

COLUMBINE LOGGING

Scale: 5" / 100'
Measured Depth Log

Well Name Wells Ranch AE19-636

Location NWSW 20 6N 62W 6 PM

State Colorado

County Weld

Country United States

Rig Number H&P 330

API Number 05-123-39640

Field WATTENBERG

Region DJ BASIN

Drilling Completed 1/6/2015

Spud Date 12/29/2014

Surface Coordinates NWSW 20 6N 62W 6 PM
1648 FSL 65 FWL
Lat/Long: 40.46948/-104.35586

Bottom Hole Coordinates Planned Sec: 24 Twp: 6N 63W
1700 FFSLL 235 FFELL

Ground Elevation 4,786'

K.B. Elevation 4,816'

Logged Interval 2,000' To 11772'

Total Depth 11772'

Formation NIOBRARA

Type of Drilling Fluid WATER BASED MUD

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 (RIGHT)



NORMAL FAULT



OVERTURNED STRATA



REVERSE FAULT



CASING



SIDEWALL CORE (LEFT)



SIDEWALL CORE (RIGHT)



SLIDE



SURVEY



DRILL STEM TEST



WIRELINE TESTED - LEFT



WIRELINE TESTED - RT

Rounding

- ANGULAR
- ROUNDED
- SUBANG
- SUBRND

Textures

- BOUNDSTONE
- CHALKY
- CRYPTOXLN

E EARTHY

FX FINELYXLN

GS GRAINSTONE

L LITHOGRAPHIC

MX MICROXLN

MS MUDSTONE

PS PACKSTONE

WS WACKSTONE

Sorting

- M MODERATE
- P POOR
- W WELL

Accessories

Fossils

GASTROPOD

INOCERAMUS

ARGILLITE GRAIN

B BENTONITE

HEAVY MINERAL

K KAOLIN

Stringer

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

OOLITE
 OSTRACOD
 PELECYPOD
 PELLET
 PISOLITE
 PLANT REMAINS
 PLANT SPORES
 SCAPHOPOD
 STROMATOPOROID

Minerals

ANHYDRITIC
 ARGILLACEOUS

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

MARCASITE
 MARLSTONE
 MICACEOUS
 MINERAL CRYSTALS
 NODULES
 PHOSPHATE PELLETS
 PYRITE
 SALT CAST
 SANDY
 SIDERITE
 SILICEOUS
 SILTY
 TUFFACEOUS

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 Suite 2200
Denver, CO 80202

Geologist

Name Teresa Malesardi

Company Noble Energy Inc

Address 1625 Broadway Suite 2200
Denver, CO 80202

tmalesardi@nobleenergyinc.com

Zone Color Coding

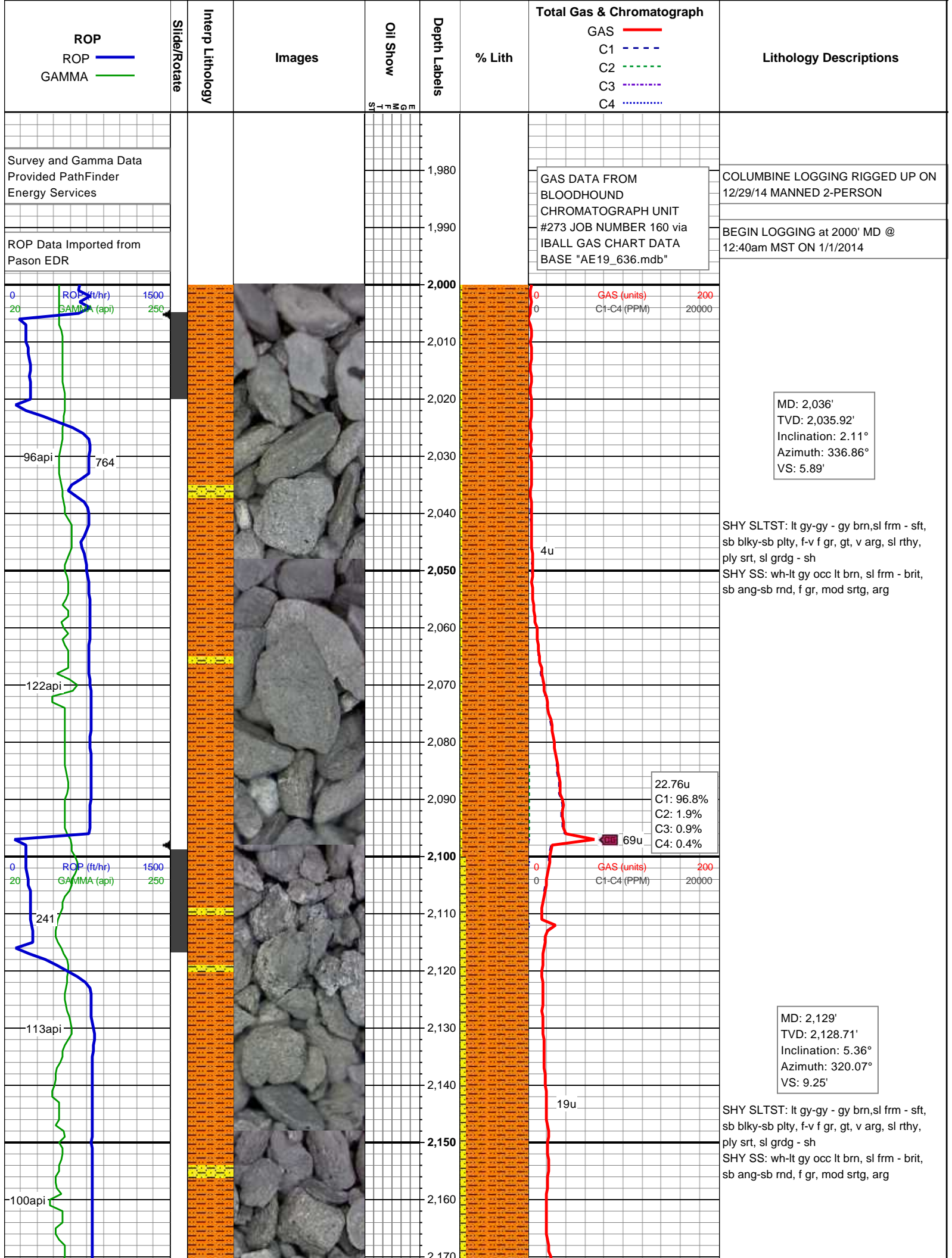
Oil
 Condensate
 Gas
 Note
 Core
 Pressure
 Error
 Water
 Seal

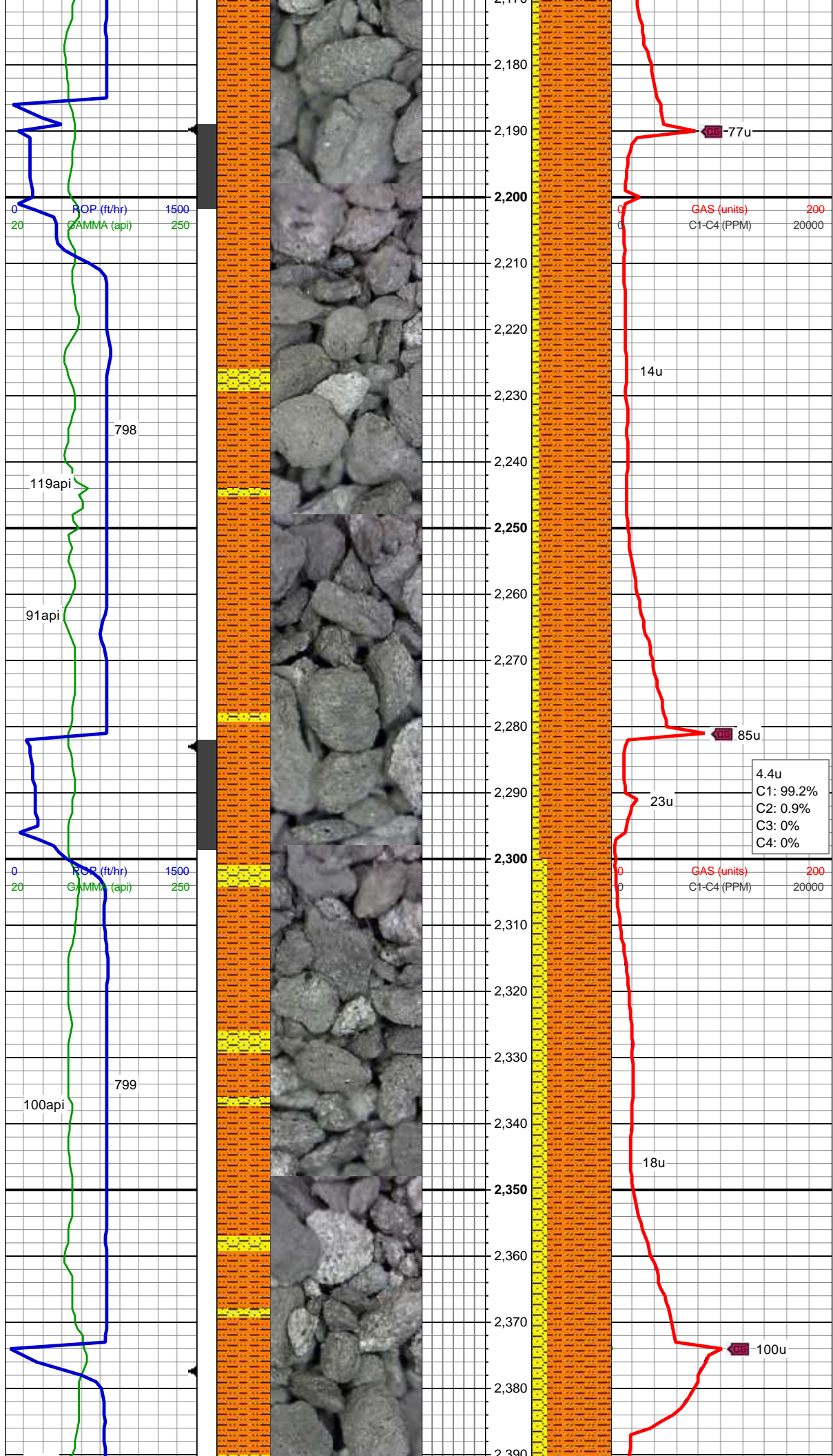
Other

Well Site Logging Company Columbine Logging Inc.

Well Site Geologist (Days) Brad Wilson

Well Site Geologist (Nights) Brendan J. Pfeiffer





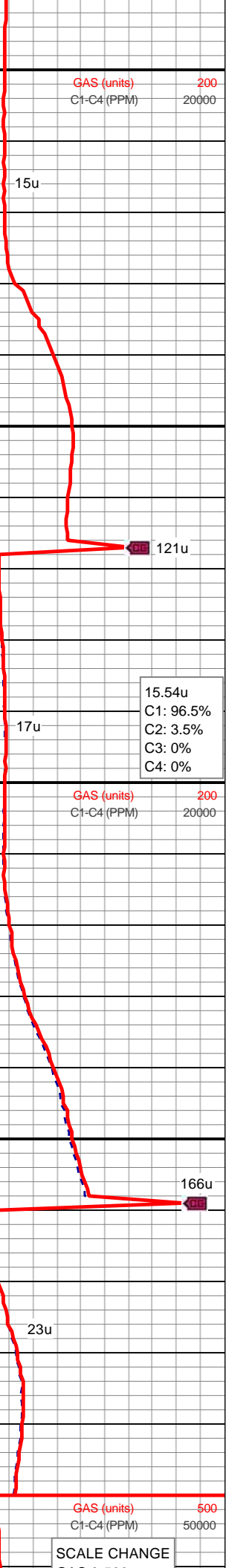
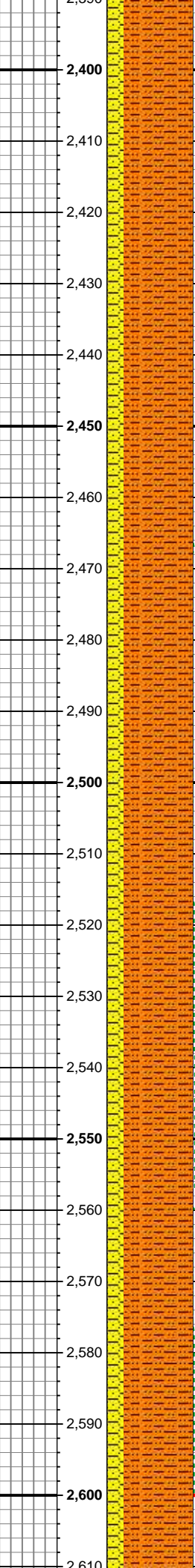
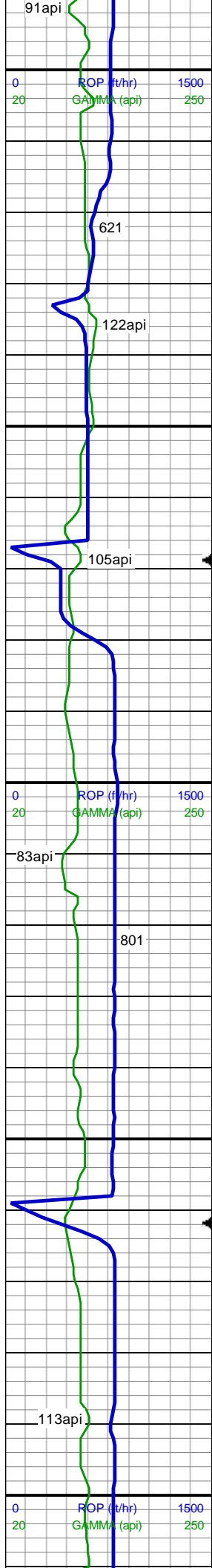
MD: 2,222'
TVD: 2,221.19'
Inclination: 6.77°
Azimuth: 313.37°
VS: 15.89'

SHY SLTST: lt gy-gy - gy brn,sl frm - sft,
sb blk-y-sb plty, f-v f gr, gt, v arg, sl rthy,
ply srt, sl grd-g - sh
SHY SS: wh-lt gy occ lt brn, sl frm - brit,
sb ang-sb rnd, f gr, mod srtg, arg

4.4u
C1: 99.2%
C2: 0.9%
C3: 0%
C4: 0%

MD: 2,316'
TVD: 2,314.31'
Inclination: 8.88°
Azimuth: 307.04°
VS: 25.55'

SHY SLTST: lt gy-gy - gy brn,sl frm - sft,
sb blk-y-sb plty, f-v f gr, gt, v arg, sl rthy,
ply srt, sl grd-g - sh
SHY SS: wh-lt gy occ lt brn, sl frm - brit,
sb ang-sb rnd, f gr, mod srtg, arg



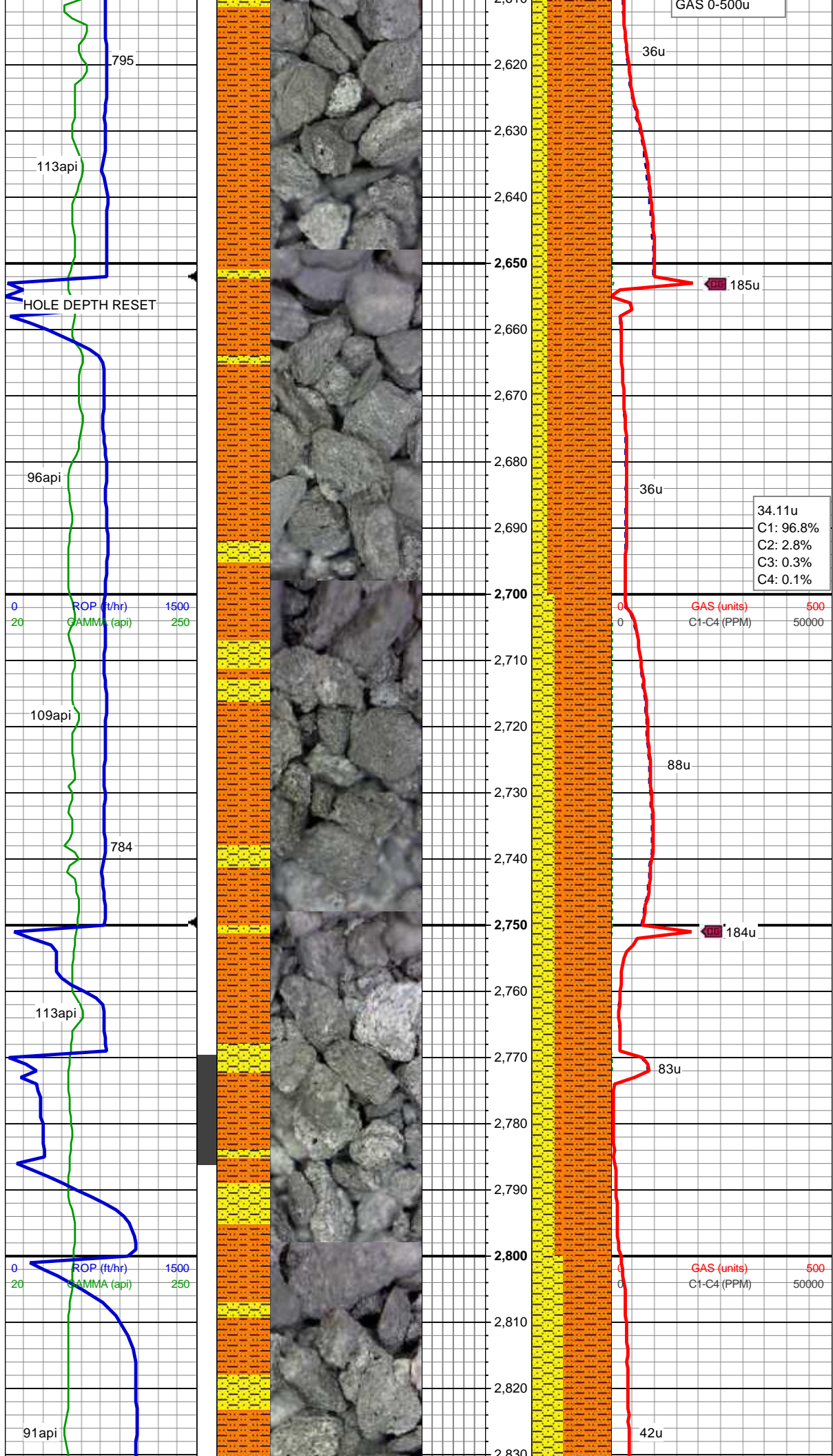
MD: 2,408'
TVD: 2,405.26'
Inclination: 8.44°
Azimuth: 305.81°
VS: 36.53'

SHY SLTST: lt gy-gy - gy brn,sl frm - sft,
sb blkly-sb plty, f-v f gr, gt, v arg, sl rthy,
ply srt, sl grdg - sh
SHY SS: wh-lt gy occ lt brn, sl frm - brit,
sb ang-sb rnd, f gr, mod srtg, arg

MD: 2,501'
TVD: 2,497.26'
Inclination: 8.44°
Azimuth: 305.71°
VS: 47.45'

SHY SLTST: lt gy-gy - gy brn,sl frm - sft,
sb blkly-sb plty, f-v f gr, gt, v arg, sl rthy,
ply srt, sl grdg - sh
SHY SS: wh-lt gy occ lt brn, sl frm - brit,
sb ang-sb rnd, f gr, mod srtg, arg

MD: 2,596'
TVD: 2,591.25'
Inclination: 8.27°
Azimuth: 305.32°
VS: 58.53'

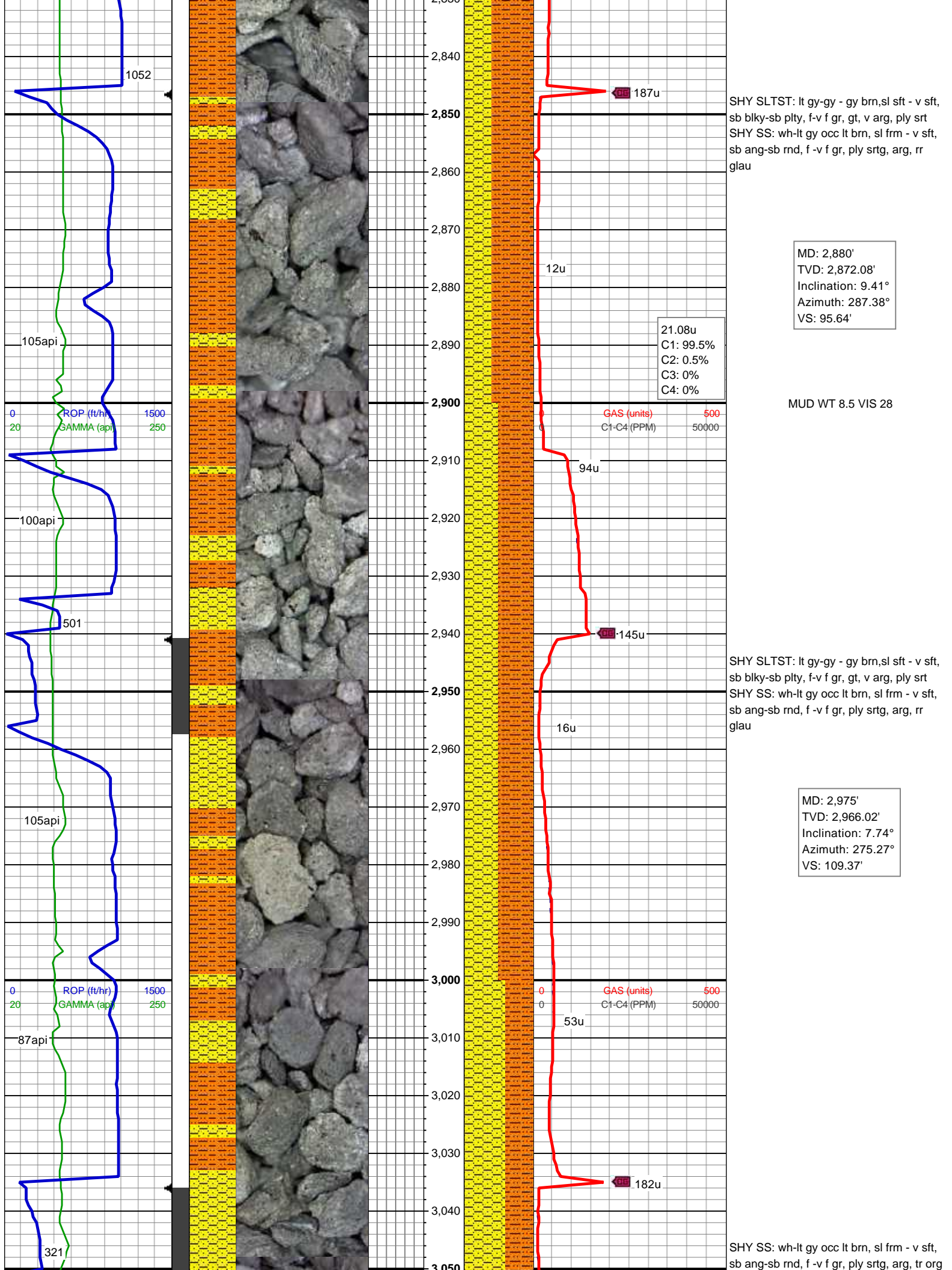


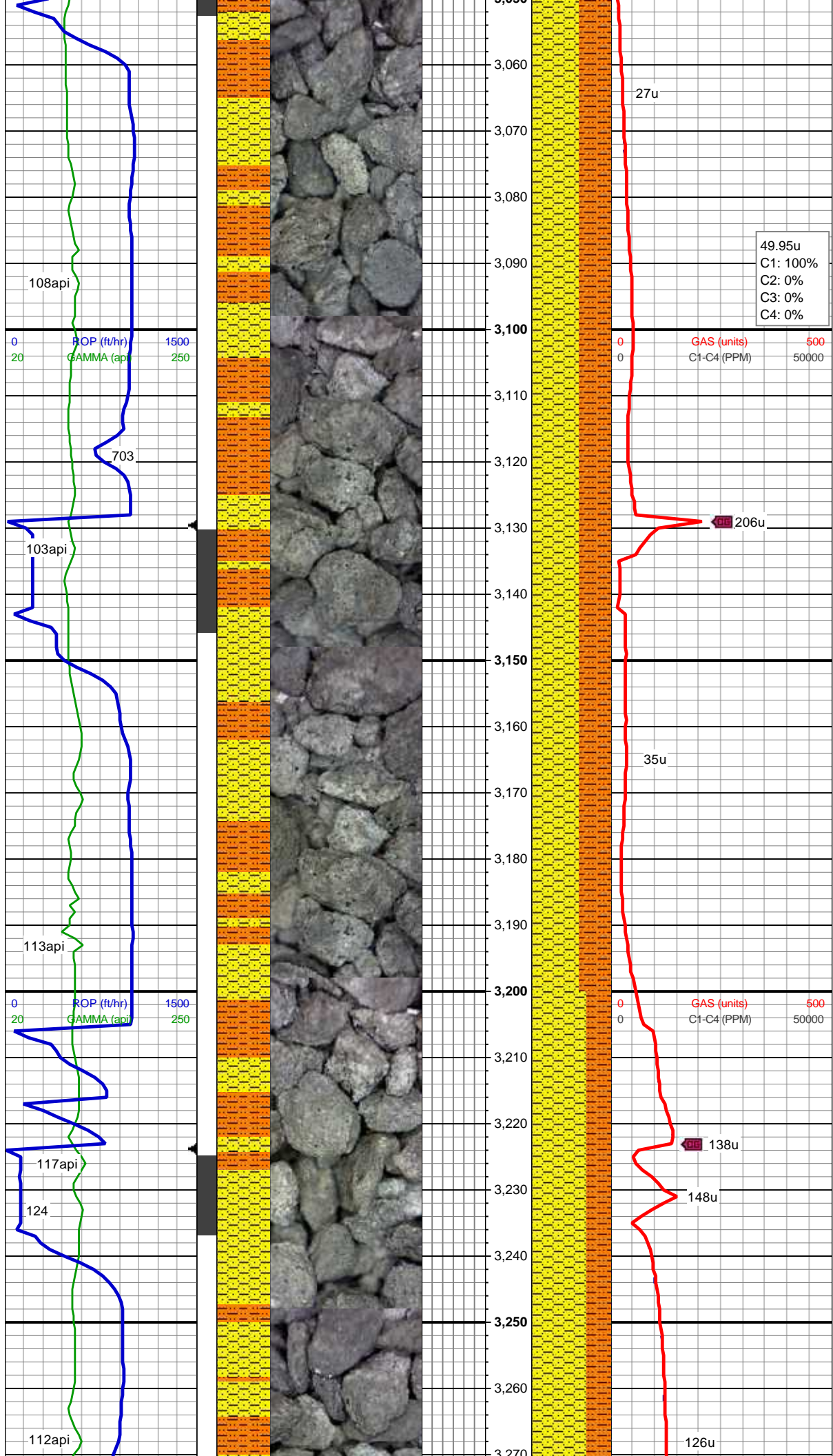
SHY SLTST: lt gy-gy - gy brn,sl frm - sft,
sb blk-y-sb plty, f-v f gr, gt, v arg, sl rthy,
ply srt, sl grdg - sh
SHY SS: wh-lt gy occ lt brn, sl frm - brit,
sb ang-sb rnd, f gr, mod srtg, arg

MD: 2,691'
TVD: 2,685.28'
Inclination: 8.09°
Azimuth: 304.58°
VS: 69.46'

SHY SLTST: lt gy-gy - gy brn,sl sft - v sft,
sb blk-y-sb plty, f-v f gr, gt, v arg, ply srt
SHY SS: wh-lt gy occ lt brn, sl frm - v sft,
sb ang-sb rnd, f -v f gr, ply srtg, arg, rr
glau

MD: 2,786'
TVD: 2,779.26'
Inclination: 8.79°
Azimuth: 290.13°
VS: 81.66'





mat
SHY SLTST: lt gy-gy - gy brn,sl sft - v sft,
sb blk-y-sb plty, f-v f gr, gt, v arg, ply srt

MD: 3,070'
TVD: 3,060.35'
Inclination: 5.89°
Azimuth: 262.42°
VS: 120.57'

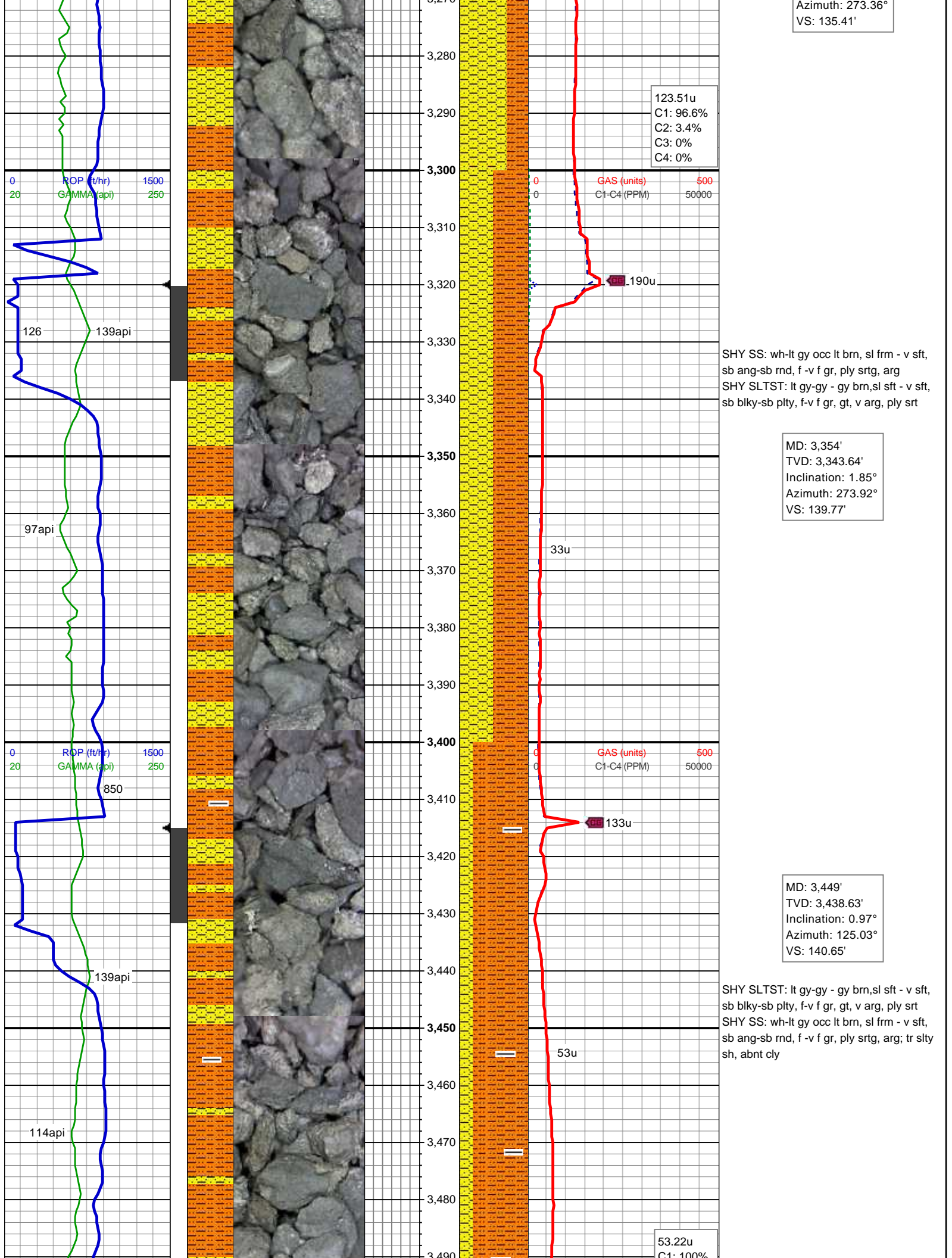
49.95u
C1: 100%
C2: 0%
C3: 0%
C4: 0%

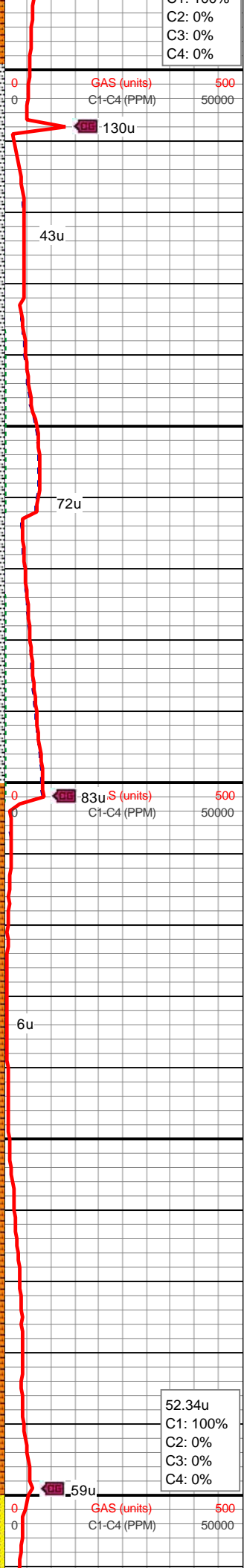
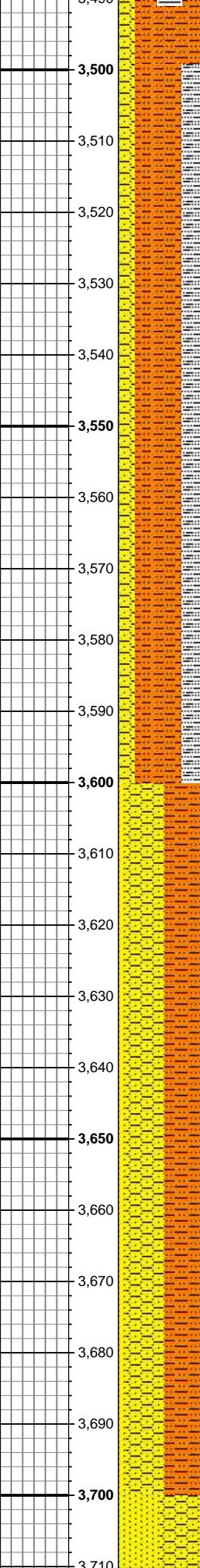
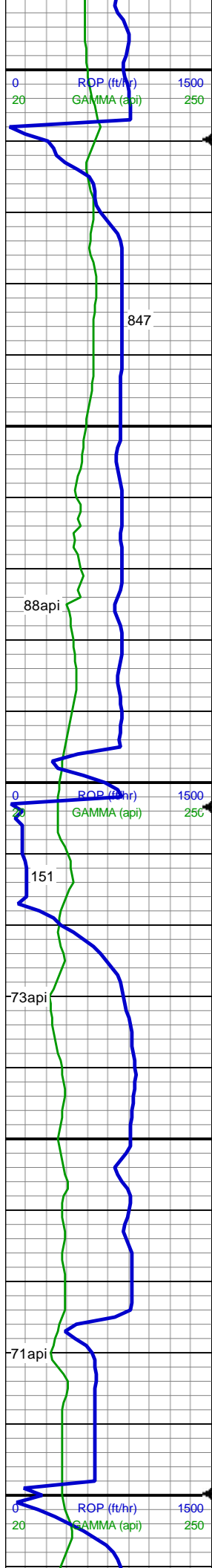
SHY SS: wh-lt gy occ lt brn, sl frm - v sft,
sb ang-sb rnd, f -v f gr, ply srtg, arg, tr org
mat
SHY SLTST: lt gy-gy - gy brn,sl sft - v sft,
sb blk-y-sb plty, f-v f gr, gt, v arg, ply srt

MD: 3,164'
TVD: 3,153.97'
Inclination: 4.4°
Azimuth: 263.02°
VS: 128.95'

SHY SS: wh-lt gy occ lt brn, sl frm - v sft,
sb ang-sb rnd, f -v f gr, ply srtg, arg, tr org
mat
SHY SLTST: lt gy-gy - gy brn,sl sft - v sft,
sb blk-y-sb plty, f-v f gr, gt, v arg, ply srt

MD: 3,259'
TVD: 3,248.75'
Inclination: 3.43°



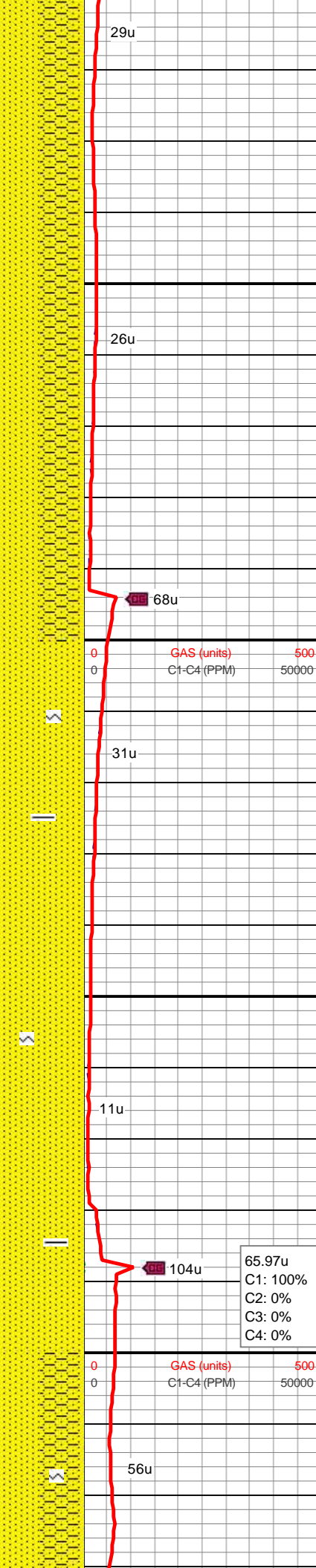
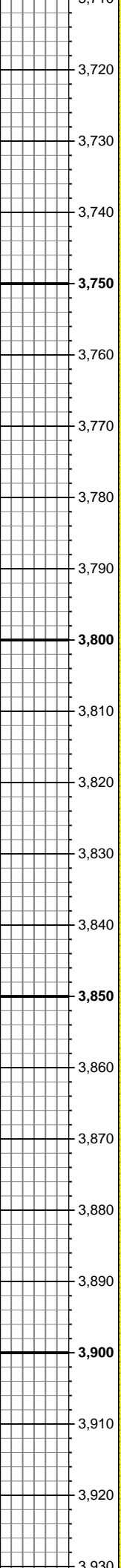
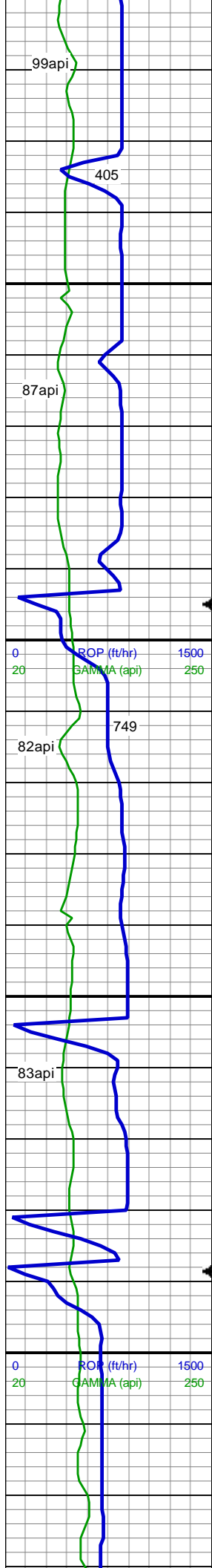


MD: 3,544'
TVD: 3,533.61'
Inclination: 1.14°
Azimuth: 116.37°
VS: 139.16'

SHY SLTST: lt gy-gy - gy brn,sl sft - v sft,
sb blk-y-sb plty, f-v f gr, gt, v arg, ply srt
SHY SS: wh-lt gy occ lt brn, sl frm - v sft,
sb ang-sb rnd, f -v f gr, ply srtg, arg
SLTY SH: med -dk gy, sb blk-y-sb plty, v
sft- sl frm, slt tex, sl rthy lstr, sl aren, non
calc

MD: 3,639'
TVD: 3,628.61'
Inclination: 0.09°
Azimuth: 320.53°
VS: 138.37'

SHY SLTST: lt gy-gy - gy brn,sl sft - v sft,
sb blk-y-sb plty, f-v f gr, gt, v arg, ply srt
SHY SS: wh-lt gy occ lt brn, sl frm - v sft,
sb ang-sb rnd, f -v f gr, ply srtg, arg
SS: lt gy - wh, S&P, frm - brit, sb rnd, f gr,
mod srt, sl arg; occ abnt cly



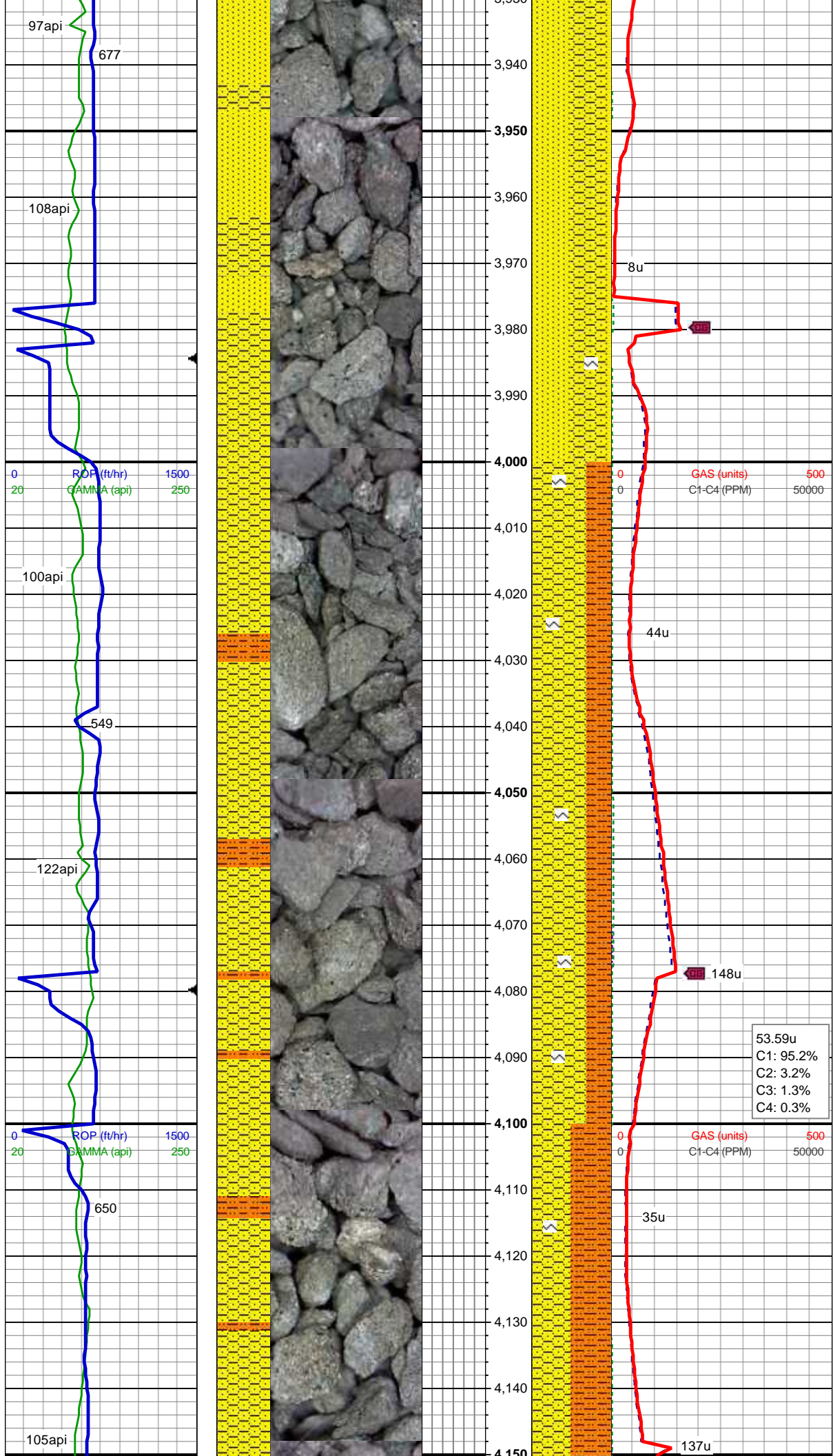
MD: 3,734'
TVD: 3,723.61'
Inclination: 0.35°
Azimuth: 352.23°
VS: 138.45'

SHY SS: wh-lt gy occ lt brn, sl frm - v sft,
sb ang-sb rnd, f -v f gr, ply srtg, arg
SS: lt gy - wh, S&P, frm - brit, sb rnd, f gr,
mod srt, sl arg; rr - occ glau

MD: 3,829'
TVD: 3,818.61'
Inclination: 0.35°
Azimuth: 339.54°
VS: 138.58'

SS: lt gy - wh, S&P, frm - brit, sb rnd, f gr,
mod srt, sl arg; occ glau, ip grdg - shy ss,
tr dk gy - blk sh

MD: 3,924'
TVD: 3,913.6'
Inclination: 0.53°
Azimuth: 348.01°
VS: 138.76'



SHY SS: wh-lt gy occ lt brn, sl frm - v sft,
sb ang-sb rnd, f -v f gr, ply srtg, v arg,
abnt glau
SS: lt gy - wh, S&P, frm - brit, sb rnd, f gr,
mod srt, sl calc, grdg - shy ss

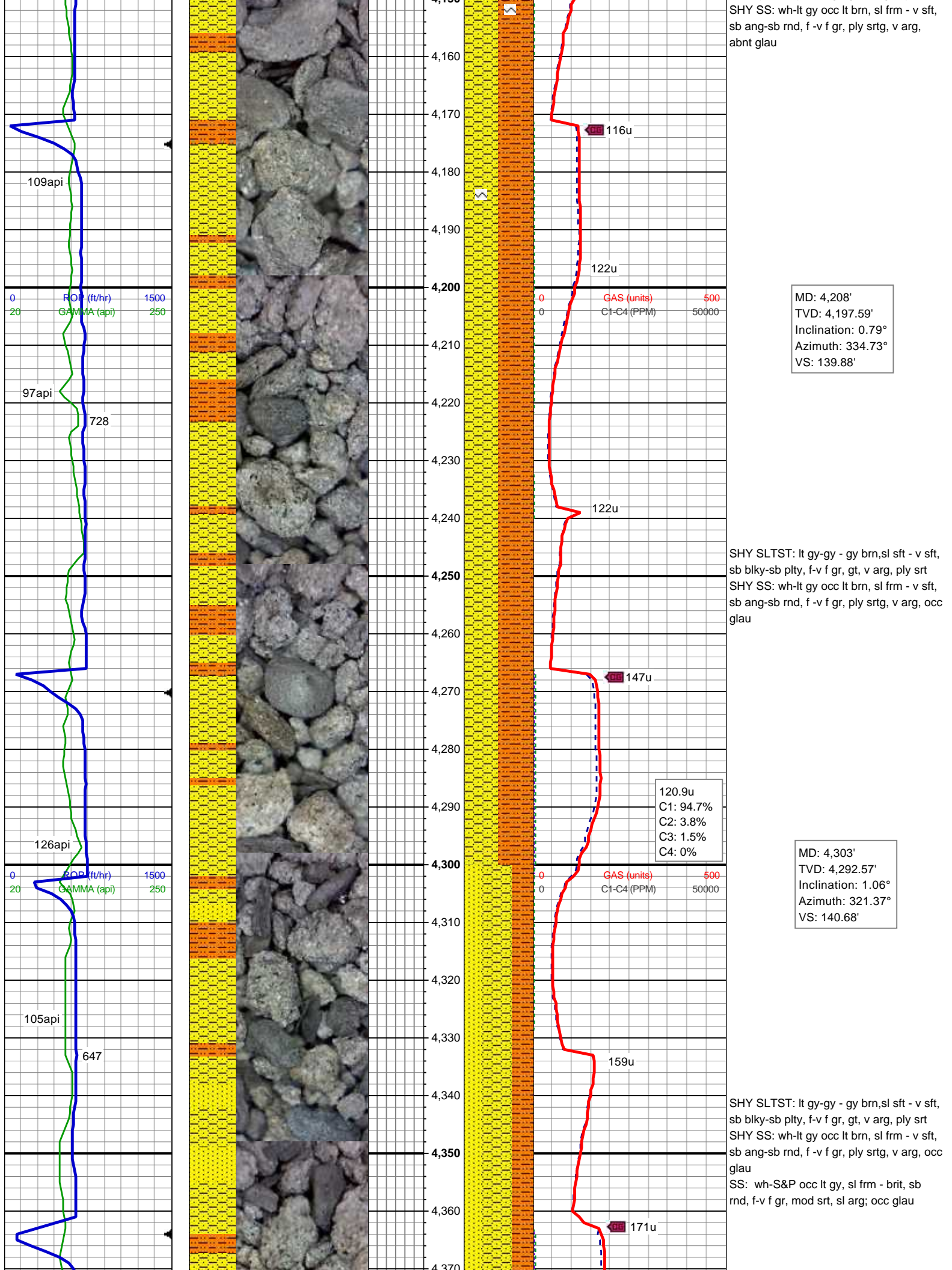
MD: 4,018'
TVD: 4,007.6'
Inclination: 0.7°
Azimuth: 339.59°
VS: 139.03'

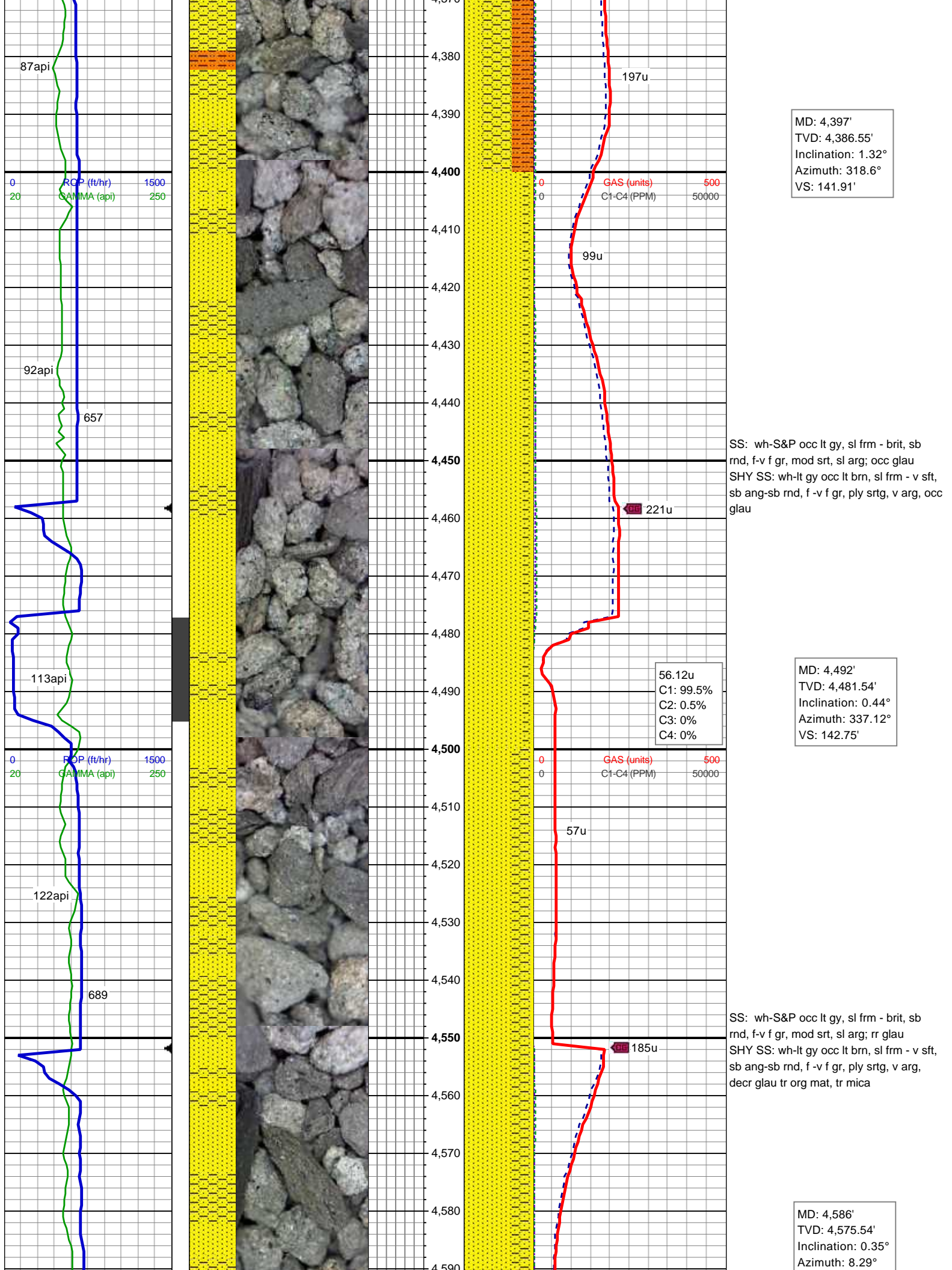
SHY SS: wh-lt gy occ lt brn, sl frm - v sft,
sb ang-sb rnd, f -v f gr, ply srtg, v arg,
abnt glau
SHY SLTST: lt gy-gy - gy brn,sl sft - v sft,
sb blkly-sb plty, f-v f gr, gt, v arg, ply srt

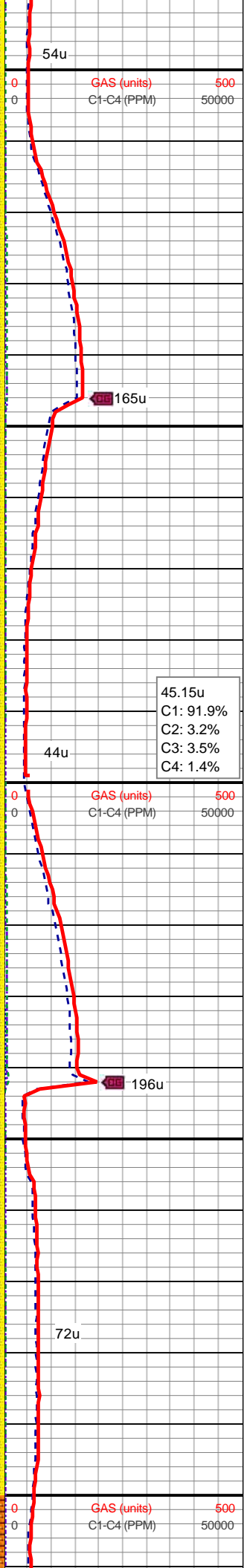
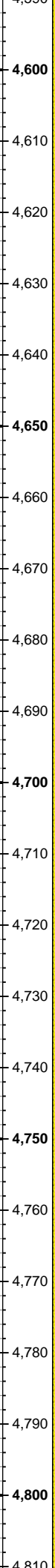
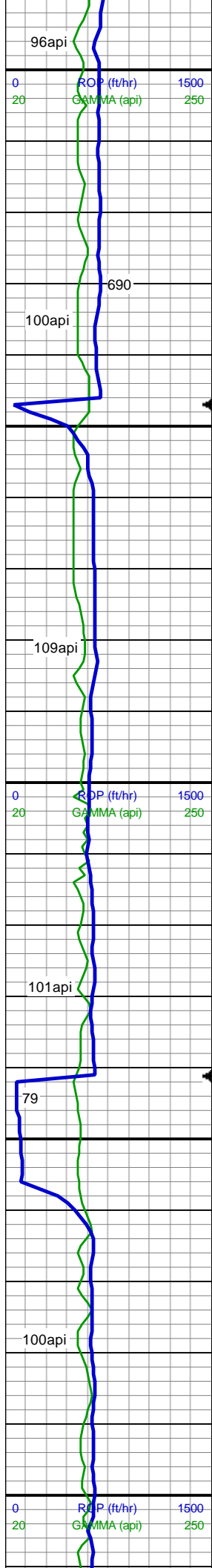
53.59u
C1: 95.2%
C2: 3.2%
C3: 1.3%
C4: 0.3%

MD: 4,113'
TVD: 4,102.59'
Inclination: 0.53°
Azimuth: 332.63°
VS: 139.41'

SHY SLTST: lt gy-gy - gy brn,sl sft - v sft,
sb blkly-sb plty, f-v f gr, gt, v arg, ply srt







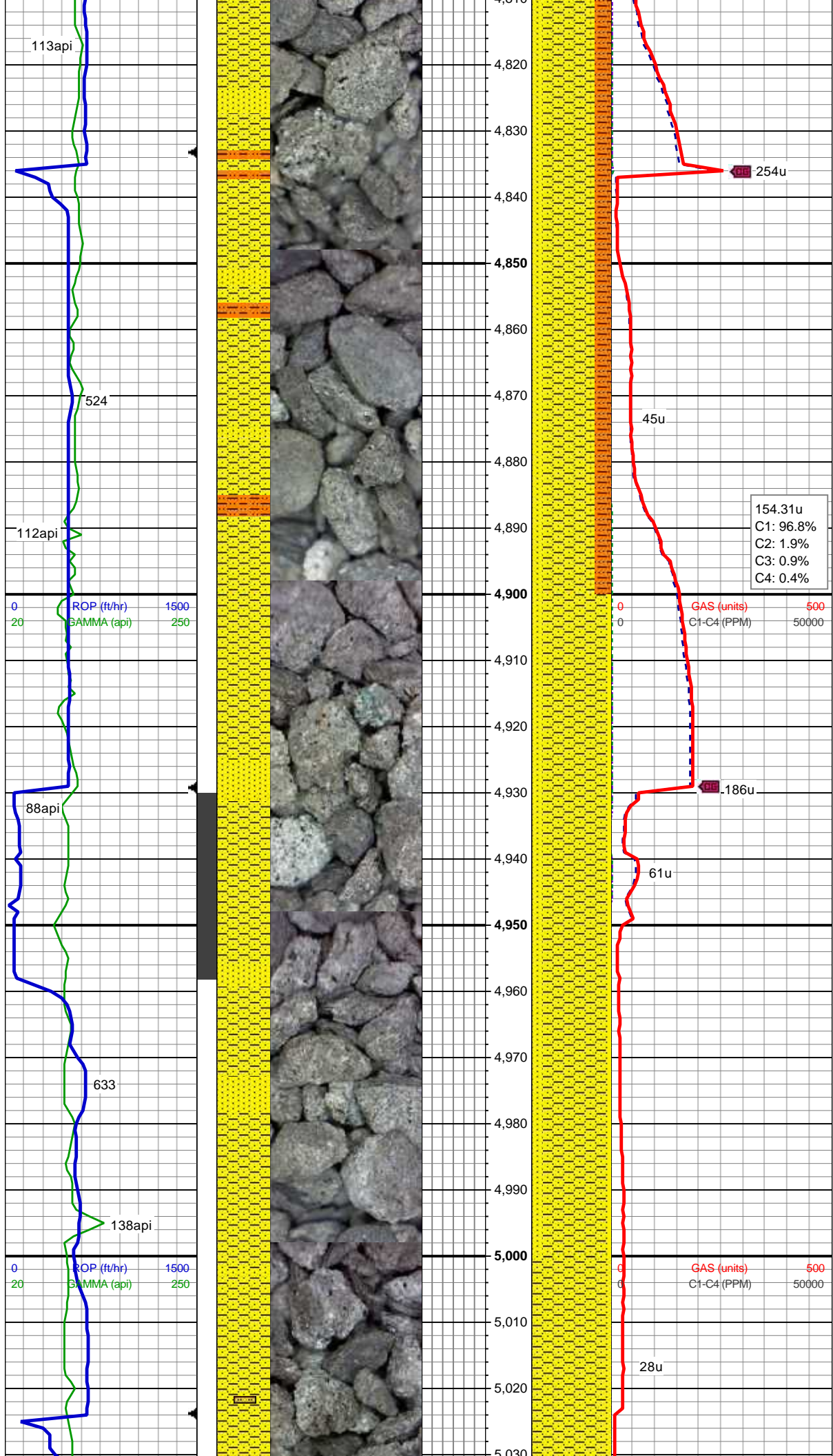
SS: wh-S&P occ lt gy, sl frm - brit, sb
rnd, f-v f gr, mod srt, sl arg; rr glau
SHY SS: wh-lt gy occ lt brn, sl frm - v sft,
sb ang-sb rnd, f -v f gr, ply srtg, v arg,
decr glau tr org mat, tr mica

MD: 4,680'
TVD: 4,669.54'
Inclination: 0.44°
Azimuth: 341.65°
VS: 142.9'

45.15u
C1: 91.9%
C2: 3.2%
C3: 3.5%
C4: 1.4%

SS: wh-S&P occ lt gy, sl frm - brit, sb
rnd, f-v f gr, mod srt, sl arg; rr glau
SHY SS: wh-lt gy occ lt brn, sl frm - v sft,
sb ang-sb rnd, f -v f gr, ply srtg, v arg,
decr glau tr org mat, tr mica

MD: 4,774'
TVD: 4,763.53'
Inclination: 1.06°
Azimuth: 179.53°
VS: 143.02'

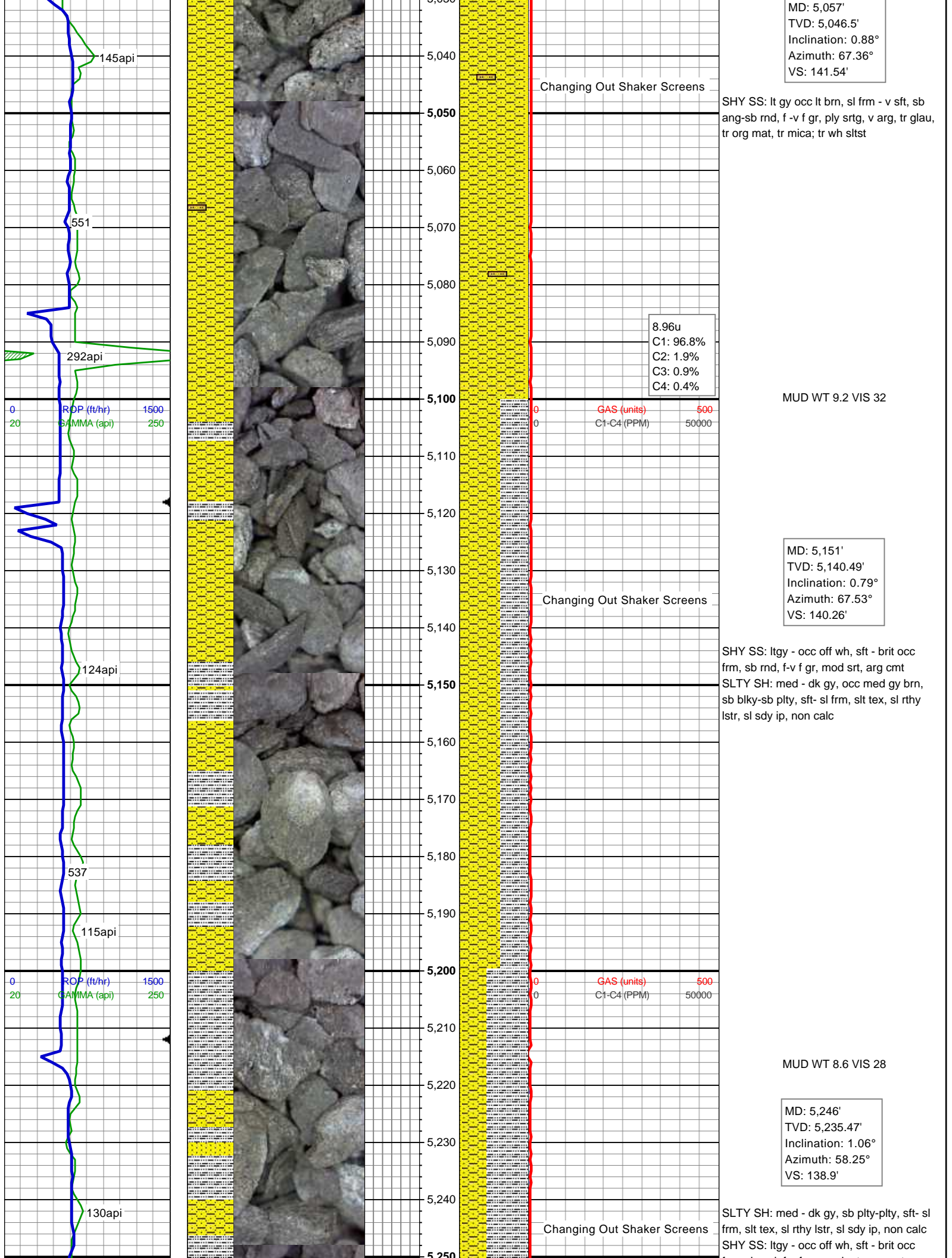


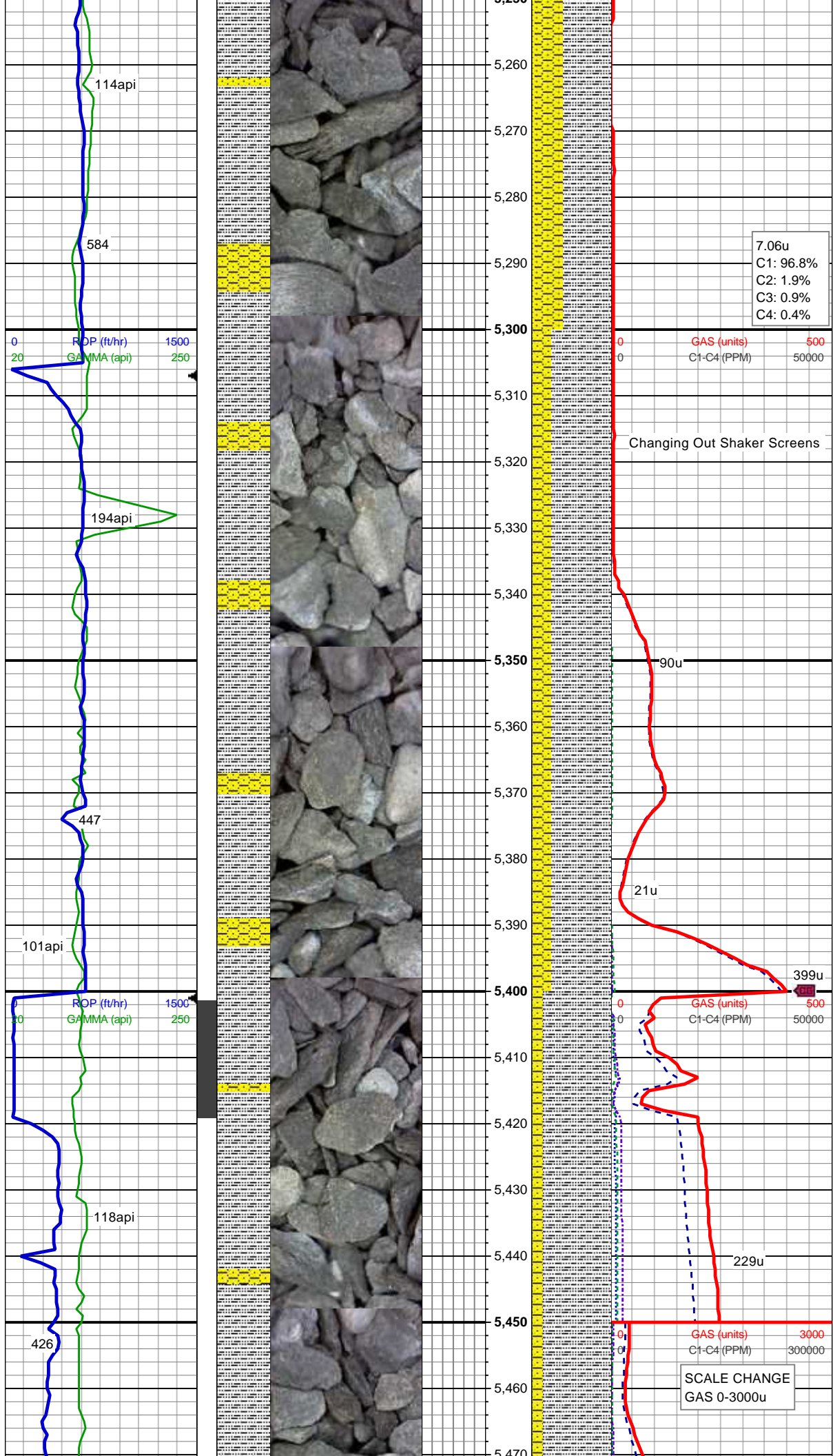
SHY SS: wh-lt gy occ lt brn, sl frm - v sft, sb ang-sb rnd, f -v f gr, ply srtg, v arg, decr glau tr org mat, tr mica
SS: lt gy -wh-S&P, sl frm - brit, sb rnd, f-v f gr, mod srt, sl arg; rr glau
SHY SLTST: lt gy-gy - gy brn,sl sft - v sft, sb blkly-sb plty, f-v f gr, gt, v arg, ply srt

MD: 4,868'
TVD: 4,857.51'
Inclination: 1.23°
Azimuth: 188.29°
VS: 143.19'

SHY SS: lt gy occ lt brn, sl frm - v sft, sb ang-sb rnd, f -v f gr, ply srtg, v arg, decr glau tr org mat, tr mica
SS: lt gy -wh-S&P, sl frm - brit, sb rnd, f-v f gr, mod srt, sl arg; rr glau

MD: 4,962'
TVD: 4,951.51'
Inclination: 0.7°
Azimuth: 80.23°
VS: 142.79'





firm, sb rnd, f-v f gr, mod srt, arg cmt
SS: lt gy -wh-S&P, sl frm - brit, sb rnd, f-v
f gr, mod srt, sl arg; rr cal

7.06u
C1: 96.8%
C2: 1.9%
C3: 0.9%
C4: 0.4%

GAS (units)
C1-C4 (PPM)

Changing Out Shaker Screens

MD: 5,340'
TVD: 5,329.46'
Inclination: 1.14°
Azimuth: 63.97°
VS: 137.3'

SLTY SH: med - dk gy, sb plty-plty, sft - sl
frm, slt tex, sl rthy lstr, sl sdy ip, non calc
SHY SS: ltgy - occ off wh, sft - brit occ
frm, sb rnd, f-v f gr, mod srt, arg cmt; tr
pyr

90u

21u

399u

GAS (units)
C1-C4 (PPM)

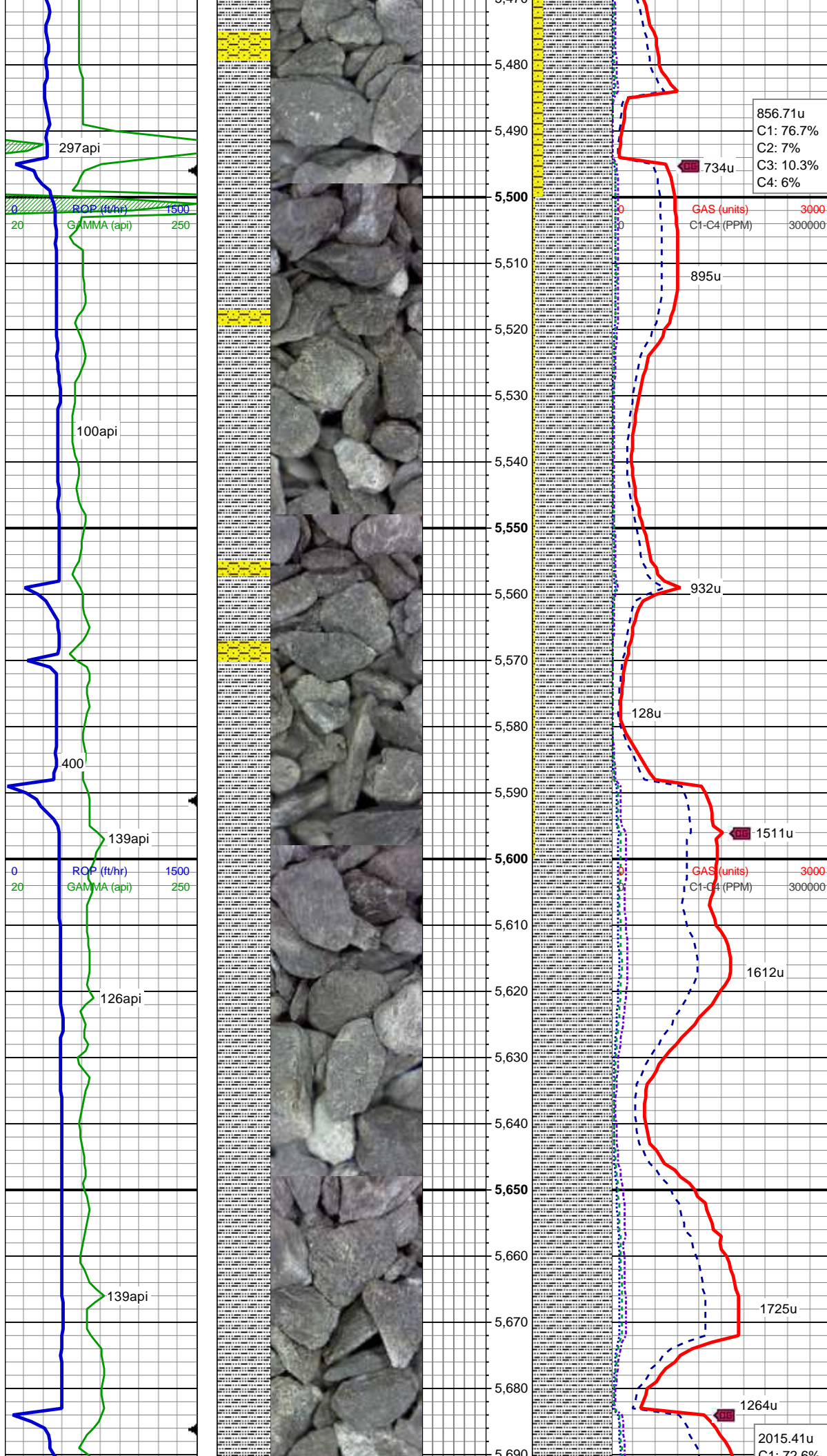
MD: 5,435'
TVD: 5,424.44'
Inclination: 1.14°
Azimuth: 150.12°
VS: 135.99'

SLTY SH: med - dk gy, sb plty-plty, sft - sl
frm, slt tex, sl rthy lstr, sl sdy ip, non calc
SHY SS: ltgy - occ off wh, sft - brit occ
frm, sb rnd, f-v f gr, mod srt, arg cmt; tr
pyr, tr s&p ss

229u

GAS (units)
C1-C4 (PPM)

SCALE CHANGE
GAS 0-3000u



856.71u
C1: 76.7%
C2: 7%
C3: 10.3%
C4: 6%

734u

GAS (units) 3000
C1-C4 (PPM) 300000

895u

MD: 5,529'
TVD: 5,518.43'
Inclination: 1.14°
Azimuth: 154.63°
VS: 135.15'

SLTY SH: med - dk gy, sb plty-plty, sft- sl
frm, slt tex, sl rthy lstr, sl sdy ip, non calc
SHY SS: ltgy - occ off wh, sft - brit occ
frm, sb rnd, f-v f gr, mod srt, arg cmt; rr
s&p ss

932u

128u

1511u

GAS (units) 3000
C1-C4 (PPM) 300000

1612u

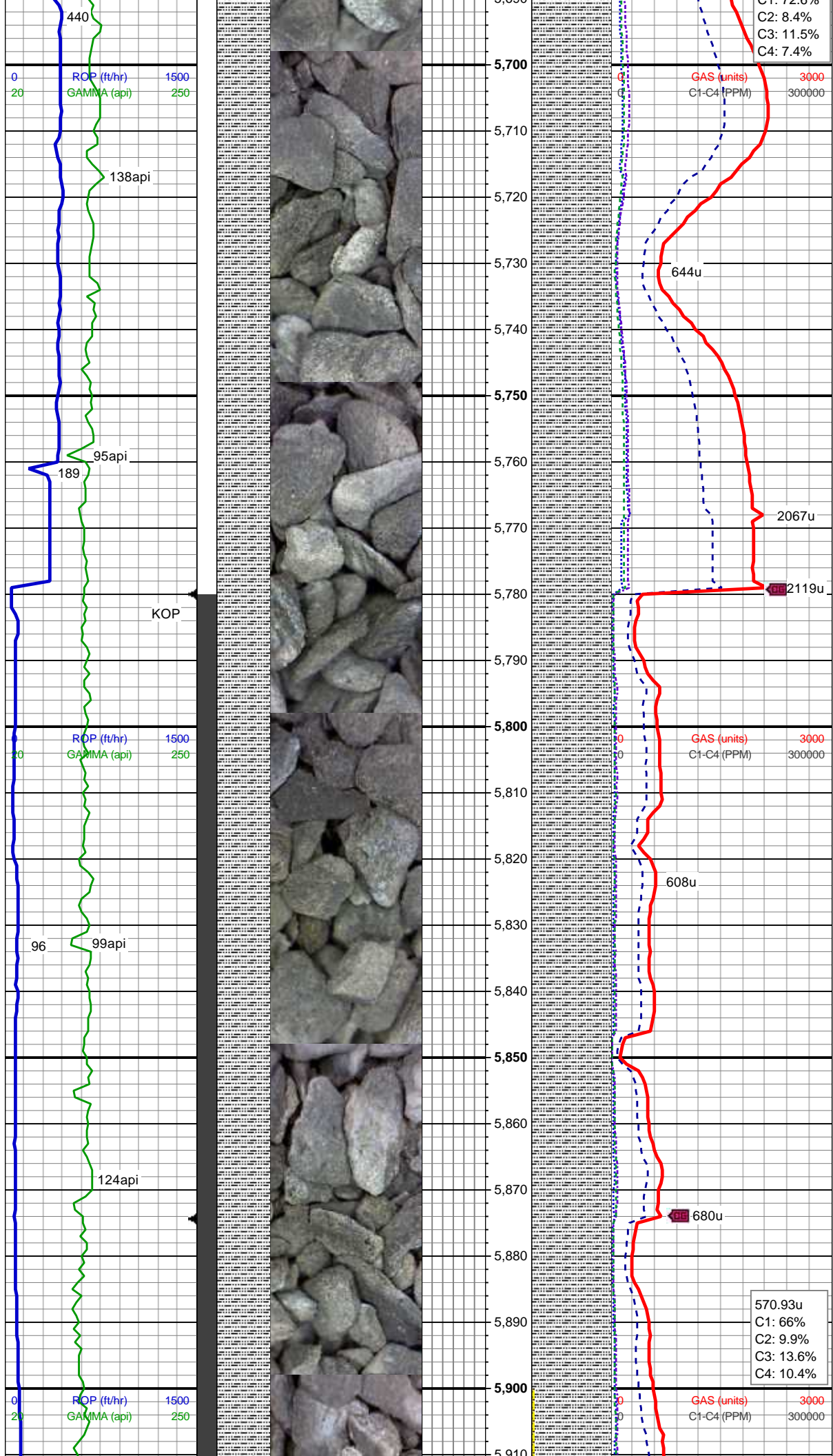
MD: 5,624'
TVD: 5,613.41'
Inclination: 0.97°
Azimuth: 155.64°
VS: 134.45'

SLTY SH: med - dk gy, sb plty-plty, sft- sl
frm, slt tex, sl rthy lstr, sl sdy ip, non calc;
rr glau, no bent

1725u

1264u

2015.41u
C1: 72.6%



MD: 5,719'
TVD: 5,708.4'
Inclination: 0.97°
Azimuth: 159.94°
VS: 133.87'

SLTY SH: med - dk gy, sb plty-plty, sft- sl
frm, slt tex, sl rthy lstr, sl sdy ip, non calc;
occ s&p ss, no bent

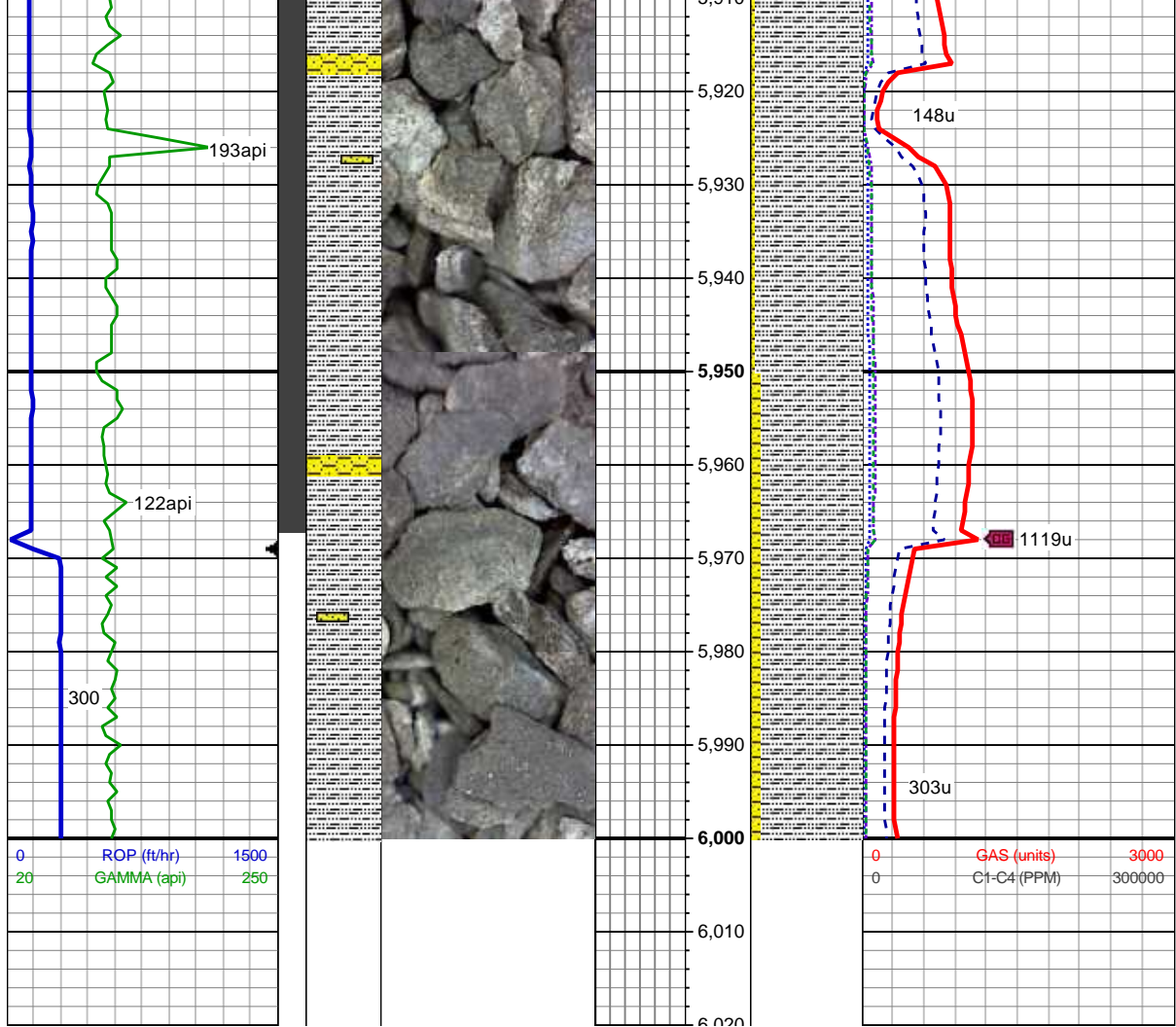
MD: 5,813'
TVD: 5,802.33'
Inclination: 3.61°
Azimuth: 242.79°
VS: 136.27'

SLTY SH: med - dk gy, sb plty-plty, sft- sl
frm, slt tex, sl rthy lstr, sl sdy ip, non calc;
tr s&p ss, rr shy sltst no bent

570.93u
C1: 66%
C2: 9.9%
C3: 13.6%
C4: 10.4%

MD: 5,908'
TVD: 5,895.83'
Inclination: 15.65°

Azimuth: 261.87°
VS: 151.73'



SLTY SH: med - dk gy, sb blkly-sb plty, sft-sl frm, slt tex, sl rthy lstr, sl sdy ip, non calc
SHY SS: ltgy-gy - occ offwht, sft - brit occ frm, sb rnd, f-v f gr, mod srt, arg cmt; tr s&p ss

MUDLOG CONTUINES ON
"Wells Ranch AE19-636
HORZ.mplot" for Curve and
Lateral Sections of this Well.