

COLUMBINE LOGGING

Scale: 5" / 100'
Measured Depth Log

Well Name Storis E24-73HC VERT

Location SEC 24 T6N R65W

State COLORADO

County WELD

Country USA

Rig Number H&P 315

API Number 05-123-38151

AFE # 139612

Region DJ BASIN

Field WATTENBERG

Spud Date 5/17/2014

Drilling Completed 5/23/2014

Surface Coordinates NENE SEC 24 T6N R65W
330' FNL; 1,212' FEL

LAT/LON: 40.47782/-104.60622

Bottom Hole Coordinates SEC 24 T6N R65W
535' FSL; 1,320' FEL

Ground Elevation 4,684'

K.B. Elevation 4,708'

Logged Interval 2,000' **To** 6,258'

Total Depth 11,368

Formation CODELL

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
 CHERT
 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
 CONNECTION GAS DOWN...
 CONNECTION GAS DOWN
 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

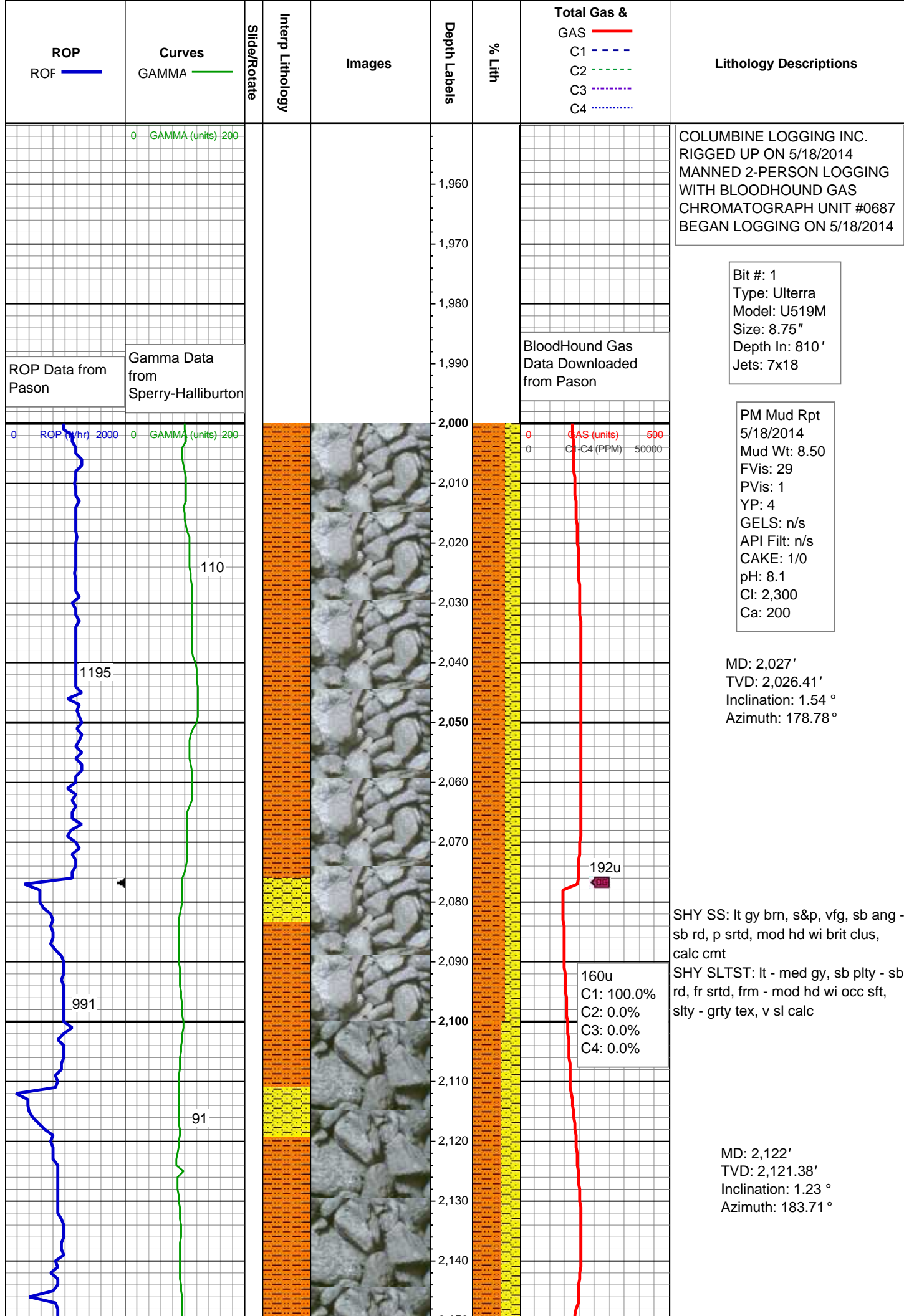
BOUNDSTONE
 CHALKY
 CRYPTOXLN
 EARTHY
 FINELYXLN

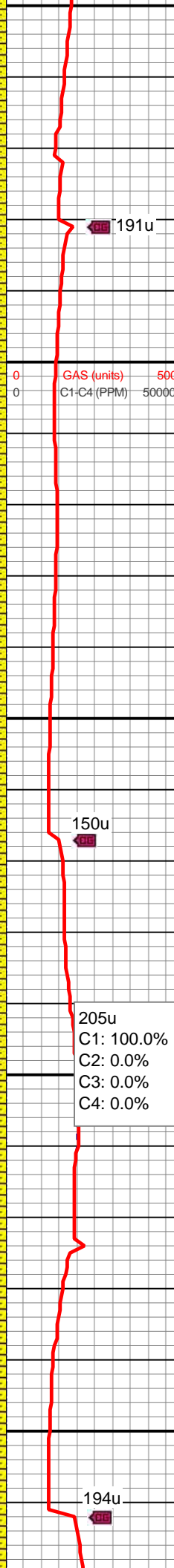
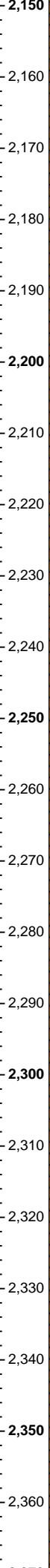
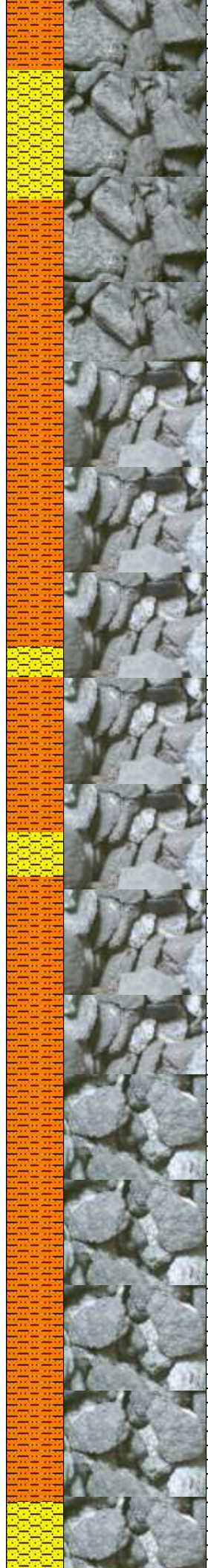
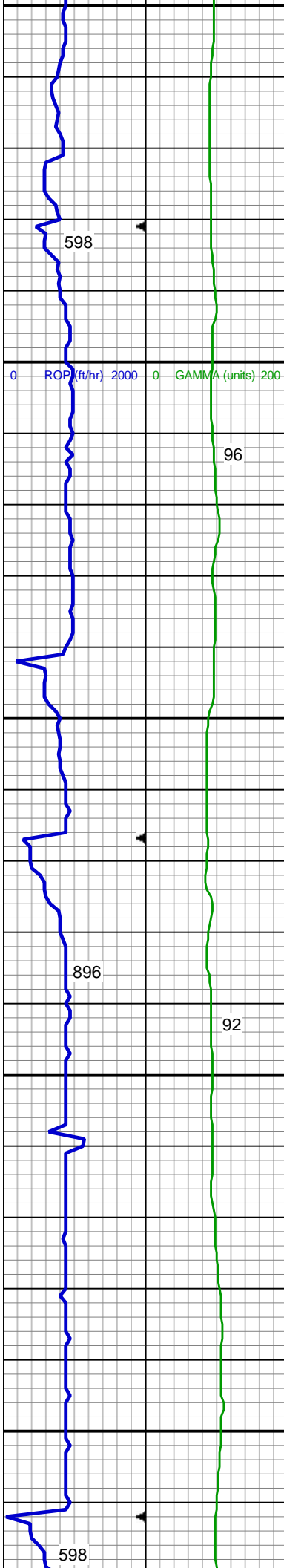
Grainstone

LITHOGRAPHIC
 MICROXLN
 MUDSTONE
 PACKSTONE
 WACKESTONE

Sorting

MODERATE
 POOR
 WELL



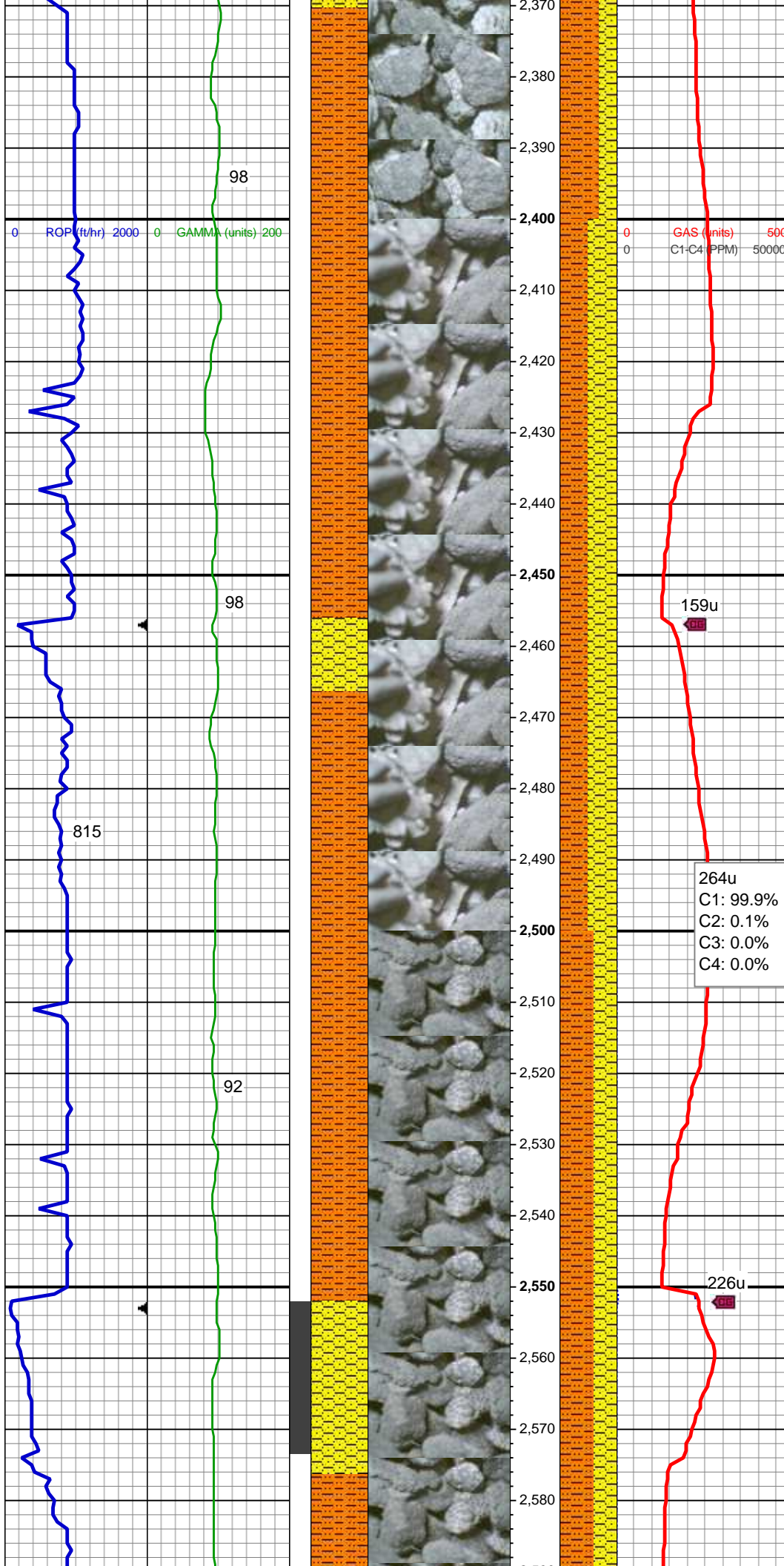


SHY SLTST: lt - med gy, sb plty - sb rd, fr srted, frm - mod hd wi occ sft, slty - grty tex, v sl calc
SHY SS: lt gy brn, s&p, vfg, sb ang - sb rd, p srted, mod hd wi brit clus, calc cmt

MD: 2,217'
TVD: 2,216.36'
Inclination: 1.24 °
Azimuth: 174.82 °

SHY SLTST: lt - med gy, sb plty - sb rd, fr srted, frm - mod hd wi occ sft, slty - grty tex, v sl calc
SHY SS: lt gy brn, s&p, vfg, sb ang - sb rd, p srted, mod hd wi brit clus, calc cmt

MD: 2,312'
TVD: 2,311.34'
Inclination: 1.42 °
Azimuth: 205.83 °



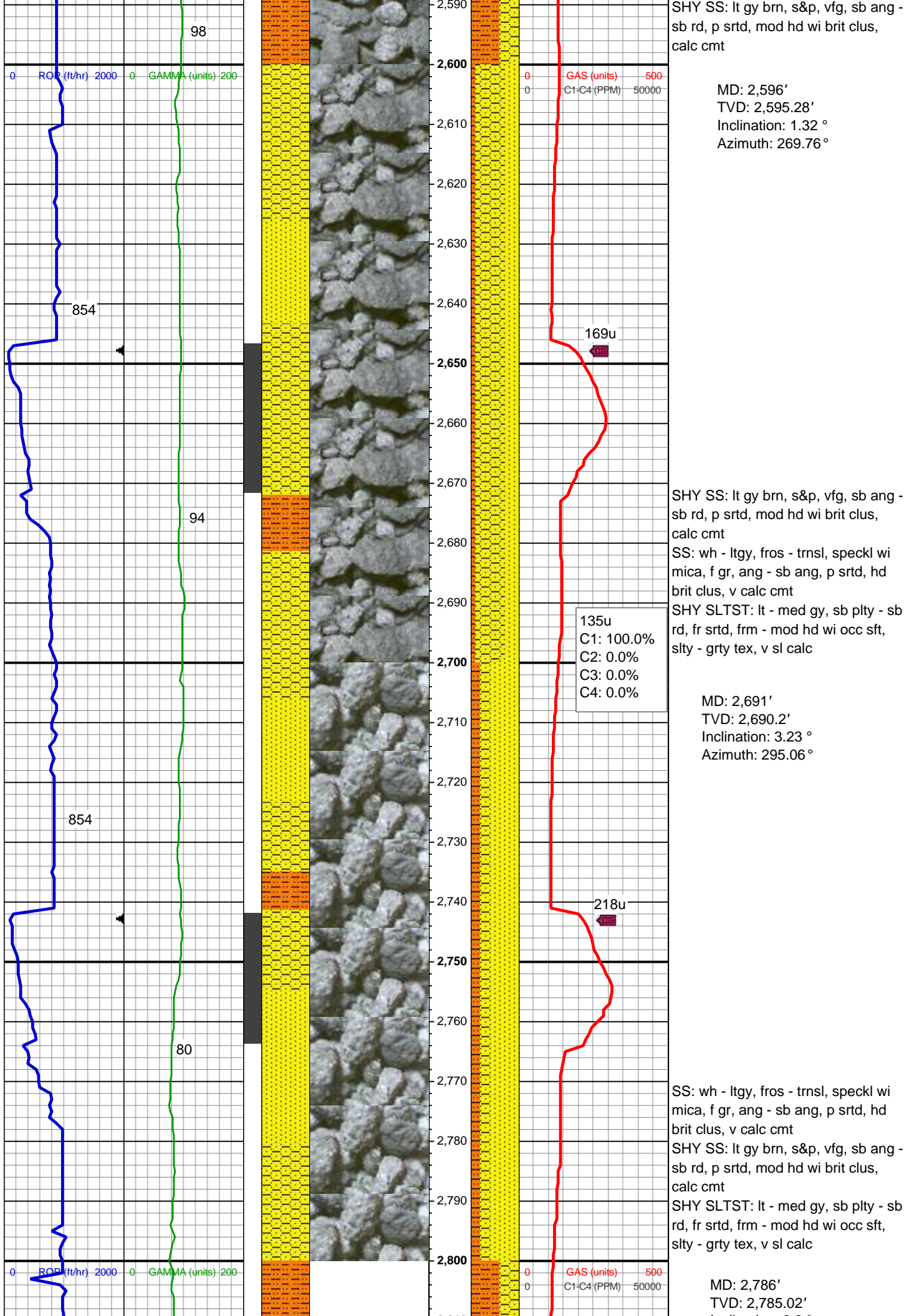
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rd, fr srted, frm - mod hd wi occ sft,
slty - grty tex, v sl calc
SHY SS: lt gy brn, s&p, vfg, sb ang -
sb rd, p srted, mod hd wi brit clus,
calc cmt

MD: 2,407'
TVD: 2,406.31'
Inclination: 1.25 °
Azimuth: 179.54 °

SHY SLTST: lt - med gy, sb plty - sb
rd, fr srted, frm - mod hd wi occ sft,
slty - grty tex, v sl calc
SHY SS: lt gy brn, s&p, vfg, sb ang -
sb rd, p srted, mod hd wi brit clus,
calc cmt

MD: 2,502'
TVD: 2,501.29'
Inclination: 1 °
Azimuth: 193.68 °

SHY SLTST: lt - med gy, sb plty - sb
rd, fr srted, frm - mod hd wi occ sft,
slty - grty tex, v sl calc



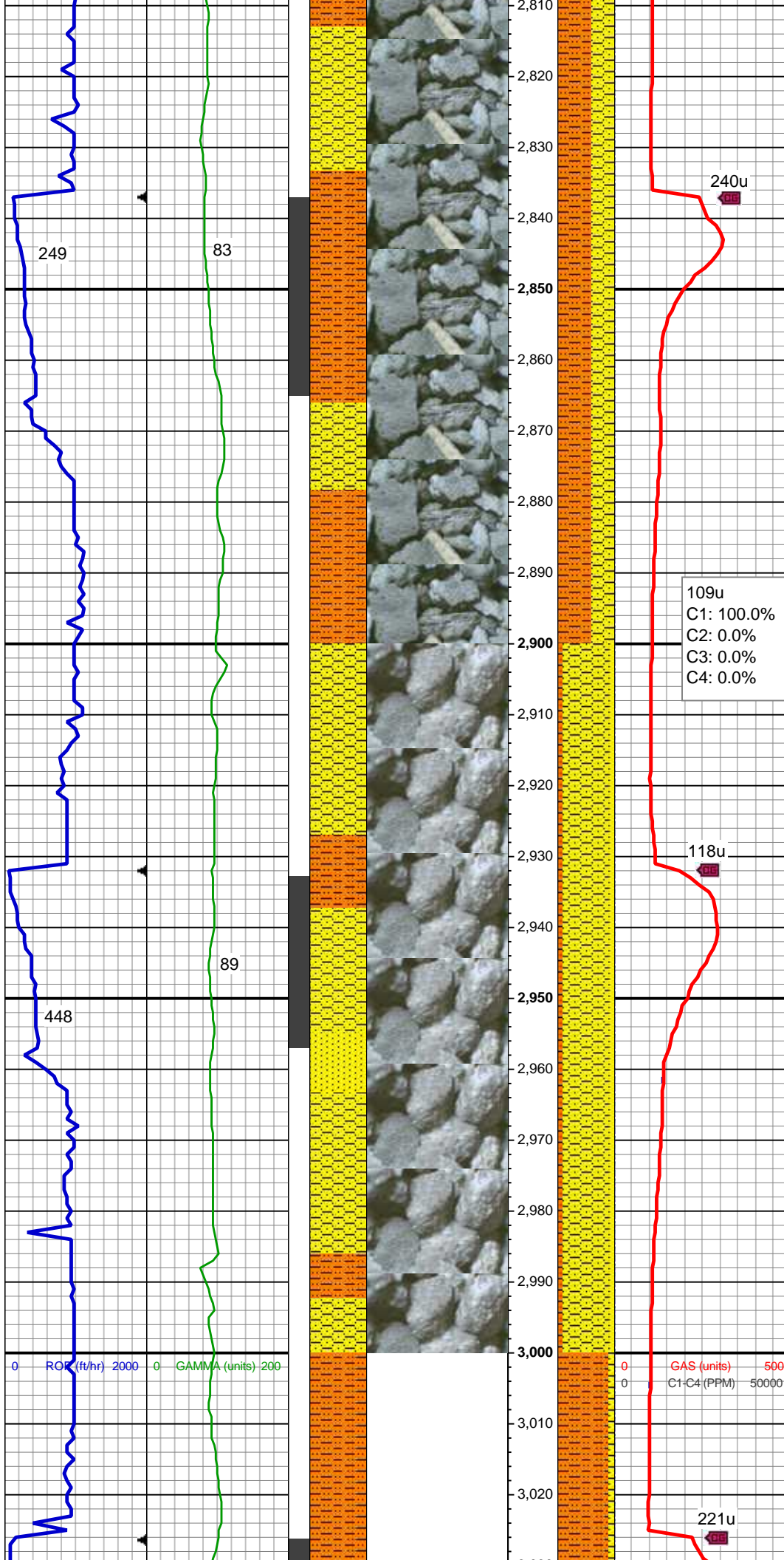
Inclination: 3.8 °
Azimuth: 307.65 °

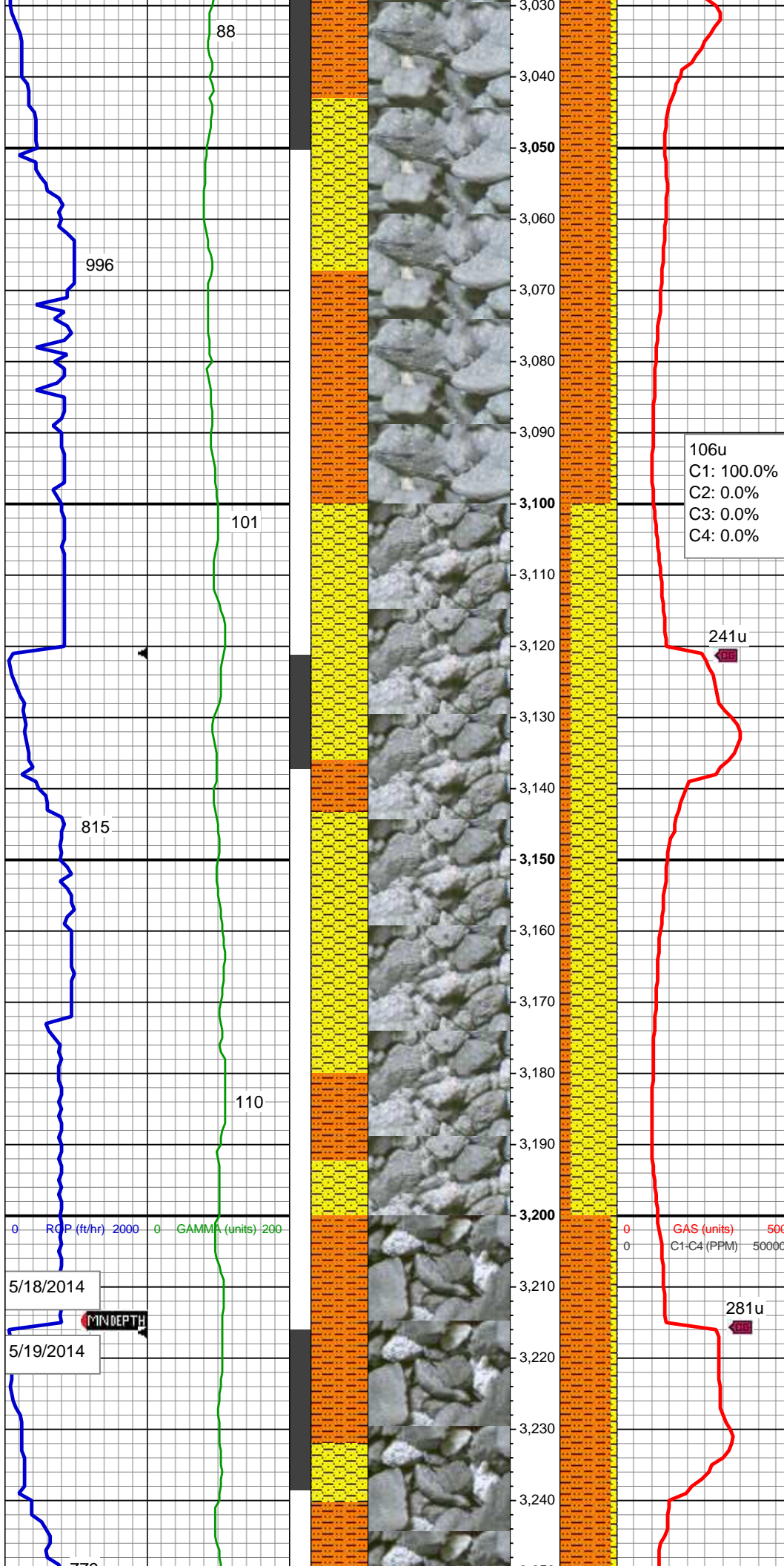
MD: 2,881'
TVD: 2,879.7'
Inclination: 5.59 °
Azimuth: 322.44 °

SHY SLTST: lt - med gy, sb plty - sb
rd, fr srted, frm - mod hd wi occ sft,
slty - grty tex, v sl calc
SHY SS: lt gy brn, s&p, vfg, sb ang -
sb rd, p srted, mod hd wi brit clus,
calc cmt

MD: 2,976'
TVD: 2,974.12'
Inclination: 7.12 °
Azimuth: 320.9 °

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





MD: 3,071'
TVD: 3,068.29'
Inclination: 8.03 °
Azimuth: 331.8 °

SHY SLTST: lt - med gy, sb plty - sb
rd, fr srted, frm - mod hd wi occ sft,
slty - grty tex, v sl calc

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

MUD WT: 8.80/9.20
VIS: 28/28 IN/OUT

MD: 3,166'
TVD: 3,162.39'
Inclination: 7.77 °
Azimuth: 338.47 °

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

SHY SLTST: lt - med gy, sb plty - sb
rd, fr srted, frm - mod hd wi occ sft,
slty - grty tex, v sl calc

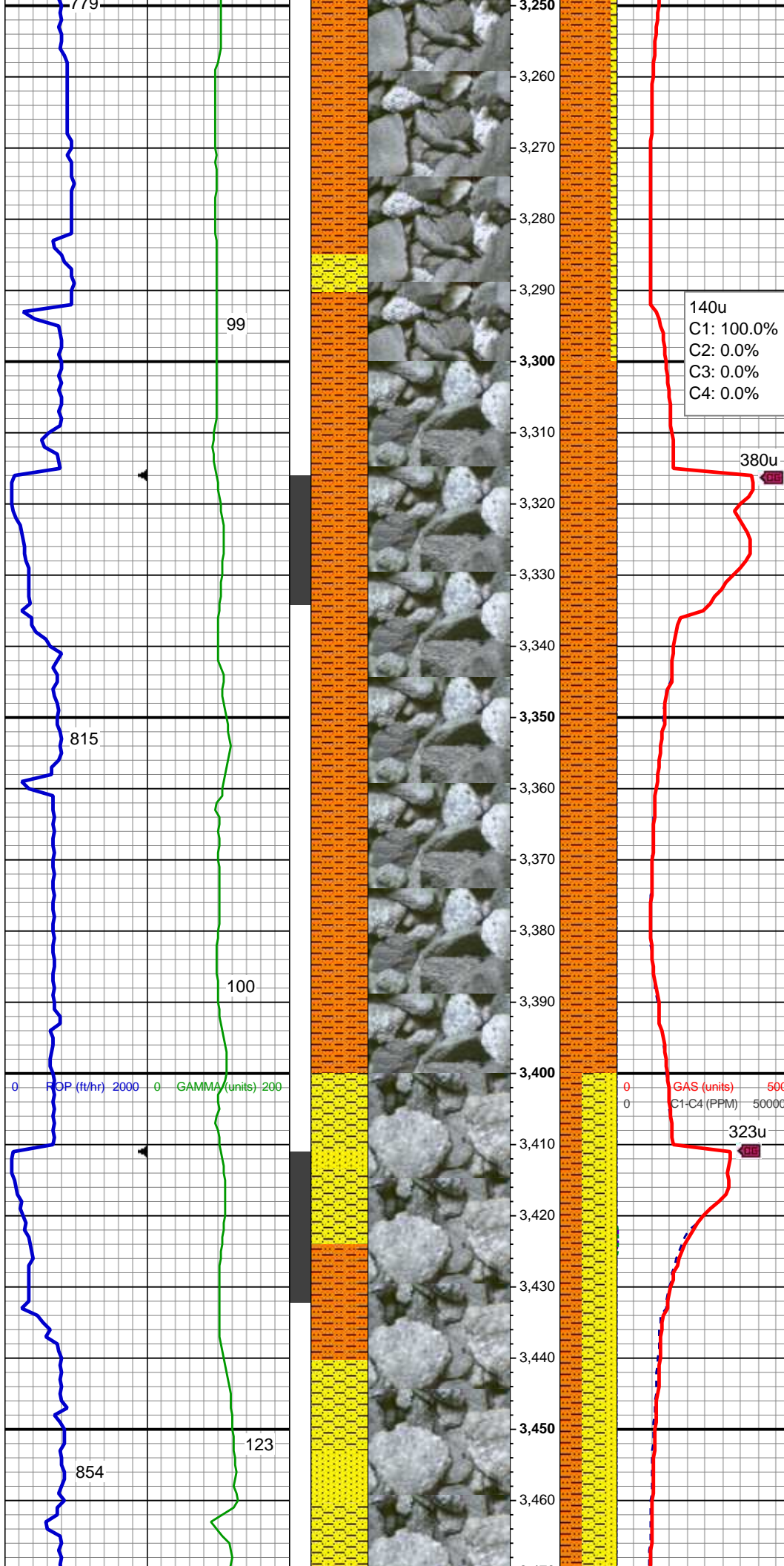
106u
C1: 100.0%
C2: 0.0%
C3: 0.0%
C4: 0.0%

241u

DB

281u

DB



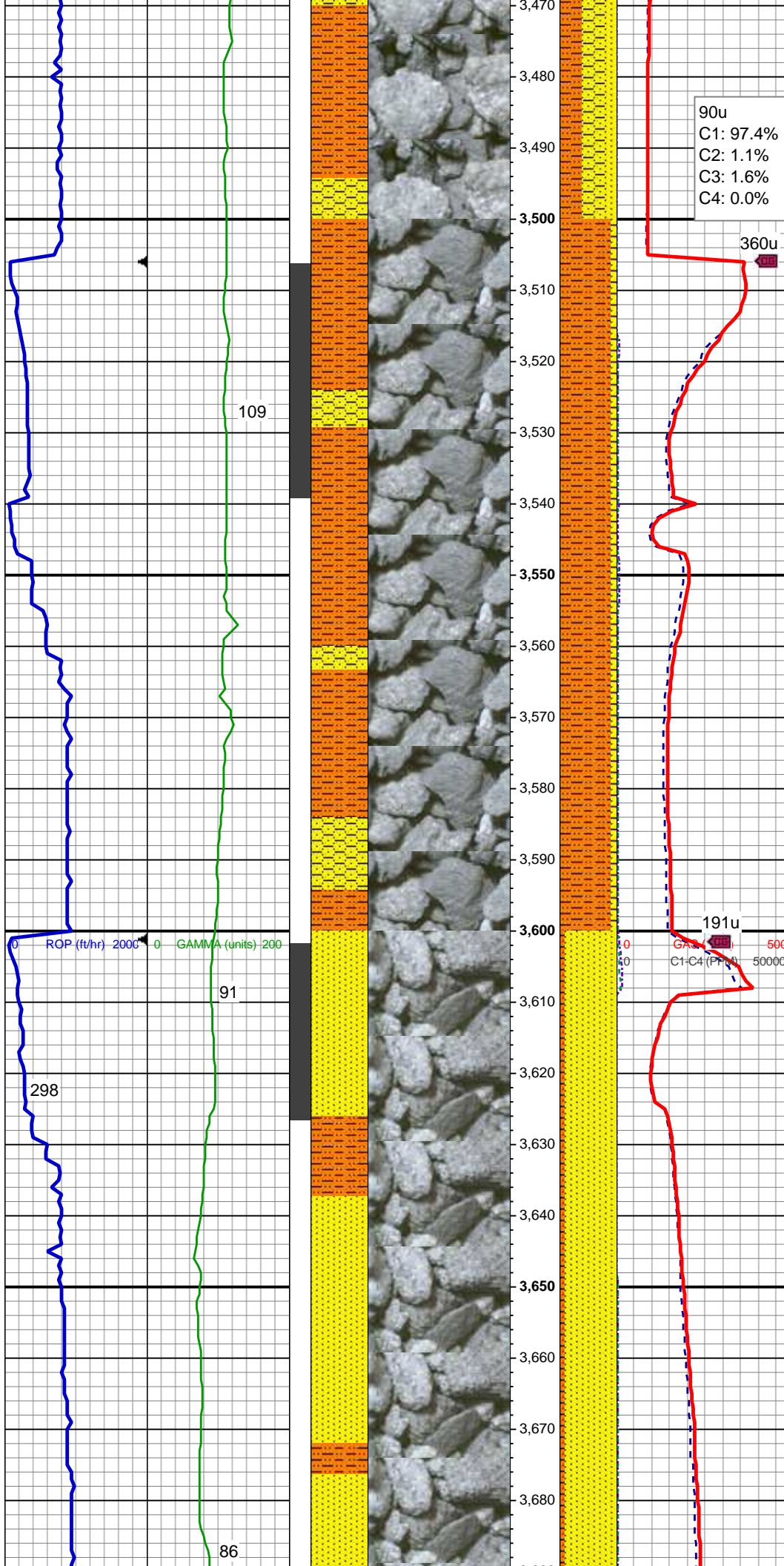
MD: 3,261'
TVD: 3,256.51'
Inclination: 7.83 °
Azimuth: 341.46 °

SHY SLTST: lt - med gy, sb plty - sb
rd, fr srted, frm - mod hd wi occ sft,
slty - grty tex, v sl calc
SHY SS: lt gy brn, s&p, vfg, sb ang -
sb rd, p srted, mod hd wi brit clus,
calc cmt

MD: 3,356'
TVD: 3,350.69'
Inclination: 7.25 °
Azimuth: 347.14 °

SHY SLTST: lt - med gy, sb plty - sb
rd, fr srted, frm - mod hd wi occ sft,
slty - grty tex, v sl calc

MD: 3,451'
TVD: 3,445.07'
Inclination: 5.89 °
Azimuth: 345.35 °



SHY SLTST: lt - med gy, sb plty - sb rd, fr srted, frm - mod hd wi occ sft, slty - grty tex, v sl calc

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

SS: wh - ltgy, fros - trns, speckl wi mica, f gr, ang - sb ang, p srted, hd brit clus, v calc cmt

MD: 3,546'
TVD: 3,539.4'
Inclination: 7.67 °
Azimuth: 354.73 °

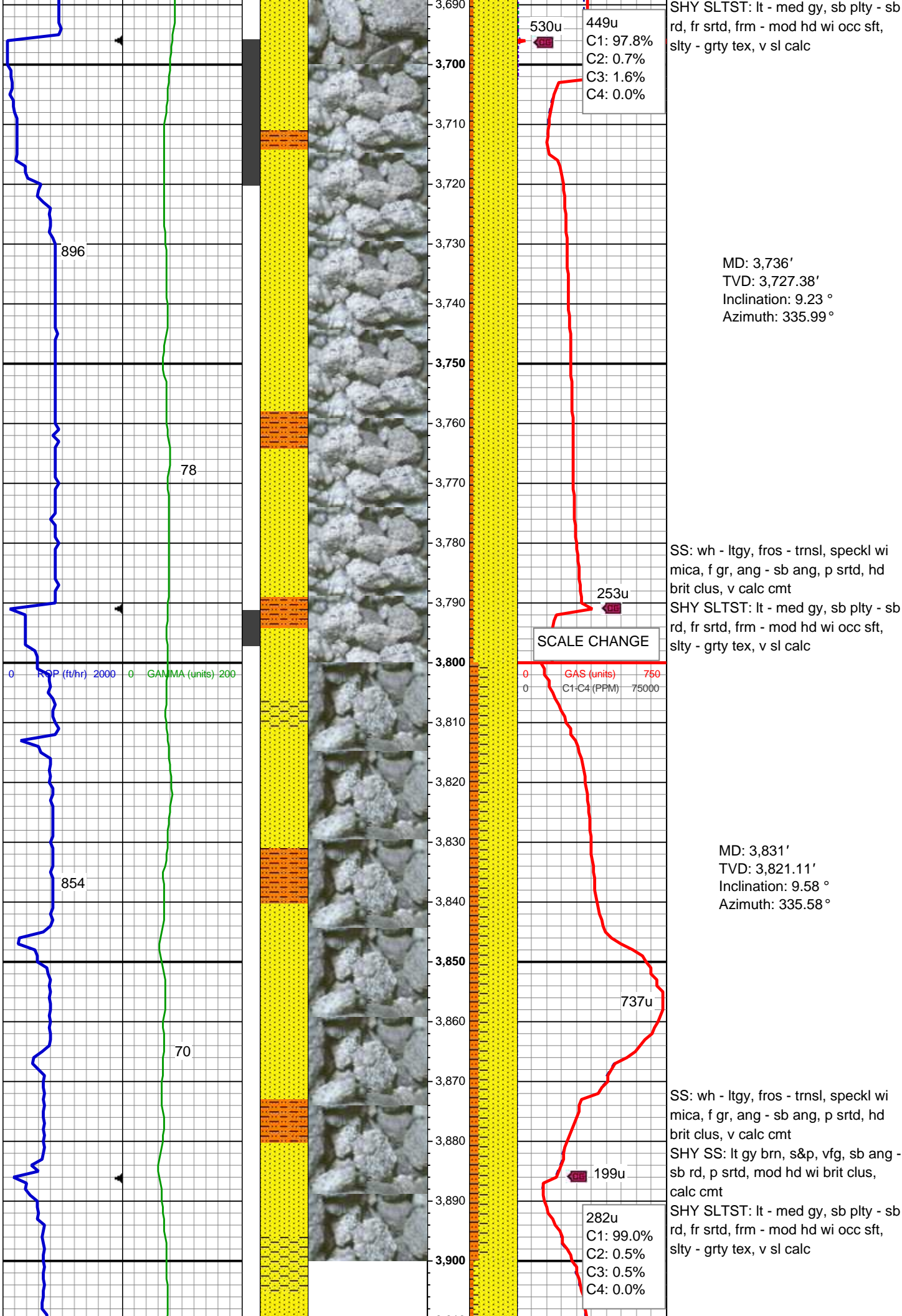
Parkman Top @
3,552' MD; 3,545' TVD

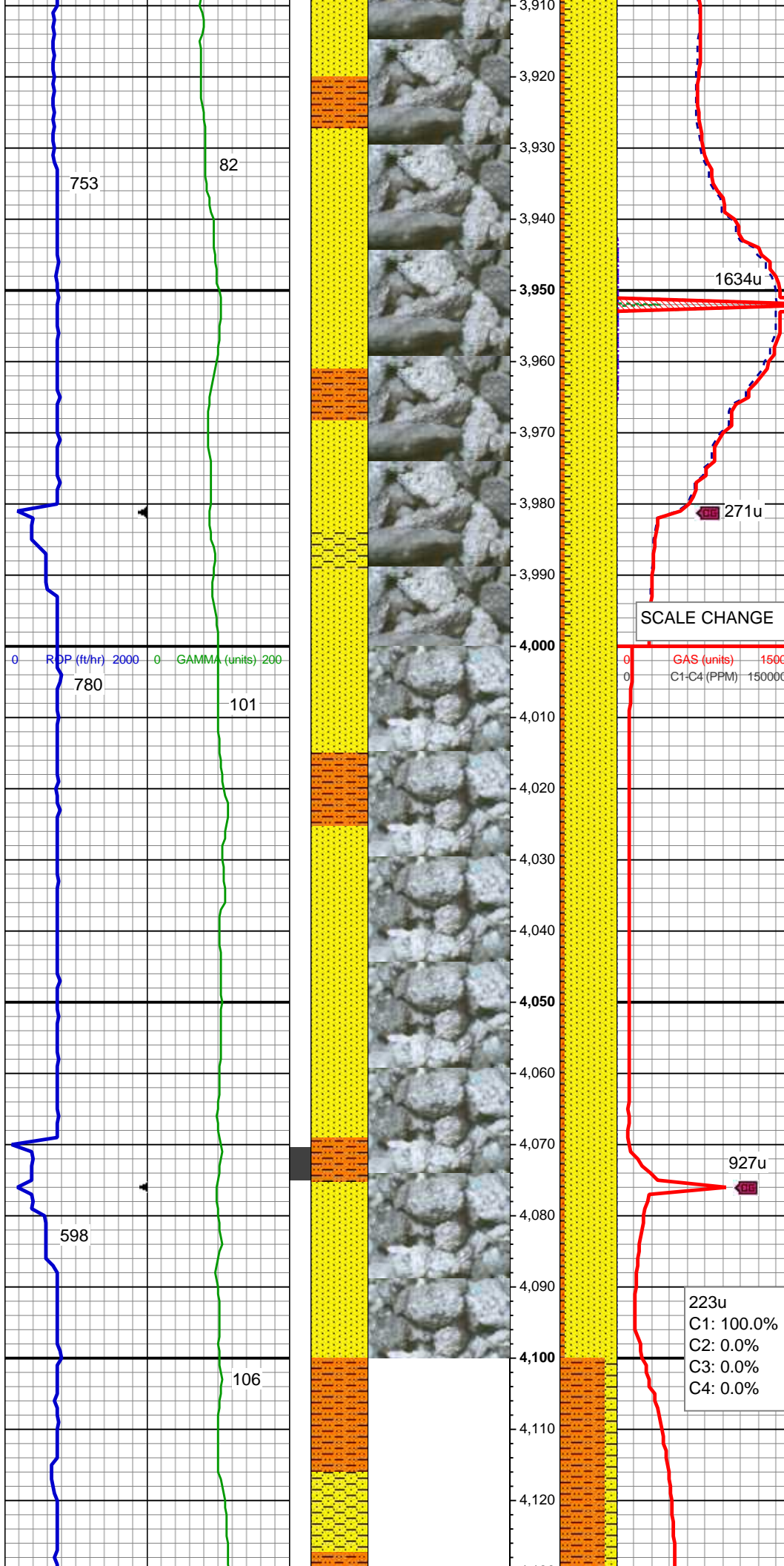
SHY SLTST: lt - med gy, sb plty - sb rd, fr srted, frm - mod hd wi occ sft, slty - grty tex, v sl calc

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

MD: 3,641'
TVD: 3,633.48'
Inclination: 8.27 °
Azimuth: 346.61 °

SS: wh - ltgy, fros - trns, speckl wi mica, f gr, ang - sb ang, p srted, hd brit clus, v calc cmt





MD: 3,926'
TVD: 3,914.79'
Inclination: 9.56 °
Azimuth: 337 °

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

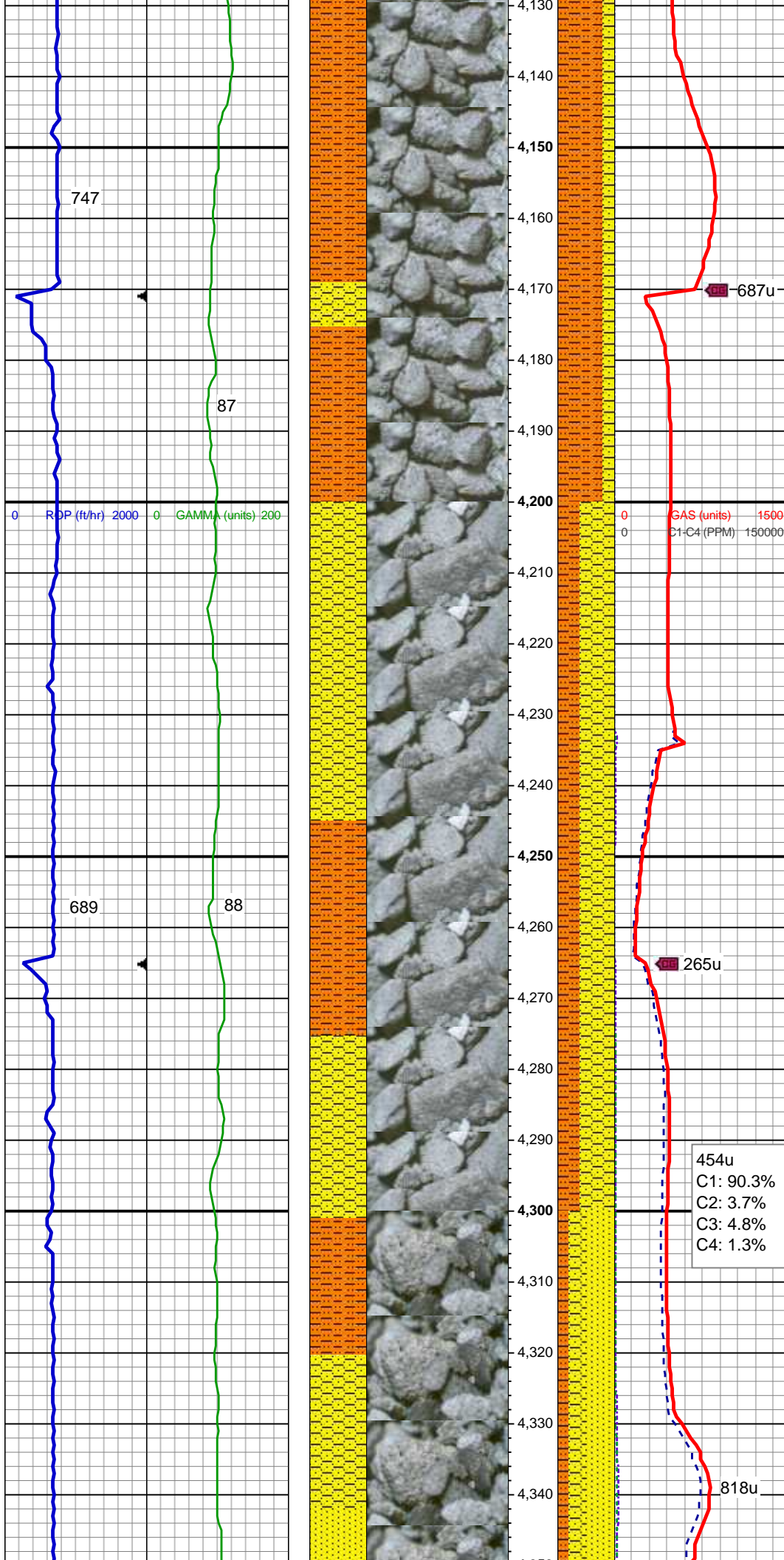
MD: 4,021'
TVD: 4,008.54'
Inclination: 8.99 °
Azimuth: 336.5 °

Sussex Top @
4,068' MD; 4,055' TVD

SS: wh - ltgy, fros - trnsl, speckl wi mica, f gr, ang - sb ang, p srted, hd brit clus, v calc cmt
SHY SLTST: lt - med gy, sb plty - sb rd, fr srted, frm - mod hd wi occ sft, slty - grty tex, v sl calc

MD: 4,115'
TVD: 4,101.55'
Inclination: 7.64 °
Azimuth: 335.78 °

223u
C1: 100.0%
C2: 0.0%
C3: 0.0%
C4: 0.0%



SHY SLTST: lt - med gy, sb plty - sb
rd, fr srted, frm - mod hd wi occ sft,
slty - grty tex, v sl calc
SHY SS: lt gy brn, s&p, vfg, sb ang -
sb rd, p srted, mod hd wi brit clus,
calc cmt

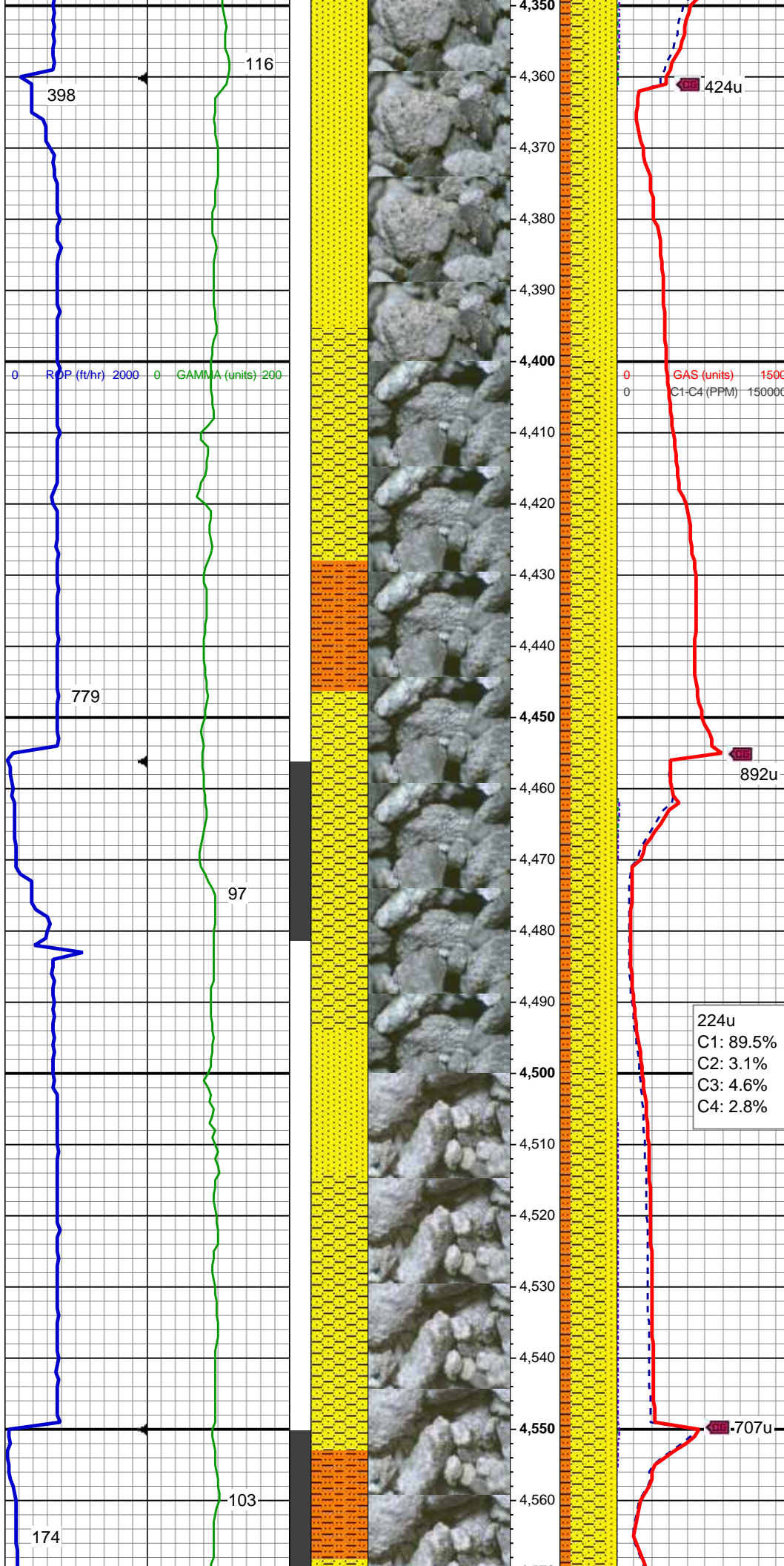
MD: 4,210'
TVD: 4,195.84'
Inclination: 6.33 °
Azimuth: 339.09 °

AM Mud Rpt
5/19/2014
Mud Wt: 8.60
FVis: 32
PVis: 4
YP: 5
GELS: 2/7/11
API Filt: n/s
CAKE: 1/0
pH: 9.0
Cl: 2,000
Ca: 120

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

SHY SLTST: lt - med gy, sb plty - sb
rd, fr srted, frm - mod hd wi occ sft,
slty - grty tex, v sl calc

MD: 4,305'
TVD: 4,290.33'
Inclination: 5.63 °
Azimuth: 336.94 °



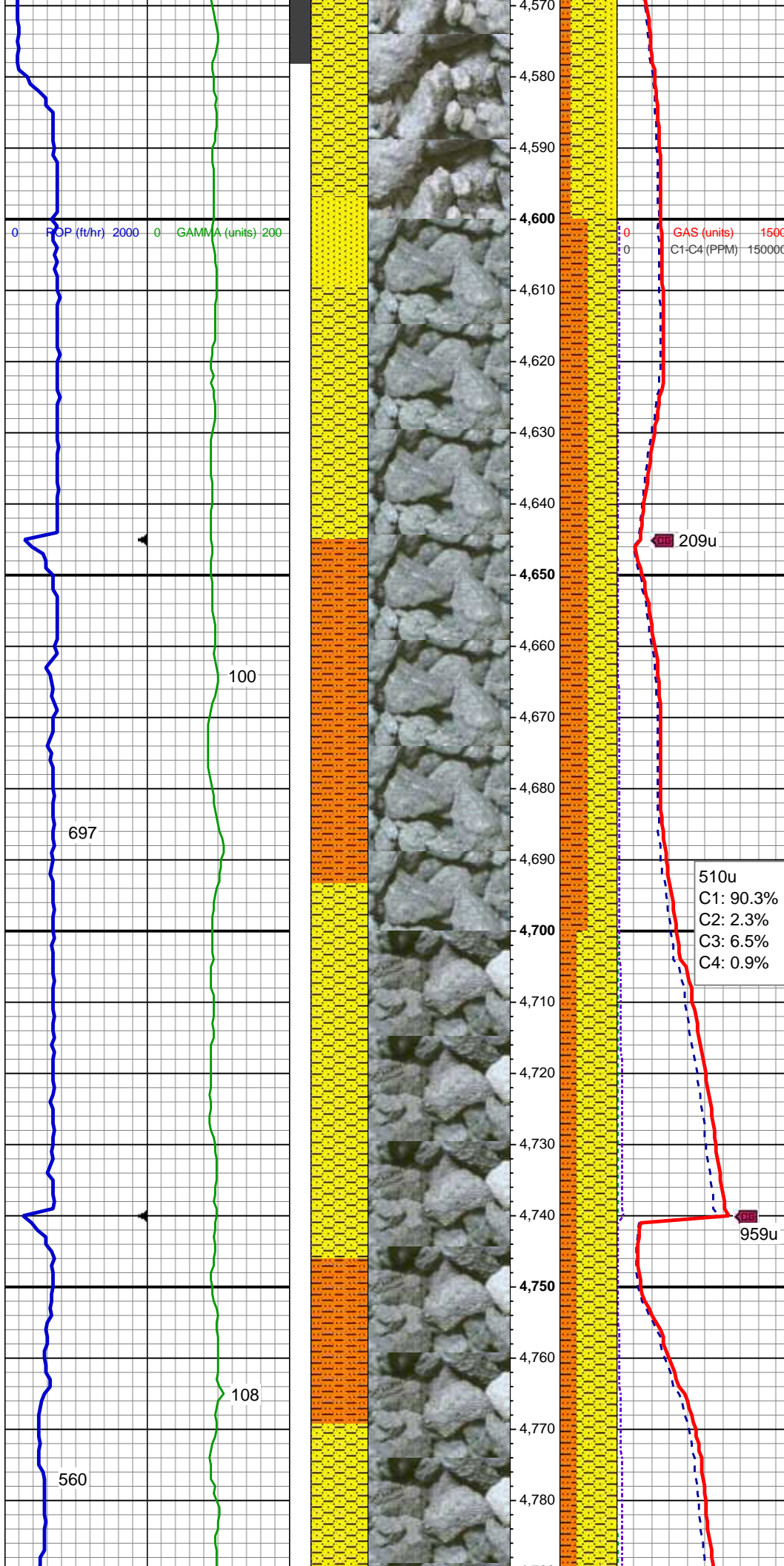
SS: wh - ltgy, fros - trnsl, speckl wi mica, f gr, ang - sb ang, p srted, hd brit clus, v calc cmt
SHY SS: lt gy brn, s&p, vfg, sb ang - sb rd, p srted, mod hd wi brit clus, calc cmt
SHY SLTST: lt - med gy, sb plty - sb rd, fr srted, frm - mod hd wi occ sft, slty - grty tex, v sl calc

MD: 4,400'
TVD: 4,384.99'
Inclination: 3.95 °
Azimuth: 332.59 °

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

MD: 4,495'
TVD: 4,479.81'
Inclination: 3.07 °
Azimuth: 329.72 °

224u
C1: 89.5%
C2: 3.1%
C3: 4.6%
C4: 2.8%



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

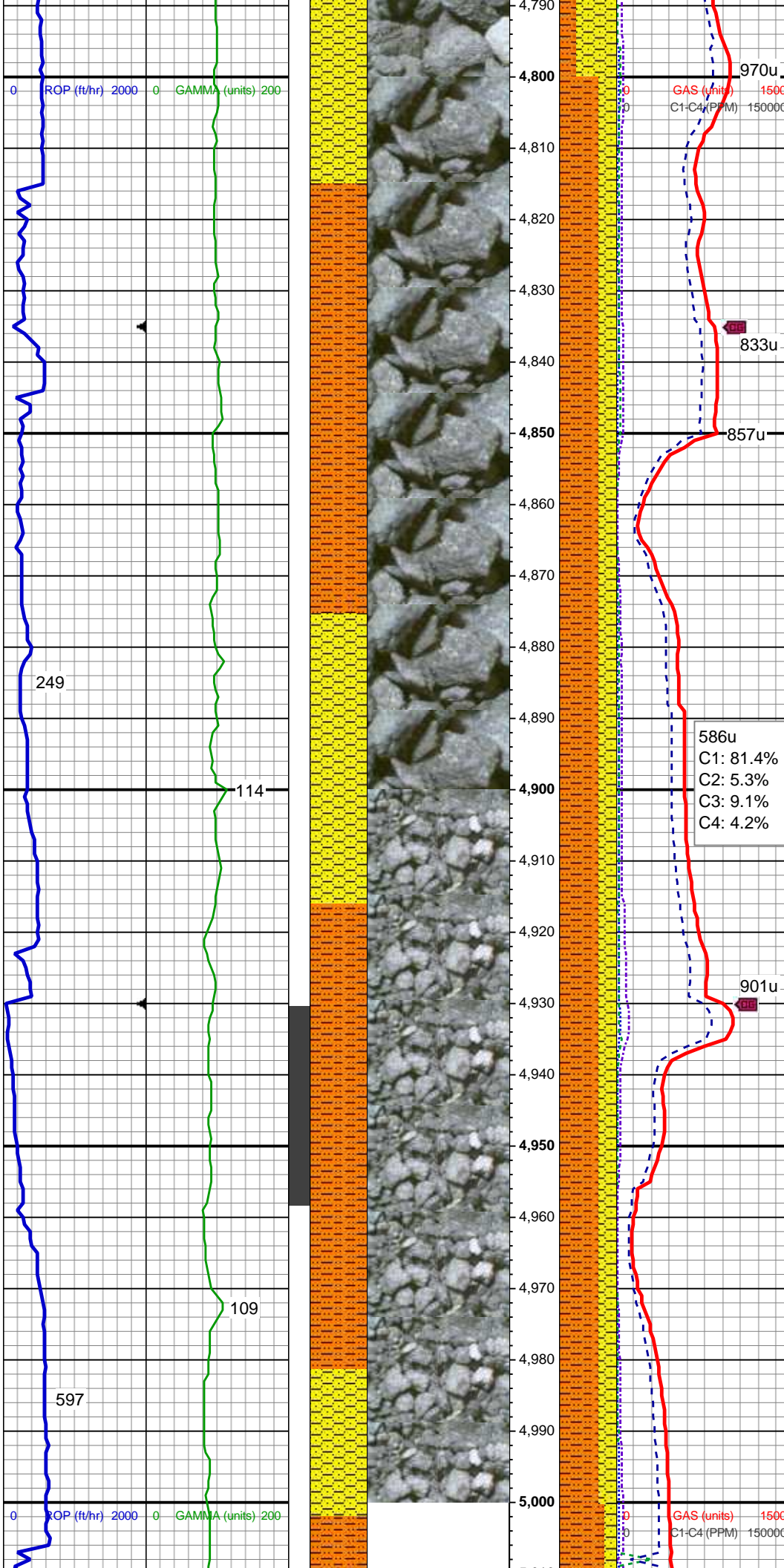
MD: 4,590'
TVD: 4,574.75'
Inclination: 1.07 °
Azimuth: 337.86 °

SHY SS: lt gy brn, s&p, vfg, sb ang - sb rd, p srted, mod hd wi brit clus, calc cmt
SHY SLTST: lt - med gy, sb plty - sb rd, fr srted, frm - mod hd wi occ sft, slty - grty tex, v sl calc

MD: 4,685'
TVD: 4,669.72'
Inclination: 1.47 °
Azimuth: 6.69 °

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

MD: 4,780'
TVD: 4,764.68'
Inclination: 2.14 °
Azimuth: 0.91 °



SHY SLTST: lt - med gy, sb plty - sb rd, fr srted, frm - mod hd wi occ sft, slty - grty tex, v sl calc

Shannon Top @
4,818' MD; 4,805' TVD

MUD WT: 9.00/9.45
VIS: 30/30 IN/OUT

MD: 4,875'
TVD: 4,859.58'
Inclination: 3.02 °
Azimuth: 15.18 °

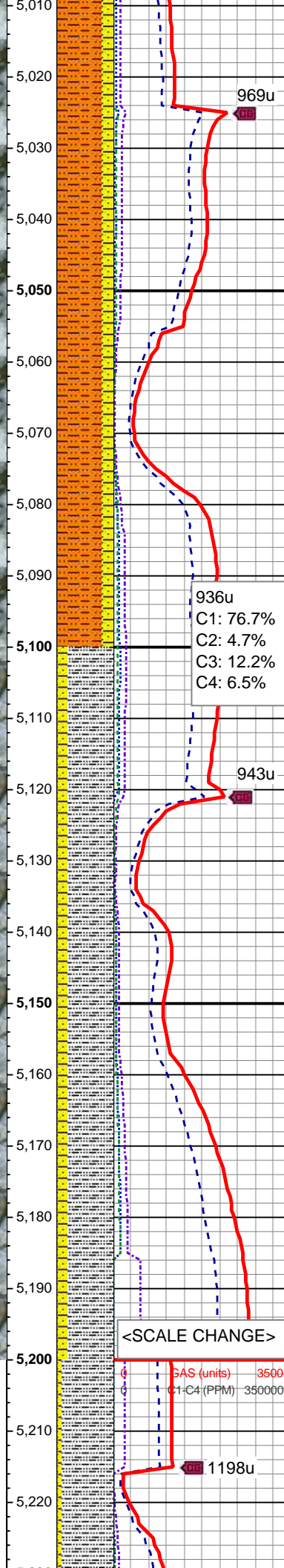
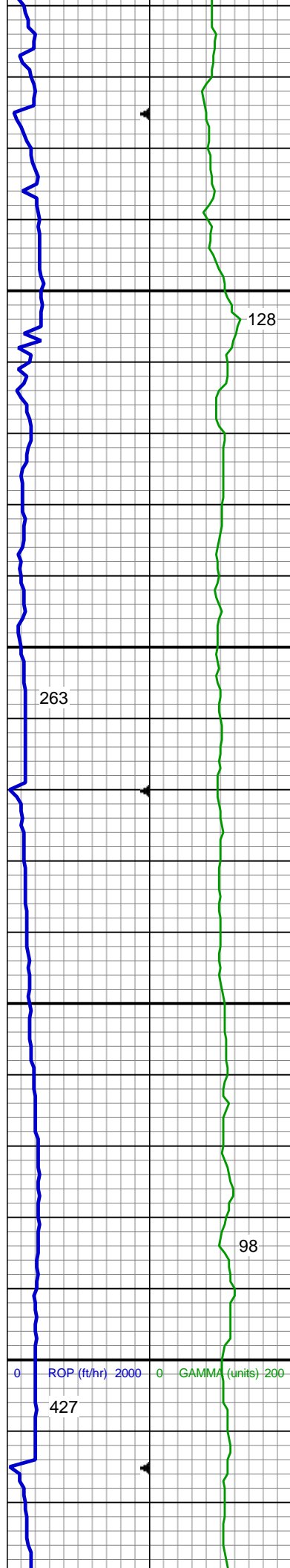
SHY SLTST: lt - med gy, sb plty - sb rd, fr srted, frm - mod hd wi occ sft, slty - grty tex, v sl calc

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

MD: 4,970'
TVD: 4,954.51'
Inclination: 1.28 °
Azimuth: 7.58 °

SHY SLTST: lt - med gy, sb plty - sb rd, fr srted, frm - mod hd wi occ sft, slty - grty tex, v sl calc

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



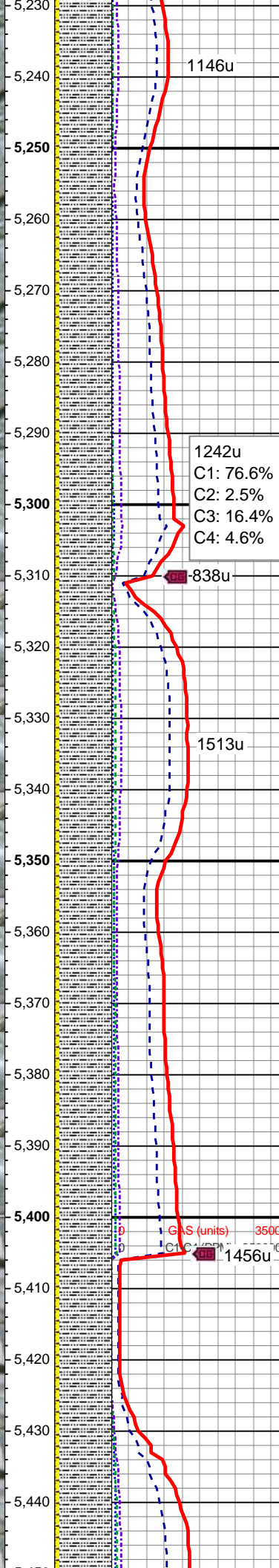
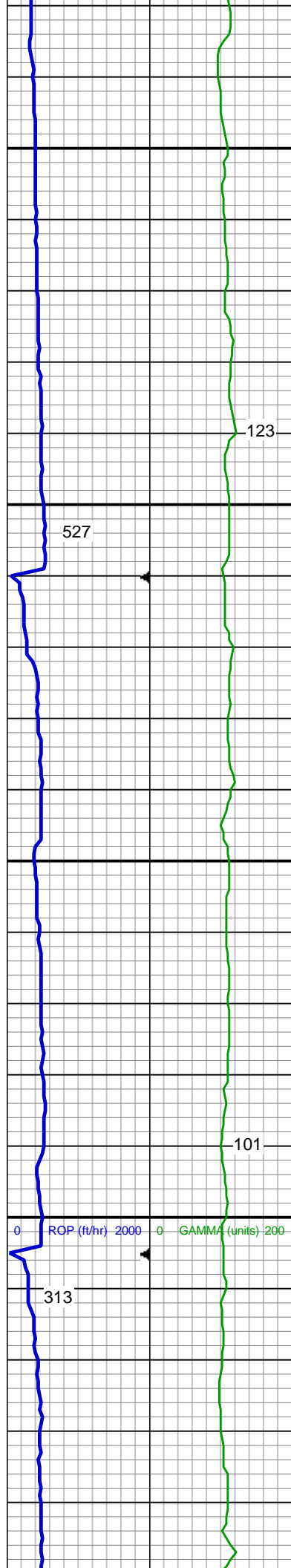
MD: 5,064'
TVD: 5,048.49'
Inclination: 0.97 °
Azimuth: 10.57 °

SHY SLTST: lt - med gy, sb plty - sb rd, fr srted, frm - mod hd wi occ sft, slty - grty tex, v sl calc
SHY SS: lt gy brn, s&p, vfg, sb ang - sb rd, p srted, mod hd wi brit clus, calc cmt

MUD WT: 9.4/9.2
VIS: 34/33 IN/OUT

MD: 5,159'
TVD: 5,143.47'
Inclination: 1.25 °
Azimuth: 15.73 °

SLTY SH: lt - med gy brn, occ dk gy, frm - hd, plty - sb plty, occ sb blkly, slty - grty tex, v sl calc
SHY SS: lt gy brn, sme glau, vfg, sb ang - sb rd, p srted, mod hd wi brit clus, calc cmt



MD: 5,254'
TVD: 5,238.45'
Inclination: 1.5 °
Azimuth: 354.06 °

SLTY SH: lt - med gy brn, occ dk gy,
frm - hd, plty - sb plty, occ sb blk,
slty - grty tex, v sl calc
SHY SS: lt gy brn, sme glau, vfg, sb
ang - sb rd, p srt, mod hd wi brit
clus, calc cmt

MUD WT: 9.5/9.4
VIS: 35/36 IN/OUT

SLTY SH: lt - med gy brn, occ dk gy,
frm - hd, plty - sb plty, occ sb blk,
slty - grty tex, v sl calc
SHY SS: lt gy brn, sme glau, vfg, sb
ang - sb rd, p srt, mod hd wi brit
clus, calc cmt

MD: 5,444'
TVD: 5,428.35'
Inclination: 2.09 °
Azimuth: 248.26 °

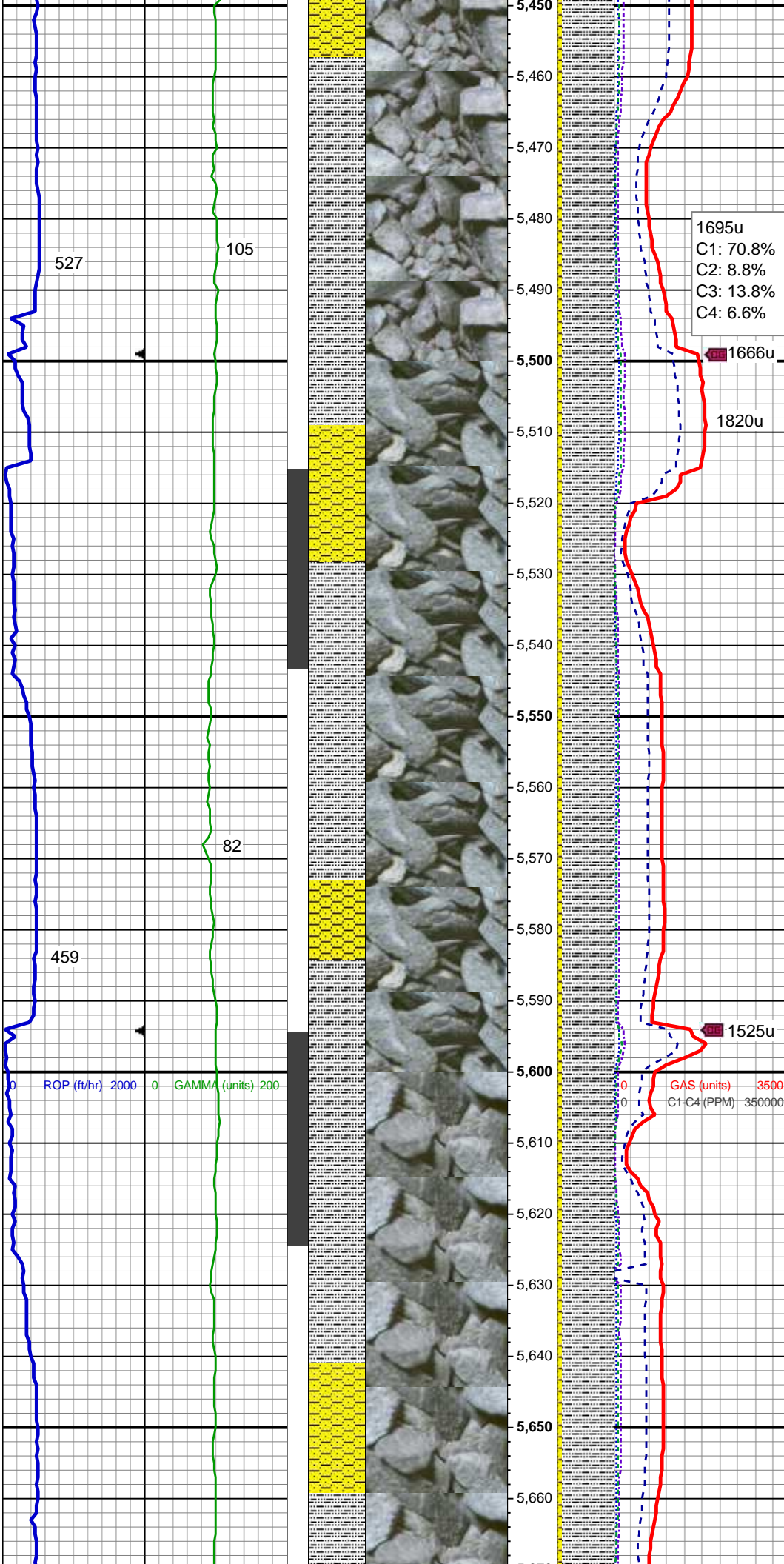
MD: 5,539'
TVD: 5,523.29'
Inclination: 2.54 °
Azimuth: 273.51 °

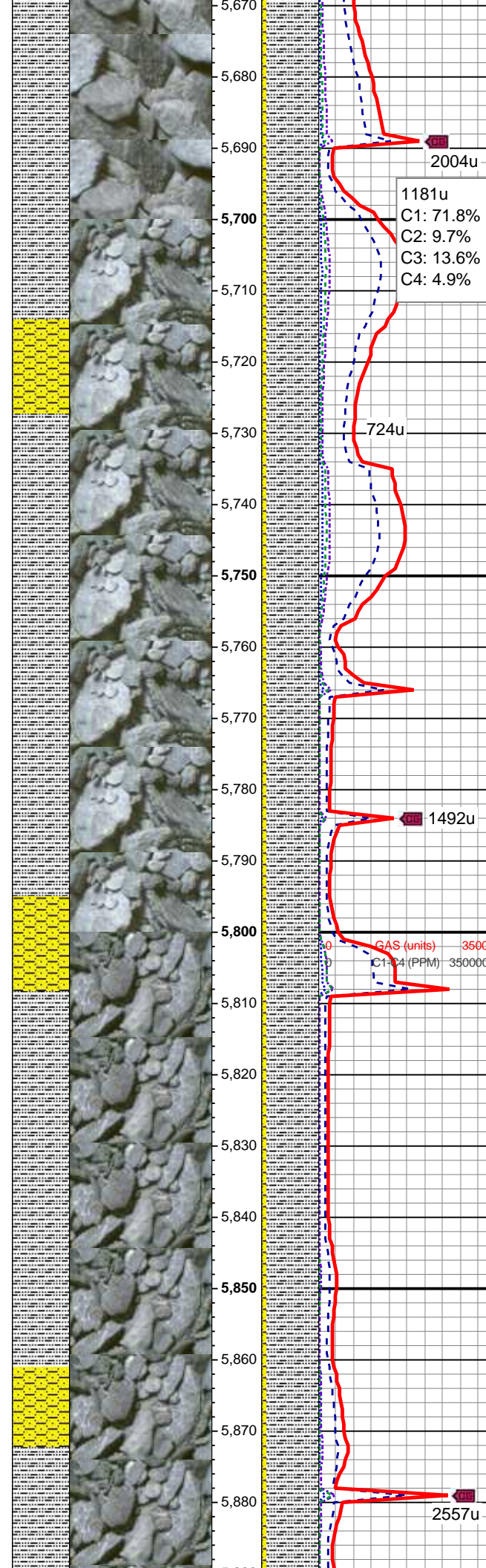
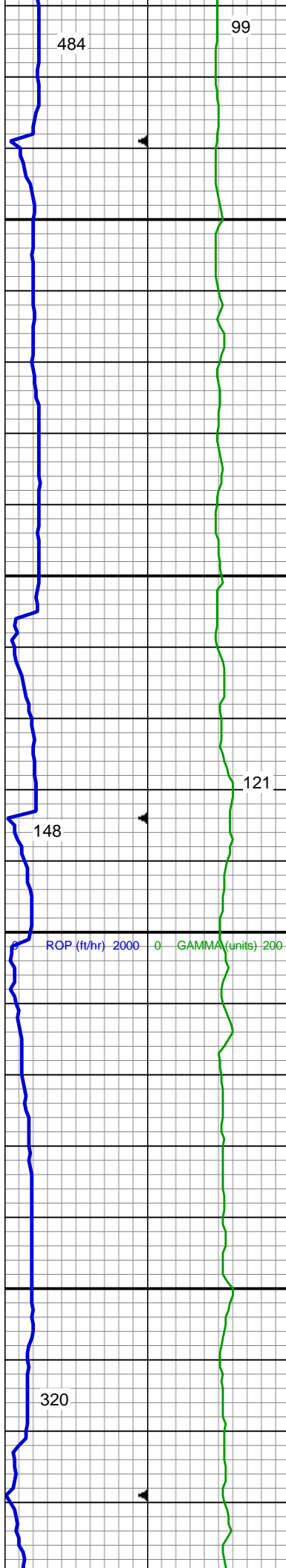
MUD WT: 9.6/9.8
VIS: 34/34 IN/OUT

MD: 5,634'
TVD: 5,618.26'
Inclination: 0.35 °
Azimuth: 1.68 °

SLTY SH: lt - med gy brn, occ dk gy,
frm - hd, plty - sb plty, occ sb blk,
sly - grty tex, v sl calc
SHY SS: lt gy brn, sme glau, vfg, sb
ang - sb rd, p srted, mod hd wi brit
clus, calc cmt

SLTY SH: lt - med gy brn, occ dk gy,
frm - hd, plty - sb plty, occ sb blk,
sly - grty tex, v sl calc
SHY SS: lt gy brn, sme glau, vfg, sb
ang - sb rd, p srted, mod hd wi brit
clus, calc cmt





SLTY SH: lt - med gy brn, occ dk gy,
frm - hd, plty - sb plty, occ sb blk,
silty - grty tex, v sl calc
SHY SS: lt gy brn, sme glau, vfg, sb
ang - sb rd, p srted, mod hd wi brit
clus, calc cmt

MUD WT: 9.8/9.9
VIS: 39/39 IN/OUT

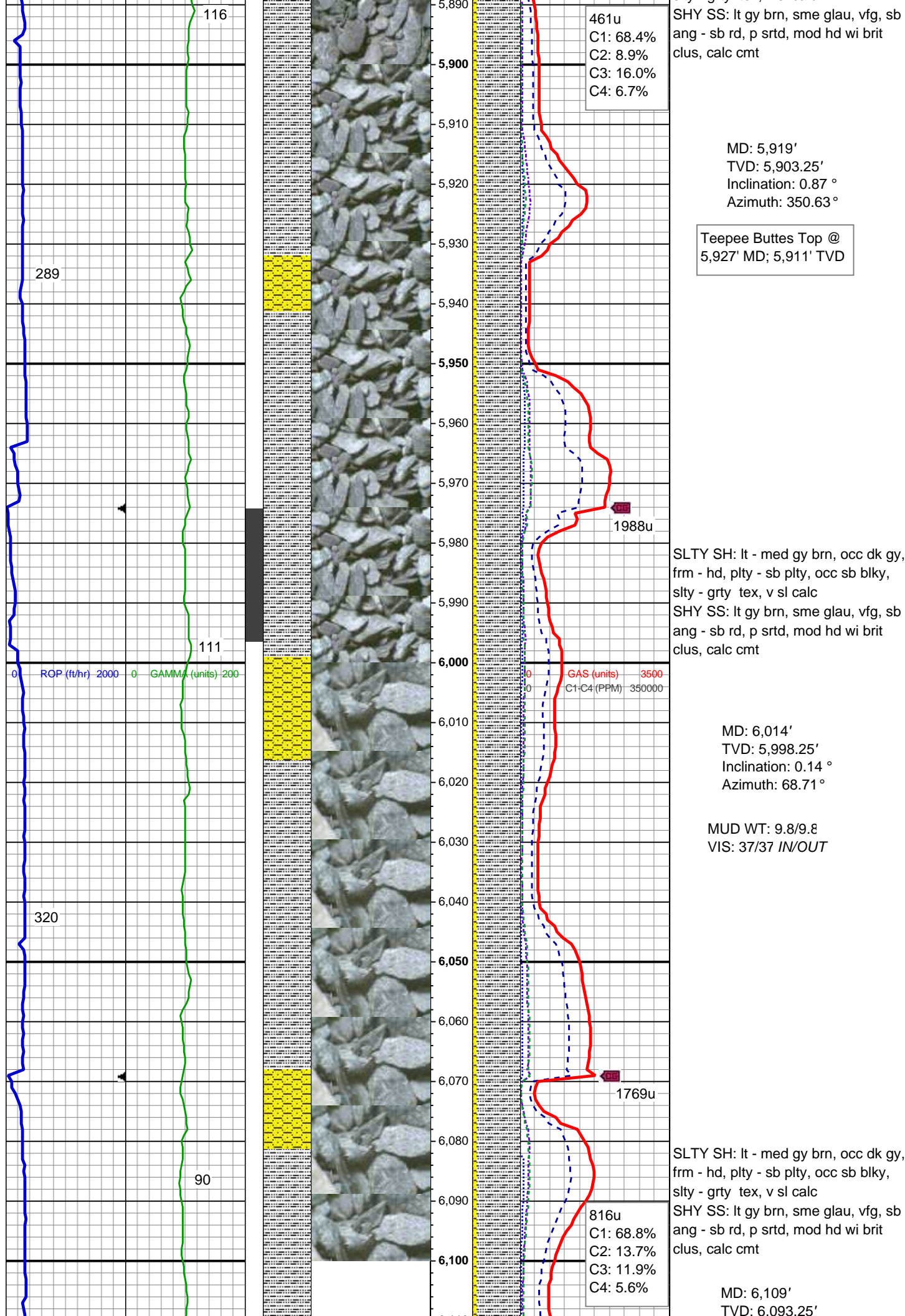
MD: 5,729'
TVD: 5,713.26'
Inclination: 0.17 °
Azimuth: 169.49 °

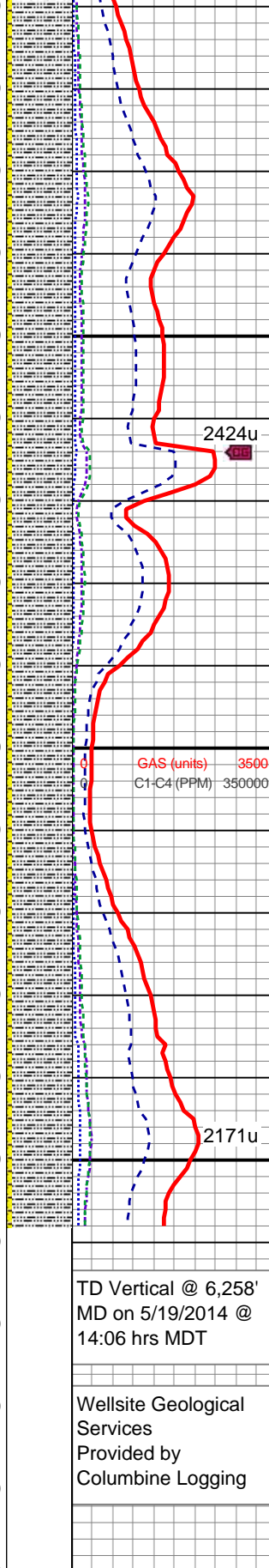
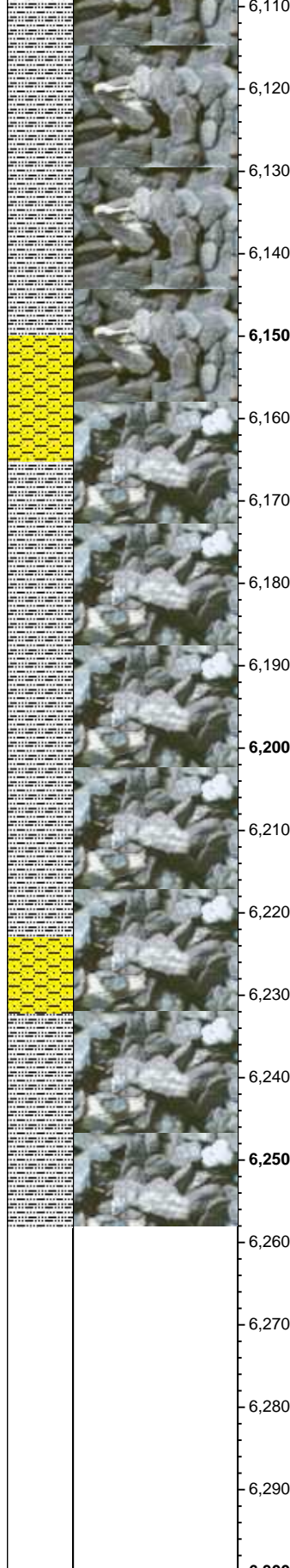
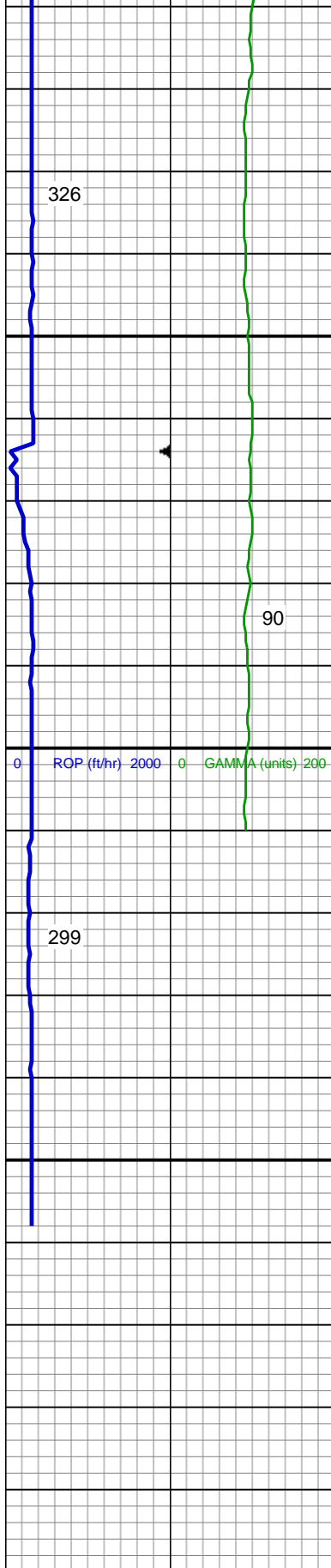
SLTY SH: lt - med gy brn, occ dk gy,
frm - hd, plty - sb plty, occ sb blk,
silty - grty tex, v sl calc
SHY SS: lt gy brn, sme glau, vfg, sb
ang - sb rd, p srted, mod hd wi brit
clus, calc cmt

MD: 5,824'
TVD: 5,808.26'
Inclination: 0.72 °
Azimuth: 359.16 °

MUD WT: 9.9/10
VIS: 39/37 IN/OUT

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





Inclination: 0.45 °
Azimuth: 283.62 °

PM Mud Rpt
5/19/2014
Mud Wt: 9.90
FVis: 38
PVis: 11
YP: 13
GELS: 6/15/22
API Filt: 9.5
CAKE: 2/0
pH: 8.9
Cl: 2,100
Ca: 160

SLTY SH: lt - med gy brn, occ dk gy, frm - hd, plty - sb plty, occ sb blk, slty - grty tex, v sl calc
SHY SS: lt gy brn, sme glau, vfg, sb ang - sb rd, p srt, mod hd wi brit clus, calc cmt

MD: 6,202'
TVD: 6,186.24'
Inclination: 0.77 °
Azimuth: 315.87 °

SLTY SH: lt - med gy brn, occ dk gy, frm - hd, plty - sb plty, occ sb blk, slty - grty tex, v sl calc
SHY SS: lt gy brn, sme glau, vfg, sb ang - sb rd, p srt, mod hd wi brit clus, calc cmt

See Corresponding Horizontal Log
Storis E24-73HC HORZ