

**Natural Gamma Ray
Rate Of Penetration**



1 : 1200

County	: Barber
Field	: Arrowhead
Location	: Lat: 37° 2' 5.26" North Long: 98° 24' 44.15" West
Well	: Schupbach 3510 #4-1H
Company	: Shell Exploration and Productio
Rig	: Nabors 180
LOCATION	Company : Shell Exploration and Productio Rig : Nabors 180 Well : Schupbach 3510 #4-1H Field : Arrowhead County : Barber API Number : 15007238530100
Latitude	: 37° 2' 5.26" North
Longitude	: 98° 24' 44.15" West
UTM Easting	= 2,025,611.78 ft
UTM Northing	= 134,054.97 ft
Other Services	Directional Services

Permanent Datum	: Ground Level	Elevation	: 1309.00 ft
Log Measured From	: Drill Floor	23.80 ft	Above Permanent Datum
Drilling Measured From	: Drill Floor	MD LOG	

Depth Logged	: 83.00 ft	To	9,880.00 ft
Date Logged	: 17-Aug-12	To	20-Sep-12
Total Depth MD	: 9,880.00 ft	TVD	: 4,794.26 ft
Spud Date	: 18-Aug-12	Plot Type	: Final
		Plot Date	: 20-Sep-12
		Unit No.	: PP#40
		Job No.	: OK-XX-0009504797

Run No.	Borehole Record (MD)		Run No.	Borehole Record (MD)	
	Size	From To		Size	From To
0100	12.250 in	83.00 ft			
0200	8.750 in	800.00 ft			
0300	8.750 in	4,318.00 ft			
0400	6.125 in	5,216.00 ft			
0500	6.125 in	6,191.00 ft			
0600	6.125 in	6,714.00 ft			
0700	6.125 in	7,788.00 ft			

WELL INFORMATION

MWD Run Number	200	300	400	500	600
Date run completed	05-Sep-12	08-Sep-12	12-Sep-12	14-Sep-12	16-Sep-12
Rig Bit Number	0200	0300	0400	0500	0600
Bit Size (in)	8.750	8.750	6.125	6.125	6.125
Tool Nominal OD (in)	8.000	6.750	4.750	4.750	4.750
Log Start Depth (MD, ft)	800.00	4,318.00	5,216.00	6,191.00	6,714.00
Log End Depth (MD, ft)	4,318.00	5,216.00	6,191.00	6,714.00	7,788.00
Drill or Wipe	Drill	Drill	Drill	Drill	Drill
Drill/Wipe Start Date and Time	02-Sep-12 09:13	05-Sep-12 13:11	10-Sep-12 04:45	12-Sep-12 08:44	14-Sep-12 01:35
Drill/Wipe End Date and Time	05-Sep-12 06:00	08-Sep-12 11:32	12-Sep-12 08:31	14-Sep-12 09:44	16-Sep-12 12:30
Min Inc (deg) @ Depth (MD, ft)	.03 @ 2,883.00	6.89 @ 4,273.00	89.60 @ 6,010.00	89.38 @ 6,485.00	89.66 @ 7,434.00
Max Inc (deg) @ Depth (MD, ft)	4.59 @ 804.00	86.28 @ 5,159.00	91.67 @ 5,725.00	90.62 @ 6,295.00	91.48 @ 7,244.00
Bit TFA(in2) / Bit Type	.66 / PDC	.45 / PDC	.55 / PDC	.55 / PDC	.52 / PDC
Flow Rate (gpm)	550.00	400.00	297.00	297.00	299.00
Max AV (fpm) / CV (fpm) @ MWD	286.0 / 322.0	332.0 / 420.0	479.0 / 520.0	484.0 / 520.0	484.0 / 520.0
Fluid Type	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel	Fresh Water Gel
Density (ppg) / Viscosity (spqt)	9.10 / 55.00	9.10 / 60.00	8.40 / 27.00	8.40 / 27.00	8.40 / 28.00
Filtrate CL (ppm)	22,000.00	20,500.00	2,600.00	2,500.00	28,000.00
pH / Fluid Loss (mptm)	11.20 / 0	11.20 / 0	11.20 / 5	11.20 / 0	11.20 / 5
PV (cP) / YP (lhf2)	18 / 18.00	25 / 18.00	1 / 1.00	1 / 1.00	1 / 1.00
% Solids / % Sand	4.50 / 1.00	7.90 / 1.00	1.00 / 0.75	1.00 / 1.00	1.00 / 0.75
% Oil / Oil:Water Ratio	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A	N/A / N/A
Rm @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A
Rmf @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A

Rmc @ Measured Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A
Max Tool Temp (degF) / Source	144.54 / PCM	139.96 / PCM	133.20 / PCM	133.20 / PCM	130.96 / PCM
Rm @ Max Tool Temp (degF)	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A	N/A @ N/A
Lead MWD Engineer	Fred Martin	Fred Martin	Fred Martin	Fred Martin	Fred Martin
Customer Representative	Jack Everett	Jack Everett	John Dyer	Jack Everett	Jack Everett

SENSOR INFORMATION

Directional Sensor Information

Tool Type	PCDC	PCDC	PCDC	PCDC	PCDC
Distance From Bit (ft)	60.16	54.22	50.29	51.20	51.24
Software Version	6.21	6.21	6.21	6.21	6.21
Sub Serial Number	11149805	11149805	11130241	11130241	11130421
Sonde Serial Number	400471	400261	400261	400471	400261
Sensor ID Number	N/A	N/A	N/A	N/A	N/A
Toolface Offset (deg)	39.40	358.40	234.52	101.36	38.01

Gamma Ray Sensor Information

Tool Type	PCG	PCG	PCG	PCG	PCG
Distance From Bit (ft)	55.06	49.12	45.19	46.10	46.14
Recorded Sample Period (sec)	20	15	15	15	15
Software Version	8.15	8.15	8.15	8.15	8.15
Sub Serial Number	11149805	11149805	11130241	11130241	11130241
Insert/Sonde Serial Number	11293316	11293340	11293340	11293316	11293340

Pulser Controller Sensor Information

Tool Type	PCM	PCM	PCM	PCM	PCM
Software Version	5.28	5.28	5.28	5.28	5.28
PIC Software Version	1.40	1.40	1.40	1.40	1.40
Sub/HOC Serial Number	11149805	11149805	11130241	11130241	11130241
Insert/Probe/Module SN	11400905	10868851	10868851	11400905	10868851
Battery Serial Number	N/A	N/A	N/A	N/A	N/A
Valve Insert SN	N/A	N/A	N/A	N/A	N/A
DC Insert Serial Number	N/A	N/A	N/A	N/A	N/A
Choke Size (32nd)	N/A	N/A	N/A	N/A	N/A
Driver Current (amps)	N/A	N/A	N/A	N/A	N/A
Driver SMI Current (amps)	N/A	N/A	N/A	N/A	N/A
Boot Strap Version	4,130.00	4,130.00	4,130.00	4,130.00	4,130.00

WELL INFORMATION

MWD Run Number	700			
Date run completed	20-Sep-12			
Rig Bit Number	0700			
Bit Size (in)	6.125			
Tool Nominal OD (in)	4.750			
Log Start Depth (MD, ft)	7,788.00			
Log End Depth (MD, ft)	9,880.00			
Drill or Wipe	Drill			
Drill/Wipe Start Date and Time	16-Sep-12 21:13			
Drill/Wipe End Date and Time	19-Sep-12 12:42			
Min Inc (deg) @ Depth (MD, ft)	88.37 @ 8,099.00			
Max Inc (deg) @ Depth (MD, ft)	91.97 @ 8,288.00			
Bit TFA(in2) / Bit Type	.64 / PDC			
Flow Rate (gpm)	300.00			
Max AV (fpm) / CV (fpm) @ MWD	490.0 / 498.0			
Fluid Type	Fresh Water Gel			

Density (ppg) / Viscosity (spqt)	8.40 / 30.00			
Filtrate CL (ppm)	2,700.00			
pH / Fluid Loss (mptm)	11.20 / 5			
PV (cP) / YP (lhf2)	1 / 2.00			
% Solids / % Sand	1.00 / 1.00			
% Oil / Oil:Water Ratio	N/A / N/A			
Rm @ Measured Temp (degF)	N/A @ N/A			
Rmf @ Measured Temp (degF)	N/A @ N/A			
Rmc @ Measured Temp (degF)	N/A @ N/A			
Max Tool Temp (degF) / Source	142.25 / PCM			
Rm @ Max Tool Temp (degF)	N/A @ N/A			
Lead MWD Engineer	Fred Martin			
Customer Representative	John Dyer			

SENSOR INFORMATION

Directional Sensor Information

Tool Type	PCDC			
Distance From Bit (ft)	57.17			
Software Version	6.21			
Sub Serial Number	11130241			
Sonde Serial Number	400471			
Sensor ID Number	N/A			
Toolface Offset (deg)	248.19			

Gamma Ray Sensor Information

Tool Type	PCG			
Distance From Bit (ft)	52.07			
Recorded Sample Period (sec)	15			
Software Version	8.15			
Sub Serial Number	11130241			
Insert/Sonde Serial Number	11293316			

Pulser Controller Sensor Information

Tool Type	PCM			
Software Version	5.28			
PIC Software Version	1.40			
Sub/HOC Serial Number	11130241			
Insert/Probe/Module SN	11400905			
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	4,130.00			

REMARKS

1. All depths are calibrated to the driller's pipe tally and are measured from the rotary table.
2. No depth corrections have been made for pipe stretch or compression.
3. All data presented is recorded (memory data) unless otherwise stated.

4. The following smoothing parameters have been applied to the data:

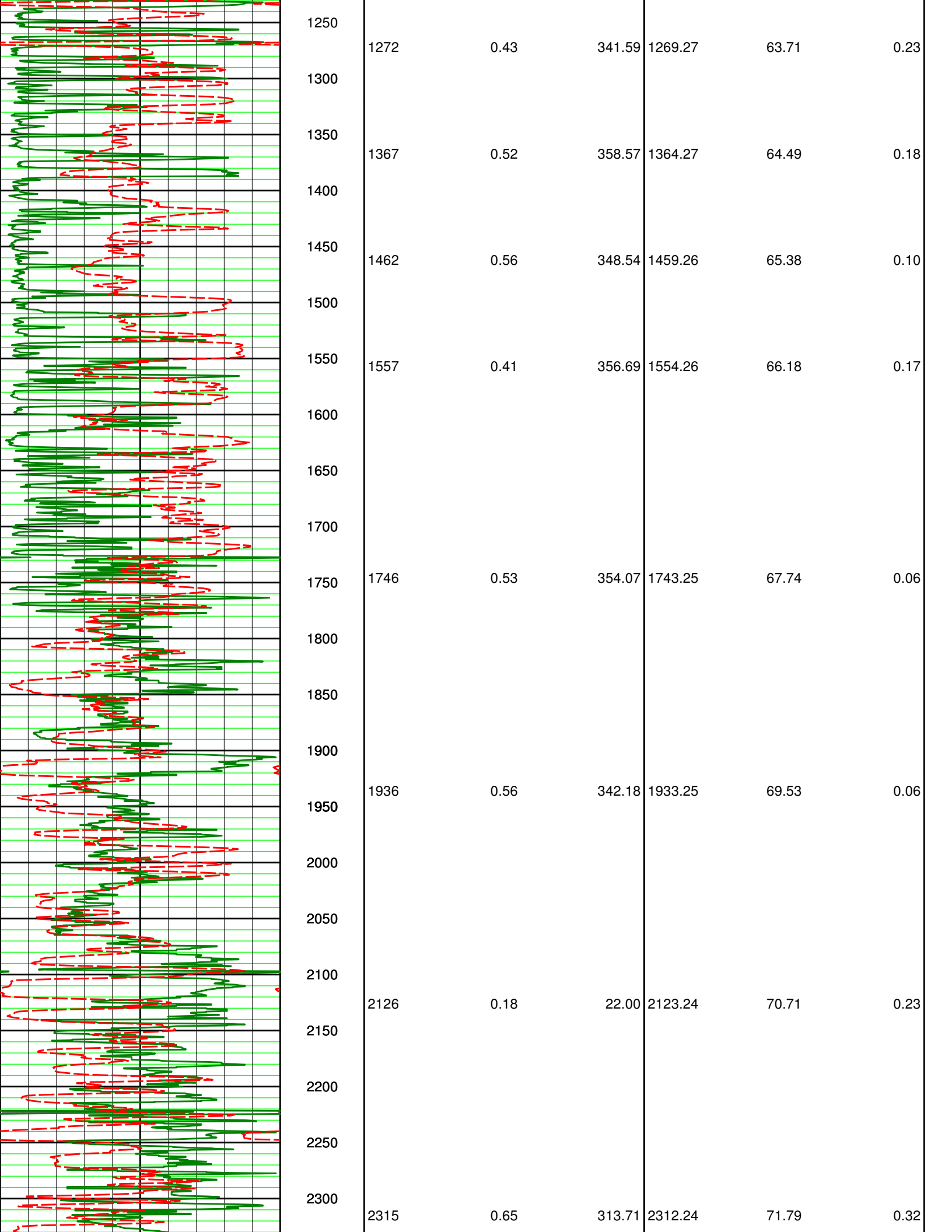
- ROP: 1.0 ft interval, 3.0 ft coercion distance.
- GAMMA: 0.5 ft interval, 0.6 ft coercion distance.

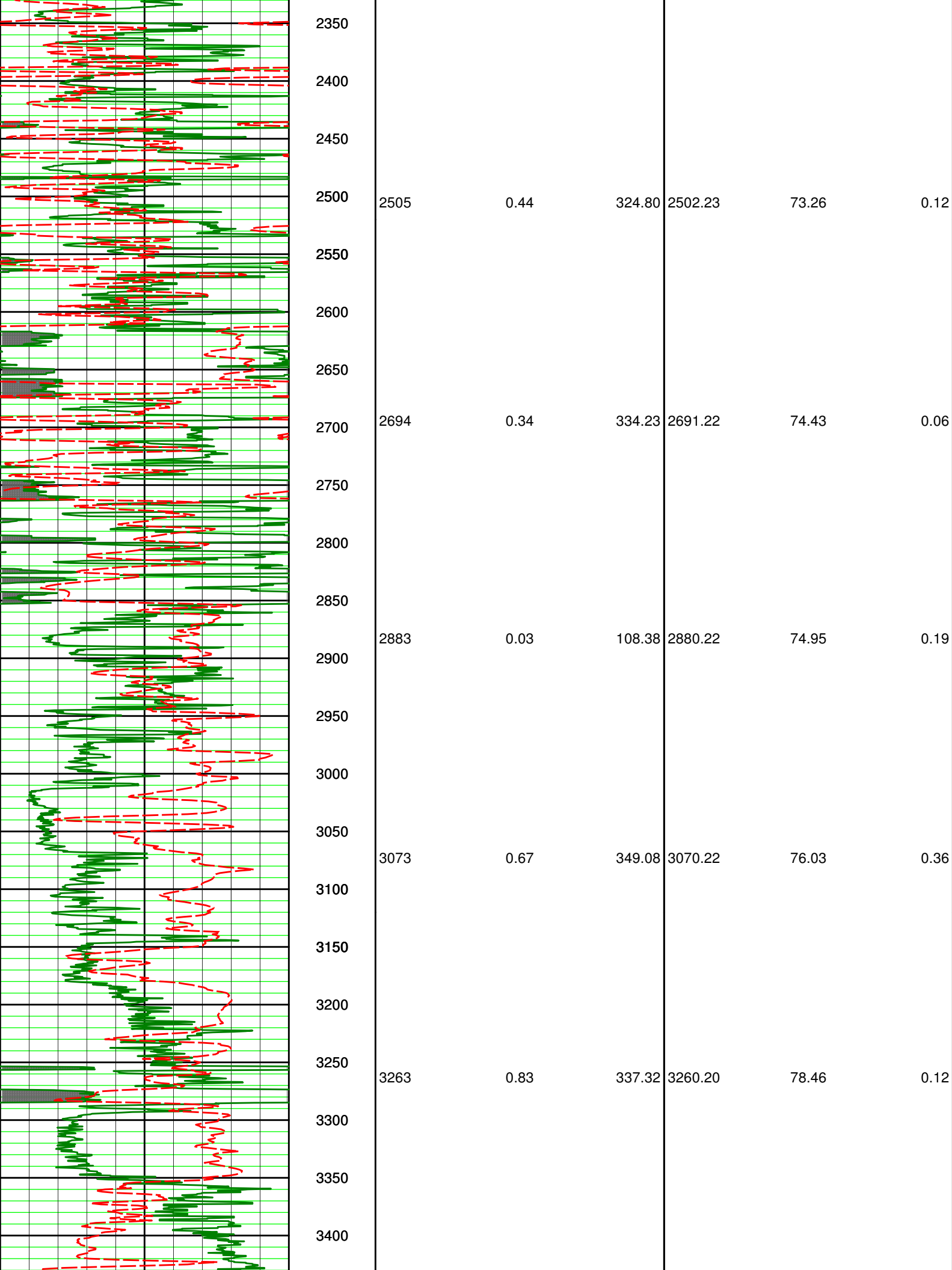
5. Run 100 was directional only.

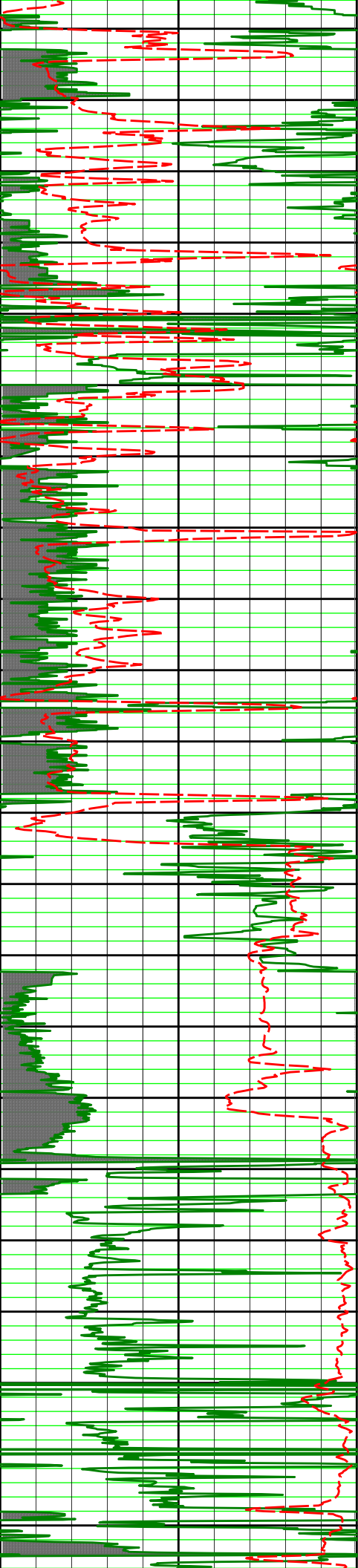
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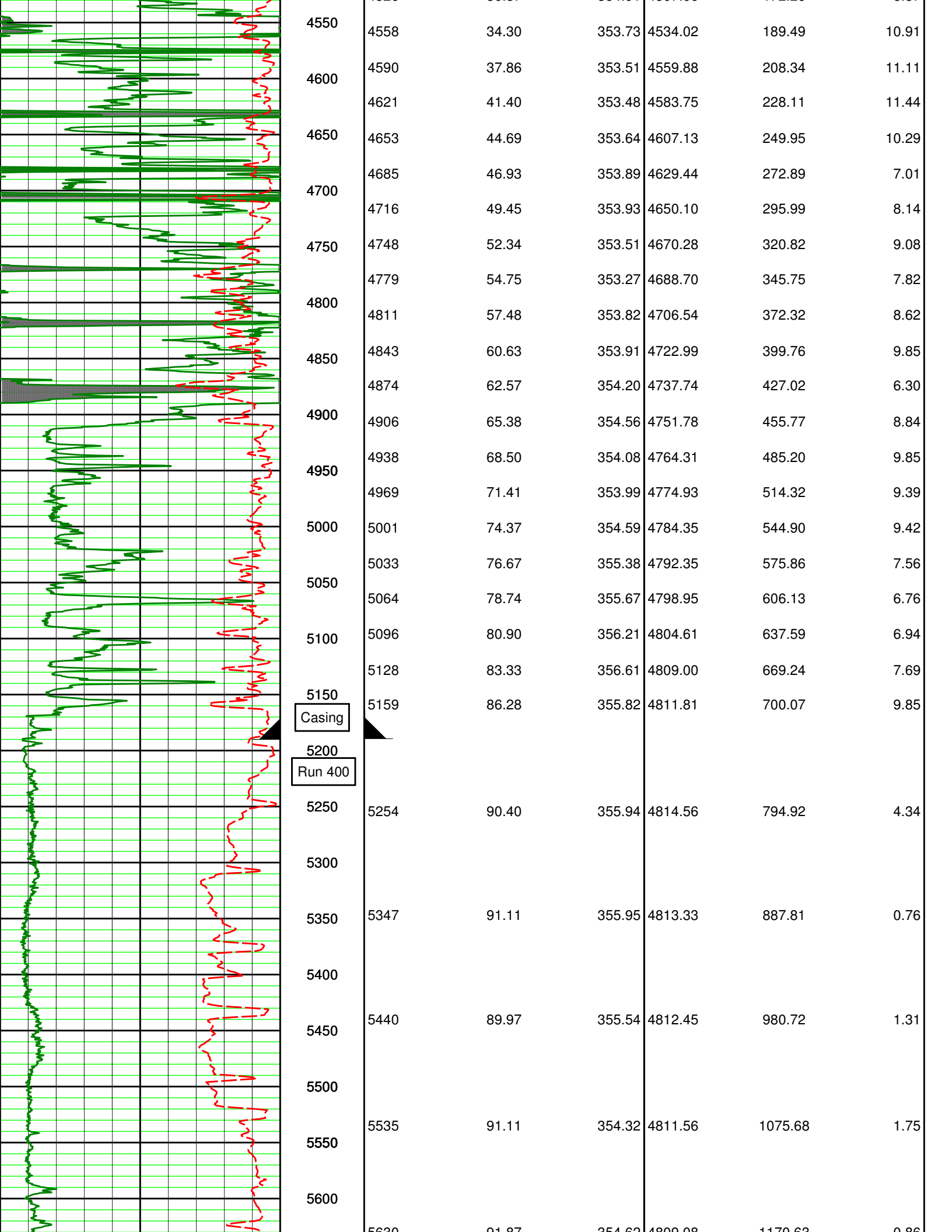
PCG GR XHi-Range RT api								
0 150								
Rate of Penetration feet per hr		MD ft	Surveys			Surveys		
250 0		1 : 1200	Depth	Inclination	Azimuth	TVD	Vertical Sec	Dogleg Sev
		733	733	5.25	351.70	730.83	44.99	0.64
		750	Casing					
		800	804	4.59	358.74	801.57	51.06	1.26
			Run 200					
		835	835	4.42	0.33	832.47	53.48	0.66
		850	866	3.82	0.51	863.39	55.69	1.95
		900	897	2.68	359.26	894.34	57.44	3.68
		950						
		1000	991	0.90	354.84	988.29	60.36	1.90
		1050						
		1100	1084	0.79	356.59	1081.28	61.73	0.12
		1150						
		1200	1178	0.61	356.34	1175.27	62.87	0.19

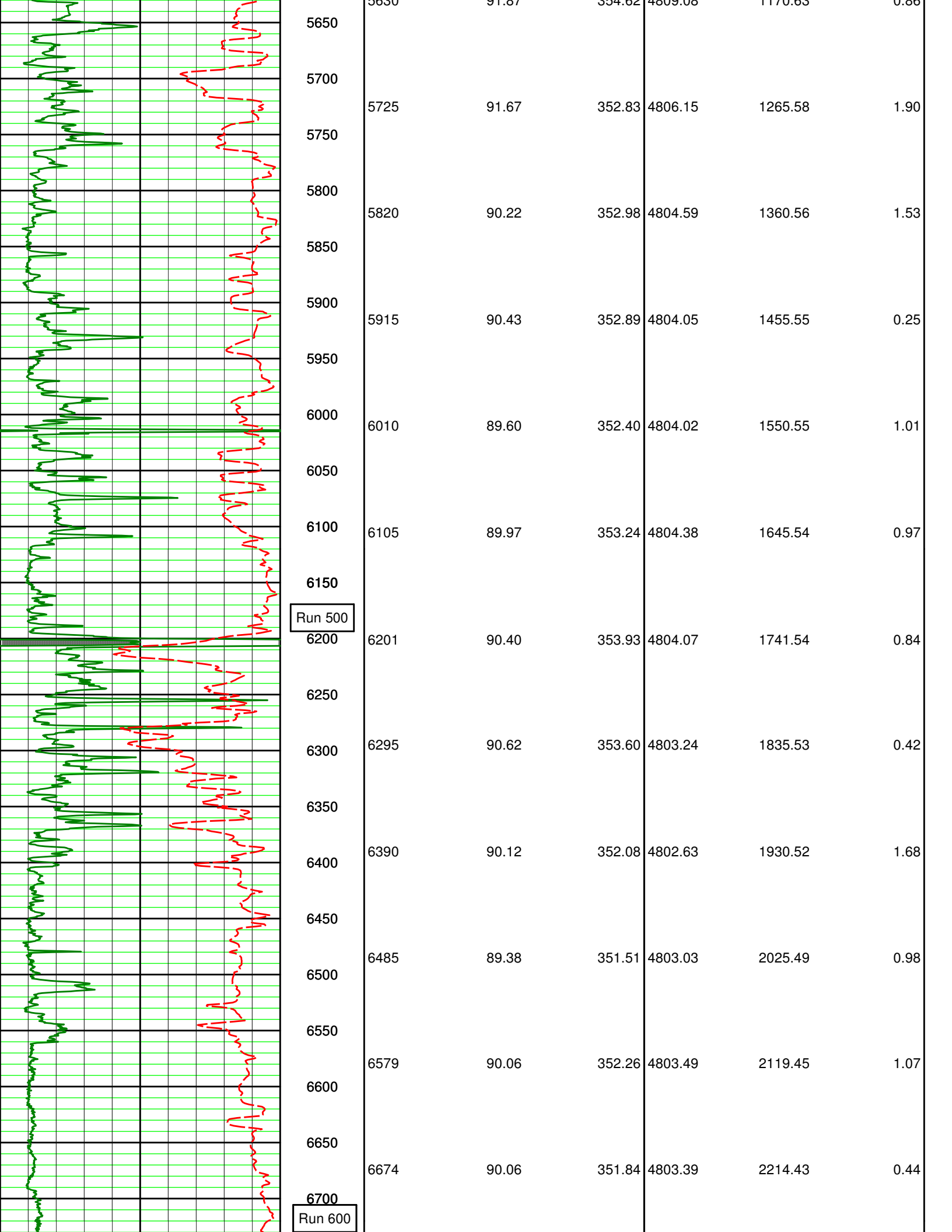


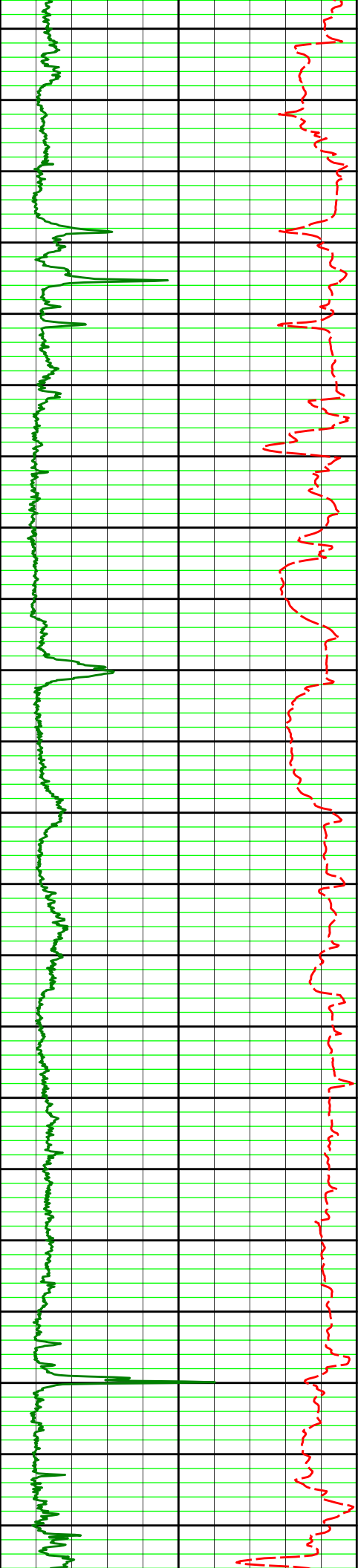




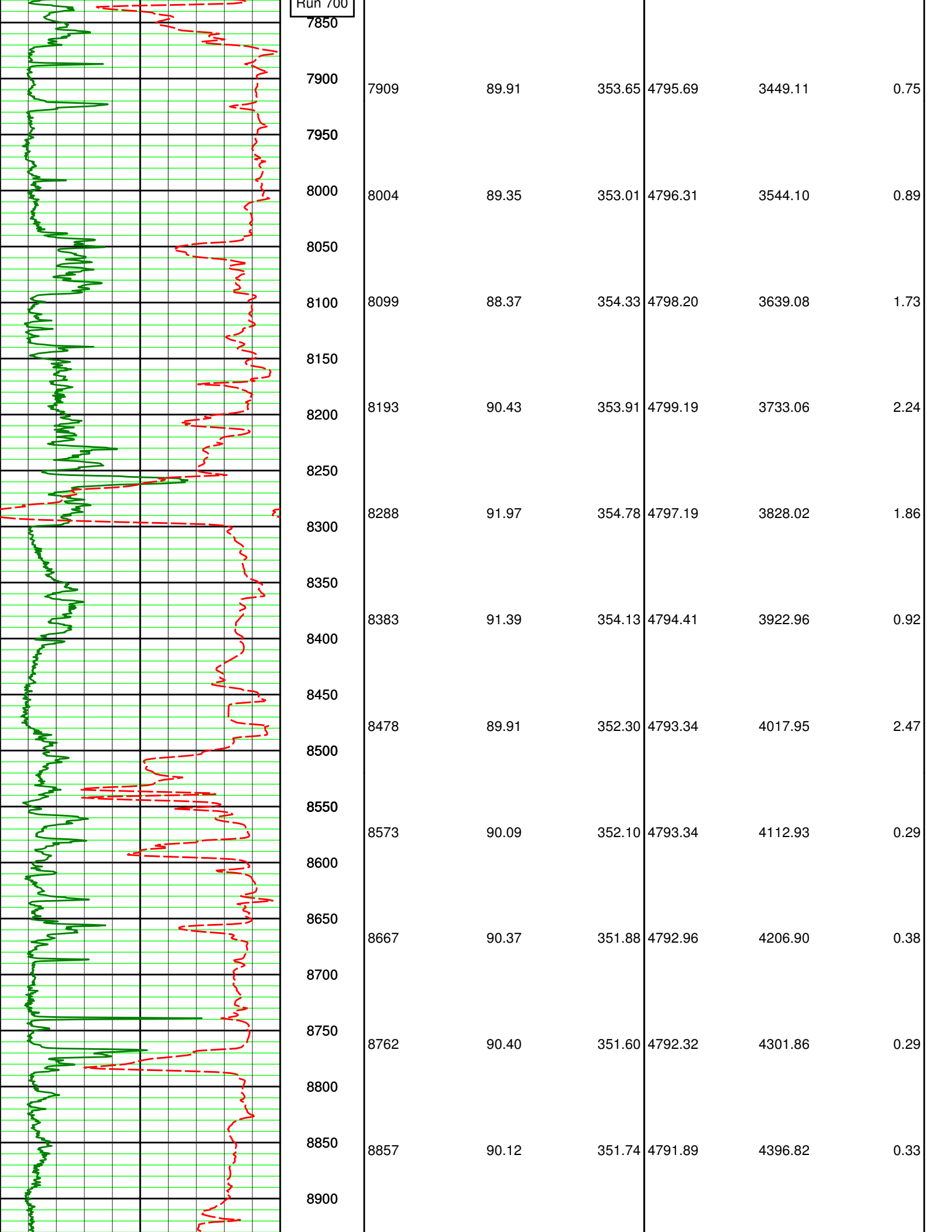
3450	3452	0.57	13.07	3449.19	80.66	0.26
3500						
3550						
3600						
3650	3642	0.50	347.24	3639.18	82.37	0.13
3700						
3750						
3800						
3850	3832	0.31	332.57	3829.18	83.68	0.11
3900						
3950						
4000						
4050	4022	0.22	306.56	4019.17	84.42	0.08
4100						
4150						
4200	4212	0.69	9.68	4209.17	85.77	0.33
4250	4243	3.63	2.18	4240.14	86.92	9.50
	4273	6.89	358.51	4270.01	89.65	10.92
4300	4305	10.02	357.88	4301.66	94.34	9.77
	4336	13.07	357.81	4332.03	100.52	9.83
4350	4368	16.20	357.59	4362.99	108.58	9.79
4400	4400	19.55	357.84	4393.44	118.37	10.48
4450	4431	22.58	357.74	4422.37	129.48	9.77
	4463	25.68	357.04	4451.57	142.53	9.74
4500	4495	28.19	356.15	4480.09	157.00	7.95
	4526	30.87	354.91	4507.06	172.26	8.87

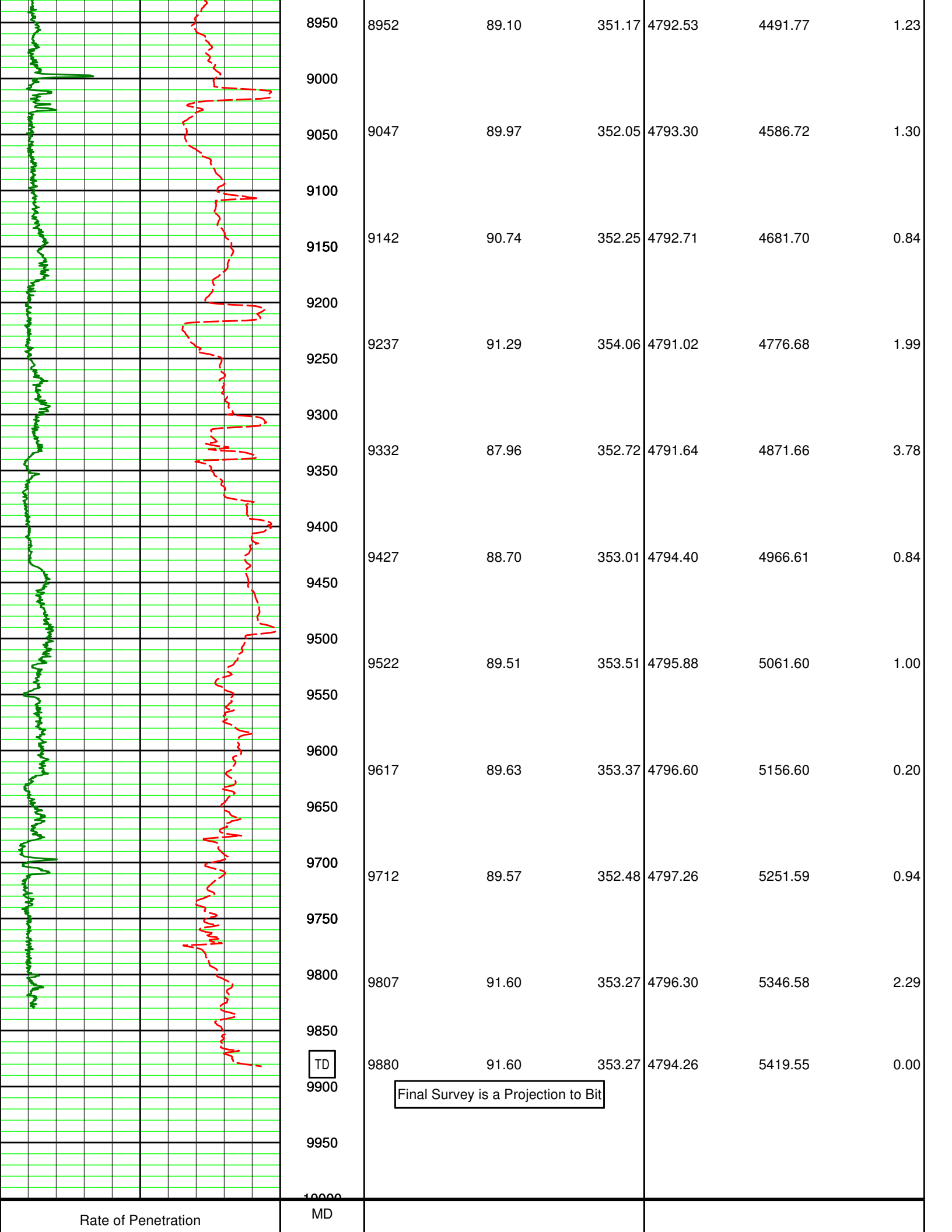






6750						
6769	90.55	351.68	4802.88	2309.39	0.54	
6800						
6850						
6864	91.08	351.75	4801.52	2404.34	0.56	
6900						
6950	6959	90.83	352.13	4799.94	2499.30	0.48
7000						
7050	7054	90.18	353.88	4799.10	2594.29	1.97
7100						
7150	7149	90.00	354.35	4798.95	2689.28	0.53
7200						
7250	7244	91.48	354.82	4797.72	2784.25	1.64
7300						
7350	7339	90.71	355.07	4795.90	2879.20	0.86
7400						
7450	7434	89.66	354.37	4795.59	2974.17	1.33
7500						
7550	7529	90.03	354.66	4795.85	3069.14	0.49
7600						
7650	7624	90.77	354.35	4795.18	3164.12	0.84
7700						
7719	90.06	353.63	4794.50	3259.11	1.06	
7750						
7800	7814	89.29	353.29	4795.03	3354.11	0.89





Final Survey is a Projection to Bit

Rate of Penetration

MD

250	feet per hr	ft	Surveys		Surveys			
0		1 : 1200	Depth	Inclination	Azimuth	TVD	Vertical Sec	Dogleg Sev
0	PCG GR XHi-Range RT api	150						



HALLIBURTON

DIRECTIONAL SURVEY REPORT

Shell Exploration and Productio

Schubach 3510 #4-1H

Arrowhead

Barber KS

USA

OK-XX-0009504797

Surveys from 0' MD to 9,880' are provided by Halliburton Sperry Drilling Services.

Final Survey is a projection to the bit.

Measured Depth (feet)	Inclination (degrees)	Direction (degrees)	Vertical Depth (feet)	Latitude (feet)	Departure (feet)	Vertical Section (feet)	Dogleg (deg/100ft)
0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	TIE-IN
80.00	0.31	239.54	80.00	0.11 S	0.19 W	-0.09	0.39
142.00	0.51	111.31	142.00	0.29 S	0.07 W	-0.28	1.20
172.00	0.64	87.19	172.00	0.33 S	0.22 E	-0.36	0.92
202.00	0.86	43.88	201.99	0.16 S	0.54 E	-0.23	1.97
234.00	1.41	21.30	233.99	0.38 N	0.85 E	0.28	2.19
269.00	2.25	2.08	268.97	1.47 N	1.03 E	1.34	2.93
300.00	3.38	358.41	299.93	2.99 N	1.03 E	2.85	3.69
331.00	4.33	353.54	330.86	5.06 N	0.87 E	4.93	3.25
362.00	4.92	352.41	361.76	7.55 N	0.57 E	7.43	1.93
394.00	5.30	351.83	393.63	10.37 N	0.17 E	10.28	1.19
425.00	5.84	348.62	424.49	13.33 N	0.34 W	13.28	1.99
456.00	6.31	345.58	455.31	16.53 N	1.08 W	16.54	1.86
488.00	6.39	345.19	487.12	19.96 N	1.97 W	20.05	0.27
519.00	6.43	344.50	517.92	23.30 N	2.87 W	23.47	0.29
613.00	5.78	351.18	611.39	33.05 N	5.01 W	33.41	1.02
706.00	5.42	351.34	703.95	42.02 N	6.39 W	42.48	0.40
733.00	5.25	351.70	730.83	44.50 N	6.76 W	44.99	0.64
804.00	4.59	358.74	801.57	50.55 N	7.29 W	51.06	1.26
835.00	4.42	0.33	832.47	52.99 N	7.31 W	53.48	0.66
866.00	3.82	0.51	863.39	55.22 N	7.29 W	55.69	1.95
897.00	2.68	359.26	894.34	56.98 N	7.29 W	57.44	3.68
991.00	0.90	354.84	988.29	59.91 N	7.39 W	60.36	1.90
1084.00	0.79	356.59	1081.28	61.27 N	7.49 W	61.73	0.12
1178.00	0.61	356.34	1175.27	62.41 N	7.56 W	62.87	0.19
1272.00	0.43	341.59	1269.27	63.24 N	7.70 W	63.71	0.23
1367.00	0.52	358.57	1364.27	64.01 N	7.83 W	64.49	0.18
1462.00	0.56	348.54	1459.26	64.90 N	7.93 W	65.38	0.10
1557.00	0.41	356.69	1554.26	65.69 N	8.04 W	66.18	0.17
1746.00	0.53	354.07	1743.25	67.25 N	8.17 W	67.74	0.06
1936.00	0.56	342.18	1933.25	69.01 N	8.55 W	69.53	0.06
2126.00	0.18	22.00	2123.24	70.17 N	8.72 W	70.71	0.23
2315.00	0.65	313.71	2312.24	71.19 N	9.38 W	71.79	0.32
2505.00	0.44	324.80	2502.23	72.53 N	10.58 W	73.26	0.12
2694.00	0.34	334.23	2691.22	73.63 N	11.25 W	74.43	0.06
2883.00	0.03	108.38	2880.22	74.12 N	11.45 W	74.95	0.19
3073.00	0.67	349.08	3070.22	75.19 N	11.61 W	76.03	0.36
3263.00	0.83	337.32	3260.20	77.55 N	12.35 W	78.46	0.12
3452.00	0.57	13.07	3449.19	79.73 N	12.66 W	80.66	0.26
3642.00	0.50	347.24	3639.18	81.46 N	12.63 W	82.37	0.13
3832.00	0.31	332.57	3829.18	82.73 N	13.05 W	83.68	0.11
4022.00	0.22	306.56	4019.17	83.40 N	13.59 W	84.42	0.08
4212.00	0.69	9.68	4209.17	84.76 N	13.69 W	85.77	0.33

4243.00	3.63	2.18	4240.14	85.92 N	13.62 W	86.92	9.50
4273.00	6.89	358.51	4270.01	88.67 N	13.64 W	89.65	10.92
4305.00	10.02	357.88	4301.66	93.37 N	13.79 W	94.34	9.77
4336.00	13.07	357.81	4332.03	99.57 N	14.02 W	100.52	9.83
4368.00	16.20	357.59	4362.99	107.65 N	14.35 W	108.58	9.79
4400.00	19.55	357.84	4393.44	117.46 N	14.74 W	118.37	10.48
4431.00	22.58	357.74	4422.37	128.59 N	15.17 W	129.48	9.77
4463.00	25.68	357.04	4451.57	141.65 N	15.77 W	142.53	9.74
4495.00	28.19	356.15	4480.09	156.12 N	16.63 W	157.00	7.95
4526.00	30.87	354.91	4507.06	171.35 N	17.83 W	172.26	8.87
4558.00	34.30	353.73	4534.02	188.50 N	19.54 W	189.49	10.91
4590.00	37.86	353.51	4559.88	207.22 N	21.64 W	208.34	11.11
4621.00	41.40	353.48	4583.75	226.87 N	23.88 W	228.11	11.44
4653.00	44.69	353.64	4607.13	248.57 N	26.33 W	249.95	10.29
4685.00	46.93	353.89	4629.44	271.38 N	28.82 W	272.89	7.01
4716.00	49.45	353.93	4650.10	294.35 N	31.27 W	295.99	8.14
4748.00	52.34	353.51	4670.28	319.03 N	33.99 W	320.82	9.08
4779.00	54.75	353.27	4688.70	343.80 N	36.86 W	345.75	7.82
4811.00	57.48	353.82	4706.54	370.19 N	39.85 W	372.32	8.62
4843.00	60.63	353.91	4722.99	397.48 N	42.78 W	399.76	9.85
4874.00	62.57	354.20	4737.74	424.60 N	45.60 W	427.02	6.30
4906.00	65.38	354.56	4751.78	453.21 N	48.42 W	455.77	8.84
4938.00	68.50	354.08	4764.31	482.51 N	51.33 W	485.20	9.85
4969.00	71.41	353.99	4774.93	511.47 N	54.36 W	514.32	9.39
5001.00	74.37	354.59	4784.35	541.90 N	57.40 W	544.90	9.42
5033.00	76.67	355.38	4792.35	572.76 N	60.11 W	575.86	7.56
5064.00	78.74	355.67	4798.95	602.95 N	62.47 W	606.13	6.76
5096.00	80.90	356.21	4804.61	634.37 N	64.70 W	637.59	6.94
5128.00	83.33	356.61	4809.00	666.00 N	66.68 W	669.24	7.69
5159.00	86.28	355.82	4811.81	696.80 N	68.72 W	700.07	9.85
5254.00	90.40	355.94	4814.56	791.50 N	75.54 W	794.92	4.34
5347.00	91.11	355.95	4813.33	884.26 N	82.11 W	887.81	0.76
5440.00	89.97	355.54	4812.45	976.99 N	89.01 W	980.72	1.31
5535.00	91.11	354.32	4811.56	1071.61 N	97.40 W	1075.68	1.75
5630.00	91.87	354.62	4809.08	1166.14 N	106.55 W	1170.63	0.86
5725.00	91.67	352.83	4806.15	1260.52 N	116.92 W	1265.58	1.90
5820.00	90.22	352.98	4804.59	1354.78 N	128.65 W	1360.56	1.53
5915.00	90.43	352.89	4804.05	1449.06 N	140.34 W	1455.55	0.25
6010.00	89.60	352.40	4804.02	1543.27 N	152.50 W	1550.55	1.01
6105.00	89.97	353.24	4804.38	1637.53 N	164.37 W	1645.54	0.97
6201.00	90.40	353.93	4804.07	1732.93 N	175.09 W	1741.54	0.84
6295.00	90.62	353.60	4803.24	1826.37 N	185.30 W	1835.53	0.42
6390.00	90.12	352.08	4802.63	1920.62 N	197.15 W	1930.52	1.68
6485.00	89.38	351.51	4803.03	2014.65 N	210.70 W	2025.49	0.98
6579.00	90.06	352.26	4803.49	2107.70 N	223.97 W	2119.45	1.07
6674.00	90.06	351.84	4803.39	2201.79 N	237.12 W	2214.43	0.44
6769.00	90.55	351.68	4802.88	2295.81 N	250.73 W	2309.39	0.54
6864.00	91.08	351.75	4801.52	2389.80 N	264.42 W	2404.34	0.56
6959.00	90.83	352.13	4799.94	2483.85 N	277.74 W	2499.30	0.48
7054.00	90.18	353.88	4799.10	2578.14 N	289.32 W	2594.29	1.97
7149.00	90.00	354.35	4798.95	2672.64 N	299.06 W	2689.28	0.53
7244.00	91.48	354.82	4797.72	2767.20 N	308.02 W	2784.25	1.64
7339.00	90.71	355.07	4795.90	2861.81 N	316.39 W	2879.20	0.86
7434.00	89.66	354.37	4795.59	2956.41 N	325.13 W	2974.17	1.33
7529.00	90.03	354.66	4795.85	3050.97 N	334.21 W	3069.14	0.49
7624.00	90.77	354.35	4795.18	3145.53 N	343.31 W	3164.12	0.84
7719.00	90.06	353.63	4794.50	3240.01 N	353.26 W	3259.11	1.06
7814.00	89.29	353.29	4795.03	3334.39 N	364.08 W	3354.11	0.89
7909.00	89.91	353.65	4795.69	3428.77 N	374.88 W	3449.11	0.75
8004.00	89.35	353.01	4796.31	3523.12 N	385.91 W	3544.10	0.89
8099.00	88.37	354.33	4798.20	3617.52 N	396.38 W	3639.08	1.73
8193.00	90.43	353.91	4799.19	3711.02 N	406.01 W	3733.06	2.24
8288.00	91.97	354.78	4797.19	3805.53 N	415.37 W	3828.02	1.86
8383.00	91.39	354.13	4794.41	3900.04 N	424.55 W	3922.96	0.92
8478.00	89.91	352.30	4793.34	3994.36 N	435.77 W	4017.95	2.47
8573.00	90.09	352.10	4793.34	4088.49 N	448.66 W	4112.93	0.29
8667.00	90.37	351.88	4792.96	4181.57 N	461.75 W	4206.90	0.38
8762.00	90.40	351.60	4792.32	4275.58 N	475.40 W	4301.86	0.29
8857.00	90.12	351.74	4791.89	4369.58 N	489.17 W	4396.82	0.33
8952.00	89.10	351.17	4792.53	4463.52 N	503.29 W	4491.77	1.23
9047.00	89.97	352.05	4793.30	4557.50 N	517.15 W	4586.72	1.30

9142.00	90.74	352.25	4792.71	4651.60 N	530.12 W	4681.70	0.84
9237.00	91.29	354.06	4791.02	4745.91 N	541.45 W	4776.68	1.99
9332.00	87.96	352.72	4791.64	4840.26 N	552.39 W	4871.66	3.78
9427.00	88.70	353.01	4794.40	4934.48 N	564.19 W	4966.61	0.84
9522.00	89.51	353.51	4795.88	5028.81 N	575.34 W	5061.60	1.00
9617.00	89.63	353.37	4796.60	5123.19 N	586.19 W	5156.60	0.20
9712.00	89.57	352.48	4797.26	5217.46 N	597.88 W	5251.59	0.94
9807.00	91.60	353.27	4796.30	5311.72 N	609.66 W	5346.58	2.29
9880.00	91.60	353.27	4794.26	5384.18 N	618.21 W	5419.55	0.00

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 353.34 DEGREES (TRUE)
A TOTAL CORRECTION OF 4.88 DEG FROM MAGNETIC NORTH TO TRUE NORTH HAS BEEN APPLIED**

**HORIZONTAL DISPLACEMENT IS RELATIVE TO THE WELL HEAD.
HORIZONTAL DISPLACEMENT(CLOSURE) AT 9880.00 FEET
IS 5419.56 FEET ALONG 353.45 DEGREES (TRUE)**

Final Survey is a projection to the bit.