

# COLUMBINE LOGGING

Scale: 5" / 100'  
Measured Depth Log

**Well Name** CASTOR FEDERAL LD15-72HN

**Location** NENE SEC 15 T9N R58W

**State** COLORADO

**County** WELD

**Country** UNITED STATES

**Rig Number** H&P 273

**API Number** 05-123-37433

**Region** DJ BASIN

**Field** WILDCAT

**Spud Date** 12/8/2013

**Drilling Completed** 12/11/2013

**Surface Coordinates** 300' FNL; 660' FEL

**Ground Elevation** 4704'

**K.B. Elevation** 4728'

**Logged Interval** 1242' **To** 4860'

**Total Depth** 4860'

**Formation** NIOBRARA B MARL

**Type of Drilling Fl...** LSND

## Operator

**Company** NOBLE ENERGY INC.

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

## Geologist

**Name** SARAH COMPTON

**Company** NOBLE ENERGY INC.

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

## Other

Wellsite Geologist #1: LAURA KELLOGG

Wellsite Geologist #2: CONOR PESICKA

## Rock Types

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

## 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

E EARTHY  
F FENESTRAL  
F FRACTURE  
X INTERCRYSTALLINE  
O 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

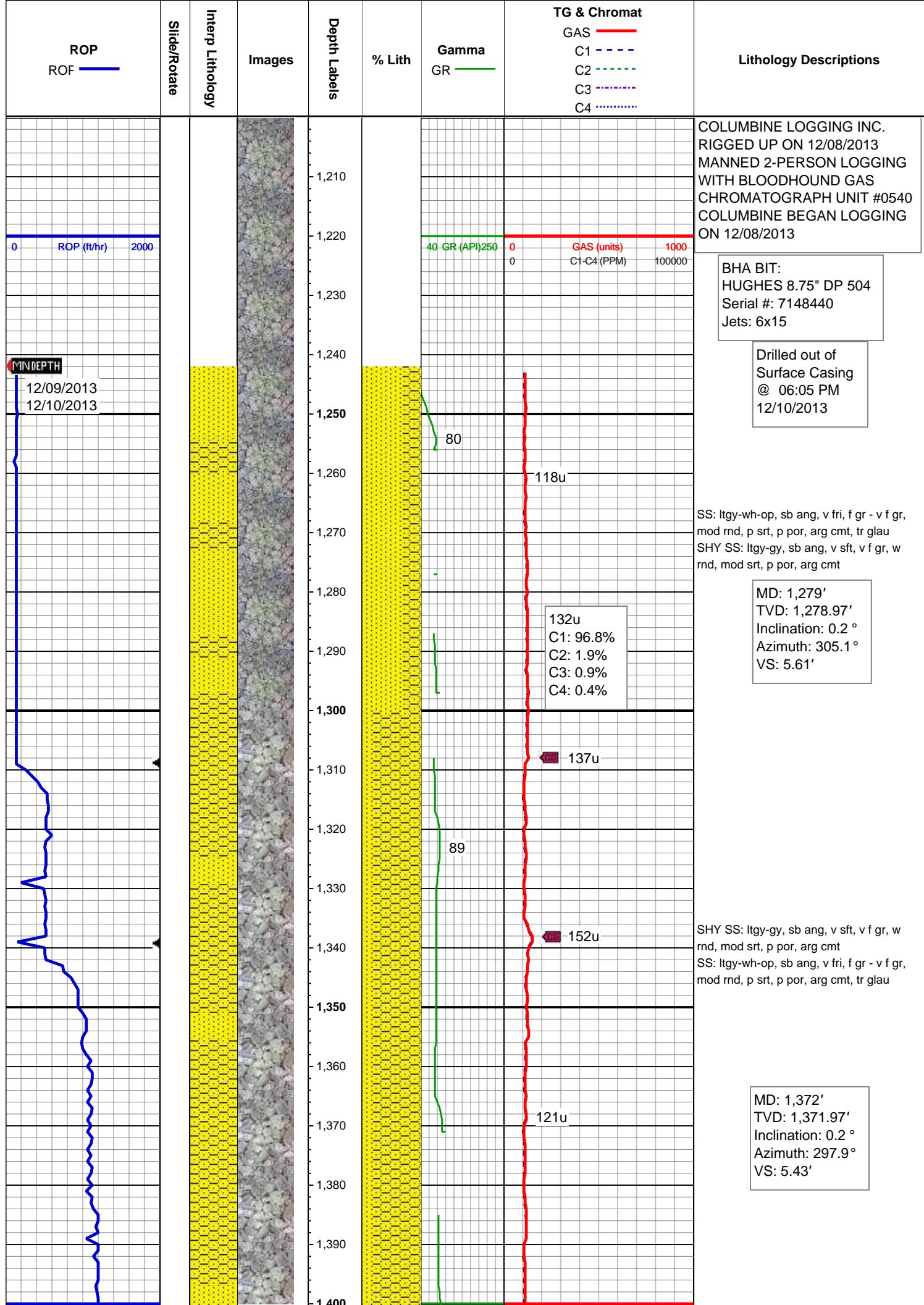
BOUNDSTONE  
CHALKY  
CRYPTOXLN

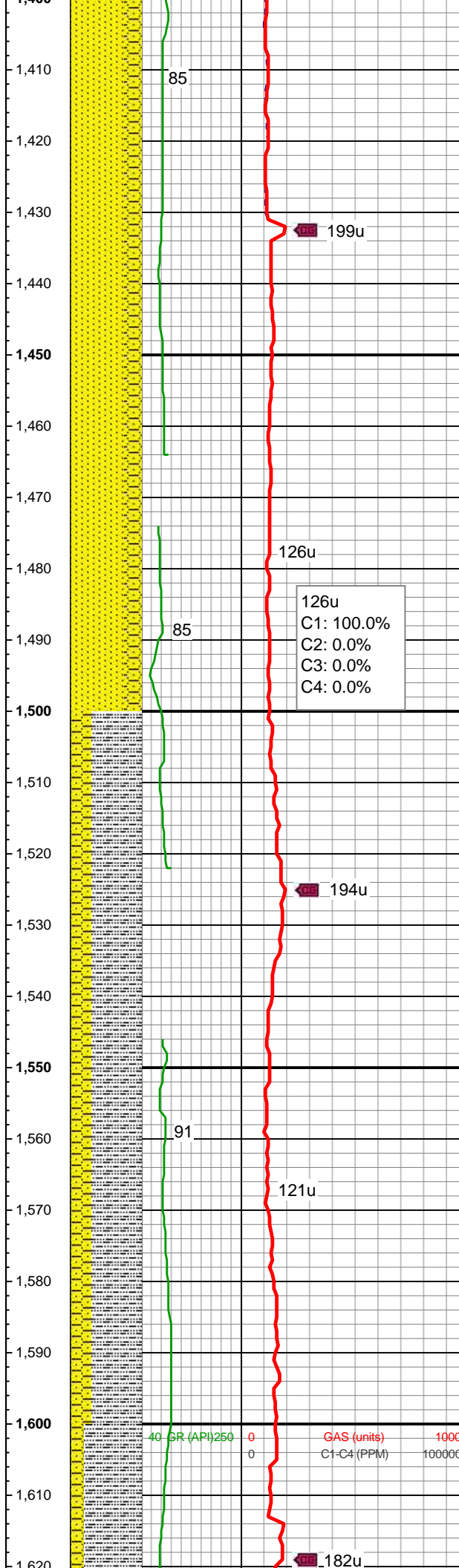
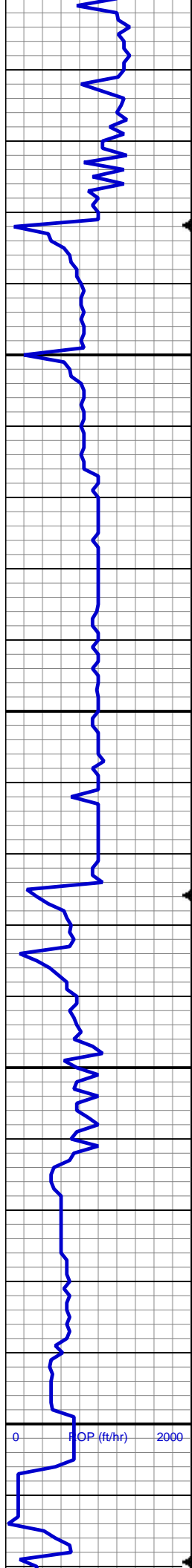
### E EARTHY

FINELYXLN  
GRAINSTONE  
L LITHOGRAPHIC  
MICROXLN  
MUDSTONE  
PACKSTONE  
WACKESTONE

### Sorting

M MODERATE  
P POOR  
W WELL





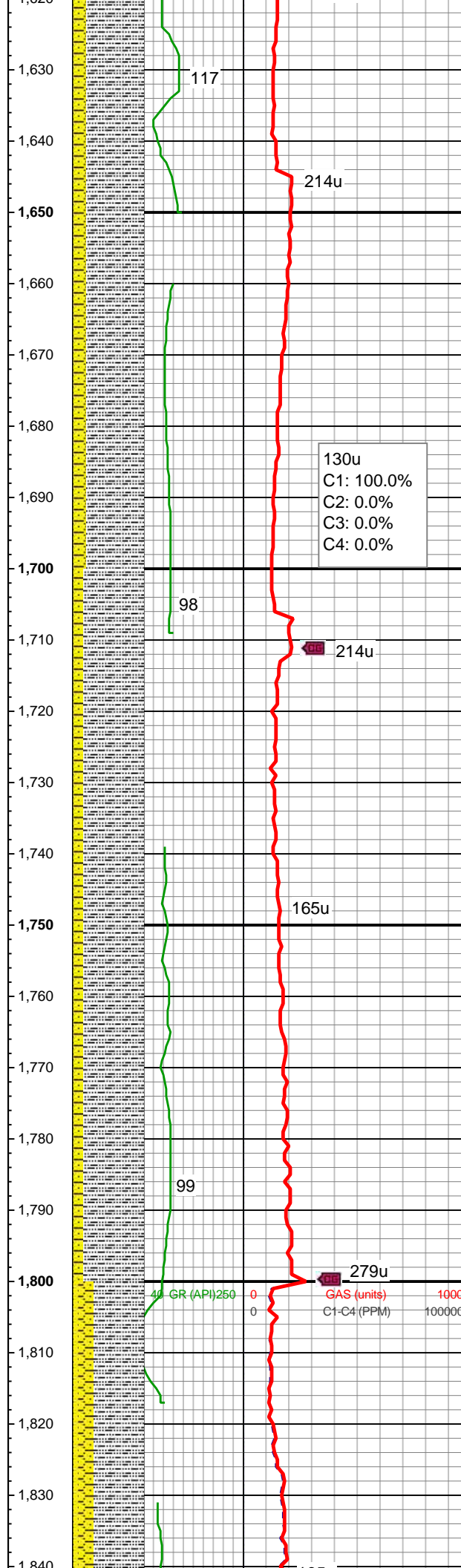
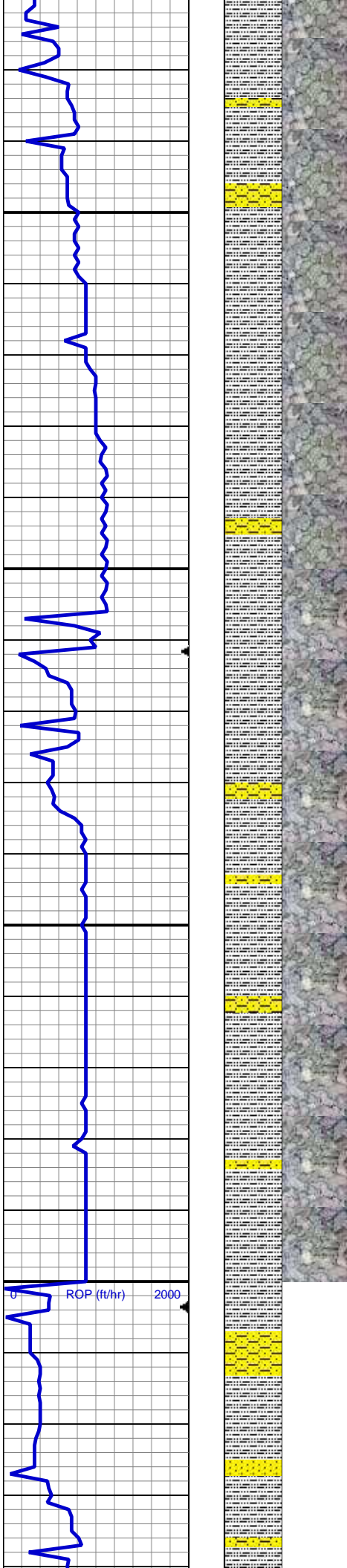
SS: ltgy-wh-op, sb ang, v fri, f gr - v f gr,  
mod rnd, p srt, p por, arg cmt, tr glau  
SHY SS: ltgy-gy, sb ang, v sft, v f gr, w  
rnd, mod srt, p por, arg cmt

MD: 1,465'  
TVD: 1,464.97'  
Inclination: 0.3 °  
Azimuth: 299.1 °  
VS: 5.23'

126u  
C1: 100.0%  
C2: 0.0%  
C3: 0.0%  
C4: 0.0%

SLTY SH: gy-dk gy, sb blkly-sb plty, v sft,  
sly tex, arg cmt  
SHY SS: ltgy-gy, sb ang, v sft, v f gr, w  
rnd, w srt, p por, arg cmt, grdg to ss

MD: 1,558'  
TVD: 1,557.96'  
Inclination: 0.3 °  
Azimuth: 283 °  
VS: 5.04'



SLTY SH: gy-dk gy, sb blkly-sb plty, v sft, slty tex, arg cmt  
SHY SS: ltgy-gy, sb ang, v sft, v f gr, w rnd, w srt, p por, arg cmt

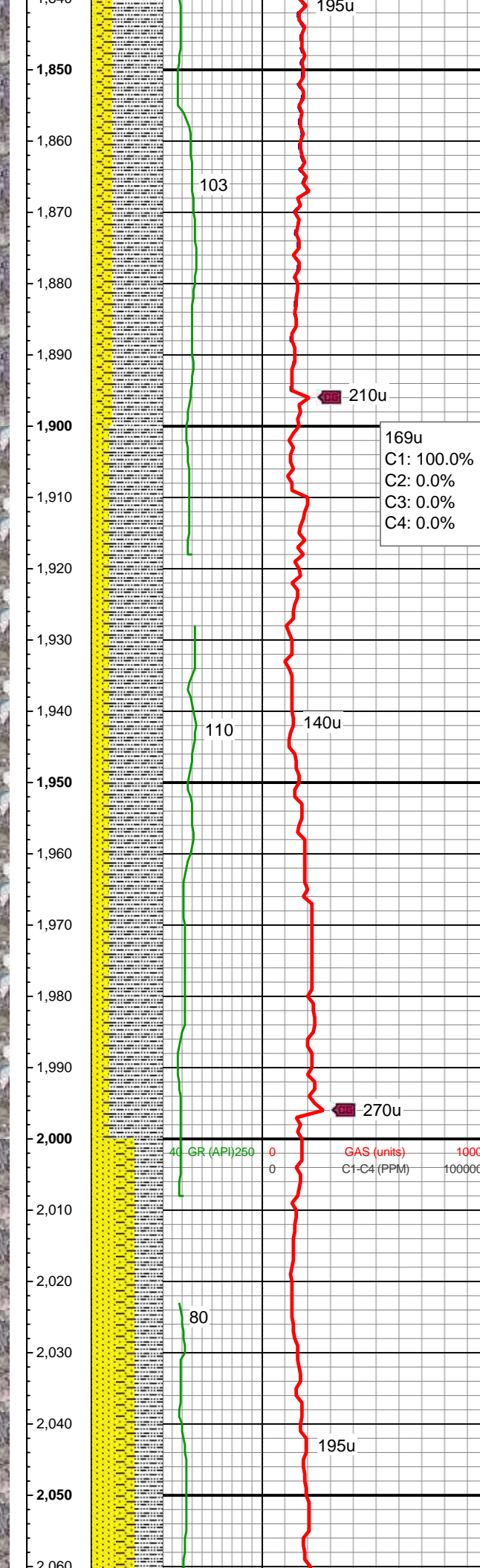
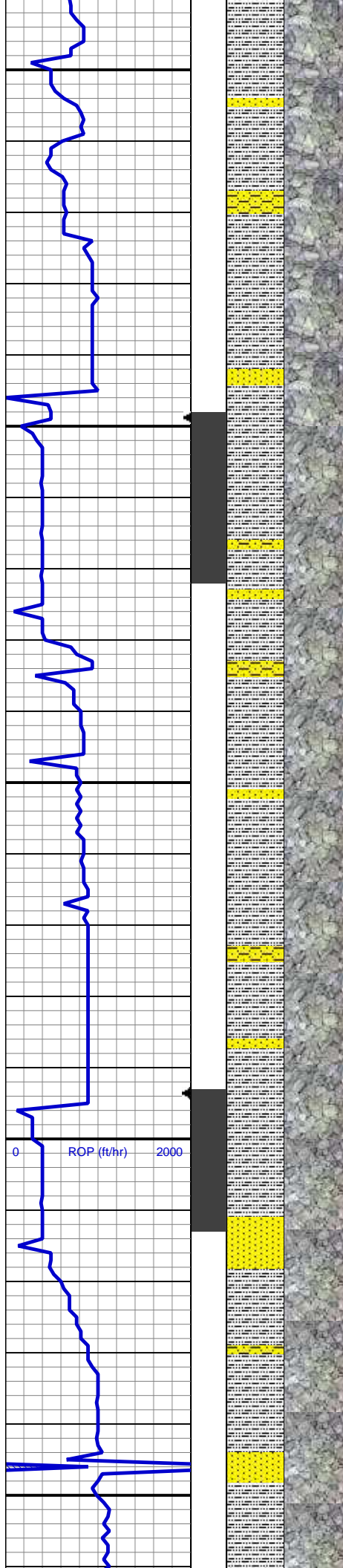
MD: 1,650'  
TVD: 1,649.96'  
Inclination: 0.3 °  
Azimuth: 299.1 °  
VS: 4.85'

WT IN 8.40/ OUT 8.40  
VIS IN 26/ OUT 26

SLTY SH: gy-dk gy, sb blkly-sb plty, v sft, slty tex, arg cmt  
SHY SS: ltgy-gy, sb ang, v sft, v f gr, w rnd, w srt, p por, arg cmt, tr ss

MD: 1,743'  
TVD: 1,742.96'  
Inclination: 0.2 °  
Azimuth: 311.1 °  
VS: 4.61'

MD: 1,838'  
TVD: 1,837.95'  
Inclination: 1.7 °  
Azimuth: 30.7 °  
VS: 3.31'



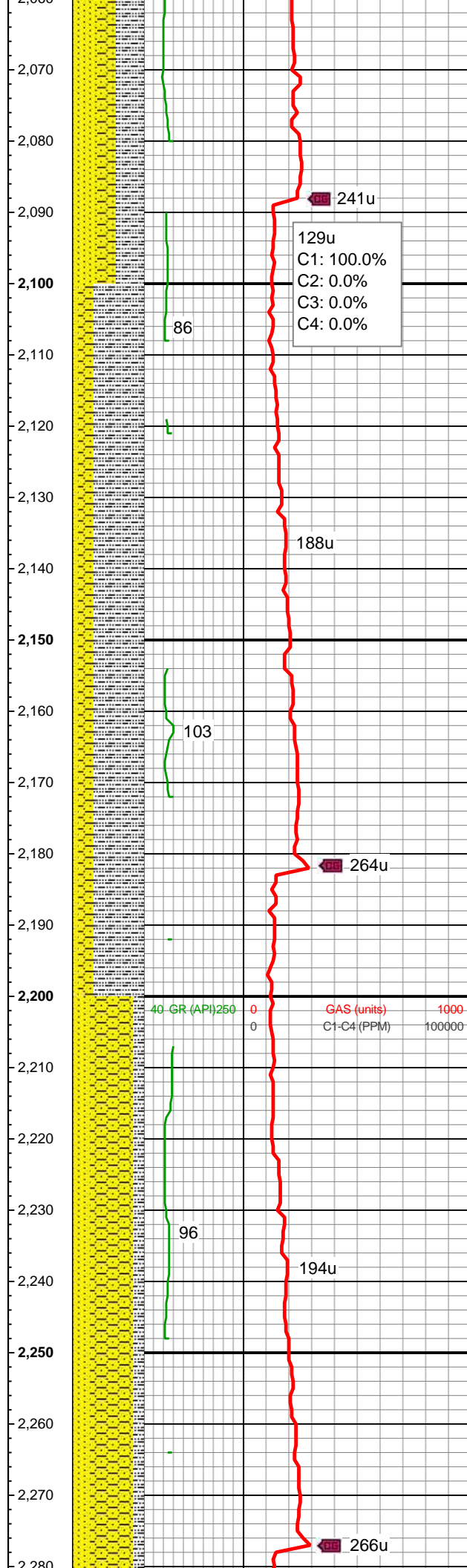
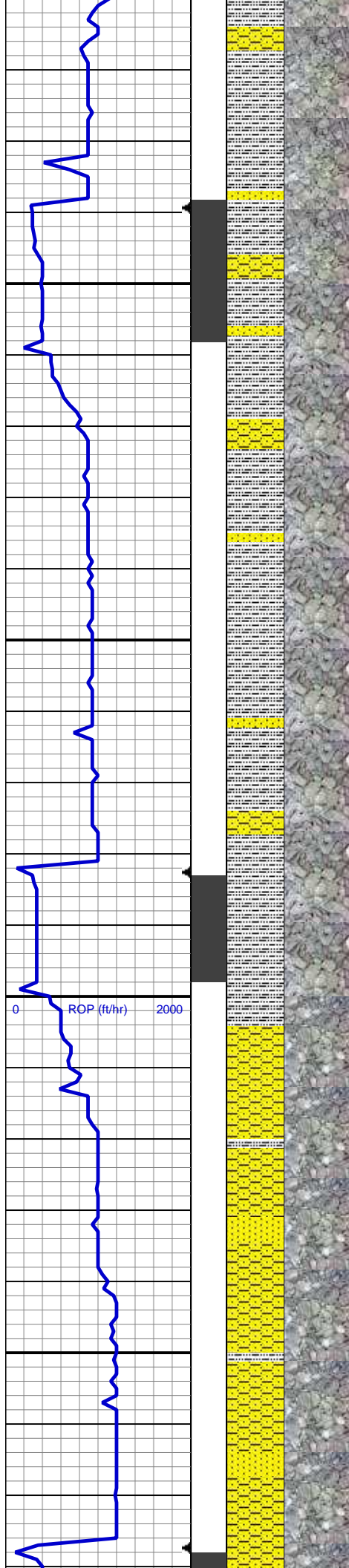
SLTY SH: gy-dk gy, sb blkly-sb plty, v sft, slty tex, arg cmt  
SHY SS: ltgy-gy, sb ang, v sft, v f gr, w rnd, w srt, p por, arg cmt  
SS: wh-op, sb ang-ang, v fri, f gr, w rnd, mod srt, p por, arg cmt, tr lthc frag, tr glau

MD: 1,933'  
TVD: 1,932.86'  
Inclination: 3.3 °  
Azimuth: 353.3 °  
VS: -0.6'

SLTY SH: gy-dk gy, sb blkly-sb plty, v sft, slty tex, arg cmt  
SS: wh-op, sb ang-ang, v fri, f gr, w rnd, mod srt, p por, arg cmt, tr lthc frag, tr glau  
SHY SS: ltgy-gy, sb ang, v sft, v f gr, w rnd, w srt, p por, arg cmt

MD: 2,028'  
TVD: 2,027.62'  
Inclination: 4.8 °  
Azimuth: 8.9 °  
VS: -7.23'

SLTY SH: gy-dk gy, sb blkly-sb plty, v sft, slty tex, arg cmt  
SS: wh-lt gy-op, sb ang-ang, v fri, f gr, w rnd, mod srt, p por, arg cmt, shy ip, tr lthc frag, tr glau  
SHY SS: ltgy-gy, sb ang, v sft, v f gr, w rnd, w srt, p por, arg cmt



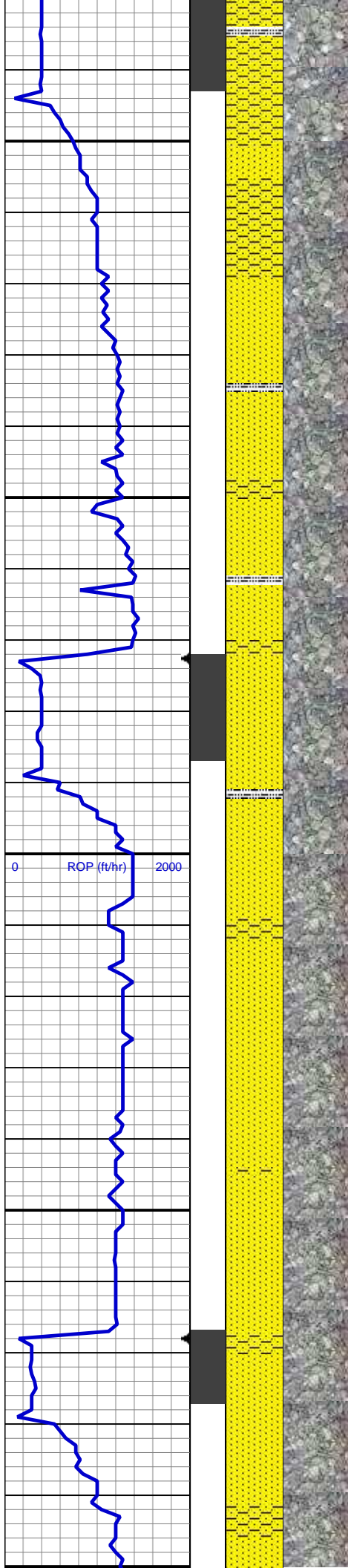
WT IN 8.40+ OUT 8.60+  
VIS IN 26/ OUT 27

MD: 2,123'  
TVD: 2,122.16'  
Inclination: 6.5 °  
Azimuth: 1.9°  
VS: -16.49'

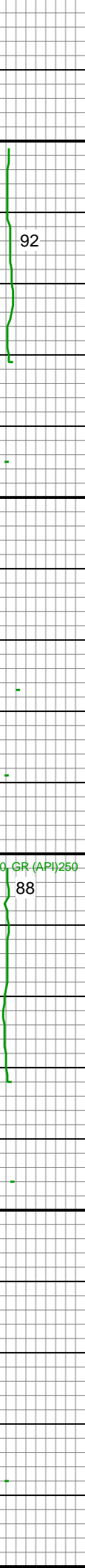
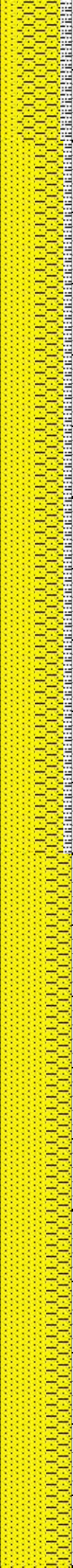
SLTY SH: gy-dk gy, sb blkly-sb plty, v sft, slty tex, arg cmt  
SHY SS: ltgy-gy, sb ang, v sft, v f gr, w rnd, w srt, p por, arg cmt  
SS: wh-lt gy-op, sb ang-ang, v fri, f gr, w rnd, mod srt, p por, arg cmt, shy ip, tr lthc frag, tr glau

MD: 2,218'  
TVD: 2,216.47'  
Inclination: 7.3 °  
Azimuth: 1°  
VS: -27.88'

SHY SS: ltgy-gy, sb ang, v sft, v f gr, w rnd, w srt, p por, arg cmt, tr lthc frag  
SS: wh-lt gy-op, sb ang-ang, v fri, f gr, w rnd, mod srt, p por, arg cmt, lenc shy ss, tr lthc frag, tr glau  
SLTY SH: gy-dk gy, sb blkly-sb plty, v sft, slty tex, arg cmt



2,290  
2,300  
2,310  
2,320  
2,330  
2,340  
2,350  
2,360  
2,370  
2,380  
2,390  
2,400  
2,410  
2,420  
2,430  
2,440  
2,450  
2,460  
2,470  
2,480  
2,490  
2,500



147u  
C1: 100.0%  
C2: 0.0%  
C3: 0.0%  
C4: 0.0%

92

197u

276u

88

171u

347u

162u  
C1: 100.0%  
C2: 0.0%  
C3: 0.0%  
C4: 0.0%

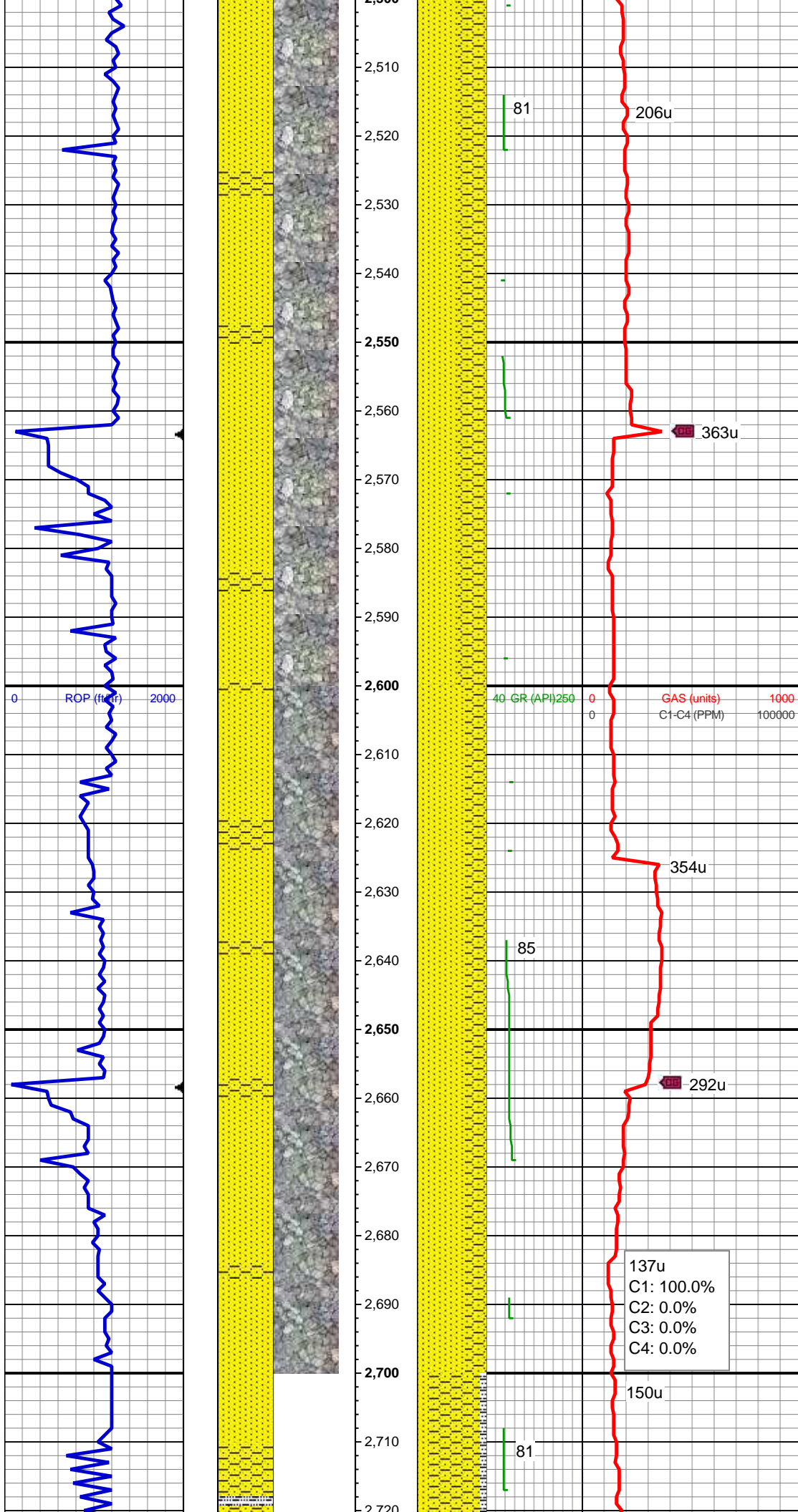
SS: wh-lt gy-op, sb ang-ang, v fri, f gr, w  
rnd, mod srt, p por, arg cmt, lenc shy ss,  
tr lthc frag, tr glau  
SHY SS: ltgy-gy, sb ang, v sft, v f gr, w  
rnd, w srt, p por, arg cmt, tr lthc frag  
SLTY SH: gy-dk gy, sb blkly-sb plty, v sft,  
sfty tex, arg cmt

MD: 2,312'  
TVD: 2,309.64'  
Inclination: 7.9 °  
Azimuth: 359.4 °  
VS: -40.3'

MD: 2,407'  
TVD: 2,403.6'  
Inclination: 9.1 °  
Azimuth: 359.9 °  
VS: -54.34'

WT IN 8.40+ OUT 8.40+  
VIS IN 26/ OUT 26

MD: 2,502'  
TVD: 2,497.34'



Inclination: 9.6 °  
Azimuth: 353.4 °  
VS: -69.74'

SS: wh-lt gy-op, sb ang-ang, v fri, f gr, w  
rnd, mod srt, p por, arg cmt, lenc shy ss,  
tr lthc frag, tr glau  
SHY SS: ltgy-gy, sb ang, v sft, v f gr, w  
rnd, w srt, p por, arg cmt, tr lthc frag

MD: 2,597'  
TVD: 2,591.04'  
Inclination: 9.4 °  
Azimuth: 353.6 °  
VS: -85.38'

SS: wh-gy-op, sb ang-ang, v fri, f gr, w  
rnd, mod srt, p por, arg cmt, lenc shy ss,  
tr lthc frag, tr glau  
SHY SS: ltgy-gy, sb ang, v sft, v f gr, w  
rnd, w srt, p por, arg cmt, tr lthc frag

137u  
C1: 100.0%  
C2: 0.0%  
C3: 0.0%  
C4: 0.0%

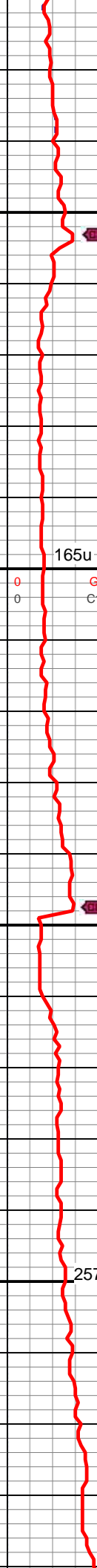
MD: 2,692'  
TVD: 2,684.8'  
Inclination: 9.1 °  
Azimuth: 354.1 °  
VS: -100.61'

MINDEPTH

12/11/2013

0 ROP (ft/hr) 2000

2,720  
2,730  
2,740  
2,750  
2,760  
2,770  
2,780  
2,790  
2,800  
2,810  
2,820  
2,830  
2,840  
2,850  
2,860  
2,870  
2,880  
2,890  
2,900  
2,910  
2,920  
2,930  
2,940



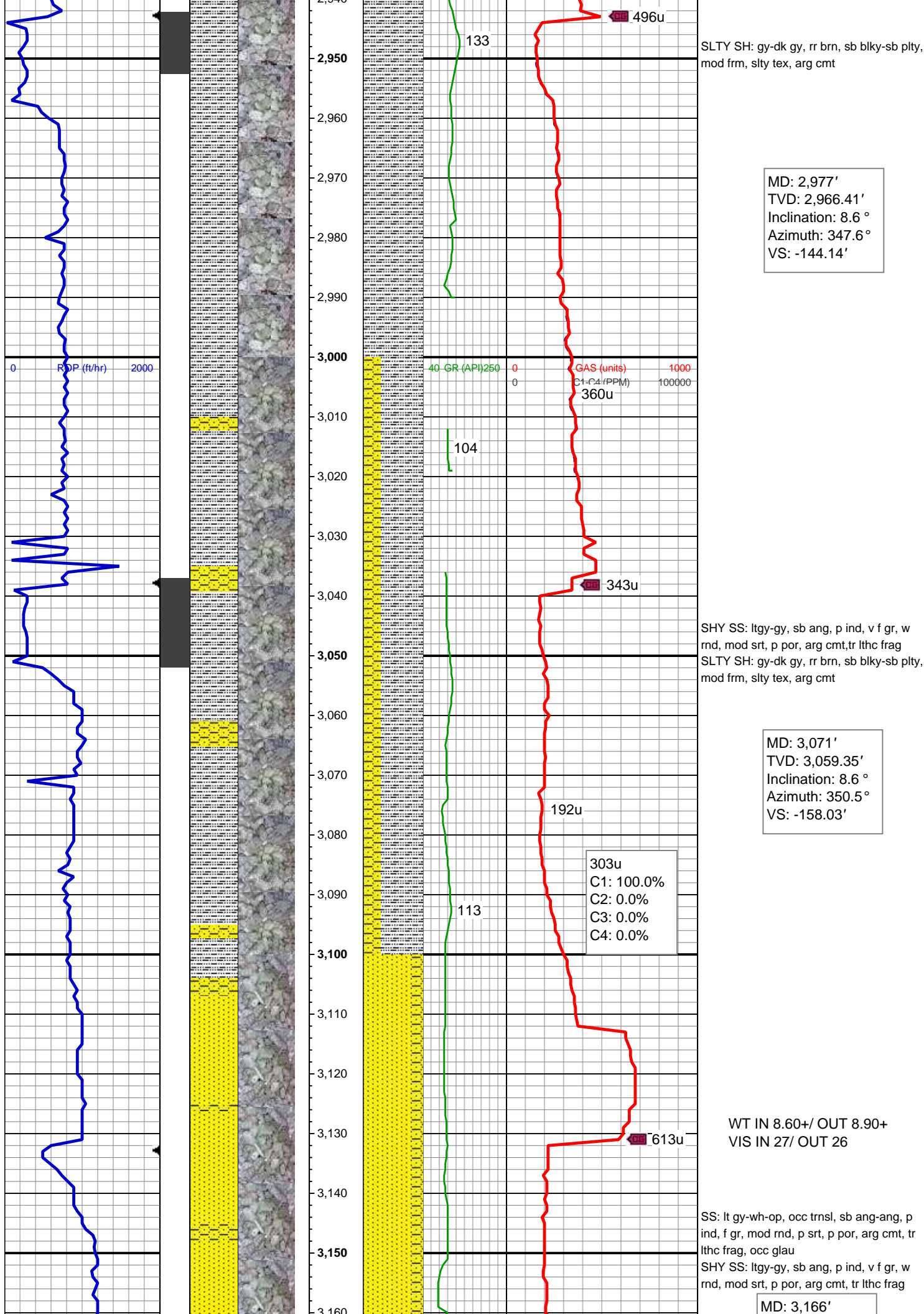
261u  
C1: 100.0%  
C2: 0.0%  
C3: 0.0%  
C4: 0.0%

SHY SS: ltgy-gy, sb ang, mod ind, v f gr,  
w rnd, w srt, p por, arg cmt, tr lthc frag  
SS: gy, sm wh, sb ang-ang, mod ind, f gr,  
w rnd, mod srt, p por, arg cmt, tr lthc frag,  
tr glau  
SLTY SH: gy-dk gy, sb blkly-sb plty, v sft,  
silty tex, arg cmt

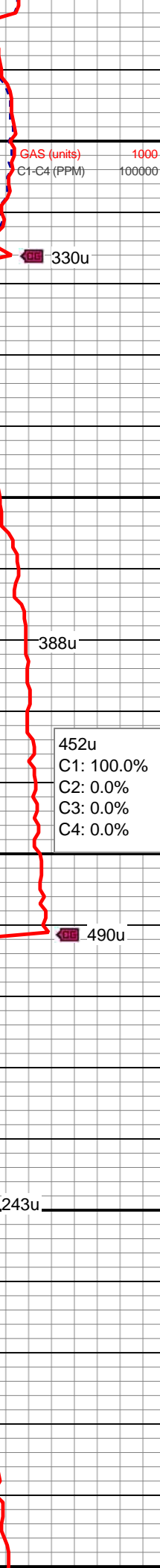
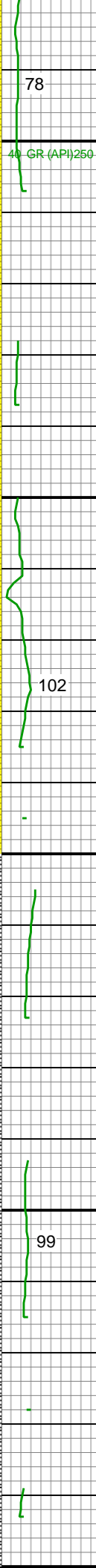
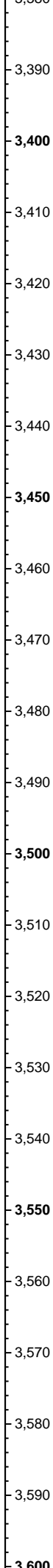
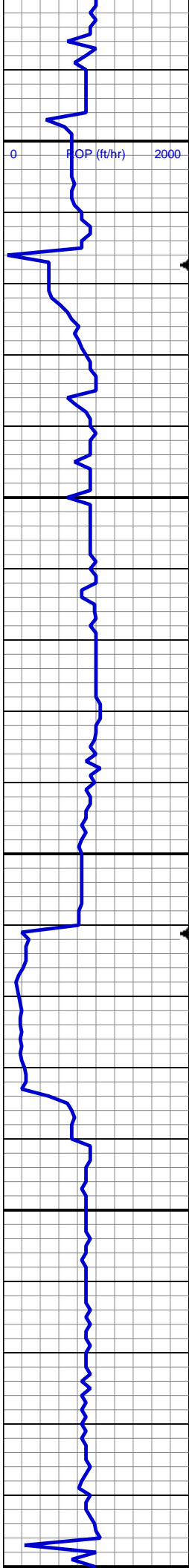
MD: 2,787'  
TVD: 2,778.67'  
Inclination: 8.6 °  
Azimuth: 354.1 °  
VS: -115.19'

SHY SS: ltgy-gy, sb ang, mod ind, v f gr,  
w rnd, w srt, p por, arg cmt, tr lthc frag  
SS: gy, sm wh, sb ang-ang, mod ind, f gr,  
w rnd, mod srt, p por, arg cmt, tr lthc frag,  
tr glau  
SLTY SH: gy-dk gy, sb blkly-sb plty, v sft,  
silty tex, arg cmt

MD: 2,882'  
TVD: 2,872.54'  
Inclination: 9.1 °  
Azimuth: 349.8 °  
VS: -129.72'







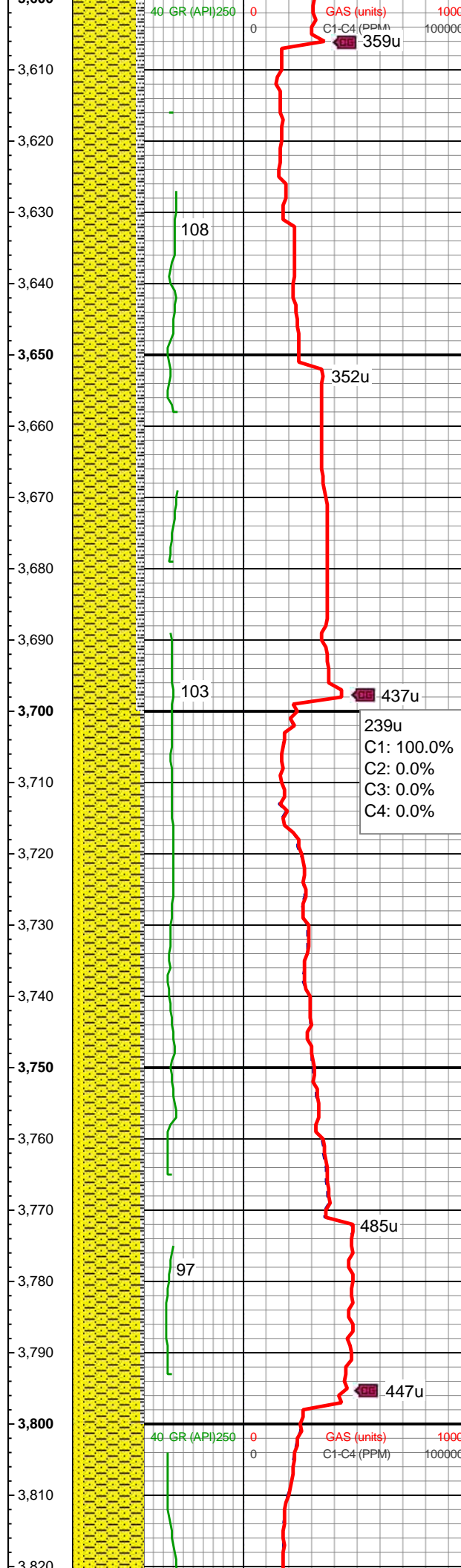
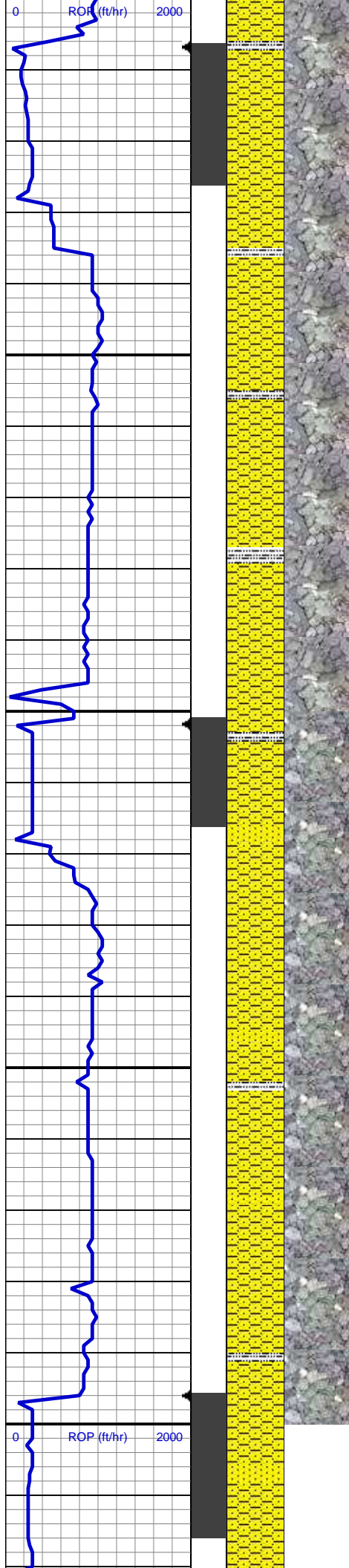
SS: lt gy-wh-trnsl, sb ang-ang, p ind, f gr, mod rnd, lse cons-uncons, p srt, arg cmt, tr lthc frag, occ glau, tr shy ss

MD: 3,451'  
TVD: 3,434.97'  
Inclination: 8.9 °  
Azimuth: 358.9 °  
VS: -215.22'

WT IN 8.60+ OUT 8.60+  
VIS IN 26/ OUT 26

MD: 3,546'  
TVD: 3,528.93'  
Inclination: 8.1 °  
Azimuth: 356.3 °  
VS: -229.25'

SHY SS: ltgy-gy, sb ang, p ind, v f gr, w rnd, p srt, arg cmt, tr lthc frag, occ glau  
SS: lt gy-wh-trnsl, sb ang-ang, p ind, f gr, mod rnd, lse cons-uncons, p srt, arg cmt, tr lthc frag, occ glau  
SLTY SH: gy-dk gy, sb blkgy-sb plty, slty tex, arg cmt



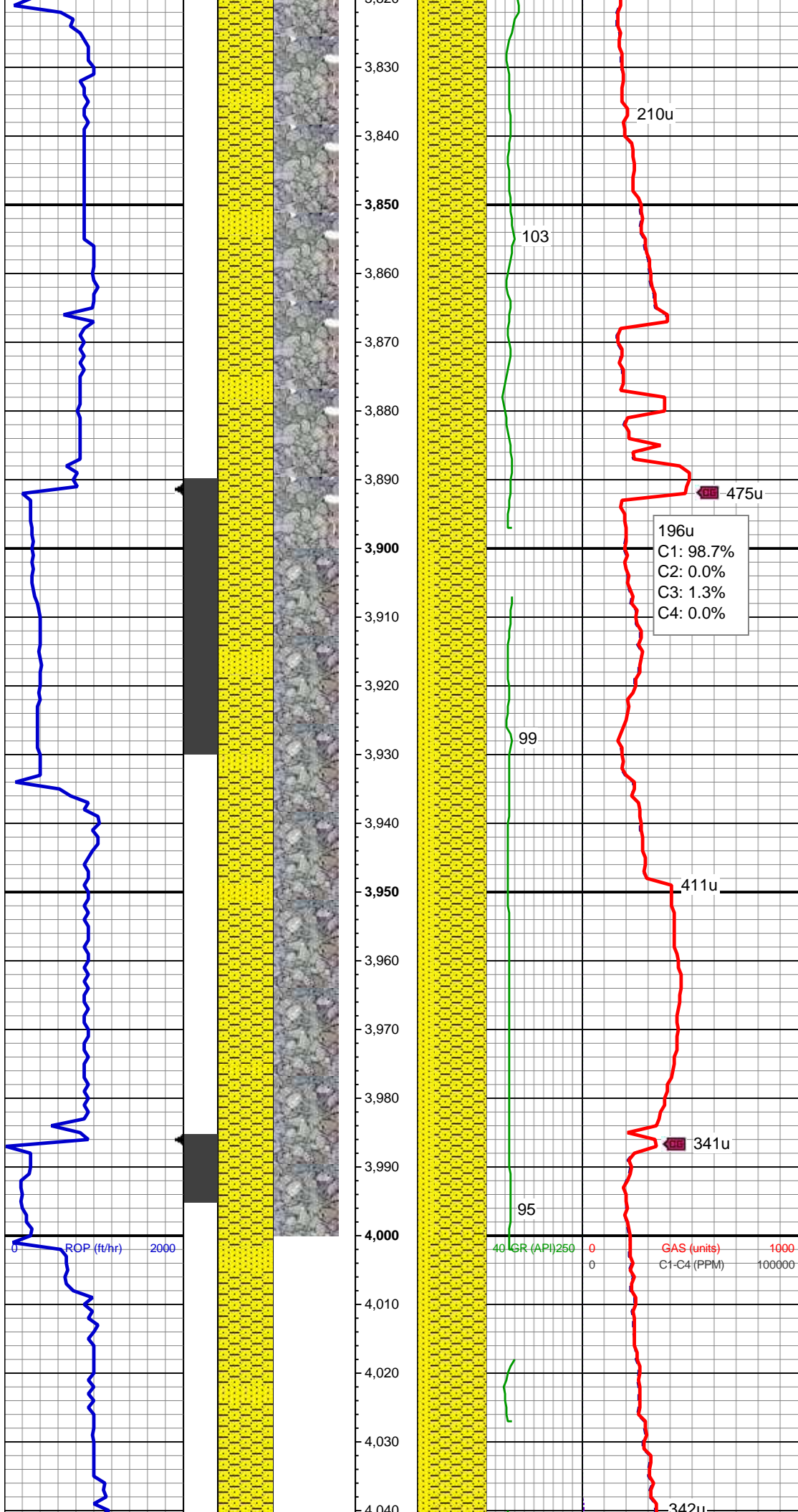
MD: 3,641'  
TVD: 3,623.2'  
Inclination: 6 °  
Azimuth: 359.6 °  
VS: -240.91'

SHY SS: ltgy-gy, sb ang, p ind, v f gr, w  
rnd, p srt, arg cmt, tr lthc frag, occ glau  
SLTY SH: gy-dk gy, sb blkgy-sb plty, slty  
tex, arg cmt

MD: 3,736'  
TVD: 3,717.85'  
Inclination: 3.8 °  
Azimuth: 6.3 °  
VS: -248.99'

SHY SS: ltgy-gy, sb ang, p ind, v f gr, w  
rnd, p srt, arg cmt, tr lthc frag, abnt glau  
SS: ltgy-wh-trnsl, sb ang-ang, p ind, f gr,  
mod rnd, p srt, arg cmt, tr lit frag, abnt  
glau  
SLTY SH: gy-dk gy, sb blkgy-sb plty, slty  
tex, arg cmt

WT IN 8.60+ / OUT 8.60+  
VIS IN 26 / OUT 26



MD: 3,830'  
TVD: 3,811.72'  
Inclination: 2.1 °  
Azimuth: 16.8 °  
VS: -253.7'

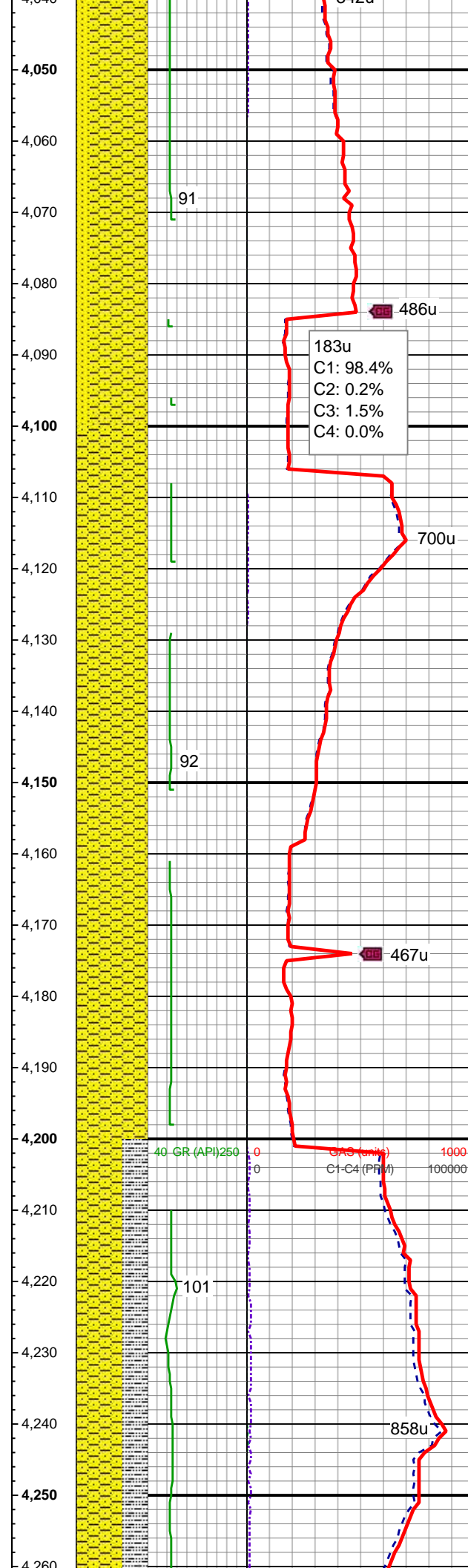
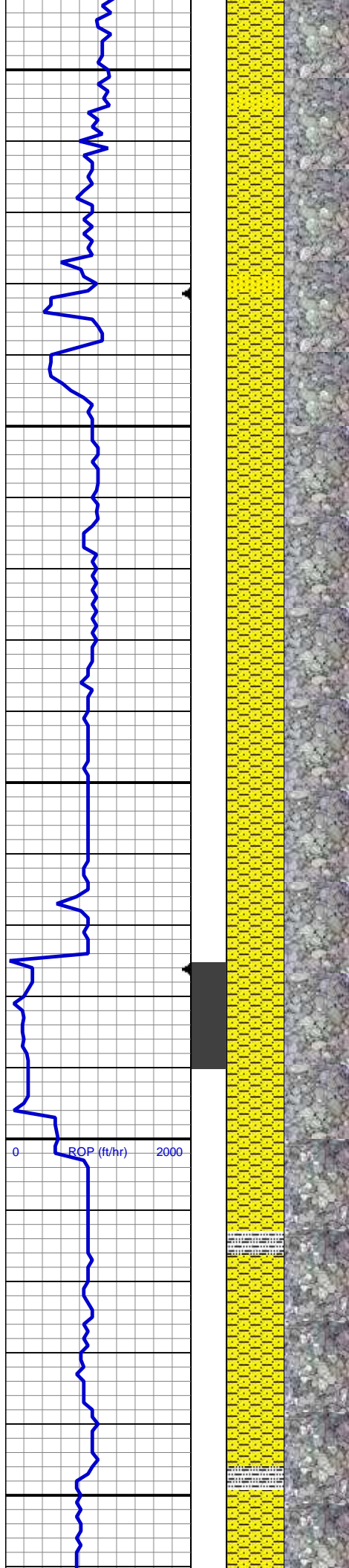
SHY SS: ltgy-gy, sb ang, p ind, v f gr, w rnd, p srt, arg cmt, tr lthc frag, abnt glau  
SS: ltgy-wh-trnsl, sb ang-ang, p ind, f gr, mod rnd, p srt, arg cmt, tr lit frag, abnt glau

196u  
C1: 98.7%  
C2: 0.0%  
C3: 1.3%  
C4: 0.0%

MD: 3,925'  
TVD: 3,906.71'  
Inclination: 1.1 °  
Azimuth: 215.8 °  
VS: -254.63'

SHY SS: ltgy-gy, sb ang, p ind, v f gr, w rnd, p srt, arg cmt, tr lthc frag, abnt glau  
SS: ltgy-wh-trnsl, sb ang-ang, p ind, f gr, mod rnd, p srt, arg cmt, tr lit frag, abnt glau

MD: 4,020'  
TVD: 4,001.67'  
Inclination: 1.9 °  
Azimuth: 198.1 °  
VS: -252.43'



SHY SS: ltgy-gy, sb ang, p ind, v f gr, w  
rnd, p srt, arg cmt, tr lthc frag, abnt glau  
SS: ltgy-wh-trnsl, sb ang-ang, p ind, f gr,  
mod rnd, p srt, arg cmt, tr lit frag, abnt  
glau

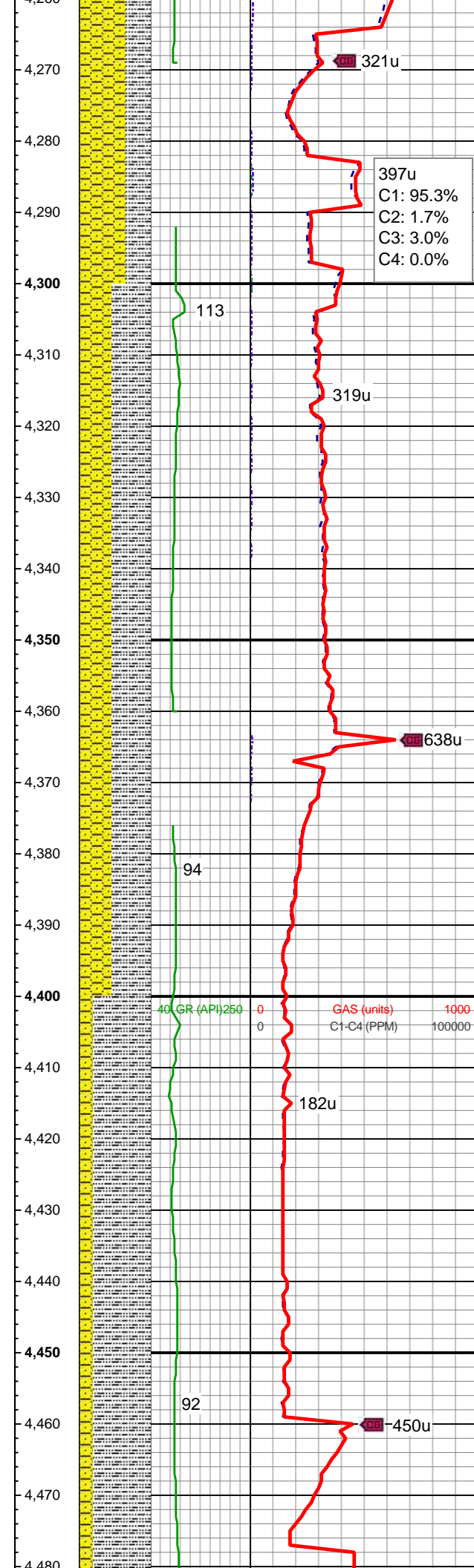
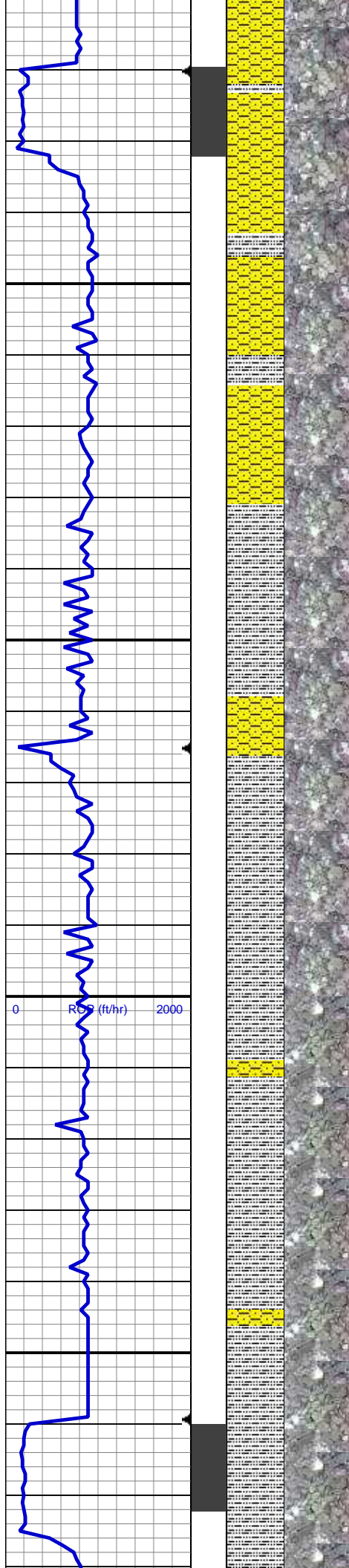
MD: 4,115'  
TVD: 4,096.63'  
Inclination: 1.4 °  
Azimuth: 199.3 °  
VS: -249.87'

SHY SS: ltgy-gy, sb ang, p ind, v f gr, w  
rnd, p srt, arg cmt, tr lthc frag, abnt glau

WT IN 8.80+ OUT 8.80+  
VIS IN 26/ OUT 26

MD: 4,210'  
TVD: 4,191.6'  
Inclination: 1.6 °  
Azimuth: 165.7 °  
VS: -247.49'

SHY SS: ltgy-gy, sb ang, p ind, v f gr, w  
rnd, p srt, arg cmt, tr lthc frag, abnt glau  
SLTY SH: gy-dk gy, sb blkly-sb plty, slty  
tex, arg cmt



MD: 4,305'  
TVD: 4,286.56'  
Inclination: 1.9 °  
Azimuth: 195.9 °  
VS: -244.7'

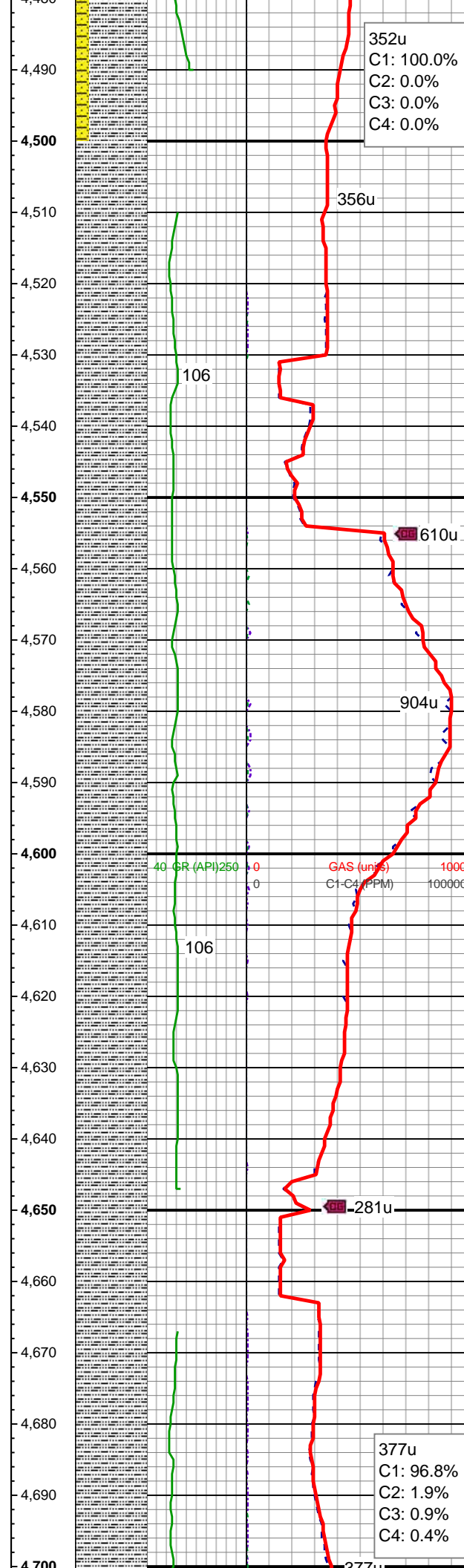
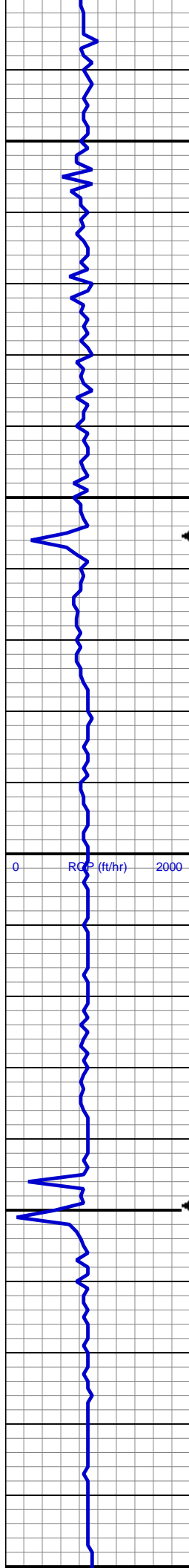
SLTY SH: gy-dk gy, sb blkly-sb plty, slty  
tex, arg cmt  
SHY SS: ltgy-gy, sb ang, p ind, v f gr, w  
rnd, p srt, arg cmt, tr lithc frag, occ glau

WT IN 9.00+ OUT 9.00+  
VIS IN 33/ OUT 33

MD: 4,400'  
TVD: 4,381.49'  
Inclination: 2.6 °  
Azimuth: 228.1 °  
VS: -241.82'

SLTY SH: gy-dk gy, sb blkly-sb plty, slty  
tex, arg cmt  
SHY SS: ltgy-gy, sb ang, p ind, v f gr, w  
rnd, p srt, arg cmt, tr lithc frag, occ glau

WT IN 9.10/ OUT 9.10



VIS IN 33/ OUT 33

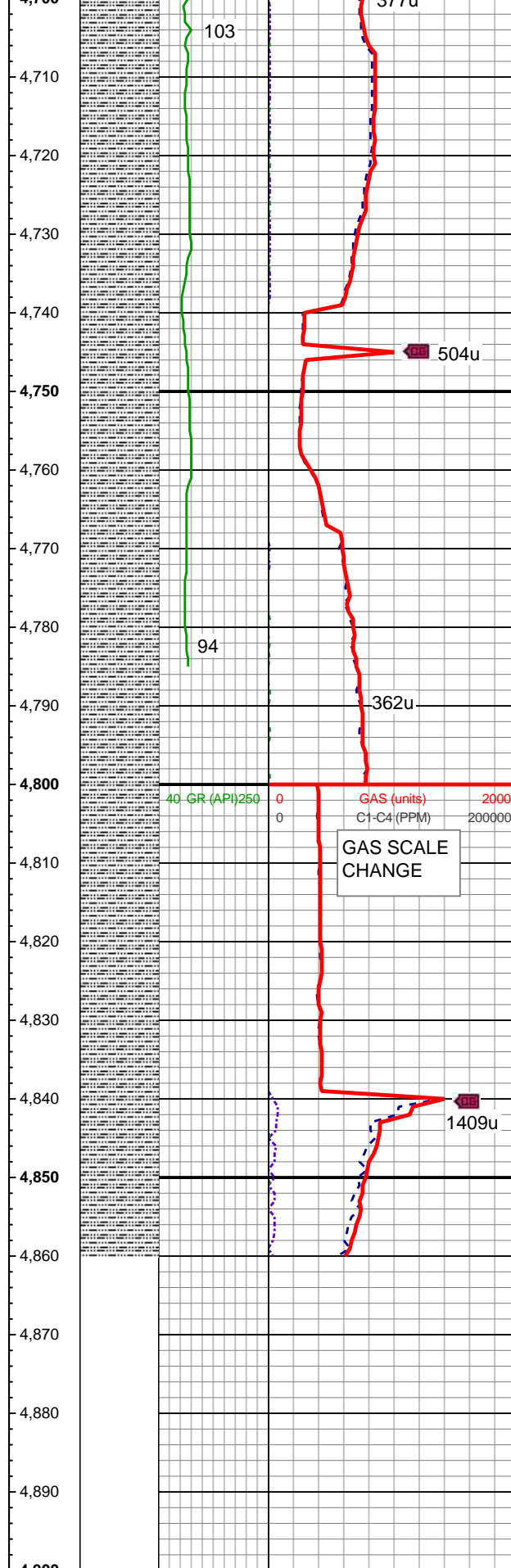
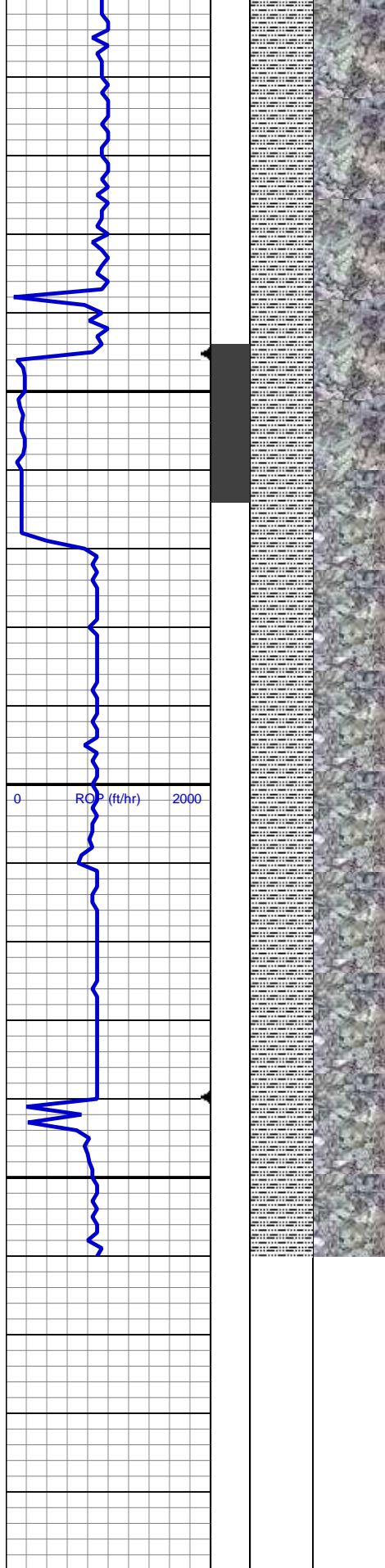
MD: 4,495'  
TVD: 4,476.44'  
Inclination: 1.3 °  
Azimuth: 192.1 °  
VS: -239.4'

SLTY SH: gy-dk gy, sb blk-y-sb plty, slty  
tex, arg cmt

MD: 4,589'  
TVD: 4,570.42'  
Inclination: 0.6 °  
Azimuth: 148.7 °  
VS: -237.93'

SLTY SH: gy-dk gy, sb blk-y-sb plty, slty  
tex, arg cmt

MD: 4,684'  
TVD: 4,665.42'  
Inclination: 0.8 °  
Azimuth: 91.7 °  
VS: -237.45'



SLTY SH: gy-dk gy, sb blkly-sb plty, slty  
tex, arg cmt

MD: 4,779'  
TVD: 4,760.4'  
Inclination: 1.6 °  
Azimuth: 138.8 °  
VS: -236.38'

WT IN 9.20/ OUT 9.20  
VIS IN 32/ OUT 32

SLTY SH: gy-dk gy, sb blkly-sb plty, slty  
tex, arg cmt

TD @ 4860' MD  
12/11/2013 @ 07:19 AM

LOG CONTINUES ON MPlot  
"CASTOR FEDERAL LD15-72HN  
HORZ"