

COLUMBINE LOGGING

Scale: 5" / 100'
Measured Depth Log

Well Name Fiscus Federal LD 23-78HN VERT

Location SEC 23 T9N R58W

State Colorado

County Weld

Country USA

Rig Number H&P 315

API Number 051233707000

Region DJ Basin

Field Wildcat

Spud Date 9/15/2013

Drilling Completed 9/21/2013

Surface Coordinates SENW SEC 14 T5N R64W
275' FSL; 600' FWL

LAT/LONG: 40.437350/-103.838325

Bottom Hole Coordinates NWNW SEC 23 T9N R58W
660' FWL; 660' FNL

Ground Elevation 4779'

K.B. Elevation 4803'

Logged Interval 2000' **To** 10037'

Total Depth 10037'

Formation 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

	SHALY SILTSTONE		CHALK		IGNEOUS		SHALE COLORED
	SHALY SANDSTONE		CHERT		LIMESTONE		SHALE GRAY
	SANDSTONE		CLAY CHOKE SAND		SIDERITE or LIMONITE		SILTSTONE
	SILTY SHALE		CLAYSTONE		MARLSTONE		TILL
	UNKNOWN		COAL		METAMORPHIC		TUFF
	ANHYDRITE		CONGLOMERATE		NO SAMPLE		WELDED TUFF
	BENTONITE		DOLOMITE		SALT		
	BRECCIA		GRANITE		SALT- PEPPER SAND		
	CEMENT		GYPSUM		SHALE		

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

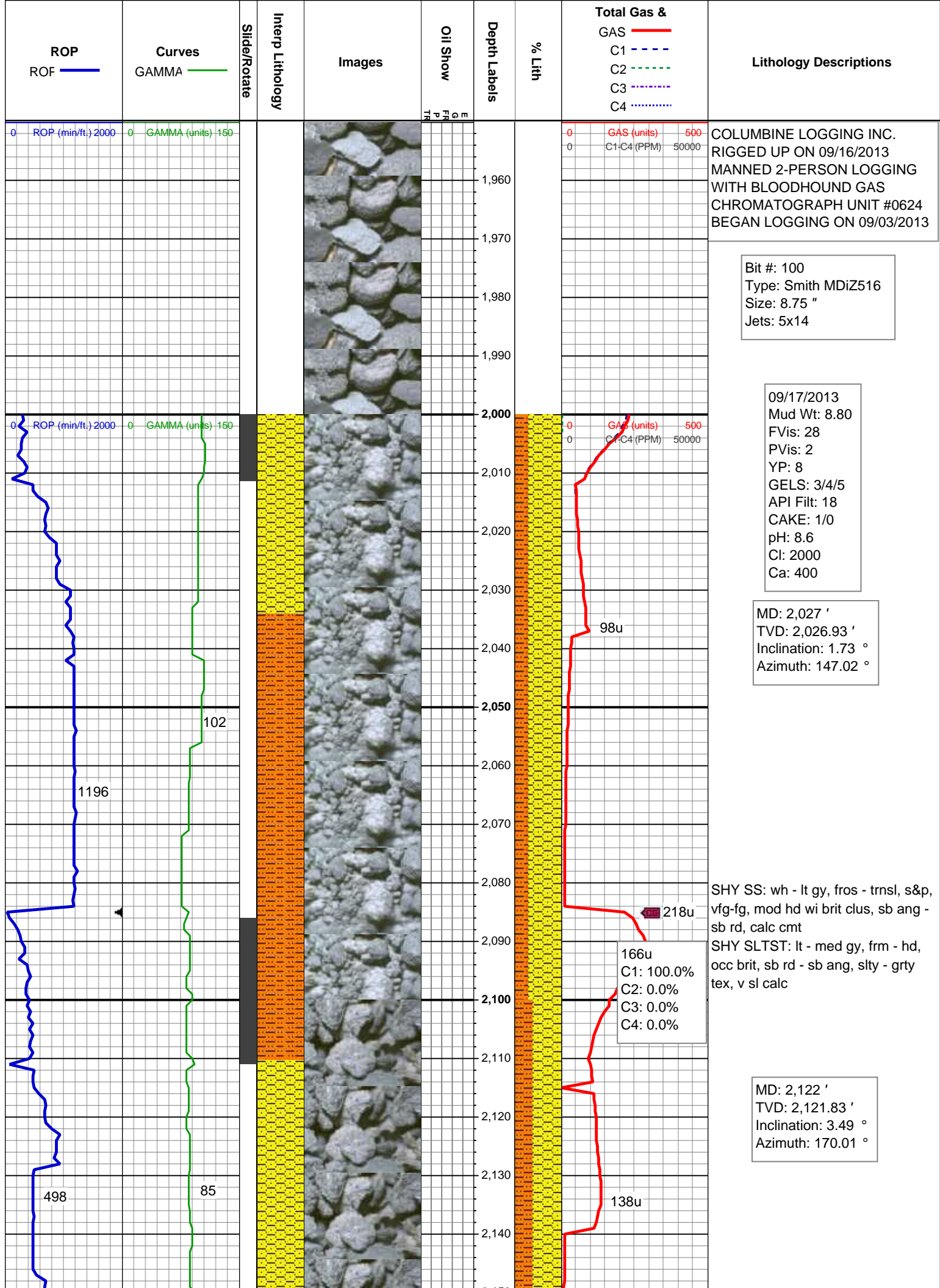
BOUNDSTONE
 CHALKY
 CRYPTOXLN

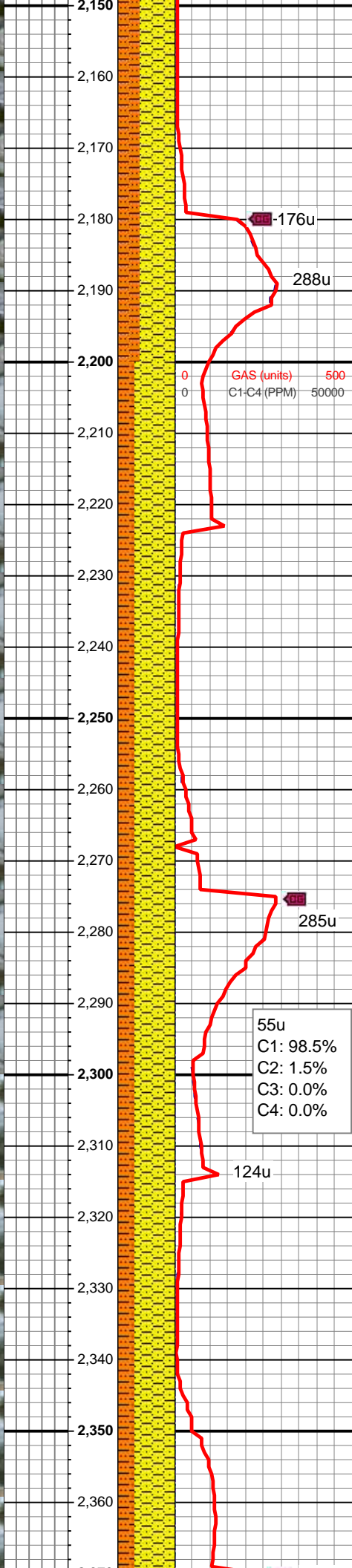
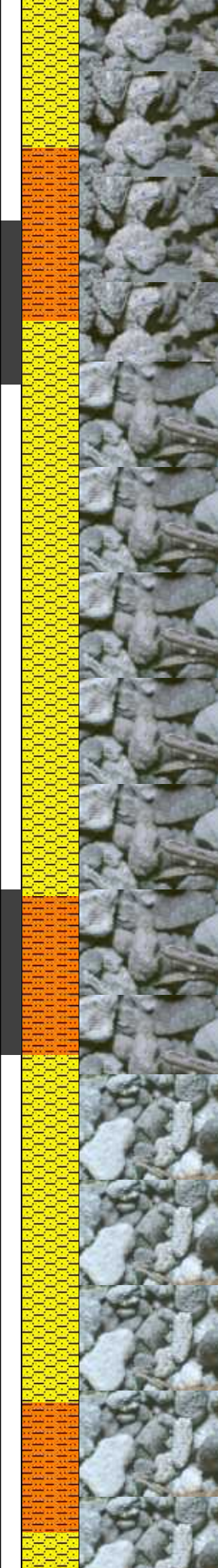
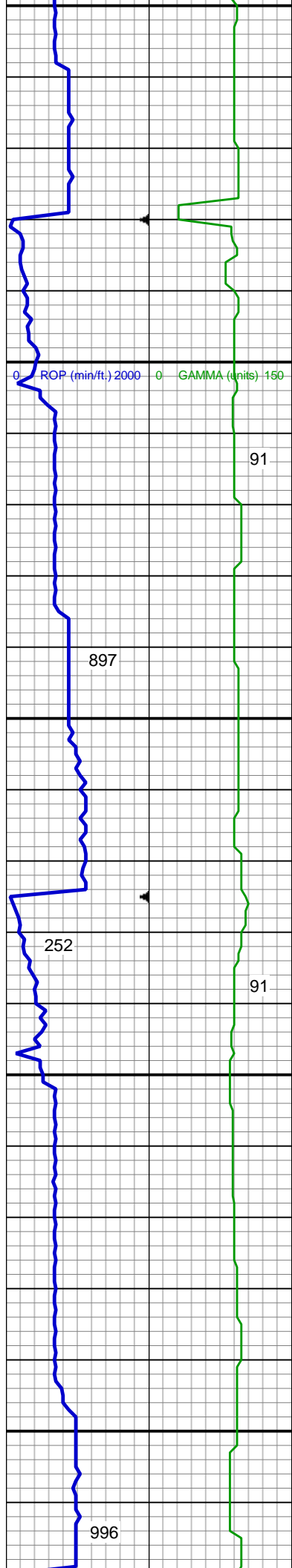
Earthy

FINELYXLN
 GRAINSTONE
 LITHOGRAPHIC
 MICROXLN
 MUDSTONE
 PACKSTONE
 WACKESTONE

Sorting

MODERATE
 POOR
 WELL



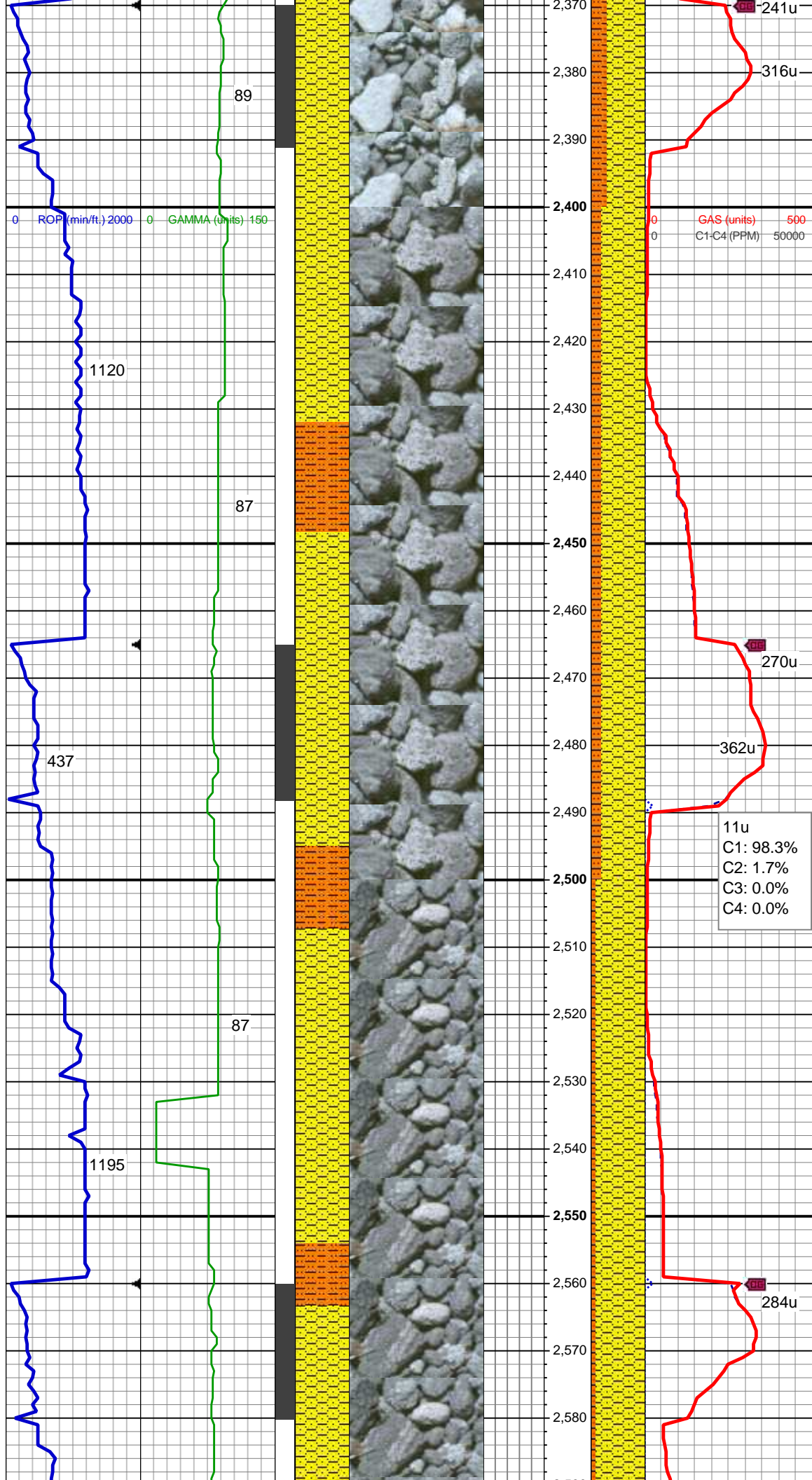


SHY SS: wh - lt gy, fros - trnsl, s&p, vfg-fg, mod hd wi brit clus, sb ang - sb rd, calc cmt
SHY SLTST: lt - med gy, frm - hd, occ brit, sb rd - sb ang, slty - grty tex, v sl calc

MD: 2,217 '
TVD: 2,216.53 '
Inclination: 5.54 °
Azimuth: 165.32 °

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

MD: 2,312 '
TVD: 2,311.02 '
Inclination: 6.39 °
Azimuth: 159.42 °

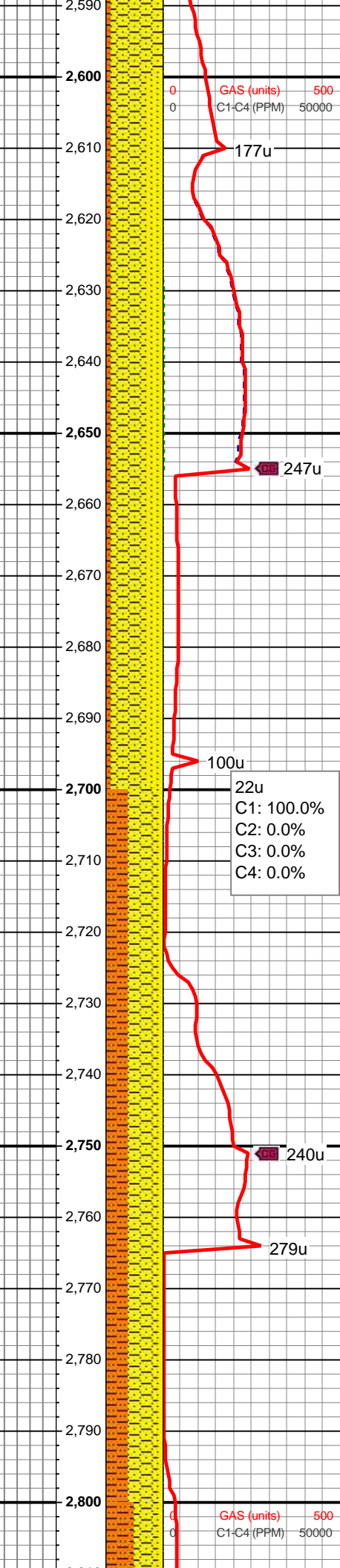
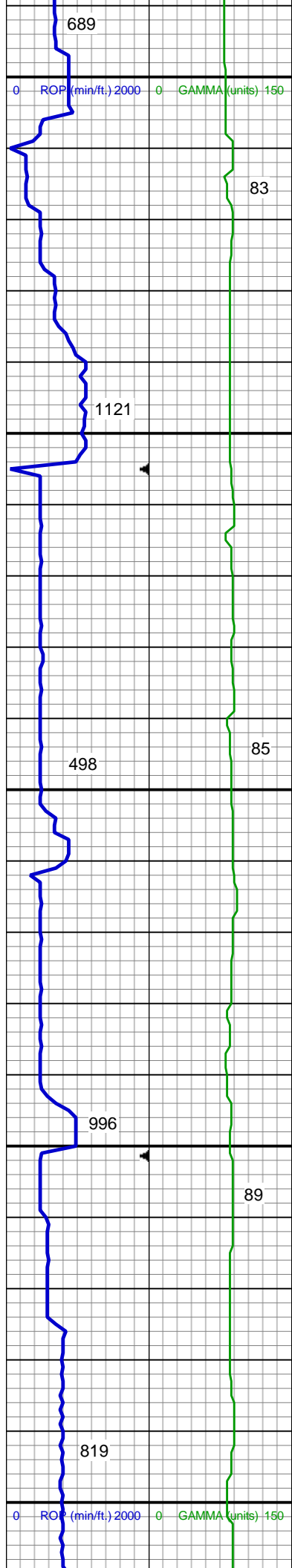


MD: 2,407 '
TVD: 2,405.27 '
Inclination: 7.94 °
Azimuth: 163.14 °

11u
C1: 98.3%
C2: 1.7%
C3: 0.0%
C4: 0.0%

MD: 2,501 '
TVD: 2,498.17 '
Inclination: 9.6 °
Azimuth: 162.61 °

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



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

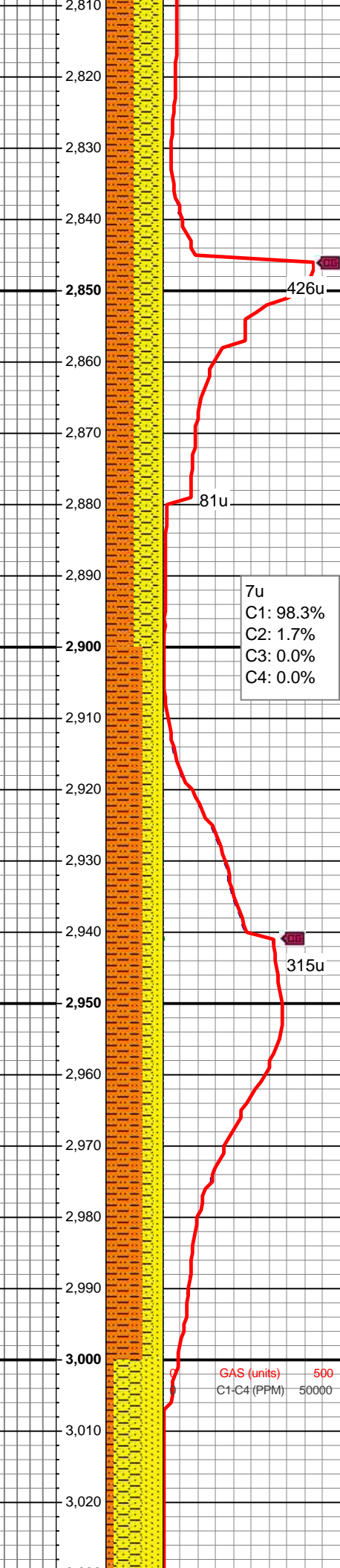
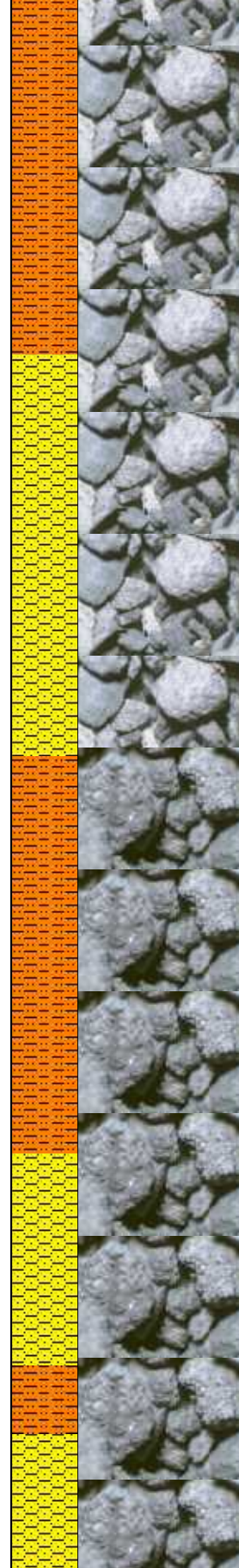
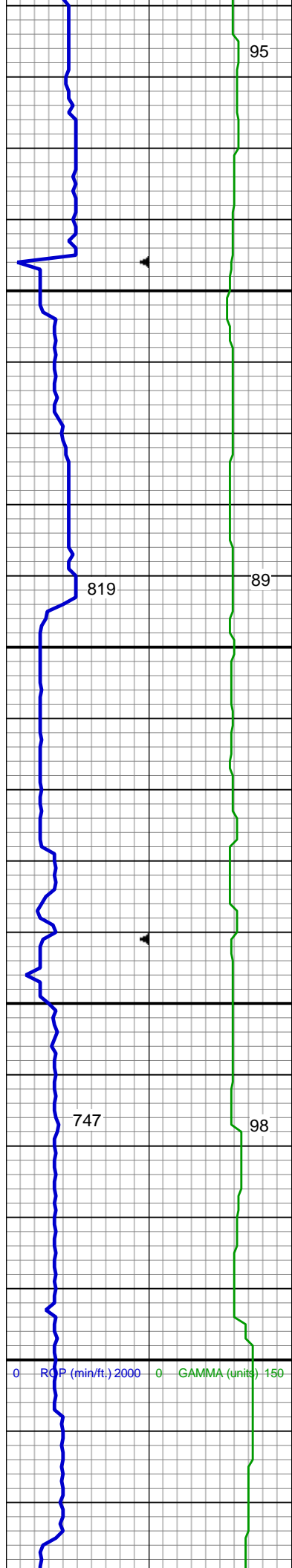
MD: 2,596 '
TVD: 2,591.69 '
Inclination: 10.66 °
Azimuth: 162.38 °

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

MD: 2,691 '
TVD: 2,685.03 '
Inclination: 10.78 °
Azimuth: 161.74 °

SHY SS: lt gy, s&p, vfg, mod hd wi brit clus, sb ang - sb rd, calc cmt
SHY SLTST: lt - med gy, frm - 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: 2,786 '
TVD: 2,778.39 '
Inclination: 10.58 °



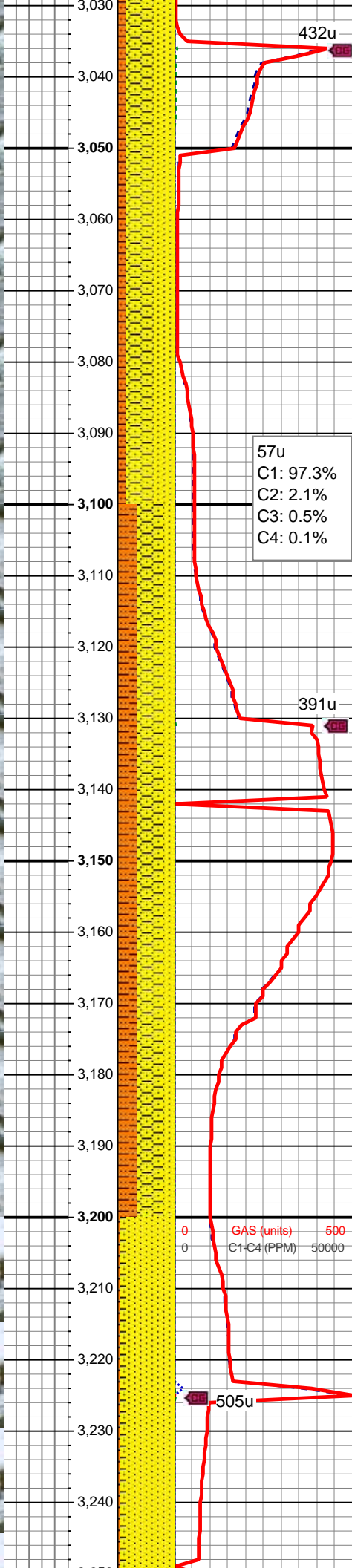
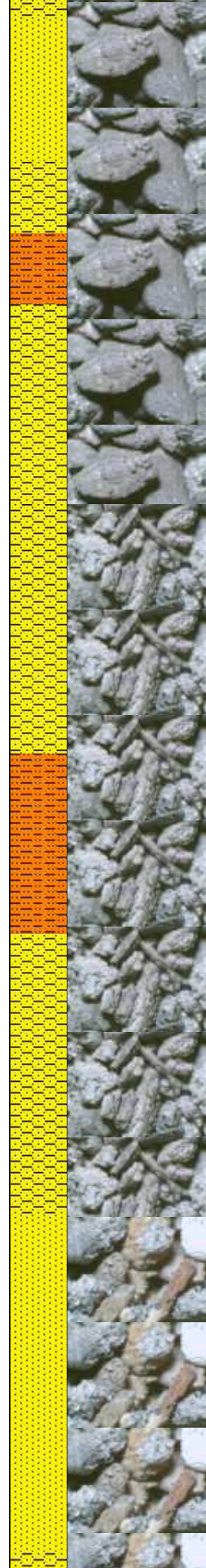
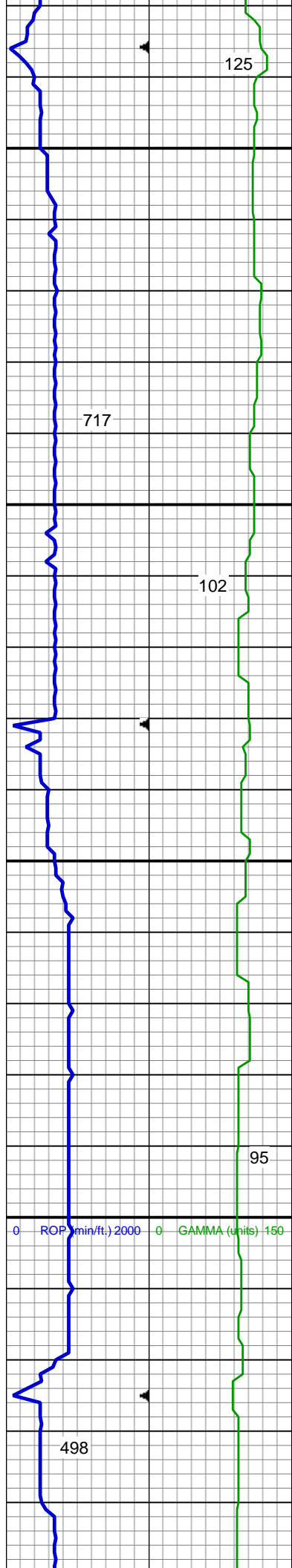
Inclination: 10.38 °
Azimuth: 162.61 °

SHY SS: lt gy, s&p, vfg, mod hd wi
brit clus, sb ang - sb rd, calc cmt
SHY SLTST: lt - med gy, frm - 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: 2,881 '
TVD: 2,871.88 '
Inclination: 9.9 °
Azimuth: 156.32 °

MD: 2,976 '
TVD: 2,965.65 '
Inclination: 8.58 °
Azimuth: 163.22 °

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



MD: 3,071 '
TVD: 3,059.66 '
Inclination: 7.9 °
Azimuth: 164.13 °

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

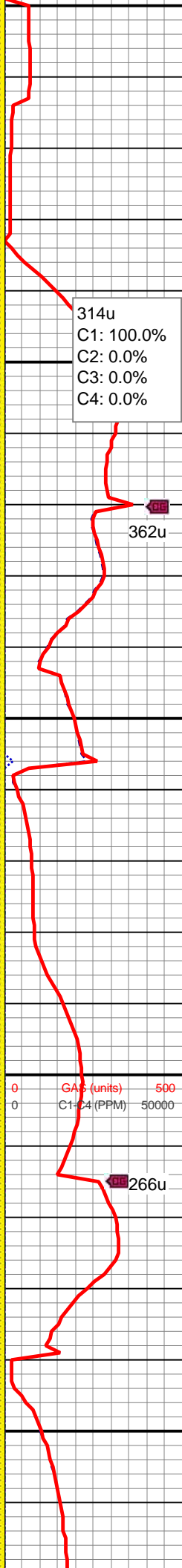
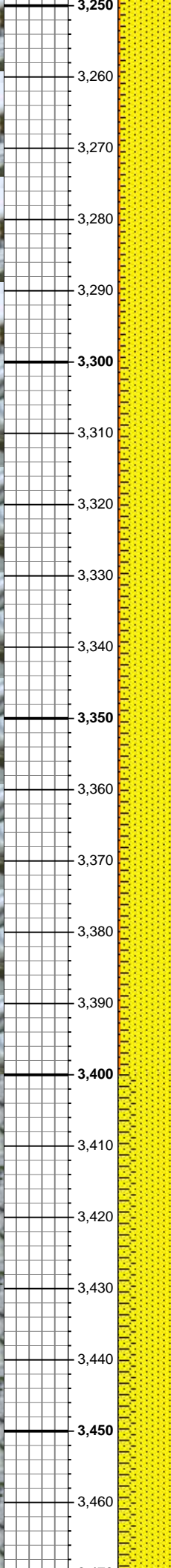
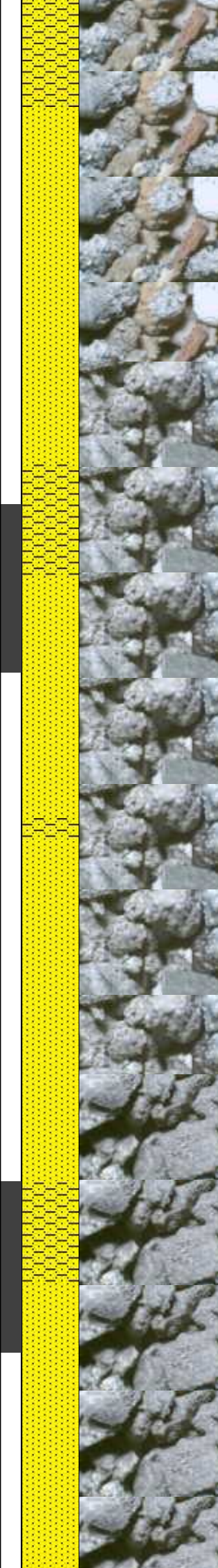
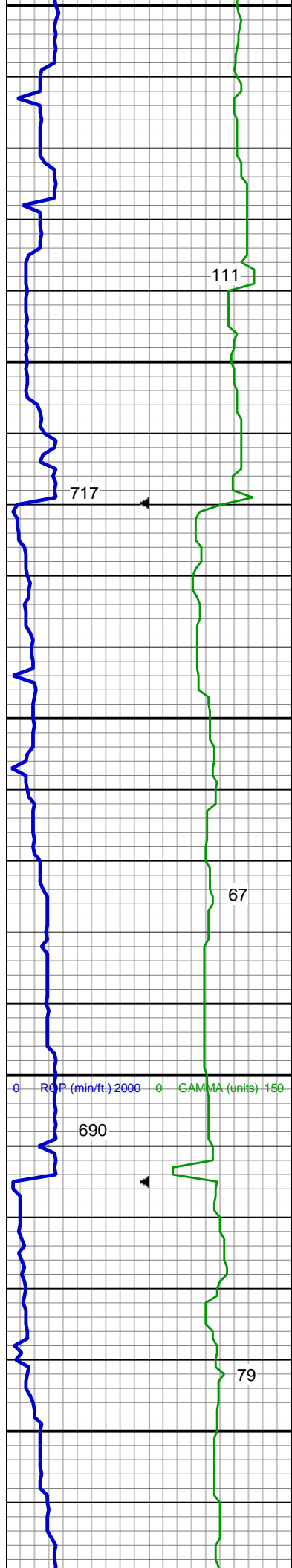
57u
C1: 97.3%
C2: 2.1%
C3: 0.5%
C4: 0.1%

MD: 3,166 '
TVD: 3,153.75 '
Inclination: 8.06 °
Azimuth: 164.33 °

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

MUD WT: 8.7/8.7
VIS: 31/31 IN/OUT

GAS (units) 500
C1-C4 (PPM) 50000



MD: 3,260 '
TVD: 3,246.78 '
Inclination: 8.34 °
Azimuth: 163.25 °

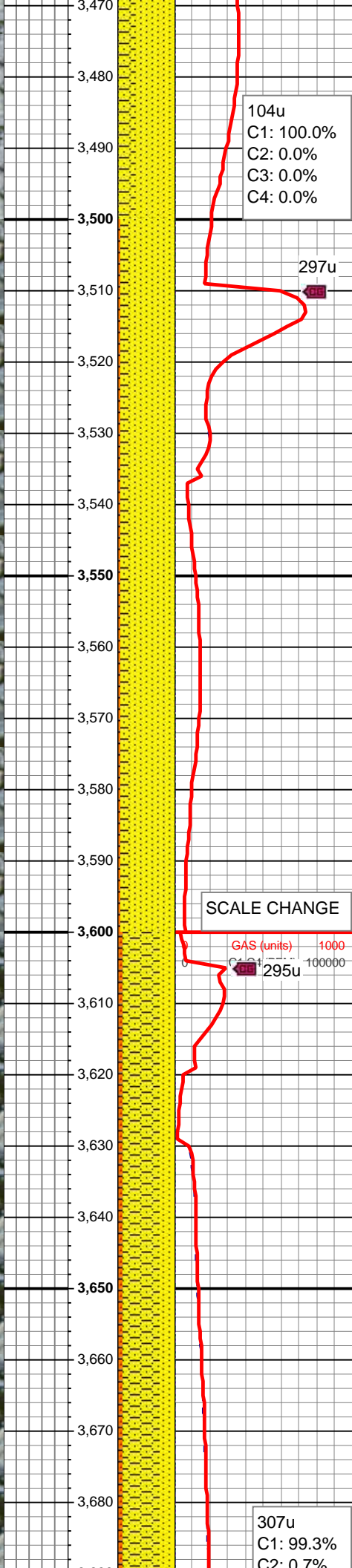
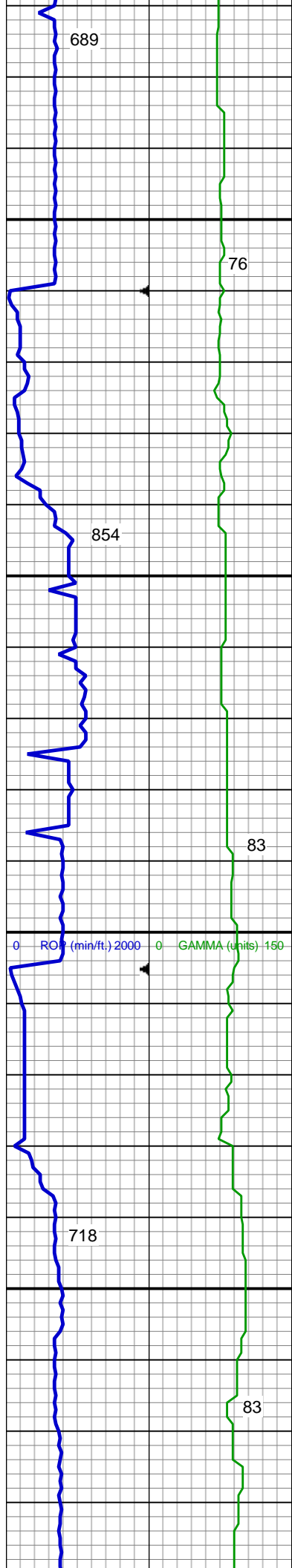
SS: wh - lt gy, clr-trnsl, fros - trnsl, speckl wi mica, vf-f gr, hd brit clus, ang - sb ang, v calc cmt
SHY SS: lt gy-gy, s&p, vfg, mod hd wi brit clus, sb ang - sb rd, occ rnd calc cmt
SHY SLTST: lt - med gy, frm - sl hd, sb rd - sb blkly, slty - grty tex, v sl calc

MD: 3,355 '
TVD: 3,340.94 '
Inclination: 6.89 °
Azimuth: 162.46 °

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

MUD WT: 8.7/8.7
VIS: 31/31 IN/OUT

MD: 3,450 '
TVD: 3,435.38 '
Inclination: 5.63 °
Azimuth: 161.69 °



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

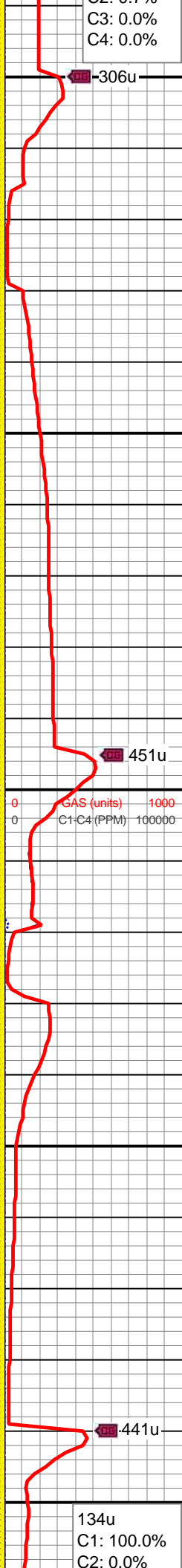
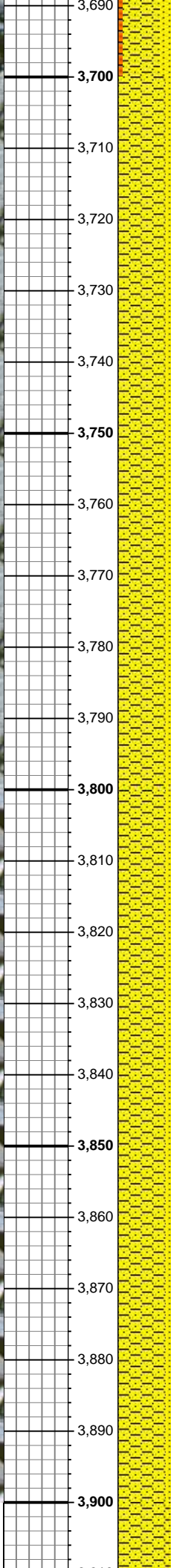
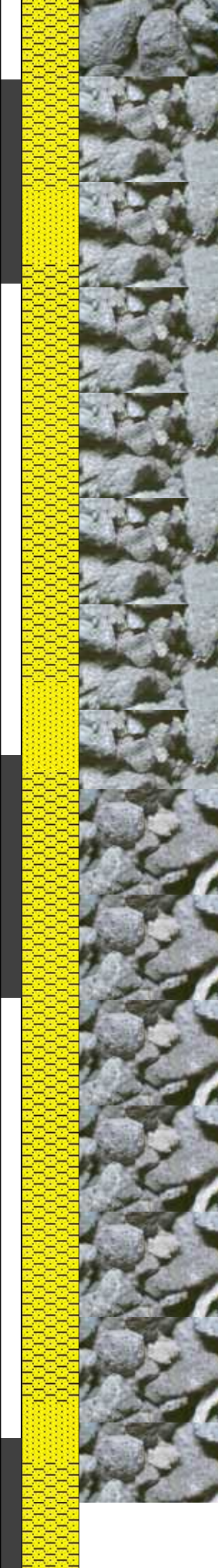
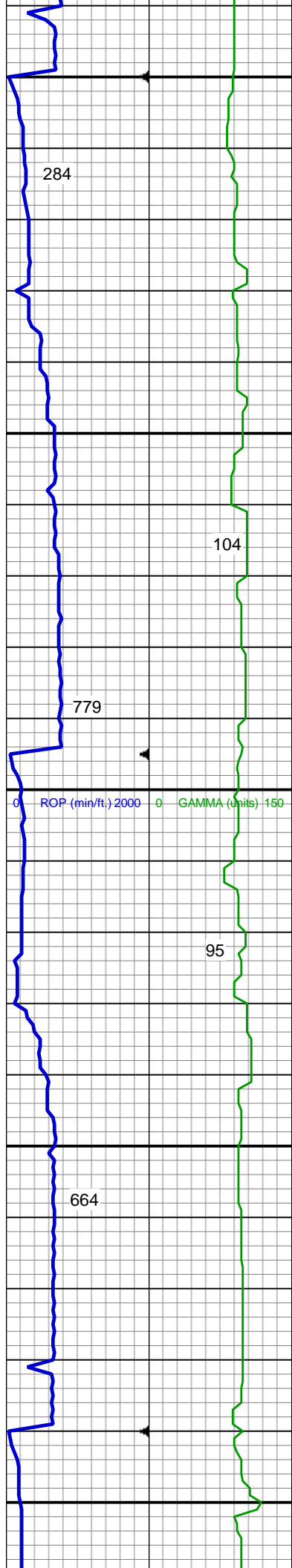
MD: 3,545 '
TVD: 3,530.06 '
Inclination: 3.67 °
Azimuth: 159.93 °

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

MD: 3,640 '
TVD: 3,624.82 '
Inclination: 4.5 °
Azimuth: 175.42 °

MUD WT: 8.8/8.6
VIS: 31/30 IN/OUT

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



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

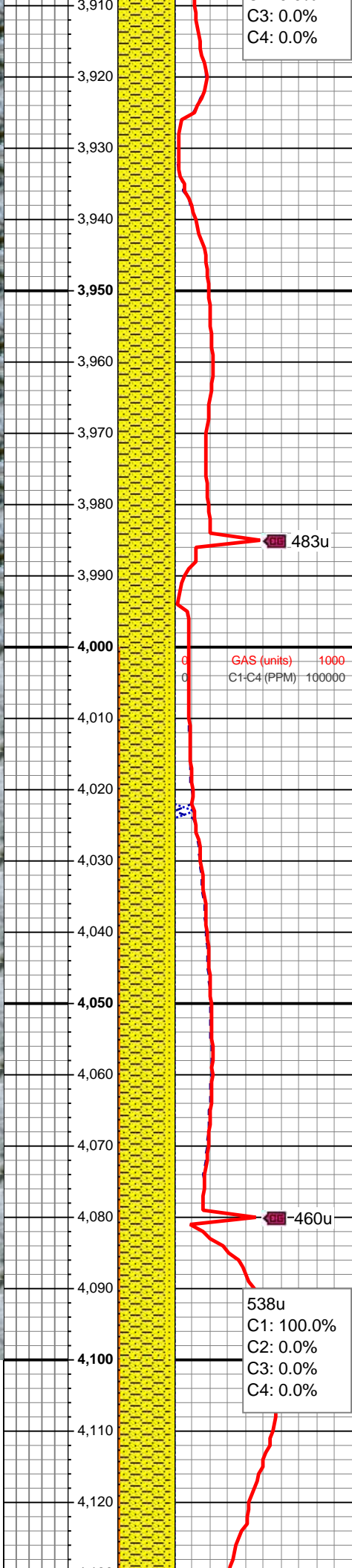
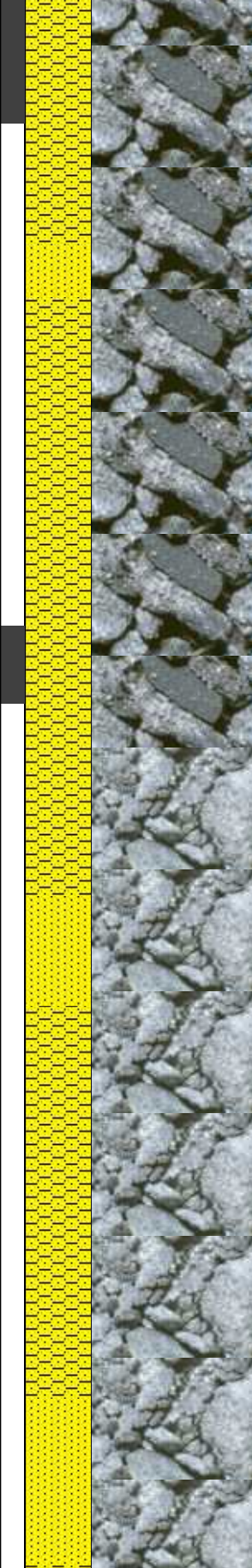
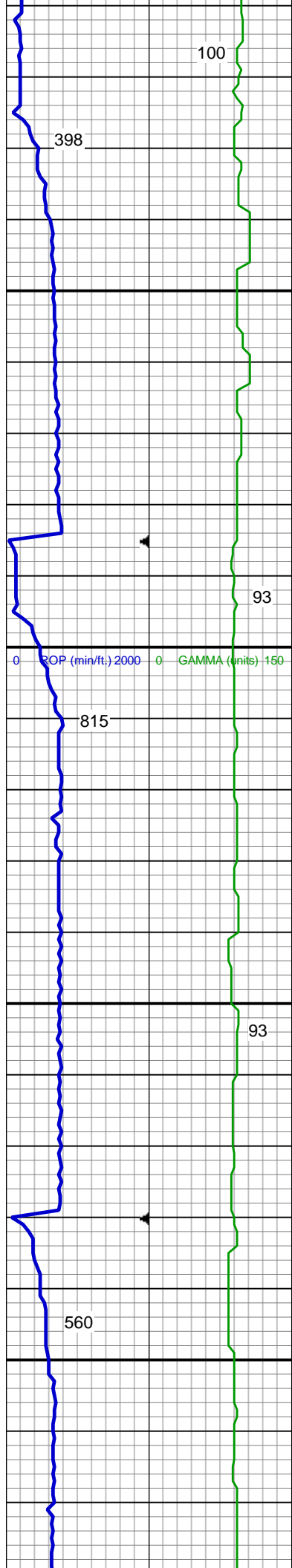
MD: 3,735 '
TVD: 3,719.37 '
Inclination: 6.6 °
Azimuth: 173.65 °

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

MD: 3,830 '
TVD: 3,813.96 '
Inclination: 4.06 °
Azimuth: 149.8 °

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

MUD WT: 8.8/8.6
VIS: 29/30 IN/OUT

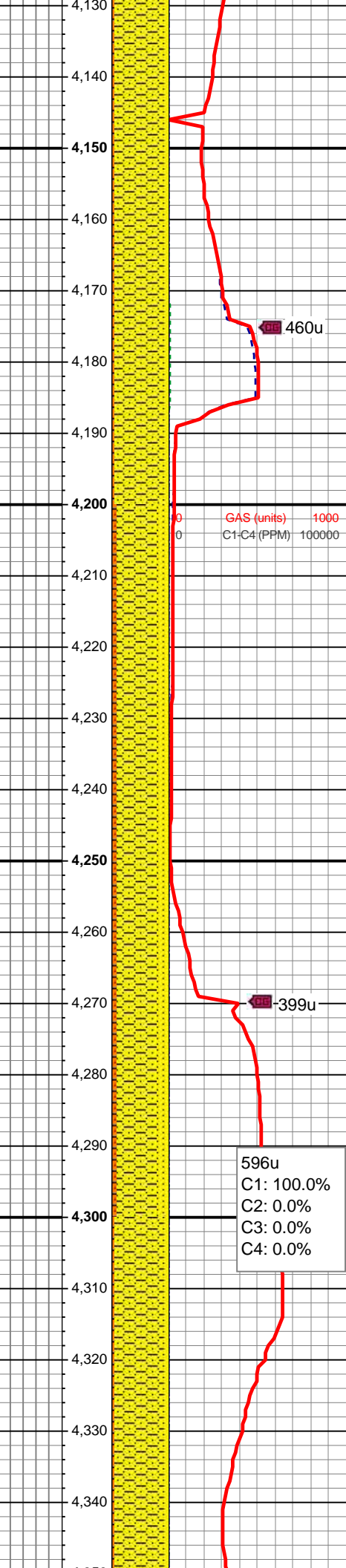
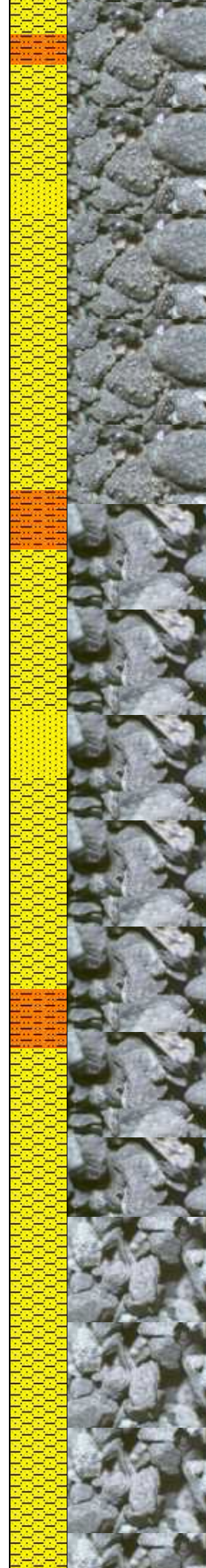
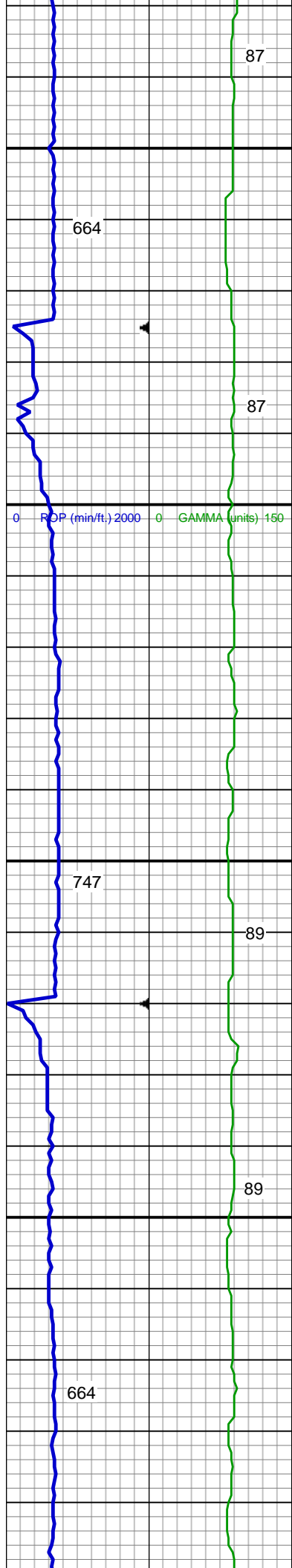


MD: 3,925 '
TVD: 3,908.85 '
Inclination: 1.34 °
Azimuth: 155.37 °

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

MD: 4,020 '
TVD: 4,003.84 '
Inclination: 0.32 °
Azimuth: 168.76 °

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



460u

GAS (units) 1000

C1-C4 (PPM) 100000

596u

C1: 100.0%

C2: 0.0%

C3: 0.0%

C4: 0.0%

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

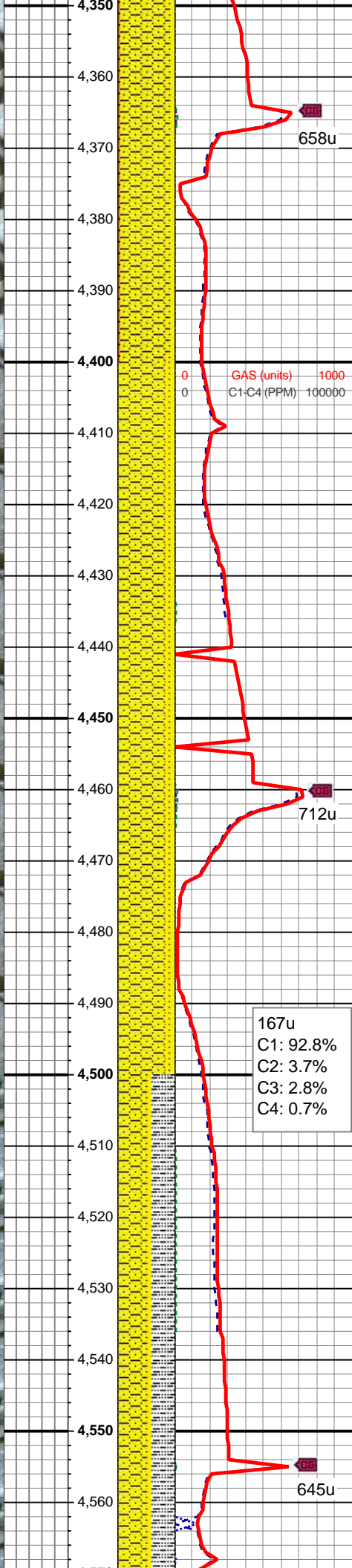
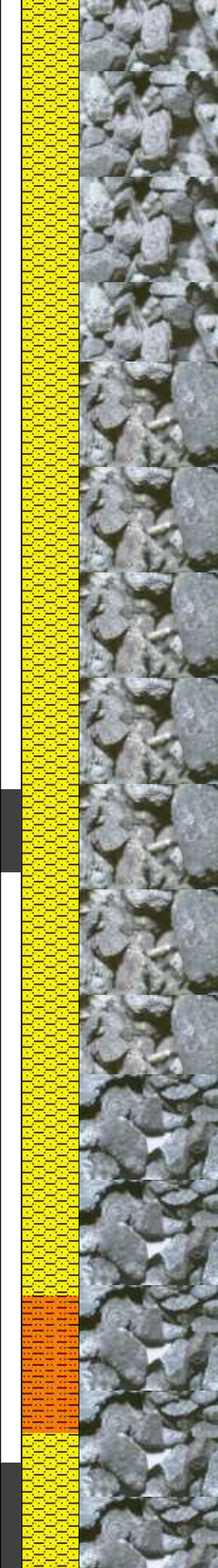
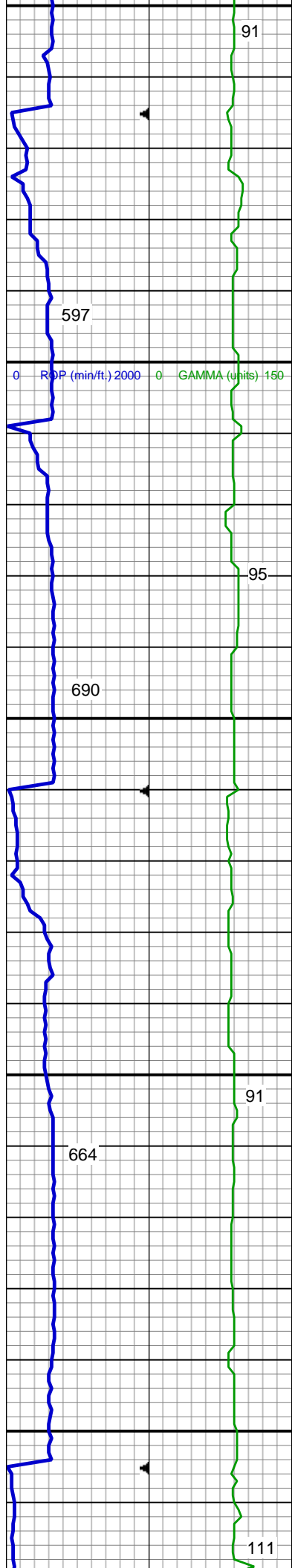
SHY SS: lt gy-m gy, s&p, vfg, mod
hd wi brit clus, sb ang - sb rd, calc
cmt
SS: wh - lt gy, clr-trnsl, fros, speckl
wi mica,f gr, hd brit clus, ang - sb
ang, v calc cmt
SHY SLTST: lt - med gy, frm - sl hd,
sb rd - sb blkly, slty - grty tex, v sl
calc

MD: 4,305 '

TVD: 4,288.81 '

Inclination: 1.2 °

Azimuth: 80.33 °



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

MD: 4,400 '
TVD: 4,383.79 '
Inclination: 1.57 °
Azimuth: 103.14 °

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

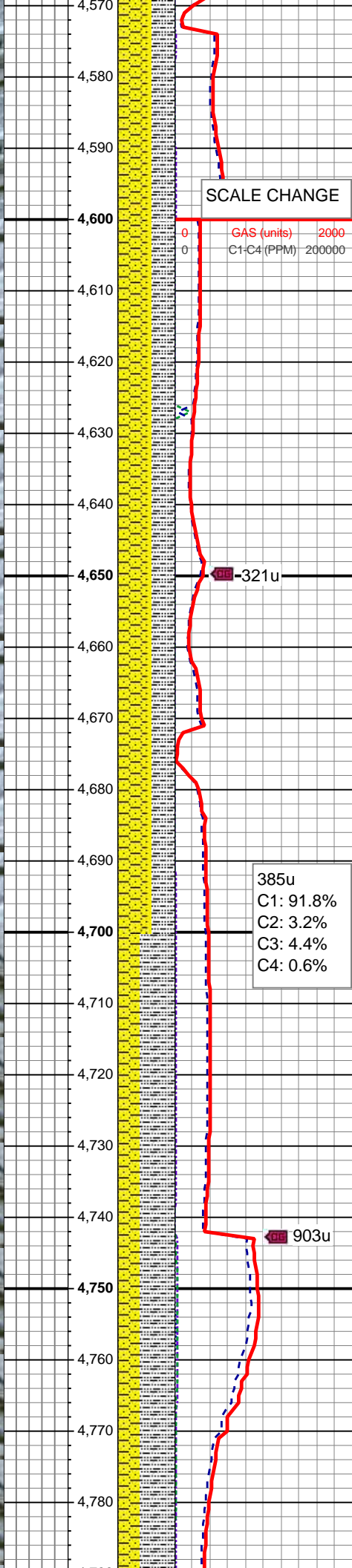
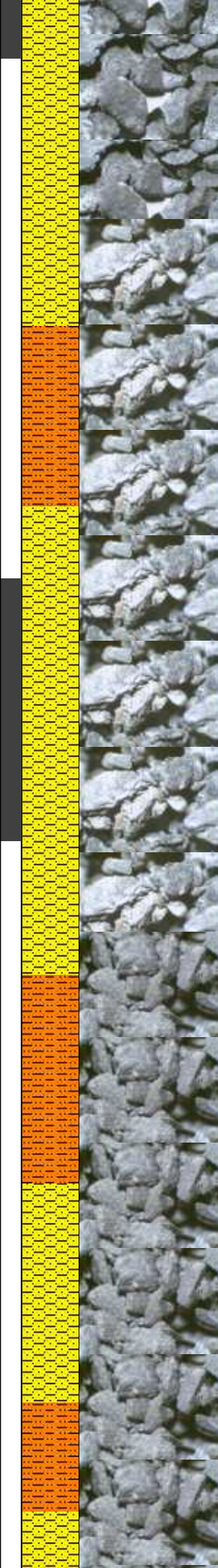
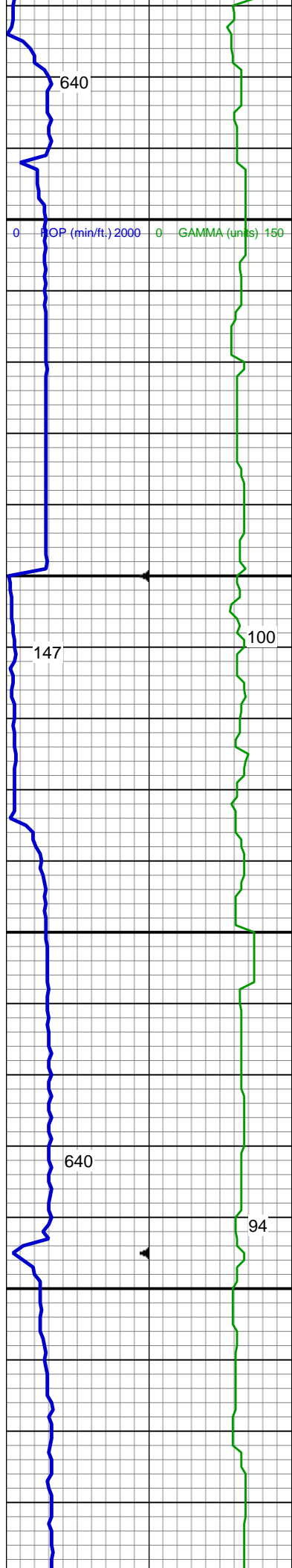
MD: 4,495 '
TVD: 4,478.74 '
Inclination: 2.06 °
Azimuth: 109.18 °

167u
C1: 92.8%
C2: 3.7%
C3: 2.8%
C4: 0.7%

658u

712u

645u



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

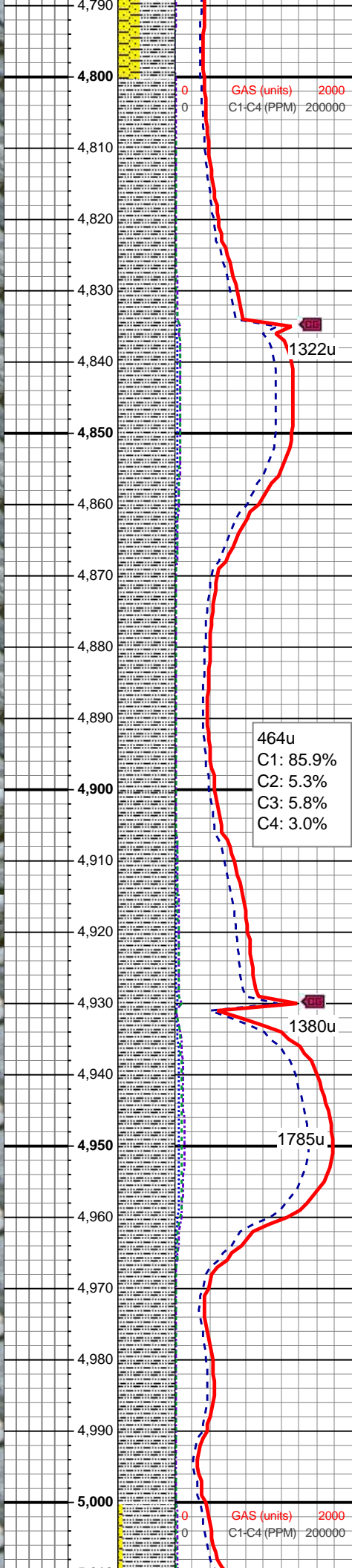
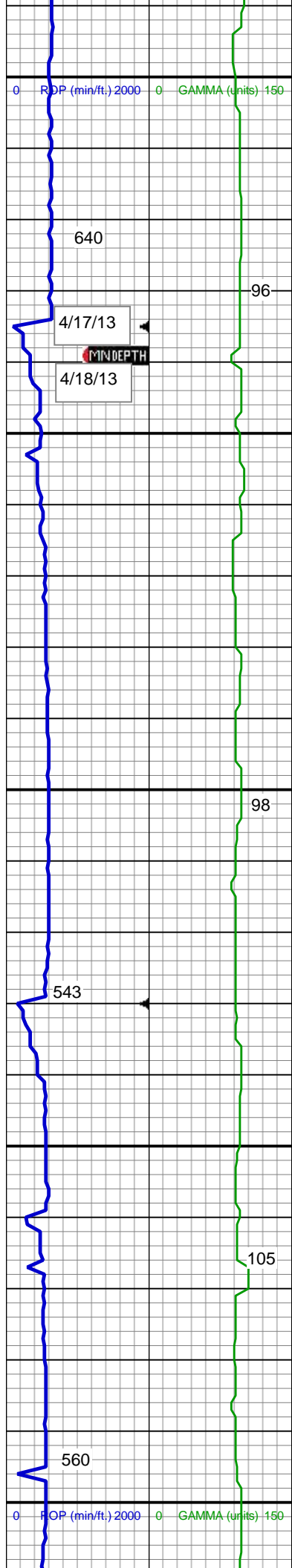
MD: 4,590 '
TVD: 4,573.68 '
Inclination: 2.17 °
Azimuth: 80.21 °

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

MD: 4,685 '
TVD: 4,668.65 '
Inclination: 1.49 °
Azimuth: 324.19 °

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

MD: 4,780 '
TVD: 4,763.62 '
Inclination: 1.6 °
Azimuth: 327.8 °



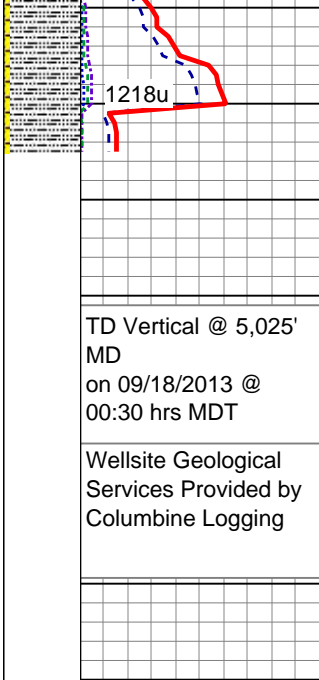
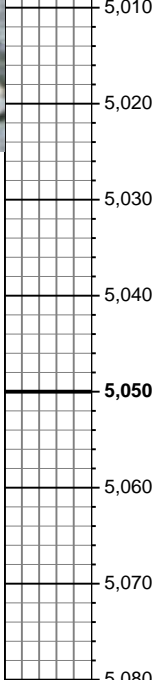
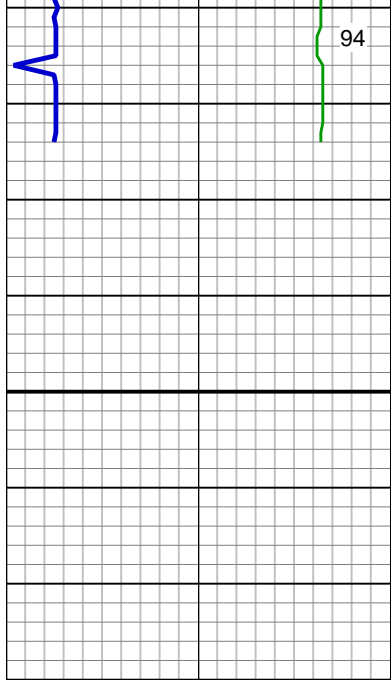
SHY SLTST: lt - med gy, frm, sb rd - sb blk, slty - grty tex, v sl calc

MD: 4,875 '
TVD: 4,858.58 '
Inclination: 1.53 °
Azimuth: 341.12 °

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

MUD WT: 9.2/9.1
VIS: 39/38 IN/OUT

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



MD: 5,025 '
TVD: 5,008.56 '
Inclination: 0.77 °
Azimuth: 331.52 °

See Corresponding Horizontal Log
Fiscus Federal LD 23-78HN