

COLUMBINE LOGGING

Scale: 5" / 100'
Measured Depth Log

Well Name Crow Creek AA01-789 VERT

Location SEC 1 T6N R63W

State COLORADO

County WELD

Country USA

Rig Number H&P 315

API Number 05-123-40166

AFE # 200435

Region DJ BASIN

Field WATTENBERG

Spud Date 12/16/2014

Drilling Completed 12/26/2014

Surface Coordinates NWNW SEC 1 T6N R63W
290' FNL; 500' FWL

LAT/LON: 40.52203/-104.39248

Bottom Hole Coordinates SEC 13 T6N R63W
30' FNL; 60' FWL

Ground Elevation 4,796'

K.B. Elevation 4,820'

Logged Interval 2,000' To 6,101'

Total Depth 16,966'

Formation NIOBRARA C CHALK

Type of Drilling Fluid LSND

Other Symbols

Oil Show

- DEAD
- EVEN
- QUESTIONABLE
- SPOTTED STAINING

Porosity

- E EARTHY
- F FENESTRAL
- F FRACTURE
- INTERCRYSTALLINE
- INTEROOLITIC
- MOLDIC

- ORGANIC
- PINPOINT
- VUGGY

Engineering

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

- 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
- WIRELINE TESTED - LEFT

- WIRELINE TESTED - RT

Rounding

- ANGULAR
- ROUNDED
- SUBANG
- SUBRND

Textures

- BOUNDSTONE
- CHALKY
- CRYPTOXLN
- E EARTHY
- FINELYXLN













- GRAINSTONE
- L LITHOGRAPHIC
- MIX MICROXLN
- MS MUDSTONE
- PS PACKSTONE
- WS WACKSTONE

Sorting

- M MODERATE
- P POOR
- W WELL

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

 GYPSIFEROUS

 HEAVY MINERAL

 KAOLIN

 MARLSTONE

 MINERAL CRYSTALS

 NODULES

 PHOSPHATE PELLETS

 PYRITE

 SALT CAST

 SANDY

 SILICEOUS

 SILTY

 TUFFACEOUS


Stringer

 ANHYDRITE STRINGER

 BENTONITE STRINGER

 COAL STRINGER

 DOLOMITE STRINGER

 GYPSUM STRINGER

 LIMESTONE STRINGER

 MARLSTONE (CALC) STRG







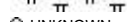


 MARLSTONE (DOL) STRG

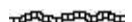
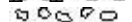




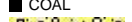


 SANDSTONE STRINGER

 SHALE STRINGER

 SILTSTONE STRINGER

Rock Types

 SHALY SILTSTONE
 SHALY SANDSTONE
 SANDSTONE
 SILTY SHALE
 LIMESTONE
 CHALK
 MARLSTONE
 UNKNOWN
 ANHYDRITE

 BENTONITE
 BRECCIA
 CEMENT
 CHERT
 CLAY CHOKESAND
 CLAYSTONE
 COAL
 CONGLOMERATE
 DOLOMITE

 GRANITE
 GYPSUM
 IGNEOUS
 SIDERITE or LIMONITE
 METAMORPHIC
 NO SAMPLE
 SALT
 SALT- PEPPER SAND
 SHALE

 SHALE COLORED
 SHALE GRAY
 SILTSTONE
 TILL
 TUFF
 WELDED TUFF

Operator

Company Noble Energy Inc

Address 1625 BROADWAY SUITE 2200
DENVER, CO 80202




Geologist

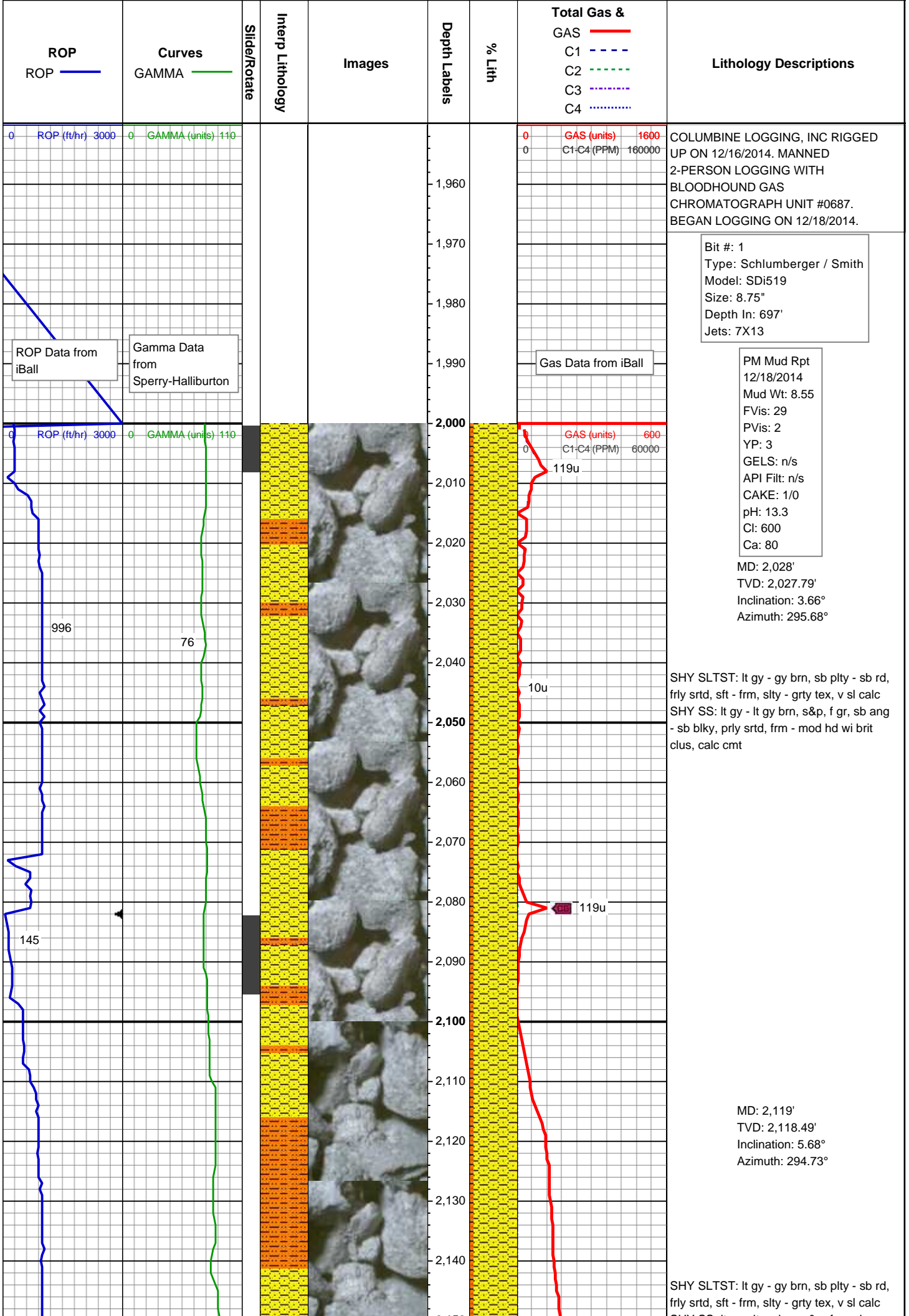
Name NATHAN MURPHY; ZACH UBER

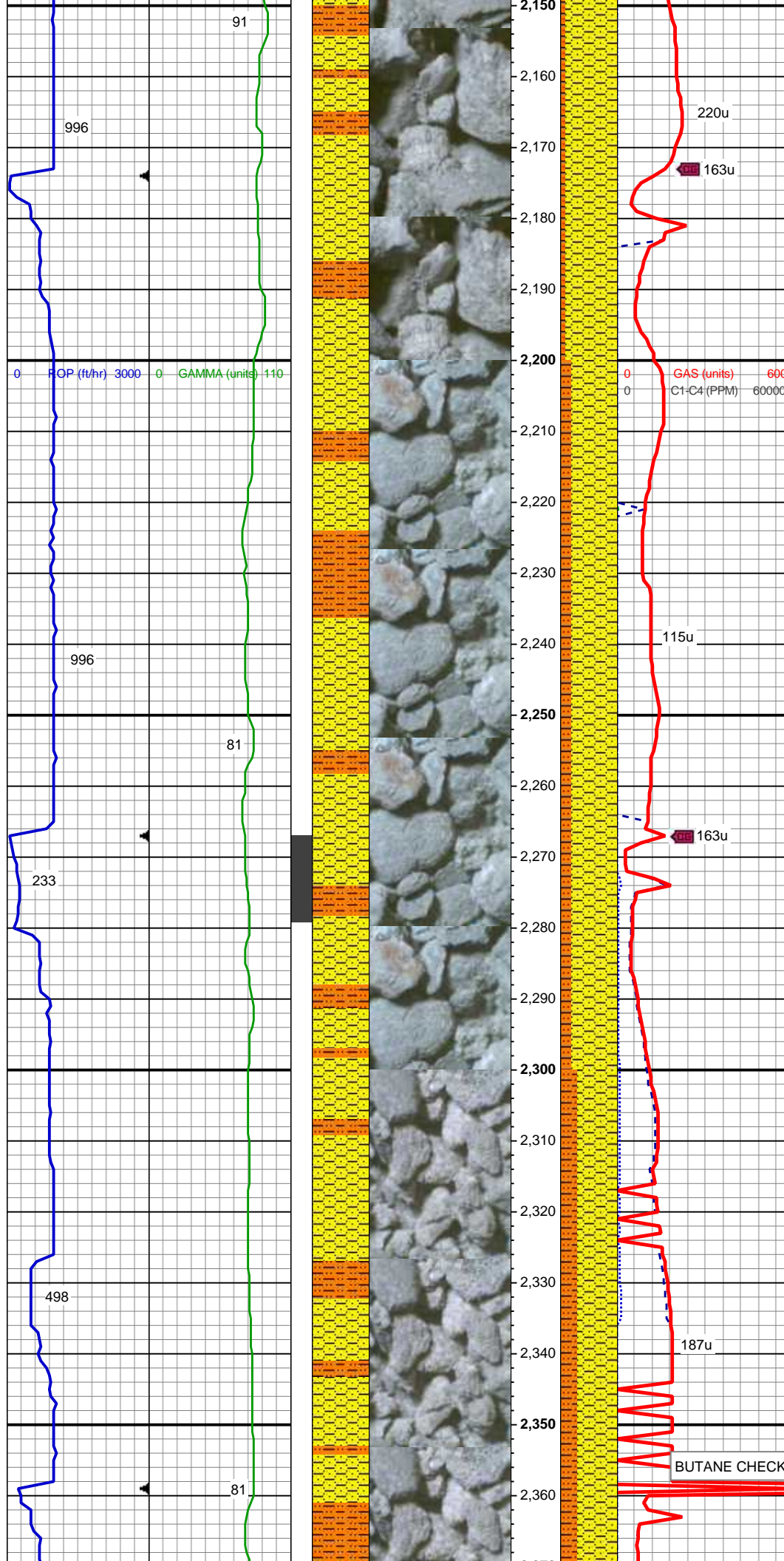
Company COLUMBINE LOGGING, INC

Address 602 S LIPAN ST
DENVER, CO 80223

Zone Color Coding

 Oil	 Condensate	 Gas
 Note	 Core	 Pressure
 Error	 Water	 Seal

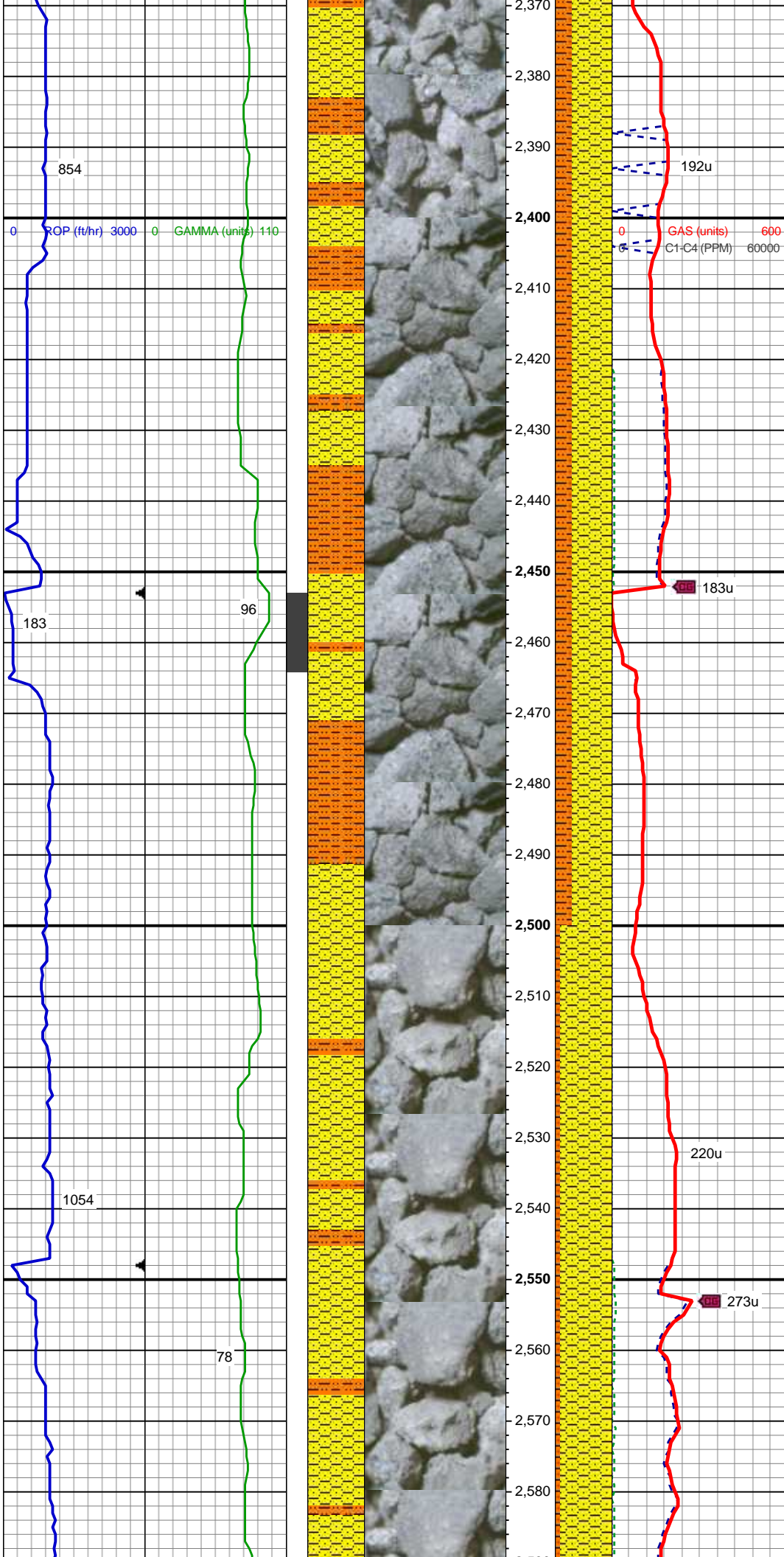




SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blkly, prly srted, calc cmt

SHY SLTST: lt gy - gy brn, sb plty - sb rd,
frly srted, sft - frm, slty - grty tex, v sl calc
SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blkly, prly srted, frm, calc cmt

SHY SLTST: lt gy - gy brn, sb plty - sb rd,
frly srted, sft - frm, slty - grty tex, v sl calc
SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blkly, prly srted, frm - mod hd wi brit
clus, calc cmt



MD: 2,397'
TVD: 2,394.76'
Inclination: 6.86°
Azimuth: 296.9°

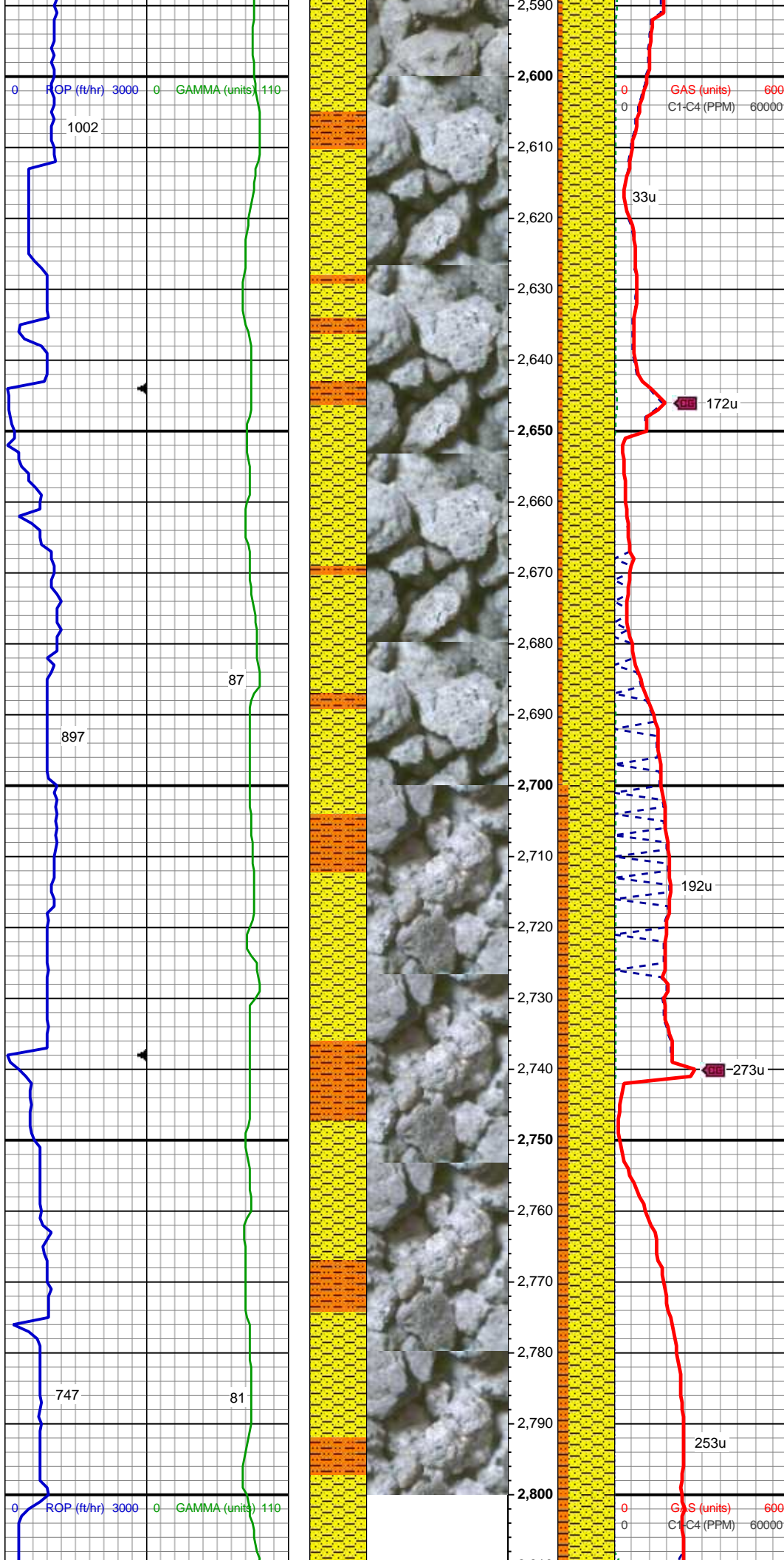
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frly srted, sft - frm, slty - grty tex, v sl calc
SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srted, frm - mod hd wi brit
clus, calc cmt

MD: 2,492'
TVD: 2,488.87'
Inclination: 8.77°
Azimuth: 289.11°

SHY SLTST: lt gy - gy brn, sb plty - sb rd,
frly srted, sft - frm, slty - grty tex, v sl calc
SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srted, frm - mod hd wi brit
clus, calc cmt

MD: 2,587'
TVD: 2,582.79'
Inclination: 8.51°

Azimuth: 289.48°

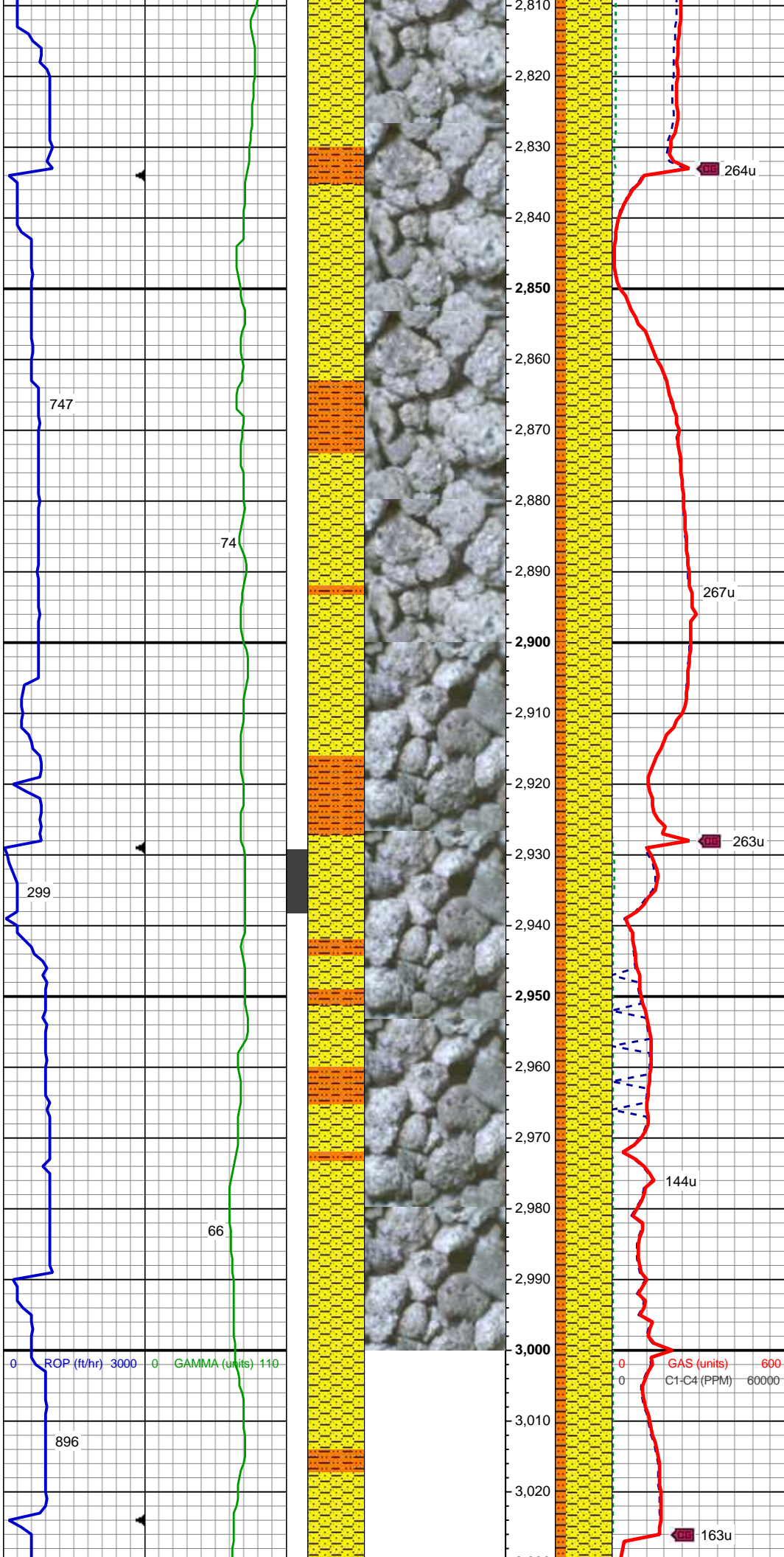


SHY SLTST: lt gy - gy brn, sb plty - sb rd,
frly srted, sft - frm, slty - grty tex, v sl calc
SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srted, frm - mod hd wi brit
clus, calc cmt

MD: 2,681'
TVD: 2,675.71'
Inclination: 8.91°
Azimuth: 292.38°

SHY SLTST: lt gy - gy brn, sb plty - sb rd,
frly srted, sft - frm, slty - grty tex, v sl calc
SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srted, frm - mod hd wi brit
clus, calc cmt

MD: 2,776'
TVD: 2,769.6'
Inclination: 8.6°
Azimuth: 290.66°

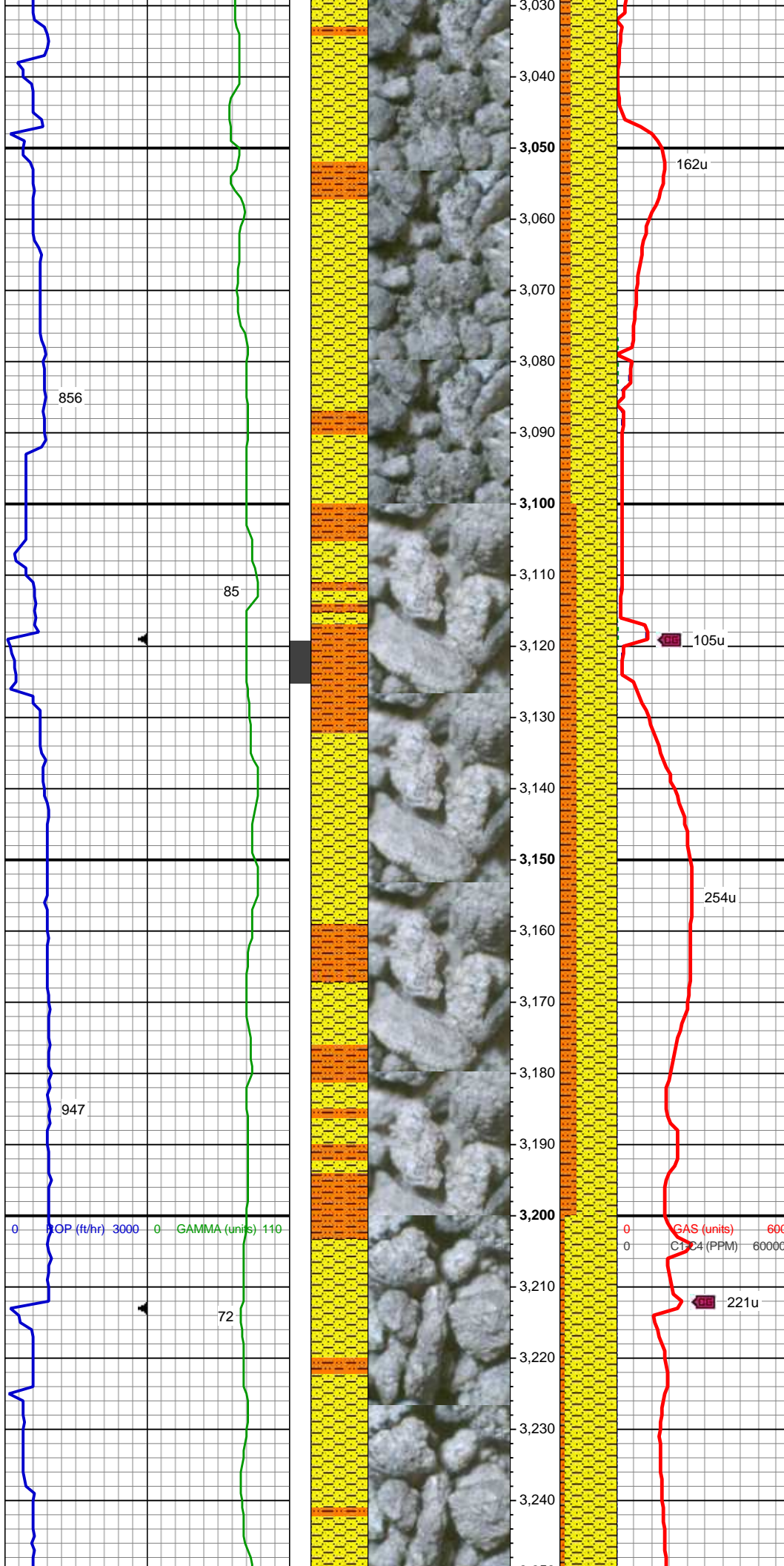


SHY SLTST: lt gy - gy brn, sb plty - sb rd,
frly srted, sft - frm, slty - grty tex, v sl calc
SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srted, frm - mod hd wi brit
clus, calc cmt

MD: 2,871'
TVD: 2,863.55'
Inclination: 8.51°
Azimuth: 289.35°

SHY SLTST: lt gy - gy brn, sb plty - sb rd,
frly srted, sft - frm, slty - grty tex, v sl calc
SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srted, frm - mod hd wi brit
clus, calc cmt

MD: 2,966'
TVD: 2,957.45'
Inclination: 8.95°
Azimuth: 295.94°



SHY SLTST: lt gy - gy brn, sb plty - sb rd,
frly srted, sft - frm, slty - grty tex, v sl calc
SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srted, frm - mod hd wi brit
clus, calc cmt

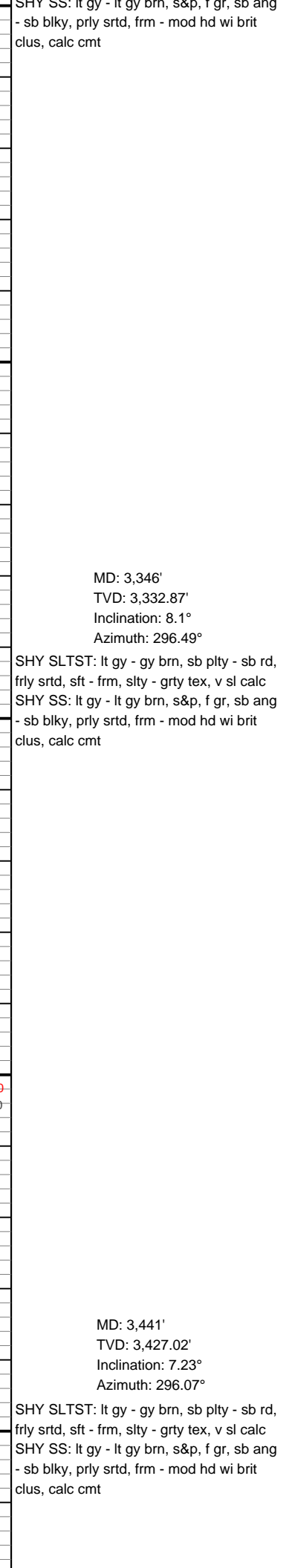
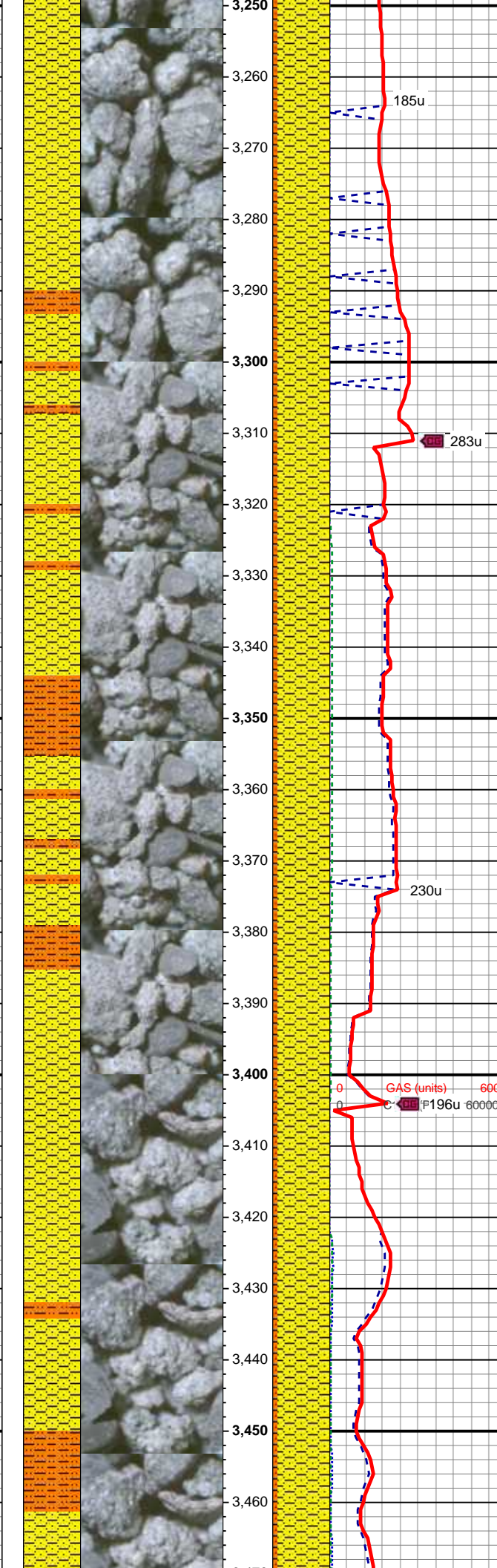
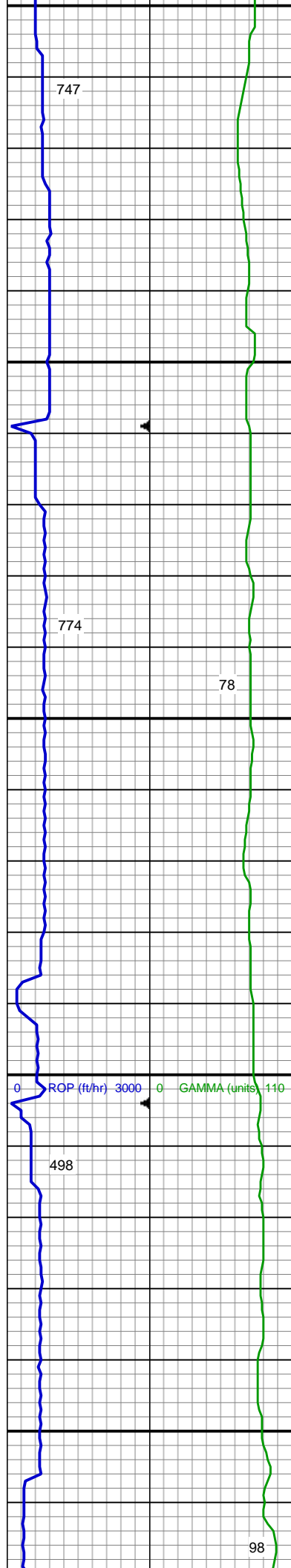
MD: 3,061'
TVD: 3,051.27'
Inclination: 9.08°
Azimuth: 294.67°

SHY SLTST: lt gy - gy brn, sb plty - sb rd,
frly srted, sft - frm, slty - grty tex, v sl calc
SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srted, frm - mod hd wi brit
clus, calc cmt

MD: 3,156'
TVD: 3,145.07'
Inclination: 9.19°
Azimuth: 299.36°

SHY SLTST: lt gy - gy brn, sb plty - sb rd,
frly srted, sft - frm, slty - grty tex, v sl calc
SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srted, frm - mod hd wi brit
clus, calc cmt

MD: 3,251'
TVD: 3,238.9'
Inclination: 8.81°
Azimuth: 297.97°



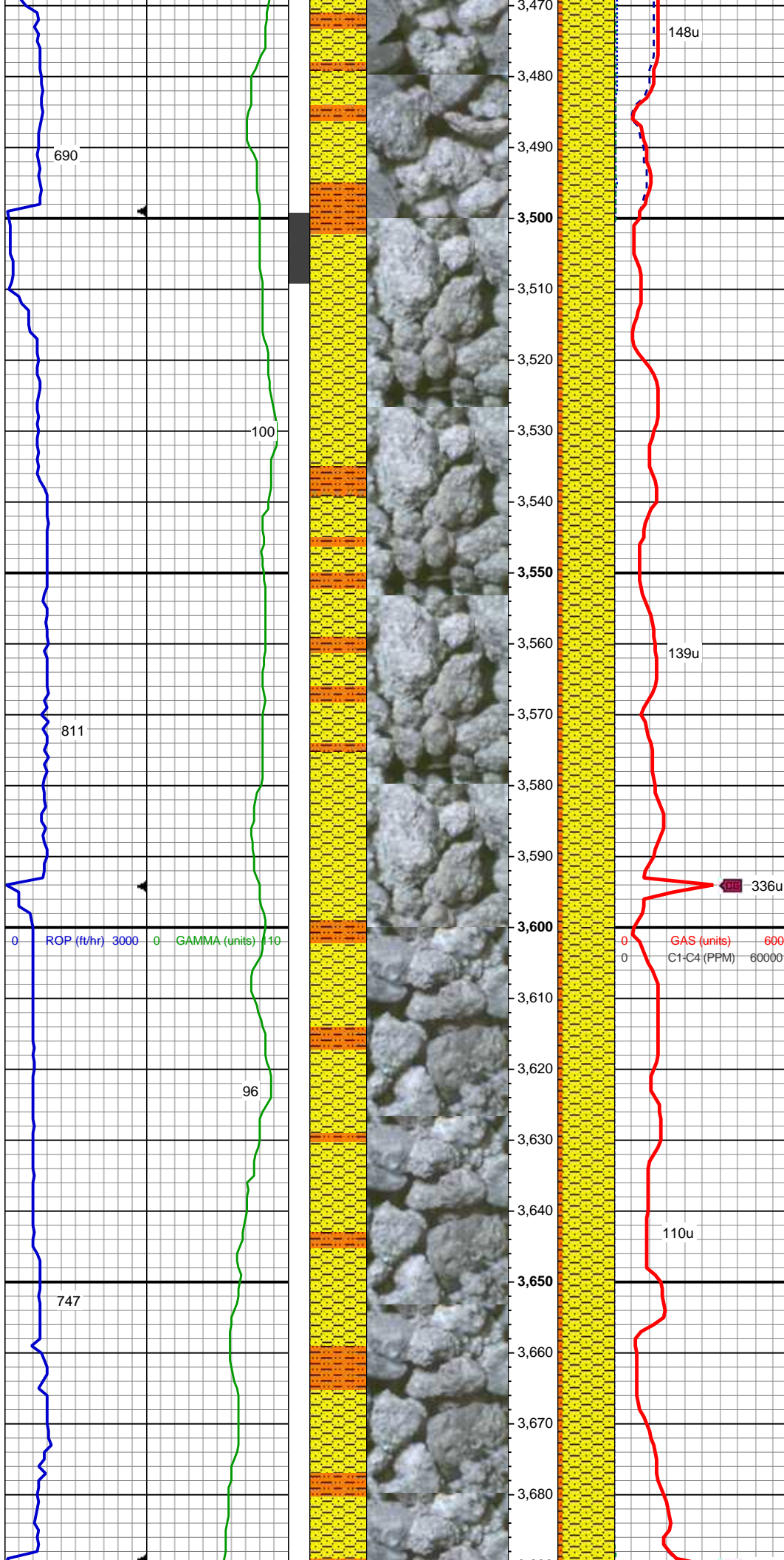
SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srted, frm - mod hd wi brit
clus, calc cmt

MD: 3,346'
TVD: 3,332.87'
Inclination: 8.1°
Azimuth: 296.49°

SHY SLTST: lt gy - gy brn, sb plty - sb rd,
frly srted, sft - frm, slty - grty tex, v sl calc
SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srted, frm - mod hd wi brit
clus, calc cmt

MD: 3,441'
TVD: 3,427.02'
Inclination: 7.23°
Azimuth: 296.07°

SHY SLTST: lt gy - gy brn, sb plty - sb rd,
frly srted, sft - frm, slty - grty tex, v sl calc
SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srted, frm - mod hd wi brit
clus, calc cmt



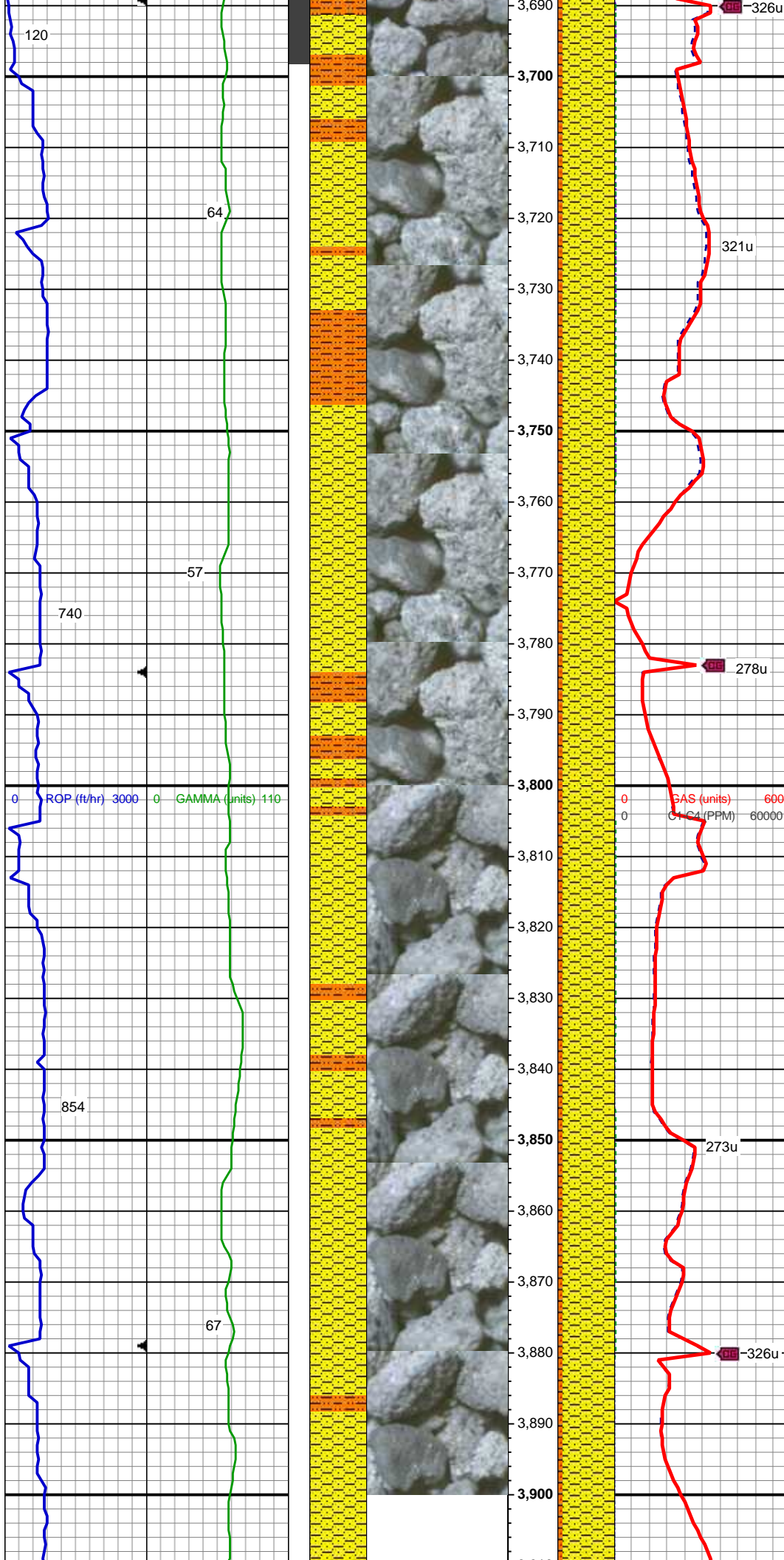
MD: 3,536'
TVD: 3,521.13'
Inclination: 8.45°
Azimuth: 299.12°

SHY SLTST: lt gy - gy brn, sb plty - sb rd,
frly srted, sft - frm, slty - grty tex, v sl calc
SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srted, frm - mod hd wi brit
clus, calc cmt

MD: 3,631'
TVD: 3,615.15'
Inclination: 8.01°
Azimuth: 298.93°

PARKMAN TOP @
3,646' MD; 3,629' TVD

SHY SLTST: lt gy - gy brn, sb plty - sb rd,
frly srted, sft - frm, slty - grty tex, v sl calc
SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srted, frm - mod hd wi brit
clus, calc cmt

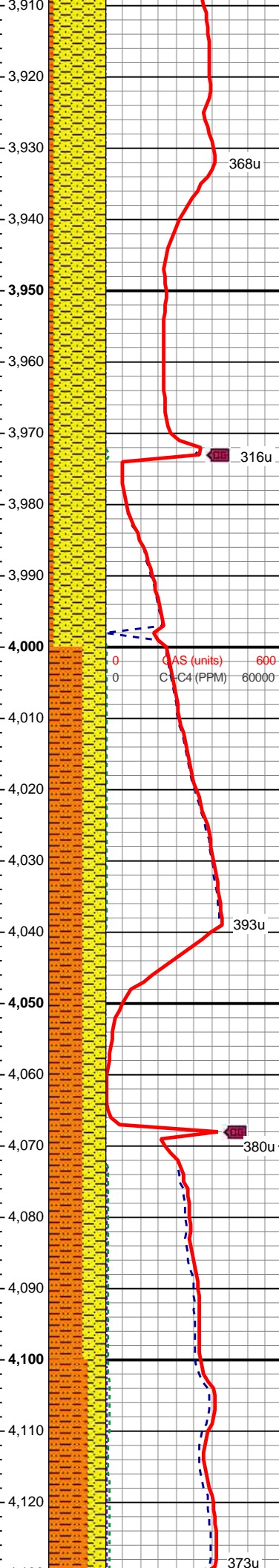
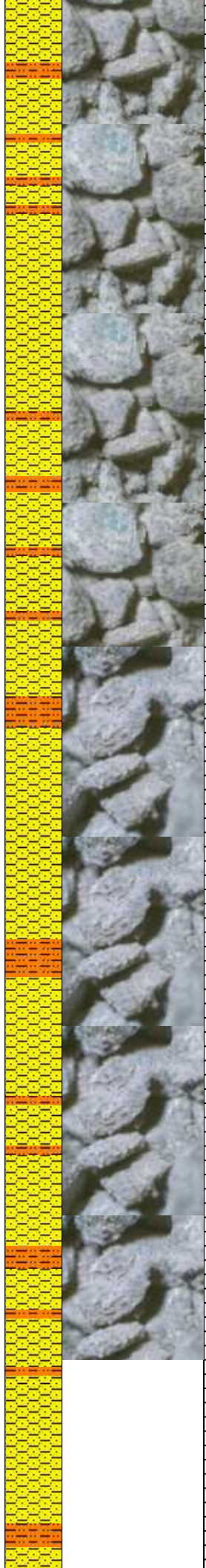
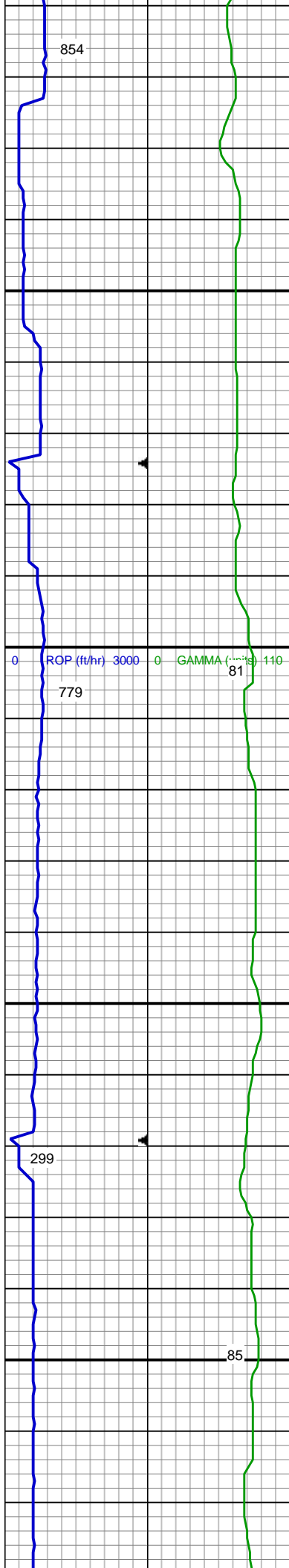


MD: 3,726'
TVD: 3,709.03'
Inclination: 9.55°
Azimuth: 296.42°

SHY SLTST: lt gy - gy brn, sb plty - sb rd,
frly srted, sft - frm, slty - grty tex, v sl calc
SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srted, frm - mod hd wi brit
clus, calc cmt

MD: 3,820'
TVD: 3,801.64'
Inclination: 10.2°
Azimuth: 296.16°

SHY SLTST: lt gy - gy brn, sb plty - sb rd,
frly srted, sft - frm, slty - grty tex, v sl calc
SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srted, frm - mod hd wi brit
clus, calc cmt



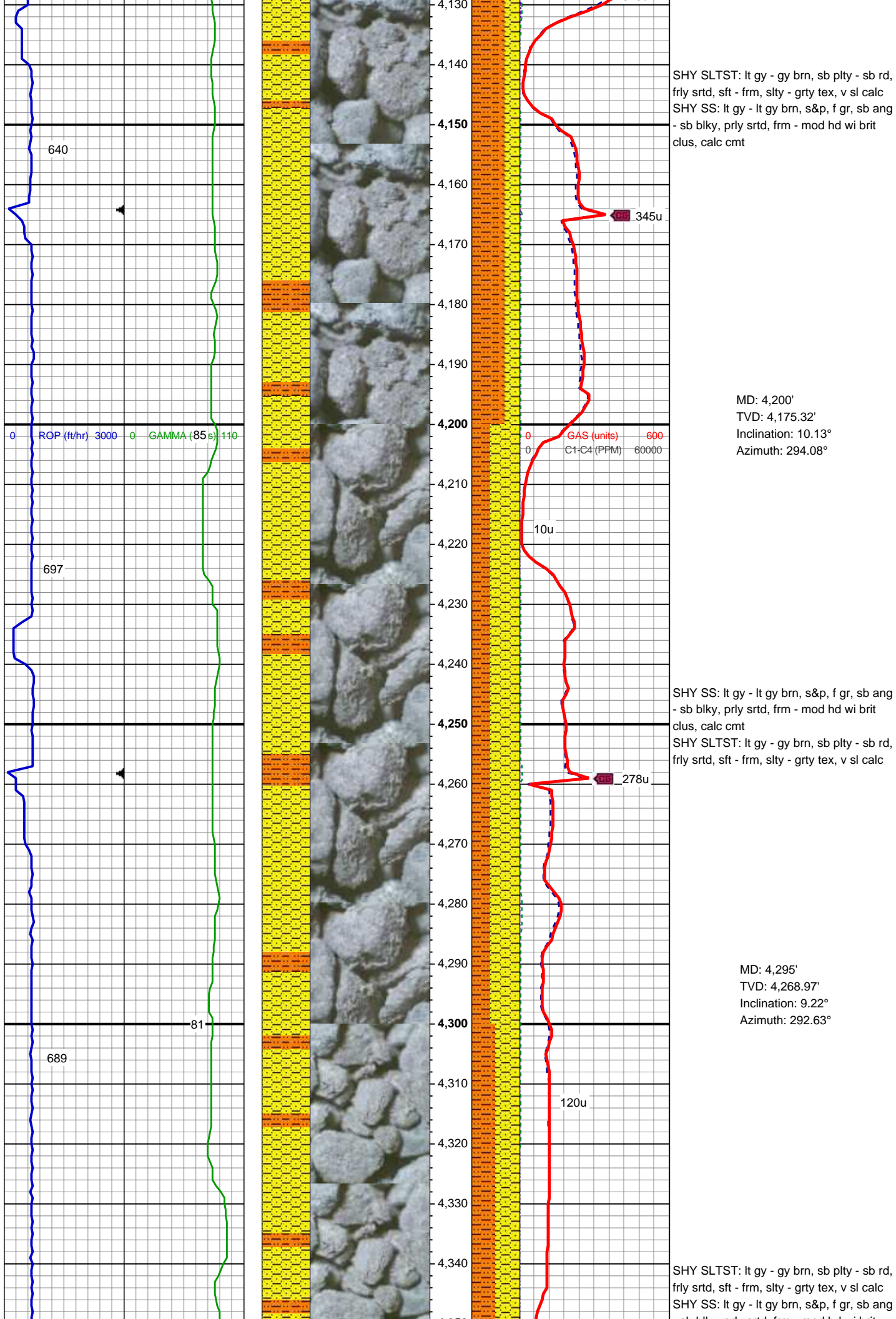
MD: 3,915'
TVD: 3,895.1'
Inclination: 10.45°
Azimuth: 296.76°

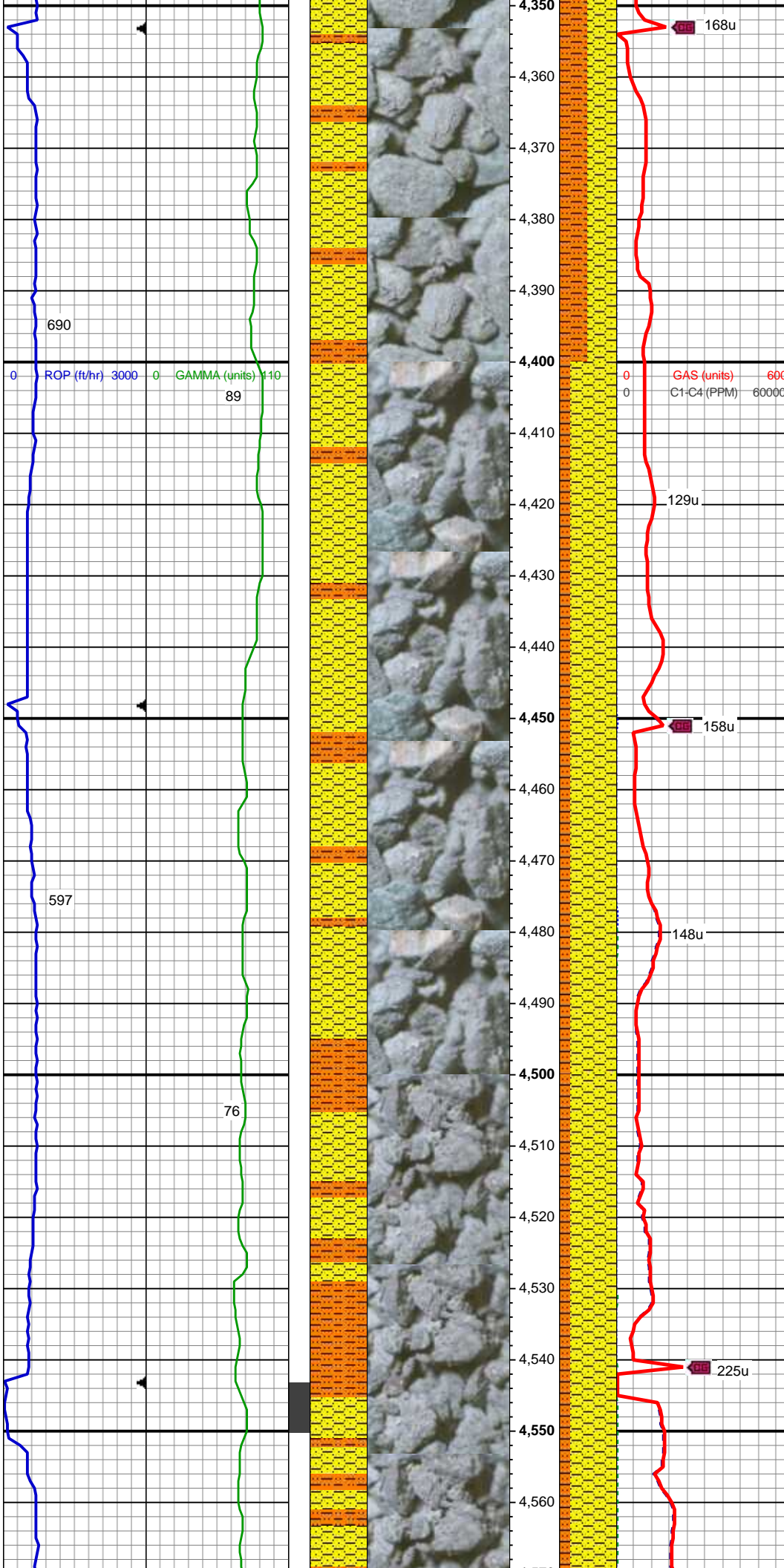
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SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang - sb blk, prly srted, frm - mod hd wi brit clus, calc cmt

MD: 4,010'
TVD: 3,988.46'
Inclination: 10.9°
Azimuth: 296.28°

SHY SLTST: lt gy - gy brn, sb plty - sb rd, frly srted, sft - frm, slty - grty tex, v sl calc
SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang - sb blk, prly srted, frm - mod hd wi brit clus, calc cmt

MD: 4,105'
TVD: 4,081.83'
Inclination: 10.34°
Azimuth: 294.98°





- sb blkly, prly srted, frm - mod hd wi brit
clus, calc cmt

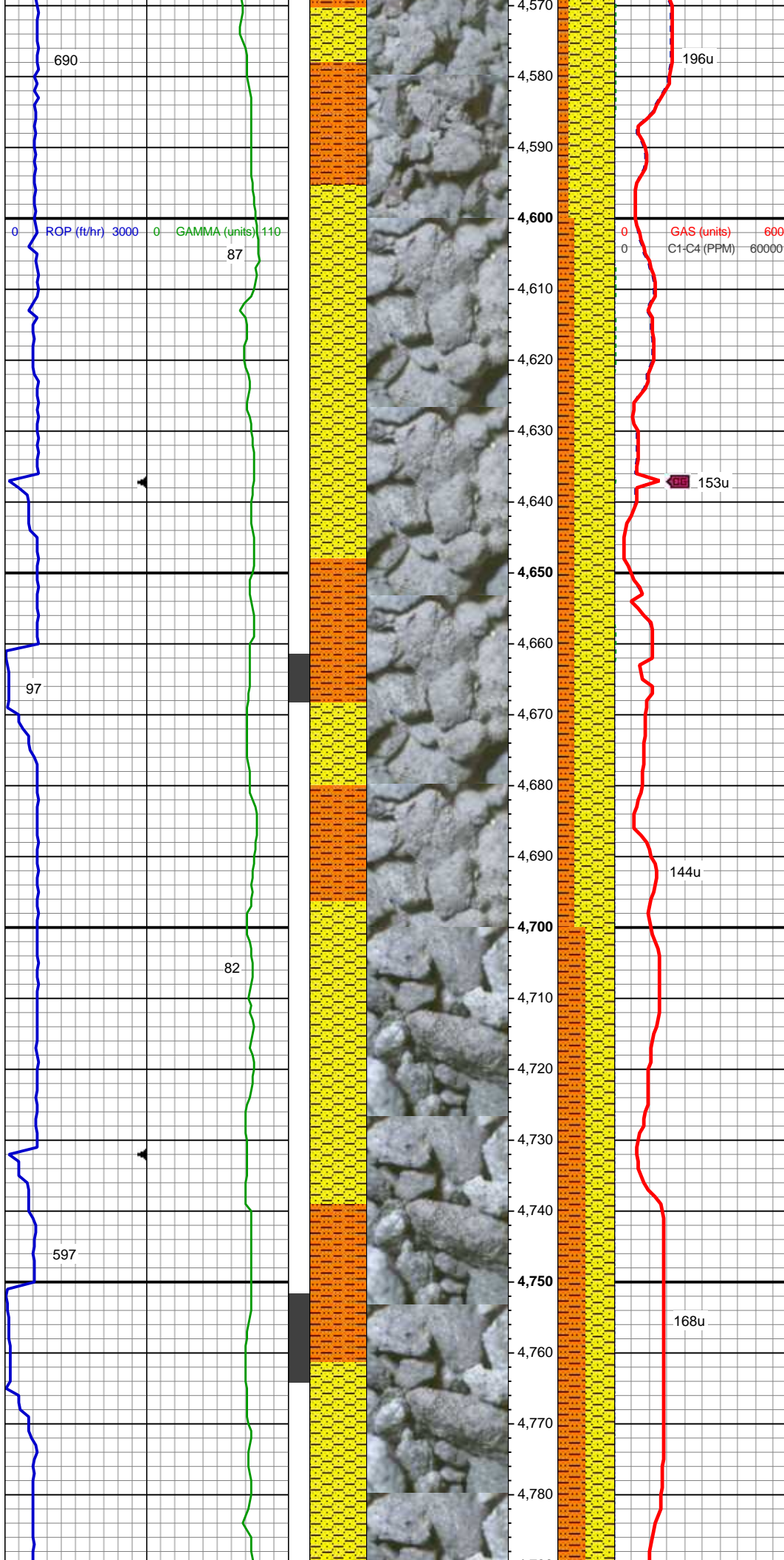
MD: 4,389'
TVD: 4,361.91'
Inclination: 8°
Azimuth: 291.8°

SUSSEX TOP @
4,443' MD; 4,418' TVD

SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blkly, prly srted, frm - mod hd wi brit
clus, calc cmt
SHY SLTST: lt gy - gy brn, sb plty - sb rd,
frylly srted, sft - frm, slty - grty tex, v sl calc

MD: 4,483'
TVD: 4,455.05'
Inclination: 7.48°
Azimuth: 288.54°

SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blkly, prly srted, frm - mod hd wi brit
clus, calc cmt
SHY SLTST: lt gy - gy brn, sb plty - sb rd,
frylly srted, sft - frm, slty - grty tex, v sl calc



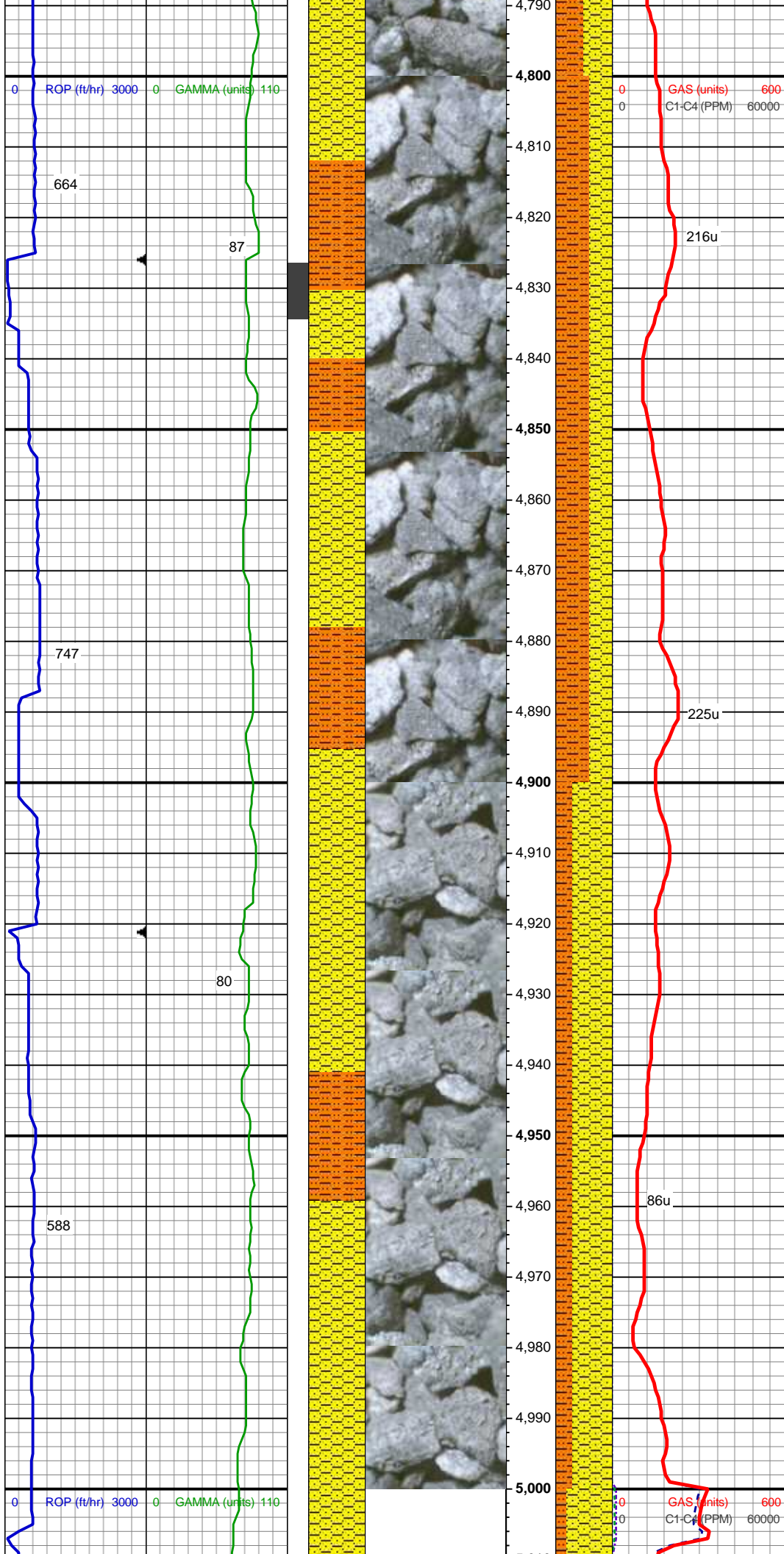
MD: 4,578'
TVD: 4,549.26'
Inclination: 7.35°
Azimuth: 292.44°

SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srt, frm - mod hd wi brit
clus, calc cmt
SHY SLTST: lt gy - gy brn, sb plty - sb rd,
frly srt, sft - frm, slty - grty tex, v sl calc

MD: 4,672'
TVD: 4,642.52'
Inclination: 7.01°
Azimuth: 294.46°

SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srt, frm - mod hd wi brit
clus, calc cmt
SHY SLTST: lt gy - gy brn, sb plty - sb rd,
frly srt, sft - frm, slty - grty tex, v sl calc

MD: 4,767'
TVD: 4,736.68'
Inclination: 8.24°
Azimuth: 295.41°



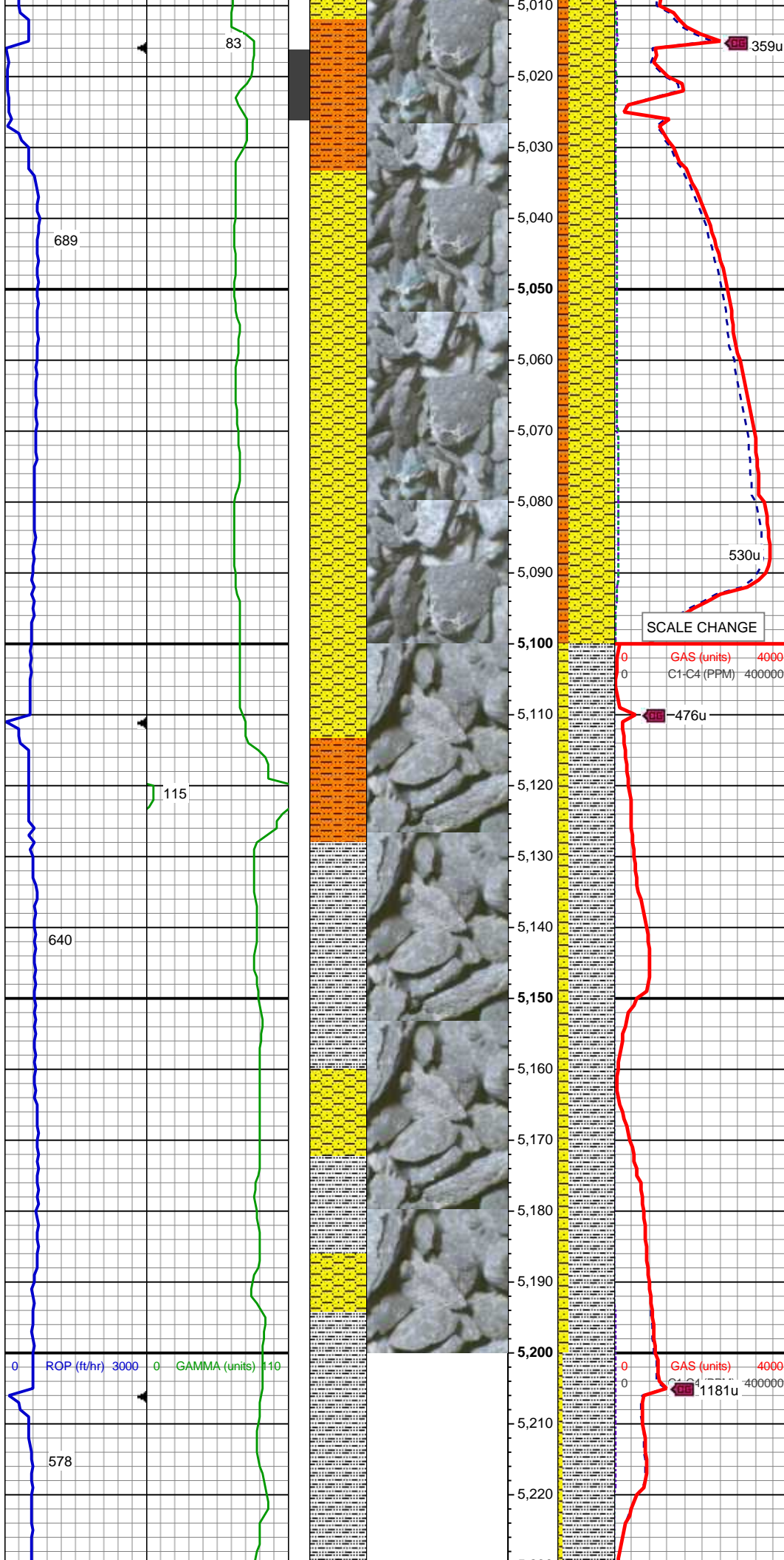
SHY SLTST: lt gy - gy brn, sb plty - sb rd,
frly srted, sft - frm, slty - grty tex, v sl calc
SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srted, frm - mod hd wi brit
clus, calc cmt

MD: 4,861'
TVD: 4,829.66'
Inclination: 8.69°
Azimuth: 301.18°

SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly srted, frm - mod hd wi brit
clus, calc cmt
SHY SLTST: lt gy - gy brn, sb plty - sb rd,
frly srted, sft - frm, slty - grty tex, v sl calc

MD: 4,956'
TVD: 4,923.69'
Inclination: 7.66°
Azimuth: 298.32°

SHANNON TOP @
4,957' MD; 4,922' TVD



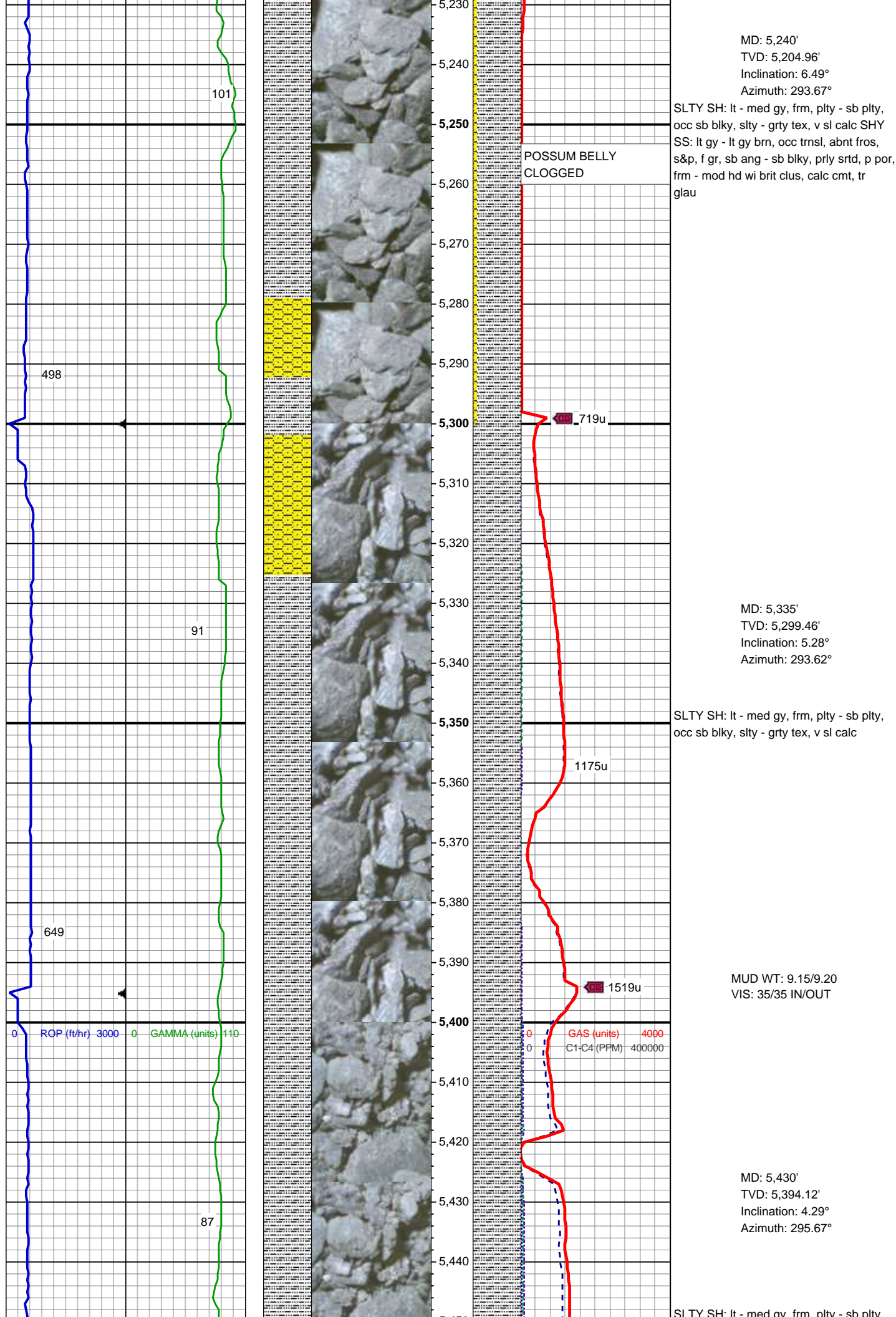
MD: 5,051'
TVD: 5,017.71'
Inclination: 8.78°
Azimuth: 296.4°

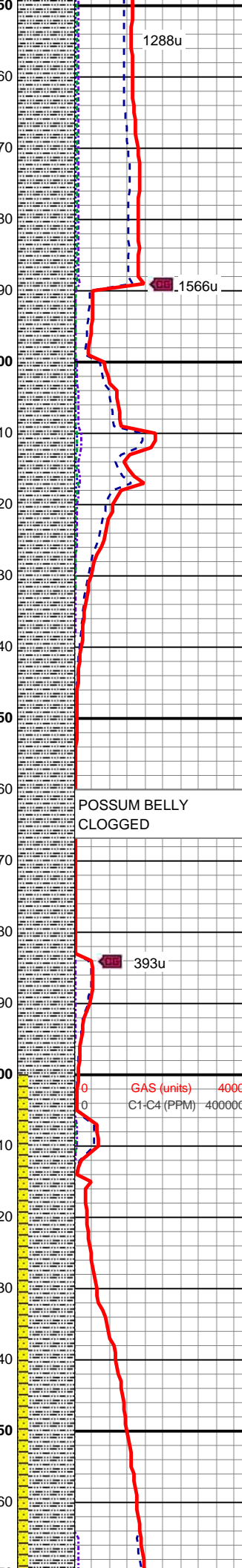
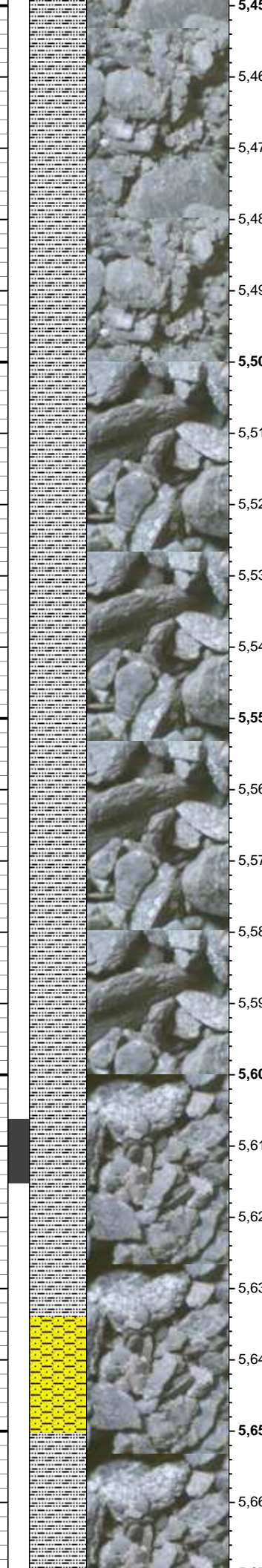
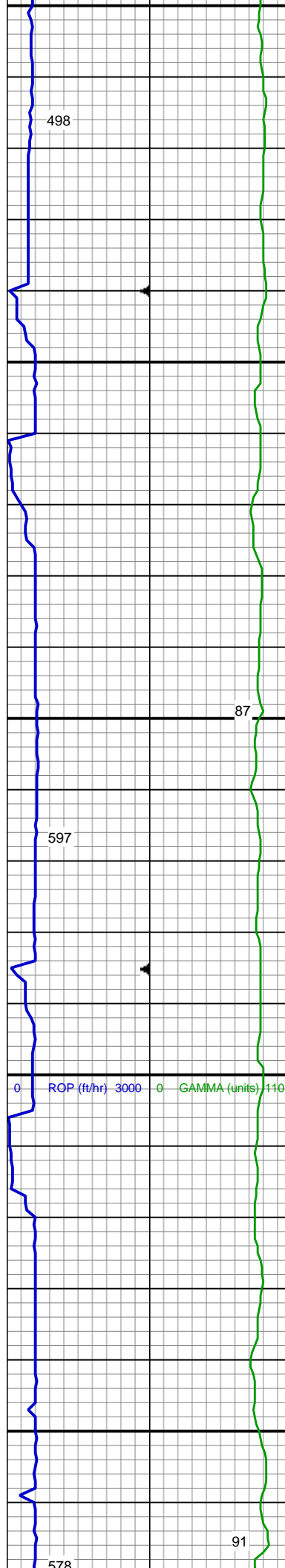
SHY SS: lt gy - lt gy brn, s&p, f gr, sb ang
- sb blk, prly strd, frm - mod hd wi brit
clus, calc cmt
SHY SLTST: lt gy - gy brn, sb plty - sb rd,
frly strd, sft - frm, slty - grty tex, v sl calc

MD: 5,146'
TVD: 5,111.7'
Inclination: 7.92°
Azimuth: 296°

SLTY SH: lt - med gy, frm, plty - sb plty,
occ sb blk, slty - grty tex, v sl calc SHY
SS: lt gy - lt gy brn, occ trns, abnt fros,
s&p, f gr, sb ang - sb blk, prly strd, p por,
frm - mod hd wi brit clus, calc cmt, tr
glau

AM Mud Rpt
12/19/2014
Mud Wt: 8.90
FVis: 30
PVis: 3
YP: 3
GELS: n/s
API Filt: n/s
CAKE: 1/0
pH: 9.7
Cl: 900
Ca: 80





occ sb blkly, slty - grty tex, v sl calc

MUD WT: 9.25/9.35
VIS: 38/36 IN/OUT

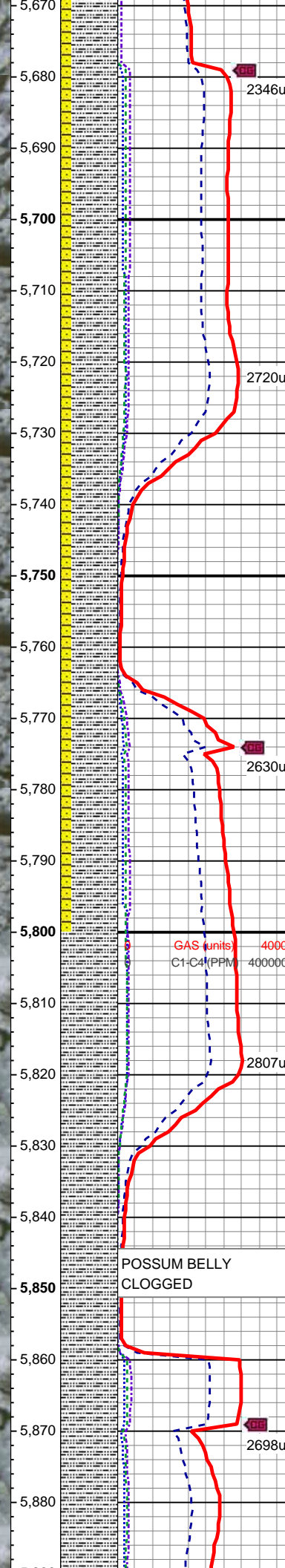
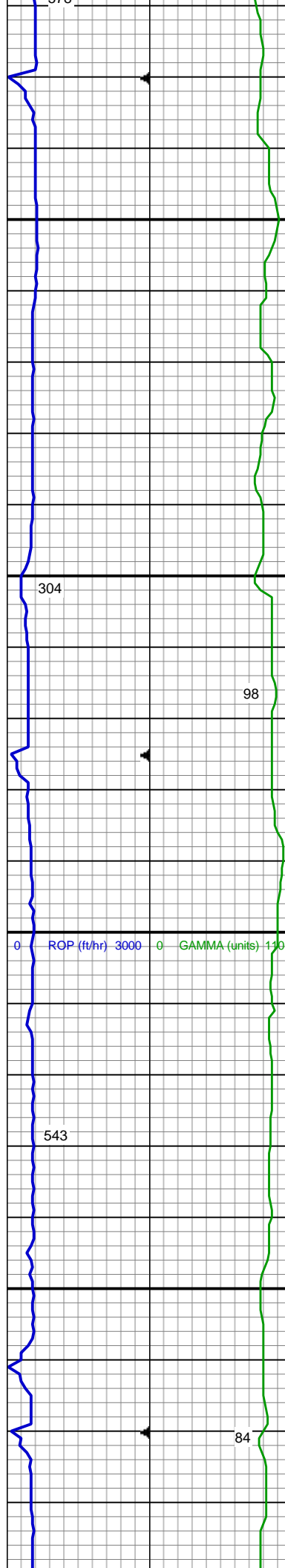
MD: 5,525'
TVD: 5,488.93'
Inclination: 3.08°
Azimuth: 297.4°

SLTY SH: lt - med gy, frm, plty - sb plty,
occ sb blkly, slty - grty tex, v sl calc

POSSUM BELLY
CLOGGED

MD: 5,620'
TVD: 5,583.85'
Inclination: 1.42°
Azimuth: 280.9°

SLTY SH: lt - med gy, frm, plty - sb plty,
occ sb blkly, slty - grty tex, v sl calc SHY
SS: lt gy - lt gy brn, occ trnsl, abnt fros,
s&p, f gr, sb ang - sb blkly, prly strd, p por,
frm - mod hd wi brit clus, calc cmt, tr
glau



MUD WT: 9.35/9.35
VIS: 36/36 IN/OUT

MD: 5,714'
TVD: 5,677.83'
Inclination: 1.11°
Azimuth: 247.75°

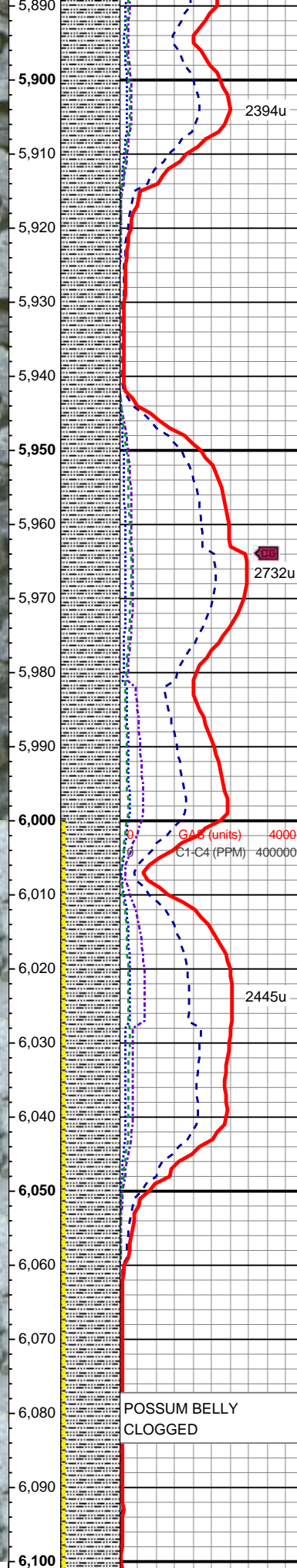
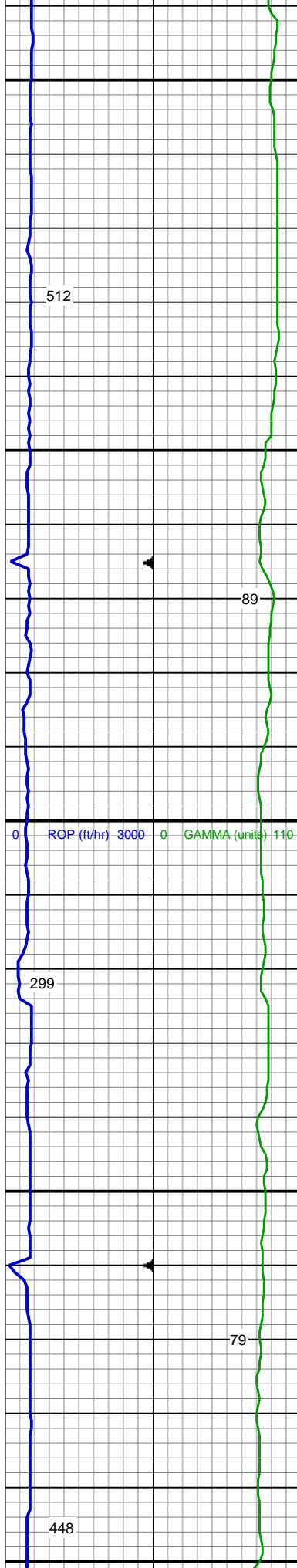
SLTY SH: lt - med gy, frm, plty - sb plty,
occ sb blkly, slty - grty tex, v sl calc SHY
SS: lt gy - lt gy brn, occ trnsl, abnt fros,
s&p, f gr, sb ang - sb blkly, prly srted, p por,
frm - mod hd wi brit clus, calc cmt, tr
glau

MD: 5,809'
TVD: 5,772.81'
Inclination: 1.04°
Azimuth: 240.63°

TEEPREE BUTTES TOP @
5,840' MD; 5,802' TVD

POSSUM BELLY
CLOGGED

SLTY SH: lt - med gy, frm, plty - sb plty,
occ sb blkly, slty - grty tex, v sl calc



MD: 5,904'
TVD: 5,867.8'
Inclination: 0.85°
Azimuth: 238.46°

SLTY SH: lt - med gy, frm, plty - sb plty,
occ sb blkly, slty - grty tex, v sl calc

MD: 5,999'
TVD: 5,962.79'
Inclination: 0.73°
Azimuth: 240.23°

MUD WT: 9.60/9.50
VIS: 40/39 IN/OUT

MD: 6,043'
TVD: 6,006.79'
Inclination: 0.69°
Azimuth: 245.15°

SLTY SH: lt - med gy, frm, plty - sb plty,
occ sb blkly, slty - grty tex, v sl calc SHY
SS: lt gy - lt gy brn, occ trnsl, abnt fros,
s&p, f gr, sb ang - sb blkly, prly srtd, p por,
frm - mod hd wi brit clus, calc cmt, tr
glau

