

COLUMBINE LOGGING

Scale: 5" / 100'
Measured Depth Log

Well Name Brecken LD28-727

Location SWSE 28 9N 58W

State COLORADO

County WELD

Country USA

Rig Number H&P #273

API Number 05-123-41567

Field WATTENBERG

Region DJ BASIN

Drilling Completed 8/11/2015

Spud Date 8/6/2015

Surface Coordinates LAT: 40.71583
LONG: -103.86547
358' FSL
1704' FEL

Bottom Hole Coordinates 290' FNL
1179' FEL

Ground Elevation 4829'

K.B. Elevation 4853'

Logged Interval 1200' To 10579'

Total Depth 10579'

Formation NIOBRARA B MARL/B CHALK

Type of Drilling Fluid H2O, LSND

Other Symbols

Oil Show

- DEAD
- EVEN
- QUESTIONABLE
- SPOTTED STAINING

Porosity

- E EARTHY
- F FENESTRAL
- F FRACTURE
- X INTERCRYSTALLINE
- INTEROOLITIC
- MOLDIC

ORGANIC

P PINPOINT

V VUGGY

Engineering

- BIT CHANGE
- CONNECTION (LEFT)
- CONNECTION (RIGHT)
- CONNECTION GAS
- TRIP GAS
- DOWN TIME GAS
- CORE - LOST
- CORE - RECOVERED
- DST INTERVAL

FAULT

FORMATION TOP

GAS SHOW

OIL SHOW

MN DEPTH MN DEPTH

MN DEPTH MN DEPTH (RIGHT)

NORMAL FAULT

OVERTURNED STRATA

REVERSE FAULT

CASING

SIDEWALL CORE (LEFT)

SIDEWALL CORE (RIGHT)

SLIDE

SURVEY

DST DRILL STEM TEST

WIRELINE TESTED - LEFT

WIRELINE TESTED - RT

Rounding

- ANGULAR
- ROUNDED
- SUBANG
- SUBRND

Textures

- BOUNDSTONE
- CHALKY
- CRYPTOXLN

E EARTHY

FINELYXLN

GRAINSTONE

L LITHOGRAPHIC

MX MICROXLN

MS MUDSTONE

PS PACKSTONE

WS WACKESTONE

Sorting

- M MODERATE
- P POOR
- W WELL

Accessories

Fossils

GASTROPOD

ARGILLITE GRAIN

HEAVY MINERAL

Stringer

Fossils

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

Inoceramus

- OOLITE
- OSTRACOD
- PELECYPOD
- PELLET
- PISOLITE
- PLANT REMAINS
- PLANT SPORES
- SCAPHOPOD
- STROMATOPOROID

Minerals

- ANHYDRITIC
- ARGILLACEOUS

Bentonite

- BITUMENOUS SUBSTANCE
- BRECCIA FRAGMENTS
- CALCAREOUS
- CARBONACEOUS FLAKES
- CHTDK
- CHTLT
- COAL - THIN BEDS
- DOLOMITIC
- FELDSPAR
- FERRUGINOUS PELLET
- FERRUGINOUS
- GLAUCONITE
- GYPSIFEROUS

Kaolin

- MARCASITE
- MARLSTONE
- MICACEOUS
- MINERAL CRYSTALS
- NODULES
- PHOSPHATE PELLETS
- PYRITE
- SALT CAST
- SANDY
- SIDERITE
- 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

Rock Types

UNKNOWN

- ANHYDRITE
- BENTONITE
- BRECCIA
- CEMENT
- CHALK
- CHERT
- CLAY CHOKE SAND
- CLAYSTONE

COAL

- CONGLOMERATE
- DOLOMITE
- DOLOMITIC LIMESTONE
- GRANITE
- GYPSUM
- IGNEOUS
- LIMESTONE
- SIDERITE or LIMONITE

MARLSTONE

- METAMORPHIC
- NO SAMPLE
- SALT
- SALT- PEPPER SAND
- SANDSTONE
- SHALE
- SHALE COLORED
- SHALE GRAY

SHALY SANDSTONE

- SHALY SILTSTONE
- SILTSTONE
- SILTY SHALE
- TILL
- TUFF
- WELDED TUFF

Operator

Company NOBLE ENERGY, INC.

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

Geologist

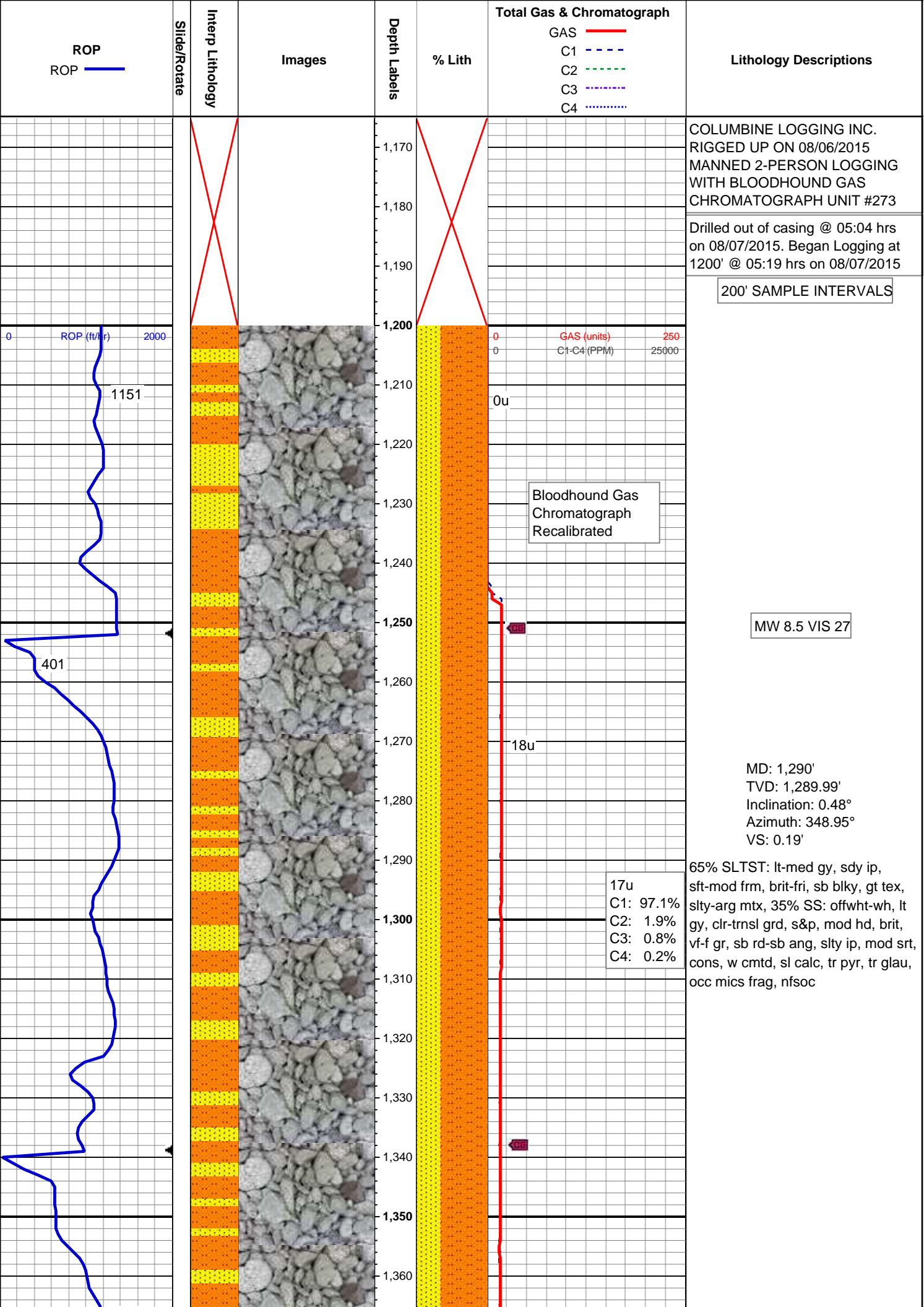
Name MICHAEL ANDERSON, JOEY LUCE

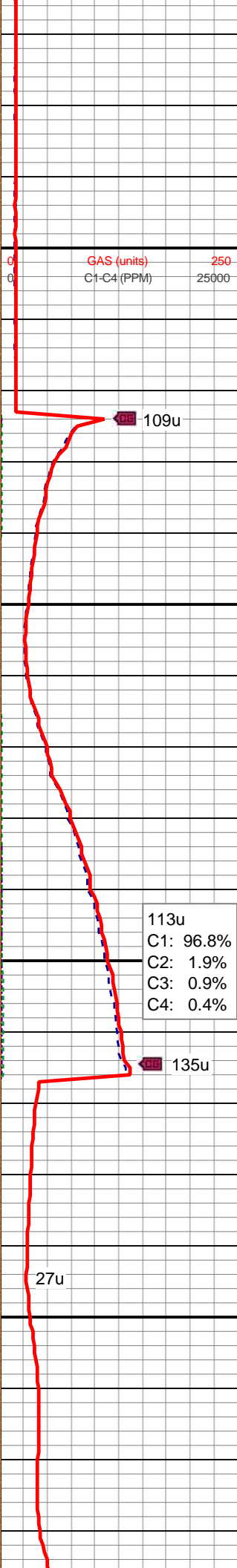
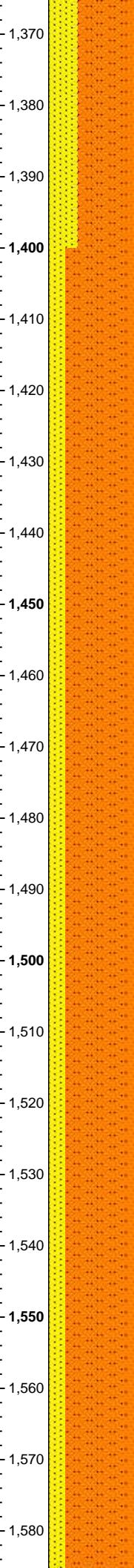
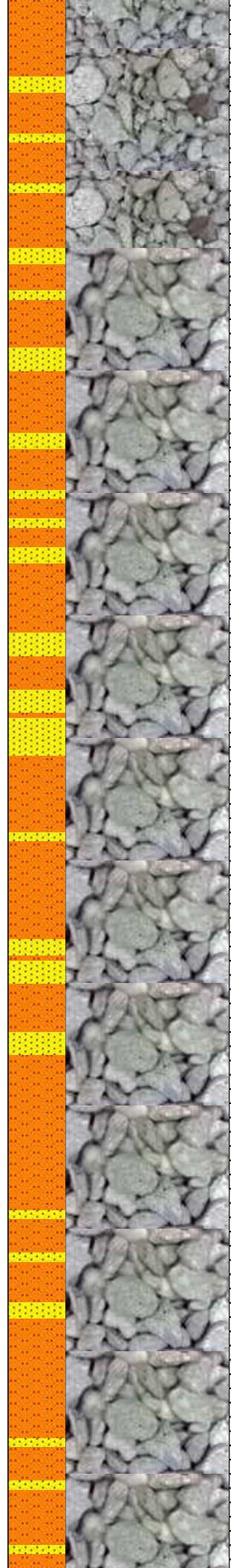
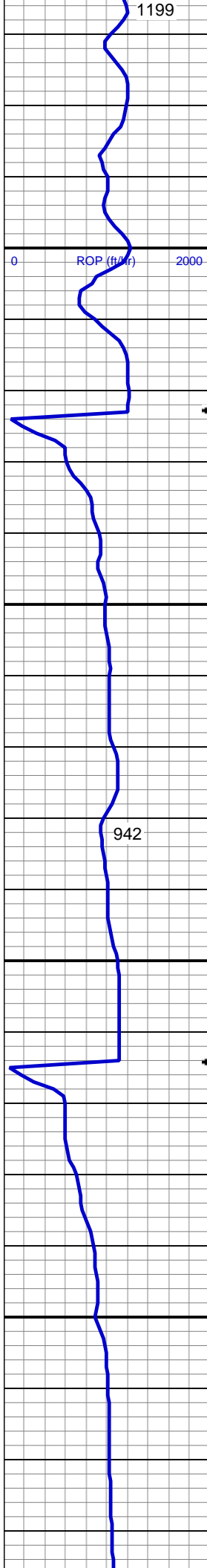
Company COLUMBINE LOGGING, INC.

Address 602 S. LIPAN ST
DENVER, COLORADO 80223
(303) 289-7764

Zone Color Coding

- Oil
- Note
- Error
- Condensate
- Core
- Water
- Gas
- Pressure
- Seal





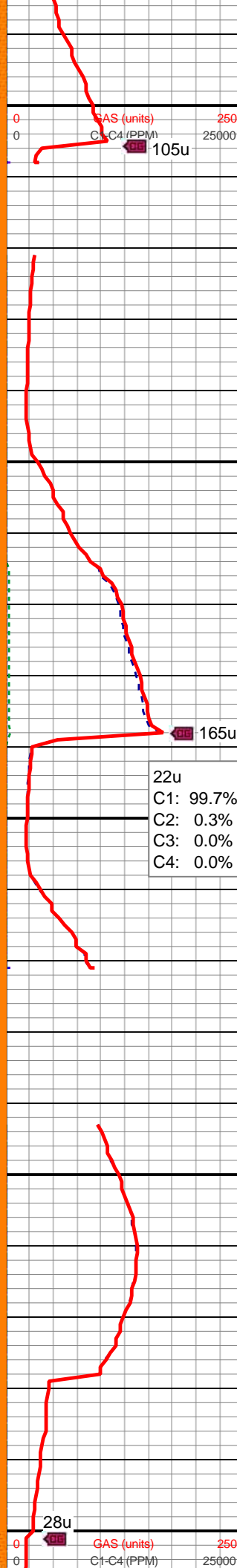
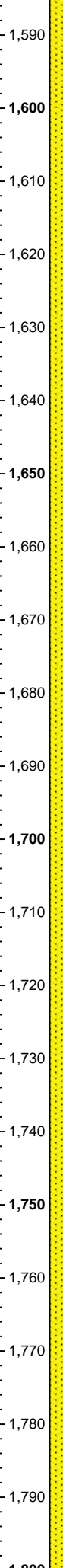
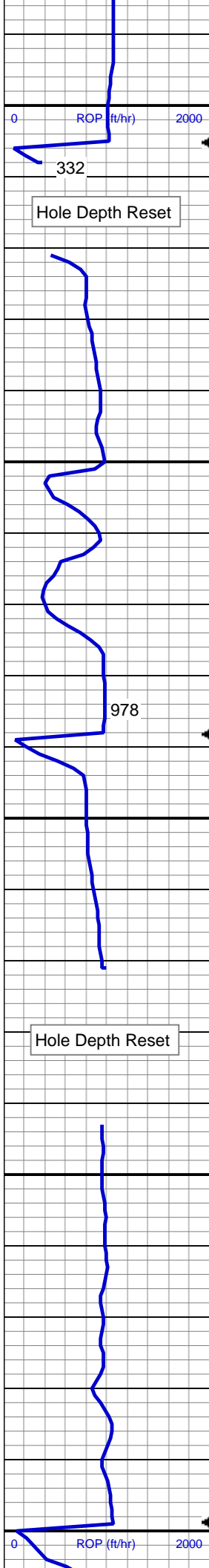
MD: 1,381'
TVD: 1,380.99'
Inclination: 0.75°
Azimuth: 1.53°
VS: 1.15'

MD: 1,472'
TVD: 1,471.98'
Inclination: 0.81°
Azimuth: 6.36°
VS: 2.38'

113u
C1: 96.8%
C2: 1.9%
C3: 0.9%
C4: 0.4%

80% SLTST: lt-med gy, sdy ip, sft-mod frm, brit-fri, sb blk, gt tex, slty-arg mt, grd to 20% SS: offwht-wh, lt gy, clr-trnsd grd, s&p, mod hd, brit, vf gr, sb rd-sb ang, slty ip, w srt, cons, w cmtd, sl calc, rr mics frag, nfsoc

MD: 1,564'
TVD: 1,563.97'
Inclination: 0.65°
Azimuth: 24.74°
VS: 3.52'

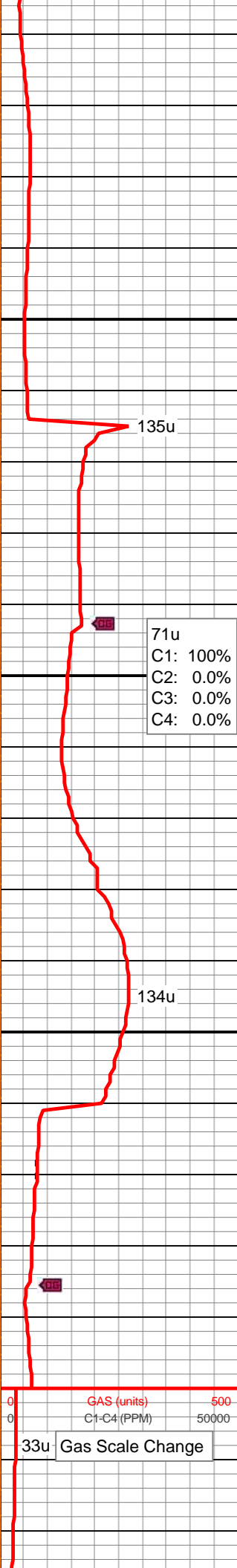
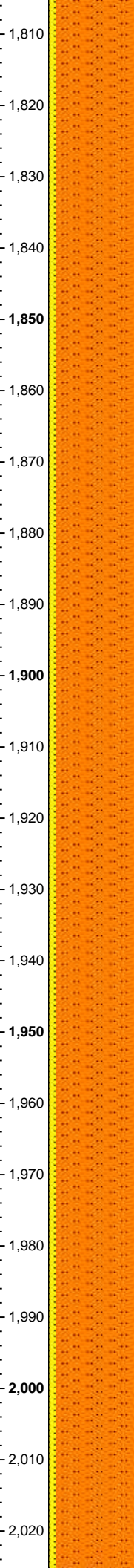
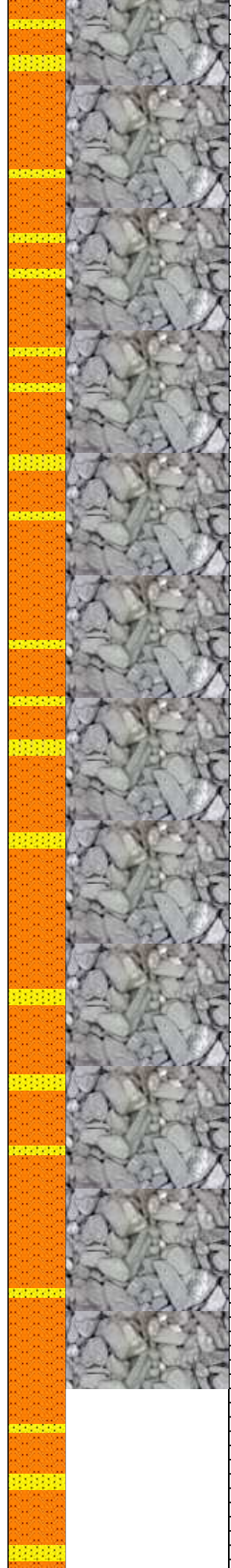
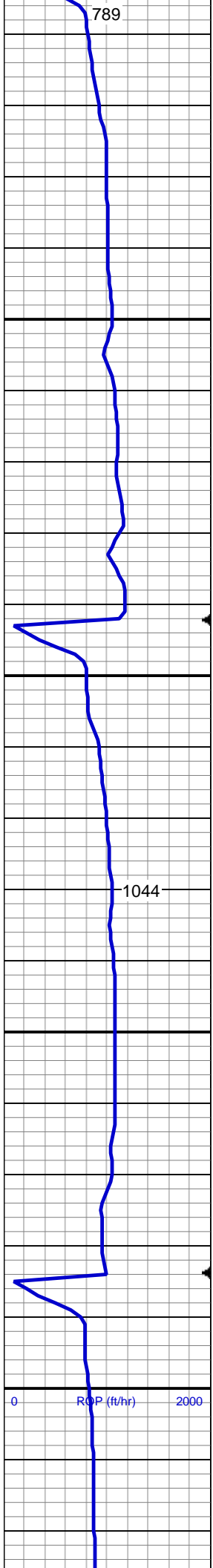


MD: 1,655'
TVD: 1,654.97'
Inclination: 0.71°
Azimuth: 17.54°
VS: 4.57'

MW 8.6 VIS 28

75% SLTST: lt-med gy, rr dk gy, sdy ip, v sft-mod frm, brit-fri, sb blk, gt tex, slty-arg mtx, grd to 25% SS: offwht-wh, lt gy, clr-trnsl grd, s&p, mod hd, brit, vf-f gr, sb rd-sb ang, slty ip, mod-w srt, cons, w cmt, sl calc, occ pyr, rr mics frag, nfsoc

MD: 1,747'
TVD: 1,746.96'
Inclination: 0.87°
Azimuth: 2.27°
VS: 5.82'

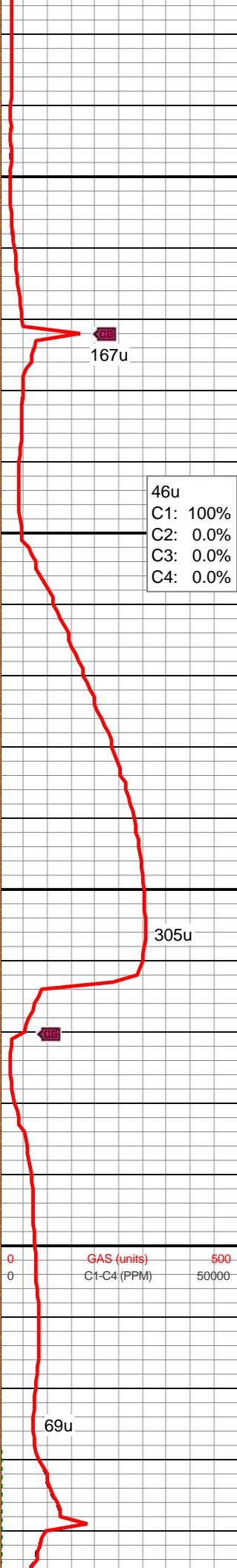
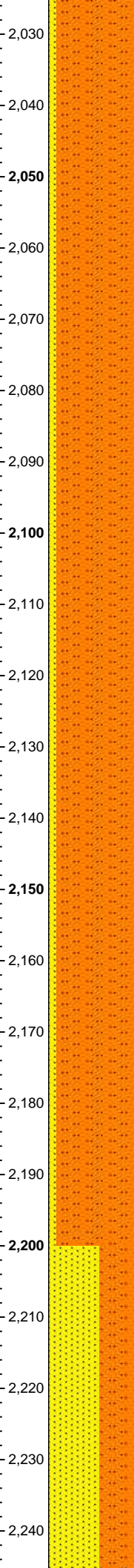
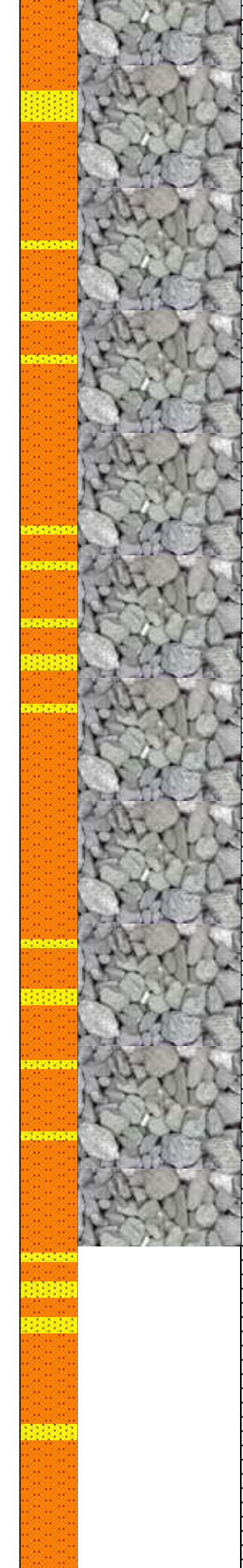
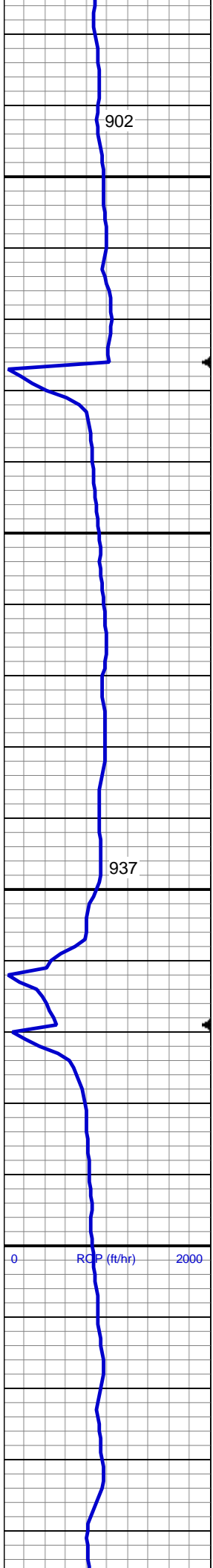


MD: 1,838'
TVD: 1,837.94'
Inclination: 1.04°
Azimuth: 1.18°
VS: 7.32'

90% SLTST: lt-med gy, rr dk gy, sdy
ip, pred sft, occ mod frm, fri-brit ip,
sb blk, gt tex, slty-arg mtx, non
calc, occ (10%) ss, rr pyr assoc wi
ss, nfsoc

MD: 1,930'
TVD: 1,929.93'
Inclination: 1.05°
Azimuth: 357.86°
VS: 8.98'

MD: 2,021'
TVD: 2,020.91'
Inclination: 1.27°
Azimuth: 1.1°



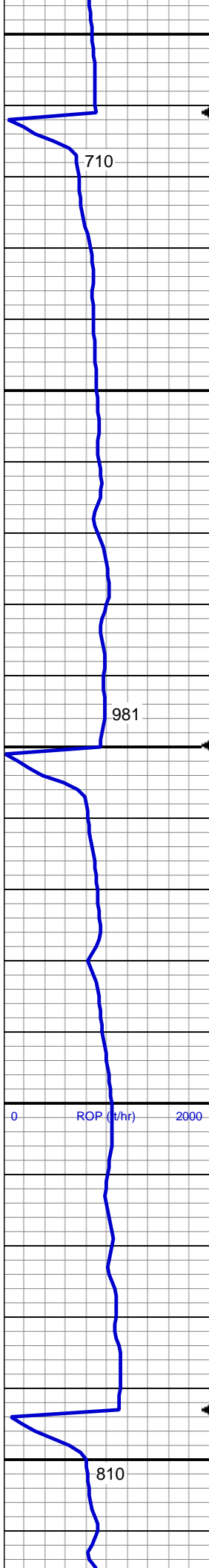
46u
C1: 100%
C2: 0.0%
C3: 0.0%
C4: 0.0%

90% SLTST: lt-med gy, rr dk gy, sdy
ip, sft-mod frm, fri-brit, sb blk, gt
tex, slty-arg mtx, non calc, occ
(10%) ss, rr diss, pyr, rr mics frag,
nfsoc

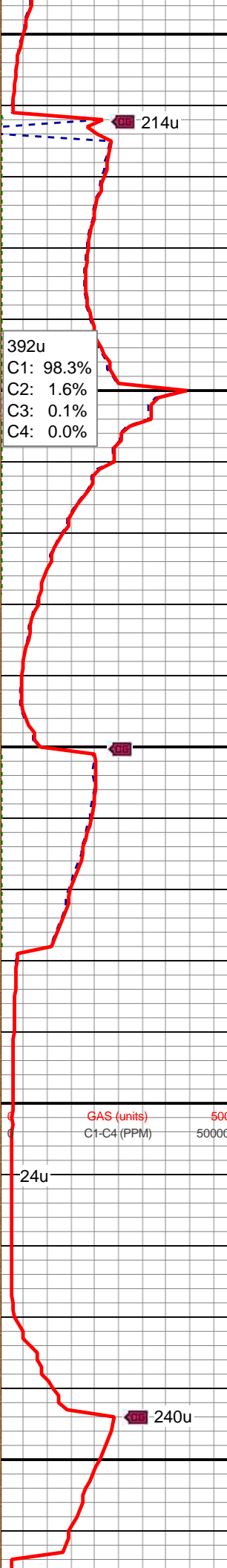
MD: 2,113'
TVD: 2,112.89'
Inclination: 1.16°
Azimuth: 10.1°
VS: 12.75'

MW 8.7 VIS 29

MD: 2,205'
TVD: 2,204.87'
Inclination: 1.1°
Azimuth: 9.92°
VS: 14.56'



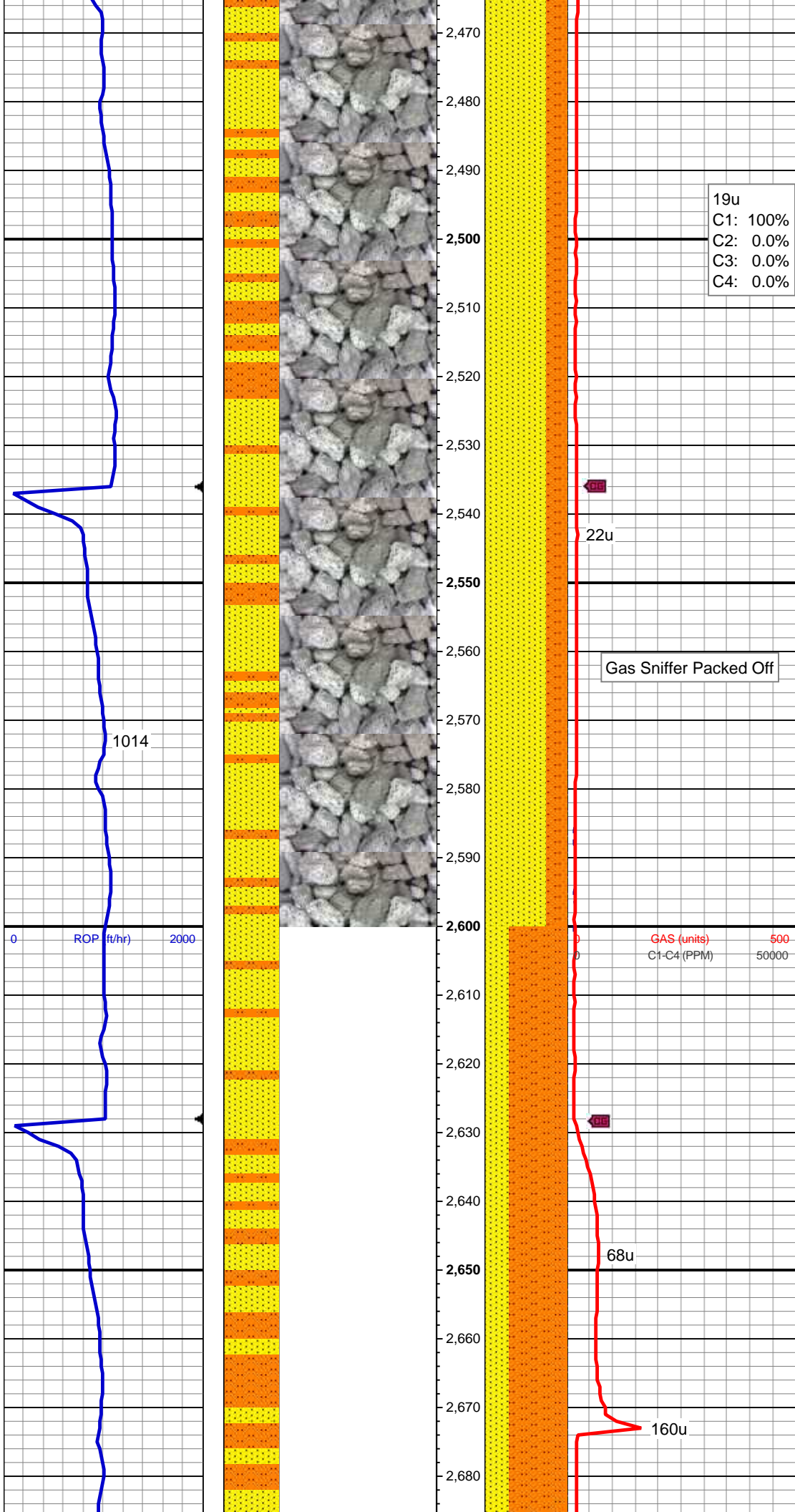
2,250
2,260
2,270
2,280
2,290
2,300
2,310
2,320
2,330
2,340
2,350
2,360
2,370
2,380
2,390
2,400
2,410
2,420
2,430
2,440
2,450
2,460



MD: 2,297'
TVD: 2,296.85'
Inclination: 1.14°
Azimuth: 1.14°
VS: 16.36'

60% SS: offwht-wh, lt gy, clr-trnsl
grd, s&p, mod-v hd, brit, vf gr, sb
rd-sb ang, w srt, cons, w cmtd, grdg
to 40% SLTST: lt-med gy, sdy ip,
mod sft-frm, brit-fri, sb blkly, gt tex,
sly-arg mtx, v sl calc, tr mics frag,
occ v dul yel ss flor, n stn od or cut

MD: 2,389'
TVD: 2,388.83'
Inclination: 1.3°
Azimuth: 358.24°
VS: 18.3'



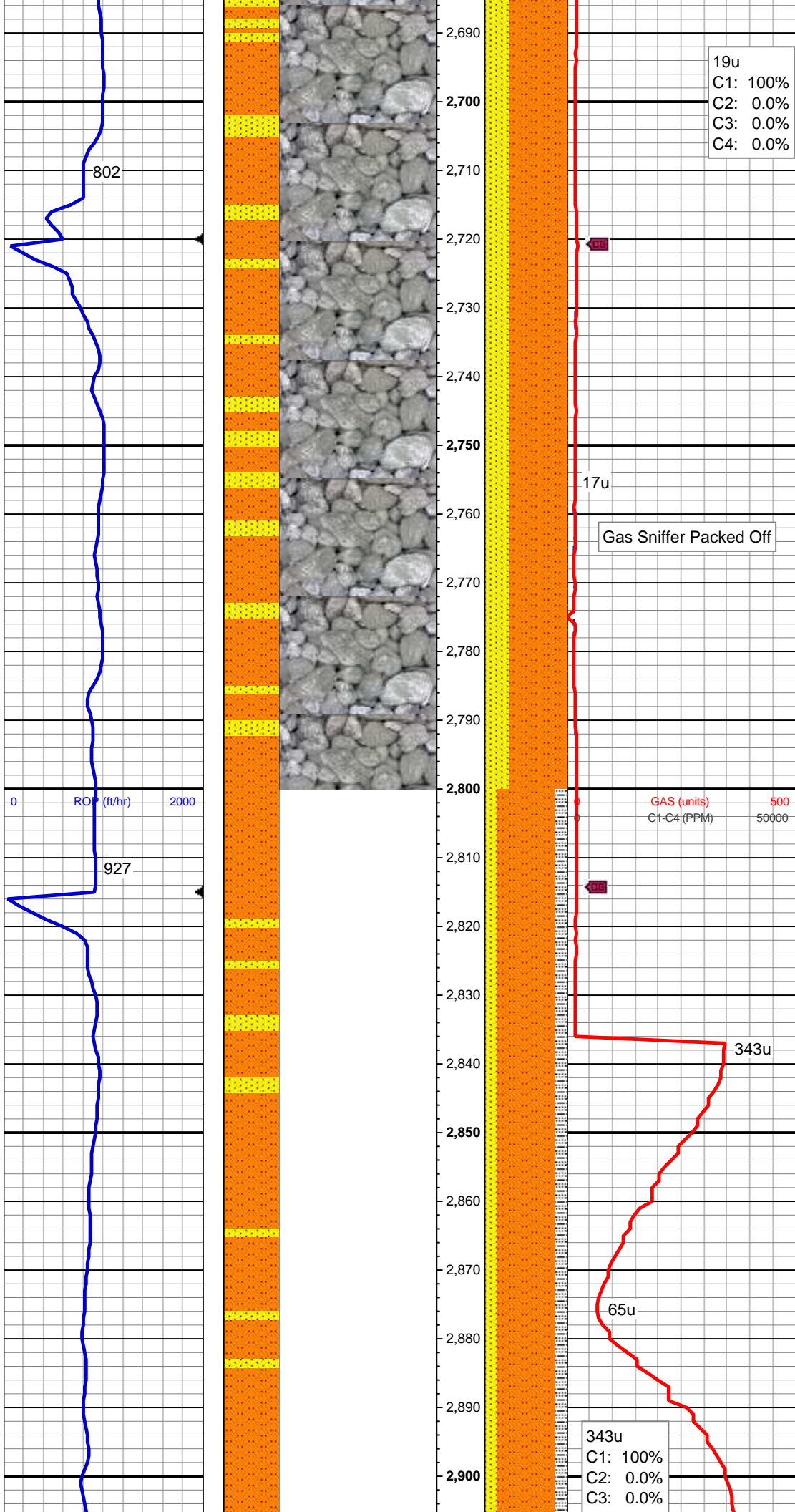
MD: 2,480'
TVD: 2,479.81'
Inclination: 1.3°
Azimuth: 349.12°
VS: 20.31'

19u
C1: 100%
C2: 0.0%
C3: 0.0%
C4: 0.0%

75% SS: offwht-wh, lt gy, clr-trnsl
grd, s&p ip, mod-v hd, brit, vf-l gr, sb
rd-sb ang, w srt, cons, w cmt, grdg
to & fy intlam wi 25% SLTST: lt-med
gy, sdy ip, mod sft frm, brit-fri, sb
blky, gt tex, slty-arg mtx, v sl calc,
occ mics frag, nfsoc

MD: 2,572'
TVD: 2,571.78'
Inclination: 1.42°
Azimuth: 344.43°
VS: 22.37'

MD: 2,663'
TVD: 2,662.76'
Inclination: 1.31°
Azimuth: 340.43°
VS: 24.36'



19u
C1: 100%
C2: 0.0%
C3: 0.0%
C4: 0.0%

70% SLTST: med-dk gy, sdy ip,
mod sft-frm, brit-fri, sb blk, gt tex,
sly-arg mtx, grdg to & fy intlam wi
30% SS: offwht-wh, lt gy, clr-trnsl
grd, s&p ip, mod-v hd, brit, vf gr, sb
rd-sb ang, w srt, cons, w cmtd, v sl
calc, occ mics frag, nfsoc

MD: 2,758'
TVD: 2,757.73'
Inclination: 1.38°
Azimuth: 340.52°
VS: 26.37'

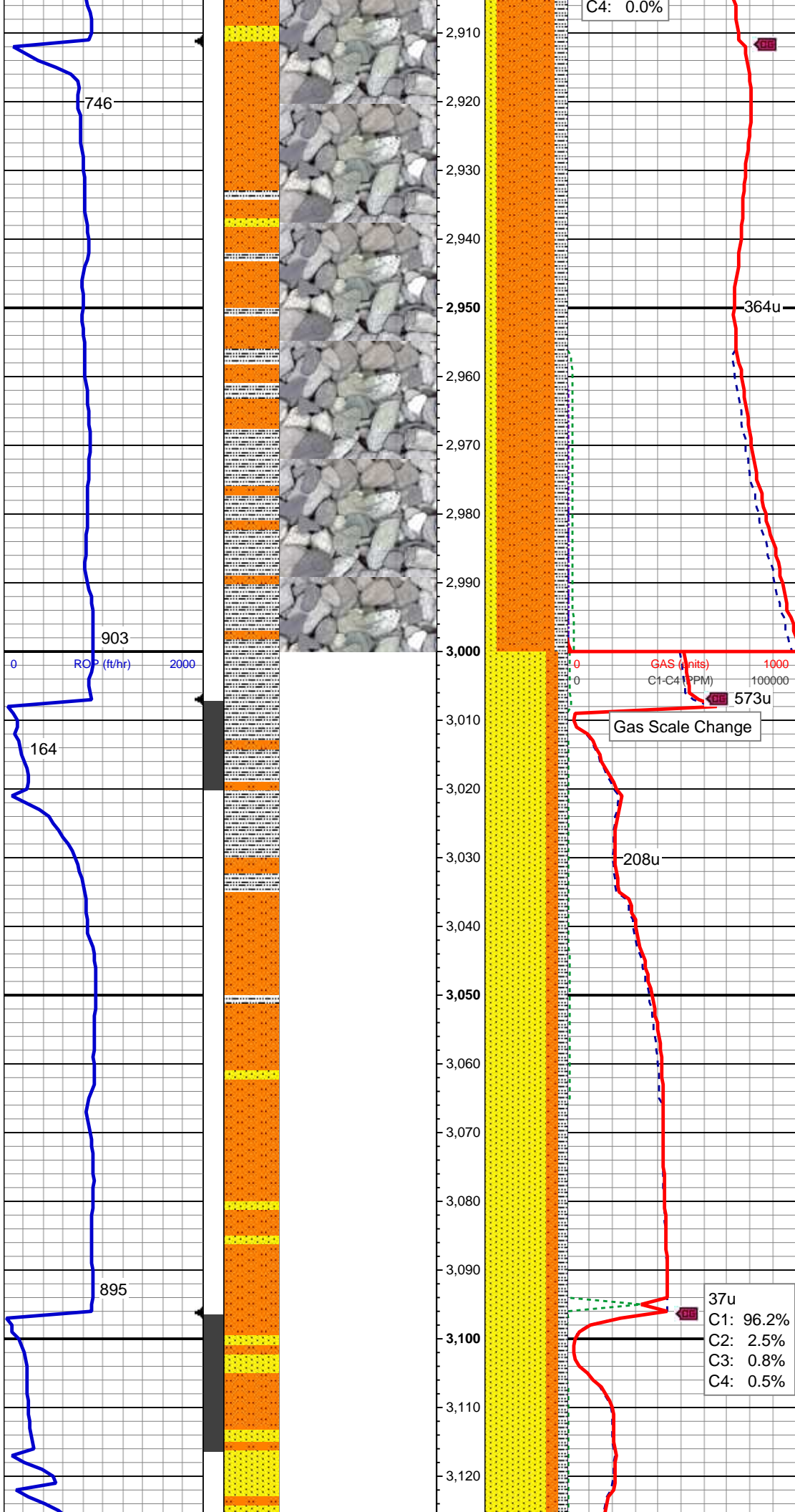
Gas Sniffer Packed Off

GAS (units)
C1-C4 (PPM)

MD: 2,853'
TVD: 2,852.71'
Inclination: 1.32°
Azimuth: 333.86°
VS: 28.32'

343u
C1: 100%
C2: 0.0%
C3: 0.0%

70% SLTST: lt-med gy, sft-frm,
brit-fri, sb blk, gt tex, sly-arg mtx,
15% SLTY SH: med-dk gy, frm, brit,
pty-sb pty, occ sb blk, sb wxy tex,
arg-v sl sly mtx, 15% SS: offwht-wh,
lt gy, clr-trnsl grd, s&p ip, mod-v hd,
brit, vf gr, sb rd sb ang, w srt, cons



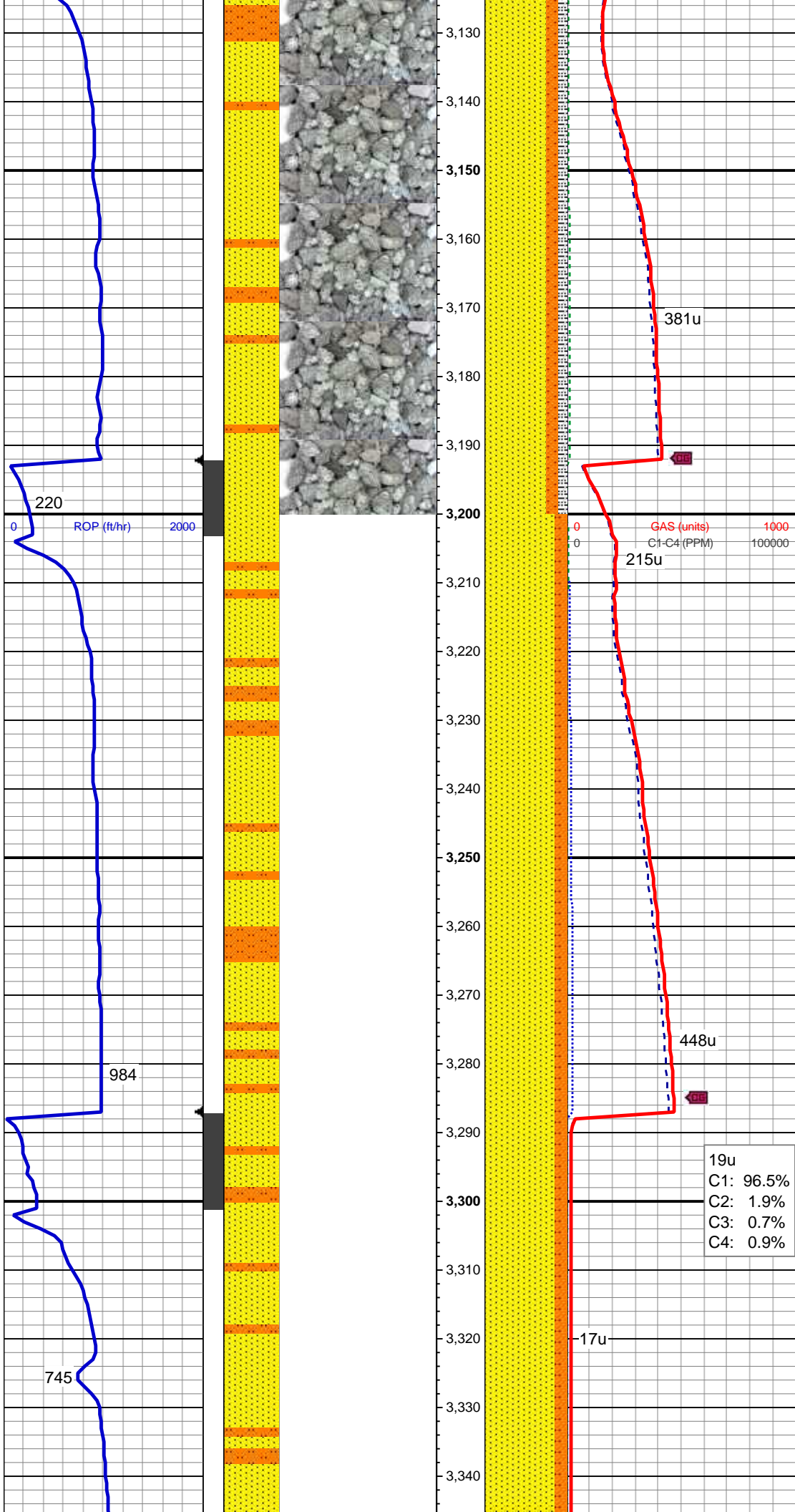
brit, v f gr, sb rd-sb ang, w srt, cons, w cmt, v sl calc, tr mics frag, rr bent, rr v dul orng mnrl flor, no stn od or cut

MD: 2,948'
TVD: 2,947.68'
Inclination: 1.12°
Azimuth: 328.4°
VS: 29.98'

MW 8.7 VIS 28

MD: 3,042'
TVD: 3,041.68'
Inclination: 1.55°
Azimuth: 137.65°
VS: 29.86'

75% SS: offwhit-wh, lt gy, clr-trnsl grd, s&p ip, v hd, brit, v f gr, sb rd-sb ang, w srt, cons, w cmt, fy intlam wi 15% SLTST: lt-med gy, med gy brn, mod frm, rr sft, brit-fri ip, sb blk, gt tex, slty-arg mtx, v sl calc, occ (10%) slty sh, tr mics frag, com bent, v slow difse, v fnt bl wh mky cut, no flor stn or od



MD: 3,137'
TVD: 3,136.52'
Inclination: 4.69°
Azimuth: 140.54°
VS: 26.29'

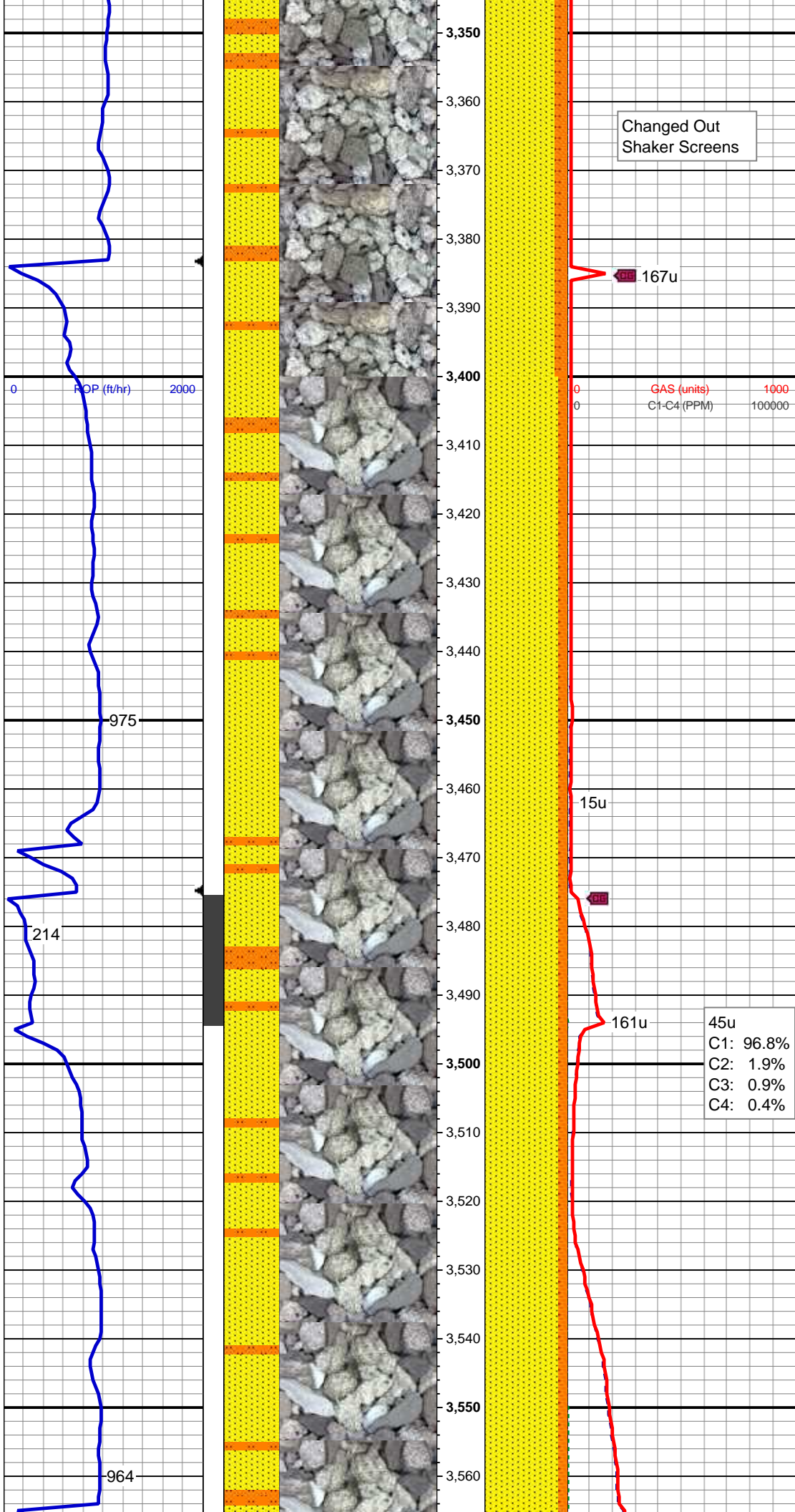
MW 8.6 VIS 28

MD: 3,232'
TVD: 3,231.08'
Inclination: 6.41°
Azimuth: 147.07°
VS: 19.44'

19u
C1: 96.5%
C2: 1.9%
C3: 0.7%
C4: 0.9%

85% SS: offwht-wh, clr-trnsl grd, s&p, mod-v hd, brit, vf-f gr, occ med grnd sd, sb rd-sb ang, mod srt, cons, w cmted, fy intlam wi 15% SLTST: lt-med gy, med gy brn, mod frm, brit, sb plty-sb blkly, gt tex, slty-arg mtx, non calc, com gn glau, occ mics frag, tr bent, v slow difse, v fnt bl wh mky cut, no flor stn or od

MD: 3,326'
TVD: 3,324.28'
Inclination: 8.43°
Azimuth: 148.43°
VS: 9.9'



Changed Out
Shaker Screens

167u

15u

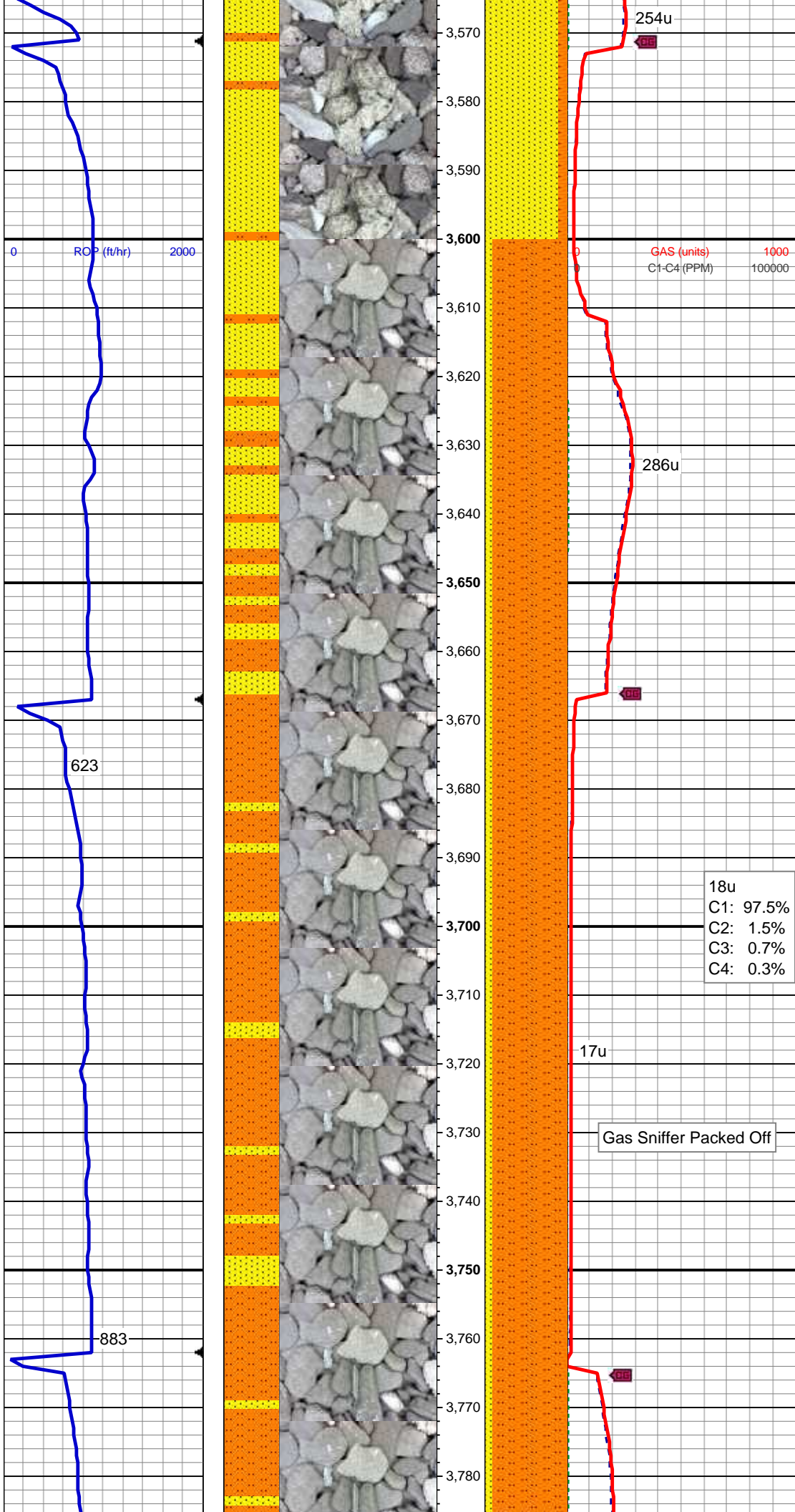
161u

45u
C1: 96.8%
C2: 1.9%
C3: 0.9%
C4: 0.4%

85% SS: offwht-wh, lt gy, lt brn,
clr-trnsl grd, s&p, mod-v hd, brit, vf-l
f gr, sb rd-sb ang, mod-w srt, cons,
w cmtd, v sl calc, occ fy intlam wi
(10%) sltst, tr gn glau, occ mics
frag, com bent, com v dul orng mnrl
flor, v slow difse, v frnt bl wh mky cut,
no stn or od

MD: 3,421'
TVD: 3,418.26'
Inclination: 8.42°
Azimuth: 148.55°
VS: -1.14'

MD: 3,516'
TVD: 3,511.81'
Inclination: 11.57°
Azimuth: 139.98°
VS: -13.27'

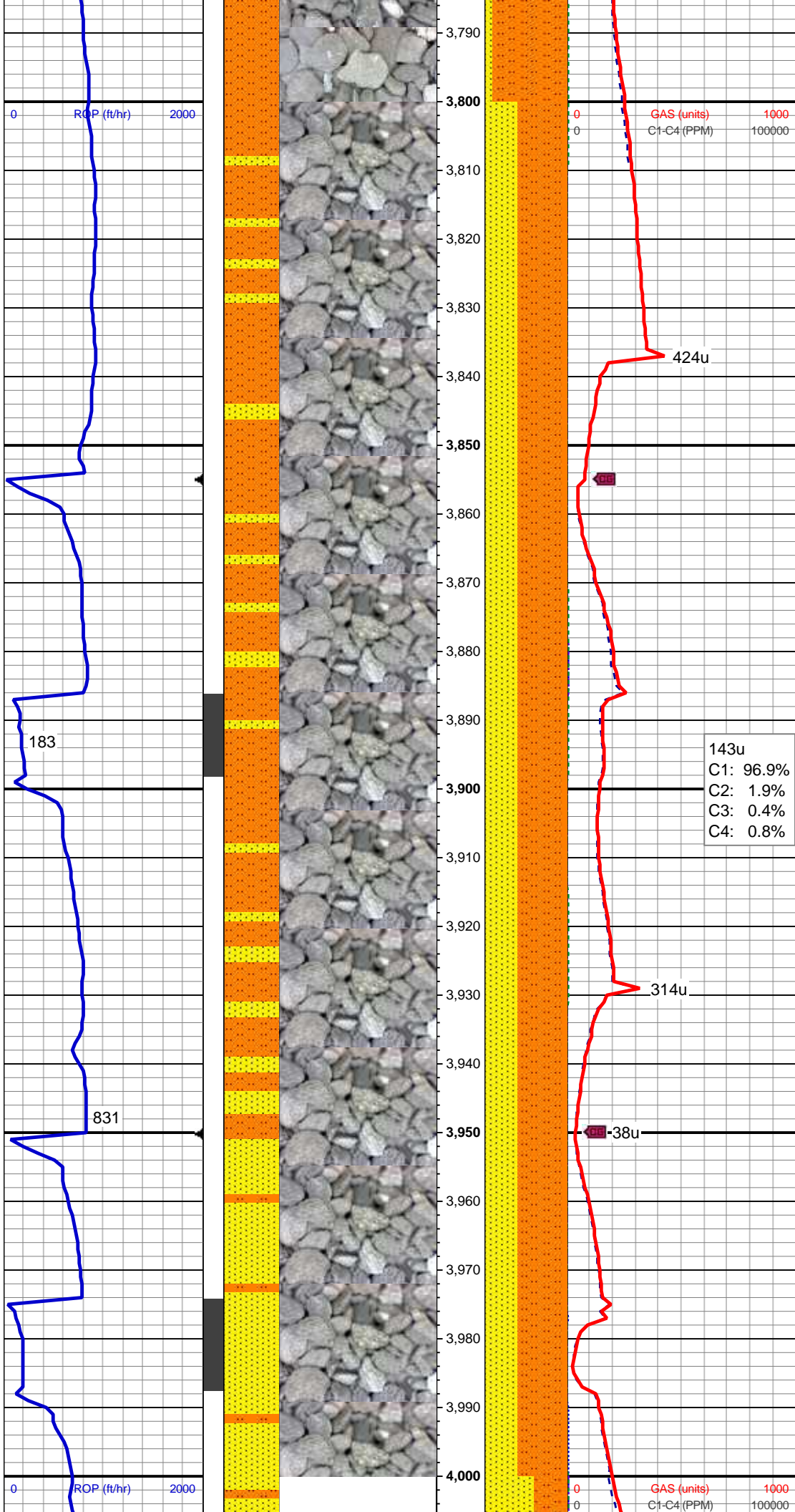


MW 8.6 VIS 28

MD: 3,611'
TVD: 3,604.86'
Inclination: 11.7°
Azimuth: 140.82°
VS: -26.67'

90% SLTST: med-dk gy, frm, brit,
sb plty-sb blkx, gt tex, slty-arg mtx,
non calc, occ (10%) ss, rr mics
frag, nfsoc

MD: 3,705'
TVD: 3,696.96'
Inclination: 11.39°
Azimuth: 142.46°
VS: -40.11'



MD: 3,800'
TVD: 3,790.3'
Inclination: 10.04°
Azimuth: 143.22°
VS: -52.98'

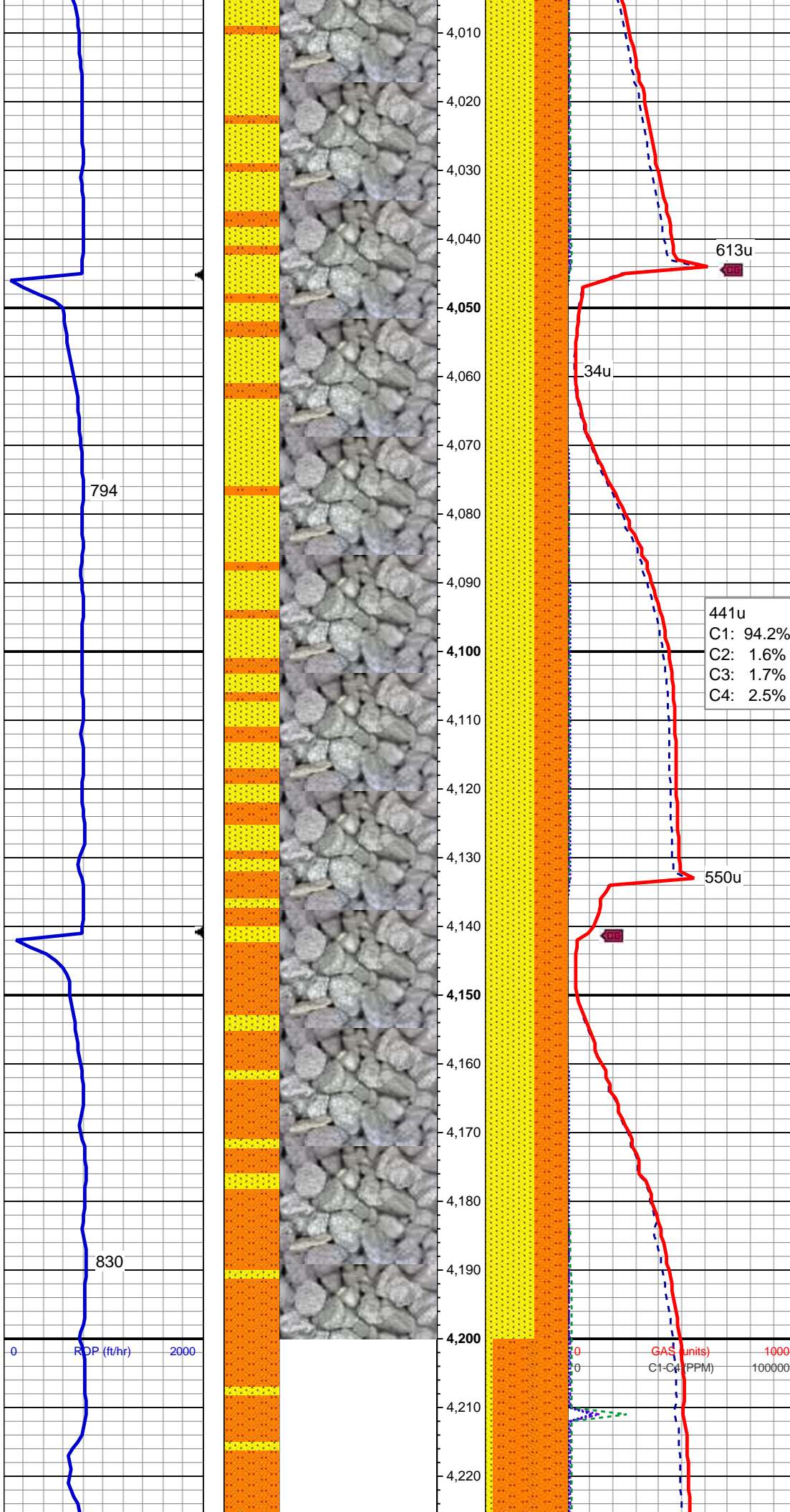
MW 8.5 VIS 28

MD: 3,895'
TVD: 3,883.71'
Inclination: 10.95°
Azimuth: 140.6°
VS: -65.39'

60% SLTST: lt-med gy, gy brn, com sdy ip, mod frm, sb blk, gt tex, slty-arg mtx, 40% SS: lt-med gy, gy brn, rr offwht, clr-trnsl grd, mod hd, brit, slty-vf gr, sb rd-sb ang, mod srt, mod cons, mod cmd, sl-mod calc, tr diss pyr, tr mics frag, occ bent, rr fos frag, rr dul bl mnrl flor, v slow difse, v dul bl wh cut, n stn or od

143u
C1: 96.9%
C2: 1.9%
C3: 0.4%
C4: 0.8%

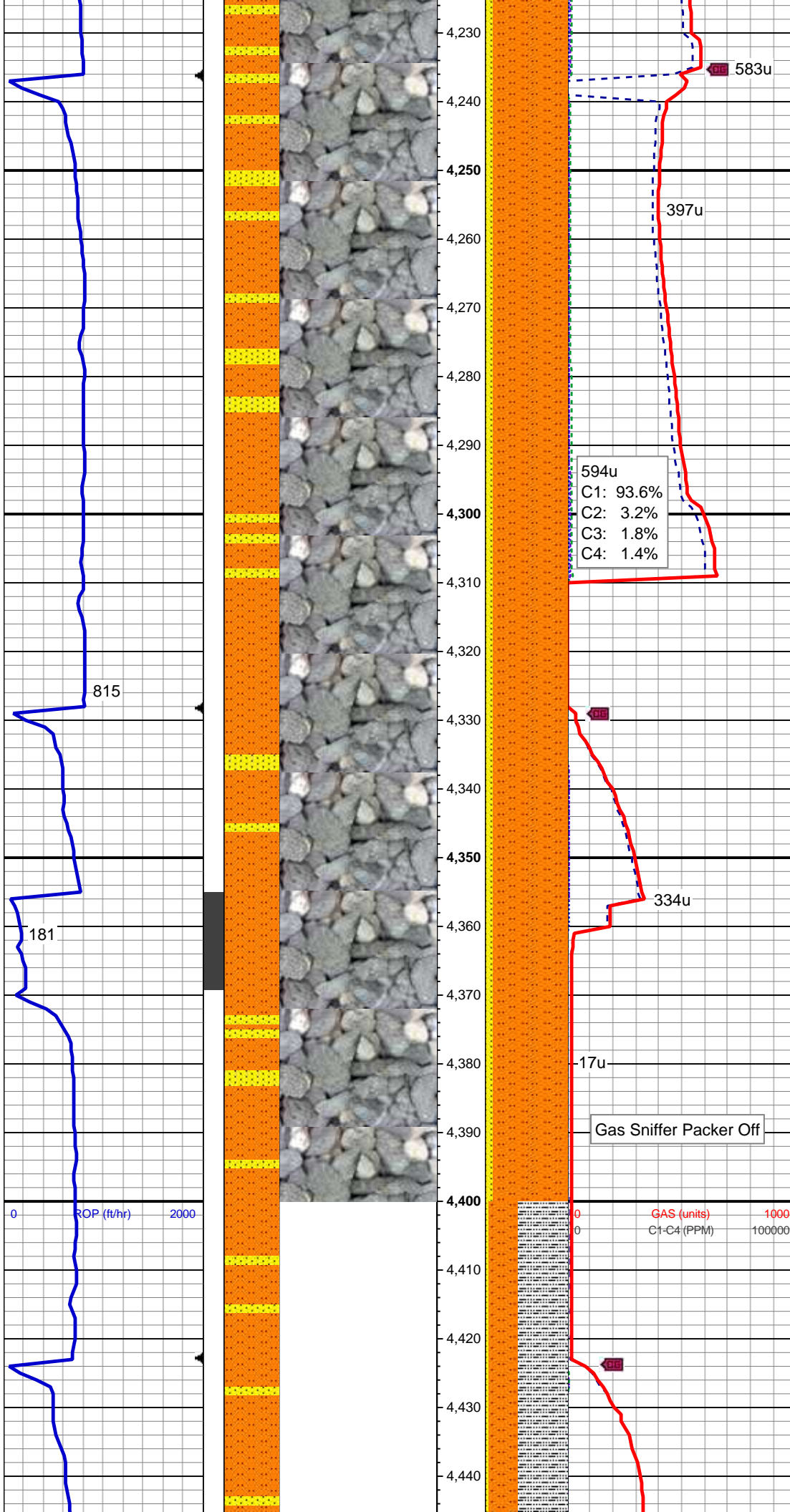
MD: 3,989'
TVD: 3,975.64'
Inclination: 13.12°
Azimuth: 137.12°
VS: -78.67'



MD: 4,084'
TVD: 4,068.26'
Inclination: 12.58°
Azimuth: 137.14°
VS: -92.56'

60% SS: offwht, lt-med gy, gy brn ip, clr-trnsl grd, mod-v hd, brit, slty-vf gr, sb rd-sb ang, mod srt, mod cons, mod cmted, grdg to 40% SLTST: lt-med gy, gy brn, sdy ip, mod frm, sb blk, gt tex, slty-arg mt, sl-mod calc, tr diss pyr, tr mics frag, occ bent, tr fos frag, v slow difse, v dul bl wh cut, n flor strn or od

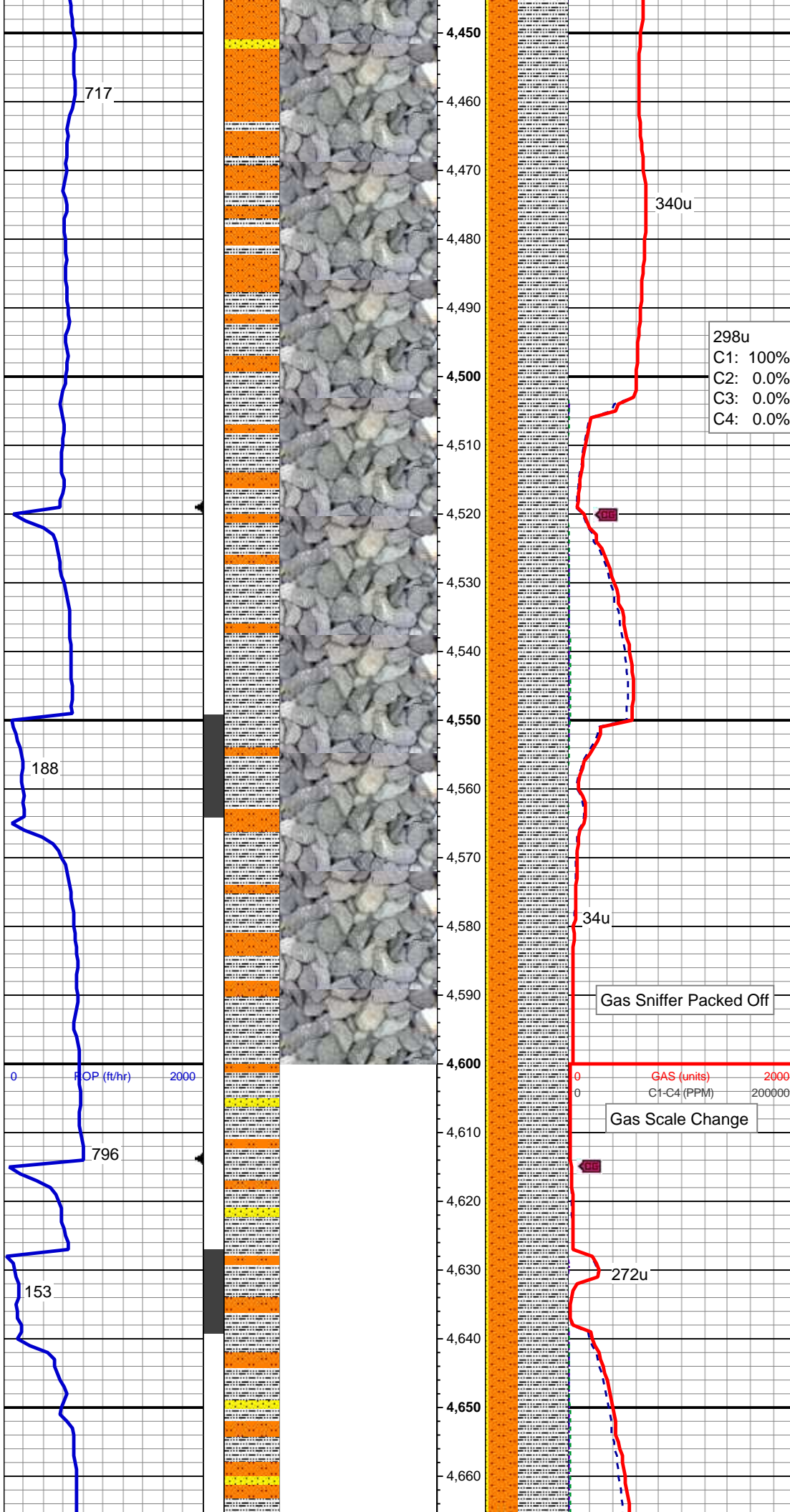
MD: 4,179'
TVD: 4,161.12'
Inclination: 11.78°
Azimuth: 135.57°
VS: -105.54'



MD: 4,273'
TVD: 4,253.26'
Inclination: 11.07°
Azimuth: 134.48°
VS: -117.26'

90% SLTST: lt-med gy, gy brn, sdy
ip, frm, brit, sb blk, gt tex, slty-arg
mtx, v sl calc, occ (10%) fy intlam ss
strgs, tr dissim pyr, rr mics frag, rr
calcite, v slow difse, v dul bl wh cut,
n flor stn or od

MD: 4,368'
TVD: 4,346.49'
Inclination: 11.1°
Azimuth: 138.04°
VS: -129.06'



MW 9.2 VIS 40

MD: 4,463'
TVD: 4,439.86'
Inclination: 10.14°
Azimuth: 139.09°
VS: -140.89'

298u
C1: 100%
C2: 0.0%
C3: 0.0%
C4: 0.0%

60% SLTY SH: med-dk gy, mod frm, brit, plty-sb plty, occ sb blkly, sb fis ip, sb wxy-sl gt tex, arg-sl slty mtz, 35% SLTST: lt-med gy, gy brn, frm, brit, sb blkly, gt tex, slty-arg mtz, non calc, tr (5%) ss, tr dissm & clus pyr, tr fos frag Inoc, rr bent, v slow difse, v dul bl wh cut, n flor stn or od

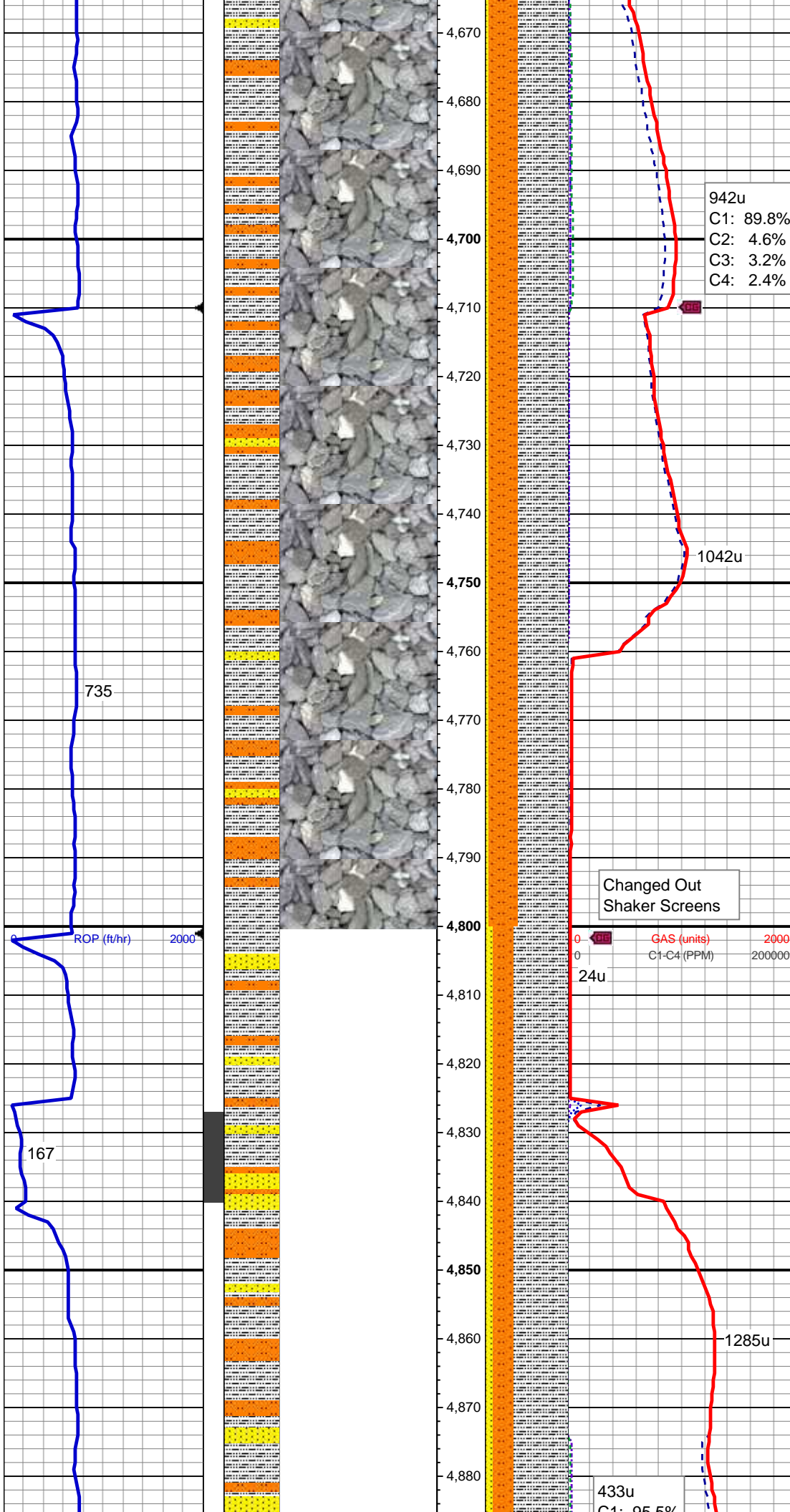
MD: 4,557'
TVD: 4,532.28'
Inclination: 10.92°
Azimuth: 143.49°
VS: -153.1'

Gas Sniffer Packed Off

Gas Scale Change

MW 9.45 VIS 42

MD: 4,652'
TVD: 4,625.26'
Inclination: 12.7°
Azimuth: 145.05°
VS: -167.61'

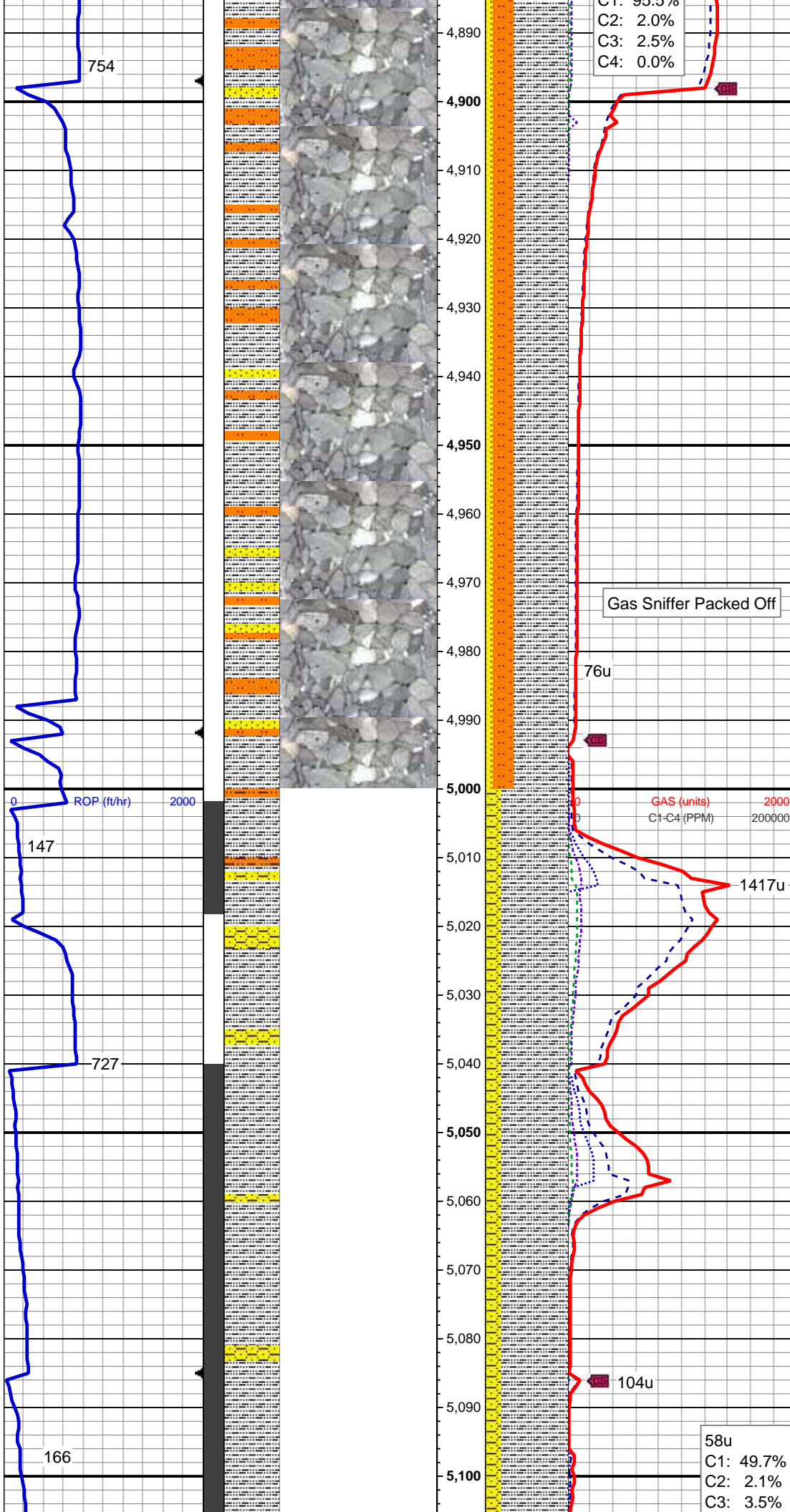


60% SLTY SH: med-dk gy, mod frm, brit, plty-sb plty, occ sb blkly, sb fis ip, sb wxy-sl gt tex, arg-sl slty mtx, 35% SLTST: lt-med gy, gy brn, frm, brit, sb blkly, gt tex, slty-arg mtx, non calc, tr (5%) ss, rr dissm pyr, rr fos frag Inoc, v slow difse, v dul bl wh cut, n flor stn or od

MD: 4,747'
TVD: 4,718.13'
Inclination: 11.66°
Azimuth: 143.04°
VS: -182.52'

MW 9.5 VIS 42

MD: 4,842'
TVD: 4,811.04'
Inclination: 12.38°
Azimuth: 143.23°
VS: -197.02'



65% SLTY SH: med-dk gy, mod frm, brit, plty-sb plty, occ sb blkly, sb wxy-sl gt tex, arg-sl slty mtz, 25% SLTST: lt-med gy, gy brn, frm, brit, sb blkly, gt tex, slty-arg mtz, non calc, occ (10%) ss, tr pyr, tr fos frag Inoc, v slow difse, v dul bl wh cut, n flor stn or od

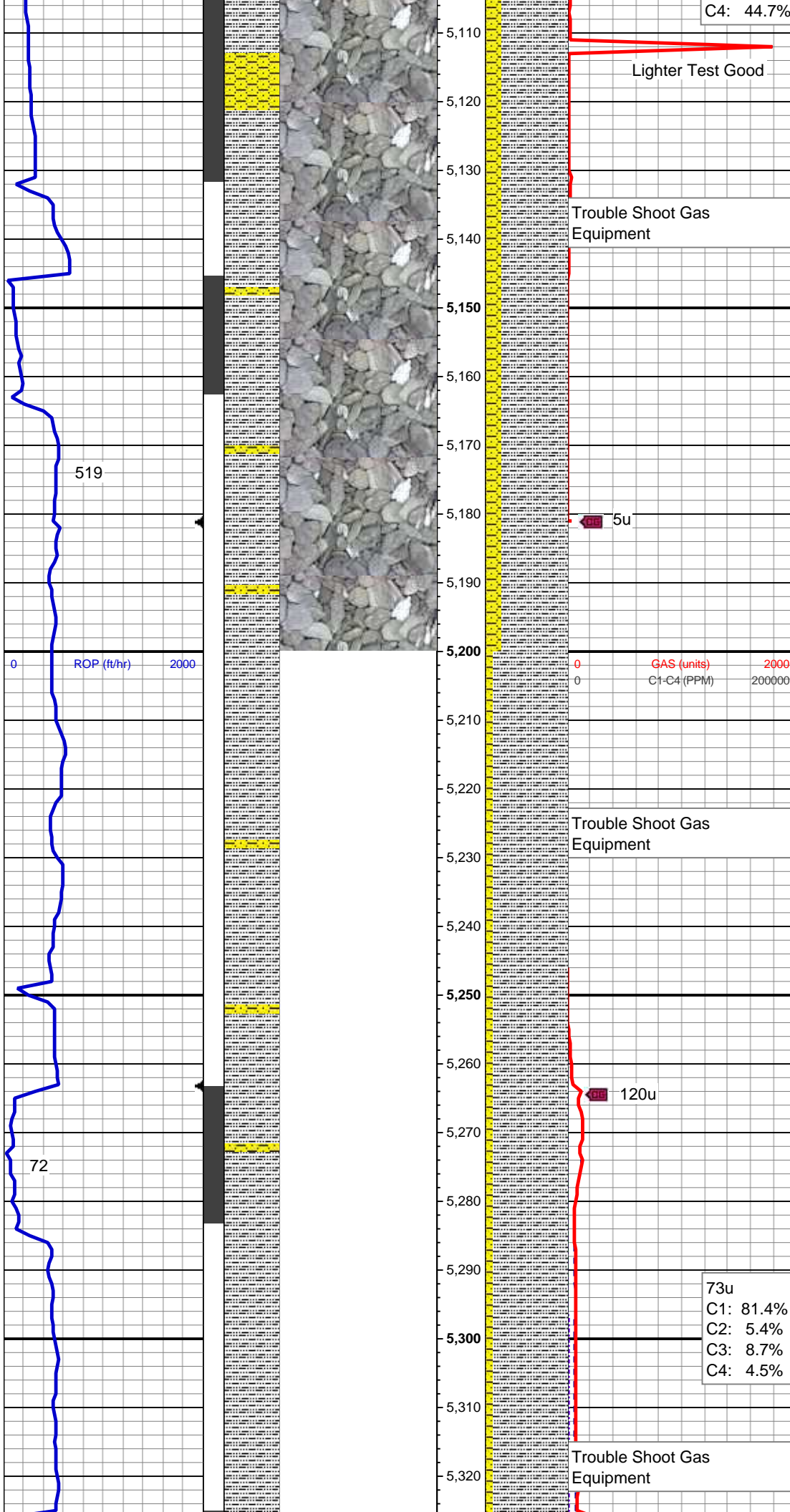
MD: 4,936'
TVD: 4,903.03'
Inclination: 11.36°
Azimuth: 145.07°
VS: -211.41'

MD: 5,031'
TVD: 4,995.83'
Inclination: 13.3°
Azimuth: 146.1°
VS: -226.86'

KOP @ 5040' MD

MW 9.7 VIS 45

80% SLTY SH: ltgy, med-dk gy, mod frm, brit, plty-sb plty, occ sb blkly, sb wxy-sl gt tex, rthy, arg-sl slty mtz, 20% SHY:SS: offwhit, lt-medgy, gy brn, clr-trnsl grn, mod-v hd, brit,



slty-vf gr, sb rd-sb ang, mod-p srt, mod cons, mod cmtd

MD: 5,126'
TVD: 5,086.24'
Inclination: 23.55°
Azimuth: 101.96°
VS: -237.28'

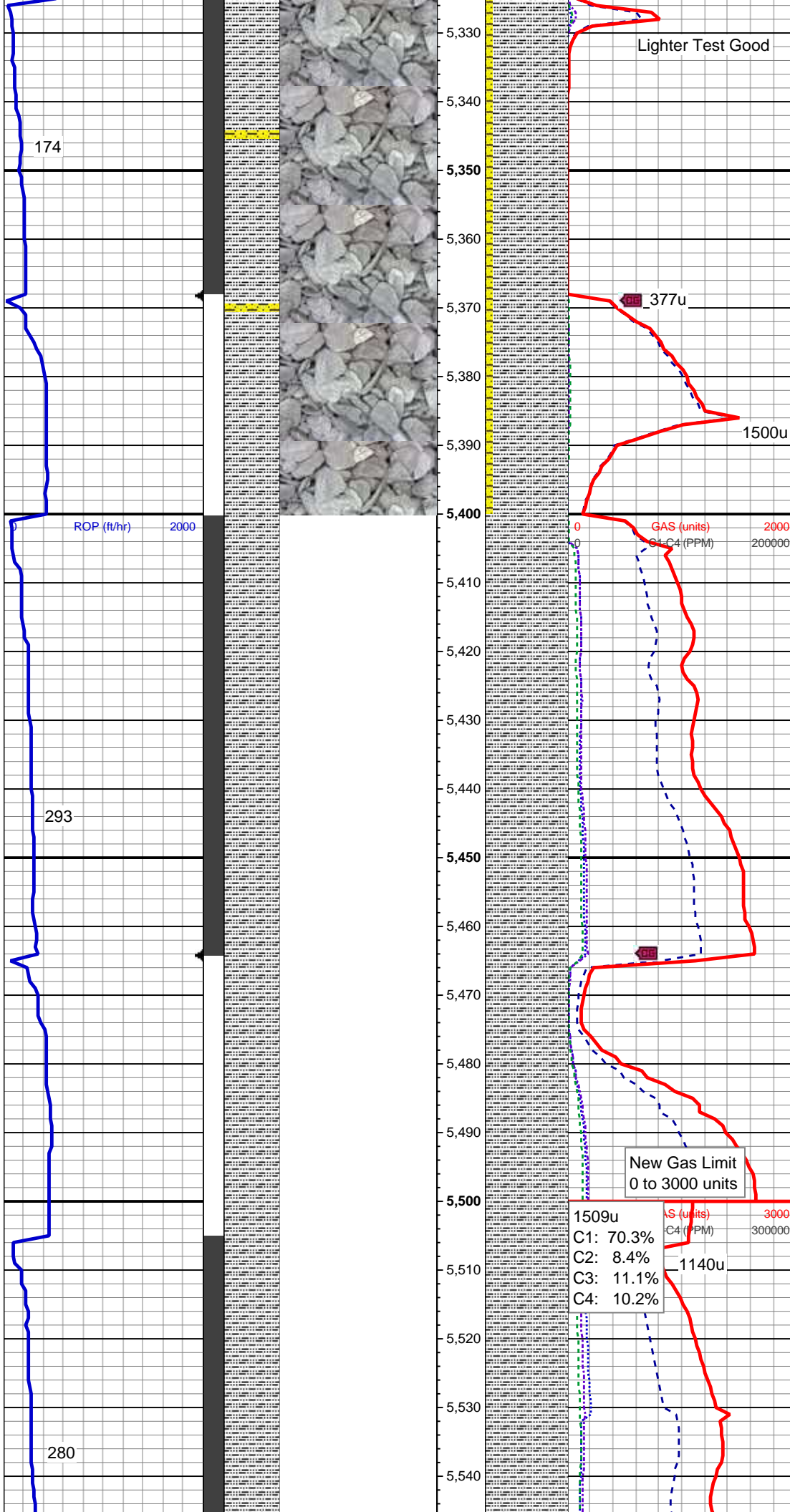
MW 10.15 VIS 40

MD: 5,220'
TVD: 5,171.88'
Inclination: 25.26°
Azimuth: 91.66°
VS: -237.7'

90% SLTY SH: ltgy, med-dk gy, mod frm, brit, pty-sb pty, occ sb blkly, sb wxy-sl gt tex, rthy, arg-sl slty mtx, 10% SHY:SS: offwhit, lt-medgy, gy brn, clr-trnsl grn, mod-v hd, brit, slty-vf gr, sb rd-sb ang, mod-p srt, mod cons, mod cmtd

MD: 5,315'
TVD: 5,257.32'
Inclination: 26.58°
Azimuth: 88.96°

VS: -233.54'



Lighter Test Good

1500u

1500u

GAS (units)

C4 (PPM)

New Gas Limit
0 to 3000 units

1509u
C1: 70.3%
C2: 8.4%
C3: 11.1%
C4: 10.2%

GAS (units)

C4 (PPM)

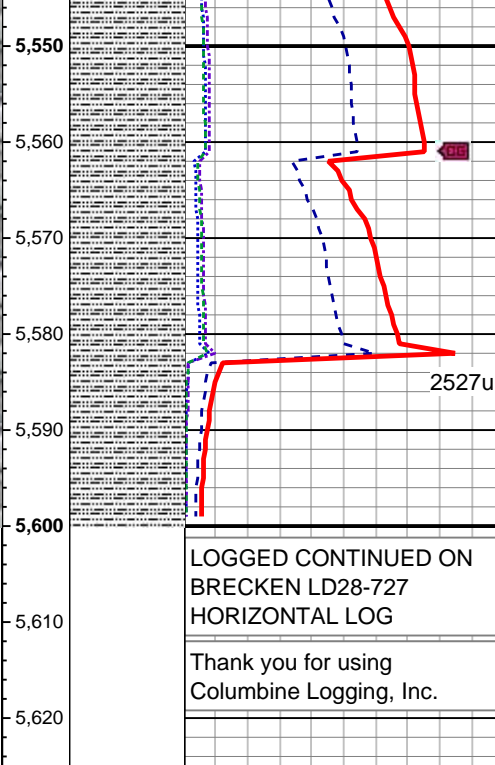
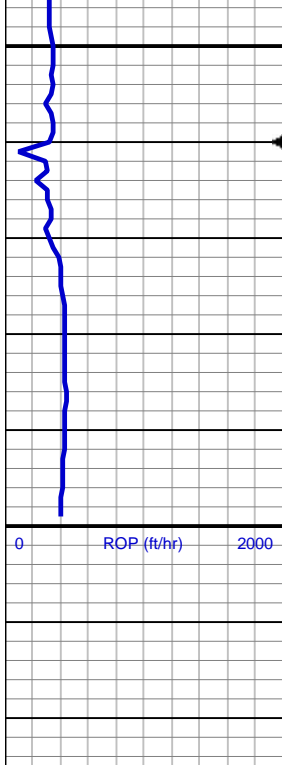
1140u

MW 10.4 VIS 44

MD: 5,410'
TVD: 5,340.36'
Inclination: 31.78°
Azimuth: 73.39°
VS: -221.28'

MD: 5,504'
TVD: 5,419.74'
Inclination: 33.5°
Azimuth: 53.21°
VS: -194.04'

100% SLTY SH: ltgy, med-dk gy,
mod frm, brit, plty-sb plty, occ sb
blkly, sb wxy-sl gt tex, rthy, arg-sl slty
mtx



MW 10.6 VIS 45

MD: 5,599'
TVD: 5,498.95'
Inclination: 33.9°
Azimuth: 36.29°
VS: -153.25'

LOGGED CONTINUED ON
BRECKEN LD28-727
HORIZONTAL LOG

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Columbine Logging, Inc.