

# COLUMBINE LOGGING

Scale: 5" / 100'  
Measured Depth Log

**Well Name** 70 Ranch 04-63-03-4841CH

**Location** NWSW S3 T4N R63W

**State** COLORADO

**County** WELD

**Country** USA

**Rig Number** NABORS M37

**API Number** 05-123-37993

**AFE #** 18534D

**Region** DJ BASIN

**Field** WATTENBERG

**Spud Date** 12/27/2013

**Drilling Completed** 1/2/2014

**Surface Coordinates** 1973' FSL, 234' FWL

**Bottom Hole Coordinates** 1844' FSL, 500' FEL

**Ground Elevation** 4560'

**K.B. Elevation** 4583'

**Logged Interval** 4000' **To** 10889'

**Total Depth** 10889'

**Formation** NIOBRARA C CHALK

**Type of Drilling Fluid** H2O, LSND

## Operator

**Company** Bill Barrett Corporation

**Address** 1099 18th St., Ste. 2300  
Denver, CO 80202

## Geologist

**Name** John Roesink

**Company** Bill Barrett Corporation

**Address** 1099 18th St., Ste. 2300  
Denver, CO 80202

## Other

## 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

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

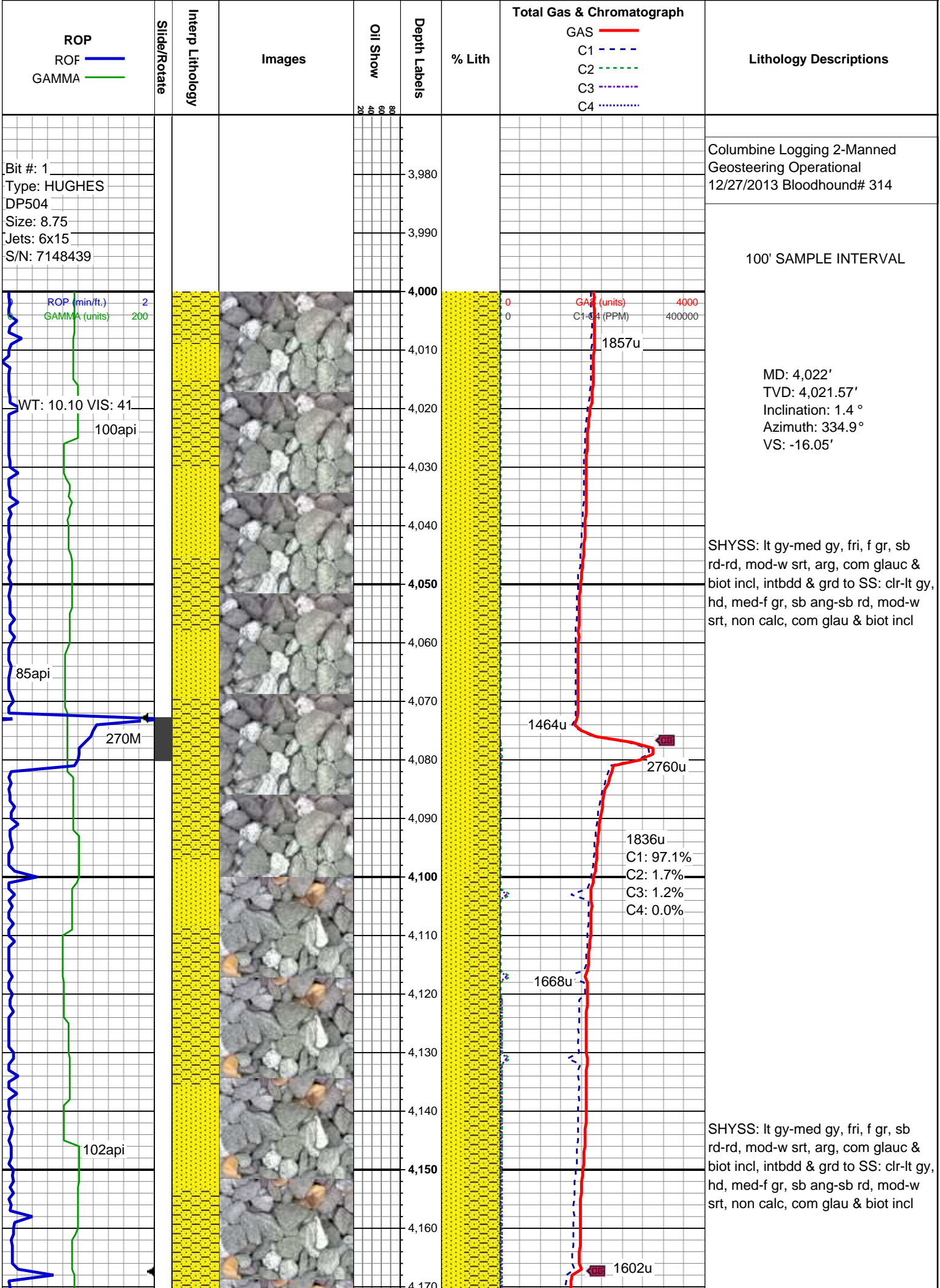
BOUNDSTONE  
CHALKY  
CRYPTOXLN

## E EARTHY

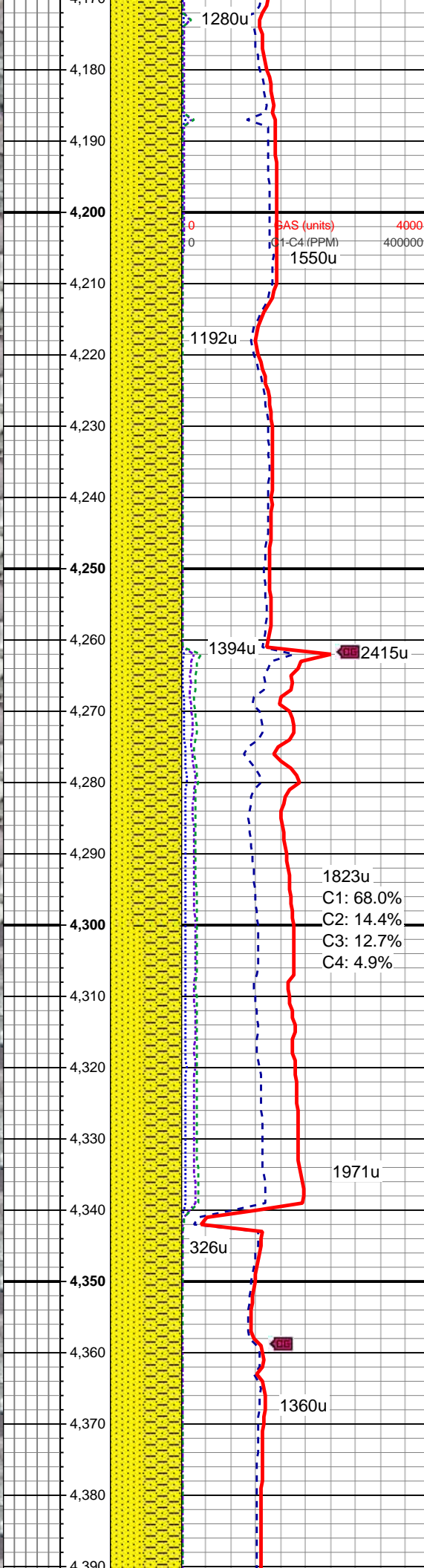
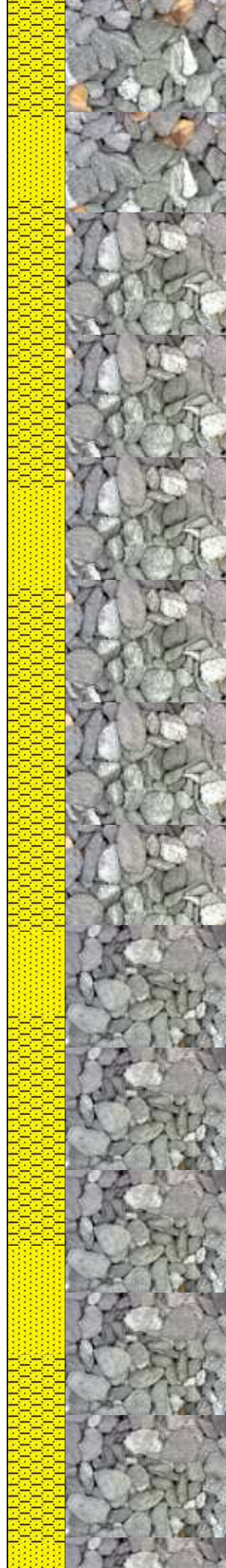
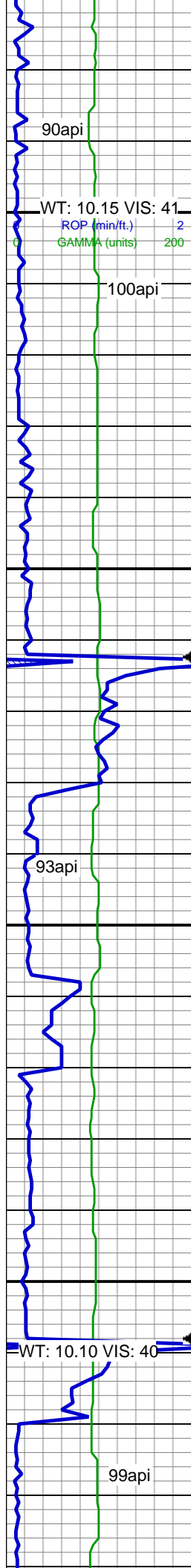
F FINELYXLN  
G GRAINSTONE  
L LITHOGRAPHIC  
M MICROXLN  
MS MUDSTONE  
PS PACKSTONE  
W WACKESTONE

## Sorting

M MODERATE  
P POOR  
W WELL



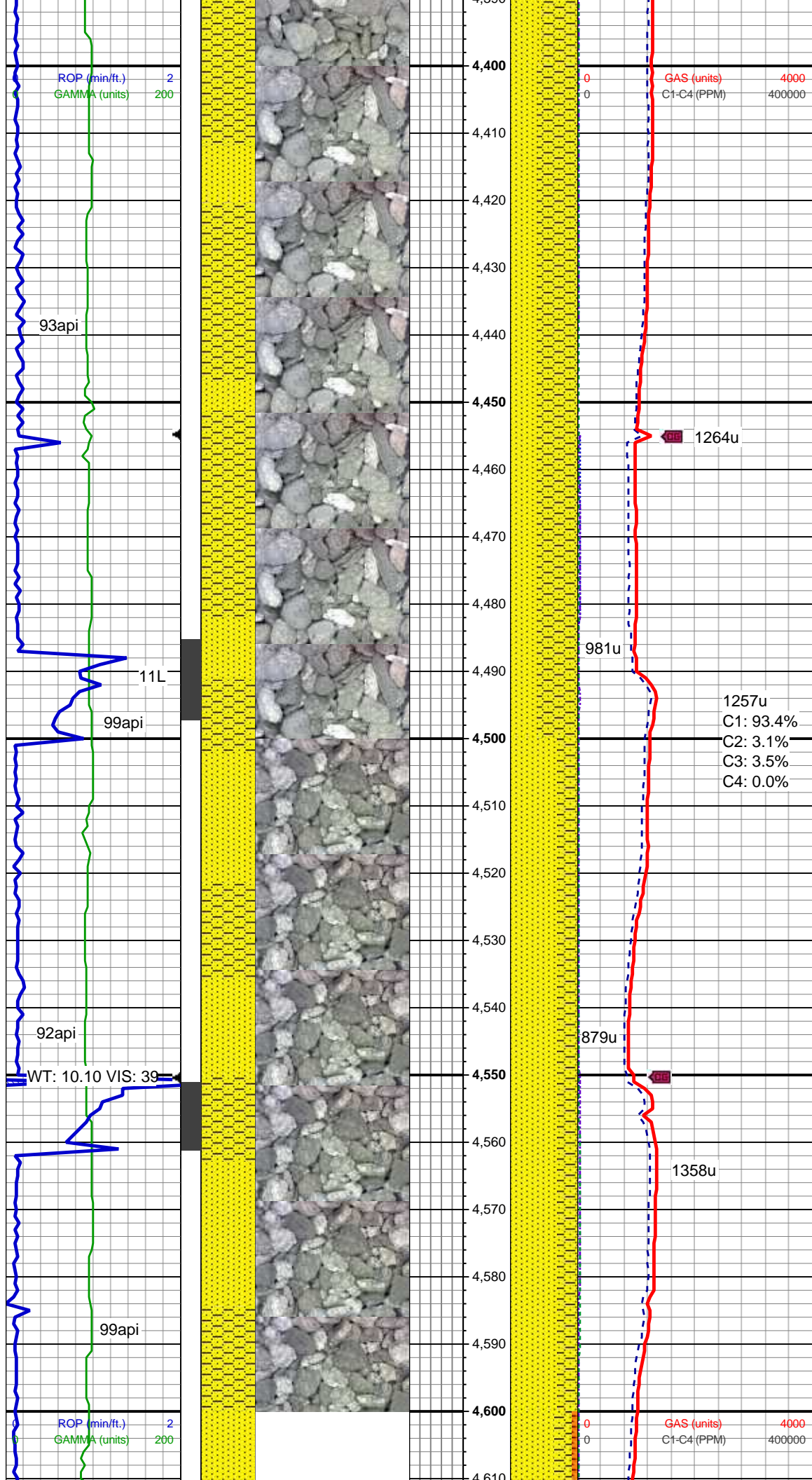




SHYSS: lt gy-med gy, fri, f gr, sb  
rd-rd, mod-w srt, arg, com glauc &  
biot incl, intbdd & grd to SS: clr-lt gy,  
hd, med-f gr, sb ang-sb rd, mod-w  
srt, non calc, com glau & biot incl

MD: 4,310'  
TVD: 4,309.44'  
Inclination: 2.2 °  
Azimuth: 287 °  
VS: -22.9'

SHYSS: lt gy-med gy, fri, f gr, sb  
rd-rd, mod-w srt, arg, com glauc &  
biot incl, intbdd & grd to SS: clr-lt gy,  
hd, med-f gr, sb ang-sb rd, mod-w  
srt, non calc, com glau & biot incl

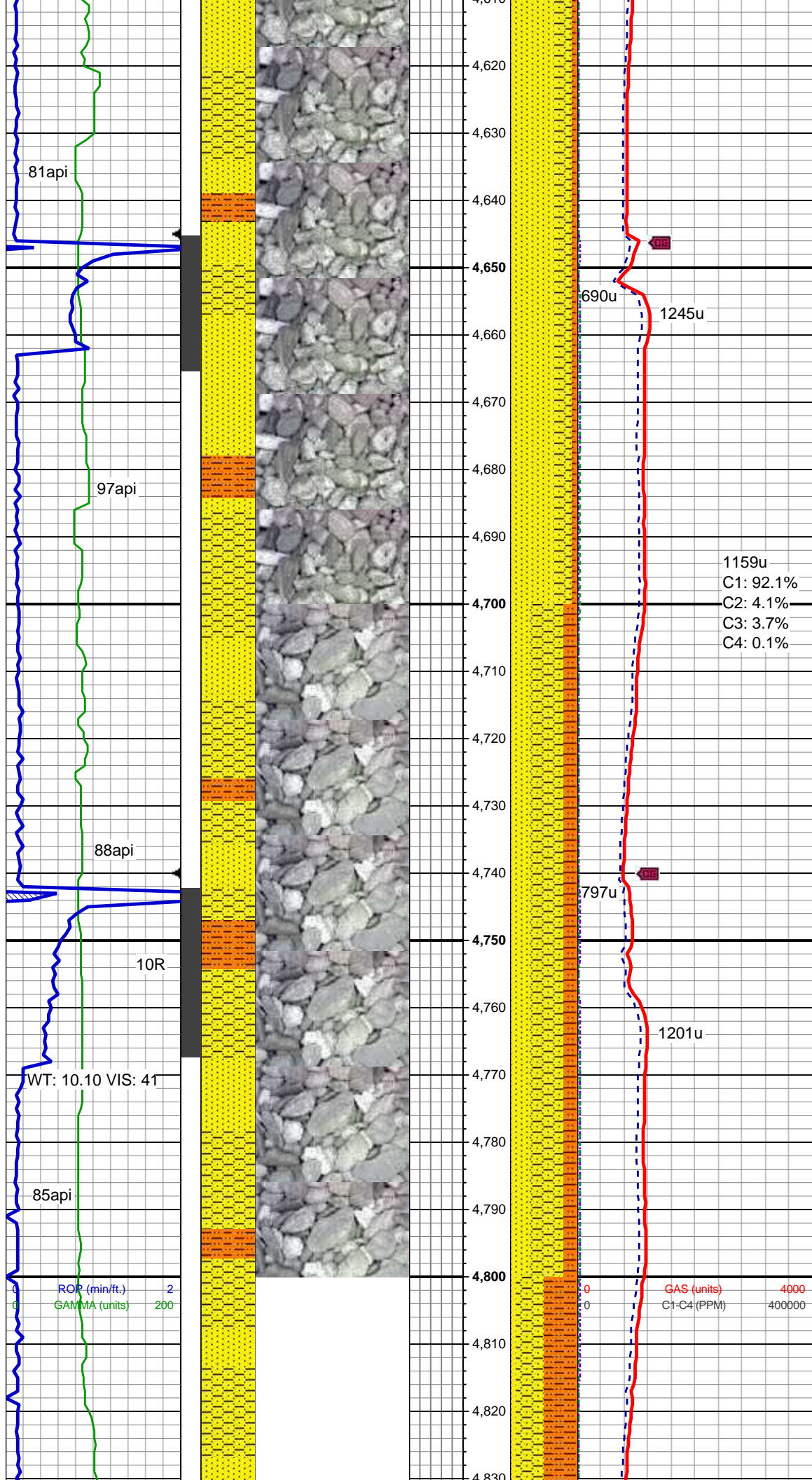


SHYSS: lt gy-med gy, fri, f gr, sb  
rd-rd, mod-w srt, arg, com glauc &  
biot incl, intbdd & grd to SS: clr-lt gy,  
hd, med-f gr, sb ang-sb rd, mod-w  
srt, non calc, com glau & biot incl

SHYSS: lt gy-med gy, fri, f gr, sb  
rd-rd, mod-w srt, arg, com glauc &  
biot incl, intbdd & grd to SS: clr-lt gy,  
hd, med-f gr, sb ang-sb rd, mod-w  
srt, non calc, com glau & biot incl

MD: 4,595'  
TVD: 4,593.84'  
Inclination: 5.1 °  
Azimuth: 265.7°  
VS: -40.78'

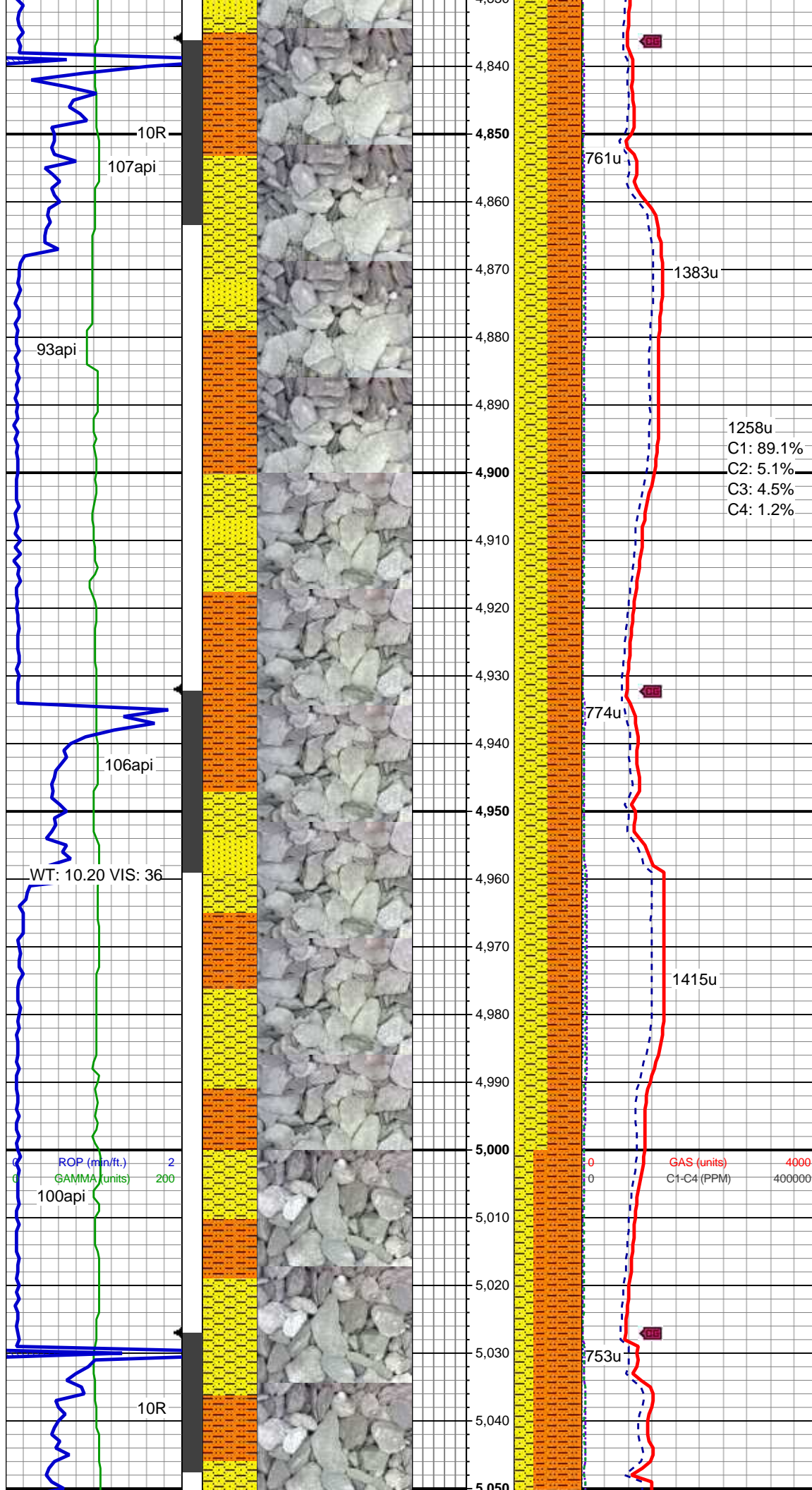




SS: clr-lt gy, hd, med-f gr, sb ang-sb rd, mod-w srt, non calc, com glau incl, SHYSS: lt gy-med gy, fri, f gr, sb rd-rd, mod-w srt, arg, com glauc incl, SHY SLTST: gy-dk gy, frm-hd, blk-y-sb blk-y, occ sb blk-y-sb plty, gr-rthy, occ sd, non calc, qtz gr, occ cmt, arg

1159u  
C1: 92.1%  
C2: 4.1%  
C3: 3.7%  
C4: 0.1%

SS: clr-lt gy, hd, med-f gr, sb ang-sb rd, mod-w srt, non calc, com glau incl, SHYSS: lt gy-med gy, fri, f gr, sb rd-rd, mod-w srt, arg, com glauc incl, SHY SLTST: gy-dk gy, frm-hd, blk-y-sb blk-y, occ sb blk-y-sb plty, gr-rthy, occ sd, non calc, qtz gr, occ cmt, arg



SHY SLTST: gy-dk gy, frm-hd, blky-sb blky, occ sb blky-sb plty, gr-rthy, occ sd, non calc, qtz gr, occ cmt, arg, SHYSS: lt gy-med gy, fri, f gr, sb rd-rd, mod-w srt, arg, com glauc incl, SS: clr-lt gy, hd, med-f gr, sb ang-sb rd, mod-w srt, non calc, com glau incl

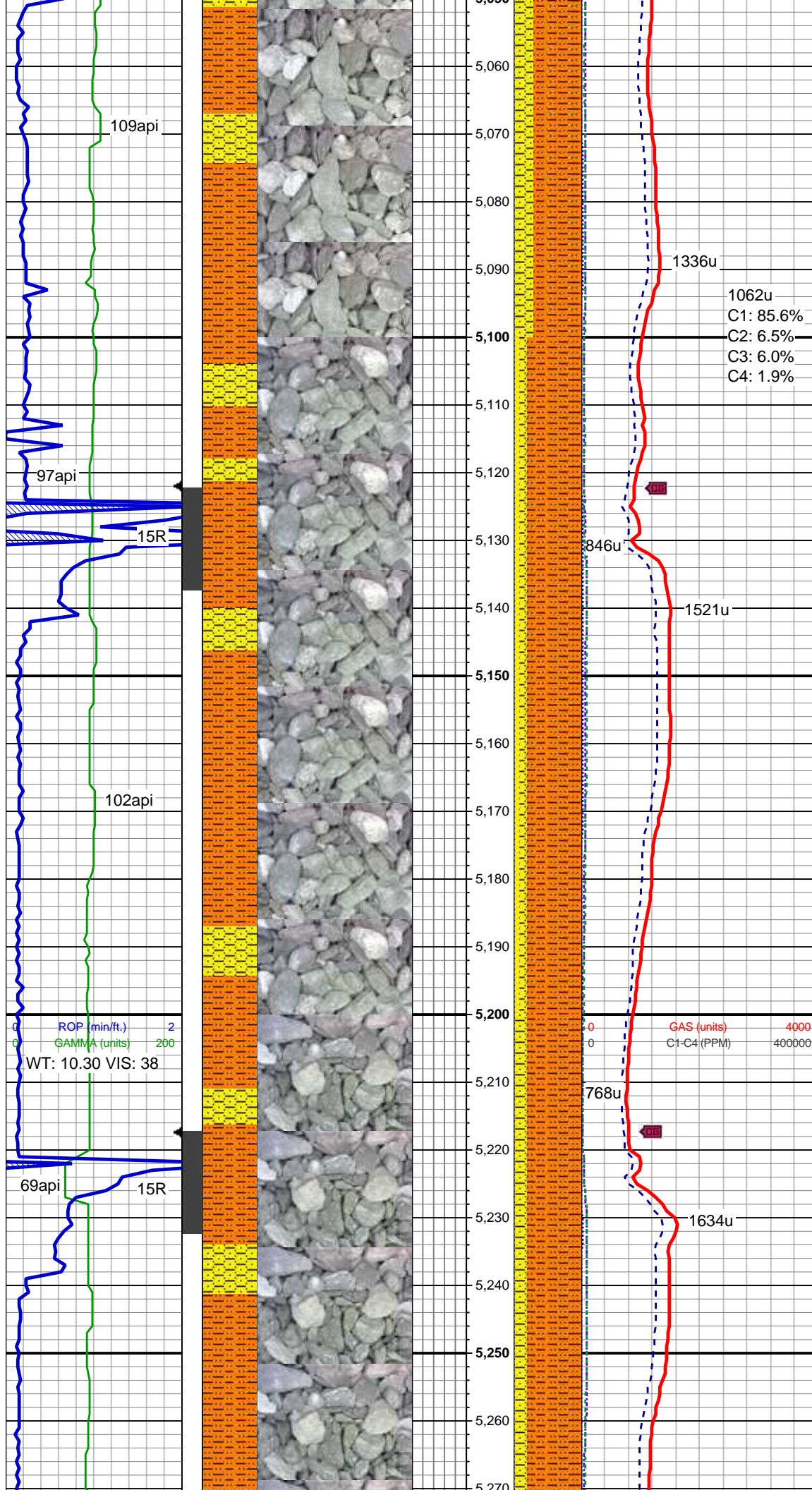
MD: 4,882'  
TVD: 4,878.68'  
Inclination: 8.8 °  
Azimuth: 271.3 °  
VS: -75.45'

1258u  
C1: 89.1%  
C2: 5.1%  
C3: 4.5%  
C4: 1.2%

SHY SLTST: gy-dk gy, frm-hd, blky-sb blky, occ sb blky-sb plty, gr-rthy, occ sd, non calc, qtz gr, occ cmt, arg, SHYSS: lt gy-med gy, fri, f gr, sb rd-rd, mod-w srt, arg, com glauc incl, SS: clr-lt gy, hd, med-f gr, sb ang-sb rd, mod-w srt, non calc, com glau incl

SHY SLTST: gy-dk gy, frm-hd, blky-sb blky, occ sb blky-sb plty, gr-rthy, occ sd, non calc, qtz gr, occ





cmt, arg, SHYSS: lt gy-med gy, fri, f  
gr, sb rd-rd, mod-w srt, arg, com  
glauc incl, tr SS

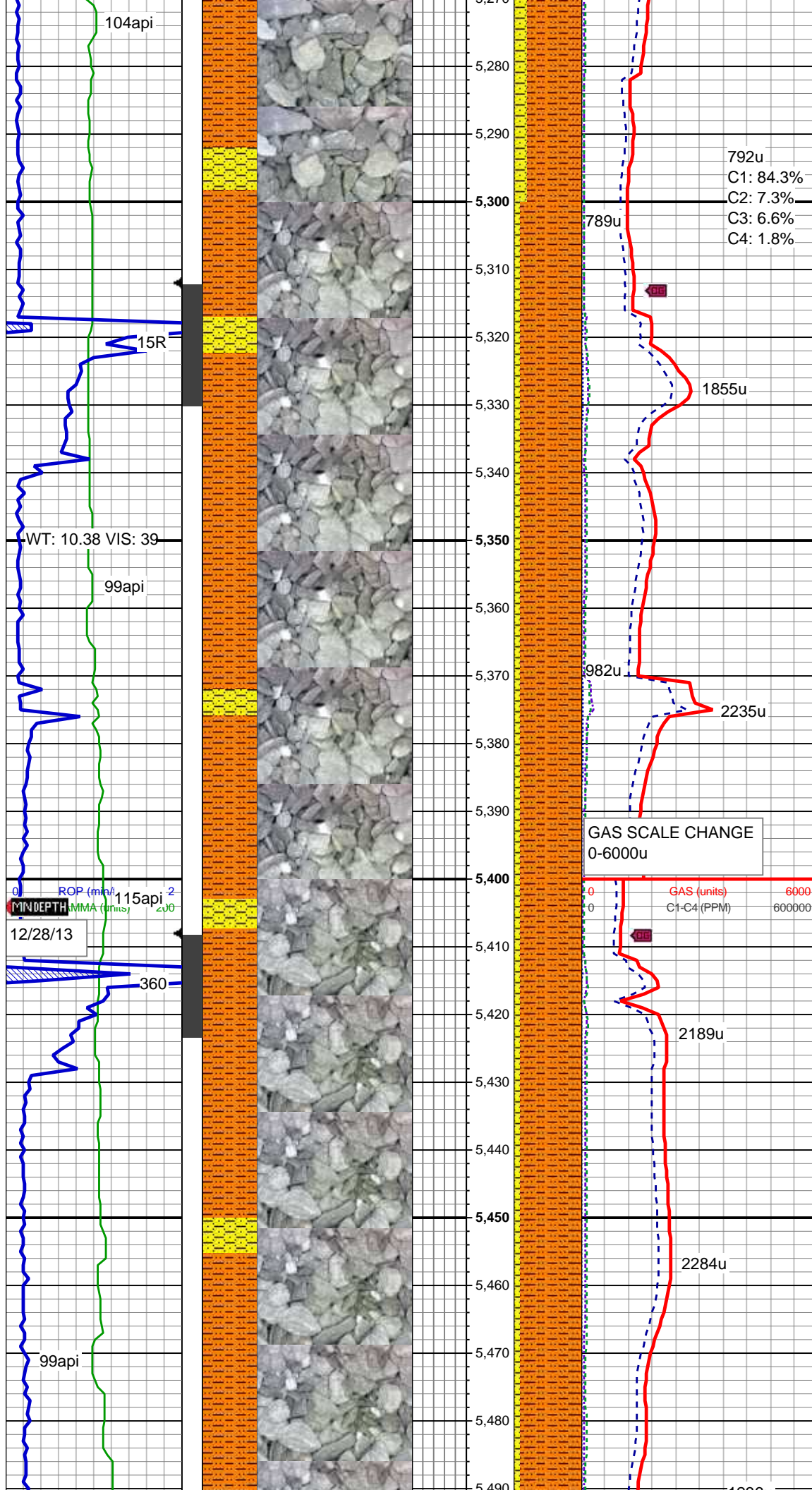
SHY SLTST: gy-dk gy, frm-hd,  
blky-sb blky, occ sb blky-sb plty,  
gr-rthy, occ sd, non calc, qtz gr, occ  
cmt, arg, SHYSS: lt gy-med gy, fri, f  
gr, sb rd-rd, mod-w srt, arg, com  
glauc incl, tr SS

MD: 5,167'  
TVD: 5,160.21'  
Inclination: 9.1 °  
Azimuth: 271.5 °  
VS: -119.78'

SHY SLTST: gy-dk gy, frm-hd,  
blky-sb blky, occ sb blky-sb plty,  
gr-rthy, occ sd, non calc, qtz gr, occ  
cmt, arg, SHYSS: lt gy-med gy, fri, f  
gr, sb rd-rd, mod-w srt, arg, com  
glauc incl, tr SS

MD: 5,262'  
TVD: 5,254.06'





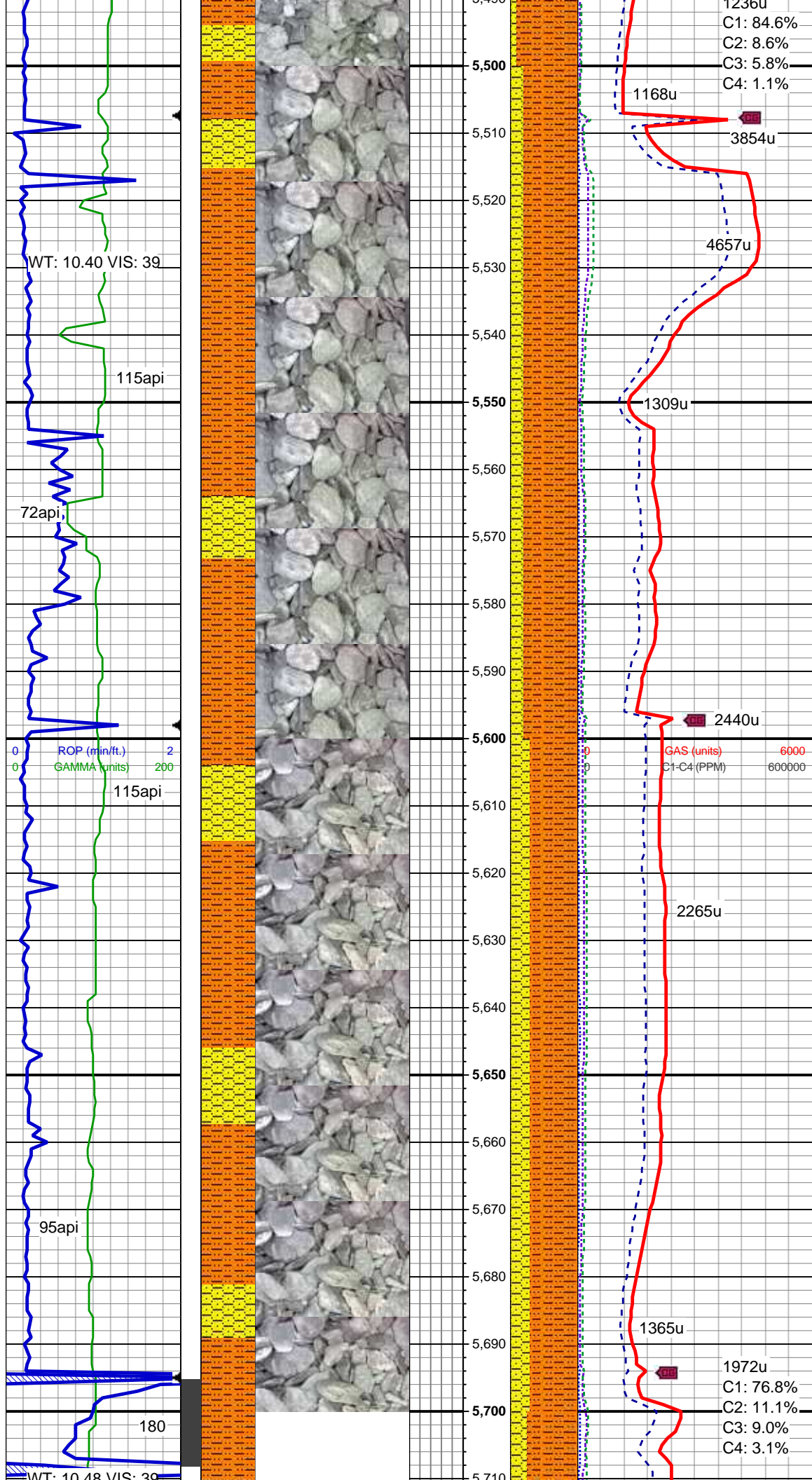
Inclination: 8.8 °  
Azimuth: 271.1 °  
VS: -134.56'

MD: 5,358'  
TVD: 5,348.98'  
Inclination: 8.4 °  
Azimuth: 274.5 °  
VS: -148.9'

SHY SLTST: gy-dk gy, frm-hd, blky-sb blky, occ sb blky-sb plty, gr-rthy, occ sd, non calc, qtz gr, occ cmt, arg, SHYSS: lt gy-med gy, fri, f gr, sb rd-rd, mod-w srt, arg, com glauc incl, tr SS

MD: 5,454'  
TVD: 5,443.95'  
Inclination: 8.4 °  
Azimuth: 270.8 °  
VS: -162.91'

SHY SLTST: gy-dk gy, frm-hd, blky-sb blky, occ sb blky-sb plty, gr-rthy, occ sd, non calc, qtz gr, occ cmt, arg, SHYSS: lt gy-med gy, fri, f gr, sb rd-rd, mod-w srt, arg, com glauc incl, tr SS



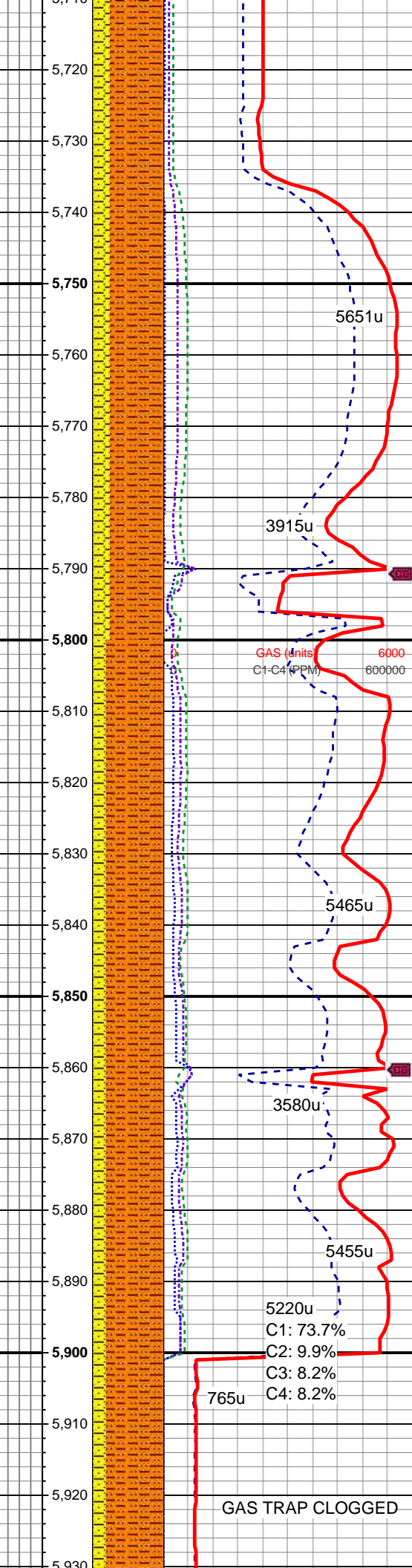
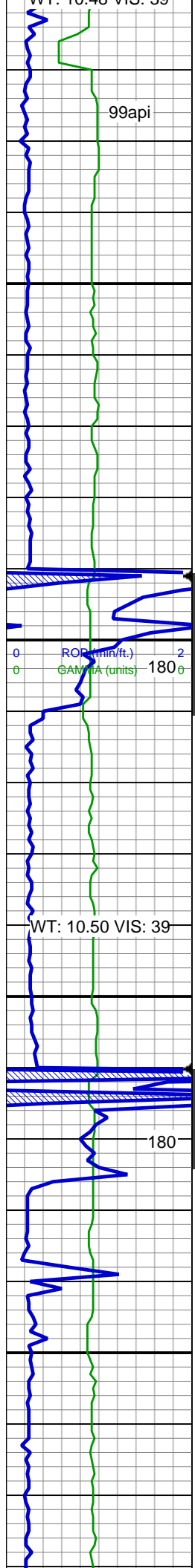
MD: 5,550'  
TVD: 5,539.12'  
Inclination: 6.6 °  
Azimuth: 268.3 °  
VS: -175.44'

SHY SLTST: gy-dk gy, frm-hd,  
blky-sb blky, occ sb blky-sb plty,  
gr-rthy, occ sd, non calc, qtz gr, occ  
cmt, arg, SHYSS: lt gy-med gy, fri, f  
gr, sb rd-rd, mod-w srt, arg, com  
glauc incl, tr SS

MD: 5,645'  
TVD: 5,633.59'  
Inclination: 5.6 °  
Azimuth: 263.4 °  
VS: -185.49'

SHY SLTST: gy-dk gy, frm-hd,  
blky-sb blky, occ sb blky-sb plty,  
gr-rthy, occ sd, non calc, qtz gr, occ  
cmt, arg, SHYSS: lt gy-med gy, fri, f  
gr, sb rd-rd, mod-w srt, arg, com  
glauc incl, tr SS





MD: 5,741'  
TVD: 5,729.29'  
Inclination: 3.3 °  
Azimuth: 266.6 °  
VS: -192.89'

SHY SLTST: gy-dk gy, frm-hd, blky-sb blky, occ sb blky-sb plty, gr-rthy, occ sd, non calc, qtz gr, occ cmt, arg, SHYSS: lt gy-med gy, fri, f gr, sb rd-rd, mod-w srt, arg, com glauc incl, tr SS

MD: 5,836'  
TVD: 5,824.21'  
Inclination: 1.2 °  
Azimuth: 253 °  
VS: -196.56'

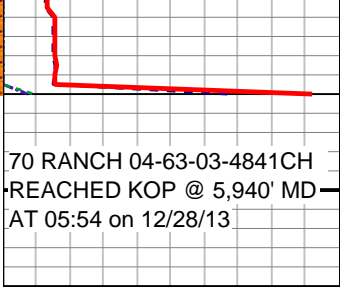
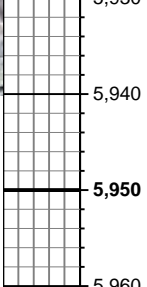
SHY SLTST: gy-dk gy, frm-hd, blky-sb blky, occ sb blky-sb plty, gr-rthy, occ sd, non calc, qtz gr, occ cmt, arg, SHYSS: lt gy-med gy, fri, f gr, sb rd-rd, mod-w srt, arg, com glauc incl, tr SS

MD: 5,890'  
TVD: 5,878.21'  
Inclination: 0.3 °  
Azimuth: 161.1 °  
VS: -197.05'

MD: 5,919'  
TVD: 5,907.21'  
Inclination: 0.1 °  
Azimuth: 8 °  
VS: -197.02'

SHY SLTST: gy-dk gy, frm-hd, blky-sb blky, occ sb blky-sb plty, gr-rthy, occ sd, non calc, qtz gr, occ cmt, arg, SHYSS: lt gy-med gy, fri, f gr, sb rd-rd, mod-w srt, arg, com glauc incl, tr SS

THANK YOU FOR  
CHOOSING  
COLUMBINE  
LOGGING, INC.



cmt, arg, SHYSS: lt gy-med gy, tri, r  
gr, sb rd-rd, mod-w srt, arg, com  
glauc incl, tr SS

70 RANCH 04-63-03-4841CH  
REACHED KOP @ 5,940' MD  
AT 05:54 on 12/28/13

LOG CONTINUED ON 70  
RANCH 04-63-03-4841CH HZ