

# COLUMBINE LOGGING

Scale: 5" / 100'  
Measured Depth Log

**Well Name** Rush 4-65 29-30 3AH

**Location** Section 28, T4S, R65W

**State** COLORADO

**County** ARAPAHOE

**Country** USA

**Rig Number** H&P 448

**API Number** 05-005-07265000C

**AFE #** WAY.CDR.0060

**Geographic Region** DJ BASIN

**Field** WILDCAT

**Spud Date** 7/12/2017

**Drilling Completed** 7/22/2017

## Surface Coordinates

Section 28 T4S R65W

1571' FSL & 422' FWL

Latitude 39° 40' 18.21" N

Longitude 104° 40' 37.59" W

## Bottom Hole Coordinates

Section 30 T4S R65W

' FSL & ' FWL

Latitude 39 ""N

Longitude 104 ""W

**Ground Elevation** 5696

**K.B. Elevation** 5722.2

**Logged Interval** 6000 **To** 15645

**Total Depth** 15645

**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

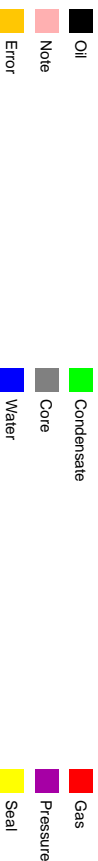
Geologists/Geoesteers on Location: Todd Thiesse, Zak Lewis

Gas Detection: Bloodhound chromatograph gas unit #0316

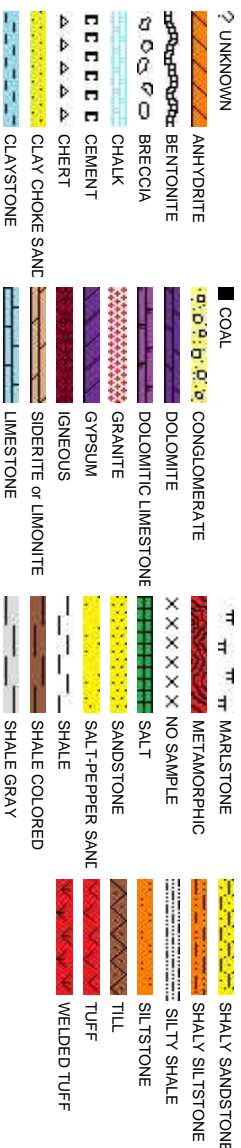
DD/MWD: Baker Hughes

Columbine Computer 87A

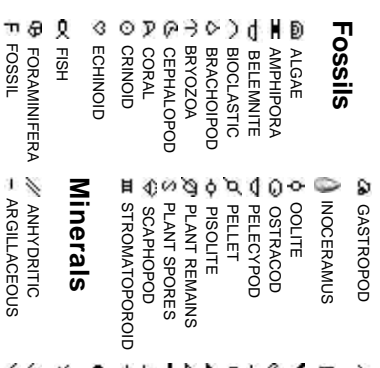
## Color Coding



## Rock Types



## Fossils



## Minerals



## Oil Show



## Engineering



## Porosity



## Accessories

[illegible]

## Other Symbols

	DST INTERVAL		E EARTHLY
	FAULT		FX FINELYXLN
	FORMATION TOP		
	GAS SHOW		GS GRAINSTONE
	OIL SHOW		L LITHOGRAPHIC
	MN DEPTH UP MN DEPTH (DOWN)		MX MICROXLN
	A ANGULAR		MS MUDSTONE
	NORMAL FAULT		PS PACKSTONE
	OVERTURNED STRATA		WS WACKESTONE
	REVERSE FAULT		
	CASING		
	SIDEWALL CORE (LEFT)		
	SIDEWALL CORE (RIGHT)		
	SLIDE		
	SURVEY		

Slide/Rotate

COLUMBINE LOGGING

ROP  
ROP  
GAMMA

Columbine Logging Inc. Rigged Up 2 man logging 7/17/2017 Chromatograph Gas Unit #0316, began logging from 6000' MD at 9:15 AM, MDT on 7/18/2017.

Gamma Data and Survey Data Provided by Baker Hughes

Gas Data From Bloodhound Unit #0316, data imported via Pason and Gaschart

Total Gas & Chromatograph  
GAS  
C1  
C2  
C3  
C4

Depth Labels

% Lith

Well Bore  
TVD

Bit Data

Bit #: 1

Type: HCC AT505F

Size: 8.5

Depth In: 2303'

Depth Out: 7490'

Jets: 5x14

S/N: 7163766

Mud Motor is 1.3°  
Survey is 47.22' behind bit  
Gamma is 43.71' behind bit.

ROP: 730 ft/hr  
RPM: 61 rpm  
SPP: 4340 PSI  
STRK 1: 98 SPM  
STRK 2: 98 SPM  
WOB: 28 klbs

MUD WT IN: 9.3 VIS: 60  
MUD WT OUT: 9.3 VIS: 54

393u  
C1: 97.3%  
C2: 2.1%  
C3: 0.6%  
C4: 0.0%

Target Formation/Member:  
Niobrara

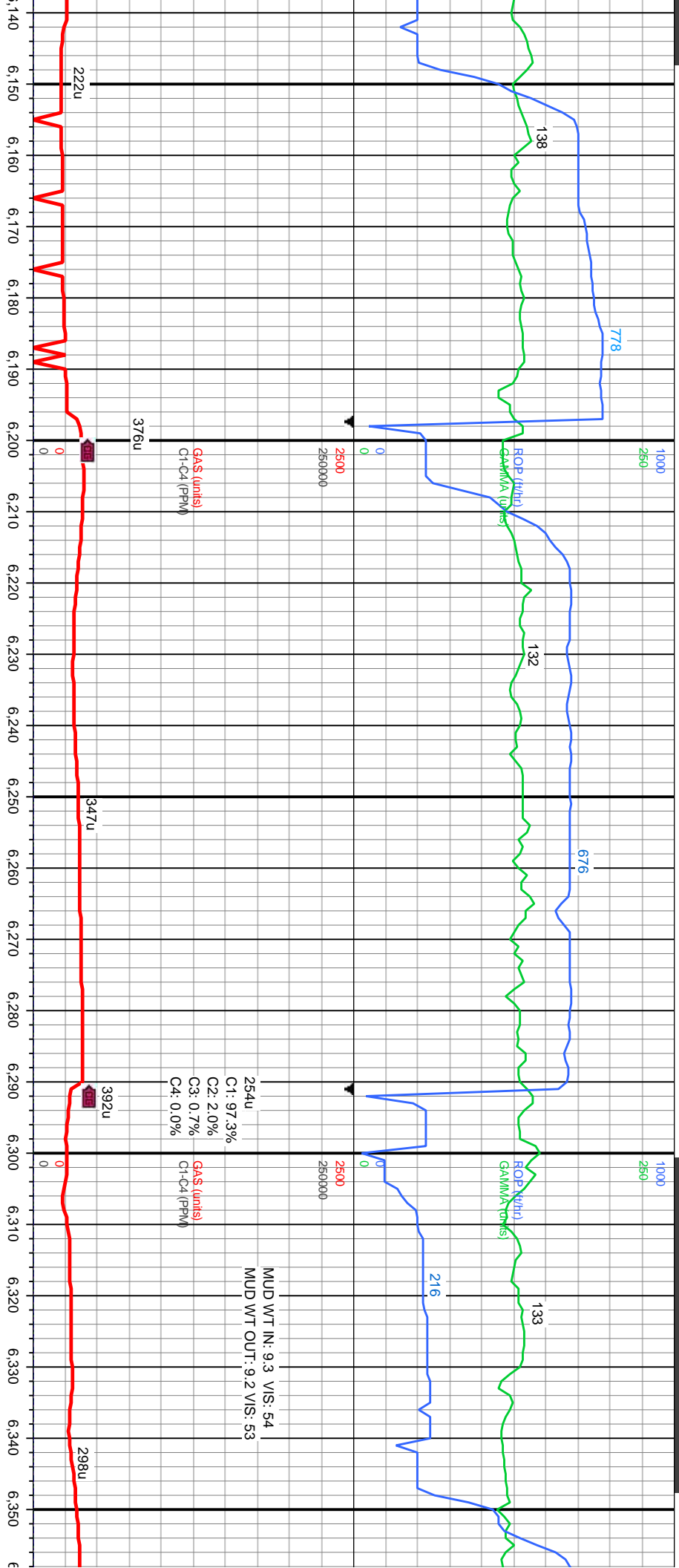
SLTY SH: gy-dk gy, sme dk brn, v sft - sft, sb pily-pty, silty to rthy tex, grgd to slst in pt, non calc with some tr SLTST. med gy- gy, sl frm, sb blk- occ sb pily, rthy-sily tex, non calc.

SLTY SH: gy-dk gy, sme dk non calc with some tr SLTST calc.

TVD (ft)

TVD (ft)

MD: 6,055'  
Inclination: 11.16°  
Azimuth: 349.68°  
TVD: 6,004.46'  
VS: 282.35'



brn, v sft - sft, sb pily-plty, silty to rthy tex, grdg to slst in pt, med gy- gy, sl frm, sb blk- occ sb pily, rthy-silty tex, non

5000 SLTY SH: gy-dk gy, sme dk brn, v sft - sft, sb pily-plty, silty to rthy tex, grdg to slst in pt, non calc with some tr SLTST: med gy- gy, sl frm, sb blk- occ sb pily, rthy-silty tex, non calc.

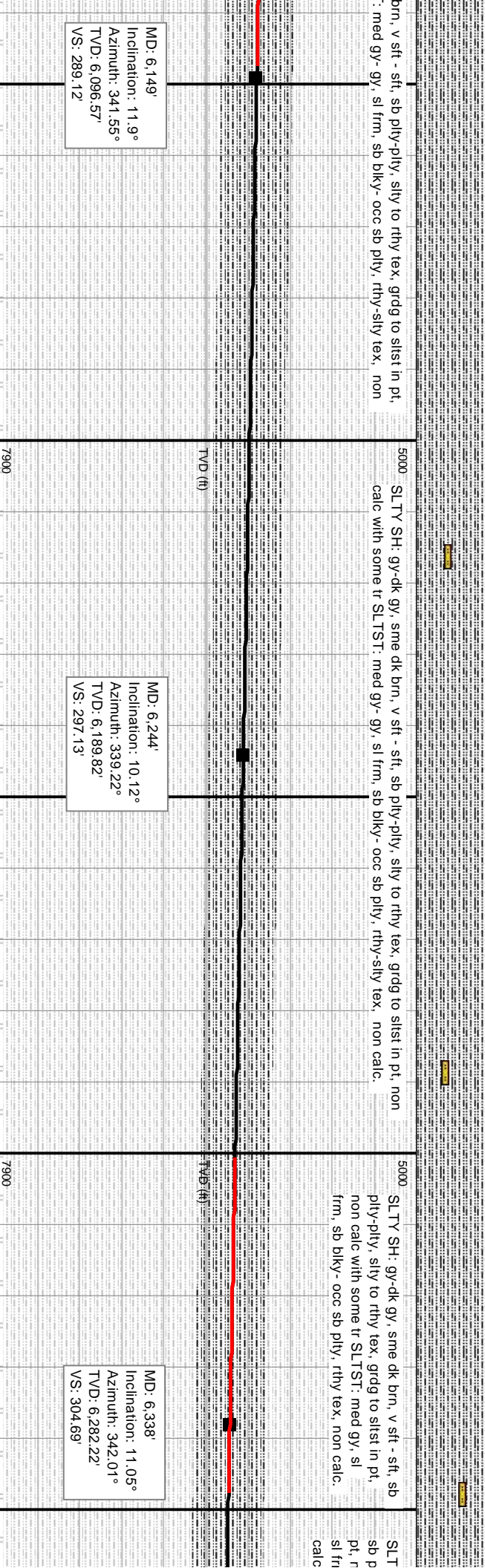
5000 SLTY SH: gy-dk gy, sme dk brn, v sft - sft, sb pily-plty, silty to rthy tex, grdg to slst in pt, non calc with some tr SLTST: med gy, sl frm, sb blk- occ sb pily, rthy tex, non calc.

SLT sb p pt, r sl frm calc

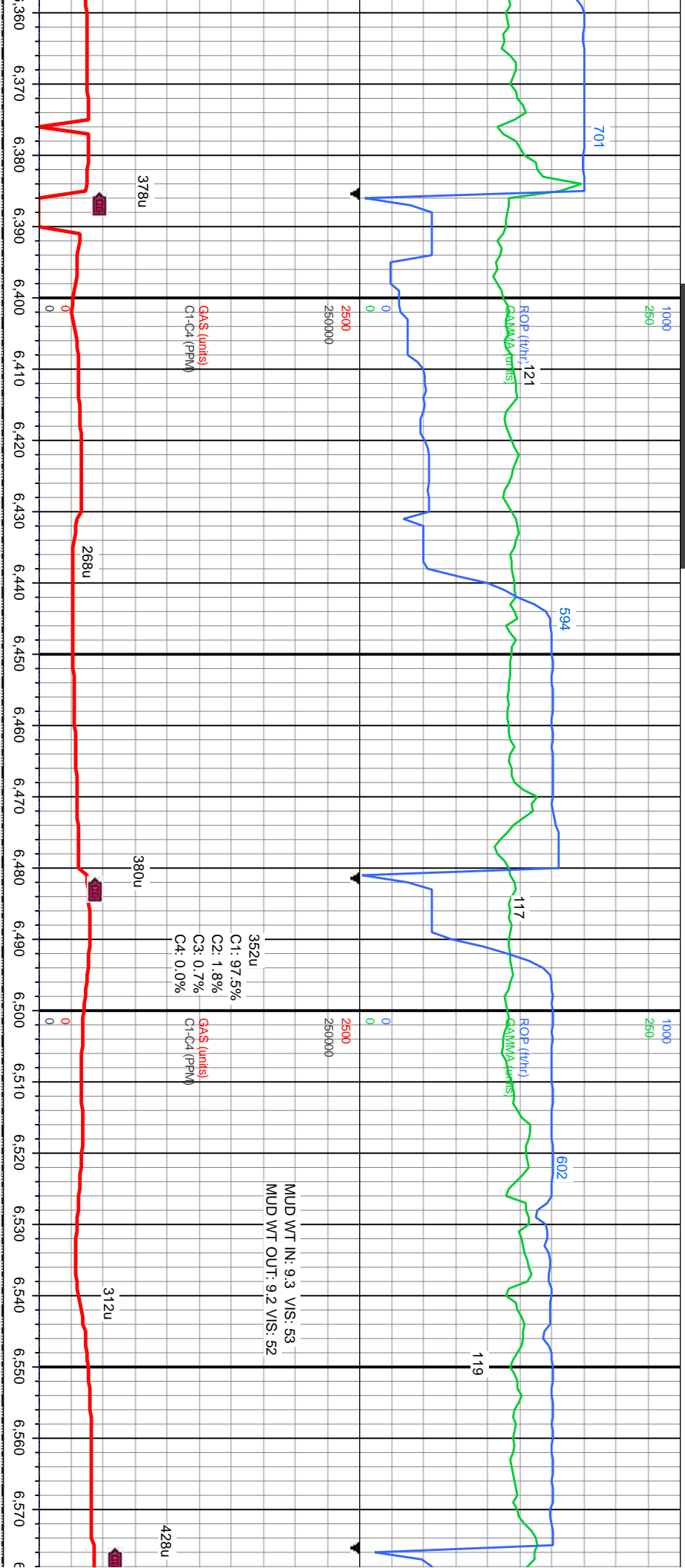
MD: 6,149'  
Inclination: 11.9°  
Azimuth: 341.55°  
TVD: 6,096.57'  
VS: 289.12'

MD: 6,244'  
Inclination: 10.12°  
Azimuth: 339.22°  
TVD: 6,189.82'  
VS: 297.13'

MD: 6,338'  
Inclination: 11.05°  
Azimuth: 342.01°  
TVD: 6,282.22'  
VS: 304.69'







Y SH: gy-dk gy, sme dk brn, v sft - sft, sly-ply, sly to rthy tex, grdg to slst in non calc with some tr SLTST: med gy, n, sb blkly - occ sb ply, rthy tex, non

5000 SLTY SH: gy-dk gy, v sft - sft, sb ply-ply, sly to rthy tex, grdg to slst in pt, non calc with some tr SLTST: med gy, sl frm, sb blkly - occ sb ply, rthy tex, non calc.

5000 SLTY SH: gy-dk gy, v sft - sft, sb ply-ply, sly to rthy tex, grdg to slst in pt, non calc with some tr SLTST: med gy, sl frm, sb blkly - occ sb ply, rthy tex, non calc.

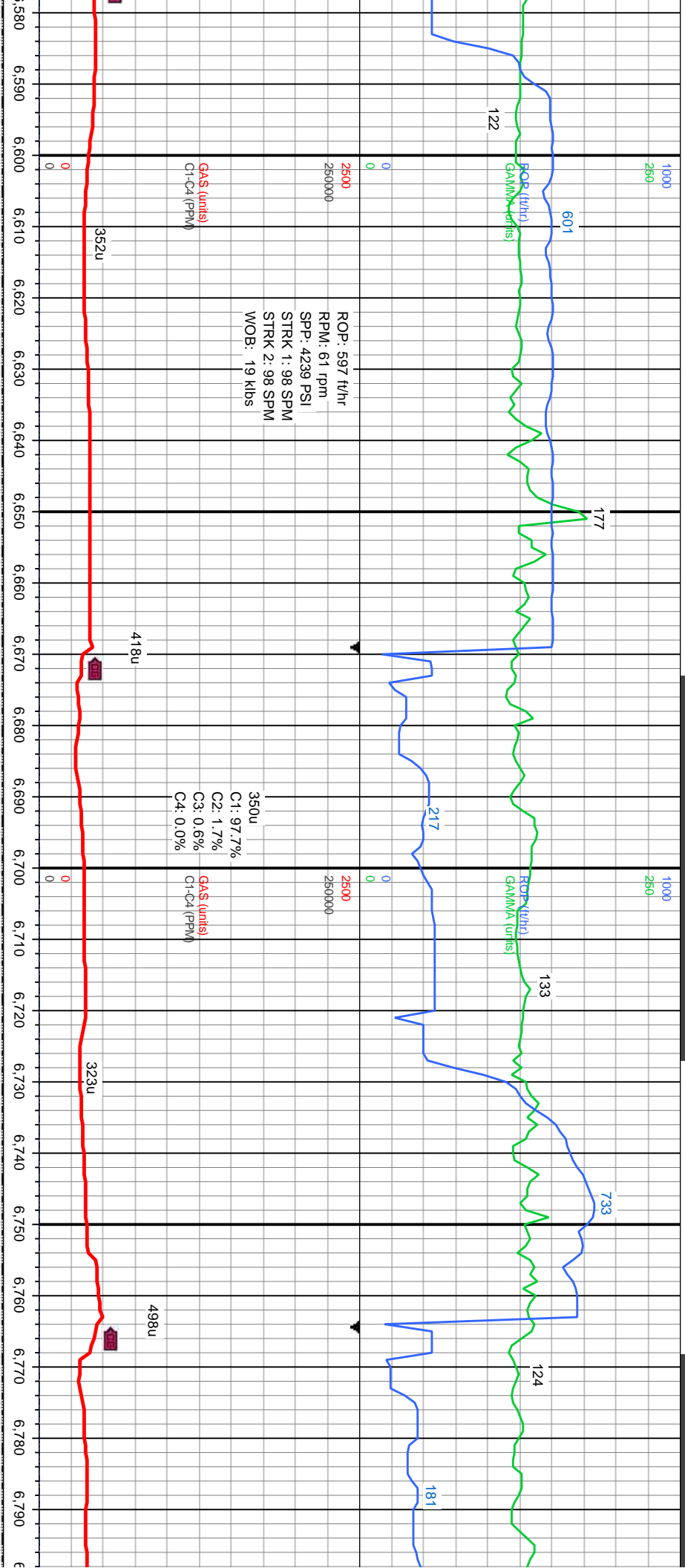
5000 SLTY SH: gy-dk gy, v sft - sft, sb ply-ply, sly to rthy tex, grdg to slst in pt, non-si calc with some tr SLTST: med gy, sl frm, sb blkly - occ sb ply, rthy tex, non-si calc.

SLTY SH: gy-dk gy, v sft - s to rthy tex, grdg to slst in p some tr SLTST: med gy, sl ply, rthy tex, non-si calc.

MD: 6.433  
Inclination: 12.6°  
Azimuth: 345.06°  
TVD: 6,375.2'  
VS: 312.3'

MD: 6.528  
Inclination: 11.74°  
Azimuth: 343.38°  
TVD: 6,468.07'  
VS: 319.94'

MUD WT IN: 9.3 VS: 53  
MUD WT OUT: 9.2 VS: 52

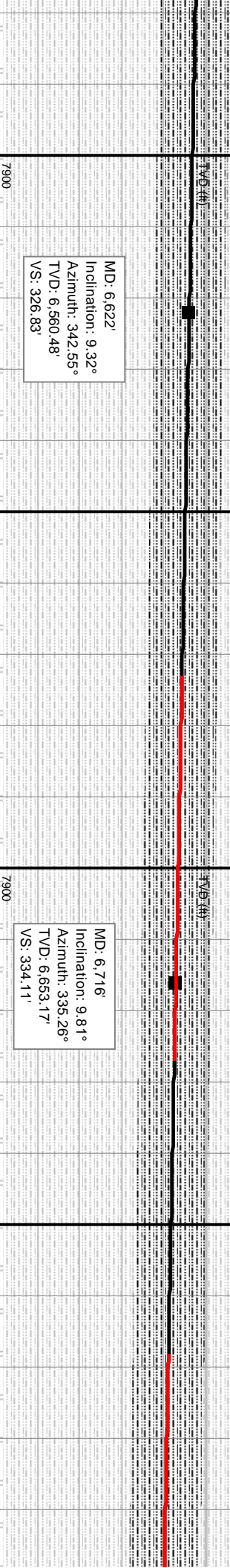


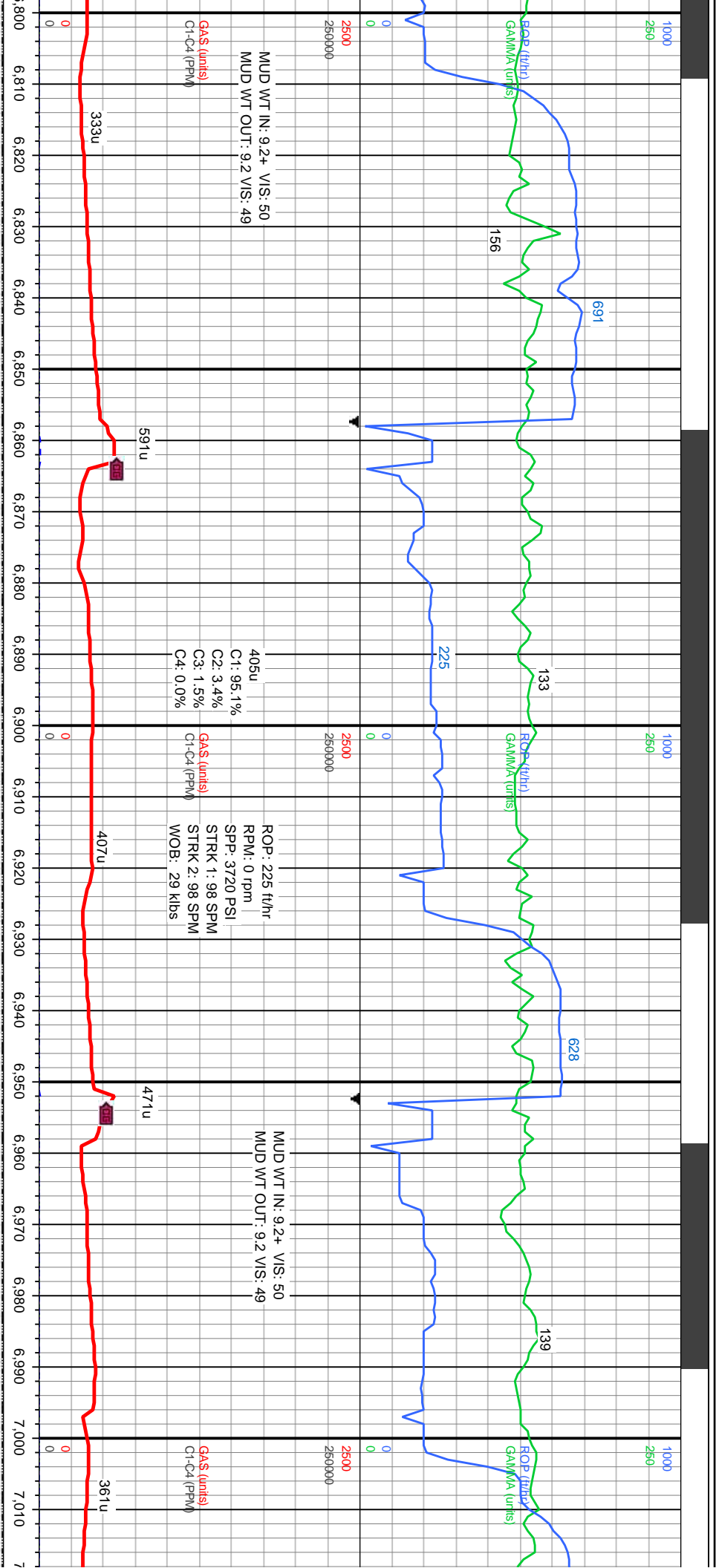
SLTY SH: gy-dk gy, v sft - sft, sb pily-pily, silty to rthy tex, grdg to slst in pt, non-sl calc with some tr SLTST: med gy, sl frm, sb biky- occ sb pily, rthy tex, non-sl calc. with tr BENT: wh-it gy, v sft.

SLTY SH: gy-dk gy, v sft - sft, sb pily-pily, silty to rthy tex, grdg to slst in pt, non-sl calc with some tr SLTST: med gy, sl frm, sb biky- occ sb pily, rthy tex, non-sl calc. with tr BENT: wh-it gy, v sft.

SLTY SH: gy-dk gy, v sft - sft, sb pily-pily, silty to rthy tex, grdg to slst in pt, non-sl calc with some tr SLTST: med gy, sl frm, sb biky- occ sb pily, rthy tex, non-sl calc.

SLTY SH: gy-dk gy, v sft - sft, sb pily-pily, silty to rthy tex, grdg to slst in pt, non-sl calc with some tr SLTST: med gy, sl frm, sb biky- occ sb pily, rthy tex, non-sl calc.





MUD WT IN: 9.2+ VIS: 50  
MUD WT OUT: 9.2 VIS: 49

ROP: 225 ft/hr  
RPM: 0 rpm  
SPP: 3720 PSI  
STRK 1: 98 SPM  
STRK 2: 98 SPM  
WOB: 29 kbs

MUD WT IN: 9.2+ VIS: 50  
MUD WT OUT: 9.2 VIS: 49

SLTY SH: dk gy-gy, v sft, sb pily, silty-rthy tex, silty in pt, non-si calic with occ tr SLTST: m gy, sft-frm, sb blkly, rthy tex, non-si calic.

SLTY SH: dk gy-gy, v sft, sb pily, silty-rthy tex, silty in pt, non-si calic with occ tr SLTST: m gy, sft-frm, sb blkly, rthy tex, non-si calic.

SLTY SH: dk gy-gy, v sft, sb pily, silty-rthy tex, silty in pt, non-si calic with occ tr SLTST: m gy, sft-frm, sb blkly, rthy tex, non-si calic.

SLTY SH: dk gy-gy, v sft, sb pily, silty-rthy tex, silty in pt, non-si calic with occ tr SLTST: m gy, sft-frm, sb blkly, rthy tex, non-si calic.

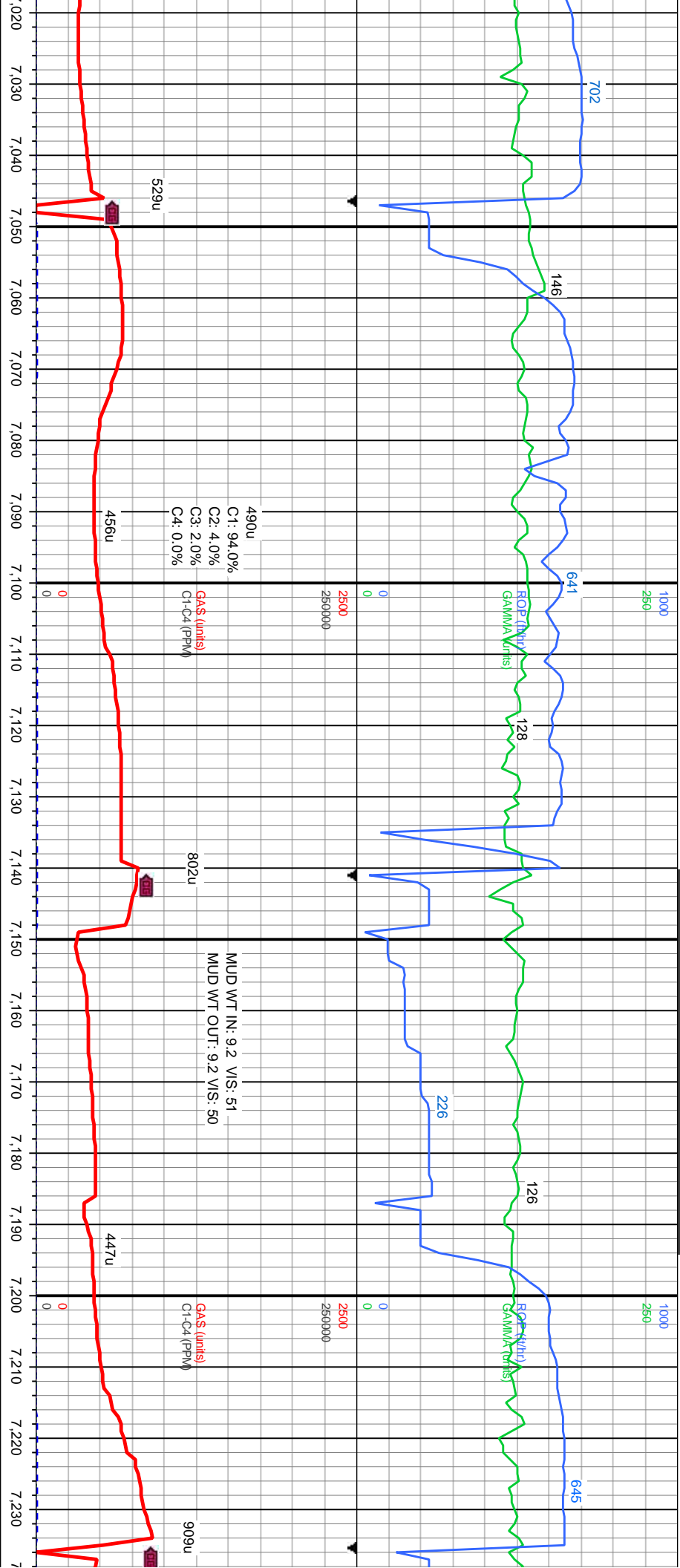
SLTY SH: dk gy-gy, v sft, sb pily, silty-rthy tex, silty in pt, non-si calic with occ tr SLTST: m gy, sft-frm, sb blkly, rthy tex, non-si calic.

MD: 6,811'  
Inclination: 10.46°  
Azimuth: 336.82°  
TVD: 6,746.69'  
VS: 342.62'

MD: 6,905'  
Inclination: 11.07°  
Azimuth: 339.62°  
TVD: 6,839.04'  
VS: 350.96'

MD: 7,000'  
Inclination: 12.29°  
Azimuth: 339.35°  
TVD: 6,932.07'  
VS: 359.75'





gy, v sft, sb plty, silty-rthy tex, calc with occ tr SLTST: m gy, rthy tex, non-sl calc.

SLTY SH: gy-dk gy, v sft-sft, sb pily, sily-rthy  
tex, sily in pt, non-sl calc with occ tr SLST: r  
gy occ dk gy, spec, sft-frm, sb blkly, rthy tex,  
non-sl calc.

SLTY SH: gy-dk gy, v sft-sft, sb ply, silty-rthy  
tex, silty in pt, non-sl calc with occ tr SLTST, m  
gy occ dk gy, spec, sft-firm, sb blk, rthy tex,  
non-sl calc.

SLTY SH: gy-dk gy, v sft-sft, sb pty-pty, sly-rthy  
tex, sly in pt, non-sl calc with occ tr SLTST: m gy  
occ dk gy, spec, sft-firm, sb blkly, rthy tex, non-sl  
calc.

SLTY SH: gy-dk gy, v sft-sft, sb p  
sly-rthy tex, sly in pt, non-sl cal  
tr SLTST: m gy occ dk gy, spec, s  
blyk, rthy tex, non-sl calc.

MD: 7,095'  
Inclination: 9.96°  
Azimuth: 338.22°  
TVD: 7,025.28'  
VS: 368.3'

(ft)

MD: 7,189'  
Inclination: 9.37°  
Azimuth: 343.33°  
TVD: 7,117.94'  
VS: 375.2'

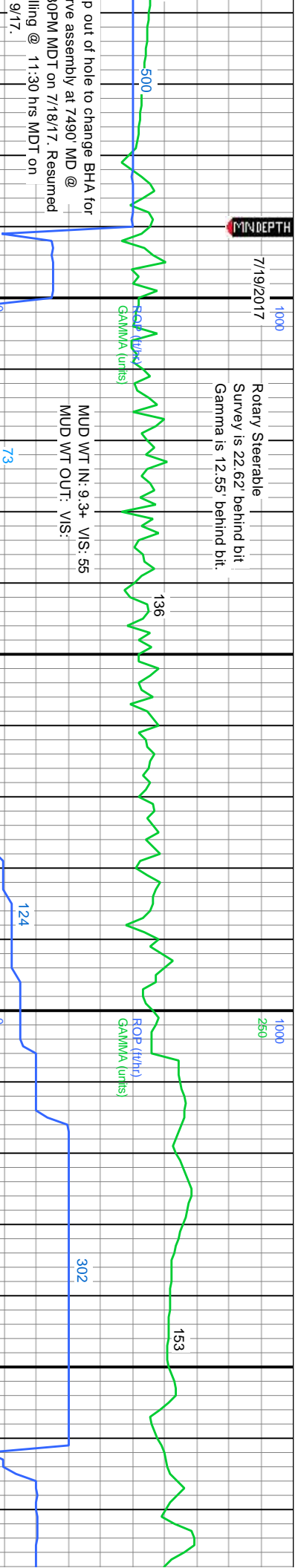
TVD (ft)



MINDEPTH

7/19/2017

Rotary Steerable  
Survey is 22.62' behind bit  
Gamma is 12.55' behind bit.



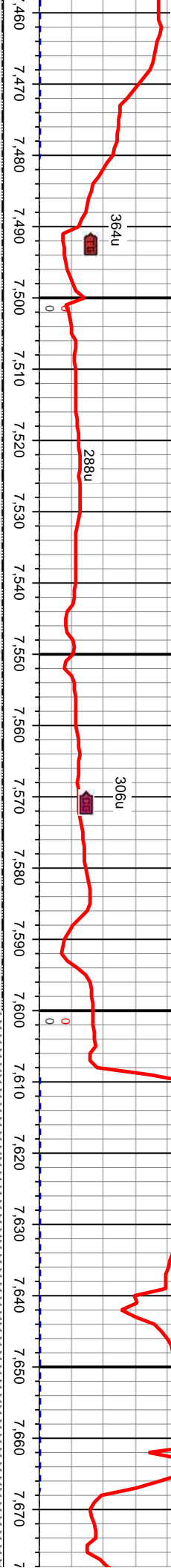
MUD WT IN: 9.3+ V/S: 55  
MUD WT OUT: V/S:

Bit Data  
Bit #: 2  
Type: HCC AT505F  
Size: 8.5  
Depth In: 7490'  
Depth Out: 14823'  
Jets: 5x15  
S/N: 7163765

Shaker down,  
moved trap to  
center shaker.

GAS (units)  
C1-C4 (PPM)

352u  
C1: 94.2%  
C2: 3.7%  
C3: 1.9%  
C4: 0.1%



SH: gy-dk gy, v sft-sft, sb pily-pily,  
sily-rthy tex, sily in pt, sl calc.

50SLTY SH: gy-dk gy, v sft-sft, sb pily-pily,  
sily-rthy tex, sily in pt grgd to tr slst, sl incr in  
calc.

SLTY SH: gy-dk gy, v sft-sft, sb pily-pily,  
sily-rthy tex, sily in pt grgd to tr slst, sl incr  
in calc.

No sample due to mud flowing  
off shakers.

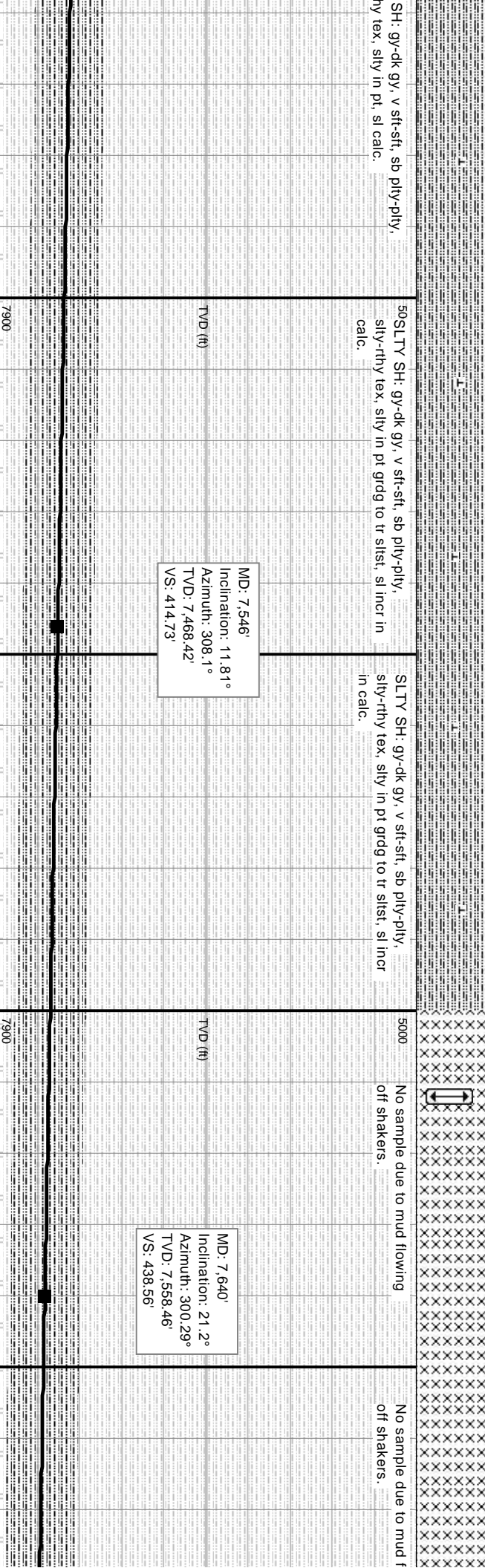
No sample due to mud f  
off shakers.

TVD (ft)

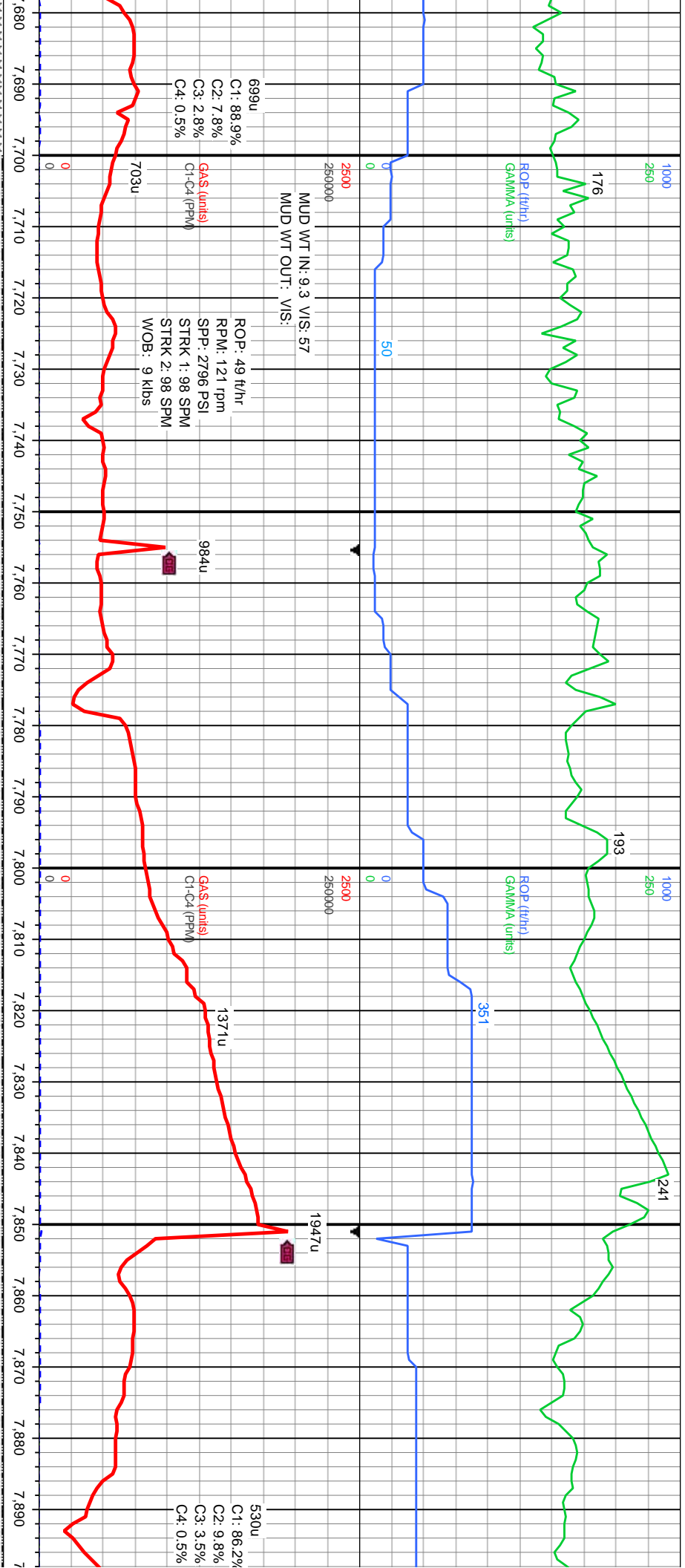
MD: 7.546'  
Inclination: 11.81°  
Azimuth: 308.1°  
TVD: 7.468.42'  
VS: 414.73'

TVD (ft)

MD: 7.640'  
Inclination: 21.2°  
Azimuth: 300.29°  
TVD: 7.558.46'  
VS: 438.56'





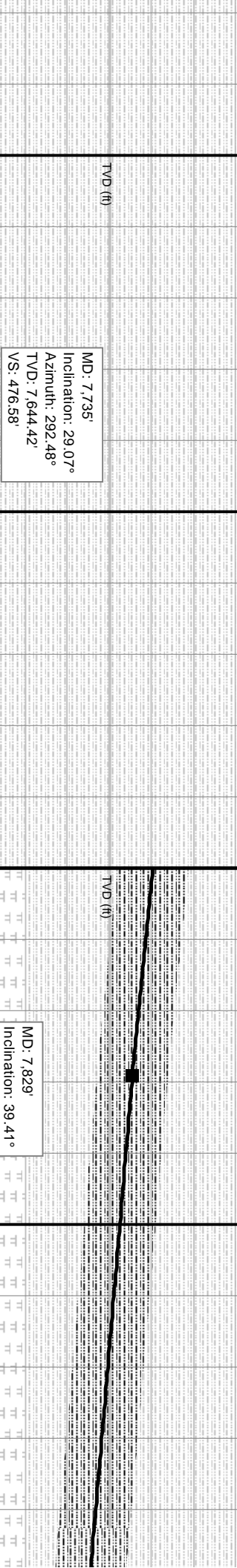


Flowing

5000 SLTY SH: gy-dk gy, v sft-sft, sb pily-pily, sily-rthy tex, sily in pt grdg to tr sltst, sl calc.

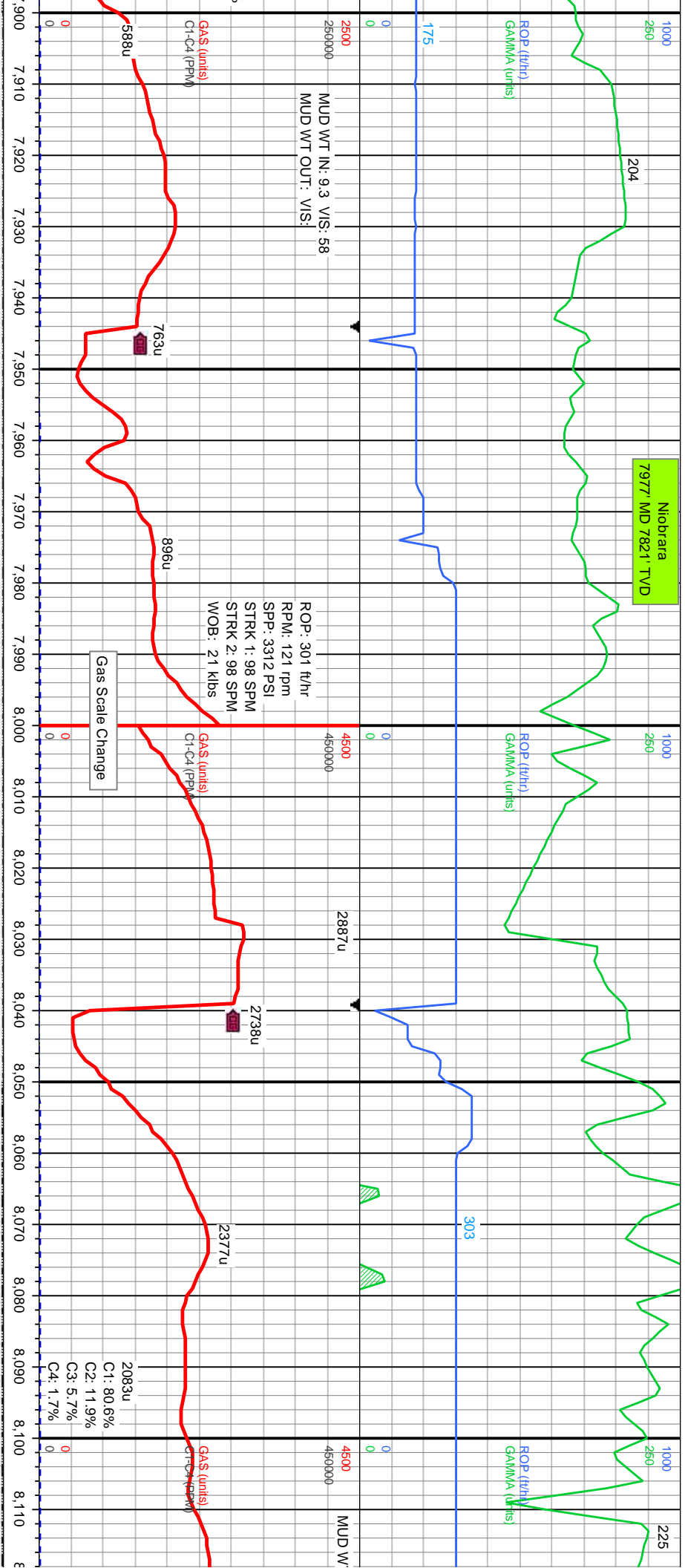
7500 SLTY SH: gy-dk gy, v sft-sft, sb pily-pily, sily-rthy tex, sily in pt grdg to tr sltst, sl calc. with BENT: tan-wh, lt gy, spec, sft.

SLTY SH: gy-dk gy, v sft-sft, sb pily-pily, sily-rthy tex, ooc sily, sl incr calc. with BENT: tan-wh, lt gy, spec, sft.





Niobrara  
7977' MD 7821' TVD



7500  
MRLST: med-dk gy, spec, slt gr, frm, sb  
ply-ply, gt tex, v calc, with tr bent, tr pyr.  
SLTY SH: m-dk gy, frm, sb ply-ply, slty tex, v  
calc grdg to mlst.

7500  
MRLST: med-dk gy, spec, slt gr, frm, sb  
ply-ply, gt tex, v calc, with tr bent, tr pyr.  
SLTY SH: m-dk gy, frm, sb ply-ply, slty tex, v  
calc grdg to mlst.

7500  
MRLST: med-dk gy, spec, slt gr, frm, sb  
ply-ply, gt tex, v calc, with tr bent, tr pyr.  
SLTY SH: m-dk gy, frm, sb ply-ply, slty tex, v  
calc grdg to mlst.

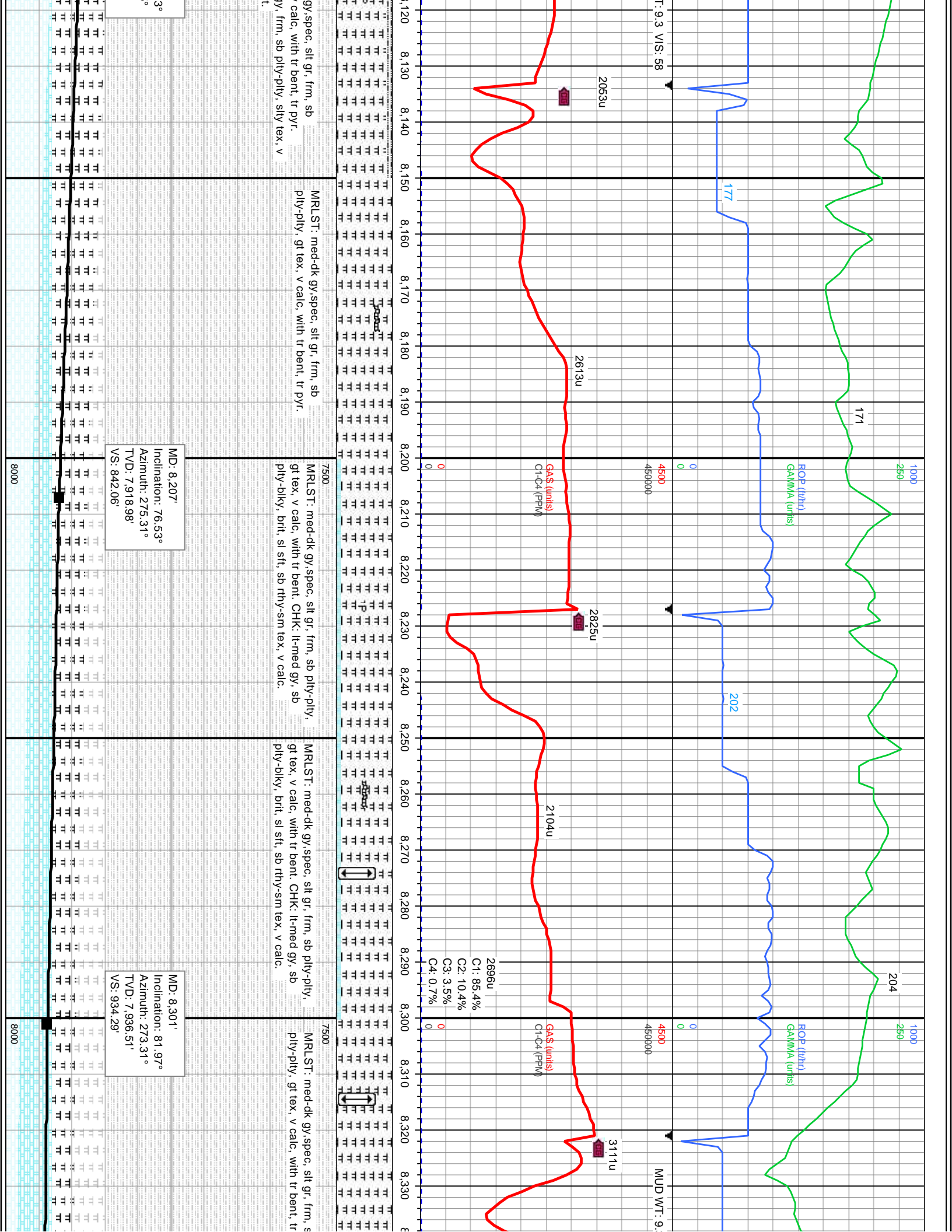
7500  
MRLST: med-dk gy, spec, slt gr, frm, sb  
ply-ply, gt tex, v calc, with tr bent, tr pyr.  
SLTY SH: m-dk gy, frm, sb ply-ply, slty tex, v  
calc grdg to mlst.

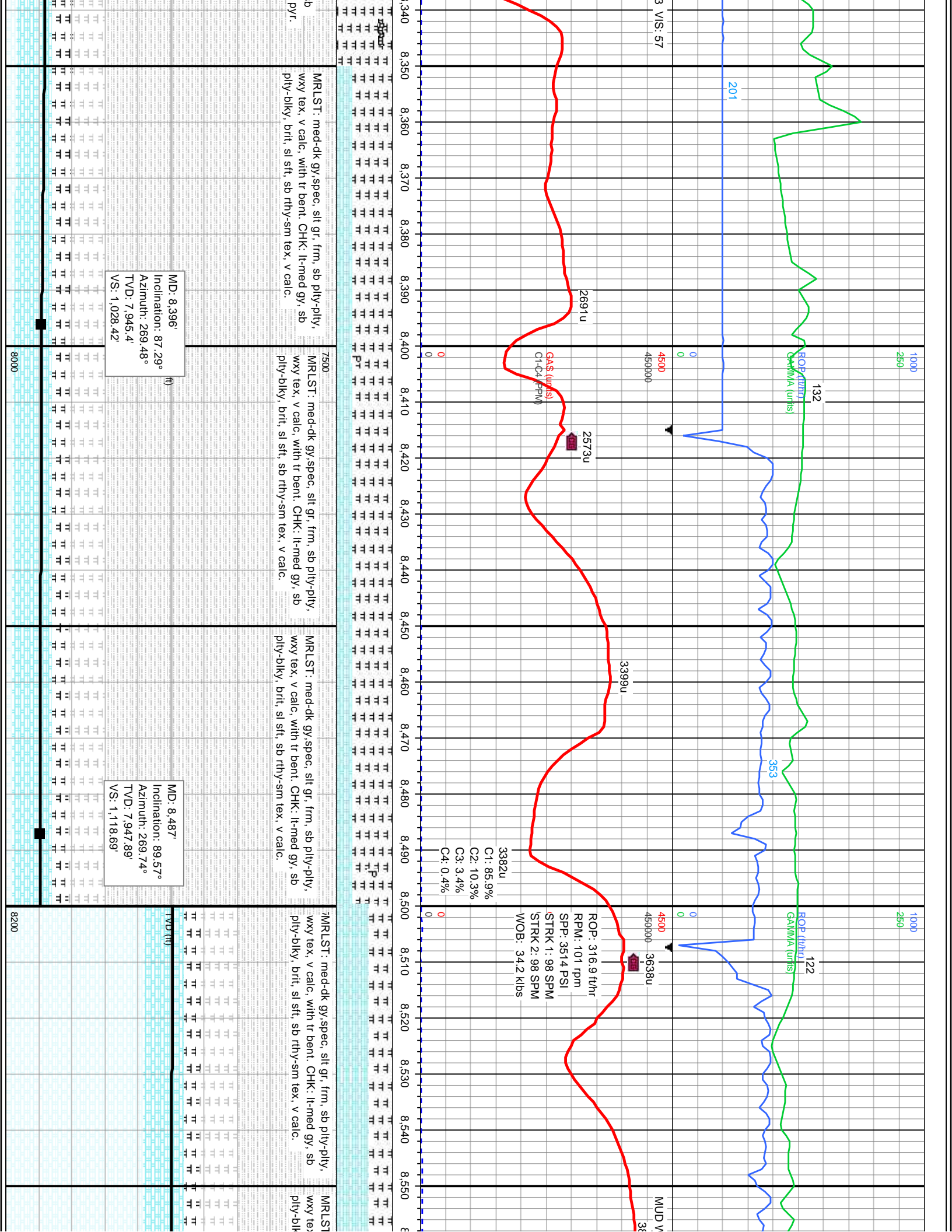
7500  
MRLST: med-dk  
ply-ply, gt tex, v  
SLTY SH: m-dk  
calc grdg to mlst

MD: 7,924'  
Inclination: 48.8°  
Azimuth: 284.79°  
TVD: 7,790.2'  
VS: 593.66'

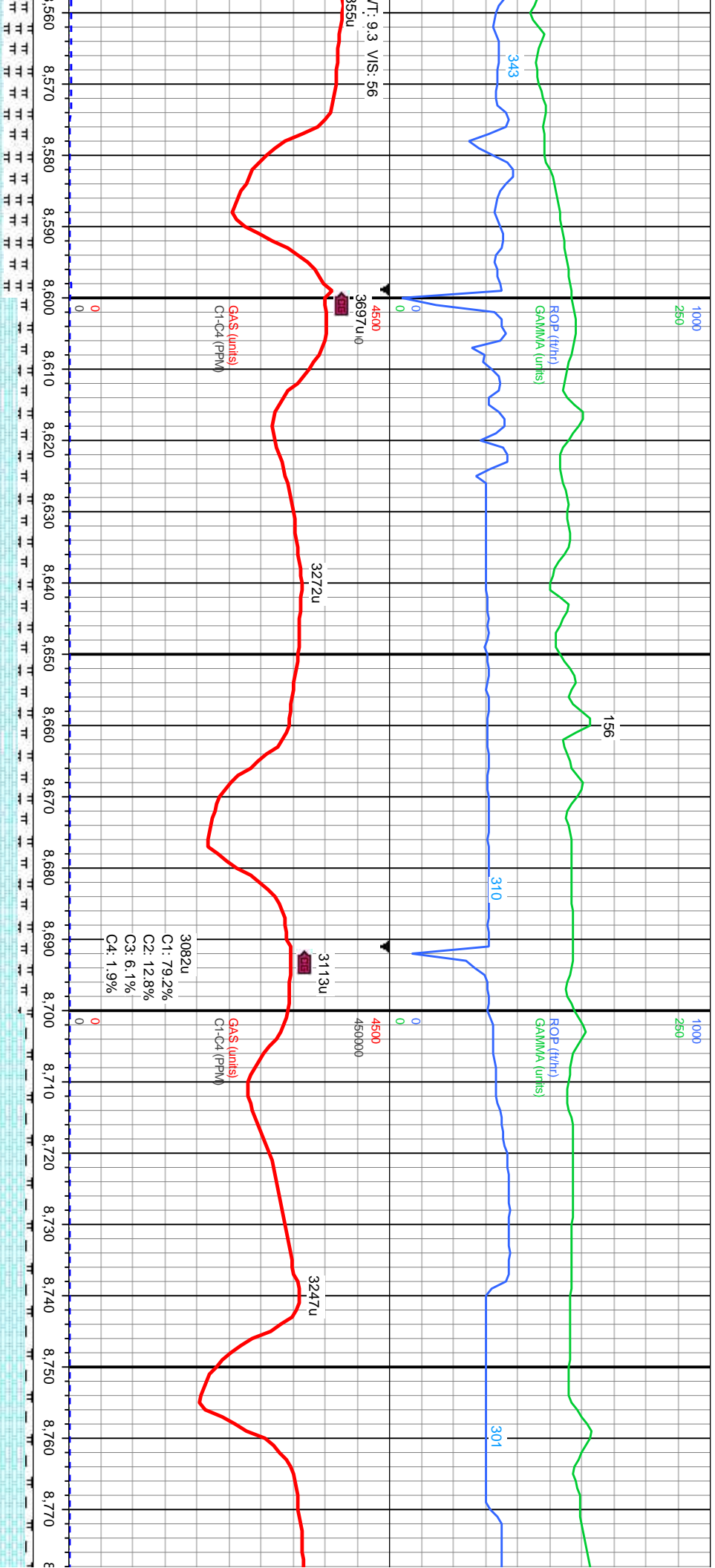
MD: 8,018'  
Inclination: 58.61°  
Azimuth: 282.18°  
TVD: 7,845.78'  
VS: 668.8'

MD: 8,112'  
Inclination: 66.6°  
Azimuth: 277.45°  
TVD: 7,889'  
VS: 752.04'









med-dk gy, spec, slt gr, frm, sb ply-pty, v calc, with tr bent, CHK: lt-med gy, sb wxy tex, v calc, with tr bent, CHK: lt-med gy, sb ply-bkly, brit, sl sft, sb rthy-sm tex, v calc.

7700  
MRLST: med-dk gy, spec, slt gr, frm, sb ply-pty, wxy tex, v calc, with tr bent, CHK: lt-med gy, sb ply-bkly, brit, sl sft, sb rthy-sm tex, v calc.

CHK: lt-med gy, str, sb ply-bkly, brit, sl sft, sb rthy-sm tex, v calc, MRLST: med-dk gy, mot-spec, slt gr, sl frm, sb ply-pty, gt tex, calc, tr pyr

7700  
CHK: lt-med gy, str, sb ply-bkly, brit, sl sft, sb rthy-sm tex, v calc, MRLST: med-dk gy, mot-spec, slt gr, sl frm, sb ply-pty, gt tex, calc

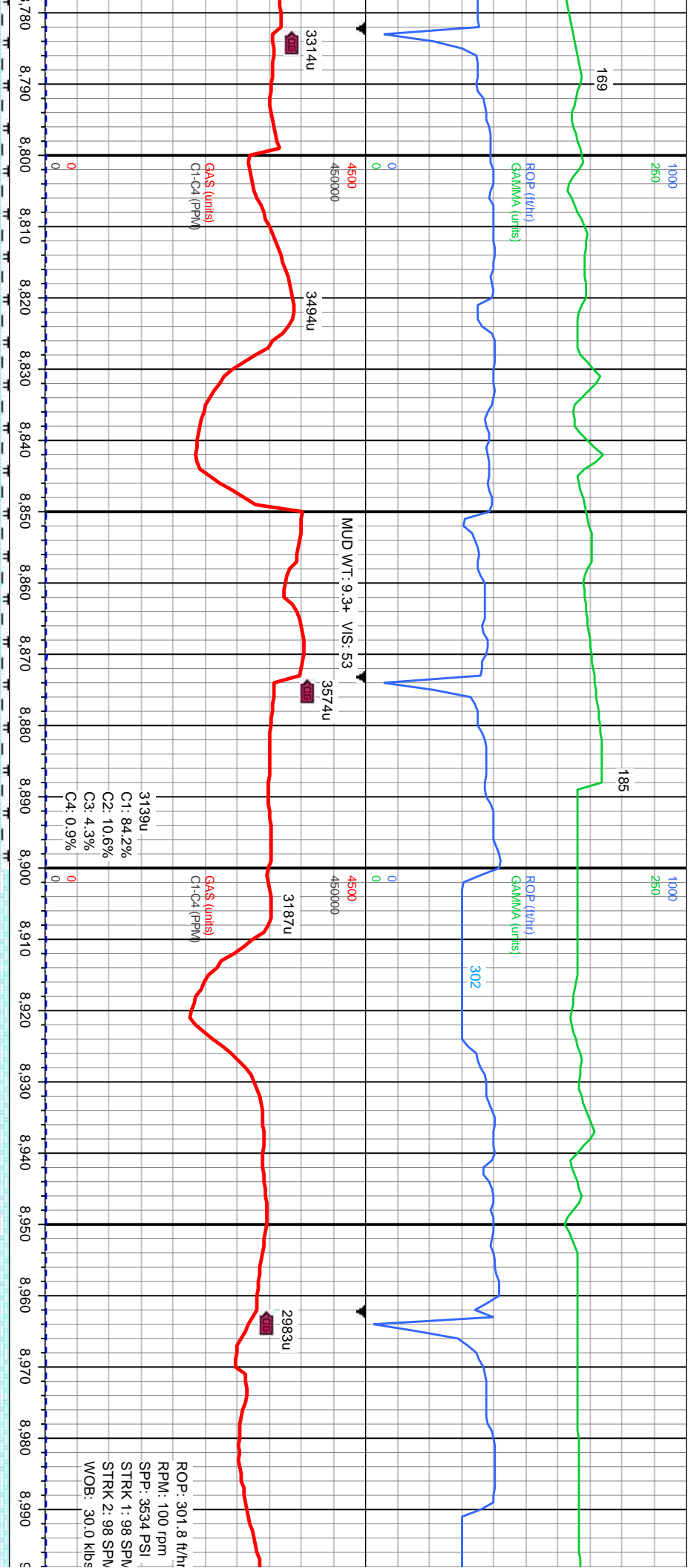
CHK: lt-med gy, str, sb ply-rthy-sm tex, v calc, MRLST: mot-spec, slt gr, sl frm, sb ply-bkly, brit, sl sft, sb rthy-sm tex, v calc.

MD: 8.578'  
Inclination: 89.32°  
Azimuth: 269.98°  
TVD: 7.948.77'  
VS: 1.209.05'

MD: 8.669'  
Inclination: 89.54°  
Azimuth: 268.53°  
TVD: 7.949.68'  
VS: 1.299.28'

MD: 8.761'  
Inclination: 89.72°  
Azimuth: 269.86°  
TVD: 7.950.27'  
VS: 1.390.5'

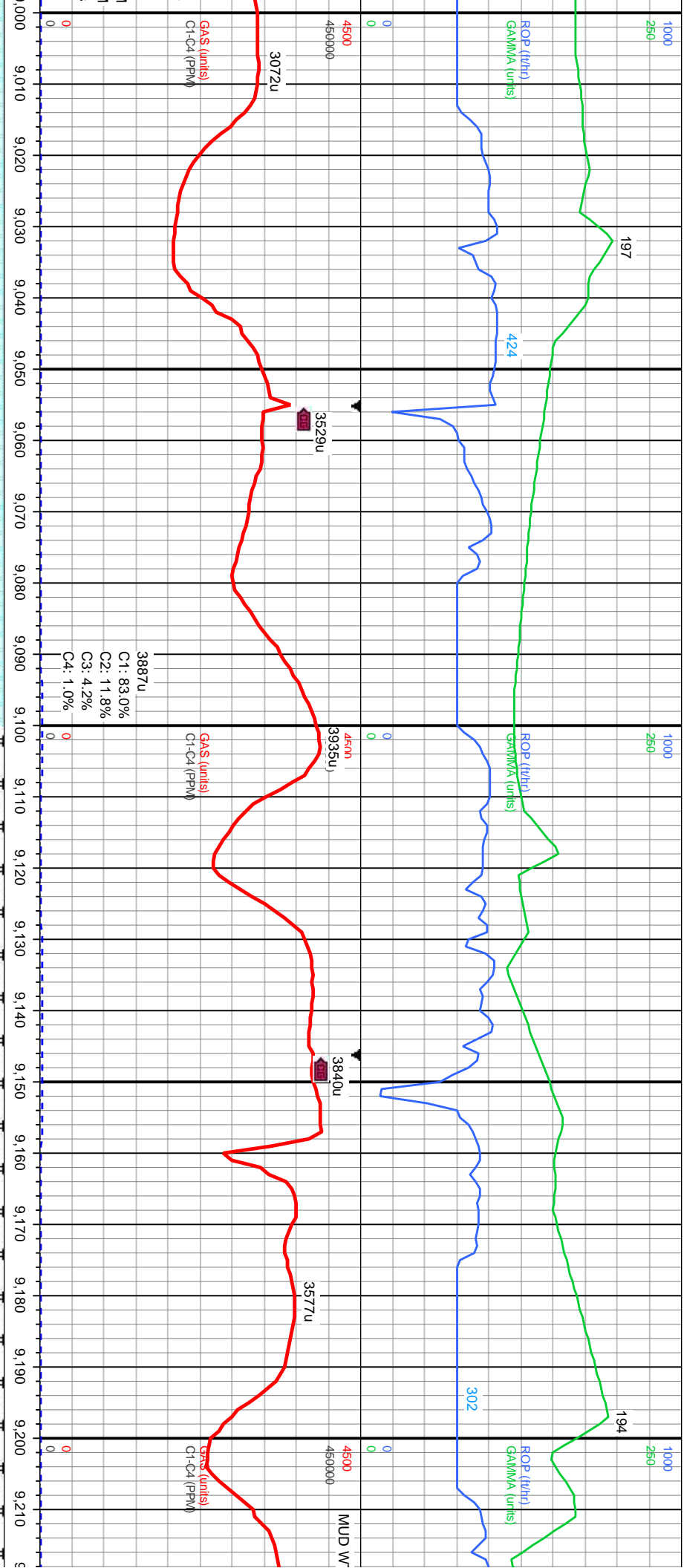




biky, brit, sl sft, sb med-dk gy, ply-pty, gt tex,		7700	CHK: lt-med gy, str, sb ply-biky, brit, sl sft, sb rthy-sm tex, v calc, MRLST: med-dk gy, mot-spec, slt gr, sl frm, sb ply-pty, gt tex, calc	
		7700	CHK: lt-med gy, str, sb ply-biky, brit, sl sft, sb rthy-sm tex, v calc, MRLST: med-dk gy, mot-spec, slt gr, sl frm, sb ply-pty, gt tex, calc, tr pyr	
		7700	CHK: lt-med gy, str, sb ply-biky, brit, sl sft, sb rthy-sm tex, v calc, tr MRLST	
		7700	CHK: lt-med gy, str, sb ply-biky, brit, sl sft, sb rthy-sm tex, v calc, tr MRLST	

MD: 8.854'  
Inclination: 89.66°  
Azimuth: 272.75°  
TVD: 7,950.78'  
VS: 1,483.08'

MD: 8.945'  
Inclination: 89.54°  
Azimuth: 270.62°  
TVD: 7,951.41'  
VS: 1,573.73'



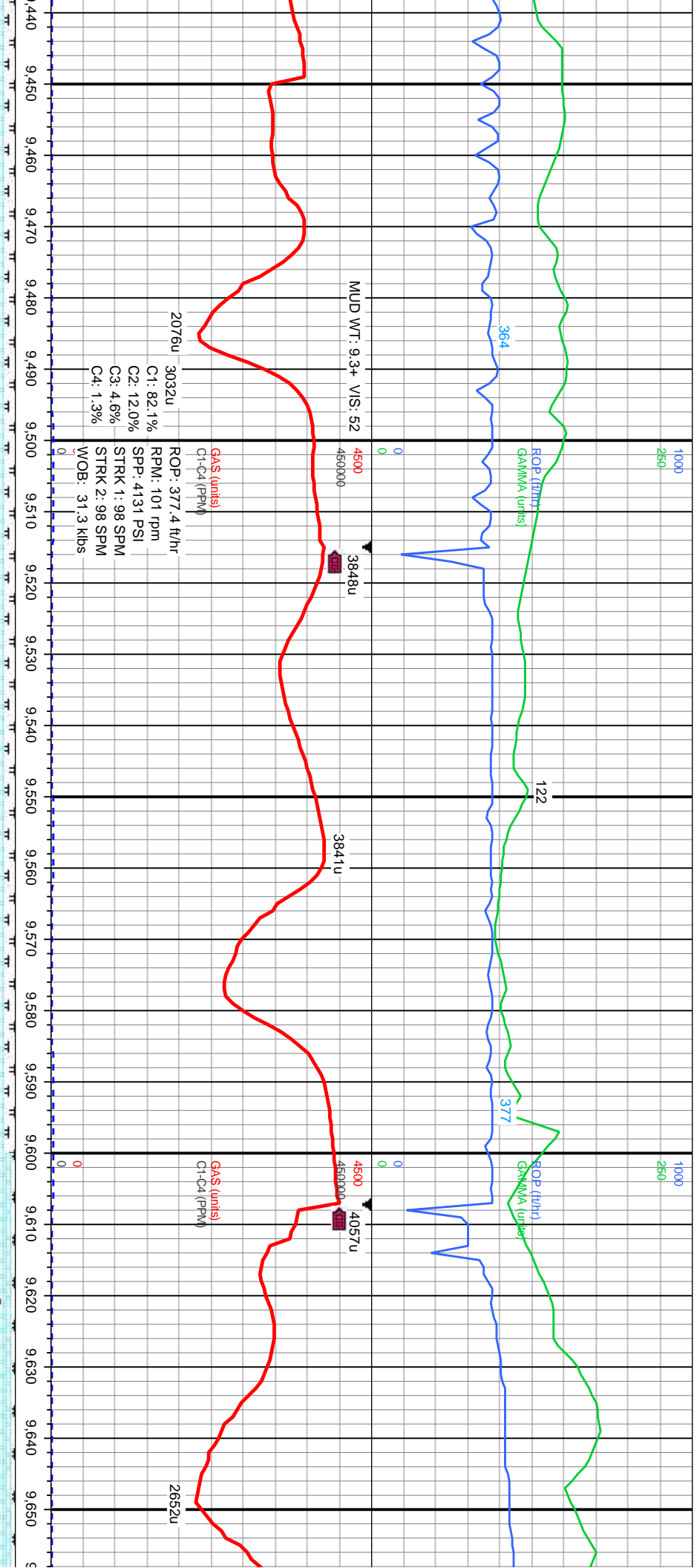
7700	CHK: lt-med gy, str, sb pily-blky, brit, sl sft, sb rthy-sm tex, v calc, tr MRLST	7700	CHK: lt-med gy, str, sb pily-blky, brit, sl sft, sb rthy-sm tex, v calc, tr MRLST	7700	CHK: lt-med gy, str, sb pily-blky, brit, sl sft, sb rthy-sm tex, v calc, MRLST: med-dk gy, mot-spec, silt gr, sl frm, sb pily-pily, gt tex, calc, tr pyr	7700	CHK: lt-med gy, str, sb pily-blky, brit, sl sft, sb rthy-sm tex, v calc, MRLST: med-dk gy, mot-spec, silt gr, sl frm, sb pily-pily, gt tex, calc, tr pyr	7700	CHK: lt-med gy, str, sb pily-blky, brit, sl sft, sb rthy-sm tex, v calc, MRLST: med-dk gy, mot-spec, silt gr, calc, tr pyr
8200		8200		8200		8200		8200	

MD: 9.038°  
Inclination: 89.94°  
Azimuth: 267.79°  
TVD: 7.951.83  
VS: 1.665.93

MD: 9.129°  
Inclination: 89.97°  
Azimuth: 266.57°  
TVD: 7.951.91°  
VS: 1.755.69

MD: 9.2°  
Inclination: 89.97°  
Azimuth: 266.57°  
TVD: 7.951.91°  
VS: 1.8





CHK: It gy-m gy,crm-wh, bnd, sb pily-biky, fri-frm, rthy tex, v calc. MRLST: med-dk gy, spec, sily gr in pt, fri-frm,sb pily-pily, v calc.

7700 CHK: It gy-m gy,crm-wh, bnd, sb pily-biky, fri-frm, wxy tex, v calc. MRLST: med-dk gy, spec-mot, mckln gr, fri-frm,sb pily-pily, v calc.

7700 CHK: It gy-m gy,crm-wh, bnd, sb pily-biky, fri-frm, wxy tex, v calc. MRLST: med-dk gy, spec-mot, mckln gr, fri-frm,sb pily-pily, v calc.

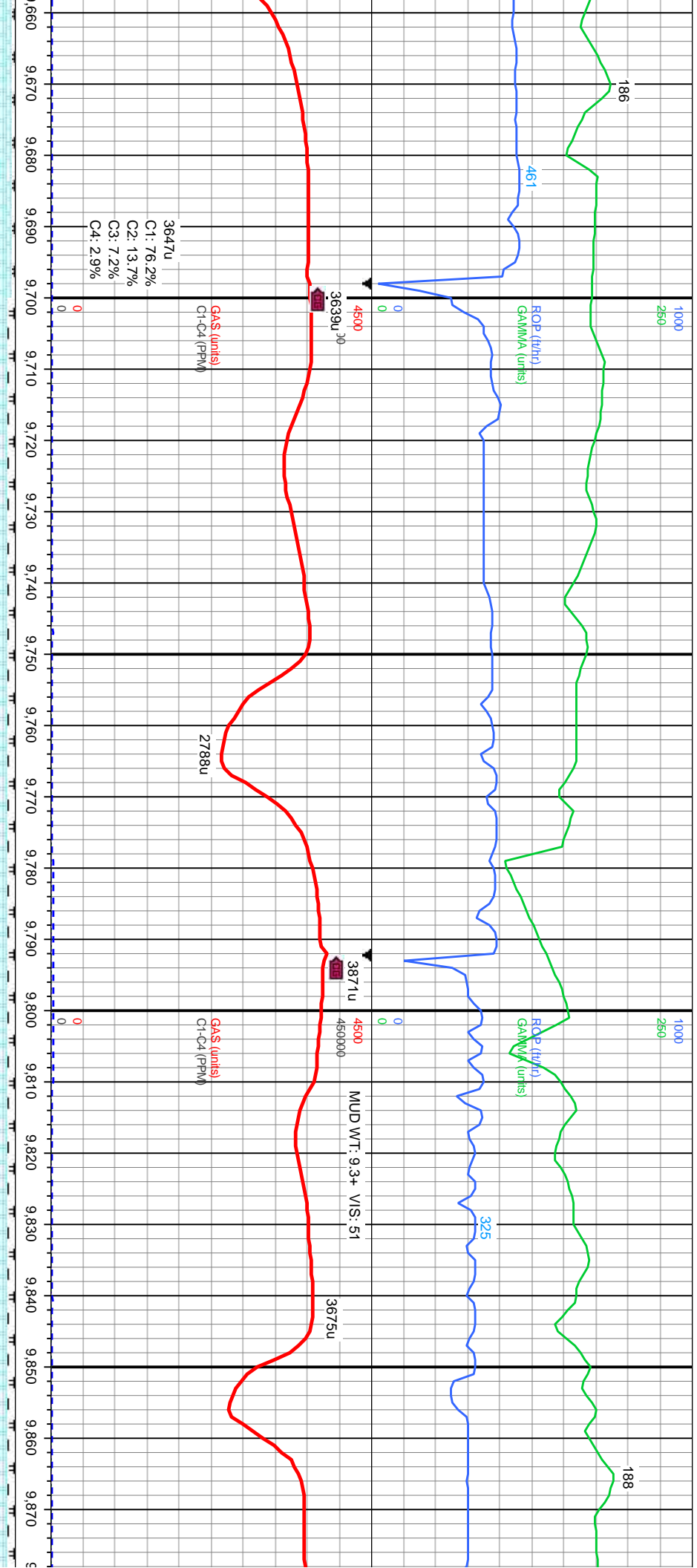
7700 CHK: m gy-lt gy, occ crm-wh, bnd, sb pily-biky, fri-occ frm, rthy tex, v calc. with tr PYR MRLST: m-dk gy, occ spec, sily gr in pt, fri-frm, sb pily-pily, v calc.

CHK: m gy-lt gy, occ crm-wh, bnd, sb pily-biky, fri-occ f

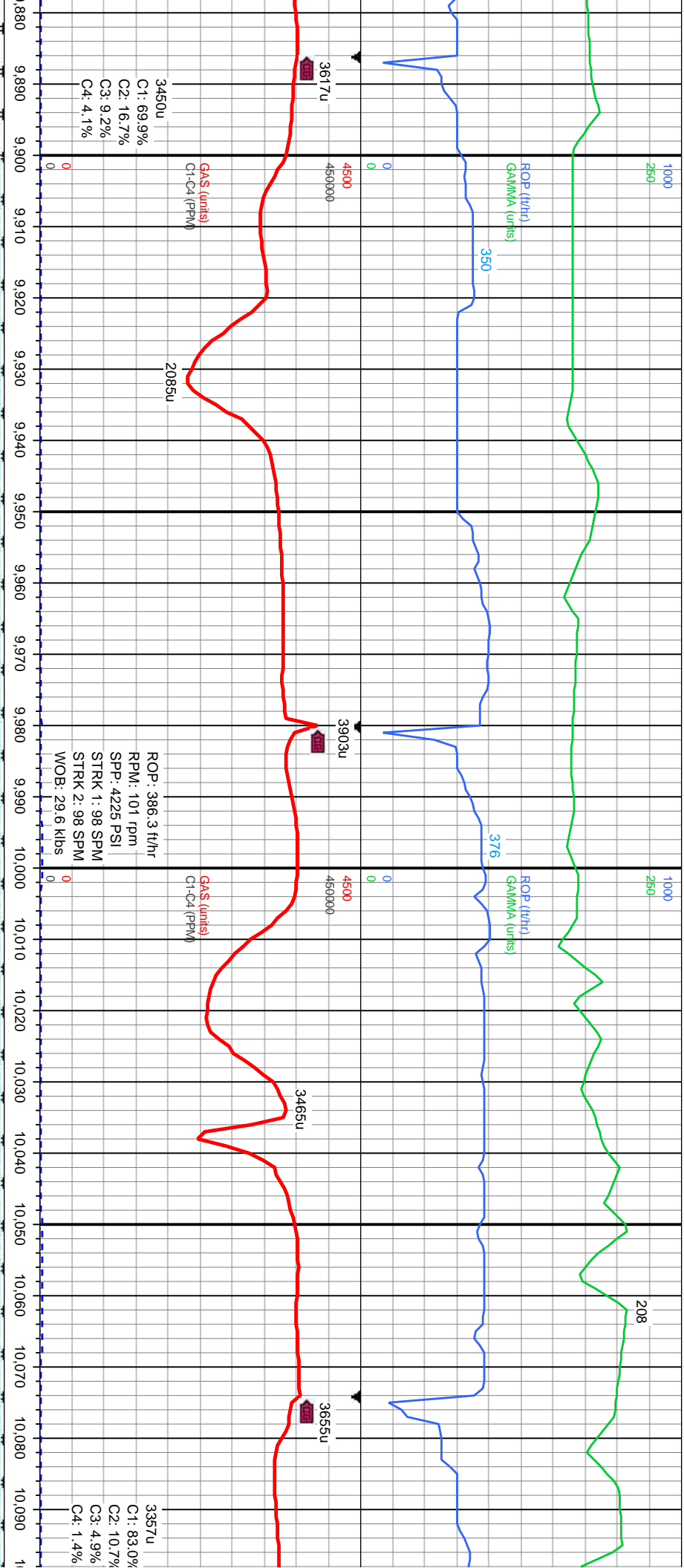
MD: 9.493°  
Inclination: 89.88°  
Azimuth: 267.99°  
TVD: 7,952.66'  
VS: 2.114.38'

MD: 9.584°  
Inclination: 90°  
Azimuth: 268.35°  
TVD: 7,952.76'  
VS: 2.204.38'





gy-ll gy, occ crm-wh, bnd, sb pily-biky, frn, rthy tex, v calc. with tr PYR MRLST: /, occ spec, silty gr in pt, fri-frn, sb /, v calc.		7700	CHK: It gy-n gy,crm-wh, bnd, sb pily-biky, fri-frn, rthy tex, v calc. MRLST: med-dk gy, spec, silty gr in pt, fri-frn,sb pily-pily, v calc.	7700	CHK: It gy-m gy,crm-wh, bnd, sb pily-biky, fri-frn, rthy tex, v calc. MRLST: med-dk gy, spec, silty gr in pt, fri-frn,sb pily-pily, v calc.	7700	CHK: It gy-m gy,crm-wh, bnd, sb pily-biky, fri-frn, rthy tex, v calc. MRLST: med-dk gy, spec, silty gr in pt, fri-frn,sb pily-pily, v calc.
MD: 9.676' Inclination: 90° Azimuth: 269.15° TVD: 7.952.76' VS: 2.295.5'		8200		8200		8200	
MD: 9.770' Inclination: 89.85° Azimuth: 268.31° TVD: 7.952.88' VS: 2.388.6'		8200		8200		8200	
MD: 9.864' Inclination: 89.91° Azimuth: 268.85° TVD: 7.953.08' VS: 2.481.67'		8200		8200		8200	



P

P

P

nd, sb pty-blky,  
ST: med-dk gy,  
p pty-pty, v calc.

CHK: It gy-m gy,crm-wh, bnd, sb pty-blky, fri-frn,  
rthy tex, v calc. MRLST: med-dk gy, spec, silty gr  
in pt, fri-frn,sb pty-pty, v calc. with tr PYR.

CHK: It gy-m gy,crm-wh, bnd, sb pty-blky, fri-frn,  
rthy tex, v calc. MRLST: med-dk gy, spec, silty gr  
in pt, fri-frn,sb pty-pty, v calc. with tr PYR.

CHK: It gy-m gy,crm-wh, bnd, sb pty-blky, fri-frn,  
rthy tex, v calc. MRLST: med-dk gy, spec, silty gr  
in pt, fri-frn,sb pty-pty, v calc. with tr PYR.

CHK: It gy-m gy,crm-wh, bnd, sb pty-blky, fri-frn,  
rthy tex, v calc. MRLST: med-dk gy, spec, silty gr  
in pt, fri-frn,sb pty-pty, v calc. with tr PYR.

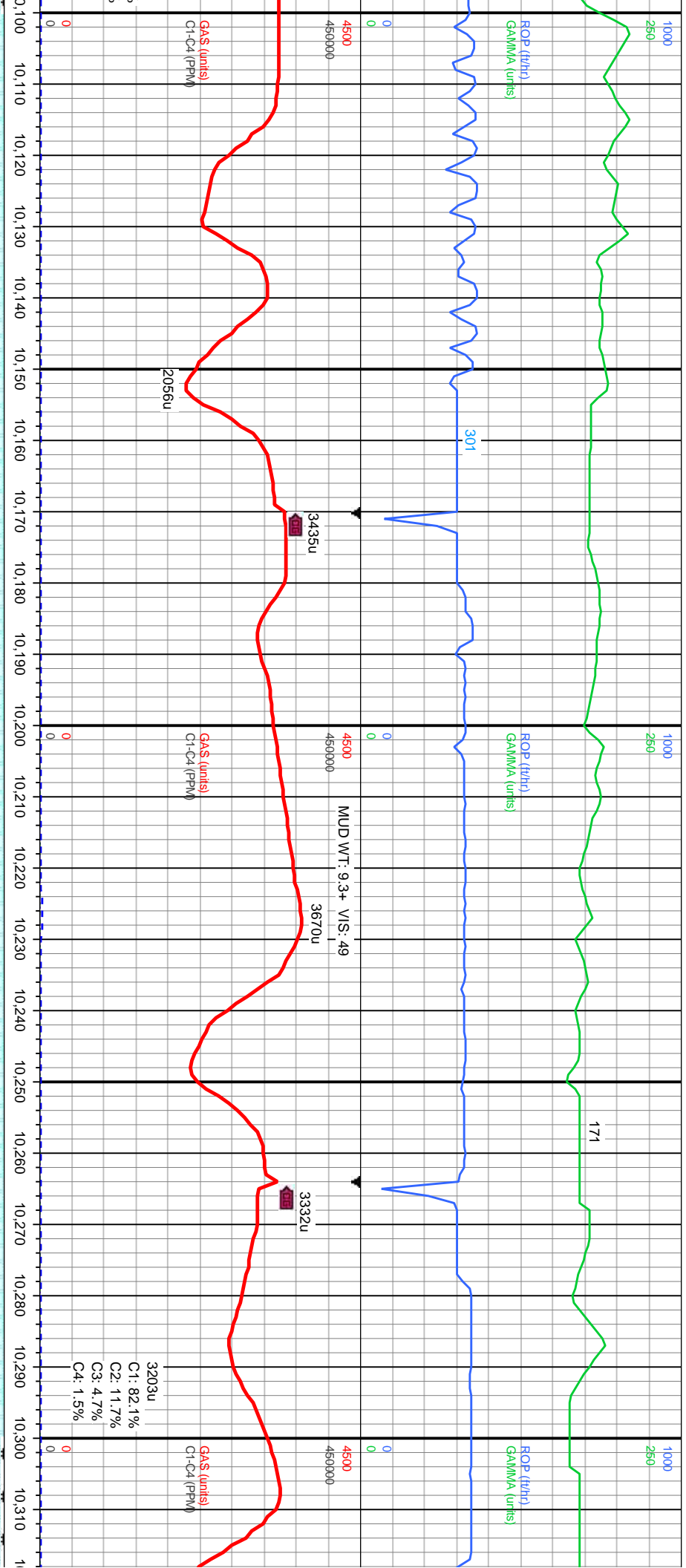
TVD (ft)

TVD (ft)

TVD (ft)

MD: 9.959'  
Inclination: 89.82°  
Azimuth: 269.51°  
TVD: 7.953.3'  
VS: 2.575.86'

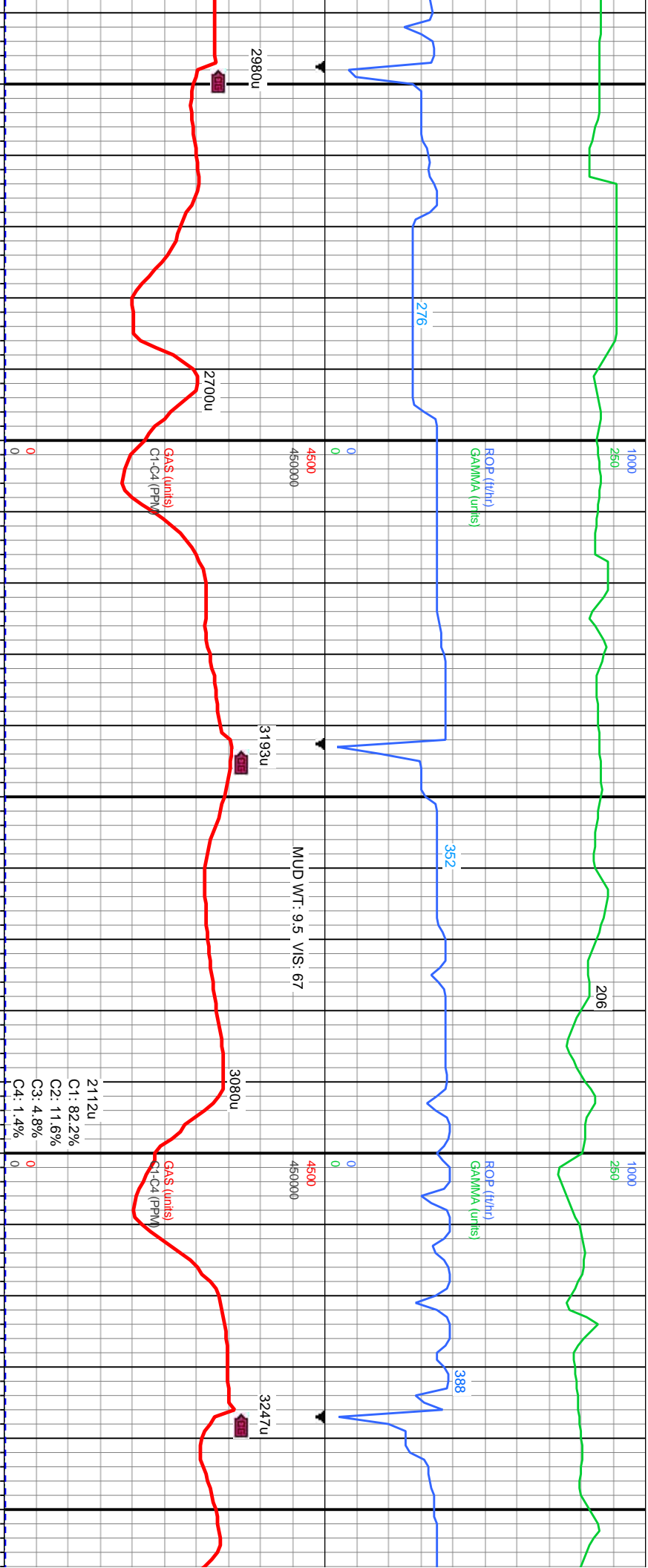
MD: 10.053'  
Inclination: 89.82°  
Azimuth: 269.99°  
TVD: 7.953.59'  
VS: 2.669.18'



7700	CHK: It gy-m gy, occ crm-wh, mot, sb pily-biky, fri-occ frm, rthy tex, v calc. tr MRLST: med-dk gy, mot, sm tex, fri,mod frm-frm, sb pily-pily, spl ip, calc	7700	CHK: It gy-m gy, occ crm-wh, mot, sb pily-biky, fri-occ frm, rthy tex, v calc. tr MRLST: med-dk gy, mot, sm tex, fri,mod frm-frm, sb pily-pily, spl ip, calc	7700	CHK: It gy-m gy, occ crm-wh, mot, sb pily-biky, fri-occ frm, rthy tex, v calc. tr MRLST: med-dk gy, mot, sm tex, fri,mod frm-frm, sb pily-pily, spl ip, calc	7700	CHK: It gy-m gy, occ crm-wh, mot, sb pily-biky, fri-occ frm, rthy tex, v calc. tr MRLST: med-dk gy, mot, sm tex, fri,mod frm-frm, sb pily-pily, spl ip, calc
TMD (ft)		TMD (ft)		TMD (ft)		TMD (ft)	





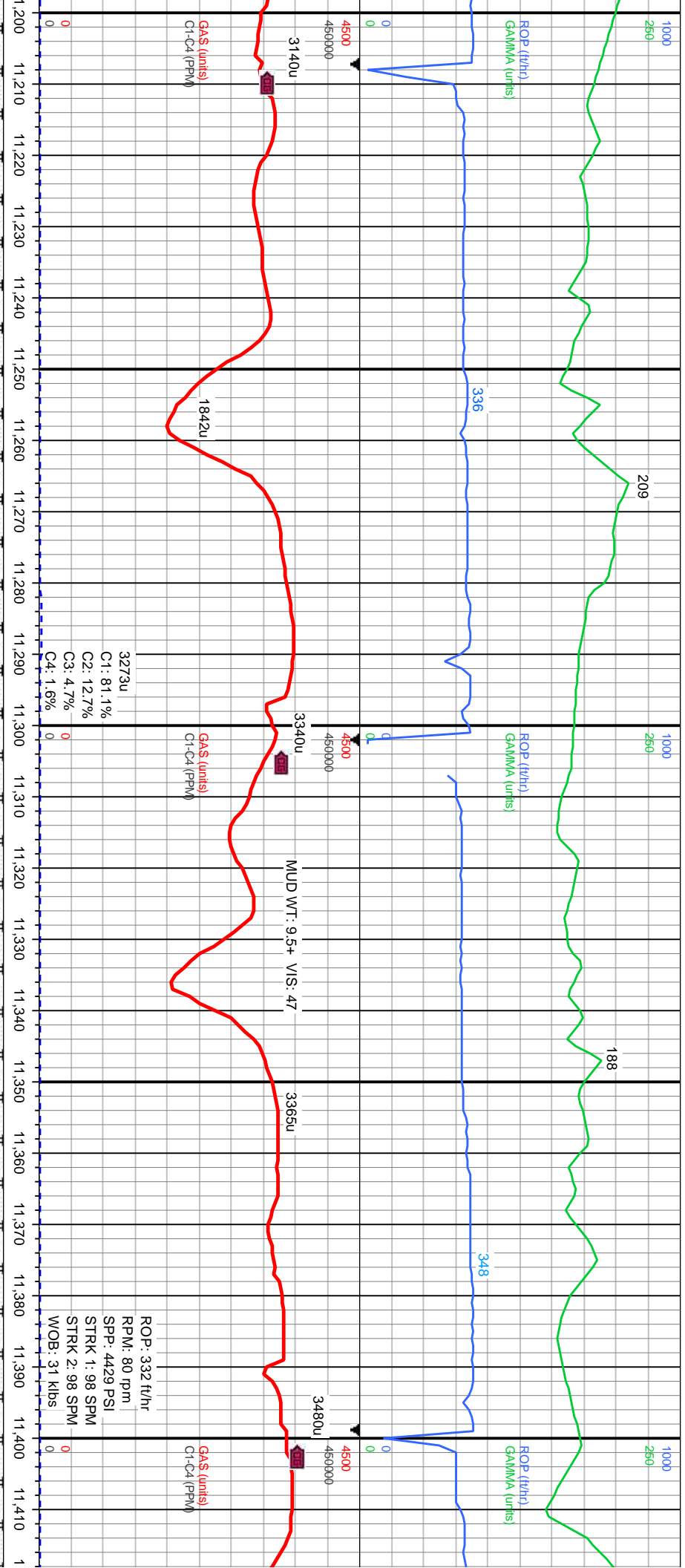


10,540	10,550	10,560	10,570	10,580	10,590	10,600	10,610	10,620	10,630	10,640	10,650	10,660	10,670	10,680	10,690	10,700	10,710	10,720	10,730	10,740	10,750				
P																									
CHK: lt gy-m gy, occ crm-wh, bnd, sb ply-blky, fri-occ frm, rthy tex, v calc. MRLST: med-dk gy, spec, silty gr in pt, fri-frm, sb ply-pty, v calc. with tr PYR.						7700 CHK: lt gy-m gy, occ crm-wh, bnd, sb ply-blky, fri-occ frm, rthy tex, v calc. MRLST: med-dk gy, spec, silty gr in pt, fri-frm, sb ply-pty, v calc. with tr PYR.						CHK: lt gy-m gy, occ crm-wh, bnd, sb ply-blky, fri-occ frm, rthy tex, v calc. spec, silty gr in pt, fri-frm, sb ply-pty, v calc. with tr PYR.						7700 CHK: lt gy-m gy, occ crm-wh, bnd, sb ply-blky, fri-occ frm, rthy tex, v calc. MRLST: med-dk gy, spec, silty gr in pt, fri-frm, sb ply-pty, v calc. with tr PYR.						CHK: ply-b med-d ply-p	
						TVD: (ft)												TVD: (ft)							
						8200												8200							
						MD: 10.621' Inclination: 89.75° Azimuth: 273.92° TVD: 7.954.54' VS: 3.235.87'																			



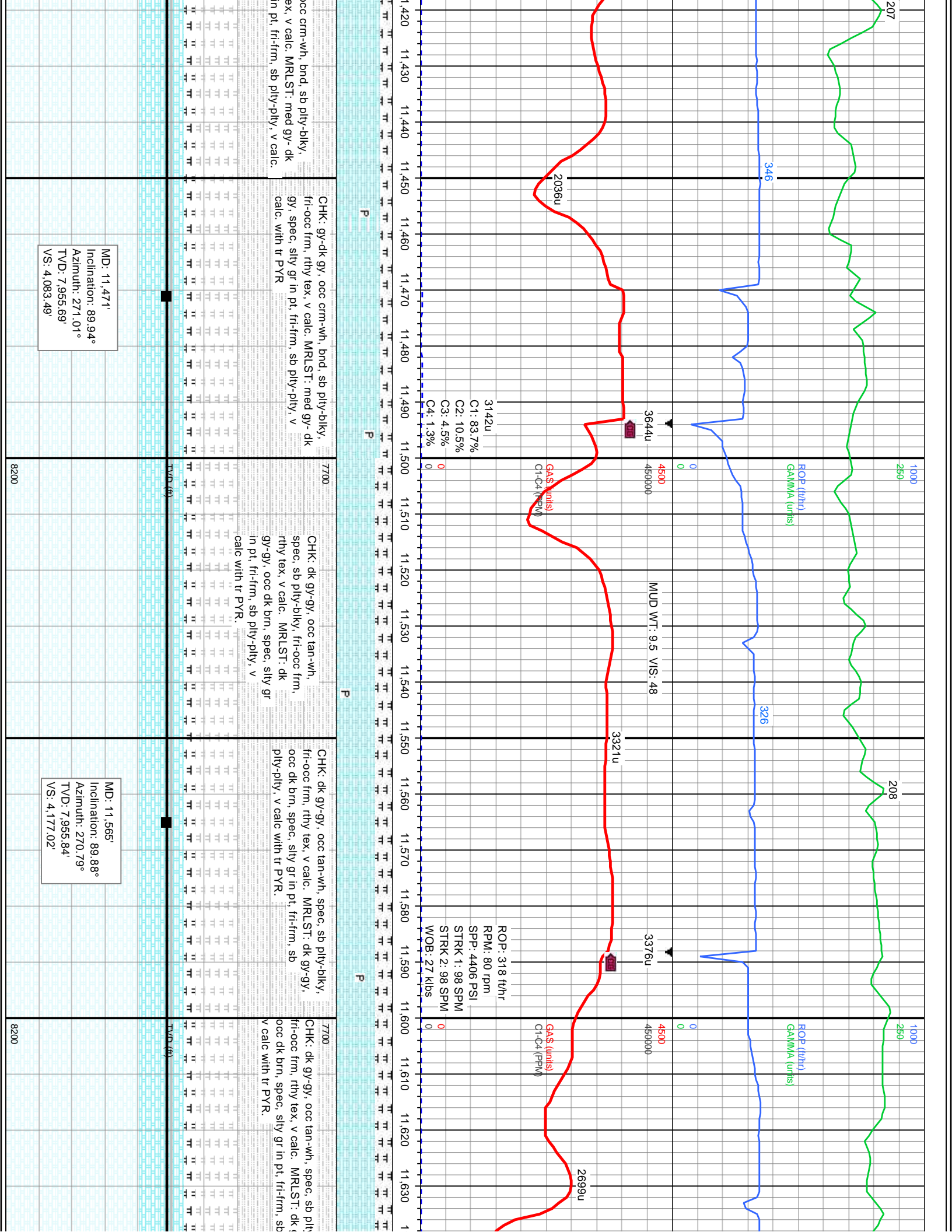


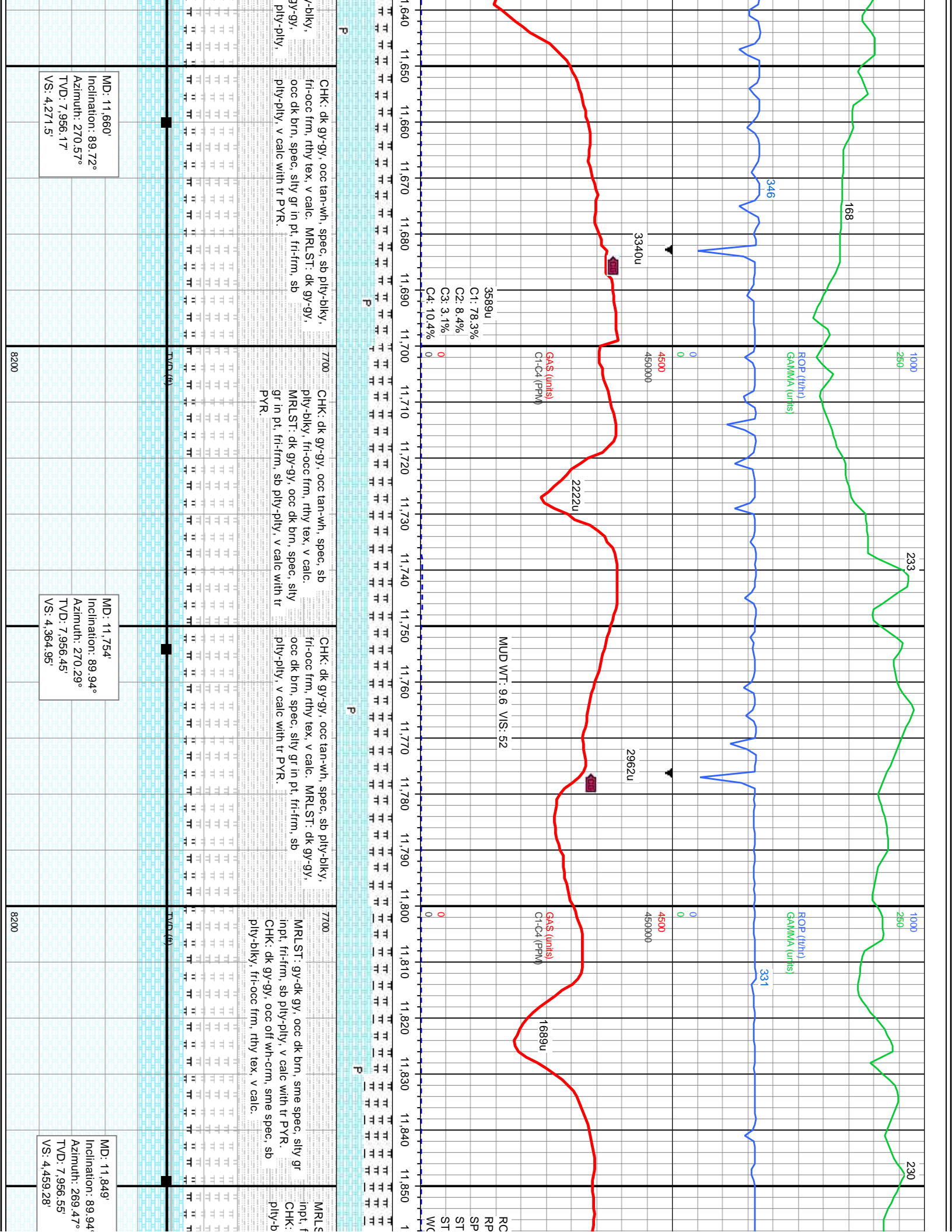


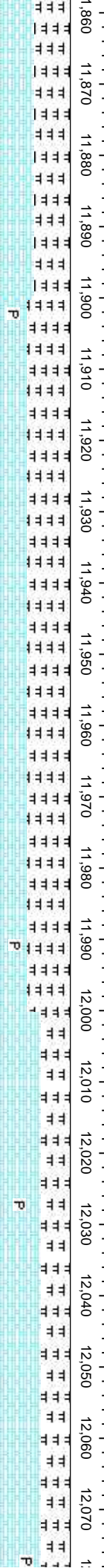
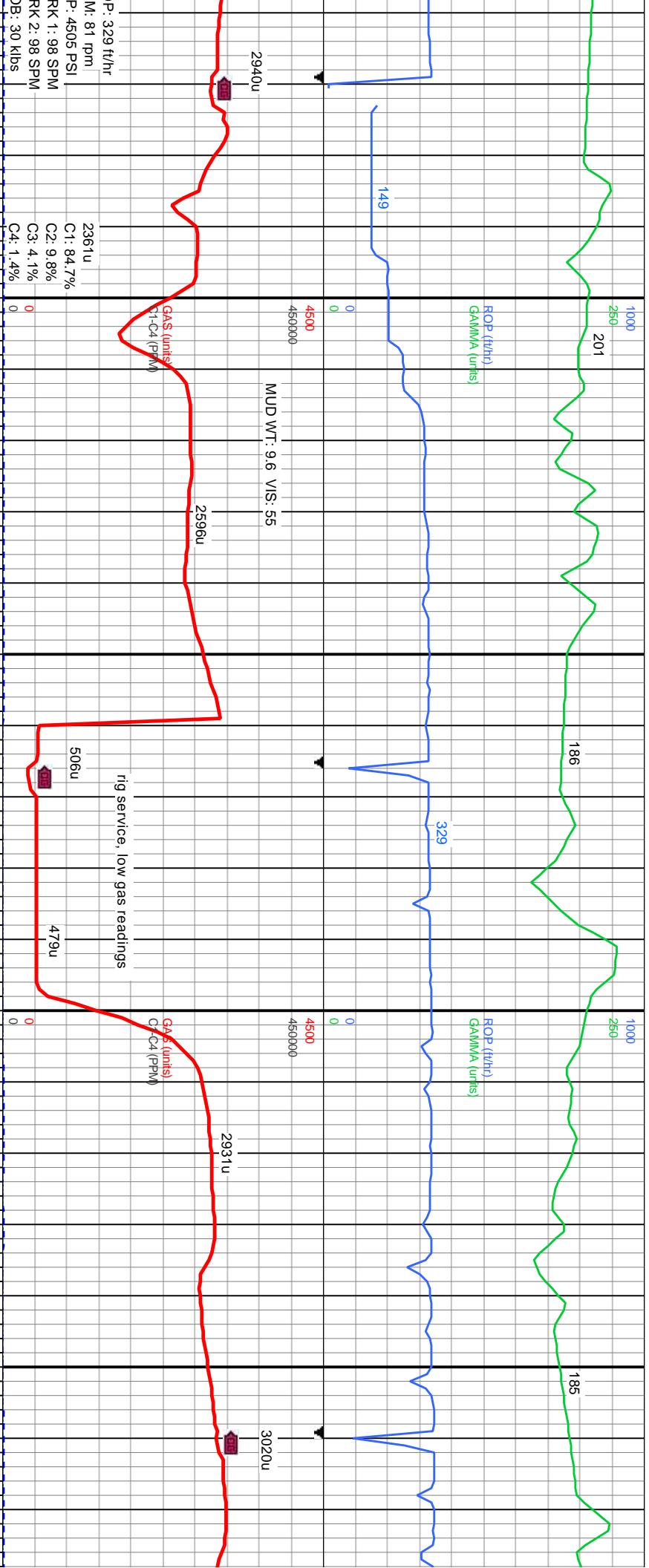


B										P										B										P										P									
7700 CHK: gy-dk gy, mot, occ crm-wh, bnd, sb ply-biky, fri-occ frm, rthy tex, v calc. MRLST: med gy- dk gy, spec, silty gr in pt, fri-frm, sb ply-pty, v calc. with tr PYR and tr BENT: lt gy, sft.										7700 CHK: gy-dk gy, mot, occ crm-wh, bnd, sb ply-biky, fri-occ frm, rthy tex, v calc. MRLST: med gy- dk gy, spec, silty gr in pt, fri-frm, sb ply-pty, v calc. with tr PYR and tr BENT: lt gy, sft.										7700 CHK: gy-dk gy, occ crm-wh, bnd, sb ply-biky, fri-occ frm, rthy tex, v calc. MRLST: med gy- dk gy, spec, silty gr in pt, fri-frm, sb ply-pty, v calc. with tr PYR										7700 CHK: gy-dk gy, occ crm-wh, bnd, sb ply-biky, fri-occ frm, rthy tex, v calc. MRLST: med gy- dk gy, spec, silty gr in pt, fri-frm, sb ply-pty, v calc. with tr PYR										7700 CHK: gy-dk gy, c fri-occ frm, rthy t gy, spec, silty gr with tr PYR									
TVD: (ft)										TVD: (ft)										TVD: (ft)										TVD: (ft)										TVD: (ft)									









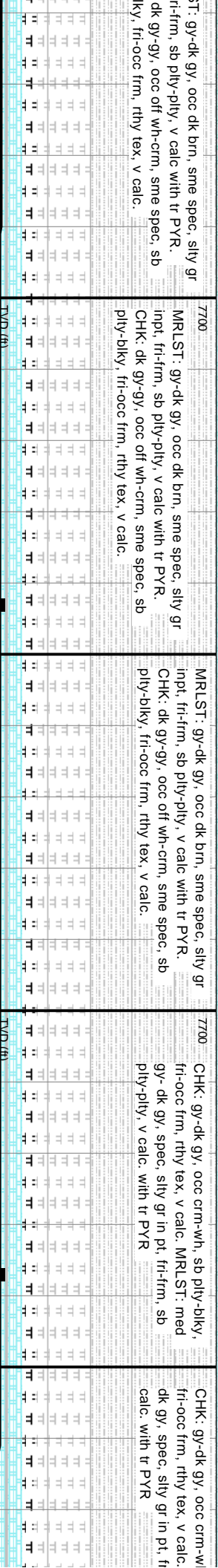
IT: gy-dk gy, occ dk brn, sme spec, silty gr  
fri-firm, sb ply-ply, v calc with tr PYR.  
dk gy-gy, occ off wh-crm, sme spec, sb  
biky, fri-occ frm, rthy tex, v calc.

7700 MRLST: gy-dk gy, occ dk brn, sme spec, silty gr  
inpt, fri-firm, sb ply-ply, v calc with tr PYR.  
CHK: dk gy-gy, occ off wh-crm, sme spec, sb  
ply-biky, fri-occ frm, rthy tex, v calc.

7700 MRLST: gy-dk gy, occ dk brn, sme spec, silty gr  
inpt, fri-firm, sb ply-ply, v calc with tr PYR.  
CHK: dk gy-gy, occ off wh-crm, sme spec, sb  
ply-biky, fri-occ frm, rthy tex, v calc.

7700 CHK: gy-dk gy, occ crm-wh, sb ply-biky,  
fri-occ frm, rthy tex, v calc. MRLST: med  
gy-dk gy, spec, silty gr in pt, fri-firm, sb  
ply-ply, v calc. with tr PYR

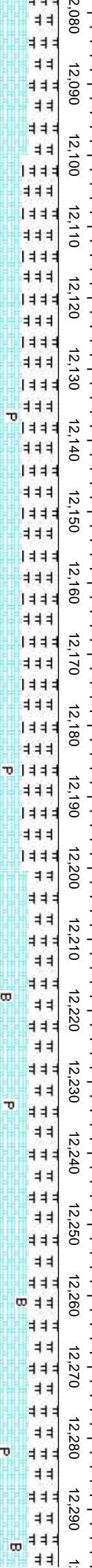
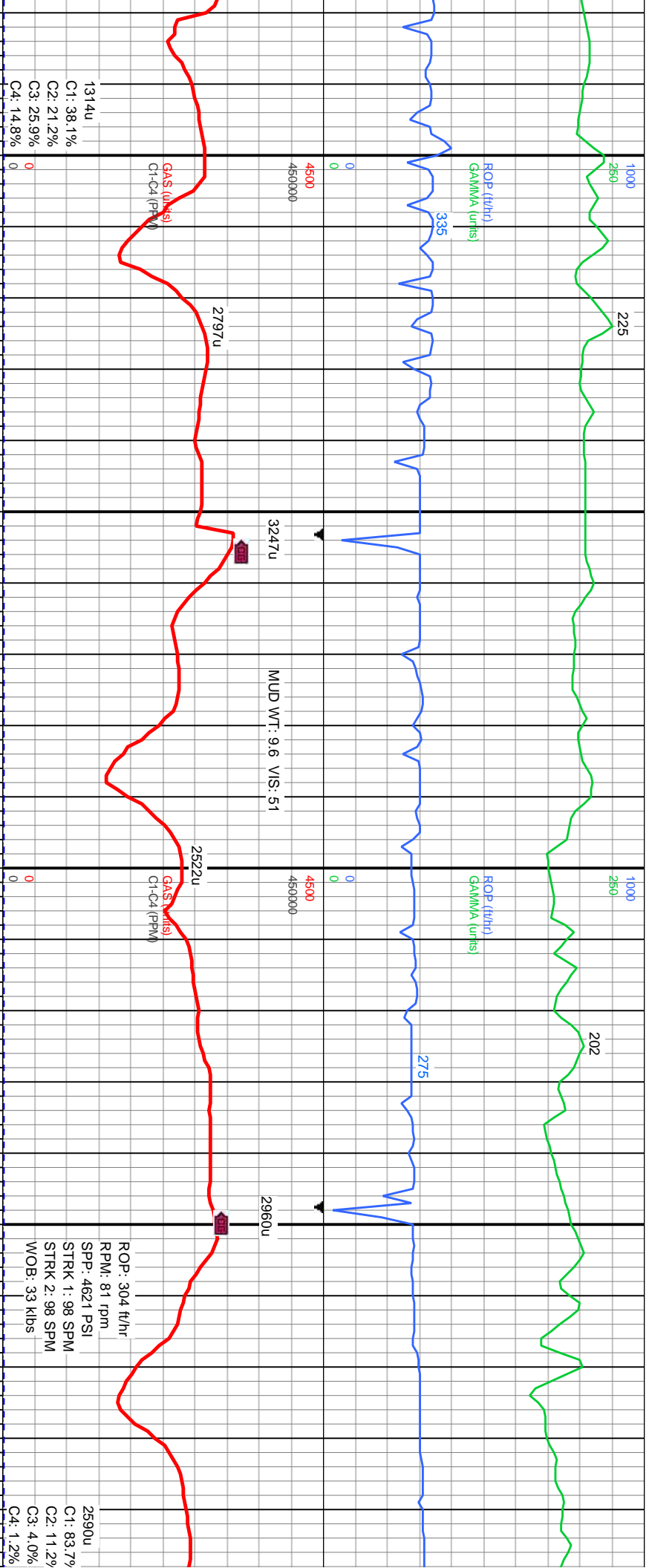
7700 CHK: gy-dk gy, occ crm-wh,  
fri-occ frm, rthy tex, v calc.  
dk gy, spec, silty gr in pt, fri  
calc. with tr PYR



MD: 11.943'  
Inclination: 89.42°  
Azimuth: 269.55°  
TVD: 7.957.07'  
VS: 4.552.55'

MD: 12.037'  
Inclination: 89.26°  
Azimuth: 269.77°  
TVD: 7.958.16'  
VS: 4.645.67'





1, sb pily-biky,  
MRLST: med gy-  
l-frm, sb pily-pily, v

7700

MRLST: gy-dk gy, occ dk brn, sme spec, silty gr  
inpt, fri-frm, sb pily-pily, v calc with tr PYR.  
CHK: dk gy-gy, occ off wh-frm, sme spec, sb  
pily-biky, fri-occ frm, rthy tex, v calc.

7700

CHK: dk gy-gy, occ dk brn, sme spec, silty  
gr inpt, fri-frm, sb pily-pily, v calc with tr PYR.  
CHK: dk gy-gy, occ off wh-frm, sme spec, sb  
pily-biky, fri-occ frm, rthy tex, v calc.

7700

CHK: dk gy-gy, occ tan-wh, spec, sb pily-biky,  
fri-occ frm, rthy tex, v calc. MRLST: dk gy-gy,  
occ dk brn, spec, silty gr in pt, fri-frm, sb  
pily-pily, v calc with tr PYR and BENT: lt-m gy,  
spec sft.

7700

CHK: dk gy-gy, occ tan-wh, spec, sb  
pily-biky, fri-occ frm, rthy tex, v calc.  
MRLST: dk gy-gy, occ dk brn, spec, silty gr in  
pt, fri-frm, sb pily-pily, v calc with tr PYR and  
BENT: lt-m gy, spec sft.

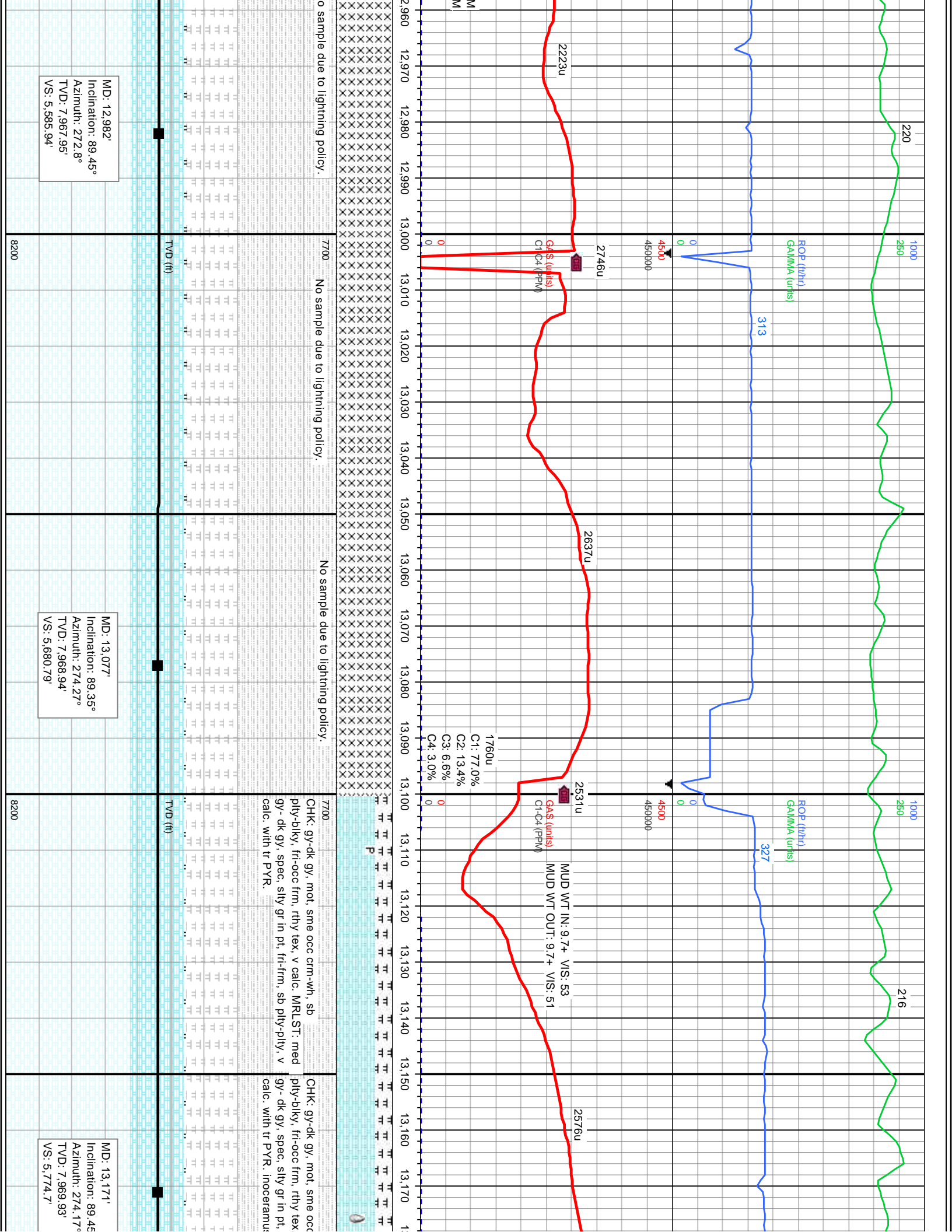




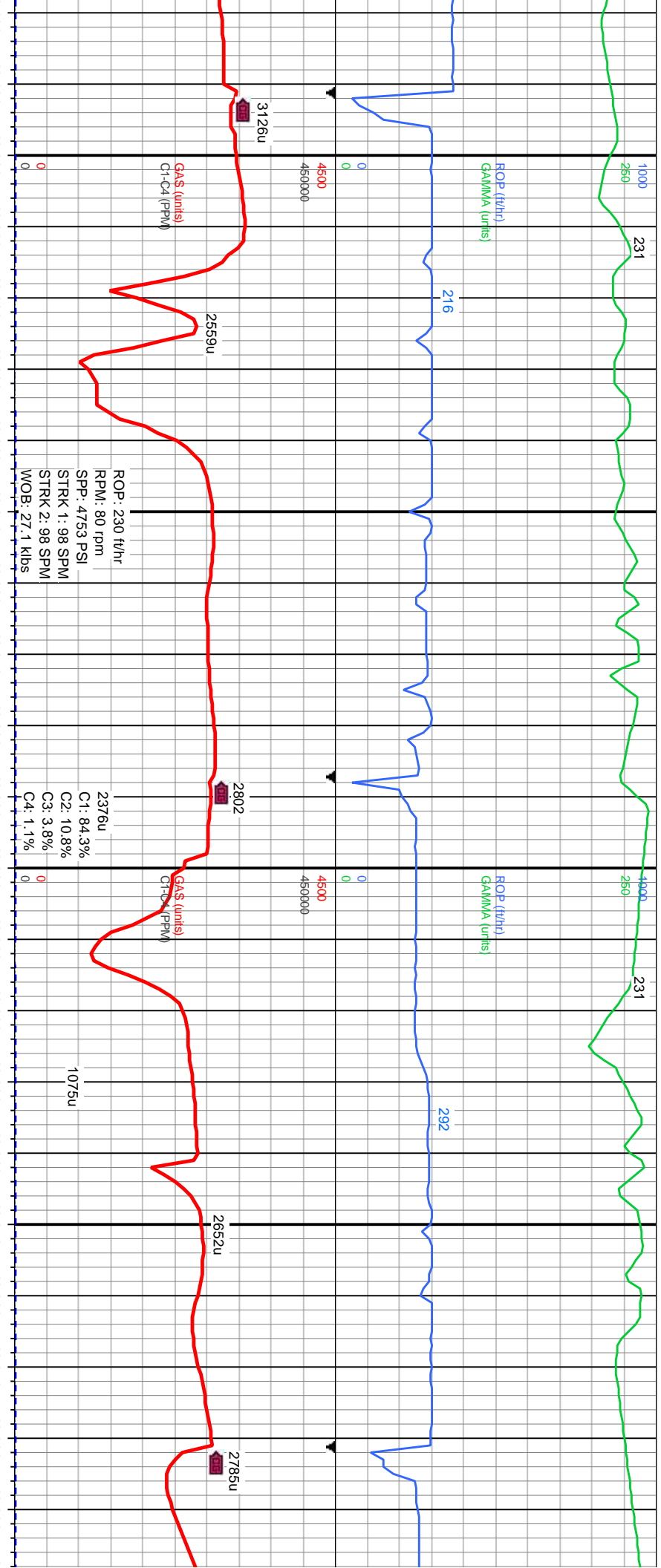








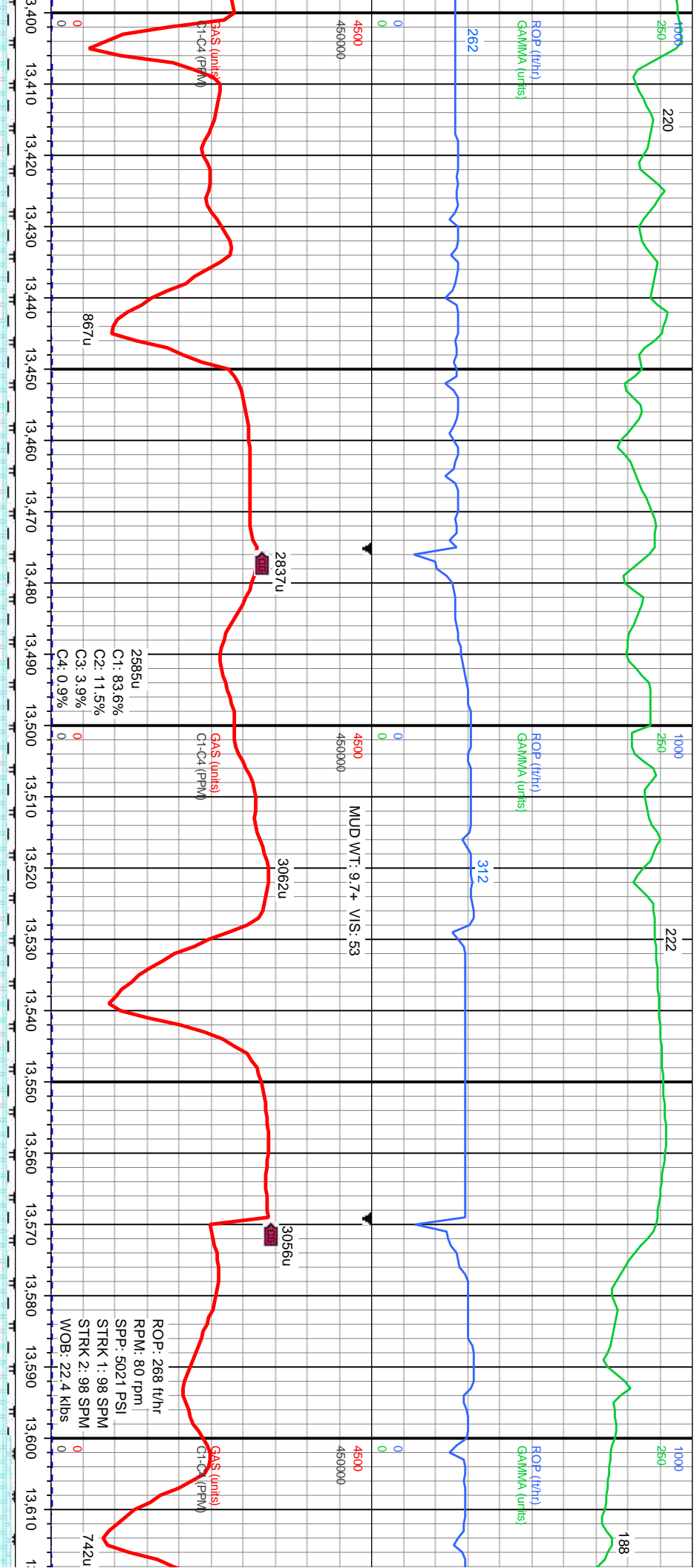




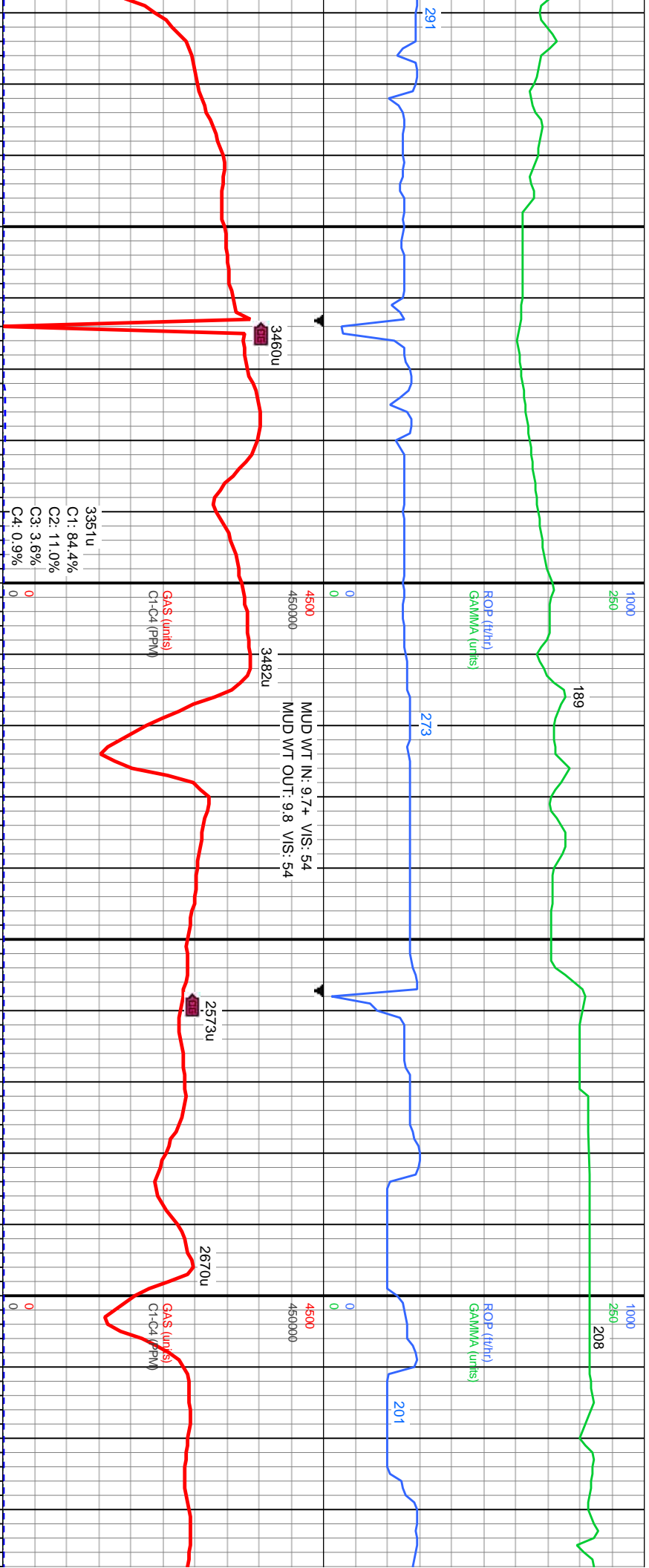
CRM-WH, SB		CRM-WH, SB		CRM-WH, SB	
FRI-OCFIRM, RTHY TEX, V CALC, MRLST: MED		FRI-OCFIRM, RTHY TEX, V CALC, MRLST: MED		FRI-OCFIRM, RTHY TEX, V CALC, MRLST: MED	
FRI-FIRM, SB PITY-PITY, V		FRI-FIRM, SB PITY-PITY, V		FRI-FIRM, SB PITY-PITY, V	
CALC. WITH TR PYR.		CALC. WITH TR PYR.		CALC. WITH TR PYR.	
CHK: GY-DK GY, MOT, SMC CRM-WH, SB PITY-BIKY, FRI-OCFIRM, RTHY TEX, V CALC, MRLST: MED		CHK: GY-DK GY, MOT, SMC CRM-WH, SB PITY-BIKY, FRI-OCFIRM, RTHY TEX, V CALC, MRLST: MED		CHK: GY-DK GY, MOT, OCC CRM-WH, OCC BND, SB PITY-BIKY, FRI-OCFIRM, RTHY TEX, V CALC, MRLST: MED	
GY, SPEC, SILTY GR IN PL, FRI-FIRM, SB PITY-PITY, V		GY, SPEC, SILTY GR IN PL, FRI-FIRM, SB PITY-PITY, V		DK GY- GY, OCC SPEC, SILTY GR IN PL, FRI-FIRM, SB PITY-PITY, V CALC. WITH TR PYR.	
TVD (ft)		TVD (ft)		TVD (ft)	
8200		8200		8200	

MD: 13.265°  
Inclination: 89.6°  
Azimuth: 274.44°  
TVD: 7.970.71'  
VS: 5.868.61'

MD: 13.359°  
Inclination: 89.26°  
Azimuth: 275.32°  
TVD: 7.971.64'  
VS: 5.962.56'



7700			7700			7700		
CHK: gy-dk gy, mot, occ crm-wh, occ bnd, sb			CHK: gy-dk gy, mot, occ crm-wh, occ bnd, sb			CHK: gy-dk gy, mot, occ crm-wh, occ bnd, sb		
ply-biky, fri-occ frm, rthy tex, v calc. MRLST:			ply-biky, fri-occ frm, rthy tex, v calc. MRLST:			ply-biky, fri-occ frm, rthy tex, v calc. MRLST:		
dk gy- gy, occ spec, slty gr ip, fri-frm, sb			dk gy- gy, occ spec, slty gr ip, fri-frm, sb			dk gy- gy, occ spec, slty gr ip, fri-frm, sb		
ply-pty, v calc.			ply-pty, v calc.			ply-pty, v calc. tr pyr.		
TVD (ft)			TVD (ft)			TVD (ft)		
MD: 13.453° Inclination: 89.23° Azimuth: 273.75° TVD: 7.972.88' VS: 6.056.49'			MD: 13.548° Inclination: 89.23° Azimuth: 271.75° TVD: 7.974.16' VS: 6.151.25'			MD: 13.548° Inclination: 89.23° Azimuth: 271.75° TVD: 7.974.16' VS: 6.151.25'		
8200			8200			8200		



P

P

m-wh, bnd, sb pty-biky, fri-frm,  
RSLT: med-dk gy, spec, silty gr  
y-pty, v calc

CHK: lt gy-m gy, crm-wh, bnd, sb pty-biky, fri-frm,  
rthy tex, v calc. MRLST: med-dk gy, spec, silty gr  
in pt, fri-frm, sb pty-pty, v calc

7700  
CHK: gy-dk gy, mot, sme occ crm-wh, sb  
pty-biky, fri-occ frm, rthy tex, v calc. MRLST: med  
gy -dk gy, spec, silty gr in pt, fri-frm, sb pty-pty, v  
calc. with tr PYR, inoceramus fos.

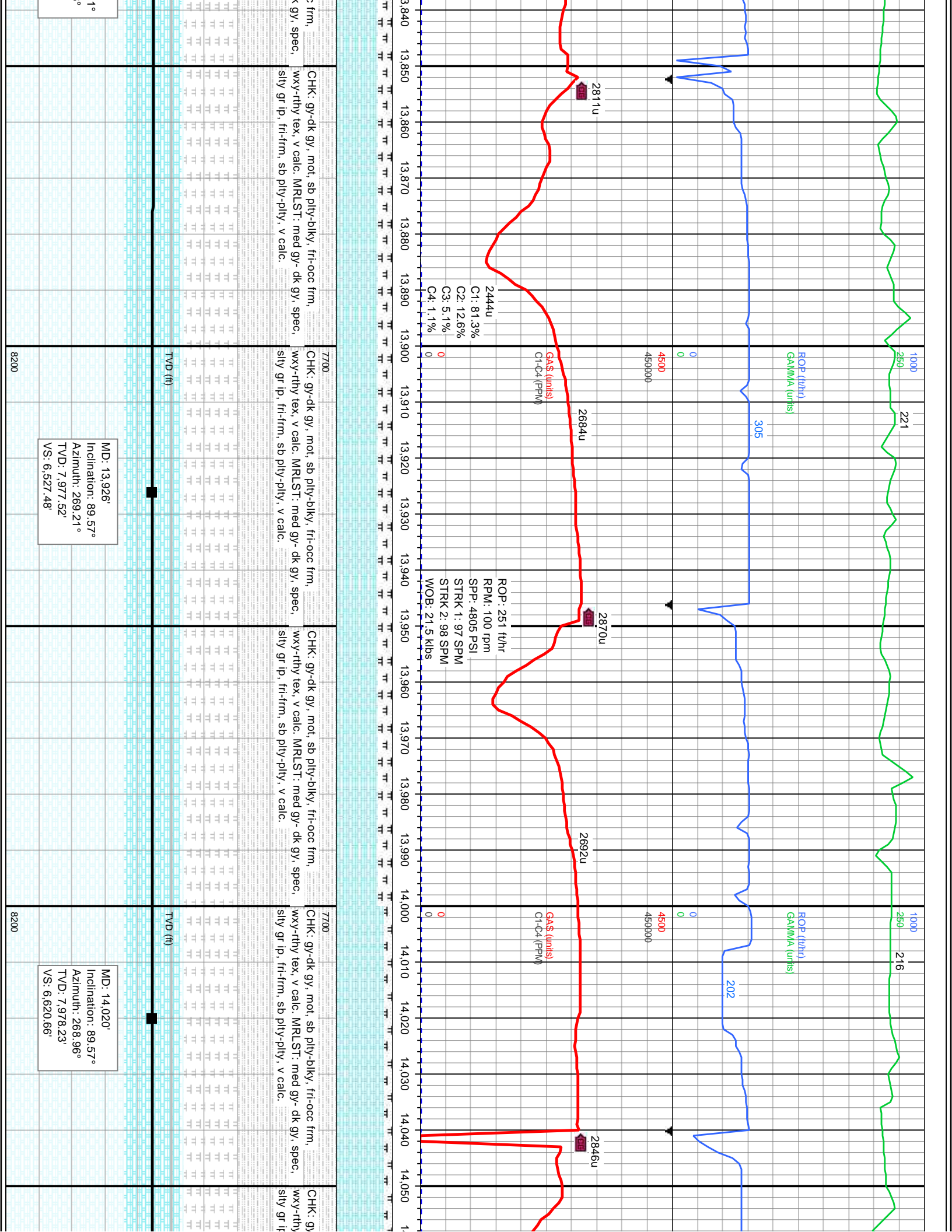
7700  
CHK: gy-dk gy, mot, sme occ crm-wh, sb  
pty-biky, fri-occ frm, rthy tex, v calc. MRLST: med  
gy -dk gy, spec, silty gr in pt, fri-frm, sb pty-pty, v  
calc. with tr PYR, inoceramus fos.

7700  
CHK: gy-dk gy, mot, sb pty-biky, fri-occ  
wxy-rthy tex, v calc. MRLST: med gy- di  
silty gr ip, fri-frm, sb pty-pty, v calc.

MD: 13.642'  
Inclination: 89.54°  
Azimuth: 272.62°  
TVD: 7.975.17'  
VS: 6.244.96'

MD: 13.736'  
Inclination: 89.51°  
Azimuth: 271.35°  
TVD: 7.975.95'  
VS: 6.338.64'

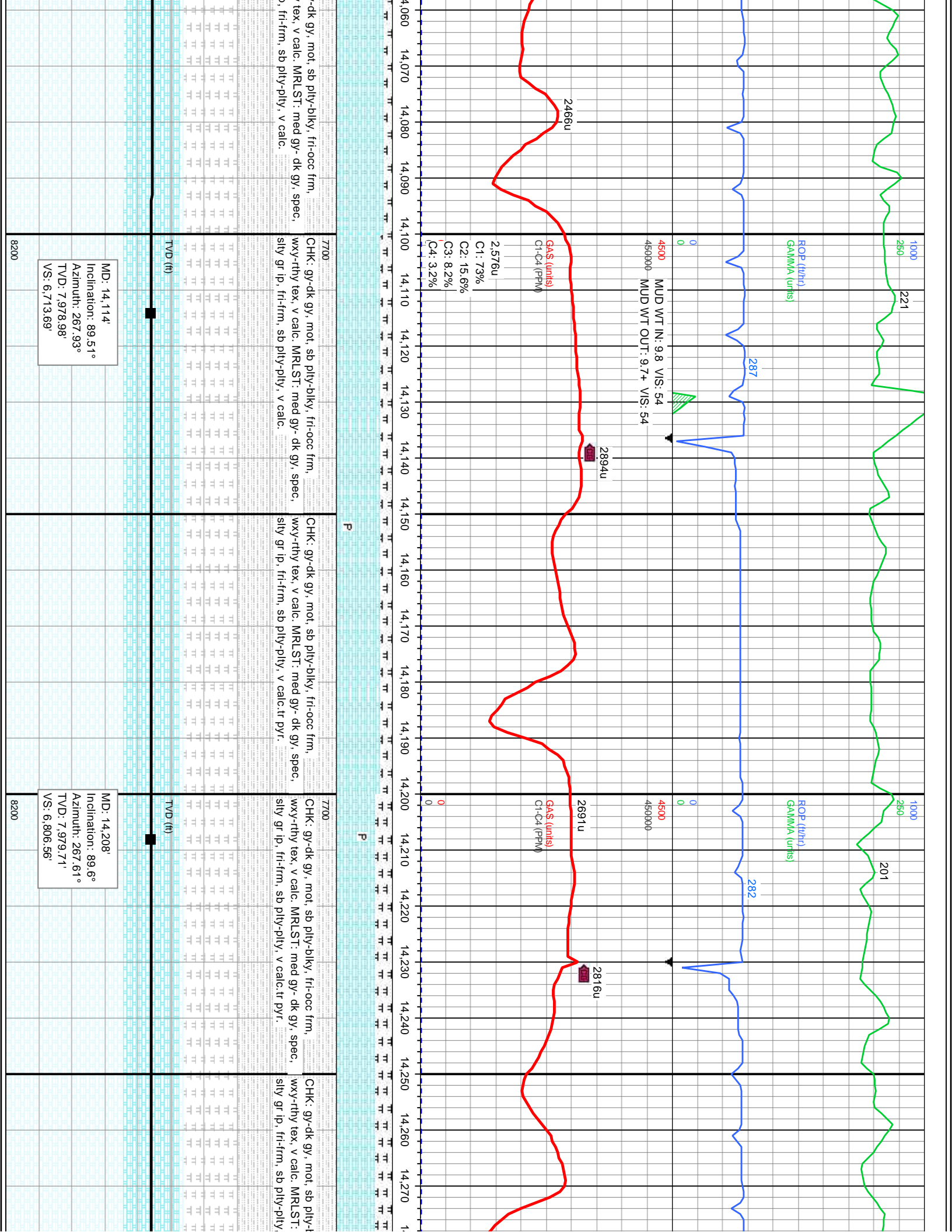
MD: 13.831'  
Inclination: 89.5°  
Azimuth: 270.48°  
TVD: 7.976.76'  
VS: 6.433.16'



MD: 13,926'  
Inclination: 89.57°  
Azimuth: 269.21°  
TVD: 7,977.52'  
VS: 6,527.48'

MD: 14,020'  
Inclination: 89.57°  
Azimuth: 268.96°  
TVD: 7,978.23'  
VS: 6,620.66'





7/21/2017

MINDEPTH



ROP (ft/hr)  
GAMMA (units)

267  
256

4500  
4500000

MUD WT IN: 9.7+ VIS: 53  
MUD WT OUT: 9.8 VIS: 53

2615u  
2775u

2615u  
2905u

2.652u  
C1: 84.6%  
C2: 10.4%  
C3: 3.8%  
C4: 1.3%

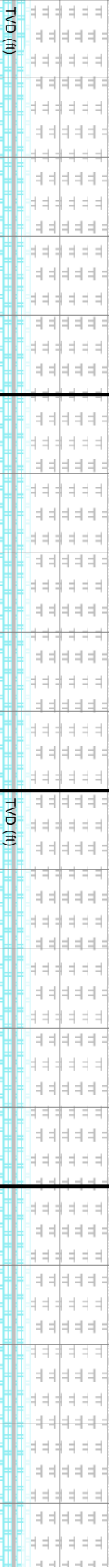
2.876u  
C1: 86.7%  
C2: 9.8%  
C3: 3.6%  
C4: 0.9%

ROP: 286 ft/hr  
RPM: 100 rpm  
SPP: 5055 PSI  
STRK 1: 97 SPM  
STRK 2: 97 SPM  
WOB: 34.5 klbs

CHK: gy-dk gy, mot, sb pily-biky, fri-occ frm, wxy-rthy tex, v calc. MRLST: med gy-dk gy, spec. silty gr ip, fri-frm, sb pily-pily, v calc. tr pyr

CHK: gy-dk gy, mot, sb pily-biky, fri-occ frm, wxy-rthy tex, v calc. MRLST: med gy-dk gy, spec. silty gr ip, fri-frm, occ hrd, sb pily-pily, v calc.

CHK: gy-dk gy, mot, sb pily-biky, fri-occ frm, occ hrd, wxy-rthy tex, v calc. MRLST: med gy-dk gy, spec. silty gr ip, fri-frm, sb pily-pily, v calc.



TVD (ft)

TVD (ft)

TVD (ft)

MD: 14,303'  
Inclination: 89.48°  
Azimuth: 266.91°  
TVD: 7,980.48'  
VS: 6,900.28'

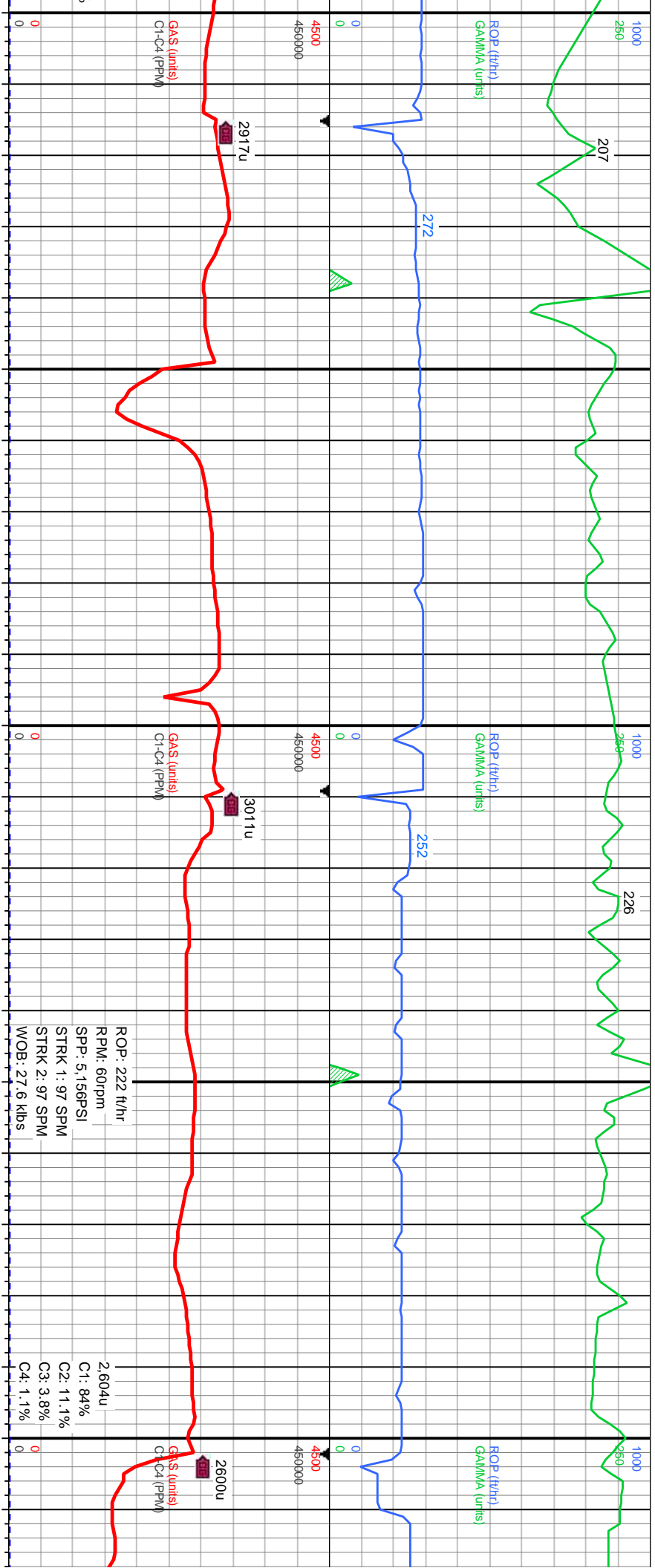
MD: 14,398'  
Inclination: 89.48°  
Azimuth: 266.63°  
TVD: 7,981.34'  
VS: 6,993.87'

MD: 14,492'  
Inclination: 89.4°  
Azimuth: 266.98°  
TVD: 7,982.19'  
VS: 7,086.47'

8200

8200

8200



7700  
CHK: gy-dk gy, mot, sb ply-biky, fri-occ frm, occ hrd, wxy-rthy tex, v calc. MRLST: med gy- dk gy, spec, silty gr ip, fri-frm, sb ply-pity, v calc.

7700  
CHK: gy-dk gy, mot, sb ply-biky, fri-occ frm, occ hrd, wxy-rthy tex, v calc. MRLST: med gy- dk gy, spec, silty gr in pt, fri-frm, sb ply-pity, v calc. with tr PYR. inoceramus fos.

7700  
CHK: gy-dk gy, mot, sme occ crm-wh, sb ply-biky, fri-occ frm, rthy tex, v calc. MRLST: med gy- dk gy, spec, silty gr in pt, fri-frm, sb ply-pity, v calc. with tr PYR. inoceramus fos.

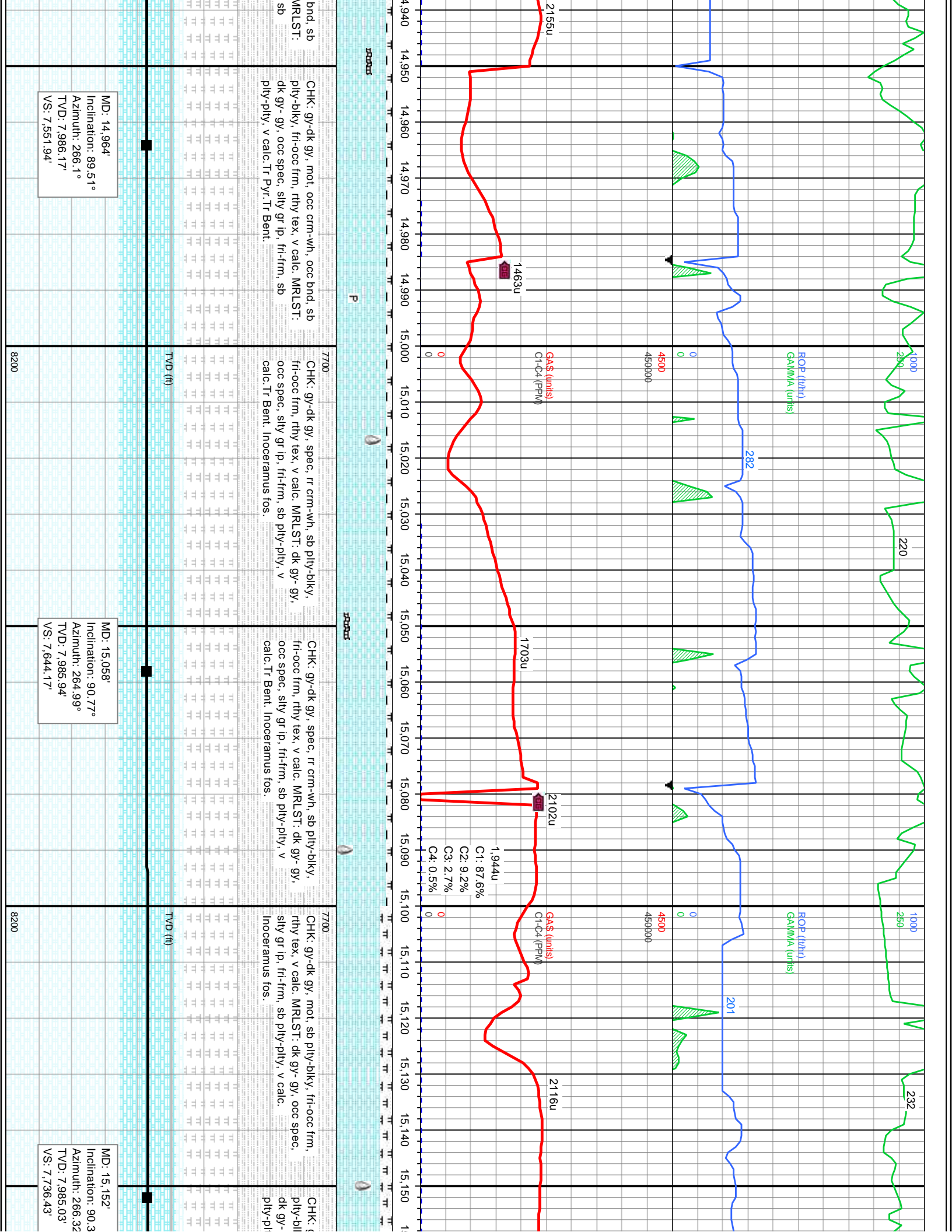
7700  
CHK: gy-dk gy, m ply-biky, fri-occ fr med gy- dk gy, sp ply-pity, v calc.

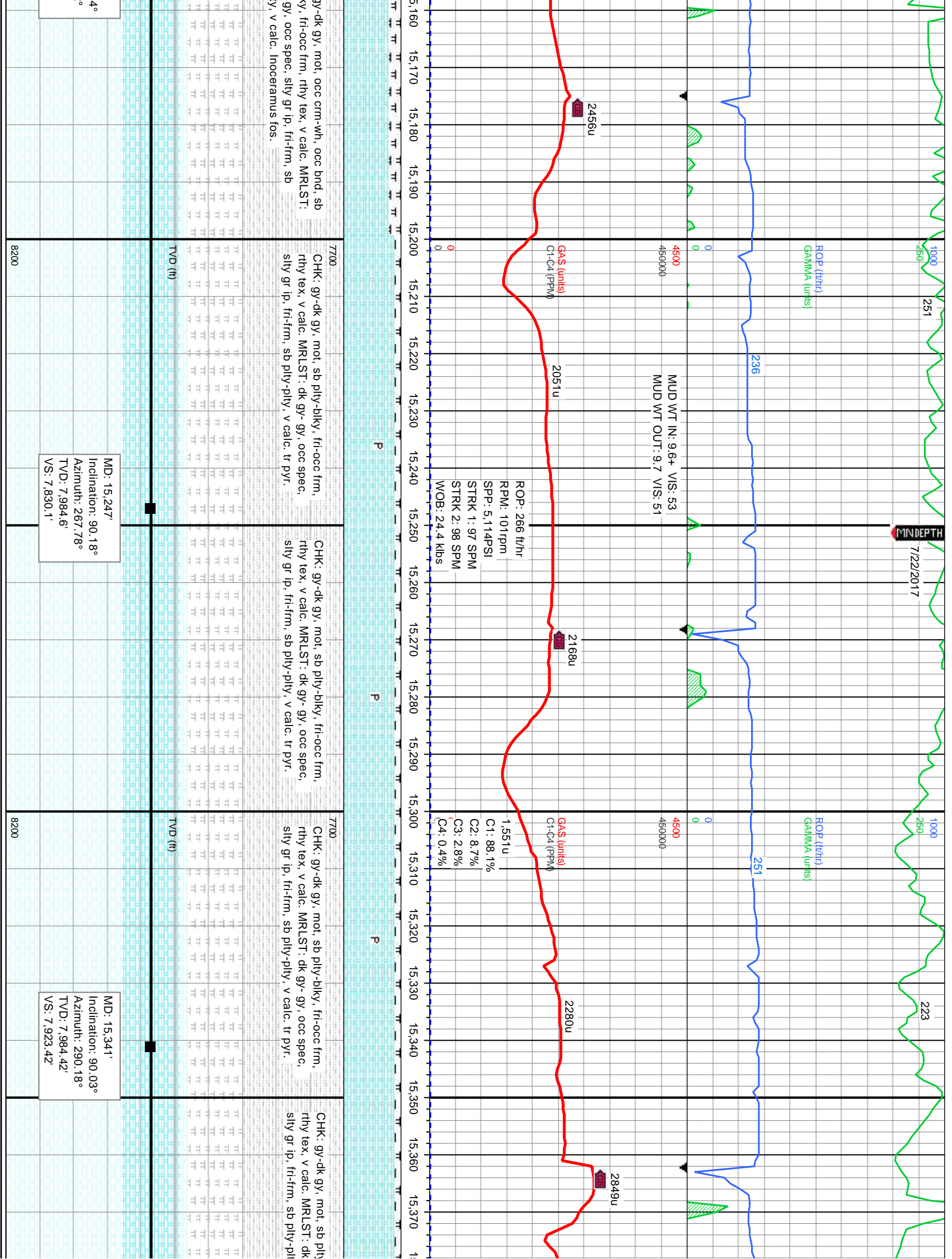
TVD (ft)	TVD (ft)	TVD (ft)	TVD (ft)
8200	8200	8200	8200
8°	MD: 14,586' Inclination: 89.54° Azimuth: 267.68° TVD: 7,982.99' VS: 7,179.23'	MD: 14,681' Inclination: 89.38° Azimuth: 267.75° TVD: 7,983.89' VS: 7,273.07'	

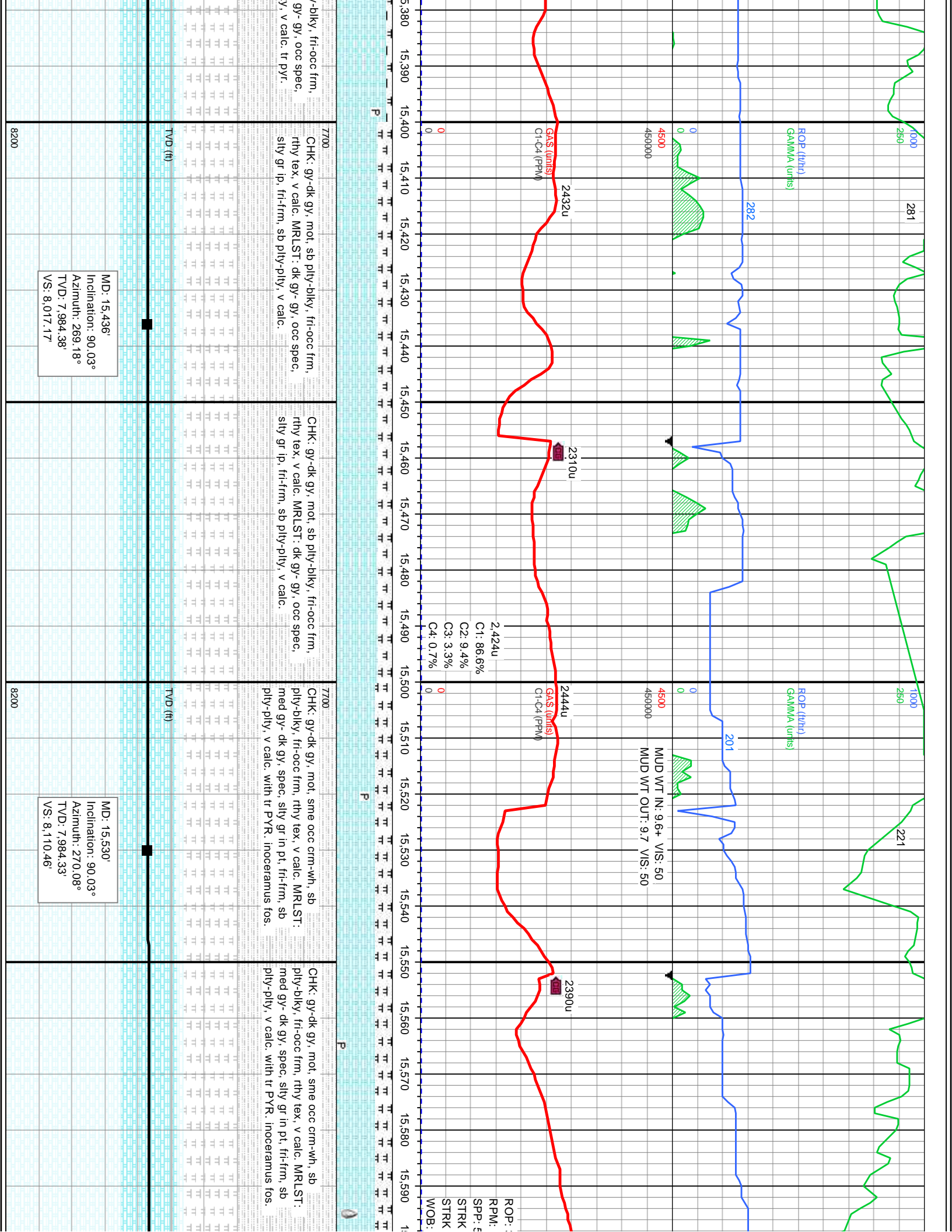












1000

250

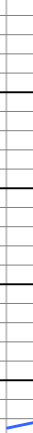
Reached TD of 15,645' MD @  
02:22 MDT on 07/22/2017

End MWD Gamma

ROP (ft/h)  
GAMMA (units)

133

333



0

4500

4500000

3140u

GA\$ (units)  
C1-C4 (PPM)

3303 ft/hr

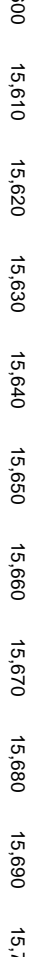
1000rpm

.121PSI

1: 97 SPM

2: 98 SPM

26.2 klbs



P

7700

CHK: gy-dk gy, mot, sme occ crm-wh, sb  
ply-blky, fri-occ frm, rthy tex, v calc, MRLST:  
med gy-dk gy, spec, silty gr in pt, fri-frm, sb  
ply-pty, v calc, with tr PYR. Inoceranus fos.

TVD (ft)



MD: 15,621'  
Inclination: 92.92°  
Azimuth: 270.95°  
TVD: 7,981.98'  
VS: 8,200.9'

MD: 15,646'  
Inclination: 92.92°  
Azimuth: 270.95°  
TVD: 7,980.81'  
VS: 8,225.74'

Projection to bit survey