



Gamma Ray

Scale:

Company: Noble Energy

1:1200 TVD

Well: Minutemen Federal LC21-625

Depth Reference:

Field: Weld County

Driller's Depth

County: Weld Country: United States

State: Colorado

Status:

Final Print

Surface Location:

Latitude:

Longitude:

Other Services:

API No: 0512342788

Job ID: 8597135

SEC: 22

TWN: 9N

RGE: 59W

Permanent Datum (P.D.):

Ground Level

Elevation:

Above P.D.

4877.00 ft

30.00 ft

Elev. KB:

4907.00 ft

Elev. DF:

4877.00 ft

Log Measured From:

Rig Floor

Dates

Interval Logged

Magnetic Field Reference

Date From:

2017-08-04

Top: (ft)

1940.00

Azi Reference North:

Grid

Dip Angle: (deg)

67.06

Date To:

2017-08-05

Bottom: (ft)

11071.00

Total Magnetic Field Strength: (nT)

52586

Spud Date:

2017-08-03

Mag to Reference North Correction: (deg)

6.74 E

Borehole Record

Casing Record

Hole Size (in)

From (ft)

To (ft)

11083.00

Size (in)

9.625

Weight (lb/ft)

36.00

From (ft)

30.00

To (ft)

1930.00

8.500

1940.00

11083.00

9.625

36.00

30.00

1930.00

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Well: Minutemen Federal LC21-625

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1930.00

	vveilsite	vveilsite		vveilsite	vveilsite		vveilsite	vveilsite
Marshall Easlick	2017-08-03	2017-08-06	Steven Cano	2017-08-03	2017-08-06			

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+ (%)
2017-08-04 14:02	1	1943.00	Oil Based Mud	9.2	9	N/A	N/A	85.2/14.8	Active Pit	25000	0.00
2017-08-05 06:25	1	8000.00	Oil Based Mud	9.3	9	N/A	N/A	83.2/16.8	Active Pit	23000	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	14236901	Near Bit Inclination	5.93	6.76	7.000	4.330
1	ATC_SU	14236901	Near Bit VSS	5.93	6.76	7.000	4.330
1	ATC_MWD	14179564	Gamma (single)	2.22	12.40	7.000	3.250
1	ATC_MWD	14179564	Directional (mag)	12.27	22.45	7.000	3.250

Service and Tool Mnemonics

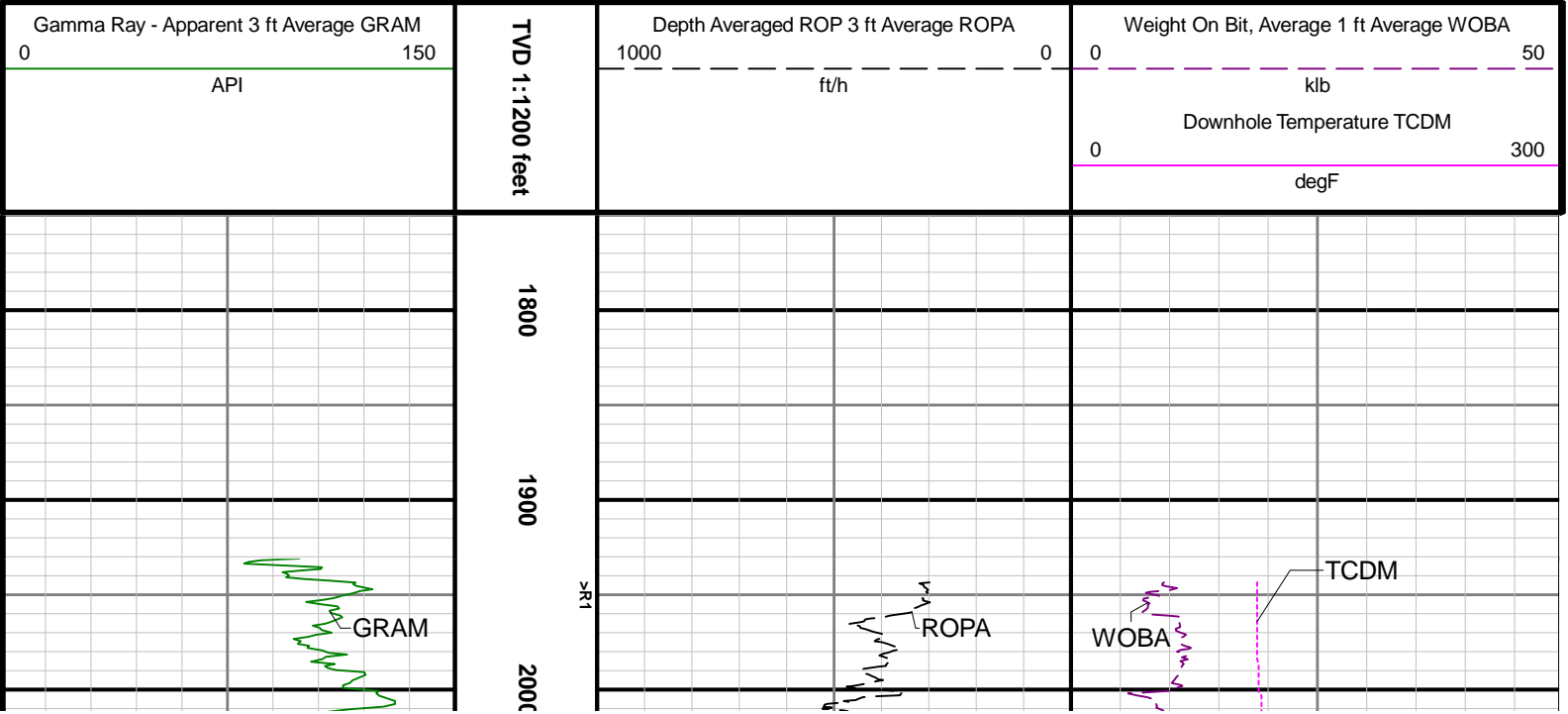
Mnemonic	Name	Description
ATC_SU	ATC_SU	Auto Trak Curve Steering Unit
ATC_MWD	ATC_MWD	Auto Trak Curve MWD
ATC_LCPM	ATC_LCPM	Auto Trak Curve LCPM

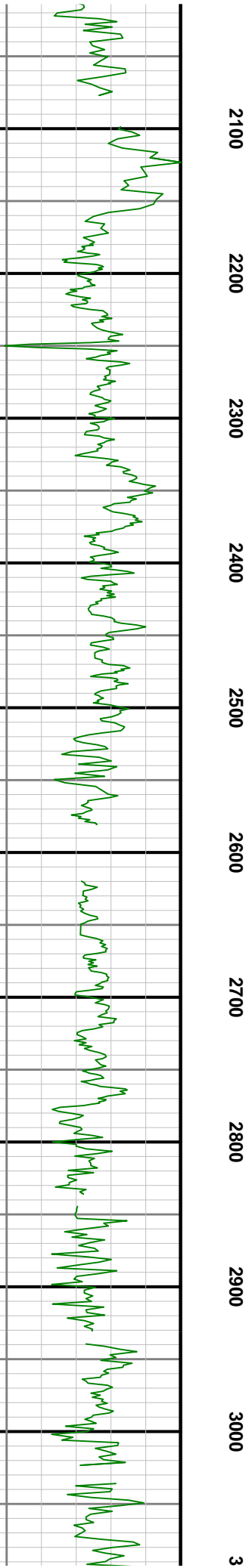
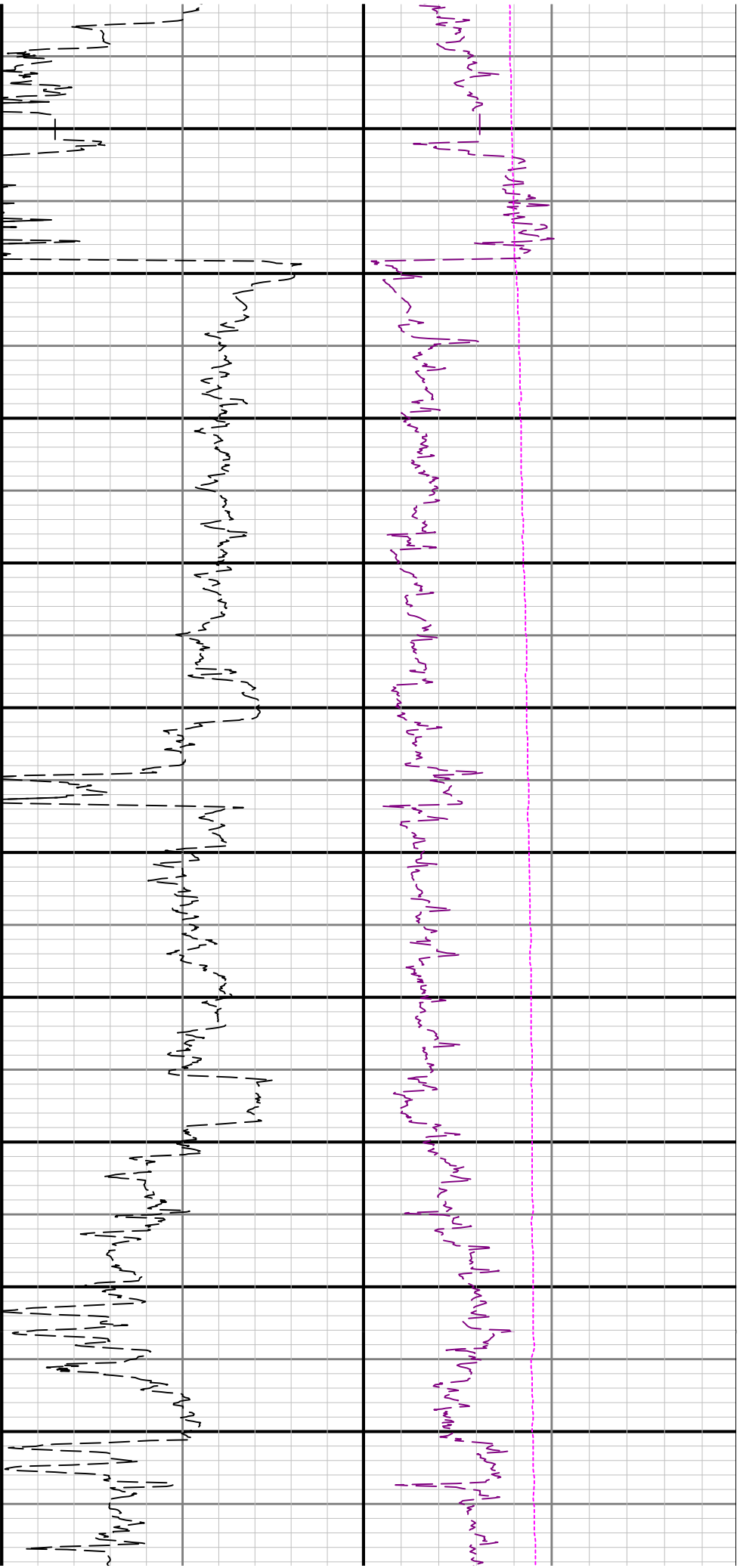
Comments

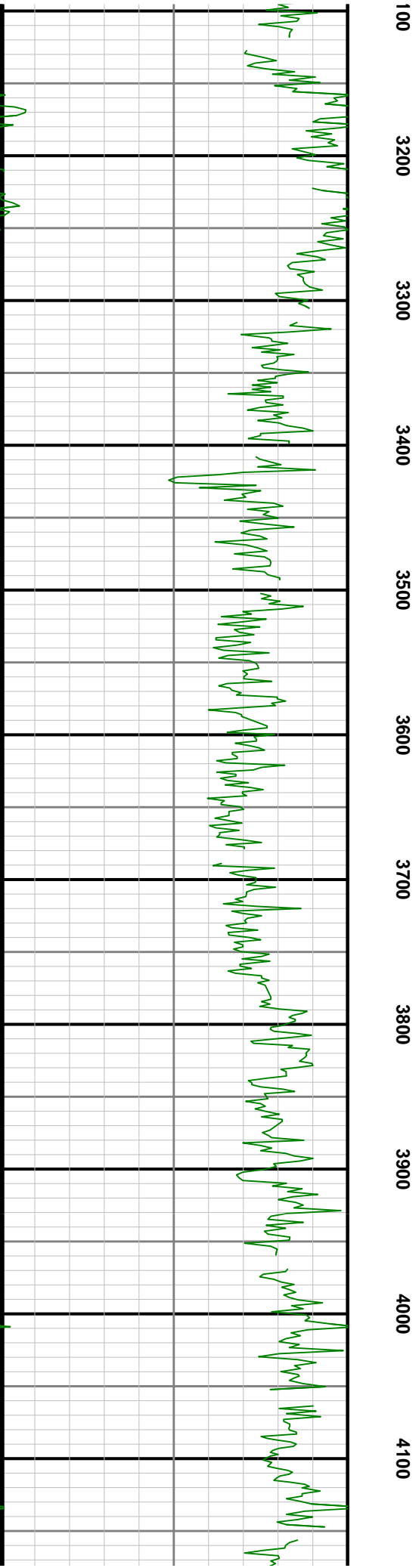
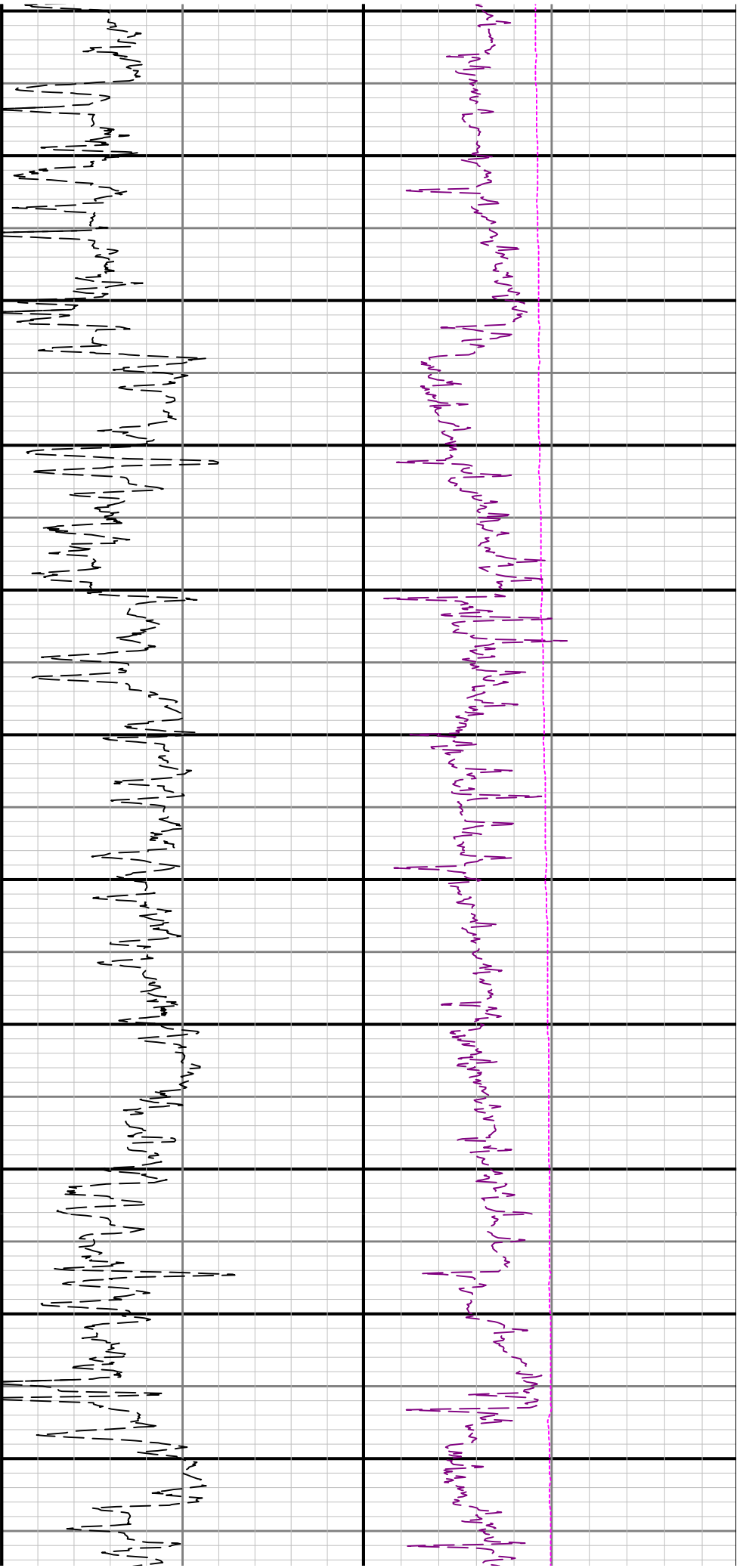
- 1 Depth measurements obtained from a depth control system not supplied or operated by Baker Hughes. Due to lack of control by Baker Hughes logging engineers, depth calibrations and measurements could not be independently verified.
- 2 Baker Hughes LWD run 1 utilized a 6 3/4 inch Navigamma service (Gamma Ray and Directional) behind a 8 1/2 inch bit and rotary steerable from 1940 to 11083 feet MD (1939 to 6085 feet TVD).

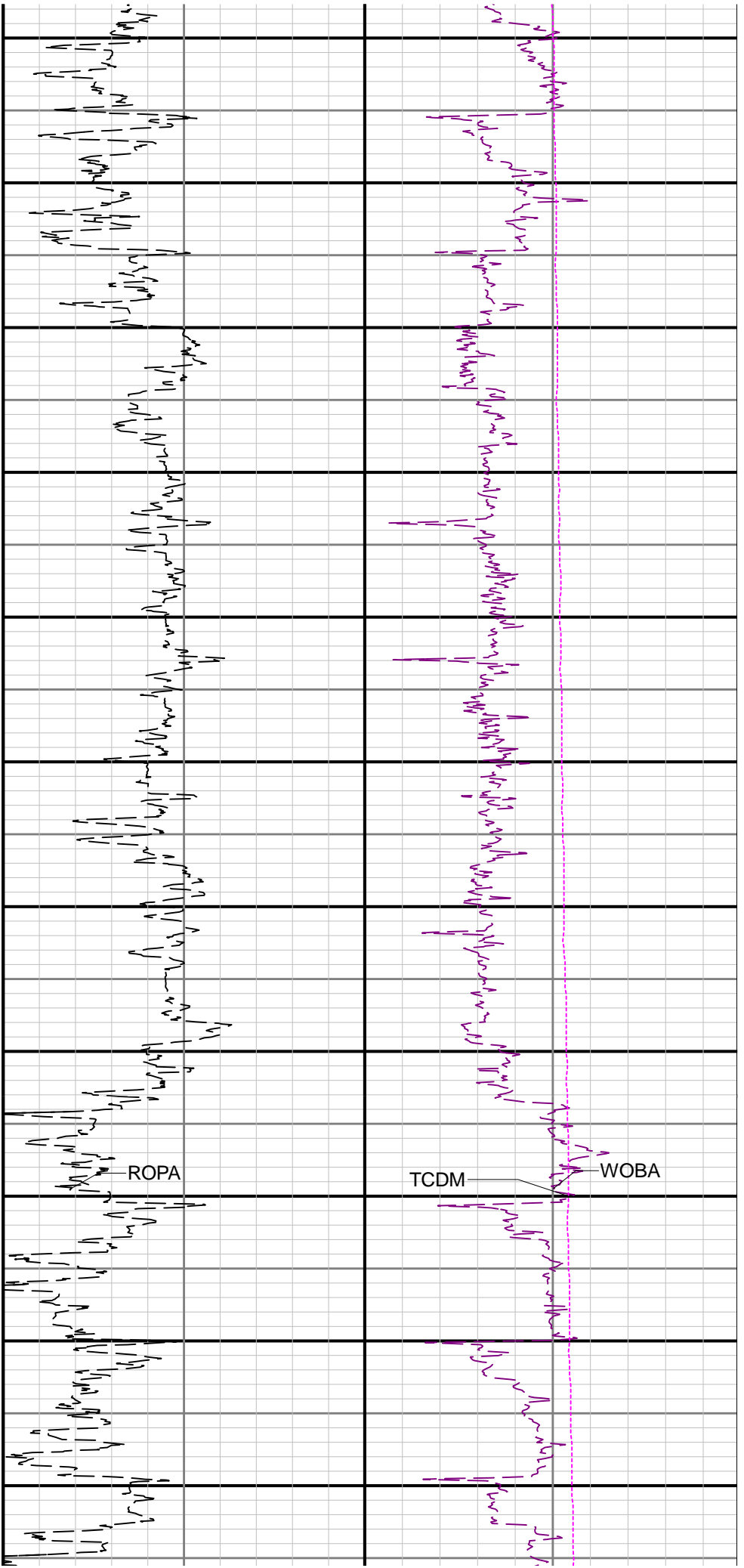
Remarks

Number	Measured Depth (ft)	Hole Section (in)	Run No.	Remark
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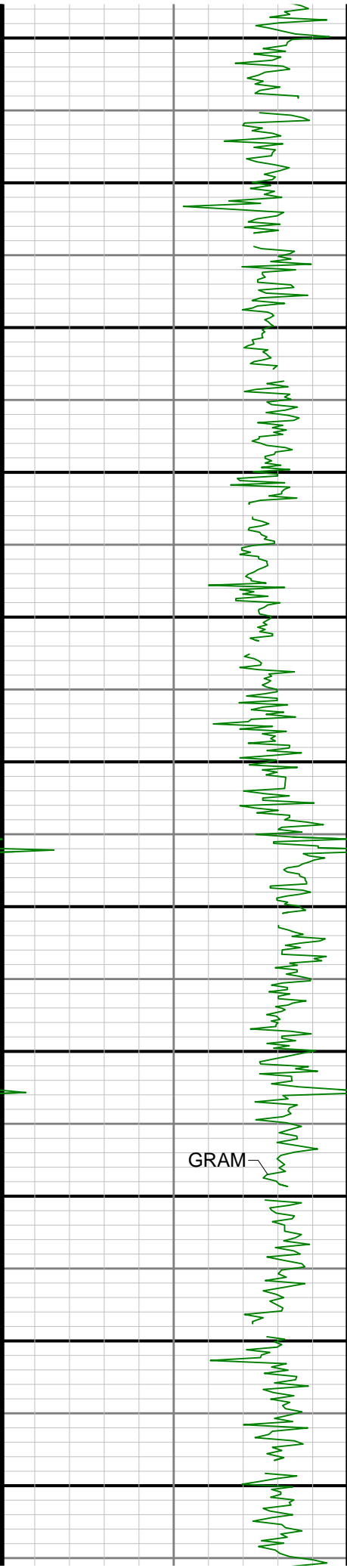


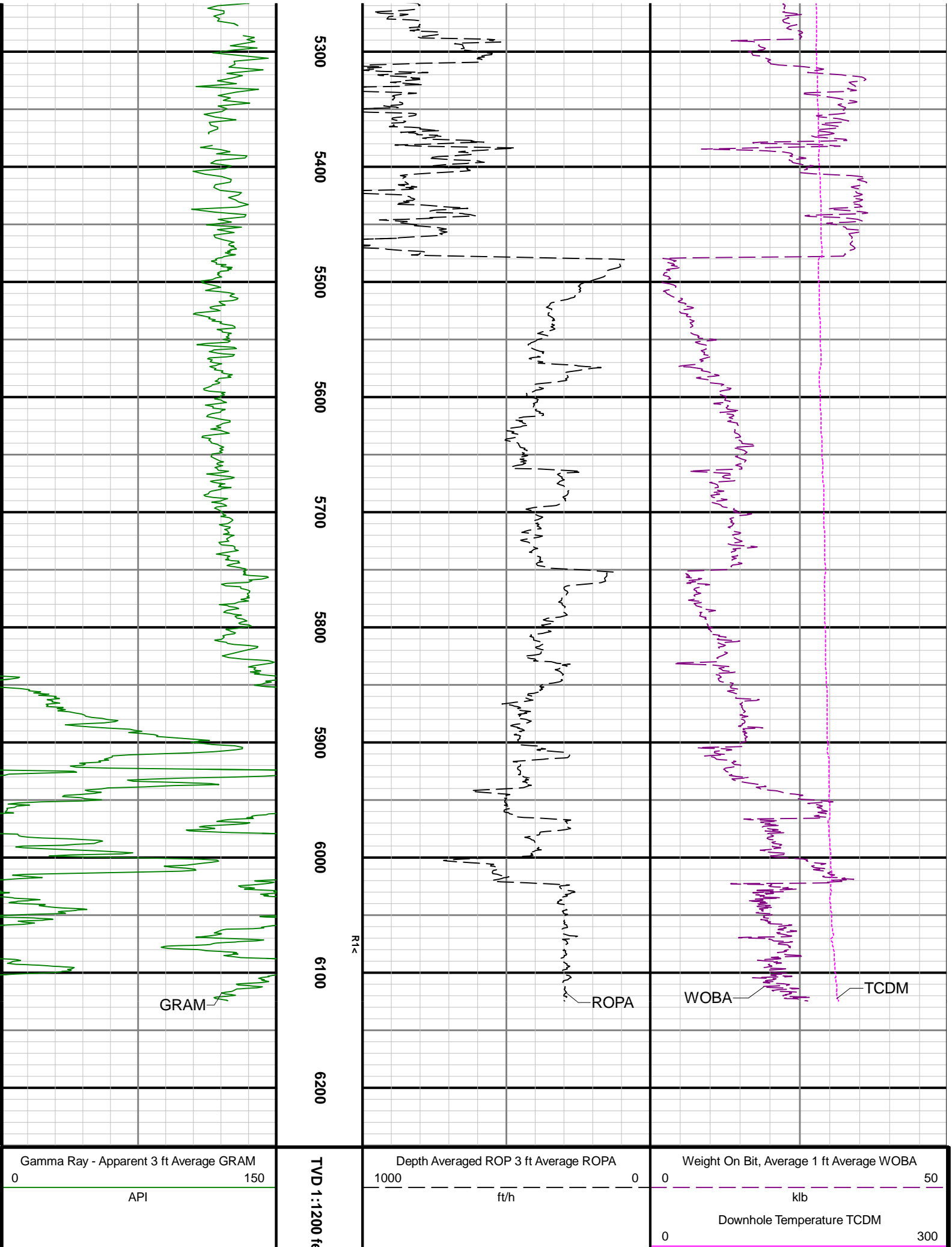






4200 4300 4400 4500 4600 4700 4800 4900 5000 5100 5200





Directional Survey Summary											
Latitude: 60° 45' 30" N				Longitude: 15° 30' 00" W							
North Reference: Grid				Drill Depth Zero: Rig Floor							
Vertical Datum is: Ground Level				Vertical Datum to DDZ: (ft) 30.00							
Vertical Section North: (m) N/A				Vertical Section East: (m) N/A							
Vertical Section Azimuth: (deg) 271.48											
Grid Convergence: (deg) N/A				Magnetic Declination: (deg) N/A							
Total Correction: (deg) 6.74				TVD Calculation Method: Minimum Curvature							
Magnetic Correction: N/A				Local Magnetic Field: (nT) 52586							
Local Magnetic Dip Angle: (deg) 67.06				Local Gravity Field: (m/s2) N/A							

Tie-In / Projection	Measured Depth (ft)	Inclination (deg)	Azimuth (deg)	Temperature (degF)	North (ft)	East (ft)	True Vertical Depth (ft)	Vertical Section (ft)	Course Length (ft)	Dog Leg Severity (deg/100ft)	Build Rate (deg/100ft)	Turn Rate (deg/100ft)
Tie-In	0.00	0.00	0.00	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	81.00	0.14	268.84	N/A	-0.00	-0.10	81.00	0.10	81.00	0.17	0.17	-112.54
	178.00	0.18	155.75	N/A	-0.14	-0.15	178.00	0.15	97.00	0.28	0.04	-116.59
	269.00	0.15	62.23	N/A	-0.22	0.01	269.00	-0.01	91.00	0.27	-0.03	-102.77
	364.00	0.14	209.28	N/A	-0.26	0.06	364.00	-0.07	95.00	0.29	-0.01	154.79
	458.00	0.21	89.88	N/A	-0.36	0.18	458.00	-0.19	94.00	0.32	0.07	-127.02
	553.00	0.45	30.54	N/A	-0.04	0.54	553.00	-0.54	95.00	0.41	0.25	-62.46
	647.00	0.14	94.47	N/A	0.27	0.84	647.00	-0.84	94.00	0.43	-0.33	68.01
	742.00	0.26	82.10	N/A	0.29	1.17	742.00	-1.17	95.00	0.13	0.13	-13.02
	836.00	0.17	8.89	N/A	0.46	1.41	836.00	-1.39	94.00	0.28	-0.10	-77.88
	931.00	0.24	99.46	N/A	0.56	1.62	930.99	-1.61	95.00	0.31	0.07	95.34
	1025.00	0.36	103.41	N/A	0.46	2.11	1024.99	-2.09	94.00	0.13	0.13	4.20
	1120.00	0.48	108.52	N/A	0.27	2.77	1119.99	-2.77	95.00	0.13	0.13	5.38
	1215.00	0.24	150.73	N/A	-0.03	3.25	1214.99	-3.25	95.00	0.36	-0.25	44.43
	1309.00	0.35	135.67	N/A	-0.41	3.54	1308.99	-3.55	94.00	0.14	0.12	-16.02
	1403.00	0.09	82.18	N/A	-0.61	3.82	1402.99	-3.83	94.00	0.32	-0.28	-56.90
	1498.00	0.22	149.00	N/A	-0.75	3.99	1497.99	-4.00	95.00	0.21	0.14	70.34
	1593.00	0.19	72.66	N/A	-0.86	4.23	1592.99	-4.25	95.00	0.27	-0.03	-80.36
	1687.00	0.24	3.33	N/A	-0.62	4.39	1686.99	-4.41	94.00	0.26	0.05	-73.76
	1782.00	0.12	127.02	N/A	-0.48	4.48	1781.99	-4.49	95.00	0.34	-0.13	130.20
	1876.00	0.05	331.74	N/A	-0.50	4.54	1875.99	-4.55	94.00	0.18	-0.07	-165.19
	1927.00	0.10	2.25	N/A	-0.44	4.53	1926.99	-4.54	51.00	0.12	0.10	59.82
	1978.00	0.60	8.04	N/A	-0.13	4.57	1977.98	-4.57	51.00	0.98	0.98	11.35
	2072.00	0.04	124.02	N/A	0.34	4.67	2071.98	-4.66	94.00	0.66	-0.60	123.38
	2167.00	0.13	345.94	N/A	0.43	4.67	2166.98	-4.66	95.00	0.17	0.09	-145.35
	2262.00	1.86	352.16	N/A	2.06	4.43	2261.96	-4.38	95.00	1.82	1.82	6.55
	2356.00	3.82	352.85	N/A	6.68	3.83	2355.84	-3.66	94.00	2.09	2.09	0.73
	2451.00	5.91	352.17	N/A	14.66	2.77	2450.50	-2.39	95.00	2.20	2.20	-0.72
	2545.00	8.14	352.87	N/A	26.06	1.29	2543.79	-0.62	94.00	2.37	2.37	0.74
	2640.00	8.02	340.91	N/A	39.00	-1.71	2637.85	2.72	95.00	1.77	-0.13	-12.59
	2734.00	7.97	331.51	N/A	50.92	-6.97	2730.94	8.28	94.00	1.39	-0.05	-10.00
	2829.00	8.05	332.54	N/A	62.61	-13.18	2825.01	14.79	95.00	0.17	0.08	1.08
	2923.00	7.97	330.54	N/A	74.13	-19.42	2918.10	21.32	94.00	0.31	-0.09	-2.13
	3018.00	8.11	329.95	N/A	85.66	-26.01	3012.16	28.21	95.00	0.17	0.15	-0.62
	3112.00	7.97	332.18	N/A	97.17	-32.37	3105.24	34.87	94.00	0.36	-0.15	2.37
	3207.00	7.89	334.94	N/A	108.90	-38.21	3199.33	41.01	95.00	0.41	-0.08	2.91
	3301.00	7.98	340.01	N/A	120.87	-43.17	3292.43	46.28	94.00	0.75	0.10	5.39
	3396.00	8.00	340.53	N/A	133.30	-47.63	3386.51	51.06	95.00	0.08	0.02	0.55
	3491.00	7.99	336.16	N/A	145.58	-52.50	3480.59	56.24	95.00	0.64	-0.01	-4.60
	3585.00	8.06	332.13	N/A	157.38	-58.22	3573.67	62.27	94.00	0.60	0.07	-4.29
	3680.00	8.13	332.35	N/A	169.22	-64.45	3667.72	68.80	95.00	0.08	0.07	0.23
	3774.00	7.99	329.75	N/A	180.75	-70.83	3760.79	75.47	94.00	0.42	-0.15	-2.77
	3869.00	8.01	332.03	N/A	192.30	-77.26	3854.87	82.20	95.00	0.33	0.02	2.40
	3964.00	7.85	335.51	N/A	204.05	-83.05	3948.96	88.30	95.00	0.53	-0.17	3.66
	4058.00	7.95	341.78	N/A	216.06	-87.75	4042.07	93.30	94.00	0.92	0.11	6.67
	4153.00	7.97	347.67	N/A	228.74	-91.21	4136.16	97.08	95.00	0.86	0.02	6.20
	4248.00	7.96	349.03	N/A	241.63	-93.87	4230.24	100.07	95.00	0.20	-0.01	1.43
	4342.00	7.95	351.15	N/A	254.44	-96.10	4323.34	102.64	94.00	0.31	-0.01	2.26
	4436.00	7.91	353.14	N/A	267.29	-97.88	4416.44	104.75	94.00	0.30	-0.04	2.12
	4531.00	6.51	348.37	N/A	279.05	-99.74	4510.68	106.92	95.00	1.60	-1.47	-5.02
	4625.00	6.54	350.58	N/A	289.55	-101.69	4604.08	109.14	94.00	0.27	0.03	2.35
	4720.00	5.42	348.48	N/A	299.29	-103.48	4698.56	111.17	95.00	1.20	-1.18	-2.21
	4814.00	4.01	346.04	N/A	306.83	-105.15	4792.24	113.04	94.00	1.51	-1.50	-2.60
	4909.00	1.31	307.81	N/A	310.72	-106.81	4887.13	114.80	95.00	3.25	-2.84	-40.24
	5003.00	0.04	165.98	N/A	311.34	-107.66	4981.12	115.66	94.00	1.43	-1.35	-150.88
	5098.00	0.20	90.55	N/A	311.31	-107.48	5076.12	115.49	95.00	0.20	0.17	-79.40

	5098.00	0.20	90.33	N/A	311.31	-107.48	5076.12	113.49	95.00	0.20	0.17	-79.40
	5193.00	0.22	59.19	N/A	311.40	-107.16	5171.12	115.17	95.00	0.12	0.02	-33.01
	5287.00	0.09	75.31	N/A	311.51	-106.93	5265.12	114.94	94.00	0.14	-0.14	17.15
	5382.00	0.06	20.60	N/A	311.58	-106.84	5360.12	114.85	95.00	0.08	-0.03	-57.59
	5476.00	0.07	50.91	N/A	311.66	-106.78	5454.12	114.80	94.00	0.04	0.01	32.24
	5571.00	8.22	262.51	N/A	310.81	-113.48	5548.80	121.47	95.00	8.72	8.58	-156.21
	5665.00	17.99	276.27	N/A	311.52	-134.63	5640.26	142.63	94.00	10.84	10.39	14.64
	5760.00	25.73	281.34	N/A	317.19	-169.49	5728.37	177.62	95.00	8.38	8.15	5.34
	5855.00	34.02	275.60	N/A	323.85	-216.24	5810.69	224.54	95.00	9.22	8.73	-6.04
	5949.00	41.84	271.32	N/A	327.14	-273.86	5884.79	282.22	94.00	8.77	8.32	-4.55
	6044.00	48.77	271.23	N/A	328.64	-341.33	5951.56	349.71	95.00	7.30	7.29	-0.09
	6138.00	55.31	264.73	N/A	325.84	-415.28	6009.39	423.56	94.00	8.83	6.96	-6.91
	6232.00	62.15	261.66	N/A	316.25	-494.99	6058.16	502.99	94.00	7.79	7.28	-3.27
	6327.00	70.65	260.58	N/A	302.80	-580.92	6096.16	588.54	95.00	9.01	8.95	-1.14
	6421.00	81.60	261.28	N/A	288.45	-670.90	6118.67	678.12	94.00	11.67	11.65	0.74
	6516.00	90.62	263.09	N/A	275.59	-764.70	6125.11	771.56	95.00	9.68	9.49	1.91
	6610.00	90.49	264.32	N/A	265.28	-858.12	6124.20	864.69	94.00	1.32	-0.14	1.31
	6704.00	90.68	265.82	N/A	257.20	-951.77	6123.24	958.09	94.00	1.61	0.20	1.60
	6799.00	90.62	266.27	N/A	250.65	-1046.54	6122.16	1052.66	95.00	0.48	-0.06	0.47
	6894.00	90.55	267.48	N/A	245.47	-1141.39	6121.19	1147.35	95.00	1.28	-0.07	1.27
	6988.00	90.65	269.23	N/A	242.77	-1235.34	6120.21	1241.20	94.00	1.86	0.11	1.86
	7083.00	90.52	269.25	N/A	241.51	-1330.33	6119.24	1336.12	95.00	0.14	-0.14	0.02
	7177.00	90.58	268.86	N/A	239.96	-1424.31	6118.33	1430.03	94.00	0.42	0.06	-0.41
	7366.00	90.71	269.71	N/A	237.60	-1613.28	6116.21	1618.88	189.00	0.45	0.07	0.45
	7461.00	90.55	270.14	N/A	237.48	-1708.28	6115.16	1713.84	95.00	0.48	-0.17	0.45
	7556.00	90.49	269.83	N/A	237.46	-1803.27	6114.30	1808.80	95.00	0.33	-0.06	-0.33
	7650.00	90.55	270.06	N/A	237.37	-1897.27	6113.45	1902.77	94.00	0.25	0.06	0.24
	7744.00	90.46	269.44	N/A	236.96	-1991.26	6112.62	1996.72	94.00	0.67	-0.10	-0.66
	7839.00	90.49	269.84	N/A	236.36	-2086.26	6111.83	2091.67	95.00	0.42	0.03	0.42
	7934.00	90.52	269.84	N/A	236.09	-2181.25	6110.99	2186.62	95.00	0.03	0.03	0.00
	8028.00	90.52	269.53	N/A	235.58	-2275.25	6110.14	2280.57	94.00	0.33	0.00	-0.33
	8123.00	90.52	269.70	N/A	234.94	-2370.24	6109.28	2375.52	95.00	0.18	0.00	0.18
	8217.00	90.68	269.66	N/A	234.41	-2464.23	6108.29	2469.47	94.00	0.18	0.17	-0.04
	8312.00	90.74	268.85	N/A	233.18	-2559.22	6107.12	2564.39	95.00	0.85	0.06	-0.85
	8501.00	90.80	268.19	N/A	228.30	-2748.14	6104.58	2753.12	189.00	0.35	0.03	-0.35
	8596.00	90.68	267.67	N/A	224.87	-2843.07	6103.35	2847.93	95.00	0.56	-0.13	-0.55
	8690.00	90.37	268.62	N/A	221.82	-2937.01	6102.49	2941.76	94.00	1.06	-0.33	1.01
	8784.00	90.65	268.64	N/A	219.58	-3030.98	6101.65	3035.64	94.00	0.30	0.30	0.02
	8879.00	90.46	267.89	N/A	216.70	-3125.93	6100.73	3130.49	95.00	0.81	-0.20	-0.79
	8974.00	90.31	268.24	N/A	213.49	-3220.88	6100.09	3225.32	95.00	0.40	-0.16	0.37
	9068.00	90.28	268.49	N/A	210.81	-3314.84	6099.61	3319.18	94.00	0.27	-0.03	0.27
	9162.00	90.40	268.95	N/A	208.71	-3408.81	6099.05	3413.07	94.00	0.51	0.13	0.49
	9257.00	90.43	268.37	N/A	206.49	-3503.78	6098.36	3507.95	95.00	0.61	0.03	-0.61
	9352.00	90.49	267.79	N/A	203.31	-3598.73	6097.60	3602.78	95.00	0.61	0.06	-0.61
	9446.00	90.49	267.64	N/A	199.56	-3692.65	6096.80	3696.57	94.00	0.16	0.00	-0.16
	9541.00	90.34	265.67	N/A	194.02	-3787.48	6096.11	3791.23	95.00	2.08	-0.16	-2.07
	9635.00	90.25	265.71	N/A	186.95	-3881.21	6095.63	3884.75	94.00	0.10	-0.10	0.04
	9730.00	90.31	266.74	N/A	180.70	-3976.00	6095.16	3979.34	95.00	1.09	0.06	1.08
	9825.00	90.49	267.02	N/A	175.53	-4070.86	6094.50	4074.04	95.00	0.35	0.19	0.29
	9919.00	90.46	266.63	N/A	170.32	-4164.71	6093.72	4167.72	94.00	0.42	-0.03	-0.41
	10014.00	90.55	266.52	N/A	164.65	-4259.54	6092.88	4262.37	95.00	0.15	0.09	-0.12
	10108.00	90.49	266.30	N/A	158.76	-4353.35	6092.03	4356.00	94.00	0.24	-0.06	-0.23
	10203.00	90.34	266.41	N/A	152.72	-4448.16	6091.34	4450.62	95.00	0.20	-0.16	0.12
	10298.00	90.28	266.59	N/A	146.92	-4542.98	6090.83	4545.26	95.00	0.20	-0.06	0.19
	10392.00	90.43	267.76	N/A	142.29	-4636.86	6090.24	4638.99	94.00	1.25	0.16	1.24
	10487.00	90.37	270.50	N/A	140.85	-4731.84	6089.58	4733.90	95.00	2.88	-0.06	2.88
	10582.00	90.40	272.81	N/A	143.59	-4826.79	6088.94	4828.89	95.00	2.43	0.03	2.43
	10676.00	90.52	272.30	N/A	147.78	-4920.69	6088.19	4922.87	94.00	0.56	0.13	-0.54
	10771.00	90.46	272.65	N/A	151.88	-5015.60	6087.37	5017.85	95.00	0.37	-0.06	0.37
	10865.00	90.40	272.18	N/A	155.84	-5109.51	6086.67	5111.83	94.00	0.50	-0.06	-0.50
	10960.00	90.37	270.60	N/A	158.15	-5204.48	6086.03	5206.83	95.00	1.66	-0.03	-1.66
	11055.00	90.40	268.60	N/A	157.48	-5299.47	6085.39	5301.77	95.00	2.11	0.03	-2.11
Projection	11083.00	90.40	268.60	N/A	156.80	-5327.46	6085.20	5329.73	28.00	0.00	0.00	0.00