

COLUMBINE LOGGING

Scale: 5" / 100'
Measured Depth Log

Well Name Wells Ranch AE30-67-1BHNA(VERT)

Location SEC29;T6N;R62W

State COLORADO

County WELD

Country USA

Rig Number H&P 322

API Number 05-123-38650-0000

AFE # 141107

Region DJ BASIN

Field WATTENBERG

Spud Date 4/5/2014

Drilling Completed 4/13/2014

Surface Coordinates PROJECTED:
LAT: 40.4598°N
LONG:104.35608°W
1959' FNL
65' FWL

Bottom Hole Coordinat... PROJECTED:
1815' FNL
385' FEL

Ground Elevation 4764'

K.B. Elevation 4788'

Logged Interval 1000' **To** 5767'

Total Depth 11885'

Formation NIOBRARA "A" MARL

Type of Drilling Fluid MUD;WATER;POLY

Operator

Company Noble Energy Inc

Address 1625 BROADWAY
DENVER, CO 80202
(303) 228-4000

Geologist

Name MIKE GREENE;MATTHEW HOPKINS

Company COLUMBINE LOGGING, INC.

Address 2385 S. LIPAN ST
DENVER, COLORADO 80223
(303) 289-7764

Rock Types

UNKNOWN	COAL	METAMORPHIC	SHALY SILTSTONE
ANHYDRITE	CONGLOMERATE	NO SAMPLE	SILTSTONE
BENTONITE	DOLOMITE	SALT	SILTY SHALE
BRECCIA	GRANITE	SALT- PEPPER SAND	TILL
CEMENT	GYPSUM	SANDSTONE	TUFF
CHALK	IGNEOUS	SHALE	WELDED TUFF
CHERT	LIMESTONE	SHALE COLORED	
CLAY CHOKE SAND	SIDERITE or LIMONITE	SHALE GRAY	
CLAYSTONE	MARLSTONE	SHALY SANDSTONE	

Accessories

Fossils

ALGAE
AMPHIPORA
BELEMNITE
BIOCLASTIC
BRACHIOPOD
BRYOZOA
CEPHALOPOD
CORAL
CRINOID
ECHINOID
FISH
FORAMINIFERA

Fossils

GASTROPOD
INOCERAMUS
OOLITE
OSTRACOD
PELECYPOD
PELLET
PISOLITE
PLANT REMAINS
PLANT SPORES
SCAPHOPOD
STROMATOPOROID

Minerals

Minerals

ANHYDRITIC
ARGILLACEOUS
ARGILLITE GRAIN
BENTONITE
BITUMENOUS SUBSTANCE
BRECCIA FRAGMENTS
CALCAREOUS
CARBONACEOUS FLAKES
CHTDK
CHTLT
COAL - THIN BEDS
DOLOMITIC
FELDSPAR
FERRUGINOUS PELLETT

Minerals

FERRUGINOUS
GLAUCONITE
GYPSIFEROUS
HEAVY MINERAL
KAOLIN
MARLSTONE
MINERAL CRYSTALS
NODULES
PHOSPHATE PELLETS
PYRITE
SALT CAST
SANDY
SILICEOUS
SILTY

Minerals

TUFFACEOUS

Stringer

ANHYDRITE STRINGER
BENTONITE STRINGER
COAL STRINGER
DOLOMITE STRINGER
GYPSUM STRINGER
LIMESTONE STRINGER
MARLSTONE (CALC) STRG
MARLSTONE (DOL) STRG
SANDSTONE STRINGER
SHALE STRINGER
SILTSTONE STRINGER

Other Symbols

Oil Show

DEAD
EVEN
QUESTIONABLE
SPOTTED STAINING

Porosity

E EARTHY
FENESTRAL
FRACTURE
INTERCRYSTALLINE
INTEROOLITIC

Oil Show

MOLDIC
ORGANIC
PINPOINT
VUGGY

Engineering

BIT
CONNECTION (LEFT)
CONNECTION (RIGHT)
CONNECTION GAS
CORE - LOST
CORE - RECOVERED
DST INTERVAL

Other Symbols

FAULT
FORMATION TOP
GAS SHOW
MN DEPTH
NORMAL FAULT
OIL SHOW
OVERTURNED STRATA
REVERSE FAULT
SIDEWALL CORE (LEFT)
SIDEWALL CORE (RIGHT)
SLIDE
SURVEY
TRIP GAS

Other Symbols

WIRELINE TESTED - LEFT

WIRELINE TESTED - RT

Rounding

ANGULAR
ROUNDED
SUBANG
SUBRND

Textures

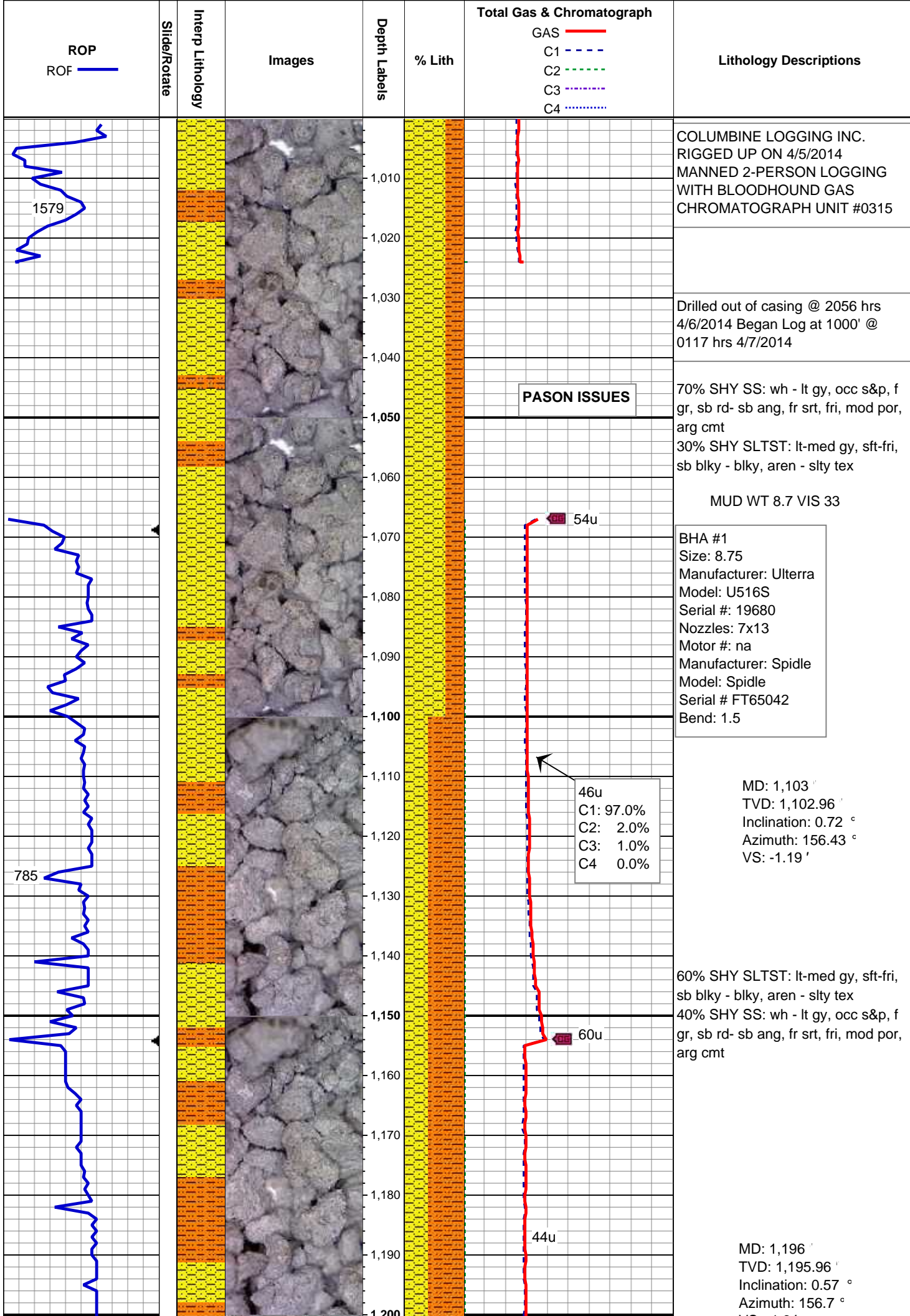
BOUNDSTONE
CHALKY
CRYPTOXLN

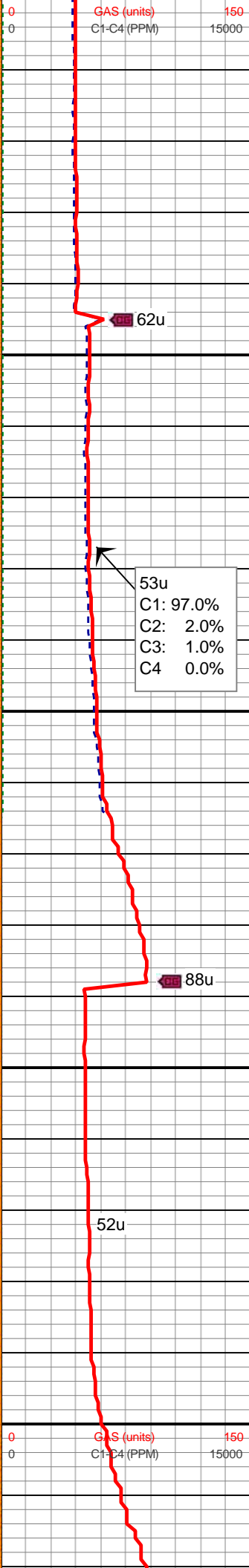
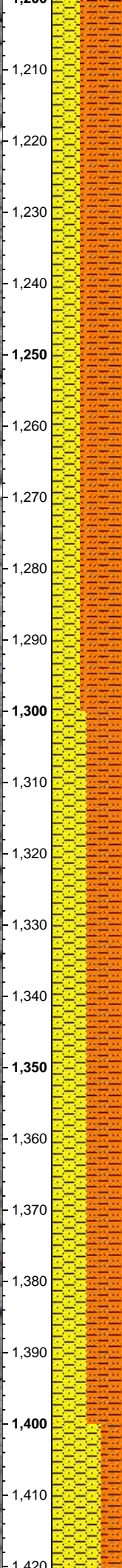
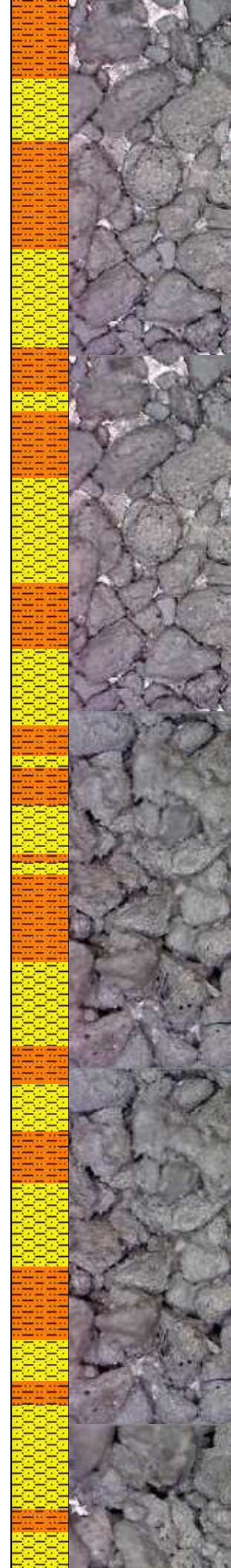
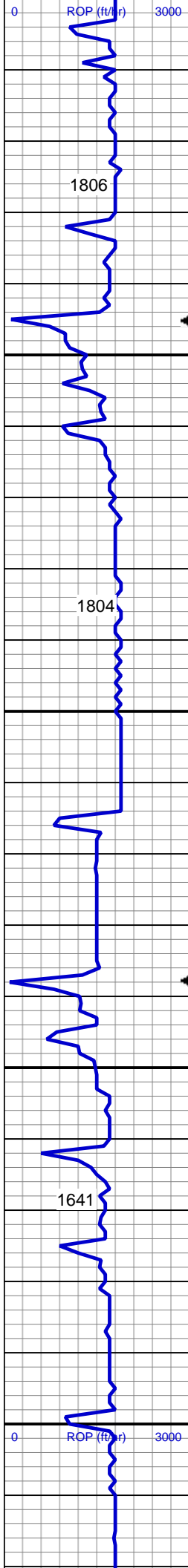
Other Symbols

E EARTHY
FX FINELYXLN
GS GRAINSTONE
L LITHOGRAPHIC
MX MICROXLN
MS MUDSTONE
PS PACKSTONE
WS WACKESTONE

Sorting

M MODERATE
P POOR
W WELL



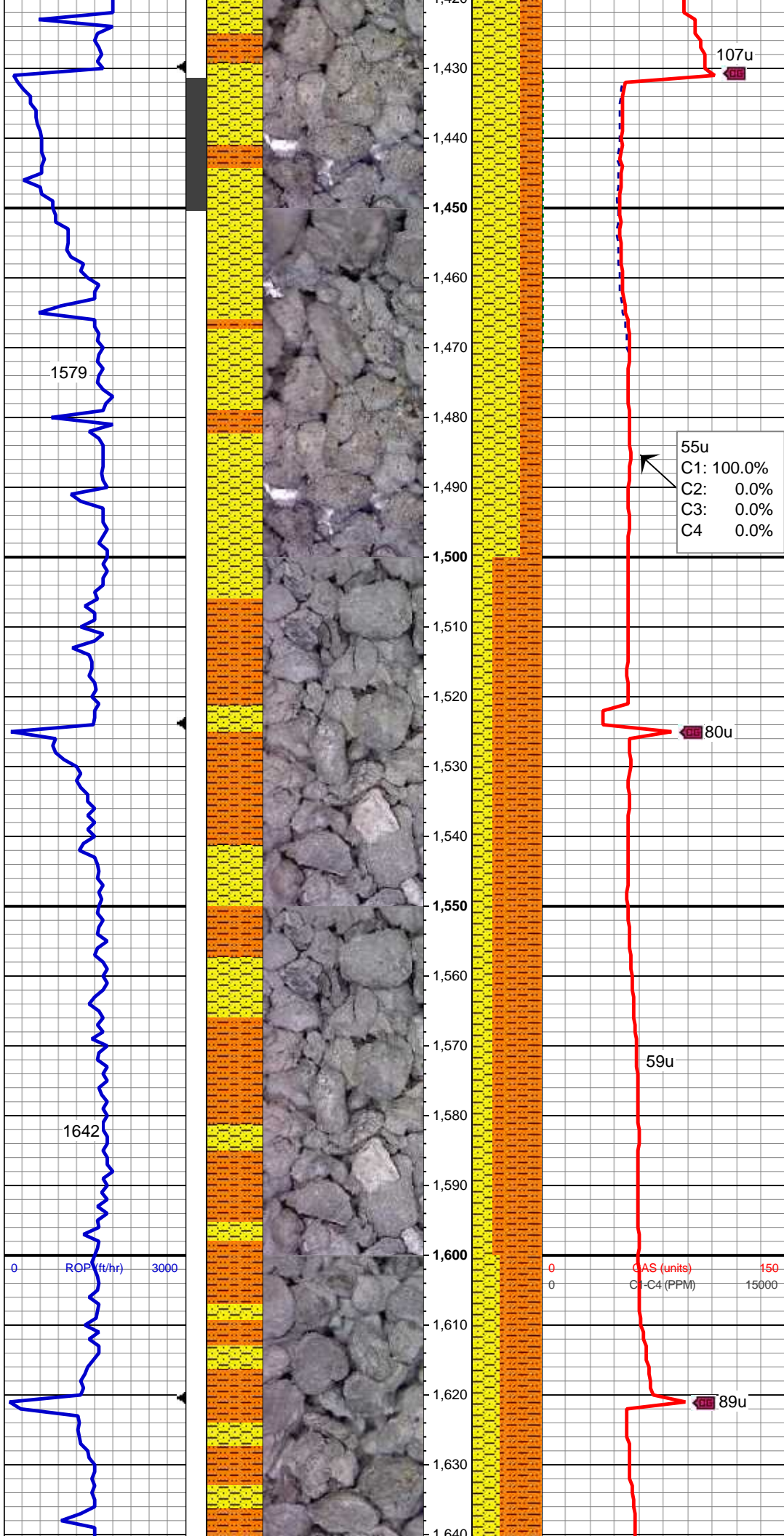


60% SHY SLTST: lt-med gy, sft-fri,
sb blkly - blkly, aren - slty tex
40% SHY SS: wh - lt gy, occ s&p, f
gr, sb rd- sb ang, fr srt, fri, mod por,
arg cmt

MD: 1,289 '
TVD: 1,288.95 '
Inclination: 0.37 °
Azimuth: 172.58 °
VS: -1.82 '

50% SHY SLTST: lt-med gy, sft-fri,
sb blkly - blkly, aren - slty tex
50% SHY SS: wh - lt gy, occ s&p, f
gr, sb rd- sb ang, fr srt, fri, mod por,
arg cmt

MD: 1,382 '
TVD: 1,381.95 '
Inclination: 0.64 °
Azimuth: 158.53 °
VS: -2.05 '



70% SHY SS: wh - lt gy, occ s&p, f
gr, sb rd- sb ang, fr srt, fri, mod por,
arg cmt 30% SHY SLTST: lt-med
gy, sft-fri, sb blk- blk, aren - slty
tex

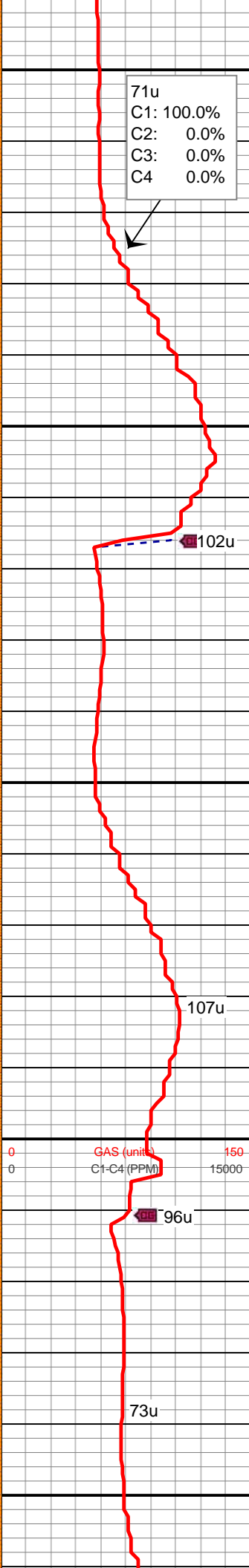
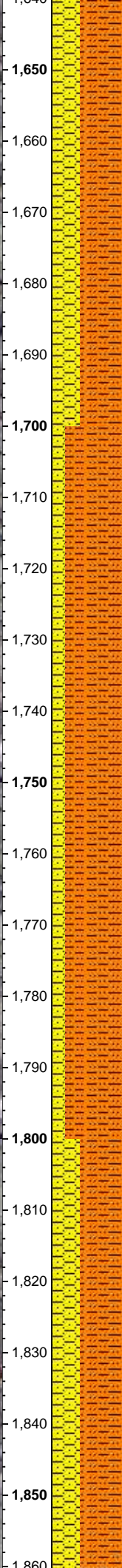
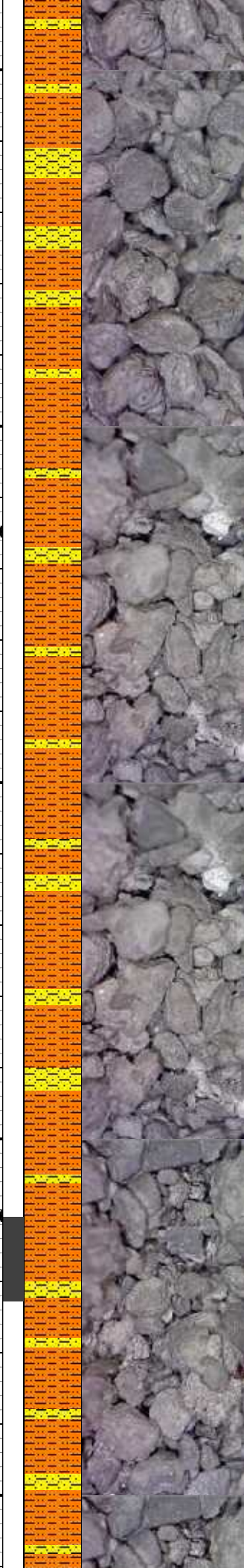
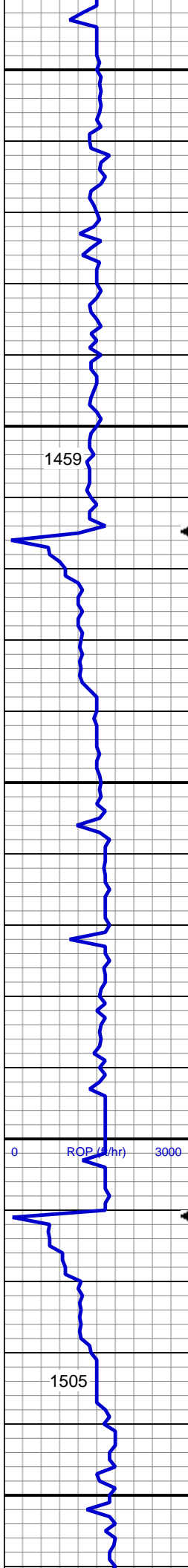
MD: 1,475 '
TVD: 1,474.94 '
Inclination: 0.75 °
Azimuth: 55.71 °
VS: -2.74 '

55u
C1: 100.0%
C2: 0.0%
C3: 0.0%
C4: 0.0%

70% SHY SLTST: lt gy, sft-fri, sb
blk- blk, aren - slty tex
30% SHY SS: wh - lt gy, occ s&p, f
gr, sb rd- sb ang, fr srt, fri, mod por,
arg cmt

MD: 1,570 '
TVD: 1,569.94 '
Inclination: 0.79 °
Azimuth: 47.66 °
VS: -3.74 '

60% SHY SLTST: lt gy, sft-fri, sb



60% SHY SLTST: lt gy, sft fri, sb
blky - blky, aren - slty tex
40% SHY SS: wh - lt gy, occ s&p, f
gr, sb rd- sb ang, fr srt, fri, mod por,
arg cmt

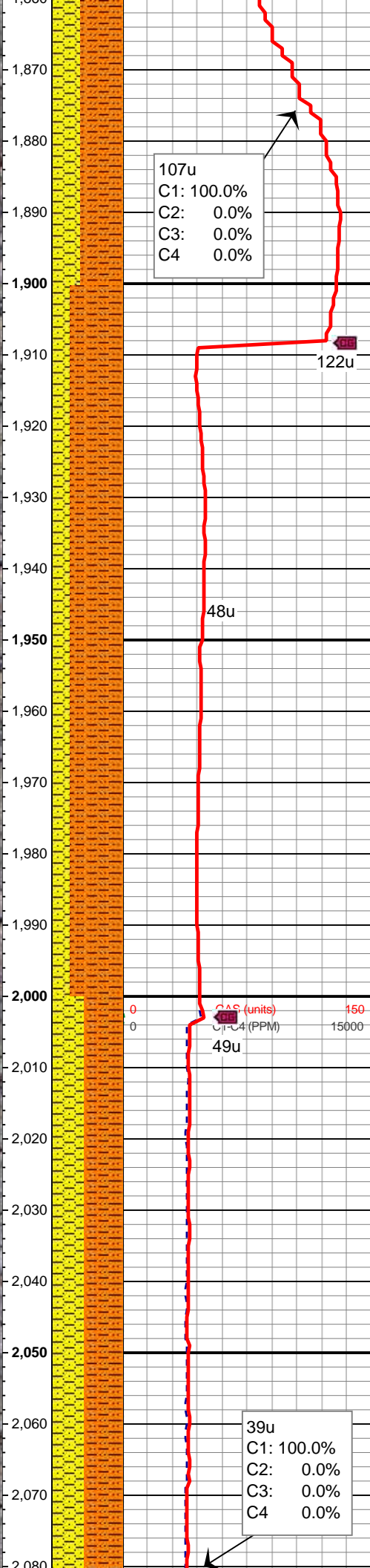
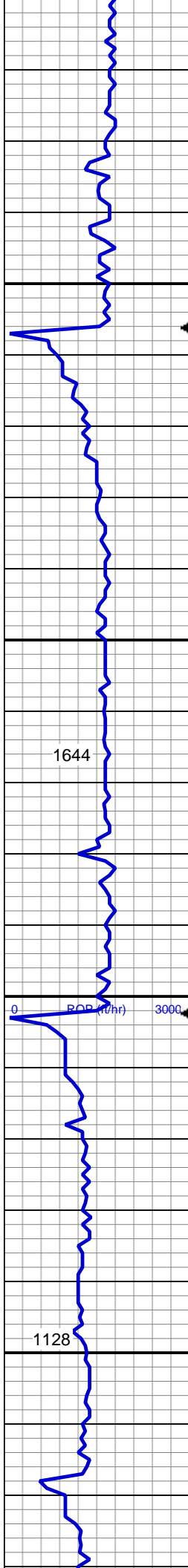
MD: 1,664 '
TVD: 1,663.93 '
Inclination: 0.64 °
Azimuth: 60.78 °
VS: -4.68 '

MUD WT 8.8 VIS 35

80% SHY SLTST: lt gy, sft-fri, sb
blky - blky, aren - slty tex
20% SHY SS: wh - lt gy, occ s&p, f
gr, sb rd- sb ang, fr srt, fri, mod por,
arg cmt

MD: 1,759 '
TVD: 1,758.93 '
Inclination: 0.19 °
Azimuth: 43.81 °
VS: -5.25 '

60% SHY SLTST: lt gy, sft-fri, sb
blky - blky, aren - slty tex
40% SHY SS: wh - lt gy, occ s&p, f
gr, sb rd- sb ang, fr srt, fri, mod por,
arg cmt



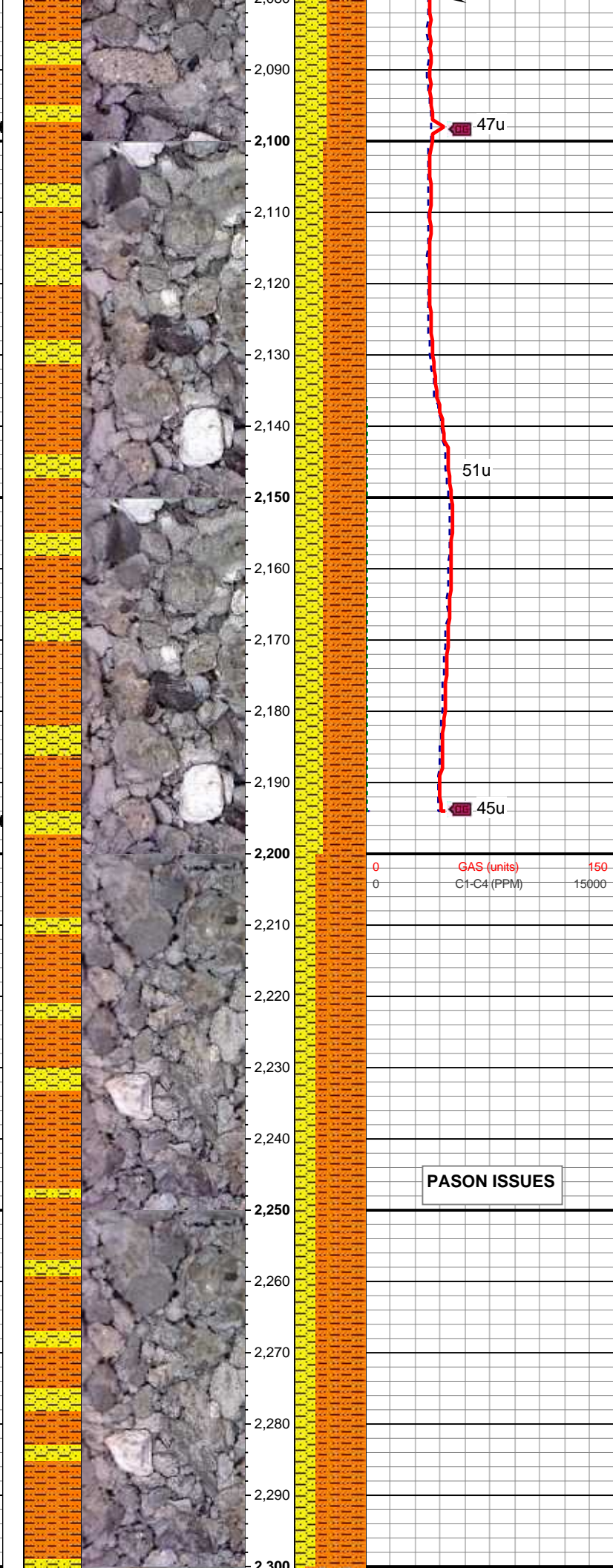
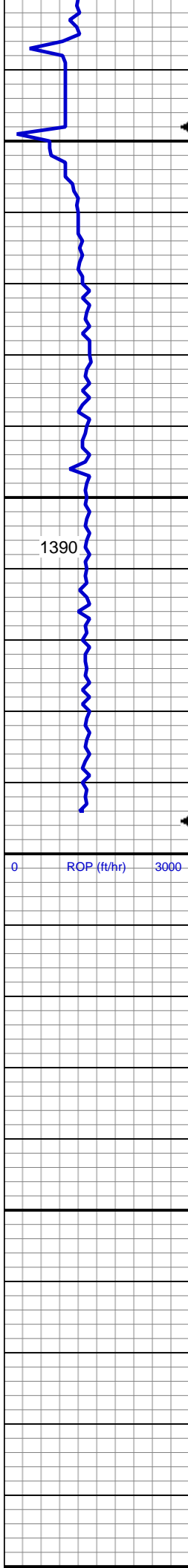
MD: 1,853 '
TVD: 1,852.92 '
Inclination: 0.4 °
Azimuth: 36.19 °
VS: -5.56 '

MD: 1,948 '
TVD: 1,947.92 '
Inclination: 0.3 °
Azimuth: 298.21 °
VS: -5.53 '

75% SHY SLTST: lt gy, sft-fri, sb
blky - blky, aren - slty tex
25% SHY SS: wh - lt gy, occ s&p, f
gr, sb rd- sb ang, fr srt, fri, mod por,
arg cmt

MD: 2,042 '
TVD: 2,041.92 '
Inclination: 0.66 °
Azimuth: 285.02 °
VS: -4.8 '

55% SHY SLTST: lt gy, sft-fri, sb
blky - blky, aren - slty tex
45% SHY SS: wh - lt gy, occ s&p, f
gr, sb rd- sb ang, fr srt, fri, mod por,
arg cmt



MUD WT 9.1 VIS 37

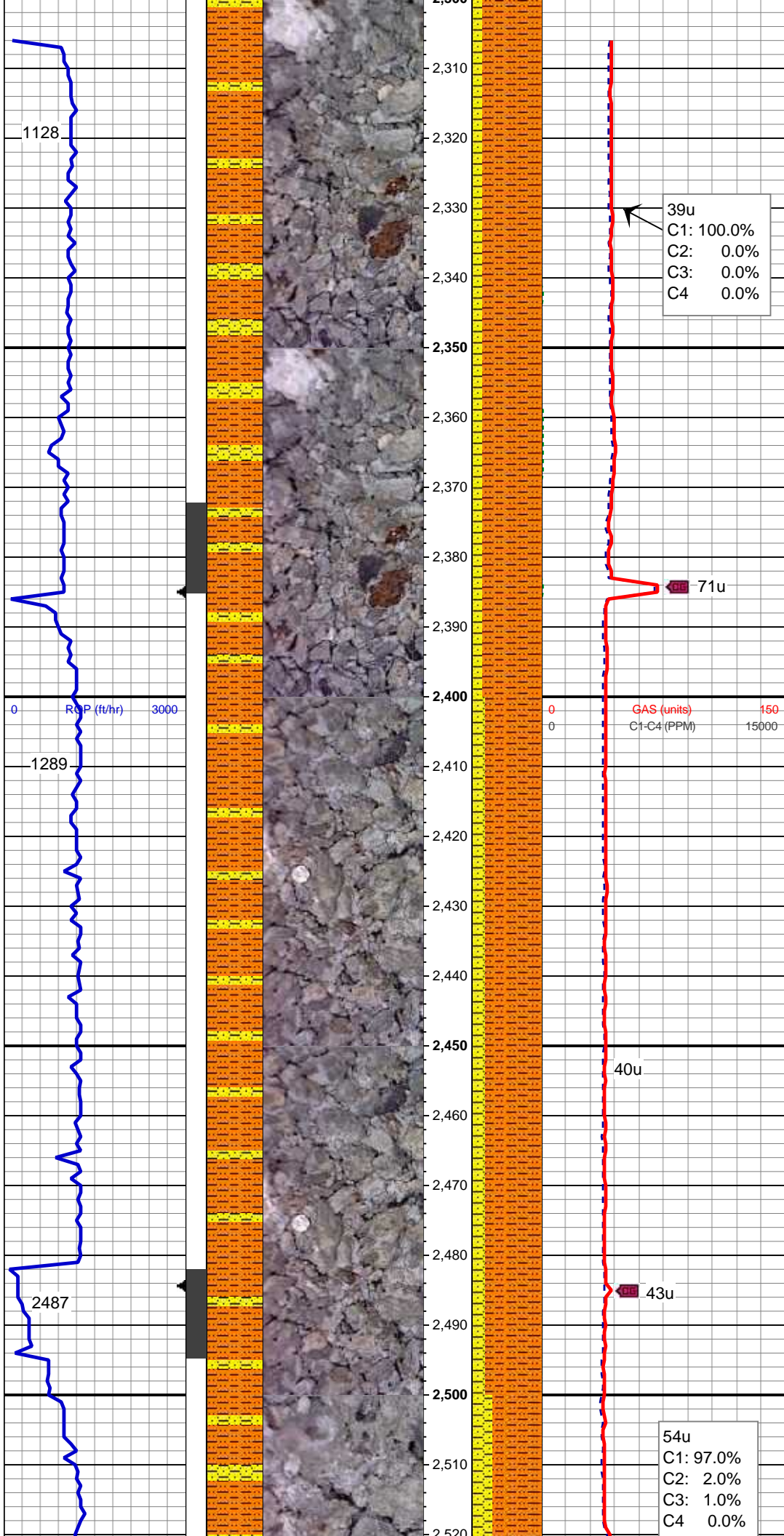
MD: 2,137 '
TVD: 2,136.91 '
Inclination: 0.9 °
Azimuth: 303.06 °
VS: -3.64 '

60% SHY SLTST: lt gy, sft-fri, sb
blky - blky, aren - slty tex
40% SHY SS: wh - lt gy, occ s&p, f
gr, sb rd- sb ang, fr srt, fri, mod por,
arg cmt

MD: 2,232 '
TVD: 2,231.9 '
Inclination: 1.05 °
Azimuth: 307.89 °
VS: -2.33 '

PASON ISSUES

70% SHY SLTST: lt gy, sft-fri, sb
blky - blky, aren - slty tex
30% SHY SS: wh - lt gy, occ s&p, f
gr, sb rd- sb ang, fr srt, fri, mod por,
arg cmt



MD: 2,327 '
TVD: 2,326.89 '
Inclination: 0.61 °
Azimuth: 91.67 °
VS: -2.15 '

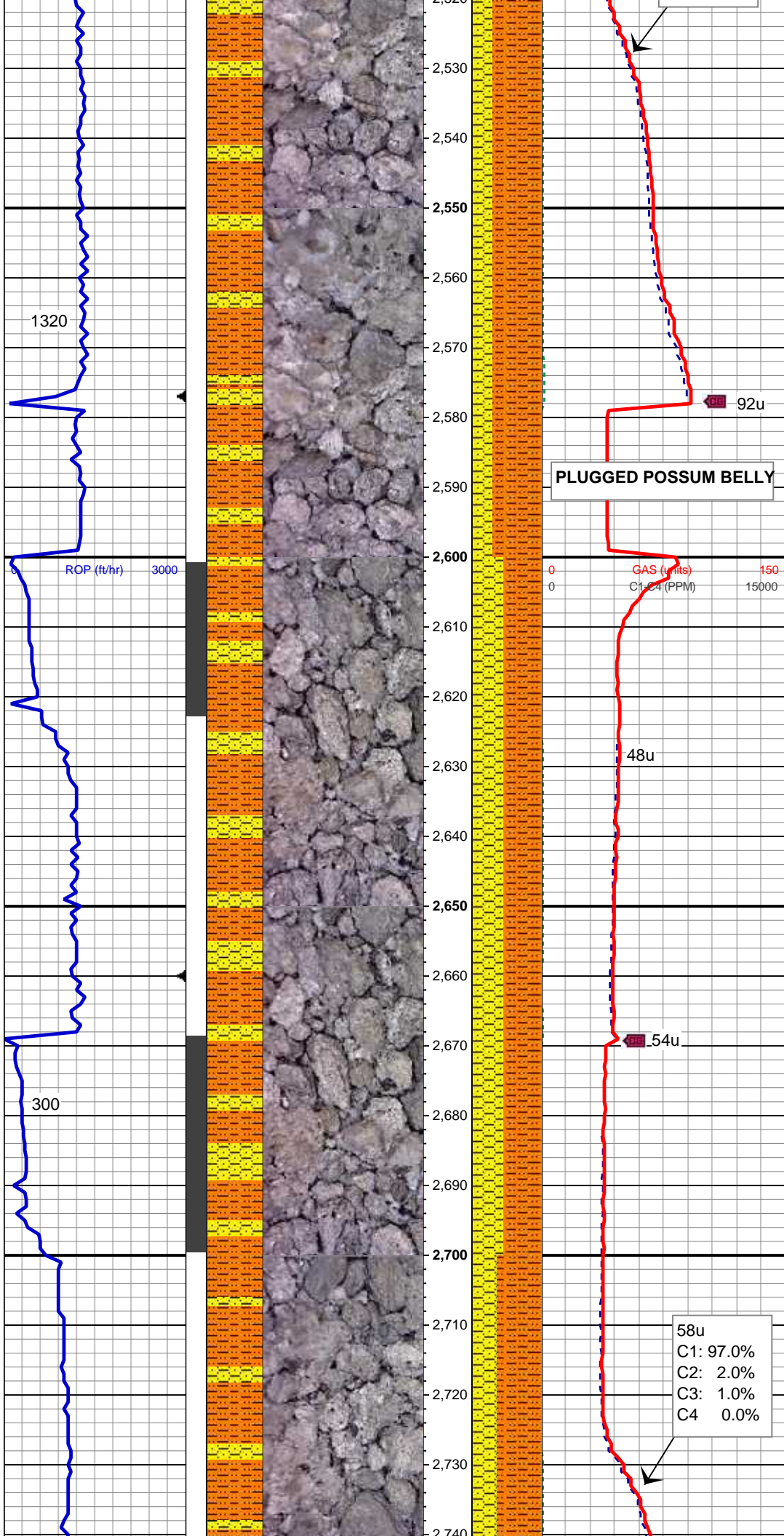
85% SHY SLTST: lt gy, sft-fri, sb
blky - blky, aren - slty tex
15% SHY SS: wh - lt gy, occ s&p, f
gr, sb rd- sb ang, fr srt, fri, mod por,
arg cmt

MD: 2,422 '
TVD: 2,421.88 '
Inclination: 1.27 °
Azimuth: 100.39 °
VS: -3.69 '

80% SHY SLTST: lt gy, sft-fri, sb
blky - blky, aren - slty tex
20% SHY SS: wh - lt gy, occ s&p, f
gr, sb rd- sb ang, fr srt, fri, mod por,
arg cmt

MUD WT 9.2 VIS 40

MD: 2,516 '
TVD: 2,515.87 '
Inclination: 0.52 °
Azimuth: 75.53 °



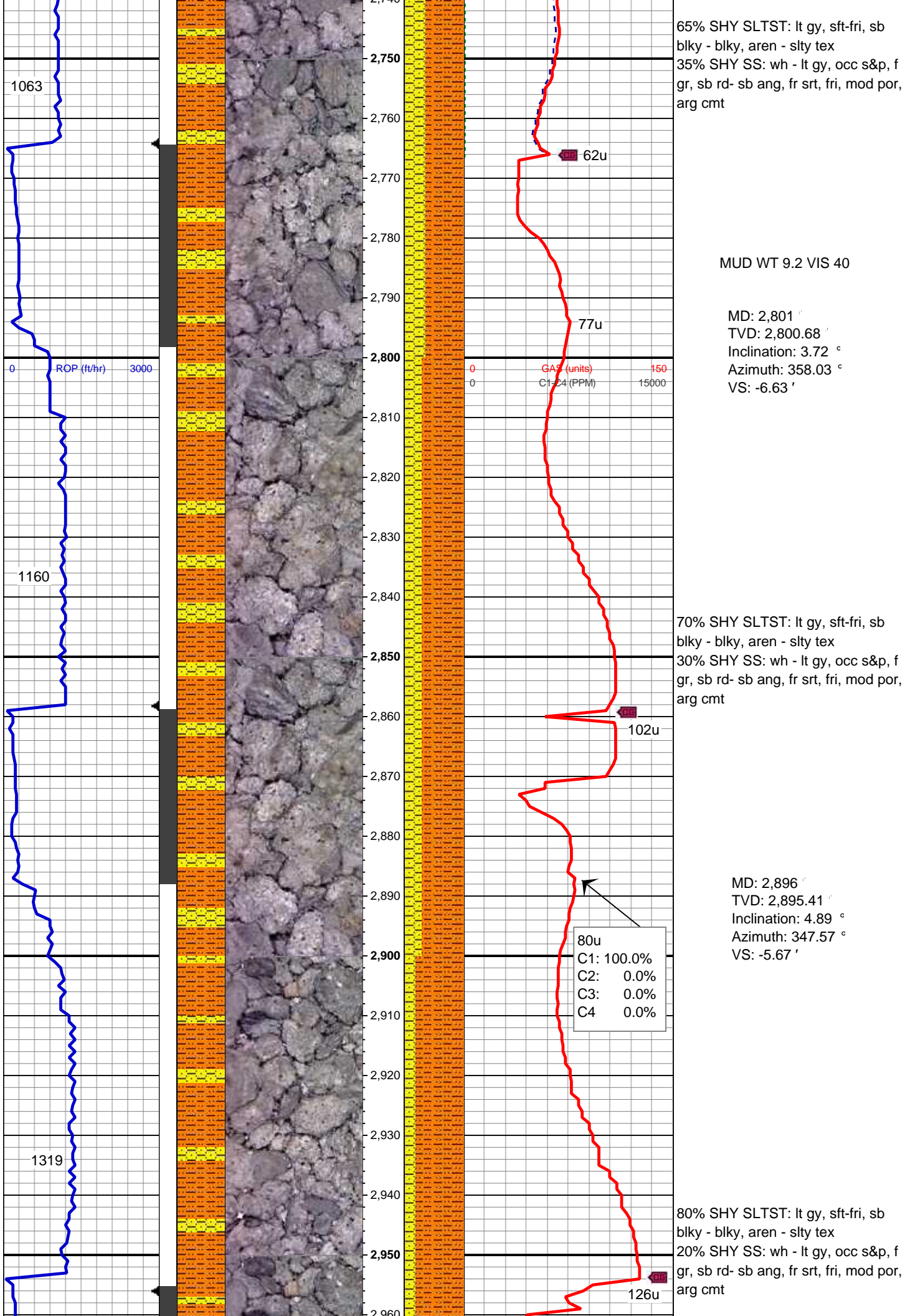
VS: -5.13'

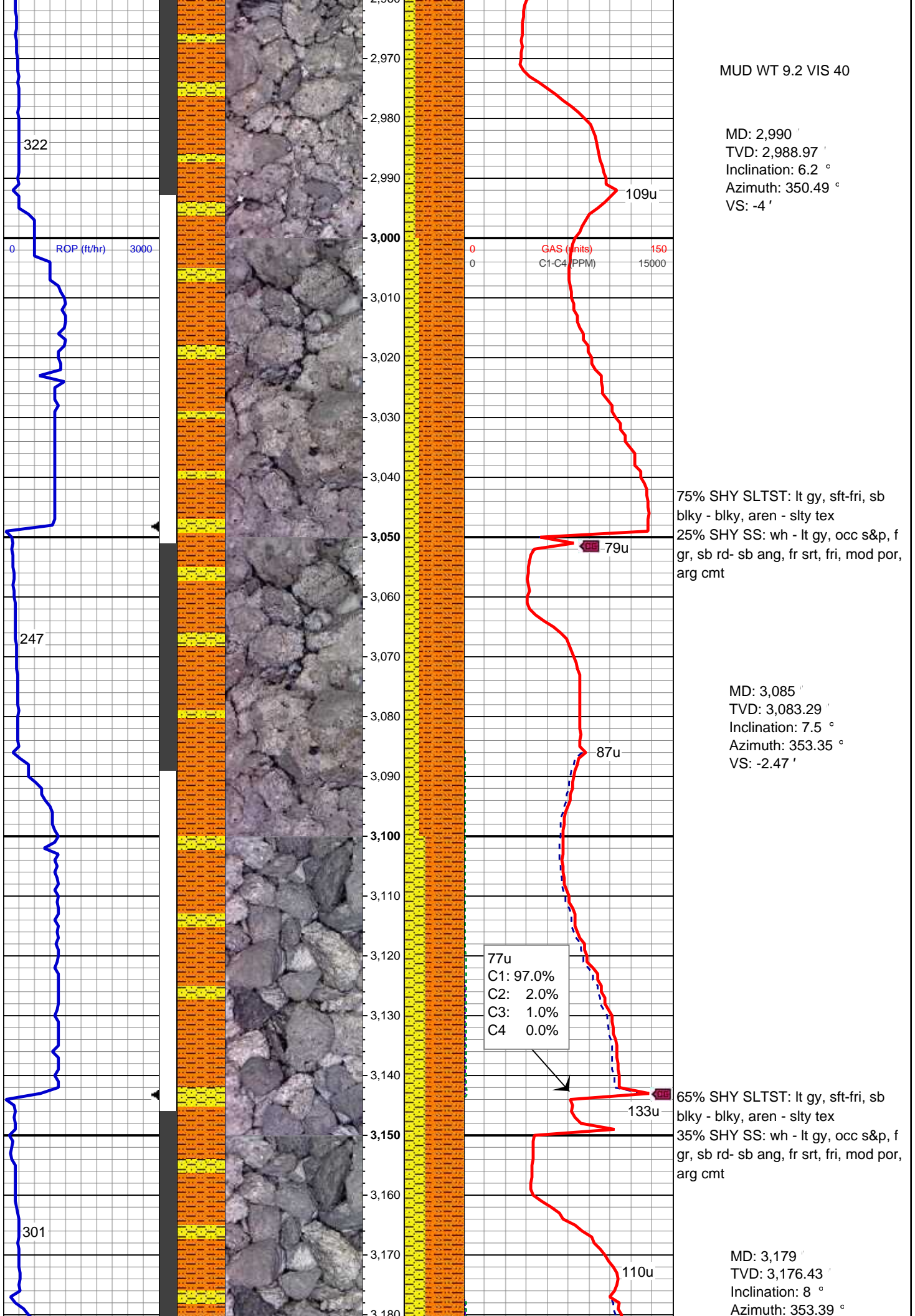
70% SHY SLTST: lt gy, sft-fri, sb
blky - blky, aren - slty tex
30% SHY SS: wh - lt gy, occ s&p, f
gr, sb rd- sb ang, fr srt, fri, mod por,
arg cmt

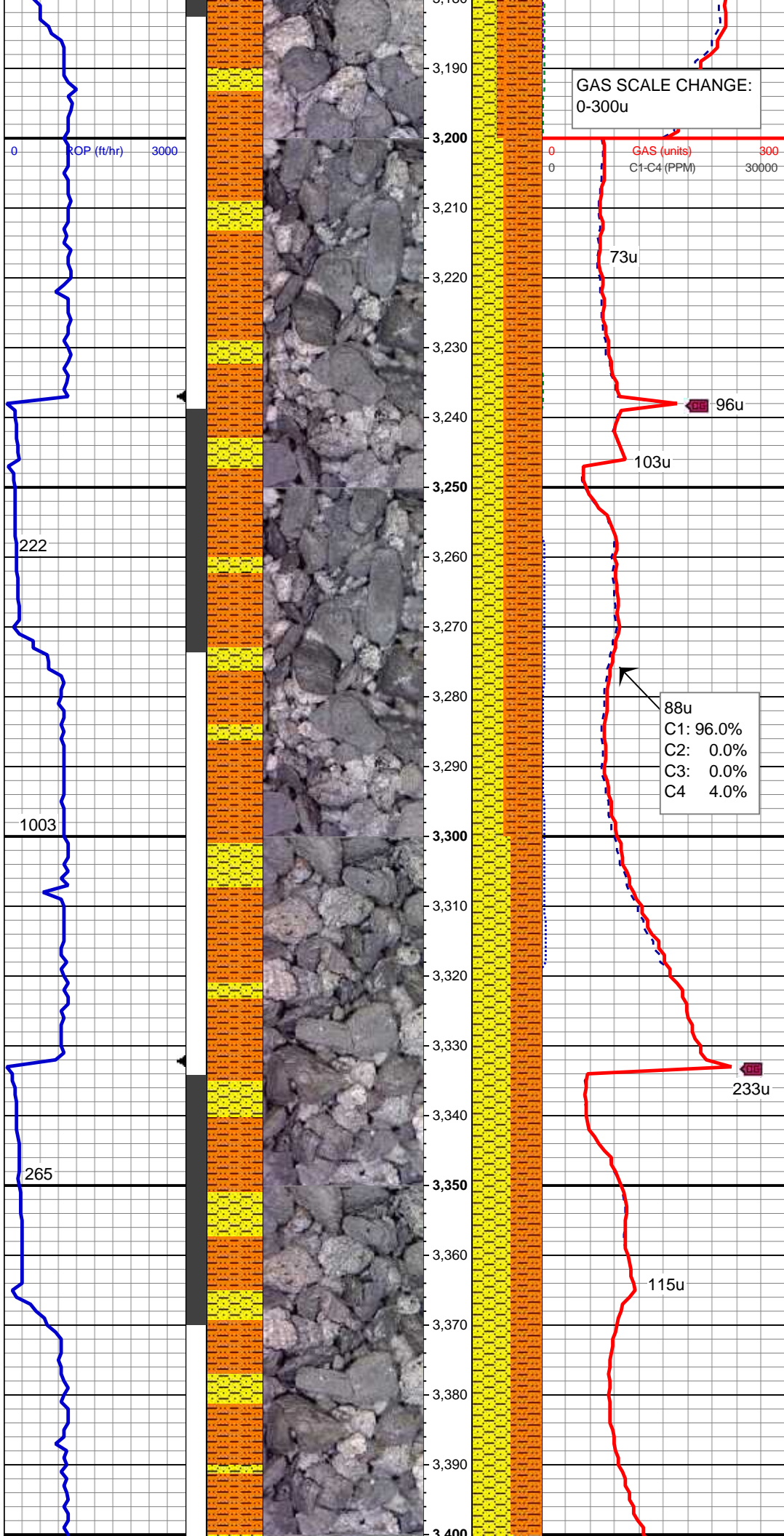
MD: 2,611'
TVD: 2,610.86'
Inclination: 1.14°
Azimuth: 10.82°
VS: -5.73'

55% SHY SLTST: lt gy, sft-fri, sb
blky - blky, aren - slty tex
45% SHY SS: wh - lt gy, occ s&p, f
gr, sb rd- sb ang, fr srt, fri, mod por,
arg cmt

MD: 2,706'
TVD: 2,705.81'
Inclination: 2.33°
Azimuth: 11.97°
VS: -6.32'







VS: -1.05'

MUD WT 9.2 VIS 40

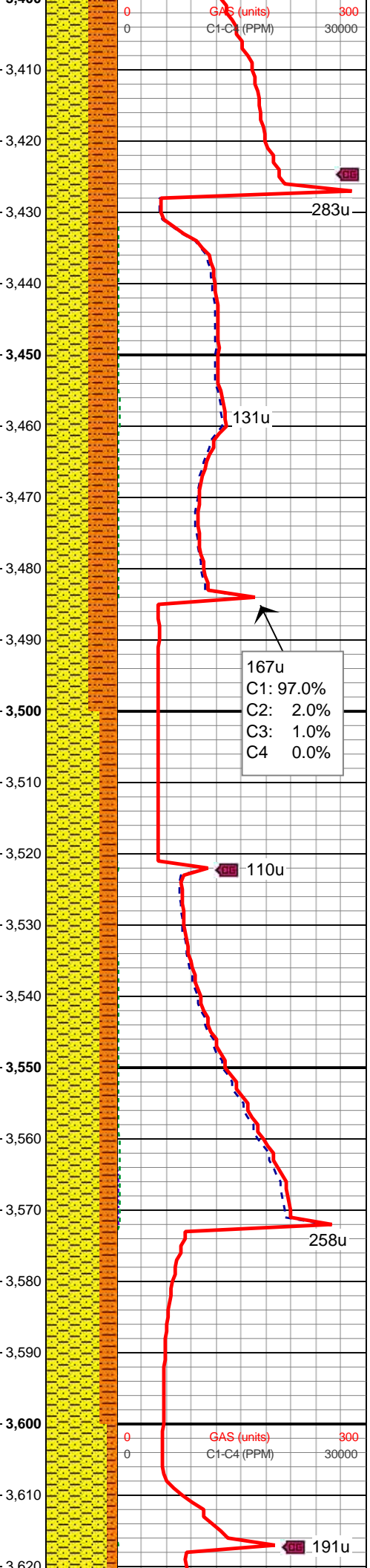
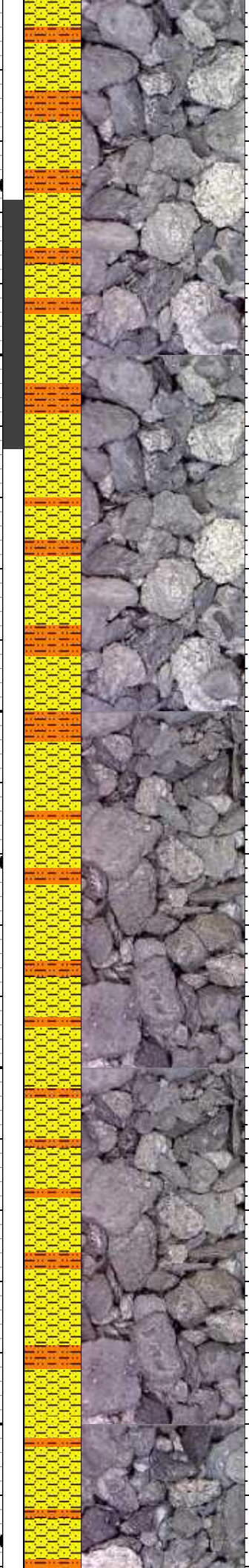
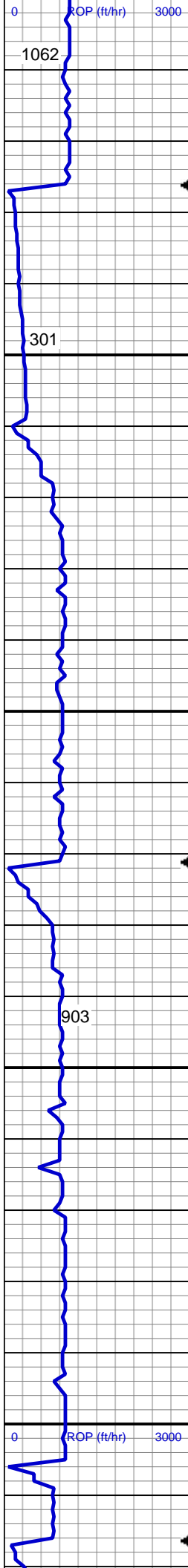
55% SHY SLTST: lt gy, sft-fri, sb
blky - blky, aren - slty tex
45% SHY SS: wh - lt gy, occ s&p, f
gr, sb rd- sb ang, fr srt, fri, mod por,
arg cmt

MD: 3,274'
TVD: 3,270.47'
Inclination: 8.33°
Azimuth: 353.65°
VS: 0.42'

55% SHY SS: wh - lt gy, occ s&p, f
gr, sb rd- sb ang, fr srt, fri, mod por,
arg cmt
45% SHY SLTST: lt gy, sft-fri, sb
blky - blky, aren - slty tex

MD: 3,369'
TVD: 3,364.47'
Inclination: 8.29°
Azimuth: 347.52°
VS: 2.62'

MUD WT 9.2 VIS 40



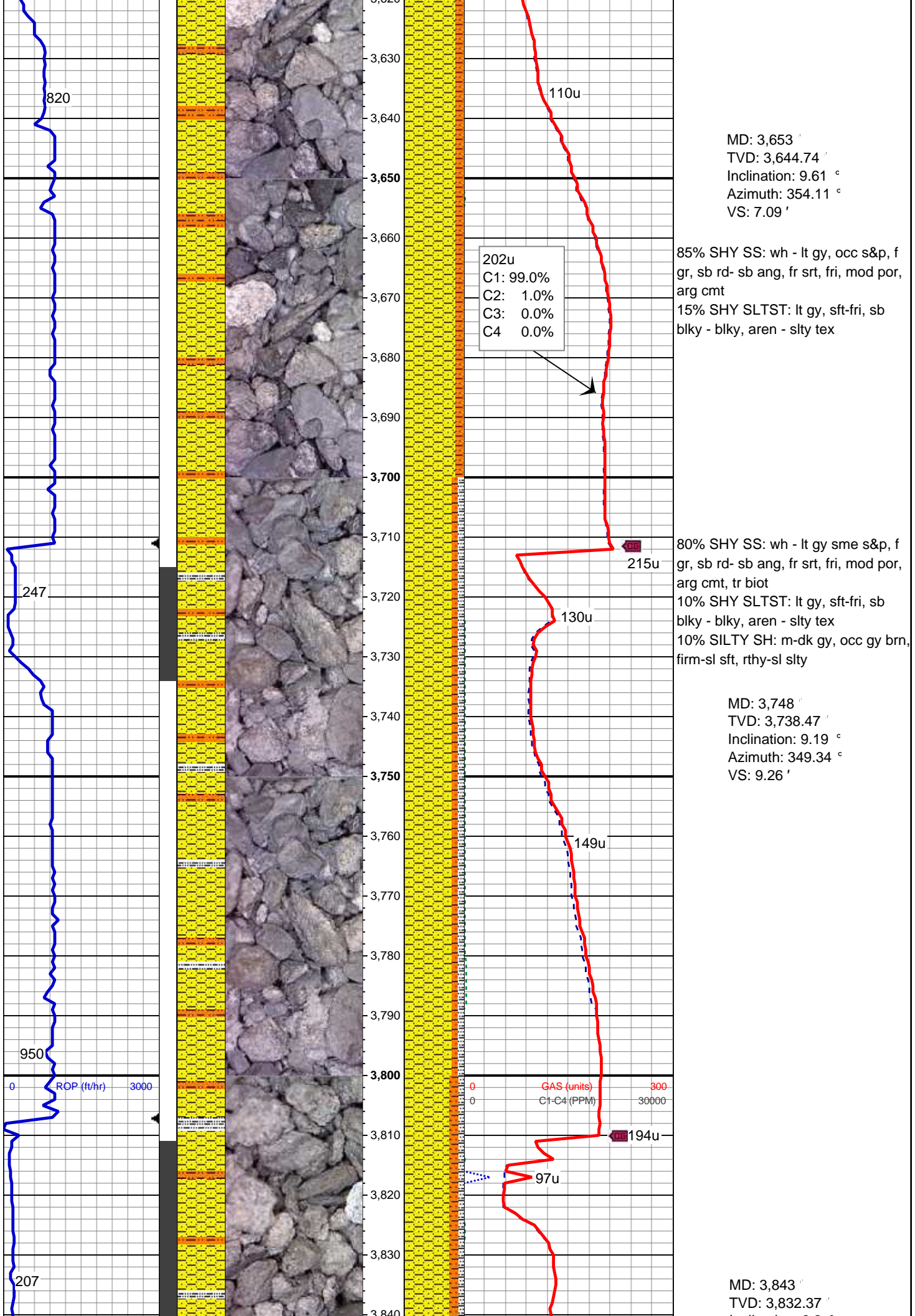
60% SHY SS: wh - lt gy, occ s&p, f
gr, sb rd- sb ang, fr srt, fri, mod por,
arg cmt
40% SHY SLTST: lt gy, sft-fri, sb
blky - blky, aren - slty tex

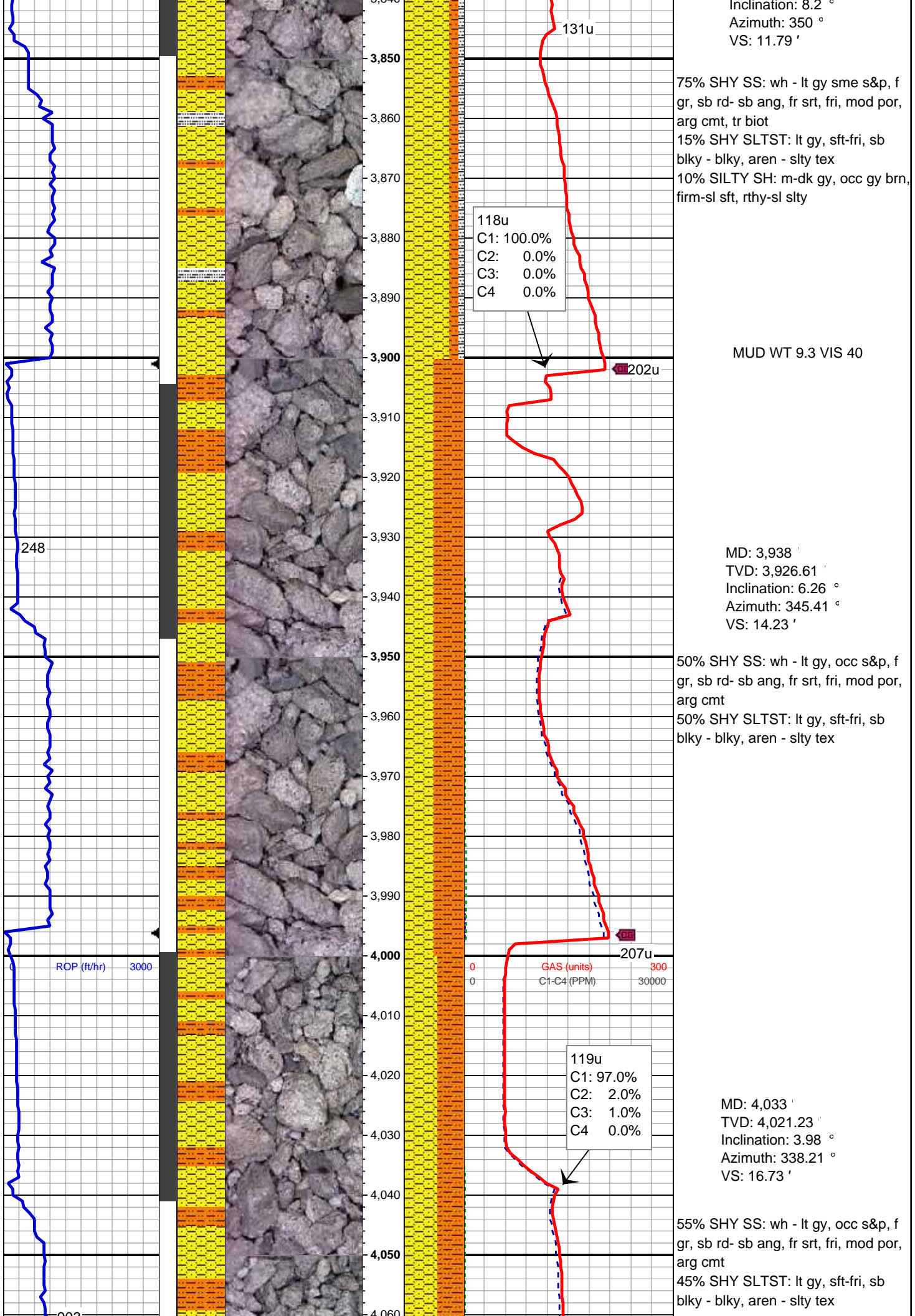
MD: 3,464 '
TVD: 3,458.31 '
Inclination: 9.65 °
Azimuth: 356.79 °
VS: 4.5 '

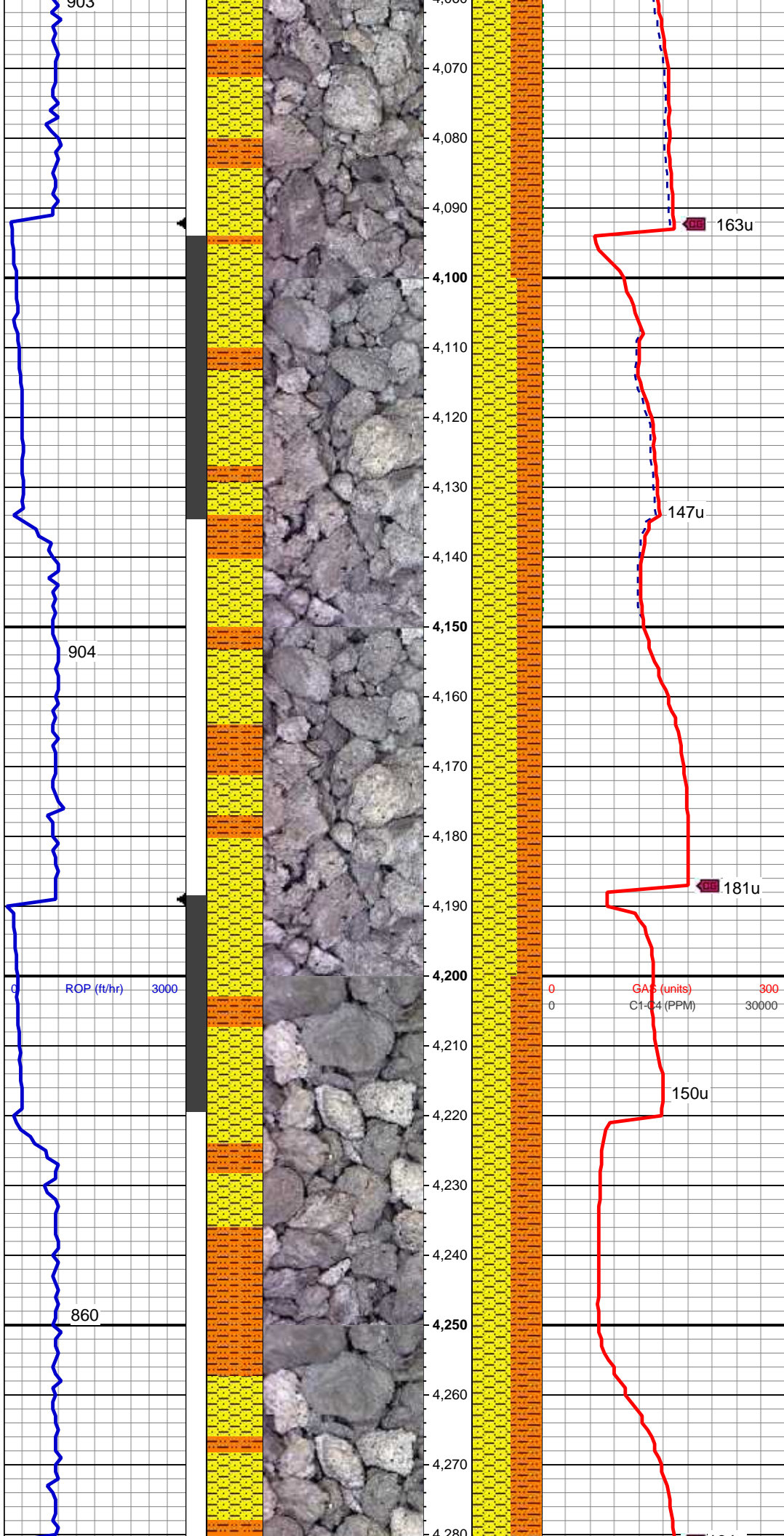
167u
C1: 97.0%
C2: 2.0%
C3: 1.0%
C4: 0.0%

75% SHY SS: wh - lt gy, occ s&p, f
gr, sb rd- sb ang, fr srt, fri, mod por,
arg cmt
25% SHY SLTST: lt gy, sft-fri, sb
blky - blky, aren - slty tex

MD: 3,559 '
TVD: 3,552.02 '
Inclination: 9.3 °
Azimuth: 354.58 °
VS: 5.62 '





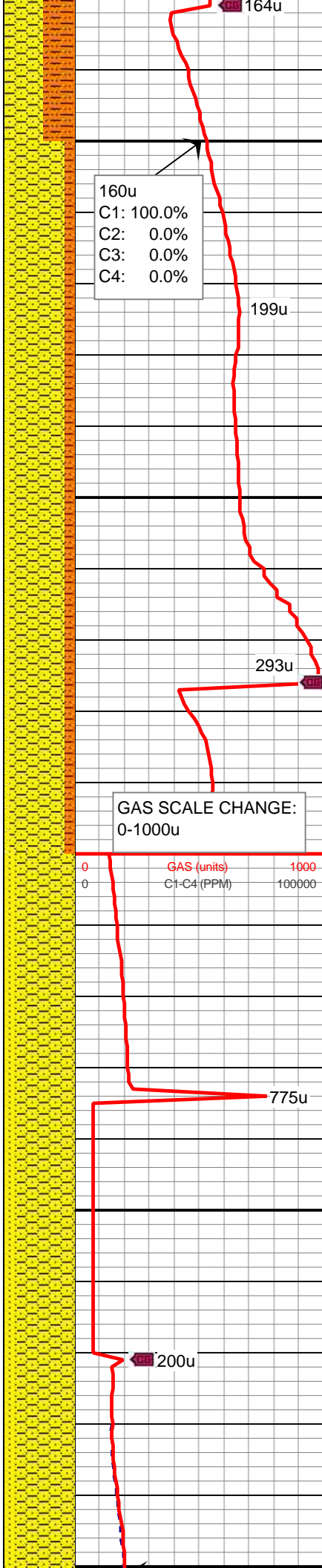
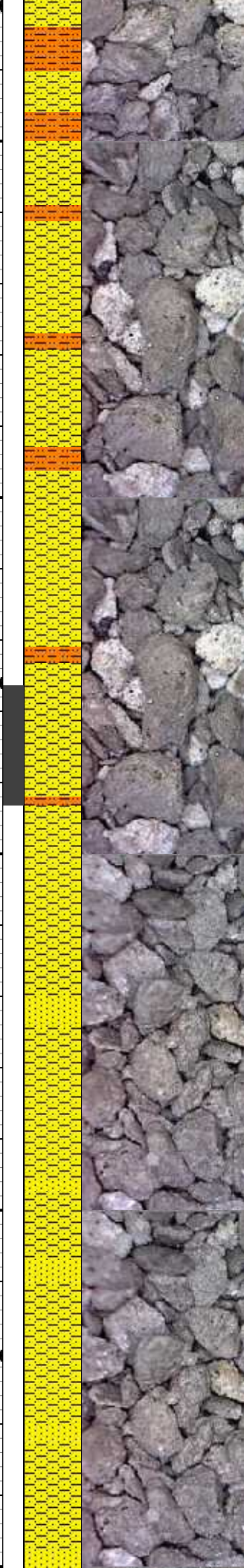
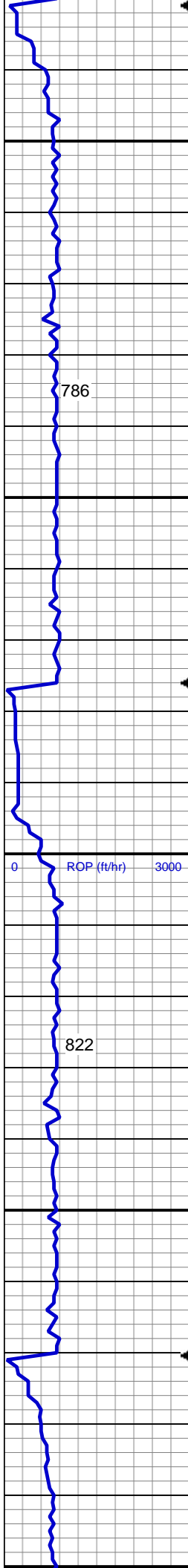


MD: 4,129 '
TVD: 4,117.1 '
Inclination: 1.84 °
Azimuth: 340.93 °
VS: 18.46 '

65% SHY SS: wh - lt gy sme s&p, f
gr, sb rd- sb ang, fr srt, fri, mod por,
arg cmt, sme glau, sme biot
35% SHY SLTST: lt gy, sft-fri, sb
blky - blky, aren - slty tex

MD: 4,224 '
TVD: 4,212.09 '
Inclination: 0.76 °
Azimuth: 186.89 °
VS: 19.03 '

55% SHY SS: wh - lt gy sme s&p, f
gr, sb rd- sb ang, fr srt, fri, mod por,
arg cmt, sme glau, sme biot
45% SHY SLTST: lt gy, sft-fri, sb blky -
blky, aren - slty tex



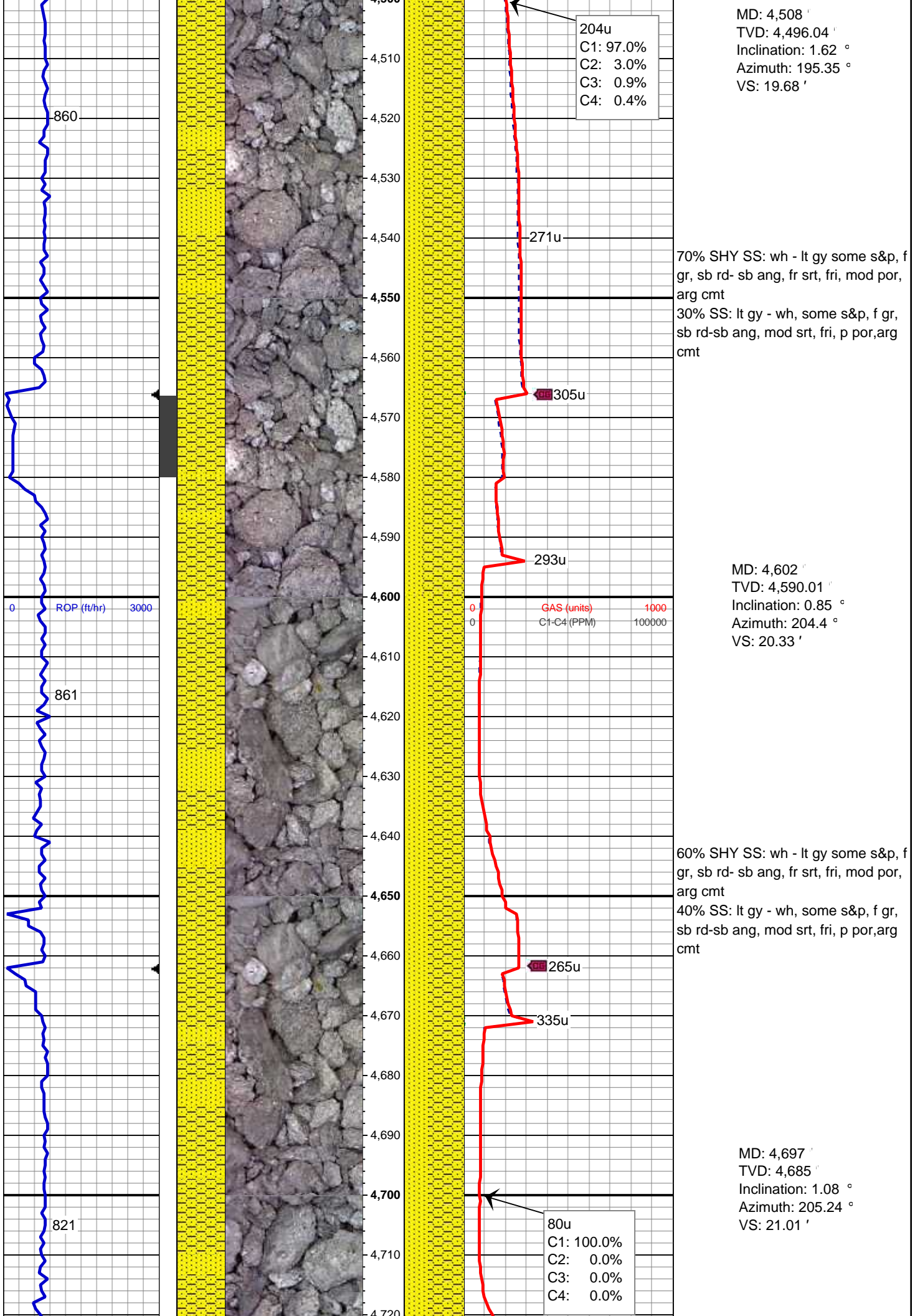
MD: 4,318 '
TVD: 4,306.08 '
Inclination: 0.59 °
Azimuth: 192.84 °
VS: 19.22 '

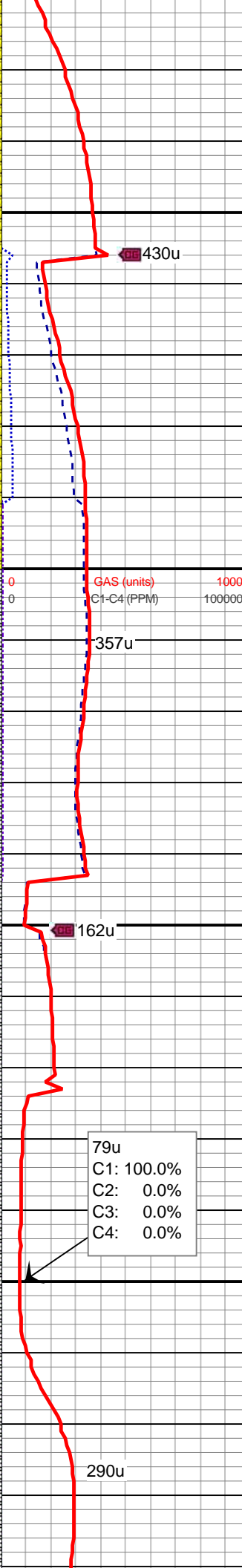
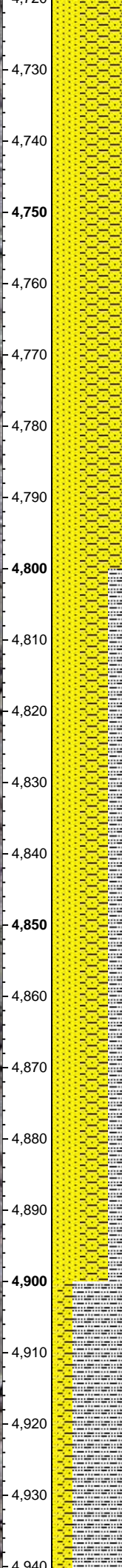
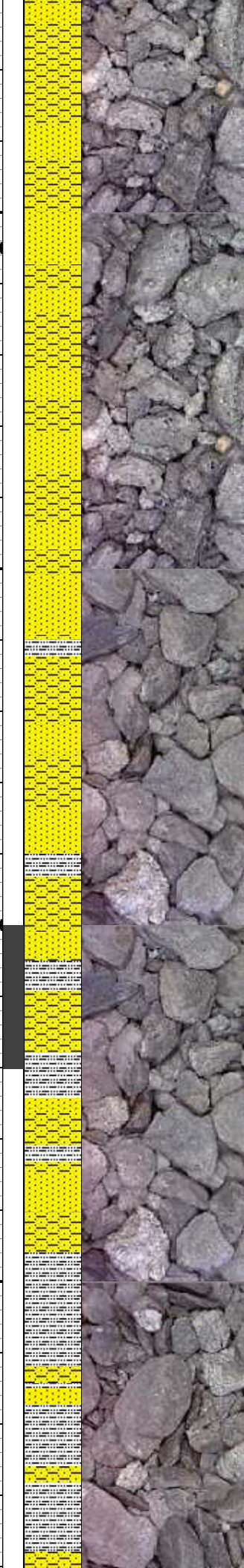
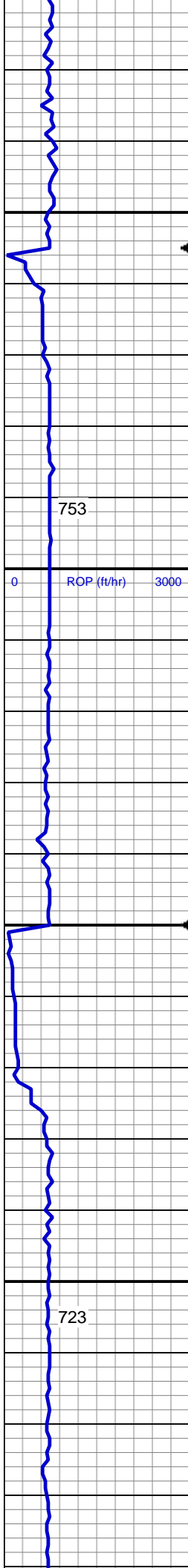
75% SHY SS: wh - lt gy some s&p, f gr, sb rd- sb ang, fr srt, fri, mod por, arg cmt
10% SS: lt gy - wh, some s&p, f gr, sb rd-sb ang, mod srt, fri, p por, arg cmt
15% SHY SLTST: lt gy, sft-fri, sb blkly - blkly, aren - slty tex

MD: 4,413 '
TVD: 4,401.07 '
Inclination: 1.31 °
Azimuth: 179.77 °
VS: 19.33 '

MUD WT 9.5 VIS 42

80% SHY SS: wh - lt gy some s&p, f gr, sb rd- sb ang, fr srt, fri, mod por, arg cmt
20% SS: lt gy - wh, some s&p, f gr, sb rd-sb ang, mod srt, fri, p por, arg cmt





60% SHY SS: wh - lt gy some s&p, f
gr, sb rd- sb ang, fr srt, fri, mod por,
arg cmt
40% SS: lt gy - wh, some s&p, f gr,
sb rd-sb ang, mod srt, fri, p por, arg
cmt

MD: 4,793 '
TVD: 4,780.99 '
Inclination: 0.64 °
Azimuth: 209.11 °
VS: 21.66 '

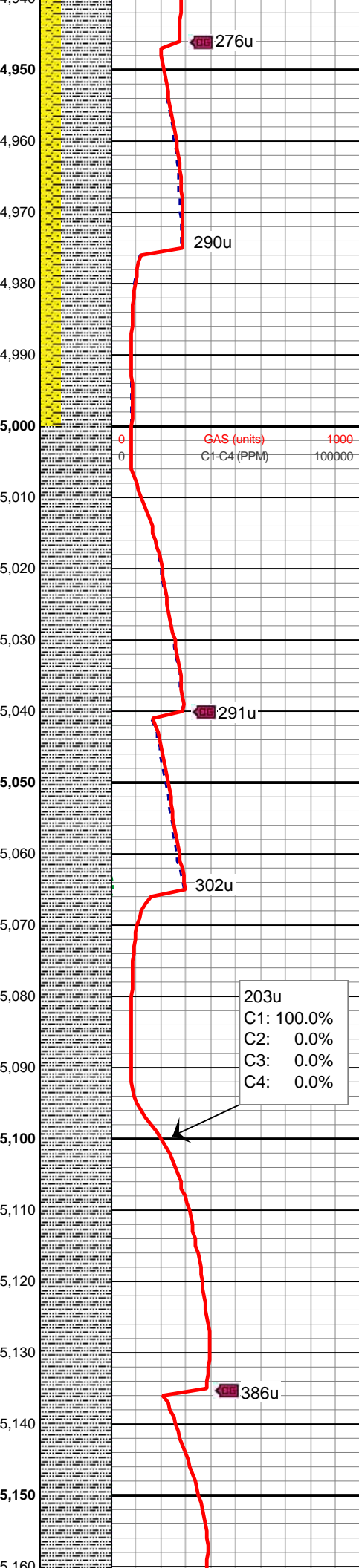
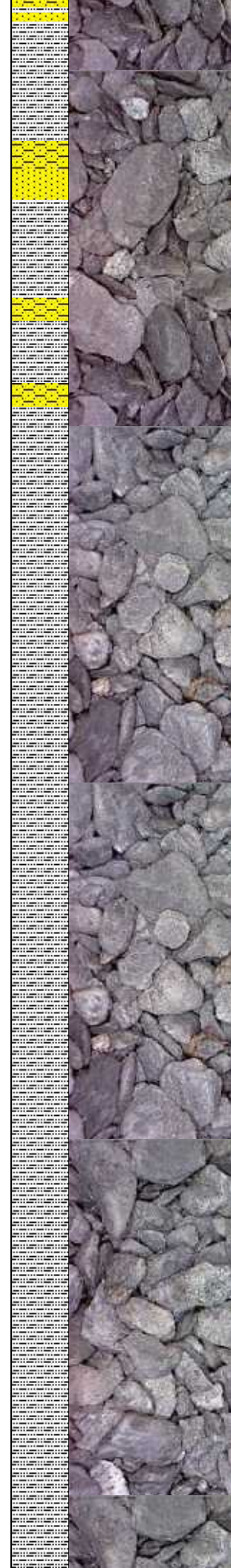
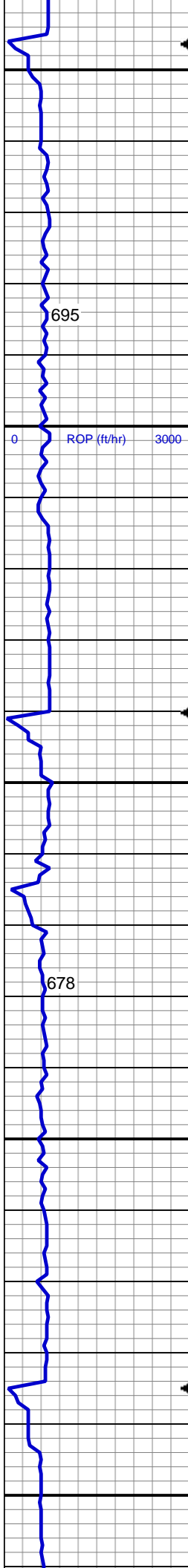
MUD WT 9.6 VIS 44

40% SHY SS: wh - lt gy some s&p, f
gr, sb rd- sb ang, fr srt, fri, mod por,
arg cmt
40% SS: lt gy - wh, some s&p, f gr,
sb rd-sb ang, mod srt, fri, p por, arg
cmt
20% SLTY SH: m-dk gy occ gy brn,
pty - sb pty firm-sl sft, rthy-sl slty

MD: 4,887 '
TVD: 4,874.98 '
Inclination: 0.73 °
Azimuth: 120.85 °
VS: 21.4 '

79u
C1: 100.0%
C2: 0.0%
C3: 0.0%
C4: 0.0%

70% SLTY SH: m-dk gy occ gy brn,



plty - sb plty firm-sl sft, rthy-sl slty
20% SHY SS: wh - lt gy some s&p, f
gr, sb rd- sb ang, fr srt, fri, mod por,
arg cmt
10% SS: lt gy - wh, some s&p, f gr,
sb rd-sb ang, mod srt, fri, p por, arg
cmt

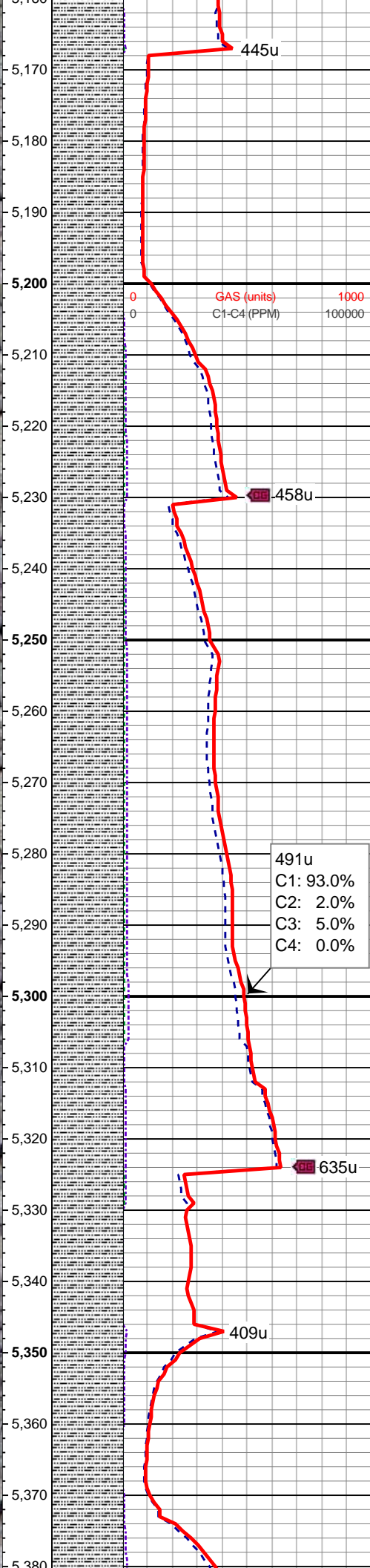
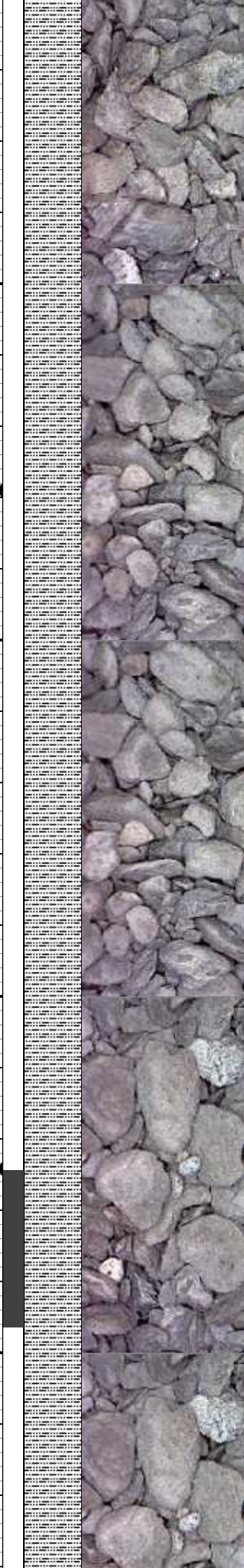
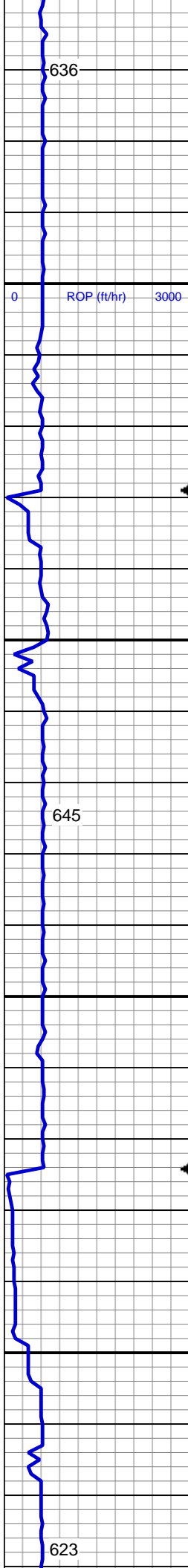
MD: 4,982 '
TVD: 4,969.98 '
Inclination: 0.68 °
Azimuth: 142.11 °
VS: 20.54 '

100% SLTY SH: med-dk gy occ gy
brn, plty - sb plty firm-sl sft, rthy-sl
slty

MD: 5,077 '
TVD: 5,064.97 '
Inclination: 0.44 °
Azimuth: 119.93 °
VS: 19.88 '

MUD WT 9.7 VIS 45

100% SLTY SH: med-dk gy occ gy
brn, plty - sb plty firm-sl sft, rthy-sl
slty



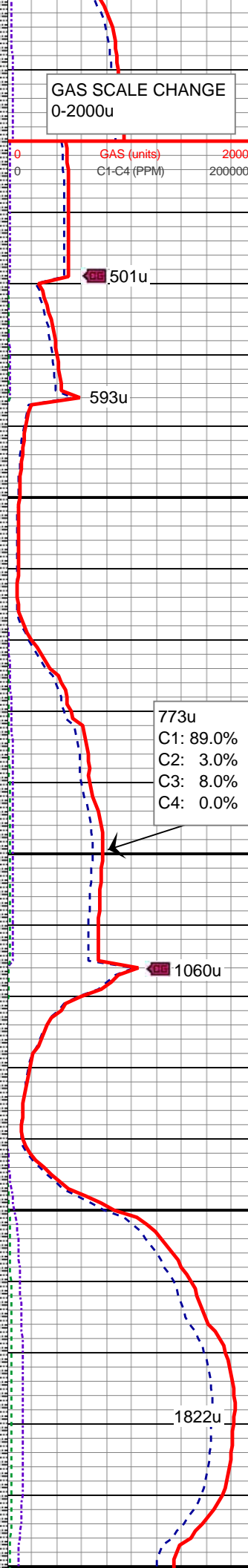
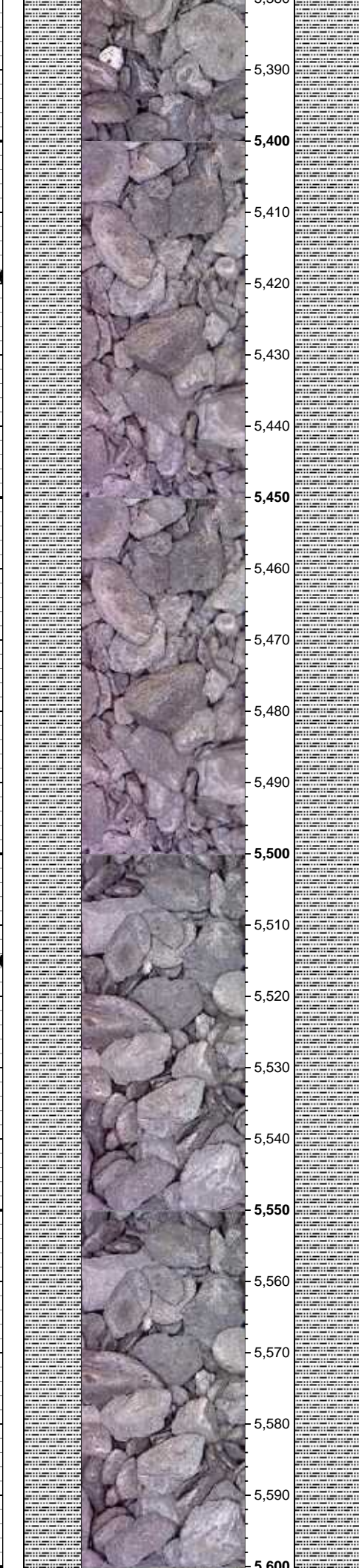
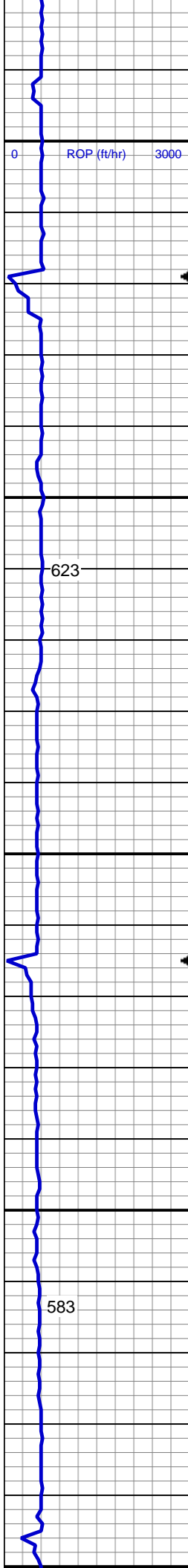
100% SLTY SH: med-dk gy occ gy
brn, plty - sb plty firm-sl sft, rthy-sl
silty

MD: 5,266 '
TVD: 5,253.97 '
Inclination: 0.59 °
Azimuth: 251.01 °
VS: 20.34 '

100% SLTY SH: med-dk gy occ gy
brn, plty - sb plty firm-sl sft, rthy-sl
silty

MD: 5,361 '
TVD: 5,348.97 '
Inclination: 0.47 °
Azimuth: 119.63 °
VS: 20.46 '

MD: 5,171 '
TVD: 5,158.97 '
Inclination: 0.45 °
Azimuth: 204.22 °
VS: 19.72 '



100% SLTY SH: med-dk gy occ gy
brn, plty - sb plty firm-sl sft, rthy-sl
sly

MD: 5,456 '
TVD: 5,443.96 '
Inclination: 0.63 °
Azimuth: 133.01 °
VS: 19.74 '

MUD WT 9.8 VIS 46

MD: 5,550 '
TVD: 5,537.96 '
Inclination: 0.62 °
Azimuth: 160.8 °
VS: 19.2 '

100% SLTY SH: med-dk gy occ gy
brn, plty - sb plty firm-sl sft, rthy-sl
sly

