

# COLUMBINE LOGGING

Scale: 5" / 100'  
Measured Depth Log

**Well Name** Smith State LD12-73-1BHN

**State** COLORADO

**County** WELD

**Country** USA

**Rig Number** H&P 326

**API Number** 05-123-39703

**Field** WILDCAT

**Region** DJ BASIN

**Drilling Completed** 12/12/2014

**Spud Date** 12/8/2014

**Surface Coordinates** SESE SEC1, T9N, R85W, 6P  
250' FSL, 1227' FEL  
40.77386  
-103.80675

**Ground Elevation** 4653'

**K.B. Elevation** 4683'

**Logged Interval** 1252' To 4783'

**Total Depth** 10286'

**Formation** NIOBRARA-B CHALK

**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

- 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 WACKSTONE

### Sorting

- MODERATE
- POOR
- W WELL

## Zone Color Coding

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

## Accessories

### Fossils

- ALGAE
- AMPHIPORA
- BELEMNITE
- BIOCLASTIC
- BRACHIOPOD
- BRIOZOA

- FOSSIL
- GASTROPOD
- INOCERAMUS
- OOLITE
- OSTRACOD
- PELECYPOD
- PELLET
- DISOLITE

- ANHYDRITIC
- ARGILLACEOUS
- ARGILLITE GRAIN
- BENTONITE
- BITUMENOUS SUBSTANCE
- BRECCIA FRAGMENTS
- CALCAREOUS
- CARBONACEOUS FLAKES

- FERRUGINOUS
- GLAUCONITE
- GYPSEFEROUS
- HEAVY MINERAL
- KAOLIN
- MARLSTONE
- MINERAL CRYSTALS
- NOODULES

- TUFFACEOUS

### Stringer

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

┆ BRYOZOA  
🐙 CEPHALOPOD  
🪸 CORAL  
🪸 CRINOID  
🪸 ECHINOID  
🐟 FISH  
🪸 FORAMINIFERA

🪸 FISOLITE  
🪸 PLANT REMAINS  
🪸 PLANT SPORES  
🪸 SCAPHOPOD  
🪸 STROMATOPOROID

## Minerals

■ CARBONACEOUS FLAKES  
⚠️ CHTDK  
⚠️ CHTLT  
— COAL - THIN BEDS  
🪸 DOLOMITIC  
+ FELDSPAR  
● FERRUGINOUS PELLET

🪸 NODULES  
● PHOSPHATE PELLETS  
P 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  
🪸 ANHYDRITE  
🪸 BENTONITE  
🪸 BRECCIA  
🪸 CEMENT  
🪸 CHALK  
🪸 CHERT  
🪸 CLAY CHOKE SAND  
🪸 CLAYSTONE

■ COAL  
🪸 CONGLOMERATE  
🪸 DOLOMITE  
🪸 GRANITE  
🪸 GYPSUM  
🪸 IGNEOUS  
🪸 LIMESTONE  
🪸 SIDERITE or LIMONITE  
🪸 MARLSTONE

🪸 METAMORPHIC  
X X X X X 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

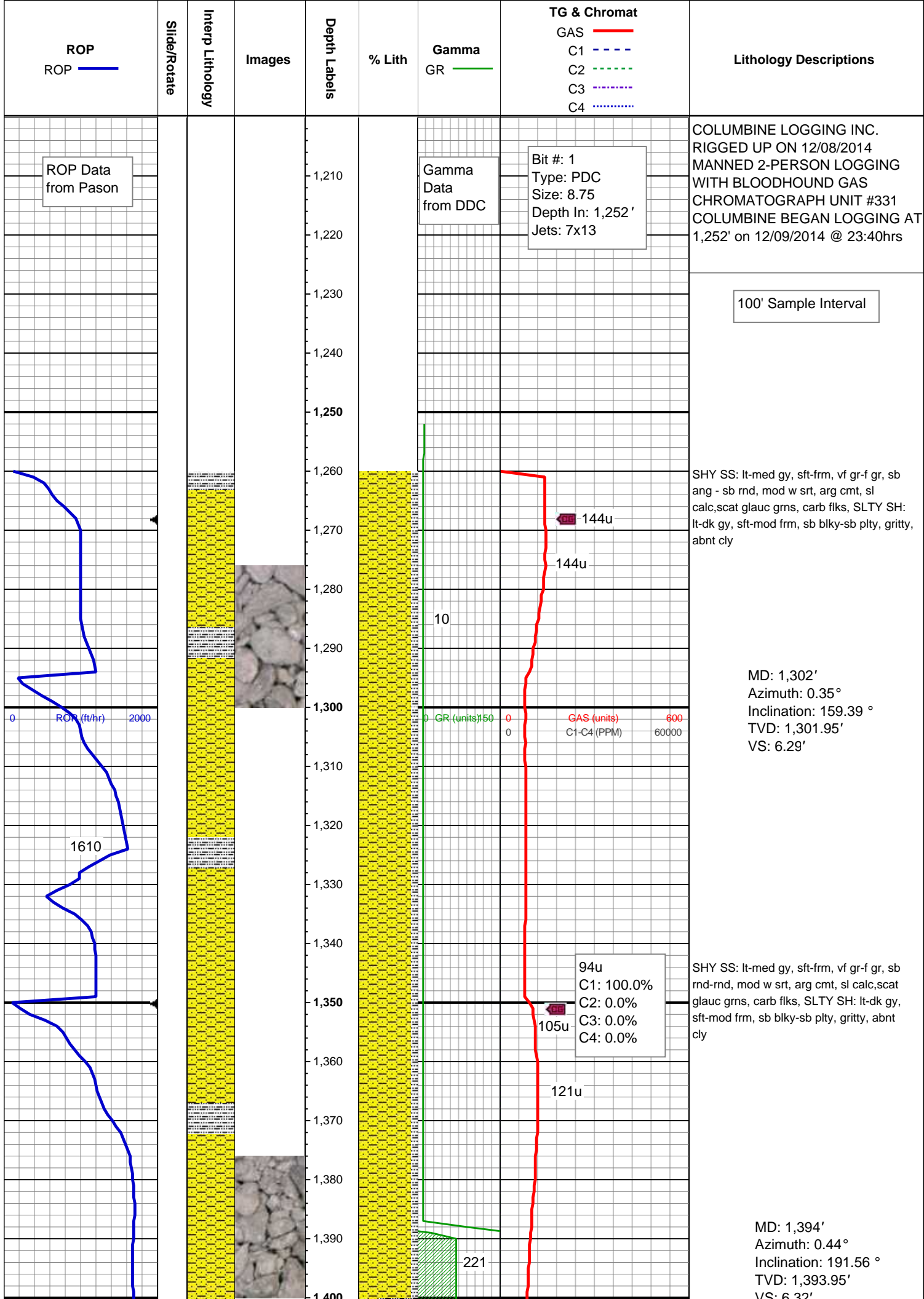
**Name** EVAN HOWELL

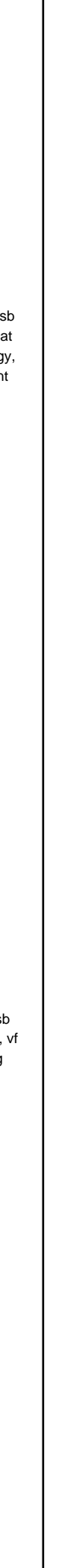
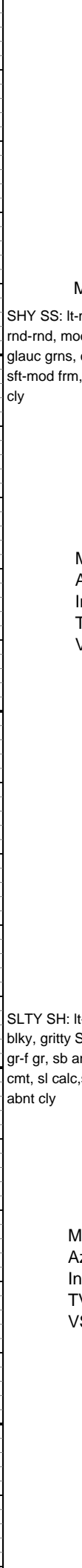
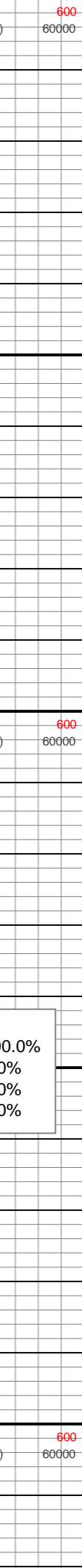
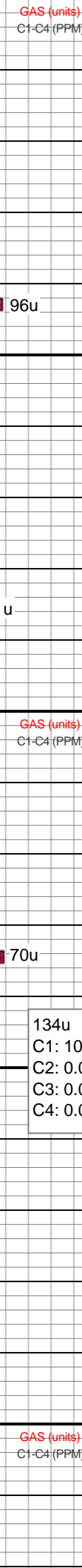
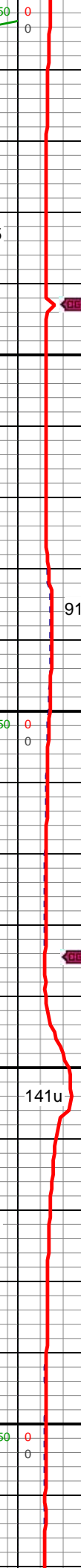
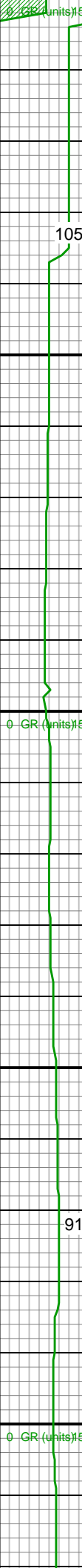
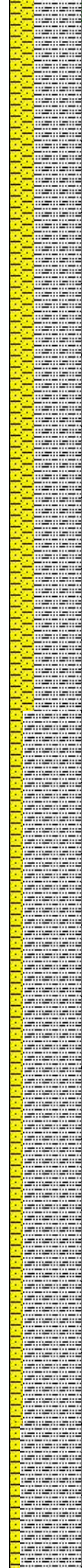
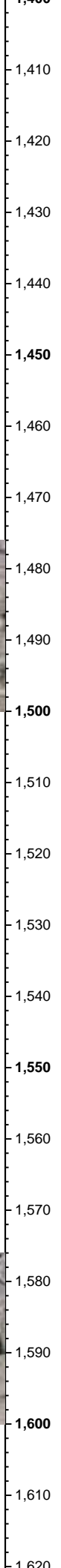
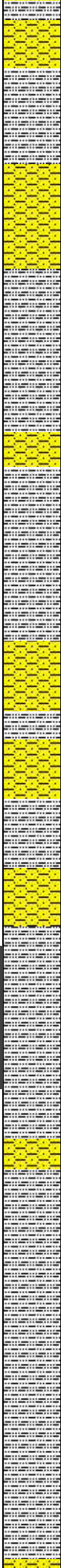
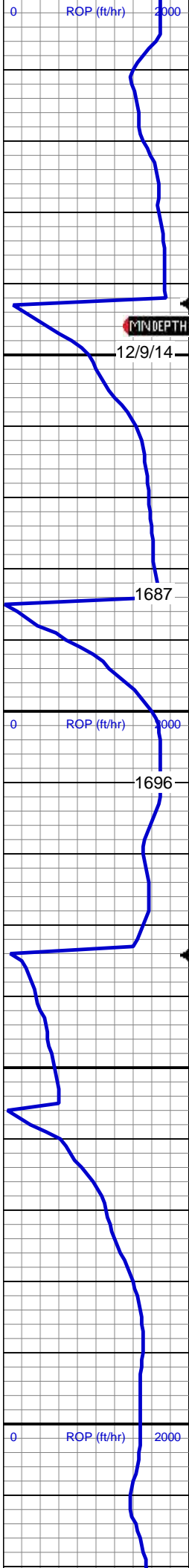
**Company** NOBLE ENERGY INC.

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

## Other

**COLUMBINE LOGGING** Mike Kerschen





Mud Wt: 8.80 / 30 Vis

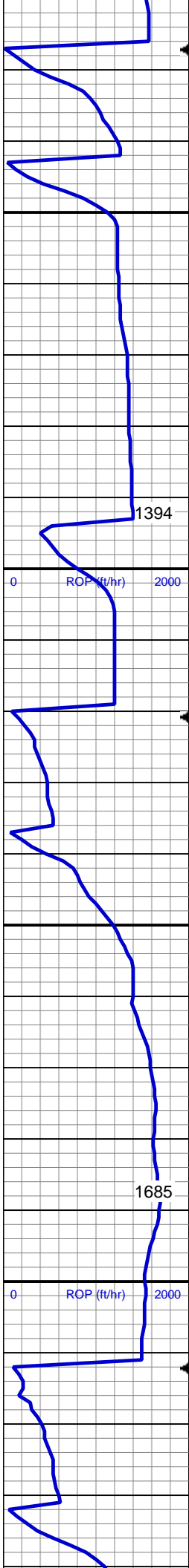
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rnd-rnd, mod w srt, arg cmt, sl calc, scat  
glauc grns, carb flks, SLTY SH: lt-dk gy,  
sft-mod frm, sb blkly-sb plty, gritty, abnt  
cly

MD: 1,486'  
Azimuth: 0.09°  
Inclination: 292.63 °  
TVD: 1,485.95'  
VS: 6.18'

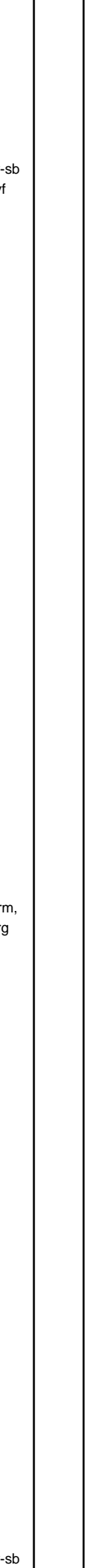
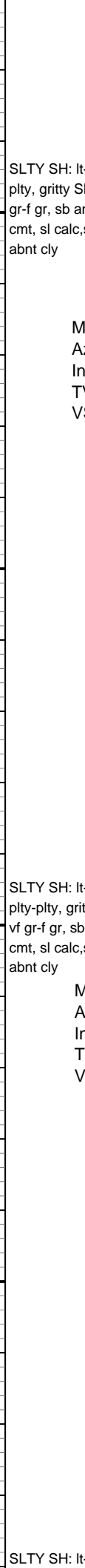
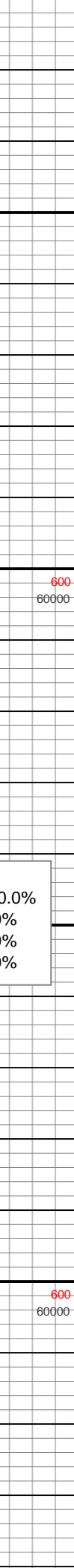
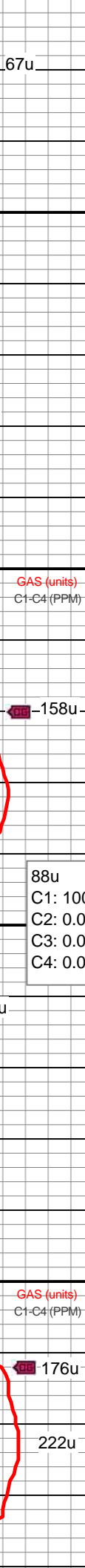
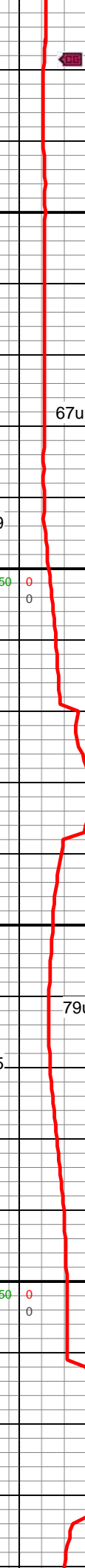
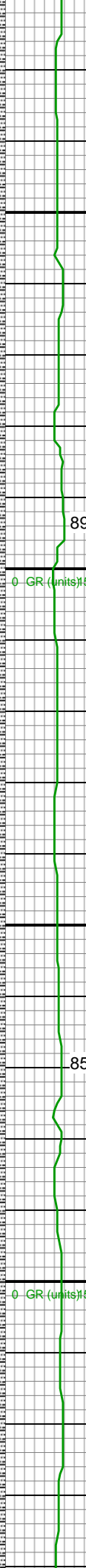
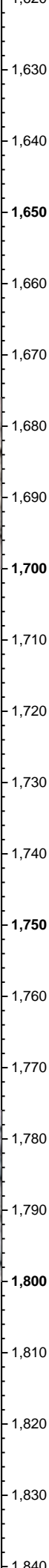
SLTY SH: lt-dk gy, sft-mod frm, blkly-sb  
blkly, gritty SHY SS: lt-med gy, sft-frm, vf  
gr-f gr, sb ang - sb rnd, mod w srt, arg  
cmt, sl calc, scat glauc grns, carb flks,  
abnt cly

MD: 1,581'  
Azimuth: 4.13°  
Inclination: 131.26 °  
TVD: 1,580.87'  
VS: 8.69'





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, scat glauc grns, carb flks,  
abnt cly



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, scat glauc grns, carb flks,  
abnt cly

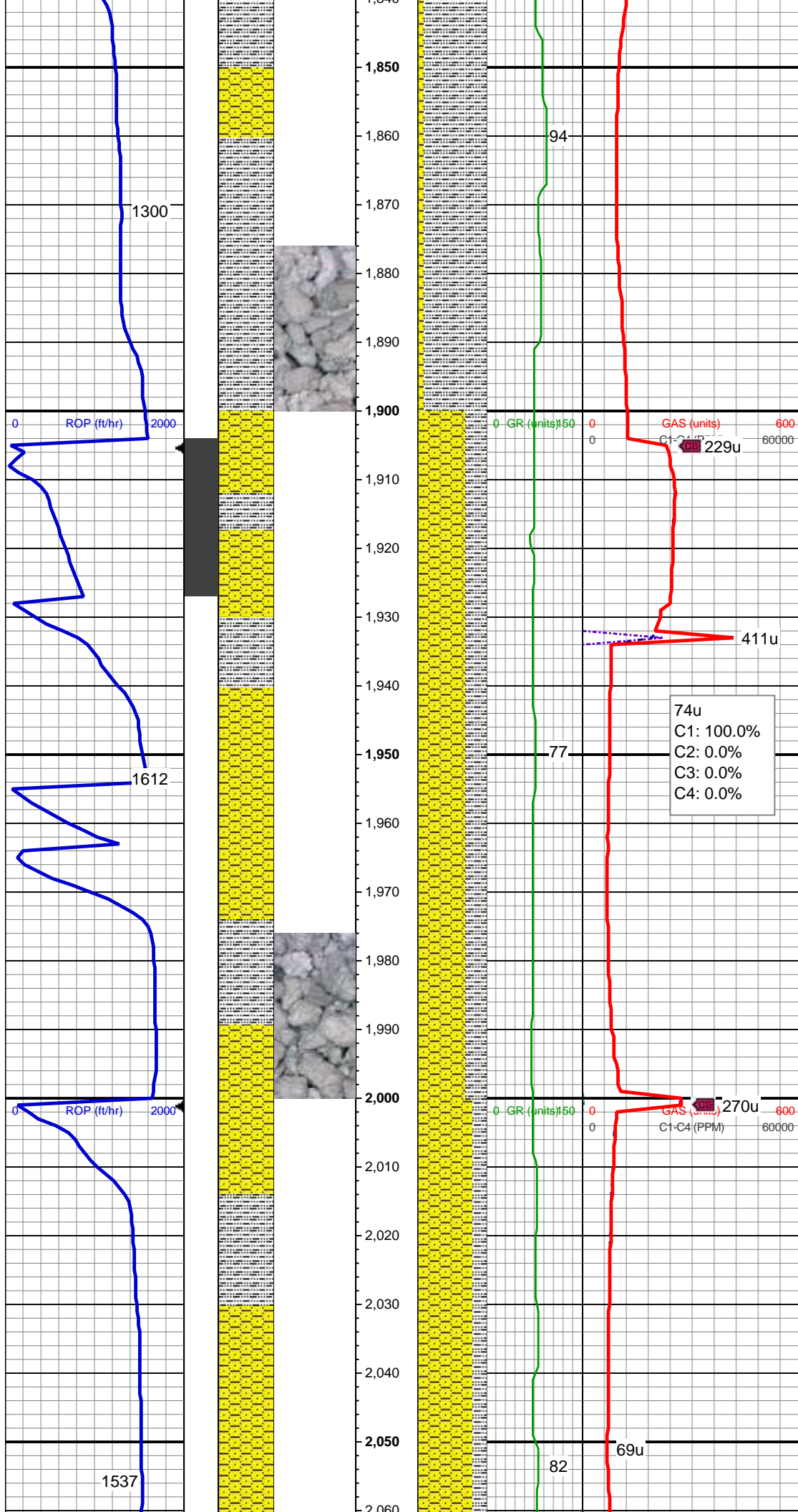
MD: 1,673'  
Azimuth: 2.9°  
Inclination: 134.08 °  
TVD: 1,672.69'  
VS: 12.85'

88u  
C1: 100.0%  
C2: 0.0%  
C3: 0.0%  
C4: 0.0%

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

MD: 1,766'  
Azimuth: 4.84°  
Inclination: 96.11 °  
TVD: 1,765.49'  
VS: 18.44'

SLTY SH: lt-dk gy, sft-mod frm, sb blkly-sb



plty, gritty SHY SS: ltgy, sft frm, vf gr-f gr, sb ang - sb rnd, mod w srt, arg cmt, sl calc, scat glauc grns, carb flks, abnt cly

MD: 1,859'  
Azimuth: 6.33°  
Inclination: 73.43°  
TVD: 1,858.06'  
VS: 27.26'

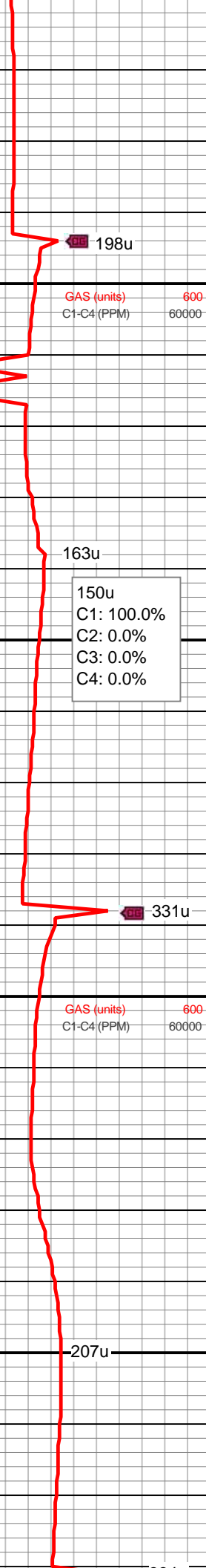
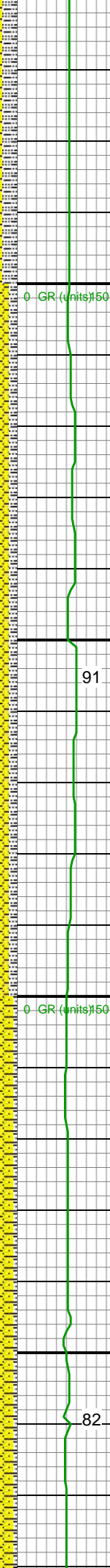
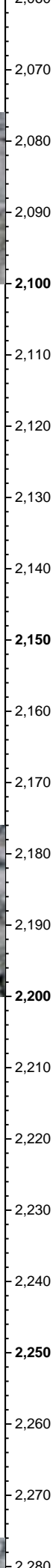
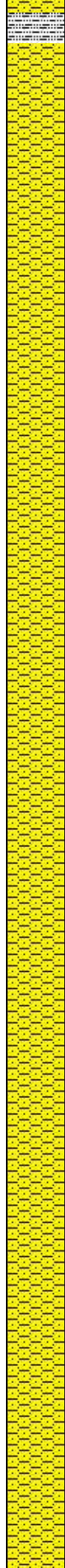
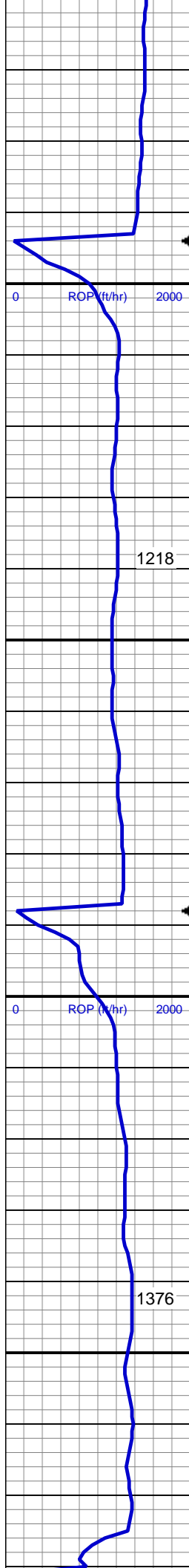
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MD: 1,953'  
Azimuth: 9.76°  
Inclination: 88.02°  
TVD: 1,951.13'  
VS: 40.19'

Mud Wt: 8.90 / 30 Vis

SHY SS: lt-med gy, sft frm, vf gr-f gr, sb rnd-rnd, mod w srt, arg cmt, sl calc, scat glauc grns, carb flks, SLTY SH: lt-dk gy, sft-mod frm, sb blkgy-sb plty, gritty, abnt cly

MD: 2,045'  
Azimuth: 8.97°  
Inclination: 83.27°  
TVD: 2,041.9'  
VS: 55.11'



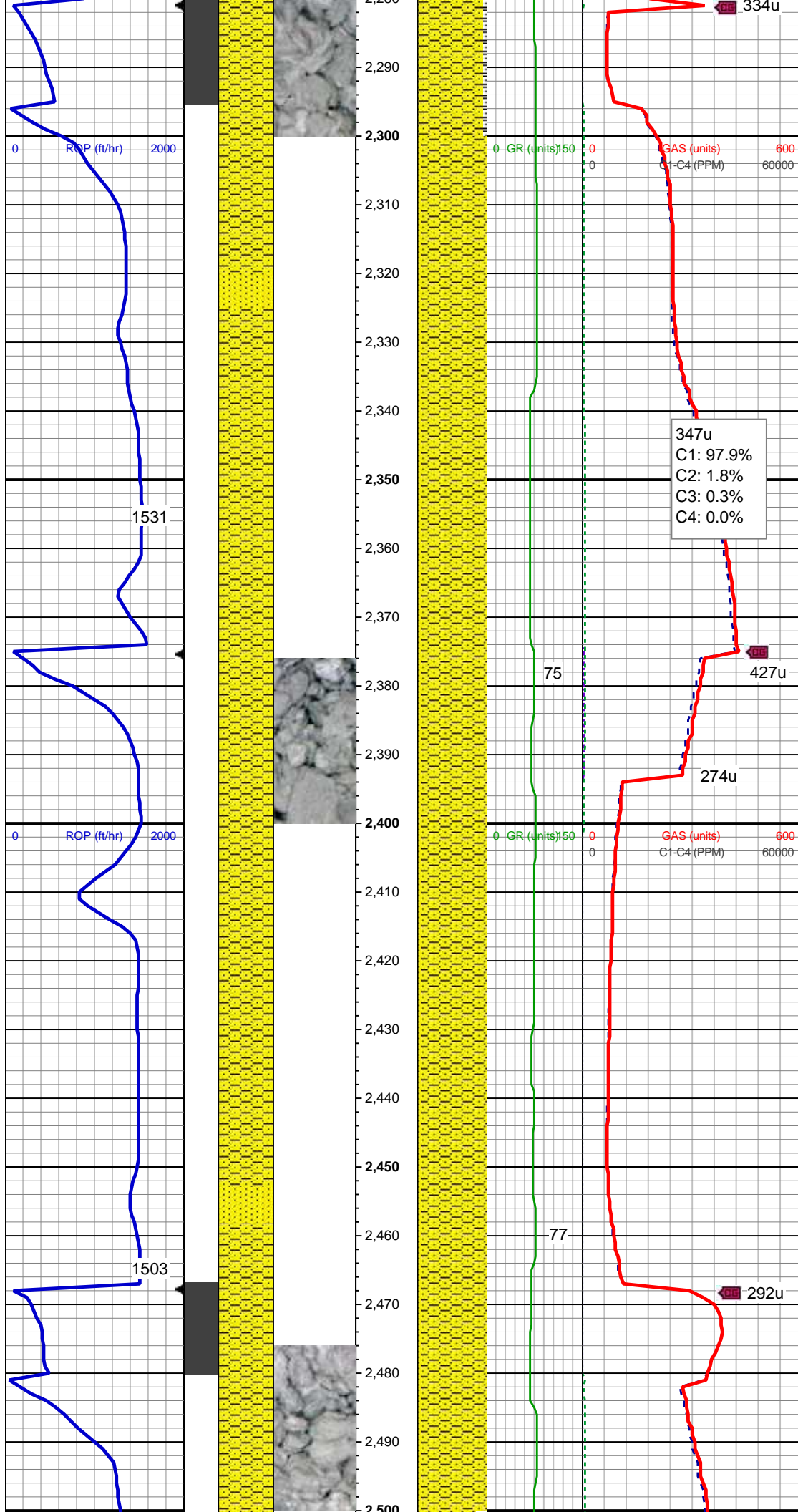
MD: 2,139'  
Azimuth: 8.53°  
Inclination: 84.51 °  
TVD: 2,134.81'  
VS: 69.33'

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

MD: 2,232'  
Azimuth: 8.18°  
Inclination: 82.57 °  
TVD: 2,226.82'  
VS: 82.75'

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





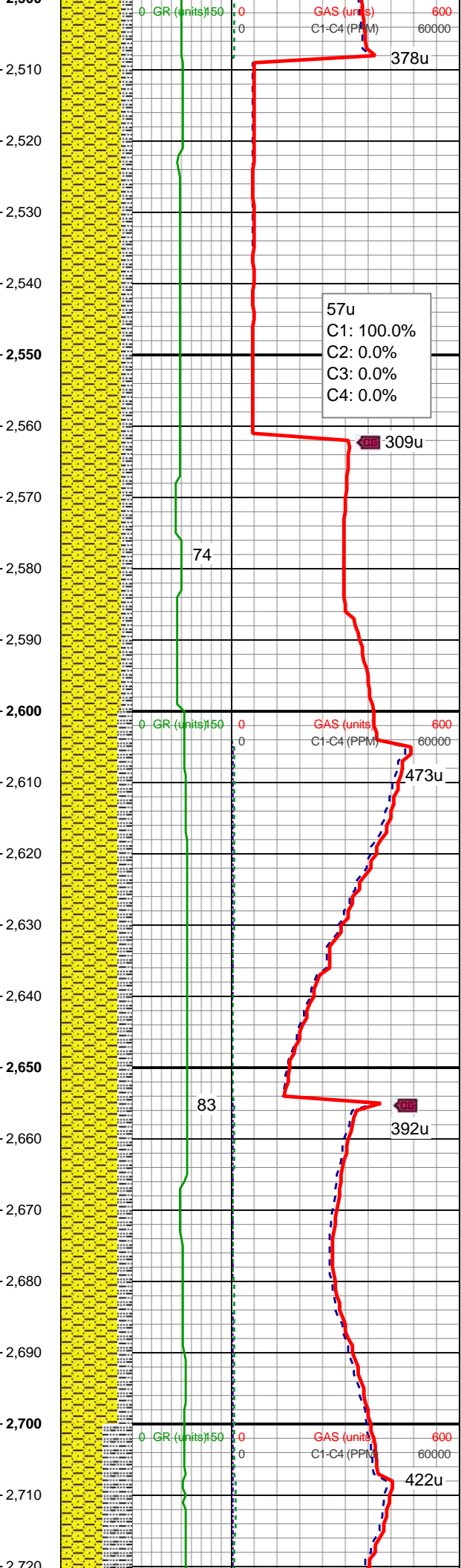
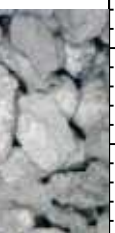
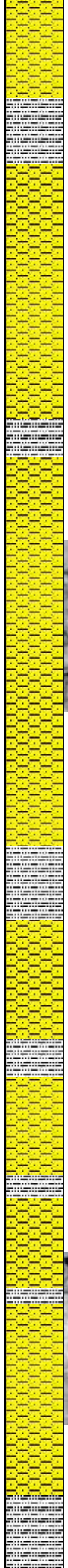
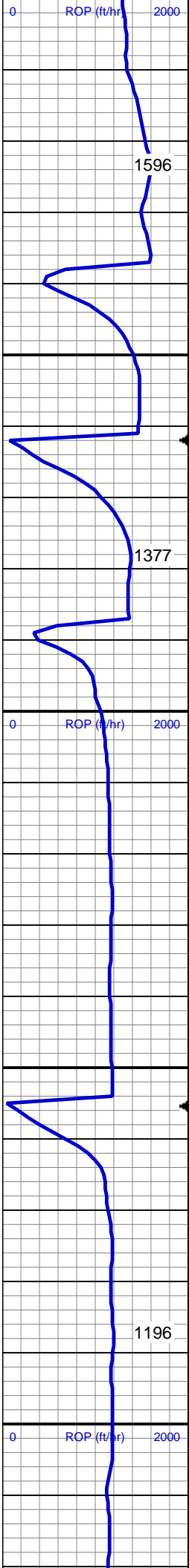
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gr, sb ang - sb rnd, mod w srt, arg cmt, sl  
calc SS: med - lt gy, s&p ip, unconc,  
speckl wi glau, f gr, hd brit clus, ang - sb  
ang, calc cmt, tr slty sh

MD: 2,418'  
Azimuth: 9.41°  
Inclination: 91.36°  
TVD: 2,410.64'  
VS: 111.08'

SHY SS: lt-med gy, s&p ip, sft frm, vf gr-f  
gr, sb ang - sb rnd, mod w srt, arg cmt, sl  
calc SS: med - lt gy, s&p ip, unconc,  
speckl wi glau, f gr, hd brit clus, ang - sb  
ang, calc cmt, tr slty sh

MD: 2,510'  
Azimuth: 10.55°



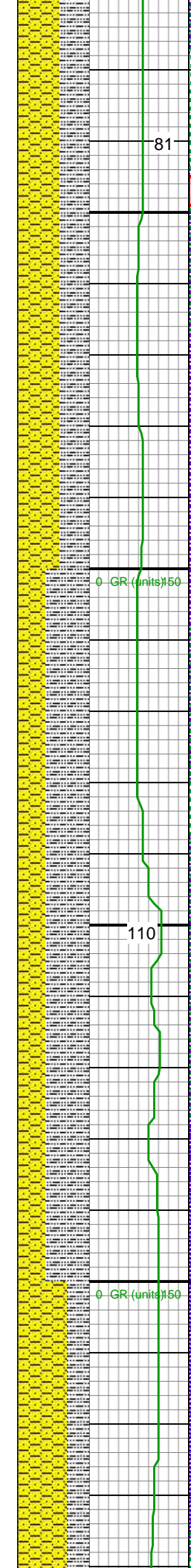
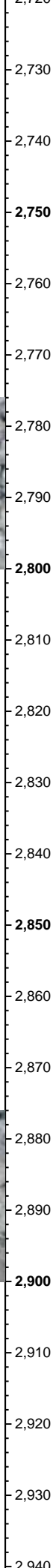
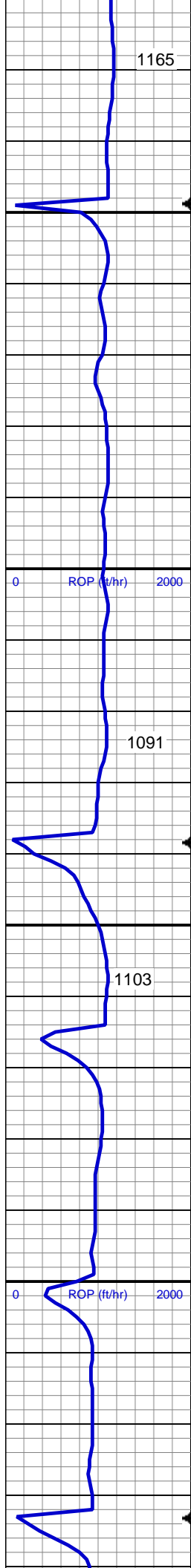


Inclination: 98.22 °  
TVD: 2,501.25'  
VS: 126.93'

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

MD: 2,602'  
Azimuth: 10.46 °  
Inclination: 96.46 °  
TVD: 2,591.71'  
VS: 143.57'

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



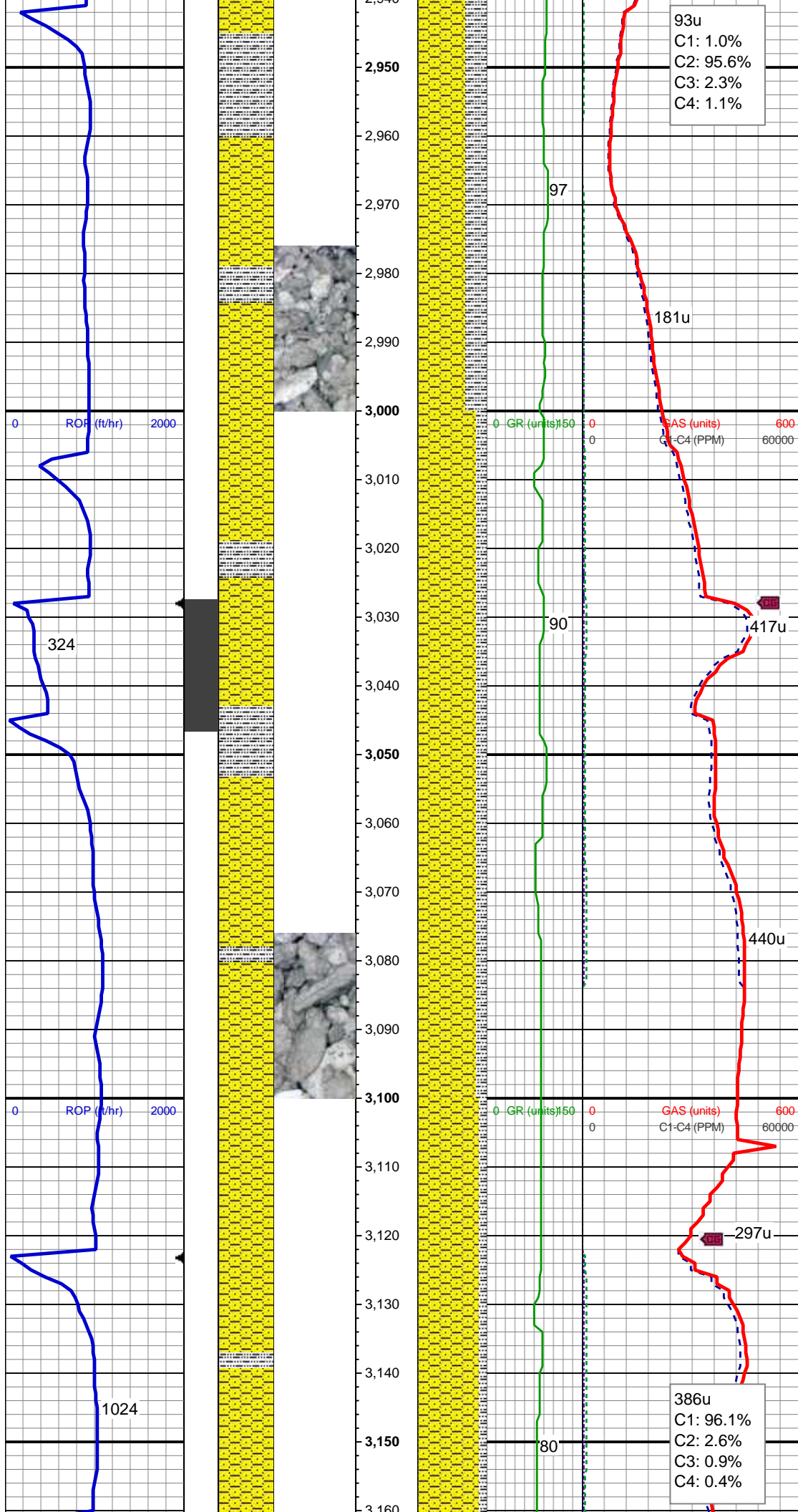
315u  
C1: 97.1%  
C2: 2.1%  
C3: 0.8%  
C4: 0.0%

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

MD: 2,790'  
Azimuth: 9.5°  
Inclination: 95.05°  
TVD: 2,776.86'  
VS: 175.98'

Mud Wt: 8.90 / 31 Vis

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, carb flks



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 blk-y-sb  
plty, gritty

MD: 2,978'  
Azimuth: 8.27°  
Inclination: 89.25 °  
TVD: 2,962.6'  
VS: 204.96'

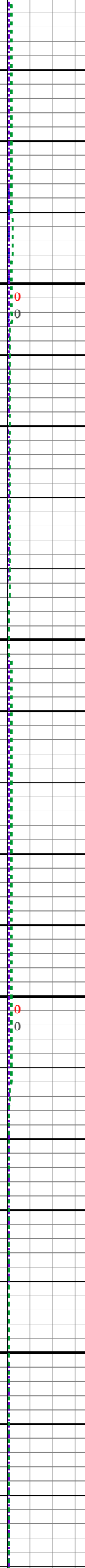
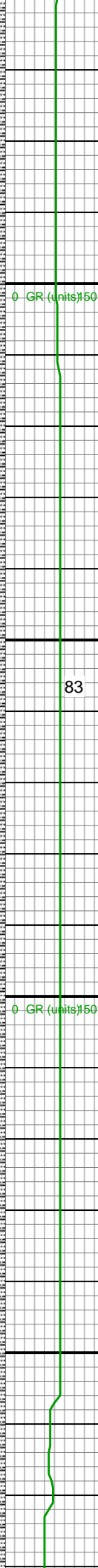
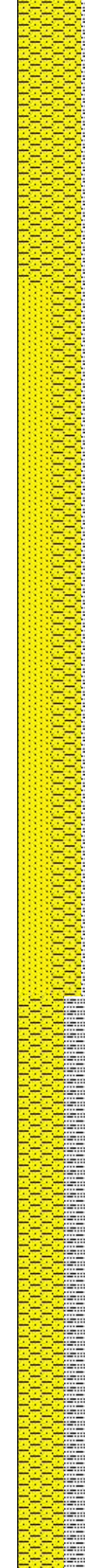
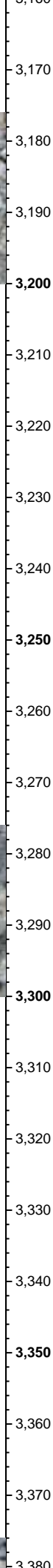
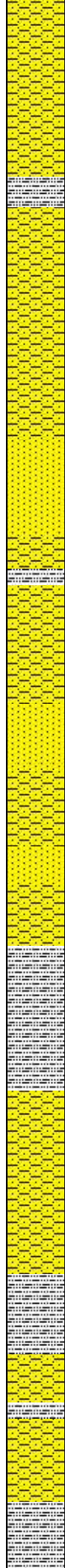
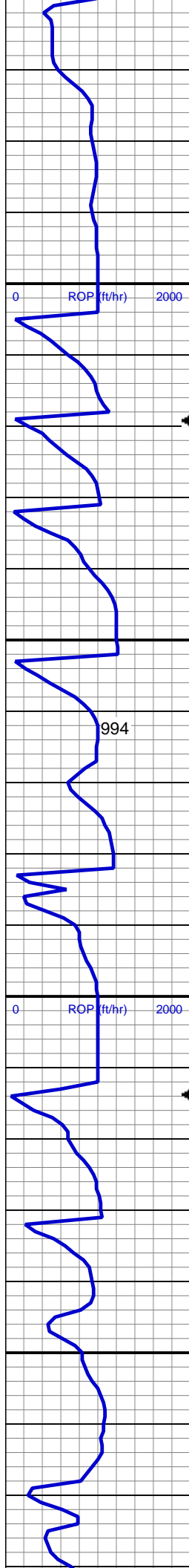
SHY SS: lt-med gy, sft-firm, vf gr-f gr, sb  
ang - sb rnd, mod w srt, arg cmt, sl calc  
SLTY SH: lt-dk gy, sft-mod frm, sb blk-y-sb  
plty, gritty

MD: 3,073'  
Azimuth: 9.76°  
Inclination: 100.85 °  
TVD: 3,056.43'  
VS: 219.7'

Mud Wt: 8.90 / 31 Vis

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 blk-y-sb  
plty, gritty





387u  
C1: 98.5%  
C2: 0.9%  
C3: 0.5%  
C4: 0.0%

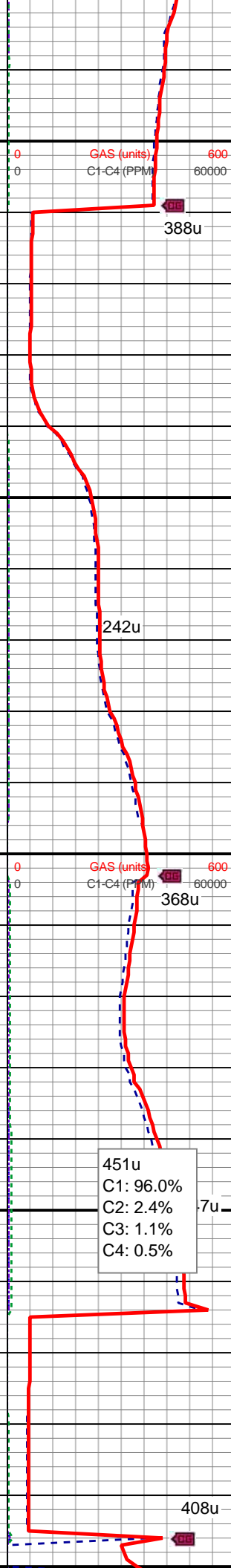
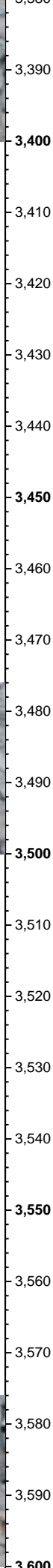
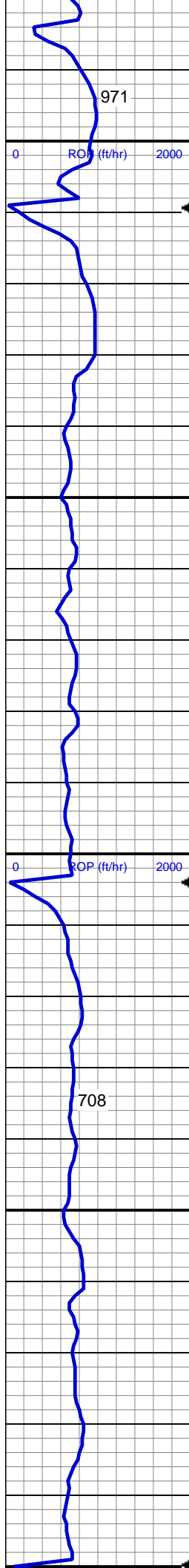
MD: 3,168'  
Azimuth: 9.85 °  
Inclination: 99.8 °  
TVD: 3,150.05'  
VS: 34.11'

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, uncon, speckl wi mica & glau, f gr, hd brit clus, ang - sb ang, calc cmt  
SLTY SH: lt-dk gy, sft-mod frm, sb blk-y-sb plty, gritty

MD: 3,263'  
Azimuth: 10.11 °  
Inclination: 98.39 °  
TVD: 3,243.61'  
VS: 37.73'

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



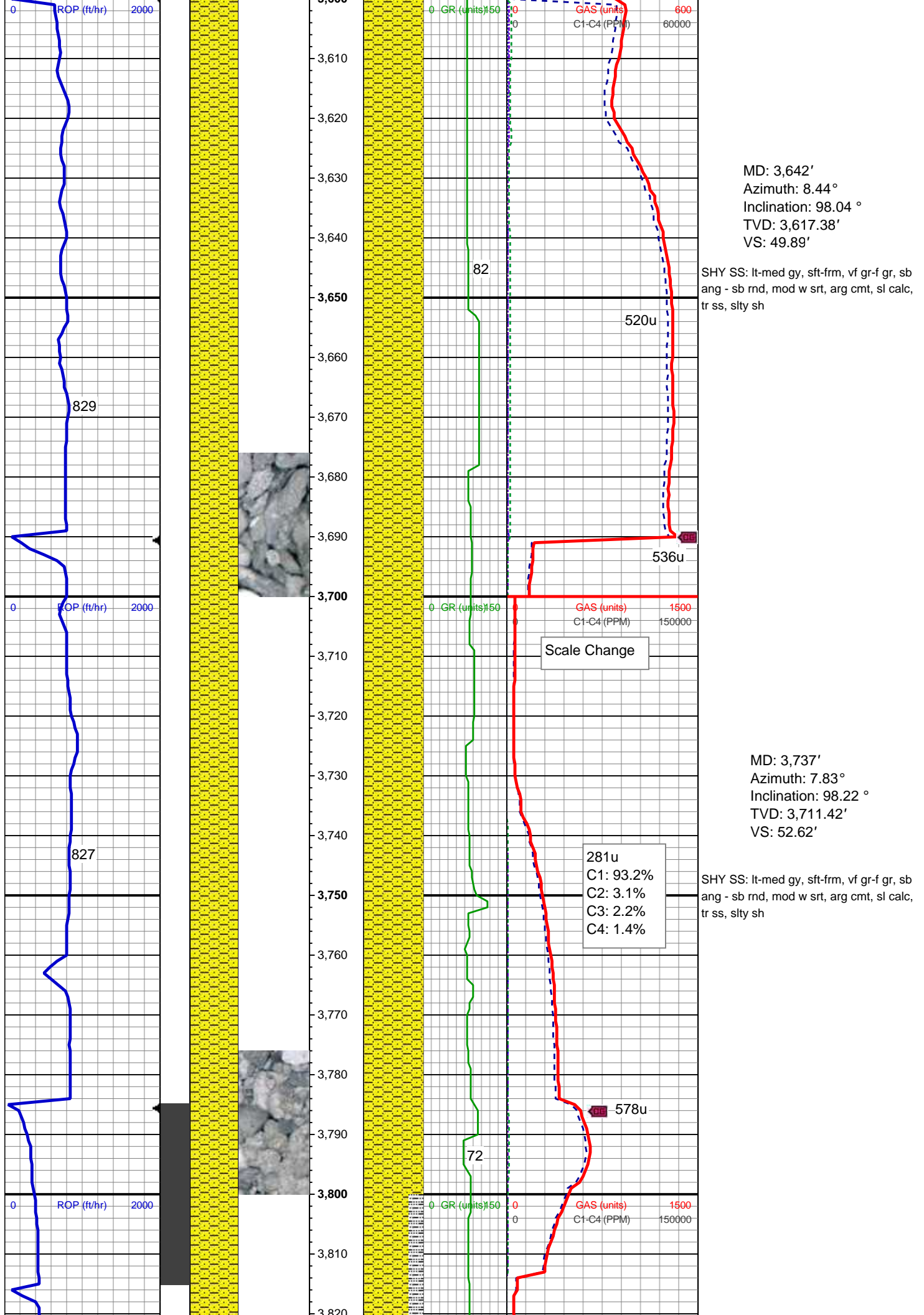


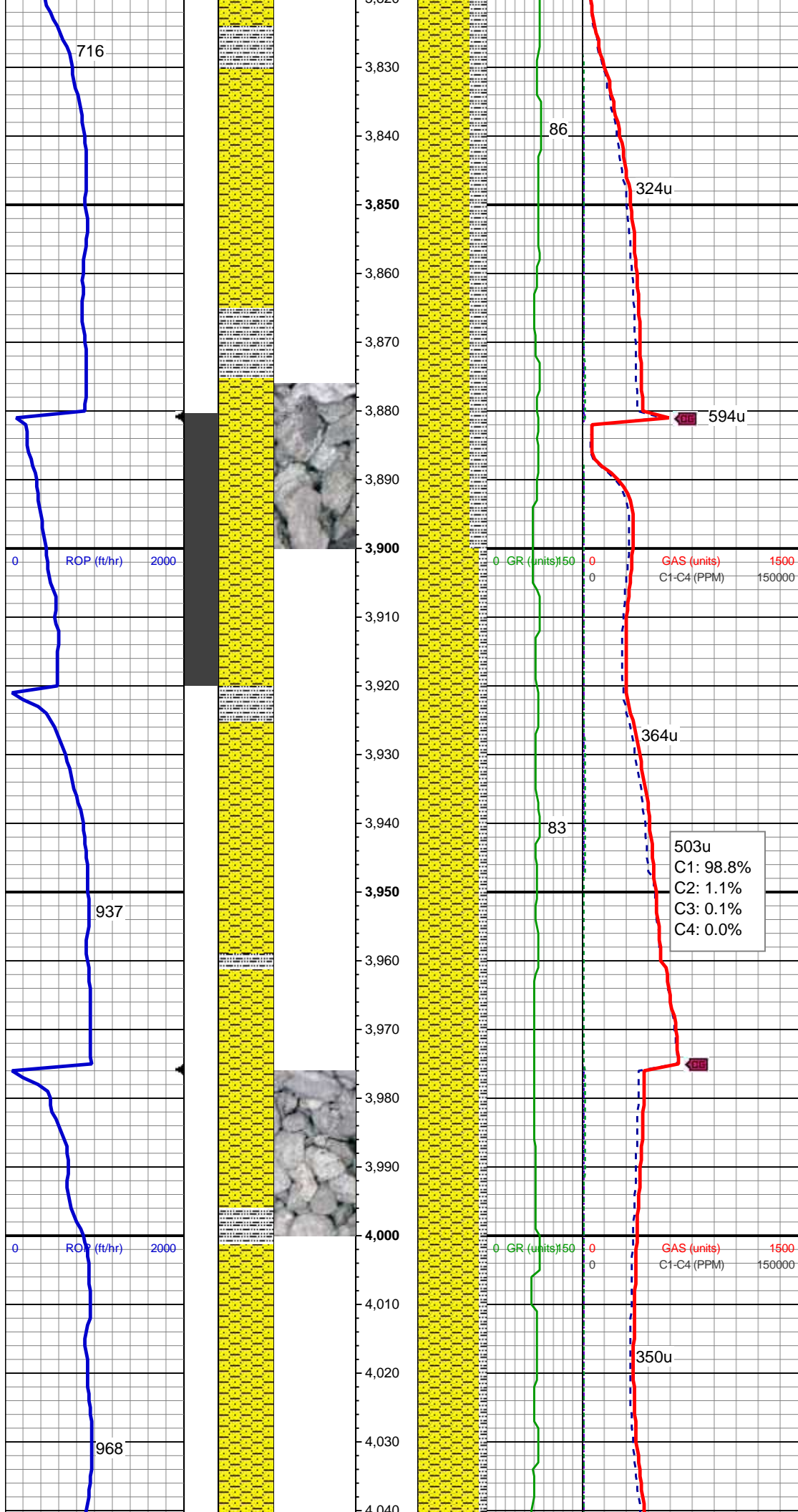
SLTY SH: lt-dk gy, sft-mod frm, sb blk-y-sb  
ply, gritty SHY SS: lt-med gy, sft-frm, vf  
gr-f gr, sb ang - sb rnd, mod w srt, arg  
cmt, sl calc

MD: 3,452'  
Azimuth: 9.76°  
Inclination: 96.99 °  
TVD: 3,429.78'  
VS: 44.12'

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

451u  
C1: 96.0%  
C2: 2.4%  
C3: 1.1%  
C4: 0.5%





MD: 3,831'  
Azimuth: 6.86°  
Inclination: 77.83 °  
TVD: 3,804.67'  
VS: 53.1'

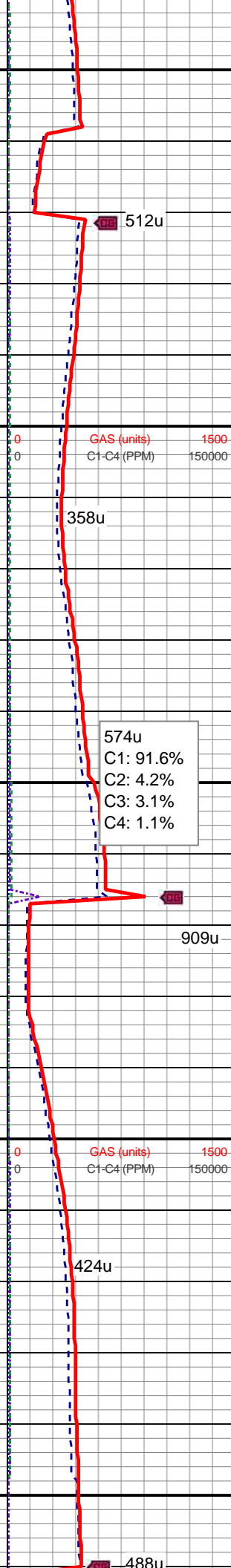
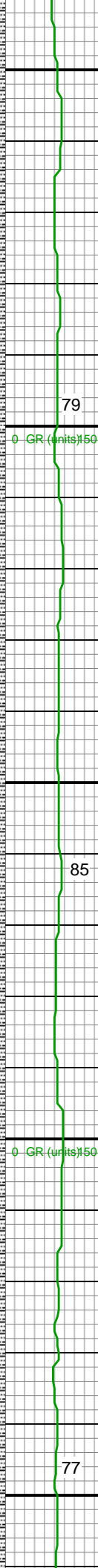
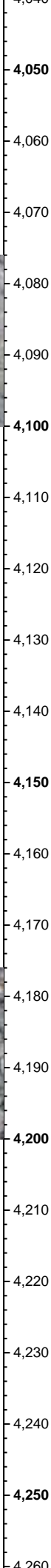
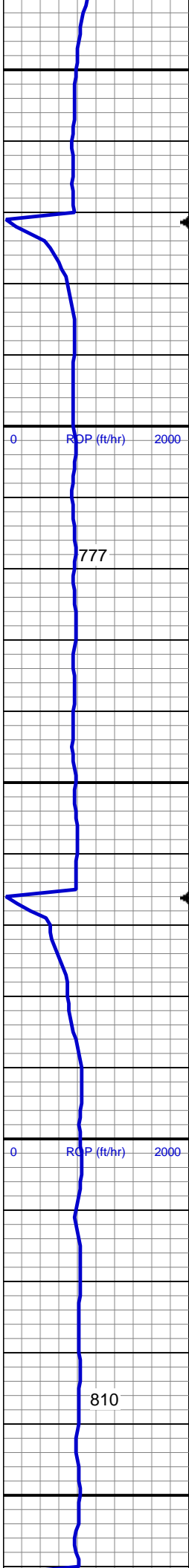
SHY SS: lt-med gy, sft-firm, vf gr-f gr, sb  
ang - sb rnd, mod w srt, arg cmt, sl calc  
SLTY SH: lt-dk gy, sft-mod frm, sb blk-y-sb  
plty, gritty

MD: 3,926'  
Azimuth: 4.48°  
Inclination: 26.85 °  
TVD: 3,899.25'  
VS: 49.05'

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 blk-y-sb  
plty, gritty

MD: 4,021'  
Azimuth: 4.48°  
Inclination: 24.39 °  
TVD: 3,993.96'  
VS: 42.57'





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: 4,115'  
Azimuth: 4.57°  
Inclination: 21.75 °  
TVD: 4,087.67'  
VS: 35.95'

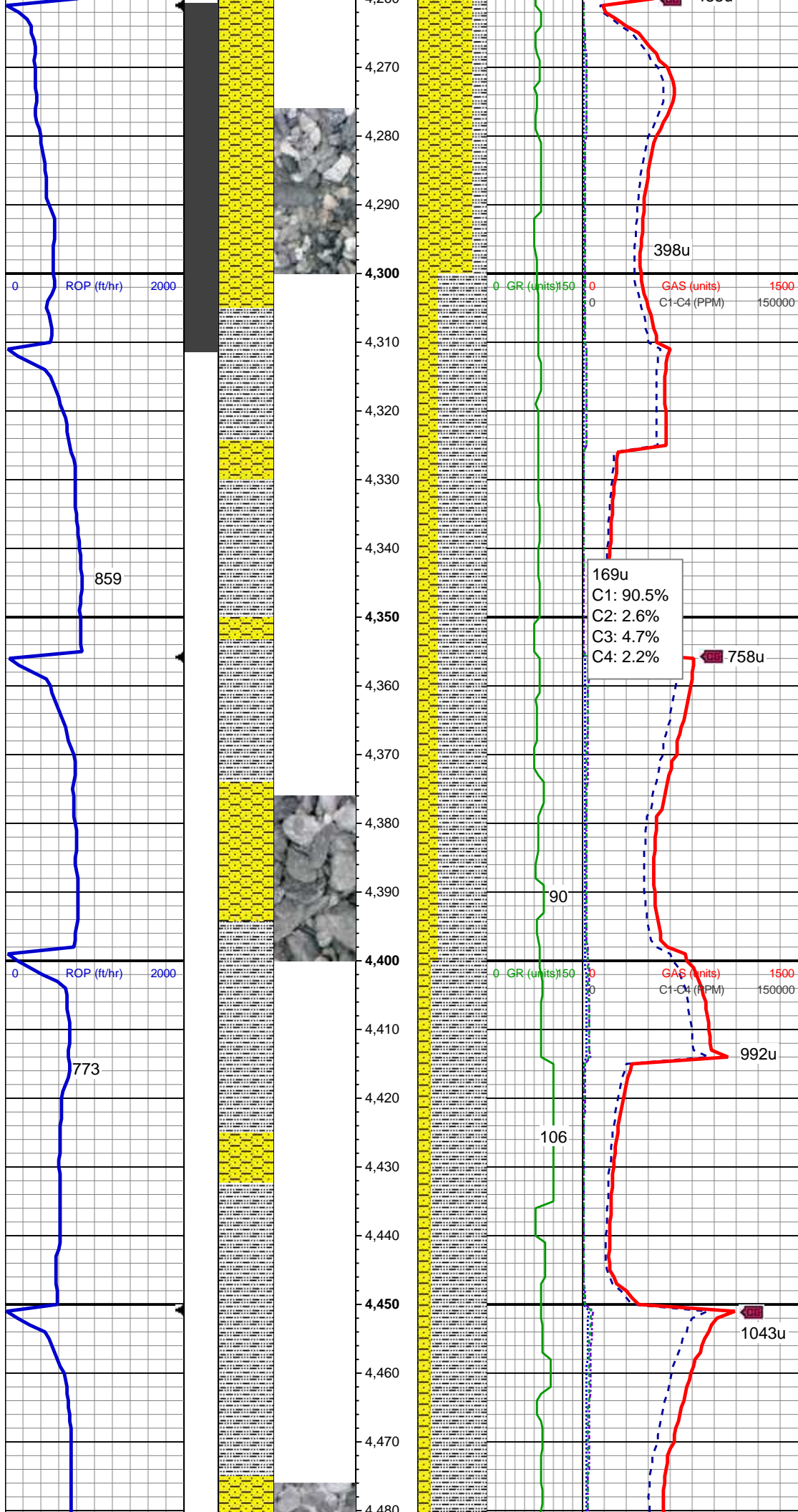
Mud Wt: 9.95 / 39 Vis

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: 4,210'  
Azimuth: 4.48°  
Inclination: 22.45 °  
TVD: 4,182.37'  
VS: 29.19'

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





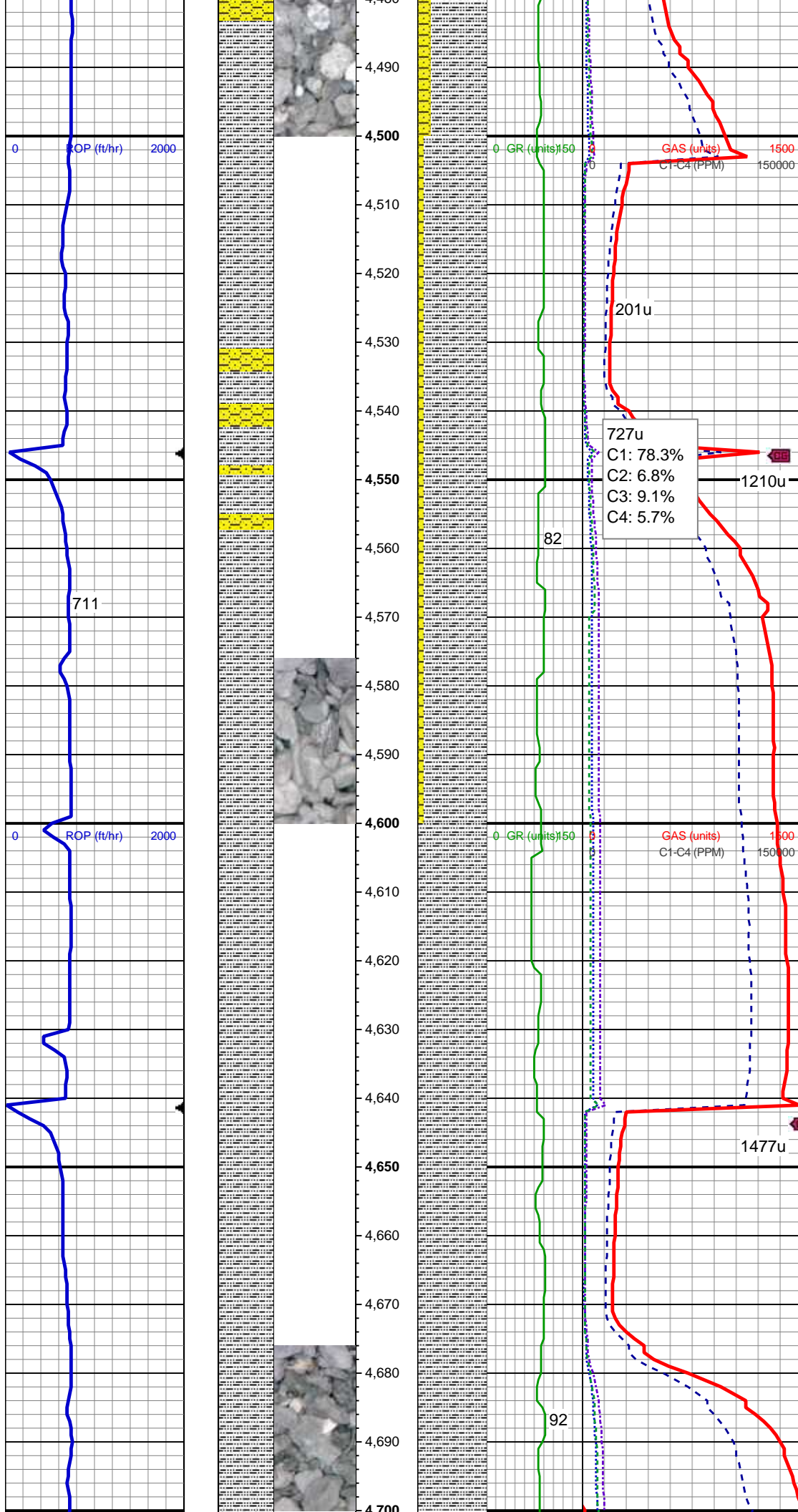
MD: 4,304'  
Azimuth: 2.2°  
Inclination: 150.6 °  
TVD: 4,276.28'  
VS: 27.52'

Mud Wt: 10.20 / 40 Vis

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

MD: 4,399'  
Azimuth: 1.67°  
Inclination: 156.4 °  
TVD: 4,371.23'  
VS: 30.46'

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



MD: 4,493'  
Azimuth: 1.58°  
Inclination: 159.74 °  
TVD: 4,465.19'  
VS: 32.99'

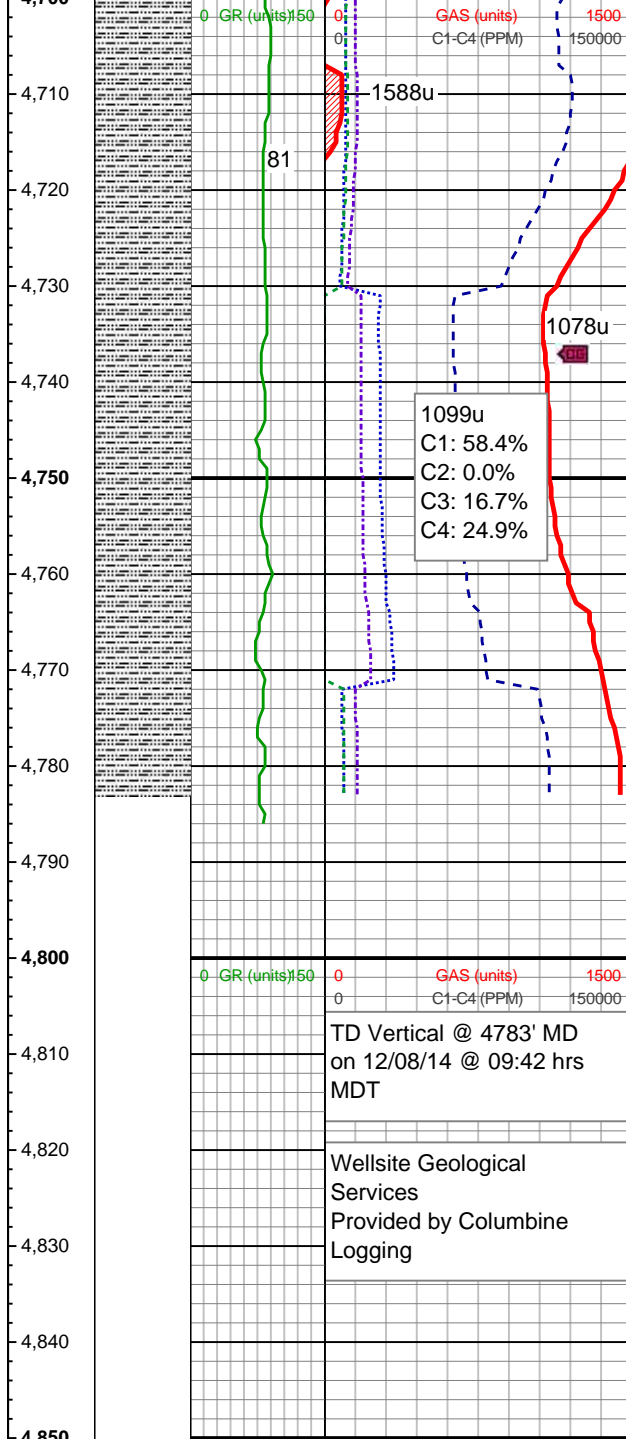
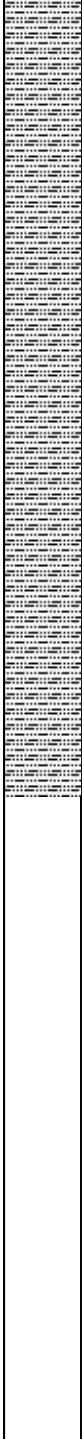
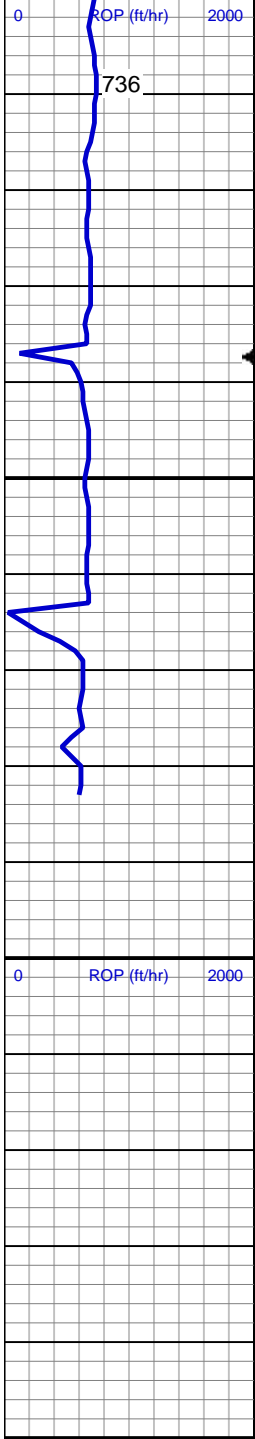
SLTY SH: lt-dk gy, sft-mod frm, sb blkly-sb  
pity, gritty SHY SS: lt-med gy, sft-frm, vf  
gr-f gr, sb ang - sb rnd, mod w srt, arg  
cmt, sl calc

MD: 4,588'  
Azimuth: 1.41°  
Inclination: 171.69 °  
TVD: 4,560.16'  
VS: 35.41'

SLTY SH: lt-dk gy, sft-mod frm, sb blkly-sb  
pity, gritty, tr shly ss

Mud Wt: 10.45 / 43 Vis

MD: 4,682'  
Azimuth: 1.41°  
Inclination: 167.3 °  
TVD: 4,654.13'  
VS: 37.7'



MD: 4,777'  
Azimuth: 1.32°  
Inclination: 147.61°  
TVD: 4,749.1'  
VS: 39.82'

TD Vertical @ 4783' MD  
on 12/08/14 @ 09:42 hrs  
MDT

Wellsite Geological  
Services  
Provided by Columbine  
Logging

See Corresponding Horizontal Log  
Smith State LD12-73-1BHN(HORZ)