

COLUMBINE LOGGING

Scale: 5" / 100'
Measured Depth Log

Well Name Trebor B11-66-1HN VERT

Location SEC 11 T5N R64W

State COLORADO

County WELD

Country USA

Rig Number H&P 315

API Number 05-123-36304

AFE # 136855

Region DJ BASIN

Field WATTENBERG

Spud Date 6/27/2013

Drilling Completed 7/3/2013

Surface Coordinates LAT/LON 40.415290/-104.524240

SEC 11 T5N R64W
2,112' FNL; 783' FWL

Bottom Hole Coordinates SEC 11 T5N R64W
535' FEL; 2,310' FNL

Ground Elevation 4601'

K.B. Elevation 4625'

Logged Interval 2000' **To** 11040'

Total Depth 11040'

Formation NIOBRARA B CHALK

Type of Drilling Fluid LSND

Operator

Company Noble Energy Inc

Address 1625 Broadway Suite 2200
Denver, CO 80202

Geologist

Name CHRIS SCAHEL, NATHAN MURPHY

Company COLUMBINE LOGGING, INC

Address 2385 S Lipan St
Denver, CO 80223

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
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

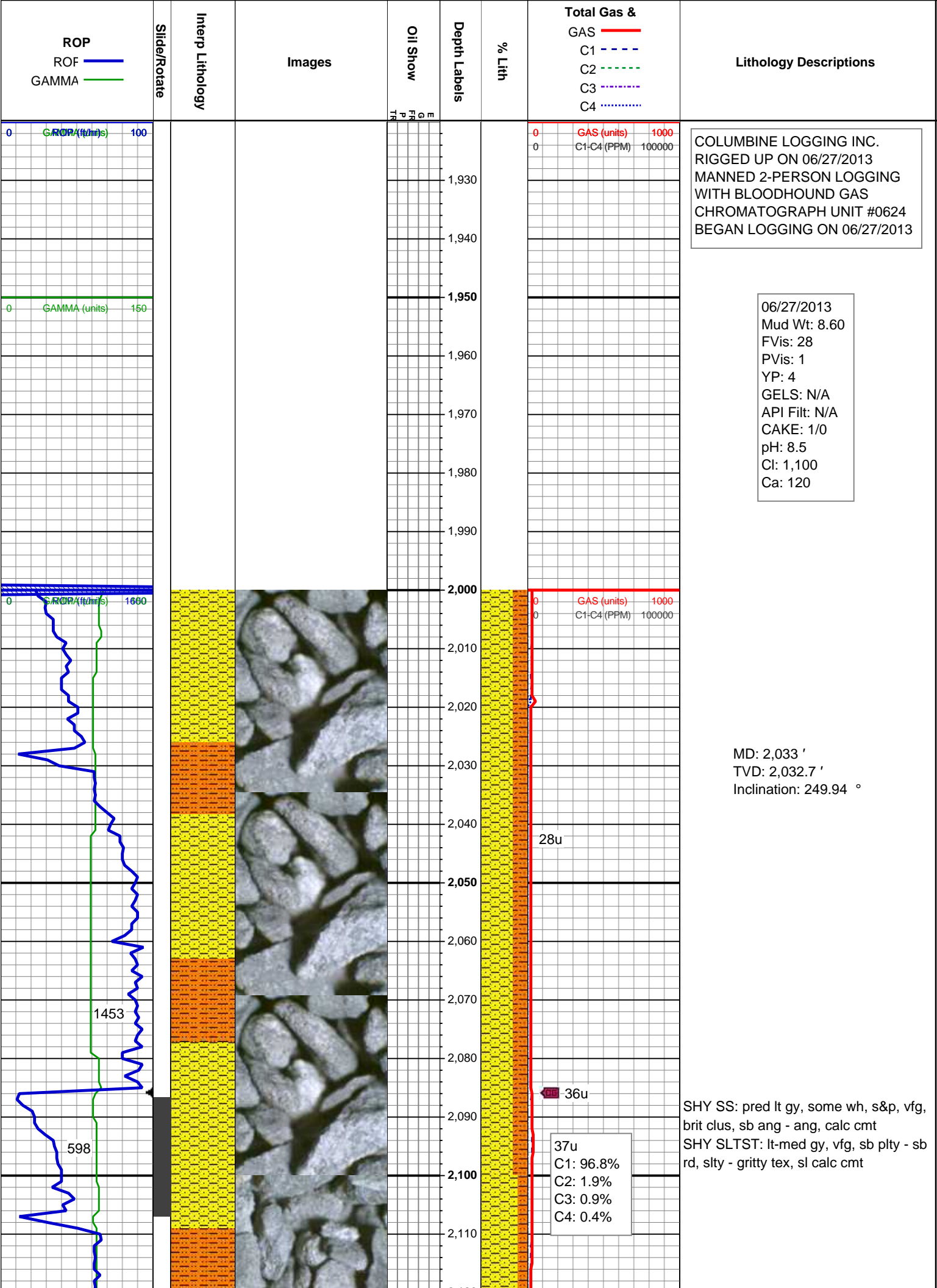
BOUNDSTONE
CHALKY
CRYPTOXLN

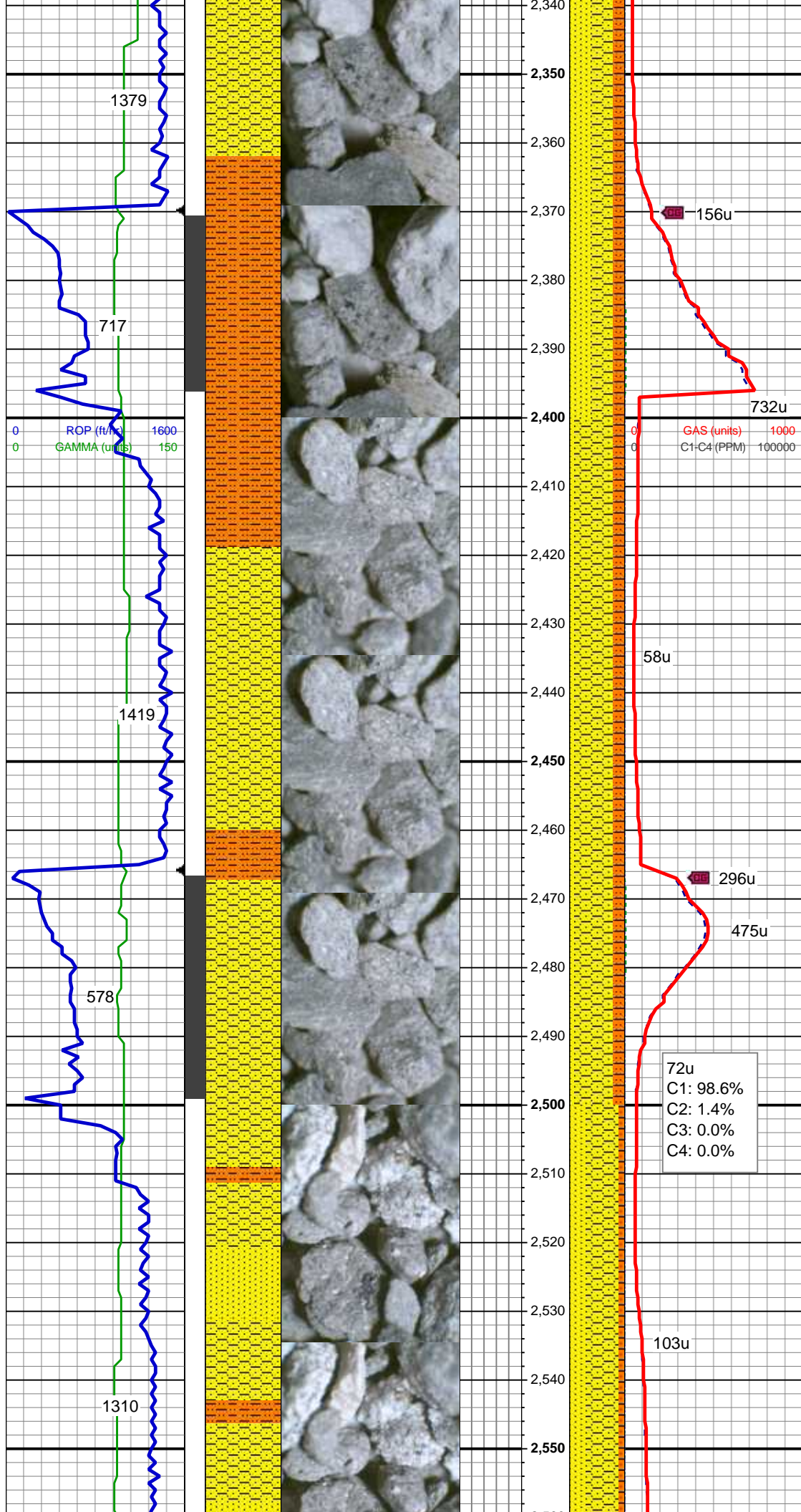
Earthy

FINELYXLN
GRAINSTONE
LITHOGRAPHIC
MICROXLN
MUDSTONE
PACKSTONE
WACKESTONE

Sorting

MODERATE
POOR
WELL





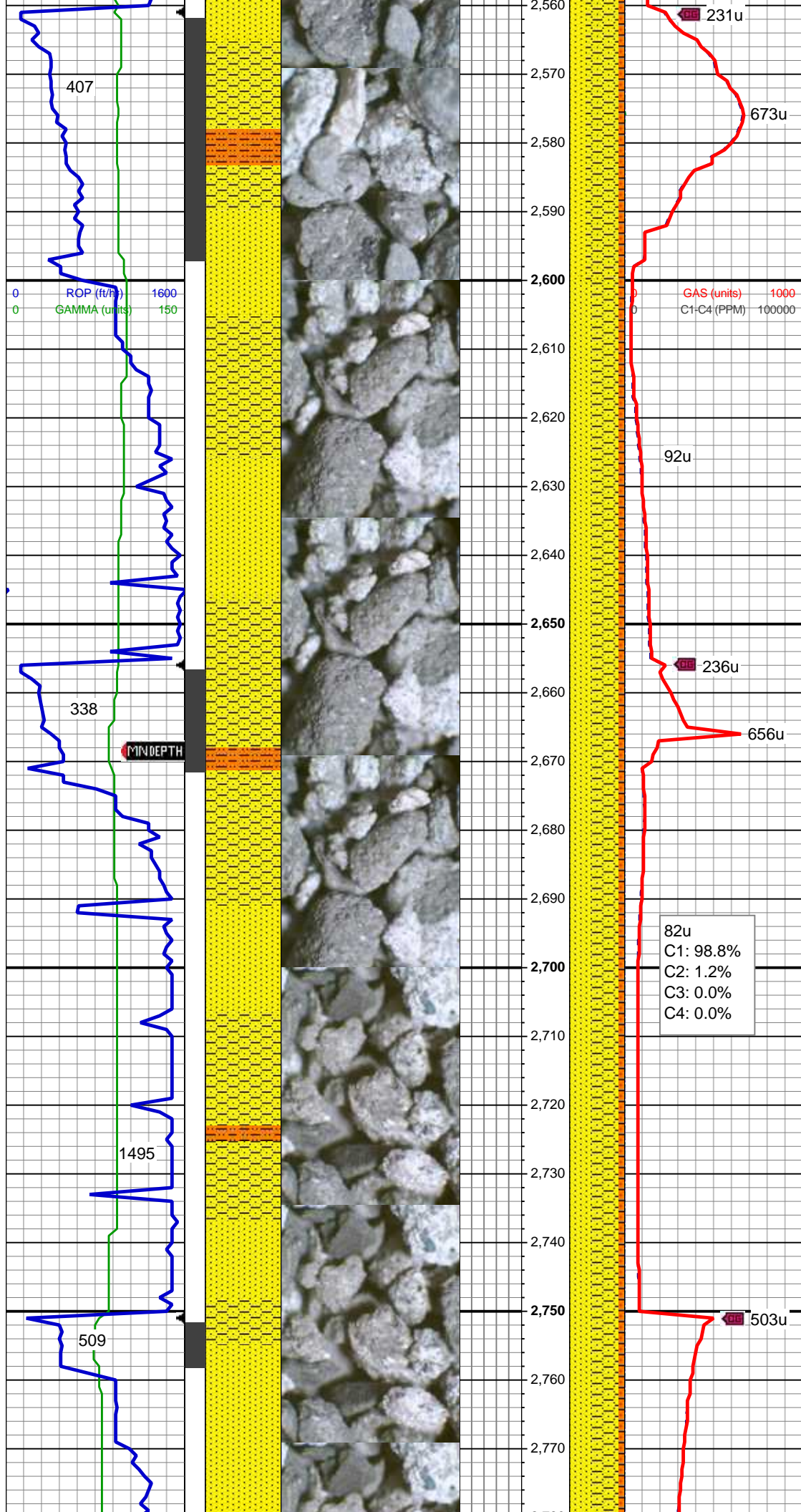
SS: wh, lt gy, pred trns, sme clr, spec
wi mica & phlog, tr dk gn xl glau, hd, v
brit clus, sb ang - ang, v calc cmt
SHY SS: pred lt gy, some wh, s&p, vfg,
brit clus, sb ang - ang, calc cmt
SHY SLTST: lt-med gy, vfg, sb plty - sb
rd, slty - gritty tex, sl calc cmt

MD: 2,412 '
TVD: 2,407.41 '
Inclination: 11.06 °
Azimuth: 263.55 °

SHY SS: pred lt gy, some wh, s&p, vfg,
brit clus, sb ang - ang, calc cmt
SHY SLTST: lt-med gy, vfg, sb plty - sb
rd, slty - gritty tex, sl calc cmt
SS: wh, lt gy, pred trns, sme clr, spec
wi mica & phlog, tr dk gn xl glau, hd, v
brit clus, sb ang - ang, v calc cmt

MD: 2,507 '
TVD: 2,500.55 '
Inclination: 11.7 °
Azimuth: 260.56 °

MUD WT: 8.60
VIS: 28.00 IN/OUT



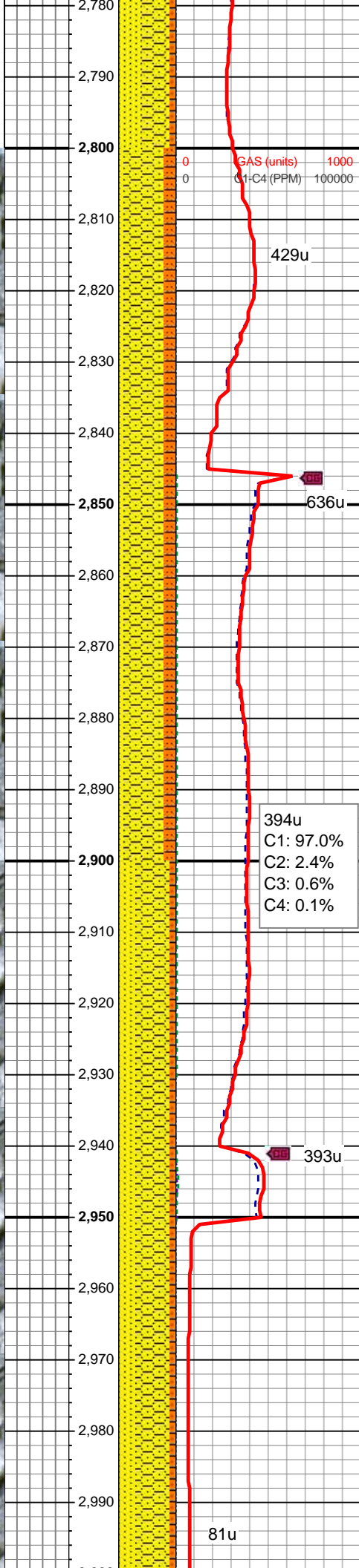
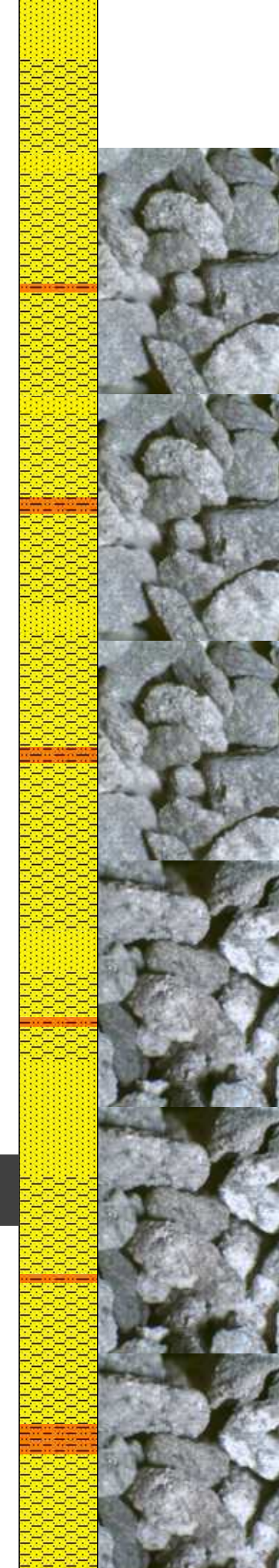
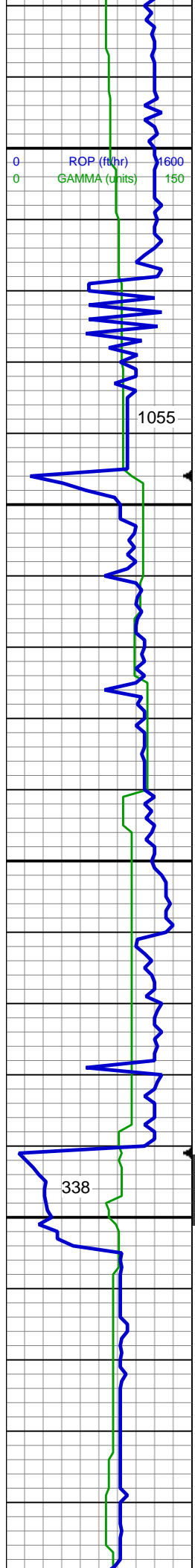
SHY SS: pred lt gy, some wh, s&p, vfg, brit clus, sb ang - ang, calc cmt
SS: wh, lt gy, pred trnsl, sme clr, spec wi mica & phlog, tr dk gn xl glau, hd, v brit clus, sb ang - ang, v calc cmt
SHY SLTST: lt-med gy, vfg, sb plty - sb rd, slty - gritty tex, sl calc cmt

MD: 2,602 '
TVD: 2,593.18 '
Inclination: 13.91 °
Azimuth: 255.17 °

SHY SS: pred lt gy, some wh, s&p, vfg, brit clus, sb ang - ang, calc cmt
SS: wh, lt gy, pred trnsl, sme clr, spec wi mica & phlog, tr dk gn xl glau, hd, v brit clus, sb ang - ang, v calc cmt
SHY SLTST: lt-med gy, vfg, sb plty - sb rd, slty - gritty tex, sl calc cmt

MD: 2,697 '
TVD: 2,685.04 '
Inclination: 15.64 °
Azimuth: 256.19 °

SHY SS: pred lt av. some wh. s&p. vfg.



brit clus, sb ang - ang, calc cmt
SS: wh, lt gy, pred trns, sme clr, spec
wi mica & phlog, tr dk gn xl glau, hd, v
brit clus, sb ang - ang, v calc cmt
SHY SLTST: lt-med gy, vfg, sb plty - sb
rd, slty - gritty tex, sl calc cmt

MD: 2,792 '
TVD: 2,776.56 '
Inclination: 15.49 °
Azimuth: 255.74 °

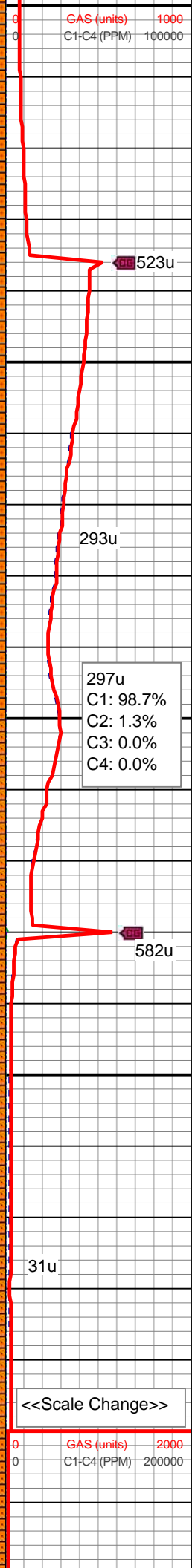
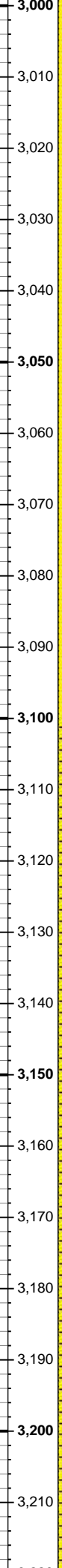
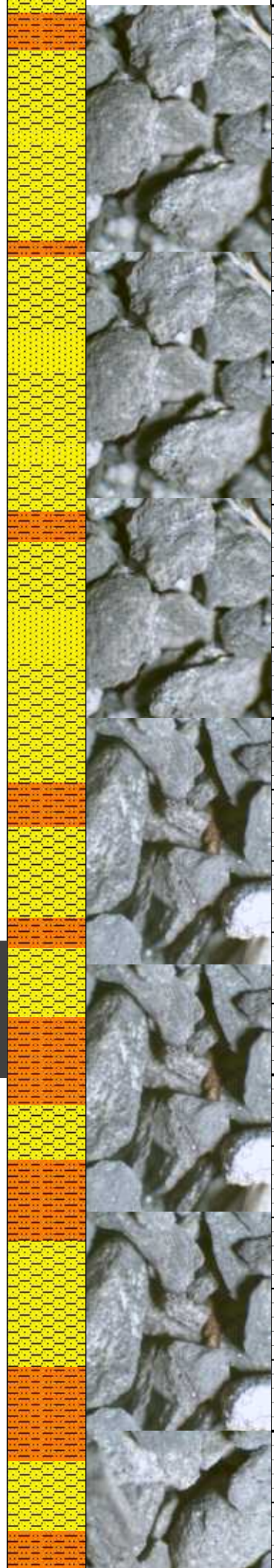
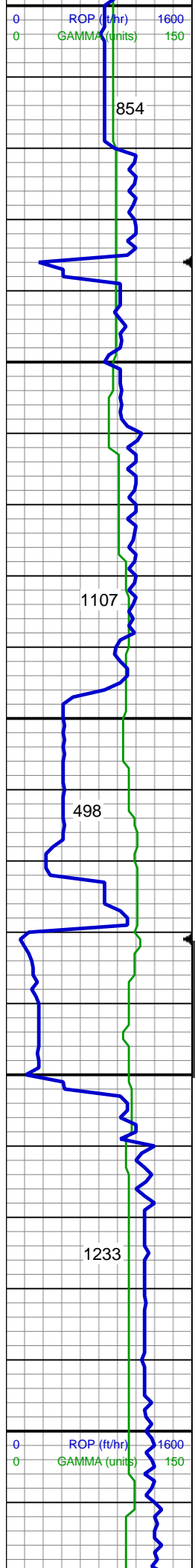
MD: 2,887 '
TVD: 2,868.26 '
Inclination: 14.77 °
Azimuth: 254.47 °

SHY SS: pred lt gy, some wh, s&p, vfg,
brit clus, sb ang - ang, calc cmt
SHY SLTST: lt-med gy, vfg, sb plty - sb
rd, slty - gritty tex, sl calc cmt
SS: wh, lt gy, pred trns, sme clr, spec
wi mica & phlog, tr dk gn xl glau, hd, v
brit clus, sb ang - ang, v calc cmt

MUD WT: 8.70
VIS: 28 IN/OUT

MD: 2,982 '
TVD: 2,959.98 '
Inclination: 15.46 °
Azimuth: 252.81 °

SHY SS: pred lt gy, some wh, s&p, vfg,
brit clus, sb ang - ang, calc cmt
SS: wh, lt gy, pred trns, sme clr, spec
wi mica & phlog, tr dk gn xl glau, hd, v
brit clus, sb ang - ang, v calc cmt
SHY SLTST: lt-med gy, vfg, sb plty - sb
rd, slty - gritty tex, sl calc cmt

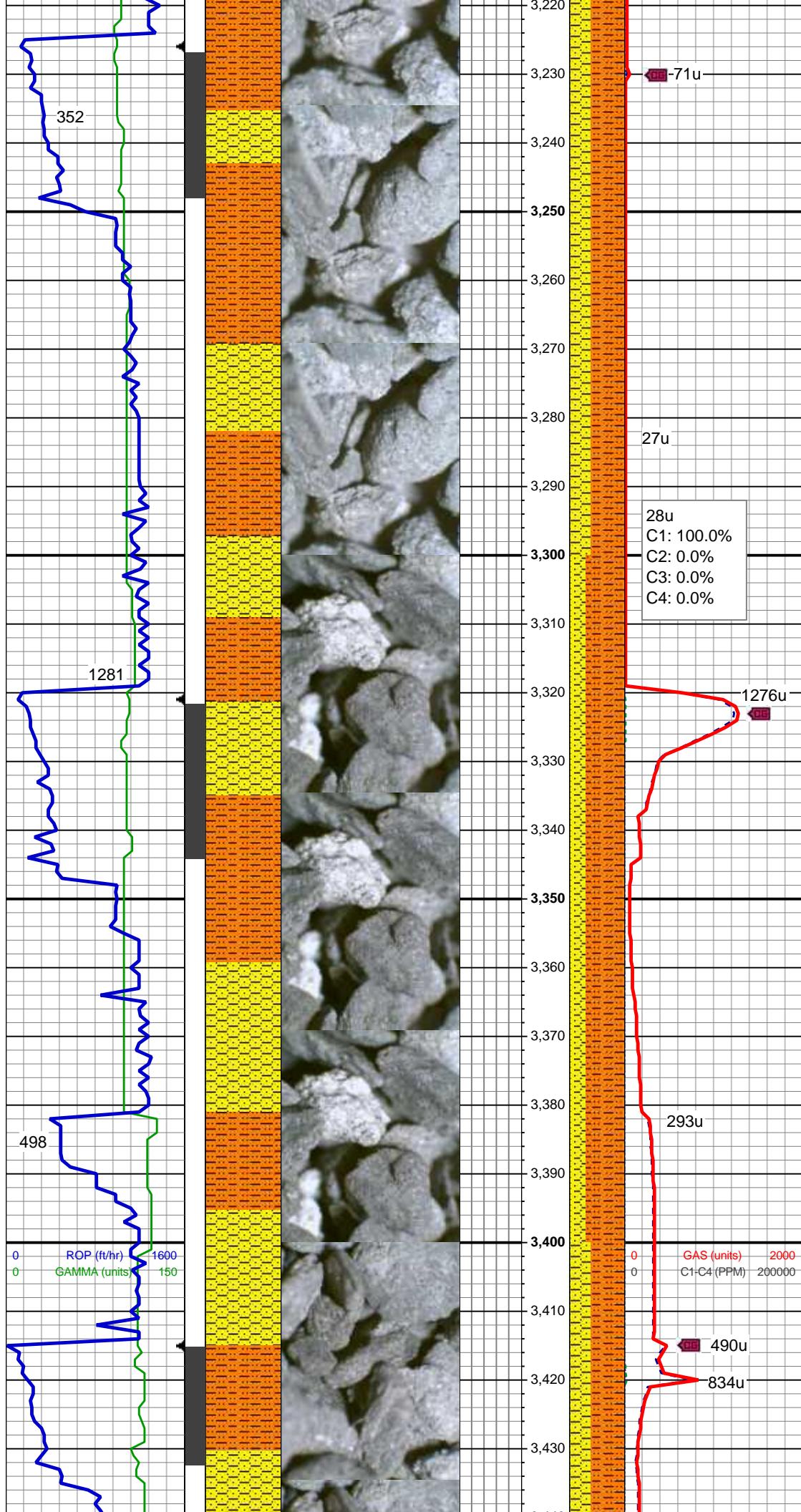


MD: 3,077 '
TVD: 3,052.02 '
Inclination: 13.15 °
Azimuth: 251.79 °

SHY SS: pred lt gy, some wh, s&p, vfg,
brit clus, sb ang - ang, calc cmt
SS: wh, lt gy, pred trns, sme clr, spec
wi mica & phlog, tr dk gn xl glau, hd, v
brit clus, sb ang - ang, v calc cmt
SHY SLTST: lt-med gy, vfg, sb plty - sb
rd, slty - gritty tex, sl calc cmt

MD: 3,172 '
TVD: 3,144.35 '
Inclination: 14.1 °
Azimuth: 254.02 °

SHY SS: pred lt gy, some wh, s&p, vfg,
brit clus, sb ang - ang, calc cmt
SHY SLTST: lt-med gy, vfg, sb plty - sb
rd, slty - gritty tex, sl calc cmt



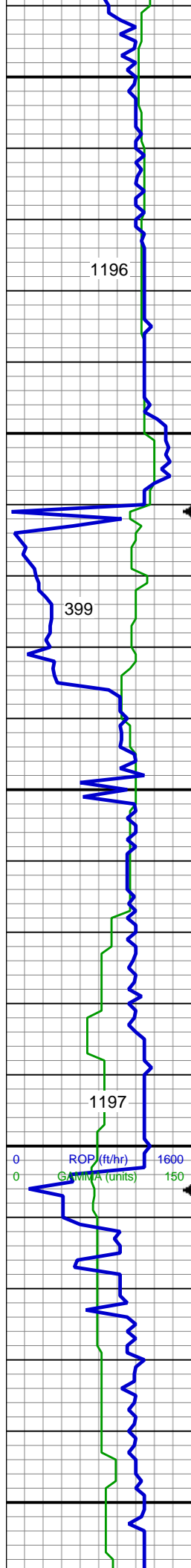
MD: 3,267 '
TVD: 3,236.39 '
Inclination: 14.56 °
Azimuth: 254.73 °

SHY SLTST: lt-med gy, vfg, sb plty - sb
rd, slty - gritty tex, sl calc cmt
SHY SS: pred lt gy, some wh, s&p, vfg,
brit clus, sb ang - ang, calc cmt

MUD WT: 8.80
VIS: 27 IN/OUT

MD: 3,362 '
TVD: 3,328.24 '
Inclination: 15.04 °
Azimuth: 257.05 °

SHY SLTST: lt-med gy, vfg, sb plty - sb
rd, slty - gritty tex, sl calc cmt
SHY SS: pred lt gy, some wh, s&p, vfg,
brit clus, sb ang - ang, calc cmt
SS: wh, lt gy, pred trnsl, sme clr, spec
wi mica & phlog, tr dk gn xl glau, hd, v
brit clus, sb ang - ang, v calc cmt



3,440
3,450
3,460
3,470
3,480
3,490
3,500
3,510
3,520
3,530
3,540
3,550
3,560
3,570
3,580
3,590
3,600
3,610
3,620
3,630
3,640
3,650

181u

242u
C1: 92.2%
C2: 3.6%
C3: 3.2%
C4: 1.0%

527u

1274u

248u

341u

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

MD: 3,457 '
TVD: 3,420.01 '
Inclination: 14.95 °
Azimuth: 258.5 °

SHY SLTST: lt-med gy, vfg, sb plty - sb
rd, slty - gritty tex, sl calc cmt
SHY SS: pred lt gy, some wh, s&p, vfg,
brit clus, sb ang - ang, calc cmt

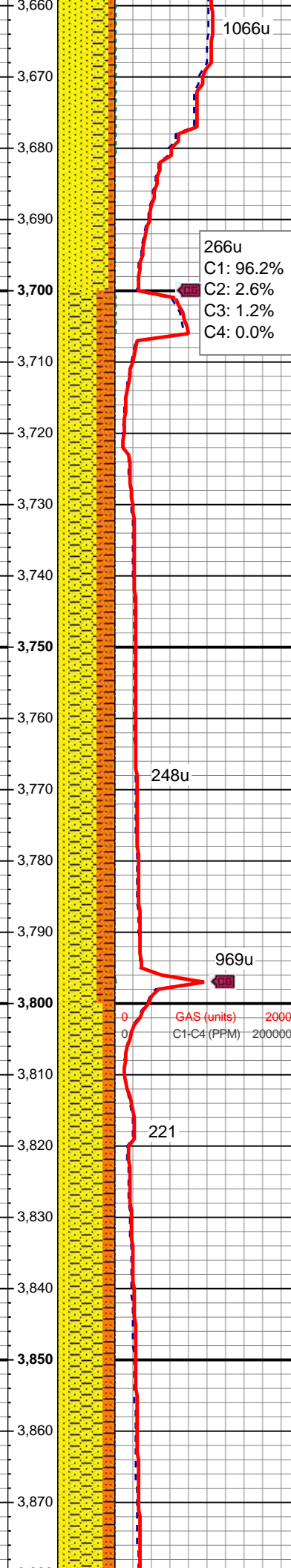
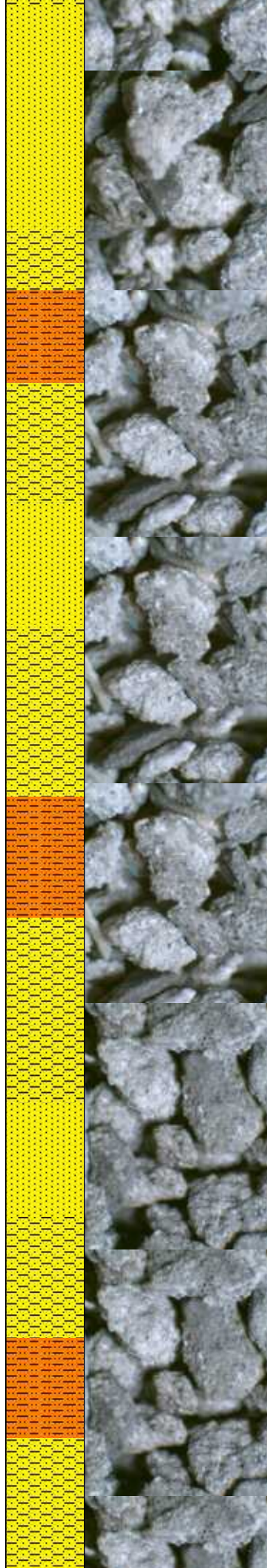
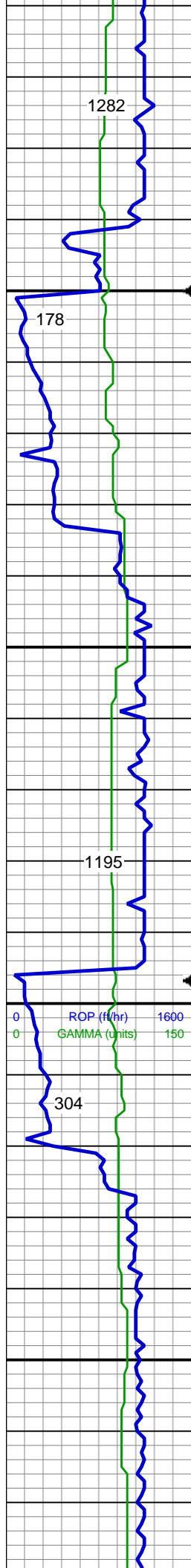
Parkman Top @
3509' MD; 3470' TVD

MD: 3,551 '
TVD: 3,510.54 '
Inclination: 16.25 °
Azimuth: 258.6 °

SS: wh, lt gy, pred trns, sme clr, spec
wi mica & phlog, tr dk gn xl glau, hd, v
brit clus, sb ang - ang, v calc cmt
SHY SS: pred lt gy, some wh, s&p, vfg,
brit clus, sb ang - ang, calc cmt
SHY SLTST: lt-med gy, vfg, sb plty - sb
rd, slty - gritty tex, sl calc cmt

06/28/2013
Mud Wt: 8.80
FVis: 30
PVis: 4
YP: 5
GELS: N/A
API Filt: N/A
CAKE: 1/0
pH: 9.4
Cl: 1,100
Ca: 80

MD: 3,646 '
TVD: 3,601.52 '
Inclination: 17.19 °
Azimuth: 257.53 °



266u
C1: 96.2%
C2: 2.6%
C3: 1.2%
C4: 0.0%

969u

248u

221

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

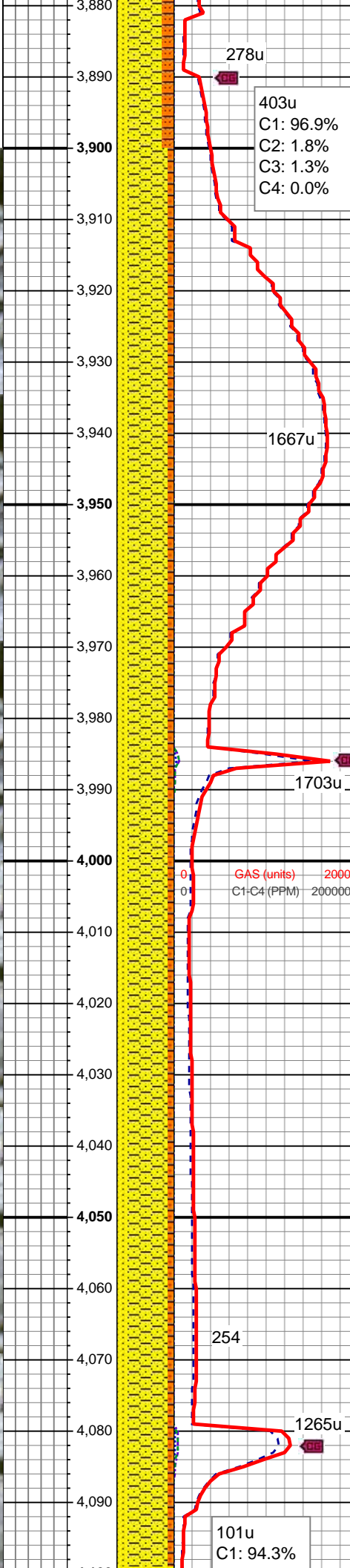
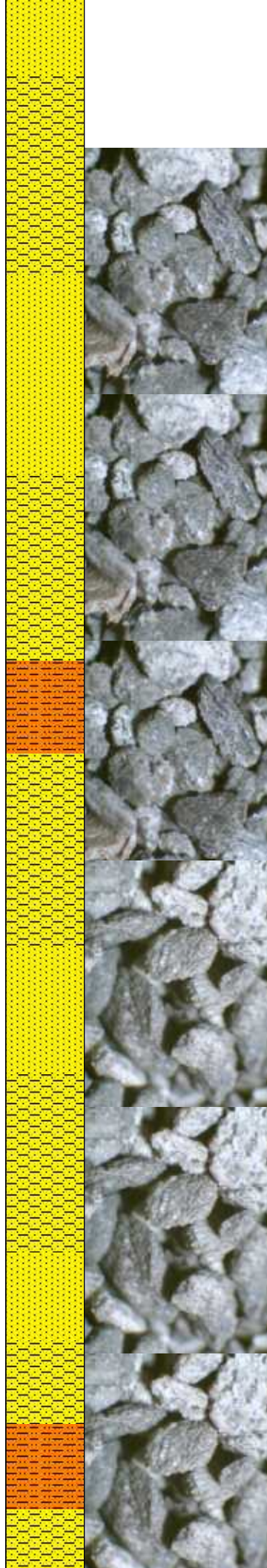
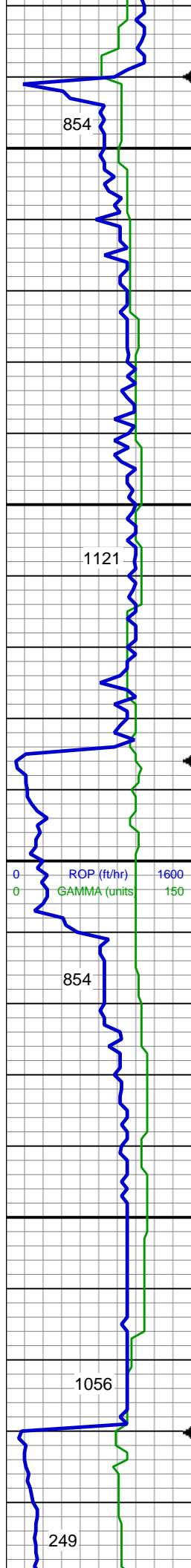
SS: wh, lt gy, pred trnsl, sme clr, spec
wi mica & phlog, tr dk gn xl glau, hd, v
brit clus, sb ang - ang, v calc cmt
SHY SS: pred lt gy, some wh, s&p, vfg,
brit clus, sb ang - ang, calc cmt
SHY SLTST: lt-med gy, vfg, sb plty - sb
rd, slty - gritty tex, sl calc cmt

MD: 3,741 '
TVD: 3,692.45 '
Inclination: 16.5 °
Azimuth: 255.87 °

SHY SS: pred lt gy, some wh, s&p, vfg,
brit clus, sb ang - ang, calc cmt
SHY SLTST: lt-med gy, vfg, sb plty - sb
rd, slty - gritty tex, sl calc cmt
SS: wh, lt gy, pred trnsl, sme clr, spec
wi mica & phlog, tr dk gn xl glau, f-vfgr,
hd, v brit clus, sb ang - ang, v calc cmt

MD: 3,836 '
TVD: 3,783.94 '
Inclination: 14.77 °
Azimuth: 250.36 °

SHY SS: pred lt gy, some wh, s&p, vfg,



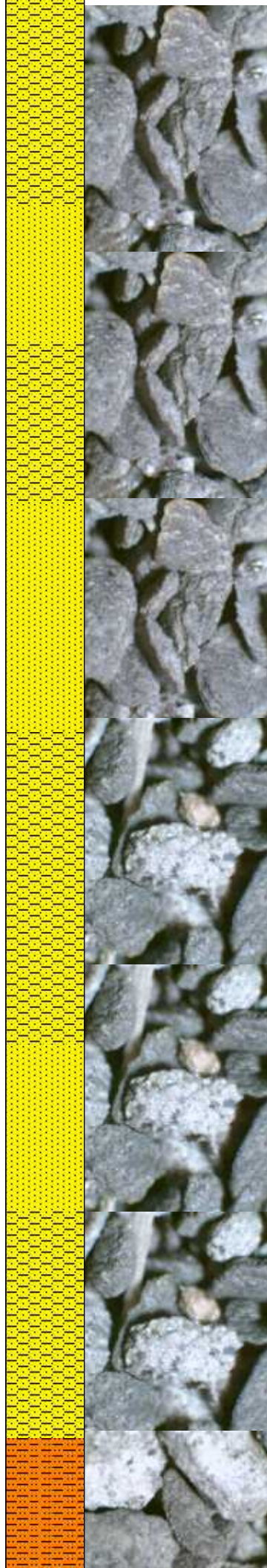
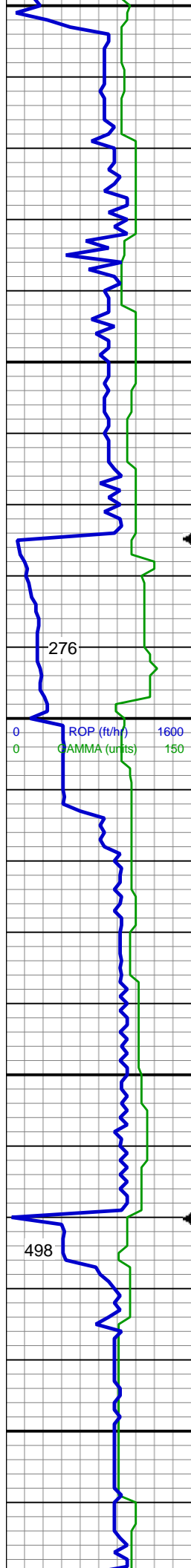
brit clus, sb ang - ang, calc cmt
SHY SLTST: lt-med gy, vfg, sb plty - sb
rd, slty - gritty tex, sl calc cmt
SS: wh, lt gy, pred trns, sme clr, spec
wi mica & phlog, tr dk gn xl glau,f-vfgr,
hd, v brit clus, sb ang - ang, v calc cmt

MD: 3,931 '
TVD: 3,876.09 '
Inclination: 13.36 °
Azimuth: 250.71 °

SHY SS: pred lt gy, some wh, s&p, vfg,
brit clus, sb ang - ang, calc cmt
SS: wh, lt gy, pred trns, sme clr, spec
wi mica & phlog, tr dk gn xl glau,f-vfgr,
hd, v brit clus, sb ang - ang, v calc cmt
SHY SLTST: lt-med gy, vfg, sb plty - sb
rd, slty - gritty tex, sl calc cmt

MD: 4,026 '
TVD: 3,968.31 '
Inclination: 14.41 °
Azimuth: 251.54 °

SHY SS: pred lt gy, some wh, s&p, vfg,
brit clus, sb ang - ang, calc cmt
SS: wh, lt gy, pred trns, sme clr, spec
wi mica & phlog, tr dk gn xl glau,f-vfgr,
hd, v brit clus, sb ang - ang, v calc cmt
SHY SLTST: lt-med gy, vfg, sb plty - sb
rd, slty - gritty tex, sl calc cmt



4,100
4,110
4,120
4,130
4,140
4,150
4,160
4,170
4,180
4,190
4,200
4,210
4,220
4,230
4,240
4,250
4,260
4,270
4,280
4,290
4,300
4,310

C2: 2.6%
C3: 3.2%
C4: 0.0%

MD: 4,121 '
TVD: 4,060.32 '
Inclination: 14.39 °
Azimuth: 253.93 °

489u

SHY SS: lt gy - med gy, gy brn, sme wh, s&p, vfg, brit clus, sb ang - ang, calc cmt
SS: wh, lt gy, pred trnsl, sme clr, spec wi mica & phlog, tr dk gn xl glau,f-vfgr, hd, v brit clus, sb ang - ang, v calc cmt

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

MD: 4,216 '
TVD: 4,152.17 '
Inclination: 15.2 °
Azimuth: 257.25 °

Sussex Top @
4235' MD; 4170' TVD

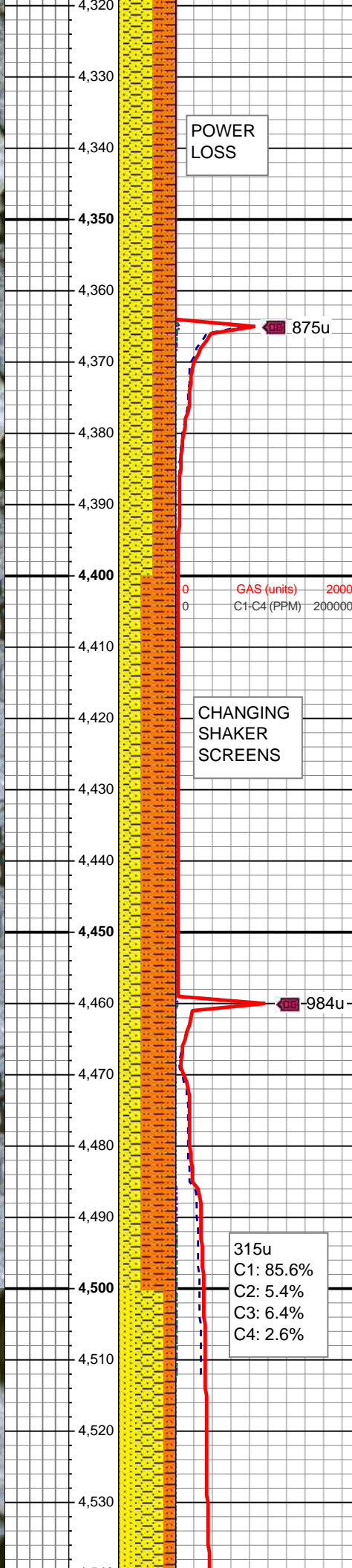
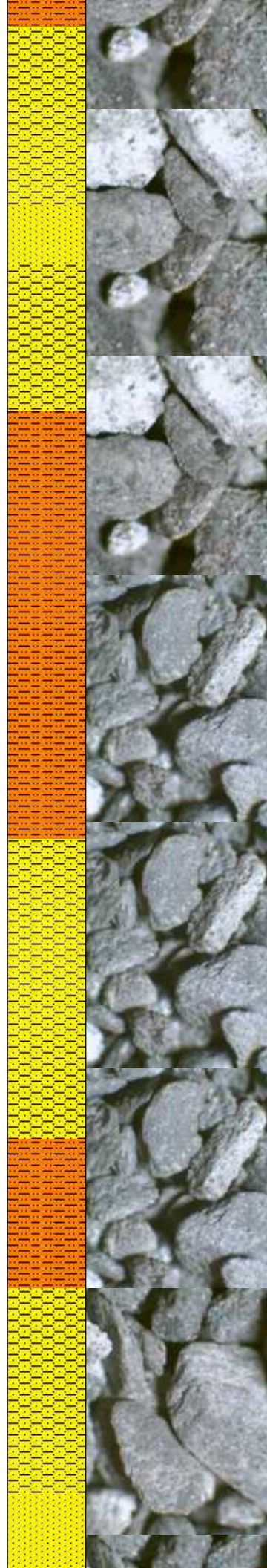
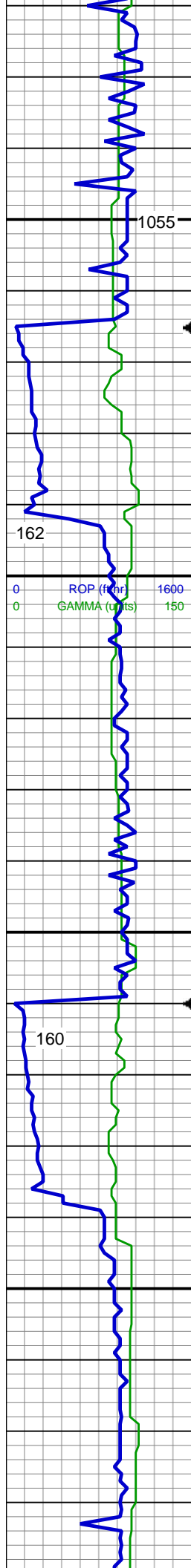
311

293u

SHY SS: lt gy - med gy, gy brn, sme wh, s&p, vfg, brit clus, sb ang - ang, calc cmt
SS: wh, lt gy, pred trnsl, sme clr, spec wi mica & phlog, tr dk gn xl glau,f-vfgr, hd, v brit clus, sb ang - ang, v calc cmt

293u
C1: 94.1%
C2: 3.1%
C3: 2.9%
C4: 0.0%

MD: 4,311 '
TVD: 4,244.28 '
Inclination: 13.13 °
Azimuth: 255.85 °

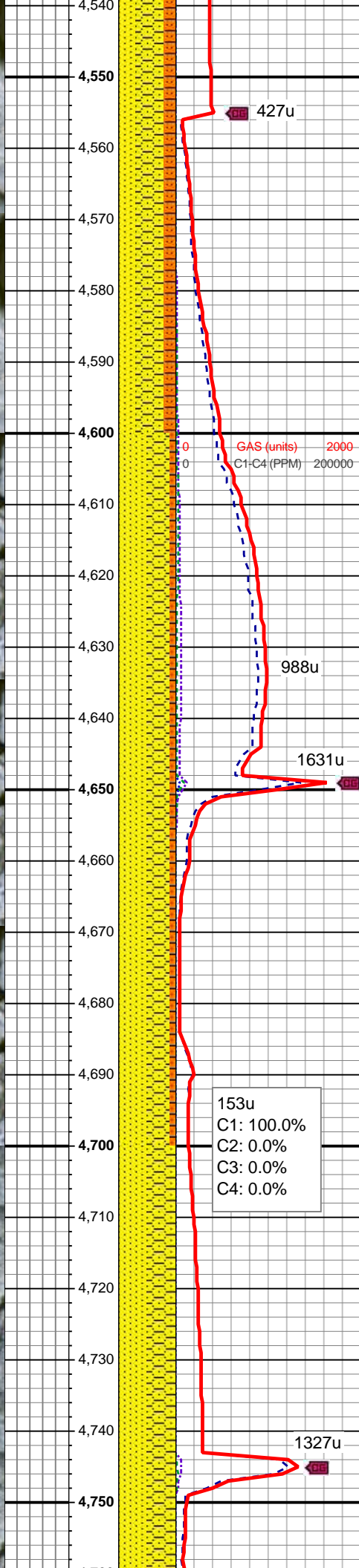
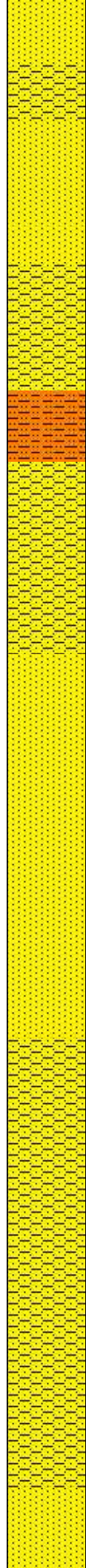
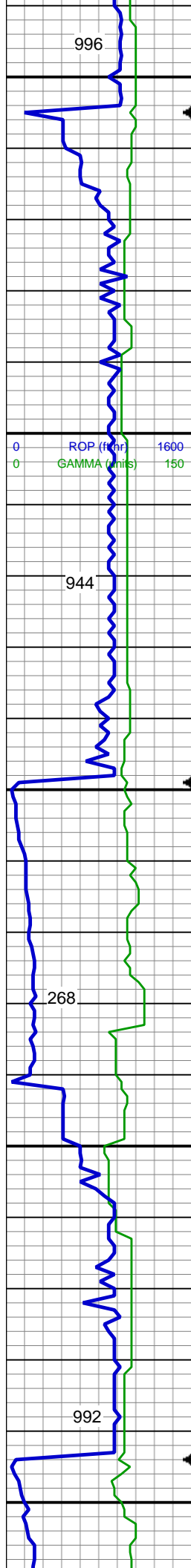


SHY SS: lt gy - med gy, gy brn, sme wh, s&p, vfg, brit clus, sb ang - ang, calc cmt
SHY SLTST: lt-dk gy, gy brn, vfg, sb plty - sb rd, slty - gritty tex, sl calc cmt
SS: wh, lt gy, pred trnsl, sme clr, spec wi mica & phlog, tr dk gn xl glau, f-vfgr, hd, v brit clus, sb ang - ang, v calc cmt

MD: 4,406 '
TVD: 4,336.65 '
Inclination: 13.91 °
Azimuth: 261.08 °

SHY SLTST: lt-dk gy, gy brn, vfg, sb plty - sb rd, slty - gritty tex, sl calc cmt
SHY SS: lt gy - med gy, gy brn, sme wh, s&p, vfg, brit clus, sb ang - ang, calc cmt
SS: wh, lt gy, pred trnsl, sme clr, spec wi mica & phlog, tr dk gn xl glau, f-vfgr, hd, v brit clus, sb ang - ang, v calc cmt

MD: 4,500 '
TVD: 4,427.89 '
Inclination: 13.91 °
Azimuth: 262.55 °



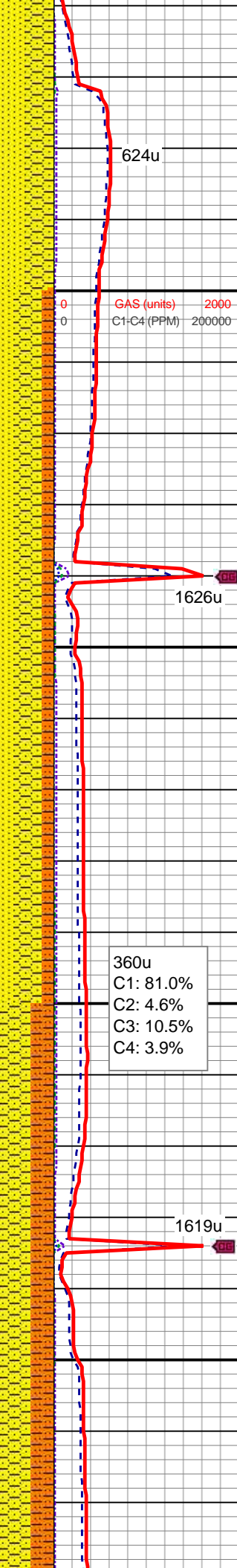
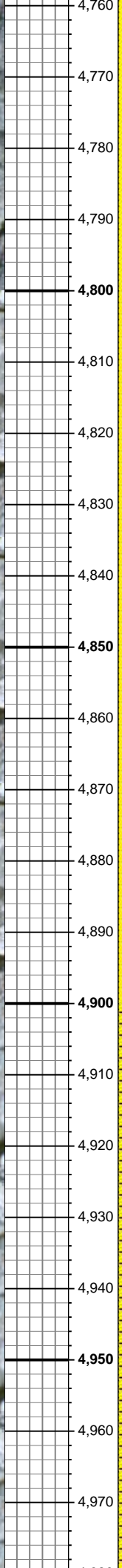
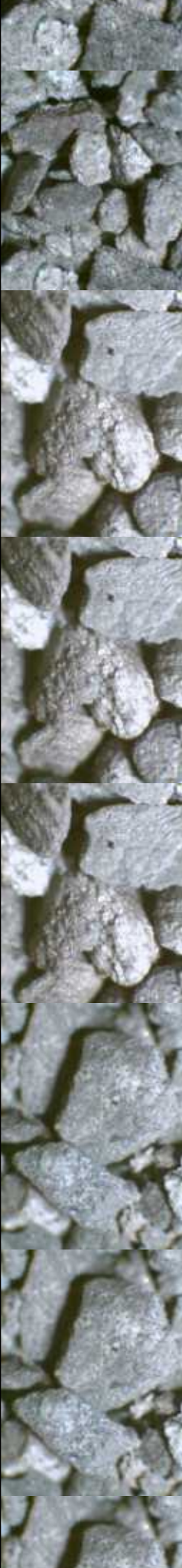
SHY SS: lt gy - med gy, gy brn, sme wh, s&p, vfg, brit clus, sb ang - ang, calc cmt
SS: wh, lt gy, pred trnsI, sme clr, spec wi mica & phlog, tr dk gn xl glau,f-vfgr, hd, v brit clus, sb ang - ang, v calc cmt
SHY SLTST: lt-dk gy, gy brn, vfg, sb plty - sb rd, slty - gritty tex, sl calc cmt

MD: 4,595 '
TVD: 4,520.59 '
Inclination: 11.37 °
Azimuth: 268.23 °

SS: wh, lt gy, pred trnsI, sme clr, spec wi mica & phlog, tr dk gn xl glau,f-vfgr, hd, v brit clus, sb ang - ang, v calc cmt
SHY SS: lt gy - med gy, gy brn, sme wh, s&p, vfg, brit clus, sb ang - ang, calc cmt
SHY SLTST: lt-dk gy, gy brn, vfg, sb plty - sb rd, slty - gritty tex, sl calc cmt

MD: 4,690 '
TVD: 4,613.57 '
Inclination: 12.37 °
Azimuth: 254.07 °

SS: wh, lt gy, pred trnsI, sme clr, spec wi mica & phlog, tr dk gn xl glau,f-vfgr,



hd, v brit clus, sb ang - ang, v calc cmt
SHY SS: lt gy - dk gy, gy brn, sme wh, s&p, trns ip, vfg, brit clus, sb ang - ang, calc cmt

MD: 4,785 '
TVD: 4,706.38 '
Inclination: 12.37 °
Azimuth: 246.45 °

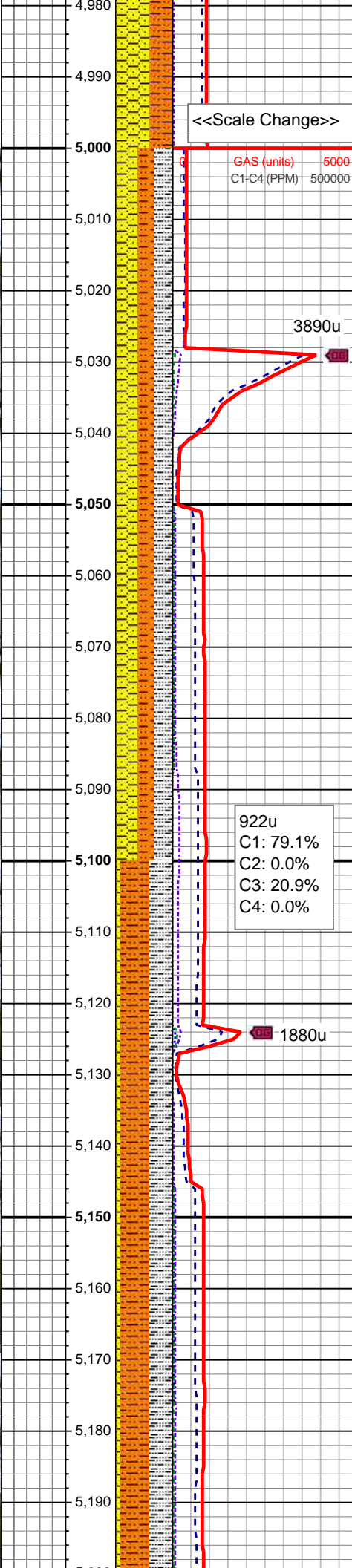
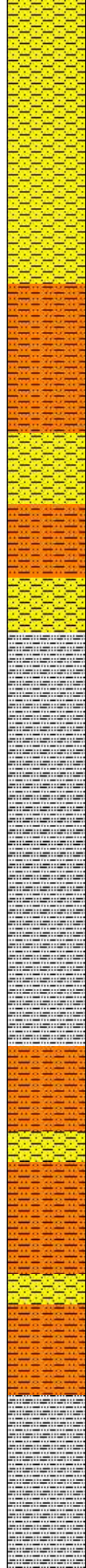
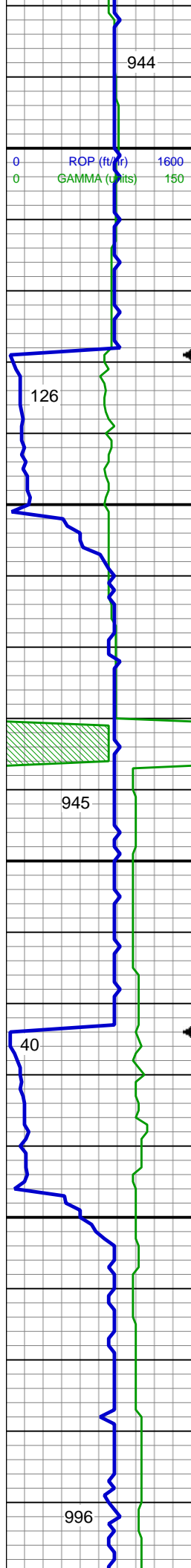
Shannon Top @
4791' MD; 4713' TVD

SHY SS: lt gy - med gy, gy brn, sme wh, s&p, vfg, brit clus, sb ang - ang, calc cmt
SS: wh, lt gy, pred trns, sme clr, spec wi mica & phlog, tr dk gn xl glau, f-vfgr, hd, v brit clus, sb ang - ang, v calc cmt
SHY SLTST: lt-dk gy, gy brn, vfg, sb plty - sb rd, slty - gritty tex, sl calc cmt

MD: 4,880 '
TVD: 4,799.48 '
Inclination: 10.54 °
Azimuth: 244.18 °

SHY SS: lt gy - med gy, gy brn, sme wh, trns ip, s&p, vfg, brit clus, sb ang - ang, calc cmt
SHY SLTST: lt-dk gy, gy brn, vfg, sb plty - sb rd, slty - gritty tex, sl calc cmt

MD: 4,975 '
TVD: 4,893.13 '
Inclination: 8.77 °
Azimuth: 238.57 °

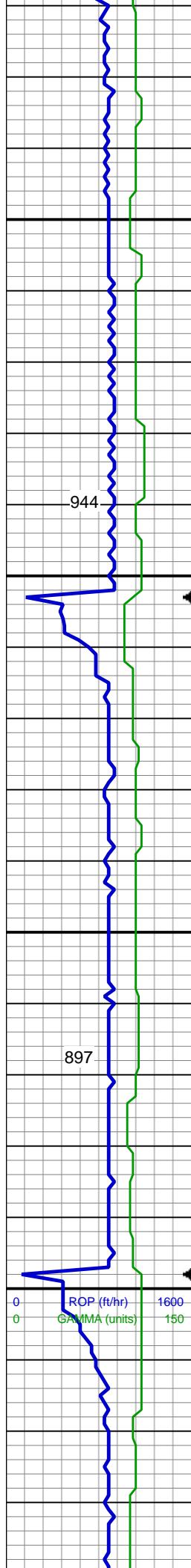


MD: 5,070 '
TVD: 4,987.27 '
Inclination: 6.68 °
Azimuth: 228.17 °

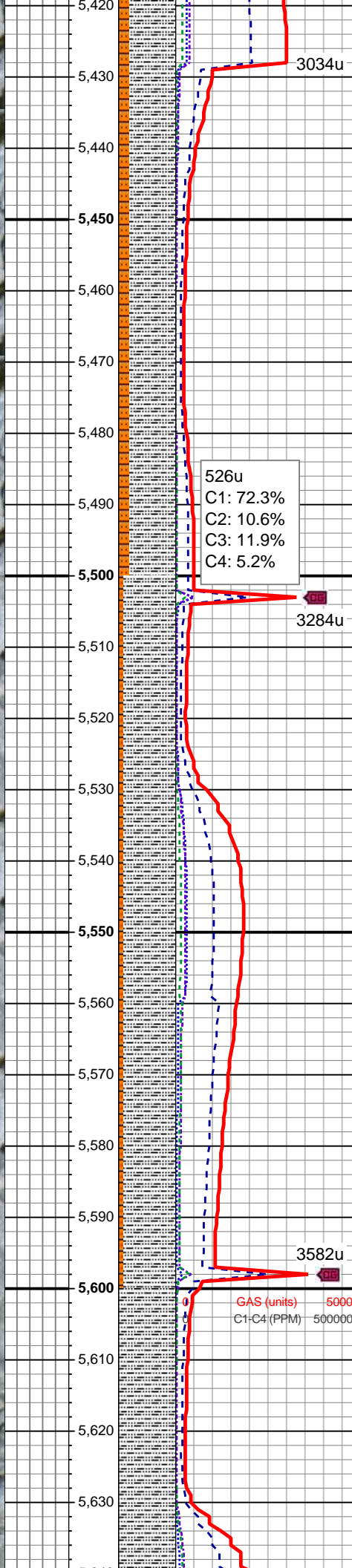
SHY SS: lt gy - med gy, gy brn, sme wh, trnsl ip, s&p, vfg, brit clus, sb ang - ang, calc cmt
SHY SLTST: lt-dk gy, gy brn, vfg, sb plty - sb rd, slty - gritty tex, sl calc cmt
SLTY SH: med gy - dk gy, frm - mod hd, sb plty - plty, slty - gritty tex, v sl calc

MD: 5,165 '
TVD: 5,081.81 '
Inclination: 4.6 °
Azimuth: 213.84 °

SHY SLTST: lt-dk gy, gy brn, vfg, sb plty - sb rd, slty - gritty tex, sl calc cmt
SLTY SH: med gy - dk gy, frm - mod hd, sb plty - plty, slty - gritty tex, v sl calc
SHY SS: lt gy - med gy, gy brn, sme wh, trnsl ip, s&p, vfg, brit clus, sb ang - ang, calc cmt



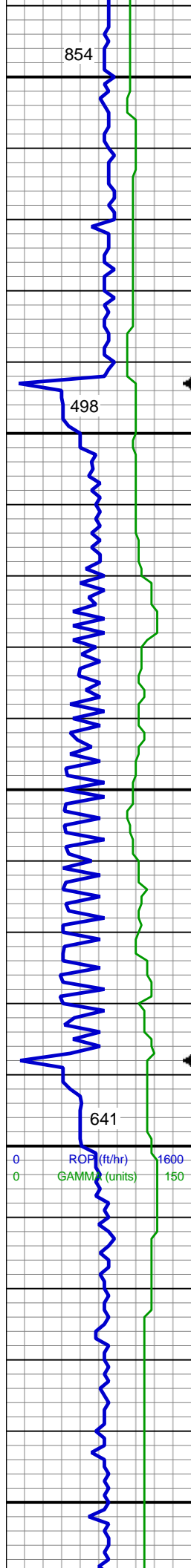
5,420
5,430
5,440
5,450
5,460
5,470
5,480
5,490
5,500
5,510
5,520
5,530
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5,550
5,560
5,570
5,580
5,590
5,600
5,610
5,620
5,630



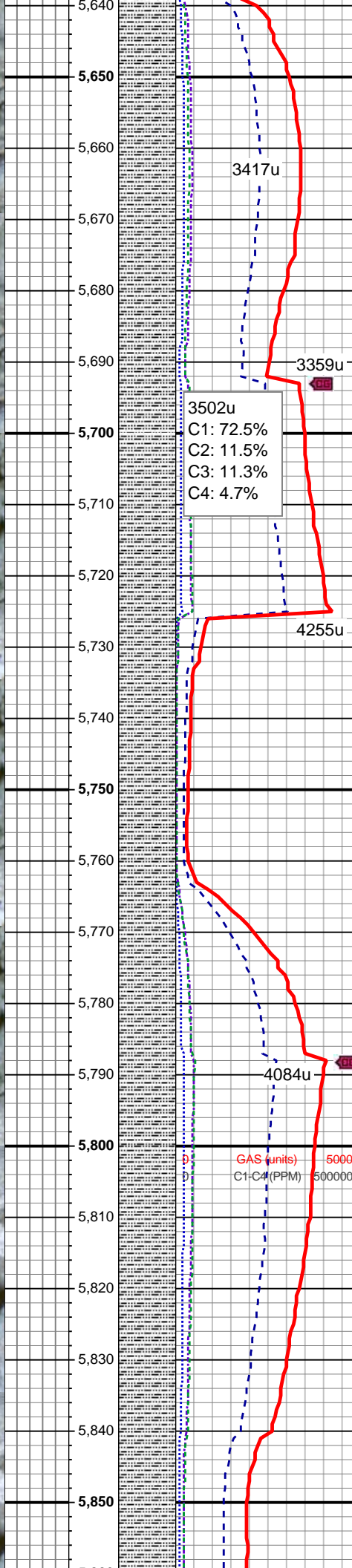
MD: 5,450 '
TVD: 5,366.58 '
Inclination: 1.34 °
Azimuth: 222.51 °

SLTY SH: med gy - dk gy, frm - mod hd,
sb plty - plty, slty - gritty tex, v sl calc
SHY SLTST: lt-dk gy, gy brn, wme wh,
occ fros, vfg, sb plty - sb rd, slty - gritty
tex, calc cmt

SLTY SH: med gy - dk gy, frm - mod hd,
sb plty - plty, slty - gritty tex, v sl calc
SHY SLTST: lt-dk gy, gy brn, wme wh,
occ fros, vfg, sb plty - sb rd, slty - gritty
tex, calc cmt



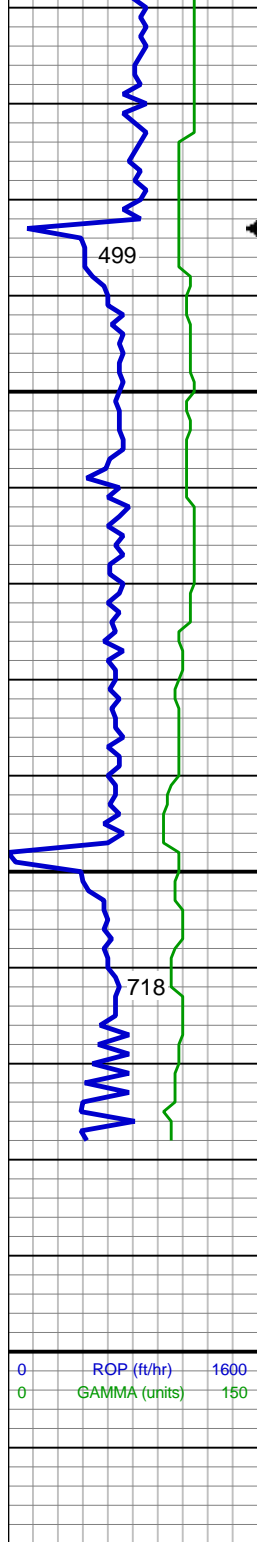
5,640
5,650
5,660
5,670
5,680
5,690
5,700
5,710
5,720
5,730
5,740
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5,780
5,790
5,800
5,810
5,820
5,830
5,840
5,850



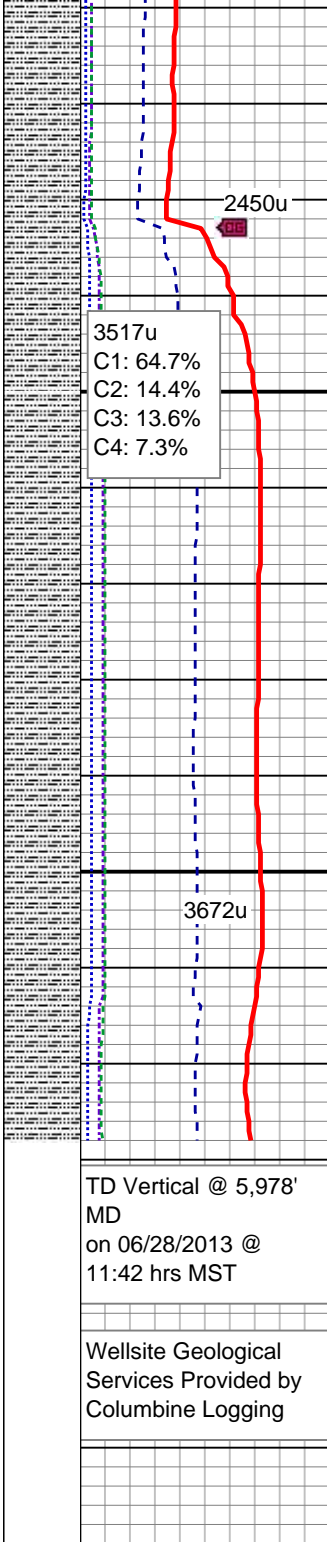
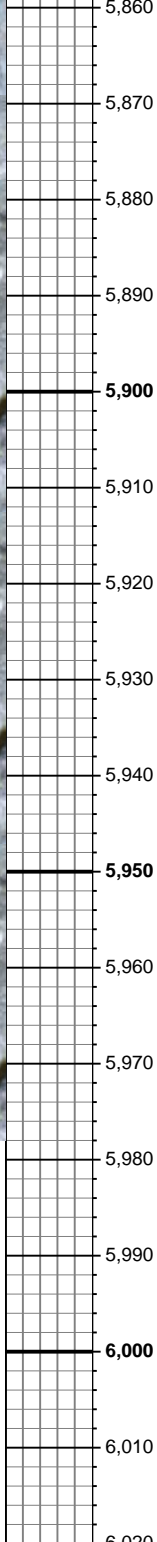
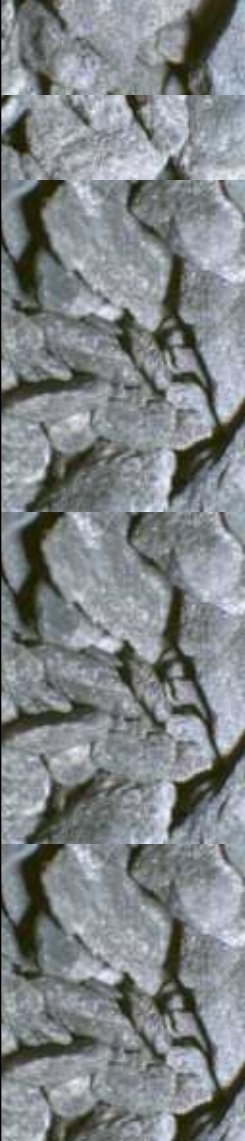
SLTY SH: lt gy - dk gy, gybrn, mod hd, sb plty - plty, slty - gritty tex, v sl calc

MD: 5,734 '
TVD: 5,650.54 '
Inclination: 0.62 °
Azimuth: 212.18 °

SLTY SH: lt gy - dk gy, gybrn, mod hd, sb plty - plty, slty - gritty tex, sl calc



0 1600 ROP (ft/hr)
0 150 GAMMA (units)



SLTY SH: lt gy - dk gy, gybrn, mod hd, sb plty - plty, slty - gt tex, sl calc, tr fos frag

MD: 5,924 '
TVD: 5,840.53 '
Inclination: 0.67 °
Azimuth: 197.81 °

06/28/2013
Mud Wt: 9.20
FVis: 33
PVis: 7
YP: 5
GELS: 3/7/13
API Filt: 8.0
CAKE: 1/0
pH: 9.3
Cl: 1,100
Ca: 80

SLTY SH: lt gy - dk gy, gybrn, mod hd, sb plty - plty, slty - gt tex, sl calc, tr fos frag

TD Vertical @ 5,978'
MD
on 06/28/2013 @
11:42 hrs MST

See Corresponding Horizontal Log
Trebtor B11-66-1HN HORZ

Wellsite Geological
Services Provided by
Columbine Logging