

# COLUMBINE LOGGING

Scale: 5" / 100'  
Measured Depth Log

**Well Name** ROHN STATE LD10-64HN

**Location** Sec. 9 T9N R58W

**State** Colorado

**County** Weld

**Country** USA

**Rig Number** Precision Drilling 829

**Region** DJ Basin

**Field** Wattenberg

**Surface Coordinates** 2050 FSL ; 330 FEL  
40.76421 ; -103.8611

**Bottom Hole Coordinates** 1650 FSL ; 660 FEL  
40.76321 ; -103.84326

**Formation** Niobrara B chalk

**Type of Drilling Fluid** Niobrara B chalk

## Operator

**Company** Noble Energy Inc

**Address** 1625 BROADWAY  
DENVER, CO 80202

## Geologist

**Name** Holly Duncan

**Company** Noble Energy, Inc.

**Address** 1625 BROADWAY  
DENVER, CO 80202

## Other

Columbine Logging, Inc.

2385 S. Lipan St.  
Denver, CO 80223

Well Site Geologists

Ryan Shilling  
Eric Bernardo

## Rock Types

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

## 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
GYPHIFEROUS

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

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

### Stringer

## Other Symbols

### Oil Show

DEAD
EVEN
QUESTIONABLE
SPOTTED STAINING

### Porosity

E EARTHY
F FENESTRAL
F FRACTURE
X INTERCRYSTALLINE
O INTEROOLITIC
M MOLDIC

ORGANIC
P PINPOINT
V VUGGY

### Engineering

BIT CHANGE
CONNECTION (LEFT)
CONNECTION (RIGHT)
CONNECTION GAS
TRIP GAS
DOWN TIME GAS
CORE - LOST
CORE - RECOVERED
DST INTERVAL

FAULT
FORMATION TOP
GAS SHOW
OIL SHOW
MN DEPTH
MN DEPTH (RIGHT)
NORMAL FAULT
OVERTURNED STRATA
REVERSE FAULT
CASING
SIDEWALL CORE (LEFT)
SIDEWALL CORE (RIGHT)
SLIDE
SURVEY

DRILL STEM TEST
WIRELINE TESTED - LEFT
WIRELINE TESTED - RT

### Rounding

ANGULAR
ROUNDED
SUBANG
SUBRND

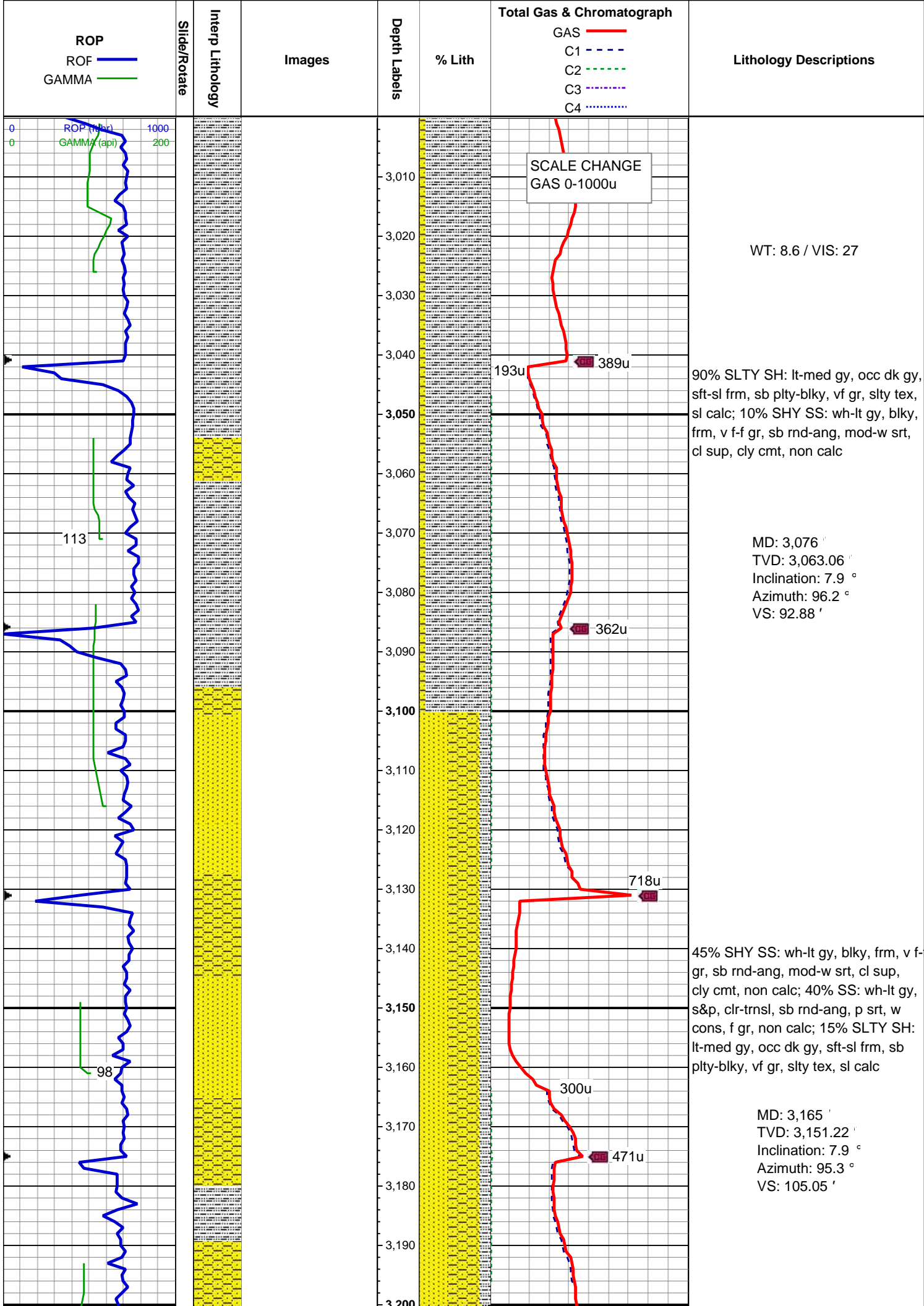
### Textures

BOUNDSTONE
CHALKY
CRYPTOXLN

E EARTHY
F FINELYXLN
G GRAINSTONE
L LITHOGRAPHIC
M MICROXLN
M MUDSTONE
P PACKSTONE
W WACKESTONE

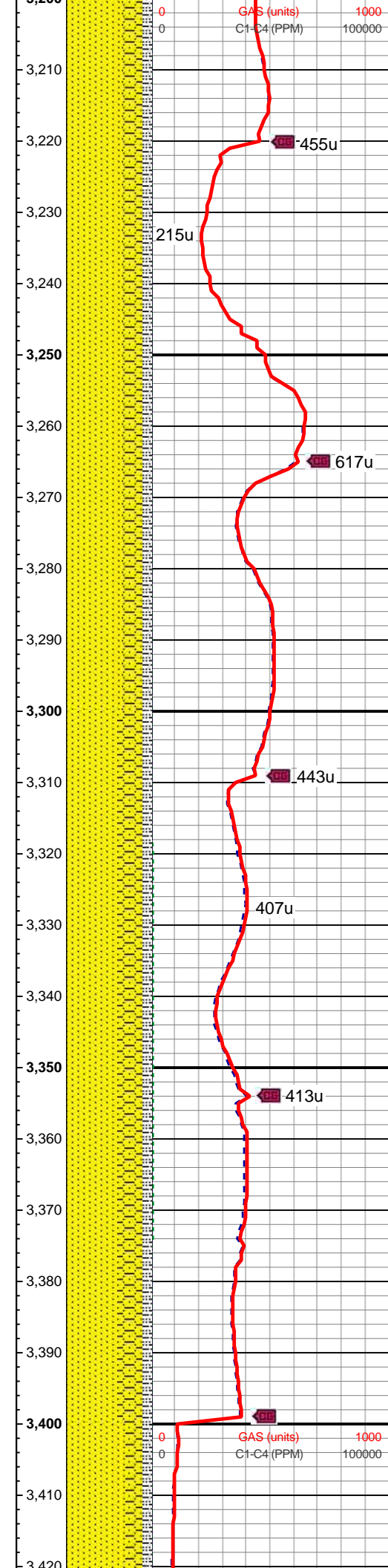
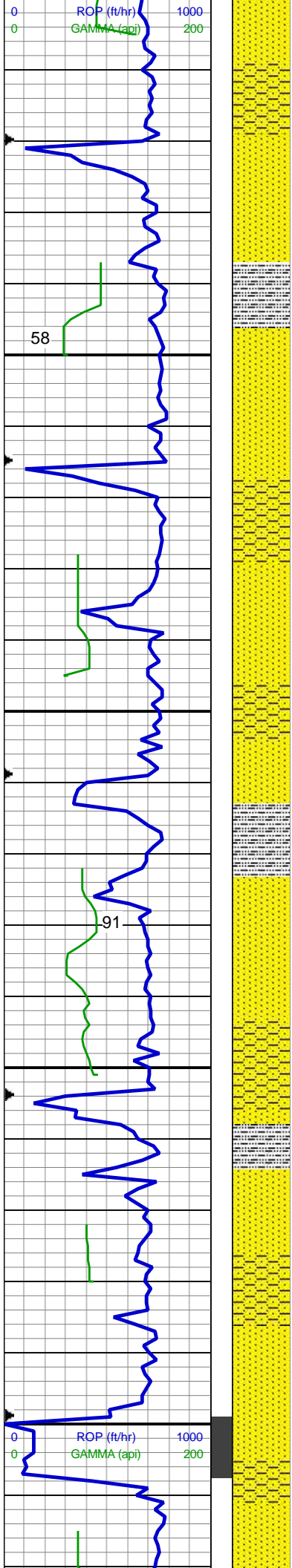
### Sorting

M MODERATE
P POOR
W WELL



113

98



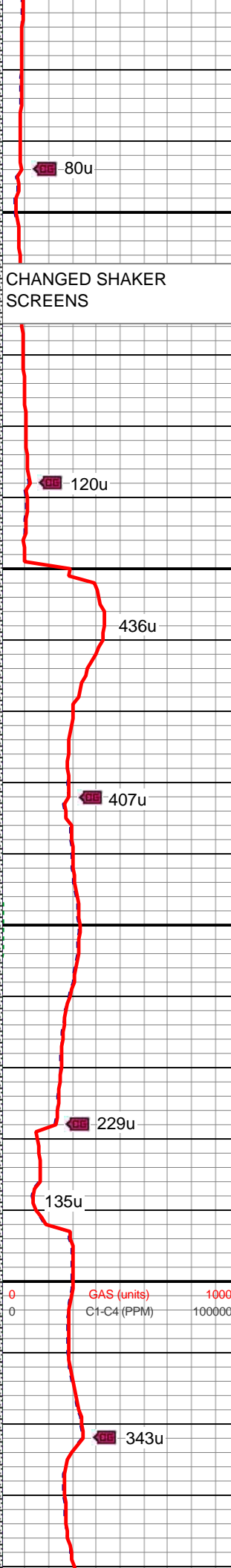
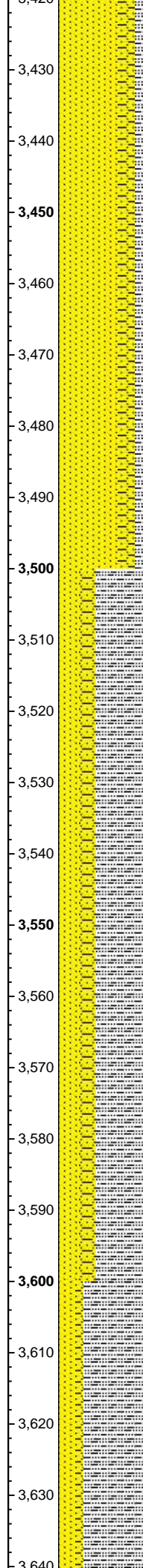
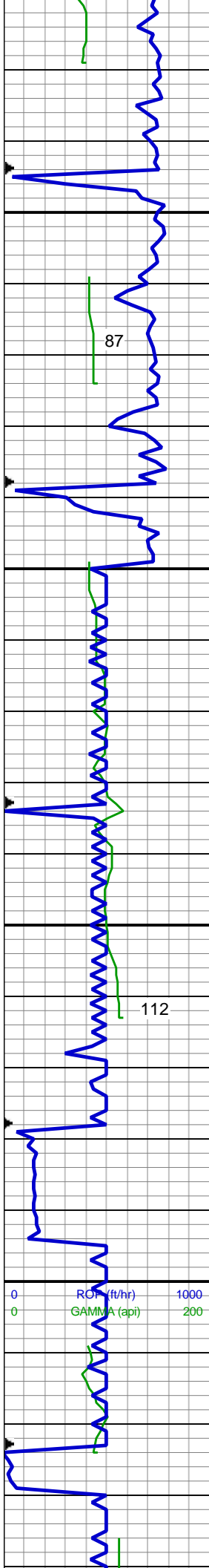
MD: 3,255 '  
TVD: 3,240.37 '  
Inclination: 7.9 °  
Azimuth: 93.7 °  
VS: 117.38 '

65% SS: wh-lt gy, s&p, clr-trnsl, sb  
rnd-ang, p srt, w cons, f gr, non  
calc; 25% SHY SS: wh-lt gy, blkyl,  
frm, v f-f gr, sb rnd-ang, mod-w srt,  
cl sup, cly cmt, non calc; 10% SLTY  
SH: lt-med gy, occ dk gy, sft-sl frm,  
sb plty-blky, vf gr, slty tex, sl calc

MD: 3,344 '  
TVD: 3,328.54 '  
Inclination: 7.7 °  
Azimuth: 93.6 °  
VS: 129.43 '

60% SS: wh-lt gy, s&p, clr-trnsl, sb  
rnd-ang, p srt, w cons, f gr, non  
calc; 30% SHY SS: wh-lt gy, blkyl,  
frm, v f-f gr, sb rnd-ang, mod-w srt,  
cl sup, cly cmt, non calc; 10% SLTY  
SH: lt-med gy, occ dk gy, sft-sl frm,  
sb plty-blky, vf gr, slty tex, sl calc





MD: 3,434 '  
TVD: 3,417.77 '  
Inclination: 7.3 °  
Azimuth: 96.9 °  
VS: 141.12 '

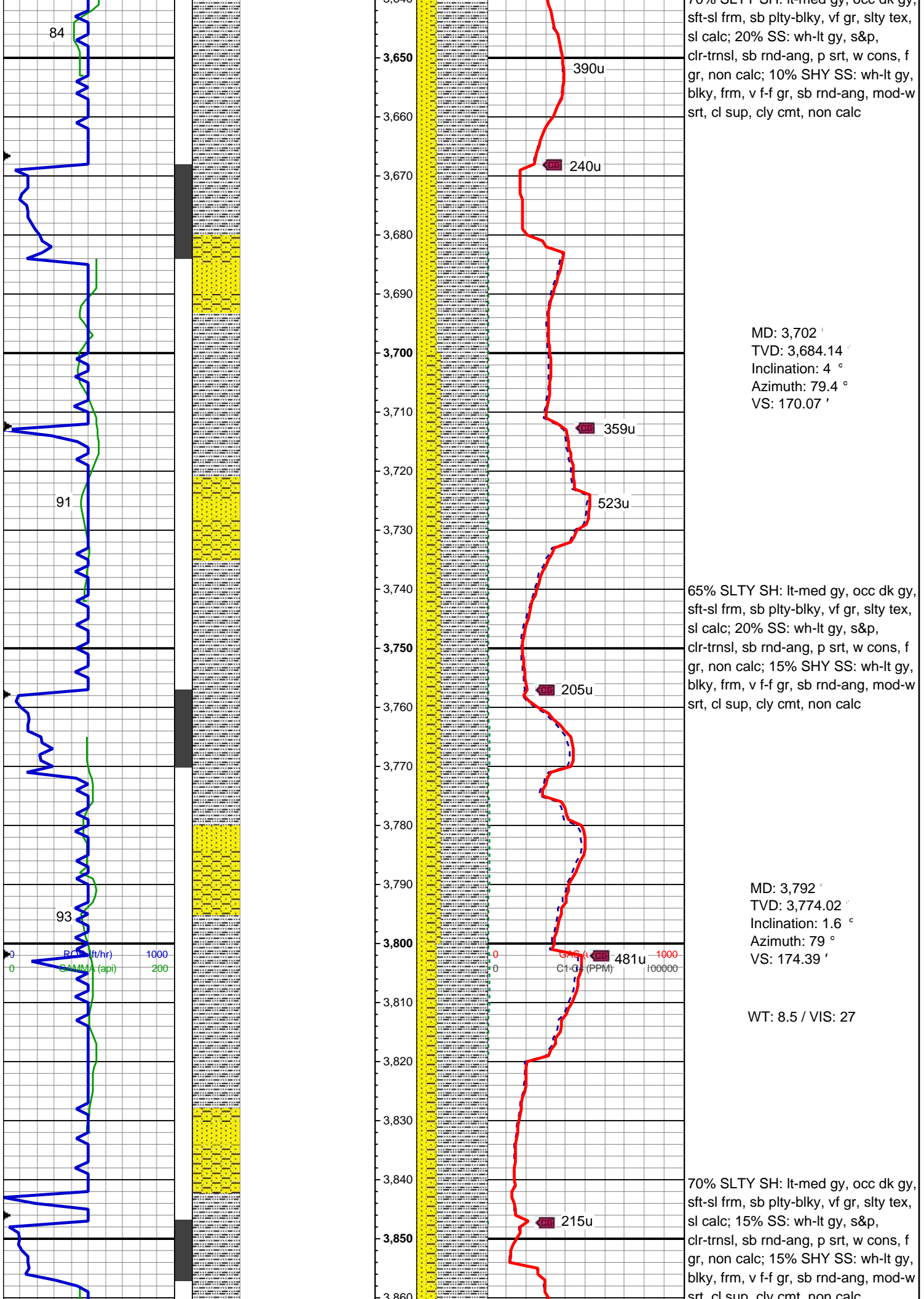
70% SS: wh-lt gy, s&p, clr-trnsl, sb  
rnd-ang, p srt, w cons, f gr, non  
calc; 20% SHY SS: wh-lt gy, blkly,  
frm, v f-f gr, sb rnd-ang, mod-w srt,  
cl sup, cly cmt, non calc; 10% SLTY  
SH: lt-med gy, occ dk gy, sft-sl frm,  
sb plty-blky, vf gr, slty tex, sl calc

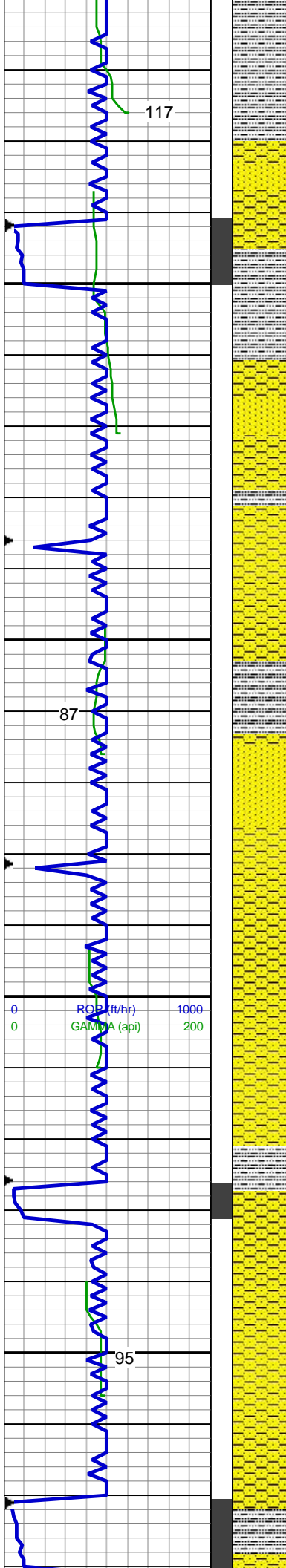
MD: 3,523 '  
TVD: 3,506.05 '  
Inclination: 7.3 °  
Azimuth: 95.8 °  
VS: 152.35 '

55% SLTY SH: lt-med gy, occ dk gy,  
sft-sl frm, sb plty-blky, vf gr, slty tex,  
sl calc; 25% SS: wh-lt gy, s&p,  
clr-trnsl, sb rnd-ang, p srt, w cons, f  
gr, non calc; 20% SHY SS: wh-lt gy,  
blkly, frm, v f-f gr, sb rnd-ang, mod-w  
srt, cl sup, cly cmt, non calc

MD: 3,613 '  
TVD: 3,595.47 '  
Inclination: 5.8 °  
Azimuth: 82.8 °  
VS: 162.55 '

70% SLTY SH: lt-med gy, occ dk gy,



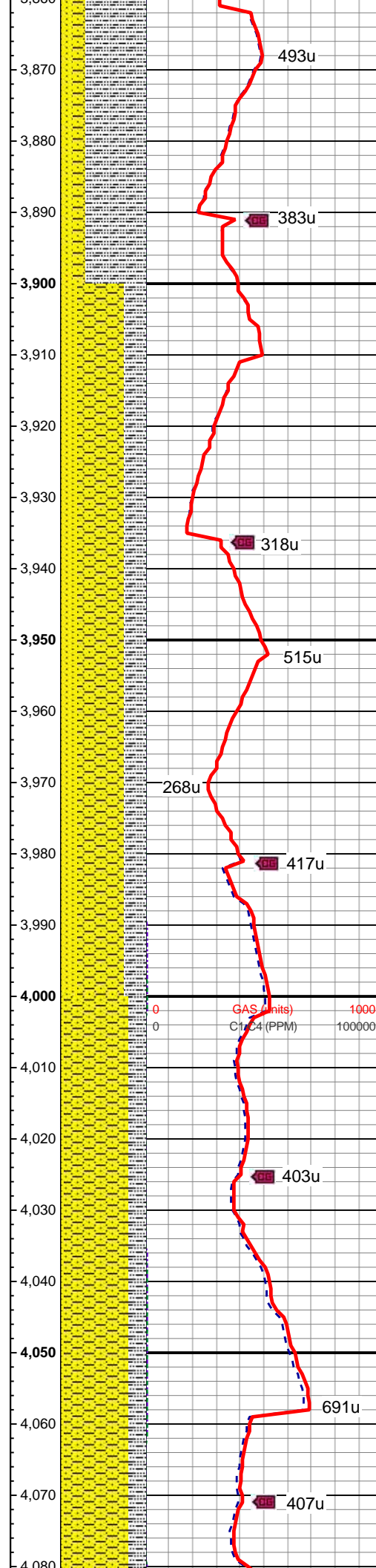


117

87

95

ROP (ft/hr) 1000  
GAMMA (api) 200



493u

383u

318u

515u

268u

417u

GAS (units) 1000  
Cl (PPM) 100000

403u

691u

407u

MD: 3,882 '  
TVD: 3,864 '  
Inclination: 0.7 °  
Azimuth: 49.7 °  
VS: 176.05 '

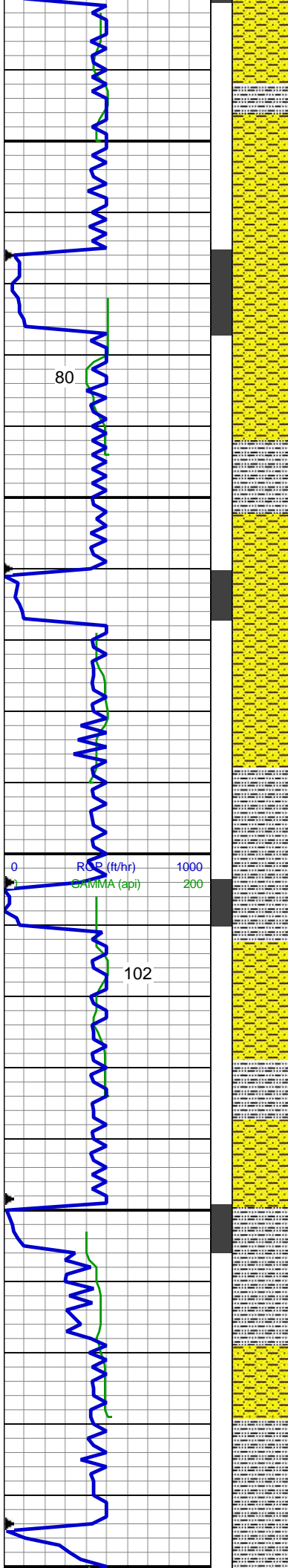
55% SHY SS: wh-lt gy, blkly, frm, v f-  
gr, sb rnd-ang, mod-w srt, cl sup,  
cly cmt, non calc; 25% SLTY SH:  
lt-med gy, occ dk gy, sft-sl frm, sb  
plty-blky, vf gr, slty tex, sl calc; 20%  
SS: wh-lt gy, s&p, clr-trnsl, sb  
rnd-ang, p srt, w cons, f gr, non calc

MD: 3,971 '  
TVD: 3,953 '  
Inclination: 0.6 °  
Azimuth: 46.7 °  
VS: 176.8 '

80% SHY SS: wh-lt gy, blkly, frm, v f-  
gr, sb rnd-ang, mod-w srt, cl sup,  
cly cmt, non calc; 20% SLTY SH:  
lt-med gy, occ dk gy, sft-sl frm, sb  
plty-blky, vf gr, slty tex, sl calc; 5%  
SS: wh-lt gy, s&p, clr-trnsl, sb  
rnd-ang, p srt, w cons, f gr, non calc

MD: 4,061 '  
TVD: 4,042.99 '  
Inclination: 1 °  
Azimuth: 49.7 °  
VS: 177.75 '



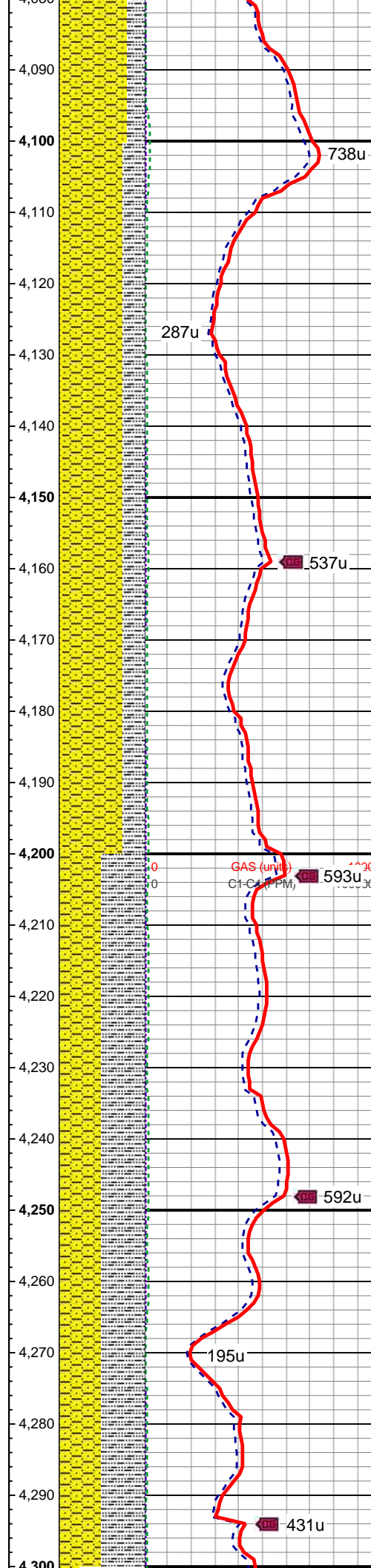


MD: 4,151 '  
TVD: 4,132.98 '  
Inclination: 1 °  
Azimuth: 32.3 °  
VS: 178.77 '

70% SHY SS: wh-lt gy, blk, frm, v f-  
gr, sb rnd-ang, mod-w srt, cl sup,  
cly cmt, non calc; 25% SLTY SH:  
lt-med gy, occ dk gy, sft-sl frm, sb  
pty-blky, vf gr, slty tex, sl calc; 5%  
SS: wh-lt gy, s&p, clr-trns, sb  
rnd-ang, p srt, w cons, f gr, non calc

MD: 4,240 '  
TVD: 4,221.95 '  
Inclination: 1.6 °  
Azimuth: 6.5 °  
VS: 179.34 '

50% SHY SS: wh-lt gy, blk, frm, v f-  
gr, sb rnd-ang, mod-w srt, cl sup,  
cly cmt, non calc; 50% SLTY SH:  
lt-med gy, occ dk gy, sft-sl frm, sb  
pty-blky, vf gr, slty tex, sl calc, tr SS



287u

537u

593u

592u

195u

431u

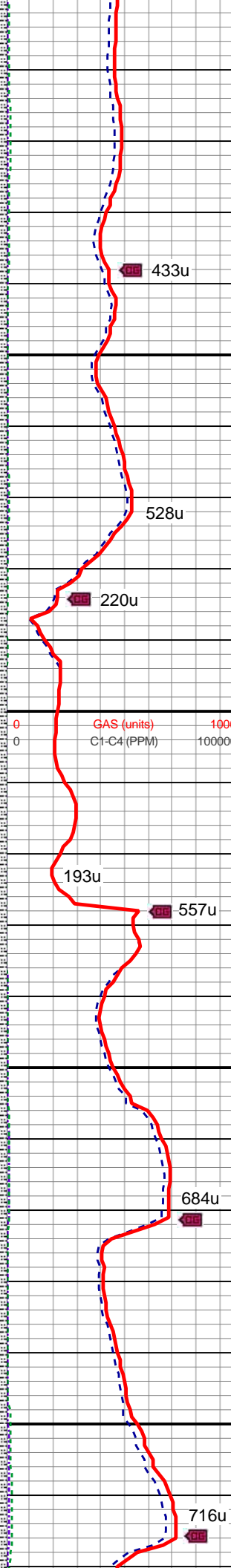
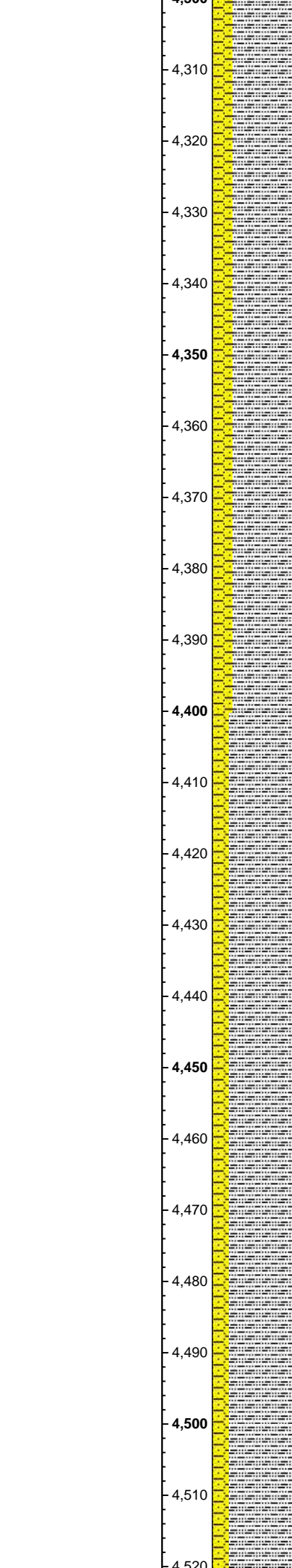
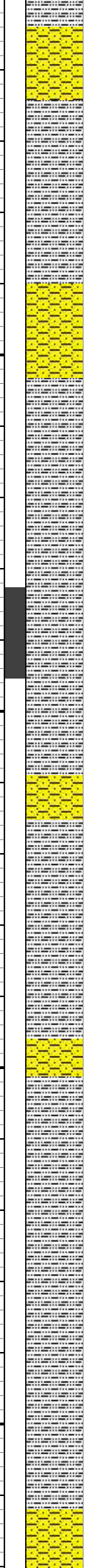
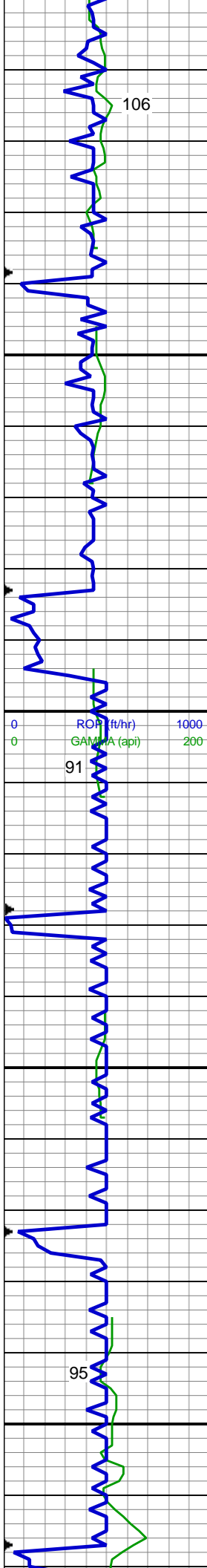
MD: 4,151 '  
TVD: 4,132.98 '  
Inclination: 1 °  
Azimuth: 32.3 °  
VS: 178.77 '

70% SHY SS: wh-lt gy, blk, frm, v f-  
gr, sb rnd-ang, mod-w srt, cl sup,  
cly cmt, non calc; 25% SLTY SH:  
lt-med gy, occ dk gy, sft-sl frm, sb  
pty-blky, vf gr, slty tex, sl calc; 5%  
SS: wh-lt gy, s&p, clr-trns, sb  
rnd-ang, p srt, w cons, f gr, non calc

MD: 4,240 '  
TVD: 4,221.95 '  
Inclination: 1.6 °  
Azimuth: 6.5 °  
VS: 179.34 '

50% SHY SS: wh-lt gy, blk, frm, v f-  
gr, sb rnd-ang, mod-w srt, cl sup,  
cly cmt, non calc; 50% SLTY SH:  
lt-med gy, occ dk gy, sft-sl frm, sb  
pty-blky, vf gr, slty tex, sl calc, tr SS

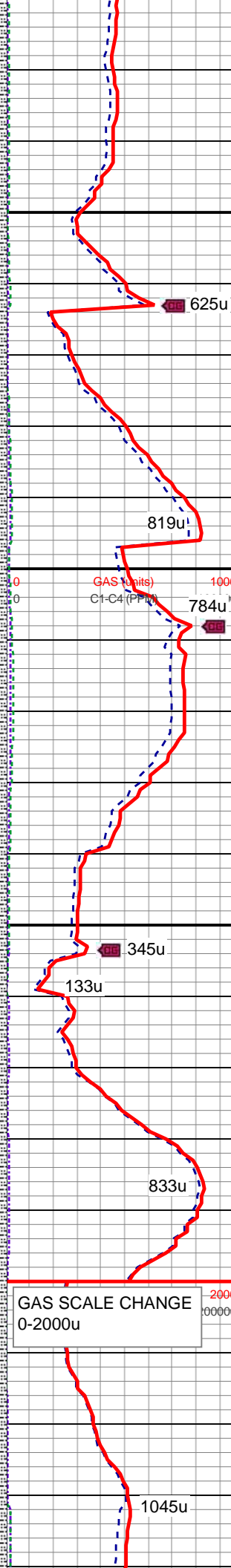
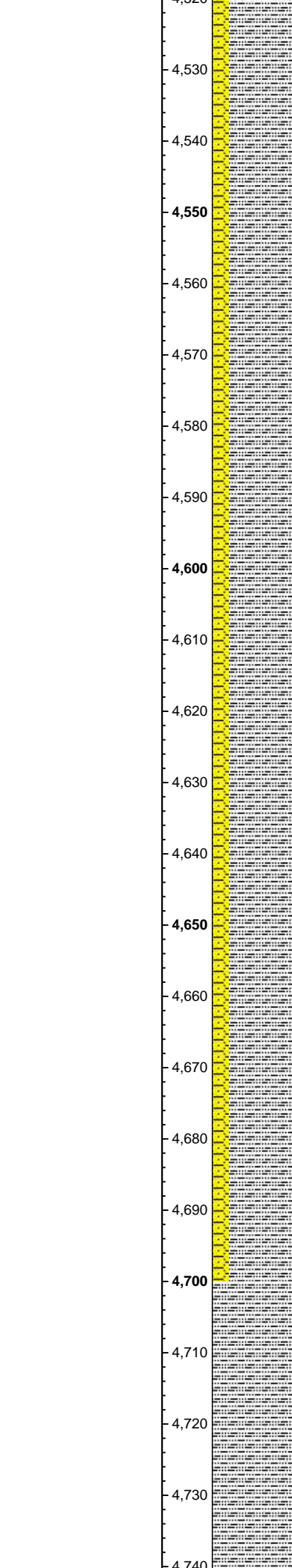
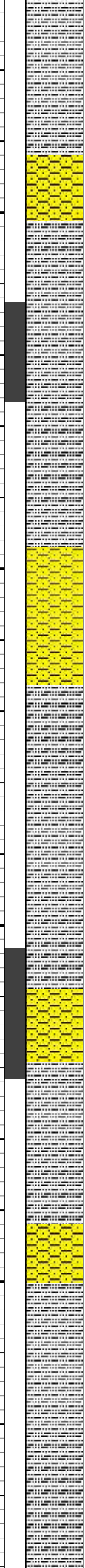
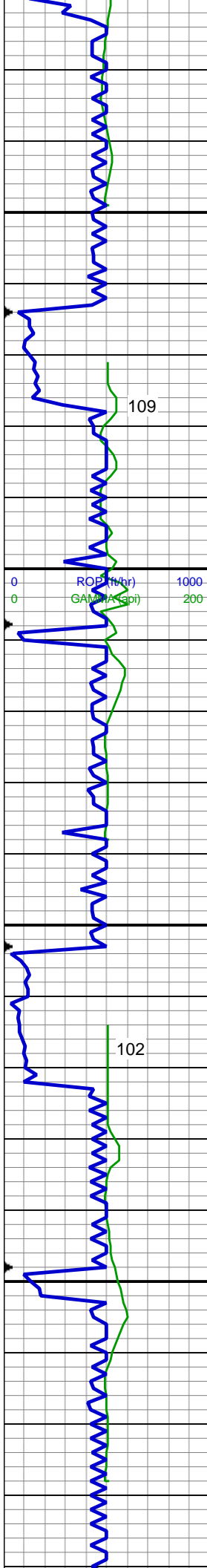




MD: 4,330 '  
TVD: 4,311.92 '  
Inclination: 1.5 °  
Azimuth: 9.4 °  
VS: 179.68 '  
  
75% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb plty-blky, vf gr, slty tex, sl calc; 25% SHY SS: wh-lt gy, blk, frm, v f-f gr, sb rnd-ang, mod-w srt, cl sup, cly cmt, non calc, tr SS

WT: 8.4 / VIS: 27  
  
MD: 4,419 '  
TVD: 4,400.9 '  
Inclination: 0.9 °  
Azimuth: 342.6 °  
VS: 179.67 '  
  
80% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb plty-blky, vf gr, slty tex, sl calc; 20% SHY SS: wh-lt gy, blk, frm, v f-f gr, sb rnd-ang, mod-w srt, cl sup, cly cmt, non calc, tr SS

WT: 8.4 / VIS: 27  
  
MD: 4,509 '  
TVD: 4,490.89 '  
Inclination: 1.1 °  
Azimuth: 335.6 °  
VS: 179.11 '



80% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb plty-blky, vf gr, slty tex, sl calc; 20% SHY SS: wh-lt gy, blkly, frm, v f-f gr, sb rnd-ang, mod-w srt, cl sup, cly cmt, non calc, tr SS

WT: 9.0 / VIS: 30

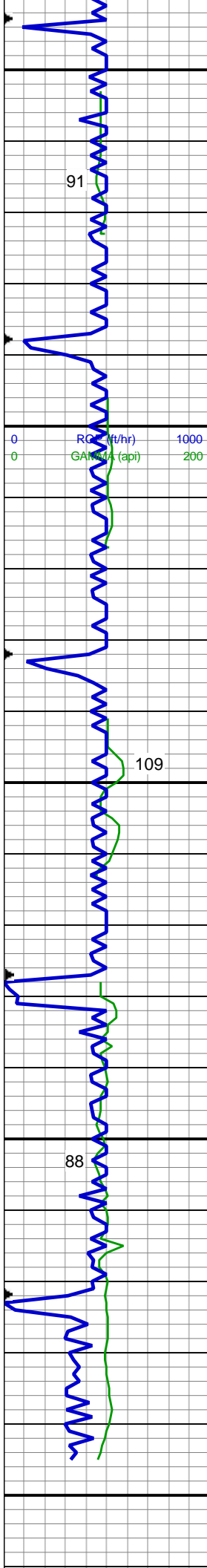
MD: 4,598 '  
TVD: 4,579.87 '  
Inclination: 1.4 °  
Azimuth: 307.4 °  
VS: 177.9 '

80% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb plty-blky, vf gr, slty tex, sl calc; 20% SHY SS: wh-lt gy, blkly, frm, v f-f gr, sb rnd-ang, mod-w srt, cl sup, cly cmt, non calc, tr SS

WT: 8.9 / VIS: 29

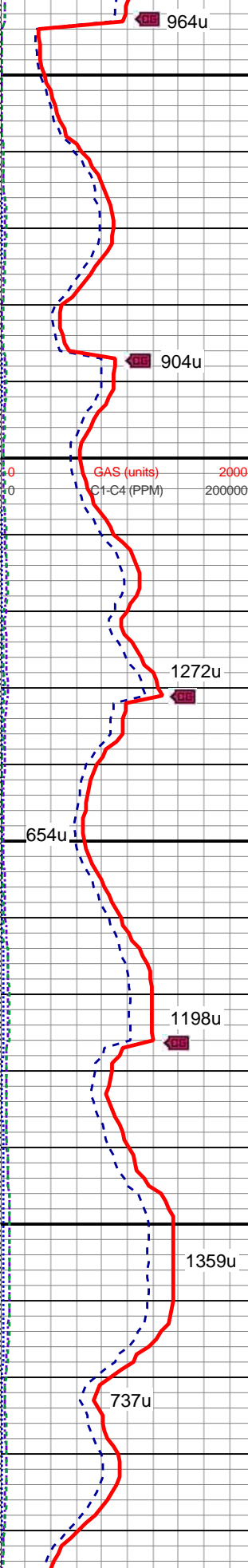
MD: 4,688 '  
TVD: 4,669.86 '  
Inclination: 0.6 °  
Azimuth: 236.6 °  
VS: 176.64 '

WT: 9.0 / VIS: 32



91  
109  
88

964u  
904u  
1272u  
654u  
1198u  
1359u  
737u



100% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb plty-blky, vf gr, slty tex, sl calc, tr SHY SS

MD: 4,778 '  
TVD: 4,759.85 '  
Inclination: 0.6 °  
Azimuth: 240.2 °  
VS: 175.83 '

100% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb plty-blky, vf gr, slty tex, sl calc, tr SHY SS

MD: 4,867 '  
TVD: 4,848.85 '  
Inclination: 0.4 °  
Azimuth: 244.8 °  
VS: 175.14 '

WT: 9.1 / VIS: 34

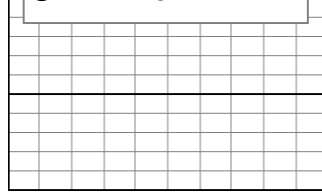
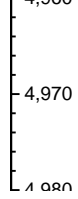
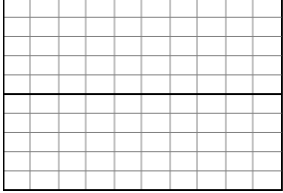
0 RO (ohm-ft/hr) 1000  
0 GAMMA (api) 200

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

TD @ 4945' MD 10/20/14  
@ XX:XX MST

Log Continues on Rohn State  
LD10-64-HN\_Horizontal





Thank you for using  
Columbine Logging, Inc.