

# COLUMBINE LOGGING

Scale: 5" / 100'  
Measured Depth Log

**Well Name** Timbro State LD16-67-1HN

**Location** SE NE SEC. 16, T9N, R58W

**State** COLORADO

**County** WELD

**Country** USA

**Rig Number** H&P 326

**API Number** 05-123-37549

**AFE #** 139485

**Region** DJ BASIN

**Field** WILDCAT

**Spud Date** 11/11/2013

**Drilling Completed** 11/17/2013

**Surface Coordinates** 1,770' FNL, 290' FEL  
Lat 40.75372 N, Long 103.86080 W

**Bottom Hole Coordinates** 1,650' FNL, 660' FWL  
Lat 40.75406 N, Long 103.87638 W

**Ground Elevation** 4755

**K.B. Elevation** 4785

**Logged Interval** 1300                      **To** 9947

**Total Depth** 9947

**Formation** A Chalk

**Type of Drilling Fluid** LSND

## Operator

**Company** NOBLE ENERGY INC.

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

## Geologist

**Name** EVAN HOWELL

**Company** NOBLE ENERGY INC.

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

RYAN SULLIVAN  
JESSICA SILVEY

## 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

### Fossil

GASTROPOD
INOCERAMUS
LOOLITE
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
Q INTEROOLITIC

### MOLDIC

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

ANGULAR
ROUNDED
SUBANG
SUBRND

### Textures

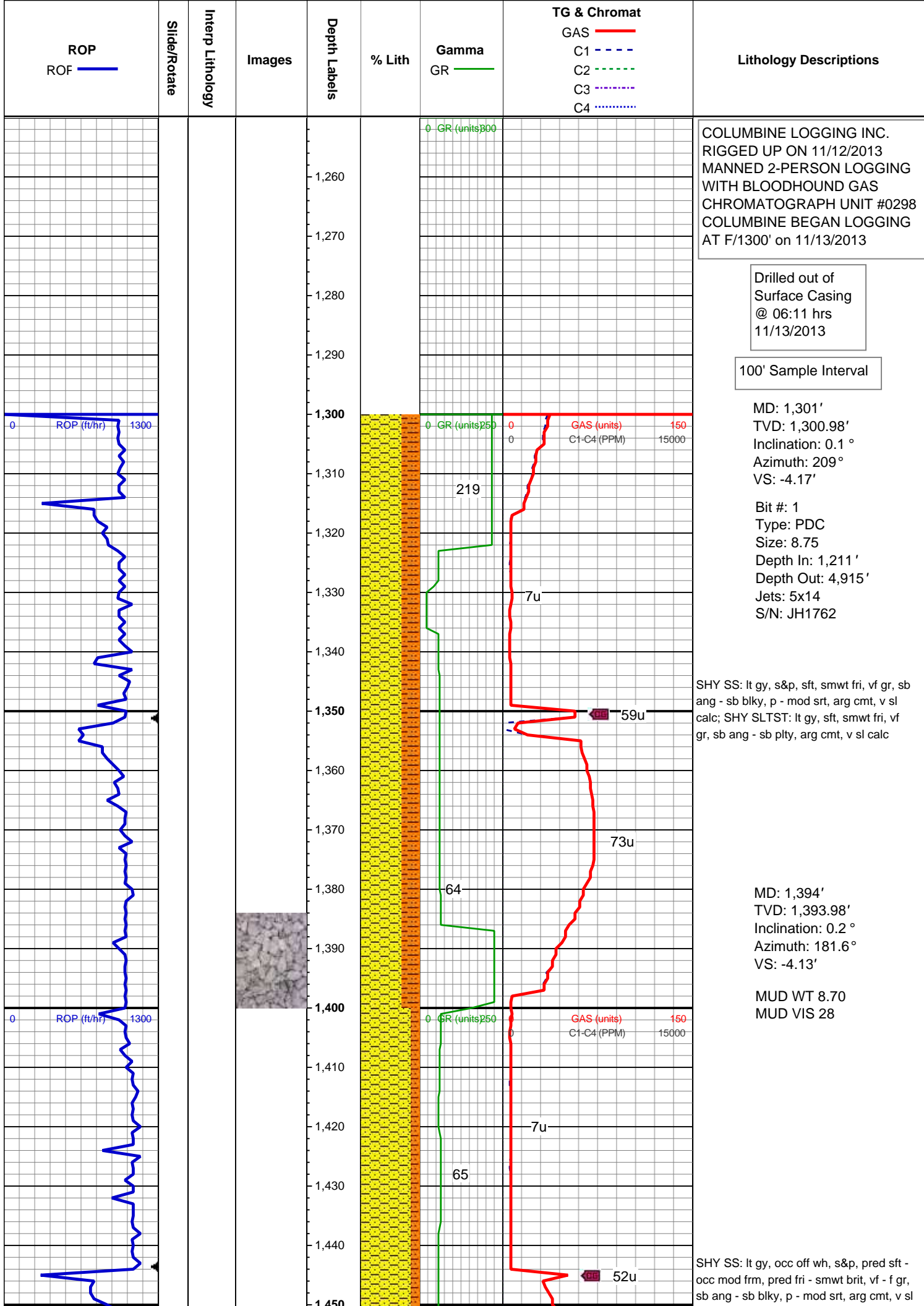
BOUNDSTONE
CHALKY
CRYPTOXLN

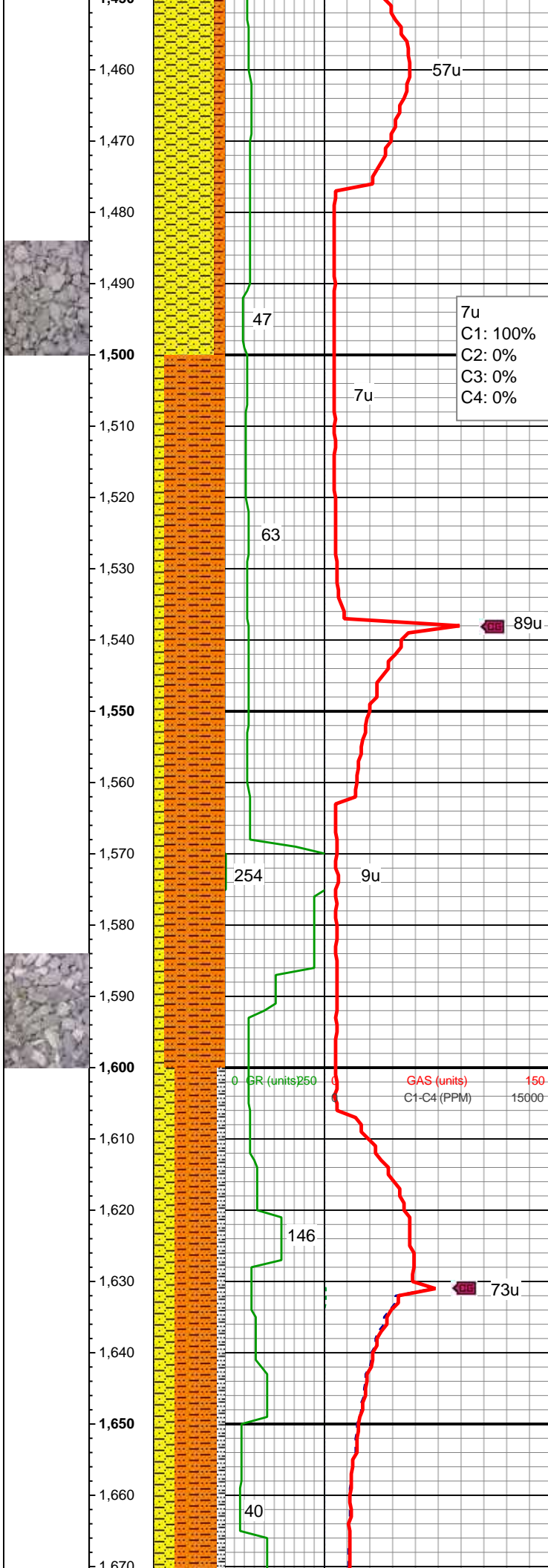
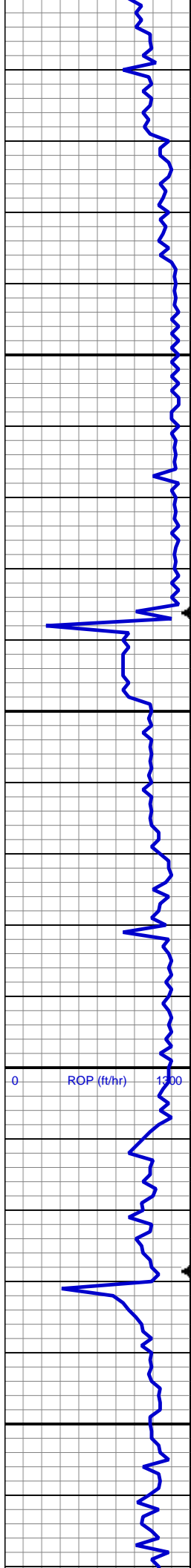
### E EARTHY

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

### Sorting

M MODERATE
P POOR
W WELL





calc; SHY SLTST: lt gy, mod sft, smwt fri, vf gr, sb ang - sb plty, arg cmt, v sl calc

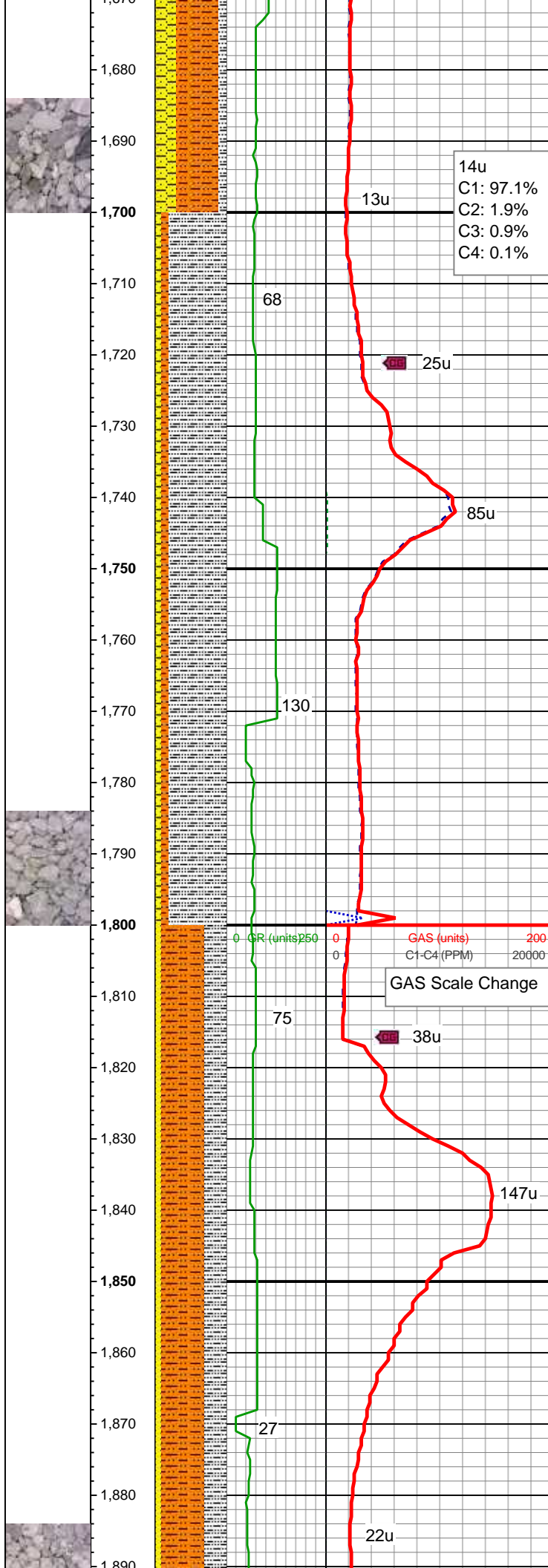
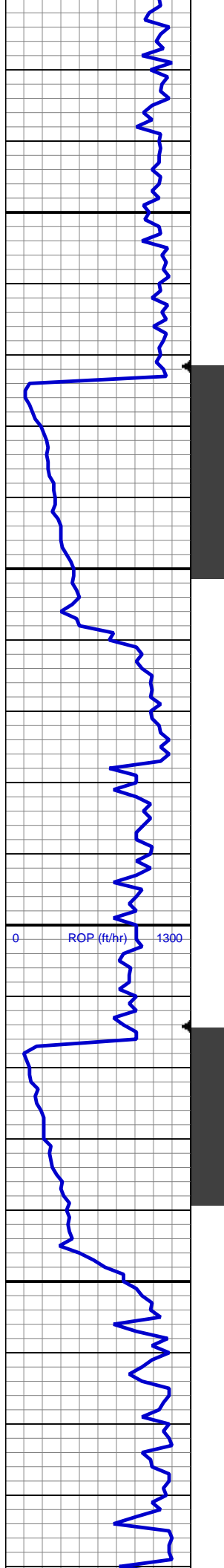
MD: 1,487'  
TVD: 1,486.98'  
Inclination: 0.1 °  
Azimuth: 189.5 °  
VS: -4.12'

SHY SLTST: lt gy, mod sft, smwt fri, vf gr, sb ang - sb plty, arg cmt, v sl calc; SHY SS: lt gy, pred sft - occ mod frm, pred fri - smwt brit, vf - f gr, sb ang - sb blkly, mod srt, arg cmt, v sl calc

MD: 1,579'  
TVD: 1,578.98'  
Inclination: 0.2 °  
Azimuth: 214.6 °  
VS: -4.01'

SHY SLTST: lt gy, mod sft - mod frm, vf gr, sb ang - sb plty, arg cmt, v sl calc; SHY SS: lt gy - occ wh, pred sft - occ mod frm, pred fri - smwt brit, vf - f gr, sb ang - sb blkly, p - mod srt, arg cmt, v sl calc, occ slty sh, sme pyr

MD: 1,672'  
TVD: 1,671.98'



Inclination: 0.1 °  
Azimuth: 168.2 °  
VS: -3.94'

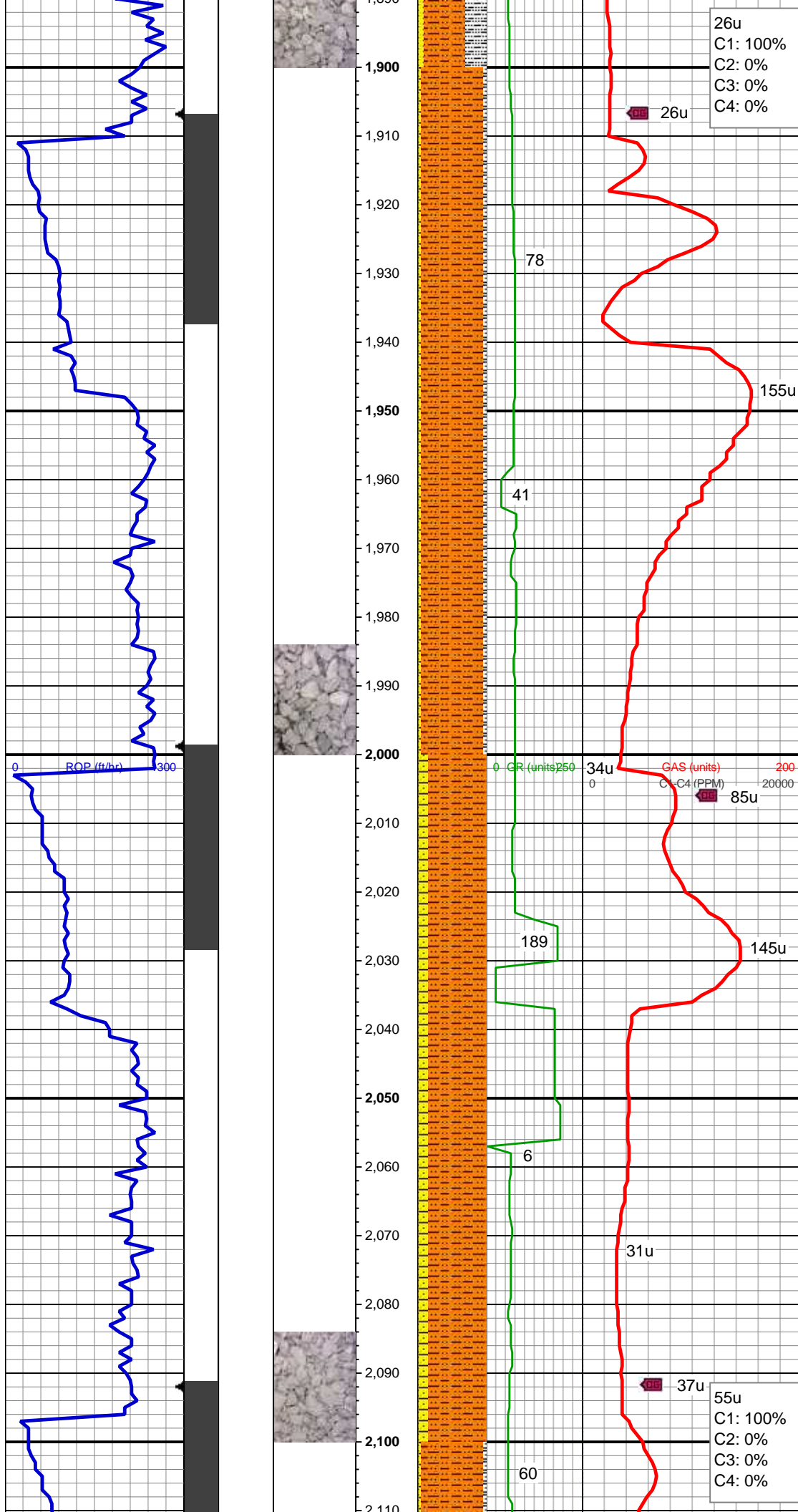
SLTY SH: lt - med gy, mod sft - mod frm, brit - smwt fri ip, vf gr, sb ang - sb plty, arg cmt; occ SHY SLTST: lt gy, mod sft - mod frm, vf gr, sb ang - sb plty, arg cmt; occ SHY SS: lt gy - wh, mod frm, pred fri - smwt brit, vf - f gr, sb ang - sb blkly, p - mod srt, arg cmt, sl calc thru

MD: 1,765'  
TVD: 1,764.95'  
Inclination: 2.5 °  
Azimuth: 77.3 °  
VS: -5.93'

SHY SLTST: lt gy, mod sft - mod frm, vf gr, sb ang - sb plty, arg cmt; SLTY SH: lt - med gy, sme dk gy, mod sft - mod frm, brit - smwt fri ip, vf gr, sb ang - sb plty, arg cmt; occ SS: lt gy - wh, s&p, mod frm, smwt brit, vf - u f gr, sb ang - sb blkly, p - mod srt, arg cmt, sl calc thru

MD: 1,858'  
TVD: 1,857.79'  
Inclination: 4.2 °  
Azimuth: 69.6 °  
VS: -11.09'





26u  
C1: 100%  
C2: 0%  
C3: 0%  
C4: 0%

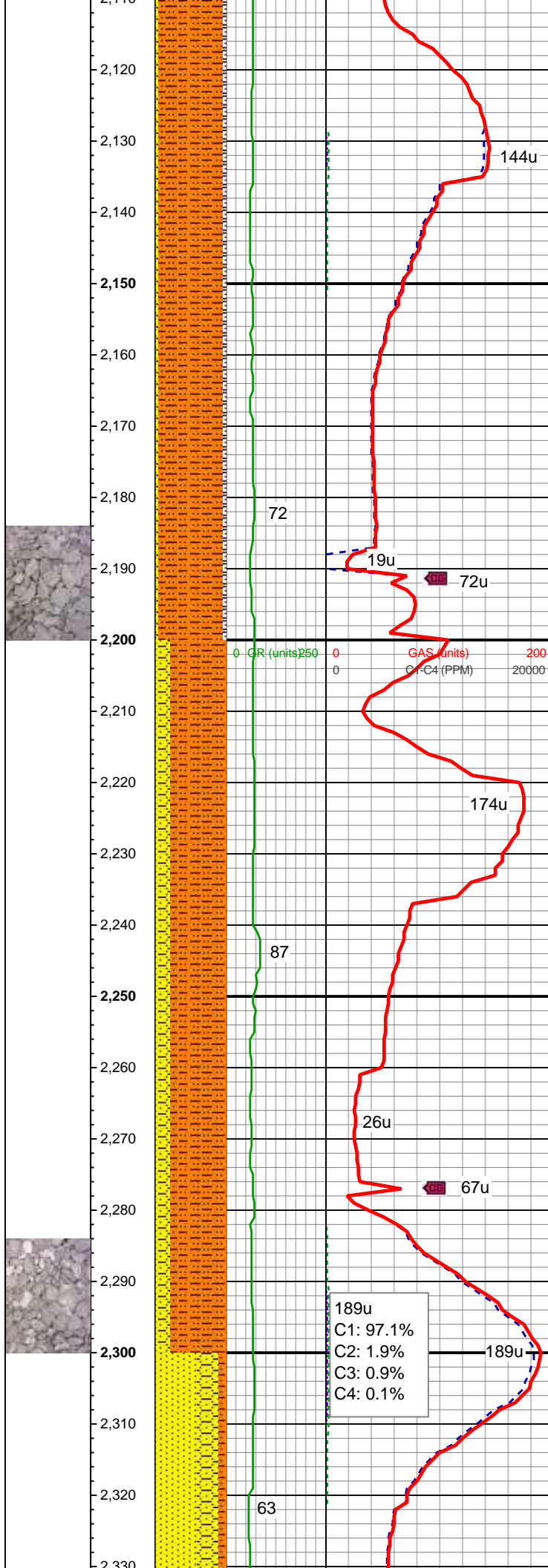
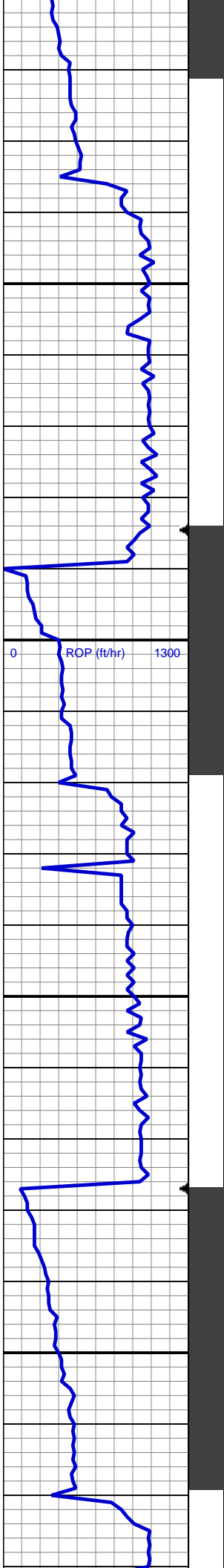
MD: 1,949'  
TVD: 1,948.44'  
Inclination: 5.7 °  
Azimuth: 68 °  
VS: -18.37'

SHY SLTST: lt gy, sft, fri, vf gr, sb ang -  
sb plty, arg cmt; tr slty sh, tr shyss, sl calc  
thru

MD: 2,042'  
TVD: 2,040.9'  
Inclination: 6.7 °  
Azimuth: 78.4 °  
VS: -27.94'

SHY SLTST: lt gy, mod sft - smwt frm, vf  
gr, sb ang - sb plty, arg cmt; SHY SS: lt  
gy - occ wh ss, mod frm, smwt brit, vf gr,  
sb ang - sb blkly, mod - w srt, arg cmt, v sl  
calc thru

55u  
C1: 100%  
C2: 0%  
C3: 0%  
C4: 0%



MD: 2,135'  
TVD: 2,133.09'  
Inclination: 8.4 °  
Azimuth: 75.4 °  
VS: -39.8'

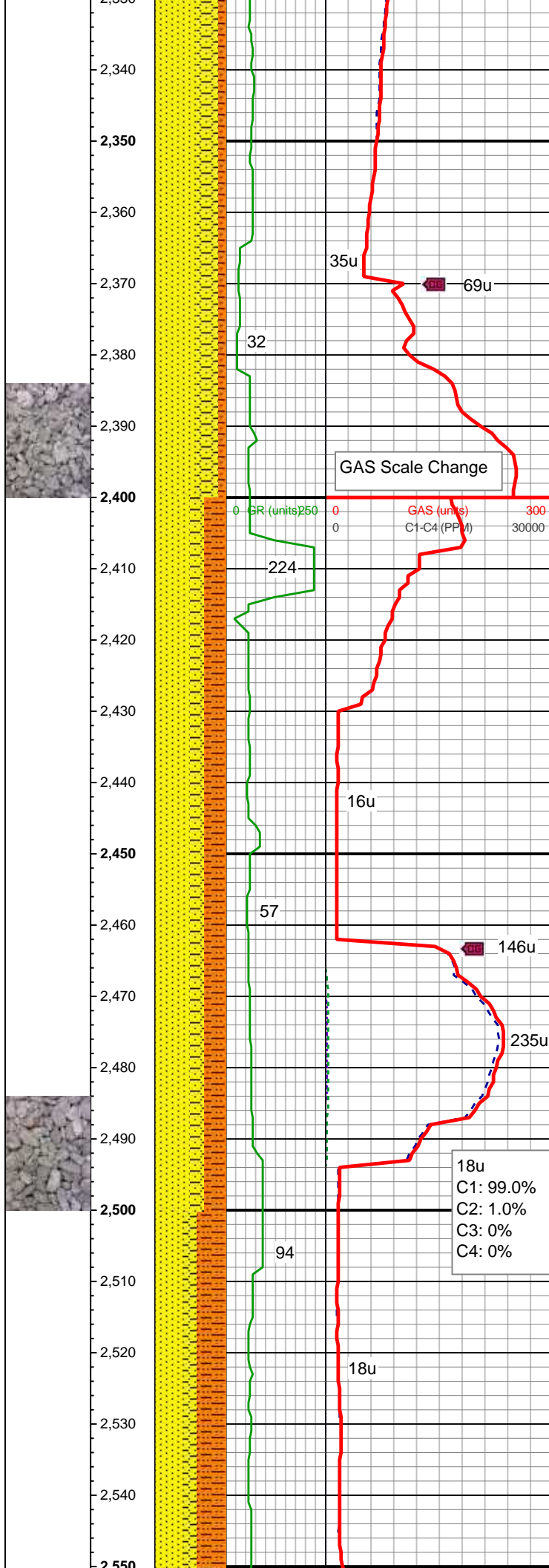
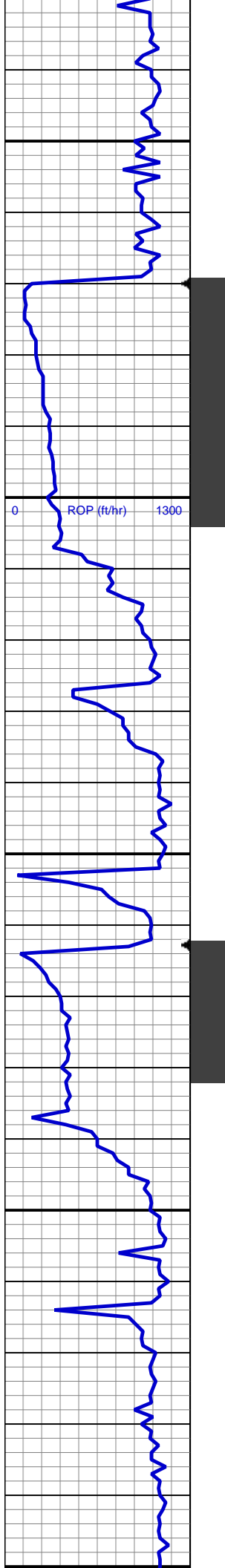
SHY SLTST: lt - med gy, mod sft - mod frm, vf gr, sb ang - sb plty, arg cmt; tr shyss, tr slty sh, non calc

MD: 2,228'  
TVD: 2,224.96'  
Inclination: 9.5 °  
Azimuth: 72.8 °  
VS: -53.66'

MUD WT IN/OUT 8.75/8.85  
MUD VIS IN/OUT 29/31

SHY SLTST: lt - med gy, sft, vf gr, sb ang - sb plty, arg cmt; SHY SS: lt gy - occ wh ss, s&p, frm, brit, vf gr, sb ang - sb blk, w srt, arg cmt, sl calc ip

MD: 2,320'  
TVD: 2,315.48'  
Inclination: 11.1 °  
Azimuth: 65.2 °  
VS: -68.89'



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

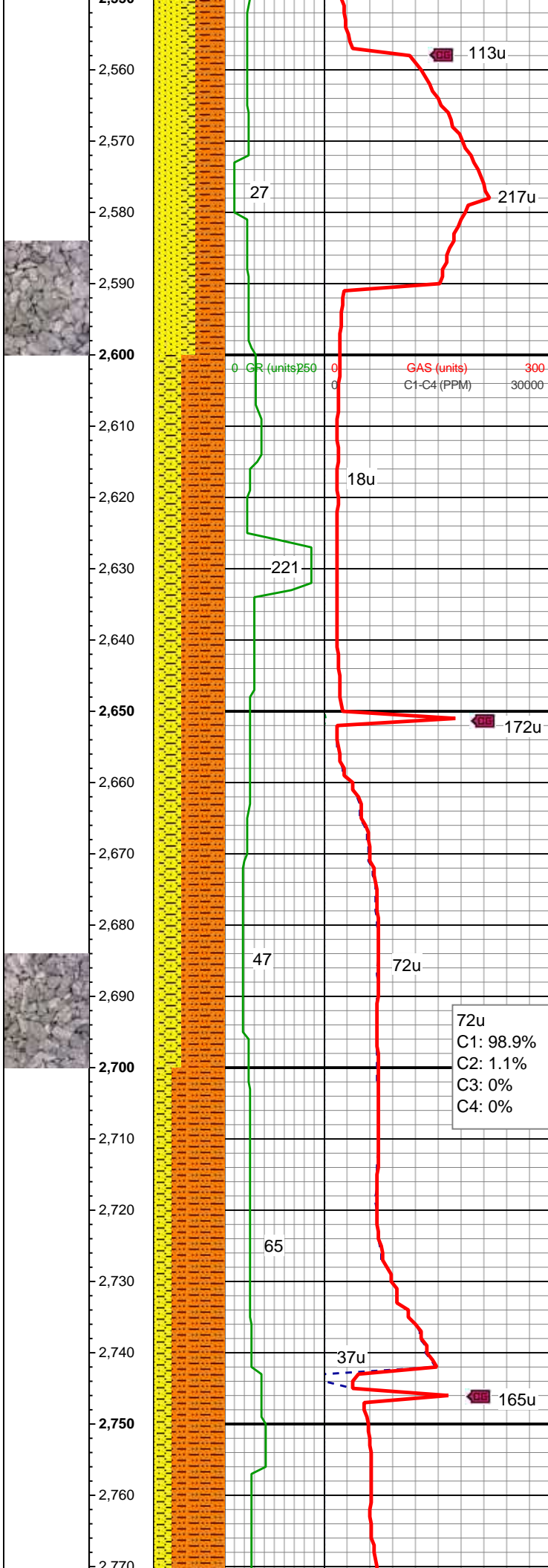
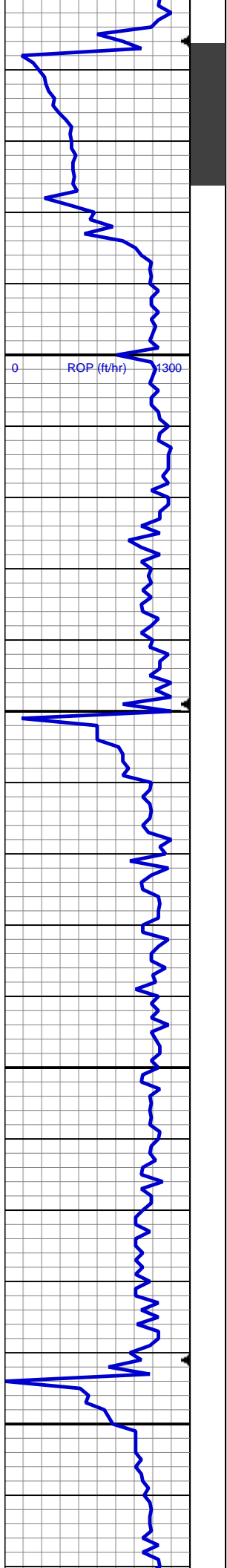
MD: 2,413'  
TVD: 2,406.53'  
Inclination: 12.4 °  
Azimuth: 70.6 °  
VS: -86.36'

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

MD: 2,507'  
TVD: 2,498.16'  
Inclination: 13.4 °  
Azimuth: 65 °  
VS: -105.67'

SS: off wh - wh, s&p, frm, brit, vf - f gr, sb ang - sb blk, mod srt, arg cmt; SHY SLTST: lt - med gy, mod frm, vf gr, sb





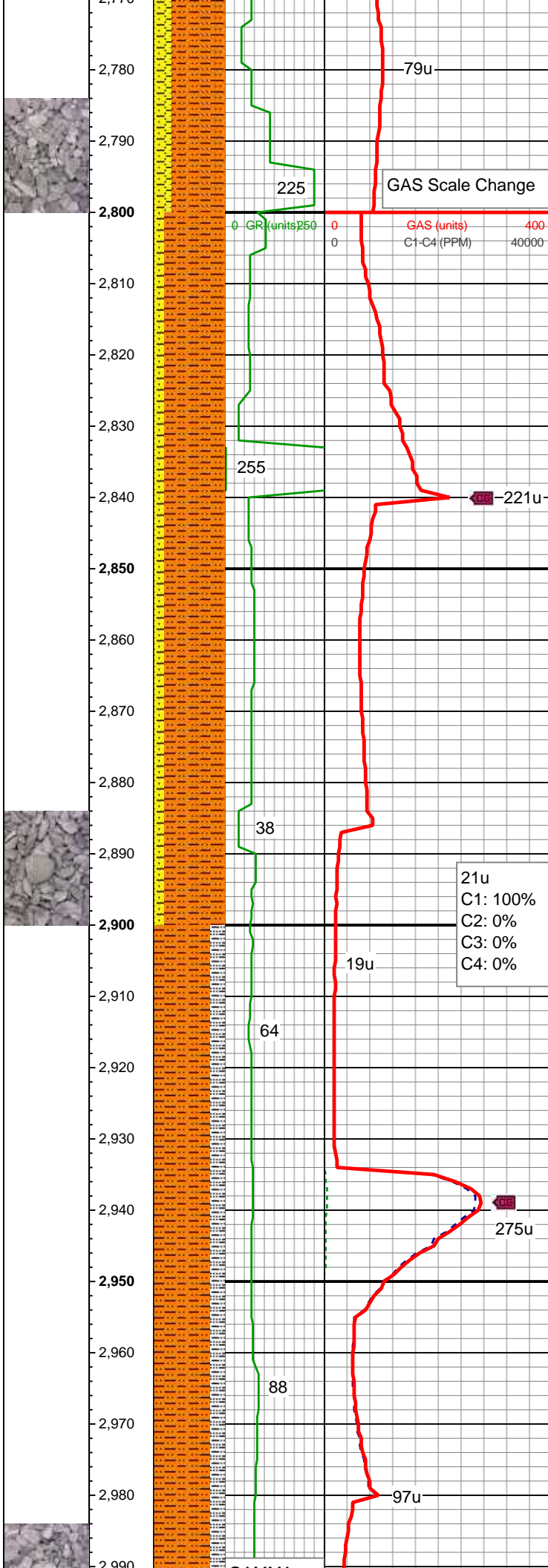
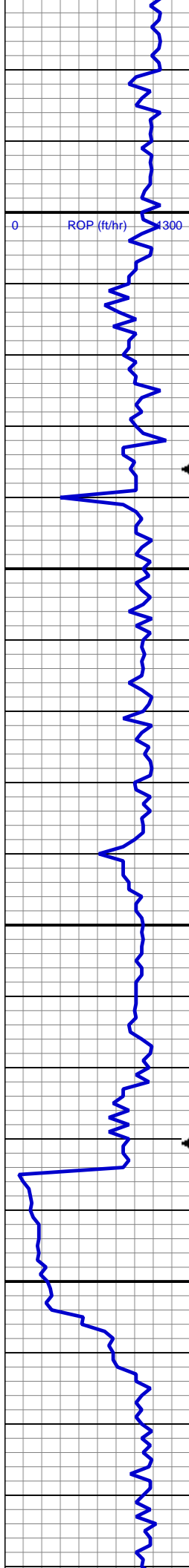
ang - sb plty, arg cmt; SHY SS: lt gy, frm, brit, vf gr, sb ang - sb blkly, w srt, arg cmt; sl calc ip

MD: 2,599'  
TVD: 2,587.49'  
Inclination: 14.3 °  
Azimuth: 57.6 °  
VS: -124.82'

SHY SLTST: lt - med gy, mod frm - frm, vf gr, sb ang - sb plty, arg cmt; SHY SS: lt gy, frm, brit, vf gr, sb ang - sb blkly, w srt, arg cmt; SS: off wh - wh, s&p, frm, brit, vf - f gr, sb ang - sb blkly, mod srt, arg cmt; sl calc ip

MD: 2,692'  
TVD: 2,677.57'  
Inclination: 14.5 °  
Azimuth: 57.1 °  
VS: -144.16'

SHY SLTST: lt - med gy, mod frm - frm, sme sft, vf gr, sb ang - sb plty, arg cmt; SHY SS: lt gy, frm, brit, vf gr, sb ang - sb blkly, w srt, arg cmt; tr ss, sl calc ip



MD: 2,787'  
TVD: 2,769.69'  
Inclination: 13.8 °  
Azimuth: 55.2 °  
VS: -163.32'

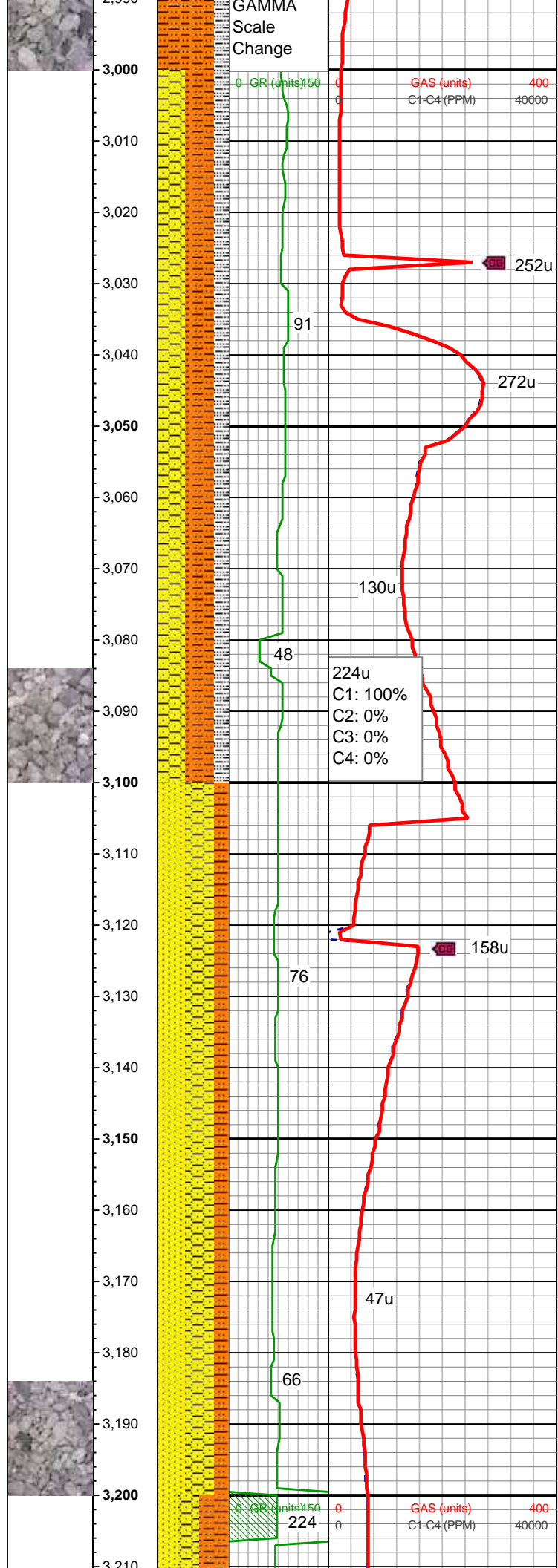
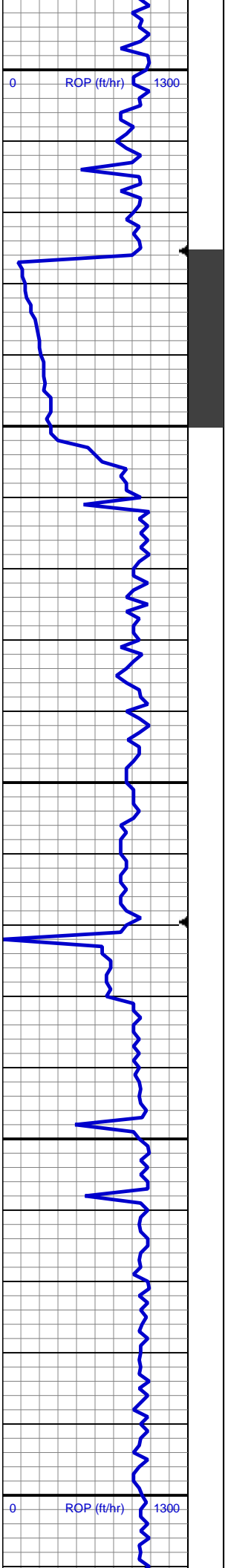
SHY SLTST: lt - med gy, mod frm - frm,  
vf gr, sb ang - sb plty, arg cmt; SHY SS: lt  
gy, mod - frm, brit, vf gr, sb ang - sb blkly,  
w srt, arg cmt; tr ss, sl calc ip

MD: 2,881'  
TVD: 2,861.29'  
Inclination: 12.1 °  
Azimuth: 52.5 °  
VS: -180.22'

21u  
C1: 100%  
C2: 0%  
C3: 0%  
C4: 0%

SHY SLTST: lt - med gy, sft - mod frm, vf  
gr, sb ang - sb plty, arg cmt; SLTY SH: lt  
- med gy, sme dk gy, mod sft - mod frm,  
brit - smwt fri ip, vf gr, sb ang - sb plty, arg  
cmt; tr shy ss, mod calc thru

MD: 2,976'  
TVD: 2,954.62'  
Inclination: 9.4 °  
Azimuth: 54.1 °  
VS: -194.29'



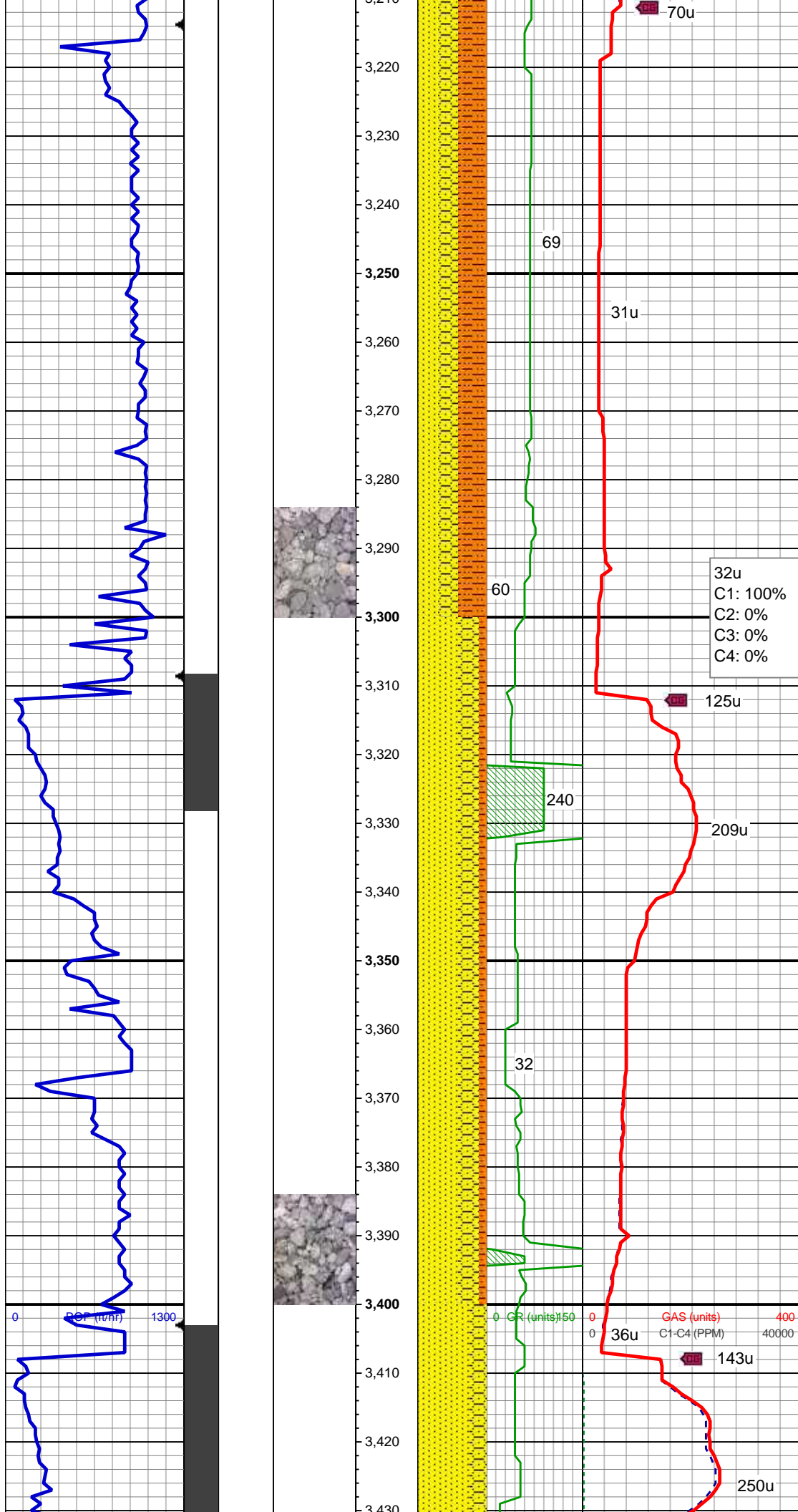
MUD WT 8.75  
MUD VIS 28

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

MD: 3,070'  
TVD: 3,047.64'  
Inclination: 7.2 °  
Azimuth: 66.1 °  
VS: -205.83'

SHY SS: lt gy, frm, brit, vf gr, sb ang - sb blk, w srt, arg cmt; SS: off wh - wh, s&p, frm, brit, vf - f gr, sb ang - sb blk, p - mod srt, arg cmt; SHY SLTST: lt - med gy, mod frm, vf gr, sb ang - sb plty, arg cmt; sl calc ip

MD: 3,164'  
TVD: 3,140.91'  
Inclination: 7 °  
Azimuth: 65.2 °  
VS: -216.36'



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

MD: 3,259'  
TVD: 3,235.19'  
Inclination: 7.2 °  
Azimuth: 64.5 °  
VS: -226.94'

32u  
C1: 100%  
C2: 0%  
C3: 0%  
C4: 0%

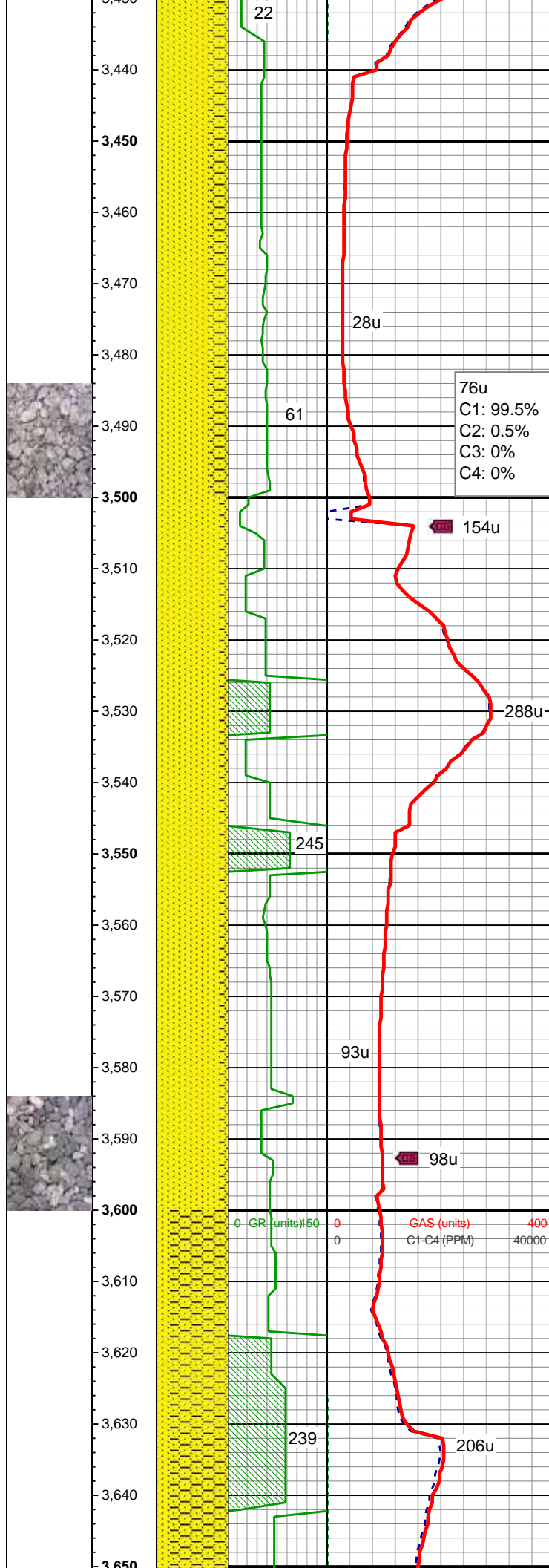
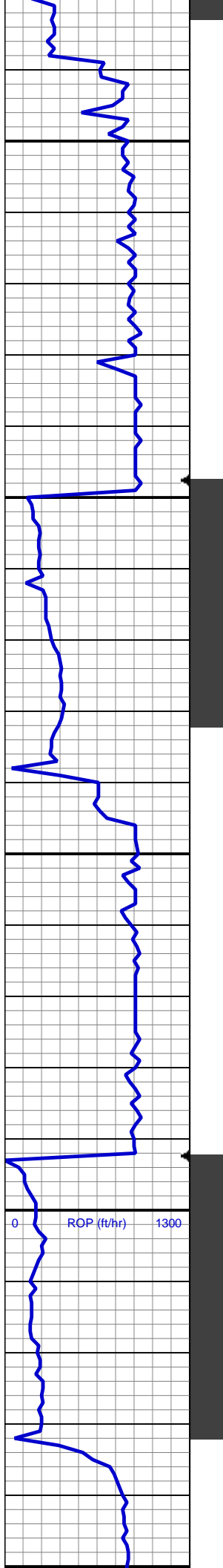
SS: off wh - wh, s&p, frm, brit, u f - med gr, sb ang - sb blkly, p - mod srt, arg cmt, spec wi glau; SHY SS: lt gy, frm, brit, u f - med gr, sb ang - sb blkly, mod srt, arg cmt; SHY SLTST: lt - med gy, mod frm, brit, vf gr, sb ang - sb plty, arg cmt; sl calc ip

MD: 3,354'  
TVD: 3,329.57'  
Inclination: 5.8 °  
Azimuth: 58 °  
VS: -236.33'

MUD WT 8.70  
MUD VIS 30

MD: 3,448'





TVD: 3,423.19'  
Inclination: 4.5 °  
Azimuth: 56.2 °  
VS: -243.37'

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

76u  
C1: 99.5%  
C2: 0.5%  
C3: 0%  
C4: 0%

154u

288u

245

93u

98u

206u

239

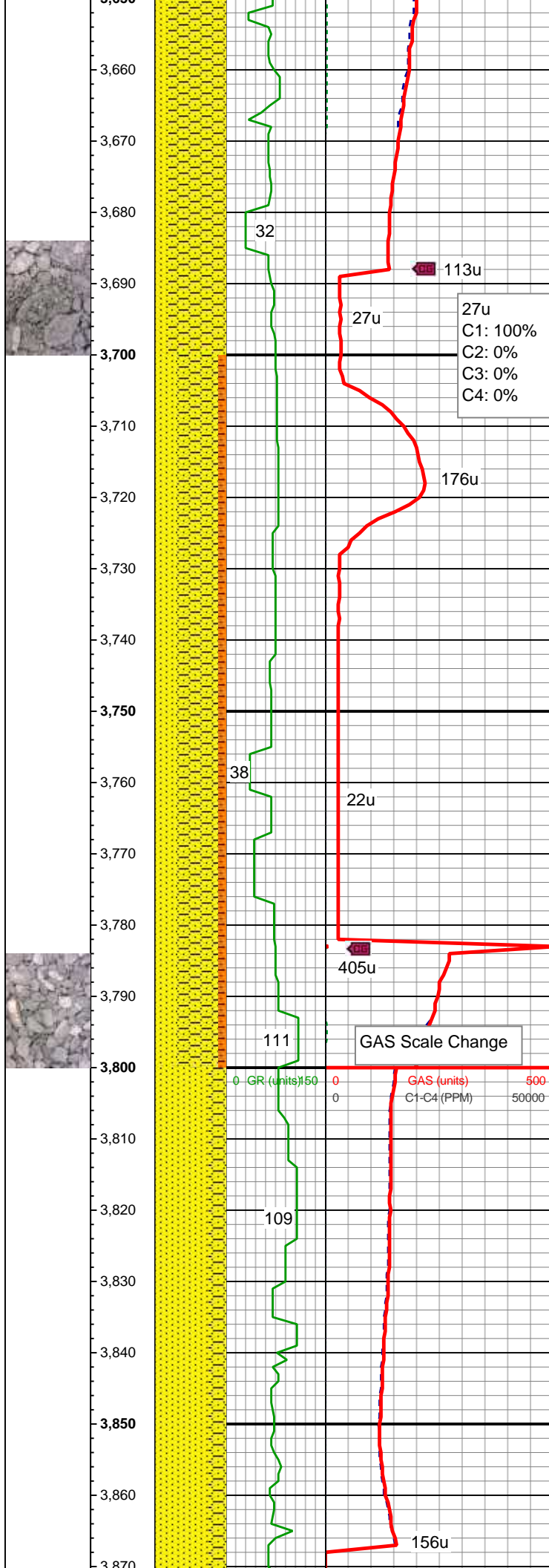
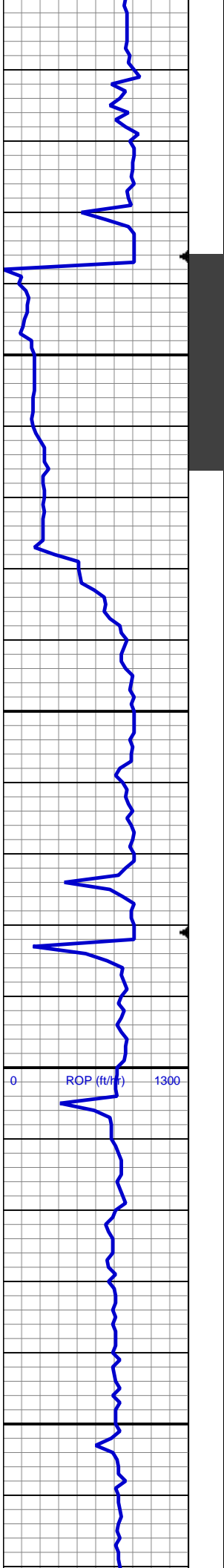
MD: 3,543'  
TVD: 3,517.96'  
Inclination: 3.6 °  
Azimuth: 81.7 °  
VS: -249.4'

SS: off wh - gry, s&p, frm, brit, u f - c gr, sb ang - sb blk, p - mod srt, arg cmt, abnt glau; SHY SS: lt gy, frm, brit, u f - med gr, sb ang - sb blk, mod srt, arg cmt; mod calc ip

MD: 3,637'  
TVD: 3,611.81'  
Inclination: 2.9 °  
Azimuth: 81.9 °  
VS: -254.66'

SHY SS: lt gy, frm, brit, u f - med gr, sb ang - sb blk, mod srt, arg cmt; tr shy sltst, mod calc ip: SS: off wh - grv. s&p. frm.





brit, u f - med gr, sb ang - sb blkly, p - mod  
srt, arg cmt, spec wi glau;

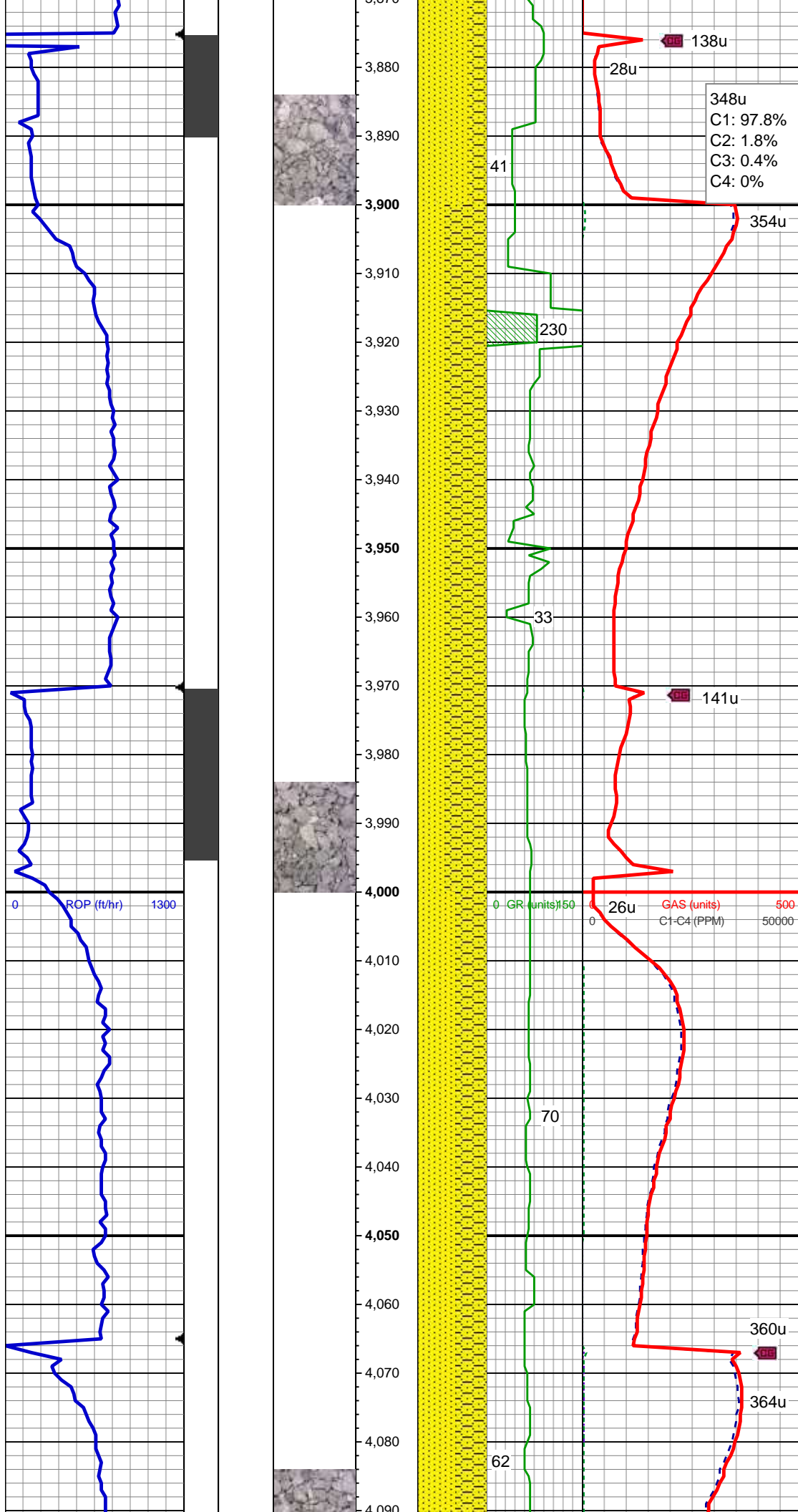
MD: 3,732'  
TVD: 3,706.76'  
Inclination: 0.9 °  
Azimuth: 122.8 °  
VS: -257.67'

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

MUD WT. 8.75  
MUD VIS 32

MD: 3,826'  
TVD: 3,800.74'  
Inclination: 1.5 °  
Azimuth: 122.1 °  
VS: -259.34'

SS: off wh - gry, s&p, frm, brit, u f - c gr,  
sb ang - sb blkly, p - mod srt, arg cmt,  
spec wi glau; SHY SS: lt gy, frm, brit, u f  
- med gr, sb ang - sb blkly, mod srt, arg  
cmt; mod calc ip



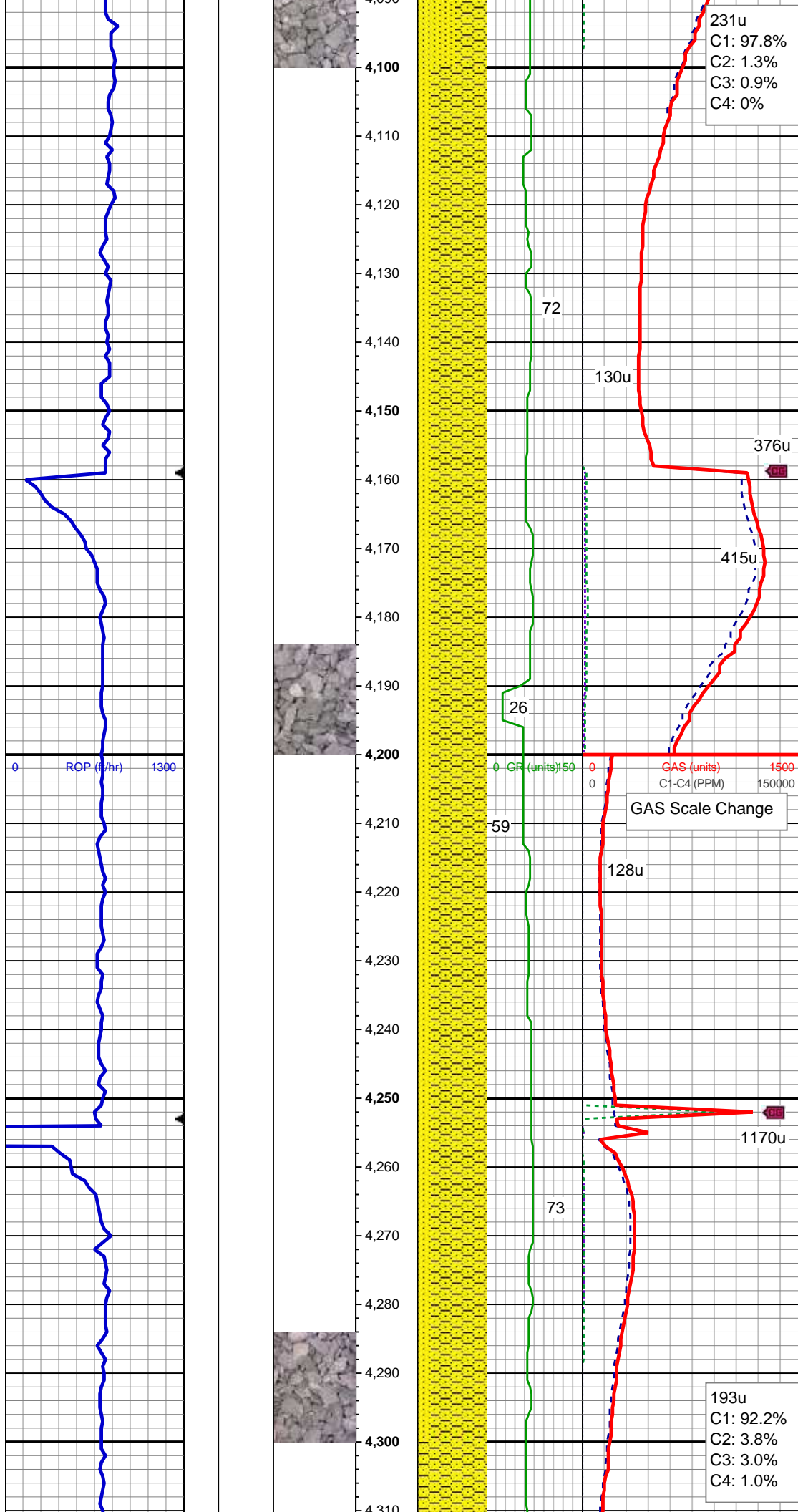
MD: 3,921'  
TVD: 3,895.72'  
Inclination: 1.1 °  
Azimuth: 56.6 °  
VS: -261.16'

SHY SS: lt gy-gry, frm, brit, u f - med gr, sb ang - sb blk, mod srt, arg cmt; mod calc ip; SS: off wh - gry, s&p ip, frm, brit, u f - med gr, sb ang - sb blk, p srt, arg cmt, tr glau

MUD WT. 8.65  
MUD VIS 32

MD: 4,016'  
TVD: 3,990.71'  
Inclination: 0.3 °  
Azimuth: 247.3 °  
VS: -261.69'

SS: off wh - gry, s&p ip, frm, brit, u f - med gr, sb ang - sb blk, p srt, arg cmt, tr glau; SHY SS: lt gy-gry, frm, brit, u f - med gr, sb ang - sb blk, mod srt, arg cmt; mod calc ip



231u  
C1: 97.8%  
C2: 1.3%  
C3: 0.9%  
C4: 0%

MD: 4,110'  
TVD: 4,084.71'  
Inclination: 0.2 °  
Azimuth: 78.9°  
VS: -261.62'

SHY SS: lt gy-gry, frm, brit, u f - med gr, sb ang - sb blk, mod srt, arg cmt; mod calc ip; SS: gry, frm, brit, u f - med gr, sb ang - sb blk, p-med srt, arg cmt, tr glau, grd to shy ss

MUD WT. 8.70  
MUD VIS 30

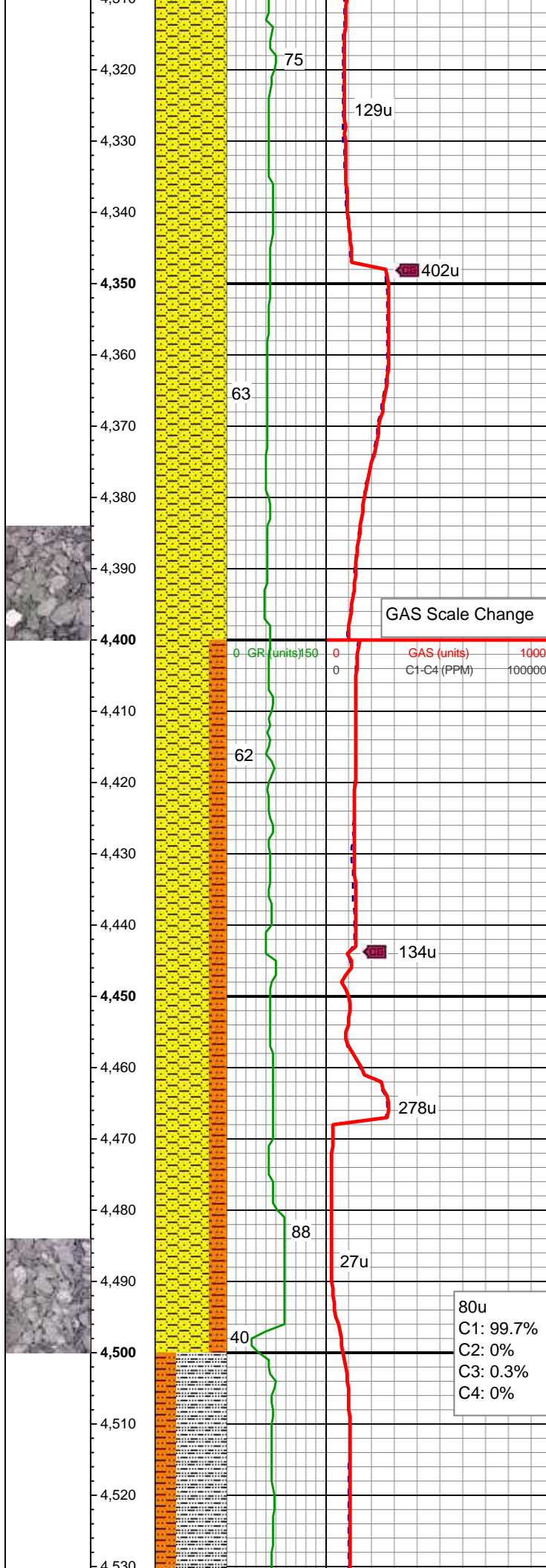
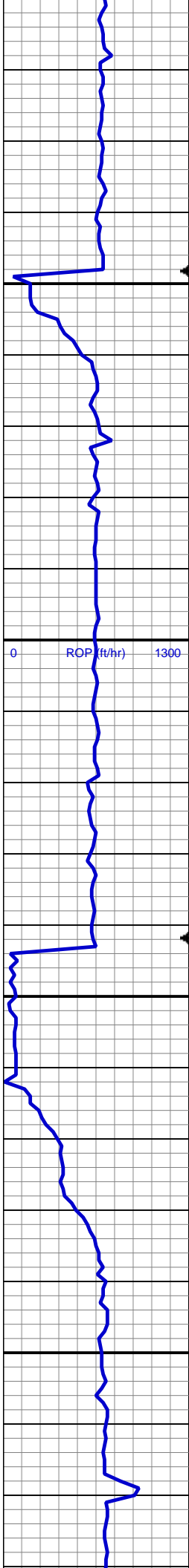
MD: 4,204'  
TVD: 4,178.71'  
Inclination: 0.4 °  
Azimuth: 69.4°  
VS: -262.09'

GAS Scale Change

SHY SS: lt gy-gry, frm, brit, u f - med gr, sb ang - sb blk, mod srt, arg cmt; mod calc ip; SS: gry, frm, brit, u f - med gr, sb ang - sb blk, p-med srt, arg cmt, tr glau, grd to shy ss

193u  
C1: 92.2%  
C2: 3.8%  
C3: 3.0%  
C4: 1.0%

MD: 4,299'  
TVD: 4,273.71'  
Inclination: 0.3 °  
Azimuth: 142.2°  
VS: -262.55'



SHY SS: lt gy-gry, frm, brit, u f - med gr, sb ang - sb blkly, mod srt, arg cmt; mod calc ip, grdg- shy sltst

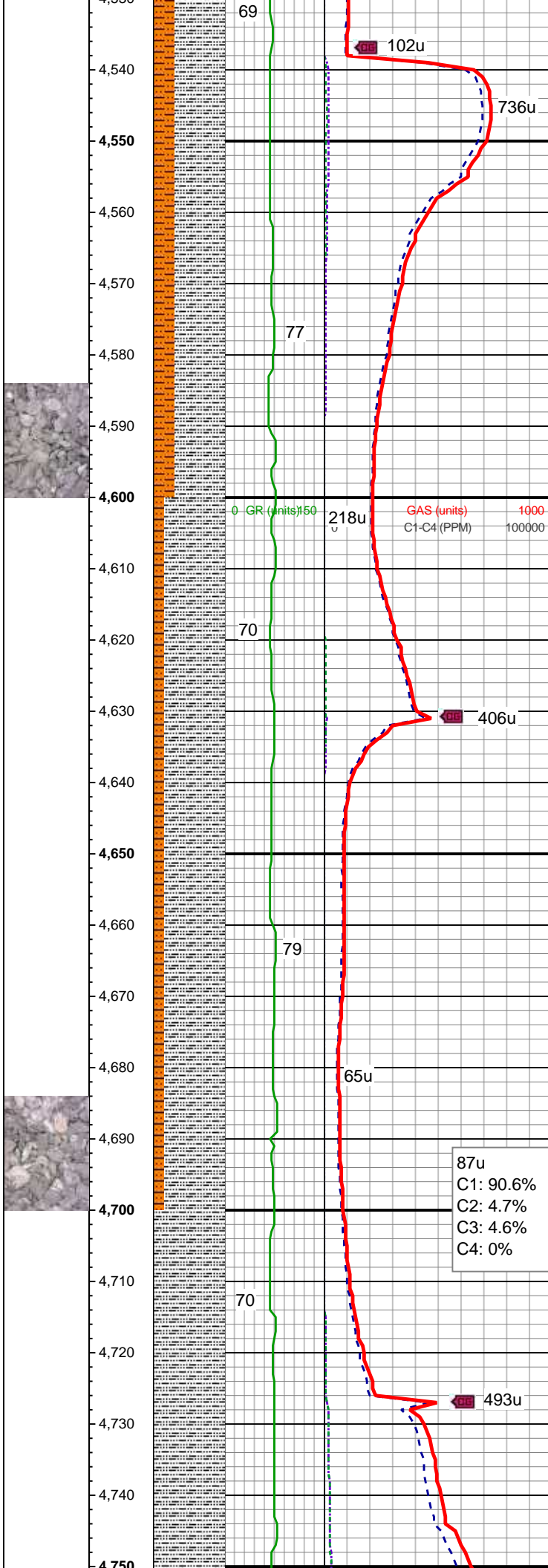
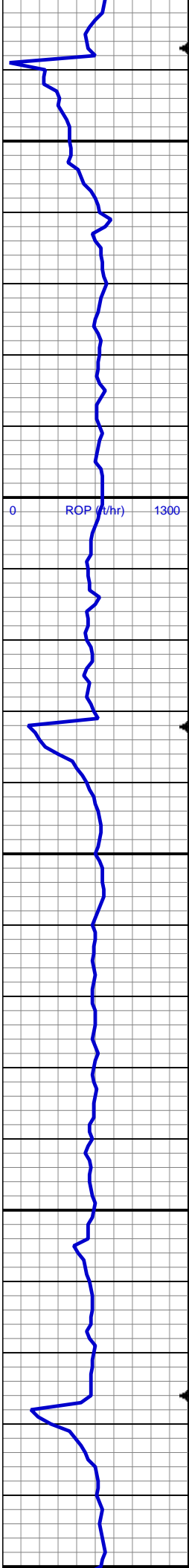
MD: 4,393'  
TVD: 4,367.7'  
Inclination: 0.7 °  
Azimuth: 158.7°  
VS: -262.92'

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

MD: 4,488'  
TVD: 4,462.69'  
Inclination: 1.1 °  
Azimuth: 219.7°  
VS: -262.56'

MUD WT. 8.80  
MUD VIS 48





SLTY SH: lt - med gy, sme dk gy, mod sft  
- mod frm, brit - smwt fri ip, vf gr, sb ang -  
sb plty, arg cmt; SHY SLTST: lt - med  
gy, sft - mod frm, vf gr, sb blkly - sb plty,  
arg cmt; tr shy ss, mod calc thru

MD: 4,583'  
TVD: 4,557.68'  
Inclination: 1.1 °  
Azimuth: 243.1 °  
VS: -261.18'

SLTY SH: lt - med gy, sme dk gy, mod sft  
- mod frm, brit - smwt fri ip, vf gr, sb ang -  
sb plty, arg cmt; SHY SLTST: lt - med  
gy, sft - mod frm, vf gr, sb blkly - sb plty,  
arg cmt; tr shy ss, mod calc thru

MD: 4,677'  
TVD: 4,651.67'  
Inclination: 0.3 °  
Azimuth: 253.1 °  
VS: -260.14'

MUD WT. 9.0  
MUD VIS 46

SLTY SH: lt - med gy, sme dk gy, mod sft  
- mod frm, brit - smwt fri ip, vf gr, sb ang -



