

COLUMBINE LOGGING

Scale: 5" / 100'
Measured Depth Log

Well Name Wells Ranch AE19-631

Location NWSW 20 6N 62W 6 PM

State COLORADO

County WELD

Country UNITED STATES

Rig Number H&P 330

API Number 05-123-39636

Field WATTENBERG

Region DJ BASIN

Drilling Completed 12/26/2014

Spud Date 12/14/2014

Surface Coordinates 1610 FSL 65 FWL
Lat/Long: 40.46938/-104.35587

Bottom Hole Coordinates Proposed Sec: 24 Twp: 6N 63W

Footages: 1370 FFSLL 235 FFELL

Ground Elevation 4,786'

K.B. Elevation 4,816'

Logged Interval 2,000' To 12,066'

Total Depth 12,066'

Formation Niobrara

Type of Drilling Fluid WATER BASED MUD

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

MN DEPTH MN DEPTH (RIGHT)

NORMAL FAULT

OVERTURNED STRATA

REVERSE FAULT

CASING

SIDEWALL CORE (LEFT)

SIDEWALL CORE (RIGHT)

SLIDE

SURVEY

DST 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

- ALGAE
- AMPHIPORA
- BELEMNITE

GASTROPOD

INOCERAMUS

OOLITE

OSTRACOD

PELECYPOD

ARGILLITE GRAIN

B BENTONITE

BITUMENOUS SUBSTANCE

BRECCIA FRAGMENTS

CALCAREOUS

HEAVY MINERAL

K KAOLIN

MARCASITE

MARLSTONE

MICACEOUS

Stringer

- ANHYDRITE STRINGER
- BENTONITE STRINGER
- COAL STRINGER

BIOCLASTIC
 BRACHIOPOD
 BRYOZOA
 CEPHALOPOD
 CORAL
 CRINOID
 ECHINOID
 FISH
 FORAMINIFERA
 FOSSIL

PELLET
 PISOLITE
 PLANT REMAINS
 PLANT SPORES
 SCAPHOPOD
 STROMATOPOROID

Minerals

ANHYDRITIC
 ARGILLACEOUS

CARBONACEOUS FLAKES
 CHTDK
 CHTLT
 COAL - THIN BEDS
 DOLOMITIC
 FELDSPAR
 FERRUGINOUS PELLET
 FERRUGINOUS
 GLAUCONITE
 GYPSIFEROUS

MINERAL CRYSTALS
 NODULES
 PHOSPHATE PELLETS
 PYRITE
 SALT CAST
 SANDY
 SIDERITE
 SILICEOUS
 SILTY
 TUFACEOUS

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
 DOLOMITIC LIMESTONE
 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 Teresa Malesardi

Company Noble Energy Inc

Address 1625 Broadway Suite 2200
Denver, CO 80202

tmalesardi@nobleenergyinc.com

Zone Color Coding

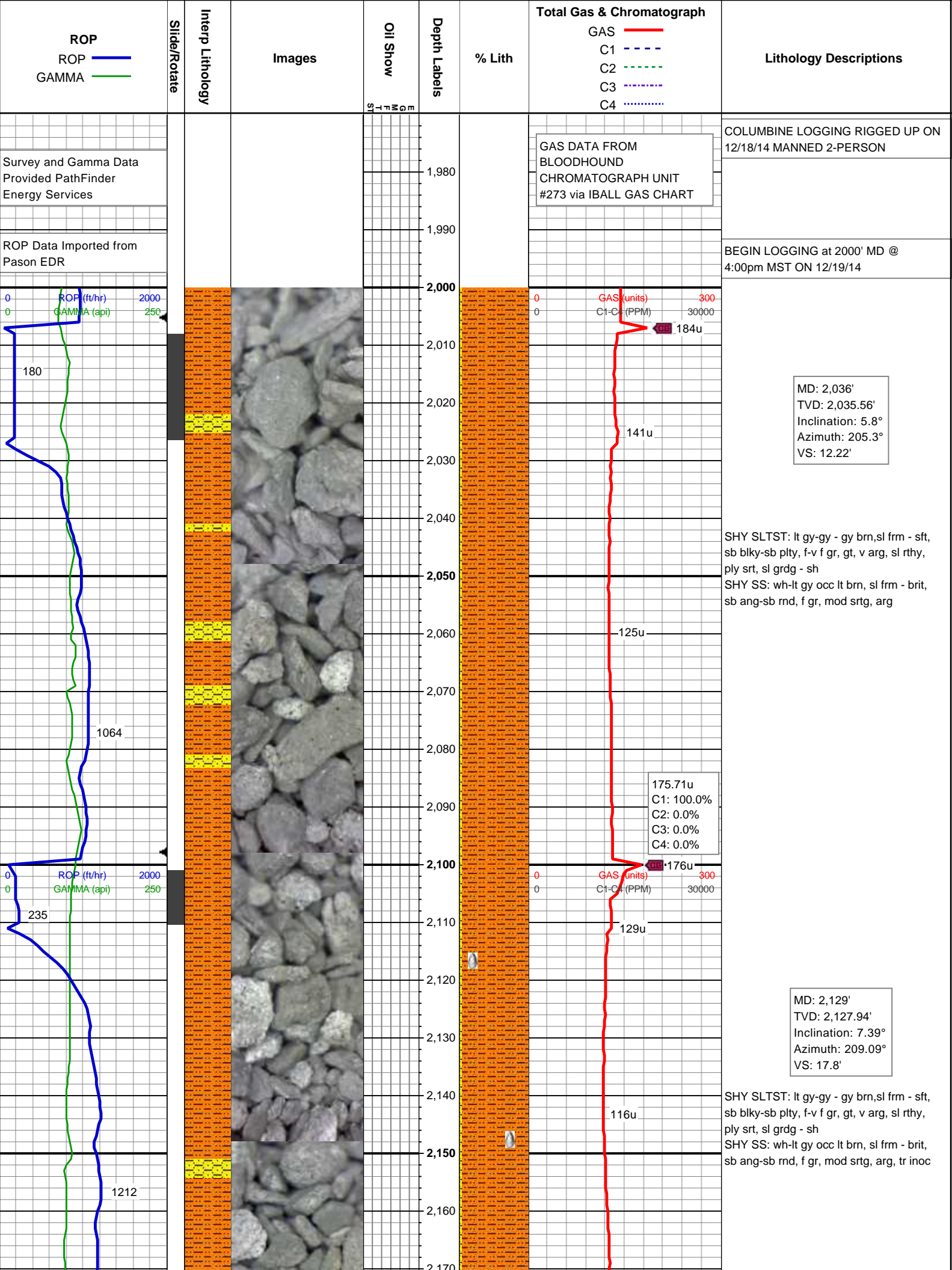
Oil
 Condensate
 Gas
 Note
 Core
 Pressure
 Error
 Water
 Seal

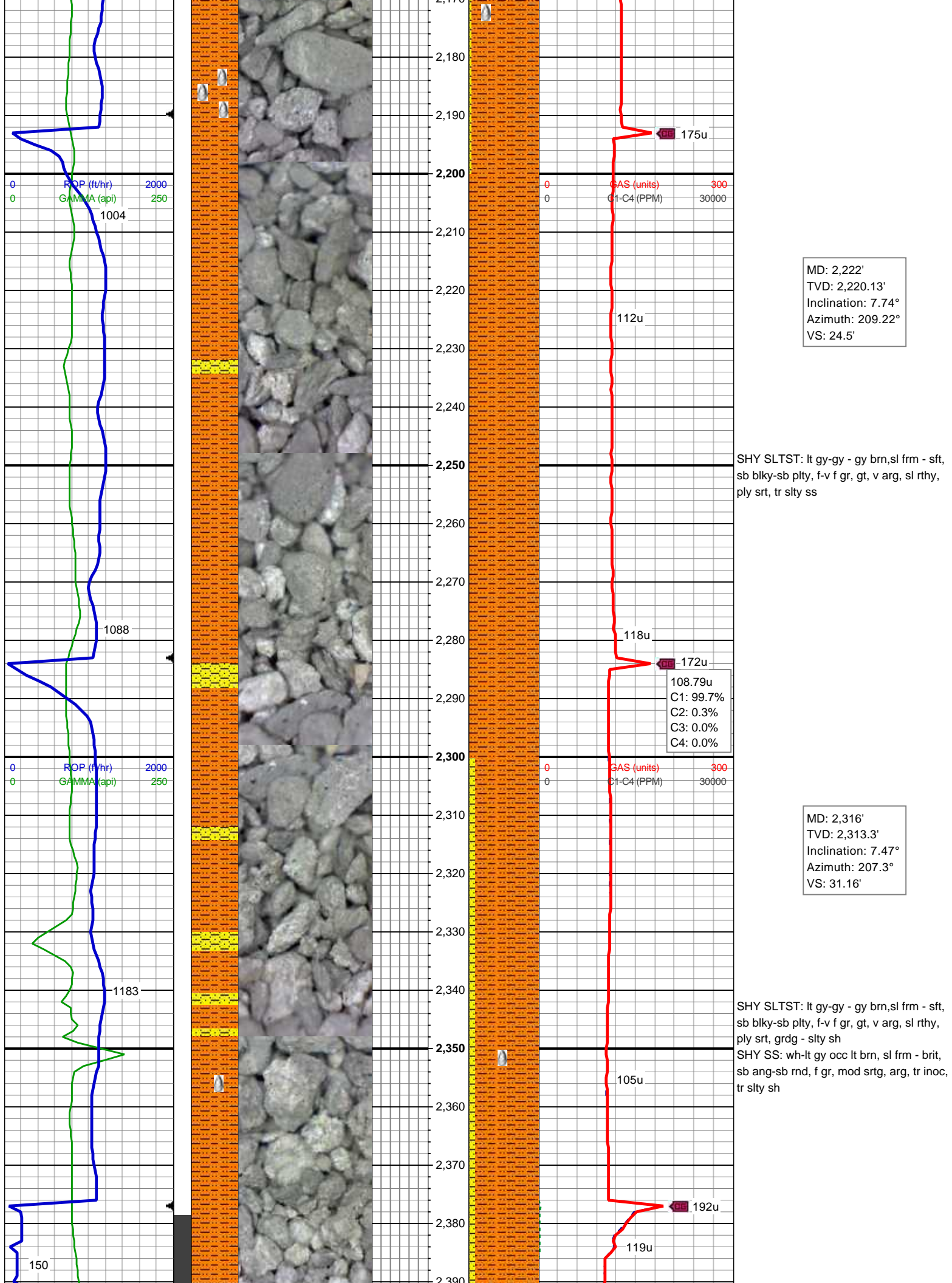
Other

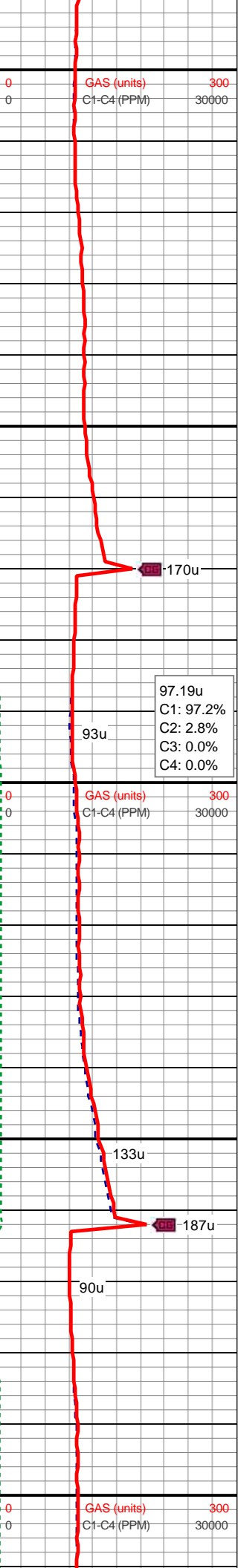
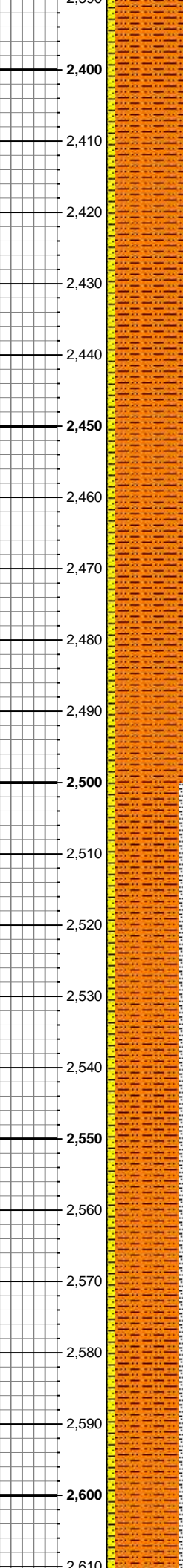
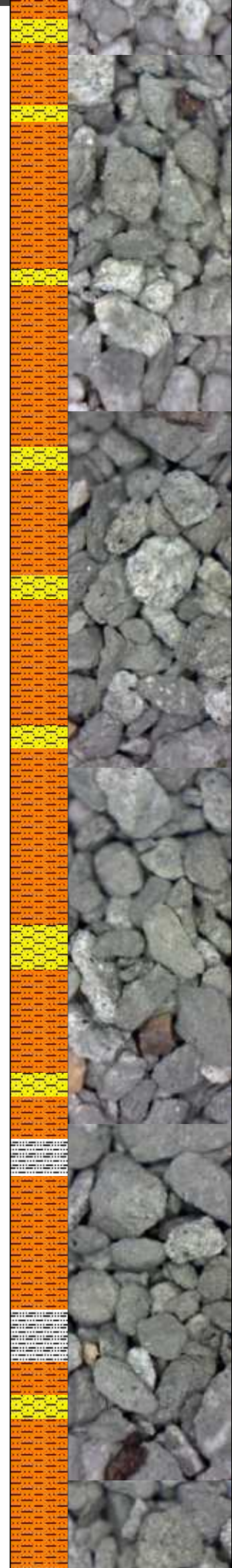
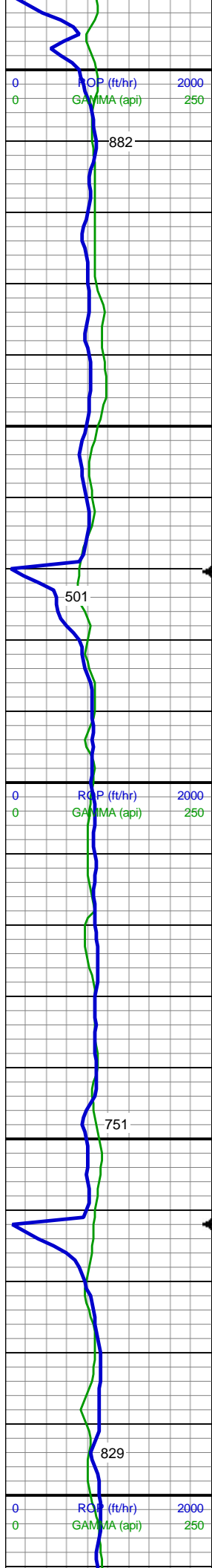
Well Site Logging Company Columbine Logging Inc.

Well Site Geologist (Days) Brad Wilson

Well Site Geologist (Nights) Brandan Pfeiffer







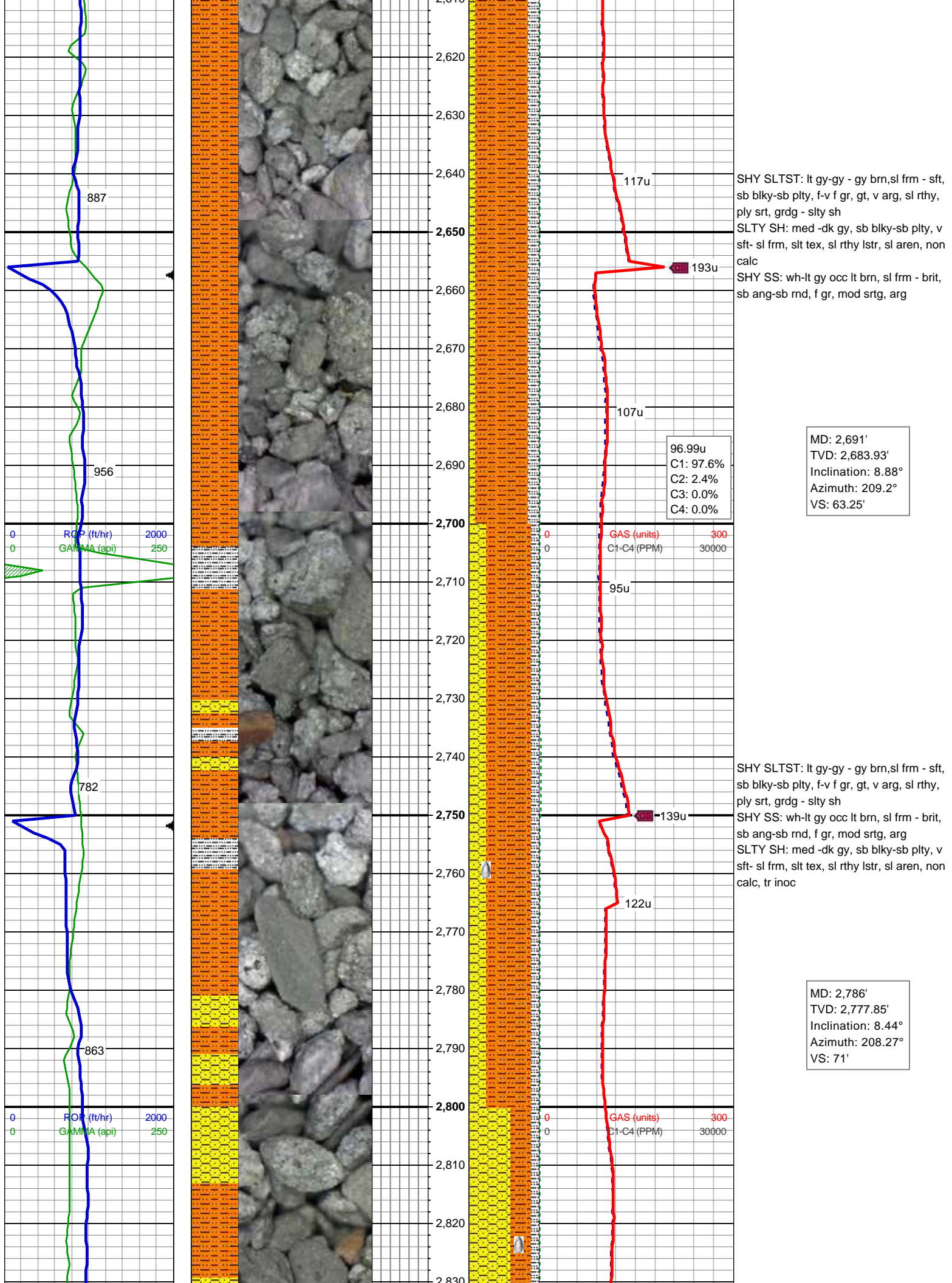
MD: 2,409'
TVD: 2,405.35'
Inclination: 8.97°
Azimuth: 212.2°
VS: 38.59'

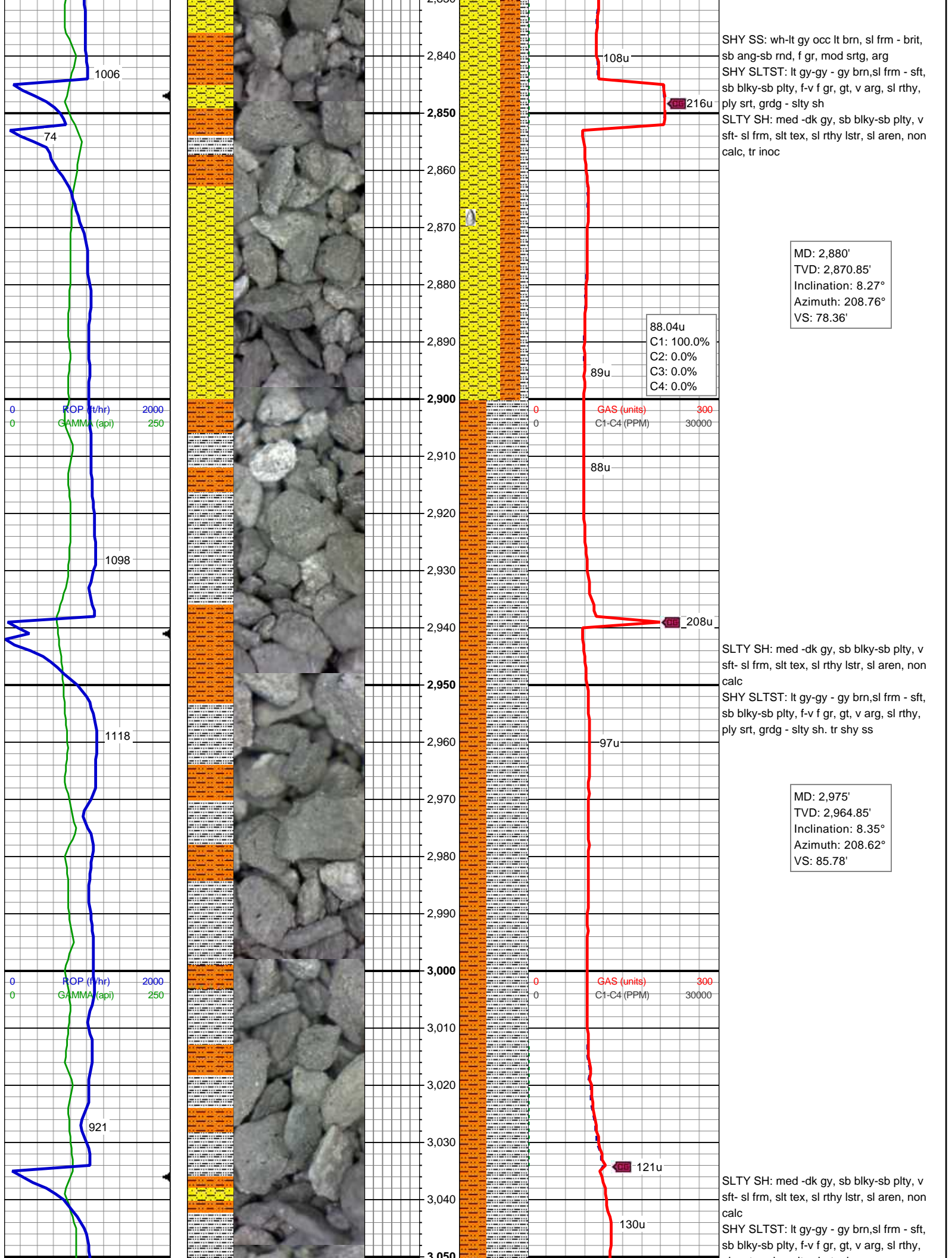
SHY SLTST: lt gy-gy - gy brn,sl frm - sft,
sb blkly-sb plty, f-v f gr, gt, v arg, sl rthy,
ply srt, grdg - slty sh
SHY SS: wh-lt gy occ lt brn, sl frm - brit,
sb ang-sb rnd, f gr, mod srtg, arg, tr slty sh

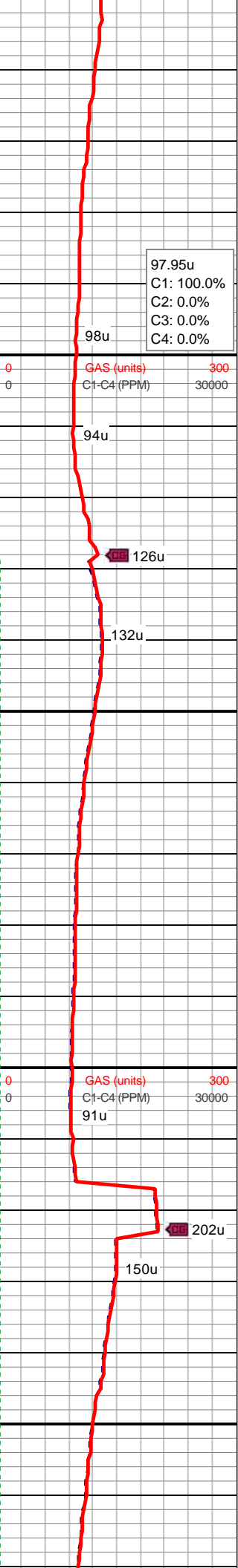
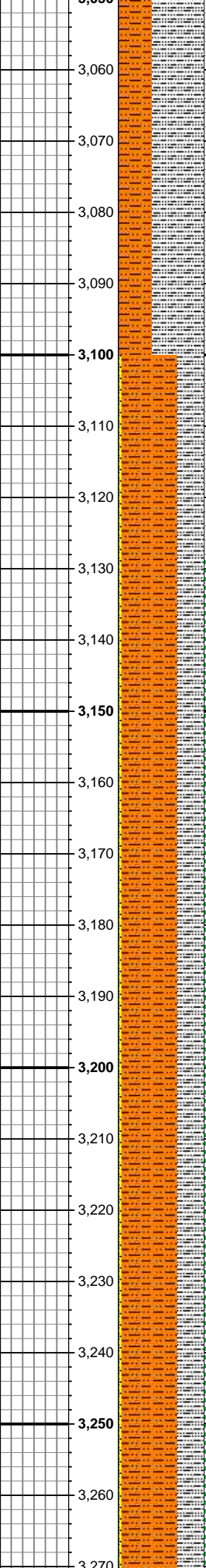
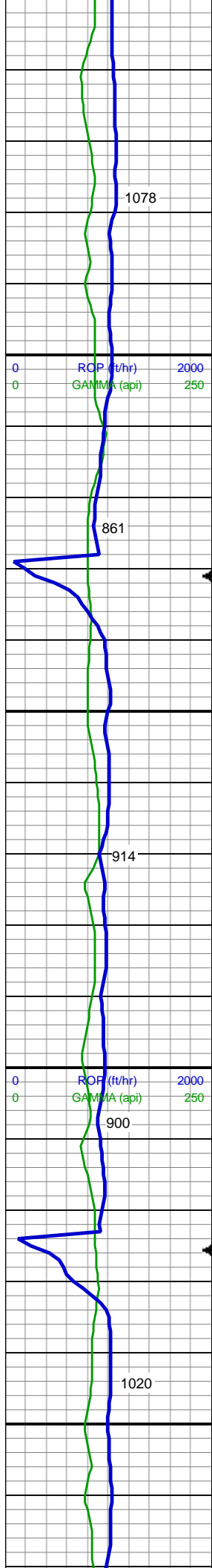
MD: 2,501'
TVD: 2,496.25'
Inclination: 8.79°
Azimuth: 210.06°
VS: 46.78'

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, grdg - slty sh
SLTY SH: med -dk gy, sb blkly-sb plty, v
sft- sl frm, slt tex, sl rthy lstr, sl aren, non
calc
SHY SS: wh-lt gy occ lt brn, sl frm - brit,
sb ang-sb rnd, f gr, mod srtg, arg

MD: 2,596'
TVD: 2,590.09'
Inclination: 9.06°
Azimuth: 210.02°
VS: 55.04'







ply srt, grdg - slty sh. tr shy ss

MD: 3,070'
TVD: 3,058.84'
Inclination: 8.44°
Azimuth: 208.61°
VS: 93.27'

97.95u
C1: 100.0%
C2: 0.0%
C3: 0.0%
C4: 0.0%

98u
GAS (units) 300
C1-C4 (PPM) 30000

94u

126u

132u

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, grdg - slty sh
SHY SS: wh-lt gy occ lt brn, sl frm - brit, sb ang-sb rnd, f gr, mod srtg, arg

MD: 3,164'
TVD: 3,151.85'
Inclination: 8.18°
Azimuth: 206.08°
VS: 100.35'

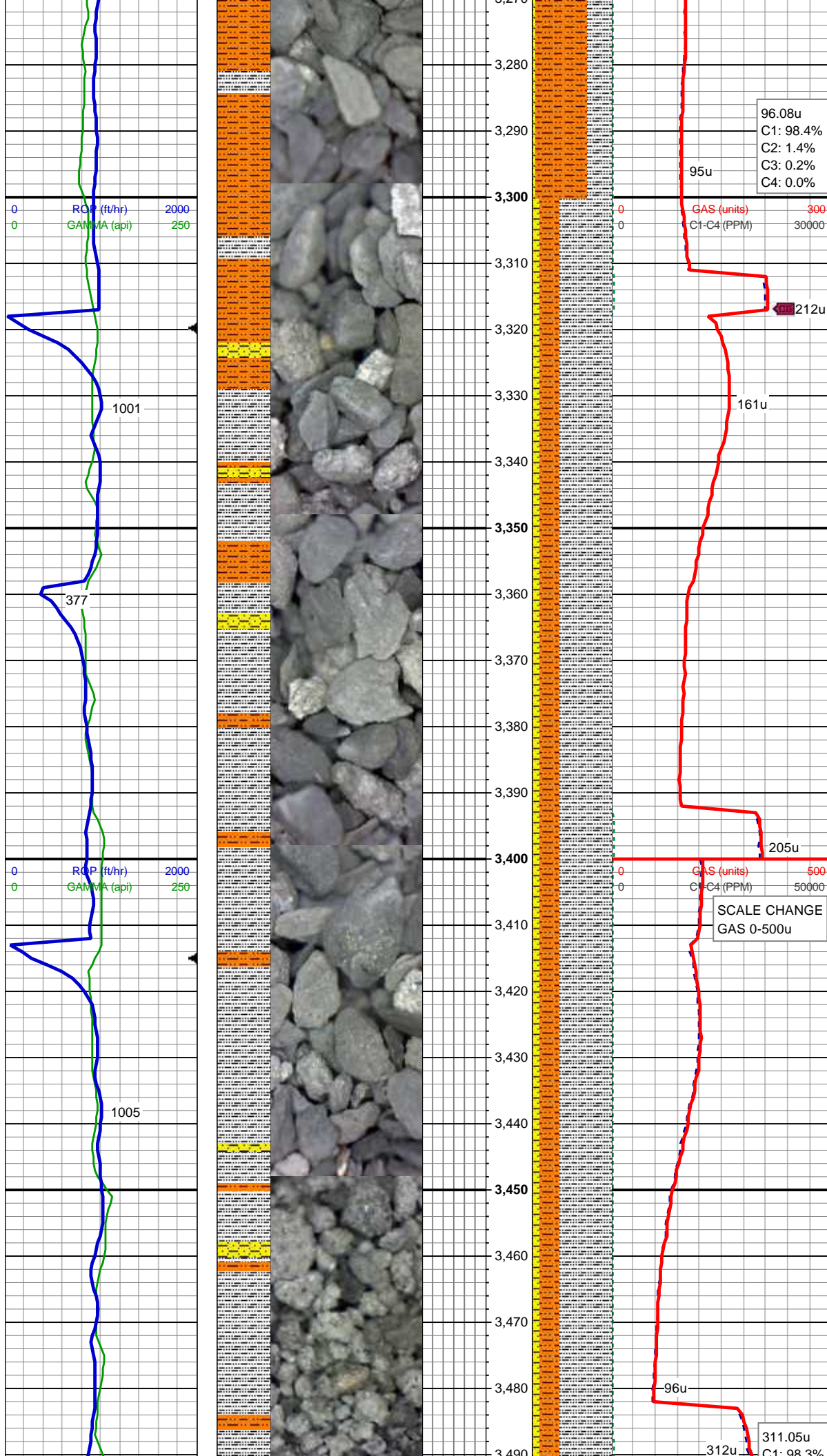
91u
GAS (units) 300
C1-C4 (PPM) 30000

202u

150u

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, grdg - slty sh
SLTY SH: med -dk gy, sb blkly-sb plty, v sft- sl frm, slt tex, sl rthy lstr, sl aren, non calc
SHY SS: wh-lt gy occ lt brn, sl frm - brit, sb ang-sb rnd, f gr, mod srtg, arg

MD: 3,259'
TVD: 3,245.92'
Inclination: 7.83°
Azimuth: 204.17°
VS: 106.81'



96.08u
C1: 98.4%
C2: 1.4%
C3: 0.2%
C4: 0.0%

GAS (units) 300
C1-C4 (PPM) 30000

212u

161u

205u

SCALE CHANGE
GAS 0-500u

96u

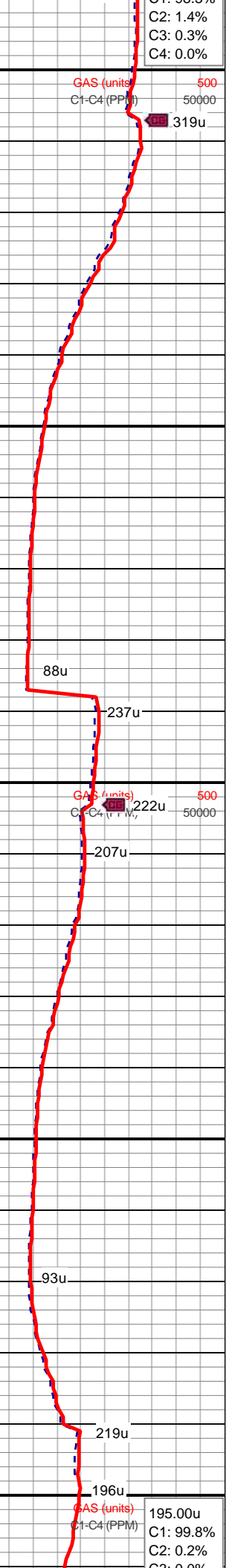
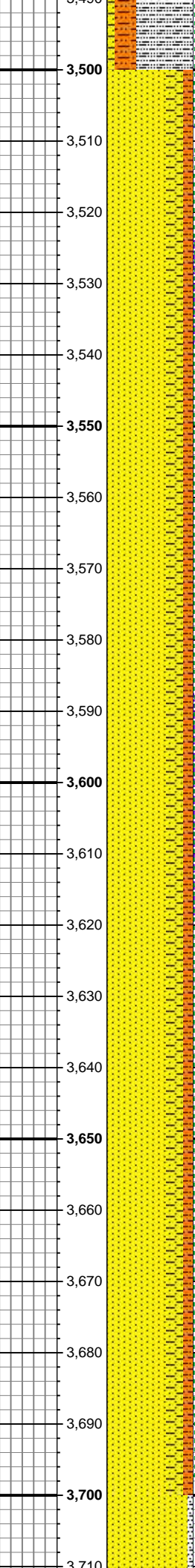
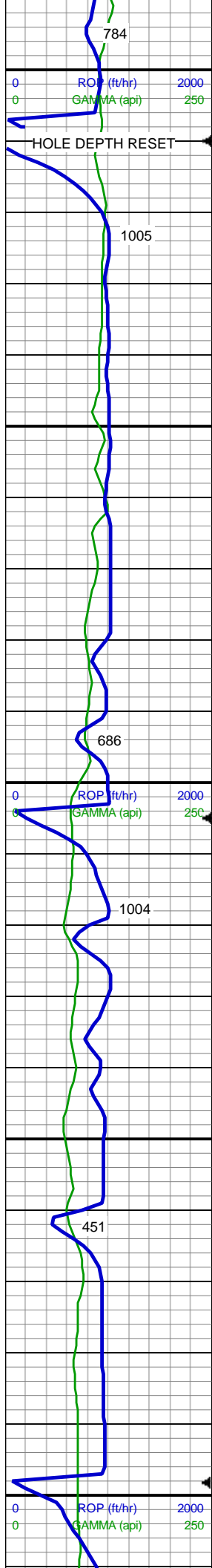
311.05u
C1: 98.3%

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, grdg - slty sh
SHY SS: wh-lt gy occ lt brn, sl frm - brit,
sb ang-sb rnd, f gr, mod srtg, arg

MD: 3,354'
TVD: 3,340.15'
Inclination: 6.77°
Azimuth: 200.42°
VS: 112.19'

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, grdg - slty sh
SHY SS: wh-lt gy occ lt brn, sl frm - brit,
sb ang-sb rnd, f gr, mod srtg, arg

MD: 3,449'
TVD: 3,434.53'
Inclination: 6.33°
Azimuth: 202.92°
VS: 116.88'



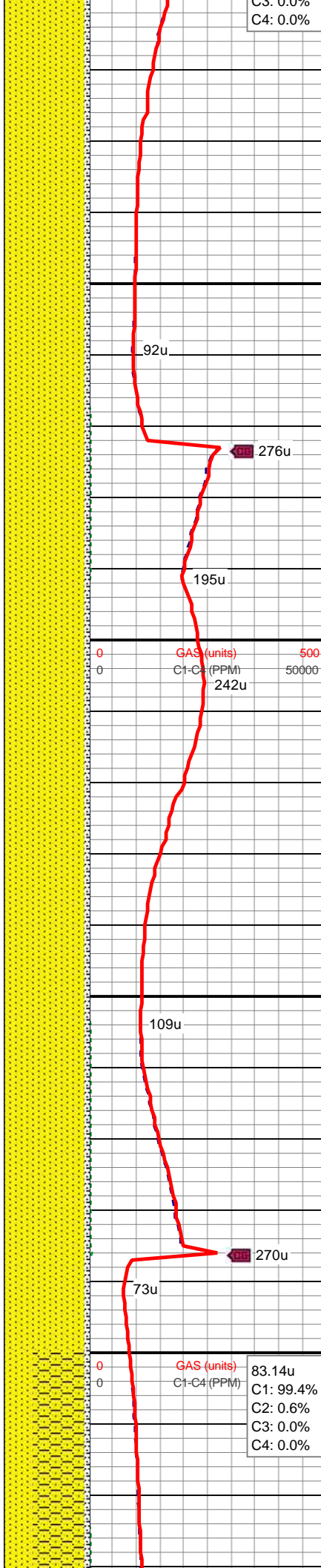
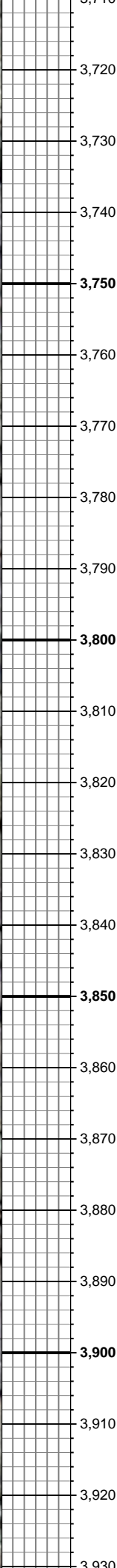
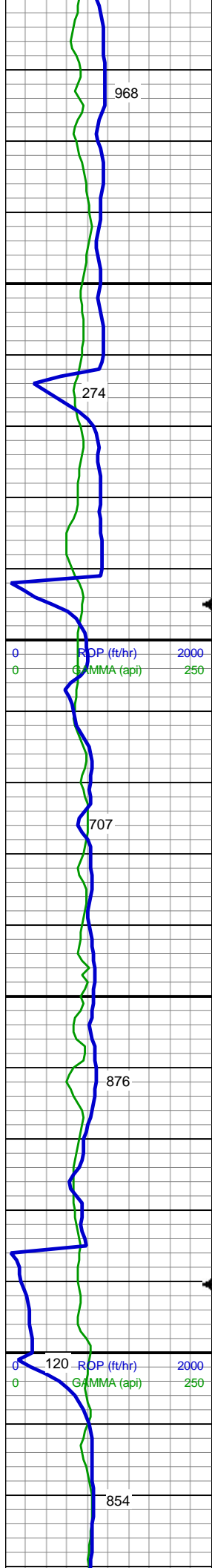
MD: 3,544'
TVD: 3,528.97'
Inclination: 6.16°
Azimuth: 202.31°
VS: 121.52'

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

MD: 3,639'
TVD: 3,623.41'
Inclination: 6.24°
Azimuth: 198.5°
VS: 125.77'

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

MUD WT 8.80 VIS 29



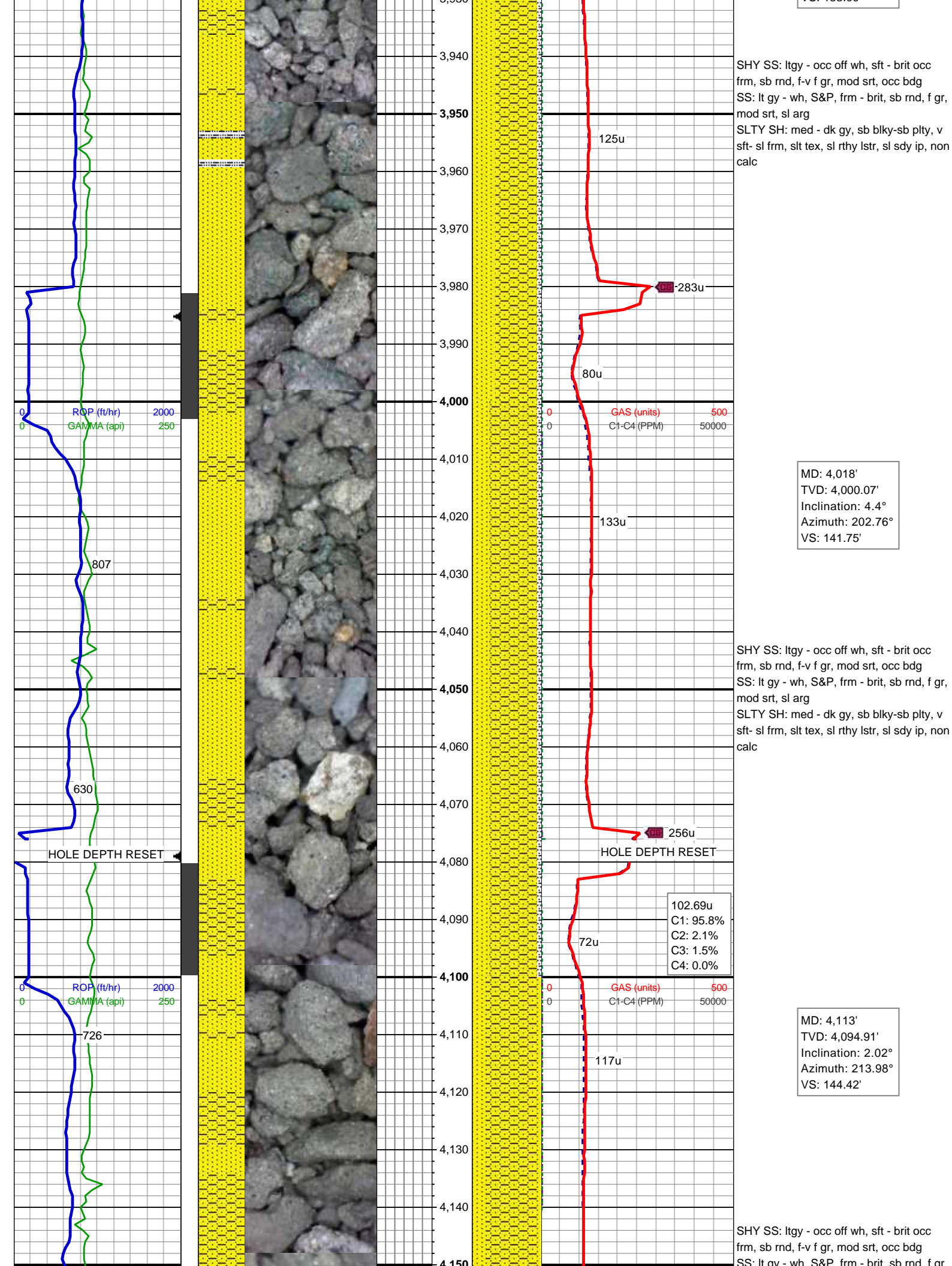
MD: 3,734'
TVD: 3,717.82'
Inclination: 6.6°
Azimuth: 197.15°
VS: 129.73'

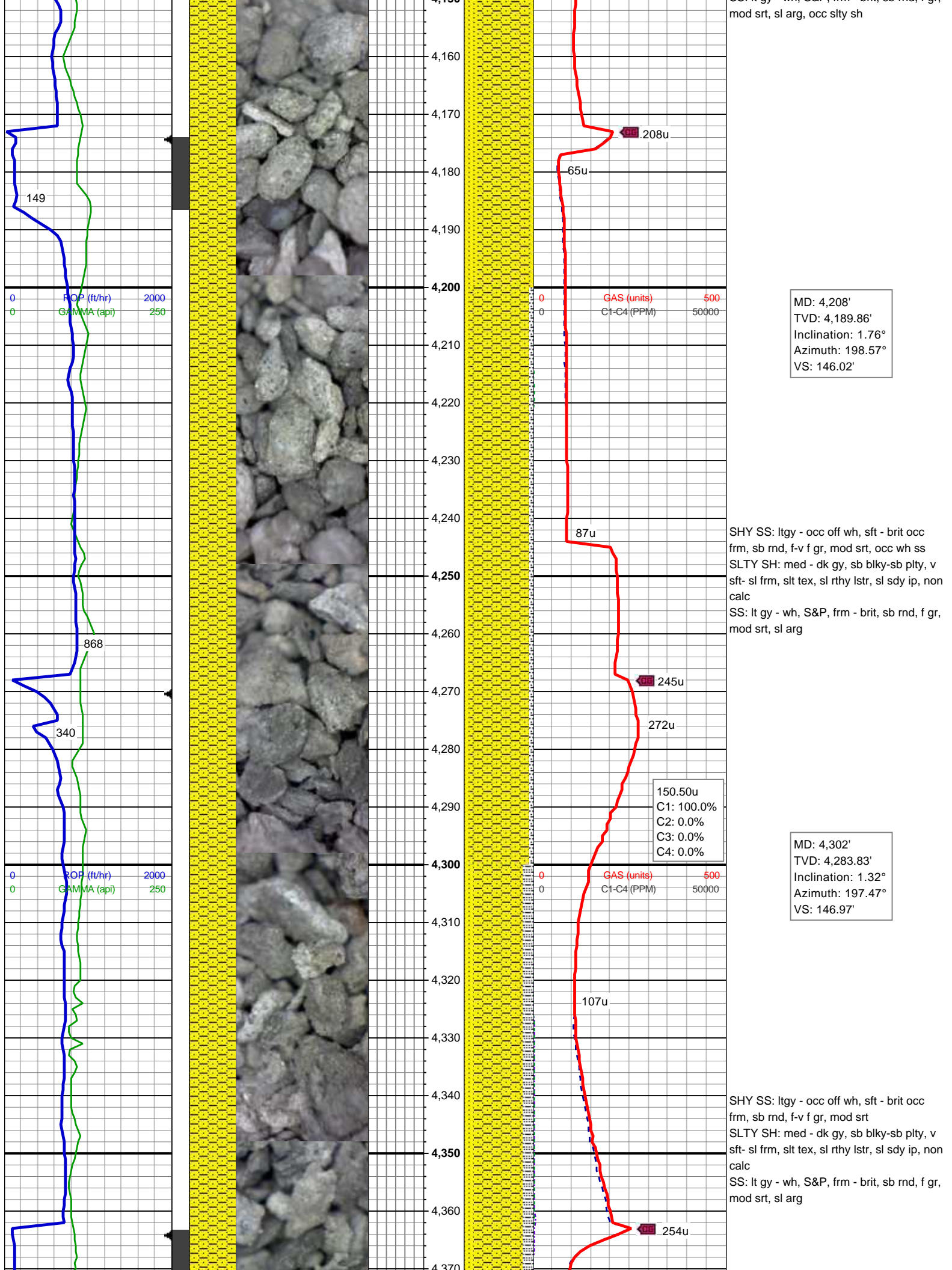
SS: lt gy - wh, S&P, frm - brit, sb rnd, f gr,
mod srt, sl arg, scat mica, tr glauc
SLTY SH: med - dk gy, sb blkly-sb plty, v
sft- sl frm, slt tex, sl rthy lstr, sl sdy ip, non
calc

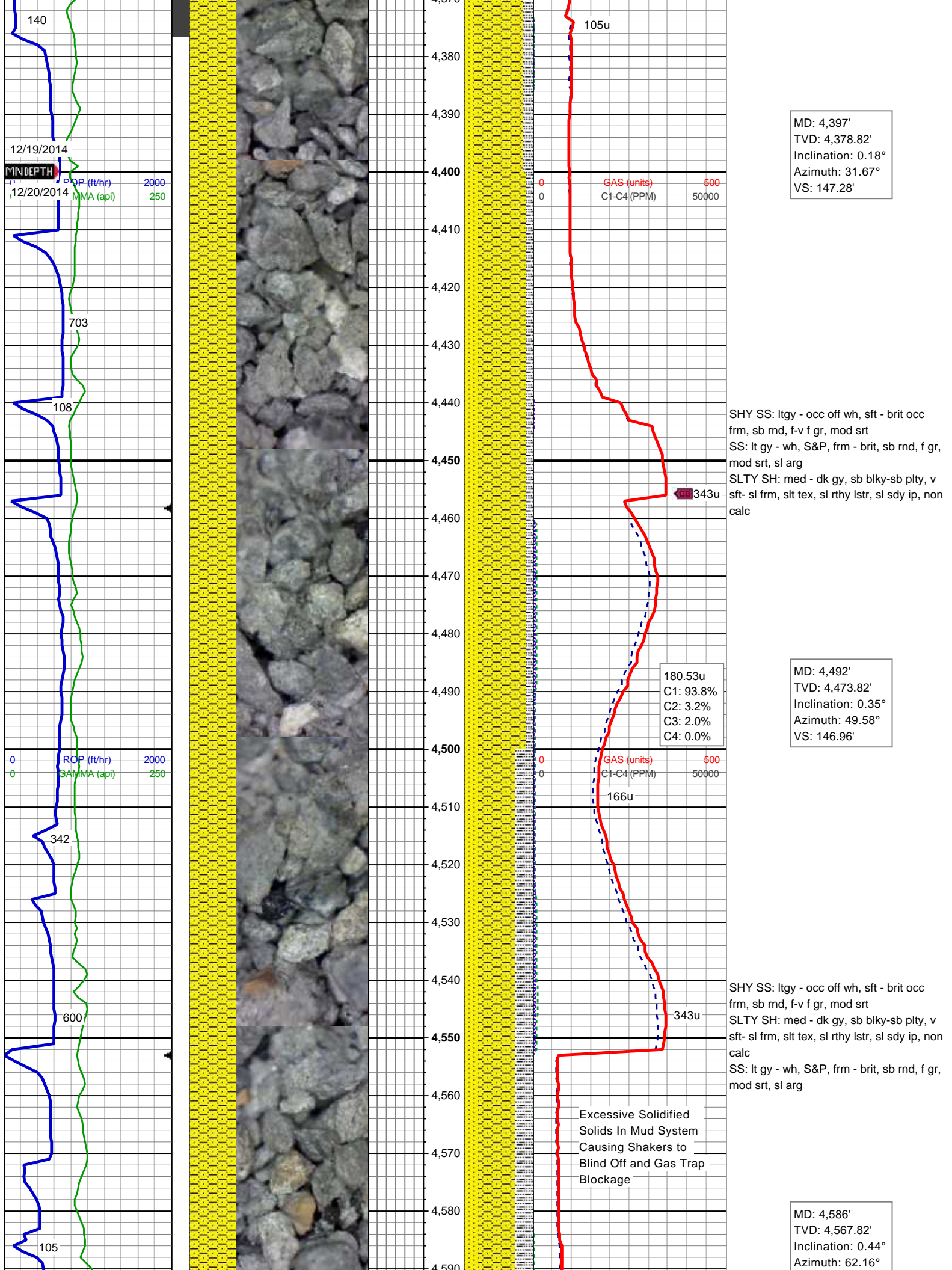
MD: 3,829'
TVD: 3,812.14'
Inclination: 7.12°
Azimuth: 197.57°
VS: 133.87'

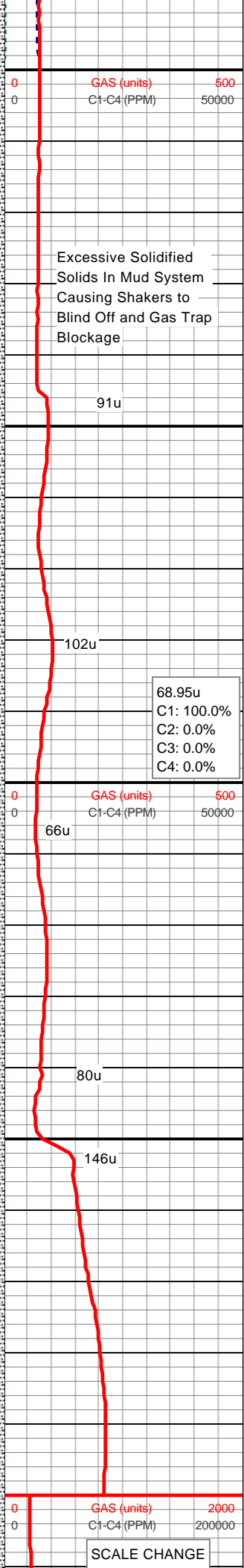
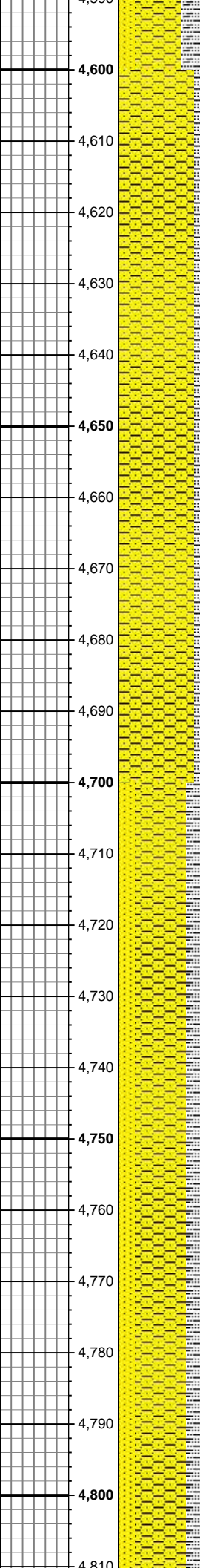
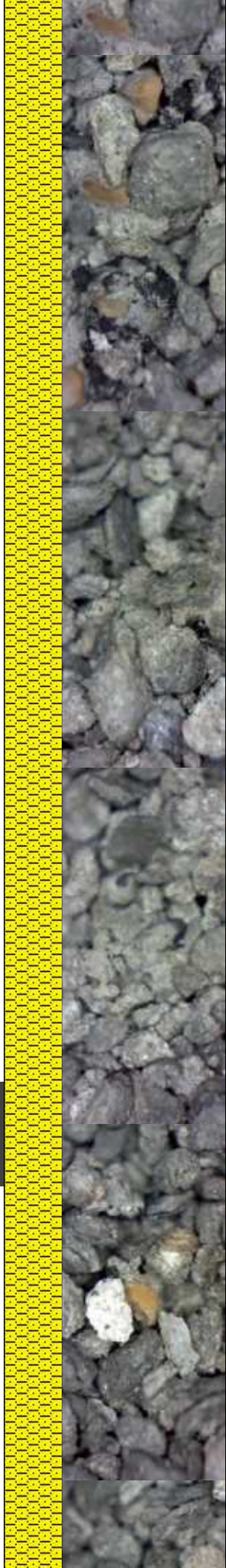
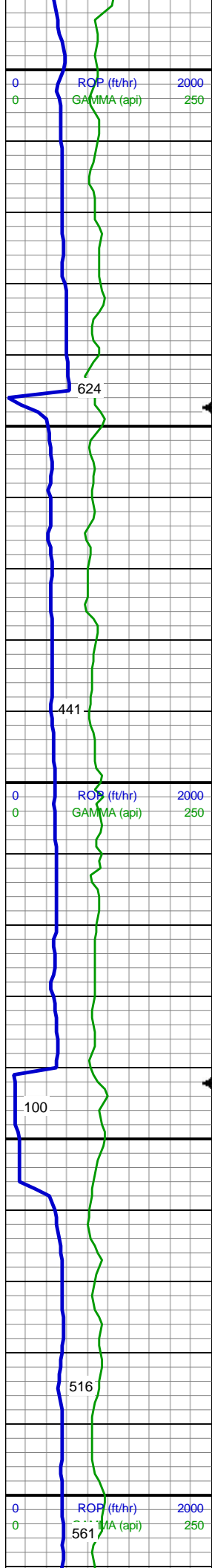
SS: lt gy - wh, S&P, frm - brit, sb rnd, f gr,
mod srt, sl arg, scat mica, tr glauc
SLTY SH: med - dk gy, sb blkly-sb plty, v
sft- sl frm, slt tex, sl rthy lstr, sl sdy ip, non
calc

MD: 3,924'
TVD: 3,906.48'
Inclination: 6.33°
Azimuth: 198.98°
VS: 138.09'









VS: 146.4'

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 blkly-sb plty, v
sft- sl frm, slt tex, sl rthy lstr, sl sdy ip, non
calc

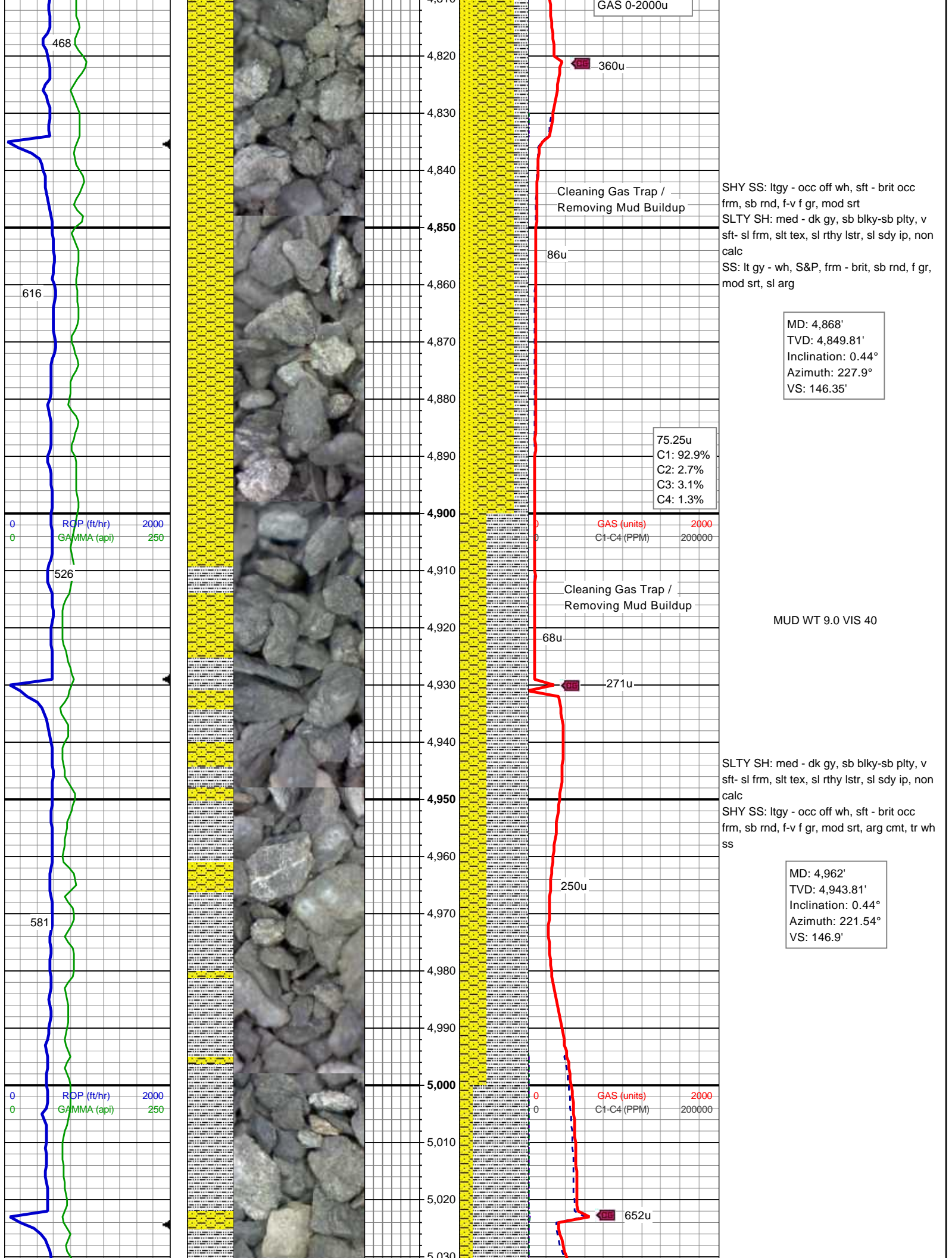
MD: 4,680'
TVD: 4,661.81'
Inclination: 0.44°
Azimuth: 71.03°
VS: 145.72'

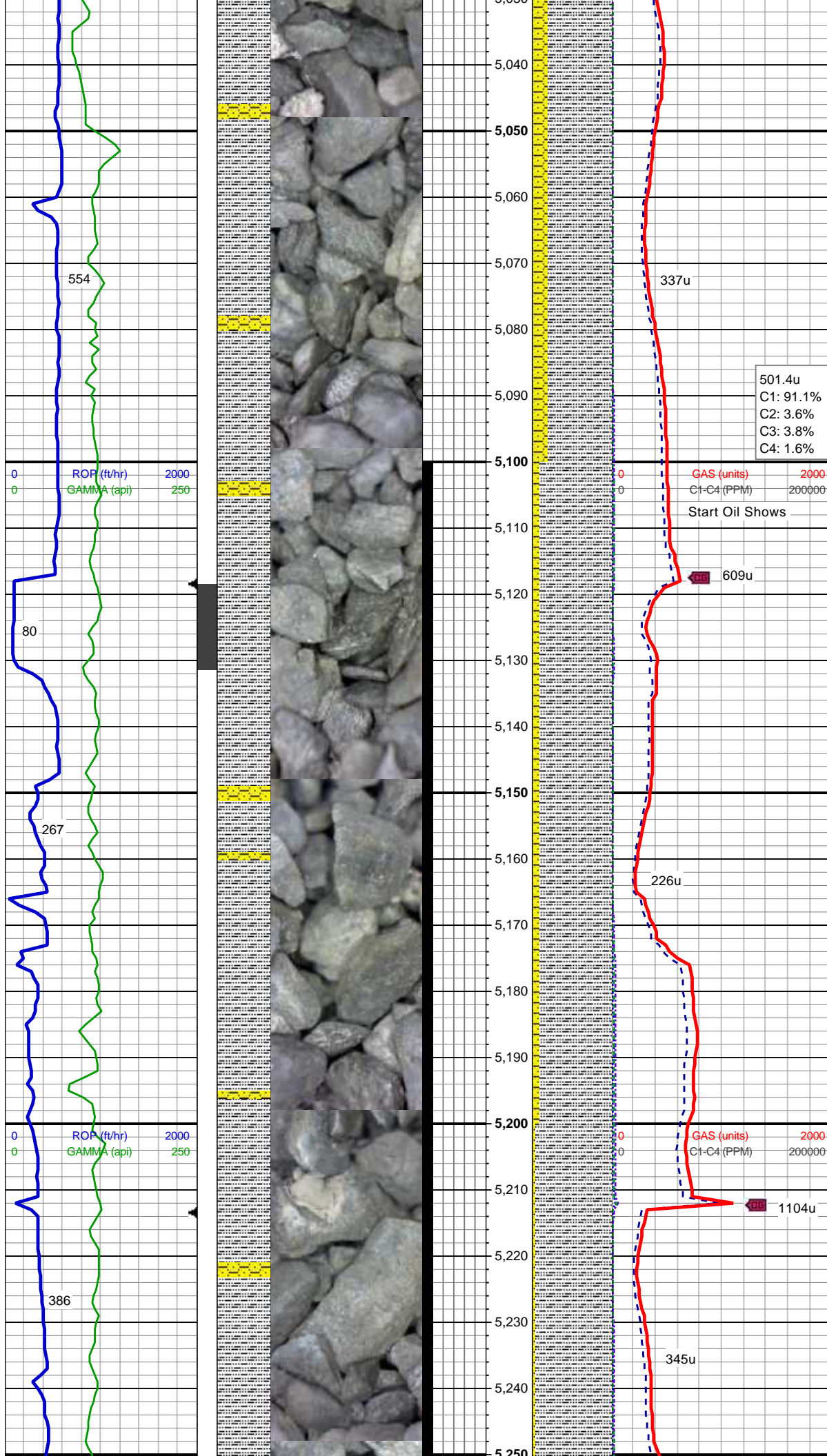
SHY SS: ltgy - occ off wh, sft - brit occ
frm, sb rnd, f-v f gr, mod srt

SLTY SH: med - dk gy, sb blkly-sb plty, v
sft- sl frm, slt tex, sl rthy lstr, sl sdy ip, non
calc

SS: lt gy - wh, S&P, frm - brit, sb rnd, f gr,
mod srt, sl arg

MD: 4,774'
TVD: 4,755.81'
Inclination: 0.44°
Azimuth: 250.58°
VS: 145.72'





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

MD: 5,057'
TVD: 5,038.8'
Inclination: 0.44°
Azimuth: 214.55°
VS: 147.38'

501.4u
C1: 91.1%
C2: 3.6%
C3: 3.8%
C4: 1.6%

0 GAS (units) 2000
0 C1-C4 (PPM) 200000
Start Oil Shows

609u

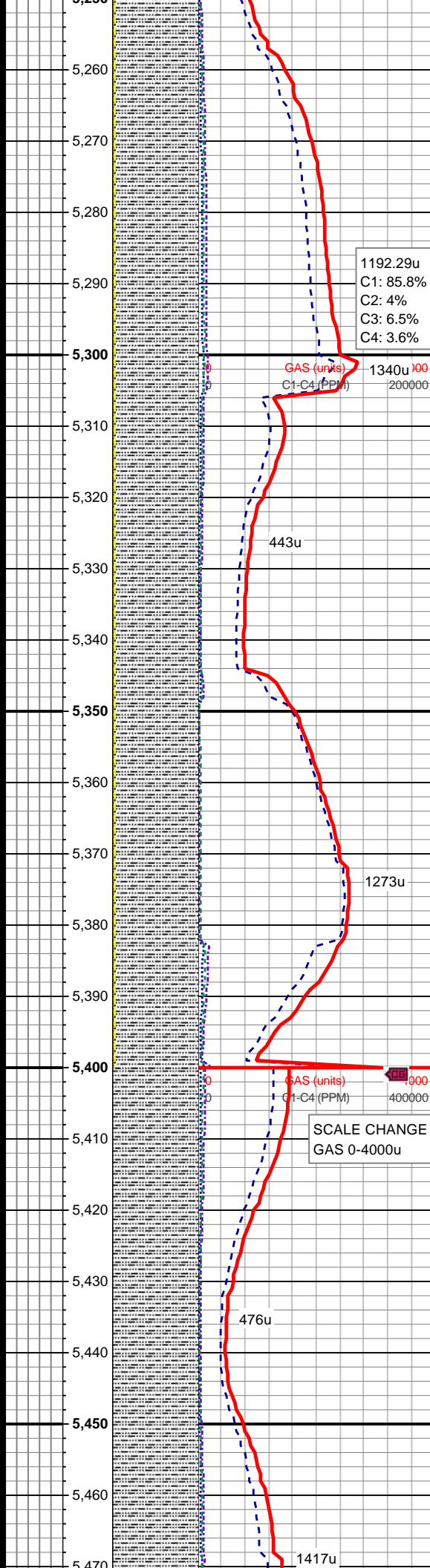
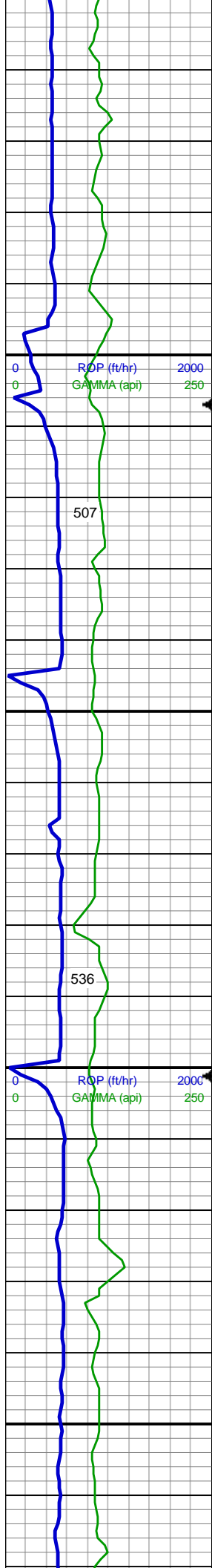
SLTY SH: med - dk gy, occ med gy brn,
sb blk-y-sb plty, sft-sl frm, slt tex, sl rthy
lstr, sl sdy ip, non calc
SHY SS: ltgy - occ off wh, sft - brit occ
frm, sb rnd, f-v f gr, mod srt, arg cmt, tr wh
ss

MD: 5,151'
TVD: 5,132.8'
Inclination: 0.79°
Azimuth: 278.63°
VS: 148.24'

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

1104u

SLTY SH: med - dk gy, occ med gy brn,
sb blk-y-sb plty, sft-sl frm, slt tex, sl rthy
lstr, sl sdy ip, non calc
SHY SS: ltov - occ off wh, sft - brit occ



frm, sb rnd, f-v f gr, mod srt, arg cmt; tr wh ss

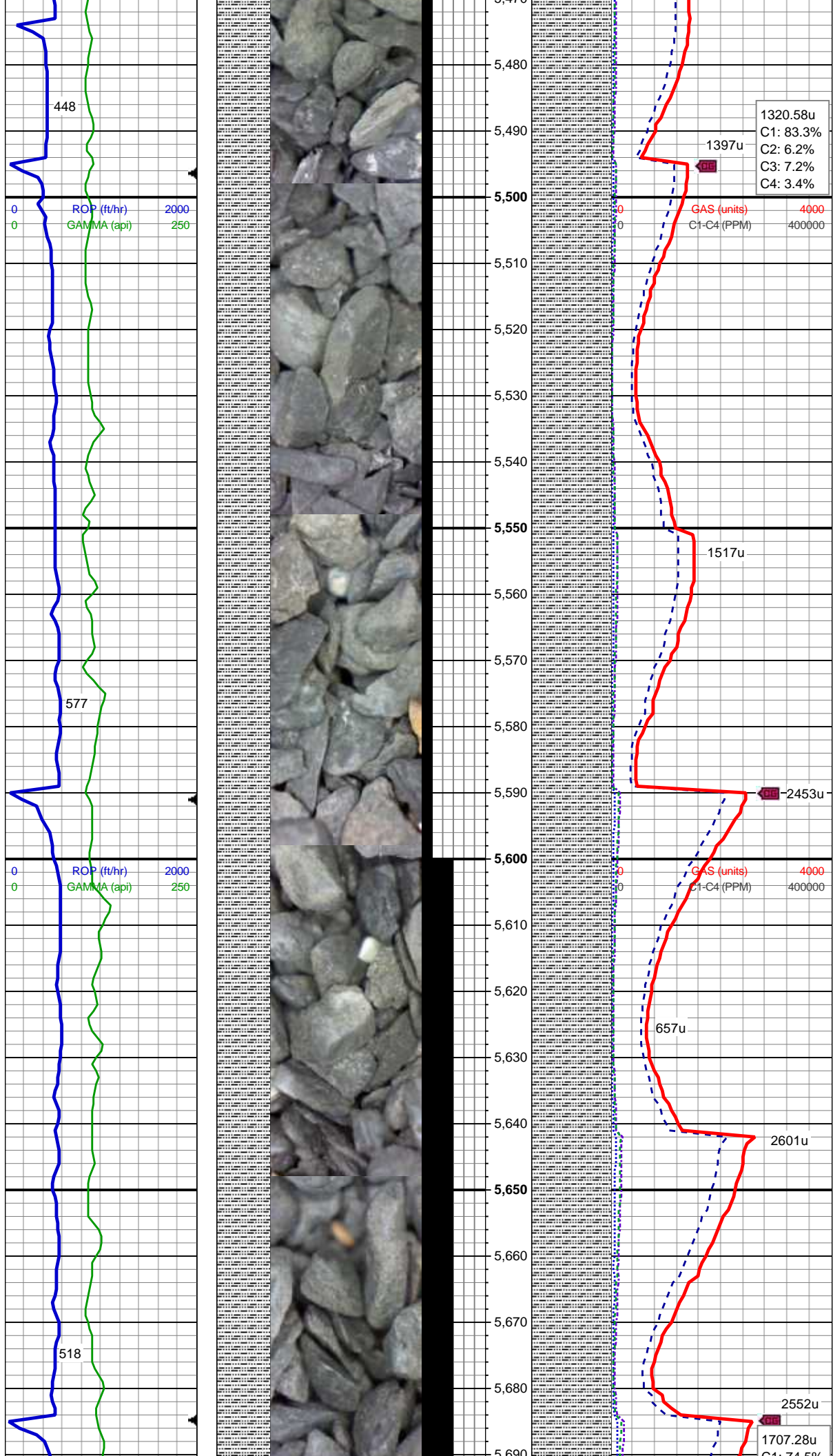
MD: 5,246'
TVD: 5,227.79'
Inclination: 0.53°
Azimuth: 321.4°
VS: 149.13'

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

MD: 5,340'
TVD: 5,321.79'
Inclination: 0.09°
Azimuth: 318.95°
VS: 149.42'

MD: 5,435'
TVD: 5,416.79'
Inclination: 0.26°
Azimuth: 204.06°
VS: 149.57'

SLTY SH: med - dk gy, occ med gy brn, sb blk-y-sb plty, sft- sl frm, slt tex, sl rthy lstr, sl sdy ip, non- v sl calc



1320.58u
C1: 83.3%
C2: 6.2%
C3: 7.2%
C4: 3.4%

1397u

GAS (units) 4000
C1-C4 (PPM) 400000

MD: 5,529'
TVD: 5,510.79'
Inclination: 0.53°
Azimuth: 178.59°
VS: 149.69'

SLTY SH: med - dk gy, occ med gy brn,
sb blkgy-sb plty, sft- sl frm, slt tex, sl rthy
lstr, sl sdy ip, non- v sl calc

1517u

2453u

GAS (units) 4000
C1-C4 (PPM) 400000

MUD WT 40 VIS 10.15

MD: 5,624'
TVD: 5,605.79'
Inclination: 0.44°
Azimuth: 215.05°
VS: 149.94'

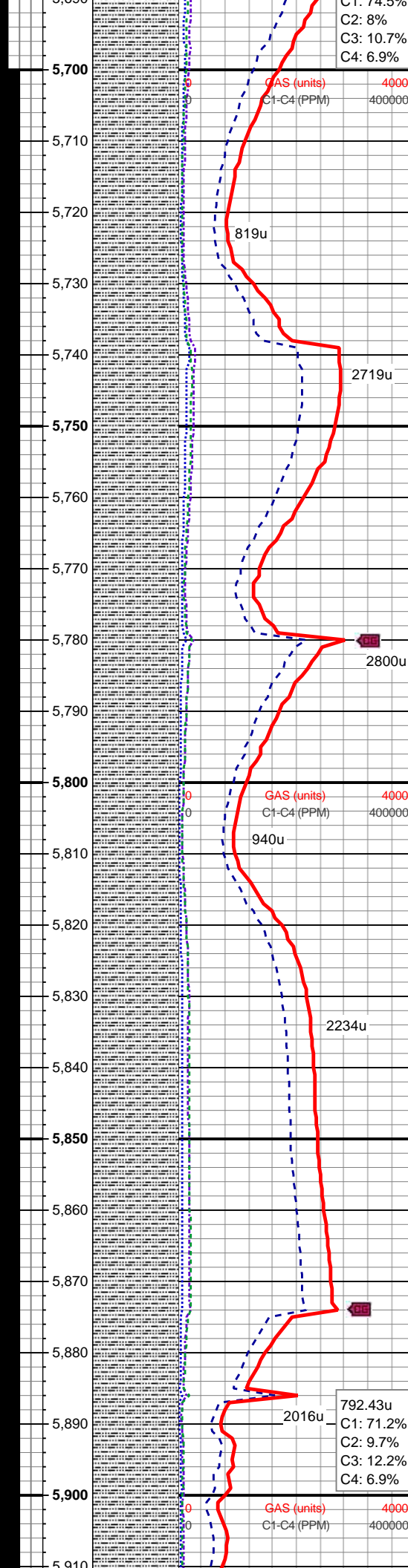
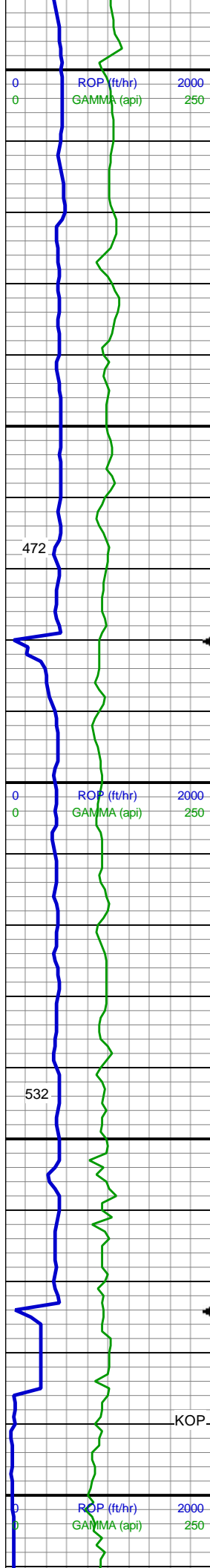
SLTY SH: med - dk gy, occ med gy brn,
sb blkgy-sb plty, sft- sl frm, slt tex, sl rthy
lstr, sl sdy ip, non- v sl calc; tr ss

657u

2601u

2552u

1707.28u
C1: 74.5%



MD: 5,719'
TVD: 5,700.78'
Inclination: 0.44°
Azimuth: 166.17°
VS: 150.11'

SLTY SH: med - dk gy, occ med gy brn, sb blk-ly-sb plty, sft- sl frm, slt tex, sl rthy lstr, sl sdy ip, non- v sl calc; tr ss, rr -tr pry

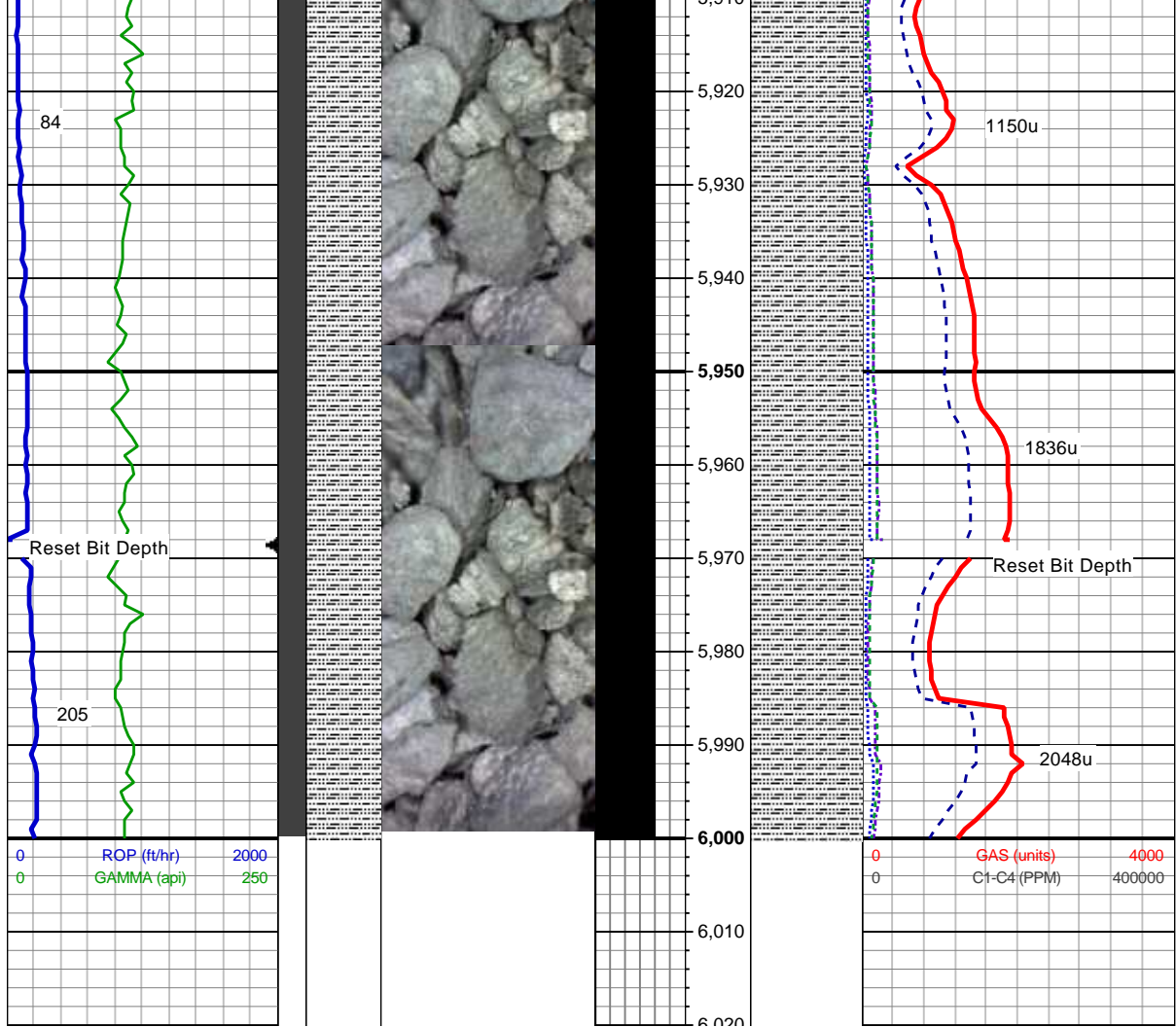
MUD WT 40 VIS 10.2

MD: 5,813'
TVD: 5,794.78'
Inclination: 0.18°
Azimuth: 304.6°
VS: 150.16'

SLTY SH: med - dk gy, sb blk-ly-sb plty, sft- sl frm, slt tex, sl rthy lstr, sl sdy ip, non calc, tr shy ss, tr pyr

MD: 5,908'
TVD: 5,889.78'
Inclination: 1.23°

Azimuth: 274.62°
VS: 151.28'



SLTY SH: med - dk gy, sb blkly-sb plty, sft-sl frm, slt tex, sl rthy lstr, sl sdy ip, non calc, tr shy ss, tr pyr

MUD WT 40 VIS 10.25

MUDLOG CONTUINES ON "Wells Ranch AE19-631 Horz.mplot" for Curve and Lateral Sections of this Well.