

# COLUMBINE LOGGING

Scale: 5" / 100'  
Measured Depth Log

**Well Name** Rohn State LD09-65HN(VERT)

**Location** NE SE SEC. 9, T9N, R58W

**State** COLORADO

**County** WELD

**Country** USA

**Rig Number** H&P 326

**API Number** 05-123-37530

**AFE #** 139467

**Region** DJ BASIN

**Field** WILDCAT

**Spud Date** 10/5/2013

**Drilling Completed** 10/28/2013

**Surface Coordinates** 2,163' FSL, 480' FEL  
Lat 40.76452 N, Long 103.86165 W

**Bottom Hole Coordinates** 2,60' FNL, 660' FWL  
Lat 40.76590 N, Long 103.87651 W

**Ground Elevation** 4716'

**K.B. Elevation** 4746'

**Logged Interval** 1.3                      **To** 9764

**Total Depth** 9764

**Formation** NIOBRARA B

**Type of Drilling Fluid** LSND

## Operator

**Company** NOBLE ENERGY INC.

## Geologist

**Name** EVAN HOWELL

**Company** NOBLE ENERGY INC.

**Address** 1625 Broadway Suite 2200  
Denver, CO 80202

## Other

Ryan Sullivan

Rock Types

UNKNOWN	COAL	METAMORPHIC	SHALY SILTSTONE
ANHYDRITE	CONGLOMERATE	NO SAMPLE	SILTSTONE
BENTONITE	DOLOMITE	SALT	SILTY SHALE
BRECCIA	GRANITE	SALT-PEPPER SAND	TILL
CEMENT	GYPSUM	SANDSTONE	TUFF
CHALK	IGNEOUS	SHALE	WELDED TUFF
CHERT	LIMESTONE	SHALE COLORED	
CLAY CHOKE SAND	SIDERITE or LIMONITE	SHALE GRAY	
CLAYSTONE	MARLSTONE	SHALY SANDSTONE	

Accessories

Fossils

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

F FOSSIL

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

Minerals

// ANHYDRITIC

- 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

Other Symbols

Oil Show

- DEAD
- EVEN
- QUESTIONABLE
- SPOTTED STAINING

Porosity

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

MOLDIC

- O ORGANIC
- P PINPOINT
- V 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
- SIDEWALL CORE (LEFT)
- SIDEWALL CORE (RIGHT)
- SLIDE
- SURVEY
- TRIP GAS

WIRELINE TESTED - LEFT

WIRELINE TESTED - RT

Rounding

- A ANGULAR
- R ROUNDED
- B SUBANG
- r SUBRND

Textures

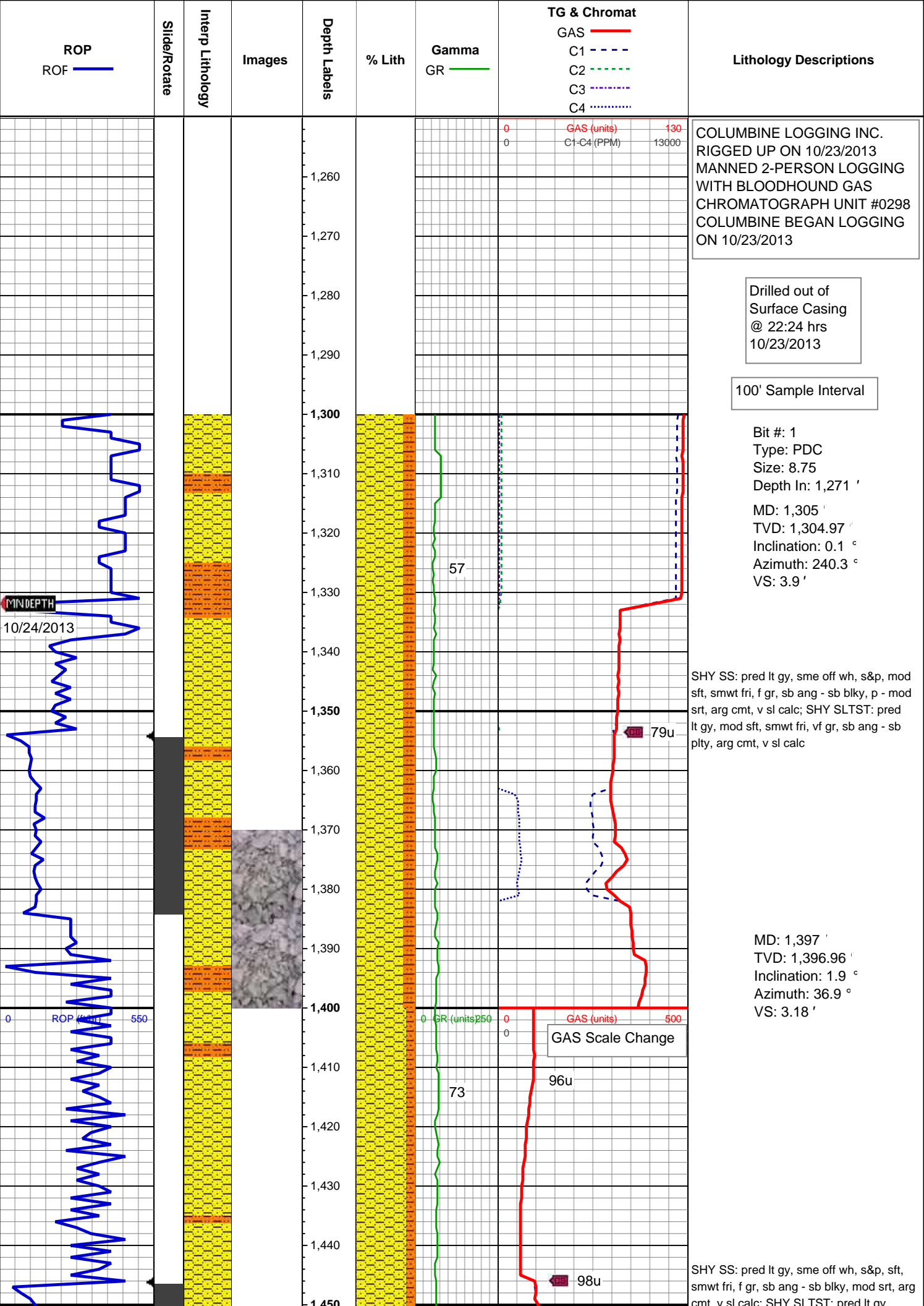
- BS BOUNDSTONE
- C CHALKY
- CX CRYPTOXLN

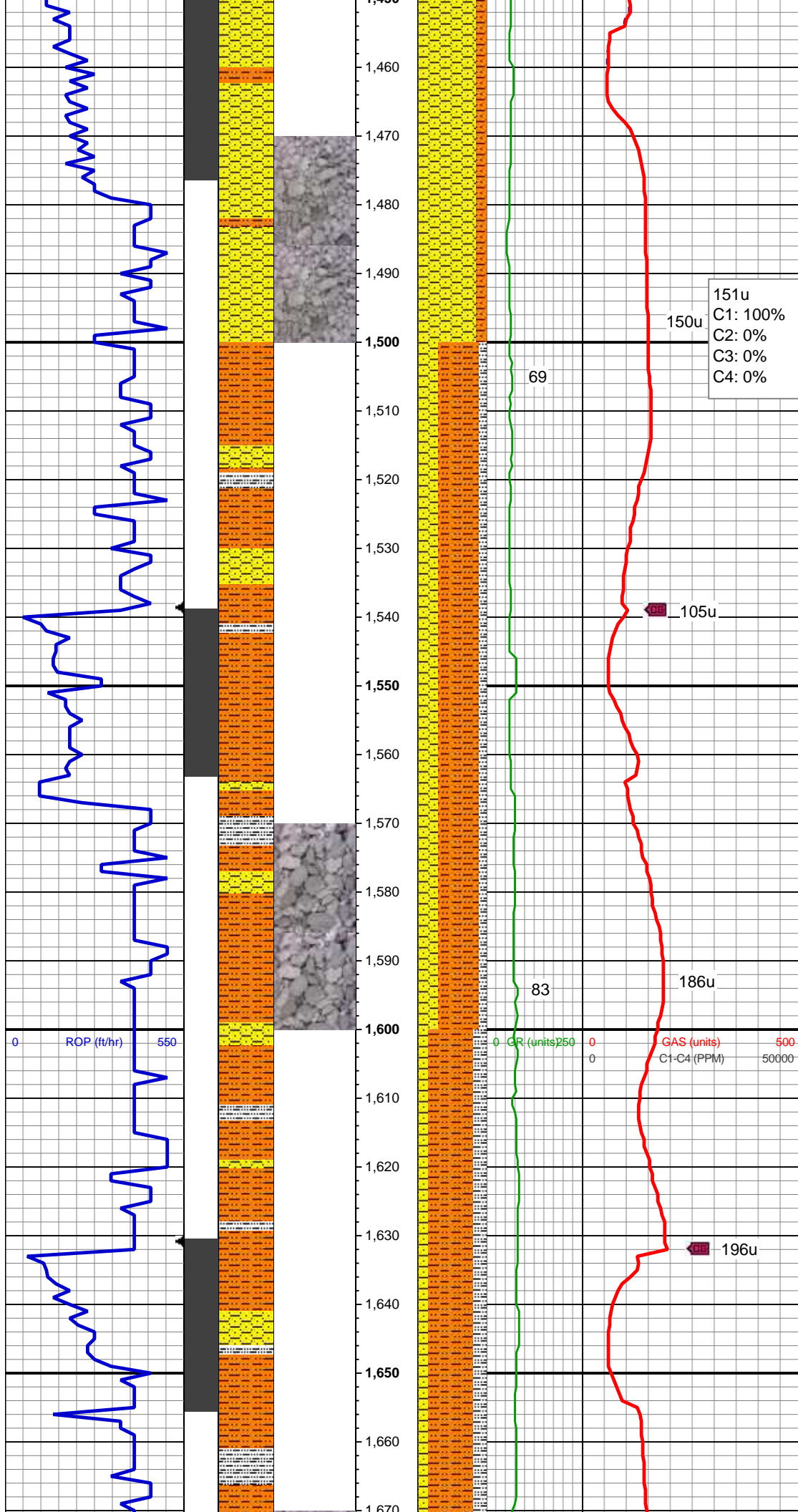
E EARTHY

- FX FINELYXLN
- GS GRAINSTONE
- L LITHOGRAPHIC
- MX MICROXLN
- MS MUDSTONE
- PS PACKSTONE
- WS WACKESTONE

Sorting

- M MODERATE
- P POOR
- W WELL





cm; v calc; s&p; s&p; pred lt gy,  
mod sft, smwt fri, vf gr, sb ang - sb plty,  
arg cmt, v sl calc

MD: 1,489 '  
TVD: 1,488.81 '  
Inclination: 4.3 °  
Azimuth: 30 °  
VS: 0.99 '

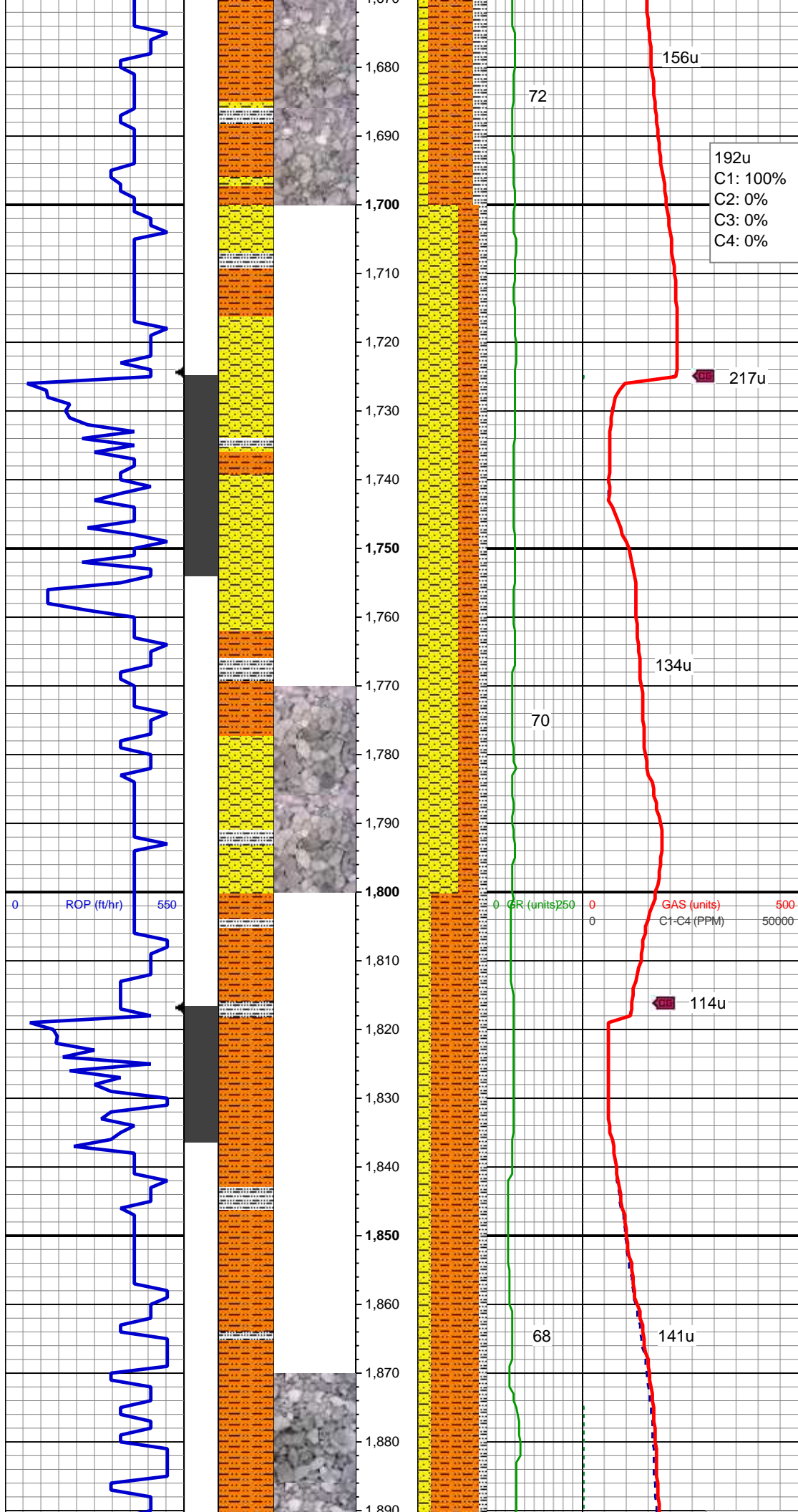
SHY SLTST: pred lt gy, mod sft, smwt fri,  
vf gr, sb ang - sb plty, arg cmt, sl calc;  
SHY SS: pred lt gy, s&p, mod sft, smwt  
fri, f gr, sb ang - sb blkly, p - mod srt, arg  
cmt, tr glau, sl calc; occ slty sh, tr lse pyr

MD: 1,581 '  
TVD: 1,580.43 '  
Inclination: 6.1 °  
Azimuth: 24.4 °  
VS: -1.97 '

SHY SLTST: pred lt gy, mod sft, smwt fri,  
vf gr, sb ang - sb plty, arg cmt, sl calc;  
SLTY SH: lt - med gy, mod sft, smwt fri,  
vf gr, sb ang - sb plty, arg tex; SHY SS:  
pred lt gy, s&p, mod sft, smwt fri, f gr, sb  
ang - sb blkly, p - mod srt, arg cmt, sl calc

MD: 1,675 '





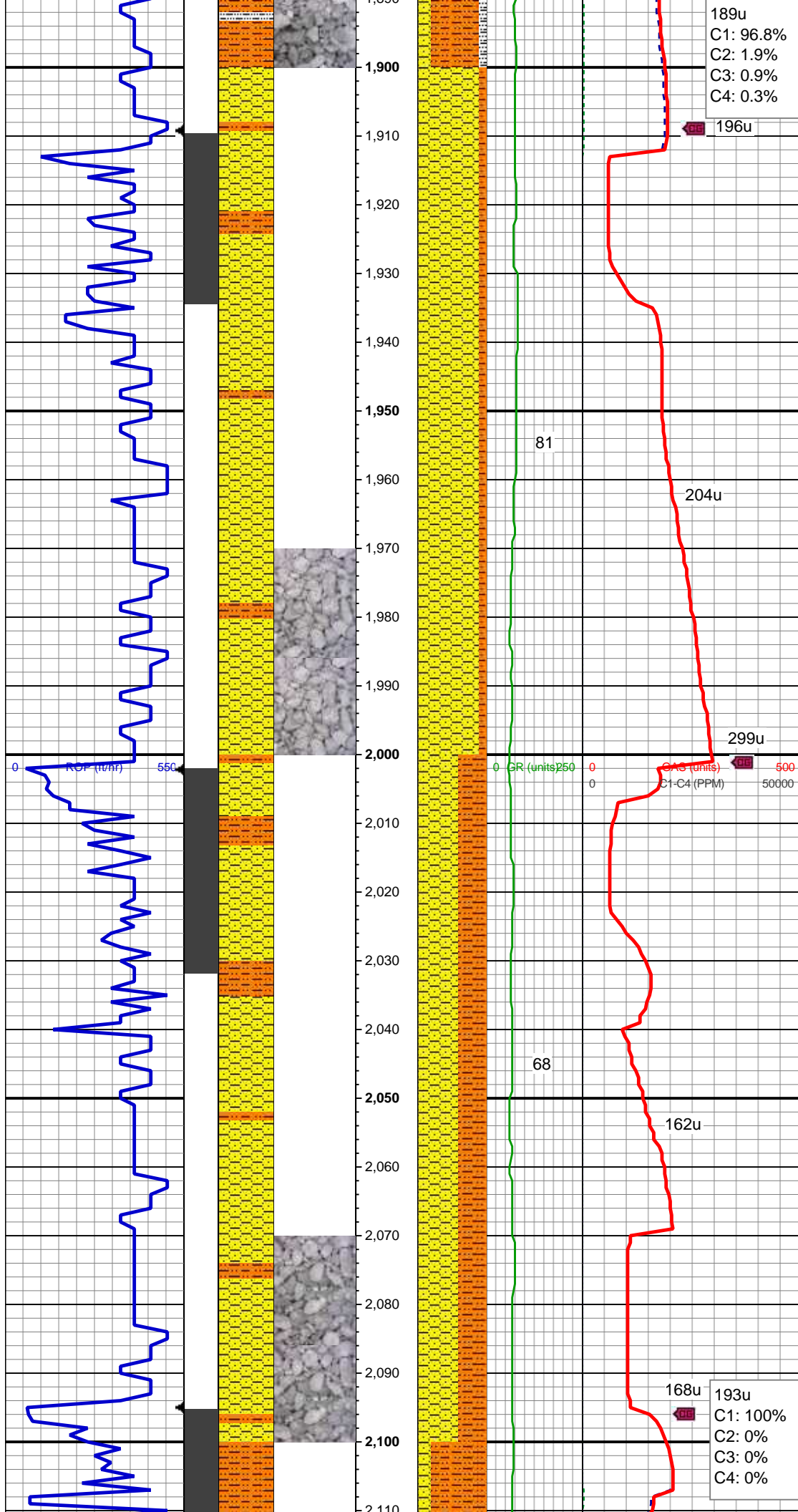
MD: 1,673.75 '  
Inclination: 7.7 °  
Azimuth: 31.1 °  
VS: -6.23 '

SHY SS: pred lt gy, s&p, mod sft, smwt fri, f gr, sb ang - sb blkly, p - mod srt, arg cmt, sl calc; SHY SLTST: pred lt gy, mod sft, smwt fri, vf gr, sb ang - sb plty, arg cmt, sl calc; SLTY SH: lt - med gy, mod sft, smwt fri, vf gr, sb ang - sb plty, arg tex

MD: 1,767 '  
TVD: 1,764.64 '  
Inclination: 10.1 °  
Azimuth: 29 °  
VS: -12.02 '

SHY SLTST: pred lt gy, mod sft, smwt fri, vf gr, sb ang - sb plty, arg cmt, sl calc; SHY SS: pred lt gy, s&p, mod frm, smwt fri, m gr, sb ang - sb blkly, mod srt, arg cmt, sl calc; SLTY SH: lt - med gy, mod sft - frm, smwt fri, vf gr, sb ang - sb plty, arg tex

MD: 1,860 '  
TVD: 1,856.03 '  
Inclination: 11.2 °  
Azimuth: 26.9 °  
VS: -18.45 '

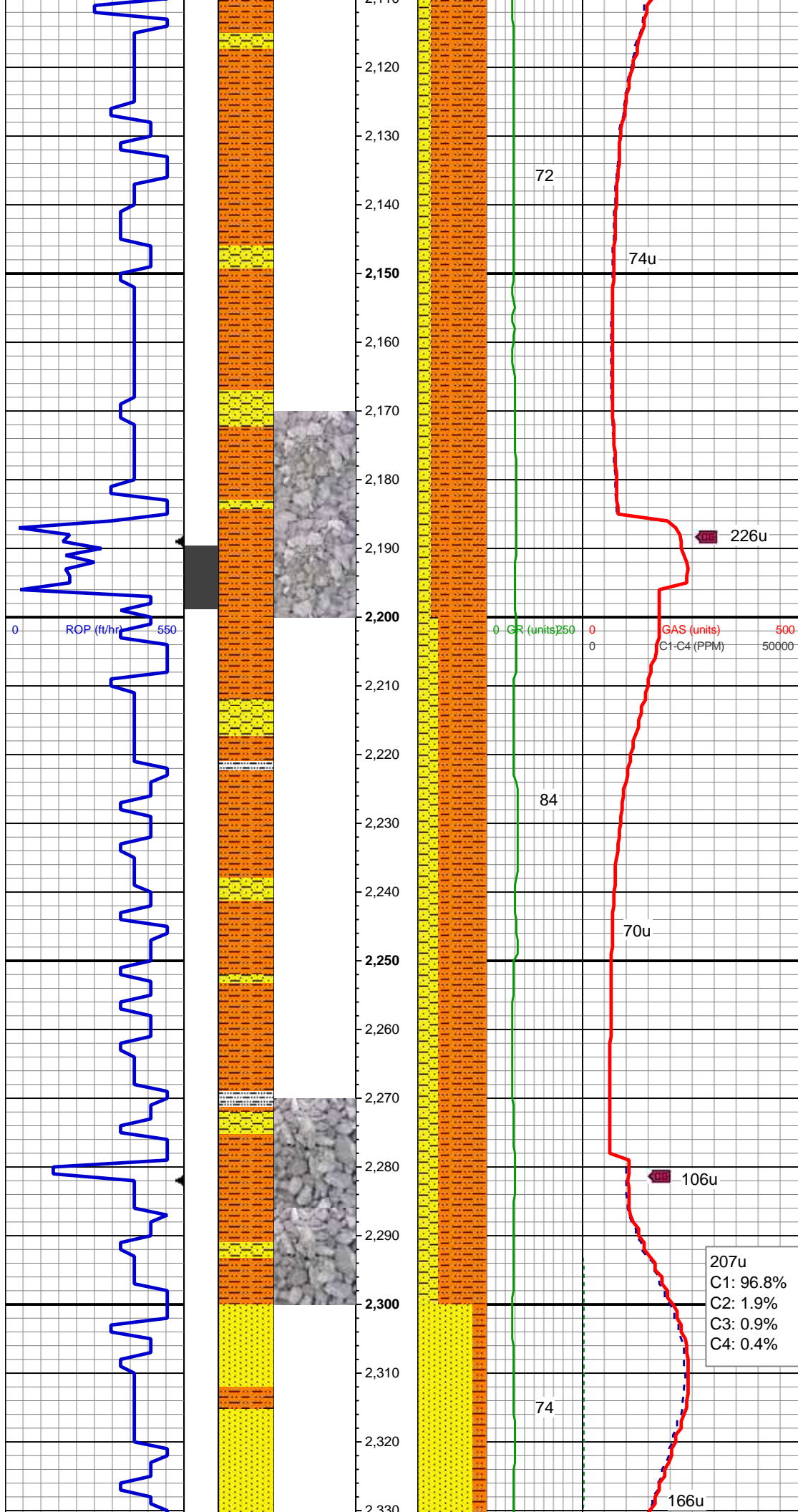


SHY SS: pred lt gy, sme wh, s&p, mod  
frm, smwt fri ip, m gr, sb ang - sb blkly,  
mod - w srt, arg cmt, spec wi glau, sl  
calc; SHY SLTST: pred lt gy, mod sft,  
smwt fri, vf gr, sb ang - sb plty, arg cmt, sl  
calc

MD: 1,953 '  
TVD: 1,946.98 '  
Inclination: 12.9 °  
Azimuth: 26 °  
VS: -25.26 '

MD: 2,046 '  
TVD: 2,037.01 '  
Inclination: 16.1 °  
Azimuth: 24.4 °  
VS: -32.91 '

SHY SS: pred lt gy, sme wh, s&p, mod  
frm, smwt fri ip, f gr, sb ang - sb blkly, mod  
- w srt, arg cmt, spec wi glau, sl calc;  
SHY SLTST: pred lt gy, mod sft, smwt fri,  
vf gr, sb ang - sb plty, arg cmt, sl calc



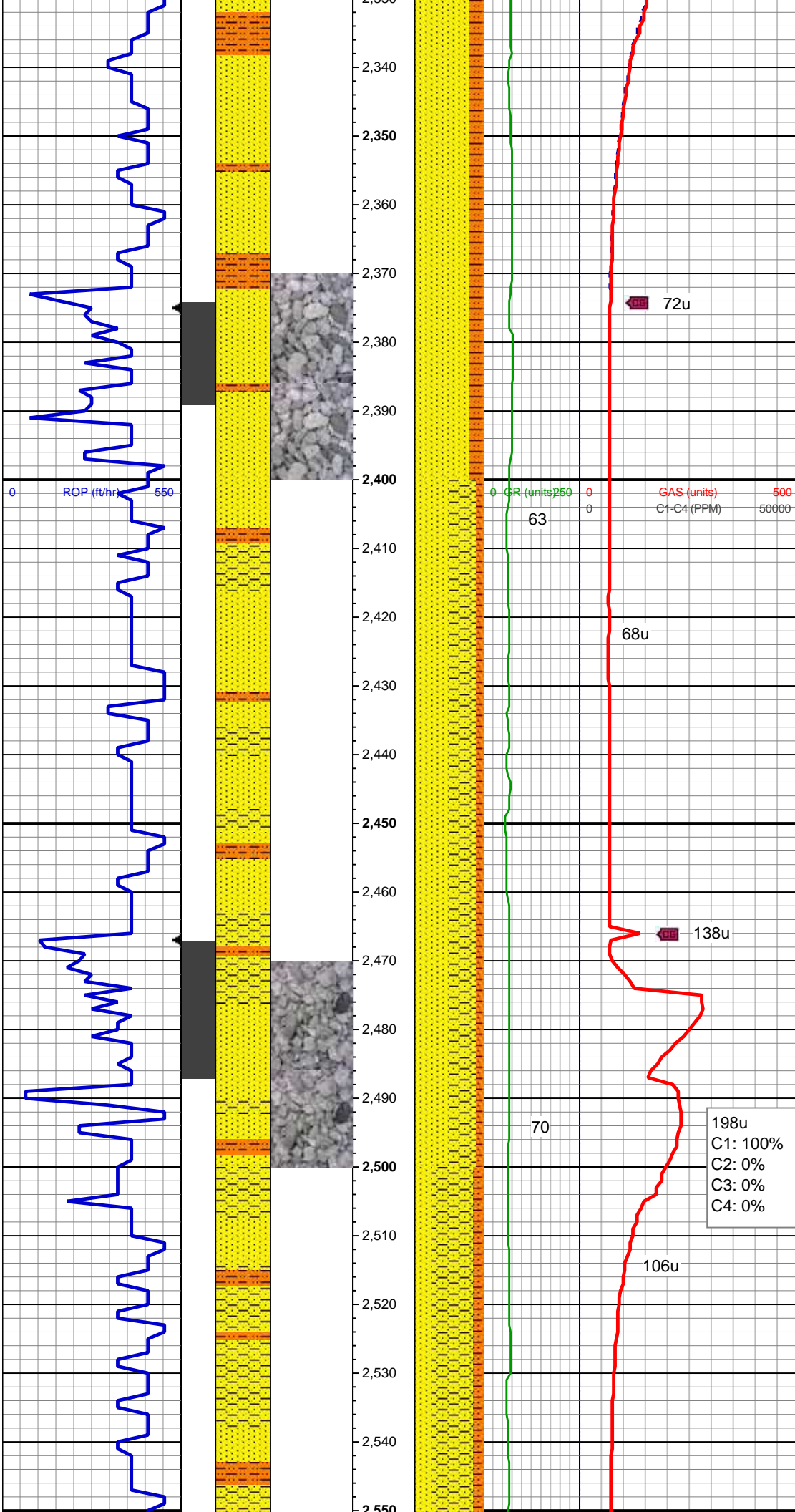
MD: 2,140 '  
TVD: 2,127.21 '  
Inclination: 16.6 °  
Azimuth: 20 °  
VS: -40.32 '  
SHY SLTST: pred med gy, mod sft - mod frm, smwt fri, vf gr, sb ang - sb plty, arg cmt, sl calc; SHY SS: pred lt gy, sme wh, s&p, mod frm, brit - fri ip, f gr, sb ang - sb blkly, mod - w srt, arg cmt, spec wi glau, sl calc

MD: 2,233 '  
TVD: 2,216.47 '  
Inclination: 16 °  
Azimuth: 15.6 °  
VS: -45.71 '  
SHY SLTST: pred med gy, mod sft - mod frm, smwt fri, vf gr, sb ang - sb plty, arg cmt, sl calc; SHY SS: pred lt gy, sme wh, s&p, frm, brit, f - med gr, sb ang - sb blkly, mod - w srt, arg cmt, spec wi glau, sl calc, tr slty sh

MD: 2,325 '  
TVD: 2,305.13 '  
Inclination: 15 °  
Azimuth: 14.2 °  
VS: -49.56 '

MUD WT 8.60  
MUD VIS 27





MUD WT 8.55  
MUD VIS 29

SHY SS: pred off wh, s&p, frm, brit, f - med gr, sb ang - sb blk, mod - w srt, arg cmt, spec wi glau, sl calc; SHY SLTST: pred lt gy, mod sft - mod frm, brit - smwt fri, vf gr, sb ang - sb plty, arg cmt, sl calc

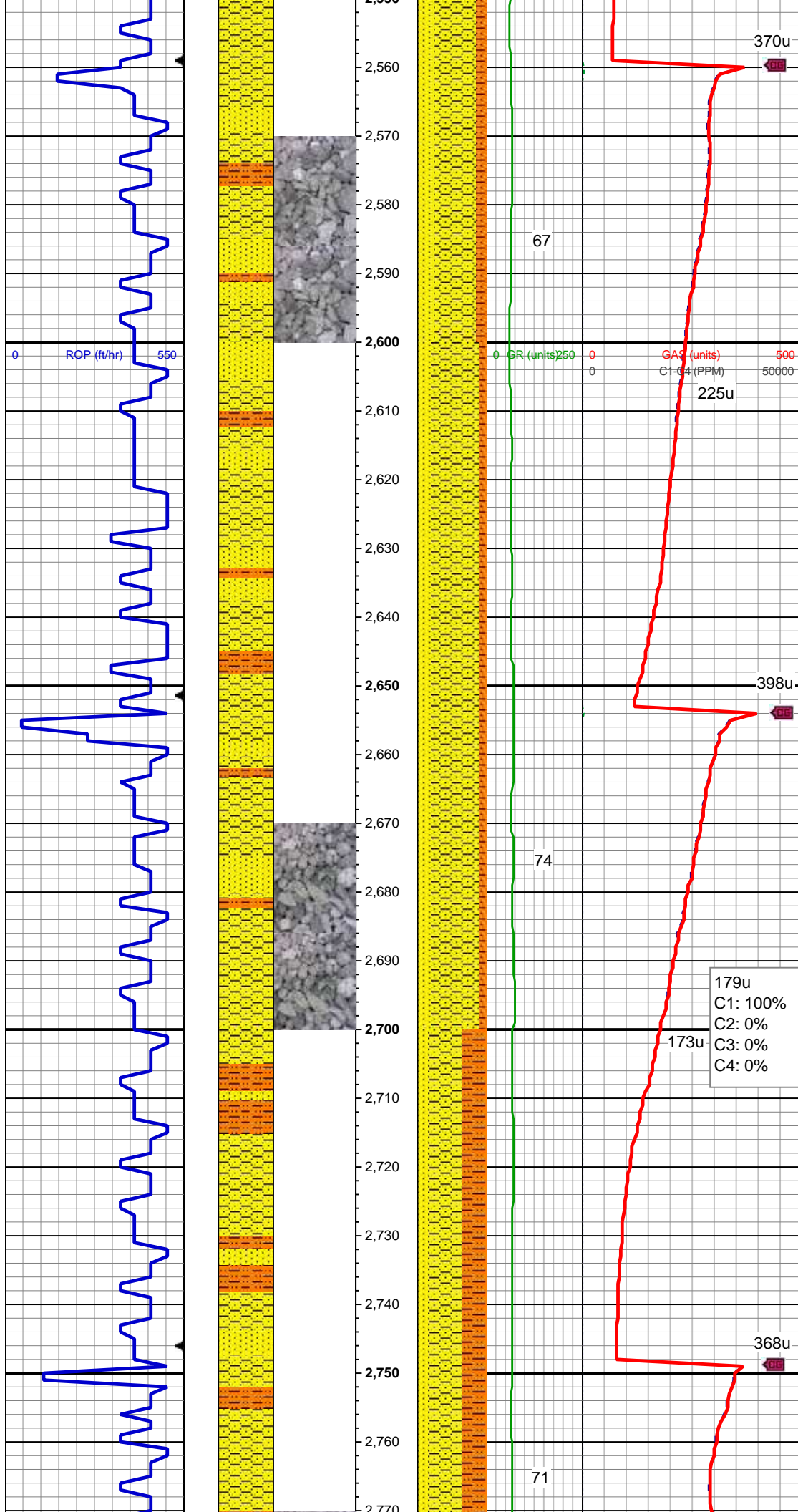
MD: 2,418 '  
TVD: 2,395.05 '  
Inclination: 14.6 °  
Azimuth: 19.1 °  
VS: -53.97 '

SHY SS: lt gy - off wh, s&p, mod frm - frm, brit, f - med gr, sb ang - sb blk, mod srt, arg cmt, sl calc, spec wi glau; SS: off wh - wh, trns, s&p, frm, brit, f - med gr, sb ang - sb blk, mod srt, arg cmt, sl calc, spec wi glau; SHY SLTST: lt - med gy, mod sft - mod frm, brit - smwt fri ip, vf - f gr, sb ang - sb plty, arg cmt, sl calc

MD: 2,510 '  
TVD: 2,483.78 '  
Inclination: 16 °  
Azimuth: 21.6 °  
VS: -60.04 '

SHY SS: lt gy - off wh, s&p, mod frm - frm, brit, f - med gr, sb ang - sb blk, mod srt, arg cmt, sl calc, spec wi glau; SS: off wh - wh, trns, s&p, frm, brit, f - med gr, sb





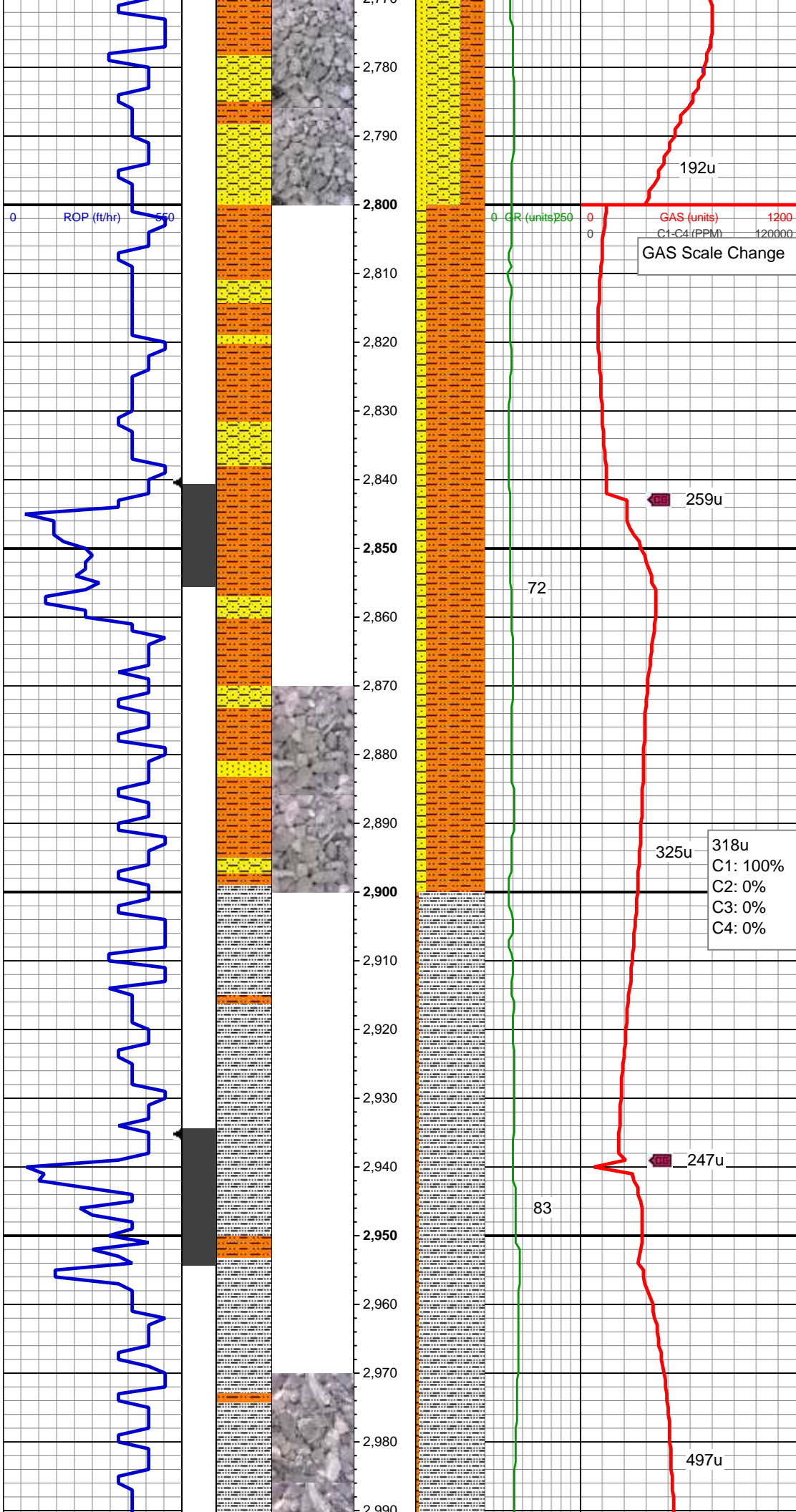
ang - sb blk, mod srt, arg cmt, sl calc,  
spec wi glau; SHY SLTST: lt - med gy,  
mod sft - mod frm, brit - smwt fri ip, vf - f  
gr, sb ang - sb plty, arg cmt, sl calc

MD: 2,602 '  
TVD: 2,572.24 '  
Inclination: 15.9 °  
Azimuth: 20.9 °  
VS: -66.73 '

SHY SS: lt gy - off wh, s&p, mod frm -  
frm, brit, f - med gr, sb ang - sb blk, mod  
srt, arg cmt, sl calc, spec wi glau; SS: off  
wh - wh, trns, s&p, frm, brit, f - med gr, sb  
ang - sb blk, mod srt, arg cmt, sl calc,  
spec wi glau; SHY SLTST: lt - med gy,  
mod sft - mod frm, brit - smwt fri ip, vf - f  
gr, sb ang - sb plty, arg cmt, sl calc

MD: 2,697 '  
TVD: 2,663.67 '  
Inclination: 15.6 °  
Azimuth: 20.2 °  
VS: -73.25 '

SHY SS: lt gy - off wh, s&p, mod frm -  
frm, brit, f - med gr, sb ang - sb blk, mod  
srt, arg cmt, sl calc, spec wi glau; SHY  
SLTST: med gy, mod sft - mod frm, brit -  
smwt fri ip, vf - f gr, sb ang - sb plty, arg  
cmt, sl calc; SS: off wh - wh, trns, s&p,  
frm, brit, f - med gr, sb ang - sb blk, mod  
srt, arg cmt, sl calc, spec wi glau



MD: 2,791 '  
TVD: 2,754.36 '  
Inclination: 14.9 °  
Azimuth: 17.9 °  
VS: -78.88 '

MUD WT 5.75  
MUD VIS 33

MUD WT 8.75  
MUD VIS 35

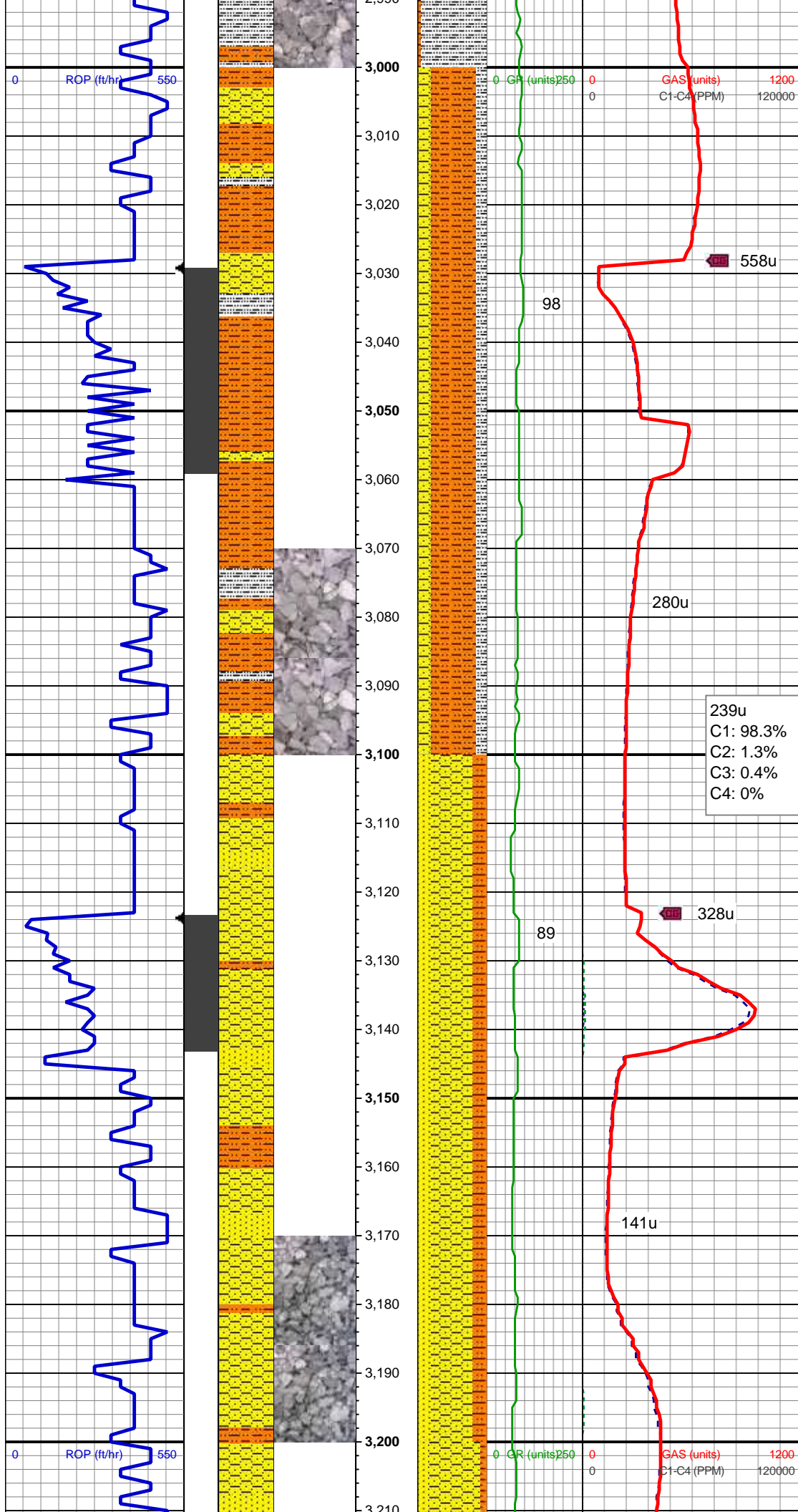
SHY SLTST: med gy, mod sft - mod frm,  
brit - smwt fri ip, vf - f gr, sb ang - sb plty,  
arg cmt, sl calc; SHY SS: lt gy, sme off  
wh, mod frm - frm, brit, f - med gr, sb ang  
- sb blk, mod srt, arg cmt, sl calc, spec  
wi glau; tr wh ss

MD: 2,885 '  
TVD: 2,845.23 '  
Inclination: 14.8 °  
Azimuth: 18.6 °  
VS: -84.03 '

318u  
C1: 100%  
C2: 0%  
C3: 0%  
C4: 0%

SLTY SH: lt - med gy, sme dk gy blk,  
mod sft - mod frm, brit - smwt fri ip, vf gr,  
sb ang - sb plty, arg cmt, sl calc; occ shy  
sltst

MD: 2,980 '  
TVD: 2,937.18 '  
Inclination: 14.3 °  
Azimuth: 17.6 °  
VS: -89.07 '



SHY SLTST: med gy, mod sft - mod frm, brit - smwt fri ip, vf - f gr, sb ang - sb plty, arg cmt, sl calc; SHY SS: lt gy, sme off wh, mod frm - frm, brit, f - med gr, sb ang - sb blk, mod srt, arg cmt, sl calc, spec wi glau; SLTY SH: lt - med gy, sme dk gy blk, mod sft - mod frm, brit - smwt fri ip, vf gr, sb ang - sb plty, arg cmt, sl calc

MD: 3,074 '  
TVD: 3,028.09 '  
Inclination: 15.2 °  
Azimuth: 24.1 °  
VS: -95.27 '

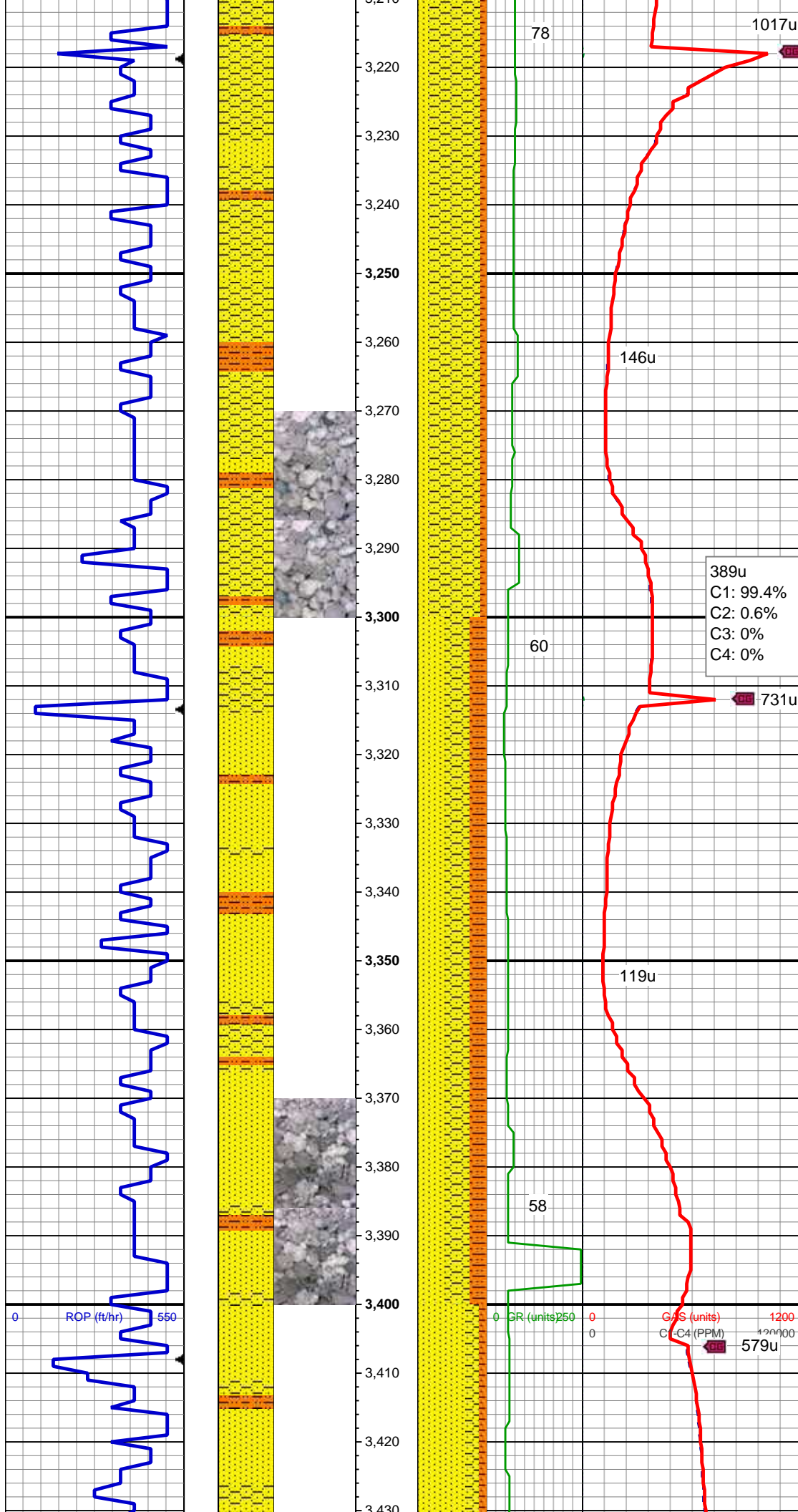
MUD WT 8.80  
MUD VIS 30

MUD WT 8.80  
MUD VIS 31

SHY SS: lt gy, sme off wh, mod frm - frm, brit, f - med gr, sb ang - sb blk, mod srt, arg cmt, sl calc, spec wi glau; SS: off wh - wh, trns, s&p, frm, brit, f - med gr, sb ang - sb blk, mod srt, arg cmt, sl calc, spec wi glau; SHY SLTST: med gy, mod sft - mod frm, brit - smwt fri ip, vf - f gr, sb ang - sb plty, arg cmt, sl calc

MD: 3,169 '  
TVD: 3,119.4 '  
Inclination: 16.8 °  
Azimuth: 24.3 °  
VS: -103.49 '





SHY SS: lt gy, sme off wh, mod frm - frm, brit, f - med gr, sb ang - sb blkly, mod srt, arg cmt, sl calc, spec wi glau; SS: off wh - wh, trnsl, s&p, frm, brit, f - med gr, sb ang - sb blkly, mod srt, arg cmt, sl calc, spec wi glau; SHY SLTST: med gy, mod sft - mod frm, brit - smwt fri ip, vf - f gr, sb ang - sb plty, arg cmt, sl calc

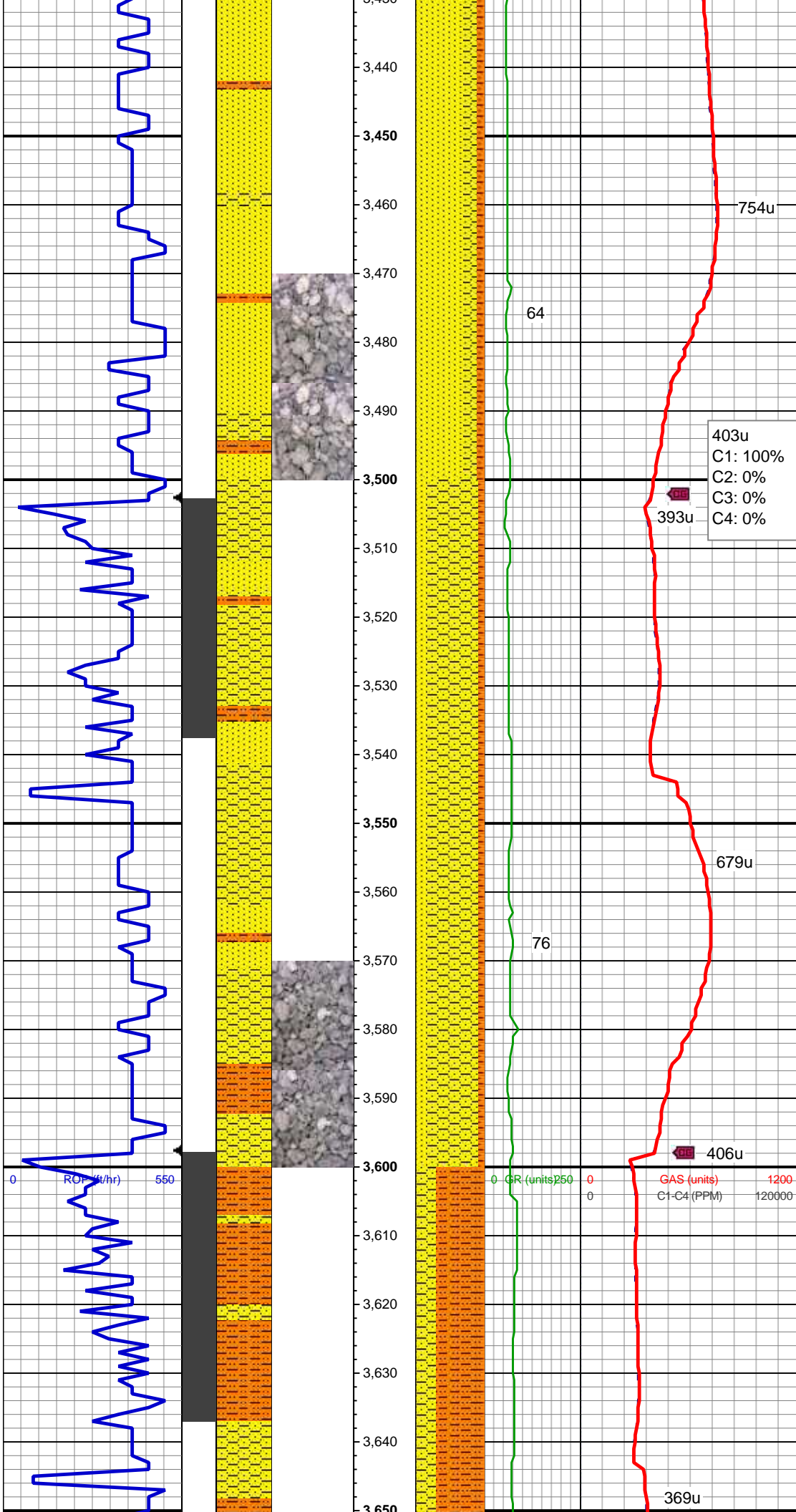
MD: 3,264 '  
TVD: 3,210.28 '  
Inclination: 17.1 °  
Azimuth: 22.7 °  
VS: -111.86 '

SS: off wh - wh, trnsl, s&p, frm, brit, med gr, sb ang - sb blkly, mod srt, arg cmt, sl calc, spec wi glau; SHY SS: lt gy, sme off wh, mod frm - frm, brit, f - med gr, sb ang - sb blkly, mod srt, arg cmt, sl calc, spec wi glau; SHY SLTST: med gy, mod sft - mod frm, brit - smwt fri ip, vf - f gr, sb ang - sb plty, arg cmt, sl calc

MD: 3,358 '  
TVD: 3,299.9 '  
Inclination: 18 °  
Azimuth: 23.2 °  
VS: -120.17 '

MUD WT 8.85  
MUD VIS 30

MUD WT 9.10  
MUD VIS 37



SS: off wh - wh, trnsl, s&p, frm, brit, med gr, sb ang - sb blkly, mod srt, arg cmt, sl calc, spec wi glau; SHY SS: lt gy, sme off wh, mod frm - frm, brit, f - med gr, sb ang - sb blkly, mod srt, arg cmt, sl calc, spec wi glau; SHY SLTST: med gy, mod sft - mod frm, brit - smwt fri ip, vf - f gr, sb ang - sb plty, arg cmt, sl calc

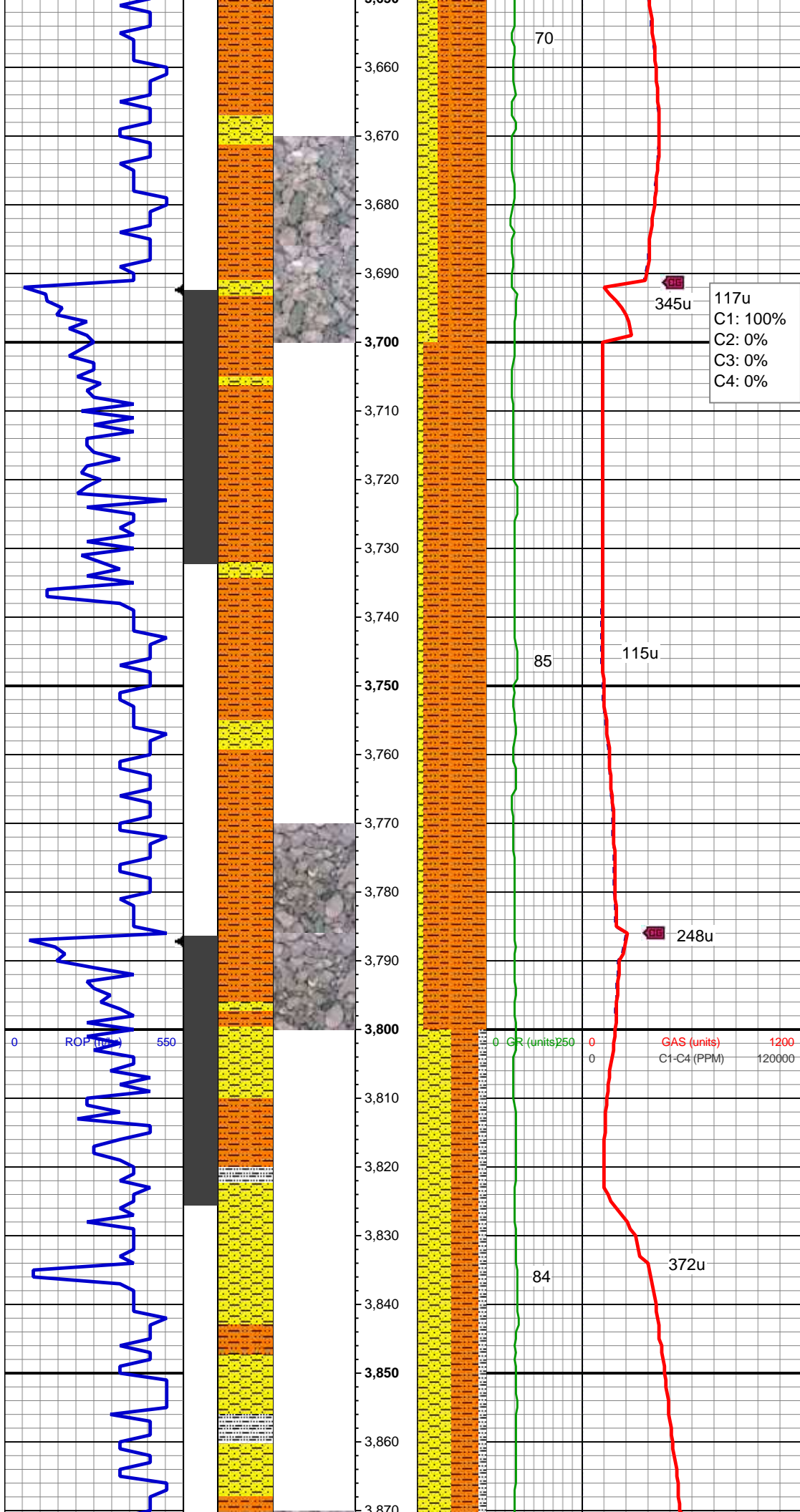
MD: 3,453 '  
TVD: 3,389.99 '  
Inclination: 19 °  
Azimuth: 23.5 °  
VS: -129.2 '

MD: 3,548 '  
TVD: 3,480.39 '  
Inclination: 16.8 °  
Azimuth: 18.5 °  
VS: -136.87 '

SHY SS: lt gy, sme off wh, mod frm - frm, brit, f - med gr, sb ang - sb blkly, mod srt, arg cmt, sl calc, spec wi glau; SS: off wh - wh, trnsl, s&p, frm, brit, med gr, sb ang - sb blkly, mod srt, arg cmt, sl calc, spec wi glau; SHY SLTST: med gy, mod sft - mod frm, bri, vf - f gr, sb ang - sb plty, arg cmt, sl calc

MD: 3,643 '  
TVD: 3,572.14 '  
Inclination: 13.3 °  
Azimuth: 7.9 °  
VS: -140.24 '

SHY SLTST: med gy, mod sft - mod frm, brit, vf - f gr, sb ang - sb plty, arg cmt, sl calc; SHY SS: lt gy, sme off wh, mod frm



- frm, brit, f - med gr, sb ang - sb blk, mod srt, arg cmt, sl calc, spec wi abnt glau

MUD WT 8.85  
MUD VIS 30

MUD WT 8.85  
MUD VIS 32

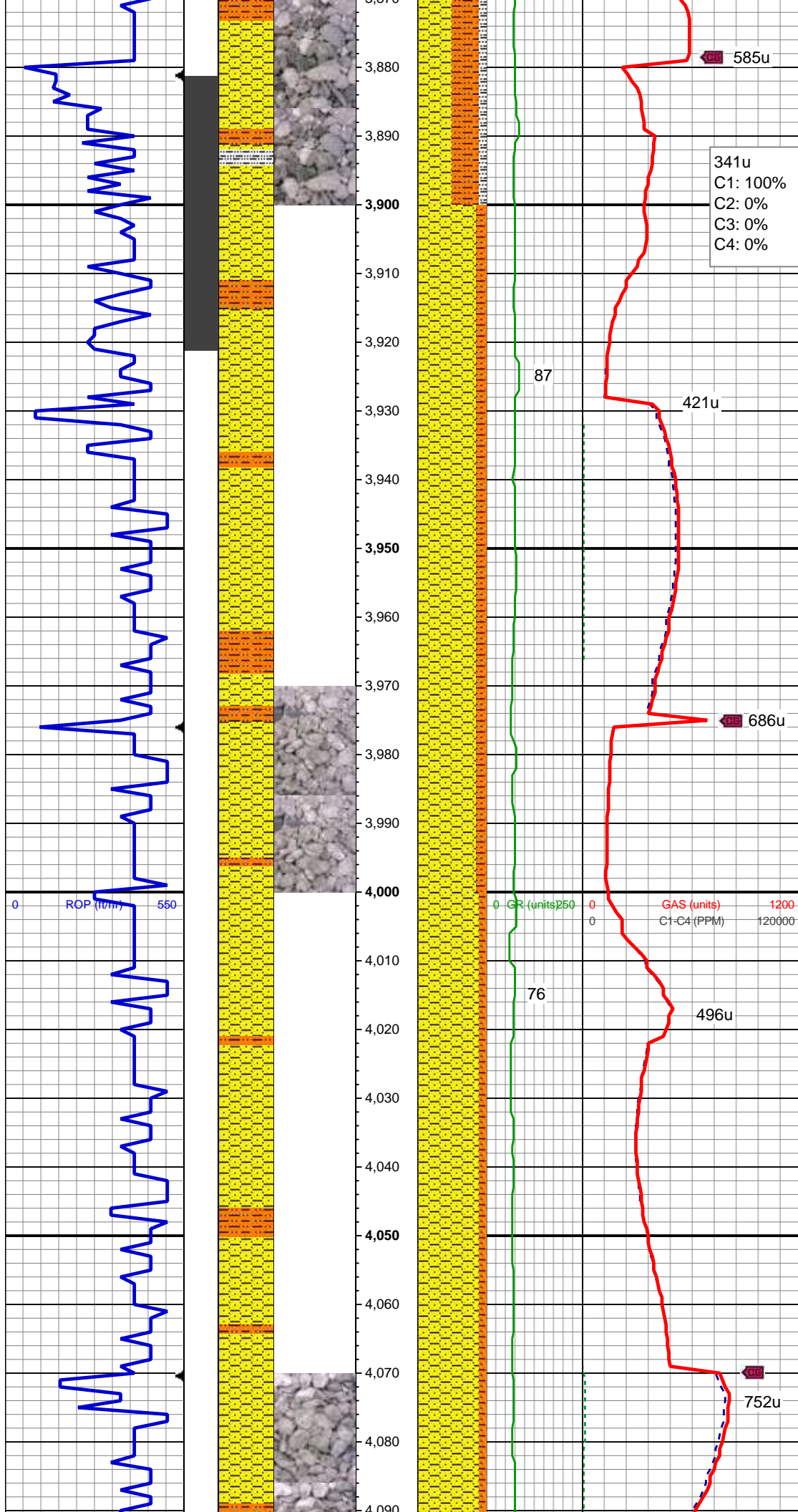
MD: 3,737 '  
TVD: 3,664.46 '  
Inclination: 8.2 °  
Azimuth: 8.1 °  
VS: -140.87 '

SHY SLTST: med gy, mod sft - mod frm, brit, vf - f gr, sb ang - sb plty, arg cmt, sl calc; SHY SS: lt - med gy, mod frm - frm, brit, f - med gr, sb ang - sb blk, mod srt, arg cmt, sl calc

MD: 3,832 '  
TVD: 3,758.92 '  
Inclination: 3.7 °  
Azimuth: 14.1 °  
VS: -141.57 '

SHY SS: lt - med gy, mod frm - frm, brit, f gr, sb ang - sb blk, mod srt, arg cmt, sl calc; SHY SLTST: med gy, mod frm, brit, vf - f gr, sb ang - sb plty, arg cmt, sl calc; SLTY SH: med gy, mod frm, brit, vf gr, sb ang - sb plty, arg cmt





MUD WT 8.75  
MUD VIS 30

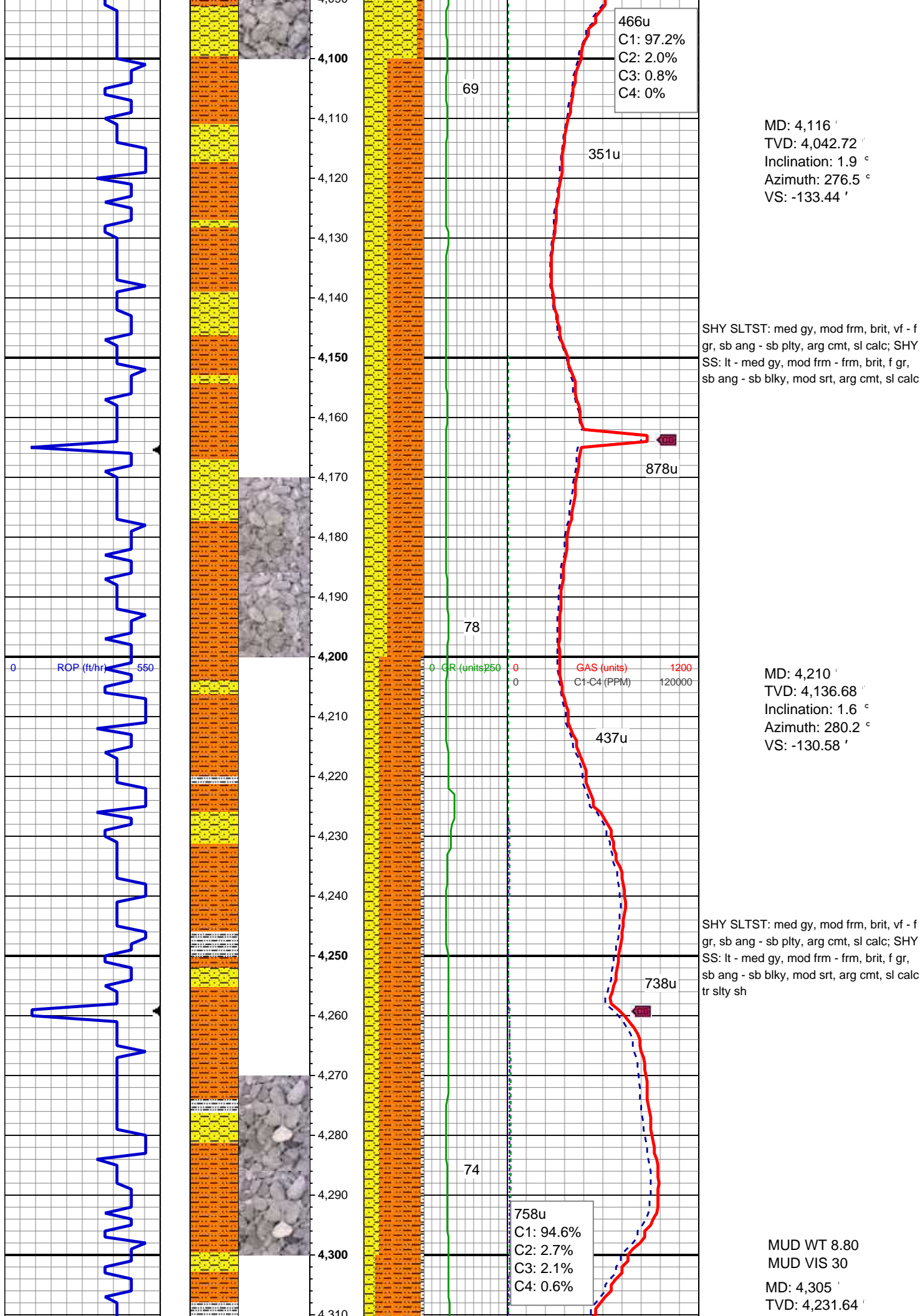
MUD WT 8.75  
MUD VIS 31

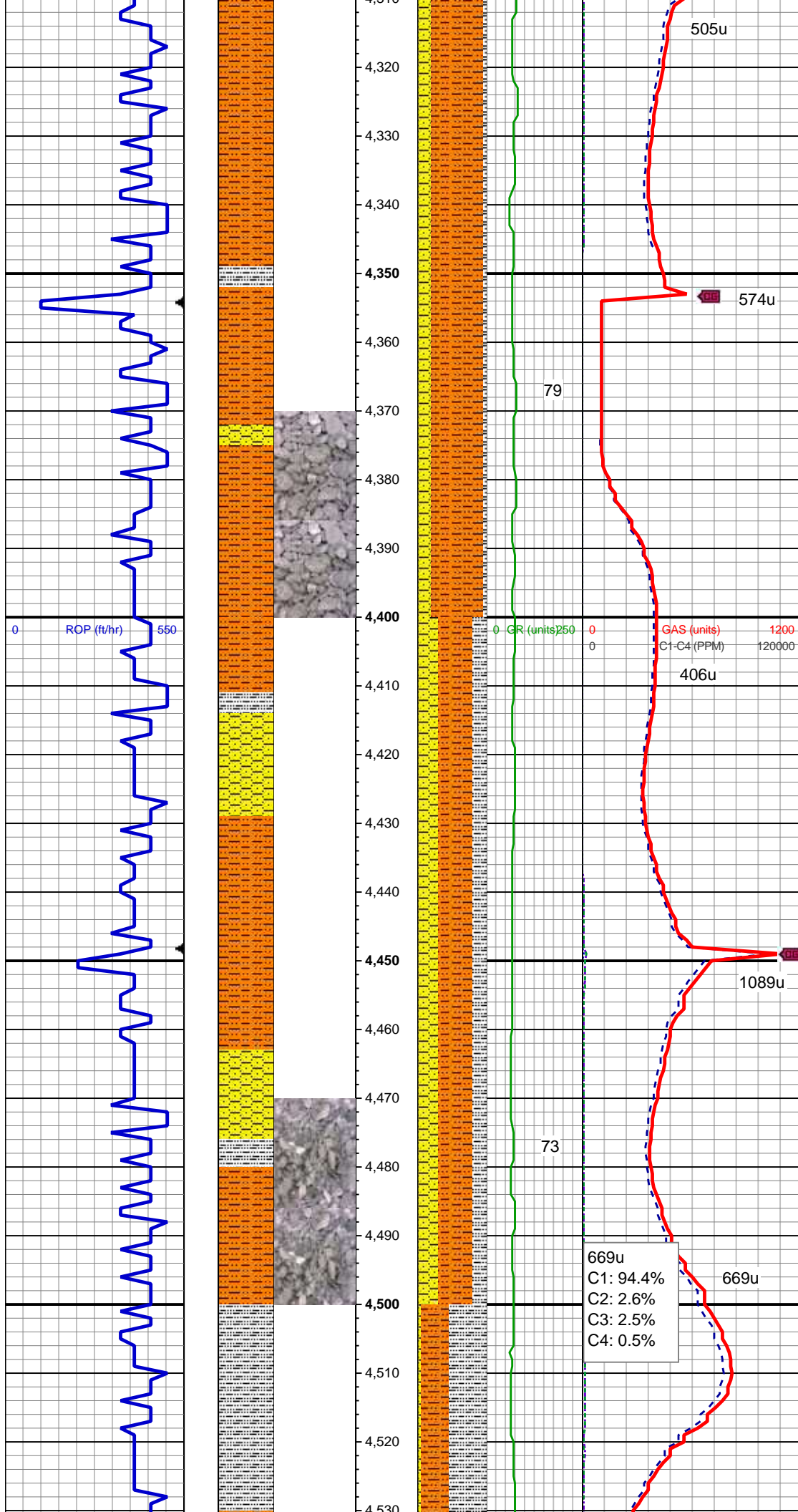
MD: 3,927 '  
TVD: 3,853.85 '  
Inclination: 2.3 °  
Azimuth: 258.4 °  
VS: -140.19 '

SHY SS: lt - med gy, mod frm - frm, brit, f  
gr, sb ang - sb blk, mod srt, arg cmt, sl  
calc; SHY SLTST: med gy, mod frm,  
brit, vf - f gr, sb ang - sb plty, arg cmt, sl  
calc

MD: 4,021 '  
TVD: 3,947.78 '  
Inclination: 2.1 °  
Azimuth: 262.6 °  
VS: -136.71 '

SHY SS: lt - med gy, mod frm - frm, brit, f  
gr, sb ang - sb blk, mod srt, arg cmt, sl  
calc; SHY SLTST: med gy, mod frm,  
brit, vf - f gr, sb ang - sb plty, arg cmt, sl  
calc





Inclination: 1.4 °  
Azimuth: 282.3 °  
VS: -128.1 '  
MUD WT 8.75  
MUD VIS 30

SHY SLTST: med gy, mod frm, brit, vf - f  
gr, sb ang - sb plty, arg cmt, sl calc; SHY  
SS: lt - med gy, mod frm - frm, brit, f gr,  
sb ang - sb blkly, mod srt, arg cmt, sl calc,  
tr slty sh

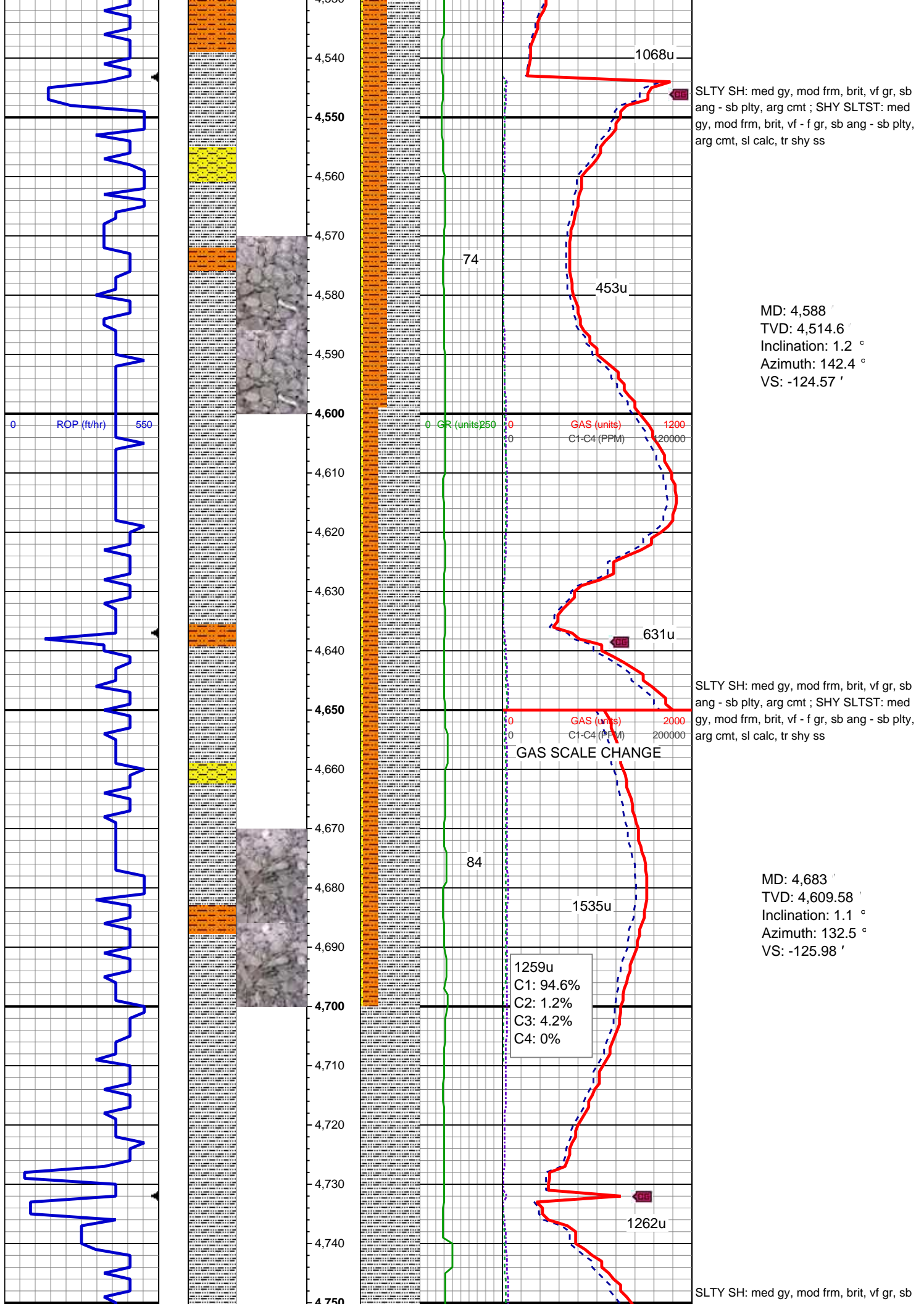
MD: 4,399 '  
TVD: 4,325.62 '  
Inclination: 1.1 °  
Azimuth: 273 °  
VS: -126.06 '

SHY SLTST: med gy, mod frm, brit, vf - f  
gr, sb ang - sb plty, arg cmt, sl calc; SHY  
SS: lt - med gy, mod frm - frm, brit, f gr,  
sb ang - sb blkly, mod srt, arg cmt, sl calc;  
SLTY SH: med gy, mod frm, brit, vf gr, sb  
ang - sb plty, arg cmt

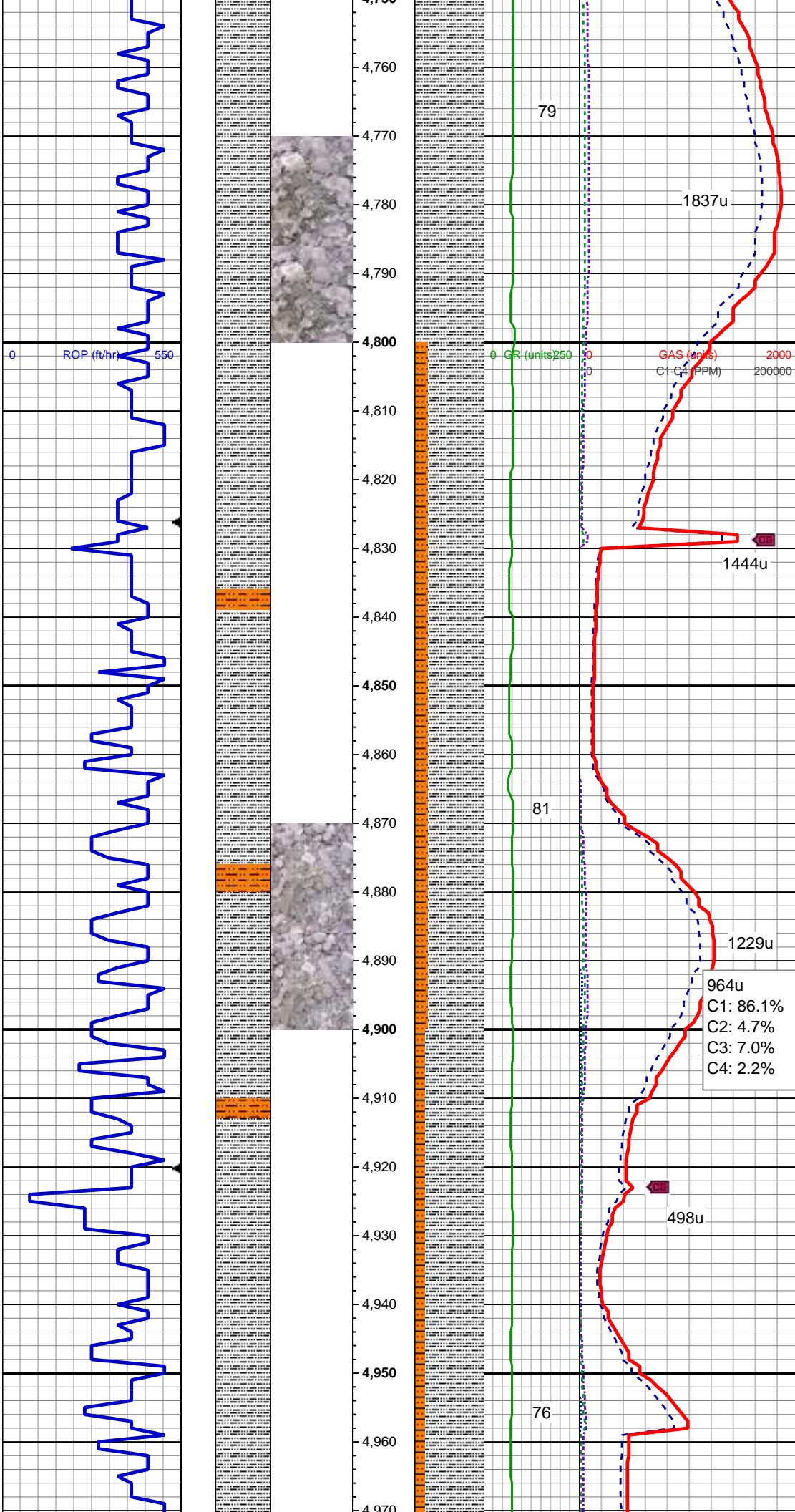
MD: 4,493 '  
TVD: 4,419.61 '  
Inclination: 1 °  
Azimuth: 236.6 °  
VS: -124.52 '

669u  
C1: 94.4%  
C2: 2.6%  
C3: 2.5%  
C4: 0.5%





ang - sb plty, arg cmt, tr shy sltst



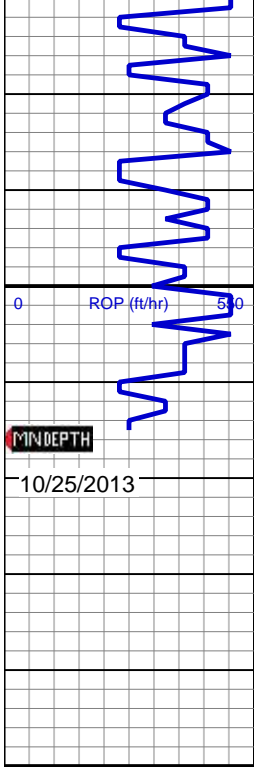
MD: 4,777 '  
TVD: 4,703.55 '  
Inclination: 1.4 °  
Azimuth: 120.2 °  
VS: -127.76 '

SLTY SH: med gy, mod frm, brit, vf gr, sb  
ang - sb plty, arg cmt ; SHY SLTST: med  
gy, mod frm, brit, vf - f gr, sb ang - sb plty,  
arg cmt, sl calc

MD: 4,871 '  
TVD: 4,797.53 '  
Inclination: 1.4 °  
Azimuth: 126.7 °  
VS: -129.79 '

SLTY SH: med gy, mod frm, brit, vf gr, sb  
ang - sb plty, arg cmt; SHY SLTST: med  
gy, mod frm, brit, vf - f gr, sb ang - sb plty,  
arg cmt, sl calc, tr shy ss

MD: 4,966 '  
TVD: 4,892.5 '  
Inclination: 1.3 °  
Azimuth: 100.4 °

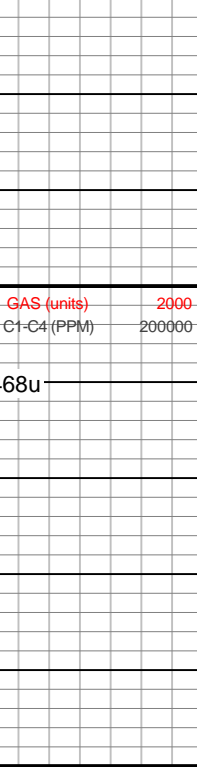
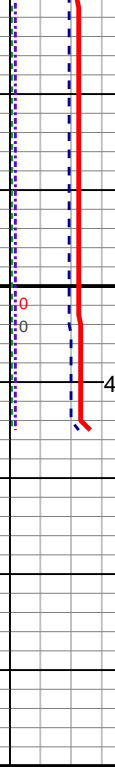
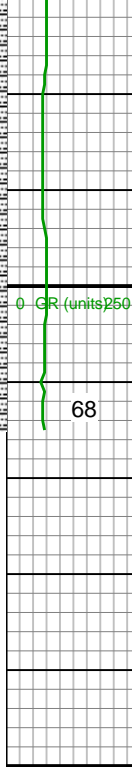


4,970  
4,980  
4,990  
5,000  
5,010  
5,020  
5,030  
5,040  
5,050



4,970  
4,980  
4,990  
5,000  
5,010  
5,020  
5,030  
5,040  
5,050

4,970  
4,980  
4,990  
5,000  
5,010  
5,020  
5,030  
5,040  
5,050



Azimuth: 100.4  
VS: -131.86'

MUD WT 9.05  
MUD VIS 42

MUD WT 9.15  
MUD VIS 43

TD @ 5015' MD  
10/24/2013 @ 17:23 hrs

TOOH FOR BHA #2  
LOG CONTINUES ON MPLOT  
"ROHN STATE  
LD09-65HN(HORZ)"

Thank you for choosing  
Columbine Logging Inc.