

# COLUMBINE LOGGING

Scale: 5" / 100'  
Measured Depth Log

**Well Name** Qualls 3C-28H Vertical Final

**Location** S28 T3N R68W

**State** COLORADO

**County** WELD

**Country** USA

**Rig Number** H&P 278

**API Number** 05-123-37047

**AFE #** 13174483

**Region** DJ BASIN

**Field** WATTENBERG

**Spud Date** 7/6/2013

**Drilling Completed** 8/12/2013

**Surface Coordinates** 802' FSL, 281' FWL

**Bottom Hole Coordinates** 1486' FSL, 460' FEL

**Ground Elevation** 4957

**K.B. Elevation** 4982

**Logged Interval** 5000 To 11540

**Total Depth** 6540

**Formation** CODELL SANDSTONE

**Type of Drilling Fluid** H2O, LSND

## Operator

**Company** Encana Oil & Gas (USA), Inc.

**Address** 370 17th Street, Suite 1700  
Denver, CO 80202

## Geologist

**Name** Stacy Tincher

**Company** Encana Oil & Gas (USA), Inc.

**Address** 370 17th Street, Suite 1700  
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 CHOKER SAND	SIDERITE or LIMONITE	SHALE GRAY	
CLAYSTONE	MARLSTONE	SHALY SANDSTONE	

## 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

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
F SUBRND

### Textures

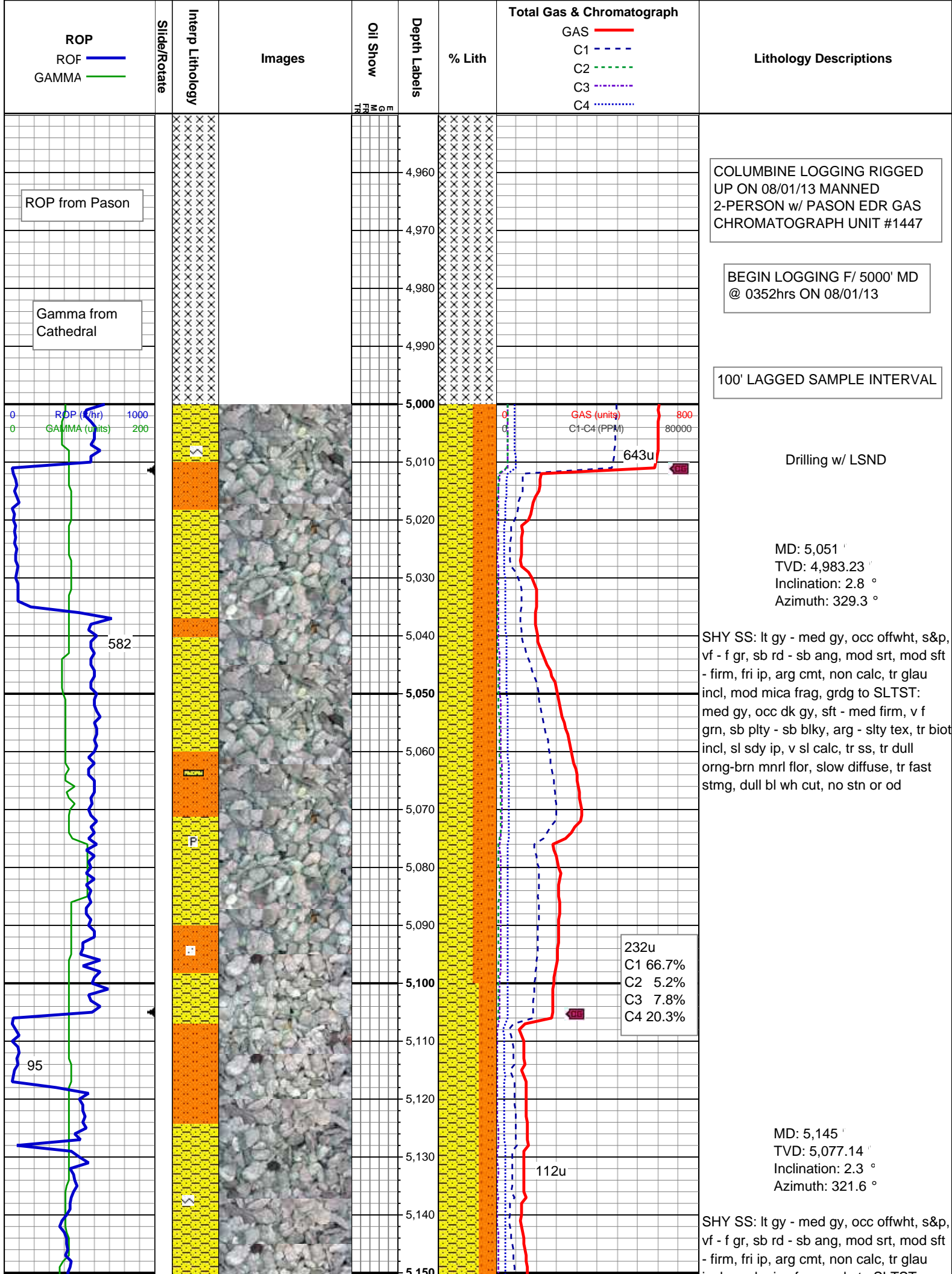
B BOUNDSTONE
C CHALKY
CX CRYPTOXLN

### E earthy

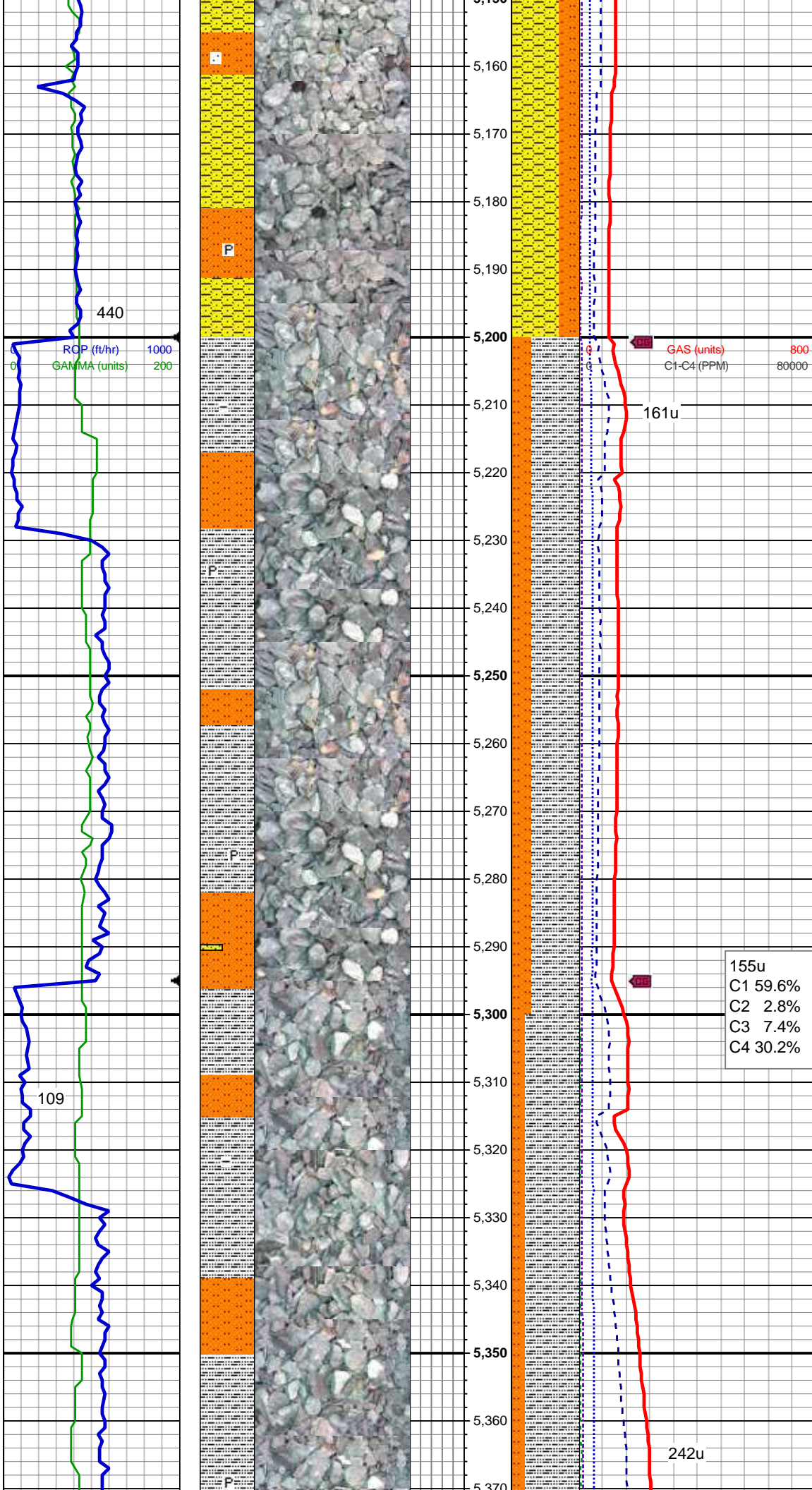
FX FINELYXLN
GS GRAINSTONE
L LITHOGRAPHIC
MX MICROXLN
MS MUDSTONE
PS PACKSTONE
WS WACKESTONE

### Sorting

M MODERATE
P POOR
W WELL







incl, mod mica frag, grad to SLTST:  
med gy, occ dk gy, sft - med firm, v f  
grn, sb plty - sb blk, arg - slty tex, tr biot  
incl, sl sdy ip, v sl calc, tr ss, tr dull  
orng-brn mnrl flr, slow diffuse, tr fast  
stmg, dull bl wh cut, no stn or od

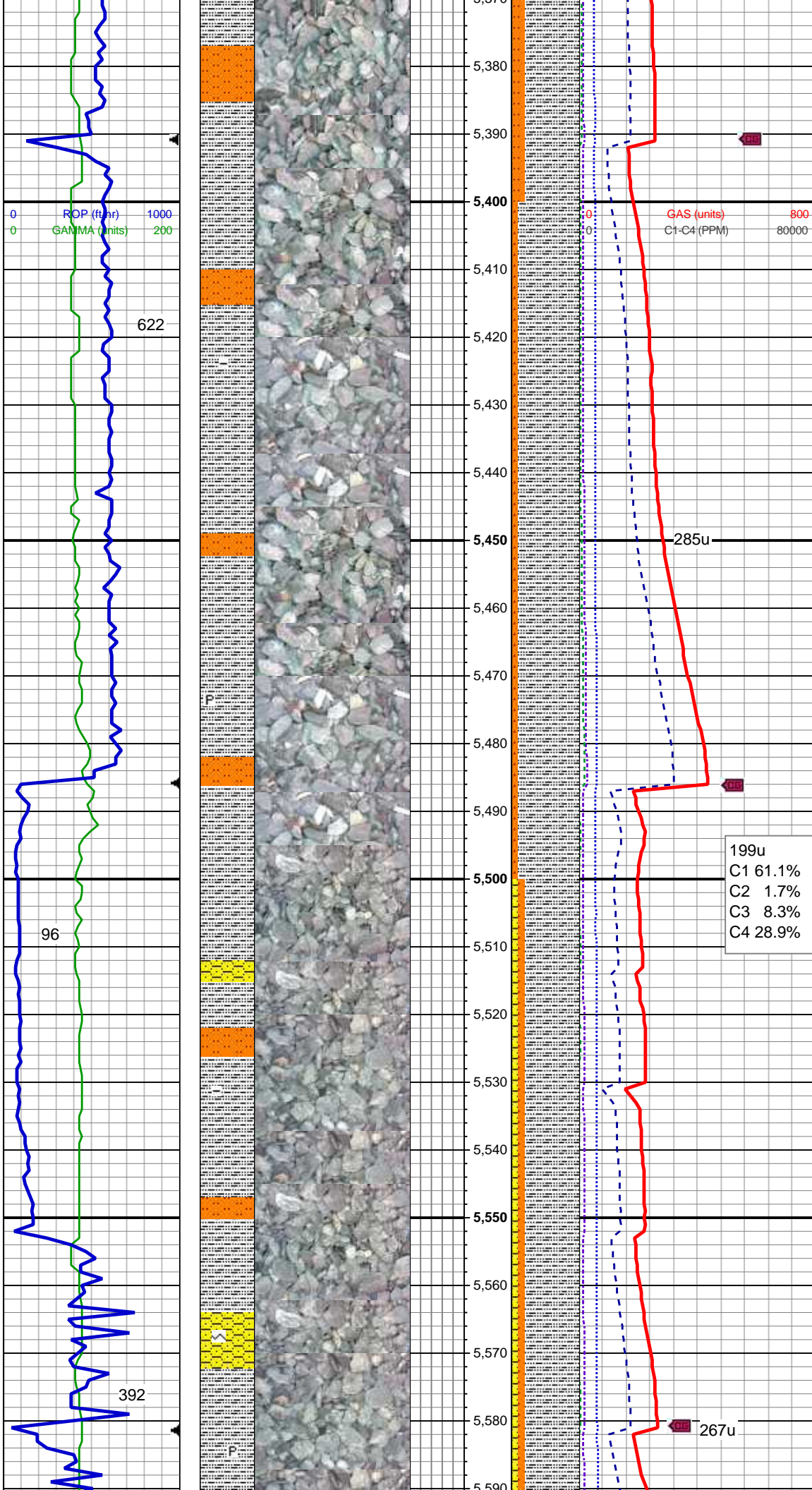
MD: 5,240 '  
TVD: 5,172.08 '  
Inclination: 1.8 °  
Azimuth: 291.4 °

SLTY SH: dk - med gy, mod sft - frm,  
sb plty, occ plty, slty tex, non calc,  
SLTST: med gy, occ dk gy, sft - mod  
firm, sb blk - sb plty, arg - slty tex, occ  
biot incl, sl sdy ip, v sl calc, intlam ss  
ip, tr shy ss, com pyr, no mnrl flr, v  
slow diffuse, tr stmg, dull bl cut, no stn  
or od

155u  
C1 59.6%  
C2 2.8%  
C3 7.4%  
C4 30.2%

MD: 5,334 '  
TVD: 5,266.05 '  
Inclination: 1.4 °  
Azimuth: 332.8 °

SLTY SH: dk - med gy, mod sft - hd, sb  
plty, occ plty, slty tex, non calc, SLTST:  
med gy, occ dk gy, sft - mod firm, sb  
blk - sb plty, arg - slty tex, occ biot incl,  
sl sdy ip, v sl calc, intlam tr ss, com pyr,  
no mnrl flr, v slow diffuse, tr stmg, dull  
bl cut, no stn or od



WT IN 10.3 / 10.0 OUT  
VIS IN 35 / 34 OUT

MD: 5,429 '  
TVD: 5,361.02 '  
Inclination: 1.5 °  
Azimuth: 345.1 °

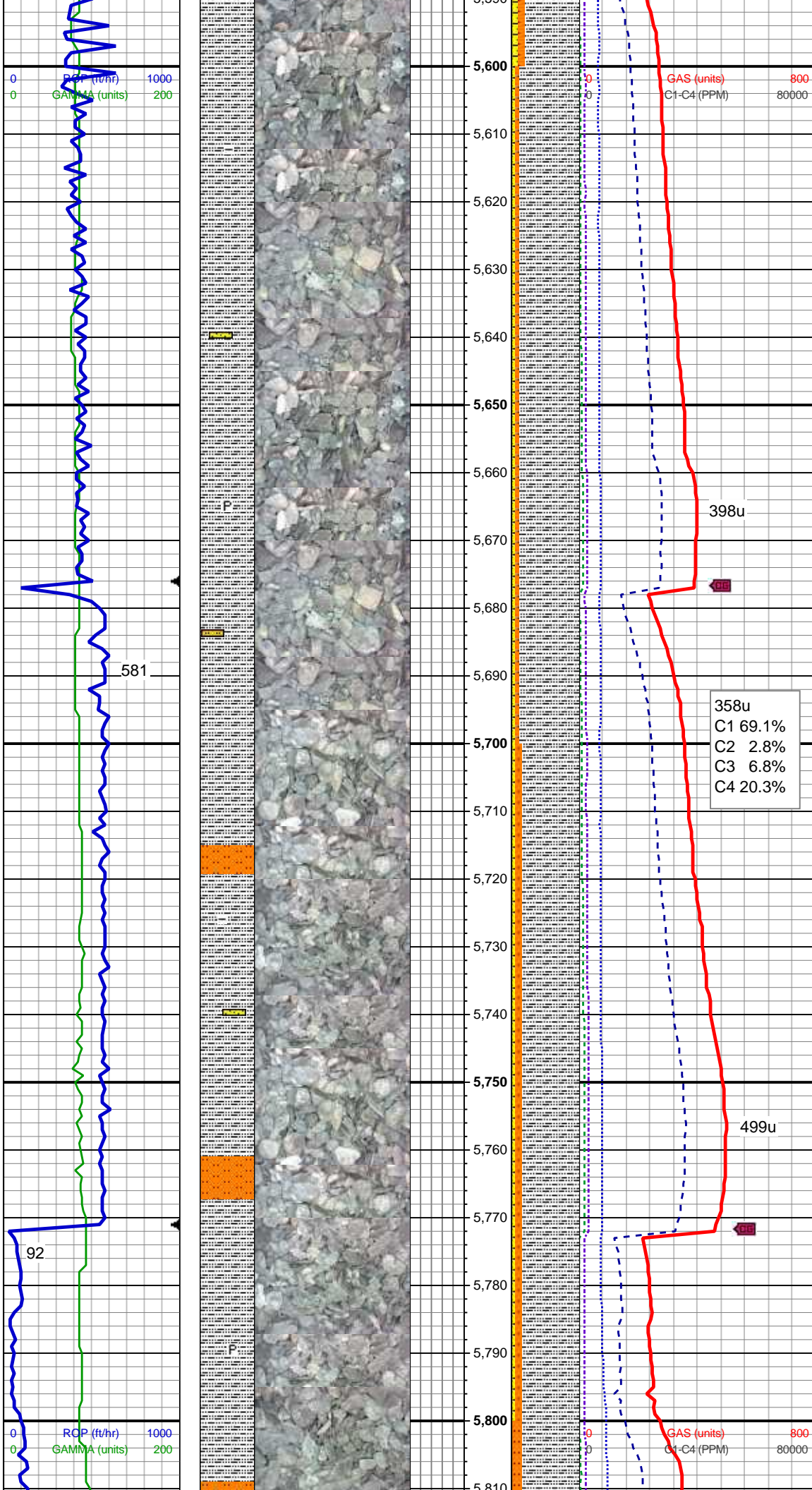
SLTY SH: dk - med gy, mod sft - hd, sb  
ppty, occ ppty, slty tex, non calc, SLTST:  
med gy, occ dk gy, sft - mod frm, sb  
blky - sb ppty, arg - slty tex, occ biot incl,  
sl sdy ip, v sl calc, intlam tr ss, com pyr,  
no mnrl flr, v slow diffuse, sl tr stmg,  
no cut, no stn or od

MD: 5,524 '  
TVD: 5,455.98 '  
Inclination: 2.4 °  
Azimuth: 65.2 °

WT IN 10.3 / 10.3 OUT  
VIS IN 35 / 34 OUT

SLTY SH: dk - med gy, mod sft - hd, sb  
ppty, occ ppty, slty tex, non calc, SHY SS:  
lt gy - lt gy brn, occ offwht, vf - f gr, sb rd  
- sb ang, mod srt, sft, fri-brit, sl calc,  
com glau & mica incl, grdg to SLTST:  
med - lt gy, sft - mod frm, sb blky - blky,  
arg - slty tex, occ biot incl, v sl calc,  
intlam ss, tr pyr, tr dull orng-brn mnrl  
flr, slow diffuse, slow stmg, dull bl wh  
cut, no stn or od





MD: 5,619 '  
TVD: 5,550.9 '  
Inclination: 2.2 °  
Azimuth: 73.6 °

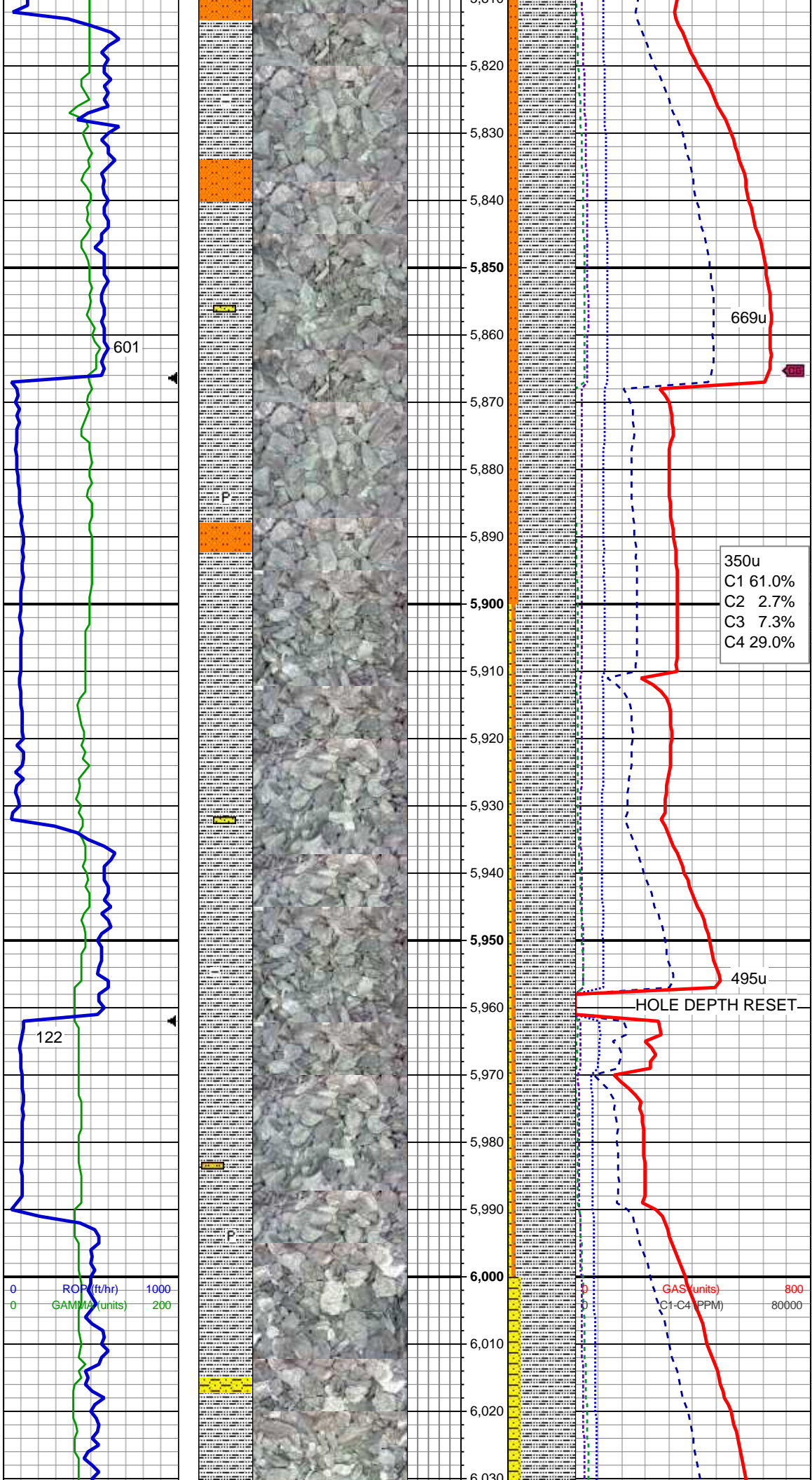
SLTY SH: dk - med gy, mod sft - hd, sb  
plty, occ plty, slty tex, non calc, tr mica  
incl, grdg to sltst ip, tr intlam ss, tr pyr, tr  
dull orng-brn mnrl flr, slow diffuse,  
slow stmg, dull bl wh cut, no stn or od

MD: 5,713 '  
TVD: 5,644.86 '  
Inclination: 0.9 °  
Azimuth: 52.3 °

SLTY SH: dk - med gy, mod sft - hd, sb  
plty, occ plty, slty tex, non calc, grdg to  
SLTST: med - lt gy, sft - mod frm, sb  
blky - blky, arg - slty tex, occ biot incl, v  
sl calc, intlam ss, tr pyr, tr dull orng-brn  
mnrl flr, slow diffuse, tr slow stmg,  
dull bl wh cut, no stn or od

WT IN 10.6 / 10.5 OUT  
VIS IN 36 / 36 OUT

MD: 5,807 '  
TVD: 5,738.85 '



Inclination: 1.4 °  
Azimuth: 334.9 °

SLTY SH: dk - med gy, mod sft - hd, sb  
plty, occ plty, slty tex, non calc, grdg to  
SLTST: med - lt gy, sft - mod frm, sb  
blky - blky, arg - slty tex, sdy ip, occ biot  
incl, v sl calc, tr pyr, no mnrl flor, slow  
diffuse, tr slow stmg, dull bl wh cut, no  
stn or od

WT IN 10.6 / 10.5 OUT  
VIS IN 36 / 37 OUT

MD: 5,902 '  
TVD: 5,833.81 '  
Inclination: 2.6 °  
Azimuth: 65 °

SLTY SH: dk - med gy, mod sft - hd, sb  
plty, occ plty, slty tex, non calc, tr mica  
incl, grdg to sltst ip, tr intlam ss, tr pyr, tr  
dull orng-brn mnrl flor, slow diffuse,  
slow stmg, dull bl wh cut, no stn or od

MD: 5,996 '  
TVD: 5,927.6 '  
Inclination: 4.9 °  
Azimuth: 57.7 °

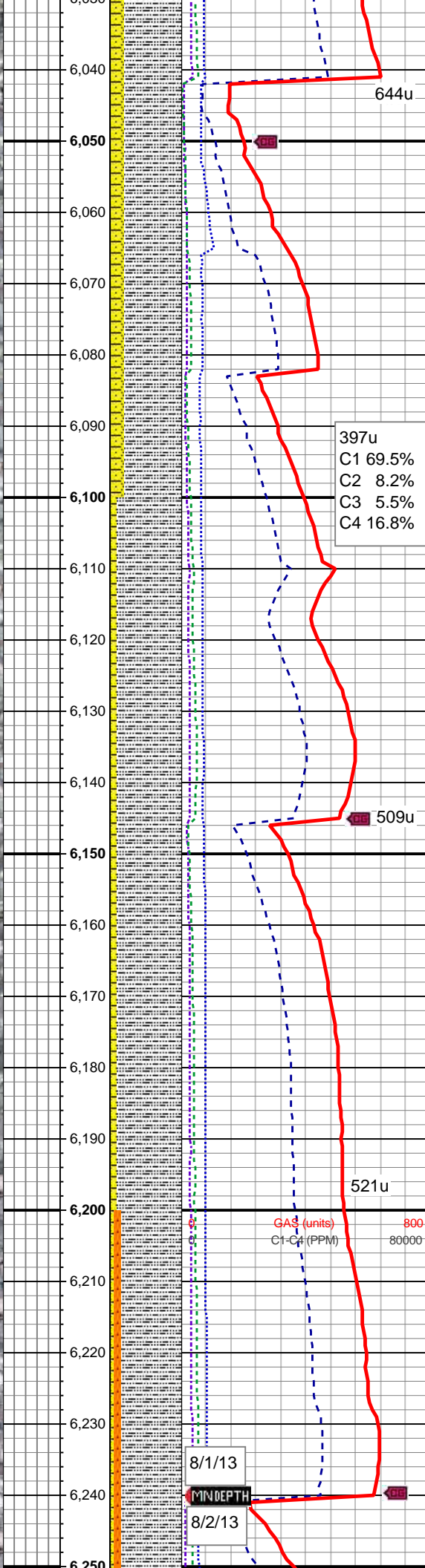


487

501

563

0 1000 200  
R.O.P. (hr)  
GAMMA (units)



SLTY SH: med gy - dk gy, mod sft - hd,  
sb plty - plty, arg mtz, slty - rthy tex, non  
calc, SHY SS: gy brn - offwht, sl trnsf,  
s&p, vf - f gr, sb rd - sb ang, mod w srt,  
sft - hrd, fri, mod glau & mica incl, calc  
ip, intlam w sltst, tr dissim pyr, com dull  
orgn-brn mnrl flr, slow diffuse, tr slow  
stmg, dull bl wh cut, no stn or od

WT IN 10.5 / 10.5 OUT  
VIS IN 36 / 36 OUT

MD: 6,091 '  
TVD: 6,022.39 '  
Inclination: 2.7 °  
Azimuth: 38.7 °

397u  
C1 69.5%  
C2 8.2%  
C3 5.5%  
C4 16.8%

SLTY SH: med gy - dk gy, mod sft - hd,  
sb plty - plty, arg mtz, slty - rthy tex, non  
calc, SHY SS: gy brn - offwht, sl trnsf,  
s&p, vf - f gr, sb rd - sb ang, mod w srt,  
sft - hrd, fri, mod glau & mica incl, calc  
ip, intlam w sltst, tr dissim pyr, com dull  
orgn-brn mnrl flr, slow diffuse, tr slow  
stmg, dull bl wh cut, no stn or od

MD: 6,185 '  
TVD: 6,116.33 '  
Inclination: 1.4 °  
Azimuth: 5.8 °

MUD DATA  
WT 10.6  
FV 40  
PV 15  
YP 10  
Sol 11.0  
pH 8.3  
Chl 800

MD: 6,216 '  
TVD: 6,147.32 '  
Inclination: 1.2 °  
Azimuth: 350.9 °

MD: 6,248 '  
TVD: 6,179.32 '  
Inclination: 1.2 °  
Azimuth: 344 °

TOOH for curve assembly at  
6240' MD @ 1539hrs on 8/1/13

Resumed drilling @  
0820 hrs on 8/28/13

8/1/13

8/2/13

MINDEPTH

GAS (units)  
C1-C4 (PPM)

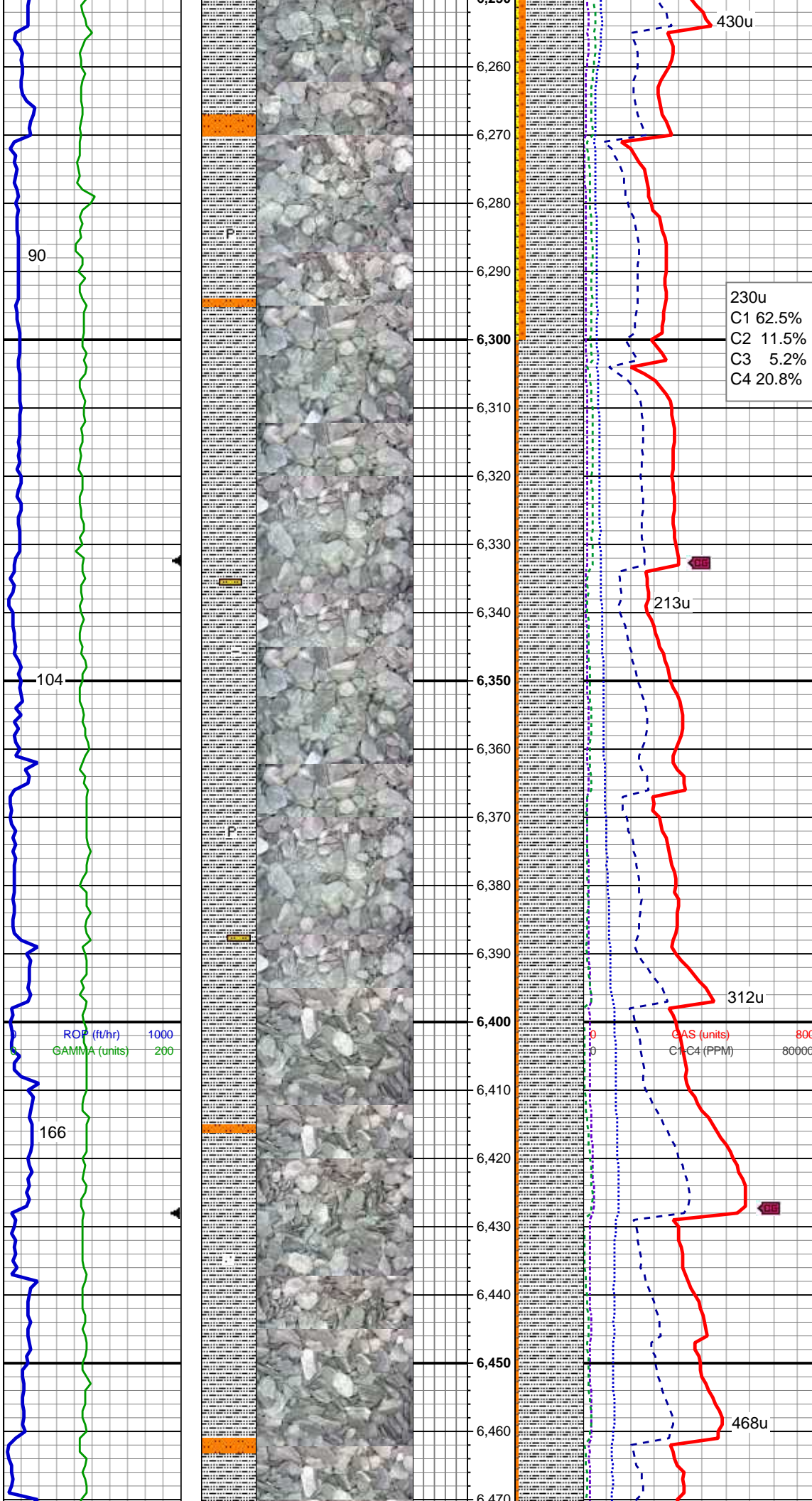
521u

509u

644u



# GAS BUSTER ON HOLE



SLTY SH: dk - med gy, mod sft - hd, sb  
 plty, occ plty, slty tex, non calc, grdg to  
 SLTST: lt - med gy, sft - mod frm, sb  
 blk - blk, arg - slty tex, com biot incl,  
 intlamm ss, tr pyr, tr dull orng-brn mnrl  
 flr, slow diffuse, tr slow stmg, dull bl  
 wh cut, no stn or od

MD: 6,279 '  
 TVD: 6,210.31 '  
 Inclination: 1.7 °  
 Azimuth: 70.4 °

WT IN 10.8 / 10.6 OUT  
 VIS IN 43 / 46 OUT

MD: 6,311 '  
 TVD: 6,242.23 '  
 Inclination: 6.2 °  
 Azimuth: 101.6 °

MD: 6,342 '  
 TVD: 6,272.88 '  
 Inclination: 10.7 °  
 Azimuth: 102.9 °

WT IN 11.0 / 10.9 OUT  
 VIS IN 42 / 41 OUT

SLTY SH: dk - med gy, mod sft - hd, sb  
 plty, occ plty, slty tex, non calc, grdg to  
 sltst ip, sme pyr, no mnrl flr, mod fast  
 diffuse, tr stmg, dull bl wh cut, no stn or  
 od

MD: 6,374 '  
 TVD: 6,304.13 '  
 Inclination: 14.2 °  
 Azimuth: 104.9 °

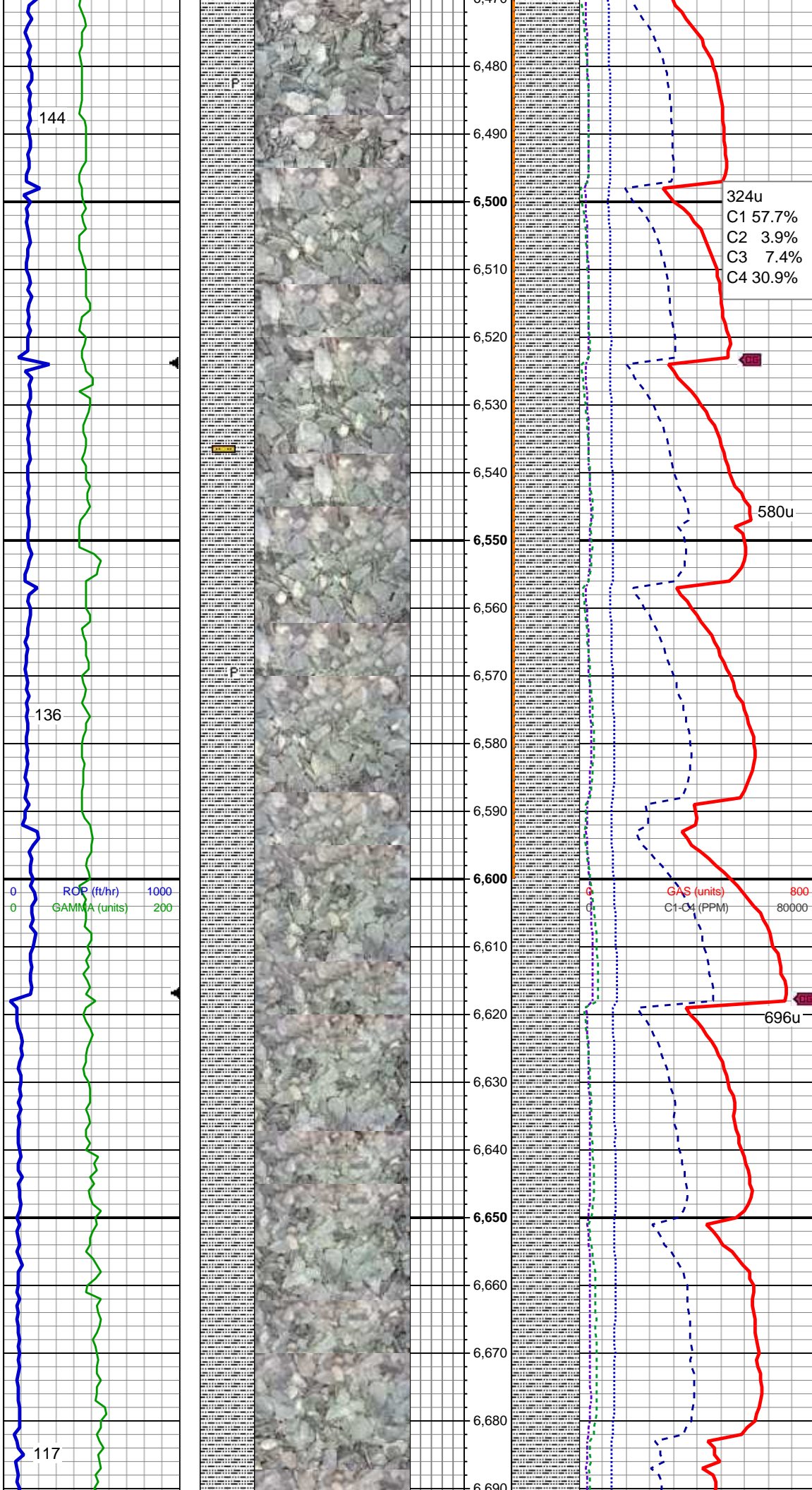
WT IN 11.3 / 11.0 OUT  
 VIS IN 40 / 40 OUT

MD: 6,405 '  
 TVD: 6,333.99 '  
 Inclination: 16.9 °  
 Azimuth: 105.7 °

WT IN 11.5 / 11.3 OUT  
 VIS IN 41 / 42 OUT

MD: 6,438 '  
 TVD: 6,365.47 '  
 Inclination: 18.5 °  
 Azimuth: 103.7 °

SLTY SH: dk - med gy, sft - mod hd, sb  
 plty, occ plty, slty - sl rthy tex, sl sdy ip,  
 non calc, grdg to sltst ip, sme pyr, no  
 mnrl flr, fast diffuse, tr fast stmg, dull  
 bl wh cut, no stn or od



MD: 6,469 '  
TVD: 6,394.77 '  
Inclination: 19.6 °  
Azimuth: 101.8 °

MD: 6,501 '  
TVD: 6,424.91 '  
Inclination: 19.7 °  
Azimuth: 99.9 °

WT IN 11.3 / 11.3 OUT  
VIS IN 43 / 41 OUT

MD: 6,532 '  
TVD: 6,454.17 '  
Inclination: 18.9 °  
Azimuth: 99.7 °

SLTY SH: dk - med gy, sft - mod hd, sb  
plty, occ plty, slty - sl rthy tex, sl sdy ip,  
non calc, grdg to sltst ip, sme pyr, no  
mnrl flr, fast diffuse, tr fast stmg, dull  
bl wh cut, no stn or od

MD: 6,564 '  
TVD: 6,484.51 '  
Inclination: 18.2 °  
Azimuth: 97.7 °

MD: 6,595 '  
TVD: 6,514.01 '  
Inclination: 17.6 °  
Azimuth: 97.3 °

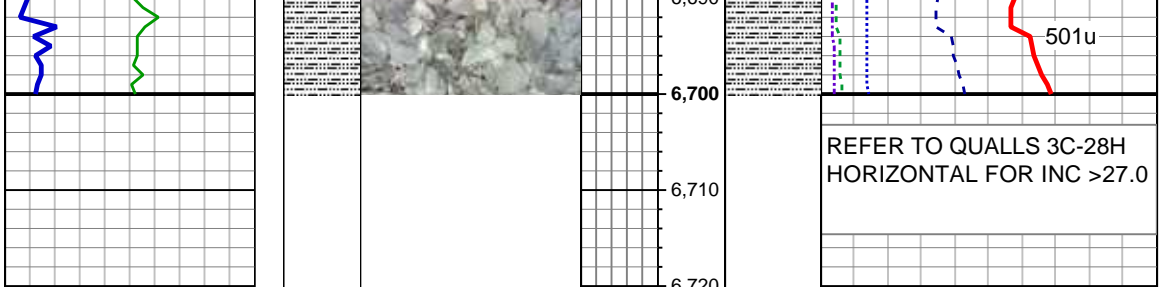
MD: 6,627 '  
TVD: 6,544.33 '  
Inclination: 19.6 °  
Azimuth: 94 °

SLTY SH: dk - med gy, sft - mod hd, sb  
plty, occ plty, slty - sl rthy tex, sl sdy ip,  
sl calc, grdg to sltst ip, no mnrl flr, fast  
diffuse, tr fast stmg, dull bl wh cut, no  
stn or od

MD: 6,658 '  
TVD: 6,573.13 '  
Inclination: 23.8 °  
Azimuth: 90.5 °

MD: 6,690 '  
TVD: 6,602.04 '  
Inclination: 27 °  
Azimuth: 88.6 °





WT IN 11.5 / 11.4 OUT  
VIS IN 44 / 46 OUT

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