

COLUMBINE LOGGING

Scale: 5" / 100'
Measured Depth Log

Well Name Wells Ranch AE19-615

Location NWSW 20 6N 62W 6 PM

State COLODADO

County WELD

Country UNITED STATES

Rig Number H&P 330

API Number 05-123-39633

Field WATTENBERG

Region DJ BASIN

Drilling Completed 12/8/2014

Spud Date 11/28/2014

Surface Coordinates Sec 20, T6N, 62W
1535 FSL 65 FWL
Lat/Long: 40.46917/-104.35587

Bottom Hole Coordinates Sec 24, T6N 63W
330 FFSLL 235 FFELL

Ground Elevation 4,786'

K.B. Elevation 4,816'

Logged Interval 1,500' **To** 12,022'

Total Depth 12,022'

Formation Niobrara

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

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

FINELYXLN

GRAINSTONE

L LITHOGRAPHIC

MX MICROXLN

MS MUDSTONE

PS PACKSTONE

WS WACKSTONE

Sorting

- M MODERATE
- P POOR
- W WELL

Accessories

Fossils

GASTROPOD

INOCERAMUS

ARGILLITE GRAIN

B BENTONITE

HEAVY MINERAL

K KAOLIN

Stringer

ALGAE	OOLITE	BITUMENOUS SUBSTANCE	MARCASITE	ANHYDRITE STRINGER
AMPHIPORA	OSTRACOD	BRECCIA FRAGMENTS	MARLSTONE	BENTONITE STRINGER
BELEMNITE	PELECYPOD	CALCAREOUS	MICACEOUS	COAL STRINGER
BIOCLASTIC	PELLET	CARBONACEOUS FLAKES	MINERAL CRYSTALS	DOLOMITE STRINGER
BRACHIOPOD	PISOLITE	CHTDK	NODULES	GYPSUM STRINGER
BRYOZOA	PLANT REMAINS	CHTLT	PHOSPHATE PELLETS	LIMESTONE STRINGER
CEPHALOPOD	PLANT SPORES	COAL - THIN BEDS	PYRITE	MARLSTONE (CALC) STRG
CORAL	SCAPHOPOD	DOLOMITIC	SALT CAST	MARLSTONE (DOL) STRG
CRINOID	STROMATOPOROID	FELDSPAR	SANDY	SANDSTONE STRINGER
ECHINOID		FERRUGINOUS PELLET	SIDERITE	SHALE STRINGER
FISH	Minerals	FERRUGINOUS	SILICEOUS	SILTSTONE STRINGER
FORAMINIFERA	ANHYDRITIC	GLAUCONITE	SILTY	
FOSSIL	ARGILLACEOUS	GYPSIFEROUS	TUFFACEOUS	

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	GYPSUM	SANDSTONE	TUFF
CHERT	IGNEOUS	SHALE	WELDED TUFF
CLAY CHOKE SAND	LIMESTONE	SHALE COLORED	
CLAYSTONE	SIDERITE or LIMONITE	SHALE GRAY	

Operator

Company NOBLE ENERGY INC.

Address 1625 Broadway Suite 2200
Denver, CO 80202

Geologist

Name Teresa Malesardi

Company Noble Energy Inc

Address 1625 Broadway Suite 2200
Denver, CO 80202

tmalesardi@nobleenergyinc.com

Zone Color Coding

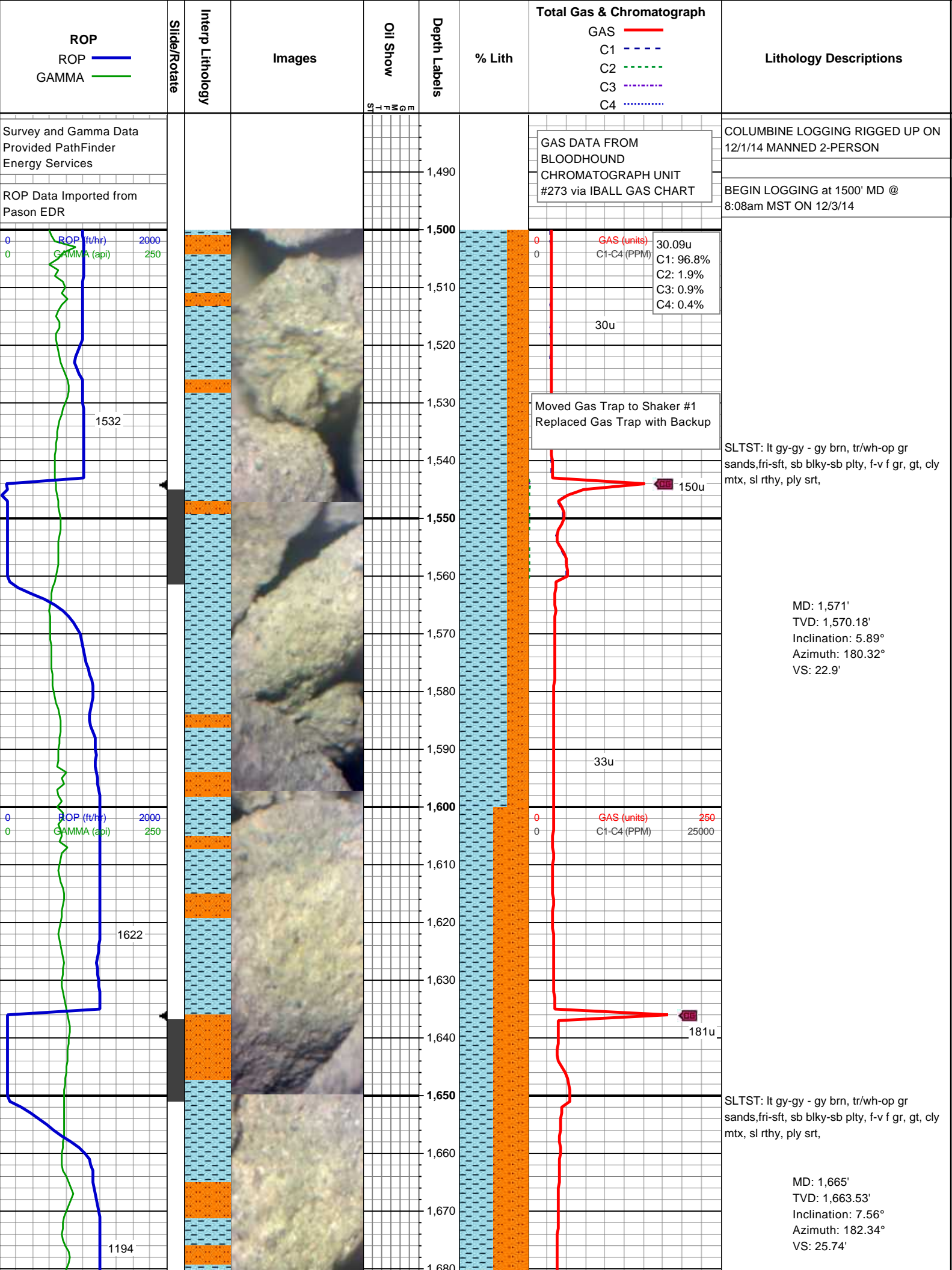
Oil	Condensate	Gas
Note	Core	Pressure
Error	Water	Seal

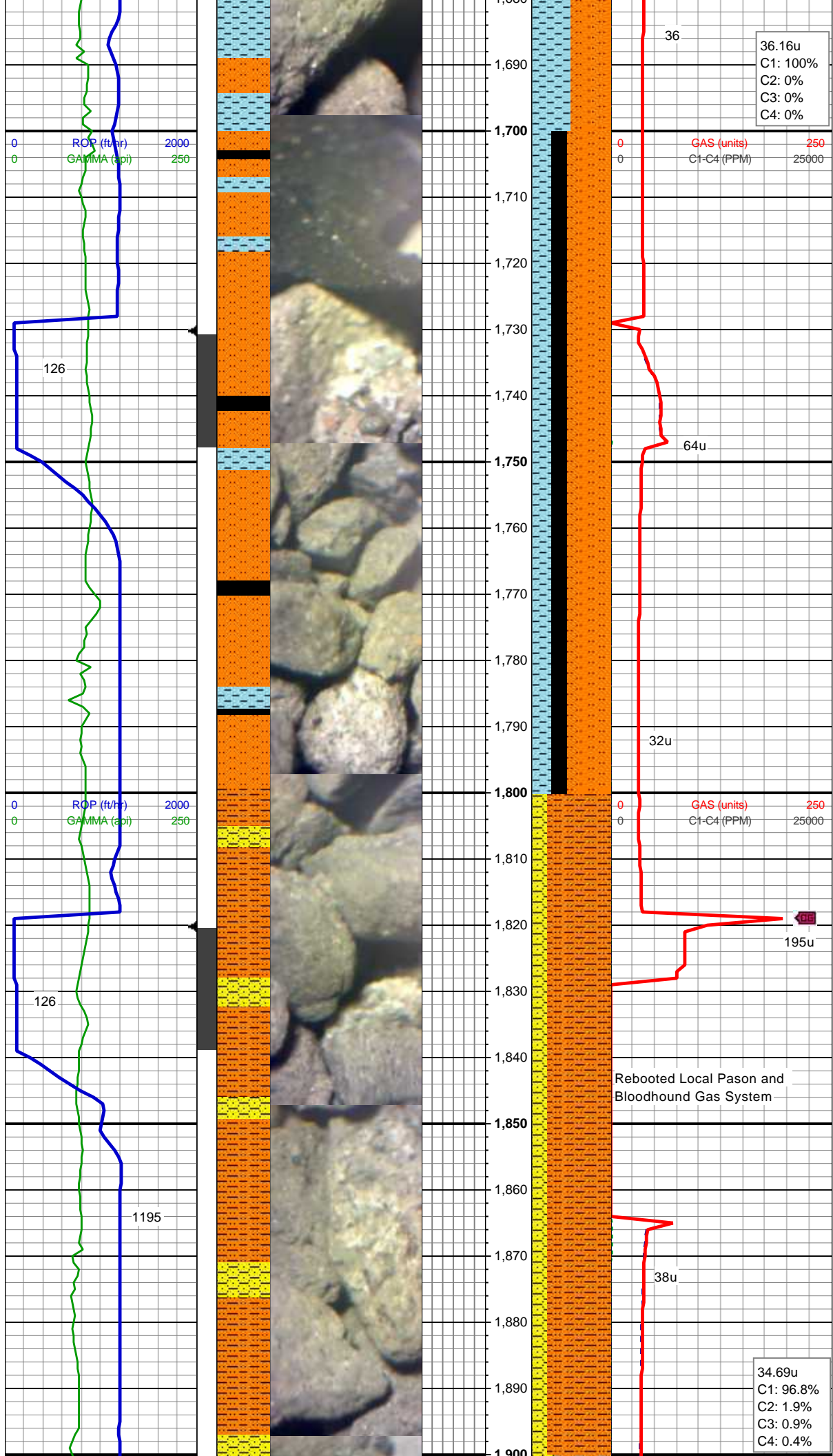
Other

Well Site Logging Company Columbine Logging Inc.

Well Site Geologist (Days) Brad Wilson

Well Site Geologist (Nights) Nathan Murphy



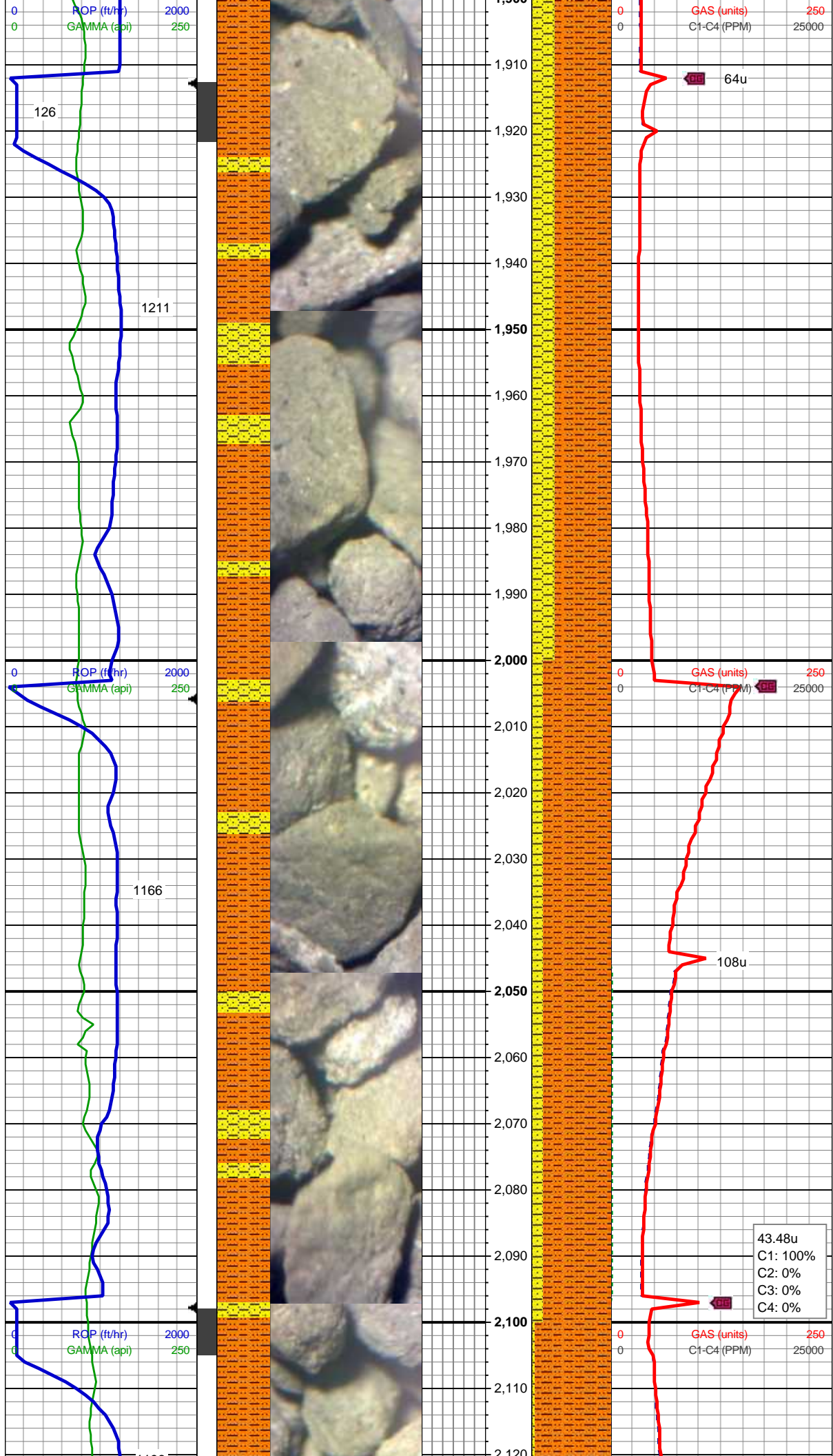


SLTST: lt gy-gy - gy brn, tr/wh-op gr
sands,fri-sft, sb blk-y-sb plty, f-v f gr, gt, cly
mtx, sl rthy, ply srt,

MD: 1,757'
TVD: 1,754.42'
Inclination: 10.2°
Azimuth: 184.36°
VS: 29.89'

MD: 1,851'
TVD: 1,846.63'
Inclination: 12.22°
Azimuth: 192.88°
VS: 36.85'

SHY SLTST: lt gy-gy - gy brn,sl frm - sft,
sb blk-y-sb plty, f-v f gr, gt, v arg, sl rthy,
ply srt sl grdg - sh
SHY SS: wh-lt gy occ lt brn, sl frm - brit,
sb ang-sb rnd, f gr, mod srtg, arg



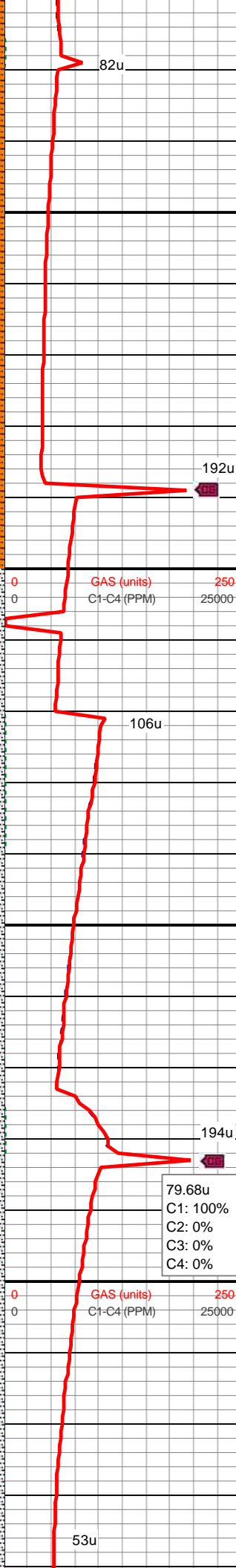
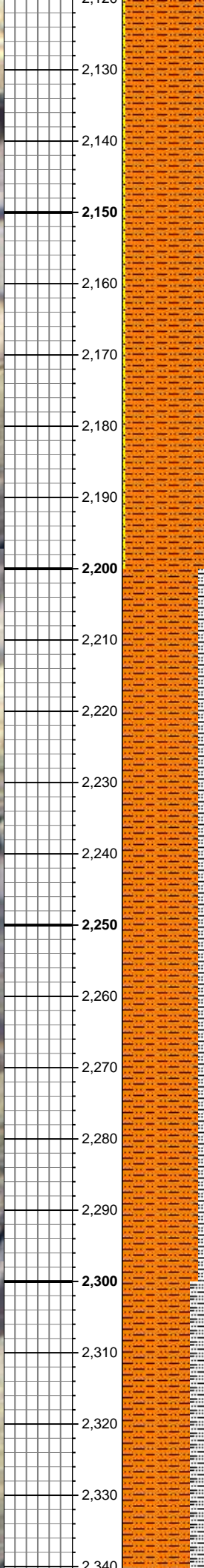
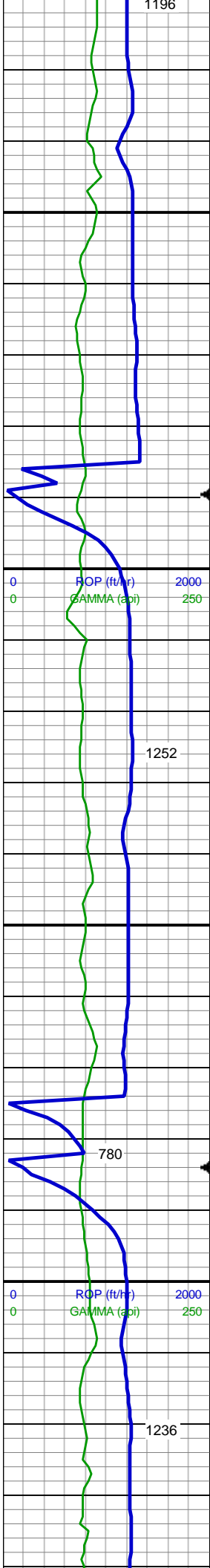
MD: 1,942'
TVD: 1,935.27'
Inclination: 13.89°
Azimuth: 190.42°
VS: 45.56'

SHY SLTST: lt gy-gy - gy brn,sl frm - sft,
sb blkly-sb plty, f-v f gr, gt, v arg, sl rthy,
ply srt sl grdg - sh
SHY SS: wh-lt gy occ lt brn, sl frm - brit,
sb ang-sb rnd, f gr, mod srtg, arg

MD: 2,035'
TVD: 2,025.48'
Inclination: 14.25°
Azimuth: 190.95°
VS: 54.81'

SHY SLTST: lt gy-gy - gy brn,sl frm - sft,
sb blkly-sb plty, f-v f gr, gt, v arg, sl rthy,
ply srt, sl grdg - sh
SHY SS: wh-lt gy occ lt brn, sl frm - brit,
sb ang-sb rnd, f gr, mod srtg, arg

43.48u
C1: 100%
C2: 0%
C3: 0%
C4: 0%



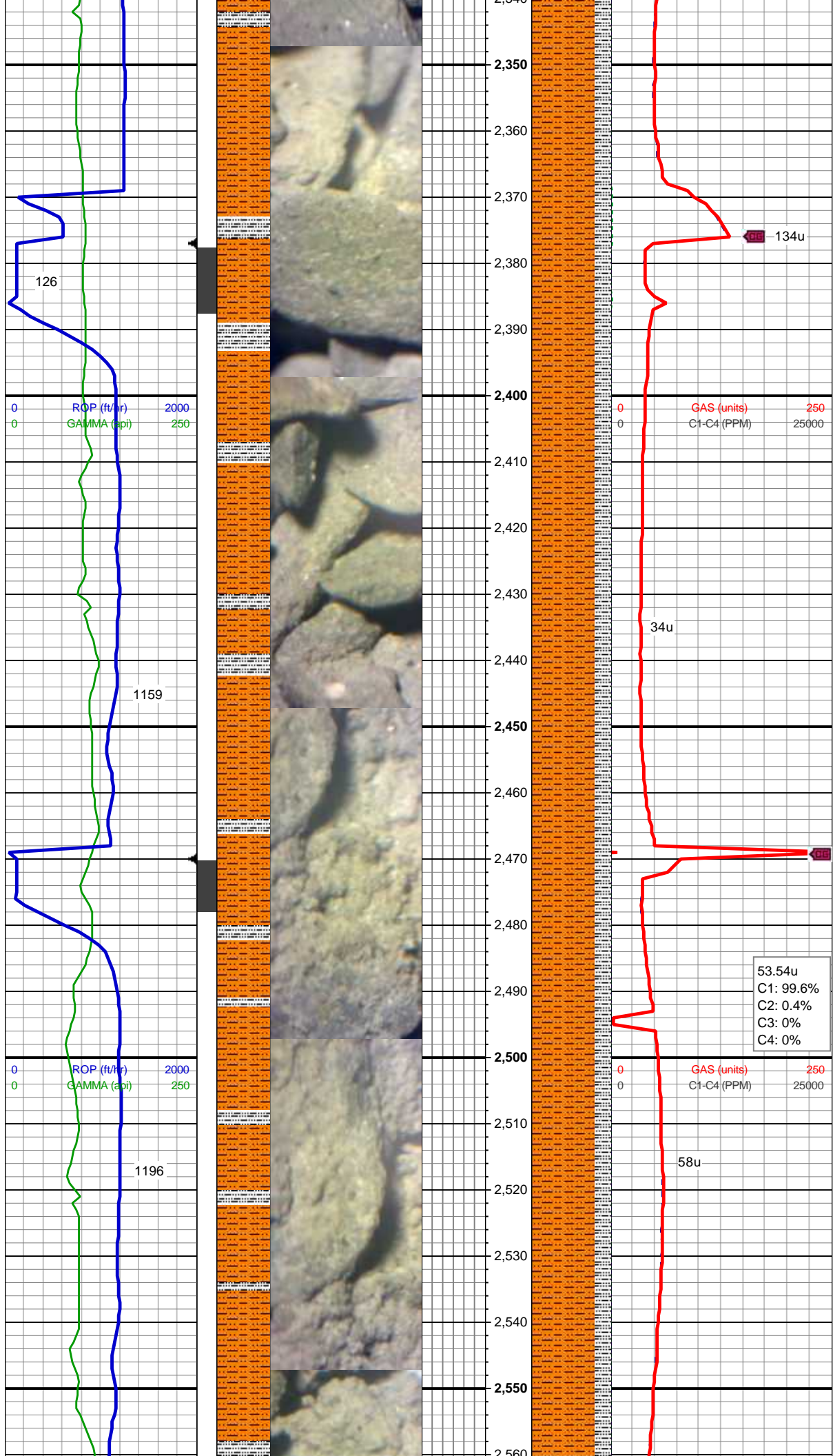
MD: 2,128'
TVD: 2,115.8'
Inclination: 13.37°
Azimuth: 186.64°
VS: 63.24'

SHY SLTST: lt gy-gy - gy brn,sl frm - sft,
sb blk-y-sb plty, f-v f gr, gt, v arg, sl rthy,
ply srt, grdg - slty sh
SHY SS: wh-lt gy occ lt brn, sl frm - brit,
sb ang-sb rnd, f gr, mod srtg, arg

MD: 2,221'
TVD: 2,206.21'
Inclination: 13.72°
Azimuth: 186.64°
VS: 70.74'

SHY SLTST: lt gy-gy - gy brn,sl frm - sft,
sb blk-y-sb plty, f-v f gr, gt, v arg, sl rthy,
ply srt
SLTY SH: med gy, sb blk-y-sb plty, v sft- sl
frm, slt tex, sl rthy lstr, sl aren, non calc

MD: 2,314'
TVD: 2,296.54'
Inclination: 13.81°
Azimuth: 187.96°
VS: 78.59'



SHY SLTST: lt gy-gy - gy brn,sl frm - sft,
sb blkly-sb plty, f-v f gr, gt, v arg, sl rthy,
ply srt
SLTY SH: med gy, sb blkly-sb plty, v sft- sl
frm, slt tex, sl rthy lstr, sl aren, non calc

MUD WT 8.3 VIS 26

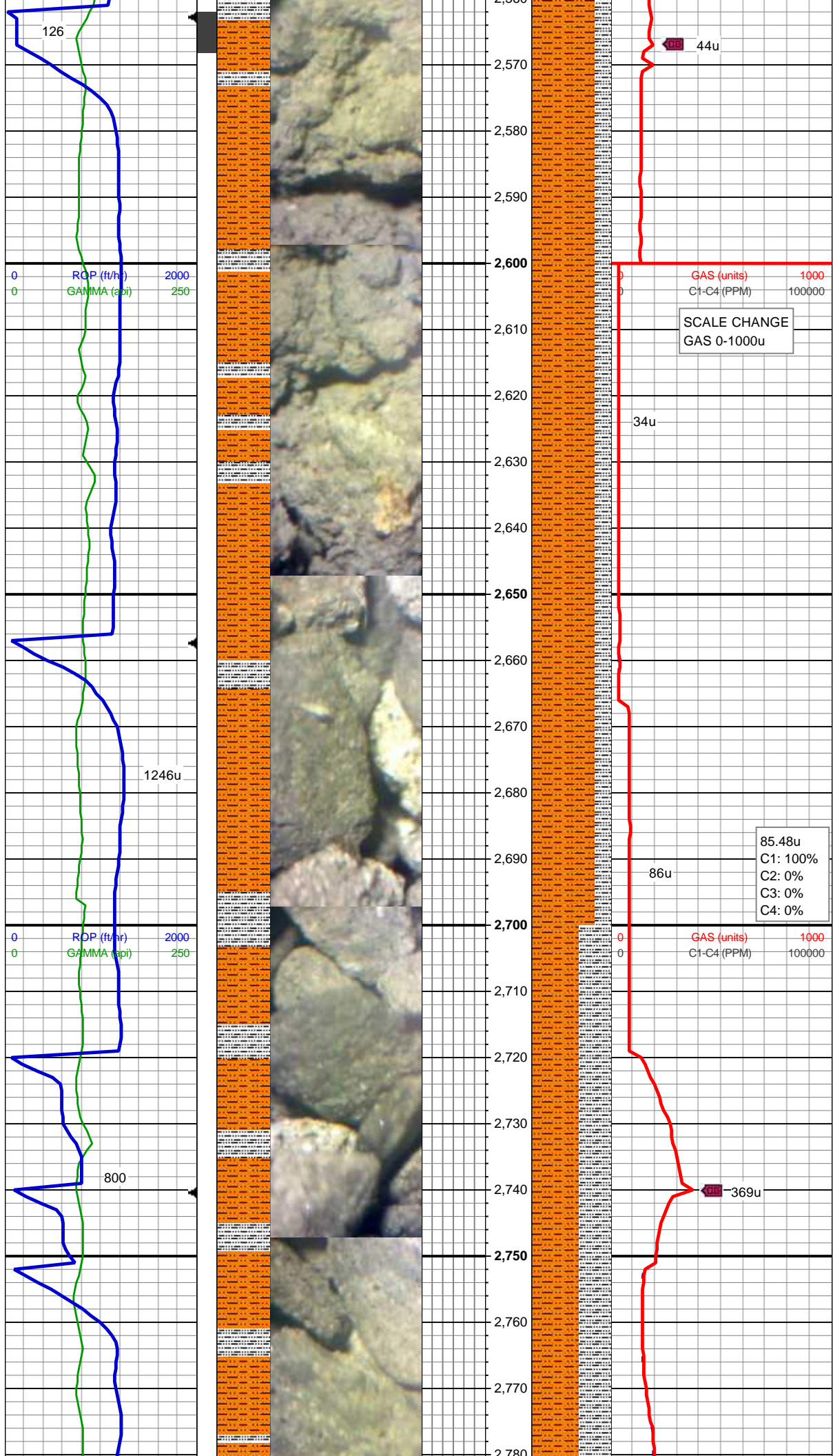
MD: 2,407'
TVD: 2,387.21'
Inclination: 11.87°
Azimuth: 186.82°
VS: 85.96'

SHY SLTST: lt gy-gy - gy brn,sl frm - sft,
sb blkly-sb plty, f-v f gr, gt, v arg, sl rthy,
ply srt
SLTY SH: med gy, sb blkly-sb plty, v sft- sl
frm, slt tex, sl rthy lstr, sl aren, non calc

MD: 2,500'
TVD: 2,478.16'
Inclination: 12.22°
Azimuth: 191.83°
VS: 93.49'

By-Passing Shakers Due To
Excessive Flock In Mud System

SHY SLTST: lt gy-gy - gy brn,sl frm - sft,
sb blkly-sb plty, f-v f gr, gt, v arg, sl rthy,
ply srt
SLTY SH: med gy, sb blkly-sb plty, v sft- sl
frm, slt tex, sl rthy lstr, sl aren, non calc



MD: 2,594'
TVD: 2,569.89'
Inclination: 13.01°
Azimuth: 190.07°
VS: 101.97'

MUD WT 8.3 VIS 26

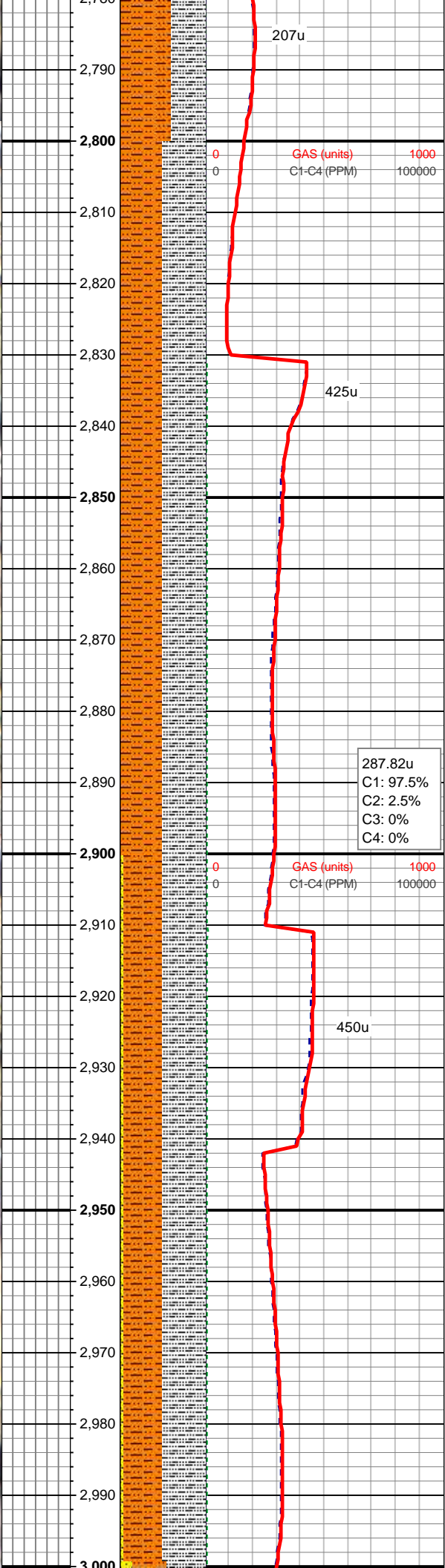
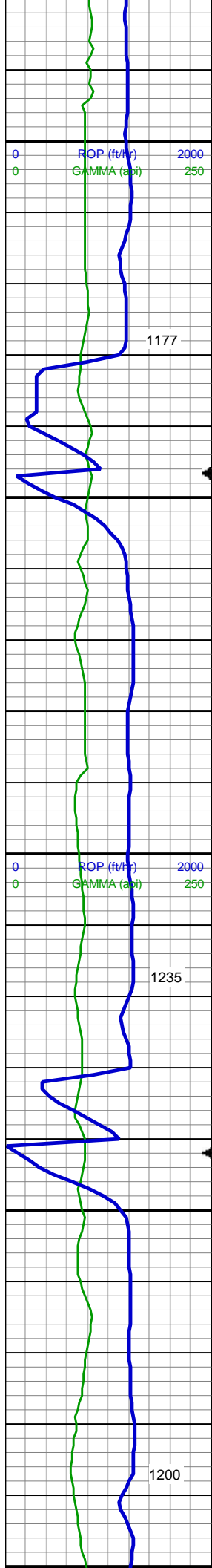
By-Passing Shakers Due To
Excessive Flock In Mud System

SHY SLTST: lt gy-gy - gy brn,sl frm - sft,
sb blk-y-sb plty, f-v f gr, gt, v arg, sl rthy,
ply srt
SLTY SH: med gy, sb blk-y-sb plty, v sft-sl
frm, slt tex, sl rthy lstr, sl aren, non calc

MD: 2,689'
TVD: 2,662.44'
Inclination: 13.1°
Azimuth: 190.69°
VS: 110.65'

SHY SLTST: lt gy-gy - gy brn,sl frm - sft,
sb blk-y-sb plty, f-v f gr, gt, v arg, sl rthy,
ply srt
SLTY SH: med -dk gy, sb blk-y-sb plty, v
sft-sl frm, slt tex, sl rthy lstr, sl aren, non
calc

MD: 2,784'



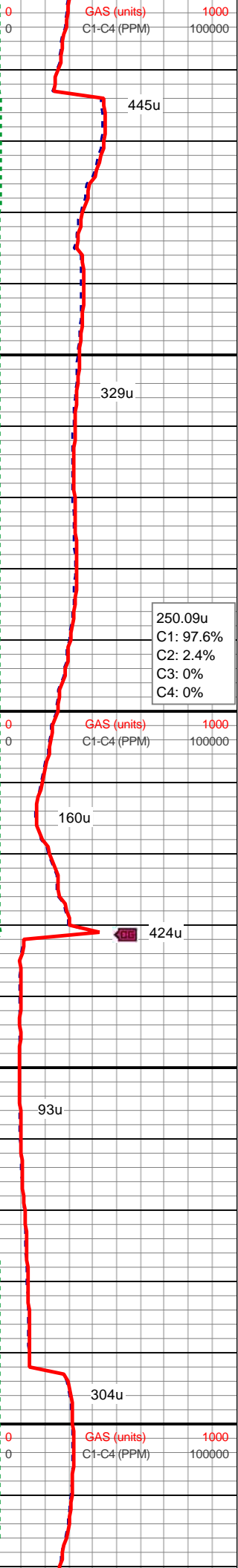
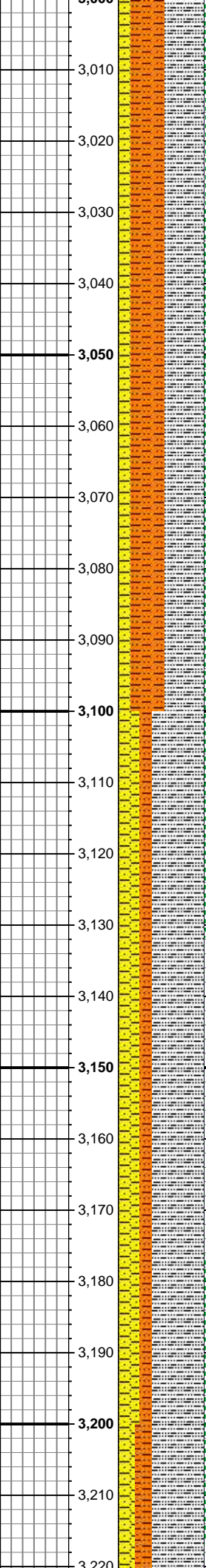
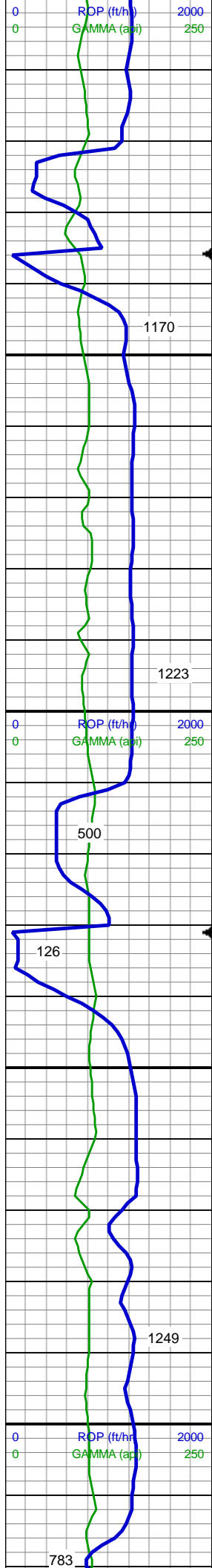
TVD: 2,754.98'
Inclination: 13.01°
Azimuth: 190.69°
VS: 119.44'

SHY SLTST: lt gy-gy - gy brn,sl frm - sft, sb blkly-sb plty, f-v f gr, gt, v arg, sl rthy, ply srt
SLTY SH: med -dk gy, sb blkly-sb plty, v sft-sl frm, slt tex, sl rthy lstr, sl aren, non calc

MD: 2,879'
TVD: 2,847.53'
Inclination: 13.1°
Azimuth: 190.33°
VS: 128.16'

SHY SLTST: lt gy-gy - gy brn,sl frm - sft, sb blkly-sb plty, f-v f gr, gt, v arg, sl rthy, ply srt
SLTY SH: med -dk gy, sb blkly-sb plty, v sft-sl frm, slt tex, sl rthy lstr, sl aren, non calc
SHY SS: ltgy - occ off wh, sft - brit occ frm, sb rnd, f-v f gr, mod srt, rr glauc

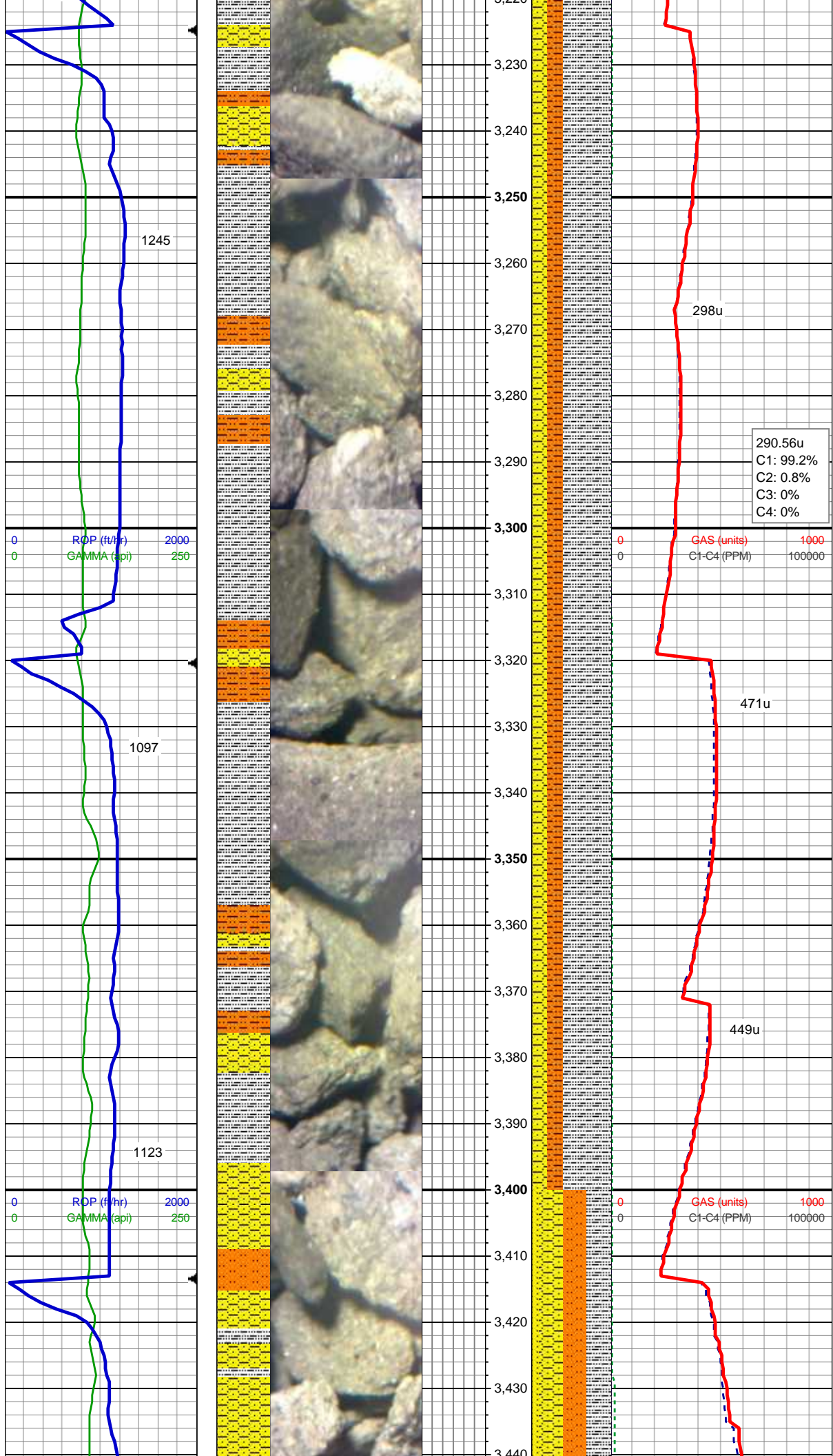
MD: 2,973'
TVD: 2,939.02'
Inclination: 13.45°
Azimuth: 190.16°
VS: 136.85'



MD: 3,068'
TVD: 3,031.38'
Inclination: 13.63°
Azimuth: 189.98°
VS: 145.73'

SLTY SH: med -dk gy, sb blkly-sb plty, v sft-sl frm, slt tex, sl rthy lstr, sl aren, non calc
SHY SLTST: lt gy-gy - gy brn,sl frm - sft, sb blkly-sb plty, f-v f gr, gt, v arg, sl rthy, ply srt
SHY SS: ltgy - occ off wh, sft - brit occ frm, sb rnd, f-v f gr, mod srt, occ bdg

MD: 3,162'
TVD: 3,122.94'
Inclination: 12.49°
Azimuth: 189.98°
VS: 154.19'



SLTY SH: med -dk gy, sb blkly-sb plty, v
sft- sl frm, slt tex, sl rthy lstr, sl aren, non
calc
SHY SLTST: lt gy-gy - gy brn,sl frm - sft,
sb blkly-sb plty, f-v f gr, gt, v arg, sl rthy,
ply srt
SHY SS: ltgy - occ off wh, sft - brit occ
frm, sb rnd, f-v f gr, mod srt, occ bdg

MD: 3,256'
TVD: 3,214.72'
Inclination: 12.49°
Azimuth: 189.46°
VS: 162.2'

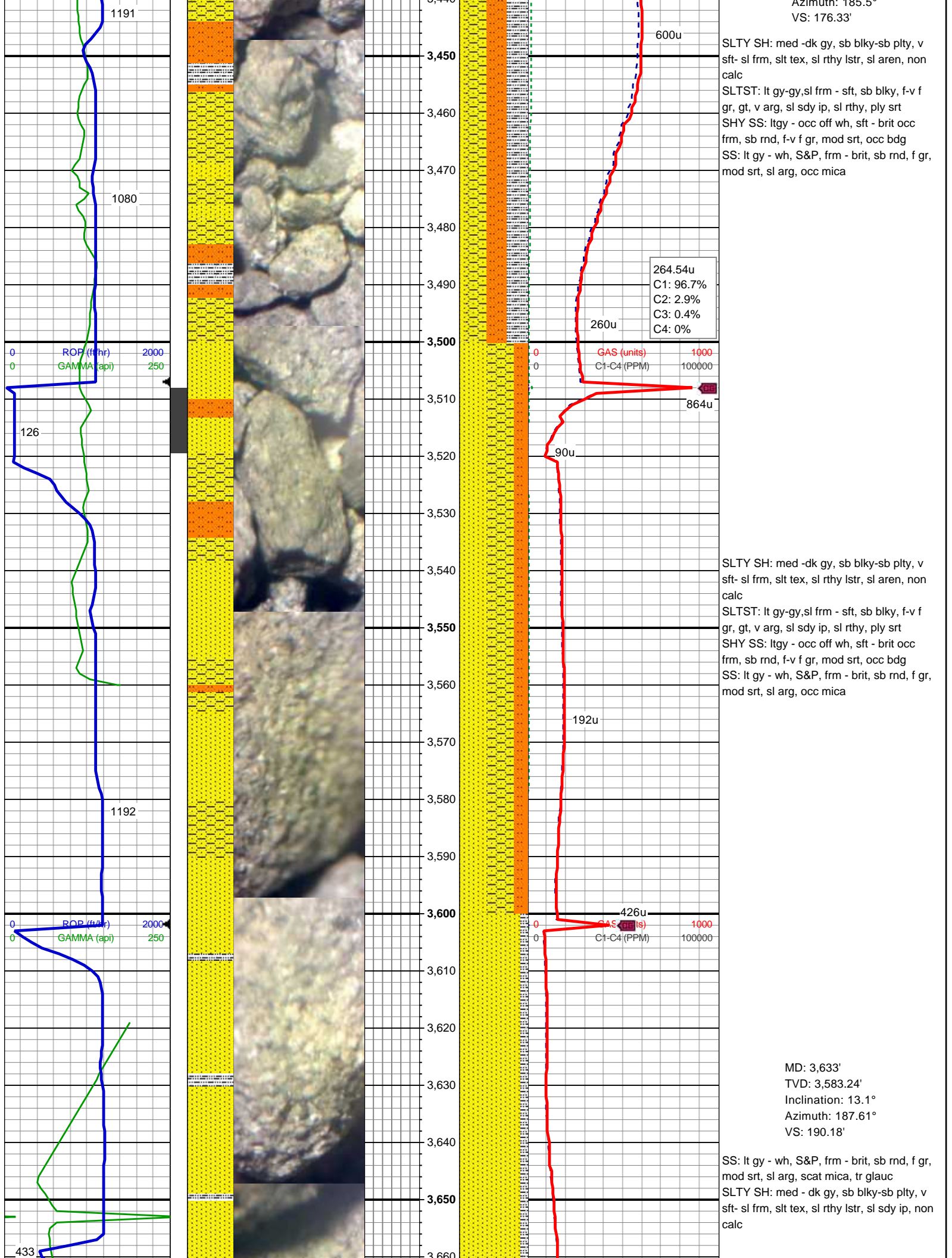
290.56u
C1: 99.2%
C2: 0.8%
C3: 0%
C4: 0%

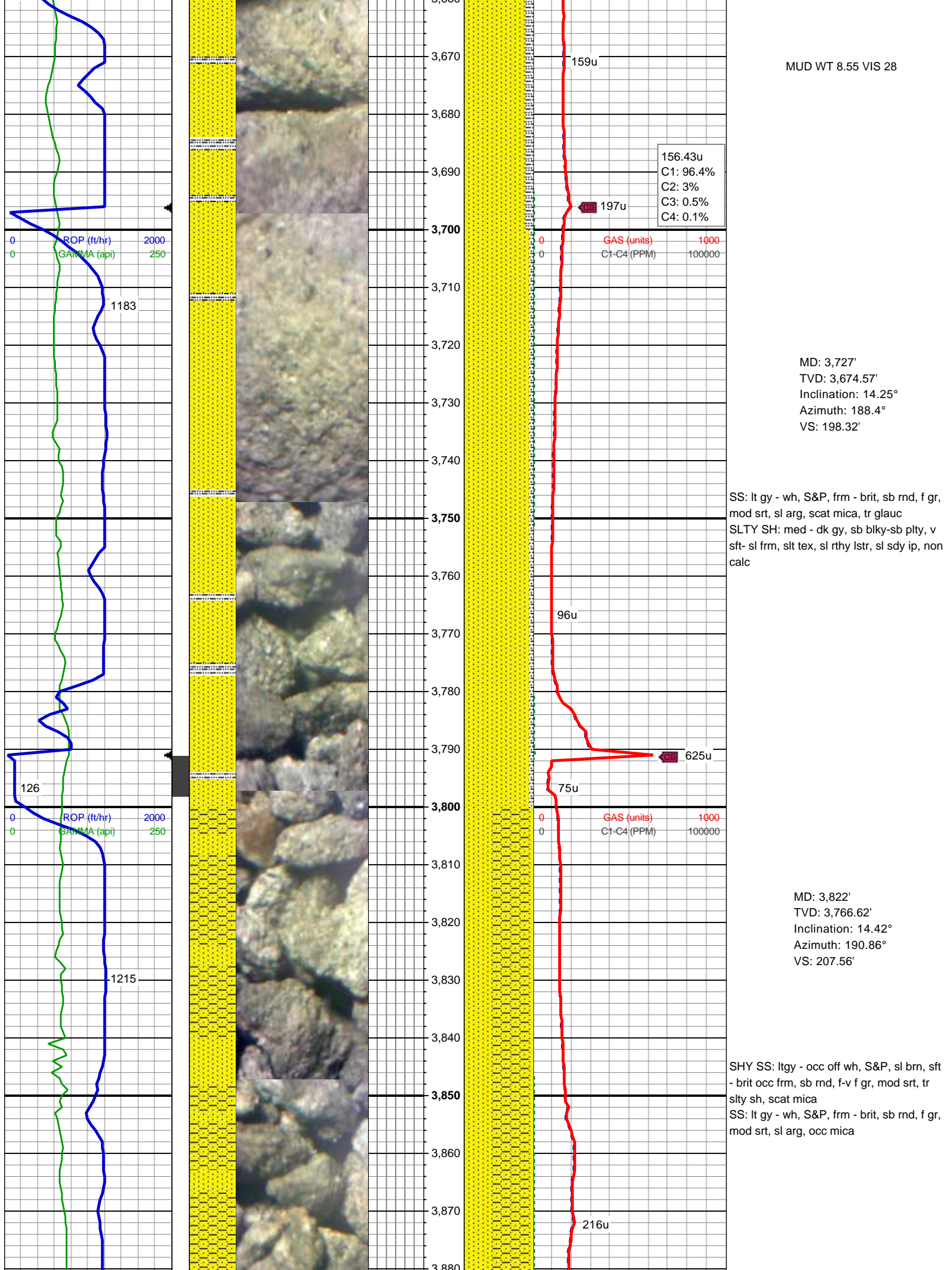
GAS (units) 1000
C1-C4 (PPM) 100000

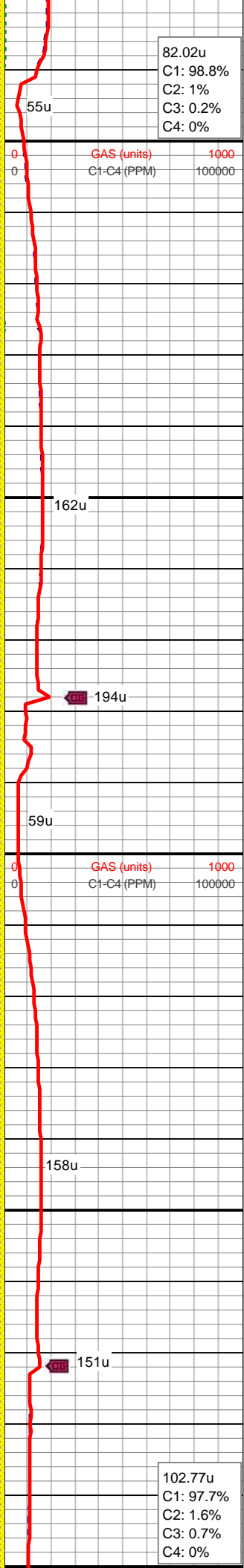
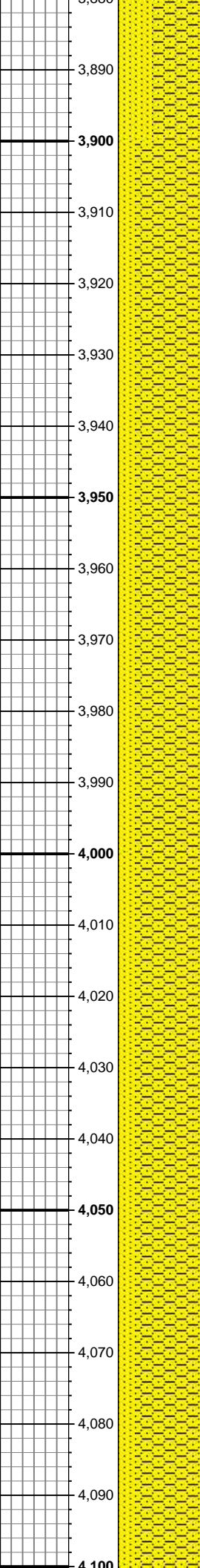
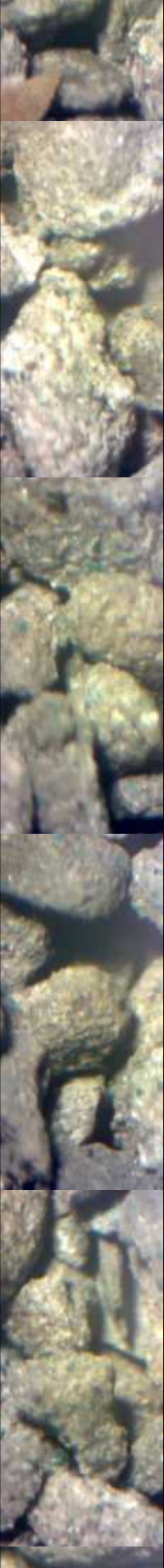
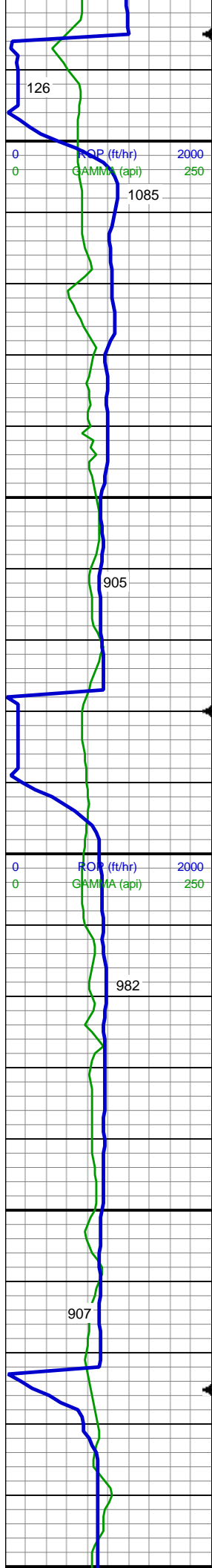
MD: 3,350'
TVD: 3,306.57'
Inclination: 12.05°
Azimuth: 187.79°
VS: 169.72'

SLTY SH: med -dk gy, sb blkly-sb plty, v
sft- sl frm, slt tex, sl rthy lstr, sl aren, non
calc
SHY SLTST: lt gy-gy - gy brn,sl frm - sft,
sb blkly-sb plty, f-v f gr, gt, v arg, sl rthy,
ply srt
SHY SS: ltgy - occ off wh, sft - brit occ
frm, sb rnd, f-v f gr, mod srt, occ bdg

MD: 3,444'
TVD: 3,398.59'
Inclination: 11.52°
Azimuth: 185.58°
VS: 162.2'







82.02u
C1: 98.8%
C2: 1%
C3: 0.2%
C4: 0%

GAS (units) 1000
C1-C4 (PPM) 100000

MD: 3,916'
TVD: 3,857.78'
Inclination: 13.81°
Azimuth: 190.69°
VS: 216.97'

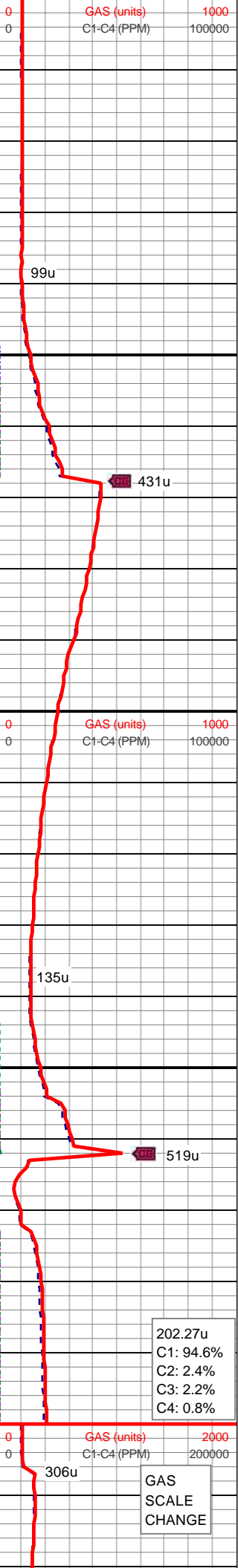
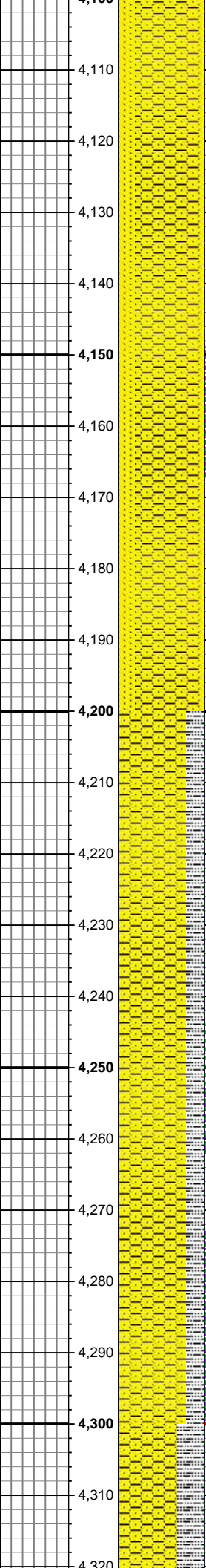
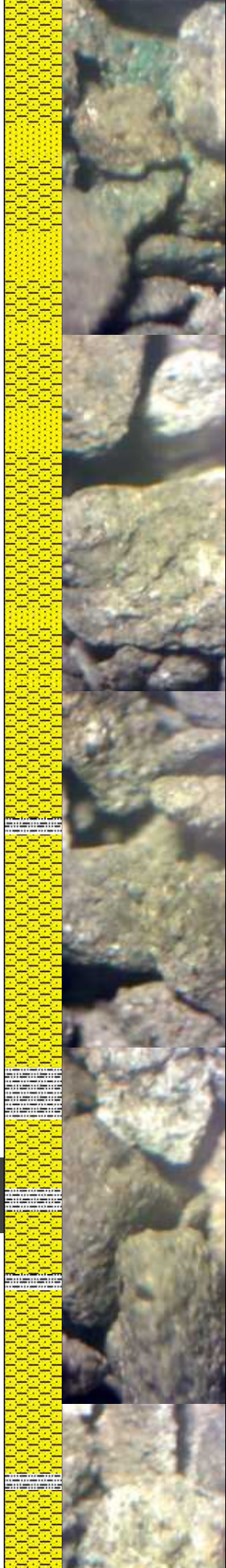
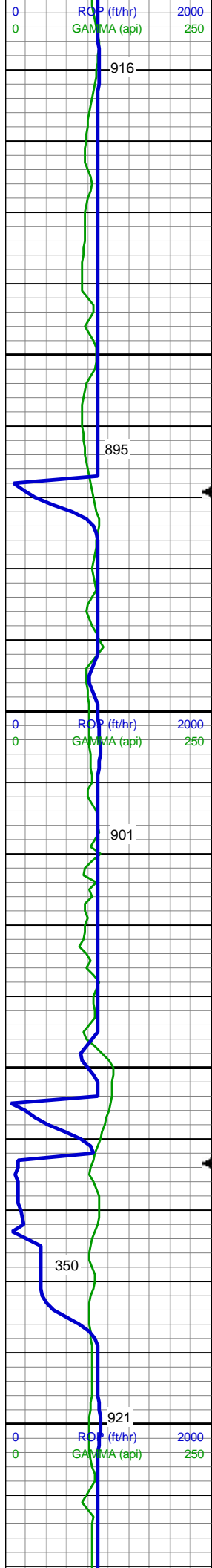
SHY SS: ltgy - occ off wh, sft - brit occ
frm, sb rnd, f-v f gr, mod srt, occ bdg
SS: lt gy - wh, S&P, frm - brit, sb rnd, f gr,
mod srt, sl arg, occ mica

MD: 4,011'
TVD: 3,950.27'
Inclination: 12.57°
Azimuth: 186.47°
VS: 225.14'

SHY SS: ltgy - occ off wh, sft - brit occ
frm, sb rnd, f-v f gr, mod srt, occ bdg
SS: lt gy - wh, S&P, frm - brit, sb rnd, f gr,
mod srt, sl arg, occ mica

102.77u
C1: 97.7%
C2: 1.6%
C3: 0.7%
C4: 0%

MD: 4,105'



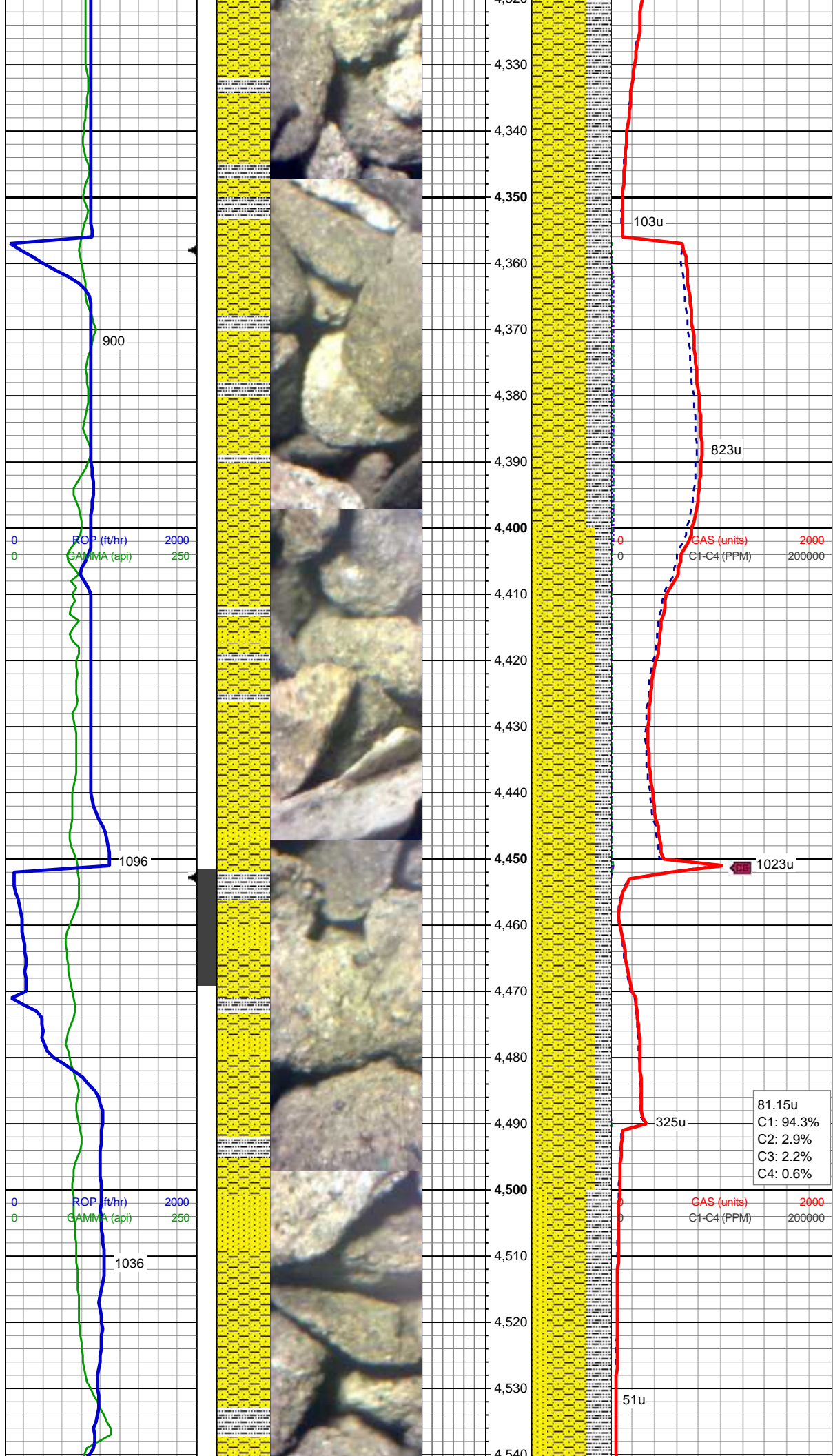
TVD: 4,042.03'
Inclination: 12.49°
Azimuth: 186.82°
VS: 232.16'

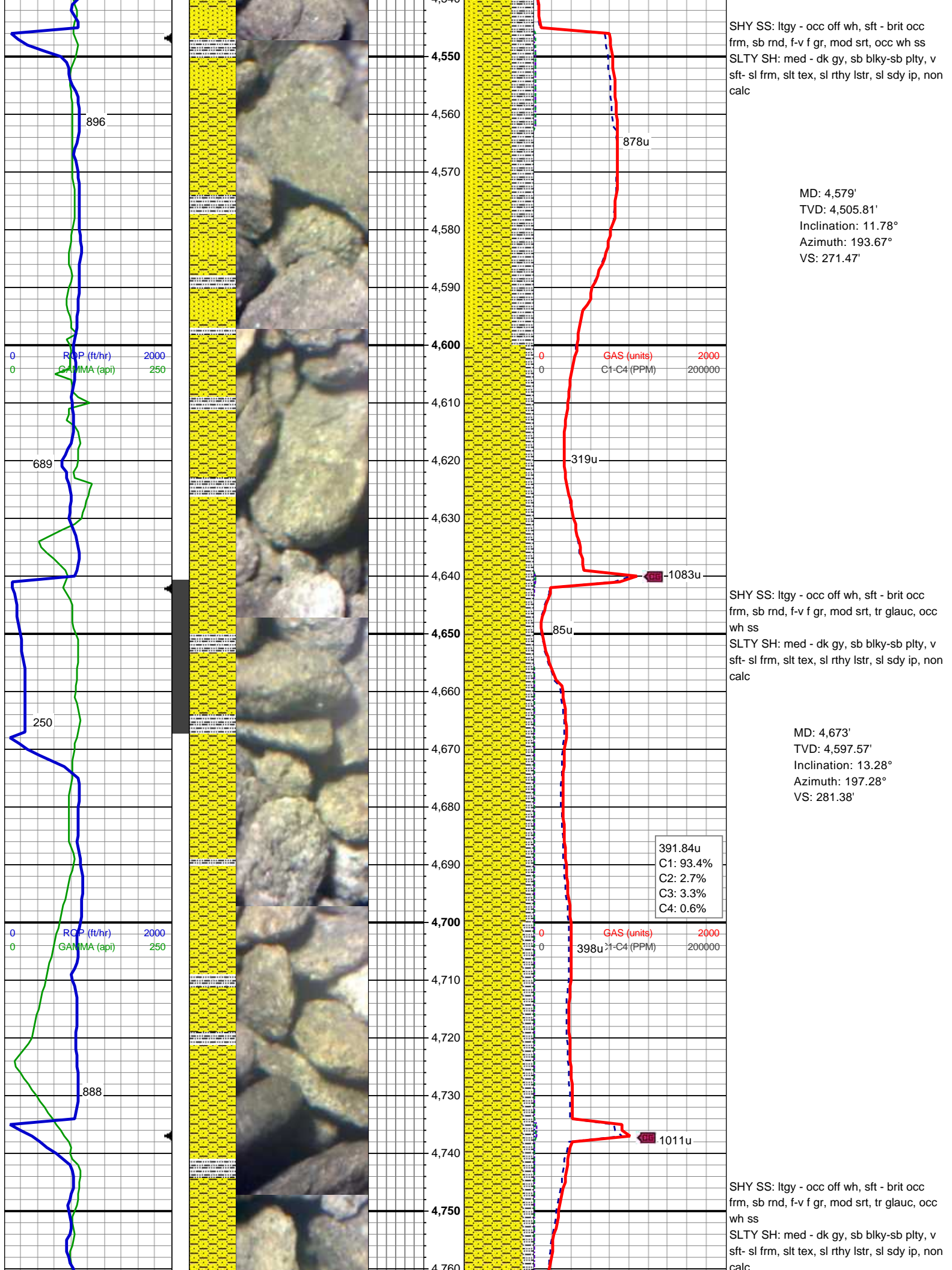
MD: 4,200'
TVD: 4,134.9'
Inclination: 11.87°
Azimuth: 187.87°
VS: 239.28'

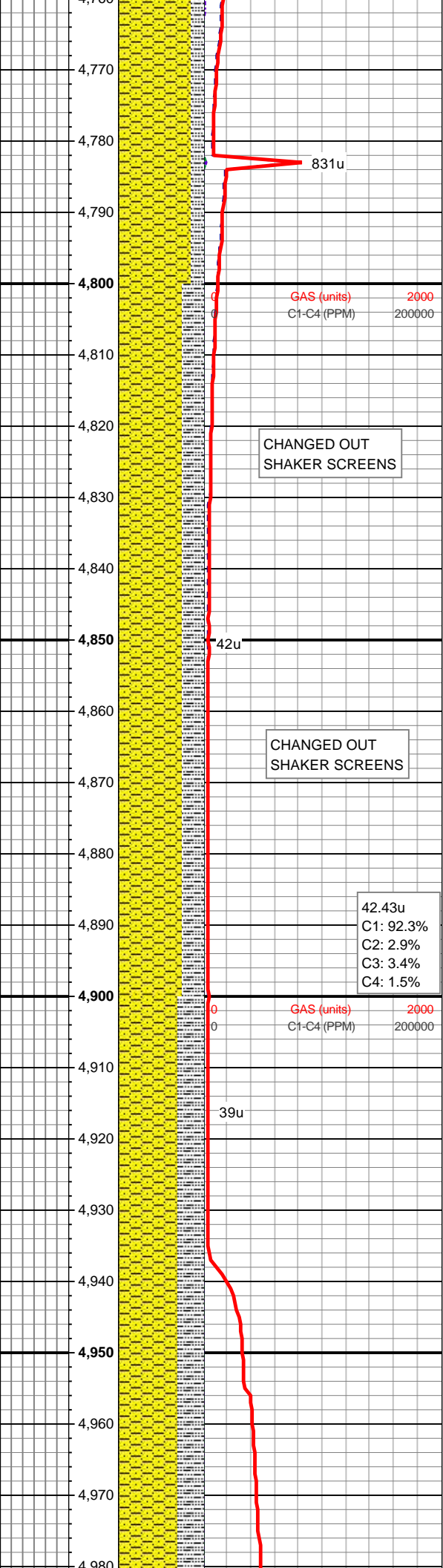
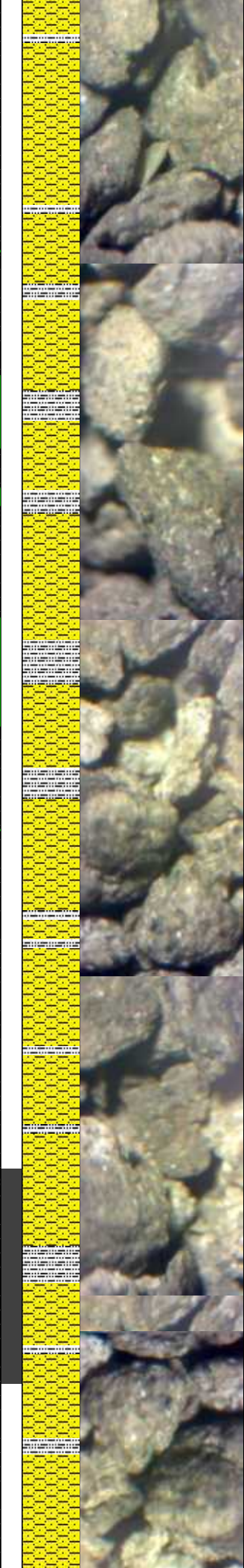
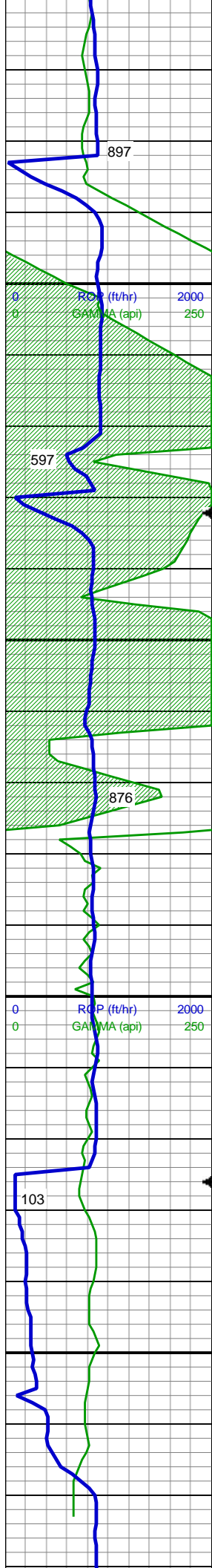
SHY SS: ltgy - occ off wh, sft - brit occ
frm, sb rnd, f-v f gr, mod srt, occ bdg
SS: lt gy - wh, S&P, frm - brit, sb rnd, f gr,
mod srt, sl arg, occ mica

SHY SS: ltgy - occ off wh, sft - brit occ
frm, sb rnd, f-v f gr, mod srt, occ wh ss
SLTY SH: med - dk gy, sb blkgy-sb plty, v
sft-sl frm, slt tex, sl rthy lstr, sl sdy ip, non
calc

MD: 4,295'
TVD: 4,227.86'
Inclination: 11.87°
Azimuth: 189.02°
VS: 246.58'







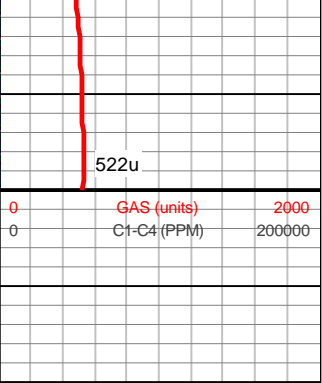
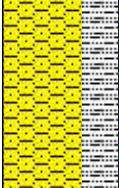
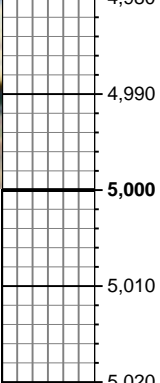
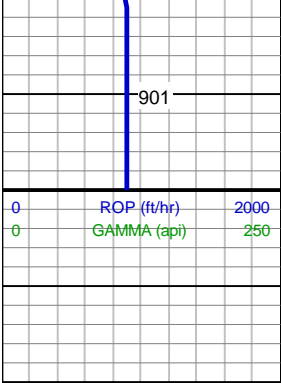
MUD WT 8.5 VIS 27

SHY SS: ltgy - occ off wh, sft - brit occ
frm, sb rnd, f-v f gr, mod srt, tr glauc, occ
wh ss
SLTY SH: med - dk gy, sb blkgy-sb plty, v
sft-sl frm, slt tex, sl rthy lstr, sl sdy ip, non
calc

MD: 4,863'
TVD: 4,782.91'
Inclination: 12.13°
Azimuth: 197.37°
VS: 302.77'

SHY SS: ltgy - occ off wh, sft - brit occ
frm, sb rnd, f-v f gr, mod srt, tr glauc, occ
wh ss
SLTY SH: med - dk gy, sb blkgy-sb plty, v
sft-sl frm, slt tex, sl rthy lstr, sl sdy ip, non
calc

MD: 4,957'
TVD: 4,874.48'
Inclination: 13.98°
Azimuth: 196.31°
VS: 313.48'



MUDLOG CONTUINES ON "Wells
Ranch AE19-615 HORZ.mplot"