



# Weatherford®

**6 3/4 in. & 4 3/4 in. WeatherfordLWD™**  
**Gamma Ray & Resistivity**  
**1 in. & 5 in. TRUE VERTICAL DEPTH**  
**RECORDED DATA**  
**FINAL PRINT**

Company: Anadarko  
Well: Haymaker 4C-9HZ  
Field: Wattenberg  
Rig: H & P 307  
County: Weld

Location		Other Services: Temperature and Directional	
Latitude: 40.14717° N	x = 3,229,999.00 ft	Mag Decl: 8.57°	
Longitude: 104.67724° W	y = 1,297,525.20 ft	Mag Dip: 66.94°	
COMPANY WELL FIELD RIG COUNTY API #		Anadarko Haymaker 4C-9HZ Wattenberg H & P 307 Weld STATE Colorado 05-123-35661-0000	

Permanent Datum: <u>Mean Sea Level</u>				K.B. Top Drive		
Log Measured From: <u>Drill Floor</u>		Elev: <u>4922.0 ft</u> above perm. datum		G.L. 4897.0 ft		
Depth Reference: <u>Drillers Tally</u>		Total Depth: <u>11667 ft</u>		D.F. 4922.0 ft		
Depth Logged: 6630 ft		to 11667 ft		Runs: 3		
Date Logged: 2-Nov-12		to 8-Nov-12		Spud Date: 16-Oct-12		
Borehole Record			Casing Record			
Hole Size	From	To	Size	Weight	From	To
8.750 in.	1125 ft	7658ft	9.625 in.	53.5 lb/ft	Surface	1125 ft
6.125 in.	7658 ft	11667 ft	7.000 in.	26.0 lb/ft	Surface	7658 ft
Borehole Deviation Record			Mud Record			
Hole Size	Min. Inc.	Max. Inc.	Type	Weight	From	To
8.750 in.	0.25°	88.46°	WBM	8.40 - 8.60 ppq	1125 ft	6673 ft
6.125 in.	87.66°	91.60°	WBM	8.60 - 10.25 ppq	6673 ft	7658 ft
			WBM	8.60 - 10.30 ppq	7658 ft	11667 ft

**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.	0.650	0.650	0.648			
Bit Start Depth	ft	1125	6673	7658			
Bit End Depth	ft	6673	7658	11667			
Top Log Interval	ft	No Logging	6630	7589			
Bottom Log Interval	ft	No Logging	7658	11667			
Begin Log Time	hrs	No Logging	9:58	18:40			
Begin Log Date	DD-MMM-YY	No Logging	2-Nov-12	6-Nov-12			
End Log Time	hrs	No Logging	2:07	10:46			
End Log Date	DD-MMM-YY	No Logging	4-Nov-12	8-Nov-12			
Drill or Wipe		Drill	Drill	Drill			
Flow Rate	gal/min	615	607	292			
Max AV / CV @ MWD	ft/min	486 / 166	480 / 404	478 / 387			
Min Inc @ Depth	deg @ ft	0.25 @ 6444	0.44 @ 6635	87.66 @ 10481			
Max Inc @ Depth	deg @ ft	20.21 @ 6952	88.46 @ 7584	91.60 @ 10861			
MUD DATA							
Depth	ft	6673	7658	11667			
Fluid Type		WBM	WBM	WBM			
Mud Weight	ppg	8.60	10.25	10.30			
Plastic Viscosity	cP	2	16	15			
Solids / Sand	%	1.7 / 0.25	7.7 / 0.25	8.7 / 0.25			
Total Chlorides	ppm	1200	1200	1300			
pH		8.5	8.9	10.1			
Oil:Water Ratio	% Vol	98.0:2.0	89.0:11.0	89.0:11.0			
Rm @ Temperature	ohm-m @ deg F	N/A	N/A	1.96 @ 66			
Rmc @ Temperature	ohm-m @ deg F	N/A	N/A	1.96 @ 63			
Rmf @ Temperature	ohm-m @ deg F	N/A	N/A	1.95 @ 67			
KCl	% Vol	0	0	0			
Client Representative		D. Barone	D. Barone	D. Barone			
WeatherfordM/LWD Engineer		R. Komrs	R. Komrs	V. Campos			

EQUIPMENT SUMMARY					
M/LWD Run Number	1	2	3		
MWD Build Number	CP20703PDYBG-01	CP20703PDYBG-02	N/A		
HEL Serial Number	N/A	N/A	NW22040PDB4.75-M3		
MFR Serial Number	N/A	N/A	NW22041RBBK4.75-M1		
IDS Serial Number	N/A	N/A	NW22046BI4.75		
SAGR Serial Number	N/A	N/A	NW22349JB4.75		
Sensor to Bit Offsets / Acquisition Rates					
Directional	ft / sec	57.92 / RT	57.51 / RT	52.29 / RT	
Gamma Ray	ft / sec	43.71 / RT	43.67 / RT	37.73 / 5	
Resistivity	ft / sec	N/A	N/A	73.53 / 5	
Other Information					
Total BHA Length	ft	96.68	96.27	133.98	
BHA Assembly Type		Steerable	Steerable	Steerable	
Stabilizer Location	ft	N/A	N/A	34.20	
Stabilizer Location	ft	N/A	N/A	N/A	
Run Circulating Time	hr	45.65	39.64	54.37	
Run Drilling Time	hr	25.26	20.12	22.86	

# MUD SUMMARY

Date and Time	Run	Bit Depth	Mud Weight	% K	Rm @ Temp	Rmf @ Temp	Rmc @ Temp	BHCT
02 Nov 12 @ 03:30	01	6673 ft	8.60 ppg	0	N/A	N/A	N/A	166 F
04 Nov 12 @ 10:15	02	7658 ft	10.25 ppg	0	N/A	N/A	N/A	176 F
08 Nov 12 @ 14:00	03	11667 ft	10.30 ppg	0	1.96 @ 66	1.95 @ 67	1.96 @ 63	231 F

## M/LWD RUN REMARKS

**Run Number: 1 :: REAL TIME DATA LOG**

**WFT Services Provided:**

Real Time Logging: Gamma Ray and Temperature.

Directional Services: On demand Inclination and Azimuth.

**Borehole and Environmental Correction:**

Collar O.D.: 6.75 in.

**Gamma Ray:** Collar O.D., collar I.D. and K1 factor.

Collar I.D.: 3.250 in.

K1 Factor: 3.012

KCl Concentration: 0%

**Run Number: 2 :: REAL TIME DATA LOG**

**WFT Services Provided:**

Real Time Logging: Gamma Ray and Temperature.

Directional Services: On demand Inclination and Azimuth.

**Borehole and Environmental Correction:**

Collar O.D.: 6.75 in.

**Gamma Ray:** Collar O.D., collar I.D. and K1 factor.

Collar I.D.: 3.250 in.

K1 Factor: 3.012

KCl Concentration: 0%

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

**WFT Services Provided:**

Recorded and Real Time Logging: Gamma Ray, Deep, Medium 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: 10.30 ppg

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

Borehole Temperature: 231° F

Drilling Fluid Resistivity: 1.96 ohm-m

KCl Concentration: 0%

M/LWD LOG COMMENTS

Comment No. 1-1

REAL TIME DATA LOG

Start of MWD Drilling Run 01

Weatherford International provided 6 3/4 in. Directional and Temperature for Run 01.

Run 01 started formation drilling October 30, 2012 at 05:00 at 1125 MD / 1124 TVD. Weatherford International logged the 8.750 in. borehole.

The WBM at the start of drilling was 8.40 ppg.

Comment No. 1-2

End of MWD Drilling Run 01

Run 01 ended drilling formation November 2, 2012 at 03:30 at 6673 MD / 6631 TVD.

The WBM at the end of drilling was 8.60 ppg.

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 November 2, 2012 at 09:58 at 6673 MD / 6631 TVD. Weatherford International logged the 8.750 in. borehole.

The WBM at the start of drilling was 8.60 ppg.

Comment No. 2-2

End of MWD Drilling Run 02

Run 02 ended drilling formation November 4, 2012 at 02:07 at 7658 MD / 7236 TVD.

The WBM at the end of drilling was 10.25 ppg.

Comment No. 3-1

RECORDED DATA LOG

Start of LWD Drilling Run 03

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

Run 03 started formation drilling November 6, 2012 at 18:40 at 7658 MD / 7236 TVD. Weatherford International logged the 6.125 in. borehole.

The WBM at the start of drilling was 8.60 ppg.

Comment No. 3-2

End of LWD Drilling Run 03

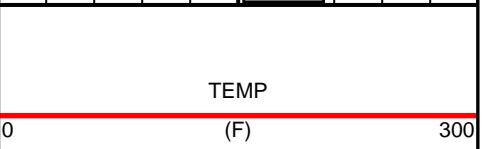
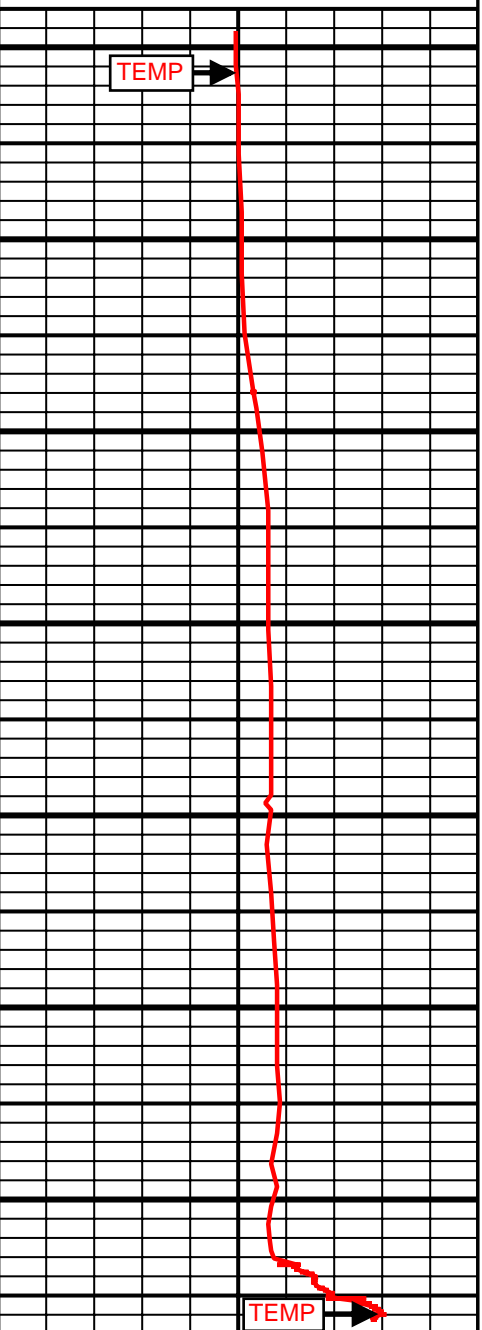
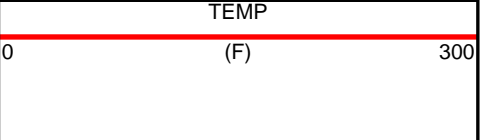
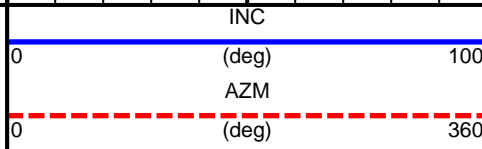
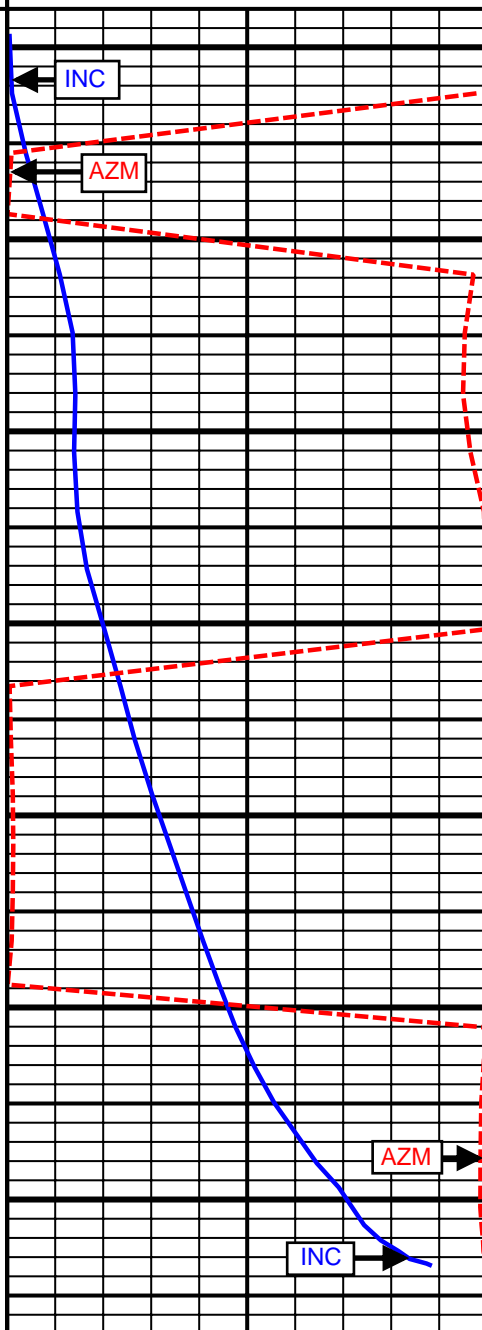
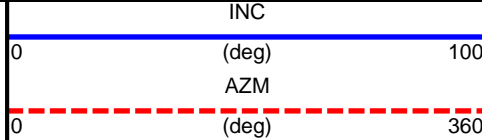
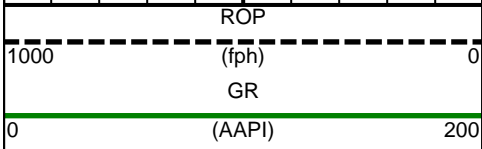
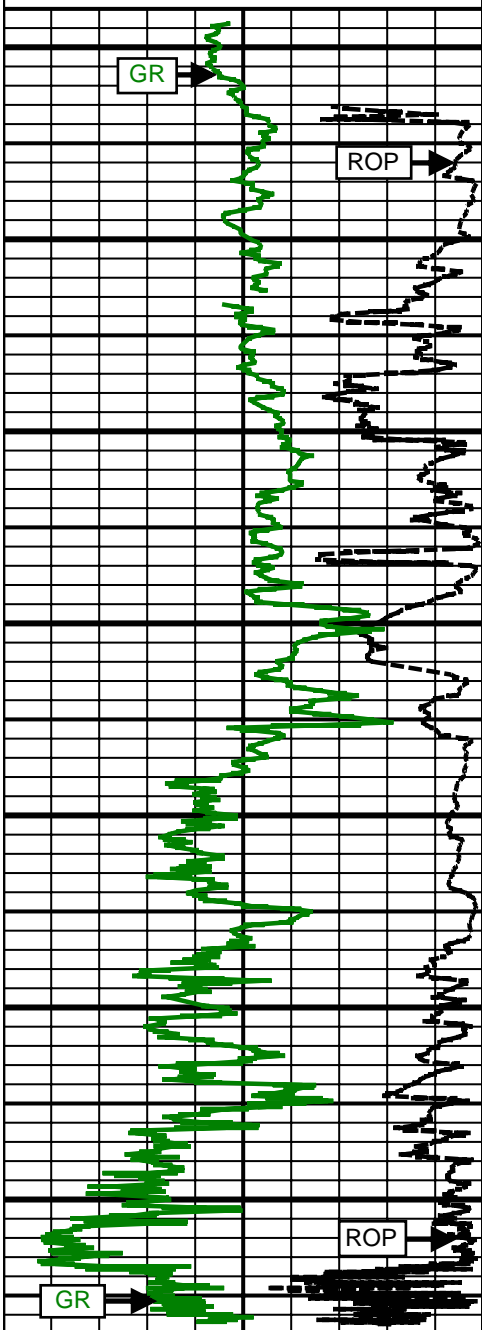
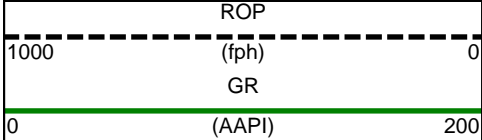
Run 03 ended drilling formation November 8, 2012 at 10:46 at 11667 MD / 7264 TVD.

The WBM at the end of drilling was 10.30 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
Inclination	INC	deg	Survey Inclination No Smoothing	None
Azimuth	AZM	deg	Survey Azimuth No Smoothing	
Temperature	TEMP	F	Temperature 3.0 ft window 0.5 ft Exponential Smoothing	

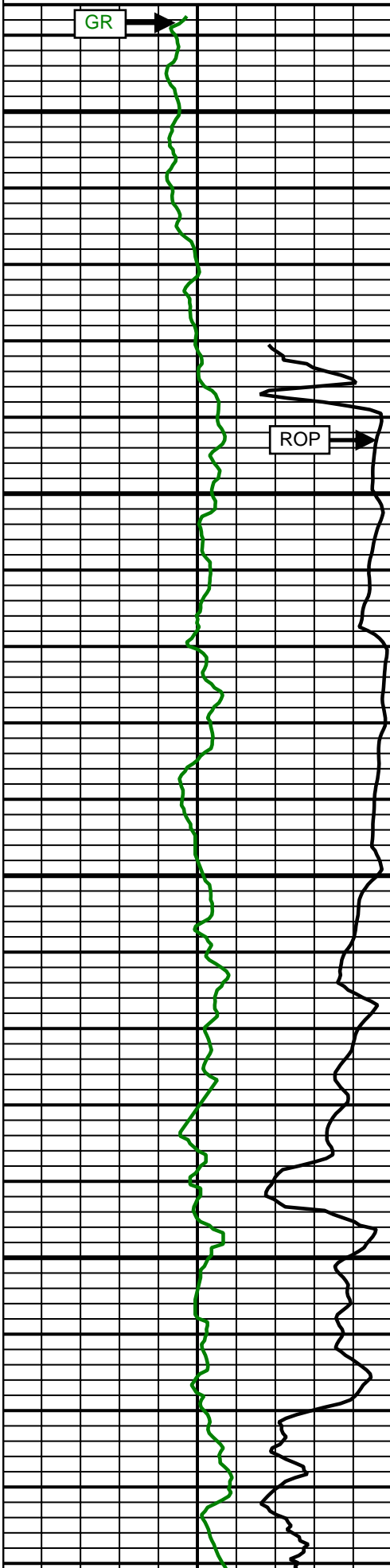


**1 Inch - True Vertical Depth**



**5 Inch - True Vertical Depth**

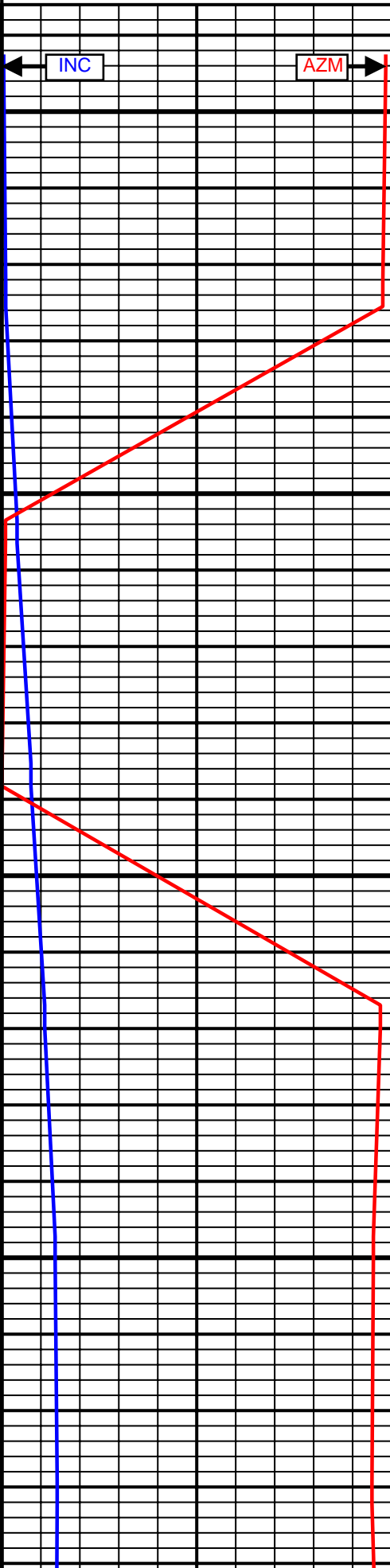
ROP (fph) 0  
GR  
(AAPI) 200



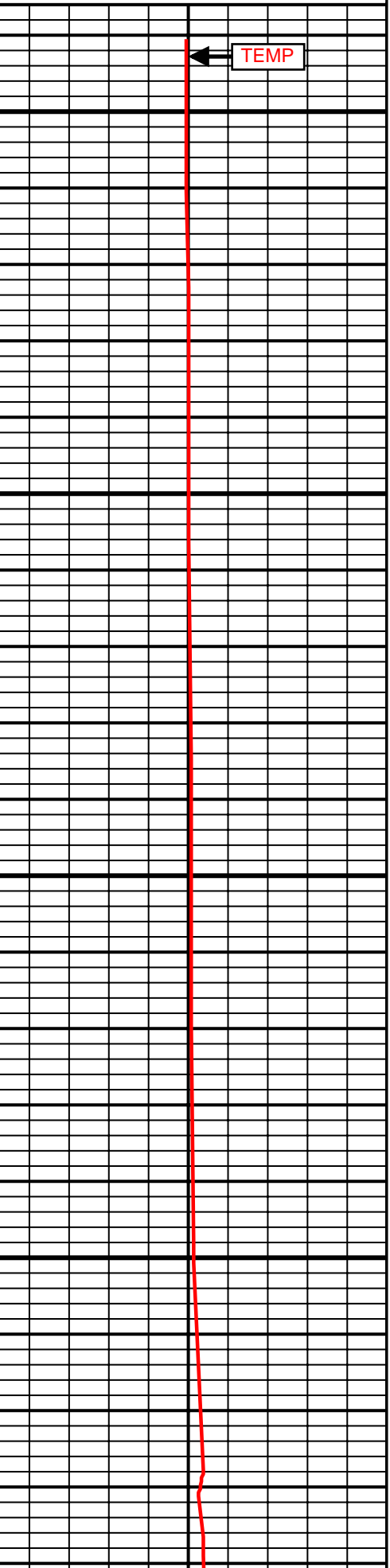
6600  
TVD

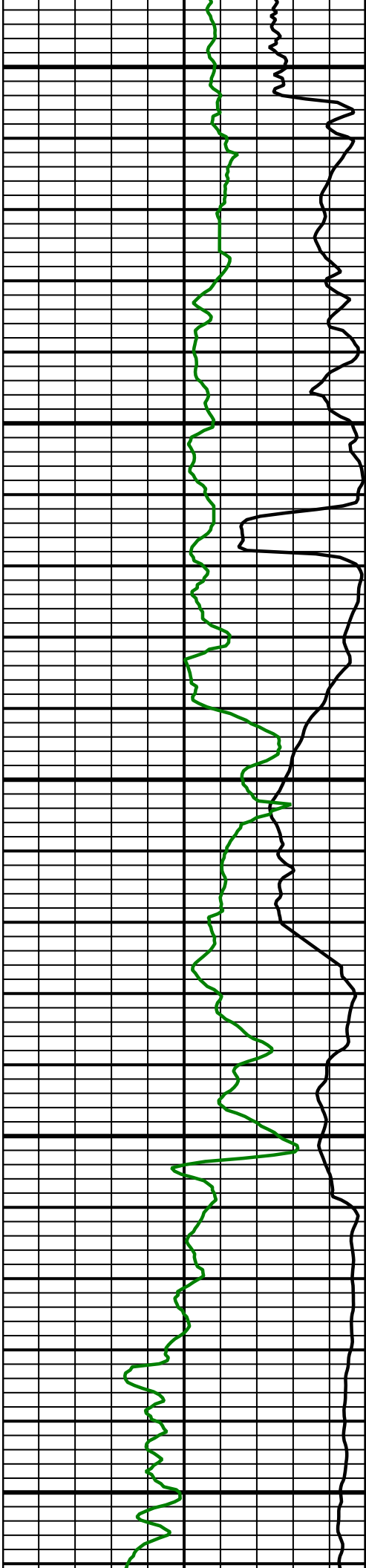
6700  
TVD

INC (deg) 0 100  
AZM (deg) 0 360



TEMP (F) 0 300

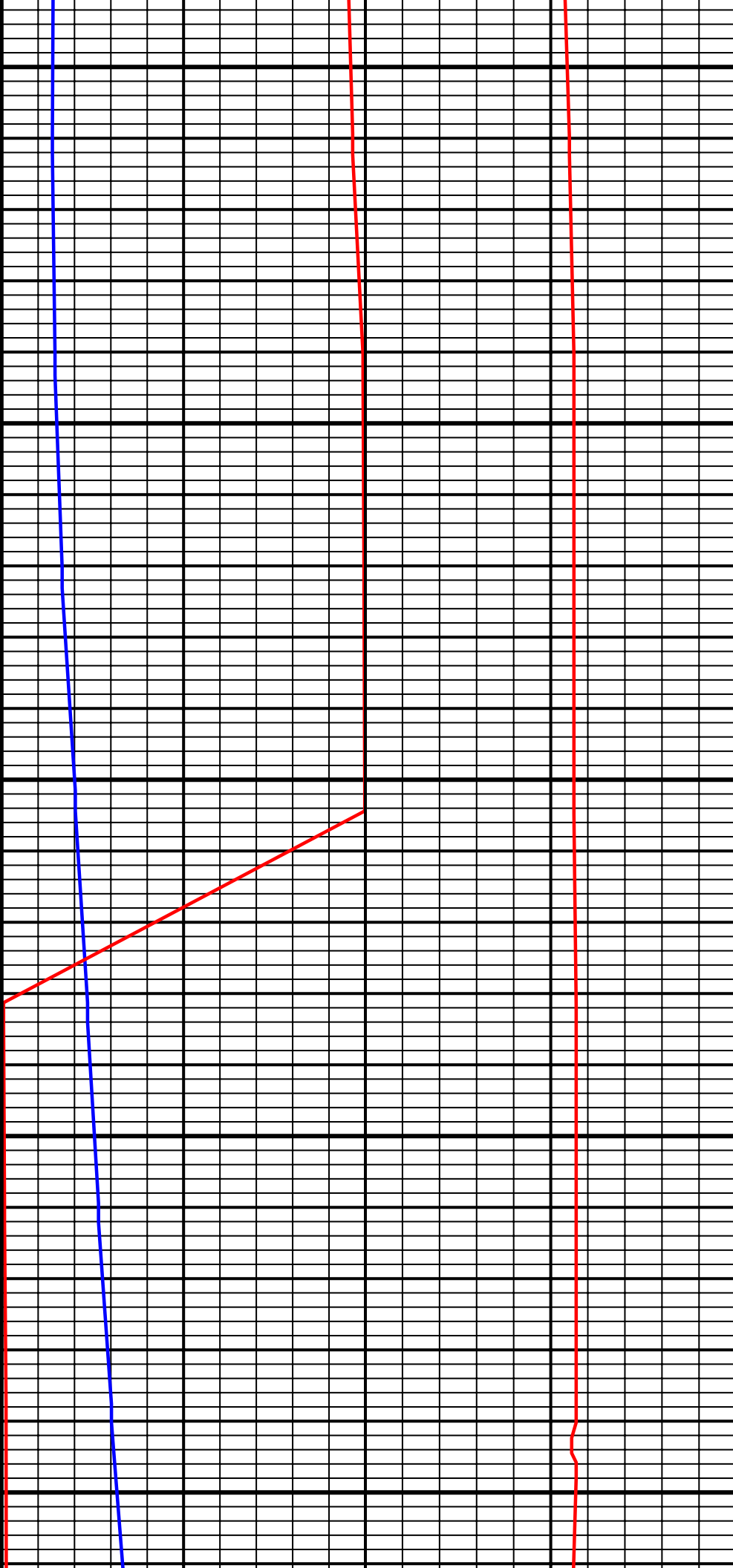


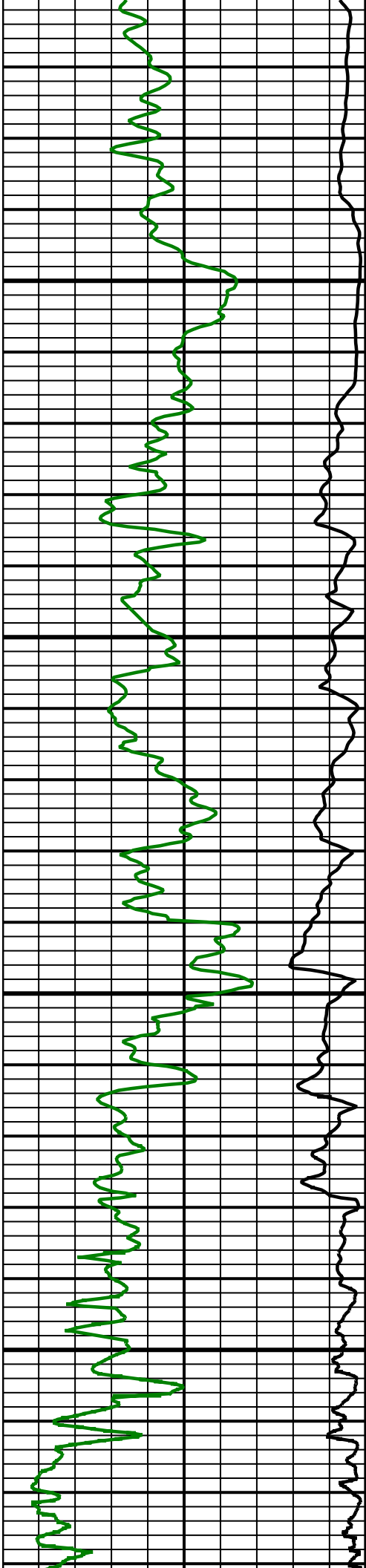


6800  
TVD

6900  
TVD

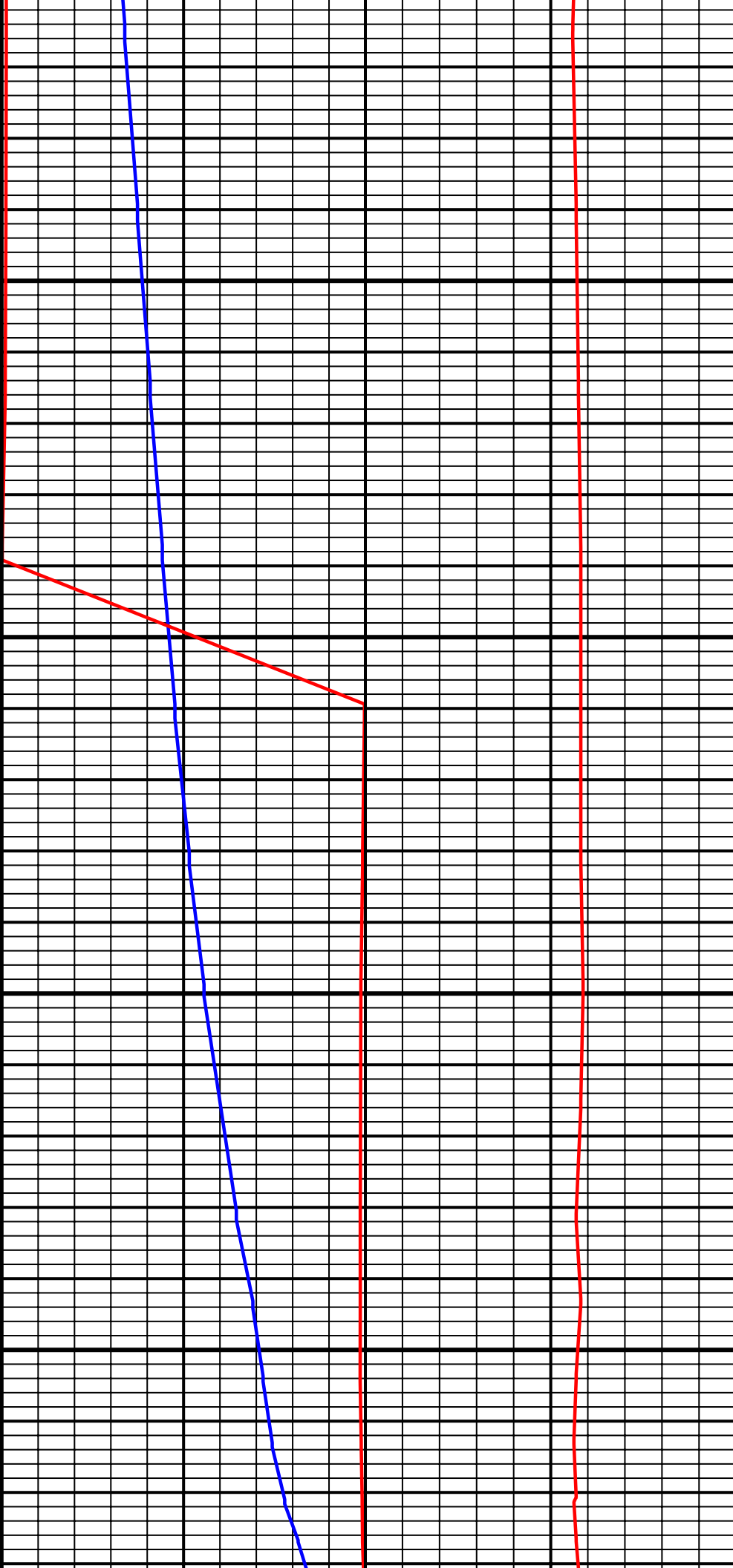
7000  
TVD

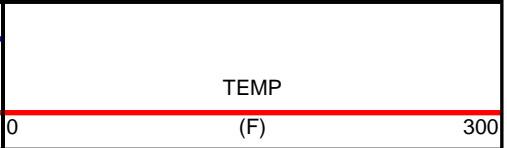
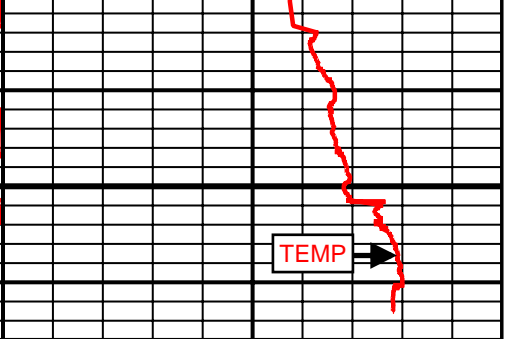
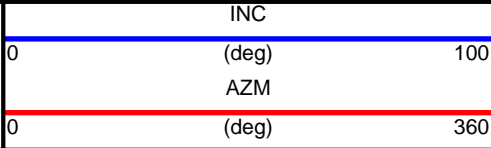
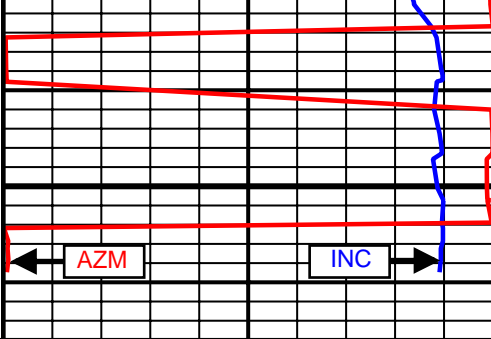
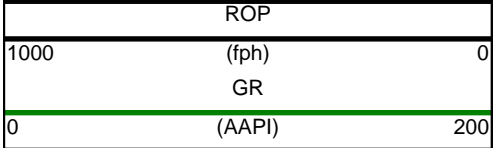
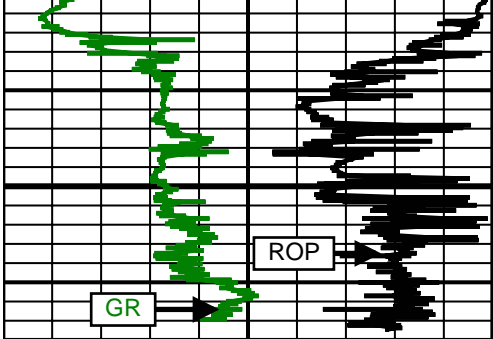




7100  
TVD

7200  
TVD





SURVEY						
Survey Calculation Method: Minimum Curvature						
Magnetic Reference	Target Direction	Total Magnetic Field	Magnetic Dip Angle	Magnetic Declination	Grid Convergence	Total Correction
True North	6.83 deg	52936 nT	66.94 deg	8.57 deg	0.00 deg	8.57 deg
Survey Tie-On	Depth	INC	AZ	TVD	NS	EW
	1125.00 ft	0.83 deg	305.45 deg	1124.98 ft	-0.23 ft	-5.91 ft

Well Head							
Depth (ft)	Inc (deg)	Azm (deg)	TVD (ft)	NS (ft)	EW (ft)	VSect (ft)	Dogleg (deg/100ft)
1191.00	1.04	287.00	1190.97	0.22	-6.87	-0.60	0.55
1323.00	3.53	234.80	1322.87	-1.77	-11.34	-3.11	2.28
1415.00	3.76	231.75	1414.68	-5.27	-16.02	-7.14	0.33
1509.00	4.14	234.39	1508.46	-9.15	-21.20	-11.61	0.45
1605.00	4.48	236.44	1604.18	-13.24	-27.14	-16.38	0.39
1699.00	3.09	218.04	1697.98	-17.27	-31.76	-20.92	1.95
1794.00	0.95	180.33	1792.92	-20.07	-33.35	-23.90	2.54
1889.00	0.76	173.79	1887.91	-21.49	-33.28	-25.29	0.22
1984.00	0.85	179.00	1982.90	-22.82	-33.20	-26.61	0.12
2078.00	2.22	131.11	2076.87	-24.71	-31.82	-28.32	1.88
2173.00	4.16	119.45	2171.71	-27.62	-27.43	-30.68	2.14
2267.00	5.59	108.68	2265.37	-30.76	-20.12	-32.94	1.80
2362.00	6.86	107.00	2359.81	-33.90	-10.32	-34.89	1.35
2457.00	8.93	105.78	2453.91	-37.57	2.21	-37.04	2.19
2552.00	7.54	103.65	2547.93	-41.04	15.36	-38.92	1.50
2646.00	8.63	112.39	2640.99	-45.18	27.87	-41.55	1.74
2741.00	10.00	116.24	2734.74	-51.55	41.86	-46.20	1.58
2836.00	9.50	115.30	2828.37	-58.54	56.35	-51.43	0.55
2932.00	9.01	116.27	2923.12	-65.26	70.25	-56.44	0.54
3027.00	8.78	110.34	3016.98	-71.07	83.72	-60.61	0.99
3122.00	7.27	107.10	3111.04	-75.36	96.27	-63.37	1.66
3217.00	7.72	107.90	3205.23	-79.09	108.08	-65.67	0.49
3312.00	8.49	104.41	3299.28	-82.79	120.95	-67.82	0.96
3407.00	7.07	103.80	3393.41	-85.93	133.42	-69.46	1.50
3502.00	8.25	111.22	3487.56	-89.79	145.45	-71.86	1.62
3597.00	9.45	111.45	3581.43	-95.11	159.06	-75.52	1.26
3692.00	7.26	110.08	3675.41	-100.03	171.96	-78.87	2.31
3787.00	7.64	110.41	3769.61	-104.29	183.52	-81.72	0.40
3882.00	8.52	110.93	3863.67	-109.01	196.01	-84.92	0.93
3976.00	9.71	110.84	3956.48	-114.31	209.92	-88.54	1.27
4071.00	10.85	111.19	4049.95	-120.40	225.75	-92.69	1.20
4166.00	10.73	110.87	4143.27	-126.78	242.35	-97.06	0.14
4261.00	9.60	104.70	4236.78	-131.94	258.27	-100.29	1.65
4356.00	8.20	103.75	4330.64	-135.56	272.52	-102.19	1.48
4451.00	8.59	117.88	4424.63	-140.49	285.37	-105.55	2.20
4545.00	8.45	111.44	4517.59	-146.30	298.01	-109.82	1.03
4641.00	8.35	114.72	4612.56	-151.79	310.90	-113.74	0.51
4736.00	10.46	112.90	4706.28	-158.03	325.11	-118.24	2.24
4831.00	9.65	107.09	4799.82	-163.73	340.67	-122.05	1.37
4926.00	8.39	102.99	4893.65	-167.62	355.03	-124.21	1.49
5021.00	8.62	105.49	4987.60	-171.08	368.65	-126.03	0.46
5116.00	8.94	113.02	5081.49	-175.87	382.30	-129.16	1.25



5211.00	10.63	115.00	5175.11	-182.46	397.04	-133.95	1.81
5307.00	8.85	114.64	5269.72	-189.28	411.78	-138.97	1.86
5402.00	9.15	116.32	5363.55	-195.68	425.19	-143.72	0.42
5496.00	7.55	116.24	5456.55	-201.72	437.43	-148.27	1.70
5591.00	6.14	114.78	5550.87	-206.61	447.64	-151.91	1.50
5686.00	4.75	112.25	5645.44	-210.23	455.89	-154.52	1.48
5780.00	5.70	114.01	5739.05	-213.60	463.76	-156.94	1.02
5875.00	4.87	112.02	5833.64	-217.04	471.81	-159.39	0.89
5970.00	4.86	108.44	5928.30	-219.82	479.36	-161.25	0.32
6065.00	2.83	106.93	6023.08	-221.78	485.43	-162.47	2.14
6160.00	1.09	112.54	6118.02	-222.81	488.50	-163.13	1.84
6254.00	0.29	67.29	6212.02	-223.06	489.55	-163.25	0.97
6349.00	0.36	40.70	6307.02	-222.74	489.97	-162.89	0.17
6444.00	0.25	24.58	6402.01	-222.32	490.25	-162.44	0.15
6540.00	0.29	8.18	6498.01	-221.89	490.37	-162.00	0.09
6615.00	0.30	346.78	6573.01	-221.51	490.35	-161.63	0.15
6635.00	0.44	354.48	6593.01	-221.39	490.33	-161.50	0.74
6666.00	0.98	351.87	6624.01	-221.00	490.28	-161.13	1.74
6697.00	3.86	3.23	6654.98	-219.70	490.30	-159.83	9.37
6729.00	7.45	0.14	6686.82	-216.55	490.37	-156.70	11.25
6761.00	10.95	349.60	6718.40	-211.48	489.83	-151.73	12.10
6792.00	13.63	343.11	6748.69	-205.09	488.23	-145.57	9.71
6825.00	14.18	341.79	6780.72	-197.53	485.84	-138.35	1.92
6856.00	13.92	347.37	6810.80	-190.29	483.84	-131.40	4.45
6888.00	14.62	357.56	6841.82	-182.49	482.82	-123.78	8.14
6919.00	16.58	358.51	6871.67	-174.16	482.54	-115.54	6.38
6952.00	20.21	359.37	6902.98	-163.75	482.36	-105.23	11.03
6984.00	23.57	1.71	6932.67	-151.83	482.49	-93.37	10.85
7015.00	26.60	2.69	6960.74	-138.70	483.00	-80.27	9.87
7047.00	30.15	4.18	6988.89	-123.52	483.92	-65.09	11.31
7078.00	33.81	4.47	7015.19	-107.15	485.16	-48.69	11.82
7109.00	37.32	4.09	7040.40	-89.17	486.50	-30.68	11.34
7141.00	40.79	3.33	7065.24	-69.06	487.80	-10.55	10.95
7172.00	44.12	0.36	7088.12	-48.15	488.46	10.28	12.54
7204.00	47.59	359.05	7110.40	-25.19	488.33	33.06	11.23
7236.00	51.55	357.22	7131.15	-0.85	487.53	57.13	13.12
7267.00	55.60	355.45	7149.55	24.03	485.93	81.65	13.85
7299.00	59.90	354.90	7166.62	50.99	483.65	108.15	13.52
7330.00	64.49	354.91	7181.08	78.30	481.21	134.97	14.81
7362.00	69.05	354.87	7193.70	107.58	478.59	163.73	14.25
7393.00	71.86	354.78	7204.07	136.67	475.96	192.30	9.07
7425.00	74.36	355.80	7213.37	167.18	473.45	222.30	8.39
7458.00	77.81	356.80	7221.30	199.14	471.38	253.79	10.86
7489.00	81.50	357.18	7226.87	229.59	469.78	283.83	11.96
7521.00	83.83	358.11	7230.95	261.30	468.48	315.16	7.83
7552.00	87.34	359.79	7233.34	292.20	467.91	345.77	12.55
7584.00	88.46	1.60	7234.51	324.17	468.30	377.56	6.65
7600.00	88.25	1.25	7234.97	340.16	468.70	393.49	2.55
7730.00	89.38	1.92	7237.66	470.08	472.29	522.91	1.01
7825.00	89.69	2.21	7238.43	565.02	475.72	617.58	0.45
7920.00	89.69	2.33	7238.94	659.94	479.48	712.28	0.13
8014.00	90.80	3.06	7238.54	753.83	483.90	806.03	1.41
8109.00	88.52	0.45	7239.11	848.77	486.81	900.64	3.65
8204.00	87.96	358.75	7242.02	943.72	486.15	994.84	1.88
8300.00	89.07	359.56	7244.51	1039.68	484.73	1089.94	1.43
8395.00	89.44	359.72	7245.75	1134.67	484.13	1184.19	0.42
8490.00	89.57	359.62	7246.57	1229.66	483.59	1278.44	0.17
8585.00	90.99	359.52	7246.10	1324.65	482.87	1372.68	1.50
8680.00	87.72	355.31	7247.17	1419.52	478.59	1466.36	5.61
8774.00	88.64	355.42	7250.16	1513.16	471.00	1558.44	0.99
8869.00	89.81	355.51	7251.44	1607.85	463.49	1651.56	1.24

8964.00	90.06	358.03	7251.55	1702.70	458.14	1745.10	2.67
9059.00	90.44	0.11	7251.14	1797.68	456.60	1839.22	2.23
9153.00	90.12	359.11	7250.68	1891.67	455.96	1932.47	1.12
9248.00	89.75	0.89	7250.78	1986.67	455.96	2026.79	1.91
9342.00	89.51	0.01	7251.39	2080.66	456.69	2120.21	0.97
9437.00	90.31	1.33	7251.54	2175.65	457.80	2214.66	1.62
9532.00	90.49	1.74	7250.88	2270.62	460.35	2309.25	0.47
9627.00	90.06	1.03	7250.42	2365.59	462.65	2403.82	0.87
9721.00	89.51	0.88	7250.77	2459.57	464.21	2497.32	0.61
9816.00	90.56	4.84	7250.72	2554.43	468.95	2592.08	4.31
9911.00	89.81	4.28	7250.41	2649.13	476.50	2687.00	0.99
10006.00	89.38	3.31	7251.08	2743.92	482.79	2781.86	1.12
10101.00	91.30	4.21	7250.52	2838.71	489.02	2876.72	2.23
10196.00	90.80	4.23	7248.78	2933.43	496.01	2971.60	0.53
10292.00	89.81	4.24	7248.27	3029.17	503.10	3067.50	1.03
10387.00	90.49	1.09	7248.02	3124.05	507.52	3162.24	3.39
10481.00	87.66	357.40	7249.53	3218.01	506.28	3255.38	4.95
10576.00	88.83	357.20	7252.44	3312.86	501.81	3349.02	1.25
10672.00	89.57	359.01	7253.78	3408.79	498.63	3443.90	2.04
10767.00	89.75	0.29	7254.35	3503.78	498.05	3538.15	1.36
10861.00	91.60	1.89	7253.24	3597.75	499.84	3631.66	2.60
10957.00	89.26	1.69	7252.52	3693.70	502.84	3727.28	2.45
11052.00	88.58	1.35	7254.31	3788.65	505.36	3821.86	0.80
11147.00	89.74	3.46	7255.70	3883.54	509.34	3916.56	2.53
11242.00	89.32	3.01	7256.48	3978.39	514.70	4011.37	0.65
11337.00	89.32	3.61	7257.61	4073.22	520.19	4106.18	0.63
11433.00	89.07	2.58	7258.96	4169.07	525.37	4201.97	1.10
11528.00	88.27	1.81	7261.16	4263.98	529.01	4296.63	1.17
11615.00	88.52	2.03	7263.60	4350.89	531.92	4383.28	0.38
Projected to Total Depth:							
11667.00	88.52	2.03	7264.96	4403.30	533.78	4435.53	0.00

---

\*Weatherford M/LWD surveys from 1191.00 ft MD to 11615.00 ft MD.\*

\*TD at 11667.00 ft MD.\*

The total correction is 8.57 deg relative to True North.

---



**Weatherford®**

Final Print

COMPANY	<u>Anadarko</u>		
WELL	<u>Haymaker 4C-9HZ</u>		
FIELD	<u>Wattenberg</u>		
RIG	<u>H &amp; P 307</u>		
LOC.	<u>Colorado</u>	COUNTY	<u>Weld</u>