

# COLUMBINE LOGGING

Scale: 5" / 100'  
Measured Depth Log

**Well Name** Buckskin 5-64 15-16-1BHZ

**Location** Sec. 15 T5S R64W

**State** COLORADO

**County** ARAPAHOE

**Country** USA

**Rig Number** TRUE 33

**API Number** 05-005-07343

**AFE #** CO-0001H

**Geographic Region** DJ BASIN

**Field** WILDCAT

**Spud Date** 4/21/2018

**Drilling Completed** 5/21/2018

**Surface Coordinates** Sec. 15 T5S R64W,  
2380' FSL, 440' FEL  
39.3653298, -104.3151575

**Bottom Hole Coordinates** Sec. 16 T5S R64W,  
1650' FNL, 100' FWL  
39.3707302, -104.3358640

**Ground Elevation** 5934'

**K.B. Elevation** 5961'

**Logged Interval** 4800' To 17997'

**Total Depth** 17997'

**Formation** Niobrara B Chalk

**Type of Drilling Fluid** OBM

## Operator

**Company** Highlands Natural Resources

**Address** 2401 East 2nd Avenue  
Suite No. 150  
Denver, Colorado 80206



## Geologist

**Name** Whit Childs

**Company** Highlands Natural Resources

**Address** 2401 East 2nd Avenue  
Suite No. 150  
Denver, Colorado 80206



Other

Columbine Logging Inc. Dennis C. Vertrees, Christopher Perez

Gas Detection: Blood Hound #0263

Columbine Computer: #27A

Color Coding

- Oil

Note

Error
- Condensate

Core

Water
- Gas

Pressure

Seal

Rock Types

- UNKNOWN

ANHYDRITE

BENTONITE

BRECCIA

CHALK

CEMENT

CHERT

CLAY CHOKE SANIC

CLAYSTONE
- COAL

CONGLOMERATE

DOLomite

DOLOMITIC LIMESTONE

GRANITE

GYPsUM

IGNEOUS

SIDERITE or LIMONITE

LIMESTONE
- MARLSTONE

METAMORPHIC

NO SAMPLE

SALT

SANDSTONE

SALT-PEPPER SANIC

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
- ALGAE

AMPHIPORA

BELEMNITE

BIOCLASTIC

BRACHOIPOD

BRYOZOA

CERPHALOPOD

CORAL

CRINOID

ANHYDRITIC

ARGILLACEOUS

Minerals

Oil Show

- P PINPOINT

V VUGGY
- DEAD

EVEN

QUESTIONABLE

SPOTTED STAINING
- BIT

CONNECTION (UP)

Engineering

Porosity

- CONNECTION (DOWN)

CONNECTION GAS

CONNECTION GAS (LEFT)

TRIP GAS

TRIP GAS (LEFT)

INTERCRYSTALLINE

INTEROOLITIC

MOLDIC

ORGANIC
- DOWN TIME GAS

DOWN TIME GAS (LEFT)

CORE - LOST

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 Inc. Rigged  
Up 2 man logging on 5/11/2018,  
began logging from 4800' MD at  
17:28 MDST, on 5/13/18.

ROP imported via Pason

Survey & Gamma Data Provided  
by Baker Hughes

Depth Correction

ROP (ft/hr)  
GAMMA (cp)

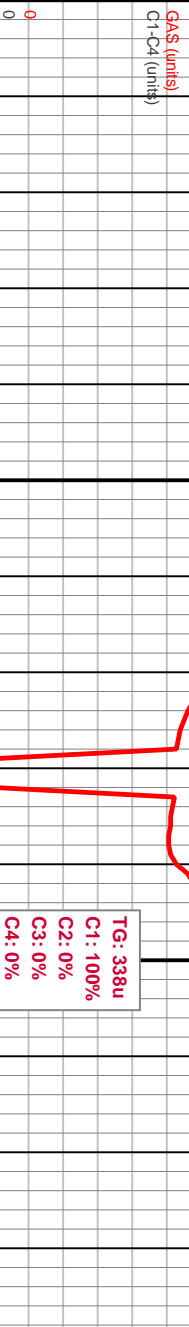
353ft/hr

133cp

Mud Wt 9.5/ Vis 47

Gas Data From Bloodhound Unit #0263,  
data imported via Pason and Iball

Total Gas & Chromatograph  
GAS  
C1  
C2  
C3  
C4



Depth Labels

% Lith

Bit Data  
Bit #: 2  
Type: AT505F  
Size: 8.5  
Depth In: 2,152'  
Depth Out: 17,997'  
Jets: 5X15  
S/N: 716374

Well Bore  
TVD

100' SAMPLE INTERVAL

MD: 4,828'  
Inclination: 11.83°  
Azimuth: 15.92°  
TVD: 4,754.1'  
VS: -210.07'

MD: 4,922'  
Inclination: 12°  
Azimuth: 14.41°  
TVD: 4,843.08'  
VS: -212.65'

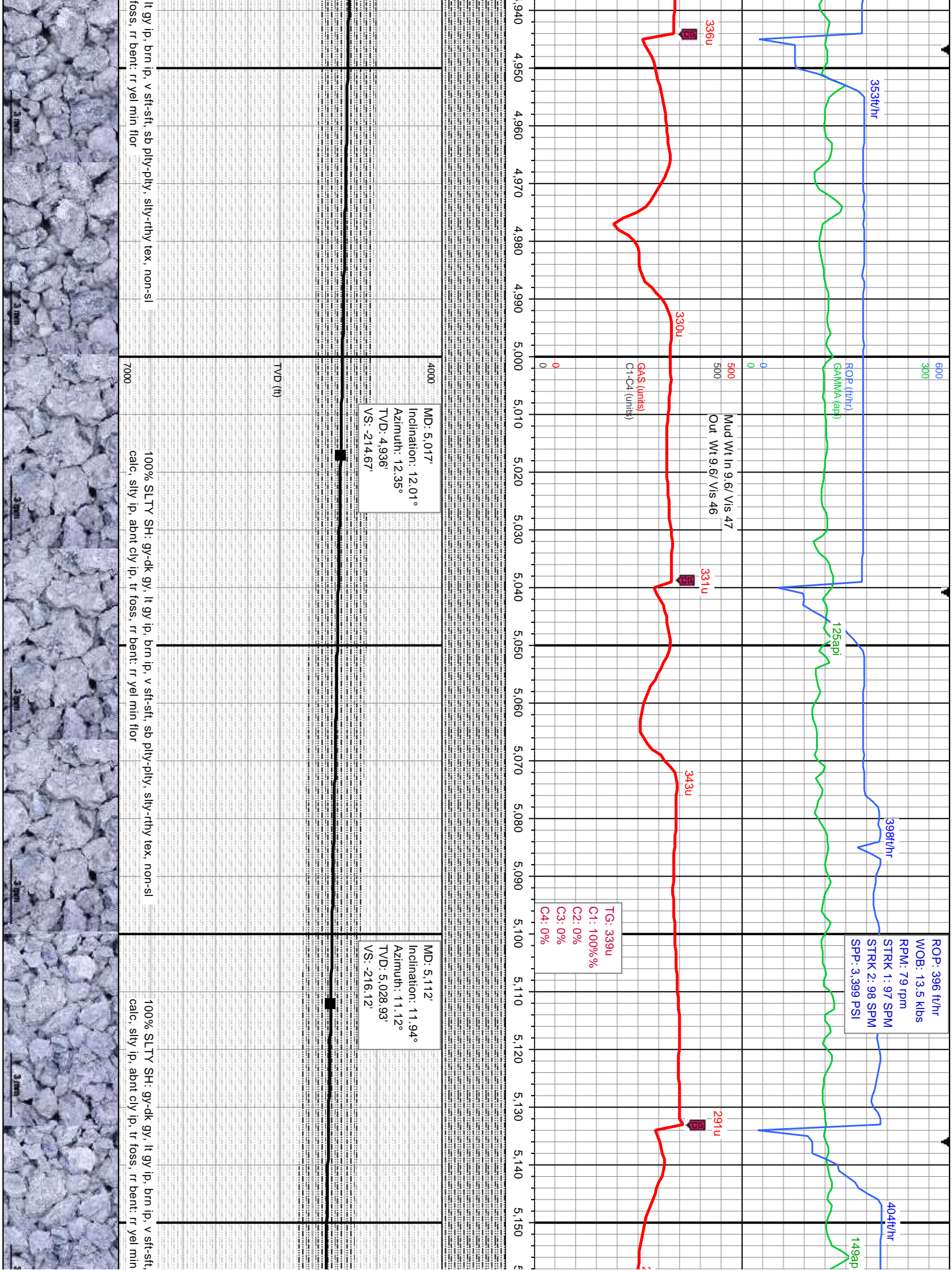
100% SLTY SH: gy-dk gy, lt gy ip, brn ip, v sft-sft, sb pily-pily, sily-rthy tex, non-sl  
calc, sily ip, abnt cly ip, tr foss, rr bent, rr yel mln flr

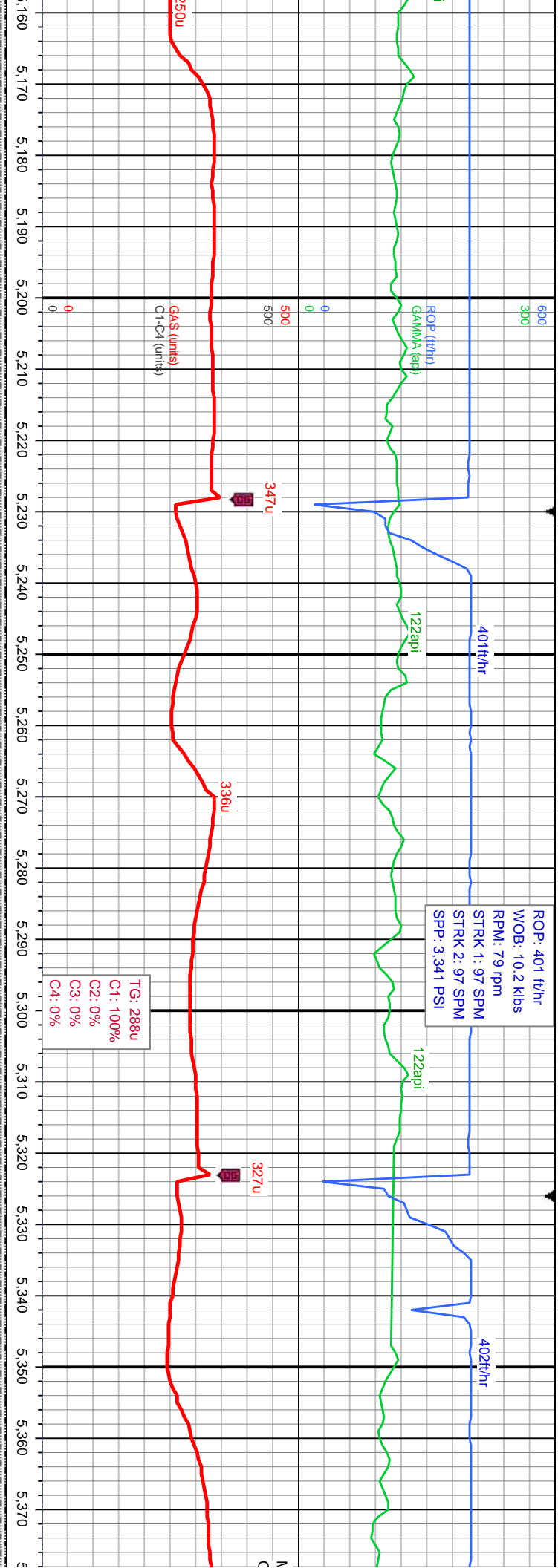
100% SLTY SH: gy-dk gy,  
calc, sily ip, abnt cly ip, tr

Images





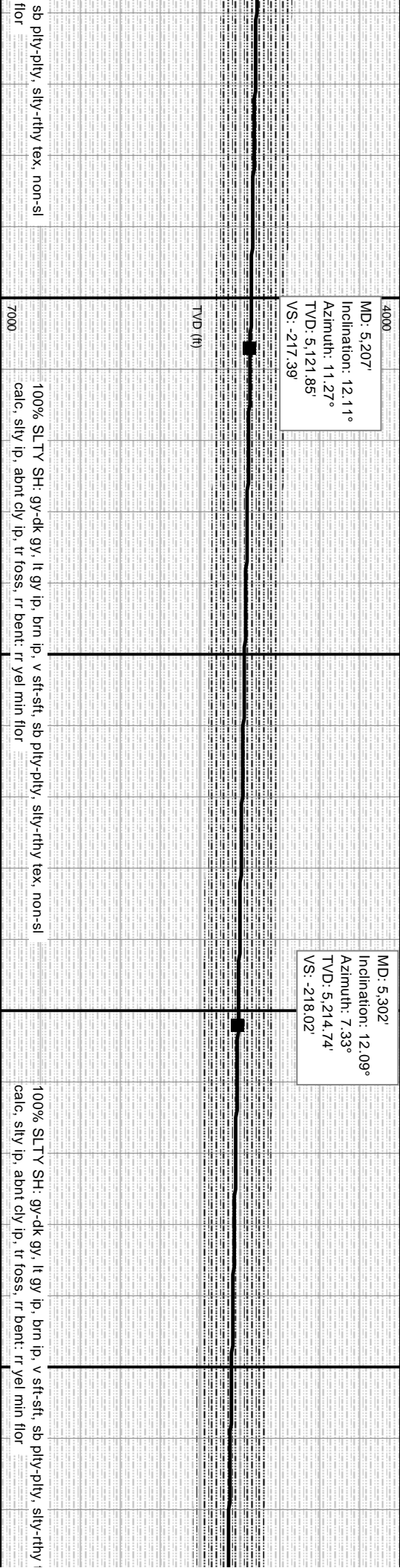




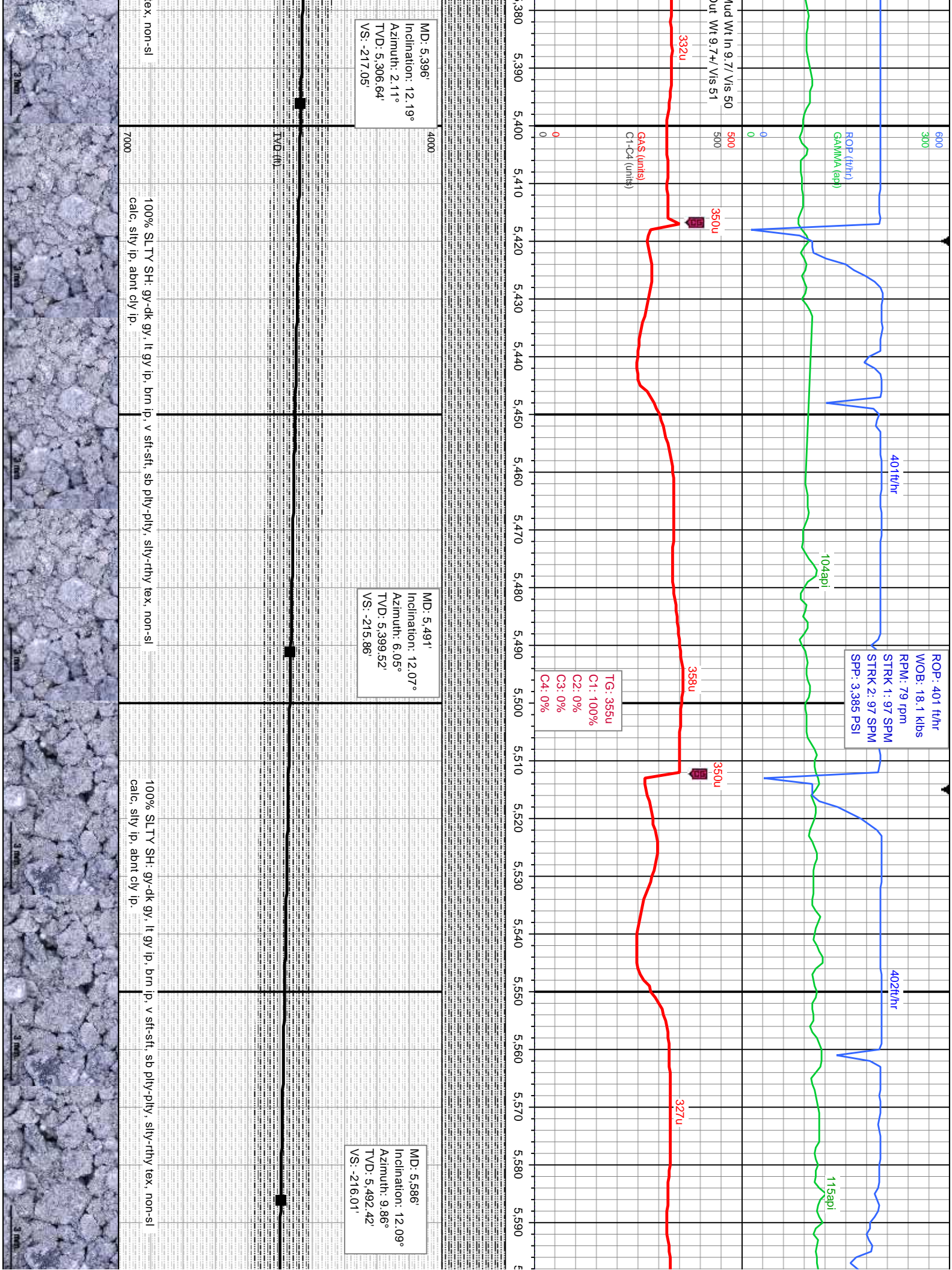
MD: 5,207'  
Inclination: 12.11°  
Azimuth: 11.27°  
TVD: 5,121.85'  
VS: -217.39'

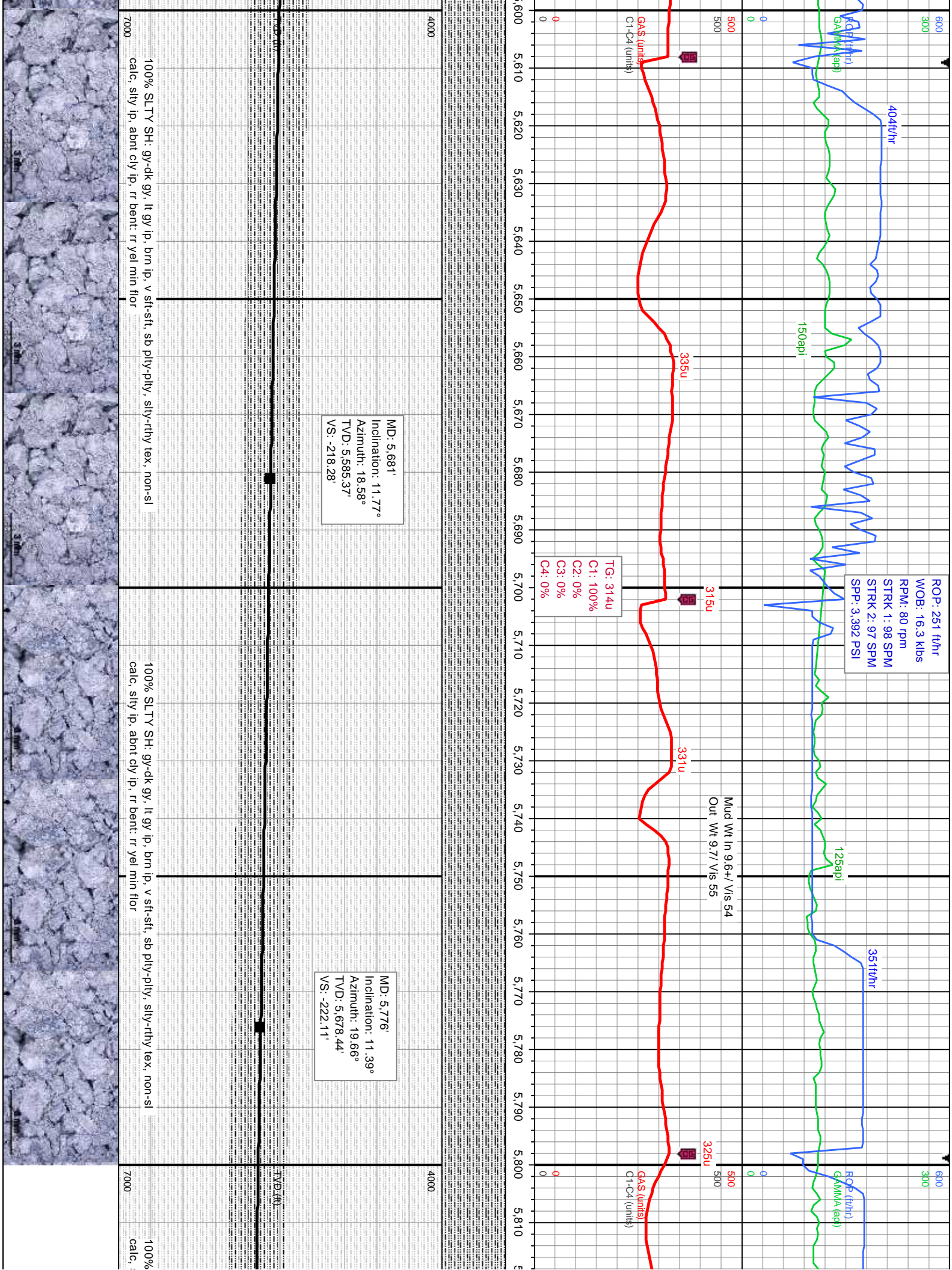
TG: 288u  
C1: 100%  
C2: 0%  
C3: 0%  
C4: 0%

MD: 5,302'  
Inclination: 12.09°  
Azimuth: 7.33°  
TVD: 5,214.74'  
VS: -218.02'

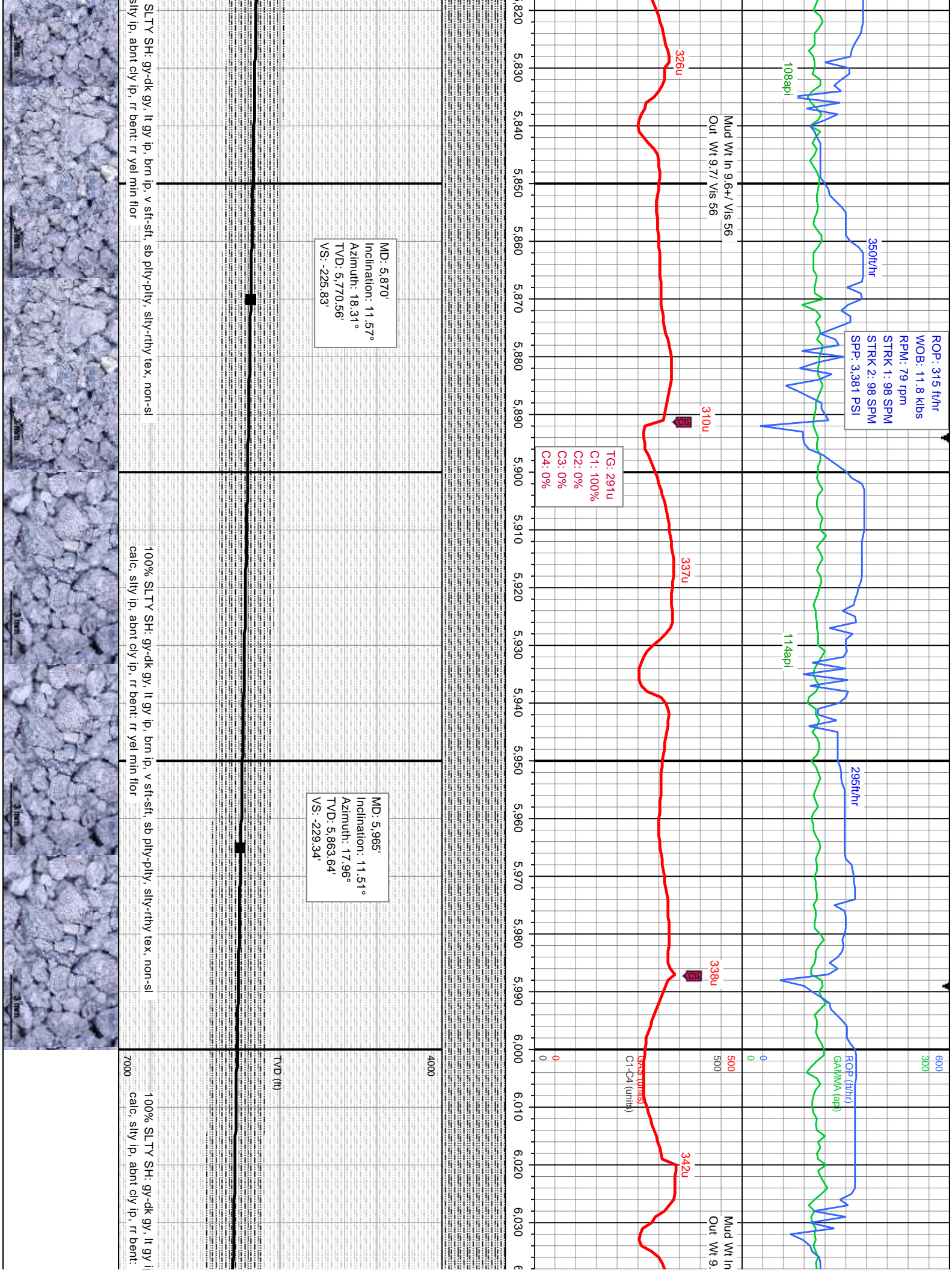


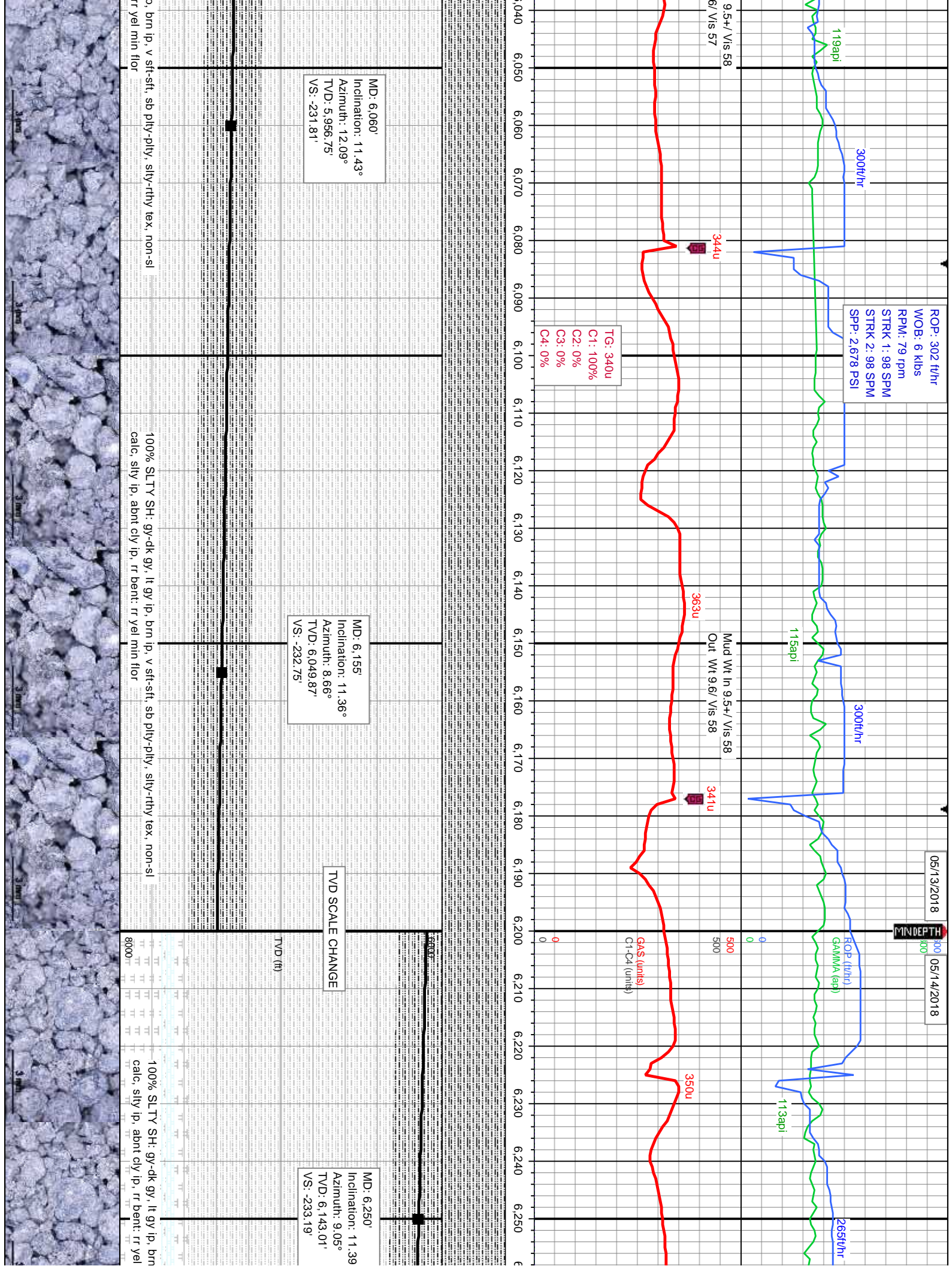






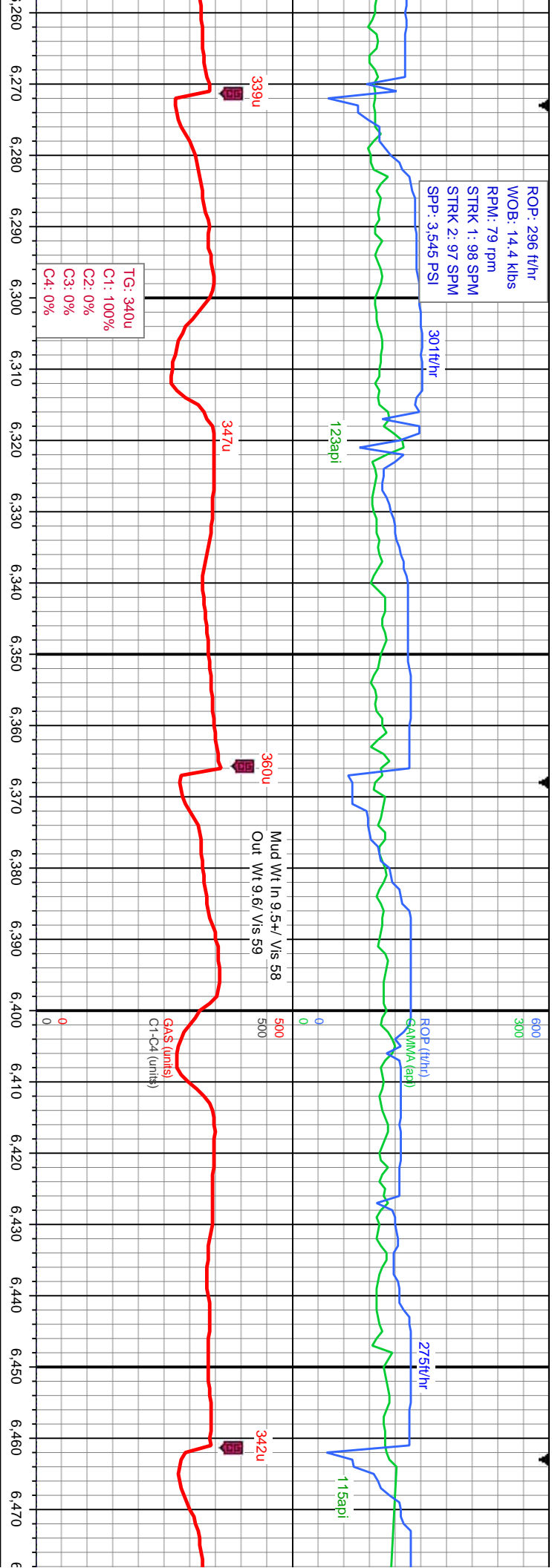








ROP: 296 ft/hr  
WOB: 14.4 klbs  
RPM: 79 rpm  
STRK 1: 98 SPM  
STRK 2: 97 SPM  
SPR: 3.545 PSI



MD: 6,345'  
Inclination: 11.42°  
Azimuth: 9.1°  
TVD: 6,236.13'  
VS: -233.7'

TVD (ft)

MD: 6,440'  
Inclination: 11.44°  
Azimuth: 14.69°  
TVD: 6,329.25'  
VS: -235.14'

ip, v sft-sft, sb pily-pily, silty-rthy tex, non-si  
min flor

100% SLTY SH: gy-dk gy, lt gy ip, v sft-sft, sb pily-pily, silty-rthy tex, non-si calic, silty  
ip, abnt cly ip, rr bent: rr yel min flor

100% SLTY SH: gy-dk gy, lt gy ip, v sft-sft, sb pily-pily, silty-rthy tex, no  
ip, abnt cly ip, rr bent: rr yel min flor



ROP: 278 ft/hr  
WOB: 11.4 klbs  
RPM: 79 rpm  
STRK 1: 97 SPM  
STRK 2: 98 SPM  
SPP: 3.367 PSI

TG: 330u  
C1: 100%  
C2: 0%  
C3: 0%  
C4: 0%

MD: 6.534'  
Inclination: 11.41°  
Azimuth: 17.87°  
TVD: 6,421.39'  
VS: -237.98'

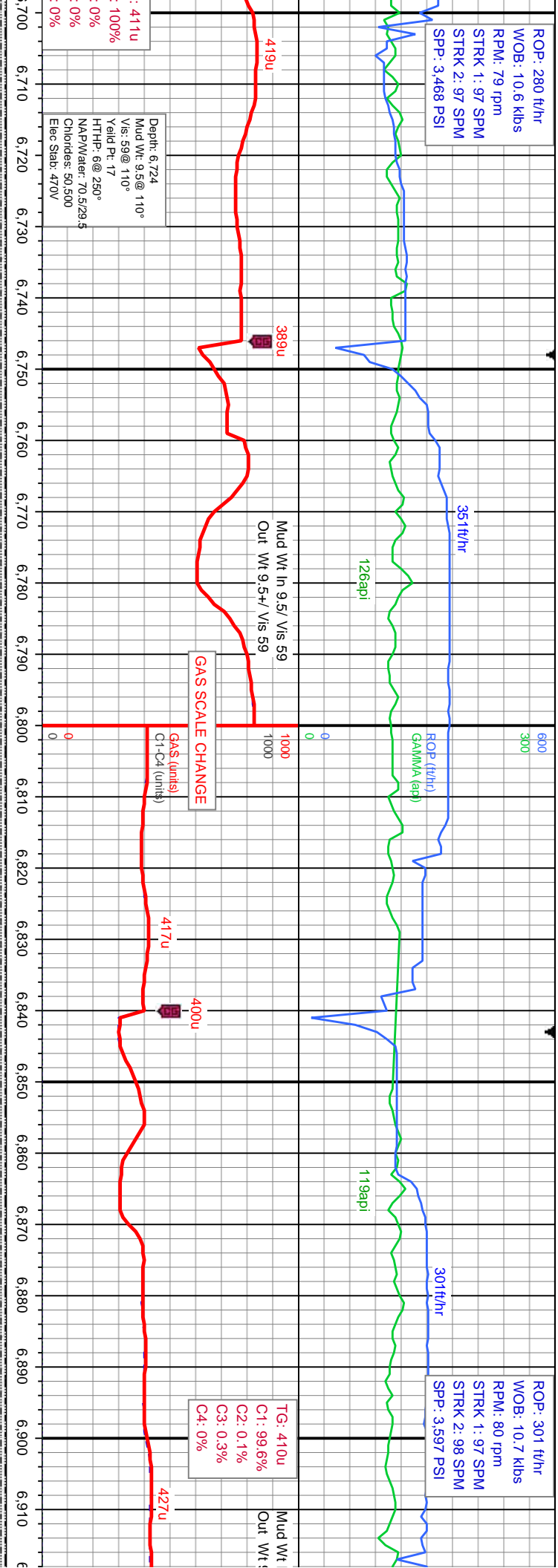
MD: 6.629'  
Inclination: 11.26°  
Azimuth: 20.82°  
TVD: 6,514.54'  
VS: -241.8'

100% SLTY SH. gy-dk gy. lt gy ip, v sft-sft, sb pty-pty, sily-rthy tex, non-sl calc, sily ip, abnt cly ip, rr bent: rr yel min flr

100% SLTY SH. gy-dk gy. lt gy ip, v sft-sft, sb pty-pty, sily-rthy tex, non-sl calc, sily ip, abnt cly ip, rr bent: rr yel min flr

ROP: 280 ft/hr  
WOB: 10.6 klbs  
RPM: 79 rpm  
STRK 1: 97 SPM  
STRK 2: 97 SPM  
SP: 3.468 PSI

ROP: 301 ft/hr  
WOB: 10.7 klbs  
RPM: 80 rpm  
STRK 1: 97 SPM  
STRK 2: 98 SPM  
SP: 3.597 PSI



Depth: 6,724  
Mud Wt: 9.5 @ 110°  
Vis: 59 @ 110°  
Yield Pt: 17  
HTHP: 6 @ 250°  
NAP/Water: 70.5/29.5  
Chlorides: 50,500  
Elec Stab: 470V

GAS SCALE CHANGE

TG: 410u  
C1: 99.6%  
C2: 0.1%  
C3: 0.3%  
C4: 0%

MD: 6,724'  
Inclination: 11.57°  
Azimuth: 22.04°  
TVD: 6,607.66'  
VS: -246.33'

MD: 6,819'  
Inclination: 11.39°  
Azimuth: 23.29°  
TVD: 6,700.76'  
VS: -251.27'

MD: 6,914'  
Inclination: 1  
Azimuth: 19  
TVD: 6,793.9  
VS: -255.76'

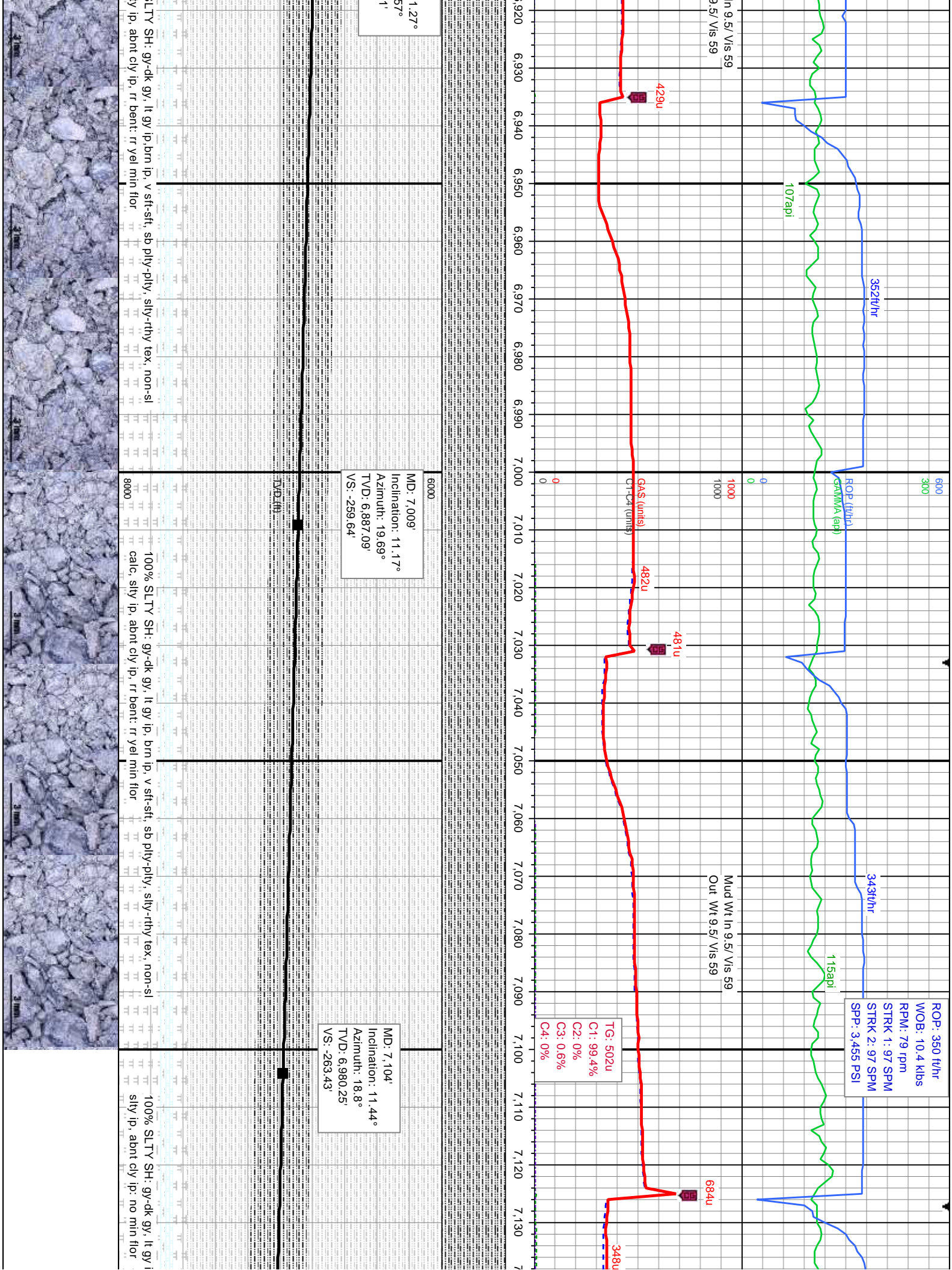
100% SLTY SH: gy-dk gy, lt gy ip, brn ip, v sft-sft, sb pily-pily, silty-rthy tex, non-sil, calc, silty ip, abnt cly ip, rr bent: rr yel min flr

100% SLTY SH: gy-dk gy, lt gy ip, brn ip, v sft-sft, sb pily-pily, silty-rthy tex, non-sil, calc, silty ip

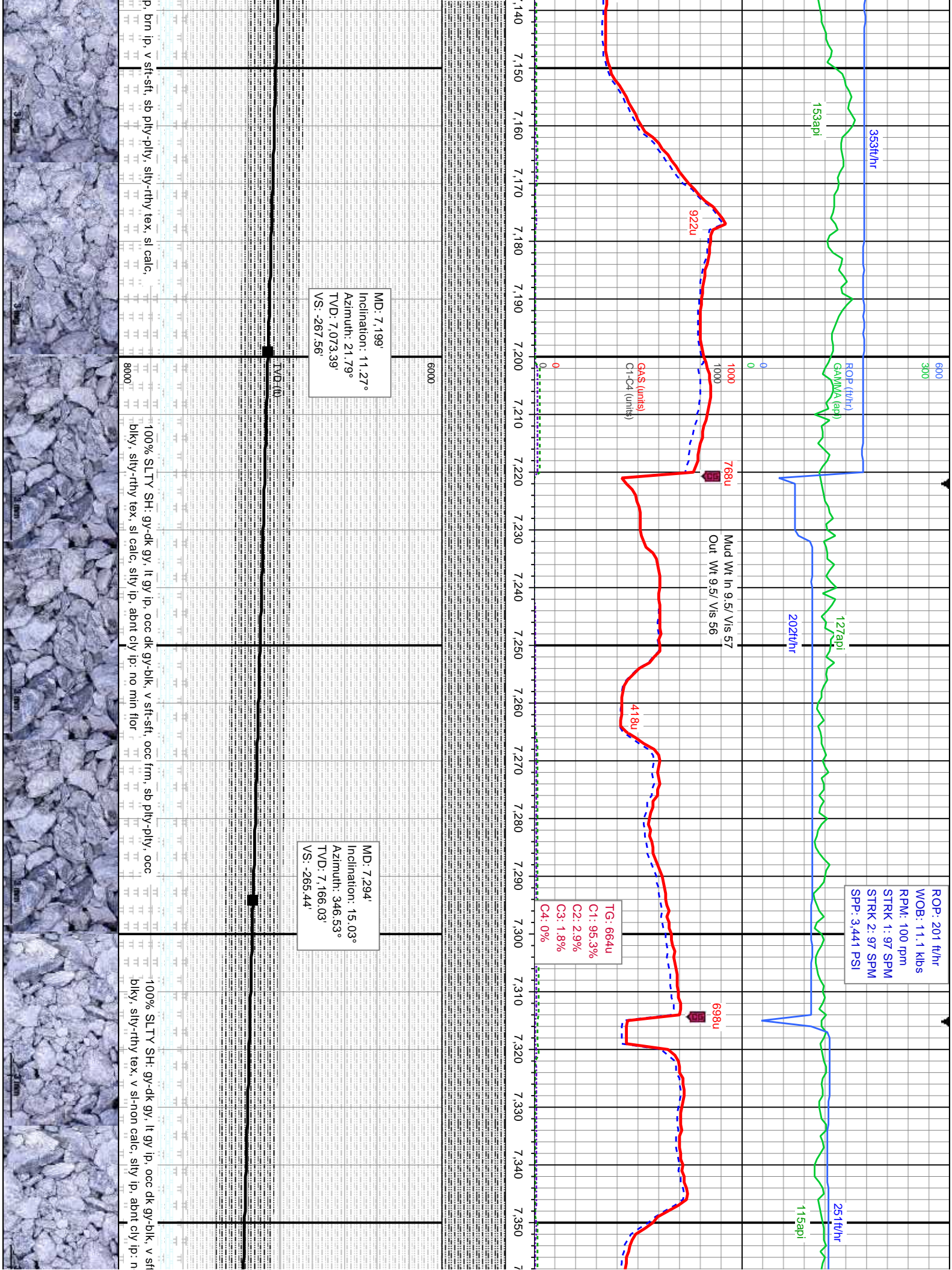
100% S

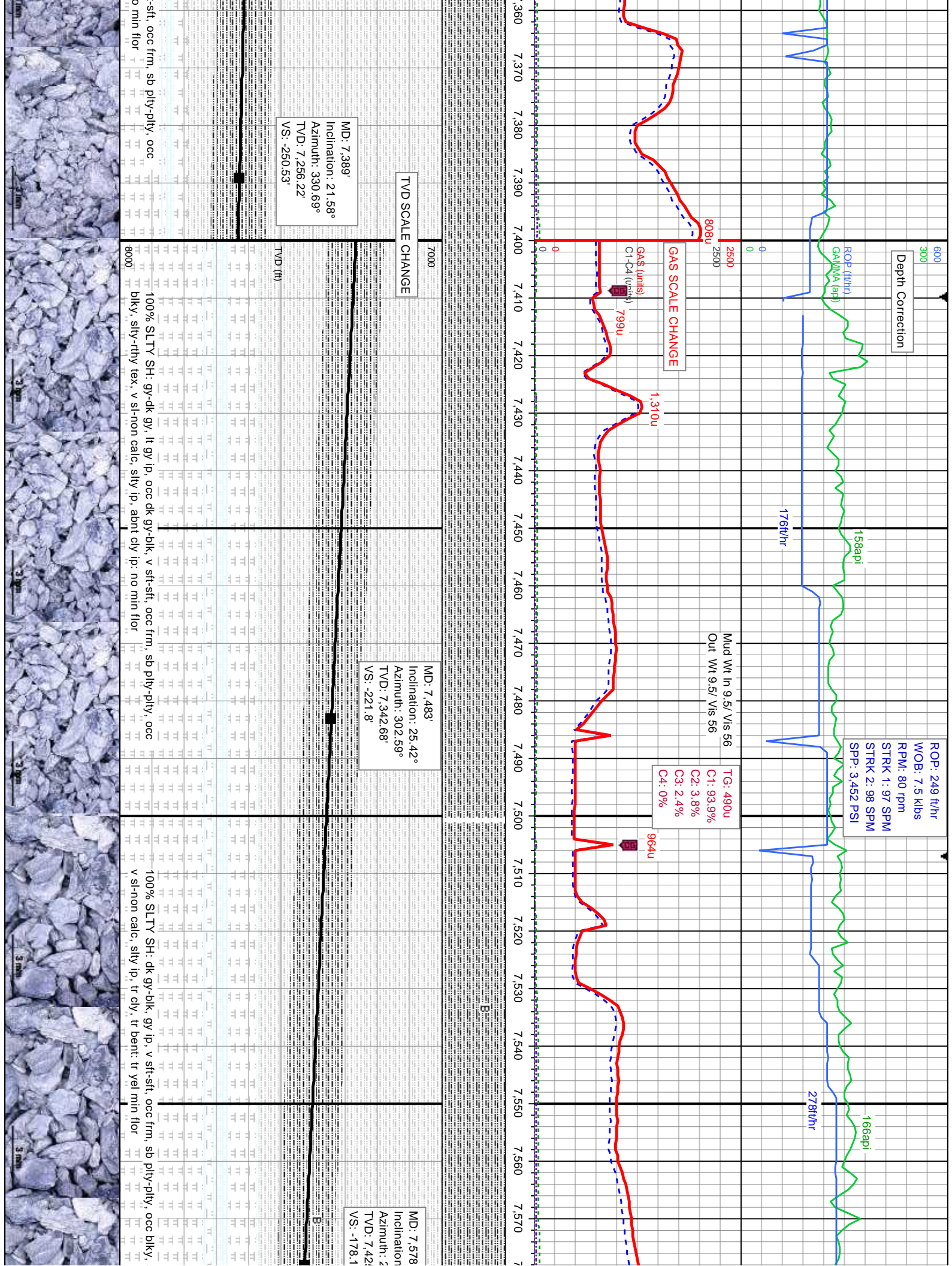














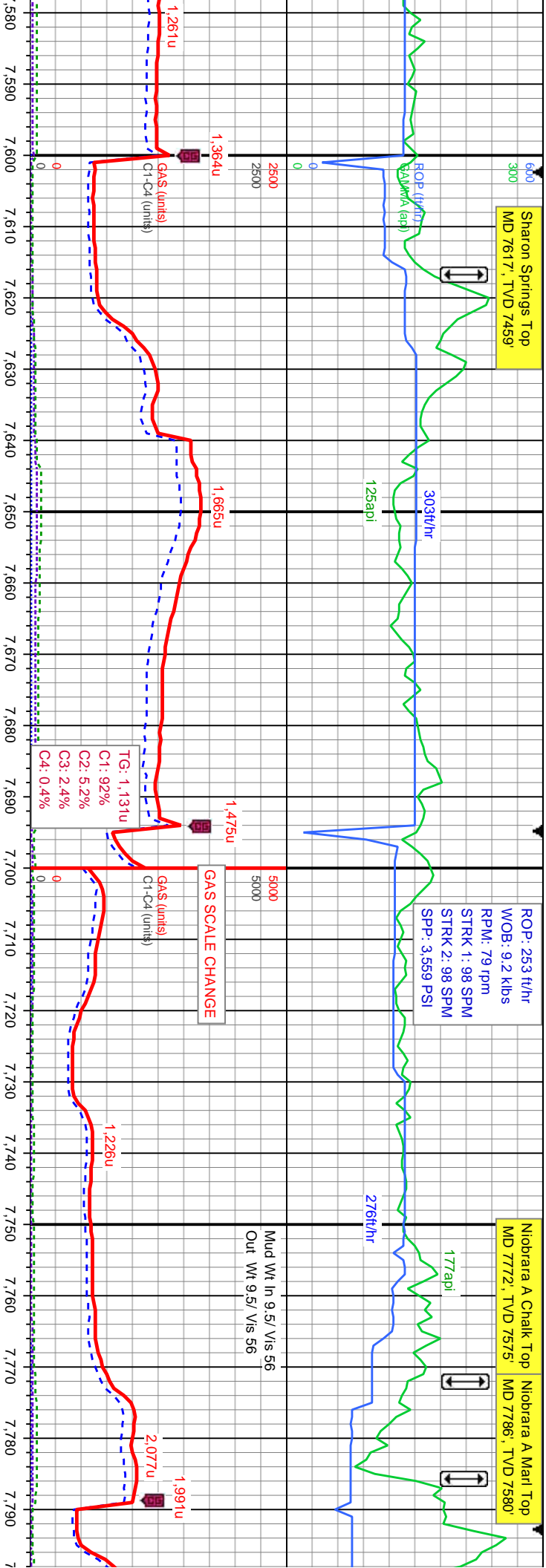
Sharon Springs Top  
MD 7617', TVD 7459'

Niobrara A Chalk Top  
MD 7772', TVD 7575'

Niobrara A Marl Top  
MD 7786', TVD 7580'

ROP: 263 ft/hr  
WOB: 9.2 klbs  
RPM: 79 rpm  
STRK 1: 98 SPM  
STRK 2: 98 SPM  
SP: 3.559 PSI

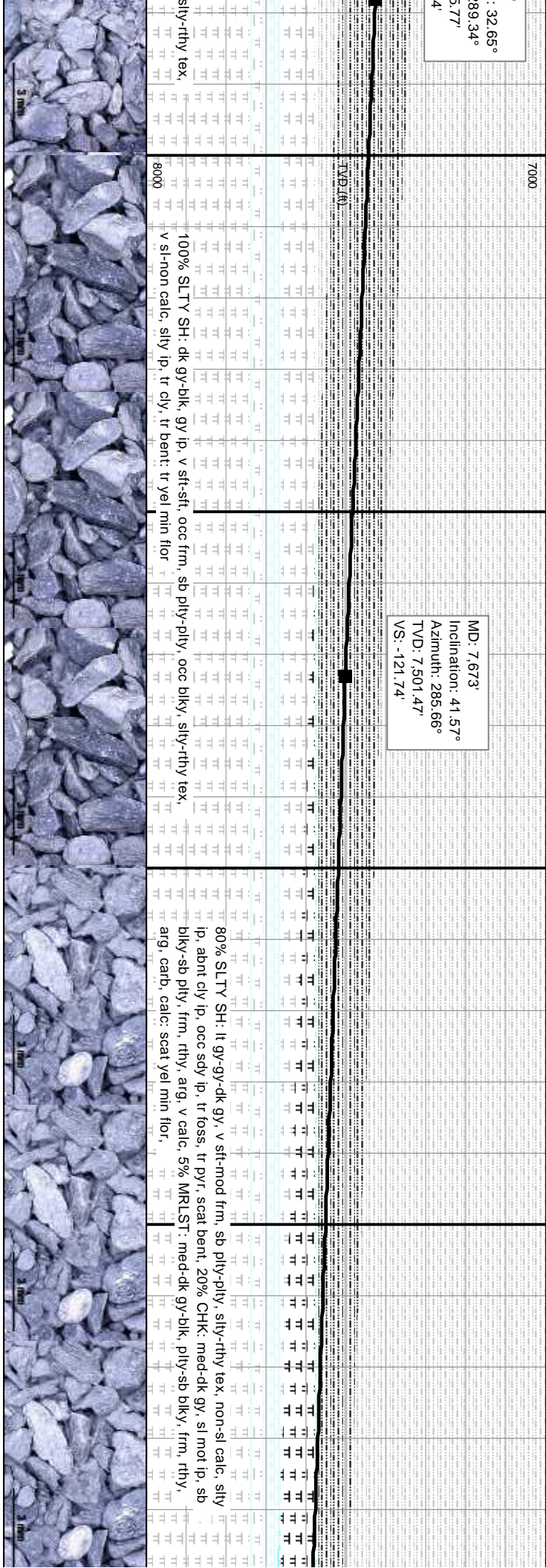
Mud Wt In 9.5/ Vis 56  
Out Wt 9.5/ Vis 56



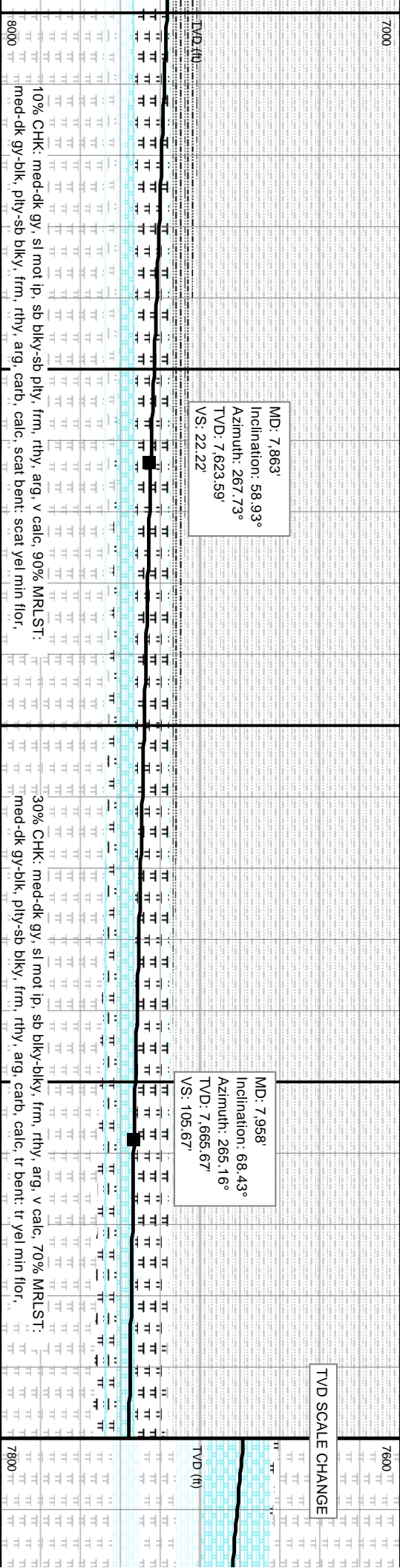
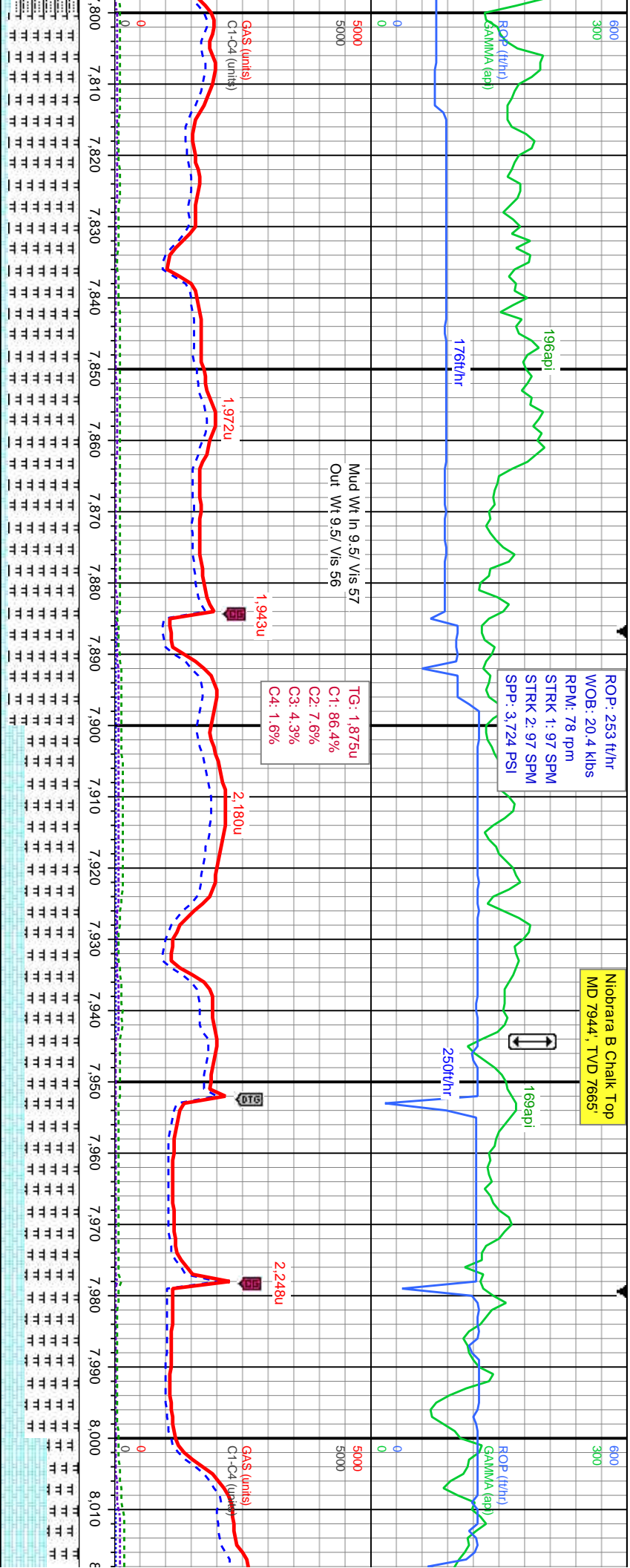
MD: 7,673'  
Inclination: 41.57°  
Azimuth: 285.66°  
TVD: 7,501.47'  
VS: -121.74'

100% SLTY SH: dk gy-blk, gy ip, v sft-sft, occ frm, sb pily-pily, occ blk, sily-rthy tex, v si-non calc, sily ip, tr cly, tr bent: tr yel min flr

80% SLTY SH: lt gy-gy-dk gy, v sft-mod frm, sb pily-pily, sily-rthy tex, non-si calc, sily ip, abnt cly ip, occ sdy ip, tr foss, tr pvt, scat bent, 20% CHK: med-dk gy, si mot ip, sb blk-sb pily, frm, rthy, arg, v calc, 5% MRLST: med-dk gy-blk, pily-sb blk, frm, rthy, arg, carb, calc: scat yel min flr,

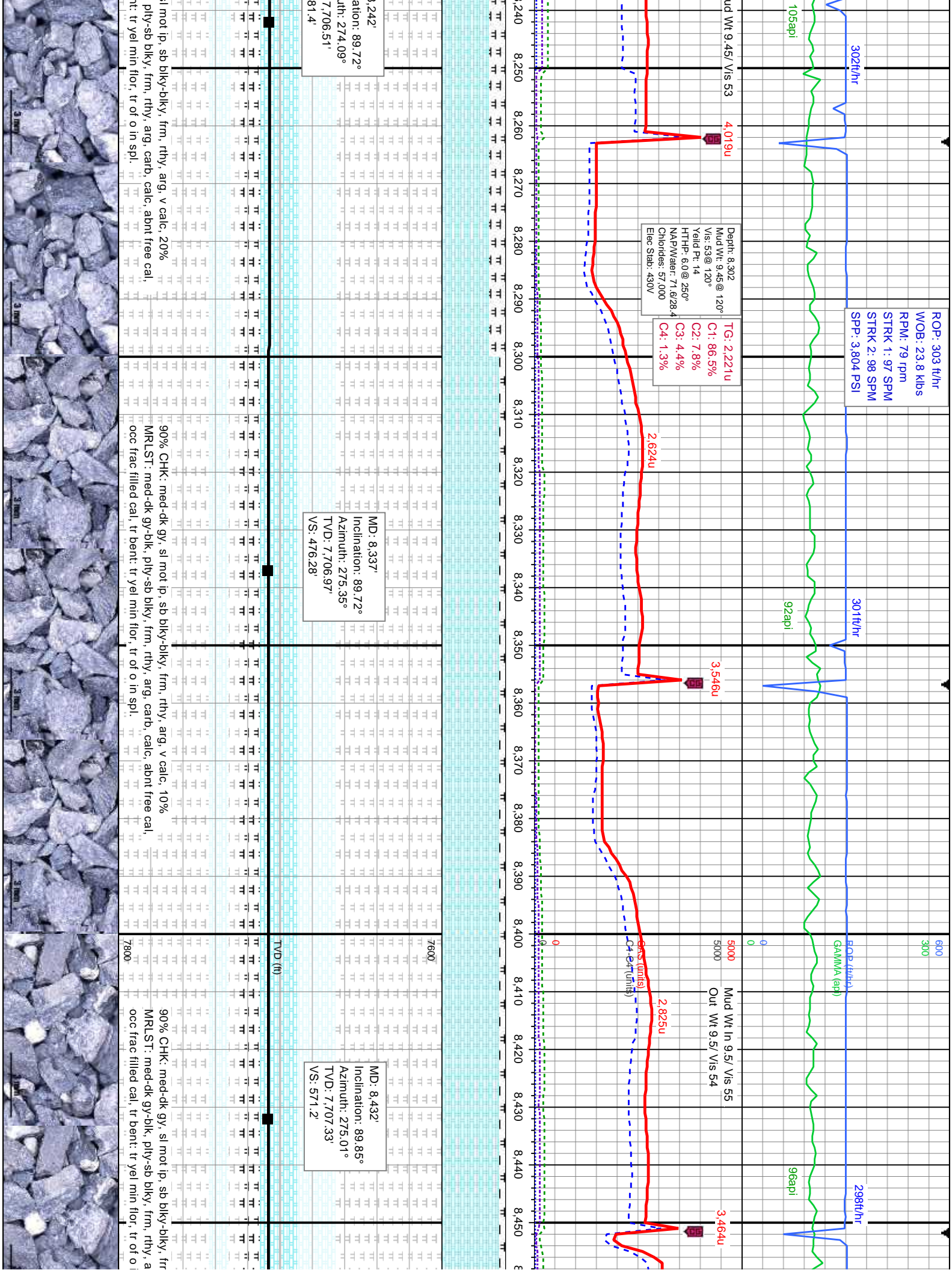














ROP: 301 ft/hr  
WOB: 20.8 klbs  
RPM: 79 rpm  
STRK 1: 98 SPM  
STRK 2: 98 SPM  
SP: 3.874 PSI

Mud Wt In 9.4/ Vis 54  
Out Wt 9.4/ Vis 53

TG: 2.839u  
C1: 85.8%  
C2: 9.1%  
C3: 3.9%  
C4: 1.2%

MD: 8.527'  
Inclination: 89.75°  
Azimuth: 274.48°  
TVD: 7.707.66'  
VS: 666.09'

MD: 8.621'  
Inclination: 89.82°  
Azimuth: 272.94°  
TVD: 7.708.02'  
VS: 759.88'

90% CHK: med-dk gy, sl mot ip, sb blk-y-bkly, frm, rthy, arg, v calc, 10%  
MRLST: med-dk gy-bkly, ply-sb blkly, frm, rthy, arg, carb, calc, abnt free cal,  
occ frac filled cal, tr bent: tr yel min flr, tr of o in spl.

90% CHK: med-dk gy, sl mot ip, sb blk-y-bkly, frm, rthy, arg, v calc, 10%  
MRLST: med-dk gy-bkly, ply-sb blkly, frm, rthy, arg, carb, calc, abnt free  
occ frac filled cal, tr bent: tr yel min flr, tr of o in spl.

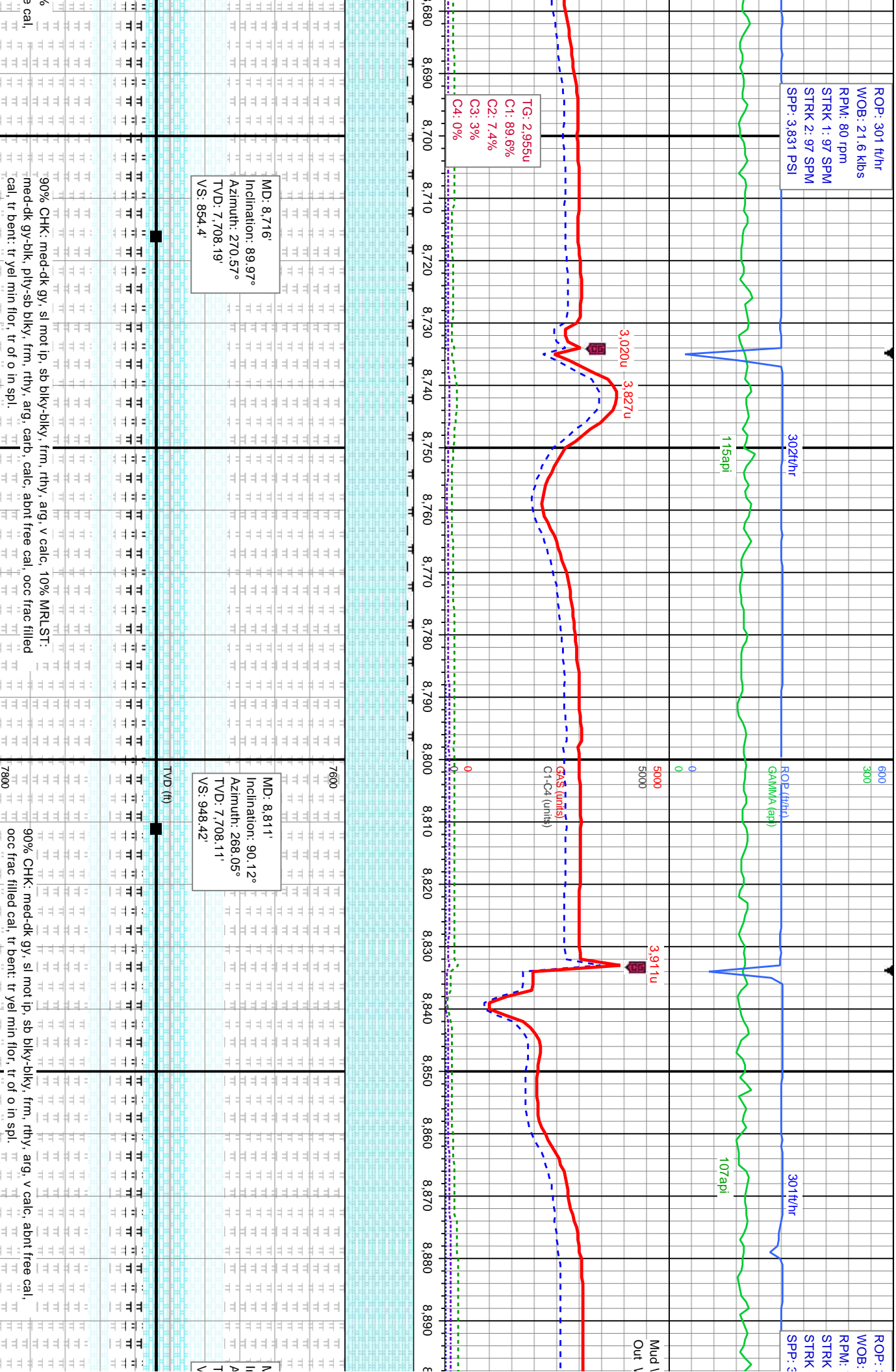
ROP: 301 ft/hr  
WOB: 21.6 klbs  
RPM: 80 rpm  
STRK 1: 97 SPM  
STRK 2: 97 SPM  
SP: 3.831 PSI

ROP:  
WOB:  
RPM:  
STRK  
STRK  
SP: 3

TG: 2.955u  
C1: 89.6%  
C2: 7.4%  
C3: 3%  
C4: 0%

MD: 8.716'  
Inclination: 89.97°  
Azimuth: 270.57°  
TVD: 7.708.19'  
VS: 854.4'

MD: 8.811'  
Inclination: 90.12°  
Azimuth: 268.05°  
TVD: 7.708.11'  
VS: 948.42'











Re-Logged gamma  
from 9400' MD to  
10383' MD

Possible Fault @  
9466' MD, 7712'  
TVD, EST. 44' Down  
Throw?

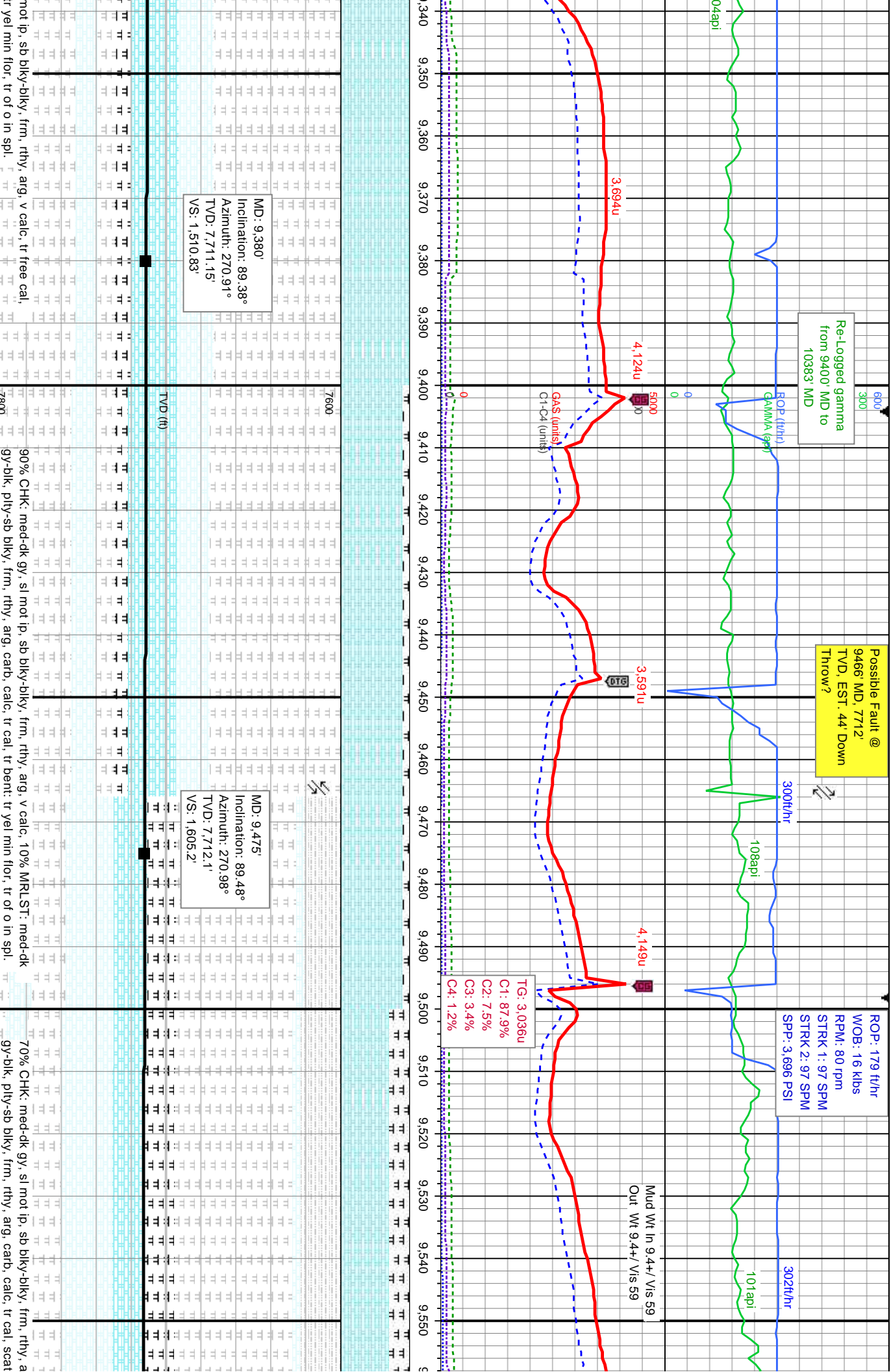
ROP: 179 ft/hr  
WOB: 16 kbs  
RPM: 80 rpm  
STRK 1: 97 SPM  
STRK 2: 97 SPM  
SP: 3.696 PSI

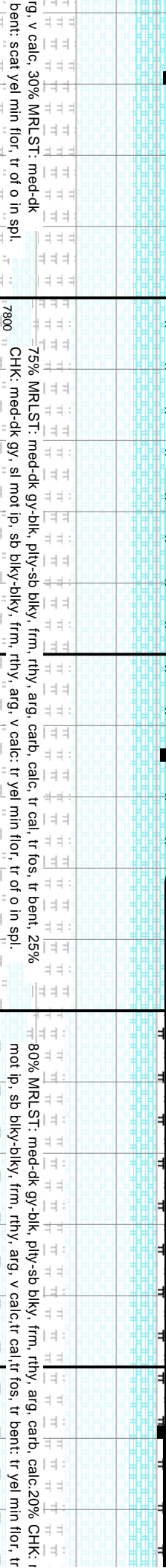
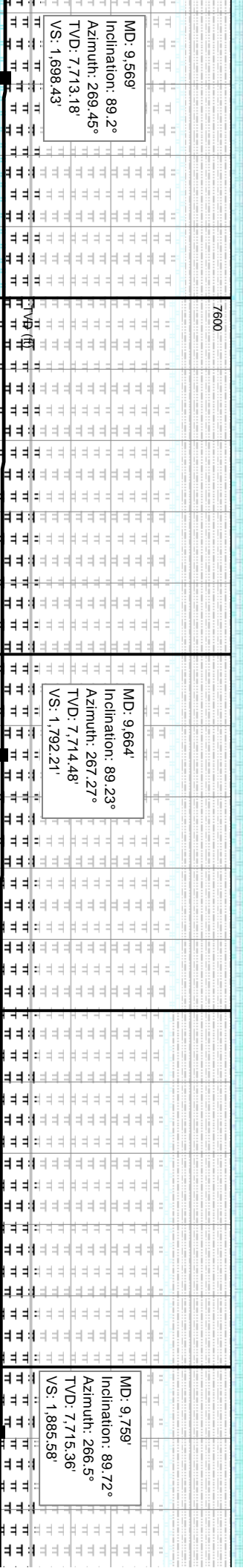
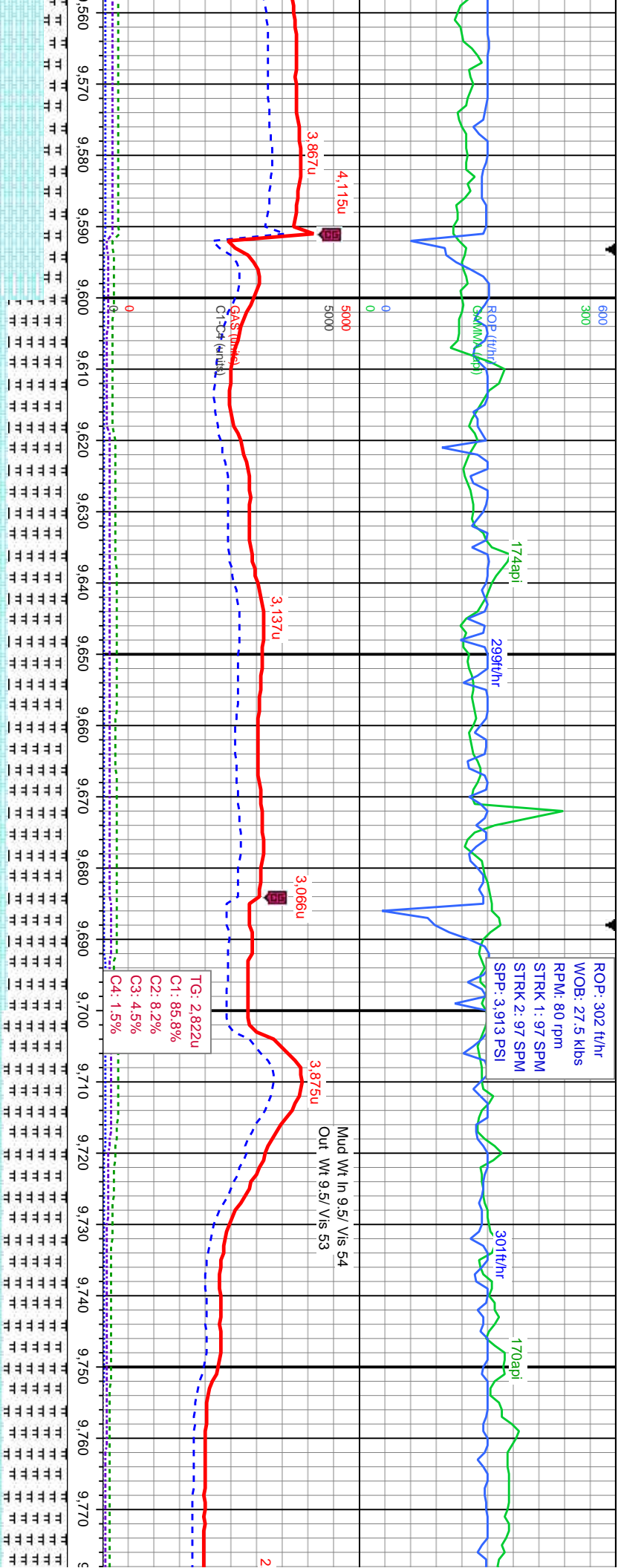
Mud Wt In 9.4+ / Vis 59  
Out Wt 9.4+ / Vis 59

TG: 3.036u  
C1: 87.9%  
C2: 7.5%  
C3: 3.4%  
C4: 1.2%

MD: 9,380'  
Inclination: 89.38°  
Azimuth: 270.91°  
TVD: 7,711.15'  
VS: 1,510.83'

MD: 9,475'  
Inclination: 89.48°  
Azimuth: 270.98°  
TVD: 7,712.1'  
VS: 1,605.2'







05/14/2018 05/15/2018

MINDEPTH

300'

ROP (ft/hr)

GAMMA (api)

180api

287ft/hr

ROP: 295 ft/hr  
WOB: 22.9 klbs  
RPM: 80 rpm  
STRK 1: 97 SPM  
STRK 2: 97 SPM  
SP: 4.007 PSI

184api

300ft/hr

0

5000

5000

Mud Wt In 9.5/ Vis 50  
Out Wt 9.5/ Vis 49

Mud Wt In 9.5/ Vis 49  
Out Wt 9.5/ Vis 49

3,350u

240u

GAS (units)

C1: 24 (units)

2,907u

4,421u

TG: 2.740u  
C1: 85.3%  
C2: 8.6%  
C3: 4.9%  
C4: 1.2%

3,303u

7600

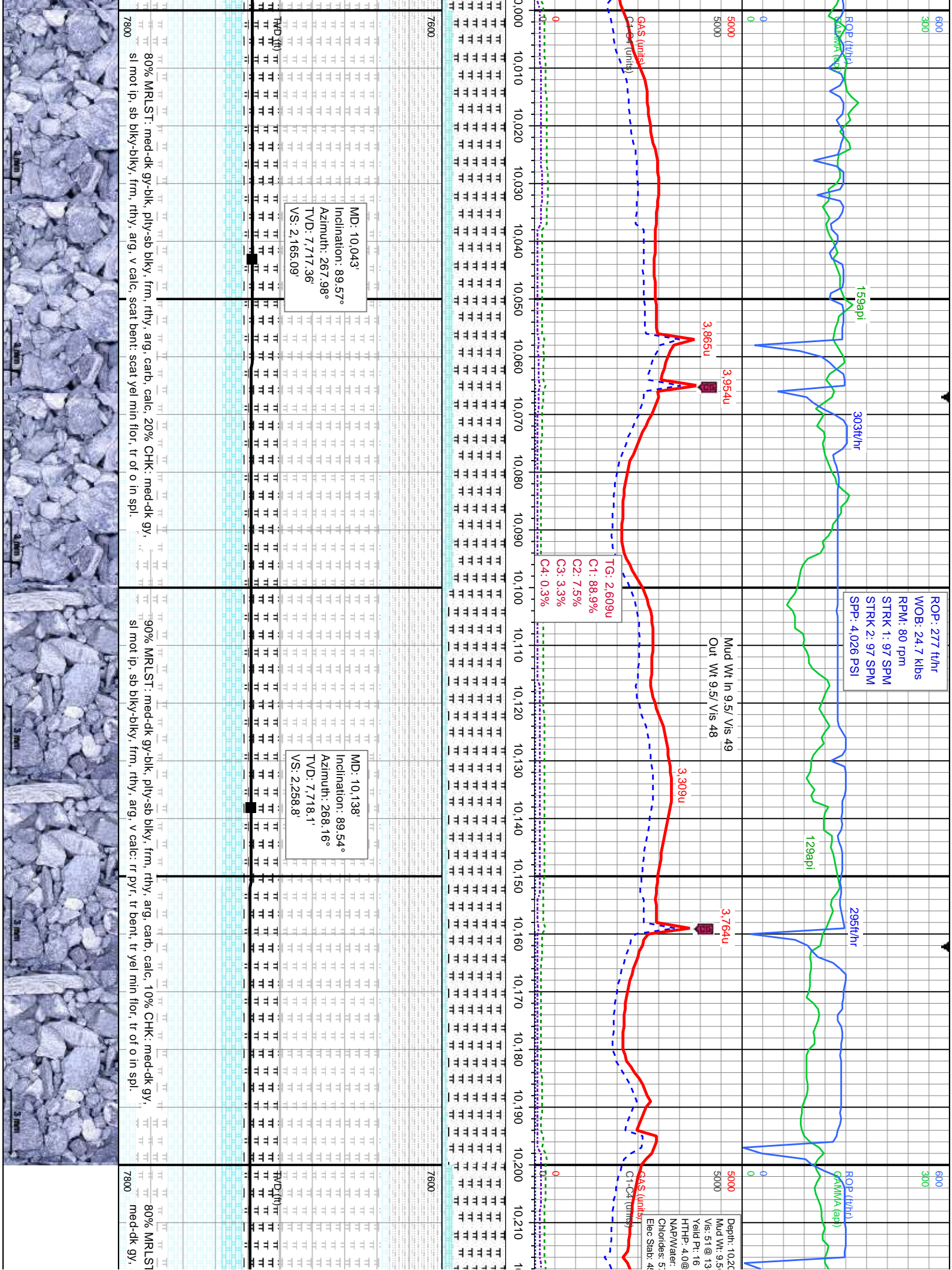
MD: 9.854'  
Inclination: 89.6°  
Azimuth: 267°  
TVD: 7.715.92'  
VS: 1.978.9'

MD: 9.949'  
Inclination: 89.54°  
Azimuth: 267.76°  
TVD: 7.716.63'  
VS: 2.072.42'

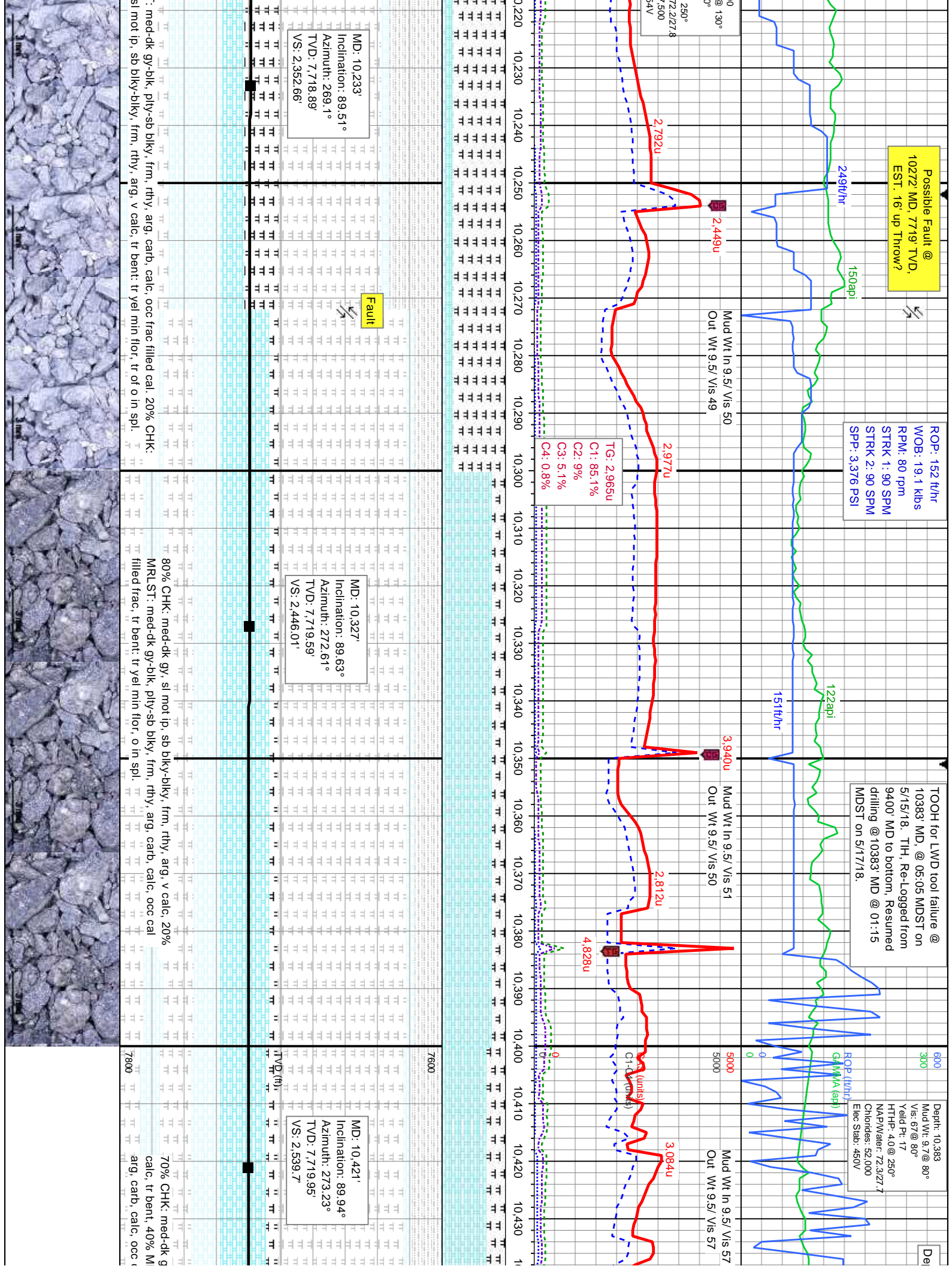
med-dk gy, sl  
of o in spl.

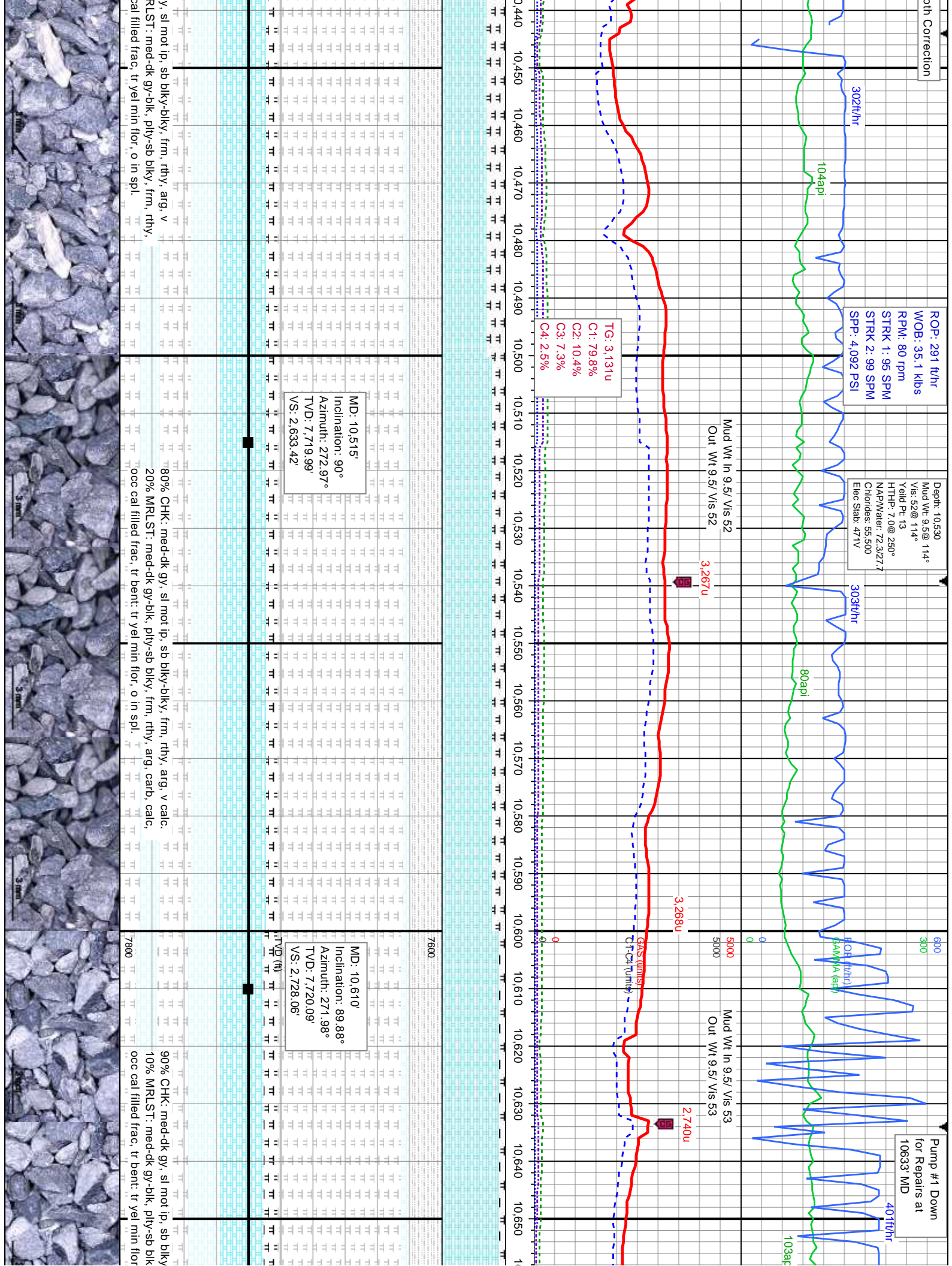
90% MRLST: med-dk gy-blk, pily-sb blk, frm, rthy, arg, carb, calc, 10% CHK: med-dk  
gy, sl mot ip, sb blk-y-blk, frm, rthy, arg, v calc, tr bent: tr yel min flor, tr of o in spl.

90% MRLST: med-dk gy-blk, pily-sb blk, frm, rthy, arg, carb, calc, 10% CHK: med-dk  
gy, sl mot ip, sb blk-y-blk, frm, rthy, arg, v calc, tr bent: tr yel min flor, tr of o in spl.









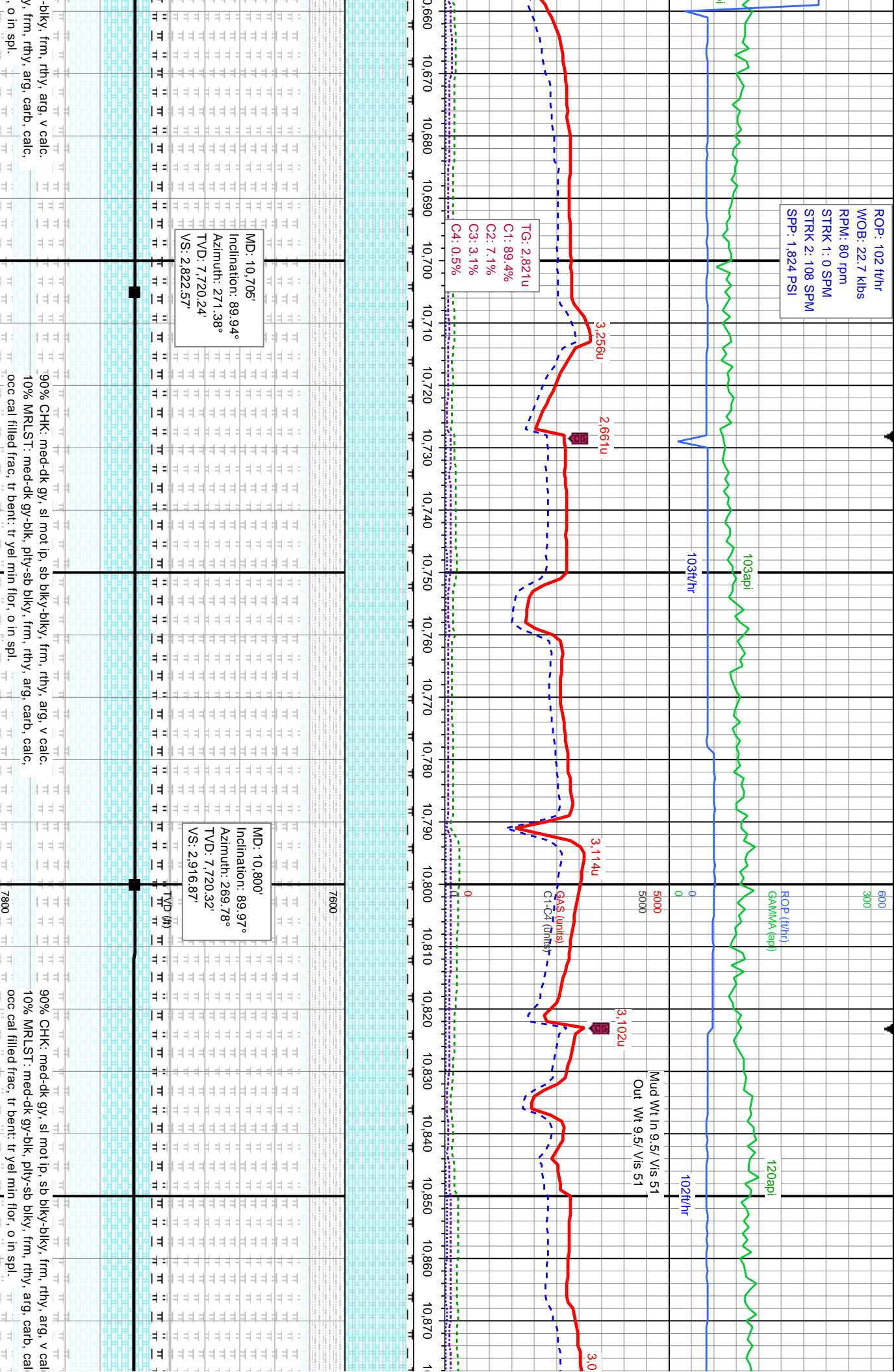


ROP: 102 ft/hr  
WOB: 22.7 klbs  
RPM: 80 rpm  
STRK 1: 0 SPM  
STRK 2: 108 SPM  
SP: 1.824 PSI

TG: 2.821u  
C1: 89.4%  
C2: 7.1%  
C3: 3.1%  
C4: 0.5%

MD: 10,705'  
Inclination: 89.94°  
Azimuth: 271.38°  
TVD: 7,720.24'  
VS: 2.822.57'

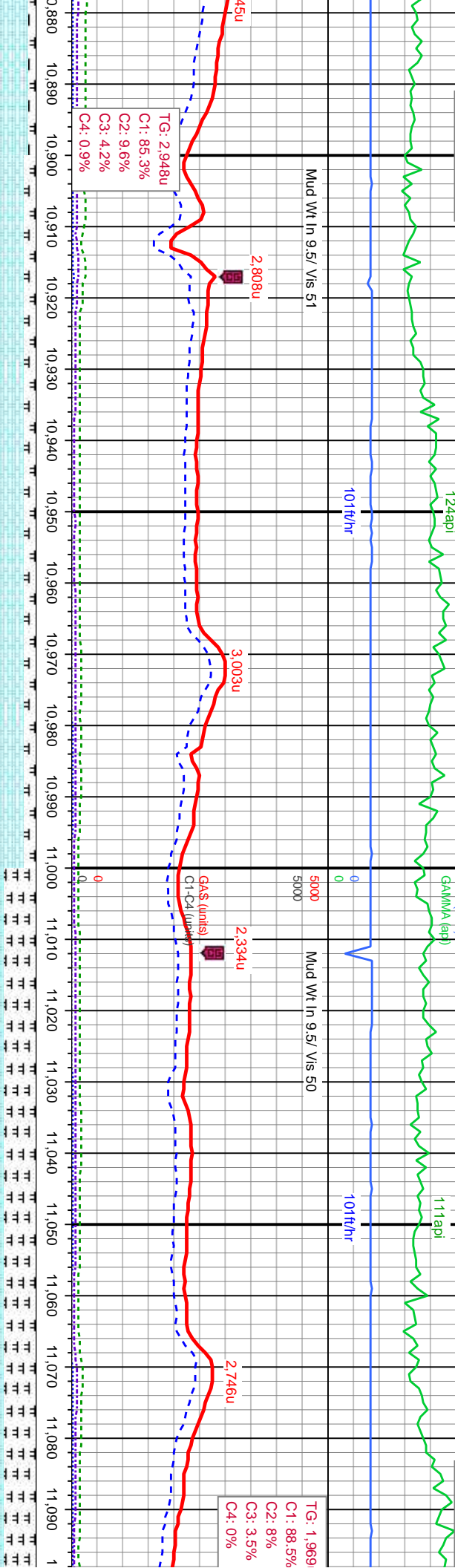
MD: 10,800'  
Inclination: 89.97°  
Azimuth: 269.78°  
TVD: 7,720.32'  
VS: 2.916.87'



ROP: 101 ft/hr  
WOB: 23.2 klbs  
RPM: 50 rpm  
STRK 1: 0 SPM  
STRK 2: 108 SPM  
SP: 1,980 PSI

Possible Fault @  
11080' MD, 7722' TVD,  
EST. 10' down Throw?

ROP: 100 ft/hr  
WOB: 26.2 klbs  
RPM: 50 rpm  
STRK 1: 0 SPM  
STRK 2: 108 SPM  
SP: 2,023 PSI



MD: 10,894'  
Inclination: 89.66°  
Azimuth: 270.04°  
TVD: 7,720.62'  
VS: 3,010.04'

MD: 10,989'  
Inclination: 89.69°  
Azimuth: 270.89°  
TVD: 7,721.16'  
VS: 3,104.32'

MD: 11,084'  
Inclination: 89.72°  
Azimuth: 271.93°  
TVD: 7,721.65'  
VS: 3,198.78'

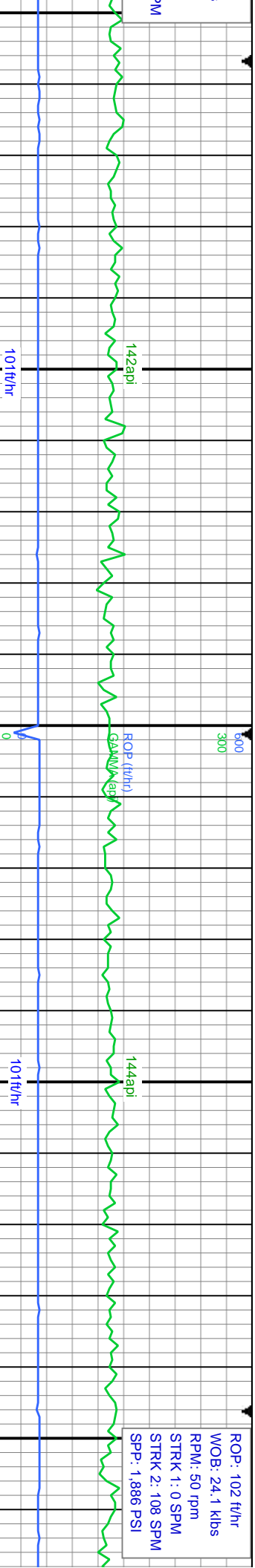
85% CHK: med-dk gy, sl mot ip, sb blkly-blky, frm, rthy, arg, v calc.  
15% MRLST: med-dk gy-blk, ply-sb blkly, frm, rthy, arg, carb, calc,  
occ cal filled frac, tr bent: tr yel min flr, abnt o in spl.

60% CHK: med-dk gy, sl mot ip, sb blkly-blky, frm, rthy, arg, v calc.  
40% MRLST: med-dk gy-blk, ply-sb blkly, frm, rthy, arg, carb, calc,  
occ cal filled frac, tr bent: tr yel min flr, abnt o in spl.





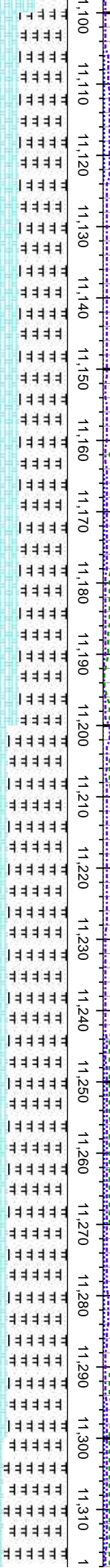
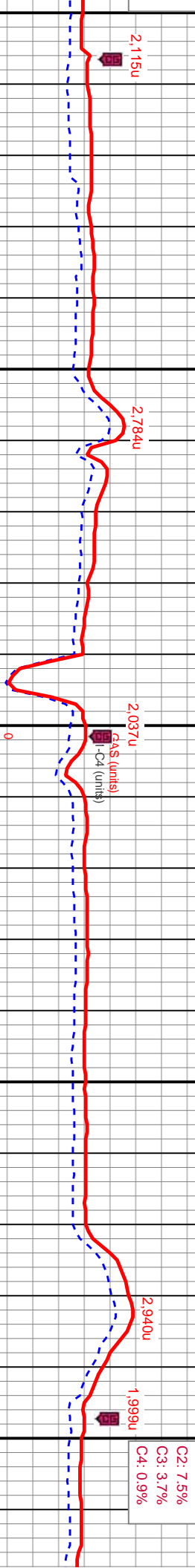
ROP: 102 ft/hr  
WOB: 24.1 klbs  
RPM: 50 rpm  
STRK 1: 0 SPM  
STRK 2: 108 SPM  
SPR: 1.886 PSI



Mud Wt In 9.5/ Vis 50

Mud Wt In 9.5/ Vis 50

TG: 1.958u  
C1: 87.9%  
C2: 7.5%  
C3: 3.7%  
C4: 0.9%



MD: 11.179'  
Inclination: 89.63°  
Azimuth: 271°  
TVD: 7.722.19'  
VS: 3.293.25'

MD: 11.274'  
Inclination: 89.63°  
Azimuth: 272.67°  
TVD: 7.722.8'  
VS: 3.387.78'

60% MRLST: med-dk gy-blk, pty-sb blk, frm, rthy, arg, carb, calc, chky  
ip, occ cal filled frac, tr bent, 40% CHK: med-dk gy, sl mot ip, sb  
blk, blk, frm, rthy, arg-v arg ip, v calc: tr yel min flr, abt o in spl.

75% MRLST: med-dk gy-blk, pty-sb blk, frm, rthy, arg, carb, calc, chky  
ip, occ cal filled frac, tr bent, 25% CHK: med-dk gy, sl mot ip, sb  
blk, blk, frm, rthy, arg-v arg ip, v calc: tr yel min flr, abt o in spl.



Possible Fault @ 11445'  
MD, 7724 TVD, EST. 10'  
Down Throw?

ROP: 100 ft/hr  
WOB: 29.2 klbs  
RPM: 50 rpm  
STRK 1: 0 SPM  
STRK 2: 108 SPM  
SPP: 1.954 PSI

Depth: 11,480  
Mud Wt: 9.4 @ 120°  
Vis: 51 @ 120°  
Yield Pct: 14  
HTHP: 6.4 @ 250°  
NAP/Water: 73.9/26.1  
Chlorides: 52,000  
Elec Stab: 60SV

TG: 2.215u  
C1: 89.2%  
C2: 7.1%  
C3: 3.1%  
C4: 0.7%

MD: 11,368'  
Inclination: 89.54°  
Azimuth: 271.41°  
TVD: 7,723.48'  
VS: 3,481.35'

MD: 11,463'  
Inclination: 89.69°  
Azimuth: 268.5°  
TVD: 7,724.12'  
VS: 3,575.51'

Fault

60% MRLST: med-dk gy-blk, pily-sb blkly, frm, rthy, arg, carb, calc, chky  
ip, occ cal filled frac, tr bent, 40% CHK: med-dk gy, sl mot ip, sb  
blkly-blky, frm, rthy, arg-v arg ip, v calc: tr yel min flor, abnt o in spl.

60% MRLST: med-dk  
ip, occ cal filled frac,  
blkly-blky, frm, rthy, &

100% MRLST: med-dk gy-blk, pily-sb blkly, frm, rthy, arg, carb, calc, chky  
o, occ cal filled frac, tr bent, 20% CHK: med-dk gy, sl mot ip, sb  
blkly-blky, frm, rthy, arg-v arg ip, v calc: tr yel min flor, abnt o in spl.

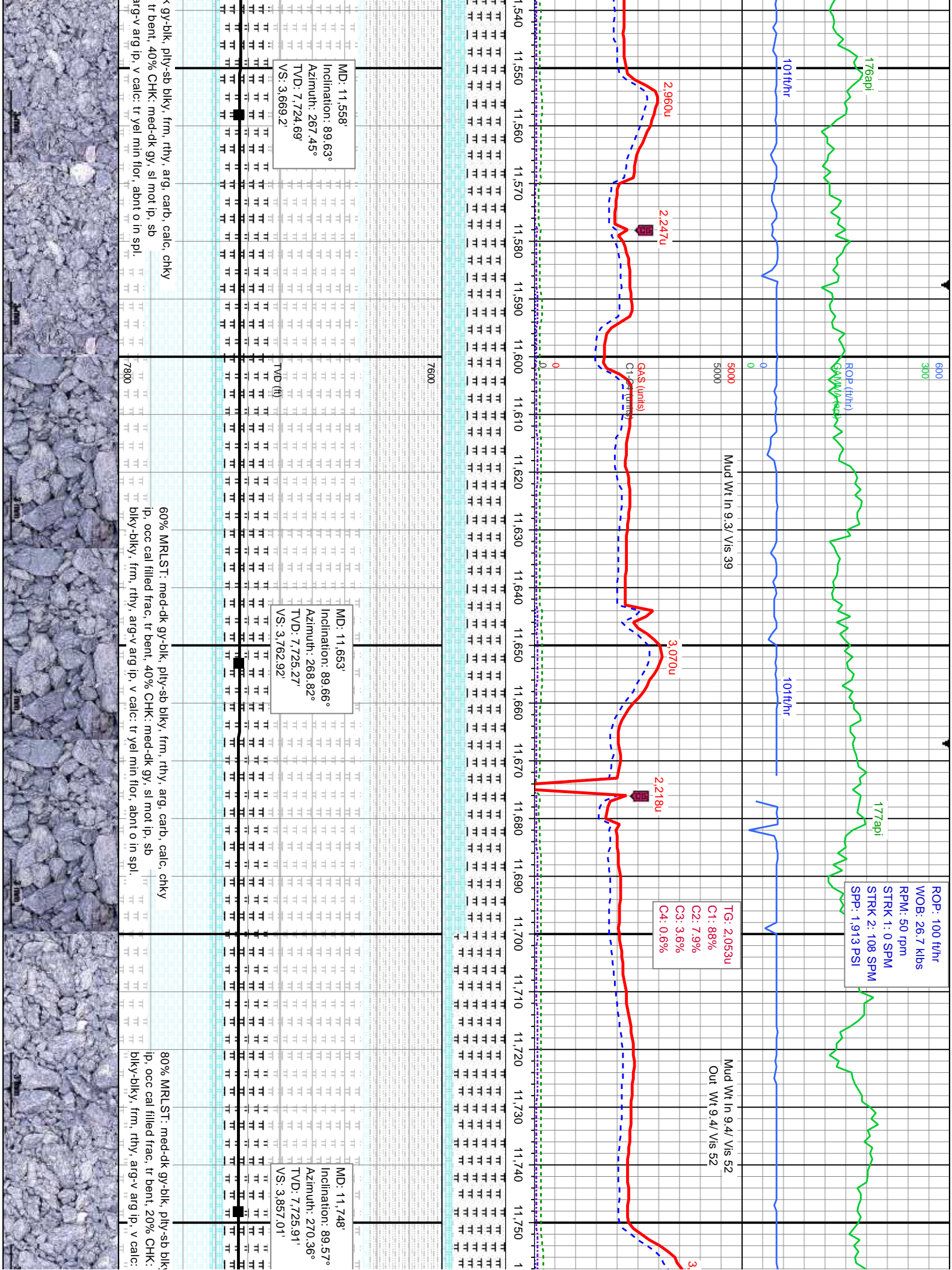
3

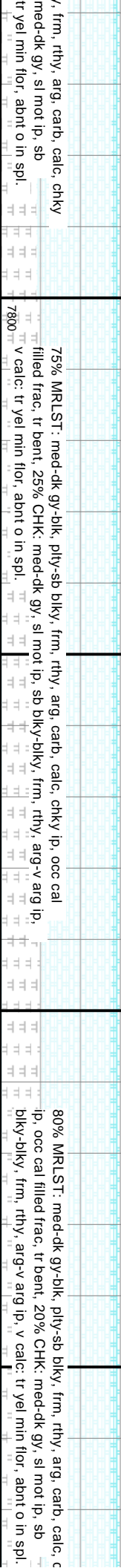
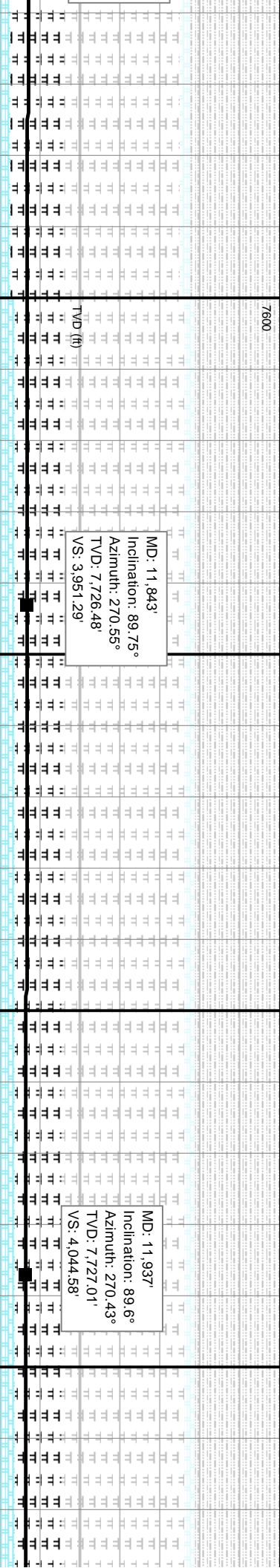
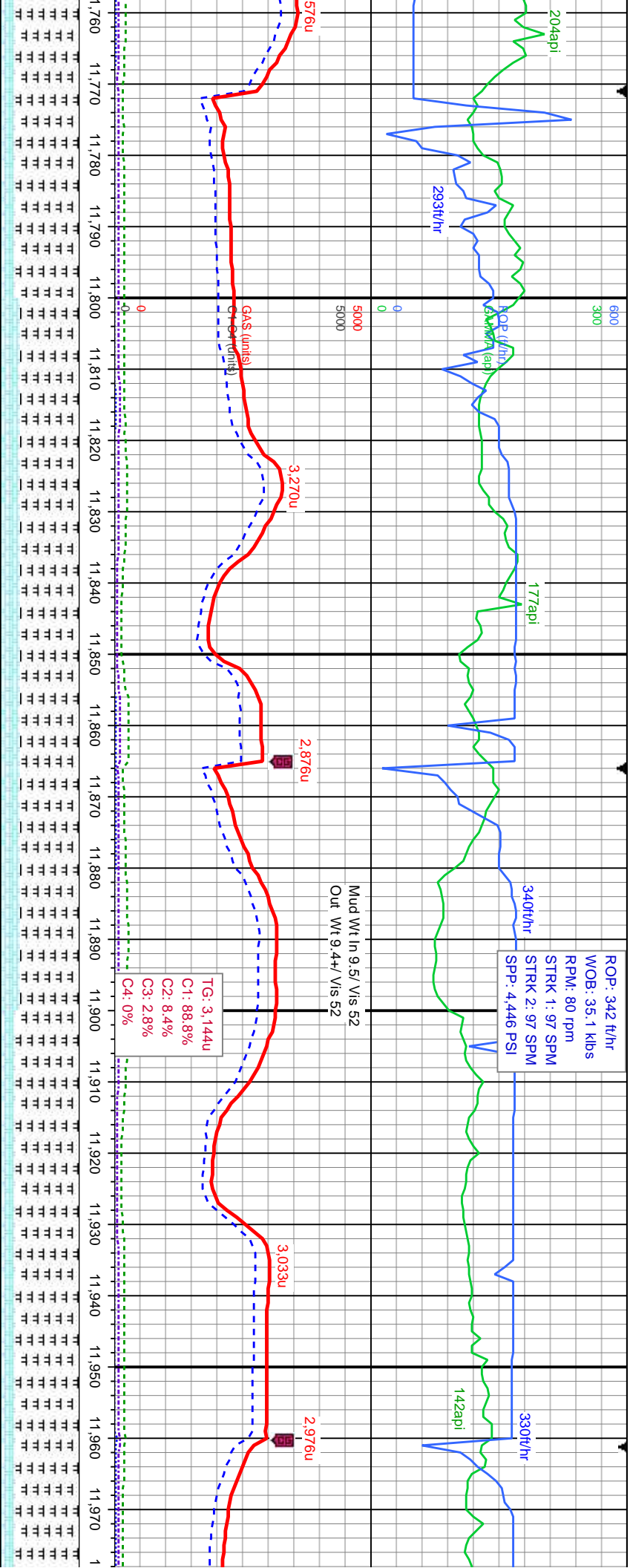
3

3

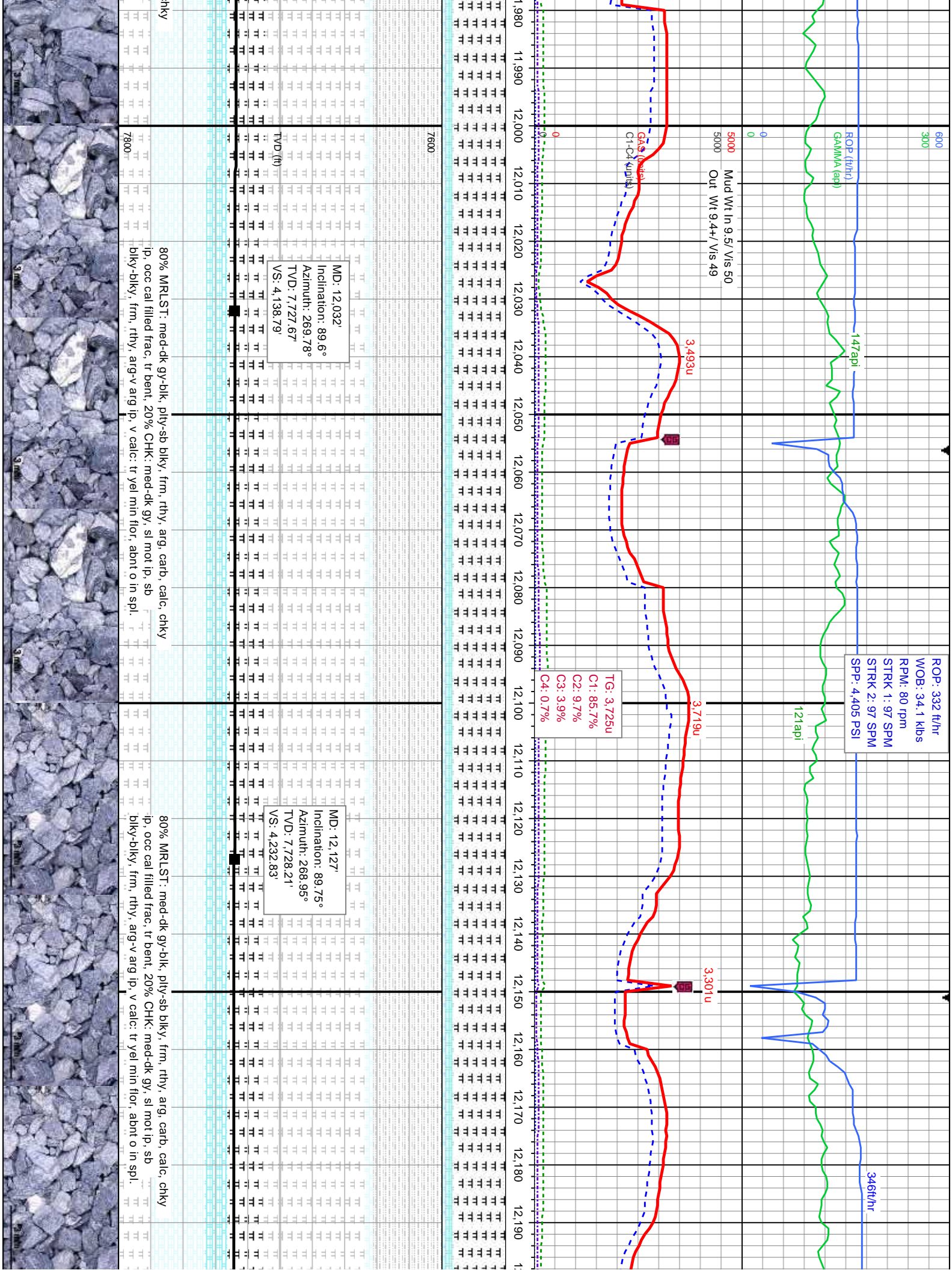
3

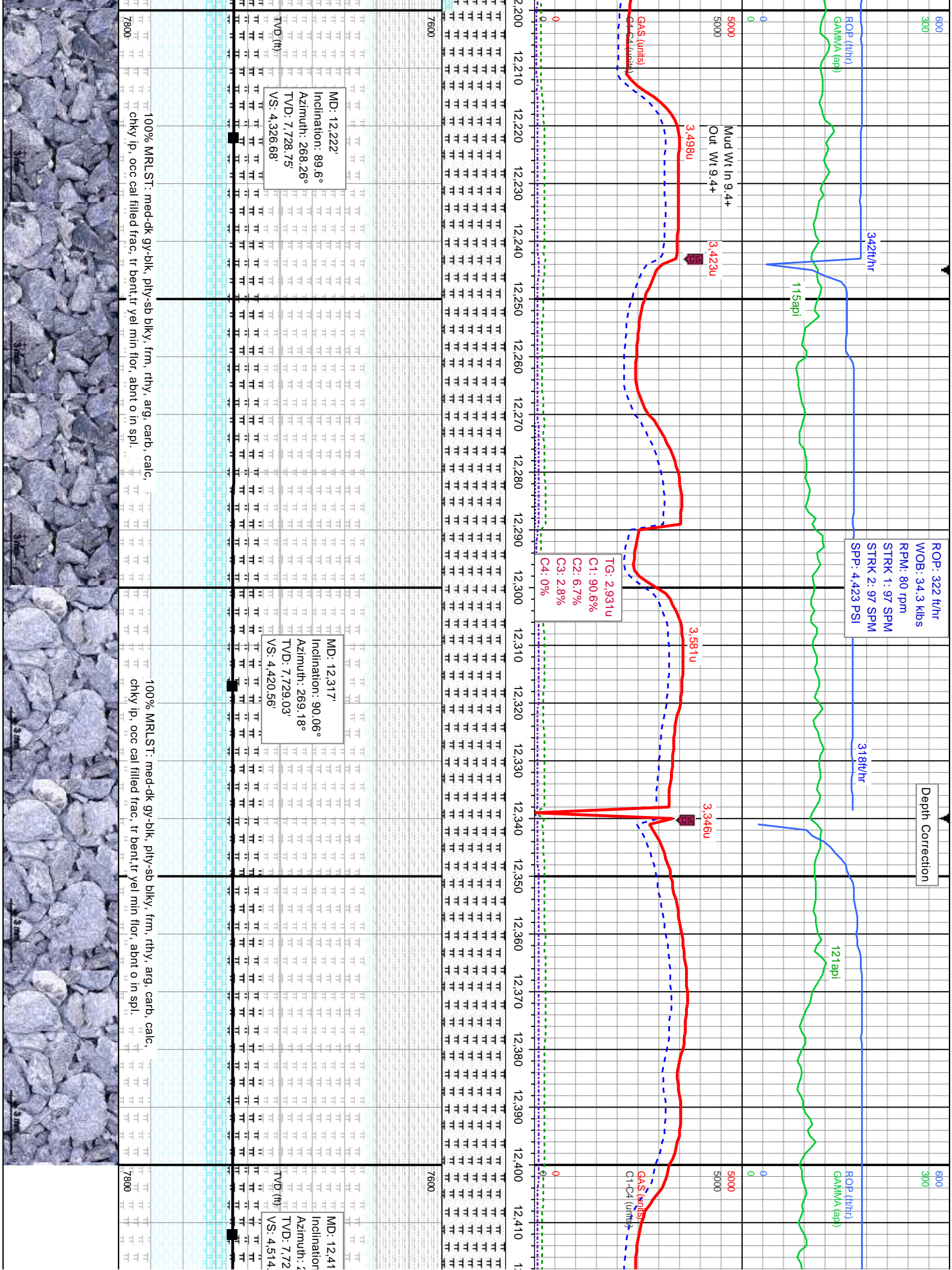














5/17/2018 5/18/2018

MINDEPTH

ROP: 345 ft/hr  
WOB: 30 klbs  
RPM: 80 rpm  
STRK 1: 97 SPM  
STRK 2: 97 SPM  
SP: 4.425 PSI

343ft/hr

105api

3,446u

3,946u

TG: 2.801u

C1: 87.7%

C2: 7.5%

C3: 3.6%

C4: 1.2%

372ft/hr

97api

3,538u

ROP (ft/hr)

GAMMA (api)

346ft/hr

95api

3,946u

GA\$ (units)

C1-C4 (units)



MD: 12,507'  
Inclination: 90.15°  
Azimuth: 273.56°  
TVD: 7,729.37'  
VS: 4,608.76'

MD: 12,601'  
Inclination: 89.88°  
Azimuth: 281.93°  
TVD: 7,729.35'  
VS: 4,702.68'

100% MR.LST: med-dk gy-blk, ply-sb blk, frm, rthy, arg, carb, calc, chky ip, occ cal filled frac, tr bent, tr yel min floor, abnt o in spl.

100% MR.LST: med-dk gy-blk, ply-sb blk, frm, rthy, arg, carb, calc, chky ip, occ cal filled frac, tr bent, tr yel min floor.

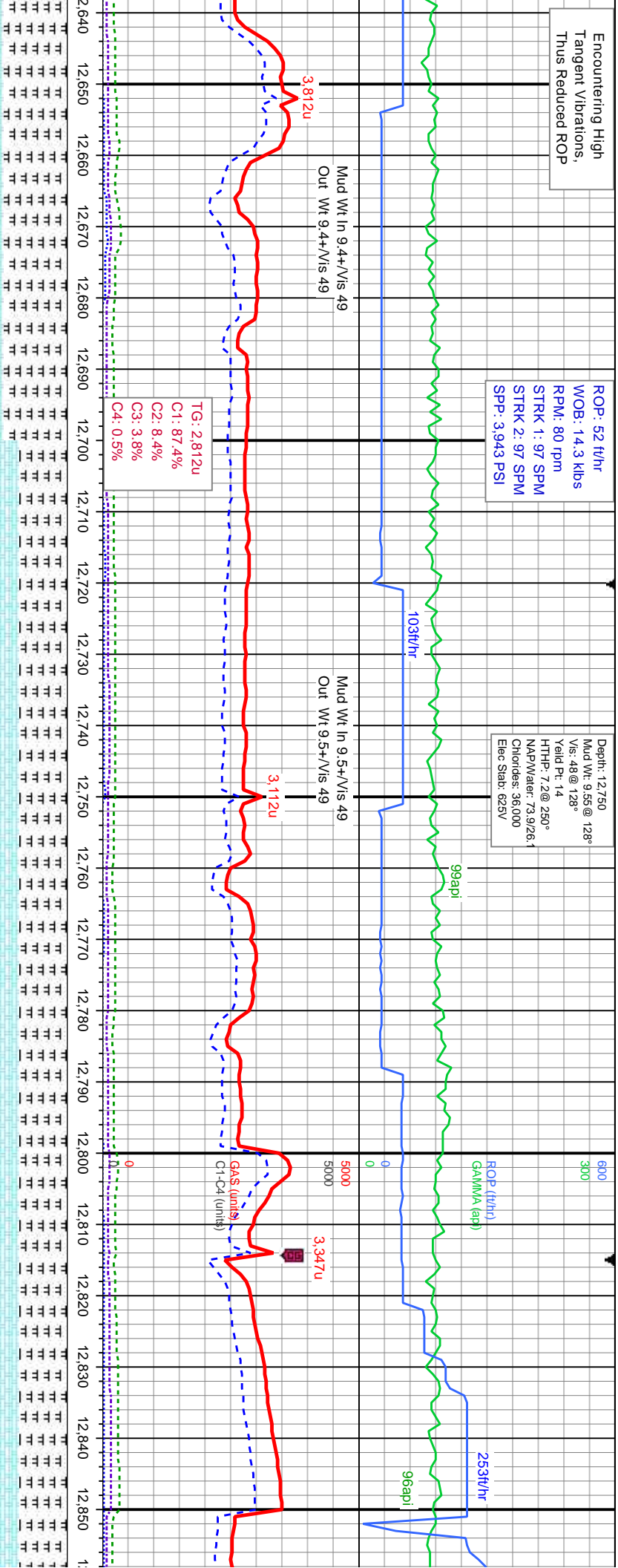
80% MR.LST: med-dk gy-blk, ip, occ cal filled frac, tr bent, blk-blk, frm, rthy, arg-v-e



### Encountering High Tangent Vibrations, Thus Reduced ROP

ROP: 52 ft/hr  
WOB: 14.3 klbs  
RPM: 80 rpm  
STRK 1: 97 SPM  
STRK 2: 97 SPM  
SPP: 3,943 PSI

Depth: 12,750  
Mud Wt: 9.55 @ 128°  
Vis: 48 @ 128°  
Yield Pt: 14  
HTHP: 7.2 @ 250°  
NAP/Water: 73.9/26.  
Chlorides: 36,000  
Elec Stab: 625V



MD: 12,696'  
Inclination: 89.75°  
Azimuth: 281.24°  
TVD: 7,729.65'  
VS: 4,797.44'

MD: 12,791'  
Inclination: 89.35°  
Azimuth: 271.53°  
TVD: 7,730.4'  
VS: 4,892.3'

rg ip, v calc: tr yel min flor.

60% MRLS1: med-dk gy-blk, plty-sb blk, frm, rthy, arg, carb, calc, chky ip, occ cal filled frac, tr bent, tr pyr, 40% CHK: med-dk gy, sl mot ip, sb blk-bk, frm, rthy, arg-v arg ip, v calc: tr yel min flor.

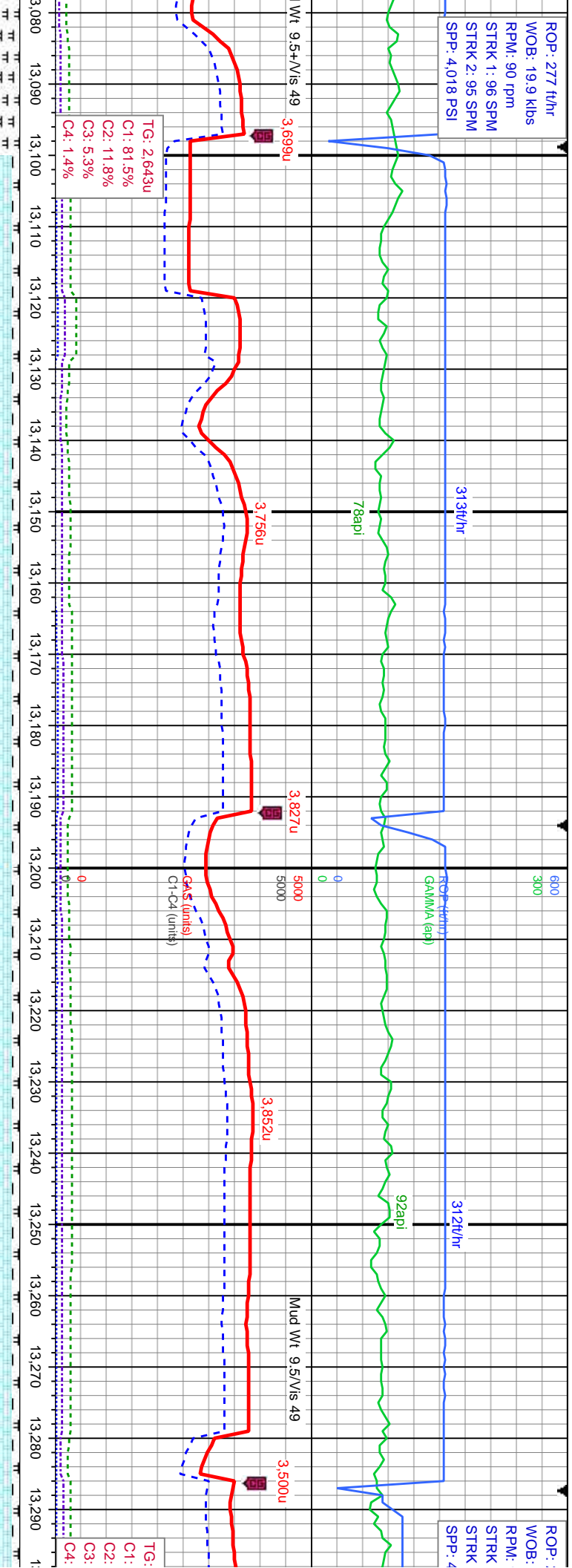
60% MRLST: med-dk gy-blk, pily-sb blkly ip, occ cal filled frac, tr bent, tr pyr, 40% blkly-blkly, frm, rthy, arg-v arg ip, v calci: t





ROP: 277 ft/hr  
WOB: 19.9 klbs  
RPM: 90 rpm  
STRK 1: 96 SPM  
STRK 2: 95 SPM  
SPP: 4,018 PSI

ROP: 1  
WOB: 1  
RPM: 1  
STRK: 1  
STRK: 1  
SPP: 4



9.72°  
.58°  
5'

MD: 13,170'  
Inclination: 89.6°  
Azimuth: 268.67°  
TVD: 7,733.21'  
VS: 5,263.28'

TVB (ft)

MD: 13,265'  
Inclination: 89.72  
Azimuth: 268°  
TVD: 7,733.77'  
VS: 5,357.06'

grip, v  
rb, cal  
n spl.

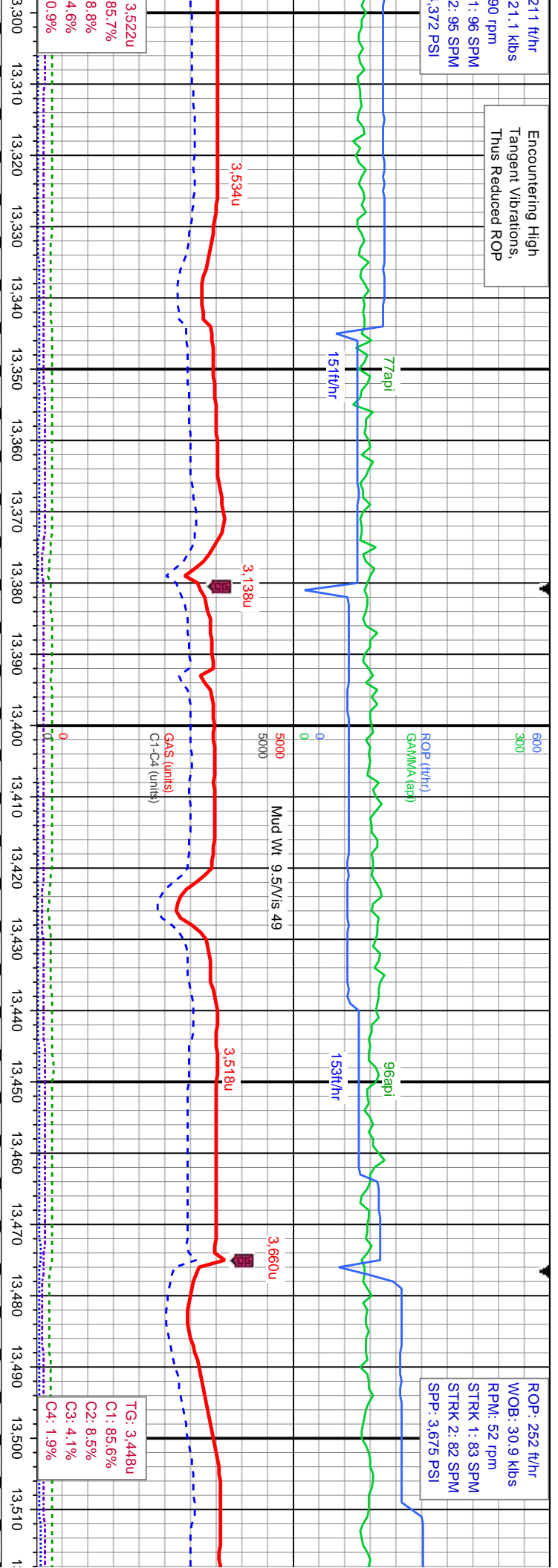
90% CHK: med-dk gy, sl mot ip, sb biky-biky, frm, rthy, arg-v arg ip, v calc, 10% MRST: med-dk gy-blk, ply-sb biky, frm, rthy, arg, carb, calc, chky ip, occ cal filled frac, tr bent, tr pyr: tr yel min flor, abnt o in spl.



21.1 ft/hr  
21.1 klbs  
90 rpm  
1: 96 SPM  
2: 95 SPM  
3: 72 PSI

Encountering High  
Tangent Vibrations.  
Thus Reduced ROP

3.522u  
85.7%  
8.8%  
4.6%  
0.9%



ROP: 252 ft/hr  
WOB: 30.9 klbs  
RPM: 52 rpm  
STRK 1: 83 SPM  
STRK 2: 82 SPM  
SP: 3.675 PSI

TG: 3.448u  
C1: 85.6%  
C2: 8.5%  
C3: 4.1%  
C4: 1.9%

MD: 13.360'  
Inclination: 89.51°  
Azimuth: 266.84°  
TVD: 7.734.41'  
VS: 5.450.58'

MD: 13.455'  
Inclination: 89.78°  
Azimuth: 268.15°  
TVD: 7.735'  
VS: 5.544.13'

90% CHK: med-dk gy, sl mot ip, sb blk-y-bkly, frm, rthy, arg-v arg ip, v  
calc, 10% MRLST: med-dk gy-blk, ply-sb blk-y, frm, rthy, arg, carb, calc,  
chky ip, occ cal filled frac, tr bent, tr pyr: tr yel min flor, abnt o in spl.

95% CHK: med-dk gy, sl mot ip, sb blk-y-bkly, frm, rthy, arg-v arg ip, v  
calc, 5% MRLST: med-dk gy-blk, ply-sb blk-y, frm, rthy, arg, carb, calc,  
chky ip, occ cal filled frac, tr bent, tr pyr: tr yel min flor, abnt o in spl.

90% Ch-  
10% MRL  
occ cal

3 mm

3 mm

3 mm

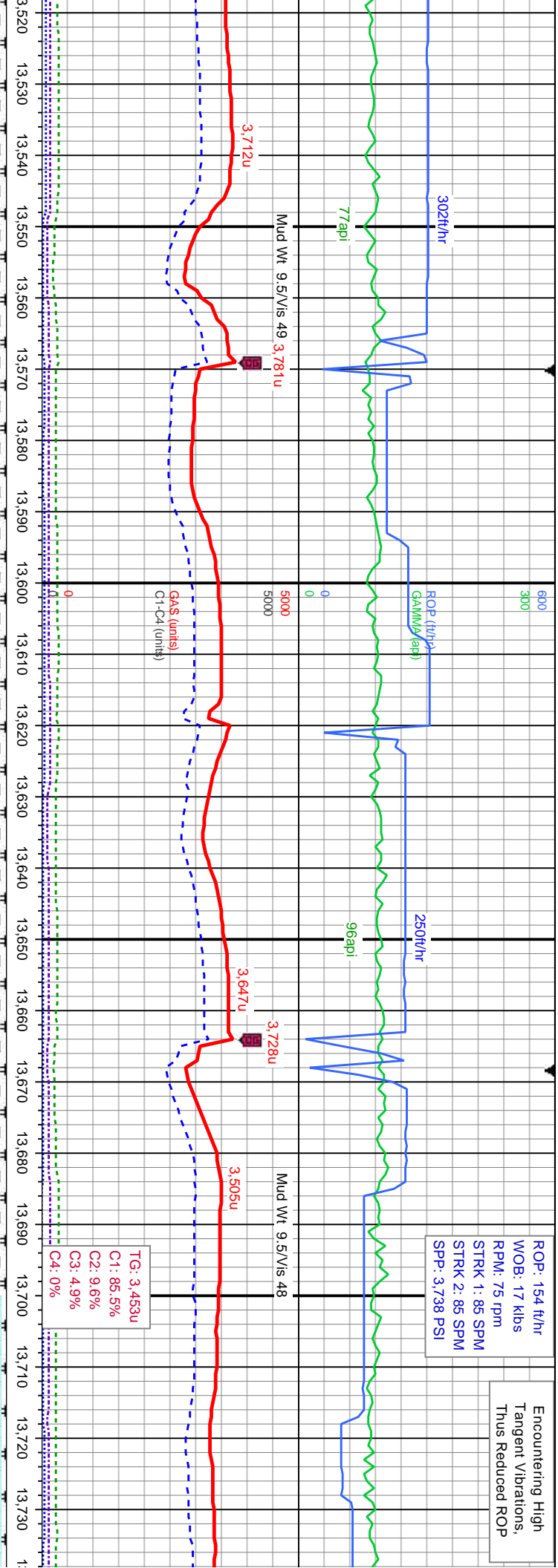
3 mm

3 mm

3 mm

Encountering High  
Tangent Vibrations,  
Thus Reduced ROP

ROP: 154 ft/hr  
WOB: 17 klbs  
RPM: 75 rpm  
STRK 1: 85 SPM  
STRK 2: 85 SPM  
SP: 3,738 PSI



MD: 13,560'  
Inclination: 89.6°  
Azimuth: 273.48°  
TVD: 7,735.51'  
VS: 5,638.45'

TVD (ft)

MD: 13,644'  
Inclination: 89.51°  
Azimuth: 265.03°  
TVD: 7,736.25'  
VS: 5,731.39'

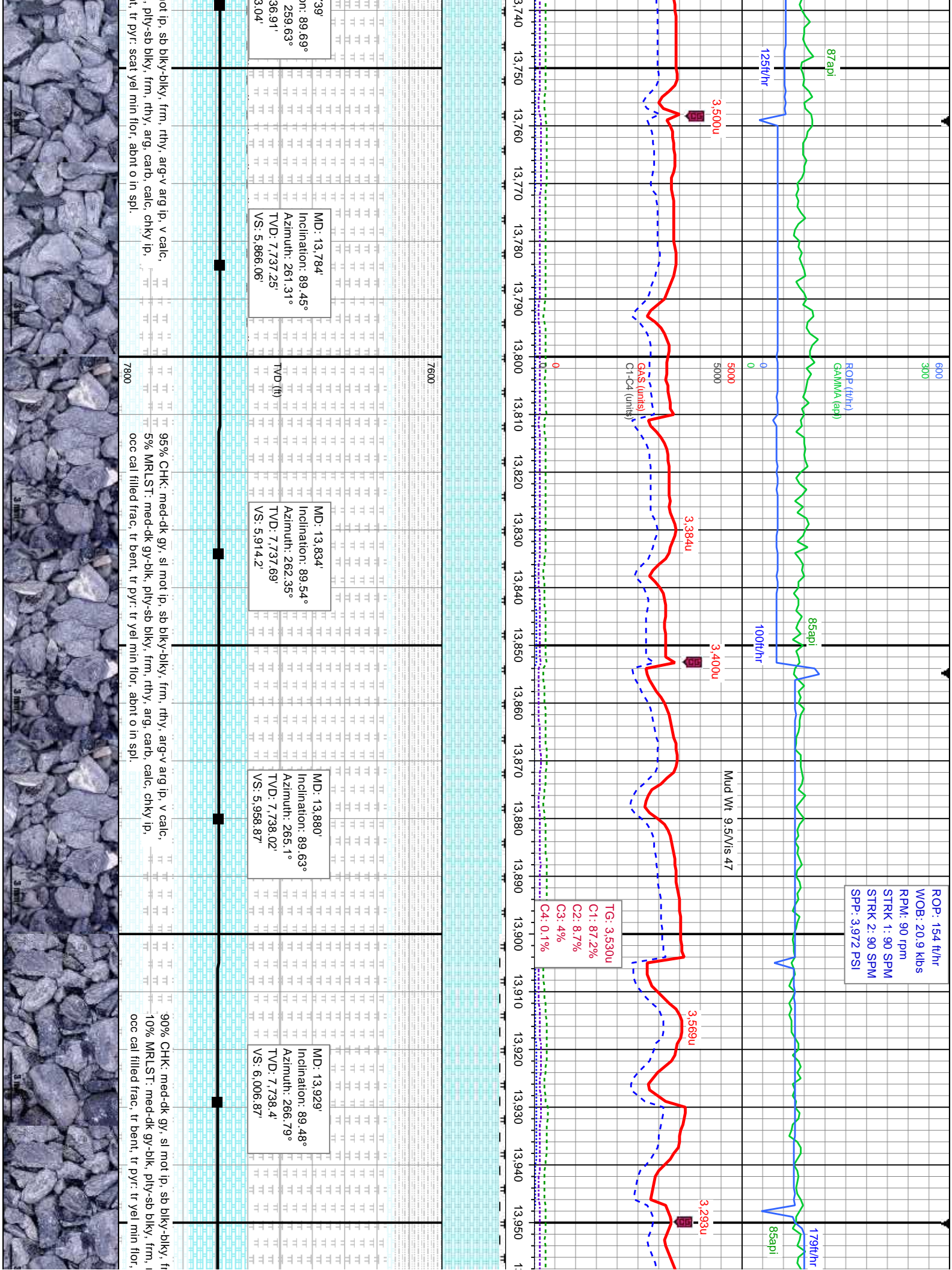
MD: 13,720'  
Inclination: 89.51°  
Azimuth: 265.03°  
TVD: 7,736.25'  
VS: 5,731.39'

med-dk gy, sl mot ip, sb blk-y-bkly, frm, rthy, arg-v arg ip, v calc, med-dk gy-bk, ply-sb blkly, frm, rthy, arg, carb, calc, chky ip, filled frac, scat bent, tr pyr: scat yel min flor, abnt o in spl.

90% CHK: med-dk gy, sl mot ip, sb blk-y-bkly, frm, rthy, arg-v arg ip, v calc, 10% MRLST: med-dk gy-bk, ply-sb blkly, frm, rthy, arg, carb, calc, chky ip, occ cal filled frac, scat bent, tr pyr: scat yel min flor, abnt o in spl.

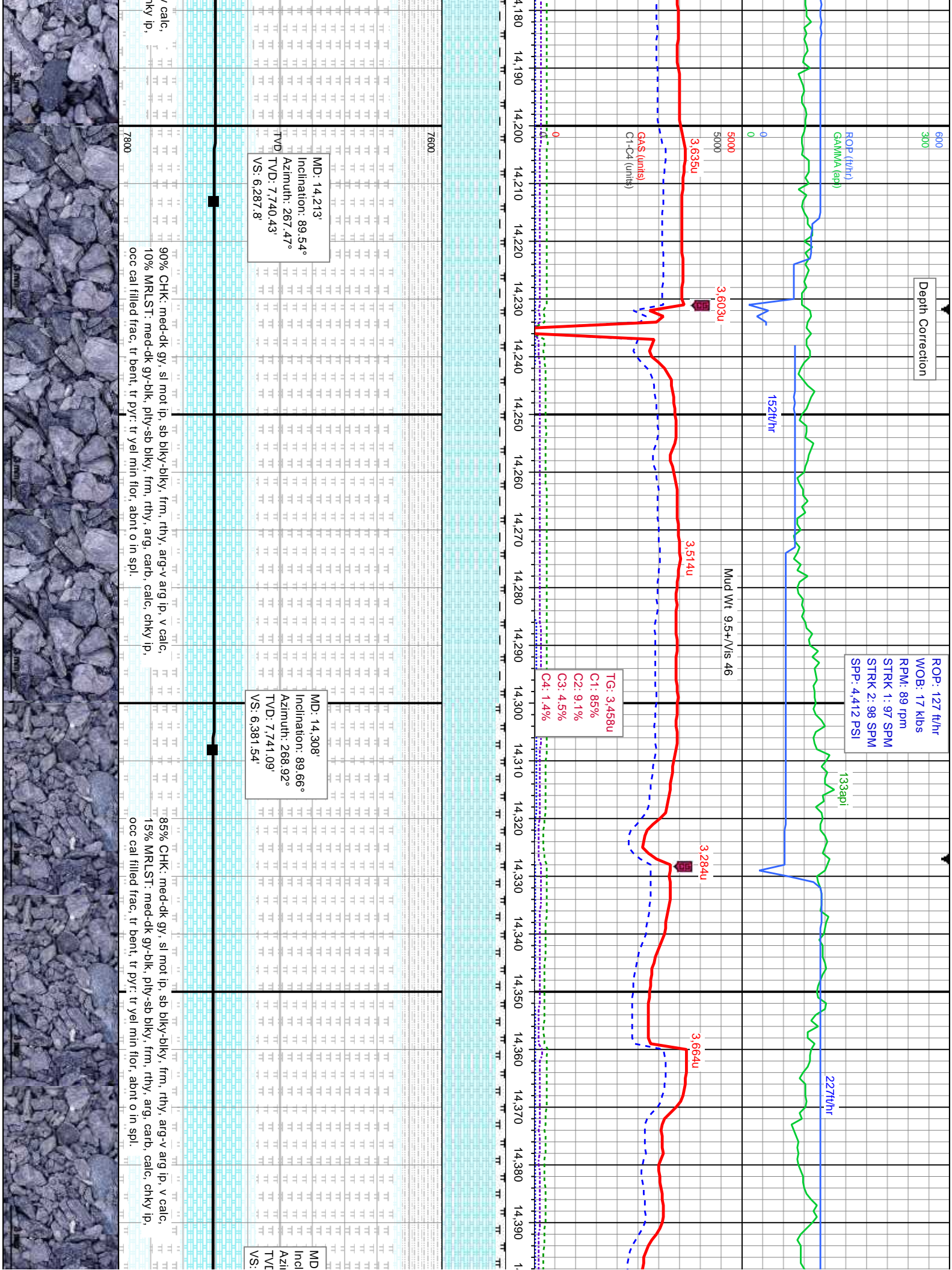
95% CHK: med-dk gy, sl mot ip, sb blk-y-bkly, frm, rthy, arg-v arg ip, v calc, 5% MRLST: med-dk gy-bk, ply-sb blkly, frm, rthy, arg, carb, calc, chky ip, occ cal filled frac, scat bent, tr pyr: scat yel min flor, abnt o in spl.

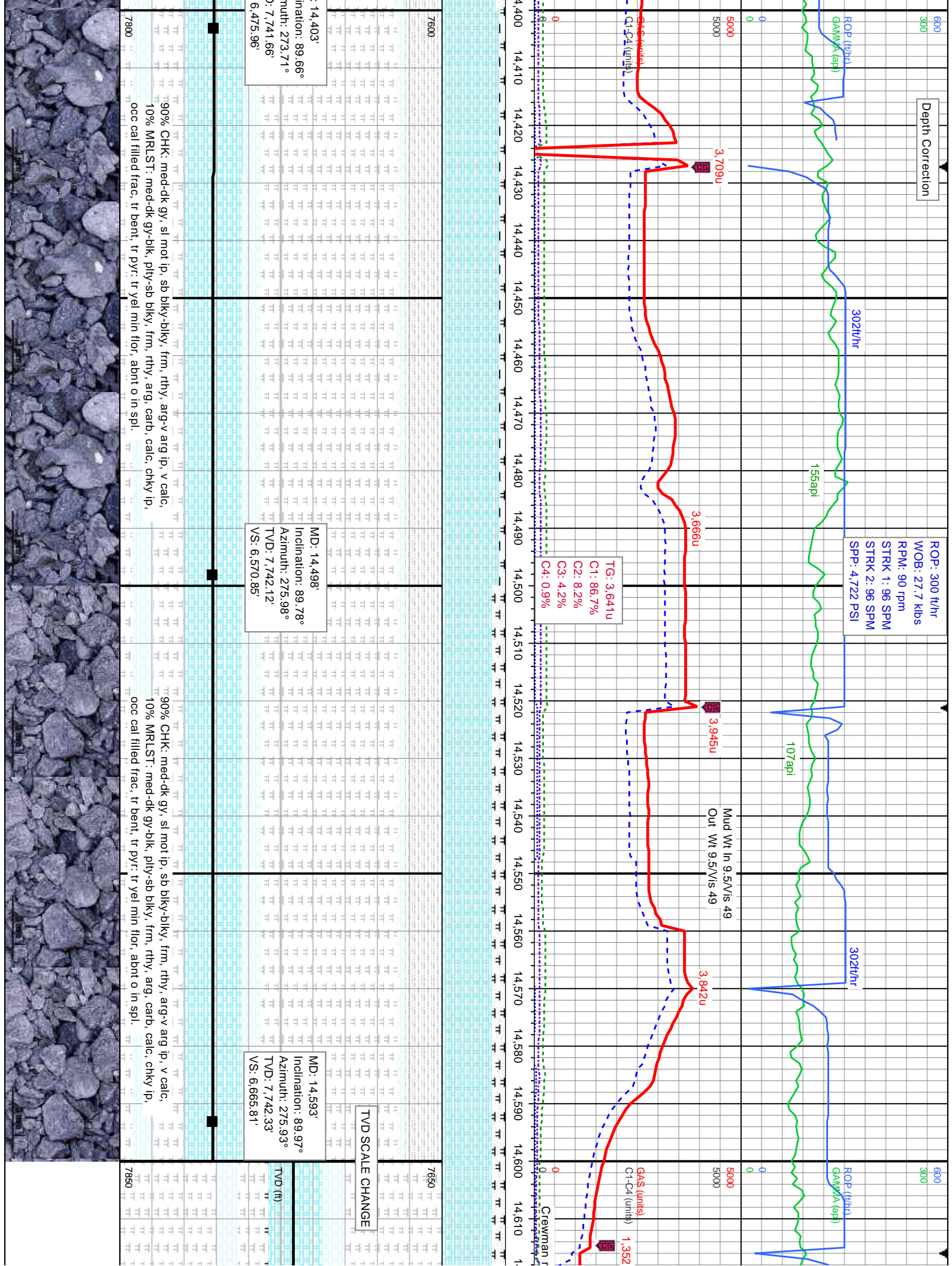




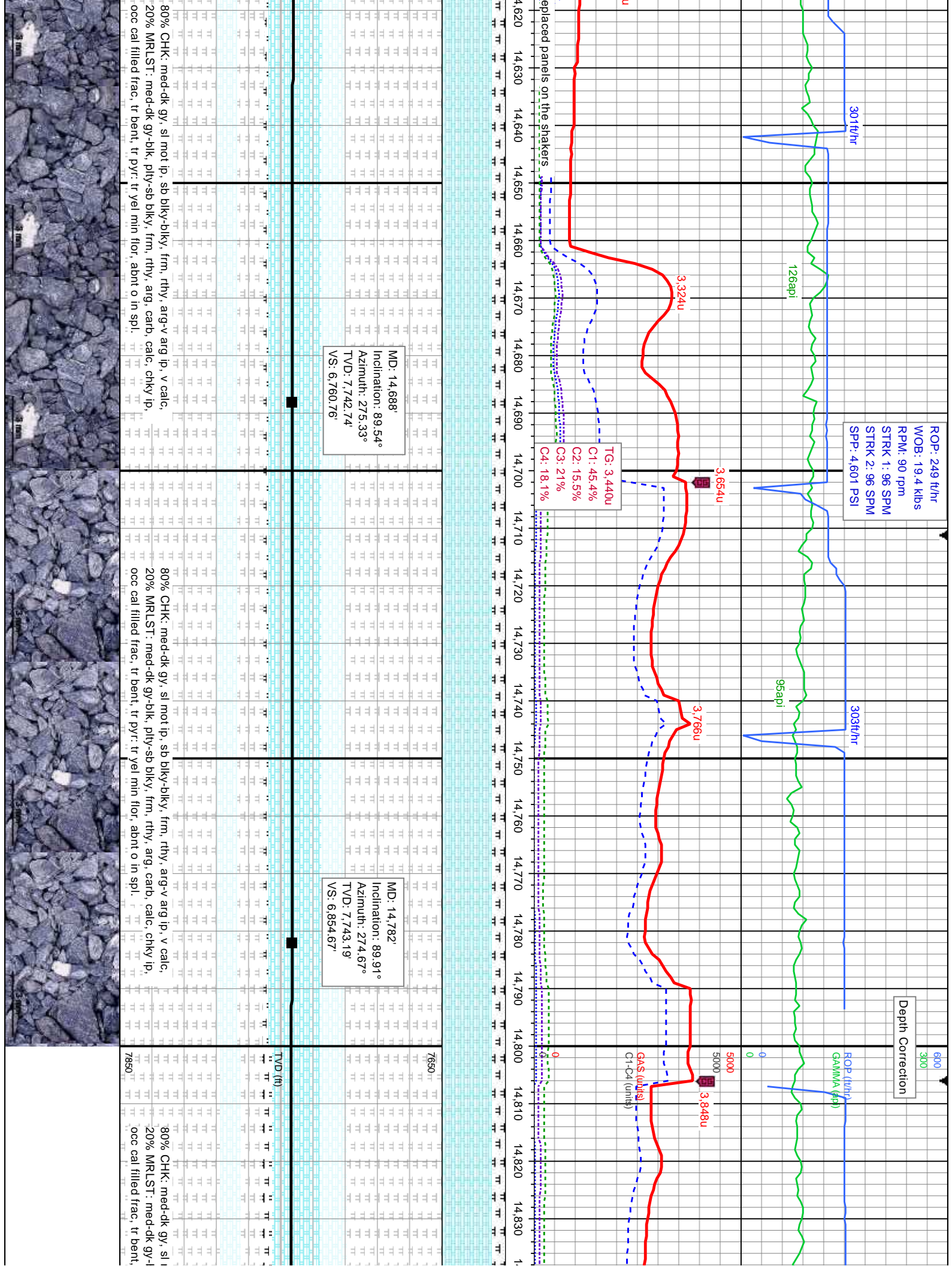


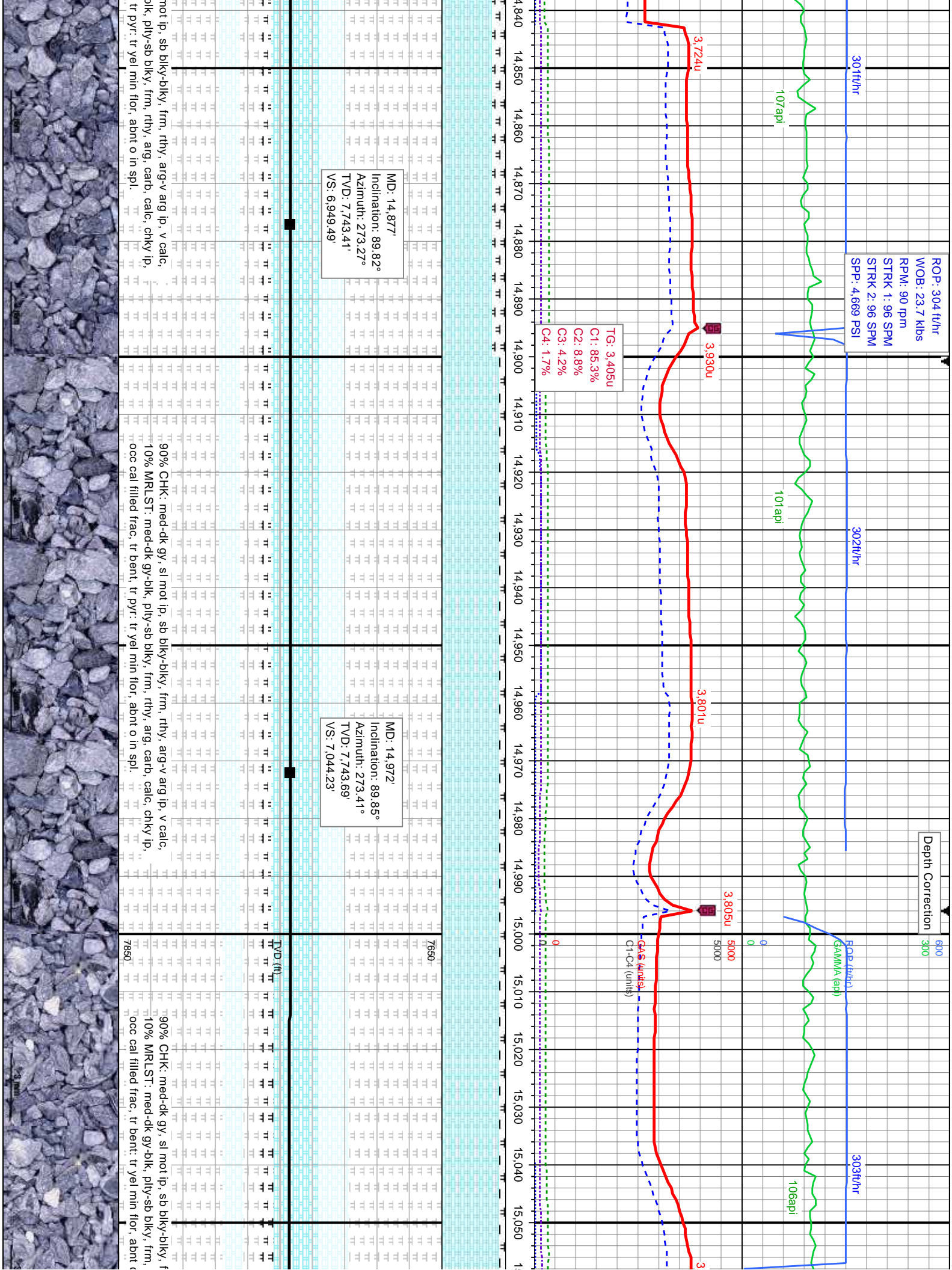












ROP: 304 ft/hr  
WOB: 23.7 klbs  
RPM: 90 rpm  
STRK 1: 96 SPM  
STRK 2: 96 SPM  
SPP: 4,669 PSI

Depth Correction

MD: 14,877'  
Inclination: 89.82°  
Azimuth: 273.27°  
TVD: 7,743.41'  
VS: 6,949.49'

TG: 3,405u  
C1: 85.3%  
C2: 8.8%  
C3: 4.2%  
C4: 1.7%

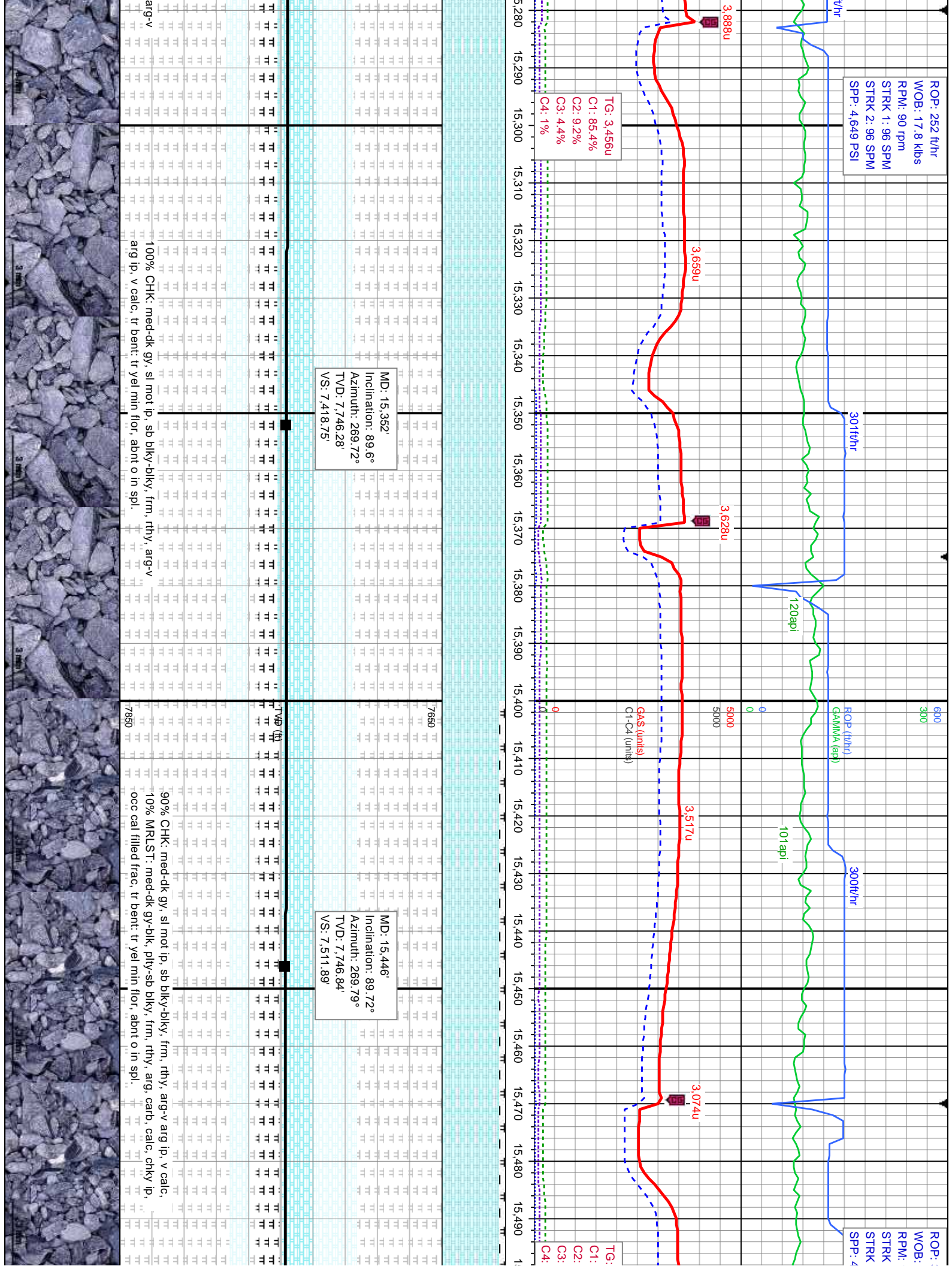
MD: 14,972'  
Inclination: 89.85°  
Azimuth: 273.41°  
TVD: 7,743.69'  
VS: 7,044.23'

90% CHK: med-dk gy, sl mot ip, sb blk-y-bkly, frm, rthy, arg-v arg ip, v calc,  
10% MRLST: med-dk gy-blk, ply-sb blkly, frm, rthy, arg, carb, calc, chky ip,  
occ cal filled frac, tr bent, tr pyr: tr yel min flor, abnt o in spl.

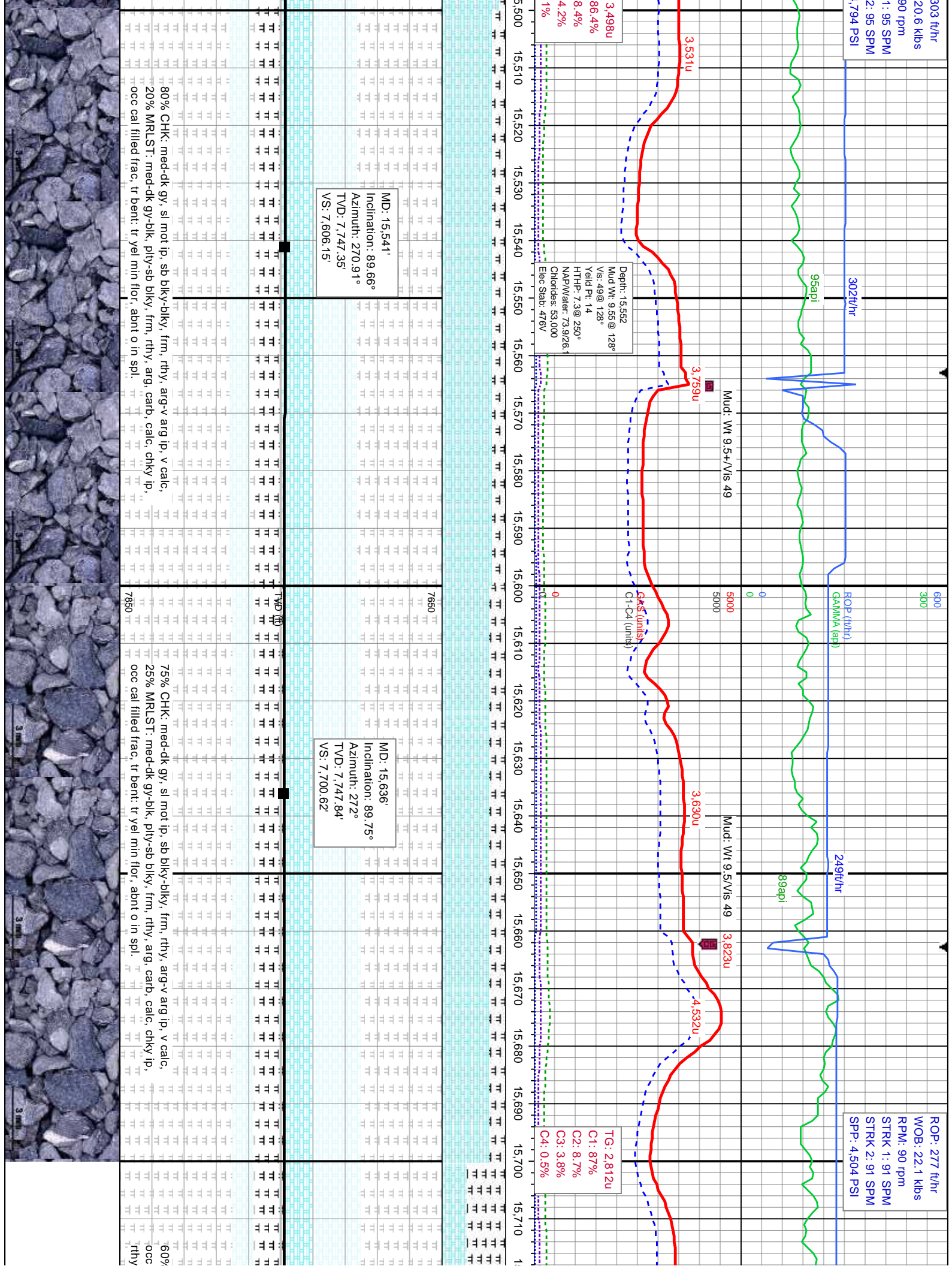
90% CHK: med-dk gy, sl mot ip, sb blk-y-bkly, f  
10% MRLST: med-dk gy-blk, ply-sb blkly, frm,  
occ cal filled frac, tr bent: tr yel min flor, abnt o

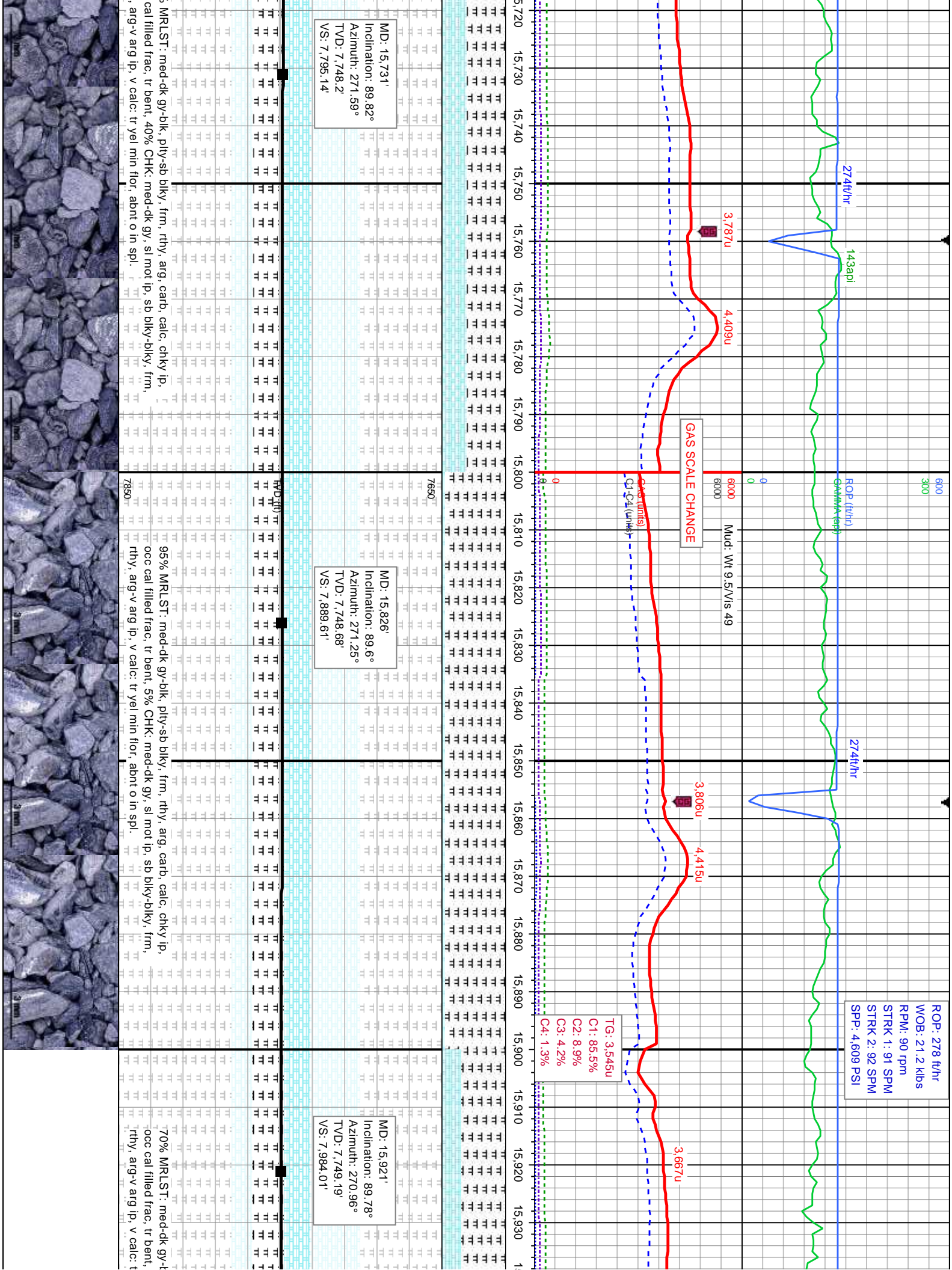




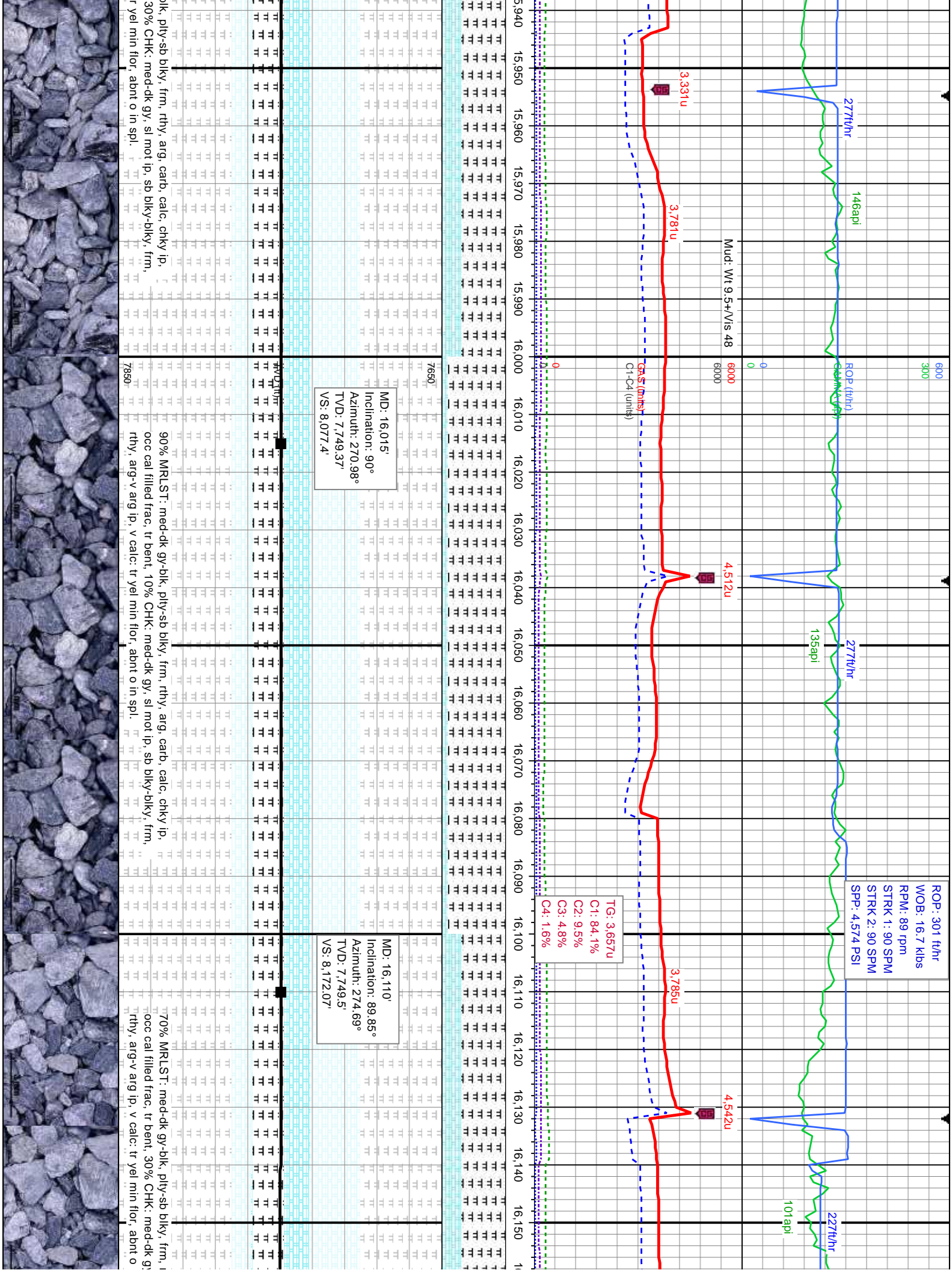


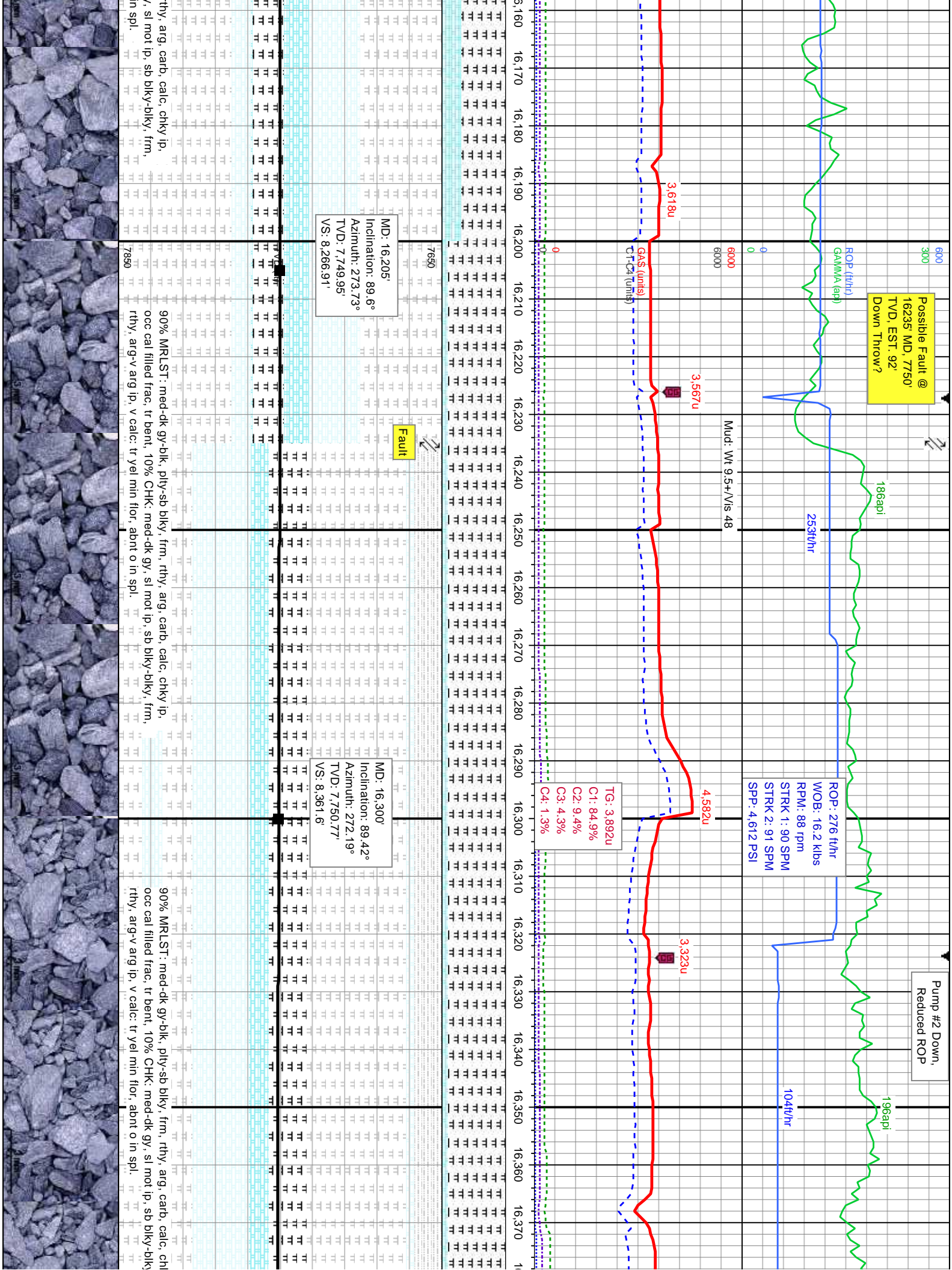




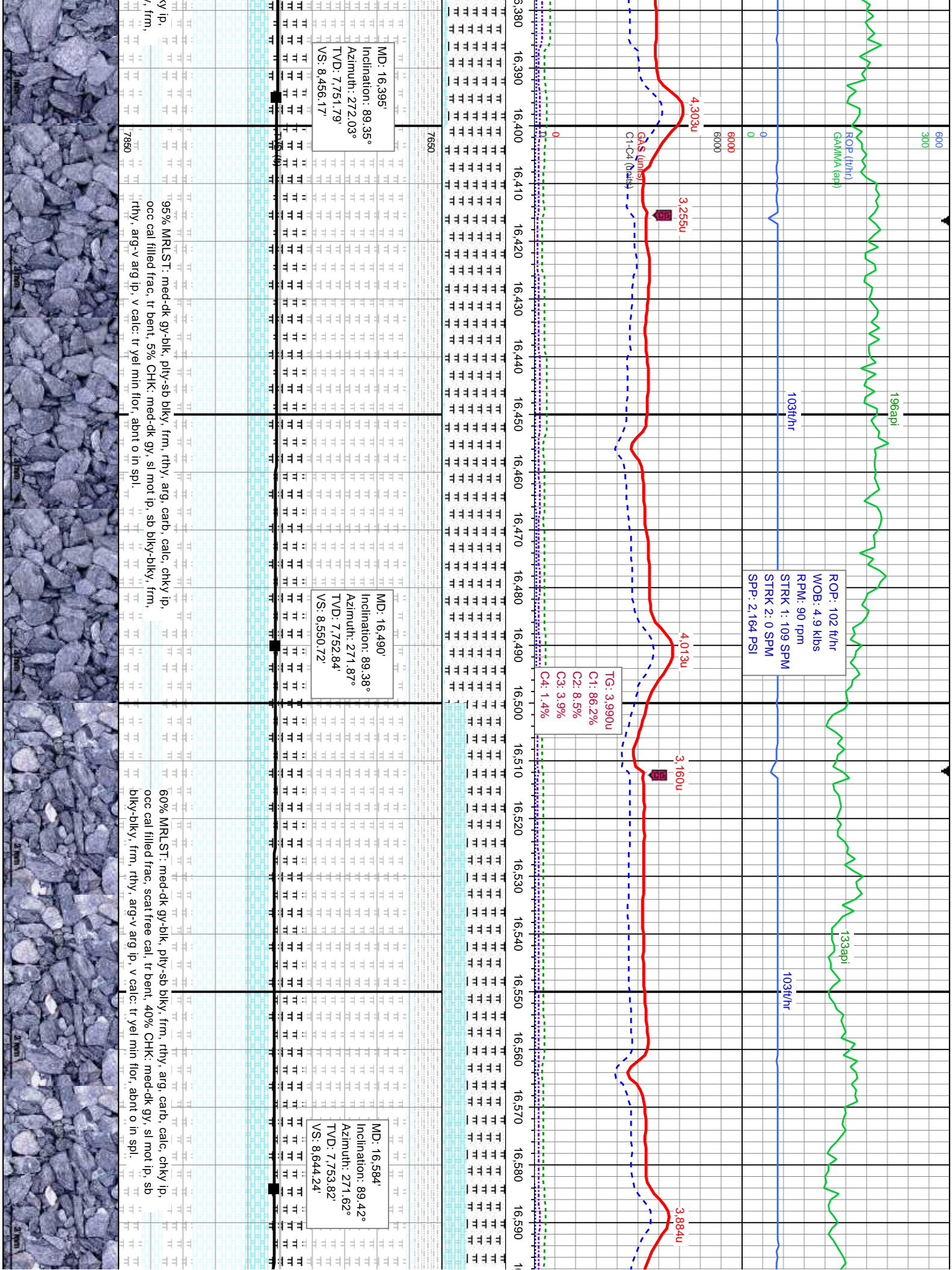


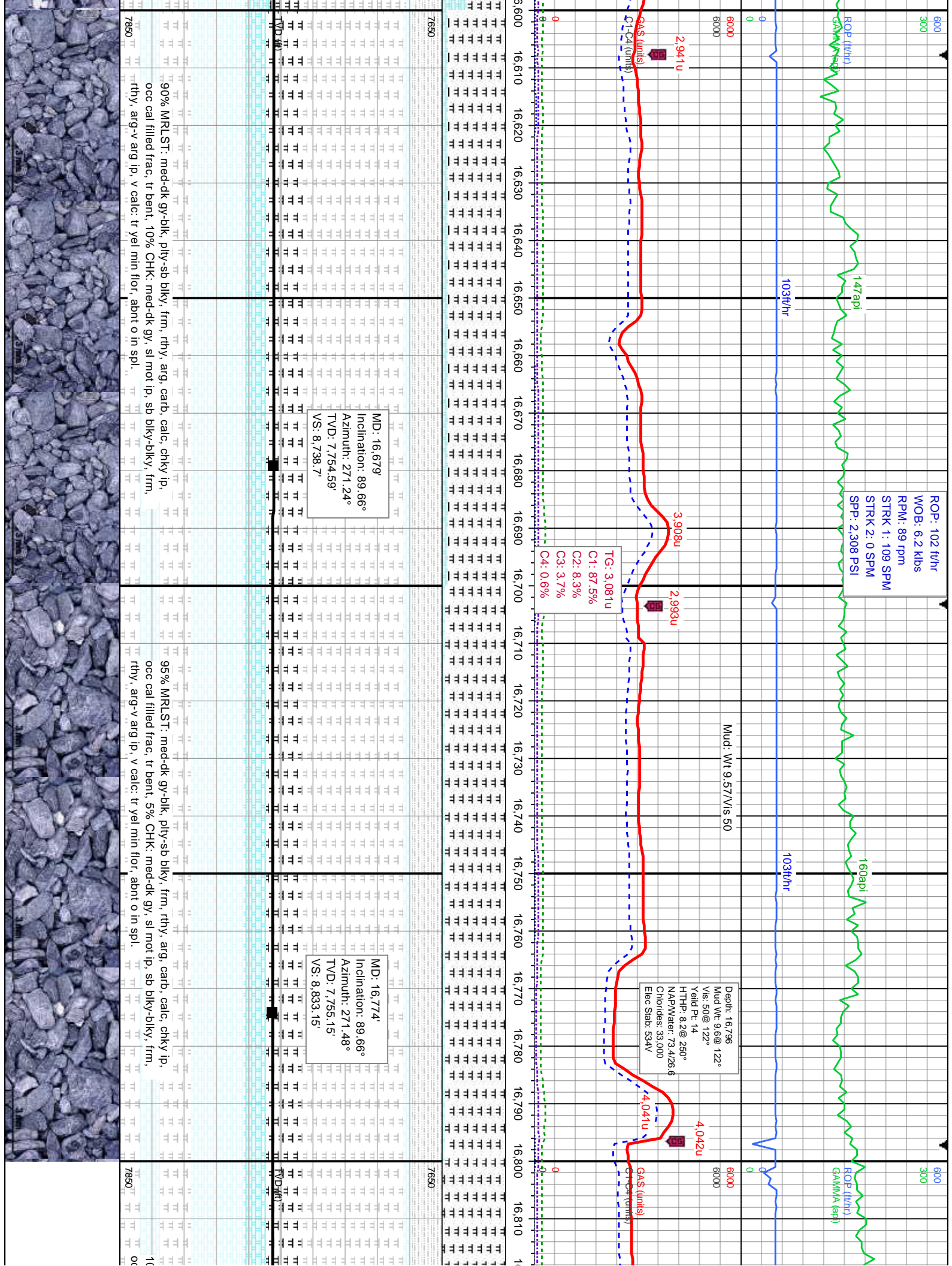






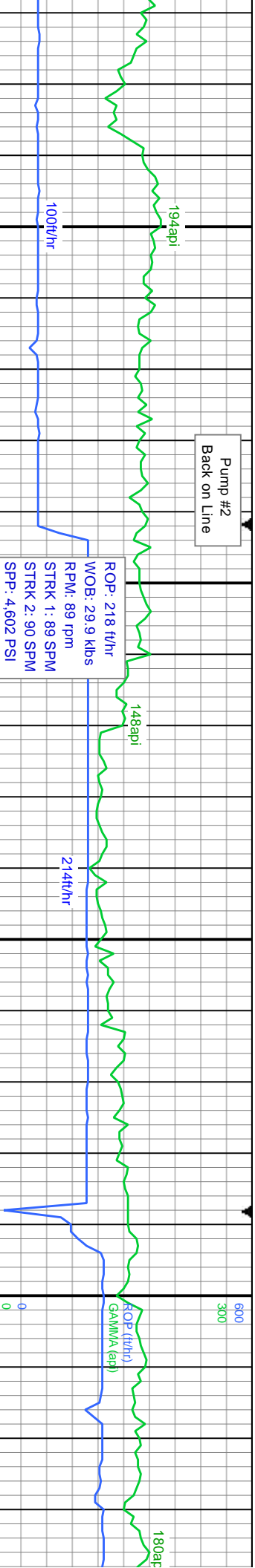








Pump #2  
Back on Line



Mud: Wt 9.6/lb/s 51

4.435u

TG: 2.620u

C1: 80.3%

C2: 12.3%

C3: 6.1%

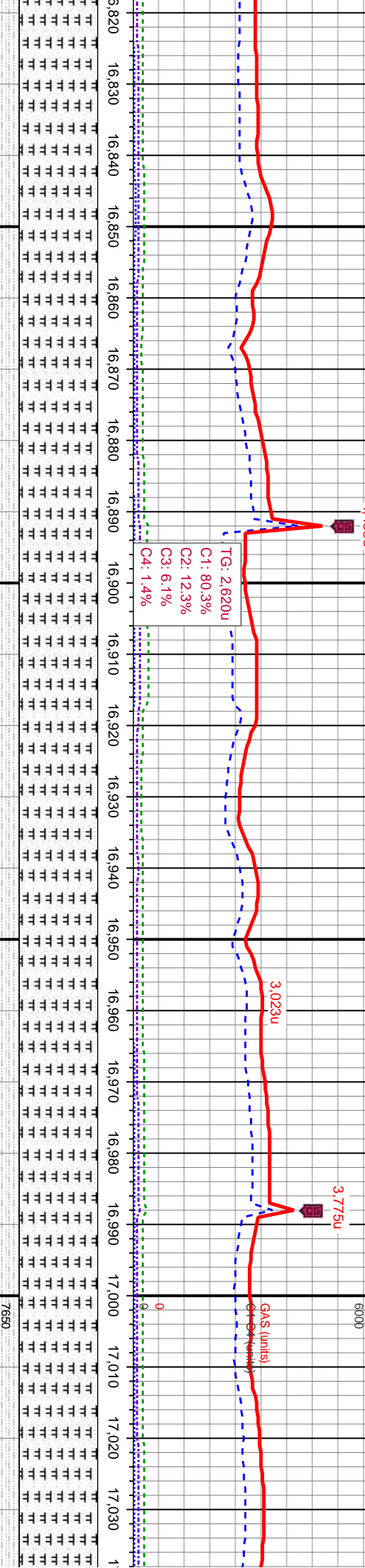
C4: 1.4%

GAS (units)

0.000000

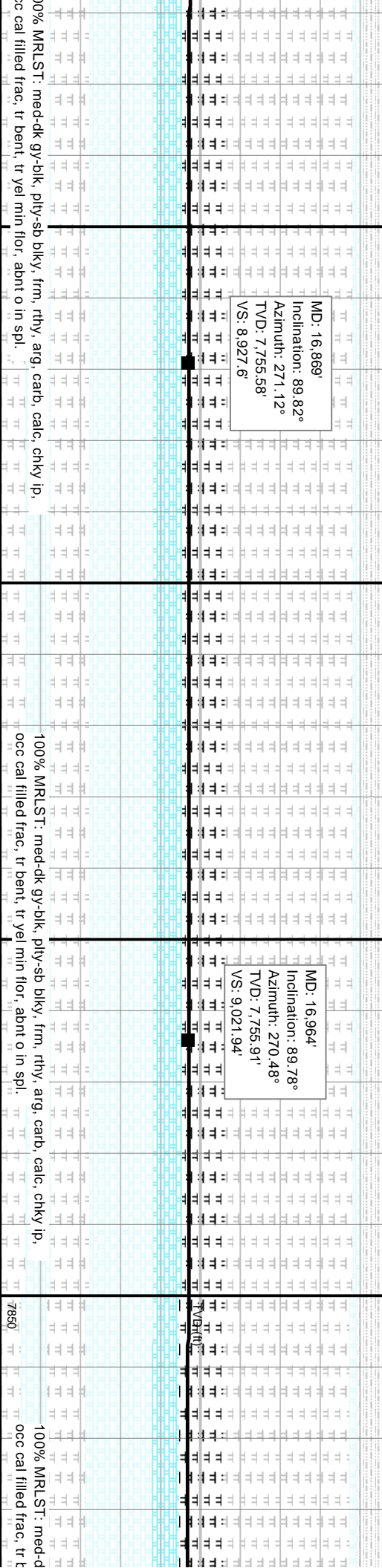
3.775u

3.023u



MD: 16.869  
Inclination: 89.82°  
Azimuth: 271.12°  
TVD: 7.755.58'  
VS: 8.927.6'

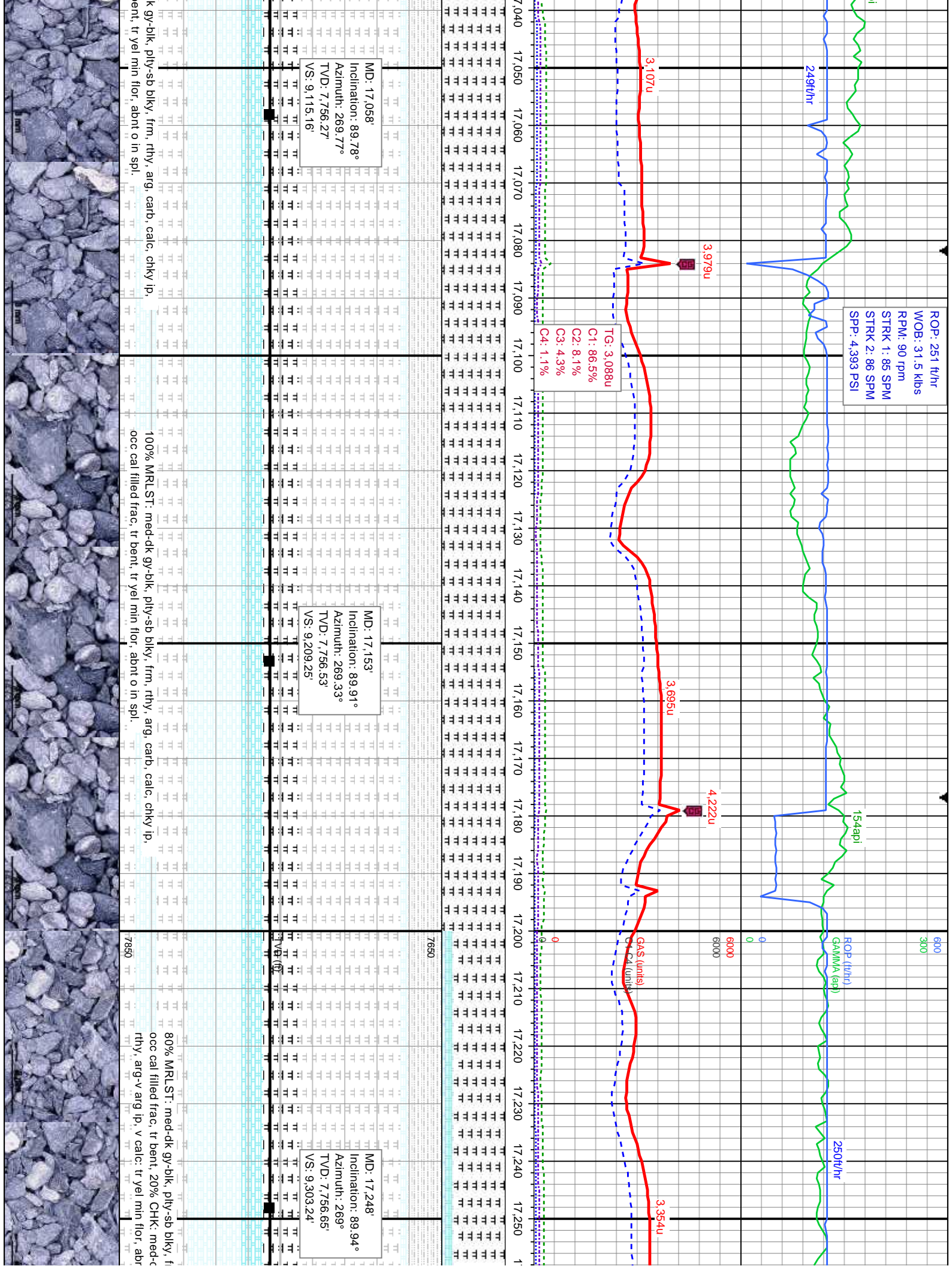
MD: 16.964  
Inclination: 89.78°  
Azimuth: 270.48°  
TVD: 7.755.91'  
VS: 9.021.94'



MD: 16.964  
Inclination: 89.78°  
Azimuth: 270.48°  
TVD: 7.755.91'  
VS: 9.021.94'

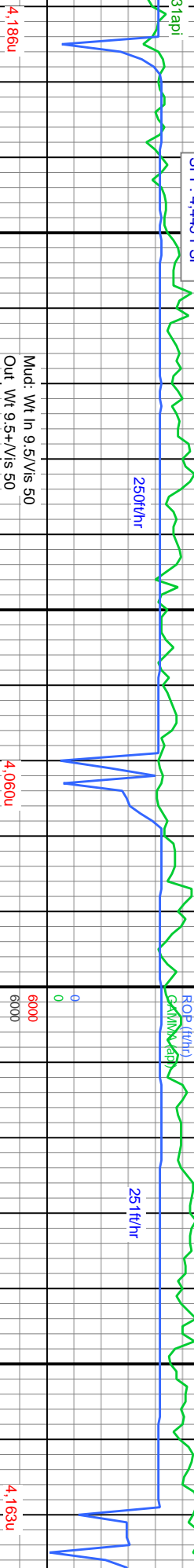


MD: 16.964  
Inclination: 89.78°  
Azimuth: 270.48°  
TVD: 7.755.91'  
VS: 9.021.94'





ROP: 252 ft/hr  
WOB: 29.4 klbs  
RPM: 90 rpm  
STKR 1: 85 SPM  
STKR 2: 85 SPM  
SP: 4.445 PSI



Mud: Wt In 9.5 V/s 50  
Out Wt 9.5 V/s 50

TG: 2.666u  
C1: 87.4%  
C2: 8.5%  
C3: 3.6%  
C4: 0.4%

MD: 17.343  
Inclination: 89.88°  
Azimuth: 269.27°  
TVD: 7.756.8  
VS: 9.397.23

MD: 17.438  
Inclination: 89.78°  
Azimuth: 268.87°  
TVD: 7.757.09  
VS: 9.491.2

80% MRLST: med-dk gy-blk, pily-sb blk, frm, rthy, arg, carb, calc, chky ip, occ cal filled frac, tr bent, 20% CHK: med-dk gy, sl mot ip, sb blk-blky, frm, rthy, arg-v arg ip, v calc: tr yel min flor, abnt o in spl.

80% MRLST: med-dk gy-blk, pily-sb blk, frm, rthy, arg, carb, calc, chky ip, occ cal filled frac, tr bent, 20% CHK: med-dk gy, sl mot ip, sb blk-blky, frm, rthy, arg-v arg ip, v calc: tr yel min flor, abnt o in spl.



