

COLUMBINE LOGGING

Scale: 5" / 100'
Measured Depth Log

Well Name ROHN STATE LD10-64-1HN

Location Sec. 9 T9N R58W

State Colorado

County Weld

Country USA

Rig Number Precision Drilling 829

API Number 05-123-37662

AFE # 200231

Region DJ Basin

Field Wattenberg

Spud Date 10/8/2014

Drilling Completed 10/17/2014

Surface Coordinates 2050 FSL ; 330 FEL
40.76421 ; -103.8611

Bottom Hole Coordinates 1650 FSL ; 660 FEL
40.76321 ; -103.84326

Ground Elevation 4716'

K.B. Elevation 4732'

Logged Interval 1252' **To** 4962'

Total Depth 10213'

Formation Niobrara B chalk

Type of Drilling Fluid FW LSND

Operator

Company Noble Energy, Inc.

Address 1625 BROADWAY
DENVER, CO 80202

Geologist

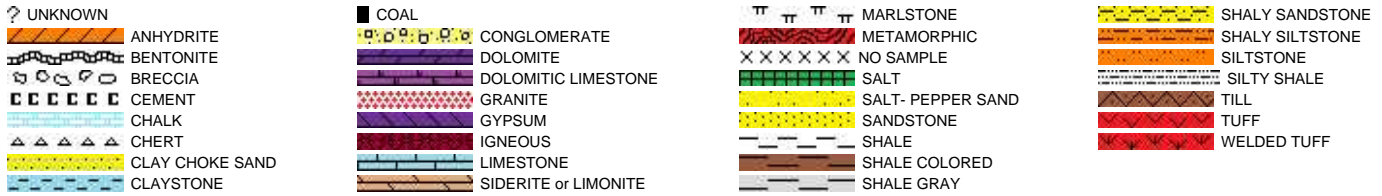
Name Holly Duncan

Company Noble Energy, Inc.

Address 1625 BROADWAY
DENVER, CO 80202

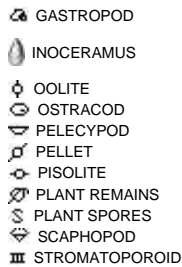
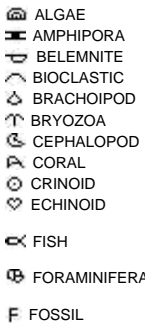
Other

Rock Types

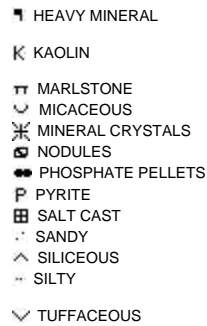
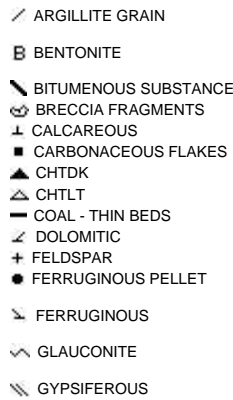
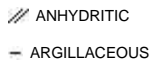


Accessories

Fossils



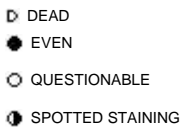
Minerals



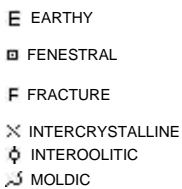
Stringer

Other Symbols

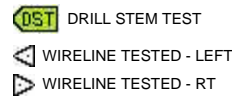
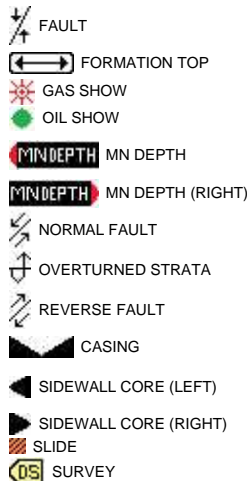
Oil Show



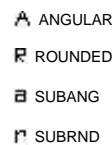
Porosity



Engineering



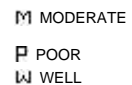
Rounding

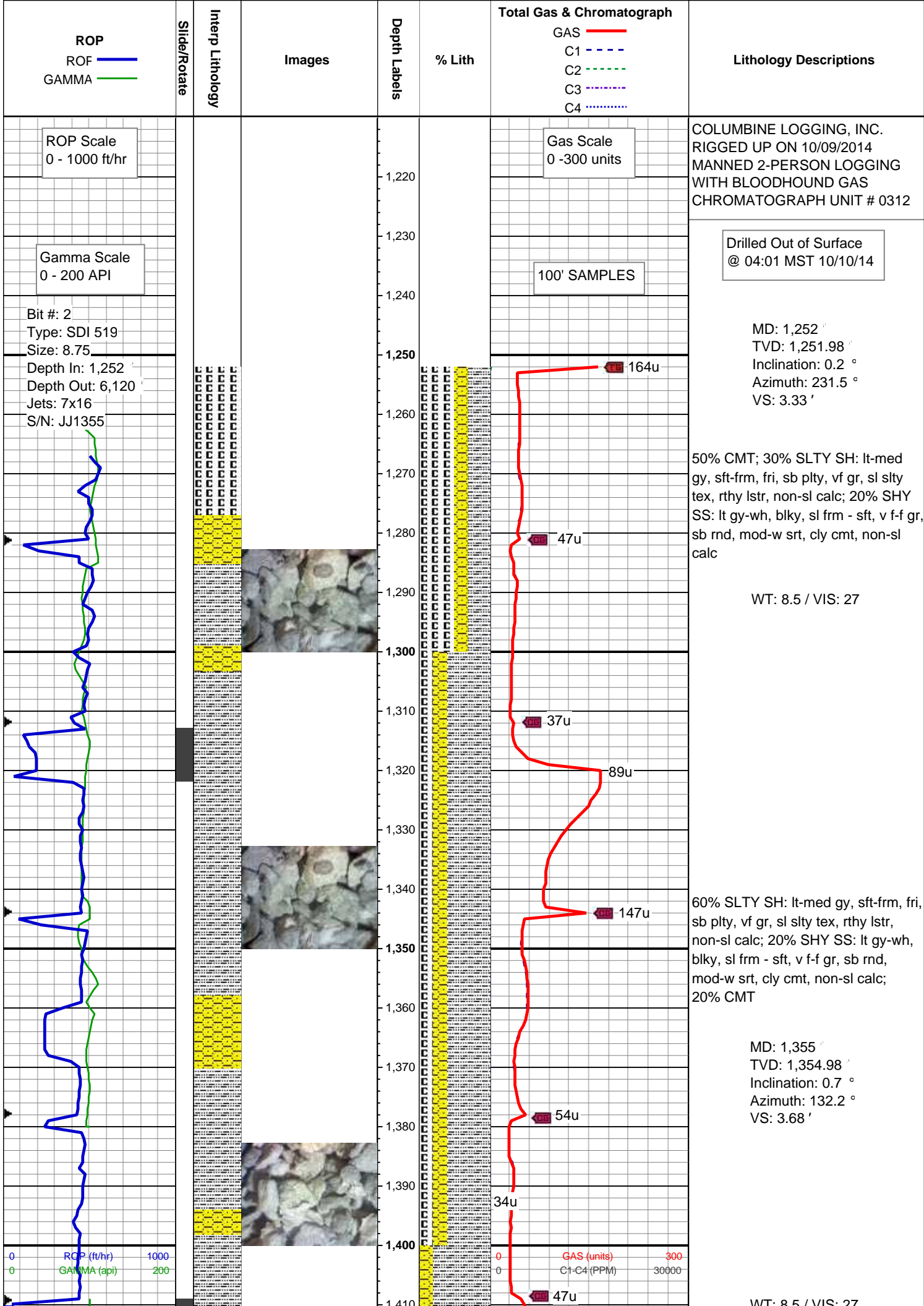


Textures



Sorting





MD: 1,447 '
TVD: 1,446.95 '
Inclination: 1.8 °
Azimuth: 169 °
VS: 4.47 '

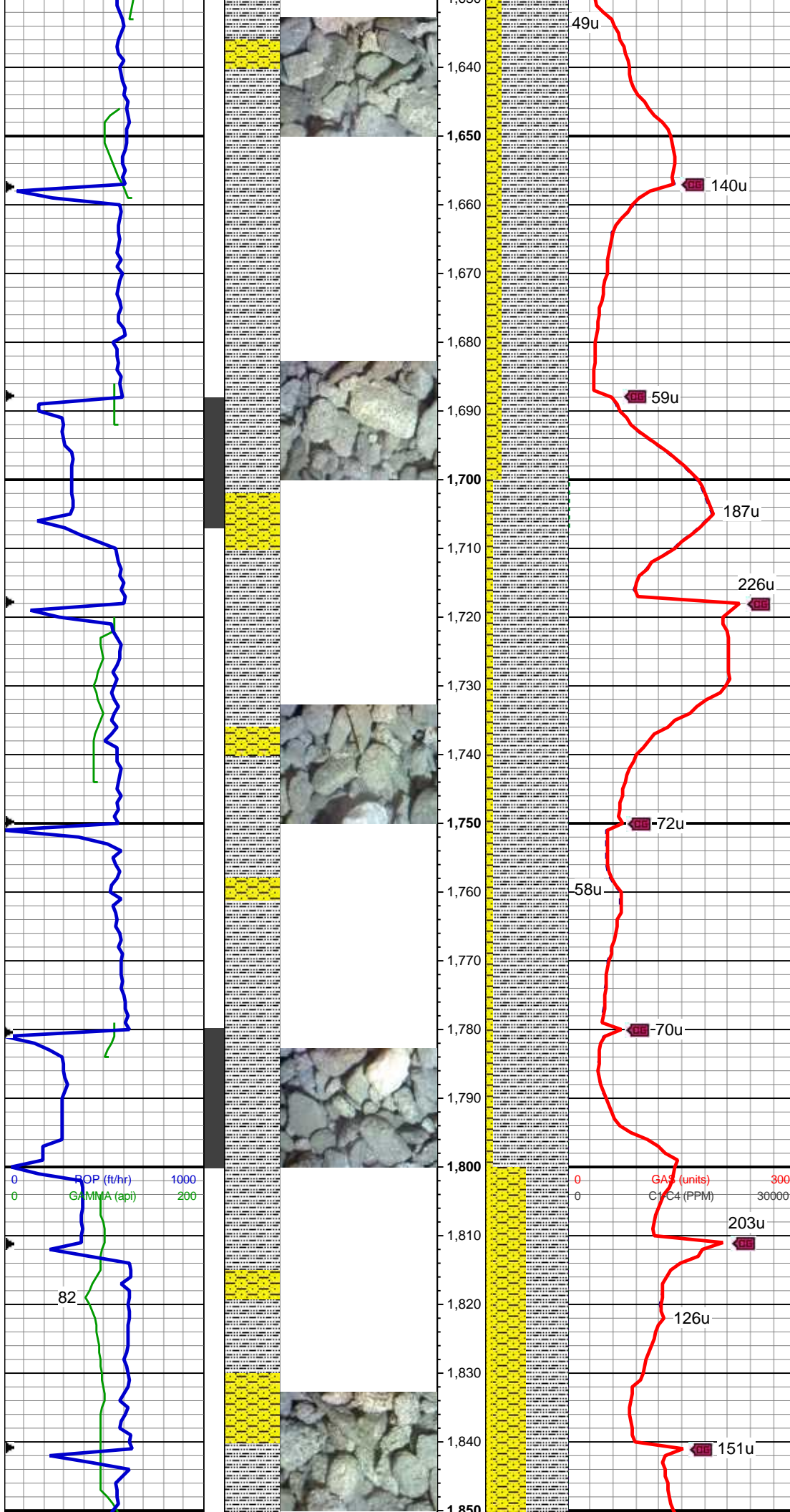
80% SLTY SH: lt-med gy, sft frm, fri,
sb plty, vf gr, sl slty tex, rthy lstr,
non-sl calc; 20% SHY SS: lt gy-wh,
blky, sl frm - sft, v f-f gr, sb rnd,
mod-w srt, cly cmt, non-sl calc

WT: 8.7 / VIS: 27

MD: 1,540 '
TVD: 1,539.84 '
Inclination: 3.7 °
Azimuth: 156.6 °
VS: 6.17 '

85% SLTY SH: lt-med gy, sft frm, fri,
sb plty, vf gr, sl slty tex, rthy lstr,
non-sl calc; 15% SHY SS: lt gy-wh,
blky, sl frm - sft, v f-f gr, sb rnd,
mod-w srt, cly cmt, non-sl calc

MD: 1,633 '
TVD: 1,632.61 '
Inclination: 4.4 °
Azimuth: 136.5 °



VS: 10.11'

80% SLTY SH: lt-med gy, sft frm, fri, sb pty, vf gr, sl slty tex, rthy lstr, non-sl calc; 20% SHY SS: lt gy-wh, blk, sl frm - sft, v f-f gr, sb rnd, mod-w srt, cly cmt, non-sl calc, v tr ss

MD: 1,726'

TVD: 1,725.27'

Inclination: 5.5°

Azimuth: 147.2°

VS: 15.32'

90% SLTY SH: lt-med gy, sft frm, fri, sb pty, vf gr, sl slty tex, rthy lstr, non-sl calc; 10% SHY SS: lt gy-wh, blk, sl frm - sft, v f-f gr, sb rnd, mod-w srt, cly cmt, non-sl calc, v tr ss

WT: 8.6 / VIS: 28

MD: 1,819'

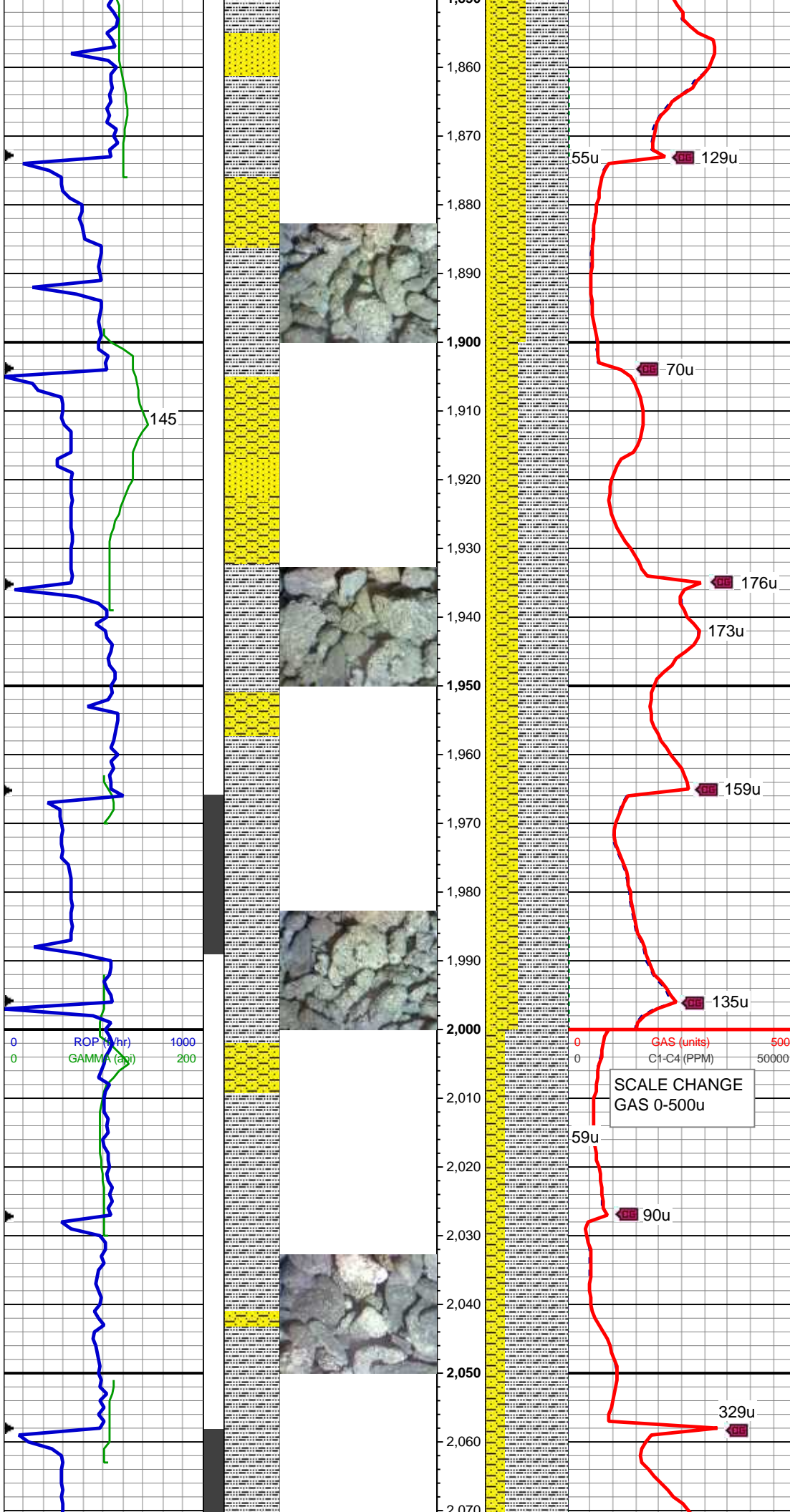
TVD: 1,817.69'

Inclination: 7.3°

Azimuth: 131.5°

VS: 22.57'

50% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb pty-blky, vf gr, slty tex, sl calc; 40% SHY SS: wh-lt gy, blk, frm - f-f gr, sb rnd, mod-w srt, cly cmt, non-sl calc, v tr ss



frm, v f-f gr, sb rnd-ang, mod-w srt, cl sup, cly cmt, non calc; 10% SS: wh-lt gy, s&p, clr-trnsl, sb rnd-ang, p srt, w cons, f gr, non calc

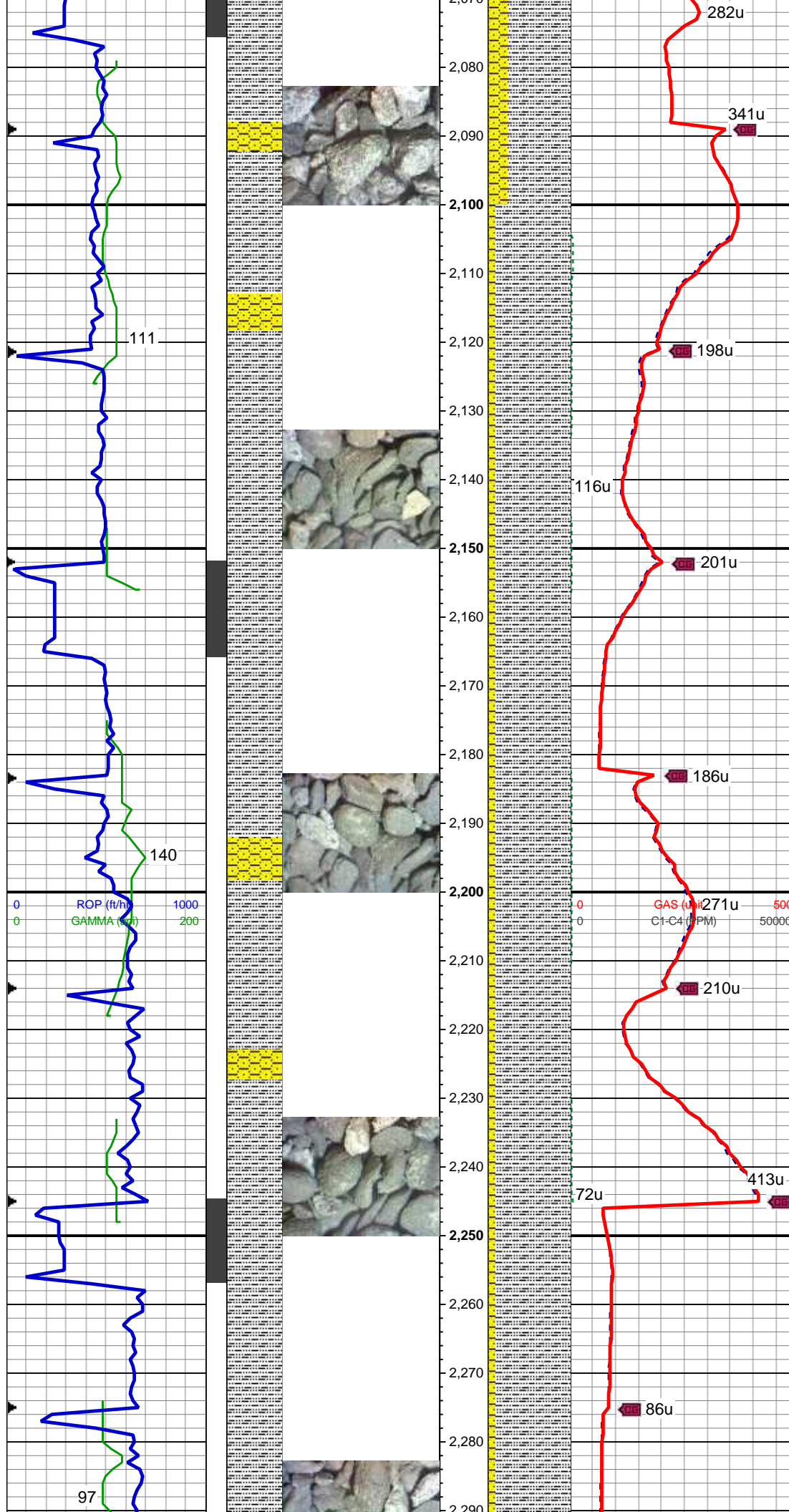
MD: 1,912 '
TVD: 1,910.1 '
Inclination: 5.7 °
Azimuth: 149.2 °
VS: 29.78 '

60% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb plty-blky, vf gr, slty tex, sl calc; 30% SHY SS: wh-lt gy, blkly, frm, v f-f gr, sb rnd-ang, mod-w srt, cl sup, cly cmt, non calc; 10% SS: wh-lt gy, s&p, clr-trnsl, sb rnd-ang, p srt, w cons, f gr, non calc

MD: 2,005 '
TVD: 2,002.46 '
Inclination: 7.9 °
Azimuth: 173.5 °
VS: 33.43 '

WT: 8.7 / VIS: 28

75% SLTY SH: lt-med gy, sft-frm, fri, sb plty, vf gr, sl slty tex, rthy lstr, non-sl calc; 25% SHY SS: lt gy-wh, blkly, sl frm - sft, v f-f gr, sb rnd, mod-w srt, cly cmt, non-sl calc, v tr ss



MD: 2,099 '
TVD: 2,095.36 '
Inclination: 9.6 °
Azimuth: 170.1 °
VS: 36.29 '

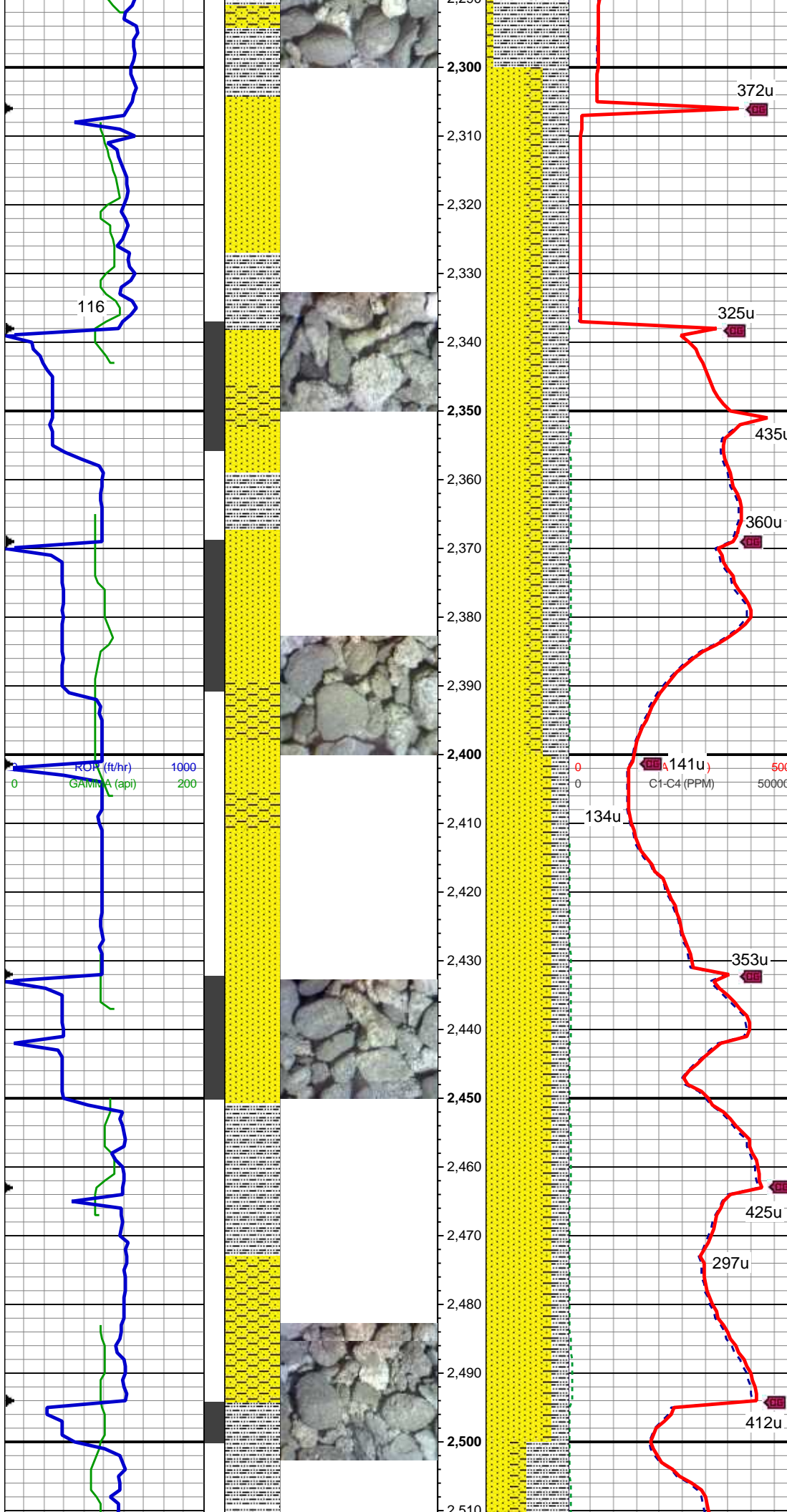
90% SLTY SH: lt-med gy, sft frm, fri, sb plty, vf gr, sl slty tex, rthy lstr, non-sl calc; 10% SHY SS: lt gy-wh, blk, sl frm - sft, v f-f gr, sb rnd, mod-w srt, cly cmt, non-sl calc

MD: 2,191 '
TVD: 2,185.92 '
Inclination: 10.7 °
Azimuth: 165.3 °
VS: 40.64 '

90% SLTY SH: lt-med gy, sft frm, fri, sb plty, vf gr, sl slty tex, rthy lstr, non-sl calc; 10% SHY SS: lt gy-wh, blk, sl frm - sft, v f-f gr, sb rnd, mod-w srt, cly cmt, non-sl calc, v tr ss

MD: 2,285 '
TVD: 2,278.27 '
Inclination: 10.8 °
Azimuth: 169.8 °
VS: 45.35 '

WT: 8.7 / VIS: 28



50% SS: wh-lt gy, s&p, clr-trnsl, sb rnd-ang, p srt, w cons, f gr, non calc; 30% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb plty-blky, vf gr, slty tex, sl calc; 20% SHY SS: wh-lt gy, blky, frm, v f-f gr, sb rnd-ang, mod-w srt, cl sup, cly cmt, non calc

MD: 2,379 '
TVD: 2,370.42 '
Inclination: 12 °
Azimuth: 170.6 °
VS: 49.5 '

70% SS: wh-lt gy, s&p, clr-trnsl, sb rnd-ang, p srt, w cons, f gr, non calc; 20% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb plty-blky, vf gr, slty tex, sl calc; 10% SHY SS: wh-lt gy, blky, frm, v f-f gr, sb rnd-ang, mod-w srt, cl sup, cly cmt, non calc

MD: 2,471 '
TVD: 2,460.31 '
Inclination: 12.6 °
Azimuth: 167.9 °
VS: 54.22 '



WT: 8.7 / VIS: 28

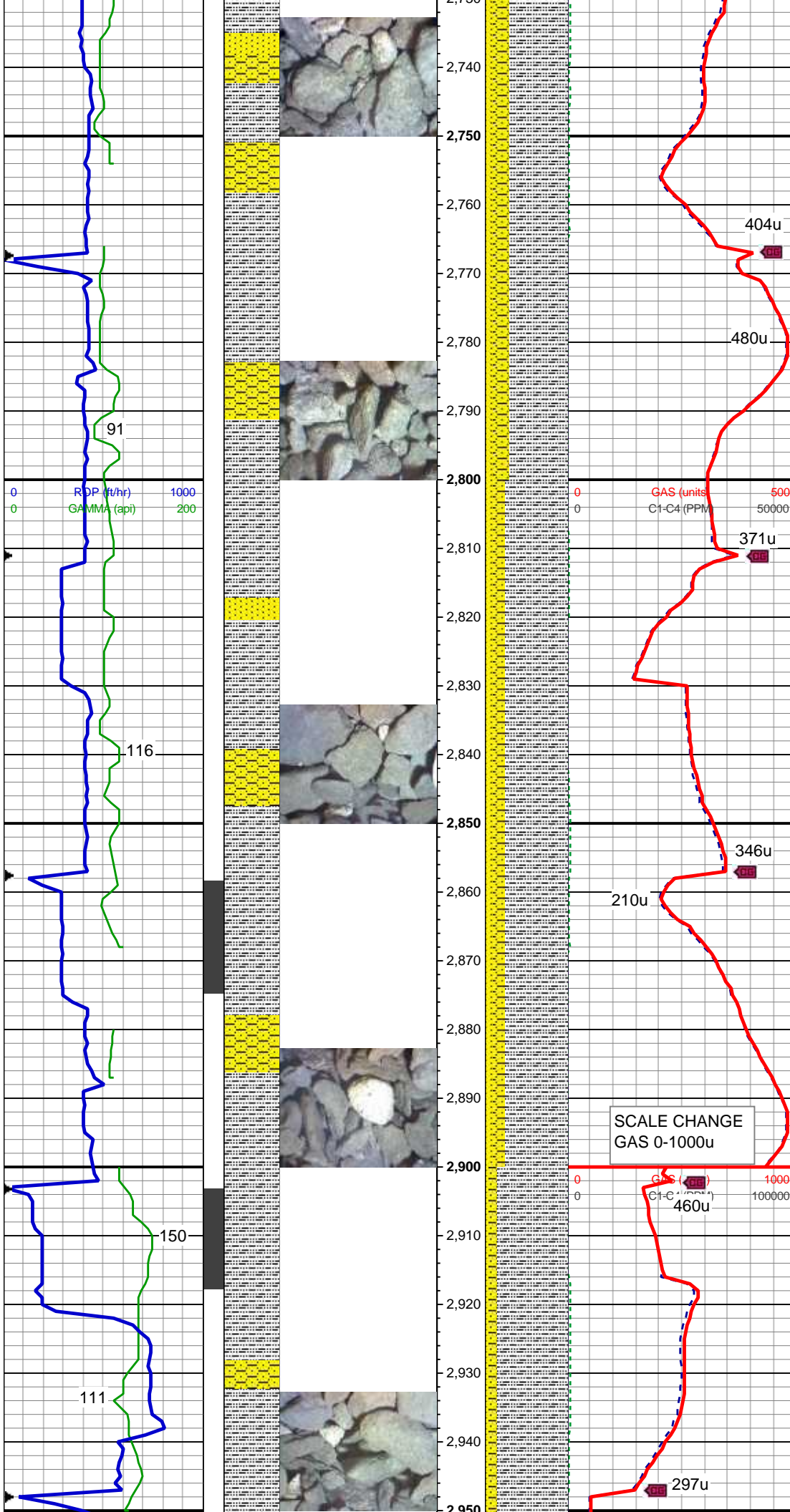
50% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb plty-blky, vf gr, slty tex, sl calc; 30% SS: wh-lt gy, s&p, clr-trnsl, sb rnd-ang, p srt, w cons, f gr, non calc; 20% SHY SS: wh-lt gy, blk, frm, v f-f gr, sb rnd-ang, mod-w srt, cl sup, cly cmt, non calc

MD: 2,578 '
TVD: 2,564.71 '
Inclination: 12.7 °
Azimuth: 166 °
VS: 60.76 '

60% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb plty-blky, vf gr, slty tex, sl calc; 30% SS: wh-lt gy, s&p, clr-trnsl, sb rnd-ang, p srt, w cons, f gr, non calc; 10% SHY SS: wh-lt gy, blk, frm, v f-f gr, sb rnd-ang, mod-w srt, cl sup, cly cmt, non calc

MD: 2,668 '
TVD: 2,652.63 '
Inclination: 12 °
Azimuth: 164 °
VS: 66.75 '

70% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb plty-blky, vf gr, slty tex, sl calc; 30% SHY SS: wh-lt gy, blk, frm, v f-f gr, sb rnd-ang, mod-w srt, cl sup, cly cmt, non calc



sl calc; 20% SHY SS: wh-lt gy, blk, frm, v f-f gr, sb rnd-ang, mod-w srt, cl sup, cly cmt, non calc; 10% SS: wh-lt gy, s&p, clr-trnsl, sb rnd-ang, p srt, w cons, f gr, non calc

MD: 2,757 '
TVD: 2,739.81 '
Inclination: 11.2 °
Azimuth: 162.4 °
VS: 72.84 '

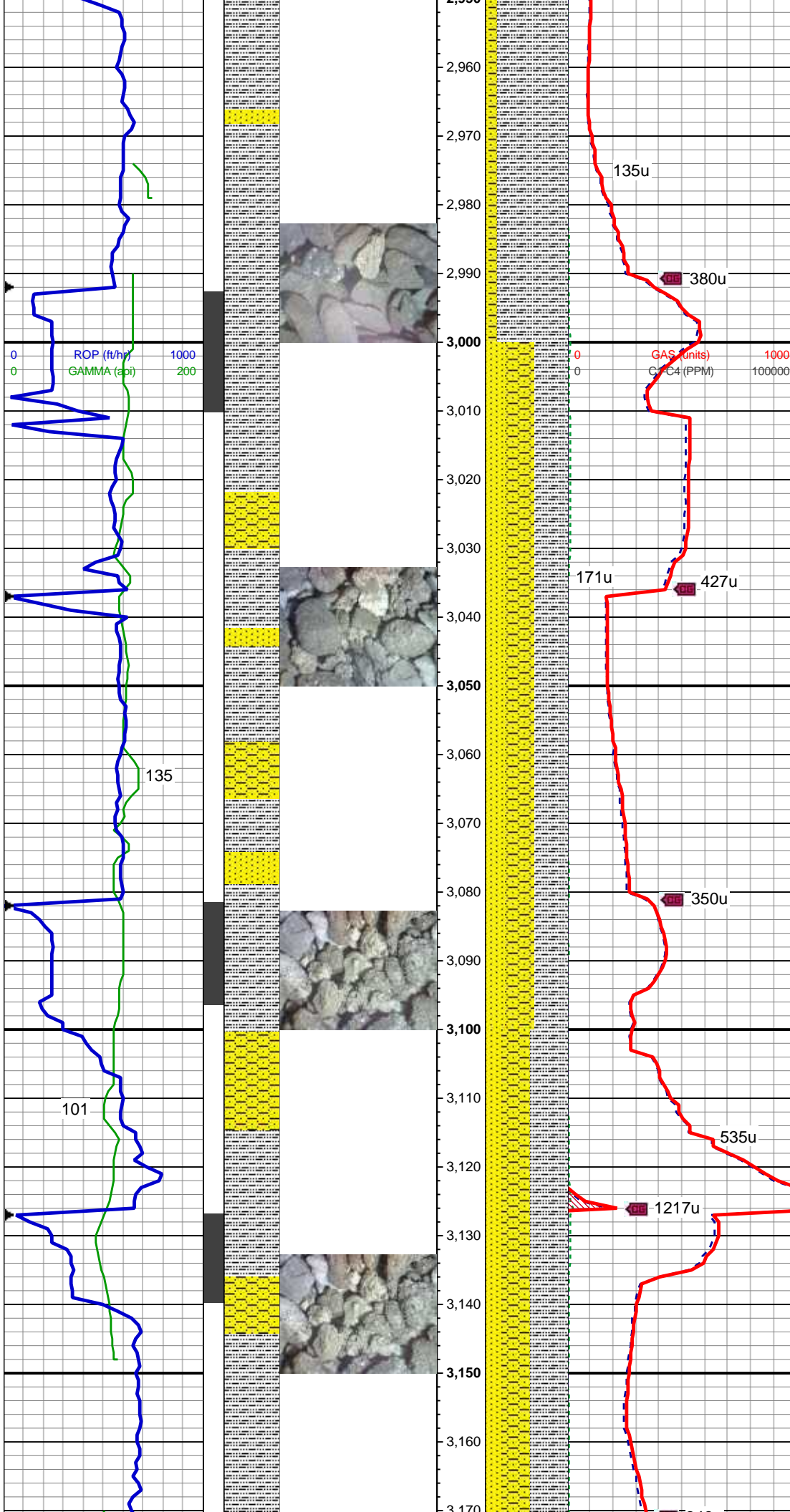
WT IN: 8.7, OUT:8.7/ VIS: 28

MD: 2,847 '
TVD: 2,828.3 '
Inclination: 9.8 °
Azimuth: 161.1 °
VS: 78.82 '

75% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb plty-blky, vf gr, slty tex, sl calc; 15% SHY SS: wh-lt gy, blk, frm, v f-f gr, sb rnd-ang, mod-w srt, cl sup, cly cmt, non calc; 10% SS: wh-lt gy, s&p, clr-trnsl, sb rnd-ang, p srt, w cons, f gr, non calc

MD: 2,936 '
TVD: 2,916.07 '
Inclination: 9.3 °
Azimuth: 154.5 °
VS: 85.11 '

85% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb plty-blky, vf gr, slty tex, sl calc; 10% SHY SS: wh-lt gy, blk, frm, v f-f gr, sb rnd-ang, mod-w srt,



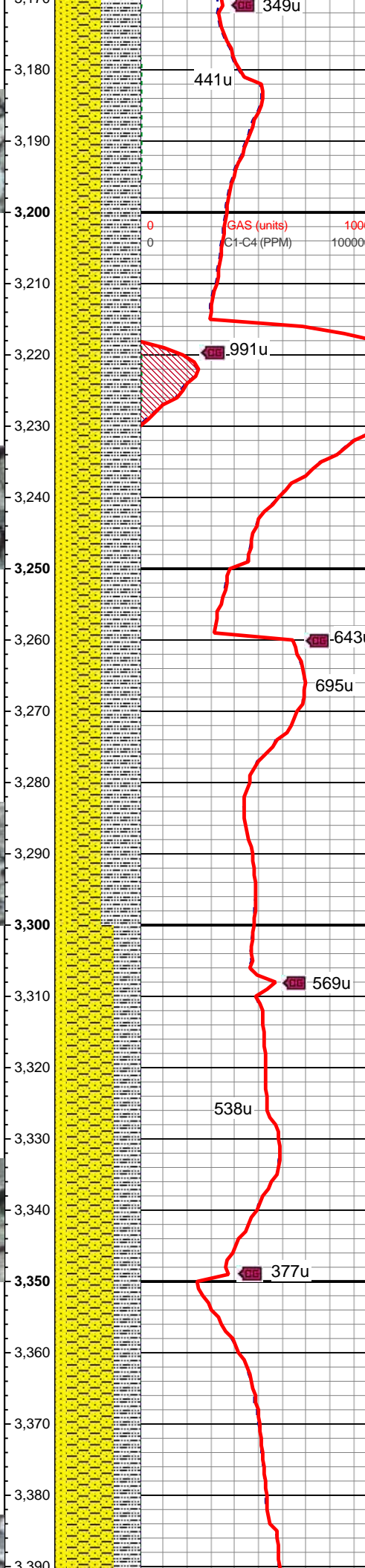
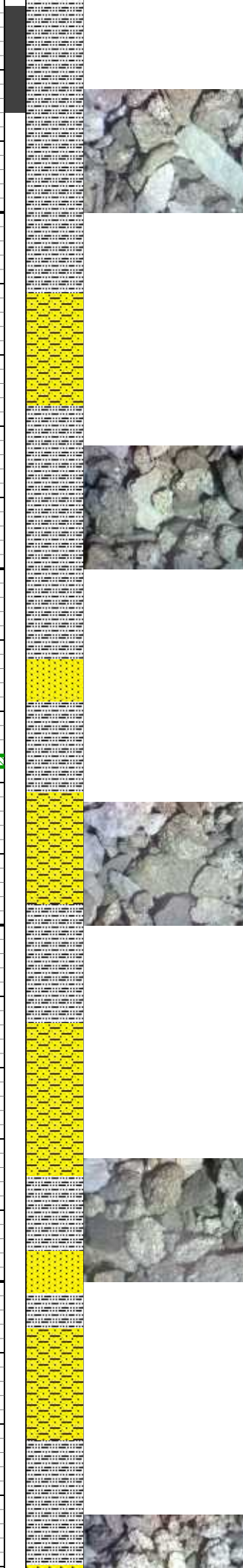
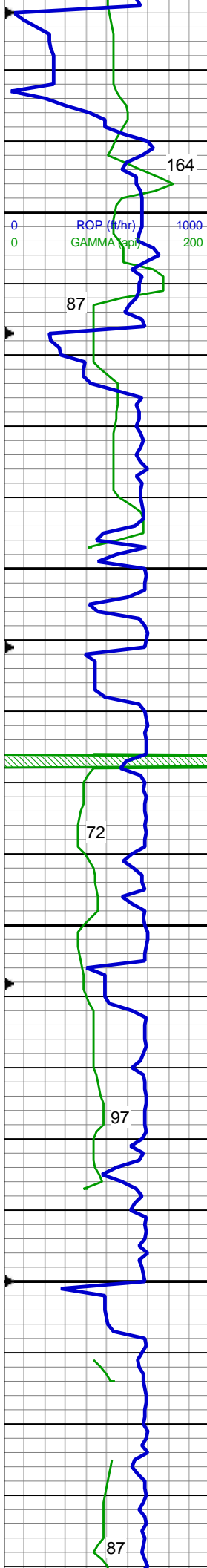
cl sup, cly cmt, non calc; 5% SS:
wh-lt gy, s&p, clr-trnsl, sb rnd-ang,
p srt, w cons, f gr, non calc

MD: 3,026 '
TVD: 3,004.76 '
Inclination: 10.3 °
Azimuth: 150.3 °
VS: 92.96 '

40% SLTY SH: lt-med gy, occ dk gy,
sft-sl frm, sb plty-blky, vf gr, slty tex,
sl calc; 35% SHY SS: wh-lt gy, blkly,
frm, v f-f gr, sb rnd-ang, mod-w srt,
cl sup, cly cmt, non calc; 25% SS:
wh-lt gy, s&p, clr-trnsl, sb rnd-ang,
p srt, w cons, f gr, non calc

MD: 3,115 '
TVD: 3,092.15 '
Inclination: 11.5 °
Azimuth: 153.2 °
VS: 101.7 '

45% SLTY SH: lt-med gy, occ dk gy,
sft-sl frm, sb plty-blky, vf gr, slty tex,
sl calc; 35% SHY SS: wh-lt gy, blkly,
frm, v f-f gr, sb rnd-ang, mod-w srt,
cl sup, cly cmt, non calc; 20% SS:
wh-lt gy, s&p, clr-trnsl, sb rnd-ang,
p srt, w cons, f gr, non calc



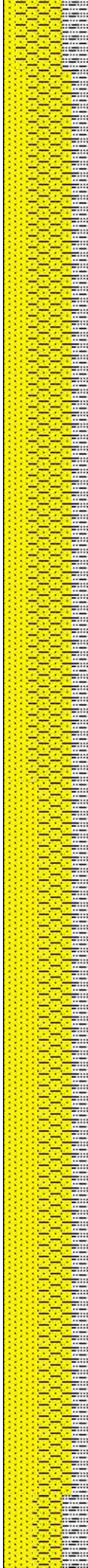
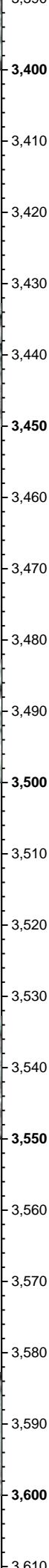
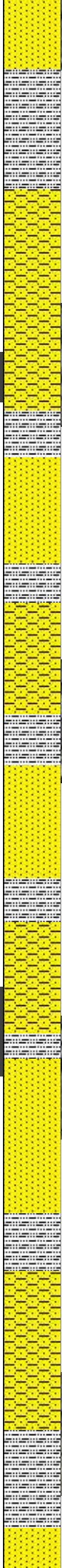
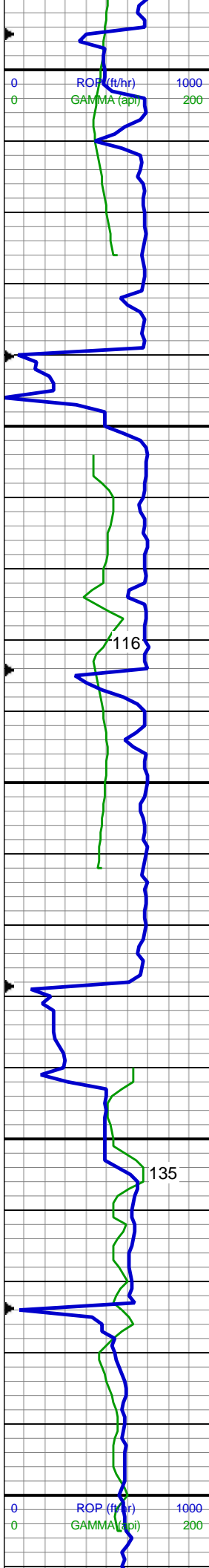
MD: 3,205 '
TVD: 3,180.17 '
Inclination: 12.6 °
Azimuth: 158 °
VS: 110.36 '

45% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb plty-blky, vf gr, slty tex, sl calc; 35% SHY SS: wh-lt gy, blkly, frm, v f-f gr, sb rnd-ang, mod-w srt, cl sup, cly cmt, non calc; 20% SS: wh-lt gy, s&p, clr-trnsl, sb rnd-ang, p srt, w cons, f gr, non calc

MD: 3,294 '
TVD: 3,267.01 '
Inclination: 12.7 °
Azimuth: 158.6 °
VS: 118.55 '

WT IN: 8.45, OUT: 8.55/ VIS: 28

55% SHY SS: wh-lt gy, blkly, frm, v f-f gr, sb rnd-ang, mod-w srt, cl sup, cly cmt, non calc; 30% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb plty-blky, vf gr, slty tex, sl calc; 15% SS: wh-lt gy, s&p, clr-trnsl, sb rnd-ang, p srt, w cons, f gr, non calc

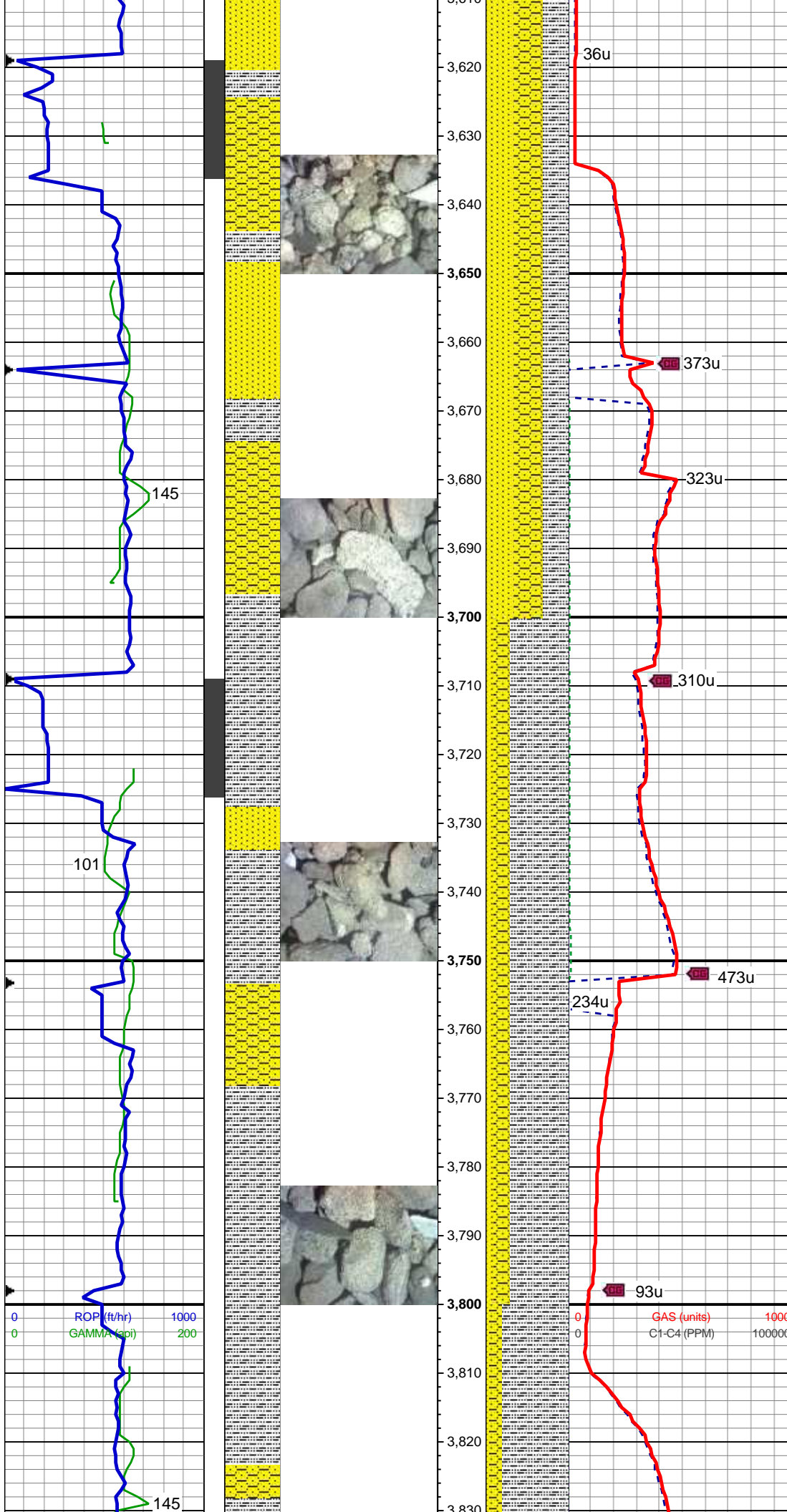


50% SHY SS: wh-lt gy, blk, frm, v f-gr, sb rnd-ang, mod-w srt, cl sup, cly cmt, non calc; 30% SS: wh-lt gy, s&p, clr-trnsl, sb rnd-ang, p srt, w cons, f gr, non calc; 20% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb plty-blky, vf gr, slty tex, sl calc

MD: 3,474 '
TVD: 3,442.53 '
Inclination: 12.9 °
Azimuth: 156.9 °
VS: 135.54 '

40% SHY SS: wh-lt gy, blk, frm, v f-gr, sb rnd-ang, mod-w srt, cl sup, cly cmt, non calc; 40% SS: wh-lt gy, s&p, clr-trnsl, sb rnd-ang, p srt, w cons, f gr, non calc; 20% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb plty-blky, vf gr, slty tex, sl calc

MD: 3,563 '
TVD: 3,529.41 '
Inclination: 12.2 °
Azimuth: 157.5 °
VS: 144 '



35% SHY SS: wh-lt gy, blk, frm, v f-
gr, sb rnd-ang, mod-w srt, cl sup,
cly cmt, non calc; 35% SS: wh-lt gy,
s&p, clr-trnsl, sb rnd-ang, p srt, w
cons, f gr, non calc; 30% SLTY SH:
lt-med gy, occ dk gy, sft-sl frm, sb
ply-blky, vf gr, slty tex, sl calc

MD: 3,653 '
TVD: 3,617.47 '
Inclination: 11.6 °
Azimuth: 162.4 °
VS: 151.32 '

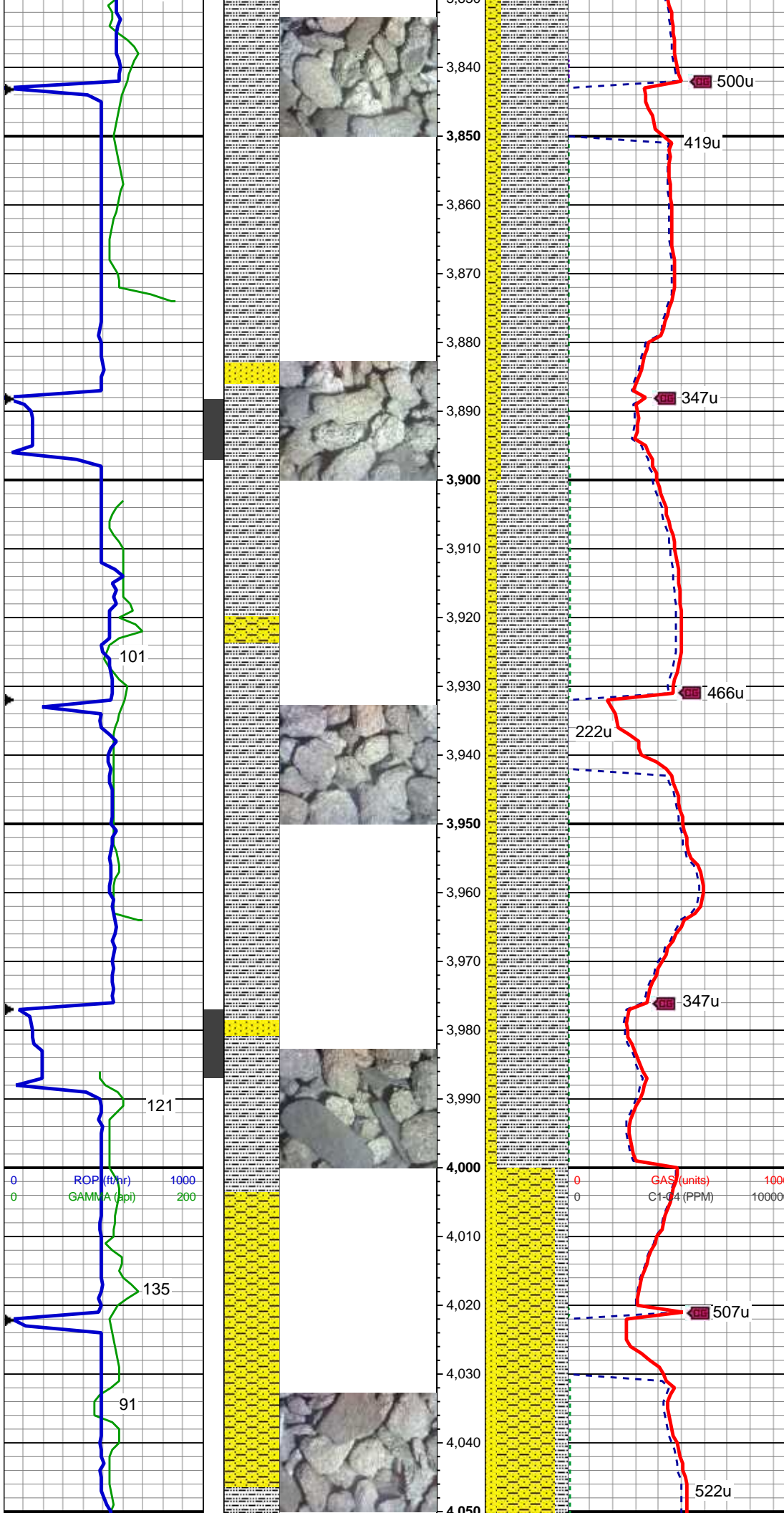
WT IN: 8.45, OUT: 8.45/ VIS: 28

MD: 3,742 '
TVD: 3,705.09 '
Inclination: 8.6 °
Azimuth: 168.4 °
VS: 156.19 '

70% SLTY SH: lt-med gy, occ dk gy,
sft-sl frm, sb ply-blky, vf gr, slty tex,
sl calc; 20% SHY SS: wh-lt gy, blk,
frm, v f-f gr, sb rnd-ang, mod-w srt,
cl sup, cly cmt, non calc; 10% SS:
wh-lt gy, s&p, clr-trnsl, sb rnd-ang,
p srt, w cons, f gr, non calc

WT IN: 8.6, OUT: 8.6/ VIS: 28

MD: 3,832 '
TVD: 3,794.22 '
Inclination: 7.3 °
Azimuth: 168 °
VS: 159.4 '



80% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb plty-blky, vf gr, slty tex, sl calc; 15% SHY SS: wh-lt gy, blk, frm, v f-f gr, sb rnd-ang, mod-w srt, cl sup, cly cmt, non calc; 5% SS: wh-lt gy, s&p, clr-trnsl, sb rnd-ang, p srt, w cons, f gr, non calc

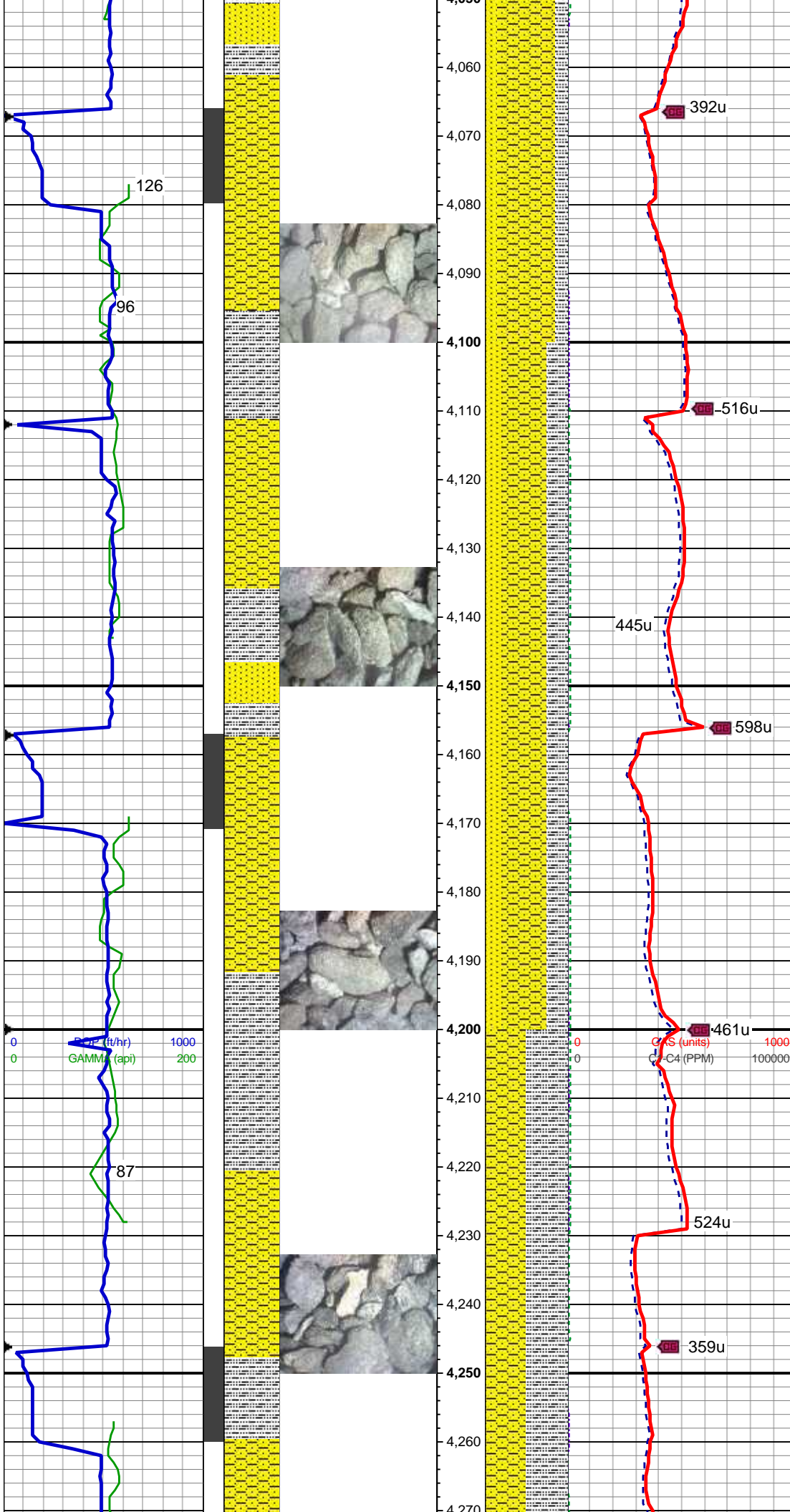
MD: 3,921 '
TVD: 3,882.56 '
Inclination: 6.7 °
Azimuth: 172.7 °
VS: 161.82 '

85% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb plty-blky, vf gr, slty tex, sl calc; 10% SHY SS: wh-lt gy, blk, frm, v f-f gr, sb rnd-ang, mod-w srt, cl sup, cly cmt, non calc; 5% SS: wh-lt gy, s&p, clr-trnsl, sb rnd-ang, p srt, w cons, f gr, non calc

MD: 4,011 '
TVD: 3,972.05 '
Inclination: 5.4 °
Azimuth: 175.3 °
VS: 163.35 '

WT IN: 8.6, OUT: 8.6 / VIS: 28

70% SHY SS: wh-lt gy, blk, frm, v f-f gr, sb rnd-ang, mod-w srt, cl sup, cly cmt, non calc; 15% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb



pty-blky, vf gr, slty tex, sl calc; 15%
SS: wh-lt gy, s&p, clr-trnsl, sb
rnd-ang, p srt, w cons, f gr, non calc

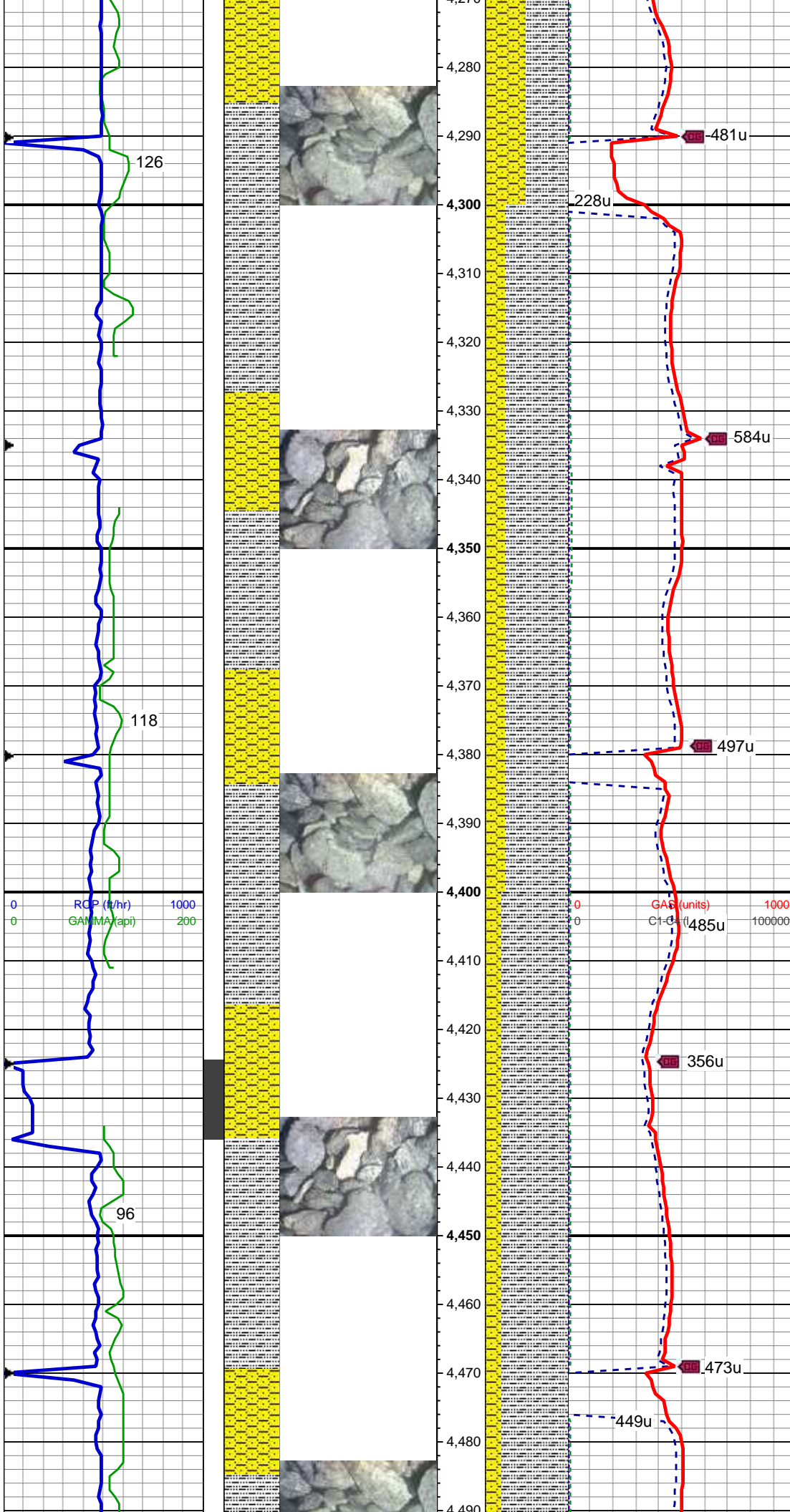
MD: 4,101'
TVD: 4,061.78'
Inclination: 3.4°
Azimuth: 174.6°
VS: 164.32'

55% SHY SS: wh-lt gy, blk, frm, v f-
gr, sb rnd-ang, mod-w srt, cl sup,
cly cmt, non calc; 25% SLTY SH:
lt-med gy, occ dk gy, sft-sl frm, sb
pty-blky, vf gr, slty tex, sl calc; 20%
SS: wh-lt gy, s&p, clr-trnsl, sb
rnd-ang, p srt, w cons, f gr, non calc

MD: 4,190'
TVD: 4,150.69'
Inclination: 1.7°
Azimuth: 189.5°
VS: 164.57'

50% SHY SS: wh-lt gy, blk, frm, v f-
gr, sb rnd-ang, mod-w srt, cl sup,
cly cmt, non calc; 50% SLTY SH:
lt-med gy, occ dk gy, sft-sl frm, sb
pty-blky, vf gr, slty tex, sl calc

MD: 4,280'



TVD: 4,240.68 '
Inclination: 0.6 °
Azimuth: 282.3 °
VS: 163.96 '

WT IN: 8.8,OUT: 8.9 / VIS: 29

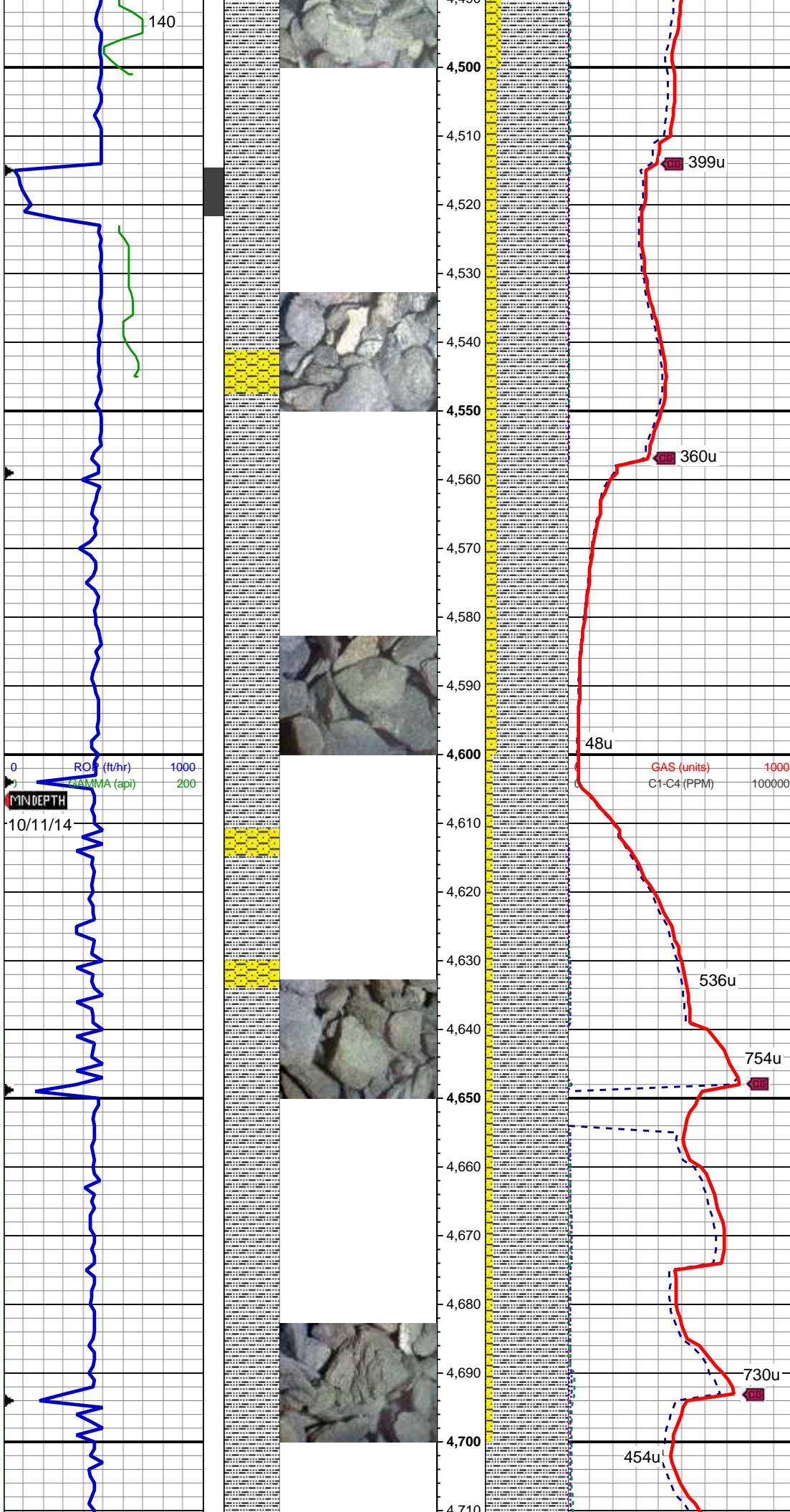
75% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb plty-blky, vf gr, slty tex, sl calc; 25% SHY SS: wh-lt gy, blk, frm, v f-f gr, sb rnd-ang, mod-w srt, cl sup, cly cmt, non calc

MD: 4,370 '
TVD: 4,330.67 '
Inclination: 0.8 °
Azimuth: 236.9 °
VS: 162.99 '

WT IN: 9.1,OUT: 9.2/ VIS: 33

80% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb plty-blky, vf gr, slty tex, sl calc; 20% SHY SS: wh-lt gy, blk, frm, v f-f gr, sb rnd-ang, mod-w srt, cl sup, cly cmt, non calc

MD: 4,459 '
TVD: 4,419.67 '
Inclination: 0.8 °
Azimuth: 332.4 °
VS: 162.17 '



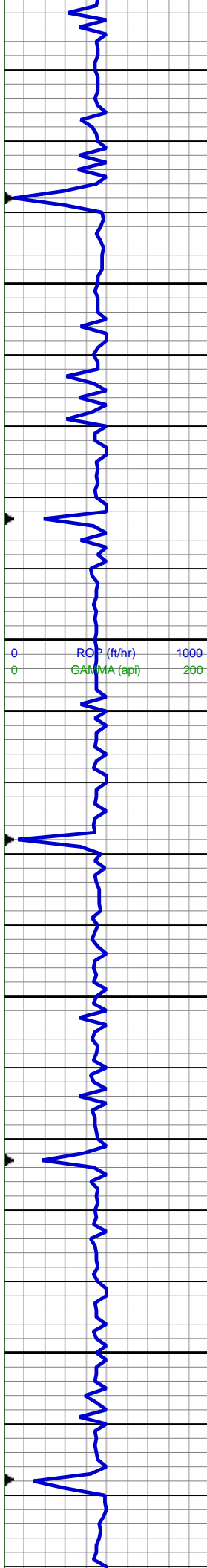
MD: 4,549 '
TVD: 4,509.65 '
Inclination: 1.4 °
Azimuth: 335.7 °
VS: 161.34 '

85% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb plty-blky, vf gr, slty tex, sl calc; 15% SHY SS: wh-lt gy, blkly, frm, v f-f gr, sb rnd-ang, mod-w srt, cl sup, cly cmt, non calc

WT IN: 9.2, OUT:9.25/ VIS: 36

MD: 4,638 '
TVD: 4,598.63 '
Inclination: 1.2 °
Azimuth: 311.4 °
VS: 160.08 '

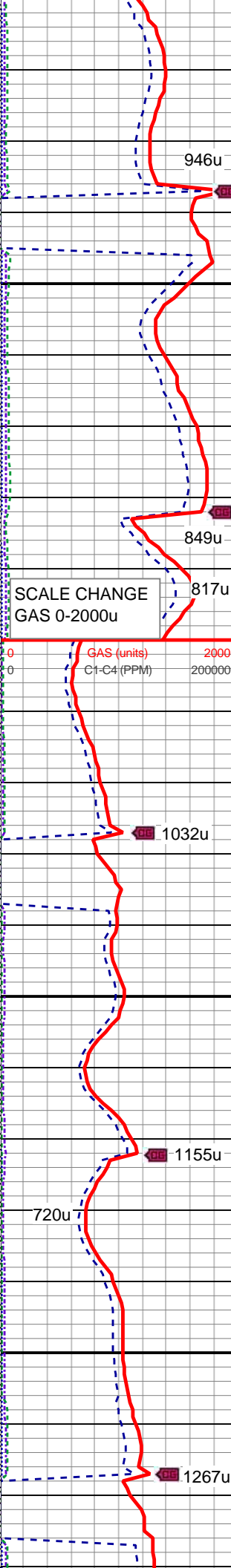
90% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb plty-blky, vf gr, slty tex, sl calc; 10% SHY SS: wh-lt gy, blkly, frm, v f-f gr, sb rnd-ang, mod-w srt, cl sup, cly cmt, non calc



4,710
4,720
4,730
4,740
4,750
4,760
4,770
4,780
4,790
4,800
4,810
4,820
4,830
4,840
4,850
4,860
4,870
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4,890
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4,910
4,920
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4,810
4,820
4,830
4,840
4,850
4,860
4,870
4,880
4,890
4,900
4,910
4,920
4,930

MD: 4,728 '
TVD: 4,688.61 '
Inclination: 0.8 °
Azimuth: 302.6 °
VS: 158.79 '

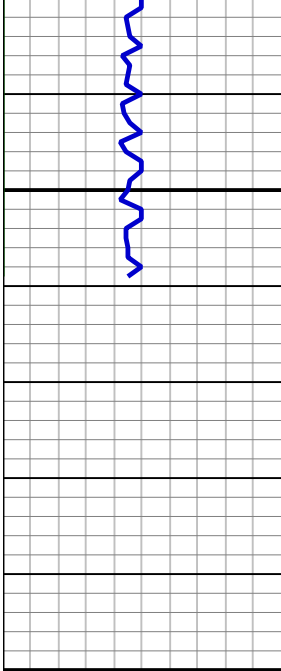
946u
849u
817u
1032u
1155u
720u
1267u

100% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb plty-blky, vf gr, slty tex, sl calc

MD: 4,818 '
TVD: 4,778.61 '
Inclination: 0.4 °
Azimuth: 306.1 °
VS: 157.98 '

100% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb plty-blky, vf gr, slty tex, sl calc

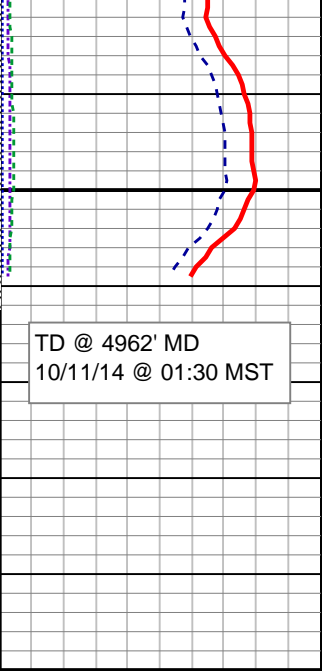
MD: 4,907 '
TVD: 4,867.61 '
Inclination: 0.3 °
Azimuth: 335.5 °
VS: 157.61 '



100% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb plty-blky, vf gr, slty tex, sl calc



100% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb plty-blky, vf gr, slty tex, sl calc



TD @ 4962' MD
10/11/14 @ 01:30 MST

100% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb plty-blky, vf gr, slty tex, sl calc

Log Continues on Rohn State
LD10-64-1HN_Horizontal

Thank you for using
Columbine Logging, Inc.