



Scale: 5" / 100'
Measured Depth Log

Well Name Wells Ranch BB11-650

Location N 40.410268 W 104.41263

State Colorado County Weld

Country USA Rig Number H&P 517

API Number 05-123-44961 Field Wattenberg

Geographic Region DJ Basin Drilling Completed 8/26/2017

Spud Date 8/24/2017

Surface Coordinates NWSW 2207 FSL & 235' FWL, SEC 11-5N-63W

Bottom Hole Coordinates NESW 2632 FSL & 2100 FWL, SEC 12-5N-63W

Ground Elevation 4668' K.B. Elevation 4698'

Logged Interval 5,900 To 14,088 Total Depth 14,088

Formation Codel

Type of Drilling Fluid OBM

Operator

Company Noble Energy, Inc.

Address 1625 Broadway Suite 2200
Denver, CO 80202



Geologist

Name Bryan Kaproth-Gerecht

Company Noble Energy Inc

Address 1625 Broadway Suite 2200
Denver, CO 80202

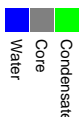
Other

Well Site Logging Company Columbine Logging



































Wellsite Geologist (Days) Zak Lewis (6am-6pm)

Wellsite Geologist (Nights) James Averill (6pm-6am)

























































Color Coding



Rock Types

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

Accessories

Fossils		Stringer	
 GASTROPOD	 ARGILLITE GRAIN	 HEAVY MINERAL	
 INOCERAMUS	 B BENTONITE	 K KAOLIN	
 ALGAE	 O OOLITE	 BITUMINOUS SUBSTANCE	 ANHYDRITE STRINGER
 AMPHIPORA	 O OSTRACOD	 BRECCIA FRAGMENTS	 BENTONITE STRINGER
 BELEMNITE	 P PELECYPOD	 C CALCAREOUS	 COAL STRINGER
 BIOCLASTIC	 P PELLET	 C CARBONACEOUS FLAKES	 DOLOMITE STRINGER
 BRACHIOPOD	 P PISULITE	 C CHTDK	 GYPSUM STRINGER
 BRYOZOA	 P PLANT REMAINS	 C CHLILT	 LIMESTONE STRINGER
 CEPHALOPOD	 S PLANT SPORES	 C COAL - THIN BEDS	 MARLSTONE (CALC) STRG
 CORAL	 S SCAPHOPOD	 D DOLOMITIC	 MARLSTONE (DOL) STRG
 CRINOID	 S STROMATOPOROID	 F FELDSPAR	 SANDSTONE STRINGER
 ECHINOID	 F FERRUGINOUS PELLET	 S SIDERITE	 SHALE STRINGER
 FISH		 F FERRUGINOUS	
 FORAMINIFERA	 A ANHYDRITIC	 G GLAUCONITE	 S SILTY
 F FOSSIL	 A ARGILLACEOUS	 G GYPSIFEROUS	 T TUFFACEOUS

Oil Show

P PINPOINT

Engineering

● EVEN
○ QUESTIONABLE
▲ BIT






































SPOTTED STAINING CONNECTION (UP)

Porosity

Porosity

▼ CONNECTION (DOWN)	
CONNECTION GAS	
CONNECTION G	
TRIP GAS	
FENESTRAL	
FRACTURE	
INTERCRYSTALLINE	
DOWNTIME GAS	
INTEROOLITIC	
MOLDIC	
CORE - LOST	
CORE - RECOVERED	
ORGANIC	

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
	MNDEPTH MN DEPTH UP	Rounding			
					MS MUDSTONE
	MNDEPTH MN DEPTH (DOWN)		ANGULAR		PS PACKSTONE
	NORMAL FAULT		ROUNDED		WS WACKESTONE
	OVERTURNED STRATA		SUBANG		
	REVERSE FAULT		SUBRND		
		Sorting			
	CASING				M MODERATE
Textures					
	SIDEWALL CORE (LEFT)				P POOR
	SIDEWALL CORE (RIGHT)		BOUNDSTONE		W WELL
	SLIDE		CHALKY		
	SURVEY		CRYPTOXLN		

ROP
ROP (ft/hr)
GAMMA (api)

Columbine Logging Inc. Rigged up 2 man logging 08/24/2017. Began Logging at 5900MD @ 21:00 MDT on 08/24/2017

Total Gas & Chromatograph

GAS
C1
C2
C3
C4

Depth Labels

% Lith

Well Bore
TVD

Images

700
250

115

55.4

Kick off point @ 5.972'

MINDEPTH
08/25/2017

114

ROP, WOB and RPM Imported from Pason EDR

GAS (units)
Gas Data From Pason EDR

MW 9.0/45

TG: 284u
C1: 69.7%
C2: 15.7%
C3: 9%
C4: 6%

GAS (units)
C1-C4 (PPT)

596u

293u

382u

59

Gamma & Survey Data
Provided by Baker Hughes Directional

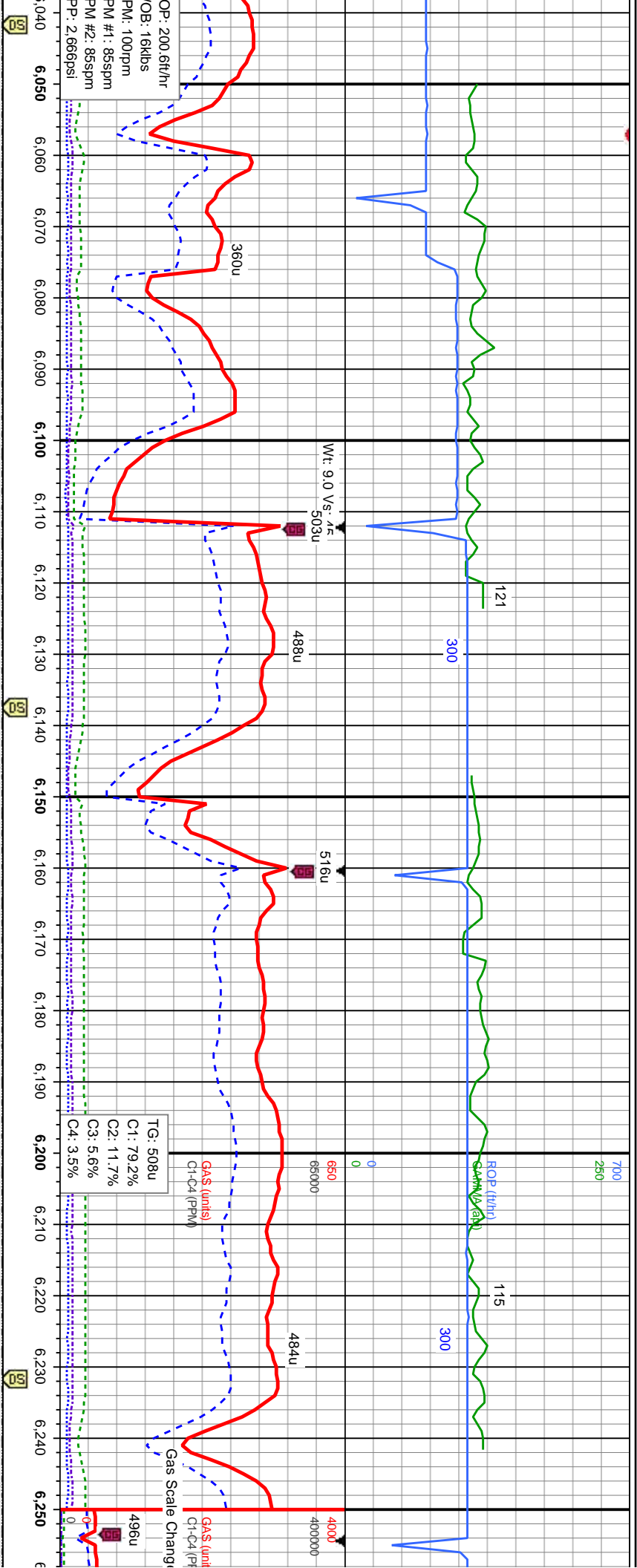
SLTY SH: gy-dk gy, occ dk brn, sft - med frm, sb ply-ply, stly to rthy tex, grgd to silst in pt, non calc with some tr SLTST: med gy- gy, sl frm, sb blk- occ sb ply, rthy-stly tex, non calc, tr pyr.

5000
SLTY SH: gy-dk gy, occ dk brn, v s calc with some tr SLTST: med gy- gy

MD: 5.948'
Inclination: 9.55°
Azimuth: 295°
TVD: 5.898'
VS: .491'

MD: 6.6
Inclination:
Azimuth
TVD: 5
VS: .49





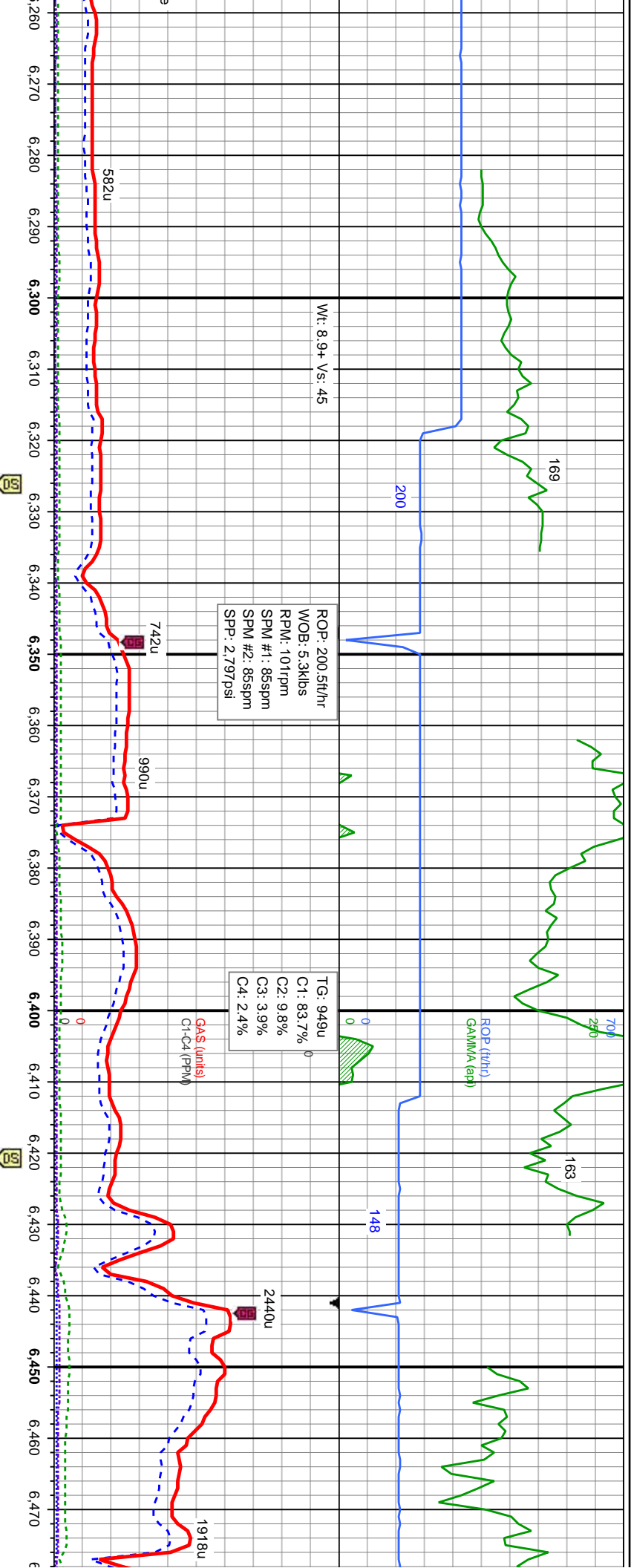
ft - sft, sb pily-pily, silty to rthy tex, grdg to slst in pt, non
gy, sl frm, sb blkly- ooc sb pily, rthy-silty tex, non calc.

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

SLTY SH: gy-dk gy, ooc dk brn, v sft - sft, sb pily-pily, silty to rthy
calc with some tr SLTST: med gy- gy, sl frm, sb blkly- ooc sb pily

42'	ion: 7.35°	MD: 6.137'	Inclination: 10.46°	MD: 6.232'	Inclination: 16.09°
h: 357°		Azimuth: 53°		Azimuth: 74°	
.991'		TVD: 6.086'		TVD: 6.178'	
7'		VS: -490'		VS: -470'	





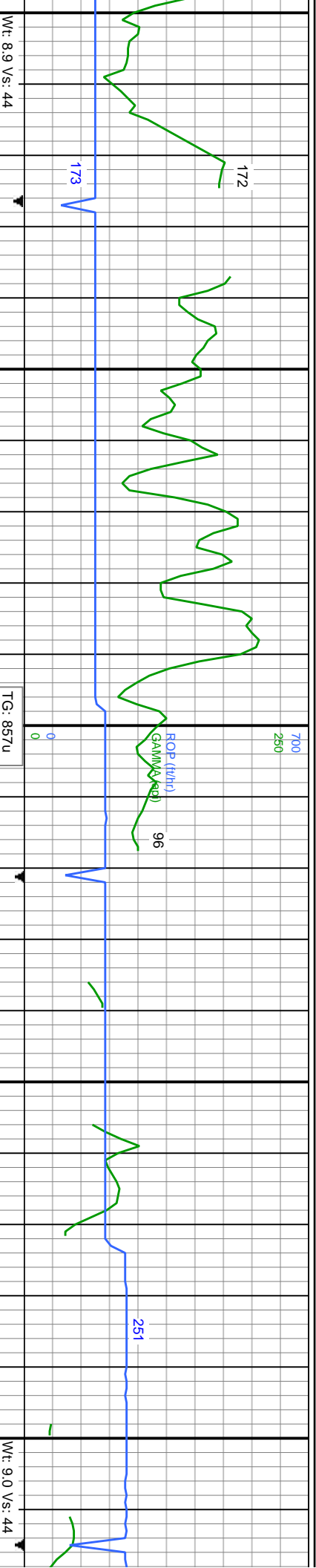
SLTY SH: gy-dk gy, v sft - sft, occ sl frm, sb ply-ply, silty to rthy tex, grdg to silst in pt, non calc BENT: wht-bf, v sft, sb blkly-blky, sb ply-ply, wxy-grsy tex, non calc SLTST: med gy- gy, sl frm, sb blkly- rr sb ply, cyxln, rthy-sily tex, grdg to mlst, non calc.

50SLTY SH: gy-dk gy, v sft - sft, occ sl frm, sb ply-ply, silty to rthy tex, grdg to silst in p calc BENT: wht-bf, v sft, sb blkly-blky, sb ply-ply, wxy-grsy tex, non calc SLTST: med frm, sb blkly- rr sb ply, cyxln, rthy-sily tex, grdg to mlst, non calc. tr pyr

MD: 6,326' Inclination: 22.46° Azimuth: 81° TVD: 6,266' VS: -439'

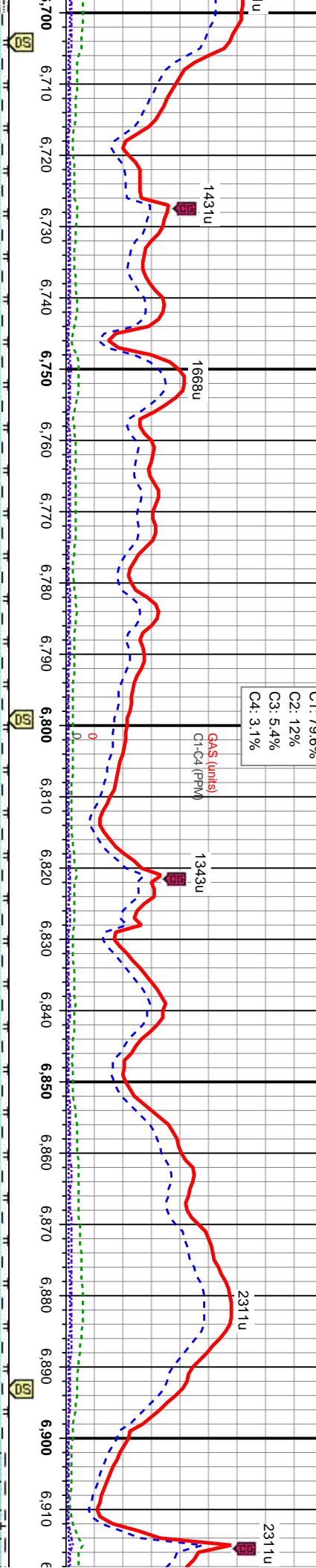
MD: 6,421' Inclination: 31.29° Azimuth: 78° TVD: 6,351' VS: -397'





TG: 857u
C1: 79.6%
C2: 12%
C3: 5.4%
C4: 3.1%

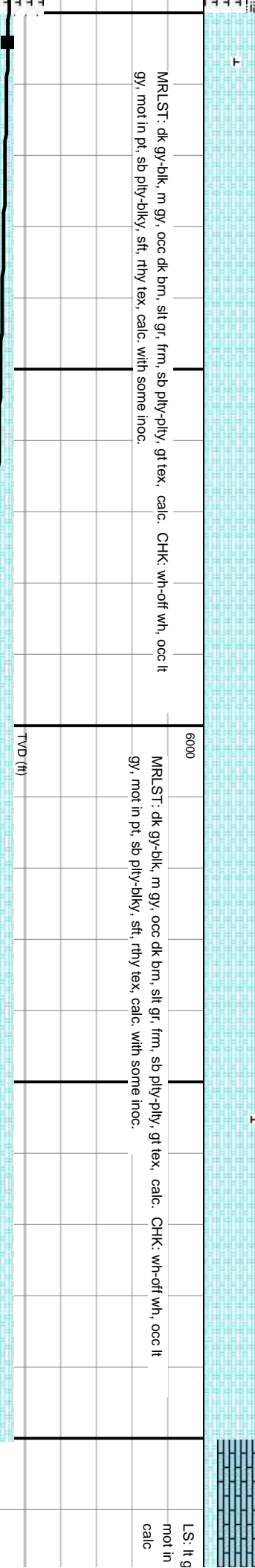
GAS (units)
C1-C4 (PPM)



MR.LST: dk gy-blk, m gy, occ dk brn, silt gr, frm, sb ply-ply, gt tex, calc. CHK: wh-off wh, occ lt gy, mot in pt, sb ply-blky, sft, rthy tex, calc. with some inoc.

MR.LST: dk gy-blk, m gy, occ dk brn, silt gr, frm, sb ply-ply, gt tex, calc. CHK: wh-off wh, occ lt gy, mot in pt, sb ply-blky, sft, rthy tex, calc. with some inoc.

LS: lt g
mot in
calc

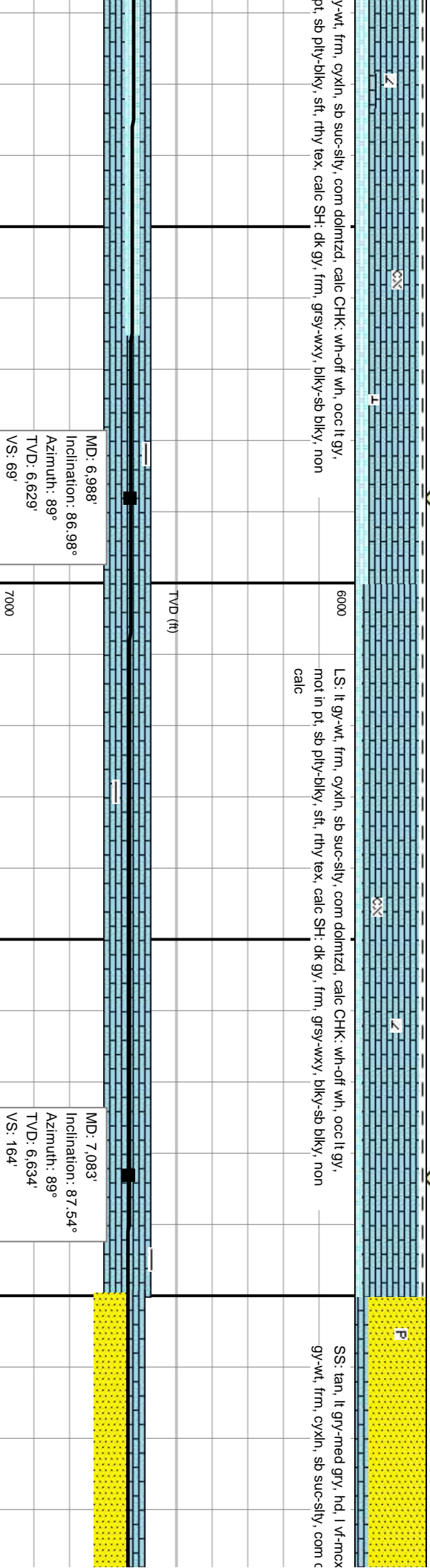
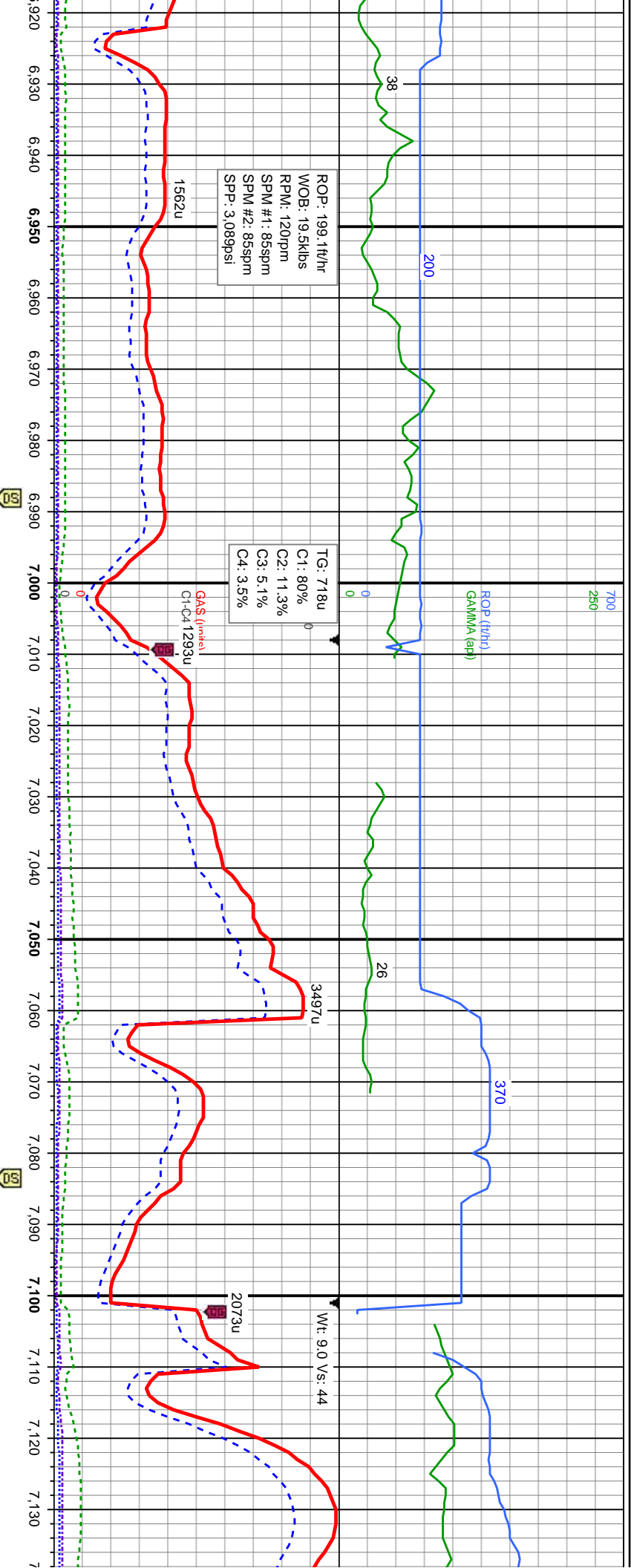


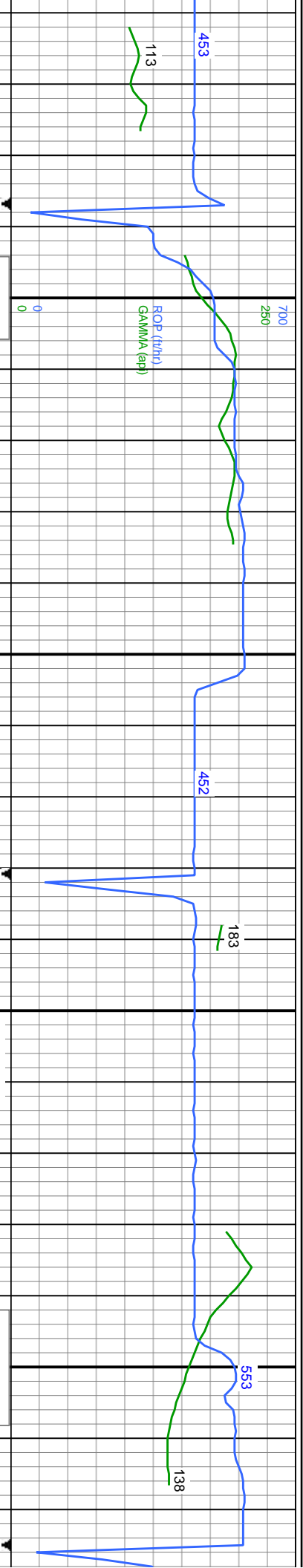
D: 6.704'
Inclination: 58.83°
Azimuth: 84°
D: 6.548'
VS: -200'

MD: 6.799'
Inclination: 69.24°
Azimuth: 88°
TVD: 6.589'
VS: -114'

MD: 6.893'
Inclination: 77.56°
Azimuth: 89°
TVD: 6.616'
VS: -24'

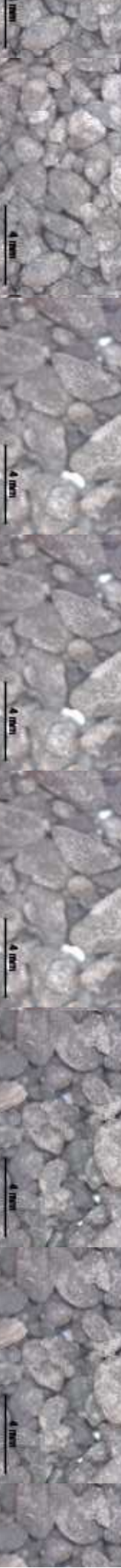
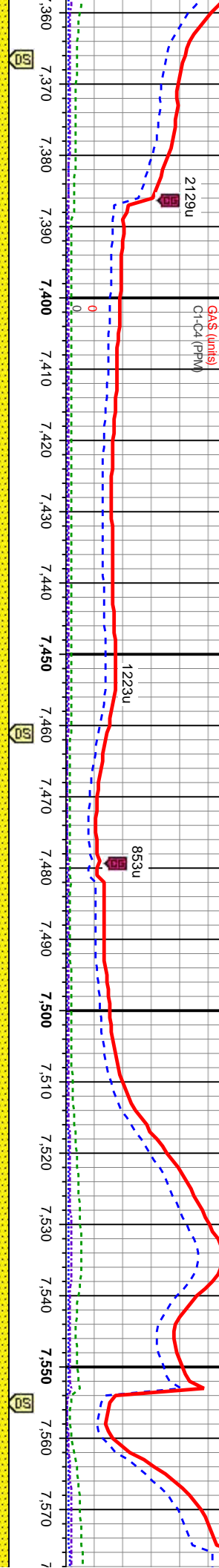


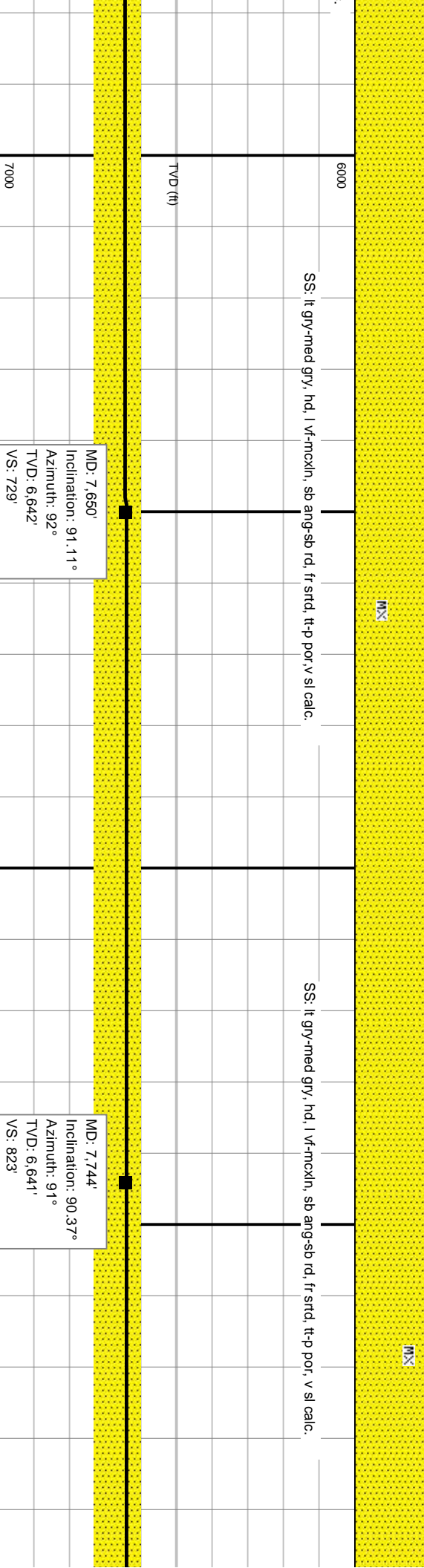
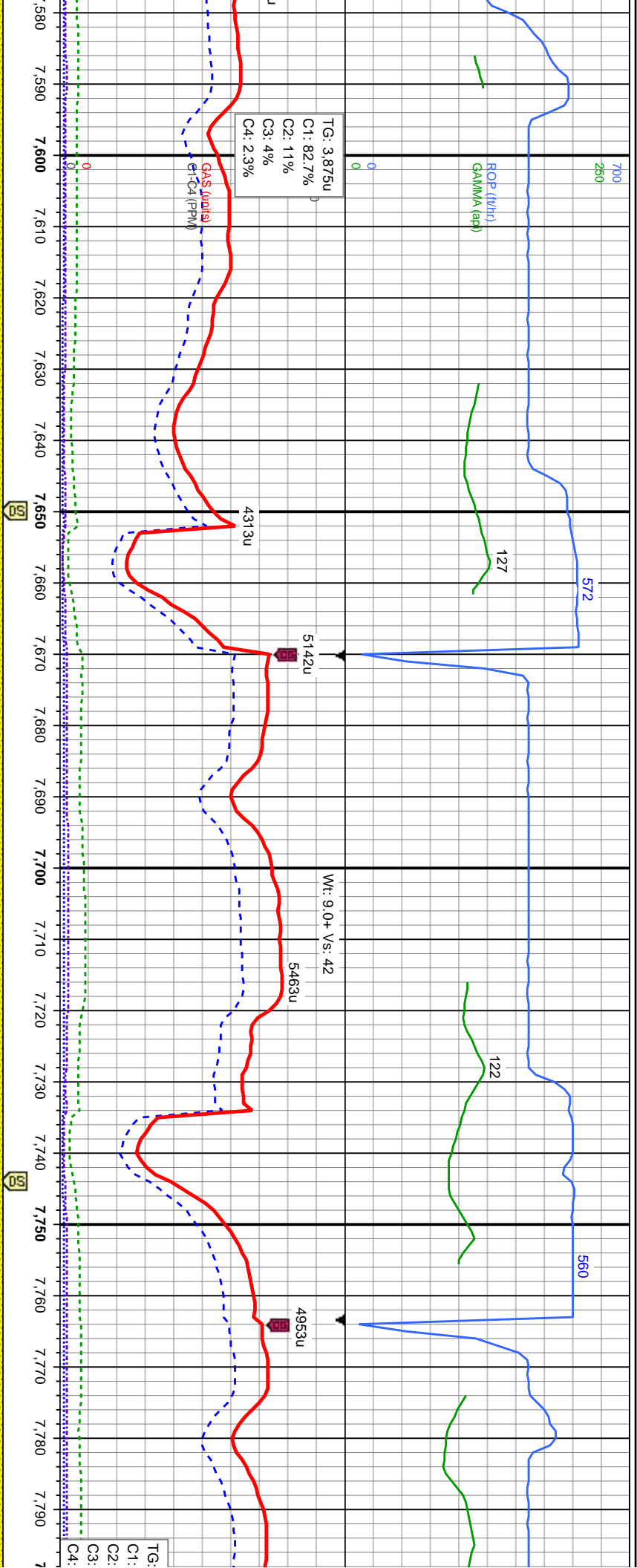


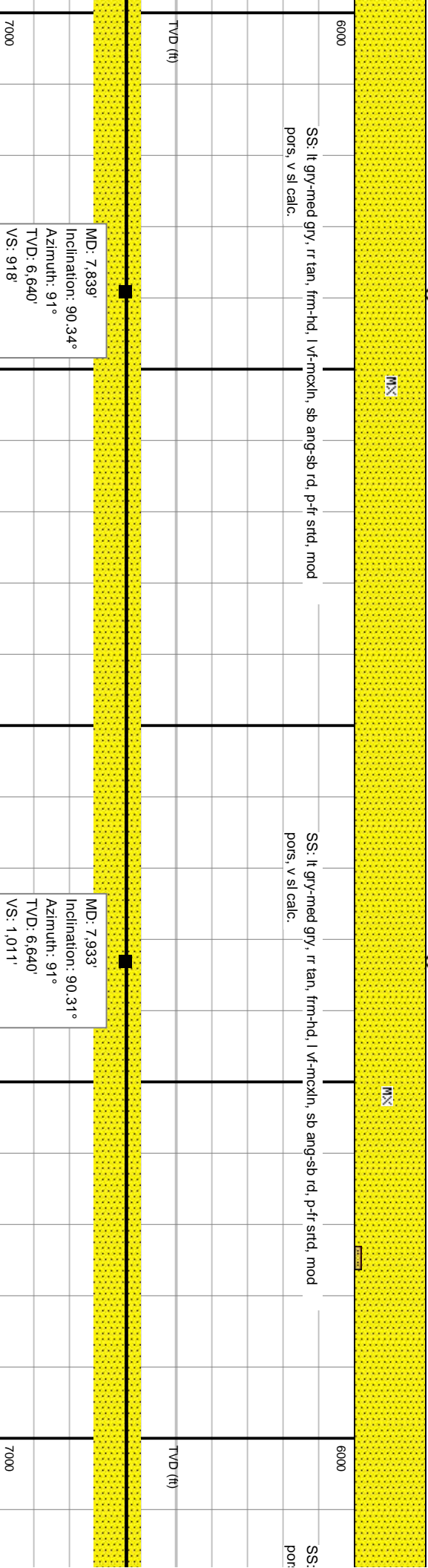
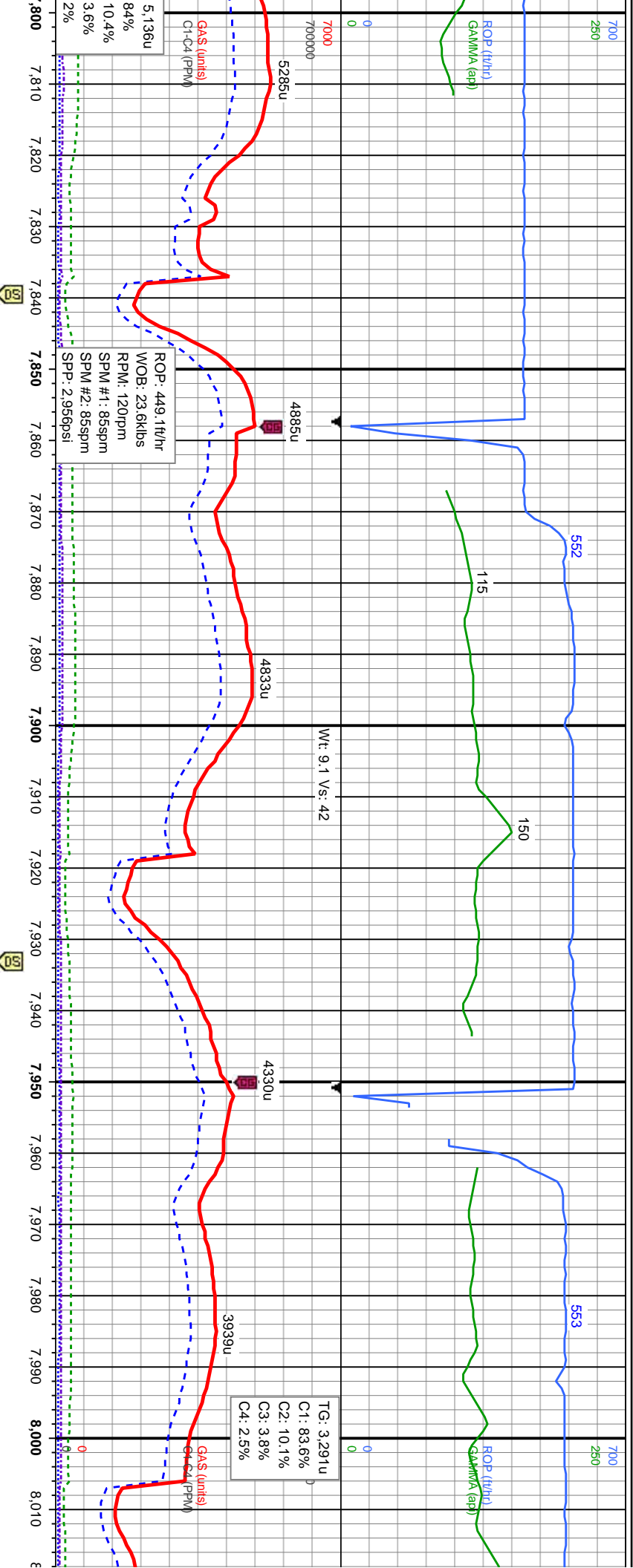


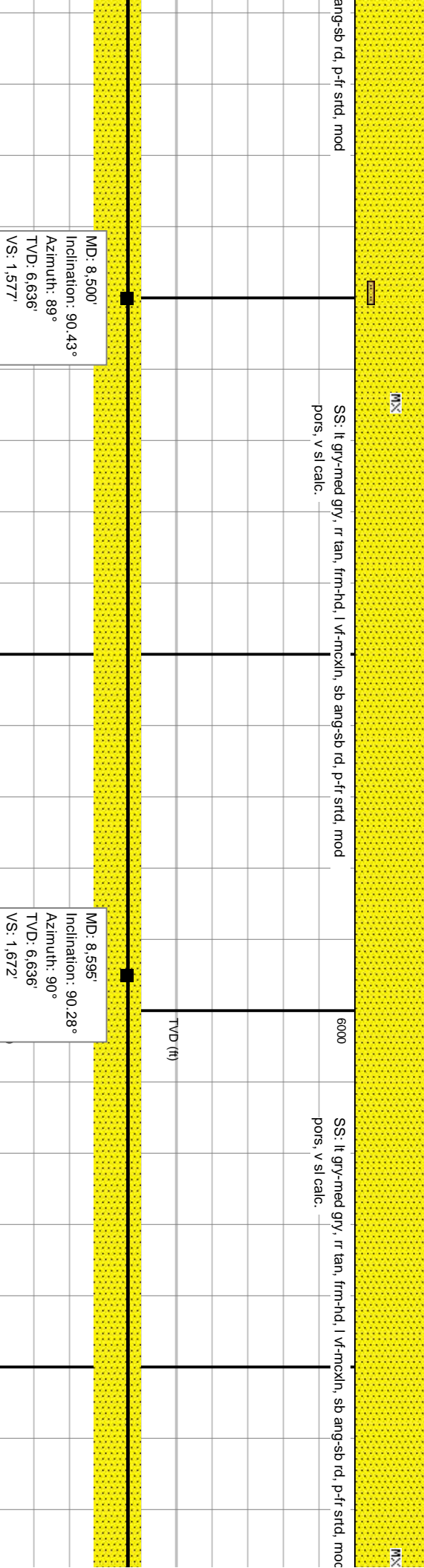
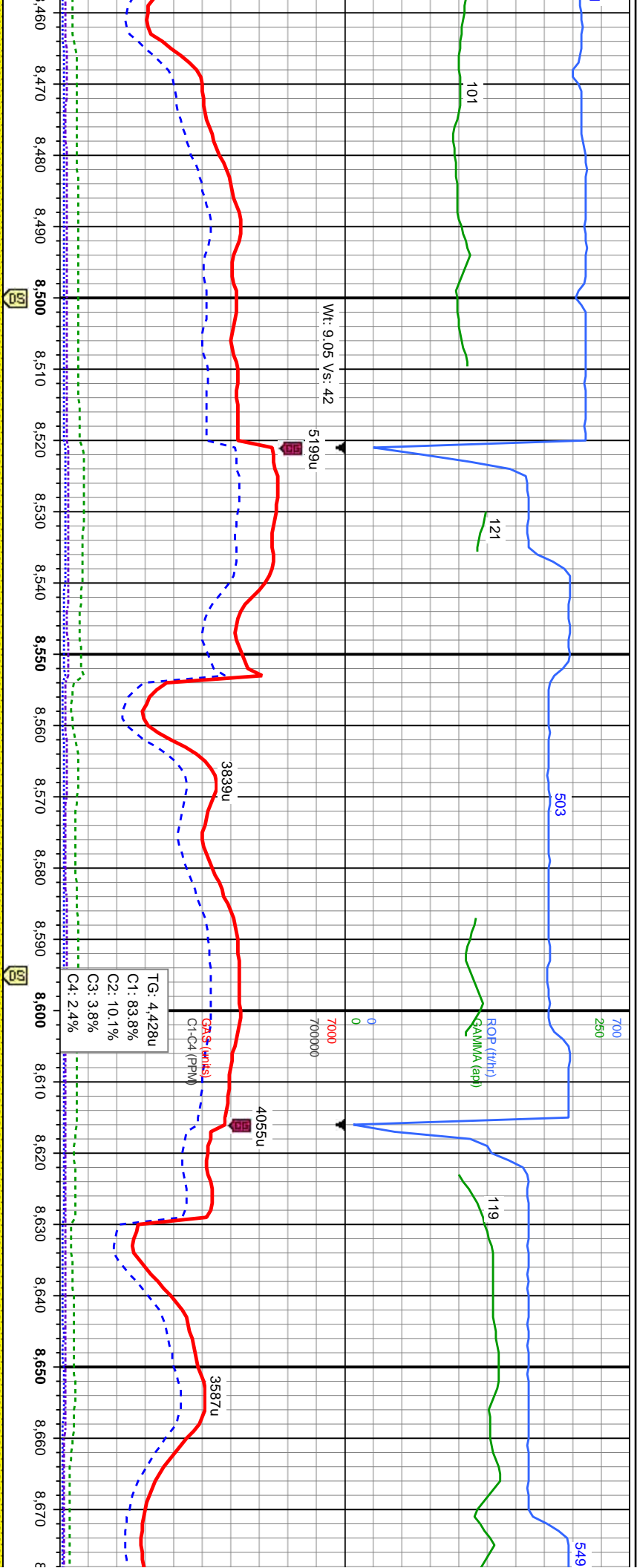
TG: 1.342u
C1: 82.1%
C2: 10.7%
C3: 4.4%
C4: 2.9%

ROP: 547.2ft/hr
WOB: 28.4klbs
RPM: 120rpm
SPM #1: 85spm
SPM #2: 85spm
SPR: 3.332psi







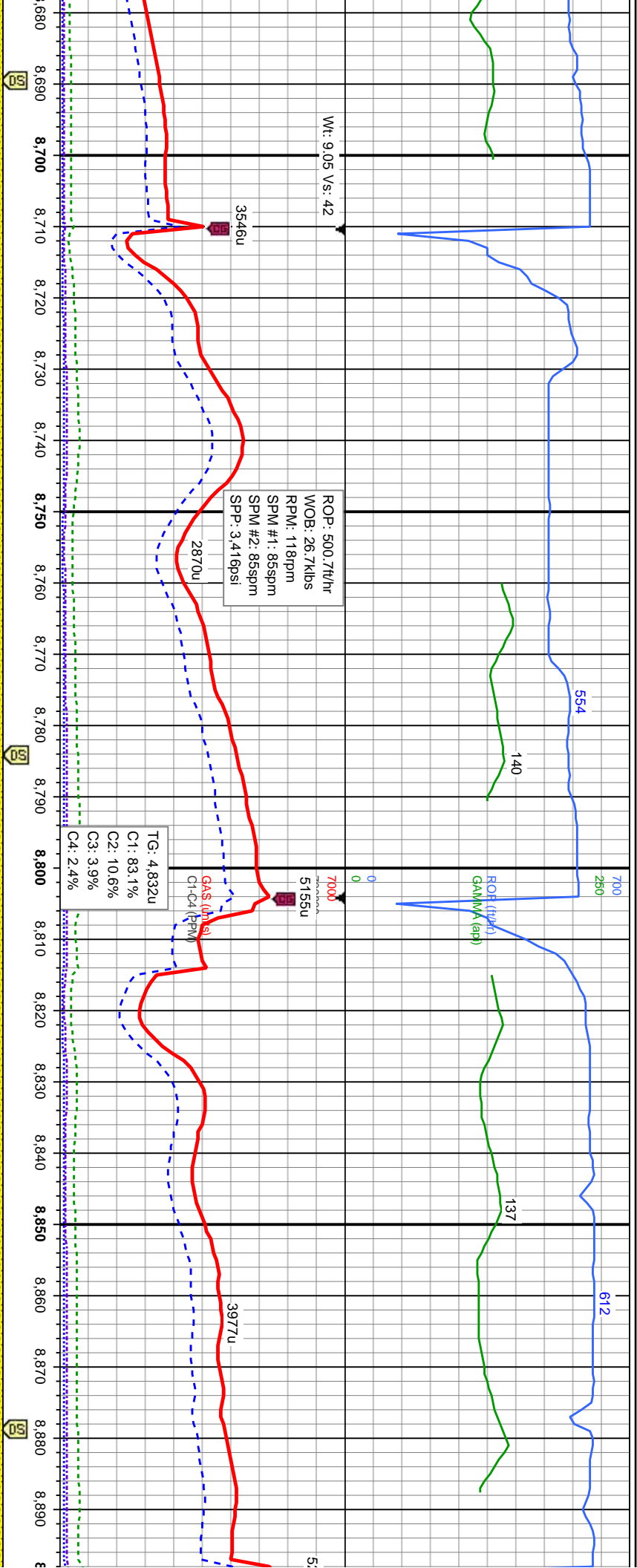


MD: 8.500'
Inclination: 90.43°
Azimuth: 89°
TVD: 6.636'
VS: 1.577'

MD: 8.595'
Inclination: 90.28°
Azimuth: 90°
TVD: 6.636'
VS: 1.672'

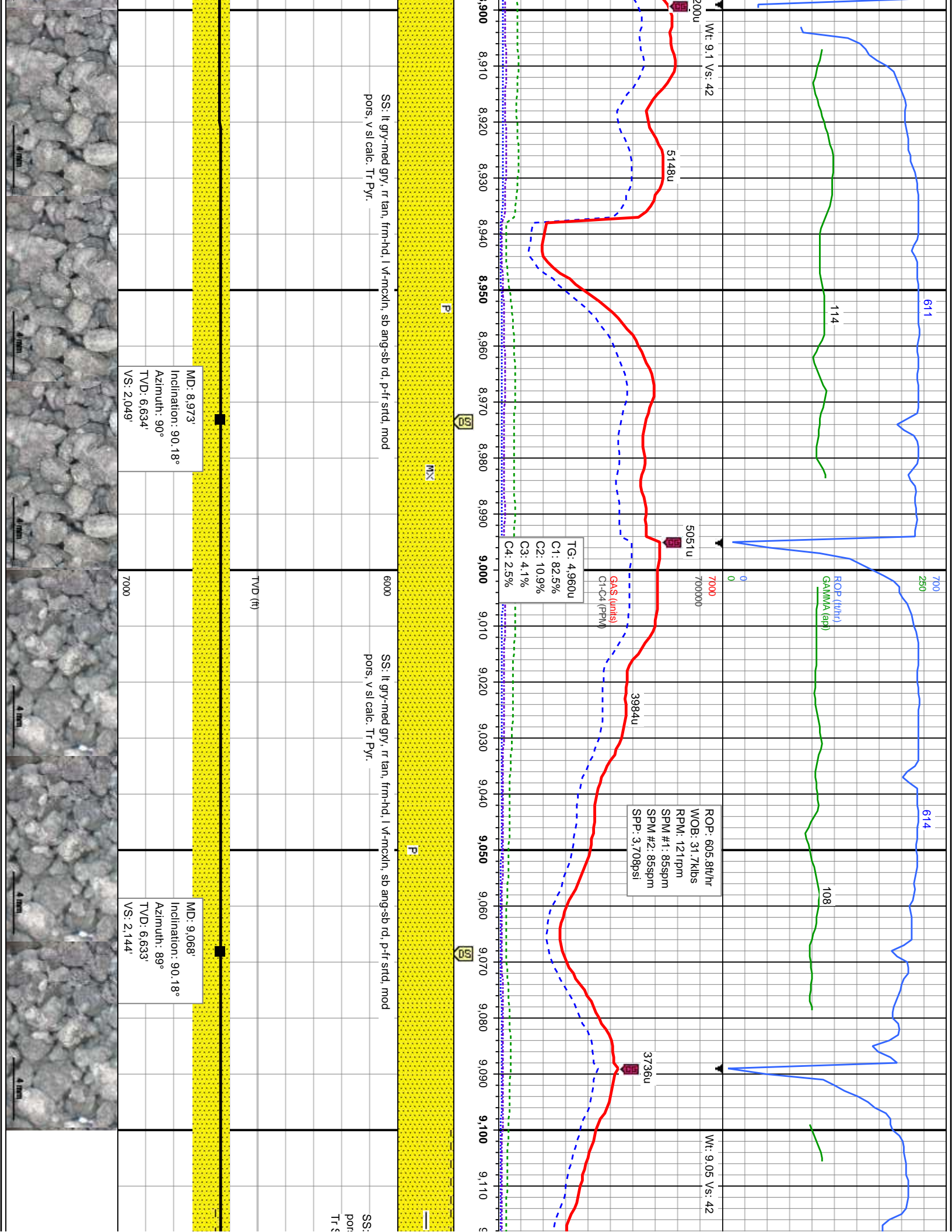
SS: lt gry-med gry, r tan, frm-hd, l vf-mcxlh, sb ang-sb rd, p-fr srd, mod
pors, v sl calc.

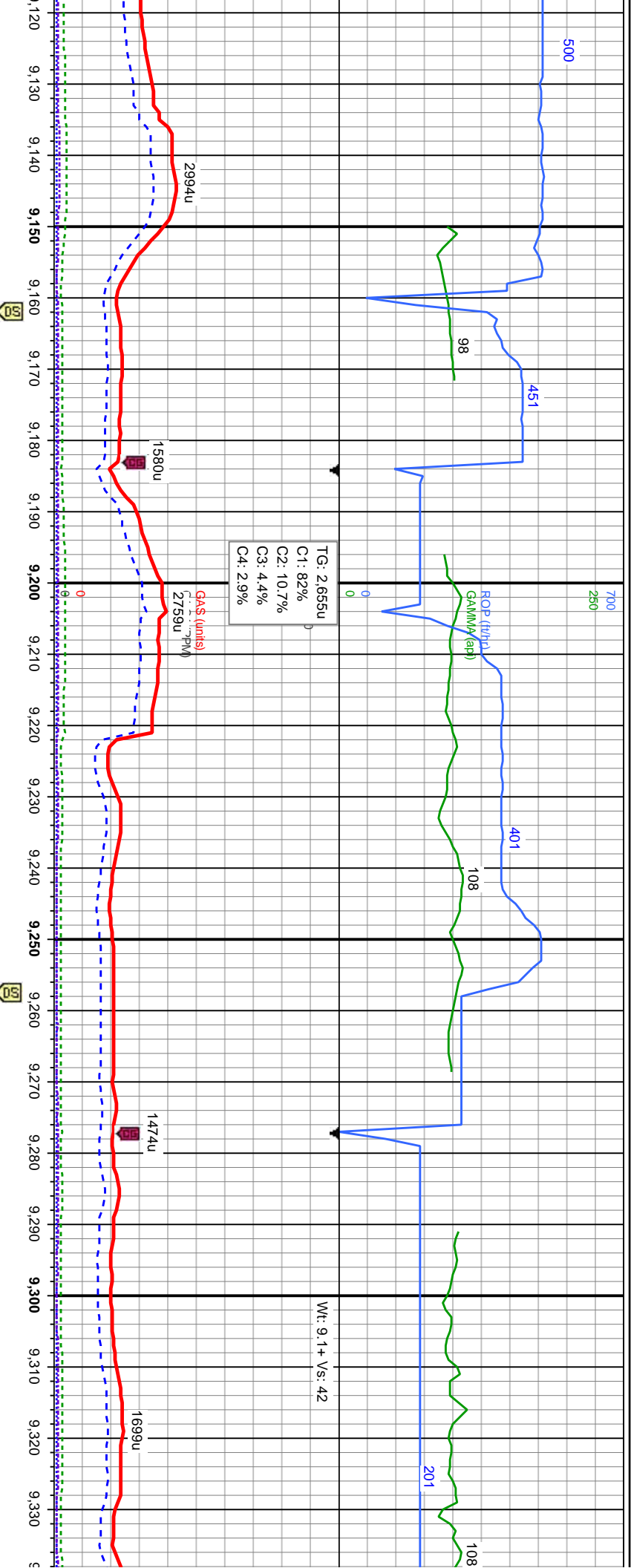
SS: lt gry-med gry, r tan, frm-hd, l vf-mcxlh, sb ang-sb rd, p-fr srd, mod
pors, v sl calc.



SS: lt gry-med gry, r tan, frm-hd, l vf-mcxl, sb ang-sb rd, p-fr srd, mod pors, v sl calc.		6000	SS: lt gry-med gry, r tan, frm-hd, l vf-mcxl, sb ang-sb rd, p-fr srd, mod pors, v sl calc.		7000
MD: 8.689° Inclination: 90.37° Azimuth: 91° TVD: 6.635° VS: 1.766°			MD: 8.784° Inclination: 90.31° Azimuth: 90° TVD: 6.635° VS: 1.860°		
		TVD (ft)			







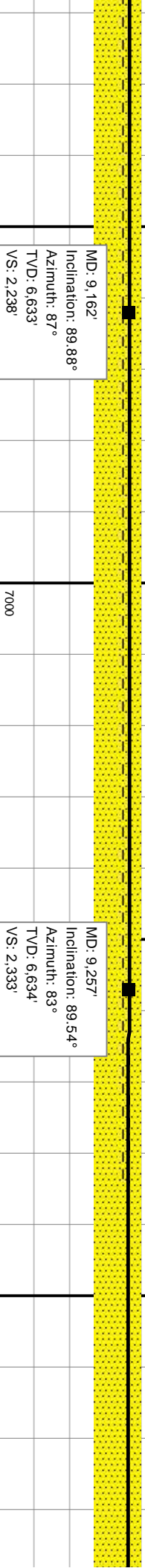
TG: 2.655u
C1: 82%
C2: 10.7%
C3: 4.4%
C4: 2.9%

Wt: 9.1+ Vs: 42



It gry-med gry, r tan, frm-hd, l vfr-mckn, sb ang-sb rd, p-fr srt, mod
pors, v sl calc. SHY SS: dk gy, frm, gt, sb blk- sb ply, non calc. dissim Pyr.
Tr Sh

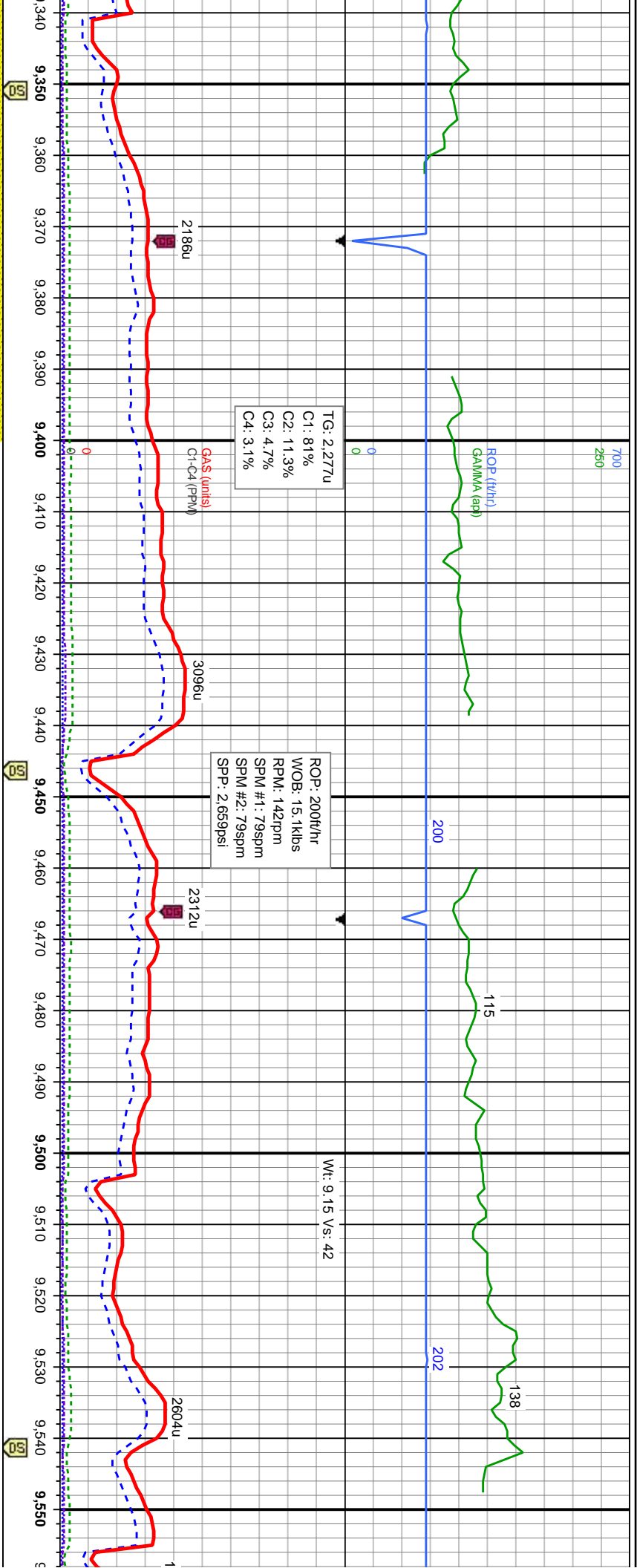
SS: lt gry-med gry, r tan, l
pors, v sl calc. Tr Pyr. Tr S



MD: 9.162'
Inclination: 89.88°
Azimuth: 87°
TVD: 6.633'
VS: 2.238'

MD: 9.257'
Inclination: 89.54°
Azimuth: 83°
TVD: 6.634'
VS: 2.333'





TG: 2.227u
C1: 81%
C2: 11.3%
C3: 4.7%
C4: 3.1%

ROP: 200ft/hr
WOB: 15.1kbs
RPM: 142rpm
SPM #1: 79spm
SPM #2: 79spm
SPP: 2.659psi

Wt: 9.15 Vs: 42

MD: 9,351'
Inclination: 88.8°
Azimuth: 83°
TVD: 6,635'
VS: 2,427'

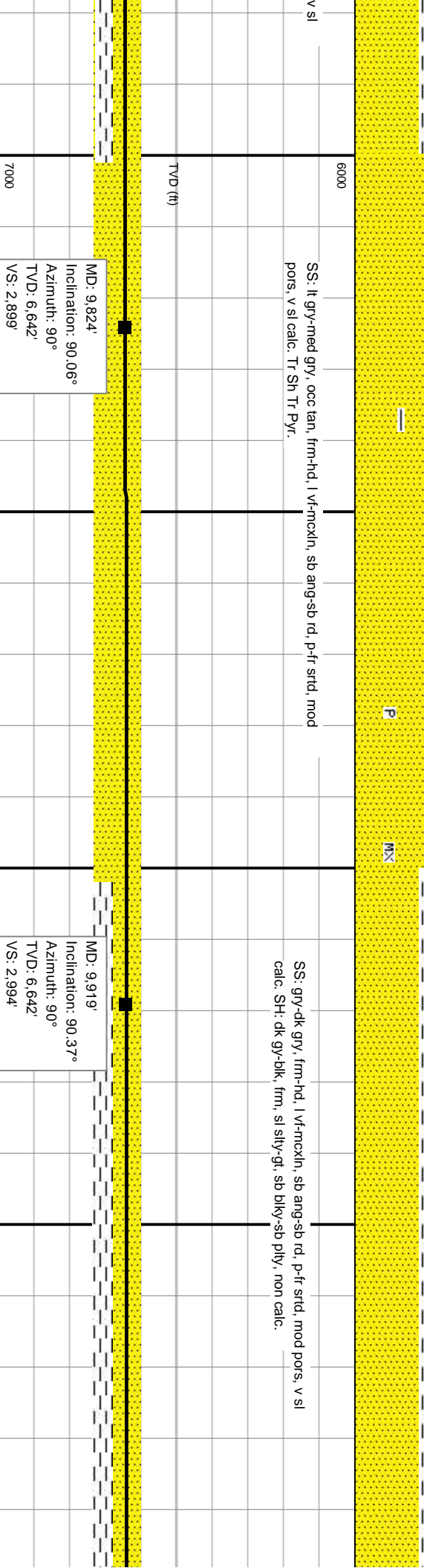
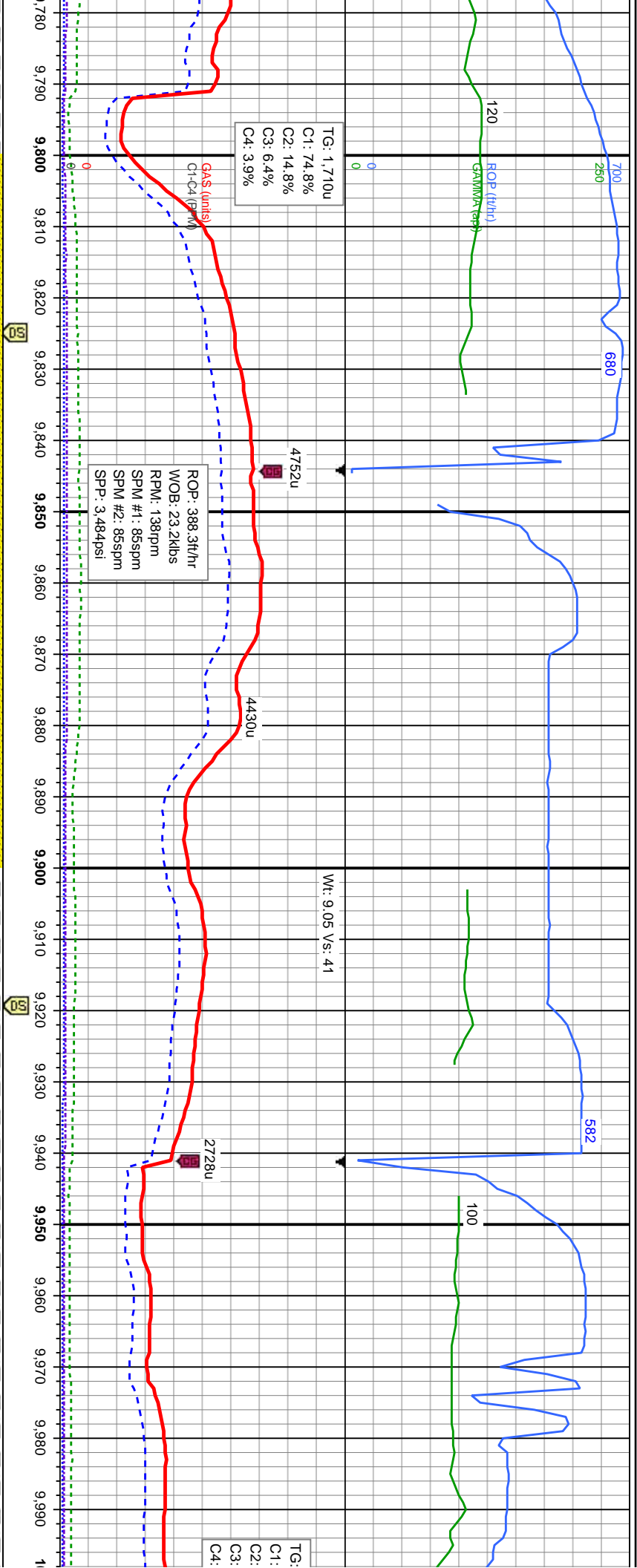
MD: 9,446'
Inclination: 88.55°
Azimuth: 83°
TVD: 6,637'
VS: 2,522'

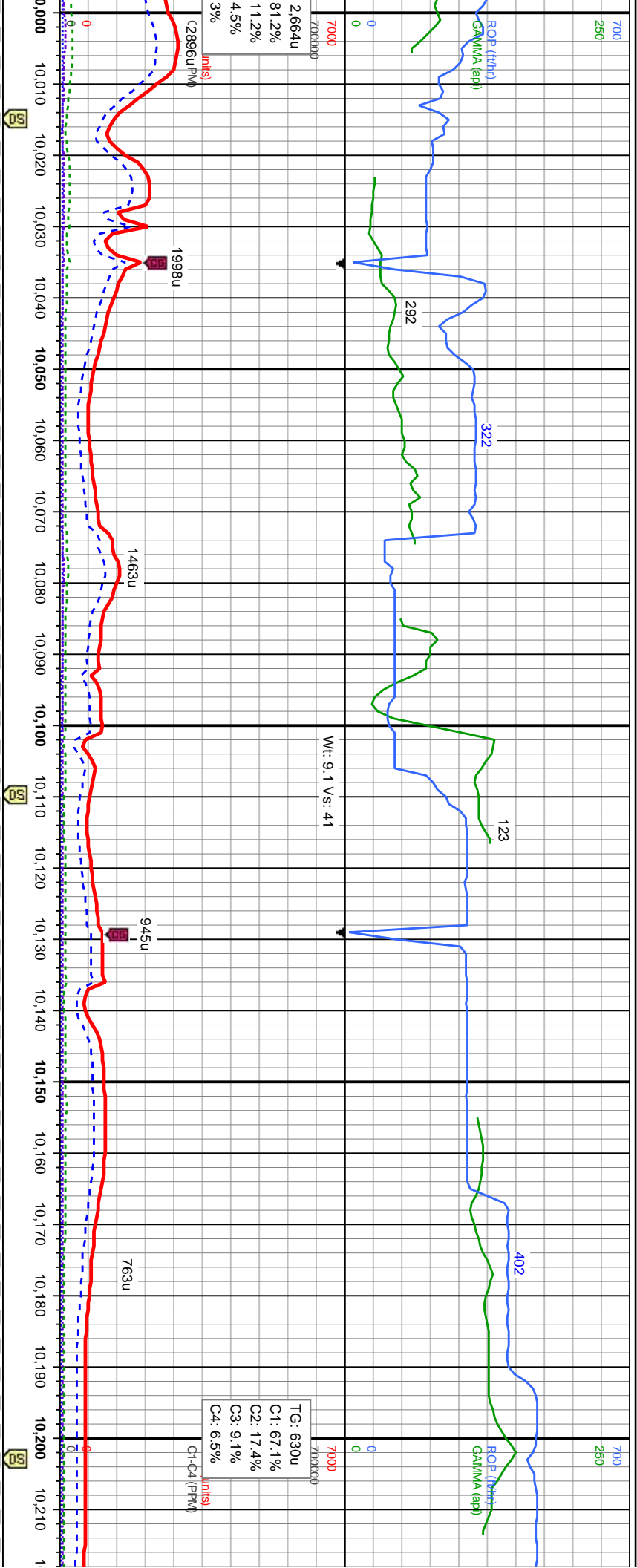
MD: 9,541'
Inclination: 88.55°
Azimuth: 86°
TVD: 6,640'
VS: 2,616'

SS: lt gry-med gry, frm-hd, l vf-mckln, sb ang-sb rd, p-fr std, mod pois, v sl
calc. SH: dk gy-blk, frm, sl silty-gt, sb blk-y-sb ply, non calc. abnt Pyr.

SS: lt gry-med gry, frm-hd, l vf-mckln, sb ang-sb
calc. SH: dk gy-blk, frm, sl silty-gt, sb blk-y-sb ply,

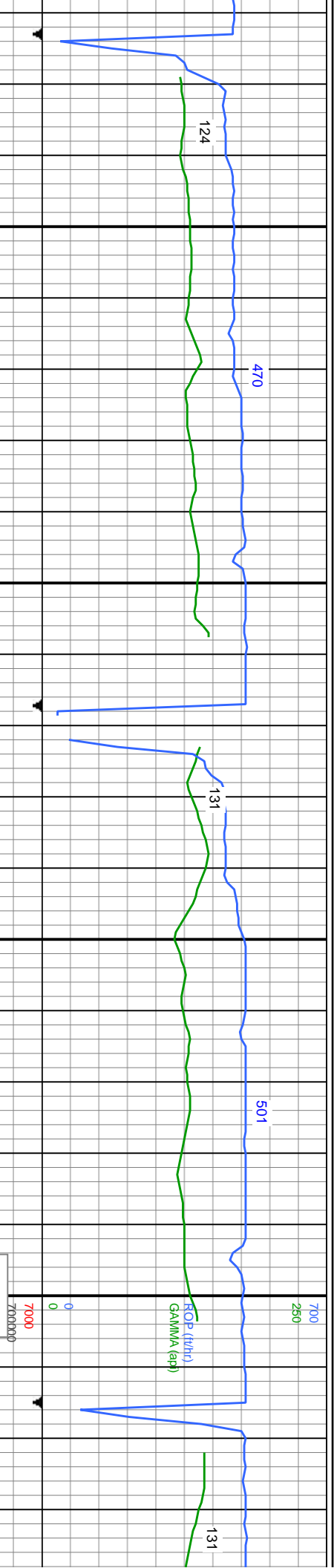






6000	SS: lt gry-med gry, frm-hd, l vf-mckln, sb ang-sb rd, p-fr strd, mod por, v sl calc. SH: dk gy-blk, frm, sl silty-gt, sb blk-y-sb pily, non calc. Tr Pyr.	6000	SS: lt gry-med gry, frm-hd, l vf-mckln, sb ang-sb rd, p-fr strd, mod por, v sl calc. SH: dk gy-blk, frm, sl silty-gt, sb blk-y-sb pily, non calc. Tr Pyr.	6000	SS: lt gry-med gry, frm-hd, l vf-mckln, sb ang-sb rd, p-fr strd, mod por, v sl calc. SH: dk gy-blk, frm, sl silty-gt, sb blk-y-sb pily, non calc. Tr Pyr.
TVD (ft)		TVD (ft)		TVD (ft)	
MD: 10.014' Inclination: 90.28° Azimuth: 89° TVD: 6.641' VS: 3.089'		MD: 10.109' Inclination: 89.32° Azimuth: 90° TVD: 6.642' VS: 3.184'		MD: 10.203' Inclination: 90.25° Azimuth: 92° TVD: 6.642' VS: 3.277'	
7000		7000		7000	

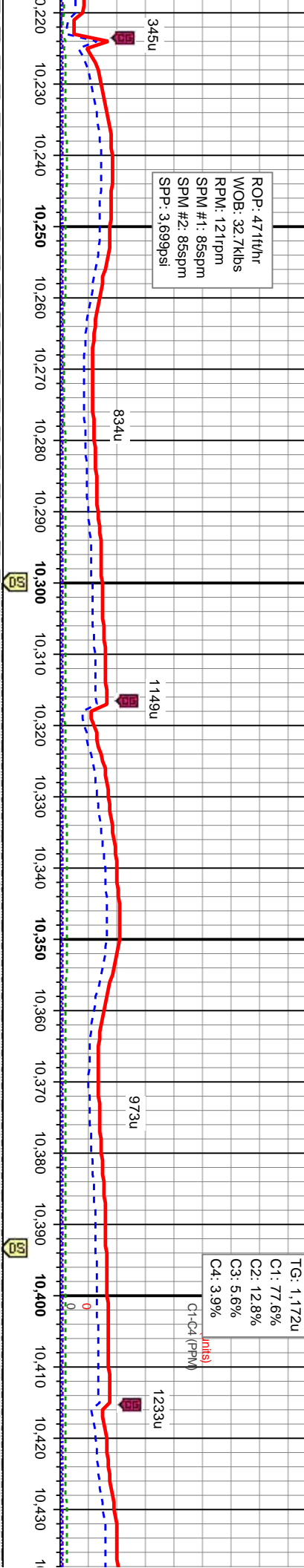




ROP: 471ft/hr
WOB: 32.7klbs
RPM: 121rpm
SPM #1: 85spm
SPM #2: 85spm
SPP: 3.699psi

TG: 1.172u
C1: 77.6%
C2: 12.8%
C3: 5.6%
C4: 3.9%

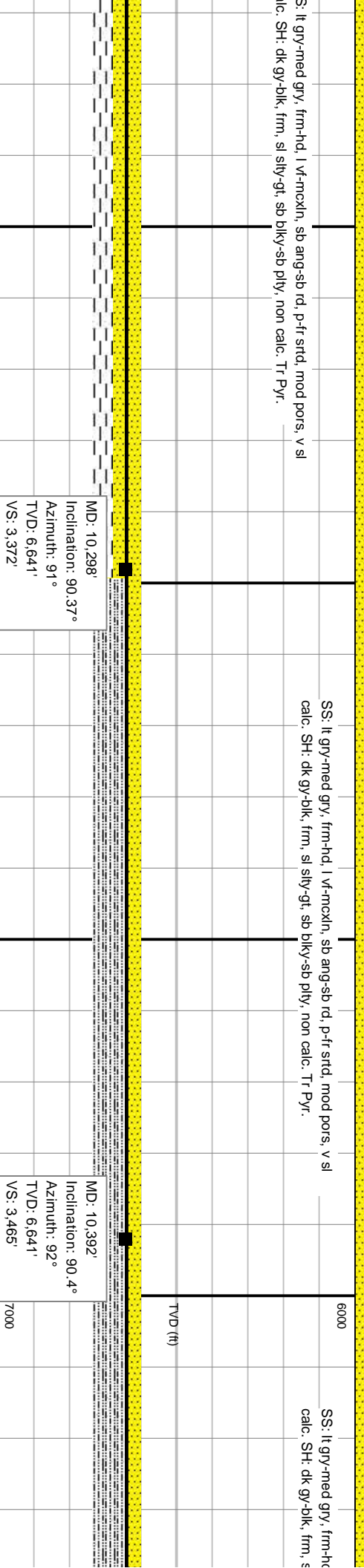
G1-C4 (PPM)
units



SS: lt gry-med gry, frm-hd, l vf-mckln, sb ang-sb rd, p-fr strd, mod pors, v sl
calc. SH: dk gy-blk, frm, sl silty-gt, sb blk-y-sb ply, non calc. Tr Pyr.

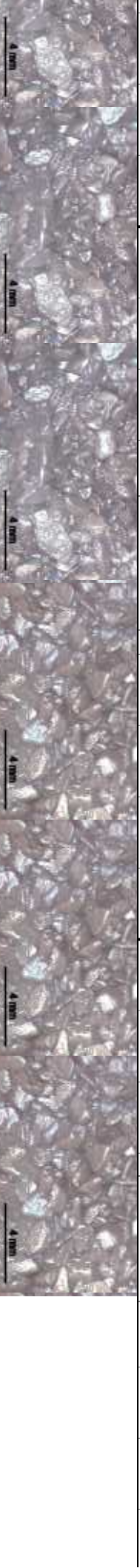
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calc. SH: dk gy-blk, frm, sl silty-gt, sb blk-y-sb ply, non calc. Tr Pyr.

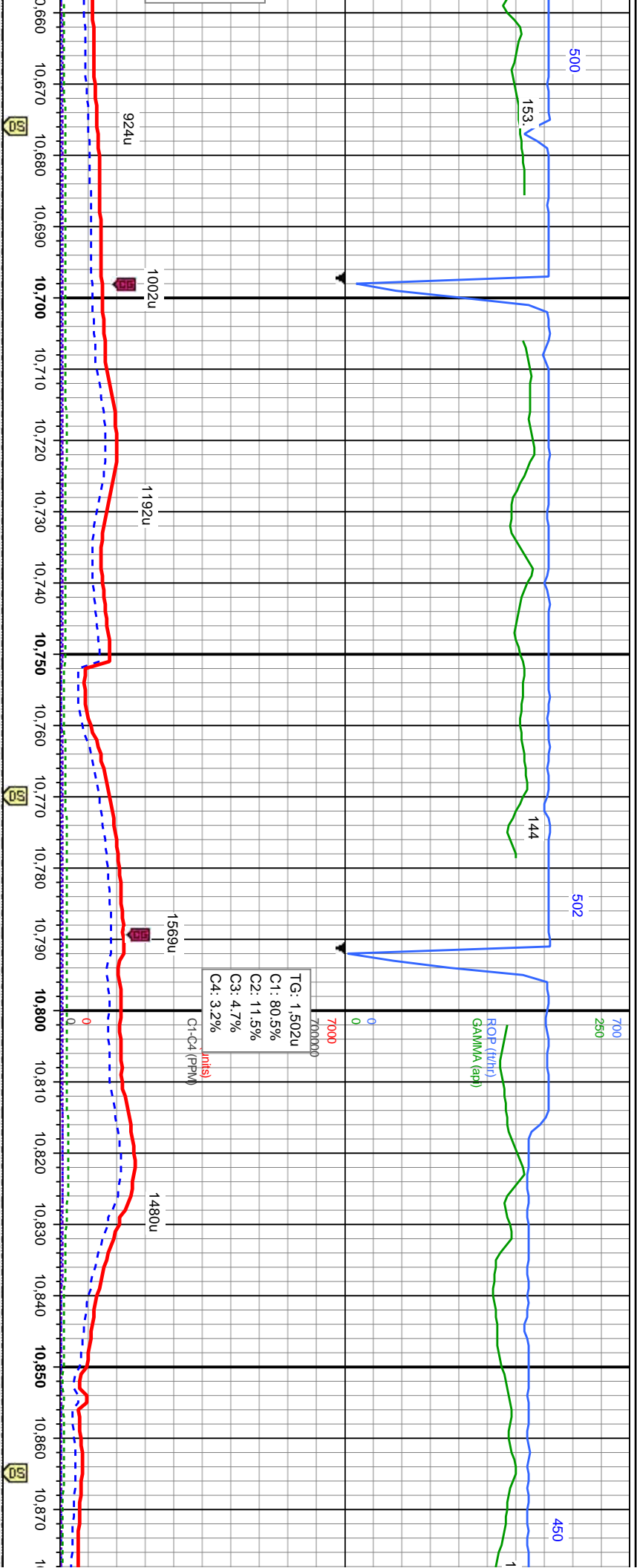
SS: lt gry-med gry, frm-hd
calc. SH: dk gy-blk, frm, s



MD: 10,298
Inclination: 90.37°
Azimuth: 91°
TVD: 6,641'
VS: 3.372'

MD: 10,392
Inclination: 90.4°
Azimuth: 92°
TVD: 6,641'
VS: 3.465'





MD: 10.676'
Inclination: 90.4°
Azimuth: 91°
TVD: 6.639'
VS: 3.748'

MD: 10.770'
Inclination: 90.4°
Azimuth: 91°
TVD: 6.638'
VS: 3.841'

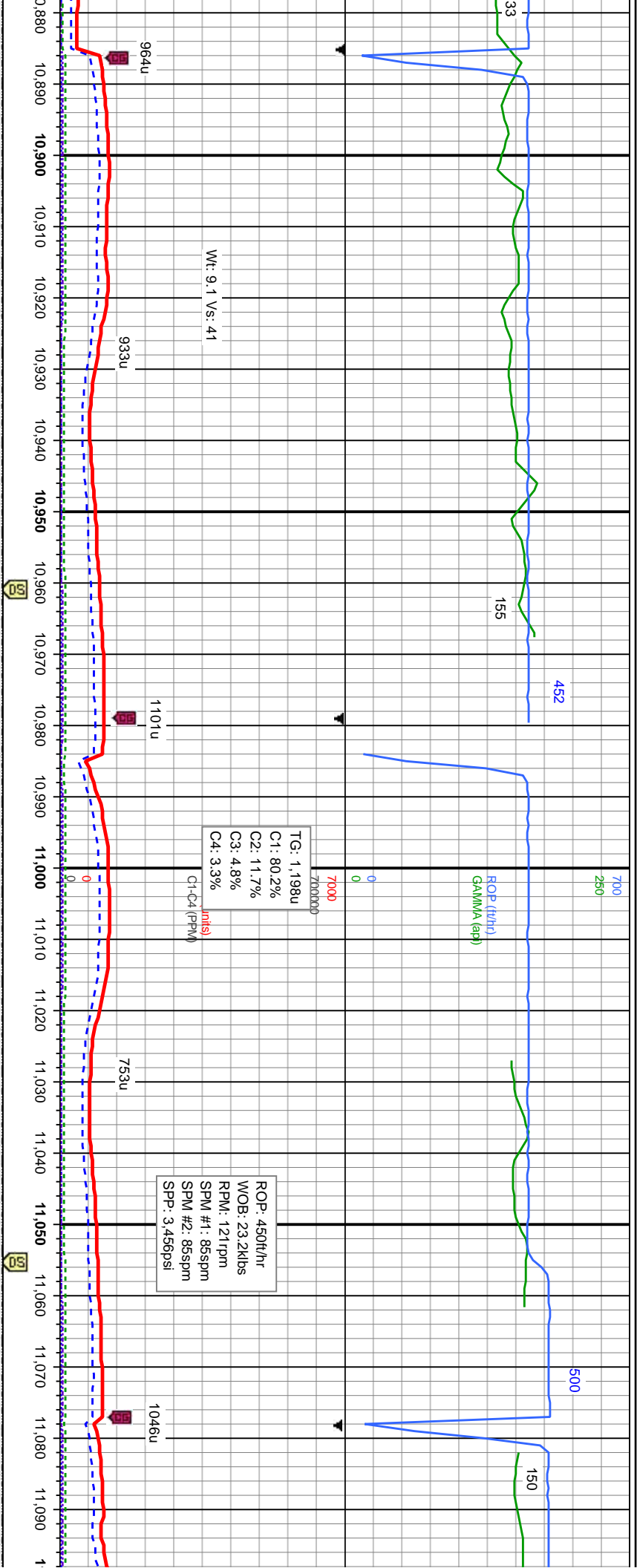
7000

MD: 10.865'
Inclination: 90.22°
Azimuth: 88°
TVD: 6.638'
VS: 3.936'

SS: lt gry-med gry, frm-hd, l vf-mcxl, sb ang-sb rd, p-fr std, mod pois, v sl calc. SH: dk gy-blk, frm, sl silty-gt, sb blk-sb ply, non calc. Tr Pyr.

SS: lt gry-med gry, frm-hd, l vf-mcxl, sb ang-sb rd, p-fr std, mod pois, v sl calc. SH: dk gy-blk, frm, sl silty-gt, sb blk-sb ply, non calc. Tr Pyr.

SS: lt gry-med gry, frm-hd, l vf-mcxl, sb ang-sb rd, p-fr std, mod pois, v sl calc. SH: dk gy-blk, frm, sl silty-gt, sb blk-sb ply, non calc. Tr Pyr.



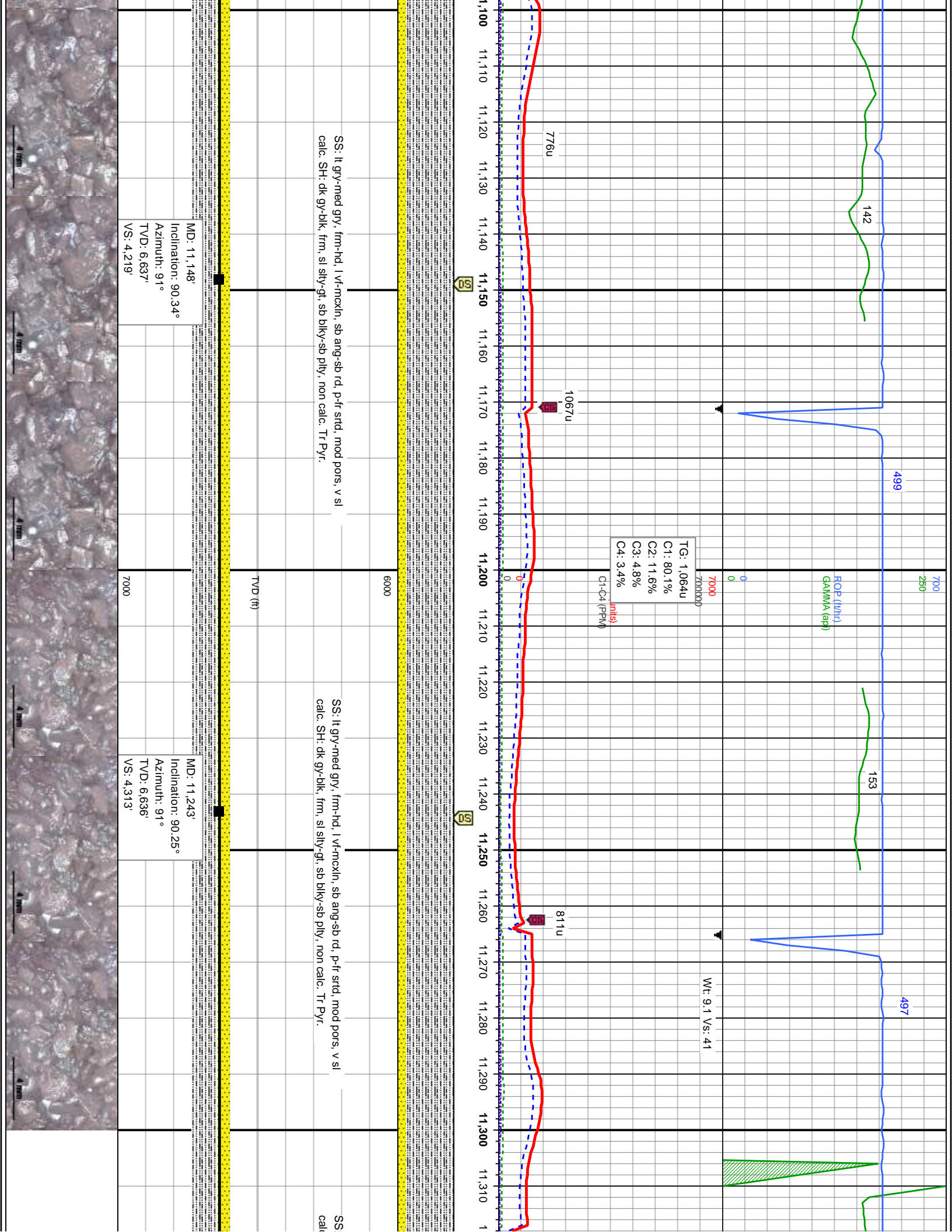
SS: lt gry-med gry, frm-hd, l vf-mcxn, sb ang-sb rd, p-fr strd, mod pors, v sl
calc. SH: dk gy-blk, frm, sl silty-gt, sb bily-sb ply, non calc. Tr Pyr.

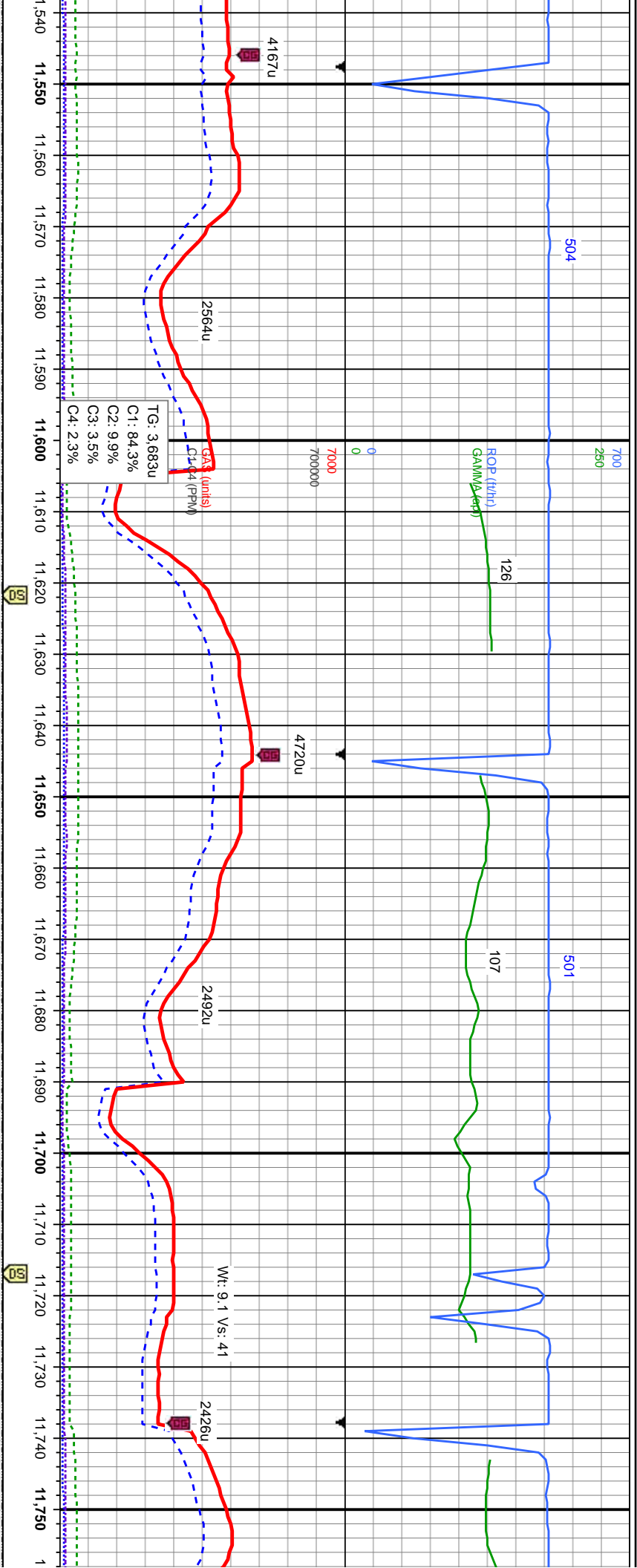
SS: lt gry-med gry, frm-hd, l vf-mcxn, sb ang-sb rd, p-fr strd, mod pors, v sl
calc. SH: dk gy-blk, frm, sl silty-gt, sb bily-sb ply, non calc. Tr Pyr.

MD: 10,960'
Inclination: 90.22°
Azimuth: 88°
TVD: 6,638'
VS: 4.031'

MD: 11,054'
Inclination: 90.37°
Azimuth: 90°
TVD: 6,637'
VS: 4.125'

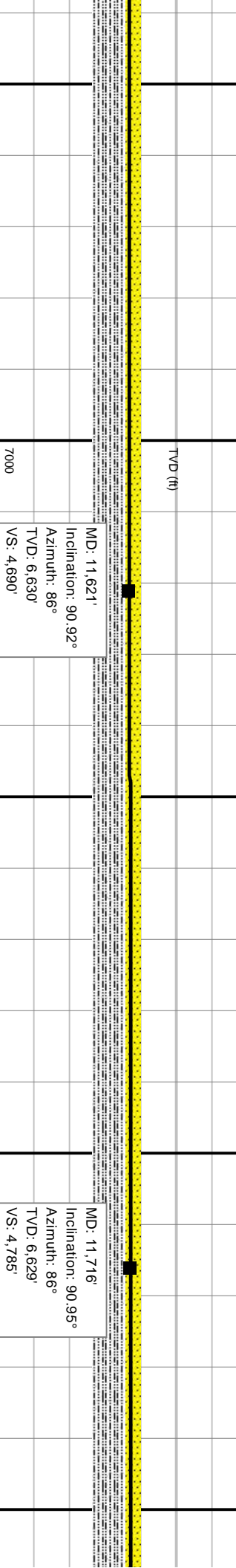






11,540 11,550 11,560 11,570 11,580 11,590 11,600 11,610 11,620 11,630 11,640 11,650 11,660 11,670 11,680 11,690 11,700 11,710 11,720 11,730 11,740 11,750 1

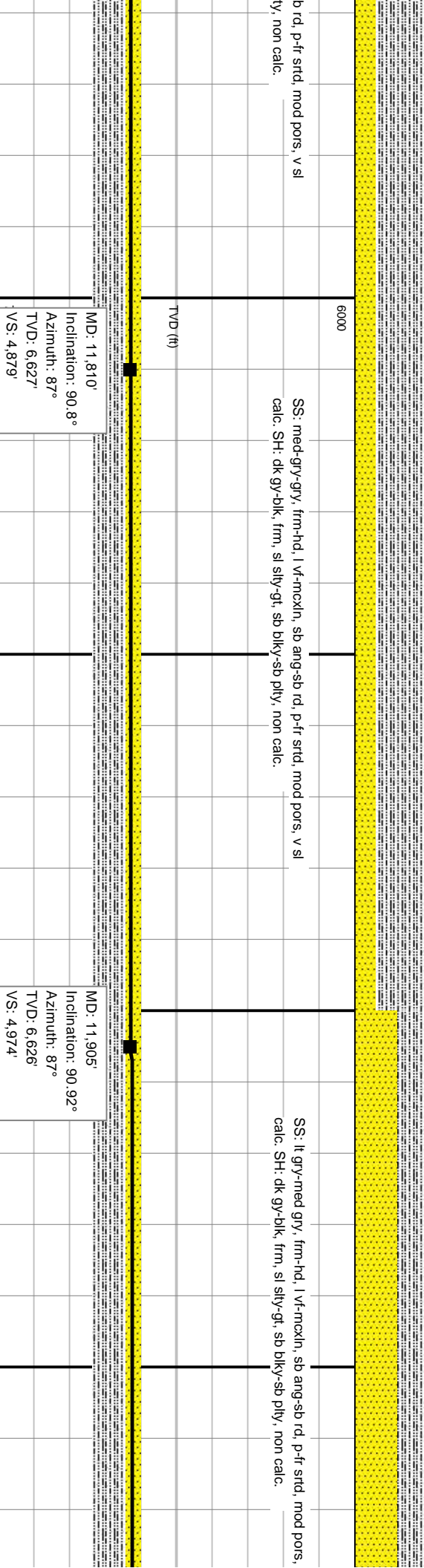
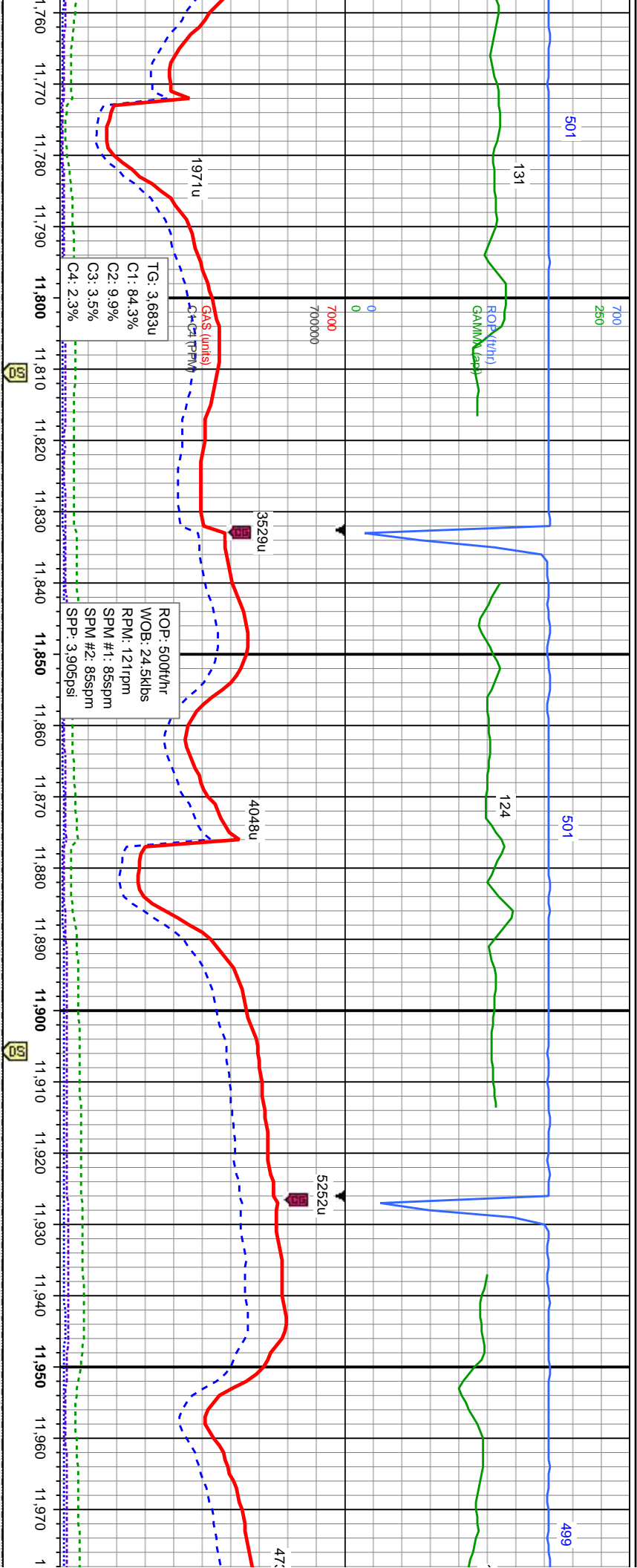
SS: lt gry-med gry, frm-hd, l vf-mcxl, sb ang-sb rd, p-fr std, mod pors, v sl
calc. SH: dk gy-blk, frm, sl silty-gt, sb blk-sb ply, non calc.

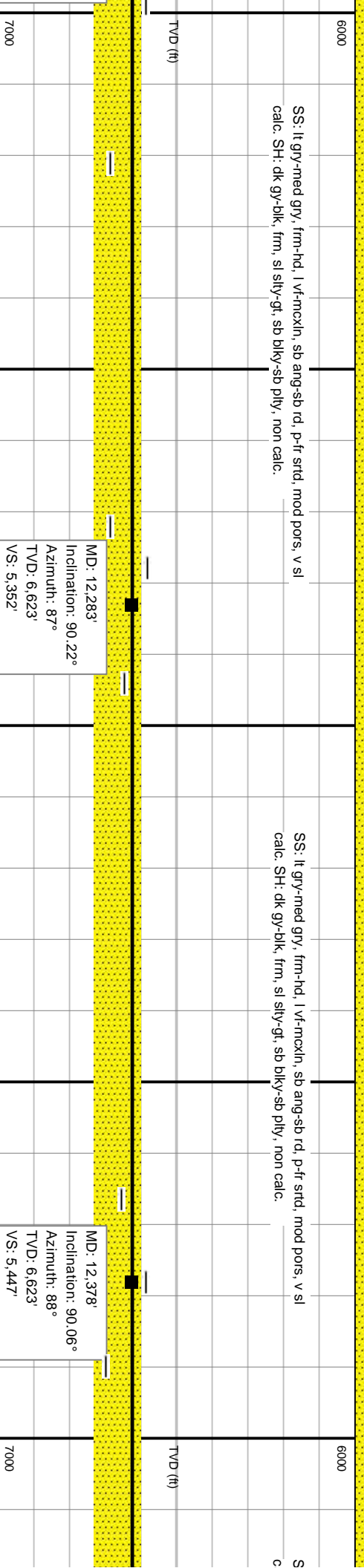
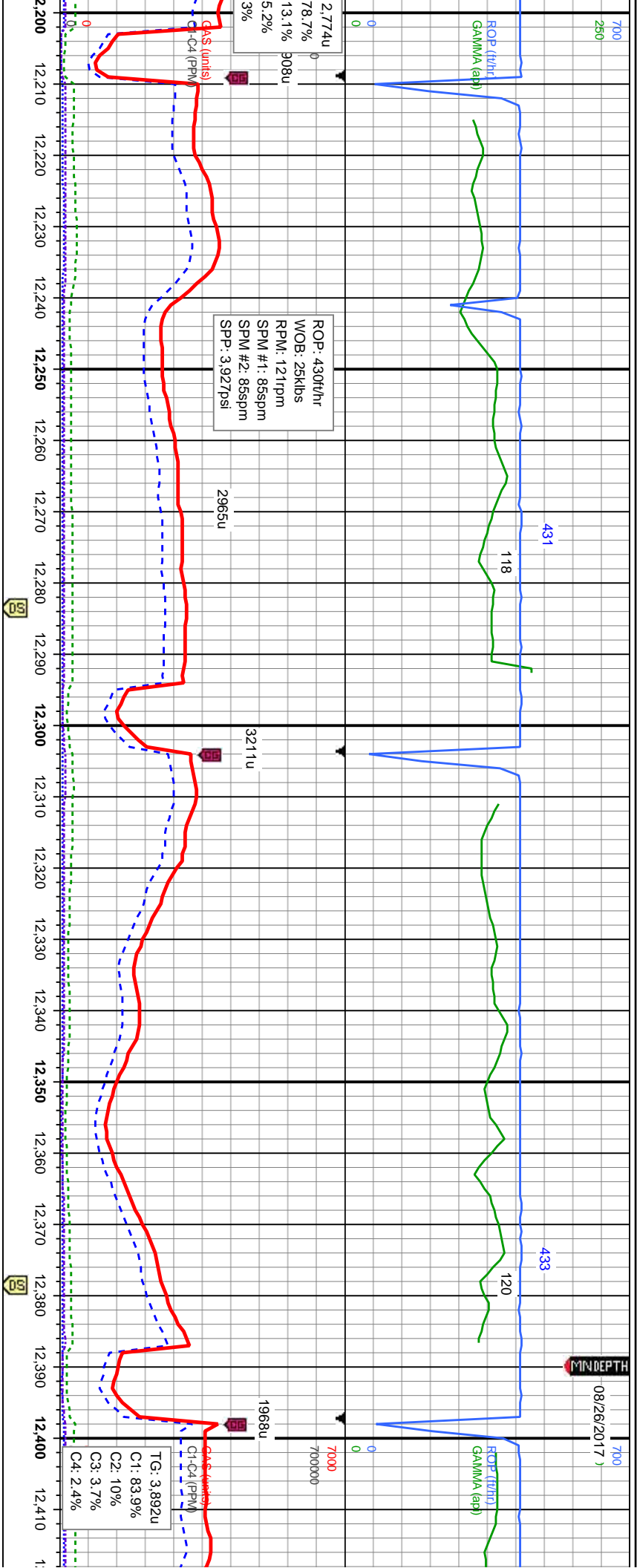


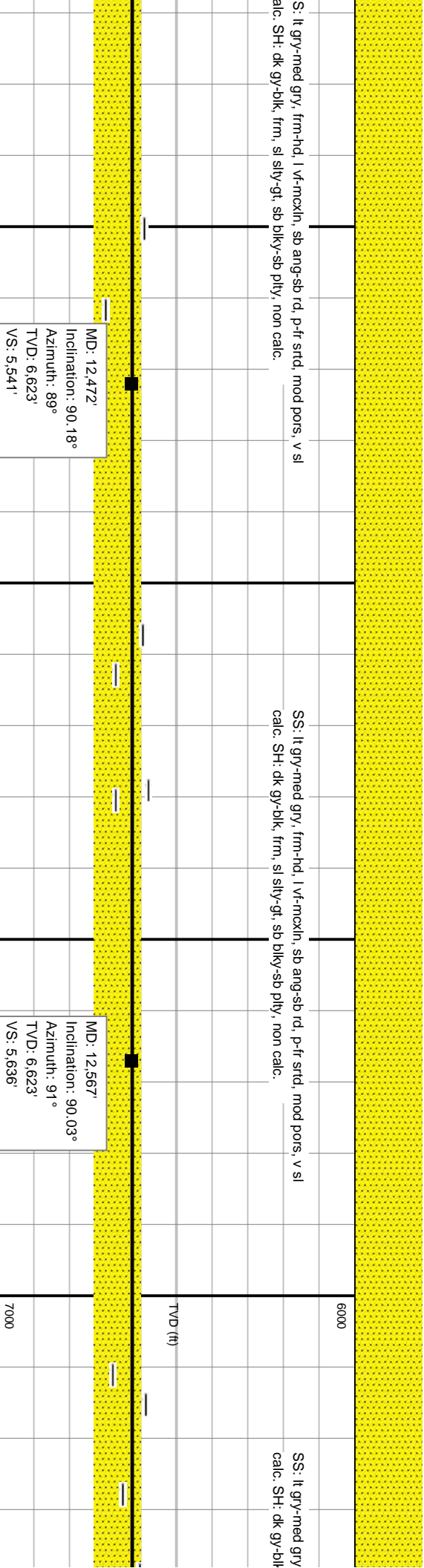
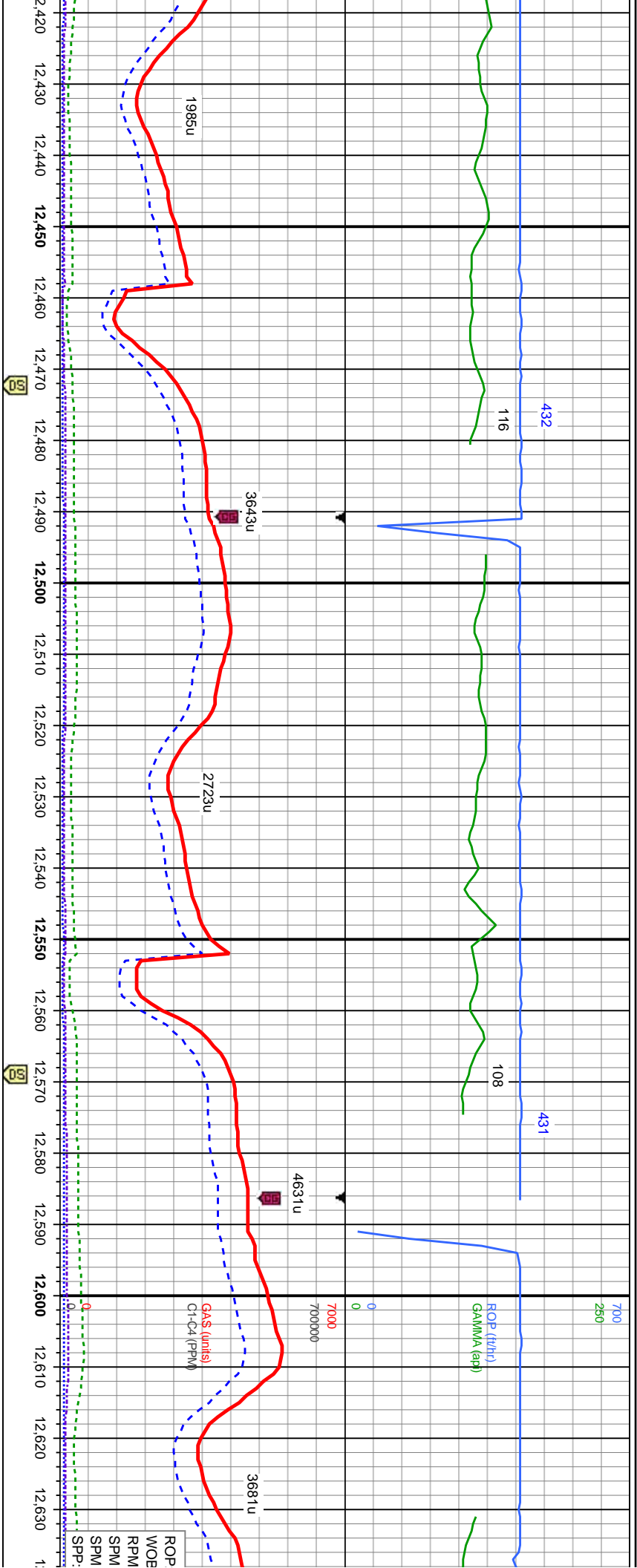
MD: 11,621'
Inclination: 90.92°
Azimuth: 86°
TVD: 6,630'
VS: 4,690'

MD: 11,716'
Inclination: 90.95°
Azimuth: 86°
TVD: 6,629'
VS: 4,785'





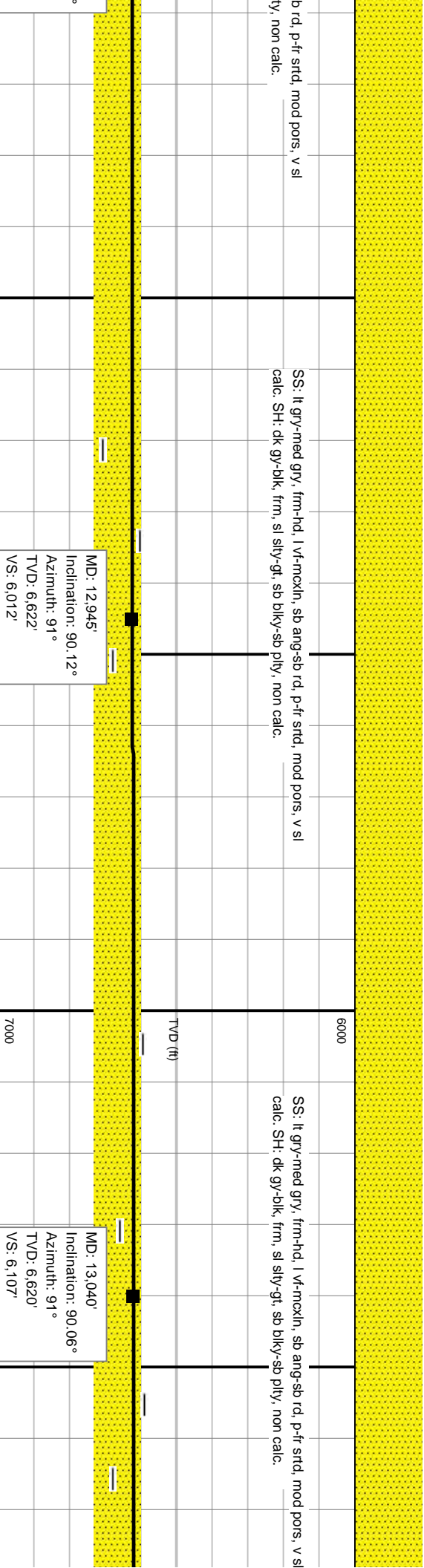
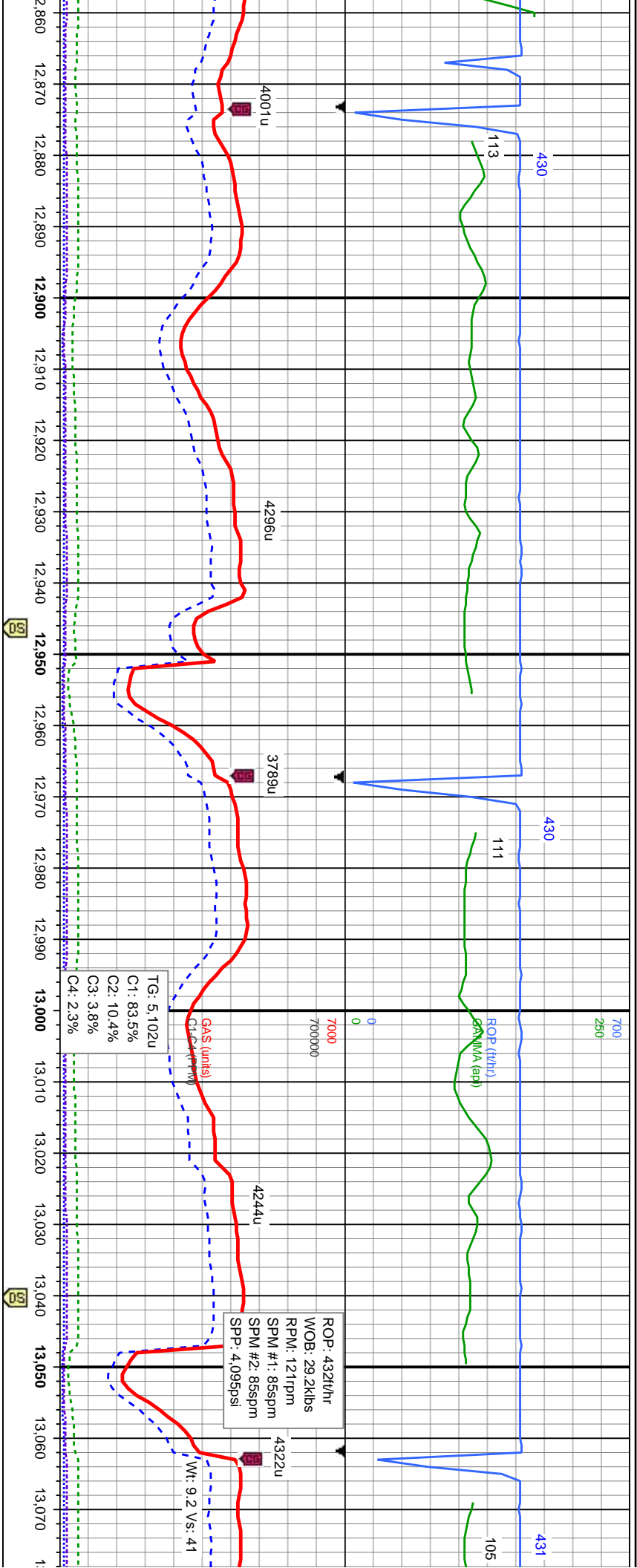


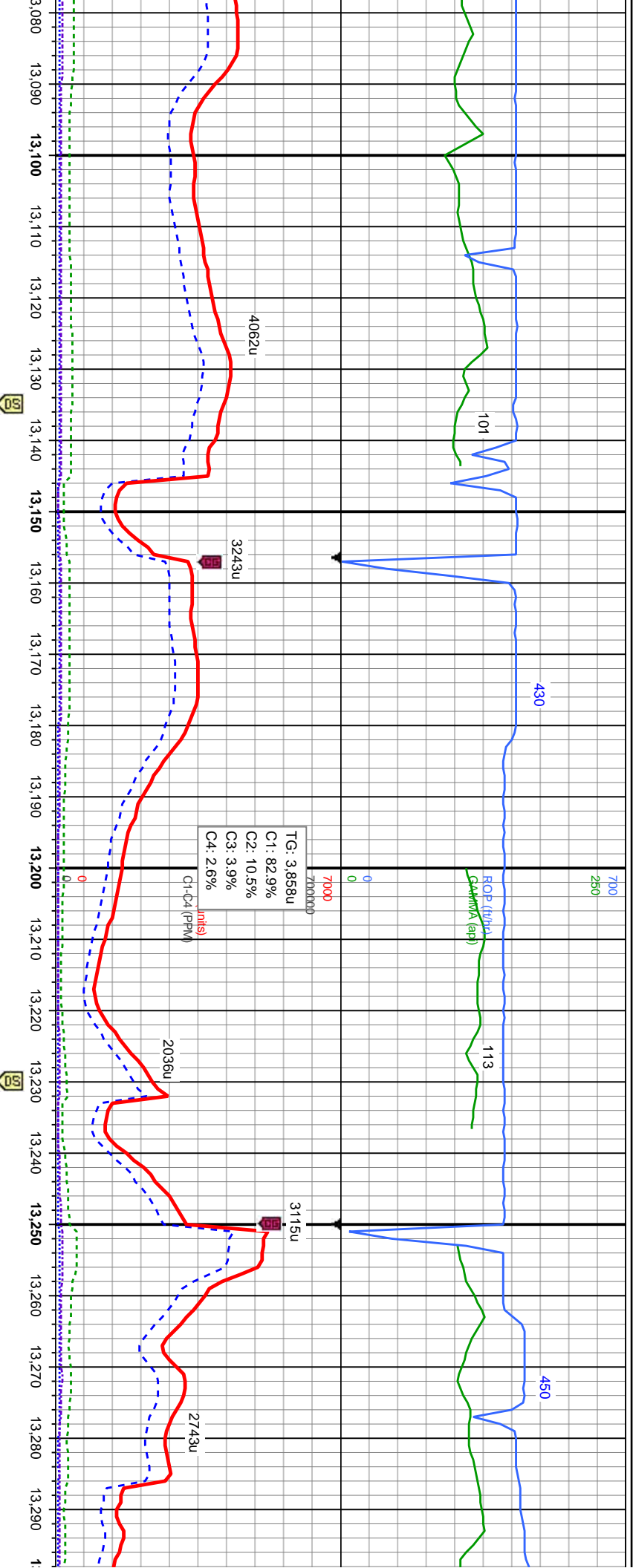


MD: 12,472'
Inclination: 90.18°
Azimuth: 89°
TVD: 6,623'
VS: 5,541'

MD: 12,567'
Inclination: 90.03°
Azimuth: 91°
TVD: 6,623'
VS: 5,636'





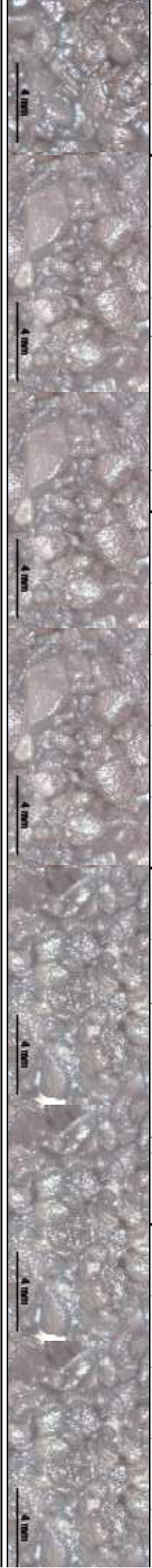


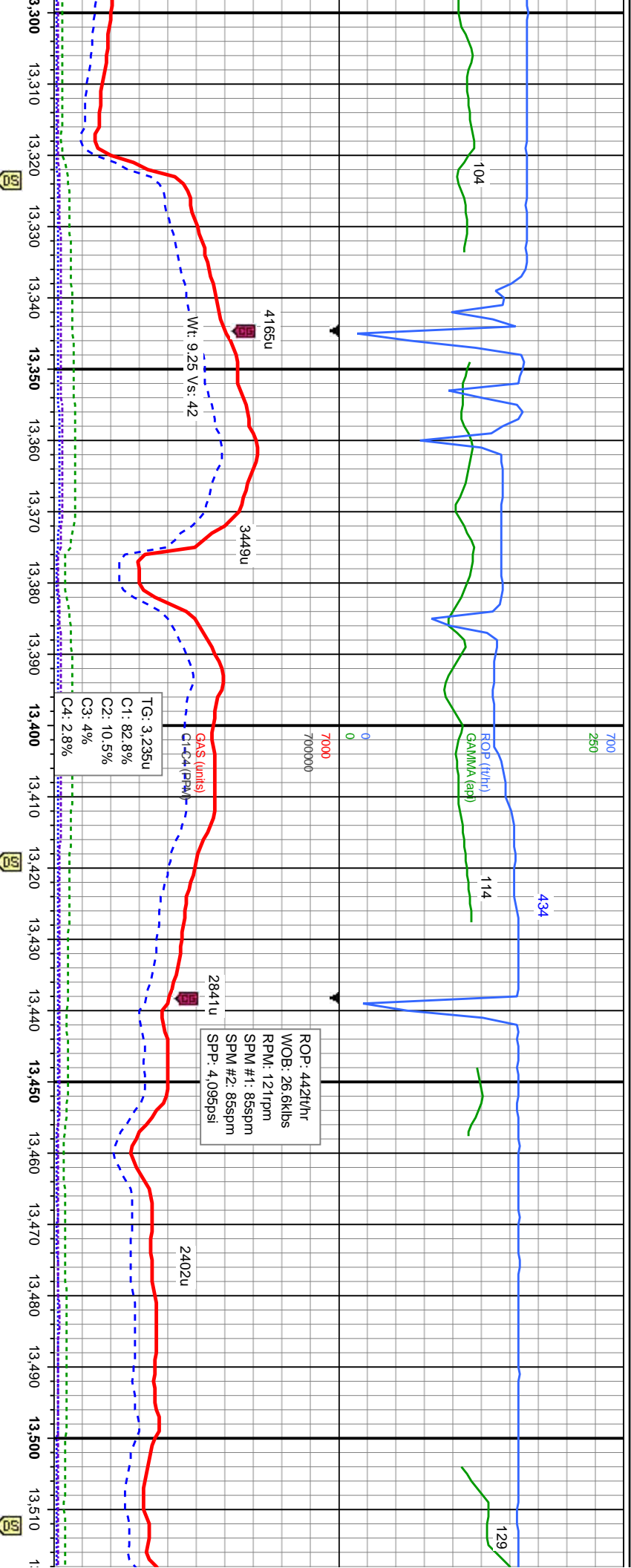
SS: lt gry-med gry, frm-hd, l vf-mcxl, sb ang-sb rd, p-fr strd, mod pors, v sl
calc. SH: dk gy-blk, frm, sl sily-gt, sb blk-y-sb ply, non calc.

SS: lt gry-med gry, frm-hd, l vf-mcxl, sb ang-sb rd, p-fr strd, mod pors, v sl
calc. SH: dk gy-blk, frm, sl sily-gt, sb blk-y-sb ply, non calc.

MD: 13,134'
Inclination: 90.06°
Azimuth: 92°
TVD: 6,620'
VS: 6,201'

MD: 13,229'
Inclination: 90.15°
Azimuth: 92°
TVD: 6,620'
VS: 6,295'





SS: lt. gry-med gry, frm-hd, l vf-mcxl, sb ang-sb rd, p-fr strd, mod pors, v sl
calc. SH: dk gy-blk, frm, sl silty-gt, sb blk-sb ply, non calc.

SS: lt gry-med gry, frm-hd, l vf-mcxl, sb ang-sb rd, p-fr strd, mod pors, v sl
calc. SH: dk gy-blk, frm, sl silty-gt, sb blk-sb ply, non calc.

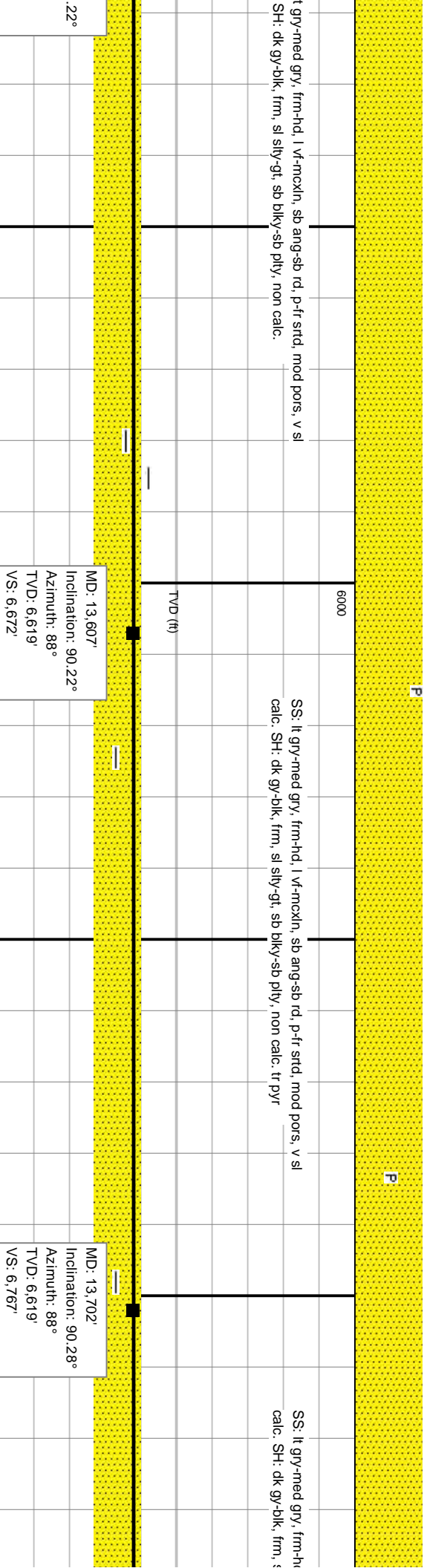
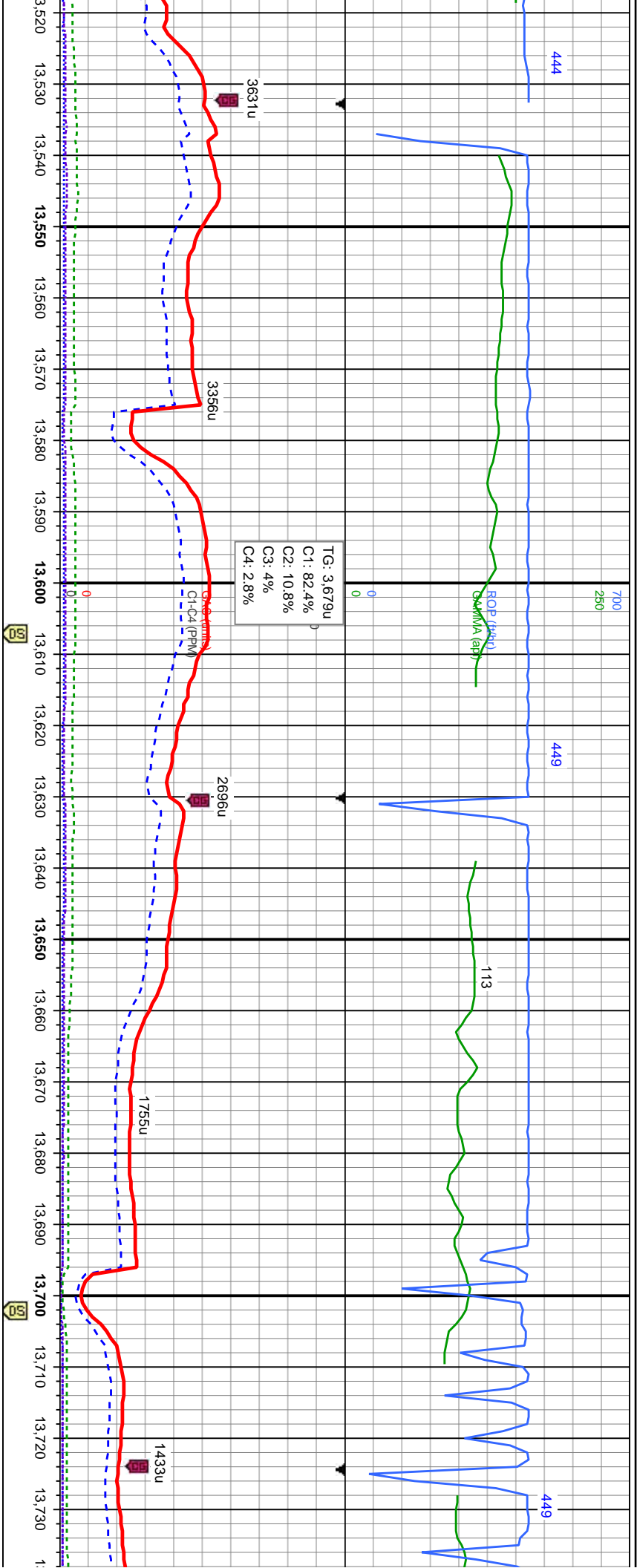
SS: l
calc.

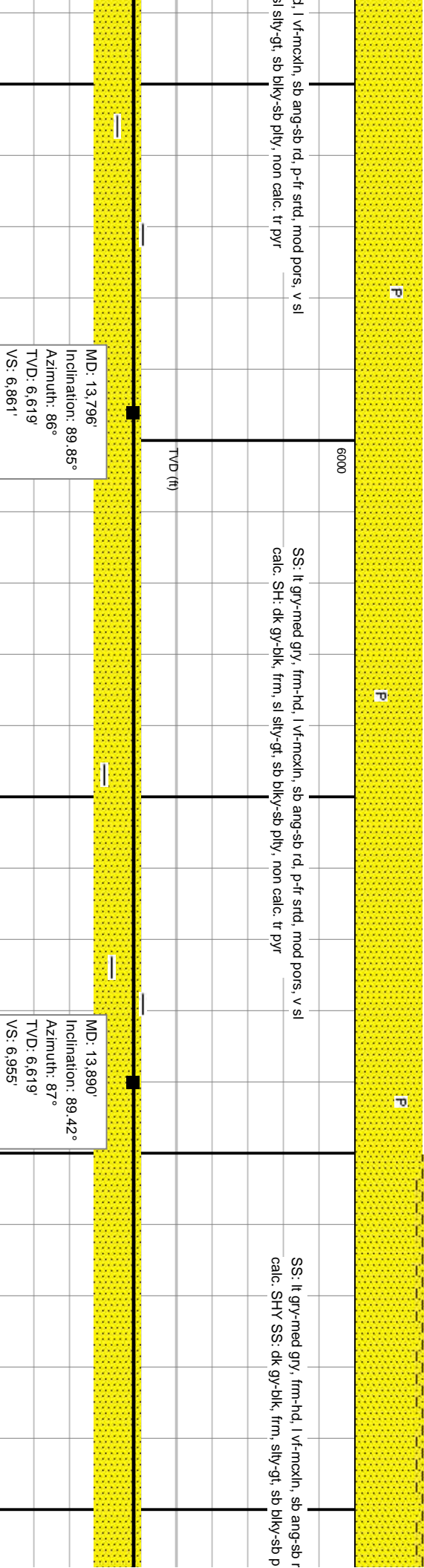
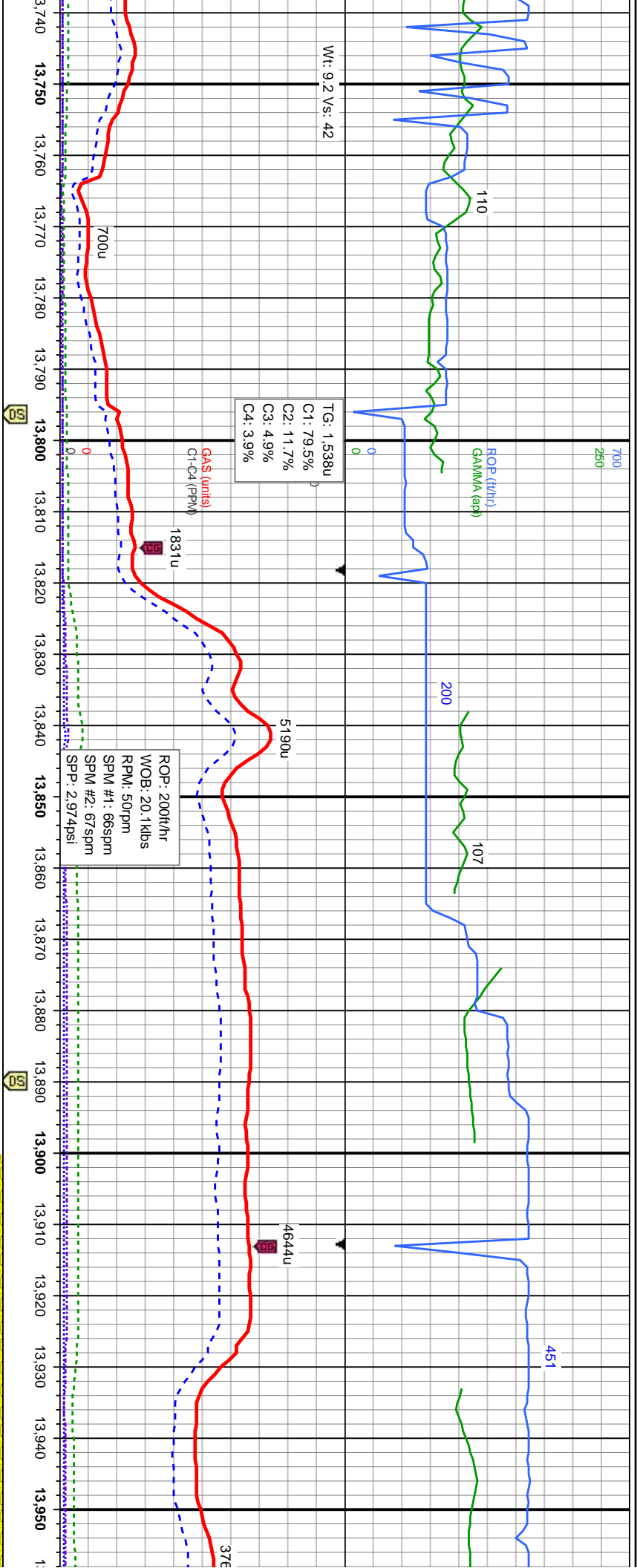
MD: 13.323'
Inclination: 90.06°
Azimuth: 90°
TVD: 6.620'
VS: 6.389'

MD: 13.418'
Inclination: 90.15°
Azimuth: 88°
TVD: 6.620'
VS: 6.484'

MD: 13.512'
Inclination: 90°
Azimuth: 88°
TVD: 6.620'
VS: 6.577'



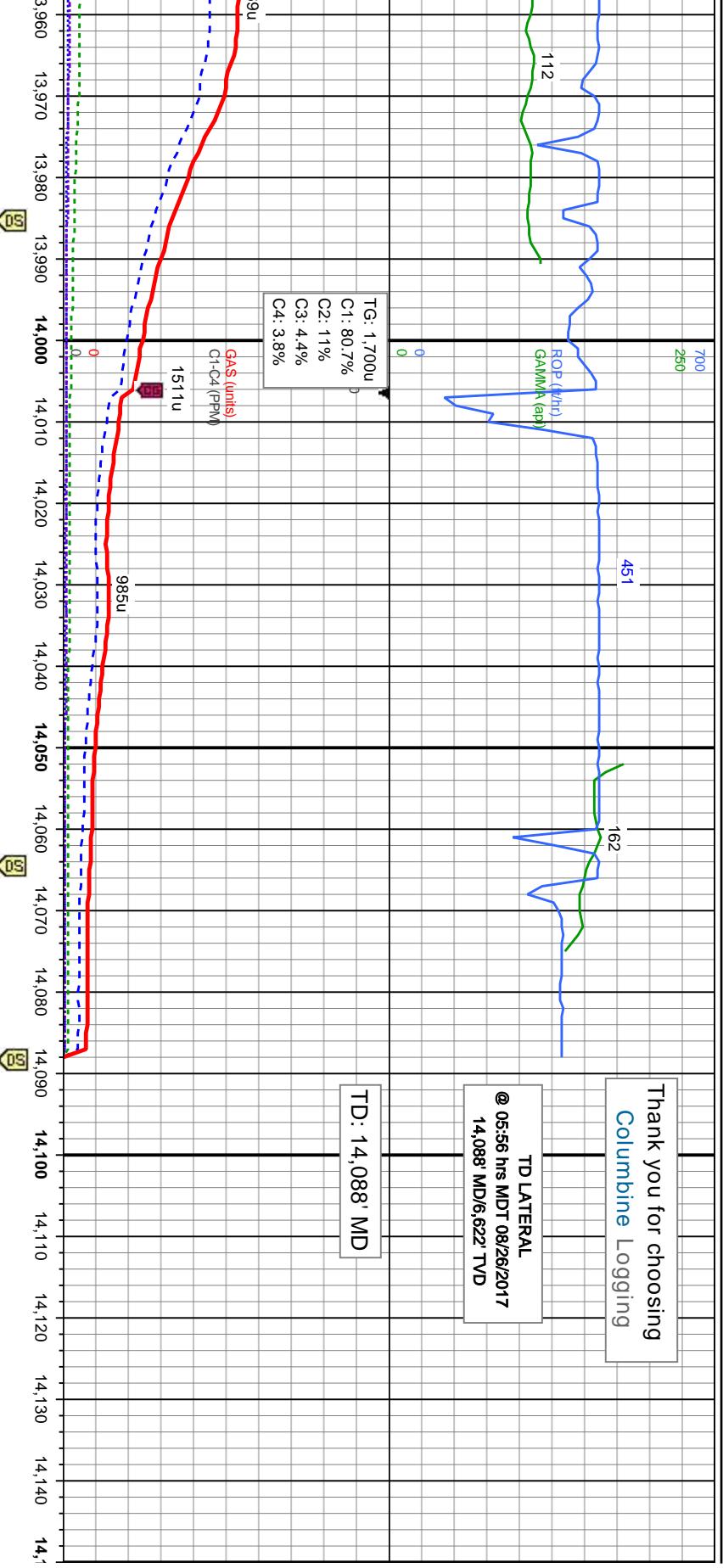




Columbine Logging

TD LATERAL
@ 05:56 hrs MDT 08/26/2017
14,088' MD/6,622' TVD

TD: 14,088' MD



SS: lt gry-med gry, frm-hd, l vf-mcxln, sb ang-sb rd, p-fr srtld, mod porcs, v s
calc. SHY SS: dk gy-blk, frm, slty-gt, sb blkly-sb plty, non calc. tr pyr

