

COLUMBINE LOGGING

Scale: 5" / 100'
Measured Depth Log

Well Name Five Rivers K09-66-1AHN

Location SWNW SEC 9, T4N, R66W

State COLORADO

County WELD

Country USA

Rig Number H&P 330

API Number 05-123-39479

Field WATTENBERG

Region DJ BASIN

Drilling Completed 8/26/2014

Spud Date 8/23/2014

Surface Coordinates 2150' FNL, 512' FWL

Ground Elevation 4699'

K.B. Elevation 4729'

Logged Interval 700' To 6346'

Total Depth 6346'

Formation NIOBRARA C CHALK

Type of Drilling Fluid LSND

Other Symbols

Oil Show

- DEAD
- EVEN
- QUESTIONABLE
- SPOTTED STAINING

Porosity

- E EARTHY
- F FENESTRAL
- F FRACTURE
- X 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
- SLIDE
- SURVEY
- TRIP GAS

- 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

Zone Color Coding

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

Accessories

Fossils

- ALGAE
- AMPHIPORA
- BELEMNITE
- BIOCLASTIC
- BRACHIOPOD
- BRYOZOA
- CEPHALOPOD
- CORDAL
- FOSSIL
- GASTROPOD
- INOCERAMUS
- OOLITE
- OSTRACOD
- PELECYPOD
- PELLET
- PISOLITE
- PLANT REMAINS
- PLANT PROPOD

- ANHYDRITIC
- ARGILLACEOUS
- ARGILLITE GRAIN
- BENTONITE
- BITUMENOUS SUBSTANCE
- BRECCIA FRAGMENTS
- CALCAREOUS
- CARBONACEOUS FLAKES
- CHTDK
- CHULT

- FERRUGINOUS
- GLAUCONITE
- GYPsIFEROUS
- HEAVY MINERAL
- KAOLIN
- MARLSTONE
- MINERAL CRYSTALS
- NODULES
- PHOSPHATE PELLETS
- TYNITE

- TUFFACEOUS

Stringer

- ANHYDRITE STRINGER
- BENTONITE STRINGER
- COAL STRINGER
- DOLOMITE STRINGER
- GYPsUM STRINGER
- LIMESTONE STRINGER
- MARLSTONE (OIL) STRINGER

CORAL
CRINOID
ECHINOID
FISH
FORAMINIFERA

PLANT SPORES
SCAPHOPOD
STROMATOPOROID

Minerals

CHERT
COAL - THIN BEDS
DOLOMITIC
FELDSPAR
FERRUGINOUS PELLET

PYRITE
SALT CAST
SANDY
SILICEOUS
SILTY

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
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

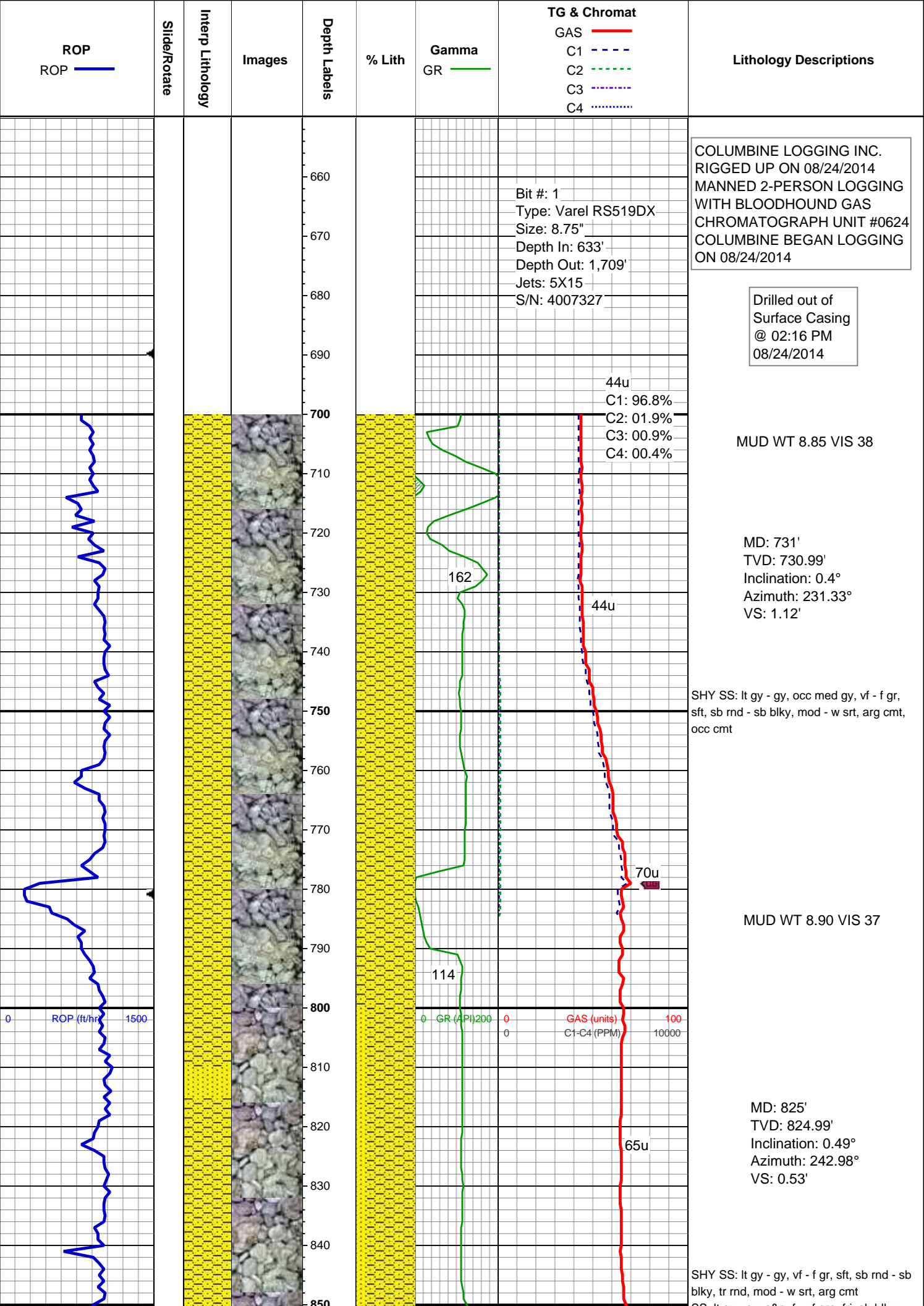
Name RENEE CLACKLER

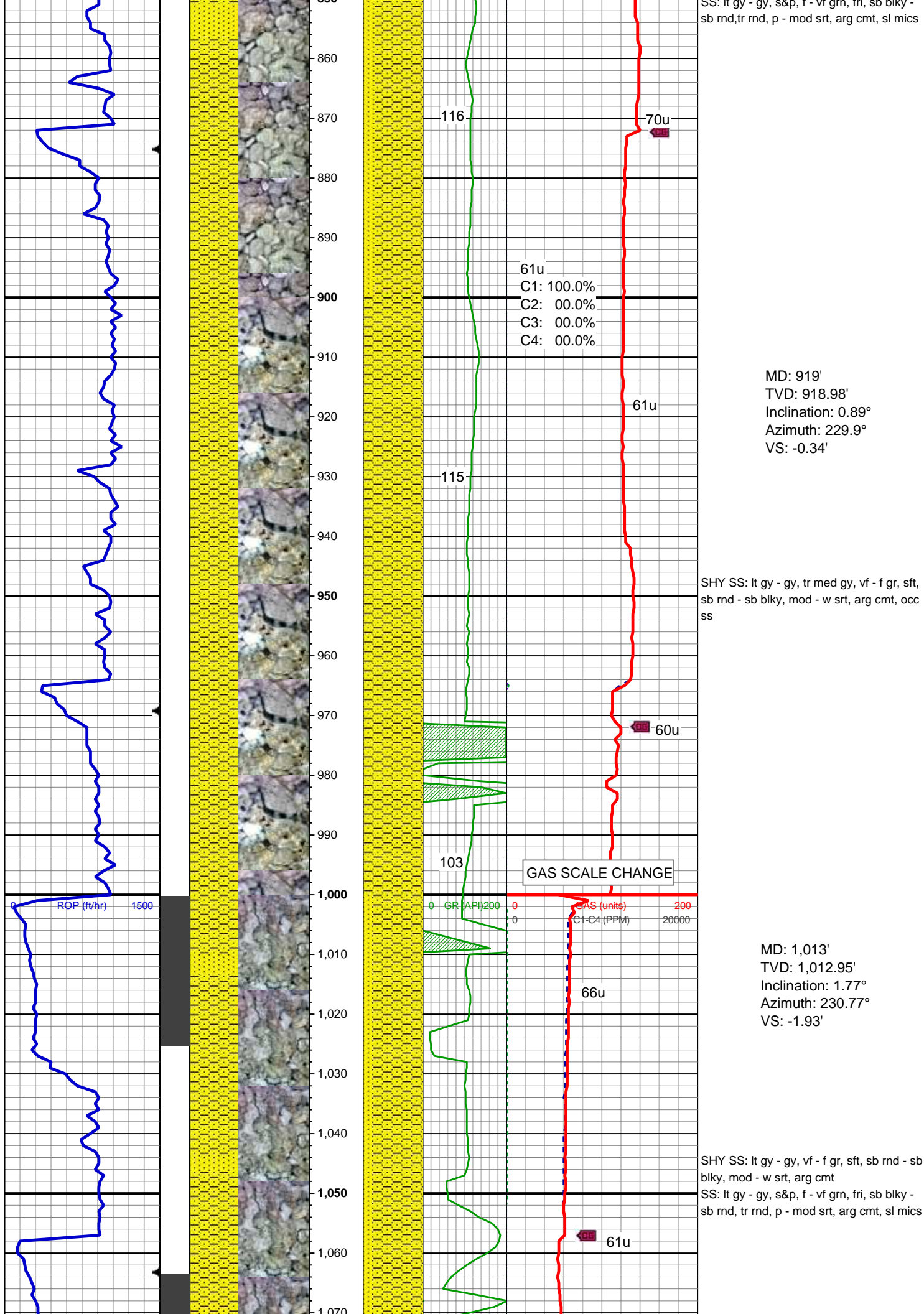
Company NOBLE ENERGY INC.

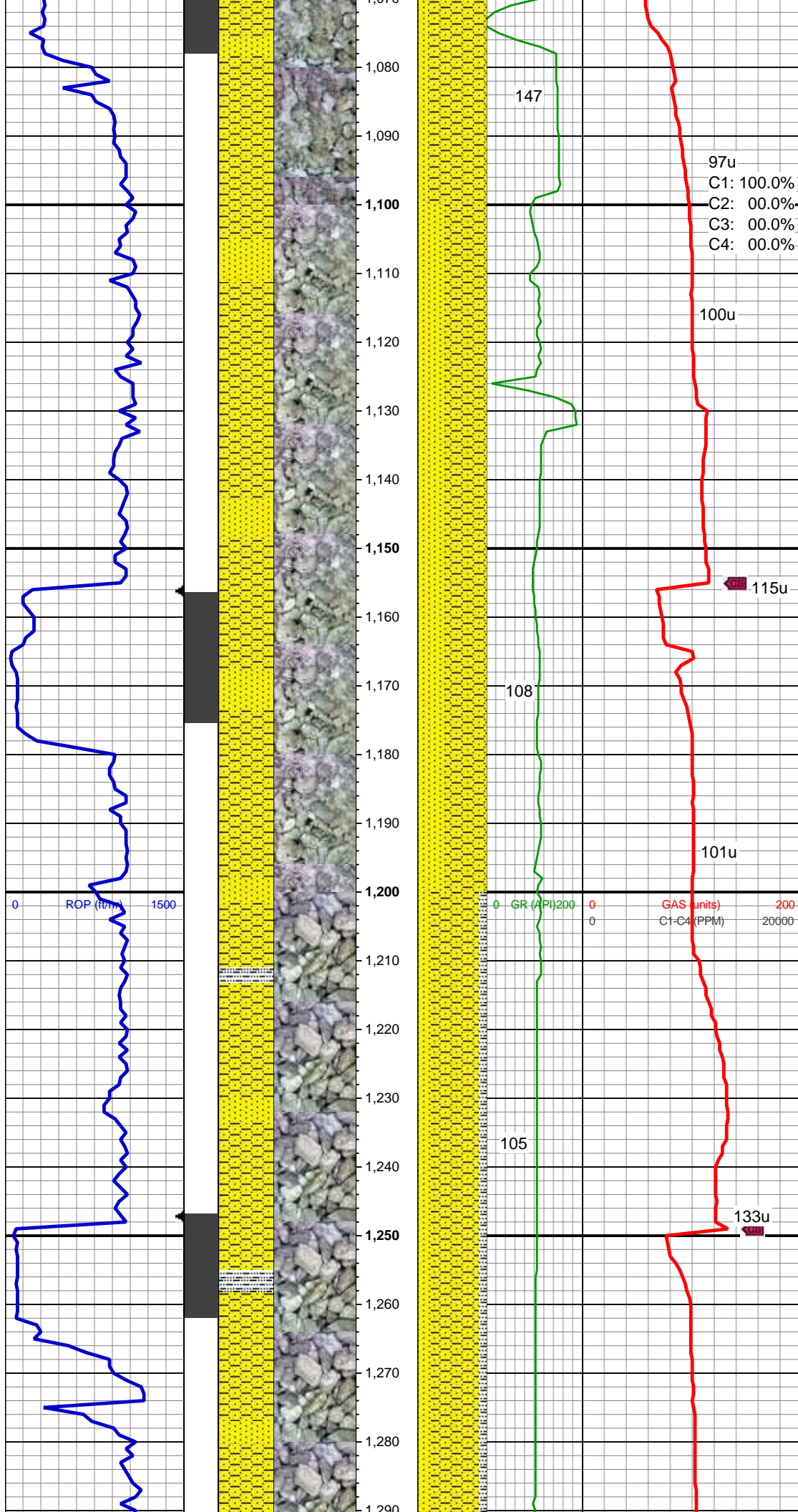
Address 1625 Broadway Suite 2200
Denver, CO 80202

Other

WELL SITE GEOLOGIST ANDREA ZUIDEMA
JESSICA SILVEY







MUD WT 8.80 VIS 36

MD: 1,106'
TVD: 1,105.84'
Inclination: 3.77°
Azimuth: 240.32°
VS: -5.53'

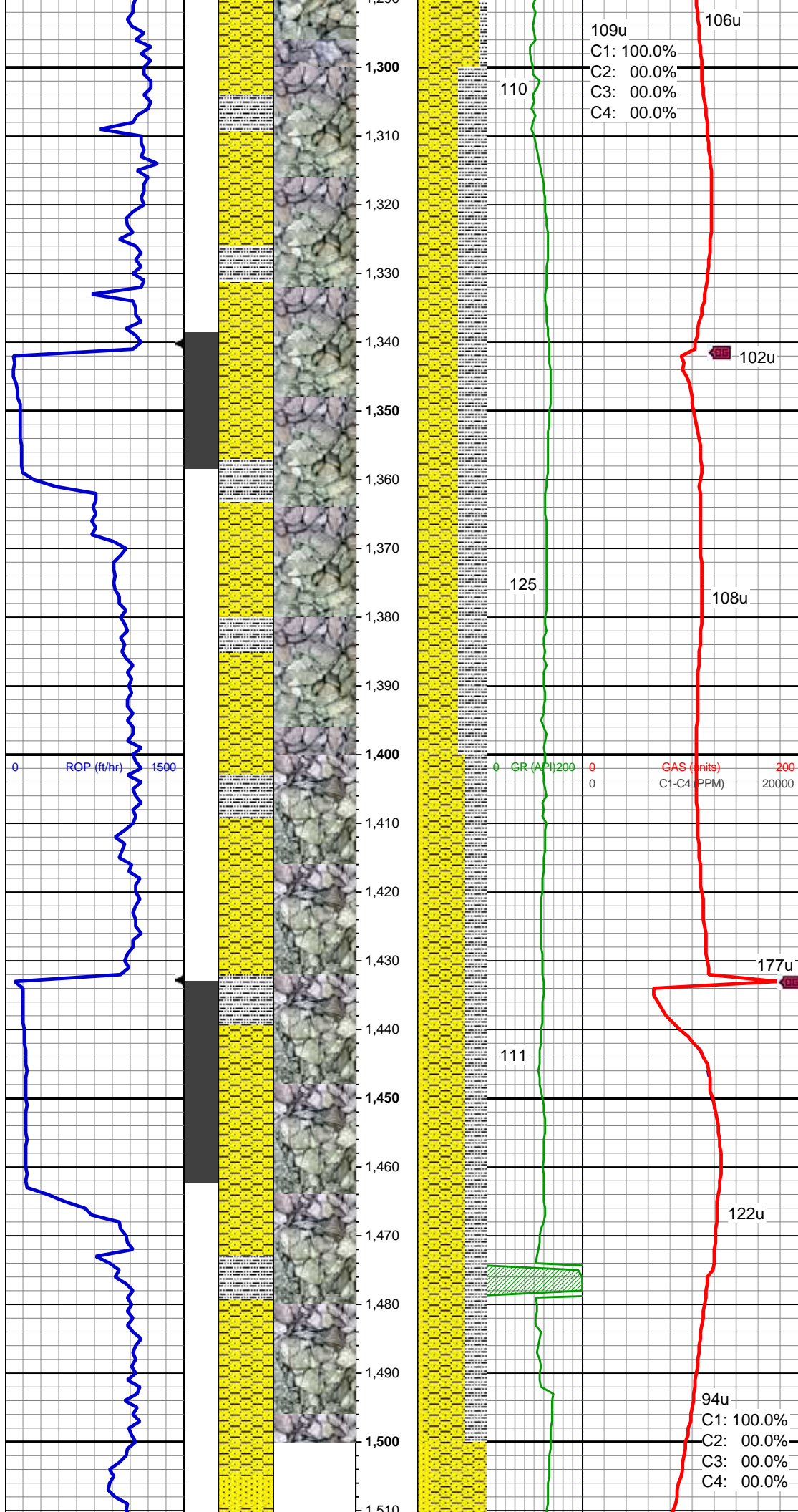
SHY SS: lt gy - gy, vf - f gr, sft, sb rnd - sb
blky, mod - w srt, arg cmt
SS: lt gy - gy, s&p, f - vf grn, fri, sb blky -
sb rnd, p - mod srt, arg cmt, sl mics

MD: 1,197'
TVD: 1,196.6'
Inclination: 4.58°
Azimuth: 232.7°
VS: -10.77'

SHY SS: lt gy - gy, vf - f gr, sft, sb rnd - sb
blky, mod - w srt, arg cmt
SS: lt gy - gy, tr wh - trns, s&p, f - vf grn,
fri, sb blky - sb rnd, p - mod srt, arg cmt, sl
mics
SLTY SH: lt gy, tr med gy, sft, sb blky - sb
pity, arg - rthy mtx, non calc

MUD WT 8.80 VIS 36

MD: 1,290'
TVD: 1,289.21'



Inclination: 5.88°
Azimuth: 229.43°
VS: -16.98'

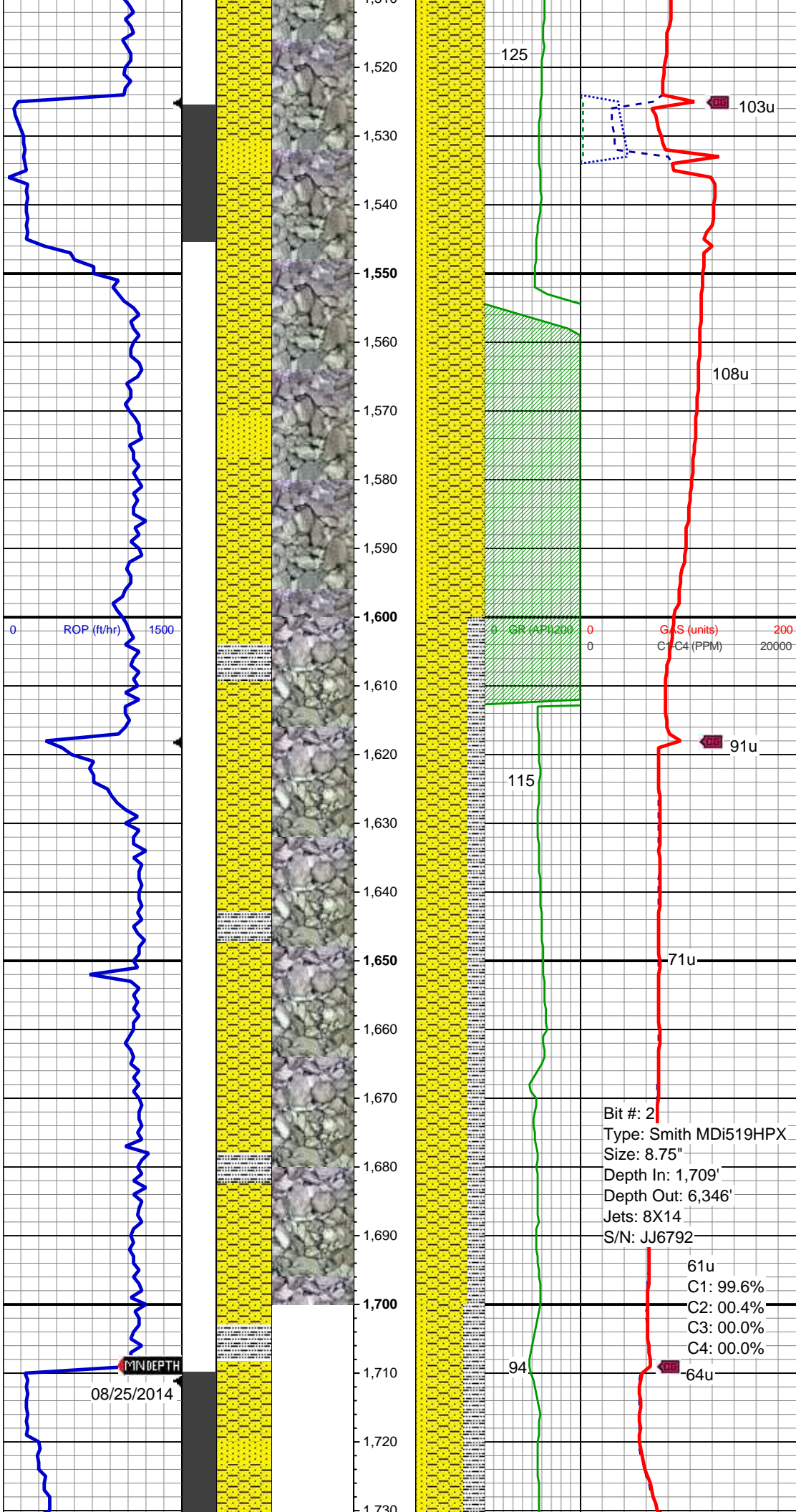
SHY SS: lt gy - gy, vf - f gr, sft, sb rnd - sb
blky, mod - w srt, arg cmt, occ ss
SLTY SH: lt gy - gy, occ med gy, sft, sb
blky - sb plty, tr plty, arg - rthy mtx, non
calc

MD: 1,383'
TVD: 1,381.65'
Inclination: 6.7°
Azimuth: 229.69°
VS: -24.29'

SHY SS: lt gy - gy, vf - f gr, sft, sb rnd - sb
blky, mod srt, arg cmt
SLTY SH: lt gy, occ med gy, sft, sb blky -
sb plty, arg - rthy mtx, non calc
SS: lt gy - gy, tr wh, s&p, f - vf grn, fri, sb
blky - sb rnd, mod srt, arg cmt, sl mics

MD: 1,475'
TVD: 1,472.82'
Inclination: 8.67°
Azimuth: 233.59°
VS: -33.45'

MUD WT 8.70 VIS 37



SHY SS: lt gy - gy, occ med gy, vf - f gr, sft, sb rnd-sb blkly, mod - w srt, arg cmt
SS: lt gy - gy, tr wh, s&p, f - vf grn, fri, sb blkly - sb rnd, mod srt, arg cmt, sl mics

MD: 1,568'
TVD: 1,564.65'
Inclination: 9.51°
Azimuth: 234.59°
VS: -44.77'

ROP (ft/hr)

0

1500

125

108u

103u

115

91u

71u

Bit #: 2
Type: Smith MDi519HPX
Size: 8.75"
Depth In: 1,709'
Depth Out: 6,346'
Jets: 8X14
S/N: JJ6792

61u
C1: 99.6%
C2: 00.4%
C3: 00.0%
C4: 00.0%

94

64u

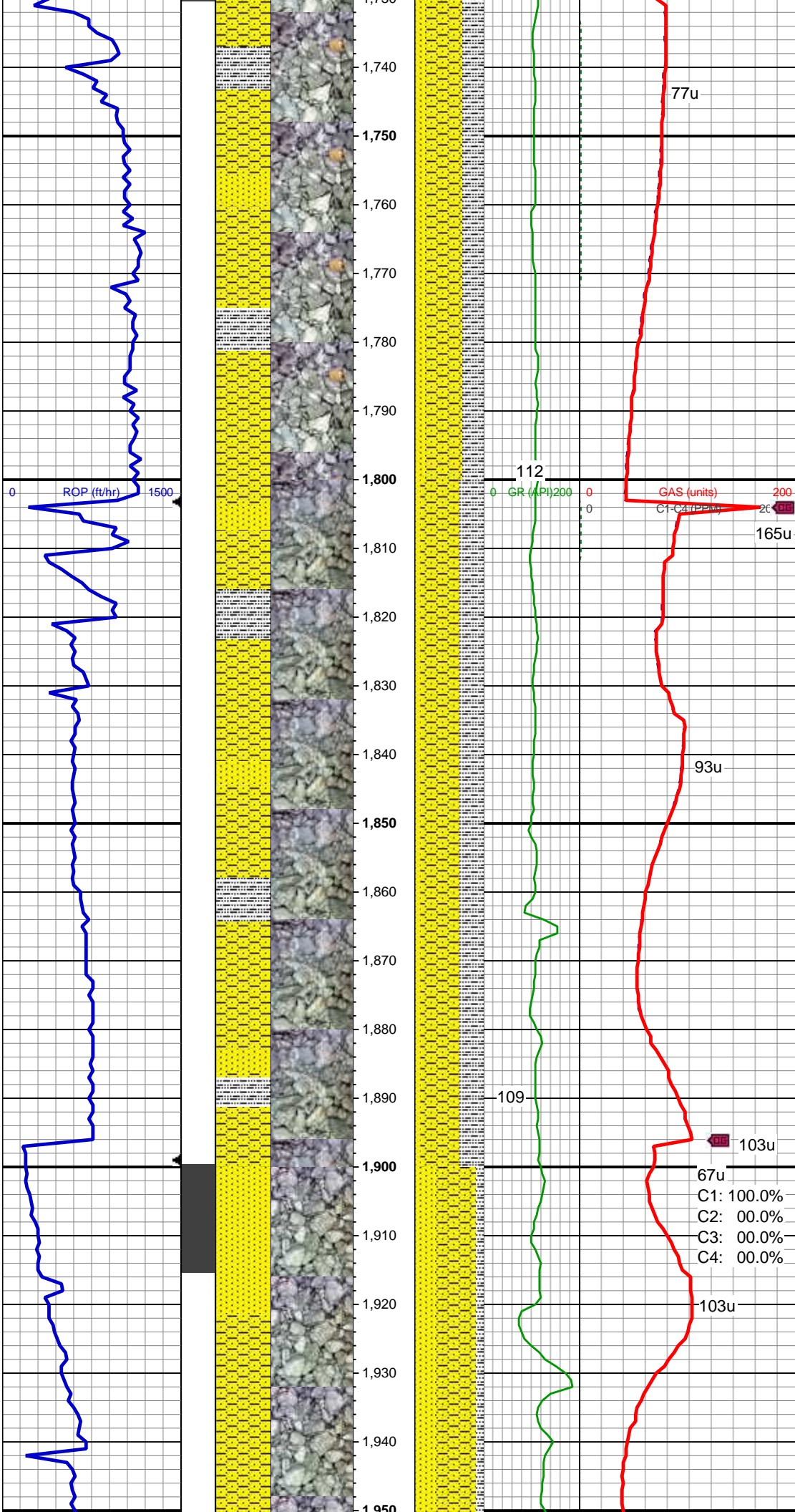
SHY SS: lt gy - gy, vf - f gr, sft, sb rnd - sb blkly, mod srt, arg cmt
SLTY SH: lt gy, sft, sb blkly - sb plty, arg - rthy mtx, non calc

MD: 1,661'
TVD: 1,656.52'
Inclination: 8.35°
Azimuth: 230.93°
VS: -55.68'

08/25/2014

MUD WT 8.60 VIS 34
TOOH for MWD/BHA
@ 07:12 PM
08/24/2014

Resumed Drilling @
01:44 AM 08/25/2014



SHY SS: lt gy - gy, vf - f gr, sft, sb rnd,
mod - w srt, arg cmt
SLTY SH: lt gy - med gy, sft, sb blkly - sb
plty, arg - rthy mtx, non calc
SS: lt gy - gy, f - vf grn, fri, sb blkly - sb
rnd, p - mod srt, arg cmt, sl mics

MD: 1,755'
TVD: 1,749.4'
Inclination: 9.32°
Azimuth: 234.81°
VS: -66.61'

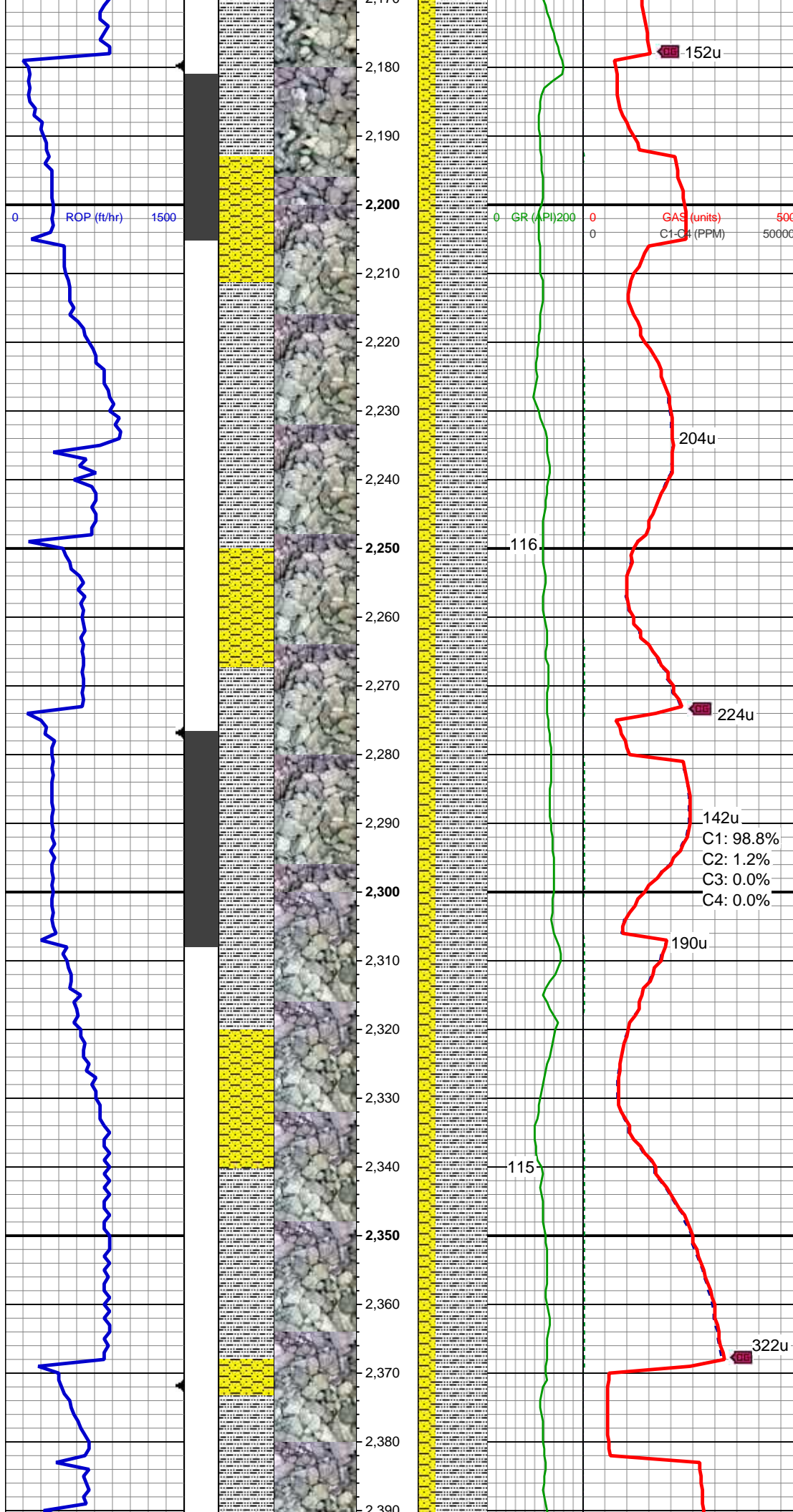
MUD WT 8.80 VIS 36

MD: 1,849'
TVD: 1,842.23'
Inclination: 8.83°
Azimuth: 230.13°
VS: -77.76'

SHY SS: lt gy - gy, vf - f gr, sft, sb rnd,
mod - w srt, arg cmt
SLTY SH: lt gy - med gy, sft, sb blkly - sb
plty, arg - rthy mtx, non calc
SS: lt gy - gy, f - vf grn, fri, sb blkly - sb
rnd, p - mod srt, arg cmt, sl mics

MD: 1,942'
TVD: 1,933.96'
Inclination: 10.08°
Azimuth: 230.89°
VS: -88.9'

SHY SS: lt gy - gy, vf - f gr, sft, sb rnd,
mod - w srt, arg cmt



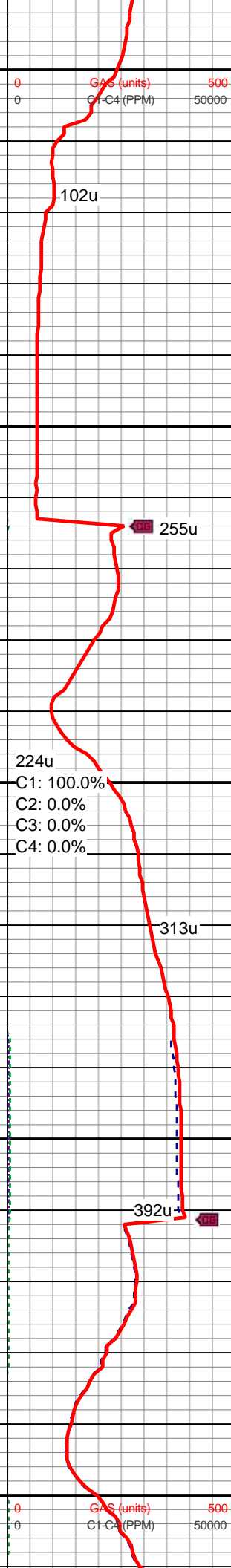
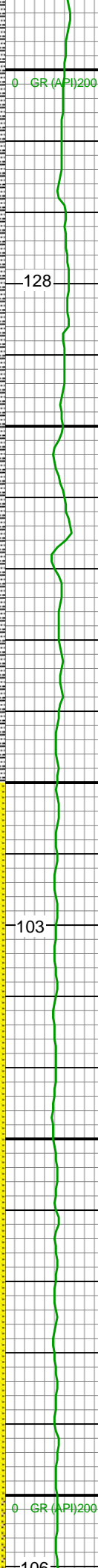
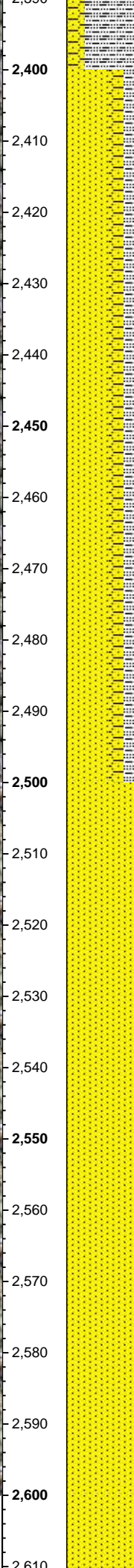
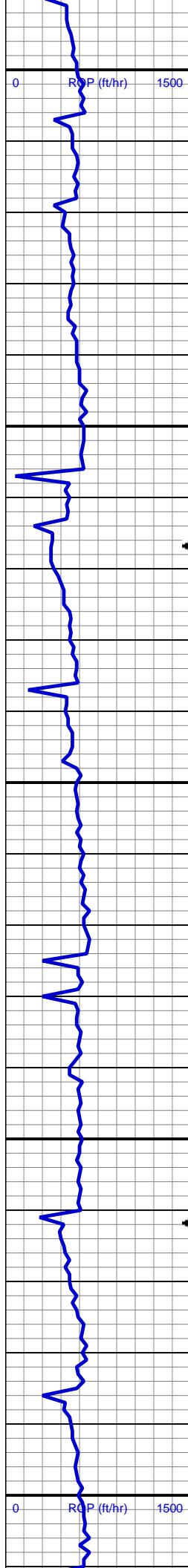
MD: 2,226'
TVD: 2,214.53'
Inclination: 8.6°
Azimuth: 231.21°
VS: -119.79'

SLTY SH: lt gy - med gy, occ dk gy, sft,
sb blkly - sb plty, arg - rthy mtx, non calc
SHY SS: lt gy - gy, vf - f gr, sft, sb rnd,
mod - w srt, arg cmt, tr ss

MD: 2,322'
TVD: 2,309.24'
Inclination: 10.2°
Azimuth: 232.95°
VS: -131.52'

SLTY SH: lt gy - med gy, occ dk gy, sft,
sb blkly - sb plty, arg - rthy mtx, non calc
SHY SS: lt gy - gy, vf - f gr, sft, sb rnd,
mod - w srt, arg cmt, tr ss

MUD WT 8.85 VIS 32



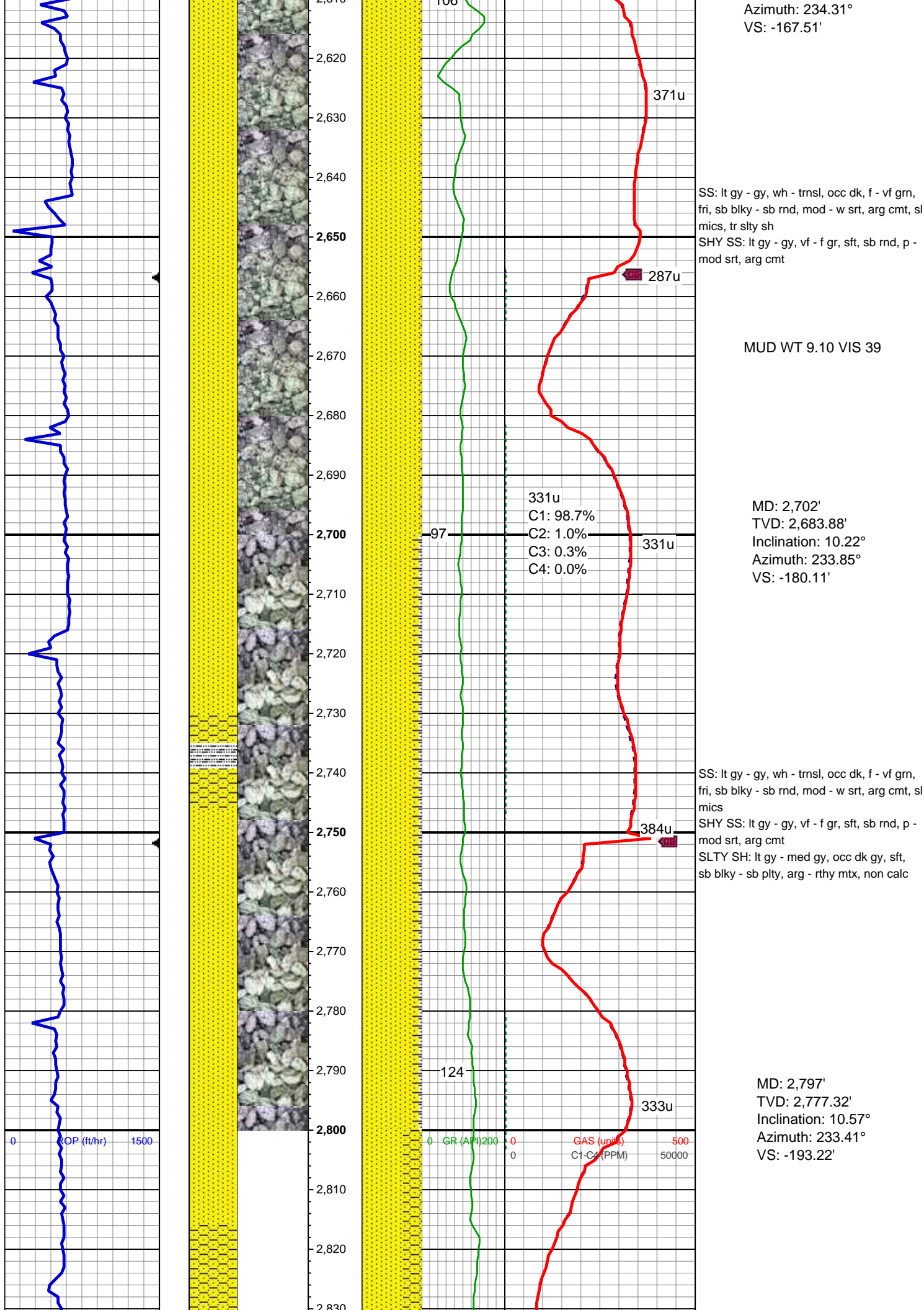
MD: 2,417'
TVD: 2,402.85'
Inclination: 9.45°
Azimuth: 233.71°
VS: -143.86'

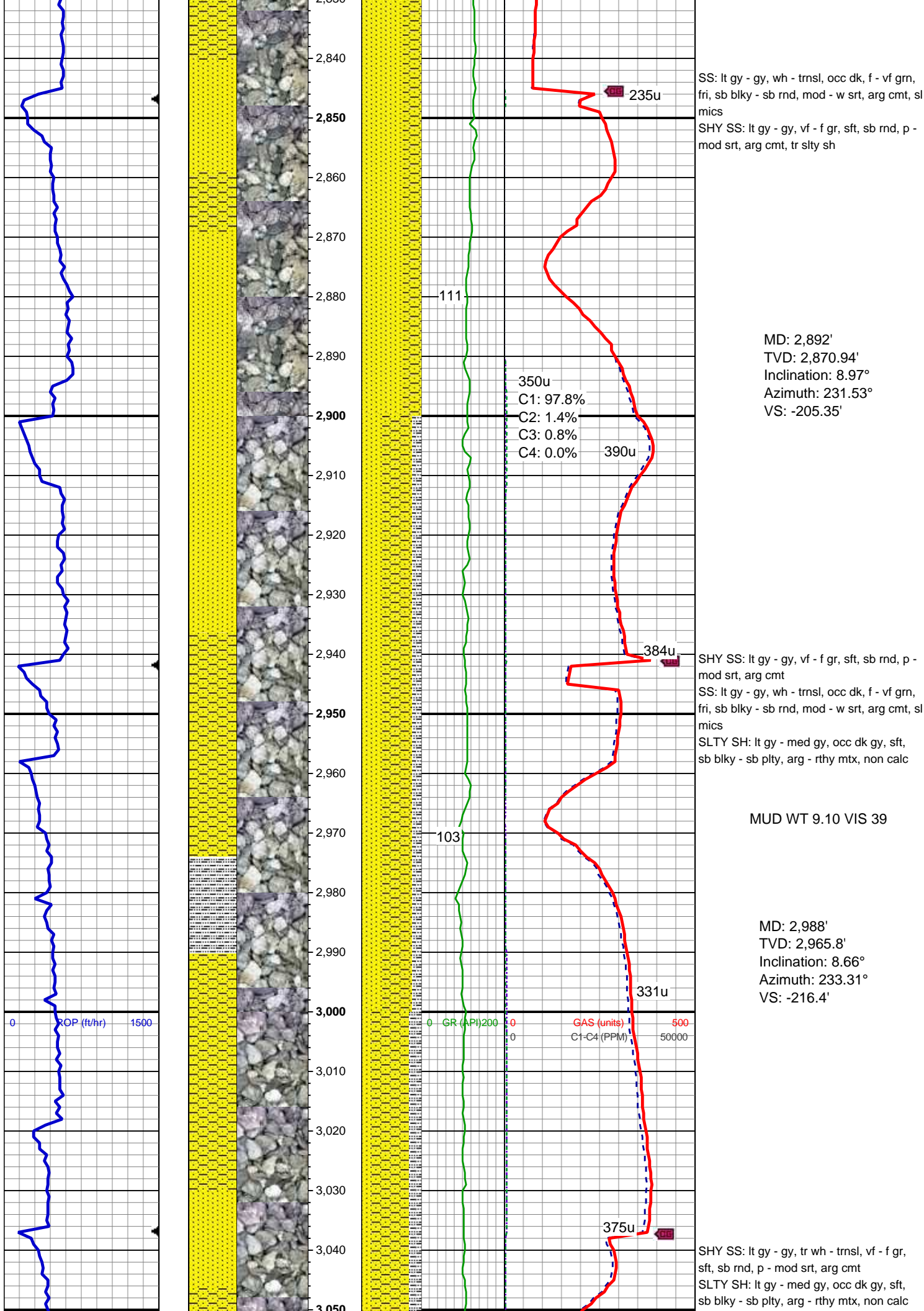
SS: lt gy - gy, f - vf grn, fri, sb blk - sb
rnd, p - mod srt, arg cmt, sl mics, tr glau
SHY SS: lt gy - gy, vf - f gr, sft, sb rnd,
mod - w srt, arg cmt
SLTY SH: lt gy - med gy, occ dk gy, sft,
sb blk - sb plty, arg - rthy mtx, non calc

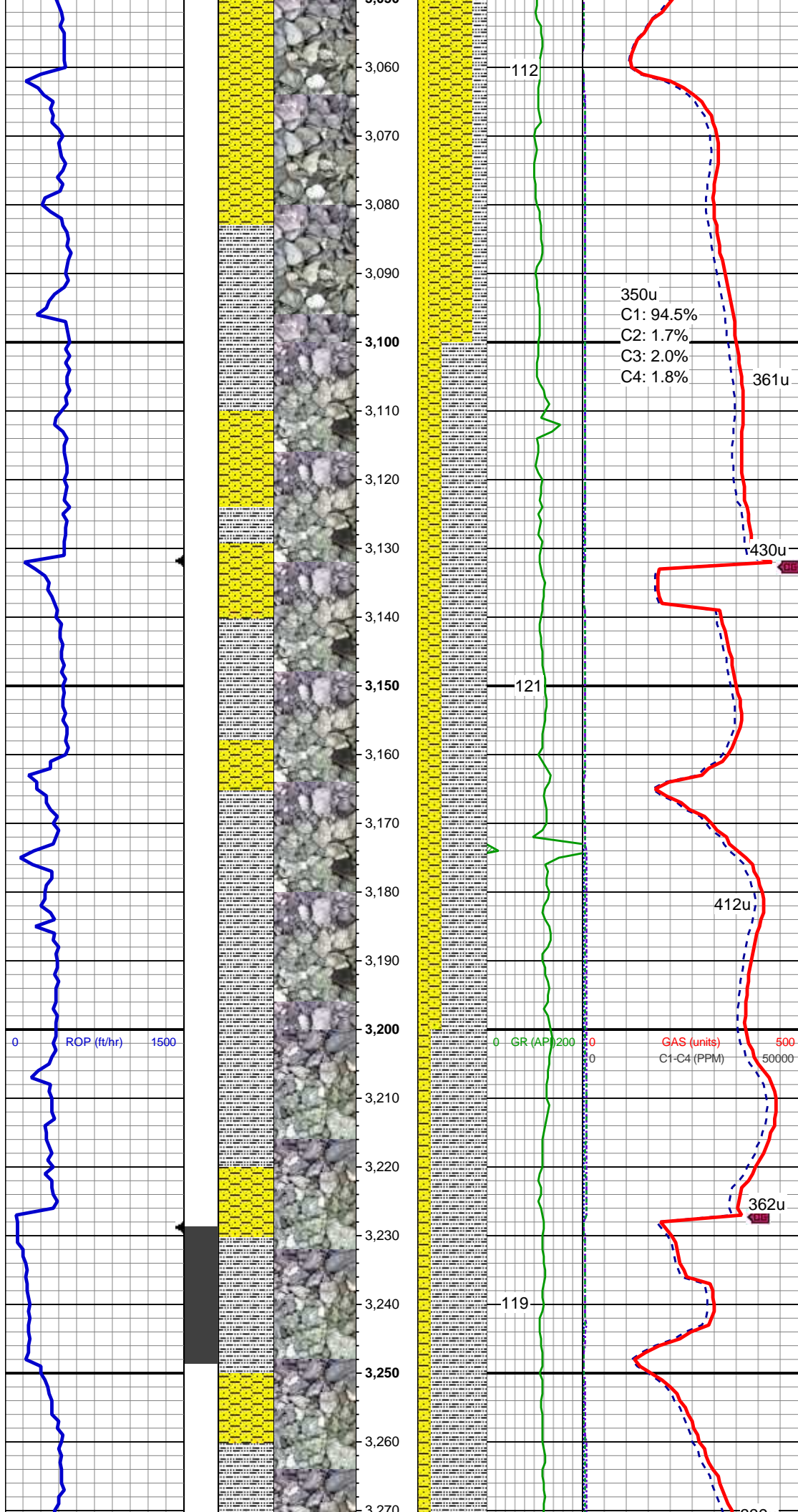
MD: 2,512'
TVD: 2,496.59'
Inclination: 9.26°
Azimuth: 232.8°
VS: -155.61'

SS: lt gy - gy, f - vf grn, fri, sb blk - sb
rnd, mod - w srt, arg cmt, sl mics, tr shy
ss, tr slty sh

MD: 2,607'
TVD: 2,590.3'
Inclination: 9.62°







SS: lt gy - gy, wh - trnsl, occ dk, f - vf grn,
fri, sb blkly - sb rnd, mod - w srt, arg cmt, sl
mics

MD: 3,083'
TVD: 3,059.7'
Inclination: 8.86°
Azimuth: 233.55°
VS: -227.43'

350u
C1: 94.5%
C2: 1.7%
C3: 2.0%
C4: 1.8%
361u

MUD WT 9.20 VIS 39

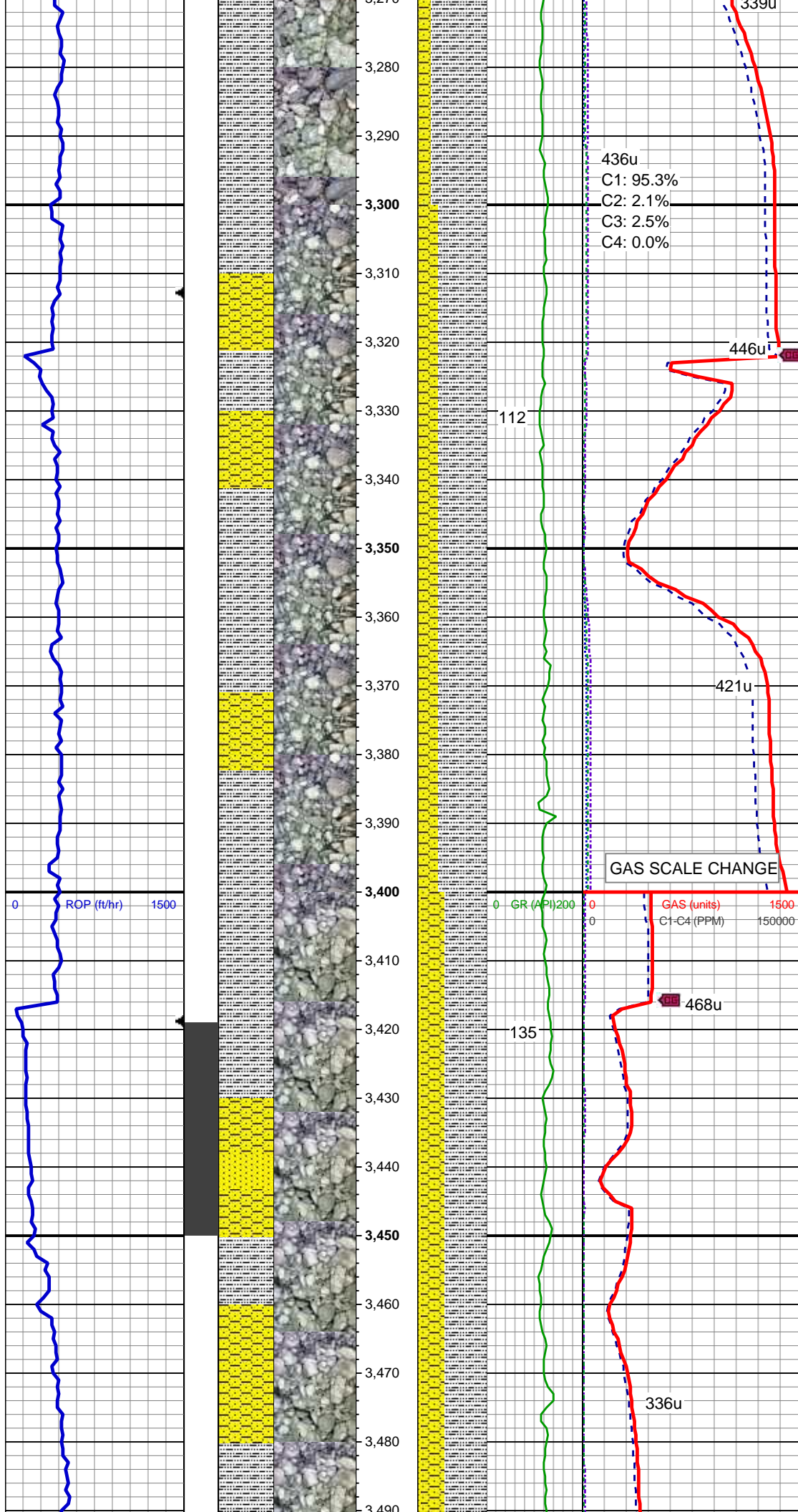
SLTY SH: lt gy - med gy, occ dk gy, sft,
sb blkly - sb plty, arg - rthy mtz, non calc
SHY SS: lt gy - gy, tr wh - trnsl, vf - f gr,
sft, sb rnd, p - mod srt, arg cmt
SS: lt gy - gy, wh - trnsl, occ dk, f - vf grn,
fri, sb blkly - sb rnd, mod - w srt, arg cmt, sl
mics

MD: 3,178'
TVD: 3,153.68'
Inclination: 7.93°
Azimuth: 229.04°
VS: -237.68'

0 GR (AP) 200 0 GAS (units) 500
0 C1-C4 (PPM) 50000

SLTY SH: lt gy - med gy, occ dk gy, sft,
sb blkly - sb plty, arg - rthy mtz, non calc
SHY SS: lt gy - gy, tr wh - trnsl, vf - f gr,
sft, sb rnd, p - mod srt, arg cmt, tr ss

MD: 3,273'



TVD: 3,247.66'
Inclination: 8.86°
Azimuth: 232.2°
VS: -247.81'

436u
C1: 95.3%
C2: 2.1%
C3: 2.5%
C4: 0.0%

446u

112

421u

GAS SCALE CHANGE

SLTY SH: lt gy - med gy, occ dk gy, sft, sb blk - sb plty, arg - rthy mtx, non calc
SHY SS: lt gy - gy, tr wh - trns, vf - f gr, sft, sb rnd, p - mod srt, arg cmt, tr ss

MD: 3,368'
TVD: 3,341.68'
Inclination: 7.58°
Azimuth: 231.13°
VS: -257.9'

MUD WT 9.15 VIS 42

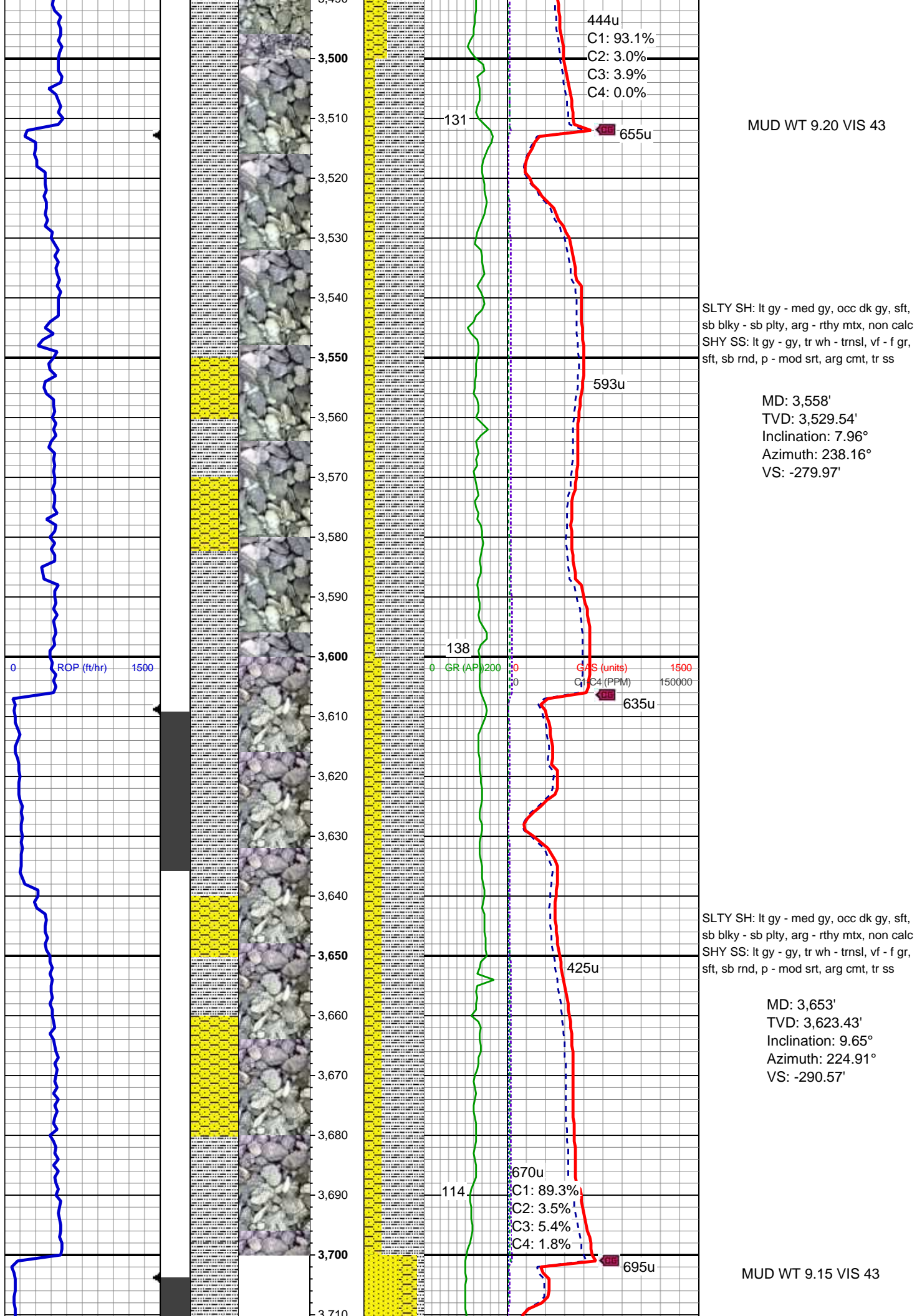
468u

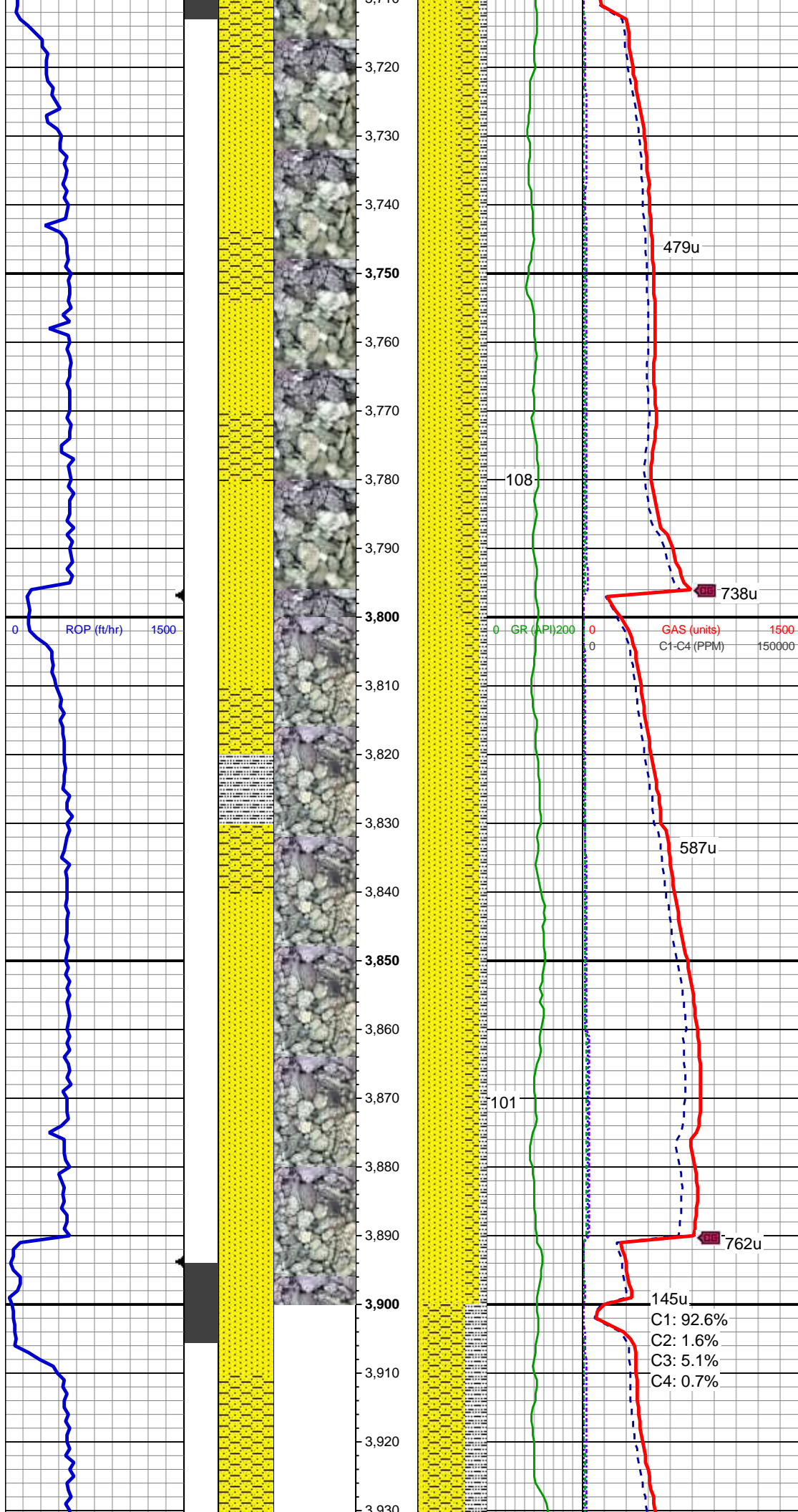
135

SLTY SH: lt gy - med gy, occ dk gy, sft, sb blk - sb plty, arg - rthy mtx, non calc
SHY SS: lt gy - gy, tr wh - trns, vf - f gr, sft, sb rnd, p - mod srt, arg cmt
SS: lt gy - gy, wh - trns, tr dk mtx, f - vf grn, fri, sb blk - sb rnd, mod - w srt, arg cmt, sl mics

MD: 3,463'
TVD: 3,435.63'
Inclination: 9.43°
Azimuth: 234.81°
VS: -268.57'

336u





MD: 3,748'
TVD: 3,717.08'
Inclination: 9.66°
Azimuth: 229.11°
VS: -301.48'

SS: lt gy - gy, wh - trnsl, tr med gy mtx, f -
vf grn, fri, sb blkly - sb rnd, mod - w srt, arg
cmt, sl mics
SHY SS: lt gy - gy, tr wh - trnsl, vf - f gr,
sft, sb rnd, p - mod srt, arg cmt
SLTY SH: lt gy - med gy, occ dk gy, sft,
sb blkly - sb plty, arg - rthy mtx, non calc

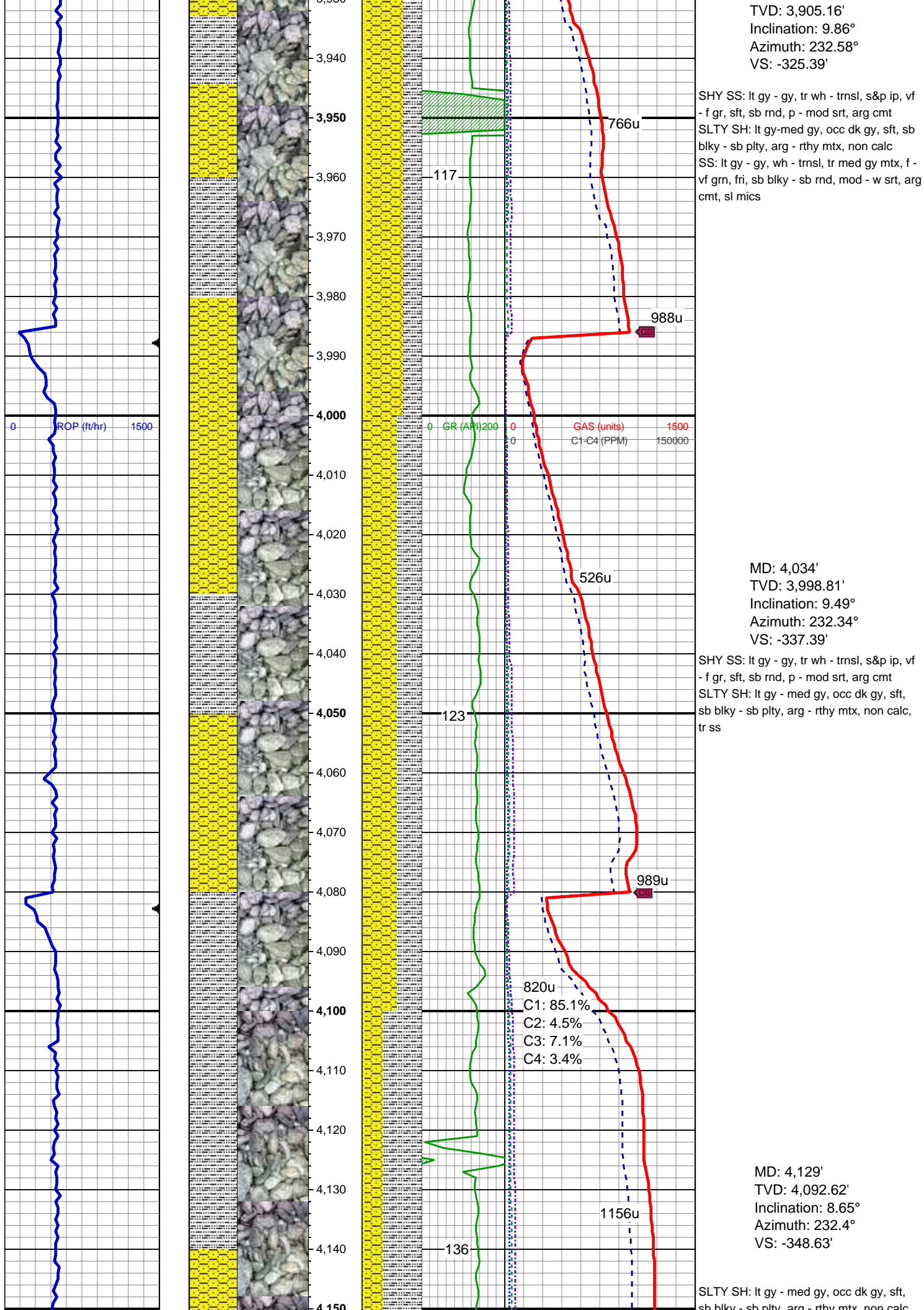
MD: 3,844'
TVD: 3,811.63'
Inclination: 10.3°
Azimuth: 228.67°
VS: -313.27'

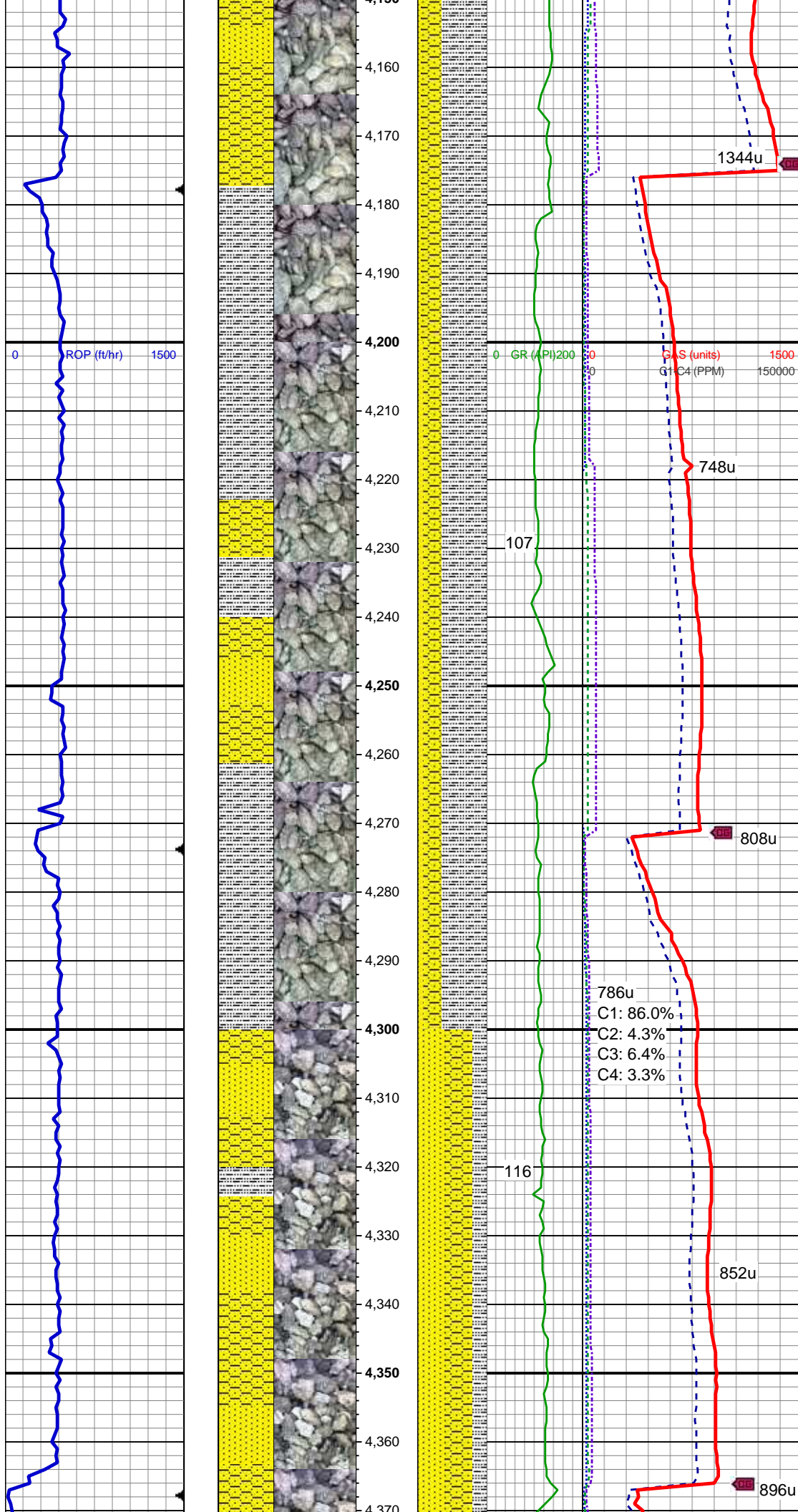
SS: lt gy - gy, wh - trnsl, tr med gy mtx, f -
vf grn, fri, sb blkly - sb rnd, mod - w srt, arg
cmt, sl mics, tr dissn pyr
SHY SS: lt gy - gy, tr wh - trnsl, vf - f gr,
sft, sb rnd, p - mod srt, arg cmt
SLTY SH: lt gy - med gy, occ dk gy, sft,
sb blkly - sb plty, arg - rthy mtx, non calc

MUD WT 9.25 VIS 44

MD: 3,939'

C1: 92.6%
C2: 1.6%
C3: 5.1%
C4: 0.7%





SB blkly - sb plty, arg - rthy mtx, non calc
SHY SS: lt gy - gy, tr wh - trnsi, s&p ip, vf
- f gr, sft, sb rnd, p - mod srt, arg cmt
SS: lt gy - gy, wh - trnsi, tr med gy mtx, f -
vf grn, fri, sb blkly - sb rnd, mod - w srt, arg
cmt, sl mics

MUD WT 9.20 VIS 44

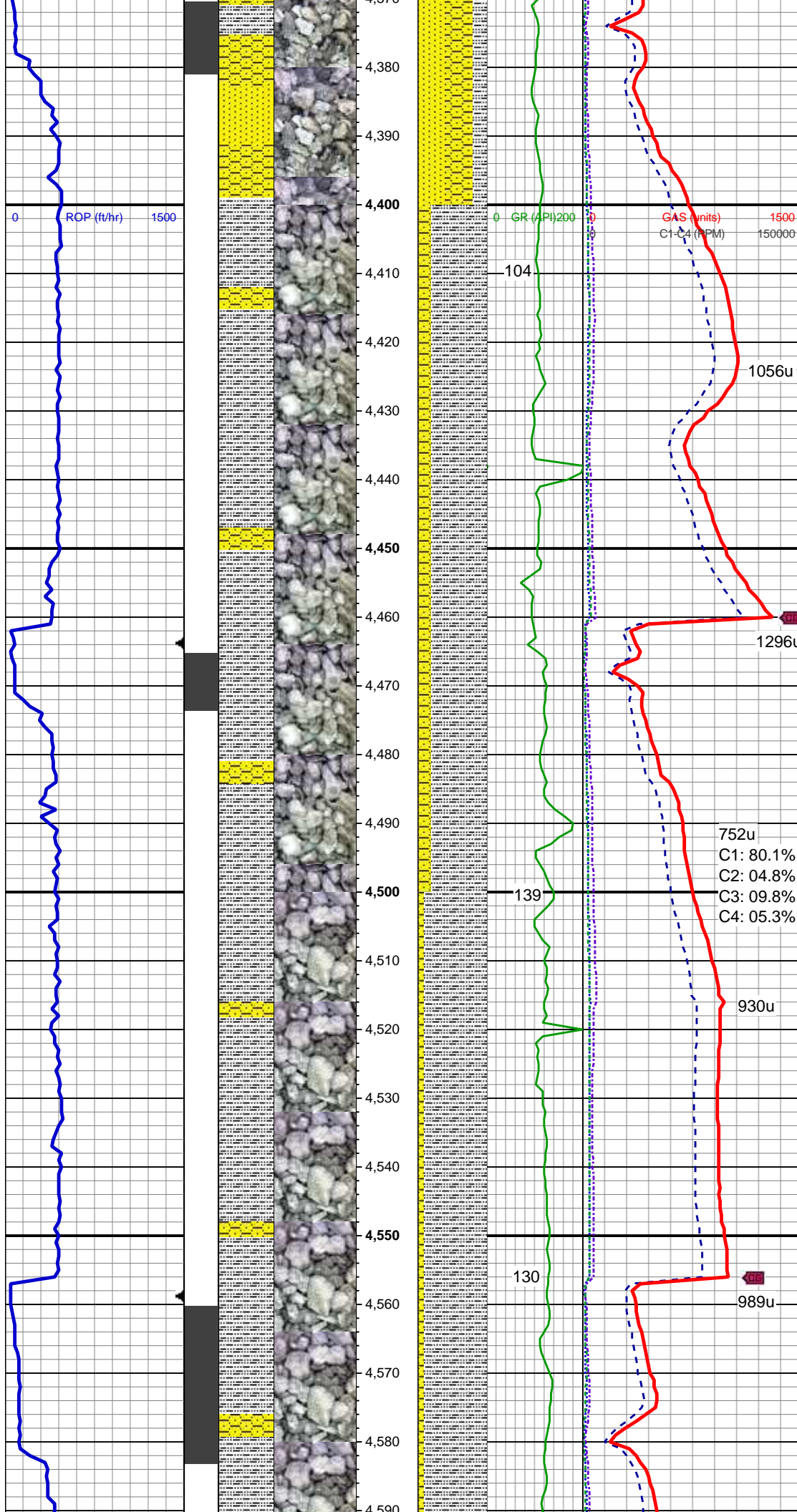
MD: 4,224'
TVD: 4,186.58'
Inclination: 8.38°
Azimuth: 231.57°
VS: -359.12'

SLTY SH: lt gy - med gy, occ dk gy, sft,
sb blkly - sb plty, arg - rthy mtx, non calc
SHY SS: lt gy - gy, tr wh - trnsi, s&p ip, vf
- f gr, sft, sb rnd, p - mod srt, arg cmt
SS: lt gy - gy, wh - trnsi, tr med gy mtx, f -
vf grn, fri, sb blkly - sb rnd, mod - w srt, arg
cmt, sl mics

MD: 4,320'
TVD: 4,281.59'
Inclination: 8.1°
Azimuth: 228.82°
VS: -369.1'

SHY SS: lt gy - gy, s&p ip, vf - f gr, sft, sb
rnd-sb blkly, mod srt, arg cmt
SS: lt gy - gy, occ wh-trnsi, tr med gy
mtx, f - vf grn, fri, sb blkly - sb rnd, tr rnd,
mod - w srt, arg cmt, sl mics
SLTY SH: lt gy - med gy, tr dk gy, sft, sb
blkly - sb plty, tr plty, arg - rthy mtx, non
calc

MUD WT 9.30 VIS 46



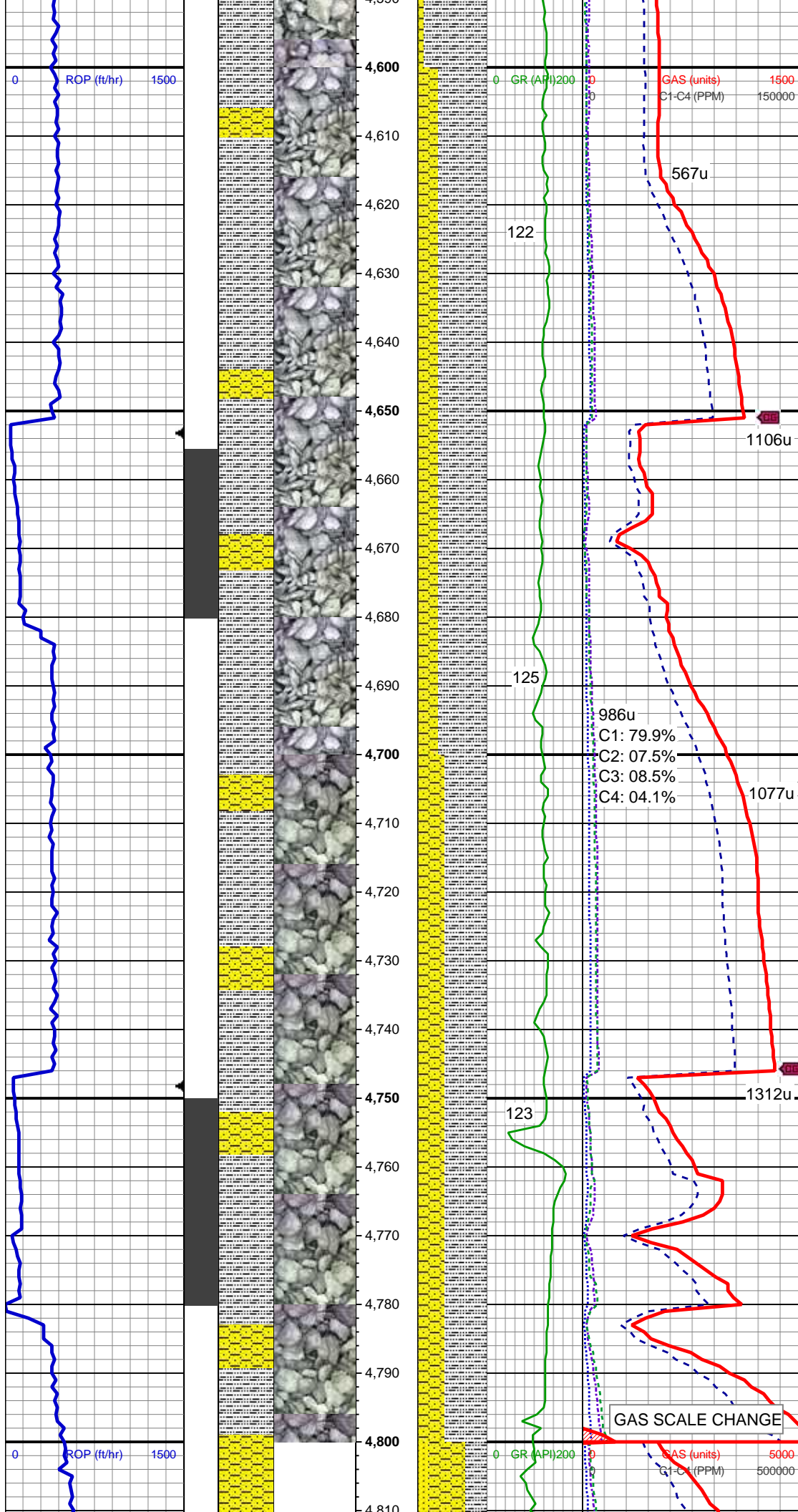
MD: 4,415'
TVD: 4,375.74'
Inclination: 7.26°
Azimuth: 235.14°
VS: -378.53'

SLTY SH: lt gy - med gy, occ dk gy, sft, sb blkly - sb plty, tr plty, arg - rthy mtx, non calc, tr - occ ss
SHY SS: lt gy - gy, tr med gy, vf - f gr, sft, sb rnd - sb blkly, mod - w srt, arg cmt

MD: 4,510'
TVD: 4,470.03'
Inclination: 6.72°
Azimuth: 230.75°
VS: -387.29'

MUD WT 9.30 VIS 42

SLTY SH: lt gy - med gy, tr dk gy, sft, sb blkly - sb plty, occ plty, arg - rthy mtx, non calc, occ ss
SHY SS: lt gy - gy, occ med gy, vf - f gr, sft, sb rnd - sb blkly, mod - w srt, arg cmt



MD: 4,605'
TVD: 4,564.56'
Inclination: 4.66°
Azimuth: 229.08°
VS: -394.1'

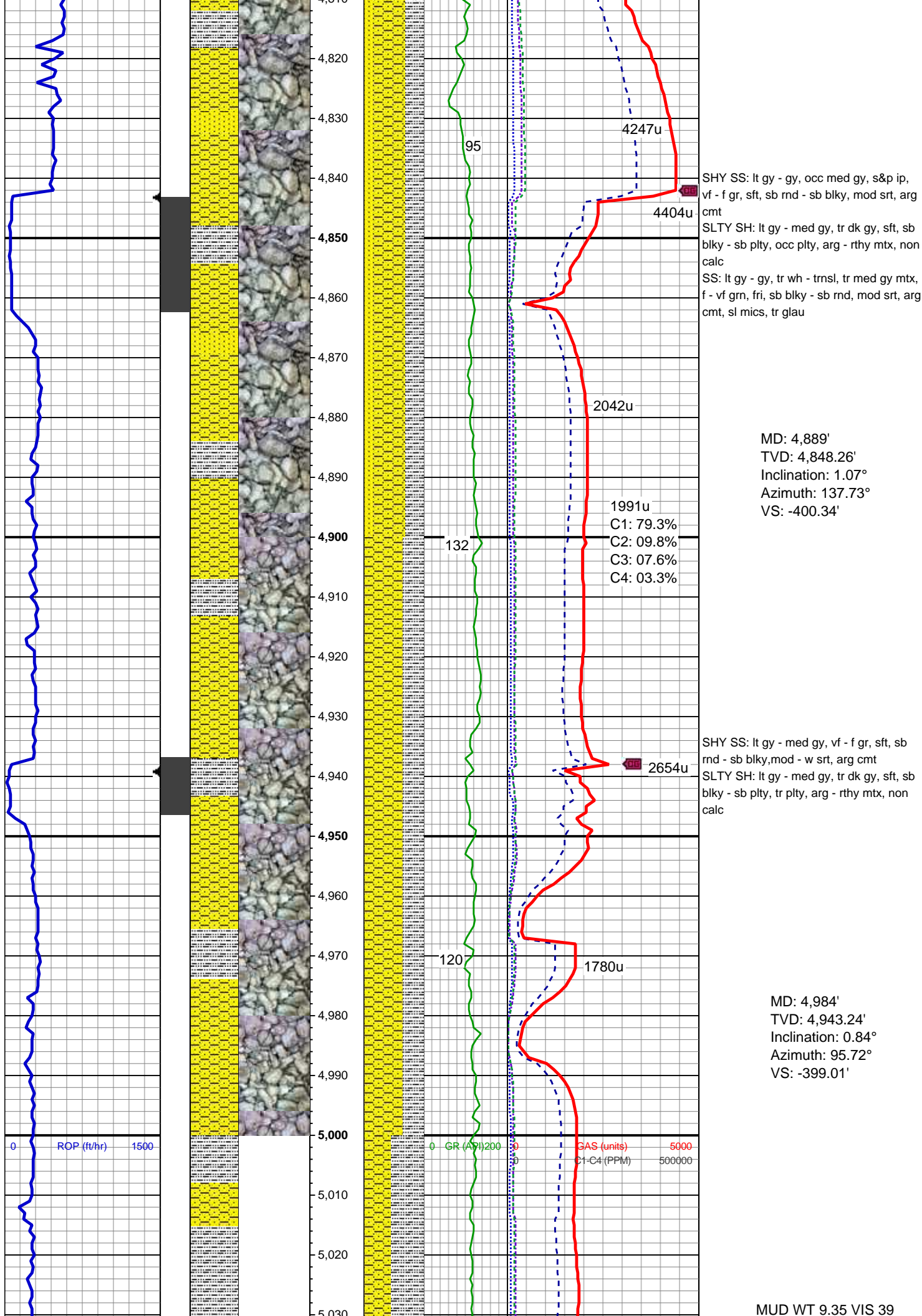
MUD WT 9.35 VIS 38

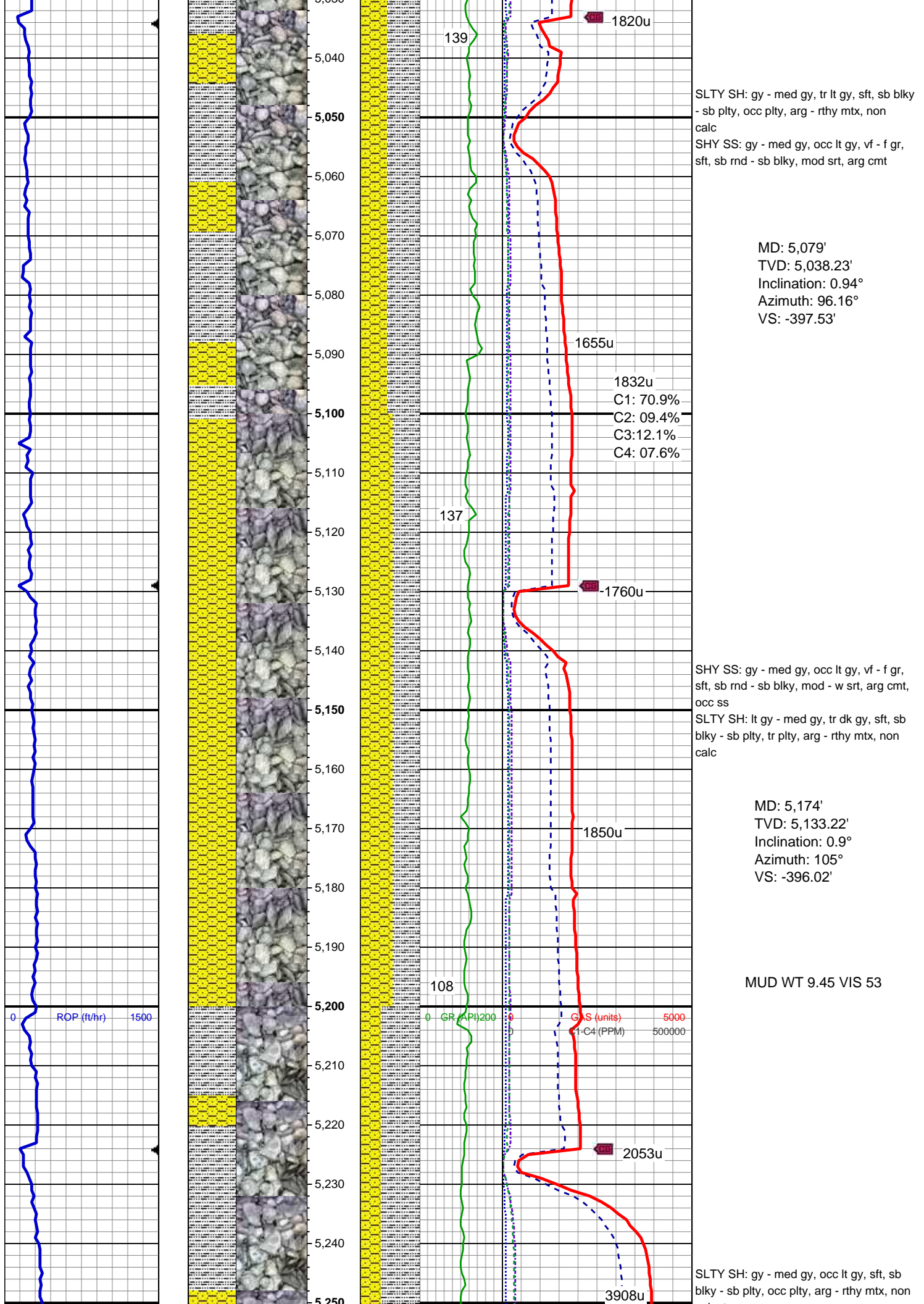
SLTY SH: lt gy - med gy, tr dk gy, sft, sb
blky - sb plty, tr plty, arg - rthy mtx, non
calc
SHY SS: lt gy - gy, tr med gy, vf - f gr, sft,
sb rnd - sb blky, mod - w srt, arg cmt

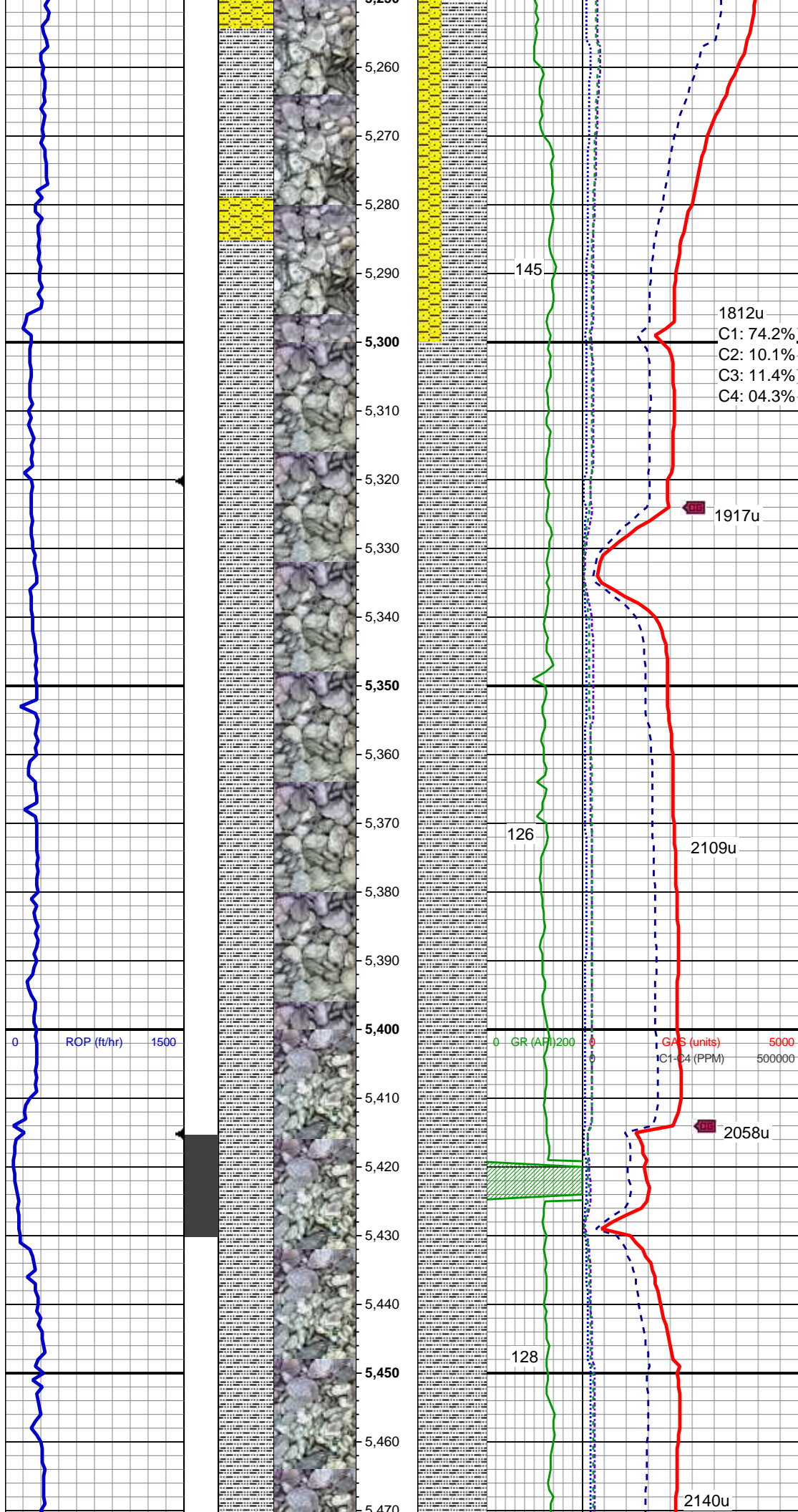
MD: 4,700'
TVD: 4,659.34'
Inclination: 2.98°
Azimuth: 236.94°
VS: -398.83'

SLTY SH: lt gy - med gy, tr dk gy, sft, sb
blky - sb plty, tr plty, arg - rthy mtx, non
calc
SHY SS: lt gy - gy, occ med gy, vf - f gr,
sft, sb rnd - sb blky, w srt, arg cmt

MD: 4,795'
TVD: 4,754.28'
Inclination: 1.43°
Azimuth: 187.79°
VS: -400.89'







calc, tr pyr
SHY SS: gy - med gy, tr lt gy, vf - f gr, sft,
sb rnd - sb blk, mod srt, arg cmt

MD: 5,270'
TVD: 5,229.21'
Inclination: 0.72°
Azimuth: 113.23°
VS: -394.72'

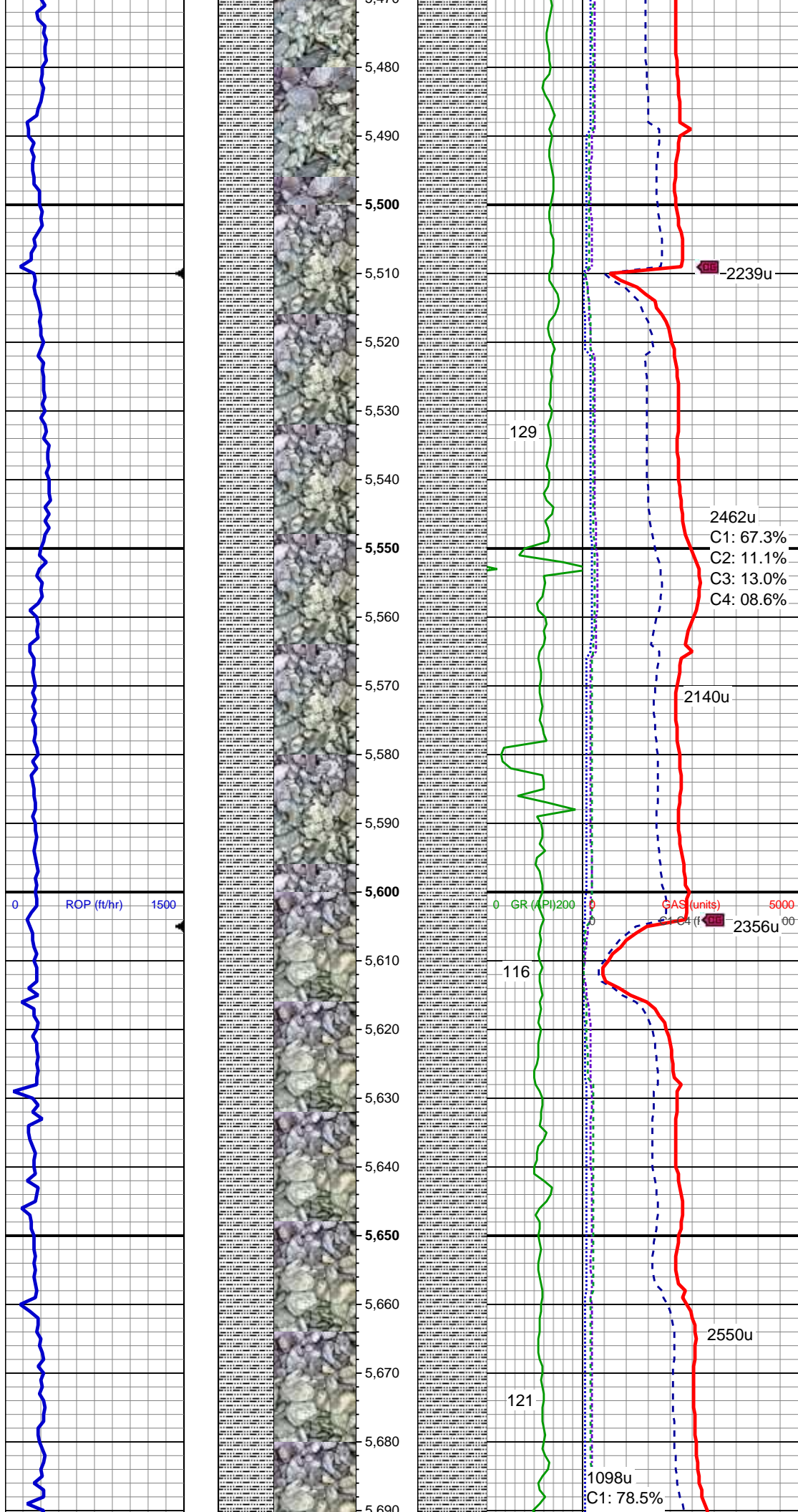
SLTY SH: gy - med gy, occ lt gy, sft, sb
blk - sb plty, occ plty, arg - rthy mt, non
calc, tr shy ss

MD: 5,365'
TVD: 5,324.2'
Inclination: 0.8°
Azimuth: 131.99°
VS: -393.63'

MUD WT 9.45 VIS 54

SLTY SH: gy - med gy, occ lt gy, sft, sb
blk - sb plty, occ plty, arg - rthy mt, non
calc, tr shy ss, tr pyr

MD: 5,460'
TVD: 5,419.2'
Inclination: 0.35°
Azimuth: 356.86°



VS: -393.15'

MD: 5,555'
TVD: 5,514.2'
Inclination: 0.42°
Azimuth: 26.15°
VS: -393.05'

SLTY SH: gy - med gy, tr lt gy, sft, sb blkly
- sb plty, occ plty, arg - rthy mtx, non
calc, tr shy ss

2462u
C1: 67.3%
C2: 11.1%
C3: 13.0%
C4: 08.6%

2140u

0 ROP (ft/hr) 1500

0 GR (API) 200

CAS (units) 5000

2356u

116

MD: 5,650'
TVD: 5,609.2'
Inclination: 0.32°
Azimuth: 28.38°
VS: -392.81'

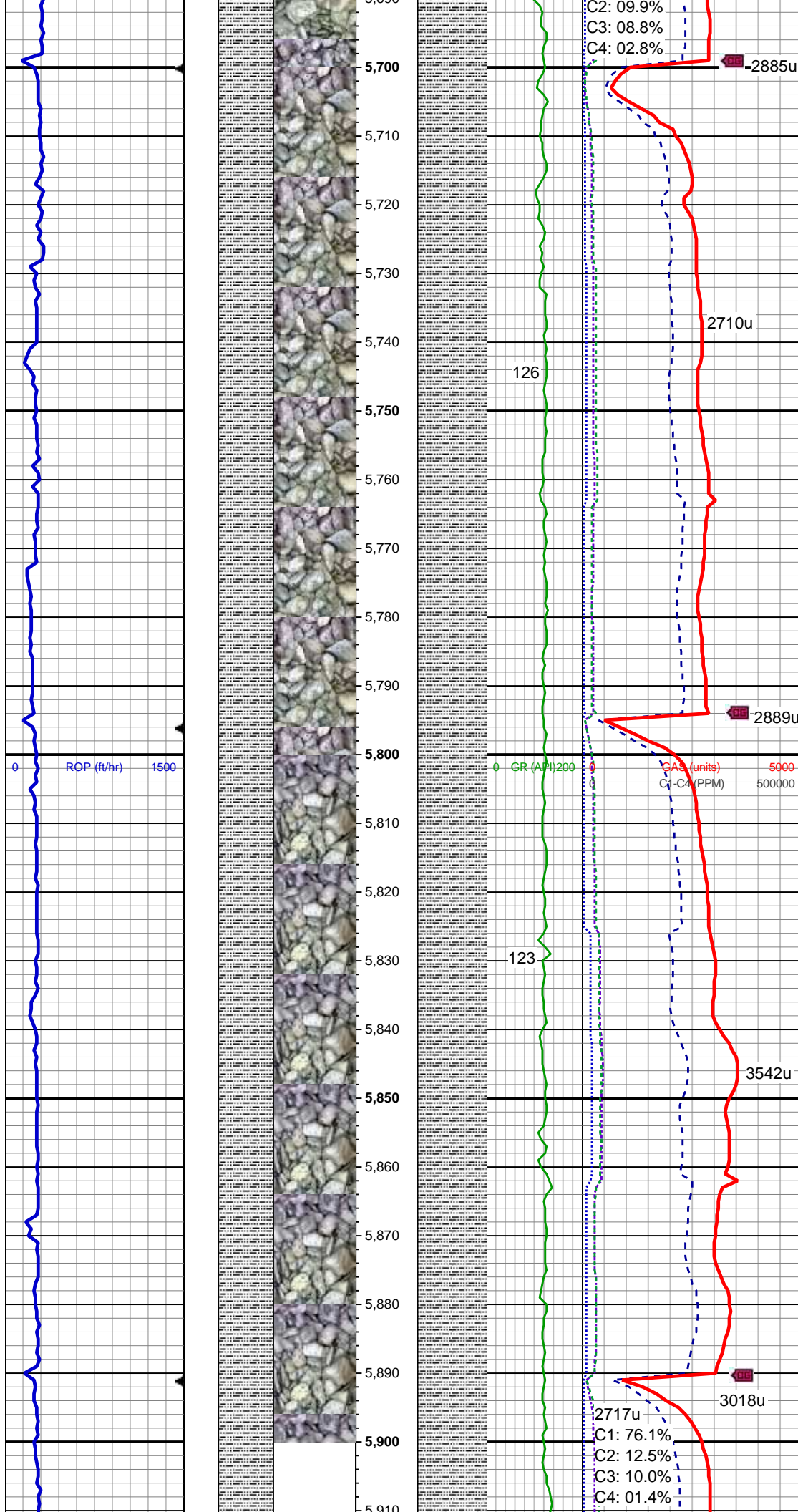
SLTY SH: gy - med gy, tr lt gy, occ dk gy,
sft, sb blkly - sb plty, occ plty, arg - rthy
mtx, non calc

2550u

121

1098u
C1: 78.5%

MUD WT 9.80 VIS 43



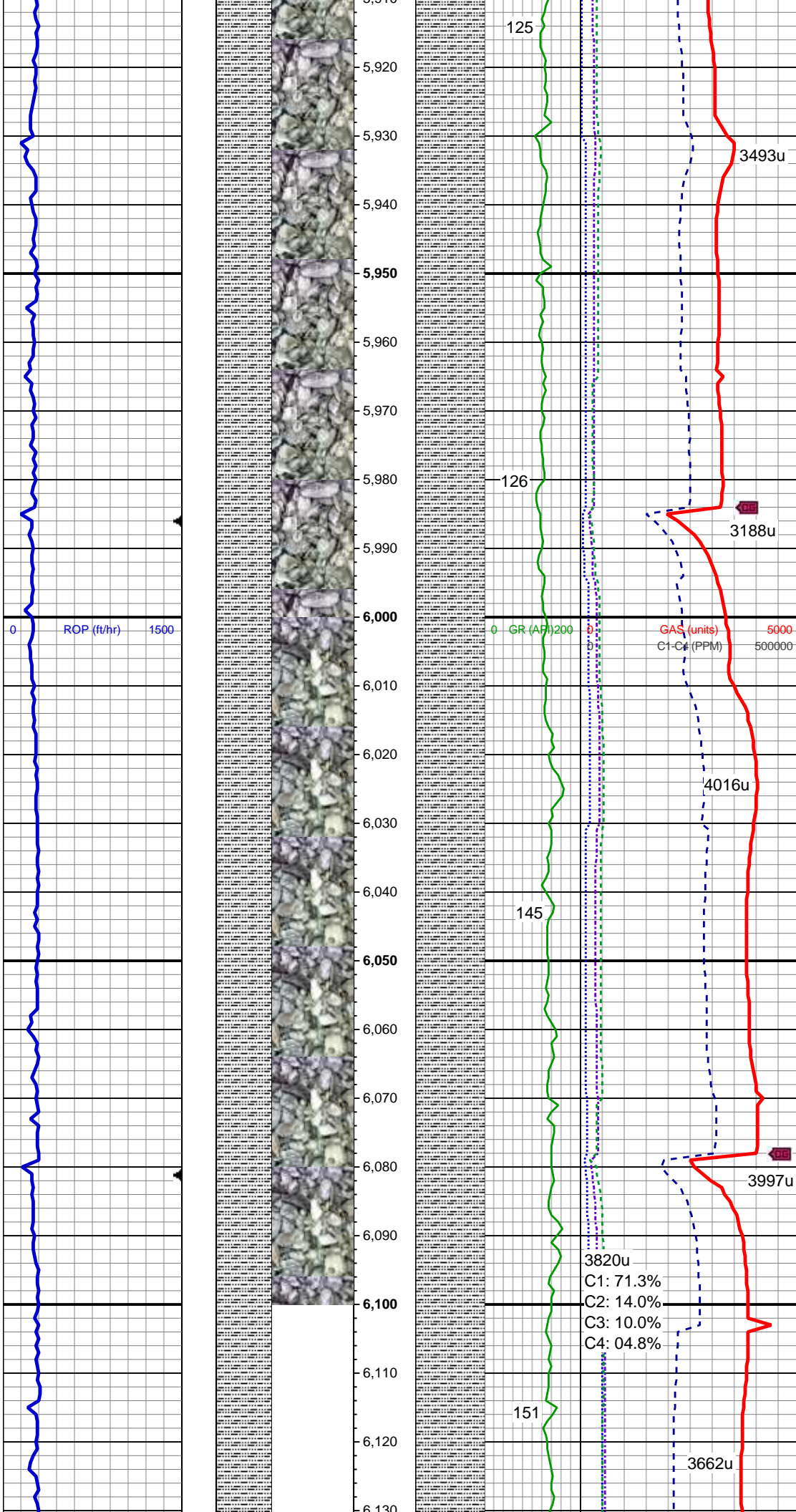
MD: 5,746'
TVD: 5,705.2'
Inclination: 0.15°
Azimuth: 71.89°
VS: -392.59'

SLTY SH: gy - med gy, tr lt gy, tr dk gy,
sft, sb blkly - sb plty, tr plty, arg - rthy mtx,
non calc, tr shy ss

MD: 5,840'
TVD: 5,799.2'
Inclination: 0.29°
Azimuth: 108.16°
VS: -392.25'

SLTY SH: gy - med gy, tr lt gy, tr dk gy,
sft, sb blkly - sb plty, occ plty, arg - rthy
mtx, non calc, occ shy ss

MUD WT 9.90 VIS 45



MD: 5,936'
TVD: 5,895.19'
Inclination: 0.24°
Azimuth: 115.05°
VS: -391.82'

SLTY SH: gy - med gy, tr lt gy, tr dk gy, sft, sb blkly - sb plty, tr plty, arg - rthy mtx, non calc, tr ss

MD: 6,031'
TVD: 5,990.19'
Inclination: 0.4°
Azimuth: 106.52°
VS: -391.31'

SLTY SH: gy - med gy, occ dk gy, sft, sb blkly - sb plty, occ plty, arg - rthy mtx, non calc

MUD WT 9.95 VIS 47

MD: 6,126'
TVD: 6,085.19'
Inclination: 0.4°
Azimuth: 86.89°

MD: 6,221'
TVD: 6,180.19'
Inclination: 0.33°
Azimuth: 82.82°
VS: -390.06'

SLTY SH: gy - med gy, occ dk gy, sft, sb
blky - sb plty, tr plty, arg - rthy mtx, non
calc, tr shy ss

MD: 6,296'
TVD: 6,255.19'
Inclination: 0.42°
Azimuth: 93.99°
VS: -389.57'

SLTY SH: gy - med gy, occ dk gy, sft, sb
blky - sb plty, tr plty, arg - rthy mtx, non
calc, tr shy ss

 TD @ 6346' MD |

08/26/2014 @ 01:07 AM

TOOH FOR CURVE BHA
LOG CONTINUES ON MPLOT
FIVE RIVERS K09-66-1AHN(HORZ)

Thank you for choosing
Columbine Logging Inc.

6,355
6,360
6,370
6,380
6,390
6,400