

# COLUMBINE LOGGING

Scale: 5" / 100'  
Measured Depth Log

**Well Name** Sharpe State LD02-77HN

**Location** SWSW SEC 2 T9N R58W

**State** COLORADO

**County** WELD

**Country** USA

**Rig Number** H&P 273

**API Number** 05-123-39820

**Field** WILDCAT

**Region** DJ BASIN

**Drilling Completed** 12/29/2014

**Spud Date** 12/23/2014

**Surface Coordinates** 615' FSL; 1192' FWL

**Bottom Hole Coordinates** 330' FFNLL; 1320' FFWLL

**Ground Elevation** 4748'

**K.B. Elevation** 4772'

**Logged Interval** 1240' To 4815'

**Total Depth** 9665'

**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
- PINPOINT
- 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

### Rounding

- ANGULAR
- ROUNDED
- SUBANG
- SUBRND

### Textures

- BOUNDSTONE
- CHALKY
- CRYPTOXLN

- WIRELINE TESTED - LEFT
- WIRELINE TESTED - RT
- 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

### Fossil

- GASTROPOD
- INOCERAMUS
- OOLITE
- OSTRACOD
- PELECYPOD
- PELLET

### ANHYDRITIC

- ARGILLACEOUS
- ARGILLITE GRAIN
- BENTONITE
- BITUMENOUS SUBSTANCE
- BRECCIA FRAGMENTS
- CAI CARFOUS

### 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** Nick Kopiasz

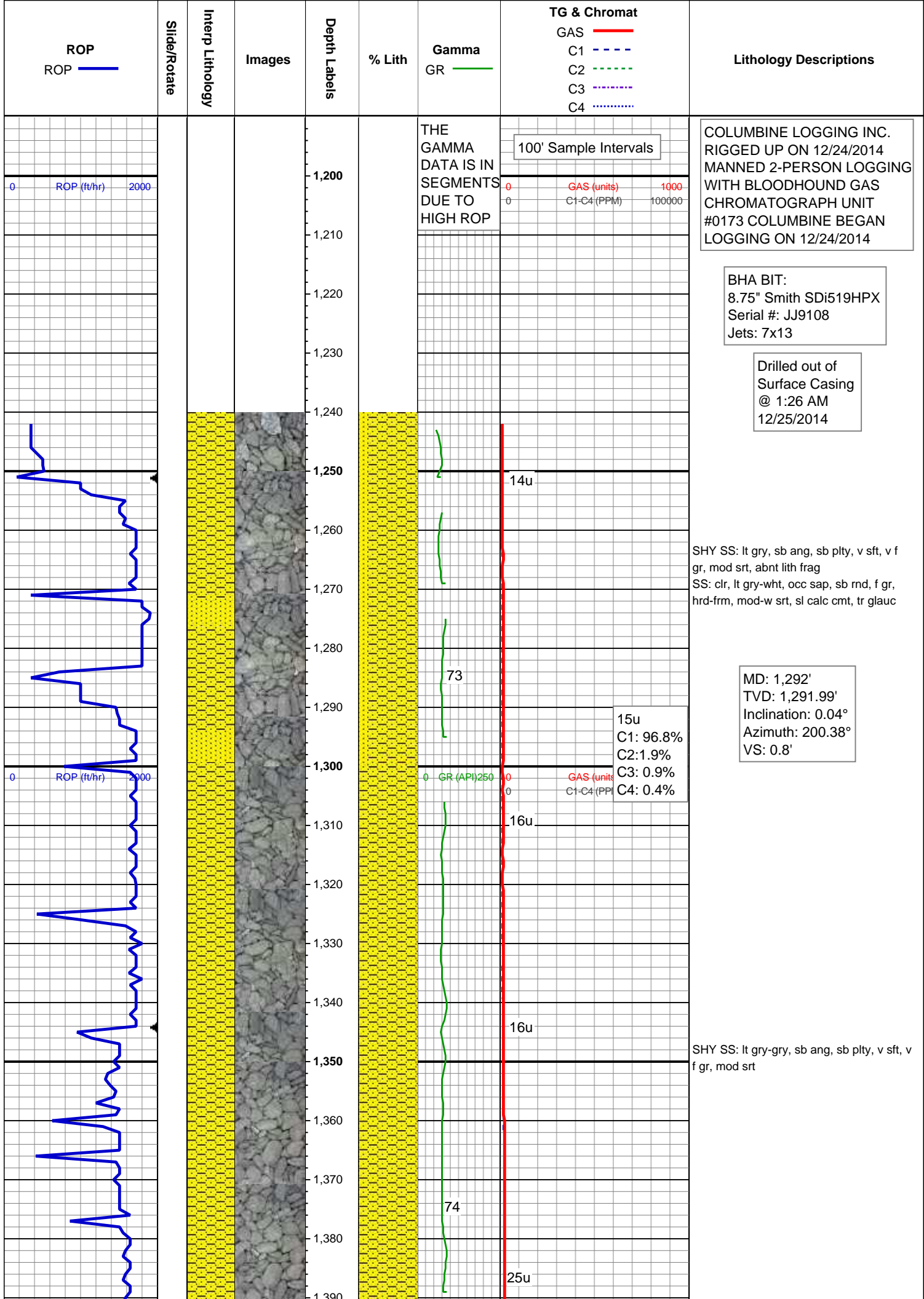
**Wellsite Geological Services Provided By** Columbine Logging Inc.

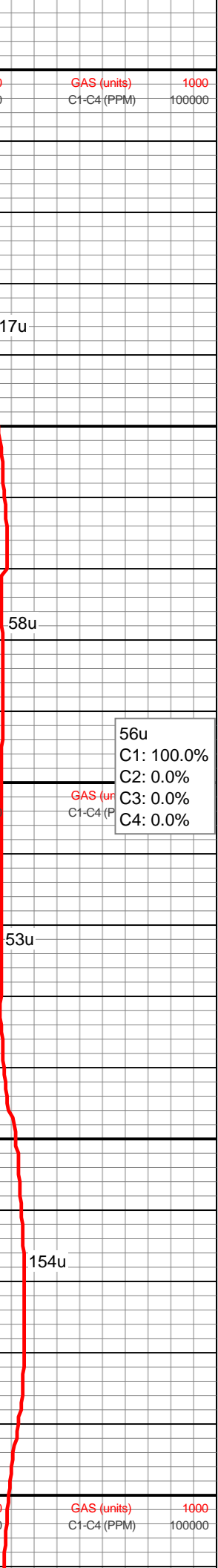
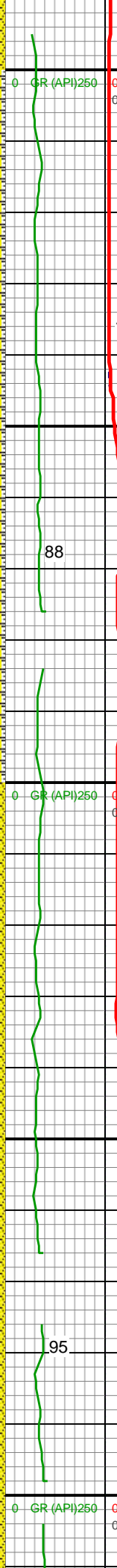
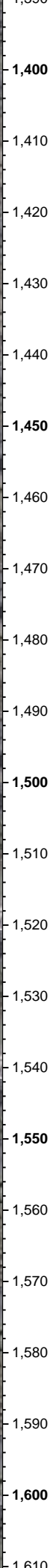
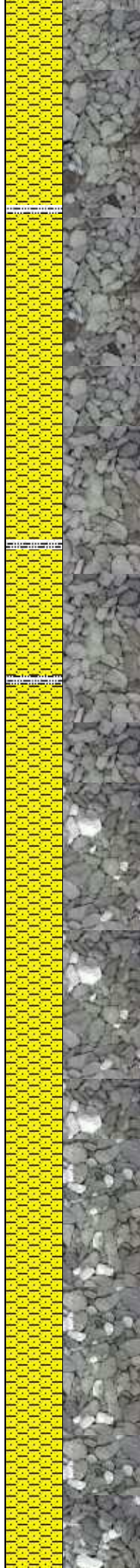
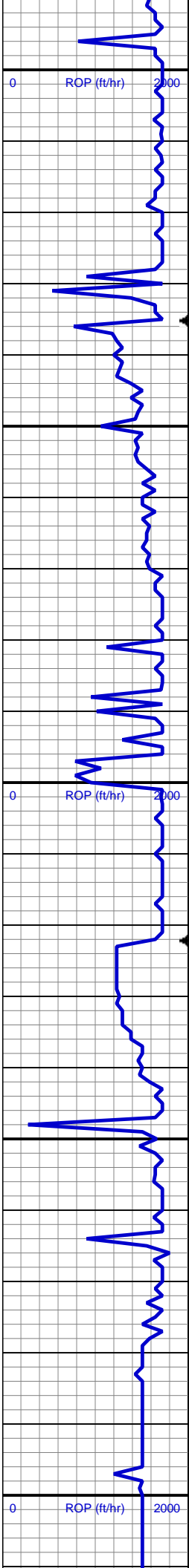
## Geologist

**Name** RENEE CLACKLER

**Company** NOBLE ENERGY INC.

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





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

56u  
C1: 100.0%  
C2: 0.0%  
C3: 0.0%  
C4: 0.0%

SHY SS: lt gry-gry, sb ang, sb plty, v sft, v f gr, mod srt

MD: 1,570'  
TVD: 1,569.98'  
Inclination: 0.64°  
Azimuth: 157.91°  
VS: -0.75'

17u

88

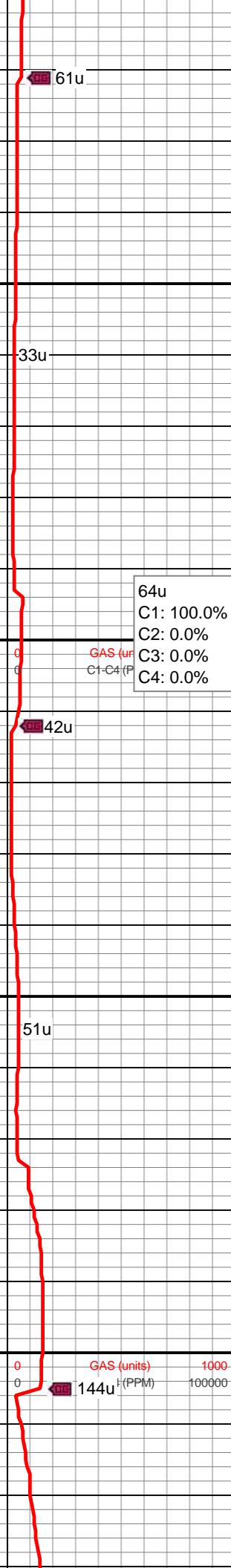
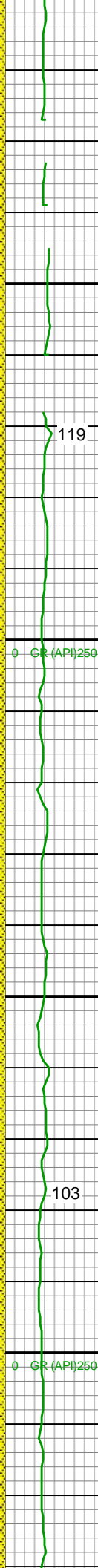
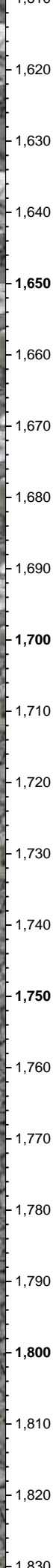
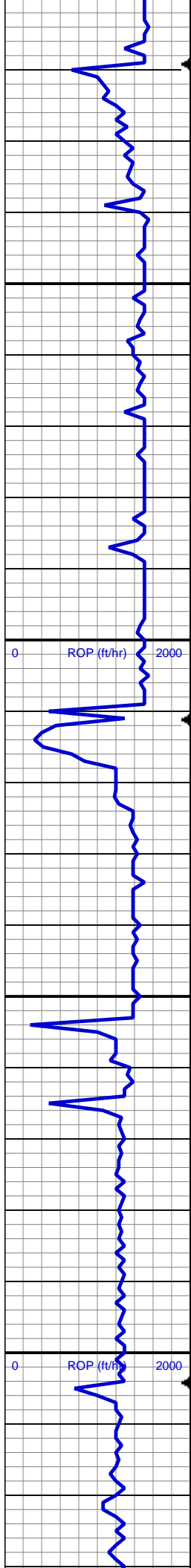
58u

53u

154u

95





SHY SS: lt gry-gry, sb ang, sb plty, v sft, v f gr, mod srt

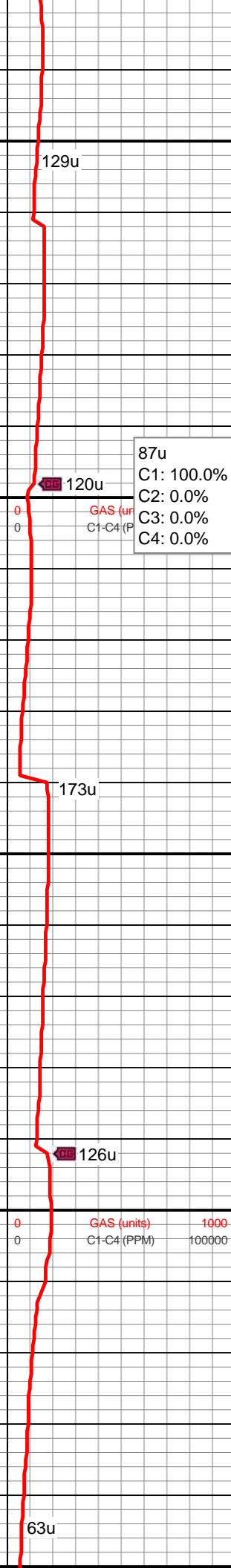
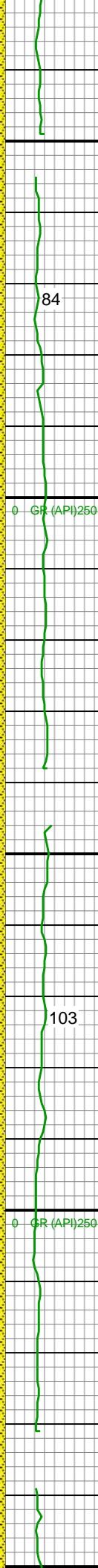
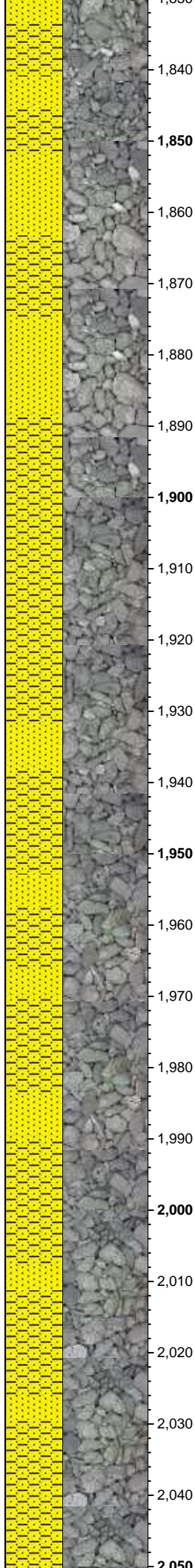
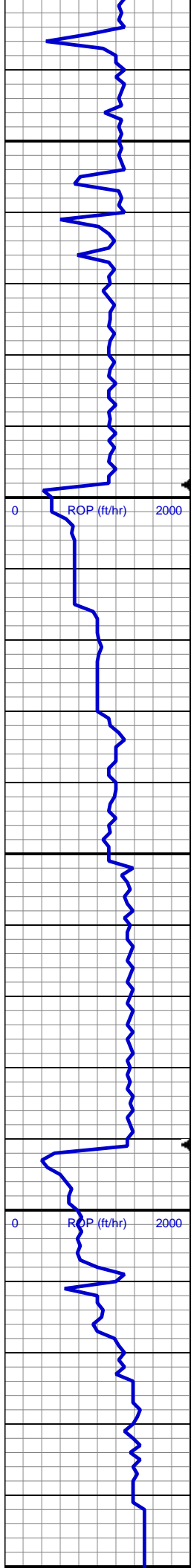
MD: 1,662'  
TVD: 1,661.97'  
Inclination: 1.13°  
Azimuth: 159.47°  
VS: -2.08'

64u  
C1: 100.0%  
C2: 0.0%  
C3: 0.0%  
C4: 0.0%

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, tr glauc

MD: 1,847'



TVD: 1,846.92'  
Inclination: 1.53°  
Azimuth: 143.48°  
VS: -5.78'

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, tr glauc

129u

84

87u  
C1: 100.0%  
C2: 0.0%  
C3: 0.0%  
C4: 0.0%

120u

173u

103

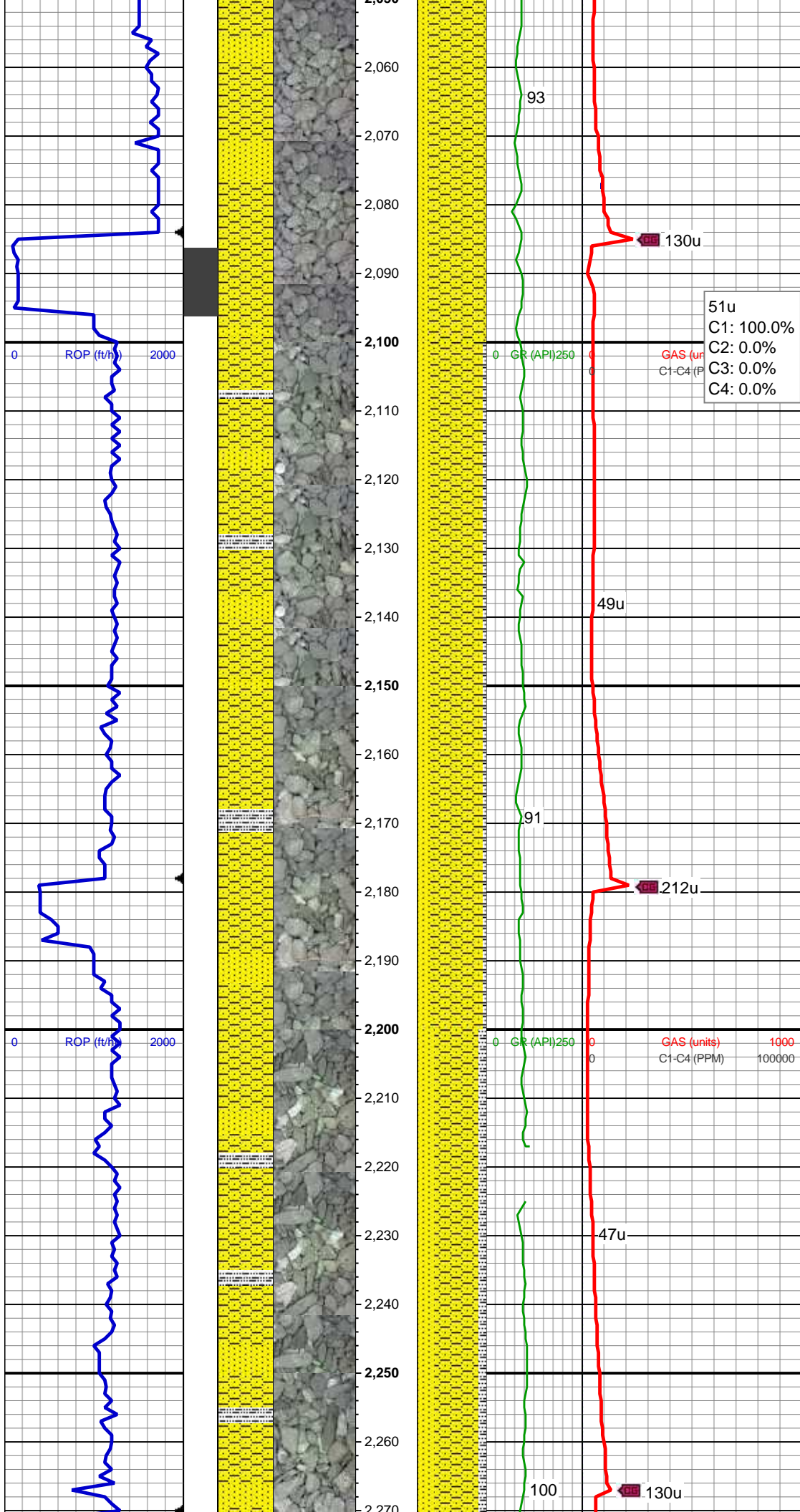
126u

MD: 2,033'  
TVD: 2,032.84'  
Inclination: 1.82°  
Azimuth: 146.41°  
VS: -10.24'

63u

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





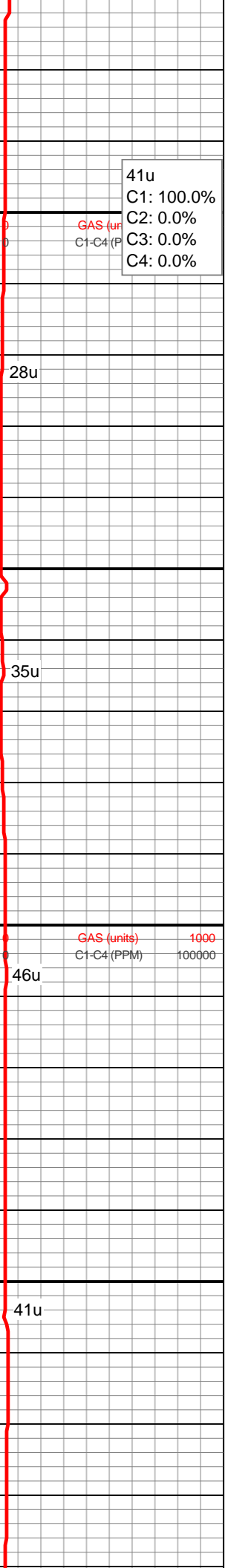
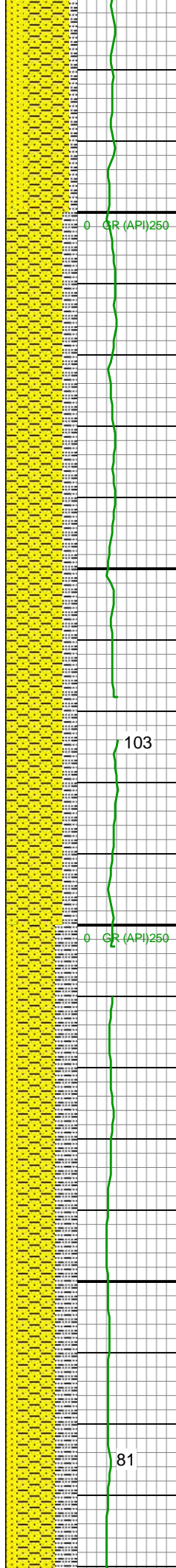
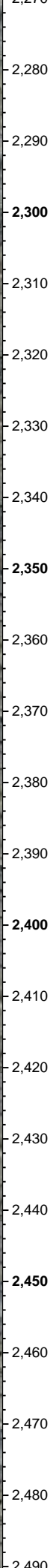
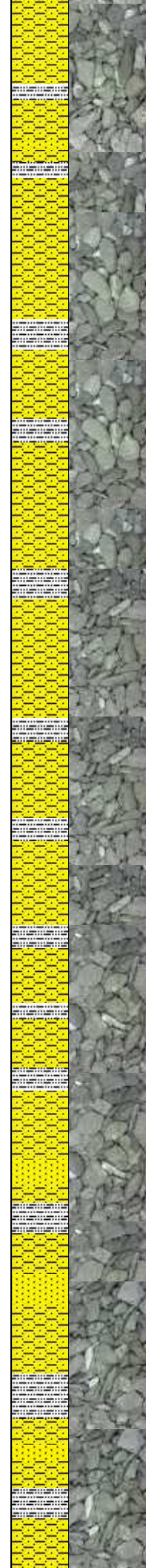
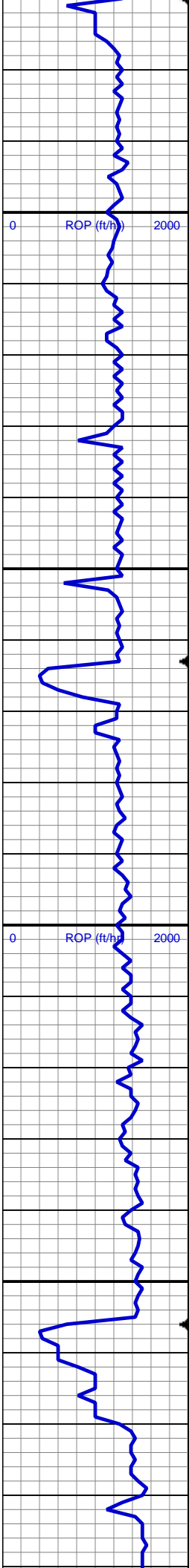
SS: clr, lt gry-wht, occ sap, sb rnd, f gr,  
hrd-frn, mod-w srt, sl calc cmt, tr glauc

MD: 2,126'  
TVD: 2,125.82'  
Inclination: 0.76°  
Azimuth: 115°  
VS: -11.73'

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

MD: 2,218'  
TVD: 2,217.8'  
Inclination: 1.39°  
Azimuth: 74.69°  
VS: -11.7'

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

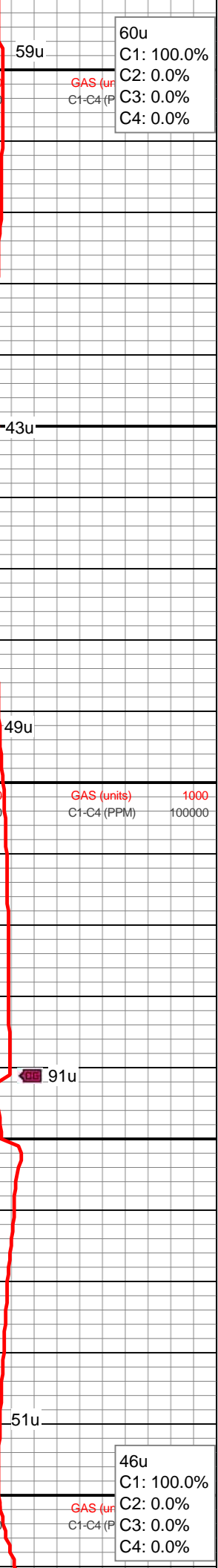
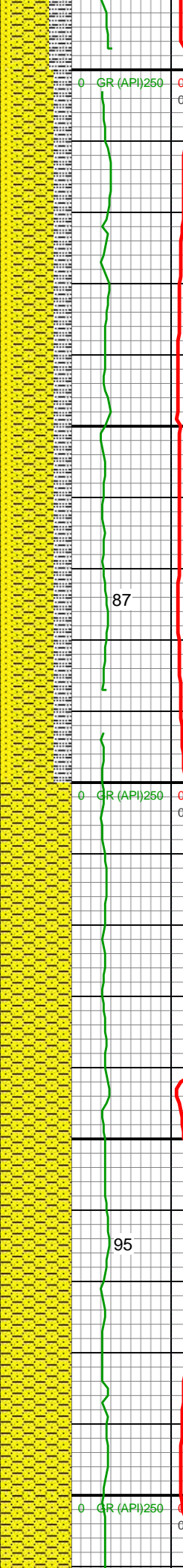
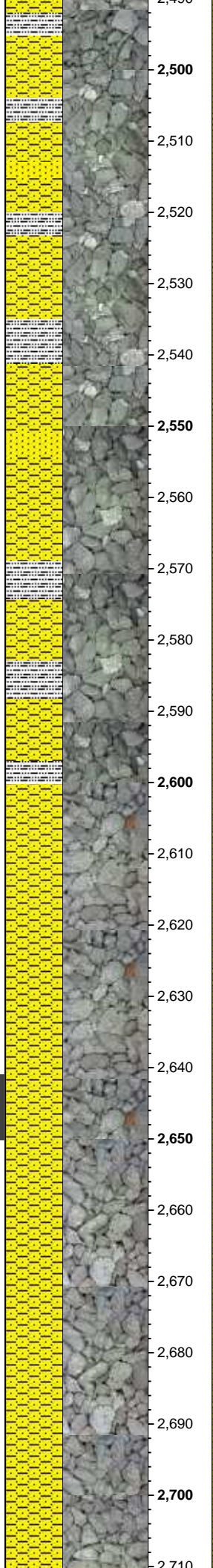
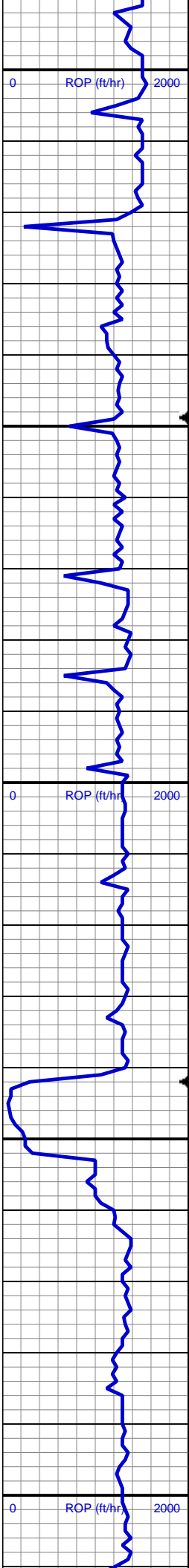


MD: 2,312'  
TVD: 2,311.78'  
Inclination: 1.23°  
Azimuth: 78.36°  
VS: -11.2'

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

SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, abnt 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 frm, mod-w srt, sl calc cmt





MD: 2,496'  
TVD: 2,495.73'  
Inclination: 1.25°  
Azimuth: 67.14°  
VS: -10.04'

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

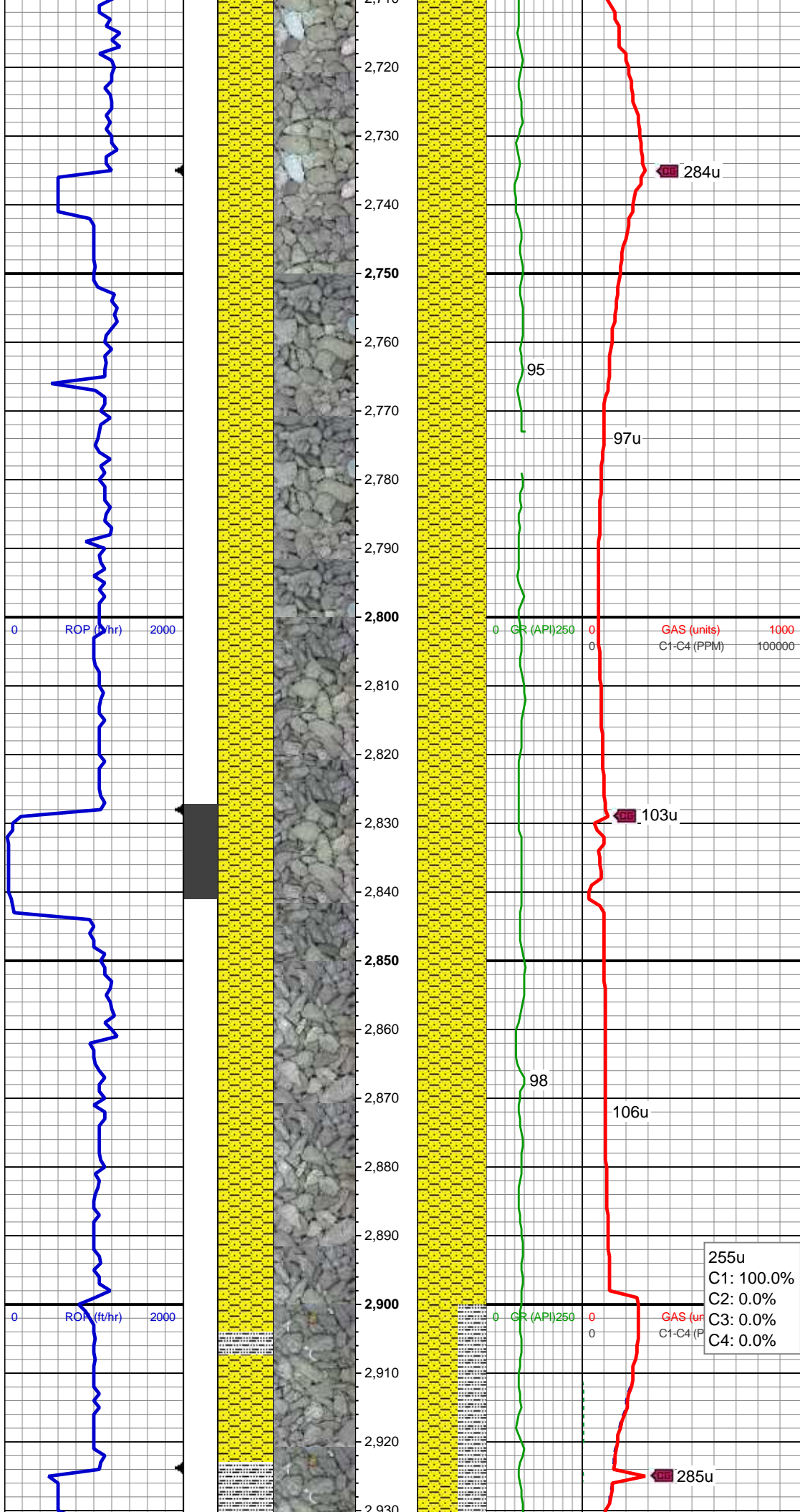
MD: 2,588'  
TVD: 2,587.71'  
Inclination: 1.31°  
Azimuth: 69.88°  
VS: -9.29'

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

MD: 2,681'  
TVD: 2,680.66'  
Inclination: 2.32°  
Azimuth: 54.64°  
VS: -7.84'

60u  
C1: 100.0%  
C2: 0.0%  
C3: 0.0%  
C4: 0.0%

46u  
C1: 100.0%  
C2: 0.0%  
C3: 0.0%  
C4: 0.0%



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

MD: 2,774'  
TVD: 2,773.59'  
Inclination: 2.23°  
Azimuth: 55.05°  
VS: -5.73'

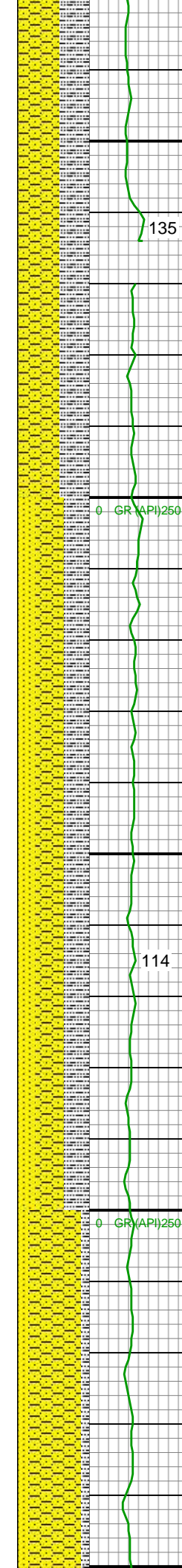
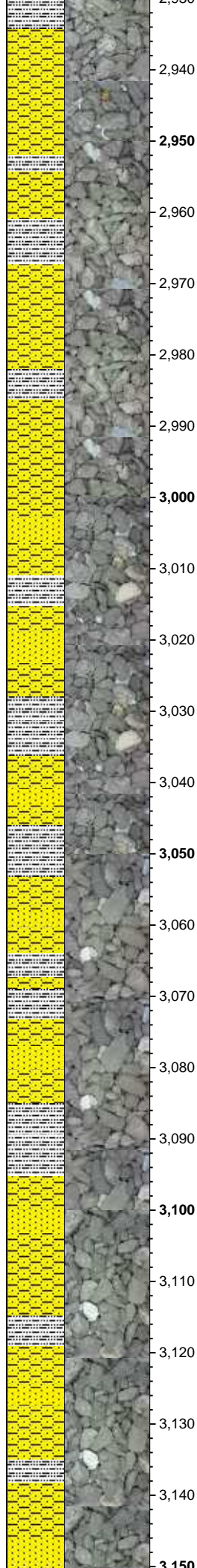
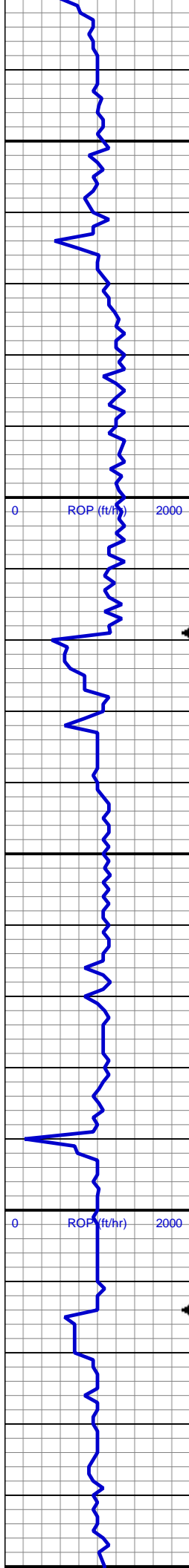
WT IN 8.80/ OUT 8.80  
VIS IN 28/ OUT 28

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

MD: 2,869'  
TVD: 2,868.55'  
Inclination: 1.11°  
Azimuth: 11.3°  
VS: -3.77'

255u  
C1: 100.0%  
C2: 0.0%  
C3: 0.0%  
C4: 0.0%





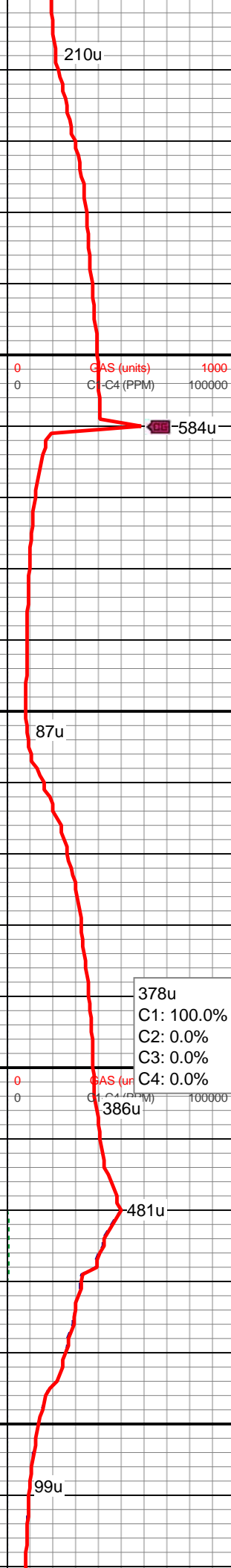
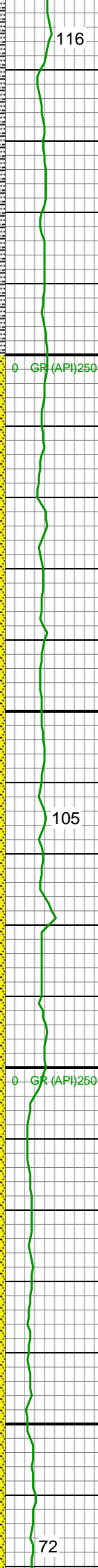
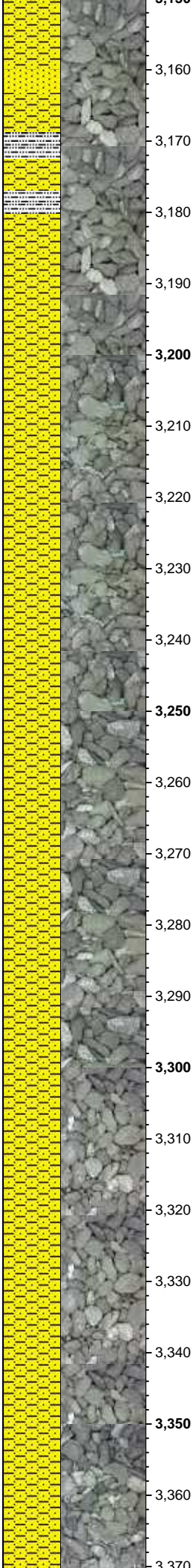
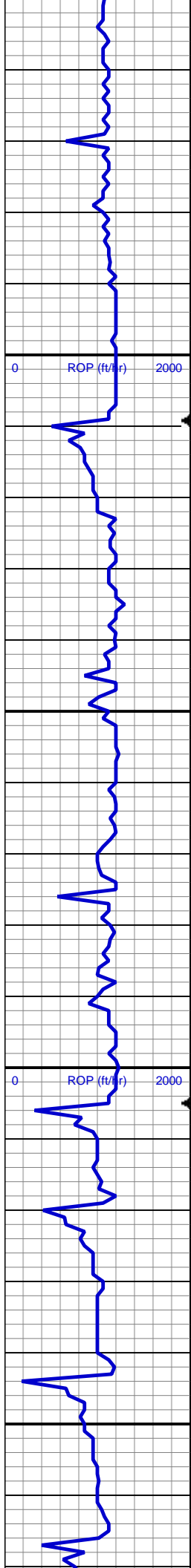
SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, abnt lith frag  
SLTY SH: gry-dkr gry, rnd, sb plty, v sft,  
silty tex

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

MD: 3,058'  
TVD: 3,057.53'  
Inclination: 0.66°  
Azimuth: 340.8°  
VS: -0.95'

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,



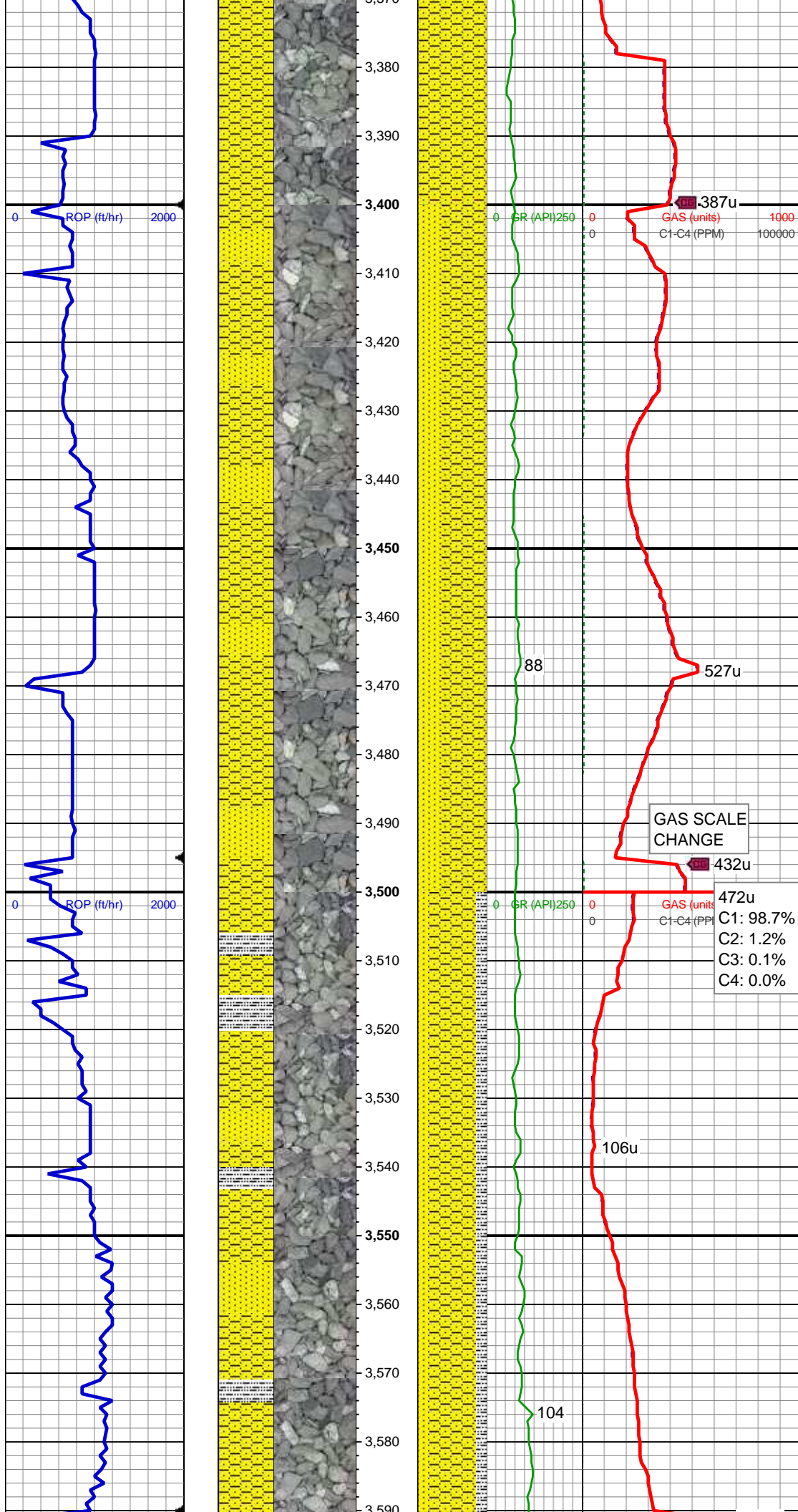


hrd-frm, mod-w srt, sl calc cmt  
SLTY SH: gry-dkr gry, rnd, sb plty, v sft, slty tex

MD: 3,152'  
TVD: 3,151.52'  
Inclination: 0.99°  
Azimuth: 350.09°  
VS: 0.36'

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, occ lith frag



MD: 3,436'  
TVD: 3,435.49'  
Inclination: 0.78°  
Azimuth: 11.16°  
VS: 4.65'

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, tr glauc

GAS SCALE  
CHANGE

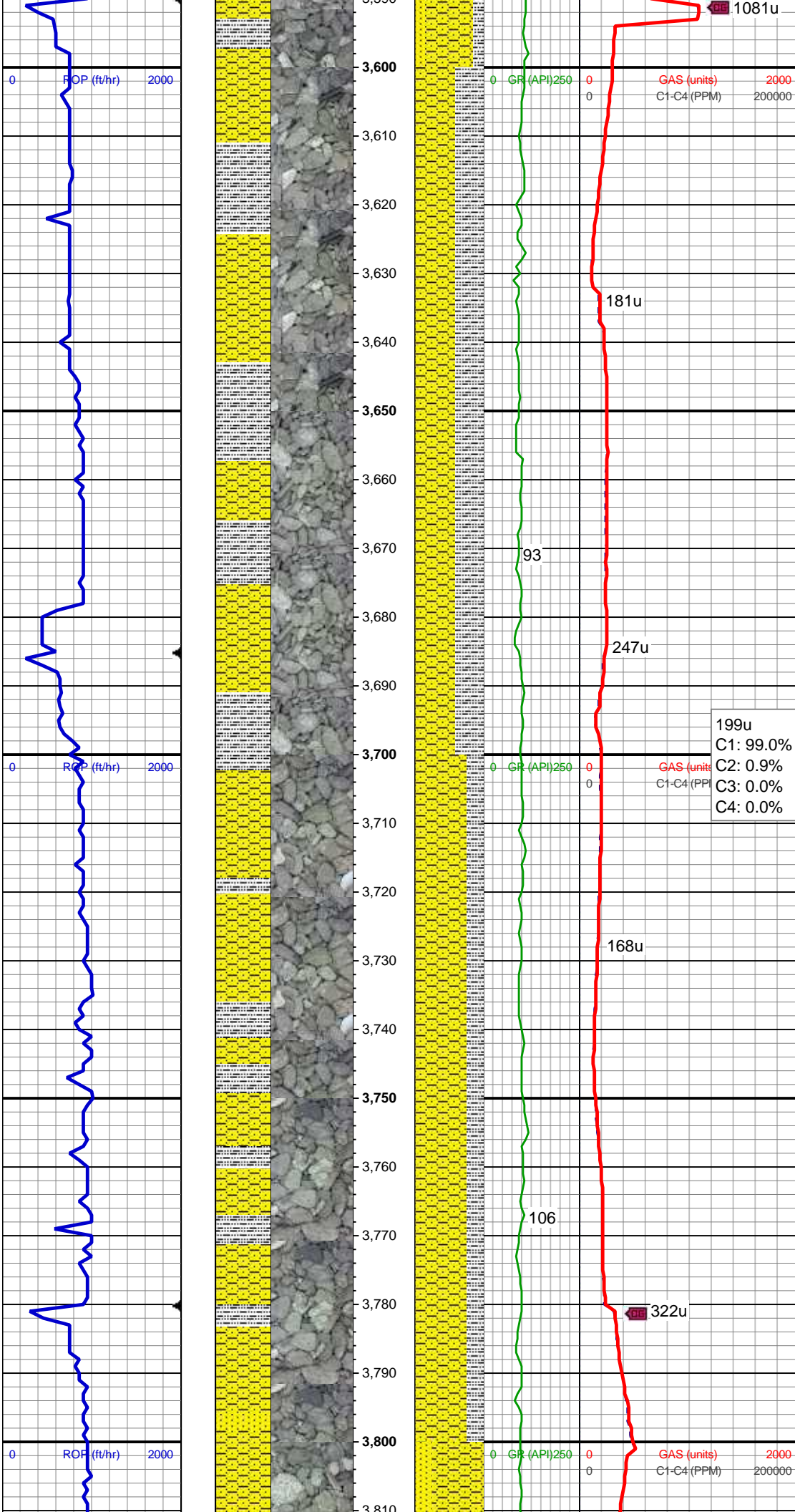
432u  
472u  
C1: 98.7%  
C2: 1.2%  
C3: 0.1%  
C4: 0.0%

WT IN 8.80/ OUT 8.80  
VIS IN 27/ OUT 27

MD: 3,531'  
TVD: 3,530.48'  
Inclination: 0.9°  
Azimuth: 21.12°  
VS: 5.97'

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





MD: 3,626'  
TVD: 3,625.46'  
Inclination: 1.19°  
Azimuth: 13.5°  
VS: 7.62'

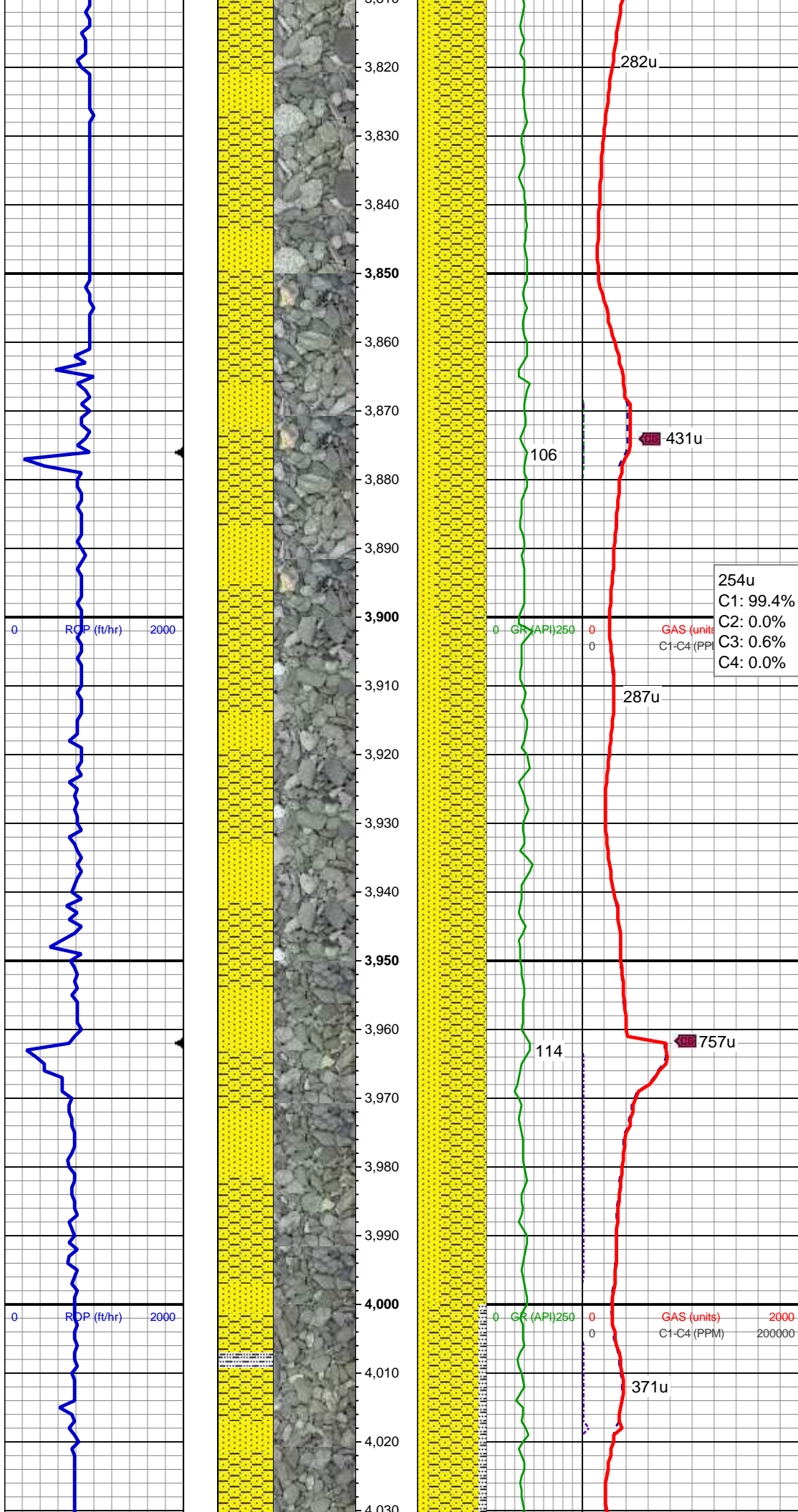
SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, abnt lith frag  
SLTY SH: gry-dkr gry, rnd, sb plty, v sft,  
sly tex

199u  
C1: 99.0%  
C2: 0.9%  
C3: 0.0%  
C4: 0.0%

MD: 3,720'  
TVD: 3,719.44'  
Inclination: 1.05°  
Azimuth: 6.33°  
VS: 9.43'

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

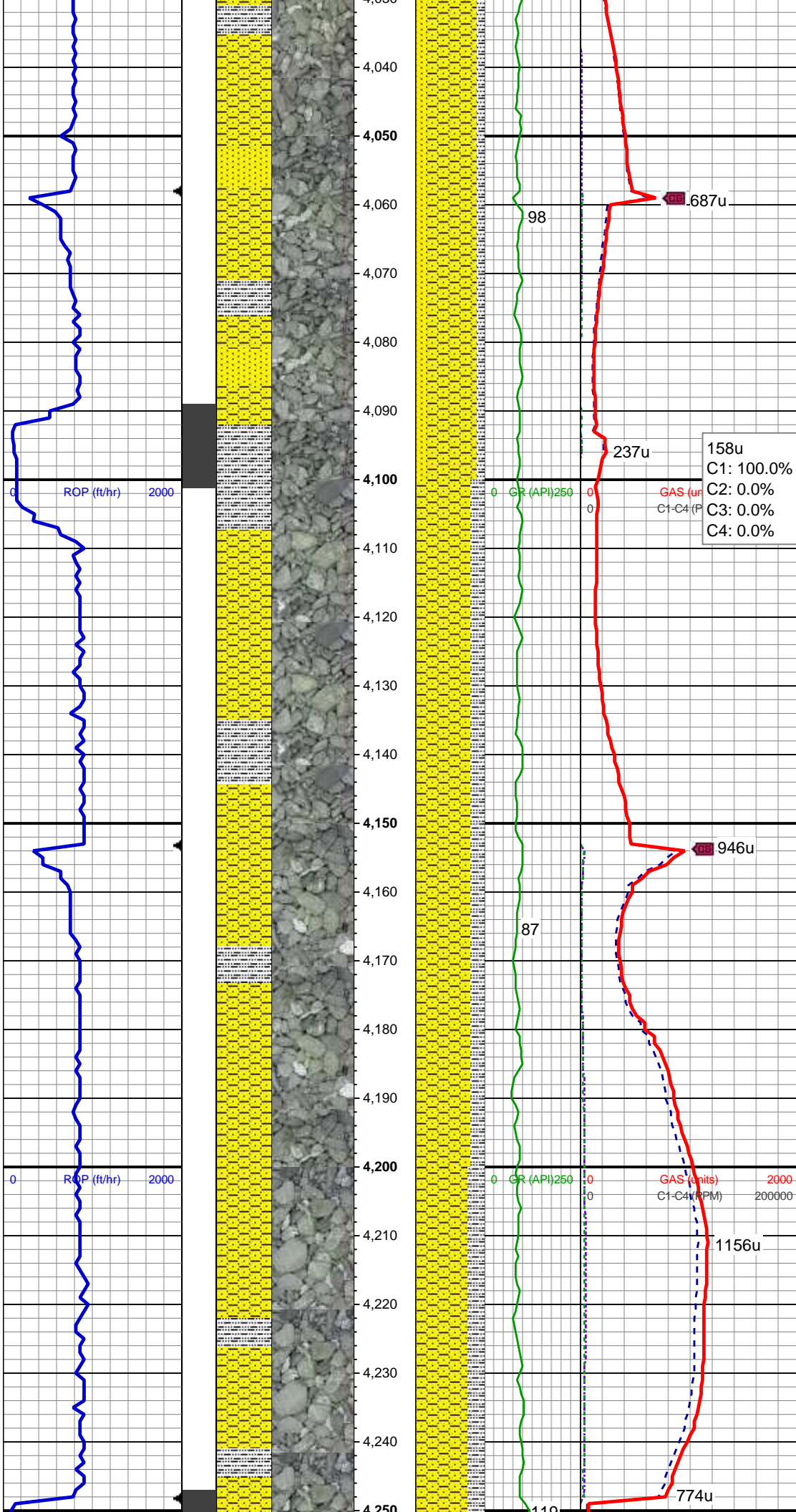




SHY SS: lt gry, sb ang, sb plty, v sft, v f  
gr, mod srt, abnt lith frag  
SS: clr, lt gry-wht, occ sap, sb rnd, f gr,  
hrd-frm, mod-w srt, sl calc cmt

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

MD: 4,005'  
TVD: 4,004.35'  
Inclination: 2.17°  
Azimuth: 312.37°  
VS: 14.91'



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, tr glauc  
SLTY SH: gry-dkr gry, rnd, sb plty, v sft,  
sly tex

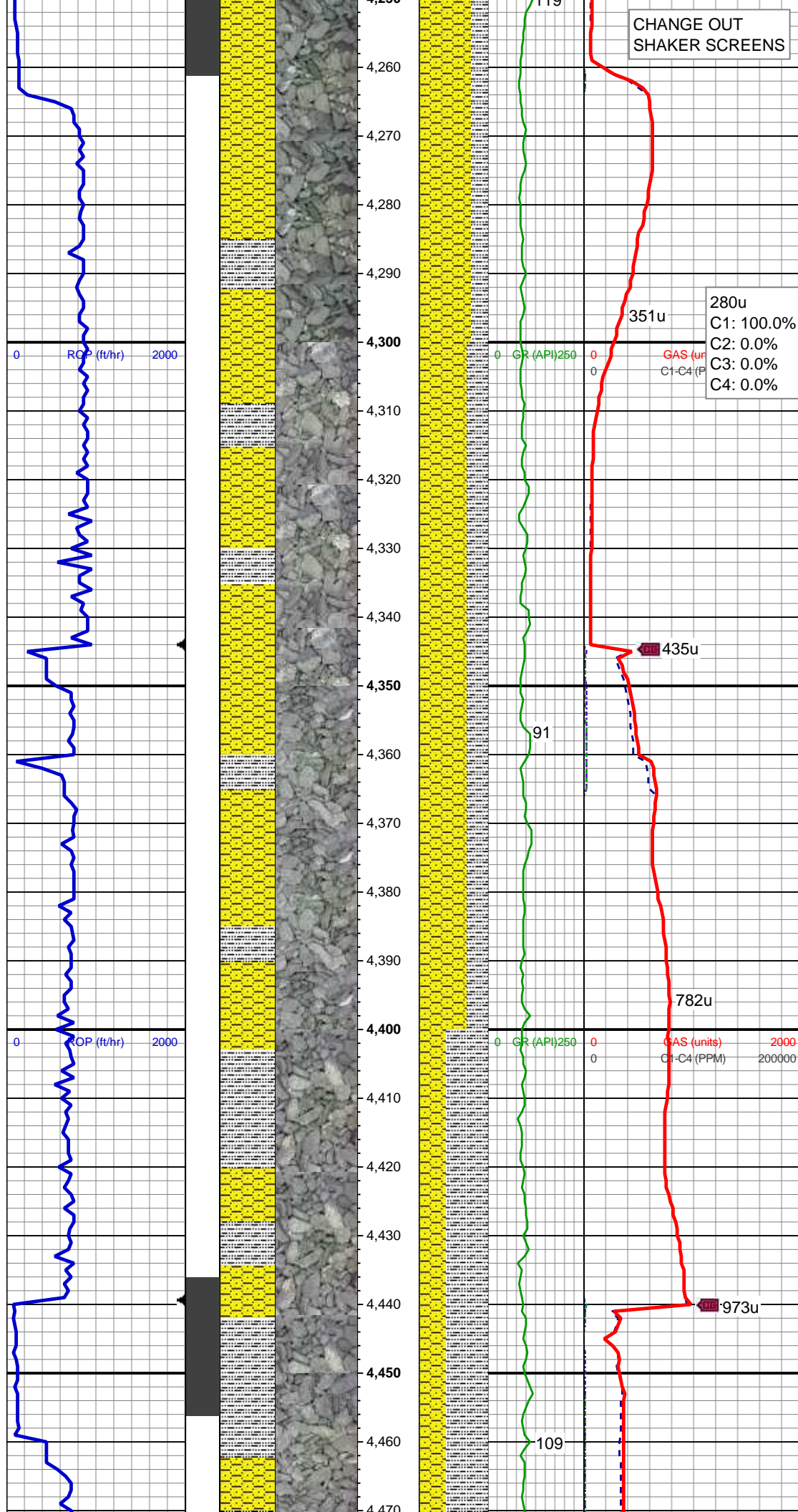
MD: 4,100'  
TVD: 4,099.3'  
Inclination: 1.73°  
Azimuth: 298.56°  
VS: 16.82'

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

MD: 4,194'  
TVD: 4,193.25'  
Inclination: 1.89°  
Azimuth: 277.43°  
VS: 17.7'

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





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

MD: 4,289'  
TVD: 4,288.22'  
Inclination: 1.18°  
Azimuth: 221.81°  
VS: 17.18'

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

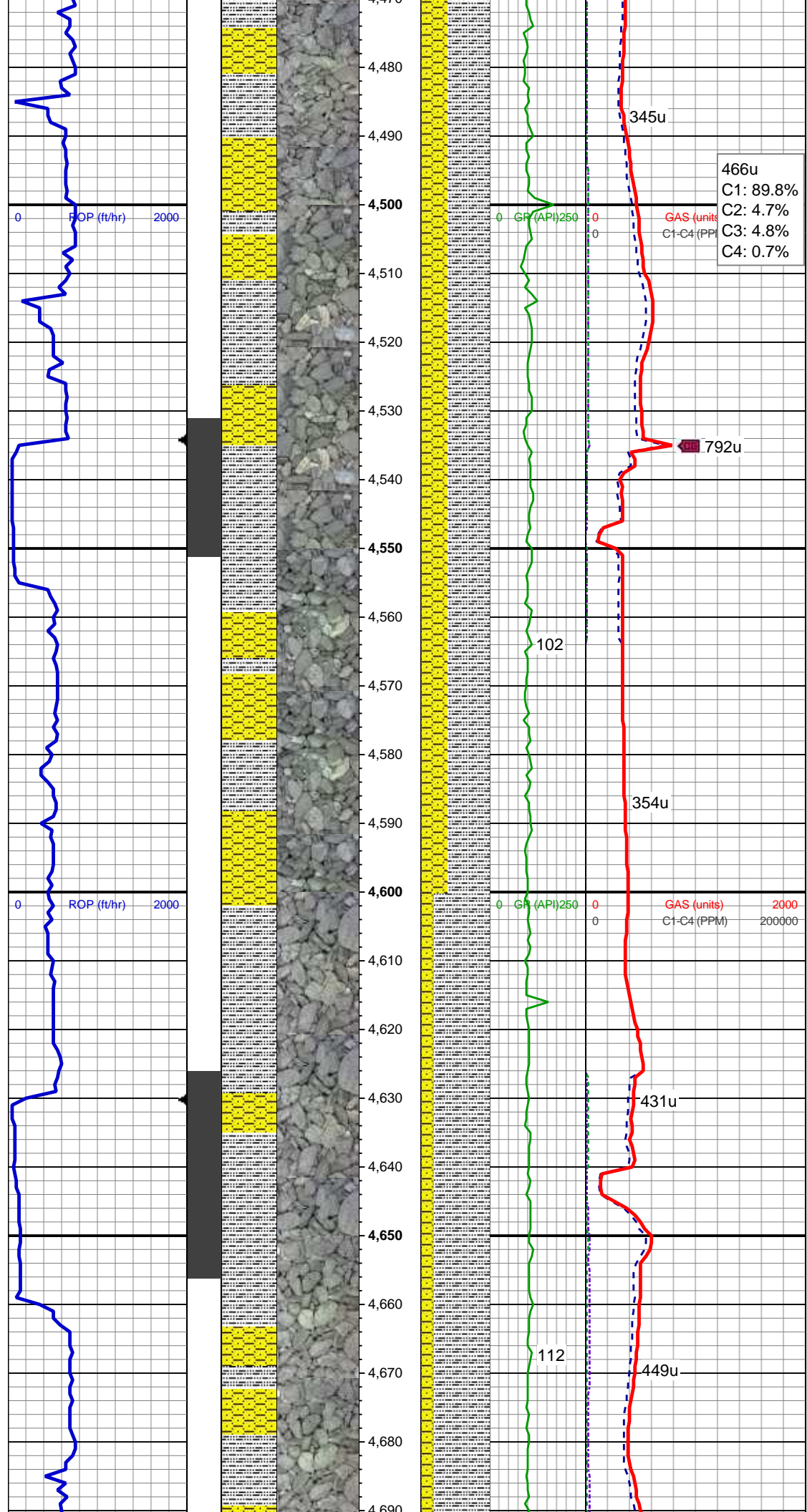
MD: 4,383'  
TVD: 4,382.19'  
Inclination: 1.88°  
Azimuth: 245.27°  
VS: 15.82'

WT IN 9.40/ OUT 9.40  
VIS IN 37/ OUT 37

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



MD: 4,478'  
TVD: 4,477.13'  
Inclination: 2.46°  
Azimuth: 205.7°  
VS: 13.34'



466u  
C1: 89.8%  
C2: 4.7%  
C3: 4.8%  
C4: 0.7%

GAS (units)  
C1-C4 (PPM)

792u

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

MD: 4,573'  
TVD: 4,572.08'  
Inclination: 1.33°  
Azimuth: 158.78°  
VS: 10.48'

354u

431u

WT IN 9.50/ OUT 9.50  
VIS IN 35/ OUT 35

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

449u

112

