

COLUMBINE LOGGING

Scale: 5" / 100'
Measured Depth Log

Well Name Wells Ranch AE19-649

Location NWSW 20 6N 62W 6 PM

State COLORADO

County WELD

Country UNITED STATES

Rig Number H&P 330

API Number 05-123-39635

Field WATTENBERG

Region DJ BASIN

Drilling Completed 1/24/2015

Spud Date 1/15/2015

Surface Coordinates NWSW 20 6N 62W 6 PM
1723 FSL 65 FWL
Lat/Long: 40.46969/-104.35586

Bottom Hole Coordinates Planned Location
Sec: 24 Twp: 6N 63W
Footages: 2570 FFSLL 235 FFELL

Ground Elevation 4,786'

K.B. Elevation 4,816'

Logged Interval 2,000' To 11,772'

Total Depth 11,772'

Formation NIOBRARA

Type of Drilling Fluid WATER BASED MUD, LSND

Other Symbols

Oil Show

- DEAD
- EVEN
- QUESTIONABLE
- SPOTTED STAINING

Porosity

- E EARTHY
- F FENESTRAL
- F FRACTURE
- 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 WACKSTONE

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 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

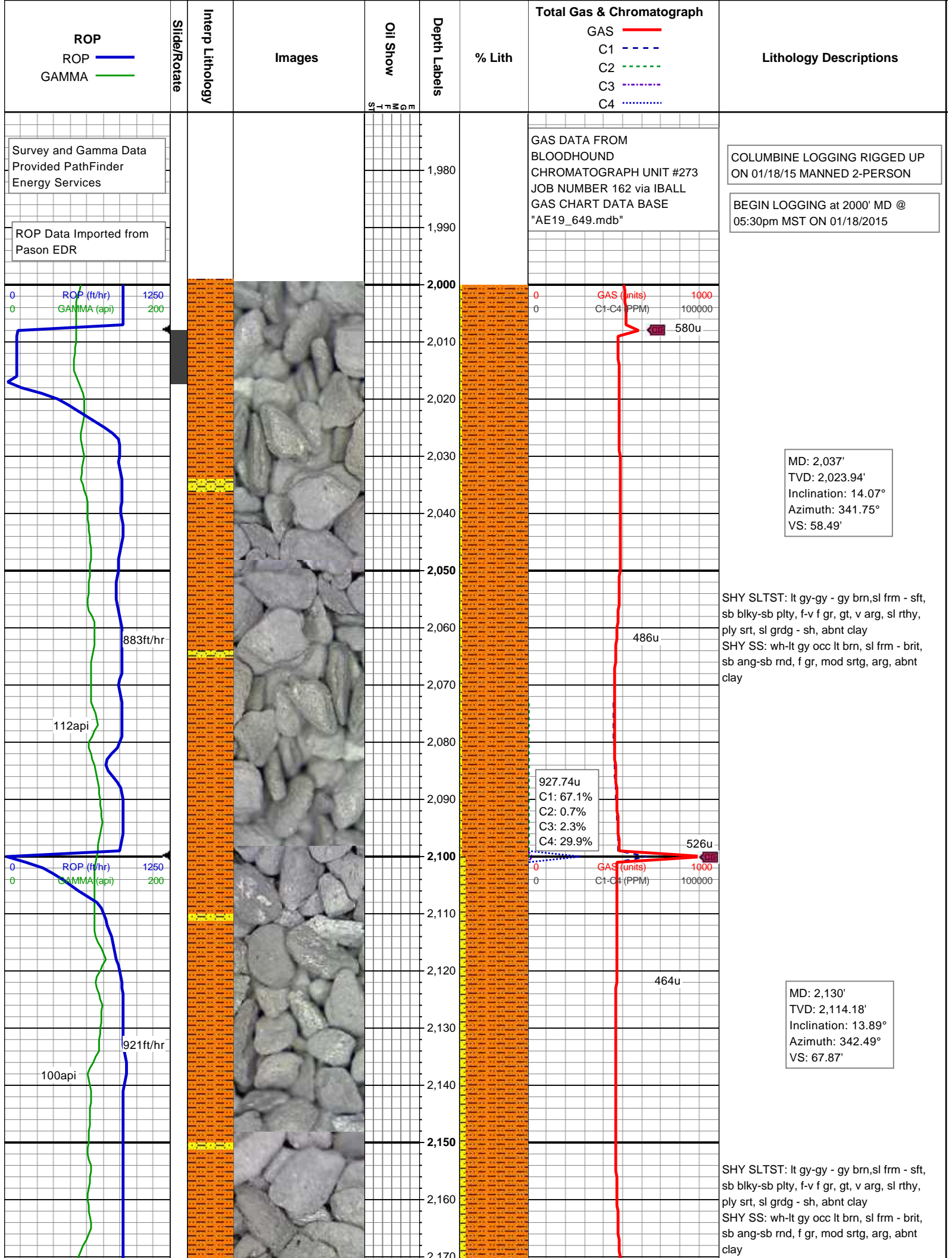
- Oil
- Condensate
- Gas
- Note
- Core
- Pressure
- Error
- Water
- Seal

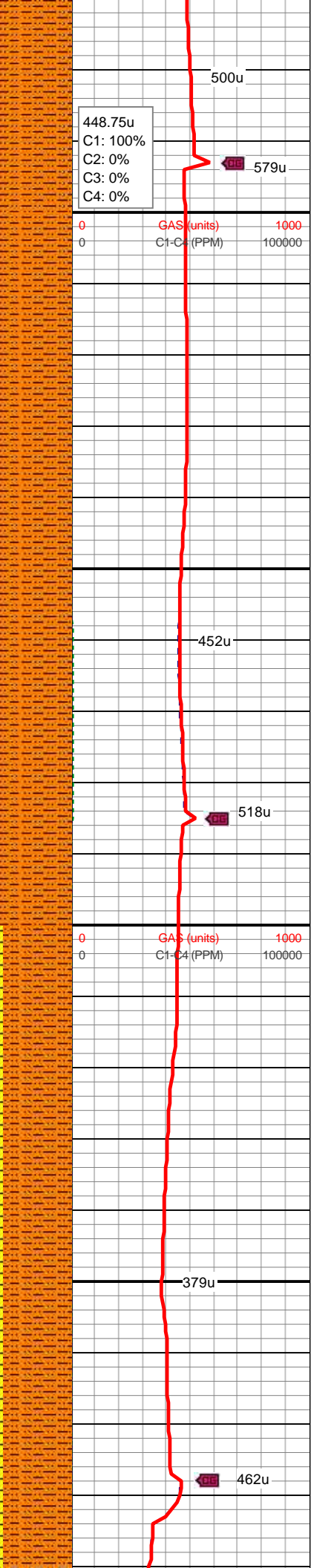
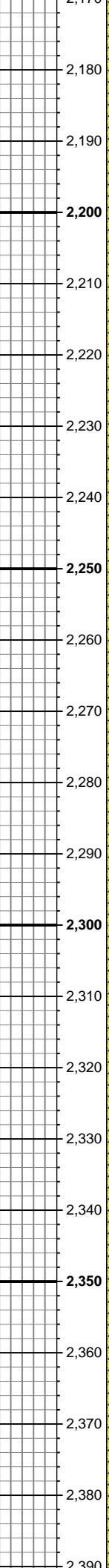
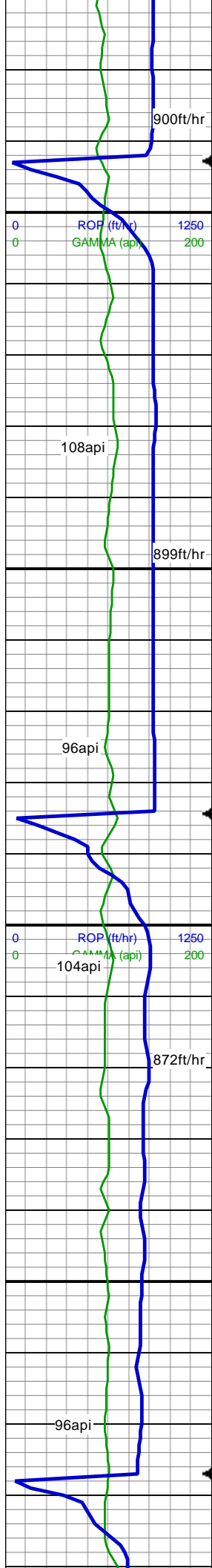
Other

Well Site Logging Company Columbine Logging Inc.

Well Site Geologist (Days) Brad Wilson

Well Site Geologist (Nights) Jason Bell

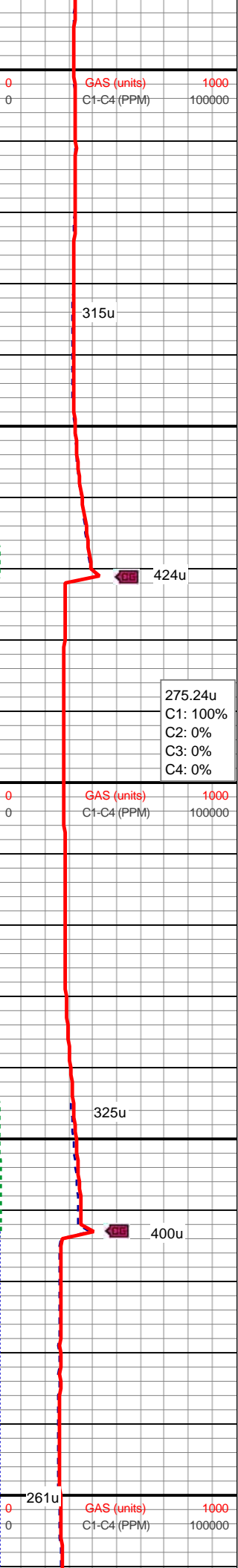
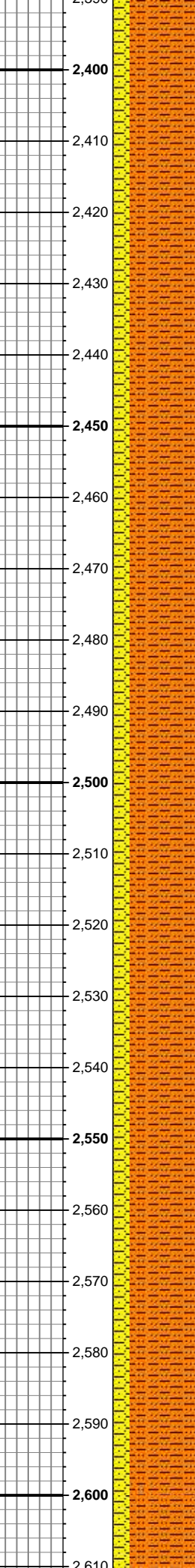
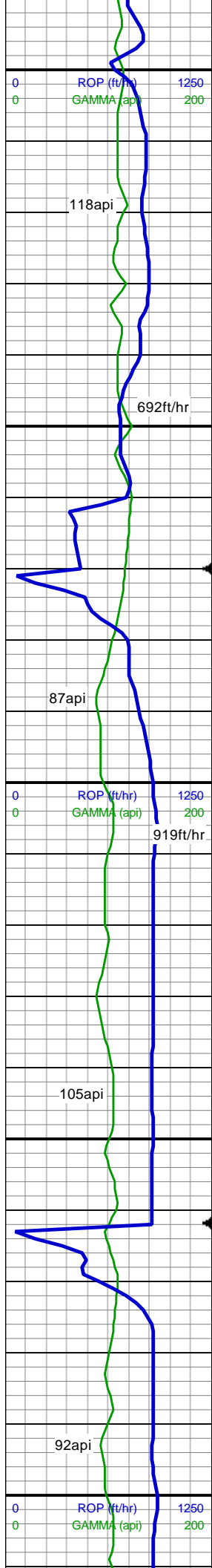




SHY SLTST: lt gy-gy - gy brn,sl frm - sft, sb blkly-sb plty, f-v f gr, gt, v arg, sl rthy, ply srt, sl grd - sh, abnt clay
SHY SS: wh-lt gy occ lt brn, sl frm - brit, sb ang-sb rnd, f gr, mod srtg, arg, abnt clay

MD: 2,316'
TVD: 2,294.57'
Inclination: 14.33°
Azimuth: 342.53°
VS: 86.53'

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 grd - sh, abnt clay
SHY SS: wh-lt gy occ lt brn, sl frm - brit, sb ang-sb rnd, f gr, mod srtg, arg, abnt clay, increasing shy ss



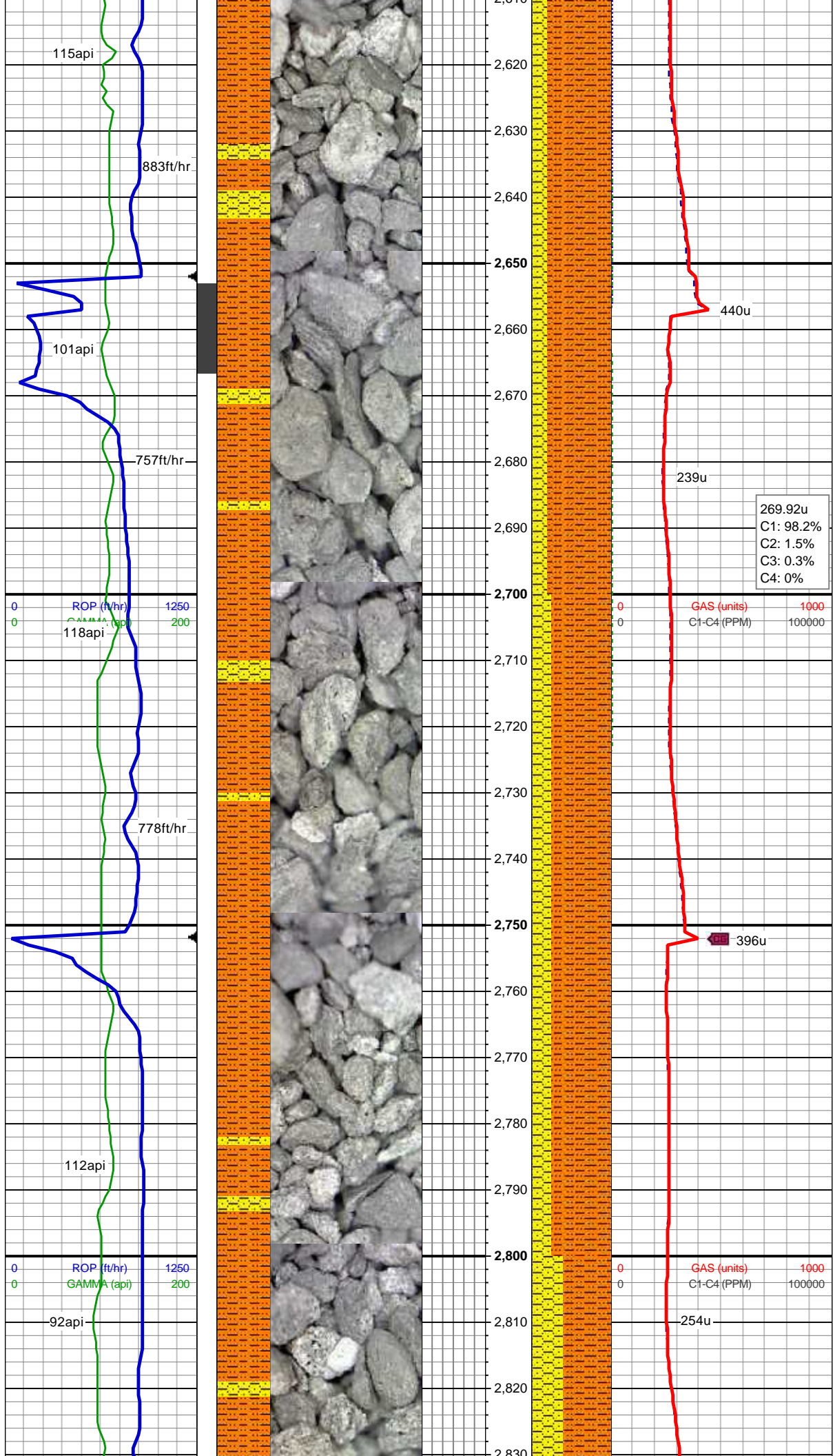
MD: 2,410'
TVD: 2,385.7'
Inclination: 14.07°
Azimuth: 342.81°
VS: 95.95'

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

MD: 2,502'
TVD: 2,474.9'
Inclination: 14.25°
Azimuth: 342.8°
VS: 105.11'

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

MD: 2,596'
TVD: 2,565.94'
Inclination: 14.6°
Azimuth: 342.38°
VS: 114.71'

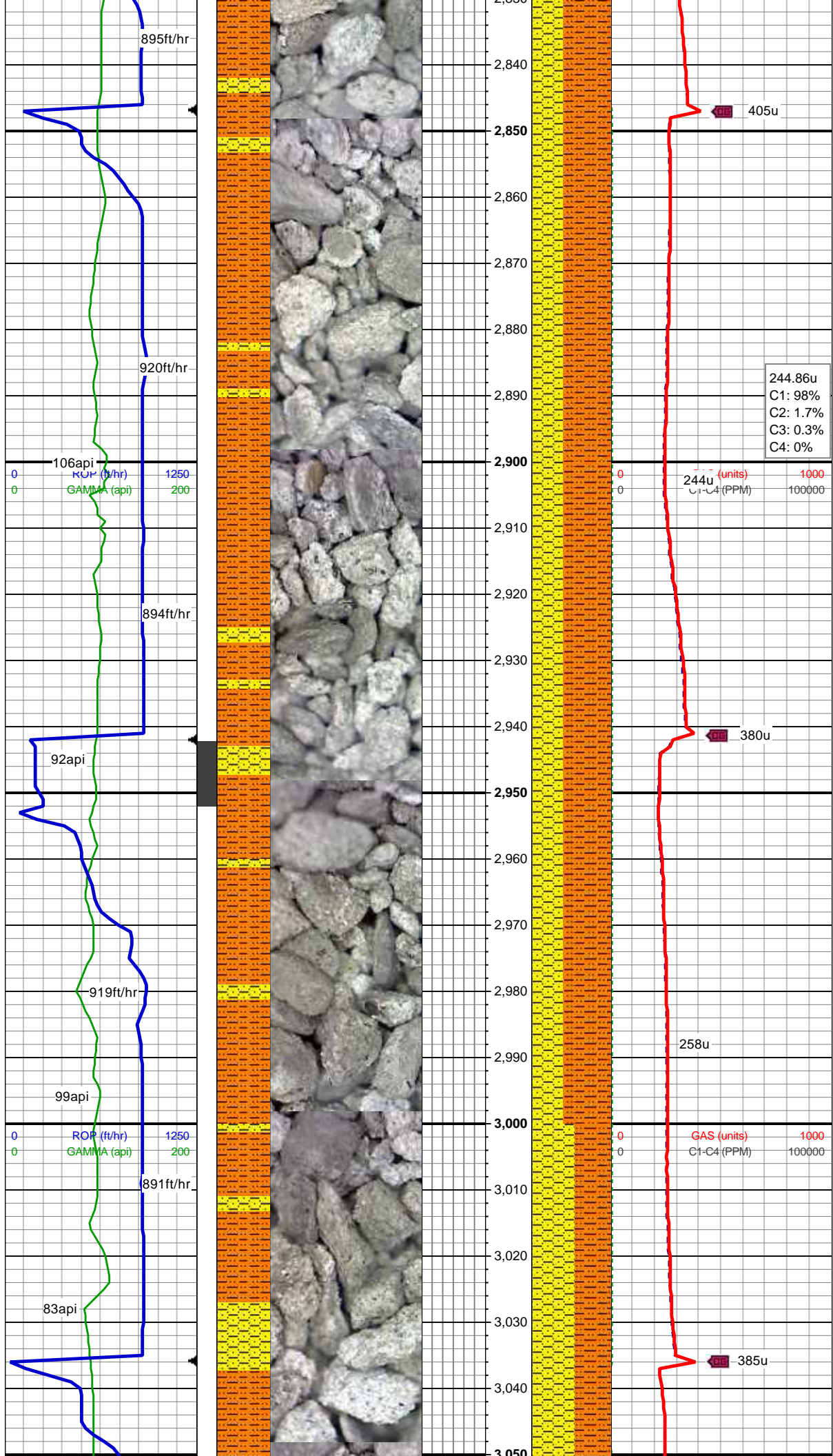


SHY SLTST: lt gy-gy - gy brn,sl frm - sft,
sb blkly-sb plty, f-v f gr, gt, v arg, sl rthy,
ply srt, sl grdg - sh, tr foss frag, abunt clay
SHY SS: wh-lt gy occ lt brn, sl frm - brit,
sb ang-sb rnd, f gr, mod srtg, arg, abnt
clay

269.92u
C1: 98.2%
C2: 1.5%
C3: 0.3%
C4: 0%

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, tr foss frag, abunt clay
SHY SS: wh-lt gy occ lt brn, sl frm - brit,
sb ang-sb rnd, f gr, mod srtg, arg, abnt
clay

MD: 2,786'
TVD: 2,750.13'
Inclination: 14.25°
Azimuth: 336.16°
VS: 137.14'

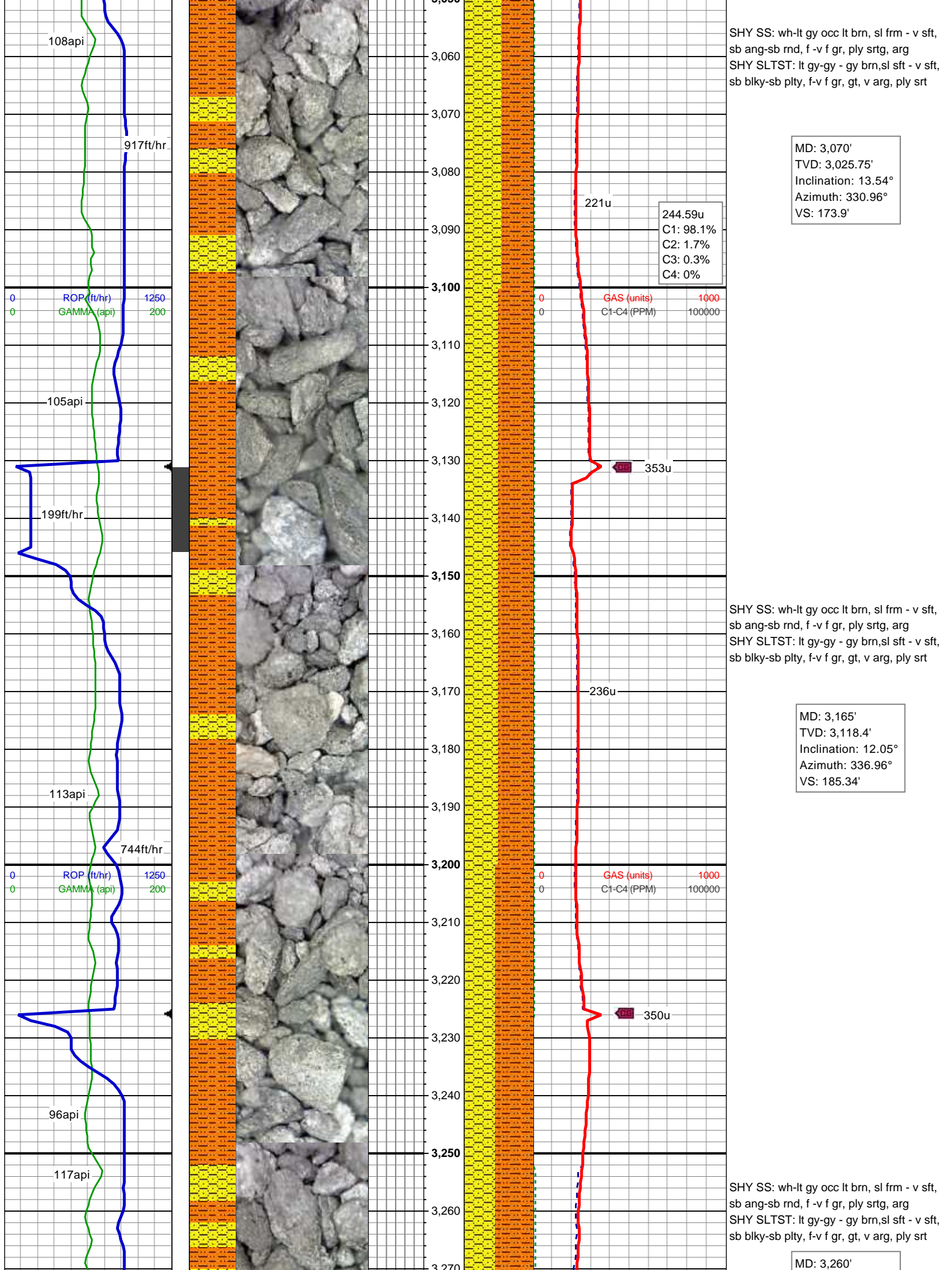


SHY SLTST: lt gy-gy - gy brn,sl sft - v sft,
sb blk-y-sb plty, f-v f gr, gt, v arg, ply srt,
abnt clay
SHY SS: wh-lt gy occ lt brn, sl frm - v sft,
sb ang-sb rnd, f -v f gr, ply srtg, arg,
increasing shy ss

MD: 2,881'
TVD: 2,842.18'
Inclination: 14.42°
Azimuth: 336.79°
VS: 149.01'

SHY SS: wh-lt gy occ lt brn, sl frm - v sft,
sb ang-sb rnd, f -v f gr, ply srtg, arg
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: 2,976'
TVD: 2,934.36'
Inclination: 13.54°
Azimuth: 332.33°
VS: 161.23'



SHY SS: wh-lt gy occ lt brn, sl frm - v sft,
sb ang-sb rnd, f -v f gr, ply srtg, arg
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: 3,025.75'
Inclination: 13.54°
Azimuth: 330.96°
VS: 173.9'

244.59u
C1: 98.1%
C2: 1.7%
C3: 0.3%
C4: 0%

221u

353u

SHY SS: wh-lt gy occ lt brn, sl frm - v sft,
sb ang-sb rnd, f -v f gr, ply srtg, arg
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

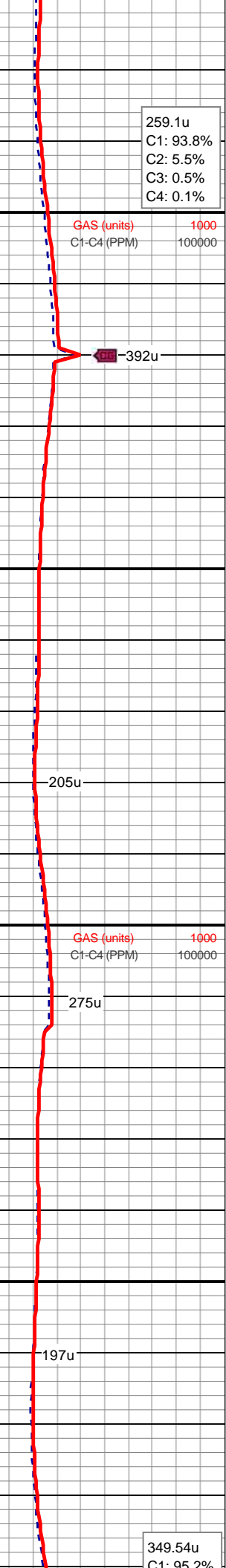
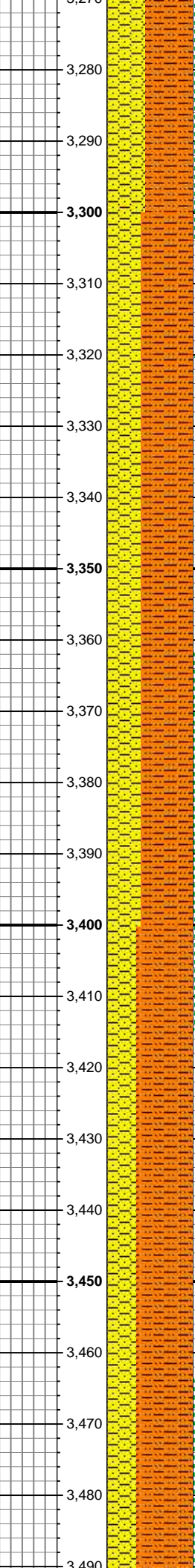
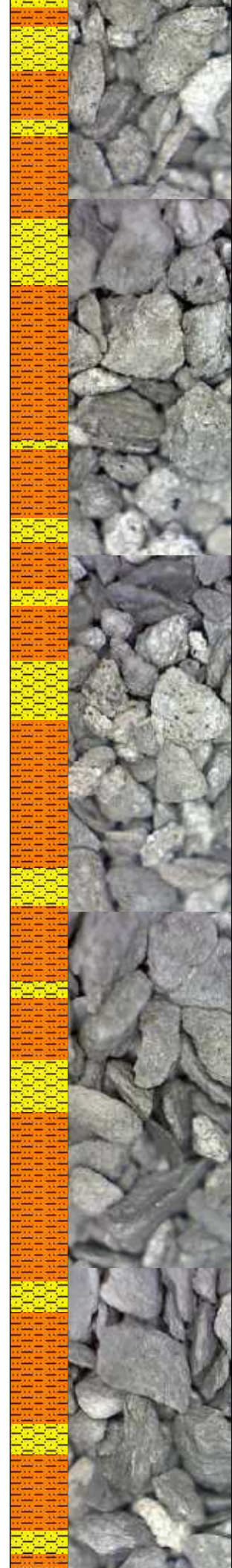
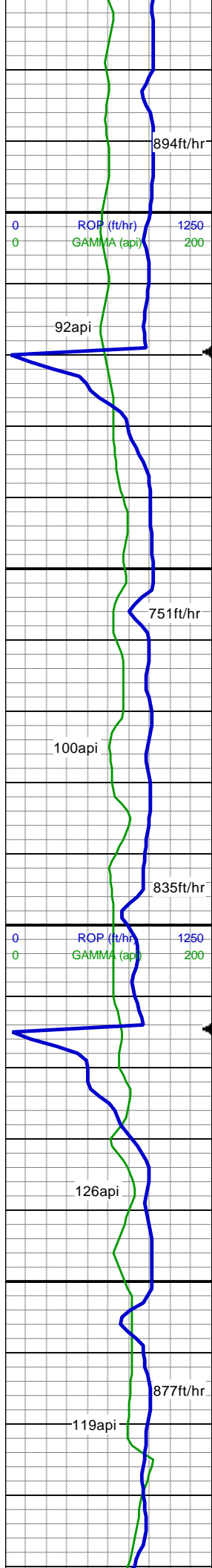
MD: 3,165'
TVD: 3,118.4'
Inclination: 12.05°
Azimuth: 336.96°
VS: 185.34'

236u

350u

SHY SS: wh-lt gy occ lt brn, sl frm - v sft,
sb ang-sb rnd, f -v f gr, ply srtg, arg
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: 3,260'



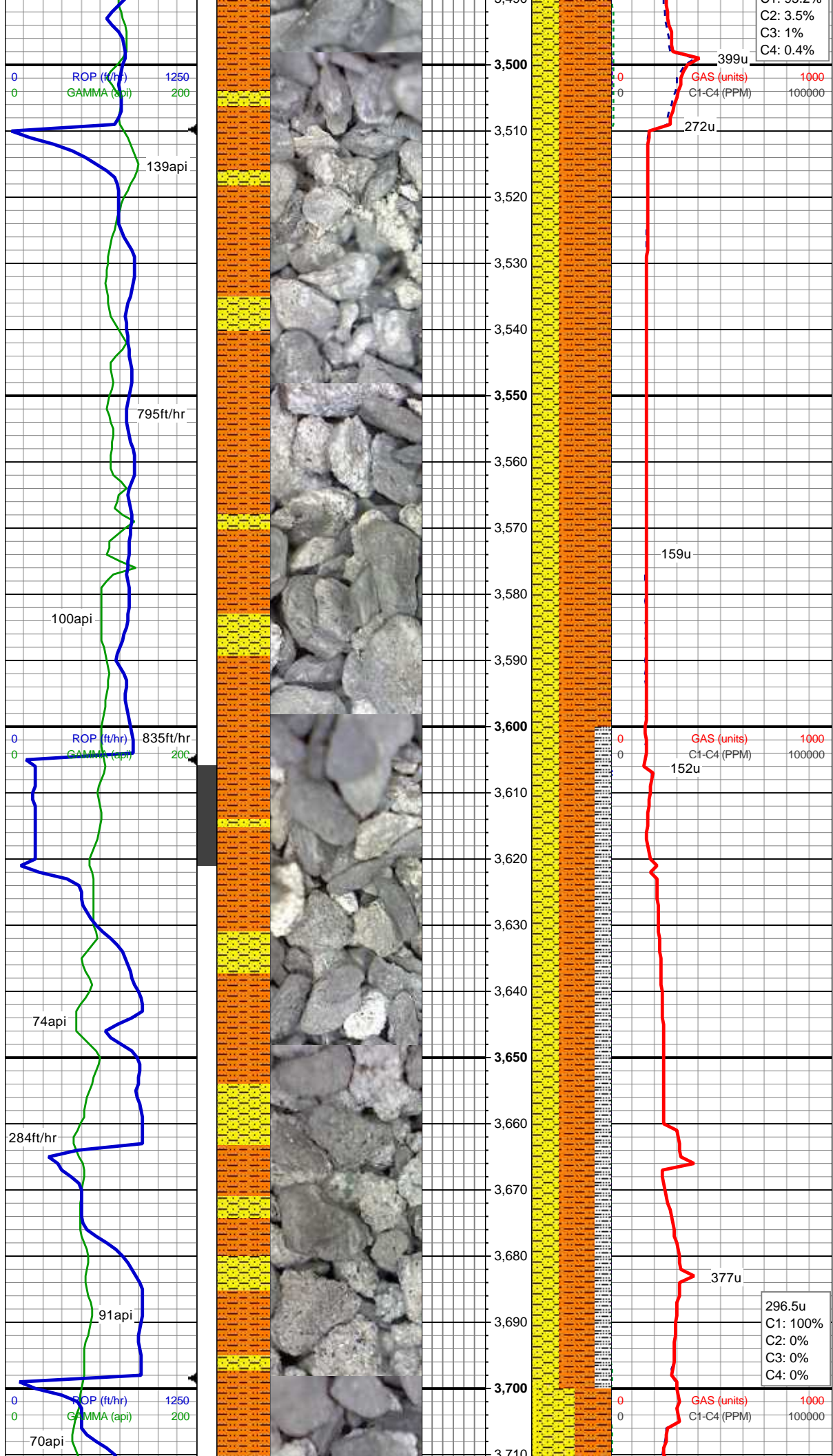
TVD: 3,211.3'
Inclination: 12.05°
Azimuth: 337.86°
VS: 195.08'

MD: 3,354'
TVD: 3,303.29'
Inclination: 11.7°
Azimuth: 338.91°
VS: 204.28'

MD: 3,449'
TVD: 3,396.45'
Inclination: 10.9°
Azimuth: 339.33°
VS: 212.93'

SHY SS: wh-lt gy occ lt brn, sl frm - v sft, sb ang-sb rnd, f -v f gr, ply srtg, arg, tr foss fragments
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
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

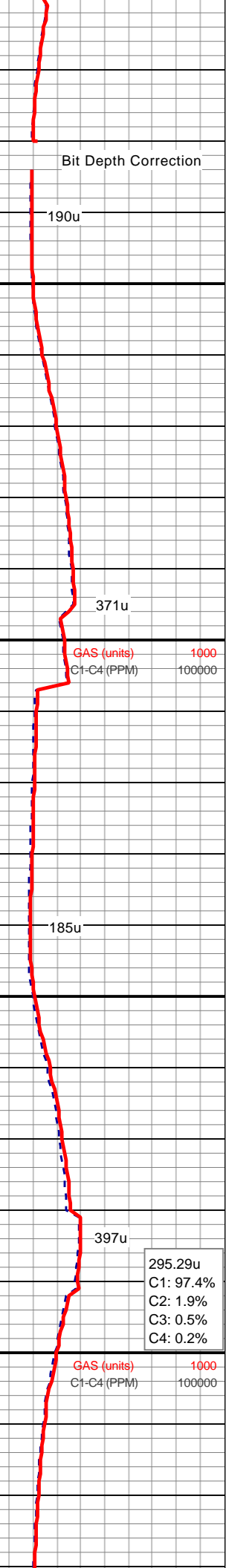
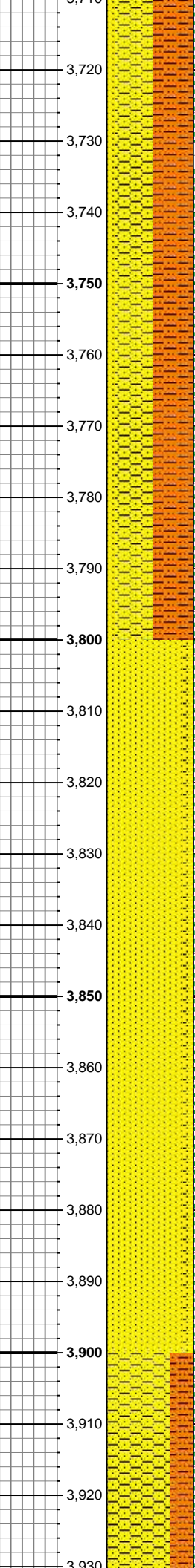
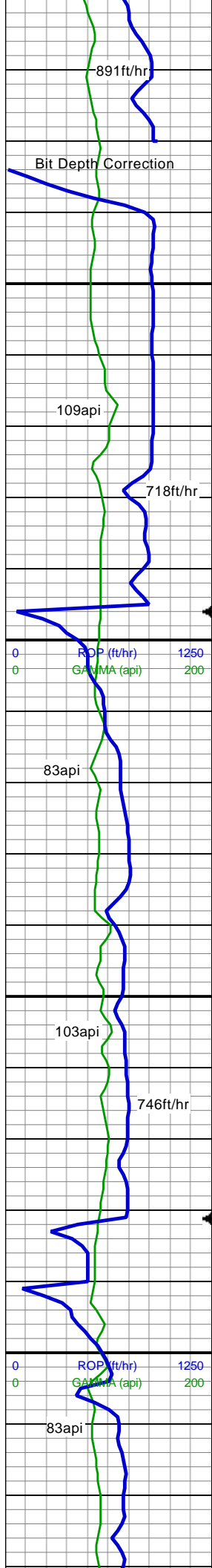


MD: 3,545'
TVD: 3,490.81'
Inclination: 10.29°
Azimuth: 338.97°
VS: 221.12'

SHY SS: wh-lt gy occ lt brn, sl frm - v sft,
sb ang-sb rnd, f -v f gr, ply srtg, arg, tr foss
fragments
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: 3,640'
TVD: 3,584.09'
Inclination: 11.52°
Azimuth: 341.62°
VS: 229.12'

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: 3,734'
TVD: 3,676.07'
Inclination: 12.31°
Azimuth: 343.03°
VS: 237.15'

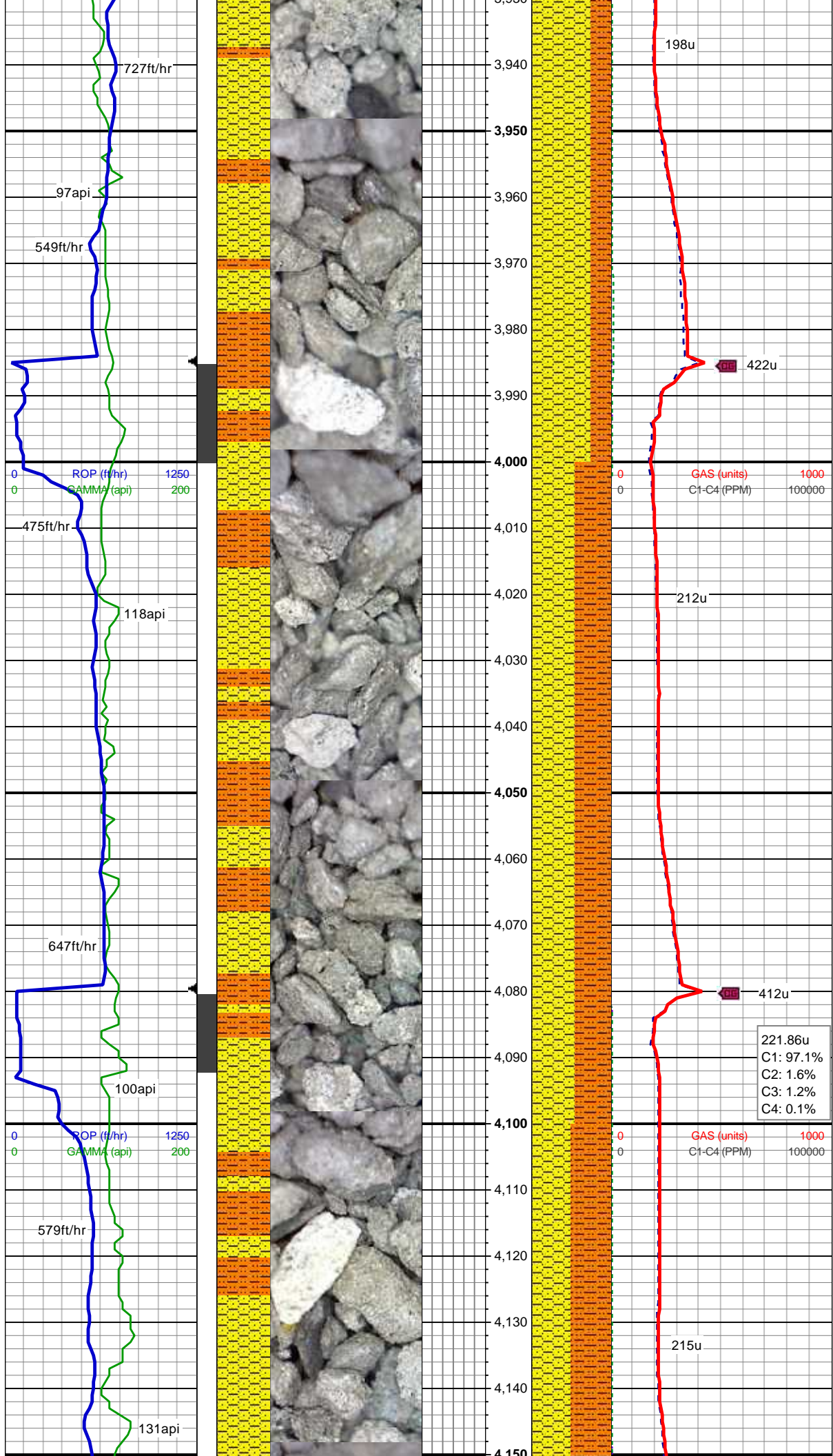
SHY SLTST: lt gy-gy - gy brn,sl sft - v sft,
sb blkly-sb plty, f-v f gr, gt, v arg, ply srt
SHY SS: wh-lt gy occ lt brn, sl frm - v sft,
sb ang-sb rnd, f -v f gr, ply srtg, arg
SS: lt gy - wh, S&P, frm - brit, sb rnd, f gr,
mod srt, sl arg

MD: 3,829'
TVD: 3,768.73'
Inclination: 13.19°
Azimuth: 342.88°
VS: 245.63'

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

295.29u
C1: 97.4%
C2: 1.9%
C3: 0.5%
C4: 0.2%

MD: 3,924'
TVD: 3,861.08'
Inclination: 13.89°
Azimuth: 342.81°
VS: 254.66'



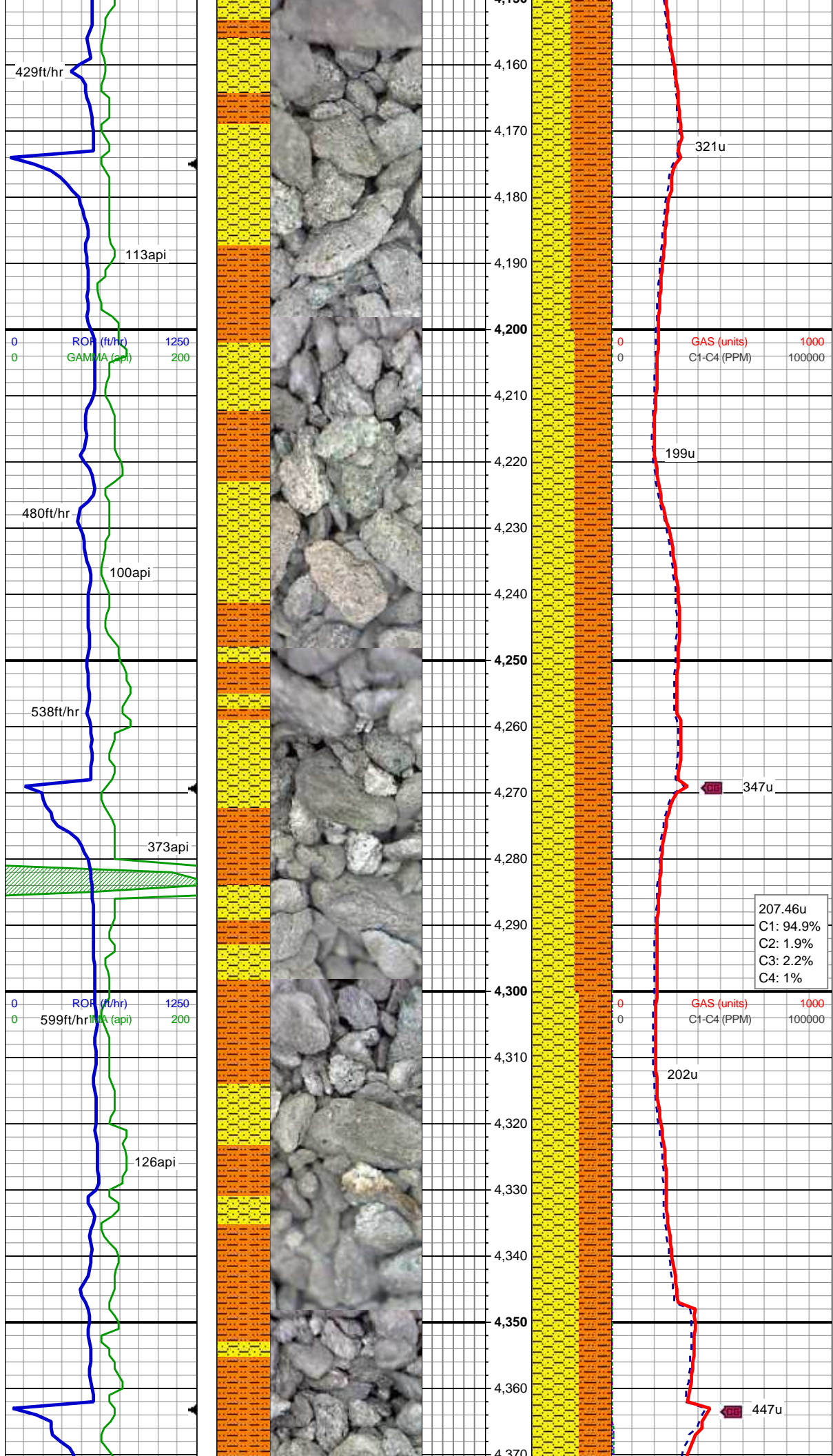
SHY SS: wh-lt gy occ lt brn, S&P, sl frm - v sft, sb ang-sb rnd, f -v f gr, ply srtg, v arg, tr foss frag
SHY SLTST: lt gy-gy - gy brn,sl sft - v sft, sb blkly-sb plty, f-v f gr, gt, v arg, ply srt

MD: 4,019'
TVD: 3,953.29'
Inclination: 13.98°
Azimuth: 337.37°
VS: 264.93'

SHY SLTST: lt gy-gy - gy brn,sl sft - v sft, sb blkly-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, v arg, abnt glau, tr foss frag

221.86u
C1: 97.1%
C2: 1.6%
C3: 1.2%
C4: 0.1%

MD: 4,114'
TVD: 4,045.82'
Inclination: 12.22°
Azimuth: 340.51°
VS: 275.03'



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, v arg,
abnt glau

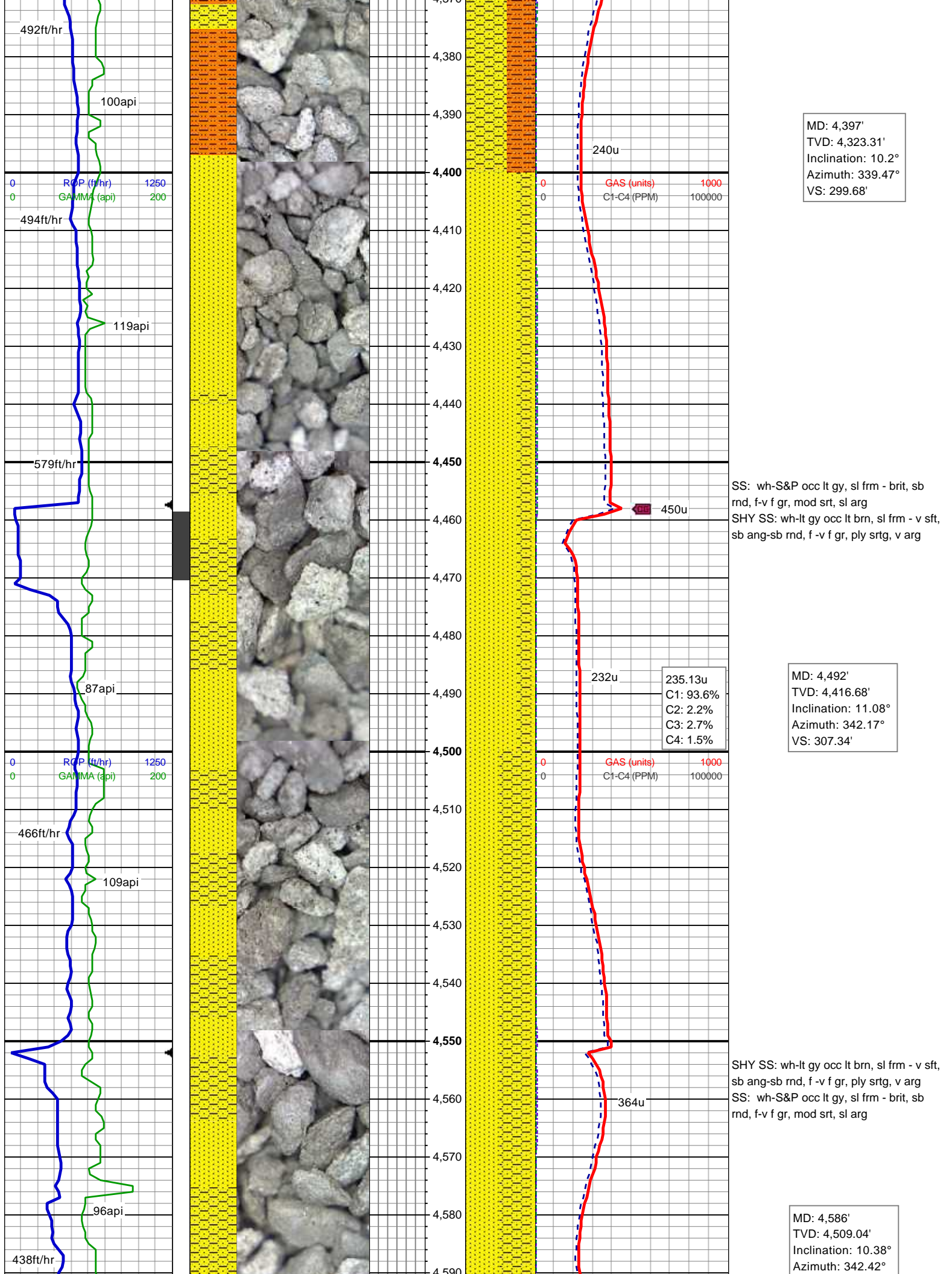
MD: 4,209'
TVD: 4,138.75'
Inclination: 11.7°
Azimuth: 340.29°
VS: 283.78'

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, v arg, tr
glau, tr foss frag

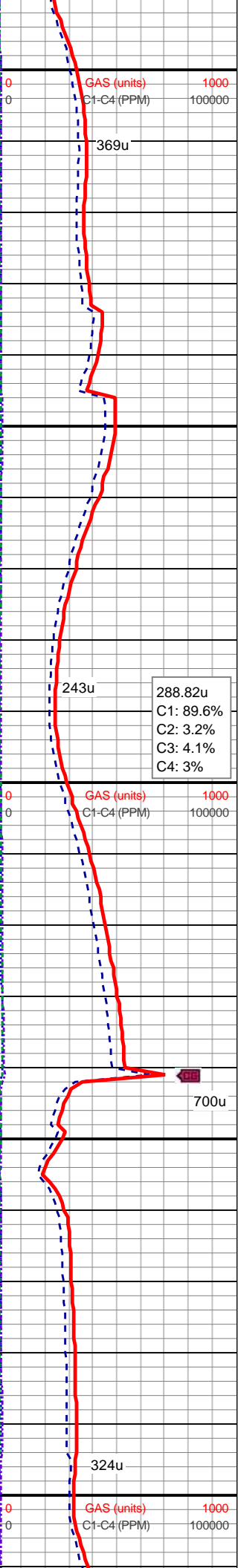
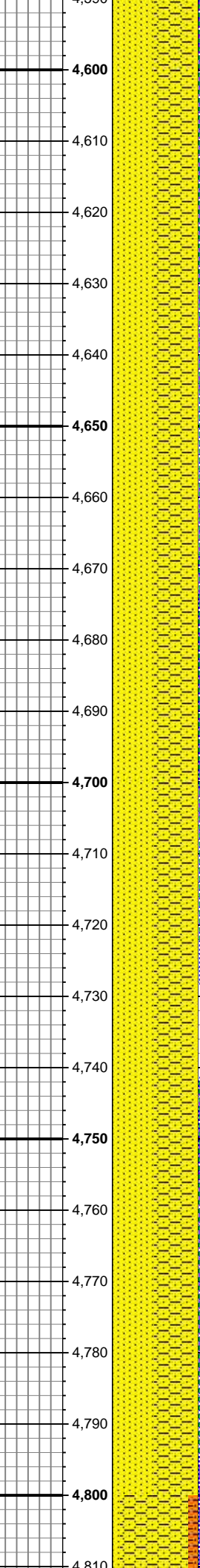
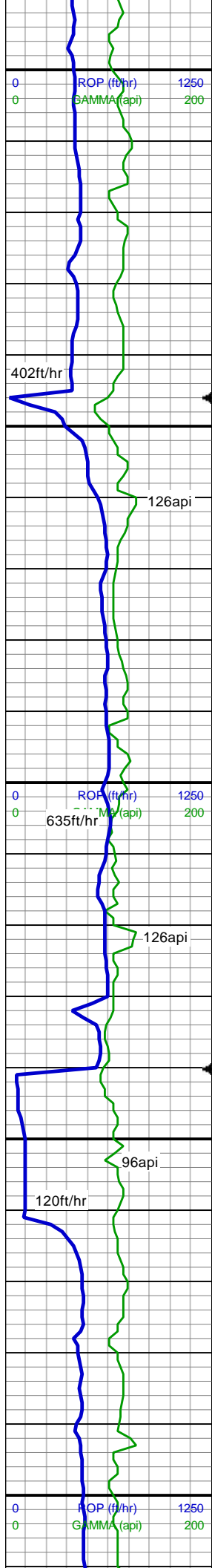
207.46u
C1: 94.9%
C2: 1.9%
C3: 2.2%
C4: 1%

MD: 4,303'
TVD: 4,230.92'
Inclination: 10.99°
Azimuth: 340.92°
VS: 291.94'

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, v arg



VS: 314.6'

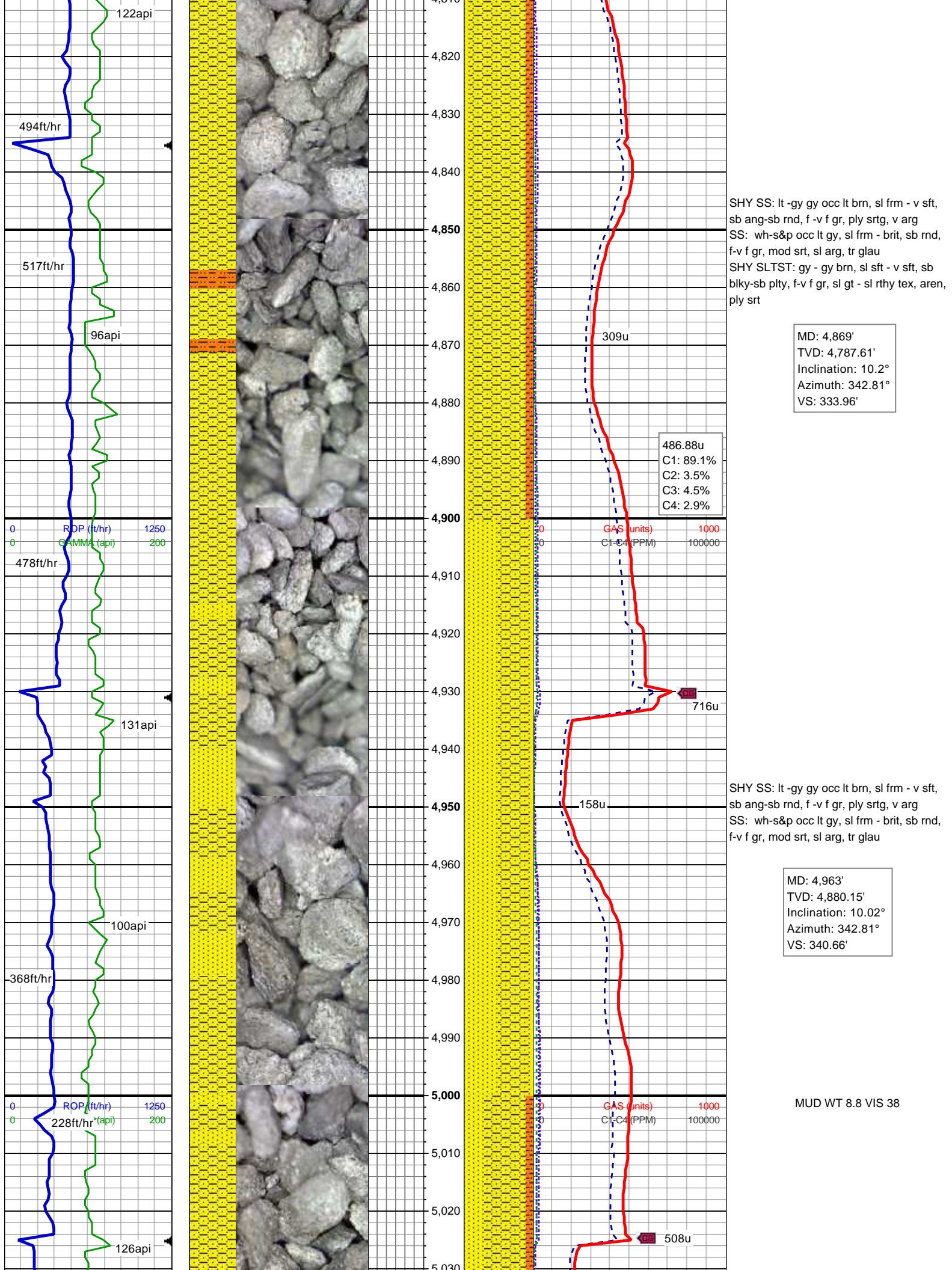


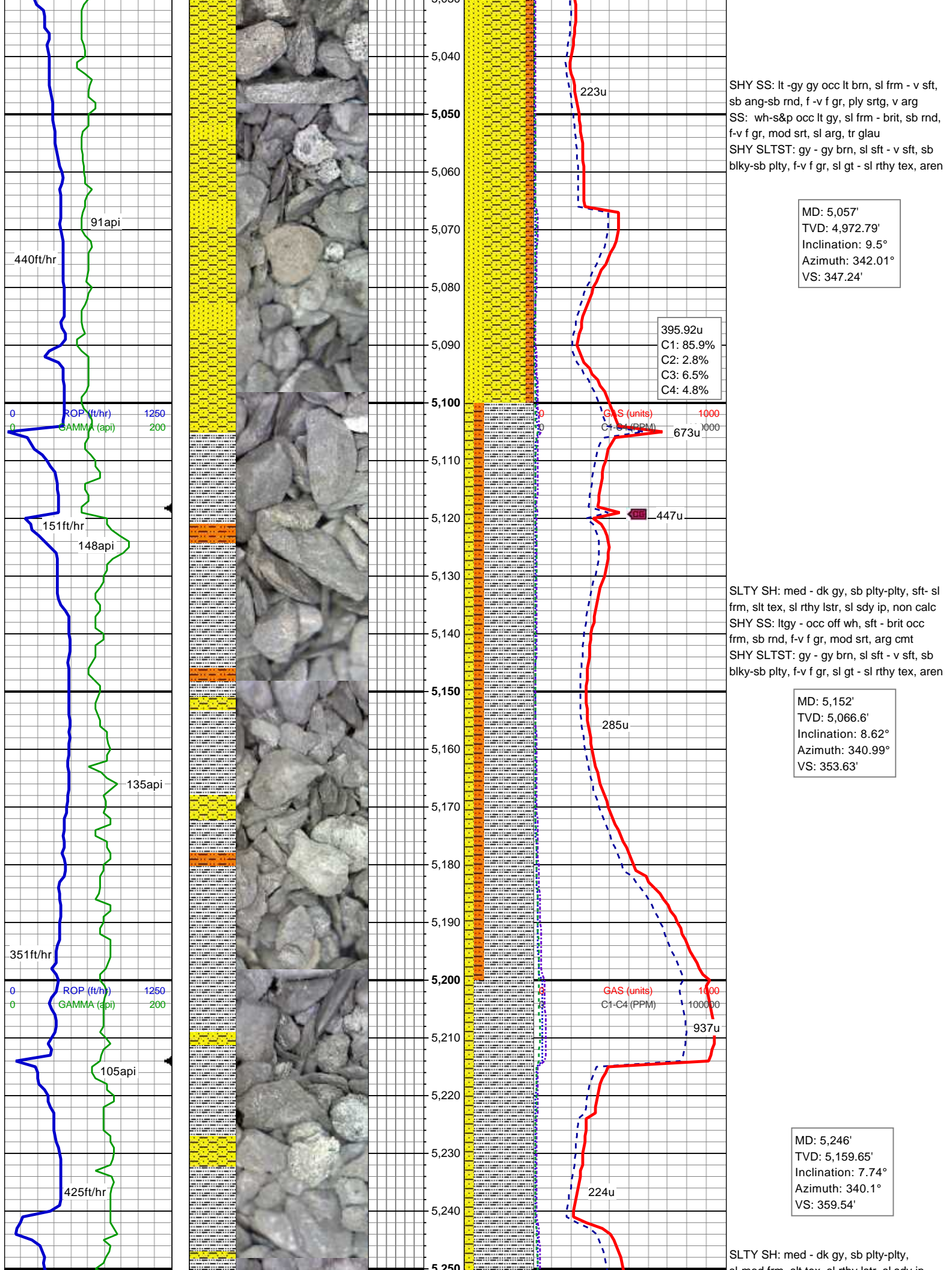
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sb ang-sb rnd, f -v f gr, ply srtg, v arg
SS: wh-S&P occ lt gy, sl frm - brit, sb
rnd, f-v f gr, mod srt, sl arg

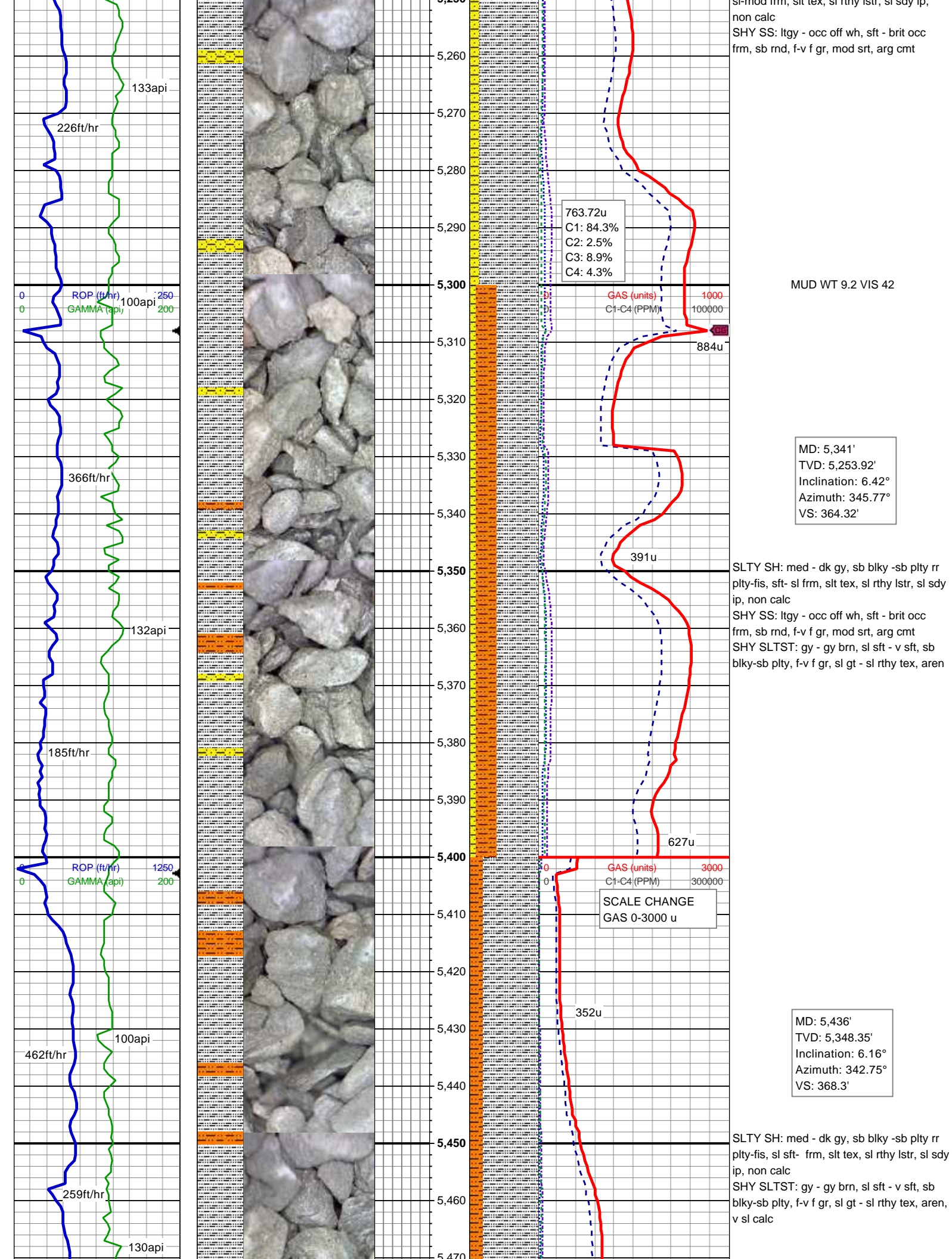
MD: 4,681'
TVD: 4,602.61'
Inclination: 9.5°
Azimuth: 343.9°
VS: 321.19'

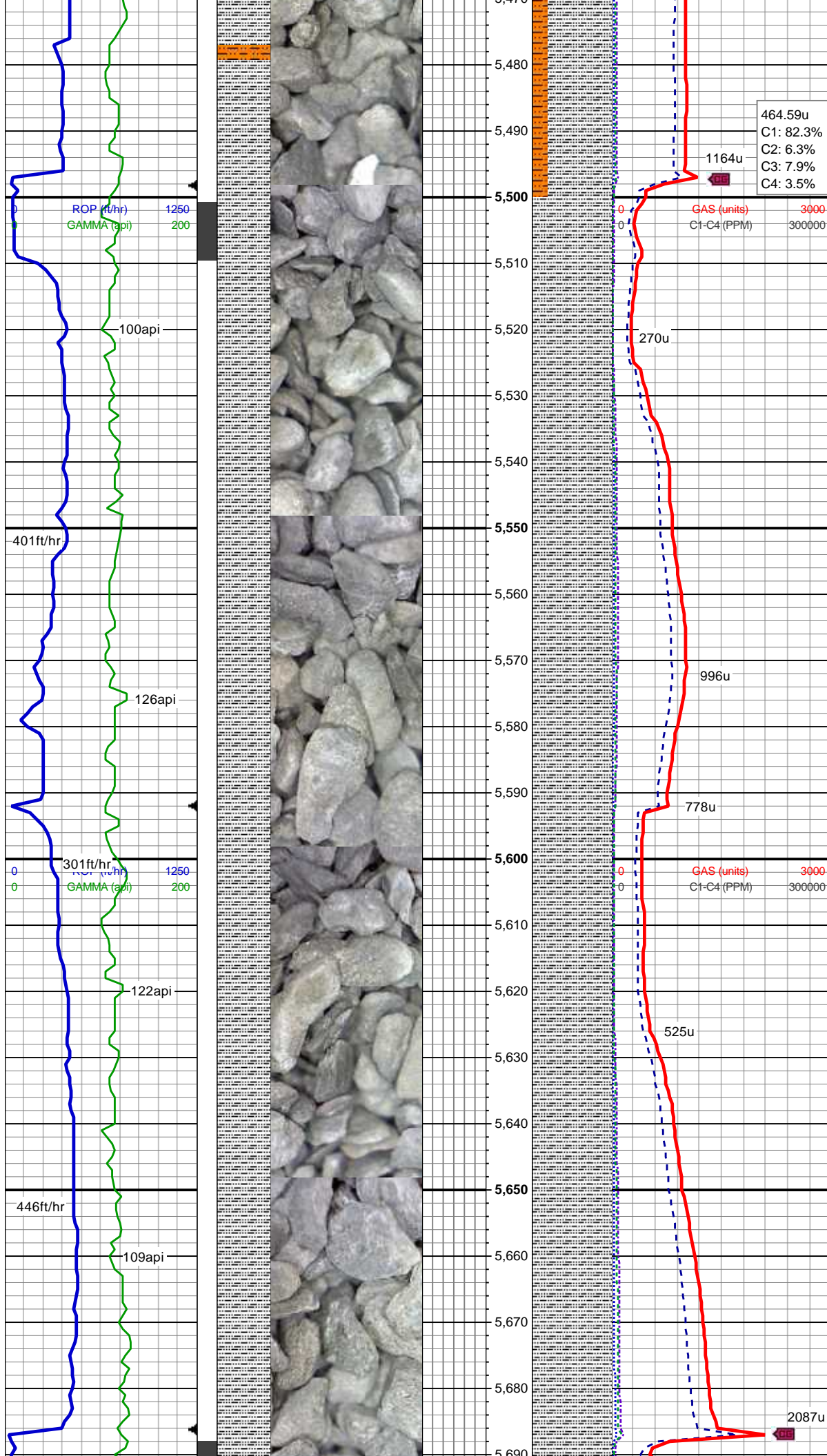
SHY SS: wh-lt gy occ lt brn, sl frm - v sft,
sb ang-sb rnd, f -v f gr, ply srtg, v arg
SS: wh-S&P occ lt gy, sl frm - brit, sb
rnd, f-v f gr, mod srt, sl arg, tr glau

MD: 4,775'
TVD: 4,695.16'
Inclination: 10.64°
Azimuth: 345.28°
VS: 327.39'









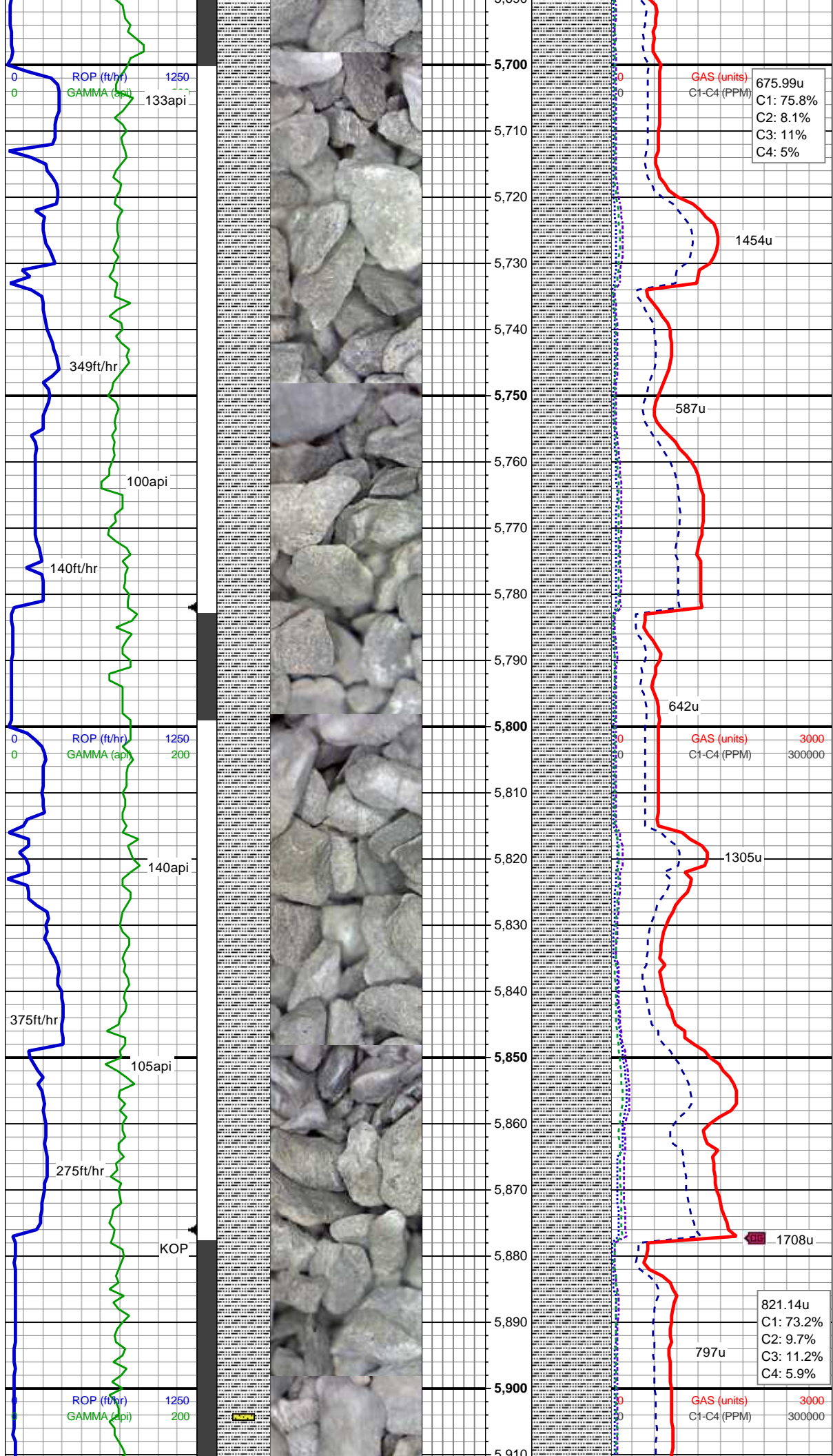
MD: 5,530'
TVD: 5,441.92'
Inclination: 4.75°
Azimuth: 342.7°
VS: 371.95'

SLTY SH: med - dk gy, sb blkly -sb plty, sl sft- frm, slt tex, sl rthy lstr, pred aren, non calc, no bent, occ imbd pyr

MUD WT 9.2 VIS 42

MD: 5,625'
TVD: 5,536.64'
Inclination: 4.04°
Azimuth: 346.11°
VS: 374.74'

SLTY SH: med - dk gy, sb blkly -sb plty, sl sft- frm, slt tex, sl rthy lstr, pred aren, non calc, no bent, occ imbd pyr



MD: 5,719'
TVD: 5,630.48'
Inclination: 2.73°
Azimuth: 350.46°
VS: 376.54'

SLTY SH: med - dk gy, sb blkly -sb plty, sl
sft- frm, slt tex, sl rthy lstr, pred aren, non
calc, no bent, occ -abnt bnnd org mat; tr
shy ss

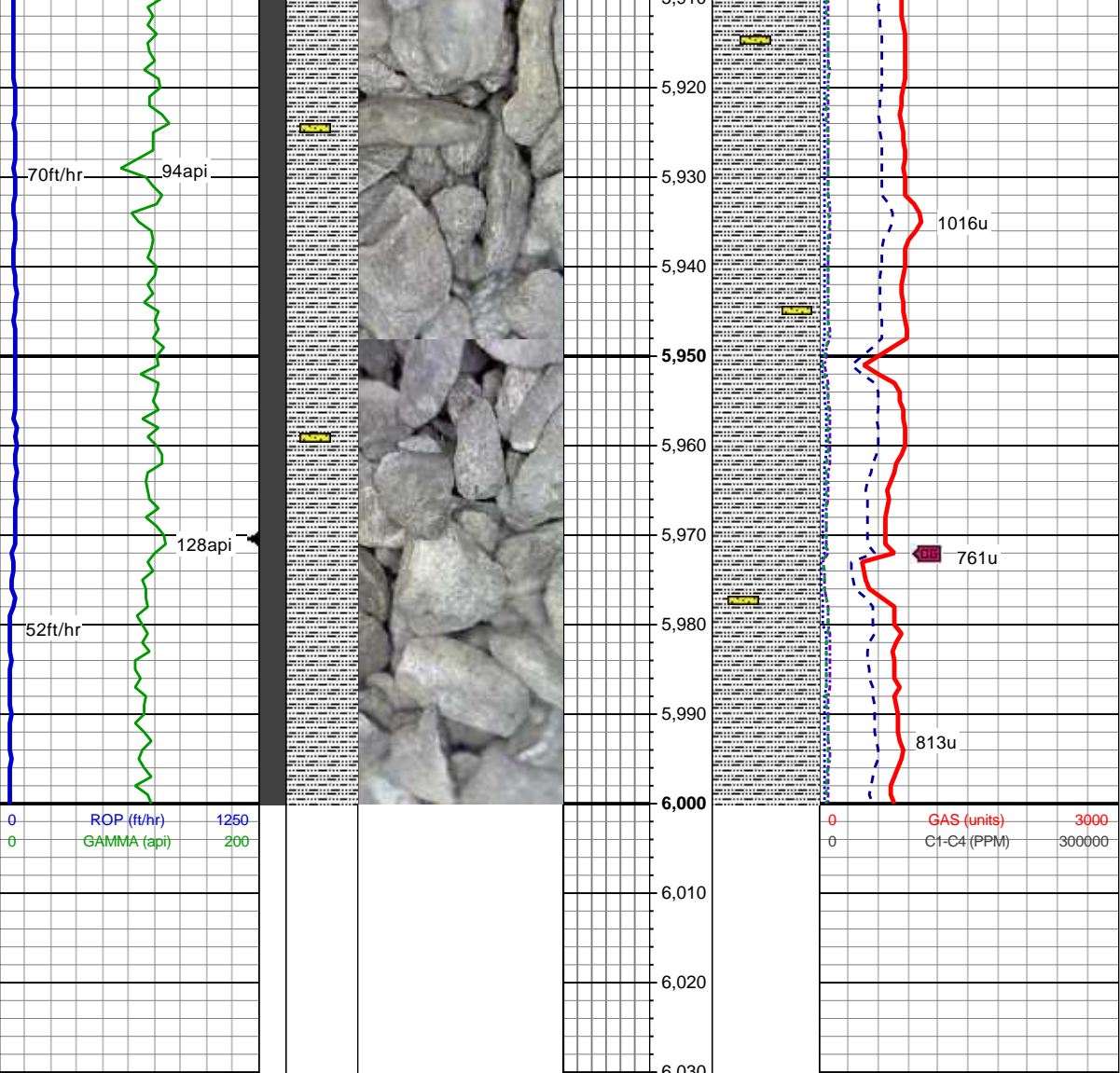
MUD WT 10.5 VIS 47

MD: 5,814'
TVD: 5,725.41'
Inclination: 1.41°
Azimuth: 358.65°
VS: 377.34'

SLTY SH: med - dk gy, sb blkly -sb plty, sl
sft- frm, slt tex, sl rthy lstr, pred aren, non
calc, no bent, occ bnnd org mat

MUD WT 10.7 VIS 47

MD: 5,908'
TVD: 5,819.35'



IVD: 0,015.00
Inclination: 2.81°
Azimuth: 306.33°
VS: 379.51'

SLTY SH: med - dk gy, sb blkly -sb plty, sl
sft- frm, slt tex, sl rthy lstr, pred aren, non
calc, no bent, rr bndd org mat; tr ss

MUD WT 10.7 VIS 43

MUDLOG CONTUINES ON
"Wells Ranch AE19-649
HORZ.mplot" for Curve and
Lateral Sections of this Well.