Scientific Drilling

PROPAGATION RESISTIVITY
GAMMA RAY

5" = 100' MD

COMPANY : CATAMOUNT
WELL : JAQUES 9 PILOT
FIELD : FRUITLAND COAL
COUNTY : LA PLATA
STATE : COLORADO
COUNTRY : USA
UWI : 05-067-10021

COMPANY : CATAMOUNT
WELL : JAQUES 9 PILOT
FIELD : FRUITLAND COAL
COUNTY : LA PLATA
STATE : COLORADO
COUNTRY : USA
UWI : 05-067-10021

WELL LOCATION NAD83
LAT:37.0764857° LONG:-107.7078627°

SEC:27 TWP:33N RANGE:8W

OTHER SERVICES

DIRECTIONAL
ROP
CONDUCTIVITY
FETR

DEPTH REF. : RKB
REF. HEIGHT : 11.000 ft RKB to Ground Level
GROUND LEVEL : 7031.000 ft G.L. to MEAN SEA LEVEL

BOREHOLE RECORD

HOLE SIZE in	FROM ft	TO ft
7.875	533	4248

CASING RECORD

CASING SIZE in	FROM ft	TO ft

DEVIATION RECORD

INCLINATION deg	FROM ft	TO ft

DRILLING CO. : AZTEC
RIG : 507
LWD UNIT NO. : KIT ELECTR DISTRICT : GRAND JUNCTIO
SPUD DATE : 7/21/2018
LWD START DATE : 7/22/2018 DEPTH : 533 ft
LWD END DATE : 07/23/2018 DEPTH : 4248 ft
TOTAL DEPTH : 4248 ft

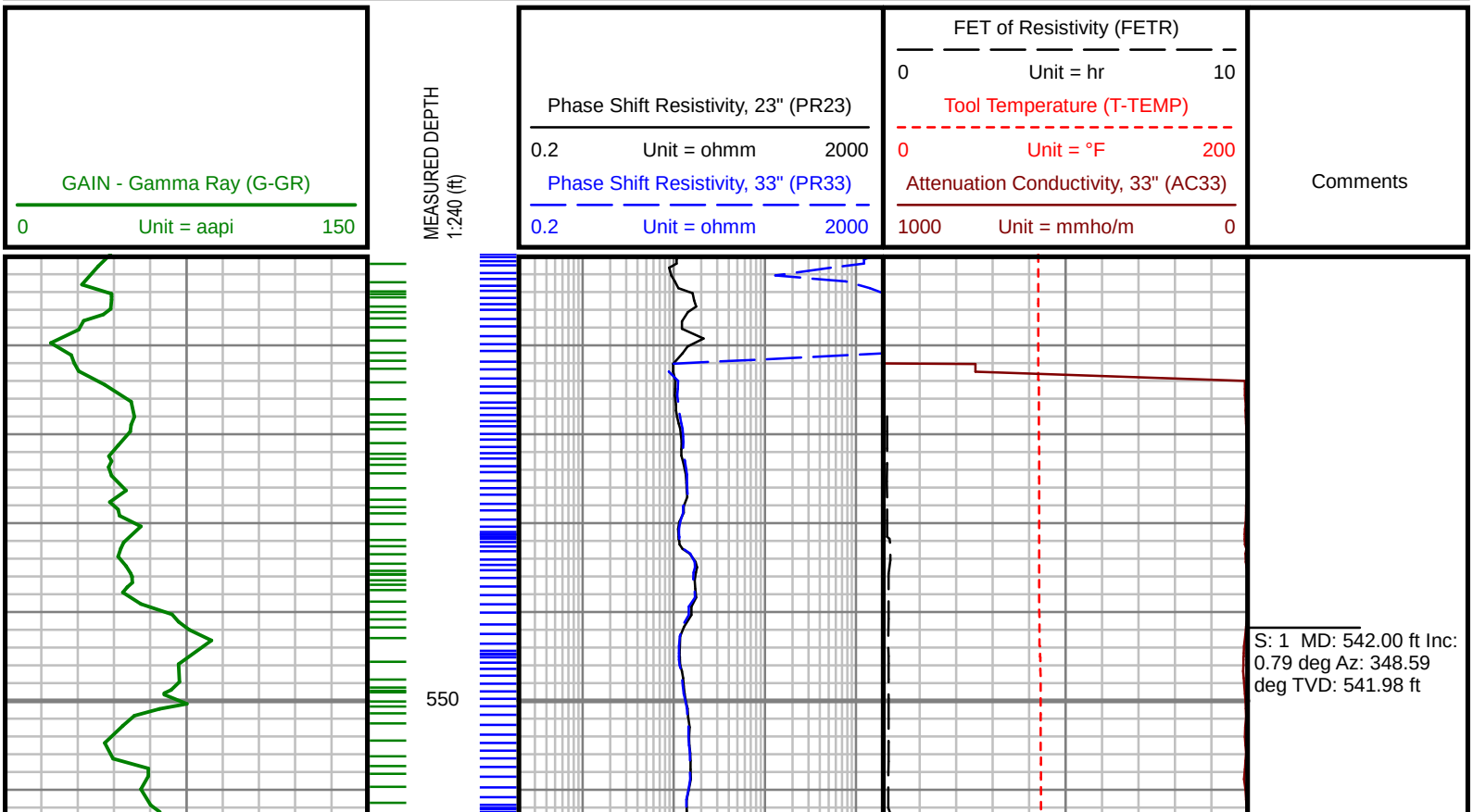
Run Data

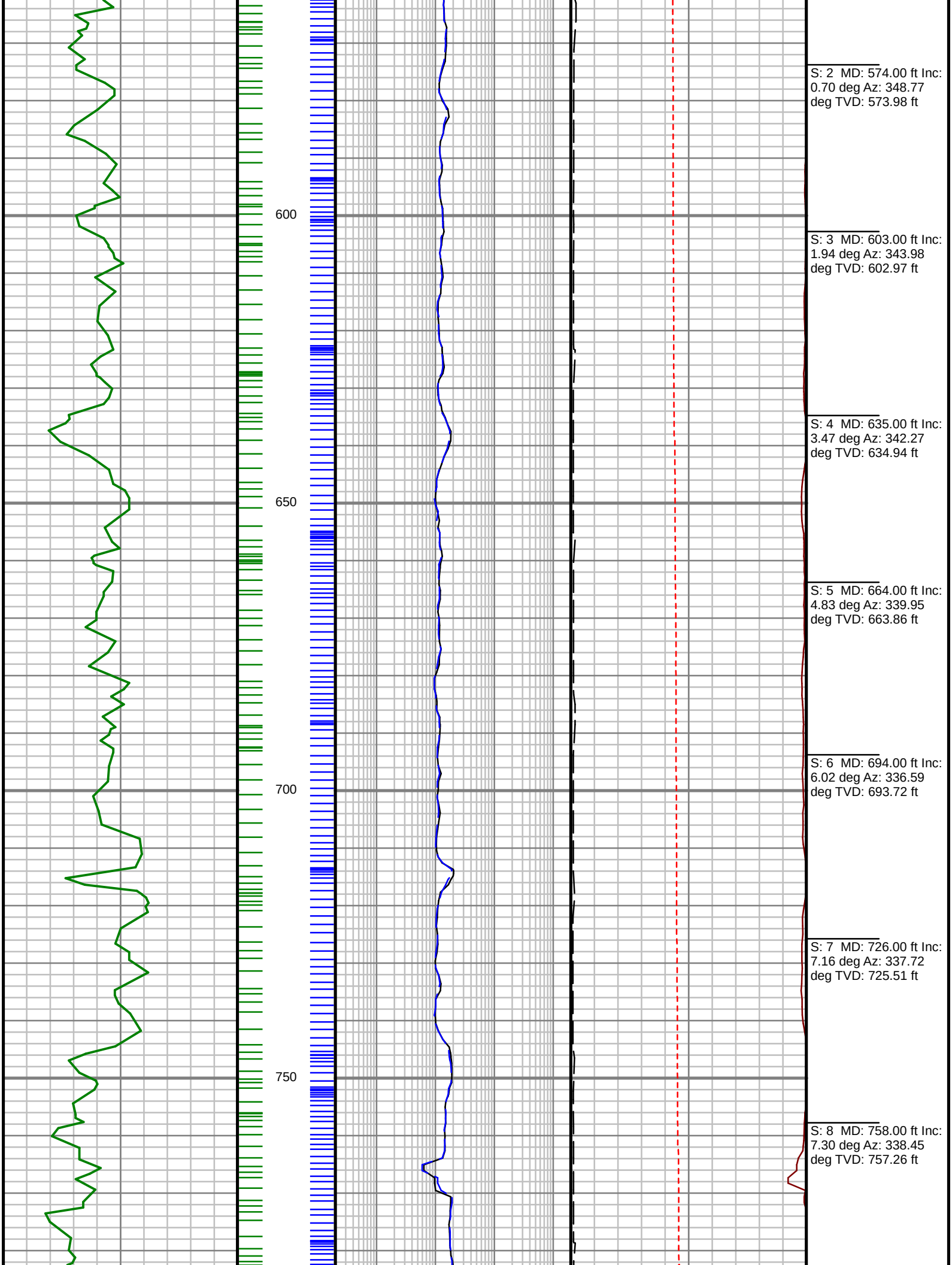
RUN NUMBER	1																							
START DATE	7/22/2018																							
START TIME	0000																							
END DATE	07/23/2018																							
END TIME	0600																							
DEPTH IN (ft)	533																							
DEPTH OUT (ft)	4248																							
LOG TOP (ft)	533																							
LOG BOTTOM (ft)	4217																							
HOLE SIZE (in)	7.875																							
MUD DATA @ (ft)	907																							
MUD TYPE	LSND																							
DENSITY (lb / gal)	9.2																							
VISCOSITY (s / qt)	36																							
pH	10.5																							
FLUID LOSS (cm3 / 30)	25																							
SALINITY (ppm)	400																							
Rm (ohmm @ deg F)	-																							
Rmf (ohmm @ deg F)	-																							
MAX TEMP (deg F)	130																							
Rm @ MAX TEMP (ohmm)	-																							
LWD ENGINEER #1	P.KNEPPER																							
LWD ENGINEER #2	J.BAASSIRI																							
LWD ENGINEER #3																								
LOG WITNESS #1																								
LOG WITNESS #2																								

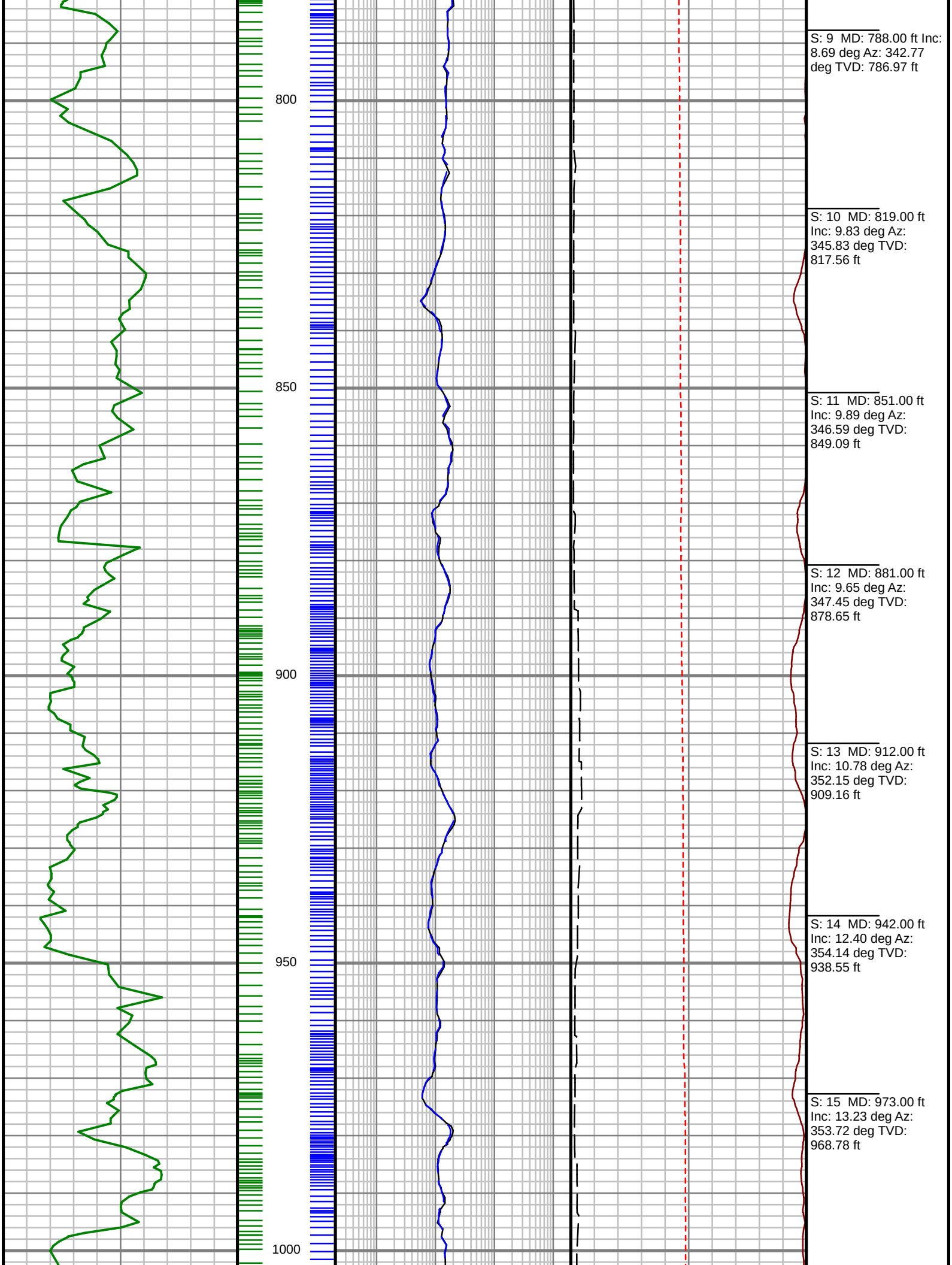
Remarks
CATAMOUNT PRODUCTION AFE# 2018006
SCIENTIFIC DRILLING INTERNATIONAL JOB# OP.011764
ALL REFERENCES IN THE DEPTH TRACK ARE AT BIT DEPTH.
ALL DATA IS MEMORY DATA UNLESS STATED OTHERWISE.
FLAT AVERAGE FILTER OF 1.00 FT APPLIED TO GAIN - GAMMA RAY CURVE
FLAT AVERAGE FILTER OF 1.00 FT APPLIED TO PHASE SHIFT RESISTIVITY, 23" CURVE
FLAT AVERAGE FILTER OF 1.00 FT APPLIED TO PHASE SHIFT RESISTIVITY, 33" CURVE
FLAT AVERAGE FILTER OF 1.00 FT APPLIED TO ATTENUATION CONDUCTIVITY, 33" CURVE
RUN #1: GAMMA RAY AND PRT LOGGING RUN
SENSORS S/N: CONTROLLER=1026 / MWD EYE=1647 / GAIN=84 / PRT=368
BIT TO SENSOR OFFSETS: SURVEY= 52.28 FT. / PRT=35.28 FT. / GAIN INC=32.78 FT. / GAIN GR=31.07 FT.
MNEMONICS LIST:
G-GR = GAIN - GAMMA RAY AC33 = ATTENUATION CONDUCTIVITY, 33"
PR23 = PHASE SHIFT RESISTIVITY, 23"
PR33 = PHASE SHIFT RESISTIVITY, 33"
FETR = FET OF RESISTIVITY
T-TEMP = TOOL TEMPERATURE

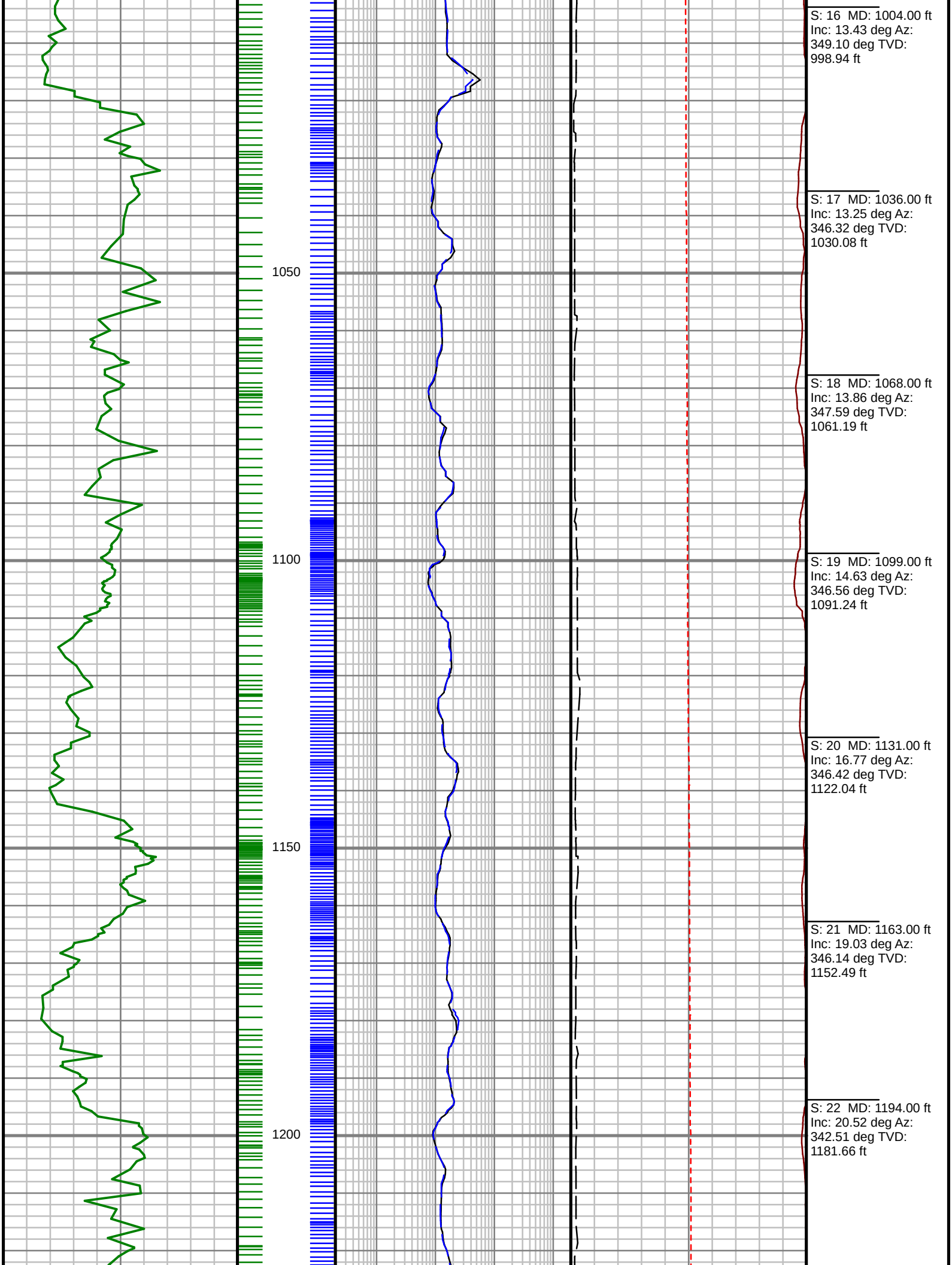
All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to our general terms and conditions as set out in our current price schedule.

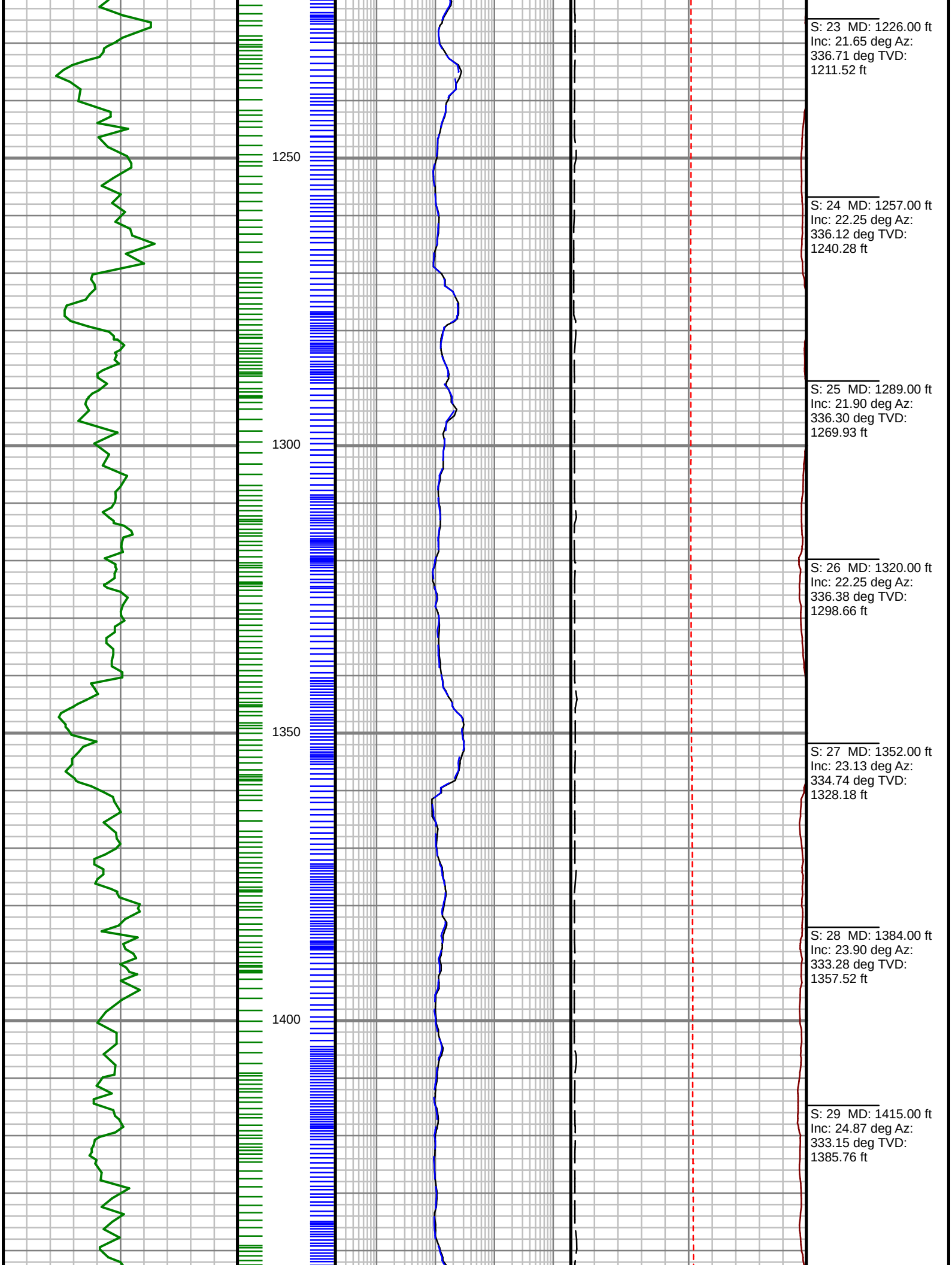
FIELD COPY

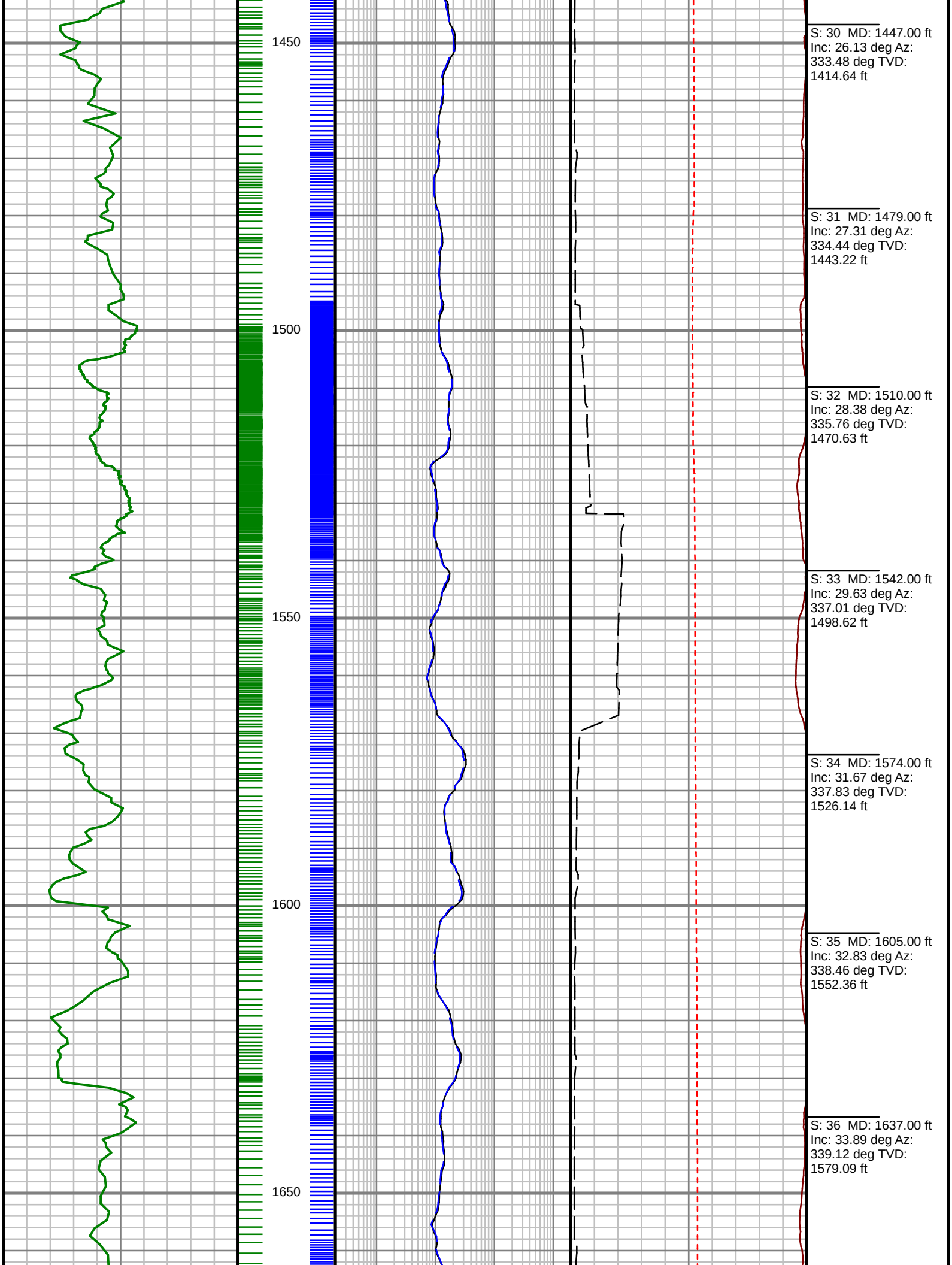


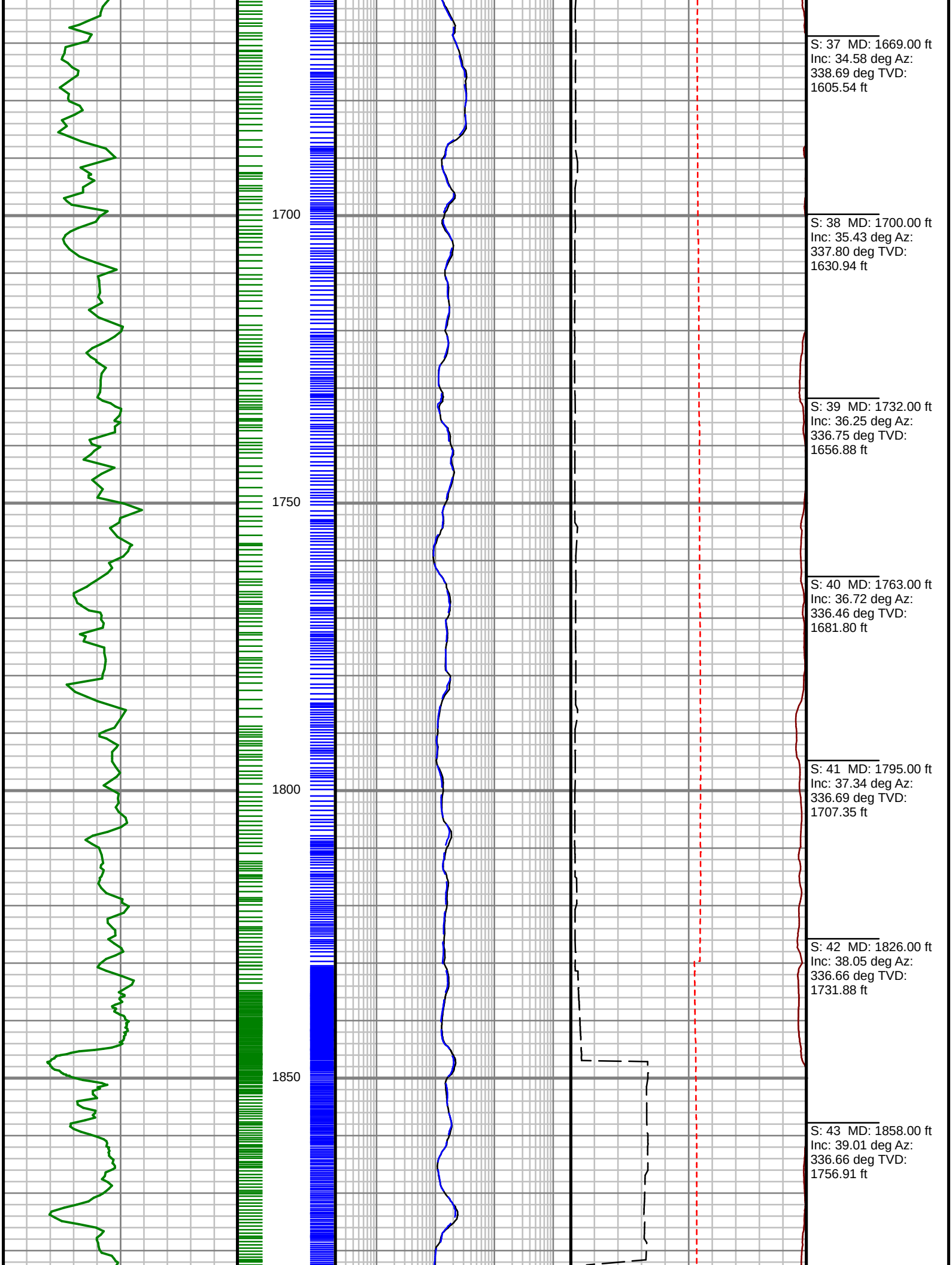

600
650
700
750
S: 2 MD: 574.00 ft Inc: 0.70 deg Az: 348.77 deg TVD: 573.98 ft
S: 3 MD: 603.00 ft Inc: 1.94 deg Az: 343.98 deg TVD: 602.97 ft
S: 4 MD: 635.00 ft Inc: 3.47 deg Az: 342.27 deg TVD: 634.94 ft
S: 5 MD: 664.00 ft Inc: 4.83 deg Az: 339.95 deg TVD: 663.86 ft
S: 6 MD: 694.00 ft Inc: 6.02 deg Az: 336.59 deg TVD: 693.72 ft
S: 7 MD: 726.00 ft Inc: 7.16 deg Az: 337.72 deg TVD: 725.51 ft
S: 8 MD: 758.00 ft Inc: 7.30 deg Az: 338.45 deg TVD: 757.26 ft

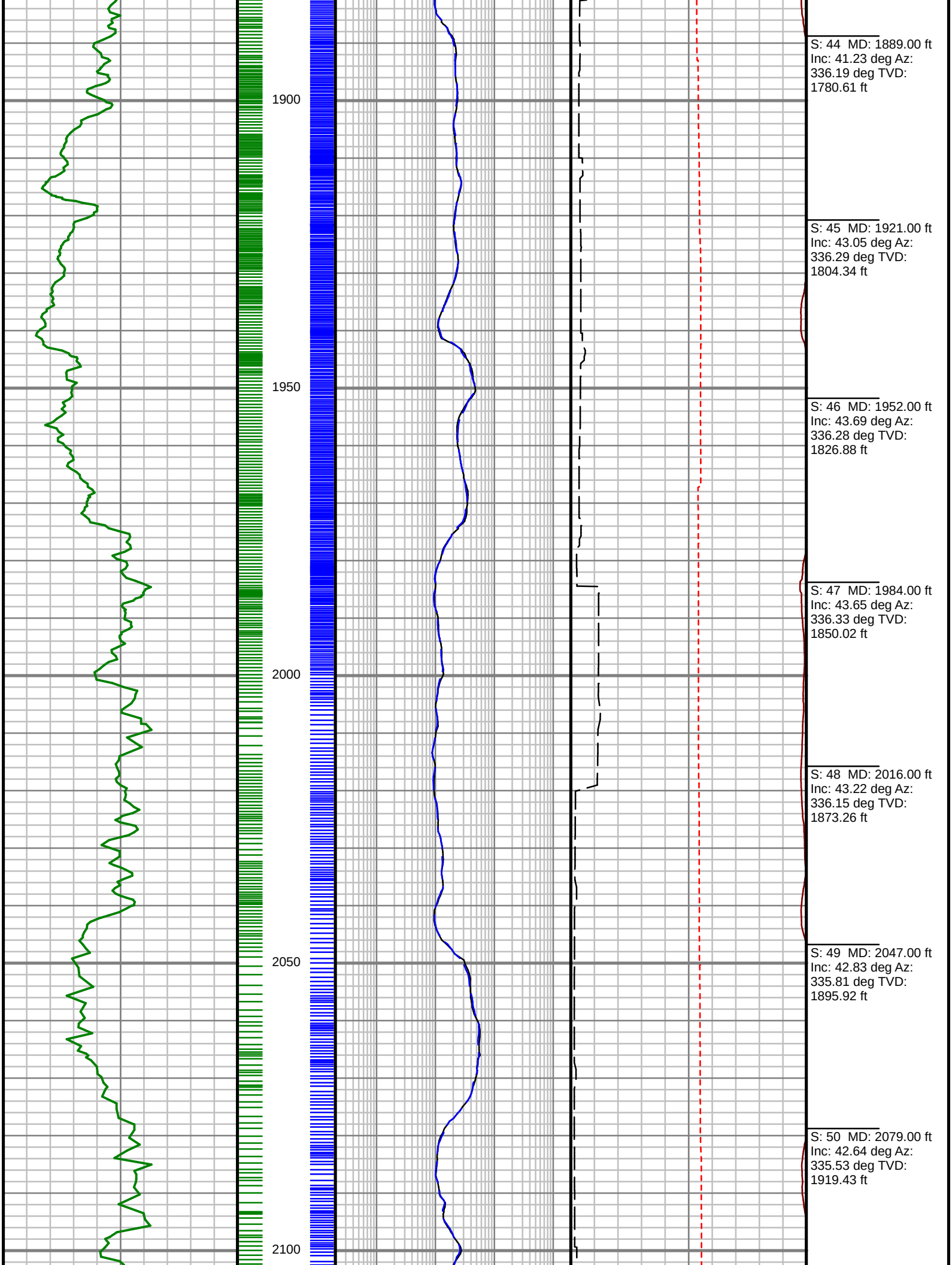

800
850
900
950
1000
S: 9 MD: 788.00 ft Inc: 8.69 deg Az: 342.77 deg TVD: 786.97 ft
S: 10 MD: 819.00 ft Inc: 9.83 deg Az: 345.83 deg TVD: 817.56 ft
S: 11 MD: 851.00 ft Inc: 9.89 deg Az: 346.59 deg TVD: 849.09 ft
S: 12 MD: 881.00 ft Inc: 9.65 deg Az: 347.45 deg TVD: 878.65 ft
S: 13 MD: 912.00 ft Inc: 10.78 deg Az: 352.15 deg TVD: 909.16 ft
S: 14 MD: 942.00 ft Inc: 12.40 deg Az: 354.14 deg TVD: 938.55 ft
S: 15 MD: 973.00 ft Inc: 13.23 deg Az: 353.72 deg TVD: 968.78 ft

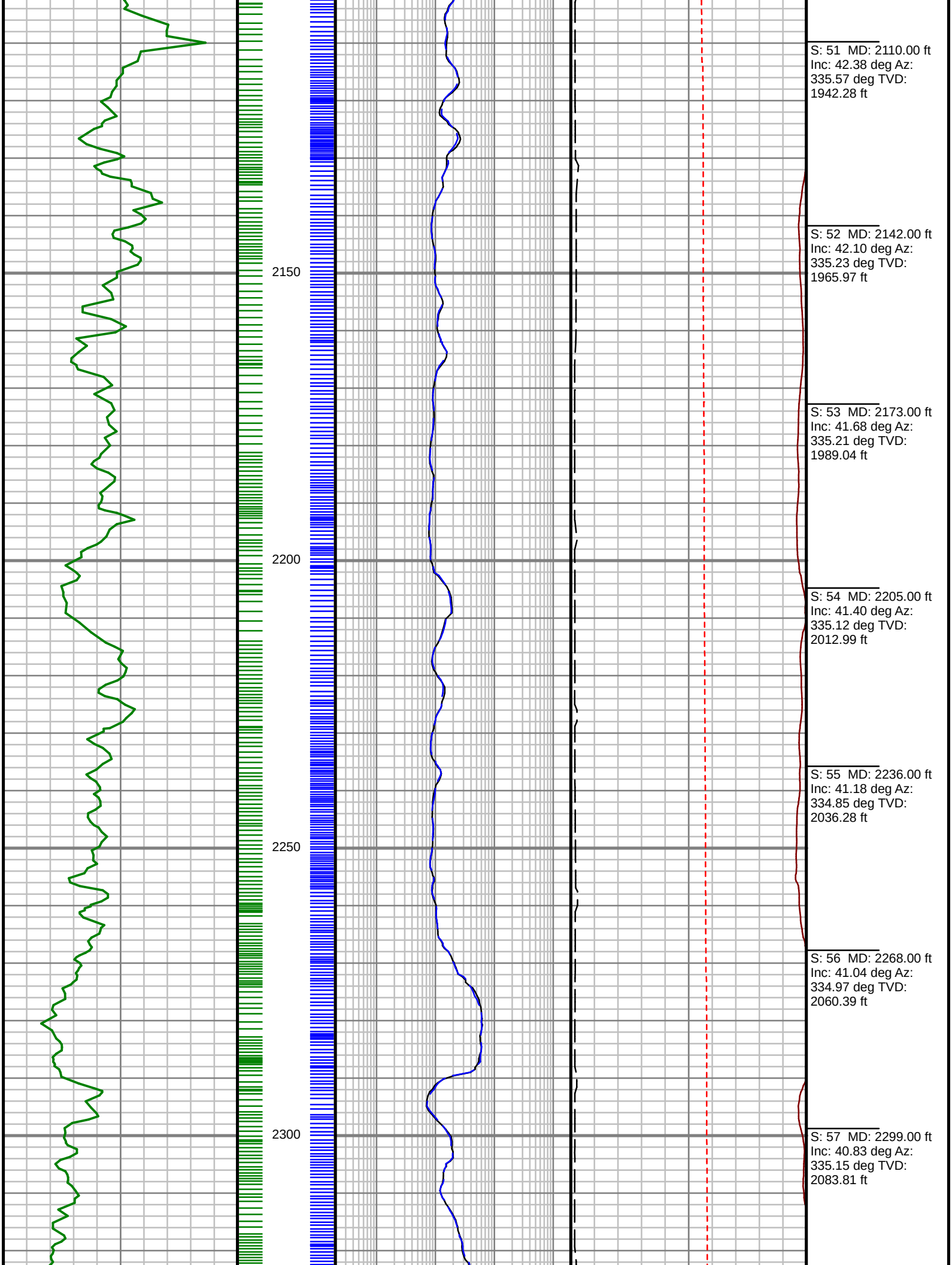

1050
1100
1150
1200
S: 16 MD: 1004.00 ft
Inc: 13.43 deg Az:
349.10 deg TVD:
998.94 ft
S: 17 MD: 1036.00 ft
Inc: 13.25 deg Az:
346.32 deg TVD:
1030.08 ft
S: 18 MD: 1068.00 ft
Inc: 13.86 deg Az:
347.59 deg TVD:
1061.19 ft
S: 19 MD: 1099.00 ft
Inc: 14.63 deg Az:
346.56 deg TVD:
1091.24 ft
S: 20 MD: 1131.00 ft
Inc: 16.77 deg Az:
346.42 deg TVD:
1122.04 ft
S: 21 MD: 1163.00 ft
Inc: 19.03 deg Az:
346.14 deg TVD:
1152.49 ft
S: 22 MD: 1194.00 ft
Inc: 20.52 deg Az:
342.51 deg TVD:
1181.66 ft

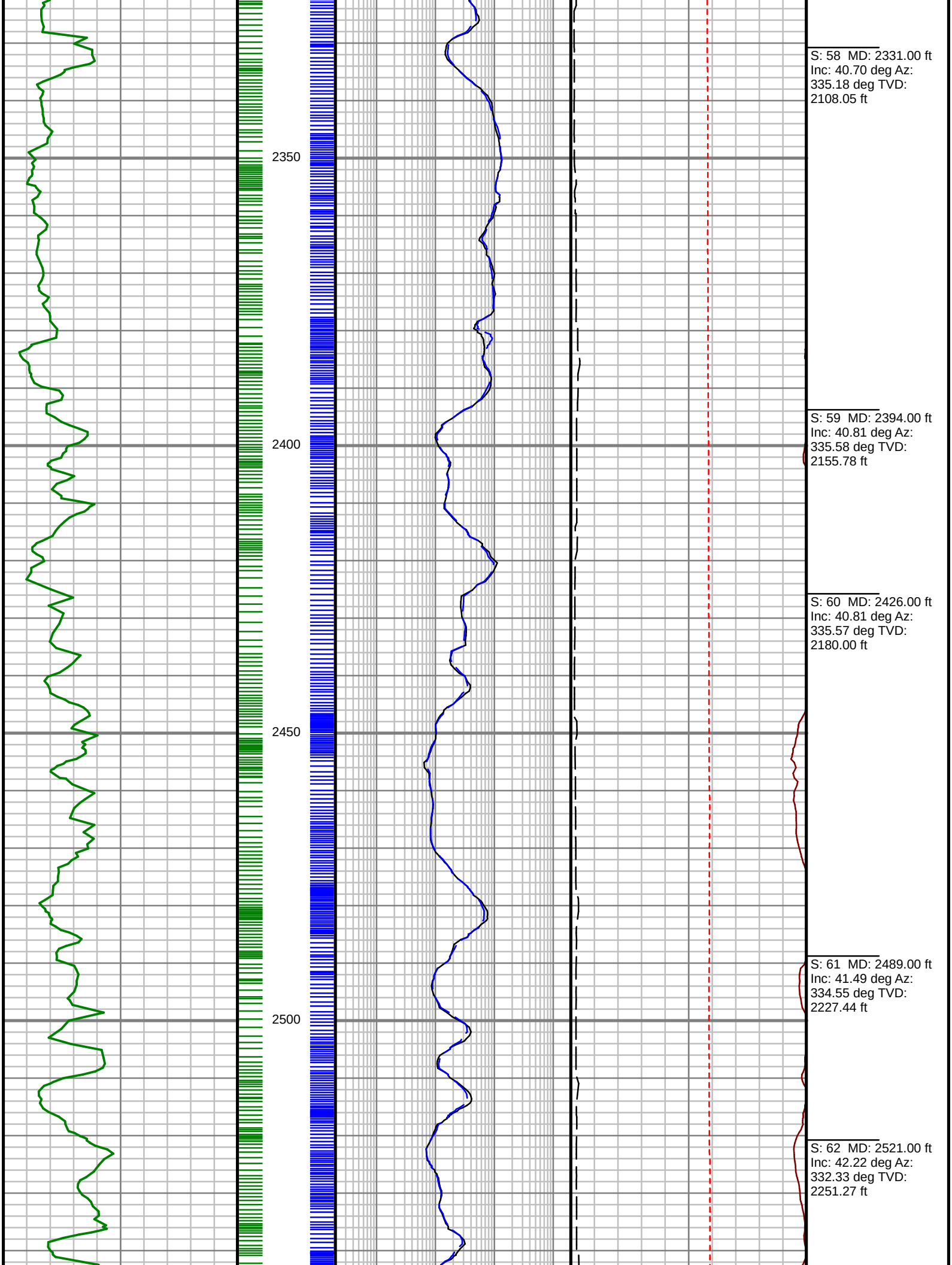

1250
1300
1350
1400
S: 23 MD: 1226.00 ft
Inc: 21.65 deg Az:
336.71 deg TVD:
1211.52 ft
S: 24 MD: 1257.00 ft
Inc: 22.25 deg Az:
336.12 deg TVD:
1240.28 ft
S: 25 MD: 1289.00 ft
Inc: 21.90 deg Az:
336.30 deg TVD:
1269.93 ft
S: 26 MD: 1320.00 ft
Inc: 22.25 deg Az:
336.38 deg TVD:
1298.66 ft
S: 27 MD: 1352.00 ft
Inc: 23.13 deg Az:
334.74 deg TVD:
1328.18 ft
S: 28 MD: 1384.00 ft
Inc: 23.90 deg Az:
333.28 deg TVD:
1357.52 ft
S: 29 MD: 1415.00 ft
Inc: 24.87 deg Az:
333.15 deg TVD:
1385.76 ft

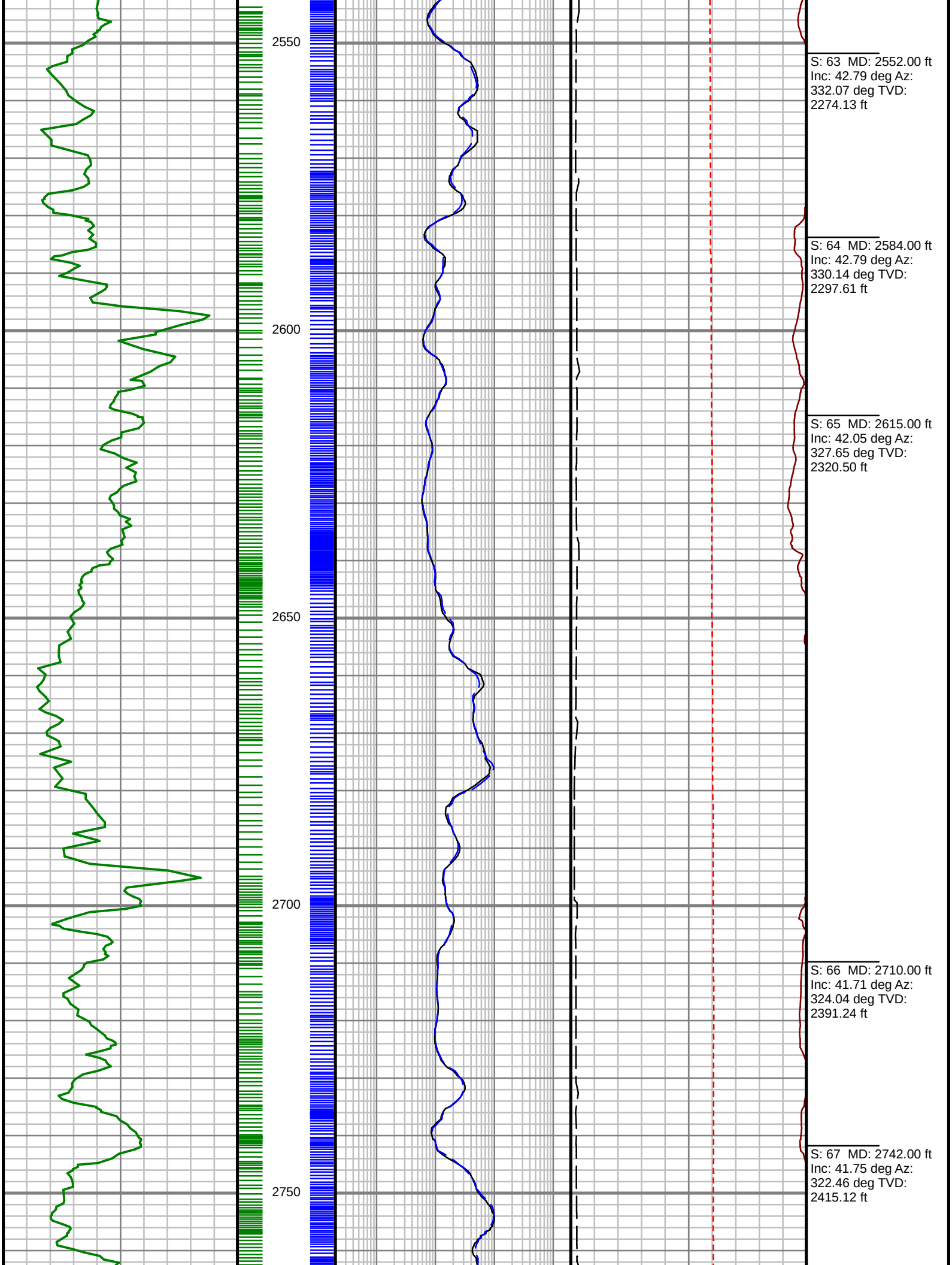

1450
1500
1550
1600
1650
S: 30 MD: 1447.00 ft
Inc: 26.13 deg Az:
333.48 deg TVD:
1414.64 ft
S: 31 MD: 1479.00 ft
Inc: 27.31 deg Az:
334.44 deg TVD:
1443.22 ft
S: 32 MD: 1510.00 ft
Inc: 28.38 deg Az:
335.76 deg TVD:
1470.63 ft
S: 33 MD: 1542.00 ft
Inc: 29.63 deg Az:
337.01 deg TVD:
1498.62 ft
S: 34 MD: 1574.00 ft
Inc: 31.67 deg Az:
337.83 deg TVD:
1526.14 ft
S: 35 MD: 1605.00 ft
Inc: 32.83 deg Az:
338.46 deg TVD:
1552.36 ft
S: 36 MD: 1637.00 ft
Inc: 33.89 deg Az:
339.12 deg TVD:
1579.09 ft

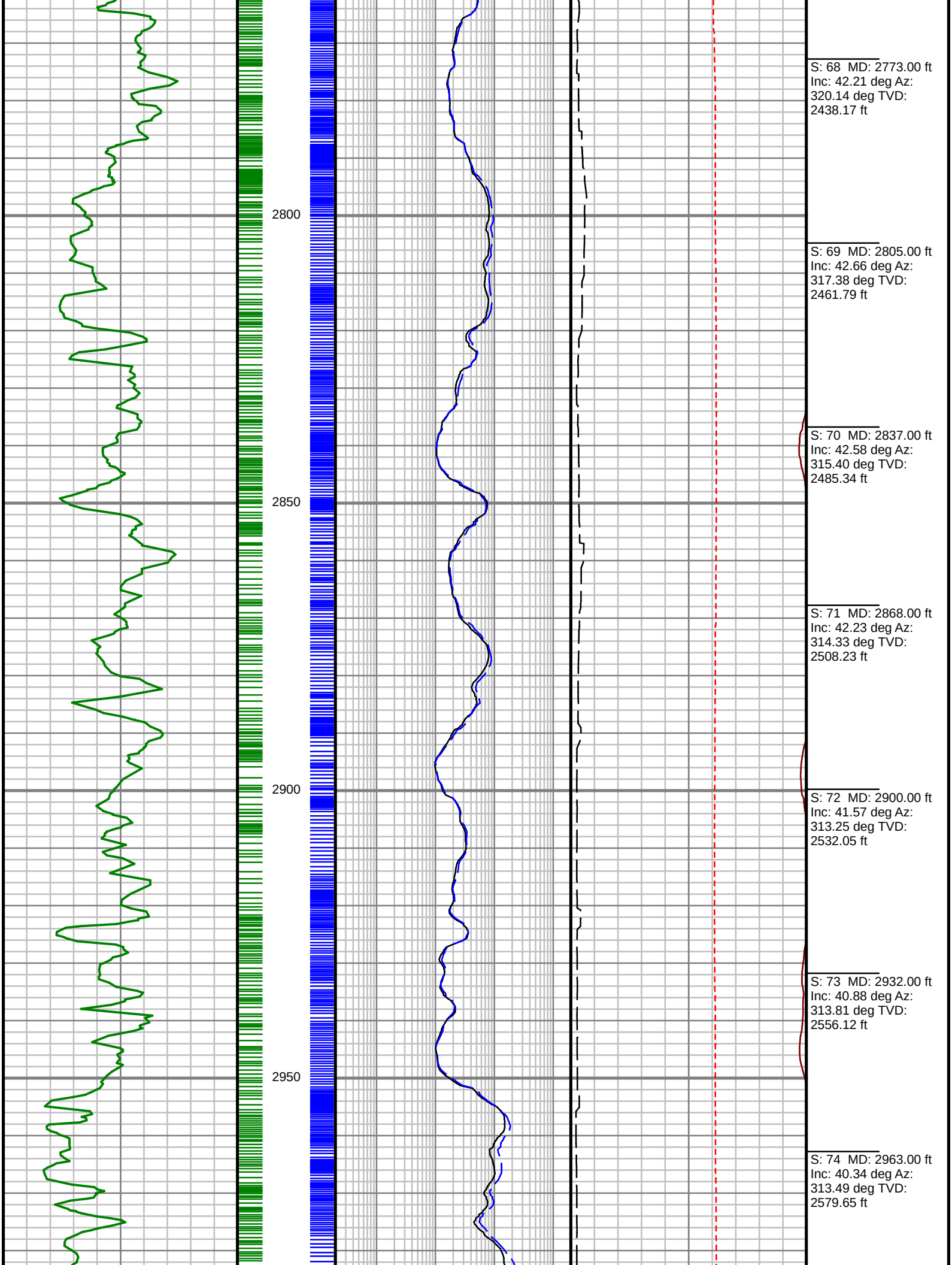

1700
1750
1800
1850
S: 37 MD: 1669.00 ft
Inc: 34.58 deg Az:
338.69 deg TVD:
1605.54 ft
S: 38 MD: 1700.00 ft
Inc: 35.43 deg Az:
337.80 deg TVD:
1630.94 ft
S: 39 MD: 1732.00 ft
Inc: 36.25 deg Az:
336.75 deg TVD:
1656.88 ft
S: 40 MD: 1763.00 ft
Inc: 36.72 deg Az:
336.46 deg TVD:
1681.80 ft
S: 41 MD: 1795.00 ft
Inc: 37.34 deg Az:
336.69 deg TVD:
1707.35 ft
S: 42 MD: 1826.00 ft
Inc: 38.05 deg Az:
336.66 deg TVD:
1731.88 ft
S: 43 MD: 1858.00 ft
Inc: 39.01 deg Az:
336.66 deg TVD:
1756.91 ft

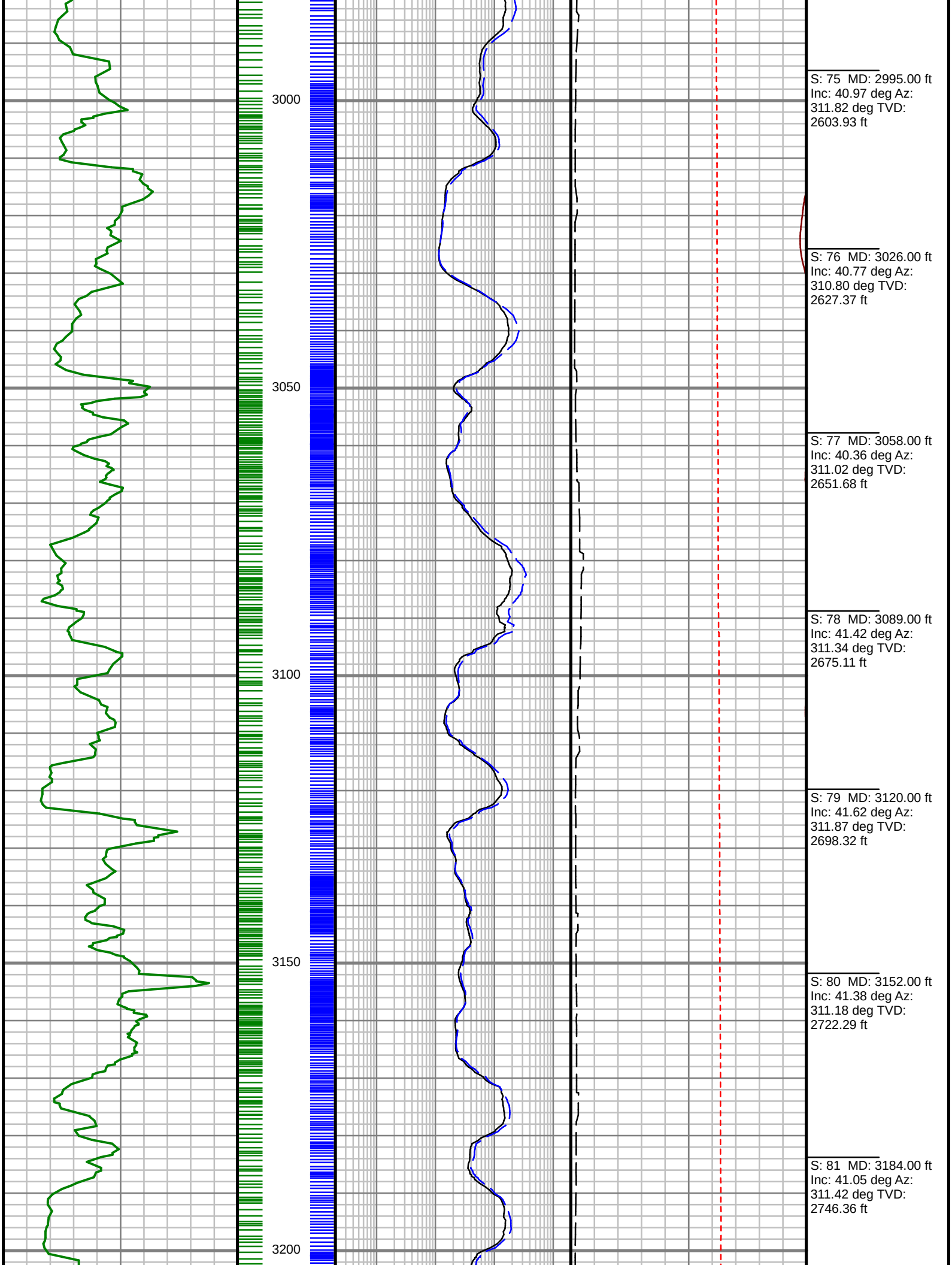

1900
1950
2000
2050
2100
S: 44 MD: 1889.00 ft
Inc: 41.23 deg Az:
336.19 deg TVD:
1780.61 ft
S: 45 MD: 1921.00 ft
Inc: 43.05 deg Az:
336.29 deg TVD:
1804.34 ft
S: 46 MD: 1952.00 ft
Inc: 43.69 deg Az:
336.28 deg TVD:
1826.88 ft
S: 47 MD: 1984.00 ft
Inc: 43.65 deg Az:
336.33 deg TVD:
1850.02 ft
S: 48 MD: 2016.00 ft
Inc: 43.22 deg Az:
336.15 deg TVD:
1873.26 ft
S: 49 MD: 2047.00 ft
Inc: 42.83 deg Az:
335.81 deg TVD:
1895.92 ft
S: 50 MD: 2079.00 ft
Inc: 42.64 deg Az:
335.53 deg TVD:
1919.43 ft

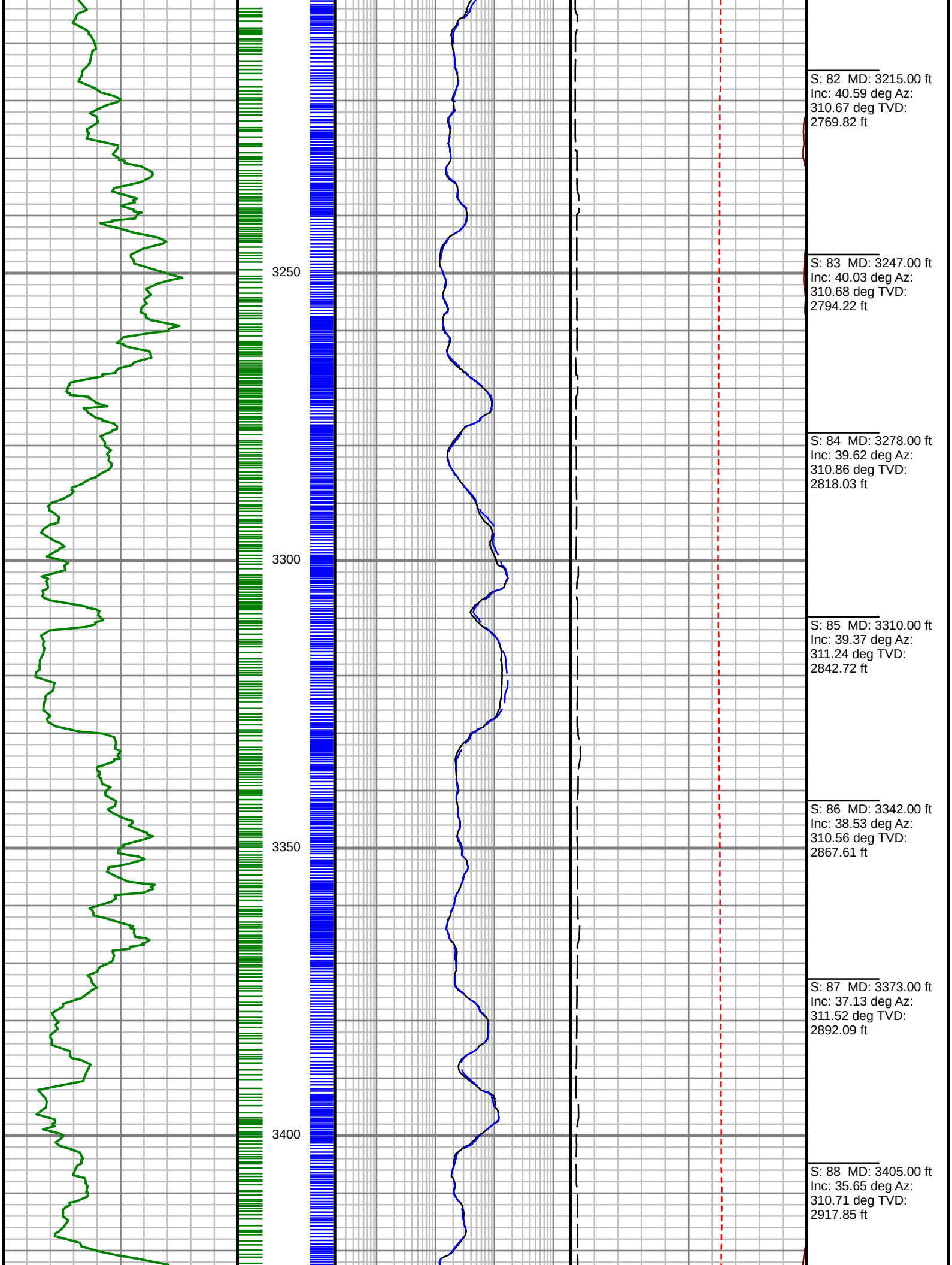

S: 51 MD: 2110.00 ft
Inc: 42.38 deg Az:
335.57 deg TVD:
1942.28 ft
S: 52 MD: 2142.00 ft
Inc: 42.10 deg Az:
335.23 deg TVD:
1965.97 ft
S: 53 MD: 2173.00 ft
Inc: 41.68 deg Az:
335.21 deg TVD:
1989.04 ft
S: 54 MD: 2205.00 ft
Inc: 41.40 deg Az:
335.12 deg TVD:
2012.99 ft
S: 55 MD: 2236.00 ft
Inc: 41.18 deg Az:
334.85 deg TVD:
2036.28 ft
S: 56 MD: 2268.00 ft
Inc: 41.04 deg Az:
334.97 deg TVD:
2060.39 ft
S: 57 MD: 2299.00 ft
Inc: 40.83 deg Az:
335.15 deg TVD:
2083.81 ft
2150
2200
2250
2300

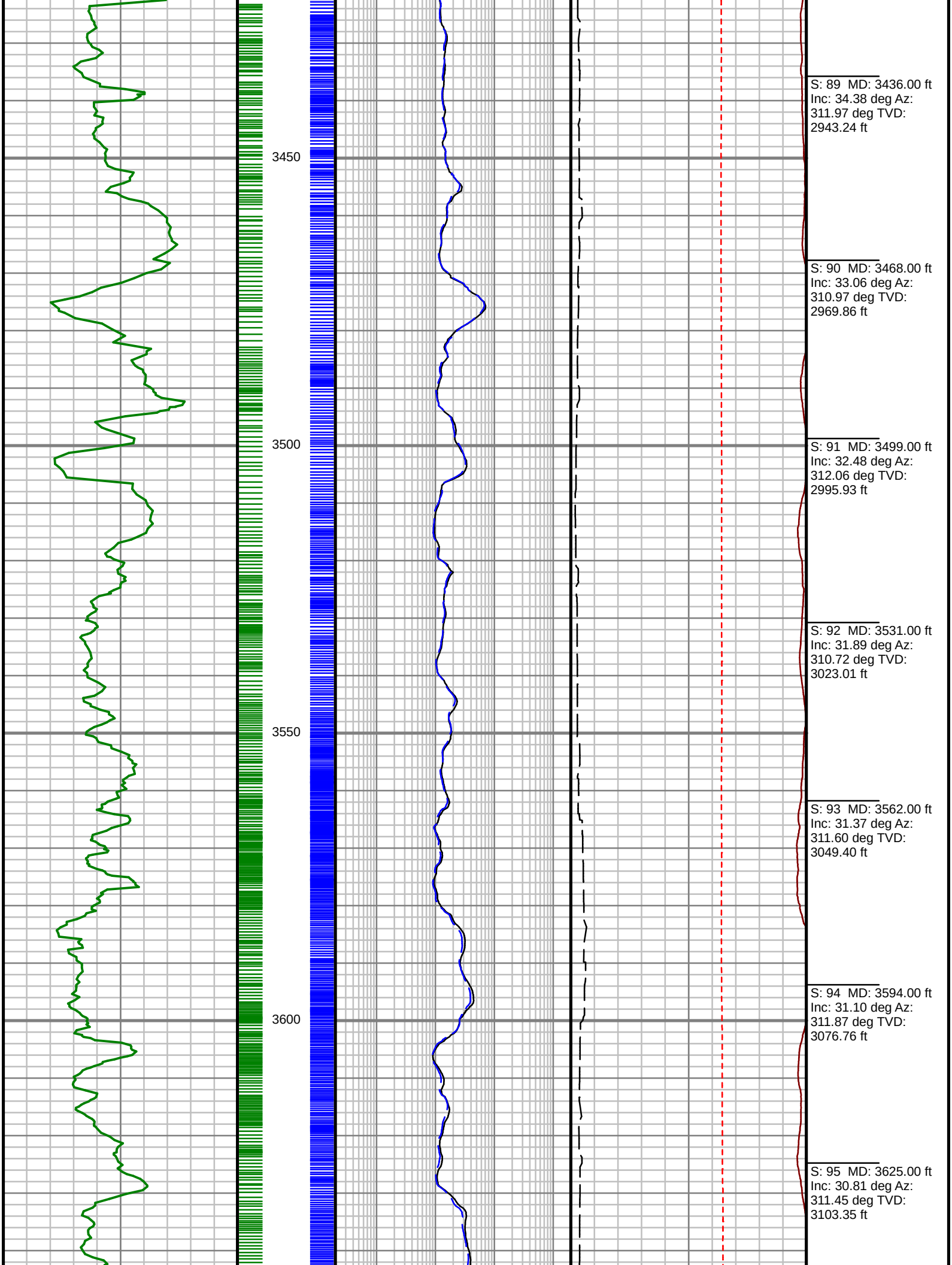

2350
2400
2450
2500
S: 58 MD: 2331.00 ft
Inc: 40.70 deg Az:
335.18 deg TVD:
2108.05 ft
S: 59 MD: 2394.00 ft
Inc: 40.81 deg Az:
335.58 deg TVD:
2155.78 ft
S: 60 MD: 2426.00 ft
Inc: 40.81 deg Az:
335.57 deg TVD:
2180.00 ft
S: 61 MD: 2489.00 ft
Inc: 41.49 deg Az:
334.55 deg TVD:
2227.44 ft
S: 62 MD: 2521.00 ft
Inc: 42.22 deg Az:
332.33 deg TVD:
2251.27 ft

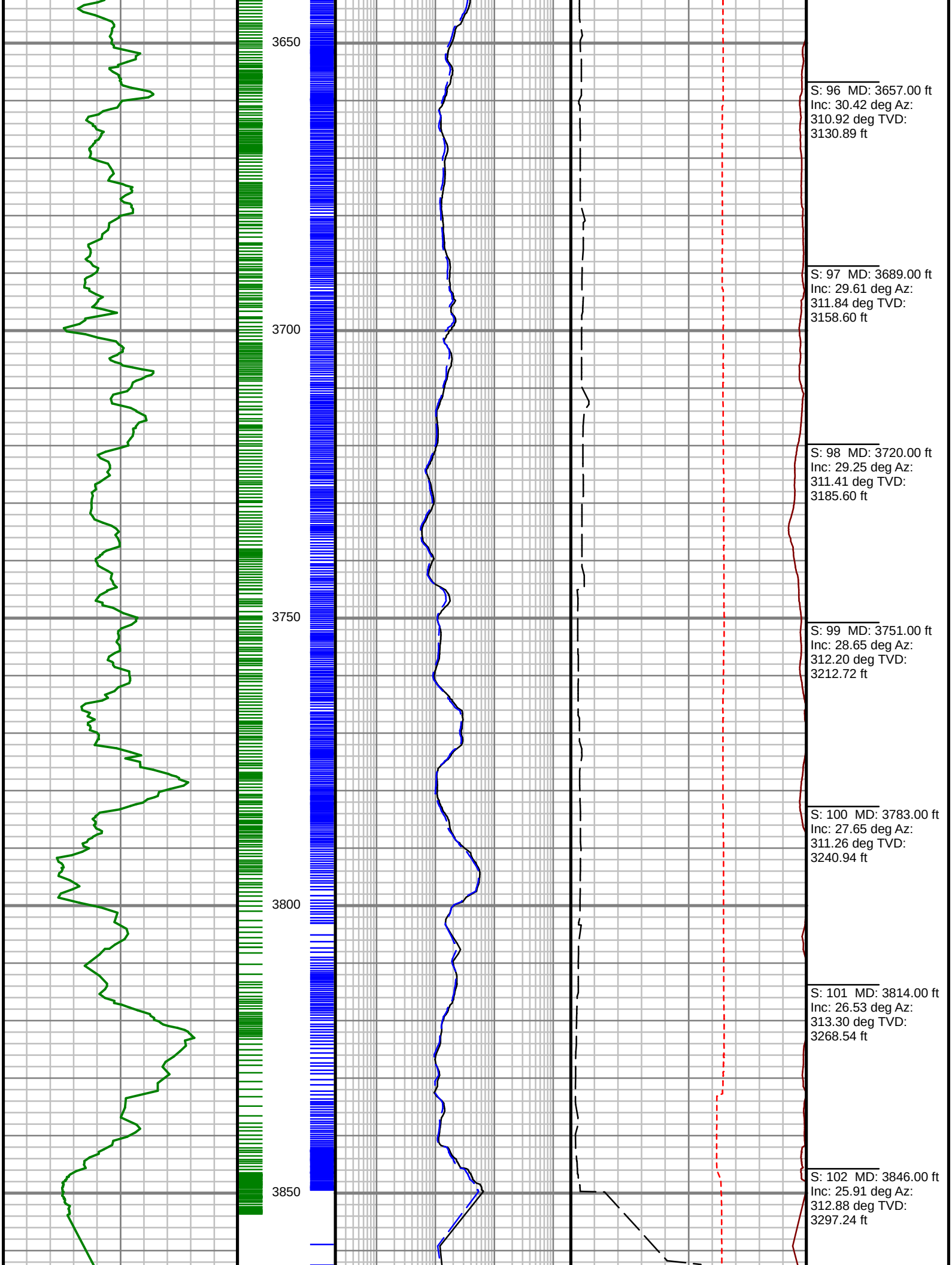

2550
2600
2650
2700
2750
S: 63 MD: 2552.00 ft
Inc: 42.79 deg Az:
332.07 deg TVD:
2274.13 ft
S: 64 MD: 2584.00 ft
Inc: 42.79 deg Az:
330.14 deg TVD:
2297.61 ft
S: 65 MD: 2615.00 ft
Inc: 42.05 deg Az:
327.65 deg TVD:
2320.50 ft
S: 66 MD: 2710.00 ft
Inc: 41.71 deg Az:
324.04 deg TVD:
2391.24 ft
S: 67 MD: 2742.00 ft
Inc: 41.75 deg Az:
322.46 deg TVD:
2415.12 ft

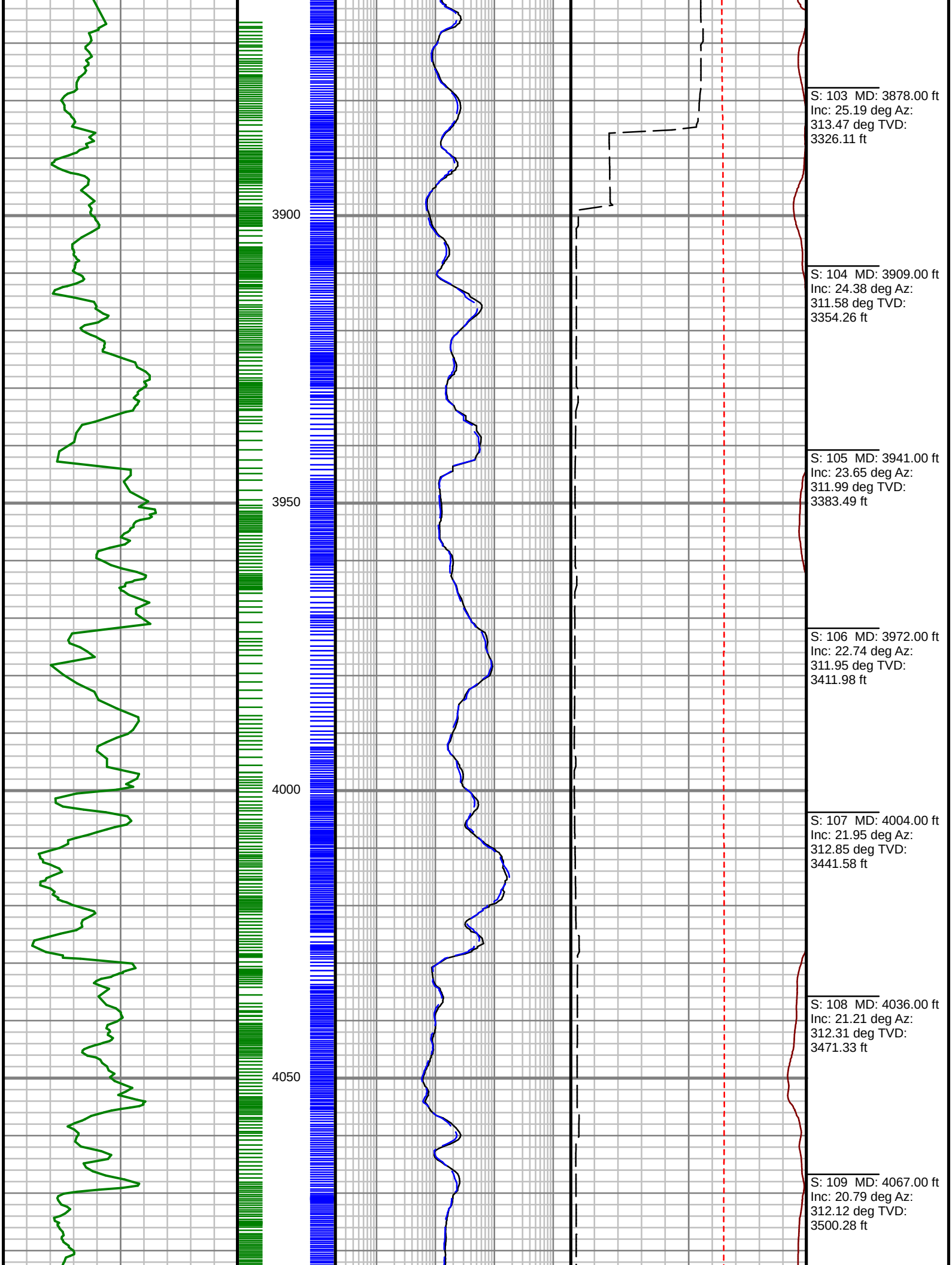

2800
2850
2900
2950
S: 68 MD: 2773.00 ft
Inc: 42.21 deg Az:
320.14 deg TVD:
2438.17 ft
S: 69 MD: 2805.00 ft
Inc: 42.66 deg Az:
317.38 deg TVD:
2461.79 ft
S: 70 MD: 2837.00 ft
Inc: 42.58 deg Az:
315.40 deg TVD:
2485.34 ft
S: 71 MD: 2868.00 ft
Inc: 42.23 deg Az:
314.33 deg TVD:
2508.23 ft
S: 72 MD: 2900.00 ft
Inc: 41.57 deg Az:
313.25 deg TVD:
2532.05 ft
S: 73 MD: 2932.00 ft
Inc: 40.88 deg Az:
313.81 deg TVD:
2556.12 ft
S: 74 MD: 2963.00 ft
Inc: 40.34 deg Az:
313.49 deg TVD:
2579.65 ft

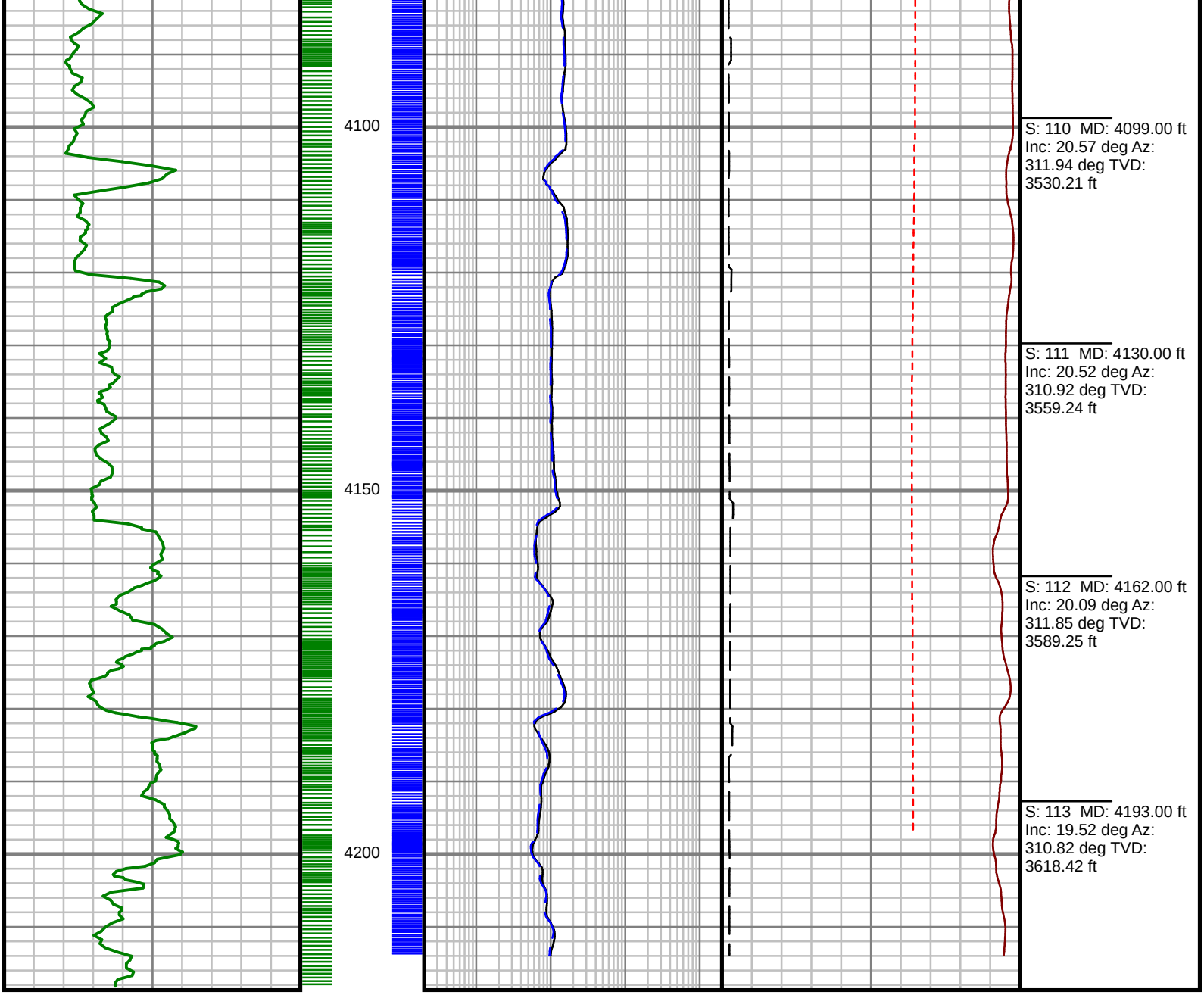

3000
3050
3100
3150
3200
S: 75 MD: 2995.00 ft
Inc: 40.97 deg Az:
311.82 deg TVD:
2603.93 ft
S: 76 MD: 3026.00 ft
Inc: 40.77 deg Az:
310.80 deg TVD:
2627.37 ft
S: 77 MD: 3058.00 ft
Inc: 40.36 deg Az:
311.02 deg TVD:
2651.68 ft
S: 78 MD: 3089.00 ft
Inc: 41.42 deg Az:
311.34 deg TVD:
2675.11 ft
S: 79 MD: 3120.00 ft
Inc: 41.62 deg Az:
311.87 deg TVD:
2698.32 ft
S: 80 MD: 3152.00 ft
Inc: 41.38 deg Az:
311.18 deg TVD:
2722.29 ft
S: 81 MD: 3184.00 ft
Inc: 41.05 deg Az:
311.42 deg TVD:
2746.36 ft


3250
3300
3350
3400
S: 82 MD: 3215.00 ft
Inc: 40.59 deg Az:
310.67 deg TVD:
2769.82 ft
S: 83 MD: 3247.00 ft
Inc: 40.03 deg Az:
310.68 deg TVD:
2794.22 ft
S: 84 MD: 3278.00 ft
Inc: 39.62 deg Az:
310.86 deg TVD:
2818.03 ft
S: 85 MD: 3310.00 ft
Inc: 39.37 deg Az:
311.24 deg TVD:
2842.72 ft
S: 86 MD: 3342.00 ft
Inc: 38.53 deg Az:
310.56 deg TVD:
2867.61 ft
S: 87 MD: 3373.00 ft
Inc: 37.13 deg Az:
311.52 deg TVD:
2892.09 ft
S: 88 MD: 3405.00 ft
Inc: 35.65 deg Az:
310.71 deg TVD:
2917.85 ft


3450
3500
3550
3600
S: 89 MD: 3436.00 ft
Inc: 34.38 deg Az:
311.97 deg TVD:
2943.24 ft
S: 90 MD: 3468.00 ft
Inc: 33.06 deg Az:
310.97 deg TVD:
2969.86 ft
S: 91 MD: 3499.00 ft
Inc: 32.48 deg Az:
312.06 deg TVD:
2995.93 ft
S: 92 MD: 3531.00 ft
Inc: 31.89 deg Az:
310.72 deg TVD:
3023.01 ft
S: 93 MD: 3562.00 ft
Inc: 31.37 deg Az:
311.60 deg TVD:
3049.40 ft
S: 94 MD: 3594.00 ft
Inc: 31.10 deg Az:
311.87 deg TVD:
3076.76 ft
S: 95 MD: 3625.00 ft
Inc: 30.81 deg Az:
311.45 deg TVD:
3103.35 ft


3650
3700
3750
3800
3850
S: 96 MD: 3657.00 ft
Inc: 30.42 deg Az:
310.92 deg TVD:
3130.89 ft
S: 97 MD: 3689.00 ft
Inc: 29.61 deg Az:
311.84 deg TVD:
3158.60 ft
S: 98 MD: 3720.00 ft
Inc: 29.25 deg Az:
311.41 deg TVD:
3185.60 ft
S: 99 MD: 3751.00 ft
Inc: 28.65 deg Az:
312.20 deg TVD:
3212.72 ft
S: 100 MD: 3783.00 ft
Inc: 27.65 deg Az:
311.26 deg TVD:
3240.94 ft
S: 101 MD: 3814.00 ft
Inc: 26.53 deg Az:
313.30 deg TVD:
3268.54 ft
S: 102 MD: 3846.00 ft
Inc: 25.91 deg Az:
312.88 deg TVD:
3297.24 ft


3900
3950
4000
4050
S: 103 MD: 3878.00 ft
Inc: 25.19 deg Az:
313.47 deg TVD:
3326.11 ft
S: 104 MD: 3909.00 ft
Inc: 24.38 deg Az:
311.58 deg TVD:
3354.26 ft
S: 105 MD: 3941.00 ft
Inc: 23.65 deg Az:
311.99 deg TVD:
3383.49 ft
S: 106 MD: 3972.00 ft
Inc: 22.74 deg Az:
311.95 deg TVD:
3411.98 ft
S: 107 MD: 4004.00 ft
Inc: 21.95 deg Az:
312.85 deg TVD:
3441.58 ft
S: 108 MD: 4036.00 ft
Inc: 21.21 deg Az:
312.31 deg TVD:
3471.33 ft
S: 109 MD: 4067.00 ft
Inc: 20.79 deg Az:
312.12 deg TVD:
3500.28 ft



GAIN - Gamma Ray (G-GR)

0 Unit = aapi 150

MEASURED DEPTH
1:240 (ft)

Phase Shift Resistivity, 33" (PR33)

0.2 Unit = ohmm 2000

Phase Shift Resistivity, 23" (PR23)

0.2 Unit = ohmm 2000

Attenuation Conductivity, 33" (AC33)

1000 Unit = mmho/m 0

Tool Temperature (T-TEMP)

0 Unit = °F 200

FET of Resistivity (FETR)

0 Unit = hr 10

Comments

Scientific Drilling

PROPAGATION RESISTIVITY
GAMMA RAY

5" = 100' MD