

# COLUMBINE LOGGING

Scale: 5" / 100'  
Measured Depth Log

**Well Name** Crow Creek AA01-724

**Location** Sec. 1 T6N R63W

**State** Colorado

**County** Weld

**Country** USA

**Rig Number** PD 829

**API Number** 05-123-40152

**AFE #** 200448

**Region** DJ Basin

**Field** Wattenberg

**Spud Date** 12/13/2014

**Drilling Completed** 12/19/2014

**Surface Coordinates** 290 FNL ; 1213 FEL  
40.50832 ; -104.37811

**Bottom Hole Coordinates** 30 FNL ; 910 FEL  
40.50832 ; -104.37811

**Ground Elevation** 4857'

**K.B. Elevation** 4873'

**Logged Interval** 698' **To** 5496'

**Total Depth** 11598'

**Formation** Niobrara B chalk

**Type of Drilling Fluid** FW LSND

## Operator

**Company** NOBLE ENERGY INC.

**Address** 1625 BROADWAY  
DENVER, CO 80202

## Geologist

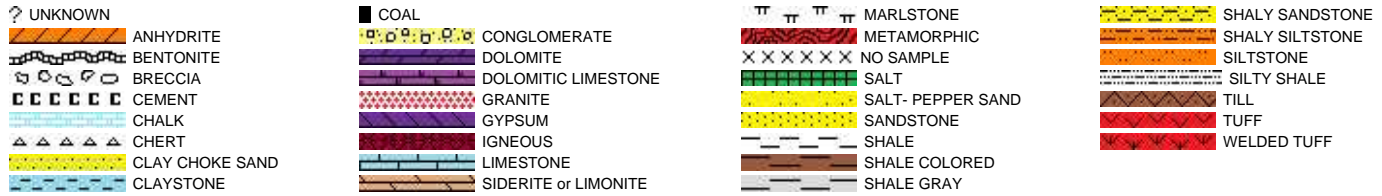
**Name** Emerson Palmer

**Company** Noble Energy, Inc.

**Address** 1625 BROADWAY  
DENVER, CO 80202

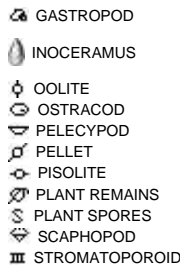
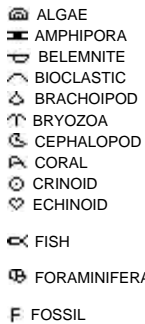
## Other

## Rock Types

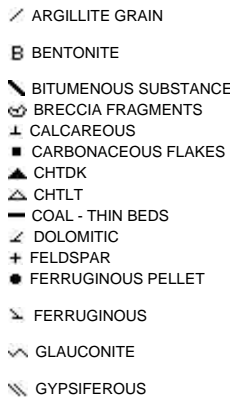
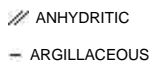


## Accessories

### Fossils



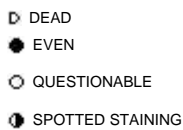
### Minerals



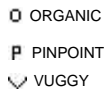
### Stringer

## Other Symbols

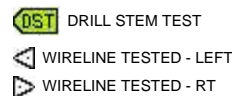
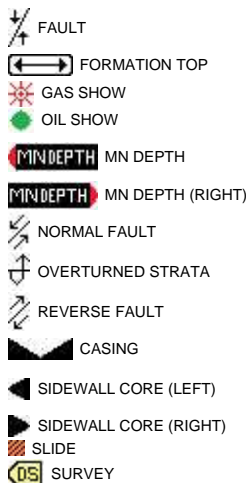
### Oil Show



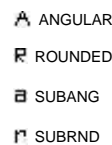
### Porosity



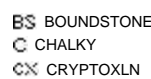
### Engineering



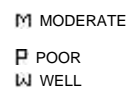
### Rounding

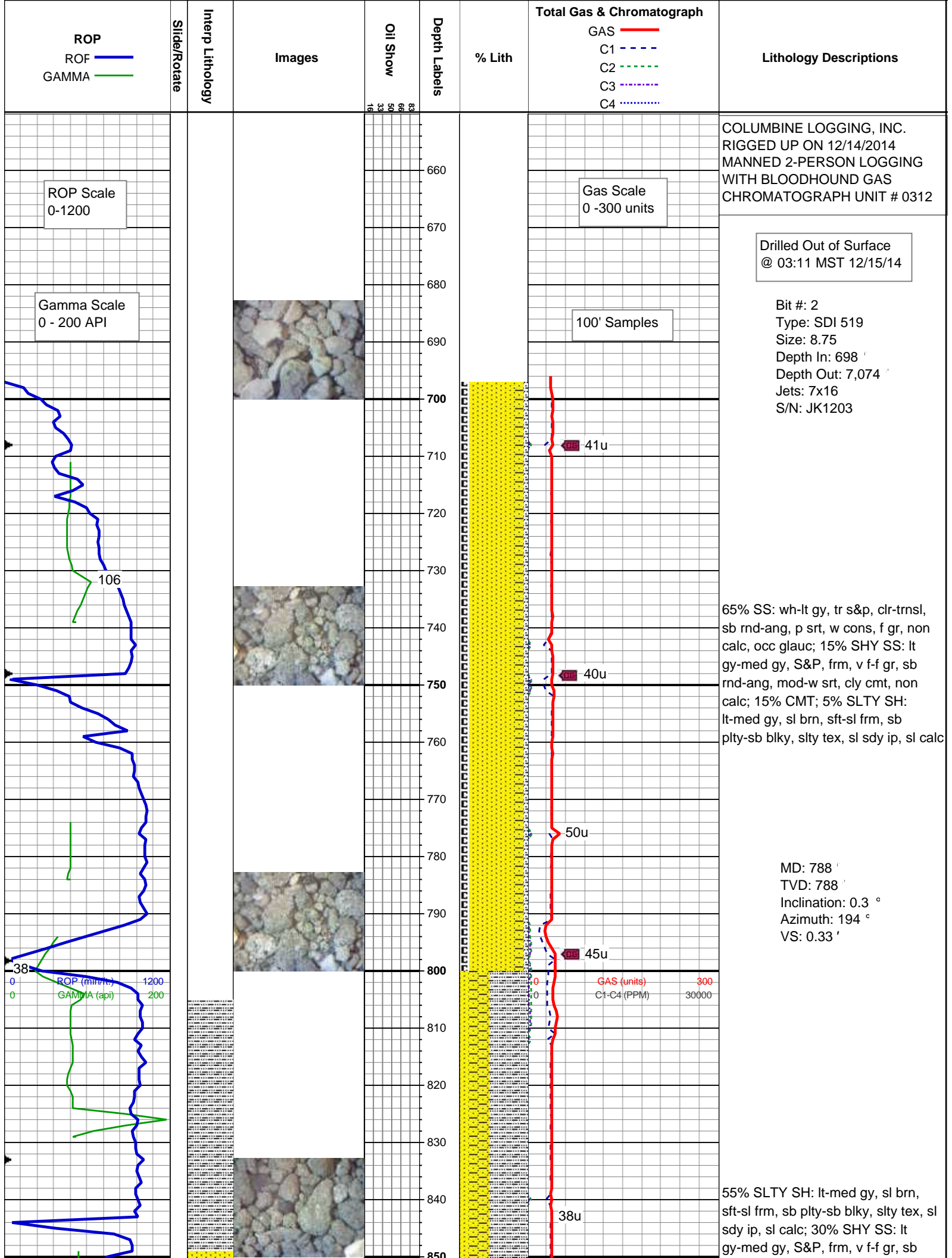


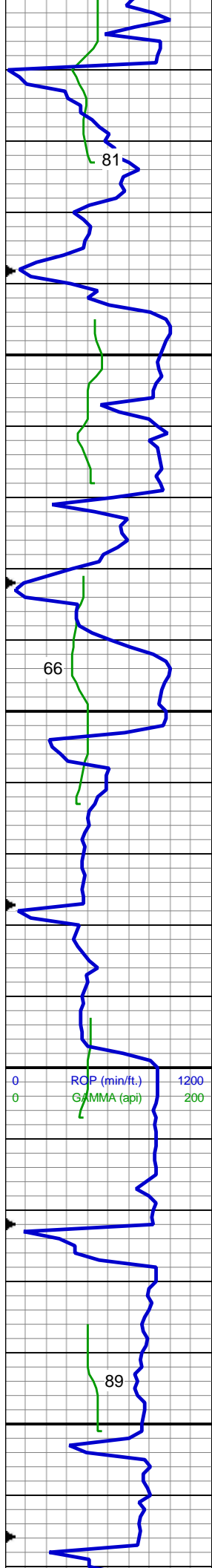
### Textures



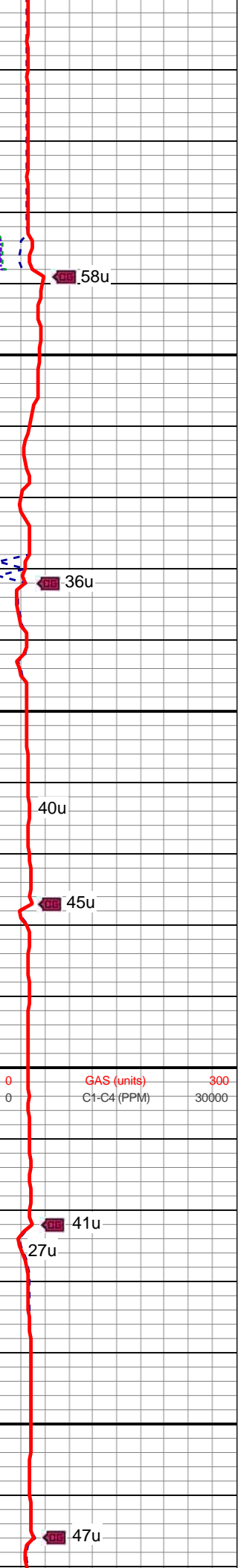
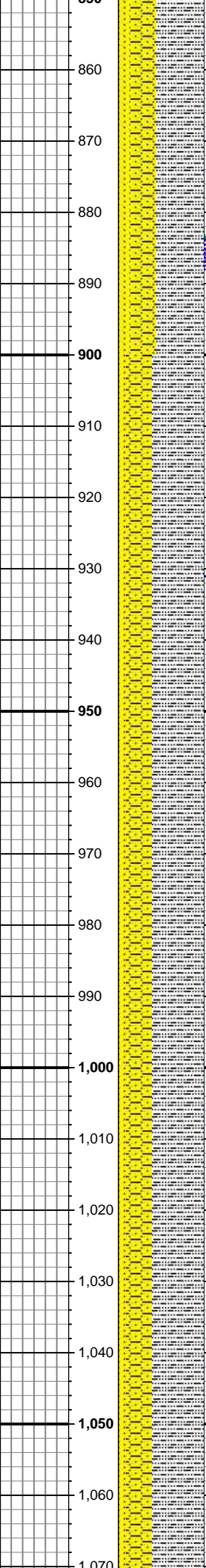
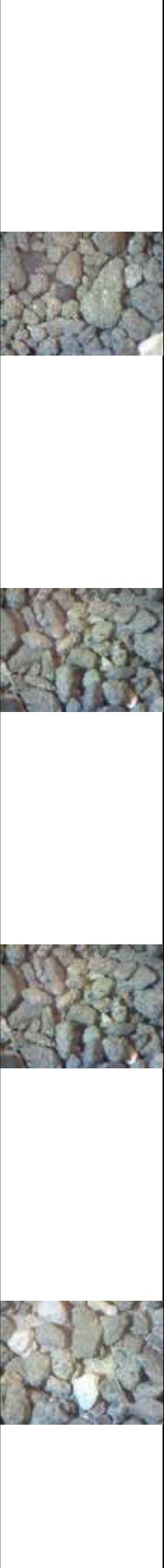
### Sorting







81  
66  
89



rnd-ang, mod-w srt, cly cmt, non calc; 15% SS: wh-lt gy, tr s&p, clr-trnsl, sb rnd-ang, p srt, w cons, f gr, non calc

MD: 877 '  
TVD: 877 '  
Inclination: 0.3 °  
Azimuth: 177.8 °  
VS: 0.79 '

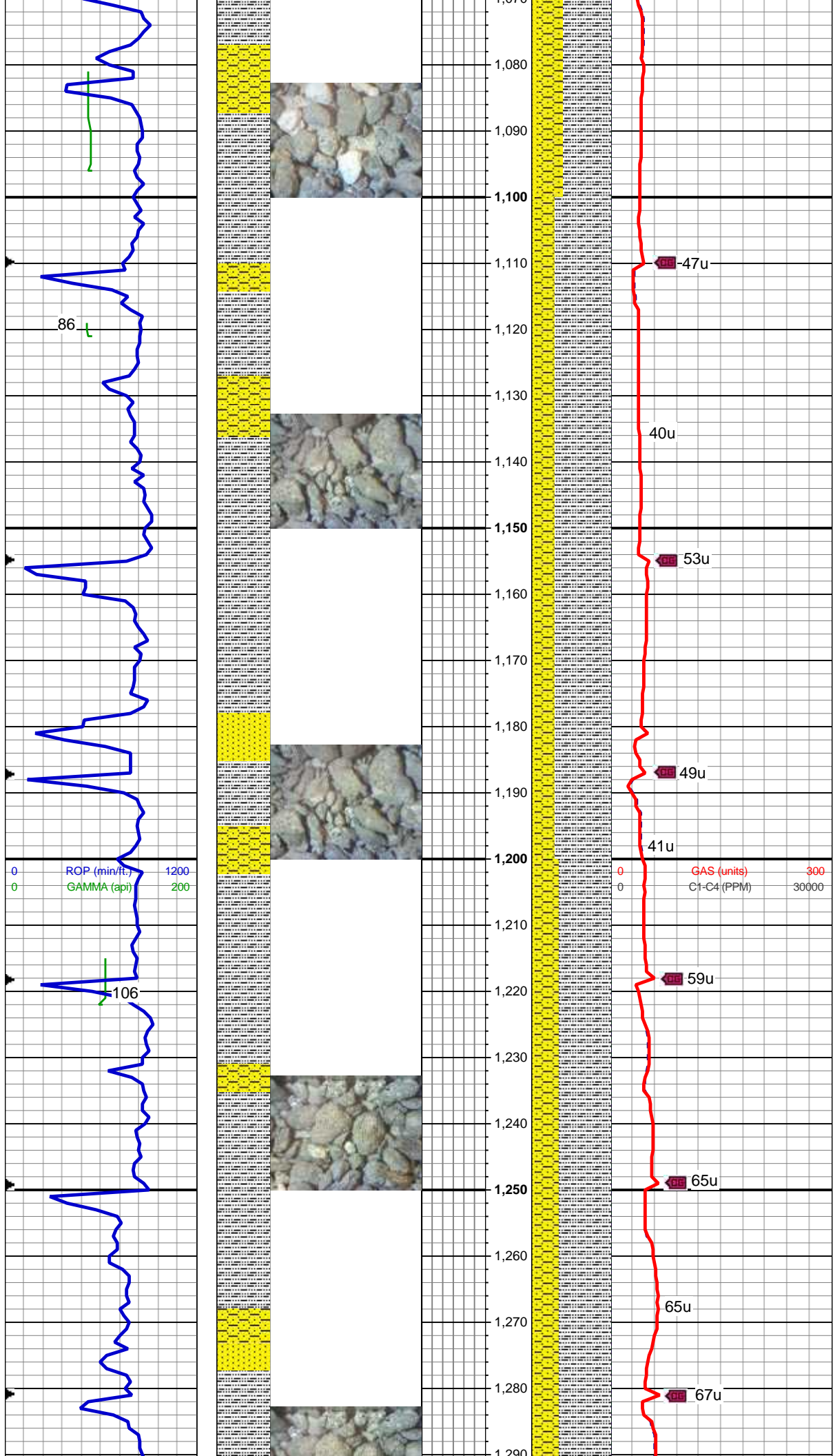
60% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb plty-sb blkly, slty tex, sl sdy ip, sl calc; 30% SHY SS: lt gy-med gy, S&P, frm, v f-f gr, sb rnd-ang, mod-w srt, cly cmt, non calc; 10% SS: wh-lt gy, tr s&p, clr-trnsl, sb rnd-ang, p srt, w cons, f gr, non calc

MD: 967 '  
TVD: 967 '  
Inclination: 0.4 °  
Azimuth: 181.4 °  
VS: 1.33 '

60% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb plty-sb blkly, slty tex, sl sdy ip, sl calc; 30% SHY SS: lt gy-med gy, S&P, frm, v f-f gr, sb rnd-ang, mod-w srt, cly cmt, non calc; 10% SS: wh-lt gy, tr s&p, clr-trnsl, sb rnd-ang, p srt, w cons, f gr, non calc

MD: 1,056 '  
TVD: 1,055.99 '





Inclination: 0.5 °  
Azimuth: 218.5 °  
VS: 1.93 '

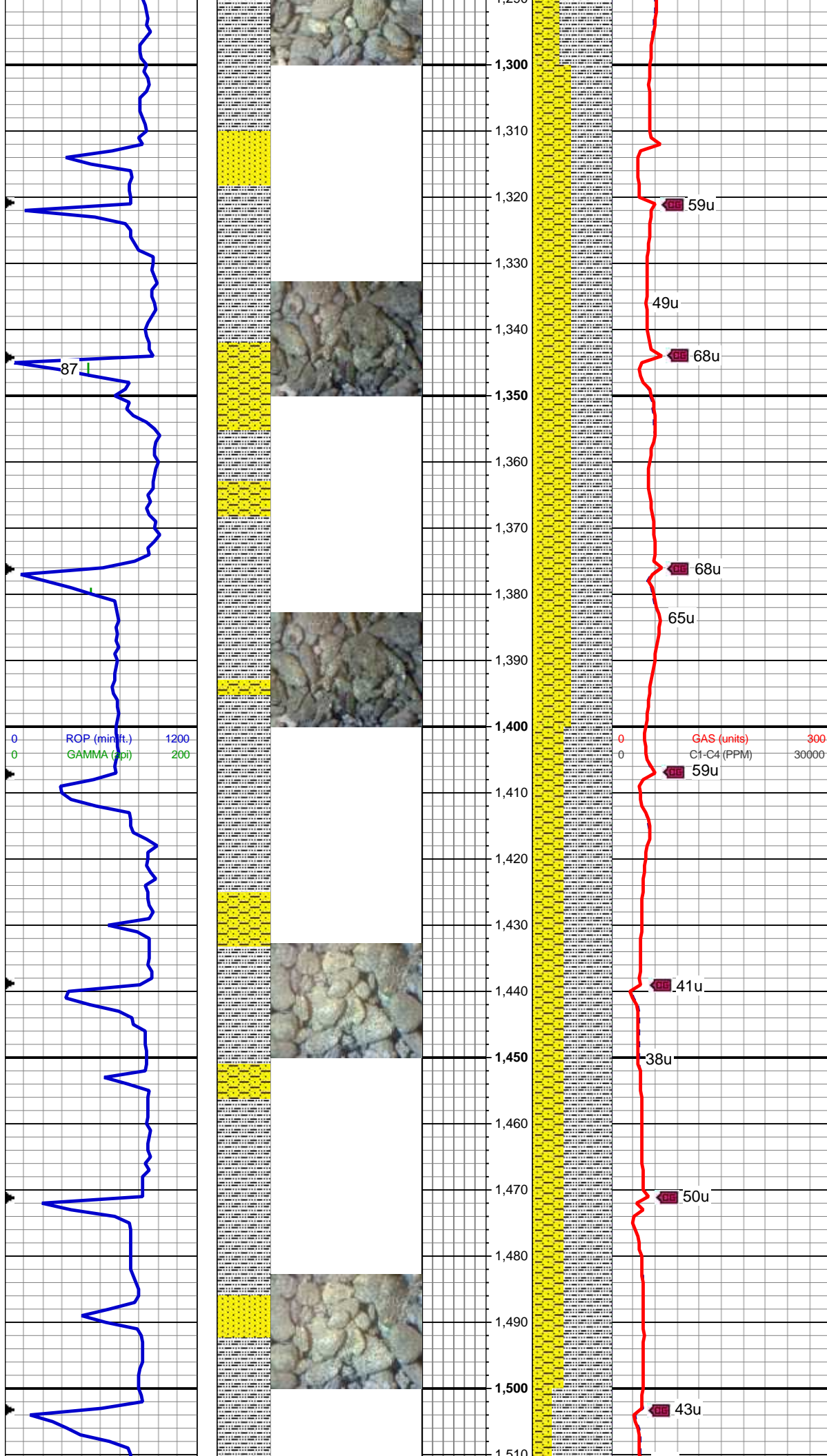
WT: 8.6 / VIS: 31

75% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb plty-sb blkly, slty tex, sl sdy ip, sl calc; 20% SHY SS: lt gy-med gy, S&P, frm, v f-f gr, sb rnd-ang, mod-w srt, cly cmt, non calc; 5% SS: wh-lt gy, tr s&p, clr-trnsl, sb rnd-ang, p srt, w cons, f gr, non calc

MD: 1,164 '  
TVD: 1,163.99 '  
Inclination: 0.4 °  
Azimuth: 188.3 °  
VS: 2.64 '

65% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb plty-sb blkly, slty tex, sl sdy ip, sl calc; 30% SHY SS: lt gy-med gy, S&P, frm, v f-f gr, sb rnd-ang, mod-w srt, cly cmt, non calc; 5% SS: wh-lt gy, tr s&p, clr-trnsl, sb rnd-ang, p srt, w cons, f gr, non calc

MD: 1,259 '  
TVD: 1,258.99 '  
Inclination: 0.6 °  
Azimuth: 183.2 °  
VS: 3.46 '



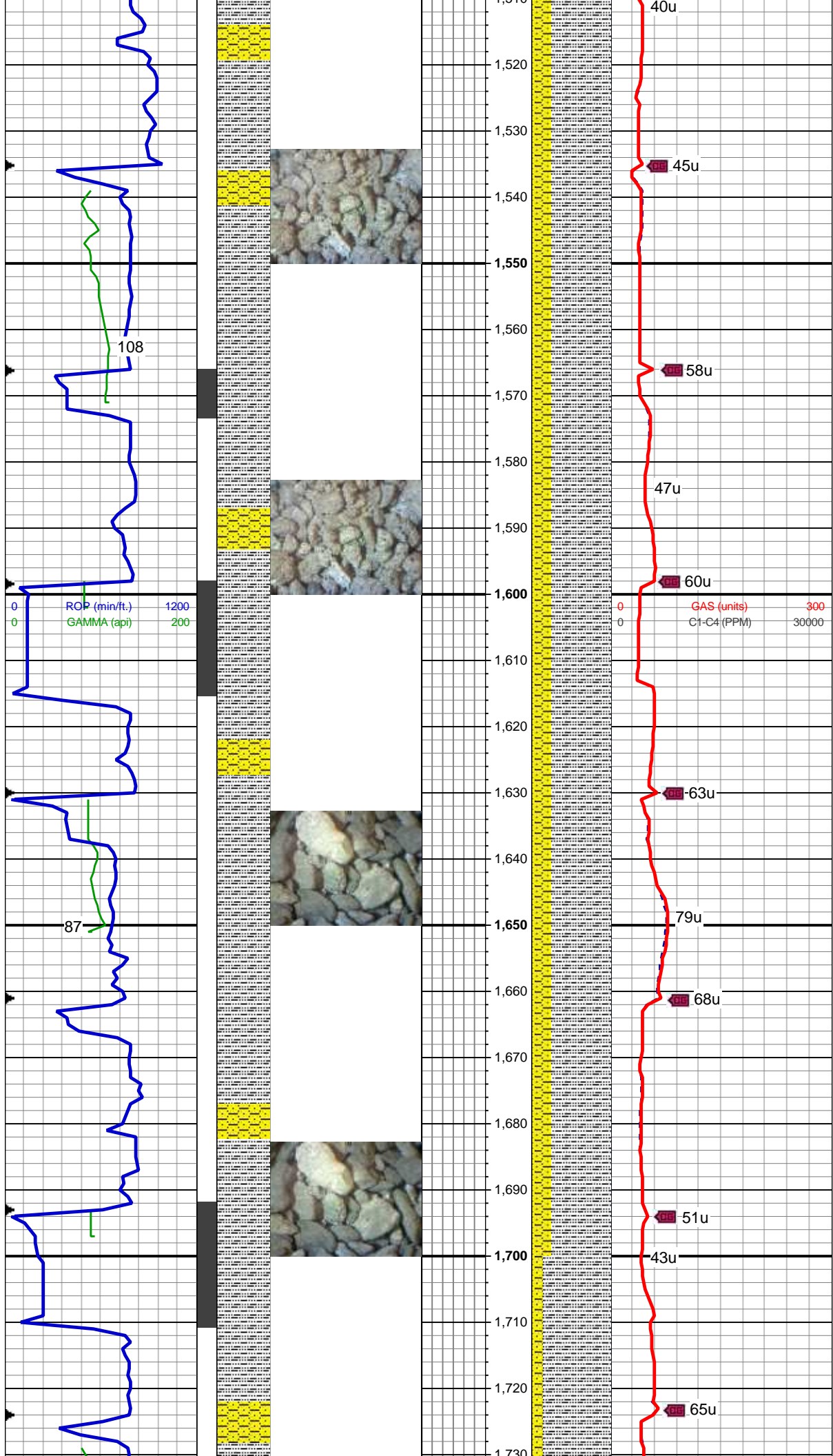
MD: 1,354 '  
TVD: 1,353.98 '  
Inclination: 0.9 °  
Azimuth: 211 °  
VS: 4.56 '

50% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb pty-sb blkly, slty tex, sl sdy ip, sl calc; 40% SHY SS: lt gy-med gy, S&P, frm, v f-f gr, sb rnd-ang, mod-w srt, cly cmt, non calc; 10% SS: wh-lt gy, tr s&p, clr-trnsl, sb rnd-ang, p srt, w cons, f gr, non calc

MD: 1,449 '  
TVD: 1,448.97 '  
Inclination: 0.8 °  
Azimuth: 210.1 °  
VS: 5.72 '

60% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb pty-sb blkly, slty tex, sl sdy ip, sl calc; 35% SHY SS: lt gy-med gy, S&P, frm, v f-f gr, sb rnd-ang, mod-w srt, cly cmt, non calc; 5% SS: wh-lt gy, tr s&p, clr-trnsl, sb rnd-ang, p srt, w cons, f gr, non calc





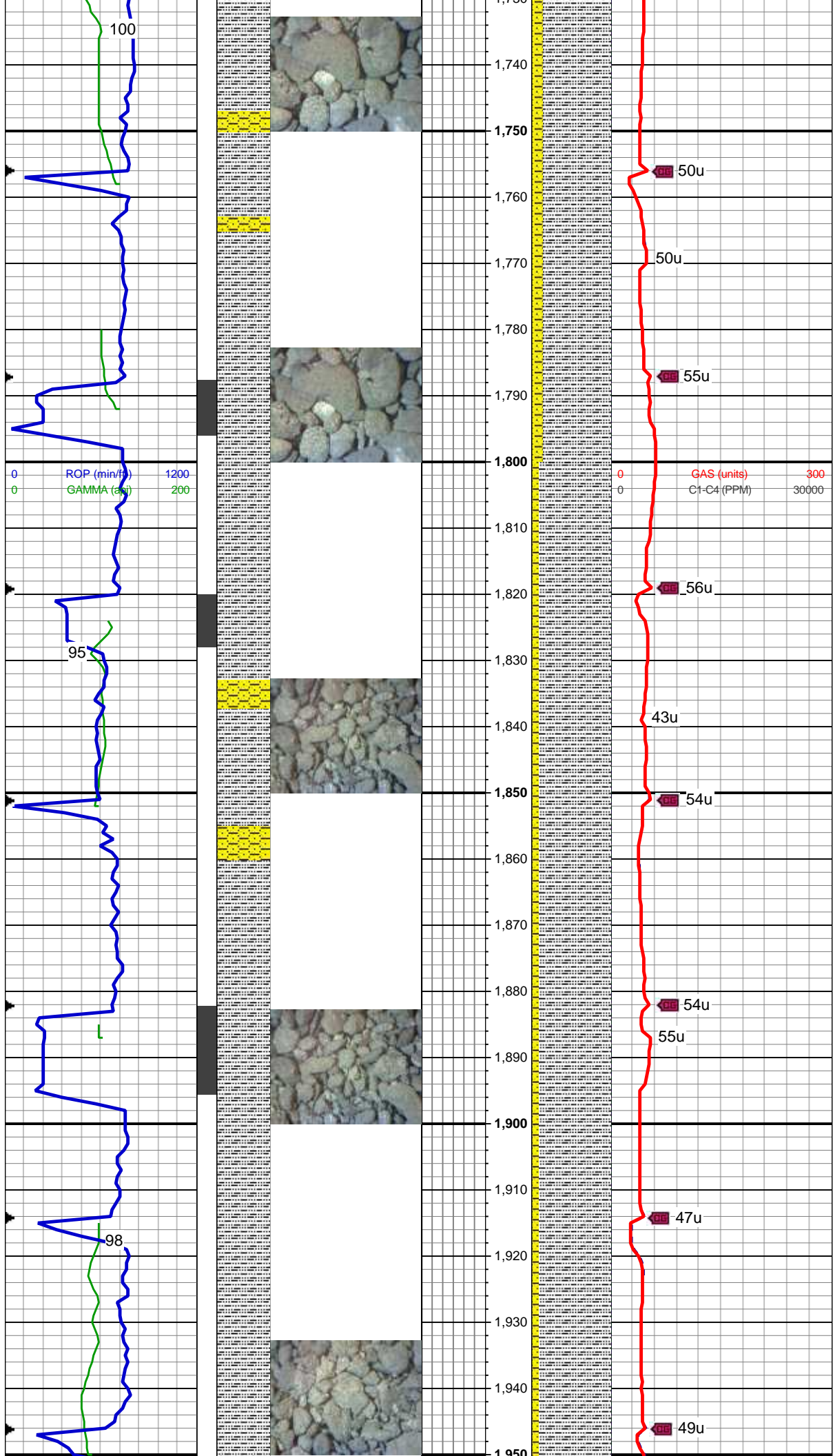
MD: 1,544 '  
TVD: 1,543.96 '  
Inclination: 0.4 °  
Azimuth: 239.3 °  
VS: 6.42 '

75% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb plty-sb blk, slty tex, sl sdy ip, sl calc; 20% SHY SS: lt gy-med gy, S&P, frm, v f-f gr, sb rnd-ang, mod-w srt, cly cmt, non calc; 10% SS: wh-lt gy, tr s&p, clr-trnsl, sb rnd-ang, p srt, w cons, f gr, non calc

MD: 1,639 '  
TVD: 1,638.95 '  
Inclination: 1.8 °  
Azimuth: 116.7 °  
VS: 7.33 '

75% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb plty-sb blk, slty tex, sl sdy ip, sl calc; 20% SHY SS: lt gy-med gy, S&P, frm, v f-f gr, sb rnd-ang, mod-w srt, cly cmt, non calc; 5% SS: wh-lt gy, tr s&p, clr-trnsl, sb rnd-ang, p srt, w cons, f gr, non calc

MD: 1,734 '  
TVD: 1,733.82 '  
Inclination: 4.1 °  
Azimuth: 85.3 °  
VS: 8.07 '



85% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb pty-sb blk, slty tex, sl sdy ip, sl calc; 10% SHY SS: lt gy-med gy, S&P, frm, v f-f gr, sb rnd-ang, mod-w srt, cly cmt, non calc; 10% SS: wh-lt gy, tr s&p, clr-trnsl, sb rnd-ang, p srt, w cons, f gr, non calc, occ sh

WT: 8.5 / VIS: 27

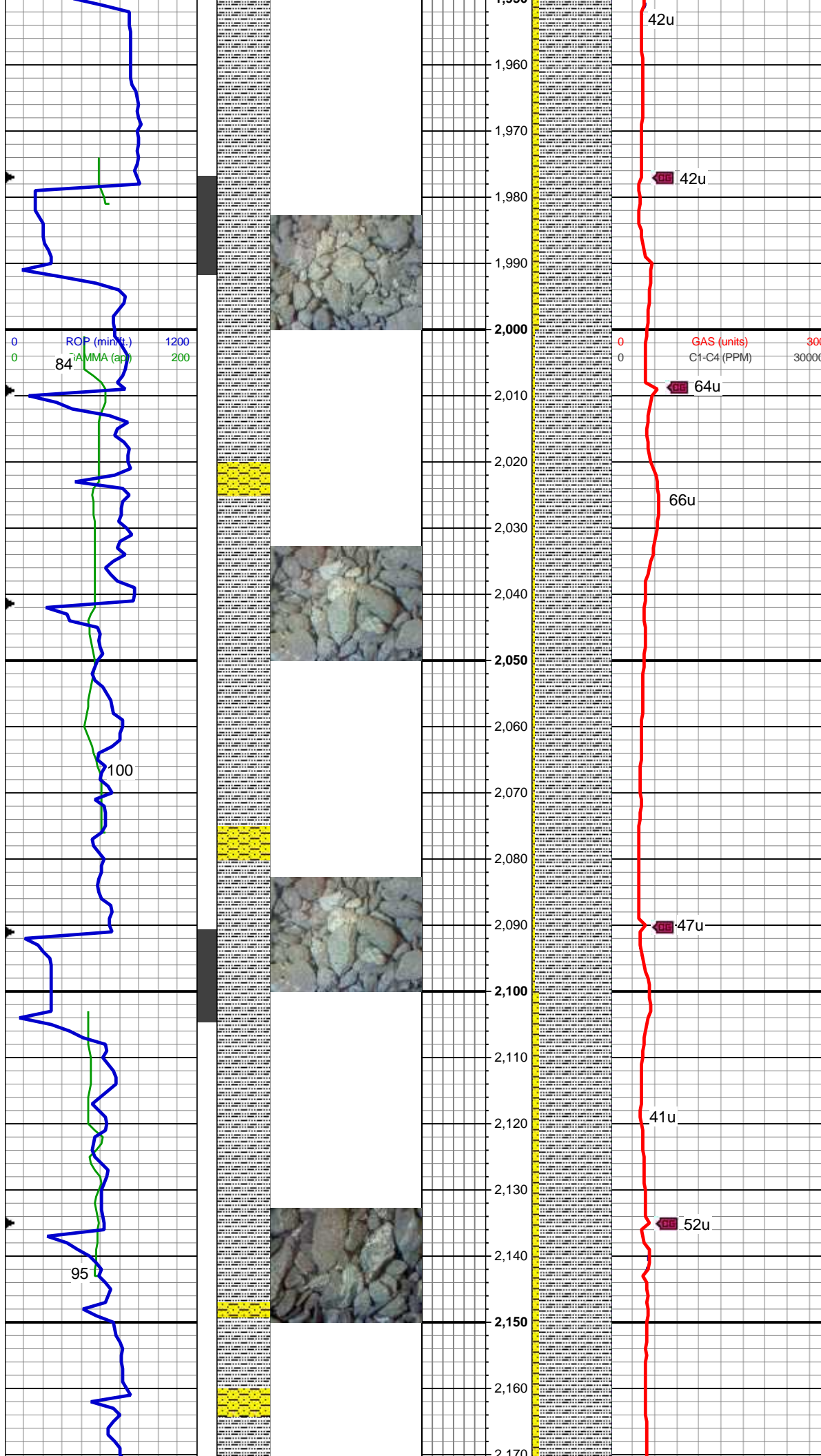
MD: 1,829 '  
TVD: 1,828.54 '  
Inclination: 4.7 °  
Azimuth: 93.2 °  
VS: 8.53 '

90% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb pty-sb blk, slty tex, sl sdy ip, sl calc; 10% SHY SS: lt gy-med gy, S&P, frm, v f-f gr, sb rnd-ang, mod-w srt, cly cmt, non calc, occ ss

MD: 1,924 '  
TVD: 1,923.13 '  
Inclination: 6 °  
Azimuth: 82.3 °  
VS: 8.73 '

90% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb pty-sb blk, slty tex, sl sdy ip, sl calc; 10% SHY SS: lt

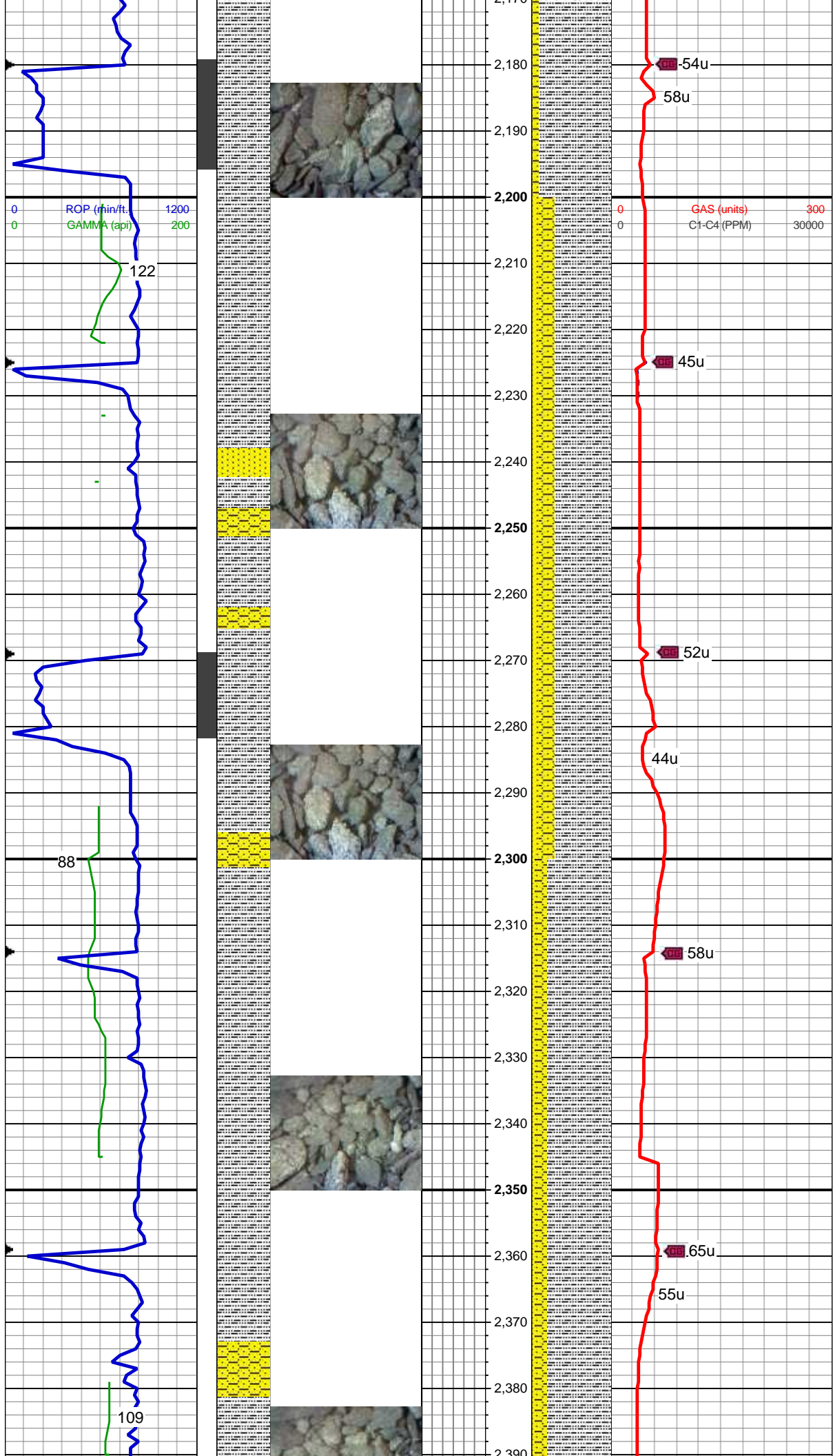




gy-med gy, S&P, frm, v f-f gr, sb  
rnd-ang, mod-w srt, cly cmt, non  
calc, occ ss

MD: 2,037 '  
TVD: 2,035.35 '  
Inclination: 7.5 °  
Azimuth: 72.2 °  
VS: 6.63 '  
  
95% SLTY SH: lt-med gy, sl brn,  
sft-sl frm, sb plty-sb blkly, slty tex, sl  
sdy ip, sl calc; 5% SHY SS: lt  
gy-med gy, S&P, frm, v f-f gr, sb  
rnd-ang, mod-w srt, cly cmt, non  
calc, tr ss

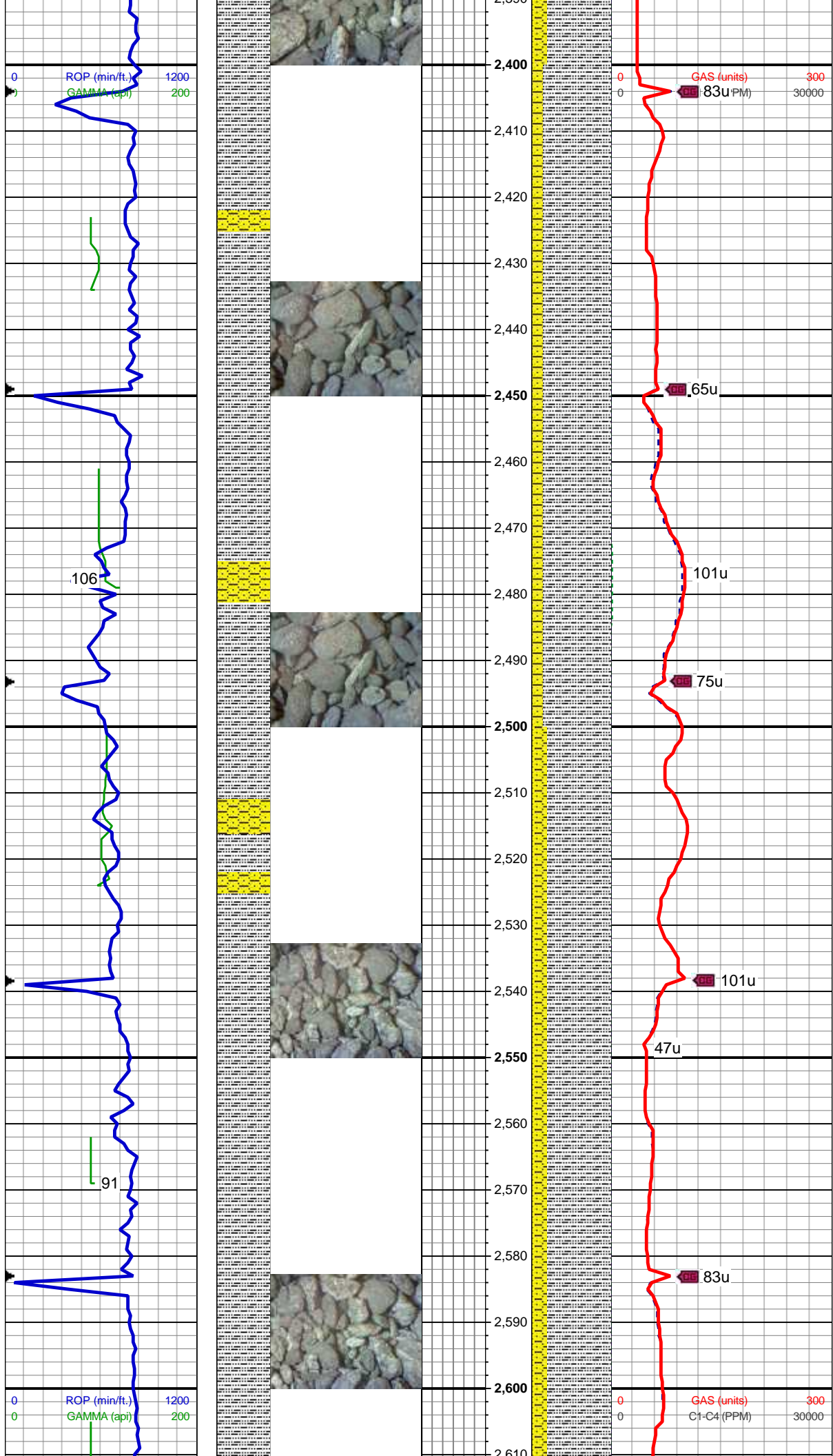
MD: 2,127 '  
TVD: 2,124.38 '  
Inclination: 9.3 °  
Azimuth: 69.6 °  
VS: 3.22 '  
  
90% SLTY SH: lt-med gy, sl brn,  
sft-sl frm, sb plty-sb blkly, slty tex, sl  
sdy ip, sl calc; 10% SHY SS: lt  
gy-med gy, S&P, frm, v f-f gr, sb  
rnd-ang, mod-w srt, cly cmt, non  
calc, tr ss



MD: 2,216 '  
TVD: 2,212.21 '  
Inclination: 9.4 °  
Azimuth: 56.3 °  
VS: -2.38 '

MD: 2,306 '  
TVD: 2,300.95 '  
Inclination: 9.8 °  
Azimuth: 46.7 °  
VS: -10.83 '





MD: 2,396 '  
TVD: 2,389.65 '  
Inclination: 9.7 °  
Azimuth: 44.1 °  
VS: -20.71 '

85% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb plty-sb blkly, slty tex, sl sdy ip, sl calc; 15% SHY SS: lt gy-med gy, S&P, frm, v f-f gr, sb rnd-ang, mod-w srt, cly cmt, non calc, tr ss

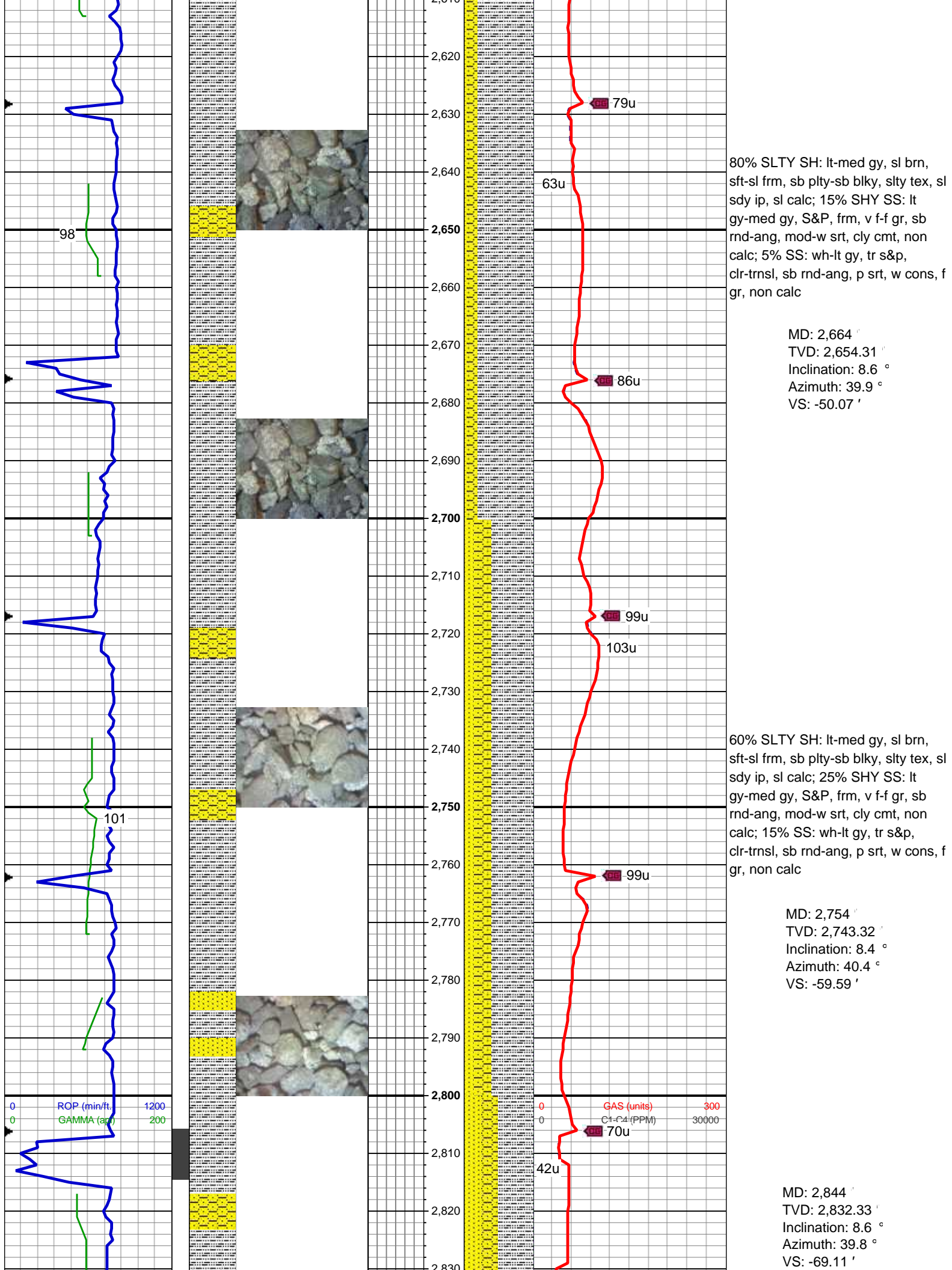
MD: 2,485 '  
TVD: 2,477.46 '  
Inclination: 9.1 °  
Azimuth: 42.3 °  
VS: -30.54 '

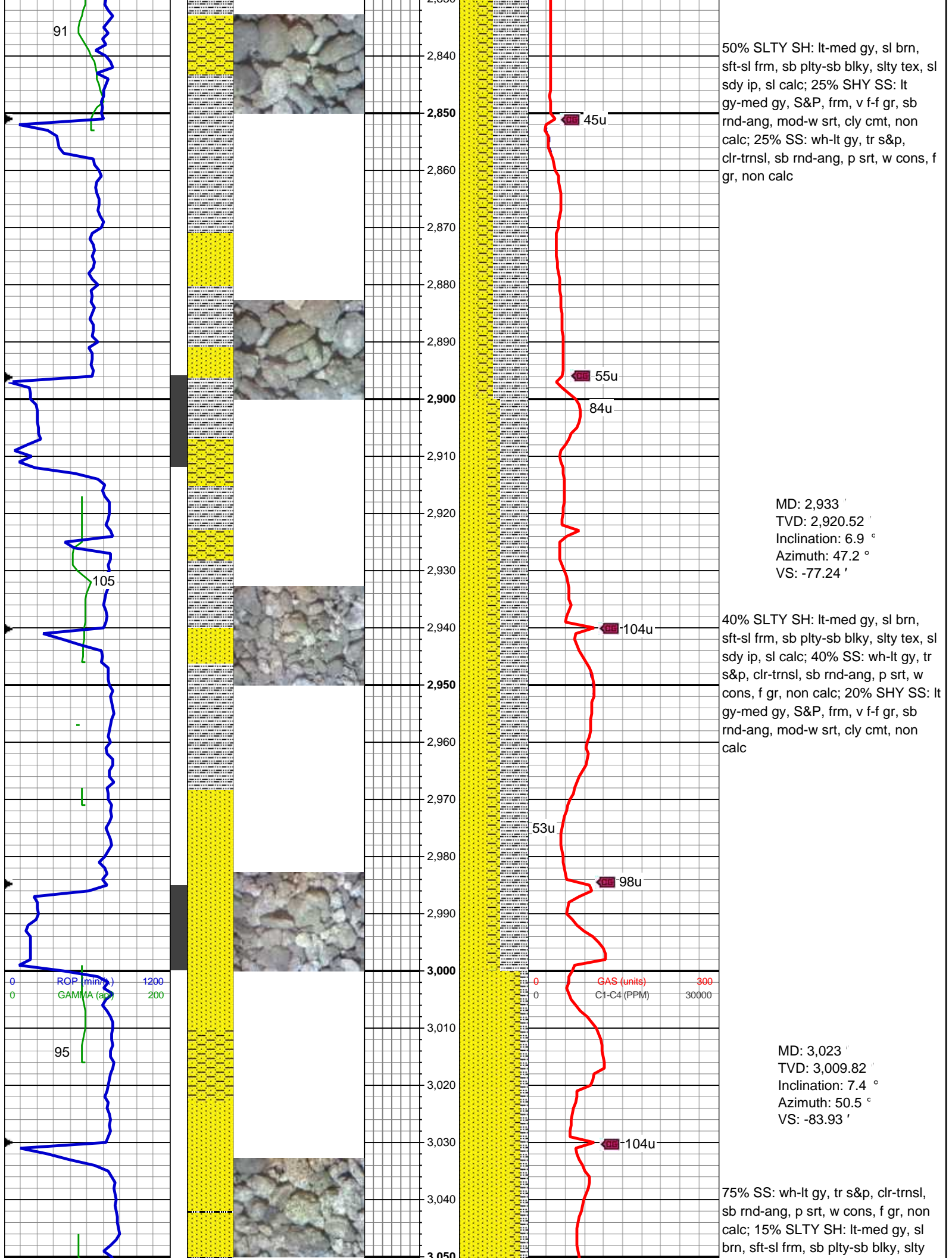
WT: 8.6 / VIS: 32

85% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb plty-sb blkly, slty tex, sl sdy ip, sl calc; 15% SHY SS: lt gy-med gy, S&P, frm, v f-f gr, sb rnd-ang, mod-w srt, cly cmt, non calc, tr ss

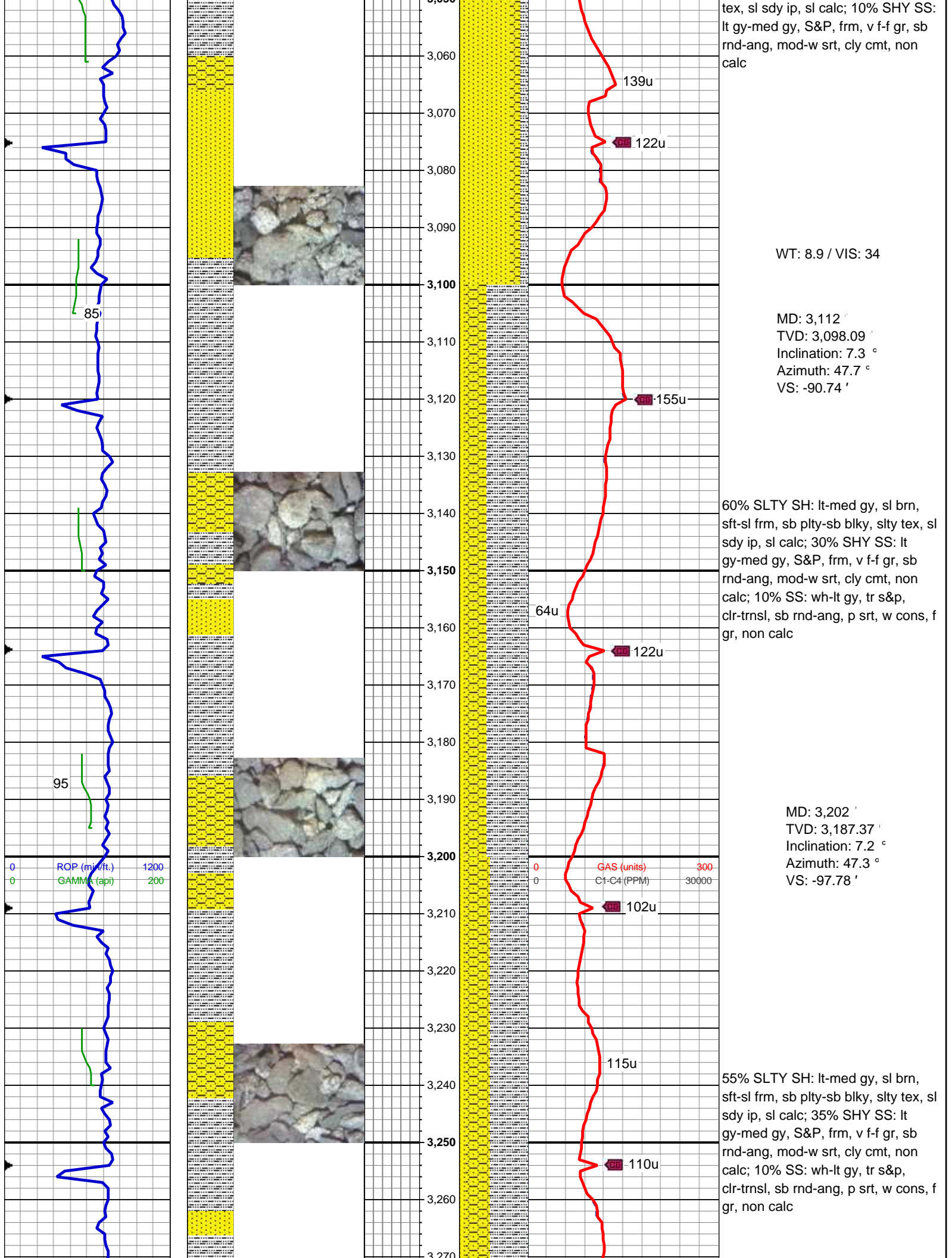
MD: 2,575 '  
TVD: 2,566.35 '  
Inclination: 8.9 °  
Azimuth: 40.5 °  
VS: -40.4 '











tex, sl sdy ip, sl calc; 10% SHY SS: lt gy-med gy, S&P, frm, v f-f gr, sb rnd-ang, mod-w srt, cly cmt, non calc

WT: 8.9 / VIS: 34

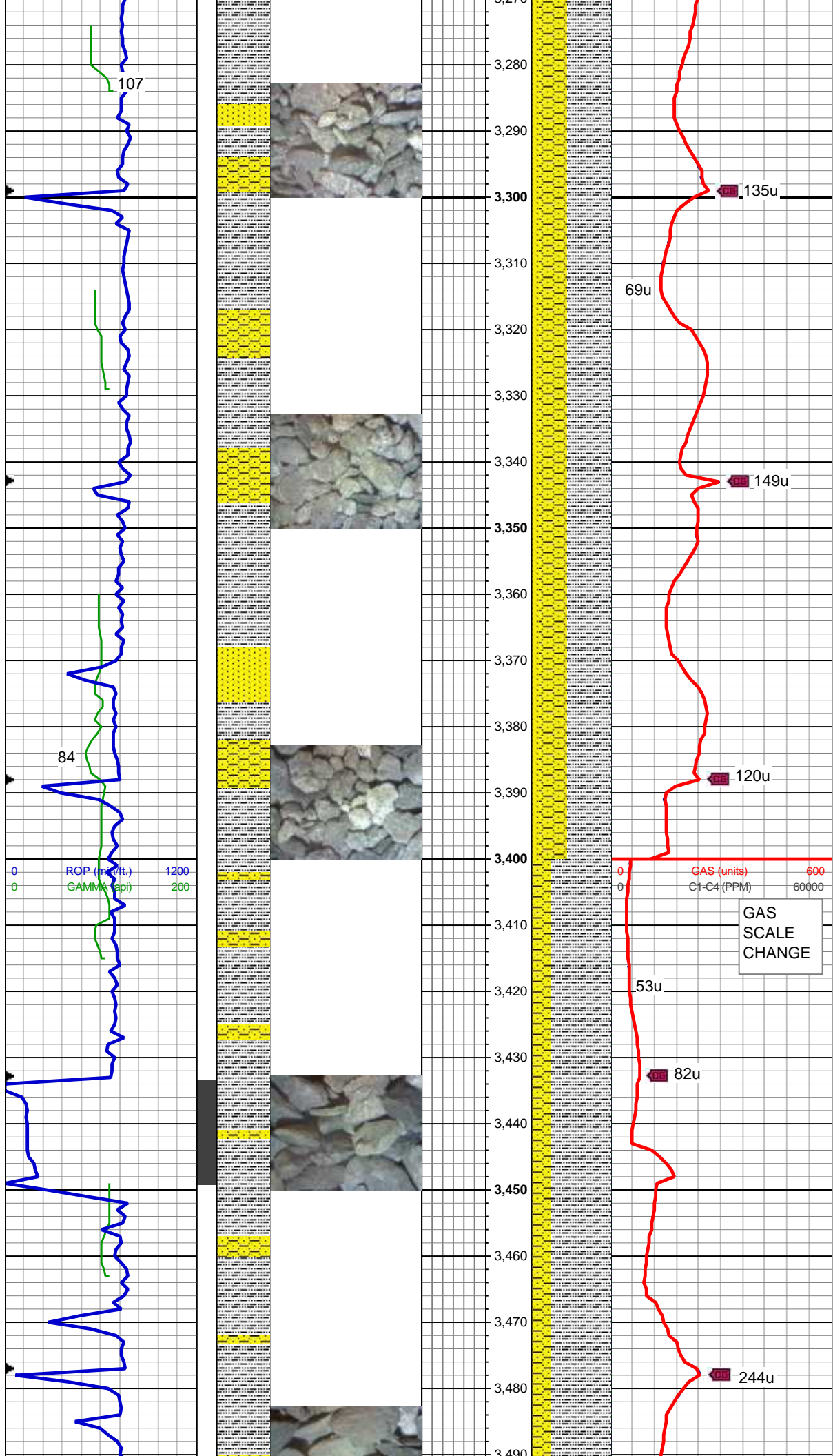
MD: 3,112 '  
TVD: 3,098.09 '  
Inclination: 7.3 °  
Azimuth: 47.7 °  
VS: -90.74 '

60% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb plty-sb blk, slty tex, sl sdy ip, sl calc; 30% SHY SS: lt gy-med gy, S&P, frm, v f-f gr, sb rnd-ang, mod-w srt, cly cmt, non calc; 10% SS: wh-lt gy, tr s&p, clr-trnsl, sb rnd-ang, p srt, w cons, f gr, non calc

MD: 3,202 '  
TVD: 3,187.37 '  
Inclination: 7.2 °  
Azimuth: 47.3 °  
VS: -97.78 '

55% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb plty-sb blk, slty tex, sl sdy ip, sl calc; 35% SHY SS: lt gy-med gy, S&P, frm, v f-f gr, sb rnd-ang, mod-w srt, cly cmt, non calc; 10% SS: wh-lt gy, tr s&p, clr-trnsl, sb rnd-ang, p srt, w cons, f gr, non calc





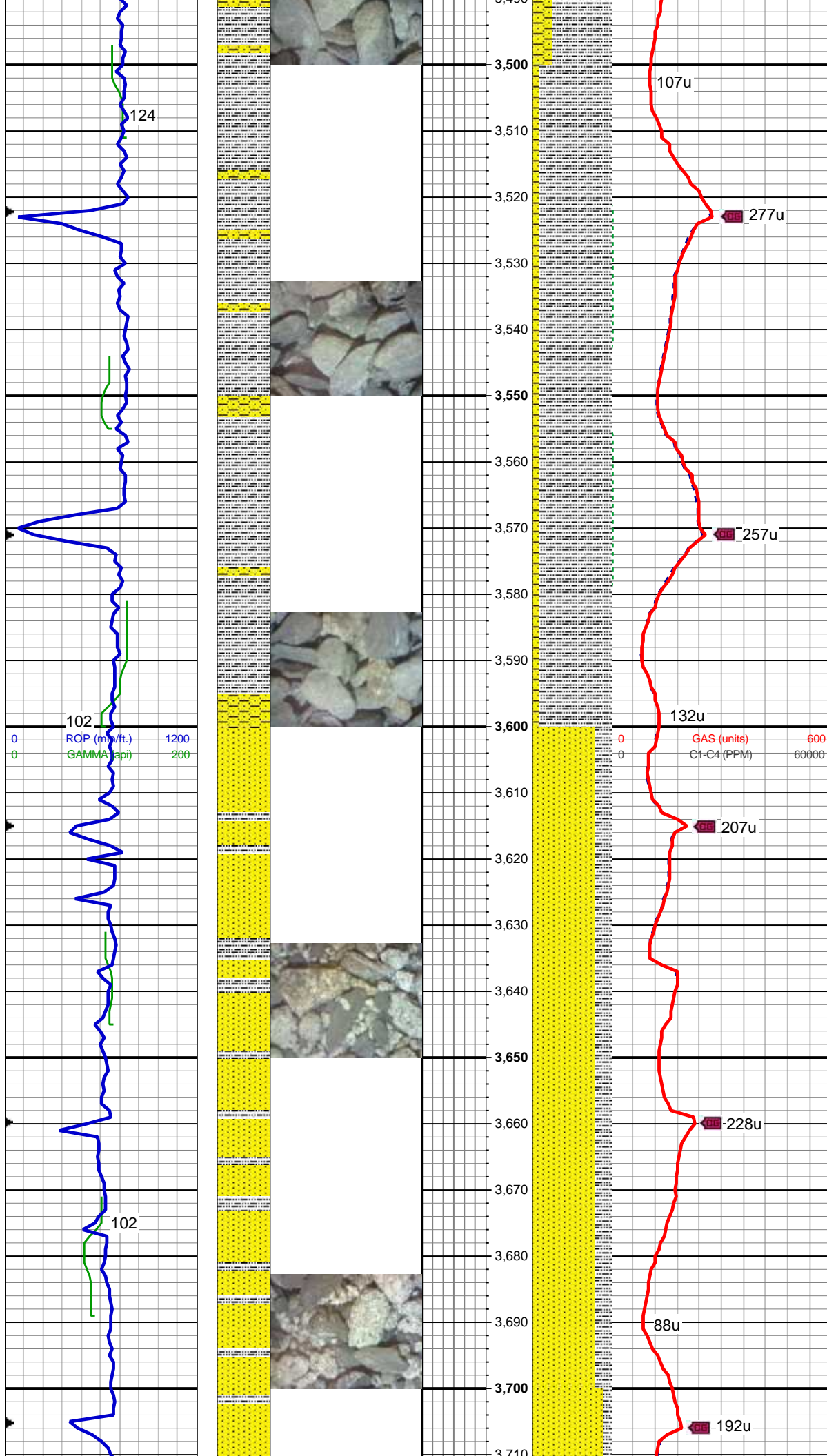
MD: 3,292 '  
TVD: 3,276.68 '  
Inclination: 7 °  
Azimuth: 45.2 °  
VS: -104.86 '

55% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb plty-sb blkly, slty tex, sl sdy ip, sl calc; 35% SHY SS: lt gy-med gy, S&P, frm, v f-f gr, sb rnd-ang, mod-w srt, cly cmt, non calc; 10% SS: wh-lt gy, tr s&p, clr-trnsl, sb rnd-ang, p srt, w cons, f gr, non calc

MD: 3,381 '  
TVD: 3,365.05 '  
Inclination: 6.7 °  
Azimuth: 43.2 °  
VS: -111.91 '

75% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb plty-sb blkly, slty tex, sl sdy ip, sl calc; 25% SHY SS: lt gy-med gy, S&P, frm, v f-f gr, sb rnd-ang, mod-w srt, cly cmt, non calc, tr wh ss

MD: 3,470 '  
TVD: 3,453.44 '  
Inclination: 6.7 °  
Azimuth: 49.9 °  
VS: -118.47 '



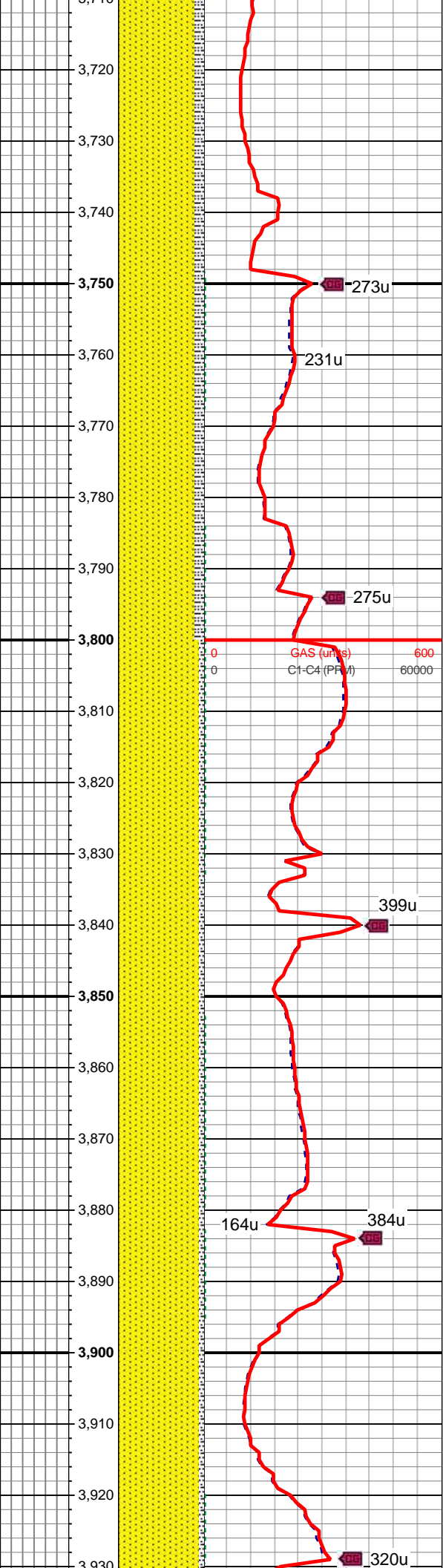
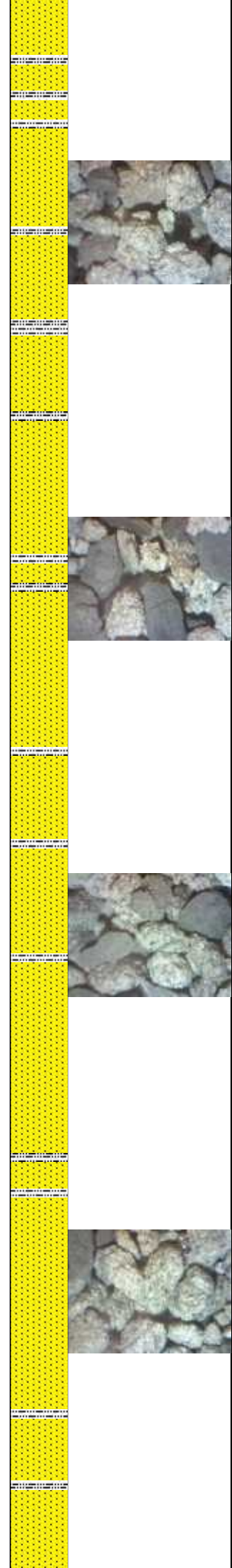
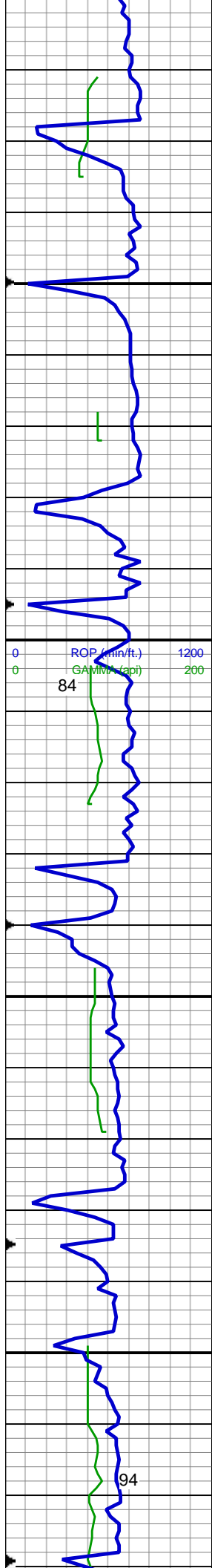
90% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb ply-sb blk, slty tex, sl sdy ip, sl calc; 10% SHY SS: lt gy-med gy, S&P, frm, v f-f gr, sb rnd-ang, mod-w srt, cly cmt, non calc, tr wh ss

MD: 3,560 '  
TVD: 3,542.88 '  
Inclination: 6.1 °  
Azimuth: 46.3 °  
VS: -124.59 '

MD: 3,650 '  
TVD: 3,632.39 '  
Inclination: 5.8 °  
Azimuth: 45.8 °  
VS: -130.56 '

80% SS:wh- lt gy, occ sl brn, S&P, frm, v f-f gr, sb rnd-ang, mod-w srt, non calc, scat glauc; 20% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb ply-sb blk, slty tex, sl sdy ip, sl calc





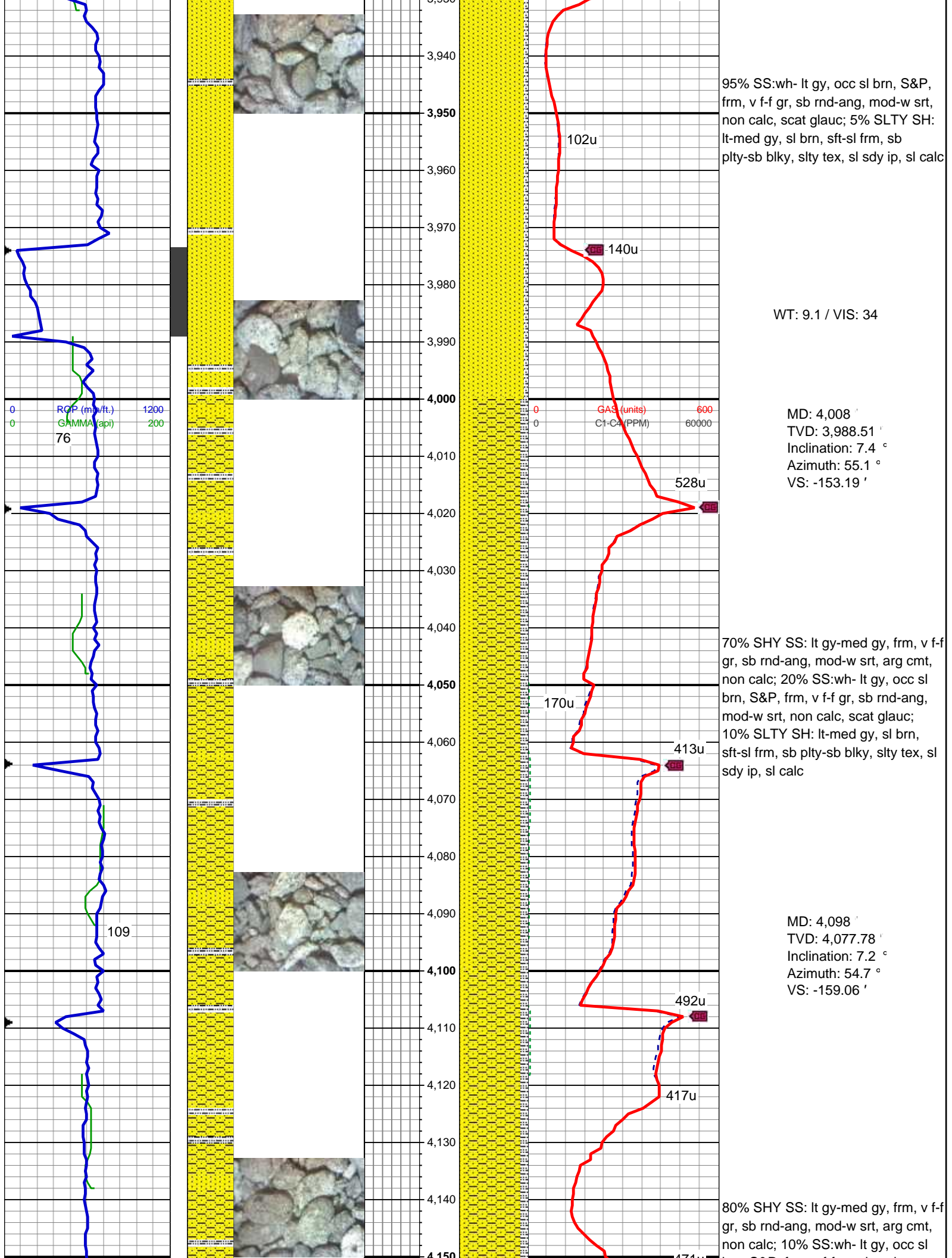
90% SS:wh- lt gy, occ sl brn, S&P, frm, v f-f gr, sb rnd-ang, mod-w srt, non calc, scat glauc; 10% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb ply-sb blkly, slty tex, sl sdy ip, sl calc

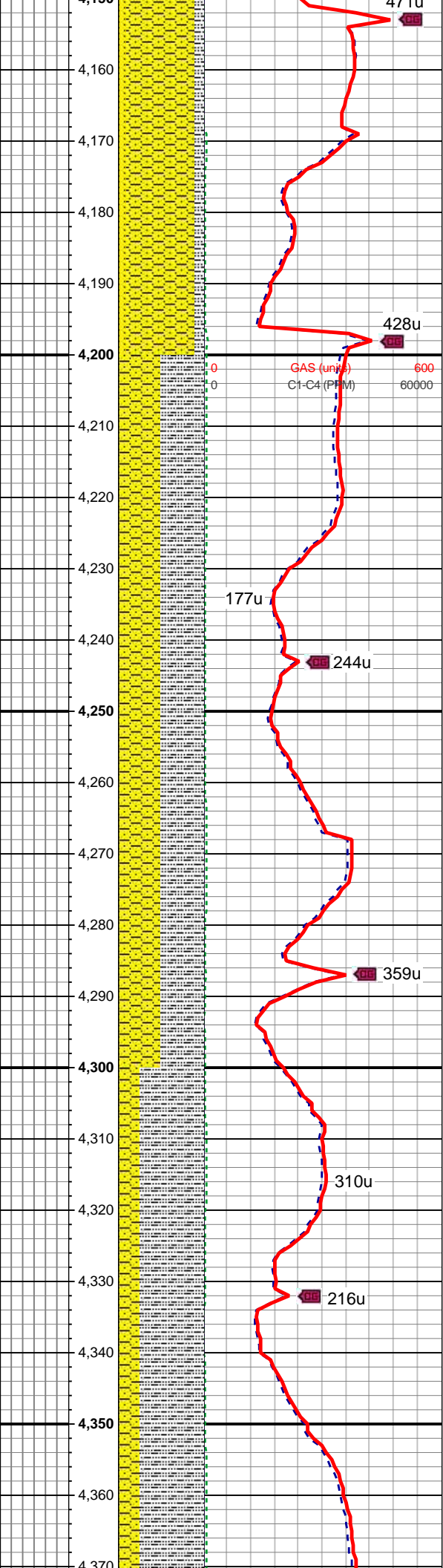
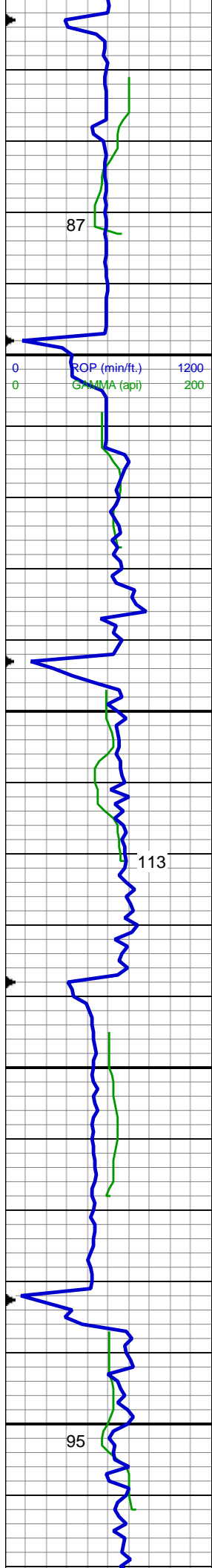
MD: 3,829 '  
TVD: 3,810.49 '  
Inclination: 5.6 °  
Azimuth: 46 °  
VS: -142.2 '

95% SS:wh- lt gy, occ sl brn, S&P, frm, v f-f gr, sb rnd-ang, mod-w srt, non calc, scat glauc; 5% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb ply-sb blkly, slty tex, sl sdy ip, sl calc

MD: 3,919 '  
TVD: 3,900.07 '  
Inclination: 5.5 °  
Azimuth: 48.1 °  
VS: -147.65 '







brn, S&P, frm, v f-f gr, sb rnd-ang, mod-w srt, non calc, scat glauc; 10% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb plty-sb blk, slty tex, sl sdy ip, sl calc

MD: 4,188 '  
TVD: 4,167.08 '  
Inclination: 7.1 °  
Azimuth: 55 °  
VS: -164.83 '

WT: 9.0 / VIS: 34

50% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb plty-sb blk, slty tex, sl sdy ip, sl calc; 50% SHY SS: lt gy-med gy, S&P, frm, v f-f gr, sb rnd-ang, mod-w srt, cly cmt, non calc, tr wh ss

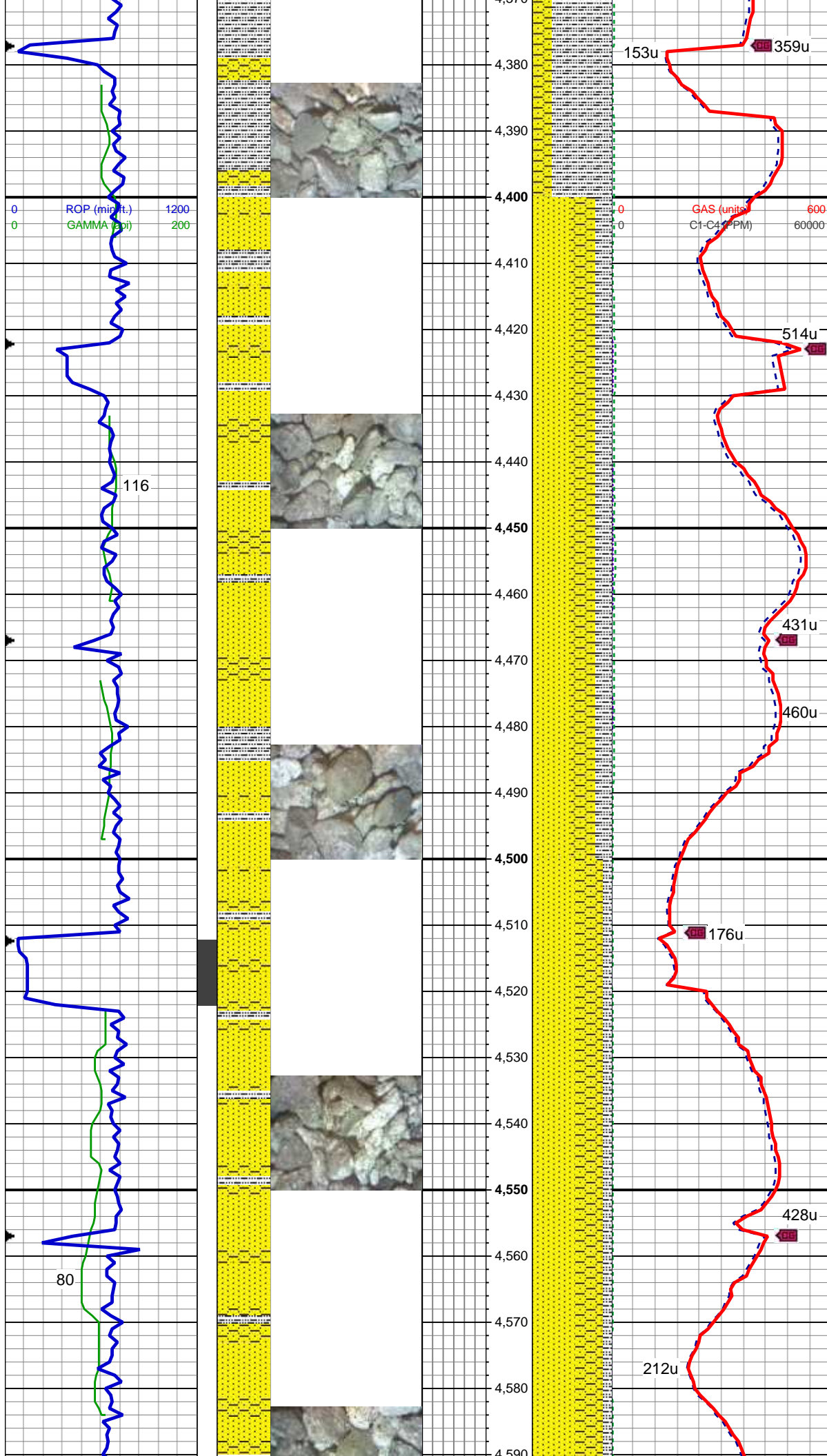
MD: 4,277 '  
TVD: 4,255.41 '  
Inclination: 6.9 °  
Azimuth: 52.5 °  
VS: -170.58 '

75% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb plty-sb blk, slty tex, sl sdy ip, sl calc; 25% SHY SS: lt gy-med gy, S&P, frm, v f-f gr, sb rnd-ang, mod-w srt, cly cmt, non calc, tr wh ss

MD: 4,367 '  
TVD: 4,344.79 '  
Inclination: 6.6 °



Azimuth: 49.4 °  
VS: -176.62 '



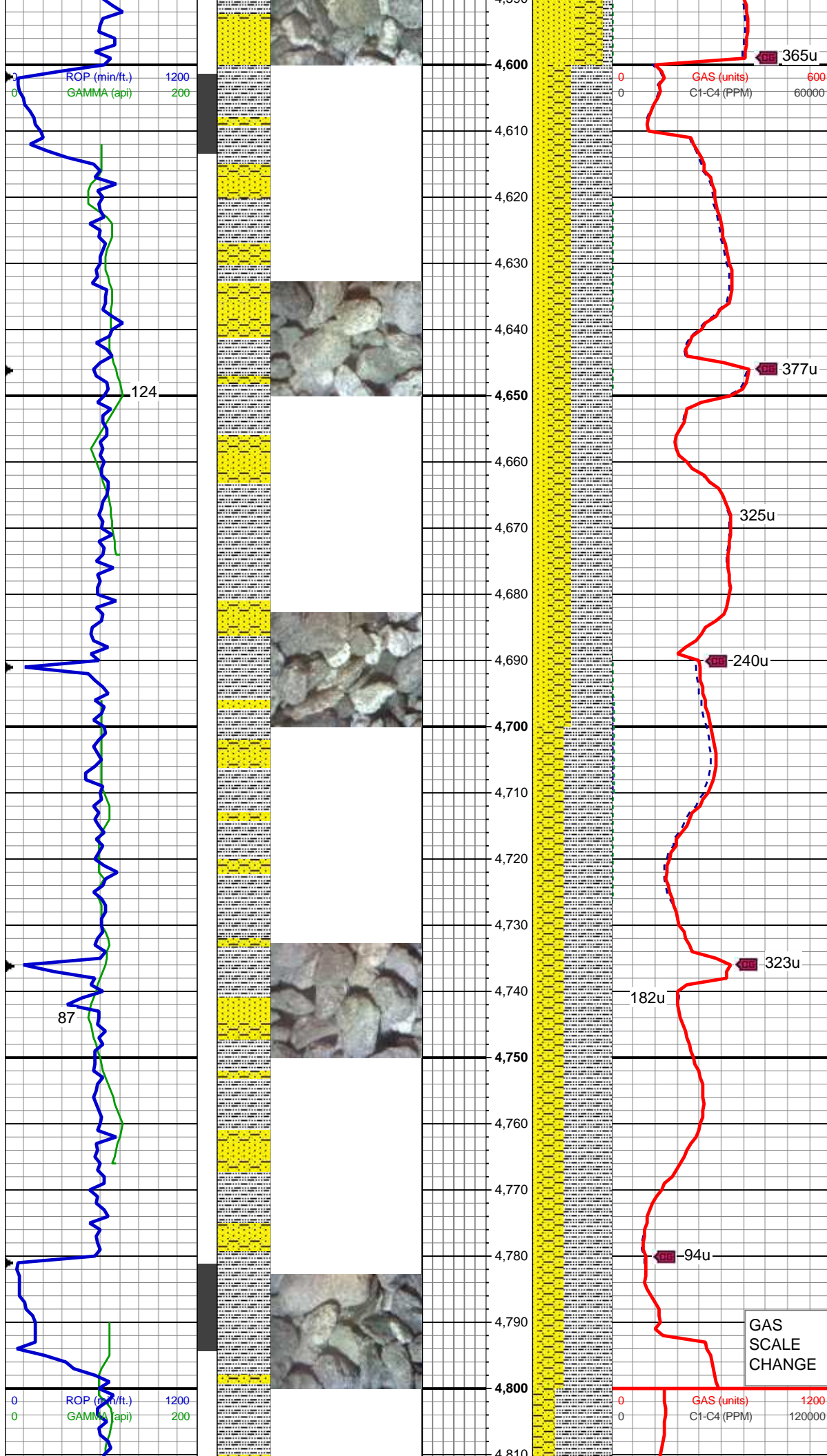
50% SS:wh- lt gy, occ sl brn, S&P, frm, v f-f gr, sb rnd-ang, mod-w srt, non calc, scat glauc; 30% SHY SS: lt gy-med gy, frm, v f-f gr, sb rnd-ang, mod-w srt, arg cmt, non calc; 20% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb plty-sb blkly, slty tex, sl sdy ip, sl calc

MD: 4,456 '  
TVD: 4,433.25 '  
Inclination: 6 °  
Azimuth: 45.2 °  
VS: -182.69 '

WT: 9.1 / VIS: 34

MD: 4,546 '  
TVD: 4,522.83 '  
Inclination: 5.1 °  
Azimuth: 38.5 °  
VS: -188.69 '

55% SS:wh- lt gy, occ sl brn, S&P, frm, v f-f gr, sb rnd-ang, mod-w srt, non calc, scat glauc; 35% SHY SS: lt gy-med gy, frm, v f-f gr, sb rnd-ang, mod-w srt, arg cmt, non calc; 10% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb plty-sb blkly, slty tex, sl sdy ip, sl calc



MD: 4,636 '  
TVD: 4,612.56 '  
Inclination: 3.8 °  
Azimuth: 30.2 °  
VS: -194.09 '

50% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb plty-sb blkly, slty tex, sl sdy ip, sl calc; 30% SHY SS: lt gy-med gy, frm, v f-f gr, sb rnd-ang, mod-w srt, arg cmt, non calc; 55% SS:wh, S&P, frm, v f-f gr, sb rnd-ang, mod-w srt, non calc, tr glauc

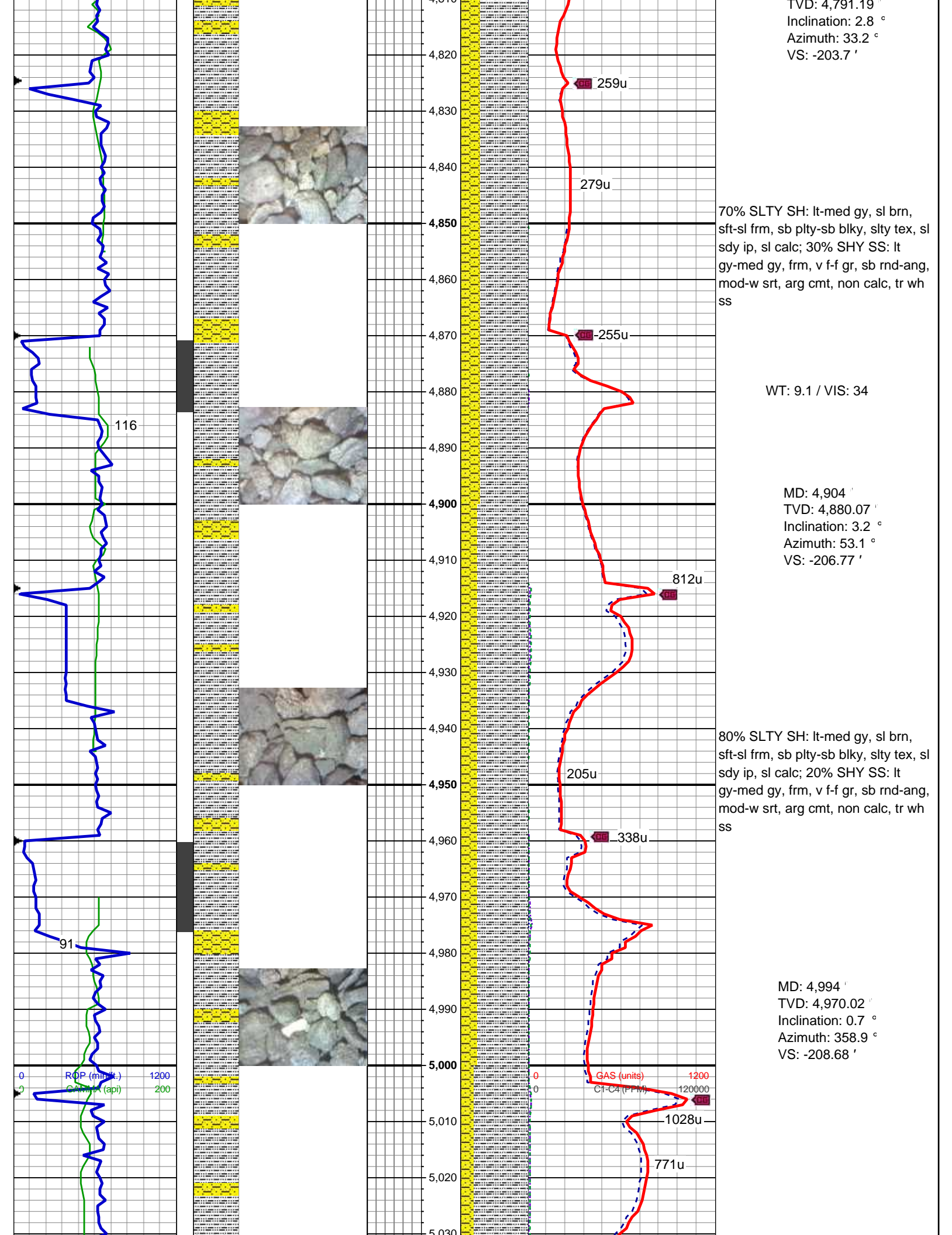
MD: 4,725 '  
TVD: 4,701.35 '  
Inclination: 4 °  
Azimuth: 25.5 °  
VS: -199.22 '

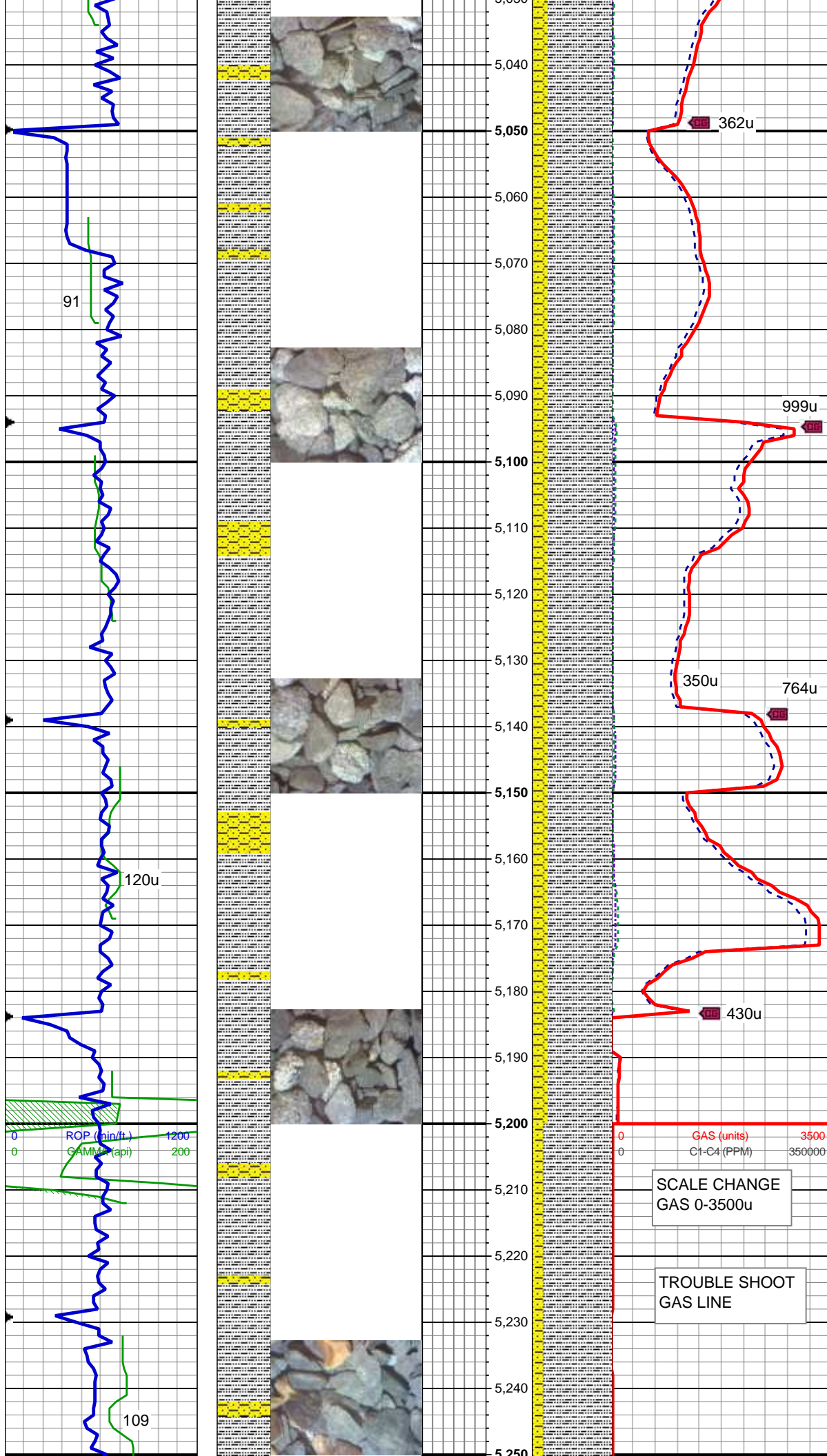
60% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb plty-sb blkly, slty tex, sl sdy ip, sl calc; 30% SHY SS: lt gy-med gy, frm, v f-f gr, sb rnd-ang, mod-w srt, arg cmt, non calc; 10% SS:wh, S&P, frm, v f-f gr, sb rnd-ang, mod-w srt, non calc, tr glauc

GAS  
SCALE  
CHANGE

MD: 4,815 '







80% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb plty-sb blk, slty tex, sl sdy ip, sl calc; 20% SHY SS: lt gy-med gy, frm, v f-f gr, sb rnd-ang, mod-w srt, arg cmt, non calc, tr wh ss

MD: 5,084 '  
TVD: 5,060.01 '  
Inclination: 0.8 °  
Azimuth: 12.7 °  
VS: -209.83 '

80% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb plty-sb blk, slty tex, sl sdy ip, sl calc; 20% SHY SS: lt gy-med gy, frm, v f-f gr, sb rnd-ang, mod-w srt, arg cmt, non calc, tr wh ss

MD: 5,173 '  
TVD: 5,149 '  
Inclination: 1.1 °  
Azimuth: 355.6 °  
VS: -211.28 '

85% SLTY SH: lt-med gy, sl brn, sft-sl frm, sb plty-sb blk, slty tex, sl sdy ip, sl calc; 10% SHY SS: lt gy-med gy, frm, v f-f gr, sb rnd-ang, mod-w srt, arg cmt, non calc; 5%



SS:wh, S&P, frm, v f-f gr, sb  
rnd-ang, mod-w srt, non calc

MD: 5,263 '  
TVD: 5,238.98 '  
Inclination: 0.8 °  
Azimuth: 343.6 °  
VS: -212.75 '

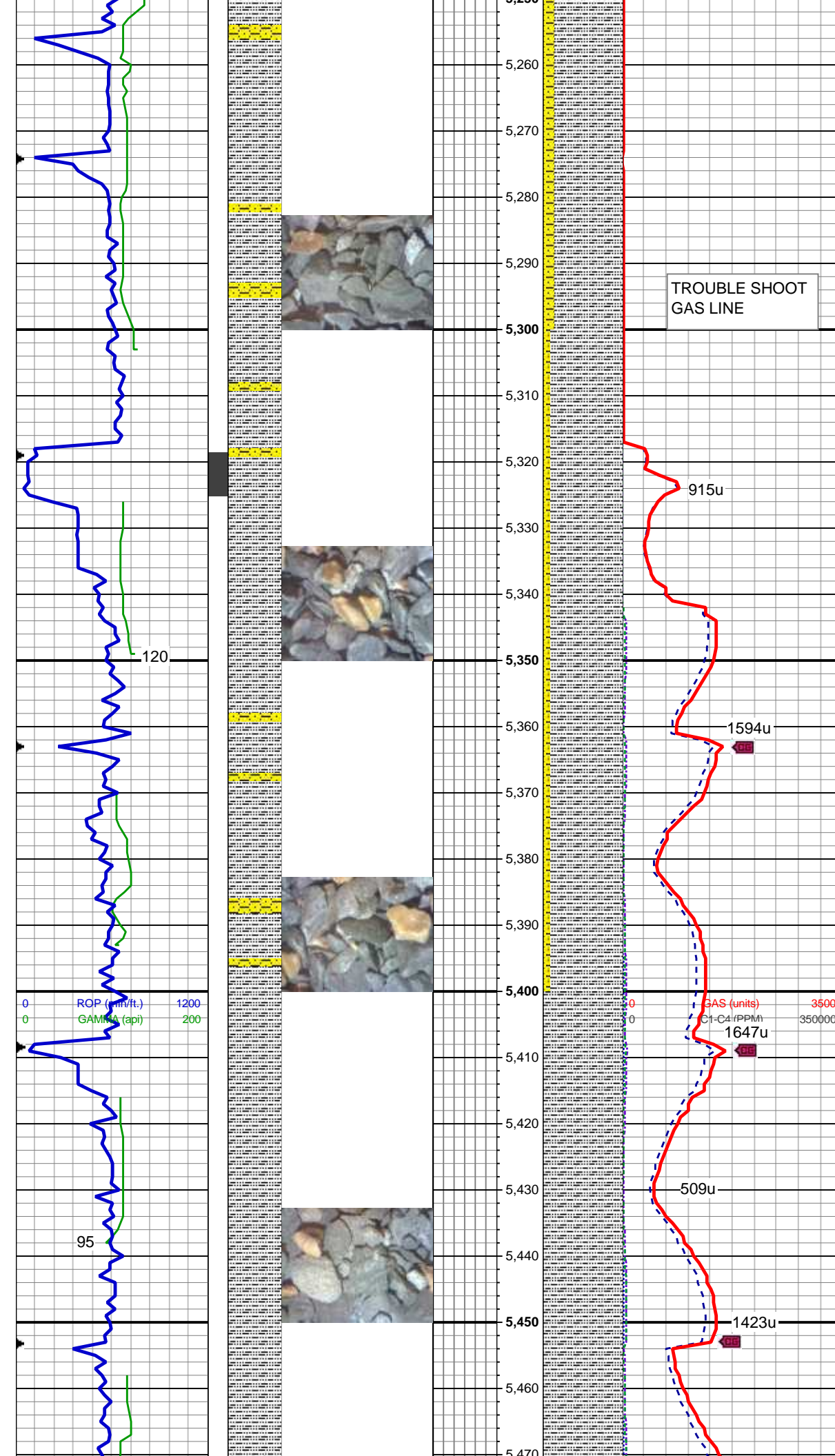
WT: 9.1 / VIS: 34

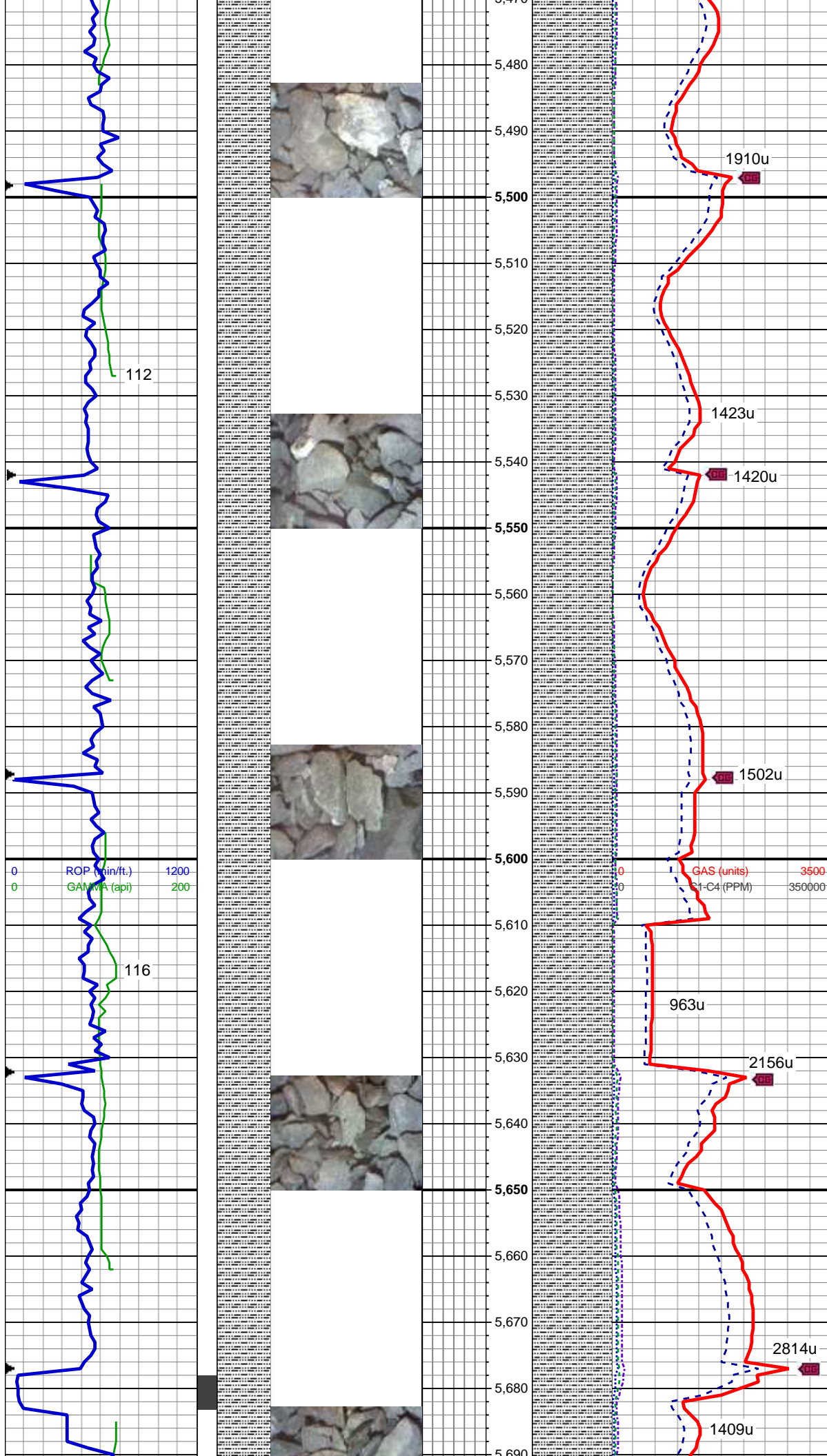
MD: 5,353 '  
TVD: 5,328.98 '  
Inclination: 0.1 °  
Azimuth: 169.3 °  
VS: -213.29 '

90% SLTY SH: lt-med gy, sl brn,  
sft-sl frm, sb plty-sb blkly, slty tex, sl  
sdy ip, sl calc; 5% SHY SS: lt  
gy-med gy, frm, v f-f gr, sb rnd-ang,  
mod-w srt, arg cmt, non calc; 5%  
SS:wh, S&P, frm, v f-f gr, sb  
rnd-ang, mod-w srt, non calc

MD: 5,442 '  
TVD: 5,417.98 '  
Inclination: 0.5 °  
Azimuth: 243 °  
VS: -213.06 '

100% SLTY SH: lt-med gy, sl brn,  
sft-sl frm, sb plty-sb blkly, slty tex, sl  
sdy ip, sl calc, tr pyr, tr shy ss





MD: 5,532 '  
TVD: 5,507.98 '  
Inclination: 0.5 °  
Azimuth: 287 °  
VS: -213.05 '

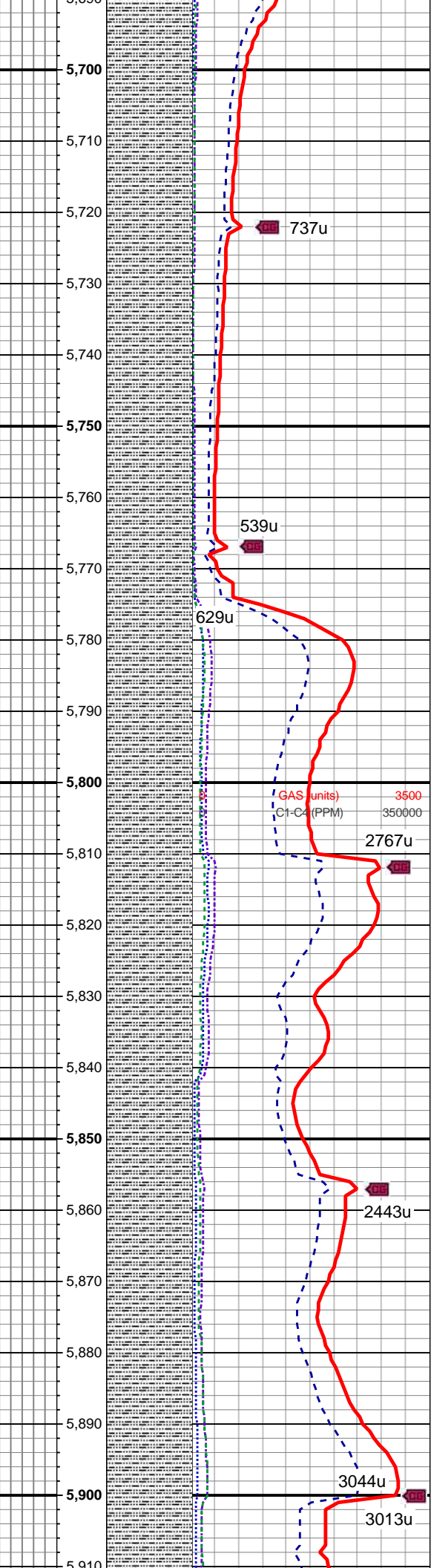
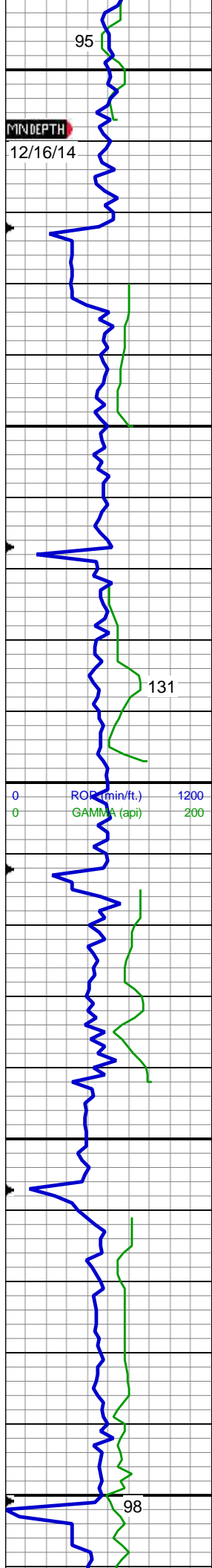
100% SLTY SH: lt-med gy, sl brn,  
sft-sl frm, sb ply-sb blkly, slty tex, sl  
sdy ip, sl calc, tr pyr, tr shy ss

WT: 9.2 / VIS: 34

MD: 5,621 '  
TVD: 5,596.98 '  
Inclination: 0.3 °  
Azimuth: 282.6 °  
VS: -213.26 '

100% SLTY SH: lt-med gy, sl brn,  
sft-sl frm, sb ply-sb blkly, slty tex, sl  
sdy ip, sl calc, tr pyr, tr shy ss





MD: 5,711 '  
TVD: 5,686.97 '  
Inclination: 0.4 °  
Azimuth: 310 °  
VS: -213.55 '

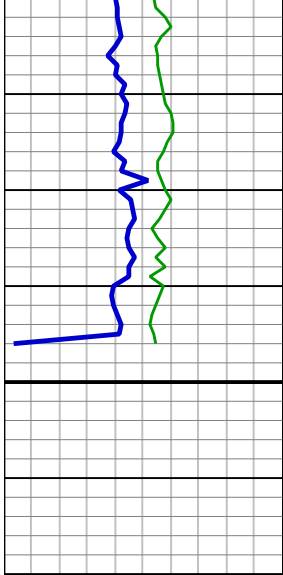
100% SLTY SH: lt-med gy, sl brn,  
sft-sl frm, sb plty-sb blkly, slty tex, sl  
sdy ip, sl calc, tr pyr, tr shy ss

MD: 5,801 '  
TVD: 5,776.97 '  
Inclination: 0.4 °  
Azimuth: 294 °  
VS: -213.91 '

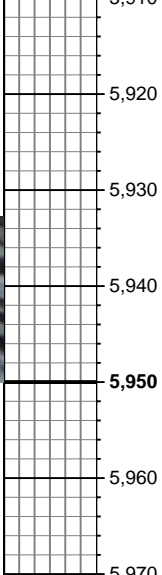
100% SLTY SH: lt-med gy, sl brn,  
sft-sl frm, sb plty-sb blkly, slty tex, sl  
sdy ip, sl calc, tr pyr, tr shy ss

MD: 5,891 '  
TVD: 5,866.97 '  
Inclination: 0.4 °  
Azimuth: 324.6 °  
VS: -214.33 '

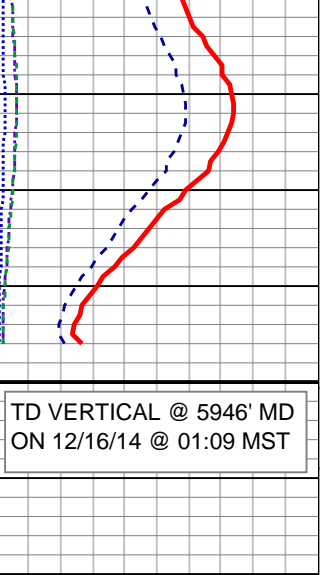
WT: 9.4 / VIS: 45



5,910  
5,920  
5,930  
5,940  
5,950  
5,960  
5,970



5,910  
5,920  
5,930  
5,940  
5,950  
5,960  
5,970



100% SLTY SH: lt-med gy, sl brn,  
sft-sl frm, sb pty-sb blk, slty tex, sl  
sdy ip, sl calc, tr pyr, tr shy ss

MD: 5,935 '  
TVD: 5,910.97 '  
Inclination: 0.5 °  
Azimuth: 286.9 °  
VS: -214.53 '

Log Continues on Crow Creek  
AA01-724\_Horz

Thank you for using  
Columbine Logging, Inc.

TD VERTICAL @ 5946' MD  
ON 12/16/14 @ 01:09 MST