

COLUMBINE LOGGING

Scale: 5" / 100'
Measured Depth Log

Well Name Schuh 3-65 21-20 3AH

Location SEC 21 T3S-R65W

State COLORADO

County ADAMS

Country USA

Rig Number Nabors B16

API Number 050011020100

AFE # WAY.CDR.0052

Geographic Region DJ BASIN

Field Niobrara

Spud Date 12/12/2018

Drilling Completed 12/18/2018

Surface Coordinates 1311ft FSL 475ft FEL SEC 21 T3S-R65W

SL Lat: 39° 46' 21.54" (NAD83)

SL Long: 104° 39' 40.09" (NAD83)

Bottom Hole Coordinates Proposed BHL:

2483ft FSL 325ft FWL SEC 20 T 3S-R65W

Ground Elevation 5596'

K.B. Elevation 5621'

Logged Interval 6000' To 18028'

Total Depth 18028'

Formation Niobrara C Chalk

Type of Drilling Fluid OBM

Operator

Company Conoco Phillips

Address 600 N. Dairy Ashford Rd.
Houston, TX 77079-1175



Geologist

Name Dave Aldridge

Company Conoco Phillips Central Rockies Implementation

Address Dave.E.Aldridge@conocophillips.com

Office:(832)486-3983

600 N Dairy Ashford EC3 14-W134

Houston, TX 77079



Other

Columbine Logging Inc. Mud Logging Company

Geologists/Geosteers on Location: Todd Thiesse, Dustin Morgan

Gas Detection: Bloodhound chromatograph gas unit #311

DD/MWD: Baker Hughes

Columbine Computer 87A

Color Coding

- Oil
- Ndle
- Error
- Condensate
- Core
- Water
- Gas
- Pressure
- Seal

Rock Types

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

Fossils

- GASTROPOD
- INOCERAMUS
- OOLITE
- OSTRACOD
- PELECYPOD
- PELLET
- PISOLITE
- PLANT REMAINS
- PLANT SPORES
- SCAPHOPOD
- STROMATOPOROID
- ECHINOID
- FISH
- FORAMINIFERA
- FOSSIL
- ANHYDRITIC
- ARGILLACEOUS

Minerals

Oil Show

- P PINPOINT
- V VUGGY

Engineering

- DEAD
- EVEN
- QUESTIONABLE
- BIT
- SPOTTED STAINING
- CONNECTION (UP)

Porosity

- CONNECTION (DOWN)
- CONNECTION GAS
- CONNECTION GAS
- TRIP GAS
- TRIP GAS (LEFT)
- INTERCRYSTALLINE
- DOWN TIME GAS
- INTEROOLITIC
- DOWN TIME GAS (L
- MOLDIC
- CORE - LOST
- ORGANIC
- CORE - RECOVERED

Accessories

ARGILLITE GRAIN	HEAVY MINERAL	
BENTONITE	KAOLIN	
BITUMENOUS SUBSTANCE	MARCASTITE	
BRECCIA FRAGMENTS	MARLSTONE	ANHYDRITE STRINGER
CALCAREOUS	MICACEOUS	BENTONITE STRINGER
CARBONACEOUS FLAKES	MINERAL CRYSTALS	COAL STRINGER
CHITDK	NODULES	DOLomite STRINGER
COAL - THIN BEDS	PHOSPHATE PELLETS	GYPSUM STRINGER
DOLOMITIC	PYRITE	LIMESTONE STRINGER
ELDSPAR	SALT CAST	MARLSTONE (CALC) STRG
FERRUGINOUS PELLET	SANDY	MARLSTONE (DOL) STRG
FERRUGINOUS	SIDERITE	SANDSTONE STRINGER
GLAUCONITE	SILICEOUS	SHALE STRINGER
GYPSIFEROUS	SILTY	SILTSTONE STRINGER
	TUFFACEOUS	

Stringer

Other Symbols

DST INTERVAL	WIRELINE TESTED - LEFT	E EARTHY
FAULT	WIRELINE TESTED - RT	FX FINELYXLN
FORMATION TOP	DRILL STEM TEST	GS GRAINSTONE
GAS SHOW	MNDEPTH MN DEPTH	L LITHOGRAPHIC
OIL SHOW		MX MICROXLN
Rounding		
MN DEPTH UP		MS MUDSTONE
MN DEPTH (DOWN)	A ANGULAR	PS PACKSTONE
NORMAL FAULT	R ROUNDED	WS WACKESTONE
OVERTURNED STRATA	S SUBANG	
REVERSE FAULT	n SUBRND	
CASING		
Textures		
SIDEWALL CORE (LEFT)		M MODERATE
SIDEWALL CORE (RIGHT)	B3 BOUNDSTONE	P POOR
SLIDE	C CHALKY	W WELL
SURVEY	CX CRYPTOXLN	
Sorting		

COLUMBINE LOGGING

ROP
ROP (ft/hr)
GAMMA (API units)

Columbine Logging Inc. Rigged Up 2 man logging 12/13/2018 Chromatograph Gas Unit #0311, began logging from 6000' MD at 11:00 AM, MDT on 12/15/18.

Gamma Data and Survey Data Provided by Baker Hughes

Total Gas & Chromatograph
GAS
C1
C2
C3
C4

GAS (units)
C1-C4 (units)

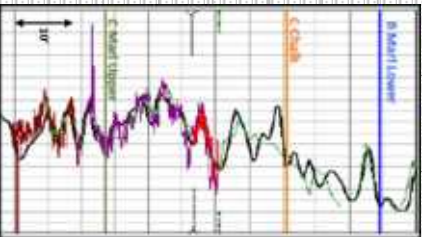
Gas Data From Bloodhound Unit #0311, data imported via Rig Watch and Gaschart

Depth Labels

% Lith

Well Bore
TVD

Target Formation/Member:
Niobrara C Chalk



Bit Data
Bit #: 2
Type: HTC AT A605
Size: 8.5"
Depth In: 2258'
Depth Out: 18028'
Jets: 5x14
S/N: 5284559

ROP: 301 ft/hr
RPM: 100
SPR: 3263 PSI
STRK 1: 103 SPM
STRK 2: 103 SPM
WOB: 11 klbs

TG: 172u
C1: .99.2%
C2: 0.3%
C3: 0.5%
C4: 0%

MUD WT IN: 9.85 VIS:
MUD WT OUT: 9.8 VIS:

5000
SLTY SH: gy-dk gy, occ lt gy, v sft - sft, sb
ply-pty, silty to rthy tex, tr grdg to silst in pt, sl
calc with some tr SLTST: med gy- gy, sl frm, sb
biky- occ sb pty, rthy-silty tex, sl calc.

5000
SLTY SH: gy-dk gy, occ lt gy, v sft - sft, sb
ply-pty, silty to rthy tex, tr grdg to silst in pt, sl
calc with some tr SLTST: med gy- gy, sl frm, sb
biky- occ sb pty, rthy-silty tex, sl calc.

5000
SLTY SH: gy- dk gy, sme lt gy, v
silty, sb pty-pty, silty-gt tex, sl-inc

MD: 6,030'

Inclination: 20.56°

Azimuth: 29.31°

TVD: 5,990.56'

VS: -69.3'

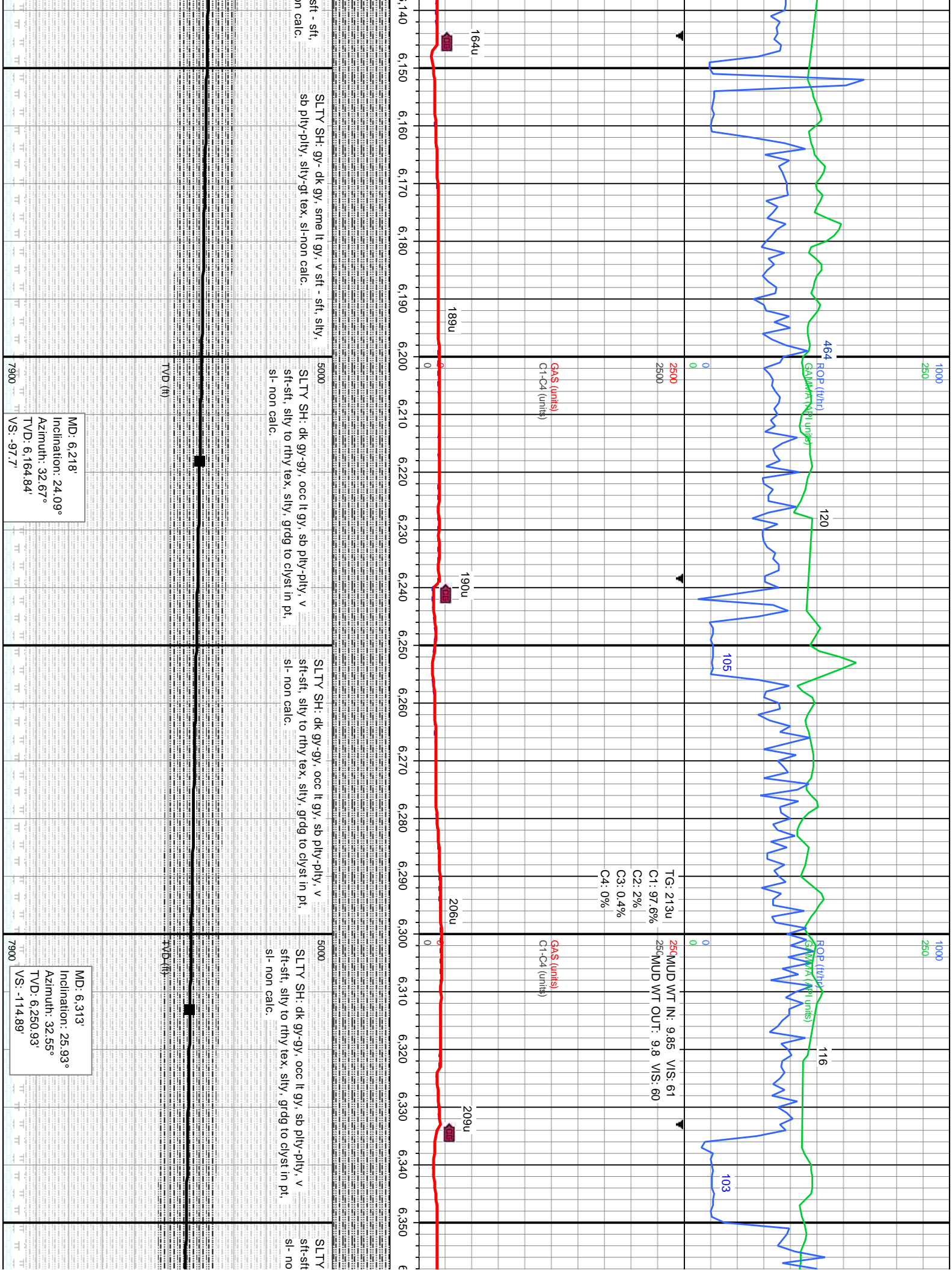
MD: 6,125'

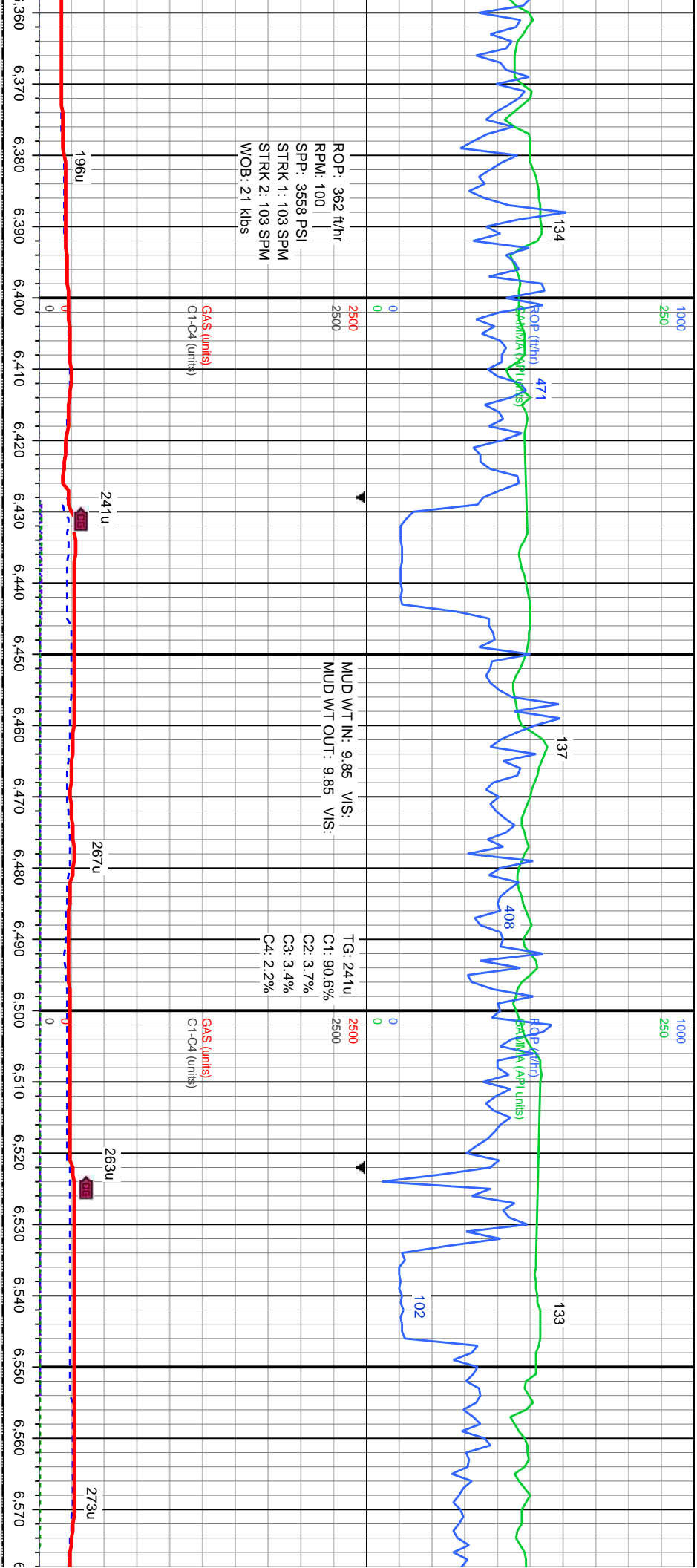
Inclination: 21.69°

Azimuth: 31.01°

TVD: 6,079.17'

VS: -82.63'





SH: dk gy-gy, occ lt gy, sb pty-pty, v
sily to rthy tex, sily, grdg to clyst in pt,
n calc.

5000
SLTY SH: dk gy-gy, occ lt gy, sb pty-pty, v
sft-sft, sily to rthy tex, arg, grdg to clyst in pt,
sl- non calc.

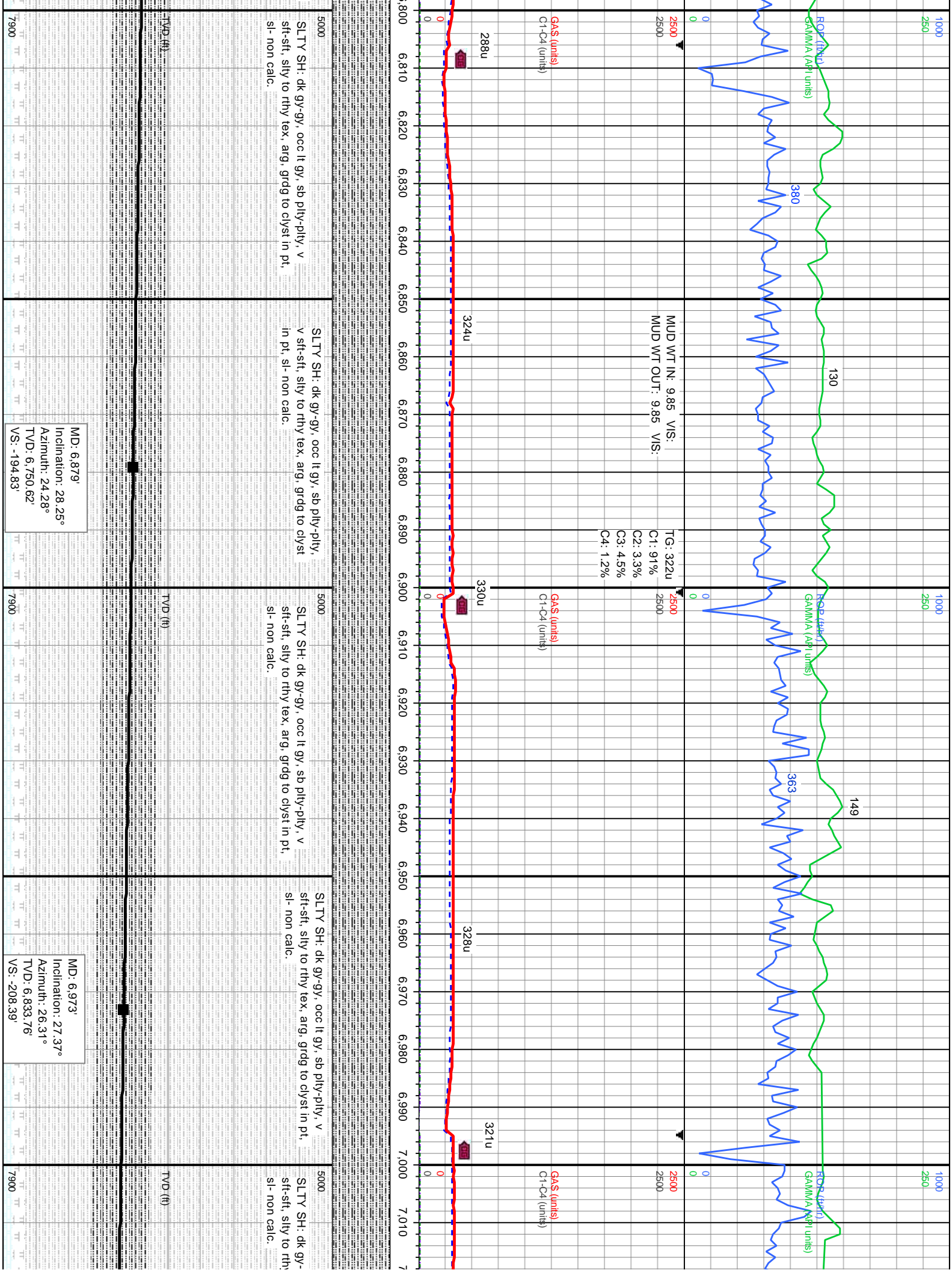
5000
SLTY SH: dk gy-gy, occ lt gy, sb pty-pty, v
sft-sft, sily to rthy tex, arg, grdg to clyst in pt,
sl- non calc.

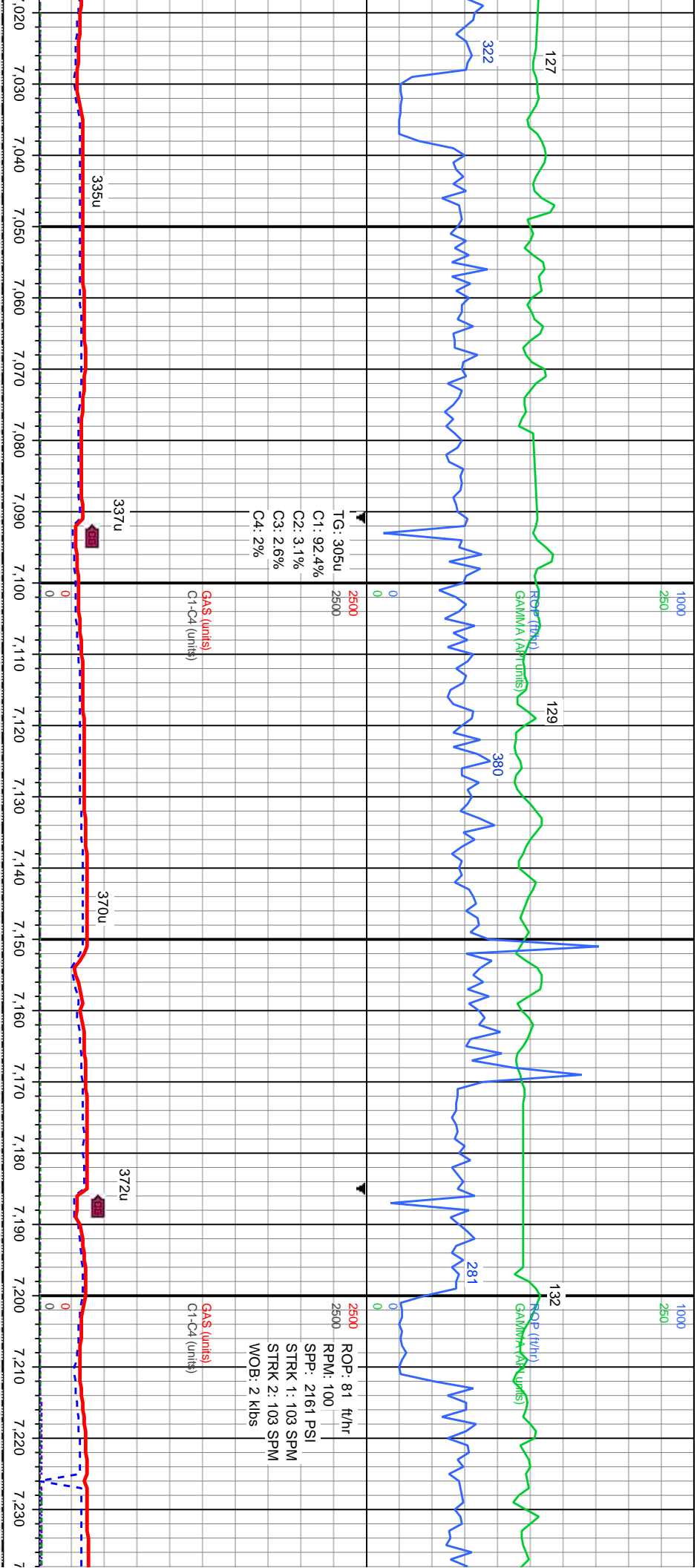
5000
SLTY SH: dk gy-gy, occ lt gy, sb pty-pty, v
sft-sft, sily to rthy tex, arg, grdg to clyst in pt, sl-
non calc.

SLTY SH: dk gy-gy, occ lt
sft-sft, sily to rthy tex, arg,
sl- non calc.

MD: 6,407'
Inclination: 27.6°
Azimuth: 29.34°
TVD: 6,334.86'
VS: -131.86'

MD: 6,501'
Inclination: 27.89°
Azimuth: 24.73°
TVD: 6,418.06'
VS: -146.65'





gy, occ lt gy, sb pily-pily, v
/ tex, arg, grdg to clyst in pt,

SLTY SH: dk gy-gy, occ lt gy, sb pily-pily, v
sft-sft, silty to rthy tex, arg, grdg to clyst in
pt, sl- non calc.

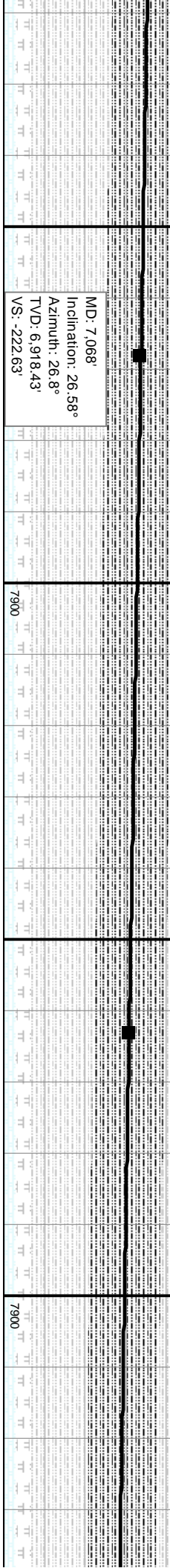
5000
SLTY SH: dk gy-gy, occ lt gy, sb pily-pily, v
sft-sft, silty to rthy tex, arg, grdg to clyst in pt,
sl- non calc.

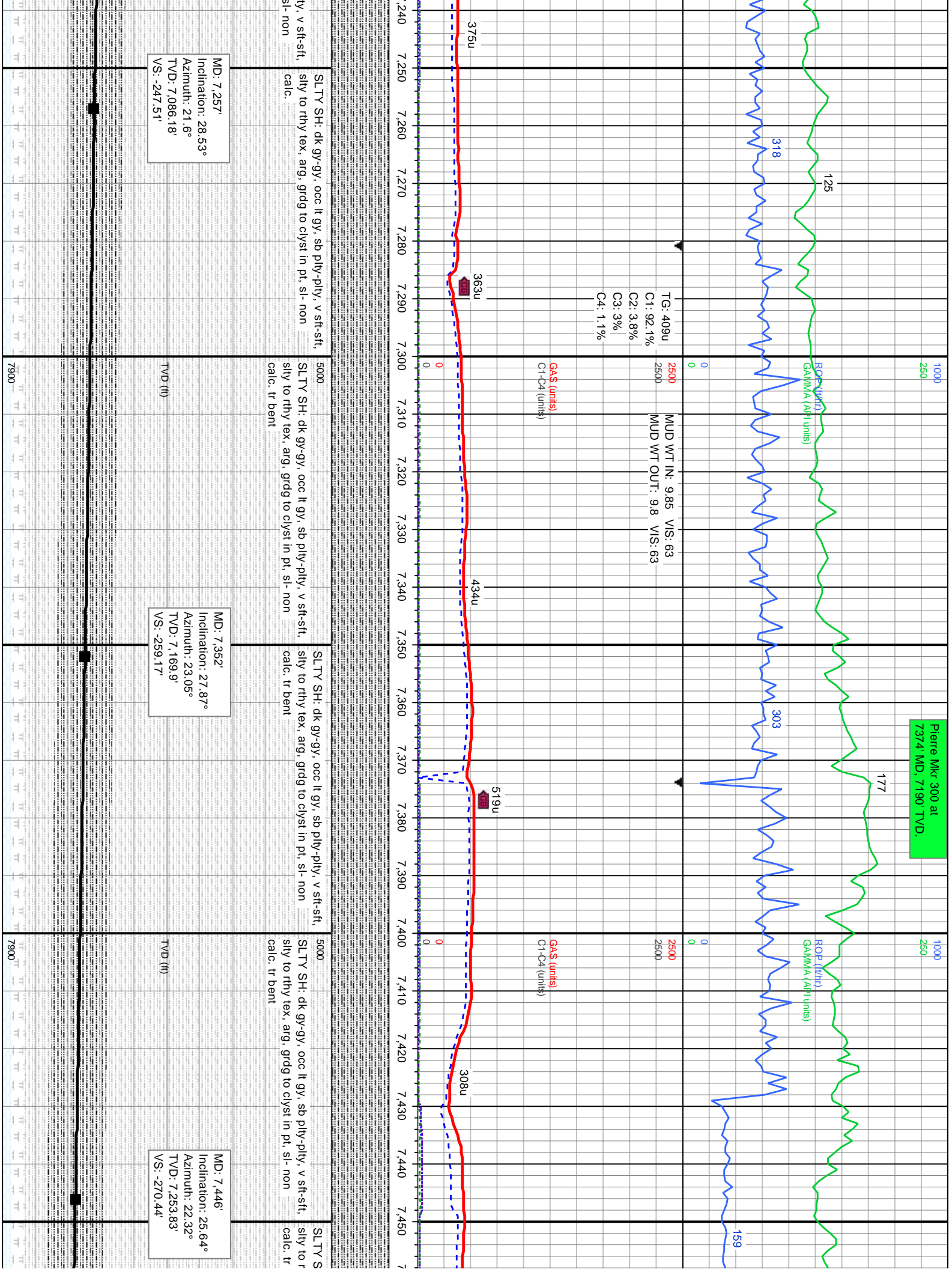
SLTY SH: dk gy-gy, occ lt gy, sb pily-pily,
v sft-sft, silty to rthy tex, arg, grdg to clyst
in pt, sl- non calc.

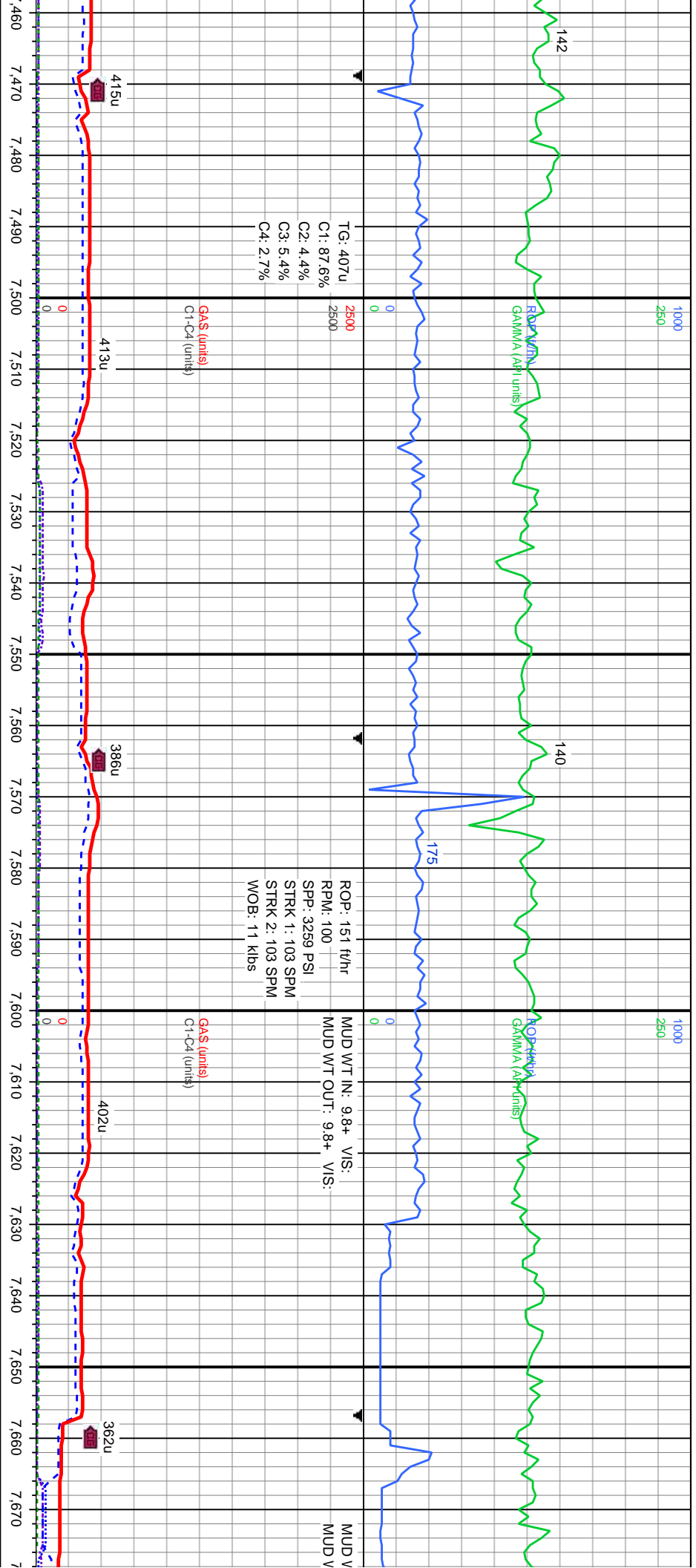
5000
SLTY SH: dk gy-gy, occ lt gy, sb pily-pl
silty to rthy tex, arg, grdg to clyst in pt, :
calc.

MD: 7,068'
Inclination: 26.58°
Azimuth: 26.8°
TVD: 6,918.43'
VS: -222.63'

MD: 7,163'
Inclination: 27.31°
Azimuth: 23.62°
TVD: 7,003.12'
VS: -235.88'







H: dk gy-gy, occ lt gy, sb plty-plty, v sft-sft, thny tex, arg, grdg to clyst in pt, si- non bent

SL TV SH: dk-gy-gy, occ lt gy, sb ply-pty, v st-ft, silty to rhytex, arg, grdg to clyst in pt, sl-non calc.

SLTY SH: dk gy-gy, occ lt gy, sb plty-plty, v sft-sft, silty to rthy tex, arg, grdg to clyst in pt, sl-non calc.

NOTE: Scale Change.

SLTY SH: dk gy-gy, occ lt gy, sb plty-plty, v sft-sft, slty to rthy tex, arg, grdg to clyst in pt, sl-non calc.

SLTY SH: dk gy-gy, occ lt gy
sly to rthy tex, arg, grdg to c
calc.

TVD (ft)

MD: 7,541'
Inclination: 23.66°
Azimuth: 8.33°
TVD: 7,340.24'
VS: -276.14'

TVD (44)

NOTE: Scale Change.

MD: 7,635'
Inclination: 23.65°
Azimuth: 5.25°
TVD: 7,426.35'
VS: -275.83'

Pierre Mkr 125 at
7704' MD, 7489' TVD.

1000
250
12/15/2018
12/16/2018
MWDDEPTH

202

ROP (ft/hr)
GAMMA (API units)

ROP (ft/hr)
GAMMA (API units)

83

0

184

0

151

WT IN: 9.8 V/S: 62
WT OUT: 9.8 V/S: 61

TG: 164u
C1: 96.8%
C2: 1.9%
C3: 0.9%
C4: 0.4%

TG: 1,103u
C1: 96.8%
C2: 1.9%
C3: 0.9%
C4: 0.4%

GAS (units)
C1-C4 (units)

GAS (units)
C1-C4 (units)

Shaker 1 shut down for cleaning and screen replacement

0

160u

152u

0

132u

7,680 7,690 7,700 7,710 7,720 7,730 7,740 7,750 7,760 7,770 7,780 7,790 7,800 7,810 7,820 7,830 7,840 7,850 7,860 7,870 7,880 7,890 7,900

sb ply-ply, v sft-sft,
cyst in pt, sl- non
SLTY SH: dk gy-gy, occ lt gy, sb ply-ply, v sft-sft,
sly to rhy tex, arg, grdg to clyst in pt, sl- non
calc.

SLTY SH: dk gy-gy, occ lt gy, sb ply-ply, v sft-sft,
sly to rhy tex, arg, grdg to clyst in pt, sl- non
calc.

SLTY SH: dk gy-gy, occ lt gy, sb ply-ply, v sft-sft,
sly to rhy tex, arg, grdg to clyst in pt, sl- non
calc.

TVD (ft)

TVD (ft)

8500

8500

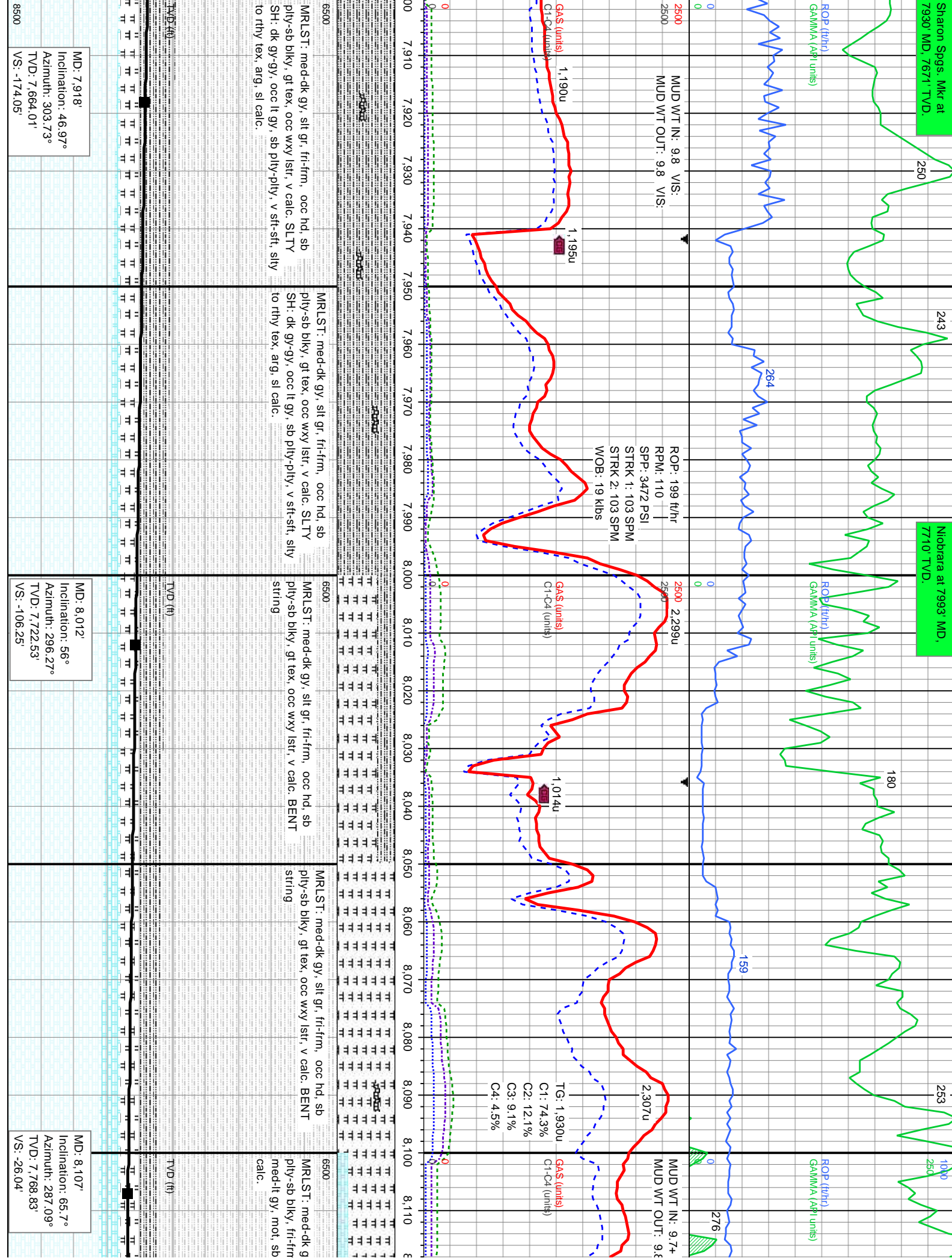
8500

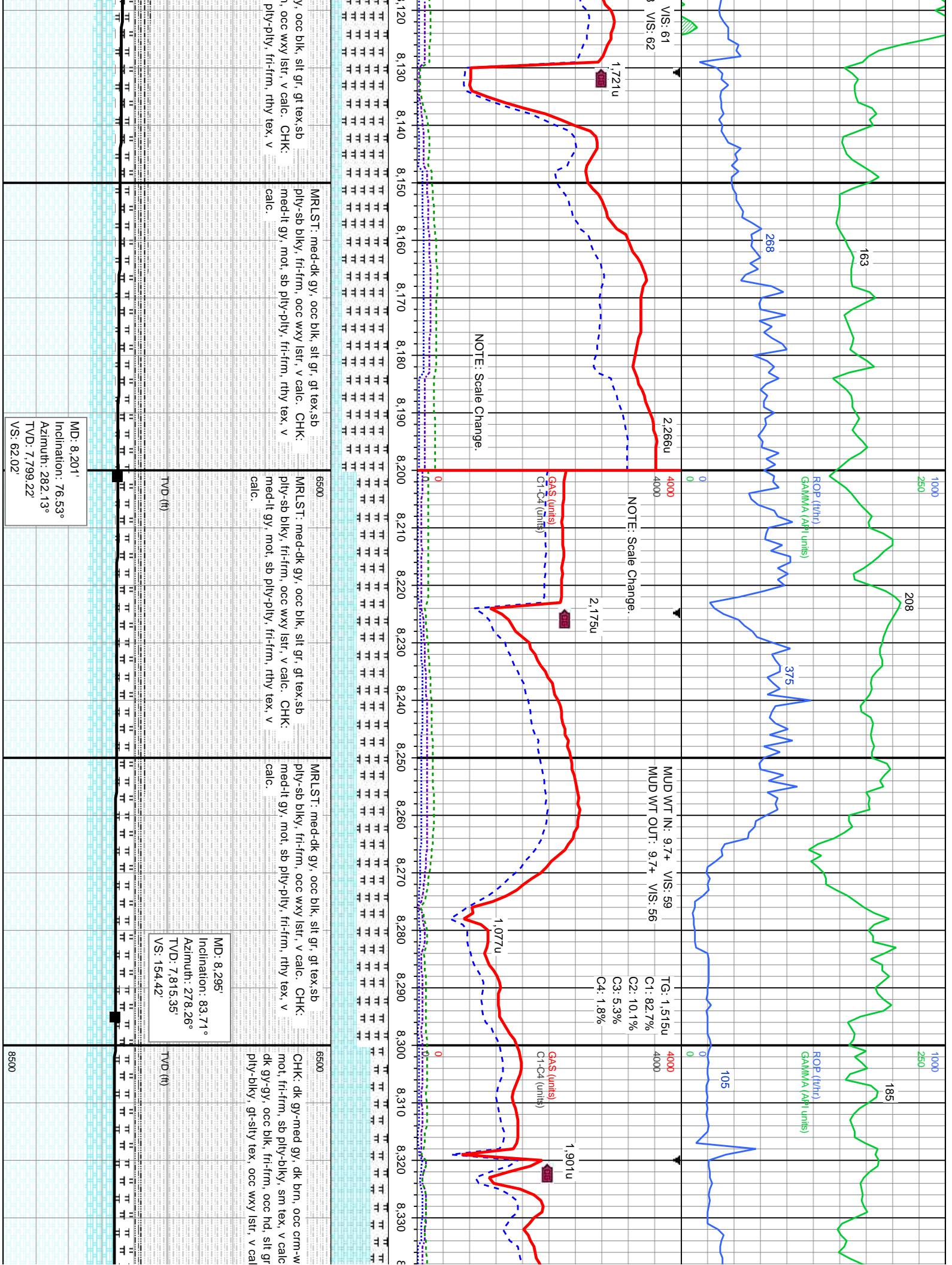
MD: 7,729'
Inclination: 26.38°
Azimuth: 331.11°
TVD: 7,511.96'
VS: -262.78'

MD: 7,824'
Inclination: 35.68°
Azimuth: 312.25°
TVD: 7,593.47'
VS: -227.47'

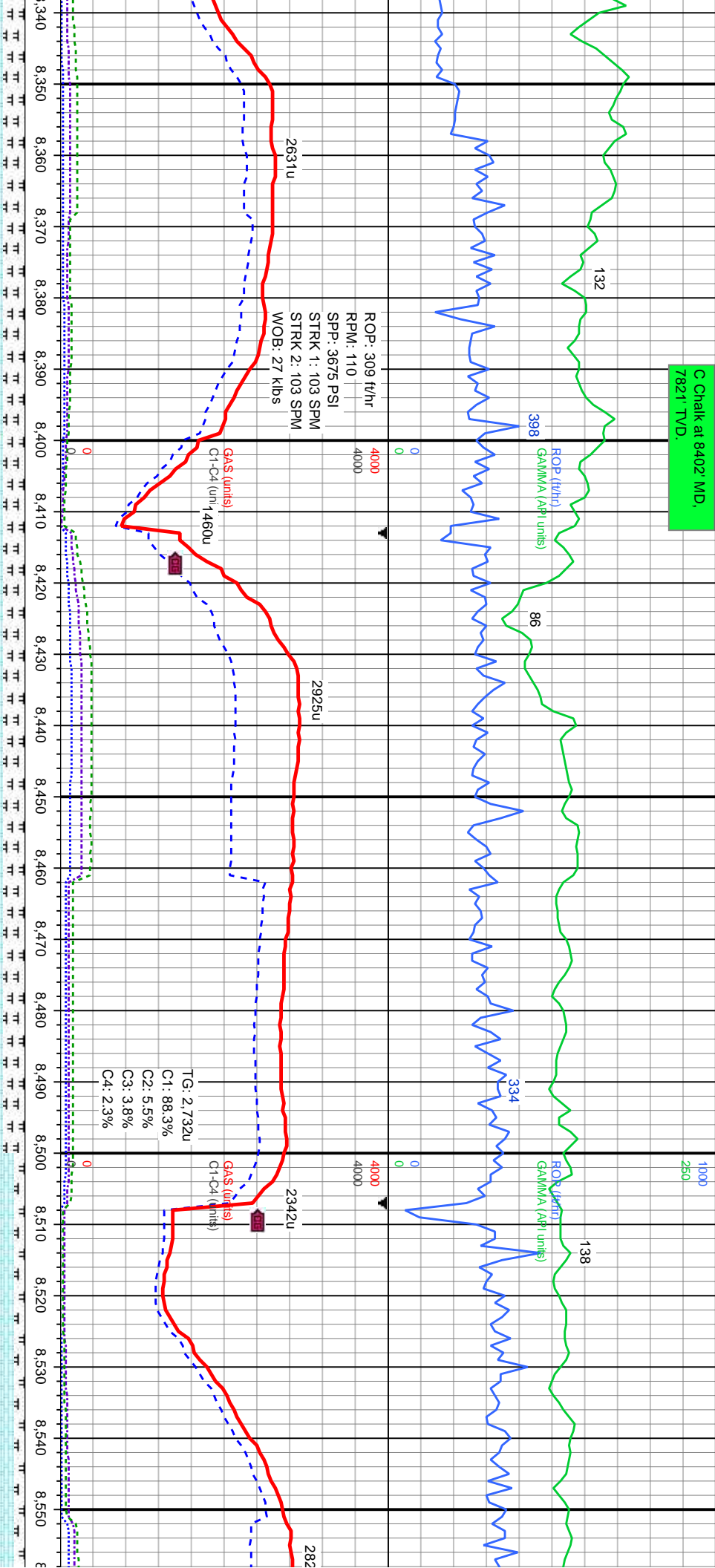
Sharon Spgs. Mkr at
7930' MD, 7671' TVD.

Niobrara at 7993' MD,
7710' TVD.





1000
250

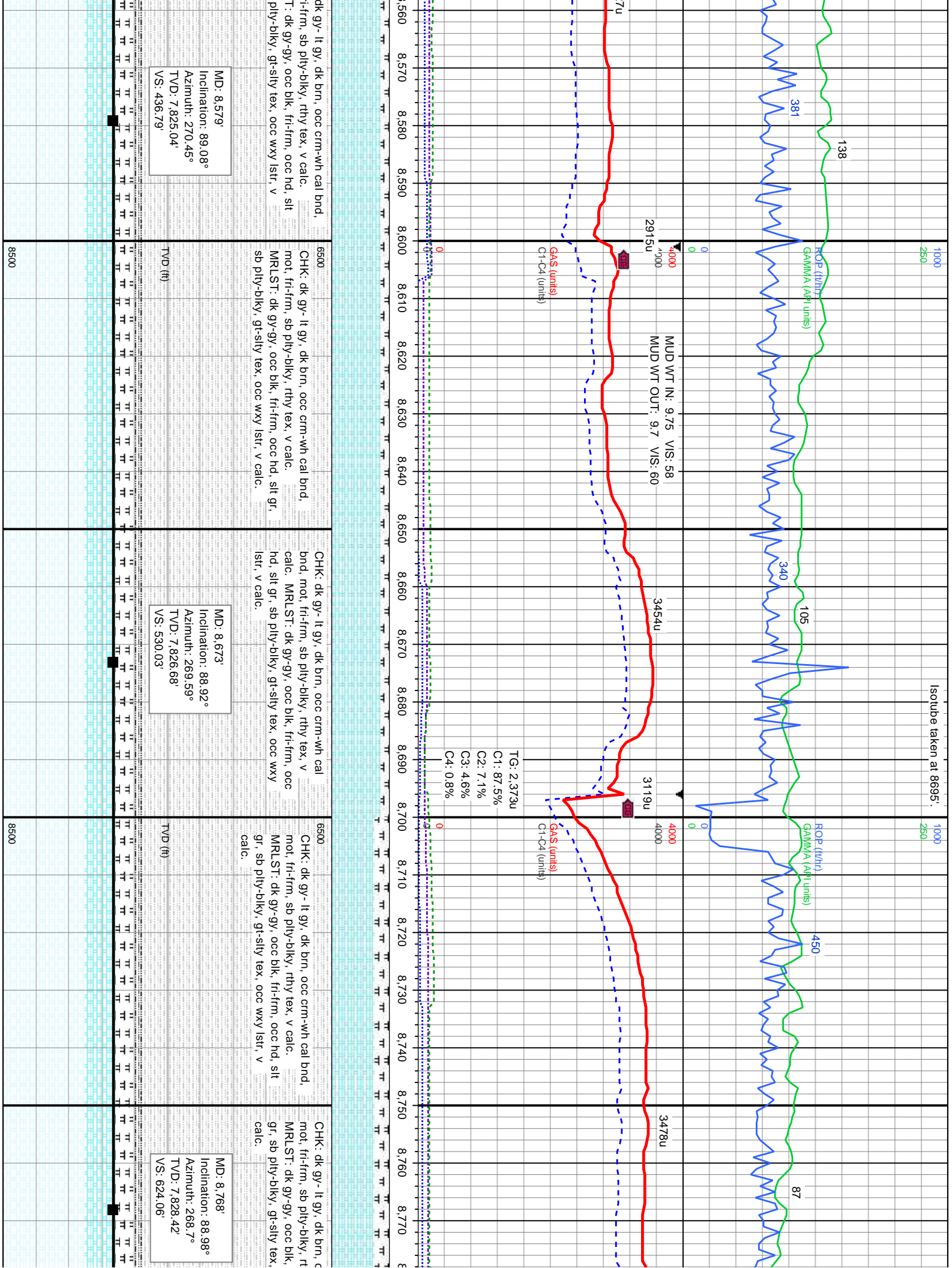


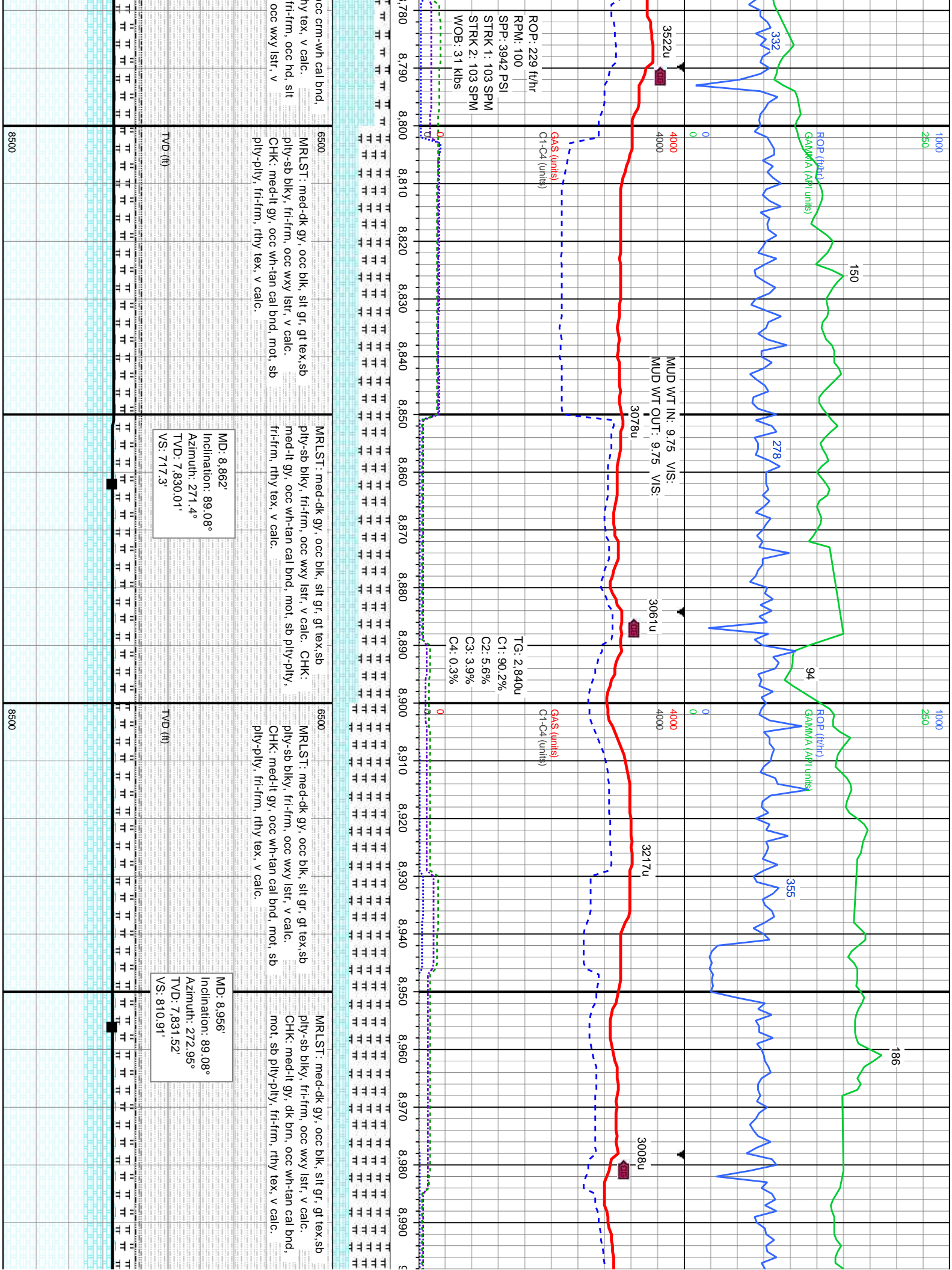
CHK: dk gy- lt gy, dk brn, occ crm-wb cal bnd
mot, fri-frm, sb ply-bkly, rhy tex, v calc.
MRLST: dk gy-gy, occ blk, fri-frm, occ hd, sit
gy, sb ply-bkly, gt-sily tex, occ wxy lstr, v

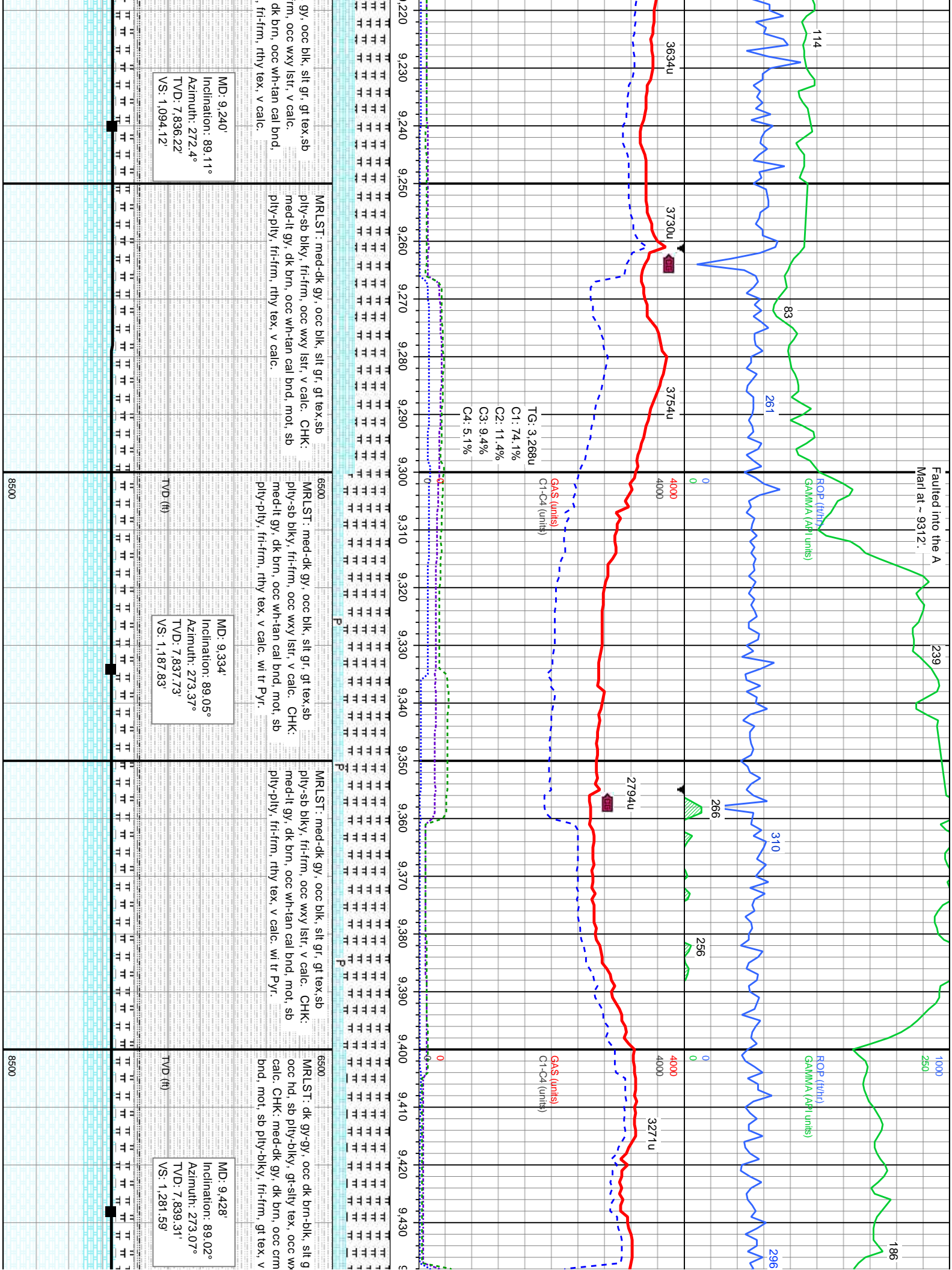
TVD (ft)

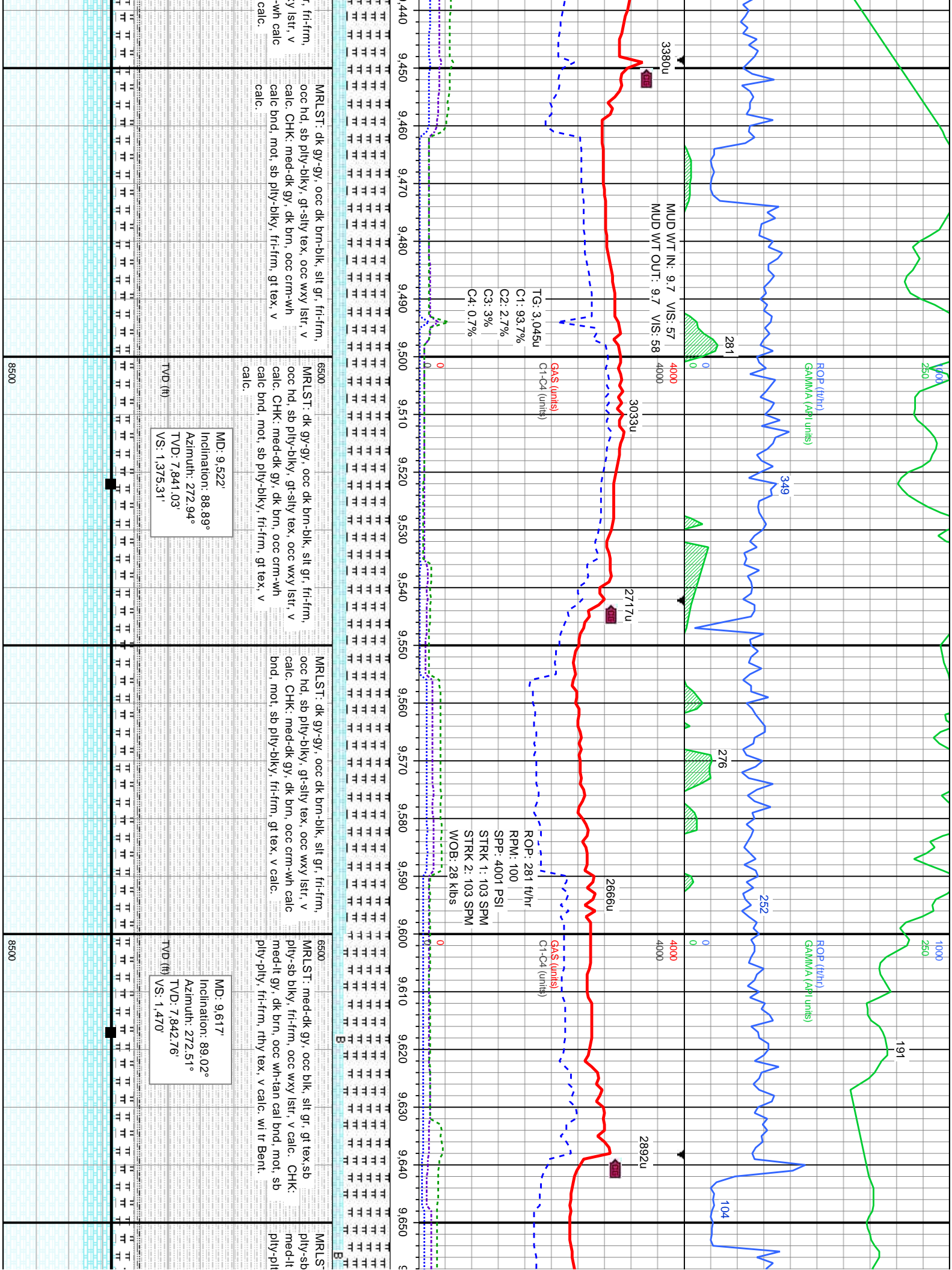


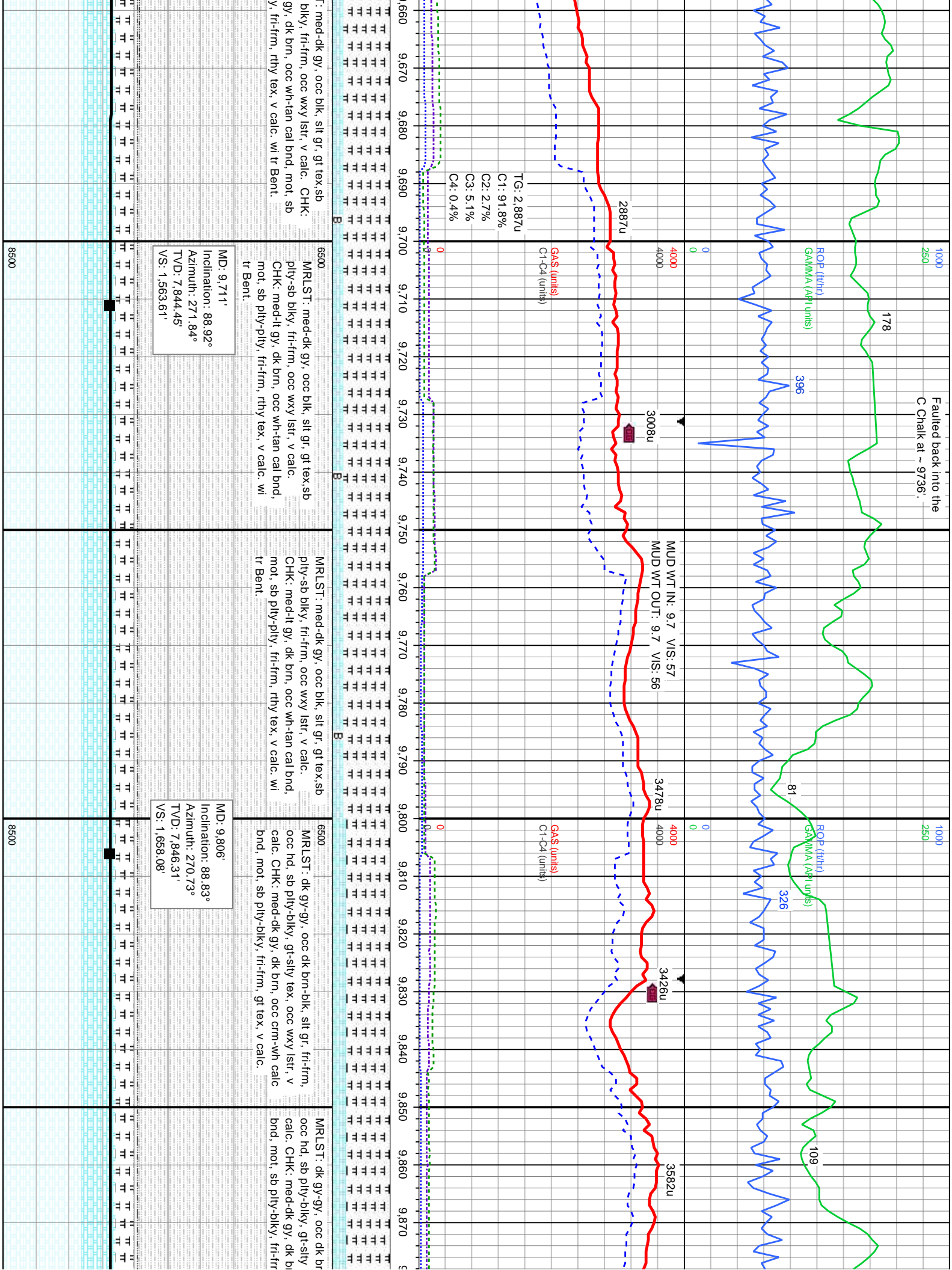
CHK:
mot, fr
MRLS
gr, sb
calc.

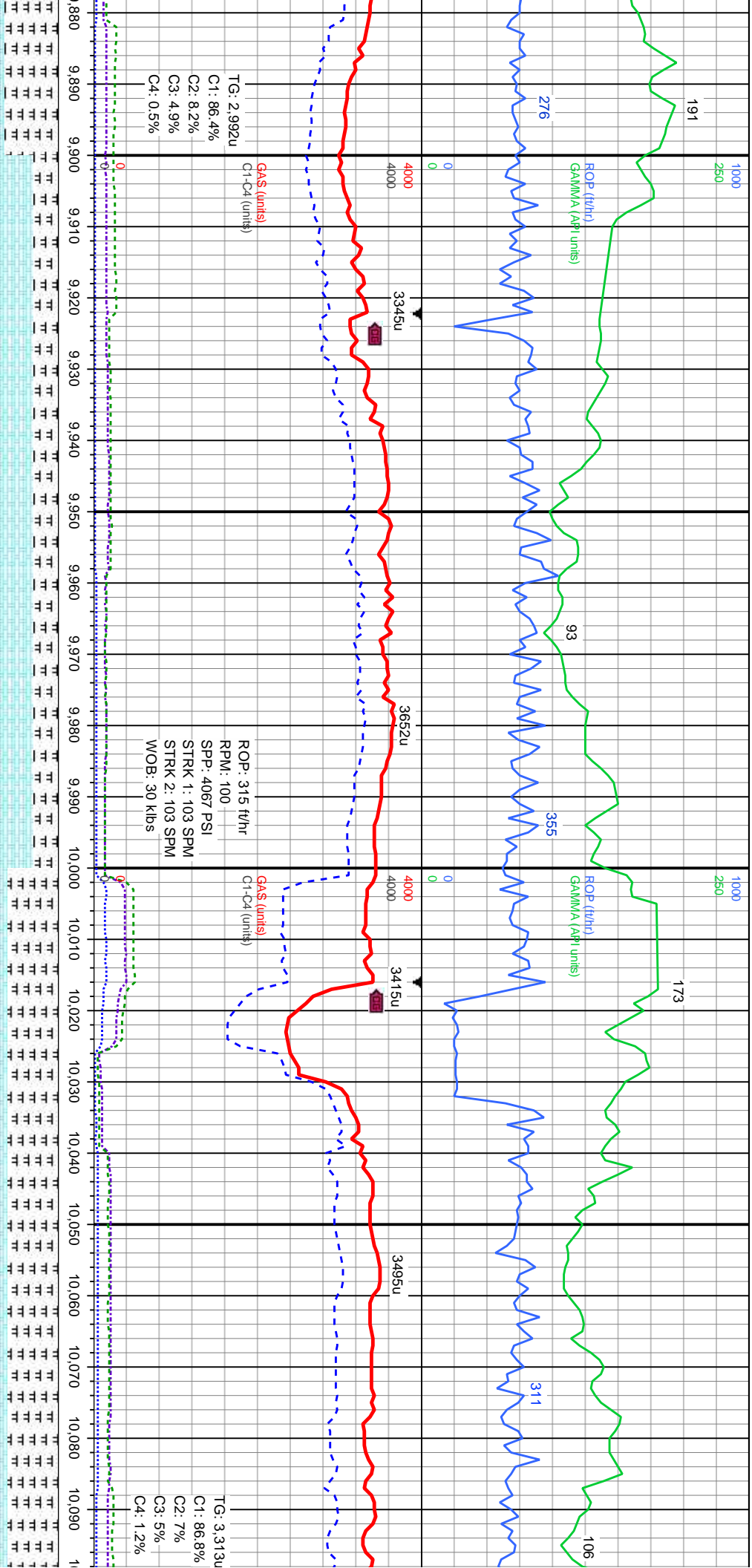












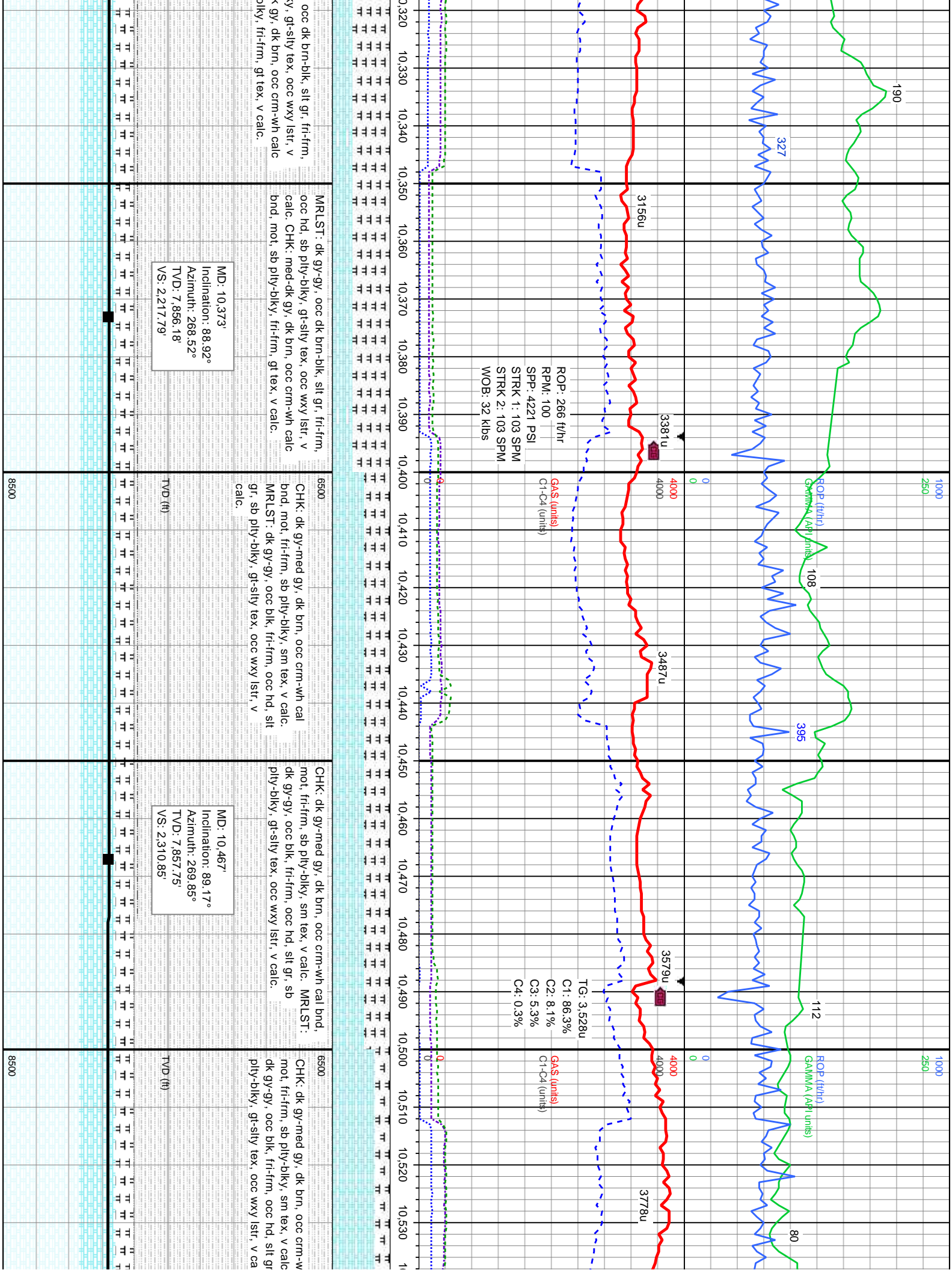
MD: 9,900'
Inclination: 88.98°
Azimuth: 269.24°
TVD: 7,848.11'
VS: 1,751.3'

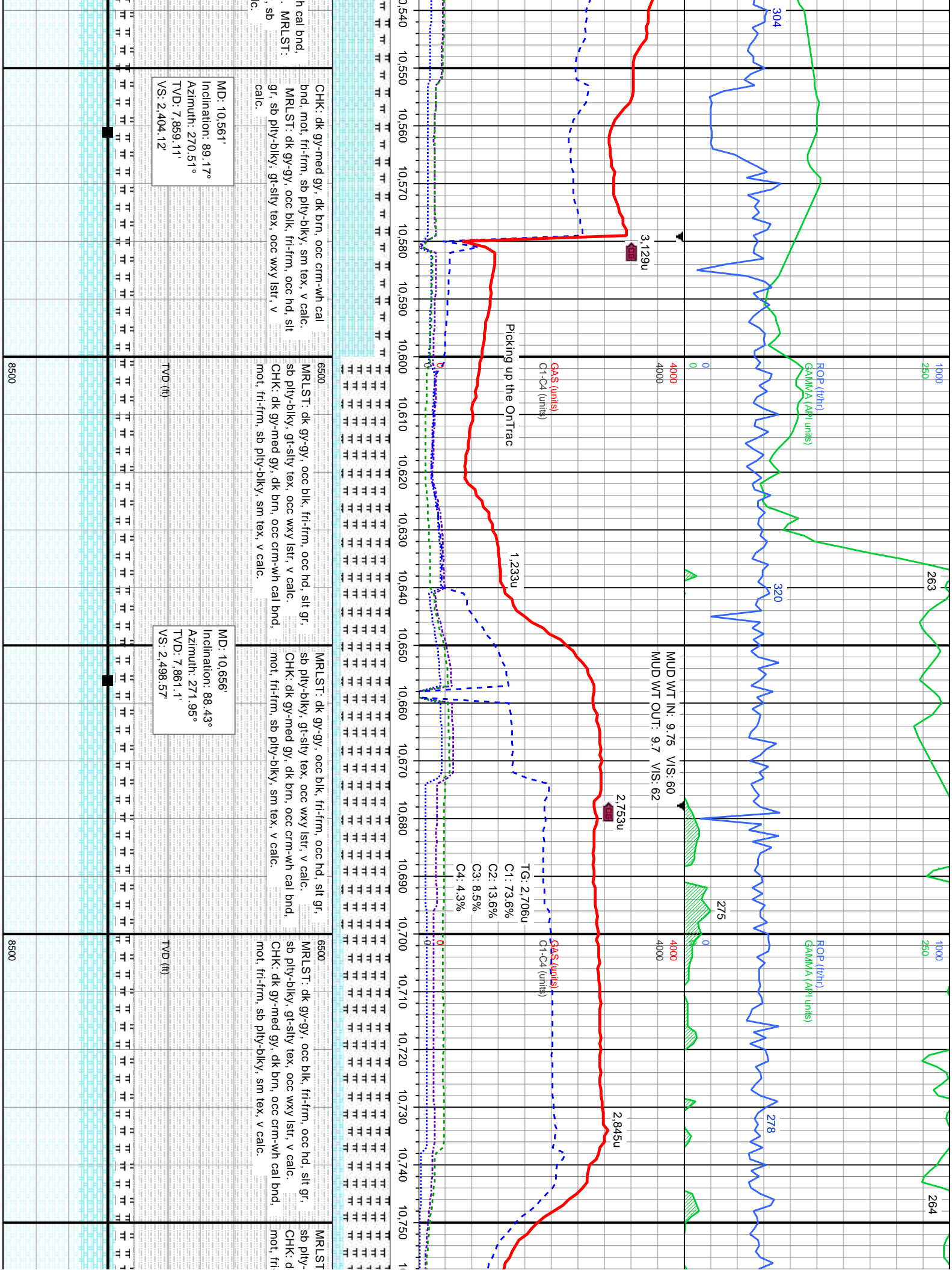
TG: 2,992u
C1: 86.4%
C2: 8.2%
C3: 4.9%
C4: 0.5%

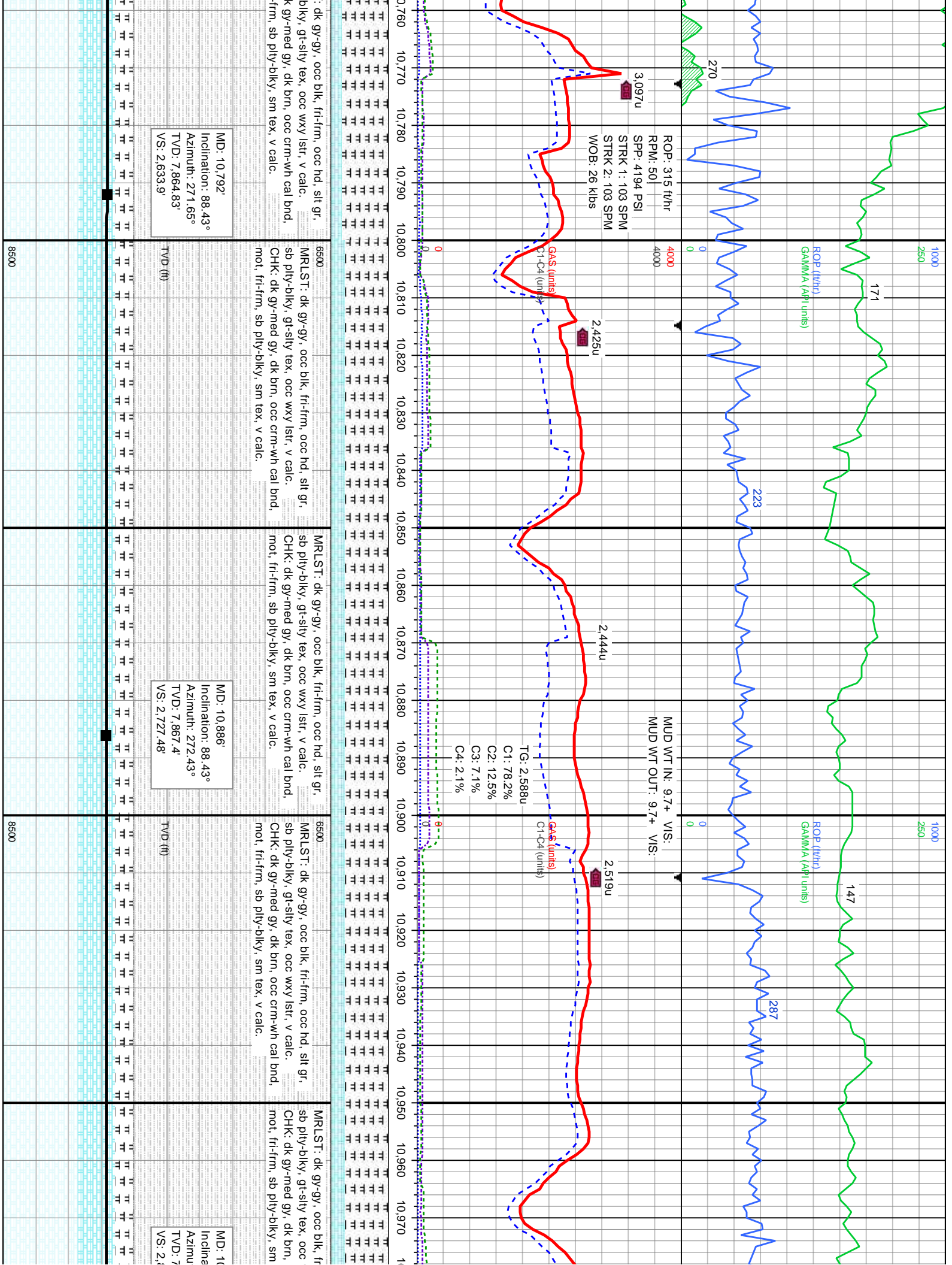
ROP: 315 ft/hr
RPM: 100
SP: 4067 PSI
STRK 1: 103 SPM
STRK 2: 103 SPM
WOB: 30 klbs

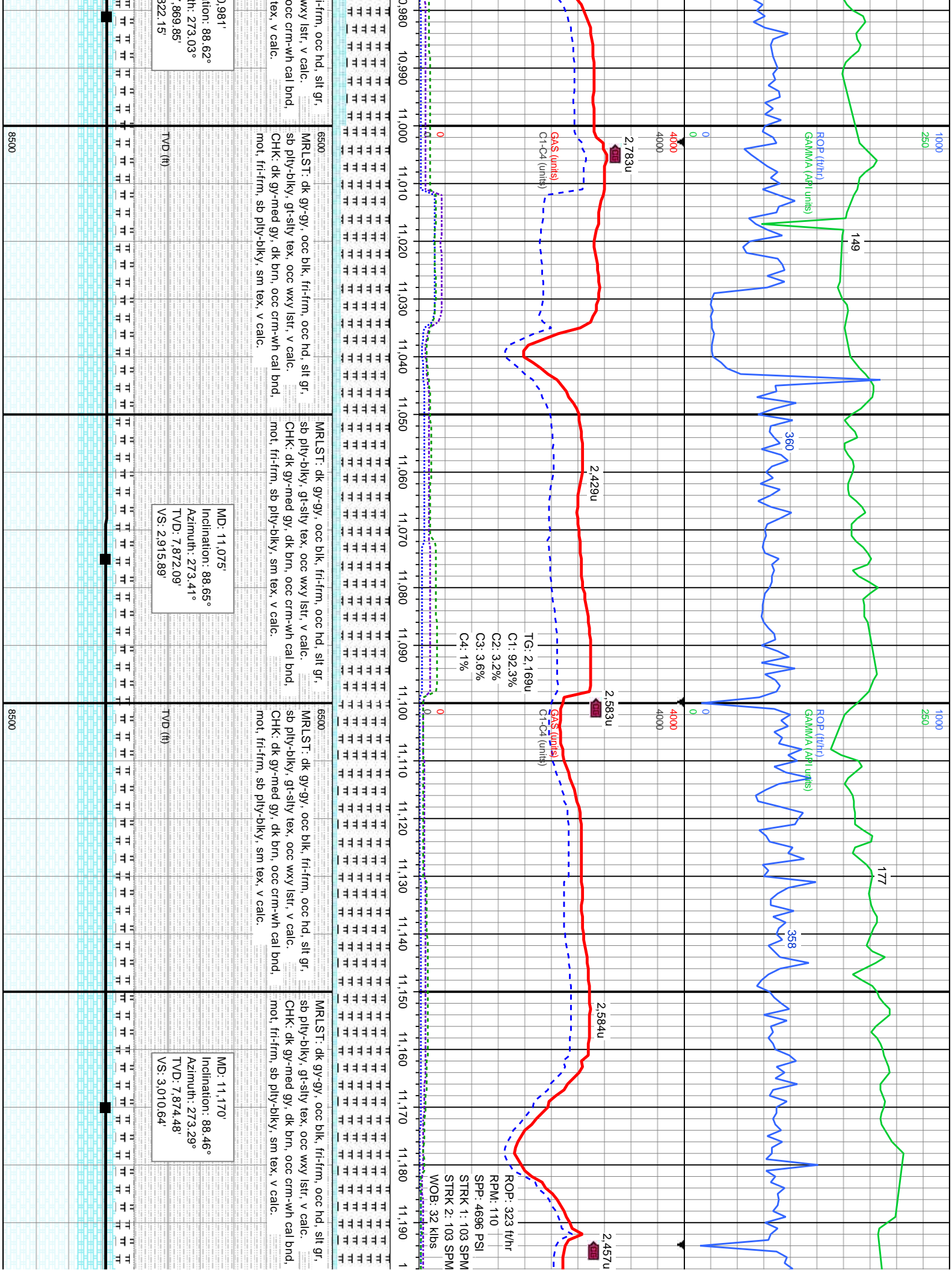
TG: 3,313u
C1: 86.8%
C2: 7%
C3: 5%
C4: 1.2%

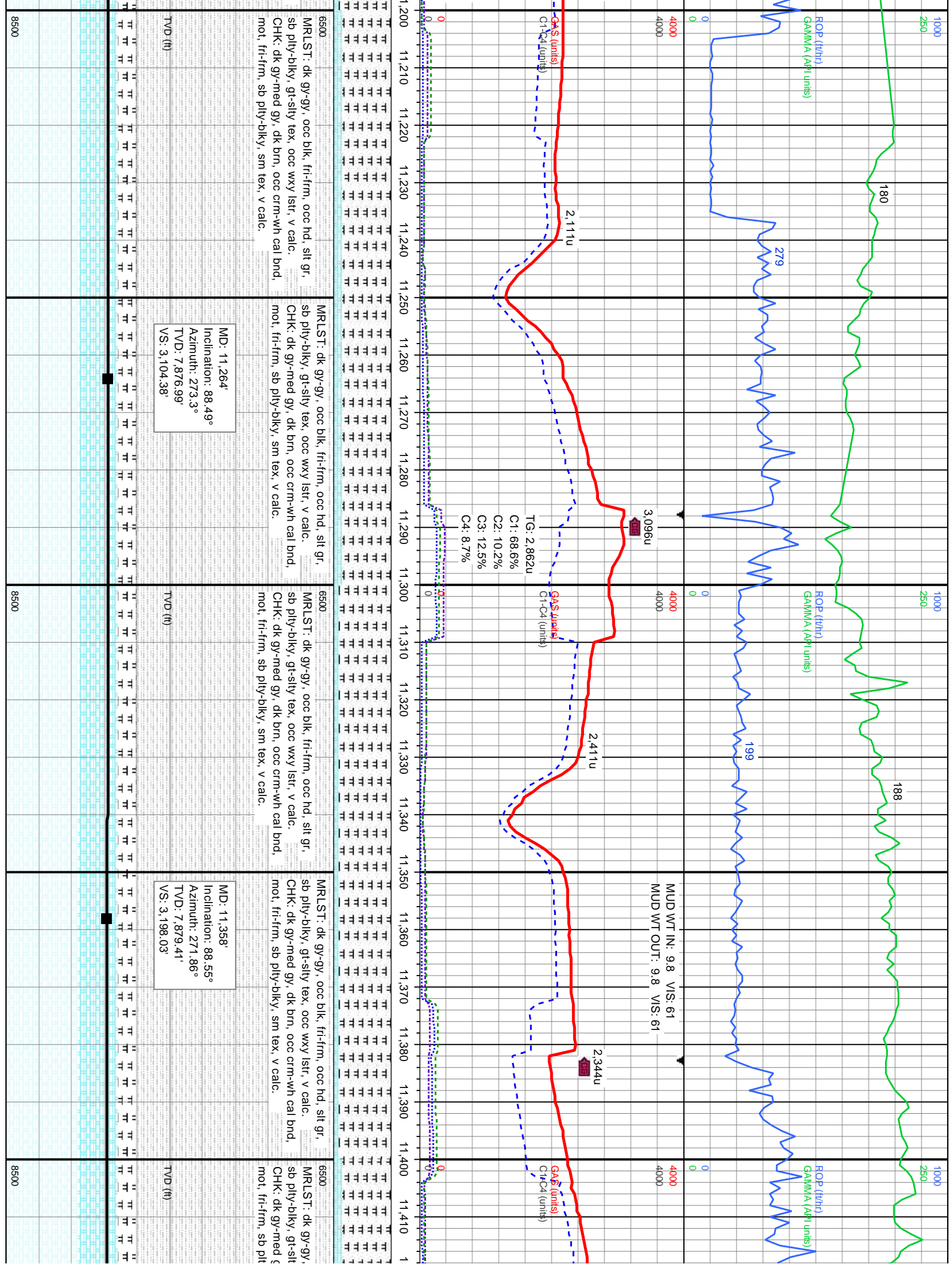
MD: 10,089'
Inclination: 88.86°
Azimuth: 267.22°
TVD: 7,851.31'
VS: 1,937.51'

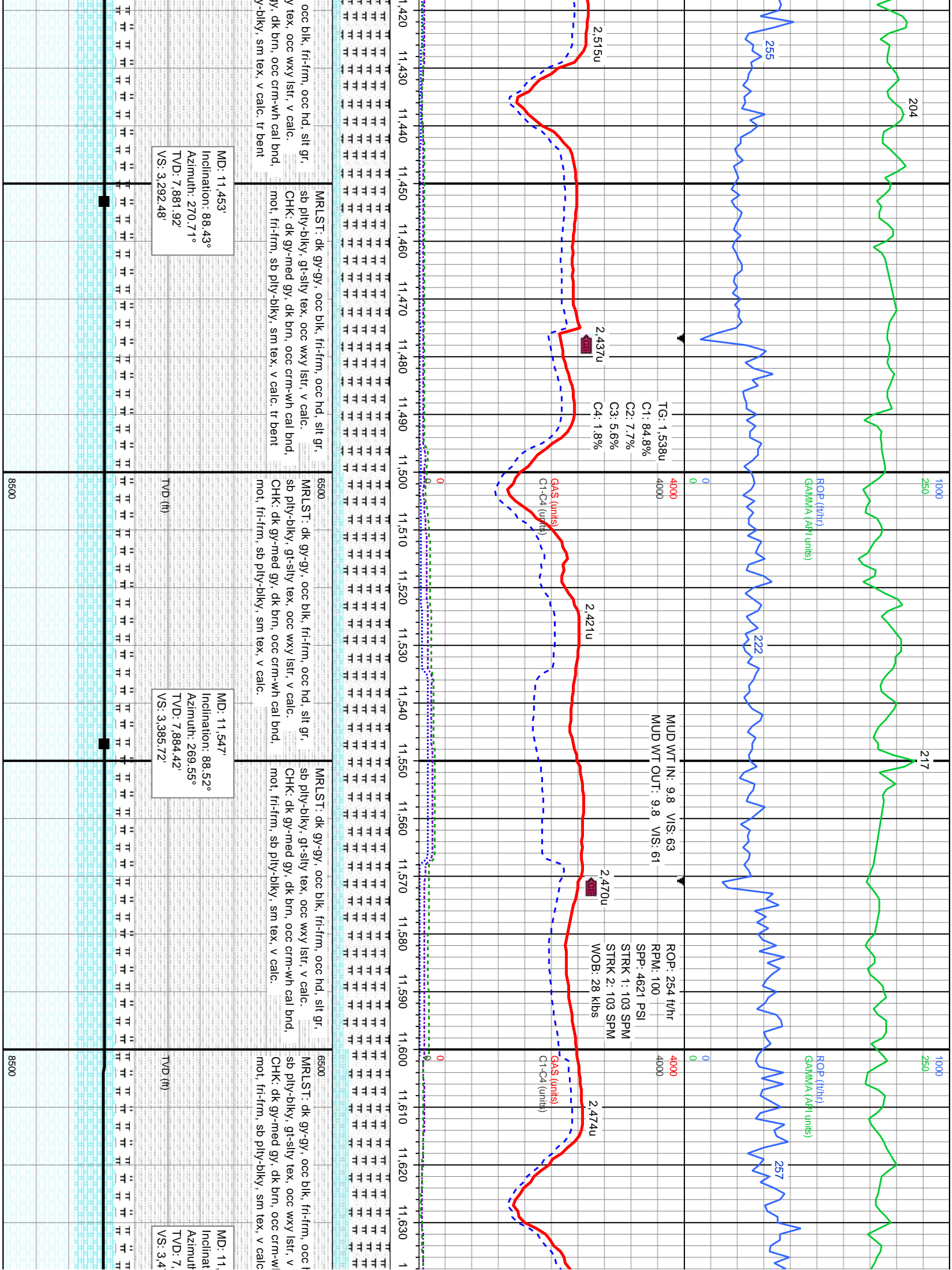


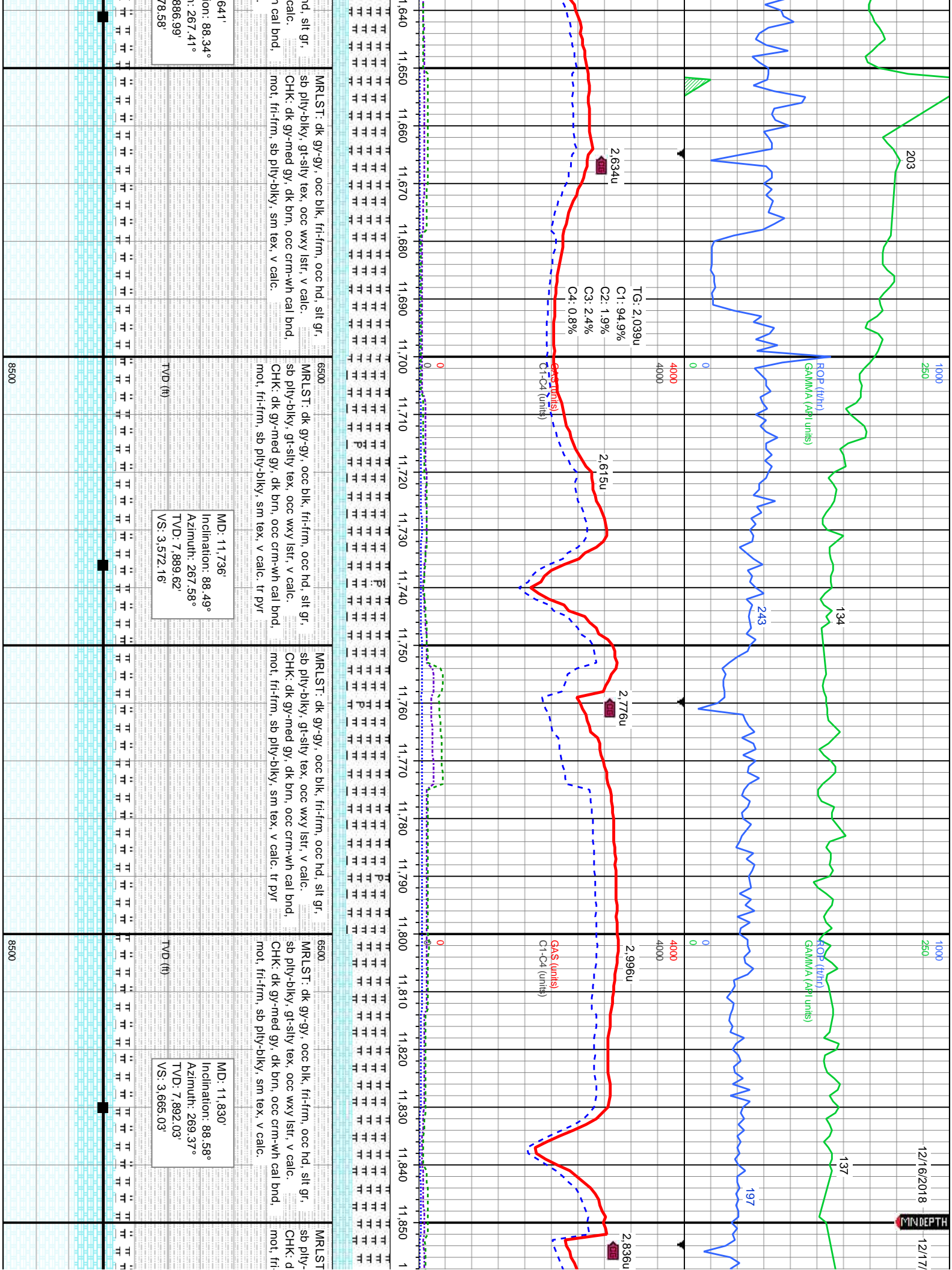


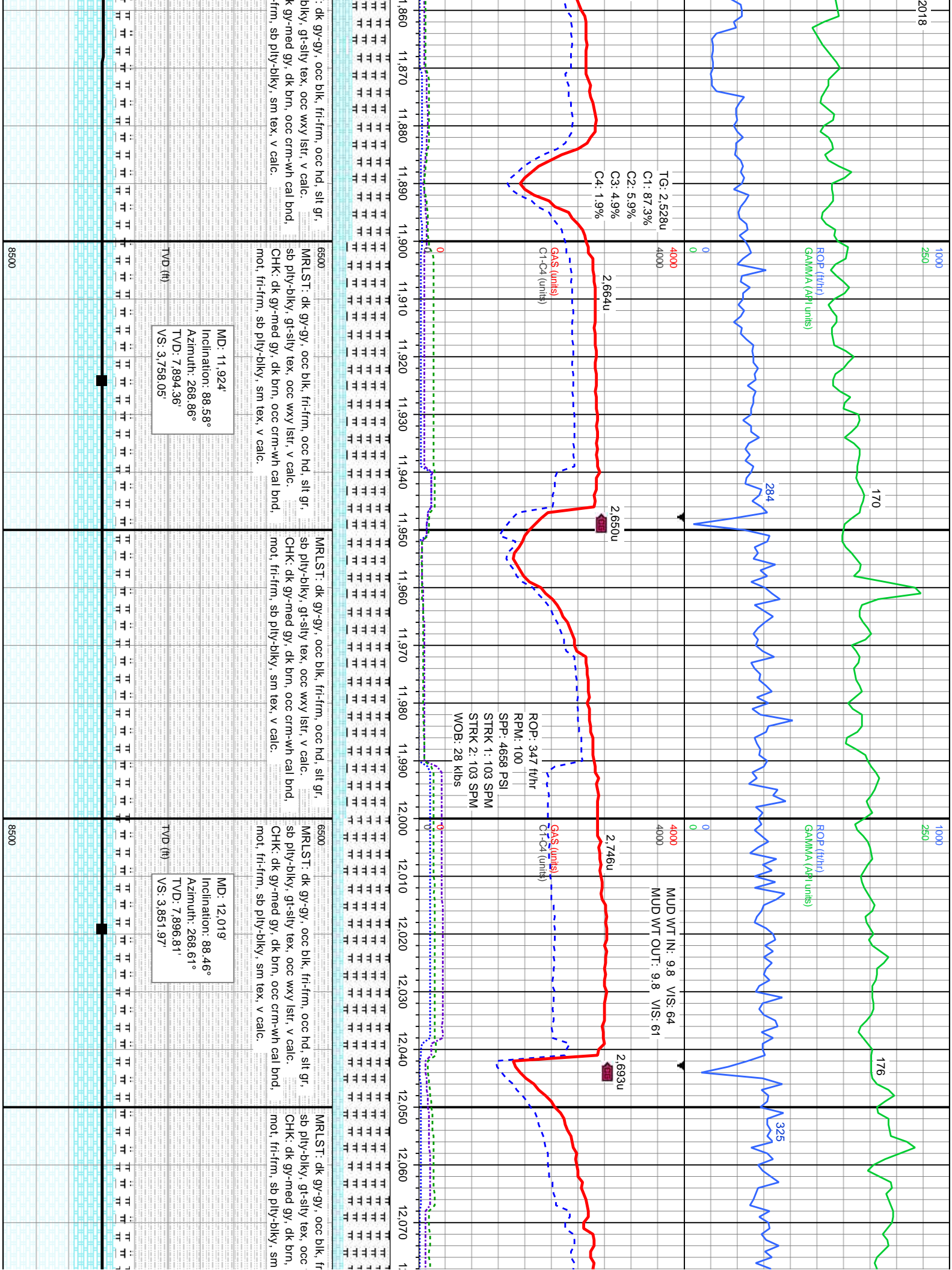


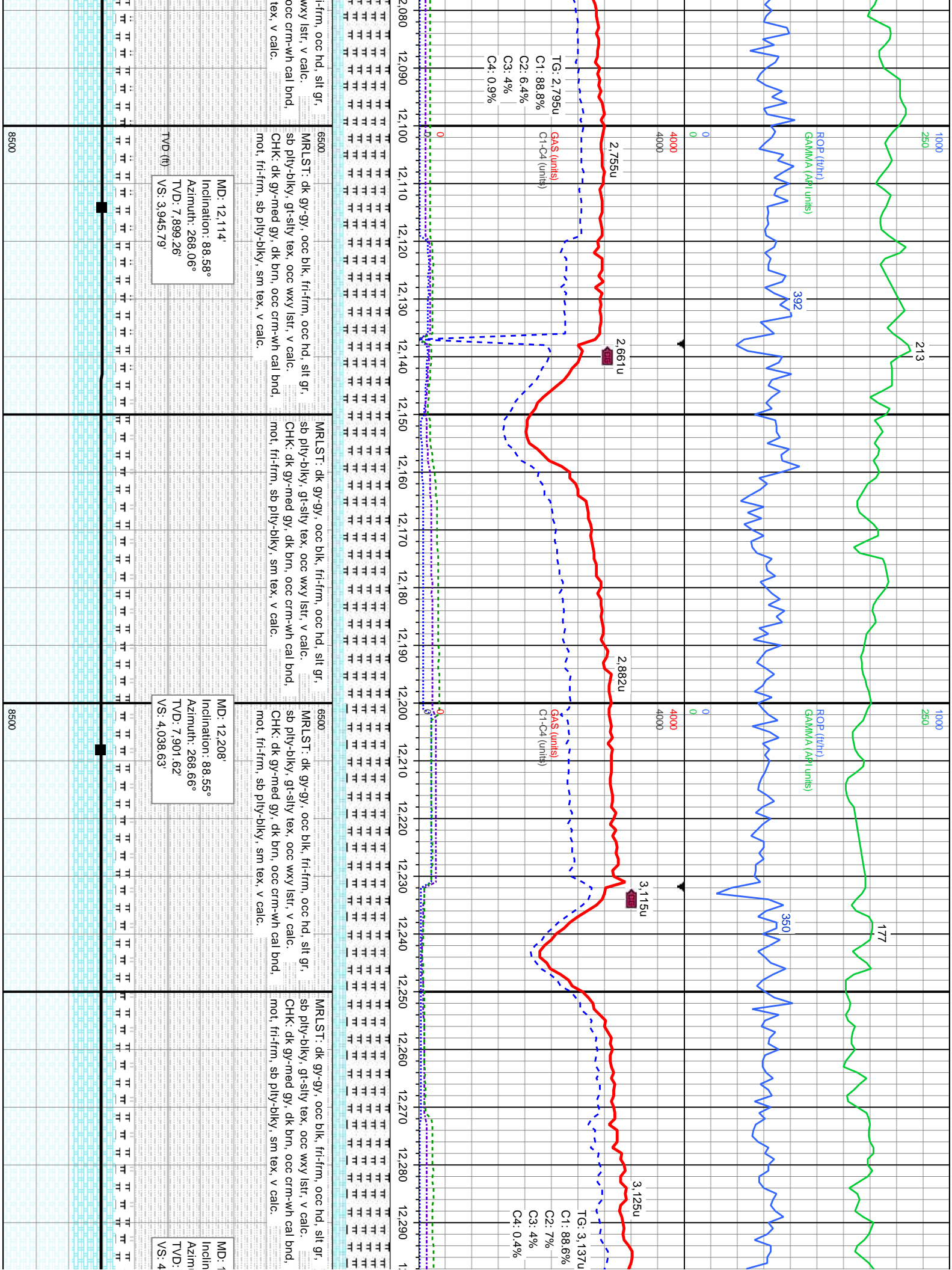


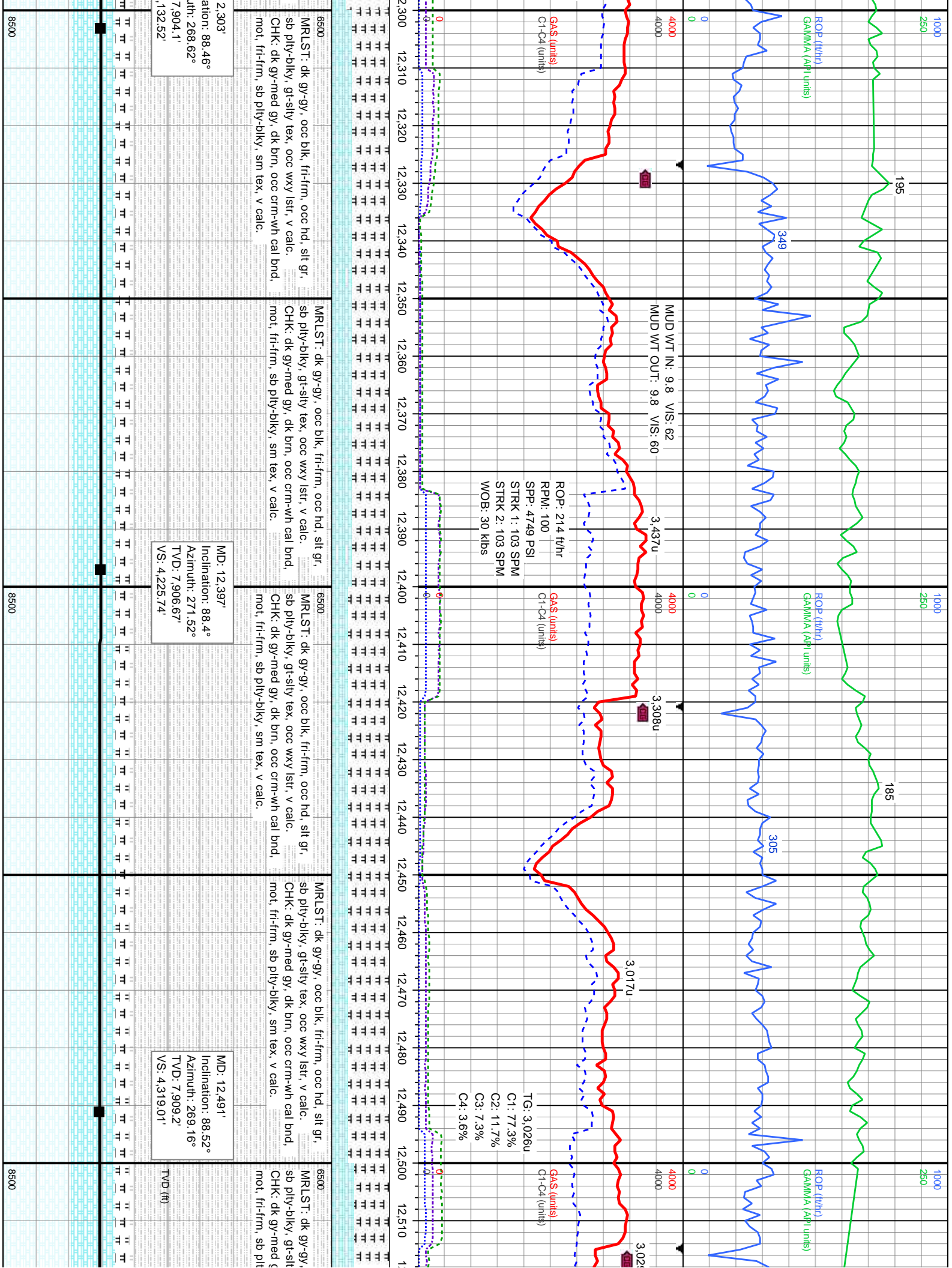


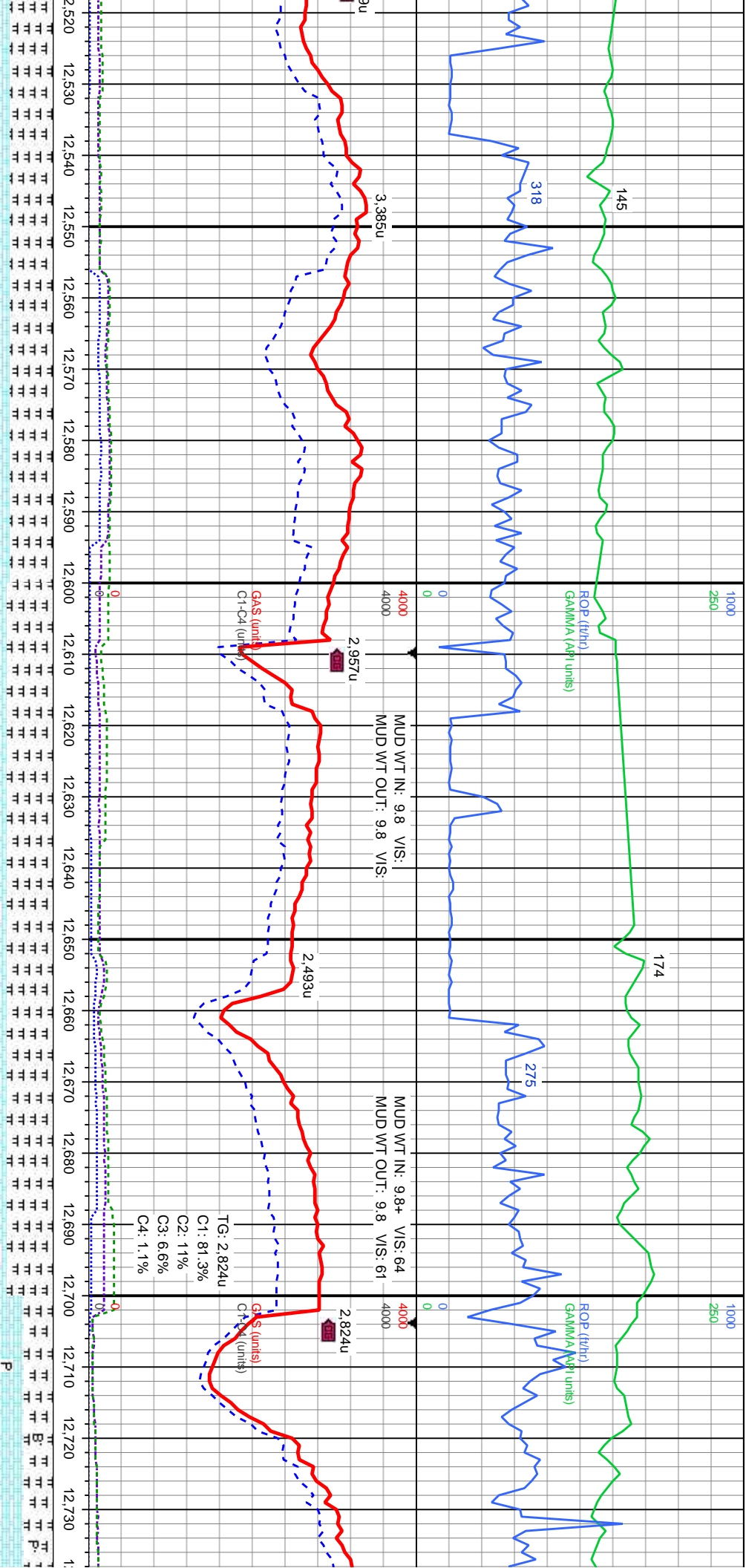












occ blk, fri-frn, occ hd, sil gr,
v tex, occ wxy lstr, v calc.
gy, dk brn, occ crm-wh cal bnd,
y-biky, sm tex, v calc.

MR LST: dk gy-gy, occ blk, fri-frn, occ hd, sil gr,
sb ply-biky, gt-sily tex, occ wxy lstr, v calc.
CHK: dk gy-med gy, dk brn, occ crm-wh cal bnd,
mot, fri-frn, sb ply-biky, sm tex, v calc.

MD: 12,586'
Inclination: 88.8°
Azimuth: 270.27°
TVD: 7,911.42'
VS: 4,413.16'

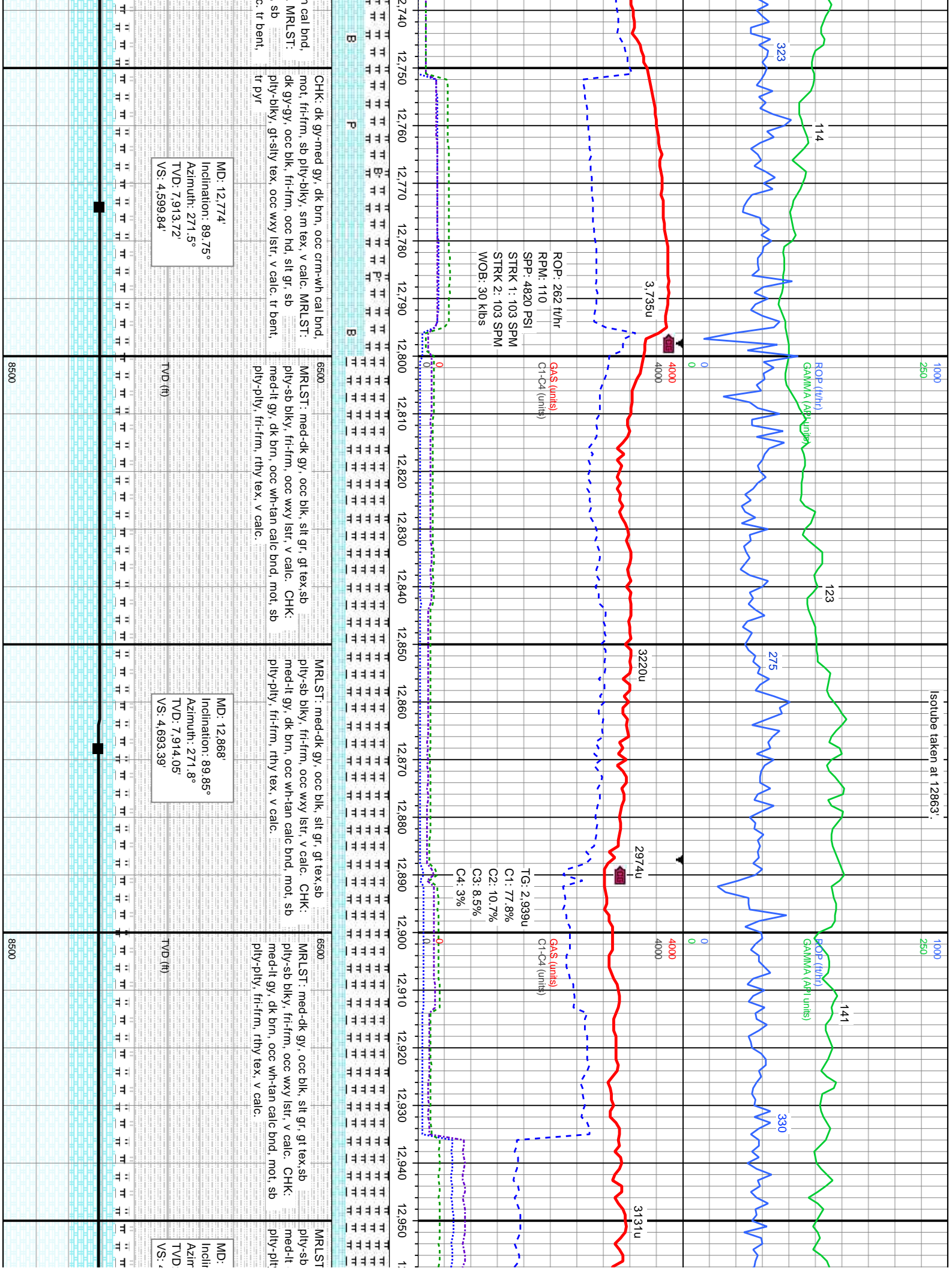
TVD (ft)

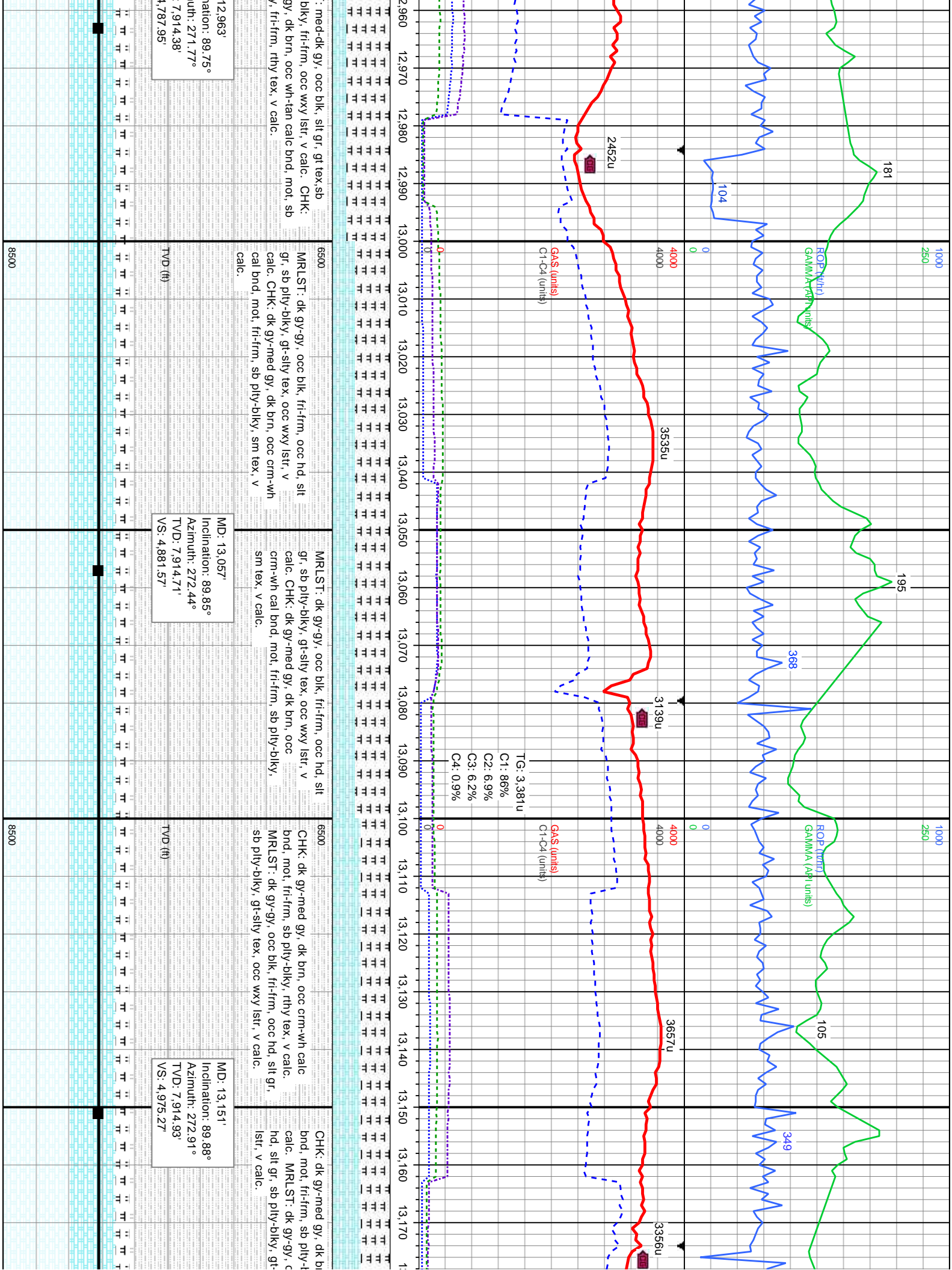
6500
MR LST: dk gy-gy, occ blk, fri-frn, occ hd, sil gr,
sb ply-biky, gt-sily tex, occ wxy lstr, v calc.
CHK: dk gy-med gy, dk brn, occ crm-wh cal bnd,
mot, fri-frn, sb ply-biky, sm tex, v calc.

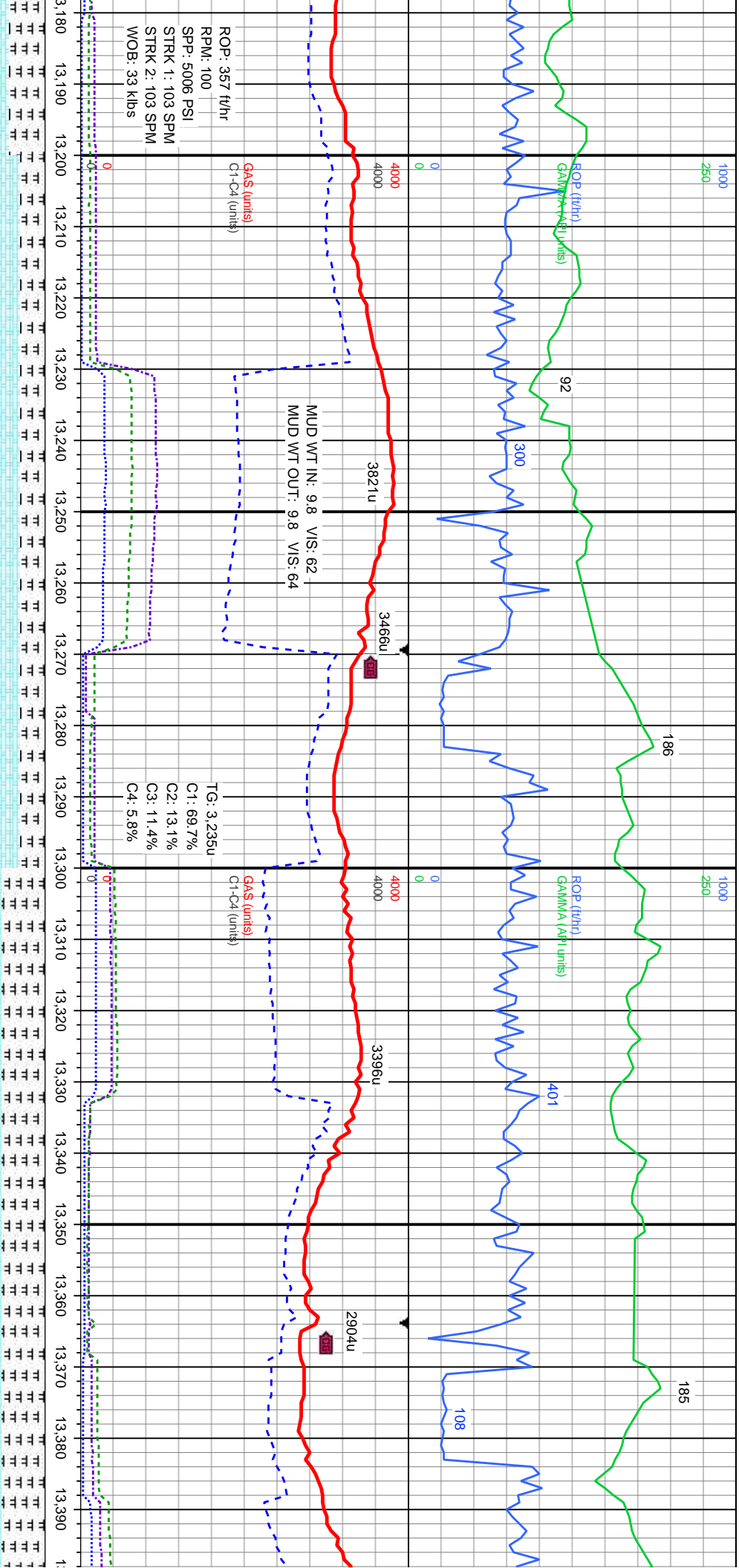
MD: 12,680'
Inclination: 89.32°
Azimuth: 270.14°
TVD: 7,912.96'
VS: 4,506.44'

TVD (ft)

6500
CHK: dk gy-med gy, dk brn, occ crm-wh
mot, fri-frn, sb ply-biky, sm tex, v calc
dk gy-gy, occ blk, fri-frn, occ hd, sil gr
ply-biky, gt-sily tex, occ wxy lstr, v cal
tr pyr







rk, rthy tex, v
occ blk, fri-firm, occ
sily tex, occ wxy

6500

CHK: dk gy- lt gy, dk brn, occ crm-wh cal bnd,
mot, fri-firm, sb ply-biky, rthy tex, v calc.
MRLST: dk gy-gy, occ blk, fri-firm, occ
sb ply-biky, gr-sily tex, occ wxy lstr, v calc.

MD: 13,246'
Inclination: 89.78°
Azimuth: 273.33°
TVD: 7,915.22'
VS: 5,070.02'

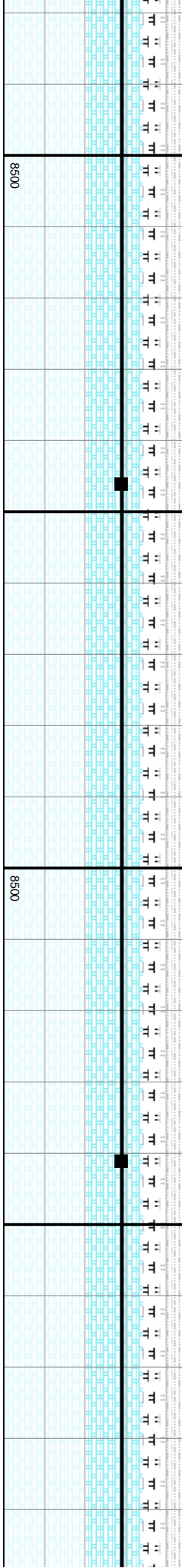
CHK: dk gy- lt gy, dk brn, occ crm-wh cal
bnd, mot, fri-firm, sb ply-biky, rthy tex, v
calc. MRLST: dk gy-gy, occ blk, fri-firm, occ
hd, sit gr, sb ply-biky, gr-sily tex, occ wxy
lstr, v calc.

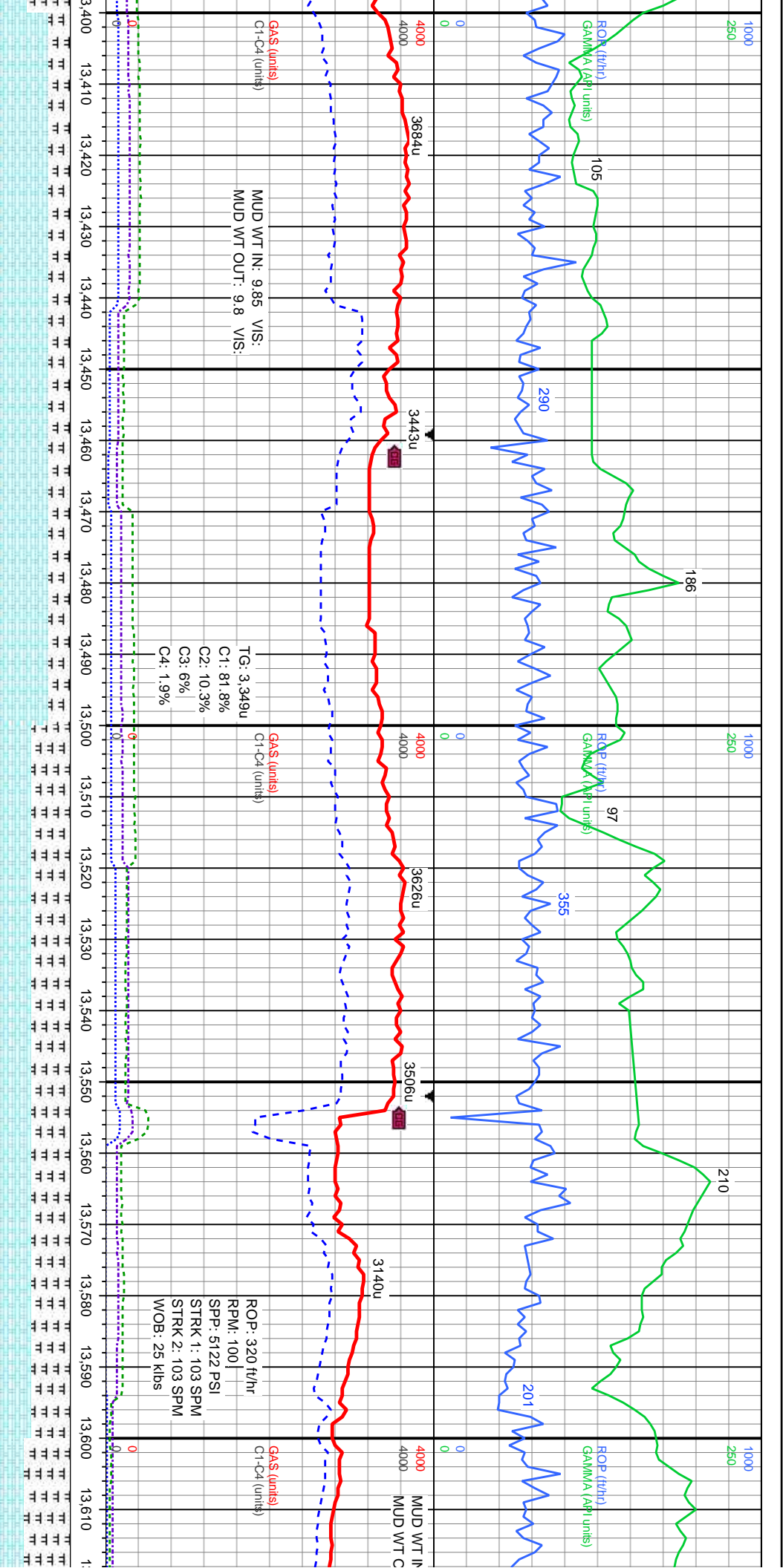
6500

MRLST: med-dk gy, occ blk, sit gr, gt tex, sb
ply-sb biky, fri-firm, occ wxy lstr, v calc. CHK:
med-lt gy, occ wh-tan calc bnd, mot, sb
fri-firm, rthy tex, v calc.

MD: 13,341'
Inclination: 89.97°
Azimuth: 273.9°
TVD: 7,915.42'
VS: 5,164.83'

MRLST: med-dk gy, occ blk, sit gr, gt tex, sb
ply-sb biky, fri-firm, occ wxy lstr, v calc. CHK:
med-lt gy, occ wh-tan calc bnd, mot, sb
ply-ply, fri-firm, rthy tex, v calc.





6500
CHK: dk gy-med gy, dk brn, occ crm-wh calc
bnd, mot, fri-frn, sb ply-biky, rthy tex, v calc.
MRLST: dk gy-gy, occ blk, fri-frn, occ hd, sit
gr, sb ply-biky, gt-sily tex, occ wxy istr, v
calc.

6500
CHK: dk gy-med gy, dk brn, occ crm-wh calc
bnd, mot, fri-frn, sb ply-biky, rthy tex, v calc.
MRLST: dk gy-gy, occ blk, fri-frn, occ hd, sit gr,
sb ply-biky, gt-sily tex, occ wxy istr, v calc.

6500
MRLST: med-dk gy, occ blk, sit gr, gt tex, sb
ply-sb biky, fri-frn, occ wxy istr, v calc.
CHK: med-it gy, occ wh-tan calc bnd, mot, sb
ply-pily, fri-frn, rthy tex, v calc.

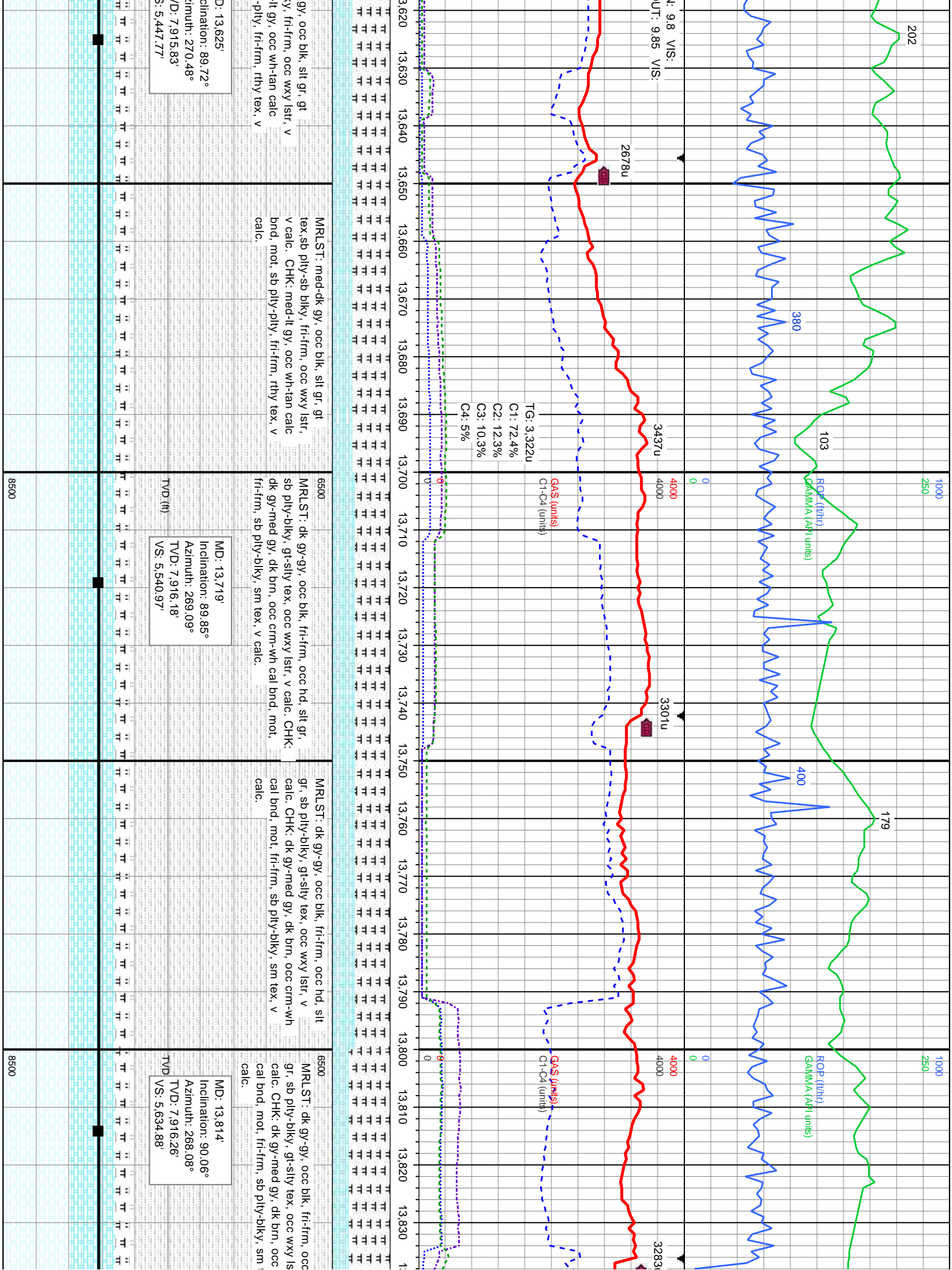
6500
MRLST: med-dk gy, occ blk, sit gr, gt tex, sb
ply-sb biky, fri-frn, occ wxy istr, v calc. CHK:
med-it gy, occ wh-tan calc bnd, mot, sb
ply-pily, fri-frn, rthy tex, v calc.

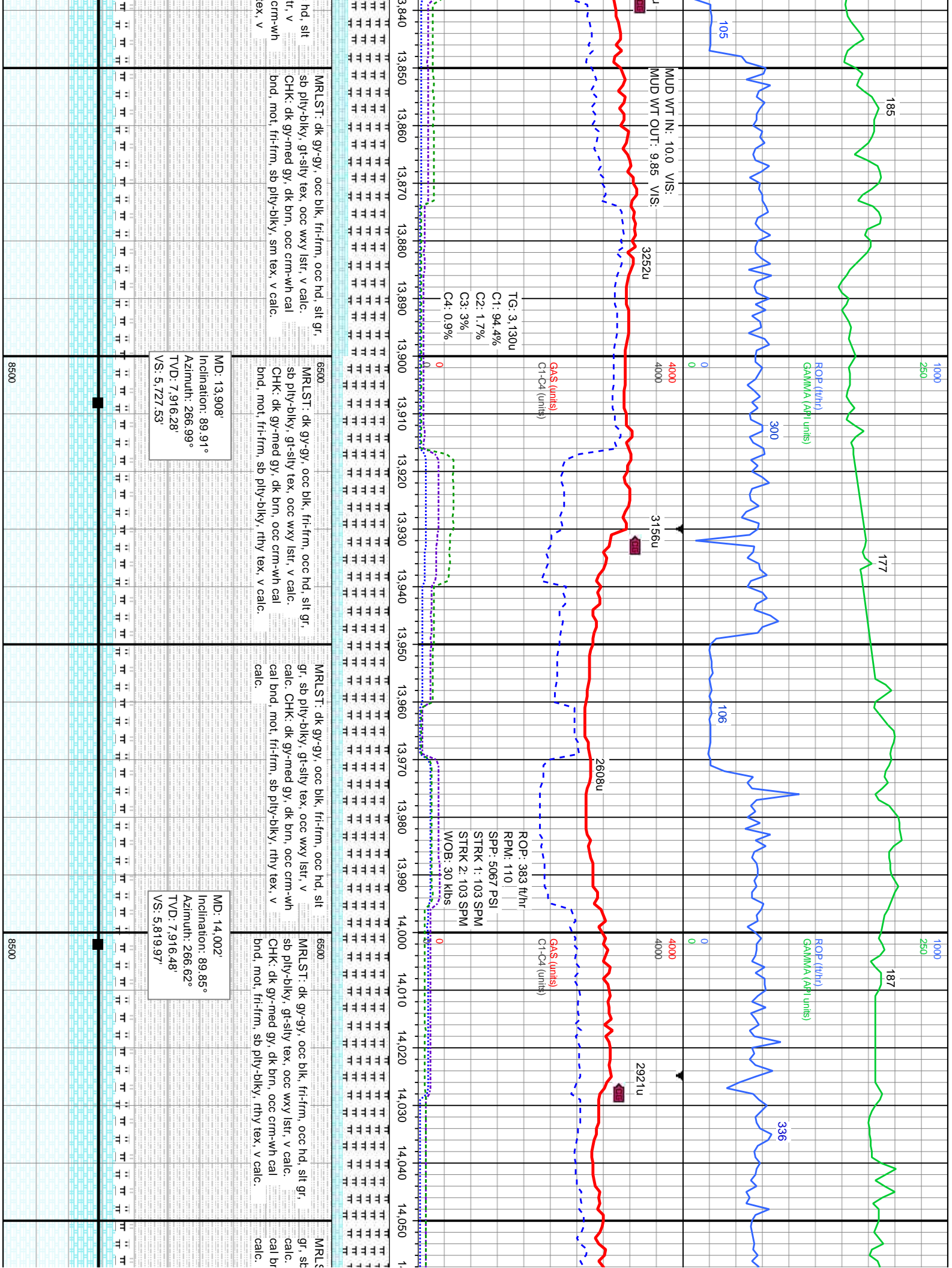
6500
MRLST: med-dk
tex, sb ply-sb blk
calc. CHK: med-
bnd, mot, sb ply
calc.

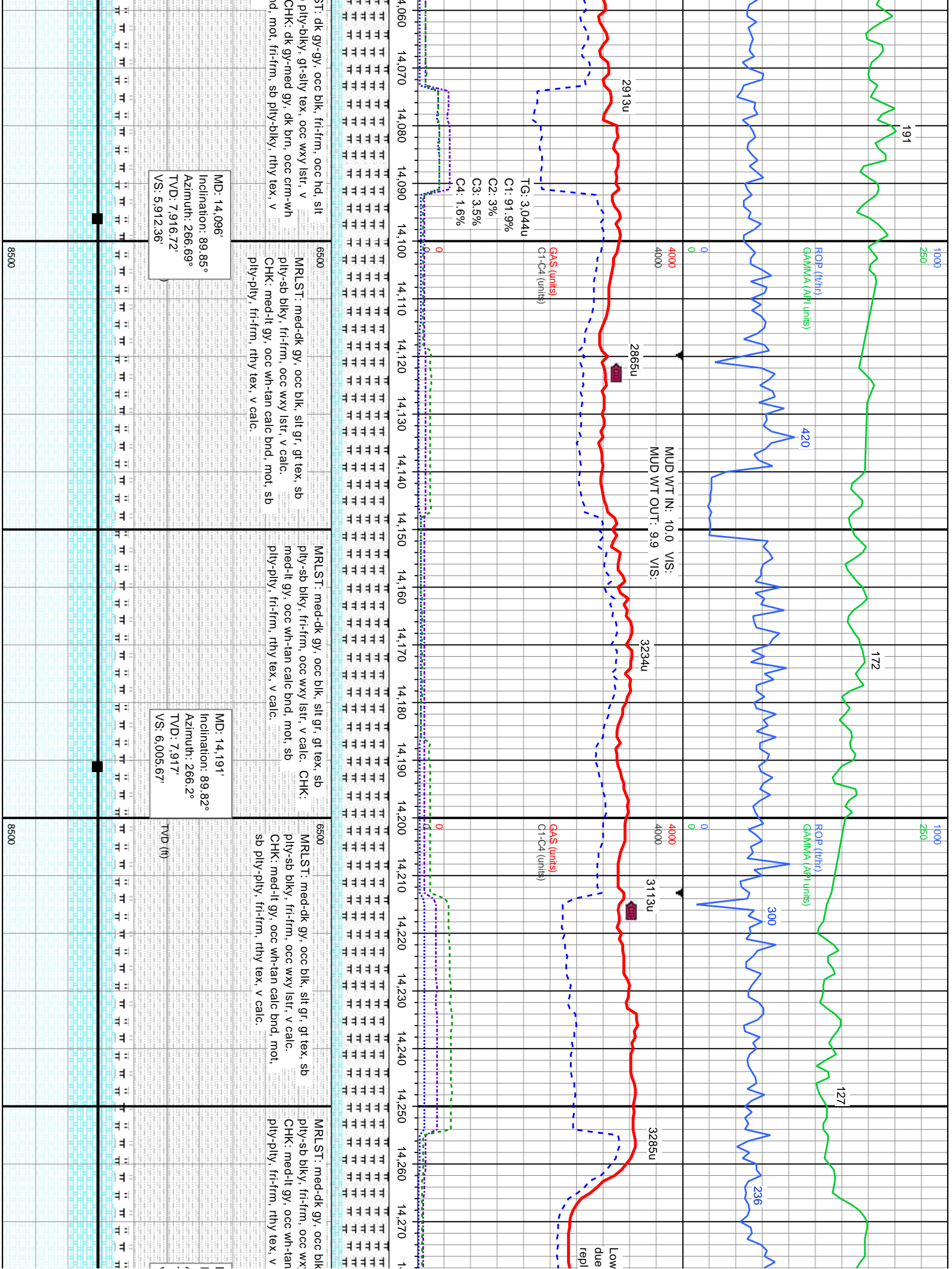
MD: 13.436'
Inclination: 89.91°
Azimuth: 273.35°
TVD: 7,915.52'
VS: 5,259.64'

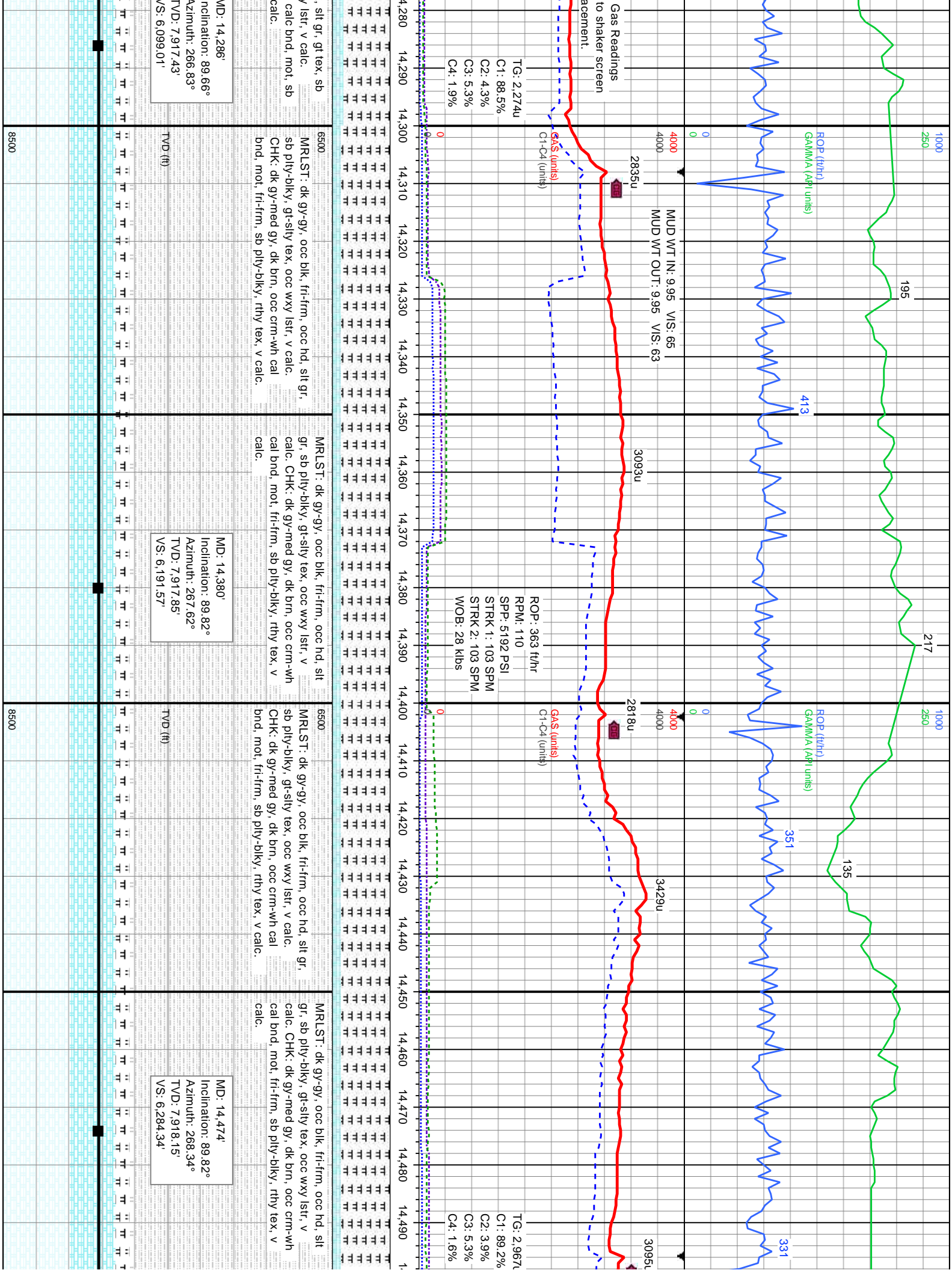
MD: 13.530'
Inclination: 90°
Azimuth: 271.77°
TVD: 7,915.6'
VS: 5,353.32'

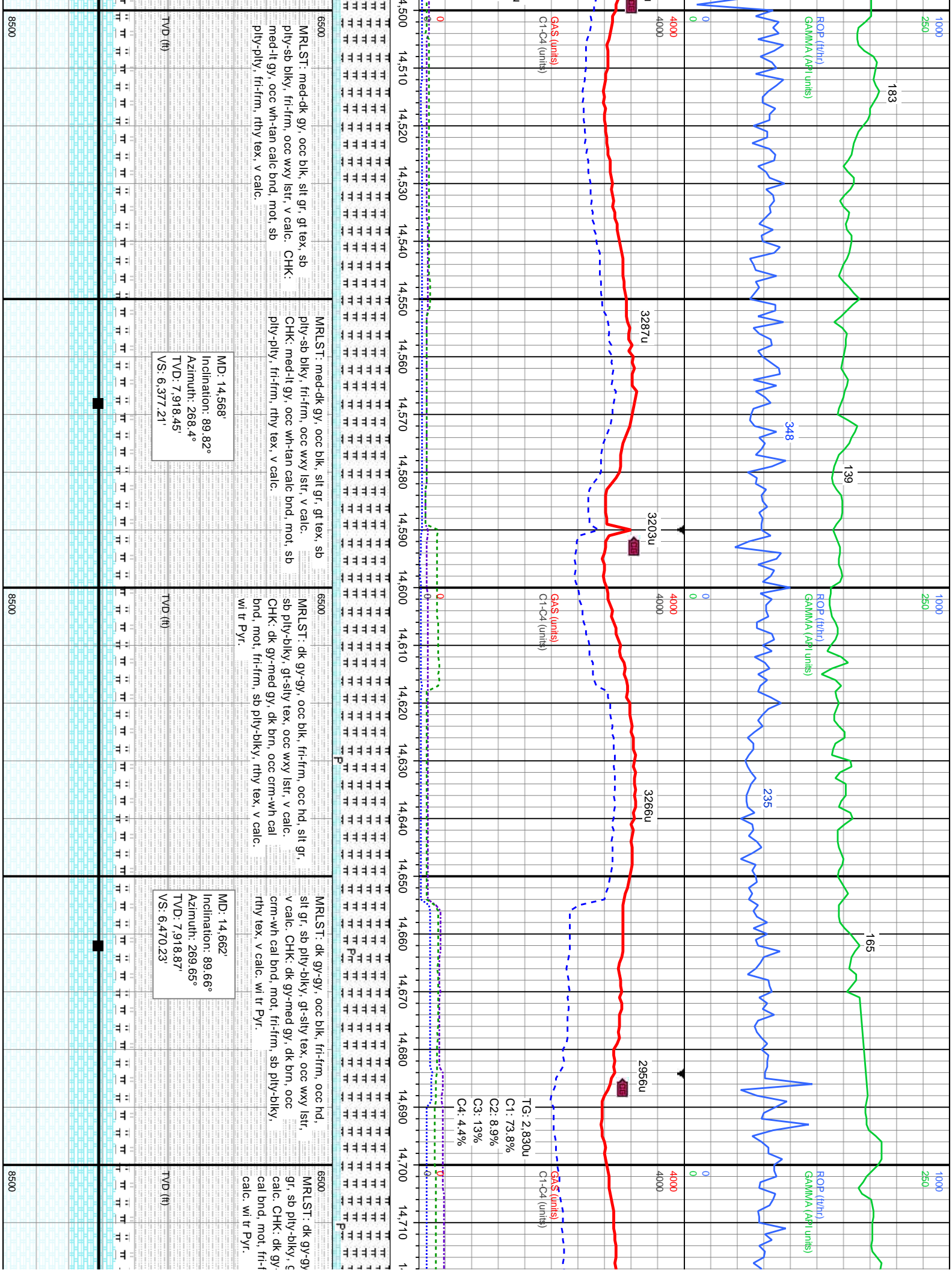
M
In
Az
TV
VS

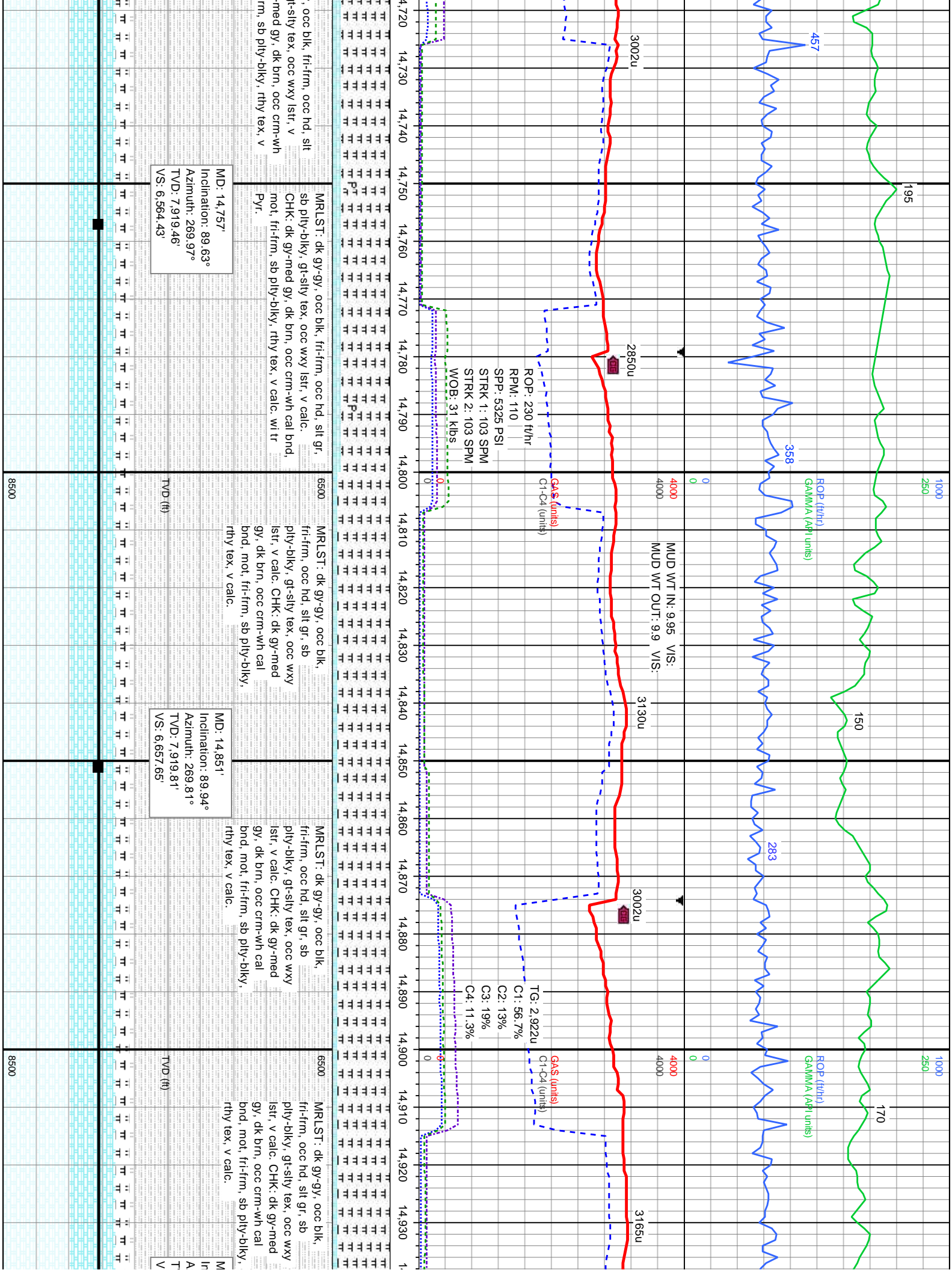


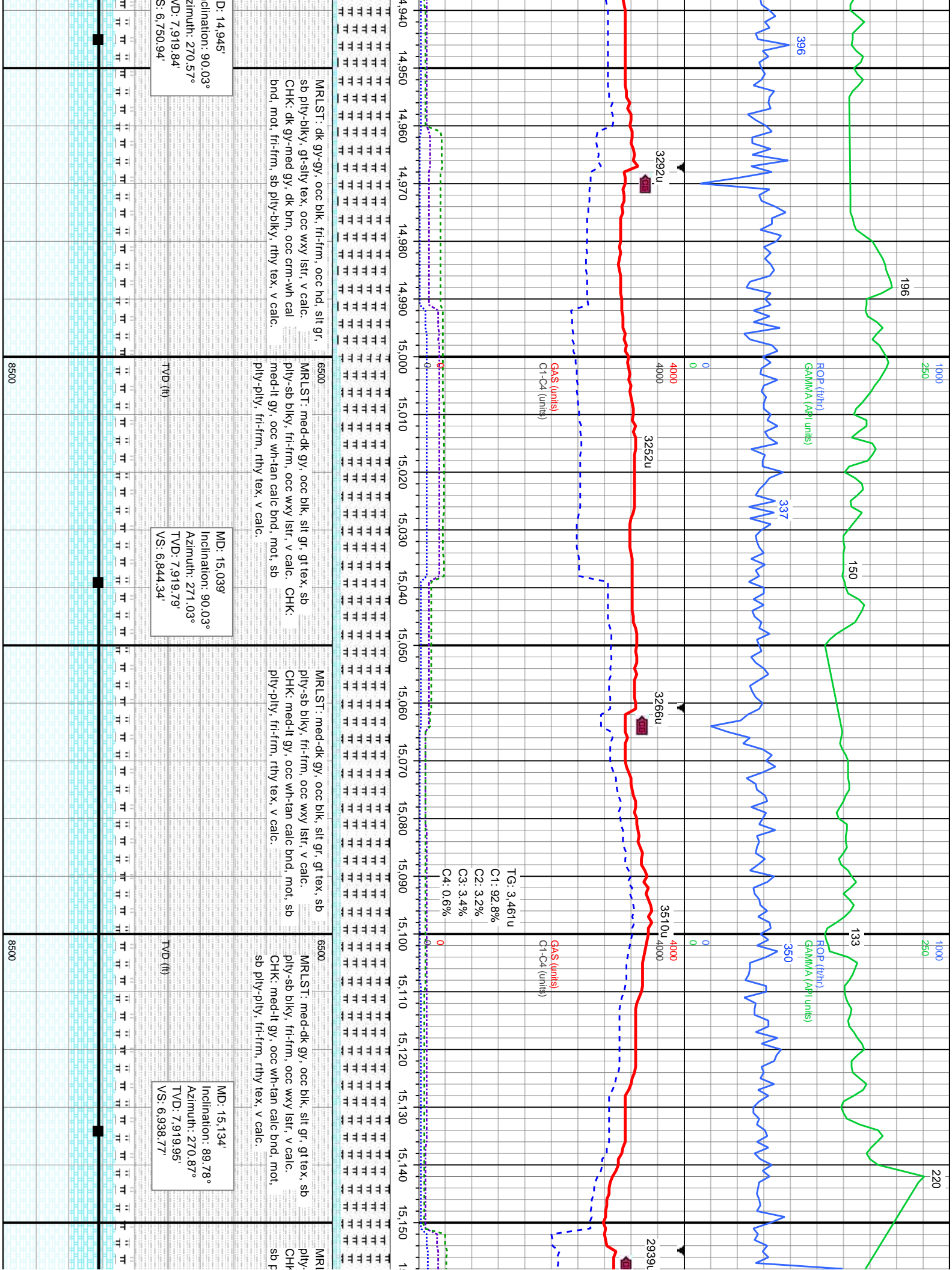


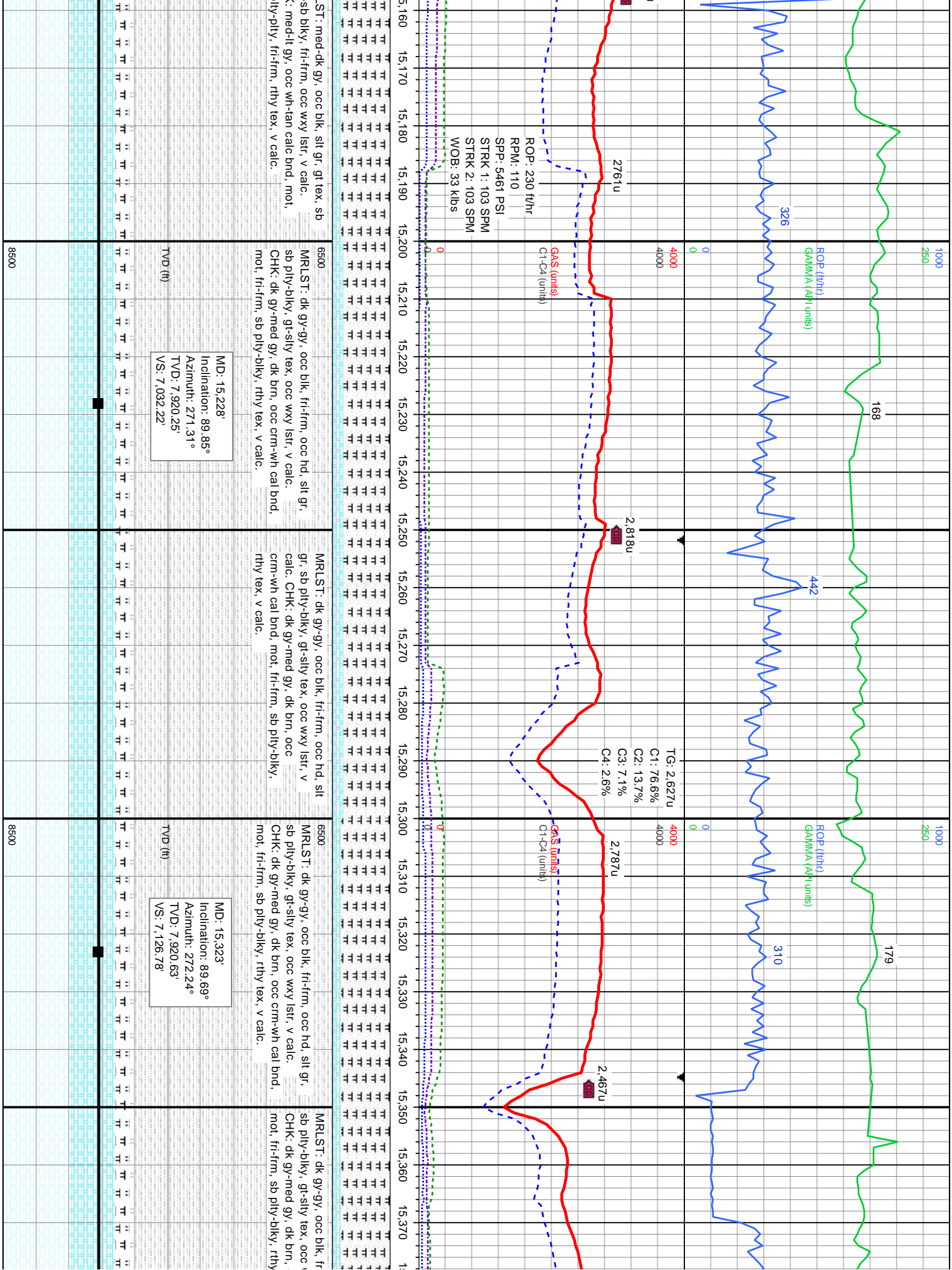


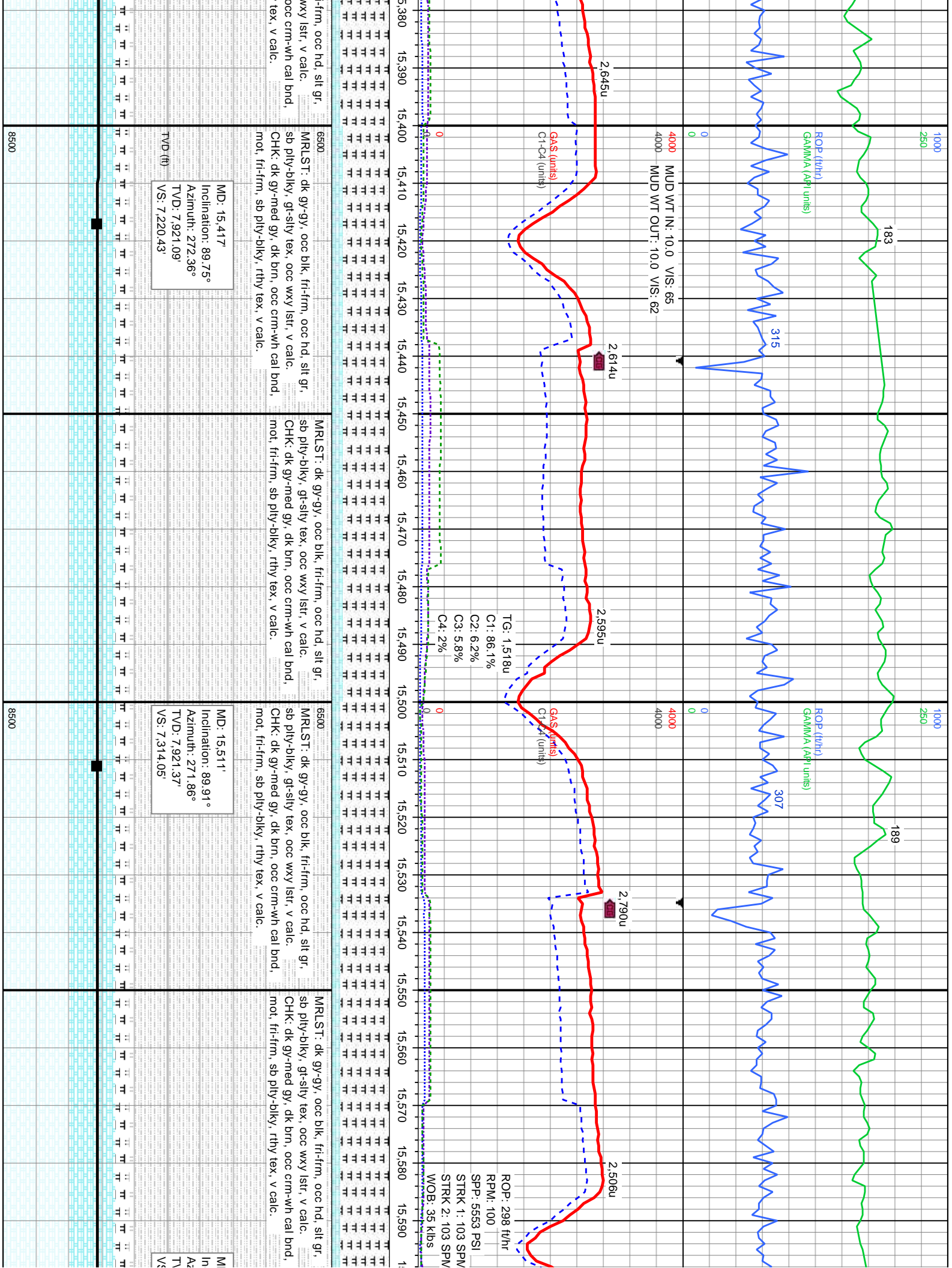


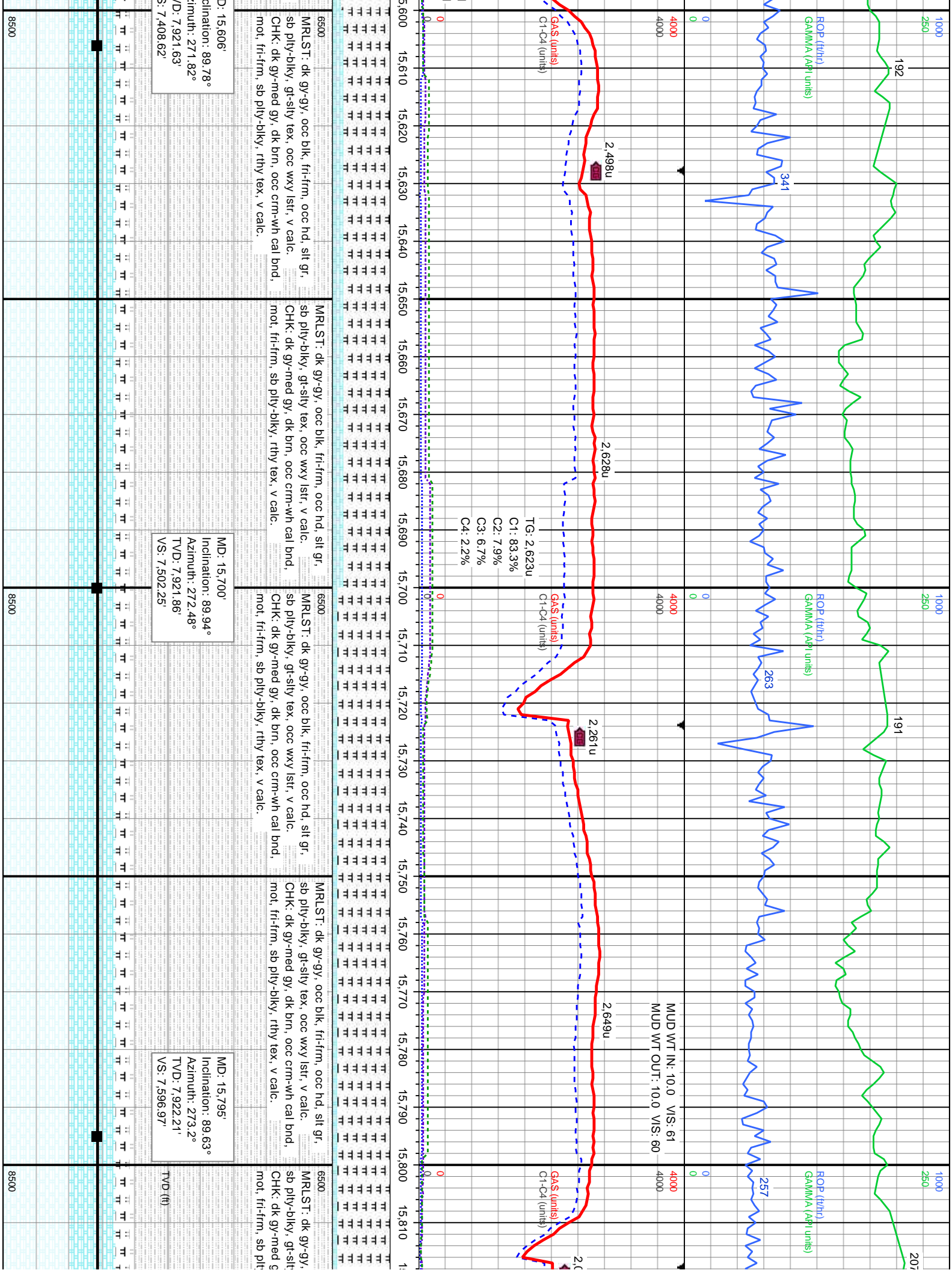


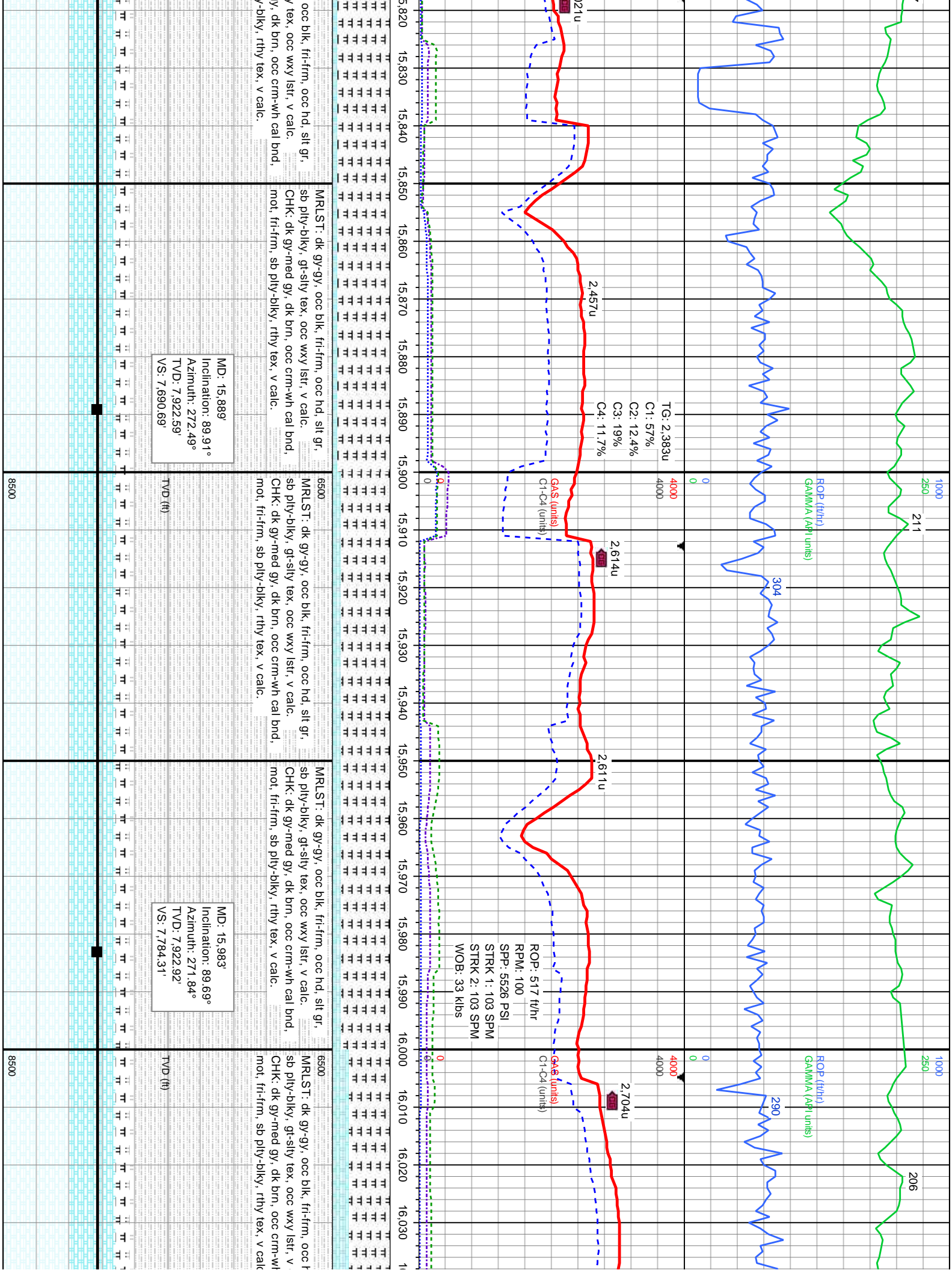


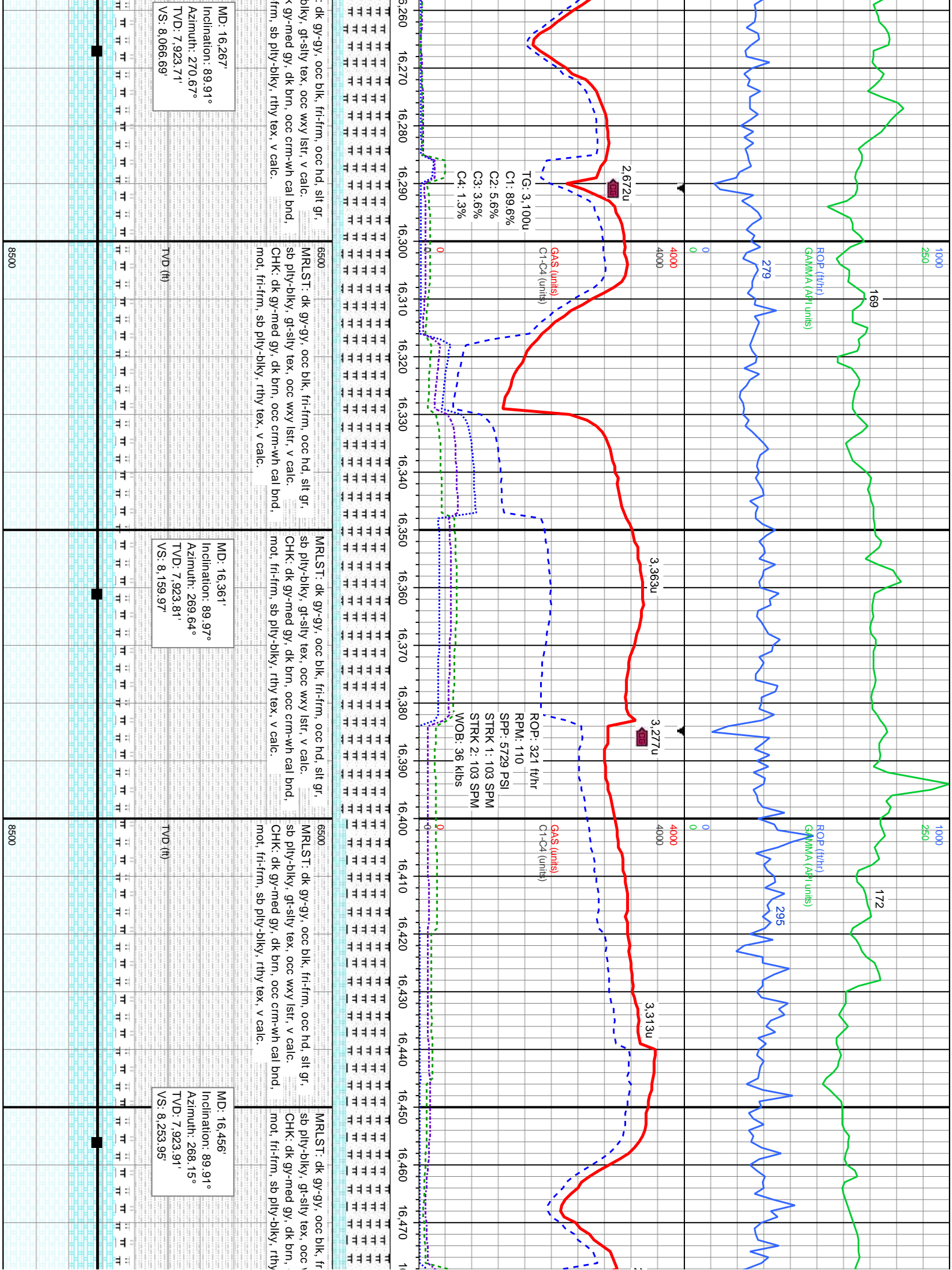


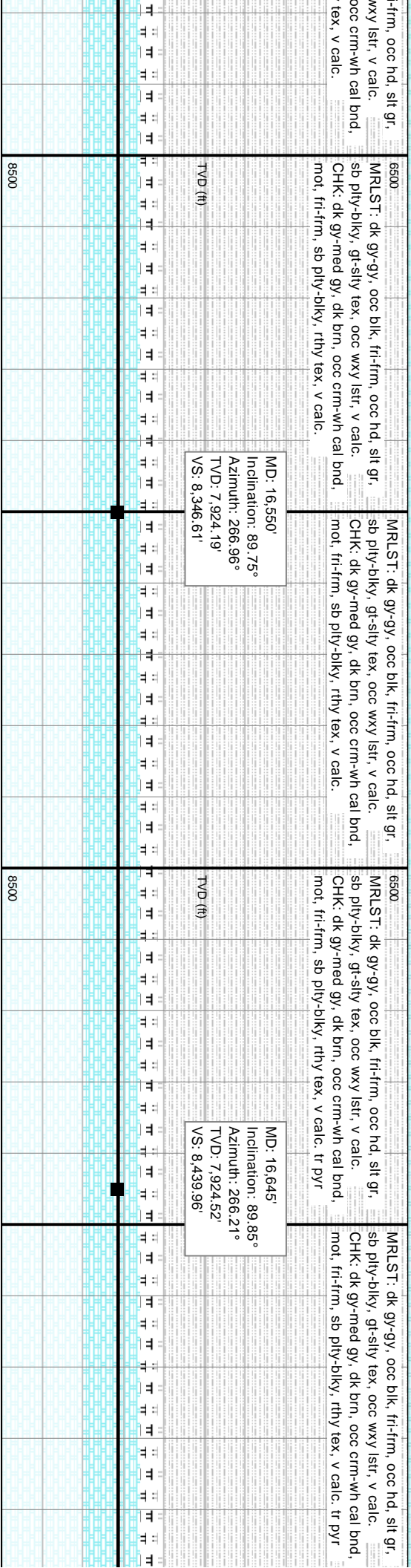
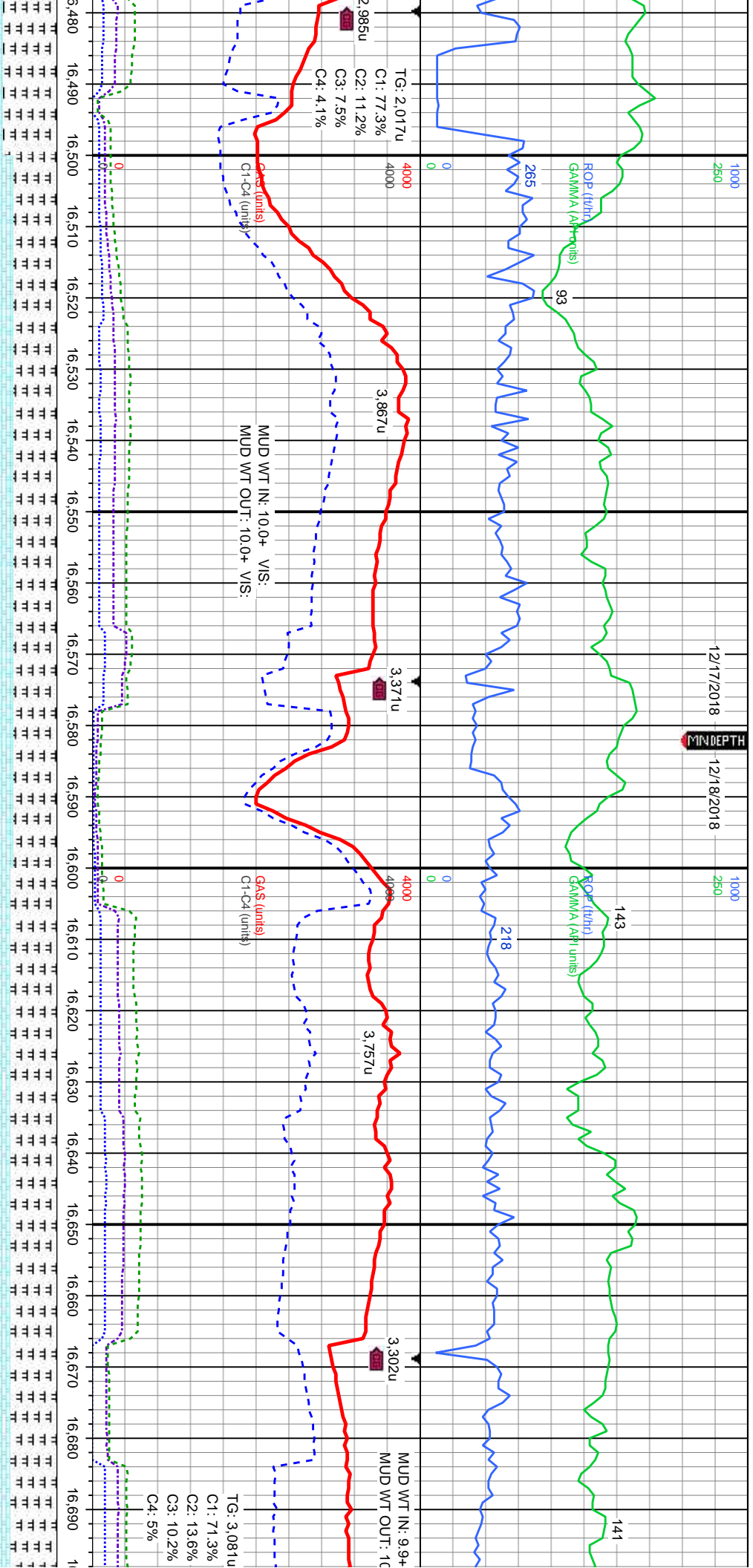


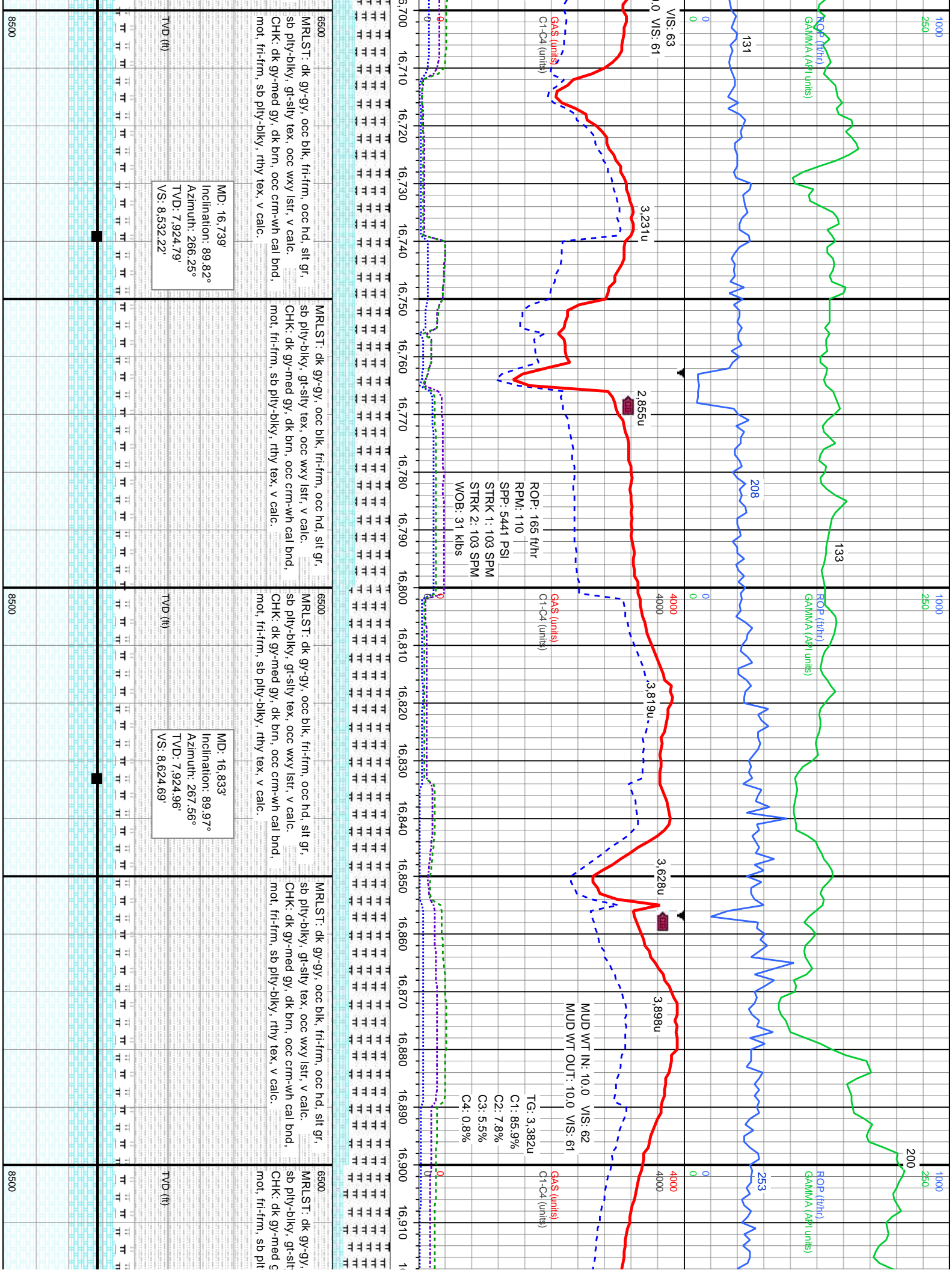


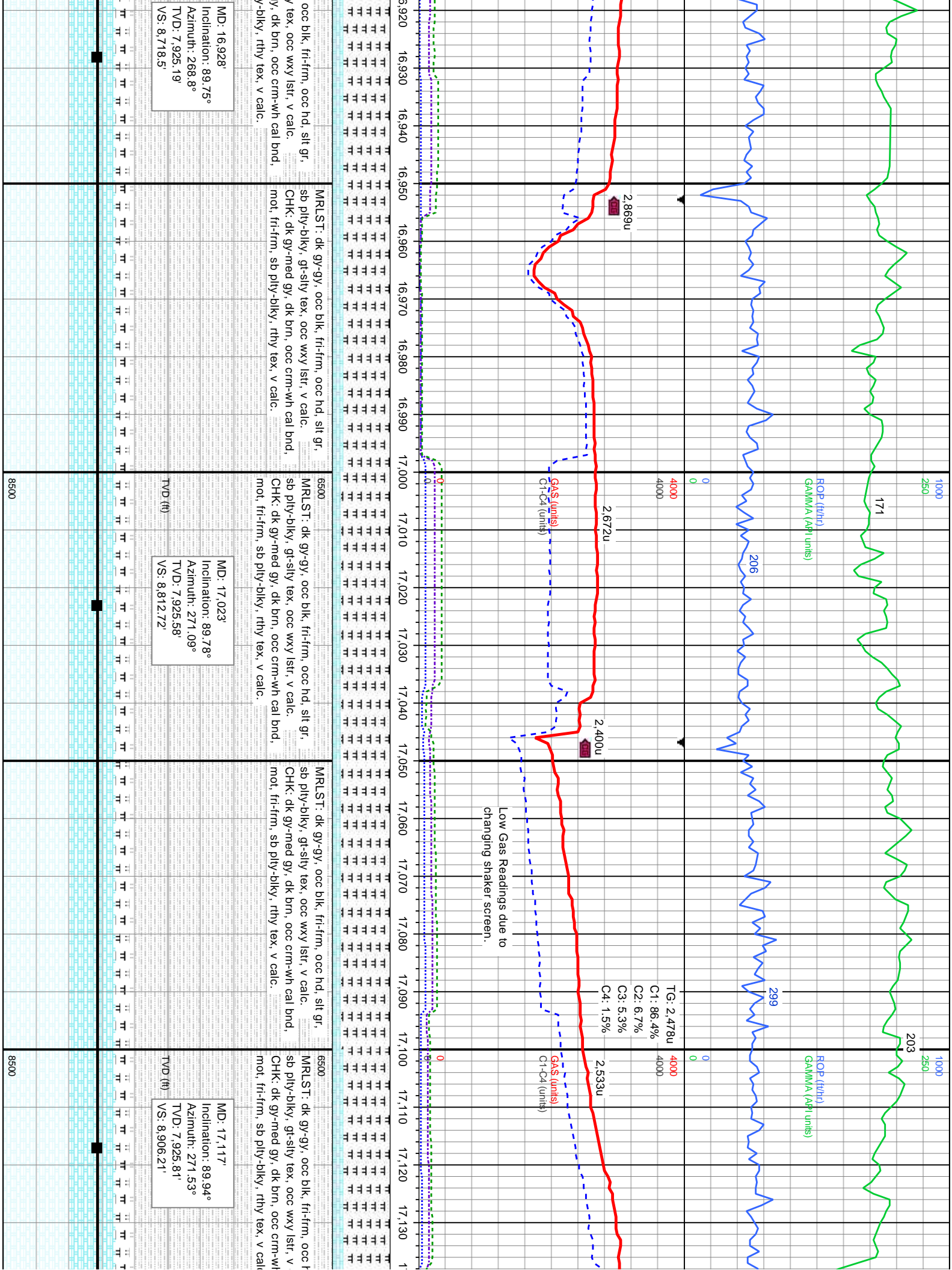


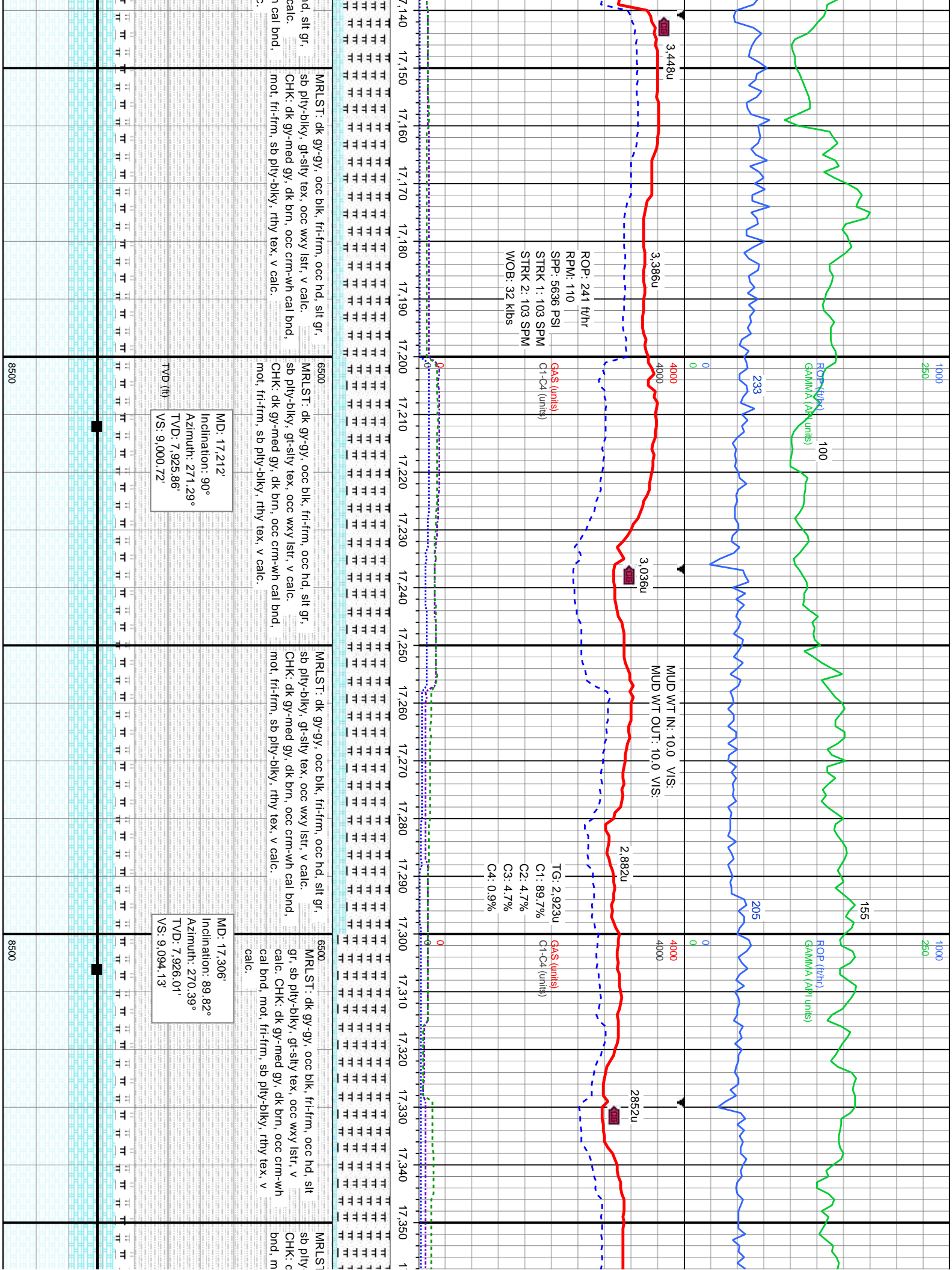


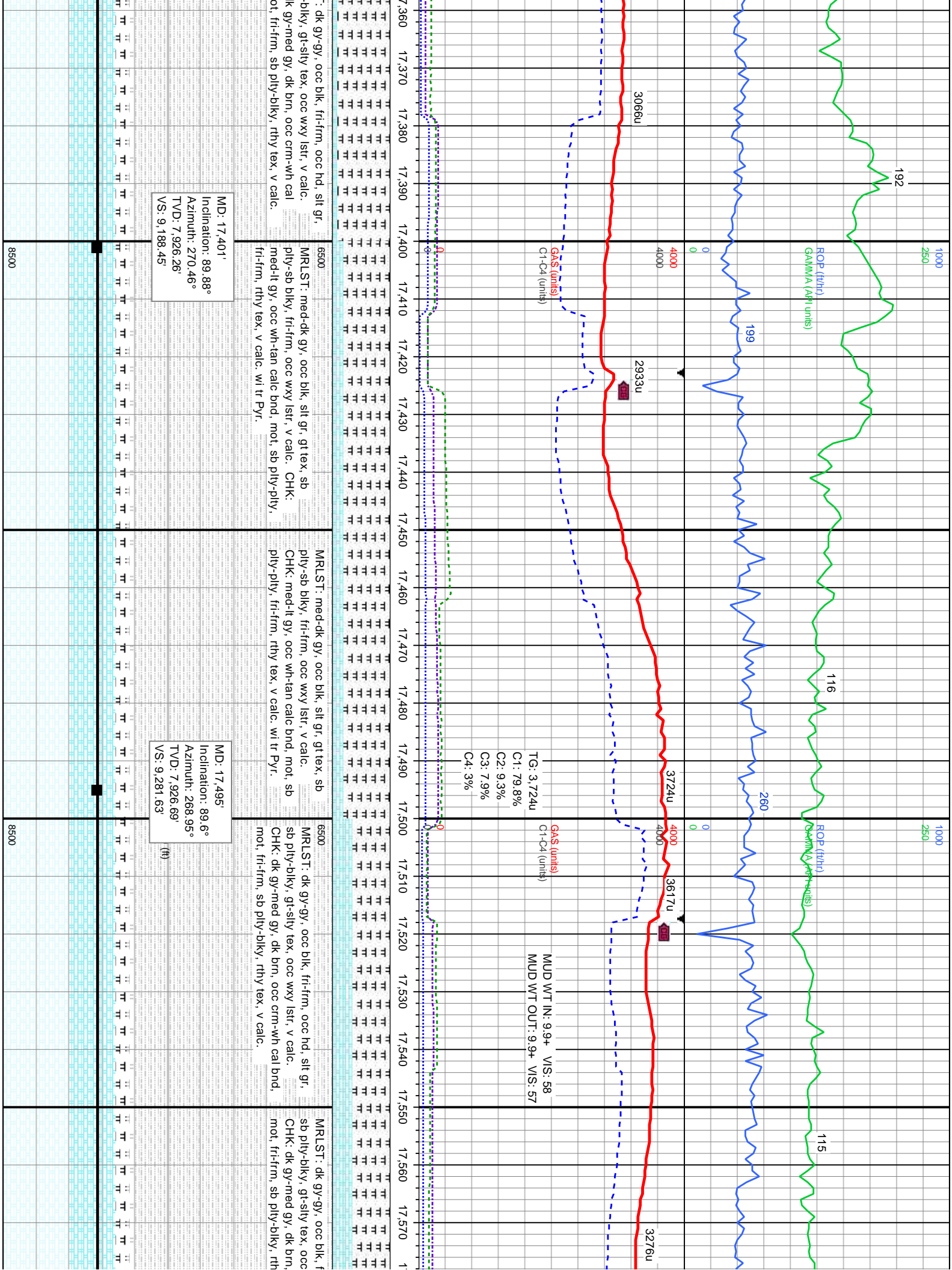


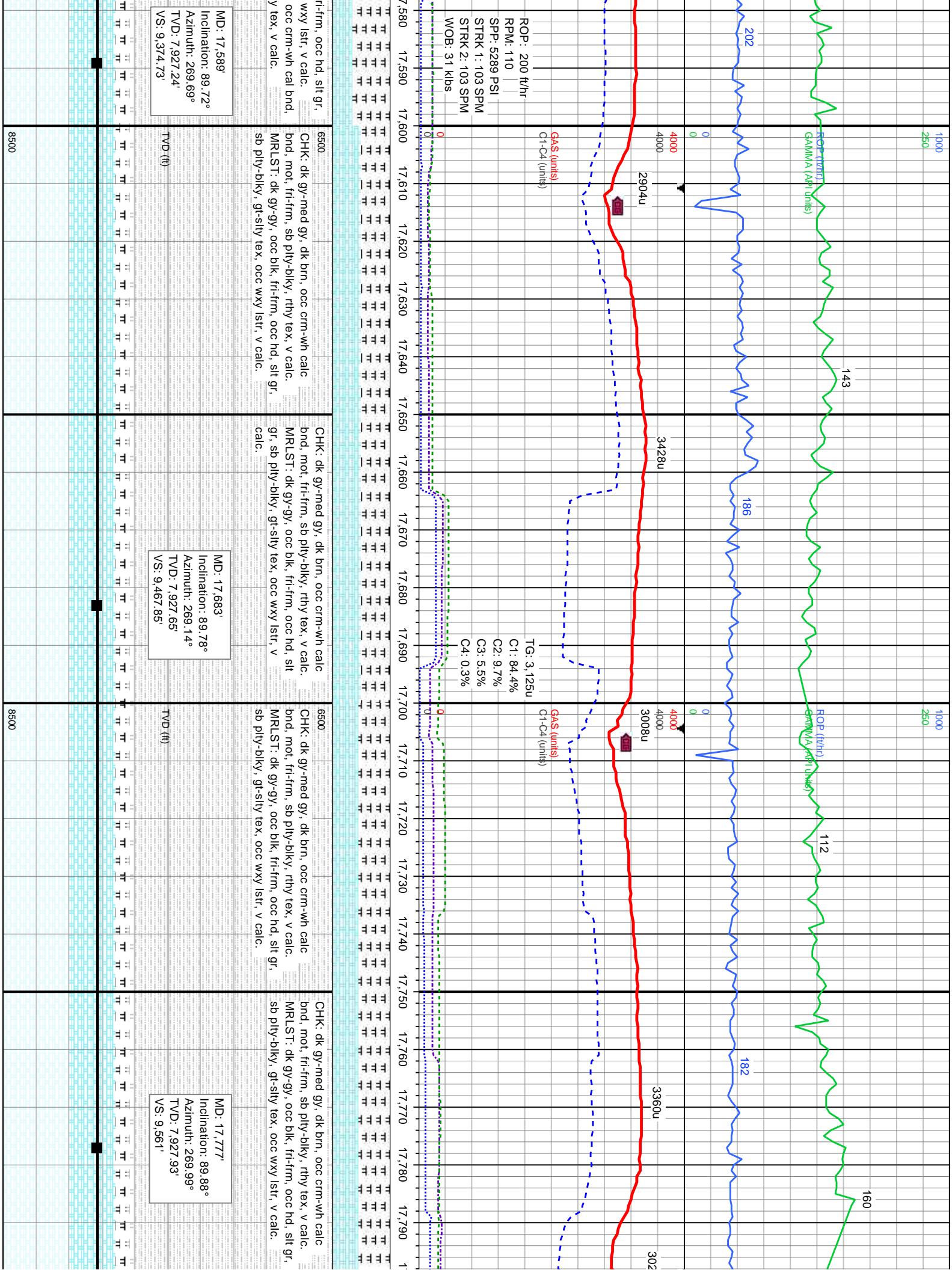


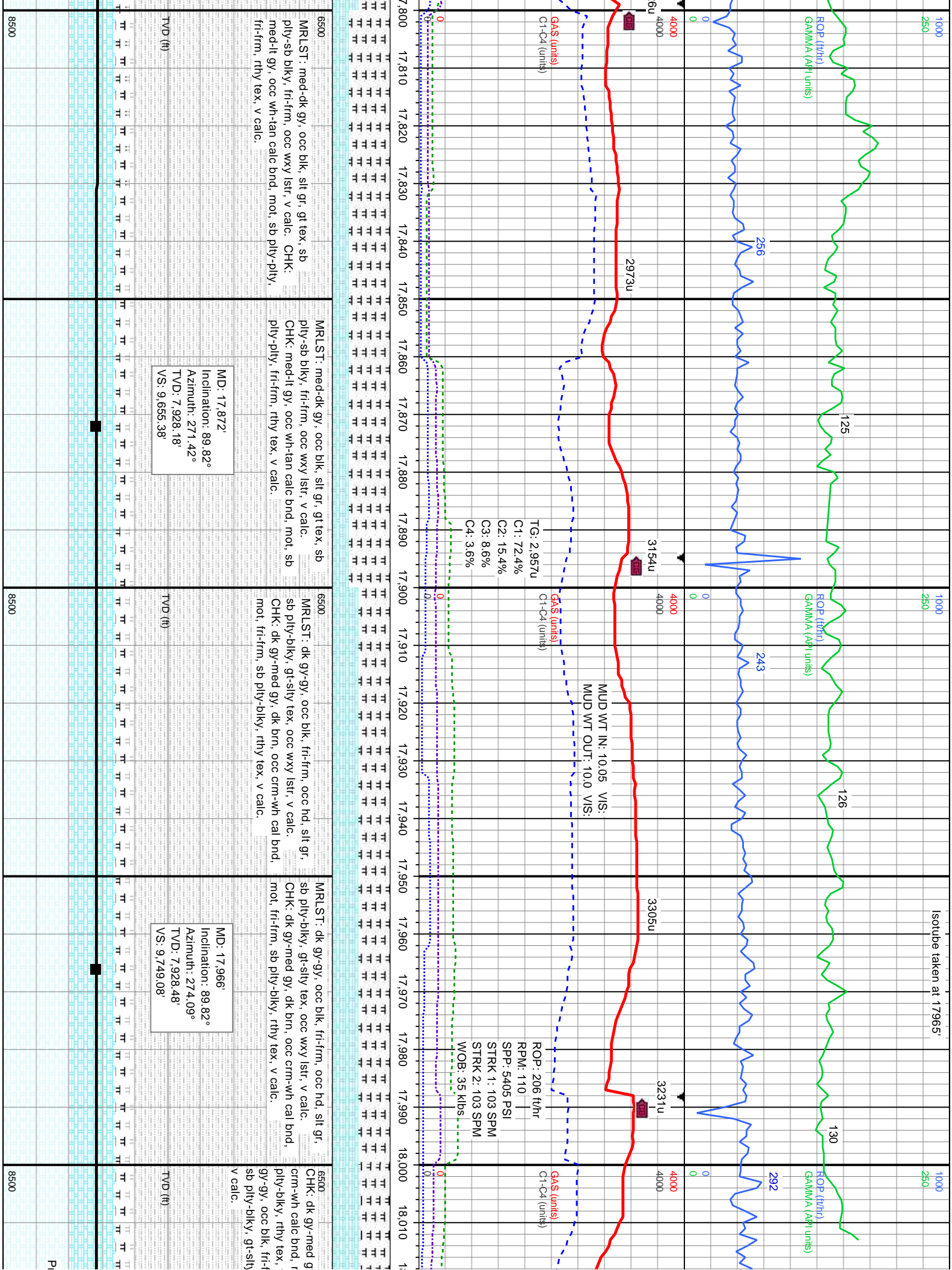




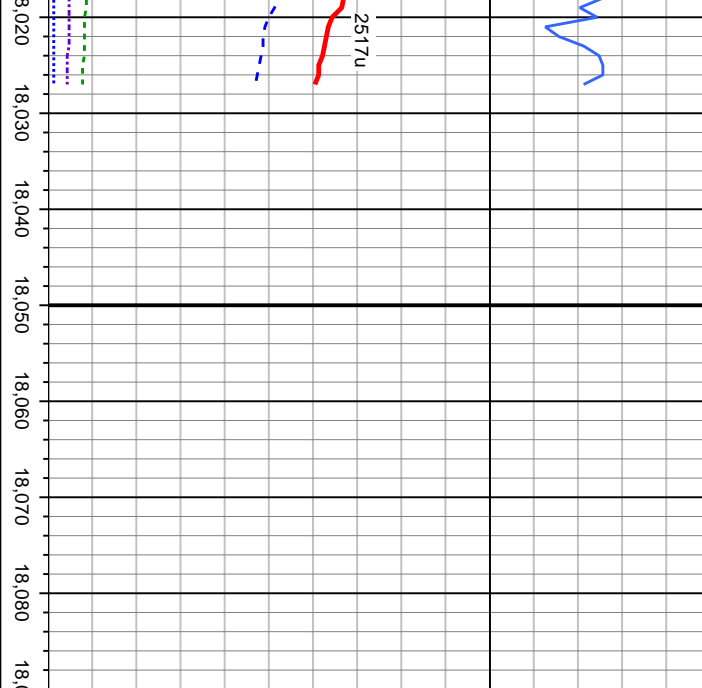




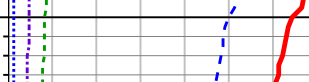




Reached TD at 9:10 AM
MDT on 12/18/2018 at
18,028' Drillers Depth.



2517u



1 1 1 1
 1 1 1
 1 1 1 1
 1 1 1

Y, dk brn, occ
not, fri-frn, sb
v calc. MRLST: dk
rm, occ hd, slt gr,
tex, occ wxy lstr,

MD: 18,028'
Inclination: 89.82°
Azimuth: 274.09°
TVD: 7,928.67'
VS: 9,810.98'

Projection to Bit Survey.