

# COLUMBINE LOGGING

Scale: 5" / 100'  
Measured Depth Log

**Well Name** Seyler B10-64-1HN

**Location** NWSW Sec. 10 T5N R64W

**State** Colorado

**County** Weld

**Country** USA

**Rig Number** Ensign 121

**API Number** 05-123-37181-0000

**AFE #** 136849

**Region** DJ BASIN

**Field** KERSEY

**Spud Date** 10/1/2013

**Drilling Completed** 10/7/2013

**Surface Coordinates** 2203' FSL x 509' FEL

**Bottom Hole Coordinates** 1650' FSL x 700' FEL

**Ground Elevation** 4598

**K.B. Elevation** 4611

**Logged Interval** 1500 To 6150

**Total Depth** 10758

**Formation** NIOBRARA B CHALK

**Type of Drilling Fluid** H2O, LSND

## Operator

**Company** Noble Energy Inc

**Address** 1625 Broadway Suite 2000  
Denver, CO 80202

## Geologist

**Name** John-Michael Villeneuve, Terry Acomb`

**Company** Columbine Logging Inc.

**Address** 2385 S. Lipan St.  
Denver, CO 80223

## 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

## 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

### 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  
NODES  
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

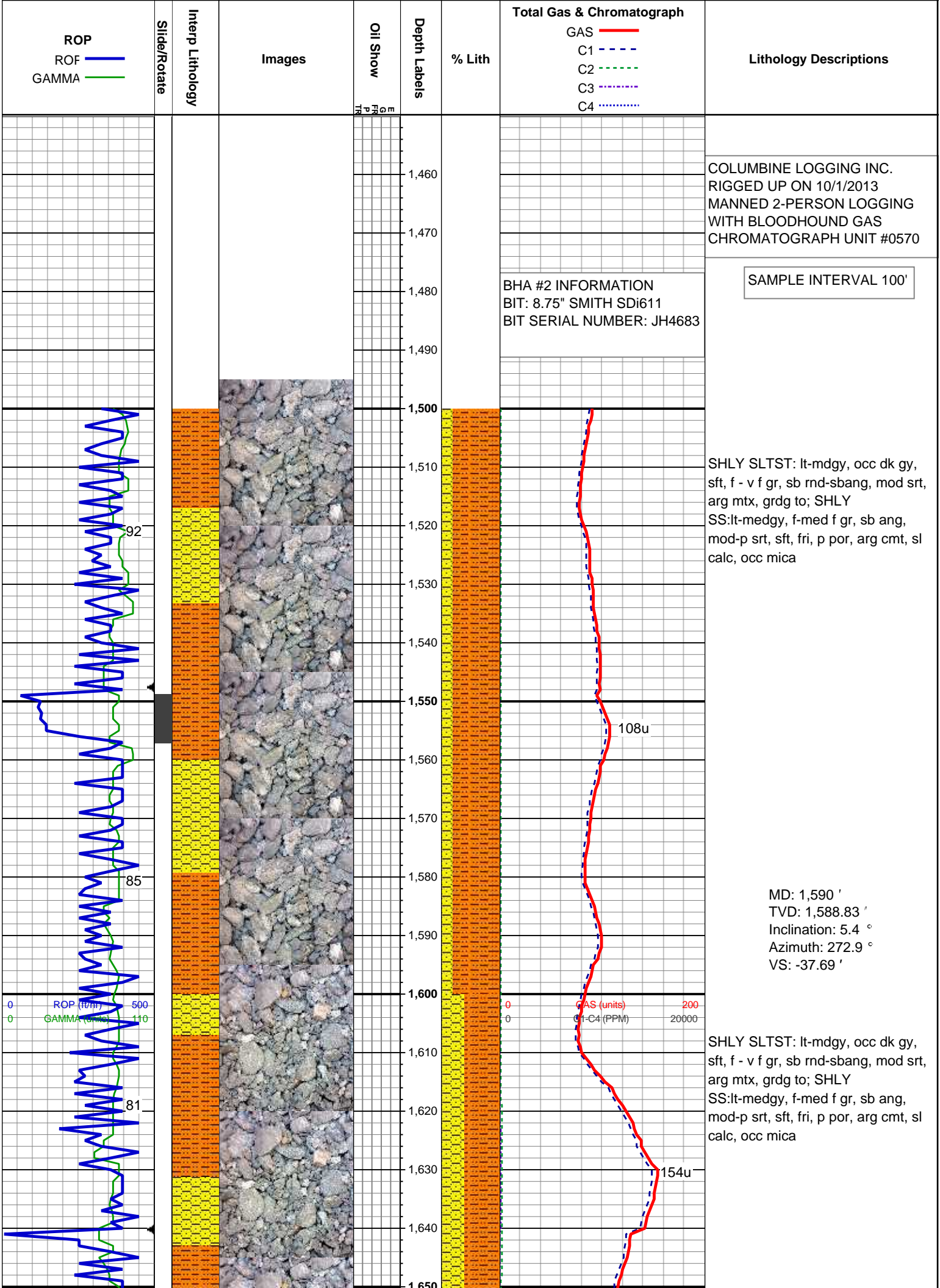
BOUNDSTONE  
CHALKY  
CRYPTOXLN

### EARTHY

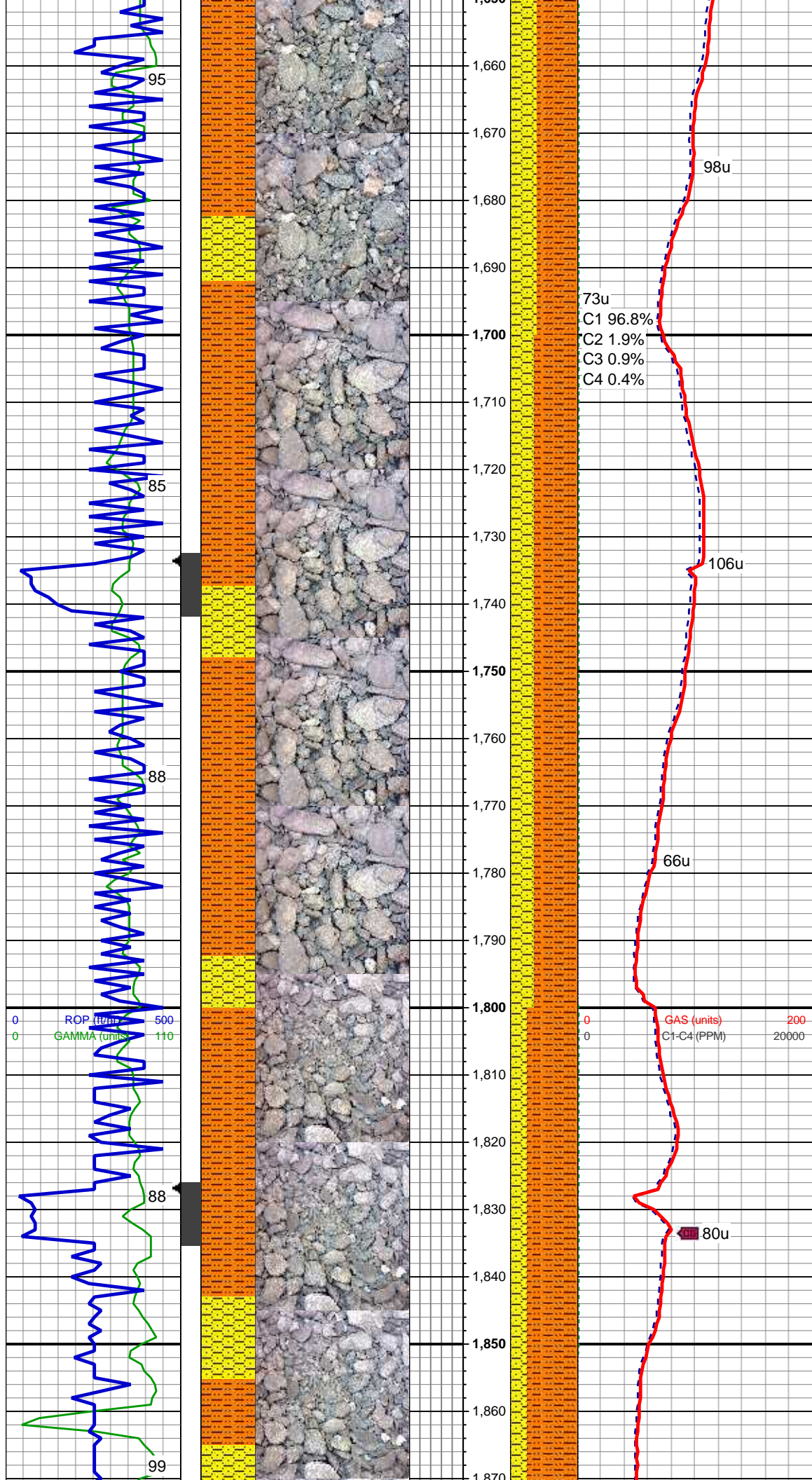
FINELYXLN  
GRAINSTONE  
LITHOGRAPHIC  
MICROXLN  
MUDSTONE  
PACKSTONE  
WACKESTONE

### Sorting

MODERATE  
POOR  
WELL







MD: 1,683 '  
TVD: 1,681.47 '  
Inclination: 4.7 °  
Azimuth: 269.6 °  
VS: -45.82 '

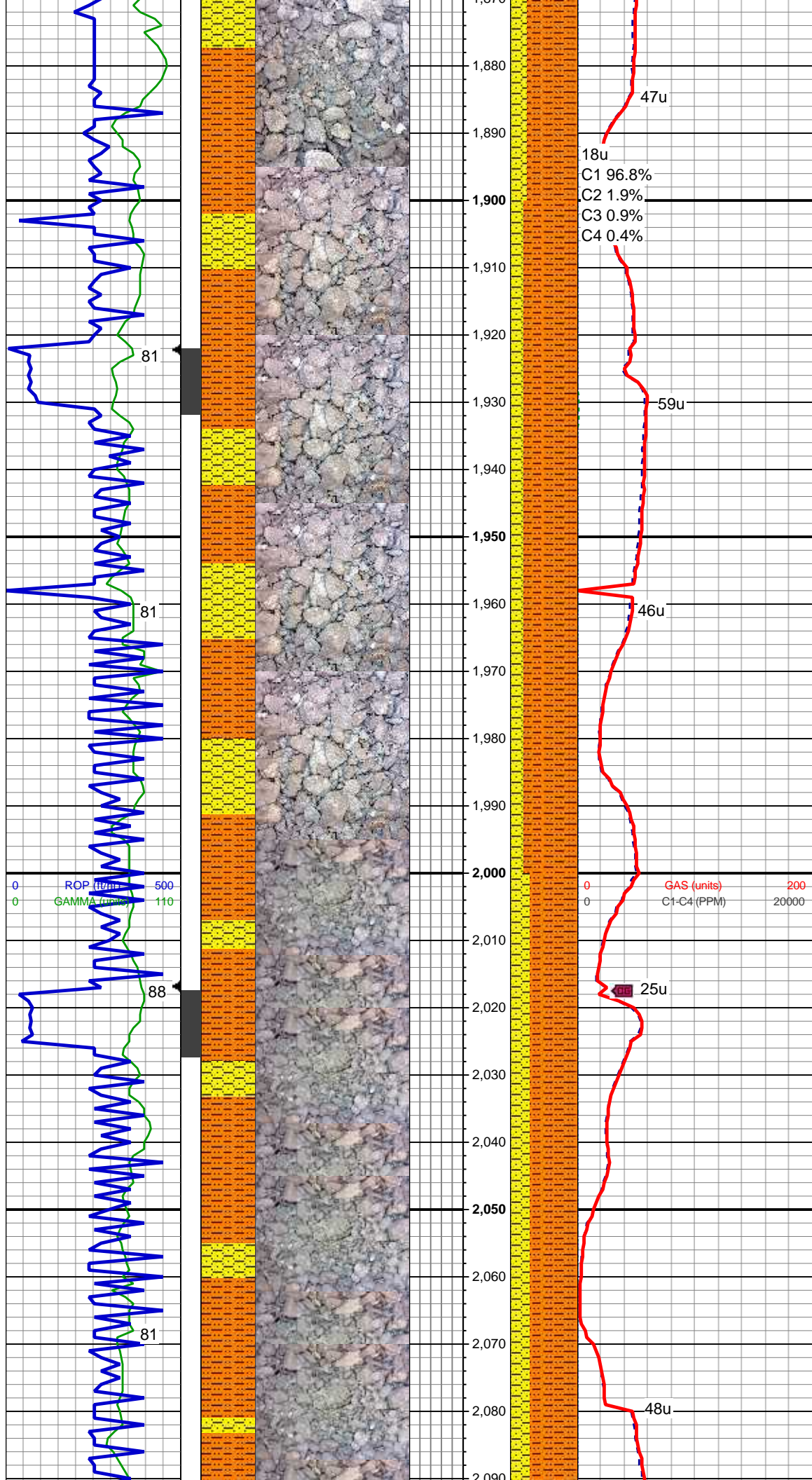
SHLY SLTST: lt-mdgy, occ dk gy, sft, f - v f gr, sb rnd-sbang, mod srt, arg mtx, grd g to; SHLY SS:lt-medgy, f-med f gr, sb ang, mod-p srt, sft, fri, p por, arg cmt, sl calc, occ mica

MD: 1,777 '  
TVD: 1,775.13 '  
Inclination: 5.1 °  
Azimuth: 251.6 °  
VS: -53.38 '

SHLY SLTST: lt-mdgy, occ dk gy, sft, f - v f gr, sb rnd-sbang, mod srt, arg mtx, grd g to; SHLY SS:lt-medgy, f-med f gr, sb ang, mod-p srt, sft, fri, p por, arg cmt, sl calc, occ mica

MD: 1,872 '  
TVD: 1,869.7 '





TVD: 1,869.7 '  
Inclination: 5.8 °  
Azimuth: 246.2 °  
VS: -61.25 '

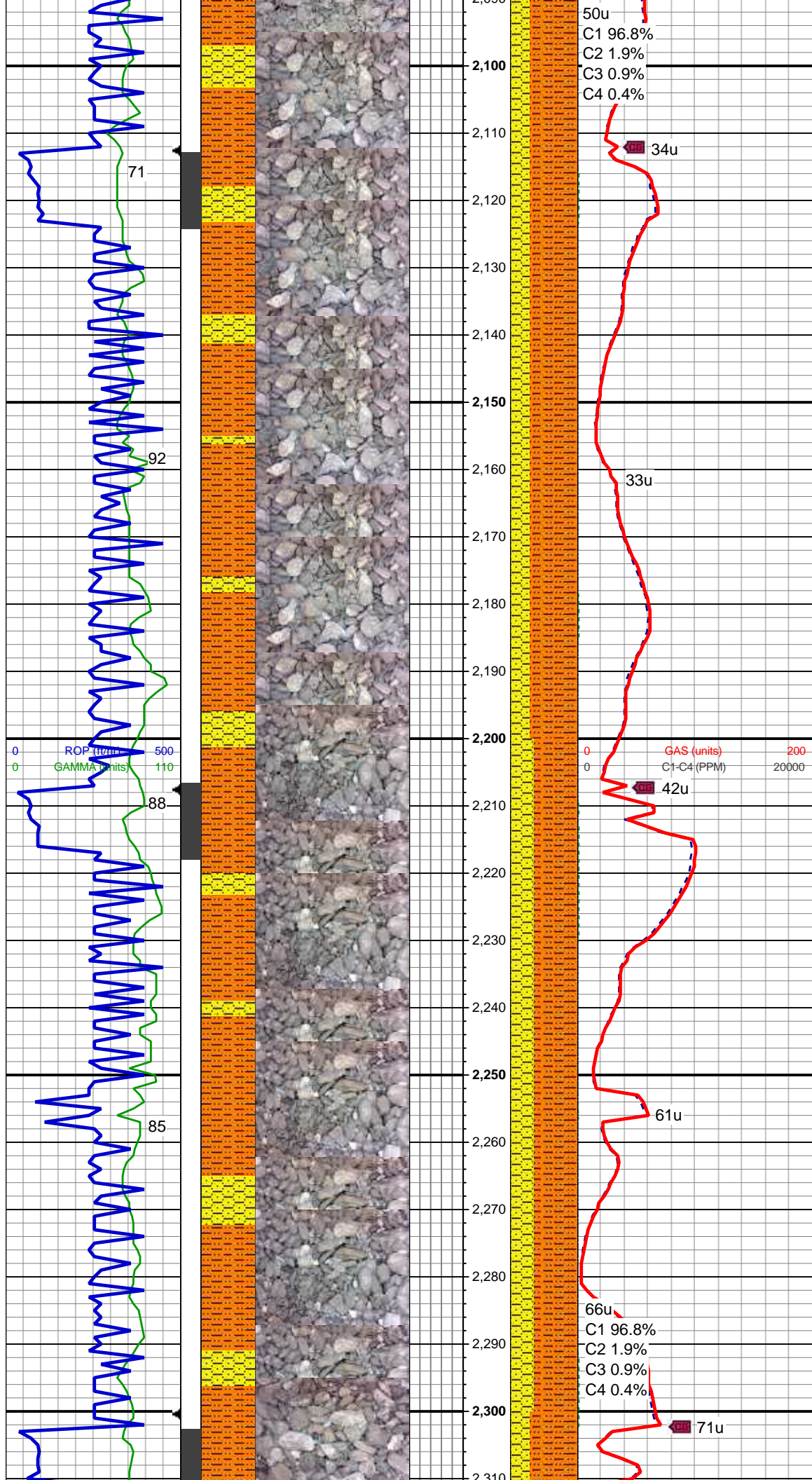
SHLY SLTST: lt-mdgy, occ dk gy,  
sft, f - v f gr, sb rnd-sbang, mod srt,  
arg mtx, grdg to; SHLY  
SS:lt-medgy, f-med f gr, sb ang,  
mod-p srt, sft, fri, p por, arg cmt, sl  
calc, occ mica

MUD WT 8.5/8.55 VIS 28/28

MD: 1,967 '  
TVD: 1,964.2 '  
Inclination: 6.1 °  
Azimuth: 233.2 °  
VS: -68.93 '

SHLY SLTST: lt-md gy, occ dk gy,  
sft, f - v f gr, sb rnd-sbang, mod srt,  
arg mtx, grdg to; SHLY SS:lt-med  
gy,off wh, vf - f gr, sb rnd -sb ang,  
mod-p srt, sft, fri, arg cmt, sl calc

MD: 2,062 '  
TVD: 2,058.59 '  
Inclination: 6.9 °  
Azimuth: 225.3 °  
VS: -75.99 '



SHLY SLTST: lt-md gy, occ dk gy, sft, f - v f gr, sb rnd-sbang, mod srt, arg mtx, grdg to; SHLY SS:lt-med gy,off wh, vf - f gr, sb rnd -sb ang, mod-p srt, sft, fri, arg cmt, sl calc

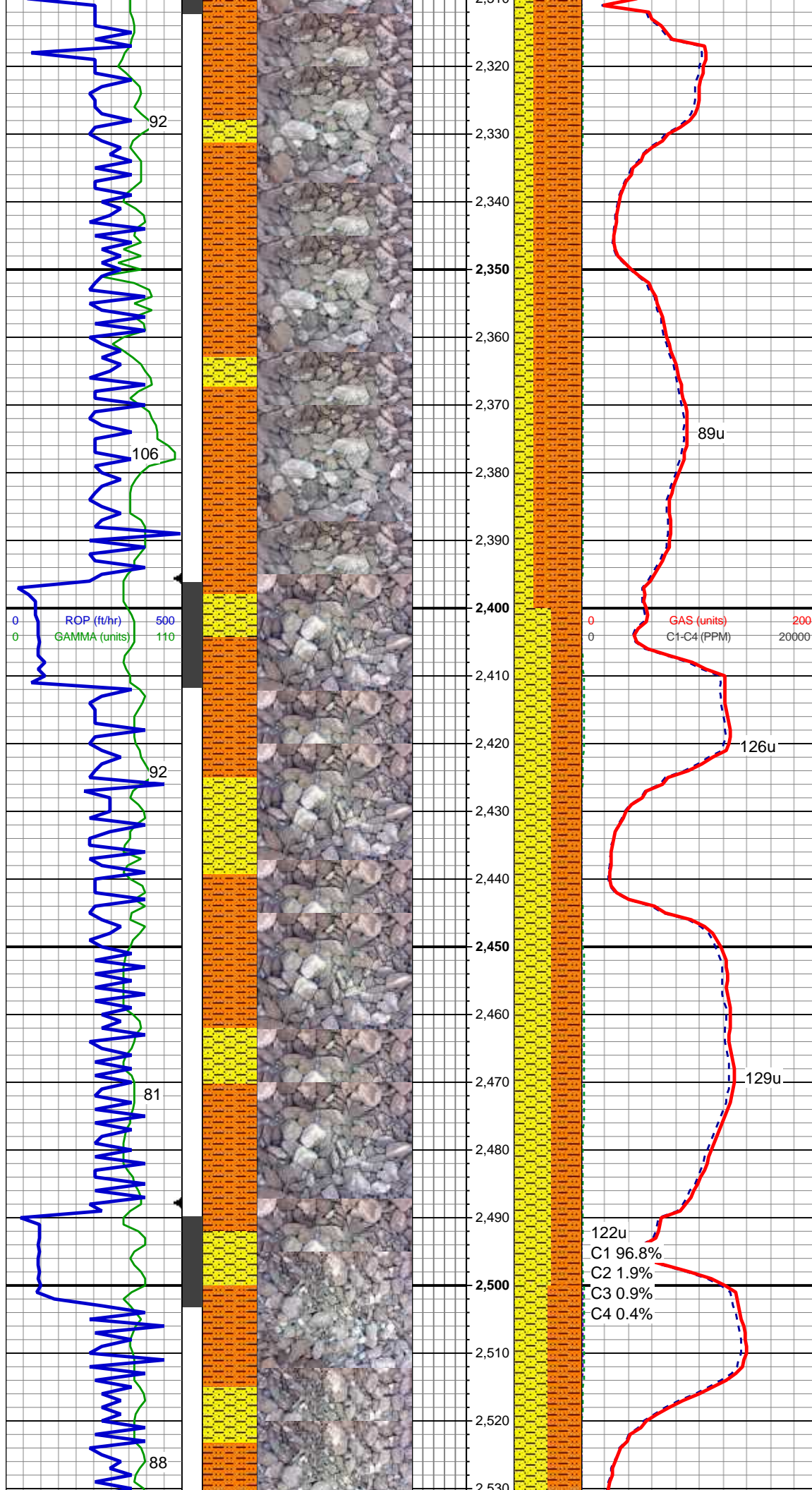
MD: 2,157 '  
TVD: 2,152.8 '  
Inclination: 7.9 °  
Azimuth: 211.4 °  
VS: -82.08 '

SHLY SLTST: lt-md gy, occ dk gy, sft, f - v f gr, sb rnd-sbang, mod srt, arg mtx, grdg to; SHLY SS:lt-med gy,off wh, vf - f gr, sb rnd -sb ang, mod-p srt, sft, fri, arg cmt, sl calc

MD: 2,250 '  
TVD: 2,244.89 '  
Inclination: 8.2 °  
Azimuth: 214.5 °  
VS: -87.61 '

SHLY SLTST: lt-md gy, occ dk gy,





sft, f - v f gr, sb rnd-sbang, mod srt,  
arg mtx, grdg to; SHLY SS:lt-med  
gy,off wh, vf - f gr, sb rnd -sb ang,  
mod-p srt, sft, fri, arg cmt, sl calc

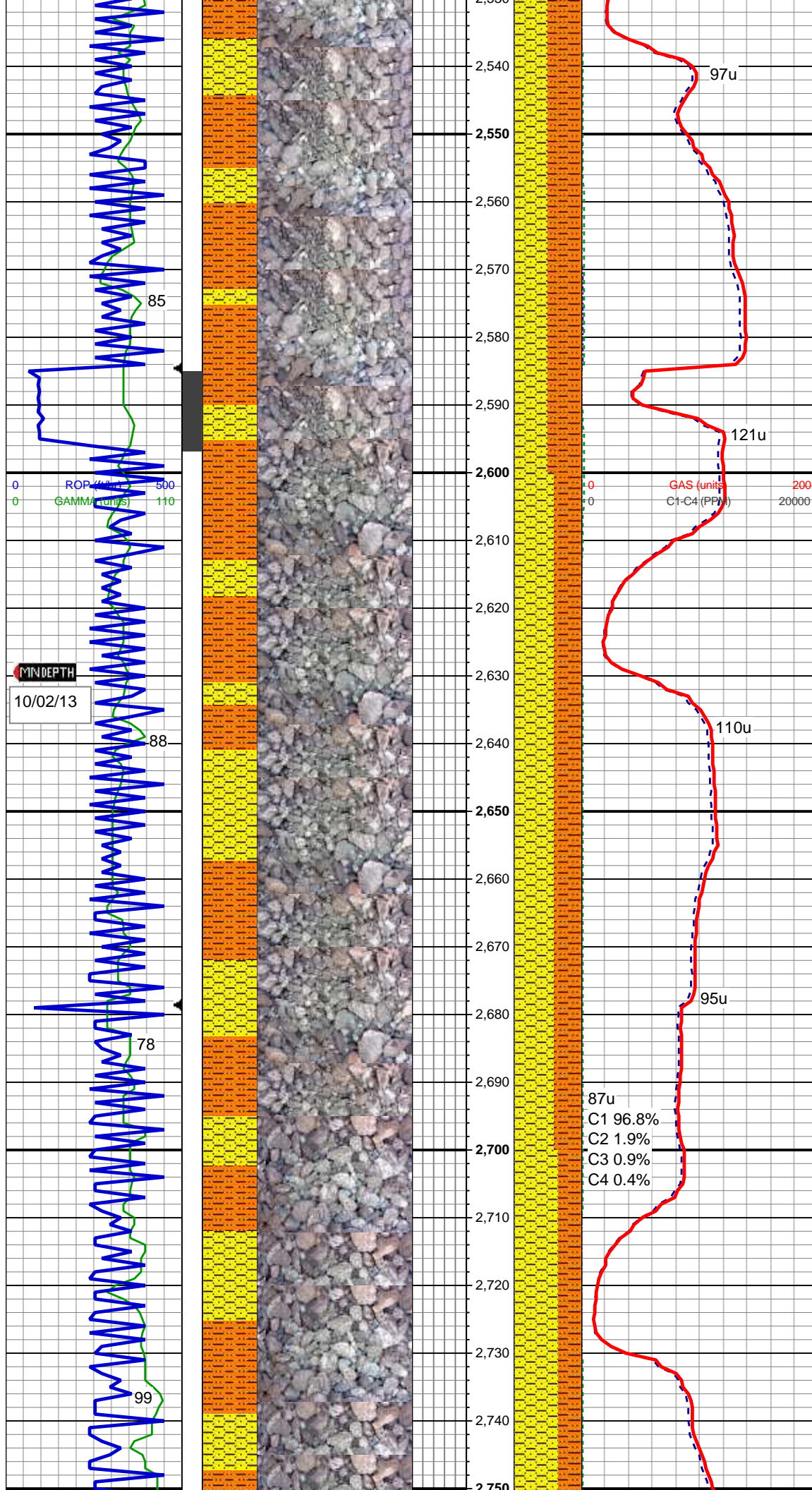
MD: 2,345 '  
TVD: 2,338.84 '  
Inclination: 8.8 °  
Azimuth: 220.2 °  
VS: -94.54 '

SHLY SS: lt-med gy,off wh, vf - f gr,  
sb rnd -sb ang, mod-p srt, sft, fri,  
arg cmt, sl calc  
SHLY SLTST: lt-md gy, occ dk gy,  
sft, f - v f gr, sb rnd-sbang, mod srt,  
arg mtx

MD: 2,439 '  
TVD: 2,431.54 '  
Inclination: 10.3 °  
Azimuth: 218.9 °  
VS: -102.72 '

SHLY SS: lt-med gy,off wh, vf - f gr,  
sb rnd -sb ang, mod-p srt, sft, fri,  
arg cmt, sl calc  
SHLY SLTST: lt-md av, occ dk av,

122u  
C1 96.8%  
C2 1.9%  
C3 0.9%  
C4 0.4%



sft, f - v f gr, sb rnd-sbang, mod srt, arg mtx

MD: 2,534 '  
TVD: 2,524.87 '  
Inclination: 11.2 °  
Azimuth: 217 °  
VS: -111.6 '

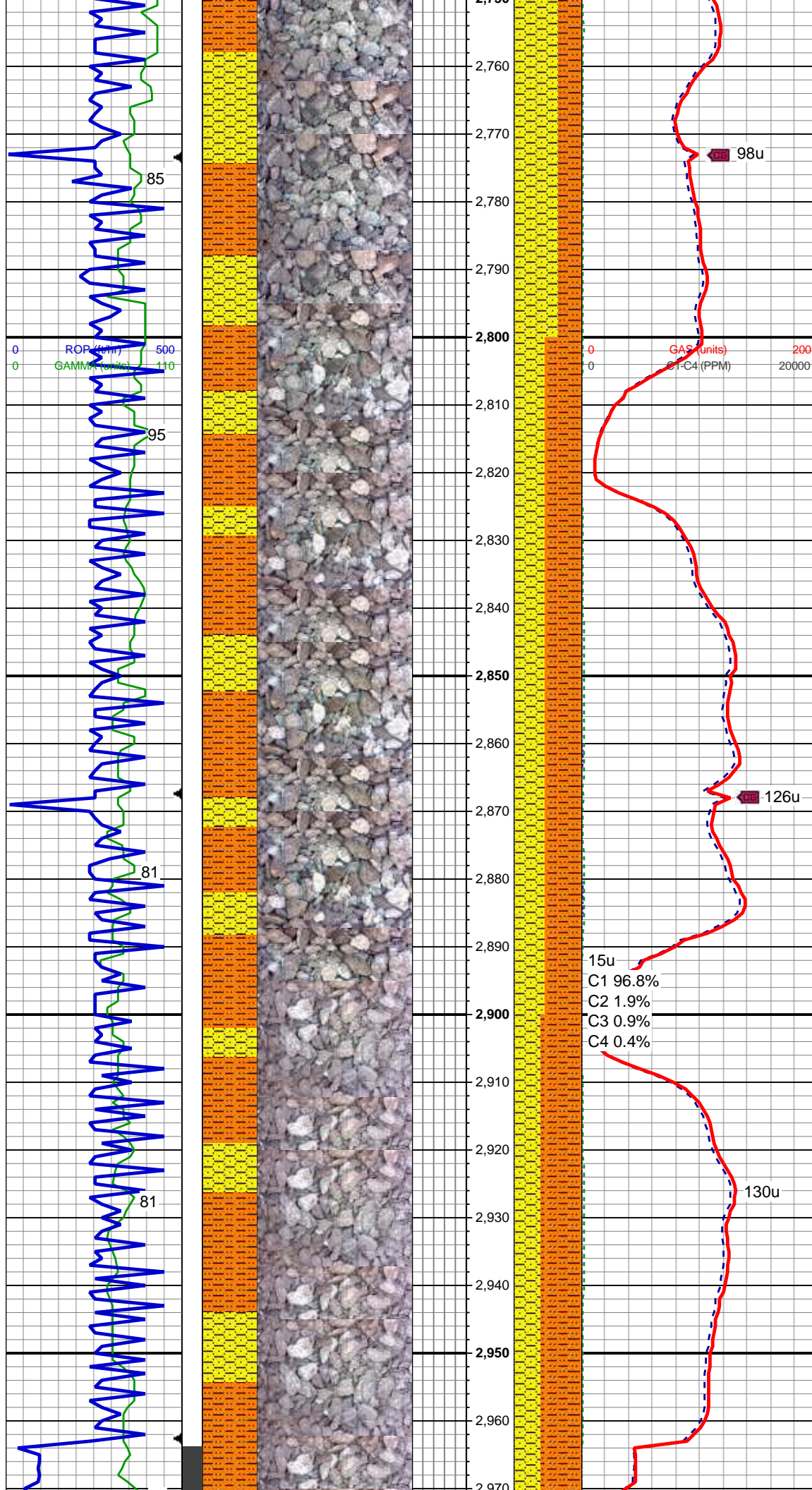
SHLY SS: lt-med gy, off wh, vf - f gr, sb rnd -sb ang, mod-p srt, sft, fri, arg cmt, sl calc  
SHLY SLTST: lt-md gy, occ dk gy, sft, f - v f gr, sb rnd-sbang, mod srt, arg mtx

MD: 2,628 '  
TVD: 2,616.81 '  
Inclination: 12.8 °  
Azimuth: 214.4 °  
VS: -120.7 '

SHLY SS: lt-med gy, off wh, vf - f gr, sb rnd -sb ang, mod-p srt, sft, fri, arg cmt, sl calc  
SHLY SLTST: lt-md gy, occ dk gy, sft, f - v f gr, sb rnd-sbang, mod srt, arg mtx

MD: 2,722 '  
TVD: 2,708.5 '  
Inclination: 12.7 °  
Azimuth: 213 °  
VS: -129.75 '



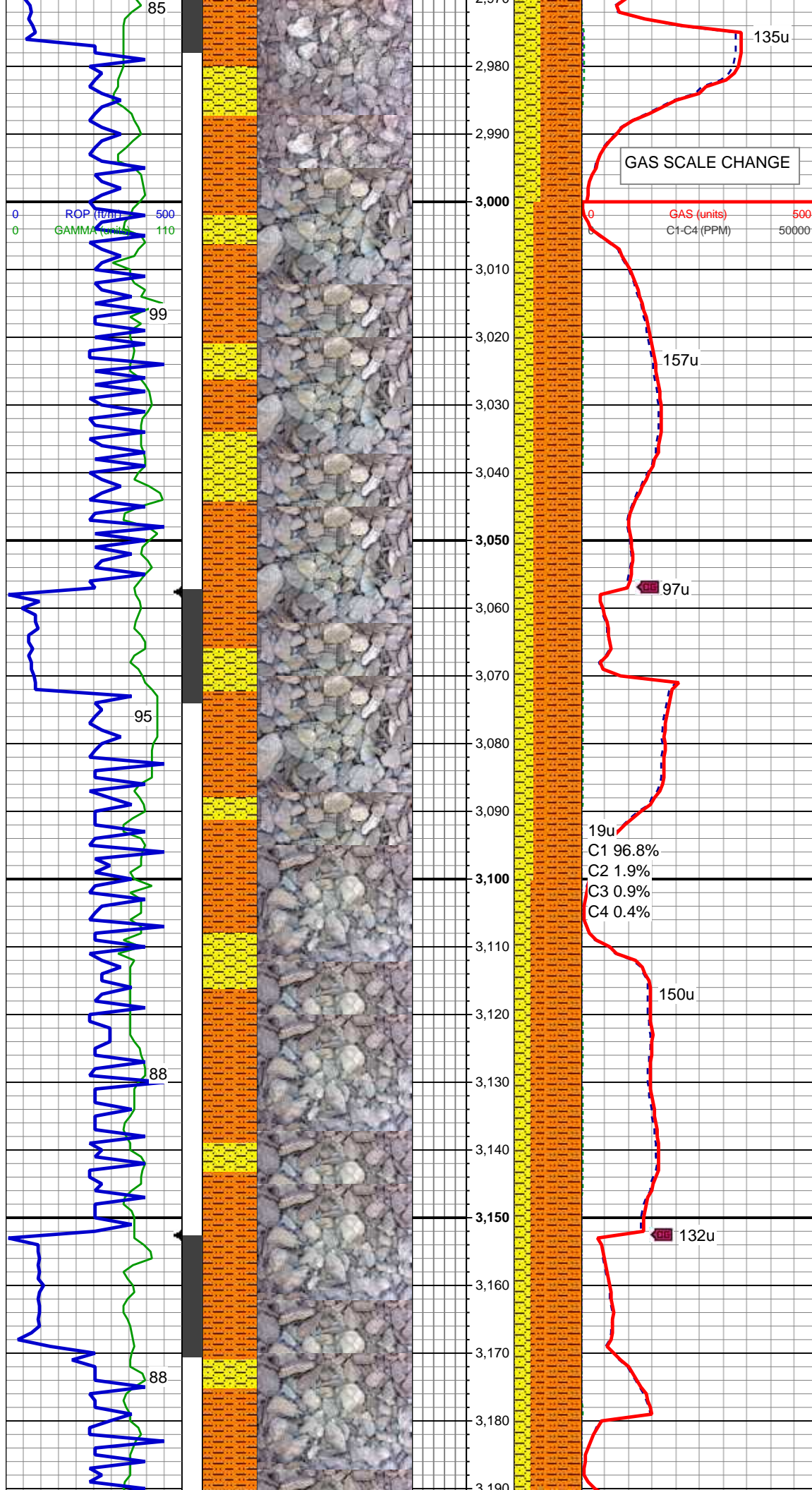


MD: 2,817 '  
TVD: 2,801.26 '  
Inclination: 12.2 °  
Azimuth: 210.1 °  
VS: -137.99 '

SHLY SS: lt-med gy, off wh, vf - f gr,  
sb rnd -sb ang, mod-p srt, sft, fri,  
arg cmt, sl calc  
SHLY SLTST: lt-md gy, occ dk gy,  
sft, f - v f gr, sb rnd-sbang, mod srt,  
arg mtx

MD: 2,912 '  
TVD: 2,894.21 '  
Inclination: 11.7 °  
Azimuth: 206.1 °  
VS: -144.81 '

SHLY SLTST: lt-md gy, occ dk gy,  
sft, f - v f gr, sb rnd-sbang, mod srt,  
arg mtx, grdg to; SHLY SS: lt-med  
gy, off wh, vf - f gr, sb rnd -sb ang,  
mod-p srt, sft, fri, arg cmt, sl calc



MD: 3,007 '  
TVD: 2,987.22 '  
Inclination: 11.8 °  
Azimuth: 209.1 °  
VS: -151.35 '

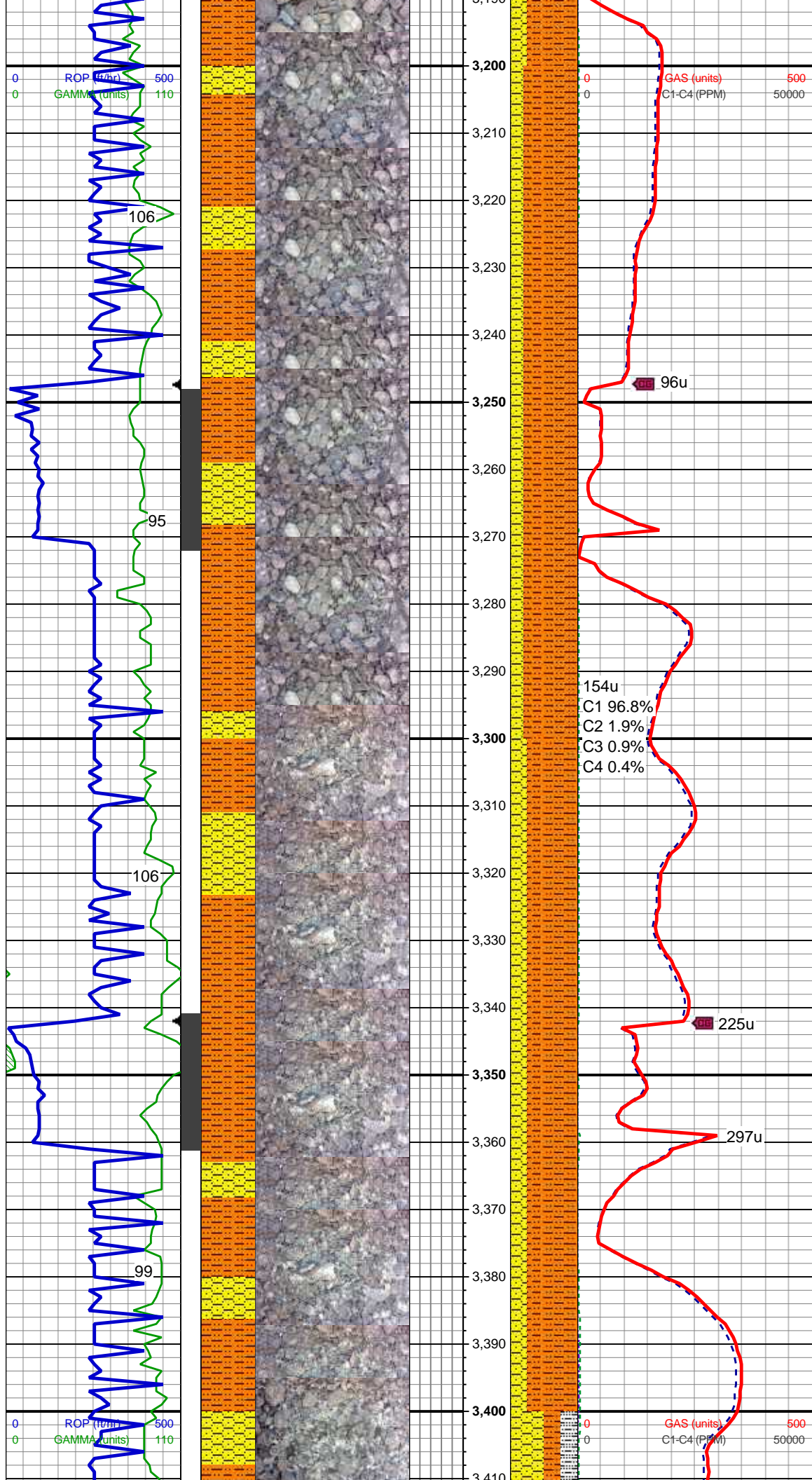
SHLY SLTST: lt-md gy, occ dk gy, sft, f - v f gr, sb rnd-sbang, mod srt, arg mtx, grdg to; SHLY SS:lt-med gy,off wh, vf - f gr, sb rnd -sb ang, mod-p srt, sft, fri, arg cmt, sl calc

MD: 3,102 '  
TVD: 3,080.37 '  
Inclination: 10.8 °  
Azimuth: 210.5 °  
VS: -158.31 '

SHLY SLTST: lt-md gy, occ dk gy, sft, f - v f gr, sb rnd-sbang, mod srt, arg mtx, grdg to; SHLY SS:lt-med gy,off wh, vf - f gr, sb rnd -sb ang, mod-p srt, sft, fri, arg cmt, sl calc

MD: 3,196 '  
TVD: 3,172.77 '





Inclination: 10.4 °  
Azimuth: 211.9 °  
VS: -165.16 '

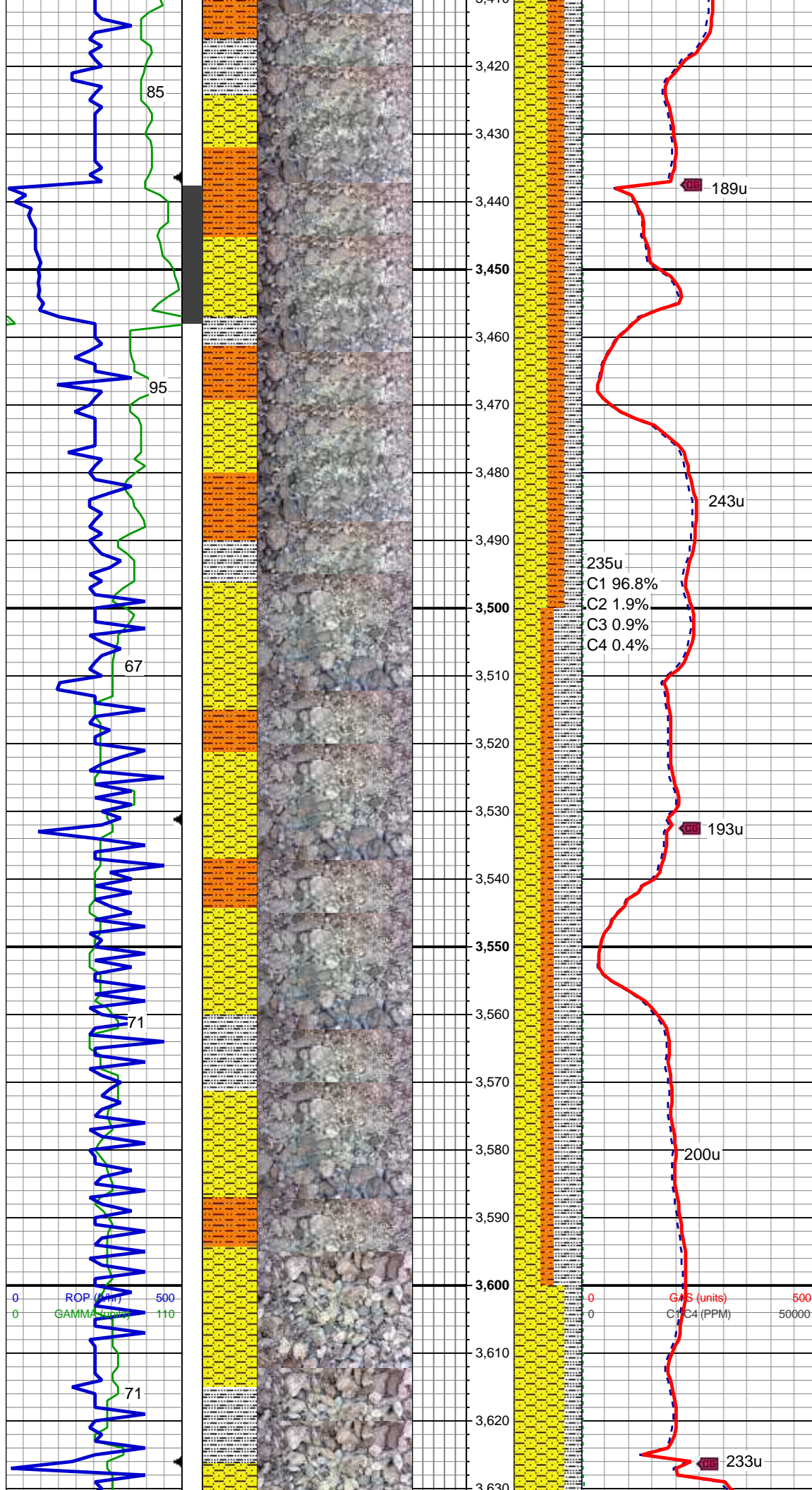
SHLY SLTST: lt-md gy, occ dk gy, sft, f - v f gr, sb rnd-sbang, mod srt, arg mtx, grdg to; SHLY SS:lt-med gy,off wh, vf - f gr, sb rnd -sb ang, mod-p srt, sft, fri, arg cmt, sl calc

MD: 3,291 '  
TVD: 3,266.21 '  
Inclination: 10.4 °  
Azimuth: 212.3 °  
VS: -172.2 '

SHLY SLTST: lt-md gy, occ dk gy, sft, f - v f gr, sb rnd-sbang, mod srt, arg mtx, grdg to; SHLY SS:lt-med gy,off wh, vf - f gr, sb rnd -sb ang, mod-p srt, sft, fri, arg cmt, sl calc

MD: 3,386 '  
TVD: 3,359.6 '  
Inclination: 10.7 °  
Azimuth: 214.7 °  
VS: -179.74 '

SHLY SLTST: lt-med gy, off wh, vf - f gr, sb rnd -sb ang, mod-p srt, sft, fri, arg cmt, sl calc



SHLY SLTST: lt gy - dk gy, sbiky,  
frm-v frm, tr sdy  
SHLY SS: off wh, lt gy - med gy, ,  
vfgr, sb ang - sb rnd, mod-w srt, sl  
calc  
SLTY SH: med gy - dk gy, frm-sl hd,  
sly

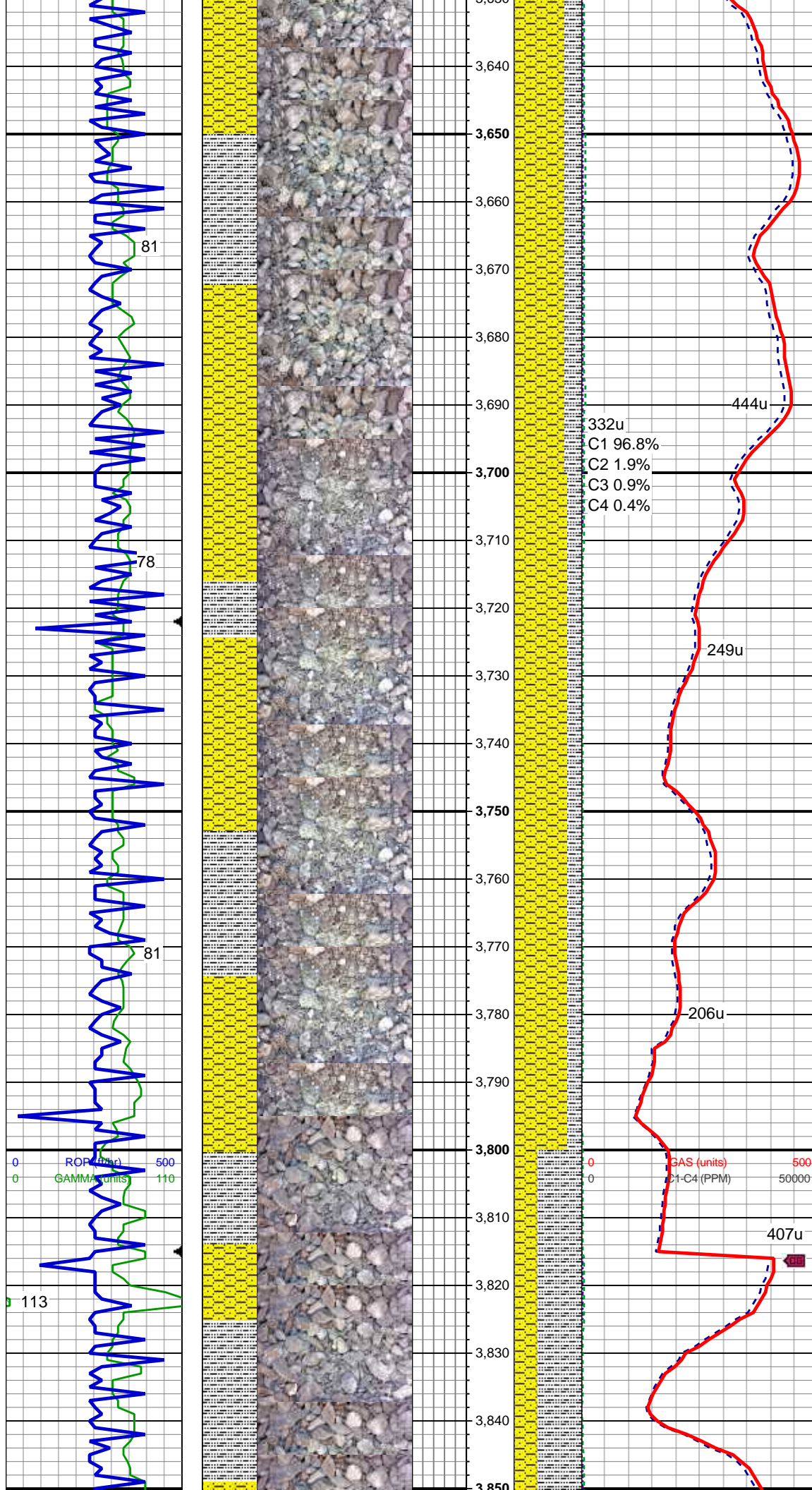
MD: 3,481 '  
TVD: 3,452.71 '  
Inclination: 12.2 °  
Azimuth: 212.3 °  
VS: -187.88 '

SHLY SLTST: lt gy - dk gy, sbiky,  
frm-v frm, tr sdy  
SHLY SS: off wh, lt gy - med gy, ,  
vfgr, sb ang - sb rnd, mod-w srt, sl  
calc  
SLTY SH: med gy - dk gy, frm-sl hd,  
sly

MD: 3,576 '  
TVD: 3,545.58 '  
Inclination: 12.1 °  
Azimuth: 212.1 °  
VS: -196.13 '

MUD WT 8.5/8.5 VIS 27/27





SHLY SS: off wh, lt gy - med gy, ,  
vfgr, sb ang - sb rnd, mod-w srt, sl  
calc  
SLTY SH: med gy - dk gy, frm-sl hd,  
slty

MD: 3,671 '  
TVD: 3,638.37 '  
Inclination: 12.7 °  
Azimuth: 211 °  
VS: -204.33 '

332u  
C1 96.8%  
C2 1.9%  
C3 0.9%  
C4 0.4%

444u

SHLY SS: off wh, lt gy - med gy, ,  
vfgr, sb ang - sb rnd, mod-w srt, sl  
calc  
SLTY SH: med gy - dk gy, frm-sl hd,  
slty

249u

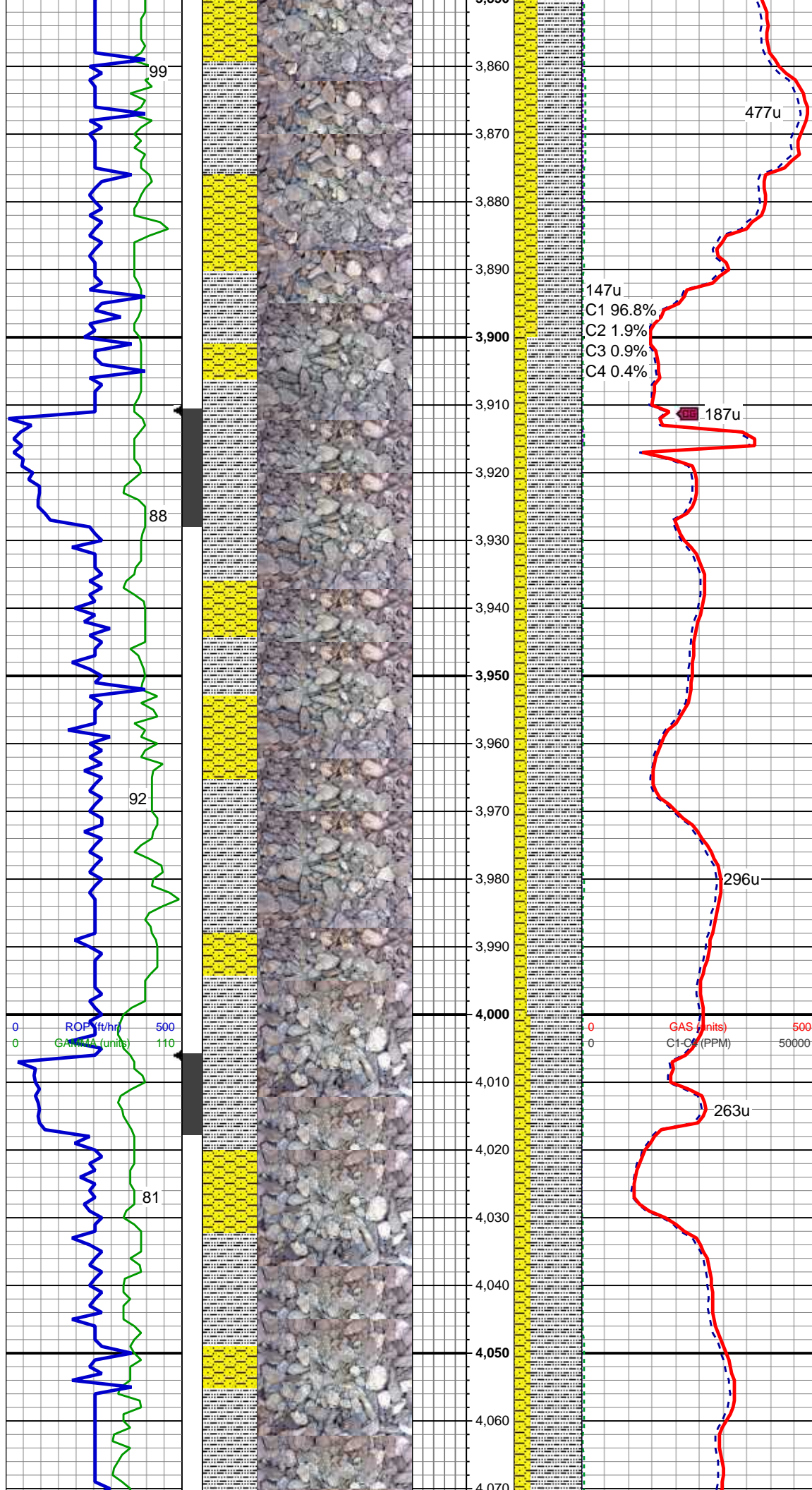
MD: 3,765 '  
TVD: 3,730.03 '  
Inclination: 12.9 °  
Azimuth: 208.9 °  
VS: -212.16 '

206u

407u

SHLY SS: off wh, lt gy - med gy, ,  
vfgr, sb ang - sb rnd, mod-w srt, sl  
calc  
SLTY SH: med gy - dk gy, frm-sl hd,  
slty, sl calc





MD: 3,860 '  
TVD: 3,822.65 '  
Inclination: 12.8 °  
Azimuth: 206.8 °  
VS: -219.39 '

MUD WT 8.6/8.6 VIS 28/28

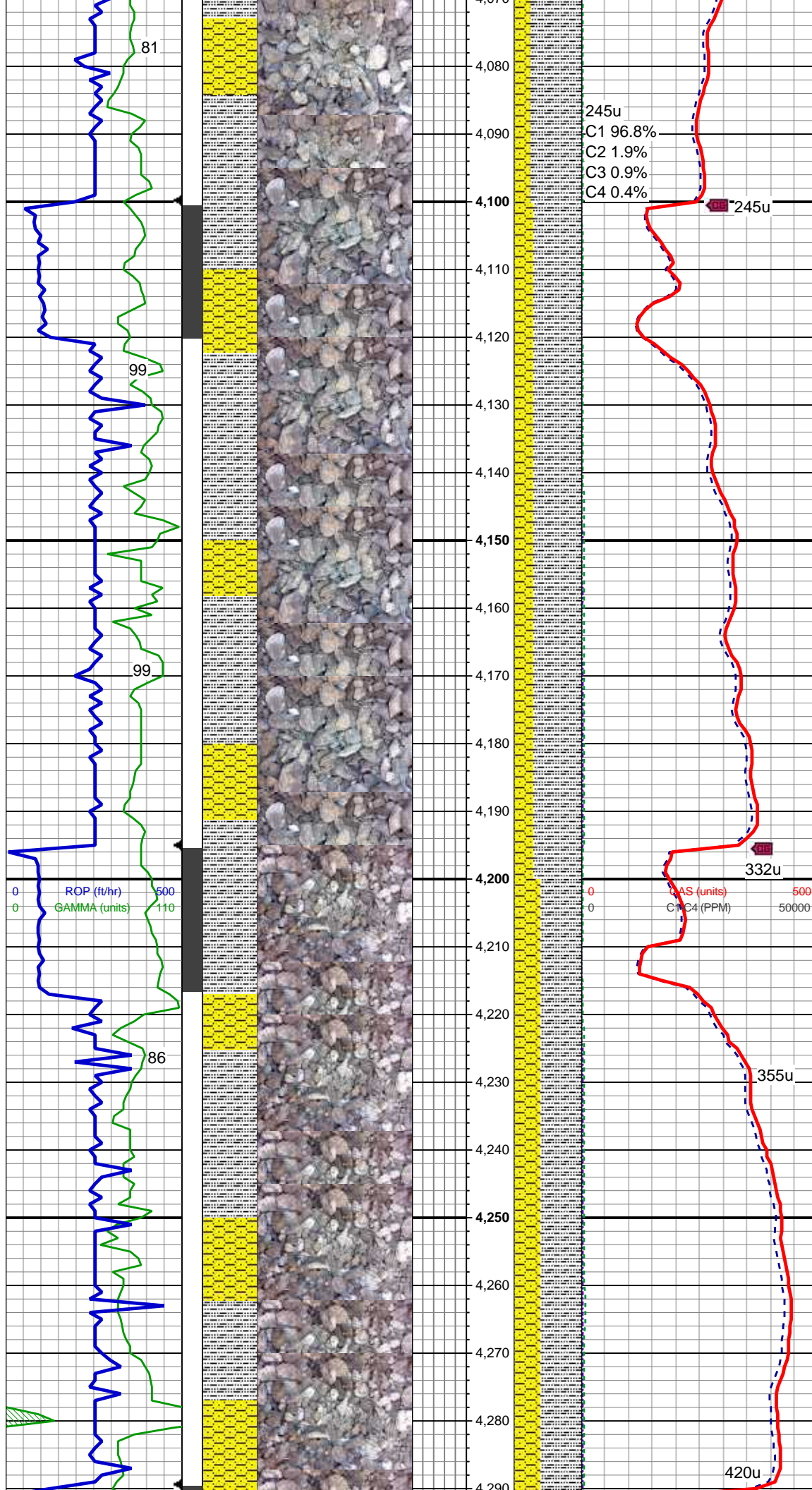
SHLY SS: off wh, lt gy - med gy, ,  
vfgr, sb ang - sb rnd, mod-w srt, sl  
calc  
SLTY SH: med gy - dk gy, frm-sl hd,  
silty, sl calc

MD: 3,955 '  
TVD: 3,915.74 '  
Inclination: 10.2 °  
Azimuth: 208.6 °  
VS: -225.79 '

SHLY SS: off wh, lt gy - med gy, ,  
vfgr, sb ang - sb rnd, mod-w srt, sl  
calc  
SLTY SH: med gy - dk gy, frm-sl hd,  
silty, sl calc

MD: 4,050 '  
TVD: 4,009.34 '  
Inclination: 9.5 °  
Azimuth: 215.8 °  
VS: -232.45 '





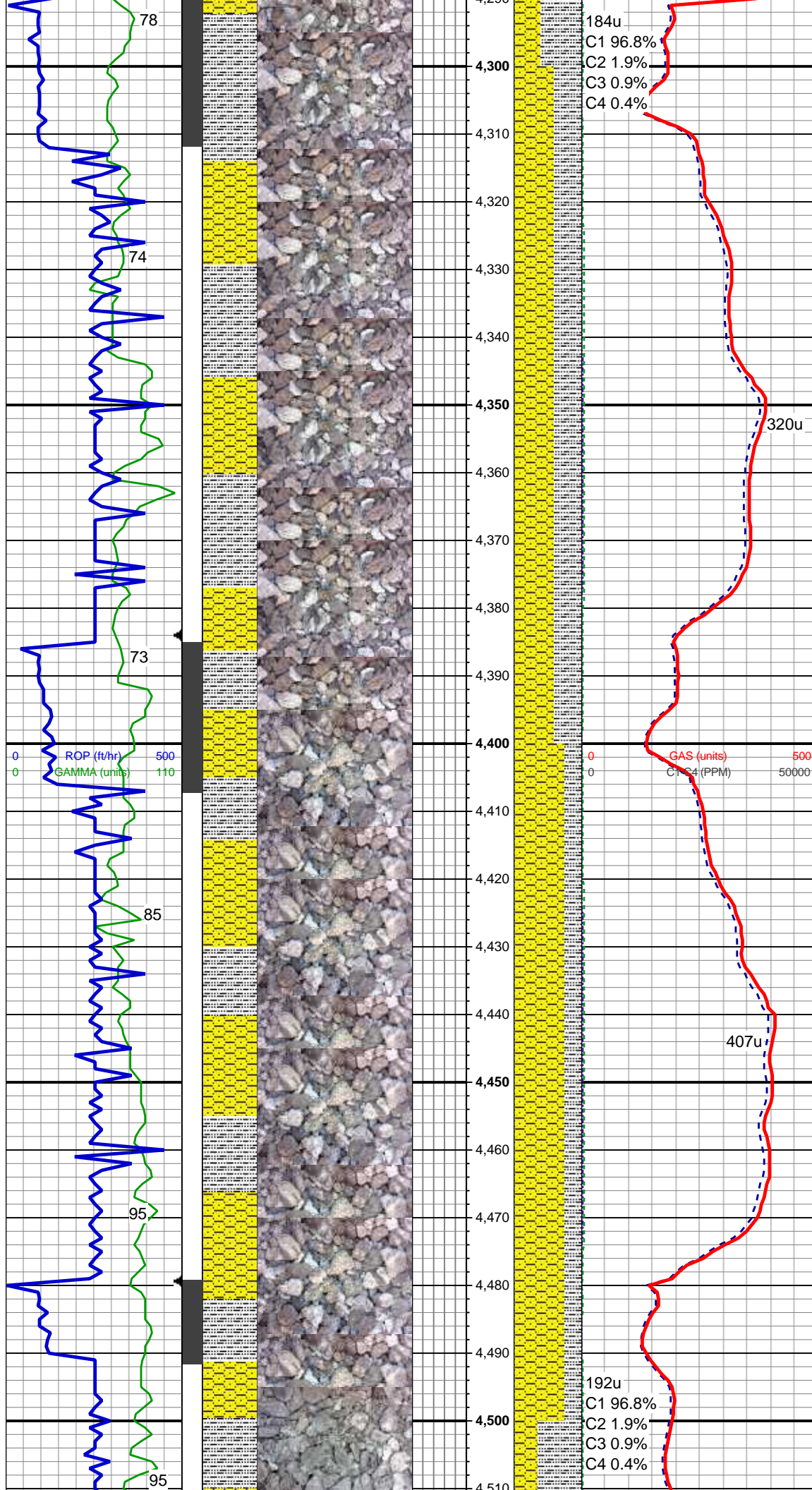
SHLY SS: off wh, lt gy - med gy, ,  
vfgr, sb ang - sb rnd, mod-w srt, sl  
calc  
SLTY SH: med gy - dk gy, frm-sl hd,  
silty, sl calc

MD: 4,145 '  
TVD: 4,102.99 '  
Inclination: 9.8 °  
Azimuth: 215.1 °  
VS: -239.83 '

SHLY SS: off wh, lt gy - med gy, ,  
vfgr, sb ang - sb rnd, mod-w srt, sl  
calc, tr pyr  
SLTY SH: med gy - dk gy, frm-sl hd,  
silty, sl calc

MD: 4,239 '  
TVD: 4,195.49 '  
Inclination: 10.7 °  
Azimuth: 215.4 °  
VS: -247.53 '





SHLY SS: off wh, lt gy - med gy, ,  
vfgr, sb ang - sb rnd, mod-w srt, sl  
calc, tr pyr  
SLTY SH: med gy - dk gy, frm-sl hd,  
slty, sl calc

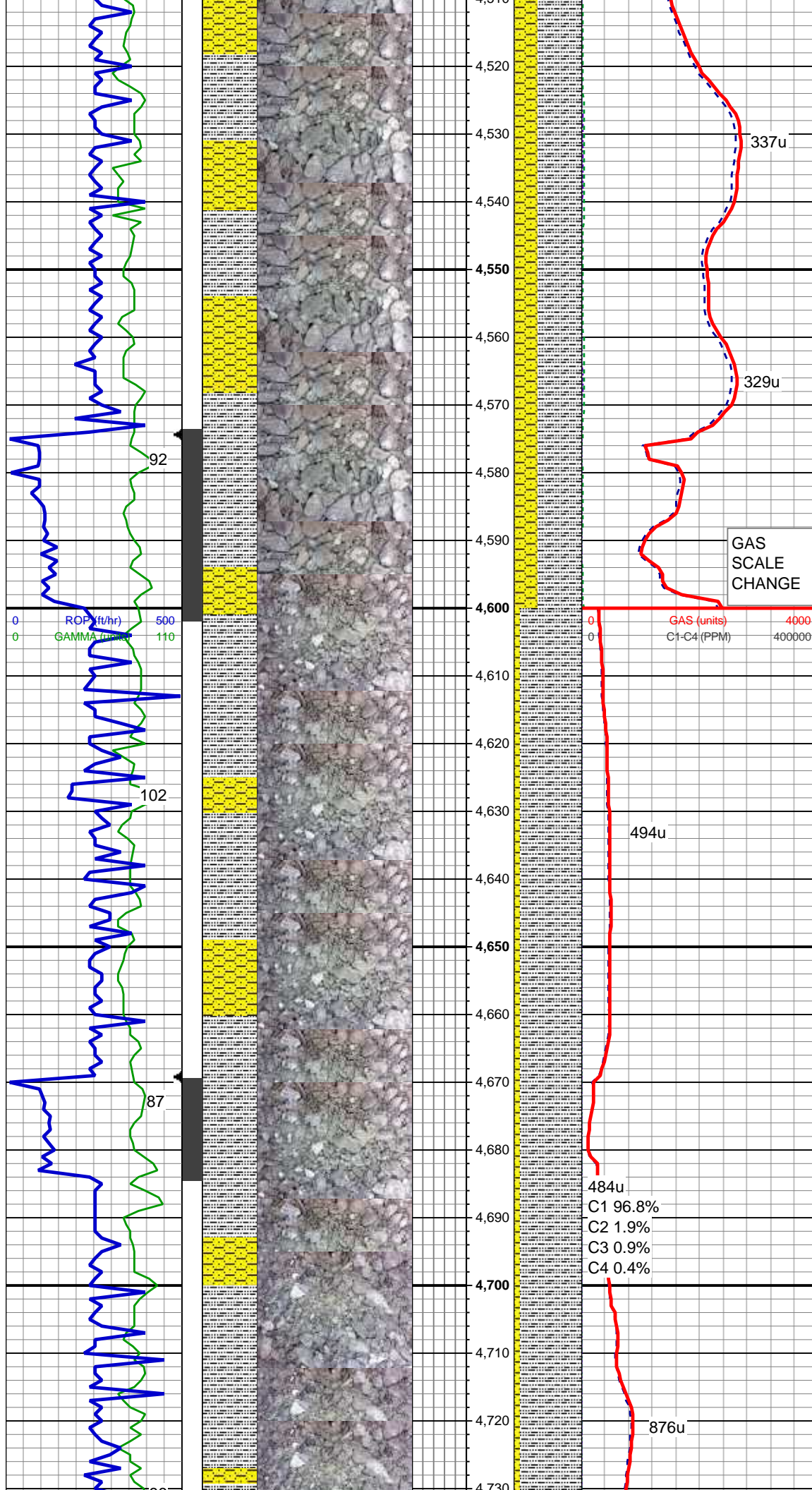
MD: 4,334 '  
TVD: 4,288.76 '  
Inclination: 11.2 °  
Azimuth: 215.9 °  
VS: -255.95 '

MUD WT 8.5/8.6 VIS 28/28

SHLY SS: off wh, lt gy - med gy, ,  
vfgr, sb ang - sb rnd, mod-w srt, sl  
calc, tr pyr  
SLTY SH: med gy - dk gy, frm-sl hd,  
slty, sl calc

MD: 4,429 '  
TVD: 4,381.75 '  
Inclination: 12.4 °  
Azimuth: 217 °  
VS: -265.26 '





MD: 4,524 '  
TVD: 4,474.71 '  
Inclination: 11.4 °  
Azimuth: 216.1 °  
VS: -274.68 '

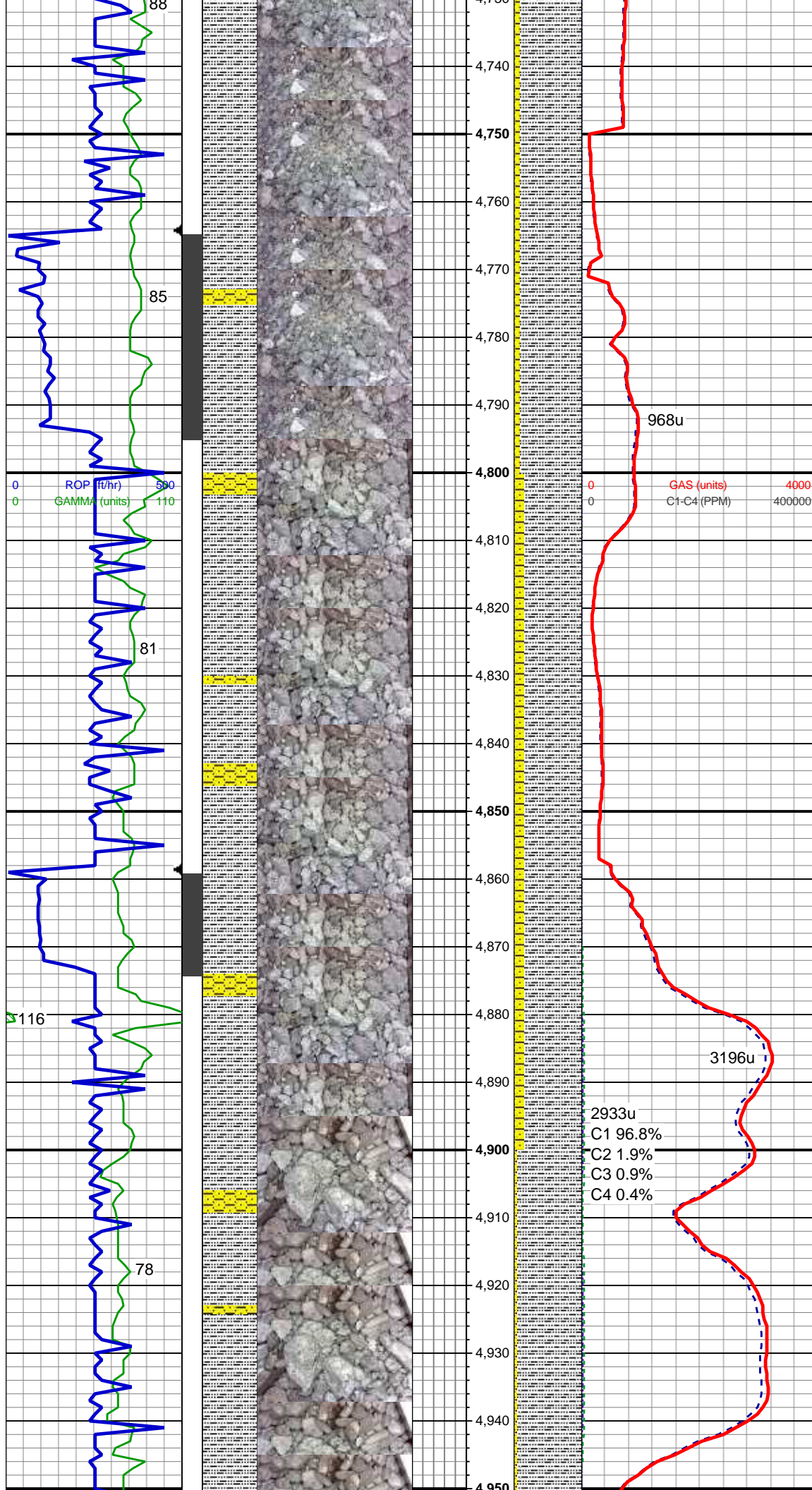
SHLY SS: off wh, lt gy - med gy, ,  
vfgr, sb ang - sb rnd, mod-w srt, sl  
calc, tr pyr  
SLTY SH: med gy - dk gy, frm-sl hd,  
slty, sl calc, tr flor

SHLY SS: off wh, lt gy - med gy, ,  
vfgr, sb ang - sb rnd, mod-w srt, sl  
calc, tr pyr  
SLTY SH: med gy - dk gy, frm-sl hd,  
slty, sl calc, tr flor

MD: 4,619 '  
TVD: 4,567.79 '  
Inclination: 11.7 °  
Azimuth: 215.9 °  
VS: -283.65 '

MD: 4,714 '  
TVD: 4,660.9 '  
Inclination: 11.2 °  
Azimuth: 217.7 °  
VS: -292.78 '

SHLY SS: off wh, lt gy - med gy, ,  
vfgr, sb ang - sb rnd, mod-w srt, sl  
calc, occ slty



SLTY SH: med gy - dk gy, frm-sl hd,  
silty, sl calc, tr flor

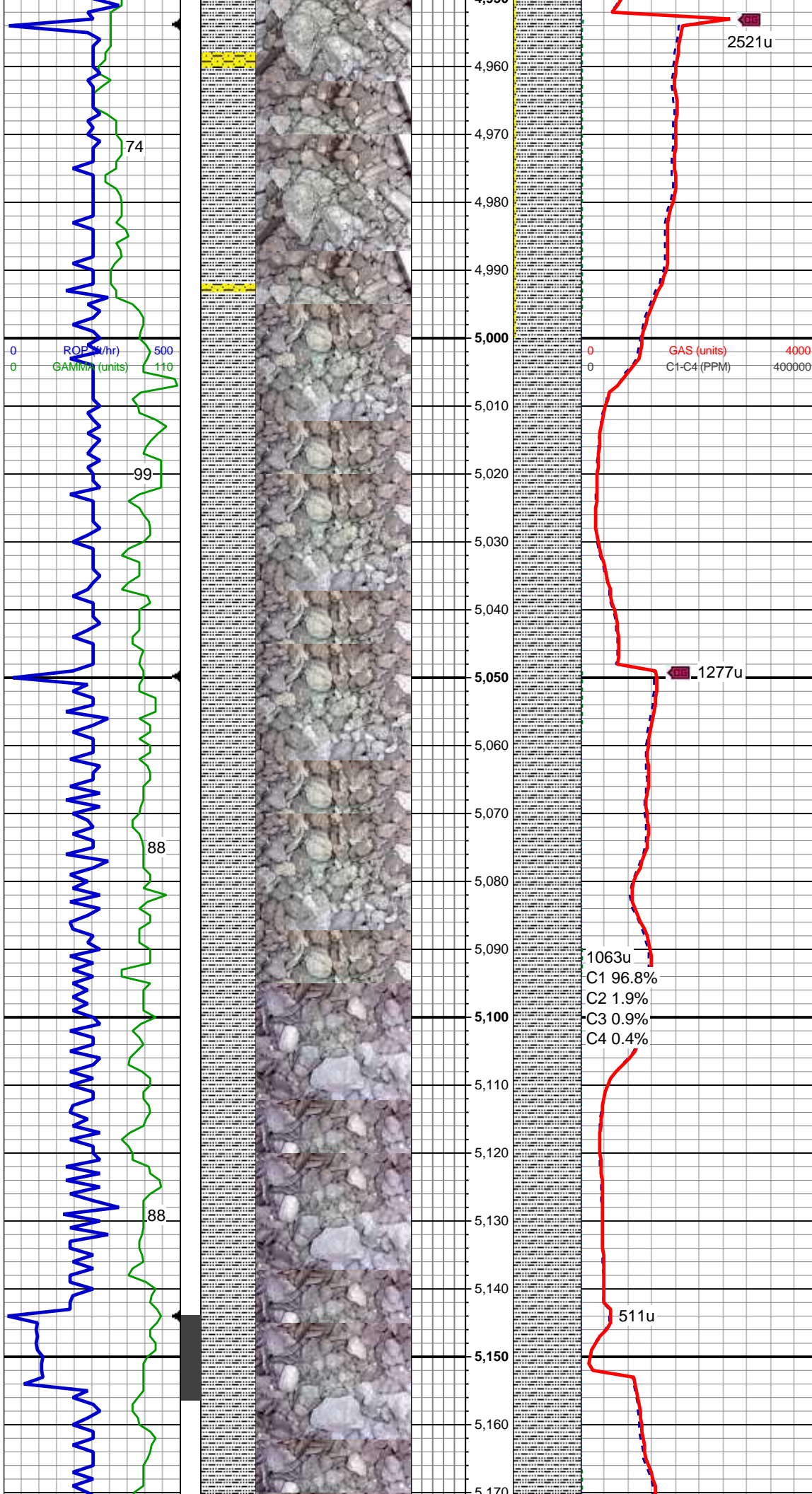
MD: 4,808 '  
TVD: 4,753.03 '  
Inclination: 11.7 °  
Azimuth: 215.2 °  
VS: -301.7 '

SHLY SS: off wh, lt gy - med gy, ,  
vfgr, sb ang - sb rnd, mod-w srt, sl  
calc, occ silty  
SLTY SH: med gy - dk gy, frm-sl hd,  
silty, sl calc, tr flor

MD: 4,903 '  
TVD: 4,845.83 '  
Inclination: 13 °  
Azimuth: 216.5 °  
VS: -311.26 '

SHLY SS: off wh, lt gy - med gy, ,  
vfgr, sb ang - sb rnd, mod-w srt, sl  
calc, occ silty  
SLTY SH: med gy - dk gy, frm-sl hd,  
silty, sl calc, tr flor





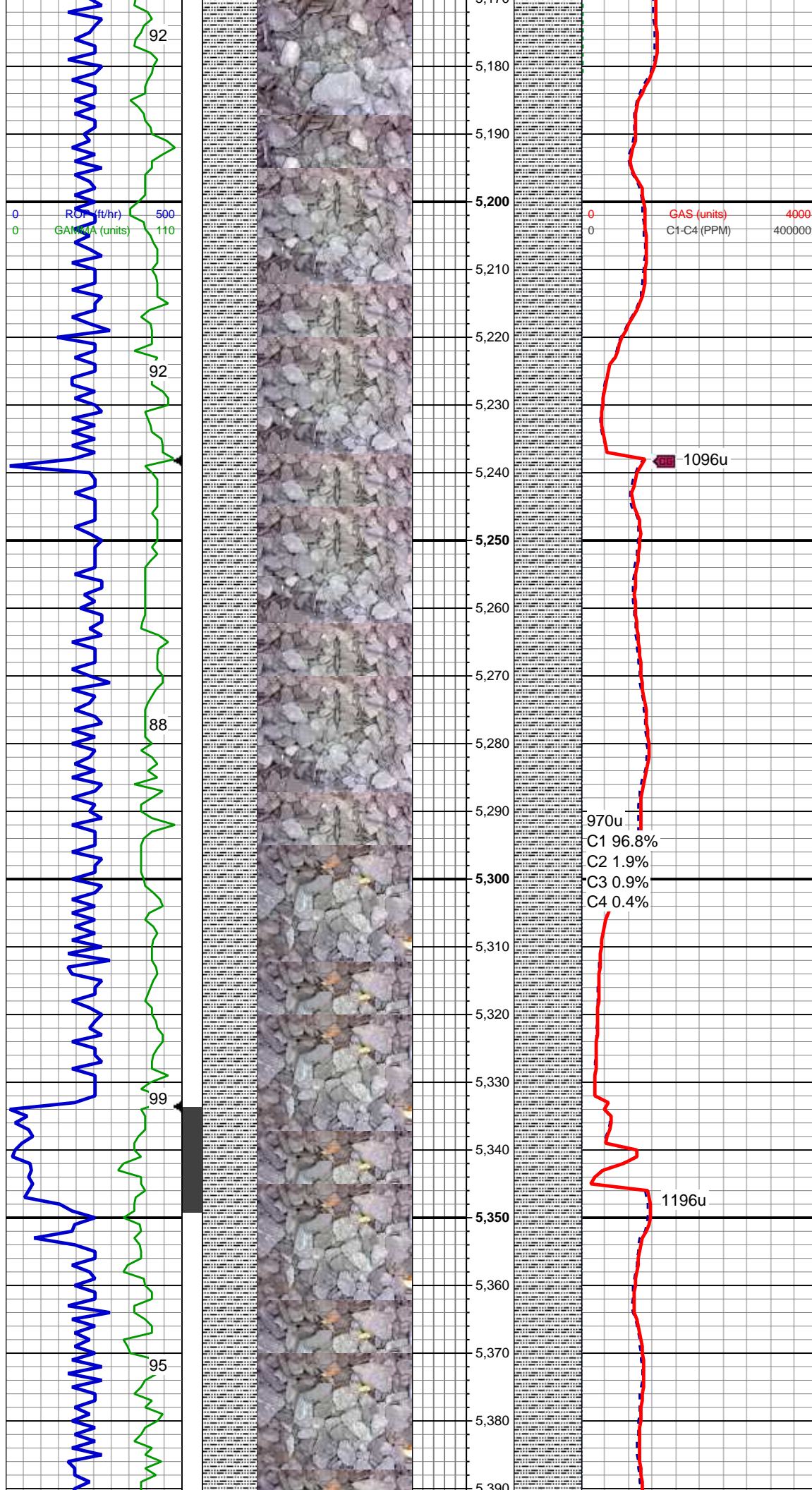
MUD WT 8.5/8.5 VIS 28/28

MD: 4,998 '  
TVD: 4,938.56 '  
Inclination: 12.1 °  
Azimuth: 212.1 °  
VS: -320.47 '

SLTY SH: dk-med gy occ blk, sb  
blky - sb plty, firm, arg, rthy grity  
mtx, sl-mod calc

MD: 5,093 '  
TVD: 5,031.84 '  
Inclination: 9.7 °  
Azimuth: 202.9 °  
VS: -326.64 '

SLTY SH: dk-med gy occ blk, sb  
blky - sb plty, firm, arg, rthy grity  
mtx, sl-mod calc



MD: 5,188 '  
TVD: 5,125.71 '  
Inclination: 8 °  
Azimuth: 197.8 °  
VS: -329.87 '

MUD WT 8.7/8.8 VIS 31/29

SLTY SH: dk-med gy occ blk, sb  
blky - sb plty, firm, arg, rthy grity  
mtx, sl-mod calc

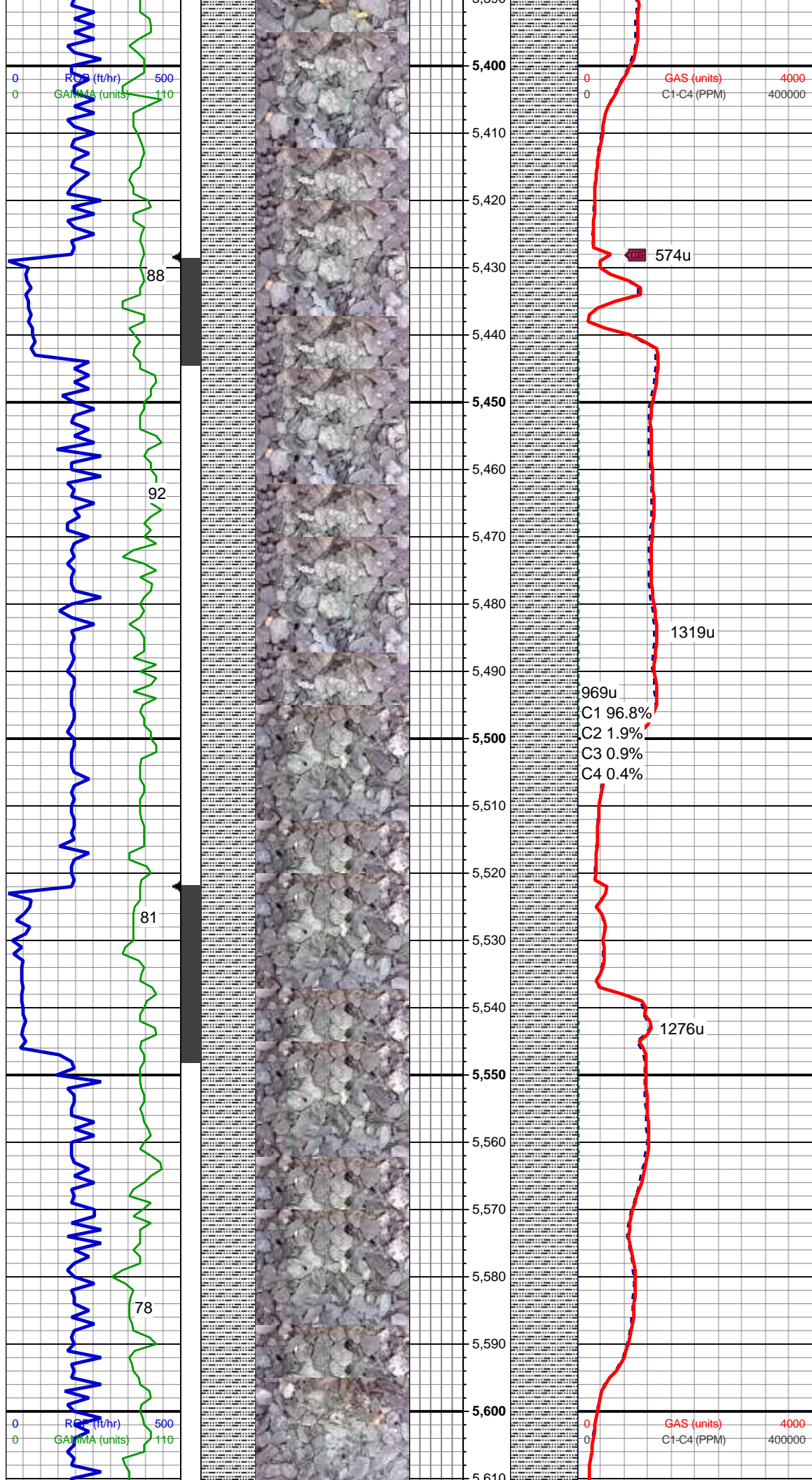
MD: 5,282 '  
TVD: 5,218.98 '  
Inclination: 6.3 °  
Azimuth: 186.1 °  
VS: -330.84 '

SLTY SH: dk-med gy occ blk, sb  
blky - sb plty, firm, arg, rthy grity  
mtx, sl-mod calc

MUD WT 8.8/8.85 VIS 30/30

MD: 5,377 '  
TVD: 5,313.53 '  
Inclination: 4.9 °  
Azimuth: 185.9 °  
VS: -330.55 '





SLTY SH: dk-med gy occ blk, sb  
blky - sb plty, firm, arg, rthy grity  
mtx, sl-mod calc

MUD WT 9.1/9.05 VIS 32/31

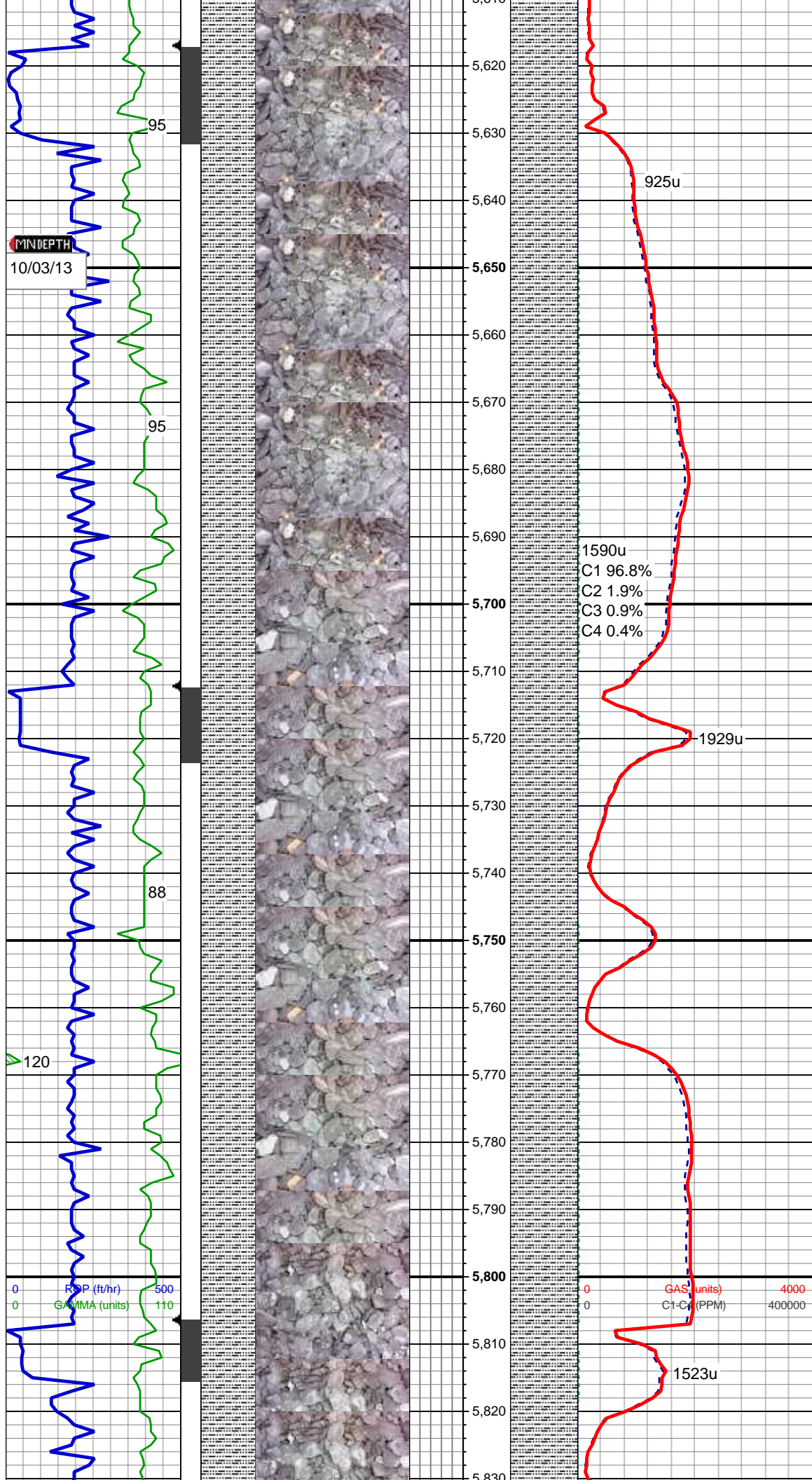
MD: 5,472 '  
TVD: 5,408.21 '  
Inclination: 4.5 °  
Azimuth: 198 °  
VS: -331.07 '

MUD WT 9.8/9.7 VIS 31/31

SLTY SH: dk-med gy occ blk, sb  
blky - sb plty, firm, arg, rthy grity  
mtx, sl-mod calc

MD: 5,567 '  
TVD: 5,503 '  
Inclination: 3.2 °  
Azimuth: 218.6 °  
VS: -333.08 '

MUD WT 10.0/9.9 VIS 30/31



SLTY SH: dk-med gy occ blk, sb  
blky - sb plty, firm, arg, rthy grity  
mtx, sl-mod calc

MD: 5,662 '  
TVD: 5,597.88 '  
Inclination: 2.5 °  
Azimuth: 234.2 °  
VS: -335.94 '

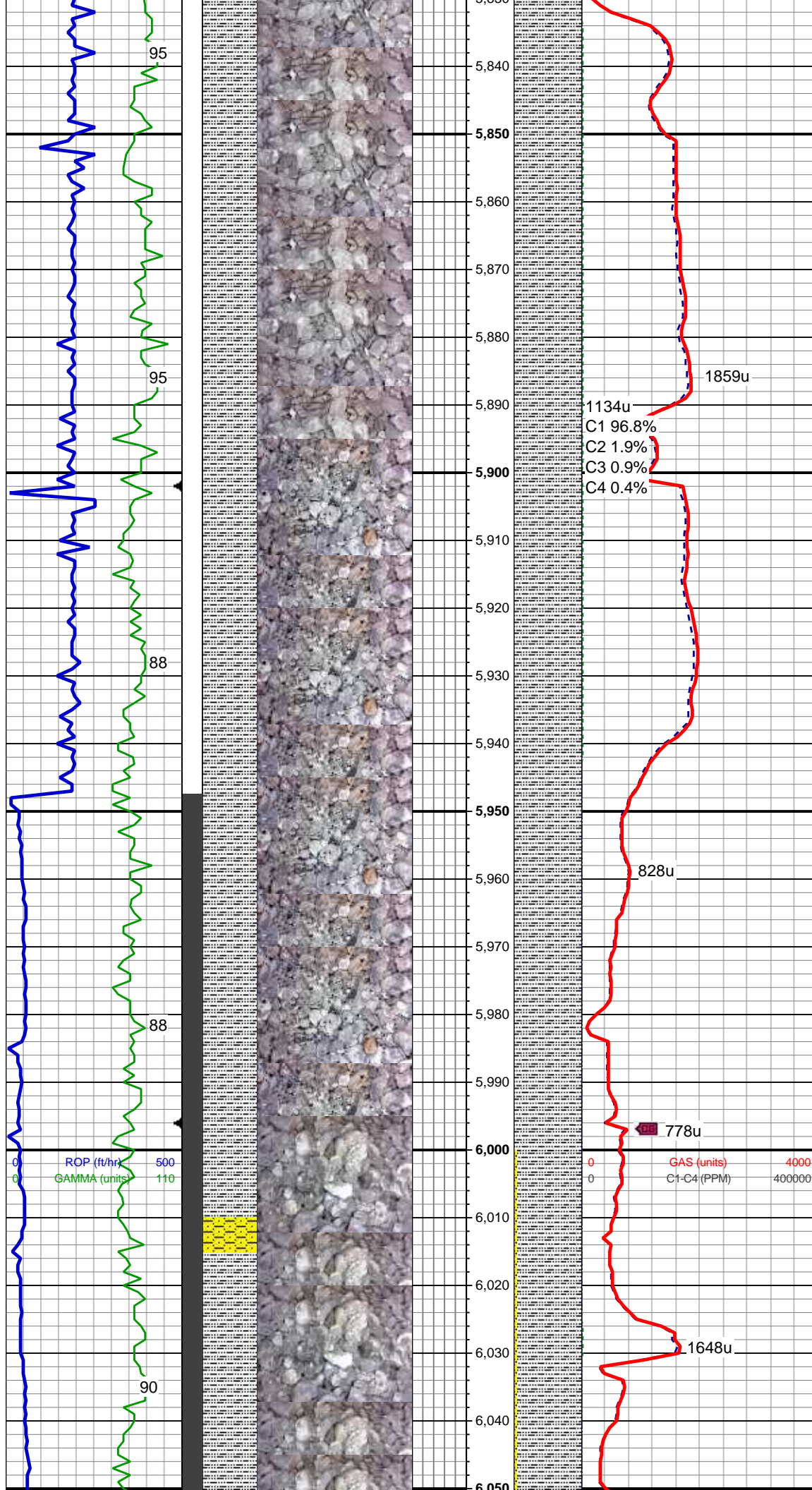
MUD WT 10.25/10.1 VIS 32/31

SLTY SH: dk-med gy occ blk, sb  
blky - sb plty, firm, arg, rthy grity  
mtx, sl-mod calc

MD: 5,757 '  
TVD: 5,692.81 '  
Inclination: 2 °  
Azimuth: 252 °  
VS: -338.93 '

SLTY SH: dk-med gy occ blk, sb  
blky - sb plty, firm, arg, rthy grity





mtx, sl-mod calc

MD: 5,851 '  
TVD: 5,786.78 '  
Inclination: 0.4 °  
Azimuth: 219.8 °  
VS: -340.58 '

MUD WT 10.5/10.35 VIS 31/31

MUD WT 10.8/10.7 VIS 31/31

MD: 5,946 '  
TVD: 5,881.77 '  
Inclination: 1.6 °  
Azimuth: 140.7 °  
VS: -339.78 '

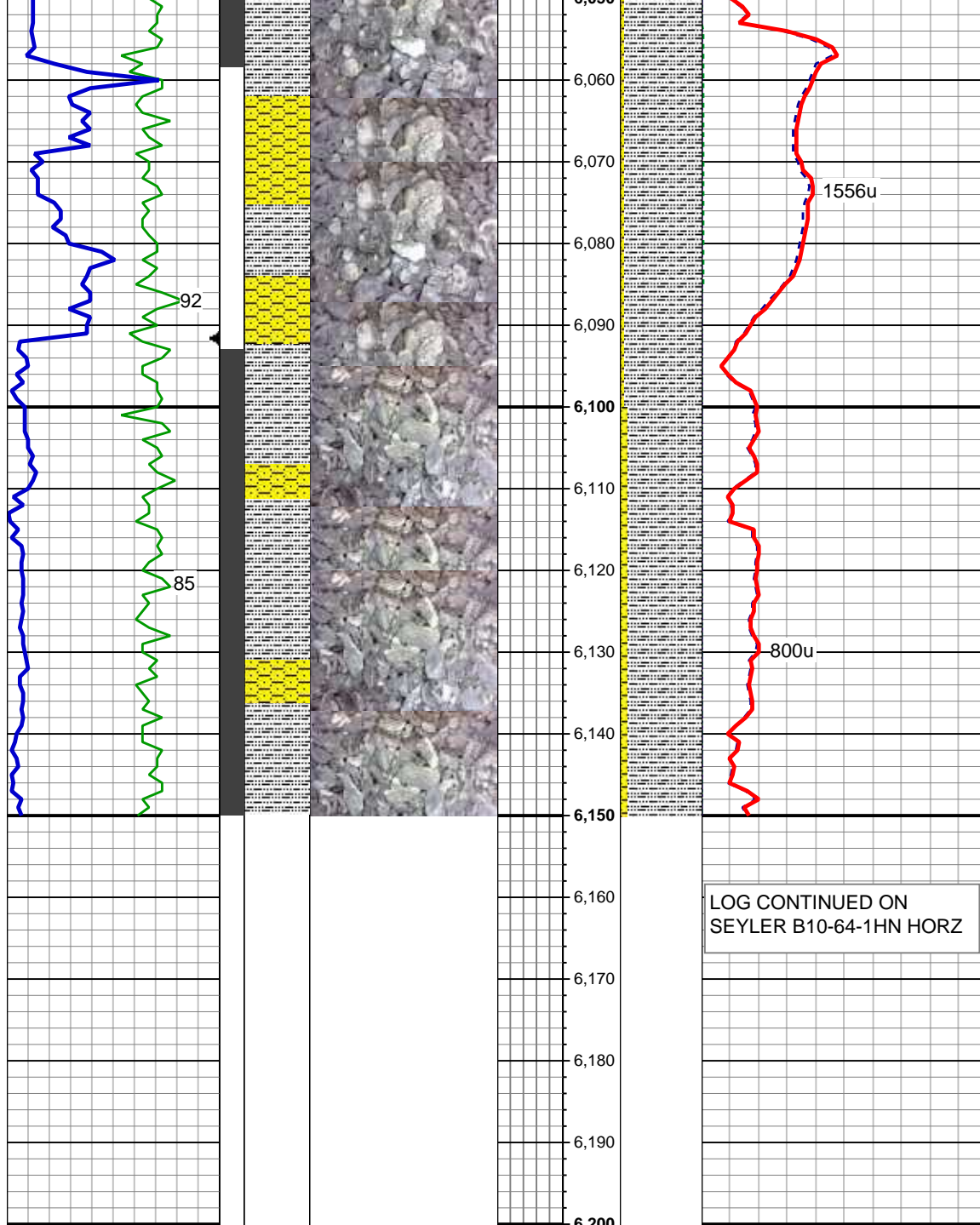
SLTY SH: dk-med gy occ blk, sb  
blkly - sb plty, firm, arg, rthy grity  
mtx, sl-mod calc

MUD WT 10.8/10.8 VIS 31/31

SLTY SH: dk-med gy occ blk, sb  
blkly - sb plty, firm, arg, rthy grity  
mtx, sl-mod calc  
SHLY SS: off wh, lt gy - med gy, ,  
vfgr, sb ang - sb rnd, mod-w srt, sl  
calc, occ slty

MD: 6,041 '  
TVD: 5,976.31 '  
Inclination: 9.1 °  
Azimuth: 90.8 °  
VS: -331.31 '

VS: -331.34'



MUD WT 10.8/10.8 VIS 31/31

SLTY SH: dk-med gy occ blk, sb  
blky - sb plty, firm, arg, rthy grity  
mtx, sl-mod calc  
SHLY SS: off wh, lt gy - med gy, ,  
vfgr, sb ang - sb rnd, mod-w srt, sl  
calc, occ slty

MD: 6,136 '  
TVD: 6,069.4 '  
Inclination: 13.8 °  
Azimuth: 95.5 °  
VS: -312.55 '