

# COLUMBINE LOGGING

Scale: 5" / 100'  
Measured Depth Log

**Well Name** Rohn State LD09-68HN(VERT)

**Location** NENE SEC 9, T9N, R58W

**State** COLORADO

**County** WELD

**Country** USA

**Rig Number** H&P 326

**API Number** 05-123-37545

**Region** DJ BASIN

**Field** WILDCAT

**Spud Date** 9/17/2013

**Drilling Completed** 9/19/2013

**Surface Coordinates** 898' FNL, 480' FEL

**Bottom Hole Coordinates** 60' FSL, 65' FEL

**Ground Elevation** 4740'

**K.B. Elevation** 4770'

**Logged Interval** 1300' **To** 4983'

**Total Depth** 4983'

**Formation** NIOBRARA B CHALK

**Type of Drilling Fluid** LSND

## 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

ANDREA ZUREMA

## Rock Types

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

## Accessories

### Fossils

ALGAE
AMPHIPORA
BELEMNITE
BIOCLASTIC
BRACHIOPOD
BRYOZOA
CEPHALOPOD
CORAL
CRINOID
ECHINOID
FISH
FORAMINIFERA

### Fossils

FOSSIL
GASTROPOD
INOCERAMUS
OOLITE
OSTRACOD
PELECYPOD
PELLET
PISOLITE
PLANT REMAINS
PLANT SPORES
SCAPHOPOD
STROMATOPOROID

### Minerals

### Minerals

ANHYDRITIC
ARGILLACEOUS
ARGILLITE GRAIN
BENTONITE
BITUMENOUS SUBSTANCE
BRECCIA FRAGMENTS
CALCAREOUS
CARBONACEOUS FLAKES
CHTDK
CHTLT
COAL - THIN BEDS
DOLOMITIC
FELDSPAR
FERRUGINOUS PELLET

### Minerals

FERRUGINOUS
GLAUCONITE
GYPSIFEROUS
HEAVY MINERAL
KAOLIN
MARLSTONE
MINERAL CRYSTALS
NODULES
PHOSPHATE PELLETS
PYRITE
SALT CAST
SANDY
SILICEOUS
SILTY

### Minerals

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

EARTHY
FENESTRAL
FRACTURE
INTERCRYSTALLINE
INTEROOLITIC

### Oil Show

MOLDIC
ORGANIC
PINPOINT
VUGGY

### Engineering

BIT
CONNECTION (LEFT)
CONNECTION (RIGHT)
CONNECTION GAS
CORE - LOST
CORE - RECOVERED
DST INTERVAL

### Other Symbols

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

### Other Symbols

WIRELINE TESTED - LEFT
WIRELINE TESTED - RT

### Rounding

ANGULAR
ROUNDED
SUBANG
SUBRND

### Textures

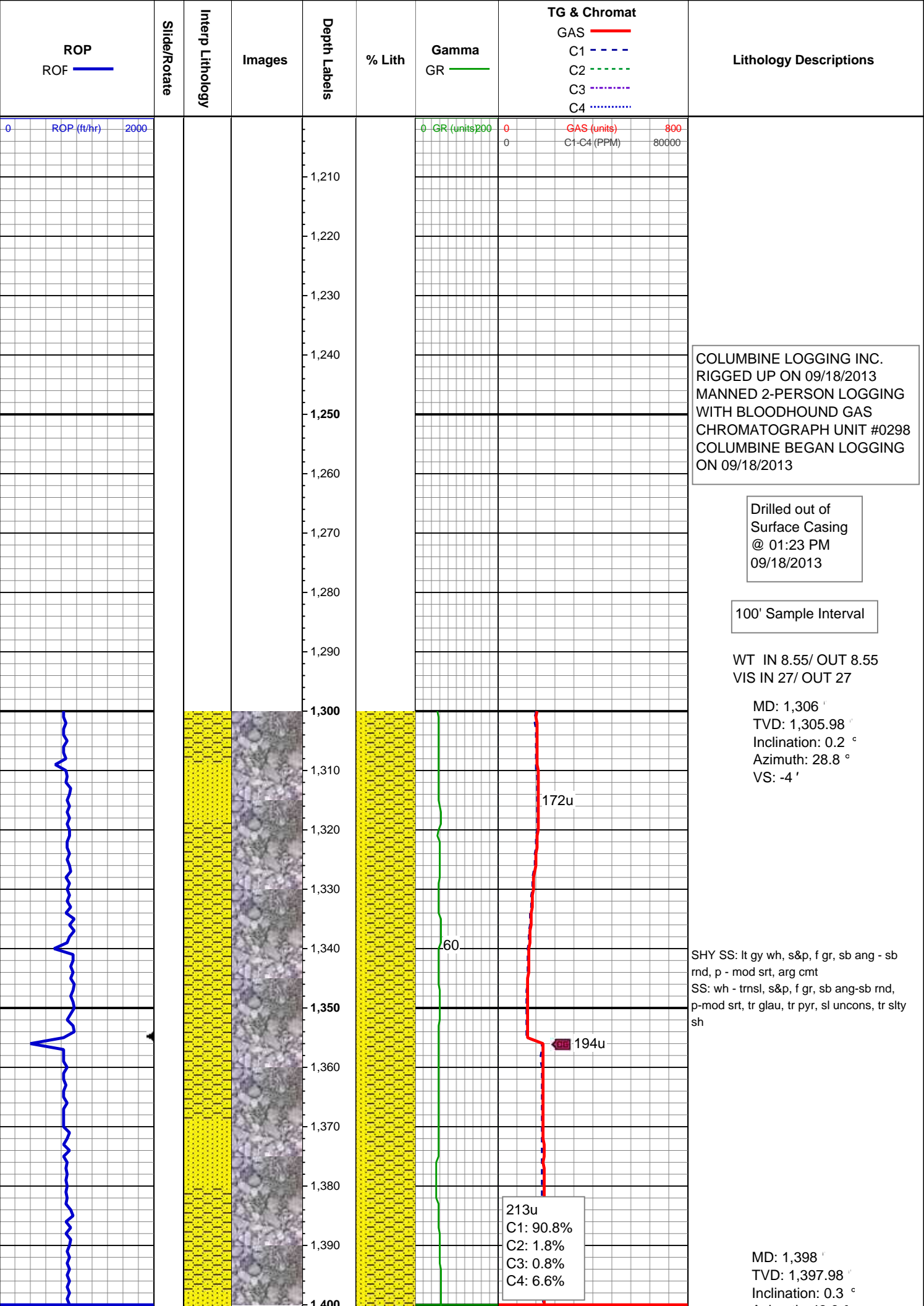
BOUNDSTONE
CHALKY
CRYPTOXLN

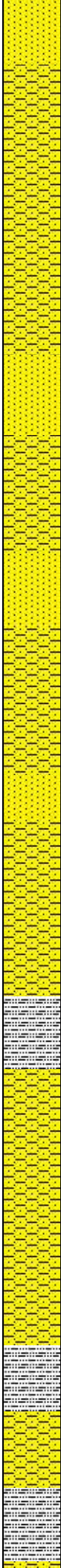
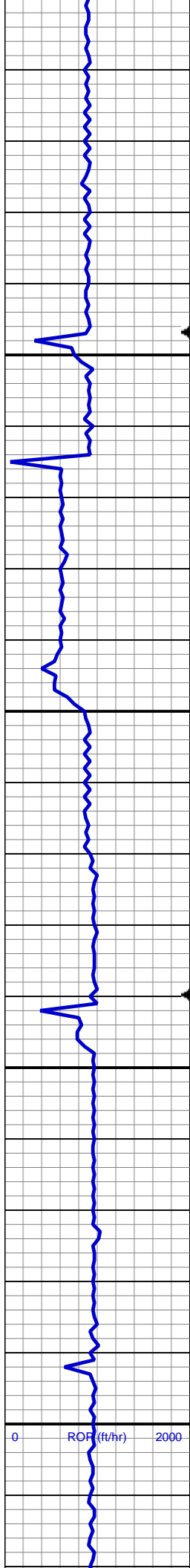
### Other Symbols

EARTHY
FINELYXLN
GRAINSTONE
LITHOGRAPHIC
MICROXLN
MUDSTONE
PACKSTONE
WACKESTONE

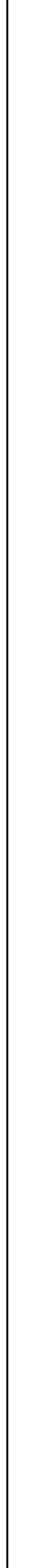
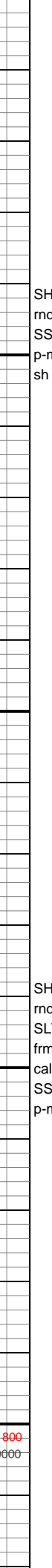
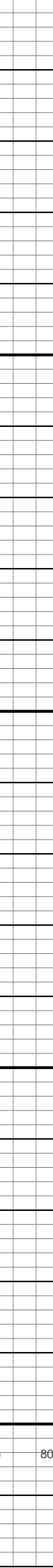
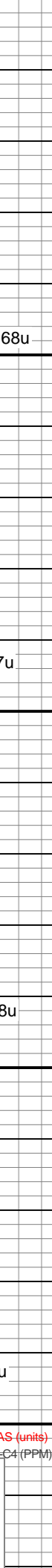
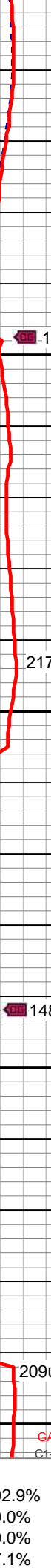
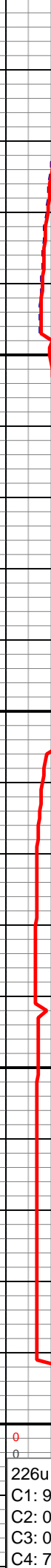
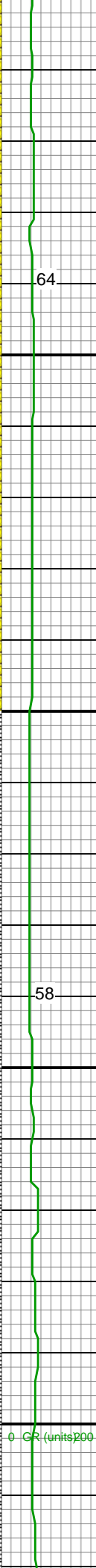
### Sorting

MODERATE
POOR
WELL





1,400  
1,410  
1,420  
1,430  
1,440  
1,450  
1,460  
1,470  
1,480  
1,490  
1,500  
1,510  
1,520  
1,530  
1,540  
1,550  
1,560  
1,570  
1,580  
1,590  
1,600  
1,610  
1,620



SHY SS: lt gy wh, s&p, f gr, sb ang - sb  
rnd, p - mod srt, arg cmt  
SS: wh - trnsl, s&p, f gr, sb ang-sb rnd,  
p-mod srt, tr glau, tr pyr, sl uncon, tr slty  
sh

MD: 1,491 '  
TVD: 1,490.98 '  
Inclination: 0.4 °  
Azimuth: 37.8 °  
VS: -4.58 '

SHY SS: lt gy wh, s&p, f gr, sb ang - sb  
rnd, p - mod srt, arg cmt  
SLTY SH: lt-med gy, occ drkgy, sft - mod  
frm, sb blk, occ plty, arg-rthy mtx, non  
calc  
SS: wh - trnsl, s&p, f gr, sb ang-sb rnd,  
p-mod srt, tr glau

MD: 1,585 '  
TVD: 1,584.97 '  
Inclination: 0.3 °  
Azimuth: 79.6 °  
VS: -5.01 '

0 ROP (ft/hr) 2000

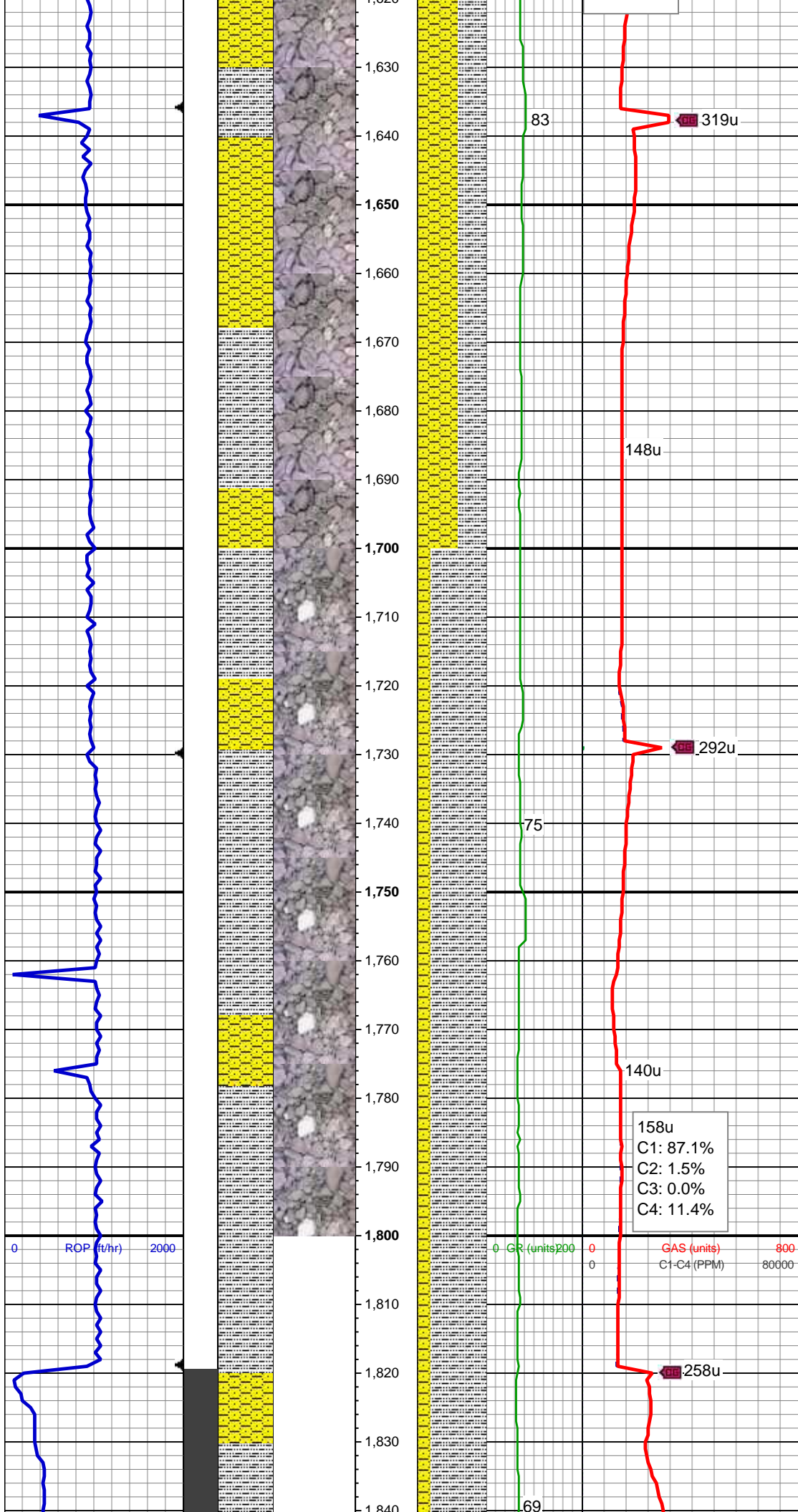
0 GR (units) 200

0 GAS (units) 800

0 C1-C4 (PPM) 8000

226u  
C1: 92.9%  
C2: 0.0%  
C3: 0.0%  
C4: 7.1%





SHY SS: lt gy wh, s&p, f gr, sb ang - sb  
rnd, p - mod srt, arg cmt  
SLTY SH: lt-med gy, sft - mod frm, sb  
blky, occ plty, arg-rthy mtx, non calc

MD: 1,678 '  
TVD: 1,677.97 '  
Inclination: 0.5 °  
Azimuth: 82.4 °  
VS: -5.65 '

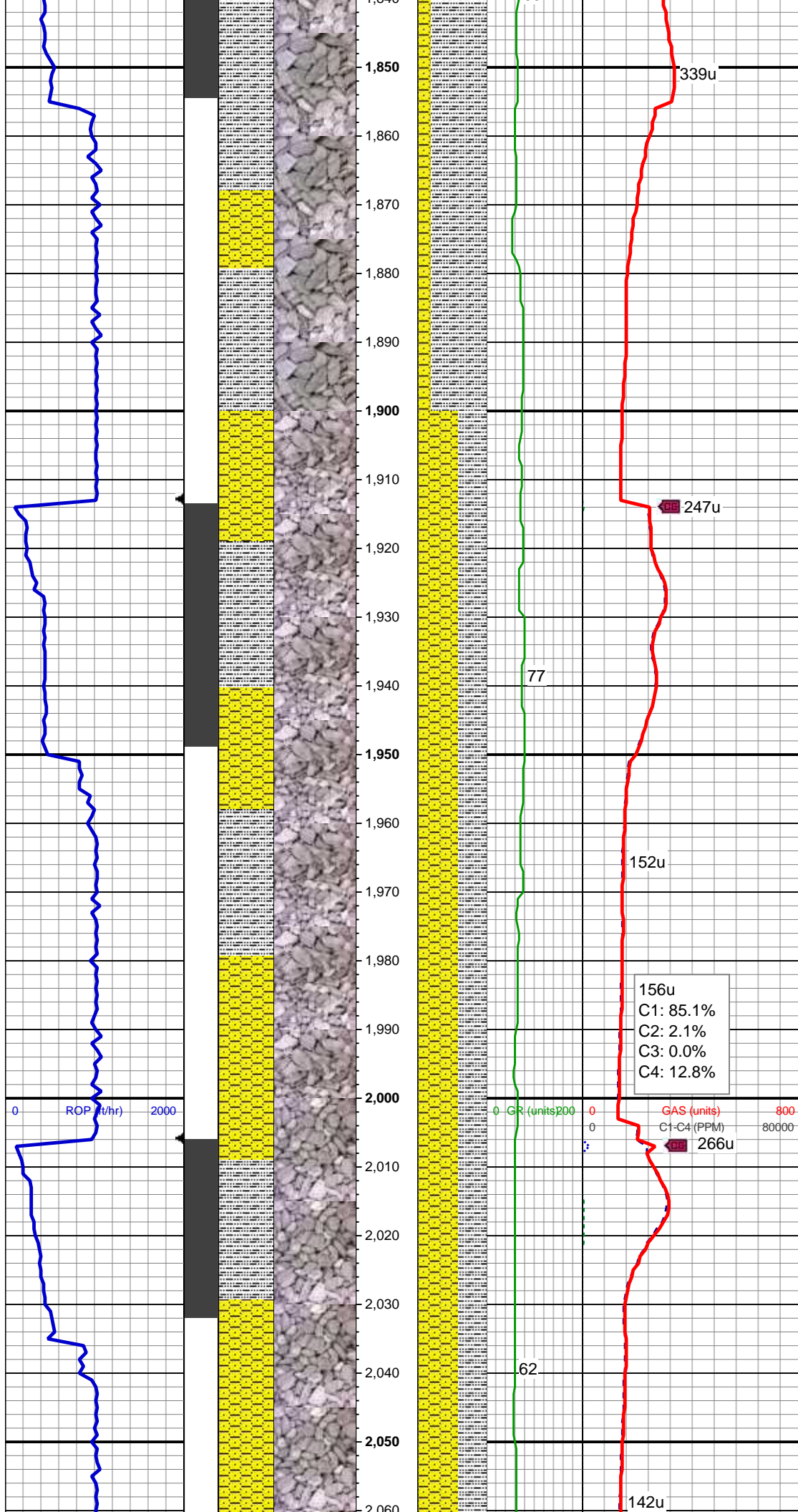
SLTY SH: lt gy, sft - mod frm, sb blky,  
occ plty, arg-rthy mtx, non calc  
SHY SS: gy - lt gy, occ wh, s&p, f gr, sb  
ang - sb rnd, p - mod srt, occ phlogopite,  
arg cmt

MD: 1,770 '  
TVD: 1,769.97 '  
Inclination: 0.4 °  
Azimuth: 109.3 °  
VS: -6.35 '

158u  
C1: 87.1%  
C2: 1.5%  
C3: 0.0%  
C4: 11.4%

GR (units) 200 0  
GAS (units) 800 0  
C1-C4 (PPM) 80000 0

SLTY SH: lt gy, sft - mod frm, sb blky



SHY SS: lt gy, s&p, f gr, sb ang - sb rnd, p - mod srt, occ phlogopite, arg cmt

MD: 1,863 '  
TVD: 1,862.95 '  
Inclination: 1.9 °  
Azimuth: 51.2 °  
VS: -7.83 '

SHY SS: lt gy wh, s&p, f gr, sb ang - sb rnd, p - mod srt, arg cmt  
SLTY SH: lt-med gy, sft - mod frm, sb blk, occ pty, arg-rthy mtx, non calc

MD: 1,955 '  
TVD: 1,954.81 '  
Inclination: 4.4 °  
Azimuth: 35.5 °  
VS: -10.91 '

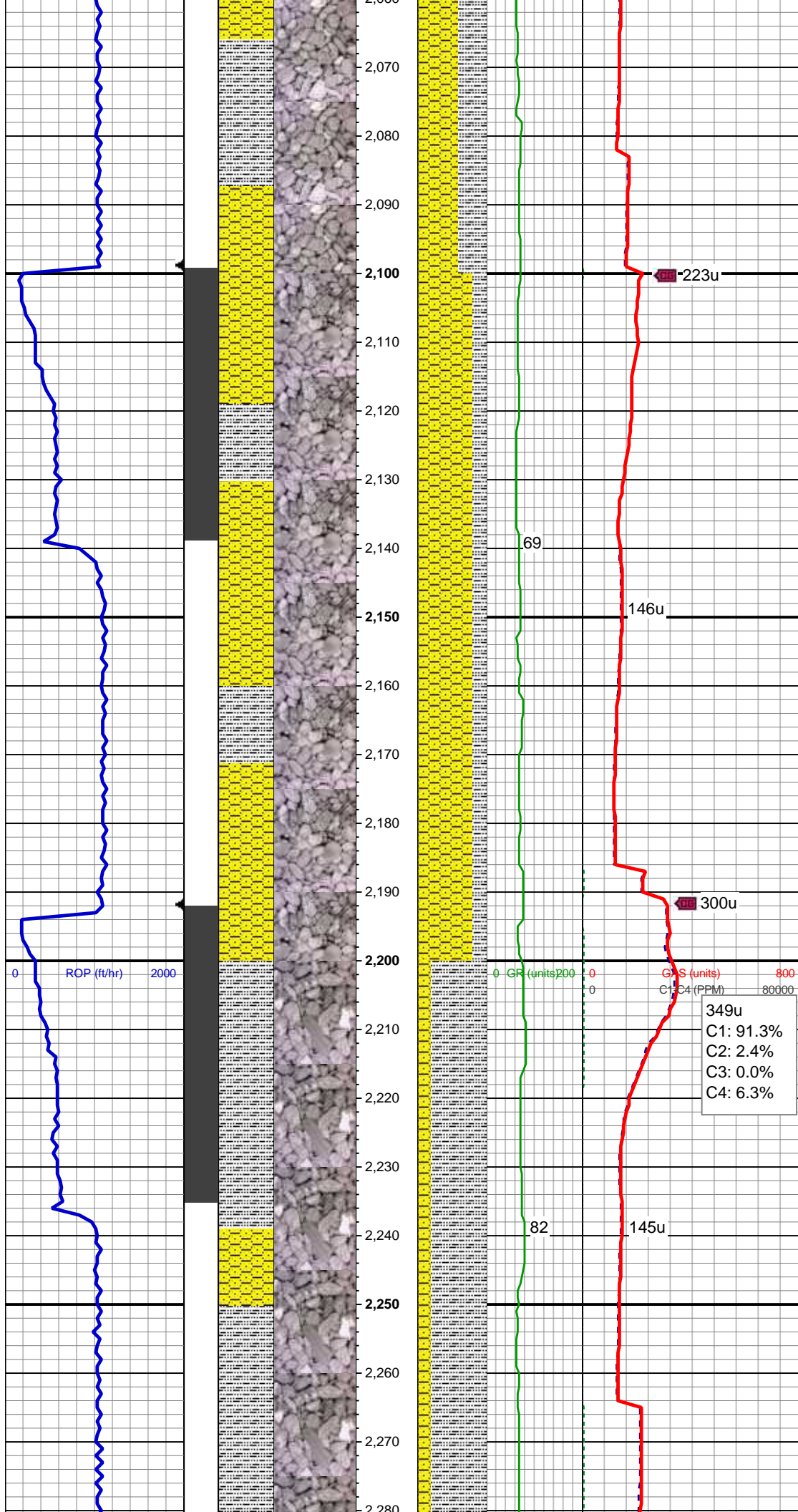
156u  
C1: 85.1%  
C2: 2.1%  
C3: 0.0%  
C4: 12.8%

GAS (units) 800  
C1-C4 (PPM) 80000  
266u

MD: 2,048 '  
TVD: 2,047.46 '  
Inclination: 5.5 °  
Azimuth: 24.3 °  
VS: -14.54 '

SHY SS: lt gy wh, s&p, f gr, sb ang - sb





rnd, p - mod srt, arg cmt  
SLTY SH: lt-med gy, sft - mod frm, sb  
blky, occ plty, arg-rthy mtx, non calc

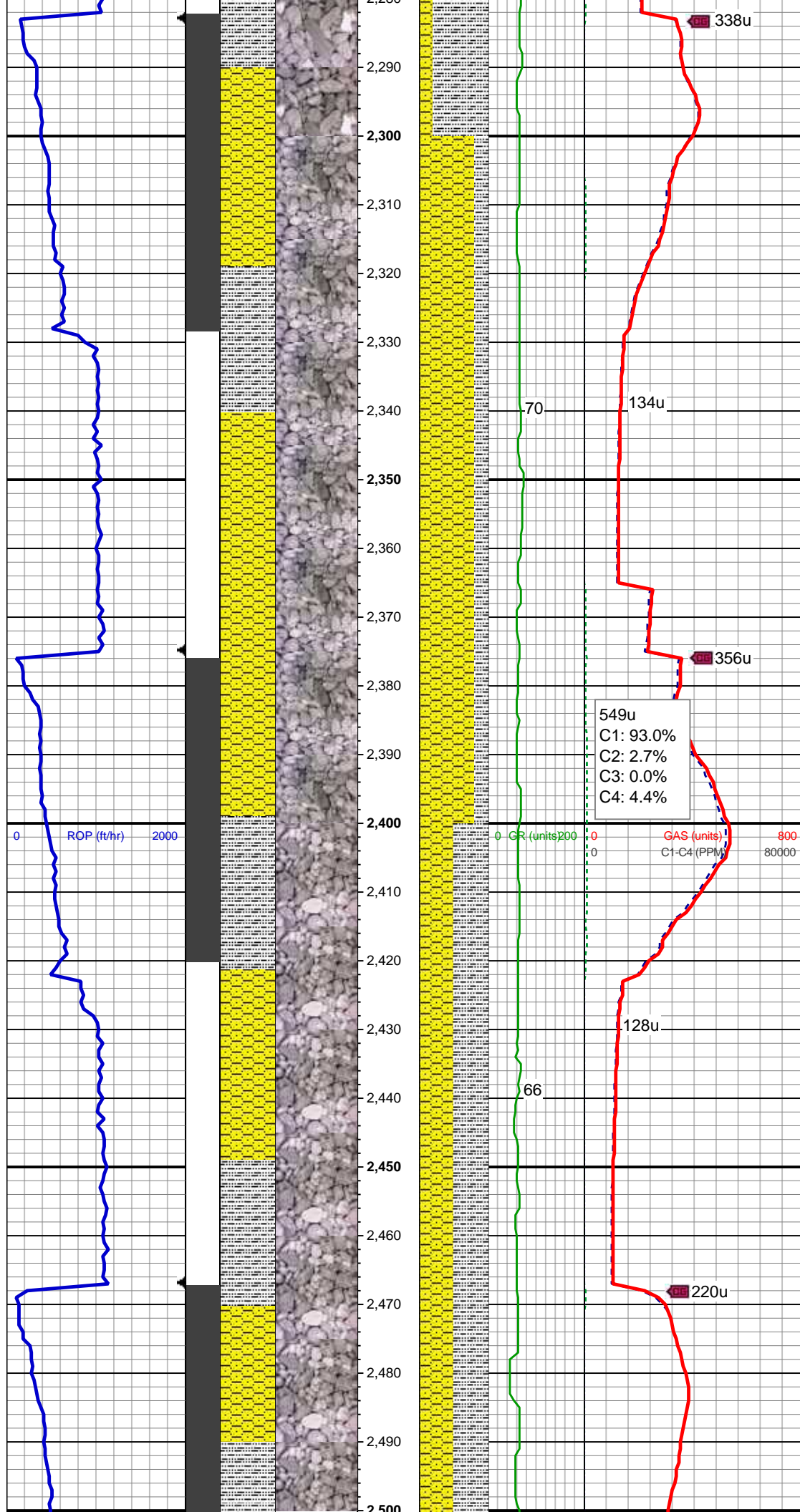
WT IN 8.65/ OUT 8.65  
VIS IN 27/ OUT 27

MD: 2,141 '  
TVD: 2,139.89 '  
Inclination: 7.2 °  
Azimuth: 23.2 °  
VS: -18.3 '

SHY SS: lt gy wh, s&p, f gr, sb ang - sb  
rnd, p - mod srt, arg cmt  
SLTY SH: lt-med gy, sft - mod frm, sb  
blky, occ plty, arg-rthy mtx, non calc

MD: 2,233 '  
TVD: 2,230.94 '  
Inclination: 9.2 °  
Azimuth: 25.7 °  
VS: -23.29 '

SLTY SH: lt gy, sft - mod frm, sb blky,  
occ plty, arg-rthy mtx, non calc  
SHY SS: gy - lt gy, occ wh, s&p, f gr, sb  
ang - sb rnd, p - mod srt, occ phlogopite,  
arg cmt



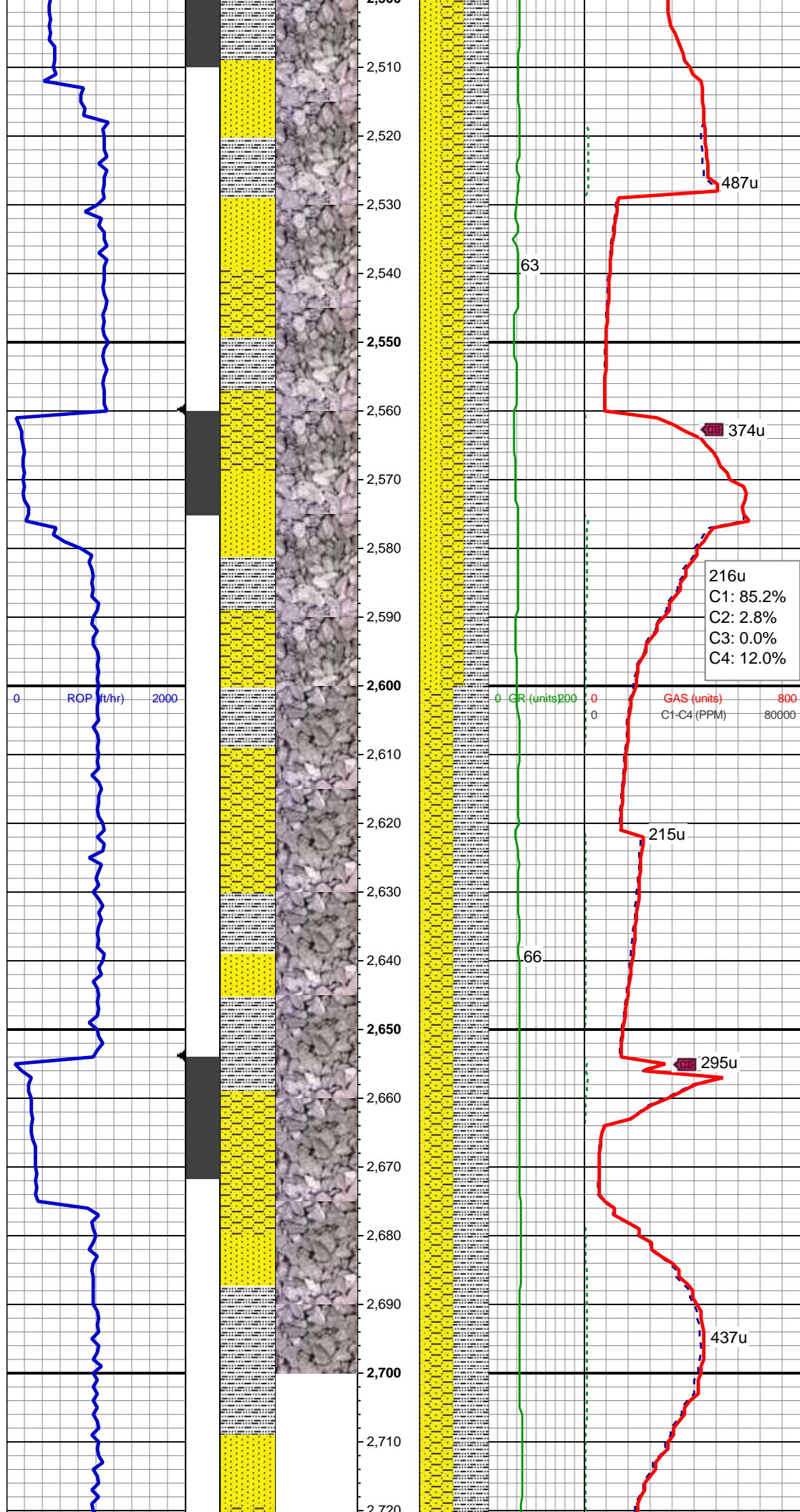
MD: 2,325 '  
TVD: 2,321.47 '  
Inclination: 11.3 °  
Azimuth: 26.4 °  
VS: -29.91 '

SHY SS: lt gy wh, s&p, f gr, sb ang - sb  
rnd, p - mod srt, arg cmt  
SLTY SH: lt-med gy, sft - mod frm, sb  
blky, occ plty, arg-rthy mtx, non calc

MD: 2,417 '  
TVD: 2,411.42 '  
Inclination: 12.9 °  
Azimuth: 20.7 °  
VS: -36.85 '

SHY SS: lt gy wh, s&p, f gr, sb ang - sb  
rnd, p - mod srt, arg cmt  
SLTY SH: lt-med gy, sft - mod frm, sb  
blky, occ plty, arg-rthy mtx, non calc





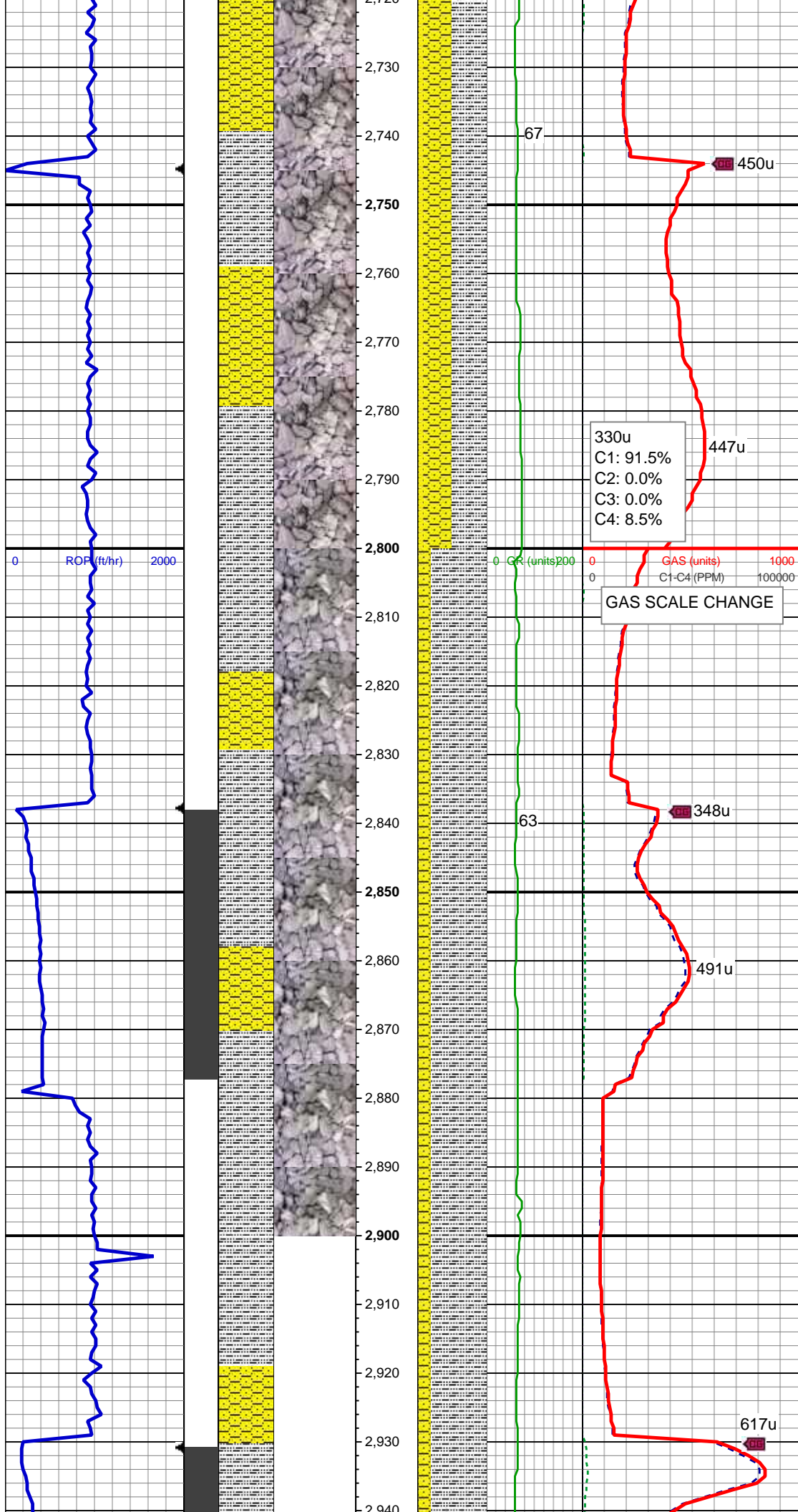
MD: 2,509 '  
TVD: 2,500.71 '  
Inclination: 15 °  
Azimuth: 19.2 °  
VS: -43.58 '

SHY SS: gy - lt gy, occ wh, s&p, f gr, sb  
ang - sb rnd, p - mod srt, arg cmt  
SLTY SH: lt gy - gy, mod sft - mod frm, sb  
blky - sb plty, arg - rthy mtx, shy tex, non  
calc  
SS: wh - trnsl, s&p, f gr, sb ang - sb rnd, p  
- mod srt, tr glau, arg cmt

MD: 2,602 '  
TVD: 2,590.41 '  
Inclination: 15.6 °  
Azimuth: 19.5 °  
VS: -50.8 '

SLTY SH: lt gy - gy, mod sft - mod frm, sb  
blky - sb plty, arg - rthy mtx, shy tex, non  
calc  
SHY SS: gy - lt gy, occ wh, s&p, f gr, sb  
ang - sb rnd, p - mod srt, arg cmt  
SS: wh - trnsl, s&p, f gr, sb ang - sb rnd, p  
- mod srt, tr glau, arg cmt

MD: 2,696 '  
TVD: 2,680.83 '  
Inclination: 16.1 °  
Azimuth: 20.9 °  
VS: -58.72 '



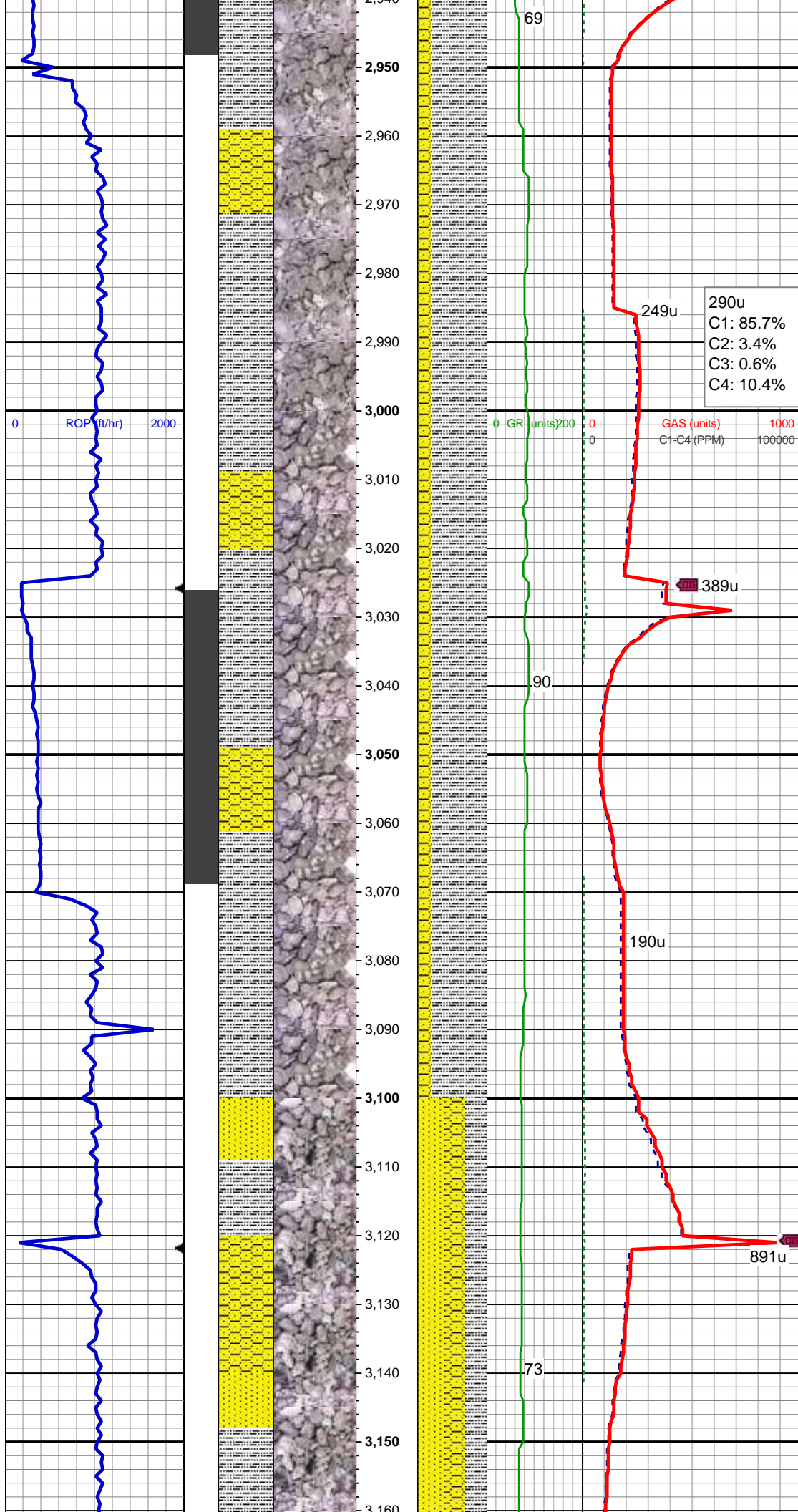
SLTY SH: lt gy - gy, mod sft - mod frm, sb  
blky - sb plty, arg - rthy mtx, shy tex, non  
calc  
SHY SS: gy - lt gy, occ wh, s&p, f gr, sb  
ang - sb rnd, p - mod srt, arg cmt  
SS: wh - trnsf, s&p, f gr, sb ang - sb rnd, p  
- mod srt, tr glau, arg cmt

MD: 2,788 '  
TVD: 2,769.49 '  
Inclination: 14.9 °  
Azimuth: 19.5 °  
VS: -66.31 '

SLTY SH: lt gy - gy, mod sft - mod frm, sb  
blky - sb plty, arg - rthy mtx, shy tex, non  
calc  
SHY SS: gy - lt gy, occ wh, s&p, f gr, sb  
ang - sb rnd, p - mod srt, arg cmt, tr ss

MD: 2,883 '  
TVD: 2,861.36 '  
Inclination: 14.6 °  
Azimuth: 25.3 °  
VS: -74.63 '





SLTY SH: lt gy - gy, mod sft - mod frm, sb  
blky - sb plty, arg - rthy mtx, shy tex, non  
calc  
SHY SS: gy - lt gy, occ wh, s&p, f gr, sb  
ang - sb rnd, p - mod srt, arg cmt, tr ss

MD: 2,977 '  
TVD: 2,952.59 '  
Inclination: 13.3 °  
Azimuth: 25.8 °  
VS: -83.59 '

WT IN 8.70/ OUT 8.70  
VIS IN 27/ OUT 27

SLTY SH: lt gy - gy, mod sft - mod frm, sb  
blky - sb plty, arg - rthy mtx, shy tex, non  
calc  
SHY SS: gy - lt gy, occ wh, s&p, f gr, sb  
ang - sb rnd, p - mod srt, arg cmt, tr ss

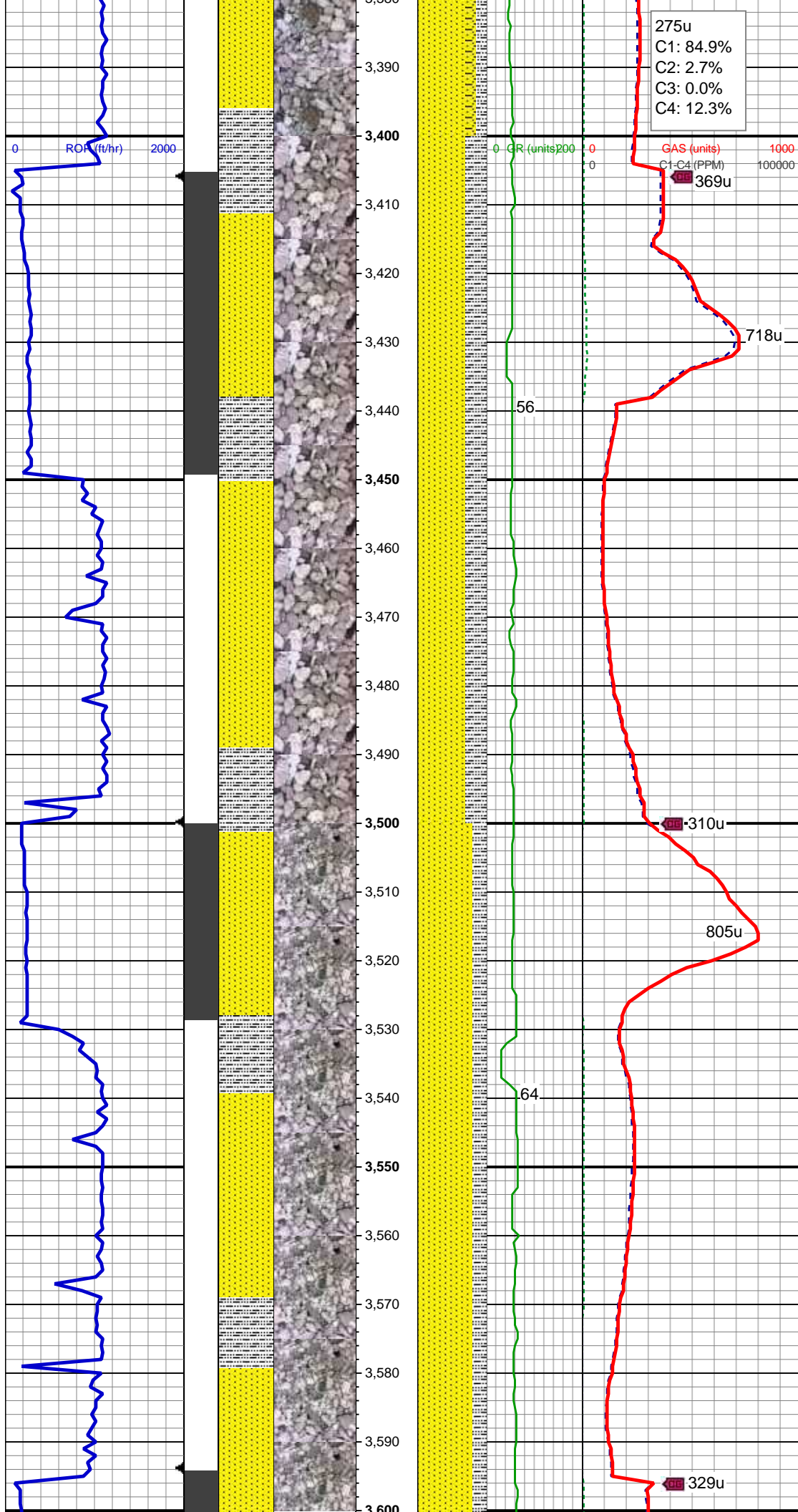
MD: 3,072 '  
TVD: 3,044.89 '  
Inclination: 14.1 °  
Azimuth: 34.5 °  
VS: -94.13 '

SS: lt gy - wh trnsi, s&p, f gr, sb ang - sb  
rnd, p - mod srt, tr glau, arg cmt  
SLTY SH: lt gy - gy, mod sft - mod frm, sb  
blky - sb plty, arg - rthy mtx, shy tex, non  
calc, tr slty sh  
SHY SS: gy - lt gy, occ wh, s&p, f gr, sb  
ang - sb rnd, p - mod srt, arg cmt, tr ss

MD: 3,167 '







275u  
C1: 84.9%  
C2: 2.7%  
C3: 0.0%  
C4: 12.3%

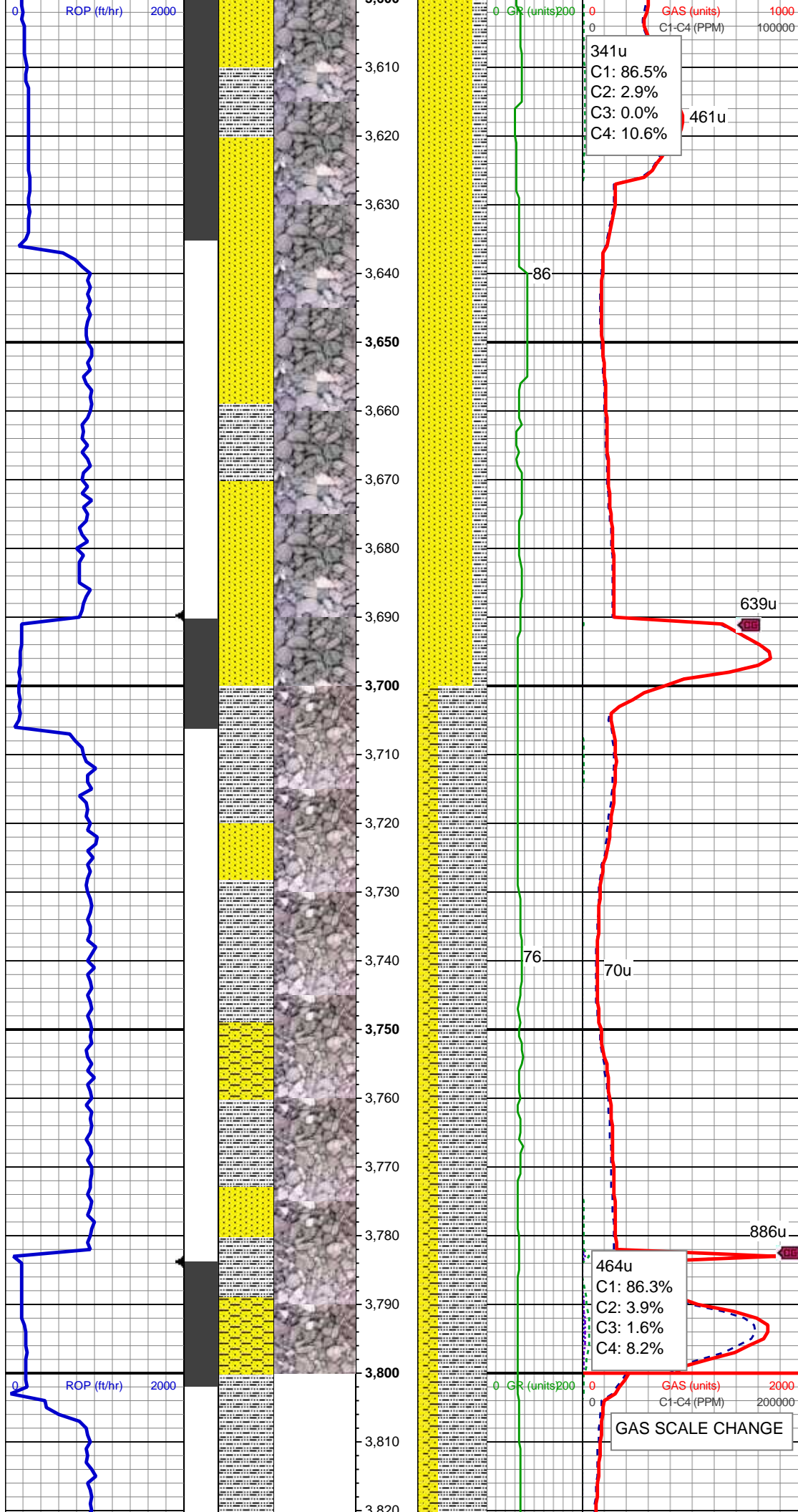
MD: 3,451 '  
TVD: 3,415.44 '  
Inclination: 8.3 °  
Azimuth: 28.6 °  
VS: -133.82 '

SS: lt gy - wh trns, s&p, f gr, sb ang - sb  
rnd, p - mod srt, tr glau, arg cmt  
SLTY SH: lt gy - gy, mod sft - mod frm, sb  
blky - sb plty, arg - rthy mtx, shy tex, non  
calc, tr slty sh

MD: 3,545 '  
TVD: 3,508.64 '  
Inclination: 6.7 °  
Azimuth: 33.8 °  
VS: -139.7 '

SS: lt gy - wh trns, s&p, f gr, sb ang - sb  
rnd, p - mod srt, tr glau, arg cmt  
SLTY SH: lt gy - gy, mod sft - mod frm, sb  
blky - sb plty, arg - rthy mtx, shy tex, non  
calc, tr slty sh





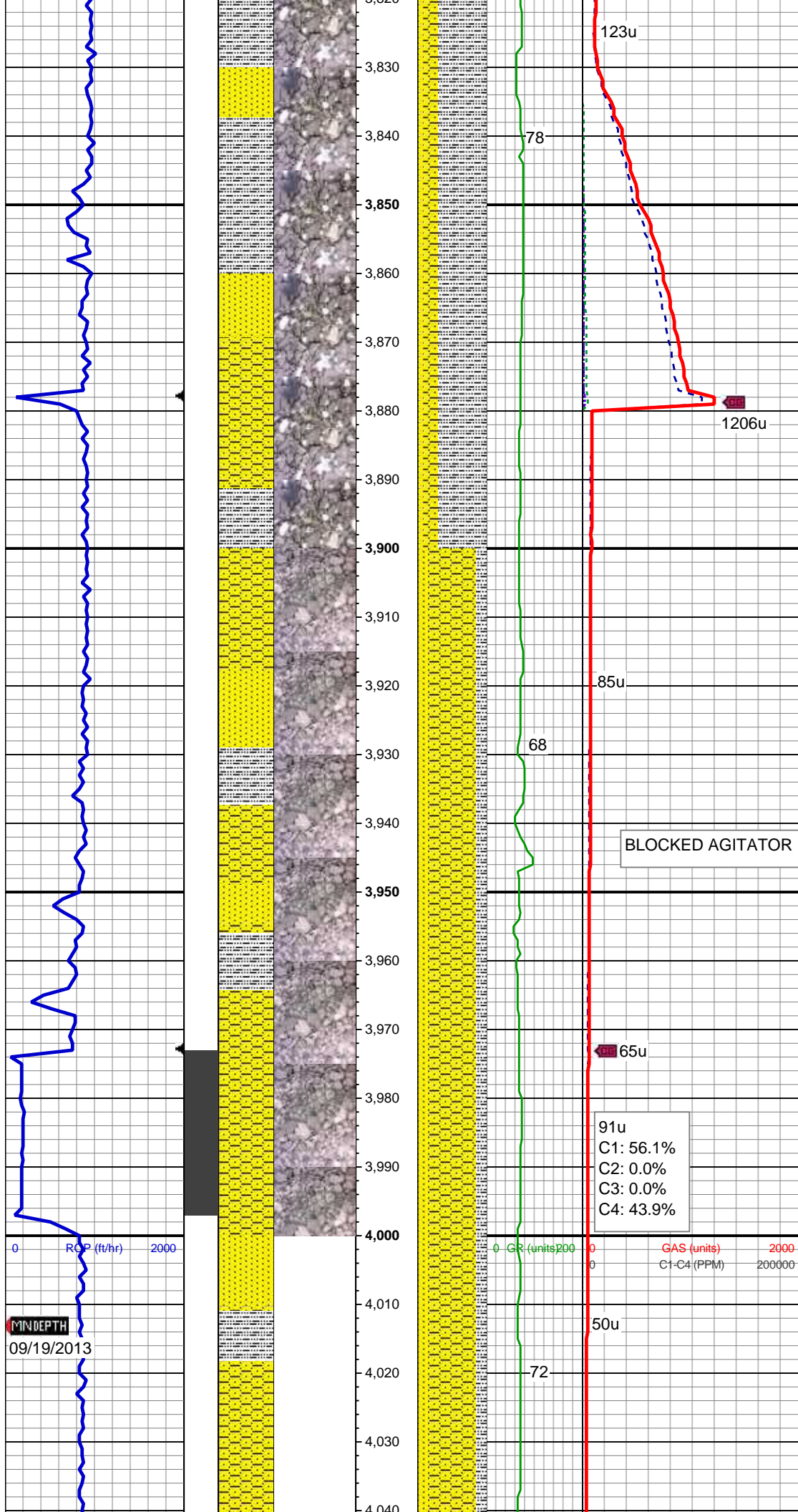
MD: 3,640 '  
TVD: 3,603.19 '  
Inclination: 4.4 °  
Azimuth: 42 °  
VS: -144.93 '

SS: lt gy - wh trnsi, s&p, f gr, sb ang - sb  
rnd, p - mod srt, tr glau, arg cmt  
SLTY SH: lt gy - gy, mod sft - mod frm, sb  
blky - sb plty, arg - rthy mtx, shy tex, non  
calc, tr slty sh

MD: 3,734 '  
TVD: 3,696.97 '  
Inclination: 3.3 °  
Azimuth: 37.8 °  
VS: -148.81 '

SLTY SH: lt-med gy, occ drkgy, sft - mod  
frm, sb blky, occ plty, arg-rthy mtx, non  
calc  
SS: wh - trnsi, s&p, f gr, sb ang-sb rnd,  
p-mod srt, abnt glau, arg mtx  
SHY SS: gy - lt gy, occ wh, s&p, f gr, sb  
ang - sb rnd, p - mod srt, arg cmt





MD: 3,829 '  
TVD: 3,791.82 '  
Inclination: 3.3 °  
Azimuth: 21.3 °  
VS: -151.29 '

SLTY SH: lt-med gy, occ drkgy, sft - mod frm, sb blkly, occ plty, arg-rthy mtx, non calc  
SS: wh - trnsl, s&p, f gr, sb ang-sb rnd, p-mod srt, abnt glau, arg mtx  
SHY SS: gy - lt gy, occ wh, s&p, f gr, sb ang - sb rnd, p - mod srt, arg cmt

MD: 3,923 '  
TVD: 3,885.68 '  
Inclination: 2.9 °  
Azimuth: 36 °  
VS: -153.5 '

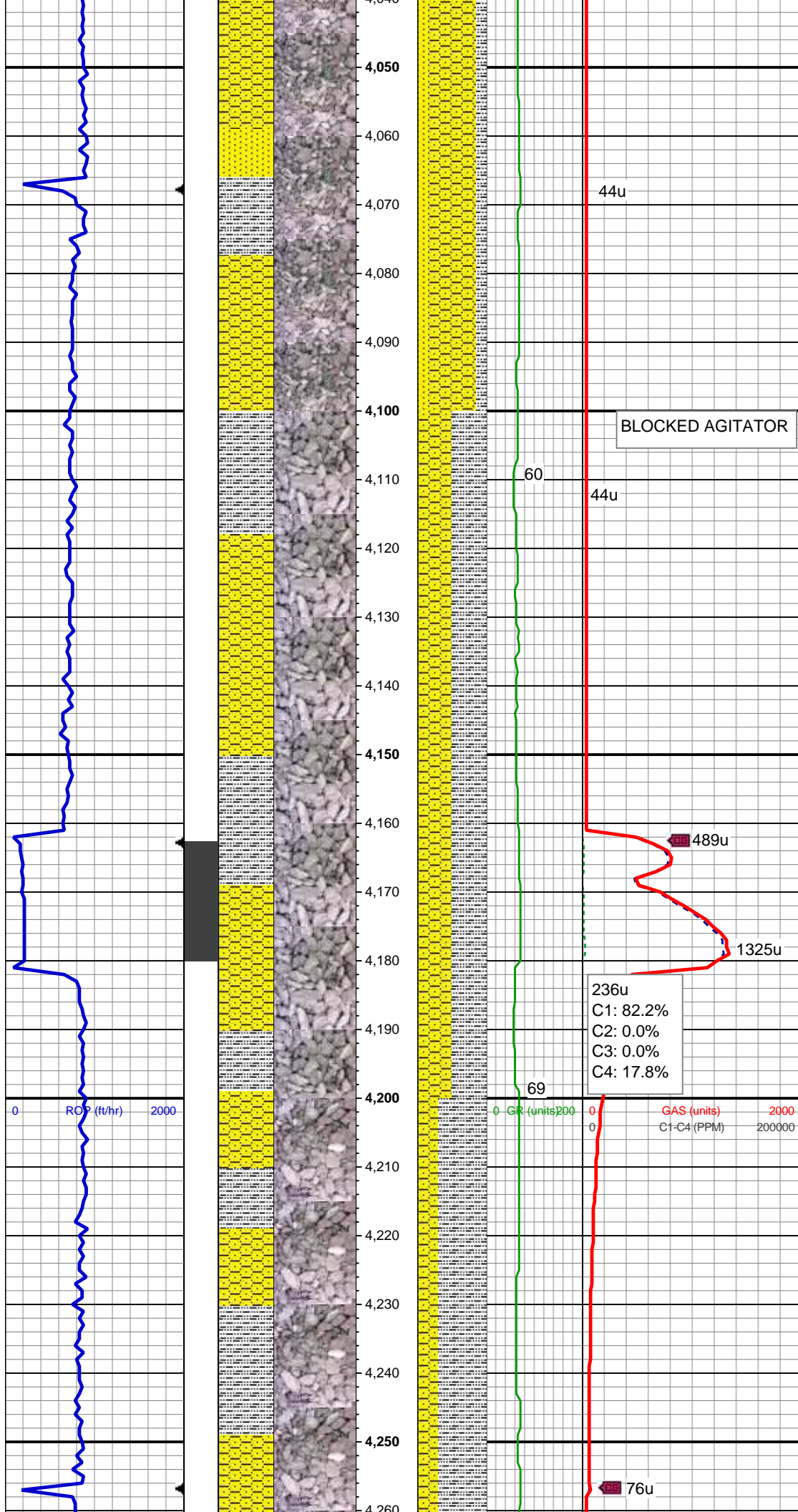
SHY SS: gy - lt gy, occ tan, s&p, f gr, sb ang - sb rnd, p - mod srt, arg cmt  
SS: wh - trnsl, s&p, f gr, sb ang-sb rnd, p-mod srt, occ glau, arg mtx  
SLTY SH: lt-med gy, occ drkgy, sft - mod frm, sb blkly, occ plty, arg-rthy mtx, non calc

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

MD: 4,018 '  
TVD: 3,980.57 '  
Inclination: 2.7 °  
Azimuth: 18.8 °  
VS: -155.47 '

BLOCKED AGITATOR

91u  
C1: 56.1%  
C2: 0.0%  
C3: 0.0%  
C4: 43.9%



SHY SS: gy - lt gy, occ tan, s&p, f gr, sb ang - sb rnd, p - mod srt, arg cmt  
SS: wh - trnsl, s&p, f gr, sb ang-sb rnd, p-mod srt, occ glau, arg mtx  
SLTY SH: lt-med gy, occ drkgy, sft - mod frm, sb blk, occ plty, arg-rthy mtx, non calc

MD: 4,113 '  
TVD: 4,075.49 '  
Inclination: 2 °  
Azimuth: 26.5 °  
VS: -156.79 '

SLTY SH: lt-med gy, occ drkgy, sft - mod frm, sb blk, occ plty, arg-rthy mtx, non calc

SHY SS: gy - lt gy, occ tan, s&p, f gr, sb ang - sb rnd, p - mod srt, arg cmt

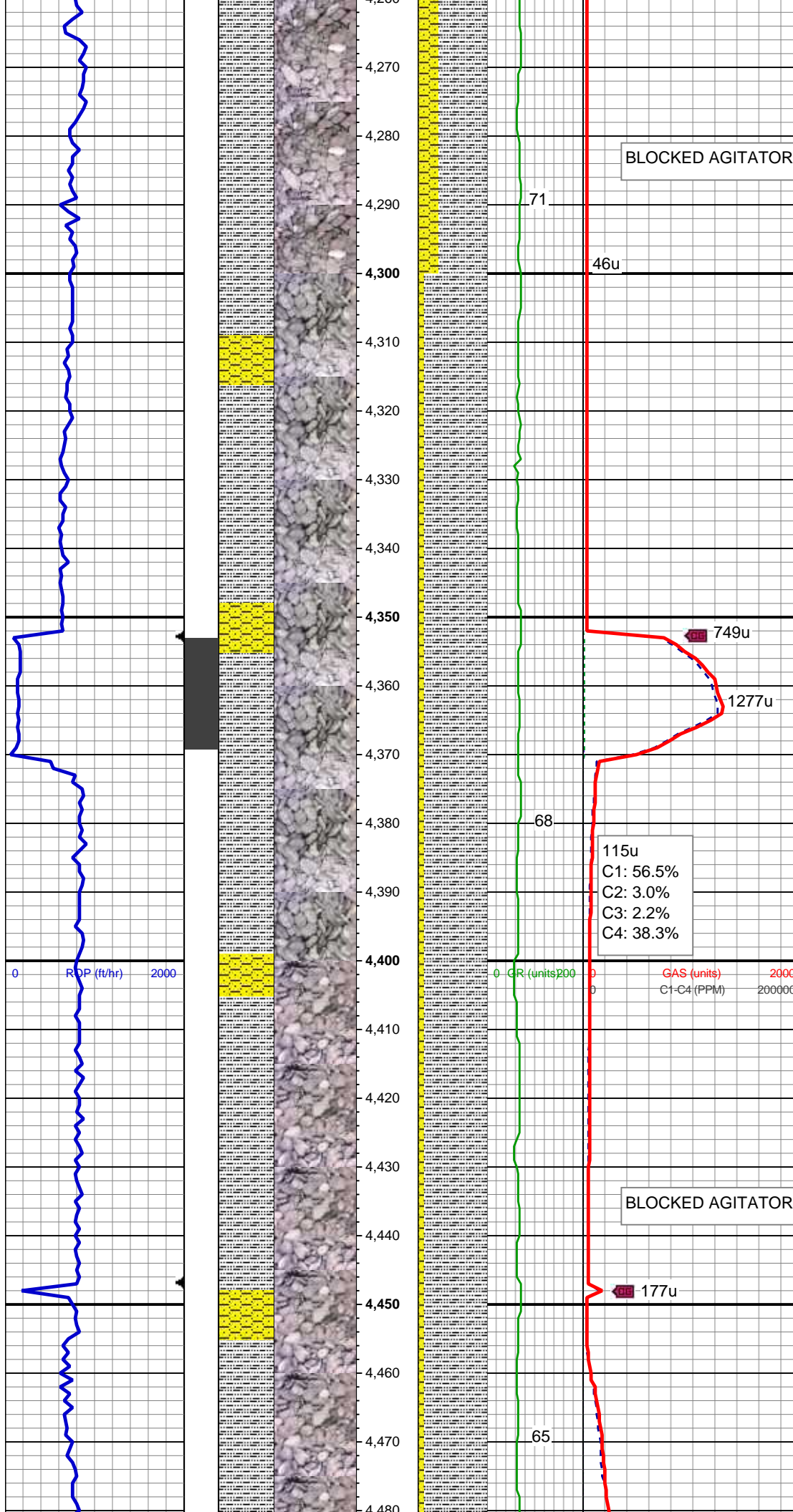
236u  
C1: 82.2%  
C2: 0.0%  
C3: 0.0%  
C4: 17.8%

MD: 4,208 '  
TVD: 4,170.44 '  
Inclination: 1.7 °  
Azimuth: 8.4 °  
VS: -157.62 '

SLTY SH: lt-med gy, occ drkgy, sft - mod frm, sb blk, occ plty, arg-rthy mtx, non calc

SHY SS: gy - lt gy, occ tan, s&p, f gr, sb ang - sb rnd, p - mod srt, arg cmt





MD: 4,303 '  
TVD: 4,265.42 '  
Inclination: 0.6 °  
Azimuth: 28 °  
VS: -157.99 '

SLTY SH: lt-med gy, occ drkgy, sft - mod  
frm, sb blkly, occ plty, arg-rthy mtx, non  
calc  
SHY SS: gy - lt gy, occ tan, s&p, f gr, sb  
ang - sb rnd, p - mod srt, arg cmt

MD: 4,398 '  
TVD: 4,360.41 '  
Inclination: 1.1 °  
Azimuth: 20.2 °  
VS: -158.49 '

BLOCKED AGITATOR

71

46u

749u

1277u

68

115u  
C1: 56.5%  
C2: 3.0%  
C3: 2.2%  
C4: 38.3%

0 ROP (ft/hr) 2000 0 GR (units) 200 0 GAS (units) 2000 0 C1-C4 (PPM) 200000

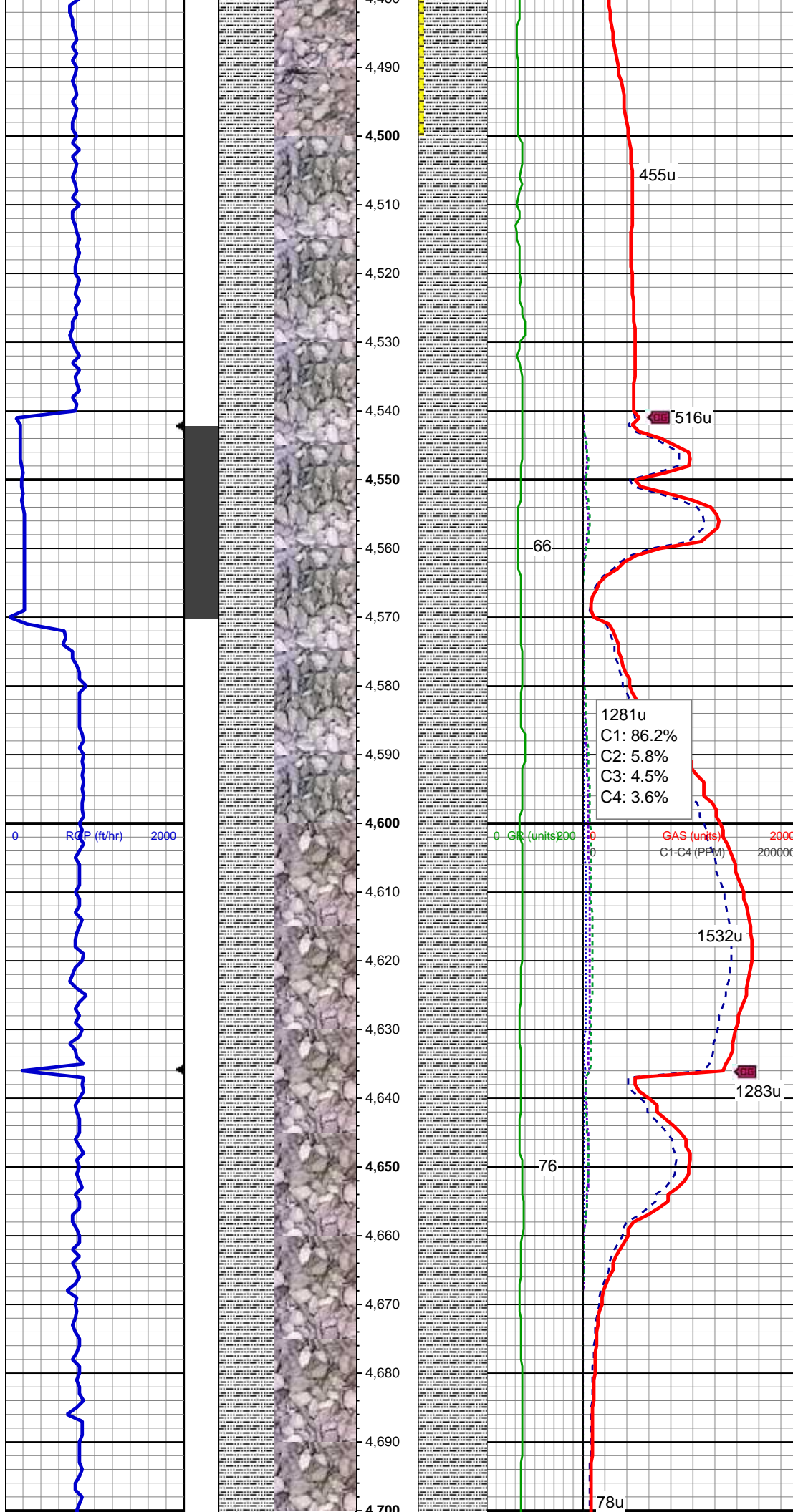
BLOCKED AGITATOR

177u

65

SLTY SH: lt-med gy, occ drkgy, sft - mod  
frm, sb blkly, occ plty, arg-rthy mtx, non  
calc  
SHY SS: gy - lt gy, occ tan, s&p, f gr, sb  
ang - sb rnd, p - mod srt, arg cmt





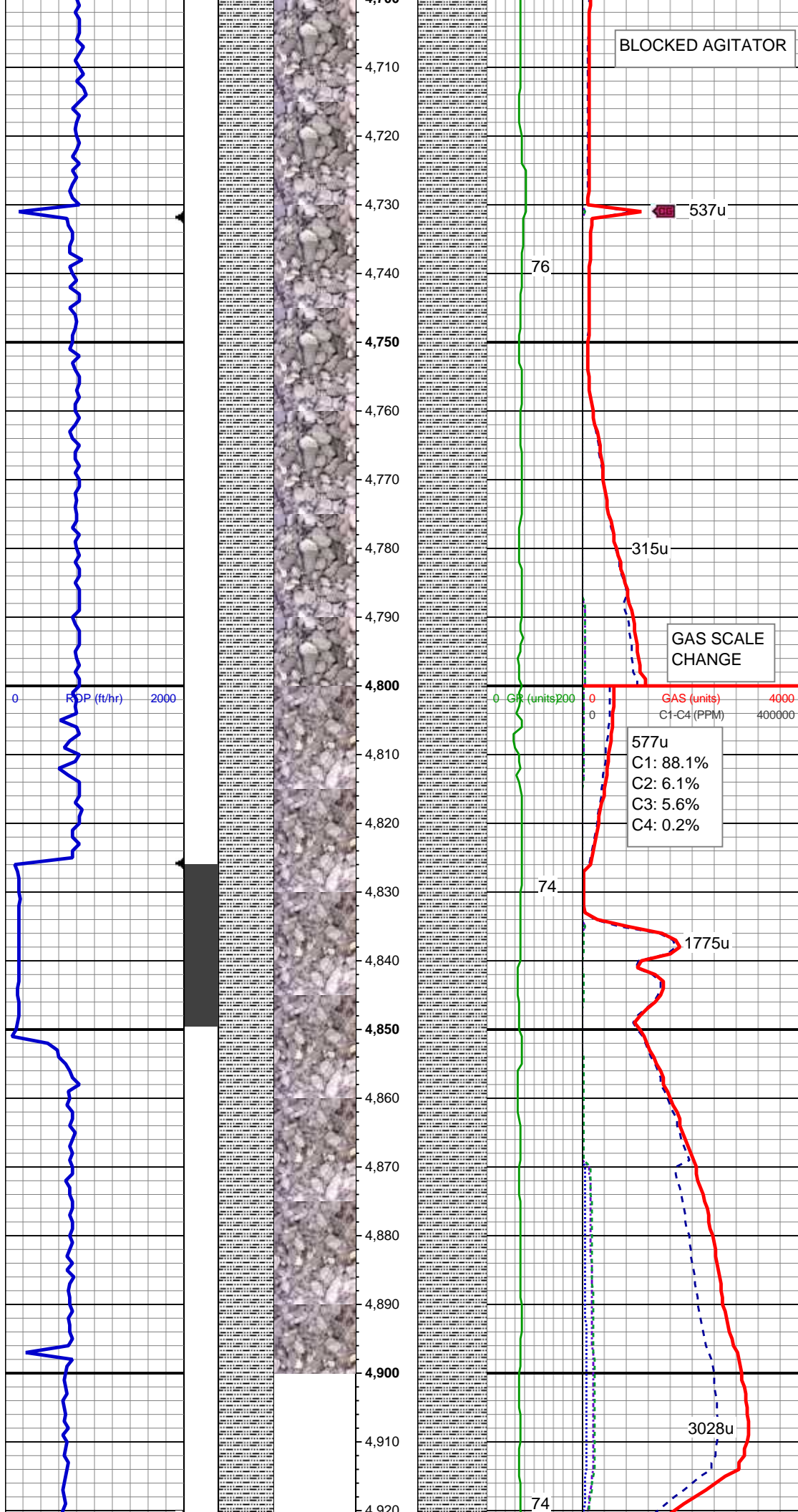
MD: 4,492 '  
TVD: 4,454.4 '  
Inclination: 0.5 °  
Azimuth: 303.9 °  
VS: -158.42 '

SLTY SH: lt-med gy, occ drkgy, sft - mod  
frm, sb blk, occ pty, arg-rthy mtx, non  
calc, tr shy ss

MD: 4,587 '  
TVD: 4,549.38 '  
Inclination: 2.2 °  
Azimuth: 7.2 °  
VS: -158.22 '

SLTY SH: lt-med gy, occ drkgy, sft - mod  
frm, sb blk, occ pty, arg-rthy mtx, non  
calc, tr shy ss

MD: 4,682 '  
TVD: 4,644.32 '  
Inclination: 1.9 °  
Azimuth: 5.6 °  
VS: -158.47 '



BLOCKED AGITATOR

537u

76

SLTY SH: lt-med gy, occ drkgy, sft - mod  
frm, sb blk, occ pty, arg-rthy mtx, non  
calc, tr shy ss

MD: 4,777 '  
TVD: 4,739.26 '  
Inclination: 1.9 °  
Azimuth: 356.3 °  
VS: -158.4 '

GAS SCALE  
CHANGE

577u  
C1: 88.1%  
C2: 6.1%  
C3: 5.6%  
C4: 0.2%

WT IN 9.00/ OUT 9.00

74

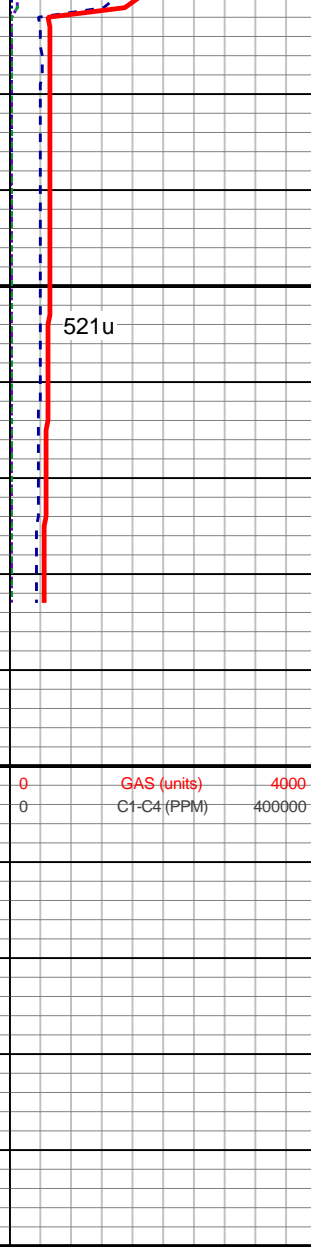
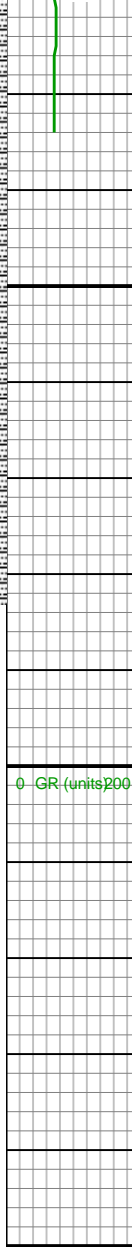
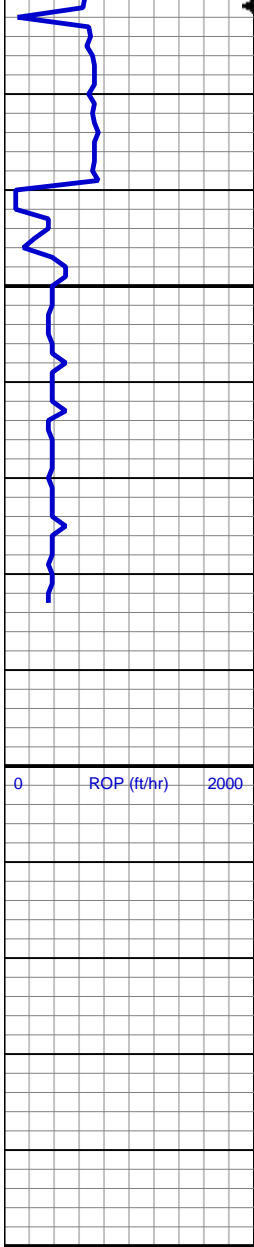
1775u

SLTY SH: lt-med gy, occ drkgy, sft - mod  
frm, sb blk, occ pty, arg-rthy mtx, non  
calc, tr shy ss

MD: 4,871 '  
TVD: 4,833.24 '  
Inclination: 0.5 °  
Azimuth: 292.7 °  
VS: -157.86 '

3028u

74



MD: 4,934 '  
TVD: 4,896.24 '  
Inclination: 0.4 °  
Azimuth: 281.6 °  
VS: -157.38 '

SLTY SH: lt-med gy, occ drkgy, sft - mod  
frm, sb blk, occ pty, arg-rthy mtx, non  
calc, tr shy ss

TD @ 4983' MD  
09/19/2013 @ 03:07 AM

TOOH FOR MWD TOOLS  
LOG CONTINUES ON MLOT  
"ROHN STATE LD09-68HN(HORZ)"

Thank you for choosing  
Columbine Logging Inc.