

COLUMBINE LOGGING

Scale: 5" / 100'
Measured Depth Log

Well Name Wells Ranch AE19-626

Location NWSW 20 6N 62W 6 PM

State COLODADO

County WELD

Country UNITED STATES

Rig Number H&P 330

API Number 05-123-39634

Field WATTENBERG

Region DJ BASIN

Drilling Completed 12/16/2014

Spud Date 12/11/2014

Surface Coordinates 1573 FSL 65 FWL
Lat/Long: 40.46928/-104.35587

Bottom Hole Coordinates 1040 FFSLL 235 FFELL

Ground Elevation 4,786'

K.B. Elevation 4,816'

Logged Interval 2,000' To 11,842'

Total Depth 11,842'

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

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
 F 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
 P PYRITE
 ■ SALT CAST
 . SANDY
 S SIDERITE
 ▲ SILICEOUS
 - SILTY
 ▲ TUFFACEOUS

■ 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
 X 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 Teresa Malesardi

Company Noble Energy Inc

Address 1625 Broadway Suite 2200
Denver, CO 80202

tmalesardi@nobleenergyinc.com

Zone Color Coding

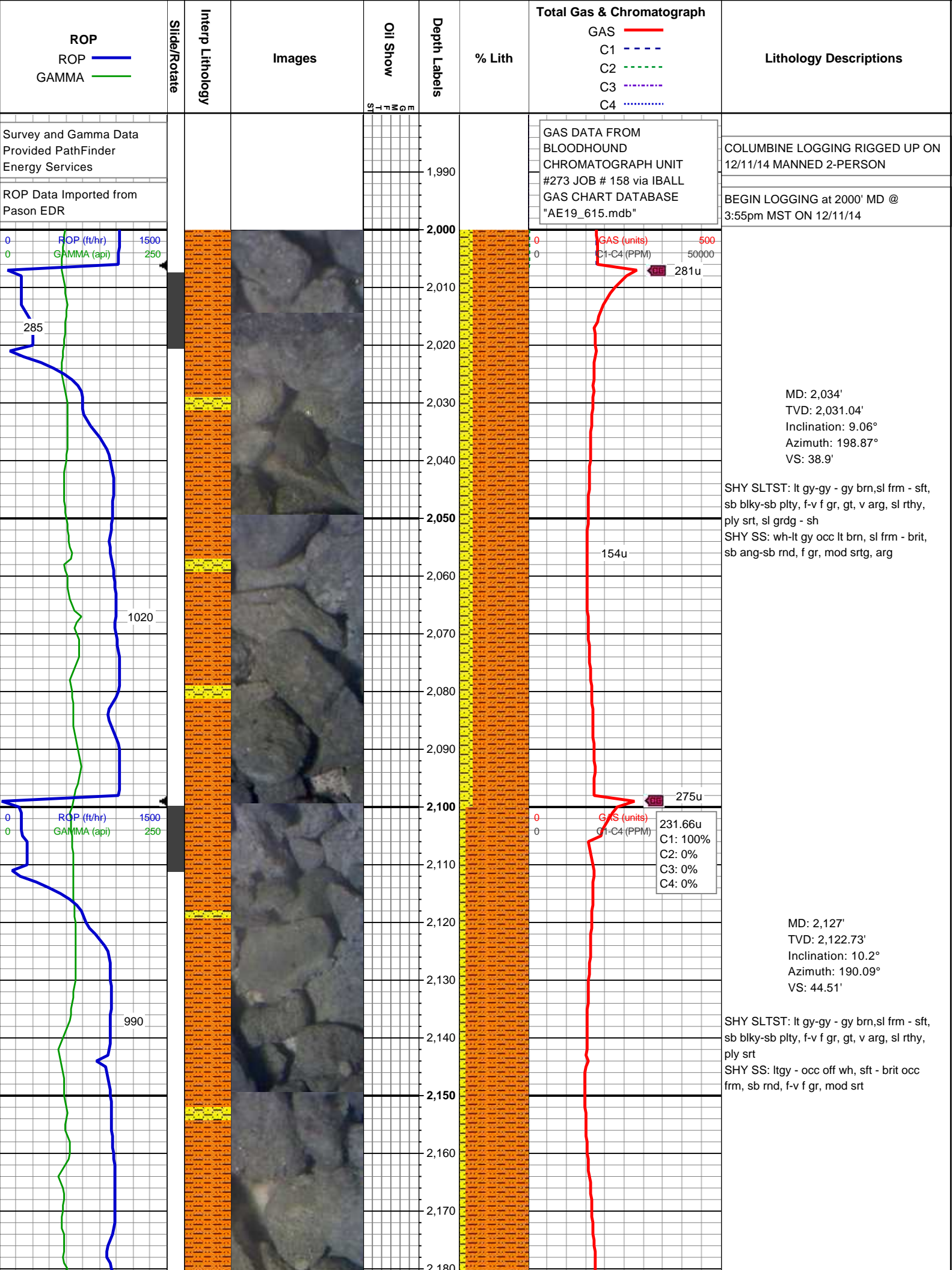
■ Oil
 ■ Condensate
 ■ Gas
 ■ Note
 ■ Core
 ■ Pressure
 ■ Error
 ■ Water
 ■ Seal

Other

Well Site Logging Company Columbine Logging Inc.

Well Site Geologist (Days) Brad Wilson

Well Site Geologist (Nights) Terry Acomb





ROP (ft/hr) 1500
GAMMA (api) 250

GAS (units) 500
C1-C4 (PPM) 50000

MD: 2,220'
TVD: 2,214.17'
Inclination: 10.82°
Azimuth: 187.04°
VS: 49.03'

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

ROP (ft/hr) 1500
GAMMA (api) 250

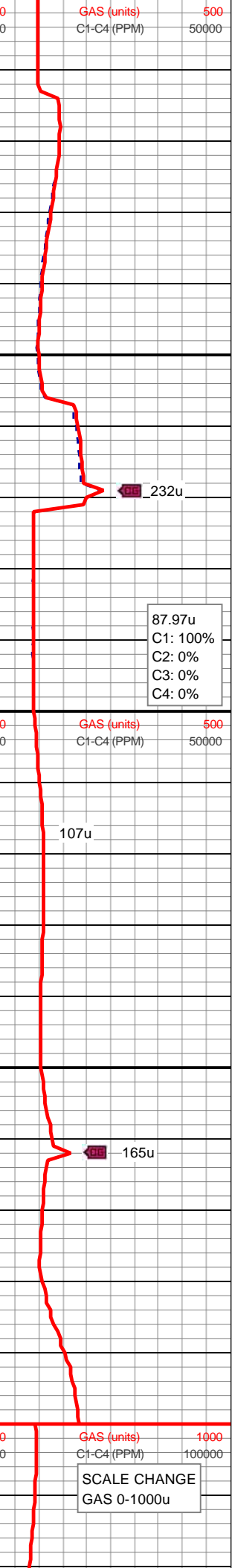
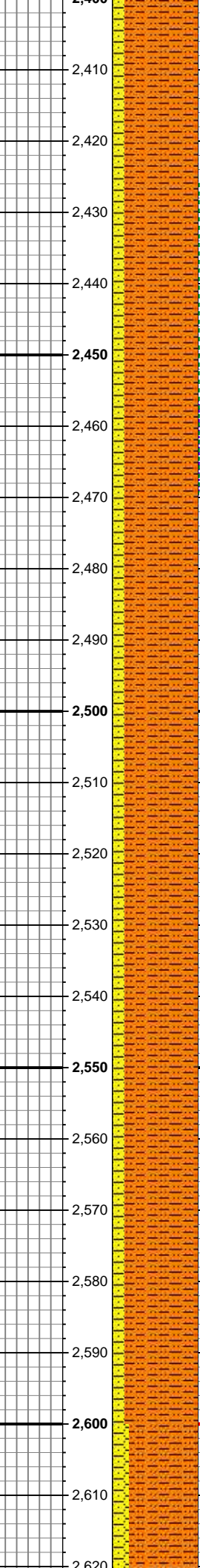
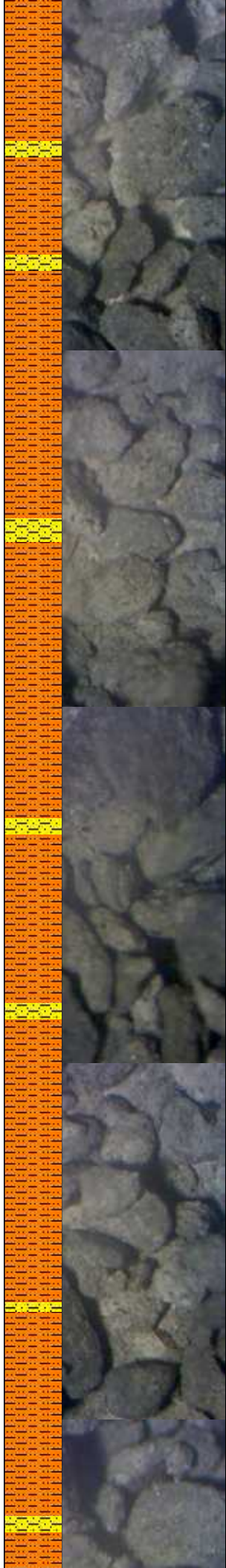
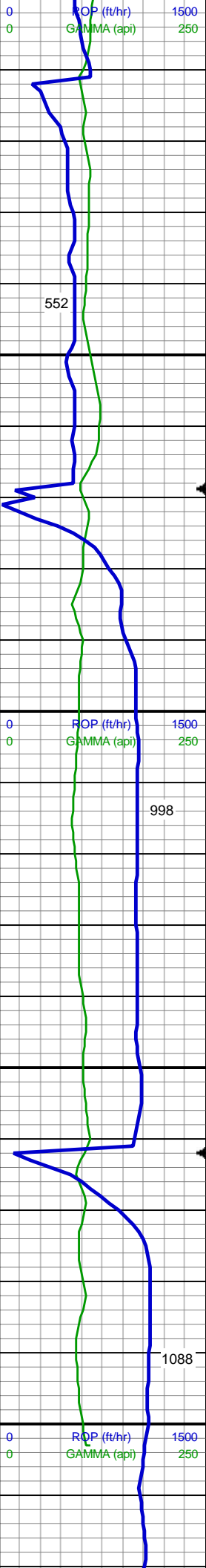
GAS (units) 127.46u
C1: 100%
C2: 0%
C3: 0%
C4: 0%

MD: 2,314'
TVD: 2,306.5'
Inclination: 10.82°
Azimuth: 184.76°
VS: 52.96'

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

ROP (ft/hr) 1500
GAMMA (api) 250

MD: 2,406'

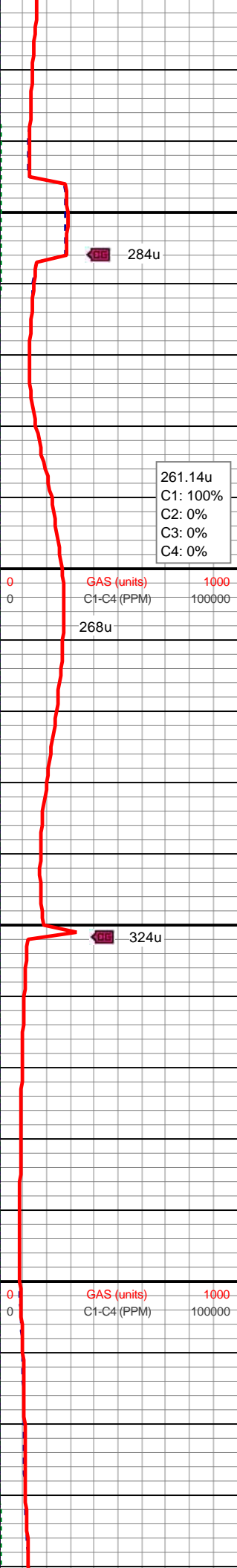
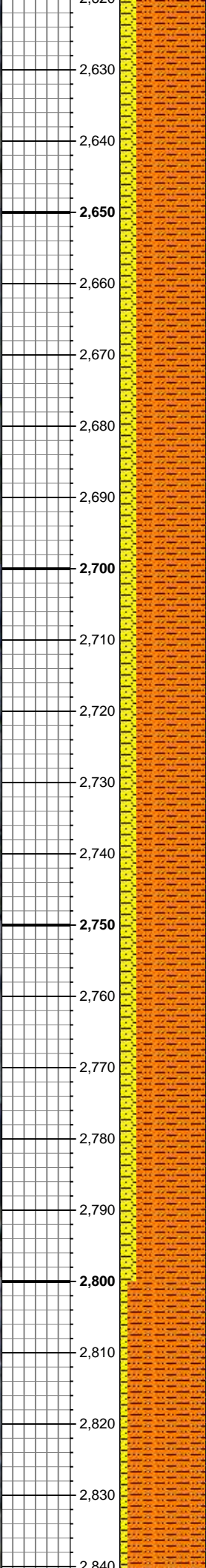
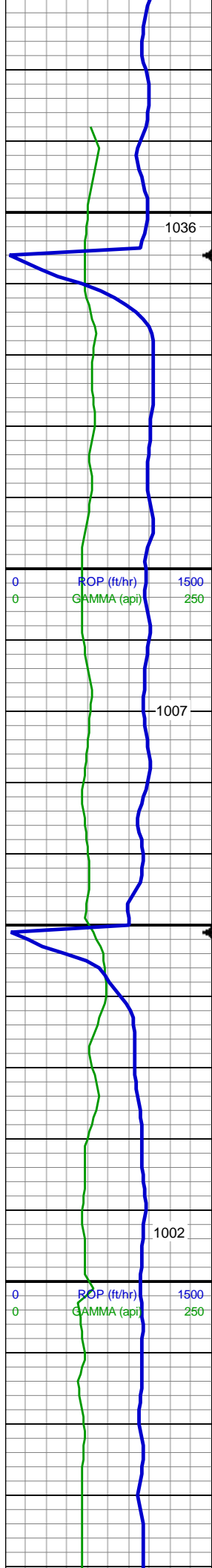


MD: 2,400'
TVD: 2,396.66'
Inclination: 12.13°
Azimuth: 191.37°
VS: 57.75'

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

MD: 2,499'
TVD: 2,487.64'
Inclination: 11.78°
Azimuth: 191.28°
VS: 63.8'

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



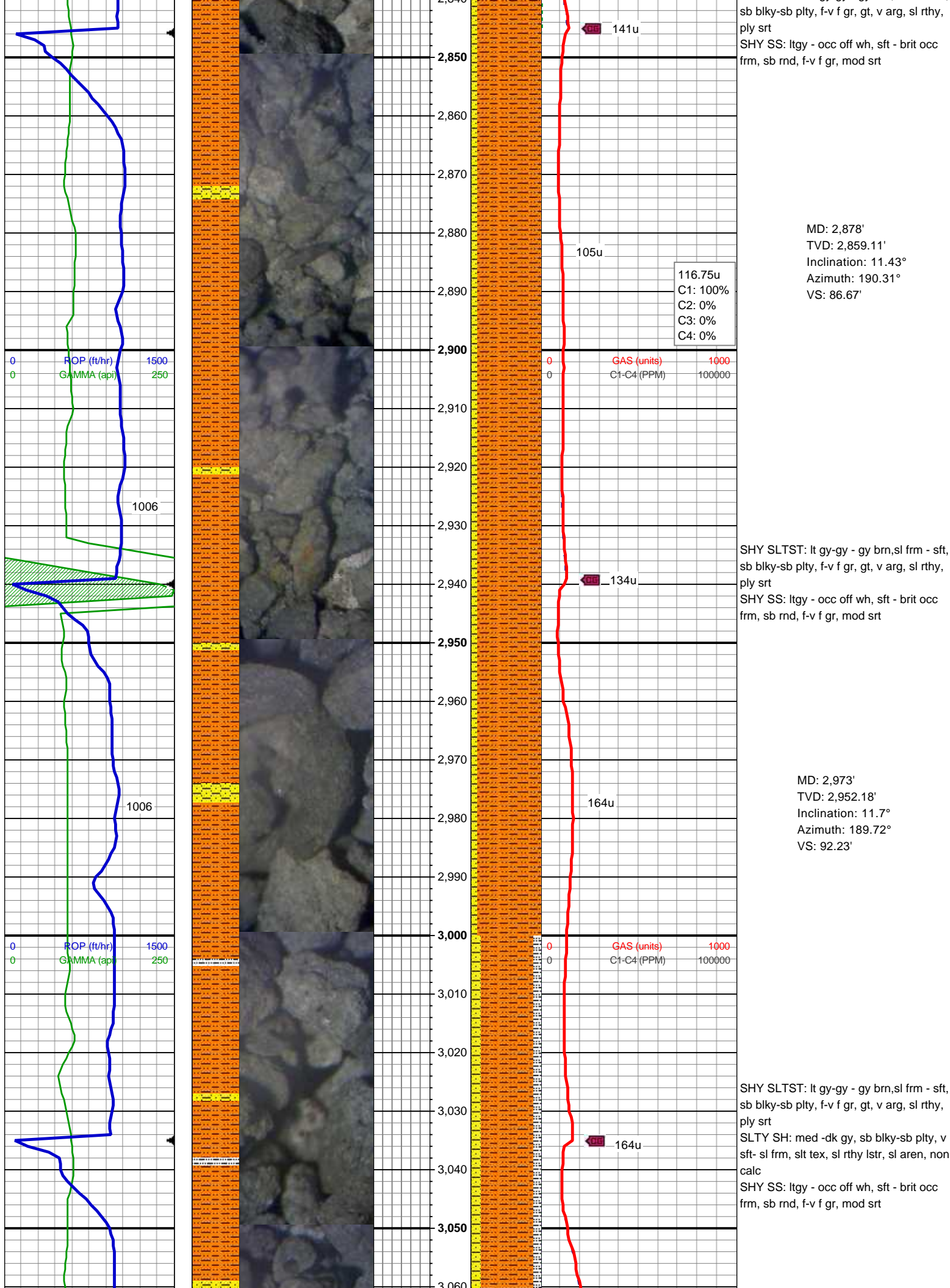
SHY SLTST: lt gy-gy - gy brn,sl frm - sft,
sb blk-y-sb plty, f-v f gr, gt, v arg, sl rthy,
ply srt
SHY SS: ltgy - occ off wh, sft - brit occ
frm, sb rnd, f-v f gr,tr med gr, mod srt

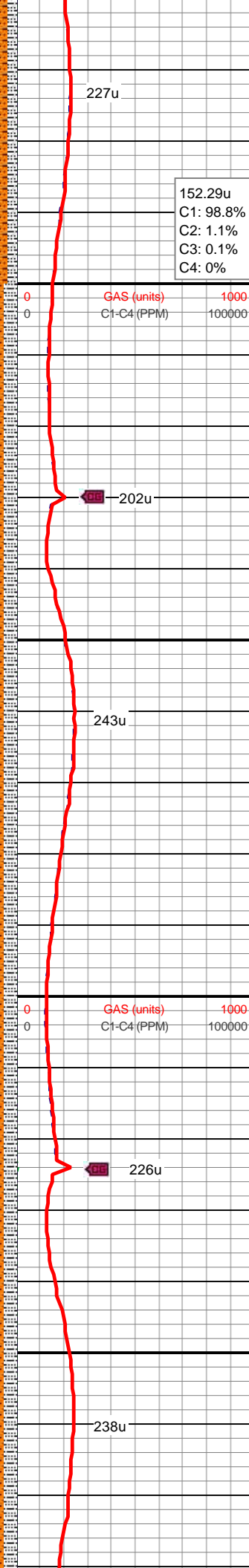
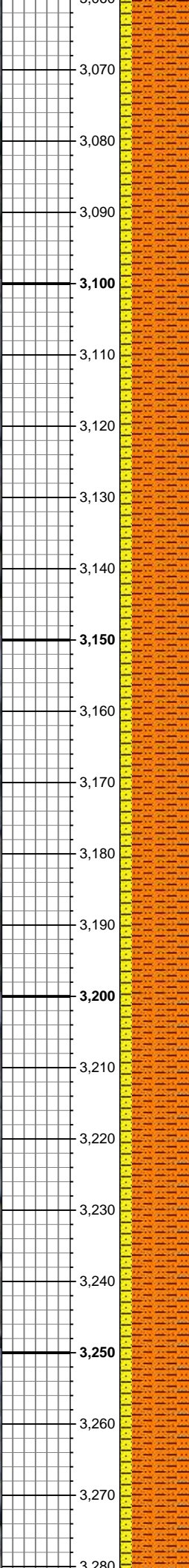
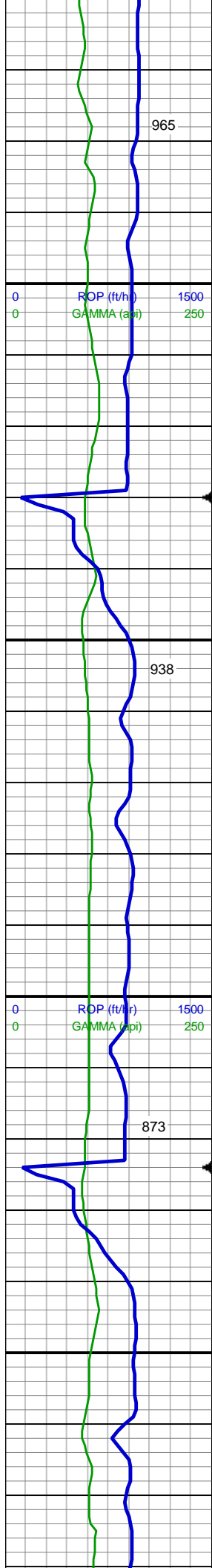
MD: 2,689'
TVD: 2,673.79'
Inclination: 11.34°
Azimuth: 190.89°
VS: 75.59'

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

MD: 2,784'
TVD: 2,766.95'
Inclination: 11.26°
Azimuth: 190.22°
VS: 81.2'

SHY SLTST: lt gy-gy - gy brn,sl frm - sft,





MD: 3,068'
TVD: 3,045.2'
Inclination: 11.78°
Azimuth: 189.47°
VS: 97.74'

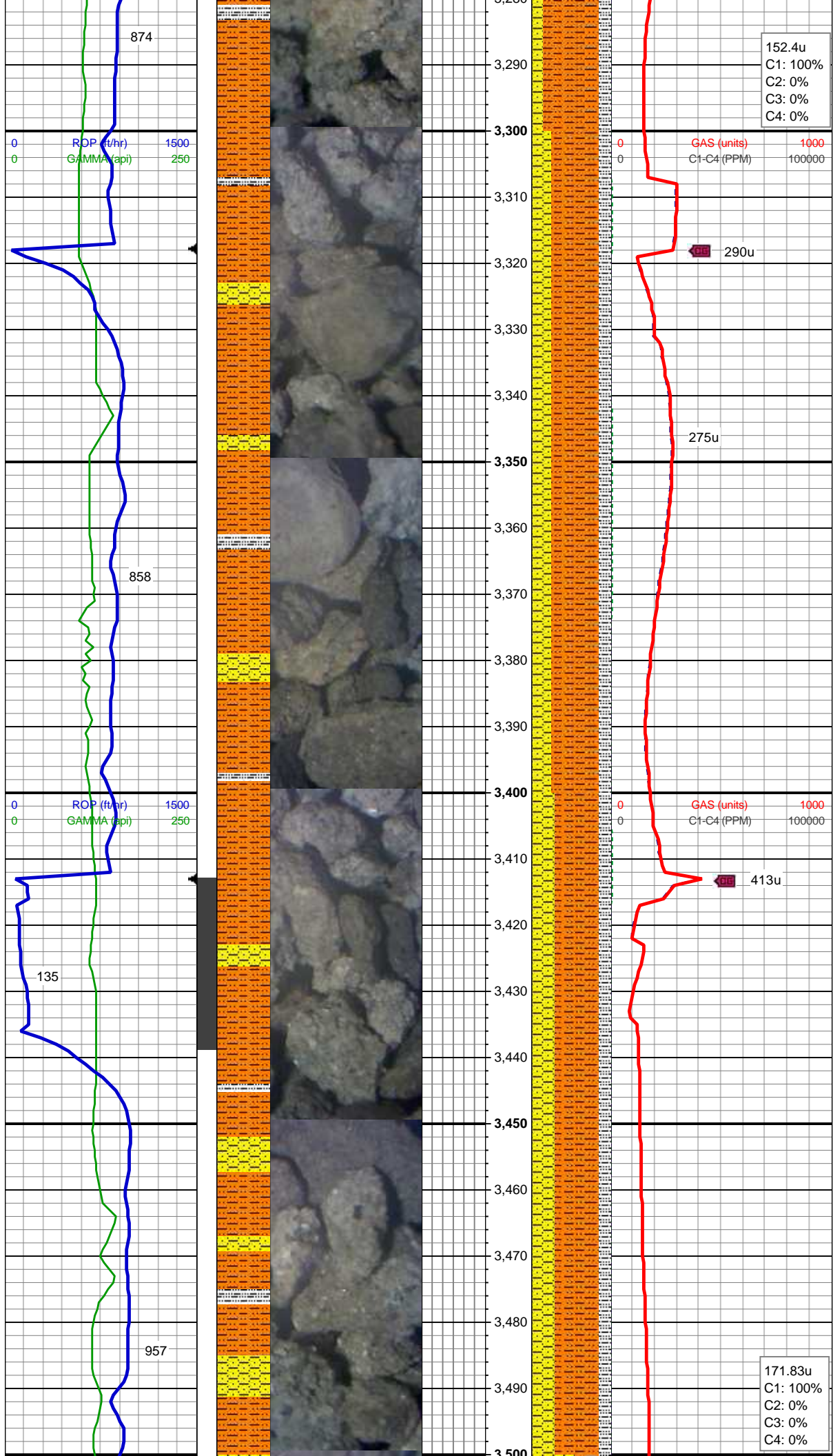
SHY SLTST: lt gy-gy - gy brn,sl frm - sft, sb blkly-sb plty, f-v f gr, gt, v arg, sl rthy, ply srt
SLTY SH: med -dk gy, sb blkly-sb plty, v sft- sl frm, slt tex, sl rthy lstr, sl aren, non calc
SHY SS: ltgy - occ off wh, sft - brit occ frm, sb rnd, f-v f gr, mod srt

MD: 3,162'
TVD: 3,137.29'
Inclination: 11.34°
Azimuth: 189.51°
VS: 103.07'

MUD WT 8.4 VIS 25

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

MD: 3,257'
TVD: 3,230.45'
Inclination: 11.26°
Azimuth: 188.09°
VS: 108.13'

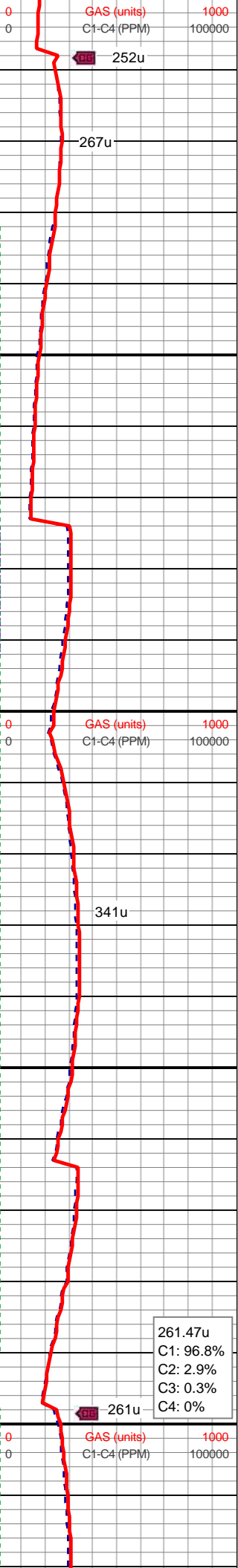
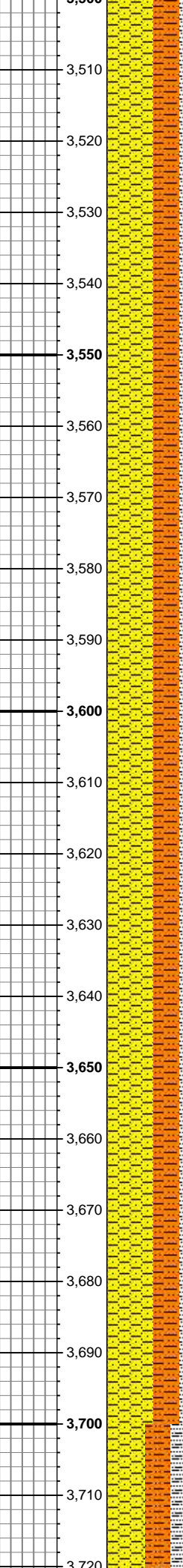
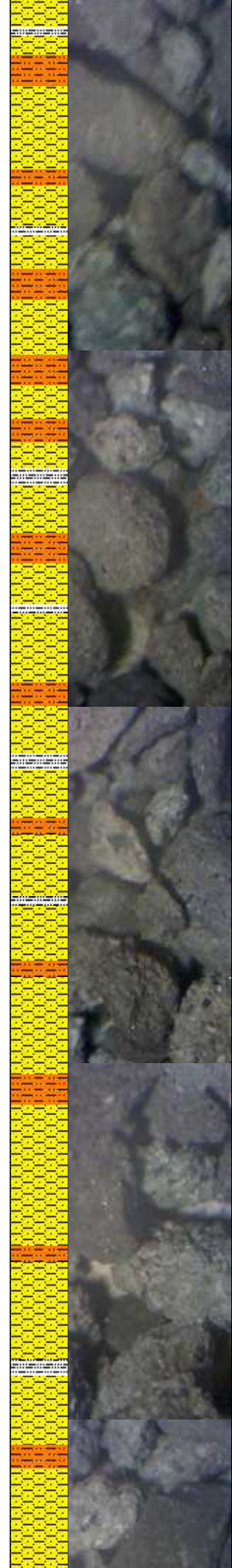
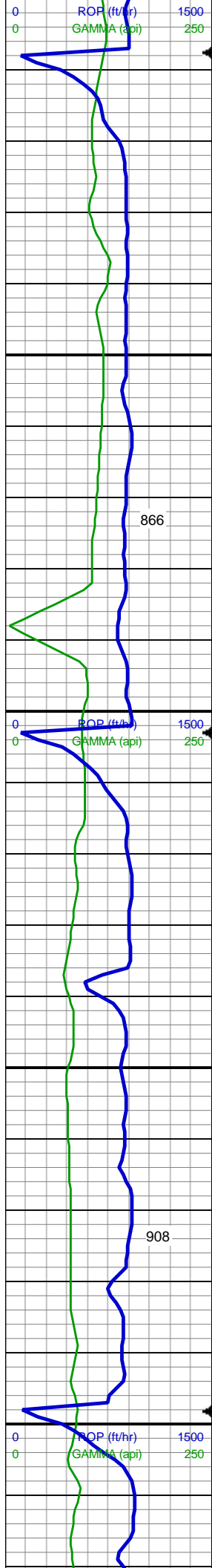


SHY SLTST: lt gy-gy - gy brn,sl frm - sft,
sb blk-y-sb plty, f-v f gr, gt, v arg, sl rthy,
ply srt
SHY SS: ltgy - occ off wh, sft - brit occ
frm, sb rnd, f-v f gr, mod srt
SLTY SH: med -dk gy, sb blk-y-sb plty, v
sft-sl frm, slt tex, sl rthy lstr, sl aren, non
calc

MD: 3,352'
TVD: 3,323.7'
Inclination: 10.73°
Azimuth: 186.67°
VS: 112.62'

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
SHY SS: ltgy - occ off wh, sft - brit occ
frm, sb rnd, f-v f gr, mod 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: 3,447'
TVD: 3,417.24'
Inclination: 9.5°
Azimuth: 199.71°
VS: 118.23'



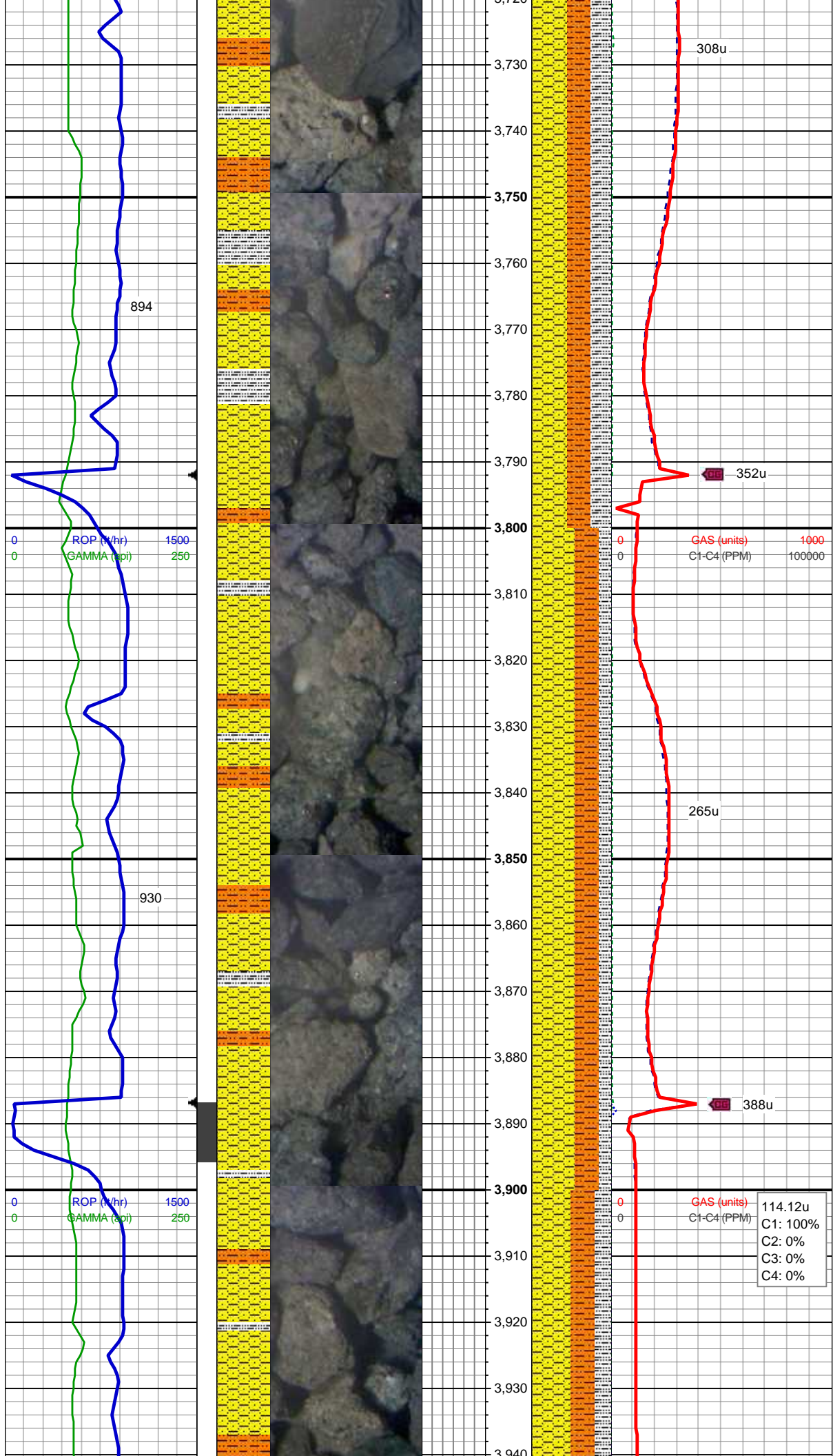
SHY SS: ltgy - occ off wh, sft - brit occ
frm, sb rnd, f-v f gr, mod srt
SHY SLTST: lt gy-gy - gy brn,sl frm - sft,
sb blkgy-sb plty, f-v f gr, gt, v arg, sl rthy,
ply srt
SLTY SH: med -dk gy, sb blkgy-sb plty, v
sft- sl frm, slt tex, sl rthy lstr, sl aren, non
calc

MD: 3,542'
TVD: 3,510.97'
Inclination: 9.23°
Azimuth: 198.49°
VS: 125.02'

MUD WT 8.5 VIS 25

MD: 3,637'
TVD: 3,604.7'
Inclination: 9.5°
Azimuth: 198.03°
VS: 131.6'

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



MD: 3,732'
TVD: 3,698.33'
Inclination: 10.02°
Azimuth: 198.41°
VS: 138.46'

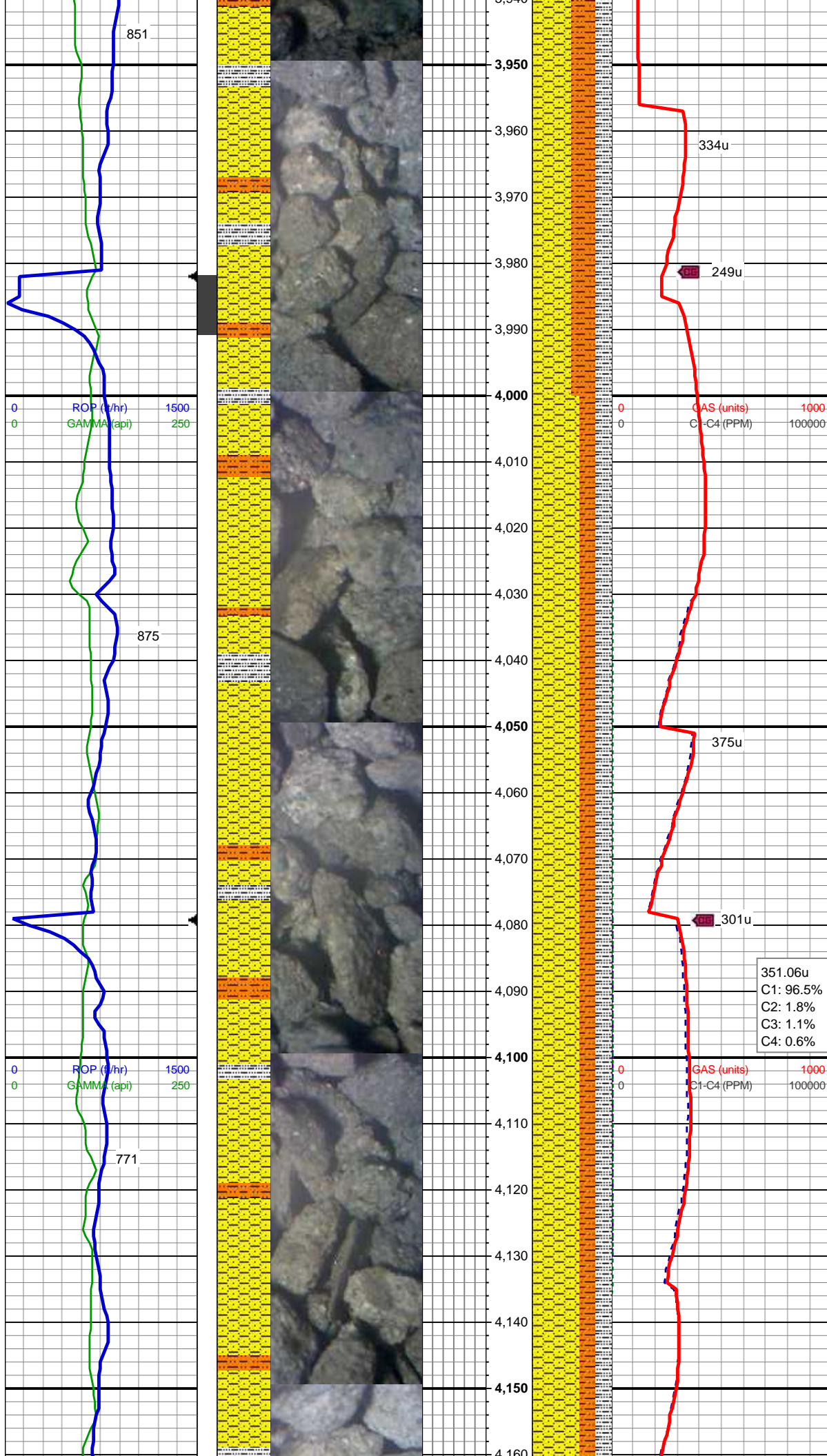
SHY SS: ltgy - occ off wh, sft - brit occ
frm, sb rnd, f-v f gr, mod srt
SHY SLTST: lt gy-gy - gy brn,sl frm - sft,
sb blk-y-sb plty, f-v f gr, gt, v arg, sl rthy,
ply srt
SLTY SH: med -dk gy, sb blk-y-sb plty, v
sft- sl frm, slt tex, sl rthy lstr, sl aren, non
calc

MD: 3,827'
TVD: 3,791.76'
Inclination: 10.82°
Azimuth: 198.07°
VS: 145.77'

SHY SS: ltgy - occ off wh, sft - brit occ
frm, sb rnd, f-v f gr, mod srt
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: 3,922'
TVD: 3,884.99'
Inclination: 11.34°
Azimuth: 196.14°
VS: 153.21'

SHY SS: ltgy - occ off wh, sft - brit occ



frm, sb rnd, f-v f gr, mod srt
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

334u

249u

MD: 4,017'
TVD: 3,978.11'
Inclination: 11.52°
Azimuth: 195.67°
VS: 160.52'

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

375u

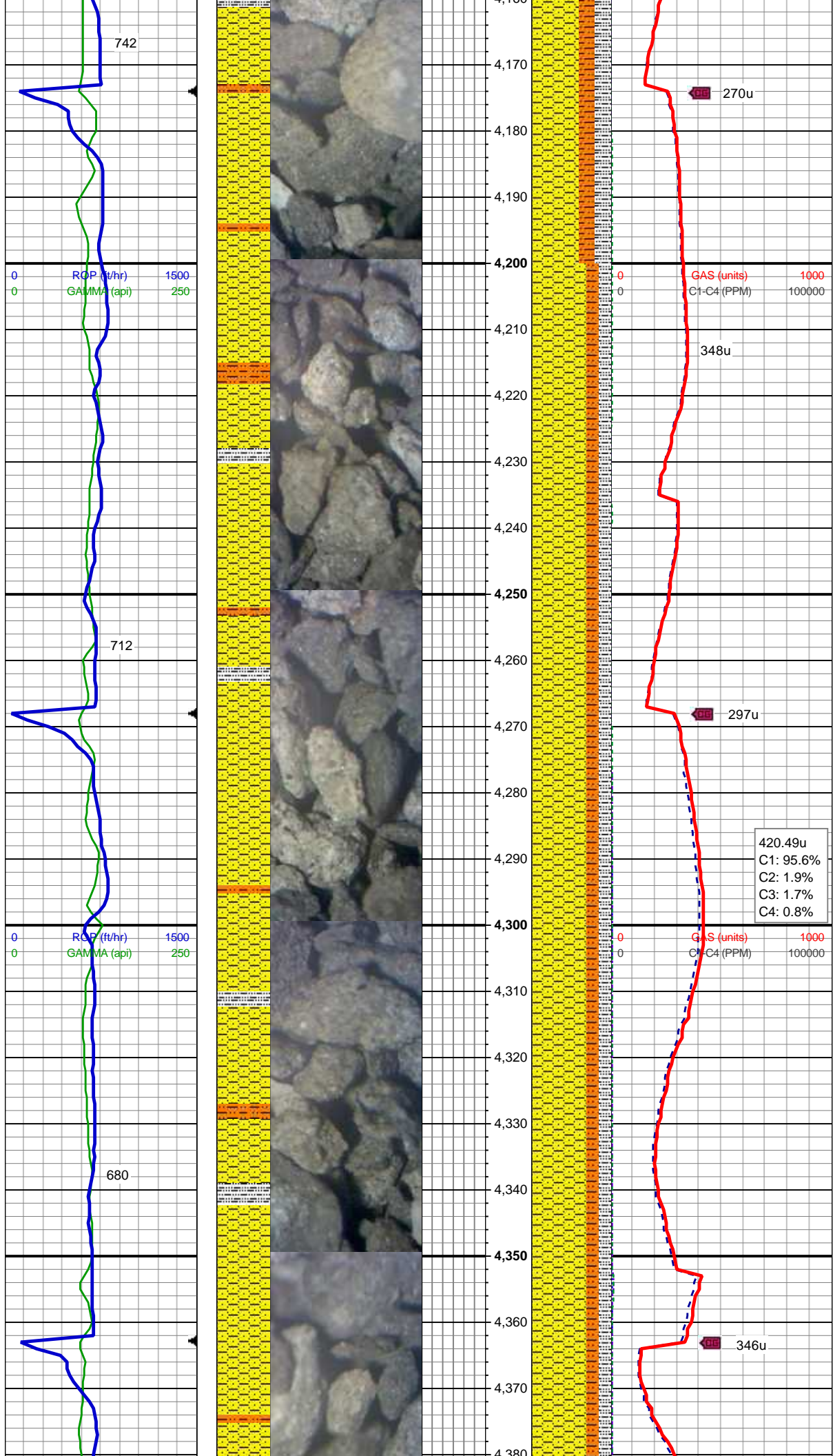
301u

351.06u
C1: 96.5%
C2: 1.8%
C3: 1.1%
C4: 0.6%

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

MD: 4,112'
TVD: 4,071.21'
Inclination: 11.43°
Azimuth: 195.66°
VS: 167.79'

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

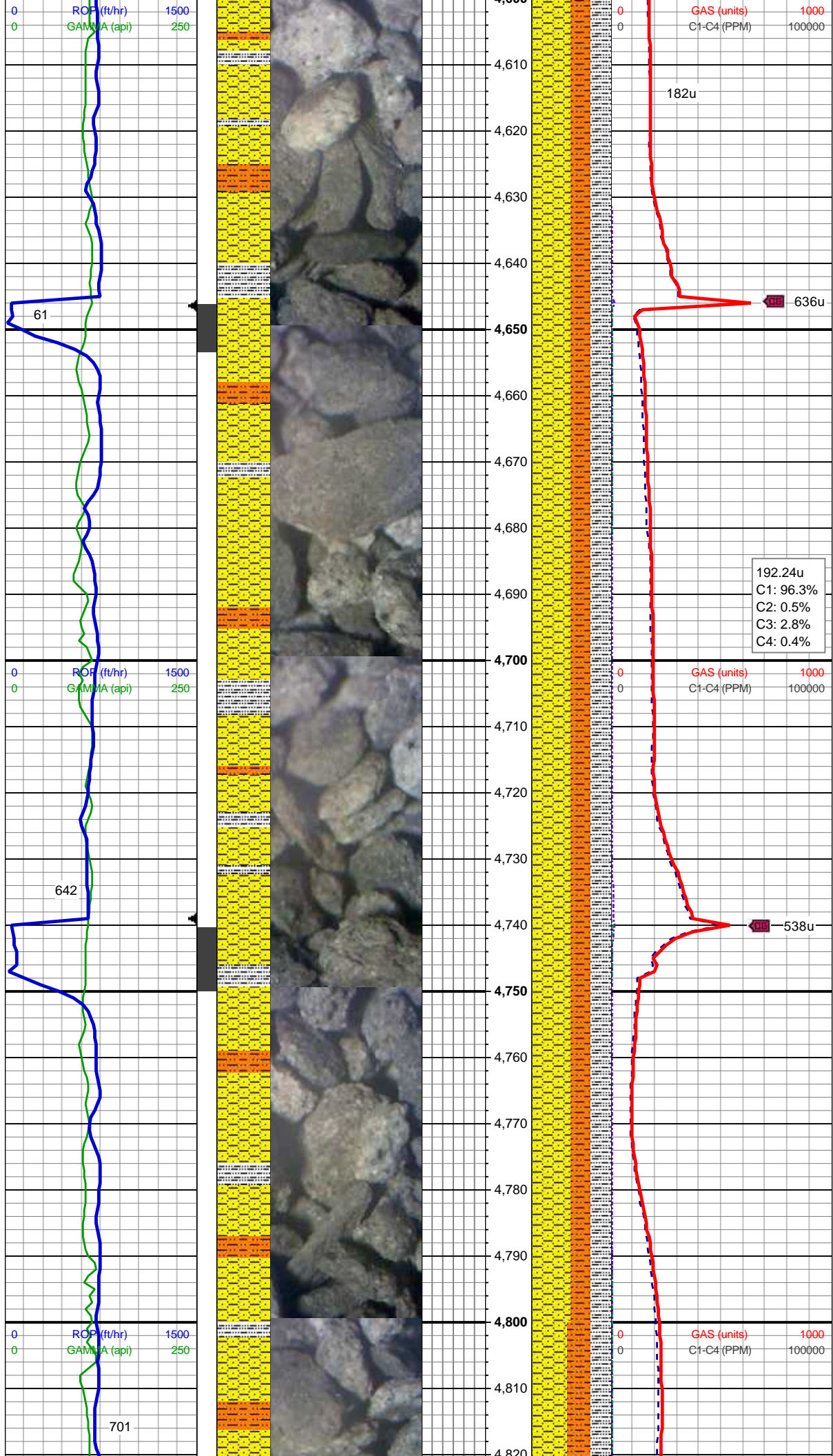


MD: 4,206'
TVD: 4,163.41'
Inclination: 10.99°
Azimuth: 194.72°
VS: 174.69'

SHY SS: ltgy - occ off wh, sft - brit occ
frm, sb rnd, f-v f gr, mod srt
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: 4,301'
TVD: 4,256.81'
Inclination: 10.11°
Azimuth: 195.49°
VS: 181.22'

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

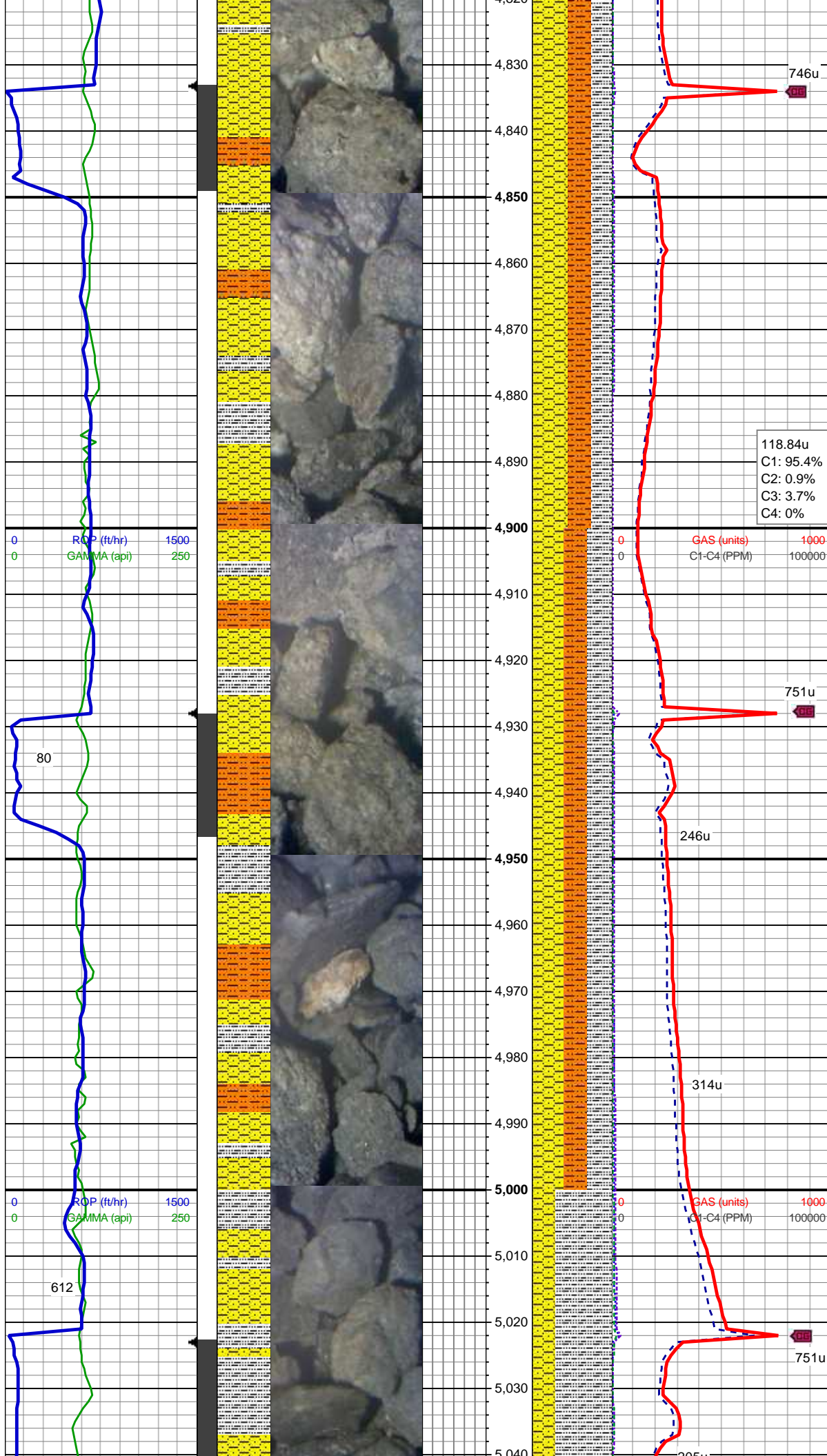


SHY SS: ltgy - occ off wh, sft - brit occ frm, sb rnd, f-v f gr, mod srt
SLTY SH: med -dk gy, occ offwh, sb blkly-sb plty, v sft- sl frm, slt tex, sl rthy lstr, sl aren, non calc
SHY SLTST: lt gy-gy - gy brn,sl frm - sft, sb blkly-sb plty, f-v f gr, gt, v arg, sl rthy, ply srt

MD: 4,678'
TVD: 4,629.58'
Inclination: 6.68°
Azimuth: 190.29°
VS: 202.81'

SHY SS: ltgy - occ off wh, sft - brit occ frm, sb rnd, f-v f gr, mod srt
SLTY SH: med -dk gy, occ offwh, 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

MD: 4,773'
TVD: 4,724.03'
Inclination: 5.63°
Azimuth: 190.08°
VS: 205.81'



SHY SS: ltgy - occ off wh, sft - brit occ
frm, sb rnd, f-v f gr, mod srt
SLTY SH: med -dk gy, occ offwh, sb
blky-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 blky-sb plty, f-v f gr, gt, v arg, sl rthy,
ply srt

MD: 4,867'
TVD: 4,817.69'
Inclination: 4.13°
Azimuth: 191.73°
VS: 208.25'

118.84u
C1: 95.4%
C2: 0.9%
C3: 3.7%
C4: 0%

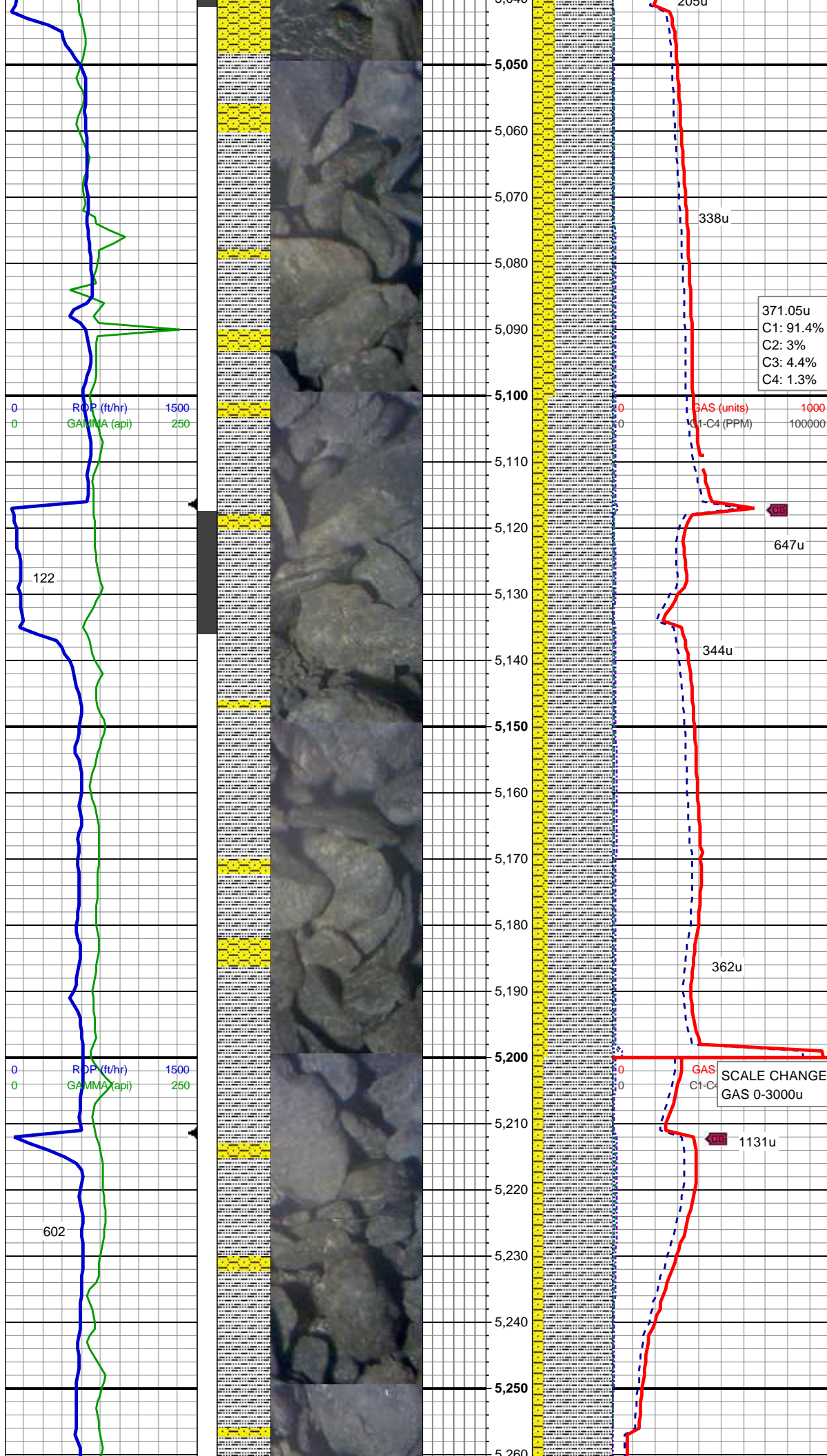
GAS (units) 1000
C1-C4 (PPM) 100000

SHY SS: ltgy - occ off wh, sft - brit occ
frm, sb rnd, f-v f gr, mod srt
SLTY SH: med -dk gy, occ offwh, sb
blky-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 blky-sb plty, f-v f gr, gt, v arg, sl rthy,
ply srt

MD: 4,961'
TVD: 4,911.52'
Inclination: 2.81°
Azimuth: 193.16°
VS: 210.12'

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

SLTY SH: med - dk gy, sb blky-sb plty, v



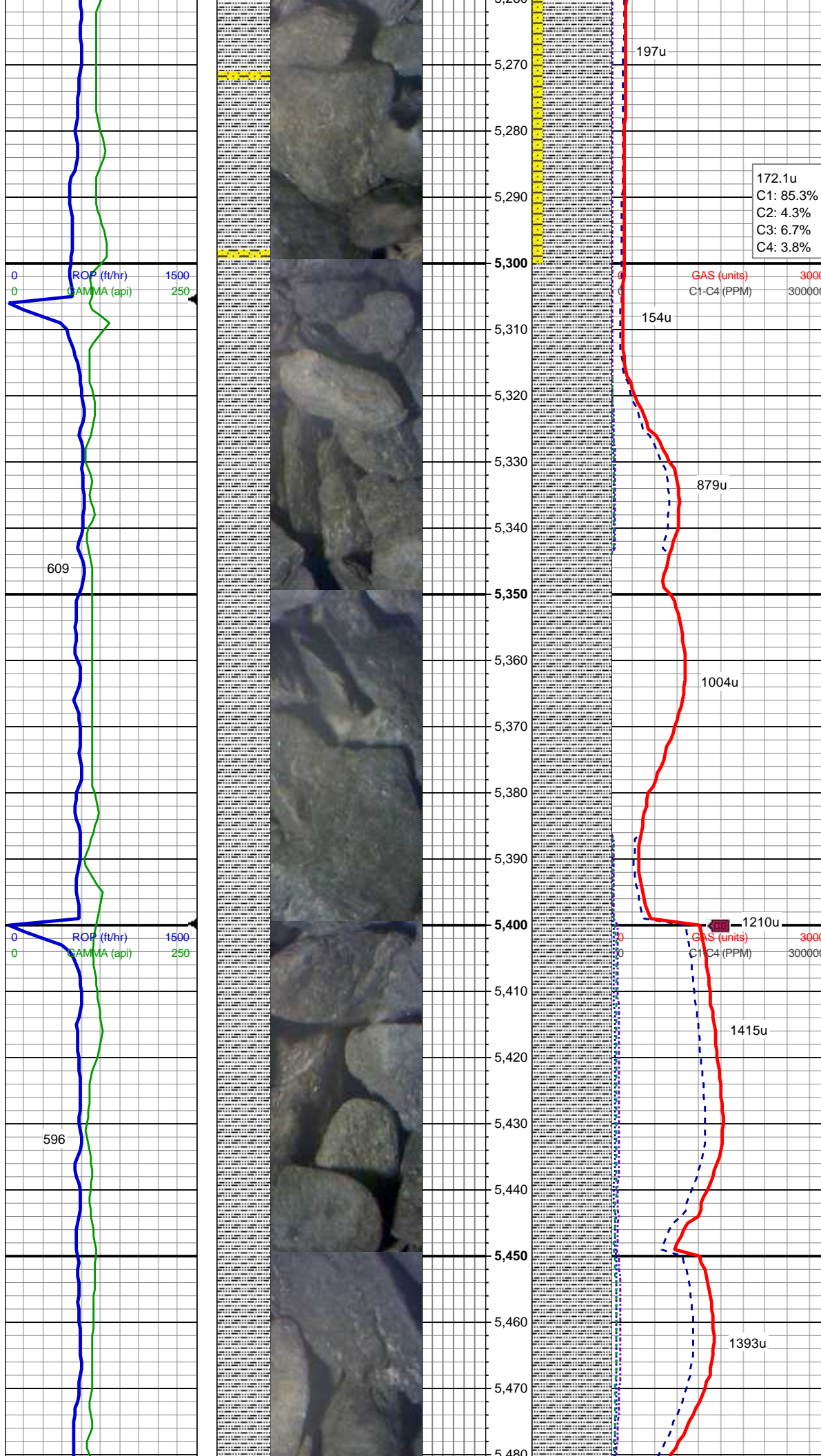
sft - sl frm, slt tex, sl rthy lstr, sl sdy ip, non calc
SHY SS: ltgy - occ off wh, sft - brit occ frm, sb rnd, f-v f gr, mod srt, arg cmt, tr wh ss

MD: 5,055'
TVD: 5,005.44'
Inclination: 1.93°
Azimuth: 193.92°
VS: 211.48'

SLTY SH: med - dk gy, sb blkly-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; no bent

MD: 5,149'
TVD: 5,099.41'
Inclination: 0.53°
Azimuth: 220.34°
VS: 212.37'

SLTY SH: med - dk gy, sb blkly-sb plty, v sft - sl frm, slt tex, sl rthy, 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; no bent

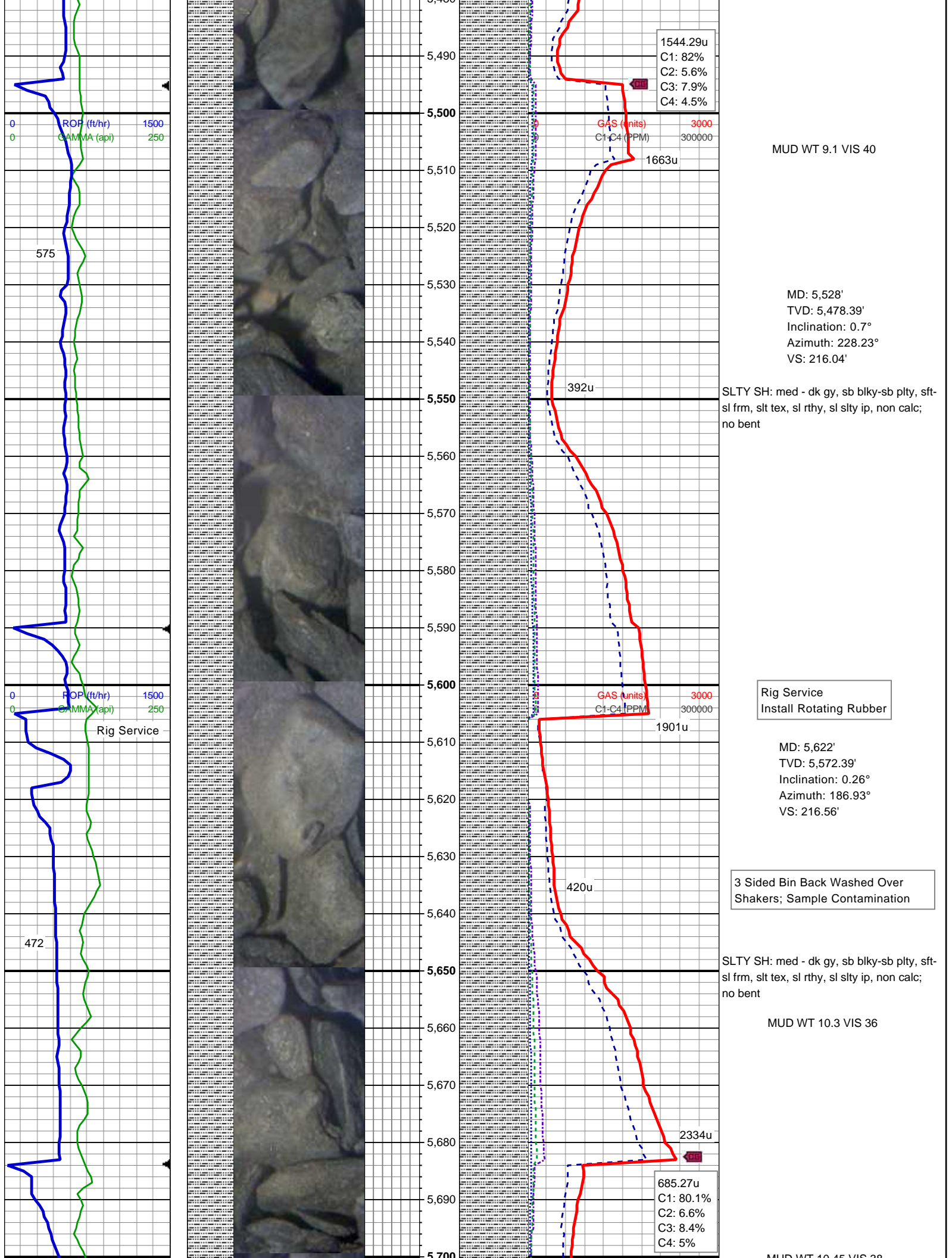
MD: 5,338'
TVD: 5,288.4'
Inclination: 0.62°
Azimuth: 232.49°
VS: 214.23'

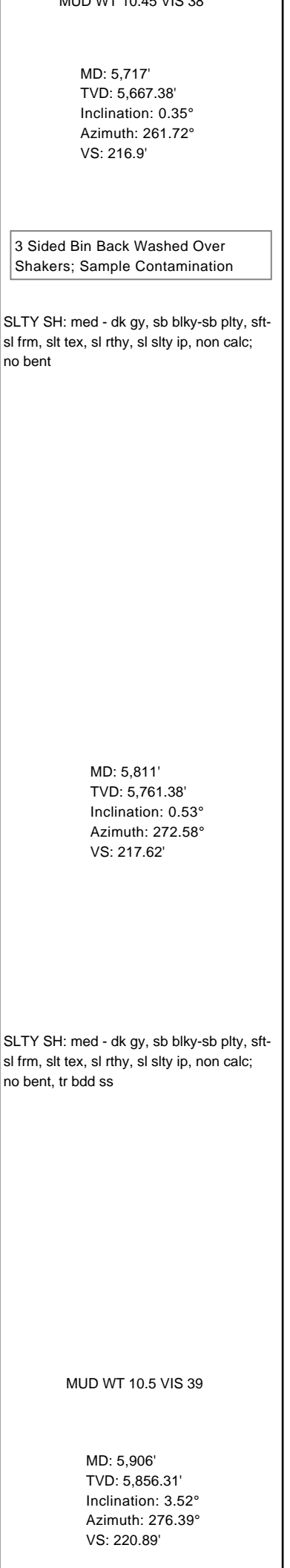
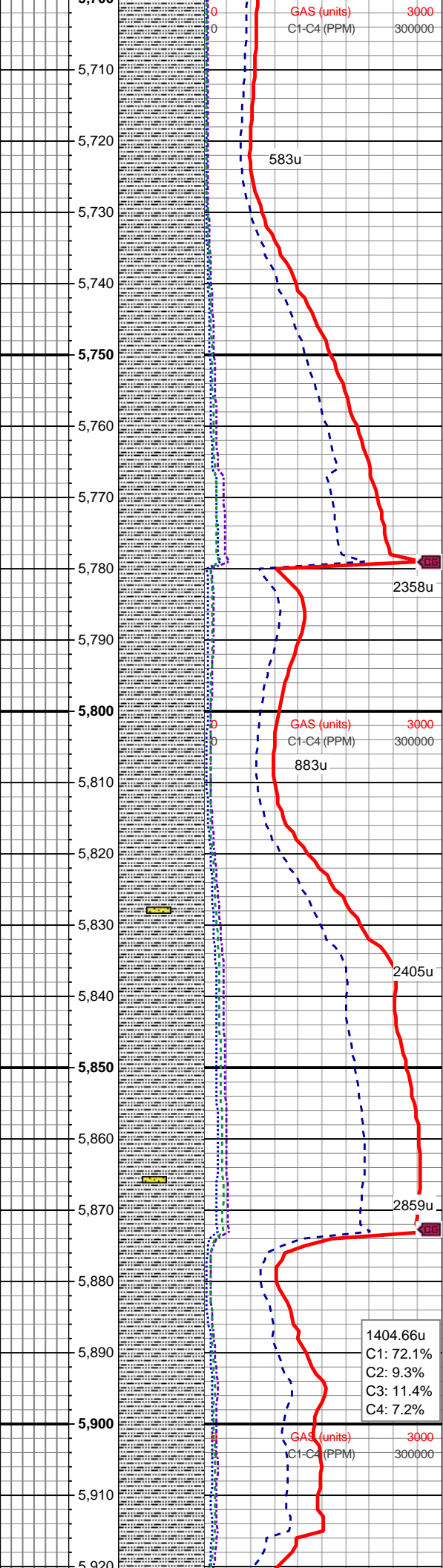
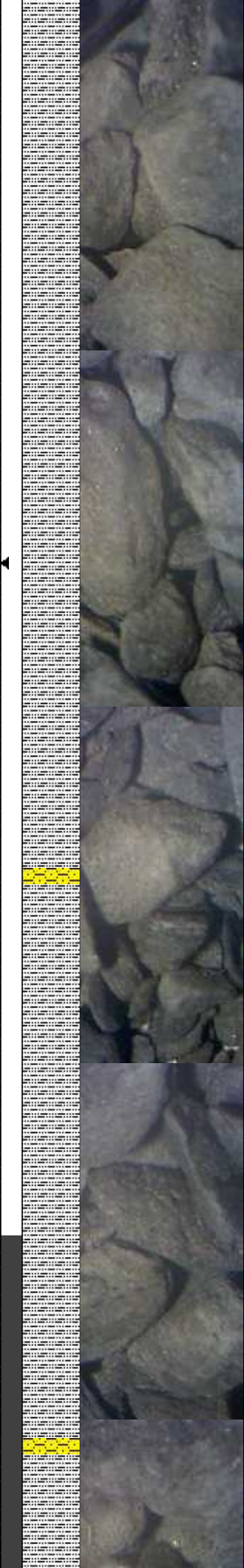
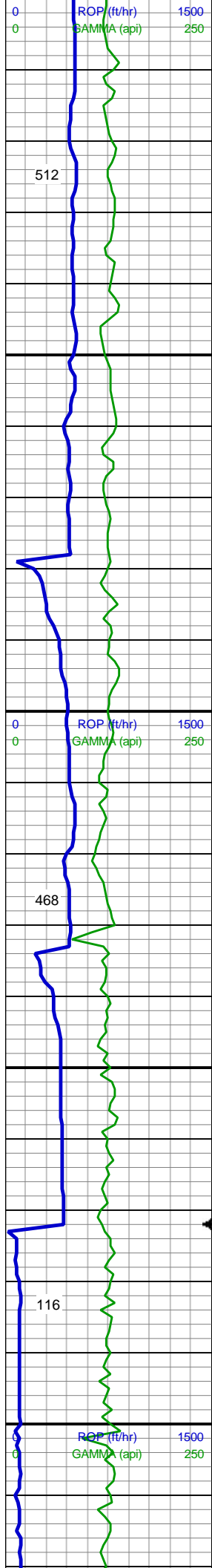
MUD WT 9.1 VIS 38

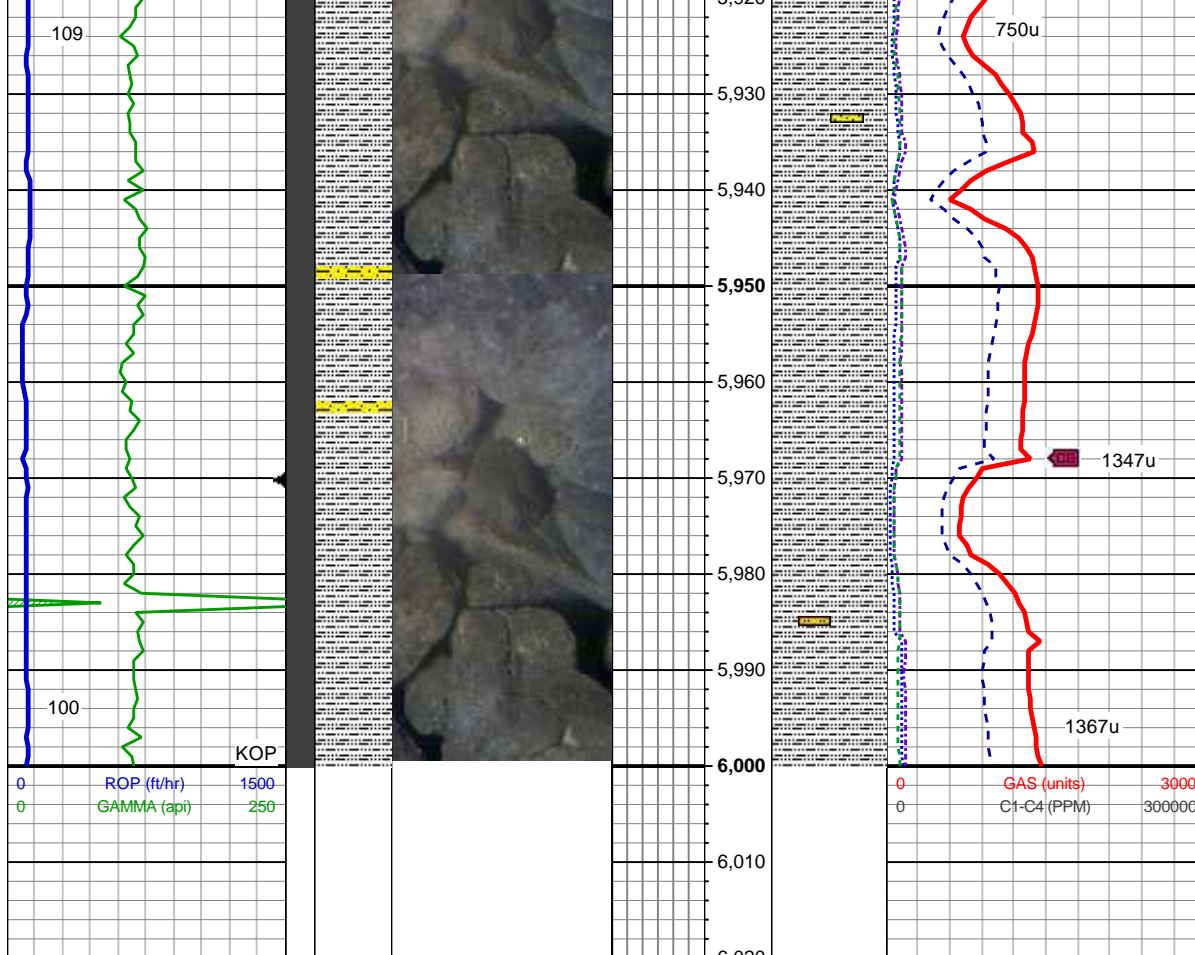
SLTY SH: med - dk gy, sb blk-sb plty, sft-
sl frm, slt tex, sl rthy, sl slty ip, non calc;
no bent

MD: 5,433'
TVD: 5,383.4'
Inclination: 0.62°
Azimuth: 232.67°
VS: 215.12'

SLTY SH: med - dk gy, sb blk-sb plty, sft-
sl frm, slt tex, sl rthy, sl slty ip, non calc;
no bent







SLTY SH: med - dk gy, sb blk-y-sb plty, sft-si frm, slt tex, sl rthy, sl slty ip, non calc; no bent, tr tan sltst

MD: 6,001'
TVD: 5,950.64'
Inclination: 9.67°
Azimuth: 275.8°
VS: 231.52'

MUDLOG CONTUINES ON "Wells Ranch AE19-626 Horz.mplot"