

# COLUMBINE LOGGING

Scale: 5.69" / 100'  
Measured Depth Log

**Well Name** Guttersen STate DD17-79-1HN

**Location** SEC17 T3N R63W

**State** COLORADO

**County** WELD

**Country** USA

**Rig Number** H&P 322

**API Number** 05-123-38013

**Region** DJ BASIN

**Field** WATTENBERG

**Spud Date** 12/8/2013

**Surface Coordinates** 275' FSL  
387' FWL  
LAT: 40.2188700° N  
LONG: -104.46967000° W

**Bottom Hole Coordinates** 75' FNL  
330' FWL

**Ground Elevation** 4820'

**K.B. Elevation** 4844'

**Logged Interval** 1000'

**Formation** NIOBRARA B CHALK

**Type of Drilling Fluid** MUD:WATER;POLY

## Operator

**Company** NOBLE ENERGY INC.

**Address** 1625 BROADWAY  
DENVER, CO 80202  
(303) 228-4000

## Geologist

**Name** JOHN READY ; BRAD WILSON

**Company** COLUMBINE LOGGING INC.

**Address** 2385 S. LIPAN ST  
DENVER, COLORADO 80223  
(303) 289-7764

## Rock Types

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

## Accessories

### Fossils

ALGAE
AMPHIPORA
BELEMNITE
BIOCLASTIC
BRACHIOIPOD
BRYOZOA
CEPHALOPOD
CORAL
CRINOID
ECHINOID
FISH
FORAMINIFERA

### 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

EARTHY
FENESTRAL
FRACTURE
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
SIDEWALL CORE (LEFT)
SIDEWALL CORE (RIGHT)
SLIDE
SURVEY
TRIP GAS

### Wireline tested - left

### Wireline tested - RT

### Rounding

ANGULAR
ROUNDED
SUBANG
SUBRND

### Textures

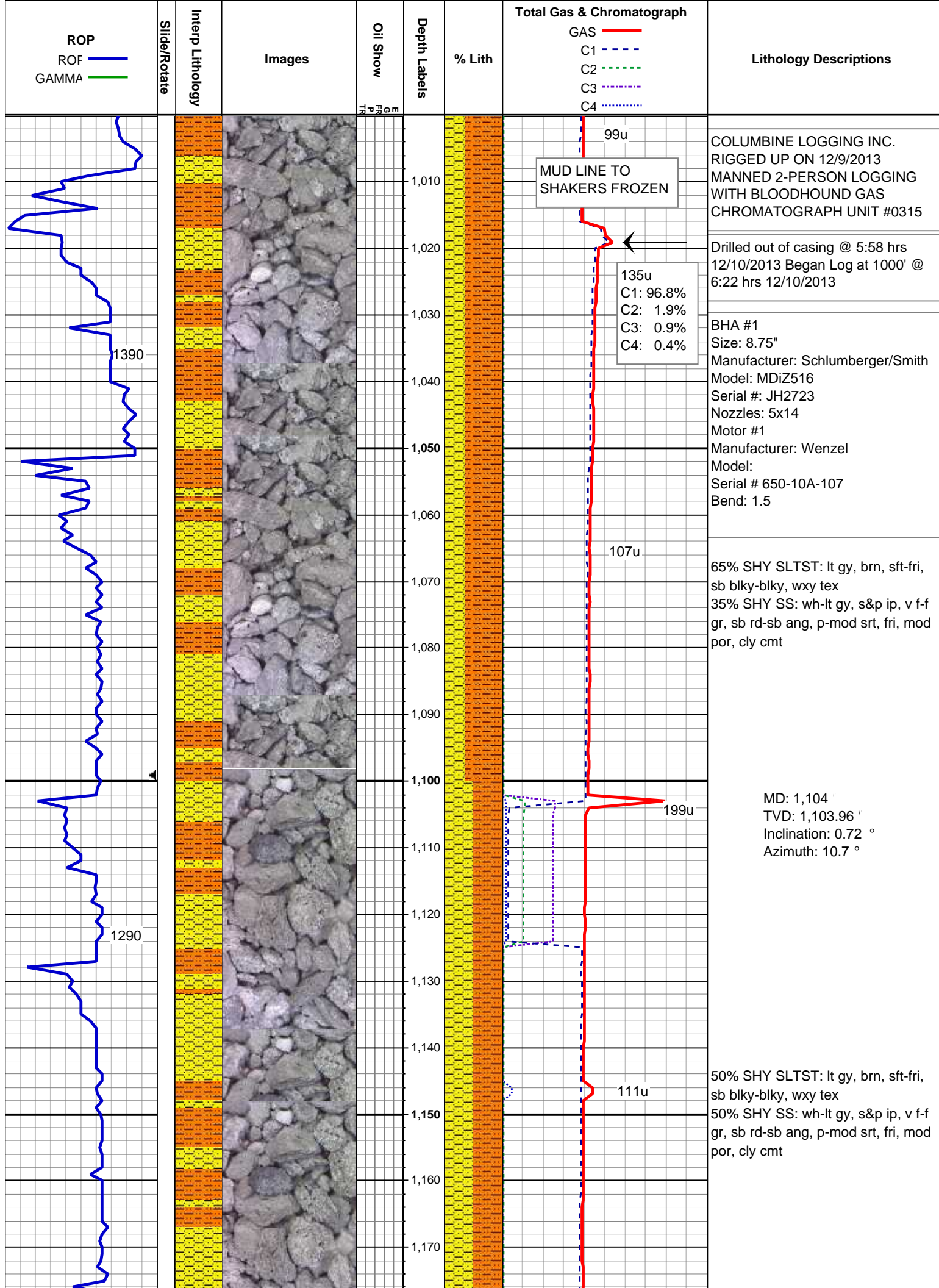
BOUNDSTONE
CHALKY
CRYPTOXLN

### Earthy

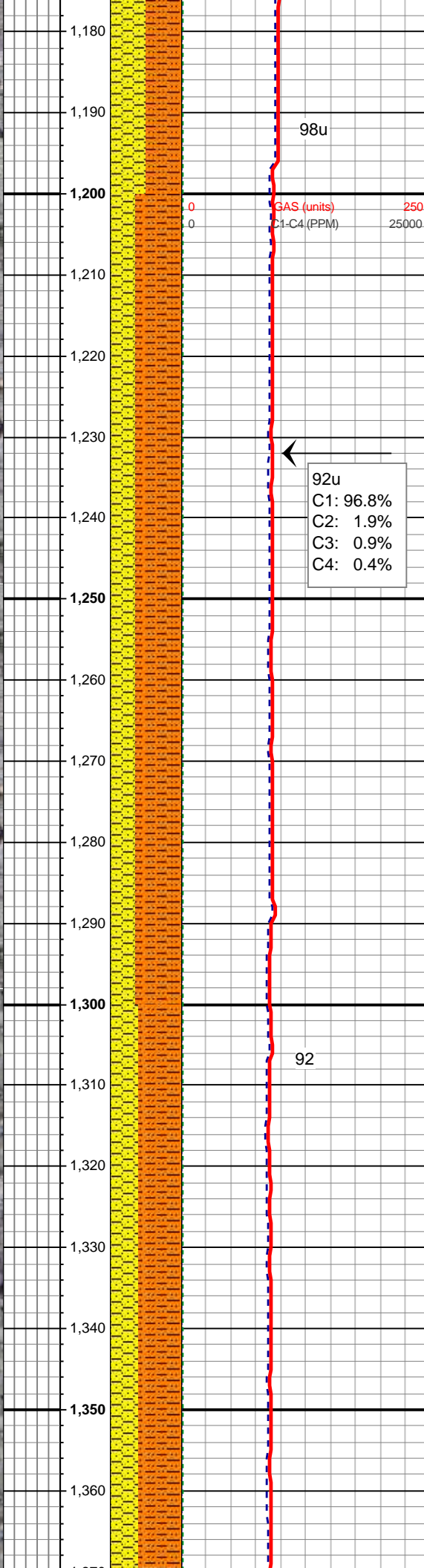
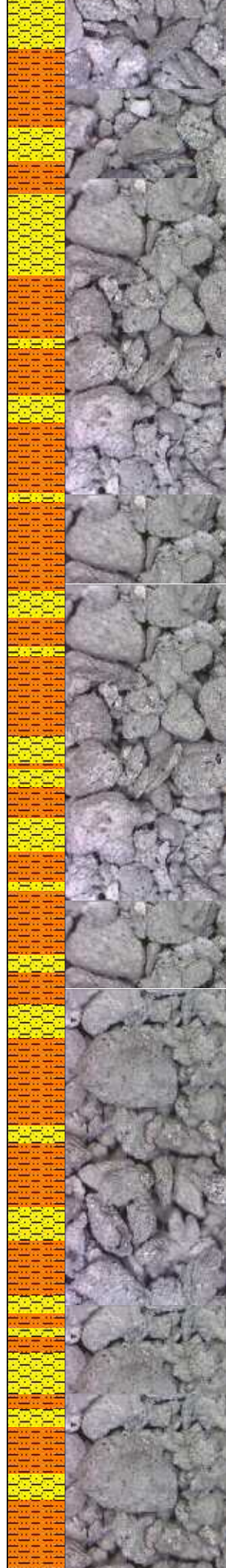
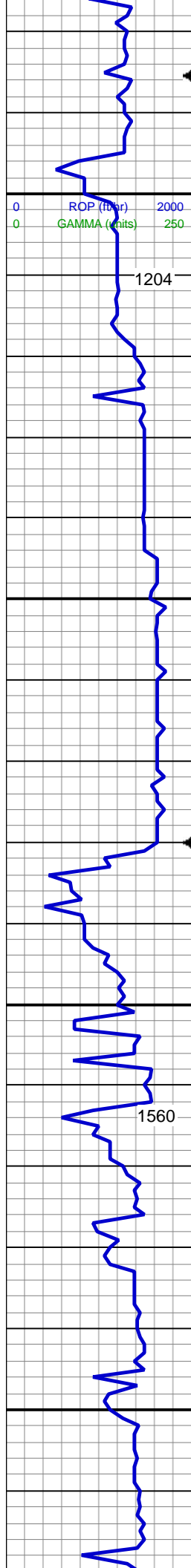
FINELYXLN
GRAINSTONE
LITHOGRAPHIC
MICROXLN
MUDSTONE
PACKSTONE
WACKESTONE

### Sorting

MODERATE
POOR
WELL





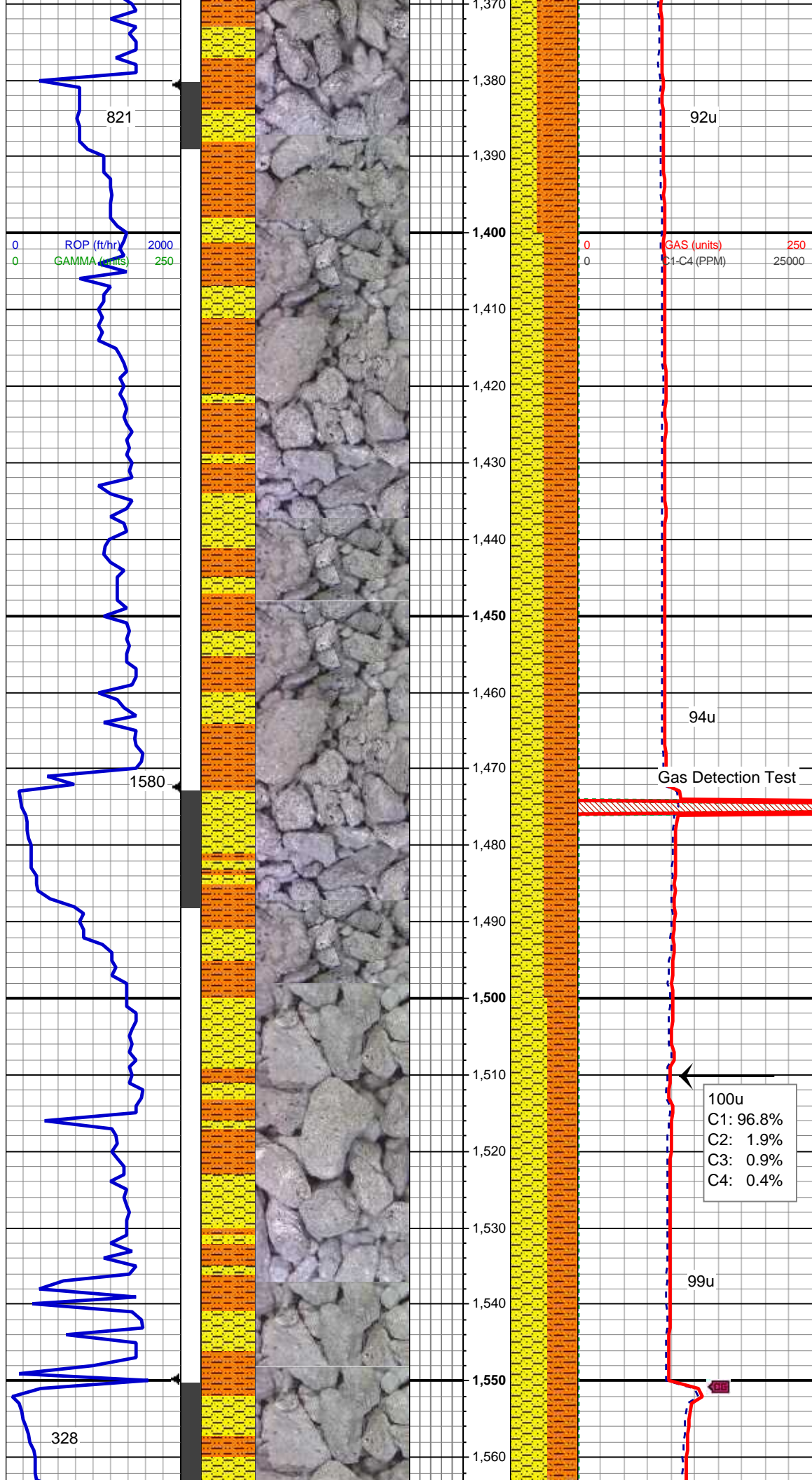


MD: 1,197 '  
TVD: 1,196.95 '  
Inclination: 1.03 °  
Azimuth: 339.82 °

65% SHY SLTST: lt gy, brn, sft-fri,  
sb blk-y-blky, wxy tex  
35% SHY SS: wh-lt gy, s&p ip, v f-f  
gr, sb rd-sb ang, p-mod srt, fri, mod  
por, cly cmt

MD: 1,290 '  
TVD: 1,289.94 '  
Inclination: 0.94 °  
Azimuth: 340.26 °

60% SHY SLTST: lt gy, brn, sft-fri,  
sb blk-y-blky, wxy tex  
40% SHY SS: wh-lt gy, s&p ip, v f-f  
gr, sb rd-sb ang, p-mod srt, fri, mod  
por, cly cmt



MD: 1,383 '  
TVD: 1,382.92 '  
Inclination: 1.19 °  
Azimuth: 343 °

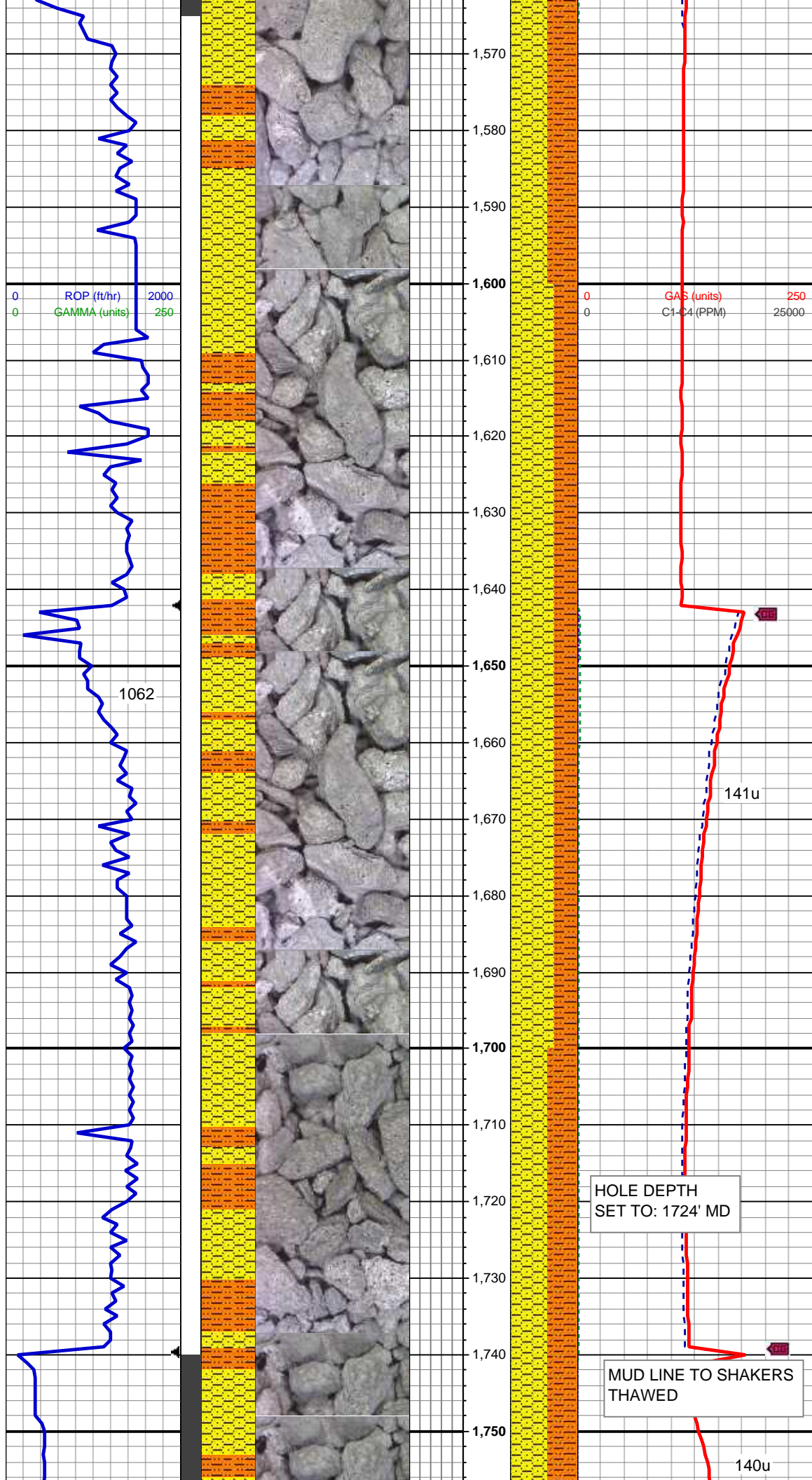
50% SHY SLTST: lt gy, brn, sft-fri,  
sb blk-y-blky, wxy tex  
50% SHY SS: wh-lt gy, s&p ip, v f-f  
gr, sb rd-sb ang, p-mod srt, fri, mod  
por, cly cmt

MD: 1,476 '  
TVD: 1,475.9 '  
Inclination: 1.63 °  
Azimuth: 346.78 °

100u  
C1: 96.8%  
C2: 1.9%  
C3: 0.9%  
C4: 0.4%

55% SHY SS: wh-lt gy, s&p ip, v f-f  
gr, sb rd-sb ang, p-mod srt, fri, mod  
por, cly cmt  
45% SHY SLTST: lt gy, brn, sft-fri,  
sb blk-y-blky, wxy - slty tex





MD: 1,571 '  
TVD: 1,570.86 '  
Inclination: 1.78 °  
Azimuth: 294.53 °

65% SHY SS: wh-lt gy, s&p ip, v f-f  
gr, sb rd-sb ang, p-mod srt, fri, mod  
por, cly cmt  
35% SHY SLTST: lt gy, brn, sft-fri,  
sb blkly-blky, wxy - slty tex

MD: 1,665 '  
TVD: 1,664.83 '  
Inclination: 0.96 °  
Azimuth: 237.76 °

MUD WT 8.5 VIS 30

HOLE DEPTH  
SET TO: 1724' MD

MUD LINE TO SHAKERS  
THAWED

55% SHY SS: wh-lt gy, s&p ip, v f-f  
gr, sb rd-sb ang, p-mod srt, fri, mod  
por, cly cmt  
45% SHY SLTST: lt gy, brn, sft-fri,  
sb blkly-blky, wxy - slty tex

sb blkly-blky, wxy - slty tex

MD: 1,760 '  
TVD: 1,759.83 '  
Inclination: 0.25 °  
Azimuth: 209.93 °

118u  
C1: 100%  
C2: 0.0%  
C3: 0.0%  
C4: 0.0%

ROP (ft/hr) 2000  
GAMMA (units) 250

GAS (units) 250  
C1-C4 (PPM) 25000

174u

45% SHY SS: wh-lt gy, s&p ip, v f-f  
gr, sb rd-sb ang, p-mod srt, fri, mod  
por, cly cmt  
45% SHY SLTST: lt gy, brn, sft-fri,  
sb blkly-blky, wxy - slty tex  
10% SS: lt gy-wh, s&p, f gr, sb rd-sb  
ang, p srt, fri, arg cmt

MD: 1,855 '  
TVD: 1,854.8 '  
Inclination: 2.21 °  
Azimuth: 210.28 °

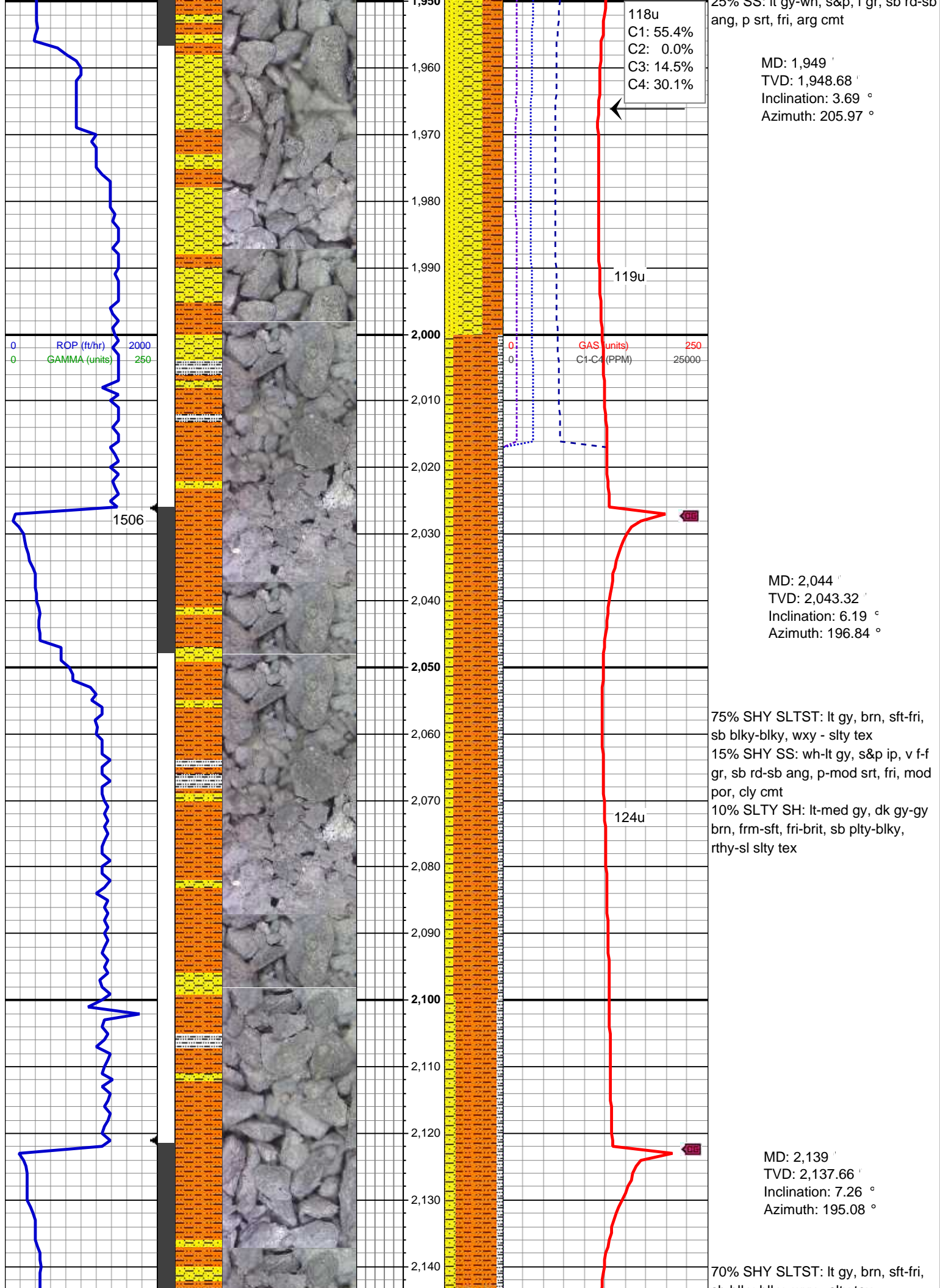
112u

250u

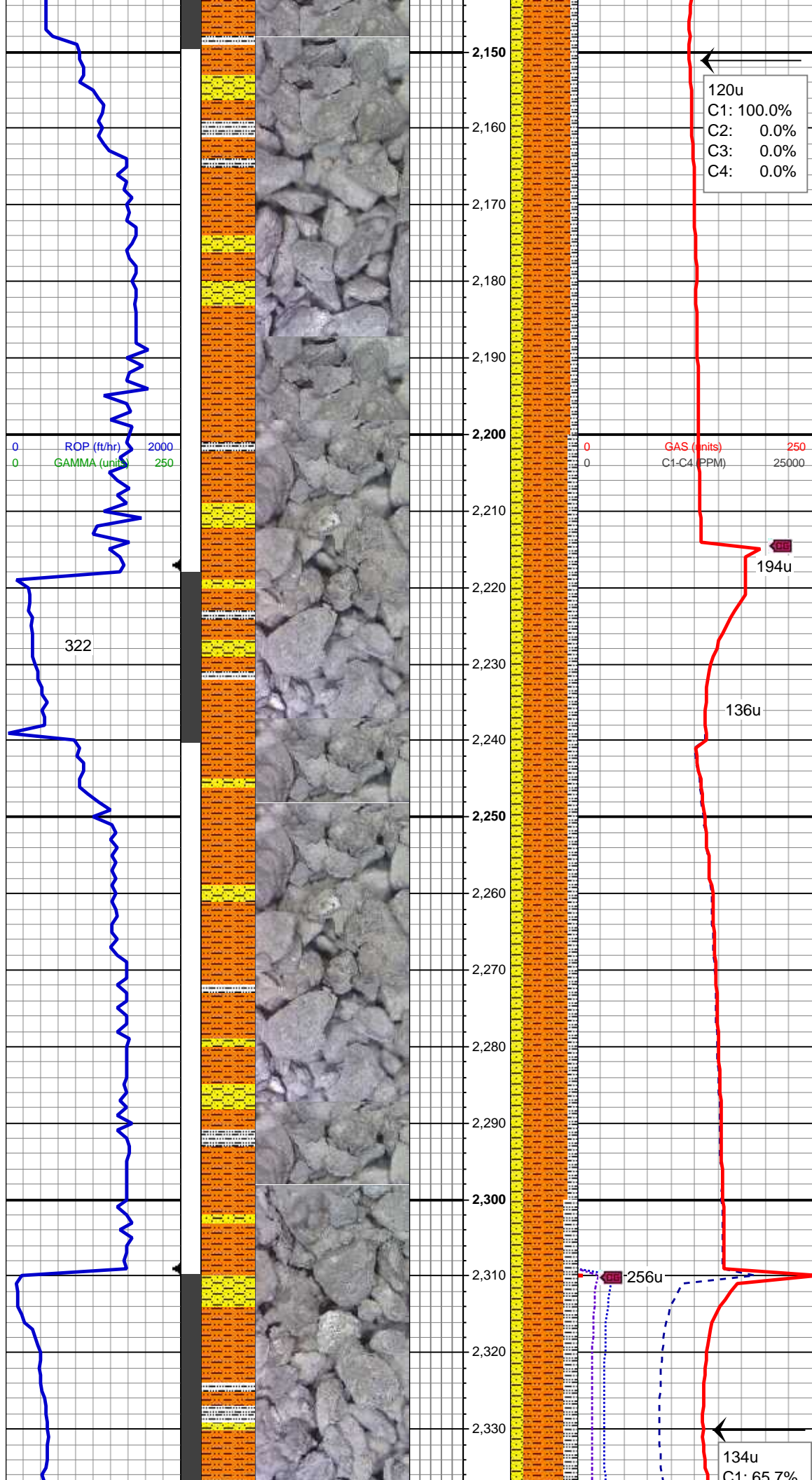
296

40% SHY SS: wh-lt gy, s&p ip, v f-f  
gr, sb rd-sb ang, p-mod srt, fri, mod  
por, cly cmt  
35% SHY SLTST: lt gy, brn, sft-fri,  
sb blkly-blky, wxy - slty tex  
25% SS: lt gy-wh, s&p, f gr, sb rd-sb









sb blkly-blky, wxy - slty tex  
20% SHY SS: wh-lt gy, s&p ip, v f-f  
gr, sb rd-sb ang, p-mod srt, fri, mod  
por, cly cmt  
10% SLTY SH: lt-med gy, dk gy-gy  
brn, frm-sft, fri-brit, sb plty-blky,  
rthy-sl slty tex

MUD WT 8.7 VIS 30

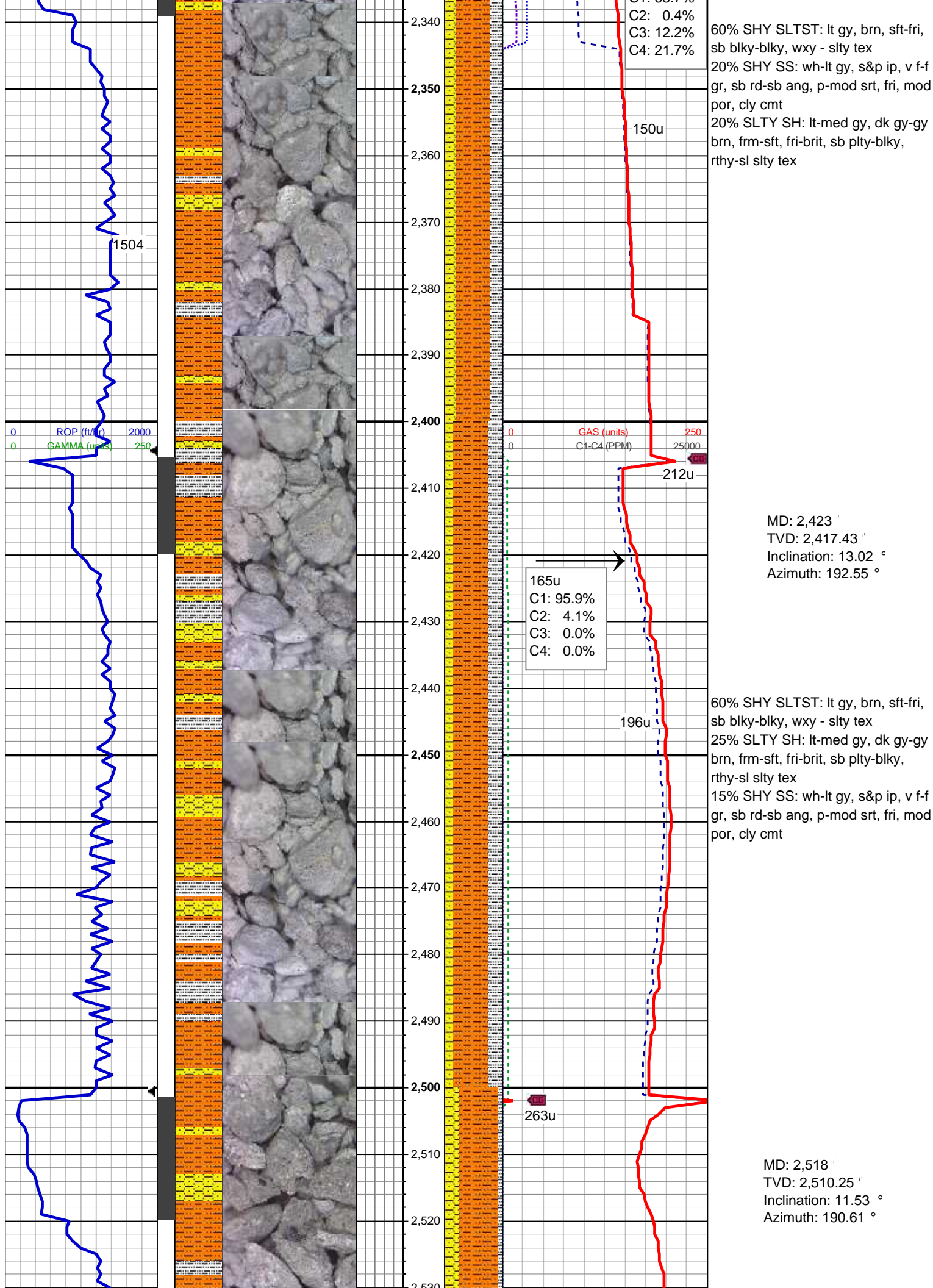
MD: 2,234 '  
TVD: 2,231.75 '  
Inclination: 8.64 °  
Azimuth: 190.87 °

65% SHY SLTST: lt gy, brn, sft-fri,  
sb blkly-blky, wxy - slty tex  
20% SHY SS: wh-lt gy, s&p ip, v f-f  
gr, sb rd-sb ang, p-mod srt, fri, mod  
por, cly cmt  
15% SLTY SH: lt-med gy, dk gy-gy  
brn, frm-sft, fri-brit, sb plty-blky,  
rthy-sl slty tex

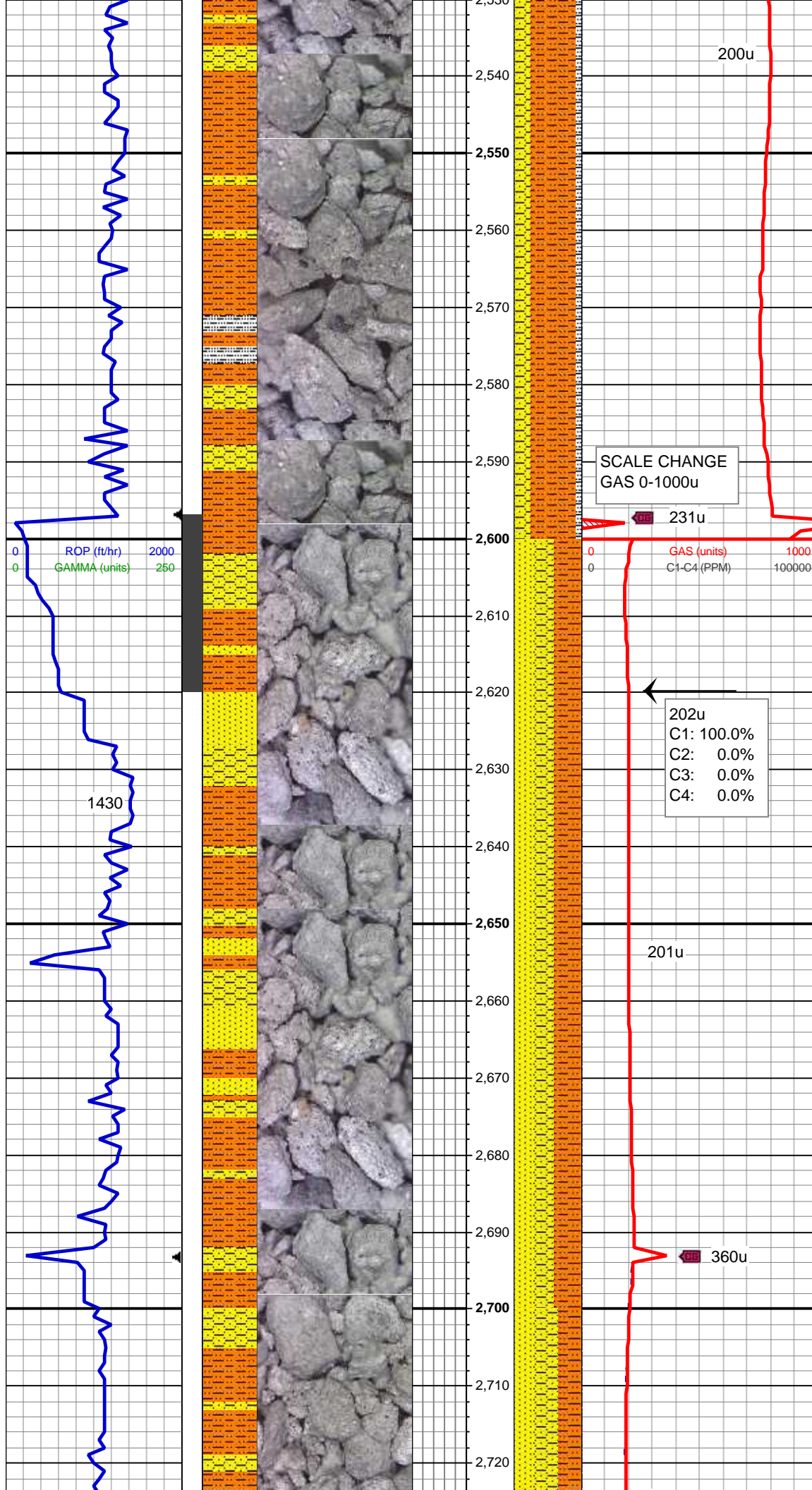
MD: 2,329 '  
TVD: 2,325.41 '  
Inclination: 10.54 °  
Azimuth: 193.01 °

120u  
C1: 100.0%  
C2: 0.0%  
C3: 0.0%  
C4: 0.0%

134u  
C1: 65.7%





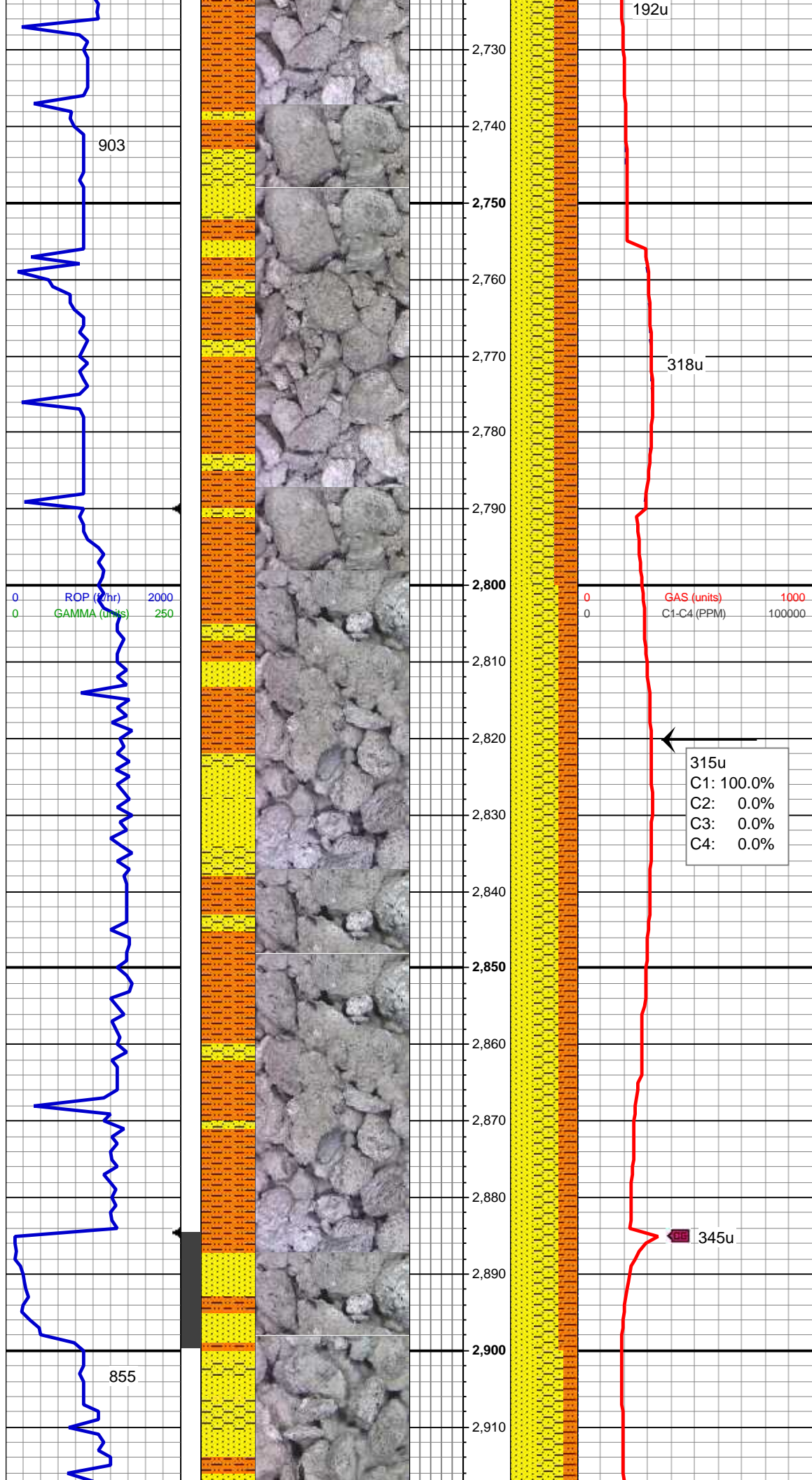


65% SHY SLTST: lt gy, brn, sft-fri,  
sb blk-ylk, wxy - slty tex  
25% SHY SS: wh-lt gy, s&p ip, v f-f  
gr, sb rd-sb ang, p-mod srt, fri, mod  
por, cly cmt  
10% SLTY SH: lt-med gy, dk gy-gy  
brn, frm-sft, fri-brit, sb plty-blk,  
rthy-sl slty tex

MD: 2,613 '  
TVD: 2,603.28 '  
Inclination: 11.85 °  
Azimuth: 189.34 °

40% SHY SLTST: lt gy, brn, sft-fri,  
sb blk-ylk, wxy - slty tex  
30% SHY SS: wh-lt gy, s&p ip, v f-f  
gr, sb rd-sb ang, p-mod srt, fri, mod  
por, cly cmt  
30% SS: lt gy-wh, s&p, f gr, sb rd-sb  
ang, p srt, fri, arg cmt, sme tr glau

MD: 2,708 '  
TVD: 2,696 '  
Inclination: 13.28 °  
Azimuth: 190.9 °



35% SHY SLTST: lt gy, brn, sft-fri,  
sb blk-y-blky, wxy - slty tex  
35% SHY SS: wh-lt gy, s&p ip, v f-f  
gr, sb rd-sb ang, p-mod srt, fri, mod  
por, cly cmt  
30% SS: lt gy-wh, s&p, f gr, sb rd-sb  
ang, p srt, fri, arg cmt, sme tr glau

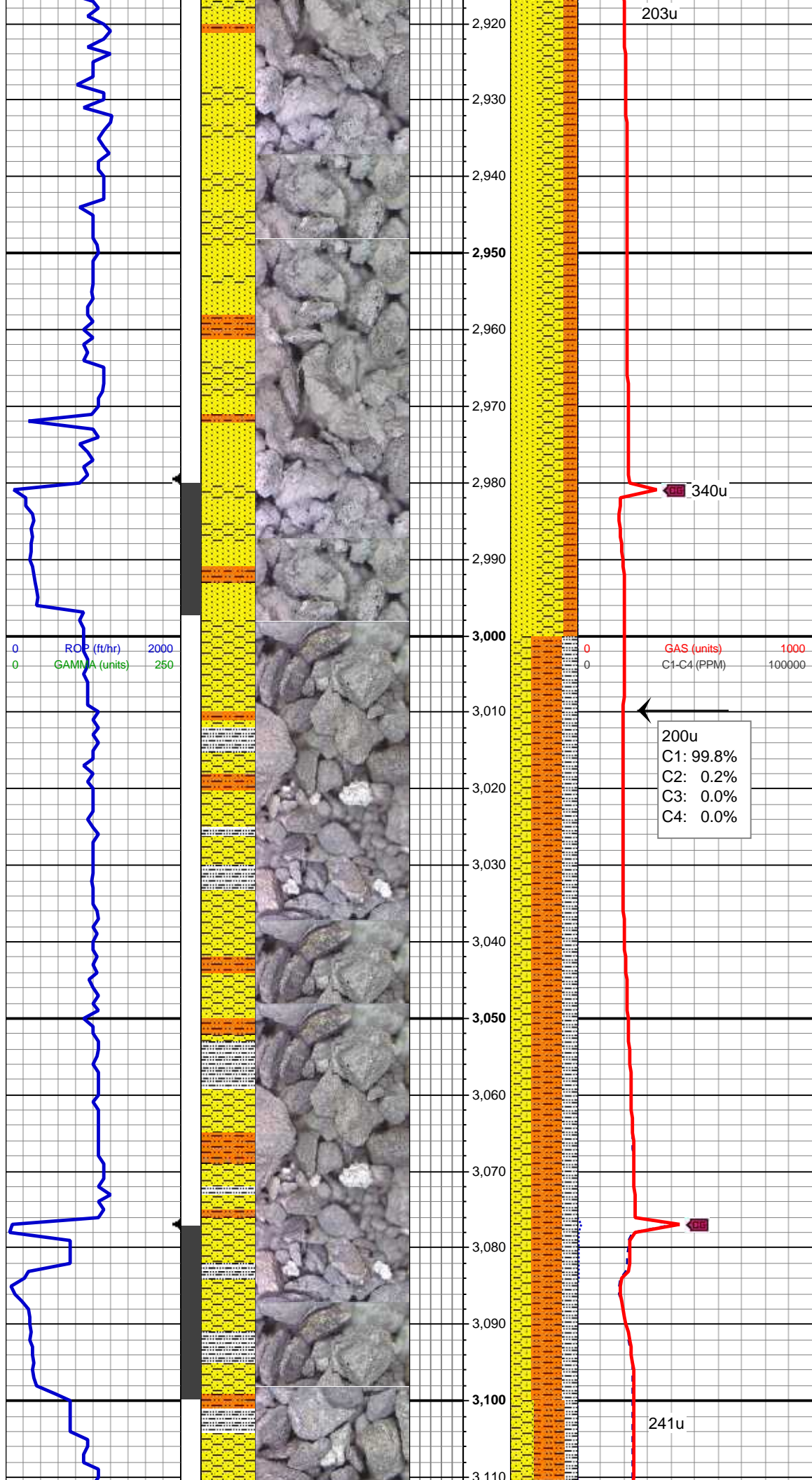
MD: 2,803 '  
TVD: 2,788.54 '  
Inclination: 12.87 °  
Azimuth: 190.2 °

315u  
C1: 100.0%  
C2: 0.0%  
C3: 0.0%  
C4: 0.0%

35% SHY SS: wh-lt gy, s&p ip, v f-f  
gr, sb rd-sb ang, p-mod srt, fri, mod  
por, cly cmt  
35% SS: lt gy-wh, s&p, f gr, sb rd-sb  
ang, p srt, fri, arg cmt  
30% SHY SLTST: lt gy, brn, sft-fri,  
sb blk-y-blky, wxy - slty tex

MD: 2,898 '  
TVD: 2,881.25 '  
Inclination: 12.36 °  
Azimuth: 187.32 °



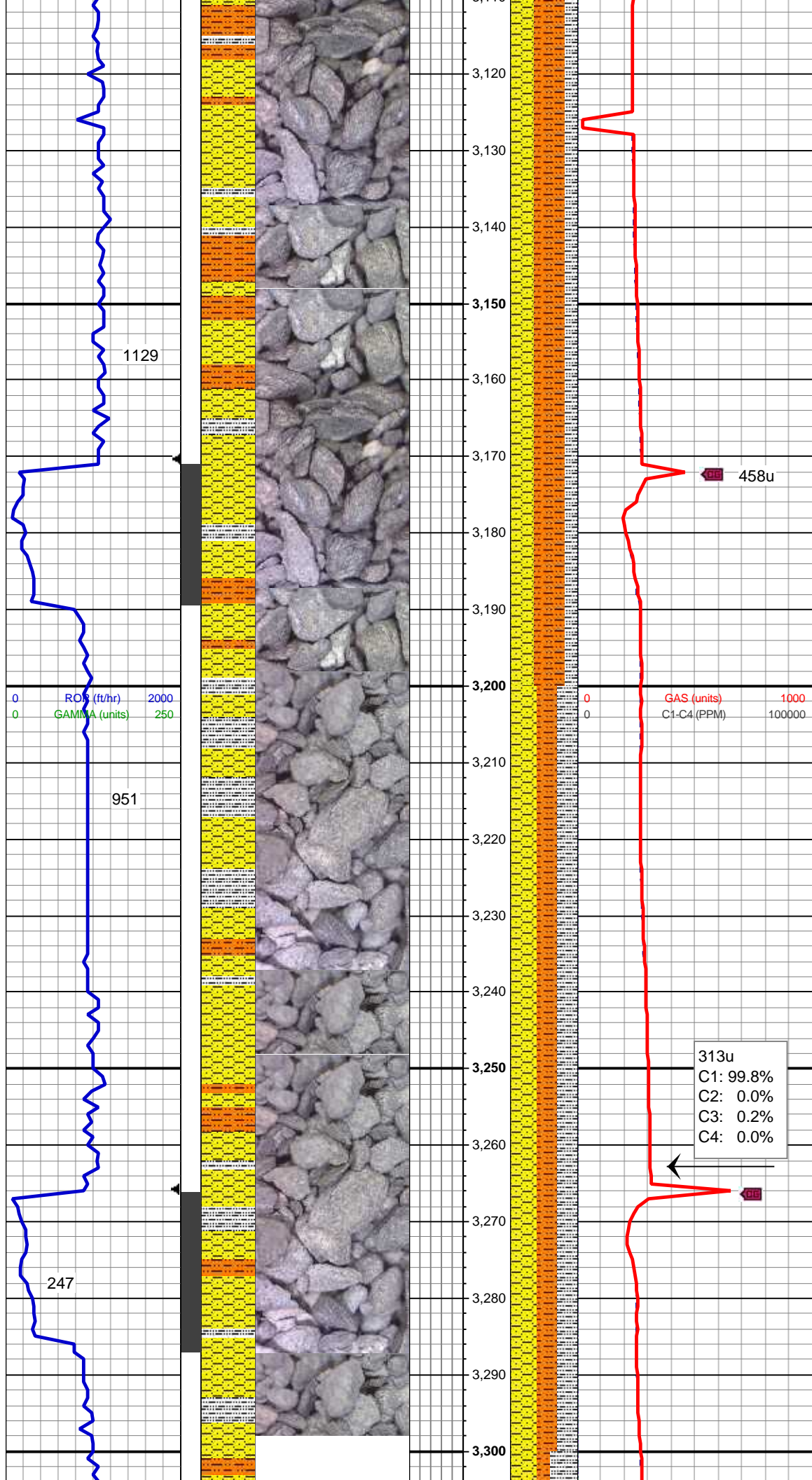


40% SHY SS: wh-lt gy, s&p ip, v f-f  
gr, sb rd-sb ang, p-mod srt, fri, mod  
por, cly cmt  
40% SS: lt gy-wh, s&p, f gr, sb rd-sb  
ang, p srt, fri, arg cmt  
20% SHY SLTST: lt gy, brn, sft-fri,  
sb blk-y-blky, wxy - slty tex

MD: 2,993 '  
TVD: 2,974.34 '  
Inclination: 10.6 °  
Azimuth: 186.51 °

45% SHY SLTST: lt gy, brn, sft-fri,  
sb blk-y-blky, wxy - slty tex  
25% SHY SS: wh-lt gy, s&p ip, v f-f  
gr, sb rd-sb ang, p-mod srt, fri, mod  
por, cly cmt, sme scat pyr  
25% SLTY SH: lt-med gy, dk gy-gy  
brn, frm-sft, fri-brit, sb plty-blky,  
rthy-sl slty tex  
5% SS: lt gy-wh, s&p, f gr, sb rd-sb  
ang, p srt, fri, arg cmt

MD: 3,088 '  
TVD: 3,068.02 '  
Inclination: 8.53 °  
Azimuth: 183.99 °



45% SHY SLTST: lt gy, brn, sft-fri,  
sb blkyl-blky, wxy - slty tex  
35% SHY SS: wh-lt gy, s&p ip, v f-f  
gr, sb rd-sb ang, p-mod srt, fri, mod  
por, cly cmt, sme scat pyr, rr biot  
20% SLTY SH: lt-med gy, dk gy-gy  
brn, frm-sft, fri-brit, sb plty-blky,  
rthy-sl slty tex

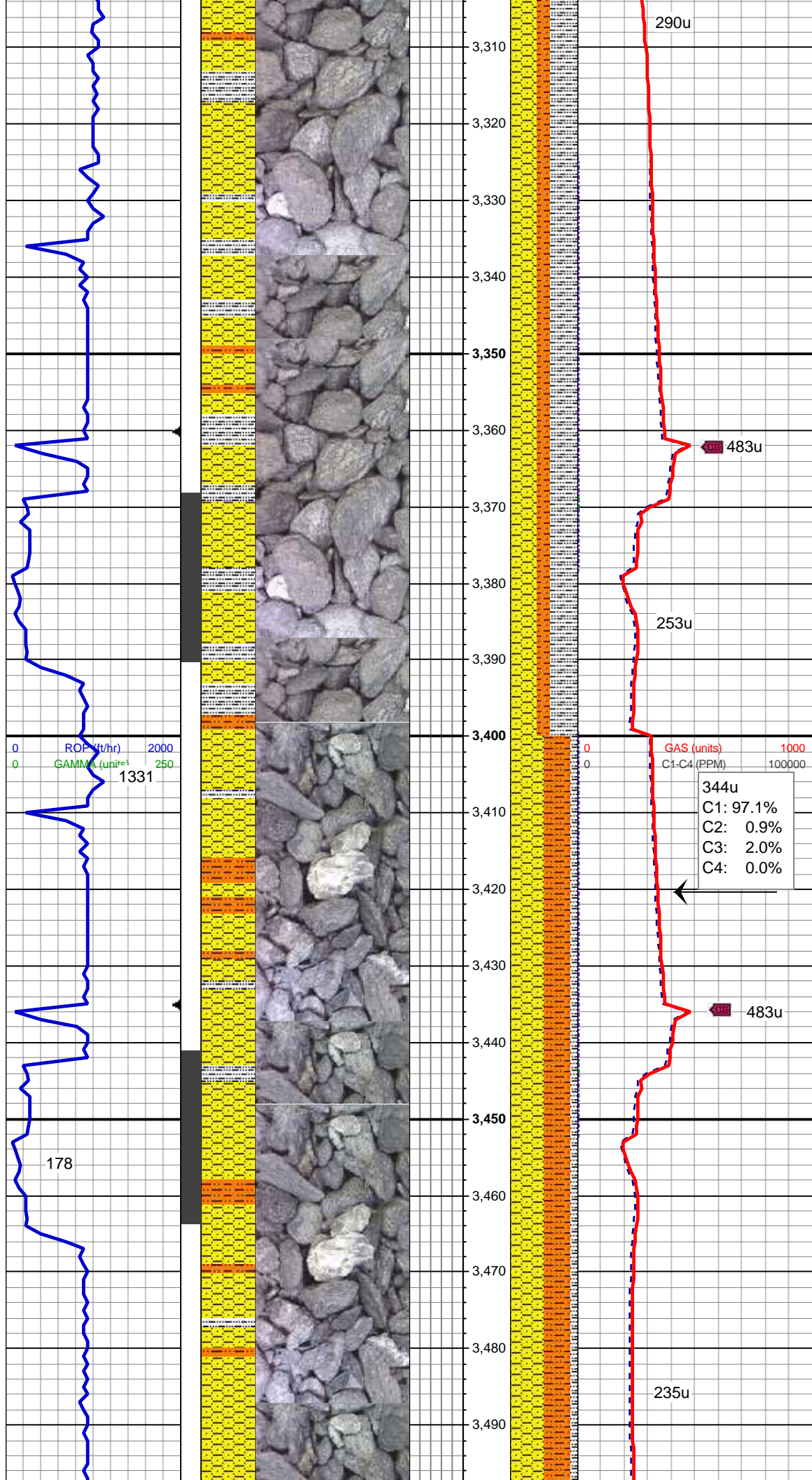
MD: 3,183 '  
TVD: 3,162.22 '  
Inclination: 6.29 °  
Azimuth: 183.18 °

MUD WT 9.0 VIS 29

40% SHY SS: wh-lt gy, s&p ip, v f-f  
gr, sb rd-sb ang, p-mod srt, fri, mod  
por, cly cmt, sme scat pyr  
30% SLTY SH: lt-med gy, dk gy,  
frm-sft, fri-brit, sb plty-blky, rthy-sl  
slty tex  
30% SHY SLTST: lt gy, brn, sft-fri,  
sb blkyl-blky, wxy - slty tex

MD: 3,277 '  
TVD: 3,255.82 '  
Inclination: 4.21 °  
Azimuth: 184.26 °



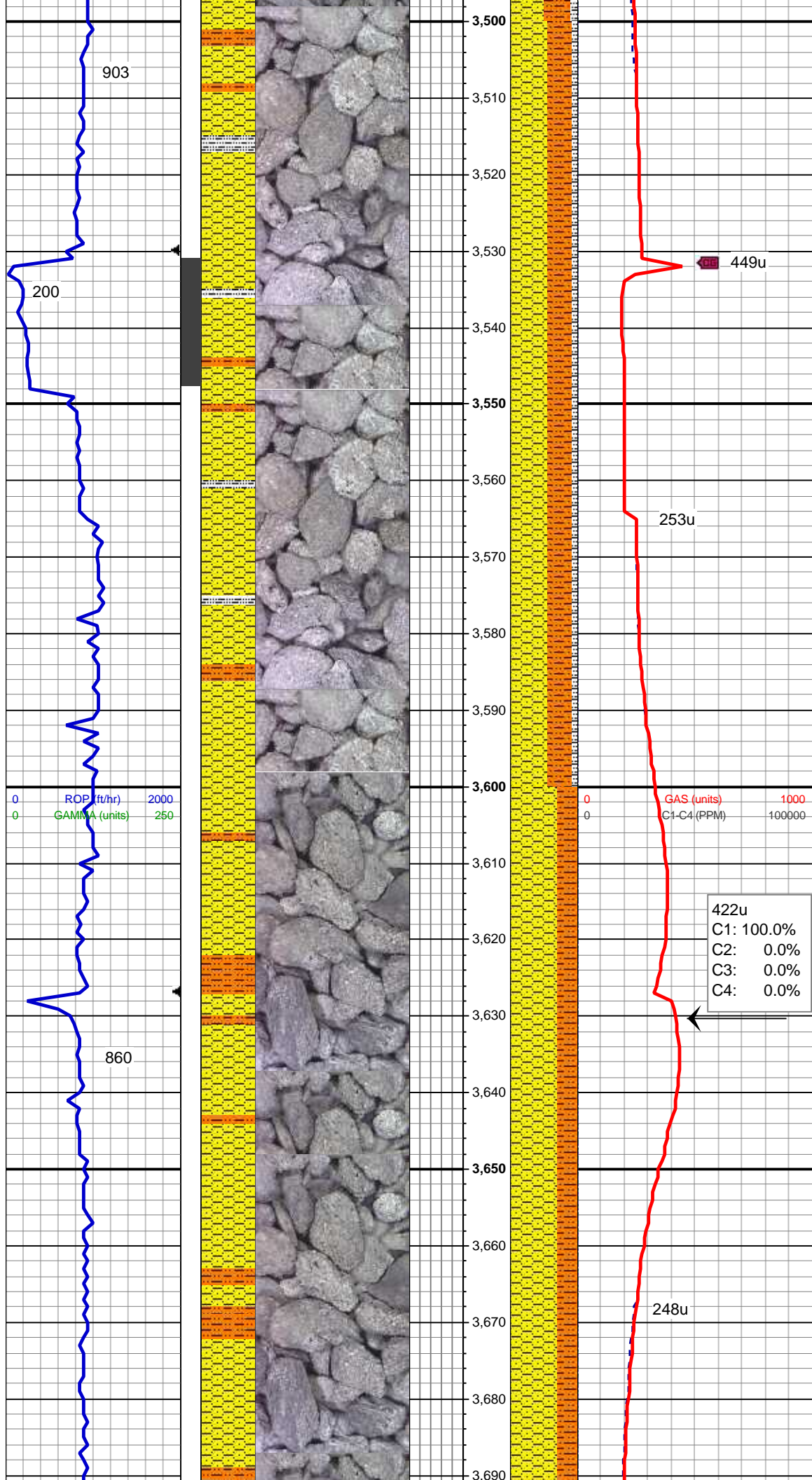


40% SHY SS: wh-lt gy, s&p ip, v f-f gr, sb rd-sb ang, p-mod srt, fri, mod por, cly cmt, sme scat pyr  
40% SLTY SH: lt-med gy, dk gy, frm-sft, fri-brit, sb plty-blky, rthy-sl slty tex  
20% SHY SLTST: lt gy, brn, sft-fri, sb blky-blky, wxy - slty tex

MD: 3,372 '  
TVD: 3,350.68 '  
Inclination: 1.91 °  
Azimuth: 186.36 °

50% SHY SS: wh-lt gy, s&p ip, v f-f gr, sb rd-sb ang, p-mod srt, fri, mod por, cly cmt, sme scat pyr  
40% SHY SLTST: lt gy, brn, sft-fri, sb blky-blky, wxy - slty tex  
10% SLTY SH: lt-med gy, dk gy, frm-sft, fri-brit, sb plty-blky, rthy-sl slty tex

MD: 3,467 '  
TVD: 3,445.62 '  
Inclination: 2.17 °  
Azimuth: 229.39 °



MUD WT 9.0+ VIS 30

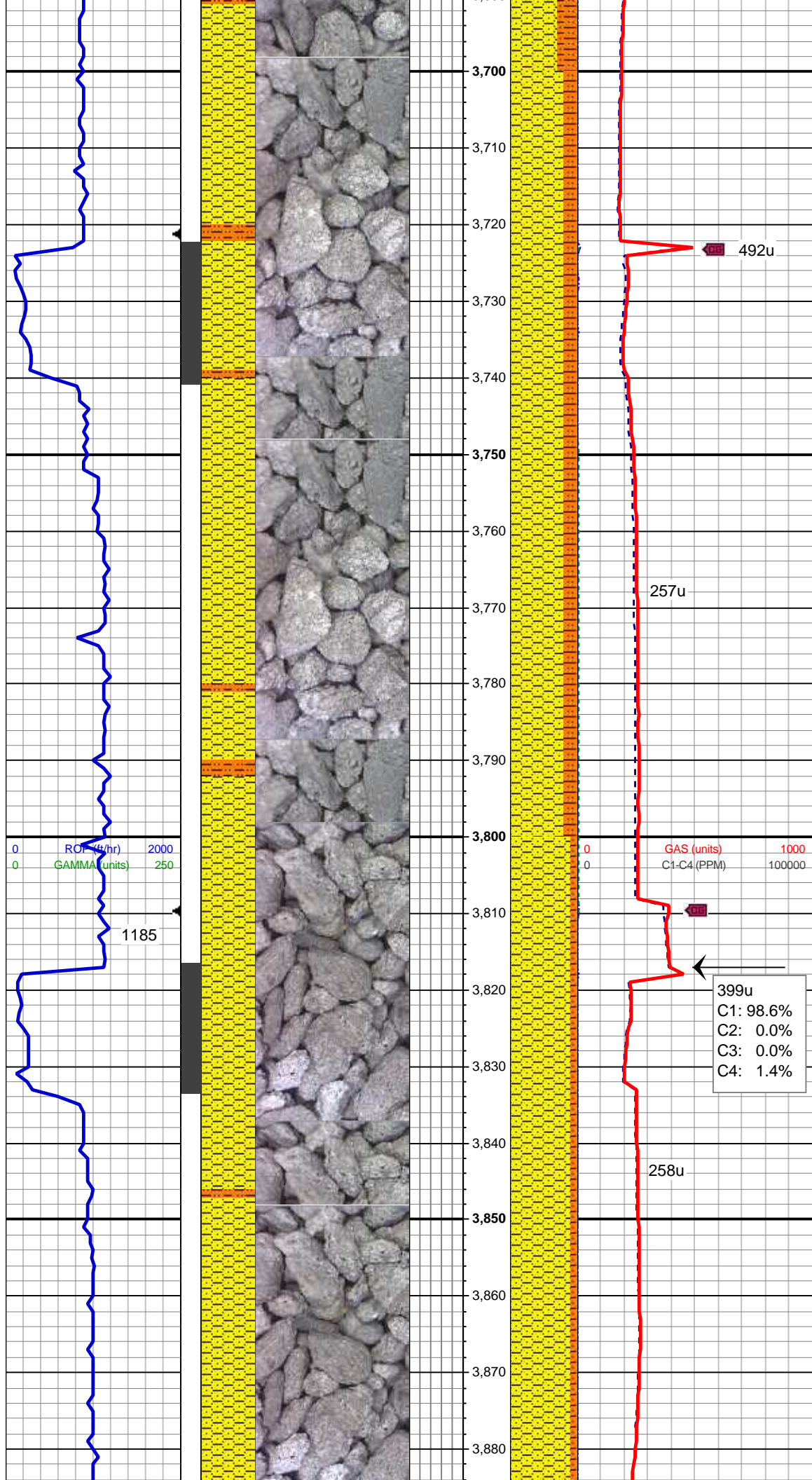
55% SHY SS: wh-lt gy, s&p ip, v f-f  
gr, sb rd-sb ang, p-mod srt, fri, mod  
por, cly cmt, sme scat pyr  
35% SHY SLTST: lt gy, brn, sft-fri,  
sb blk-y-blky, wxy - slty tex  
10% SLTY SH: lt-med gy, dk gy,  
frm-sft, fri-brit, sb plty-blky, rthy-sl  
slty tex

MD: 3,562 '  
TVD: 3,540.59 '  
Inclination: 0.63 °  
Azimuth: 178.48 °

70% SHY SS: wh-lt gy, s&p ip, v f-f  
gr, sb rd-sb ang, p-mod srt, fri, mod  
por, cly cmt, sme scat pyr  
30% SHY SLTST: lt gy, brn, sft-fri,  
sb blk-y-blky, wxy - slty tex

MD: 3,657 '  
TVD: 3,635.57 '  
Inclination: 1.91 °  
Azimuth: 198.18 °



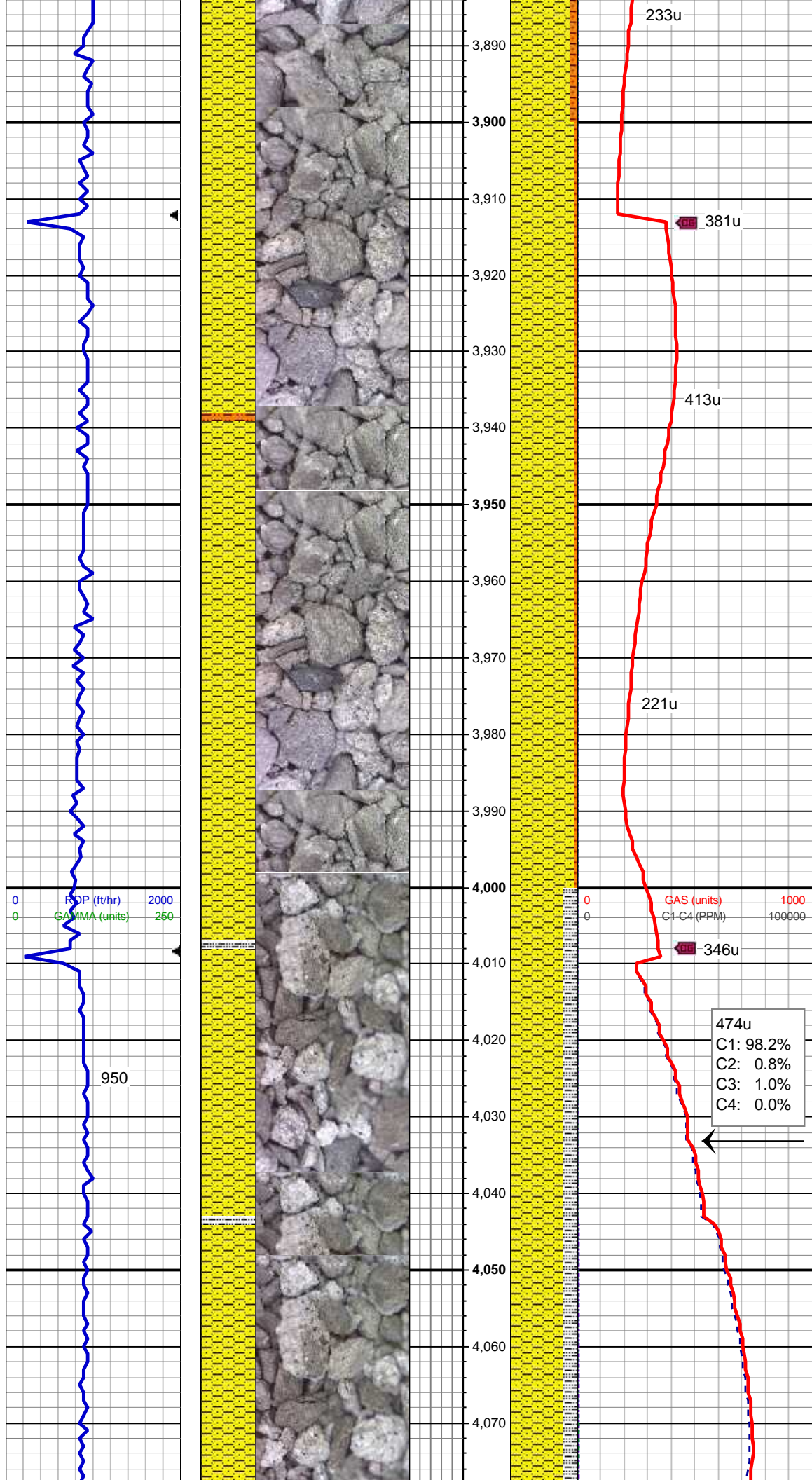


80% SHY SS: wh-lt gy, s&p ip, v f-f  
gr, sb rd-sb ang, p-mod srt, fri, mod  
por, cly cmt, sme scat pyr, scat glau  
20% SHY SLTST: lt gy, brn, sft-fri,  
sb blk-y-blky, wxy - slty tex

MD: 3,752 '  
TVD: 3,730.53 '  
Inclination: 1.36 °  
Azimuth: 158.41 °

90% SHY SS: wh-lt gy, s&p ip, v f-f  
gr, sb rd-sb ang, p-mod srt, fri, mod  
por, cly cmt, sme scat pyr, scat glau  
10% SHY SLTST: lt gy, brn, sft-fri,  
sb blk-y-blky, wxy - slty tex

MD: 3,847 '  
TVD: 3,825.52 '  
Inclination: 0.44 °  
Azimuth: 104.09 °



MD: 3,941 '  
TVD: 3,919.52 '  
Inclination: 0.25 °  
Azimuth: 130.38 °

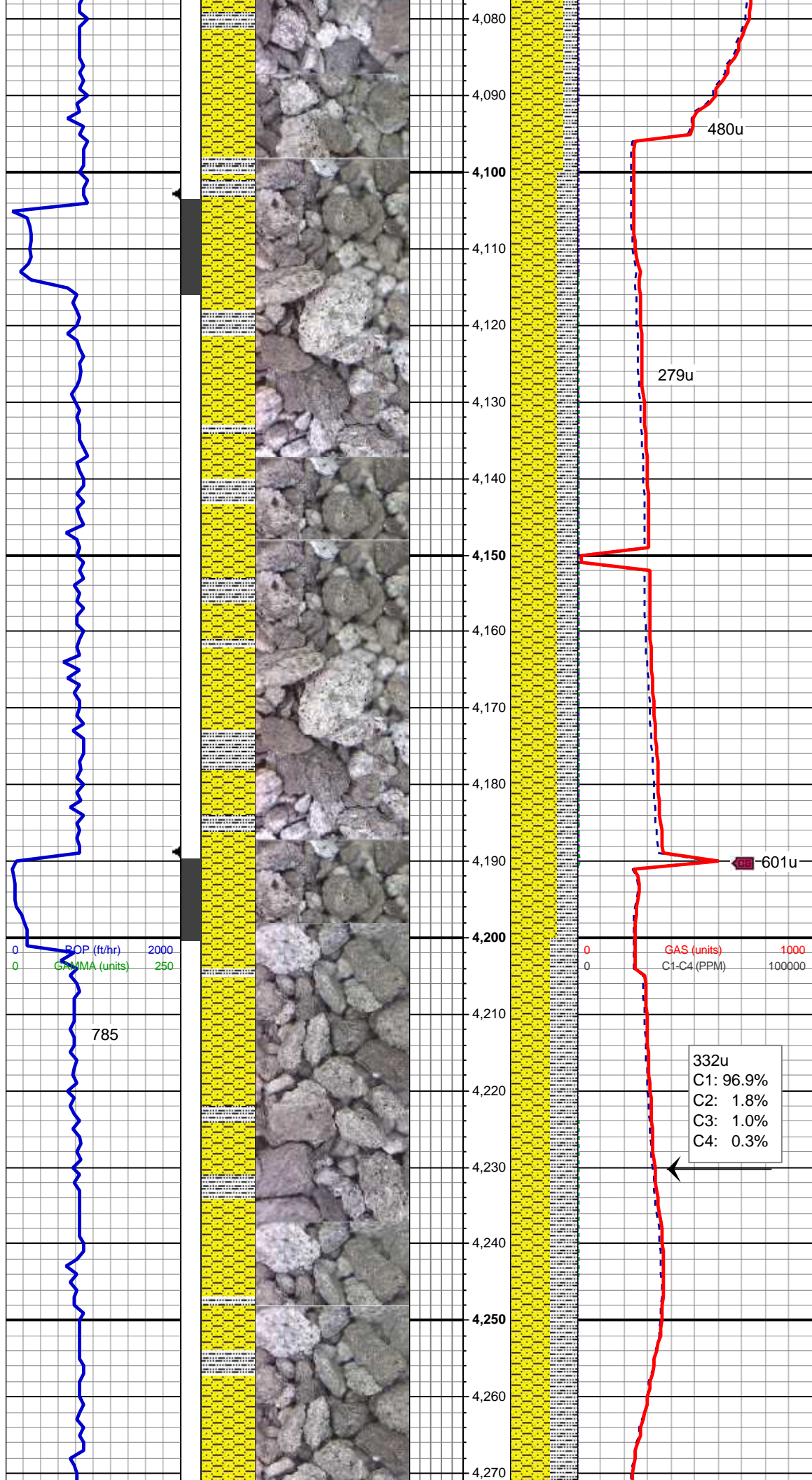
95% SHY SS: wh-lt gy, s&p ip, v f-f  
gr, sb rd-sb ang, p-mod srt, fri, mod  
por, cly cmt, scat glau  
5% SHY SLTST: lt gy, brn, sft-fri, sb  
blky-blky, wxy - slty tex

MUD WT 9.0 VIS 30

MD: 4,036 '  
TVD: 4,014.51 '  
Inclination: 0.71 °  
Azimuth: 169.91 °

80% SHY SS: wh-lt gy, s&p ip, v f-f  
gr, sb rd-sb ang, p-mod srt, fri, mod  
por, cly cmt  
20% SLTY SH: lt-med gy, dk gy,  
frm-sft, fri-brit, sb plty-blky, rthy-sl  
slty tex



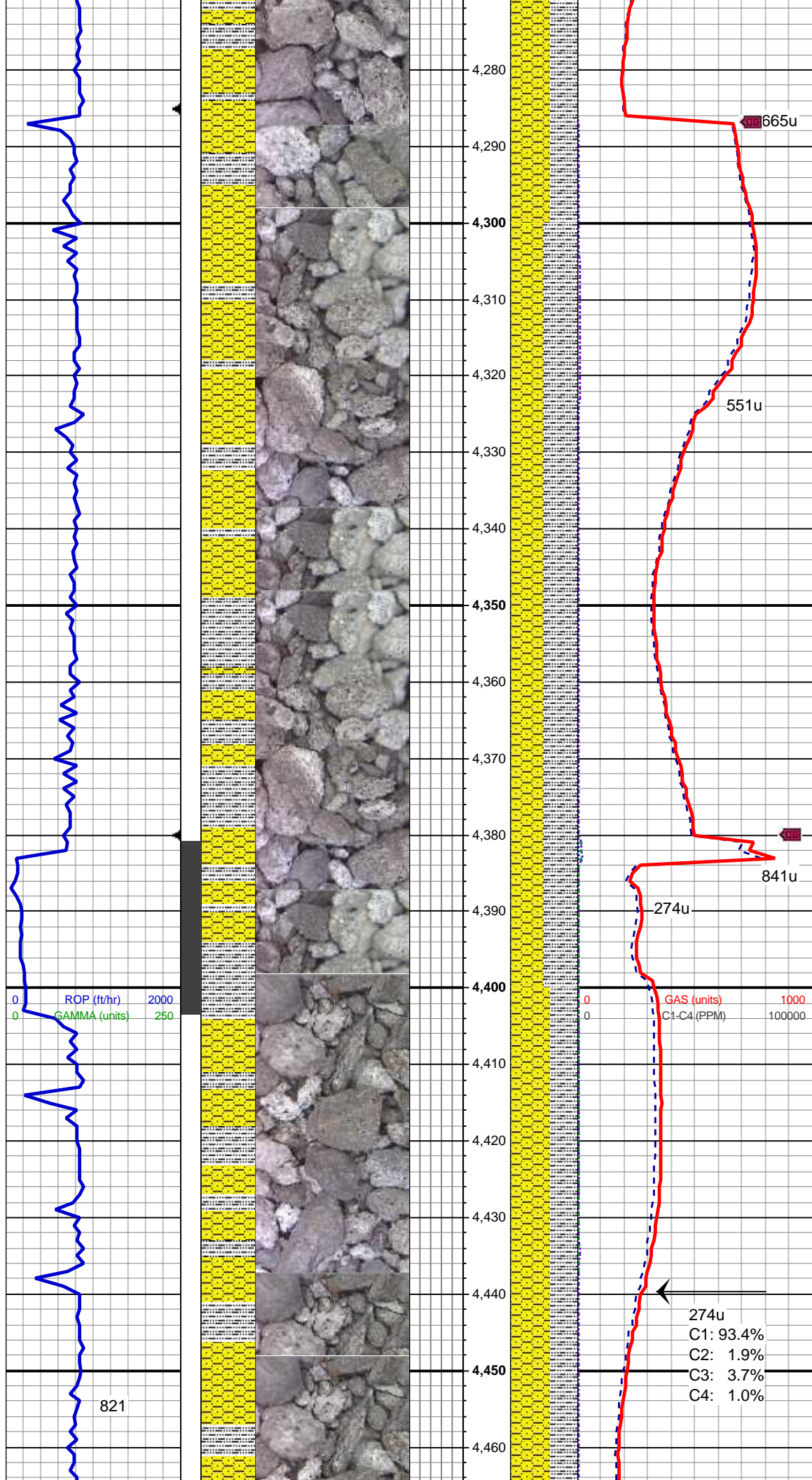


MD: 4,131 '  
TVD: 4,109.5 '  
Inclination: 1.36 °  
Azimuth: 85.86 °

70% SHY SS: wh-lt gy, s&p ip, v f-f  
gr, sb rd-sb ang, p-mod srt, fri, mod  
por, cly cmt  
30% SLTY SH: lt-med gy, dk gy,  
frm-sft, fri-brit, sb plty-blky, rthy-sl  
slty tex

MD: 4,226 '  
TVD: 4,204.49 '  
Inclination: 0.64 °  
Azimuth: 47.04 °

60% SHY SS: wh-lt gy, s&p ip, v f-f  
gr, sb rd-sb ang, p-mod srt, fri, mod  
por, cly cmt, scat biot  
40% SLTY SH: lt-med gy, dk gy,  
frm-sft, fri-brit, sb plty-blky, rthy-sl  
slty tex



MD: 4,321 '  
TVD: 4,299.49 '  
Inclination: 0.22 °  
Azimuth: 97.55 °

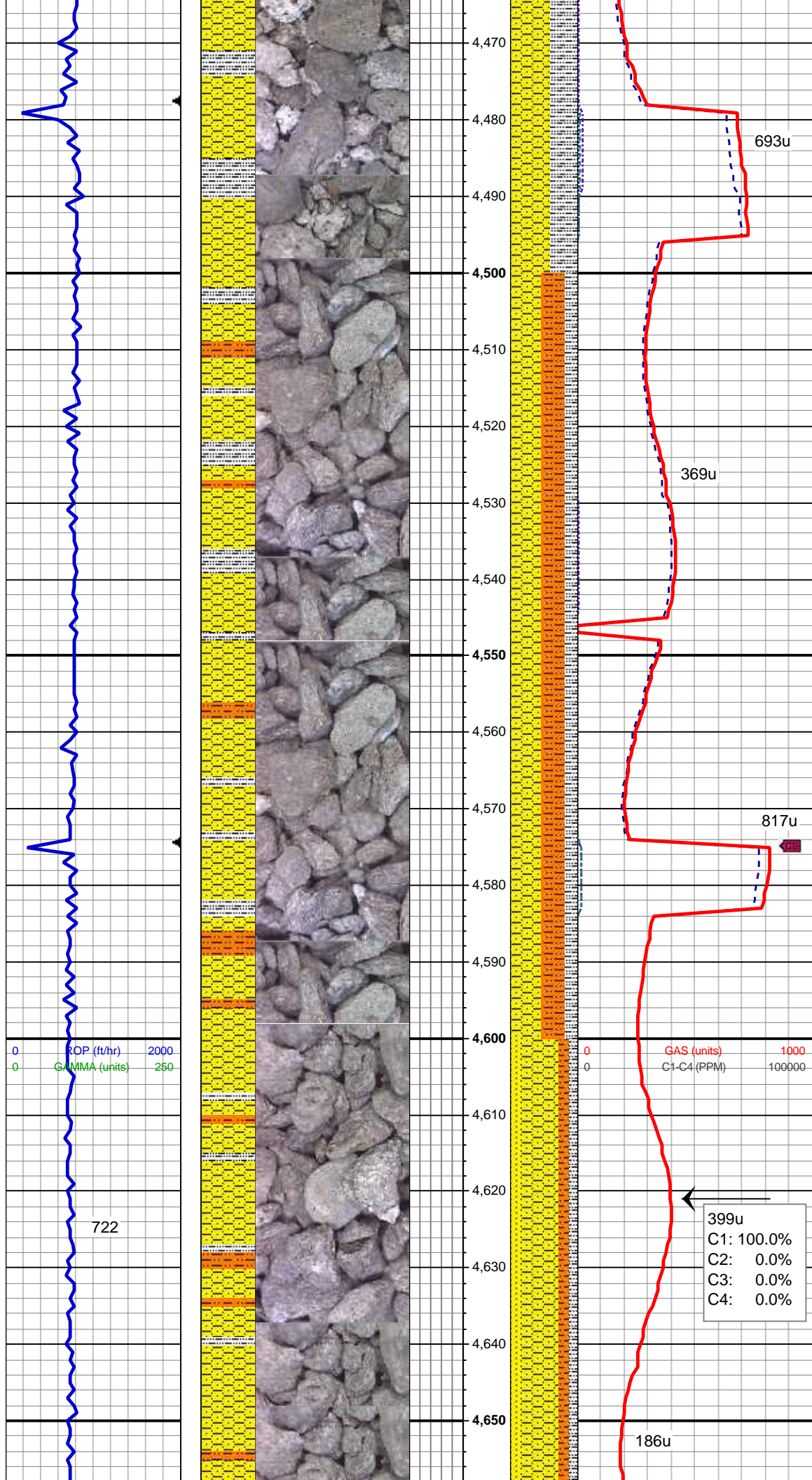
50% SHY SS: wh-lt gy, s&p ip, v f-f  
gr, sb rd-sb ang, p-mod srt, fri, mod  
por, cly cmt, scat biot  
50% SLTY SH: lt-med gy, dk gy,  
frm-sft, fri-brit, sb plty-blky, rthy-sl  
silty tex

MD: 4,415 '  
TVD: 4,393.48 '  
Inclination: 0.62 °  
Azimuth: 350.34 °

60% SHY SS: wh-lt gy, s&p ip, v f-f  
gr, sb rd-sb ang, p-mod srt, fri, mod  
por, cly cmt, scat biot  
40% SLTY SH: lt-med gy, dk gy,  
frm-sft, fri-brit, sb plty-blky, rthy-sl  
silty tex

274u  
C1: 93.4%  
C2: 1.9%  
C3: 3.7%  
C4: 1.0%





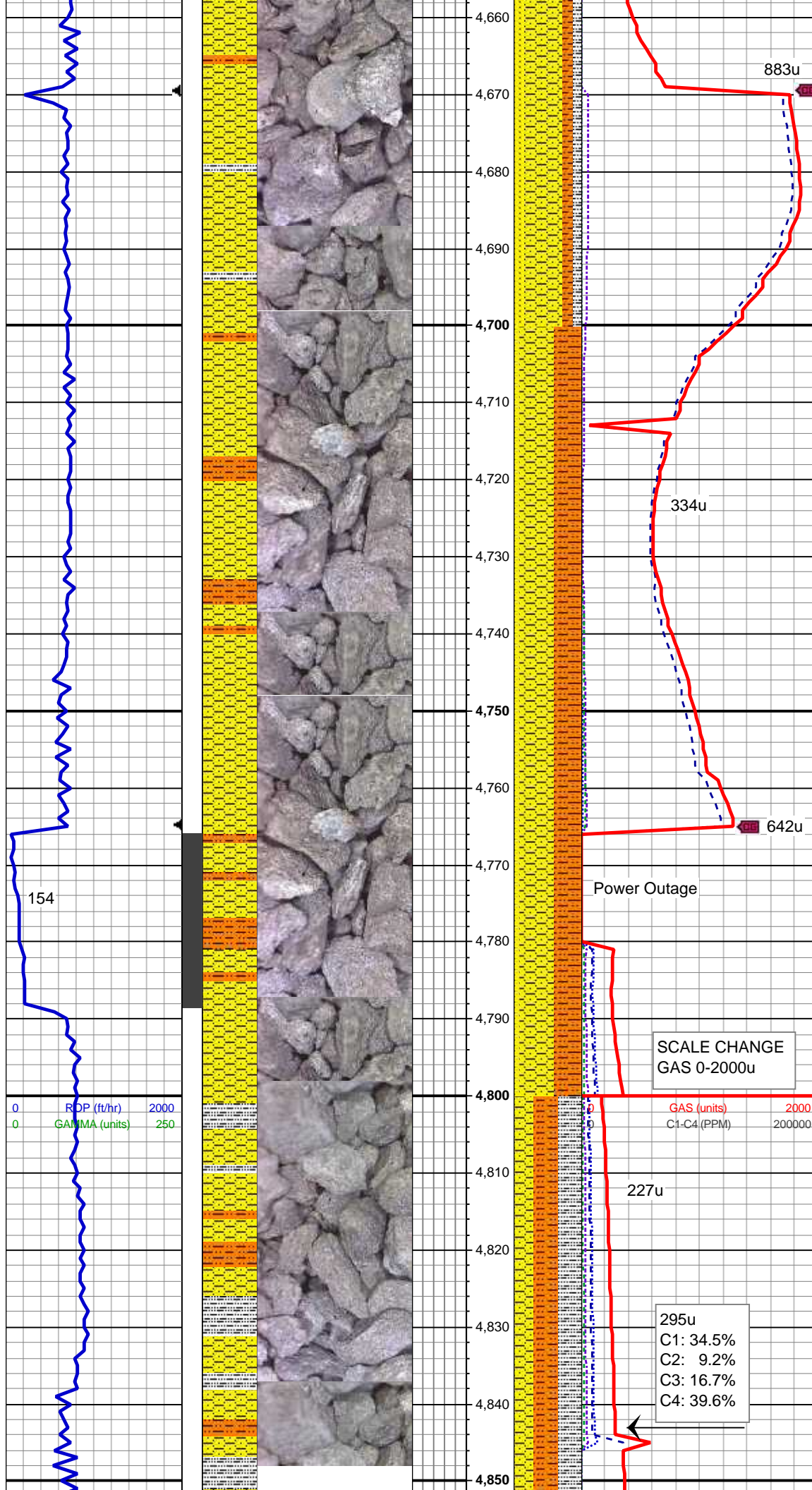
MD: 4,510 '  
TVD: 4,488.48 '  
Inclination: 0.6 °  
Azimuth: 14.67 °

45% SHY SS: wh-lt gy, s&p ip, v f-f  
gr, sb rd-sb ang, mod srt, fri, mod  
por, arg cmt  
35% SHY SLTST: lt gy - dk gy, brn,  
sb blkyl-blky  
20% SLTY SH: lt-med gy, dk gy,  
frm-sft, fri-brit, sb plty-blky, rthy-sl  
sly tex

MD: 4,605 '  
TVD: 4,583.48 '  
Inclination: 0.13 °  
Azimuth: 262.13 °

55% SHY SS: wh-lt gy, s&p ip, v f-f  
gr, sb rd-sb ang, mod srt, fri, mod  
por, arg cmt  
15% SHY SLTST: lt gy - dk gy, brn,  
sb blkyl-blky  
15% SS: lt gy-wh, s&p, f gr, sb rd-sb  
ang, p srt, fri, arg cmt  
15% SLTY SH: lt-med gy, dk gy,  
frm-sft, fri-brit, sb plty-blky, rthy-sl  
sly tex

399u  
C1: 100.0%  
C2: 0.0%  
C3: 0.0%  
C4: 0.0%



MD: 4,700 '  
TVD: 4,678.47 '  
Inclination: 0.7 °  
Azimuth: 178.81 °

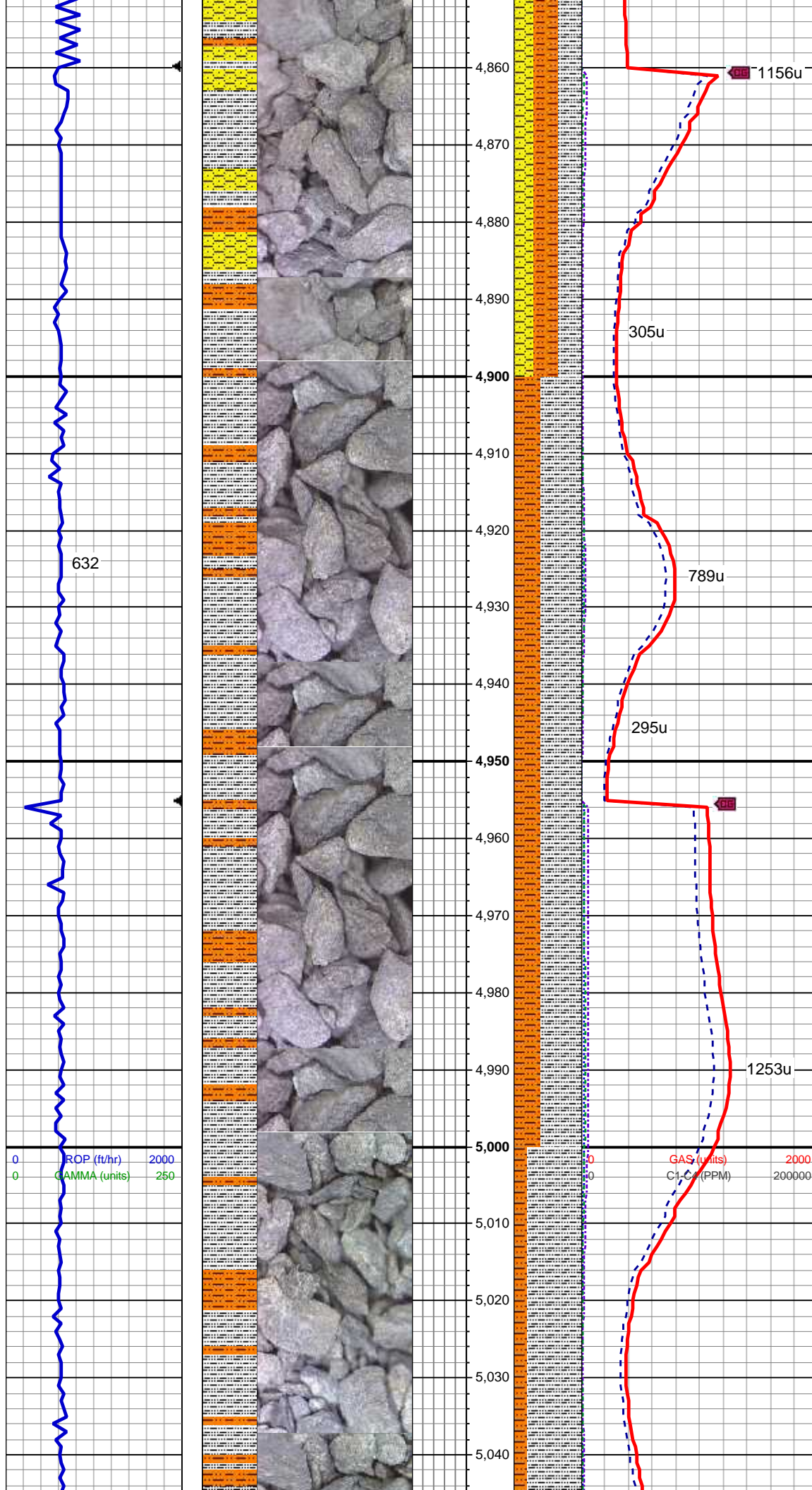
50% SHY SS: lt gy wit occ ltgy-wh,  
s&p ip, v f-f gr, sb rd-sb ang, mod  
srt, fri, mod por, arg cmt  
40% SHY SLTST: lt gy - dk gy, brn,  
sb blkly-blky  
10% SS: lt gy-wh, s&p, f gr, sb rd-sb  
ang, p srt, fri, arg cmt

MD: 4,795 '  
TVD: 4,773.47 '  
Inclination: 1.28 °  
Azimuth: 355.28 °

MUD WT 9.1 VIS 31

35% SLTY SH: med-dk gy sl gy brn,  
frm-sft, fri-brit, sb plty-blky, rthy- slty  
tex, strong grdg - shy sltst  
35% SHY SLTST: med- dk gy, brn





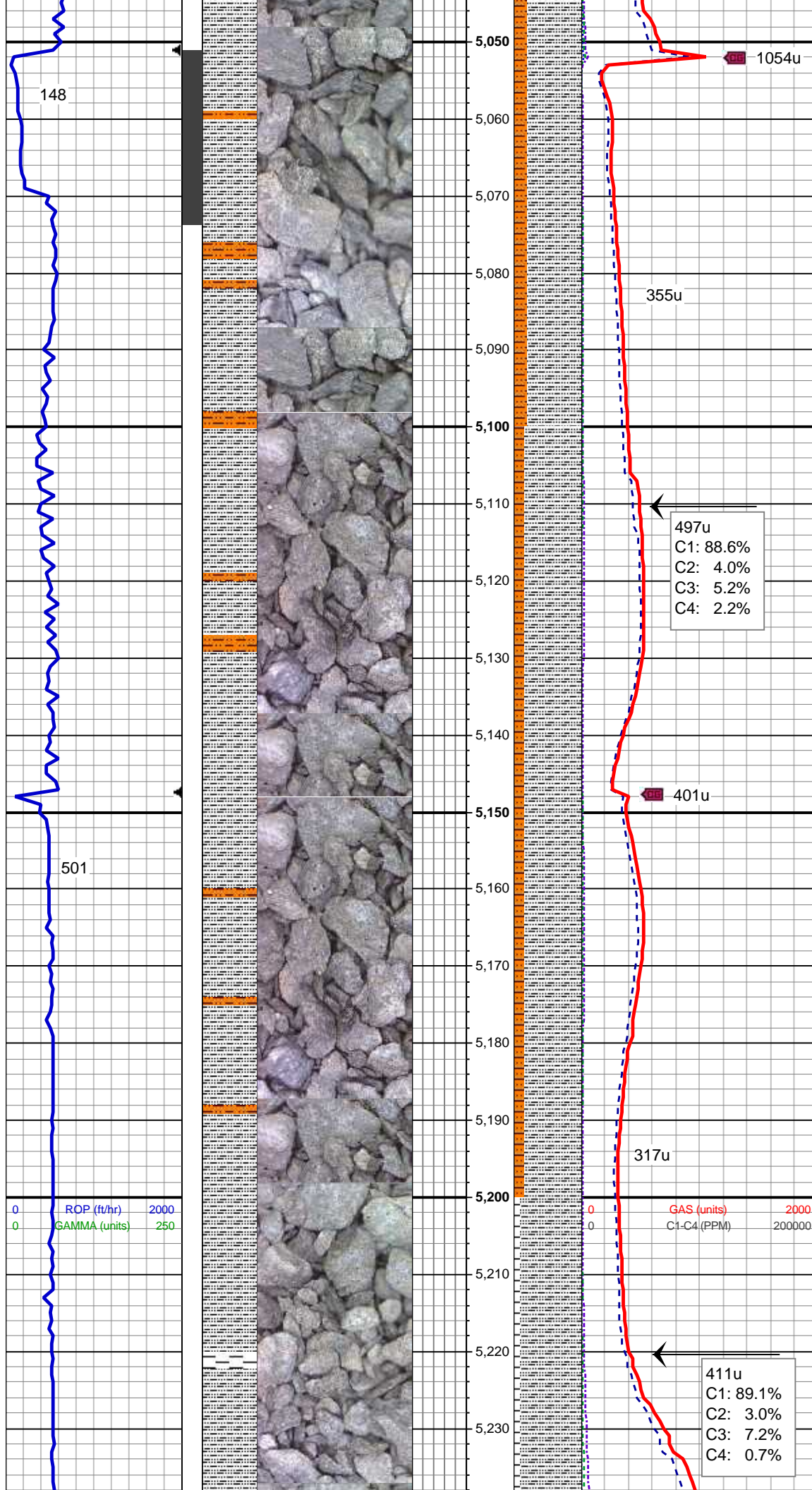
60% SHY SLTST: med-dk gy, brn  
occ lt gy, sb blkly-blky occ sb plty,  
silty - grity tex  
30% SHY SS: lt gy, s&p ip, v f-f gr,  
sb rd-sb ang, mod srt, fri, mod por,  
arg cmt

MD: 4,890 '  
TVD: 4,868.44 '  
Inclination: 1.47 °  
Azimuth: 350.82 °

60% SLTY SH: med-dk gy sl gy brn,  
frm-sft, fri-brit, sb plty-blky, rthy- slty  
tex, strong grd - shy sltst  
40% SHY SLTST: med- dk gy, brn  
occ lt gy, sb blkly-blky occ sb plty,  
silty - grity tex

MD: 4,984 '  
TVD: 4,962.4 '  
Inclination: 1.91 °  
Azimuth: 312.23 °

80% SLTY SH: med-dk gy sl gy brn,



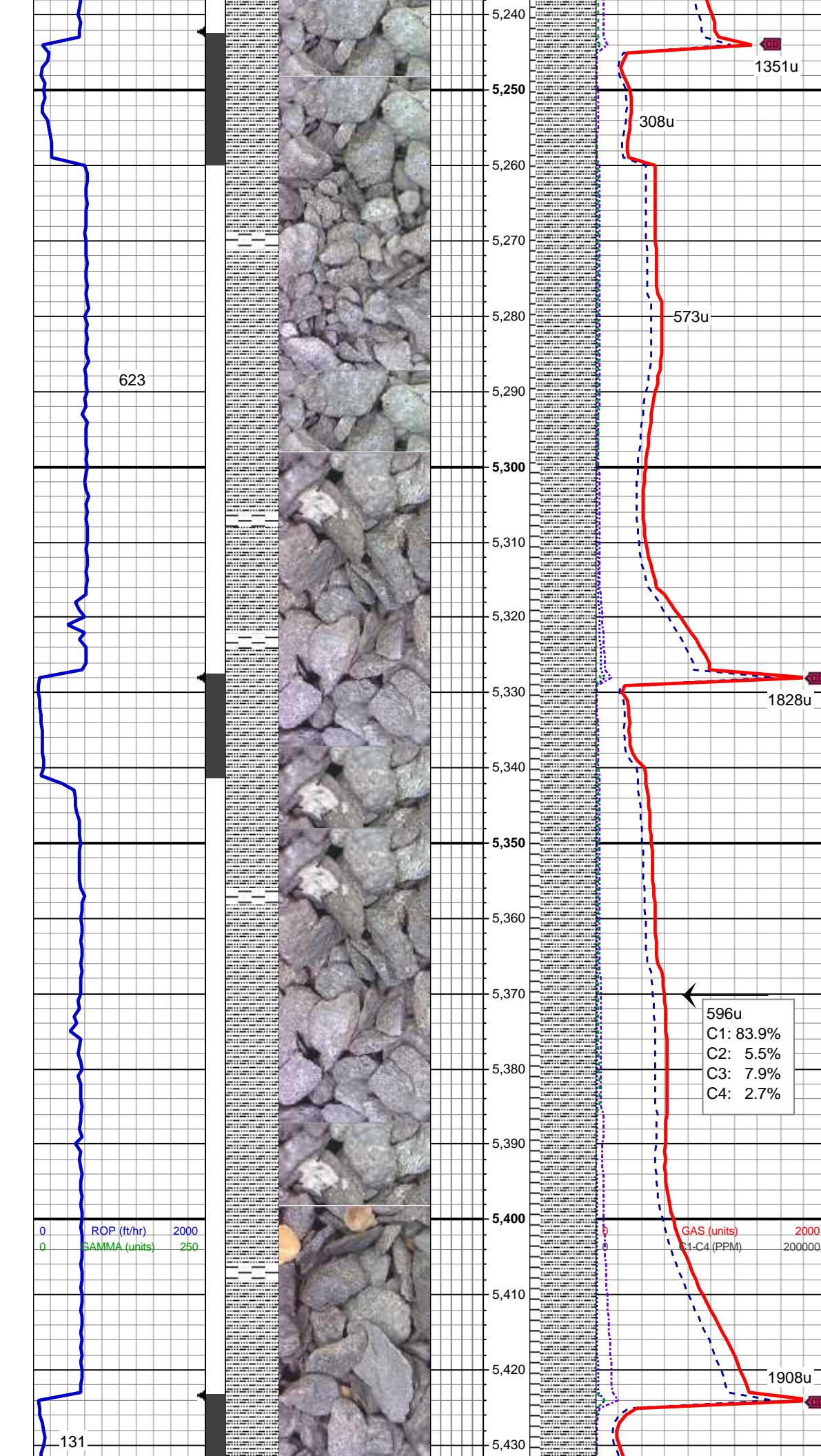
frm-sft, fri-brit, sb plty-blky, rthy- slty  
tex, strong grdg - shy sltst  
20% SHY SLTST: med- dk gy, brn  
occ lt gy, sb blky-blky occ sb plty,  
slty - grity tex, tr wh sltst

MD: 5,079 '  
TVD: 5,057.38 '  
Inclination: 0.89 °  
Azimuth: 225.34 °

85% SLTY SH: med-dk gy sl gy brn,  
frm-sft, fri-brit, sb plty-blky, rthy- slty  
tex, grdg - shy sltst  
15% SHY SLTST: med- dk gy, brn  
occ lt gy, sb blky-blky occ sb plty,  
slty - grity tex

MD: 5,174 '  
TVD: 5,152.35 '  
Inclination: 1.82 °  
Azimuth: 219.66 °





90% SLTY SH: med-dk gy , tr lt gy,  
frm-sft, fri-brit, sb plty-blky, rthy- slty  
tex, occ grdg - shy sltst  
10% SH: dk gy-gy blk, frm-sl sft, sb  
plty-plty, rthy - sl sm tex

MD: 5,269 '  
TVD: 5,247.33 '  
Inclination: 0.96 °  
Azimuth: 292.01 °

MUD WT 9.2 VIS 28

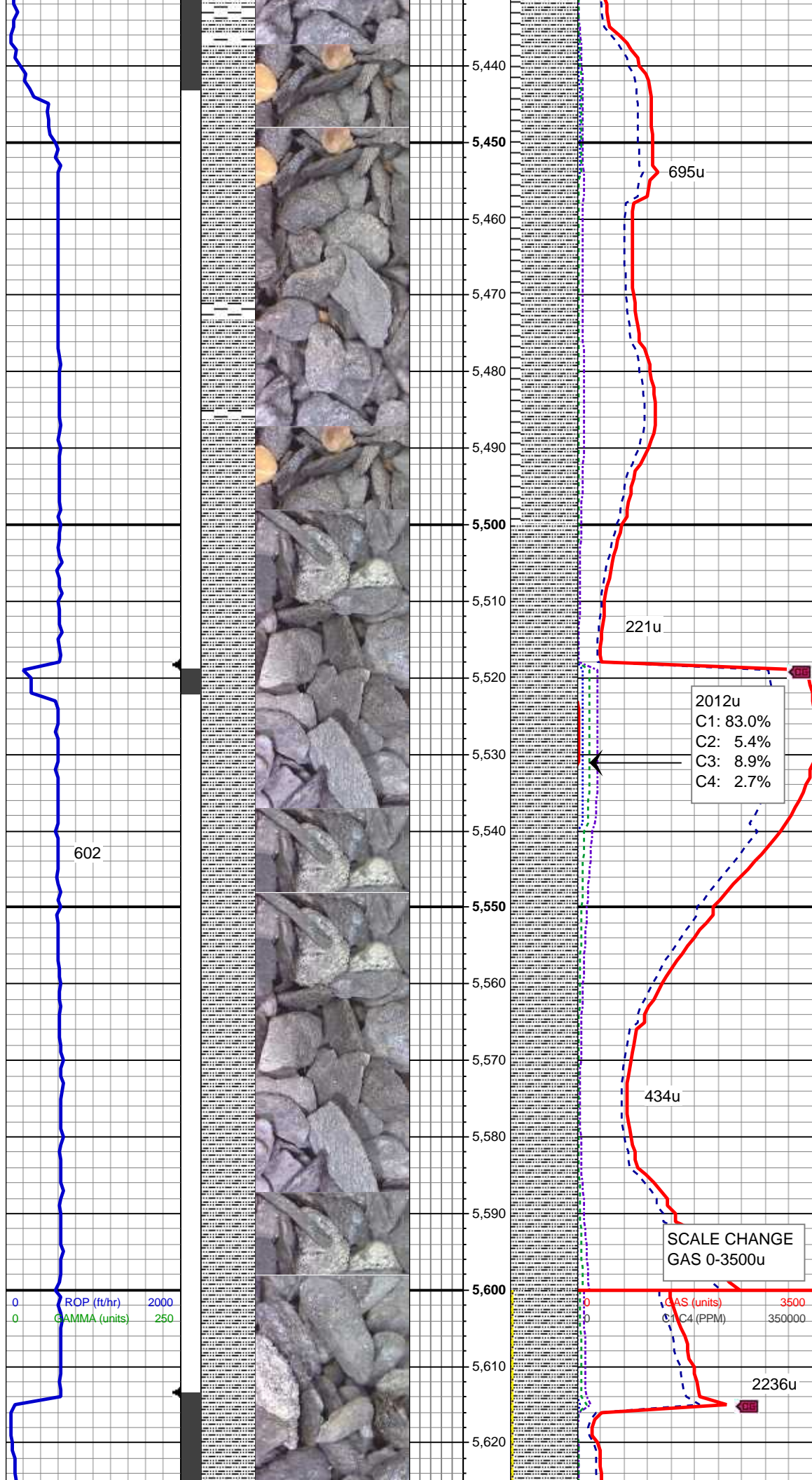
85% SLTY SH: med-dk gy , tr lt gy,  
frm-sft, fri-brit, sb plty-blky, rthy- slty  
tex, occ grdg - shy sltst  
15% SH: dk gy-gy blk, frm-sl sft, sb  
plty-plty, rthy - sl sm tex; tr lrg lse xl  
cal, no bent

MD: 5,364 '  
TVD: 5,342.32 '  
Inclination: 1.1 °  
Azimuth: 223.6 °

Fracture Zone

596u  
C1: 83.9%  
C2: 5.5%  
C3: 7.9%  
C4: 2.7%

GAS (units) 2000  
C1-C4 (PPM) 200000



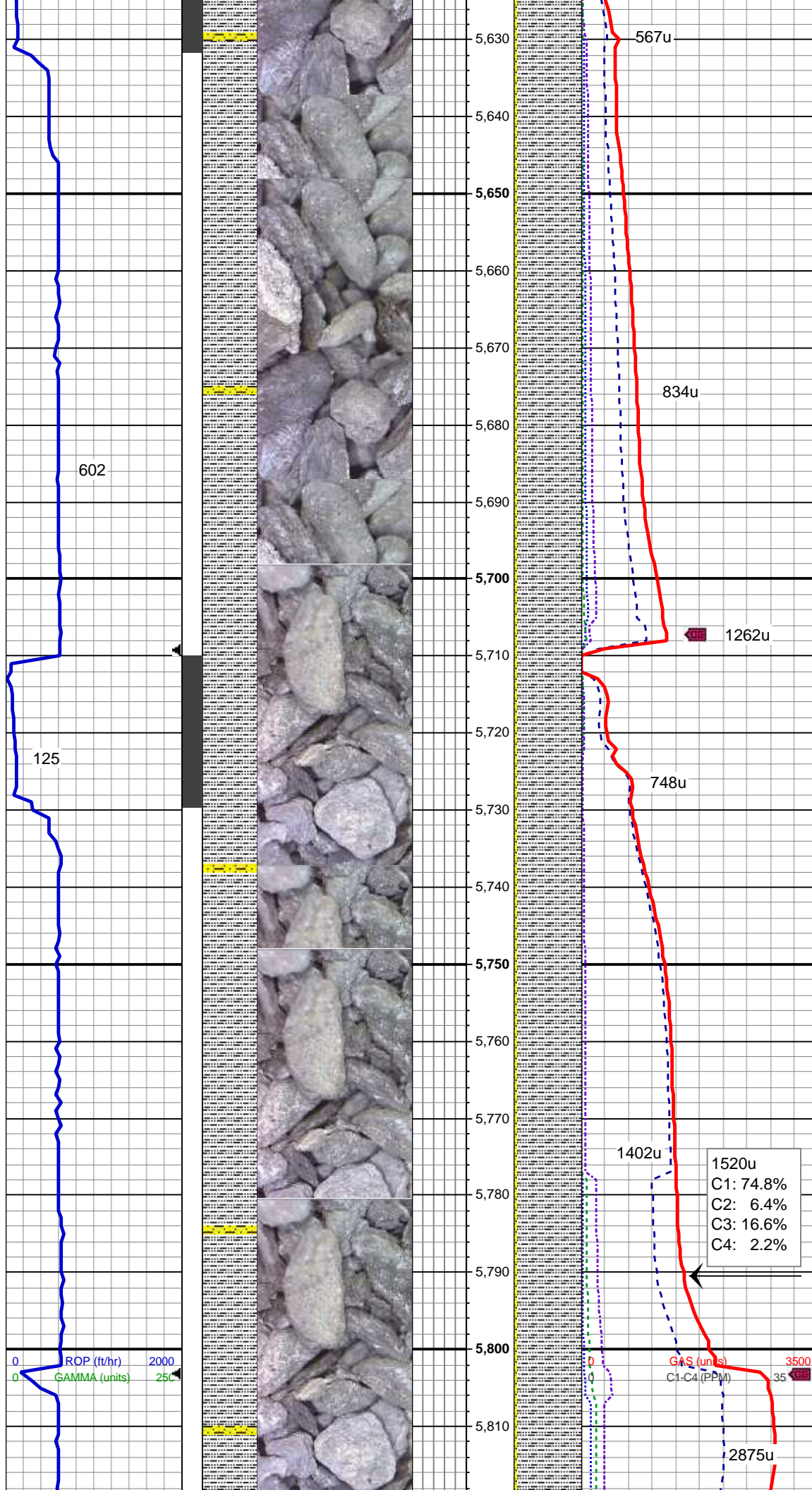
MD: 5,459 '  
TVD: 5,437.3 '  
Inclination: 1.13 °  
Azimuth: 195.63 °

85% SLTY SH: med-dk gy , tr lt gy,  
frm-sft, fri-brit, sb plty-blky, rthy- slty  
tex, occ grdg - shy sltst  
15% SH: dk gy-gy blk, frm-sl sft, sb  
plty-plty, rthy - sl sm tex; tr lrg lse xl  
cal, no bent

100% SLTY SH: med-dk gy , tr lt gy,  
frm-sft, sb plty-blky, rthy- slty tex, tr  
grdg - shy sltst, no bent

MD: 5,554 '  
TVD: 5,532.29 '  
Inclination: 0.66 °  
Azimuth: 170.35 °





100% SLTY SH: med-dk gy , tr lt gy,  
frm-sft, sb plty-blky, rthy- slty tex, tr  
grdg - shy sltst, no bent; tr shaly ss

MD: 5,649 '  
TVD: 5,627.29 '  
Inclination: 0.57 °  
Azimuth: 84.95 °

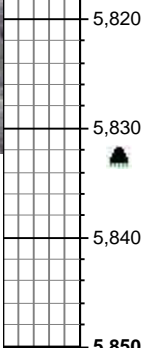
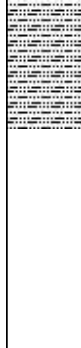
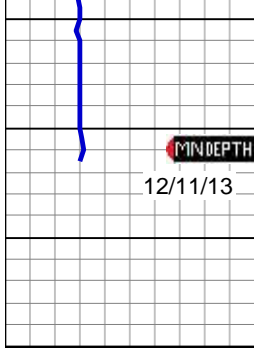
100% SLTY SH: med-dk gy , tr lt gy,  
frm-sft, sb plty-blky, rthy- slty tex, tr  
grdg - shy sltst, no bent; tr shaly ss

MD: 5,744 '  
TVD: 5,722.27 '  
Inclination: 1.51 °  
Azimuth: 355.96 °

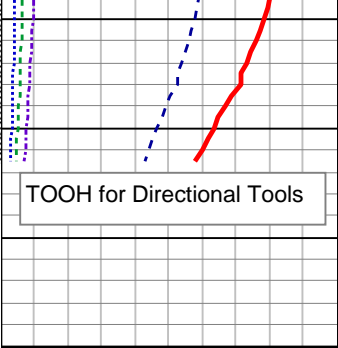
MUD WT 9.1 VIS 29

Teepee Buttes  
Prog Top: 5828'  
Loggers Top 5805'?

100% SLTY SH: med-dk gy , tr lt gy,  
frm-sl sft, sb plty-sb blky, rthy- slty  
tex, tr grdg - shy sltst, no bent; tr



shaly ss



shaly ss

TD Vertical Section  
5833' @ 21:22hrs 12/10/13

Log Continues On  
Guttersen State  
DD17-79-1HN(HORZ).MPlot