

COLUMBINE LOGGING

Scale: 5" / 100'
Measured Depth Log

Well Name Crow Creek State AC36-76HN VERT

Location SEC 36 T7N R63W

State Colorado

County Weld

Country USA

Rig Number H&P 315

API Number 05-123-37132

AFE # 139139

Region DJ Basin

Field Wattenberg

Spud Date 10/15/2013

Drilling Completed 10/21/2013

Surface Coordinates SESW SEC 36 T7N R63W
270' FSL; 1,830' FWL

LAT/LON 40.52358/-104.38767

Bottom Hole Coordinates Sec: 36 Twp: 7N 63W

1980' FWL; 535' FNL

Ground Elevation 4789'

K.B. Elevation 4813'

Logged Interval 2000' **To** 11056'

Total Depth 11056'

Formation Niobrara B Chalk

Type of Drilling Fluid LSND

Operator

Company Noble Energy Inc

Address 1625 Broadway Suite 2200
Denver, CO 80202

Geologist

Name NATHAN MURPHY, JACK WEINERTH

Company COLUMBINE LOGGING, INC

Address 2385 S Lipan St
Denver, CO 80223

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	MARLSTONE	SANDSTONE	TILL
CLAYSTONE		SIDERITE or LIMONITE		SHALE	TUFF
				SHALE COLORED	WELDED TUFF
				SHALE GRAY	
				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

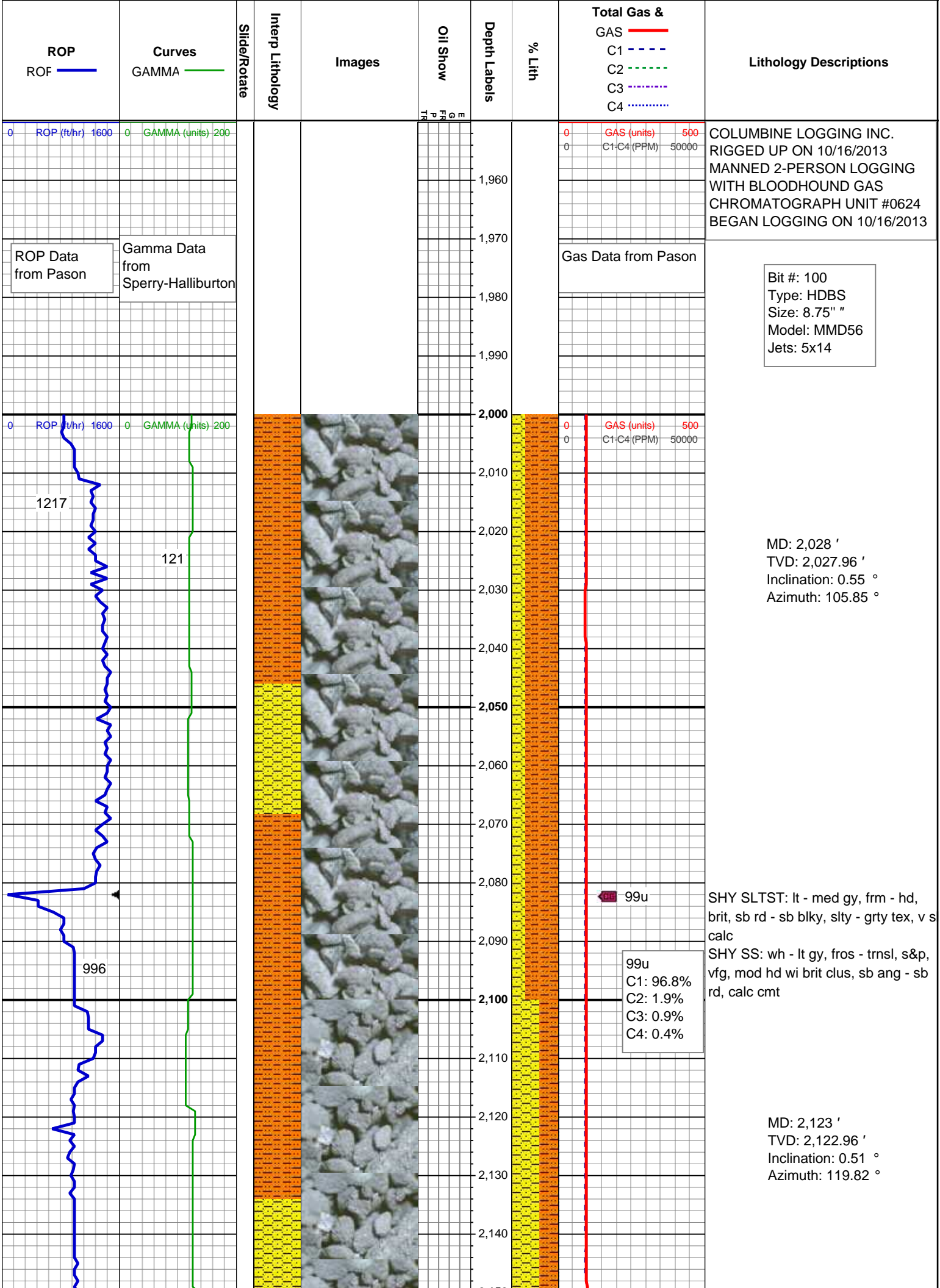
BOUNDSTONE
CHALKY
CRYPTOXLN

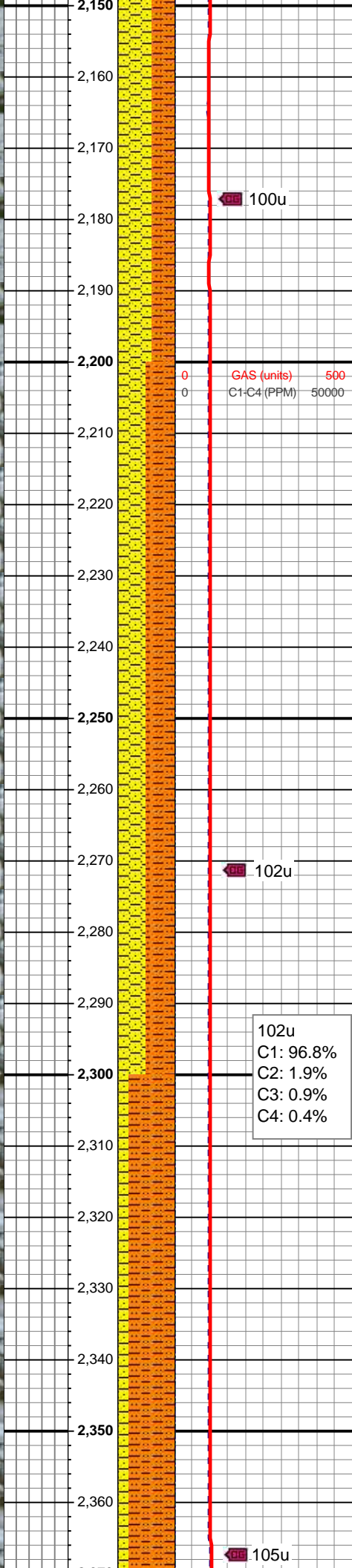
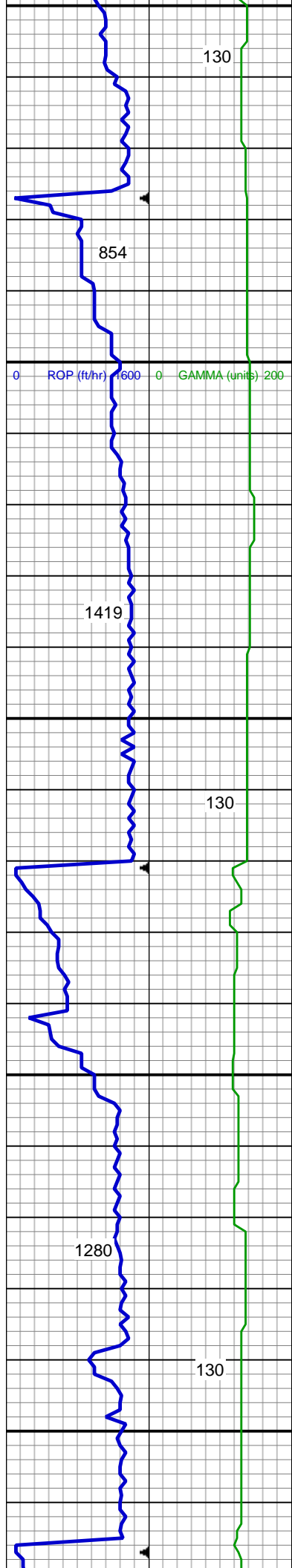
Earthy

FINELYXLN
GRAINSTONE
LITHOGRAPHIC
MICROXLN
MUDSTONE
PACKSTONE
WACKESTONE

Sorting

MODERATE
POOR
WELL



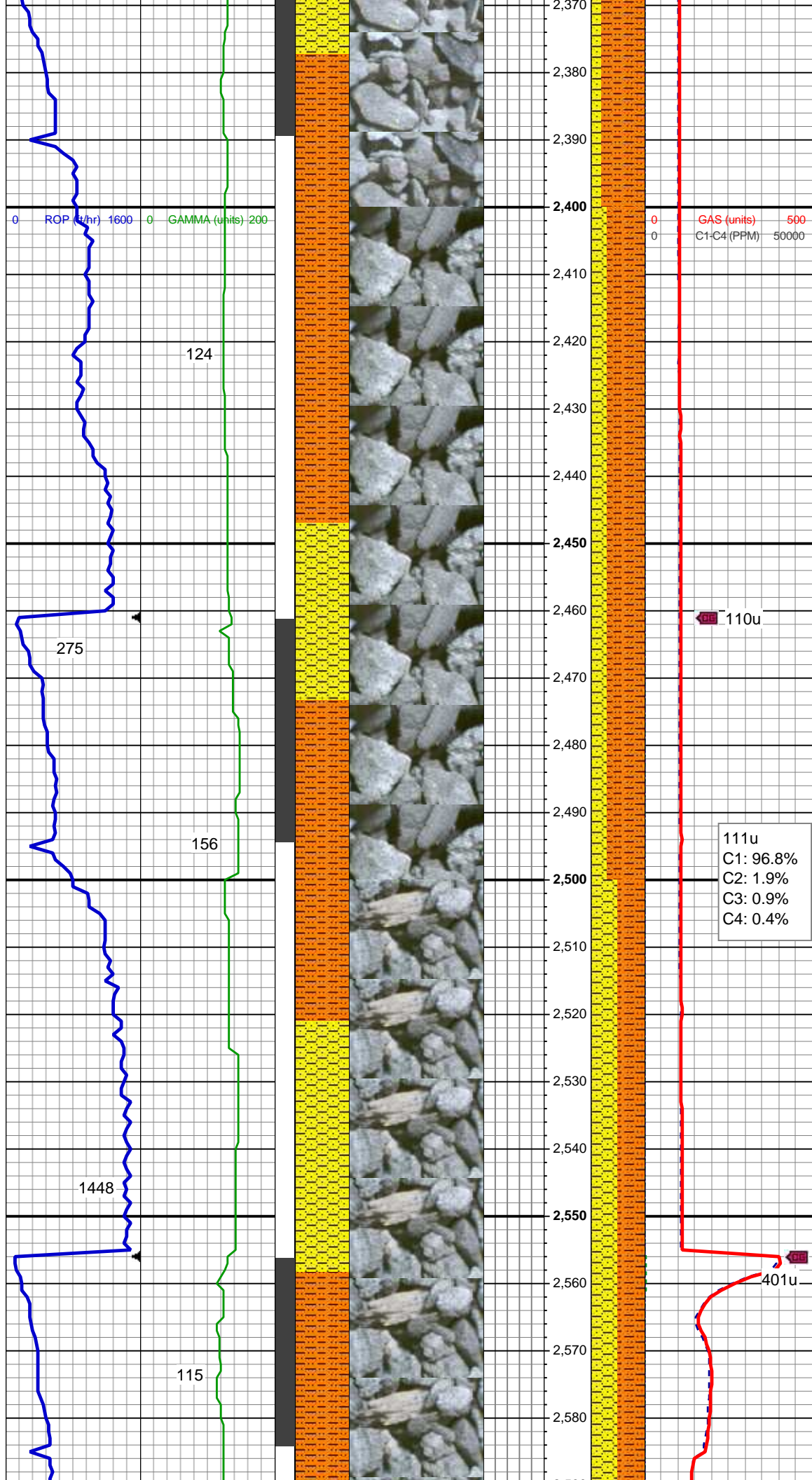


SHY SS: wh - lt gy, fros - trnsl, s&p, vfg, mod hd wi brit clus, sb ang - sb rd, calc cmt
SHY SLTST: lt - med gy, frm - hd, brit, sb rd - sb blkly, slty - grty tex, v s calc

MD: 2,218 '
TVD: 2,217.95 '
Inclination: 1.03 °
Azimuth: 66.54 °

SHY SLTST: lt - med gy, frm - hd, brit, sb rd - sb blkly, slty - grty tex, v s calc
SHY SS: wh - lt gy, fros - trnsl, s&p, vfg, mod hd wi brit clus, sb ang - sb rd, calc cmt

MD: 2,313 '
TVD: 2,312.9 '
Inclination: 2.74 °
Azimuth: 108.95 °



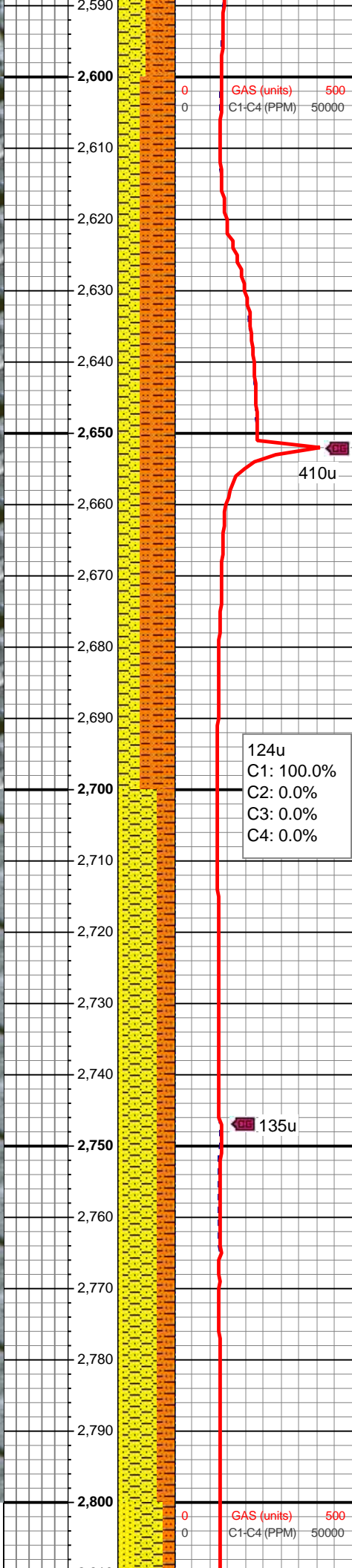
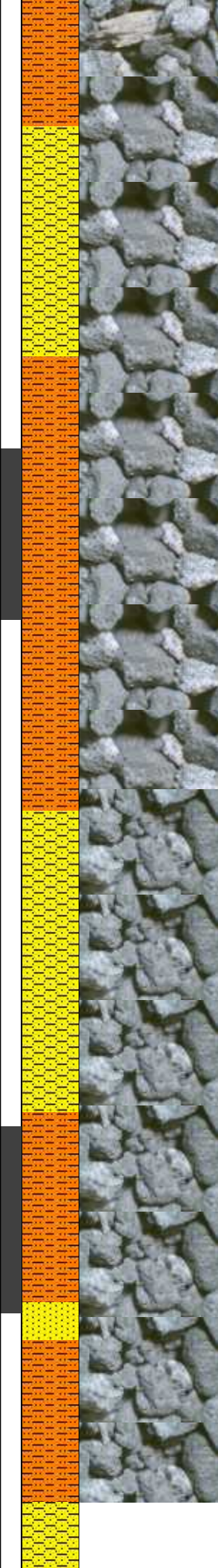
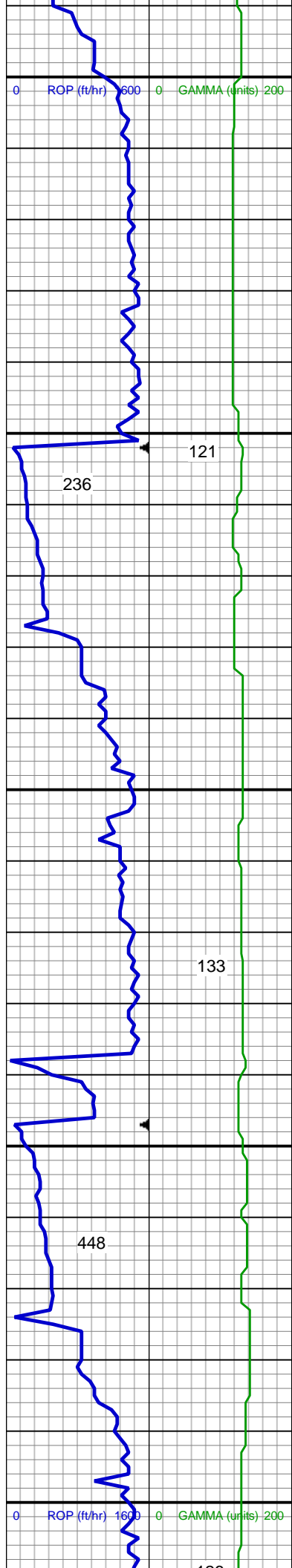
SHY SLTST: lt - med gy, frm - hd,
brit, sb rd - sb blk, slty - grty tex, v s
calc
SHY SS: wh - lt gy, fros - trns, s&p,
vfg, mod hd wi brit clus, sb ang - sb
rd, calc cmt

MD: 2,408 '
TVD: 2,407.75 '
Inclination: 3.82 °
Azimuth: 134.72 °

SHY SLTST: lt - med gy, frm - hd,
brit, sb rd - sb blk, slty - grty tex, v s
calc
SHY SS: wh - lt gy, fros - trns, s&p,
vfg, mod hd wi brit clus, sb ang - sb
rd, calc cmt

MD: 2,503 '
TVD: 2,502.42 '
Inclination: 5.65 °
Azimuth: 139.65 °

SHY SLTST: lt - med gy, frm - hd,
brit, sb rd - sb blk, slty - grty tex, v s
calc



SHY SS: wh - lt gy, fros - trnsl, s&p, vfg, mod hd wi brit clus, sb ang - sb rd, calc cmt

MD: 2,597 '
TVD: 2,595.76 '
Inclination: 7.94 °
Azimuth: 147.5 °

SHY SLTST: lt - med gy, frm - hd, brit, sb rd - sb blk, slty - grty tex, v s calc

SHY SS: wh - lt gy, fros - trnsl, s&p, vfg, mod hd wi brit clus, sb ang - sb rd, calc cmt

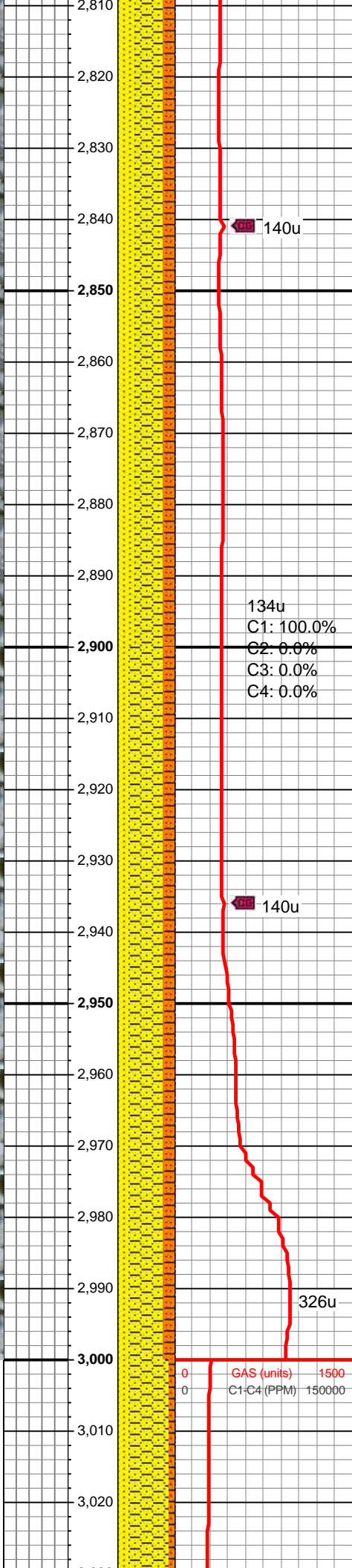
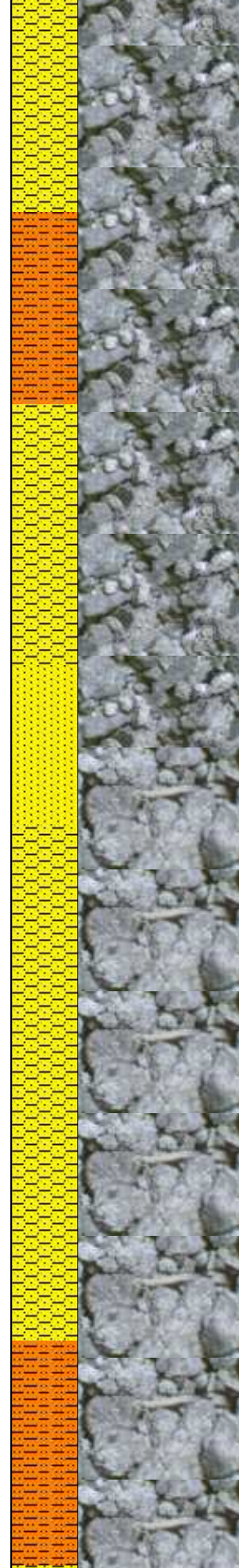
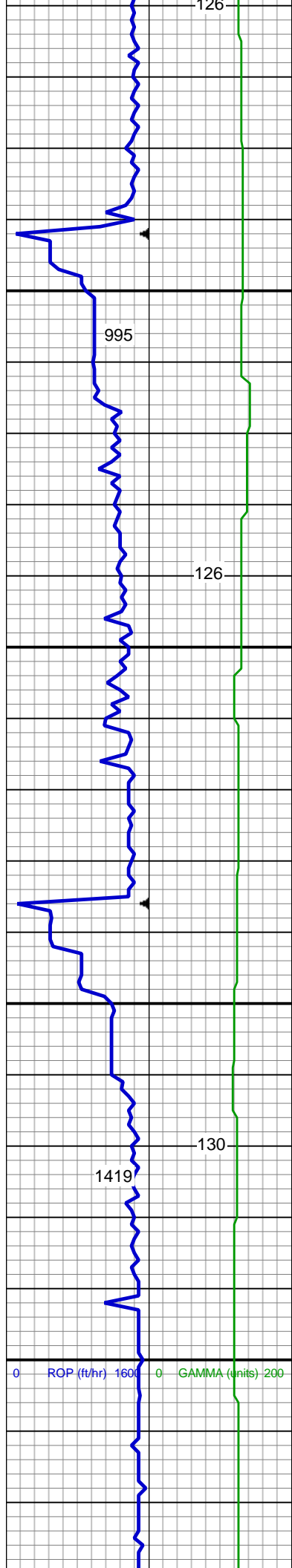
MD: 2,692 '
TVD: 2,689.66 '
Inclination: 9.46 °
Azimuth: 148.27 °

MD: 2,787 '
TVD: 2,783.1 '
Inclination: 11.32 °
Azimuth: 150.24 °

SHY SS: lt gy, s&p, vfg, frm - mod hd, wh brit clus, sb ang - sb rd, calc cmt

SHY SLTST: lt gy, frm - hd, sb rd - sb blk, slty - grty tex, v sl calc

SS: wh - lt gy, fros - trnsl, speckl wi mica, f gr, hd brit clus, ang - sb ang, v calc cmt



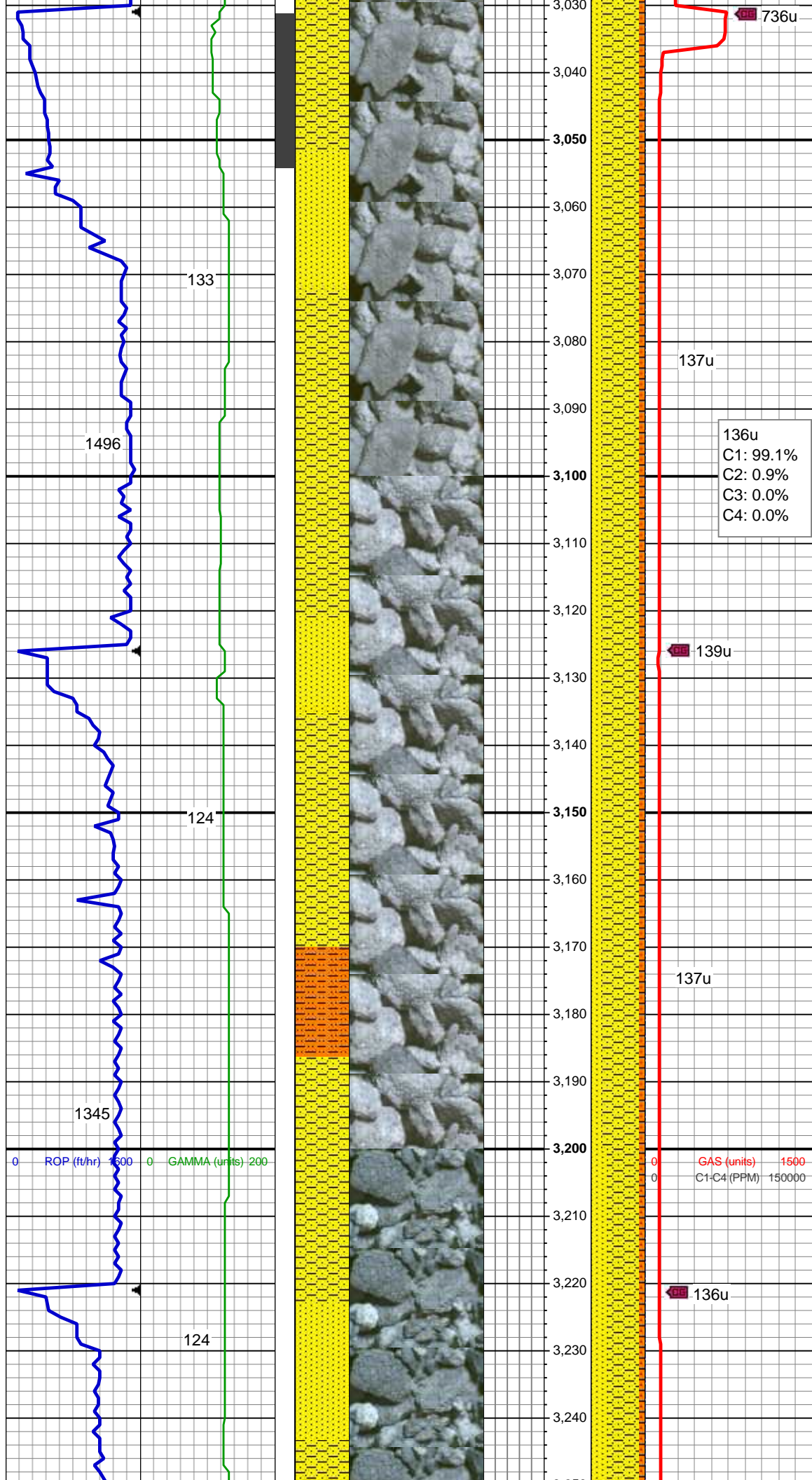
MD: 2,882 '
TVD: 2,876.34 '
Inclination: 10.77 °
Azimuth: 148.1 °

SHY SS: lt gy, s&p, vfg, frm - mod
hd, wh brit clus, sb ang - sb rd, calc
cmt
SS: wh - lt gy, fros - trnsl, speckl wi
mica, f gr, hd brit clus, ang - sb ang,
v calc cmt
SHY SLTST: lt gy, frm - hd, sb rd -
sb blk, slty - grty tex, v sl calc

MD: 2,977 '
TVD: 2,969.75 '
Inclination: 10.24 °
Azimuth: 147.96 °

SHY SS: lt gy, s&p, vfg, frm - mod
hd, wh brit clus, sb ang - sb rd, calc
cmt
SS: wh - lt gy, fros - trnsl, speckl wi
mica, f gr, hd brit clus, ang - sb ang,
v calc cmt
SHY SLTST: lt gy, frm - hd, sb rd -
sb blk, slty - grty tex, v sl calc

GAS (units) 1500
C1-C4 (PPM) 150000



MD: 3,072 '
TVD: 3,062.87 '
Inclination: 12.56 °
Azimuth: 147.11 °

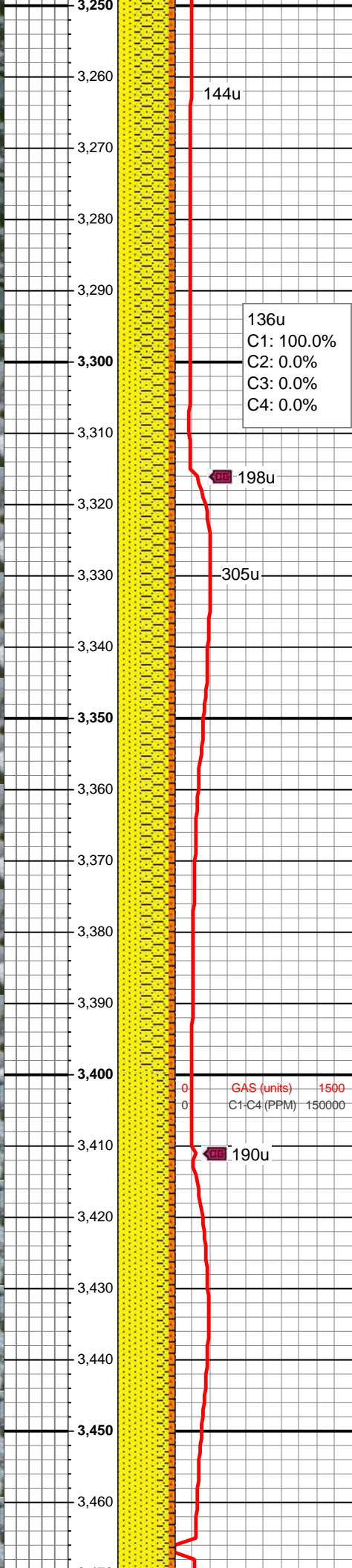
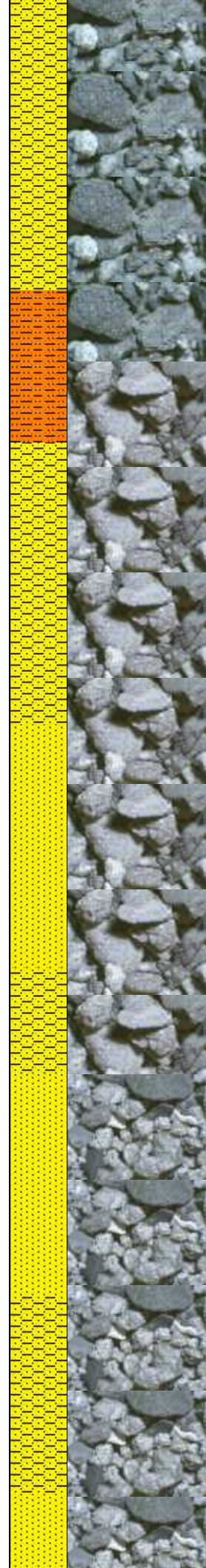
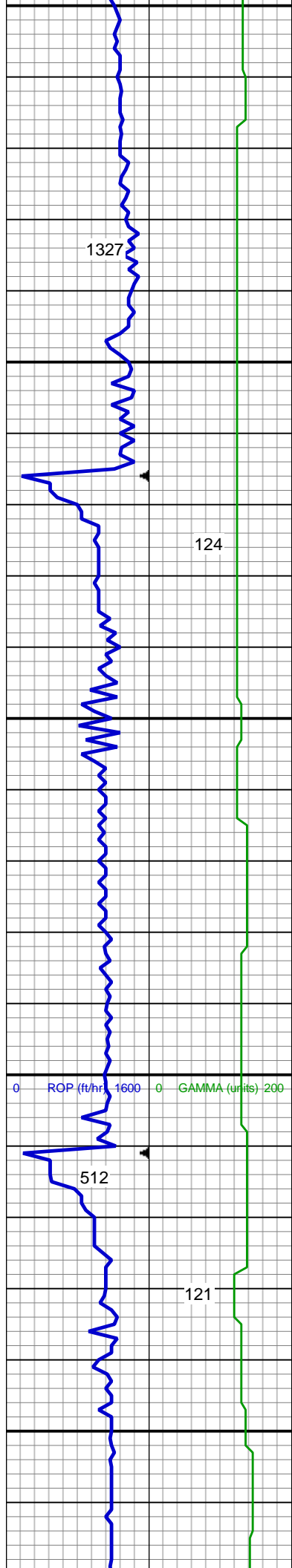
SHY SS: lt gy, s&p, vfg, frm - mod
hd, wh brit clus, sb ang - sb rd, calc
cmt
SS: wh - lt gy, fros - trnsl, speckl wi
mica, f gr, hd brit clus, ang - sb ang,
v calc cmt
SHY SLTST: lt gy, frm - hd, sb rd -
sb blk, slty - grty tex, v sl calc

MD: 3,167 '
TVD: 3,155.72 '
Inclination: 11.86 °
Azimuth: 145.7 °

SHY SS: lt gy, s&p, vfg, frm - mod
hd, wh brit clus, sb ang - sb rd, calc
cmt
SS: wh - lt gy, fros - trnsl, speckl wi
mica, f gr, hd brit clus, ang - sb ang,
v calc cmt
SHY SLTST: lt gy, frm - hd, sb rd -
sb blk, slty - grty tex, v sl calc

136u
C1: 99.1%
C2: 0.9%
C3: 0.0%
C4: 0.0%

GAS (units) 0 1500
C1-C4 (PPM) 0 150000



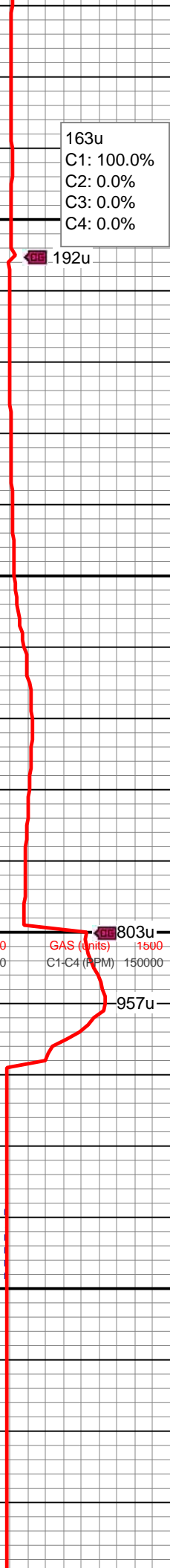
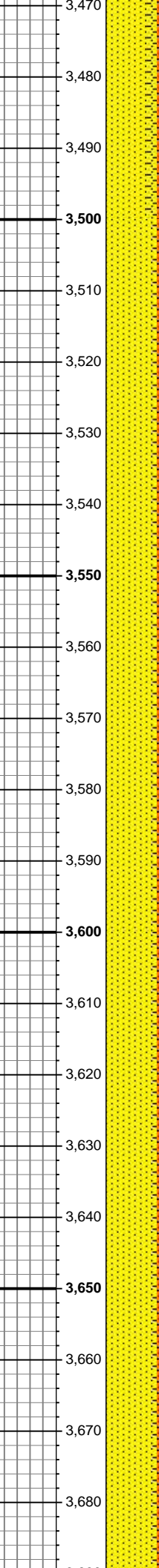
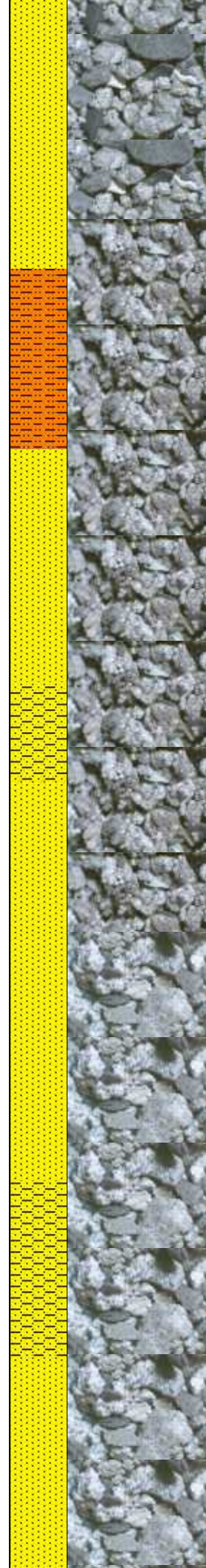
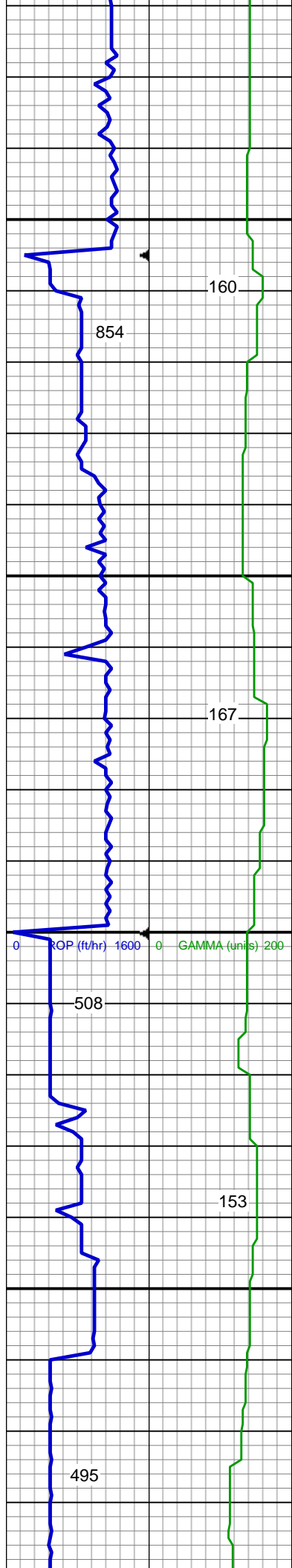
MD: 3,262 '
TVD: 3,248.79 '
Inclination: 11.29 °
Azimuth: 142.95 °

SHY SS: lt gy, s&p, vfg, frm - mod
hd, wh brit clus, sb ang - sb rd, calc
cmt
SS: wh - lt gy, fros - trnsl, speckl wi
mica, f gr, hd brit clus, ang - sb ang,
v calc cmt
SHY SLTST: lt gy, frm - hd, sb rd -
sb blk, slty - grty tex, v sl calc

MD: 3,357 '
TVD: 3,342.12 '
Inclination: 10.15 °
Azimuth: 141.2 °

SHY SS: lt gy, s&p, vfg, frm - mod
hd, wh brit clus, sb ang - sb rd, calc
cmt
SS: wh - lt gy, fros - trnsl, speckl wi
mica, f gr, hd brit clus, ang - sb ang,
v calc cmt
SHY SLTST: lt gy, frm - hd, sb rd -
sb blk, slty - grty tex, v sl calc

MD: 3,452 '
TVD: 3,435.89 '
Inclination: 8.33 °
Azimuth: 139.54 °



SS: wh - lt gy, fros - trns, speckl wi mica, f gr, hd brit clus, ang - sb ang, v calc cmt
SHY SS: lt gy, s&p, vfg, frm - mod hd, wh brit clus, sb ang - sb rd, calc cmt
SHY SLTST: lt gy, frm - hd, sb rd - sb blk, slty - grty tex, v sl calc

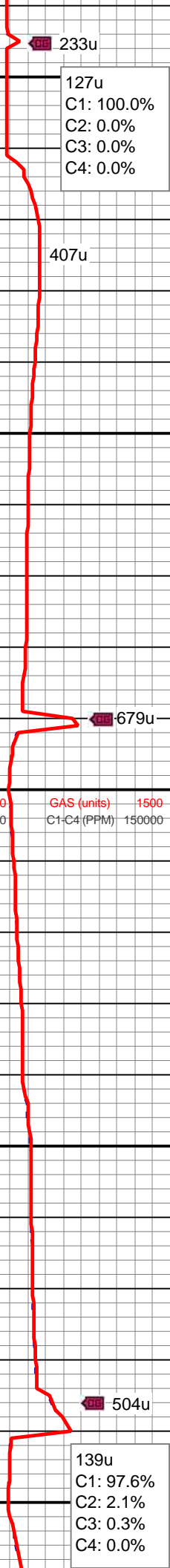
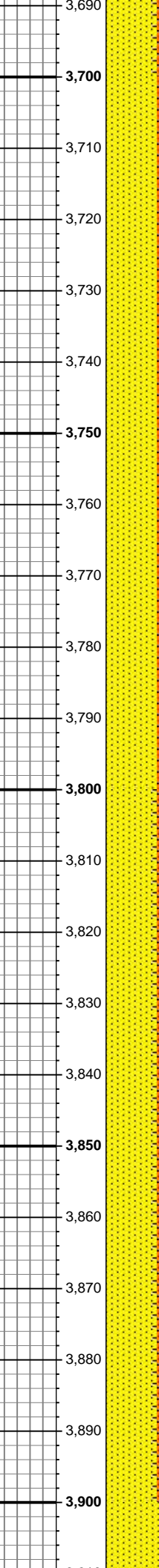
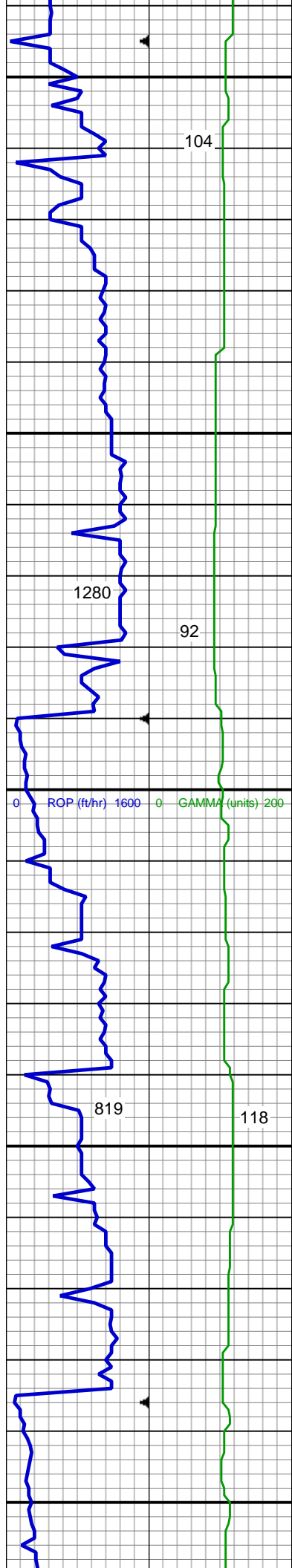
MD: 3,546 '
TVD: 3,529.06 '
Inclination: 6.91 °
Azimuth: 142.76 °

SS: wh - lt gy, fros - trns, speckl wi mica, f gr, hd brit clus, ang - sb ang, v calc cmt
SHY SS: lt gy, s&p, vfg, frm - mod hd, wh brit clus, sb ang - sb rd, calc cmt
SHY SLTST: lt gy, frm - hd, sb rd - sb blk, slty - grty tex, v sl calc

Parkman Top @
3,611' MD; 3,593' TVD

MD: 3,641 '
TVD: 3,623.34 '
Inclination: 7.13 °
Azimuth: 144.84 °

SS: wh - lt gy, fros - trns, speckl wi mica, f gr, hd brit clus, ang - sb ang, v calc cmt
SHY SS: lt gy, s&p, vfg, frm - mod hd, wh brit clus, sb ang - sb rd, calc



cmt
SHY SLTST: lt gy, frm - hd, sb rd - sb blk, slty - grty tex, v sl calc

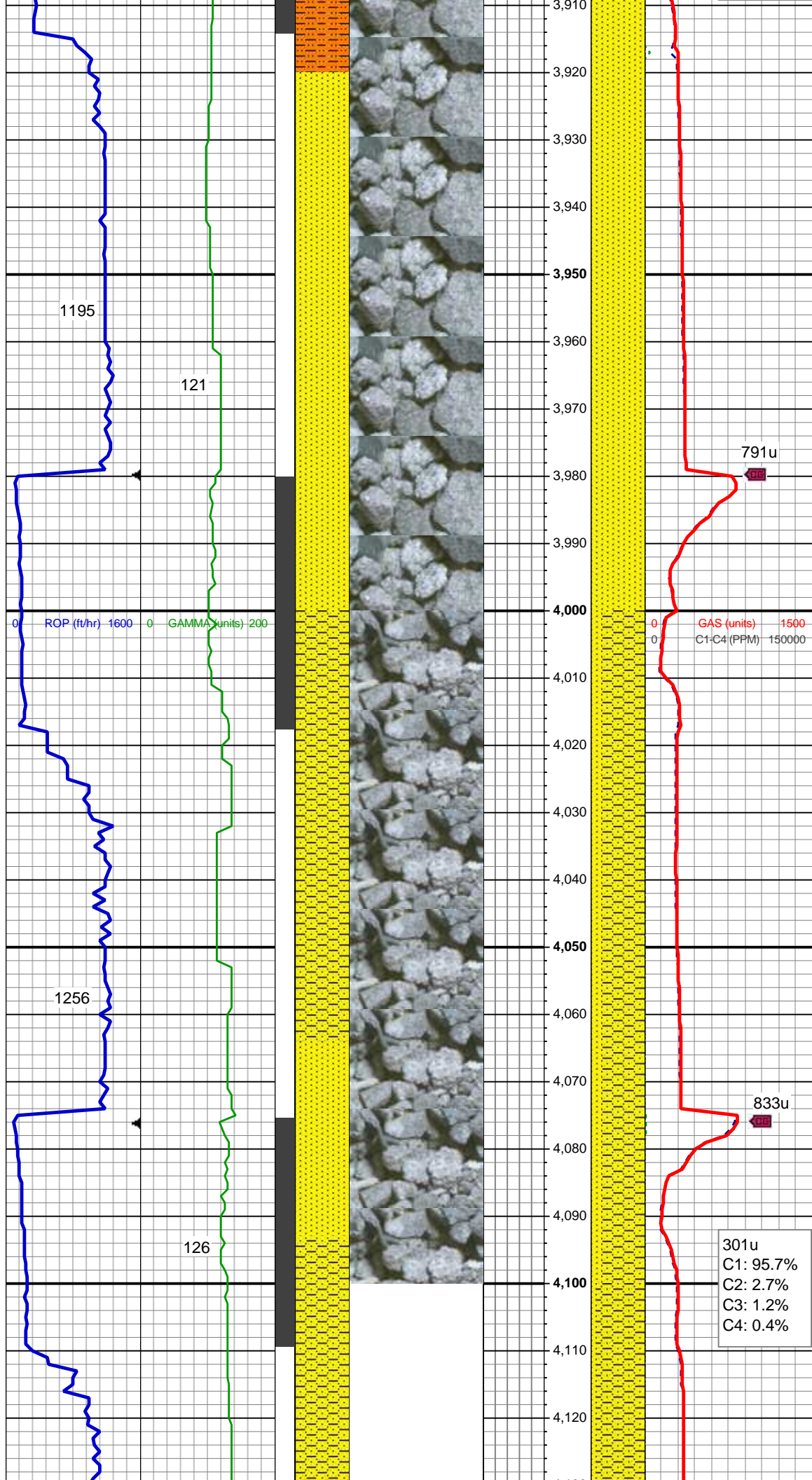
MD: 3,736 '
TVD: 3,717.52 '
Inclination: 7.93 °
Azimuth: 145.03 °

10/16/2013
Mud Wt: 8.65
FVis: 28
PVis: 3
YP: 4
GELS: --
API Filt: --
CAKE: 1/0
pH: 9.2
Cl: 1,300
Ca: 100

SS: wh - lt gy, fros - trnsl, speckl wi mica, f gr, hd brit clus, ang - sb ang, v calc cmt
SHY SLTST: lt gy, frm - hd, sb rd - sb blk, slty - grty tex, v sl calc

MD: 3,831 '
TVD: 3,811.73 '
Inclination: 6.94 °
Azimuth: 140.07 °

SS: wh - lt gy, fros - trnsl, speckl wi mica, f gr, hd brit clus, ang - sb ang, v calc cmt
SHY SS: lt gy, s&p, vfg, frm - mod hd, wh brit clus, sb ang - sb rd, calc cmt
SHY SLTST: lt gy, frm - hd, sb rd - sb blk, slty - grty tex, v sl calc



MD: 3,926 '
TVD: 3,906.09 '
Inclination: 6.28 °
Azimuth: 134.8 °

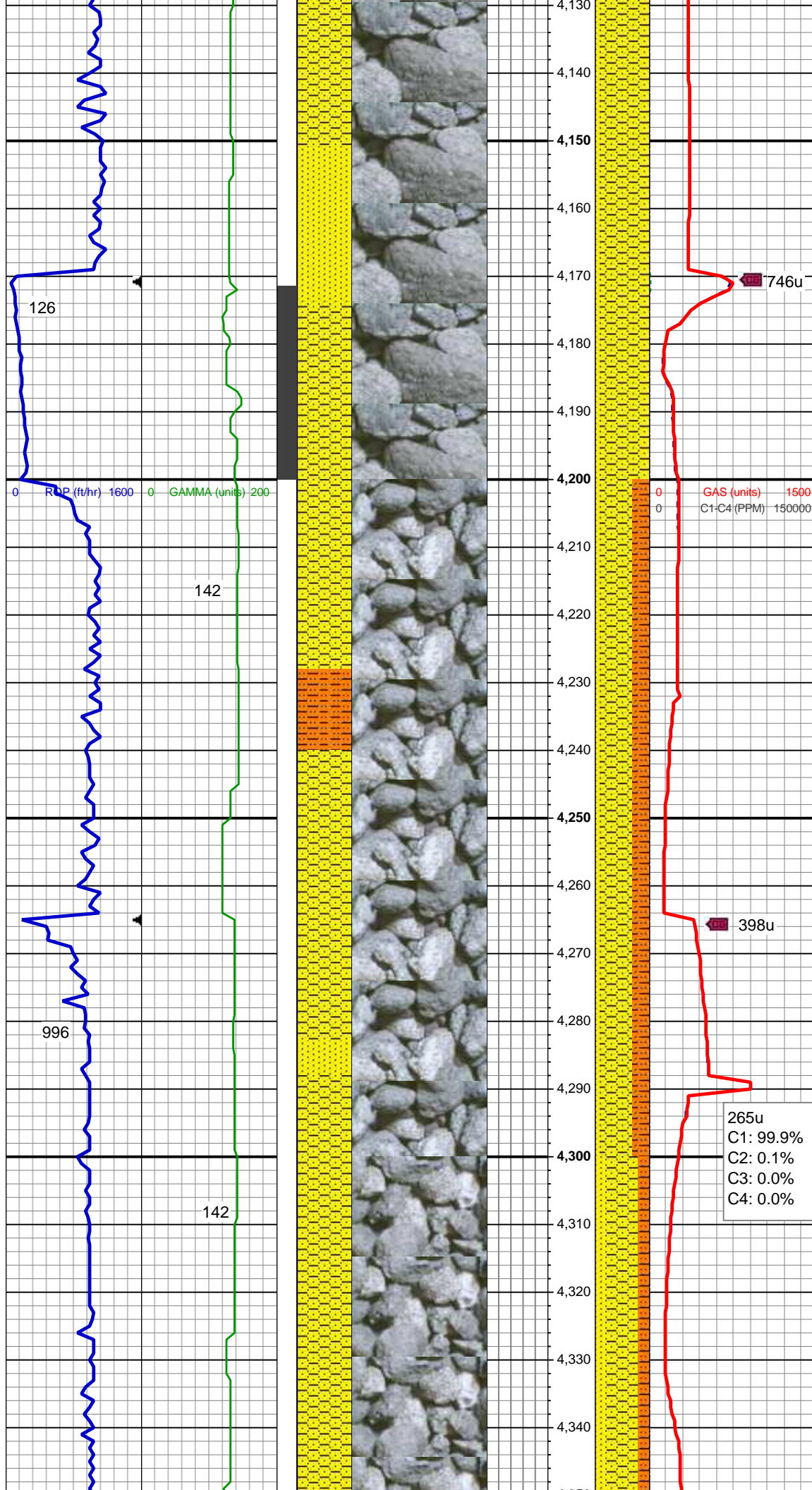
SS: wh - lt gy, fros - trnsl, speckl wi mica, f gr, hd brit clus, ang - sb ang, v calc cmt

MD: 4,021 '
TVD: 4,000.76 '
Inclination: 3.24 °
Azimuth: 124.05 °

SS: wh - lt gy, fros - trnsl, speckl wi mica, vf-f gr, hd brit clus, ang - sb ang, v calc cmt

SHY SS: lt gy, s&p, vfg, frm - mod hd, wh brit clus, sb ang - sb rd, calc cmt

MD: 4,116 '
TVD: 4,095.68 '
Inclination: 1.53 °
Azimuth: 77.08 °

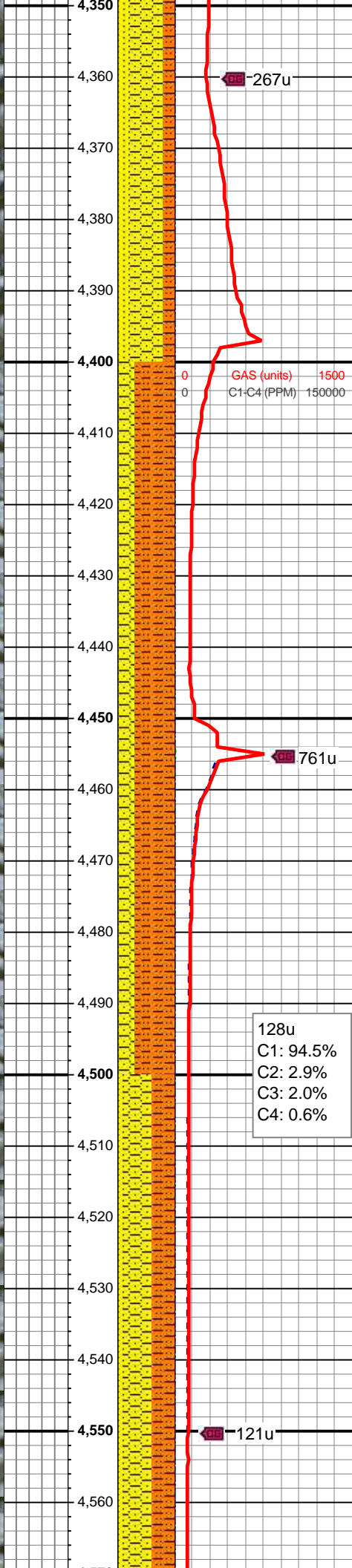
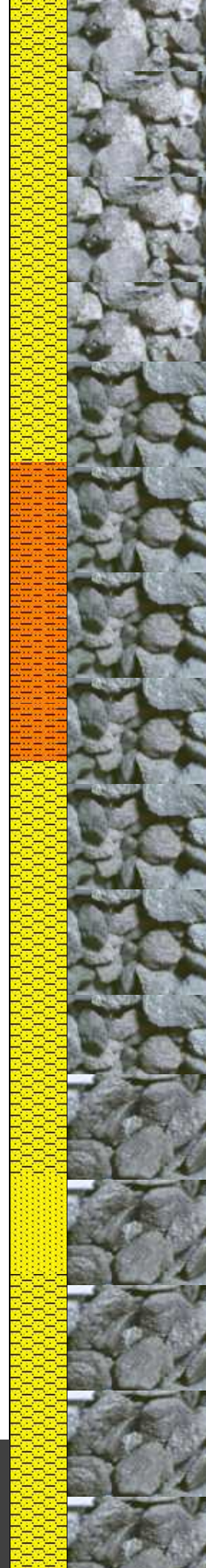
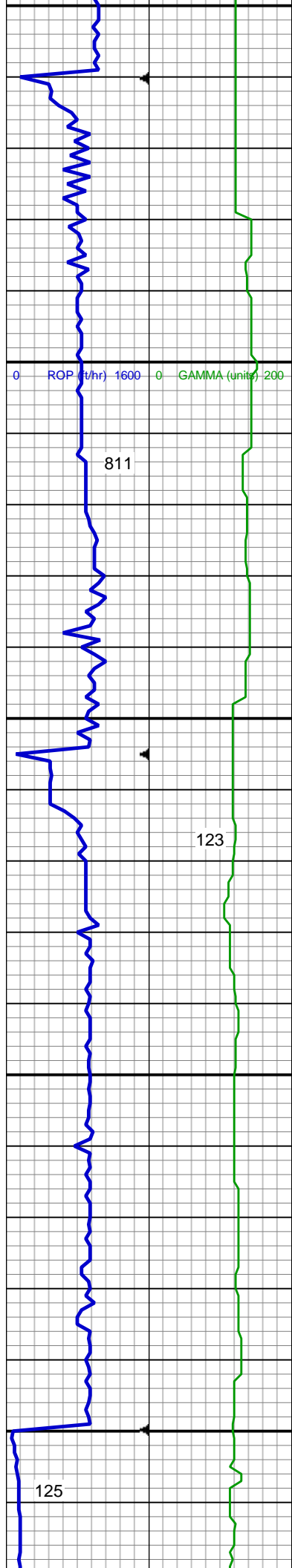


SS: wh - lt gy, fros - trnsl, speckl wi mica, f gr, hd brit clus, ang - sb ang, v calc cmt
SHY SS: lt gy, s&p, vfg, frm - mod hd, wh brit clus, sb ang - sb rd, calc cmt

MD: 4,211 '
TVD: 4,190.67 '
Inclination: 1.52 °
Azimuth: 293.67 °

SHY SS: lt gy, s&p, vfg, frm - mod hd, wh brit clus, sb ang - sb rd, calc cmt
SHY SLTST: lt gy, frm - hd, sb rd - sb blk, slty - grty tex, v sl calc
SS: wh - lt gy, fros - trnsl, speckl wi mica, f gr, hd brit clus, ang - sb ang, v calc cmt

265u
C1: 99.9%
C2: 0.1%
C3: 0.0%
C4: 0.0%



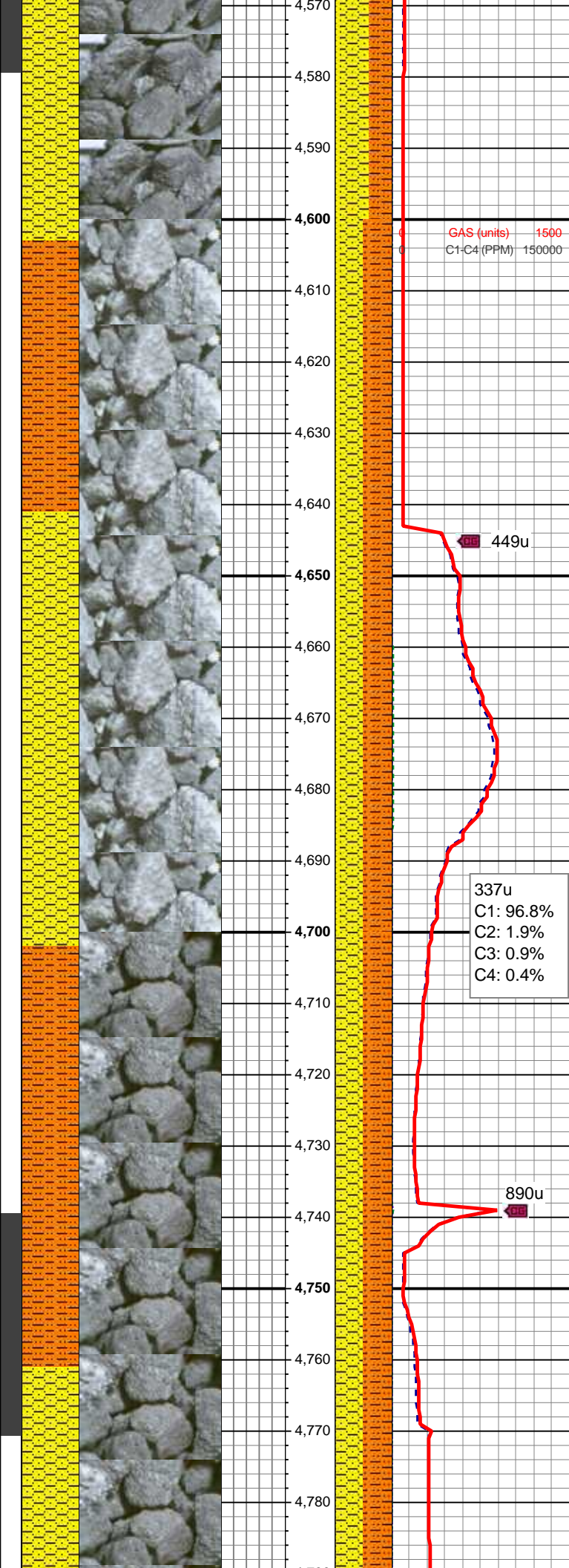
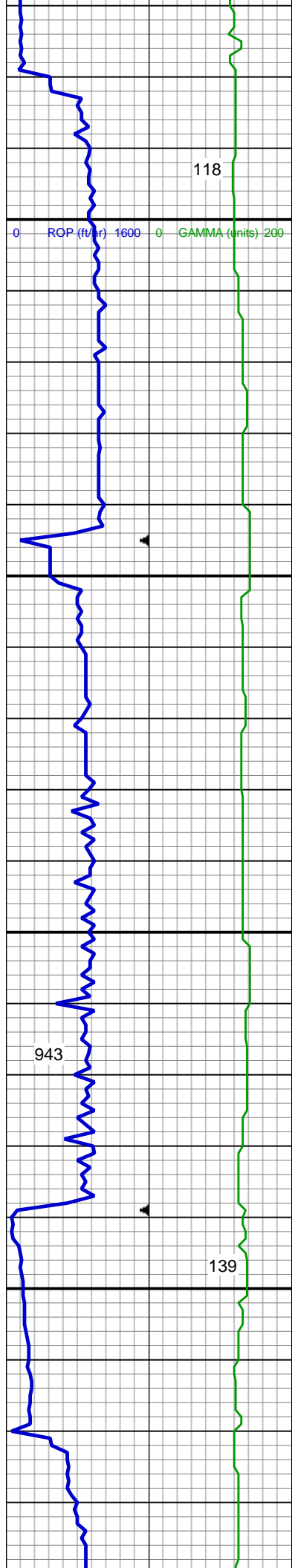
SS: wh - lt gy, fros - trnsl, speckl wi mica, f gr, hd brit clus, ang - sb ang, v calc cmt
SHY SS: lt gy, s&p, vfg, frm - hd, wh brit clus, sb ang - sb rd, calc cmt
SHY SLTST: lt gy, frm - sl hd, sb rd - sb blk, slty - grty tex, v sl calc

Sussex Top @
4,420' MD; 4,399' TVD

128u
C1: 94.5%
C2: 2.9%
C3: 2.0%
C4: 0.6%

SHY SS: lt gy, s&p, vfg, frm - mod hd, wh brit clus, sb ang - sb rd, calc cmt
SHY SLTST: lt gy, frm - hd, sb rd - sb blk, slty - grty tex, v sl calc

MD: 4,496 '
TVD: 4,475.41 '
Inclination: 3.3 °
Azimuth: 309.78 °



SHY SS: lt gy, s&p, vfg, frm - hd, wh
brit clus, sb ang - sb rd, calc cmt
SHY SLTST: lt gy, frm - sl hd, sb rd -
sb blk, slty - grty tex, v sl calc
SS: wh - lt gy, fros - trns, speckl wi
mica, f gr, hd brit clus, ang - sb ang,
v calc cmt

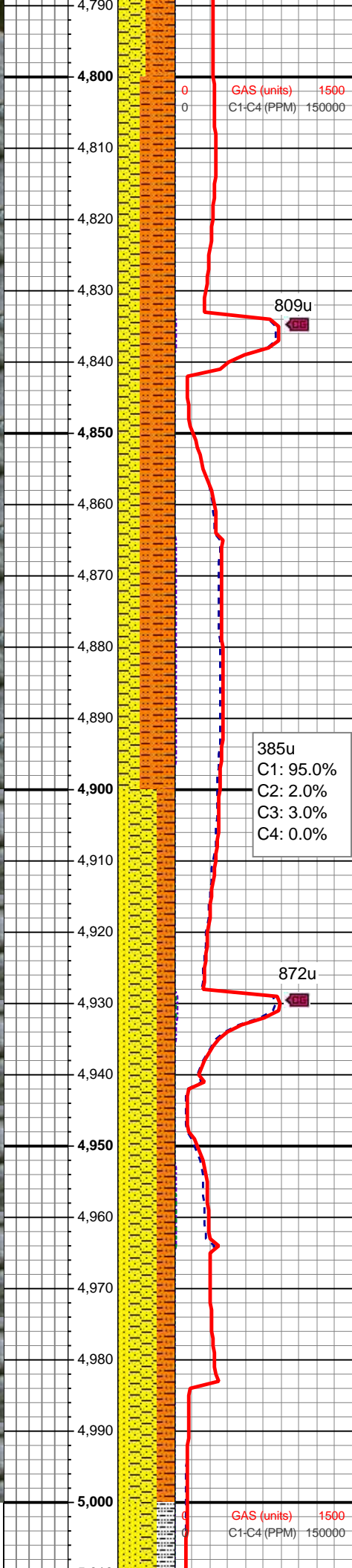
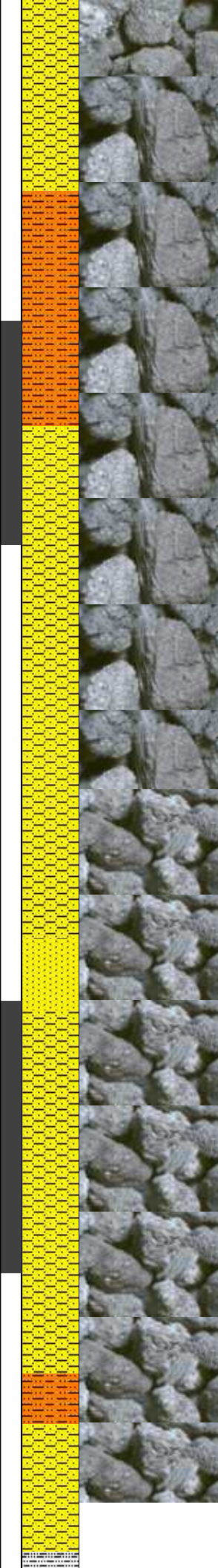
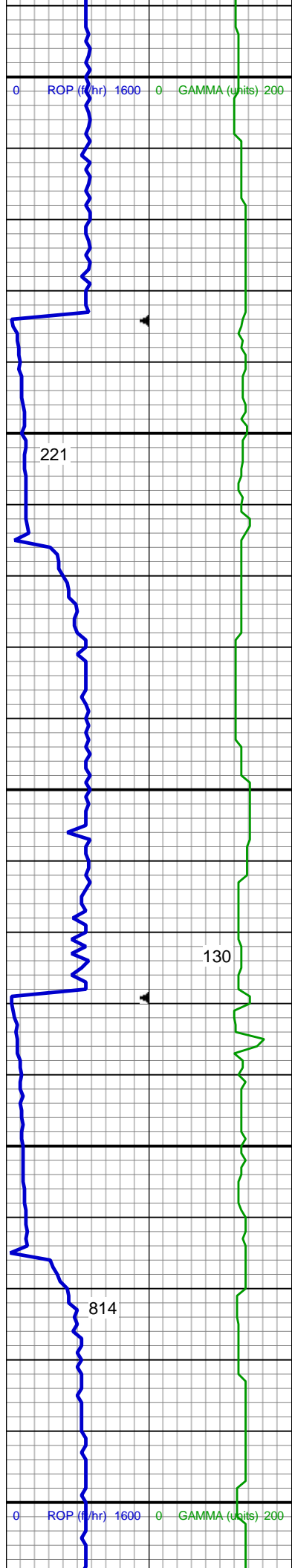
MD: 4,591 '
TVD: 4,570.31 '
Inclination: 1.9 °
Azimuth: 295.05 °

SHY SS: lt gy, occ wh, s&p, vfg-fg,
frm - hd, wh brit clus, sb ang - sb
rd, calc cmt
SHY SLTST: lt gy, frm - sl hd, occ
hd, sb rd - sb blk, slty - grty tex, v sl
calc
SS: wh - lt gy, fros - trns, speckl wi
mica, f gr, hd brit clus, ang - sb ang,
v calc cmt

MD: 4,686 '
TVD: 4,665.21 '
Inclination: 3.21 °
Azimuth: 316.47 °

SHY SS: lt gy, occ wh, s&p, vfg-fg,
frm - hd, wh brit clus, sb ang - sb
rd, calc cmt

MD: 4,780 '
TVD: 4,759.1 '
Inclination: 2.24 °
Azimuth: 320.32 °



SHY SLTST: lt gy, frm - sl hd, occ
hd, sb rd - sb blkly, slty - grty tex, v sl
calc

MD: 4,875 '
TVD: 4,854.06 '
Inclination: 1.64 °
Azimuth: 269.06 °

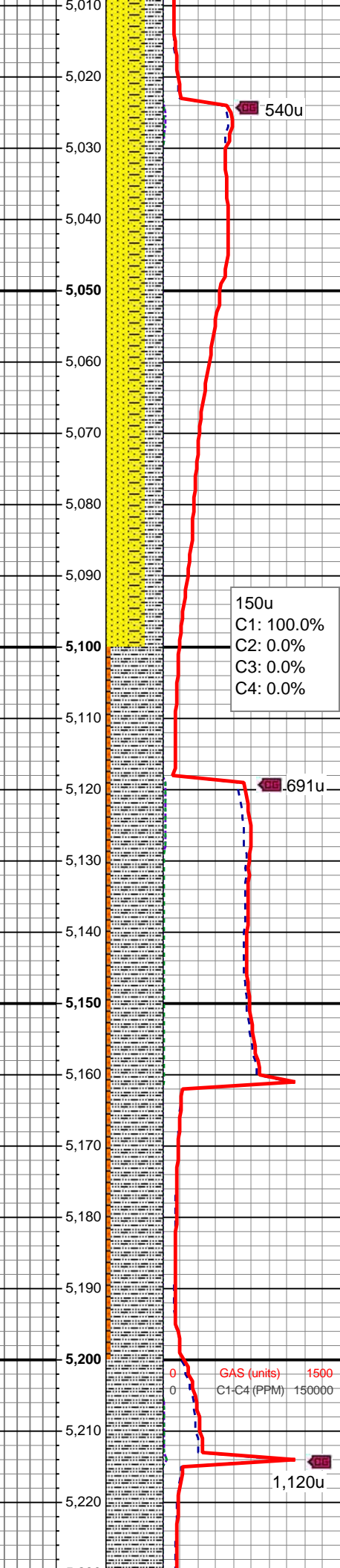
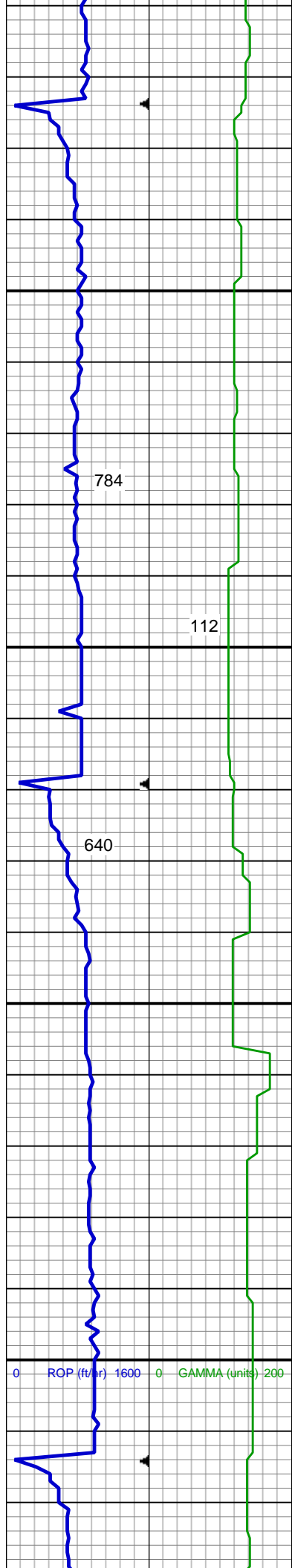
SHY SS: lt gy, occ wh, s&p, vfg-fg,
frm - hd, wh brit clus, sb ang - sb
rd, calc cmt
SHY SLTST: lt gy, frm - sl hd, occ
hd, sb rd - sb blkly, slty - grty tex, v sl
calc

Shannon Top @
4,928' MD; 4,906' TVD

MUD WT: 8.8/9.0
VIS: 30/30 IN/OUT

SHY SS: lt gy, occ wh, s&p, fg, frm -
hd, wh brit clus, sb ang - sb rd, calc
cmt
SHY SLTST: lt gy, frm - hd, sb rd -
sb blkly, slty - grty tex, v sl calc
SS: wh - lt gy, fros - trnsl, speckl wi
mica, f gr, hd brit clus, ang - sb ang,
v calc cmt

MD: 4,971 '
TVD: 4,950.03 '
Inclination: 1.76 °



540u

150u
C1: 100.0%
C2: 0.0%
C3: 0.0%
C4: 0.0%

.691u

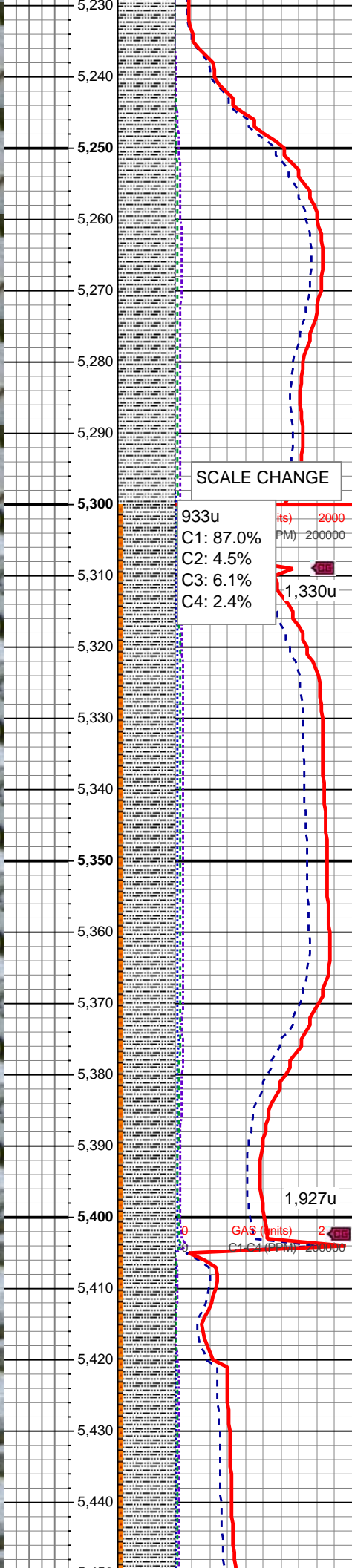
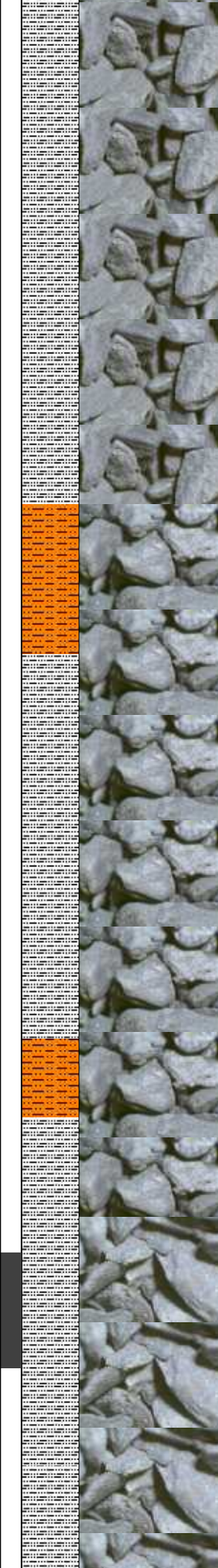
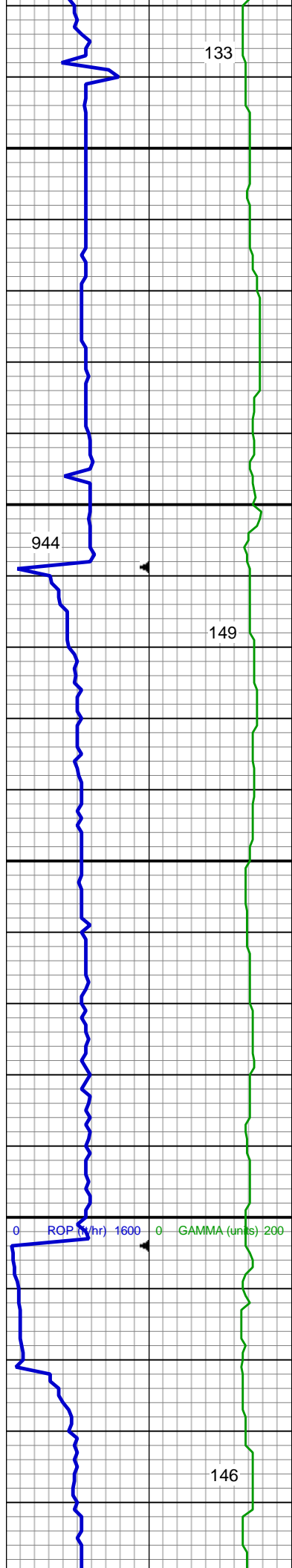
1,120u

MD: 5,065 '
TVD: 5,044 '
Inclination: 1.25 °
Azimuth: 152.22 °

SHY SS: pred lt gy, sme s&p, vfg,
frm - mod hd wi brit clus, sb ang -
sb rd, calc cmt
SLTY SH: lt - med gy brn, occ dk gy,
frm - hd, plty - sb plty - sb blk, slty -
grty tex, v sl calc
SS: wh - lt gy, fros - trns, speckl wi
mica, f gr, hd brit clus, ang - sb ang,
v calc cmt

SLTY SH: lt - med gy brn, occ dk gy,
frm - hd, plty - sb plty - sb blk, slty -
grty tex, v sl calc
SHY SLTST: lt - med gy, frm - hd, sb
plty - sb rd - sb blk, slty - grty tex, v
sl calc

GAS (units) 1500
C1-C4 (PPM) 150000



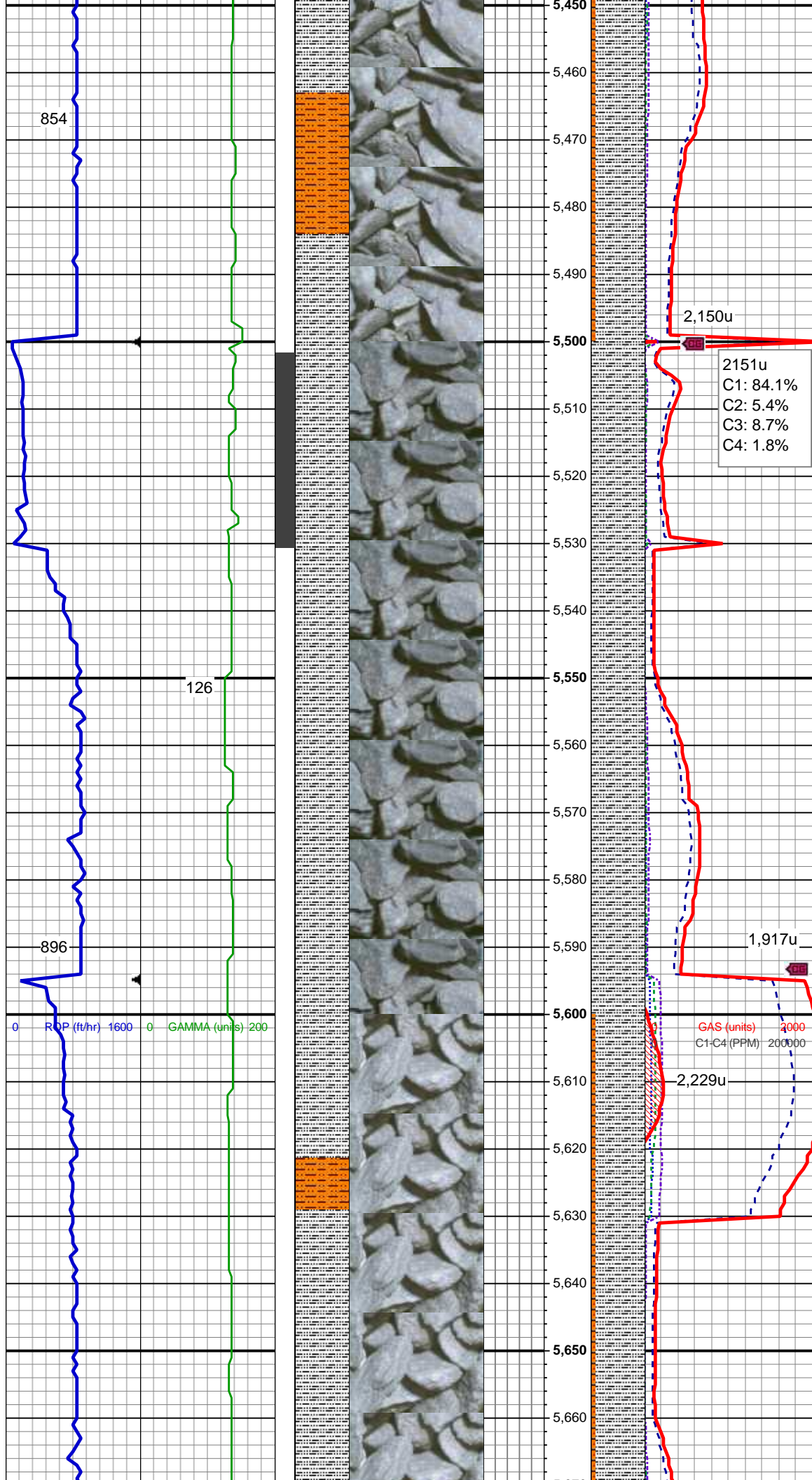
SLTY SH: lt - med gy brn, occ dk gy,
sl frm - hd, plty - sb plty, slty - grty
tex, v sl calc

MD: 5,350 '
TVD: 5,328.83 '
Inclination: 2.66 °
Azimuth: 163.6 °

SLTY SH: lt - med gy brn, occ dk gy,
frm - hd, plty - sb plty - sb blk, slty -
grty tex, v sl calc
SHY SLTST: lt - med gy, frm - hd, sb
plty - sb rd - sb blk, slty - grty tex, v
sl calc

MUD WT: 8.8/9.0
VIS: 30/30 IN/OUT

MD: 5,445 '
TVD: 5,423.75 '
Inclination: 1.96 °

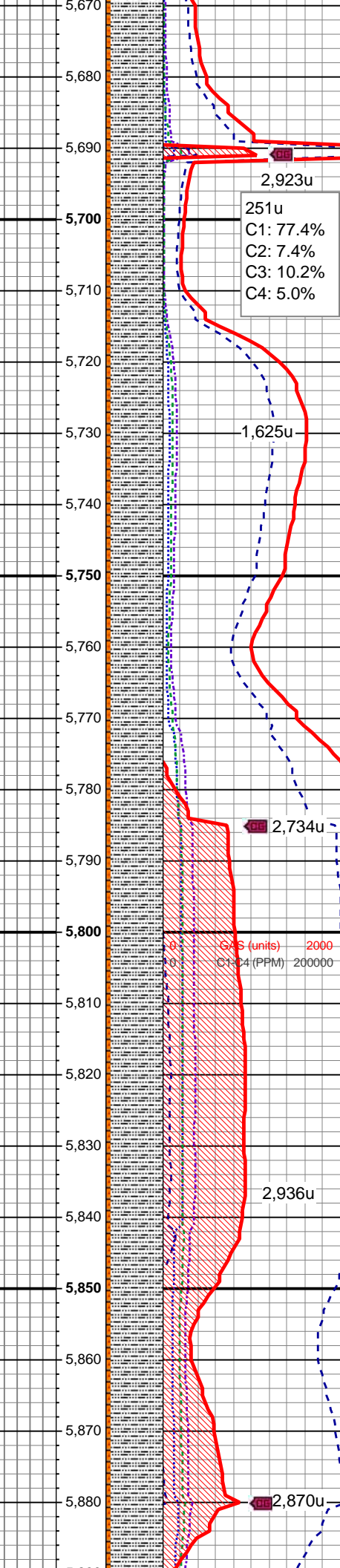
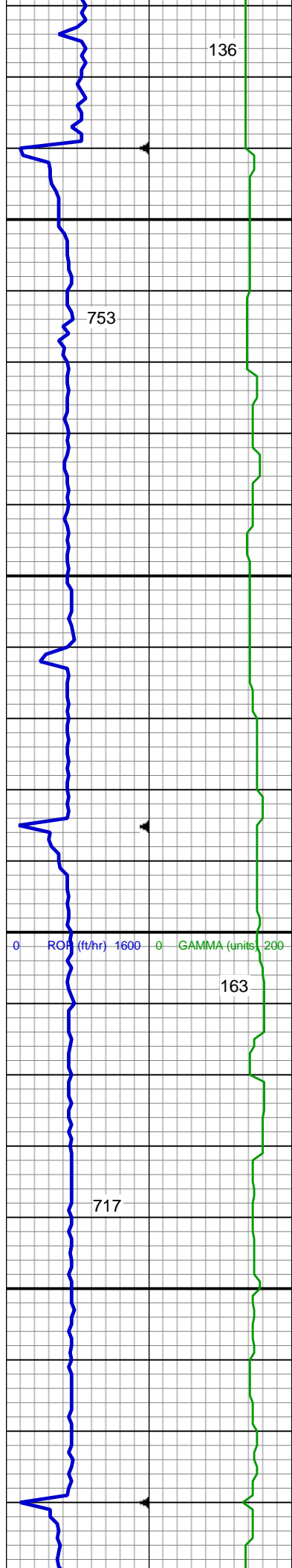


SLTY SH: lt - med gy brn, occ dk gy, frm - hd, plty - sb plty - sb blk, slty - grty tex, v sl calc
SHY SLTST: lt - med gy, frm - hd, sb plty - sb rd - sb blk, slty - grty tex, v sl calc

MD: 5,540 '
TVD: 5,518.72 '
Inclination: 1.08 °
Azimuth: 80.08 °

SLTY SH: lt - med gy, occ dk gy, frm - hd, plty - sb plty - sb blk, slty - grty tex, v sl calc

MD: 5,635 '
TVD: 5,613.71 '
Inclination: 0.87 °
Azimuth: 95.76 °



SLTY SH: lt - med gy brn, occ dk gy, frm - hd, pred plty - sb plty, occ sb blky, slty - grty tex, v sl calc

SHY SLTST: lt - med gy, frm - hd, sb plty - sb rd - sb blky, slty - grty tex, v sl calc

251u
C1: 77.4%
C2: 7.4%
C3: 10.2%
C4: 5.0%

SLTY SH: lt - med gy brn, occ dk gy, frm - hd, plty - sb plty - sb blky, slty - grty tex, v sl calc

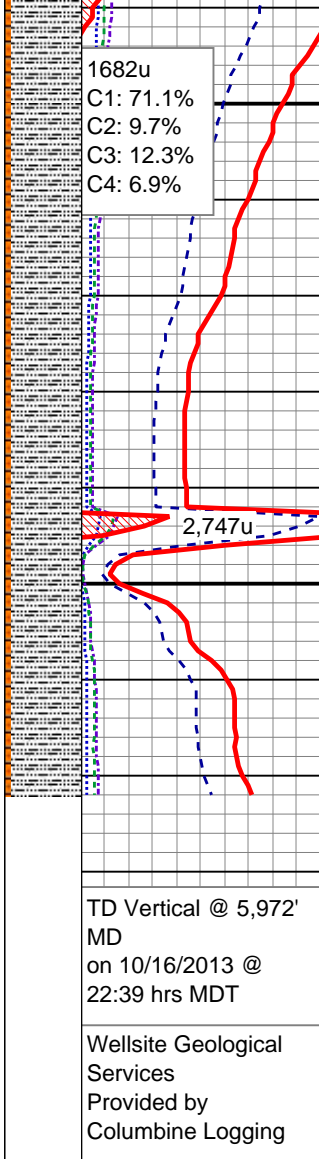
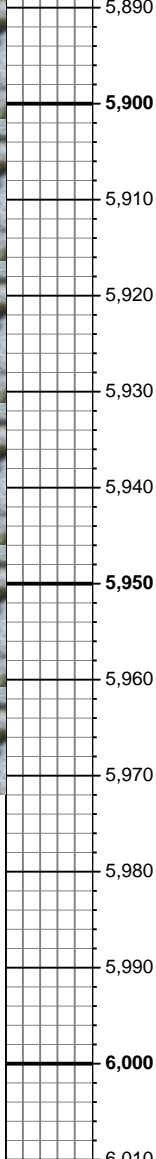
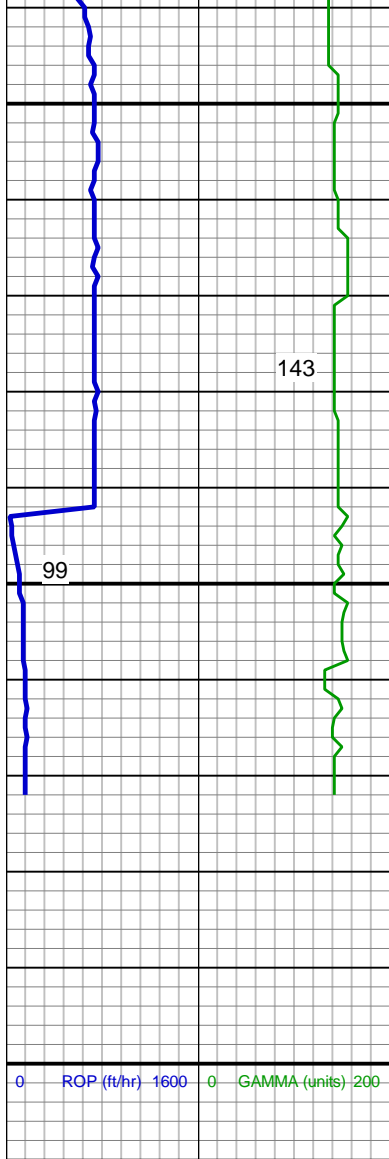
SHY SLTST: lt - med gy, frm - hd, sb plty - sb rd - sb blky, slty - grty tex, v sl calc

TeePee Buttes Top @
5,798' MD; 5,776' TVD

MD: 5,825 '
TVD: 5,803.68 '
Inclination: 1.33 °
Azimuth: 128.17 °

MUD WT: 9.2/9.2
VIS: 34/34 IN/OUT

SLTY SH: lt - med gy brn, occ dk gy, frm - hd, plty - sb plty - sb blky, slty - grty tex, v sl calc



SHY SLTST: lt - med gy, frm - hd, sb
plty - sb rd - sb blk, slty - grty tex, v
sl calc

MD: 5,916 '
TVD: 5,894.65 '
Inclination: 1.24 °
Azimuth: 125.88 °

SLTY SH: lt - med gy brn, dk gy, frm
- hd, plty - sb plty, slty - grty tex, v sl
calc

SHY SLTST: lt - med gy, frm - hd, sb
plty - sb rd, slty - grty tex, v sl calc

MD: 5,972 '
TVD: 5,950.64 '
Inclination: 1.24 °
Azimuth: 125.88 °

See Corresponding Horizontal Log
Crow Creek State AC36-76HN
HORZ