

# COLUMBINE LOGGING

Scale: 5" / 100'  
Measured Depth Log

**Well Name** Storis E24-75-1HC-VERT

**Location** SEC 24 T6N R65W

**State** COLORADO

**County** WELD

**Country** USA

**Rig Number** H&P 315

**API Number** 05-123-38144-00

**AFE #** 139616

**Region** DJ BASIN

**Field** WATTENBERG

**Spud Date** 4/27/2014

**Drilling Completed** 5/4/2014

**Surface Coordinates** NENE 24 T6N 65W  
330' FNL 1257' FEL

LAT/LON: 40.47782/-104.60638

**Bottom Hole Coordinates** LAT/LON: 40.48558/-104.40308

**Ground Elevation** 4,684'

**K.B. Elevation** 4,708'

**Logged Interval** 2,000' **To** 6,179'

**Total Depth** 4,179'

**Formation** Codell Sandstone

**Type of Drilling Fluid** LSND

## Operator

**Company** Noble Energy Inc

**Address** 1625 BROADWAY SUITE 2200  
DENVER, CO 80202

## Geologist

**Name** JACK WEINERTH, MARK KOURY

**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  
 BRACHIOIPOD  
 BRYOZOA  
 CEPHALOPOD  
 CORAL  
 CRINOID  
 ECHINOID  
 FISH  
 FORAMINIFERA

### F 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  
 M MOLDIC

### ORGANIC

### P 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

### MINDEPTH MN DEPTH

### ↘ NORMAL FAULT

### ● OIL SHOW

### ⤴ OVERTURNED STRATA

### ↗ REVERSE FAULT

### ◀ SIDEWALL CORE (LEFT)

### ▶ SIDEWALL CORE (RIGHT)

### ▨ SLIDE

### DS SURVEY

### TS TRIP GAS

### ◀ WIRELINE TESTED - LEFT

### ▷ WIRELINE TESTED - RT

### Rounding

A ANGULAR  
 R ROUNDED  
 S SUBANG  
 F SUBRND

### Textures

BS BOUNDSTONE  
 C CHALKY  
 CX CRYPTOXLN  
 E EARTHY  
 FX FINELYXLN

### GS GRAINSTONE

### L LITHOGRAPHIC

### MX MICROXLN

### MS MUDSTONE

### PS PACKSTONE

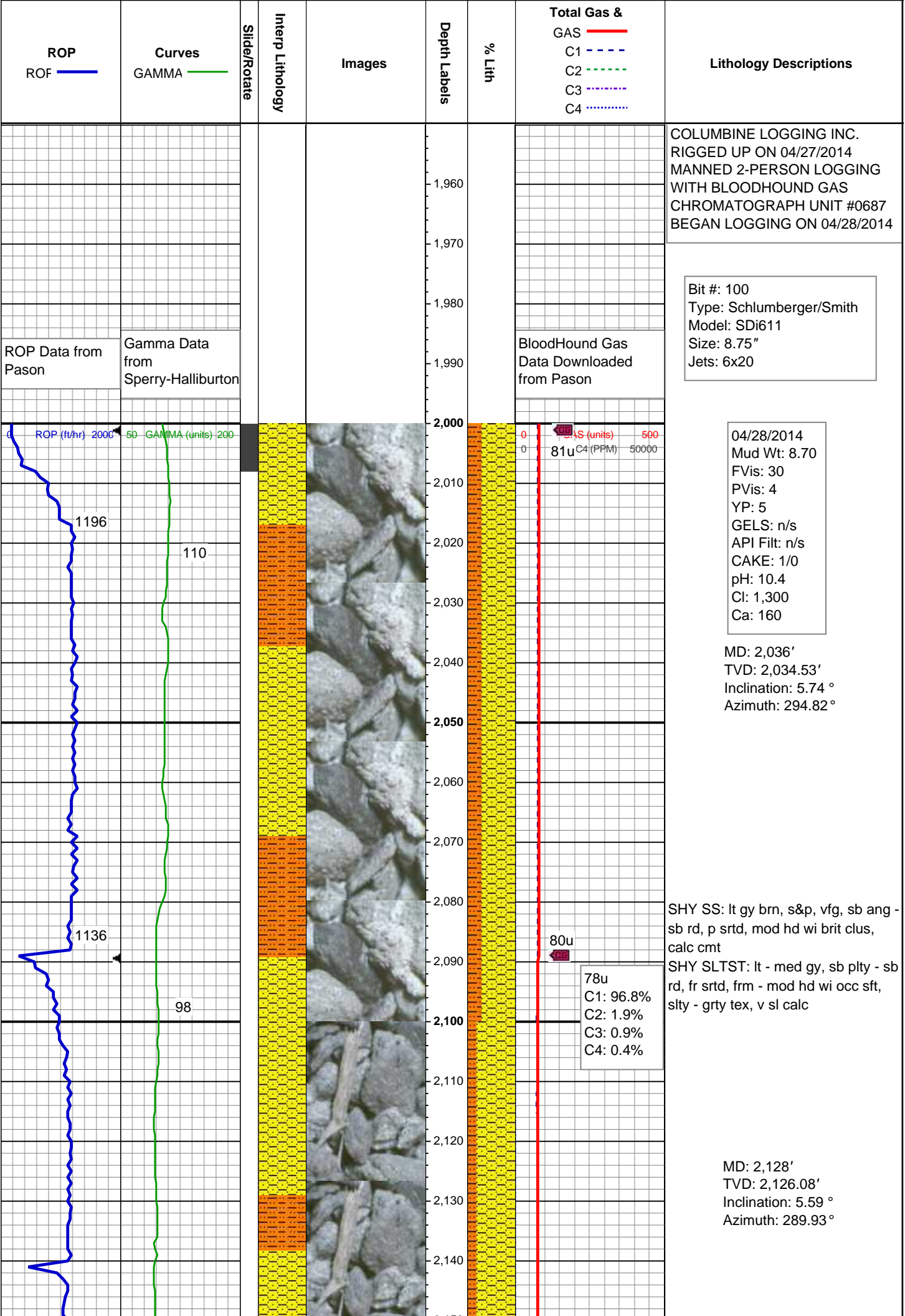
### WS WACKESTONE

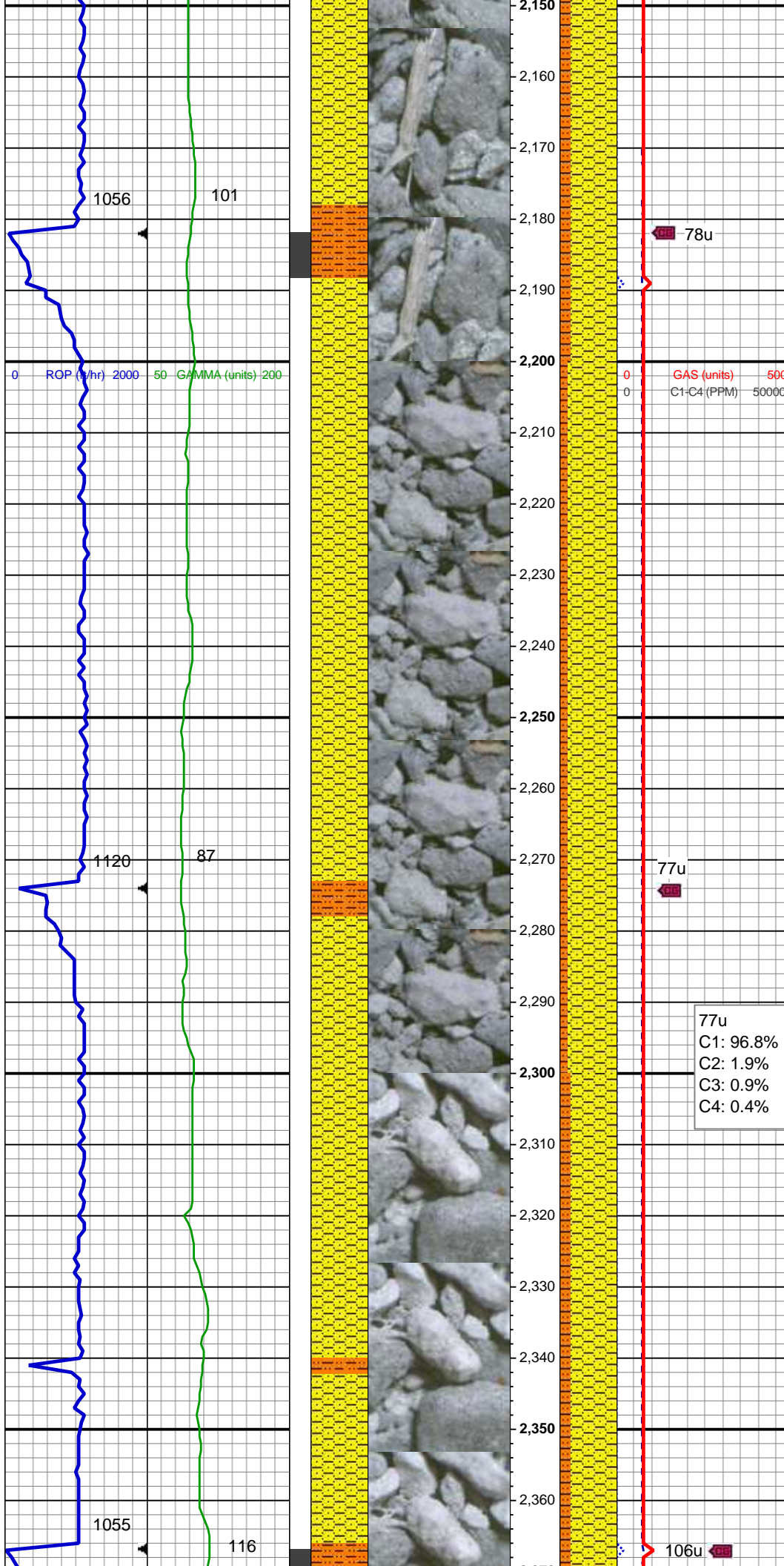
### Sorting

### M MODERATE

### P POOR

### W WELL





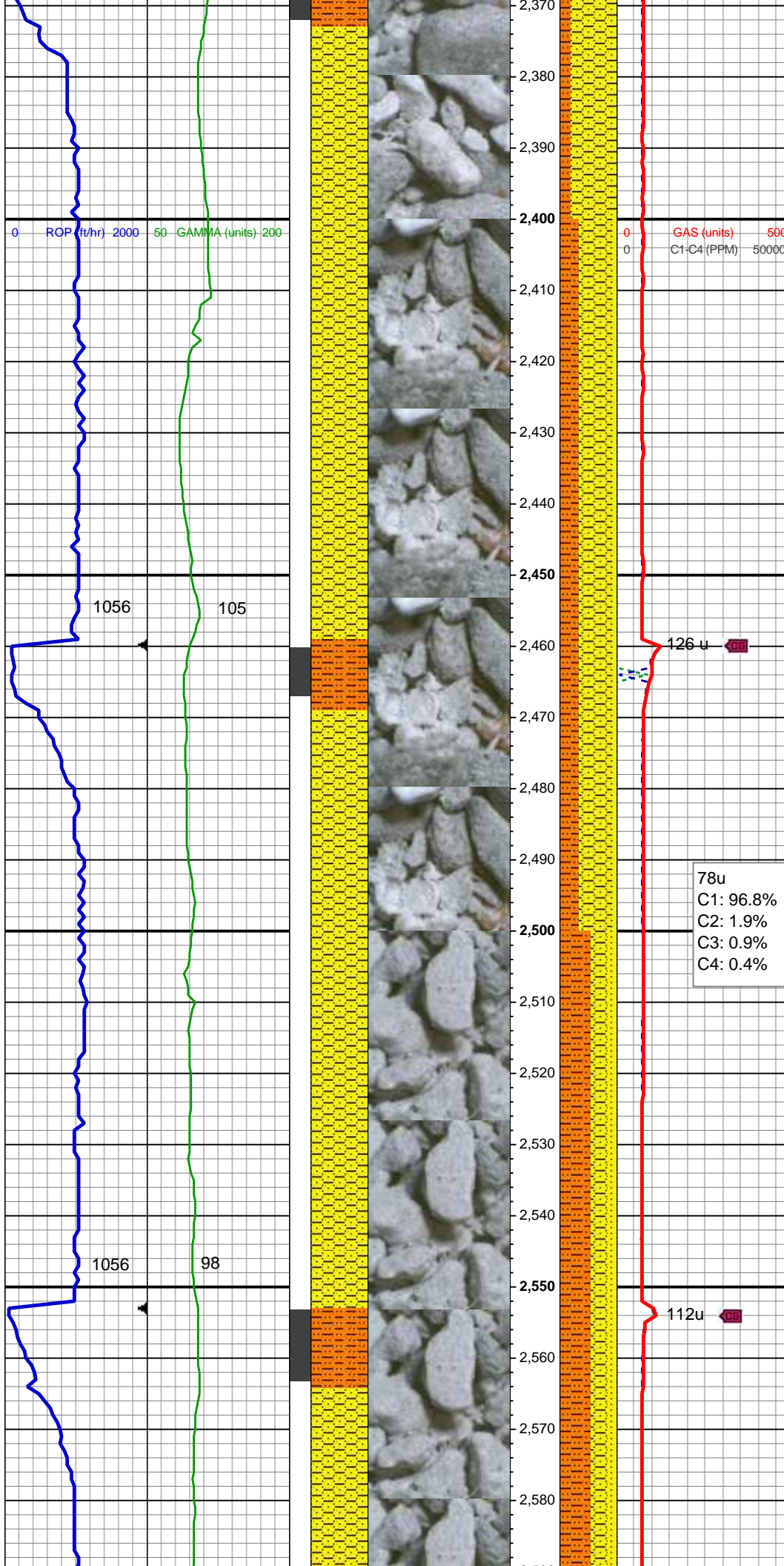
SHY SS: lt gy brn, s&p, vfg, sb ang - sb rd, p srted, mod hd wi brit clus, calc cmt  
SHY SLTST: lt - med gy, sb plty - sb rd, fr srted, frm - mod hd wi occ sft, slty - grty tex, v sl calc

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

77u  
C1: 96.8%  
C2: 1.9%  
C3: 0.9%  
C4: 0.4%

MD: 2,313'  
TVD: 2,310.27'  
Inclination: 5.16 °  
Azimuth: 292.9°





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

MD: 2,407'  
TVD: 2,403.91'  
Inclination: 4.86 °  
Azimuth: 300.22 °

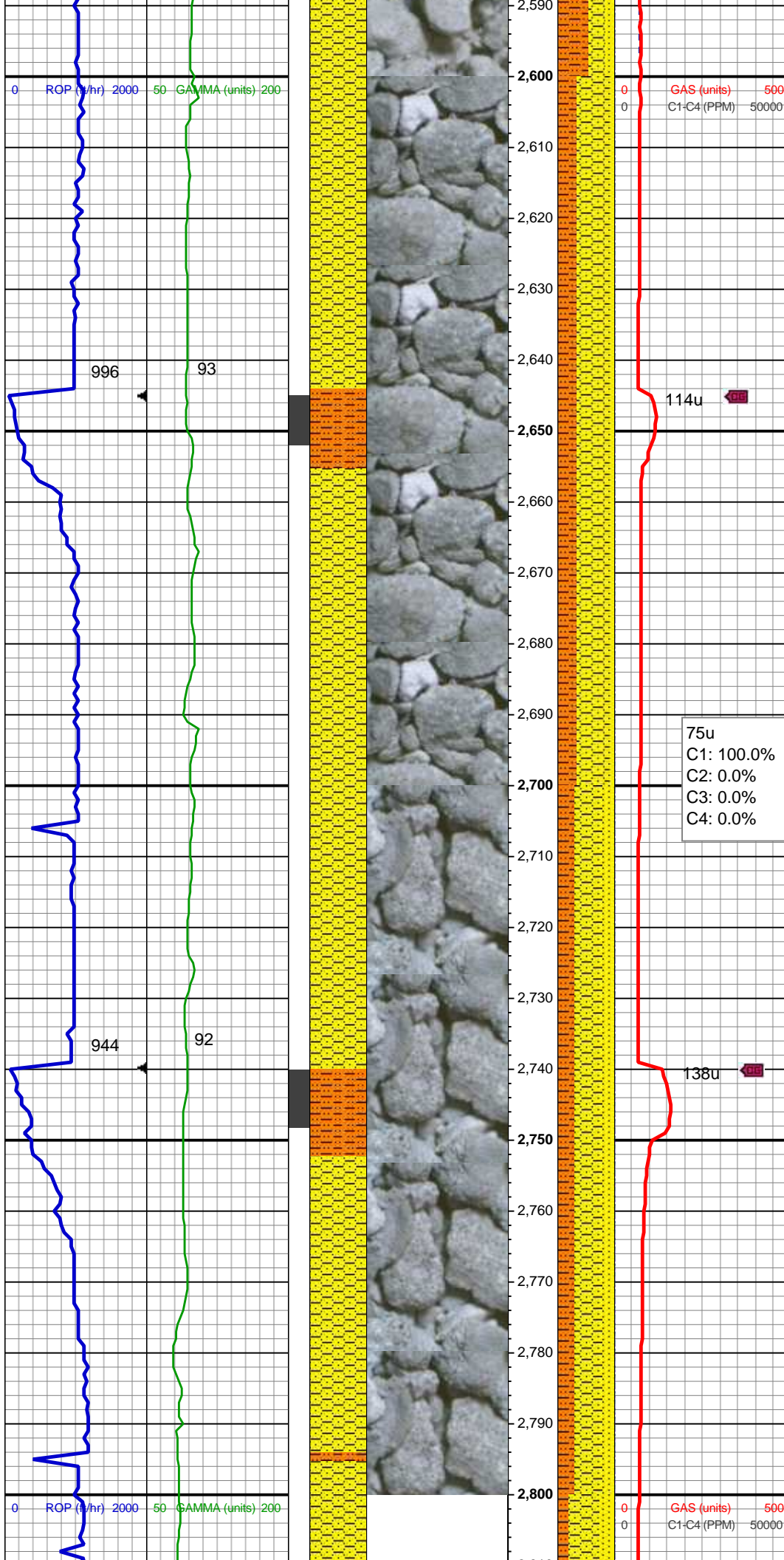
SHY SS: lt gy brn, s&p, vfg, sb ang -  
sb rd, p srted, mod hd wi brit clus,  
calc cmt  
SHY SLTST: lt - med gy, sb plty - sb  
rd, fr srted, frm - mod hd wi occ sft,  
slty - grty tex, v sl calc

78u
C1: 96.8%
C2: 1.9%
C3: 0.9%
C4: 0.4%

MD: 2,500'  
TVD: 2,496.56'  
Inclination: 5.14 °  
Azimuth: 288.53 °

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, grdg to slty  
SS:

MD: 2,591'  
TVD: 2,587.06'



Inclination: 6.8 °  
Azimuth: 282.79 °

MUD WT: 8.6, 8.6  
VIS: 30, 28 IN/OUT

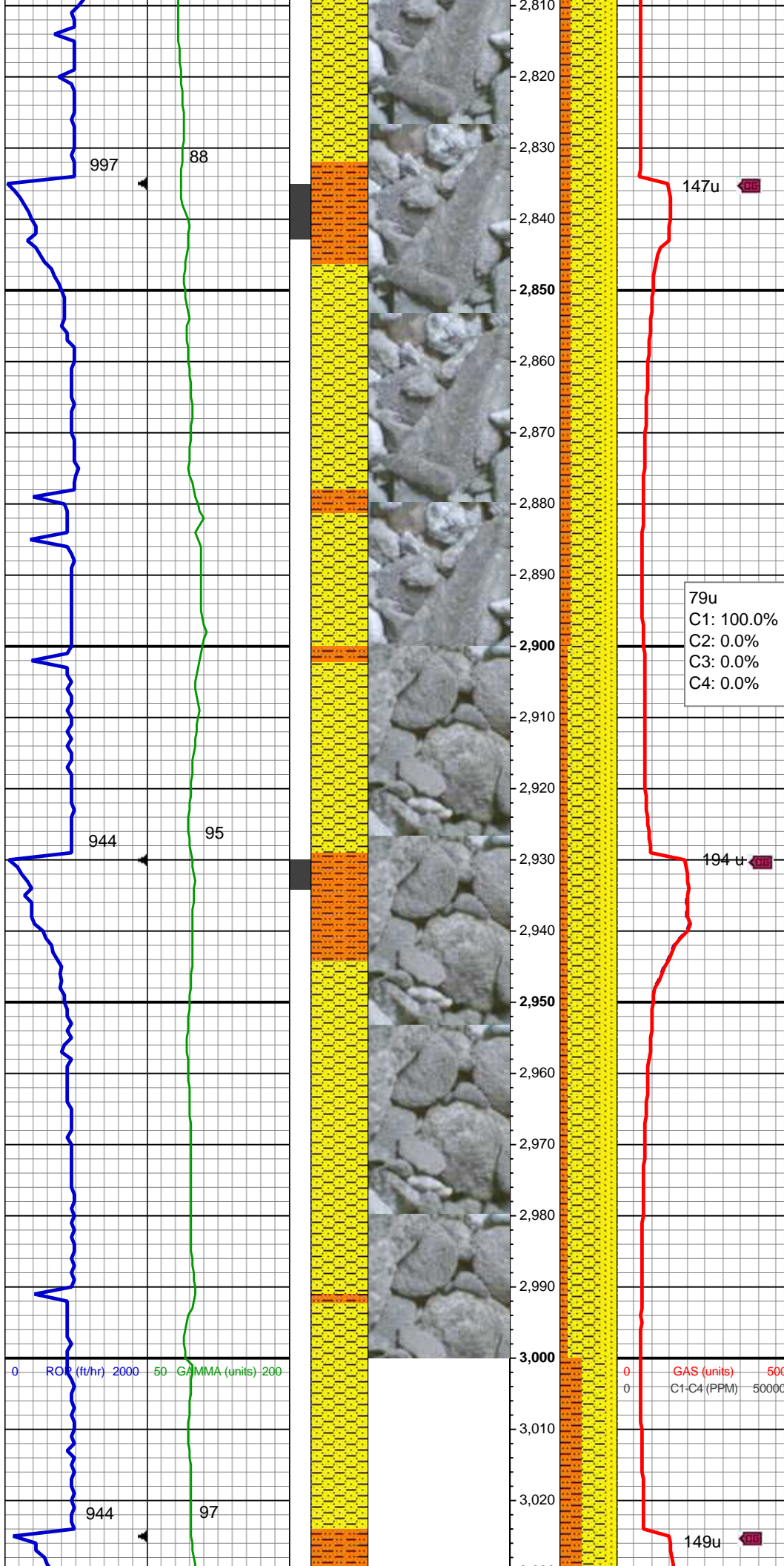
SHY SS: lt gy brn, s&p, vfg, sb ang -  
sb rd, p srtd, mod hd wi brit clus,  
calc cmt  
SHY SLTST: lt - med gy, sb plty - sb  
rd, fr srtd, frm - mod hd wi occ sft,  
slty - grty tex, v sl calc, grdg to slty  
SS:

MD: 2,686'  
TVD: 2,681.33'  
Inclination: 7.43 °  
Azimuth: 281.84 °

MD: 2,781'  
TVD: 2,775.44'  
Inclination: 8.27 °  
Azimuth: 287.48 °

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





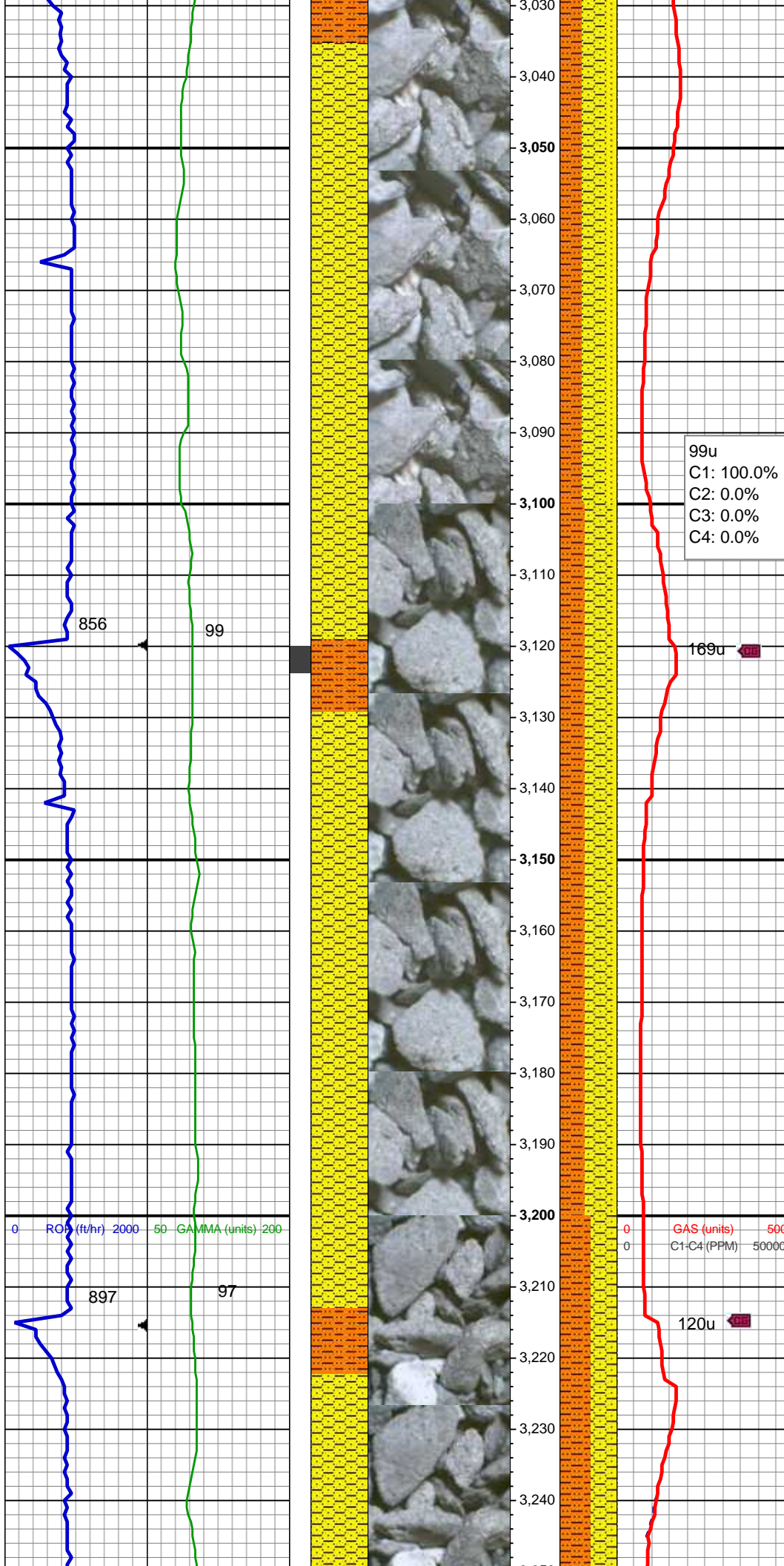
MD: 2,876'  
TVD: 2,869.35'  
Inclination: 9.11 °  
Azimuth: 291.85 °

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

MUD WT: 8.7, 8.6  
VIS: 30, 28 IN/OUT

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

MD: 2,971'  
TVD: 2,963.14'  
Inclination: 9.19 °  
Azimuth: 291.27 °



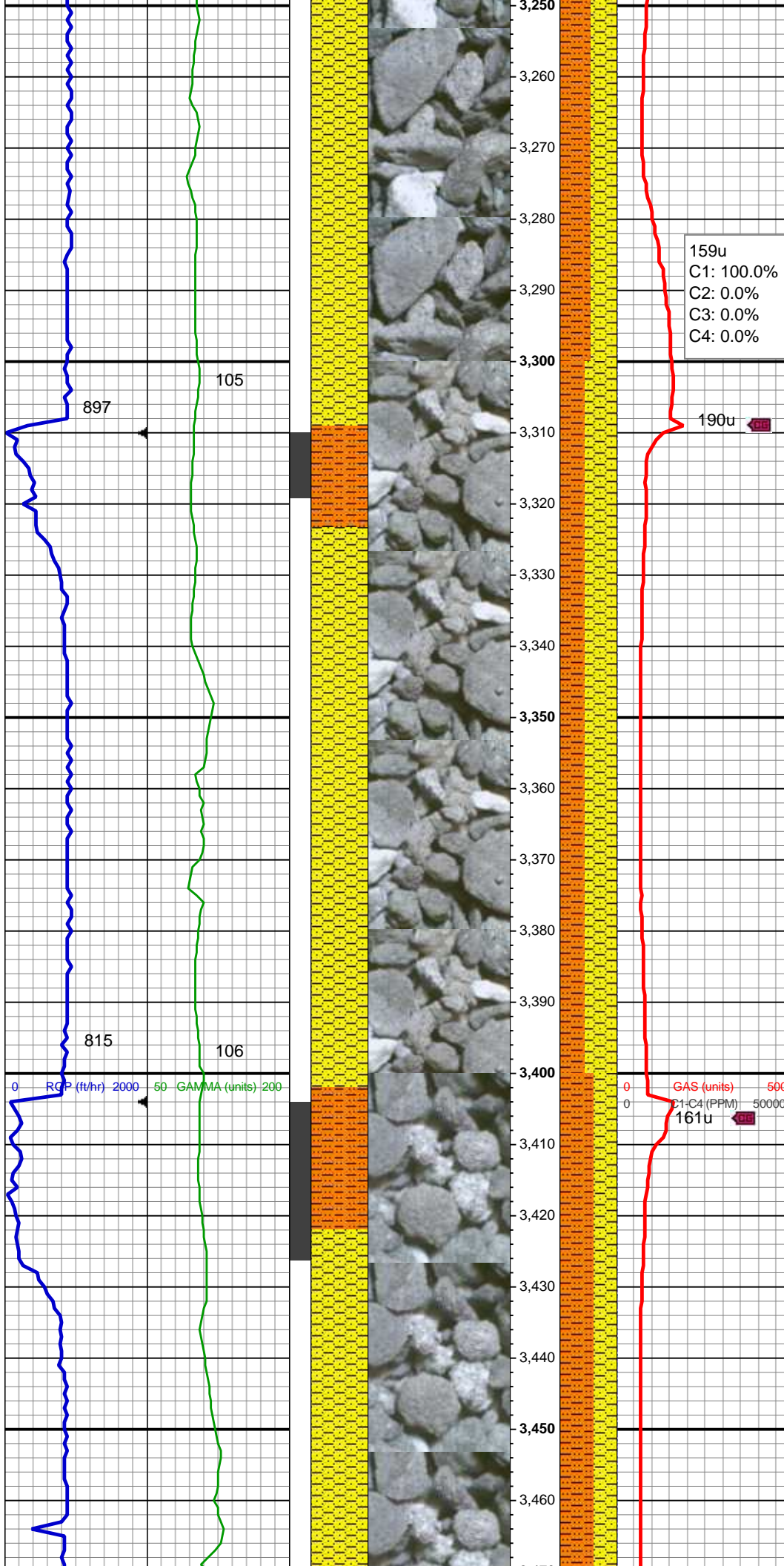
MD: 3,066'  
TVD: 3,056.91'  
Inclination: 9.28 °  
Azimuth: 290.81 °

SS: wh - ltgy, fros - trnsl, speckl wi mica, f gr, ang - sb ang, p srted, hd brit clus, v calc cmt, grdg to slty SS:  
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: 3,161'  
TVD: 3,150.75'  
Inclination: 8.62 °  
Azimuth: 289.95 °

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: 3,256'  
TVD: 3,244.83'  
Inclination: 7.39 °  
Azimuth: 284.31 °

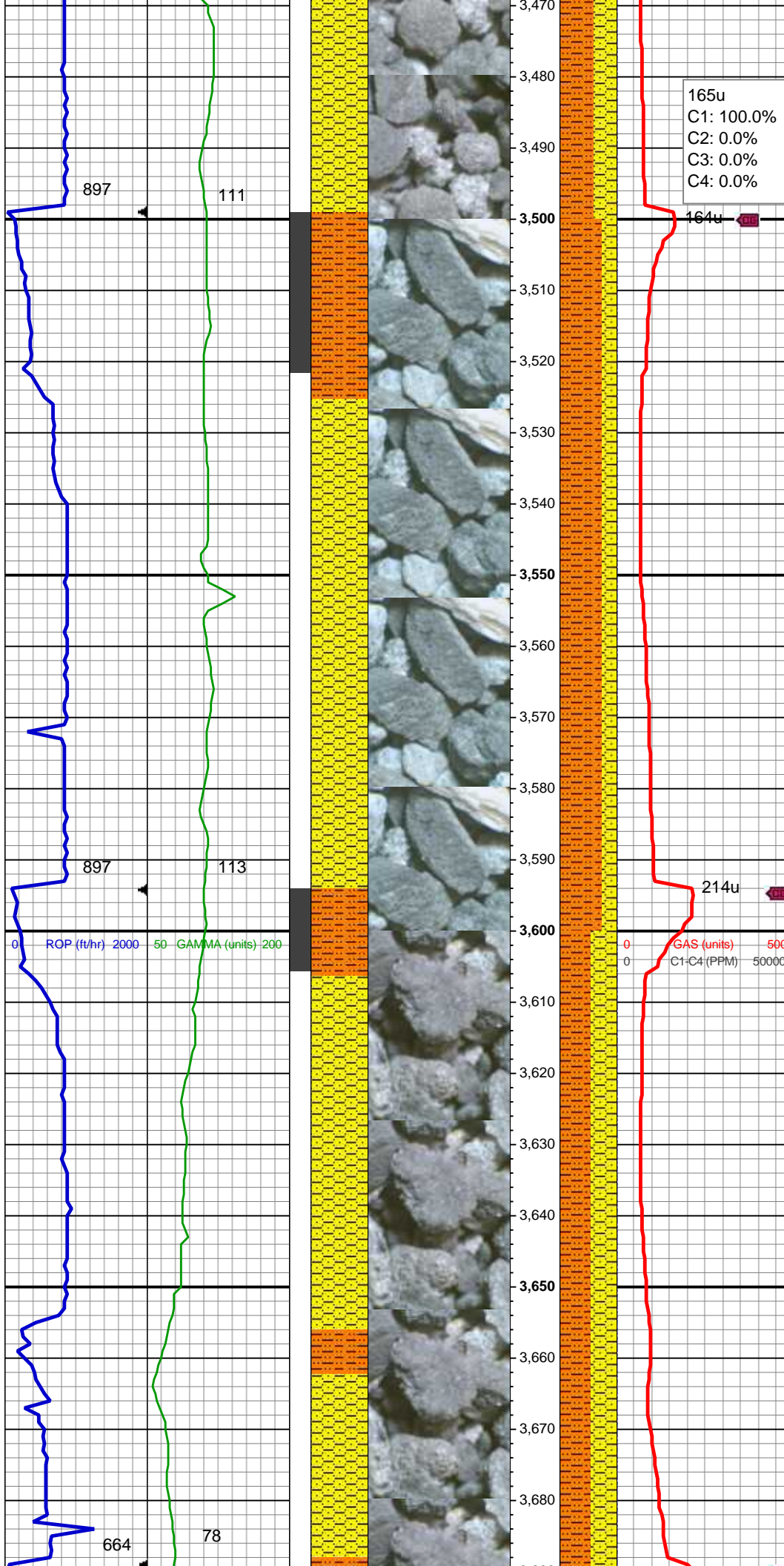
SHY SLTST: lt - med gy, sb plty - sb  
rd, fr srted, frm - mod hd wi occ sft,  
slty - grty tex, v sl calc  
SHY SS: lt gy brn, s&p, vfg, sb ang -  
sb rd, p srted, mod hd wi brit clus,  
calc cmt

MD: 3,351'  
TVD: 3,339.02'  
Inclination: 7.55 °  
Azimuth: 279.59 °

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

MUD WT: 8.7, 8.6  
VIS: 30, 28 IN/OUT

MD: 3,446'  
TVD: 3,433.12'  
Inclination: 8.29 °  
Azimuth: 270.96 °



SHY SLTST: lt - med gy, sb plty - sb  
rd, fr srted, frm - mod hd wi occ sft,  
sly - 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: 3,541'  
TVD: 3,527.03'  
Inclination: 9.17 °  
Azimuth: 286.81 °

Parkman Top @  
3,577' MD; 3,562' TVD

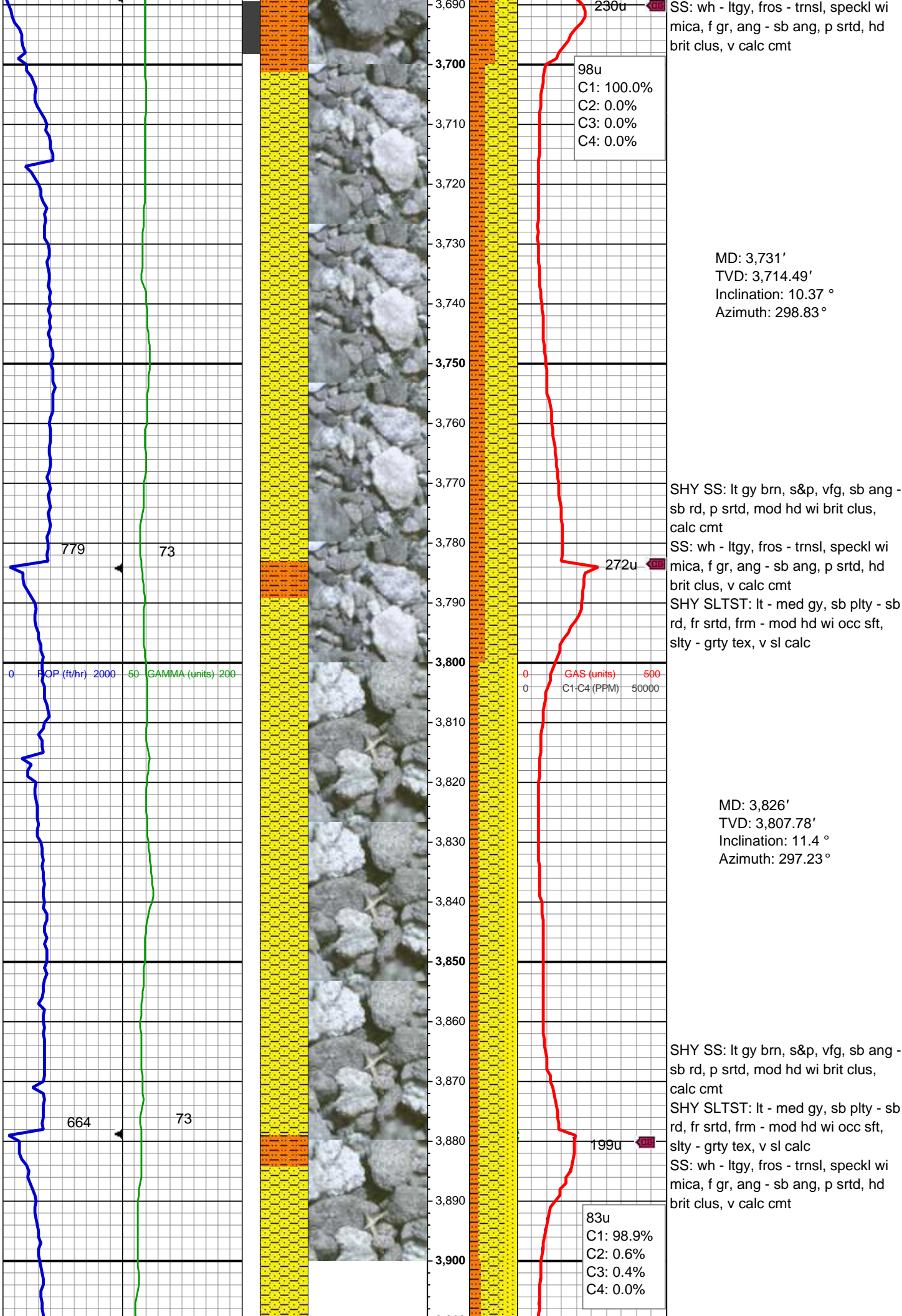
SHY SLTST: lt - med gy, sb plty - sb  
rd, fr srted, frm - mod hd wi occ sft,  
sly - grty tex, v sl calc  
SHY SS: lt gy brn, s&p, vfg, sb ang -  
sb rd, p srted, mod hd wi brit clus,  
calc cmt, grdg to sdy SH:

MD: 3,636'  
TVD: 3,620.84'  
Inclination: 9 °  
Azimuth: 294.75 °

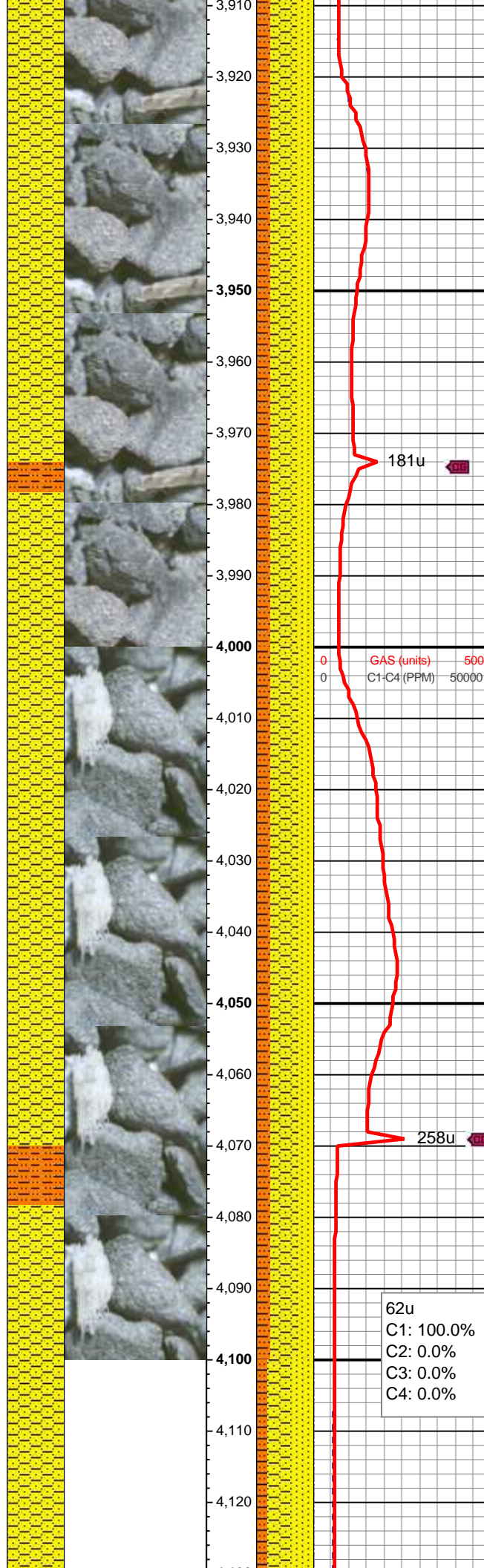
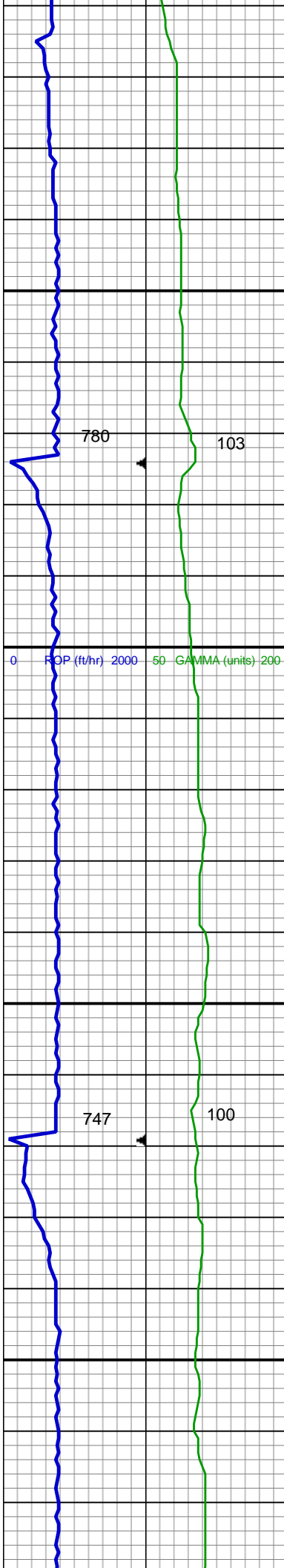
MUD WT: 8.7, 8.7  
VIS: 32, 29 IN/OUT

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

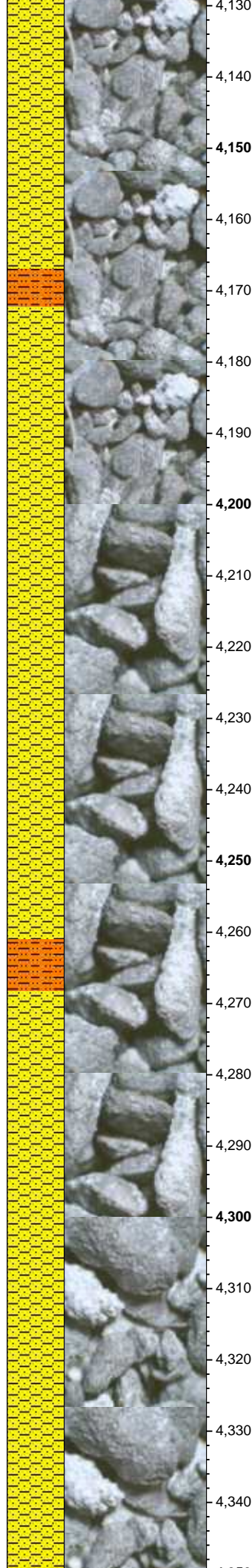
MUD WT: 8.7, 8.7  
VIS: 32, 29 IN/OUT

MD: 4,016'  
TVD: 3,993.74'  
Inclination: 12.26 °  
Azimuth: 296.16 °

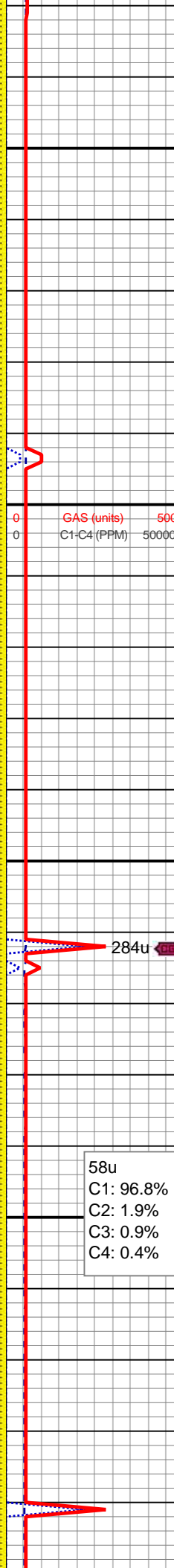
SHY SS: lt gy brn, s&p, vfg, sb ang - sb rd, p srted, mod hd wi brit clus, calc cmt  
SHY SLTST: lt - med gy, sb plty - sb rd, fr srted, frm - mod hd wi occ sft, slty - grty tex, v sl calc  
SS: wh - ltgy, fros - trns, speckl wi mica, f gr, ang - sb ang, p srted, hd brit clus, v calc cmt

Sussex Top @  
4,098' MD; 4,074' TVD

MD: 4,111'  
TVD: 4,086.76'  
Inclination: 11.18 °  
Azimuth: 292.52 °



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  
4,320  
4,330  
4,340



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: 4,206'  
TVD: 4,180.05'  
Inclination: 10.59 °  
Azimuth: 289 °

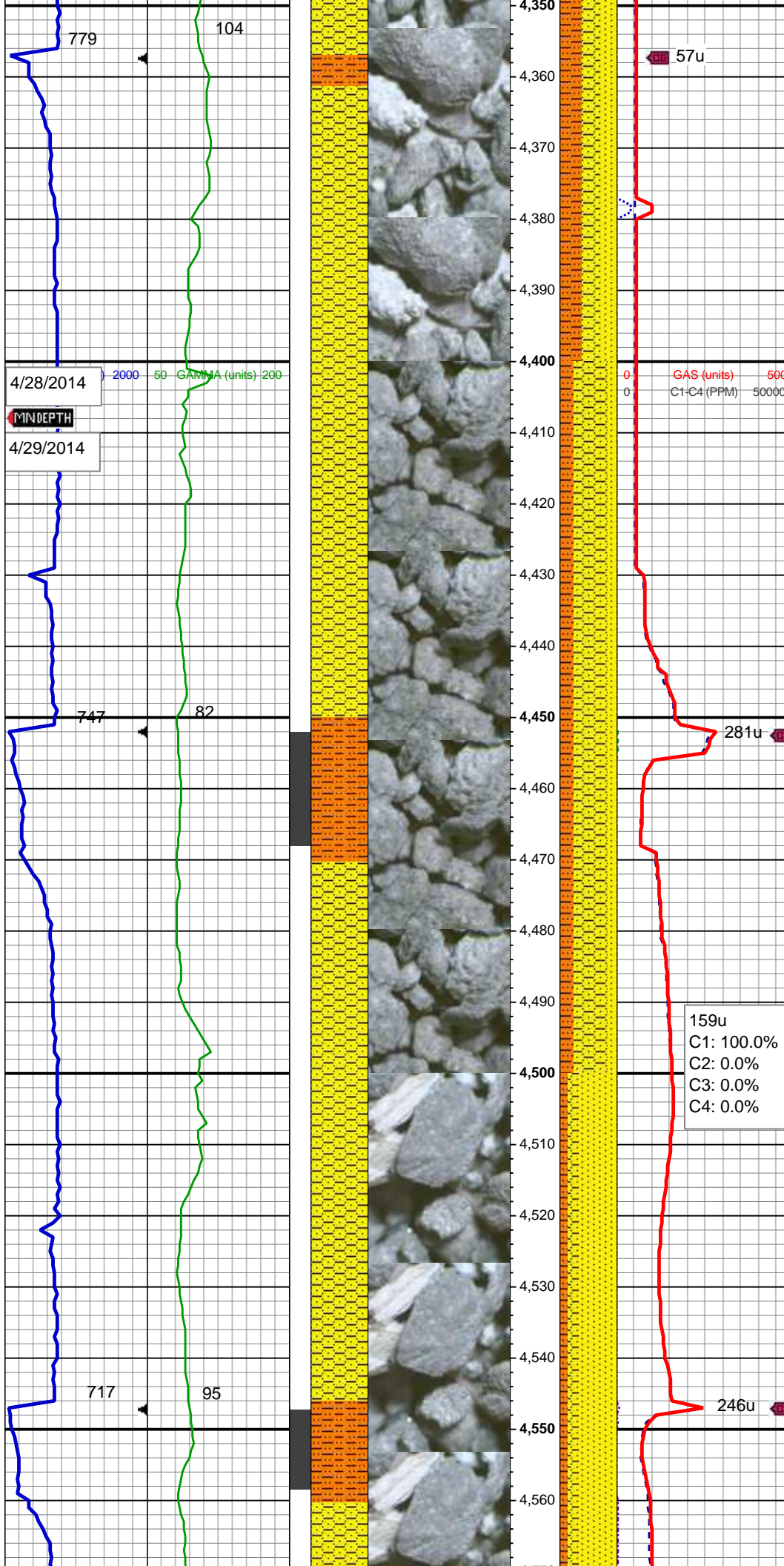
SS: wh - ltgy, fros - trns, speckl wi  
mica, f gr, ang - sb ang, p srted, hd  
brit clus, v calc cmt  
SHY SS: lt gy brn, s&p, vfg, sb ang -  
sb rd, p srted, mod hd wi brit clus,  
calc cmt  
SHY SLTST: lt - med gy, sb plty - sb  
rd, fr srted, frm - mod hd wi occ sft,  
slty - grty tex, v sl calc

58u  
C1: 96.8%  
C2: 1.9%  
C3: 0.9%  
C4: 0.4%

MD: 4,301'  
TVD: 4,273.6'  
Inclination: 9.46 °  
Azimuth: 283.91 °

MUD WT: 8.8, 8.7





SS: wh - ltgy, fros - trnsI, 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

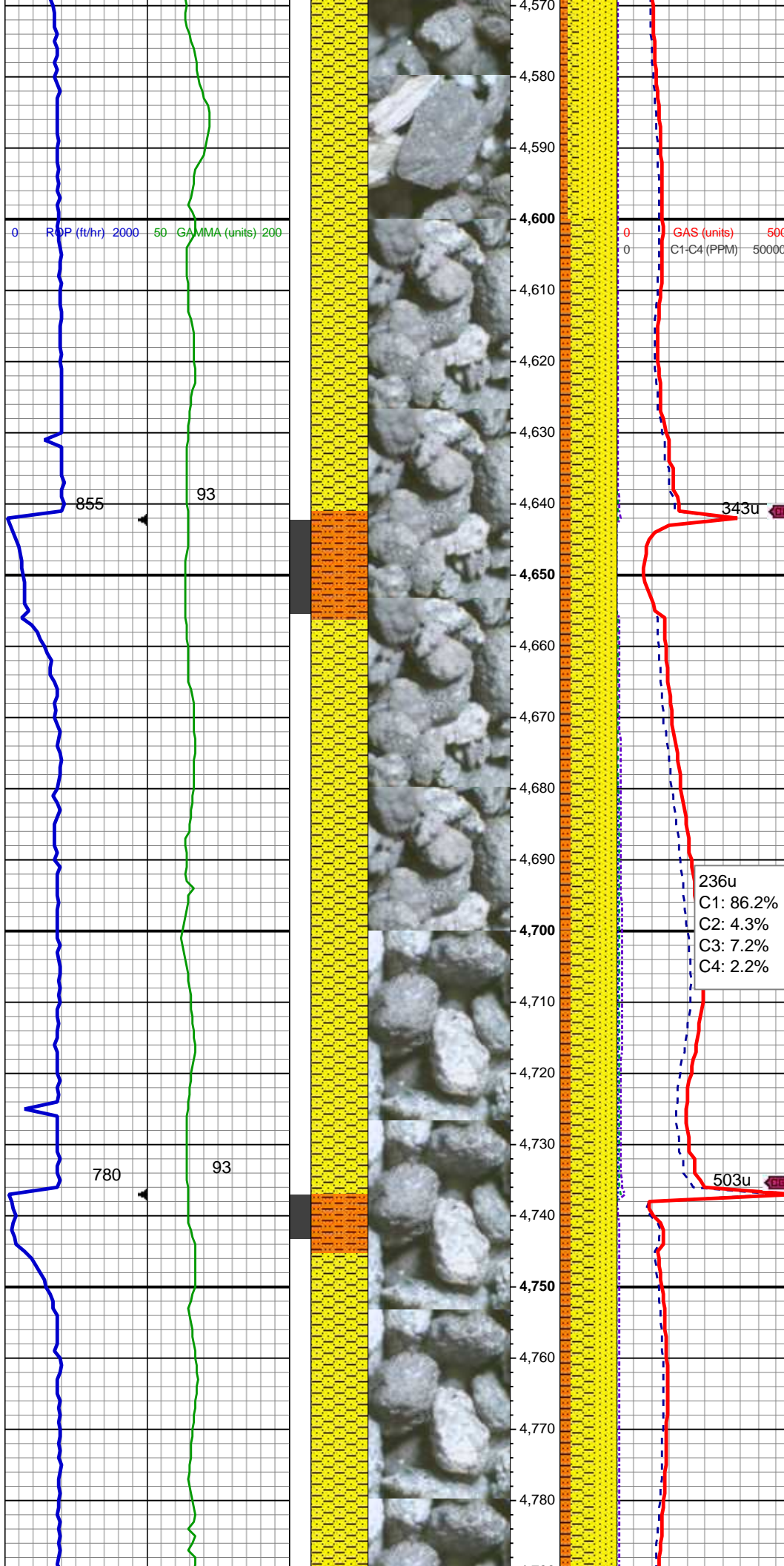
MD: 4,396'  
TVD: 4,367.44'  
Inclination: 8.44 °  
Azimuth: 278.34 °

SS: wh - ltgy, fros - trnsI, 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: 4,491'  
TVD: 4,461.4'  
Inclination: 8.59 °  
Azimuth: 282.9 °

MD: 4,585'  
TVD: 4,554.37'  
Inclination: 8.36 °  
Azimuth: 288.6 °





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

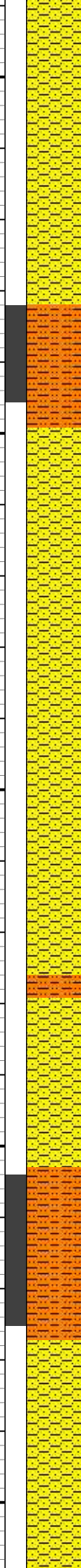
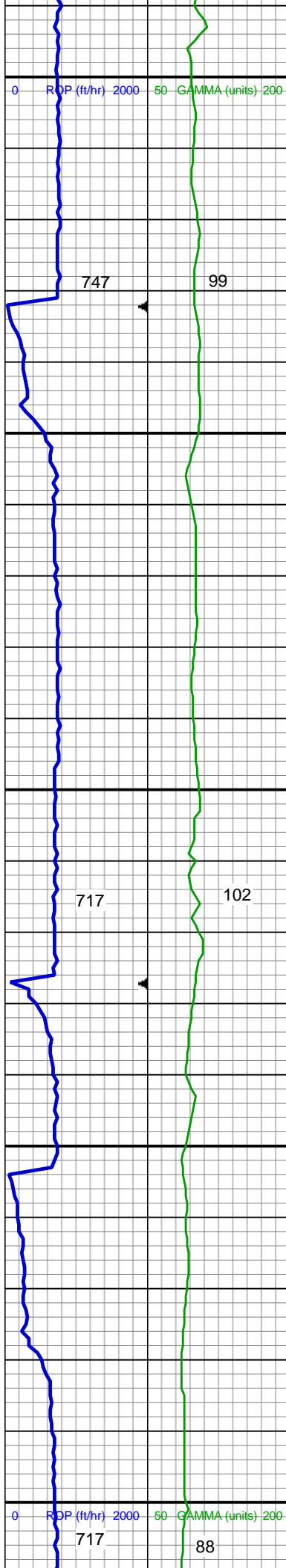
MD: 4,680'  
TVD: 4,648.33'  
Inclination: 8.68 °  
Azimuth: 299.54 °

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

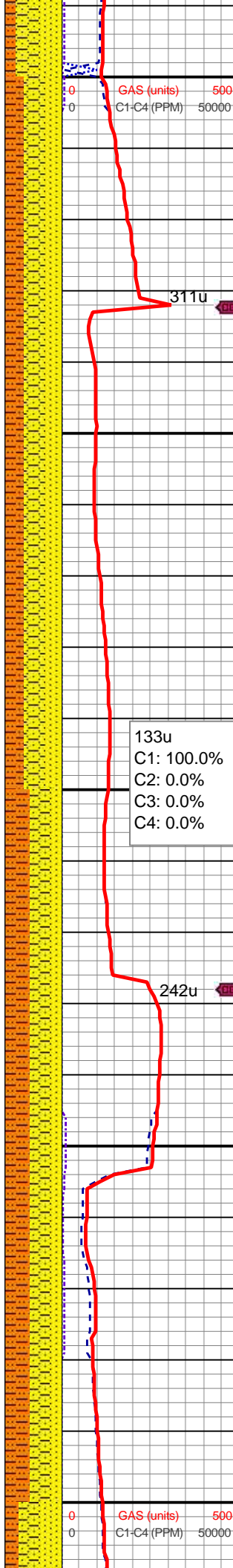
MUD WT: 8.8, 8.7  
VIS: 32, 29 IN/OUT

MD: 4,775'  
TVD: 4,742.29'  
Inclination: 8.32 °  
Azimuth: 301.31 °

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



4,790  
4,800  
4,810  
4,820  
4,830  
4,840  
4,850  
4,860  
4,870  
4,880  
4,890  
4,900  
4,910  
4,920  
4,930  
4,940  
4,950  
4,960  
4,970  
4,980  
4,990  
5,000



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 @  
4,856' MD; 4,822' TVD

MD: 4,870'  
TVD: 4,836.24'  
Inclination: 8.68 °  
Azimuth: 298.47 °

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 - trnsl, speckl wi  
mica, f gr, ang - sb ang, p srted, hd  
brit clus, v calc cmt

MD: 4,965'  
TVD: 4,930.07'  
Inclination: 9.34 °  
Azimuth: 297.87 °

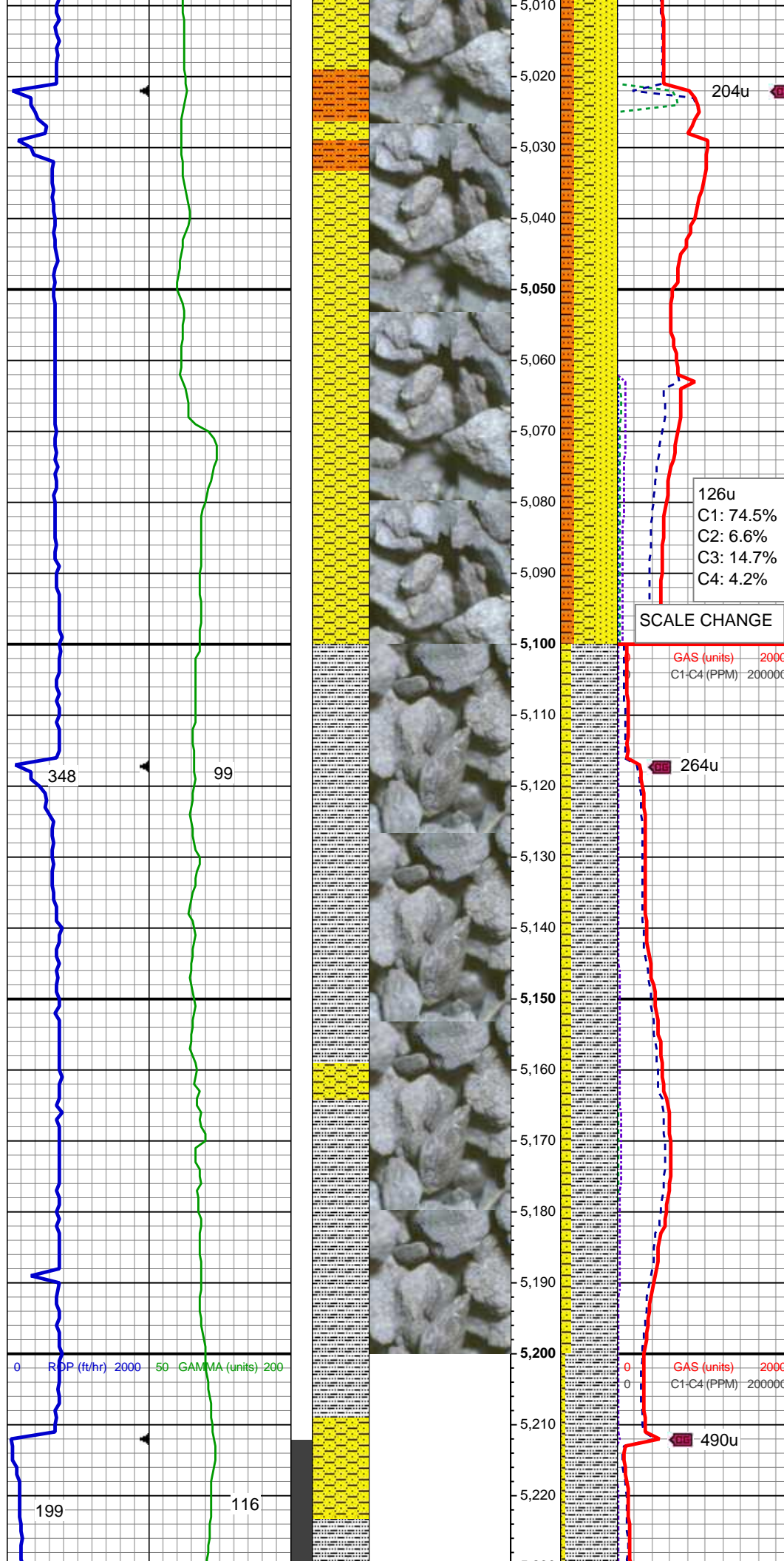
SHY SLTST: lt - med gy, sb plty - sb  
rd, fr srted, frm - mod hd wi occ sft,  
slty - grty tex, v sl calc

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 - trnsl, speckl wi  
mica, f gr, ang - sb ang, p srted, hd  
brit clus, v calc cmt, grdg to sdy SH:

MUD WT: 9.00/8.80  
VIS: 31/28 IN/OUT





MD: 5,060'  
TVD: 5,023.73'  
Inclination: 9.95 °  
Azimuth: 298.41 °

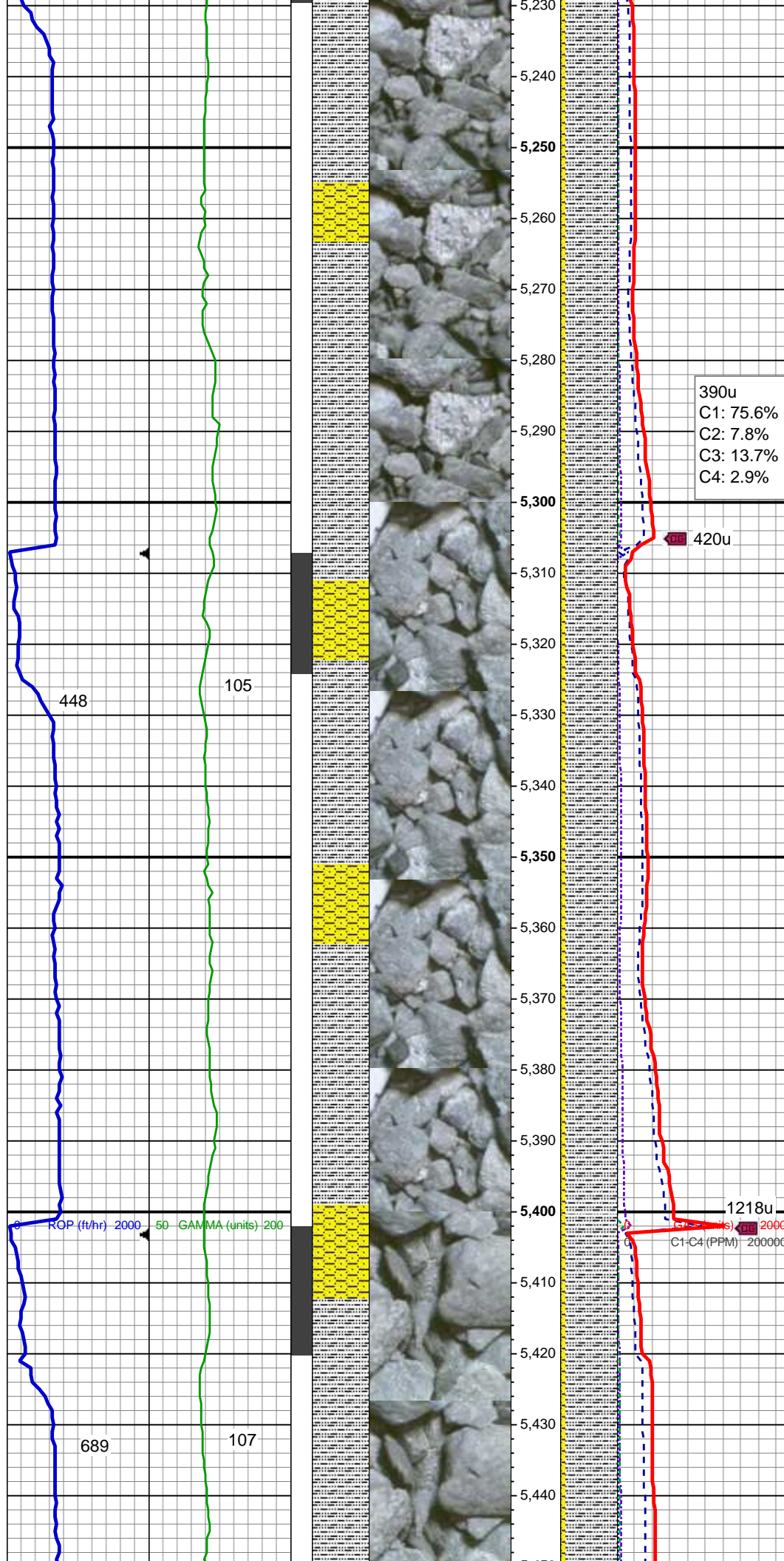
SHY SS: lt gy brn, s&p, vfg, sb ang - sb rd, p srted, mod hd wi brit clus, calc cmt  
SS: wh - ltgy, fros - trns, speckl wi mica, f gr, ang - sb ang, p srted, hd brit clus, v calc cmt, grdg to sdy SH: SHY SLTST: lt - med gy, sb plty - sb rd, fr srted, frm - mod hd wi occ sft, slty - grty tex, v sl calc

MD: 5,155'  
TVD: 5,117.54'  
Inclination: 8.13 °  
Azimuth: 298.43 °

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, fros - trns, s&p, vfg, sb ang - sb rd, p srted, mod hd wi brit clus, calc cmt

04/28/2014  
Mud Wt: 9.05  
FVis: 32  
PVis: 6  
YP: 6  
GELS: 2/4/7  
API Filt: 16.0  
CAKE: 1/0  
pH: 8.5





ph: 6.5  
Cl: 1,300  
Ca: 120

MD: 5,250'  
TVD: 5,211.52'  
Inclination: 8.7 °  
Azimuth: 295.5 °

390u  
C1: 75.6%  
C2: 7.8%  
C3: 13.7%  
C4: 2.9%

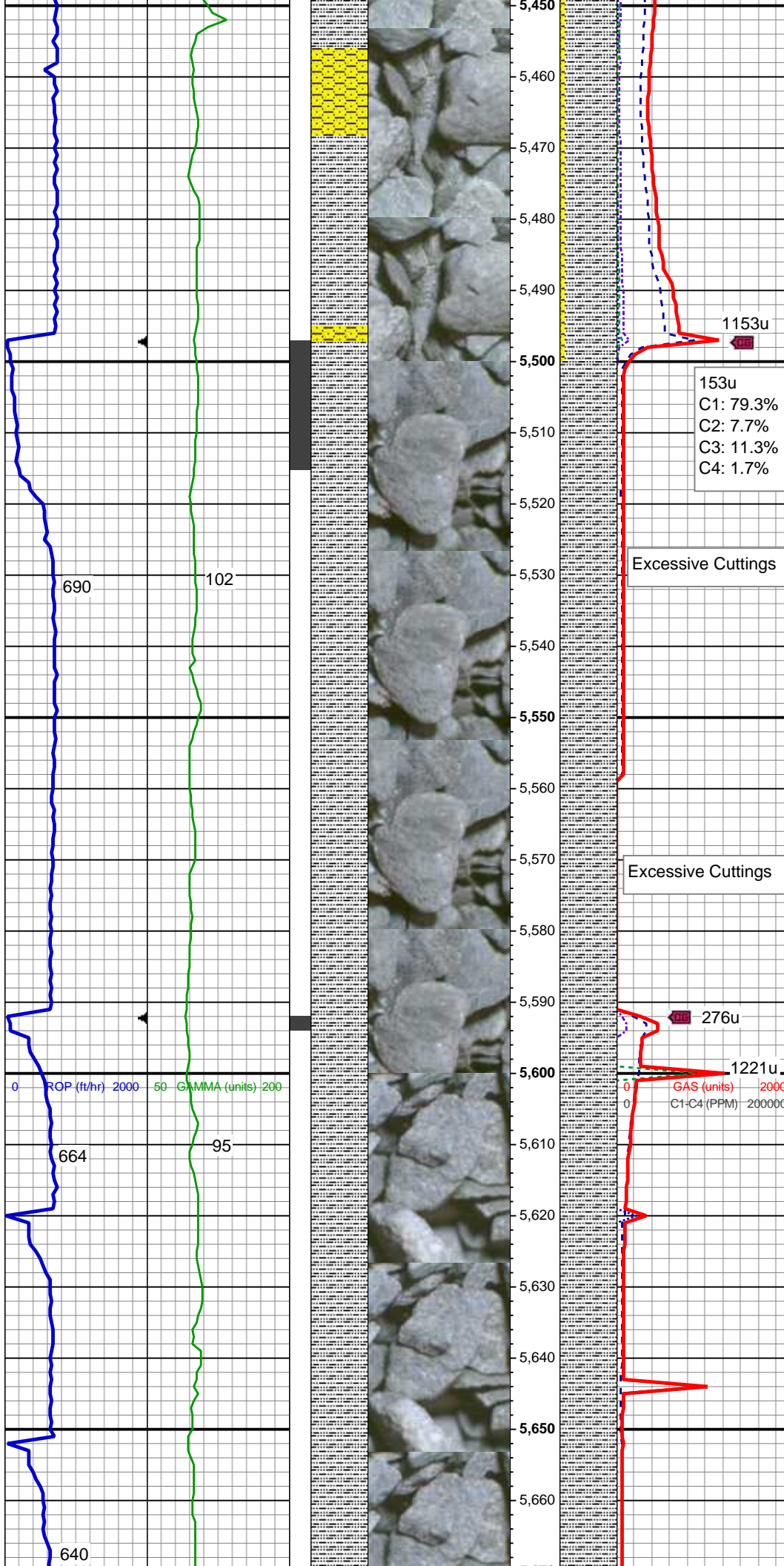
SLTY SH: lt - med gy brn, occ dk gy, frm - hd, plty - sb plty, occ sb blk, slty - grty tex, v sl calc  
SHY SS: lt gy, fros - trnsl, s&p, vfg, sb ang - sb rd, p srted, mod hd wi brit clus, calc cmt

MUD WT: 9.10/9.20  
VIS: 34/34 IN/OUT

MD: 5,345'  
TVD: 5,305.44'  
Inclination: 8.62 °  
Azimuth: 288.82 °

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

MD: 5,440'  
TVD: 5,399.37'  
Inclination: 8.63 °  
Azimuth: 279.68 °



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, fros - trnsl, s&p, vfg,  
sb ang - sb rd, p srted, mod hd wi  
brit clus, calc cmt

153u  
C1: 79.3%  
C2: 7.7%  
C3: 11.3%  
C4: 1.7%

Excessive Cuttings

MD: 5,534'  
TVD: 5,492.07'  
Inclination: 10.41 °  
Azimuth: 286.54 °

Excessive Cuttings

MUD WT: 9.20/9.20  
VIS: 34/32 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

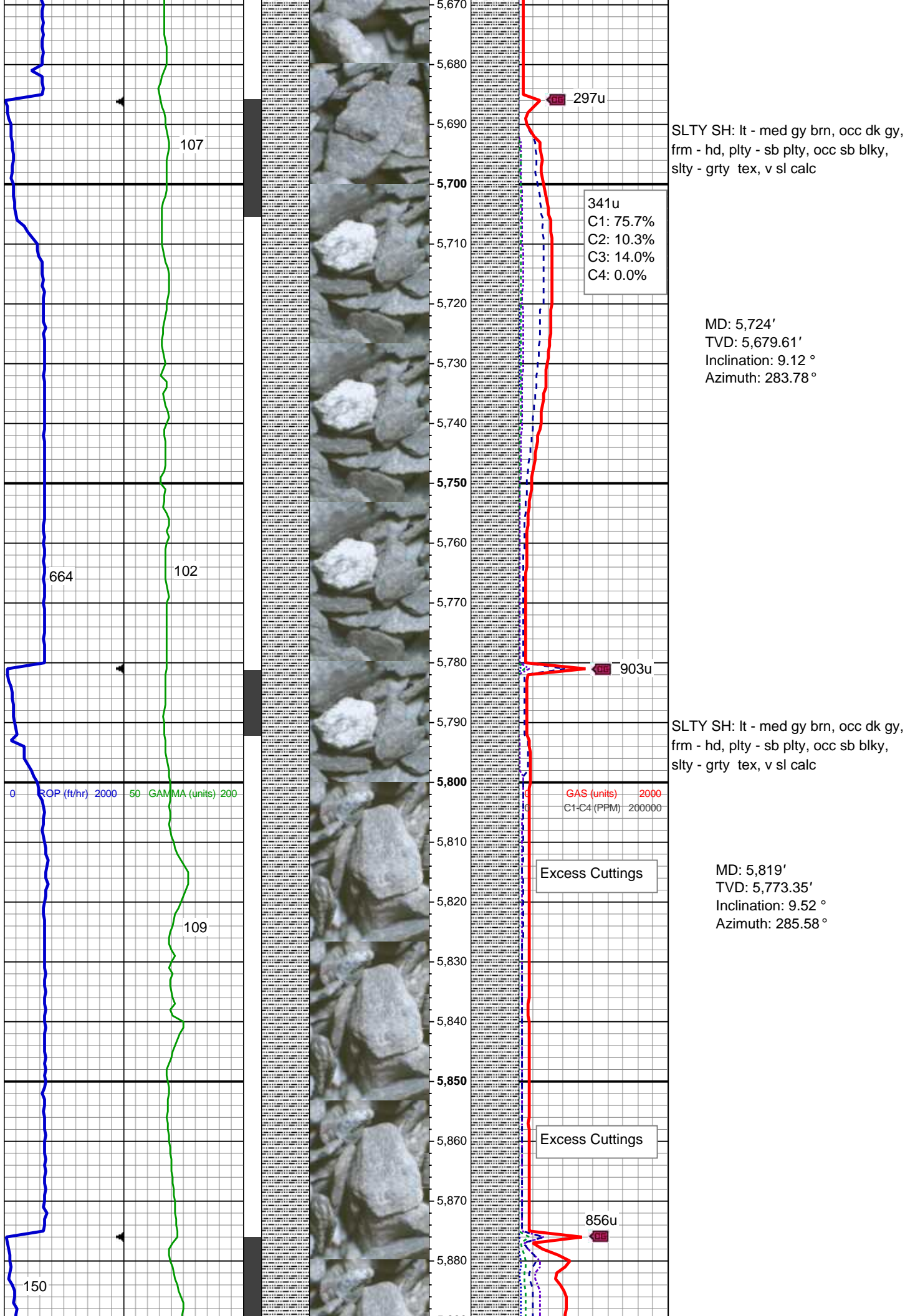
276u

1221u

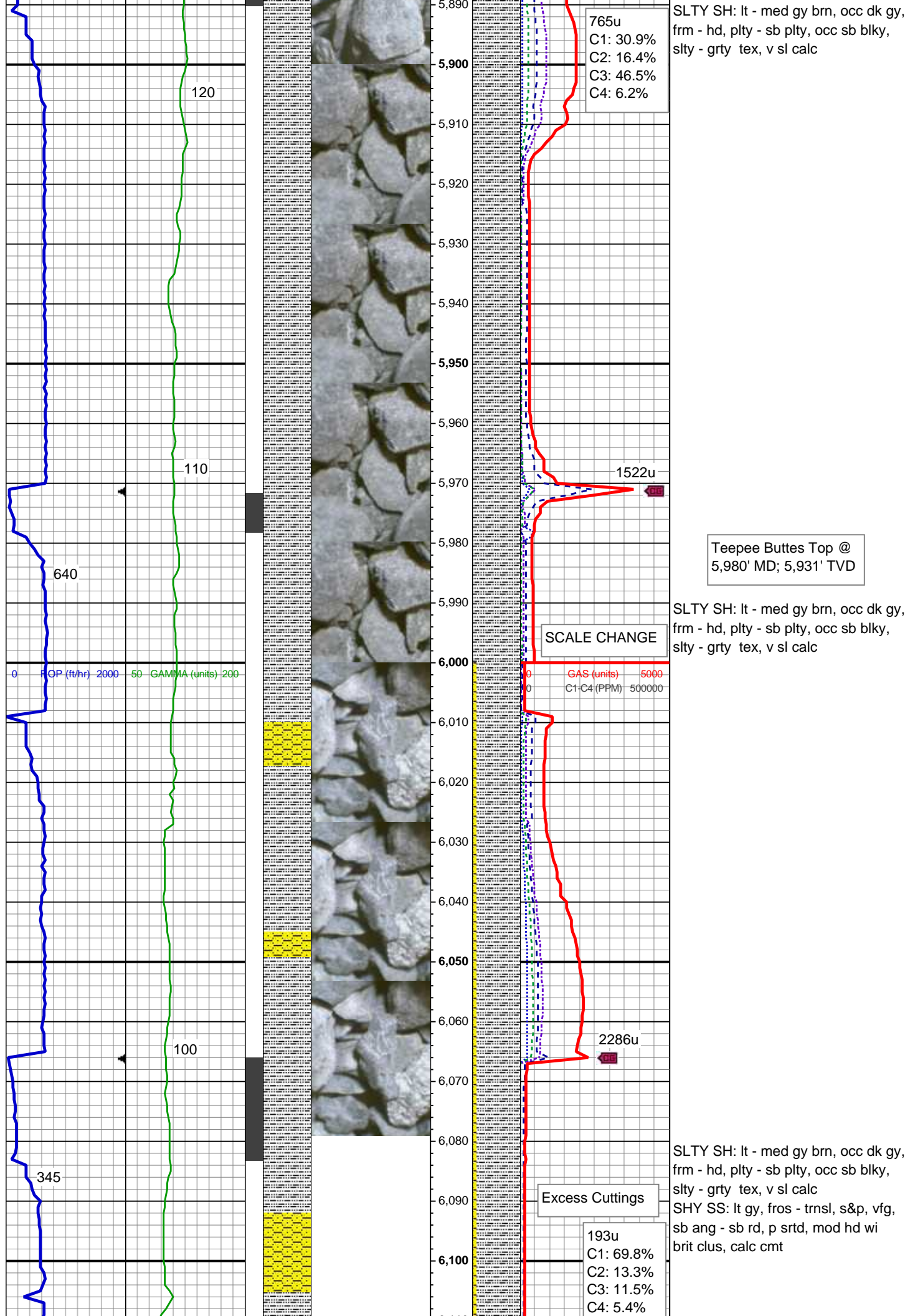
GAS (units) 2000  
C1-C4 (PPM) 200000

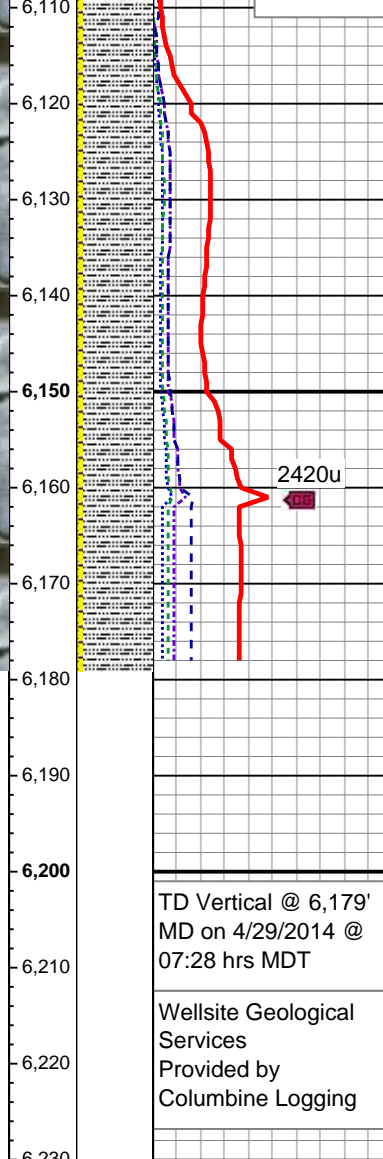
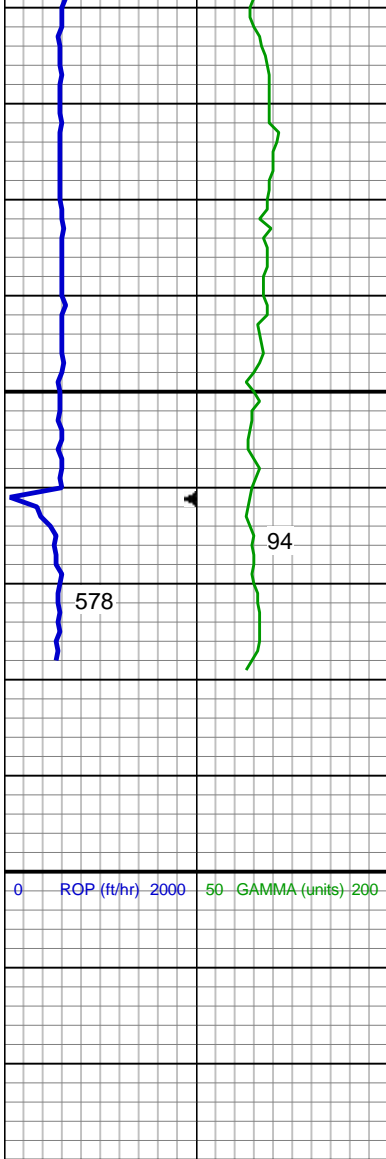
MD: 5,629'  
TVD: 5,585.75'  
Inclination: 8.69 °  
Azimuth: 283.28 °











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, fros - trnsl, s&p, vfg,  
sb ang - sb rd, p srted, mod hd wi  
brit clus, calc cmt

See Corresponding Horizontal Log  
Storis E24-75-1HC HORZ