

COLUMBINE LOGGING

Scale: 5" / 100'
Measured Depth Log

Well Name WELLS RANCH AA21-63-1HN(VERT)

Location SEC 21;T6N;R63W

State COLORADO

County WELD

Country USA

Rig Number H&P 322

API Number 05-123-37597-0000

Region DJ BASIN

Field WATTENBERG

Spud Date 1/16/2014

Drilling Completed 1/21/2014

Surface Coordinates LAT: 40.46758°N
LONG: 104.43413°W
988' FSL
525' FEL

Bottom Hole Coordinates 990' FSL
535' FWL

Ground Elevation 4731'

K.B. Elevation 4755'

Logged Interval 1000' **To** 5999'

Total Depth 10983'

Formation NIOBRARA "B" CHALK

Type of Drilling Fluid MUD;WATER;POLY

Operator

Company Noble Energy Inc

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

Geologist

Name JOHN READY, MIKE GREENE

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
 BRACHIOIPOD
 BRYOZOA
 CEPHALOPOD
 CORAL
 CRINOID
 ECHINOID
 FISH
 FORAMINIFERA

Fossil

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

Minerals

Anhydritic

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

Ferruginous

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

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

Moldic

ORGANIC
 PINPOINT
 VUGGY

Engineering

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

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

Wireline tested - left

WIRELINE TESTED - LEFT
 WIRELINE TESTED - RT

Rounding

ANGULAR
 ROUNDED
 SUBANG
 SUBRND

Textures

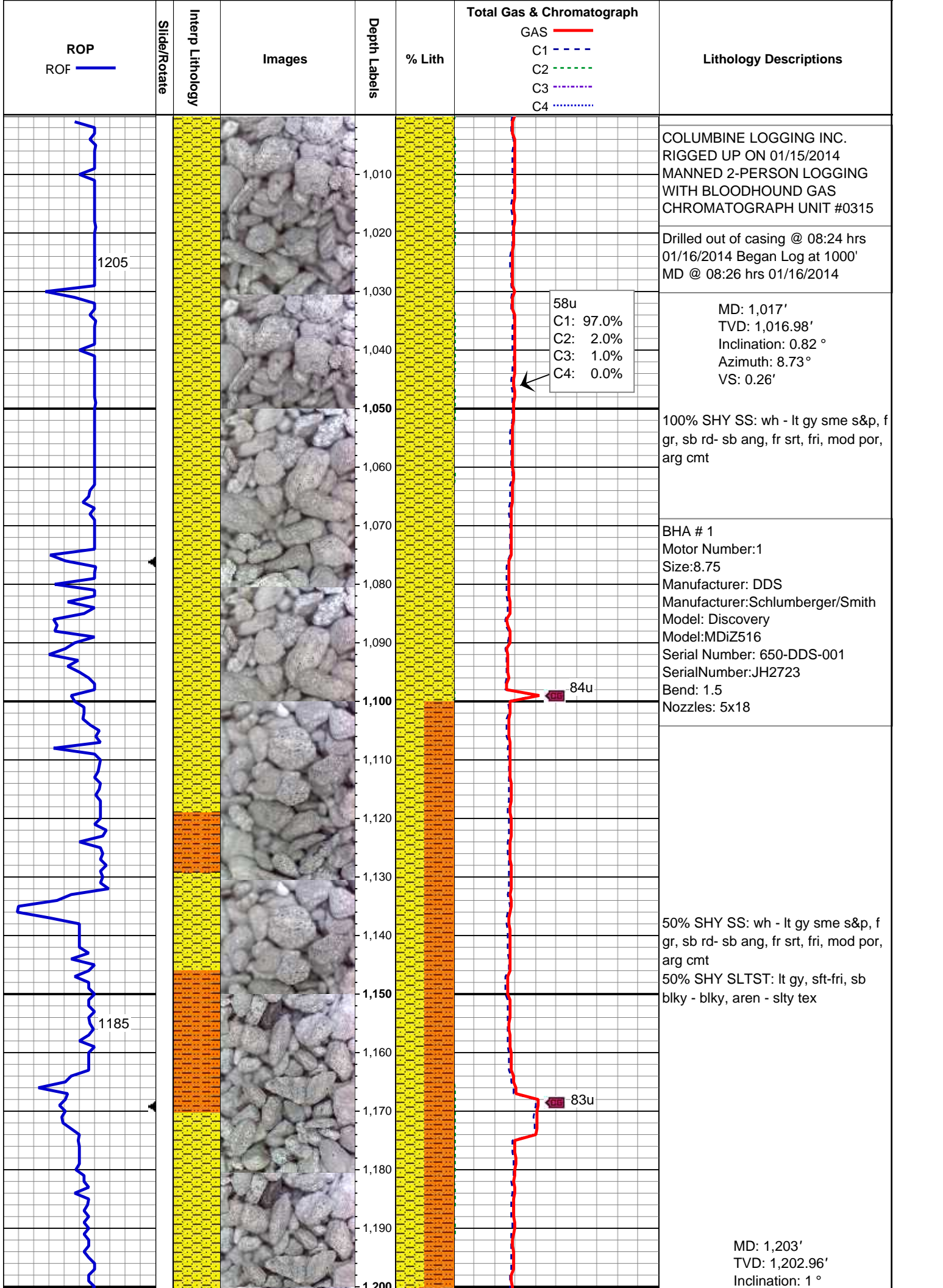
BOUNDSTONE
 CHALKY
 CRYPTOXLN

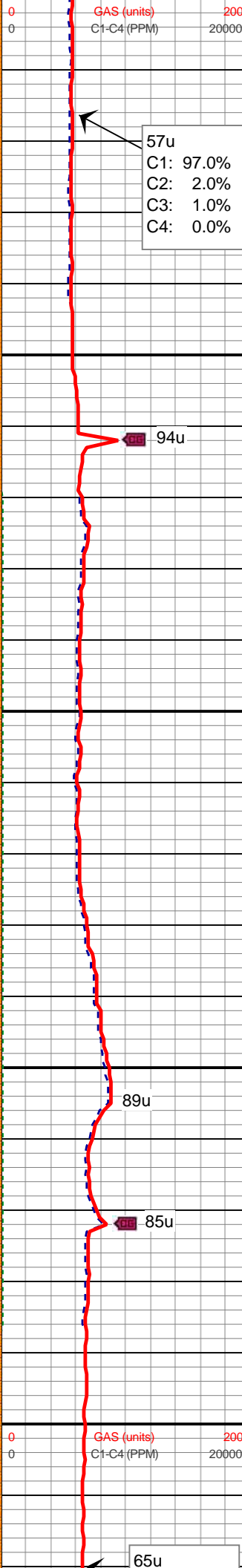
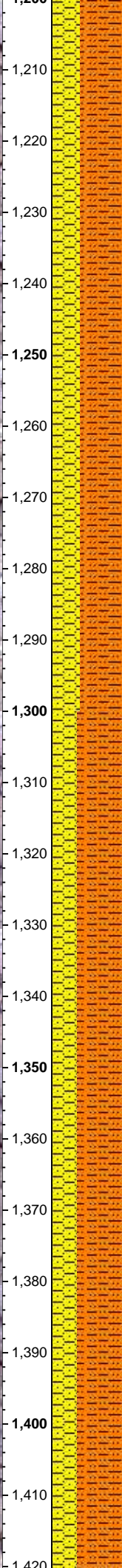
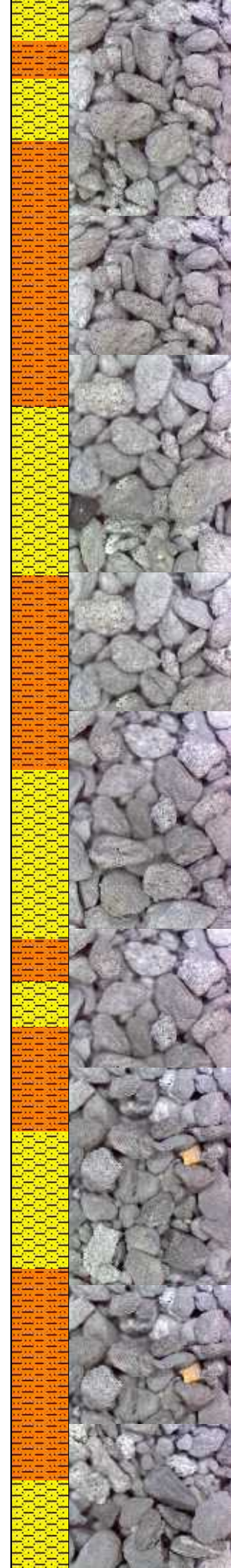
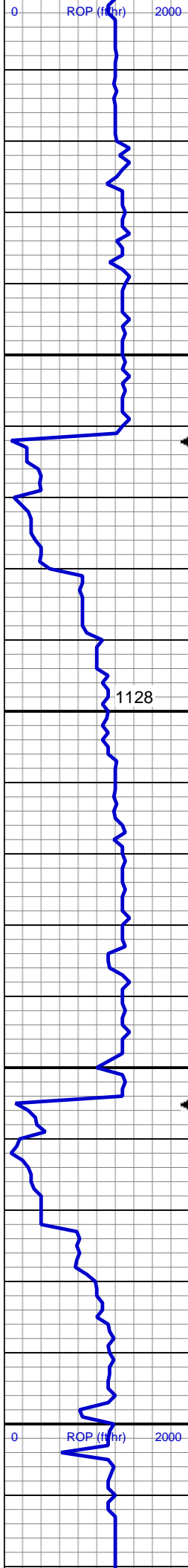
Earthy

FINELYXLN
 GRAINSTONE
 LITHOGRAPHIC
 MICROXLN
 MUDSTONE
 PACKSTONE
 WACKESTONE

Sorting

MODERATE
 POOR
 WELL





Azimuth: 20.84°
VS: -0.56'

57u
C1: 97.0%
C2: 2.0%
C3: 1.0%
C4: 0.0%

94u

MD: 1,296'
TVD: 1,295.93'
Inclination: 1.86°
Azimuth: 51.65°
VS: -2.06'

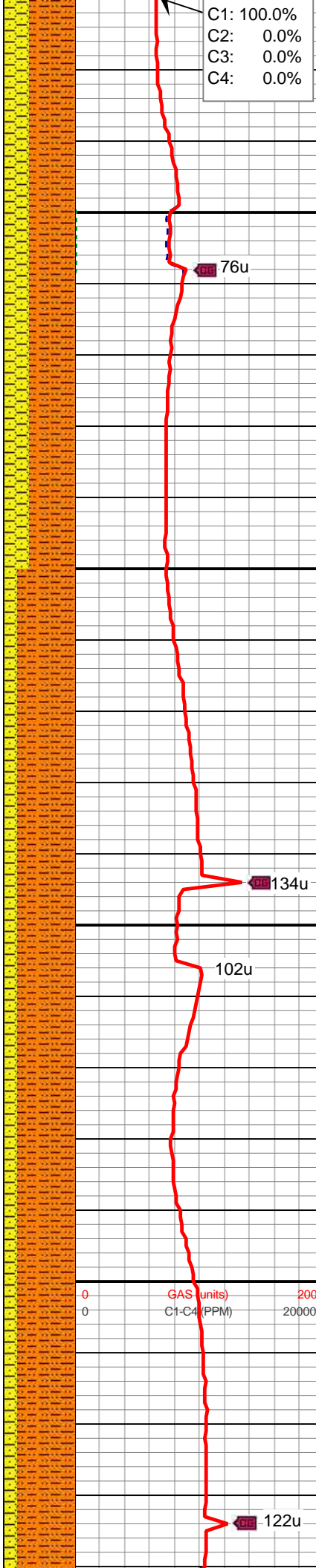
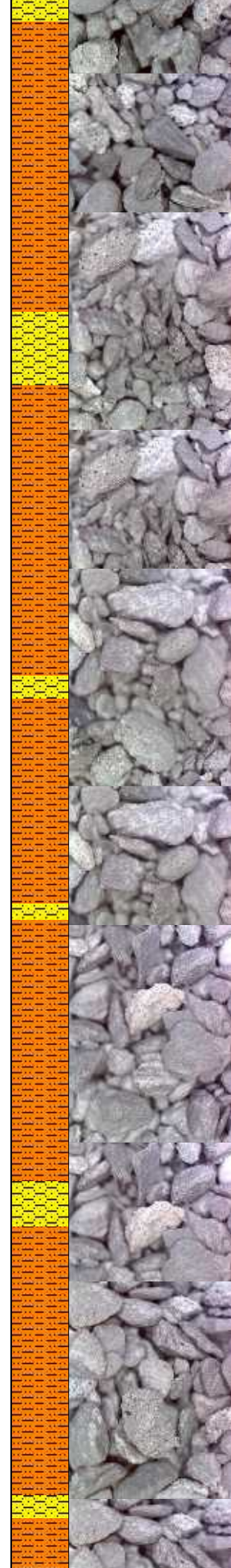
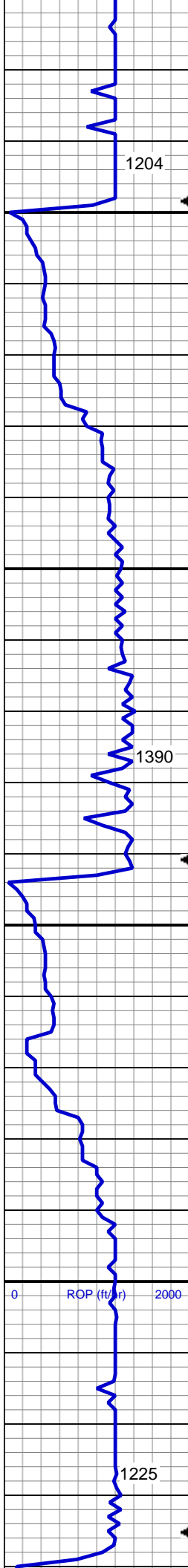
89u

85u

MD: 1,389'
TVD: 1,388.87'
Inclination: 2.27°
Azimuth: 70.74°
VS: -5.01'

MUD WT 8.4 VIS 29

65u



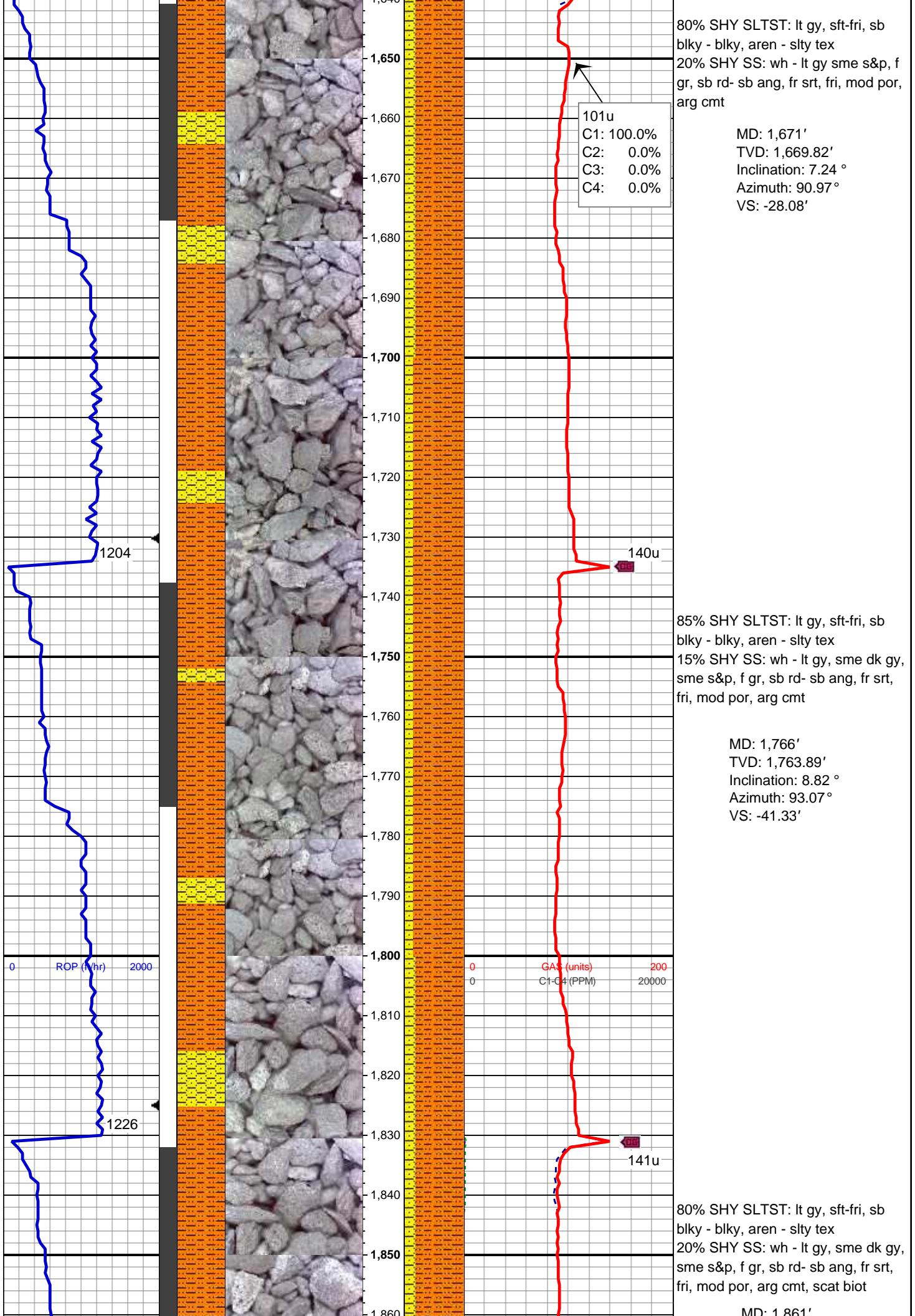
65% SHY SLTST: lt gy, sft-fri, sb
blky - blky, aren - slty tex
35% SHY SS: wh - lt gy sme s&p, f
gr, sb rd- sb ang, fr srt, fri, mod por,
arg cmt

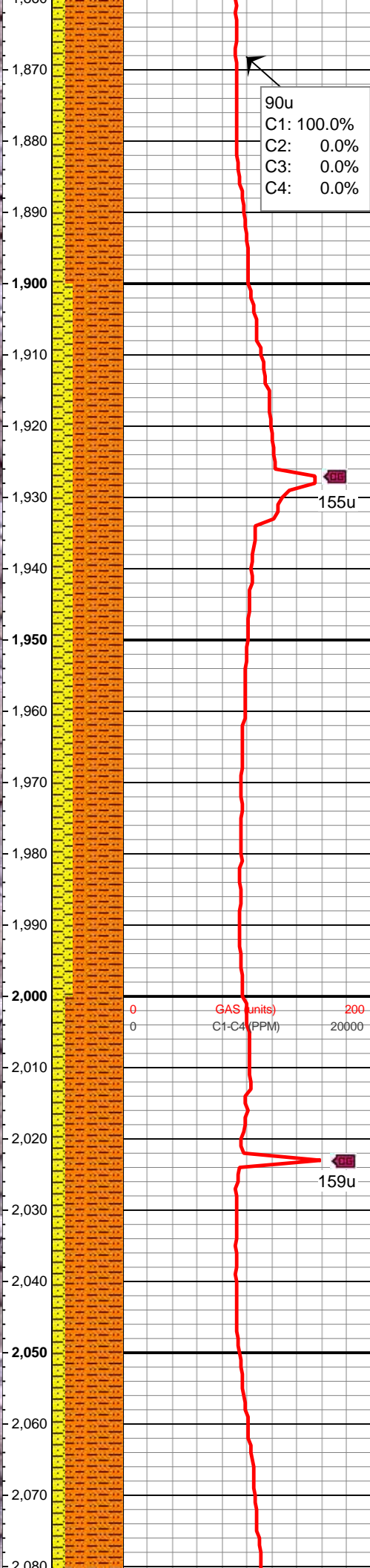
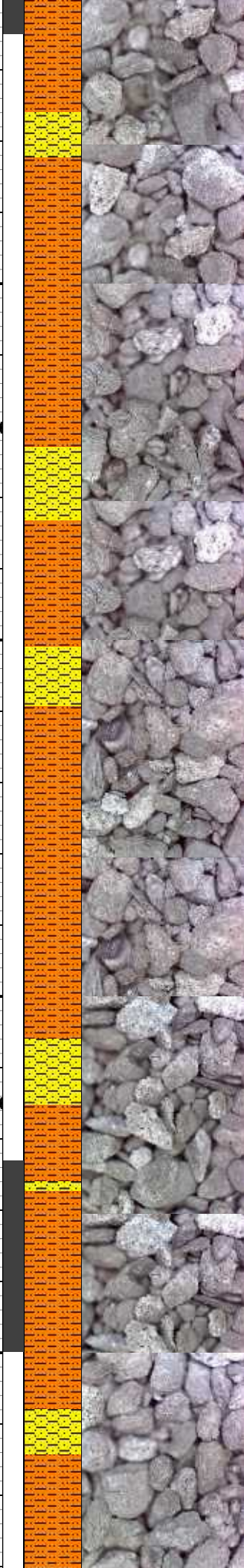
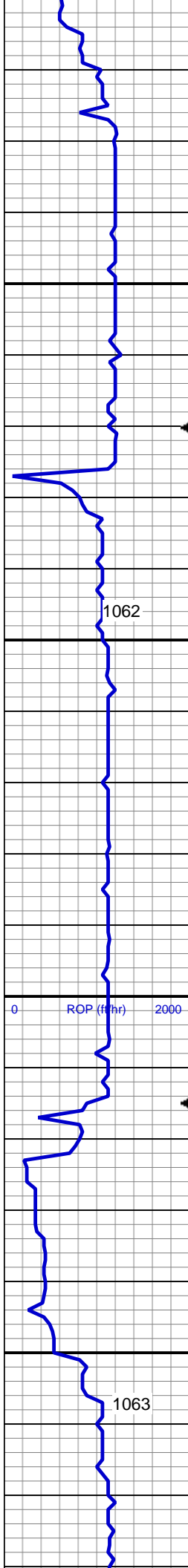
MD: 1,482'
TVD: 1,481.74'
Inclination: 3.78 °
Azimuth: 91.14 °
VS: -9.82'

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

MD: 1,576'
TVD: 1,575.42'
Inclination: 5.59 °
Azimuth: 93.41 °
VS: -17.48'

MUD WT 8.4 VIS 28





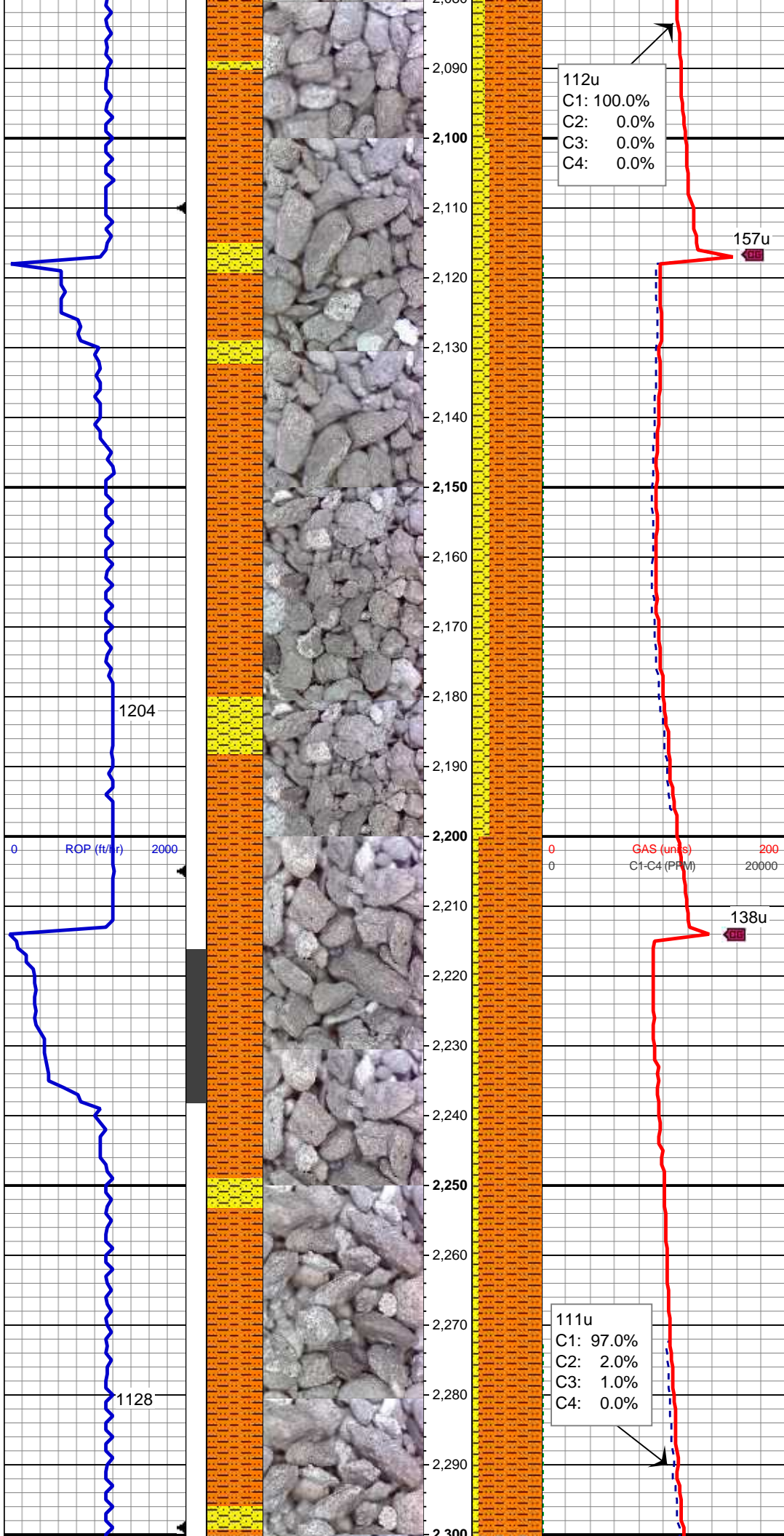
MD: 1,857.58'
TVD: 1,857.58'
Inclination: 10.25 °
Azimuth: 89.73 °
VS: -57.05'

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

MD: 1,956'
TVD: 1,951.13'
Inclination: 9.77 °
Azimuth: 85.67 °
VS: -73.55'

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

MD: 2,051'
TVD: 2,044.66'
Inclination: 10.42 °
Azimuth: 85.8 °
VS: -90.17'

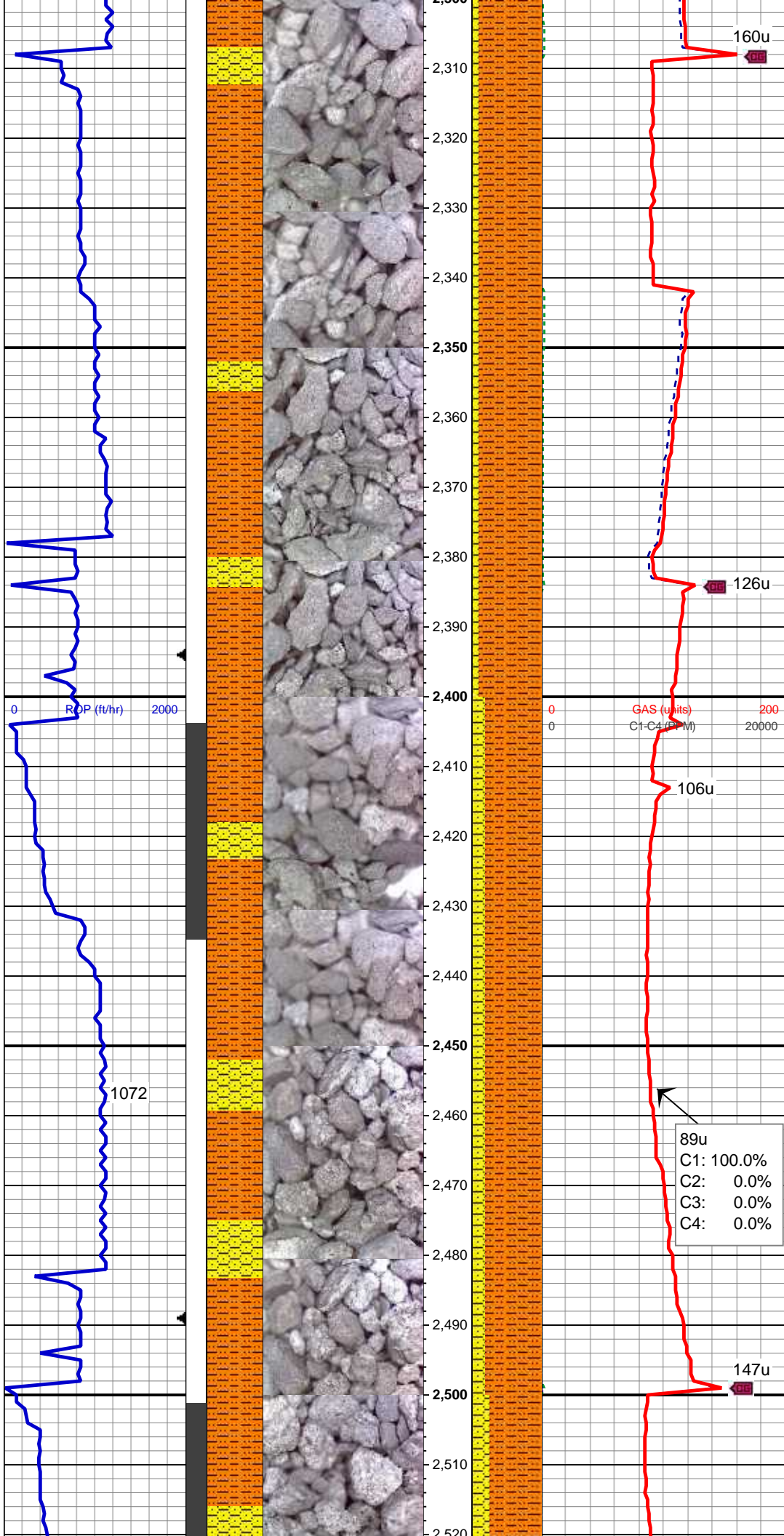


MD: 2,146'
TVD: 2,138.16'
Inclination: 9.96 °
Azimuth: 85.7°
VS: -106.95'

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

MD: 2,240'
TVD: 2,230.69'
Inclination: 10.36 °
Azimuth: 88.55°
VS: -123.51'

90% SHY SLTST: lt gy, sft-fri, sb
blky - blky, aren - slty tex
10% SHY SS: wh - lt gy, sme dk gy,
sme s&p, f gr, sb rd- sb ang, fr srt,
fri, mod por, arg cmt, scat biot



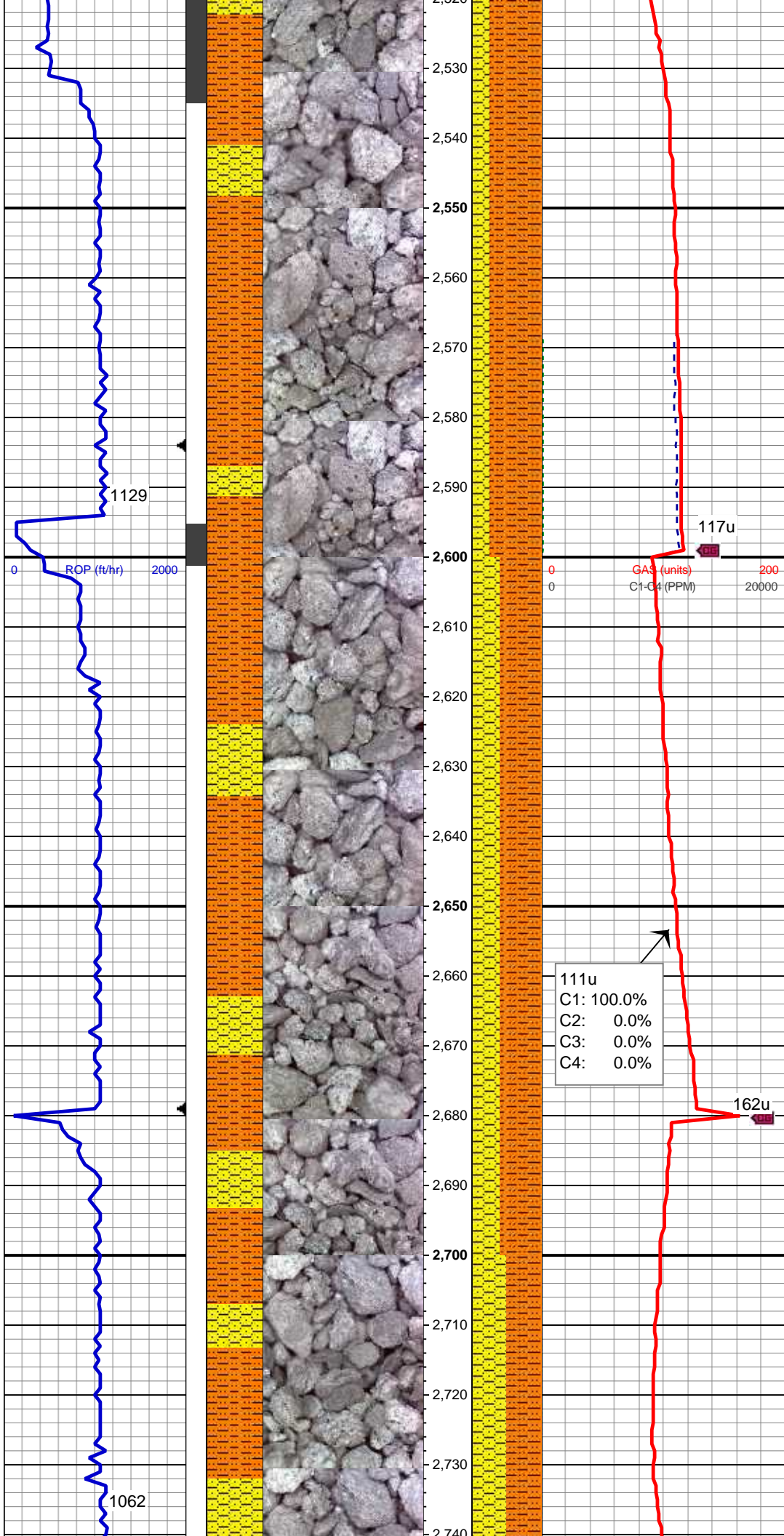
MD: 2,335'
TVD: 2,324.3'
Inclination: 9.23 °
Azimuth: 86.81 °
VS: -139.67'

90% SHY SLTST: lt gy, sft-fri, sb
blky - blky, aren - slty tex
10% SHY SS: wh - lt gy, sme dk gy,
sme s&p, f gr, sb rd- sb ang, fr srt,
fri, mod por, arg cmt, scat biot

MD: 2,430'
TVD: 2,418.1'
Inclination: 9.03 °
Azimuth: 89.47 °
VS: -154.74'

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

89u
C1: 100.0%
C2: 0.0%
C3: 0.0%
C4: 0.0%



MD: 2,525'
TVD: 2,511.7'
Inclination: 10.6 °
Azimuth: 88.97 °
VS: -170.93'

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

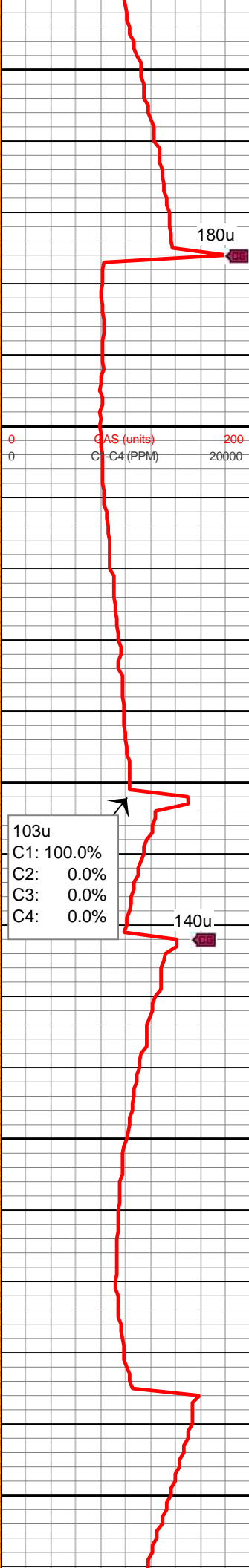
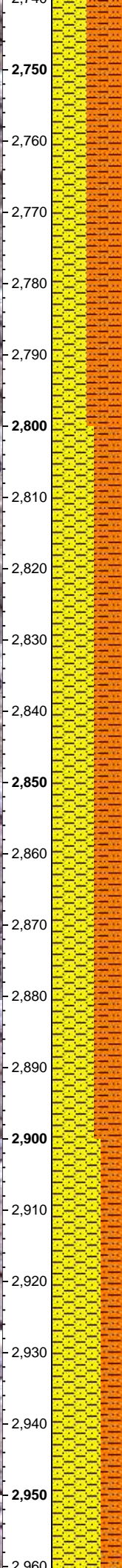
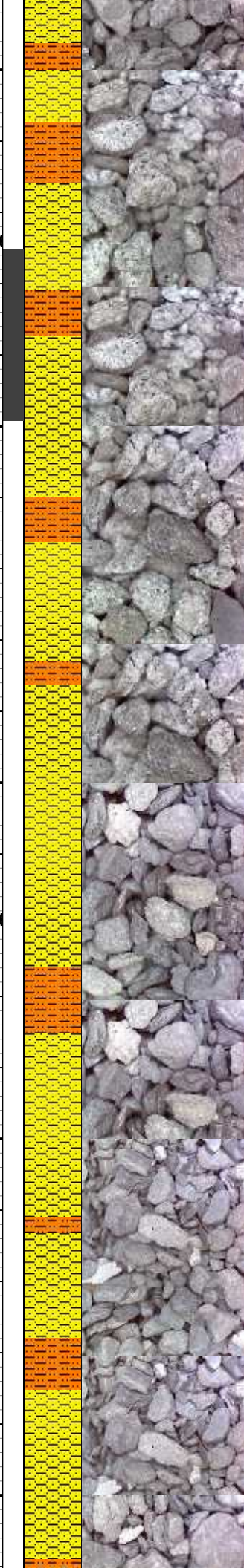
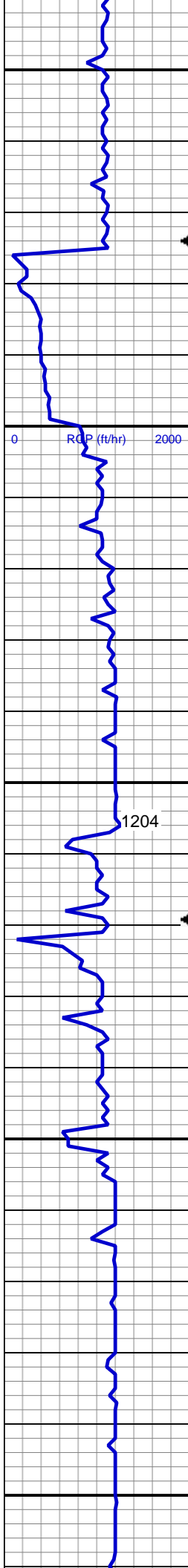
MUD WT 8.7 VIS 29

MD: 2,620'
TVD: 2,605.05'
Inclination: 10.86 °
Azimuth: 95.21 °
VS: -188.57'

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

111u
C1: 100.0%
C2: 0.0%
C3: 0.0%
C4: 0.0%

MD: 2,715'
TVD: 2,698.49'
Inclination: 9.88 °
Azimuth: 91.16 °
VS: -205.61'



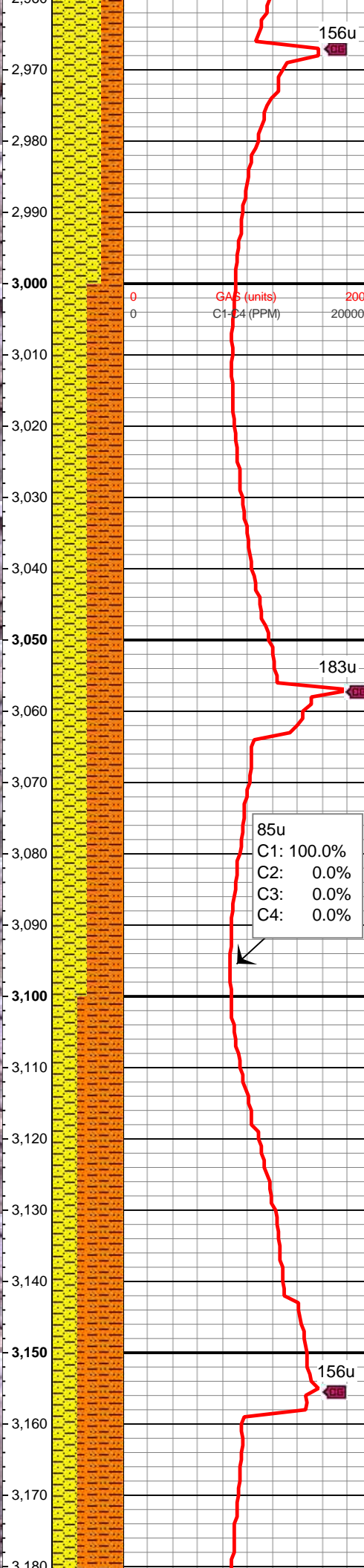
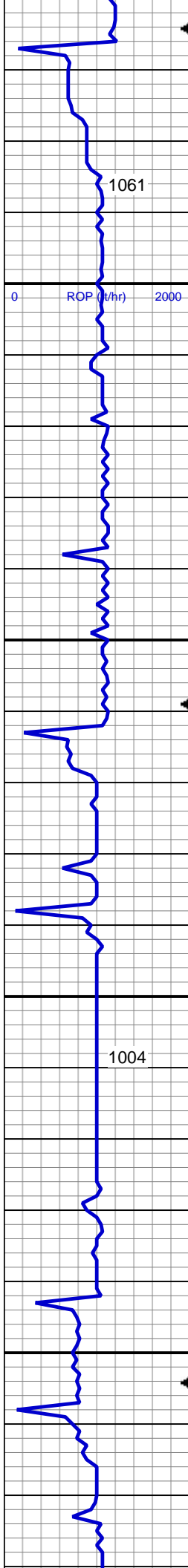
50% SHY SLTST: lt gy, sft-fri, sb
blky - blky, aren - slty tex
50% SHY SS: wh - lt gy, sme dk gy,
sme s&p, f gr, sb rd- sb ang, fr srt,
fri, mod por, arg cmt

MD: 2,810'
TVD: 2,792.02'
Inclination: 10.35 °
Azimuth: 95.53 °
VS: -222.24'

60% SHY SS: wh - lt gy, sme dk gy,
sme 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: 2,905'
TVD: 2,885.41'
Inclination: 10.76 °
Azimuth: 93.91 °
VS: -239.56'

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



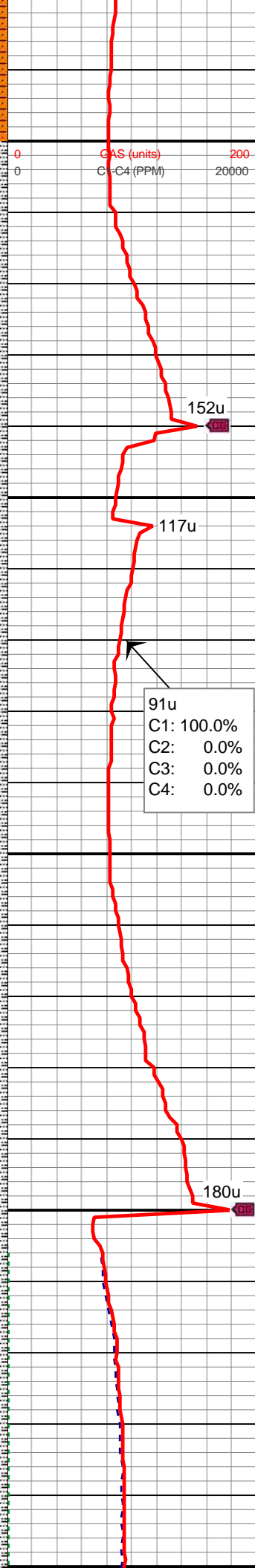
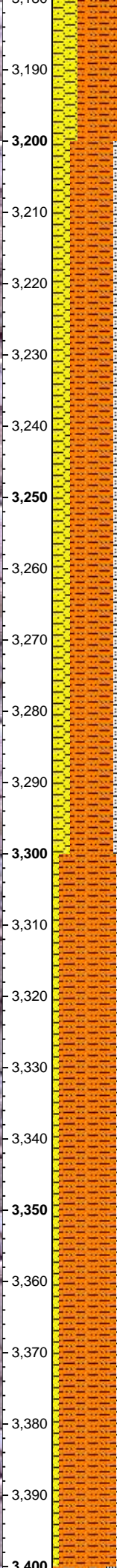
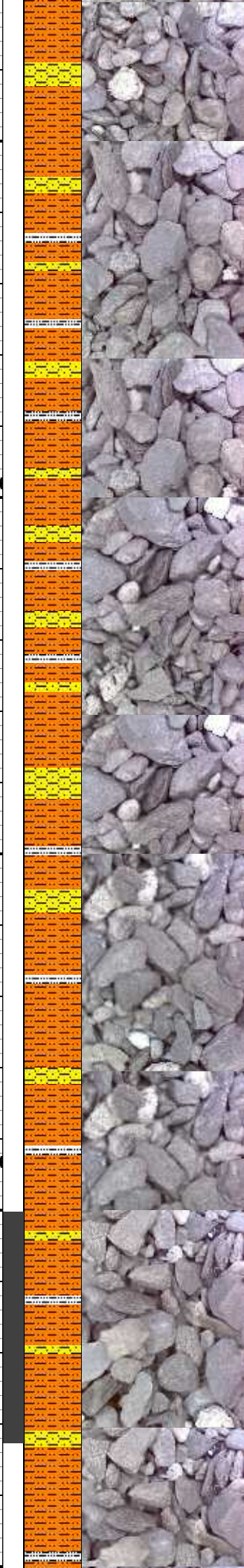
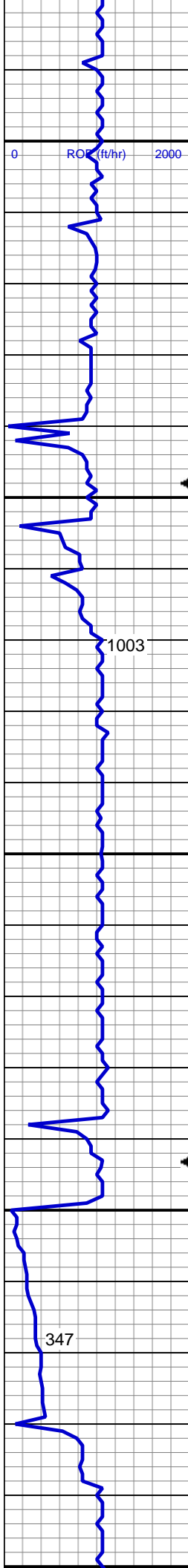
MD: 3,000'
TVD: 2,978.84'
Inclination: 10.09 °
Azimuth: 95.65 °
VS: -256.66'

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

MD: 3,095'
TVD: 3,072.36'
Inclination: 10.15 °
Azimuth: 94.78 °
VS: -273.26'

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

MD: 3,180'



MD: 3,189'
TVD: 3,164.84'
Inclination: 10.52 °
Azimuth: 94.17 °
VS: -290.05'

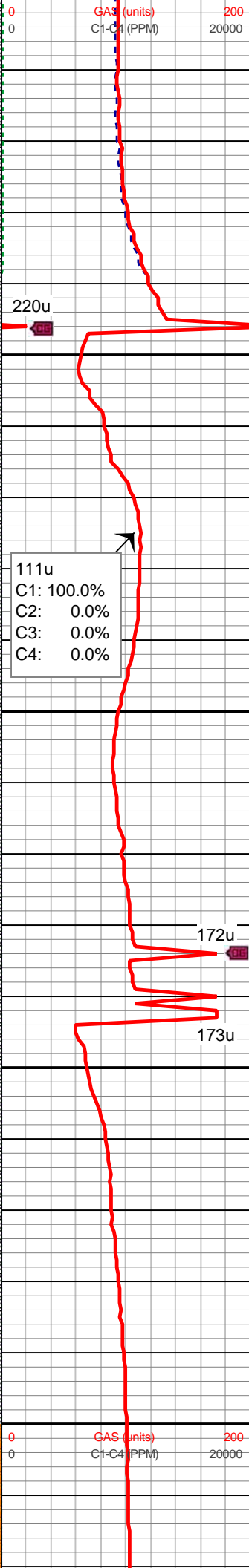
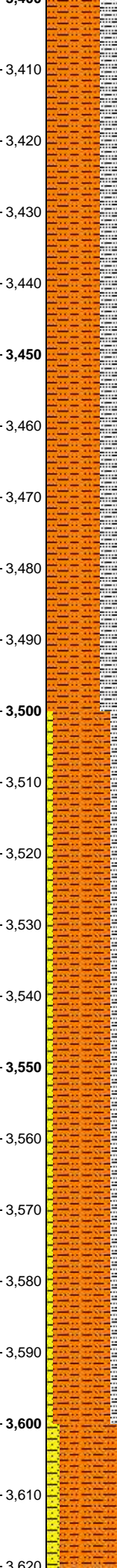
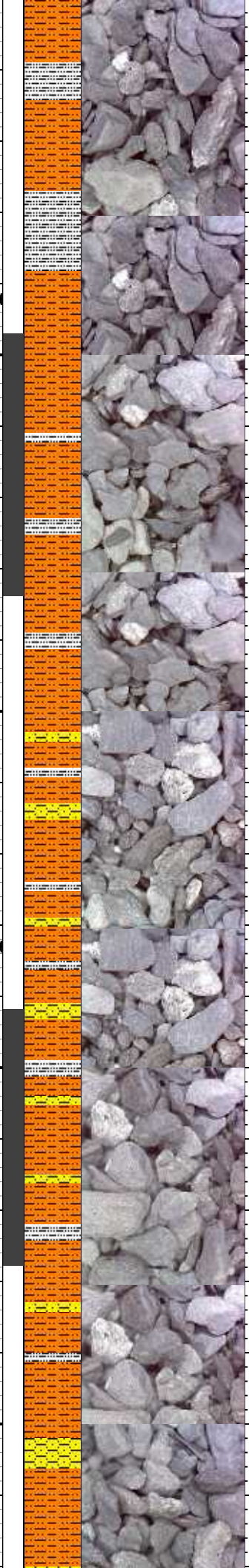
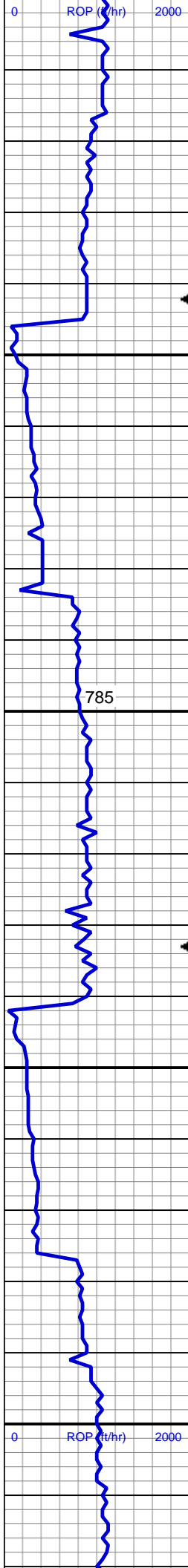
MUD WT 8.6 VIS 28

60% SHY SLTST: lt gy, sft-fri, sb
blky - blky, aren - slty tex
25% SHY SS: wh - lt gy, sme dk gy,
sme s&p, f gr, sb rd- sb ang, fr srt,
fri, mod por, arg cmt
15% SILTY SH: m-dk gy occ gy brn,
firm-sl sft, rthy-sl slty

MD: 3,284'
TVD: 3,258.48'
Inclination: 8.87 °
Azimuth: 94.69 °
VS: -305.98'

80% SHY SLTST: lt gy, sft-fri, sb
blky - blky, aren - slty tex
10% SHY SS: wh - lt gy, sme dk gy,
sme s&p, f gr, sb rd- sb ang, fr srt,
fri, mod por, arg cmt
10% SILTY SH: m-dk gy occ gy brn,
firm-sl sft, rthy-sl slty

MD: 3,379'
TVD: 3,352.39'
Inclination: 8.5 °
Azimuth: 95.2 °
VS: -320.25'



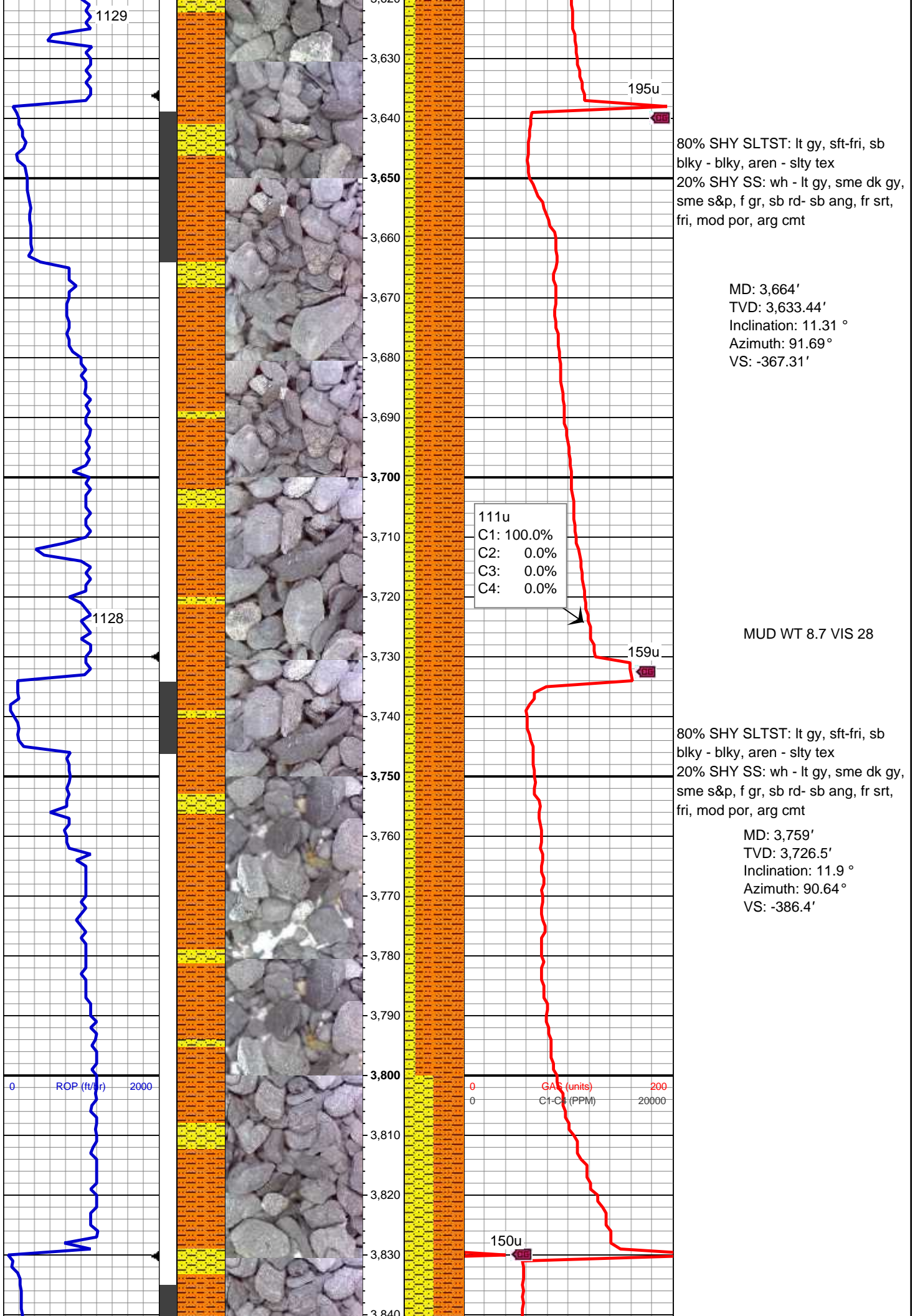
75% SHY SLTST: lt gy, sft-fri, sb
blky - blky, aren - slty tex
25% SILTY SH: m-dk gy occ gy brn,
firm-sl sft, rthy-sl slty

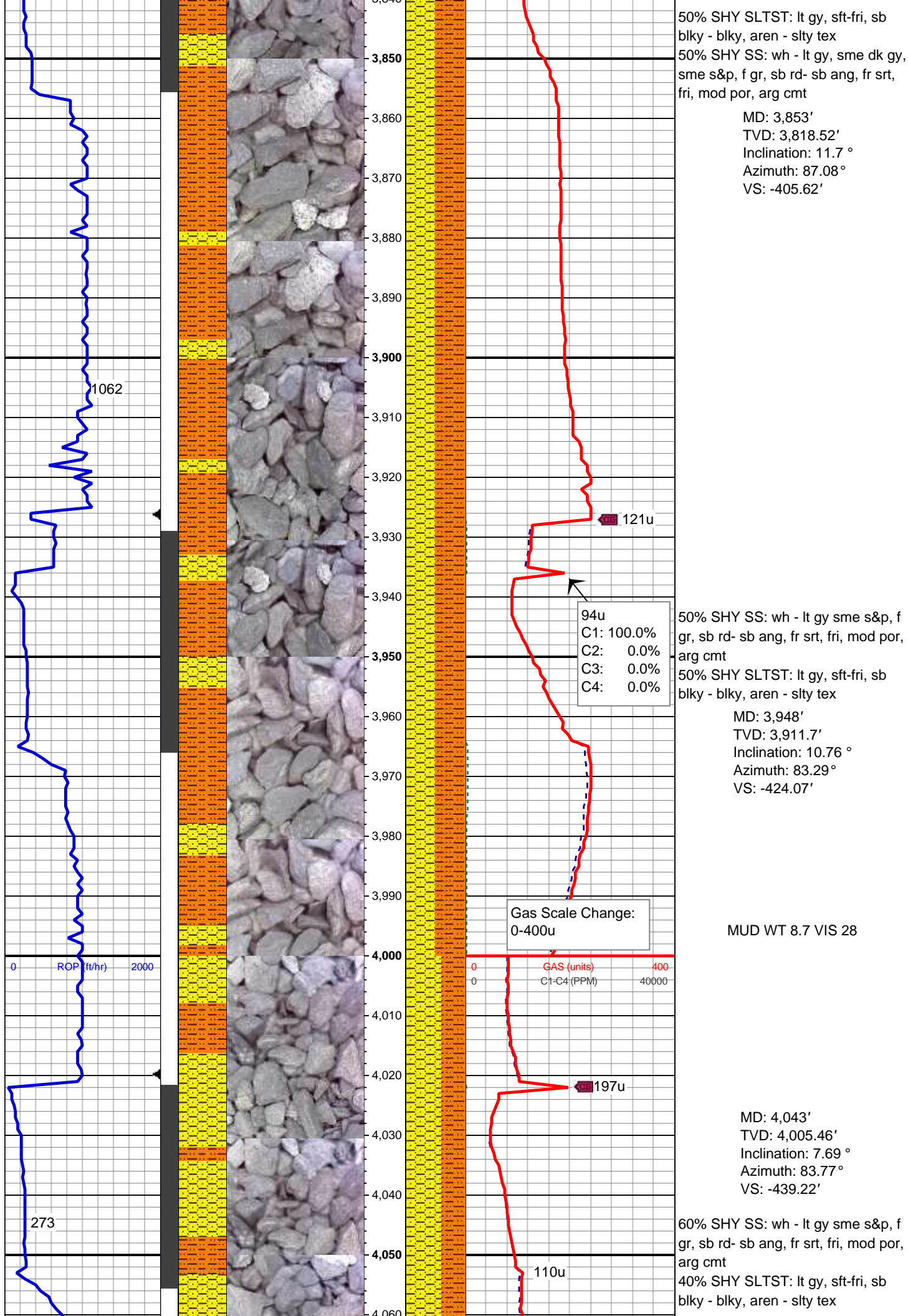
MD: 3,474'
TVD: 3,446.3'
Inclination: 8.92 °
Azimuth: 89.25 °
VS: -334.59'

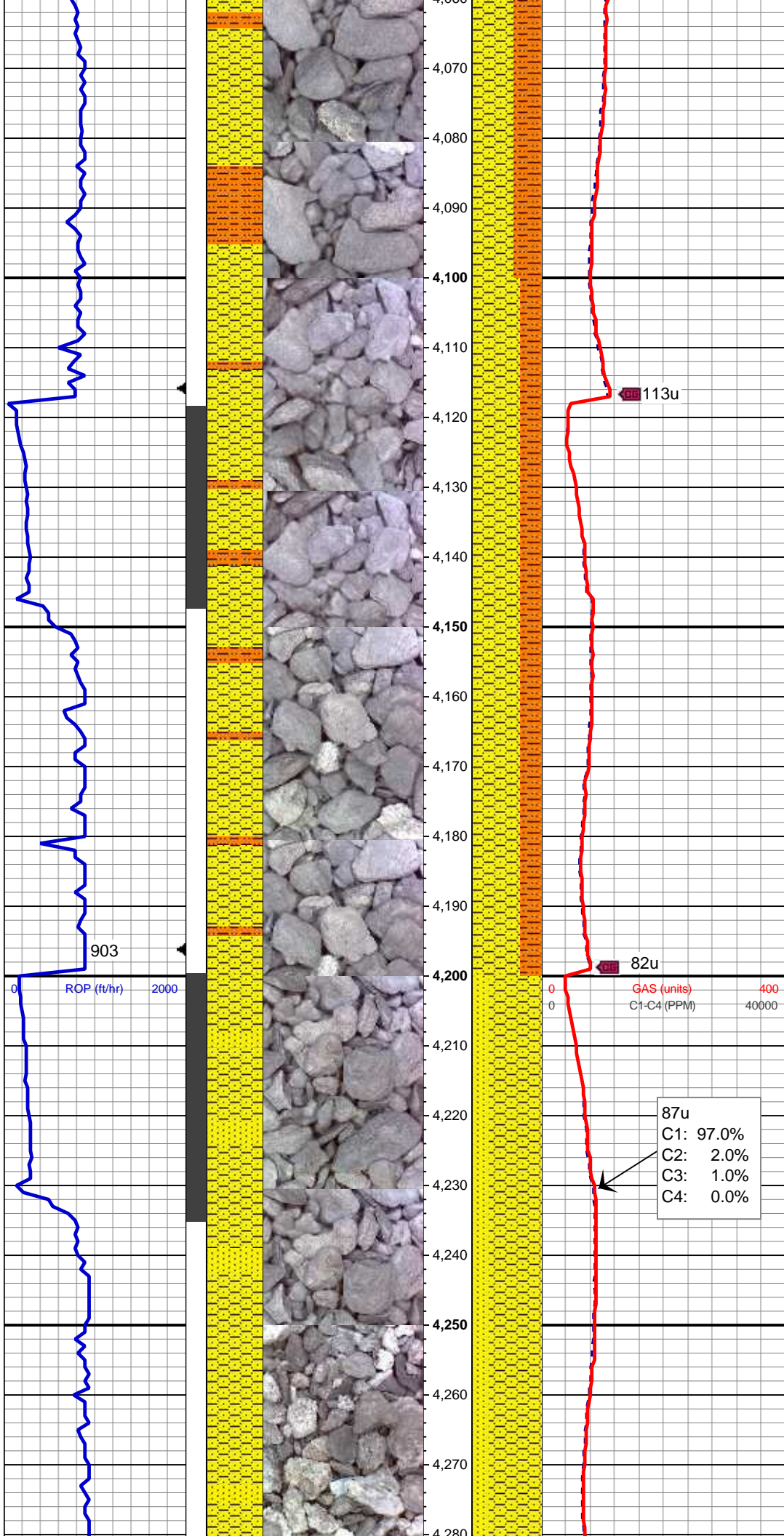
MUD WT 8.8 VIS 29

80% SHY SLTST: lt gy, sft-fri, sb
blky - blky, aren - slty tex
10% SHY SS: wh - lt gy, sme dk gy,
sme s&p, f gr, sb rd- sb ang, fr srt,
fri, mod por, arg cmt
10% SILTY SH: m-dk gy occ gy brn,
firm-sl sft, rthy-sl slty

MD: 3,569'
TVD: 3,540.04'
Inclination: 9.72 °
Azimuth: 88.52 °
VS: -349.98'







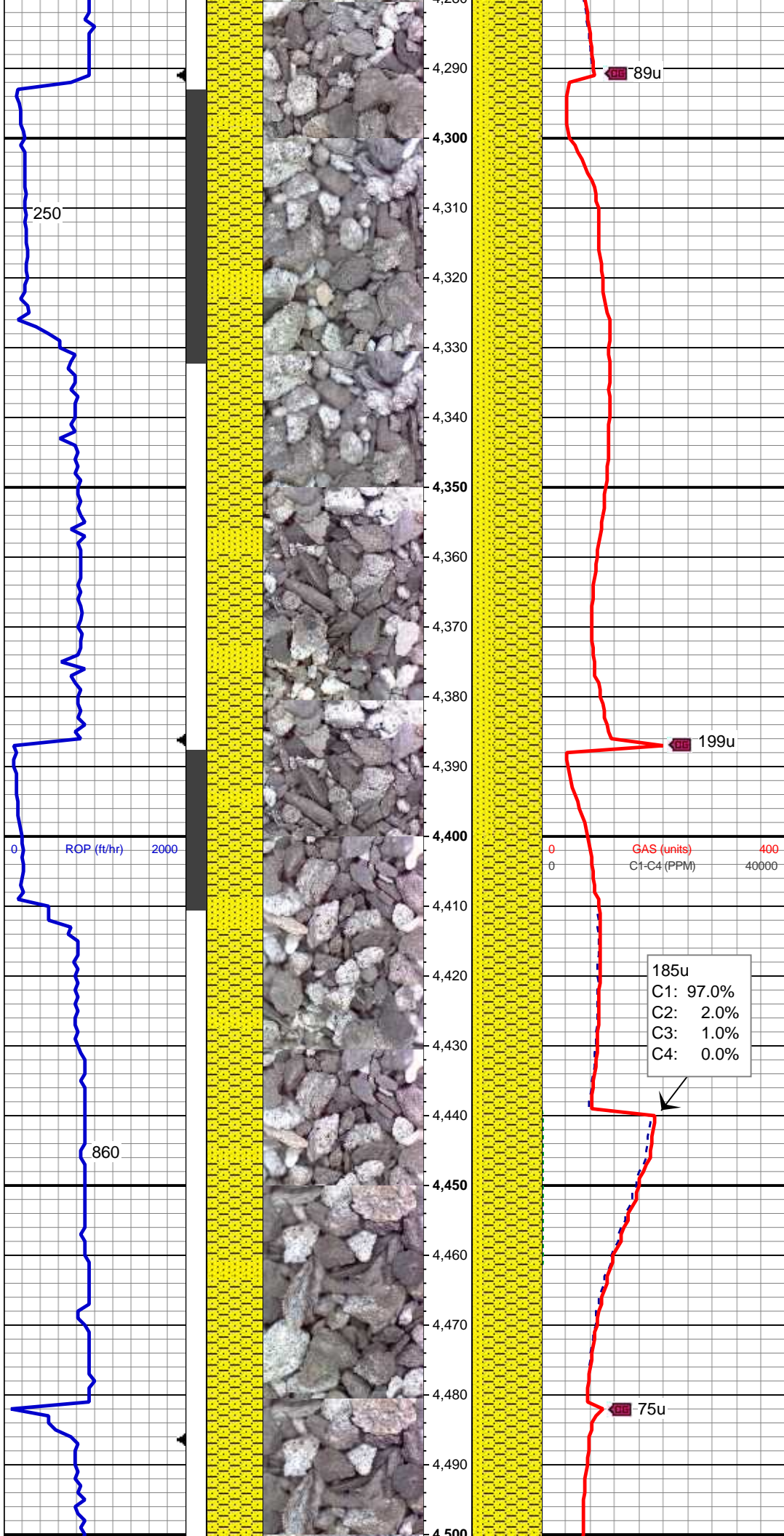
MD: 4,137'
TVD: 4,098.83'
Inclination: 5.53 °
Azimuth: 84.73 °
VS: -450'

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

MUD WT 8.7 VIS 28

MD: 4,232'
TVD: 4,193.54'
Inclination: 3.33 °
Azimuth: 94.76 °
VS: -457.31'

75% SHY SS: wh - lt gy sme s&p, f
gr, sb rd- sb ang, fr srt, fri, mod por,
arg cmt
25% SS: lt gy - wh, sme s&p, f gr,
sbrd-sbang, mod srt, fri, p por, arg
cmt



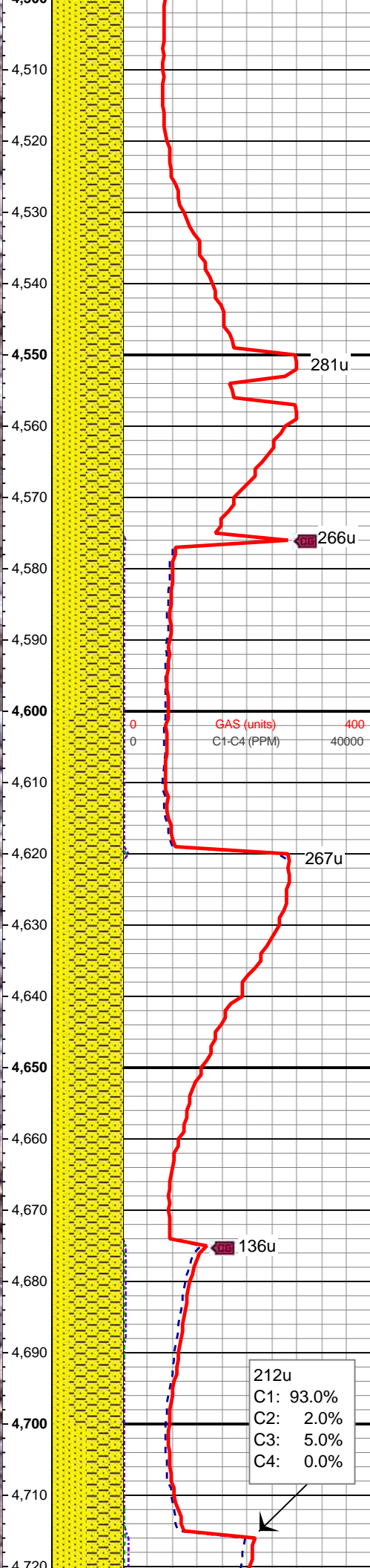
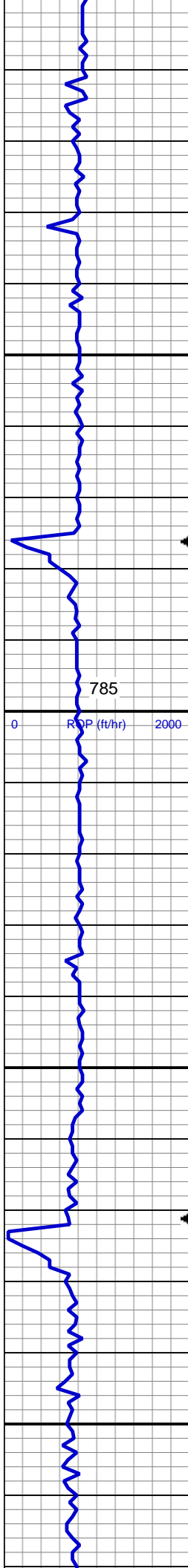
MD: 4,327'
TVD: 4,288.46'
Inclination: 1.25 °
Azimuth: 105.59 °
VS: -461.05'

70% SHY SS: wh - lt gy sme s&p, f gr, sb rd- sb ang, fr srt, fri, mod por, arg cmt
30% SS: lt gy - wh, sme s&p, f gr, sb rd-sbang, mod srt, fri, p por, arg cmt

185u
C1: 97.0%
C2: 2.0%
C3: 1.0%
C4: 0.0%

MD: 4,422'
TVD: 4,383.45'
Inclination: 0.68 °
Azimuth: 198.32 °
VS: -461.86'

85% SHY SS: wh - lt gy sme s&p, f gr, sb rd- sb ang, fr srt, fri, mod por, arg cmt
15% SS: lt gy - wh, sme s&p, f gr, sb rd-sbang, mod srt, fri, p por, arg cmt



MD: 4,517'
TVD: 4,478.43'
Inclination: 1.45 °
Azimuth: 220.82 °
VS: -460.87'

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

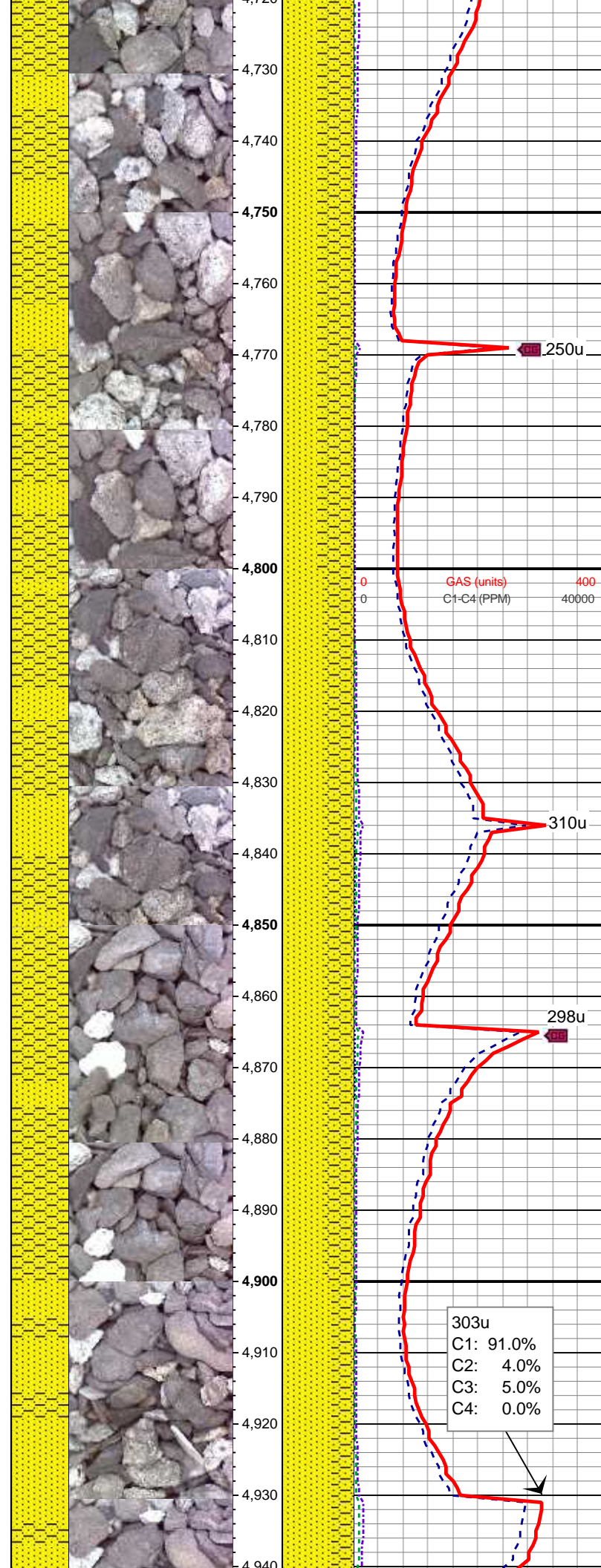
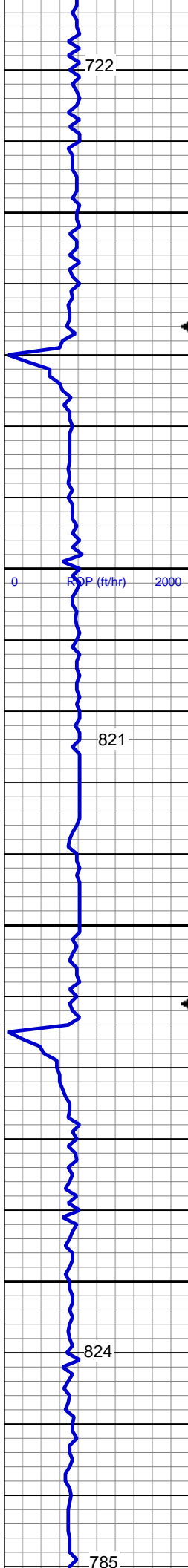
MD: 4,612'
TVD: 4,573.4'
Inclination: 1.57 °
Azimuth: 234.54 °
VS: -459'

75% SHY SS: wh - lt gy sme s&p, f gr, sb rd- sb ang, fr srt, fri, mod por, arg cmt
25% SS: lt gy - wh, sme s&p, f gr, sb rd-sb ang, mod srt, fri, p por, arg cmt

MUD WT 8.7 VIS 27

MD: 4,707'
TVD: 4,668.38'
Inclination: 0.88 °
Azimuth: 239.13 °
VS: -457.3'

212u
C1: 93.0%
C2: 2.0%
C3: 5.0%
C4: 0.0%



50% SS: lt gy - wh, sme s&p, f gr, sb rd- sb ang, fr srt, fri, mod por, arg cmt
50% SHY SS: wh - lt gy sme s&p, f gr, sb rd- sb ang, fr srt, fri, mod por, arg cmt

MD: 4,802'
TVD: 4,763.37'
Inclination: 0.94 °
Azimuth: 219.84 °
VS: -456.16'

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

MD: 4,897'
TVD: 4,858.35'
Inclination: 1.11 °
Azimuth: 218.99 °
VS: -455.06'

303u
C1: 91.0%
C2: 4.0%
C3: 5.0%
C4: 0.0%

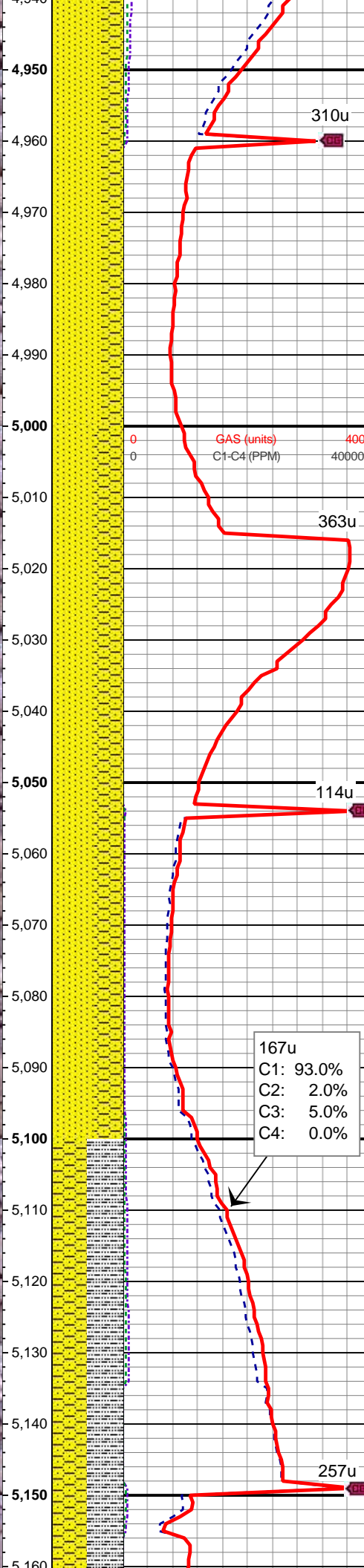
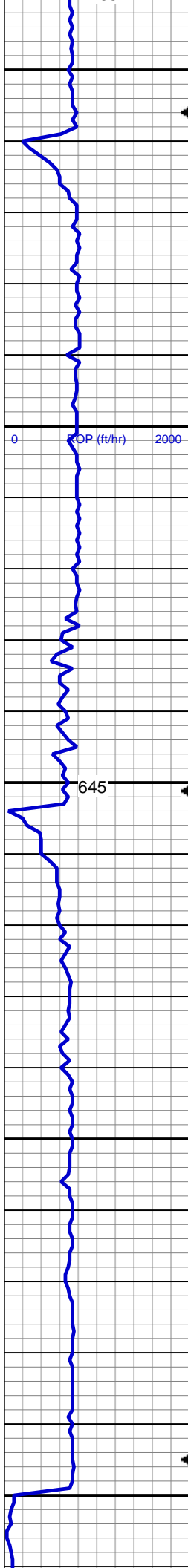
GAS (units)
C1-C4 (PPM)

250u

310u

298u





70% SS: lt gy - wh, sme s&p, f gr, sbrd-sbang, mod srt, fri, p por, arg cmt
30% SHY SS: wh - lt gy sme s&p, f gr, sb rd- sb ang, fr srt, fri, mod por, arg cmt

MD: 4,992'
TVD: 4,953.33'
Inclination: 1.01 °
Azimuth: 222.69 °
VS: -453.89'

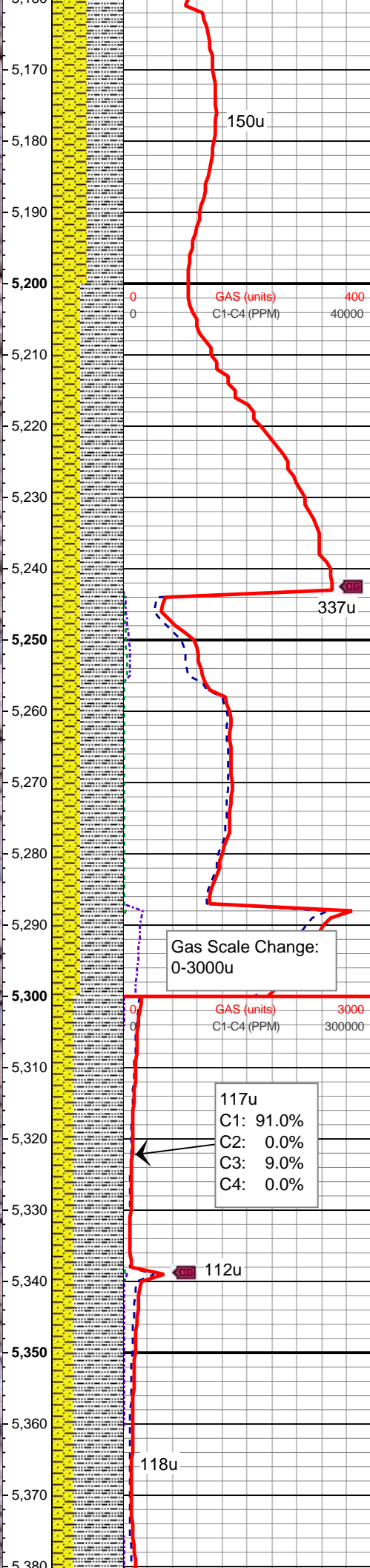
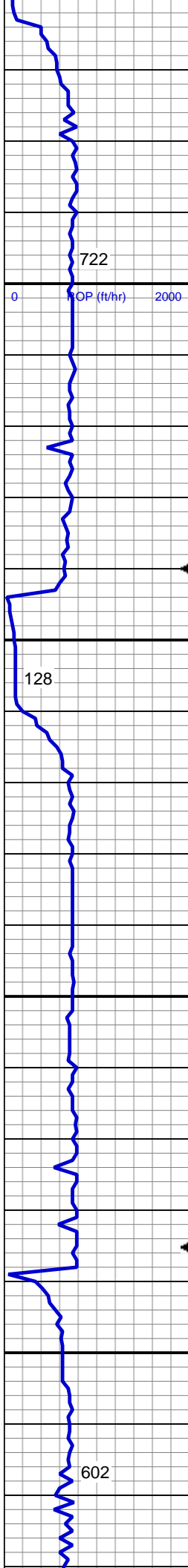
60% SS: lt gy - wh, sme s&p, f gr, sbrd-sbang, mod srt, fri, p por, arg cmt
40% SHY SS: wh - lt gy sme s&p, f gr, sb rd- sb ang, fr srt, fri, mod por, arg cmt

MD: 5,086'
TVD: 5,047.32'
Inclination: 1.18 °
Azimuth: 216.62 °
VS: -452.73'

MUD WT 8.7 VIS 28

167u
C1: 93.0%
C2: 2.0%
C3: 5.0%
C4: 0.0%

50%: SLTY SH: m-dk gy occ gy brn, pty - sb pty firm-sl sft, rthy-sl slty
50% SHY SS: wh - lt gy sme s&p, f gr, sb rd- sb ang, fr srt, fri, mod por, arg cmt



MD: 5,181'
TVD: 5,142.3'
Inclination: 0.93 °
Azimuth: 222.59 °
VS: -451.61'

60%: SLTY SH: m-dk gy occ gy brn,
plty - sb plty firm-sl sft, rthy-sl slty
40% SHY SS: wh - lt gy sme s&p, f
gr, sb rd- sb ang, fr srt, fri, mod por,
arg cmt

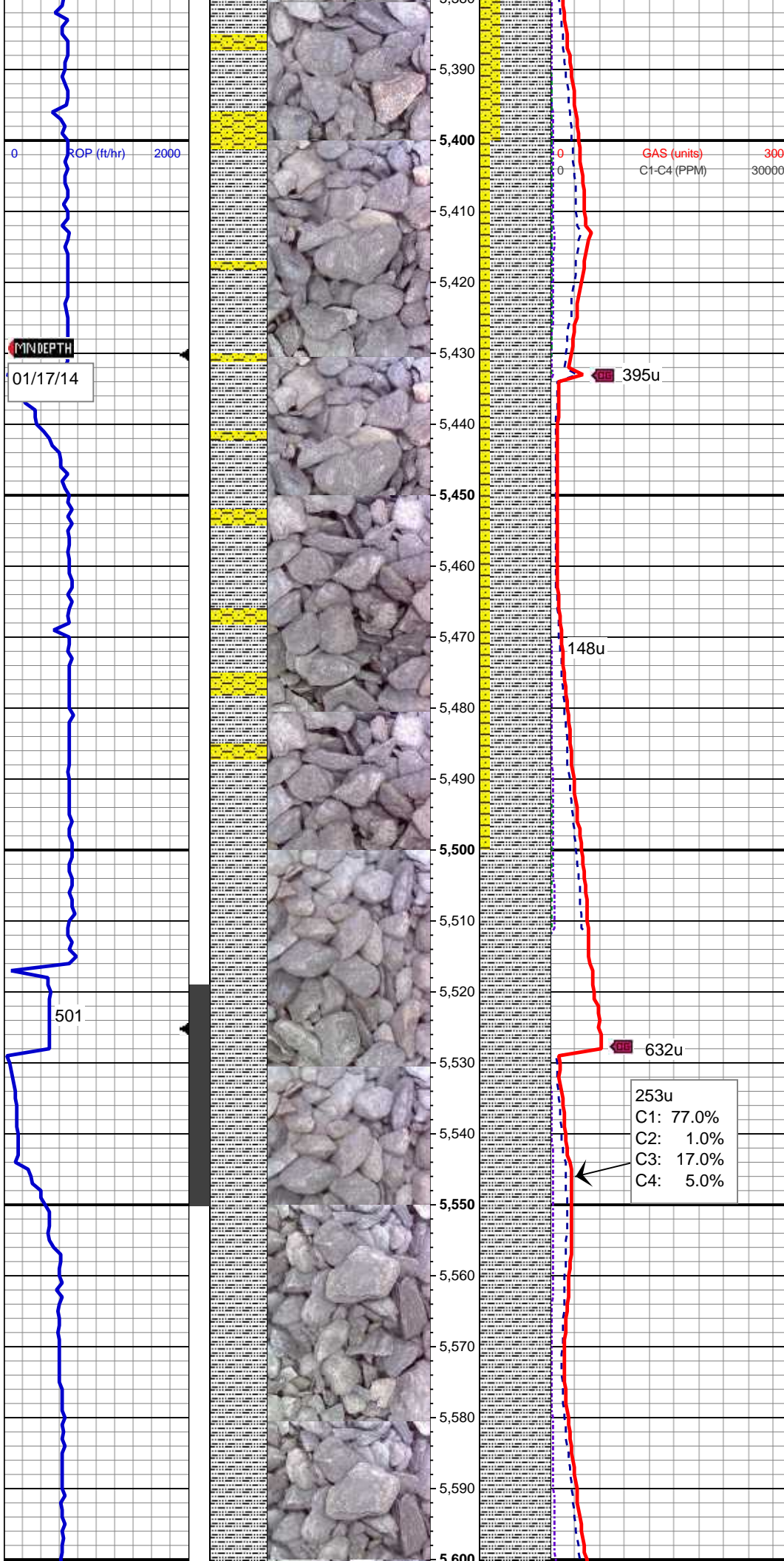
MUD WT 8.7 VIS 28
MD: 5,276'
TVD: 5,237.29'
Inclination: 0.82 °
Azimuth: 257.39 °
VS: -450.41'

Gas Scale Change:
0-3000u

117u
C1: 91.0%
C2: 0.0%
C3: 9.0%
C4: 0.0%

70% SLTY SH: m-dk gy occ gy brn,
plty - sb plty firm-sl sft, rthy-sl slty
30% SHY SS: wh - lt gy sme s&p, f
gr, sb rd- sb ang, fr srt, fri, mod por,
arg cmt

MD: 5,371'
TVD: 5,332.28'
Inclination: 0.82 °
Azimuth: 215.08 °
VS: -449.34'



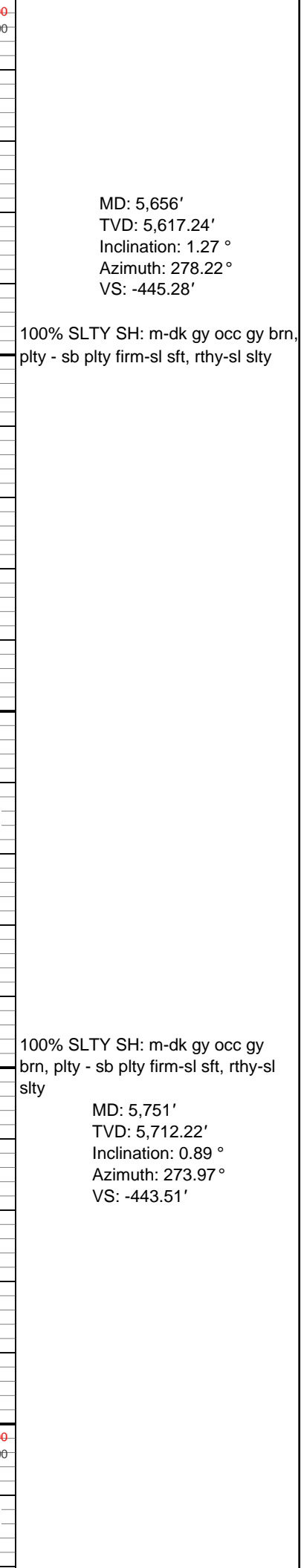
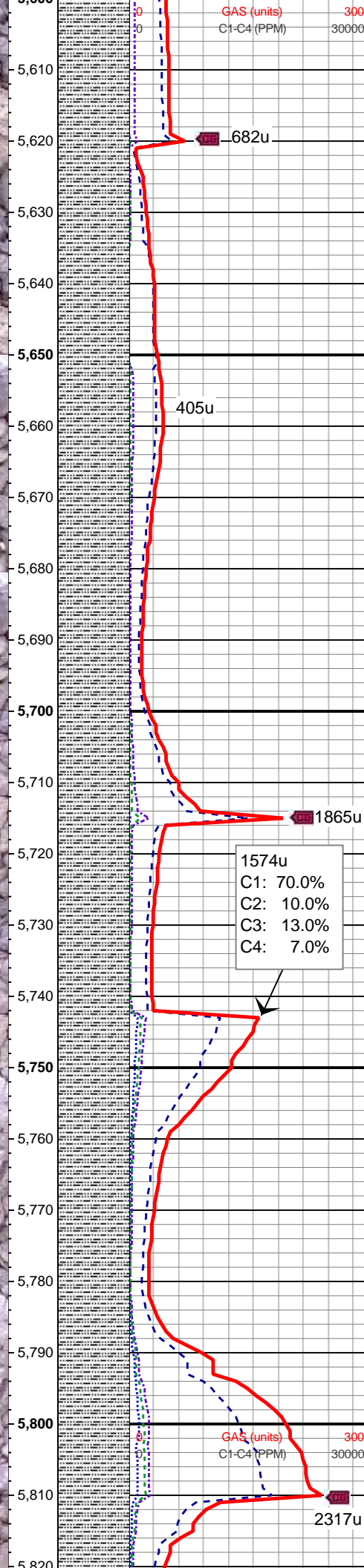
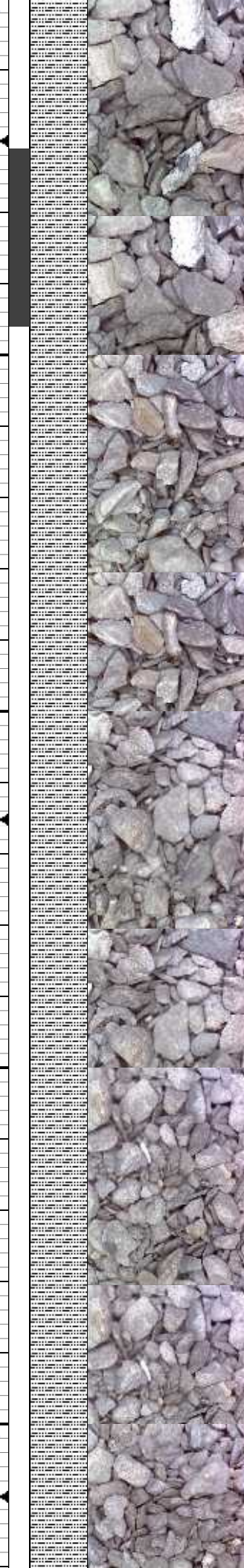
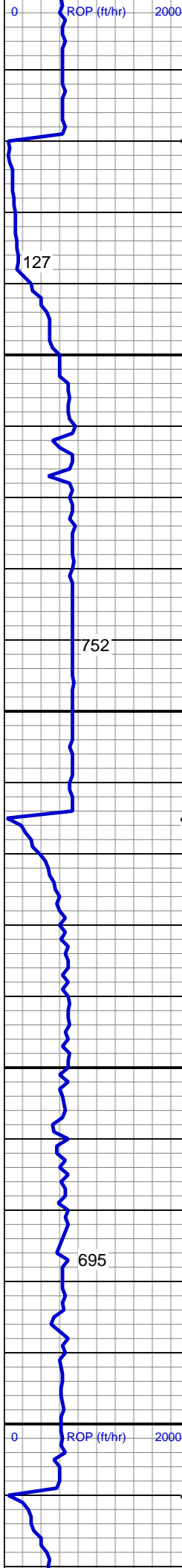
85% SLTY SH: m-dk gy occ gy brn,
 plty - sb plty firm-sl sft, rthy-sl slty
 15% SHY SS: wh - lt gy sme s&p, f
 gr, sb rd- sb ang, fr srt, fri, mod por,
 arg cmt

MD: 5,466'
 TVD: 5,427.27'
 Inclination: 1.03 °
 Azimuth: 220.21 °
 VS: -448.38'

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

MD: 5,561'
 TVD: 5,522.26'
 Inclination: 0.96 °
 Azimuth: 249.36 °
 VS: -447.07'

MUD WT 8.7 VIS 28



127

752

695

ROP (ft/hr)

5,610

5,620

5,630

5,640

5,650

5,660

5,670

5,680

5,690

5,700

5,710

5,720

5,730

5,740

5,750

5,760

5,770

5,780

5,790

5,800

5,810

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5,610

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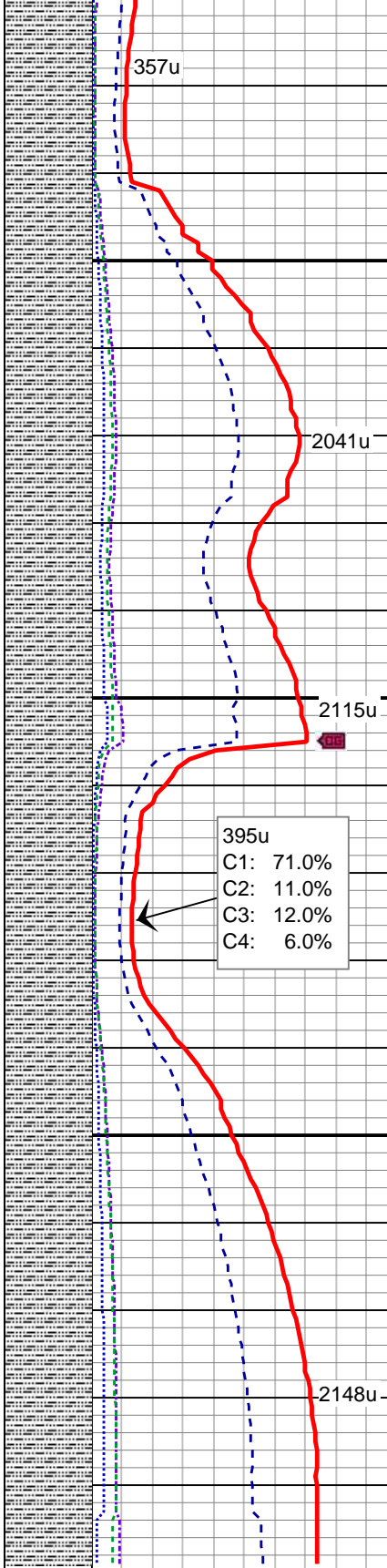
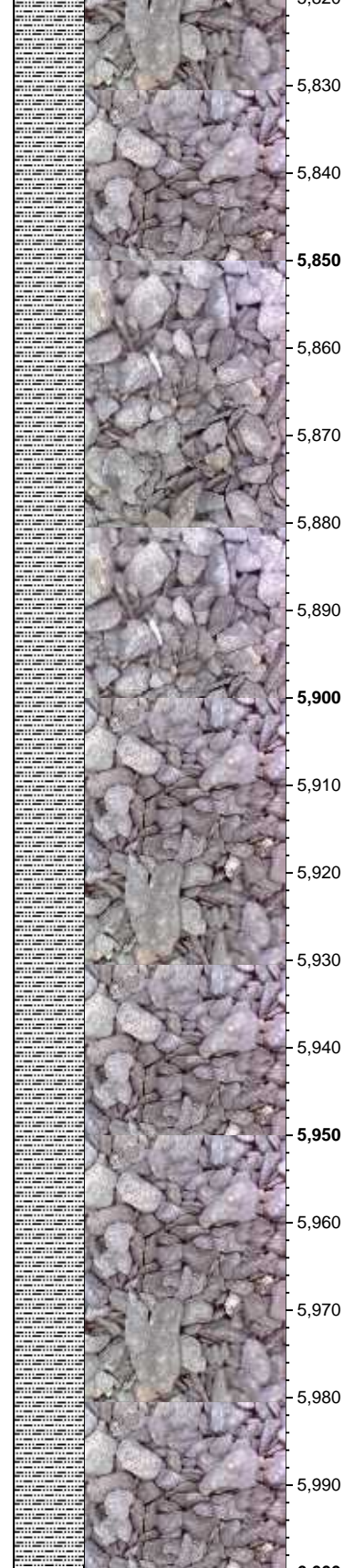
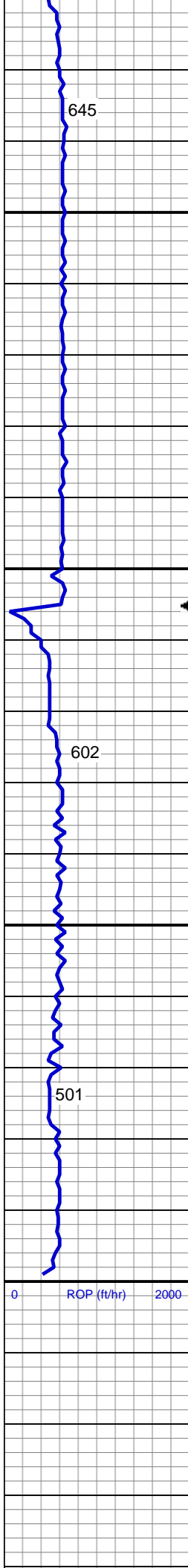
8,260

8,270

8,280

8,290

8,300



MD: 5,846'
TVD: 5,807.21'
Inclination: 0.65 °
Azimuth: 268.42 °
VS: -442.24'

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

MUD WT 8.9 VIS 29

MD: 5,941'
TVD: 5,902.21'
Inclination: 0.65 °
Azimuth: 268.07 °
VS: -441.16'

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

MUD WT 9.0 VIS 30

TD Vertical @ 5999' MD;
0222 hrs 1/17/2014

TOOH For Directional BHA

LOG CONTINUED ON:
WELLS RANCH
AA21-63-1HN(HORZ).mplot

Thank You For Choosing
Columbine Logging Inc.

