

# COLUMBINE LOGGING

Scale: 5" / 100'  
Measured Depth Log

**Well Name** Rohn State LD10-67-1HN

**Location** SENE SEC9, T9N, R58W

**State** COLORADO

**County** WELD

**Country** USA

**Rig Number** H&P 326

**API Number** 05-123-37630

**Field** WILDCAT

**Region** DJ BASIN

**Drilling Completed** 10/1/2014

**Spud Date** 9/24/2014

**Surface Coordinates** 1688' FNL, 330' FEL  
40.76853 -103.96114

**Bottom Hole Coordinates** (PROJ)  
1650' FFNLL, 660' FFELL

**Ground Elevation** 4730'

**K.B. Elevation** 4760'

**Logged Interval** 1220' To 5177'

**Total Depth** 9682'

**Formation** NIOBRARA, C CHALK

**Type of Drilling Fluid** LSND

## Other Symbols

### Oil Show

- DEAD
- EVEN
- QUESTIONABLE
- SPOTTED STAINING

### Porosity

- E EARTHY
- F FENESTRAL
- F FRACTURE
- X INTERCRYSTALLINE
- ◇ 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

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

F FOSSIL

GASTROPOD

INOCERAMUS

OOLITE

ANHYDRITIC

ARGILLACEOUS

ARGILLITE GRAIN

B BENTONITE

FERRUGINOUS

GLAUCONITE

GYPSIFEROUS

HEAVY MINERAL

TUFFACEOUS

### Stringer

ANHYDRITE STRINGER

BELEMNITE  
BIOCLASTIC  
BRACHIOPOD  
BRYOZOA  
CEPHALOPOD  
CORAL  
CRINOID  
ECHINOID  
FISH  
FORAMINIFERA

OSTRACOD  
PELECYPOD  
PELLET  
PISOLITE  
PLANT REMAINS  
PLANT SPORES  
SCAPHOPOD  
STROMATOPOROID

## Minerals

BITUMENOUS SUBSTANCE  
BRECCIA FRAGMENTS  
CALCAREOUS  
CARBONACEOUS FLAKES  
CHTDK  
CHTLT  
COAL - THIN BEDS  
DOLOMITIC  
FELDSPAR  
FERRUGINOUS PELLET

KAOLIN  
MARLSTONE  
MINERAL CRYSTALS  
NODULES  
PHOSPHATE PELLETS  
PYRITE  
SALT CAST  
SANDY  
SILICEOUS  
SILTY

BENTONITE STRINGER  
COAL STRINGER  
DOLOMITE STRINGER  
GYPSUM STRINGER  
LIMESTONE STRINGER  
MARLSTONE (CALC) STRG  
MARLSTONE (DOL) STRG  
SANDSTONE STRINGER  
SHALE STRINGER  
SILTSTONE STRINGER

## Rock Types

UNKNOWN  
ANHYDRITE  
BENTONITE  
BRECCIA  
CEMENT  
CHALK  
CHERT  
CLAY CHOKE SAND  
CLAYSTONE

COAL  
CONGLOMERATE  
DOLOMITE  
GRANITE  
GYPSUM  
IGNEOUS  
LIMESTONE  
SIDERITE or LIMONITE  
MARLSTONE

METAMORPHIC  
NO SAMPLE  
SALT  
SALT- PEPPER SAND  
SANDSTONE  
SHALE  
SHALE COLORED  
SHALE GRAY  
SHALY SANDSTONE

SHALY SILTSTONE  
SILTSTONE  
SILTY SHALE  
TILL  
TUFF  
WELDED TUFF

## Operator

**Company** NOBLE ENERGY INC.

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

## Geologist

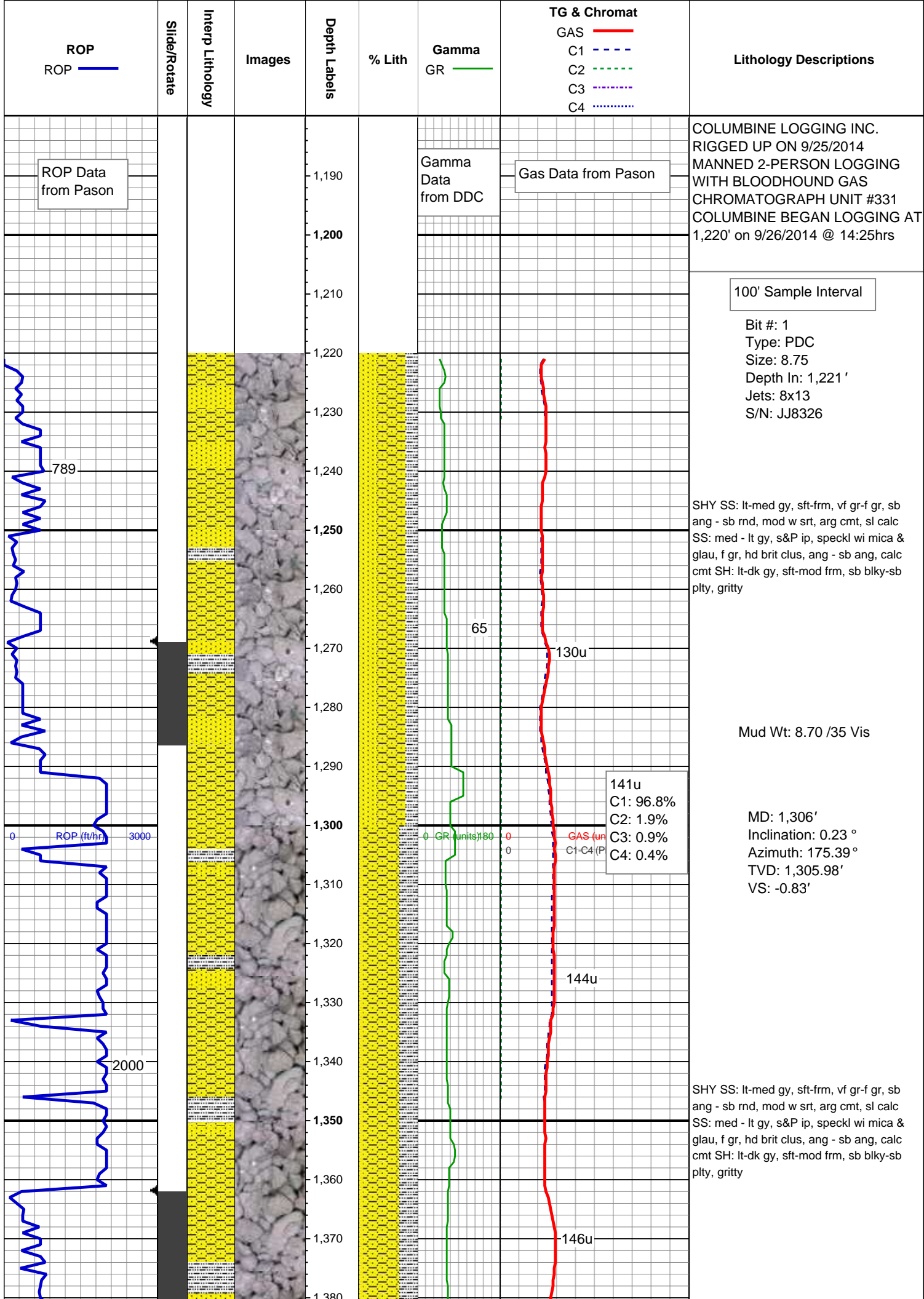
**Name** EVAN HOWELL

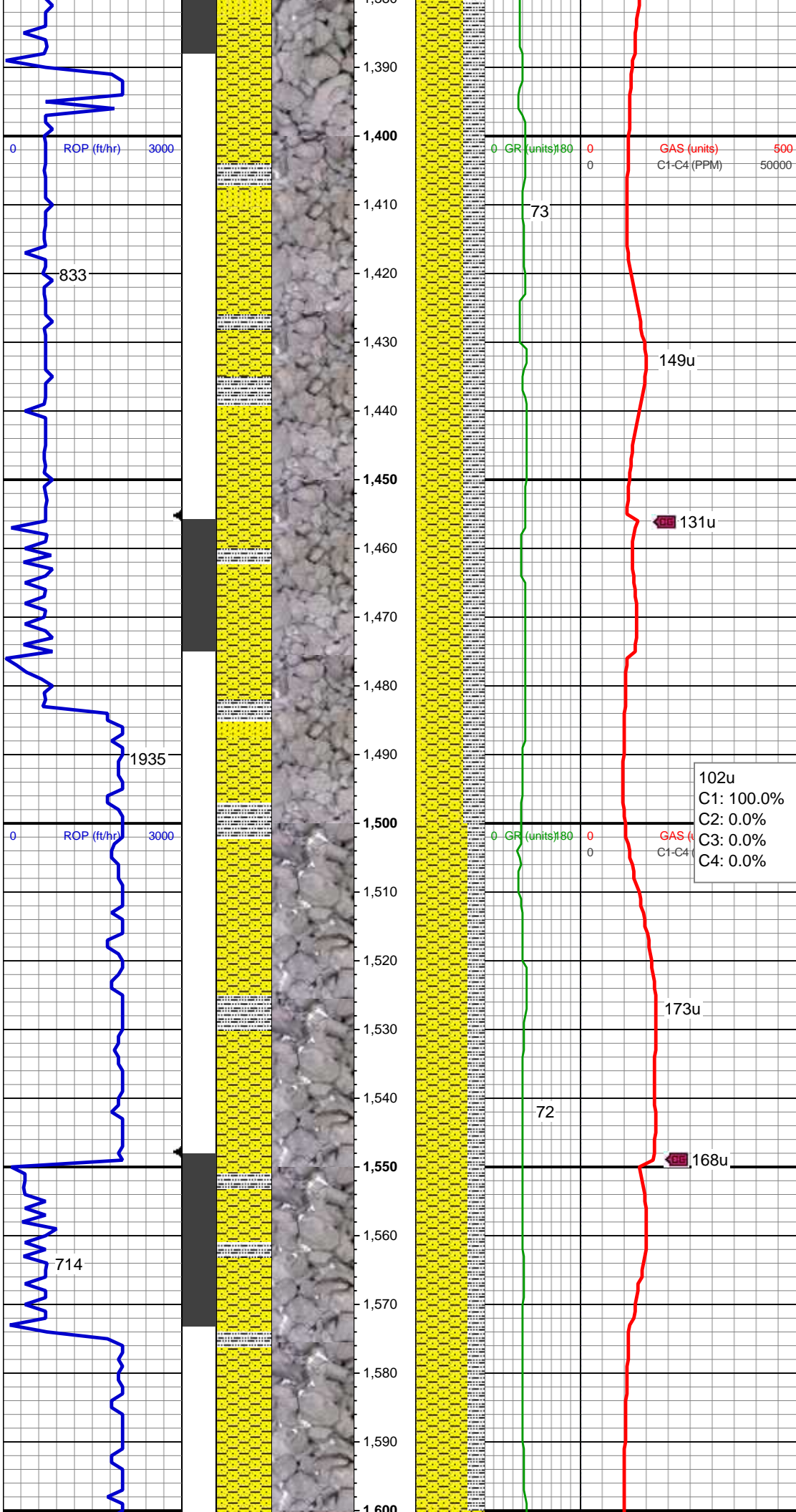
**Company** NOBLE ENERGY INC.

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

## Other

**COLUMBINE LOGGING INC.** MIKE KERSCHEN  
MATT HOPKINS





MD: 1,399'  
Inclination: 4.78 °  
Azimuth: 105.73 °  
TVD: 1,398.87'  
VS: 2.92'

SHY SS: lt-med gy, sft-frm, vf gr-f gr, sb  
ang - sb rnd, mod w srt, arg cmt, sl calc  
SS: med - lt gy, s&P ip, speckl wi mica &  
glau, f gr, hd brit clus, ang - sb ang, calc  
cmt SH: lt-dk gy, sft-mod frm, sb blk-y-sb  
plty, gritty

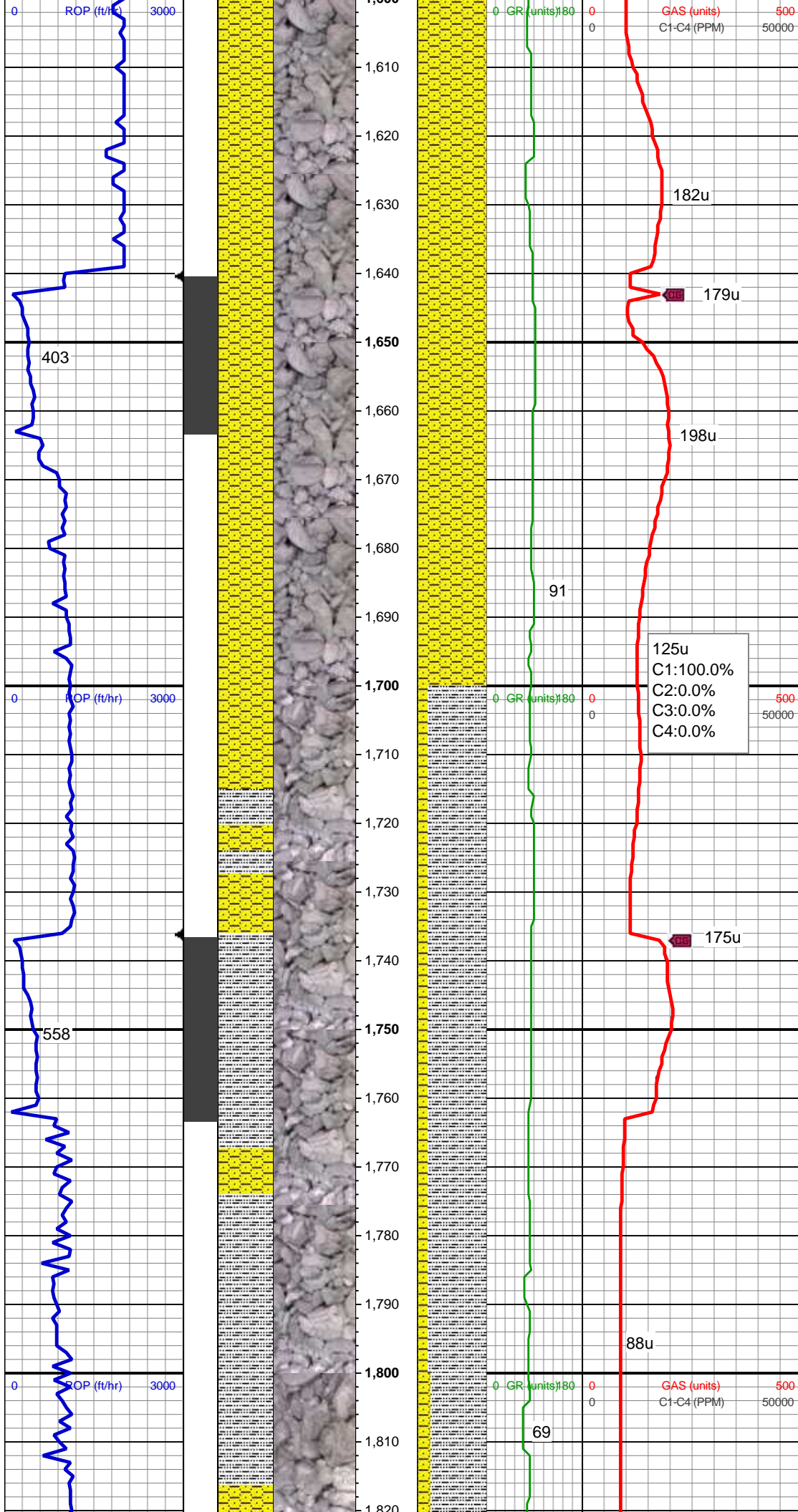
MD: 1,491'  
Inclination: 6.16 °  
Azimuth: 80.22 °  
TVD: 1,490.47'  
VS: 11.47'

102u  
C1: 100.0%  
C2: 0.0%  
C3: 0.0%  
C4: 0.0%

SHY SS: lt-med gy, sft-frm, vf gr-f gr, sb  
ang - sb rnd, mod w srt, arg cmt, sl calc  
SH: lt-dk gy, sft-mod frm, sb blk-y-sb plty,  
gritty

MD: 1,583'  
Inclination: 9.55 °  
Azimuth: 100.52 °  
TVD: 1,581.61'  
VS: 23.85'



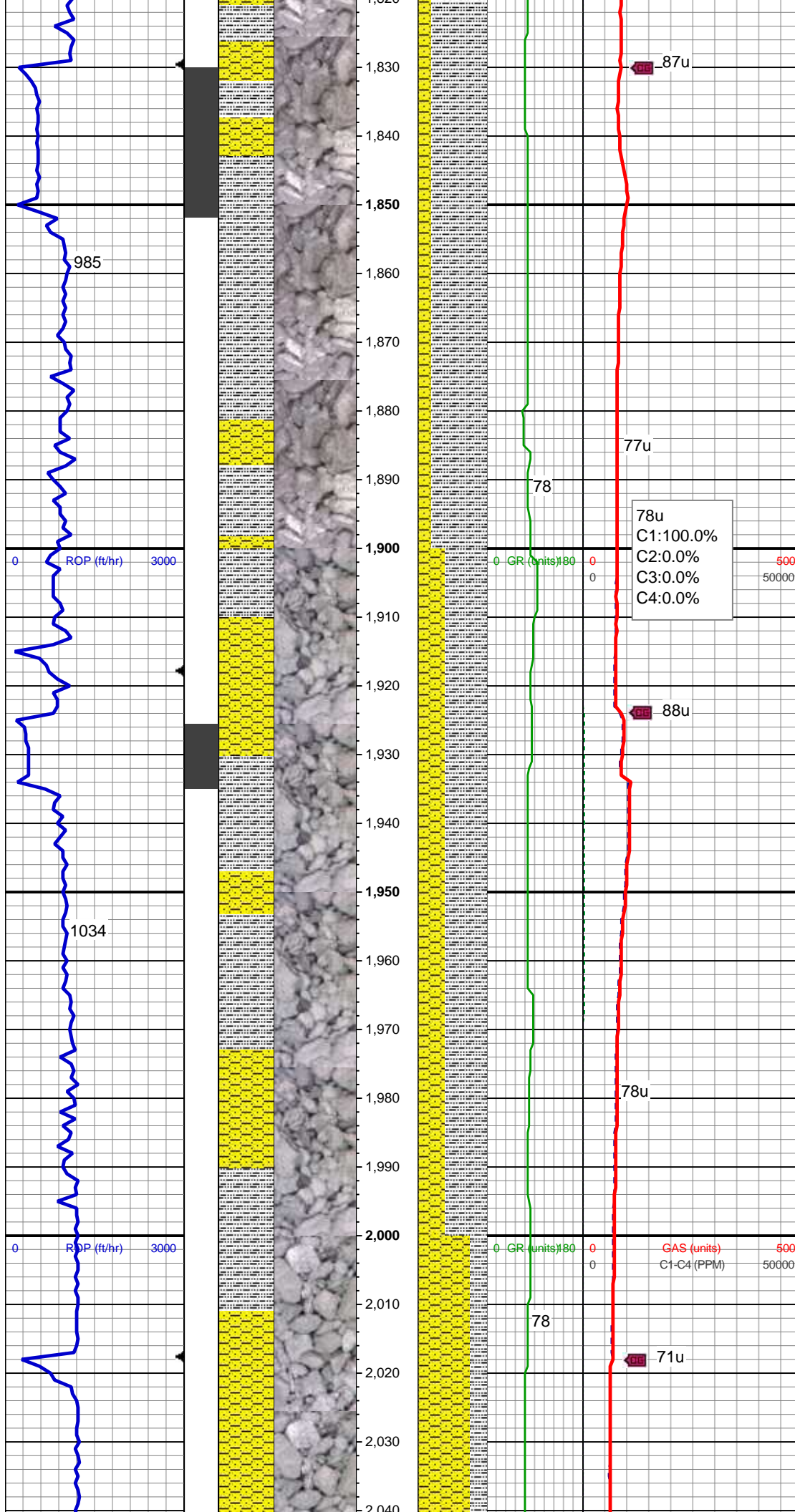


SHY SS: lt-med gy, sft frm, vf gr-f gr, sb ang - sb rnd, mod w srt, arg cmt, sl calc

MD: 1,676'  
Inclination: 12.89 °  
Azimuth: 96.49 °  
TVD: 1,672.82'  
VS: 41.74'

SLTY SH: lt-dk gy, sft-mod frm, sb blk-y-sb plty, gritty SHY SS: lt-med gy, sft frm, vf gr-f gr, sb ang - sb rnd, mod w srt, arg cmt, sl calc, abnt cly

MD: 1,769'  
Inclination: 16.3 °  
Azimuth: 94.64 °  
TVD: 1,762.8'  
VS: 65.07'



SLTY SH: lt-dk gy, sft-mod frm, sb blkly-sb  
plty, gritty SHY SS: lt-med gy, sft-frm, vf  
gr-f gr, sb ang - sb rnd, mod w srt, arg  
cmt, sl calc, abnt cly

MD: 1,862'  
Inclination: 16.63 °  
Azimuth: 83.2°  
TVD: 1,852.01'  
VS: 91.29'

78u  
C1:100.0%  
C2:0.0%  
C3:0.0%  
C4:0.0%

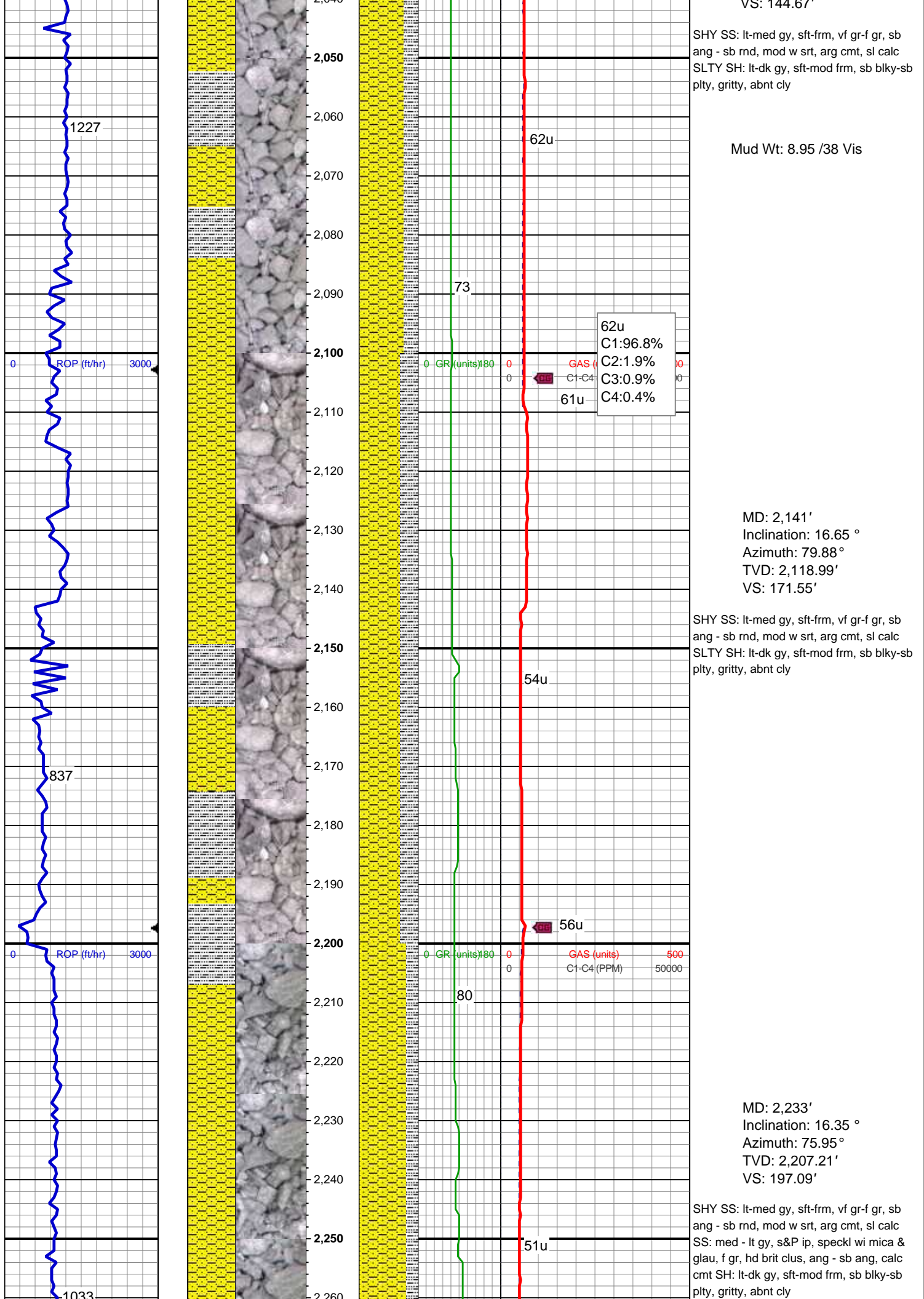
SLTY SH: lt-dk gy, sft-mod frm, sb blkly-sb  
plty, gritty SHY SS: lt-med gy, sft-frm, vf  
gr-f gr, sb ang - sb rnd, mod w srt, arg  
cmt, sl calc, abnt cly

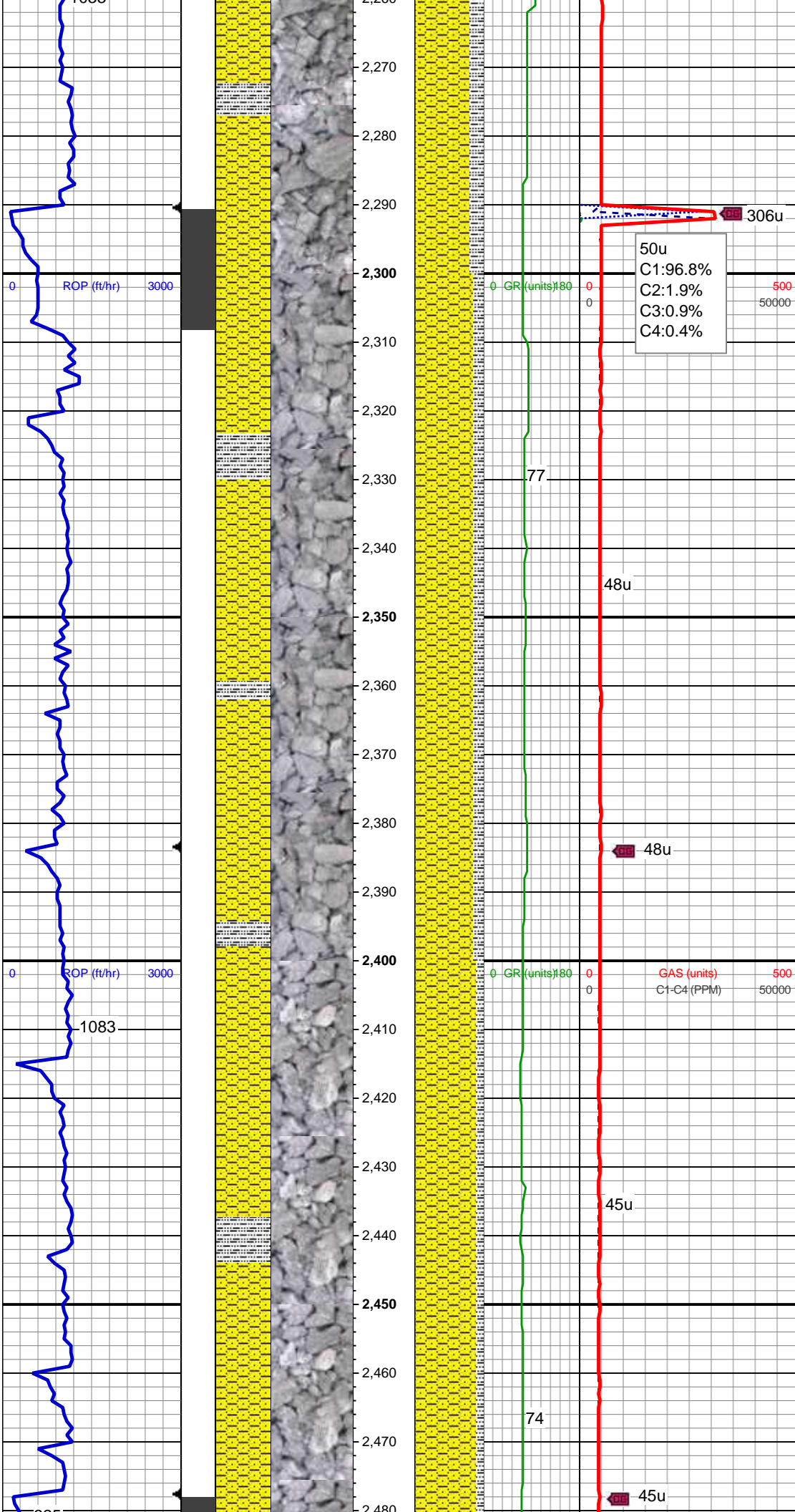
MD: 1,955'  
Inclination: 16.97 °  
Azimuth: 83.5°  
TVD: 1,941.04'  
VS: 117.99'

GAS (units)  
C1-C4 (PPM)

MD: 2,047'  
Inclination: 17.03 °  
Azimuth: 81.8°  
TVD: 2,029.03'  
VS: 141.27'







50u  
C1:96.8%  
C2:1.9%  
C3:0.9%  
C4:0.4%

MD: 2,327'  
Inclination: 15.13 °  
Azimuth: 83.09 °  
TVD: 2,297.69'  
VS: 222.1'

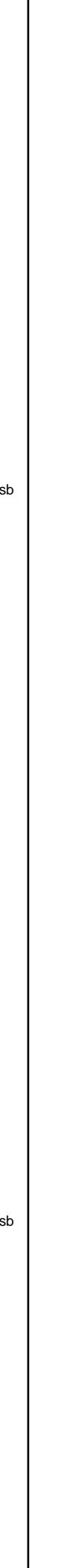
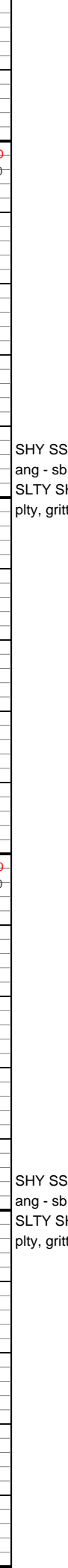
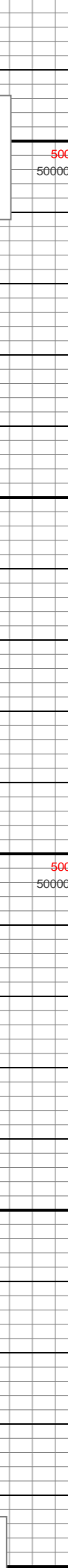
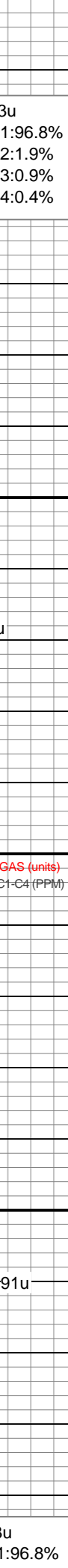
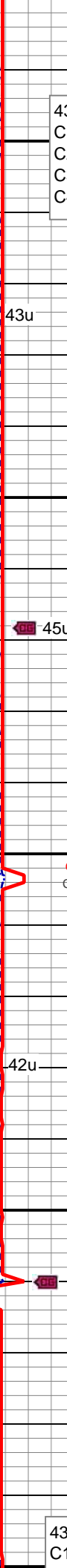
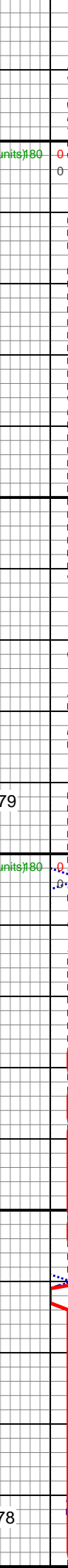
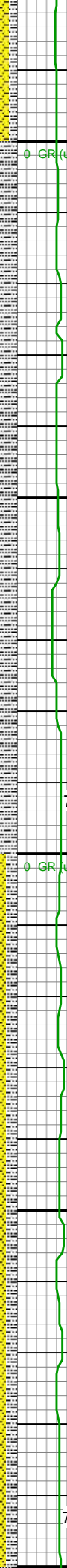
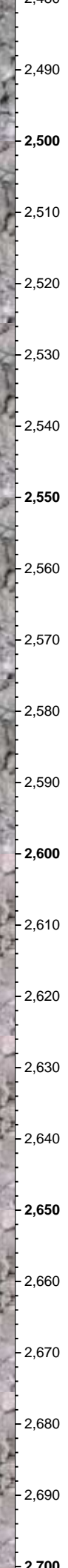
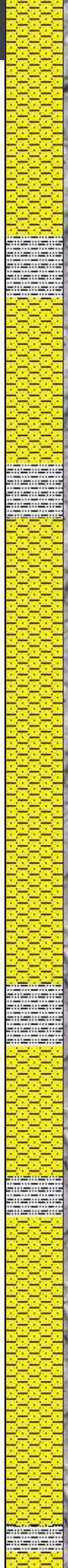
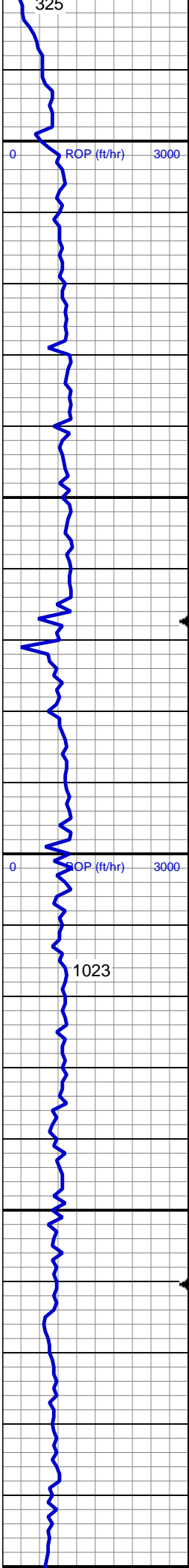
SHY SS: lt-med gy, sft frm, vf gr-f gr, sb  
ang - sb rnd, mod w srt, arg cmt, sl calc  
SLTY SH: lt-dk gy, sft-mod frm, sb blk-y-sb  
pity, gritty, abnt cly

MD: 2,420'  
Inclination: 15.23 °  
Azimuth: 80.87 °  
TVD: 2,387.45'  
VS: 246.21'

SHY SS: lt-med gy, sft frm, vf gr-f gr, sb  
ang - sb rnd, mod w srt, arg cmt, sl calc  
SLTY SH: lt-dk gy, sft-mod frm, sb blk-y-sb  
pity, gritty, abnt cly

Mud Wt: 8.95 /40 Vis





43u  
C1:96.8%  
C2:1.9%  
C3:0.9%  
C4:0.4%

500  
50000

MD: 2,511'  
Inclination: 16.16 °  
Azimuth: 93.86 °  
TVD: 2,475.08'  
VS: 270.66'

SHY SS: lt-med gy, sft frm, vf gr-f gr, sb  
ang - sb rnd, mod w srt, arg cmt, sl calc  
SLTY SH: lt-dk gy, sft-mod frm, sb blk-y-sb  
plty, gritty, abnt cly

43u

45u

79

GAS (units)  
C1-C4 (PPM)

500  
50000

MD: 2,603'  
Inclination: 16.17 °  
Azimuth: 92.07 °  
TVD: 2,563.44'  
VS: 296.23'

SHY SS: lt-med gy, sft frm, vf gr-f gr, sb  
ang - sb rnd, mod w srt, arg cmt, sl calc  
SLTY SH: lt-dk gy, sft-mod frm, sb blk-y-sb  
plty, gritty, abnt cly

42u

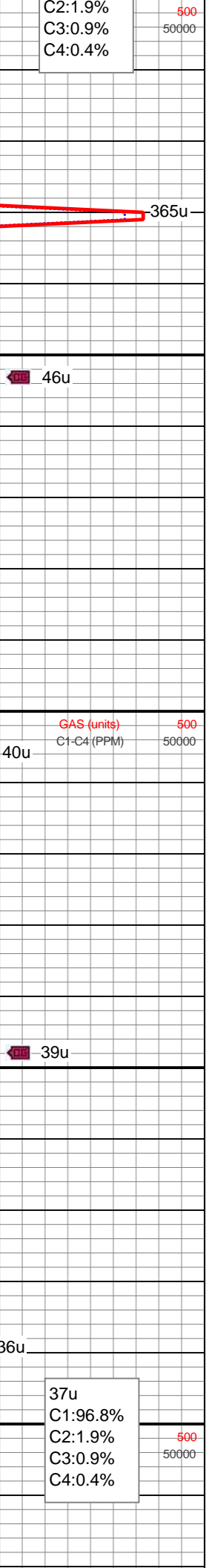
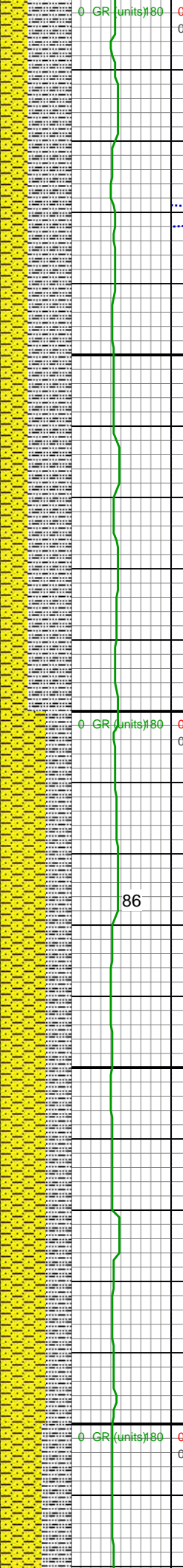
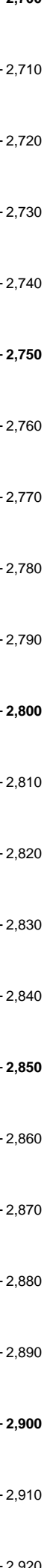
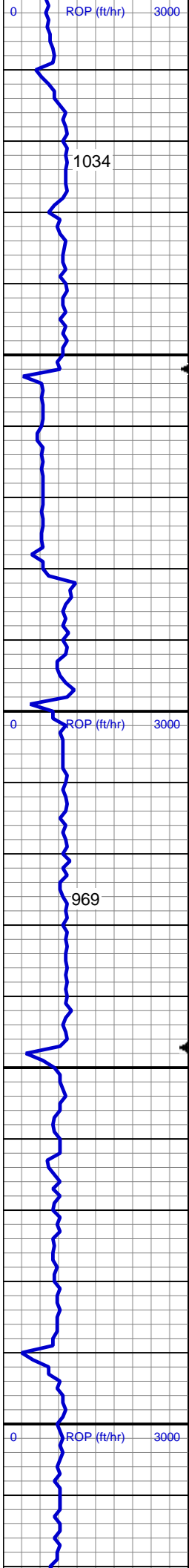
91u

78

43u  
C1:96.8%

Mud Wt: 9.00 /43 Vis

MD: 2,696'  
Inclination: 15.97 °  
Azimuth: 90.39 °  
TVD: 2,652.81'



VS: 321.97'

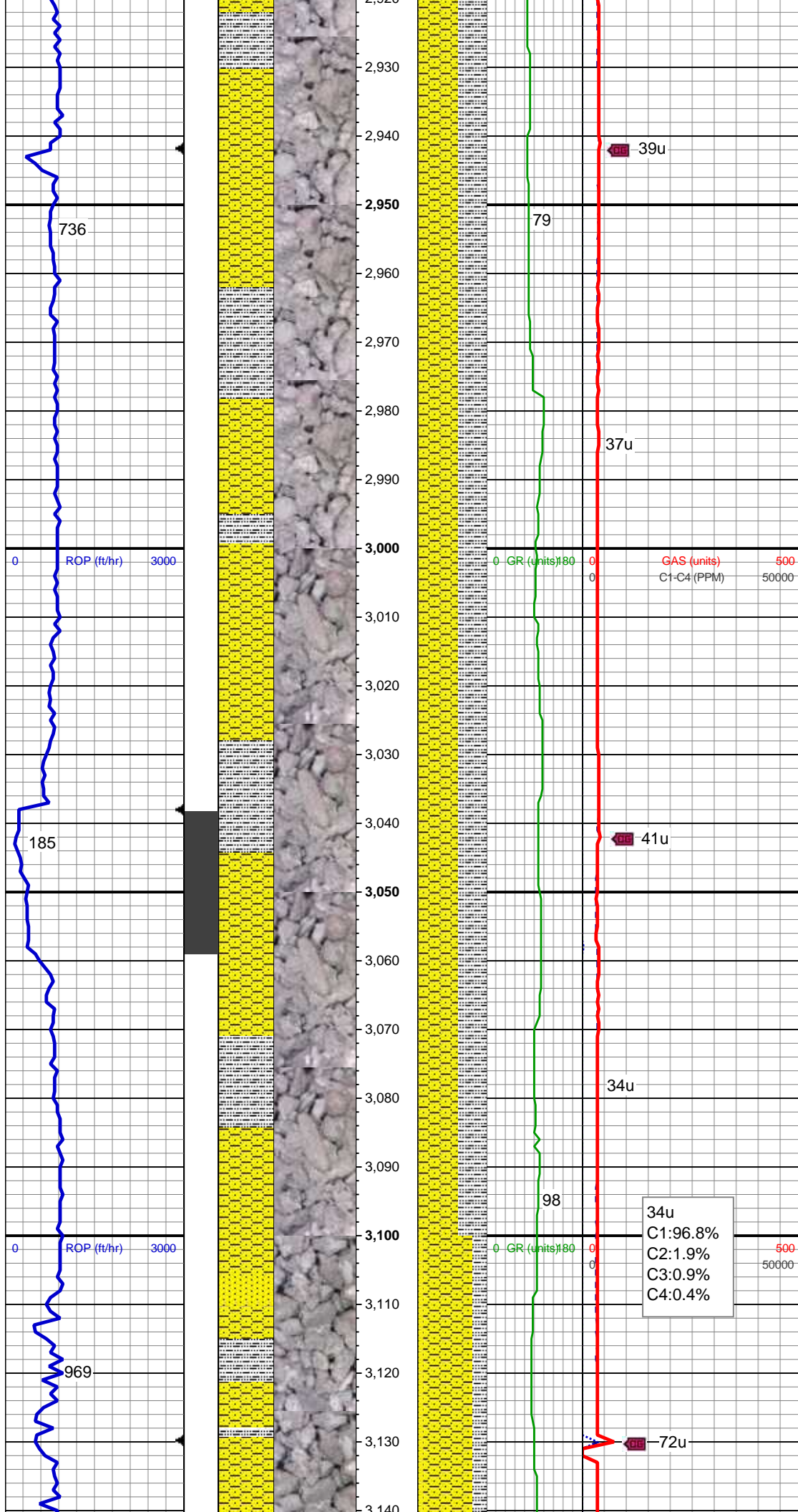
SLTY SH: lt-dk gy, sft-mod frm, sb blkly-sb pty, gritty  
SHY SS: lt-med gy, sft-frm, vf gr-f gr, sb ang - sb rnd, mod w srt, arg cmt, sl calc, abnt cly

MD: 2,790'  
Inclination: 15.89 °  
Azimuth: 88.57 °  
TVD: 2,743.2'  
VS: 347.76'

SHY SS: lt-med gy, sft-frm, vf gr-f gr, sb ang - sb rnd, mod w srt, arg cmt, sl calc  
SLTY SH: lt-dk gy, sft-mod frm, sb blkly-sb pty, gritty, abnt cly

MD: 2,885'  
Inclination: 15.77 °  
Azimuth: 87.16 °  
TVD: 2,834.6'  
VS: 373.66'





SHY SS: lt-med gy, sft-frm, vf gr-f gr, sb  
ang - sb rnd, mod w srt, arg cmt, sl calc  
SLTY SH: lt-dk gy, sft-mod frm, sb blk-y-sb  
ppty, gritty, abnt cly

MD: 2,979'  
Inclination: 15.5 °  
Azimuth: 86.13 °  
TVD: 2,925.12'  
VS: 398.95'

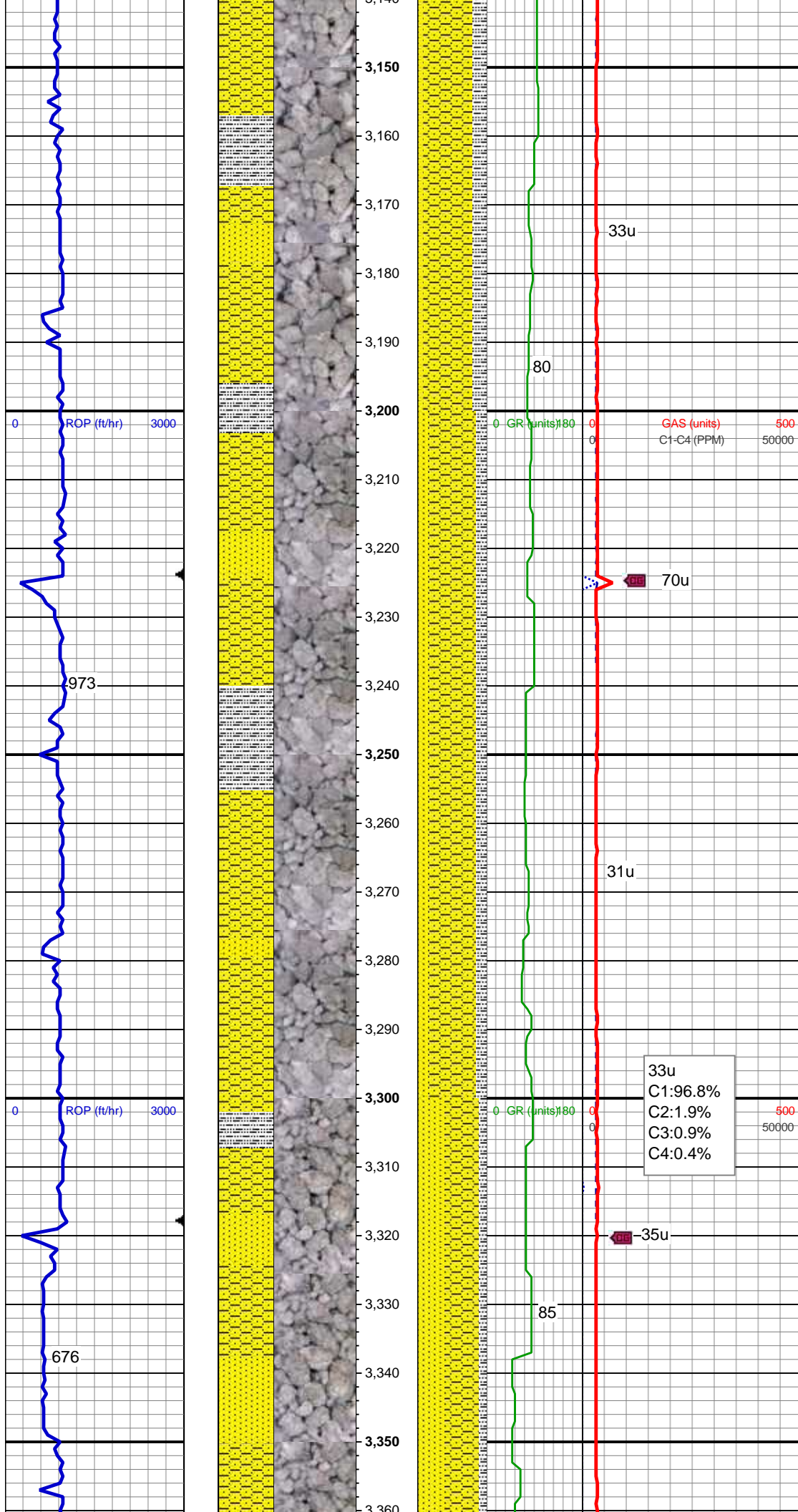
SHY SS: lt-med gy, sft-frm, vf gr-f gr, sb  
ang - sb rnd, mod w srt, arg cmt, sl calc  
SLTY SH: lt-dk gy, sft-mod frm, sb blk-y-sb  
ppty, gritty, abnt cly

Mud Wt: 9.00 /39 Vis

MD: 3,073'  
Inclination: 16.43 °  
Azimuth: 94.2 °  
TVD: 3,015.5'  
VS: 424.74'

34u  
C1:96.8%  
C2:1.9%  
C3:0.9%  
C4:0.4%





SHY SS: lt-med gy, sft-firm, vf gr-f gr, sb ang - sb rnd, mod w srt, arg cmt, sl calc  
SS: med - lt gy, s&P ip, speckl wi mica & glau, f gr, hd brit clus, ang - sb ang, calc cmt  
SH: lt-dk gy, sft-mod frm, sb blkly-sb plty, gritty, abnt cly

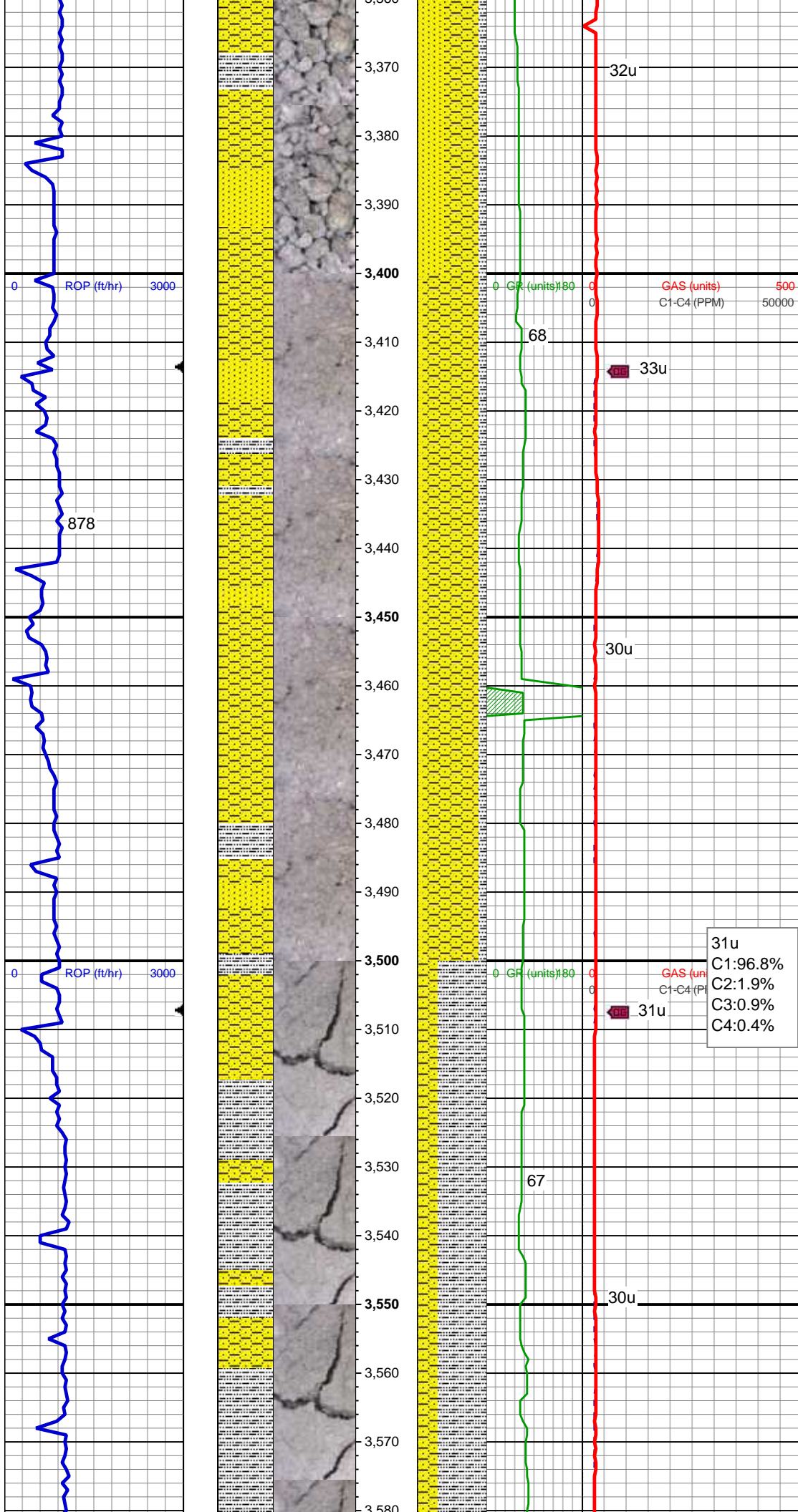
MD: 3,167'  
Inclination: 16.67 °  
Azimuth: 92.19 °  
TVD: 3,105.61'  
VS: 451.47'

SHY SS: lt-med gy, sft-firm, vf gr-f gr, sb ang - sb rnd, mod w srt, arg cmt, sl calc  
SS: med - lt gy, s&P ip, speckl wi glau, f gr, hd brit clus, ang - sb ang, calc cmt  
SH: lt-dk gy, sft-mod frm, sb blkly-sb plty, gritty, abnt cly

MD: 3,262'  
Inclination: 16.95 °  
Azimuth: 91.94 °  
TVD: 3,196.55'  
VS: 478.93'

SHY SS: lt-med gy, sft-firm, vf gr-f gr, sb ang - sb rnd, mod w srt, arg cmt, sl calc  
SS: med - lt gy, s&P ip, speckl wi glau, f gr, hd brit clus, ang - sb ang, calc cmt  
SH: lt-dk gy, sft-mod frm, sb blkly-sb plty, gritty, abnt cly

MD: 3,357'



Inclination: 17.53 °  
Azimuth: 90.32 °  
TVD: 3,287.28'  
VS: 507.08'

MD: 3,451'  
Inclination: 17.84 °  
Azimuth: 89.86 °  
TVD: 3,376.84'  
VS: 535.63'

SHY SS: lt-med gy, sft-frm, vf gr-f gr, sb ang - sb rnd, mod w srt, arg cmt, sl calc  
SS: med - lt gy, s&P ip, speckl wi glau, f gr, hd brit clus, ang - sb ang, calc cmt  
SH: lt-dk gy, sft-mod frm, sb blkly-sb plty, gritty, abnt cly

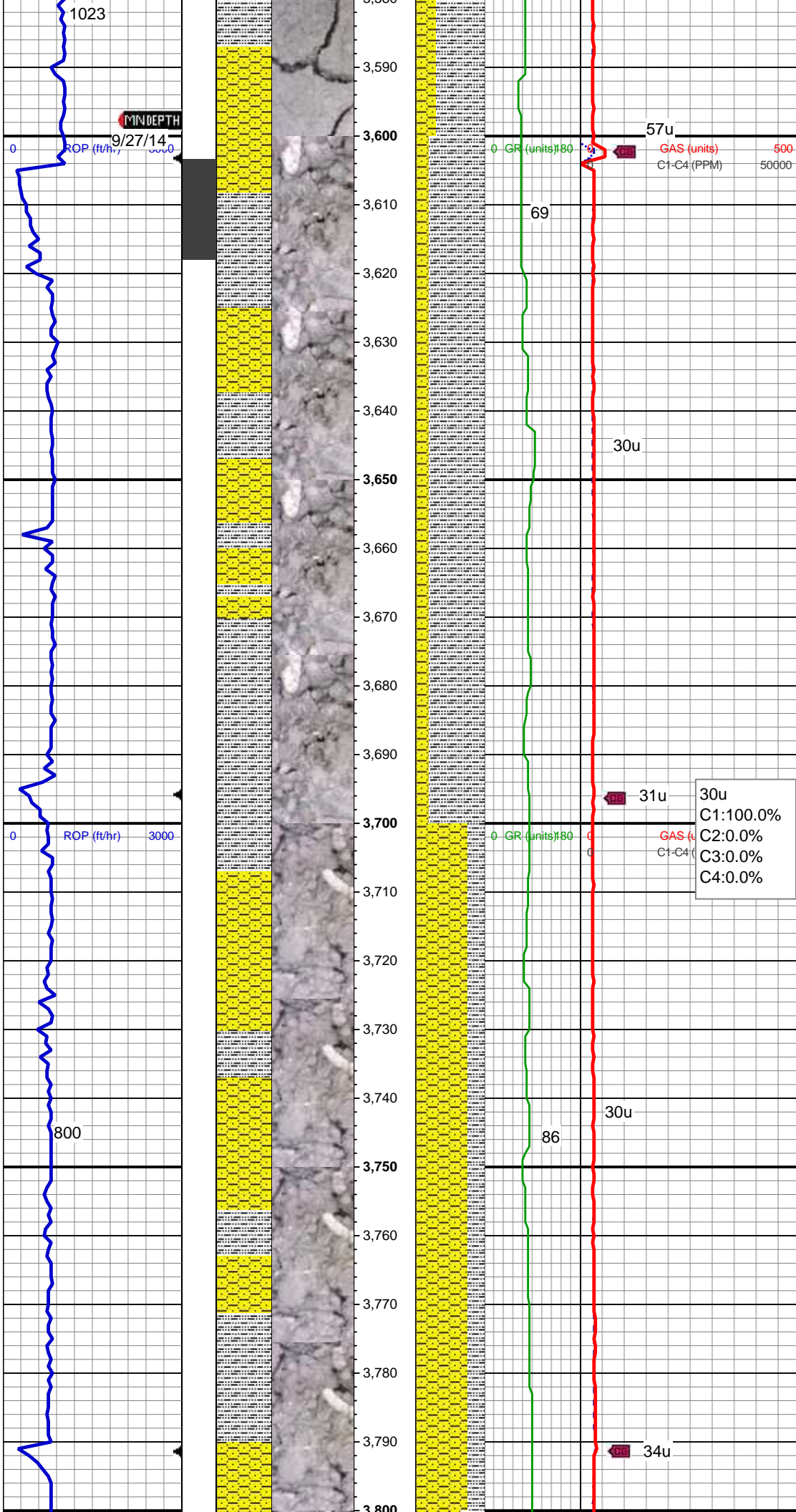
Mud Wt: 9.05 /40 Vis

31u  
C1:96.8%  
C2:1.9%  
C3:0.9%  
C4:0.4%

MD: 3,545'  
Inclination: 18.43 °  
Azimuth: 89.26 °  
TVD: 3,466.17'  
VS: 564.89'

SH: lt-dk gy, sft-mod frm, sb blkly-sb plty, gritty, SHY SS: lt-med gy, sft-frm, vf gr-f gr, sb ang - sb rnd, mod w srt, arg cmt, sl calc, abnt cly





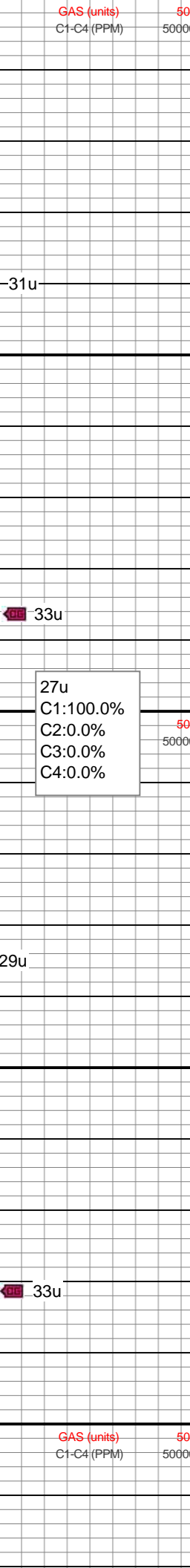
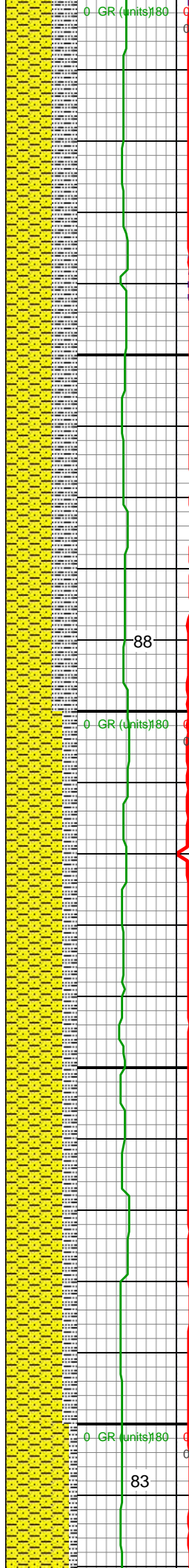
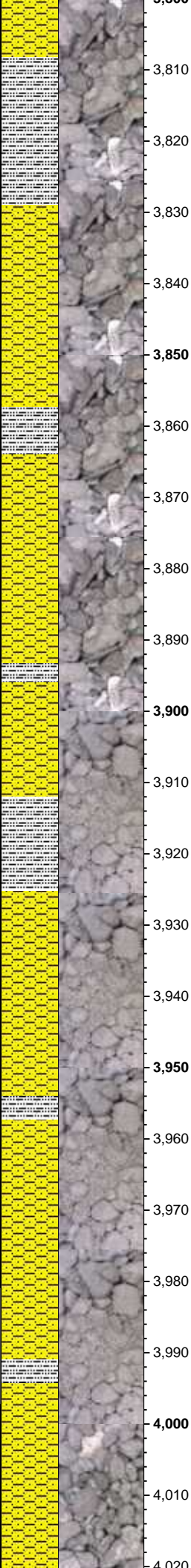
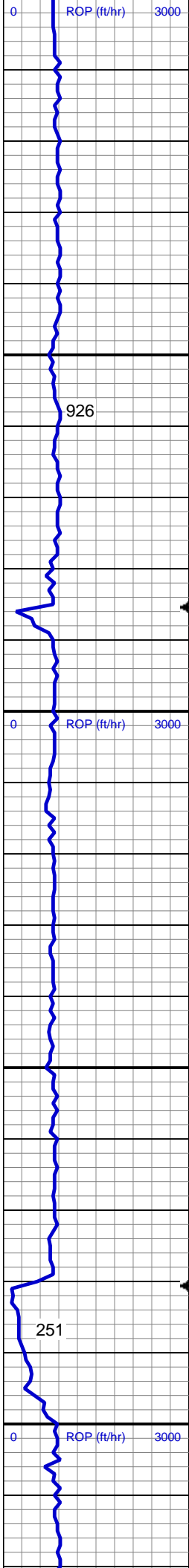
MD: 3,640'  
Inclination: 16.27 °  
Azimuth: 82.85 °  
TVD: 3,556.85'  
VS: 593.11'

SH: lt-dk gy, sft-mod frm, sb blkly-sb plty, gritty, SHY SS: lt-med gy, sft-frm, vf gr-f gr, sb ang - sb rnd, mod w srt, arg cmt, sl calc, abnt cly

MD: 3,735'  
Inclination: 16.31 °  
Azimuth: 82.43 °  
TVD: 3,648.04'  
VS: 619.54'

SHY SS: lt-med gy, sft-frm, vf gr-f gr, sb ang - sb rnd, mod w srt, arg cmt, sl calc  
SLTY SH: lt-dk gy, sft-mod frm, sb blkly-sb plty, gritty, abnt cly, occ bent





MD: 3,829'  
Inclination: 15.73 °  
Azimuth: 80.66 °  
TVD: 3,738.39'  
VS: 645.2'

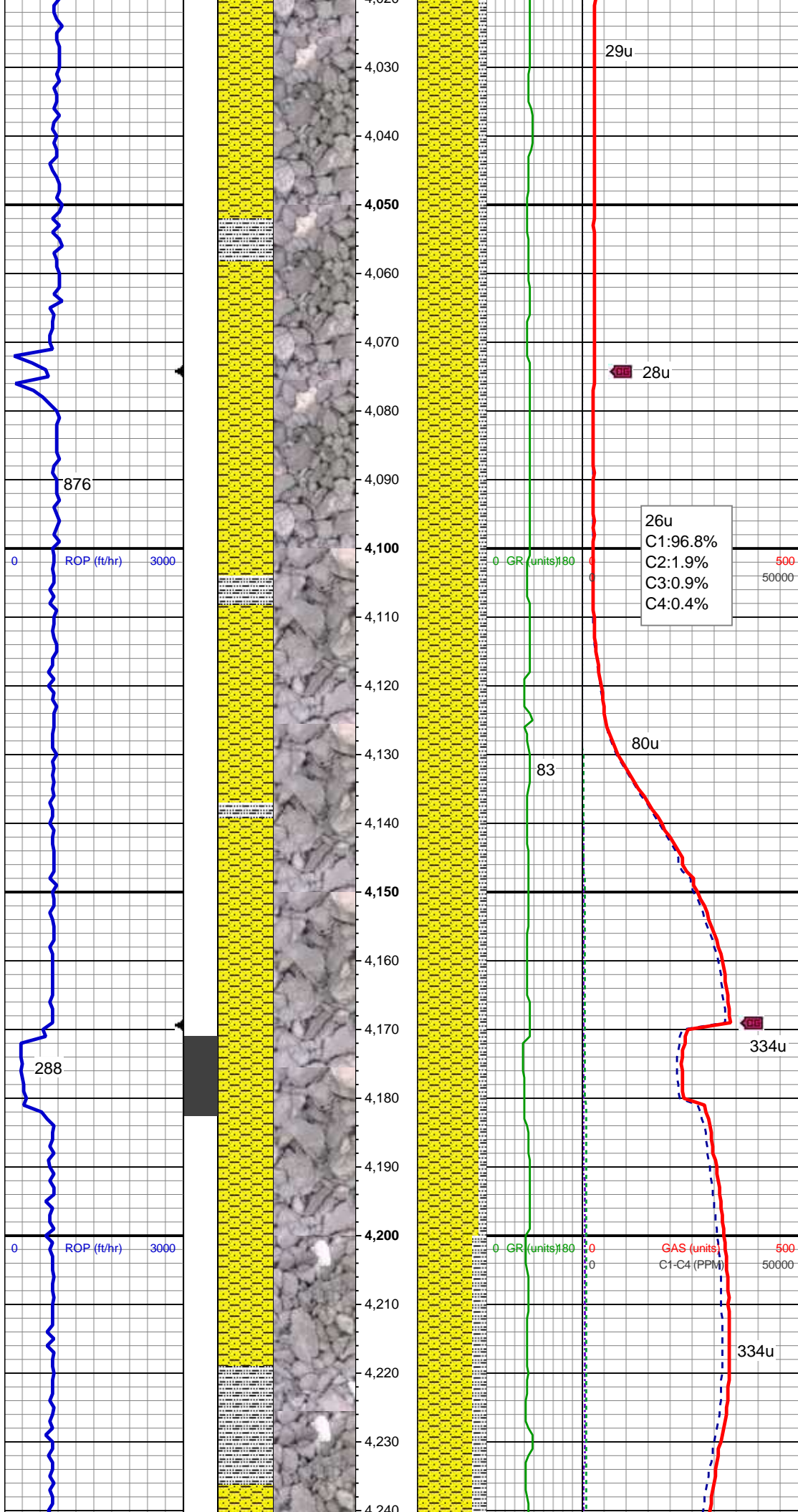
SHY SS: lt-med gy, sft frm, vf gr-f gr, sb ang - sb rnd, mod w srt, arg cmt, sl calc  
SLTY SH: lt-dk gy, sft-mod frm, sb blk-y-sb pty, gritty, abnt cly, occ bent

Mud Wt: 9.15 /48 Vis

MD: 3,924'  
Inclination: 15.1 °  
Azimuth: 78.56 °  
TVD: 3,829.97'  
VS: 670.03'

SHY SS: lt-med gy, sft frm, vf gr-f gr, sb ang - sb rnd, mod w srt, arg cmt, sl calc  
SLTY SH: lt-dk gy, sft-mod frm, sb blk-y-sb pty, gritty, abnt cly

MD: 4,018'  
Inclination: 16.52 °  
Azimuth: 82.28 °



Azimuth: 82.38°  
TVD: 3,920.41'  
VS: 695.28'

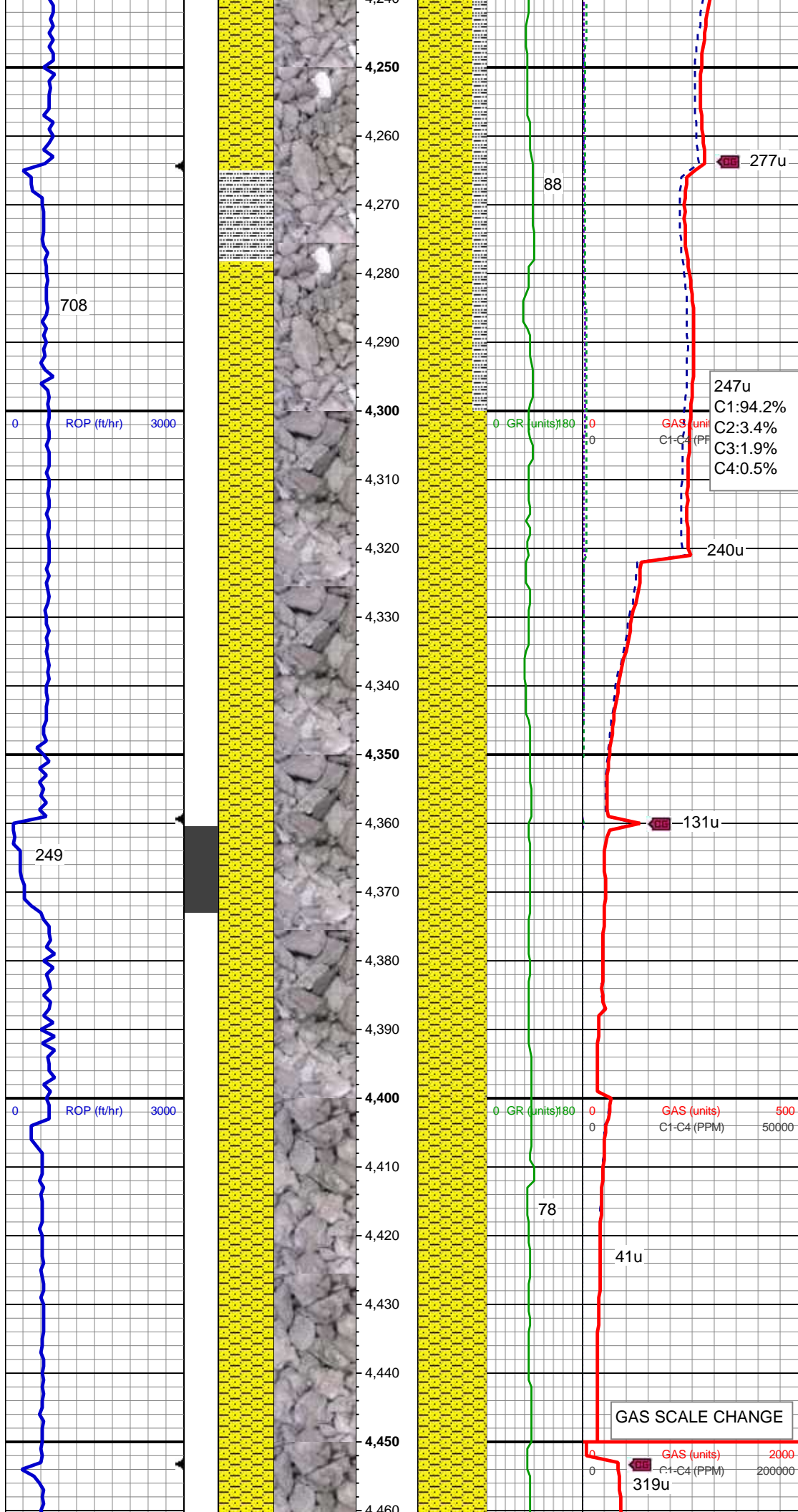
SHY SS: lt-med gy, sft-firm, vf gr-f gr, sb  
ang - sb rnd, mod w srt, arg cmt, sl calc  
SLTY SH: lt-dk gy, sft-mod frm, sb blkly-sb  
plty, gritty, abnt cly

MD: 4,113'  
Inclination: 15.89 °  
Azimuth: 80.77 °  
TVD: 4,011.64'  
VS: 721.51'

SHY SS: lt-med gy, sft-firm, vf gr-f gr, sb  
ang - sb rnd, mod w srt, arg cmt, sl calc  
SLTY SH: lt-dk gy, sft-mod frm, sb blkly-sb  
plty, gritty, abnt cly

MD: 4,207'  
Inclination: 16.26 °  
Azimuth: 84.73 °  
TVD: 4,101.97'  
VS: 747.31'





SHY SS: lt-med gy, sft-frn, vf gr-f gr, sb  
ang - sb rnd, mod w srt, arg cmt, sl calc  
SLTY SH: lt-dk gy, sft-mod frm, sb blk-y-sb  
plty, gritty, abnt cly

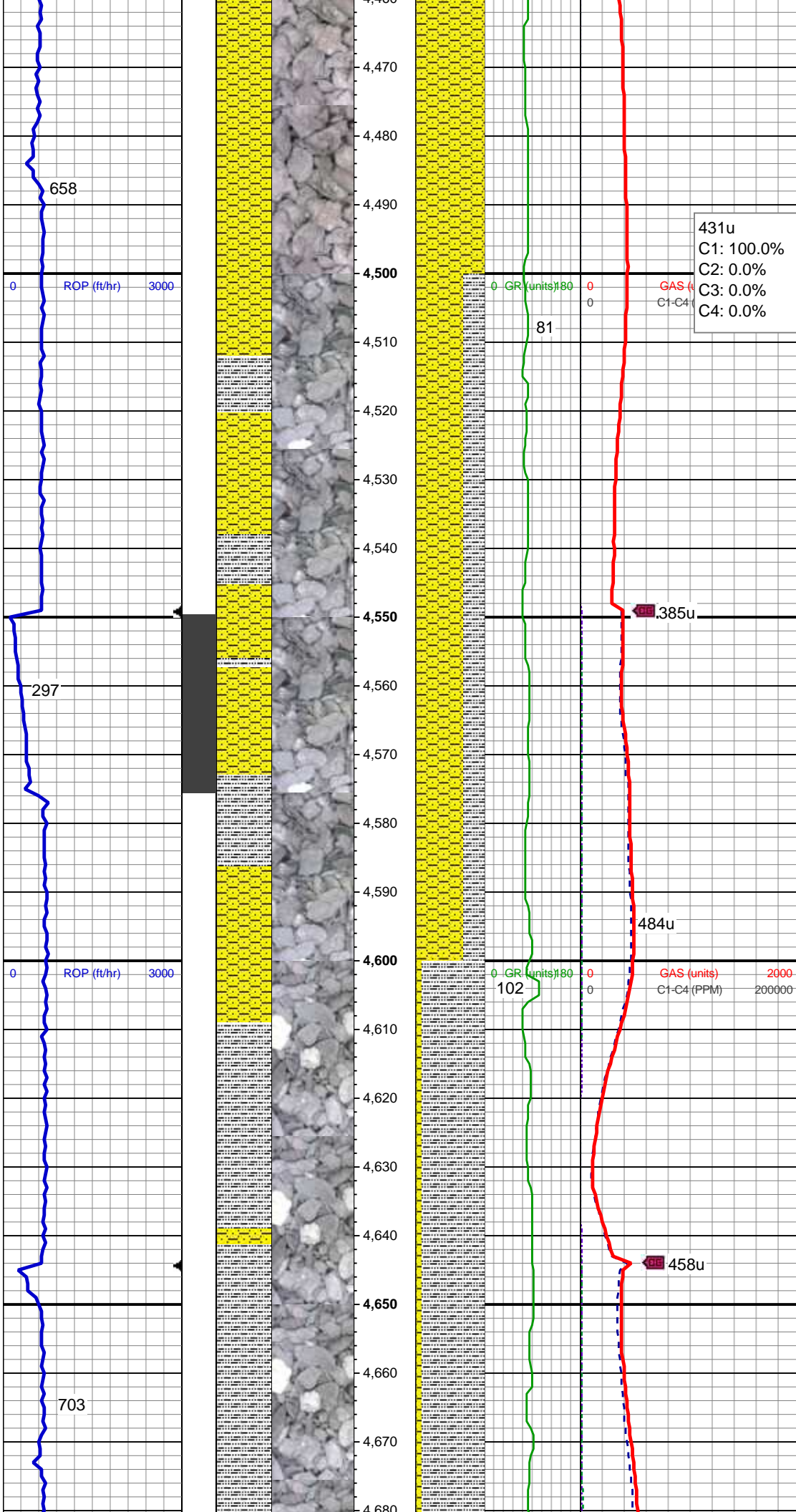
MD: 4,302'  
Inclination: 15.77 °  
Azimuth: 83.61 °  
TVD: 4,193.28'  
VS: 773.39'

SHY SS: lt-med gy, sft-frn, vf gr-f gr, sb  
ang - sb rnd, mod w srt, arg cmt, sl calc

MD: 4,396'  
Inclination: 13.95 °  
Azimuth: 89.69 °  
TVD: 4,284.14'  
VS: 797.42'

SHY SS: lt-med gy, sft-frn, vf gr-f gr, sb  
ang - sb rnd, mod w srt, arg cmt, sl calc





Mud Wt: 9.35 /48 Vis

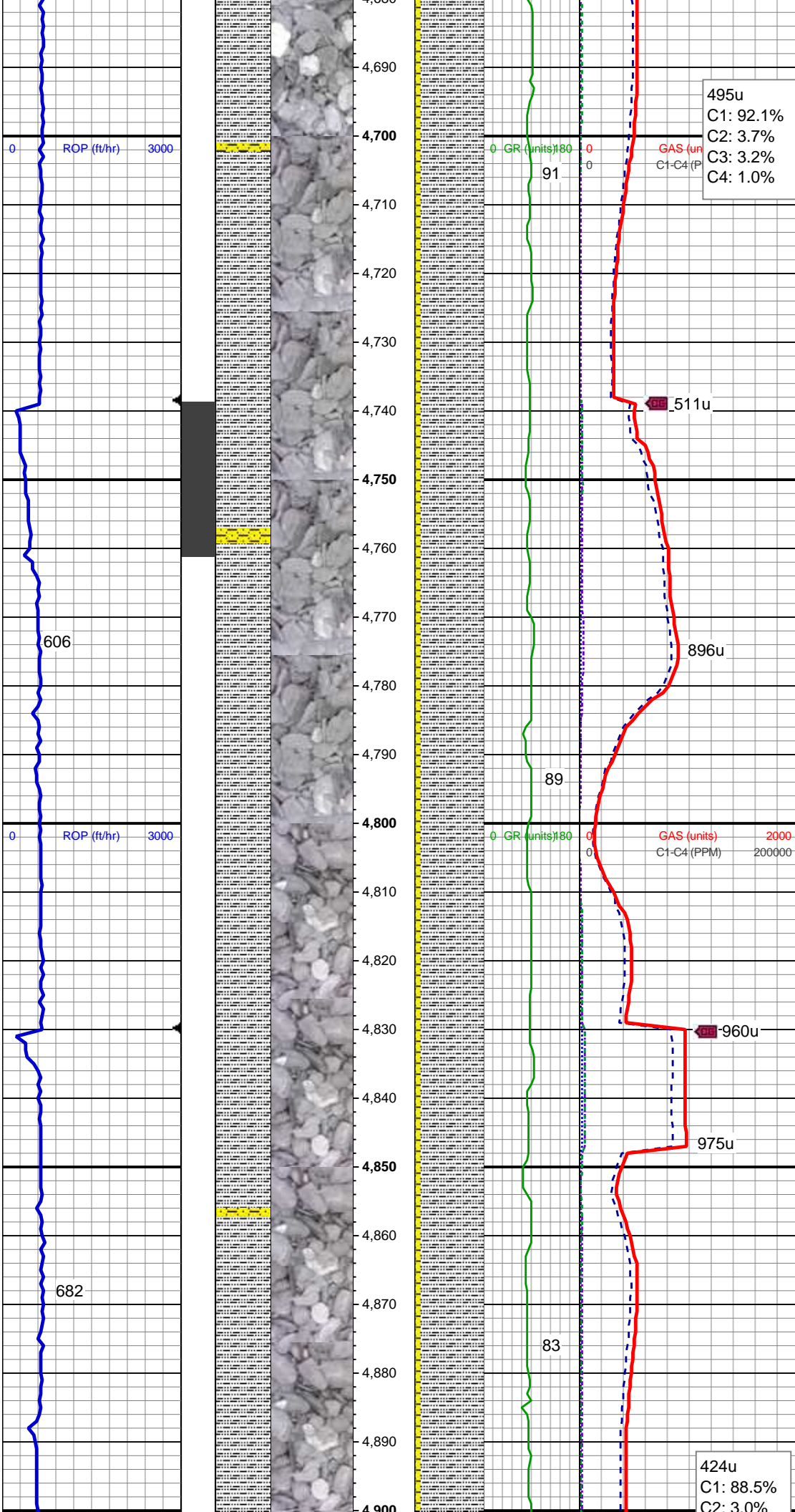
MD: 4,490'  
Inclination: 13.34 °  
Azimuth: 87.71 °  
TVD: 4,375.49'  
VS: 820.65'

SHY SS: lt-med gy, sft frm, vf gr-f gr, sb ang - sb rnd, mod w srt, arg cmt, sl calc  
SLTY SH: lt-dk gy, sft-mod frm, sb blk-y-sb pty, gritty

MD: 4,585'  
Inclination: 8.12 °  
Azimuth: 86.66 °  
TVD: 4,468.79'  
VS: 838.33'

SLTY SH: lt-dk gy, sft-mod frm, sb blk-y-sb pty, gritty SHY SS: lt-med gy, sft frm, vf gr-f gr, sb ang - sb rnd, mod w srt, arg cmt, sl calc

MD: 4,679'  
Inclination: 7.41 °  
Azimuth: 84.71 °



Azimuth: 94.74°  
TVD: 4,561.93'  
VS: 851.02'

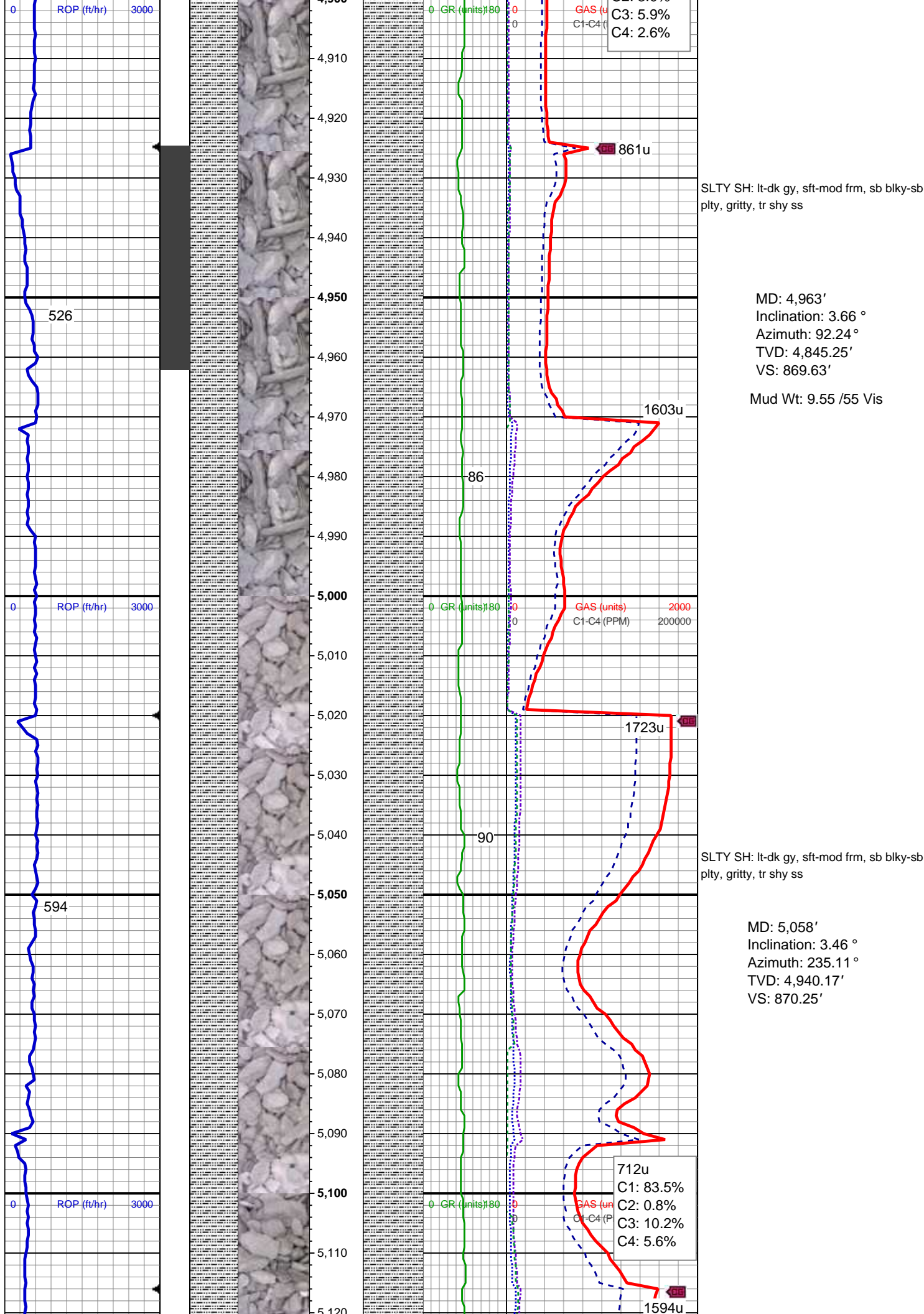
SLTY SH: lt-dk gy, sft-mod frm, sb blk-y-sb  
plty, gritty SHY SS: lt-med gy, sft-frm, vf  
gr-f gr, sb ang - sb rnd, mod w srt, arg  
cmt, sl calc

MD: 4,774'  
Inclination: 3.01 °  
Azimuth: 94.74 °  
TVD: 4,656.52'  
VS: 859.62'

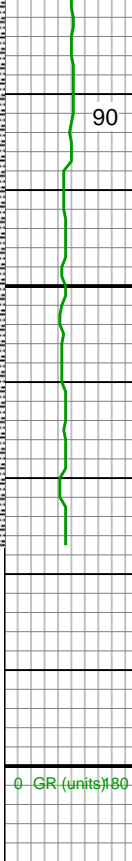
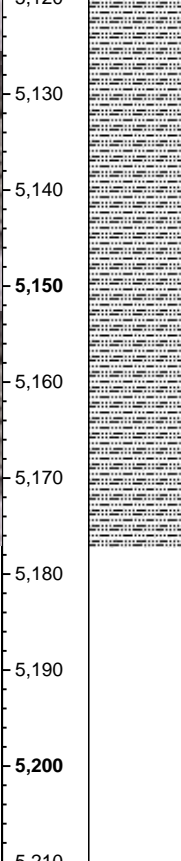
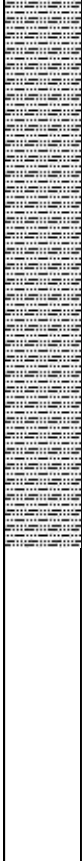
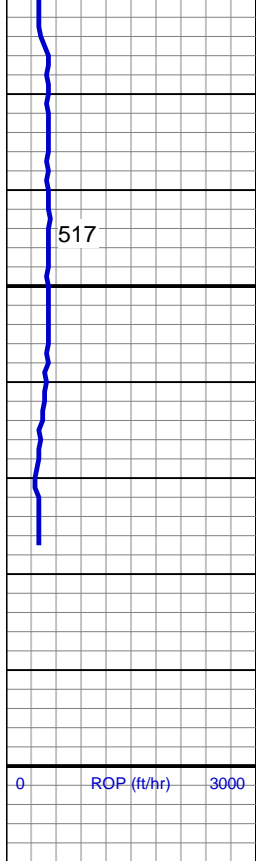
SLTY SH: lt-dk gy, sft-mod frm, sb blk-y-sb  
plty, gritty SHY SS: lt-med gy, sft-frm, vf  
gr-f gr, sb ang - sb rnd, mod w srt, arg  
cmt, sl calc

MD: 4,868'  
Inclination: 2.75 °  
Azimuth: 89.84 °  
TVD: 4,750.4'  
VS: 864.32'









TD Vertical @ 5177' MD  
on 09/27/14 @ 6:00 hrs  
MDT  
TOOH for Wireline Logs

Wellsite Geological  
Services  
Provided by Columbine  
Logging

SLTY SH: lt-dk gy, sft-mod frm, sb blk-y-sb  
ppty, gritty, tr shy ss

Mud Wt: 9.55 /51 Vis

See Corresponding Horizontal Log  
Rohn State LD10-67-1HN(HORZ)