

COLUMBINE LOGGING

Scale: 5" / 100'
Measured Depth Log

Well Name Five Rivers K07-65HN VERT

Location SEC 8 T4N R66W

State COLORADO

County WELD

Country USA

Rig Number H&P 315

API Number 05-123-39481

AFE # 141858

Region DJ BASIN

Field WATTENBERG

Spud Date 7/19/2014

Drilling Completed 7/29/2014

Surface Coordinates NESE 8 4N 66W 6 PM
2256' FSL; 53' FEL

LAT/LON: 40.32512/-104.79277

Bottom Hole Coordinates NESE 7 4N 66W
2640' FSL; 535' FWL

Ground Elevation 4699'

K.B. Elevation 4723'

Logged Interval 2000' **To** 16,501'

Total Depth 16501'

Formation NIO C CHALK

Type of Drilling Fluid LSND

Operator

Company Noble Energy Inc

Address 1625 BROADWAY SUITE 2200
DENVER, CO 80202


















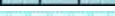











Geologist

Name NATHAN MURPHY; JACK WEINERTH

Company COLUMBINE LOGGING, INC









Address 2385 S LIPAN ST
DENVER, CO 80223

Rock Types












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

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
-  CHERT
-  CHERT
-  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

Other Symbols



Oil Show

-  DEAD
-  EVEN
-  QUESTIONABLE
-  SPOTTED STAINING










Porosity

-  EARTHY
-  FENESTRAL
-  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

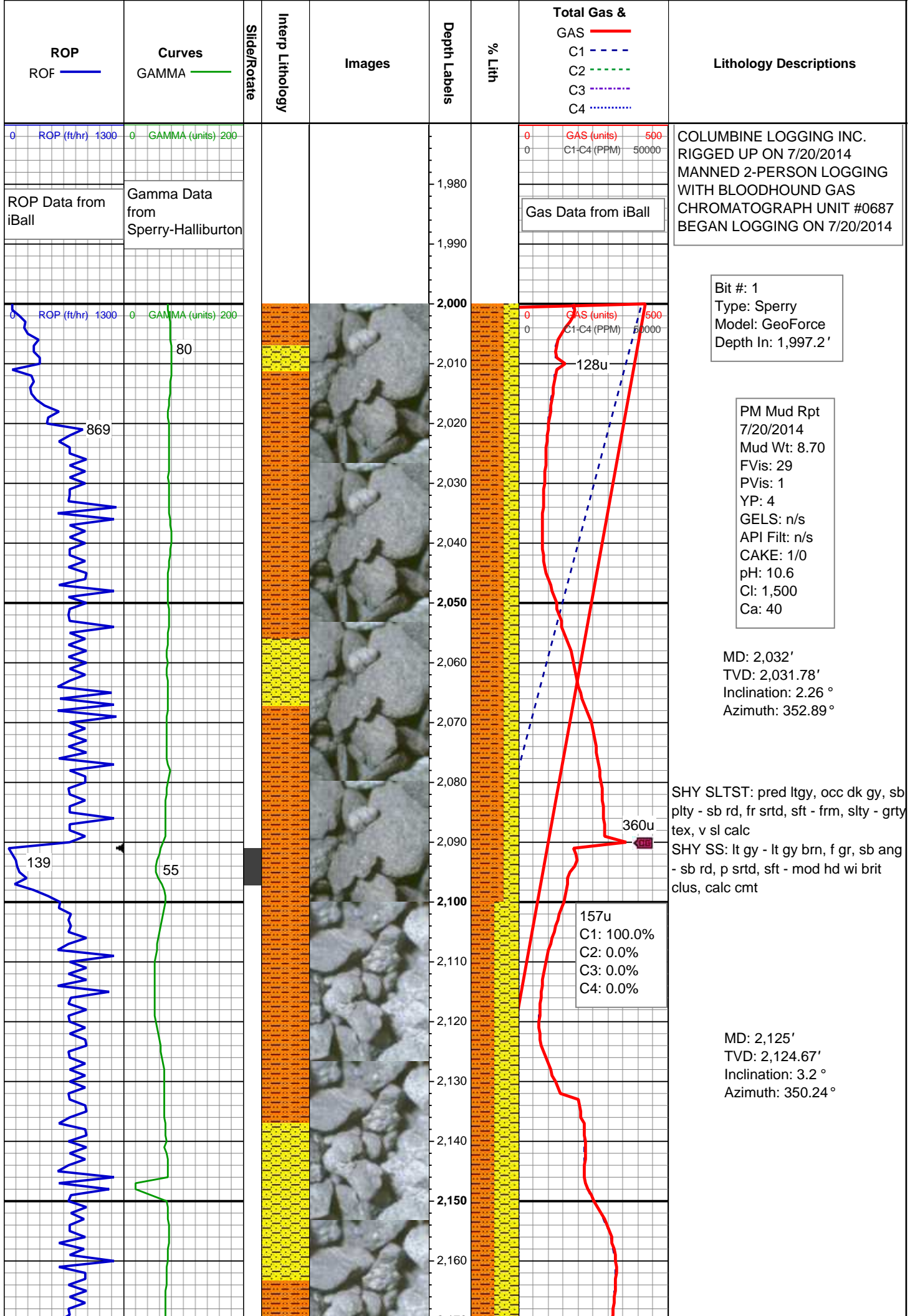
-  BOUNDSTONE
-  CHALKY
-  CRYPTOXLN
-  EARTHY
-  FINELYXLN

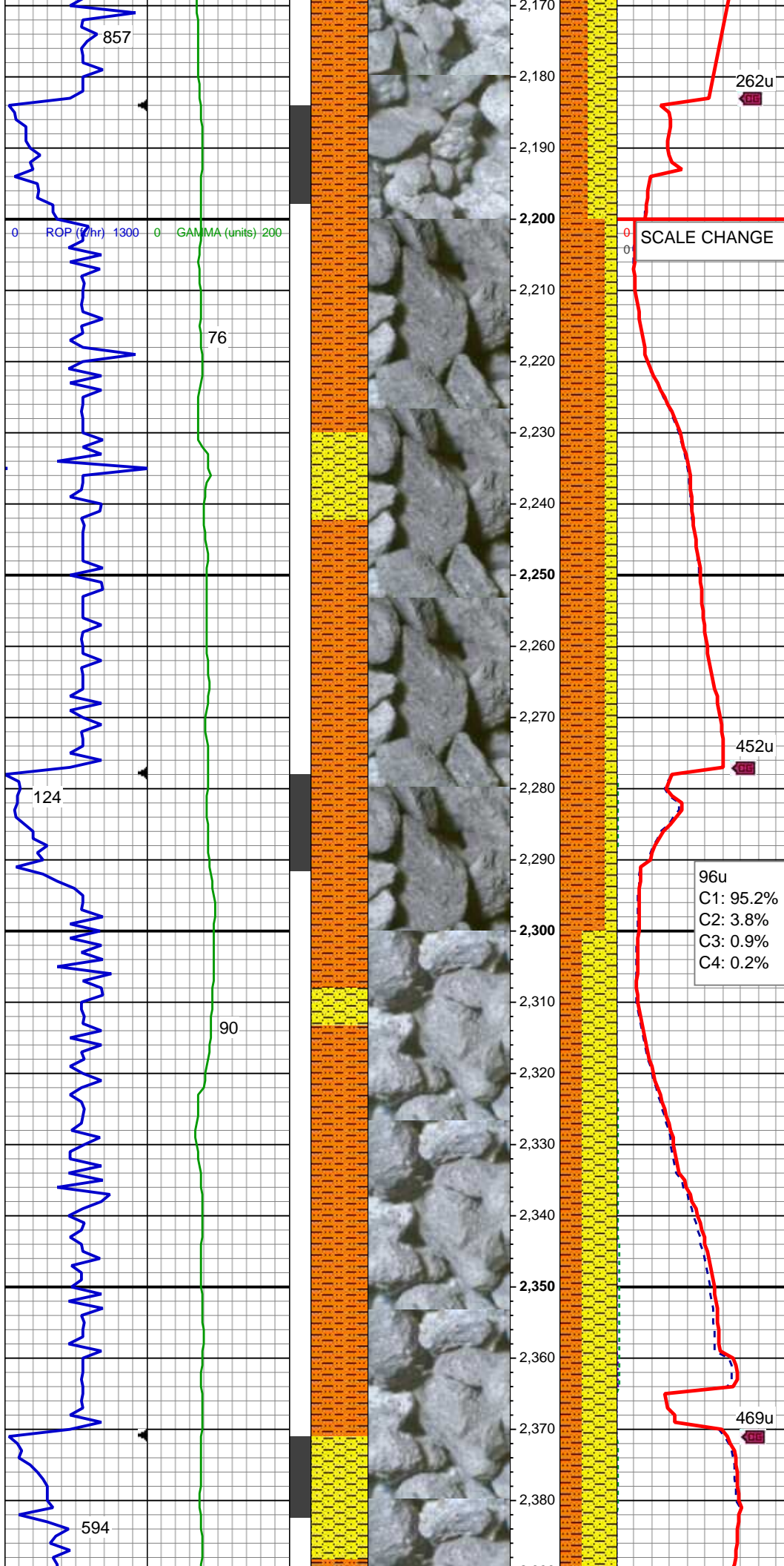
Grainstone

-  LITHOGRAPHIC
-  MICROXLN
-  MUDSTONE
-  PACKSTONE
-  WACKESTONE

Sorting

-  MODERATE
-  POOR
-  WELL





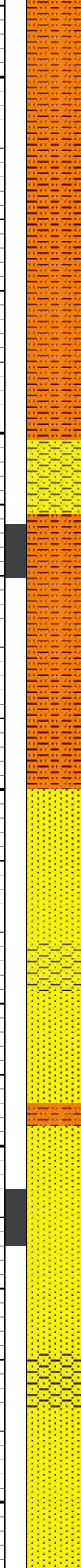
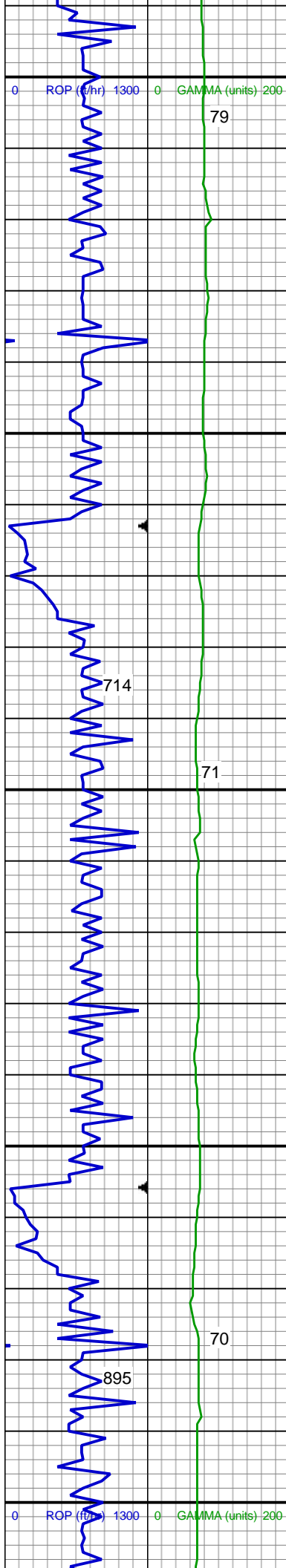
SHY SLTST: pred ltgy, occ dk gy, sb
plty - sb rd, fr srted, sft - frm, slty - grty
tex, v sl calc
SHY SS: lt gy - lt gy brn, f gr, sb ang
- sb rd, p srted, sft - mod hd wi brit
clus, calc cmt

MD: 2,219'
TVD: 2,218.45'
Inclination: 4.62 °
Azimuth: 334.73 °

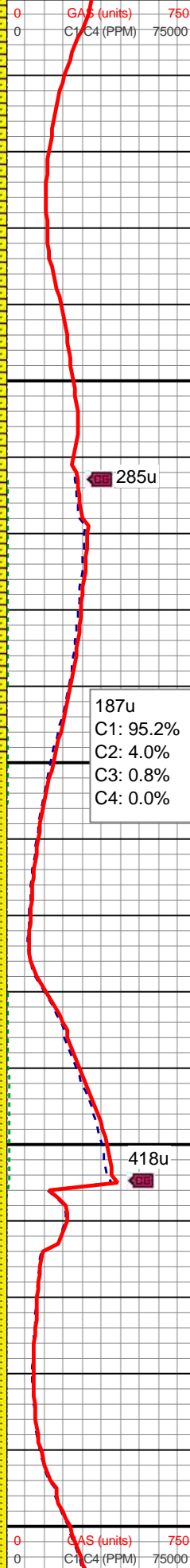
SHY SLTST: pred ltgy, occ dk gy, sb
plty - sb rd, fr srted, sft - frm, slty - grty
tex, v sl calc
SHY SS: lt gy - lt gy brn, f gr, sb ang
- sb rd, p srted, sft - mod hd wi brit
clus, calc cmt

MD: 2,311'
TVD: 2,310.02'
Inclination: 6.44 °
Azimuth: 336.05 °

SHY SS: lt gy - lt gy brn, f gr, sb ang
- sb rd, p srted, sft - mod hd wi brit



2,390
2,400
2,410
2,420
2,430
2,440
2,450
2,460
2,470
2,480
2,490
2,500
2,510
2,520
2,530
2,540
2,550
2,560
2,570
2,580
2,590
2,600



clus, calc cmt SHY SLTST: pred ltgy, occ dk gy, sb plty - sb rd, fr srted, sft - frm, slty - grty tex, v sl calc

MD: 2,404'
TVD: 2,402.32'
Inclination: 7.56 °
Azimuth: 338.1 °

SHY SLTST: pred ltgy, occ dk gy, sb plty - sb rd, fr srted, sft - frm, slty - grty tex, v sl calc

SHY SS: lt gy - lt gy brn, f gr, sb ang - sb rd, p srted, sft - mod hd wi brit clus, calc cmt

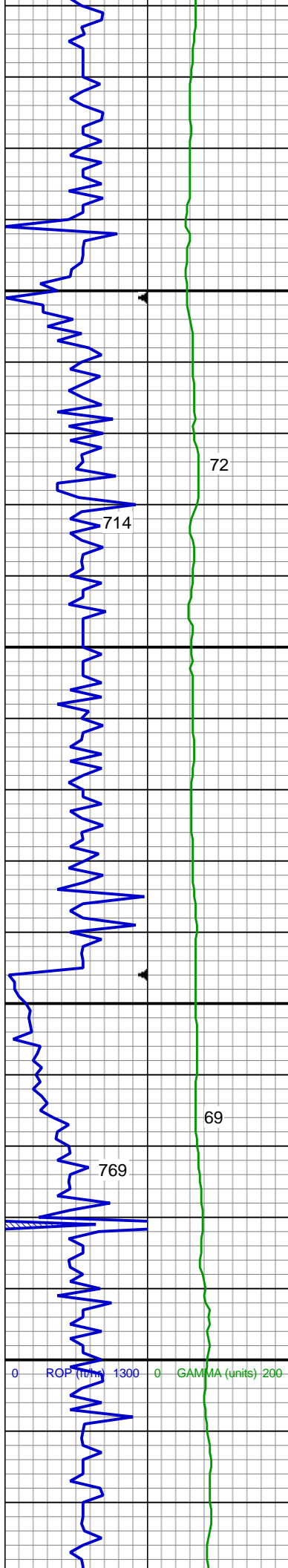
MD: 2,496'
TVD: 2,493.5'
Inclination: 7.77 °
Azimuth: 340.16 °

SS: wh, fros - trnsf, s&p, f gr, ang - sb ang, p srted, hd brit clus, v calc cmt

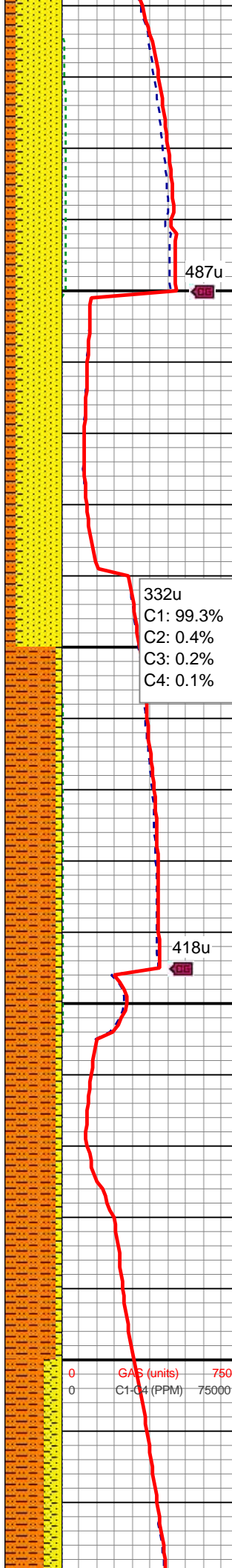
SHY SS: lt gy - lt gy brn, f gr, sb ang - sb rd, p srted, sft - mod hd wi brit clus, calc cmt

SHY SLTST: pred ltgy, occ dk gy, sb plty - sb rd, fr srted, sft - frm, slty - grty tex, v sl calc

MD: 2,591'
TVD: 2,587.38'



2.610
2.620
2.630
2.640
2.650
2.660
2.670
2.680
2.690
2.700
2.710
2.720
2.730
2.740
2.750
2.760
2.770
2.780
2.790
2.800
2.810
2.820



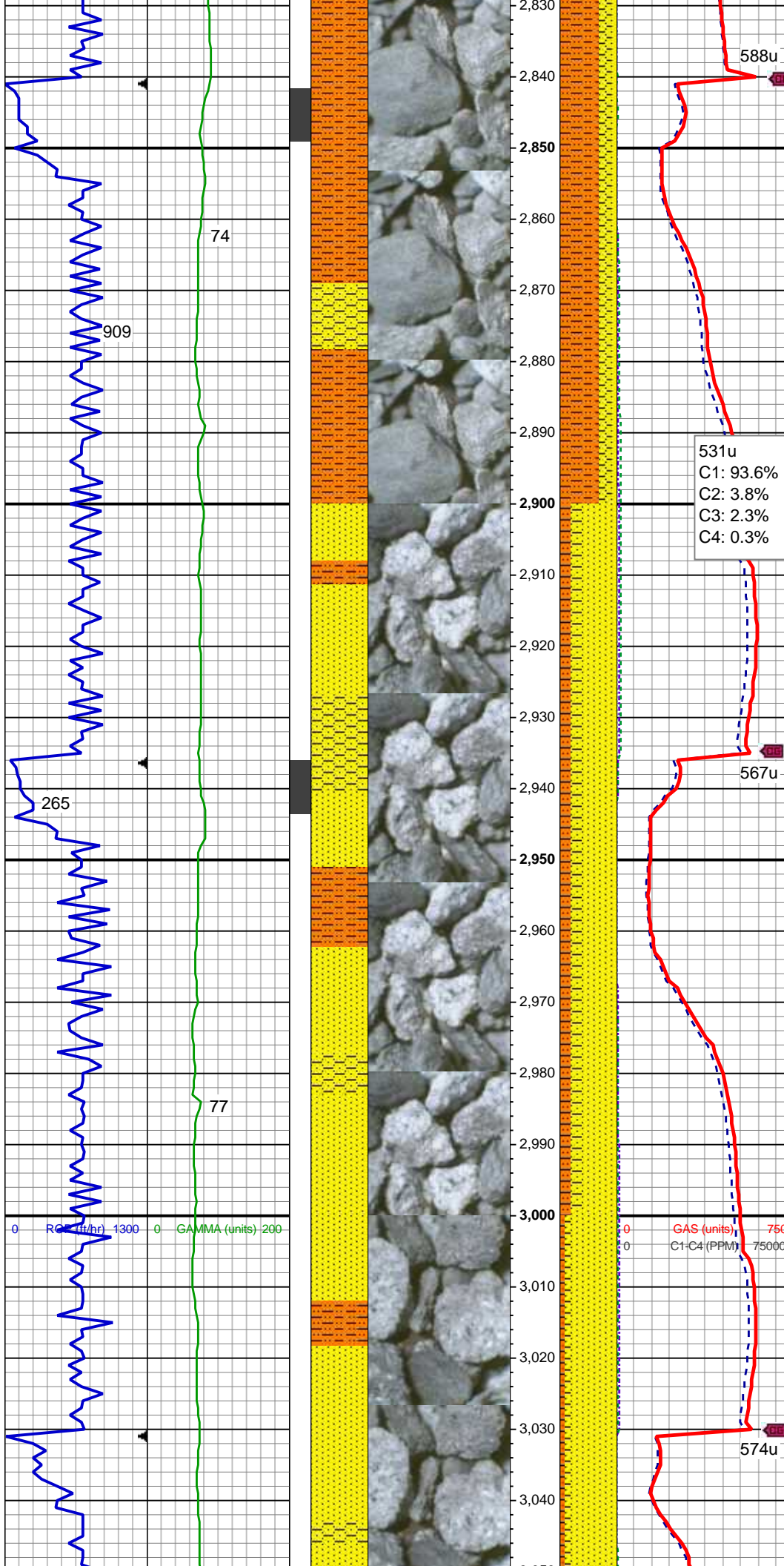
Inclination: 9.83 °
Azimuth: 339.78 °

MD: 2,686'
TVD: 2,680.91'
Inclination: 10.33 °
Azimuth: 339.93 °

SS: wh, fros - trnsl, s&p, f gr, ang -
sb ang, p srted, hd brit clus, v calc
cmt
SHY SLTST: pred ltgy, occ dk gy, sb
plty - sb rd, fr srted, sft - frm, slty - grty
tex, v sl calc
SHY SS: lt gy - lt gy brn, f gr, sb ang
- sb rd, p srted, sft - mod hd wi brit
clus, calc cmt

MD: 2,781'
TVD: 2,773.64'
Inclination: 9.04 °
Azimuth: 338.57 °

SHY SLTST: pred ltgy, occ dk gy, sb
plty - sb rd, fr srted, sft - frm, slty - grty
tex, v sl calc
SHY SS: lt gy - lt gy brn, f gr, sb ang
- sb rd, p srted, sft - mod hd wi brit
clus, calc cmt



MD: 2,876'
TVD: 2,867.63'
Inclination: 7.67 °
Azimuth: 340.77 °

SHY SLTST: pred ltgy, occ dk gy, sb
plty - sb rd, fr srted, sft - frm, slty - grty
tex, v sl calc
SHY SS: lt gy - lt gy brn, f gr, sb ang
- sb rd, p srted, sft - mod hd wi brit
clus, calc cmt
SS: wh, fros - trns, s&p, f gr, ang -
sb ang, p srted, hd brit clus, v calc
cmt

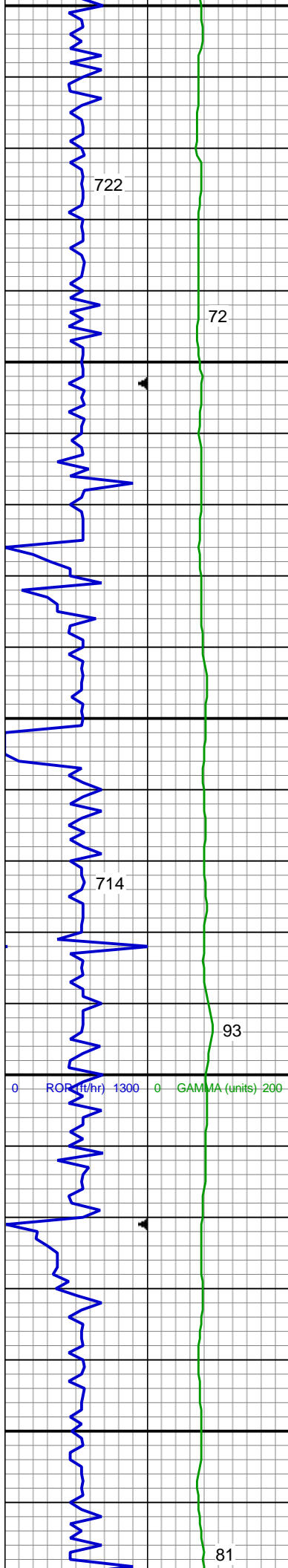
531u
C1: 93.6%
C2: 3.8%
C3: 2.3%
C4: 0.3%

MD: 2,970'
TVD: 2,960.73'
Inclination: 8.25 °
Azimuth: 348.63 °

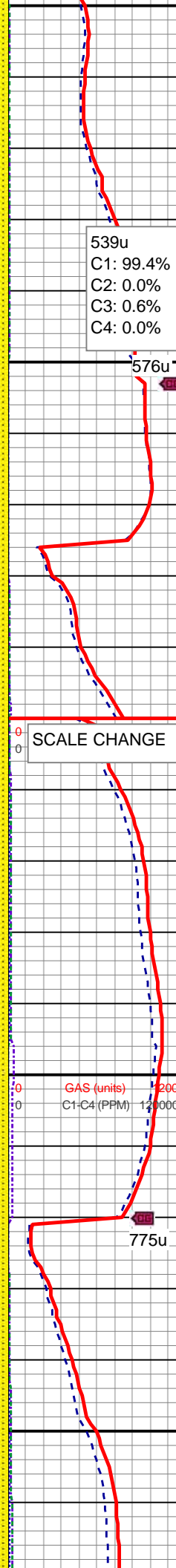
SS: wh, fros - trns, s&p, f gr, ang -
sb ang, p srted, hd brit clus, v calc
cmt
SHY SS: lt gy - lt gy brn, f gr, sb ang
- sb rd, p srted, sft - mod hd wi brit
clus, calc cmt
SHY SLTST: pred ltgy, occ dk gy, sb
plty - sb rd, fr srted, sft - frm, slty - grty
tex, v sl calc

GAS (units)
C1-C4 (PPM)

574u



3,050
3,060
3,070
3,080
3,090
3,100
3,110
3,120
3,130
3,140
3,150
3,160
3,170
3,180
3,190
3,200
3,210
3,220
3,230
3,240
3,250
3,260



MD: 3,065'
TVD: 3,054.8'
Inclination: 7.82 °
Azimuth: 347.02 °

SS: wh, fros - trnsl, s&p, f gr, ang -
sb ang, p srted, hd brit clus, v calc
cmt

SHY SS: lt gy - lt gy brn, f gr, sb ang
- sb rd, p srted, sft - mod hd wi brit
clus, calc cmt

SHY SLTST: pred ltgy, occ dk gy, sb
plty - sb rd, fr srted, sft - frm, slty - grty
tex, v sl calc

MD: 3,160'
TVD: 3,148.98'
Inclination: 7.2 °
Azimuth: 344.22 °

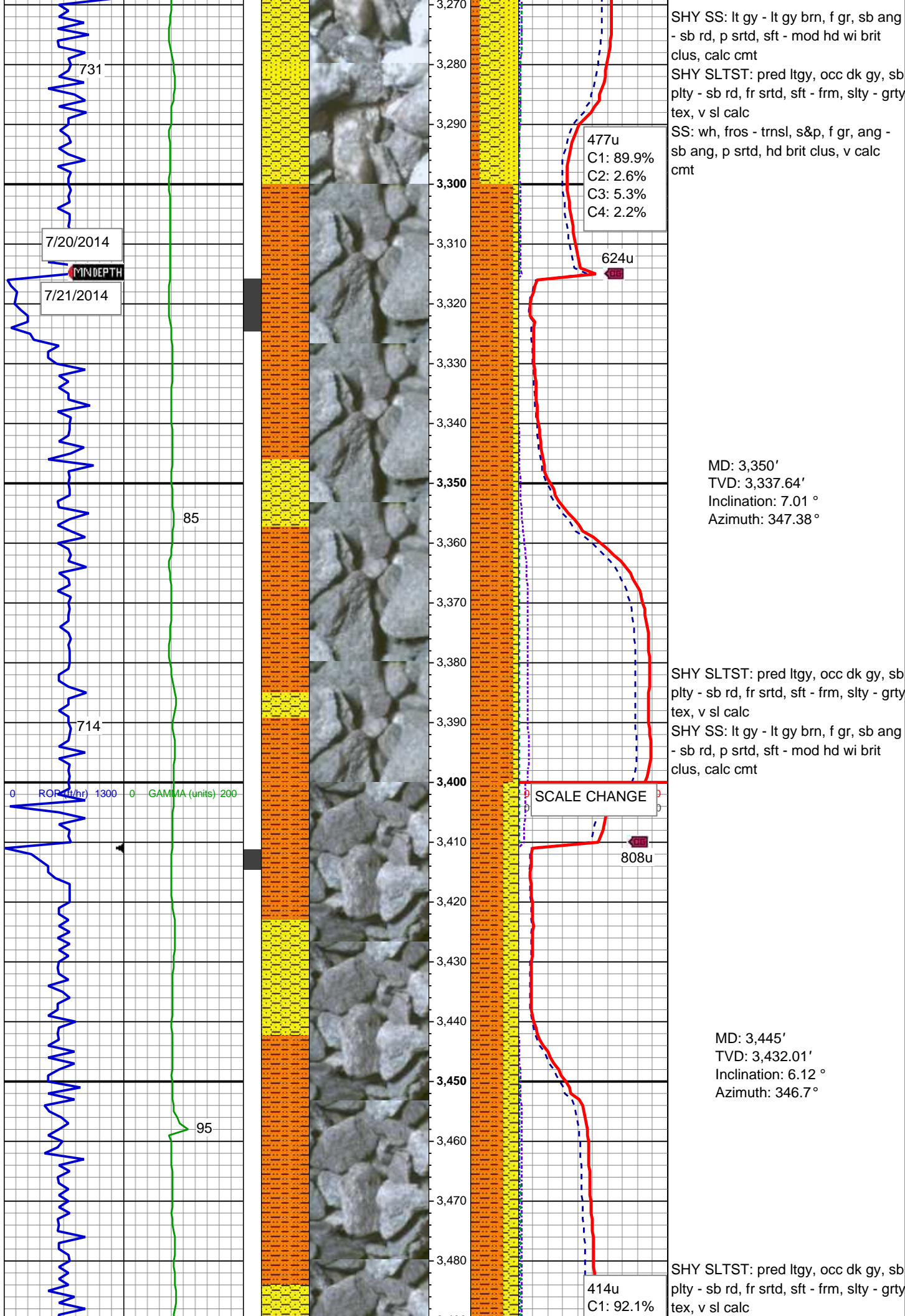
SS: wh, fros - trnsl, s&p, f gr, ang -
sb ang, p srted, hd brit clus, v calc
cmt

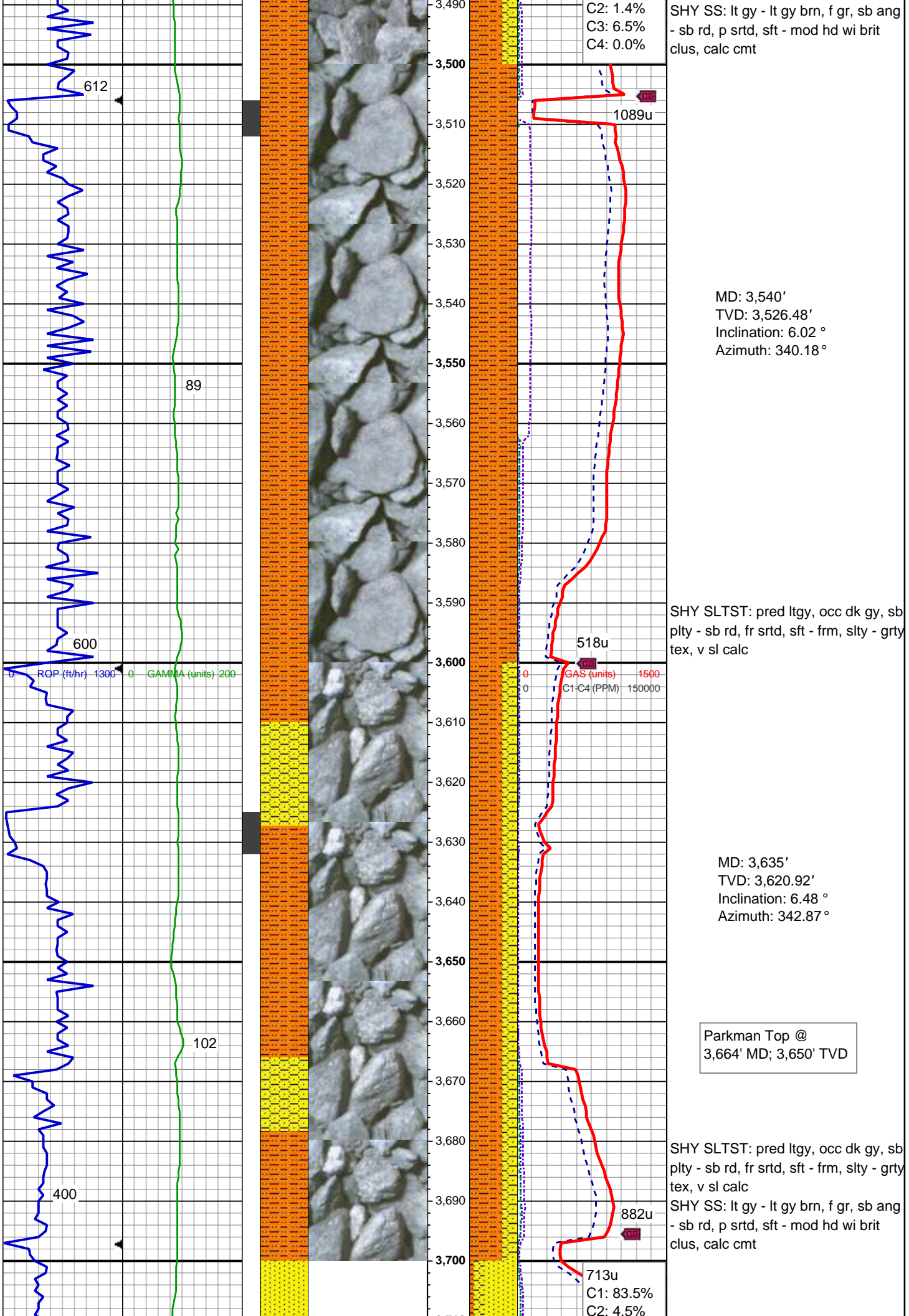
SHY SLTST: pred ltgy, occ dk gy, sb
plty - sb rd, fr srted, sft - frm, slty - grty
tex, v sl calc

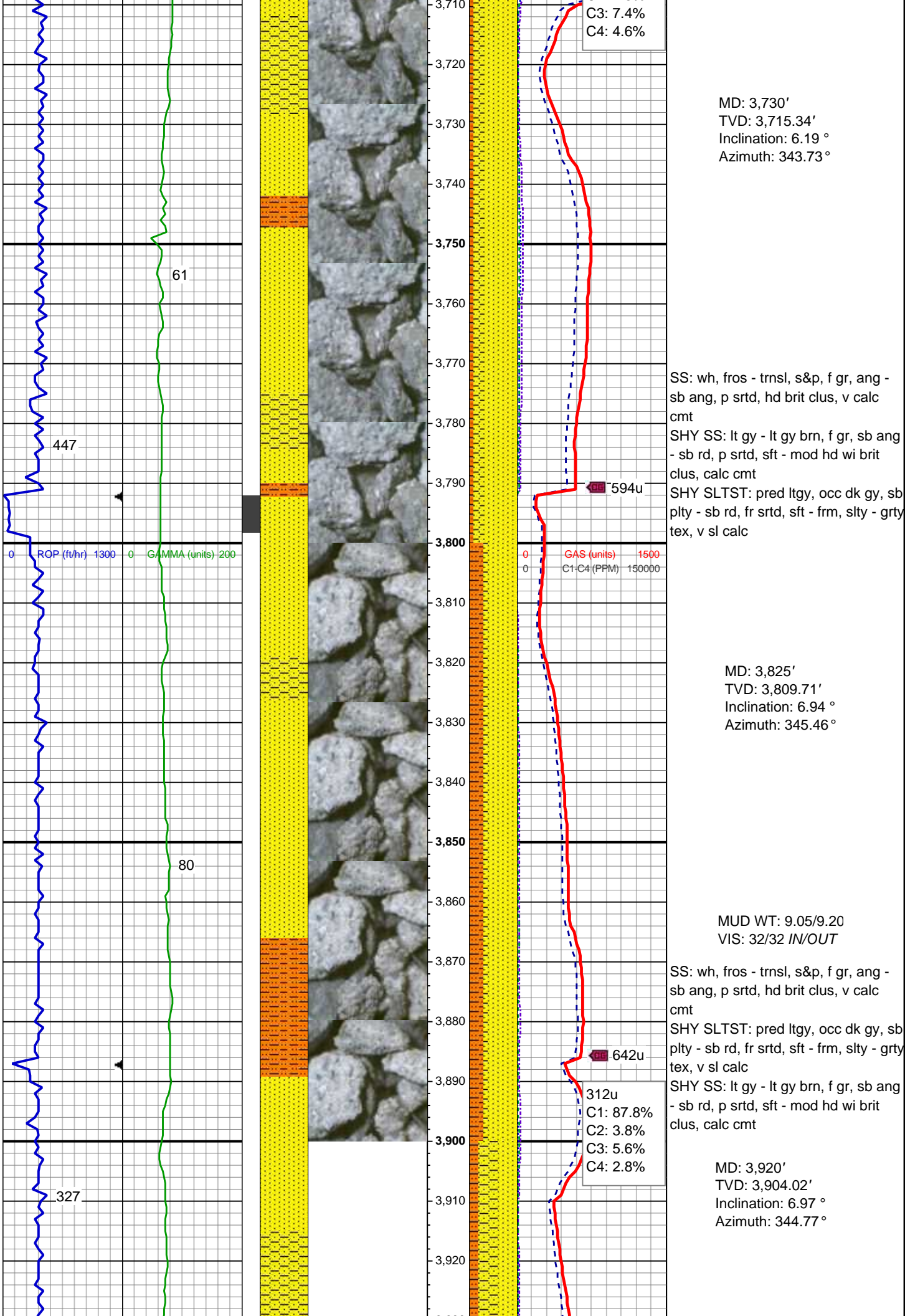
SHY SS: lt gy - lt gy brn, f gr, sb ang
- sb rd, p srted, sft - mod hd wi brit
clus, calc cmt

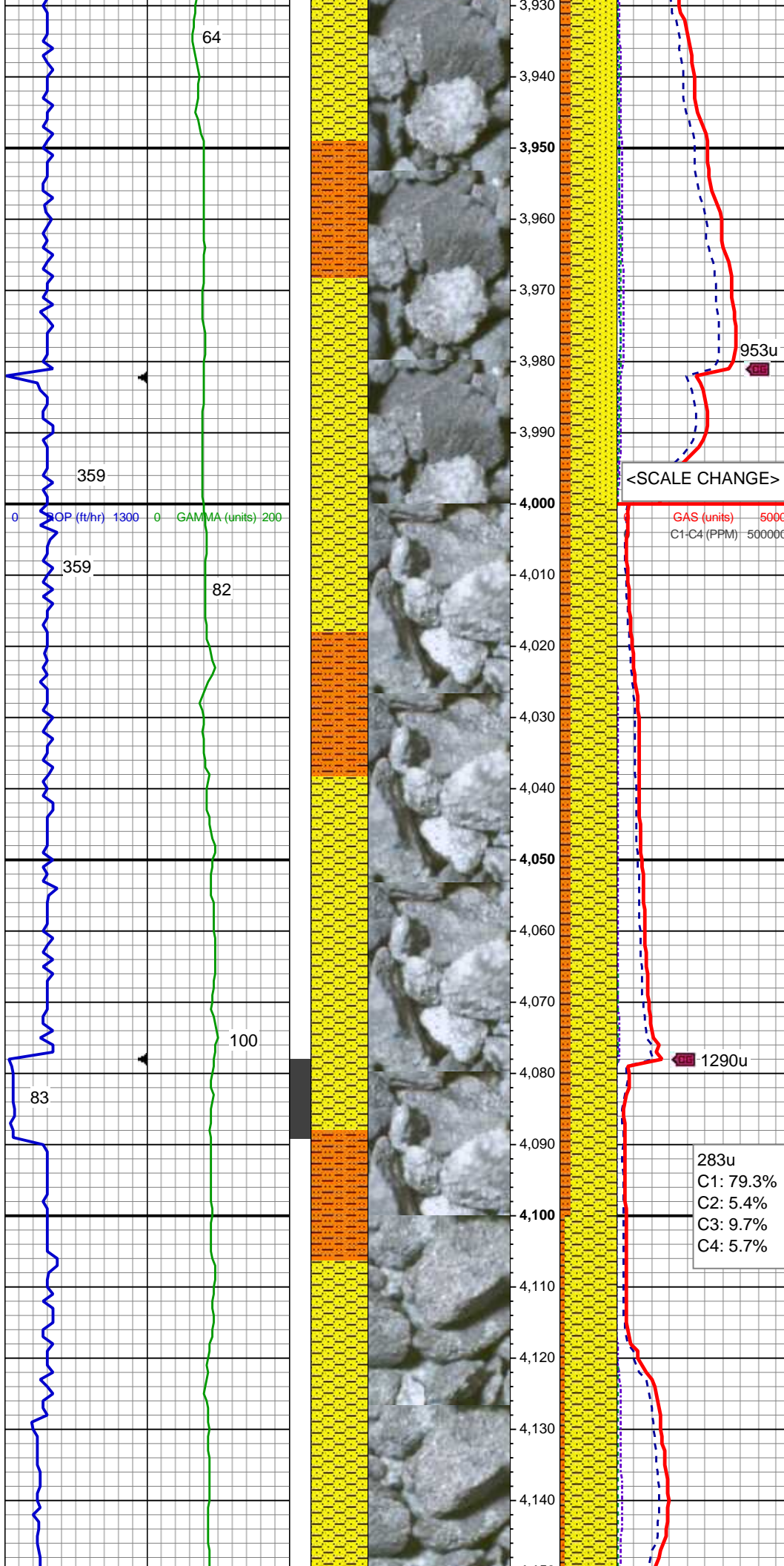
MUD WT: 8.85/8.95
VIS: 29/29 IN/OUT

MD: 3,255'
TVD: 3,243.3'
Inclination: 6.52 °
Azimuth: 343.25 °









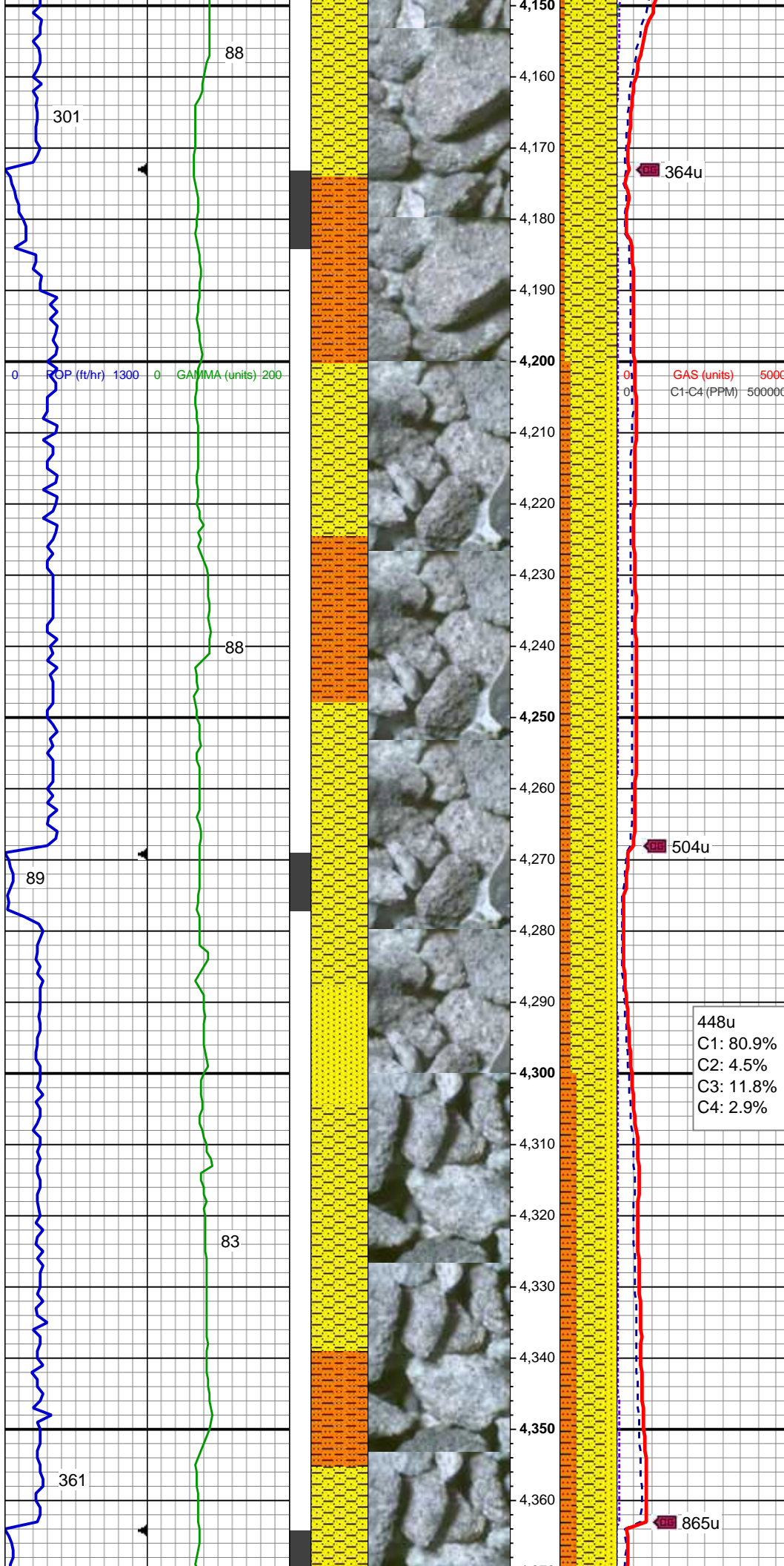
SHY SS: lt gy - lt gy brn, f gr, sb ang
- sb rd, p srted, sft - mod hd wi brit
clus, calc cmt
SS: wh, fros - trnsd, s&p, f gr, ang -
sb ang, p srted, hd brit clus, v calc
cmt
SHY SLTST: pred ltgy, occ dk gy, sb
plty - sb rd, fr srted, sft - frm, slty - grty
tex, v sl calc

MD: 4,015'
TVD: 3,998.36'
Inclination: 6.46 °
Azimuth: 343.59 °

SHY SS: lt gy - lt gy brn, f gr, sb ang
- sb rd, p srted, sft - mod hd wi brit
clus, calc cmt
SHY SLTST: pred ltgy, occ dk gy, sb
plty - sb rd, fr srted, sft - frm, slty - grty
tex, v sl calc

MD: 4,110'
TVD: 4,093.64'
Inclination: 6.88 °
Azimuth: 343.02 °

MUD WT: 9.20/9.30
VIS: 32/32 IN/OUT



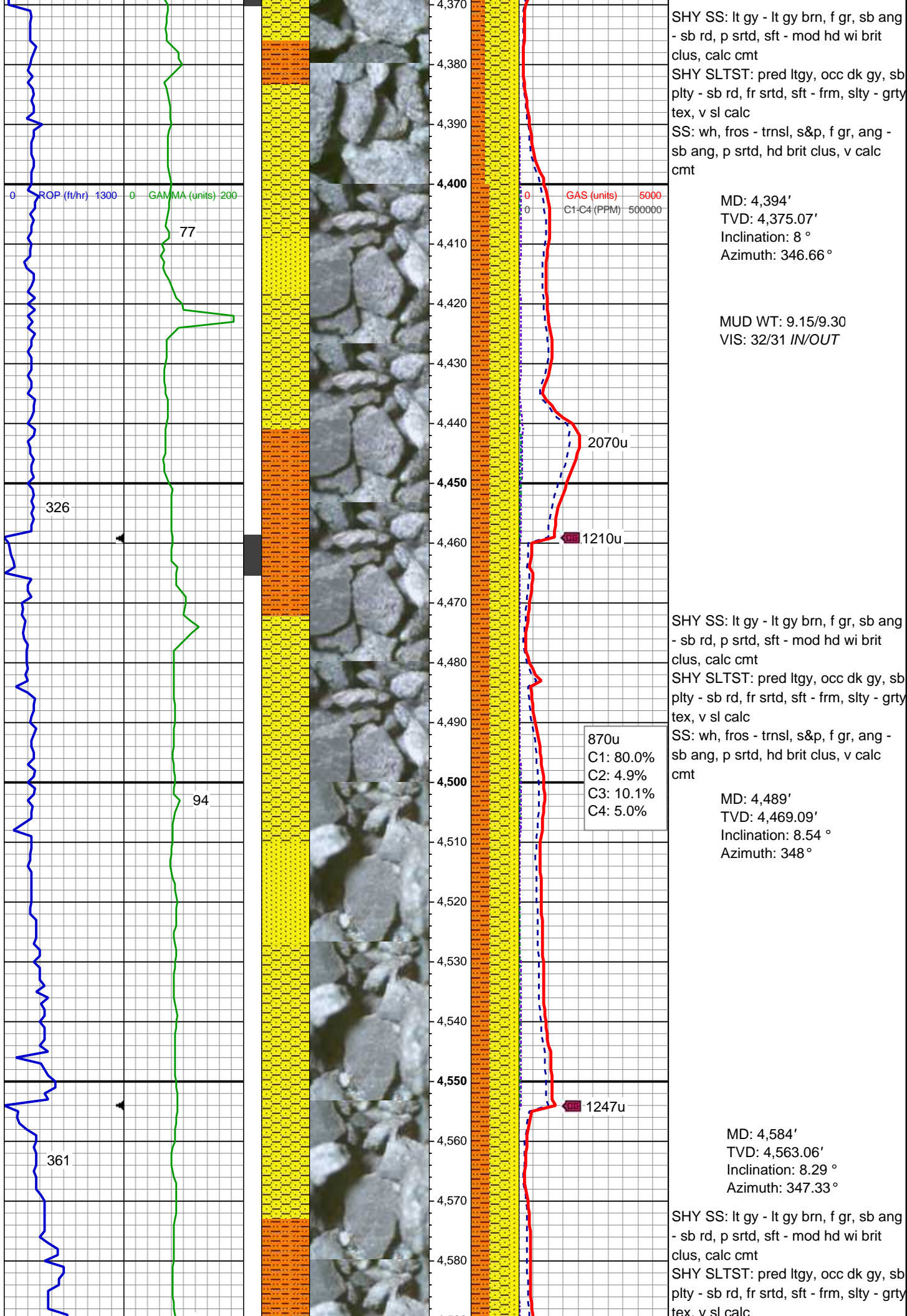
SHY SS: lt gy - lt gy brn, f gr, sb ang
- sb rd, p srted, sft - mod hd wi brit
clus, calc cmt
SHY SLTST: pred ltgy, occ dk gy, sb
plty - sb rd, fr srted, sft - frm, slty - grty
tex, v sl calc

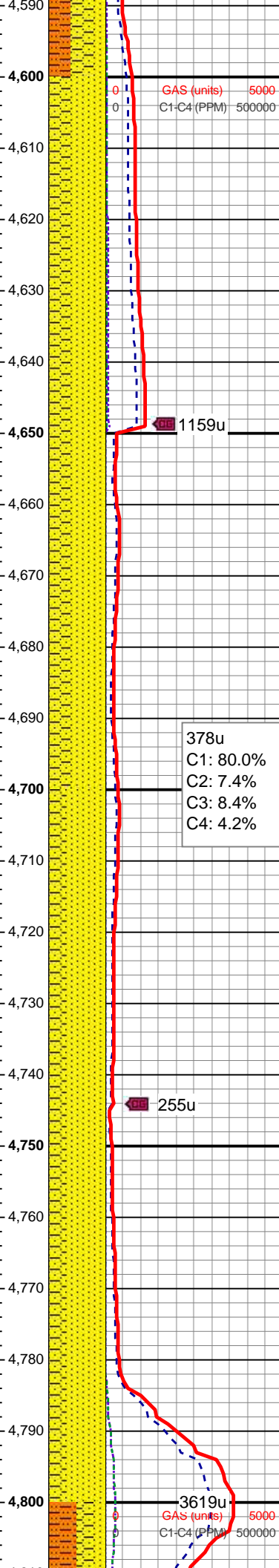
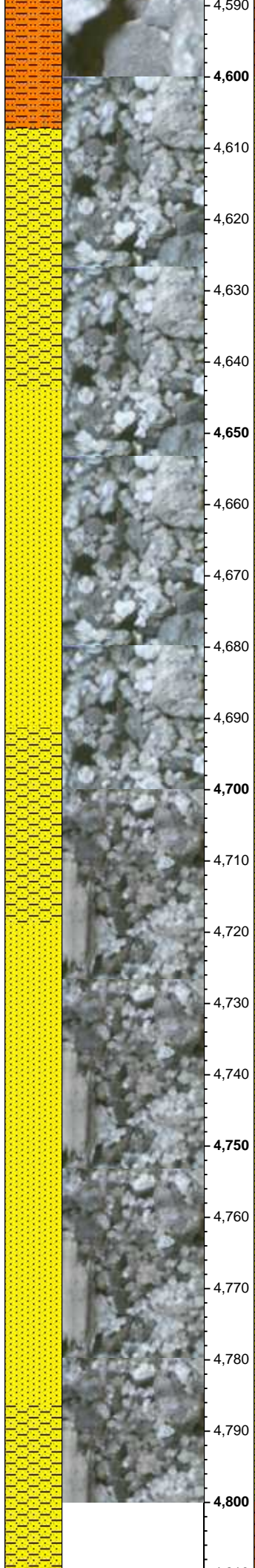
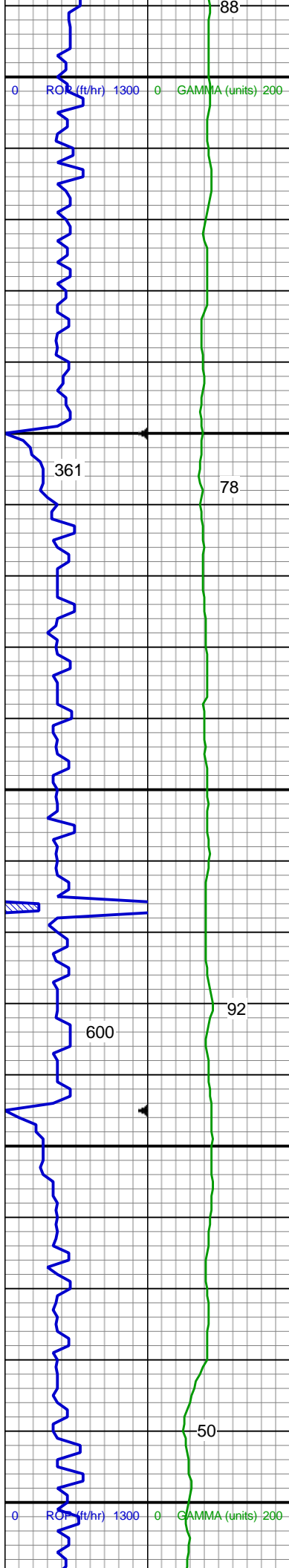
MD: 4,204'
TVD: 4,186.87'
Inclination: 7.76 °
Azimuth: 341.13 °

SHY SS: lt gy - lt gy brn, f gr, sb ang
- sb rd, p srted, sft - mod hd wi brit
clus, calc cmt
SS: wh, fros - trnsd, s&p, f gr, ang -
sb ang, p srted, hd brit clus, v calc
cmt
SHY SLTST: pred ltgy, occ dk gy, sb
plty - sb rd, fr srted, sft - frm, slty - grty
tex, v sl calc

MD: 4,299'
TVD: 4,280.98'
Inclination: 7.89 °
Azimuth: 342.73 °

Sussex Top @
4,313' MD; 4,294' TVD





SS: wh, fros - trnsl, s&p, f gr, ang - sb ang, p srted, hd brit clus, v calc cmt

MD: 4,679'
TVD: 4,657.15'
Inclination: 7.61 °
Azimuth: 347.04 °

SHY SS: lt gy - lt gy brn, f gr, sb ang - sb rd, p srted, sft - mod hd wi brit clus, calc cmt

SS: wh, fros - trnsl, s&p, f gr, ang - sb ang, p srted, hd brit clus, v calc cmt

378u
C1: 80.0%
C2: 7.4%
C3: 8.4%
C4: 4.2%

Shannon Top @
4,731' MD; 4,708' TVD

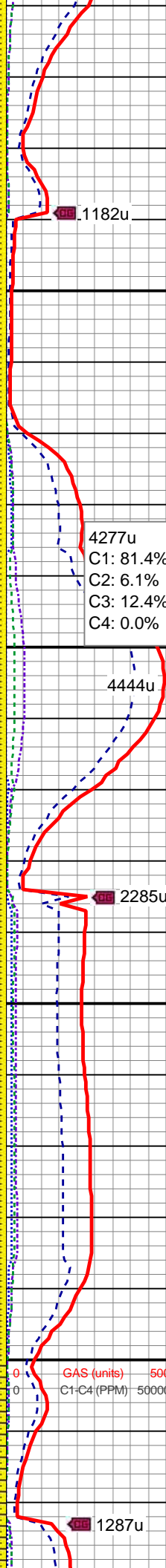
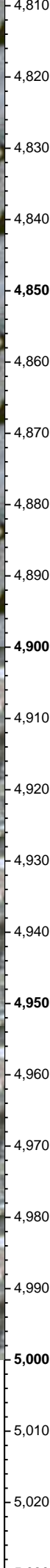
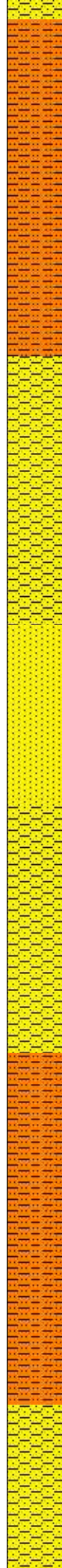
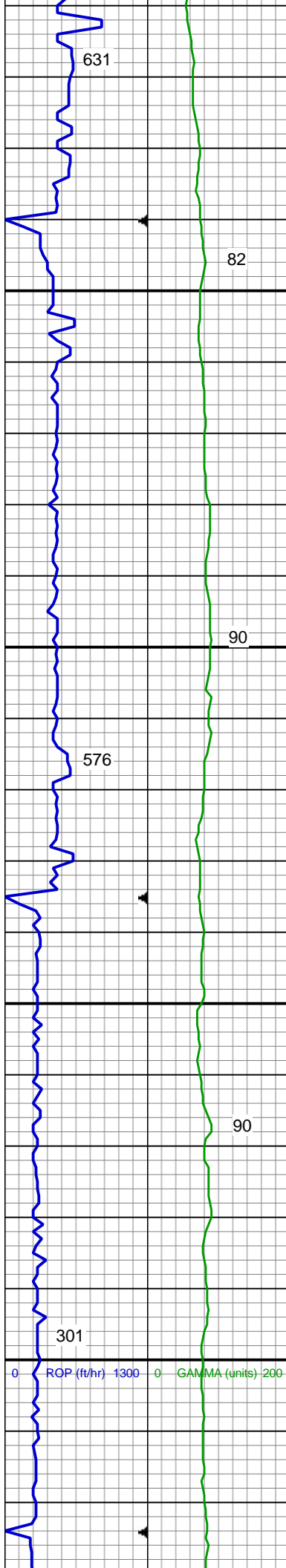
255u

MD: 4,774'
TVD: 4,751.39'
Inclination: 6.86 °
Azimuth: 348.14 °

SHY SS: lt gy - lt gy brn, f gr, sb ang - sb rd, p srted, sft - mod hd wi brit clus, calc cmt

SS: wh, fros - trnsl, s&p, f gr, ang - sb ang, p srted, hd brit clus, v calc cmt

3619u



MD: 4,869'
TVD: 4,845.75'
Inclination: 6.5 °
Azimuth: 344.64 °

SHY SLTST: pred ltgy, occ dk gy, sb
plty - sb rd, fr srted, sft - frm, slty - grty
tex, v sl calc

SHY SS: lt gy - lt gy brn, f gr, sb ang
- sb rd, p srted, sft - mod hd wi brit
clus, calc cmt

SS: wh, fros - trnsd, s&p, f gr, ang -
sb ang, p srted, hd brit clus, v calc
cmt

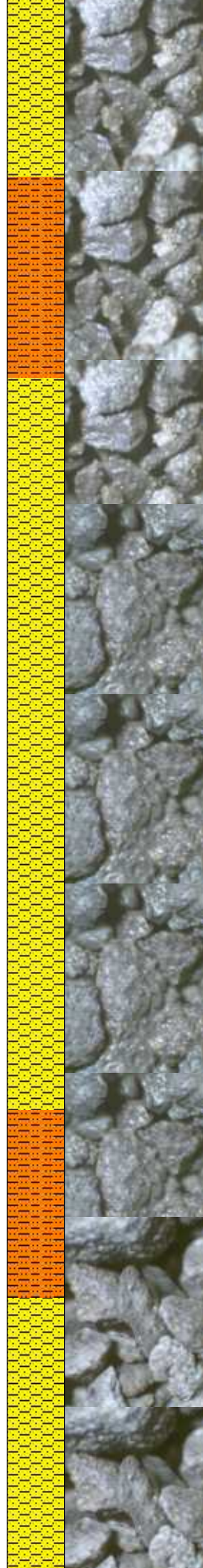
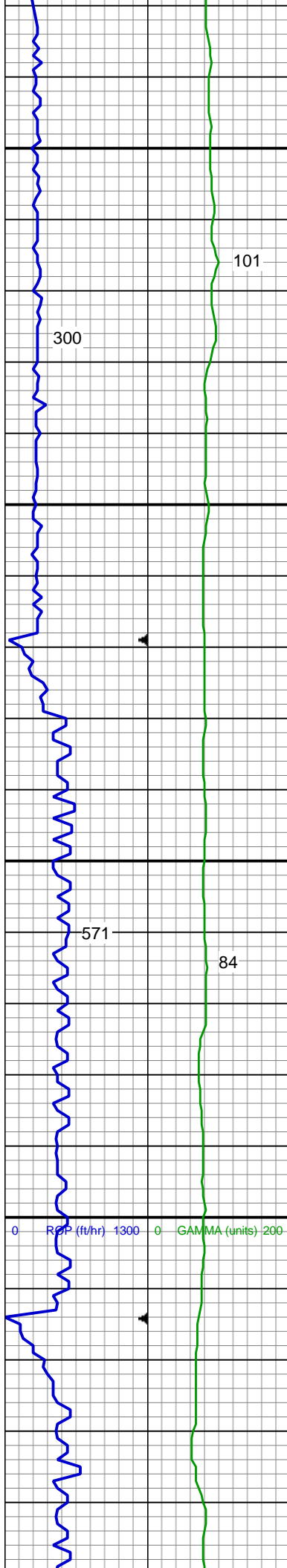
MUD WT: 9.2/9.2
VIS: 33/34 IN/OUT

MD: 4,964'
TVD: 4,940.18'
Inclination: 6.06 °
Azimuth: 345.01 °

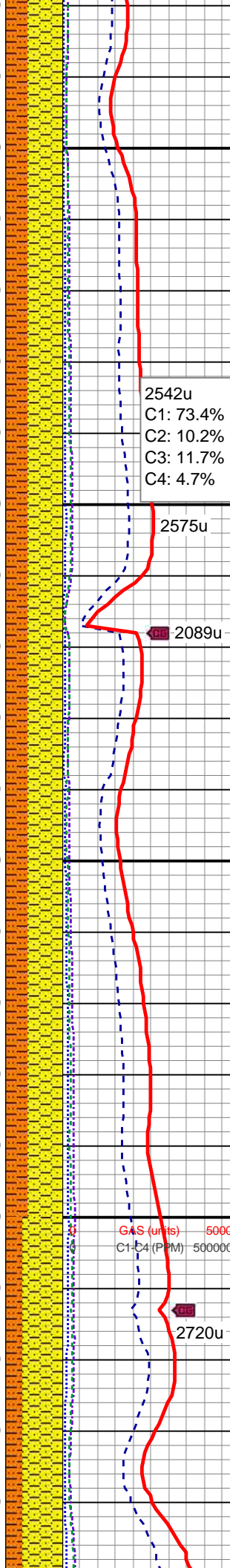
SHY SLTST: pred ltgy, occ dk gy, sb
plty - sb rd, fr srted, sft - frm, slty - grty
tex, v sl calc

SHY SS: lt gy - lt gy brn, f gr, sb ang
- sb rd, p srted, sft - mod hd wi brit
clus, calc cmt

SS: wh, fros - trnsd, s&p, f gr, ang -
sb ang, p srted, hd brit clus, v calc
cmt



5,030
5,040
5,050
5,060
5,070
5,080
5,090
5,100
5,110
5,120
5,130
5,140
5,150
5,160
5,170
5,180
5,190
5,200
5,210
5,220
5,230
5,240



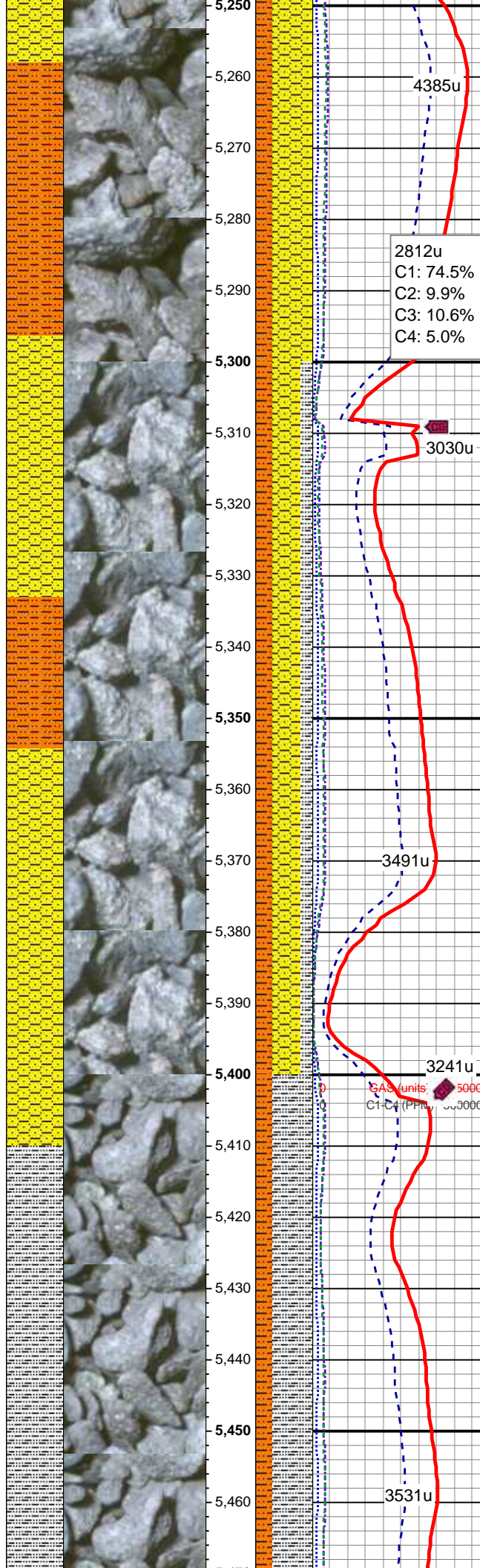
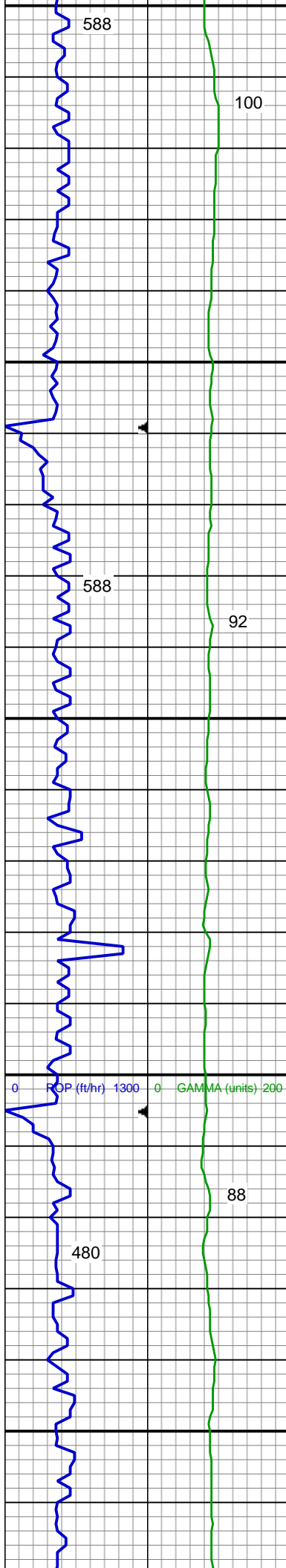
MD: 5,058'
TVD: 5,033.69'
Inclination: 5.62 °
Azimuth: 343.75 °

SHY SS: lt gy - lt gy brn, f gr, sb ang
- sb rd, p srted, sft - mod hd wi brit
clus, calc cmt
SHY SLTST: pred ltgy, occ dk gy, sb
plty - sb rd, fr srted, sft - frm, slty - grty
tex, v sl calc

MD: 5,153'
TVD: 5,128.29'
Inclination: 4.88 °
Azimuth: 341.55 °

SHY SS: lt gy - lt gy brn, f gr, sb ang
- sb rd, p srted, sft - mod hd wi brit
clus, calc cmt
SHY SLTST: pred ltgy, occ dk gy, sb
plty - sb rd, fr srted, sft - frm, slty - grty
tex, v sl calc

MD: 5,248'
TVD: 5,222.99'



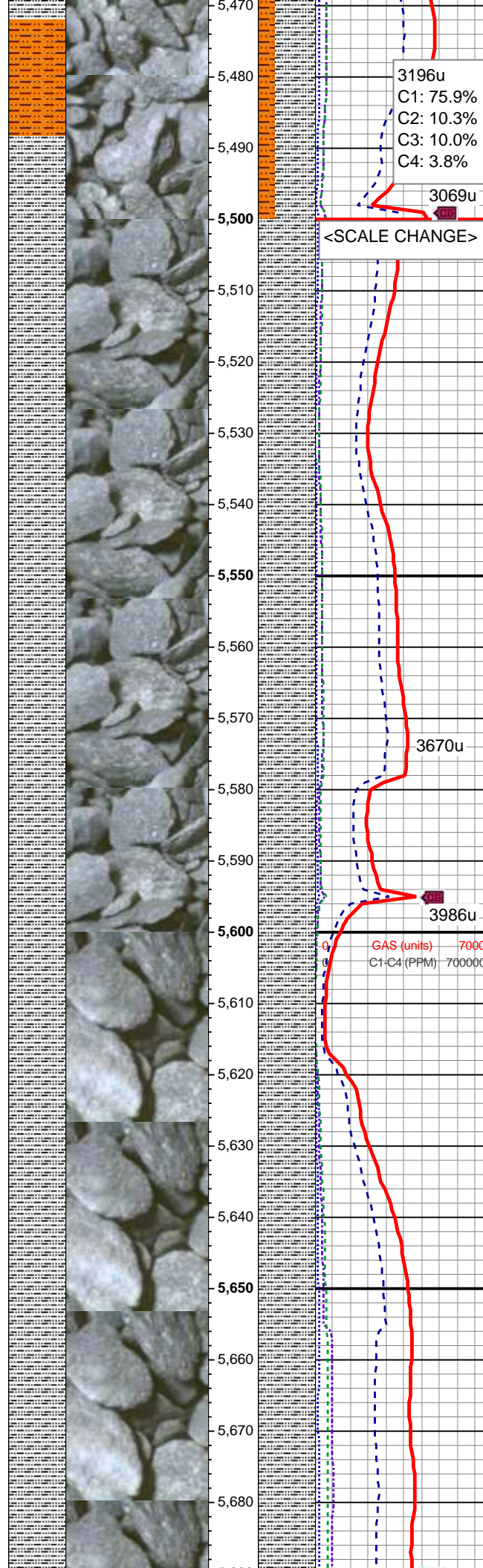
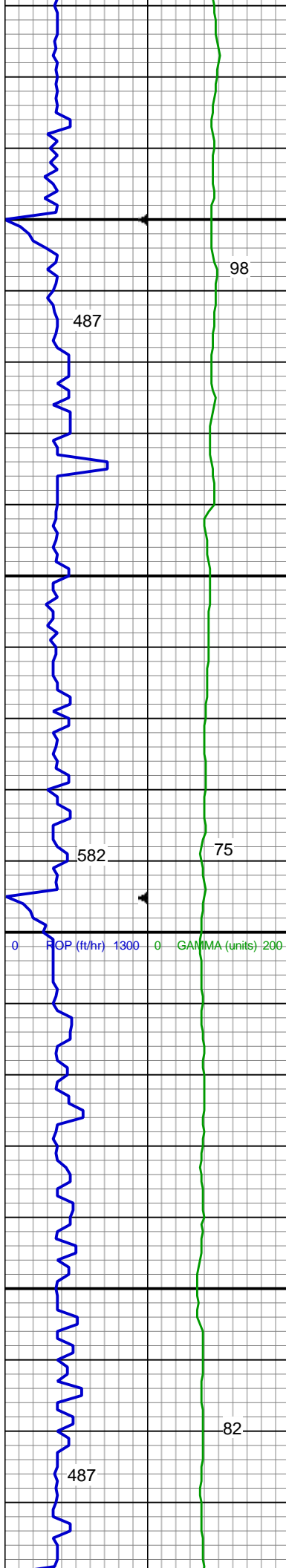
Inclination: 4.23 °
Azimuth: 340.7 °

SHY SS: lt gy - lt gy brn, f gr, sb ang
- sb rd, p srted, sft - mod hd wi brit
clus, calc cmt
SHY SLTST: pred ltgy, occ dk gy, sb
plty - sb rd, fr srted, sft - frm, slty - grty
tex, v sl calc

MUD WT: 9.4/9.3
VIS: 34/34 IN/OUT

SHY SS: lt gy - lt gy brn, f gr, sb ang
- sb rd, p srted, sft - mod hd wi brit
clus, calc cmt
SHY SLTST: pred ltgy, occ dk gy, sb
plty - sb rd, fr srted, sft - frm, slty - grty
tex, v sl calc
SLTY SH: lt - med gy - gy brn, frm -
hd, plty - sb plty, occ sb blk, slty -
grty tex, v sl calc

MD: 5,438'
TVD: 5,412.61'
Inclination: 2.98 °
Azimuth: 341.26 °

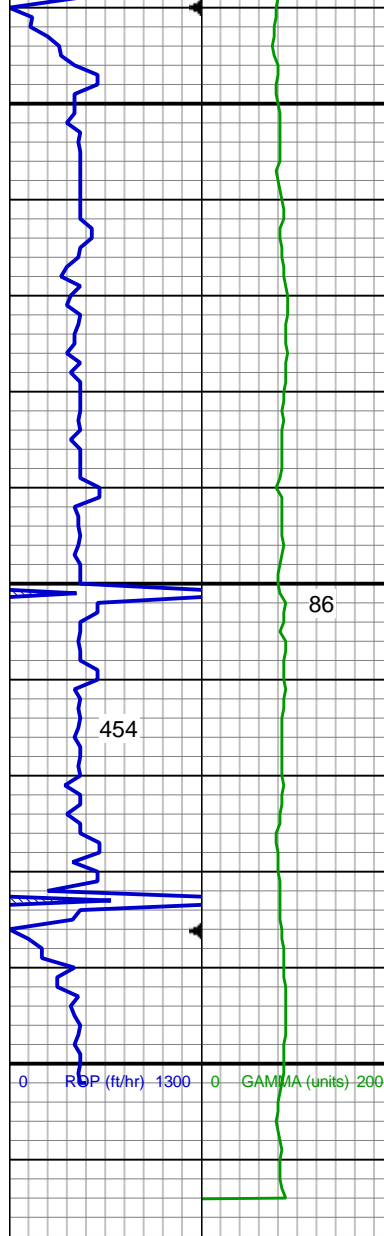


SLTY SH: lt - med gy - gy brn, frm -
hd, plty - sb plty, occ sb blk, slty -
grty tex, v sl calc
SHY SLTST: pred ltgy, occ dk gy, sb
plty - sb rd, fr srted, sft - frm, slty - grty
tex, v sl calc

MD: 5,533'
TVD: 5,507.5'
Inclination: 2.39 °
Azimuth: 347.47 °

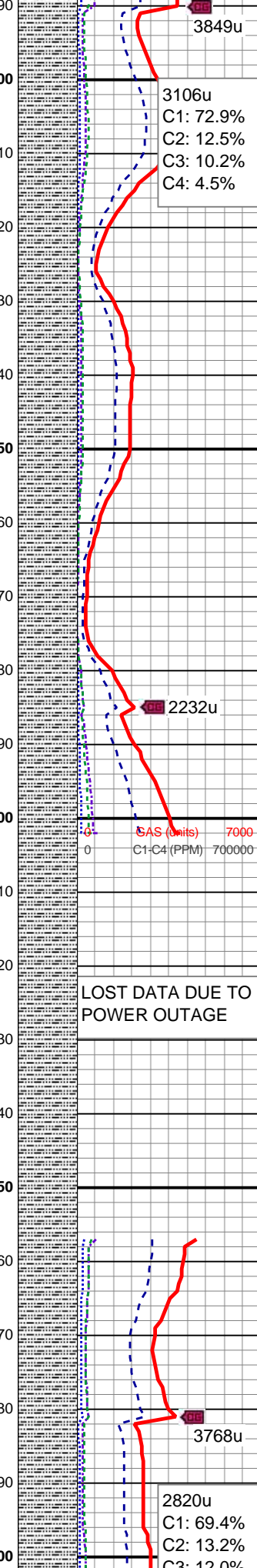
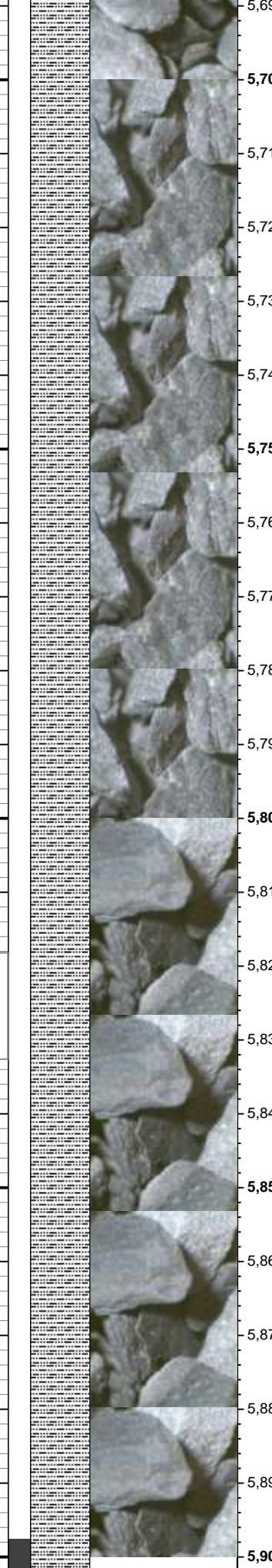
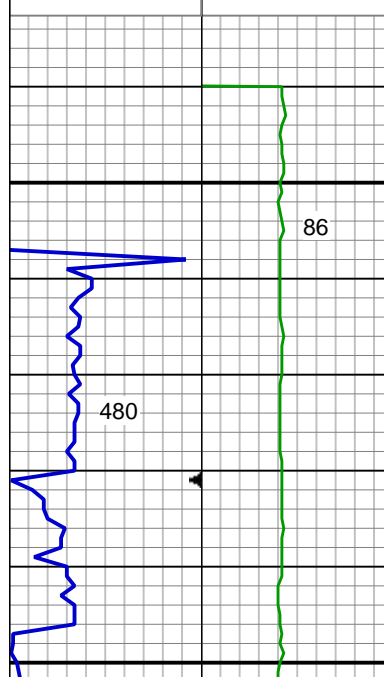
SLTY SH: lt - med gy - gy brn, frm -
hd, plty - sb plty, occ sb blk, slty -
grty tex, v sl calc

MD: 5,628'
TVD: 5,602.44'
Inclination: 1.93 °
Azimuth: 7.76 °



LOST DATA
DUE TO
POWER
OUTAGE

LOST DATA
DUE TO
POWER
OUTAGE



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

MUD WT: 9.9/9.7
VIS: 34/36 IN/OUT

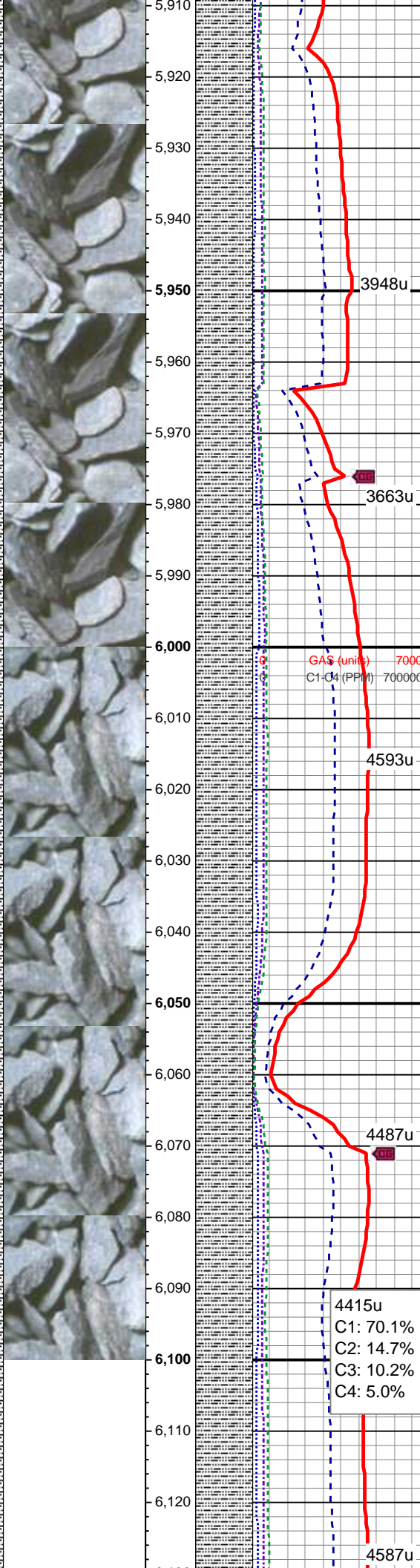
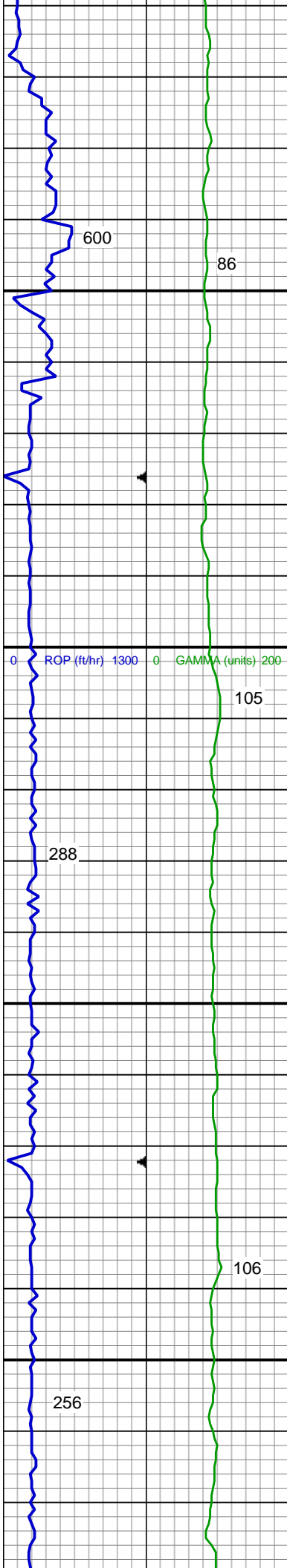
MD: 5,723'
TVD: 5,697.39'
Inclination: 1.9 °
Azimuth: 14.64 °

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

MD: 5,817'
TVD: 5,791.35'
Inclination: 1.08 °
Azimuth: 22.78 °

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

MD: 5,912'



TVD: 5,886.35'
Inclination: 0.61 °
Azimuth: 276.51 °

MUD WT: 9.8/9.8
VIS: 39/4C IN/OUT

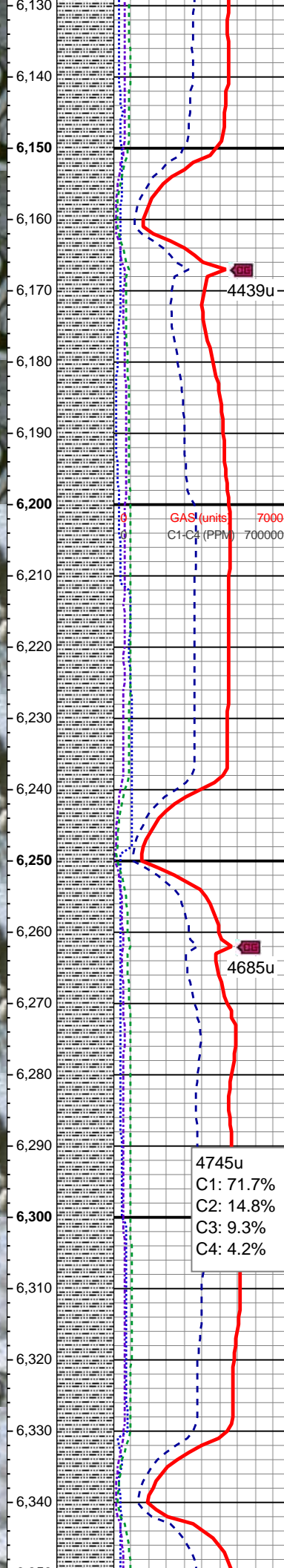
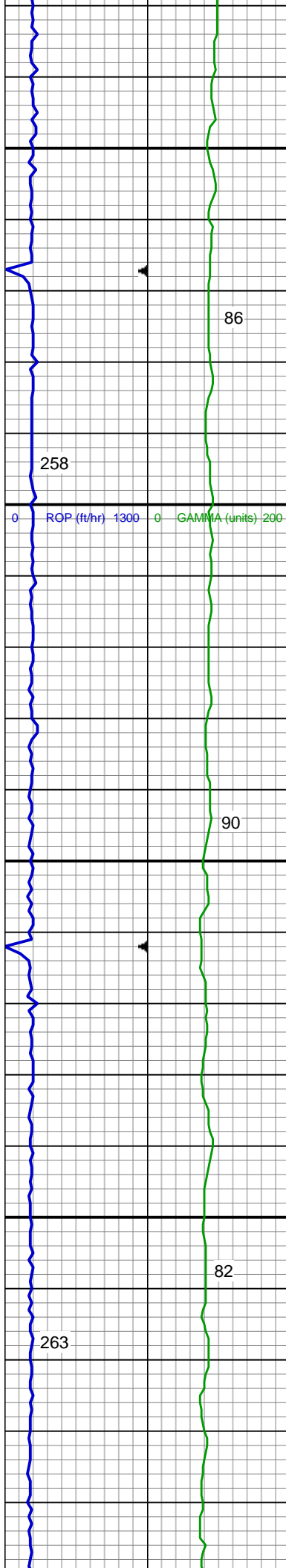
SLTY SH: lt - med gy - gy brn, frm -
hd, plty - sb plty, occ sb blkly, slty -
grty tex, v sl calc

MD: 6,007'
TVD: 5,981.34'
Inclination: 0.75 °
Azimuth: 266.49 °

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

MD: 6,102'
TVD: 6,076.33'
Inclination: 0.54 °
Azimuth: 257.51 °

Teepee Buttes Top @
6,126' MD; 6,100' TVD



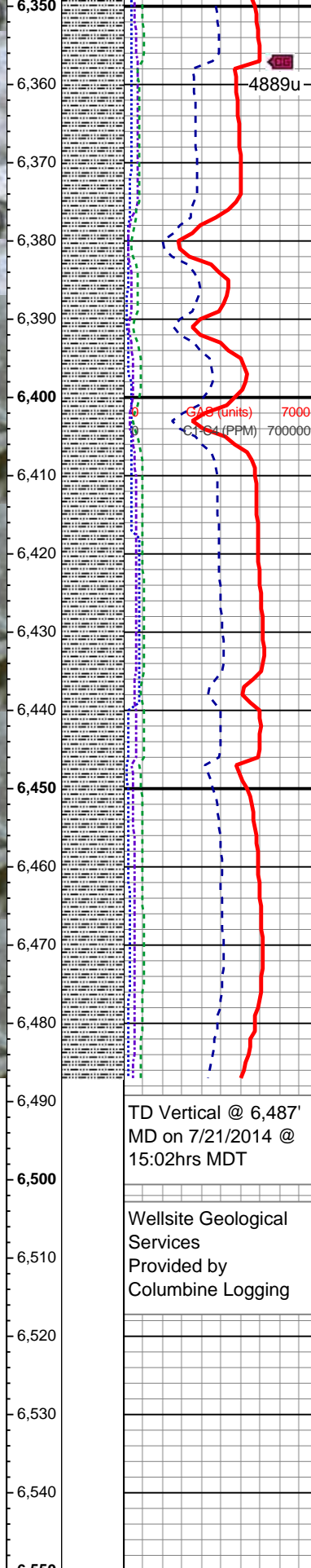
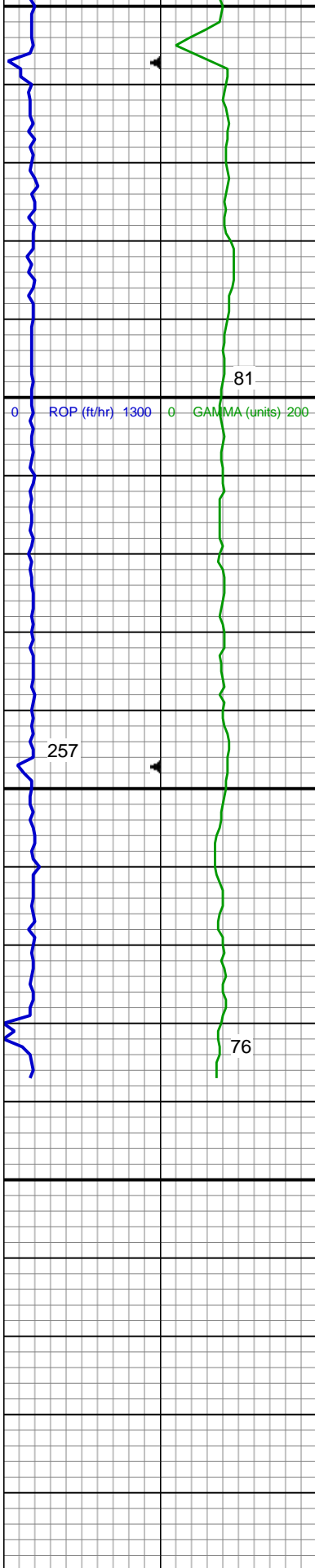
SLTY SH: lt - med gy - gy brn, frm -
hd, plty - sb plty, occ sb blk, slty -
grty tex, v sl calc

MD: 6,197'
TVD: 6,171.33'
Inclination: 0.76 °
Azimuth: 227.69 °

MD: 6,292'
TVD: 6,266.32'
Inclination: 0.63 °
Azimuth: 215.15 °

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

4745u
C1: 71.7%
C2: 14.8%
C3: 9.3%
C4: 4.2%



MD: 6,387'
TVD: 6,361.32'
Inclination: 0.54 °
Azimuth: 203.61 °

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

MD: 6,427'
TVD: 6,401.31'
Inclination: 0.49 °
Azimuth: 230.63 °

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

See Corresponding Horizontal Log
Five Rivers K07-65HN HORZ