

COLUMBINE LOGGING

Scale: 5" / 100'
Measured Depth Log

Well Name Crow Creek AA01-785 VERT

Location SEC 1 T6N R63W

State COLORADO

County WELD

Country USA

Rig Number H&P 315

API Number 05-123-40160

AFE # 200436

Region DJ BASIN

Field WATTENBERG

Spud Date 12/31/2014

Drilling Completed 1/2/2015

Surface Coordinates NWNW SEC 1 T6N R63W
290' FNL; 537' FWL

LAT/LON: 40.52203/-104.39235

Bottom Hole Coordinates SEC 12 T6N R63W
30' FNL; 350' FWL

Ground Elevation 4,797'

K.B. Elevation 4,821'

Logged Interval 2,000' To 6,006'

Total Depth 6,006'

Formation NIOBRARA B CHALK

Type of Drilling Fluid LSND

Other Symbols

Oil Show

- DEAD
- EVEN
- QUESTIONABLE
- SPOTTED STAINING

Porosity

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

- ORGANIC
- PINPOINT
- VUGGY

Engineering

- BIT
- CONNECTION (LEFT)
- CONNECTION (RIGHT)
- CONNECTION GAS
- CONNECTION GAS DOWN...
- CONNECTION GAS DOWN
- 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 - RT

Rounding

- ANGULAR
- ROUNDED
- SUBANG
- SUBRND

Textures

- BOUNDSTONE
- CHALKY
- CRYPTOXLN
- E EARTHY
- FINELYXLN

- GRAINSTONE
- L LITHOGRAPHIC
- MIX MICROXLN
- MS MUDSTONE
- PS PACKSTONE
- WS WACKSTONE

Sorting

- M MODERATE
- P POOR
- W WELL

Accessories

Fossils

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

Fossil

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

Minerals

Argillaceous

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

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

Rock Types

- SHALY SILTSTONE
- SHALY SANDSTONE
- SANDSTONE
- SILTY SHALE
- LIMESTONE
- CHALK
- MARLSTONE
- UNKNOWN
- ANHYDRITE

- BENTONITE
- BRECCIA
- CEMENT
- CHERT
- CLAY CHOKE SAND
- CLAYSTONE
- COAL
- CONGLOMERATE
- DOLOMITE

- GRANITE
- GYPSUM
- IGNEOUS
- SIDERITE or LIMONITE
- METAMORPHIC
- NO SAMPLE
- SALT
- SALT- PEPPER SAND
- SHALE

- SHALE COLORED
- SHALE GRAY
- SILTSTONE
- TILL
- TUFF
- WELDED TUFF

Operator

Company Noble Energy Inc

Address 1625 BROADWAY SUITE 2200
DENVER, CO 80202

Geologist

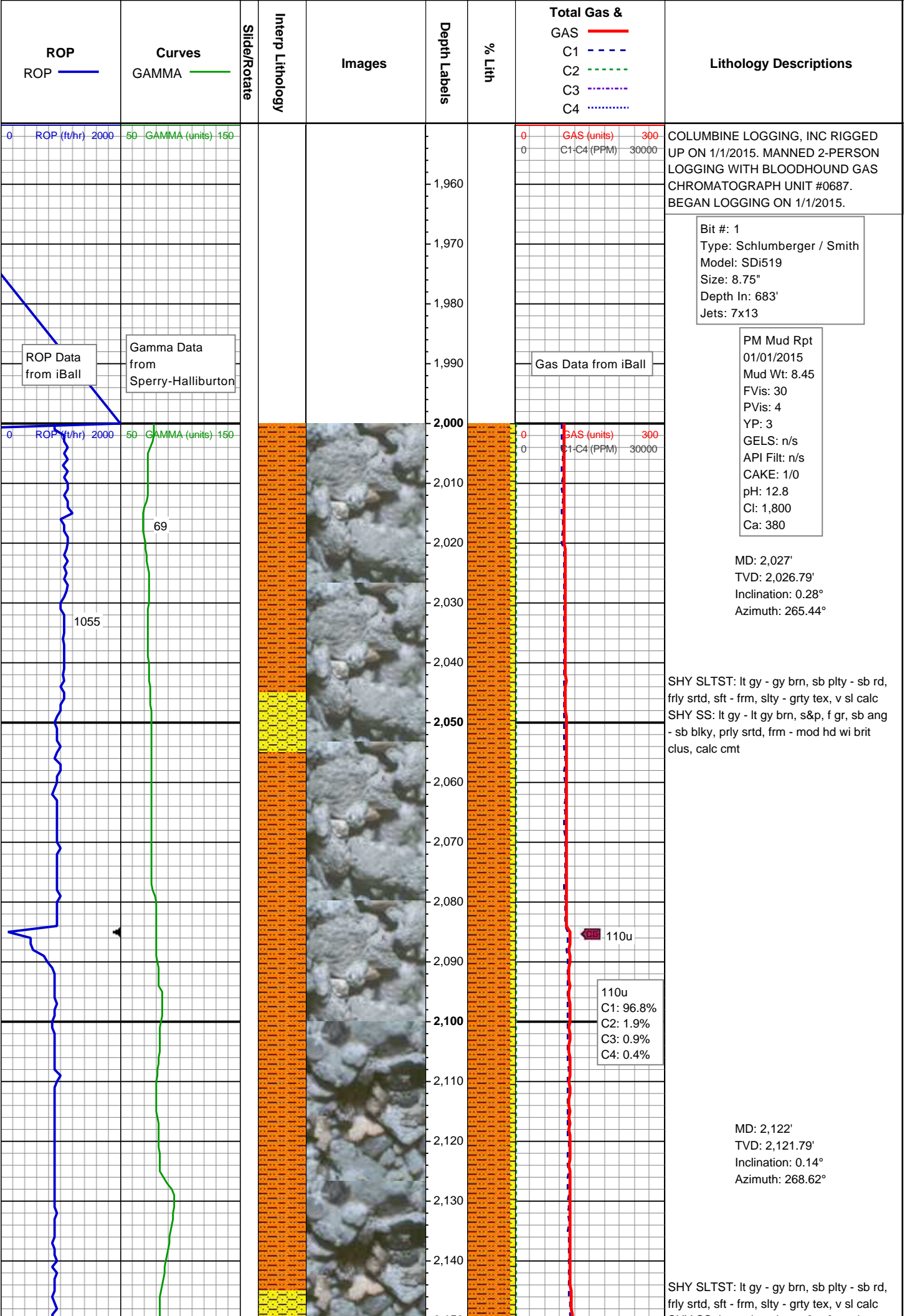
Name NATHAN MURPHY; MARK COLE

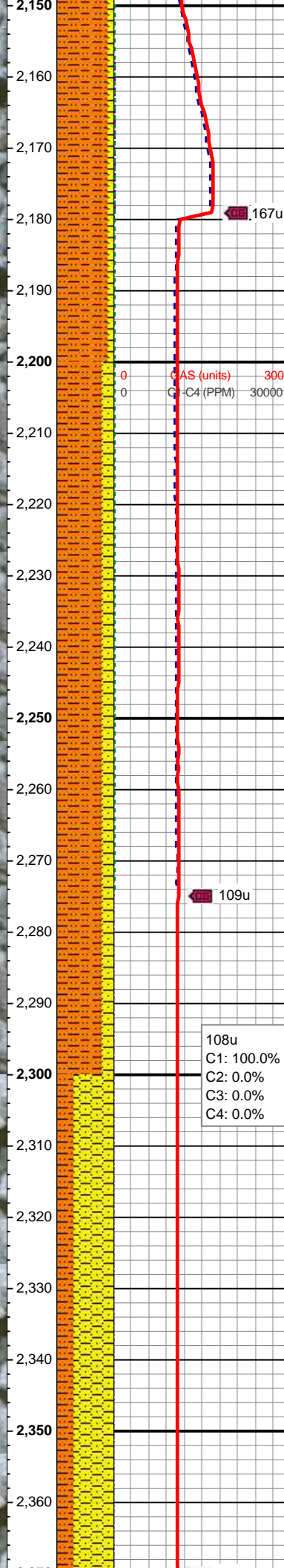
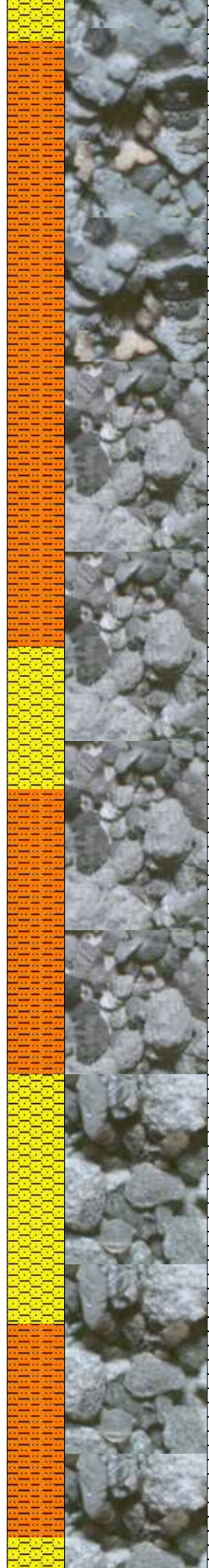
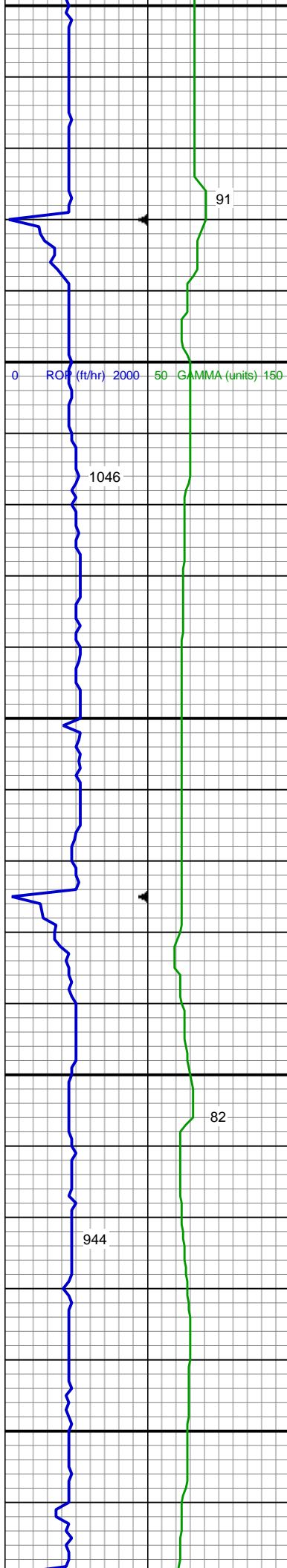
Company COLUMBINE LOGGING, INC

Address 602 S LIPAN ST
DENVER, CO 80223

Zone Color Coding

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





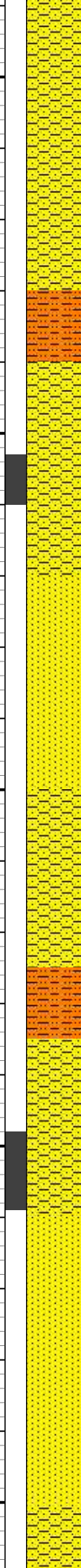
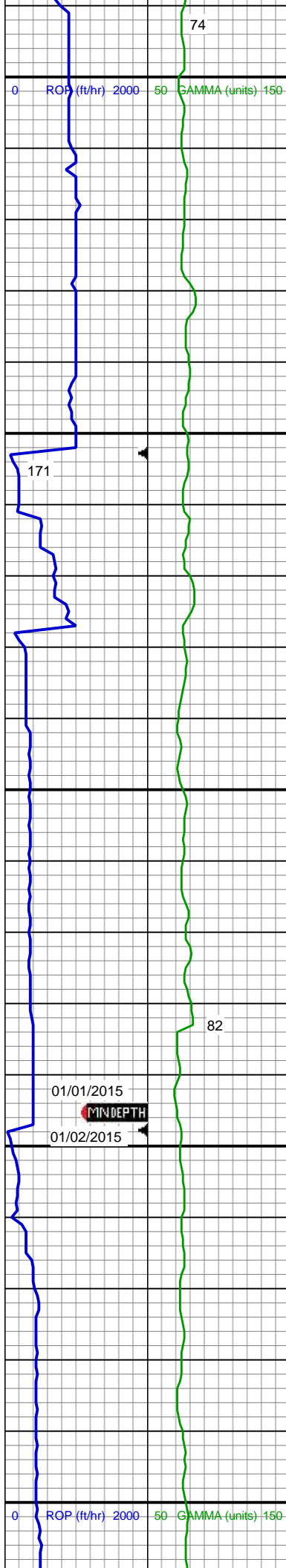
SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srt, frm - mod hd wi brit
clus, calc cmt

MD: 2,217'
TVD: 2,216.79'
Inclination: 0.45°
Azimuth: 293.42°

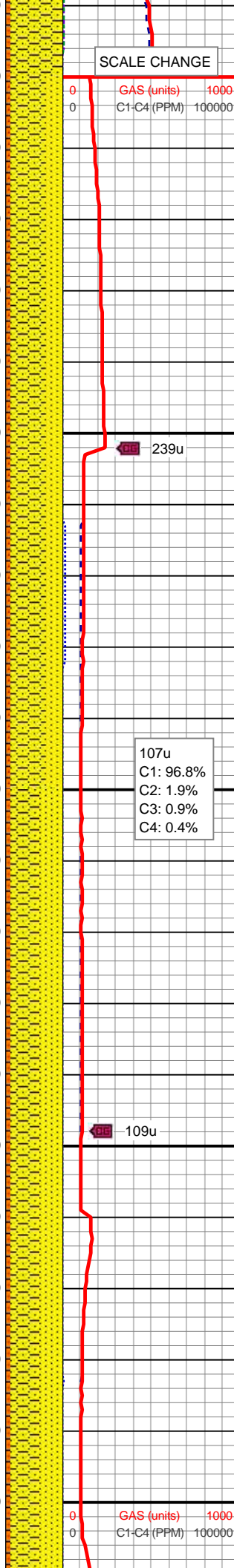
SHY SLTST: lt gy - gy brn, sb plty - sb rd,
frly srt, sft - frm, slty - grty tex, v sl calc
SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srt, frm - mod hd wi brit
clus, calc cmt

MD: 2,312'
TVD: 2,311.79'
Inclination: 0.5°
Azimuth: 241.57°

SHY SS: wh - lt gy - lt gy brn, s&p, f gr, sb
ang - sb blk, prly srt, frm - mod hd wi
brit clus, calc cmt
SHY SLTST: lt gy - gy brn, sb plty - sb rd,
frly srt, sft - frm, slty - grty tex, v sl calc



2,590
2,600
2,610
2,620
2,630
2,640
2,650
2,660
2,670
2,680
2,690
2,700
2,710
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2,740
2,750
2,760
2,770
2,780
2,790
2,800



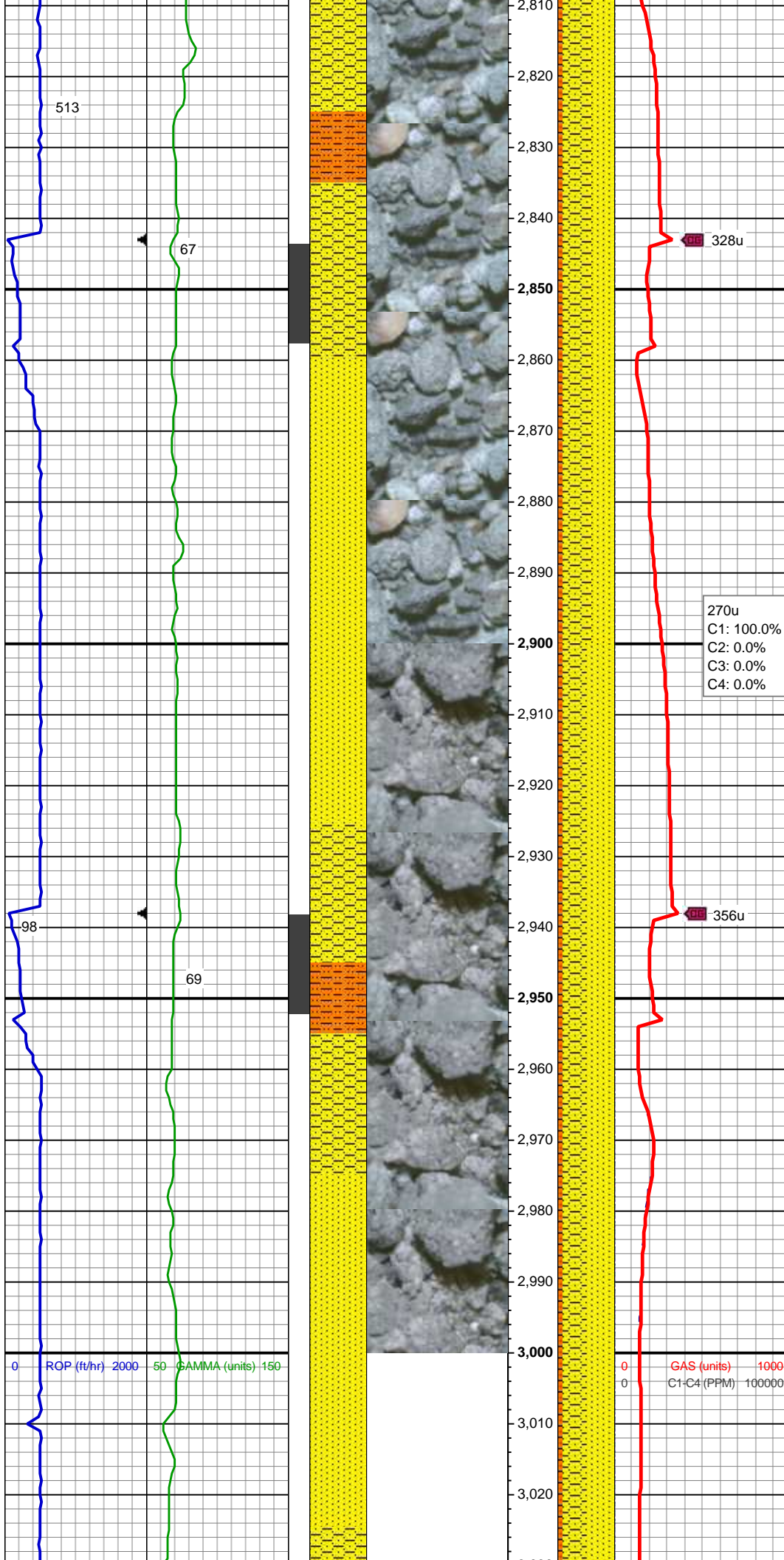
MD: 2,596'
TVD: 2,595.76'
Inclination: 1.29°
Azimuth: 317.76°

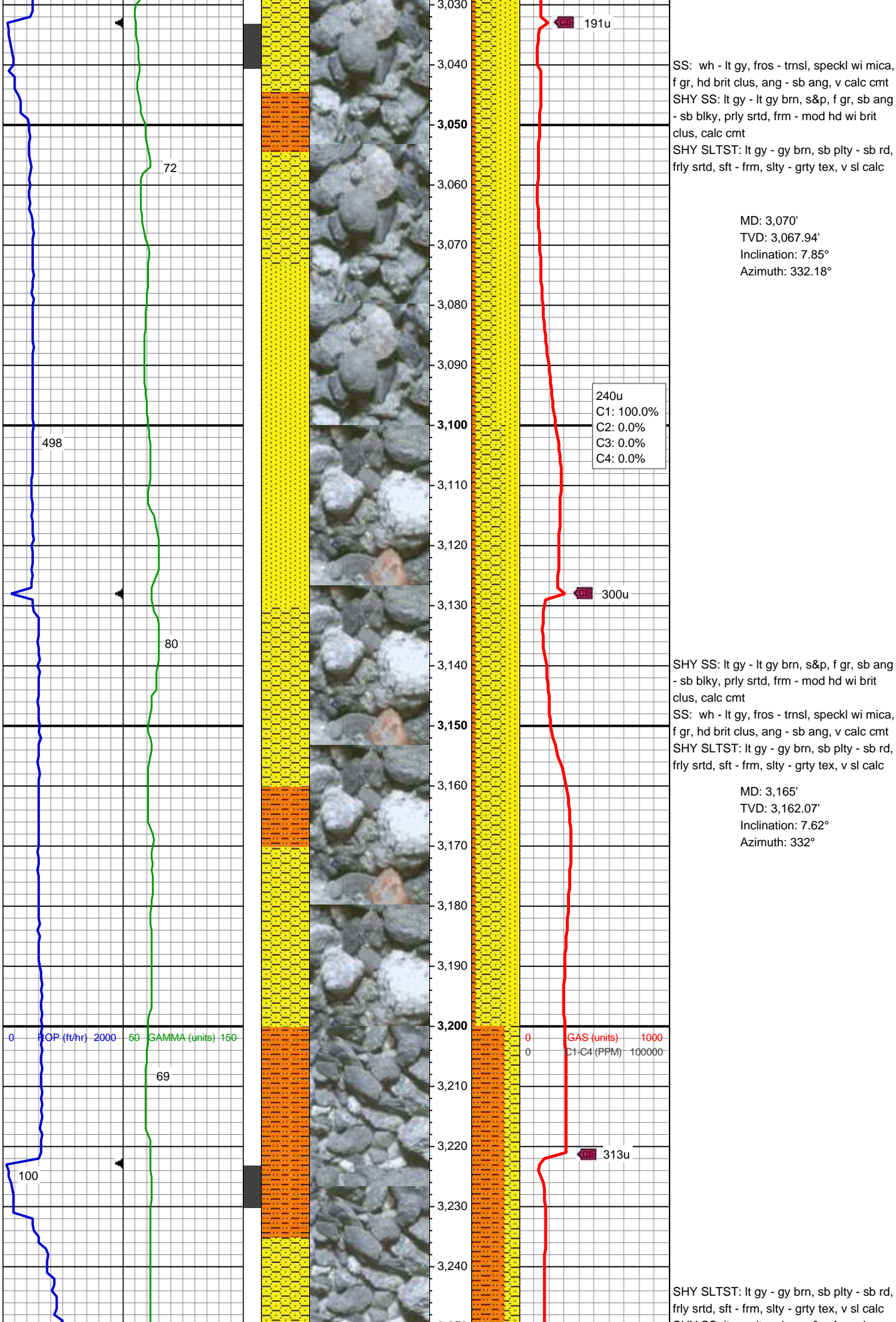
SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srt, frm - mod hd wi brit
clus, calc cmt
SS: wh - lt gy, fros - trns, speckl wi mica,
f gr, hd brit clus, ang - sb ang, v calc cmt
SHY SLTST: lt gy - gy brn, sb plty - sb rd,
fryl srt, sft - frm, slty - grty tex, v sl calc

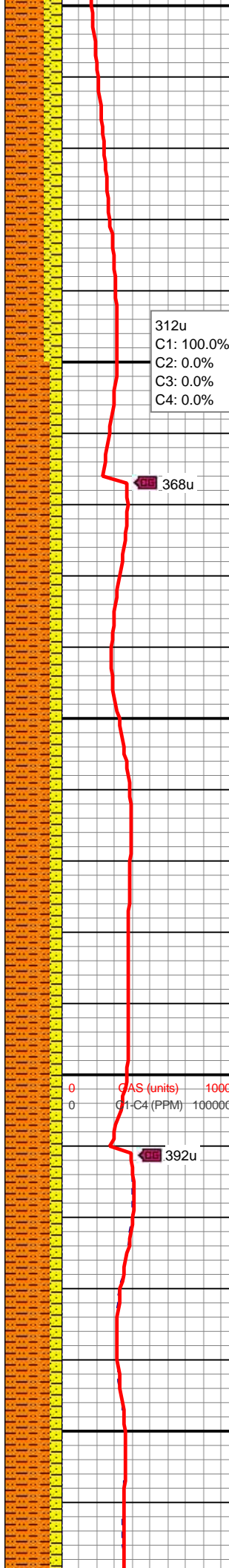
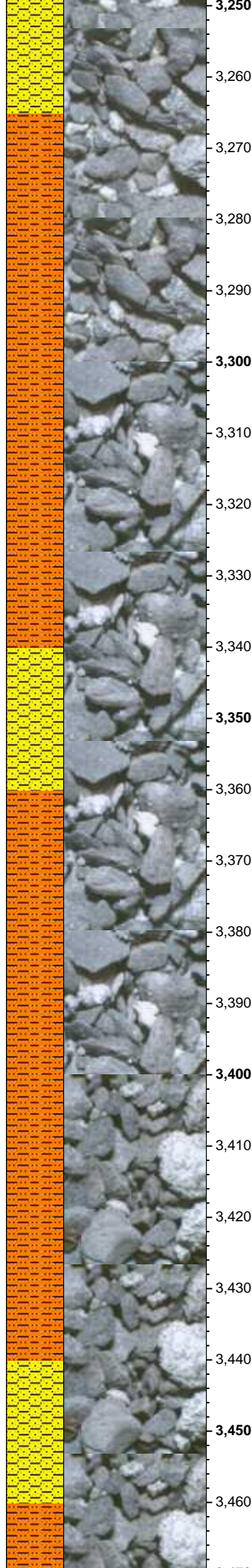
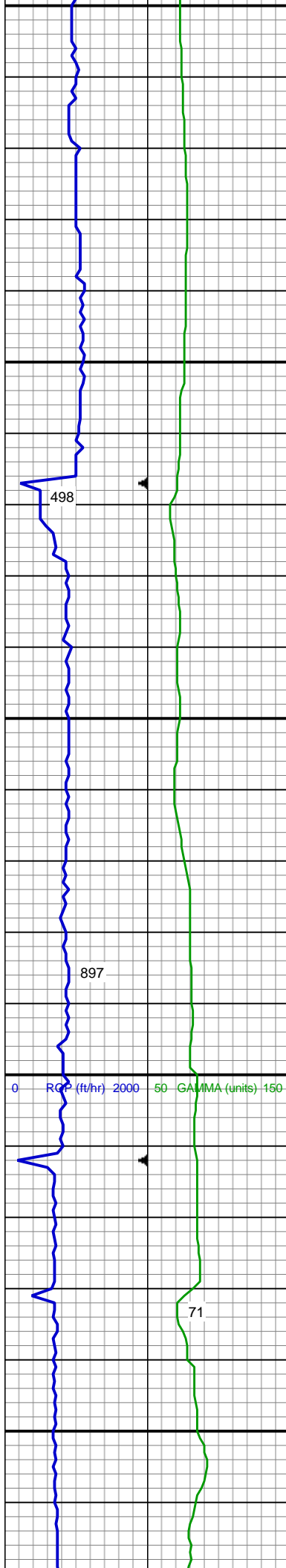
MD: 2,691'
TVD: 2,690.71'
Inclination: 2.61°
Azimuth: 328.8°

SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srt, frm - mod hd wi brit
clus, calc cmt
SS: wh - lt gy, fros - trns, speckl wi mica,
f gr, hd brit clus, ang - sb ang, v calc cmt
SHY SLTST: lt gy - gy brn, sb plty - sb rd,
fryl srt, sft - frm, slty - grty tex, v sl calc

MD: 2,786'
TVD: 2,785.56'
Inclination: 3.61°
Azimuth: 330.24°







SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srt, frm - mod hd wi brit
clus, calc cmt

MD: 3,259'
TVD: 3,255.18'
Inclination: 8.16°
Azimuth: 323.39°

SHY SLTST: lt gy - gy brn, sb plty - sb rd,
frly srt, sft - frm, slty - grty tex, v sl calc

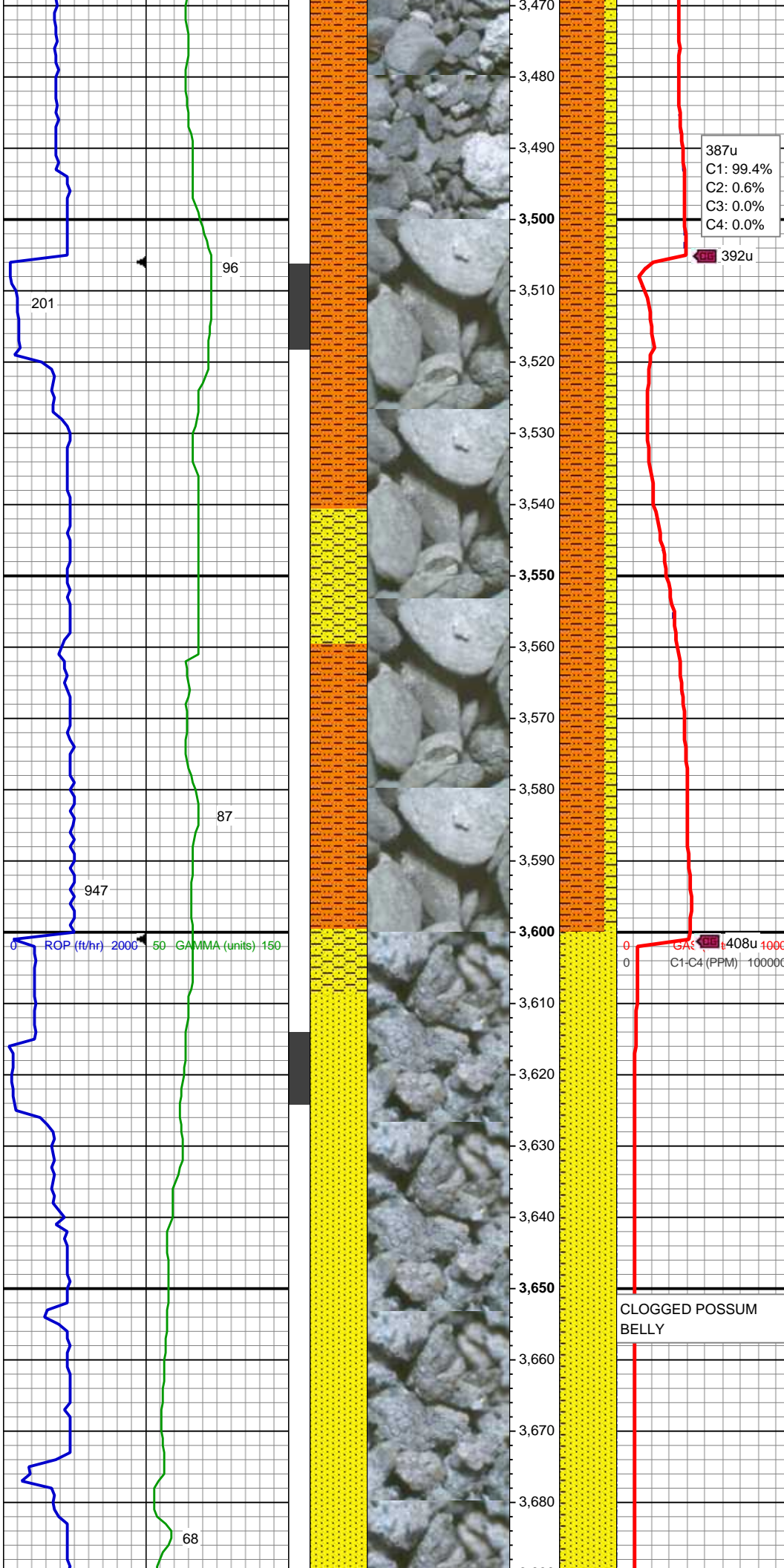
SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srt, frm - mod hd wi brit
clus, calc cmt

MD: 3,354'
TVD: 3,349.28'
Inclination: 7.66°
Azimuth: 322.12°

SHY SLTST: lt gy - gy brn, sb plty - sb rd,
frly srt, sft - frm, slty - grty tex, v sl calc

SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srt, frm - mod hd wi brit
clus, calc cmt

MD: 3,449'
TVD: 3,443.53'
Inclination: 6.69°
Azimuth: 322.2°



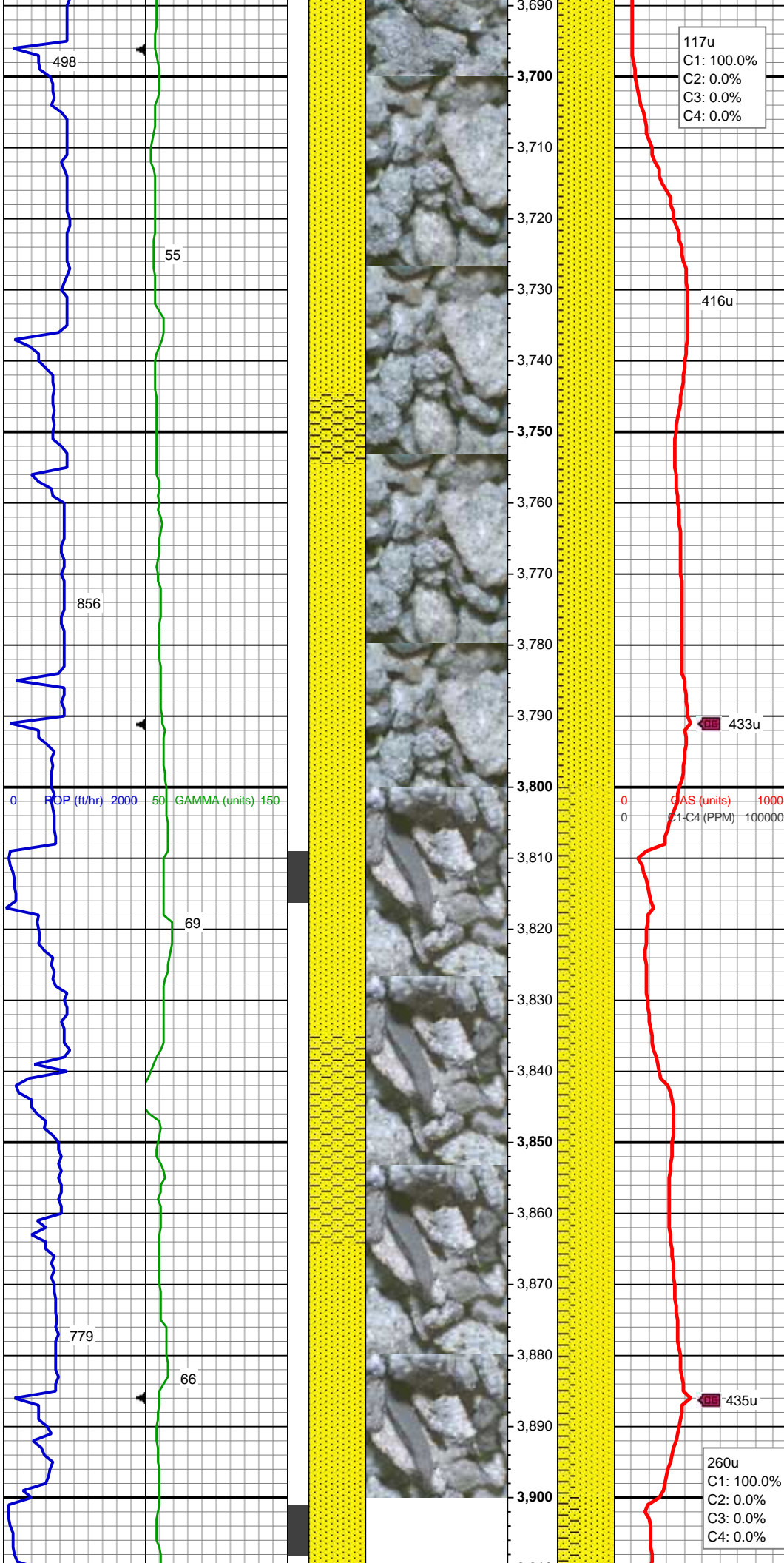
MD: 3,543'
TVD: 3,536.81'
Inclination: 7.52°
Azimuth: 314.29°

SHY SLTST: lt gy - gy brn, sb plty - sb rd,
fryl srted, sft - frm, slty - grty tex, v sl calc
SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srted, frm - mod hd wi brit
clus, calc cmt

PARKMAN TOP @
3,608' MD; 3,601' TVD

MD: 3,638'
TVD: 3,630.87'
Inclination: 8.64°
Azimuth: 315.9°

SS: wh, fros - trnsl, speckl wi mica, f gr,
hd brit clus, ang - sb ang, v calc cmt
SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srted, frm - mod hd wi brit
clus, calc cmt



MD: 3,733'
TVD: 3,724.66'
Inclination: 9.67°
Azimuth: 315.83°

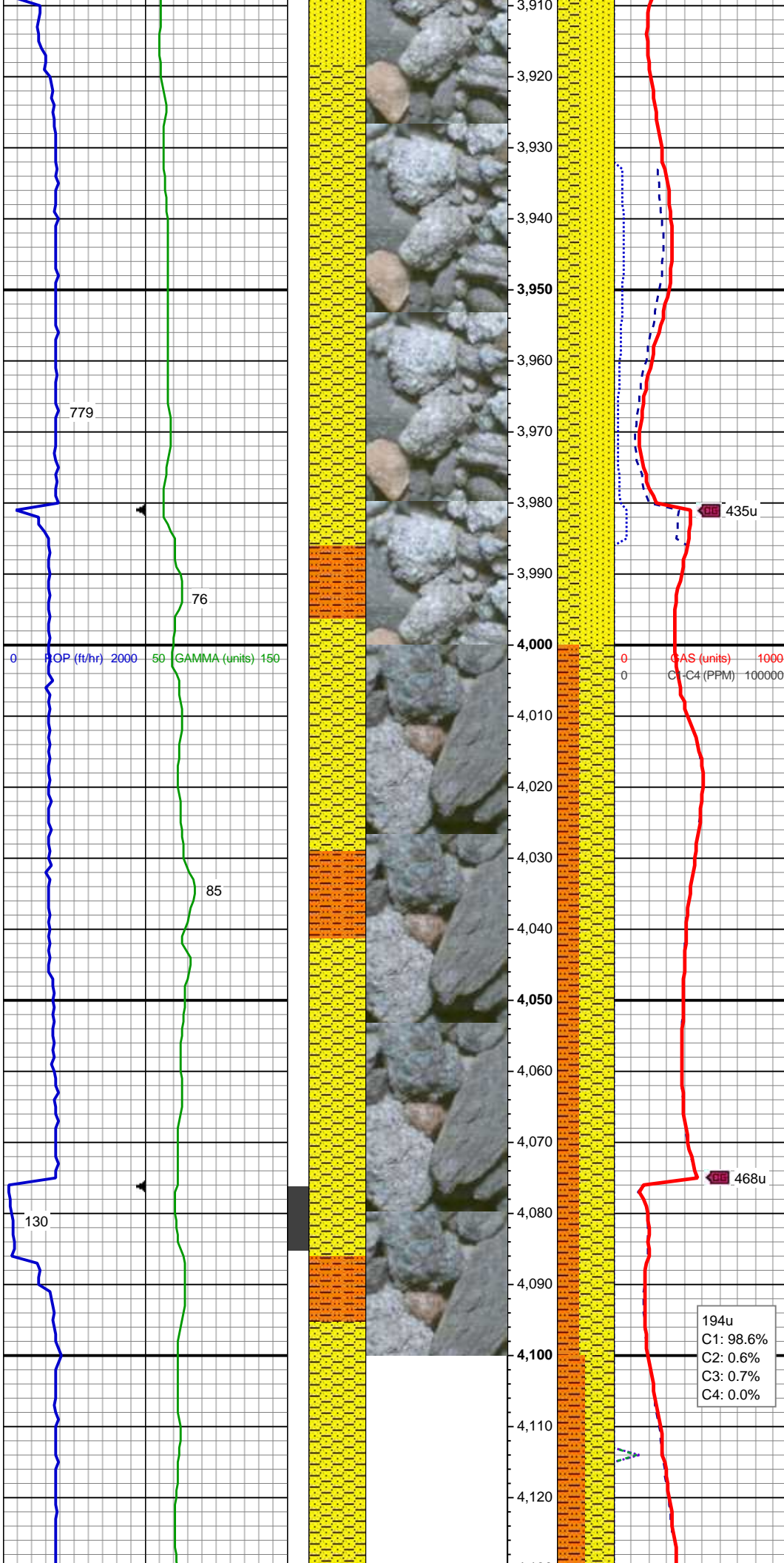
SS: wh, fros - trnsl, speckl wi mica, f gr,
hd brit clus, ang - sb ang, v calc cmt
SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srted, frm - mod hd wi brit
clus, calc cmt

MUD WT: 8.5/8.7
VIS: 29/29 IN/OUT

MD: 3,828'
TVD: 3,818.36'
Inclination: 9.24°
Azimuth: 313.69°

SS: wh, fros - trnsl, speckl wi mica, f gr,
hd brit clus, ang - sb ang, v calc cmt
SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srted, frm - mod hd wi brit
clus, calc cmt

AM Mud Rpt
01/02/2015
Mud Wt: 8.60
FVis: 30
PVis: 3
YP: 5
GELS: n/s
API Filt: n/s
CAKE: 1/0
pH: 11.3
Cl: 1,500
Ca: 120



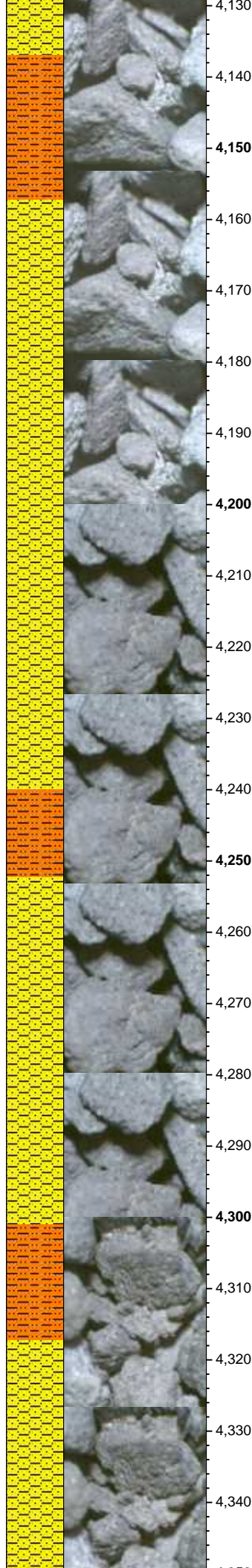
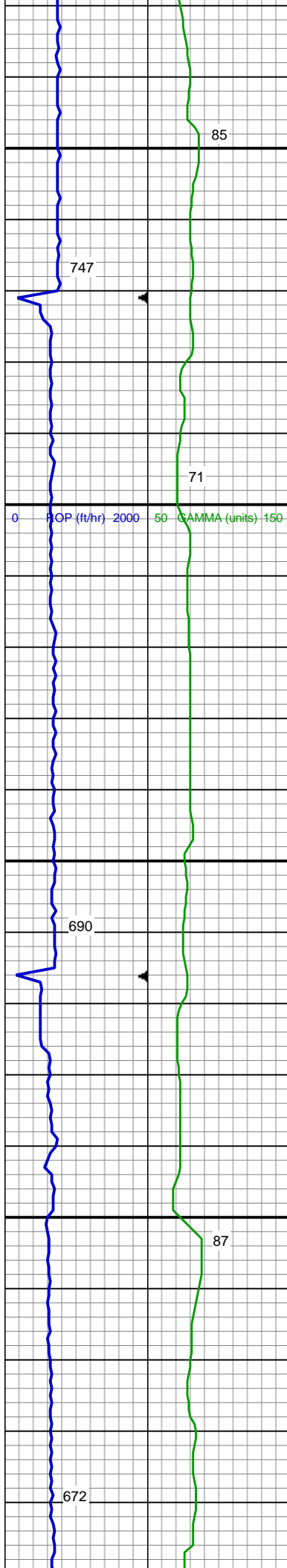
MD: 3,923'
TVD: 3,912.23'
Inclination: 8.48°
Azimuth: 309.74°

SS: wh, fros - trnsl, speckl wi mica, f gr,
hd brit clus, ang - sb ang, v calc cmt
SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srt, frm - mod hd wi brit
clus, calc cmt

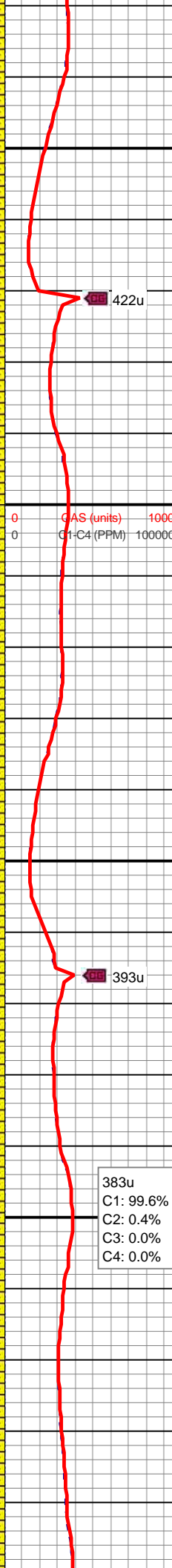
MD: 4,018'
TVD: 4,006.17'
Inclination: 8.68°
Azimuth: 309.59°

SHY SS: wh - lt gy - lt gy brn, s&p, f gr, sb
ang - sb blk, prly srt, frm - mod hd wi
brit clus, calc cmt
SHY SLTST: lt gy - gy brn, sb plty - sb rd,
fry srt, sft - frm, slty - grty tex, v sl calc

MD: 4,113'
TVD: 4,100.23'
Inclination: 7.41°
Azimuth: 315.12°



4,130
4,140
4,150
4,160
4,170
4,180
4,190
4,200
4,210
4,220
4,230
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4,280
4,290
4,300
4,310
4,320
4,330
4,340



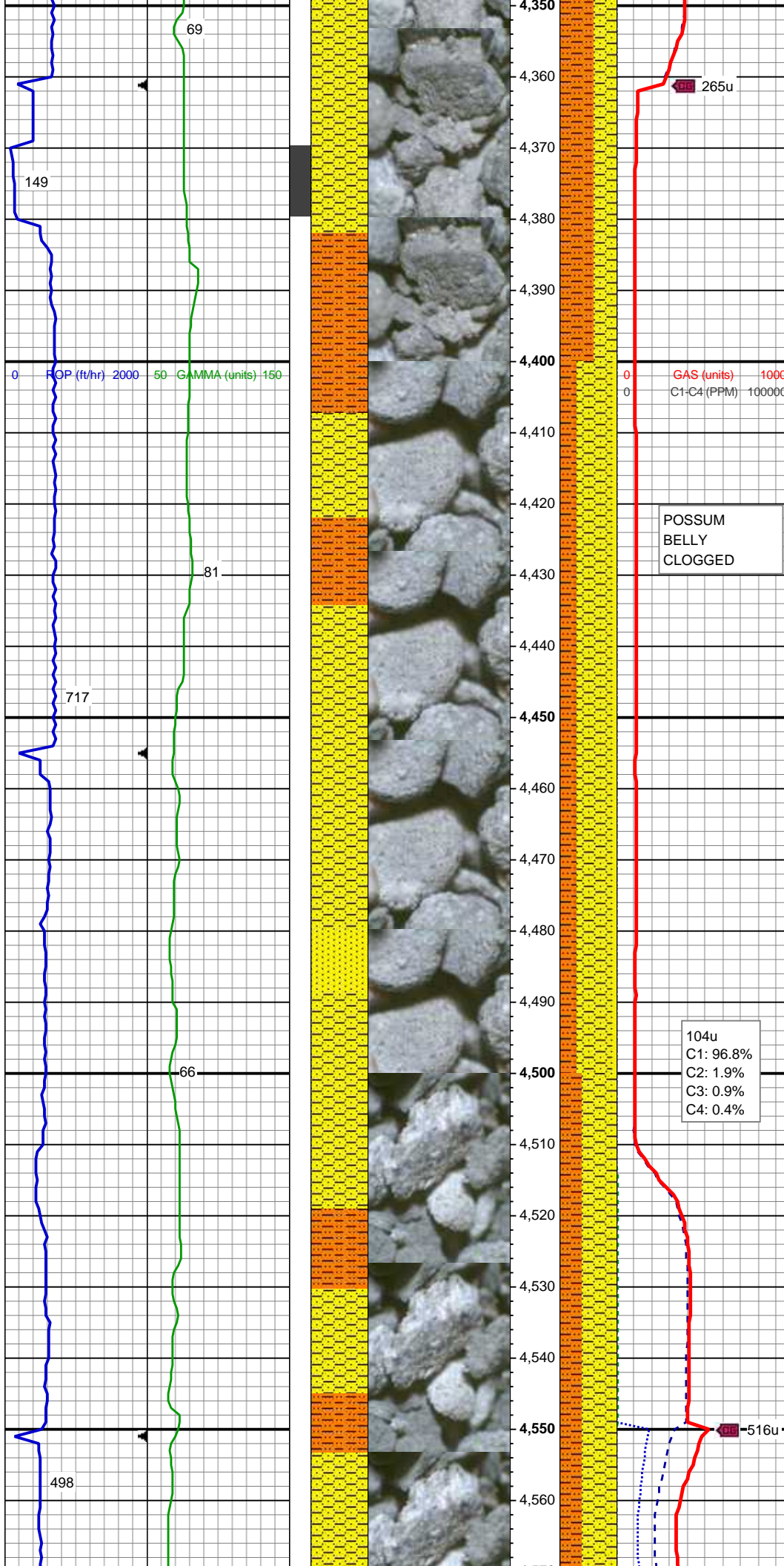
SHY SS: wh - lt gy - lt gy brn, s&p, f gr, sb
ang - sb blk, prly srt, frm - mod hd wi
brit clus, calc cmt
SHY SLTST: lt gy - gy brn, sb plty - sb rd,
fry srt, sft - frm, slty - grty tex, v sl calc

MD: 4,207'
TVD: 4,193.49'
Inclination: 7°
Azimuth: 314.19°

SHY SS: wh - lt gy - lt gy brn, s&p, f gr, sb
ang - sb blk, prly srt, frm - mod hd wi
brit clus, calc cmt
SHY SLTST: lt gy - gy brn, sb plty - sb rd,
fry srt, sft - frm, slty - grty tex, v sl calc

MD: 4,302'
TVD: 4,287.87'
Inclination: 6.06°
Azimuth: 314.59°

SHY SLTST: lt gy - gy brn, sb plty - sb rd,
fry srt, sft - frm, slty - grty tex, v sl calc



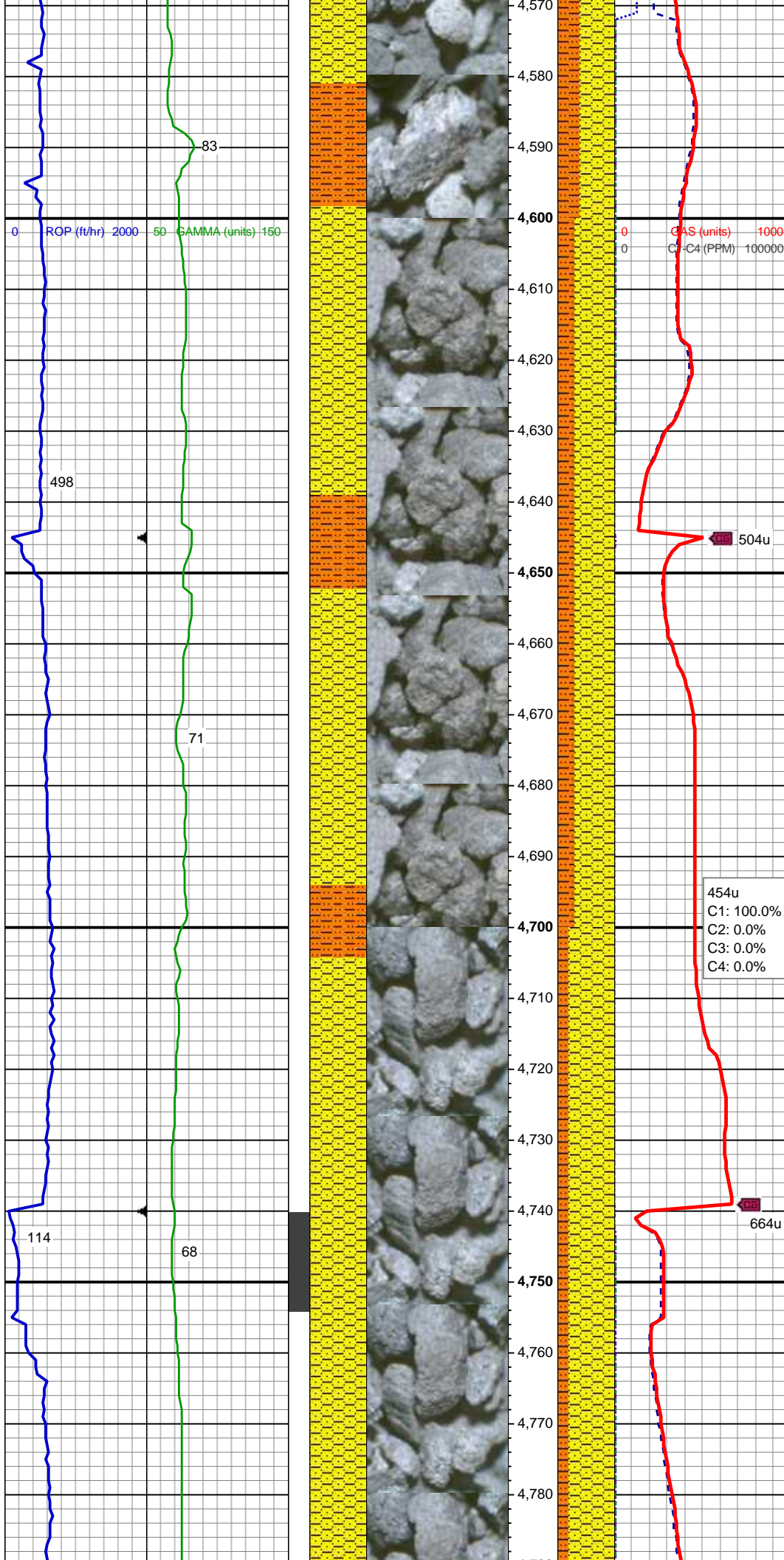
SHY SS: wh - lt gy - lt gy brn, s&p, f gr, sb
ang - sb blk, prly srt, frm - mod hd wi
brit clus, calc cmt

MD: 4,397'
TVD: 4,382.29'
Inclination: 6.68°
Azimuth: 318.82°

SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srt, frm - mod hd wi brit
clus, calc cmt
SS: wh - lt gy, fros - trns, speckl wi mica,
f gr, hd brit clus, ang - sb ang, v calc cmt
SHY SLTST: lt gy - gy brn, sb plty - sb rd,
fryl srt, sft - frm, slty - grty tex, v sl calc

MD: 4,492'
TVD: 4,476.7'
Inclination: 6.05°
Azimuth: 320.07°

SHY SS: wh - lt gy - lt gy brn, s&p, f gr, sb
ang - sb blk, prly srt, frm - mod hd wi
brit clus, calc cmt
SHY SLTST: lt gy - gy brn, sb plty - sb rd,
fryl srt, sft - frm, slty - grty tex, v sl calc



MD: 4,587'
TVD: 4,571.17'
Inclination: 6.05°
Azimuth: 320.43°

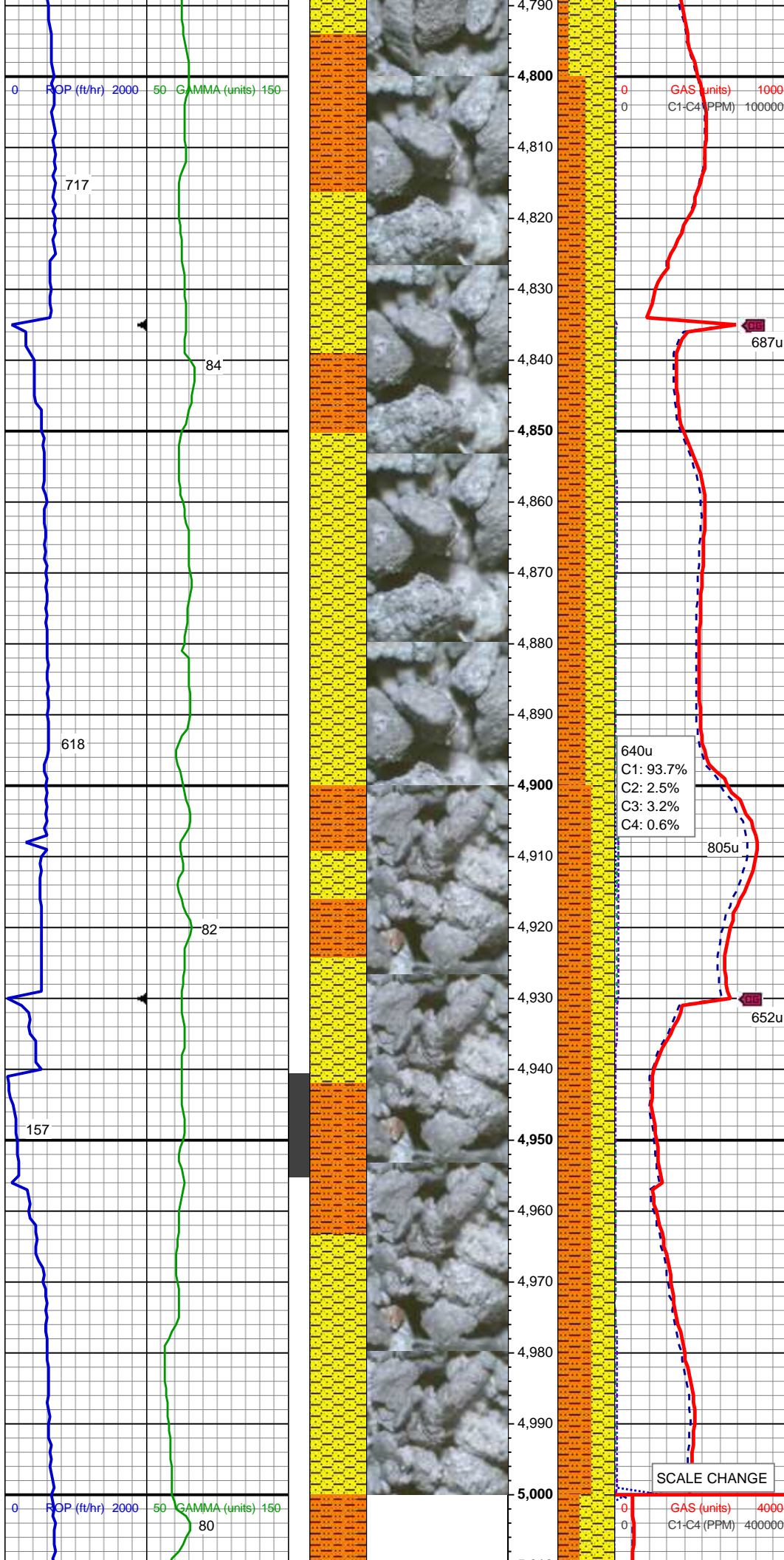
SHY SS: wh - lt gy - lt gy brn, s&p, f gr, sb
ang - sb blk, prly srt, frm - mod hd wi
brit clus, calc cmt
SHY SLTST: lt gy - gy brn, sb plty - sb rd,
fry srt, sft - frm, slty - grty tex, v sl calc

MD: 4,681'
TVD: 4,664.66'
Inclination: 5.92°
Azimuth: 321.68°

MUD WT: 8.6/807
VIS: 31/32 IN/OUT

SHY SS: wh - lt gy - lt gy brn, s&p, f gr, sb
ang - sb blk, prly srt, frm - mod hd wi
brit clus, calc cmt
SHY SLTST: lt gy - gy brn, sb plty - sb rd,
fry srt, sft - frm, slty - grty tex, v sl calc

MD: 4,776'
TVD: 4,759.31'
Inclination: 3.88°
Azimuth: 323.84°



SHY SS: wh - lt gy - lt gy brn, s&p, f gr, sb
ang - sb blk, prly srted, frm - mod hd wi
brit clus, calc cmt
SHY SLTST: lt gy - gy brn, sb plty - sb rd,
fryl srted, sft - frm, slty - grty tex, v sl calc

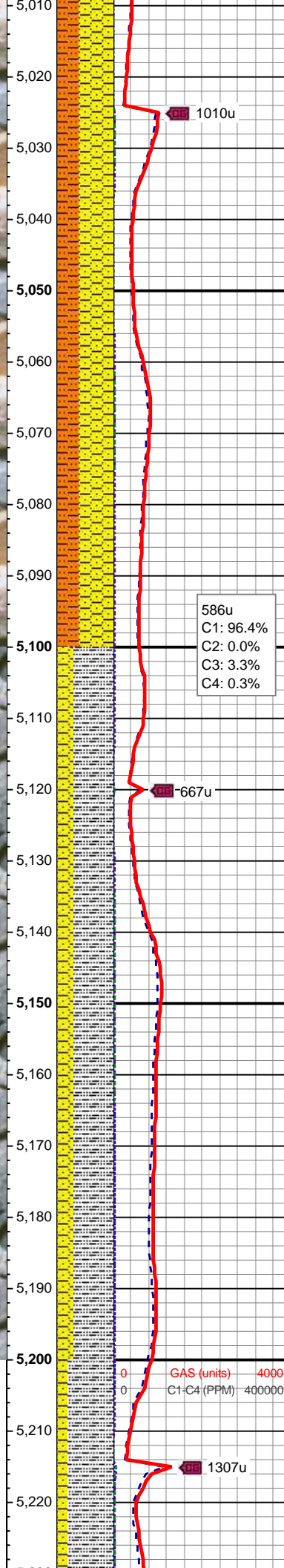
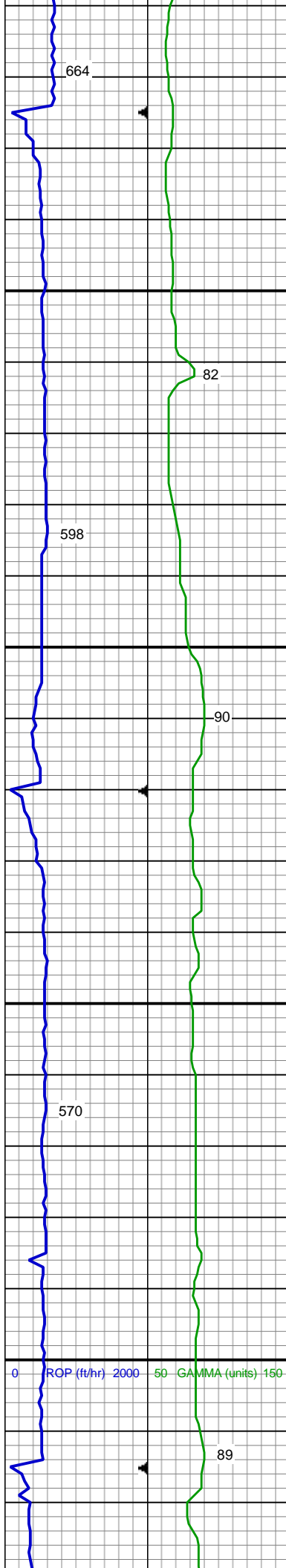
MD: 4,871'
TVD: 4,854.12'
Inclination: 3.35°
Azimuth: 320.65°

SHANNON TOP @
4,920' MD; 4,903' TVD

MUD WT: 8.7/8.7
VIS: 31/32 IN/OUT

SHY SLTST: lt gy - gy brn, sb plty - sb rd,
fryl srted, sft - frm, slty - grty tex, v sl calc
SHY SS: wh - lt gy - lt gy brn, s&p, f gr, sb
ang - sb blk, prly srted, frm - mod hd wi
brit clus, calc cmt

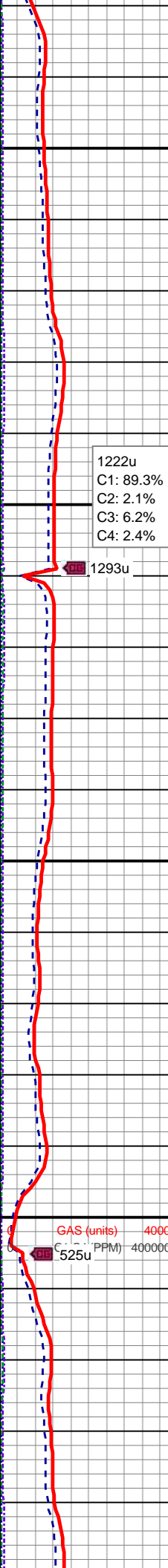
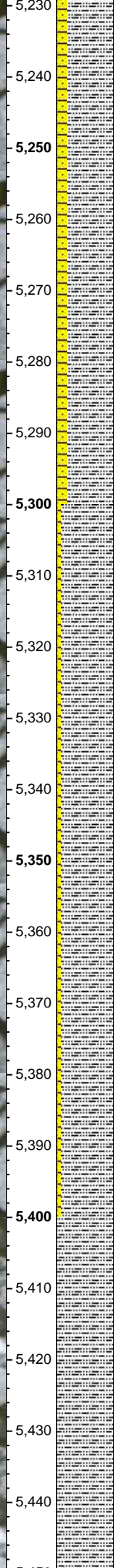
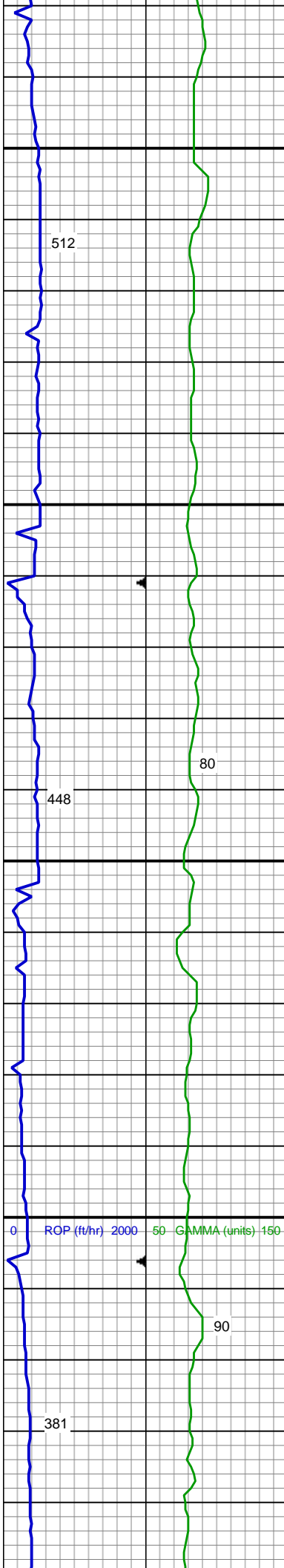
MD: 4,966'
TVD: 4,949.04'
Inclination: 1.24°
Azimuth: 302.47°



SHY SS: wh - lt gy - lt gy brn, s&p, f gr, sb
ang - sb blk, prly srt, frm - mod hd wi
brit clus, calc cmt
SHY SLTST: lt gy - gy brn, sb plty - sb rd,
fryl srt, sft - frm, slty - grty tex, v sl calc

MD: 5,061'
TVD: 5,044.01'
Inclination: 1.23°
Azimuth: 293.16°

SLTY SH: lt - med gy, frm, plty - sb plty,
occ sb blk, slty - grty tex, v sl calc
SHY SS: lt gy - lt gy brn, occ trns, abnt fros,
s&p, f gr, sb ang - sb blk, prly srt, p por,
frm - mod hd wi brit clus, calc cmt, tr
glau



MD: 5,250'
TVD: 5,232.95'
Inclination: 1.68°
Azimuth: 278.01°

SLTY SH: lt - med gy, frm, plty - sb plty, occ sb blkly, slty - grty tex, v sl calcSHY
SS: lt gy - lt gy brn, occ trnsl, abnt fros, s&p, f gr, sb ang - sb blkly, prly srtd, p por, frm - mod hd wi brit clus, calc cmt, tr glau

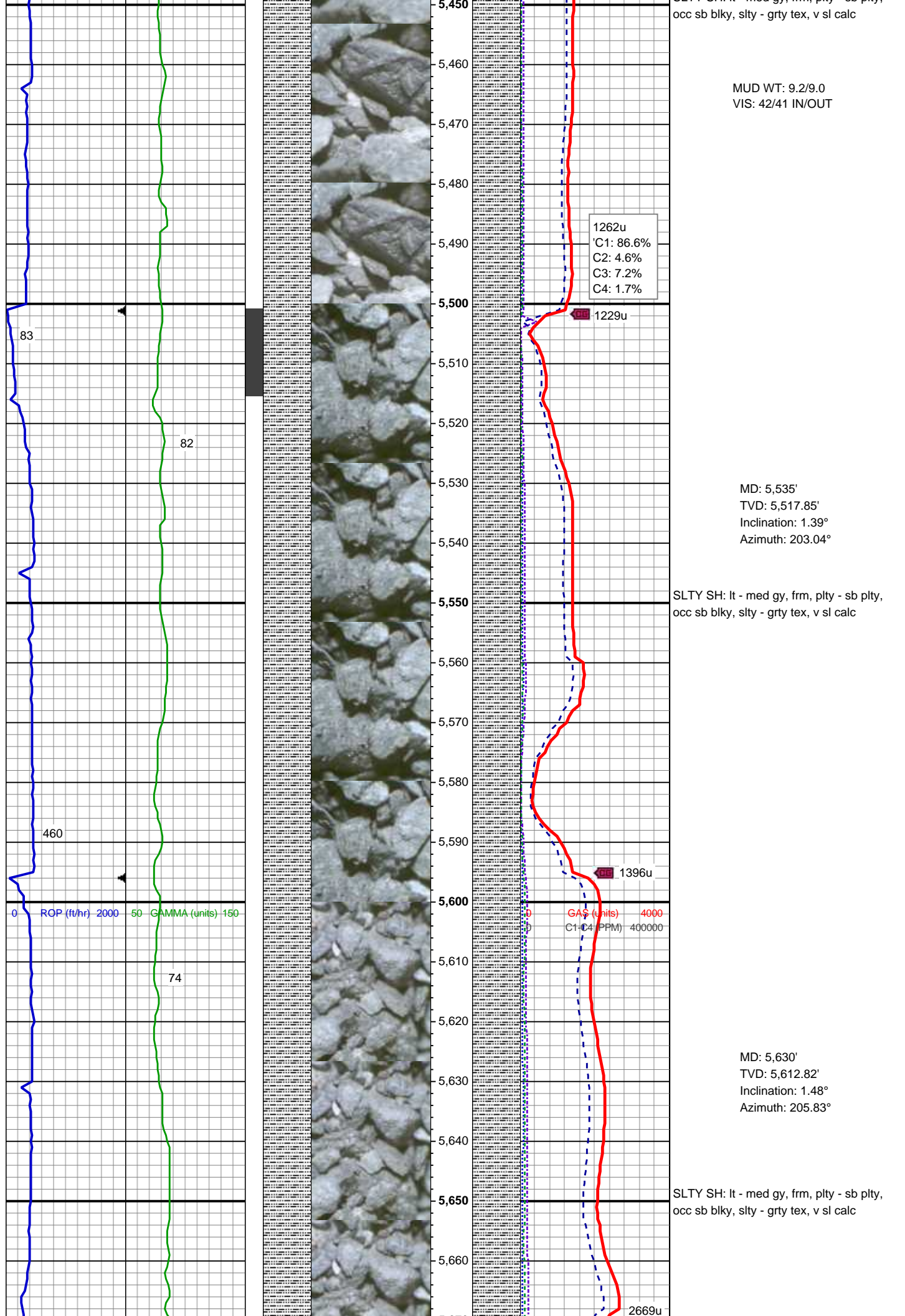
MUD WT: 8.8/8.8
VIS: 37/37 IN/OUT

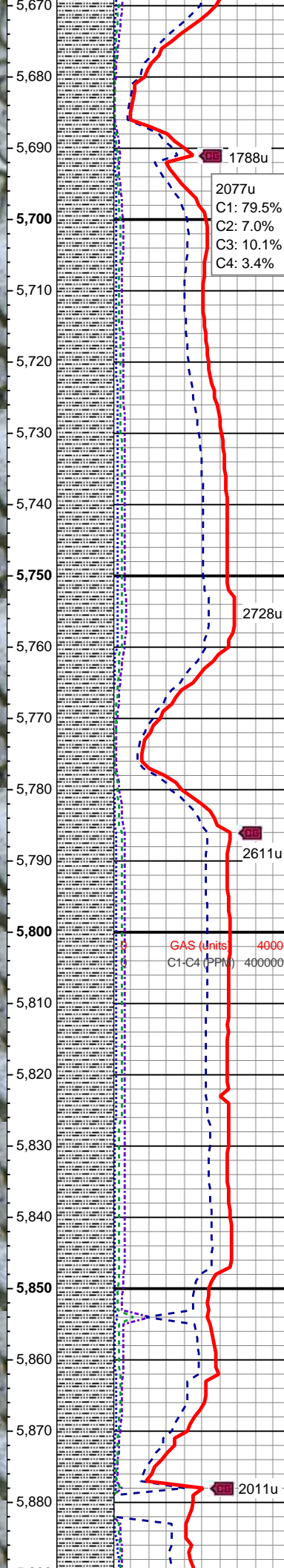
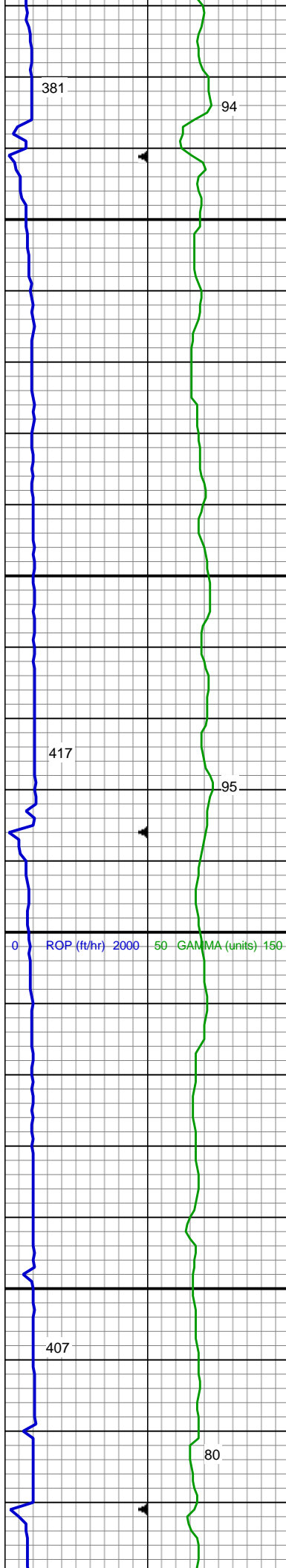
MD: 5,345'
TVD: 5,327.91'
Inclination: 1.63°
Azimuth: 285.85°

SLTY SH: lt - med gy, frm, plty - sb plty, occ sb blkly, slty - grty tex, v sl calcSHY
SS: lt gy - lt gy brn, occ trnsl, abnt fros, s&p, f gr, sb ang - sb blkly, prly srtd, p por, frm - mod hd wi brit clus, calc cmt, tr glau

MD: 5,440'
TVD: 5,422.87'
Inclination: 1.7°
Azimuth: 280.72°

SLTY SH: lt - med gy, frm, plty - sb plty





MD: 5,724'
TVD: 5,706.79'
Inclination: 1.43°
Azimuth: 211.14°

MUD WT: 9.8/9.5
VIS: 38/43 IN/OUT

SLTY SH: lt - med gy, frm, plty - sb plty,
occ sb blkly, slty - grty tex, v sl calc

TEEPEE BUTTES TOP @
5,810' MD; 5,792' TVD

MD: 5,819'
TVD: 5,801.76'
Inclination: 1.28°
Azimuth: 228.02°

SLTY SH: lt - med gy, frm, plty - sb plty,
occ sb blkly, slty - grty tex, v sl calc

