

# COLUMBINE LOGGING

Scale: 5" / 100'  
Measured Depth Log

**Well Name** Moses State LD11-78HN

**Location** SWSW SEC 2 T9N R58W

**State** COLORADO

**County** WELD

**Country** USA

**Rig Number** H&P 273

**API Number** 05-123-39828

**Field** WILDCAT

**Region** DJ BASIN

**Drilling Completed** 1/22/2015

**Spud Date** 1/16/2015

**Surface Coordinates** 465' FSL; 1154' FWL

**Bottom Hole Coordinates** 330' FFSLL; 675' FFWLL

**Ground Elevation** 4748'

**K.B. Elevation** 4772'

**Logged Interval** 1234' To 5016'

**Total Depth** 10870'

**Formation** NIOBRARA

**Type of Drilling Fluid** LSND

## Other Symbols

### Oil Show

- DEAD
- EVEN
- QUESTIONABLE
- SPOTTED STAINING

### Porosity

- E EARTHY
- F FENESTRAL
- F FRACTURE
- X INTERCRYSTALLINE
- Q INTEROOLITIC

MOLDIC

ORGANIC

P PINPOINT

V VUGGY

### Engineering

BIT

CONNECTION (LEFT)

CONNECTION (RIGHT)

CONNECTION GAS

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

SURVEY

TRIP GAS

WIRELINE TESTED - LEFT

WIRELINE TESTED - RT

### Rounding

ANGULAR

ROUNDED

SUBANG

SUBRND

### Textures

BOUNDSTONE

CHALKY

CRYPTOXLN

E EARTHY

FINELYXLN

GRAINSTONE

L LITHOGRAPHIC

MX MICROXLN

MS MUDSTONE

PS PACKSTONE

WS WACKESTONE

### Sorting

M MODERATE

P POOR

W WELL

## Zone Color Coding

- Oil
- Condensate
- Gas
- Note
- Core
- Pressure
- Error
- Water
- Seal

## Accessories

### Fossils

- ALGAE
- AMPHIPORA
- BELEMNITE
- BIOCLASTIC
- BRACHIOPOD

F FOSSIL

GASTROPOD

INOCERAMUS

OOLITE

OSTRACOD

PELECYPOD

PELLET

ANHYDRITIC

ARGILLACEOUS

ARGILLITE GRAIN

BENTONITE

BITUMENOUS SUBSTANCE

BRECCIA FRAGMENTS

CAI CARBONOUS

FERRUGINOUS

GLAUCONITE

GYPSIFEROUS

HEAVY MINERAL

KAOLIN

MARLSTONE

MINERAL CRYSTALS

TUFFACEOUS

### Stringer

- ANHYDRITE STRINGER
- BENTONITE STRINGER
- COAL STRINGER
- DOLOMITE STRINGER

↑ BRYOZOA  
🐙 CEPHALOPOD  
🪸 CORAL  
🪼 CRINOID  
🐚 ECHINOID  
🐟 FISH  
🔍 FORAMINIFERA

🔍 PISOLITE  
🌿 PLANT REMAINS  
🍄 PLANT SPORES  
🦎 SCAPHOPOD  
🪨 STROMATOPOROID

## Minerals

■ CARBONACEOUS FLAKES  
▲ CHTDK  
△ CHTLT  
— COAL - THIN BEDS  
🔪 DOLOMITIC  
+ FELDSPAR  
● FERRUGINOUS PELLET

🔍 NODULES  
● PHOSPHATE PELLETS  
🔍 PYRITE  
🔍 SALT CAST  
· SANDY  
🔍 SILICEOUS  
· SILTY

🔍 GYPSUM STRINGER  
🔍 LIMESTONE STRINGER  
🔍 MARLSTONE (CALC) STRG  
🔍 MARLSTONE (DOL) STRG  
🔍 SANDSTONE STRINGER  
— SHALE STRINGER  
🔍 SILTSTONE STRINGER

## Rock Types

🔍 UNKNOWN  
🔍 CHALK  
🔍 MARLSTONE  
🔍 SANDSTONE  
🔍 SHALY SANDSTONE  
🔍 SILTY SHALE  
🔍 ANHYDRITE  
🔍 BENTONITE  
🔍 BRECCIA

🔍 CEMENT  
🔍 CHERT  
🔍 CLAY CHOKE SAND  
🔍 CLAYSTONE  
🔍 COAL  
🔍 CONGLOMERATE  
🔍 DOLOMITE  
🔍 GRANITE  
🔍 GYPSUM

🔍 IGNEOUS  
🔍 LIMESTONE  
🔍 SIDERITE or LIMONITE  
🔍 METAMORPHIC  
X X X X X X NO SAMPLE  
🔍 SALT  
🔍 SALT- PEPPER SAND  
🔍 SHALE  
🔍 SHALE COLORED

🔍 SHALE GRAY  
🔍 SHALY SILTSTONE  
🔍 SILTSTONE  
🔍 TILL  
🔍 TUFF  
🔍 WELDED TUFF

## Operator

**Company** NOBLE ENERGY INC.

**Address** 1625 Broadway Suite 2200  
Denver, CO 80202

## Other

**Wellsite Geologist #1** Laura Kellogg

**Wellsite Geologist #2** Tim Bright

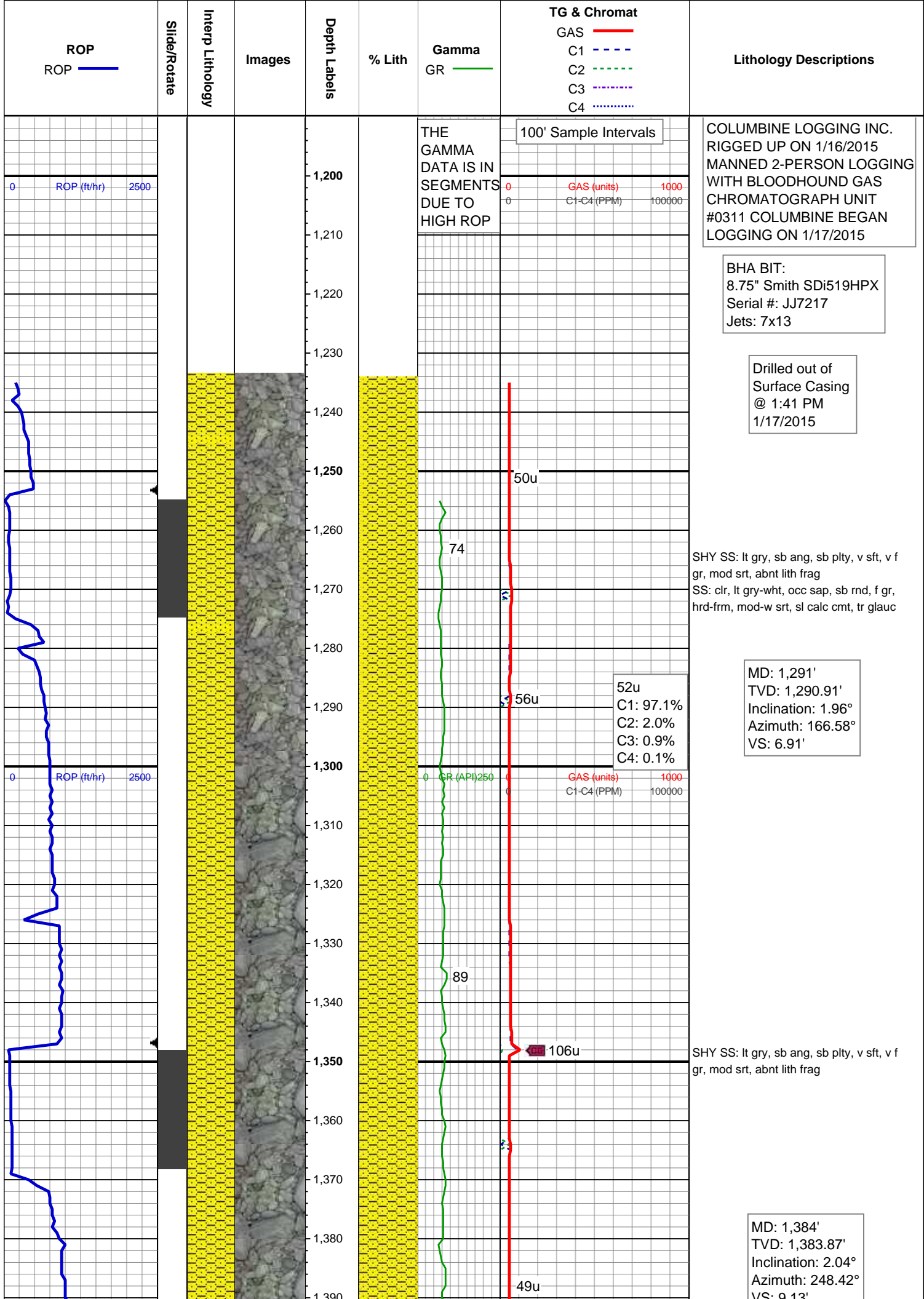
**Wellsite Geological Services Provided By** Columbine Logging Inc.

## Geologist

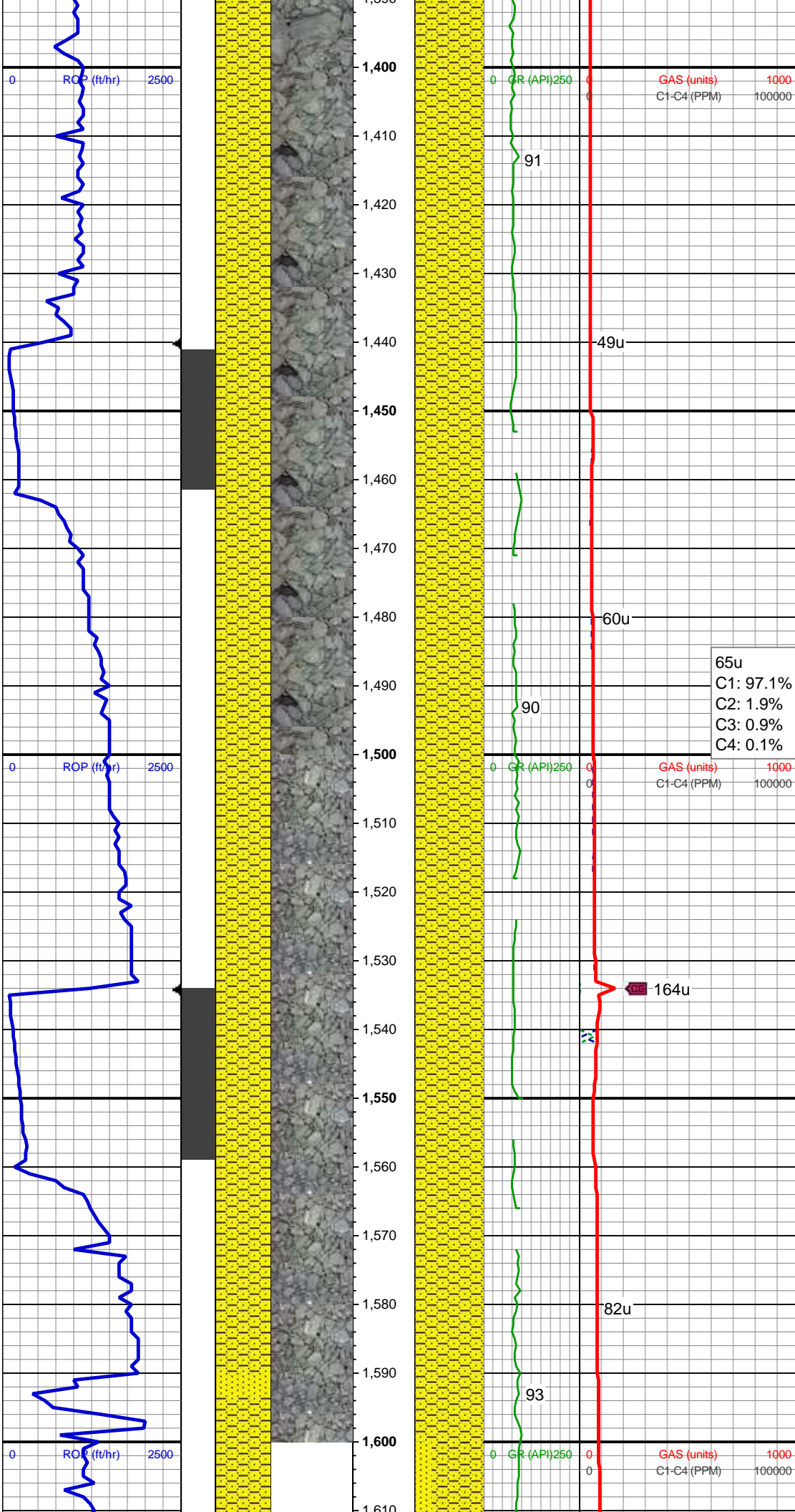
**Name** RENEE CLACKLER

**Company** NOBLE ENERGY INC.

**Address** 1625 Broadway Suite 2200  
Denver, CO 80202



VS: 9.15



SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, abnt lith frag

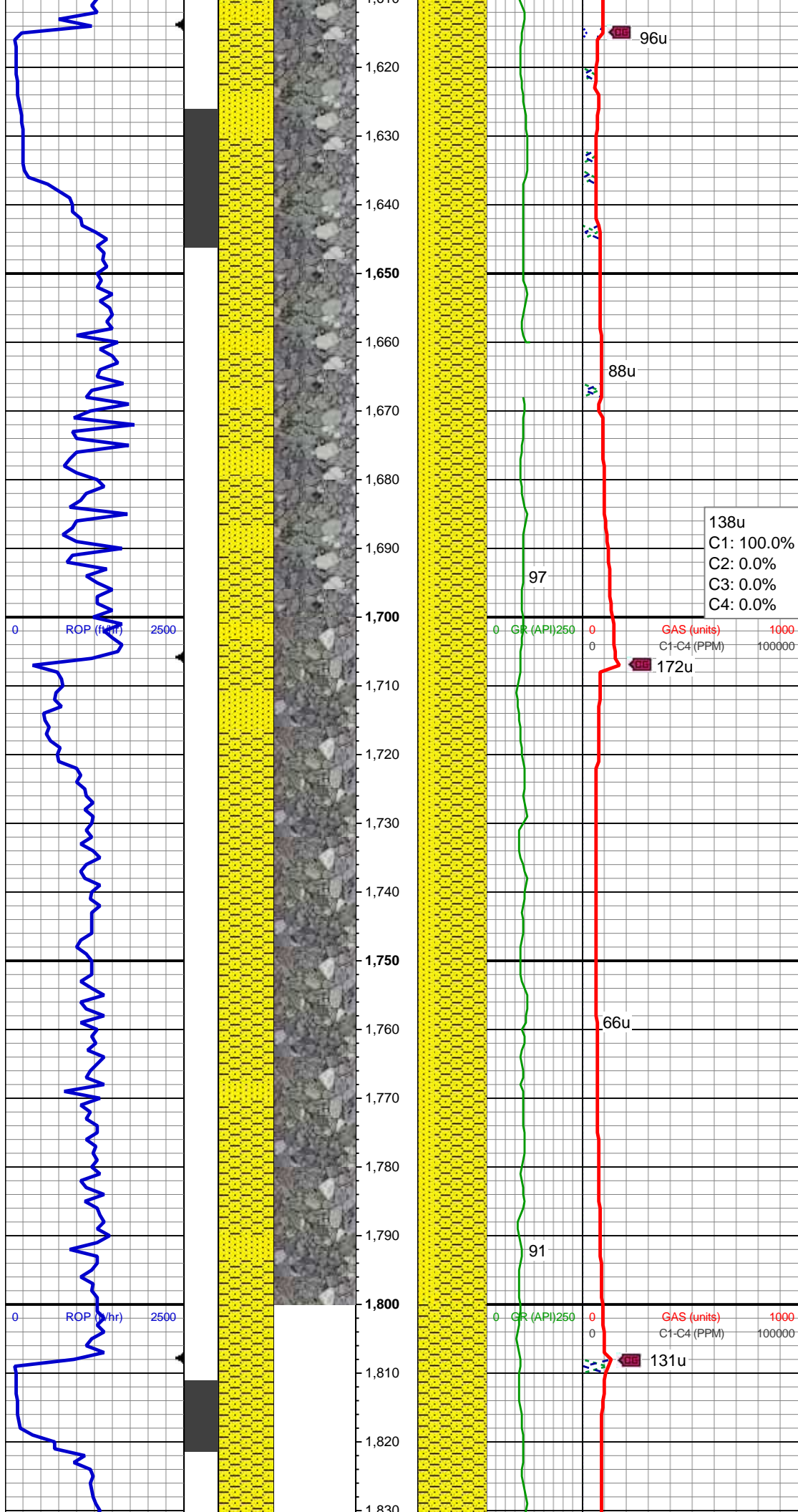
MD: 1,477'  
TVD: 1,476.73'  
Inclination: 4.25°  
Azimuth: 281.44°  
VS: 9.35'

65u  
C1: 97.1%  
C2: 1.9%  
C3: 0.9%  
C4: 0.1%

SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, abnt lith frag

MD: 1,569'  
TVD: 1,568.25'  
Inclination: 7.28°  
Azimuth: 283.11°  
VS: 7.9'





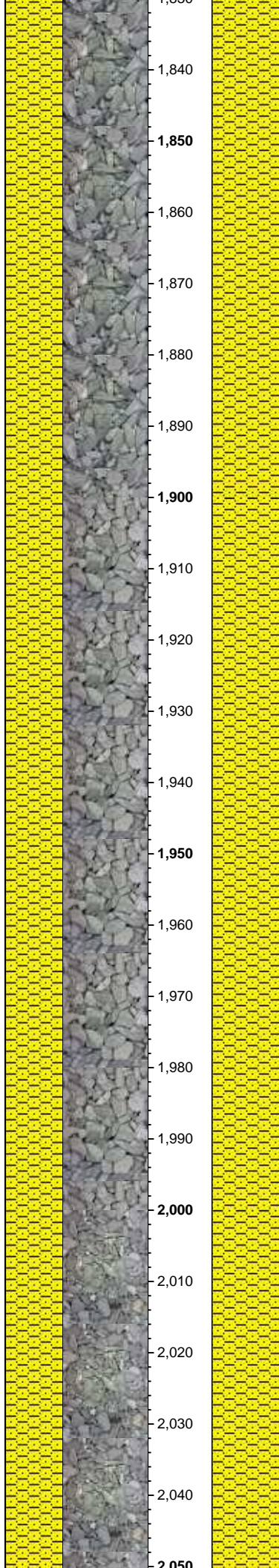
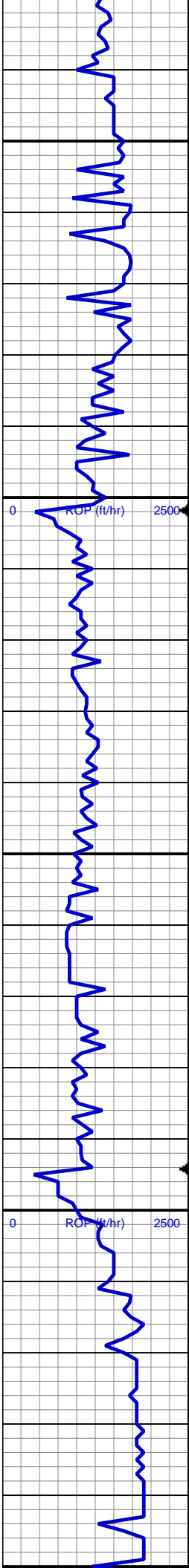
SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, abnt lith frag  
SS: clr, lt gry-wht, occ sap, sb rnd, f gr,  
hrd-frn, mod-w srt, sl calc cmt

MD: 1,662'  
TVD: 1,660.28'  
Inclination: 9.28°  
Azimuth: 285.31°  
VS: 5.38'

SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, abnt lith frag  
SS: clr, lt gry-wht, occ sap, sb rnd, f gr,  
hrd-frn, mod-w srt, sl calc cmt

MD: 1,754'  
TVD: 1,751.11'  
Inclination: 9.02°  
Azimuth: 281.9°  
VS: 2.81'

MD: 1,815'



MD: 1,847'  
TVD: 1,842.84'  
Inclination: 9.95°  
Azimuth: 281.3°  
VS: 0.66'

SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, abnt lith frag

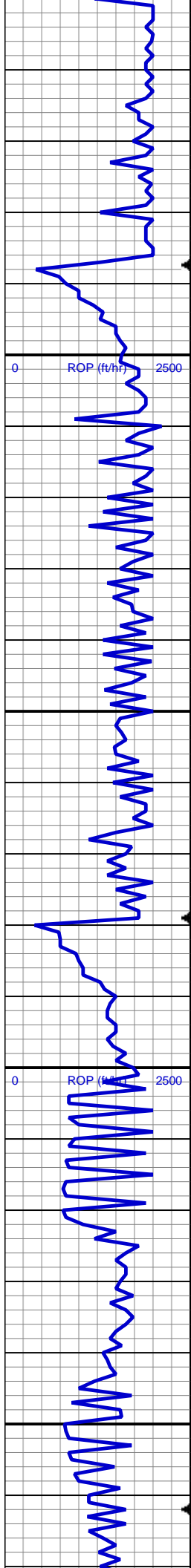
MD: 1,939'  
TVD: 1,933.48'  
Inclination: 9.79°  
Azimuth: 279.58°  
VS: -1.25'

SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, abnt lith frag

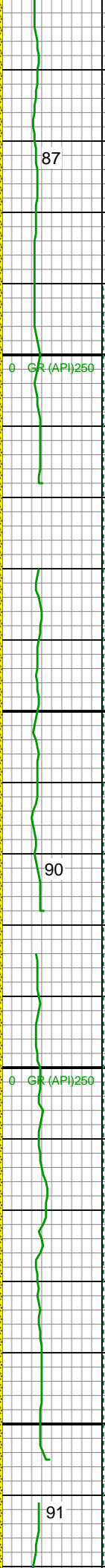
MD: 2,031'  
TVD: 2,024.18'  
Inclination: 9.46°  
Azimuth: 279.15°  
VS: -2.82'

SHY SS: lt gry, sb ang, sb plty, v sft, v f





2,050  
2,060  
2,070  
2,080  
2,090  
2,100  
2,110  
2,120  
2,130  
2,140  
2,150  
2,160  
2,170  
2,180  
2,190  
2,200  
2,210  
2,220  
2,230  
2,240  
2,250  
2,260  
2,270



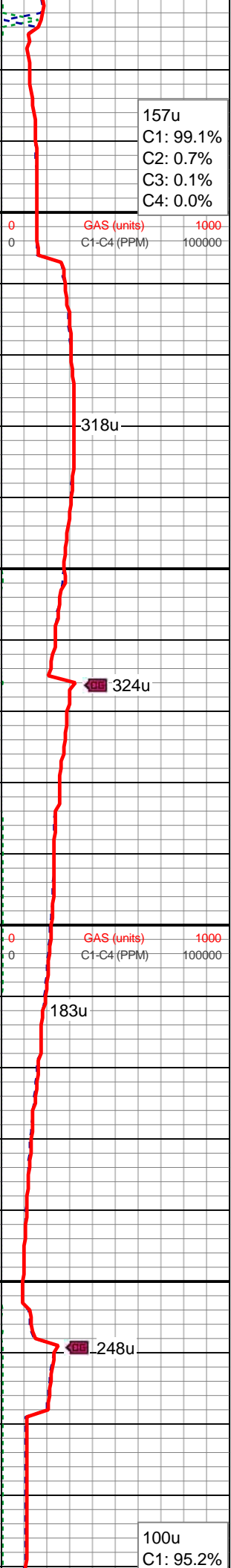
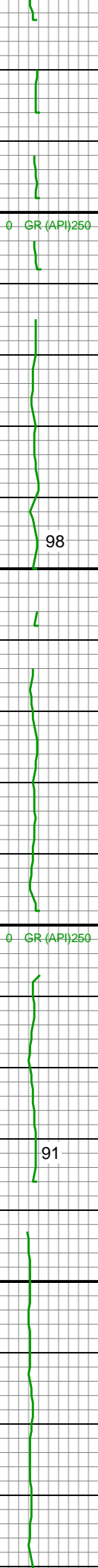
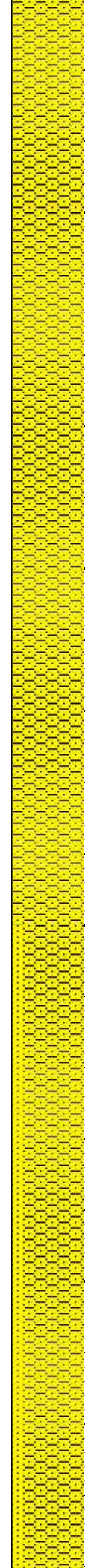
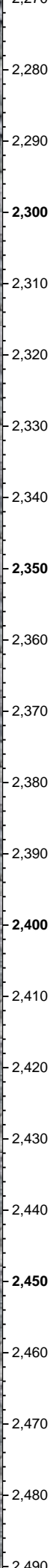
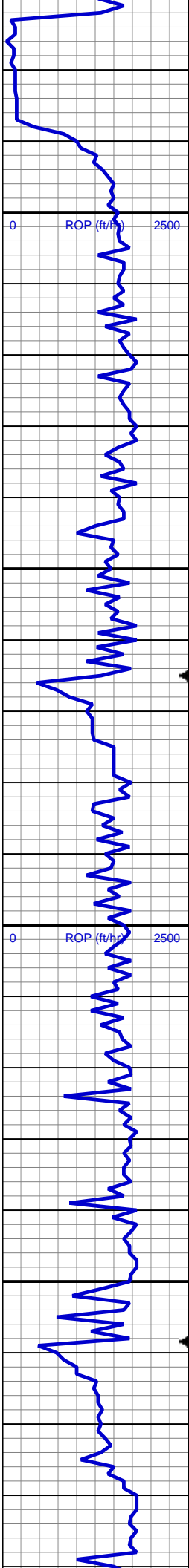
gr, mod srt, abnt lith frag

MD: 2,124'  
TVD: 2,115.91'  
Inclination: 9.52°  
Azimuth: 276.53°  
VS: -3.98'

SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, abnt lith frag

MD: 2,216'  
TVD: 2,206.75'  
Inclination: 8.68°  
Azimuth: 275.97°  
VS: -4.68'

SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, abnt lith frag



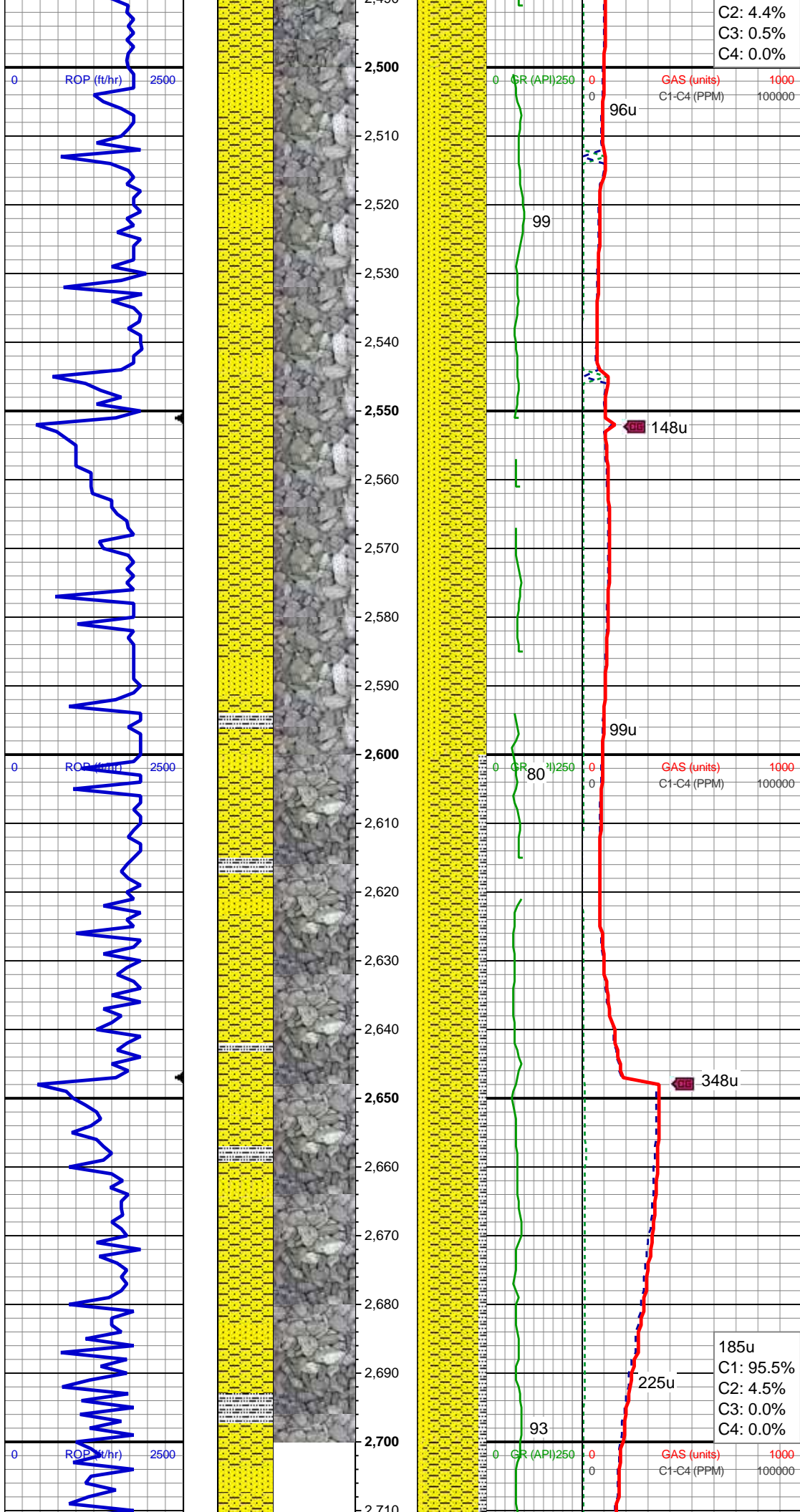
MD: 2,308'  
TVD: 2,297.51'  
Inclination: 10.14°  
Azimuth: 275.56°  
VS: -5.27'

SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, abnt lith frag

SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, abnt lith frag  
SS: clr, lt gry-wht, occ sap, sb rnd, f gr,  
hrd frm, mod-w srt, sl calc cmt

MD: 2,493'  
TVD: 2,479.75'



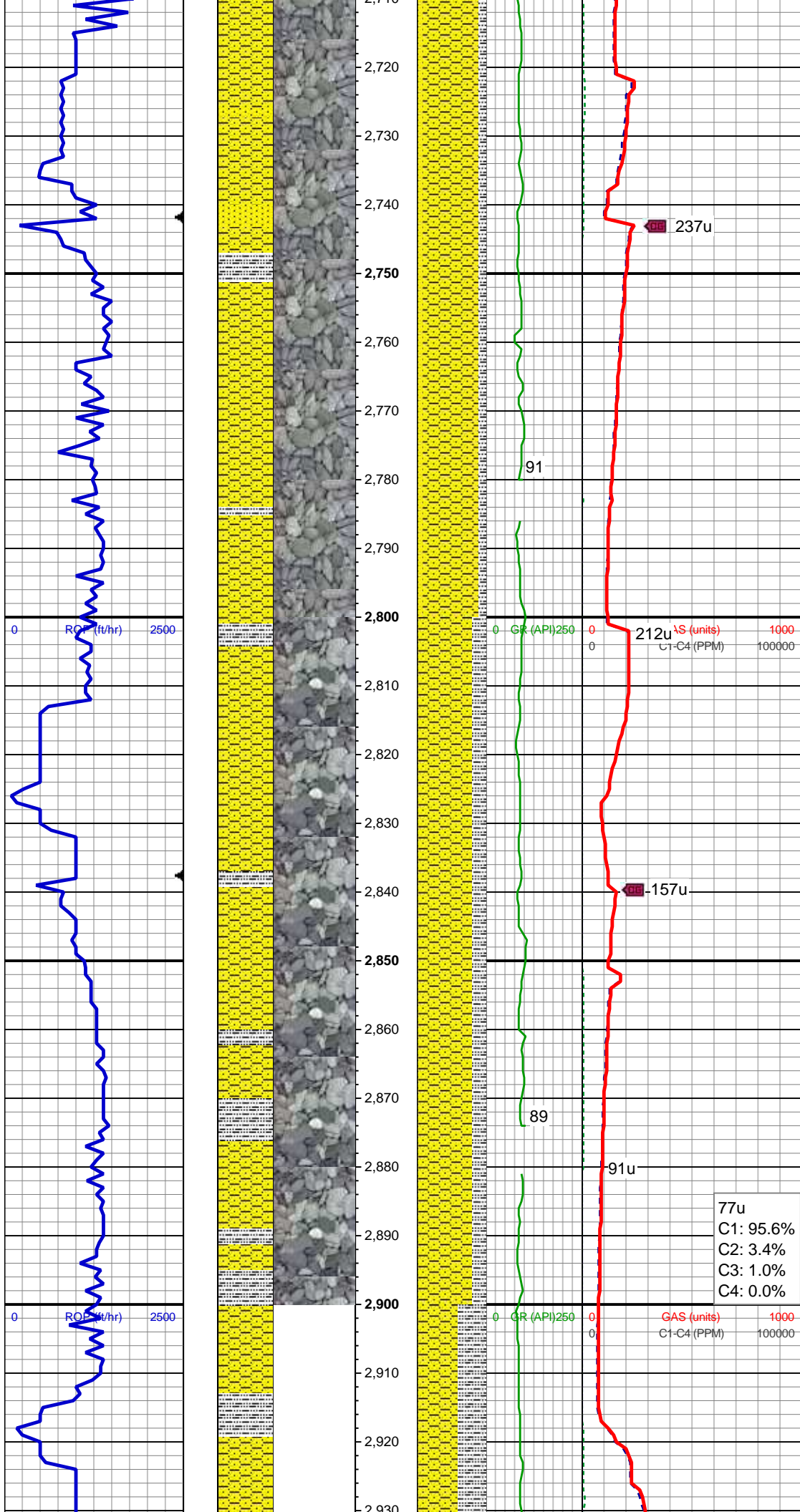


Inclination: 9.67°  
Azimuth: 274.03°  
VS: -6'

SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, abnt lith frag  
SS: clr, lt gry-wht, occ sap, sb rnd, f gr,  
hrd frm, mod-w srt, sl calc cmt

SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, tr lith frag  
SS: clr, lt gry-wht, occ sap, sb rnd, f gr,  
hrd frm, mod-w srt, sl calc cmt, rr diss  
pyr  
SLTY SH: gry-dkr gry, rnd, sb plty, v sft,  
sly tex

MD: 2,683'  
TVD: 2,666.94'  
Inclination: 10.08°  
Azimuth: 272.9°  
VS: -5.97'



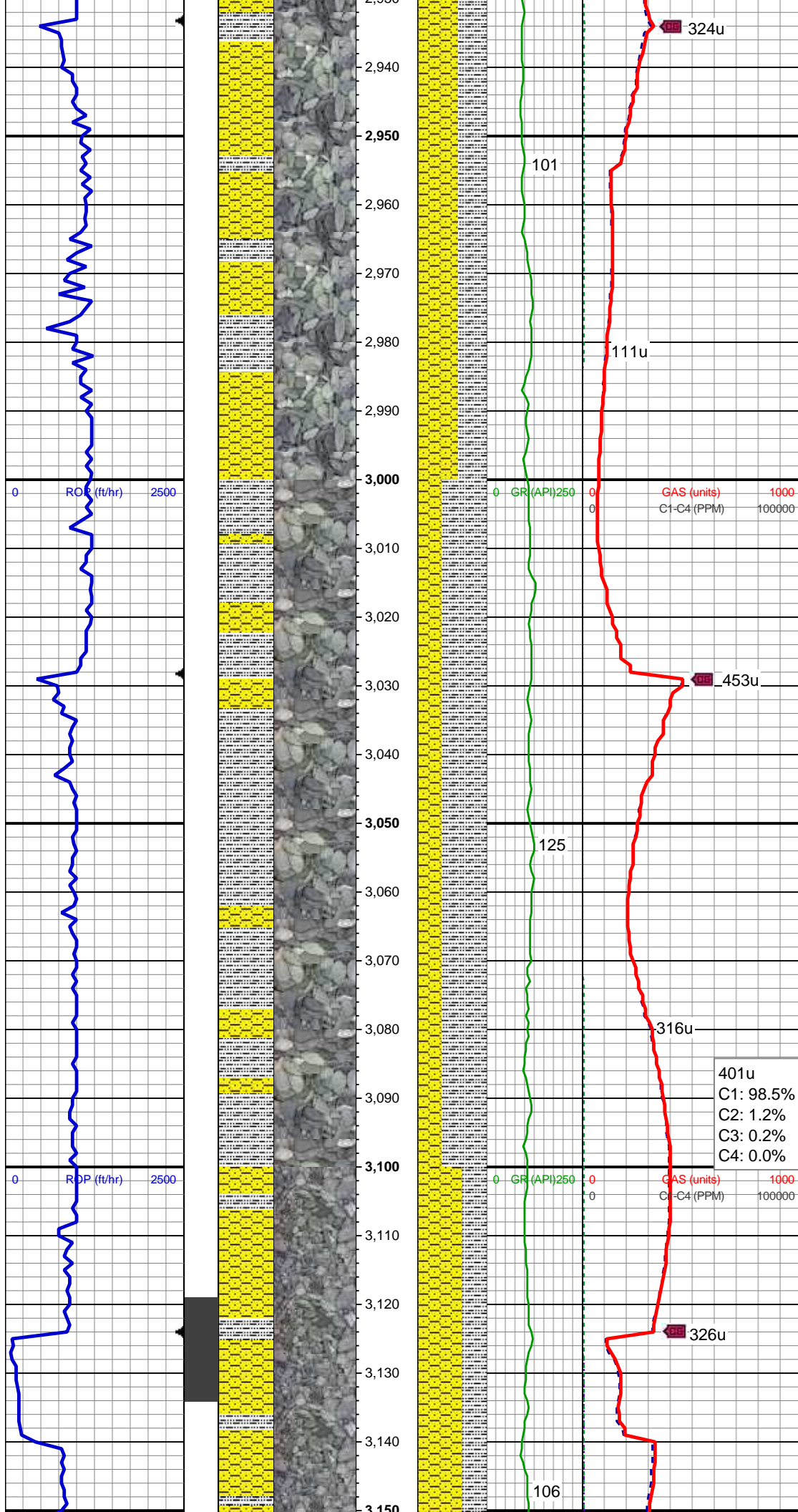
SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, tr lith frag  
SS: clr, lt gry-wht, occ sap, sb rnd, f gr,  
hrd frm, mod-w srt, sl calc cmt, rr diss  
pyr  
SLTY SH: gry-dkr gry, rnd, sb plty, v sft,  
sly tex

MD: 2,778'  
TVD: 2,760.5'  
Inclination: 9.9°  
Azimuth: 271.44°  
VS: -5.59'

SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, tr lith frag;  
SLTY SH: gry-dkr gry, rnd, sb plty, v sft,  
sly tex

77u  
C1: 95.6%  
C2: 3.4%  
C3: 1.0%  
C4: 0.0%





SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, tr lith frag;  
SLTY SH: gry-dkr gry, rnd, sb plty, v sft,  
slyt tex

MD: 2,968'  
TVD: 2,947.92'  
Inclination: 8.98°  
Azimuth: 273.16°  
VS: -4.91'

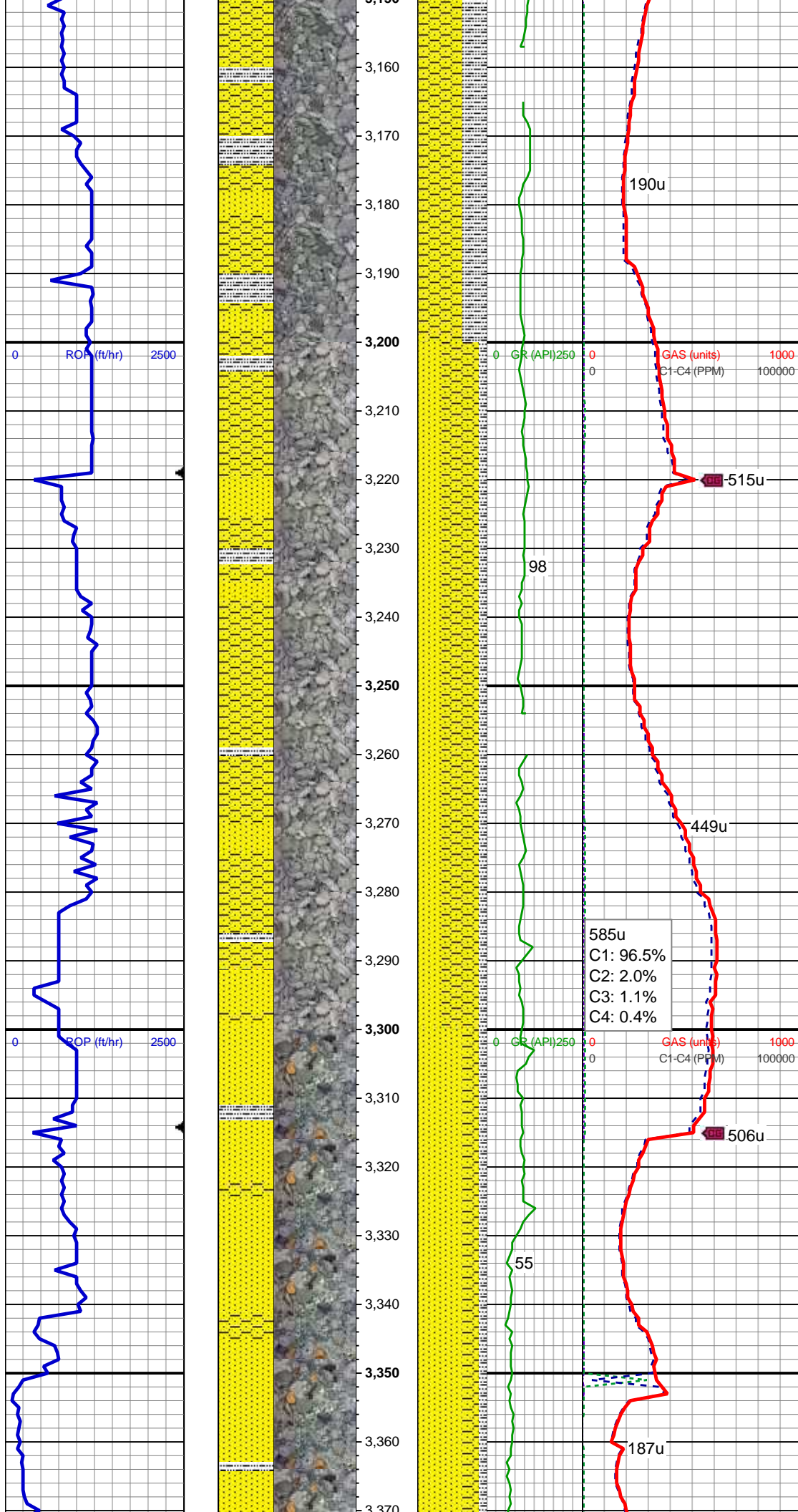
SLTY SH: gry-dkr gry, rnd, sb plty, v sft,  
slyt tex;  
SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, tr lith frag

MD: 3,062'  
TVD: 3,040.96'  
Inclination: 7.45°  
Azimuth: 276.08°  
VS: -5.15'

401u  
C1: 98.5%  
C2: 1.2%  
C3: 0.2%  
C4: 0.0%

SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, tr lith frag;





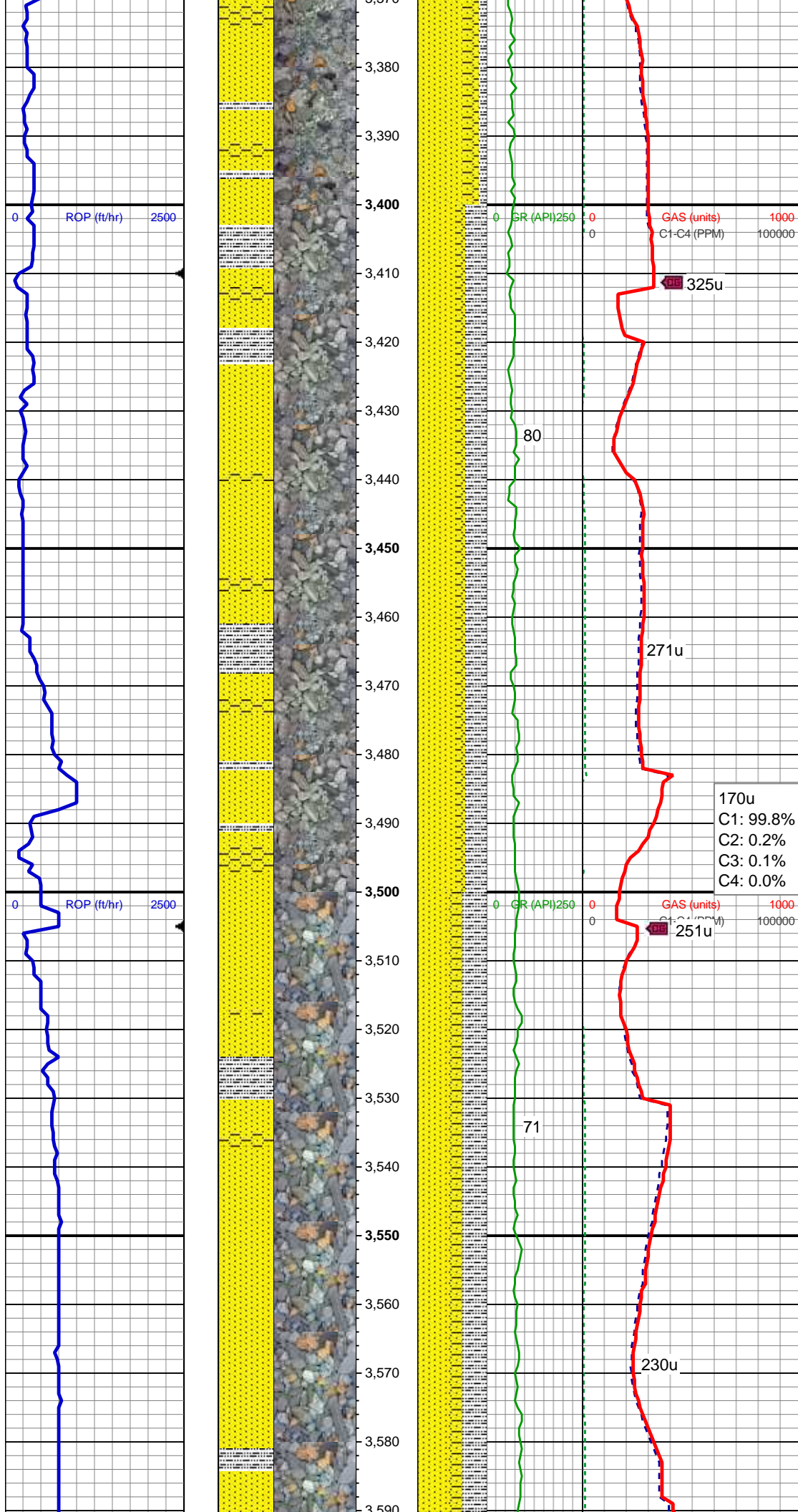
SLTY SH: gry-dkr gry, rnd, sb plty, v sft, slty tex

MD: 3,157'  
TVD: 3,135.03'  
Inclination: 8.52°  
Azimuth: 268.74°  
VS: -4.84'

MD: 3,252'  
TVD: 3,228.97'  
Inclination: 8.62°  
Azimuth: 266.94°  
VS: -3.44'

SHY SS: lt gry, sb ang, sb plty, v sft, v f gr, mod srt, tr lith frag  
SS: clr, lt gry-wht, occ sap, sb rnd, f gr, hrd-frn, mod-w srt, sl calc cmt, rr diss pyr  
SLTY SH: gry-dkr gry, rnd, sb plty, v sft, slty tex

SS: clr, lt gry-wht, occ sap, sb rnd, f gr, hrd-frn, v p srt, occ mod-w srt, sl calc cmt, rr glau, tr diss pyr;  
SHY SS: lt gry, sb ang, sb plty, v sft, v f gr, mod srt, tr lith frag  
SLTY SH: gry-dkr gry, rnd, sb plty, v sft, slty tex



MD: 3,441'  
TVD: 3,415.79'  
Inclination: 9.09°  
Azimuth: 267.9°  
VS: -0.36'

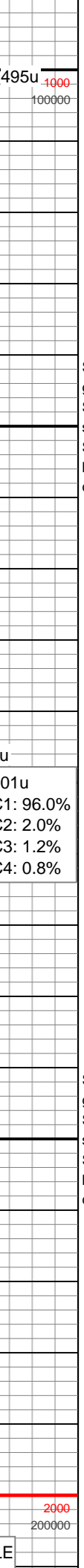
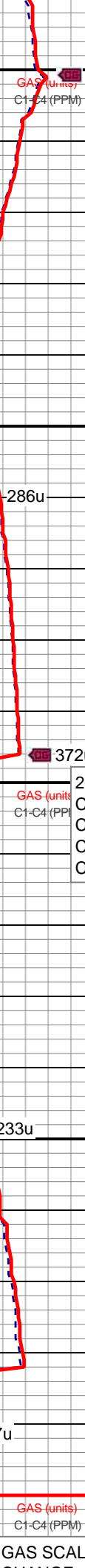
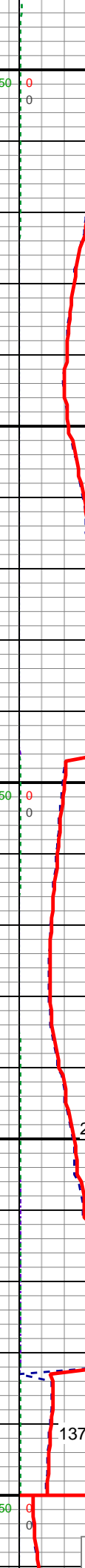
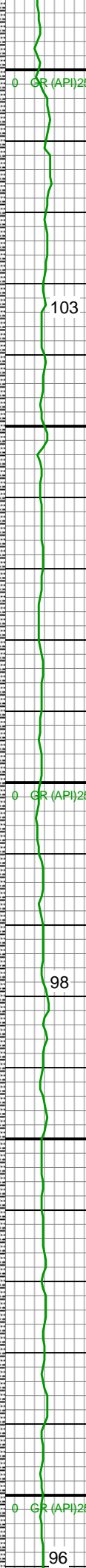
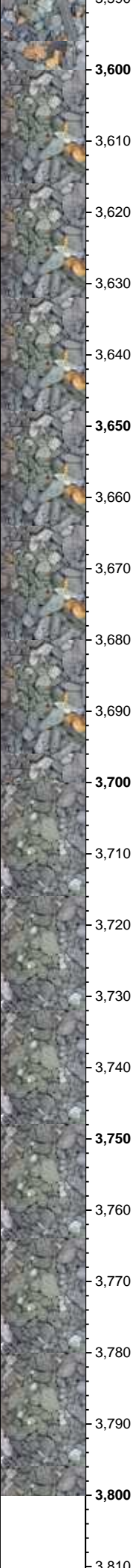
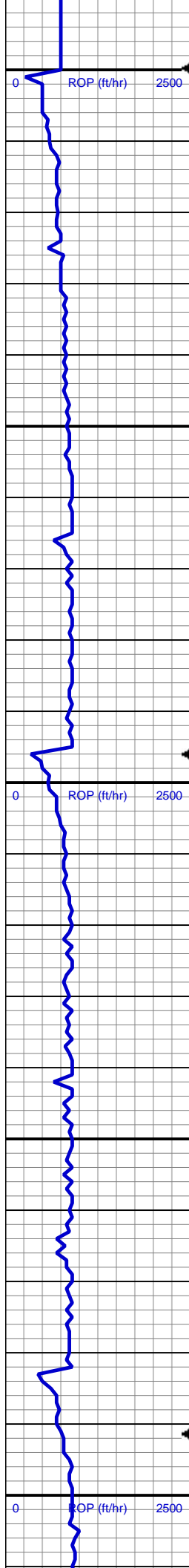
SS: clr, lt gry-wht, occ sap, sb rnd, f gr,  
hrd frm, v p srt, occ mod-w srt, sl calc  
cmt, rr glau, tr diss pyr;  
SLTY SH: gry-dkr gry, rnd, sb plty, v sft,  
silty tex;  
SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, tr lith frag

170u  
C1: 99.8%  
C2: 0.2%  
C3: 0.1%  
C4: 0.0%

MD: 3,536'  
TVD: 3,509.54'  
Inclination: 9.51°  
Azimuth: 268.28°  
VS: 1.08'

SS: clr, lt gry-wht, occ sap, sb rnd, f gr,  
hrd frm, v p srt, occ mod-w srt, sl calc  
cmt, rr glau, tr diss pyr;  
SLTY SH: gry-dkr gry, rnd, sb plty, v sft,  
silty tex;  
SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, tr lith frag





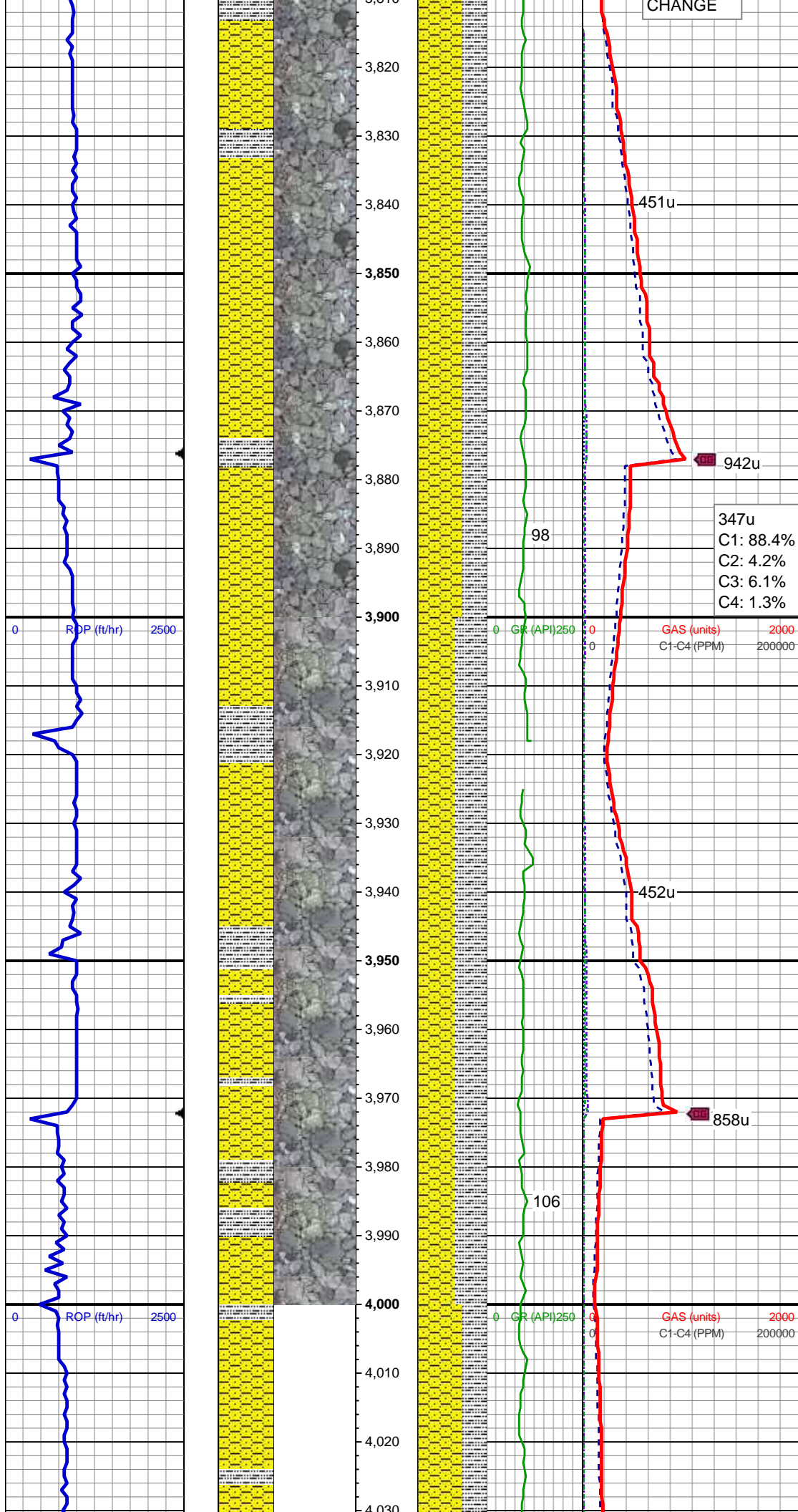
MD: 3,631'  
TVD: 3,603.21'  
Inclination: 9.66°  
Azimuth: 268.6°  
VS: 2.48'

SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, tr lith frag;  
SLTY SH: gry-dkr gry, rnd, sb plty, v sft,  
sly tex  
SS: clr, lt gry-wht, occ sap, sb rnd, f gr,  
hrd-frn, v p srt, occ mod-w srt, sl calc  
cmt, rr glau, tr dissn pyr

MD: 3,725'  
TVD: 3,695.91'  
Inclination: 9.42°  
Azimuth: 268.53°  
VS: 3.82'

SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, tr lith frag;  
SLTY SH: gry-dkr gry, rnd, sb plty, v sft,  
sly tex  
SS: clr, lt gry-wht, occ sap, sb rnd, f gr,  
hrd-frn, v p srt, occ mod-w srt, sl calc  
cmt, rr glau, tr dissn pyr





MD: 3,820'  
TVD: 3,789.72'  
Inclination: 8.77°  
Azimuth: 268.25°  
VS: 5.16'

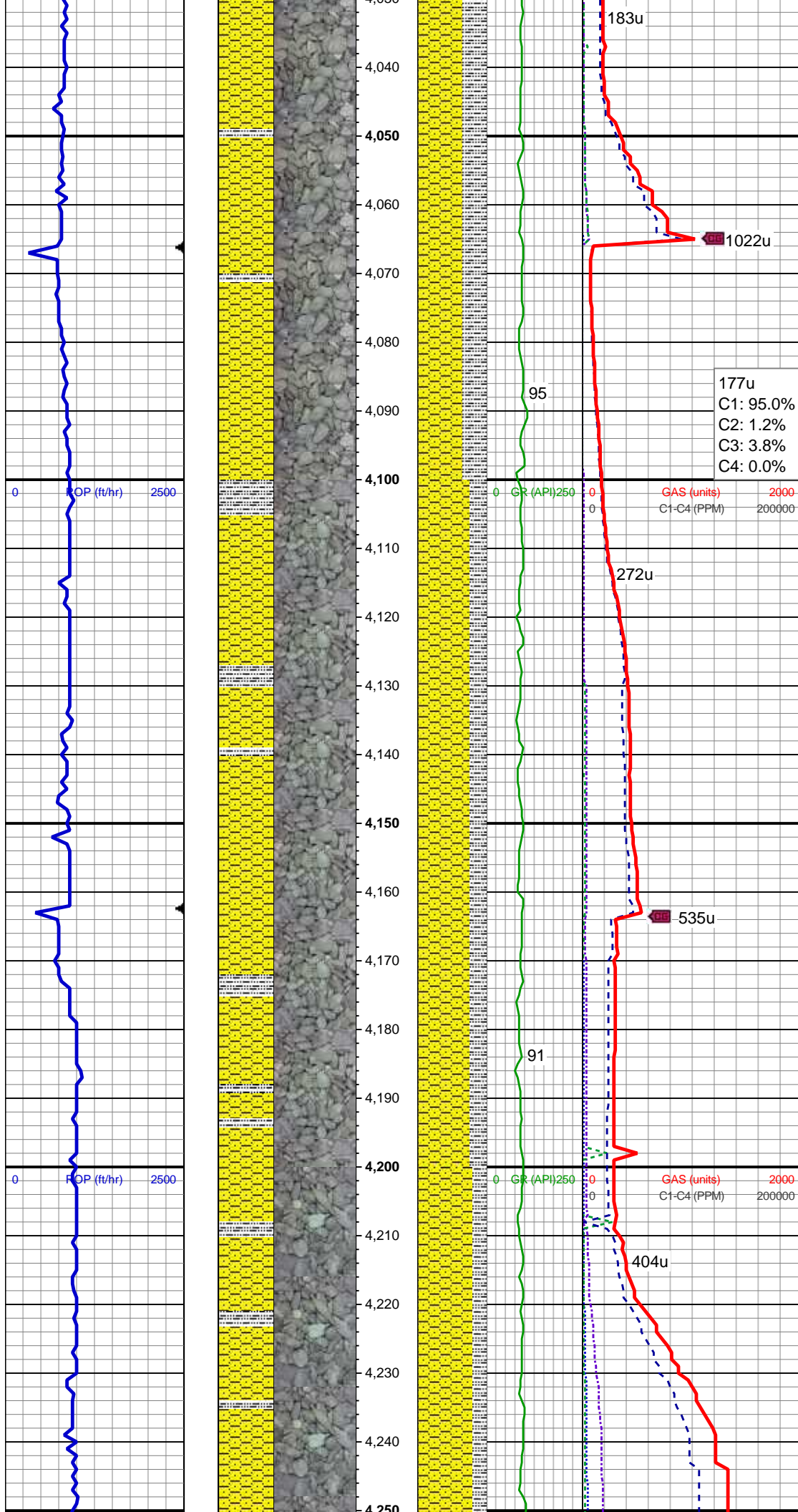
SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, tr lith frag;  
SLTY SH: gry-dkr gry, rnd, sb plty, v sft,  
sly tex

347u  
C1: 88.4%  
C2: 4.2%  
C3: 6.1%  
C4: 1.3%

MD: 3,915'  
TVD: 3,883.72'  
Inclination: 7.86°  
Azimuth: 269.54°  
VS: 6.27'

SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, tr lith frag;  
SLTY SH: gry-dkr gry, rnd, sb plty, v sft,  
sly tex

MD: 4,009'  
TVD: 3,976.89'  
Inclination: 7.29°  
Azimuth: 269.6°  
VS: 7.12'



SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, tr lith frag, v rr foss frags  
SLTY SH: gry-dkr gry, rnd, sb plty, v sft,  
sly tex

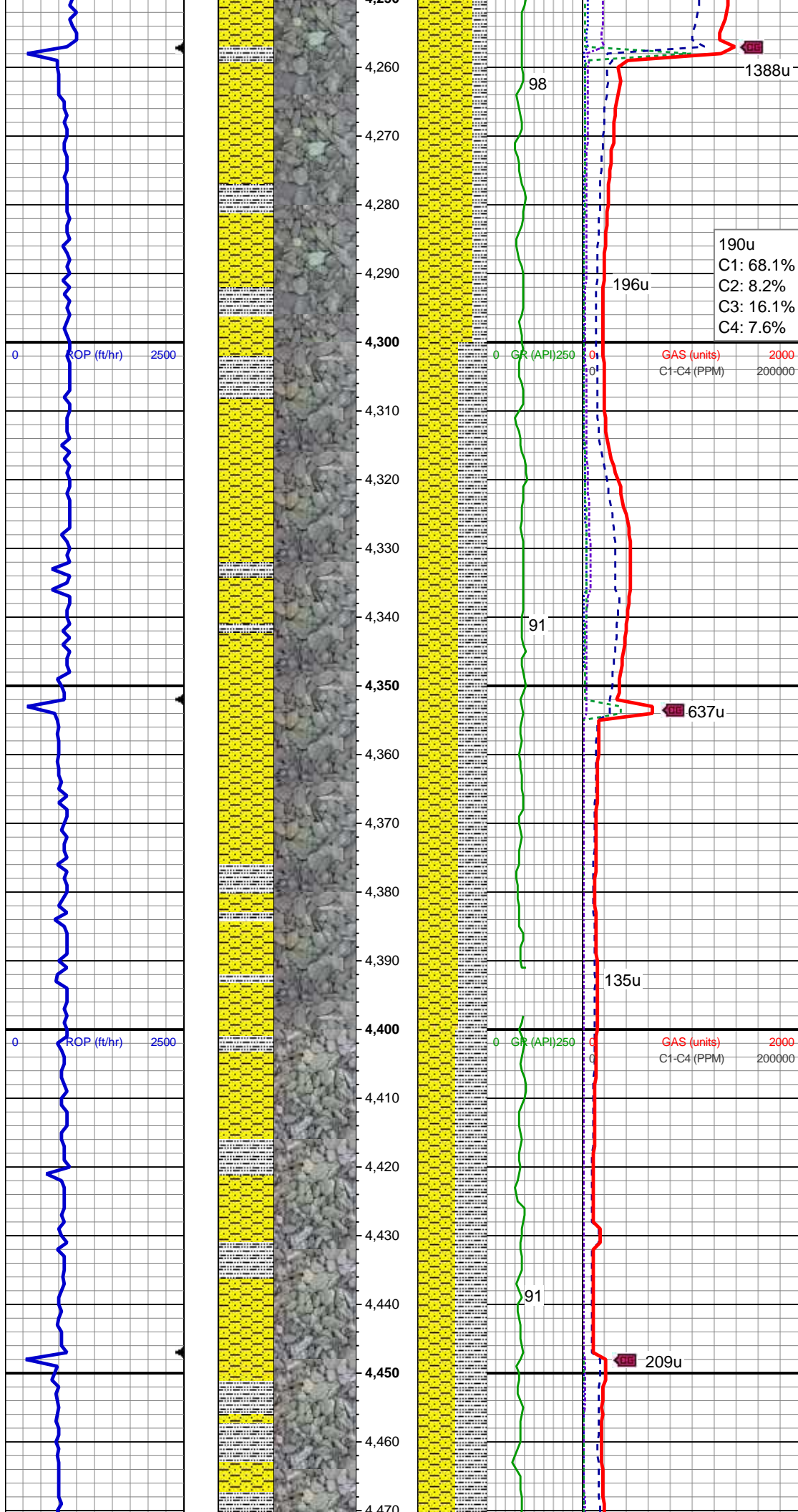
MD: 4,104'  
TVD: 4,071.16'  
Inclination: 7.01°  
Azimuth: 267.34°  
VS: 8.15'

SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, tr lith frag;  
SLTY SH: gry-dkr gry, rnd, sb plty, v sft,  
sly tex

MD: 4,199'  
TVD: 4,165.48'  
Inclination: 6.61°  
Azimuth: 267.49°  
VS: 9.35'

SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, tr lith frag;





SLTY SH: gry-dkr gry, rnd, sb plty, v sft, slty tex

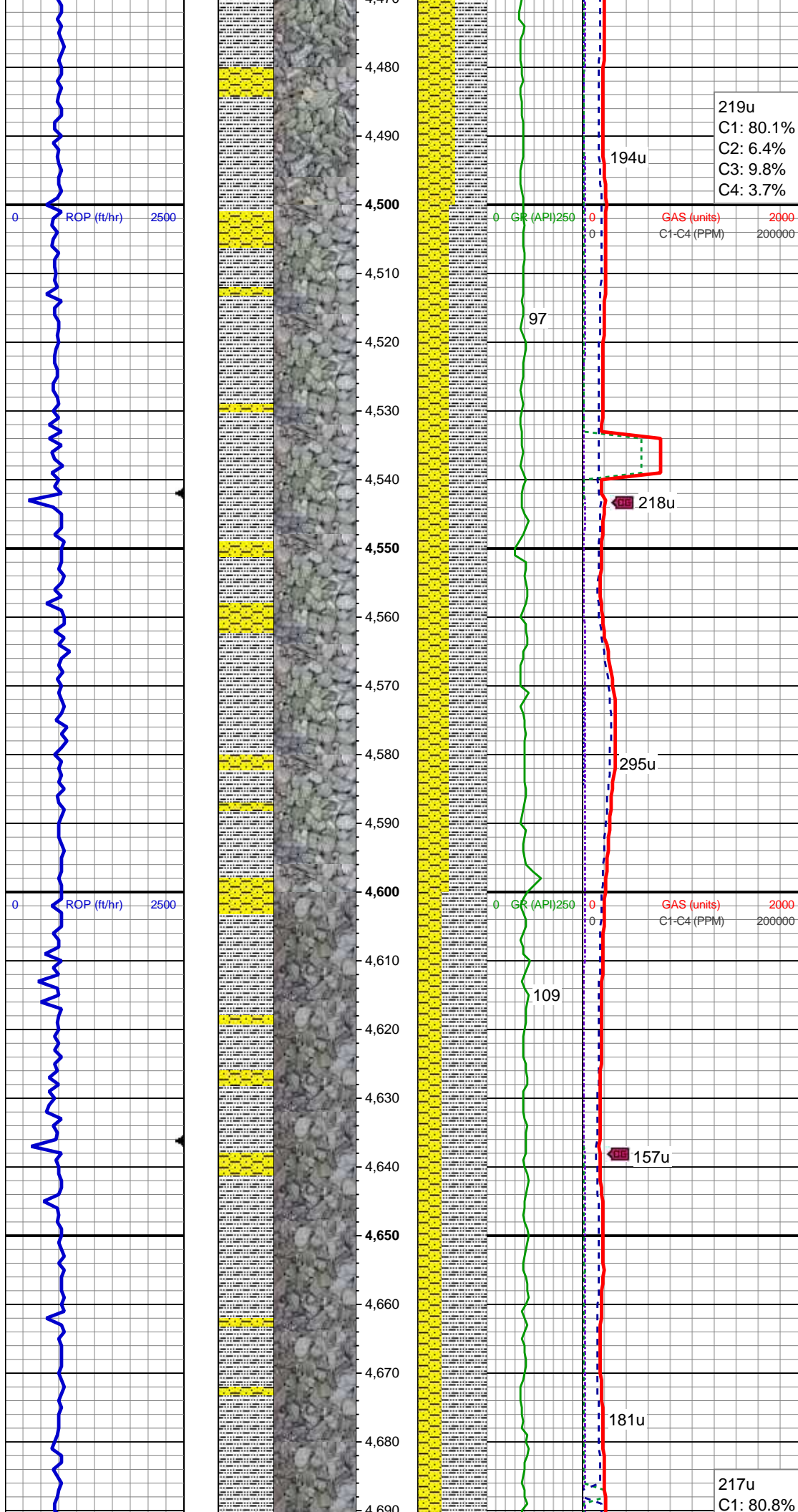
MD: 4,293'  
TVD: 4,258.92'  
Inclination: 5.92°  
Azimuth: 266.64°  
VS: 10.49'

SHY SS: lt gry, sb ang, sb plty, v sft, v f gr, mod srt, tr lith frag;  
SLTY SH: gry-dkr gry, rnd, sb plty, v sft, slty tex

MD: 4,387'  
TVD: 4,352.46'  
Inclination: 5.47°  
Azimuth: 265.32°  
VS: 11.71'

SHY SS: lt gry, sb ang, sb plty, v sft, v f gr, mod srt, tr lith frag;  
SLTY SH: gry-dkr gry, rnd, sb plty, v sft, slty tex





MD: 4,482'  
TVD: 4,447.05'  
Inclination: 5.1°  
Azimuth: 264.55°  
VS: 13.01'

219u  
C1: 80.1%  
C2: 6.4%  
C3: 9.8%  
C4: 3.7%

194u

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

97

218u

SLTY SH: gry-dkr gry, rnd, sb plty, v sft, slty tex, tr diss pyr;  
SHY SS: lt gry, sb ang, sb plty, v sft, v f gr, mod srt, tr lith frag

MD: 4,575'  
TVD: 4,539.68'  
Inclination: 5.1°  
Azimuth: 262.77°  
VS: 14.42'

295u

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

109

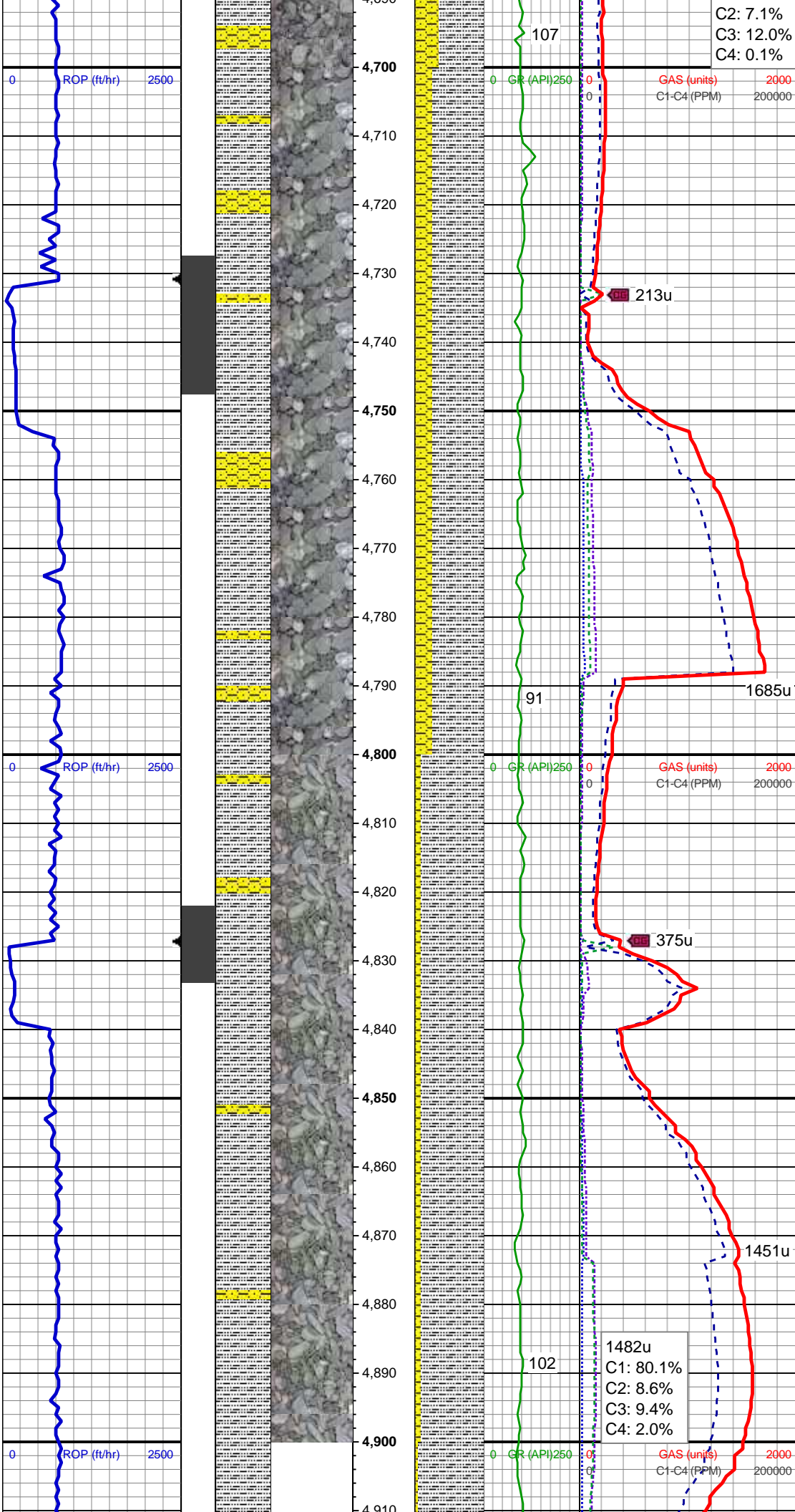
157u

SLTY SH: gry-dkr gry, rnd, sb plty, v sft, slty tex, tr diss pyr;  
SHY SS: lt gry, sb ang, sb plty, v sft, v f gr, mod srt, tr lith frag

MD: 4,670'  
TVD: 4,634.31'  
Inclination: 5.03°  
Azimuth: 260.82°  
VS: 16.12'

181u

217u  
C1: 80.8%



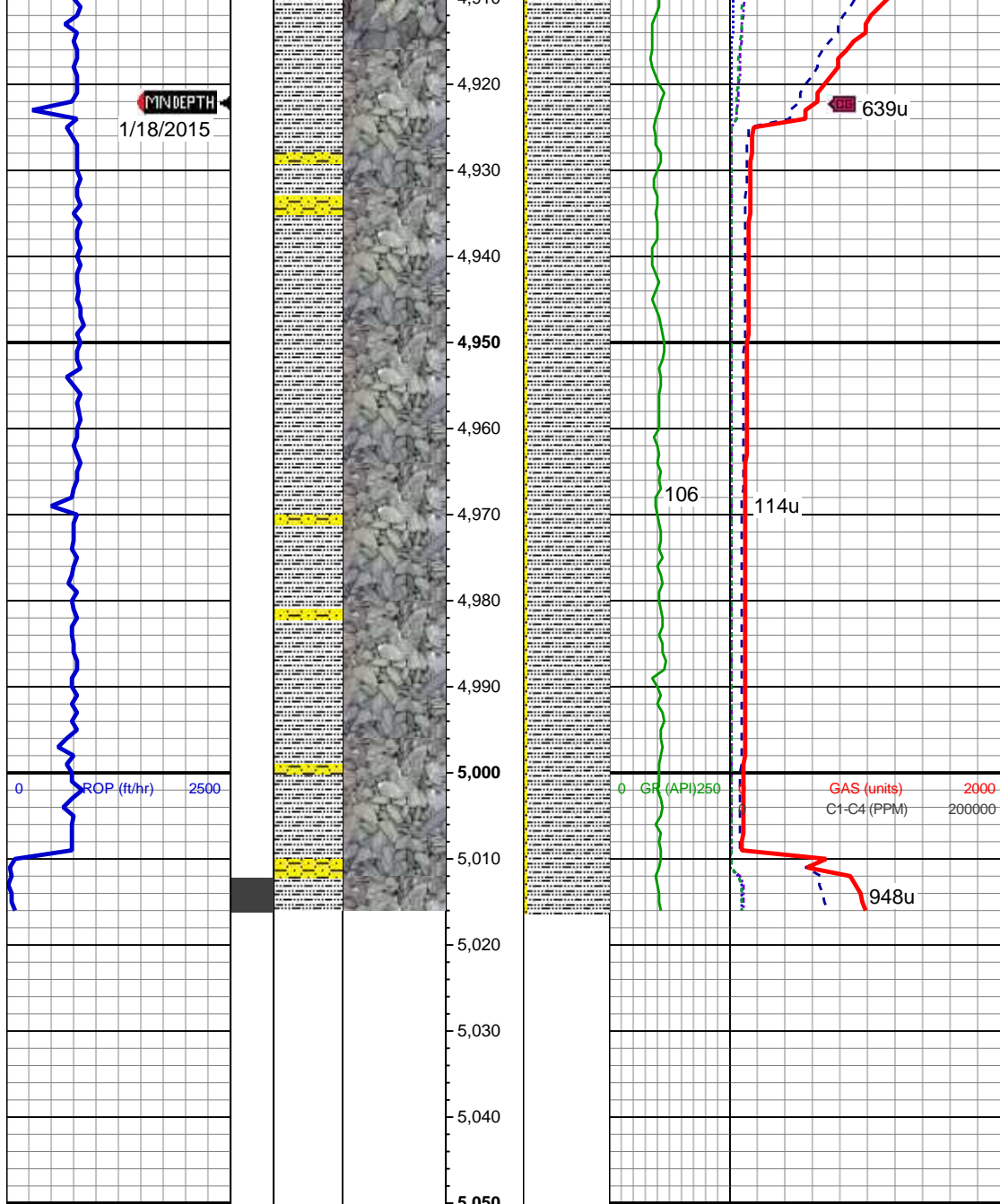
SLTY SH: gry-dkr gry, rnd, sb plty, v sft, slty tex, tr diss pyr;  
SHY SS: lt gry, sb ang, sb plty, v sft, v f gr, mod srt, tr lith frag

MD: 4,765'  
TVD: 4,729.11'  
Inclination: 2.31°  
Azimuth: 259.28°  
VS: 17.51'

SLTY SH: gry-dkr gry, rnd, sb plty, v sft, slty tex, tr diss pyr;  
SHY SS: lt gry, sb ang, sb plty, v sft, v f gr, mod srt, tr lith frag

MD: 4,860'  
TVD: 4,824.07'  
Inclination: 0.68°  
Azimuth: 240.36°  
VS: 18.29'

1482u  
C1: 80.1%  
C2: 8.6%  
C3: 9.4%  
C4: 2.0%



SLTY SH: gry-dkr gry, rnd, sb plty, v sft,  
sfty tex, tr diss pyr;  
SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, tr lith frag

MD: 4,955'  
TVD: 4,919.07'  
Inclination: 0.68°  
Azimuth: 260.09°  
VS: 18.73'

SLTY SH: gry-dkr gry, rnd, sb plty, v sft,  
sfty tex, tr diss pyr;  
SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, tr lith frag

ENDED VERT @ 5016' MD  
1/18/2015 @ 12:16 AM

LOG CONTINUES ON MPlot  
"MOSES STATE LD11-78HN  
HORZ"