




LWD MEMORY LOG

Gamma Ray

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<div><div>BAKER HUGHES</div></div>			<div>Gamma Ray</div>						
Scale:			Company: Noble Energy						
1:240 TVD			Well: Earp Federal LC23-735						
Depth Reference:			Field: Weld County						
Driller's Depth			County: Weld County Country: United States						
Status:			State: Colorado				Other Services:		
Final Print			Surface Location: Latitude: Longitude:				Wellbore Survey		
API No: 05123429410000									
Job ID: 8241862									
Permanent Datum (P.D.): Ground Level			Elevation: 4944.00 ft				Elev. KB: N/A		
Log Measured From: Rig Floor			Above P.D. 4974.00 ft				Elev. DF: 9918.00 ft Elev. GL: 4944.00 ft		
Dates			Interval Logged			Magnetic Field Reference			
Date From: 2016-12-23			Top: (ft) 1912.00			Azi Reference North: Grid			Dip Angle: (deg) 67.12
Date To: 2016-12-26			Bottom: (ft) 16571.00			Total Magnetic Field Strength: (nT) 52702			
Spud Date: 2016-12-23						Mag to Reference North Correction: (deg) 6.58 E			
Borehole Record									
Casing Record									
Hole Size (in)			From (ft)	To (ft)	Size (in)	Weight (lb/ft)	From (ft)	To (ft)	
13.000			30.00	1922.00	9.625	36.00	30.00	1912.00	
8.500			1922.00	16571.00					
Mud Record									
Deviation Record									
Type			From (ft)	To (ft)	Hole Size (in)	Interval (ft)	Inc Az (Start)	Inc Az (End)	
Oil Based Mud			0.00	16571.00	8.500	14649.00	0.09 19.54	90.15 184.15	
Acquisition System									
Software Version			Other						
Baker Hughes Cadence			RT4.1						
PloStudio			4.0.7570.8						
			Rig: H&P 524						
			Contractor: Helmerich & Payne Drilling Co						
			District: RMD Unit: D&E						

"These interpretations and analyses ("Interpretations") are opinions provided by Baker Hughes Oilfield Operations, Inc ("Baker Hughes"), based upon industry practice, empirical relationships, assumptions and measurements, (many of which may be provided by the customer). The Interpretations are not infallible and may be subject to different opinions. Vjwu."Dcmgt"Jwjjgu"fqgu"pqv"ycttcpv"vjgkt"ceewtce{"eqttgevpguu."qt"eqornvgpguu."qt"vjcv"vjg"ewuvqogtøu"cpflqt"cp{"vjktf"rctv{øu"tgnkcpge"qp"uwej"Kpvgtrtgv cvkqpu"yknn"cee qornkuj"cp{"rctvkewnct"tguwnvu0"Vjg"ewuvqogt"cuuwogu"hwnn" responsibility for the use of the Interpretations and for decisions based thereon and the customer agrees to release, defend and indemnify Baker Hughes, its parent, subsidiaries and affiliated or related entities, and subcontractors, together with its and their officers, directors, employees, agents and invitees against, any and all claims, losses, damages, or expenses sustained by the customer or any third party arising out of reliance upon or use of the Interpretations, without regard to the cause(s) thereof, including without limitation any form of negligence on the part of Baker Hughes. Unless other contract terms have been agreed to by the parties, each party's liabilities and qdnkicvkqpu"ujcnn"dg"iqxgtpgf"d{"Dcmgt"Jwjjgu"Kpeqtrqt cvgføu"Yqtnfykfg"Vgtou"cpf"Eqpfkvkqpu0\$""

Log Run Summary

Run No	Bit Run No.	Bit Size (in)	Bit Type	Bit Gauge Length (in)	Assembly Type	Logged Interval		Bit Depth Interval		Date / Time		Circ. Hours (h)
						Top	Bottom	From	To	Start Logging	End Logging	
						(ft)	(ft)	(ft)	(ft)			
1	1	8.500	PDC	2.00	AutoTrak Curve	1899.00	16565.00	1912.00	16571.00	2016-12-24 04:04	2016-12-27 00:45	63.69

Crew

Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite
David Browning	2016-12-22	2016-12-27	Steven Cano	2016-12-22	2016-12-27			

Mud Properties Record

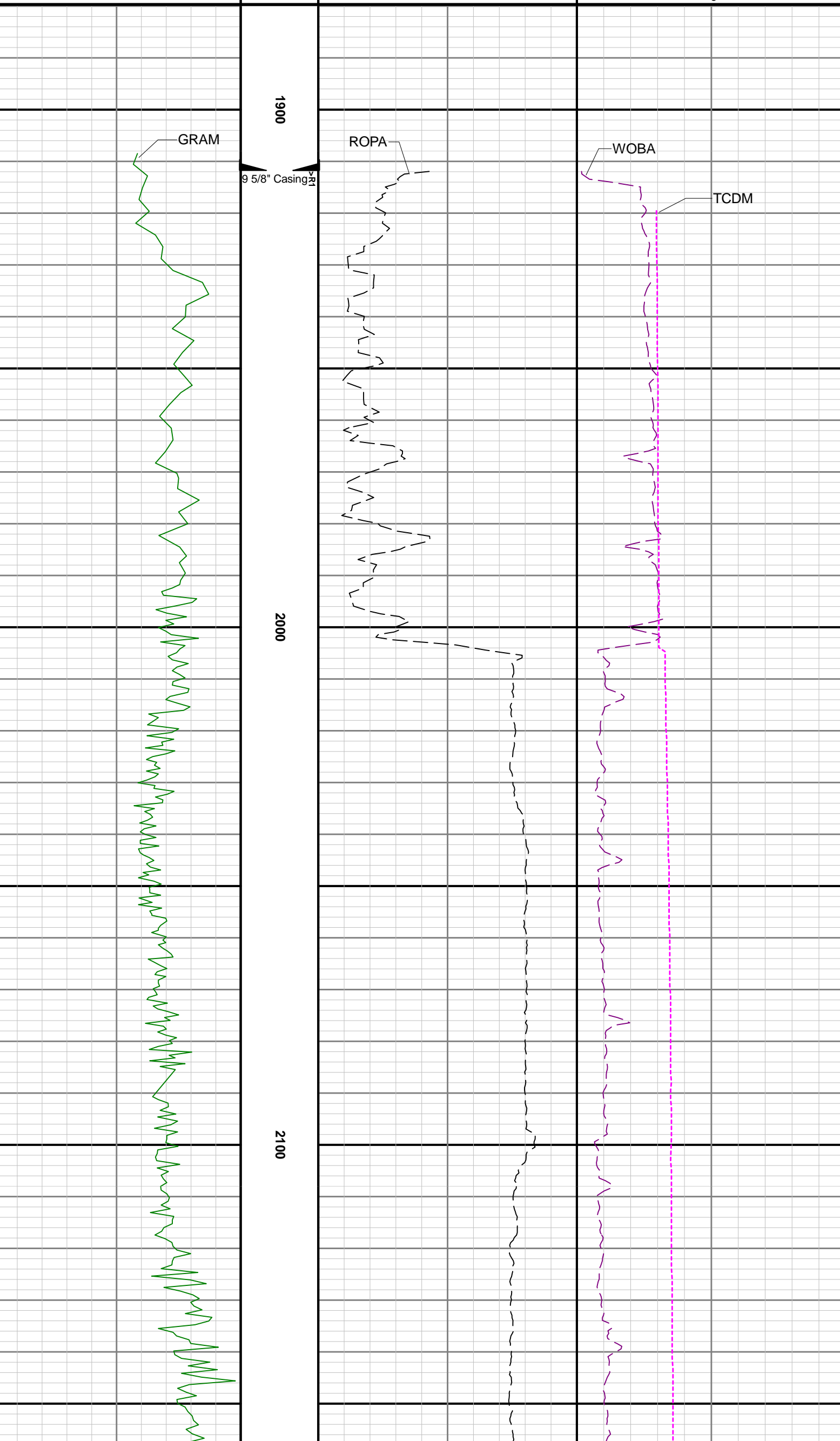
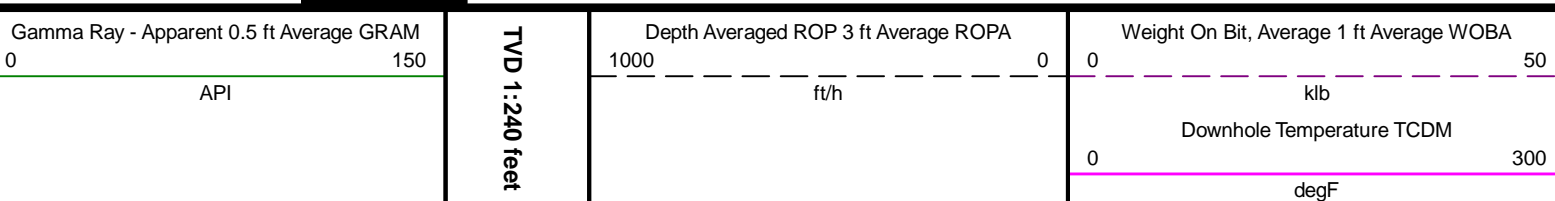
Date / Time	Run No.	Measured Depth (ft)	Mud Type	Density (ppg)	Viscosity (cP)	pH	Fluid Loss (cm3)	Oil / Water	Source	Total Chlorides (ppm)	K+ (%)
2016-12-23 21:54	1	1912.00	Oil Based Mud	8.4	7	N/A	21.5	83.8/16.2	Active Pit	11700	0.00
2016-12-24 12:28	1	3819.00	Oil Based Mud	8.6	8	N/A	18.0	77.6/22.4	Active Pit	22700	0.00
2016-12-25 12:30	1	7118.00	Oil Based Mud	9.0	8	N/A	18.1	84.7/15.3	Active Pit	24000	0.00
2016-12-26 12:32	1	14495.00	Oil Based Mud	9.2	8	N/A	20.0	86.3/13.7	Active Pit	24500	0.00

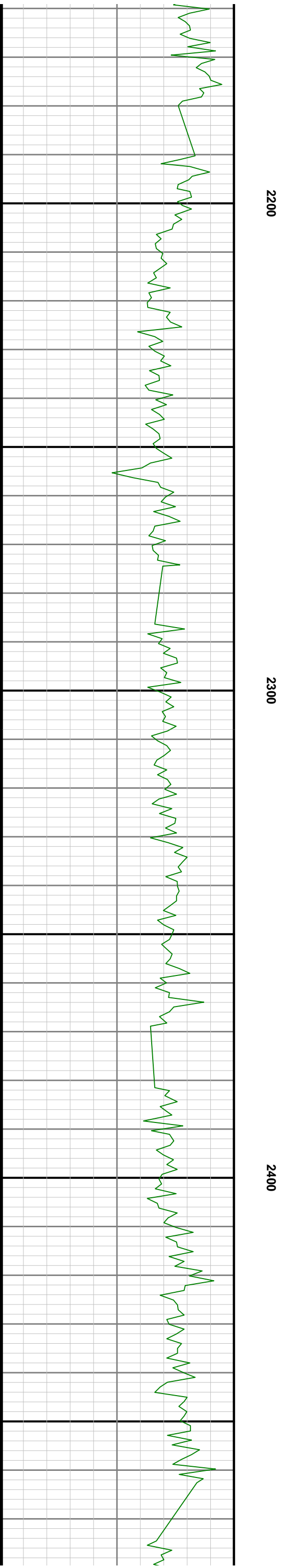
Equipment and Service Data

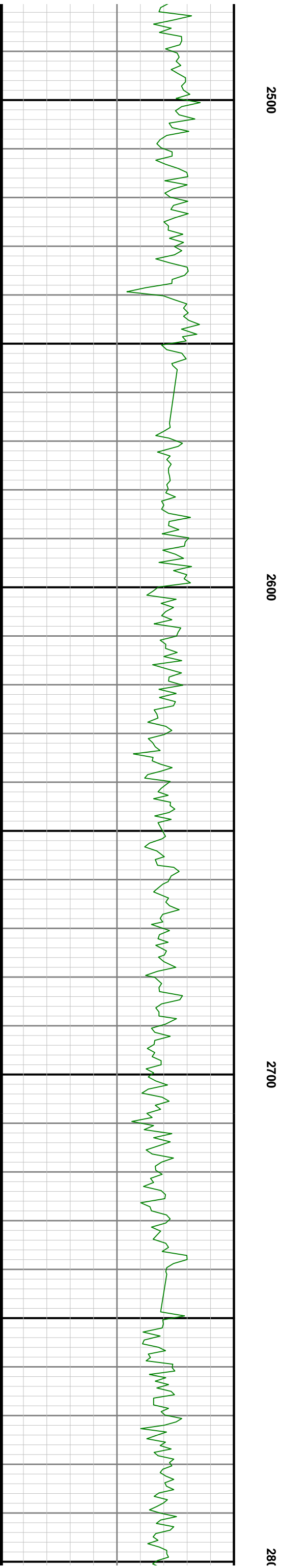
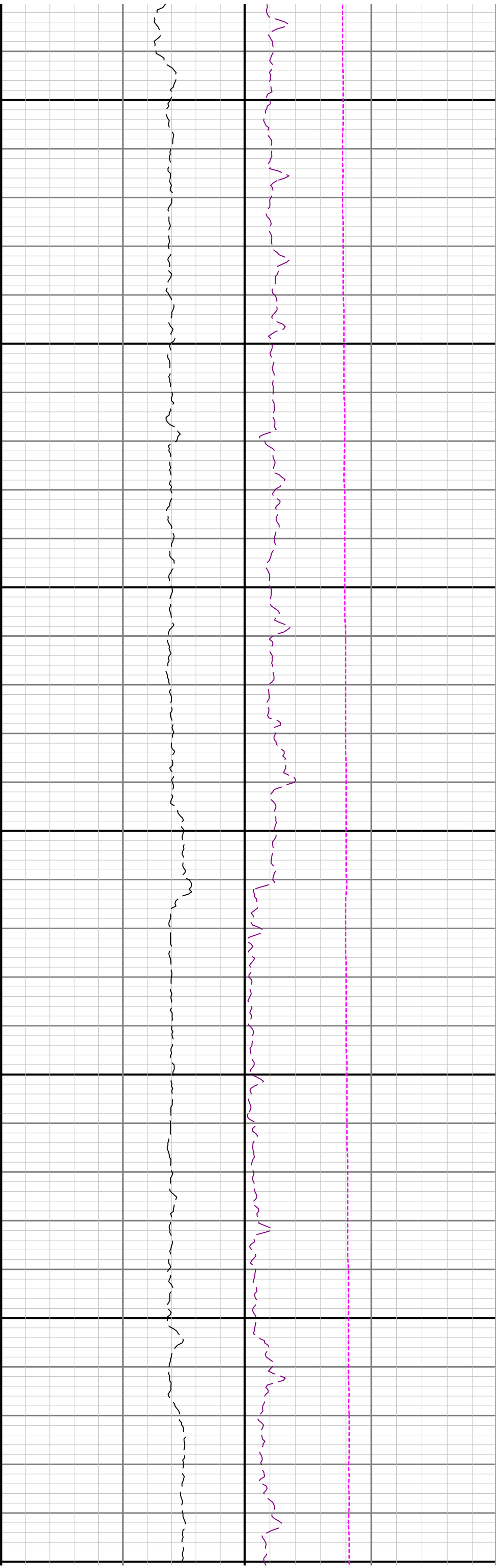
Run No.	Tool	Serial Number	Measurement	Sensor Offset (ft)	Bit Offset (ft)	Max O.D. (in)	Min I.D. (in)
1	ATC_SU	12232312	Near Bit Inclination	5.93	6.76	7.000	4.330
1	ATC_SU	12232312	Near Bit VSS	5.93	6.76	7.000	4.330
1	ATC_MWD	12168856	Gamma (single)	2.71	12.93	7.000	3.250
1	ATC_MWD	12168856	Directional (mag)	13.07	23.29	7.000	3.250

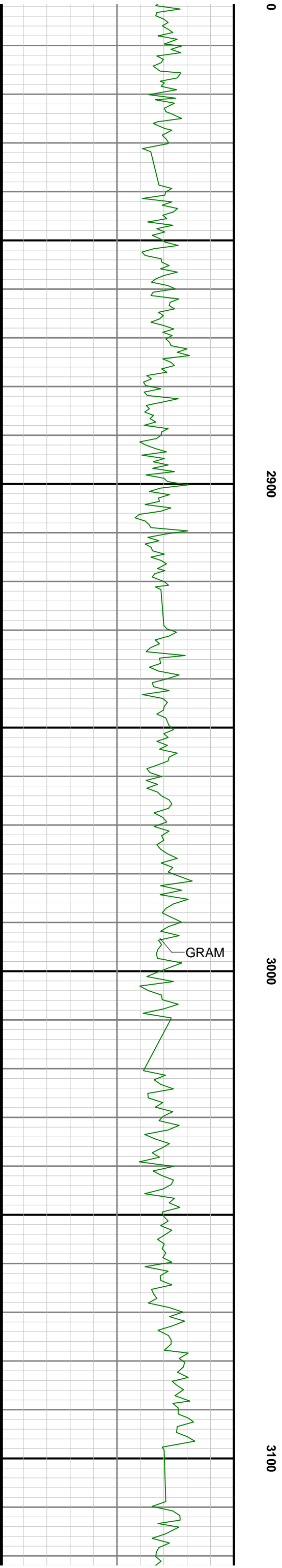
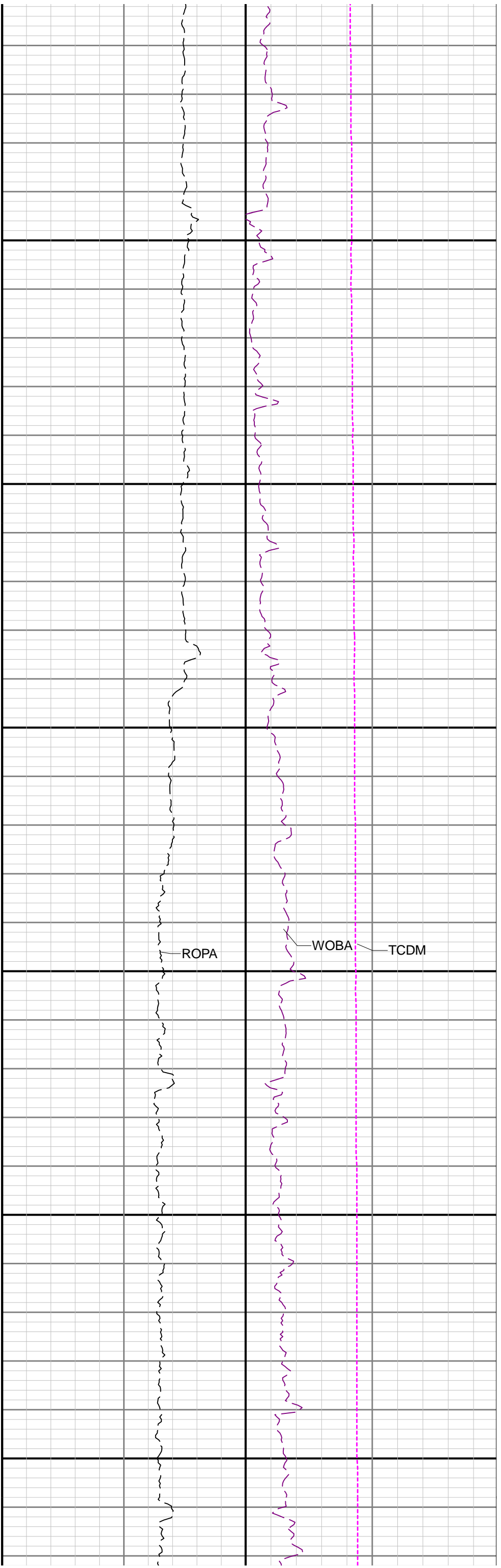
Service and Tool Mnemonics

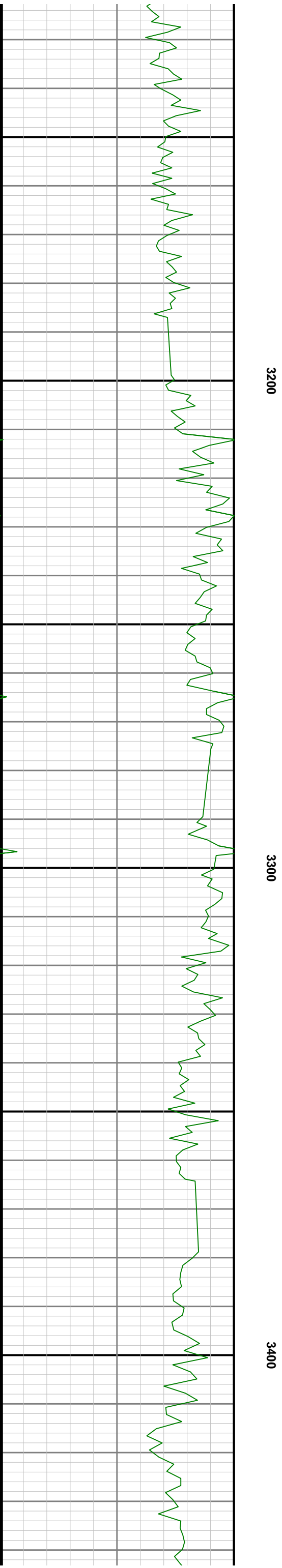
Mnemonic	Name	Description
ATC_SU	ATC_SU	Auto Trak Curve Steering Unit
ATC_MWD	ATC_MWD	Auto Trak Curve MWD
ATC_LCPM	ATC_LCPM	Auto Trak Curve LCPM

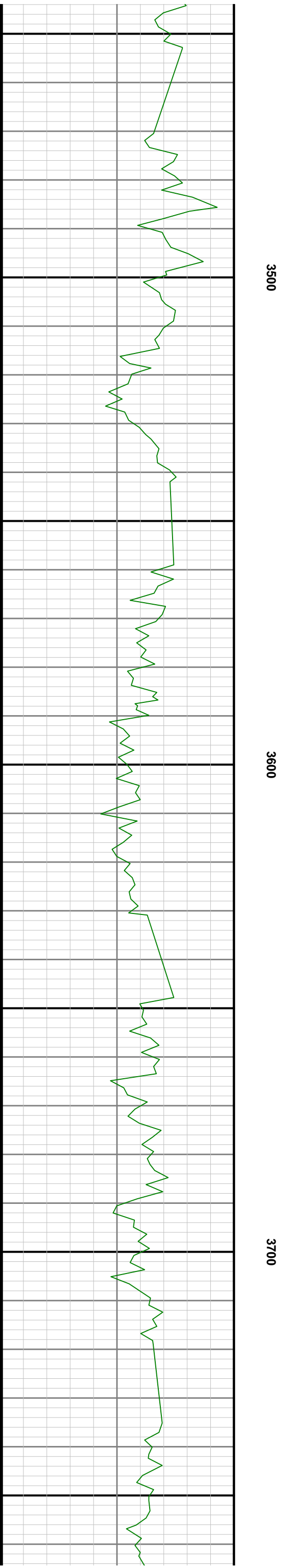
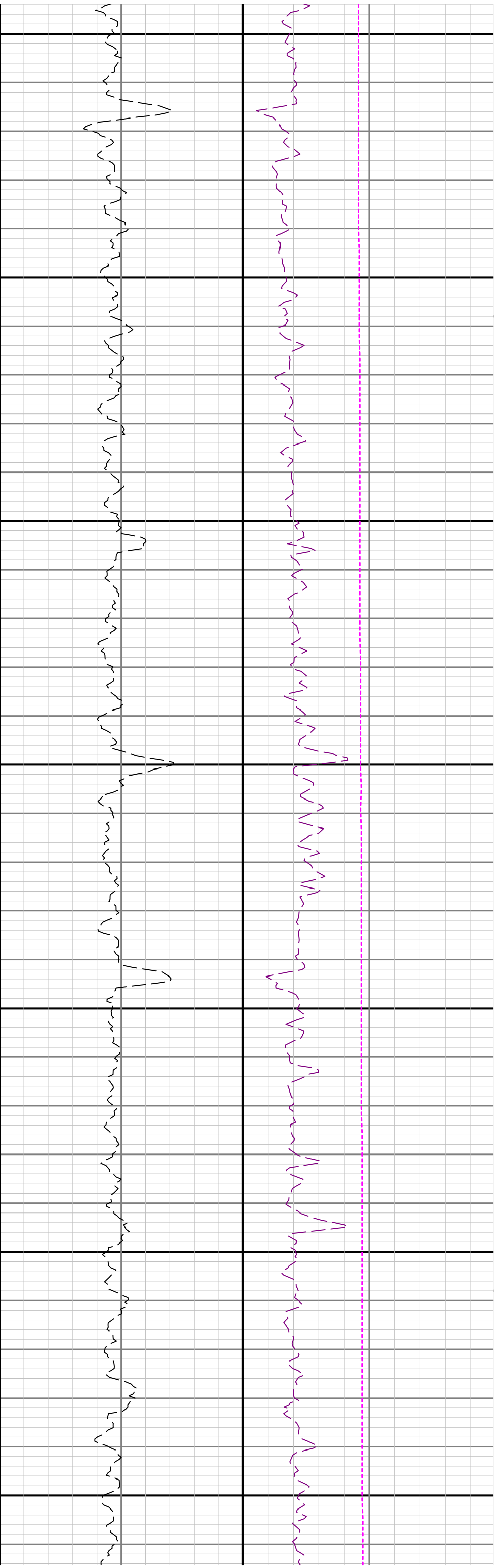


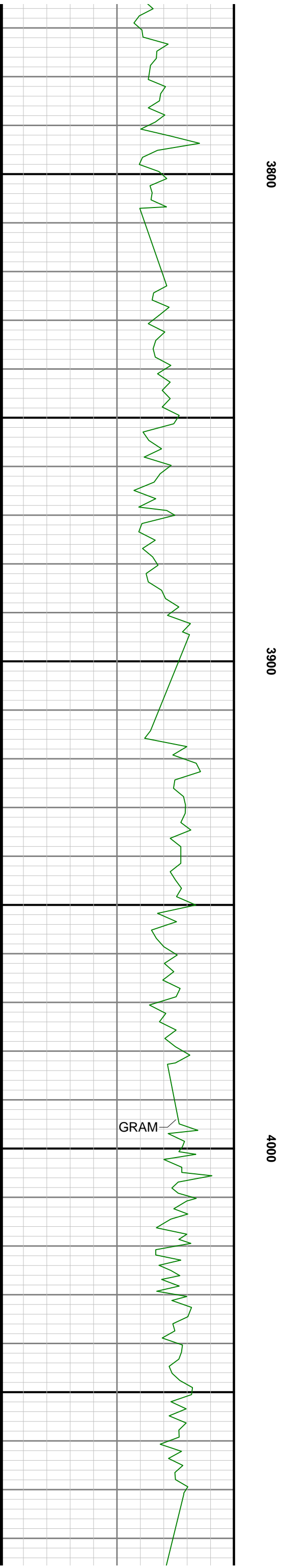
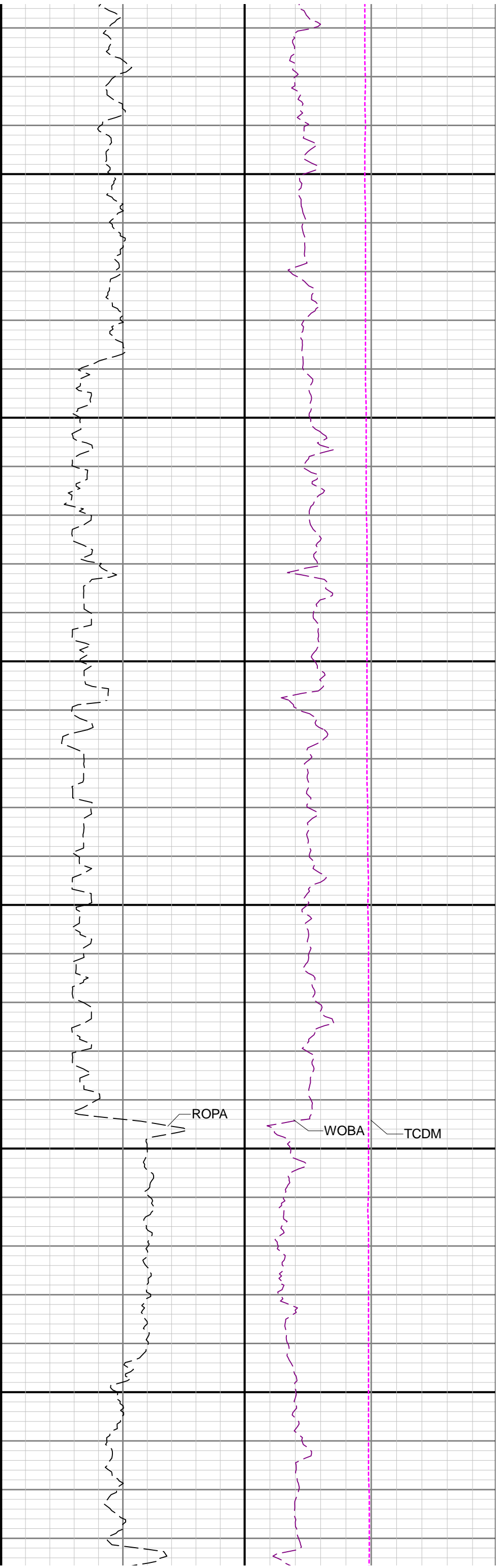


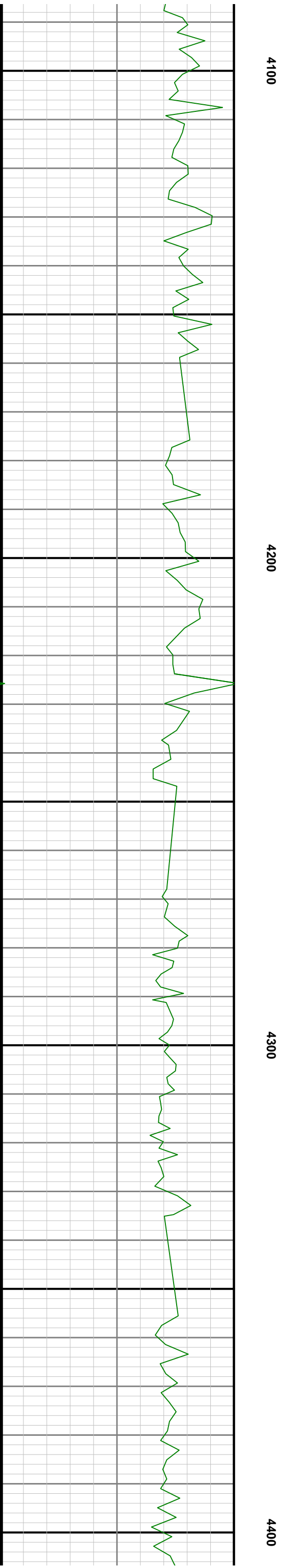
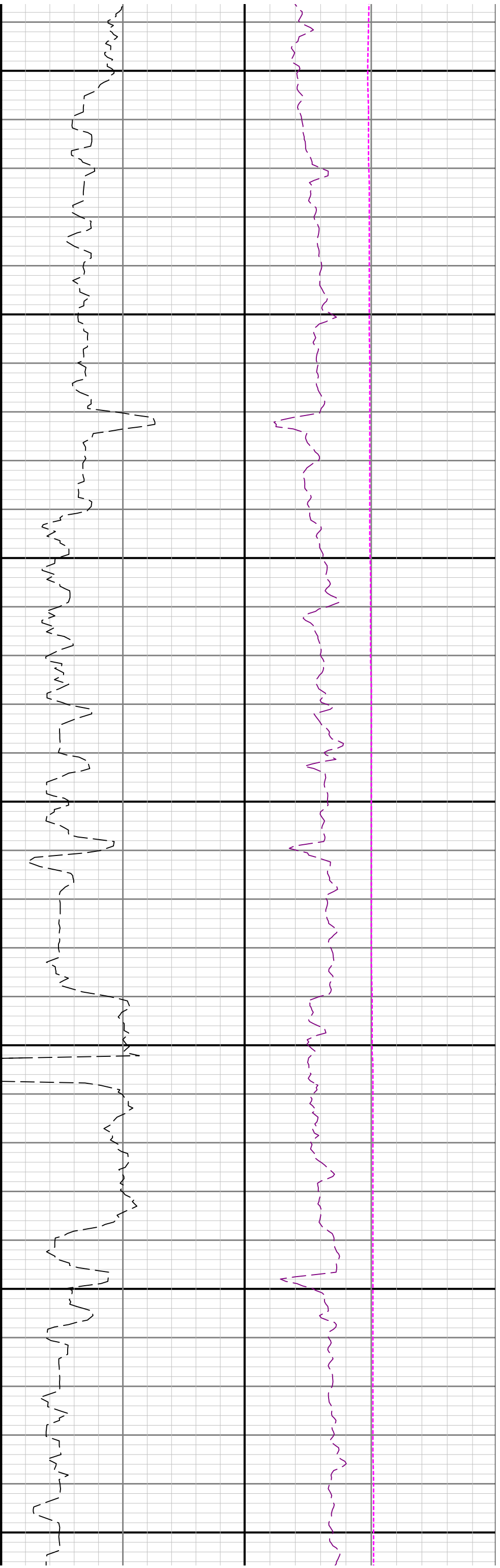


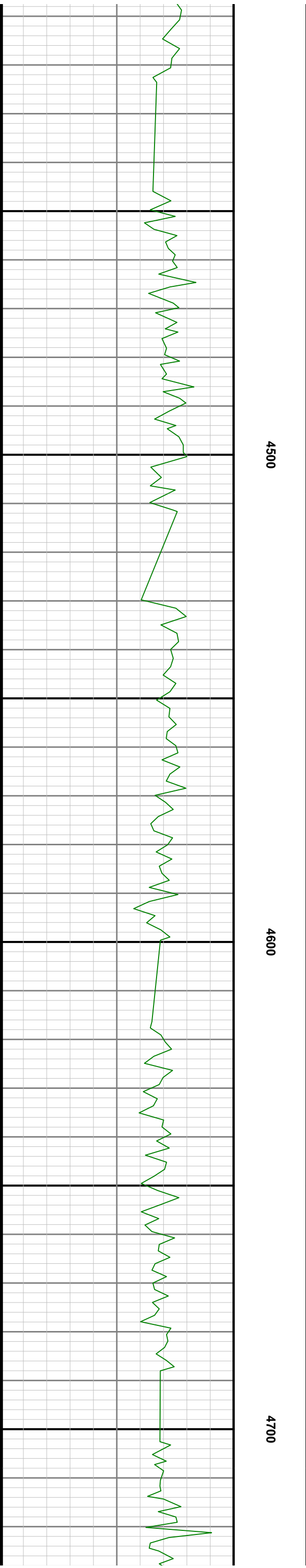
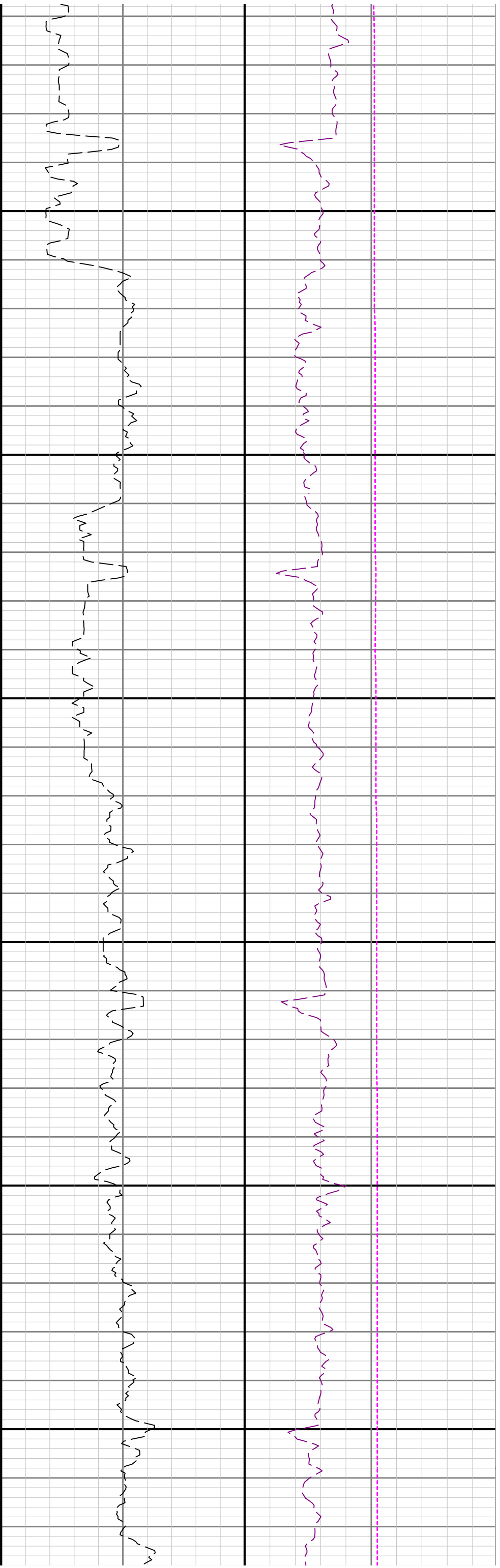


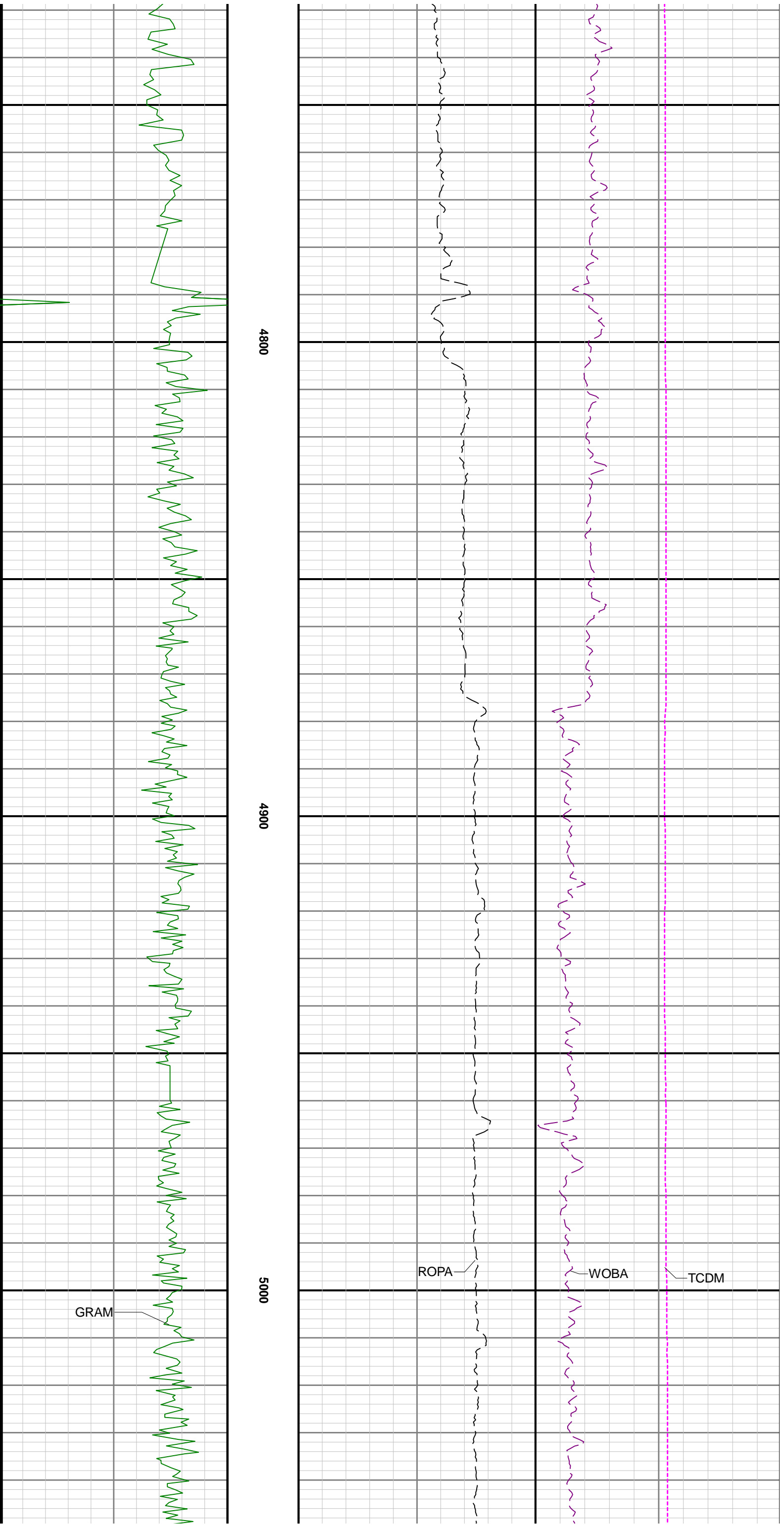


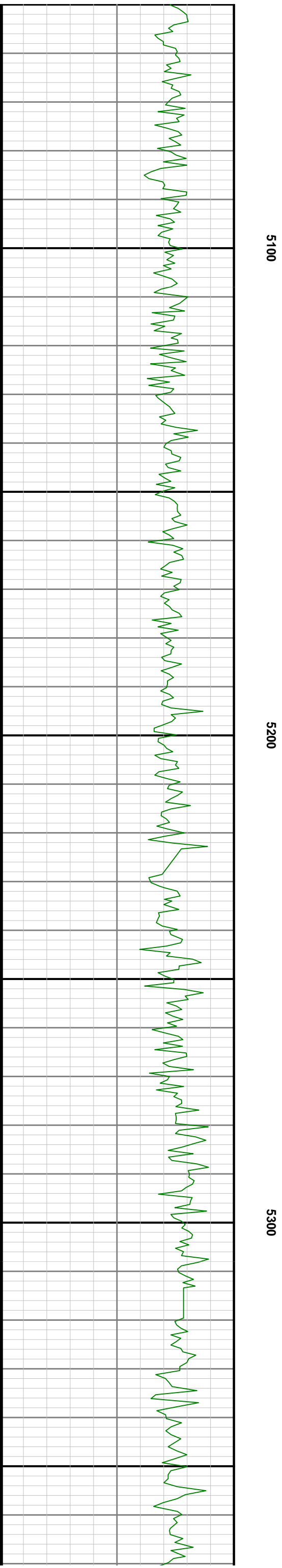
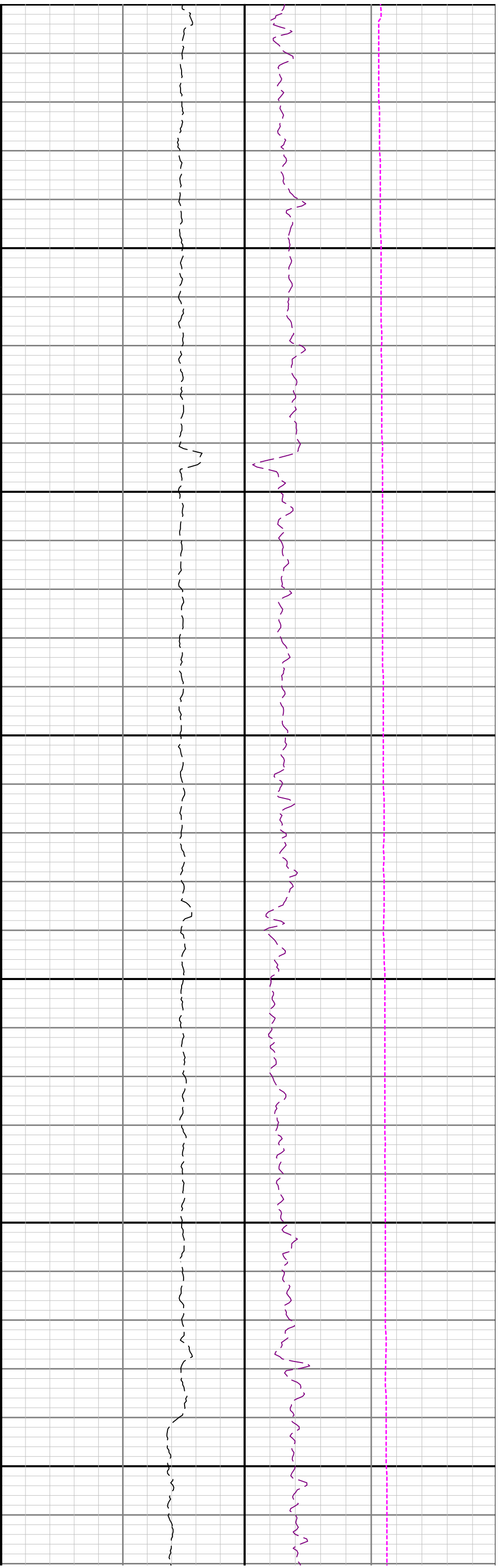










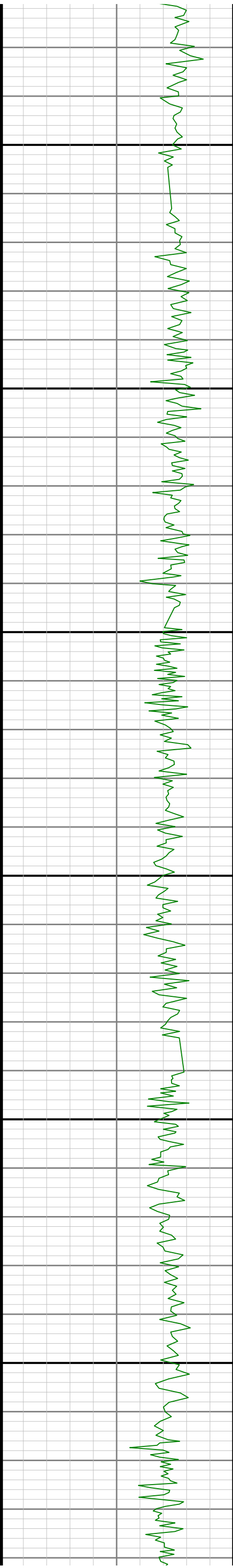


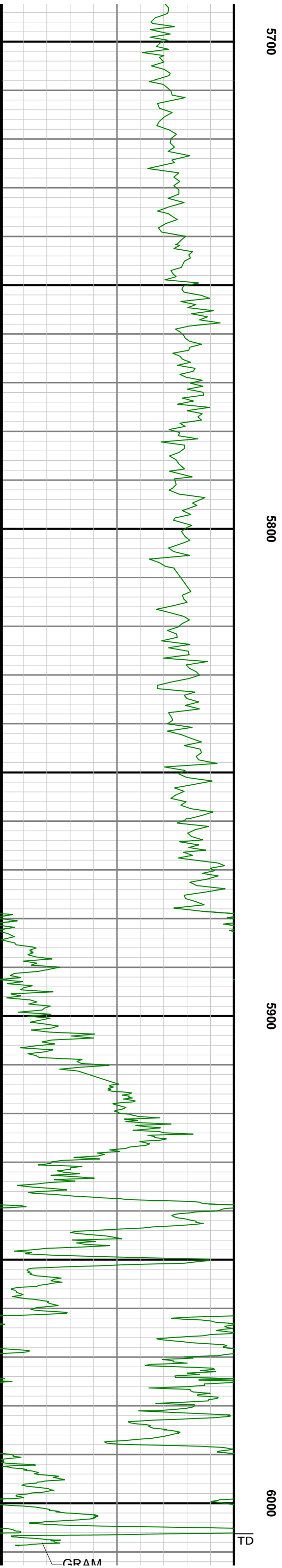
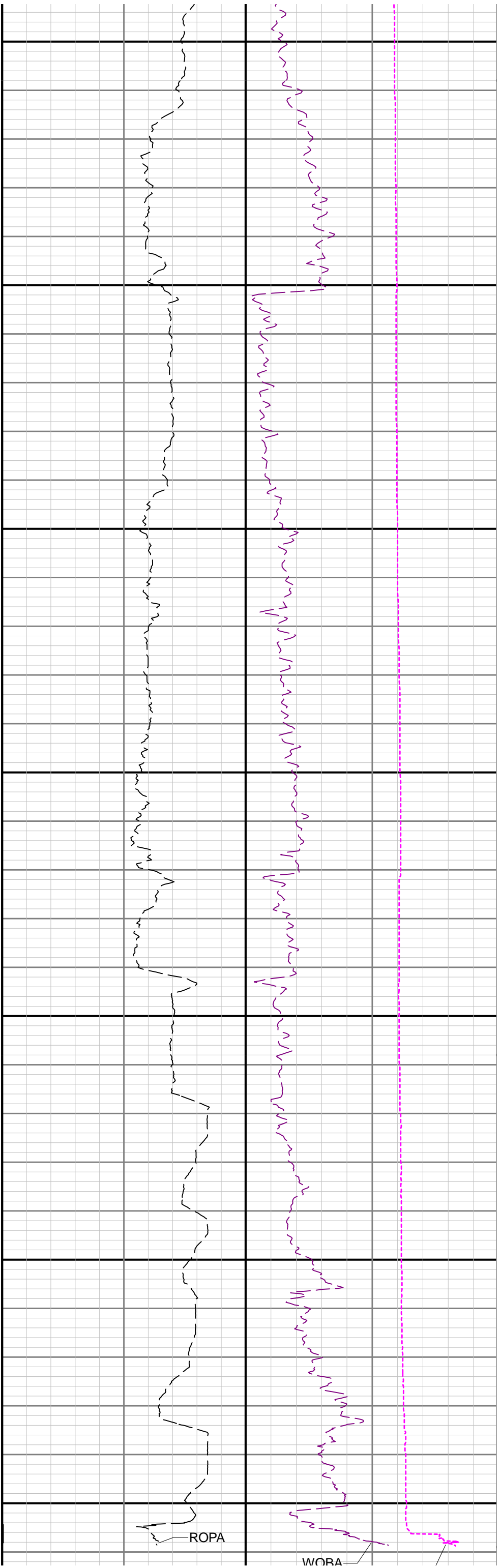


5400

5500

5600





	7377.00	90.12	173.04	N/A	-990.85	1128.26	6005.15	1127.57	95.00	1.59	0.32	1.56
	7471.00	89.94	174.86	N/A	-1084.32	1138.17	6005.10	1221.54	94.00	1.95	-0.19	1.94
	7566.00	89.91	178.35	N/A	-1179.14	1143.79	6005.23	1316.29	95.00	3.67	-0.03	3.67
	7661.00	89.85	180.25	N/A	-1274.13	1144.95	6005.43	1410.64	95.00	2.00	-0.06	2.00
	7755.00	89.88	179.42	N/A	-1368.13	1145.22	6005.65	1503.90	94.00	0.88	0.03	-0.88
	7850.00	89.78	177.39	N/A	-1463.09	1147.87	6005.93	1598.41	95.00	2.14	-0.11	-2.14
	7944.00	90.18	176.44	N/A	-1556.95	1152.93	6005.96	1692.14	94.00	1.10	0.43	-1.01
	8039.00	90.22	175.92	N/A	-1651.74	1159.26	6005.63	1786.96	95.00	0.55	0.04	-0.55
	8133.00	90.12	177.24	N/A	-1745.57	1164.86	6005.35	1880.73	94.00	1.41	-0.11	1.40
	8228.00	90.15	180.58	N/A	-1840.54	1166.67	6005.13	1975.15	95.00	3.52	0.03	3.52
	8323.00	89.88	182.99	N/A	-1935.48	1163.71	6005.10	2068.93	95.00	2.55	-0.28	2.54
	8418.00	90.00	185.57	N/A	-2030.21	1156.62	6005.20	2161.96	95.00	2.72	0.13	2.72
	8512.00	90.34	187.91	N/A	-2123.55	1145.59	6004.92	2253.11	94.00	2.52	0.36	2.49
	8607.00	90.46	186.88	N/A	-2217.76	1133.36	6004.26	2344.97	95.00	1.09	0.13	-1.08
	8701.00	90.31	185.61	N/A	-2311.20	1123.14	6003.63	2436.32	94.00	1.36	-0.16	-1.35
	8796.00	90.28	184.57	N/A	-2405.82	1114.71	6003.14	2529.07	95.00	1.10	-0.03	-1.09
	8890.00	90.46	181.25	N/A	-2499.68	1109.94	6002.53	2621.55	94.00	3.54	0.19	-3.53
	8985.00	90.37	178.23	N/A	-2594.67	1110.37	6001.85	2715.80	95.00	3.18	-0.09	-3.18
	9079.00	90.31	174.13	N/A	-2688.44	1116.63	6001.29	2809.60	94.00	4.36	-0.06	-4.36
	9174.00	90.18	173.82	N/A	-2782.91	1126.60	6000.88	2904.57	95.00	0.35	-0.14	-0.33
	9269.00	89.72	176.14	N/A	-2877.54	1134.91	6000.96	2999.48	95.00	2.49	-0.48	2.44
	9363.00	89.69	181.22	N/A	-2971.48	1137.08	6001.45	3092.93	94.00	5.40	-0.03	5.40
	9458.00	89.82	182.43	N/A	-3066.43	1134.05	6001.85	3186.70	95.00	1.28	0.14	1.27
	9553.00	89.78	181.10	N/A	-3161.39	1131.13	6002.19	3280.49	95.00	1.40	-0.04	-1.40
	9648.00	89.94	181.17	N/A	-3256.37	1129.25	6002.42	3374.44	95.00	0.18	0.17	0.07
	9742.00	89.75	181.01	N/A	-3350.35	1127.46	6002.67	3467.42	94.00	0.26	-0.20	-0.17
	9837.00	89.75	178.99	N/A	-3445.34	1127.46	6003.09	3561.62	95.00	2.13	0.00	-2.13
	9932.00	89.85	179.96	N/A	-3540.34	1128.33	6003.42	3655.94	95.00	1.03	0.11	1.02
	10027.00	89.78	176.06	N/A	-3635.26	1131.63	6003.73	3750.50	95.00	4.11	-0.07	-4.11
	10121.00	89.91	173.28	N/A	-3728.85	1140.36	6003.98	3844.44	94.00	2.96	0.14	-2.96
	10216.00	90.22	174.10	N/A	-3823.27	1150.80	6003.87	3939.42	95.00	0.92	0.33	0.86
	10311.00	89.88	173.93	N/A	-3917.75	1160.70	6003.79	4034.39	95.00	0.40	-0.36	-0.18
	10405.00	89.78	173.88	N/A	-4011.22	1170.69	6004.07	4128.37	94.00	0.12	-0.11	-0.05
	10500.00	89.75	176.40	N/A	-4105.87	1178.73	6004.46	4223.26	95.00	2.65	-0.03	2.65
	10595.00	89.69	176.88	N/A	-4200.71	1184.30	6004.92	4318.03	95.00	0.51	-0.06	0.51
	10689.00	89.51	175.07	N/A	-4294.47	1190.90	6005.58	4411.86	94.00	1.93	-0.19	-1.93
	10784.00	89.69	174.72	N/A	-4389.09	1199.35	6006.24	4506.78	95.00	0.41	0.19	-0.37
	10878.00	89.78	176.94	N/A	-4482.83	1206.19	6006.68	4600.63	94.00	2.36	0.10	2.36
	10973.00	89.82	178.82	N/A	-4577.76	1209.70	6007.01	4695.23	95.00	1.98	0.04	1.98
	11067.00	89.94	179.83	N/A	-4671.75	1210.81	6007.20	4788.58	94.00	1.08	0.13	1.07
	11162.00	89.97	179.93	N/A	-4766.75	1211.01	6007.28	4882.82	95.00	0.11	0.03	0.11
	11256.00	89.88	180.50	N/A	-4860.75	1210.65	6007.40	4975.99	94.00	0.61	-0.10	0.61
	11351.00	89.78	181.05	N/A	-4955.74	1209.37	6007.68	5070.03	95.00	0.59	-0.11	0.58
	11445.00	90.09	181.29	N/A	-5049.72	1207.45	6007.79	5162.99	94.00	0.42	0.33	0.26
	11539.00	90.12	181.65	N/A	-5143.69	1205.04	6007.62	5255.87	94.00	0.38	0.03	0.38
	11635.00	90.12	180.24	N/A	-5239.68	1203.45	6007.42	5350.85	96.00	1.47	0.00	-1.47
	11728.00	90.18	177.93	N/A	-5332.66	1204.94	6007.17	5443.26	93.00	2.48	0.06	-2.48
	11822.00	90.22	177.21	N/A	-5426.57	1208.93	6006.85	5536.90	94.00	0.77	0.04	-0.77
	11916.00	90.25	180.30	N/A	-5520.54	1210.97	6006.46	5630.35	94.00	3.29	0.03	3.29
	12011.00	90.00	182.06	N/A	-5615.51	1209.01	6006.25	5724.29	95.00	1.87	-0.26	1.85
	12105.00	89.97	180.16	N/A	-5709.49	1207.19	6006.28	5817.26	94.00	2.02	-0.03	-2.02
	12200.00	89.97	177.83	N/A	-5804.47	1208.86	6006.33	5911.66	95.00	2.45	0.00	-2.45
	12295.00	89.91	177.27	N/A	-5899.38	1212.92	6006.43	6006.31	95.00	0.59	-0.06	-0.59
	12390.00	89.94	175.98	N/A	-5994.22	1218.51	6006.55	6101.08	95.00	1.36	0.03	-1.36
	12485.00	90.03	178.91	N/A	-6089.11	1222.74	6006.58	6195.73	95.00	3.09	0.09	3.08
	12579.00	89.94	188.22	N/A	-6182.83	1216.91	6006.60	6287.92	94.00	9.90	-0.10	9.90
	12674.00	89.72	184.32	N/A	-6277.24	1206.53	6006.88	6380.22	95.00	4.11	-0.23	-4.11
	12769.00	90.00	176.14	N/A	-6372.16	1206.15	6007.12	6474.30	95.00	8.62	0.29	-8.61
	12863.00	89.94	178.04	N/A	-6466.03	1210.92	6007.16	6568.01	94.00	2.02	-0.06	2.02
	12958.00	90.18	176.66	N/A	-6560.93	1215.32	6007.07	6662.68	95.00	1.47	0.25	-1.45
	13053.00	90.03	175.64	N/A	-6655.71	1221.69	6006.89	6757.50	95.00	1.09	-0.16	-1.07
	13147.00	89.94	177.28	N/A	-6749.53	1227.50	6006.92	6851.29	94.00	1.75	-0.10	1.74
	13242.00	89.94	179.93	N/A	-6844.49	1229.81	6007.02	6945.76	95.00	2.79	0.00	2.79
	13337.00	89.88	179.71	N/A	-6939.49	1230.11	6007.16	7040.01	95.00	0.24	-0.06	-0.23
	13431.00	89.88	178.98	N/A	-7033.49	1231.18	6007.36	7133.37	94.00	0.78	0.00	-0.78
	13526.00	89.85	179.41	N/A	-7128.48	1232.52	6007.59	7227.74	95.00	0.45	-0.03	0.45
	13621.00	90.00	179.29	N/A	-7223.47	1233.60	6007.71	7322.09	95.00	0.20	0.16	-0.13
	13715.00	89.97	180.27	N/A	-7317.47	1233.96	6007.73	7415.35	94.00	1.04	-0.03	1.04
	13809.00	90.09	179.26	N/A	-7411.47	1234.34	6007.68	7508.62	94.00	1.08	0.13	-1.07
	13904.00	89.85	179.57	N/A	-7506.46	1235.31	6007.73	7602.95	95.00	0.41	-0.25	0.33
	13998.00	90.03	180.00	N/A	-7600.46	1235.67	6007.83	7696.22	94.00	0.50	0.19	0.46
	14092.00	89.94	177.93	N/A	-7694.44	1237.36	6007.86	7789.64	94.00	2.20	-0.10	-2.20
	14187.00	89.91	175.55	N/A	-7789.28	1242.77	6007.98	7884.39	95.00	2.51	-0.03	-2.51
	14281.00	90.15	174.62	N/A	-7882.93	1250.82	6007.93	7978.30	94.00	1.02	0.26	-0.99
	14376.00	89.97	173.77	N/A	-7977.44	1260.43	6007.83	8073.26	95.00	0.91	-0.19	-0.89
	14470.00	89.78	174.09	N/A	-8070.92	1270.37	6008.04	8167.24	94.00	0.40	-0.20	0.34
	14565.00	89.91	174.99	N/A	-8165.48	1279.41	6008.30	8262.18	95.00	0.96	0.14	0.95
	14659.00	90.03	176.48	N/A	-8259.22	1286.40	6008.34	8356.04	94.00	1.59	0.13	1.59
	14754.00	89.85	177.11	N/A	-8354.07	1291.71	6008.44	8450.79	95.00	0.69	-0.19	0.66
	14848.00	89.88	177.60	N/A	-8447.97	1296.05	6008.67	8544.46	94.00	0.52	0.03	0.52
	14943.00	90.03	179.03	N/A	-8542.93	1298.84	6008.74	8638.99	95.00	1.51	0.16	1.51
	15037.00	90.09	178.52	N/A	-8636.91	1300.85	6008.64	8732.45	94.00	0.55	0.06	-0.54
	15132.00	90.18	177.50	N/A	-8731.85	1304.15	6008.42	8827.03	95.00	1.08	0.09	-1.07
	15227.00	90.06	176.26	N/A	-8826.70	1309.32	6008.22	8921.77	95.00	1.31	-0.13	-1.31
	15322.00	90.25	176.68	N/A	-8921.52	1315.17	6007.96	9016.55	95.00	0.49	0.20	0.44
	15416.00	90.12	177.31	N/A	-9015.39	1320.10	6007.66	9110.28	94.00	0.68	-0.14	0.67
	15511.00	90.15	179.27	N/A	-9110.35	1322.93	6007.43	9204.81	95.00	2.06	0.03	2.06
	15605.00	90.06	181.54	N/A	-9204.34	1322.27	6007.26	9297.93	94.00	2.42	-0.10	2.41
	15700.00	90.09	181.73	N/A	-9299.30	1319.55	6007.14	9391.76	95.00	0.20	0.03	0.20
	15794.00	90.15	182.61	N/A	-9393.23	1316.00	6006.94	9484.46	94.00	0.94	0.06	0.94
	15889.00	90.18	182.88	N/A	-9488.12	1311.45	6006.67	9577.98	95.00	0.29	0.03	0.28
	15983.00	90.06	181.71	N/A	-9582.04	1307.68	6006.47	9670.64	94.00	1.25	-0.13	-1.24
	16078.00	90.34	177.78	N/A	-9677.02	1308.10	6006.14	9764.88	95.00	4.15	0.29	-4.14
	16172.00											