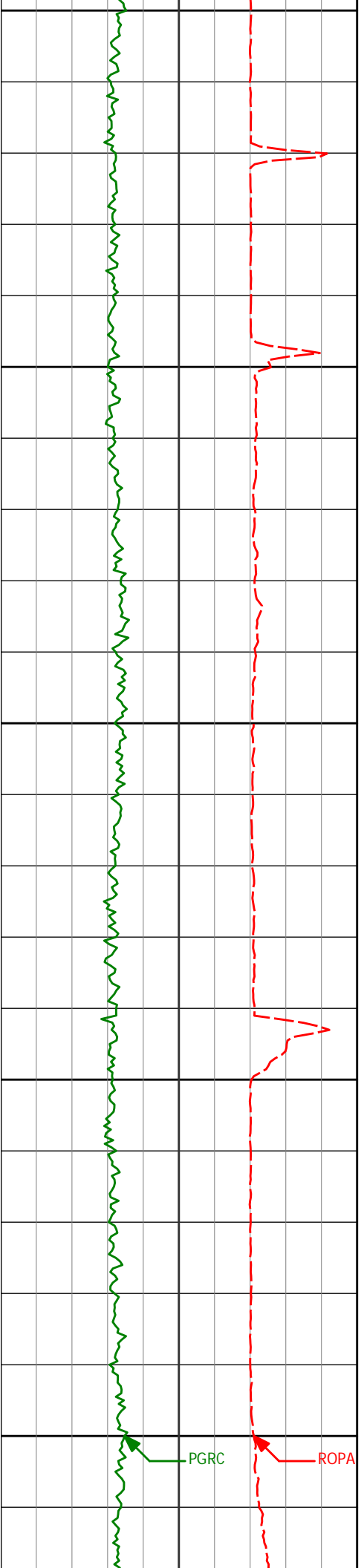


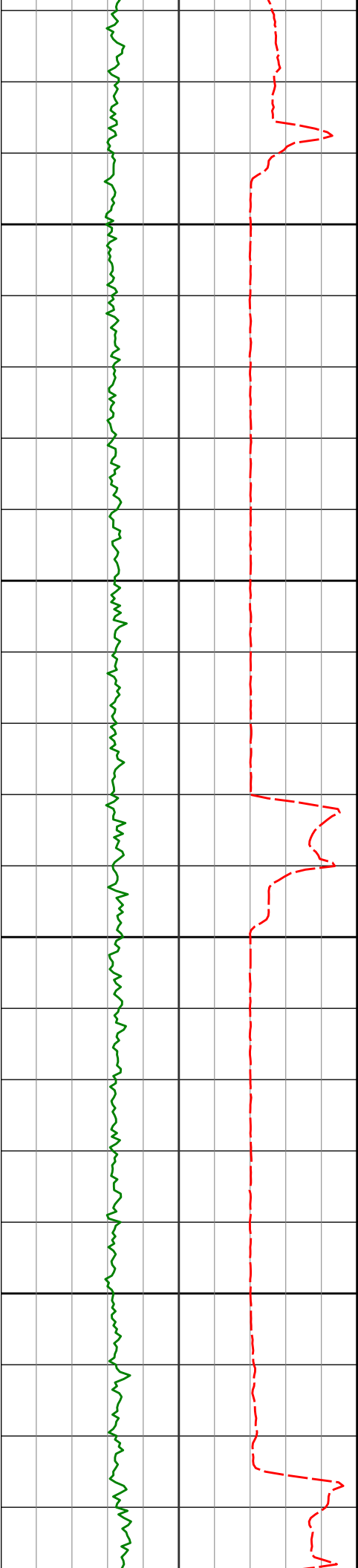










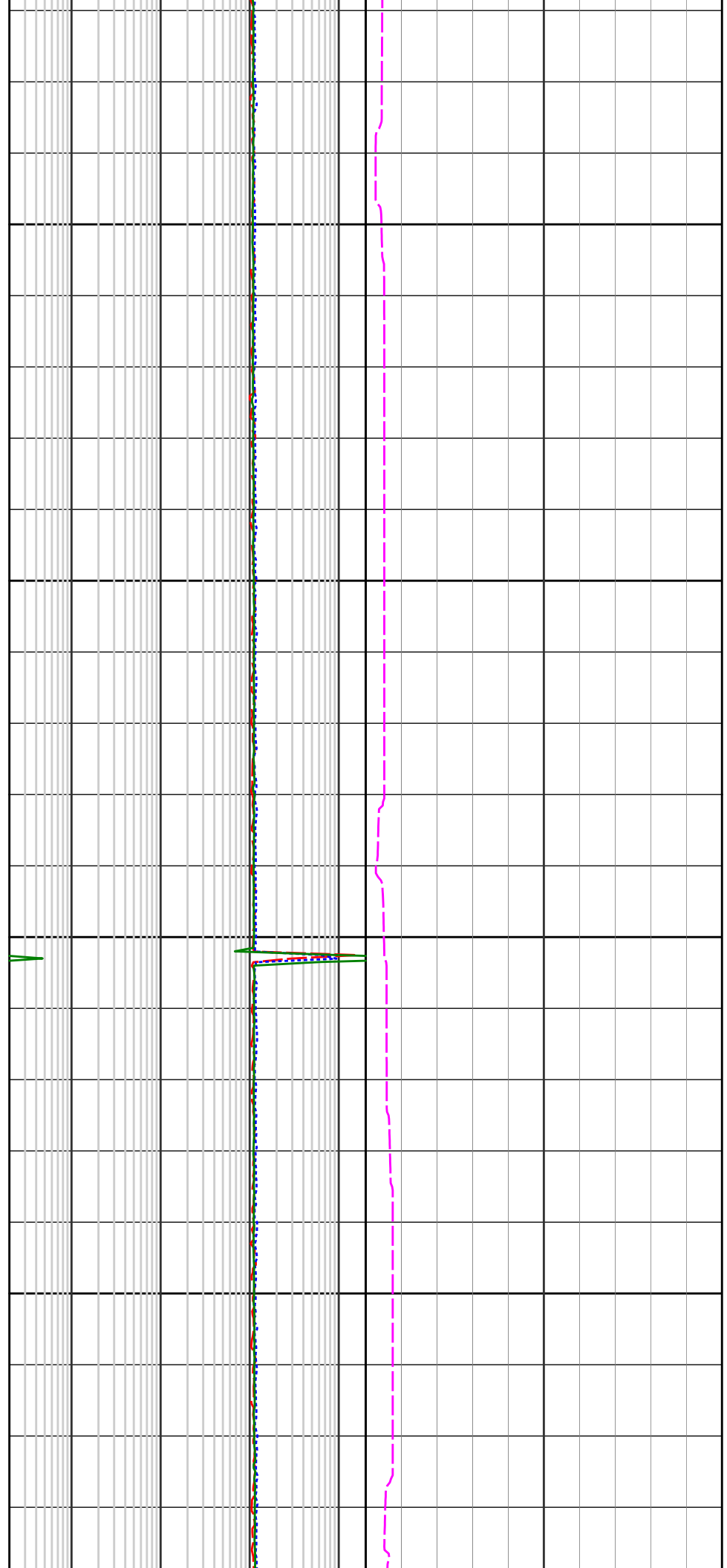


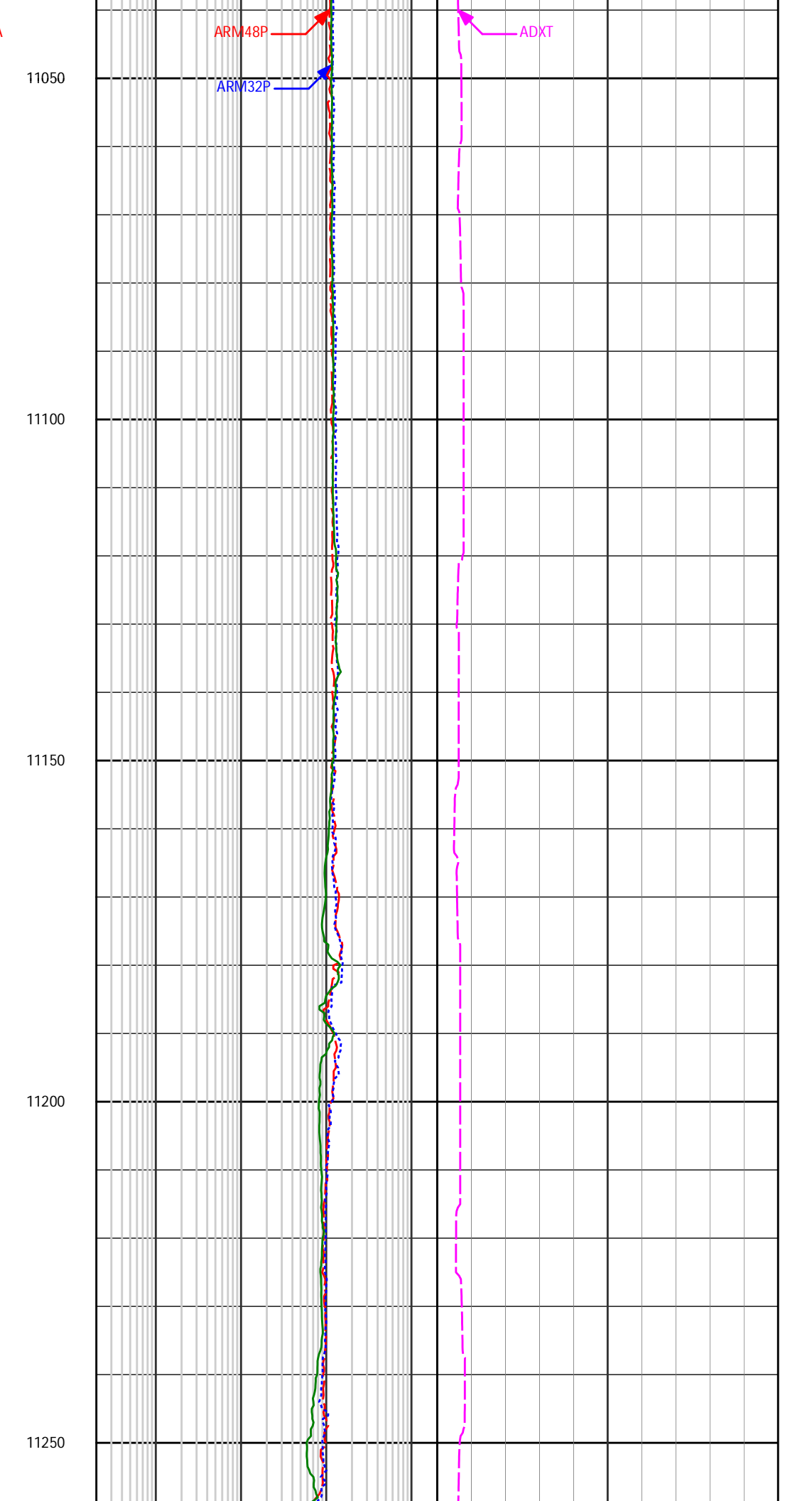
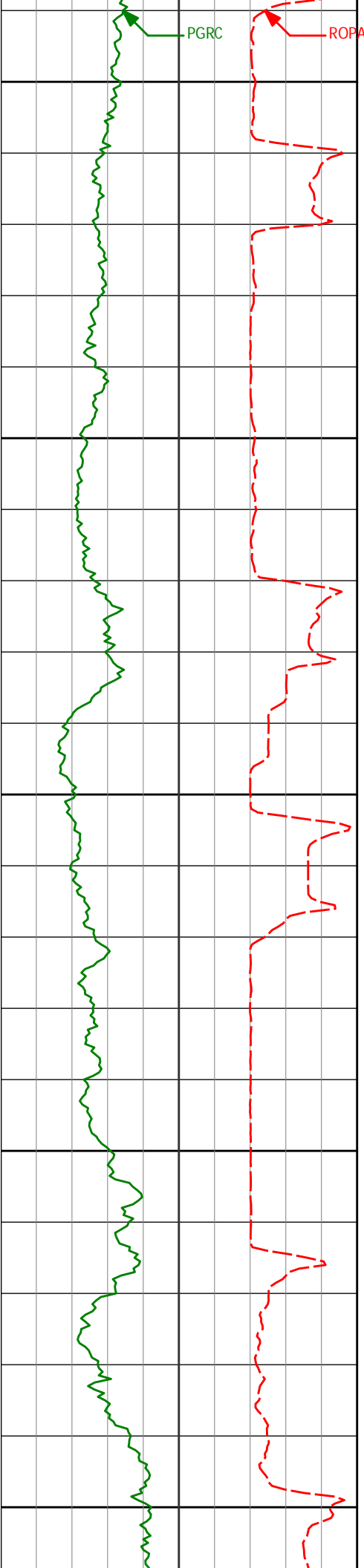
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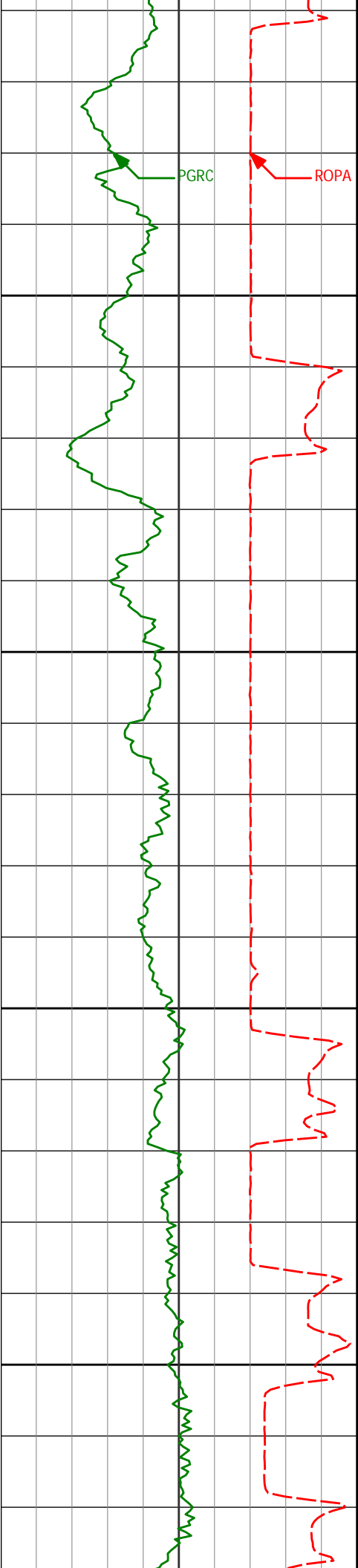
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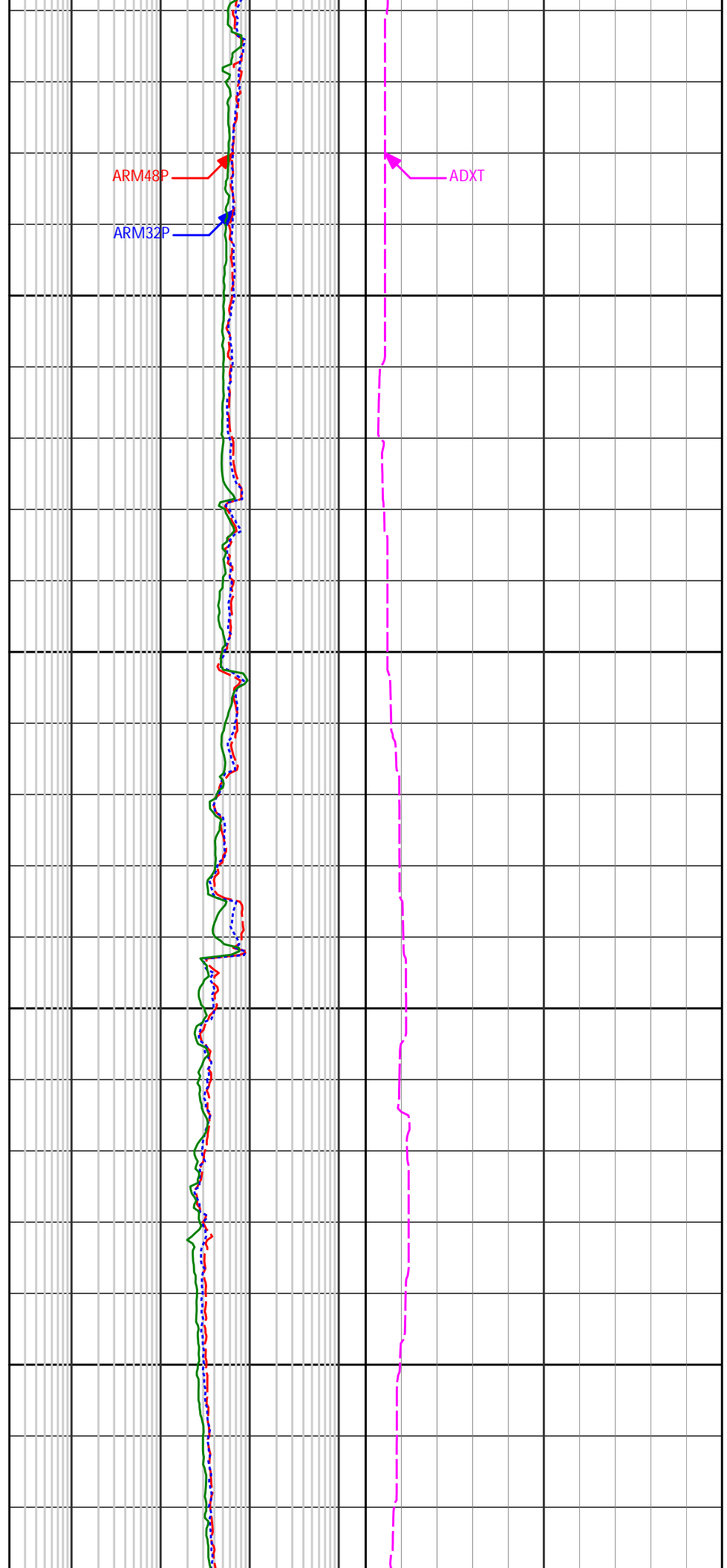


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11350

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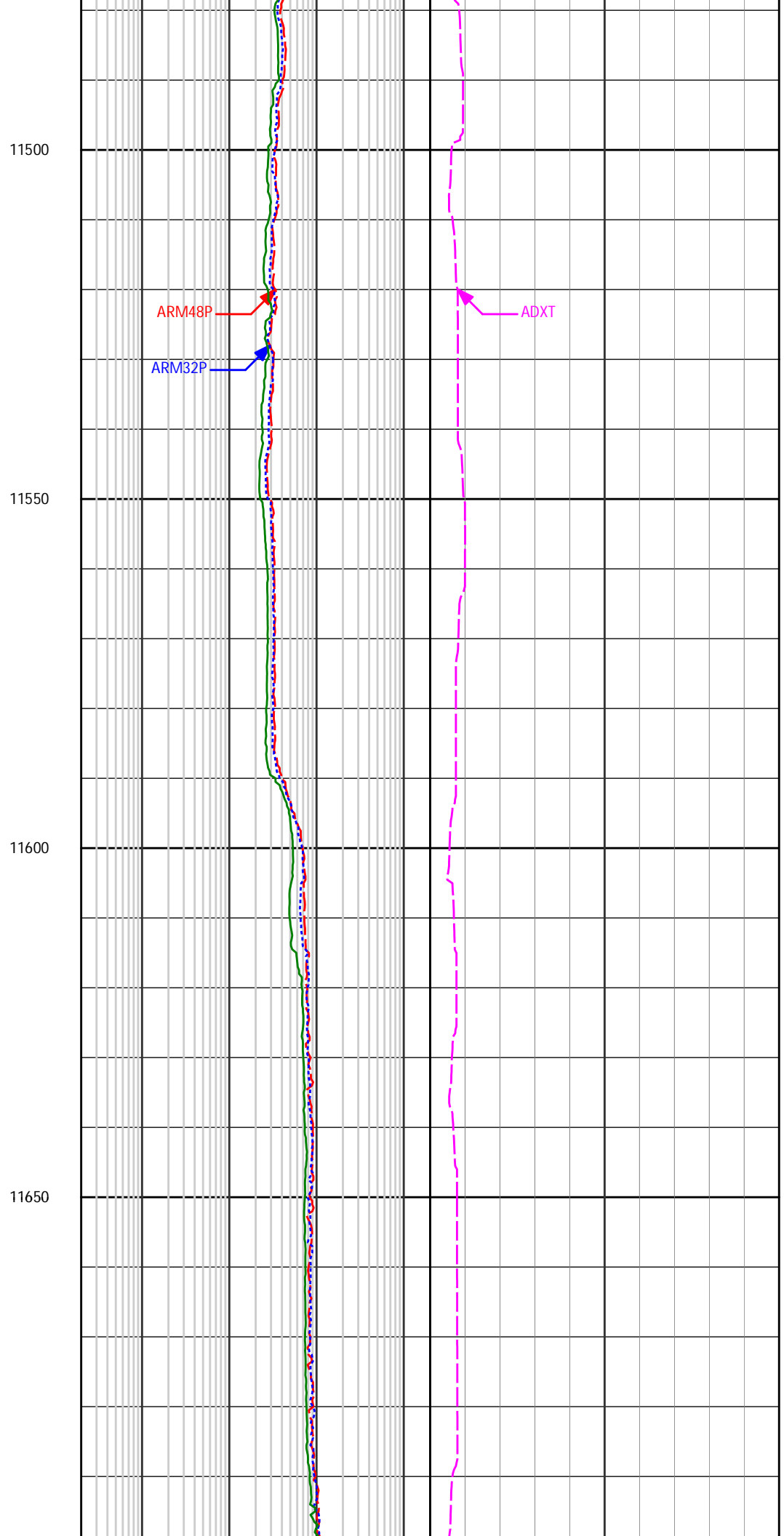
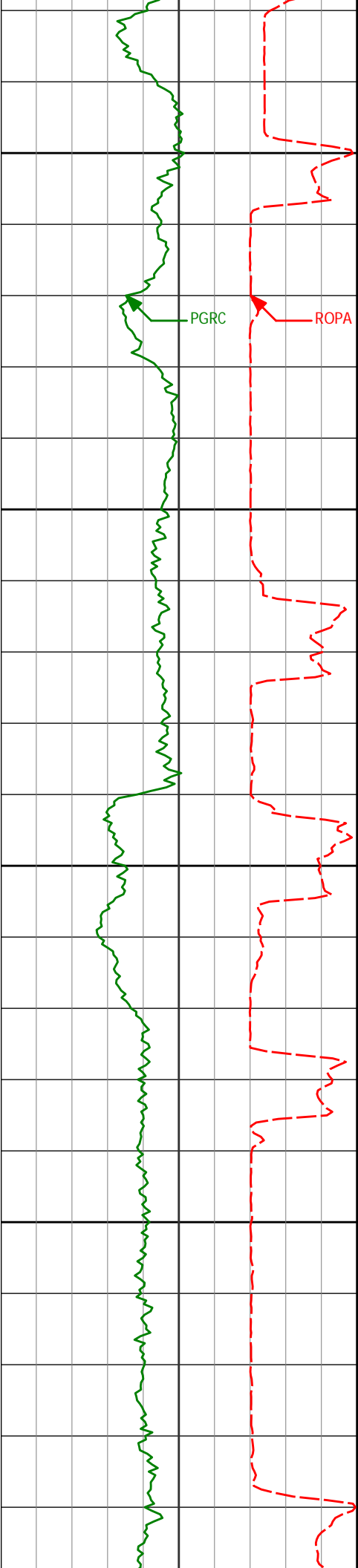
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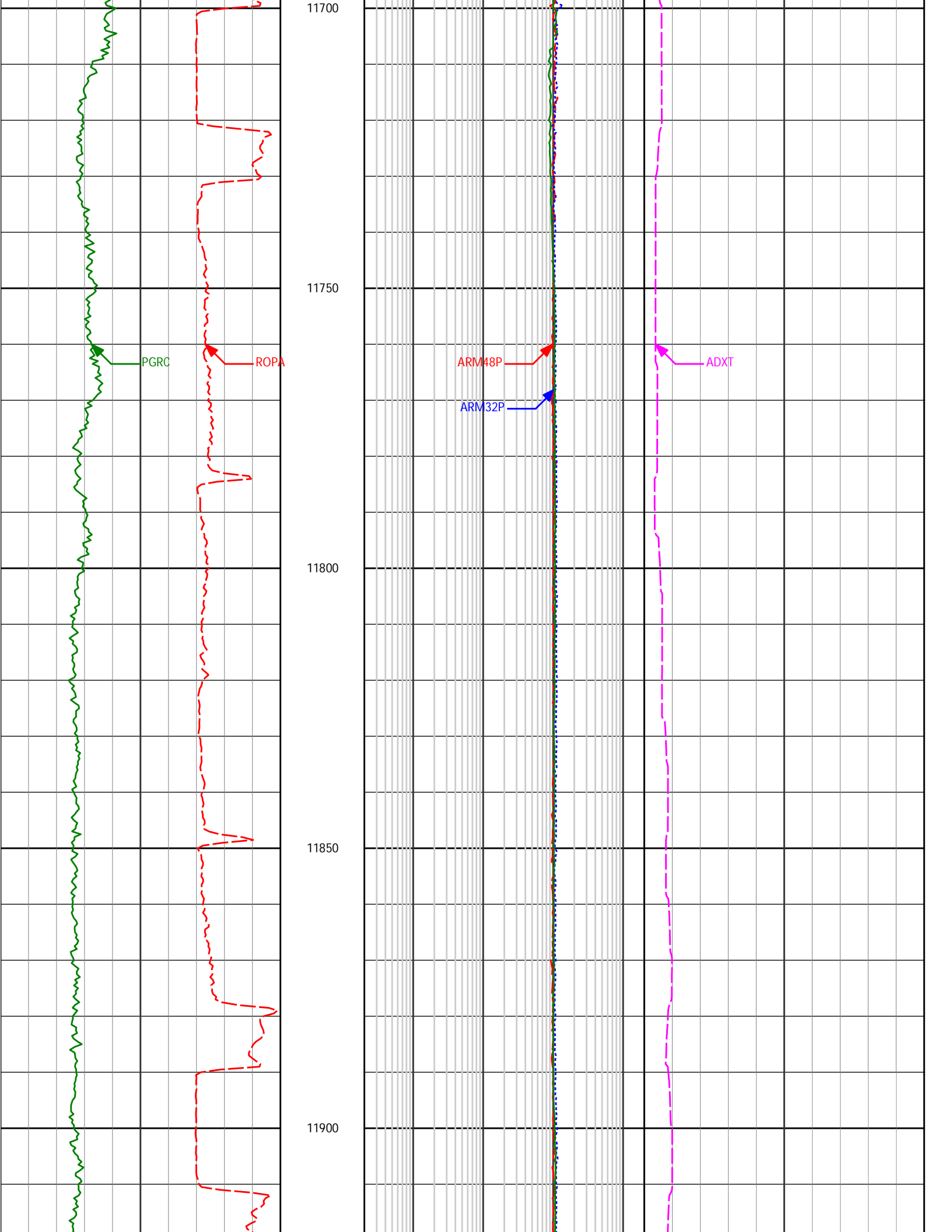


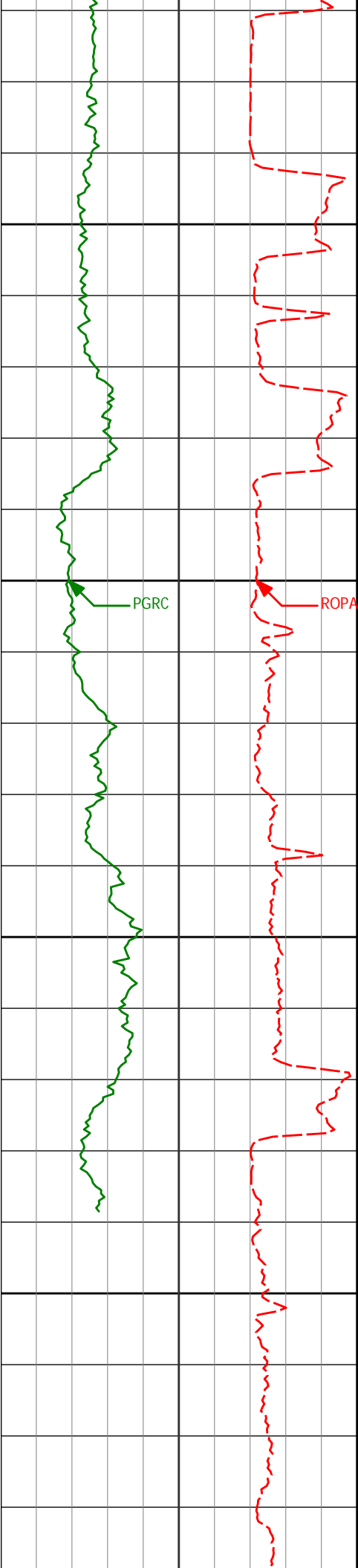
ARM48P

ARM32P

ADXT





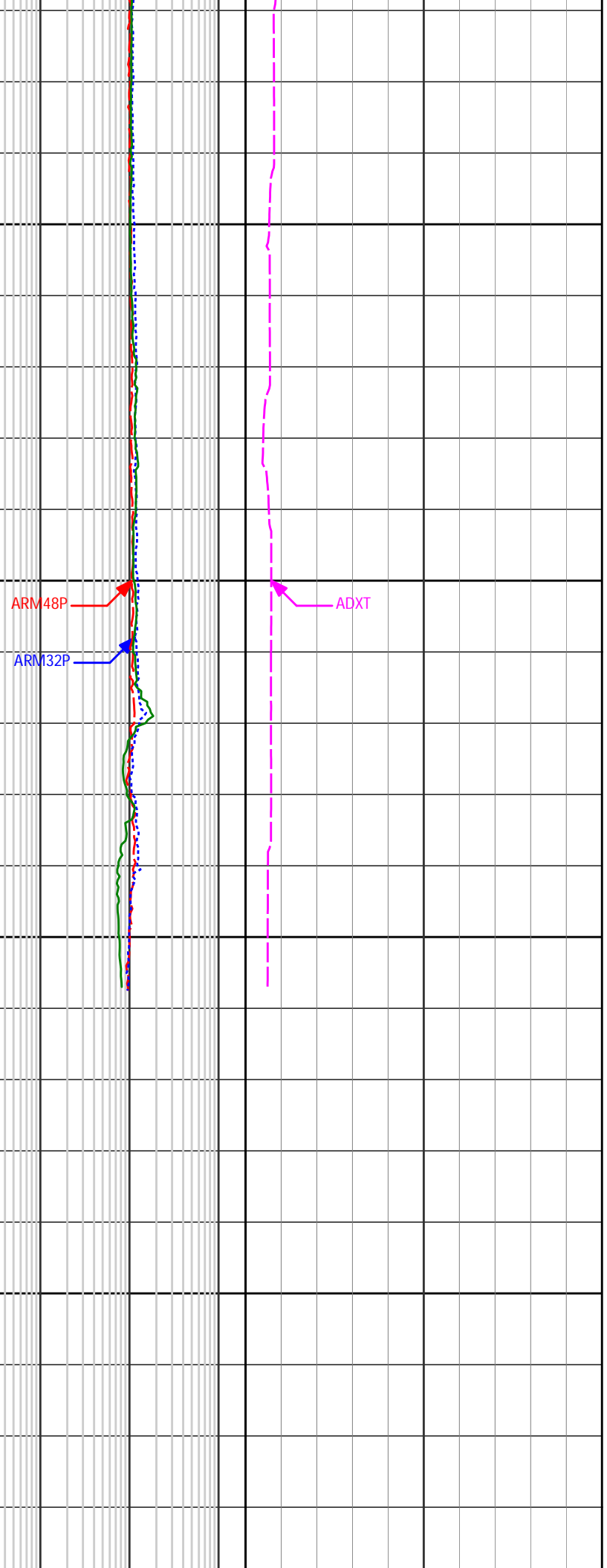


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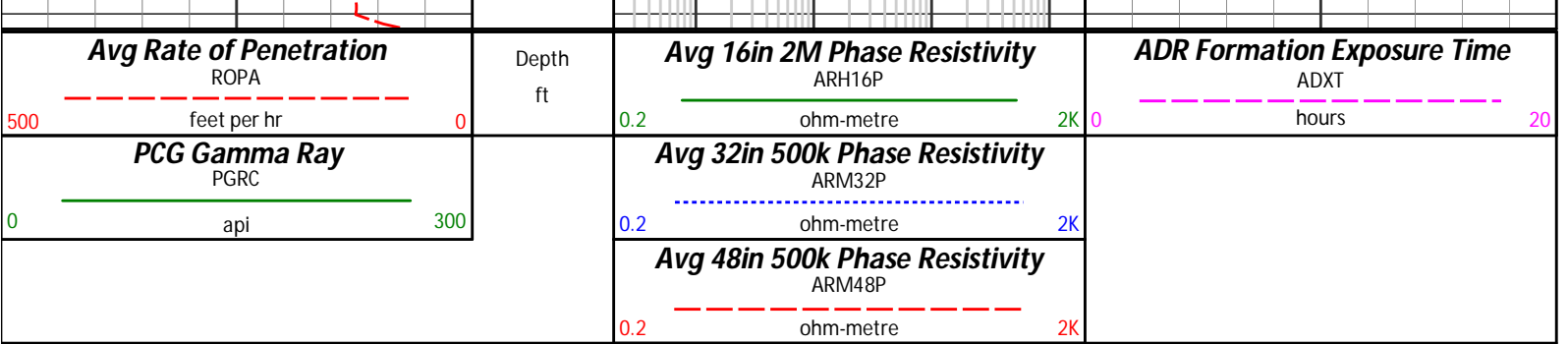
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ARM48P

ARM32P

ADXT



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DIRECTIONAL SURVEY REPORT

Conoco Phillips
 Bomhoff 5-8H
 Niobrara
 Arapahoe Colorado
 USA
 CA-XX-0900744738

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
1913.00	0.17	66.04	1912.98	0.84 N	8.92 E	8.91	TIE-IN
1960.00	0.31	86.95	1959.98	0.88 N	9.11 E	9.11	0.35
1992.00	0.19	68.44	1991.98	0.90 N	9.25 E	9.24	0.46
2023.00	0.36	288.75	2022.98	0.95 N	9.20 E	9.19	1.66
2086.00	1.39	277.42	2085.97	1.11 N	8.26 E	8.25	1.65
2150.00	2.11	278.27	2149.94	1.38 N	6.32 E	6.31	1.13
2213.00	3.02	273.04	2212.88	1.64 N	3.52 E	3.51	1.48
2308.00	4.50	270.46	2307.67	1.80 N	2.71 W	-2.72	1.57
2403.00	5.17	271.50	2402.33	1.94 N	10.72 W	-10.73	0.71
2498.00	5.38	272.27	2496.93	2.23 N	19.46 W	-19.47	0.23
2593.00	4.94	275.23	2591.54	2.78 N	27.99 W	-28.00	0.54
2688.00	3.81	266.49	2686.26	2.96 N	35.21 W	-35.23	1.38
2782.00	4.61	267.81	2780.01	2.62 N	42.10 W	-42.12	0.86
2877.00	4.93	266.60	2874.68	2.23 N	50.00 W	-50.01	0.35
2972.00	5.21	265.77	2969.31	1.67 N	58.37 W	-58.38	0.30
3067.00	5.20	264.62	3063.92	0.95 N	66.96 W	-66.96	0.11
3098.00	5.15	264.80	3094.79	0.70 N	69.74 W	-69.74	0.18
3161.00	4.68	271.46	3157.56	0.50 N	75.12 W	-75.12	1.17
3256.00	4.52	276.69	3252.26	1.04 N	82.71 W	-82.71	0.47
3351.00	4.59	276.65	3346.96	1.92 N	90.20 W	-90.21	0.08
3383.00	4.42	273.34	3378.86	2.14 N	92.71 W	-92.72	0.96
3446.00	4.21	269.09	3441.68	2.24 N	97.45 W	-97.46	0.61
3541.00	4.38	268.11	3536.41	2.07 N	104.56 W	-104.57	0.19
3636.00	4.51	269.59	3631.13	1.92 N	111.91 W	-111.92	0.18
3731.00	4.40	269.91	3725.84	1.89 N	119.29 W	-119.30	0.12
3826.00	4.34	269.78	3820.56	1.87 N	126.53 W	-126.54	0.06
3921.00	4.29	270.76	3915.29	1.90 N	133.68 W	-133.69	0.09
4016.00	4.22	272.12	4010.03	2.08 N	140.73 W	-140.74	0.13
4110.00	4.03	255.15	4103.79	1.36 N	147.38 W	-147.38	1.31
4205.00	4.01	257.66	4198.56	0.21 S	153.85 W	-153.84	0.19
4300.00	3.99	265.70	4293.33	1.17 S	160.39 W	-160.38	0.59
4395.00	4.11	278.18	4388.09	0.93 S	167.05 W	-167.05	0.93
4490.00	4.01	281.21	4482.85	0.20 N	173.68 W	-173.68	0.25
4585.00	3.69	266.82	4577.64	0.68 N	179.99 W	-179.99	1.07
4680.00	3.97	270.65	4672.43	0.54 N	186.33 W	-186.33	0.40
4775.00	4.01	271.72	4767.20	0.68 N	192.94 W	-192.94	0.09
4870.00	4.04	275.65	4861.96	1.11 N	199.59 W	-199.59	0.29
4965.00	3.90	277.07	4956.74	1.84 N	206.12 W	-206.13	0.18
5059.00	4.40	269.11	5050.49	2.17 N	212.90 W	-212.91	0.81
5154.00	4.51	266.96	5145.20	1.92 N	220.27 W	-220.28	0.21
5249.00	4.11	276.42	5239.94	2.10 N	227.38 W	-227.39	0.86
5344.00	4.09	278.73	5334.69	3.00 N	234.11 W	-234.12	0.17

5439.00	3.98	275.13	5429.46	3.80 N	240.74 W	-240.76	0.29
5534.00	3.73	273.74	5524.24	4.30 N	247.10 W	-247.13	0.28
5629.00	3.22	273.47	5619.07	4.66 N	252.85 W	-252.88	0.54
5724.00	3.55	270.60	5713.90	4.86 N	258.46 W	-258.48	0.39
5818.00	3.46	269.69	5807.73	4.87 N	264.20 W	-264.22	0.11
5913.00	4.06	271.97	5902.52	4.97 N	270.42 W	-270.45	0.66
6008.00	3.98	277.54	5997.29	5.52 N	277.05 W	-277.08	0.42
6103.00	4.00	274.25	6092.06	6.20 N	283.62 W	-283.66	0.24
6198.00	3.95	274.62	6186.83	6.71 N	290.19 W	-290.23	0.06
6293.00	4.59	262.21	6281.57	6.46 N	297.22 W	-297.25	1.18
6388.00	3.84	267.47	6376.31	5.80 N	304.16 W	-304.19	0.89
6483.00	3.31	272.08	6471.13	5.76 N	310.08 W	-310.11	0.63
6578.00	4.15	261.39	6565.93	5.34 N	316.22 W	-316.24	1.14
6673.00	3.68	263.68	6660.70	4.49 N	322.65 W	-322.67	0.52
6768.00	3.21	263.54	6755.53	3.86 N	328.32 W	-328.34	0.50
6799.00	2.97	264.91	6786.49	3.69 N	329.98 W	-330.00	0.81
6831.00	2.86	268.21	6818.45	3.59 N	331.61 W	-331.63	0.62
6863.00	1.51	244.69	6850.42	3.39 N	332.79 W	-332.80	5.00
6894.00	2.90	124.30	6881.41	2.77 N	332.51 W	-332.52	12.54
6926.00	6.60	111.63	6913.29	1.63 N	330.13 W	-330.13	11.94
6957.00	9.46	109.37	6943.99	0.13 N	326.07 W	-326.06	9.28
6989.00	12.15	108.00	6975.42	1.78 S	320.38 W	-320.37	8.45
7020.00	14.57	107.88	7005.58	3.99 S	313.57 W	-313.54	7.80
7052.00	16.42	105.80	7036.41	6.45 S	305.39 W	-305.34	6.04
7084.00	17.79	100.73	7067.00	8.60 S	296.23 W	-296.17	6.32
7115.00	19.77	95.00	7096.35	9.94 S	286.35 W	-286.29	8.74
7147.00	22.38	92.52	7126.20	10.67 S	274.87 W	-274.80	8.62
7178.00	24.91	92.10	7154.60	11.17 S	262.45 W	-262.38	8.16
7210.00	26.44	90.94	7183.44	11.54 S	248.59 W	-248.52	5.04
7242.00	28.11	87.68	7211.88	11.35 S	233.93 W	-233.86	6.99
7273.00	31.03	86.11	7238.84	10.51 S	218.66 W	-218.59	9.76
7304.00	34.48	88.20	7264.91	9.69 S	201.91 W	-201.85	11.70
7336.00	37.55	89.96	7290.79	9.40 S	183.10 W	-183.04	10.14
7368.00	40.85	90.68	7315.58	9.52 S	162.88 W	-162.82	10.42
7399.00	43.67	91.21	7338.53	9.87 S	142.04 W	-141.98	9.15
7431.00	46.69	91.26	7361.08	10.36 S	119.35 W	-119.28	9.43
7463.00	50.69	91.14	7382.20	10.86 S	95.32 W	-95.26	12.53
7494.00	54.67	91.24	7400.99	11.38 S	70.68 W	-70.61	12.84
7526.00	58.21	90.86	7418.68	11.86 S	44.02 W	-43.95	11.09
7558.00	61.43	90.69	7434.76	12.23 S	16.37 W	-16.29	10.08
7589.00	64.15	90.82	7448.94	12.60 S	11.20 E	11.27	8.78
7621.00	66.77	90.66	7462.23	12.97 S	40.30 E	40.38	8.19
7652.00	69.76	90.67	7473.71	13.31 S	69.09 E	69.17	9.66
7684.00	72.45	90.30	7484.07	13.56 S	99.36 E	99.44	8.46
7716.00	74.70	90.02	7493.12	13.65 S	130.06 E	130.14	7.08
7747.00	77.49	89.46	7500.57	13.51 S	160.14 E	160.22	9.18
7779.00	80.50	89.34	7506.67	13.18 S	191.55 E	191.63	9.43
7811.00	82.45	89.31	7511.42	12.81 S	223.19 E	223.27	6.08
7842.00	83.38	89.56	7515.24	12.51 S	253.95 E	254.03	3.11
7869.00	85.18	89.85	7517.93	12.37 S	280.82 E	280.89	6.75
7988.00	90.43	92.19	7522.49	14.49 S	399.66 E	399.74	4.83
8020.00	90.93	92.06	7522.11	15.68 S	431.64 E	431.72	1.60
8083.00	91.05	91.37	7521.02	17.56 S	494.60 E	494.70	1.12
8115.00	91.24	91.27	7520.38	18.30 S	526.58 E	526.69	0.65
8210.00	92.47	90.69	7517.30	19.93 S	621.52 E	621.63	1.44
8305.00	93.08	89.81	7512.70	20.34 S	716.40 E	716.52	1.13
8399.00	94.27	90.02	7506.67	20.20 S	810.21 E	810.32	1.29
8494.00	93.46	90.18	7500.27	20.36 S	904.99 E	905.10	0.88
8526.00	94.09	90.25	7498.16	20.48 S	936.92 E	937.03	1.97
8558.00	94.27	89.83	7495.83	20.50 S	968.84 E	968.94	1.43
8589.00	93.65	89.42	7493.69	20.29 S	999.76 E	999.87	2.39
8684.00	89.51	89.76	7491.07	19.61 S	1094.70 E	1094.80	4.38
8779.00	89.81	89.92	7491.63	19.35 S	1189.70 E	1189.80	0.37
8874.00	88.33	89.64	7493.17	18.98 S	1284.68 E	1284.78	1.59
8969.00	89.01	89.27	7495.37	18.08 S	1379.65 E	1379.74	0.81
9064.00	89.32	88.99	7496.75	16.64 S	1474.63 E	1474.71	0.44
9159.00	89.75	89.05	7497.52	15.01 S	1569.62 E	1569.68	0.46
9253.00	90.80	89.38	7497.06	13.72 S	1663.60 E	1663.66	1.17
9348.00	89.69	88.76	7496.65	12.18 S	1758.59 E	1758.63	1.34
9443.00	92.54	90.30	7494.80	11.40 S	1853.56 E	1853.59	3.40
9538.00	90.12	89.67	7492.59	11.38 S	1948.52 E	1948.56	2.62

9633.00	89.13	89.80	7493.21	10.94 S	2043.52 E	2043.55	1.05
9728.00	89.26	89.94	7494.54	10.72 S	2138.51 E	2138.53	0.20
9823.00	89.57	90.32	7495.51	10.94 S	2233.50 E	2233.53	0.52
9918.00	91.36	90.82	7494.75	11.89 S	2328.49 E	2328.52	1.96
10013.00	89.51	90.79	7494.03	13.23 S	2423.47 E	2423.51	1.95
10108.00	89.32	90.68	7495.00	14.44 S	2518.46 E	2518.50	0.23
10203.00	89.69	90.66	7495.82	15.55 S	2613.45 E	2613.50	0.39
10297.00	90.00	90.86	7496.08	16.80 S	2707.44 E	2707.49	0.39
10392.00	89.63	90.41	7496.38	17.85 S	2802.44 E	2802.49	0.61
10487.00	89.57	90.30	7497.05	18.44 S	2897.43 E	2897.49	0.14
10582.00	90.18	90.10	7497.26	18.77 S	2992.43 E	2992.49	0.68
10677.00	90.80	89.68	7496.43	18.59 S	3087.43 E	3087.48	0.79
10772.00	90.68	89.27	7495.21	17.72 S	3182.41 E	3182.46	0.45
10867.00	90.06	88.58	7494.59	15.94 S	3277.39 E	3277.43	0.98
10962.00	89.32	87.85	7495.10	12.98 S	3372.35 E	3372.36	1.09
11057.00	90.00	87.47	7495.67	9.10 S	3467.26 E	3467.25	0.82
11152.00	91.30	88.66	7494.59	5.89 S	3562.20 E	3562.17	1.86
11246.00	93.41	88.69	7490.73	3.72 S	3656.09 E	3656.04	2.24
11341.00	93.27	89.25	7485.20	2.02 S	3750.91 E	3750.86	0.60
11436.00	92.72	88.71	7480.23	0.33 S	3845.77 E	3845.70	0.81
11531.00	90.06	86.98	7477.93	3.25 N	3940.66 E	3940.57	3.34
11626.00	88.51	89.55	7479.11	6.12 N	4035.60 E	4035.49	3.16
11721.00	90.37	91.35	7480.03	5.38 N	4130.58 E	4130.47	2.71
11816.00	91.05	91.29	7478.86	3.20 N	4225.55 E	4225.45	0.72
11911.00	90.25	91.49	7477.79	0.89 N	4320.52 E	4320.43	0.87
12006.00	92.22	92.51	7475.74	2.43 S	4415.43 E	4415.36	2.34
12078.00	93.52	92.36	7472.14	5.48 S	4487.27 E	4487.22	1.82
12142.00	93.52	92.36	7468.21	8.11 S	4551.10 E	4551.06	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 90.35 DEGREES (TRUE)
A TOTAL CORRECTION OF 8.42 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 12142.00 FEET
IS 4551.10 FEET ALONG 90.10 DEGREES (TRUE)**