



Company:	Anadarko Petroleum
Well:	Cannon 13N-10HZ
Field:	Wattenberg
Rig:	Xtreme 23
County:	Weld

Location	
Latitude: 40.15885° N	Mag Decl: 8.65°
Longitude: 104.76860° W	Mag Dip: 66.76°
Other Services: Spectral Azimuthal Gamma, Directional, and Temperature	

Log Measured From:	<u>Drill Floor</u>	Elev:	<u>4965.0 ft</u>	above perm. datum
Depth Reference:	<u>Drillers Tally</u>	Total Depth:		<u>11605 ft</u>
Depth Logged:	6719 ft	to	11605 ft	
		Runs:	3	
Date Logged:	6-May-13	to	10-May-13	Spud Date: 4-May-13
				Elevation
				G.L. 4949.0 ft
				D.F. 4965.0 ft
				W.D. Onshore

Borehole Record			Casing Record			
Hole Size	From	To	Size	Weight	From	To
8.750 in.	876 ft	7668 ft	7.000 in.	26.0 lb/ft	Surface	7668 ft
6.125 in.	7668 ft	11605 ft				

Borehole Deviation Record			Mud Record			
Hole Size	Min. Inc.	Max. Inc.	Type	Weight	From	To
8.750 in.	0.78°	86.02°	WBM	9.40 ppg - 10.10 ppg	876 ft	11605 ft
6.125 in.	85.87°	93.46°				

**All interpretations of log data are opinions based on inferences from electrical or other measurements. Weatherford International does not guarantee the accuracy or correctness of any interpretation or recommendation and we shall not be liable or responsible for any loss, cost, damages or expenses incurred or sustained by anyone resulting from any interpretation or recommendation made by any of our employees or agents.**

RUN SUMMARY							
M/LWD Run Number		1	2	3			
Bit Size	in.	8.750	8.750	6.125			
Bit Type		PDC	PDC	PDC			
Bit TFA	sq.in.	1.240	1.535	1.535			
Bit Start Depth	ft	876	6760	7668			
Bit End Depth	ft	6760	7668	11605			
Top Log Interval	ft	na	6719	7590			
Bottom Log Interval	ft	na	7668	11605			
Begin Log Time	hrs	na	15:42	17:31			
Begin Log Date	DD-MMM-YY	na	6-May-13	8-May-13			
End Log Time	hrs	na	7:26	7:52			
End Log Date	DD-MMM-YY	na	7-May-13	10-May-13			
Drill or Wipe		Drill	Drill	Drill			
Flow Rate	gal/min	550	570	297			
Max AV / CV @ MWD	ft/min	435 / 389	450 / 385	487 / 363			
Min Inc @ Depth	deg @ ft	0.78 @ 1054	0.97 @ 6700	85.87 @ 8433			
Max Inc @ Depth	deg @ ft	12.77 @ 2912	86.02 @ 7608	93.46 @ 8091			
MUD DATA							
Depth	ft	6760	7668	11605			
Fluid Type		WBM	WBM	WBM			
Mud Weight	ppg	9.60	10.10	9.50			
Plastic Viscosity	cP	15	16	12			
Solids / Sand	%	8.60 / 0.25	8.70 / 0.25	6.70 / 0.25			
NaCl Equiv. Chlorides	ppm	3122	3135	3300			
pH		9.3	9.2	9.8			
Oil:Water Ratio	% Vol	12.0 : 88.0	12.0 : 88.0	3.5 : 96.5			
Rm @ Temperature	ohm-m @ deg F	na	na	1.30 @ 70°F			
Rmc @ Temperature	ohm-m @ deg F	na	na	1.14 @ 70°F			
Rmf @ Temperature	ohm-m @ deg F	na	na	1.12 @ 70°F			
KCl	% Vol	0	0	0			
Client Representative		R. McPeters	R. McPeters	R. McPeters			
WeatherfordLWD Engineer		T. Daily	T. Daily	T. Daily			

## EQUIPMENT SUMMARY

M/LWD Run Number	1	2	3		
BTR / CDS Serial Number	44702 / 44736	44702 / 44736	na		
Battery Serial Number	403467910	403467910	na		
Gamma Ray Serial Number	na	2978	na		
CMS Serial Number	1592	1592	na		
Pulser Serial Number	18705	18705	na		
HEL Serial Number	na	na	NW131110PDSBI4.75		
MFR Serial Number	na	na	NW131107RBBK4.75		
SAGR Serial Number	na	na	NW131109JB4.75		
<b>Sensor to Bit Offsets / Acquisition Rates</b>					
Directional	ft / sec	57.25 / RT	57.29 / RT	51.73 / RT	
Gamma Ray	ft / sec	na	42.99 / 16	37.12 / 5	
Resistivity	ft / sec	na	na	80.08 / 5	
<b>Other Information</b>					
Total BHA Length	ft	115.42	116.06	96.79	
BHA Assembly Type		Steerable	Steerable	Steerable	
Stabilizer Location	ft	na	na	29.24	
Run Circulating Time	hr	24.23	20.49	39.01	
Run Drilling Time	hr	15.01	10.05	17.95	

## MUD SUMMARY

Date and Time	Run	Bit Depth	Mud Weight	% K	Rm @ Temp	Rmf @ Temp	Rmc @ Temp	BHCT
06 May 13 @ 08:00	01	6760 ft	9.60 ppg	0	na	na	na	163° F
07 May 13 @ 11:32	02	7668 ft	10.10 ppg	0	na	na	na	174° F
10 May 13 @ 17:18	03	11605 ft	9.50 ppg	0	1.30 ohm-m @ 70°F	1.12 ohm-m @ 70°F	1.14 ohm-m @ 70°F	219° F

## M/LWD RUN REMARKS

**Run Number: 2 :: RECORDED DATA LOG**

**WFT Services Provided:**

Recorded and Real Time Logging: Gamma Ray and Temperature.

Directional Services: On demand Inclination and Azimuth.

**Borehole and Environmental Correction:**

Hole Size: 8.750 in.

**Gamma Ray:** Hole size, mudweight, Collar O.D., Collar I.D. and K1 factor.

Mud Weight: 10.10 ppg

**Collar O.D.:** 6.750 in.

K1 Factor: 3.179

**Collar I.D.:** 3.250 in.

**Run Number: 3 :: RECORDED DATA LOG**

**WFT Services Provided:**

Recorded and Real Time Logging: Spectral Azimuthal Gamma Ray, Deep and Shallow Resistivity, and Temperature.

Directional Services: On demand Inclination and Azimuth.

**Borehole and Environmental Correction:**

Hole Size: 6.125 in.

**Gamma Ray:** Corrected for mud weight, hole size and KCl concentration.

Mud Weight: 9.50 ppg

**Resistivities:** Corrected for borehole temperature, hole size, drilling fluid resistivity and dielectric correction.

Borehole Temperature: 219° F

Drilling Fluid Resistivity: 0.497 ohm-m @ 219° F

KCl Concentration: 0%

## M/LWD LOG COMMENTS

**Comment No. 1-1**

MWD Drilling Run 01

Start of MWD Drilling Run 01

Weatherford International provided 6 3/4 in. Directional services for Run 01. No Logging Performed.

Run 01 ended formation drilling May 6, 2013 at 4:15 at 6760 MD / 6672 TVD.

**Comment No. 2-1**

RECORDED DATA LOG

Start of MWD Drilling Run 02

Weatherford International provided 6 3/4 in. Directional, Gamma Ray, and Temperature for Run 02.

Run 02 started formation drilling May 6, 2013 at 15:42 at 6760 MD / 6672 TVD. Weatherford International logged the 8.750 in. borehole.

The WBM at the start of drilling was 10.05 ppg.

**Comment No. 2-2**

End of MWD Drilling Run 02

Run 02 ended drilling formation May 7, 2013 at 7:26 at 7668 MD / 7258 TVD.

The WBM at the end of drilling was 10.10 ppg.

**Comment No. 3-1**

RECORDED DATA LOG

Start of LWD Drilling Run 03

Weatherford International provided 4 3/4 in. Directional, Resistivity, Azimuthal Gamma Ray, and Temperature for Run 03.

Run 03 started formation drilling May 8, 2013 at 17:31 at 7668 MD / 7258 TVD. Weatherford International logged the 6.125 in. borehole.

The WBM at the start of drilling was 9.40 ppg.

**Comment No. 3-2**

End of LWD Drilling Run 03

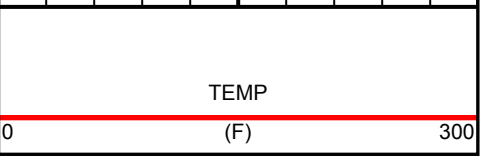
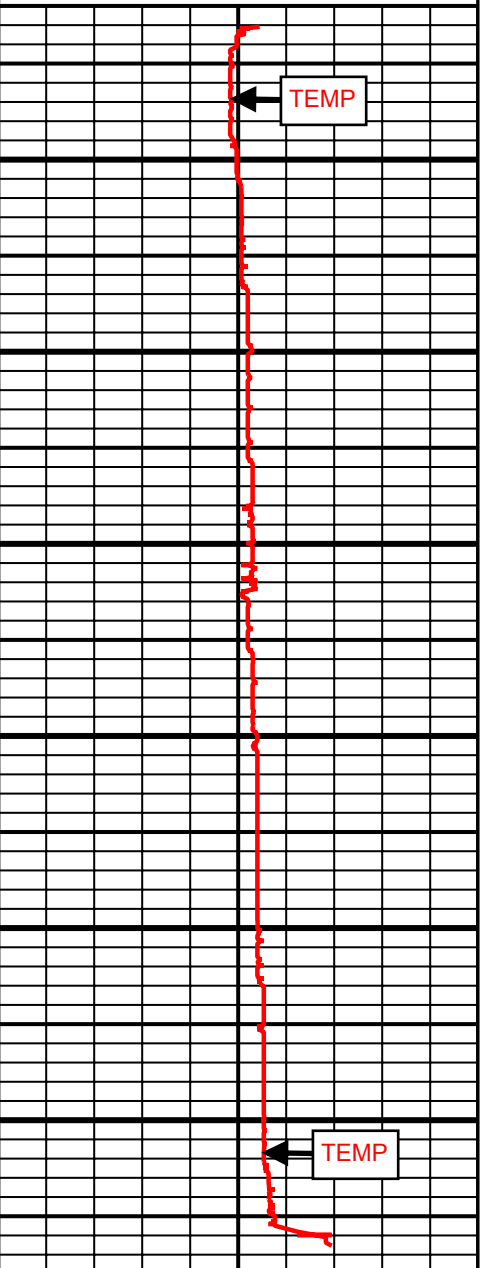
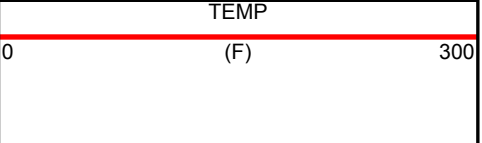
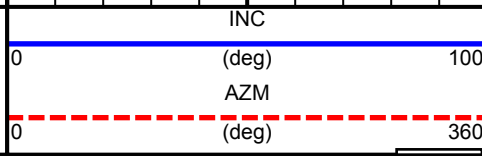
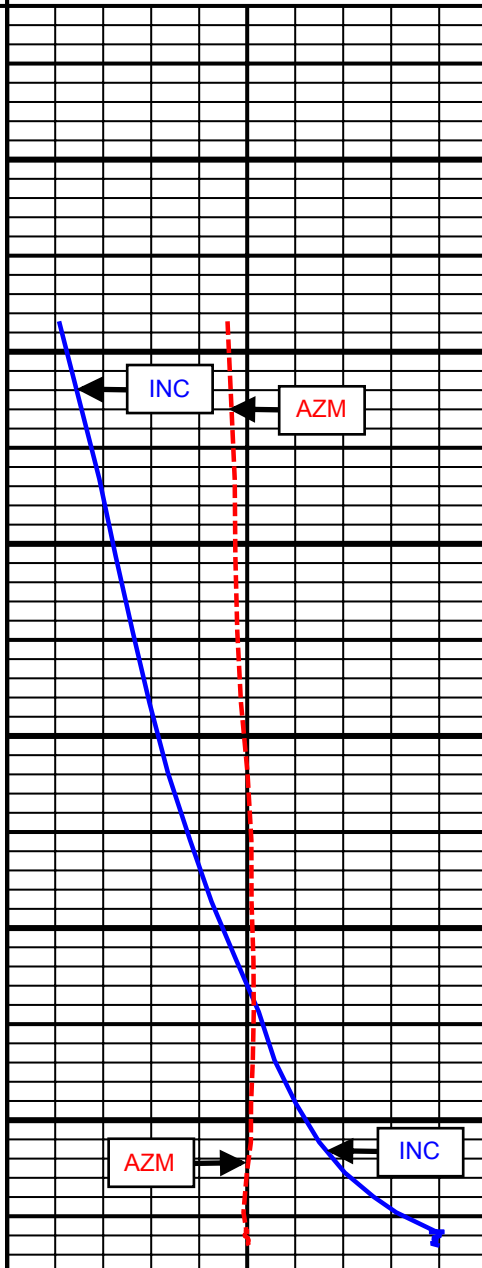
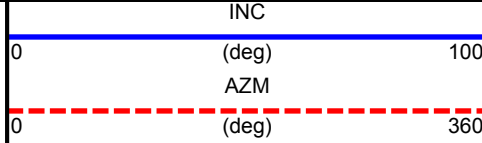
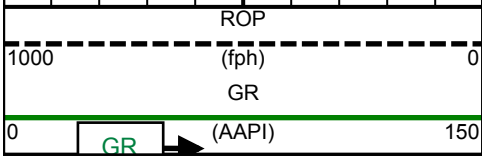
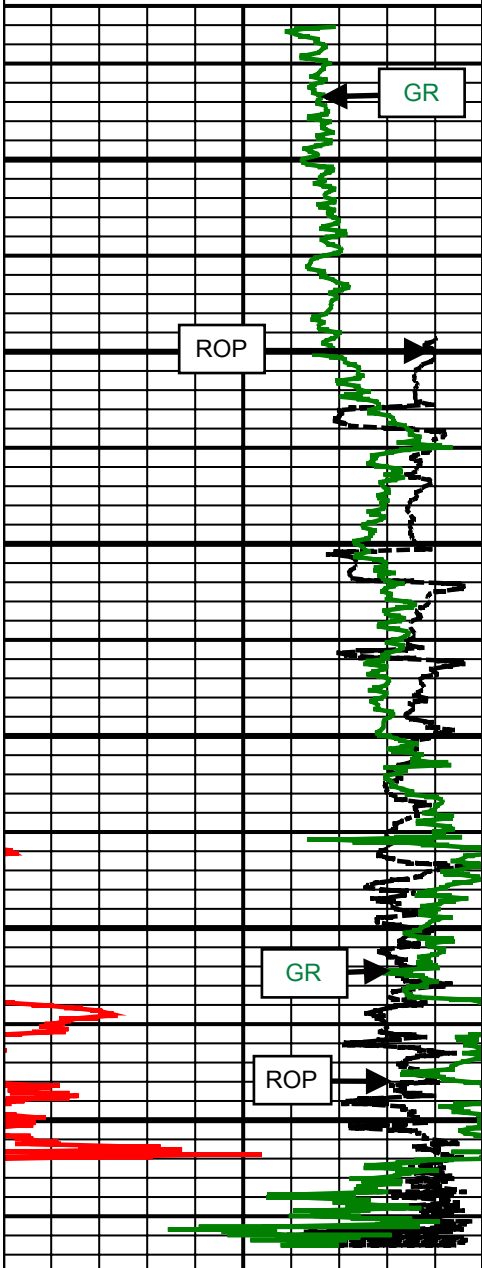
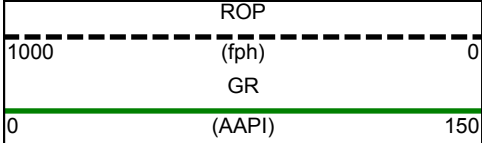
Run 03 ended drilling formation May 10, 2013 at 7:52 at 11605 MD / 7226 TVD.

The WBM at the end of drilling was 9.50 ppg.

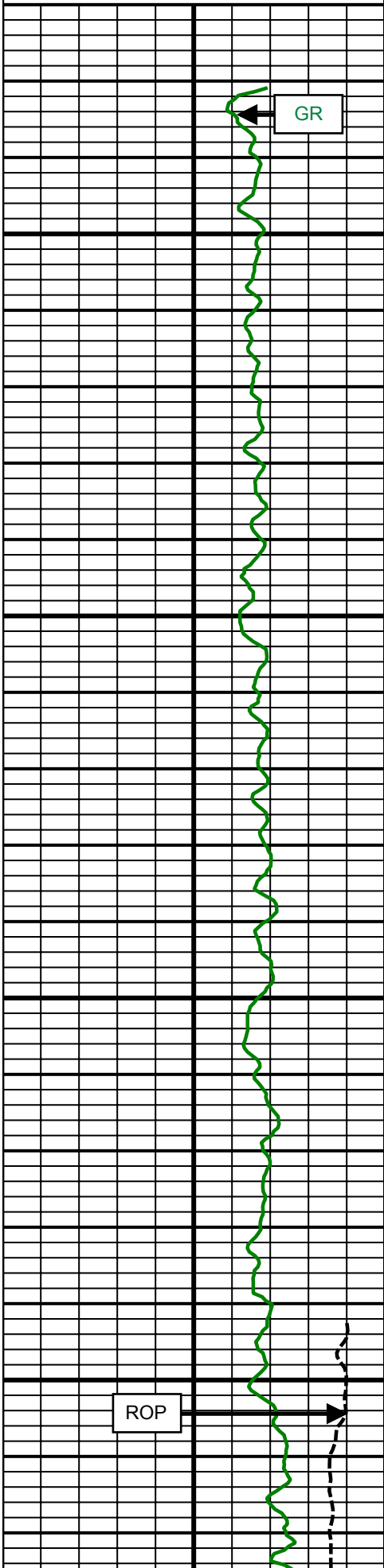
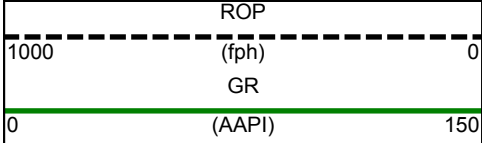
CURVE SPECIFICATIONS				
CURVE TYPE	MNEMONIC	UNITS	COMMENTS	CORRECTIONS
Rate of Penetration	ROP	fph	Rate of Penetration 3.0 ft window 0.5 ft Exponential Smoothing	None
Gamma Ray	GR	AAPI	Gamma Ray 3.0 ft window 0.5 ft Exponential Smoothing	See M/LWD Run Remarks
Gamma Ray Up	GR UP	AAPI	Recorded Azimuthal Gamma Ray 3.0 ft window 0.5 ft Exponential Smoothing	
Gamma Ray Down	GR DN	AAPI	Recorded Azimuthal Gamma Ray 3.0 ft window 0.5 ft Exponential Smoothing	
Deep Phase Resistivity	RPD2	ohm-m	2 MHz Deep Phase Resistivity 3.0 ft window 0.5 ft Exponential Smoothing	
Deep Attenuation Resistivity	RAD2	ohm-m	2 MHz Deep Attenuation Resistivity 3.0 ft window 0.5 ft Exponential Smoothing	
Deep Attenuation Resistivity	RAD4	ohm-m	400 KHz Deep Attenuation Resistivity 3.0 ft window 0.5 ft Exponential Smoothing	
Shallow Phase Resistivity	RPS2	ohm-m	2 MHz Shallow Phase Resistivity 3.0 ft window 0.5 ft Exponential Smoothing	
Deep Phase Conductivity	CPD2	mmho/m	2 MHz Deep Phase Conductivity 3.0 ft window 0.5 ft Exponential Smoothing	None
Temperature	TEMP	deg Fahrenheit	Recorded Bore hole Tmperature 3.0 ft window 0.5 ft Exponential Smoothing	



**1 Inch - True Vertical Depth**

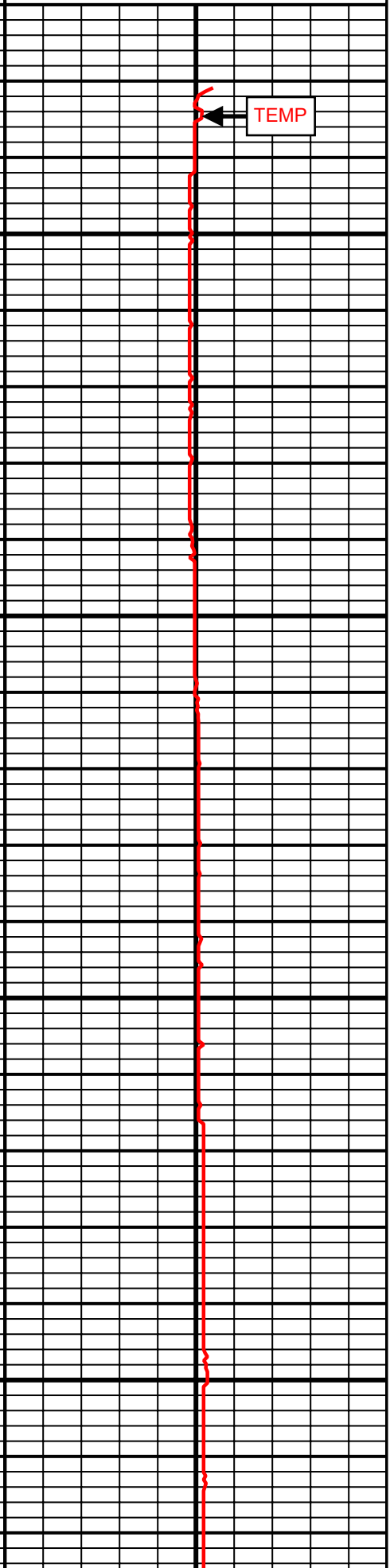
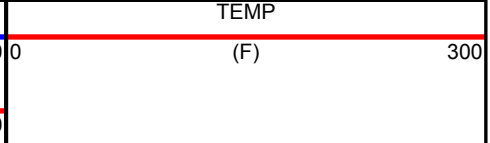
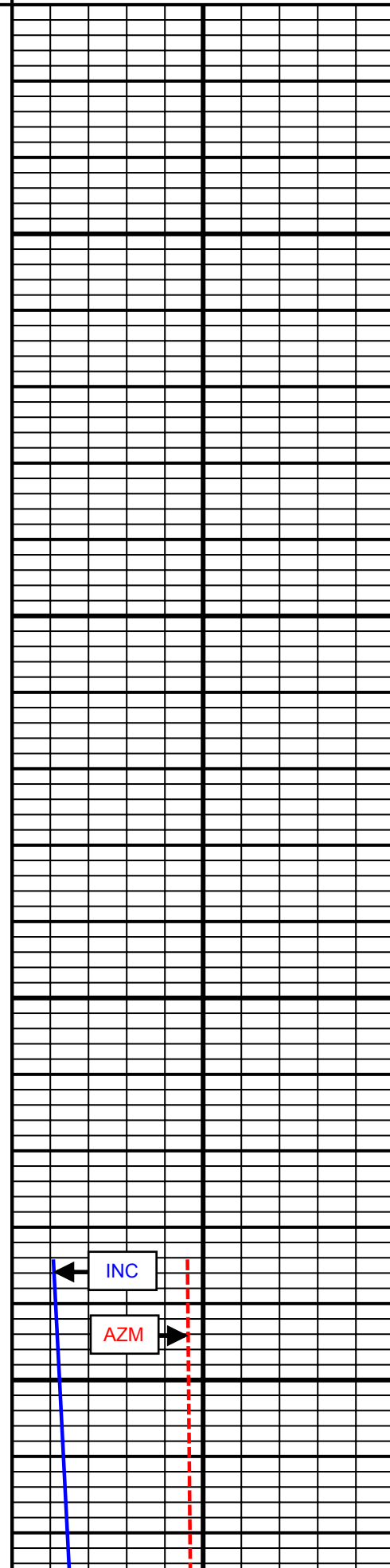
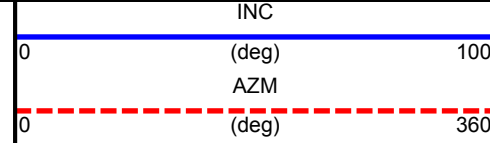


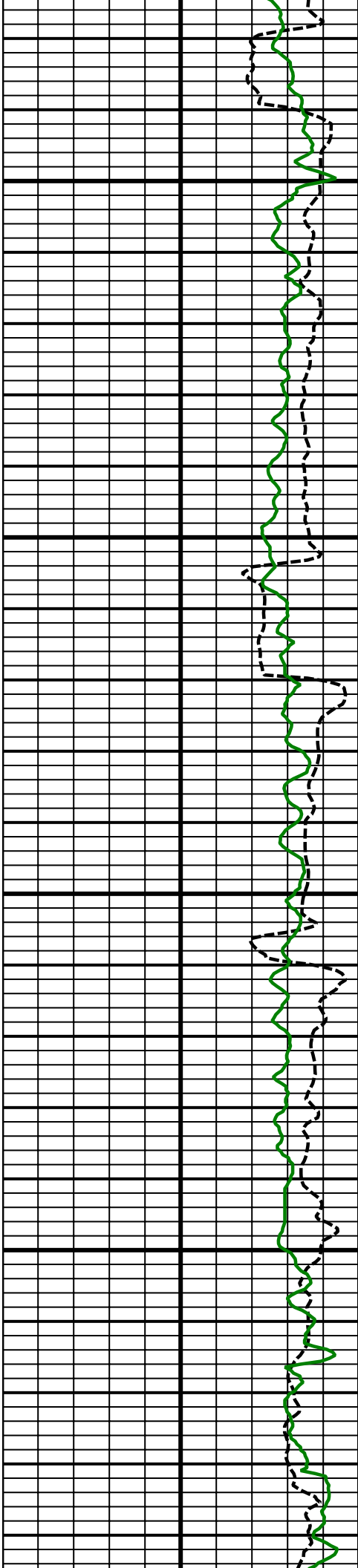
**5 Inch - True Vertical Depth**



6700  
TVD

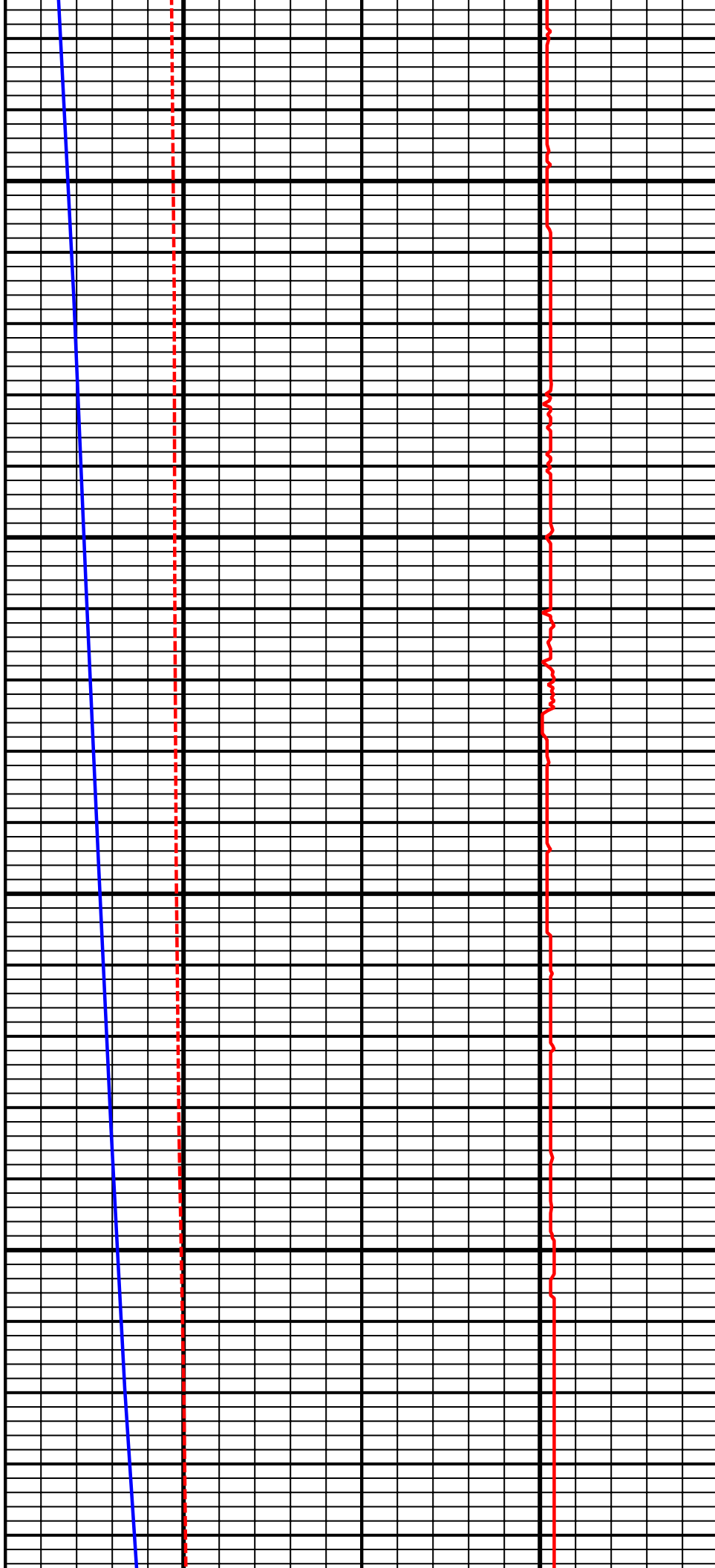
6800  
TVD

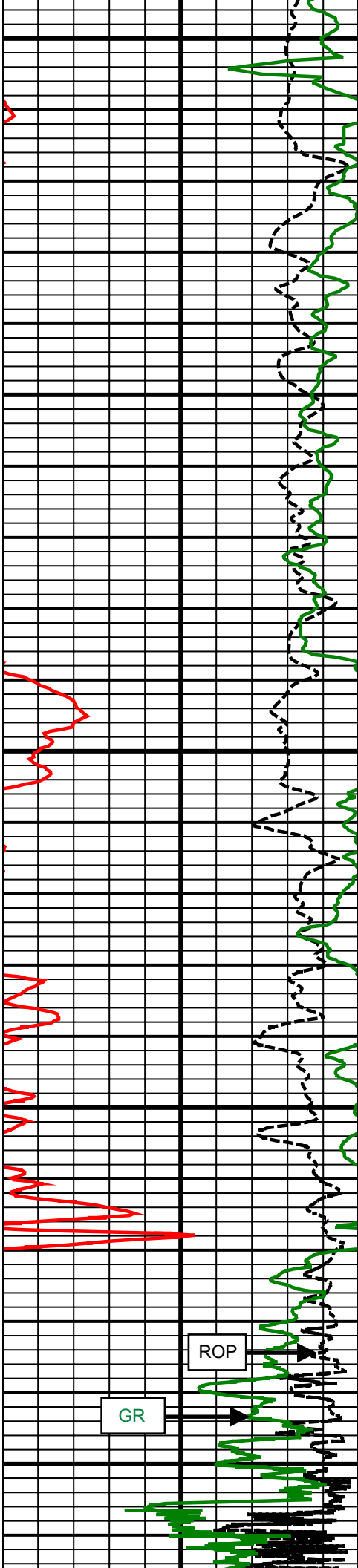




6900  
TVD

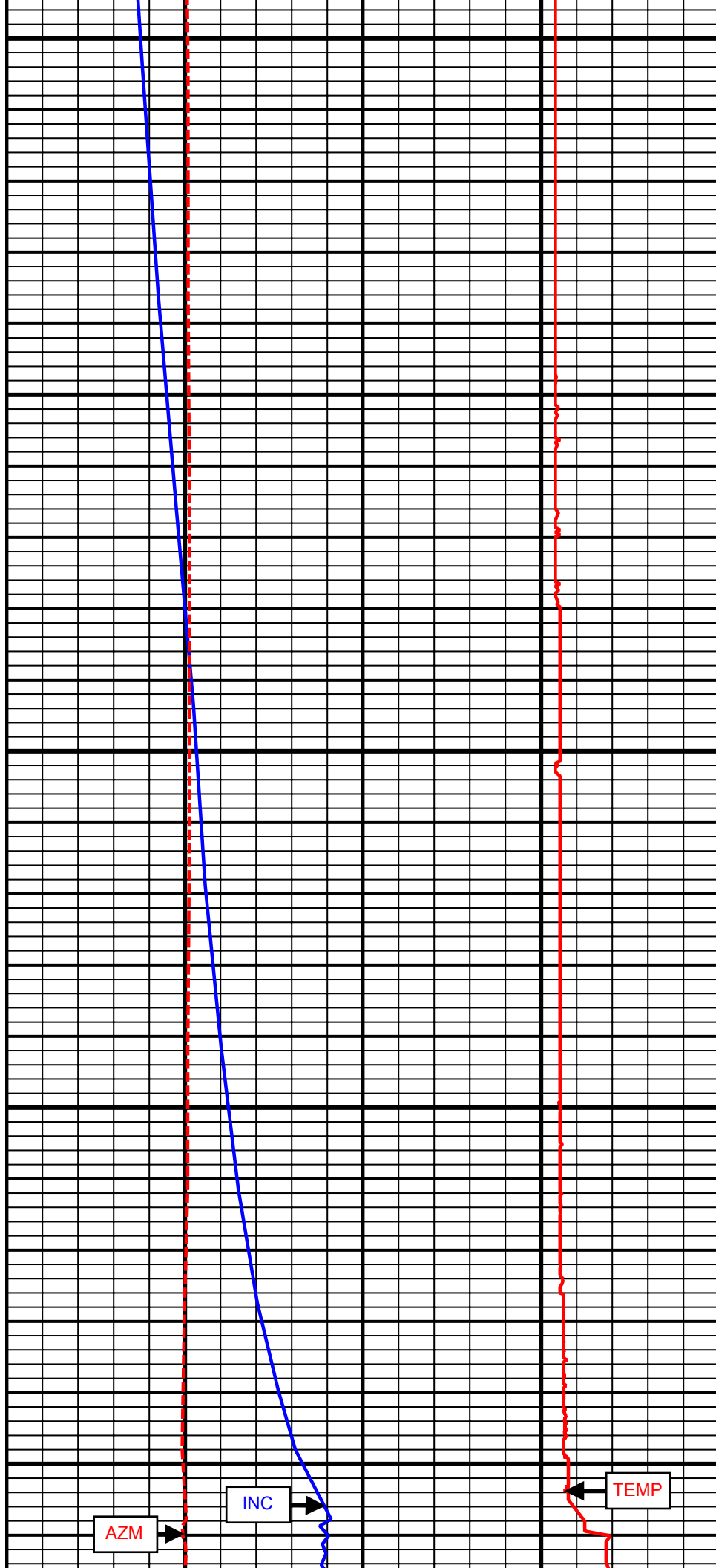
7000  
TVD





7100  
TVD

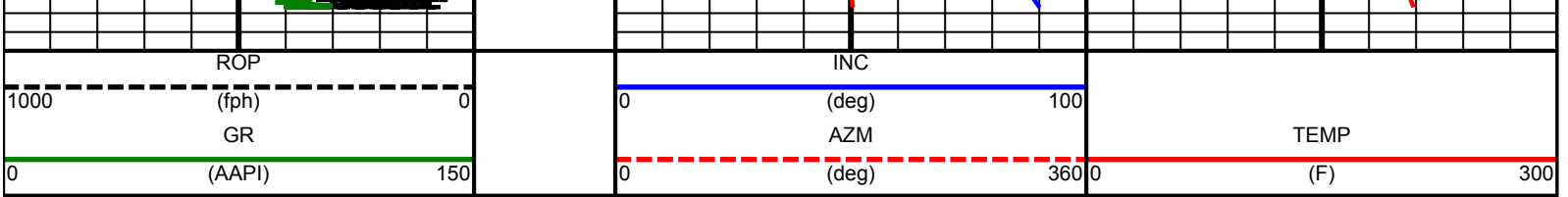
7200  
TVD



AZM

INC

TEMP



SURVEY						
Survey Calculation Method: <b>Minimum Curvature</b>						
Magnetic Reference	Target Direction	Total Magnetic Field	Magnetic Dip Angle	Magnetic Declination	Grid Convergence	Total Correction
<b>True North</b>	<b>179.65 deg</b>	<b>52710 nT</b>	<b>66.76 deg</b>	<b>8.65 deg</b>	<b>0.00 deg</b>	<b>8.65 deg</b>
<b>Survey Tie-On</b>	Depth	INC	AZ	TVD	NS	EW
	<b>896.00 ft</b>	<b>0.42 deg</b>	<b>6.25 deg</b>	<b>895.96 ft</b>	<b>5.50 ft</b>	<b>-4.40 ft</b>

Depth (ft)	Inc (deg)	Azm (deg)	TVD (ft)	Well Head		VSect (ft)	Dogleg (deg/100ft)
				NS (ft)	EW (ft)		
1054.00	0.78	305.20	1053.95	6.70	-5.22	-6.73	0.43
1145.00	1.75	284.82	1144.93	7.41	-7.07	-7.45	1.16
1236.00	2.75	306.10	1235.86	9.05	-10.17	-9.11	1.41
1327.00	4.87	307.77	1326.65	12.70	-14.99	-12.79	2.33
1418.00	6.73	306.33	1417.18	18.23	-22.34	-18.36	2.05
1515.00	7.55	302.24	1513.43	24.99	-32.31	-25.19	0.99
1607.00	8.59	291.83	1604.52	30.77	-43.80	-31.04	1.95
1699.00	9.83	290.61	1695.34	36.09	-57.53	-36.44	1.36
1791.00	10.93	286.35	1785.83	41.31	-73.25	-41.76	1.46
1885.00	11.69	286.86	1878.00	46.58	-90.92	-47.14	0.82
1978.00	11.24	285.69	1969.15	51.77	-108.66	-52.43	0.54
2072.00	11.36	290.74	2061.33	57.52	-126.14	-58.29	1.06
2165.00	12.11	292.67	2152.38	64.53	-143.70	-65.40	0.91
2258.00	10.74	291.74	2243.54	71.50	-160.76	-72.48	1.49
2352.00	9.83	290.00	2336.03	77.49	-176.43	-78.56	1.02
2445.00	9.27	294.04	2427.74	83.25	-190.73	-84.42	0.94
2538.00	11.08	291.53	2519.27	89.58	-205.89	-90.84	2.00
2632.00	11.87	287.85	2611.40	95.86	-223.49	-97.23	1.15
2725.00	12.71	289.01	2702.26	102.13	-242.27	-103.61	0.94
2819.00	12.29	284.93	2794.04	108.07	-261.71	-109.67	1.04
2912.00	12.77	285.45	2884.82	113.36	-281.18	-115.08	0.53
3005.00	11.67	286.75	2975.71	118.81	-300.10	-120.64	1.22
3099.00	12.77	292.86	3067.59	125.59	-318.78	-127.53	1.80
3192.00	11.83	293.32	3158.45	133.35	-337.00	-135.41	1.02
3286.00	10.78	284.78	3250.63	139.41	-354.35	-141.57	2.10
3371.00	11.93	289.95	3333.97	144.44	-370.30	-146.70	1.81
3456.00	9.65	291.40	3417.46	150.03	-385.19	-152.38	2.70
3542.00	9.76	288.41	3502.23	154.97	-398.82	-157.40	0.60
3627.00	11.23	288.99	3585.81	159.94	-413.48	-162.46	1.73
3712.00	10.82	284.19	3669.24	164.59	-429.04	-167.20	1.18
3798.00	10.89	286.35	3753.70	168.85	-444.66	-171.56	0.48
3883.00	10.73	292.78	3837.20	174.17	-459.66	-176.98	1.43
3968.00	11.28	292.27	3920.63	180.39	-474.65	-183.29	0.66
4054.00	12.11	300.01	4004.85	188.09	-490.25	-191.08	2.06
4139.00	11.65	297.08	4088.03	196.46	-505.61	-199.54	0.89
4224.00	12.50	293.42	4171.15	204.02	-521.69	-207.20	1.35
4310.00	12.45	295.04	4255.12	211.64	-538.63	-214.93	0.41
4395.00	11.13	292.37	4338.33	218.64	-554.52	-222.03	1.68
4481.00	10.53	288.38	4422.80	224.28	-569.66	-227.76	1.12
4566.00	11.43	278.60	4506.25	227.99	-585.36	-231.56	2.43
4651.00	10.43	273.34	4589.70	229.70	-601.37	-233.37	1.66
4737.00	11.15	280.91	4674.19	231.72	-617.30	-235.49	1.85



4822.00	12.68	289.01	4757.36	236.32	-634.19	-240.19	2.66
4908.00	11.09	285.04	4841.52	241.54	-651.11	-245.51	2.08
4993.00	9.99	283.08	4925.08	245.33	-666.18	-249.39	1.36
5078.00	10.40	283.26	5008.74	248.76	-680.83	-252.91	0.48
5163.00	11.16	289.34	5092.24	253.24	-696.06	-257.49	1.61
5249.00	12.42	290.01	5176.42	259.16	-712.61	-263.51	1.47
5334.00	12.51	288.20	5259.42	265.17	-729.94	-269.62	0.47
5420.00	9.01	284.87	5343.90	269.81	-745.30	-274.35	4.13
5505.00	9.05	287.89	5427.84	273.57	-758.10	-278.19	0.56
5591.00	12.06	286.70	5512.38	278.23	-773.14	-282.95	3.51
5676.00	11.65	284.47	5595.57	282.92	-789.96	-287.74	0.72
5761.00	9.00	288.18	5679.18	287.14	-804.59	-292.05	3.21
5847.00	9.96	289.77	5764.01	291.76	-817.98	-296.75	1.16
5932.00	10.48	291.73	5847.66	297.11	-832.08	-302.18	0.74
6018.00	7.02	285.47	5932.65	301.41	-844.41	-306.56	4.17
6102.00	6.28	293.24	6016.08	304.59	-853.58	-309.80	1.39
6188.00	5.34	292.32	6101.64	307.96	-861.60	-313.22	1.10
6273.00	4.37	292.07	6186.33	310.68	-868.27	-315.98	1.14
6359.00	3.64	283.92	6272.12	312.57	-873.95	-317.90	1.07
6444.00	2.51	279.26	6357.00	313.52	-878.41	-318.88	1.36
6530.00	1.82	276.80	6442.94	313.98	-881.62	-319.36	0.81
6615.00	1.41	274.23	6527.90	314.22	-884.01	-319.61	0.49
6700.00	0.97	233.60	6612.89	313.87	-885.63	-319.27	1.09
6786.00	2.32	174.21	6698.86	311.71	-886.04	-317.11	2.33
6872.00	10.79	165.18	6784.22	302.17	-883.80	-307.57	9.89
6957.00	19.18	170.55	6866.26	280.67	-879.46	-286.04	9.99
7000.00	22.59	171.03	6906.43	265.54	-877.02	-270.89	7.94
7043.00	26.11	172.54	6945.59	247.99	-874.50	-253.33	8.31
7085.00	29.61	175.27	6982.72	228.48	-872.44	-233.81	8.87
7128.00	33.50	180.24	7019.36	206.02	-871.62	-211.34	10.88
7171.00	38.09	183.06	7054.23	180.89	-872.37	-186.22	11.34
7213.00	42.55	183.13	7086.25	153.76	-873.84	-159.10	10.62
7256.00	47.67	184.68	7116.59	123.38	-875.93	-128.73	12.18
7298.00	52.39	184.89	7143.56	91.32	-878.62	-96.68	11.24
7341.00	55.68	184.15	7168.81	56.63	-881.36	-62.01	7.78
7384.00	60.20	182.84	7191.63	20.26	-883.57	-25.66	10.82
7427.00	64.98	182.70	7211.42	-17.86	-885.41	12.45	11.12
7469.00	70.33	179.75	7227.38	-56.67	-886.22	51.26	14.30
7512.00	76.24	178.09	7239.75	-97.83	-885.44	92.42	14.23
7554.00	81.02	177.16	7248.02	-138.96	-883.73	133.56	11.59
7608.00	86.02	177.39	7254.12	-192.54	-881.18	187.15	9.27
7750.00	91.05	181.42	7257.75	-334.41	-879.71	329.03	4.54
7835.00	90.86	181.85	7256.33	-419.36	-882.14	413.96	0.55
7920.00	89.57	181.94	7256.01	-504.31	-884.95	498.90	1.52
8006.00	91.48	181.49	7255.22	-590.26	-887.52	584.83	2.28
8091.00	93.46	181.15	7251.56	-675.16	-889.48	669.71	2.36
8177.00	92.47	179.94	7247.11	-761.04	-890.29	755.58	1.82
8262.00	91.36	178.82	7244.27	-845.98	-889.37	840.53	1.85
8348.00	87.16	178.04	7245.38	-931.92	-887.02	926.49	4.97
8433.00	85.87	177.47	7250.55	-1016.70	-883.70	1011.28	1.66
8519.00	87.66	178.19	7255.40	-1102.50	-880.44	1097.10	2.24
8603.00	87.84	177.41	7258.70	-1186.37	-877.22	1180.99	0.95
8689.00	90.31	177.80	7260.09	-1272.27	-873.63	1266.91	2.91
8774.00	92.10	178.98	7258.30	-1357.22	-871.24	1351.87	2.52
8860.00	91.79	179.15	7255.38	-1443.16	-869.84	1437.82	0.41
8945.00	90.86	178.92	7253.42	-1528.12	-868.41	1522.79	1.13
9030.00	90.62	179.88	7252.32	-1613.11	-867.52	1607.78	1.16
9116.00	90.86	180.18	7251.21	-1699.10	-867.56	1693.77	0.45
9201.00	90.37	179.56	7250.30	-1784.09	-867.37	1778.76	0.93
9287.00	90.19	180.40	7249.87	-1870.09	-867.34	1864.76	1.00
9372.00	89.94	180.16	7249.78	-1955.09	-867.76	1949.75	0.41

9458.00	89.08	179.90	7250.51	-2041.09	-867.80	2035.75	1.04
9543.00	88.52	180.70	7252.29	-2126.07	-868.25	2120.72	1.15
9628.00	90.43	181.48	7253.07	-2211.04	-869.86	2205.69	2.43
9714.00	88.58	180.25	7253.82	-2297.02	-871.16	2291.66	2.58
9799.00	88.40	181.11	7256.06	-2381.99	-872.17	2376.62	1.03
9885.00	88.03	180.16	7258.73	-2467.94	-873.12	2462.56	1.18
9970.00	88.58	180.34	7261.25	-2552.90	-873.49	2547.52	0.68
10055.00	89.63	180.99	7262.58	-2637.88	-874.48	2632.49	1.45
10141.00	88.27	180.38	7264.15	-2723.86	-875.51	2718.46	1.73
10226.00	90.06	181.26	7265.39	-2808.84	-876.72	2803.43	2.35
10312.00	90.92	180.22	7264.66	-2894.83	-877.83	2889.41	1.57
10397.00	90.31	179.98	7263.74	-2979.82	-877.98	2974.40	0.77
10483.00	91.23	179.31	7262.59	-3065.81	-877.45	3060.39	1.32
10568.00	90.49	178.58	7261.31	-3150.79	-875.88	3145.38	1.22
10653.00	91.17	178.86	7260.08	-3235.75	-873.99	3230.36	0.87
10739.00	91.60	178.92	7258.00	-3321.71	-872.32	3316.32	0.50
10824.00	91.79	179.37	7255.49	-3406.67	-871.05	3401.28	0.57
10910.00	91.36	178.44	7253.12	-3492.62	-869.41	3487.24	1.19
10995.00	91.54	179.11	7250.97	-3577.57	-867.59	3572.20	0.82
11080.00	91.79	178.85	7248.50	-3662.52	-866.08	3657.16	0.42
11166.00	92.28	179.42	7245.45	-3748.46	-864.78	3743.10	0.87
11251.00	92.47	178.91	7241.93	-3833.37	-863.55	3828.03	0.64
11337.00	92.65	178.79	7238.09	-3919.27	-861.82	3913.93	0.25
11422.00	92.10	178.63	7234.56	-4004.18	-859.91	3998.85	0.67
11507.00	92.77	178.20	7230.95	-4089.07	-857.56	4083.75	0.94
11551.00	92.83	177.93	7228.80	-4132.99	-856.08	4127.68	0.63
11605.00	92.83	177.93	7226.14	-4186.89	-854.13	4181.59	0.00

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\*\*Weatherford Surveys from 1054 ft MD to 11551 ft MD.\*\*

\*\*TD at 11605 ft MD.\*\*

The total correction is 8.65 deg relative to True North.

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**Weatherford®**

Final Print

COMPANY	<u>Anadarko Petroleum</u>		
WELL	<u>Cannon 13N-10HZ</u>		
FIELD	<u>Wattenberg</u>		
RIG	<u>Xtreme 23</u>		
LOC.	<u>Colorado</u>	COUNTY	<u>Weld</u>