

# COLUMBINE LOGGING

Scale: 5" / 100'  
Measured Depth Log

**Well Name** Arellano S-10-9HN

**Location** NESE Section 10, T5N, R65W

**State** Colorado

**County** Weld

**Country** United States

**Rig Number** Frontier (Utah) 8

**API Number** 05-123-41111

**AFE #** 411111

**Region** DJ Basin

**Field** Wattenberg

**Spud Date** 4/2/2015

**Drilling Completed** 6/25/2015

**Surface Coordinates** Section 10:

1509' FSL x 330' FEL

**Bottom Hole Coordinates** Section 9:

**Ground Elevation** 4616'

**K.B. Elevation** 4640'

**Logged Interval** 6000' **To** 14041'

**Total Depth** 14041'

**Formation** Niobrara

**Type of Drilling Fluid** FWLSND

## Operator

**Company** Bayswater Exploration & Production, LLC.

**Address** 730 17th St.  
Denver, CO 80202

## Geologist

**Name** Mark E. Brown

**Company** Bayswater Exploration & Production, LLC.

**Address** 730 17th St.  
Denver, CO 80202

## Other

**Robert Davis** Wellsite Geologist

**Ben Katka** Wellsite Geologist

**Joey Luce** Wellsite Geologist

**Columbine Logging Computer** 148

**Bloodhound Unit** 298

## Zone Color Coding



## Rock Types

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

## Accessories

GASTROPOD	ARGILLITE GRAIN	HEAVY MINERAL	
INOCERAMUS	B BENTONITE	K KAOLIN	
OOLITE	BITUMENOUS SUBSTANCE	M MARCASITE	
OSTRACOD	BRECCIA FRAGMENT'S	M MARLSTONE	
PELECYPOD	CALCAREOUS	MICACEOUS	
PELLET	CARBONACEOUS FLAKES	MINERAL CRYSTALS	
PISOLITE	CHTDK	NODULES	
PLANT REMAINS	CHTLT	PHOSPHATE PELLETS	
PLANT SPORES	COAL - THIN BEDS	P PYRITE	
SCAPHOPOD	DOLOMITIC	B SALT CAST	
STROMATOPOROID	+ FELDSPAR	: SANDY	
	● FERRUGINOUS PELLET	\$ SIDERITE	
	> FERRUGINOUS	> SILICEOUS	
	// ANHYDRITIC	+ SILTY	
	- ARGILLACEOUS	> TUFACEOUS	

## Stringer

ANHYDRITE STRINGER
BENTONITE STRINGER
COAL STRINGER
DOLomite STRINGER
GYPSUM STRINGER
LIMESTONE STRINGER
MARLSTONE (CALC) STRG
MARLSTONE (DOL) STRG
SANDSTONE STRINGER
SHALE STRINGER
SILTSTONE STRINGER

## Oil Show

P PINPOINT
> VUGGY

## Engineering

D DEAD	● EVEN
○ QUESTIONABLE	▲ BIT
● SPOTTED STAINING	▲ CONNECTION (UP)

## Porosity

▼ CONNECTION (DOWN)
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CONNECTION GAS	TRIP GAS
CONNECTION GAS	TRIP GAS (LEFT)
F FENESTRAL	X INTERFRYSTALLINE
F FRACTURE	⏱️ DOWN TIME GAS (L)
E EARTHY	⚡ INTEROOLITIC
M MOLDIC	↓ CORE - LOST
O ORGANIC	■ CORE - RECOVERED

## Fossils

ALGAE	AMPHIPORA	BELEMNITE	BIOCLASTIC	BRACHIOPOD	BRYOZOA	CEPHALOPOD	CORAL	CRINOID	ECHINOID	FISH	FORAMINIFERA	F FOSSIL
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## Minerals

INOCERAMUS	OOLITE	OSTRACOD	PELECYPOD	PELLET	PISOLITE	PLANT REMAINS	PLANT SPORES	SCAPHOPOD	STROMATOPOROID
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## Stringer

ANHYDRITE STRINGER	BENTONITE STRINGER	COAL STRINGER	DOLomite STRINGER	GYPSUM STRINGER	LIMESTONE STRINGER	MARLSTONE (CALC) STRG	MARLSTONE (DOL) STRG	SANDSTONE STRINGER	SHALE STRINGER	SILTSTONE STRINGER
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# Other Symbols

 DST INTERVAL       WIRELINE TESTED - LEFT    **E** EARTHY

 FAULT       WIRELINE TESTED - RT    **FX** FINELYXLN

 FORMATION TOP       DRILL STEM TEST      **GS** GRAINSTONE

 GAS SHOW       MINDEPTH    MN DEPTH      **L** LITHOGRAPHIC


 OIL SHOW      **MX** MICROXLN


## Rounding

 MINDEPTH UP      **MIS** MUDSTONE

 MN DEPTH (DOWN)      **PA** PACKSTONE

 NORMAL FAULT      **R** ROUNDED      **WIS** WACKSTONE

(LEFT)  OVERTURNED STRATA      **B** SUBANG

 REVERSE FAULT      **R** SUBRND

## Sorting

 CASING      **M** MODERATE

## Textures

 SIDEWALL CORE (LEFT)      **P** POOR

 SIDEWALL CORE (RIGHT)    **BS** BOUNDSTONE      **W** WELL

 SLIDE      **C** CHALKY

 SURVEY      **CX** CRYPTOXLN

Slide/Rotate

ROP

ROP

Total Gas & Chromatograph

- GAS
- C1
- C2
- C3
- C4

COLUMBINE LOGGING RIGGED  
 UP ON 4/06/2015 MANNED  
 2-PERSON LOGGING WITH  
 BLOODHOUND GAS  
 CHROMATOGRAPH #0298

Depth Labels

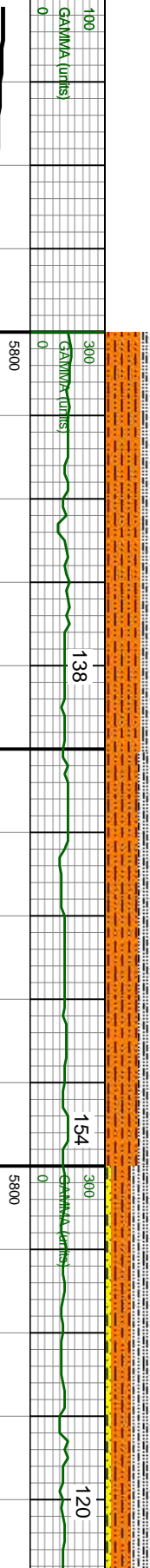
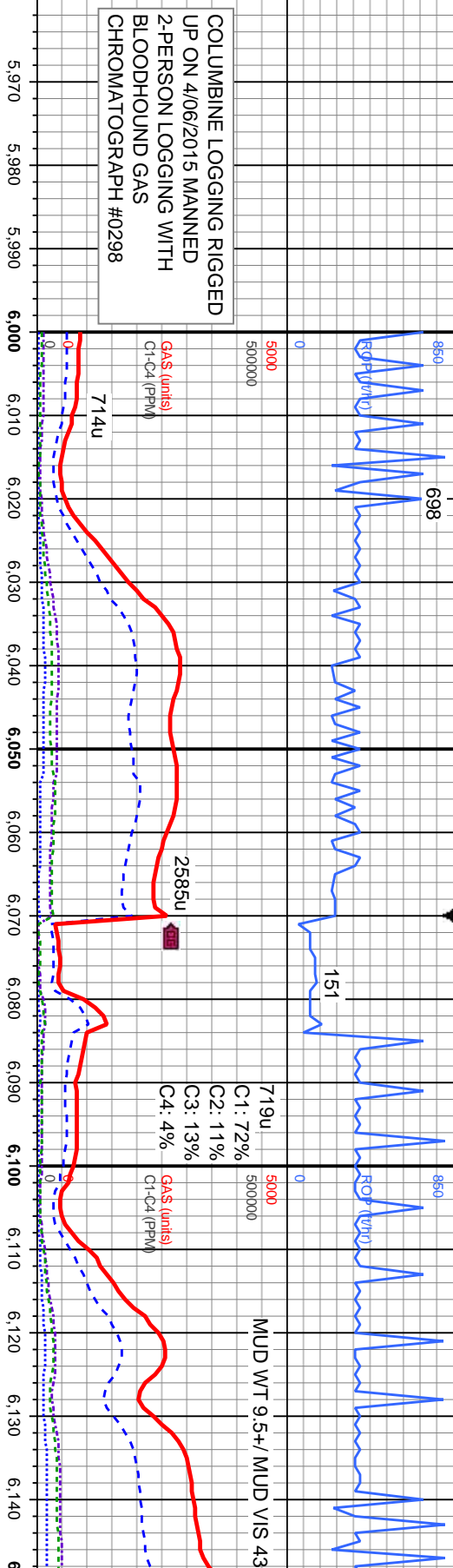
% Lith

Gamma  
GAMMA

Well Bore  
TVD

Oil Show

Images



BEGIN LOGGING F/ 6000' MD @  
 04:41 HRS ON 4/07/2015

MD: 6.019'  
 TVD: 5.925.69'  
 Inclination: 3.1°  
 Azimuth: 129.4°  
 VS: -157.46'

MD: 6.114'  
 TVD: 6.020.64'  
 Inclination: 0.5°  
 Azimuth: 93.2°  
 VS: -159.6'

SHY SLTST: lt-med gy, silt-vf gr, sl frm-hd, sb pily-sb blkly, gt tex, arg cmt, sh incl, non calc;  
 SLTY SH: med-dk gy, silt-mic gr, sl frm, sb pily-pily, rthy-sb rthy tex, mot ip, non calc;  
 tr SHY SS, v slow difse, slow strng, lt-bl cut.

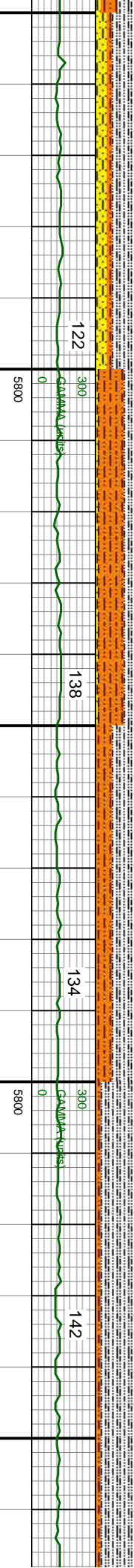
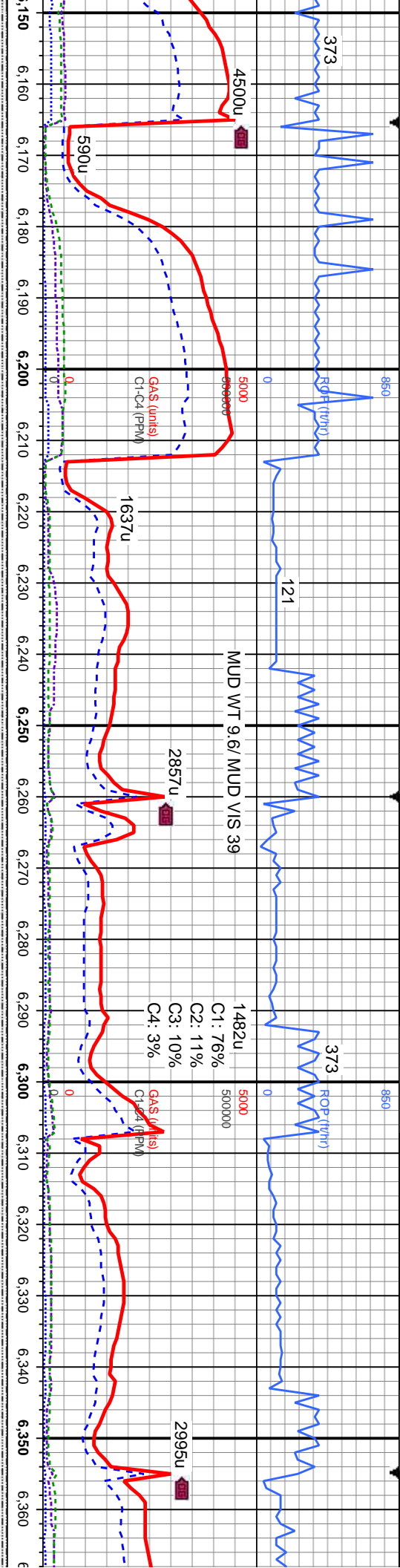
SLTY SH: med-dk gy, silt-mic gr, sl frm, ...  
 SHY SLTST: lt-med gy, silt-vf gr, sl frm-l calc;  
 SHY SS: wht-lt gy, sl trnsi-op, spe rnd-ang, calc incl, sh incl, arg cmt, v slow

EGMFTS

TVD (ft)

TVD





MD: 6,209'  
 TVD: 6,115.64'  
 Inclination: 0.2°  
 Azimuth: 268.8°  
 VS: -159.84'

MD: 6,257'  
 TVD: 6,163.61'  
 Inclination: 3.3°  
 Azimuth: 274.8°  
 VS: -158.41'

MD: 6,304'  
 TVD: 6,210.42'  
 Inclination: 6.9°  
 Azimuth: 272.1°  
 VS: -154.31'

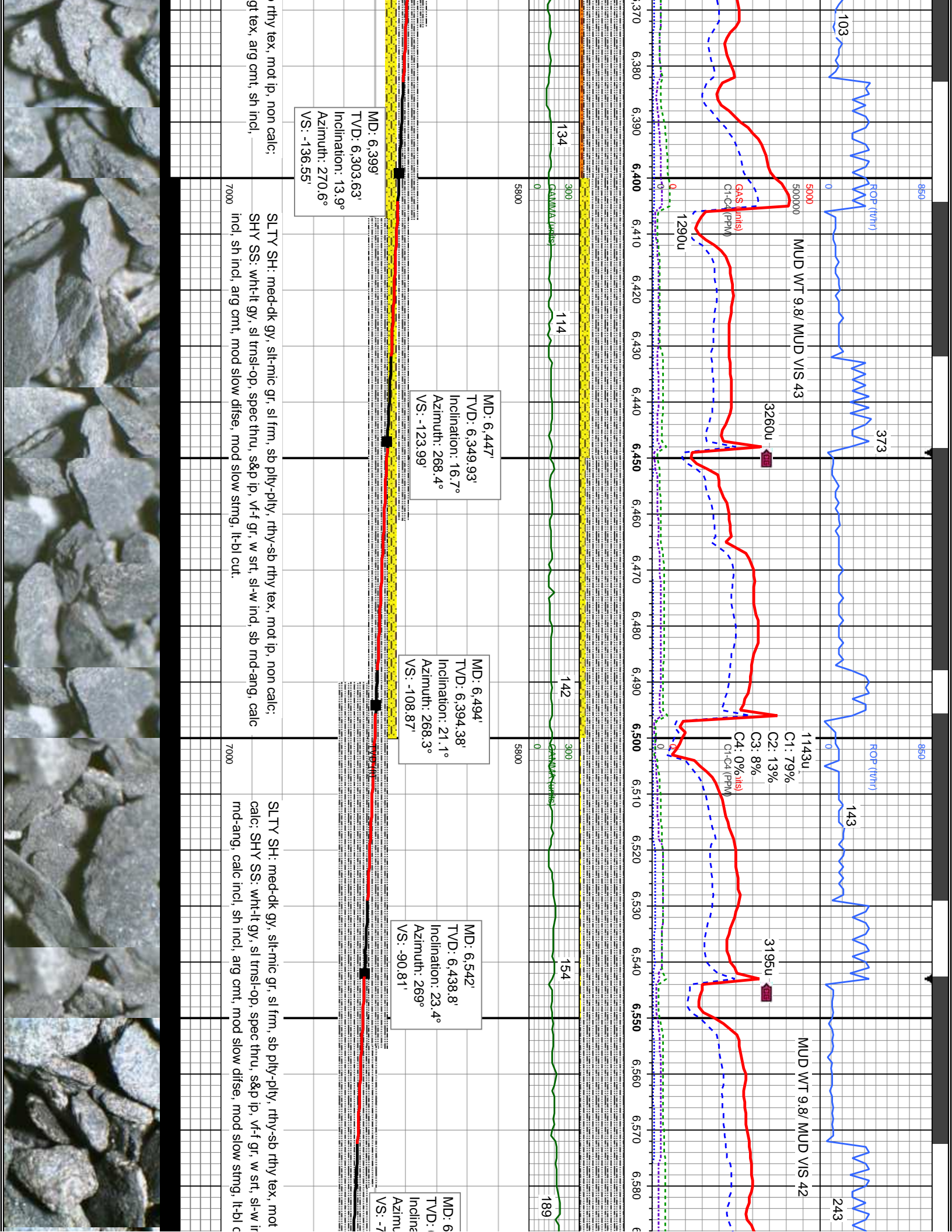
MD: 6,352'  
 TVD: 6,257.79'  
 Inclination: 11.5°  
 Azimuth: 271.8°  
 VS: -146.75'

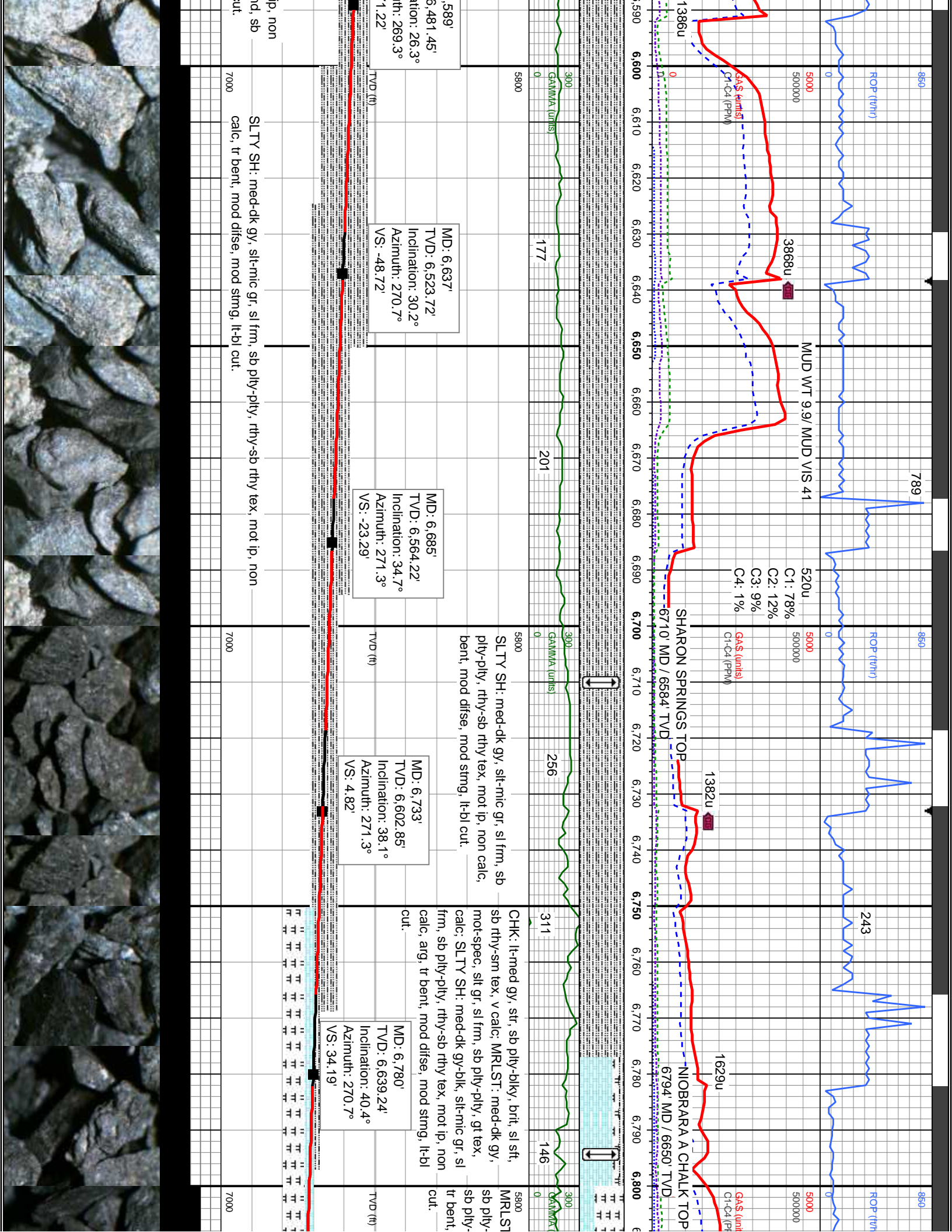
sb pily-pily, rthy-sb rthy tex, mot ip, non calc;  
 dd, sb pily-sb blkly, gt tex, arg cmt, sh incl, non  
 calc thru, s&gp ip, vf-f gr, w srt, sl-w ind, sb

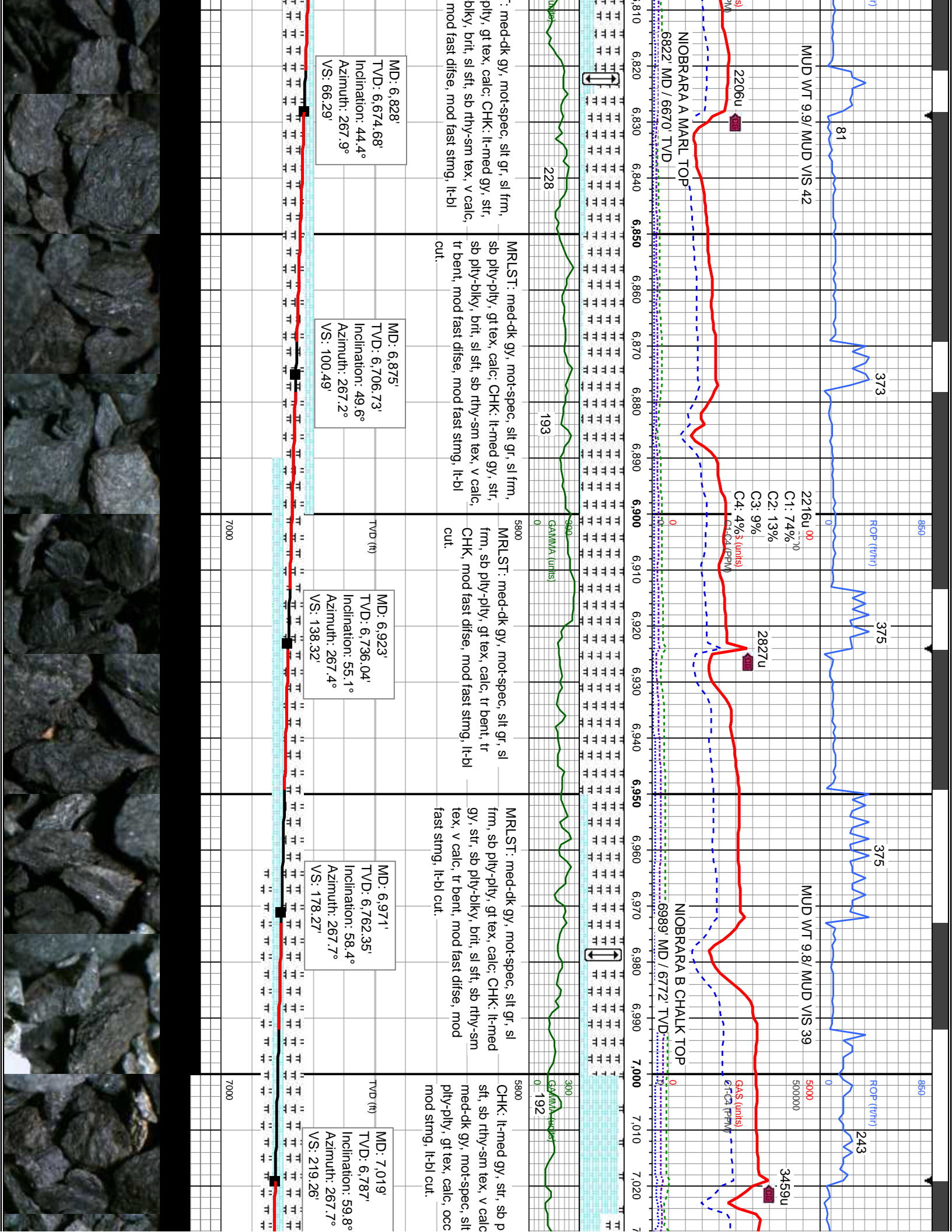
SLTY SH: med-dk gy, slt-nic gr, sl frm, sb pily-pily, rthy-sb rthy tex, mot ip, non calc;  
 SHY SLTST: lt-med gy, slt-vf gr, sl frm-hd, sb pily-sb blkly, gt tex, arg cmt, sh incl, non  
 calc; SHY SS: wht-lt gy, sl trns-op, spec thru, s&gp ip, vf-f gr, w srt, sl-w ind, sb  
 7000 rnd-ang, calc incl, sh incl, arg cmt, v slow difse, slow stmg, lt-bl cut.

SLTY SH: med-dk gy, slt-nic gr, sl frm, sb pily-pily, rthy-sb  
 SHY SLTST: lt-med gy, slt-vf gr, sl frm-hd, sb pily-sb blkly,  
 non calc, tr SHY SS, v slow difse, slow stmg, lt-bl cut.









MUD WT 9.9 / MUD VIS 42

MUD WT 9.8 / MUD VIS 39

2206u

2827u

3459u

6822' MD / 6670' TVD

6989' MD / 6772' TVD

GAS (units)  
GFC4 (PPM)

81

373

375

375

243

ROP (ft/min)

ROP (ft/min)

228

193

GAMMA (API)

GAMMA (API)

MD: 6,828'  
TVD: 6,674.68'  
Inclination: 44.4°  
Azimuth: 267.9°  
VS: 66.29'

MD: 6,875'  
TVD: 6,706.73'  
Inclination: 49.6°  
Azimuth: 267.2°  
VS: 100.49'

MD: 6,923'  
TVD: 6,736.04'  
Inclination: 55.1°  
Azimuth: 267.4°  
VS: 138.32'

MD: 6,971'  
TVD: 6,762.35'  
Inclination: 58.4°  
Azimuth: 267.7°  
VS: 178.27'

MD: 7,019'  
TVD: 6,787'  
Inclination: 59.8°  
Azimuth: 267.7°  
VS: 219.26'

med-dk gy, mot-spec, slt gr, sl frm, plty, gt tex, calc; CHK: lt-med gy, str, blkly, brit, sl sft, sb rthy-sm tex, v calc, mod fast difse, mod fast string, lt-bl cut.

MRLST: med-dk gy, mot-spec, slt gr, sl frm, sb plty-plty, gt tex, calc; CHK: lt-med gy, str, sb plty-blky, brit, sl sft, sb rthy-sm tex, v calc, tr bent, mod fast difse, mod fast string, lt-bl cut.

MRLST: med-dk gy, mot-spec, slt gr, sl frm, sb plty-plty, gt tex, calc, tr bent, tr CHK, mod fast difse, mod fast string, lt-bl cut.

MRLST: med-dk gy, mot-spec, slt gr, sl frm, sb plty-plty, gt tex, calc; CHK: lt-med gy, str, sb plty-blky, brit, sl sft, sb rthy-sm tex, v calc, tr bent, mod fast difse, mod fast string, lt-bl cut.

CHK: lt-med gy, str, sb plty-plty, gt tex, calc; CHK: lt-med gy, str, sb rthy-sm tex, v calc, mod fast difse, mod fast string, lt-bl cut.

TVD (ft)

TVD (ft)

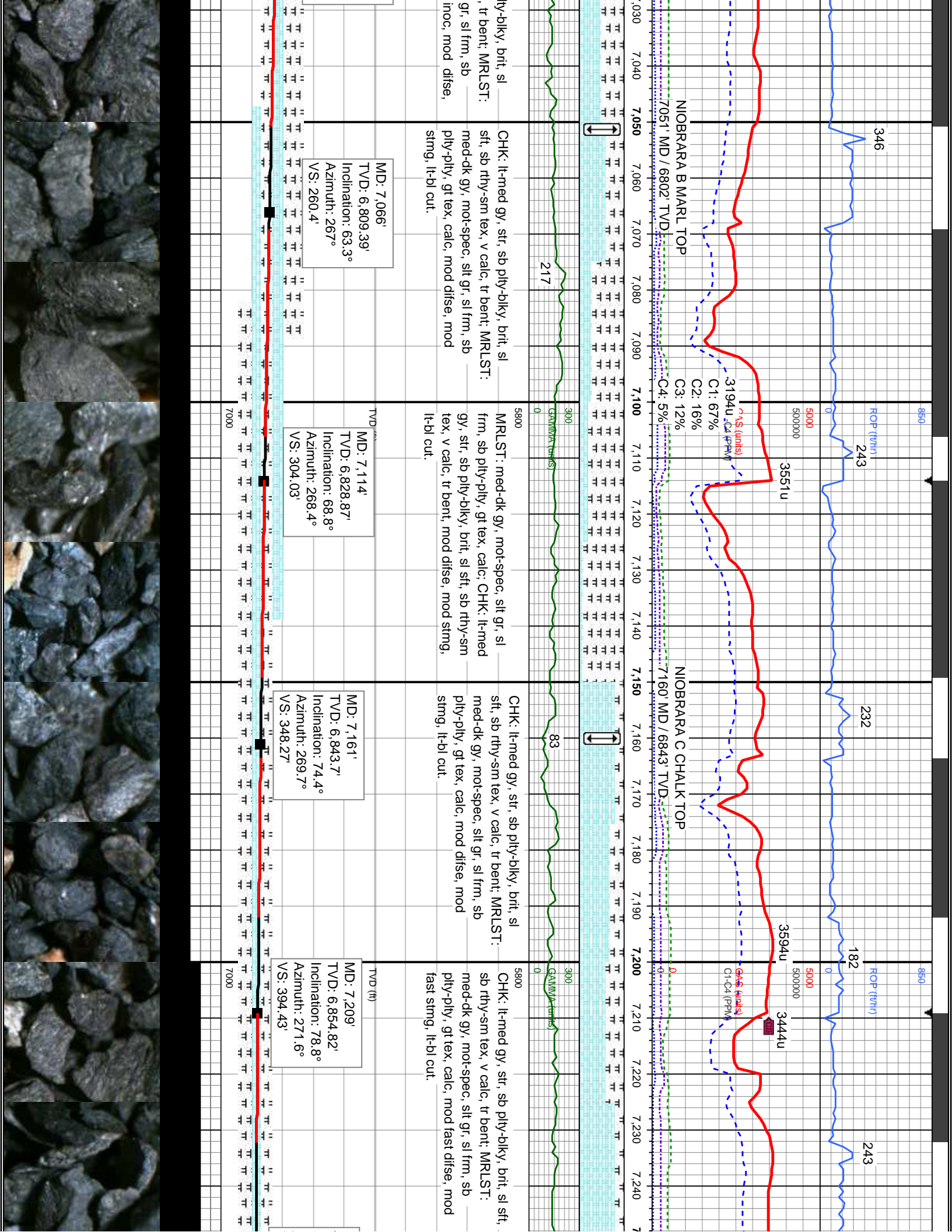
TVD (ft)

7000

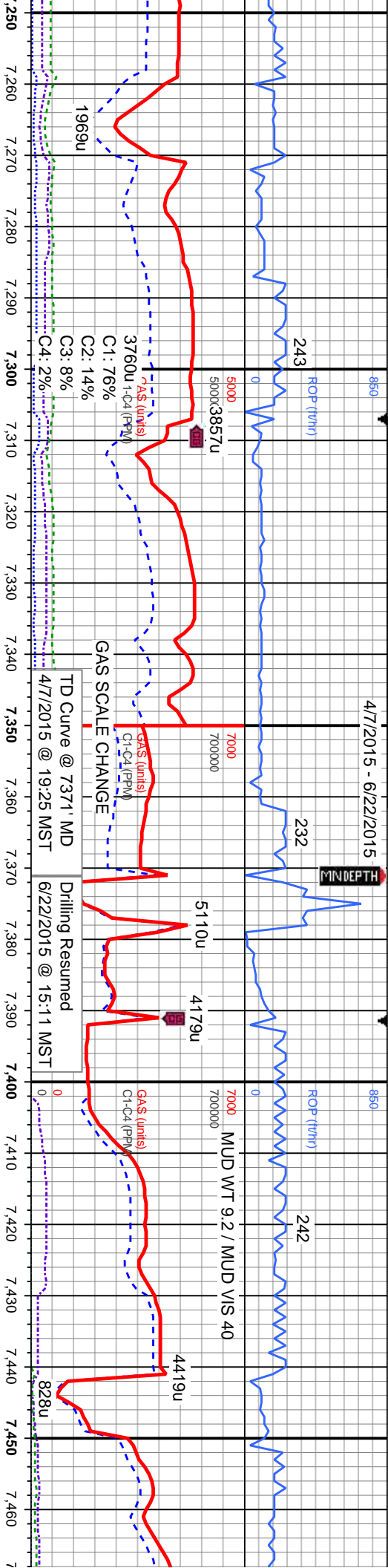
7000

7000





4/7/2015 - 6/22/2015



TD Curve @ 7371' MD  
 4/7/2015 @ 19:25 MST  
 Drilling Resumed  
 6/22/2015 @ 15:11 MST

CHK: lt-med gy, str, sb ply-blky, brit, sl sft, sb rthy-sm tex, v calc, tr bent; MRLST: med-dk gy, mot-spec, silt gr, sl frm, sb ply-ply, gt tex, calc, mod fast difse, mod fast stmg, lt-bl cut.

CHK: lt-med gy, str, sb ply-blky, brit, sl sft, sb rthy-sm tex, v calc, tr bent; MRLST: med-dk gy, mot-spec, silt gr, sl frm, sb ply-ply, gt tex, calc, mod fast difse, mod fast stmg, lt-bl cut.

CHK: lt-med gy, str, sb ply-blky, brit, sl sft, sb rthy-sm tex, v calc, tr bent; MRLST: med-dk gy, mot-spec, silt gr, sl frm, sb ply-ply, gt tex, calc, mod fast difse, mod fast stmg, lt-bl cut.

MRLST: med-dk gy, mot-spec, silt gr, sl frm, sb ply-ply, gt tex, calc, CHK: lt-med gy, str, sb ply-blky, brit, sl sft, sb rthy-sm tex, v calc, tr bent, tr cmt: mod-fast difse, mod-fast stmg, lt-bl cut

MRLST: med-dk gy, mot-spec, silt gr, sl frm, sb ply-ply, gt tex, calc, CHK: lt-med gy, str, sb ply-blky, brit, sl sft, sb rthy-sm tex, v calc, tr bent, tr cmt: mod-fast difse, mod-fast stmg, lt-bl cut

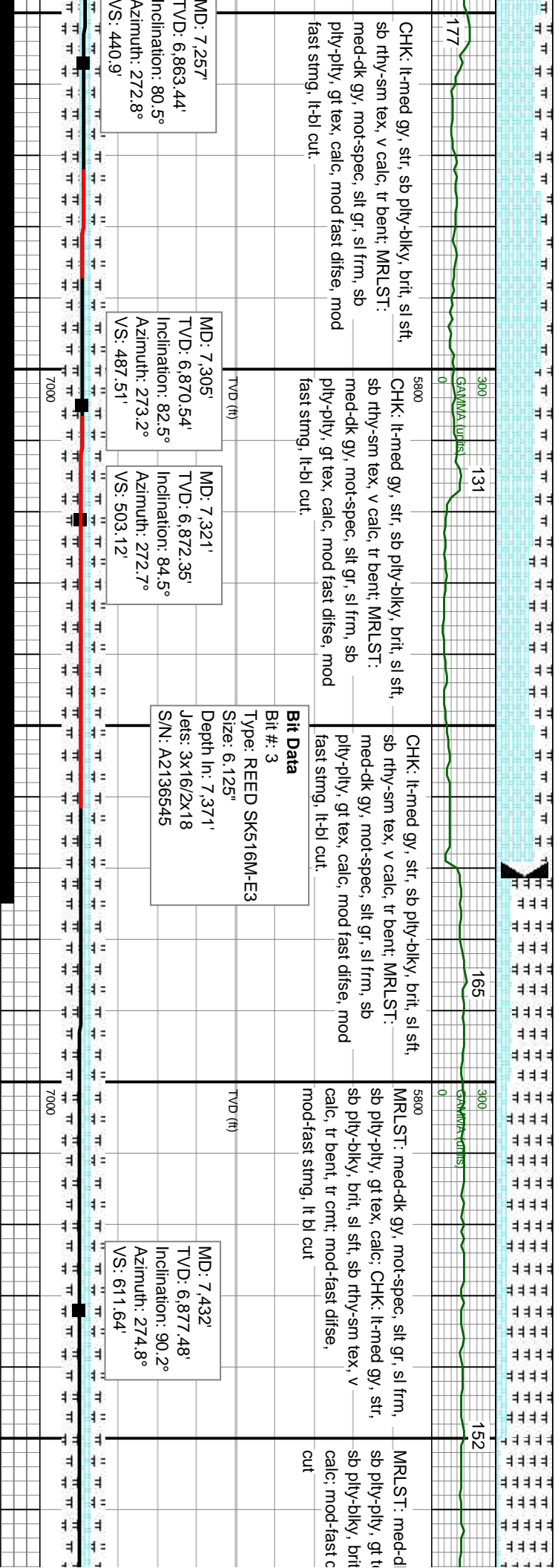
MWD: 7.257'  
 TVD: 6,863.44'  
 Inclination: 80.5°  
 Azimuth: 272.8°  
 VS: 440.9'

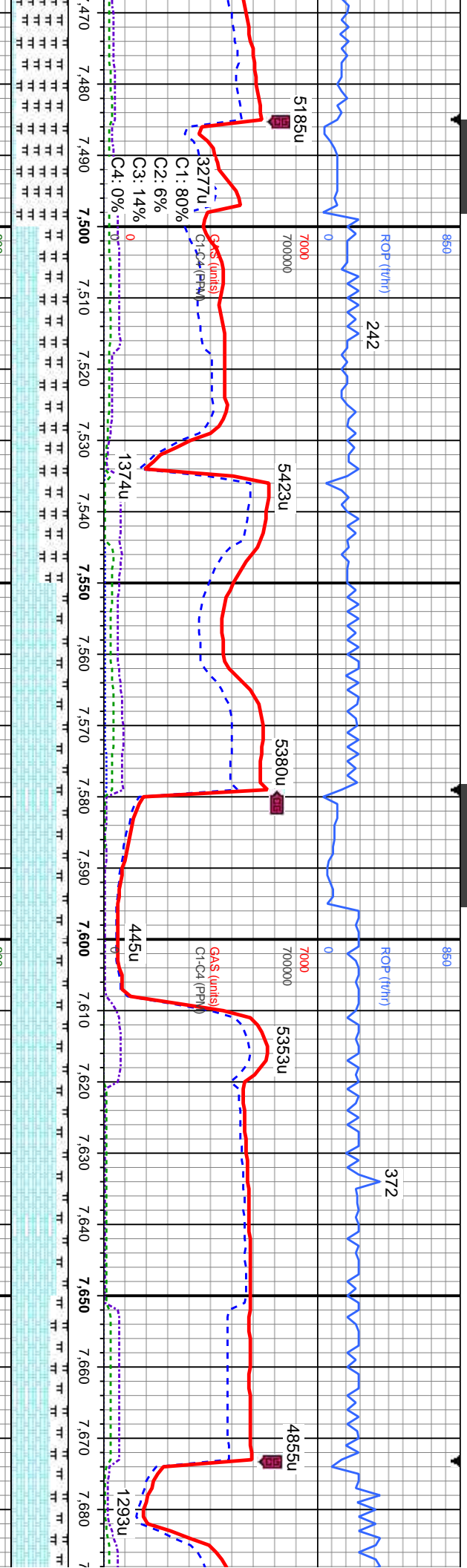
MWD: 7.305'  
 TVD: 6,870.54'  
 Inclination: 82.5°  
 Azimuth: 273.2°  
 VS: 487.51'

MWD: 7.321'  
 TVD: 6,872.35'  
 Inclination: 84.5°  
 Azimuth: 272.7°  
 VS: 503.12'

MWD: 7.432'  
 TVD: 6,877.48'  
 Inclination: 90.2°  
 Azimuth: 274.8°  
 VS: 611.64'

**Bit Data**  
 Bit #: 3  
 Type: REED SK516M-E3  
 Size: 6.125"  
 Depth In: 7.371'  
 Jets: 3x16/2x18  
 S/N: A2136545





5800  
MRLST: med-dk gy, mot-spec, silt gr, sl frm, sb pily-pily, gt tex, calc; CHK: lt-med gy, str, sb pily-blky, brit, sl sft, sb rthy-sm tex, v calc; mod-fast difse, mod-fast string, lt bl bishwh cut

5800  
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; mod-fast difse, mod-fast string, fr bishwh cut

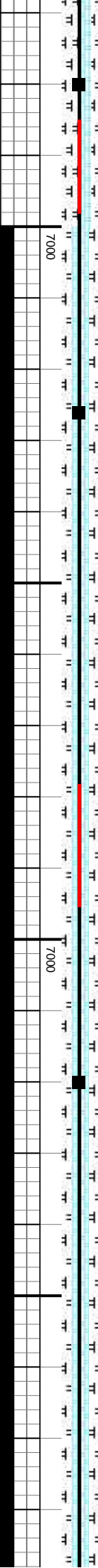
5800  
CHK: lt-med gy, str, sb pily-blky, brit, sl sft, sb rthy-sm tex, v calc; MRLST: med-dk gy, mot-spec, silt gr, sl frm, sb pily-pily, gt tex, calc; mod-fast difse, mod-fast string, fr bishwh cut

5800  
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; mod-fast difse, mod-fast string, fr bishwh cut

MD: 7.480'  
TVD: 6,877.23'  
Inclination: 90.4°  
Azimuth: 272.5°  
VS: 658.65'

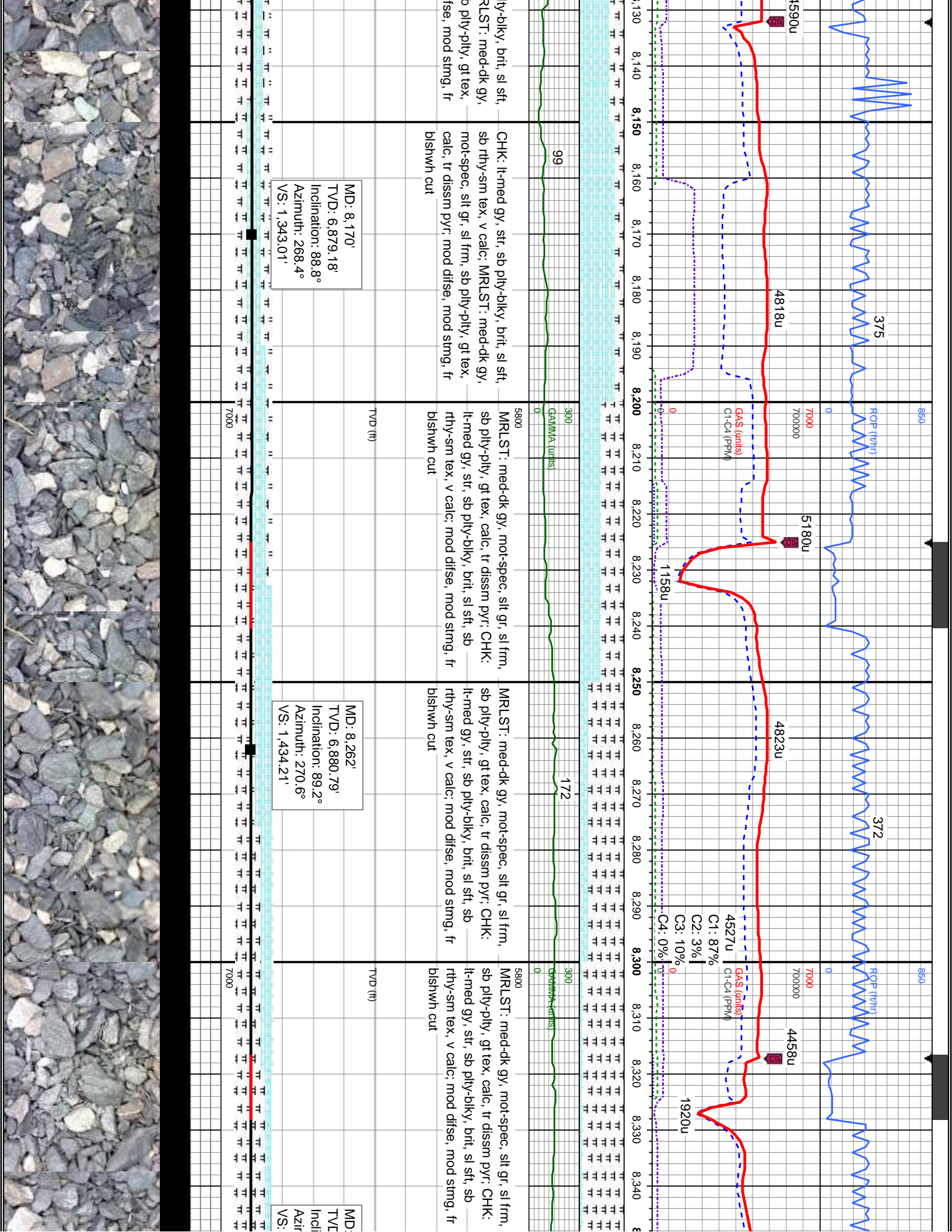
MD: 7.526'  
TVD: 6,876.86'  
Inclination: 90.5°  
Azimuth: 270.9°  
VS: 704'

MD: 7.620'  
TVD: 6,876.54'  
Inclination: 89.9°  
Azimuth: 269.9°  
VS: 796.99'









MD: 8.170'  
 TVD: 6,879.18'  
 Inclination: 88.8°  
 Azimuth: 268.4°  
 VS: 1,343.01'

MD: 8.262'  
 TVD: 6,880.79'  
 Inclination: 89.2°  
 Azimuth: 270.6°  
 VS: 1,434.21'

MD: 8.262'  
 TVD: 6,880.79'  
 Inclination: 89.2°  
 Azimuth: 270.6°  
 VS: 1,434.21'

ly-blky, brit, sl sft,  
 MRLST: med-dk gy,  
 sb pty-pily, gt tex,  
 calc, tr dissm pyr; mod stmg, fr  
 blshwh cut

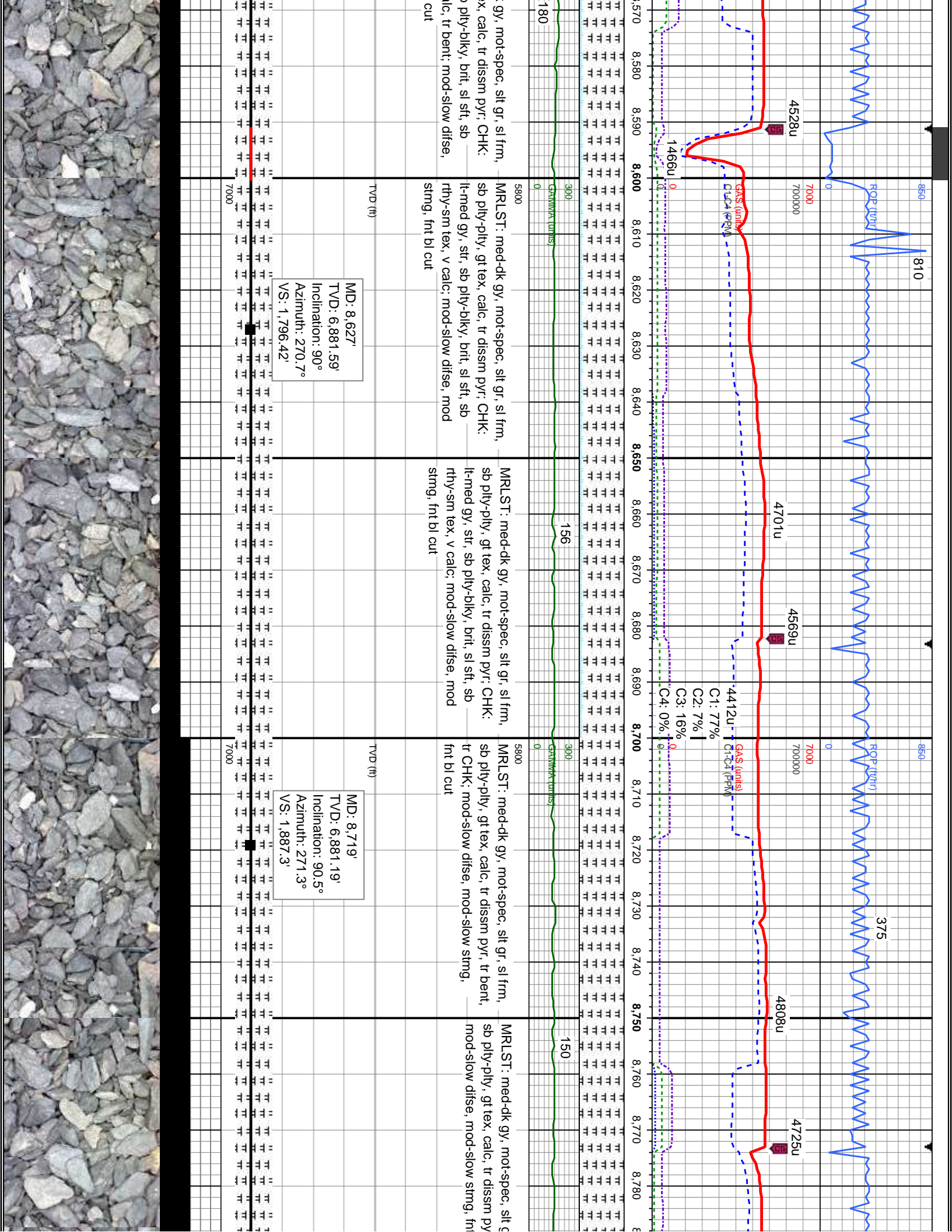
CHK: lt-med gy, str, sb pty-blky, brit, sl sft,  
 sb rthy-sm tex, v calc; MRLST: med-dk gy,  
 mot-spec, slt gr, sl frm, sb pty-pily, gt tex,  
 calc, tr dissm pyr; mod difse, mod stmg, fr  
 blshwh cut

MRLST: med-dk gy, mot-spec, slt gr, sl frm,  
 sb pty-pily, gt tex, calc, tr dissm pyr; CHK:  
 lt-med gy, str, sb pty-blky, brit, sl sft, sb  
 rthy-sm tex, v calc; mod difse, mod stmg, fr  
 blshwh cut

MRLST: med-dk gy, mot-spec, slt gr, sl frm,  
 sb pty-pily, gt tex, calc, tr dissm pyr; CHK:  
 lt-med gy, str, sb pty-blky, brit, sl sft, sb  
 rthy-sm tex, v calc; mod difse, mod stmg, fr  
 blshwh cut

GAS (units)  
 C1: 87%  
 C2: 3%  
 C3: 10%  
 C4: 0%





8500 810

8500 375

4528u

4701u

4569u

4808u

4725u

ROP (ft/min)

GAS (units)

Cl-C4 (PPM)

4412u

C1: 77%

C2: 7%

C3: 16%

C4: 0%

1466u

300

156

300

150

8580 8590 8600 8610 8620 8630 8640 8650 8660 8670 8680 8690 8700 8710 8720 8730 8740 8750 8760 8770 8780

MRLST: med-dk gy, mot-spec, slt gr, sl frm, sb ply-ply, gt tex, calc, tr dissim pyr; CHK: lt-med gy, str, sb ply-blky, brit, sl sft, sb rthy-sm tex, v calc; mod-slow difse, mod stmg, fnt bl cut

MRLST: med-dk gy, mot-spec, slt gr, sl frm, sb ply-ply, gt tex, calc, tr dissim pyr; CHK: lt-med gy, str, sb ply-blky, brit, sl sft, sb rthy-sm tex, v calc; mod-slow difse, mod stmg, fnt bl cut

MRLST: med-dk gy, mot-spec, slt gr, sl frm, sb ply-ply, gt tex, calc, tr dissim pyr; CHK: tr CHK; mod-slow difse, mod-slow stmg, fnt bl cut

MRLST: med-dk gy, mot-spec, slt gr, sl frm, sb ply-ply, gt tex, calc, tr dissim pyr; CHK: mod-slow difse, mod-slow stmg, fnt bl cut

TVD (ft)

TVD (ft)

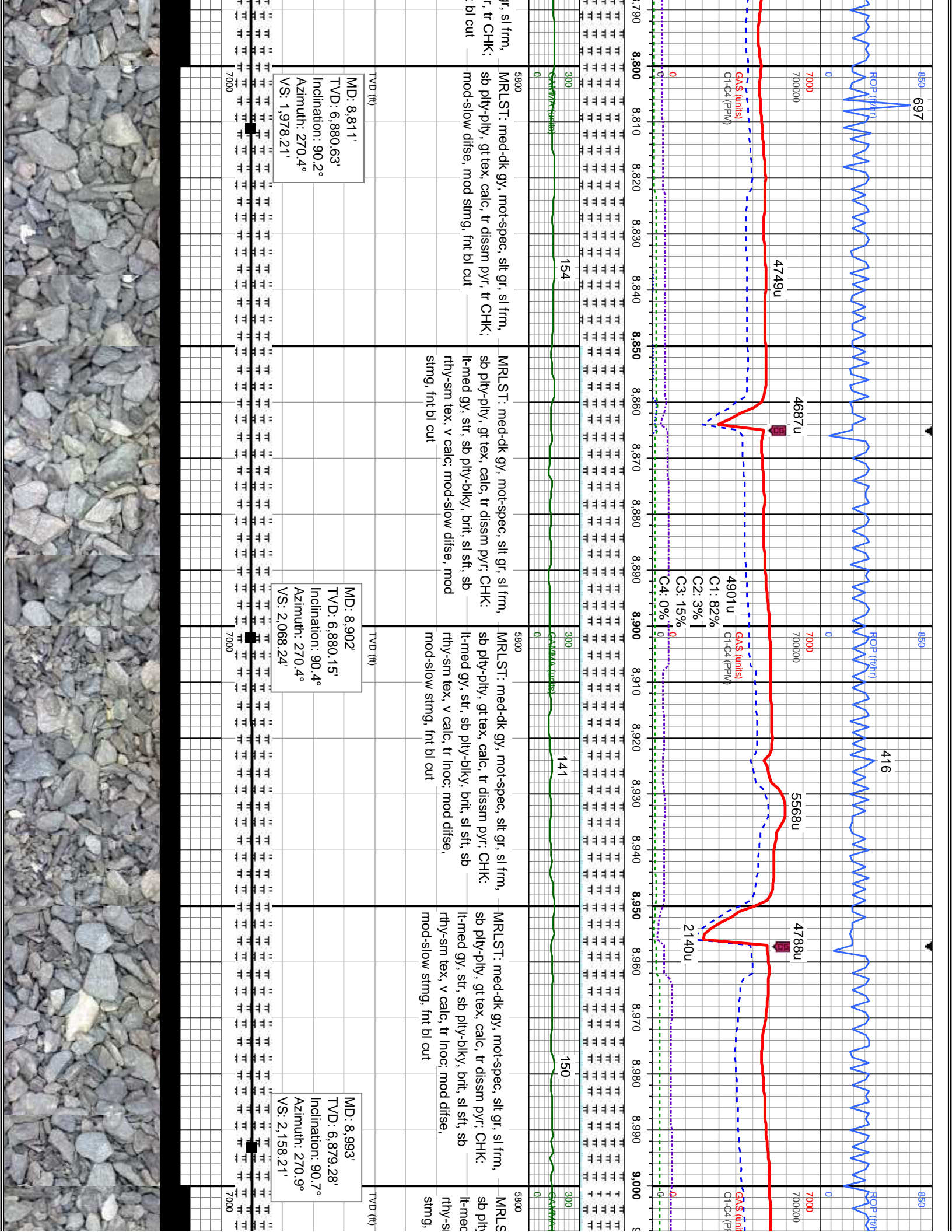
MD: 8.627'  
TVD: 6,881.59'  
Inclination: 90°  
Azimuth: 270.7°  
VS: 1,796.42'

MD: 8.719'  
TVD: 6,881.19'  
Inclination: 90.5°  
Azimuth: 271.3°  
VS: 1,887.3'

7000

7000





950 697

950

950

FOP (Wt%)

FOP (Wt%)

FOP (Wt%)

0

0

0

7000

7000

7000

7000000

7000000

7000000

4749u

4687u

4901u

416

5568u

4788u

2140u

GAS (units)

GAS (units)

GAS (units)

Cl-C4 (PPM)

Cl-C4 (PPM)

Cl-C4 (PPM)

0

0

0

8,790

8,900

9,000

8,800

8,910

8,950

8,810

8,920

8,980

8,820

8,930

8,990

8,830

8,940

8,990

8,840

8,950

8,990

8,850

8,960

8,990

8,860

8,970

8,990

8,870

8,980

8,990

8,880

8,990

8,990

8,890

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8,940

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8,970

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8,980

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300

300

300

154

141

150

5800

5800

5800

MRLST: med-dk gy, mot-spec, slt gr, sl frm, sb ply-ply, gt tex, calc, tr dissim pyr; CHK: mod-slow disse, mod stmg, frnt bl cut

MRLST: med-dk gy, mot-spec, slt gr, sl frm, sb ply-ply, gt tex, calc, tr dissim pyr; CHK: lt-med gy, str, sb ply-blky, brit, sl sft, sb rthy-sm tex, v calc; mod-slow disse, mod stmg, frnt bl cut

MRLST: med-dk gy, mot-spec, slt gr, sl frm, sb ply-ply, gt tex, calc, tr dissim pyr; CHK: lt-med rthy-sm tex, v calc, tr lnoc; mod disse, mod-slow stmg, frnt bl cut

MD: 8.811'

MD: 8.902'

MD: 8.993'

TVD: 6.880.63'

TVD: 6.880.15'

TVD: 6.879.28'

Inclination: 90.2°

Inclination: 90.4°

Inclination: 90.7°

Azimuth: 270.4°

Azimuth: 270.4°

Azimuth: 270.9°

VS: 1.978.21'

VS: 2.068.24'

VS: 2.158.21'

TVD (ft)

TVD (ft)

TVD (ft)

7000

7000

7000

7000

7000

7000

7000

7000

7000

7000

7000

7000

7000

7000

7000

7000

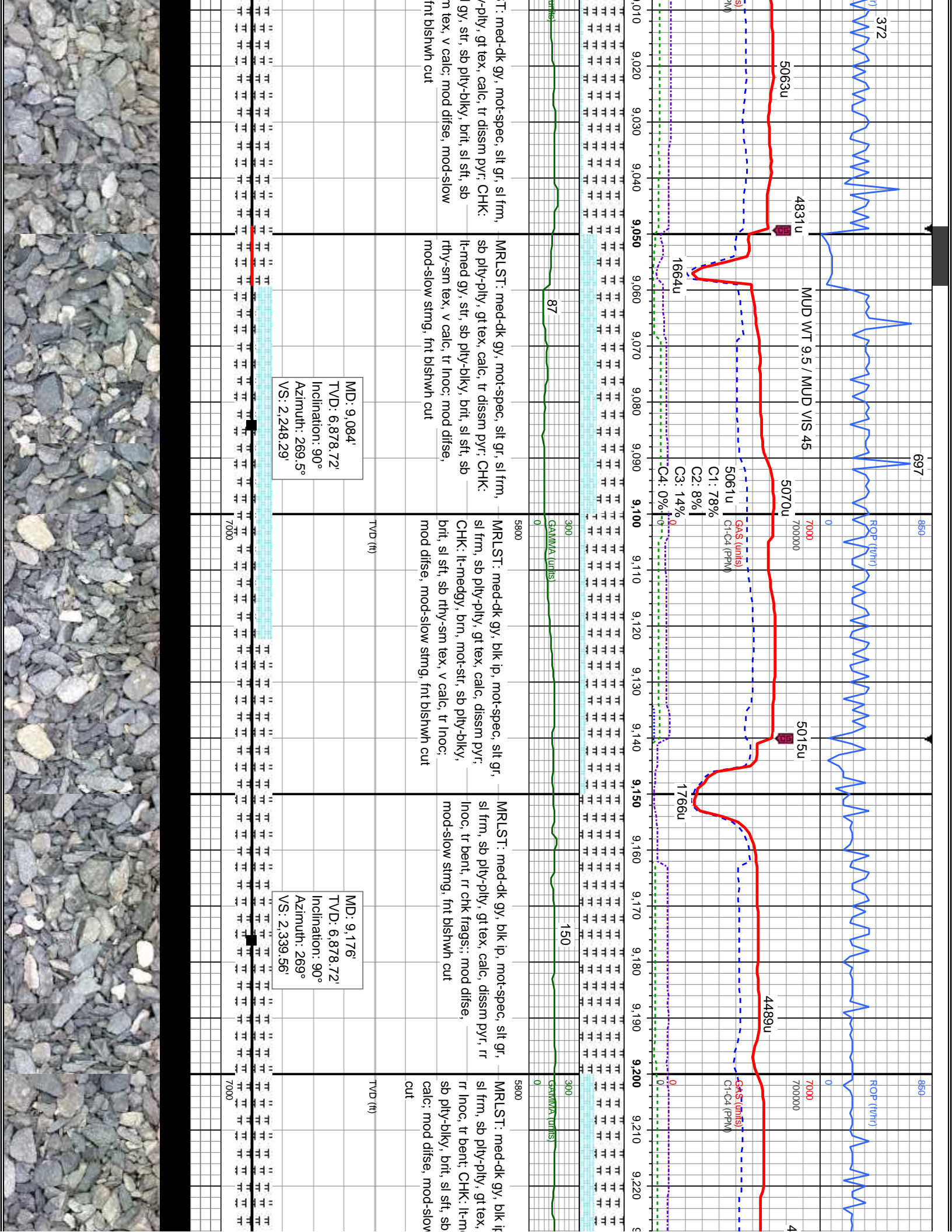
7000

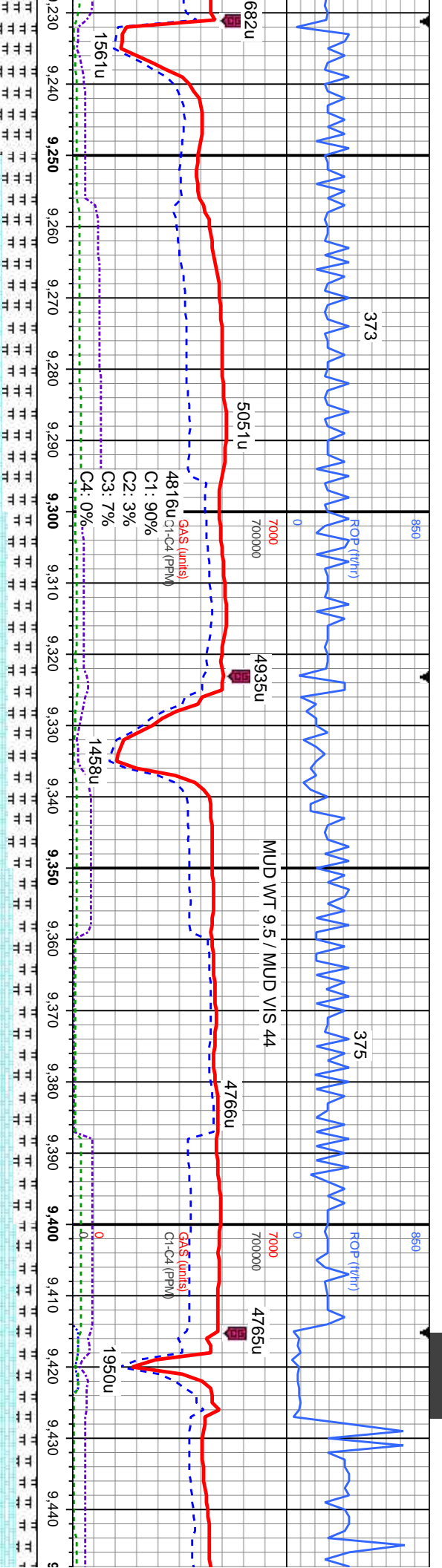
7000

7000

7000

7000





MD: 9,268'  
 TVD: 6,878.08'  
 Inclination: 90.8°  
 Azimuth: 269°  
 VS: 2,430.88'

MRLST: med-dk gy, blk ip, mot-spec, slt gr, sl frm, sb ply-pty, gt tex, calc, dissm pyr, v rr inoc, tr bent; CHK: lt-med gy, brn, mot-str, sb ply-blky, brit, sl sft, sb rthy-sm tex, v calc; mod disse, mod-slow stmg, fr blshwh cut

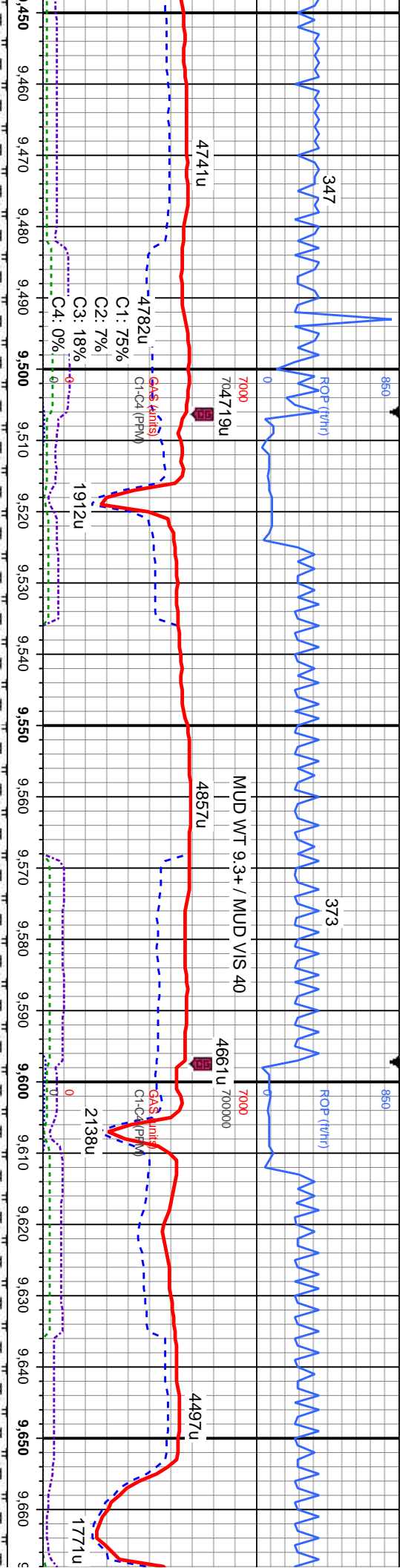
MD: 9,359'  
 TVD: 6,876.89'  
 Inclination: 90.7°  
 Azimuth: 268.3°  
 VS: 2,521.26'

CHK: lt-med gy, brn, mot-str, sb ply-blky, brit, sl sft, sb rthy-sm tex, v calc; MRLST: med-dk gy, blk ip, mot-spec, slt gr, sl frm, sb ply-pty, gt tex, calc, tr inoc, rr bent; mod disse, mod stmg, fr blshwh cut

MD: 9,359'  
 TVD: 6,876.89'  
 Inclination: 90.7°  
 Azimuth: 268.3°  
 VS: 2,521.26'

CHK: lt-med gy, brn, mot-str, sb ply-blky, brit, sl sft, sb rthy-sm tex, v calc; MRLST: med-dk gy, blk ip, mot-spec, slt gr, sl frm, sb ply-pty, gt tex, calc, tr inoc, rr bent; mod disse, mod stmg, fr blshwh cut





CHK: lt-med gy, crm-brn, mot-str, sb  
 ply-blky, brit, sl sft, sb rthy-sm tex, v calc;  
 MRLST: med-dk gy, blk ip, mot-spec, slt gr,  
 sl frm, sb ply-pty, gt tex, calc, tr inoc, tr  
 bent; mod disse, mod string, fr blshwh cut

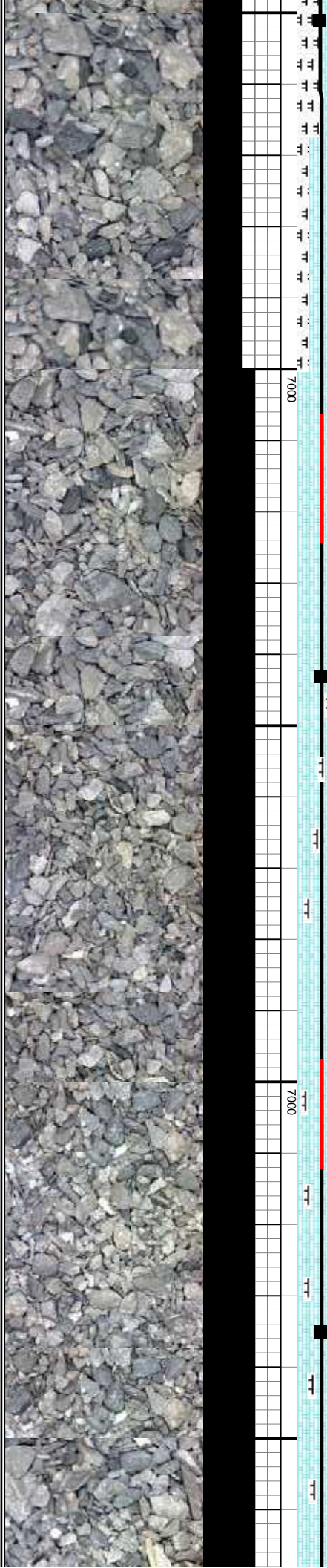
CHK: lt-med gy, crm-brn, mot-str, sb  
 ply-blky, brit, sl sft, sb rthy-sm tex, v calc;  
 MRLST: med-dk gy, blk ip, mot-spec, slt gr,  
 sl frm, sb ply-pty, gt tex, calc, tr inoc, tr  
 bent; mod disse, mod string, bri blshwh cut

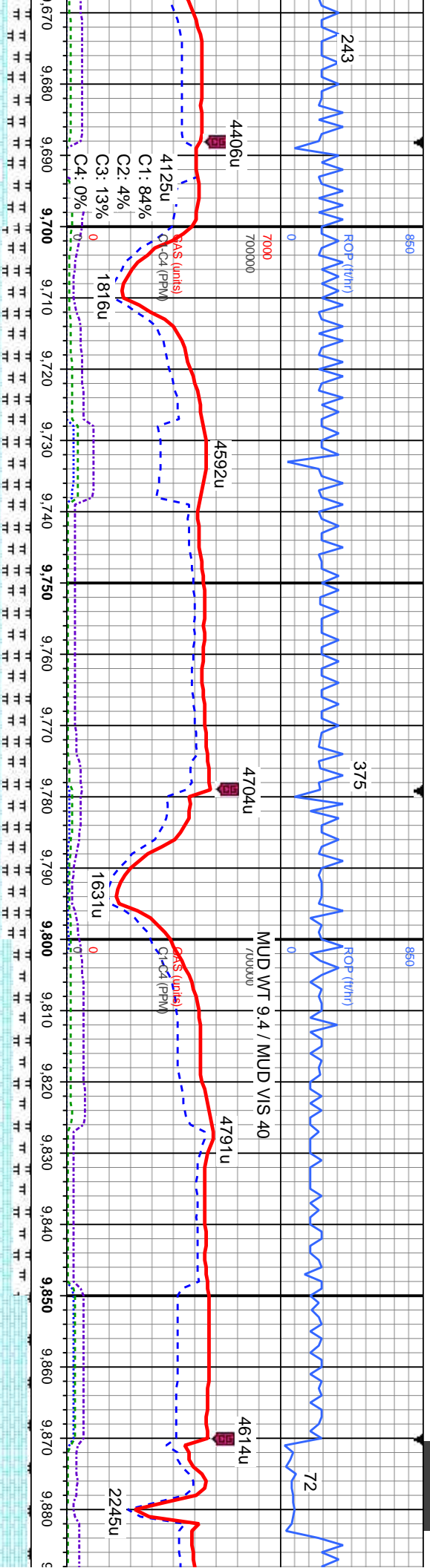
CHK: lt-med gy, crm-brn, mot-str, sb  
 ply-blky, brit, sl sft, sb rthy-sm tex, v calc;  
 MRLST: med-dk gy, blk ip, mot-spec, slt gr,  
 sl frm, sb ply-pty, gt tex, calc, tr inoc; mod  
 disse, mod string, bri blshwh cut

CHK: lt-med gy, crm-brn, mot-str, sb  
 ply-blky, 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 inoc; mod disse,  
 mod string, bri blshwh cut

MD: 9,543'  
 TVD: 6,874.64'  
 Inclination: 90.7°  
 Azimuth: 270.6°  
 VS: 2,703.91'

MD: 9,635'  
 TVD: 6,874.48'  
 Inclination: 89.5°  
 Azimuth: 269.7°  
 VS: 2,794.99'





9,670 9,680 9,690 9,700 9,710 9,720 9,730 9,740 9,750 9,760 9,770 9,780 9,790 9,800 9,810 9,820 9,830 9,840 9,850 9,860 9,870 9,880

CRM-BRN, MOT-STRT, SB  
 SFT, SB RHY-SM TEX, V CALC;  
 K GY, MOT-SPEC, SFT GR, SIL FRM,  
 TEX, CALC, TR INOC, TR BENT; MOD  
 1, BR1 BLSHW CUT

CHK: lt-med gy, crm-brn, mot-str, sb  
 pty-blky, brit, sl sft, sb rhy-sm tex, v calc;  
 MRLST: med-dk gy, mot-spec, slt gr, sl frm,  
 sb pty-pty, gt tex, calc, tr inoc, tr bent; mod  
 difse, mod strng, fr bshwh cut

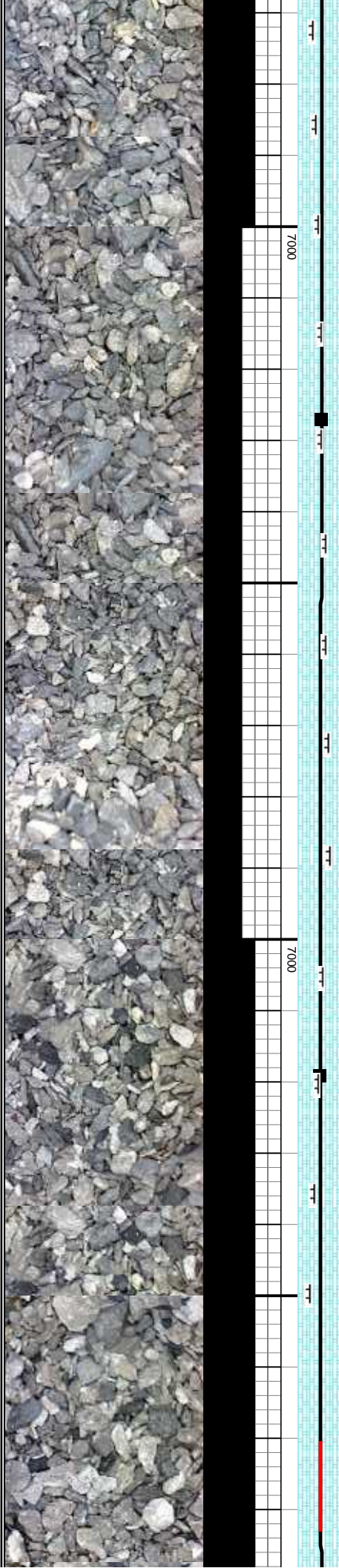
CHK: lt-med gy, crm-brn, mot-str, sb  
 pty-blky, brit, sl sft, sb rhy-sm tex, v calc;  
 MRLST: med-dk gy, mot-spec, slt gr, sl frm,  
 sb pty-pty, gt tex, calc, tr inoc; mod difse,  
 mod strng, fr bshwh cut

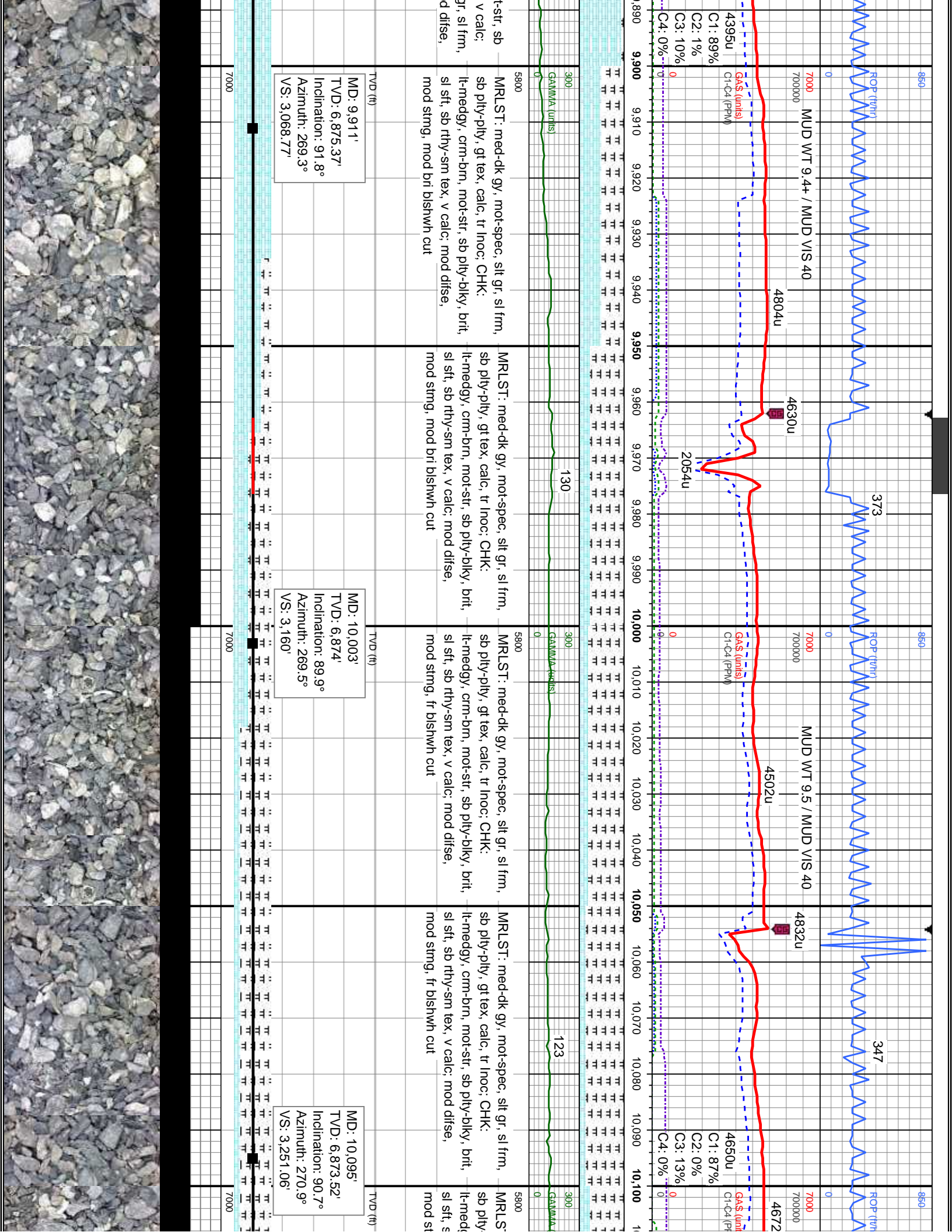
CHK: lt-med gy, crm-brn, mot-str, sb  
 pty-blky, brit, sl sft, sb rhy-sm tex, v calc;  
 MRLST: med-dk gy, mot-spec, slt gr, sl frm,  
 sb pty-pty, gt tex, calc, tr inoc; mod difse,  
 mod strng, fr bshwh cut

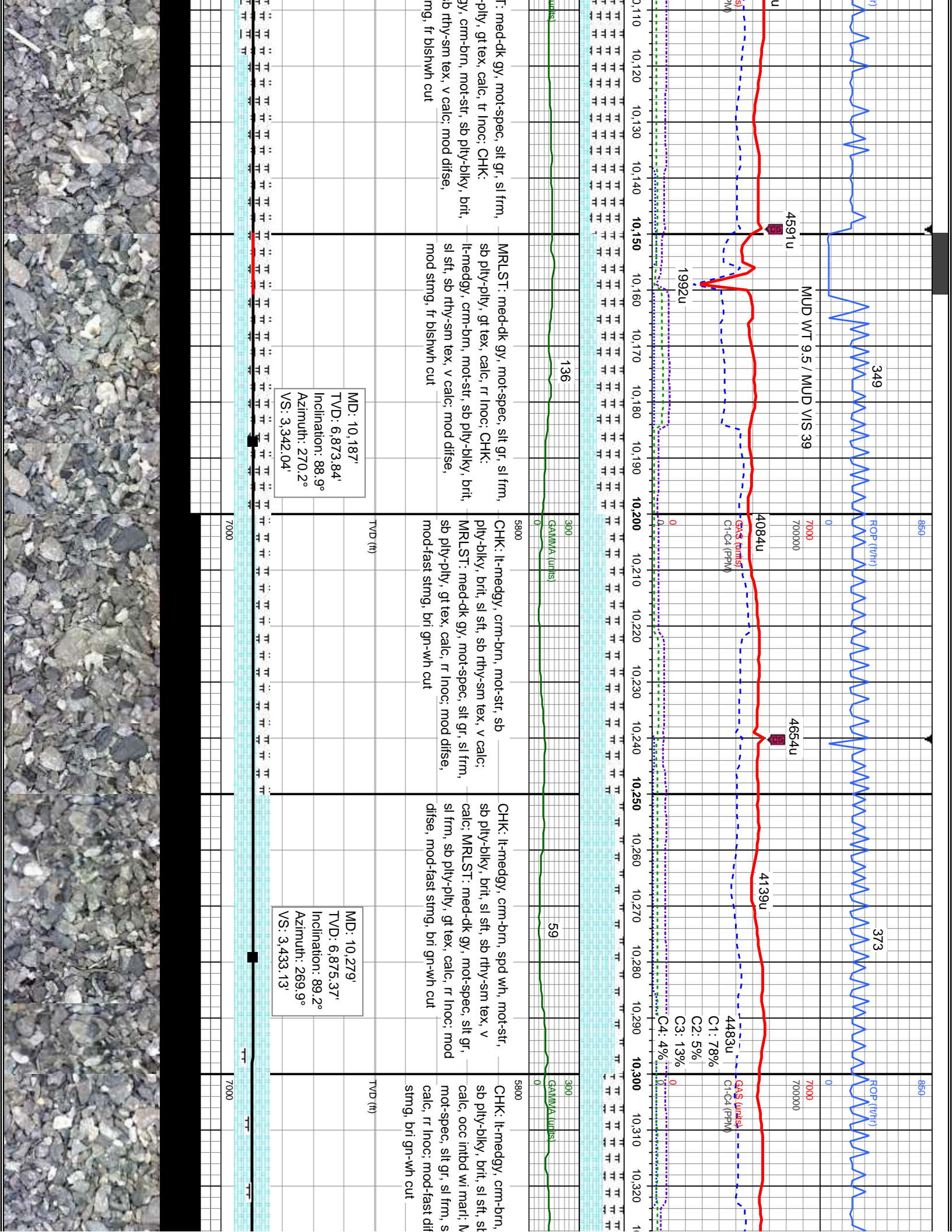
CHK: wh-tygy, medgy, crm-brn, mo  
 pty-blky, brit, sl sft, sb rhy-sm tex,  
 MRLST: med-dk gy, mot-spec, slt gr,  
 sb pty-pty, gt tex, calc, tr inoc; mo  
 mod-fast strng, mod bri bshwh cut

MD: 9,727'  
 TVD: 6,875.37'  
 Inclination: 89.4°  
 Azimuth: 269.5°  
 VS: 2,886.18'

MD: 9,819'  
 TVD: 6,876.33'  
 Inclination: 89.4°  
 Azimuth: 268.8°  
 VS: 2,977.47'







MD: 10,187'  
 TVD: 6,873.84'  
 Inclination: 88.9°  
 Azimuth: 270.2°  
 VS: 3,342.04'

MD: 10,279'  
 TVD: 6,875.37'  
 Inclination: 89.2°  
 Azimuth: 269.9°  
 VS: 3,433.13'

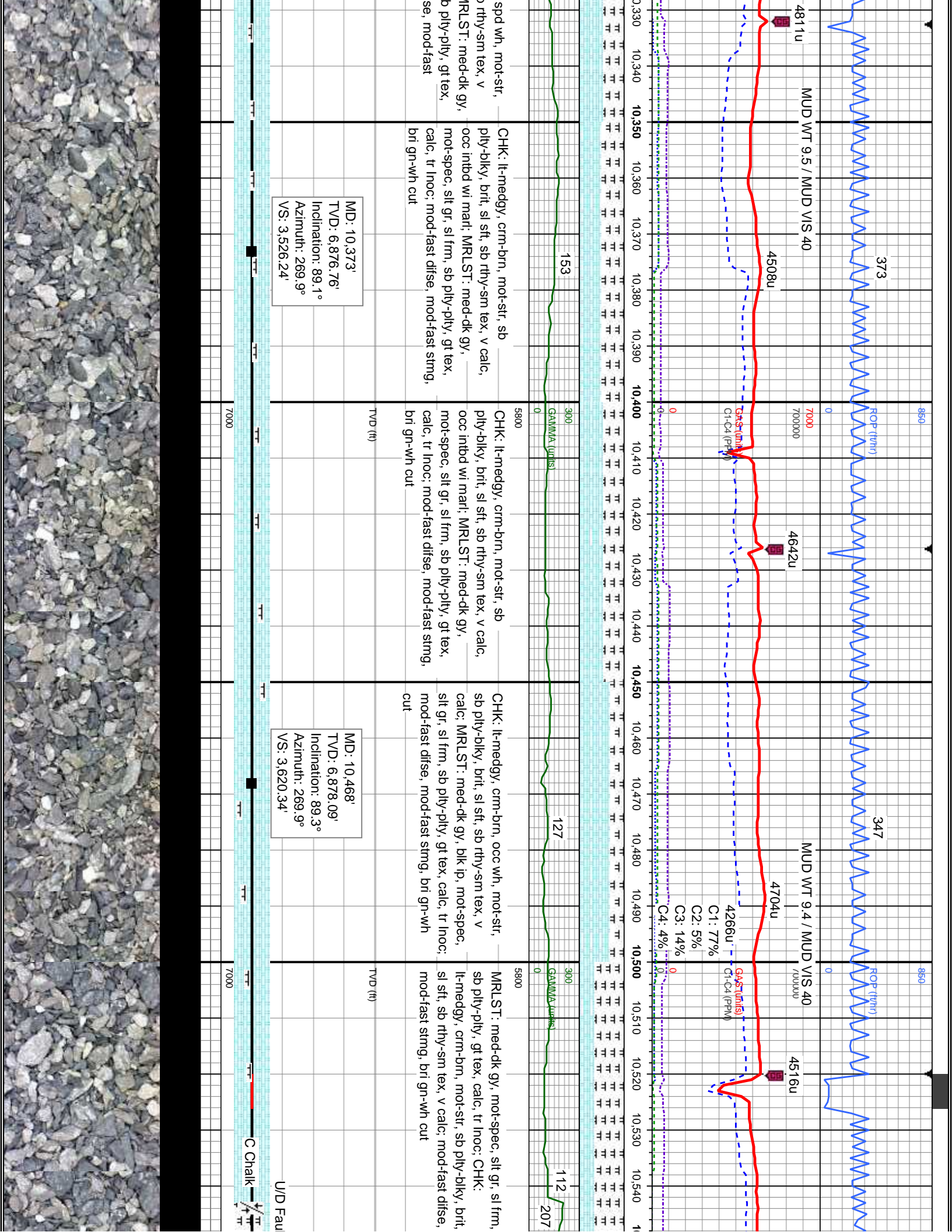
MRLST: med-dk gy, mot-spec, slt gr, sl frm, sb pily-pily, gt tex, calc, rr lnoc; CHK: lt-medgy, crm-brn, mot-str, sb pily-blky, brit, sl sft, sb rthy-sm tex, v calc; mod difse, mod stmg, fr blshwh cut

CHK: lt-medgy, crm-brn, mot-str, sb pily-blky, brit, sl sft, sb rthy-sm tex, v calc; MRLST: med-dk gy, mot-spec, slt gr, sl frm, sb pily-pily, gt tex, calc, rr lnoc; mod difse, mod-fast stmg, bri gn-wh cut

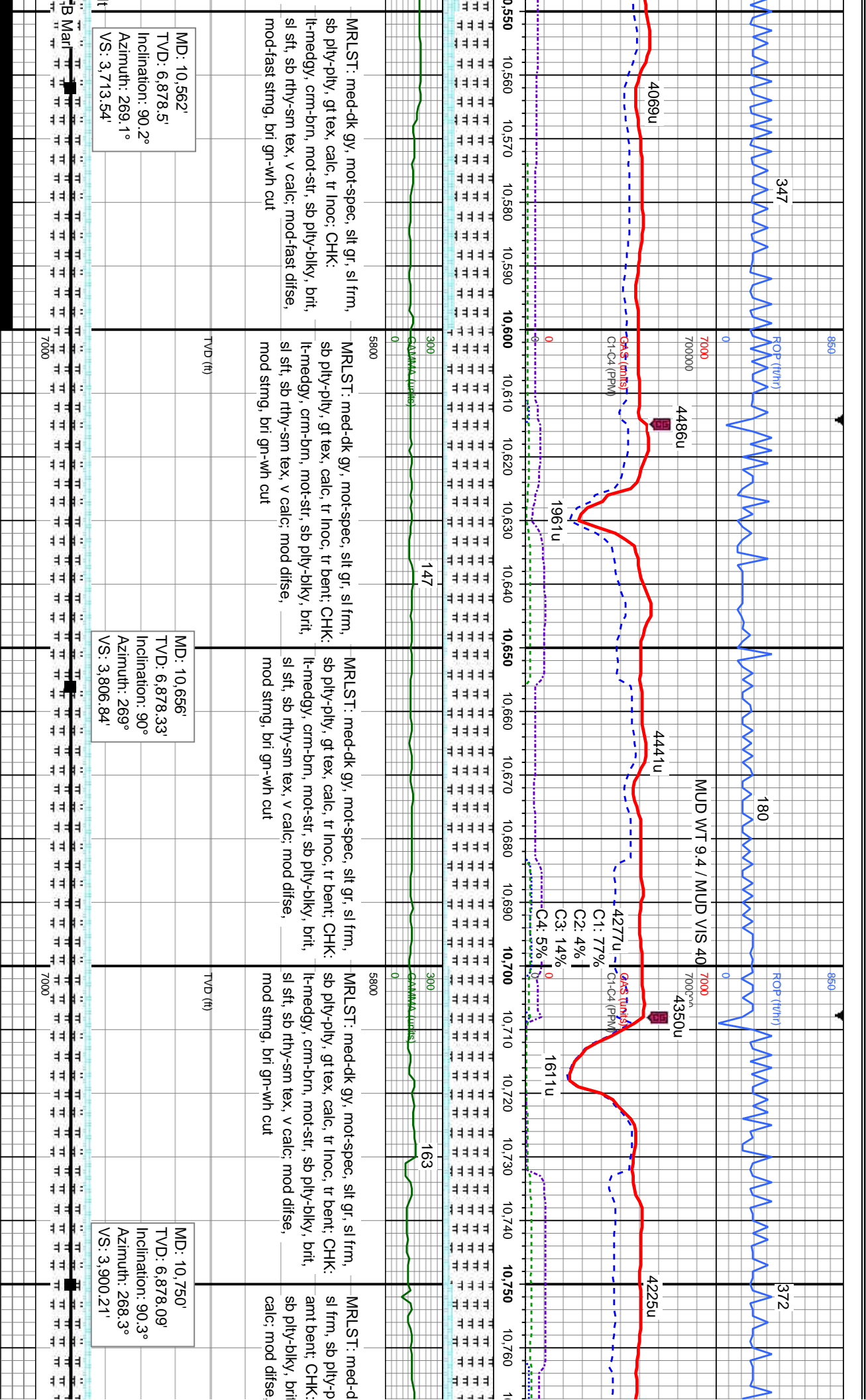
CHK: lt-medgy, crm-brn, spd wh, mot-str, sb pily-blky, brit, sl sft, sb rthy-sm tex, v calc; MRLST: med-dk gy, mot-spec, slt gr, sl frm, sb pily-pily, gt tex, calc, rr lnoc; mod difse, mod-fast stmg, bri gn-wh cut

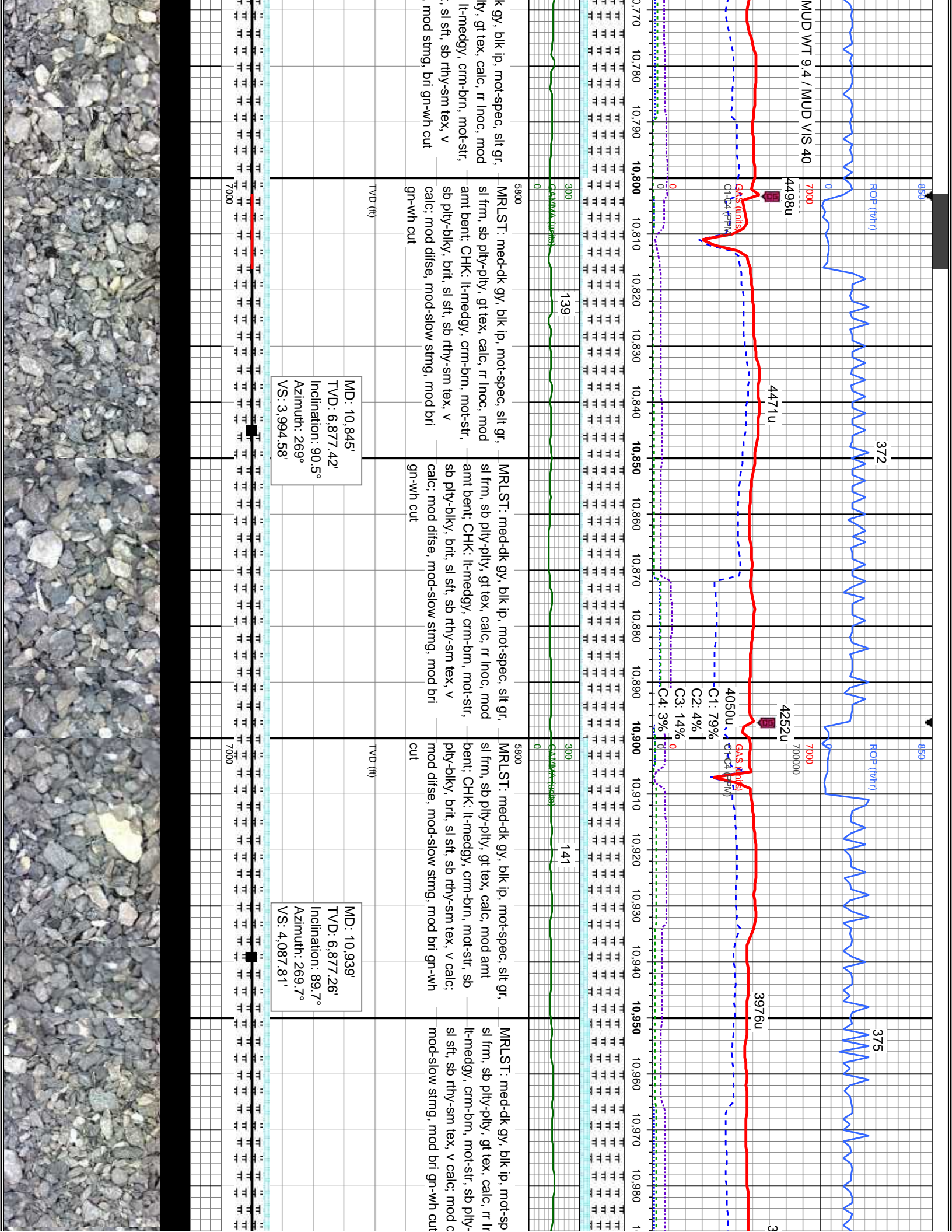
CHK: lt-medgy, crm-brn, sb pily-blky, brit, sl sft, sl calc, occ intbd wi marl; N mot-spec, slt gr, sl frm, s calc, rr lnoc; mod-fast dif stmg, bri gn-wh cut

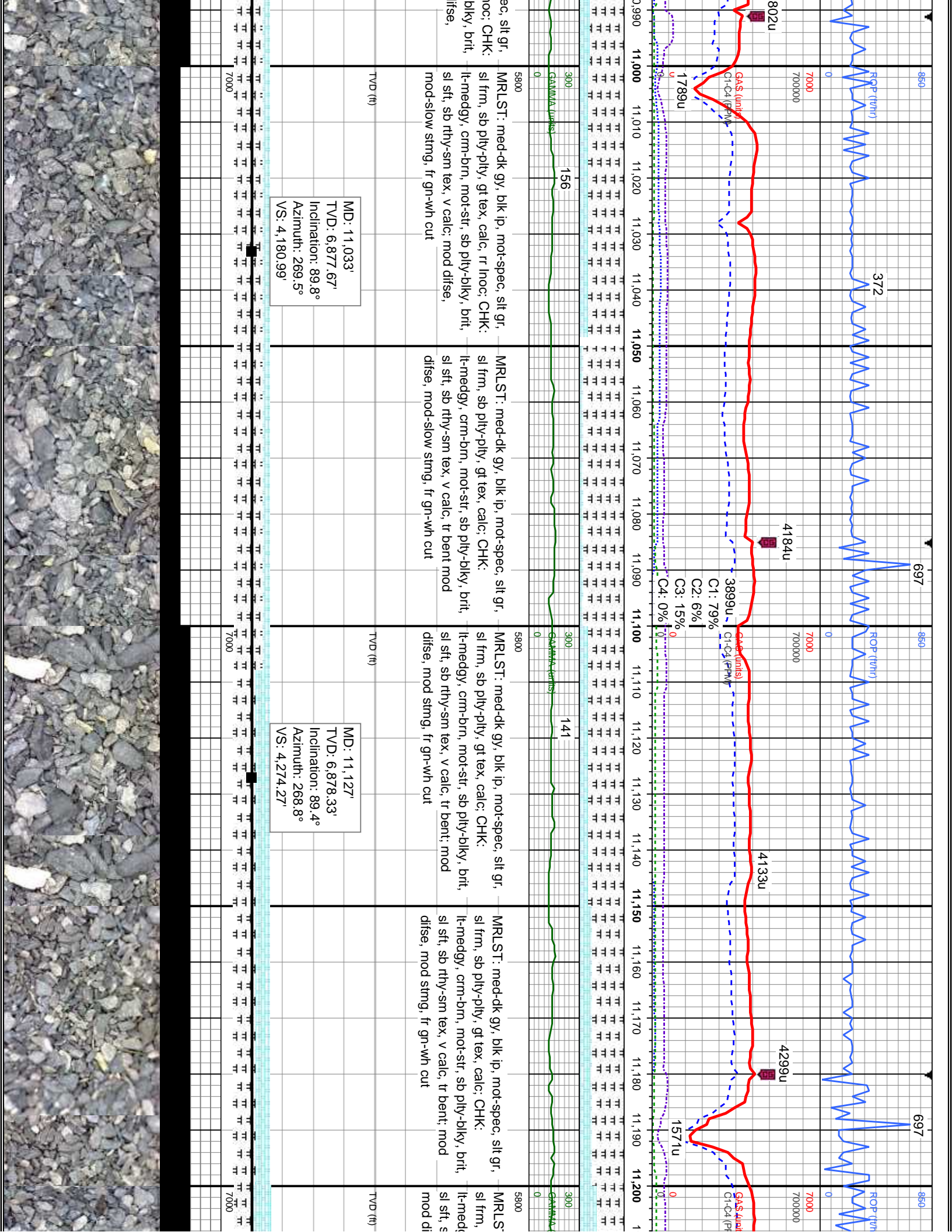
C1: 78%  
 C2: 5%  
 C3: 13%  
 C4: 4%

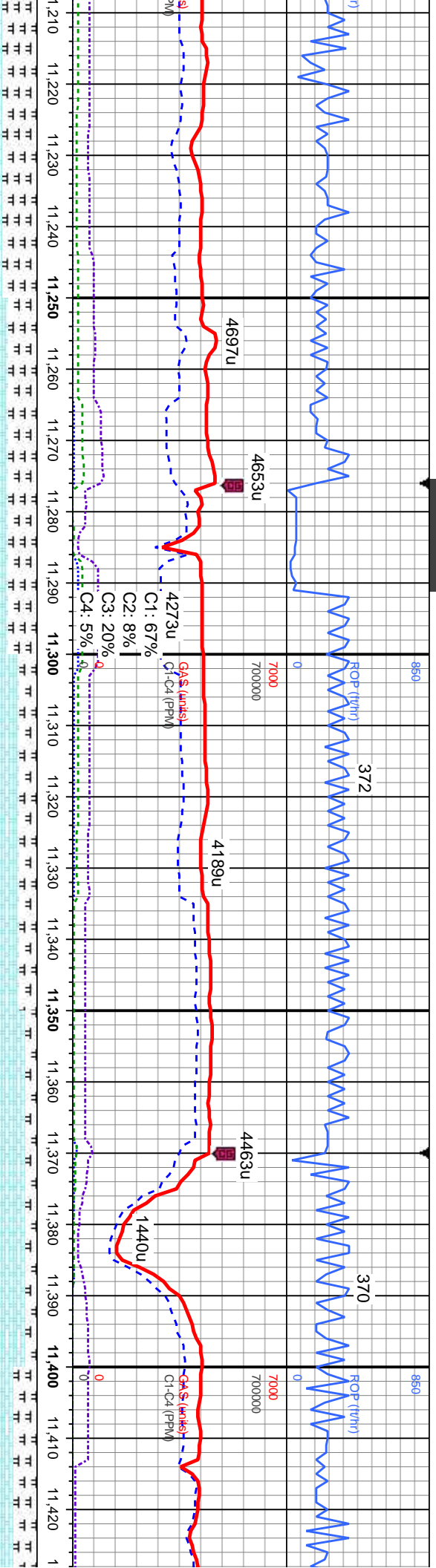












11,210 11,220 11,230 11,240 11,250 11,260 11,270 11,280 11,290 11,300 11,310 11,320 11,330 11,340 11,350 11,360 11,370 11,380 11,390 11,400 11,410 11,420

4697u  
4653u  
4273u  
4189u  
4463u  
1440u

C1: 67%  
C2: 8%  
C3: 20%  
C4: 5%

GRS (links)  
C1-C4 (PPM)

Gamma Uppis

MD: 11,222'  
TVD: 6,879.65'  
Inclination: 89°  
Azimuth: 267.7°  
VS: 4,368.7'

MD: 11,317'  
TVD: 6,880.4'  
Inclination: 90.1°  
Azimuth: 269°  
VS: 4,463.12'

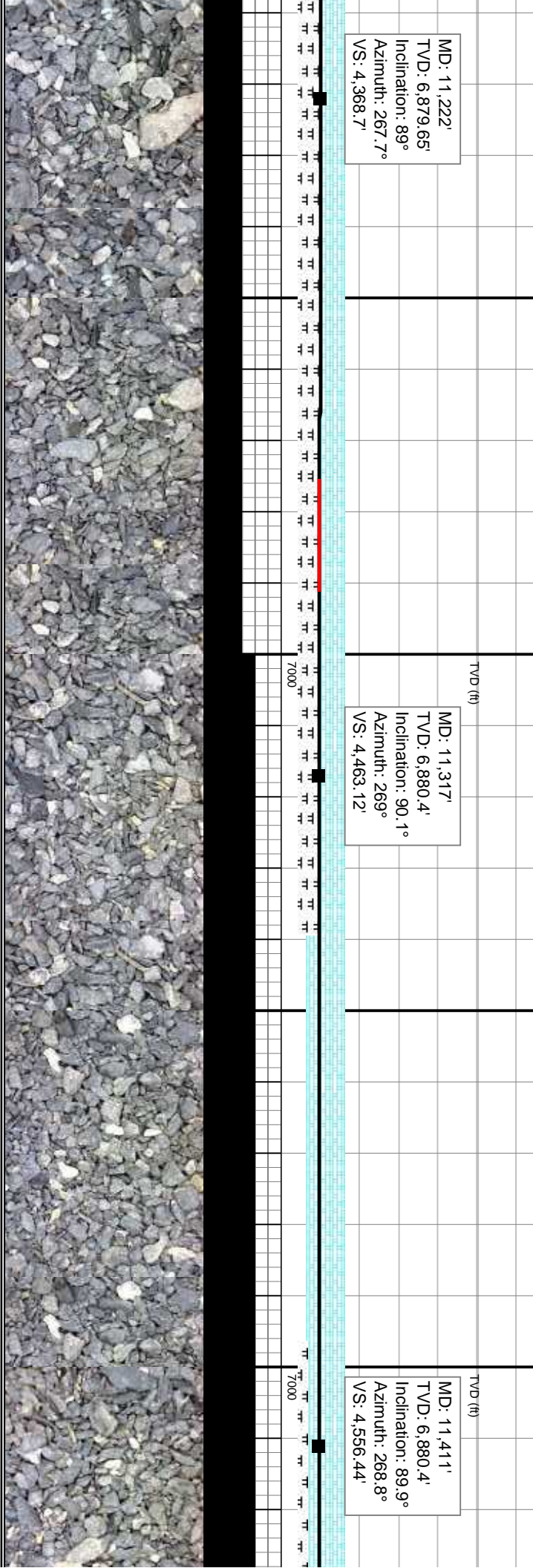
MD: 11,411'  
TVD: 6,880.4'  
Inclination: 89.9°  
Azimuth: 268.8°  
VS: 4,556.44'

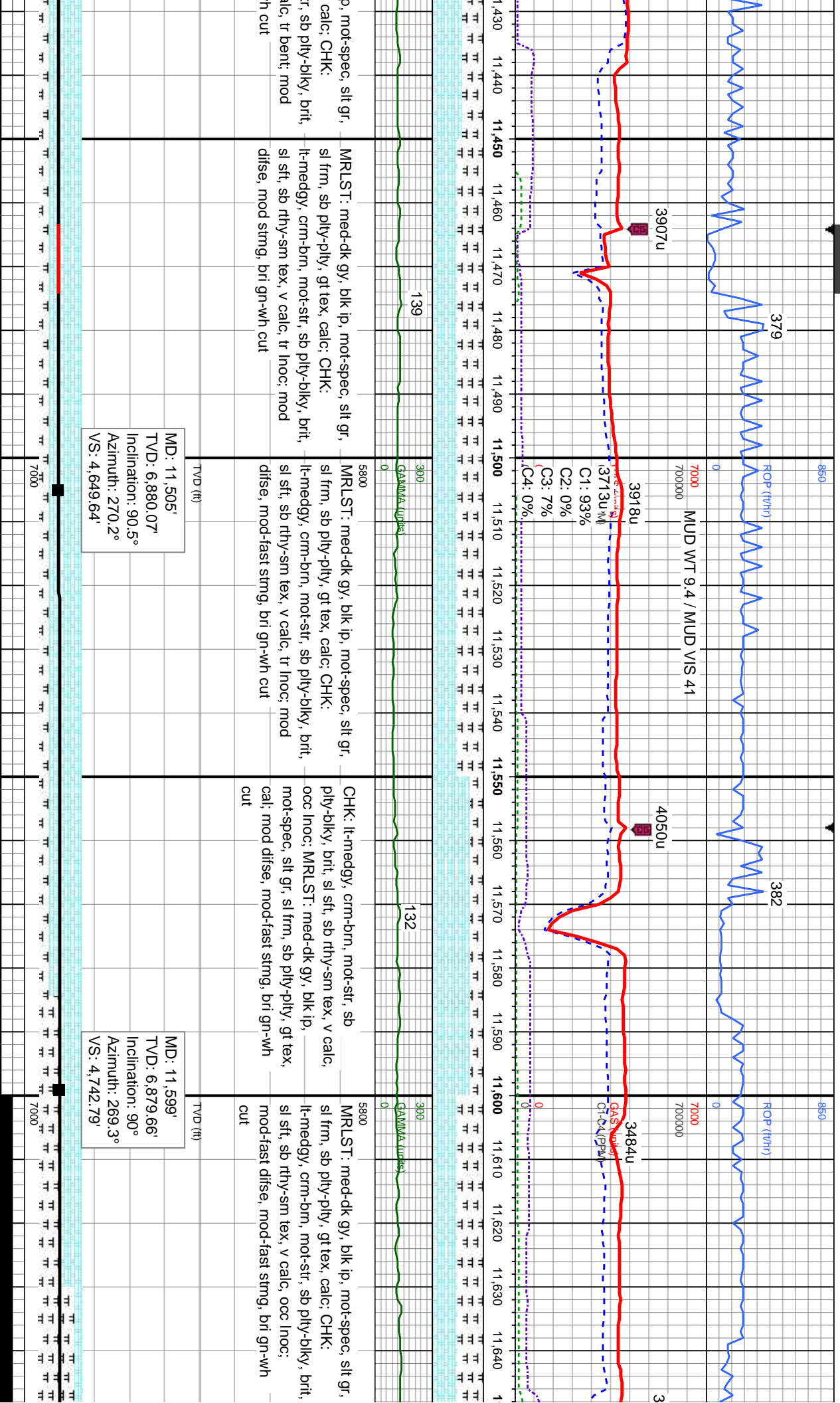
MRLST: med-dk gy, blk ip, mot-spec, slt gr,  
sl frm, sb pty-pty, gt tex, calc; CHK:  
lt-medgy, crm-bm, mot-str, sb pty-blky, brit,  
sl sft, sb rthy-sm tex, v calc, tr bent, rr inoc;  
Inoc; mod difse, mod stmg, fr gn-wh cut

MRLST: med-dk gy, blk ip, mot-spec, slt gr,  
sl frm, sb pty-pty, gt tex, calc; CHK:  
lt-medgy, crm-bm, mot-str, sb pty-blky, brit,  
sl sft, sb rthy-sm tex, v calc, tr bent, occ  
Inoc; mod difse, mod stmg, fr gn-wh cut

MRLST: med-dk gy, blk ip, mot-spec, slt gr,  
sl frm, sb pty-pty, gt tex, calc; CHK:  
lt-medgy, crm-bm, mot-str, sb pty-blky, brit,  
sl sft, sb rthy-sm tex, v calc, tr inoc; mod  
difse, mod stmg, bri gn-wh cut

MRLST: med-dk gy, blk ip, mot-spec, slt gr,  
sl frm, sb pty-pty, gt tex, calc; CHK:  
lt-medgy, crm-bm, mot-str, sb pty-blky, brit,  
sl sft, sb rthy-sm tex, v calc, tr inoc; mod  
difse, mod stmg, bri gn-wh cut





MD: 11,505'  
 TVD: 6,880.07'  
 Inclination: 90.5°  
 Azimuth: 270.2°  
 VS: 4,649.64'

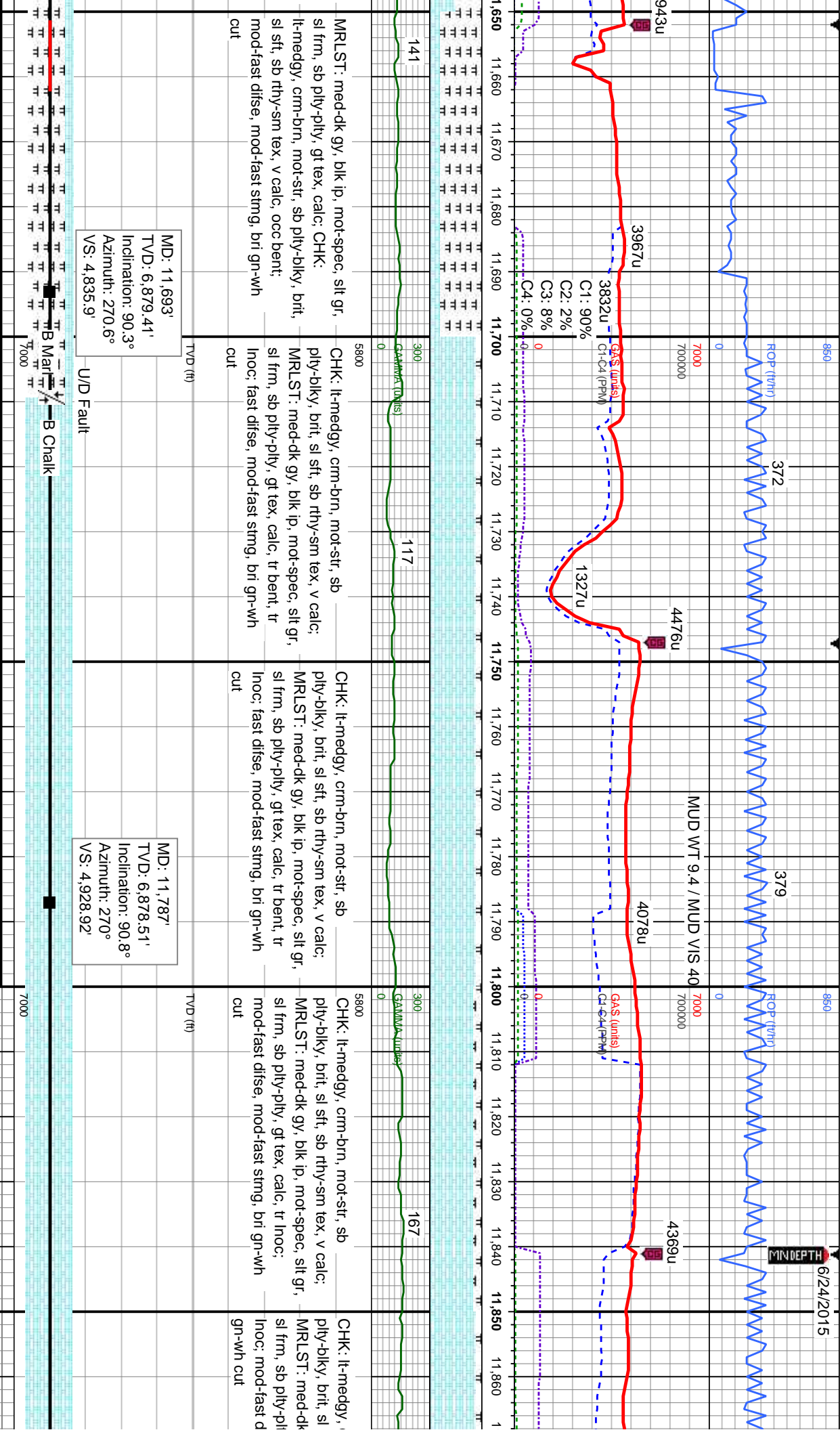
MD: 11,599'  
 TVD: 6,879.66'  
 Inclination: 90°  
 Azimuth: 269.3°  
 VS: 4,742.79'

MRLST: med-dk gy, blk ip, mot-spec, slt gr, sl frm, sb pty-pty, gt tex, calc; CHK: lt-medgy, crm-brn, mot-str, sb pty-blky, brit, sl sft, sb rhy-sm tex, v calc, tr inoc; mod difse, mod stimg, bri gn-wh cut

CHK: lt-medgy, crm-brn, mot-str, sb pty-blky, brit, sl sft, sb rhy-sm tex, v calc, occ inoc; MRLST: med-dk gy, blk ip, mot-spec, slt gr, sl frm, sb pty-pty, gt tex, calc; mod difse, mod-fast stimg, bri gn-wh cut

MRLST: med-dk gy, blk ip, mot-spec, slt gr, sl frm, sb pty-pty, gt tex, calc; CHK: lt-medgy, crm-brn, mot-str, sb pty-blky, brit, sl sft, sb rhy-sm tex, v calc, occ inoc; mod-fast difse, mod-fast stimg, bri gn-wh cut

MINDEPTH



MD: 11,693'  
 TVD: 6,879.41'  
 Inclination: 90.3°  
 Azimuth: 270.6°  
 VS: 4,835.9'

MD: 11,787'  
 TVD: 6,878.51'  
 Inclination: 90.8°  
 Azimuth: 270°  
 VS: 4,928.92'

MRLST: med-dk gy, blk ip, mot-spec, slt gr,  
 sl frm, sb pty-pty, gt tex, calc; CHK:  
 lt-medgy, cm-brn, mot-str, sb pty-blky, brit,  
 sl sft, sb rthy-sm tex, v calc, occ bent;  
 mod-fast difse, mod-fast stmg, bri gn-wh  
 cut

CHK: lt-medgy, cm-brn, mot-str, sb  
 pty-blky, brit, sl sft, sb rthy-sm tex, v calc;  
 MRLST: med-dk gy, blk ip, mot-spec, slt gr,  
 sl frm, sb pty-pty, gt tex, calc, tr bent, tr  
 Inoc: fast difse, mod-fast stmg, bri gn-wh  
 cut

CHK: lt-medgy, cm-brn, mot-str, sb  
 pty-blky, brit, sl sft, sb rthy-sm tex, v calc;  
 MRLST: med-dk gy, blk ip, mot-spec, slt gr,  
 sl frm, sb pty-pty, gt tex, calc, tr bent, tr  
 Inoc: fast difse, mod-fast stmg, bri gn-wh  
 cut

CHK: lt-medgy, cm-brn, mot-str, sb  
 pty-blky, brit, sl sft, sb rthy-sm tex, v calc;  
 MRLST: med-dk gy, blk ip, mot-spec, slt gr,  
 sl frm, sb pty-pty, gt tex, calc, tr Inoc;  
 mod-fast difse, mod-fast stmg, bri gn-wh  
 cut

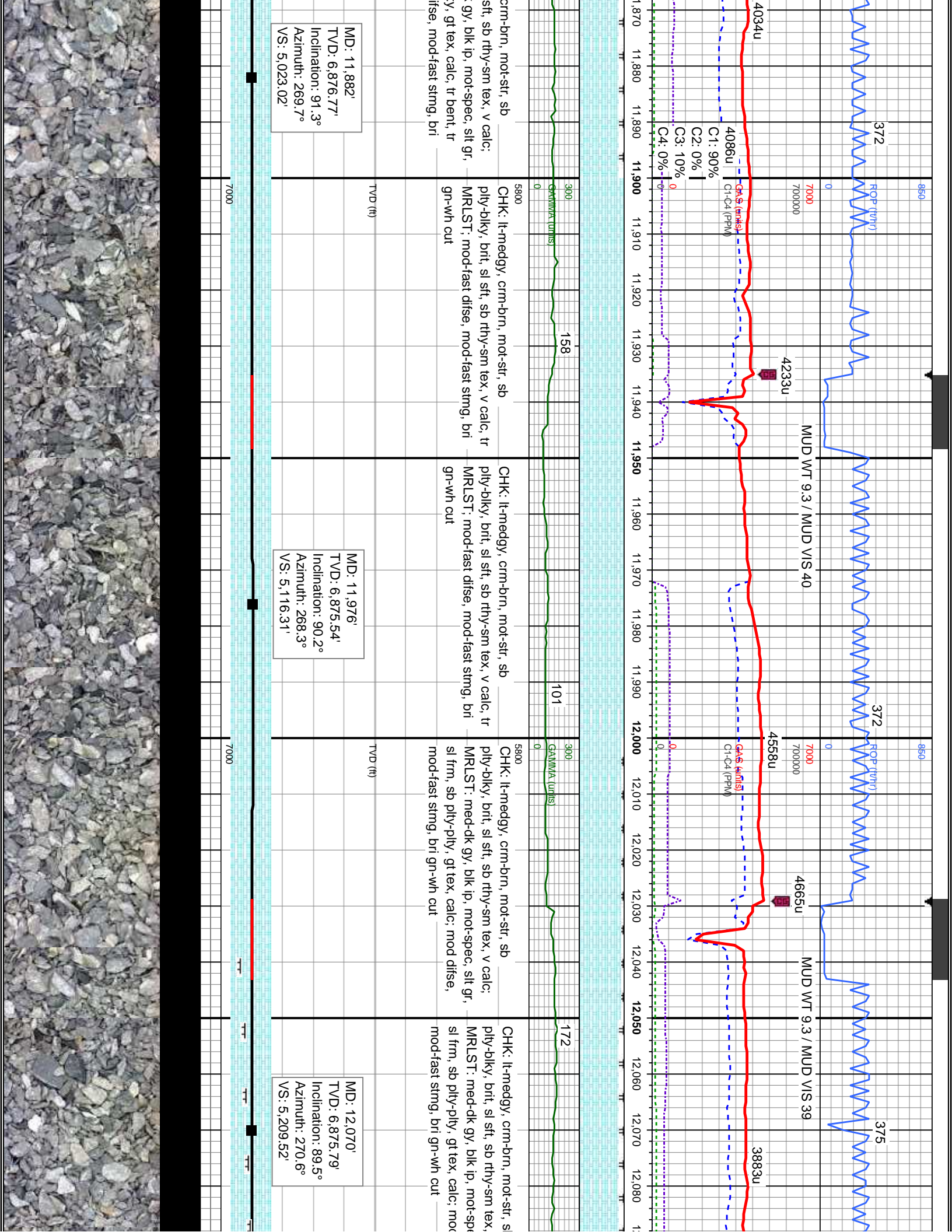
CHK: lt-medgy,  
 pty-blky, brit, sl  
 MRLST: med-dk  
 sl frm, sb pty-pty  
 Inoc: mod-fast d  
 gn-wh cut

U/D Fault

B Mar

B Chalk

1



MD: 11,882'  
 TVD: 6,876.77'  
 Inclination: 91.3°  
 Azimuth: 269.7°  
 VS: 5,023.02'

MD: 11,976'  
 TVD: 6,875.54'  
 Inclination: 90.2°  
 Azimuth: 268.3°  
 VS: 5,116.31'

MD: 12,070'  
 TVD: 6,875.79'  
 Inclination: 89.5°  
 Azimuth: 270.6°  
 VS: 5,209.52'

cjm-brn, mot-str, sb  
 sft, sb rhy-sm tex, v calc;  
 gy, blk ip, mot-spec, slt gr,  
 y, gt tex, calc, tr bent, tr  
 ifse, mod-fast strng, bri

CHK: lt-medgy, cjm-brn, mot-str, sb  
 ply-blky, brit, sl sft, sb rhy-sm tex, v calc, tr  
 MRLST: mod-fast difse, mod-fast strng, bri  
 gn-wh cut

CHK: lt-medgy, cjm-brn, mot-str, sb  
 ply-blky, brit, sl sft, sb rhy-sm tex, v calc, tr  
 MRLST: mod-fast difse, mod-fast strng, bri  
 gn-wh cut

CHK: lt-medgy, cjm-brn, mot-str, sb  
 ply-blky, brit, sl sft, sb rhy-sm tex, v calc;  
 MRLST: med-dk gy, blk ip, mot-spec, slt gr,  
 sl frm, sb ply-pty, gt tex, calc; mod difse,  
 mod-fast strng, bri gn-wh cut

CHK: lt-medgy, cjm-brn, mot-str, sb  
 ply-blky, brit, sl sft, sb rhy-sm tex,  
 MRLST: med-dk gy, blk ip, mot-sp  
 sl frm, sb ply-pty, gt tex, calc; mod  
 mod-fast strng, bri gn-wh cut

7000

7000

7000

7000

7000

TVD (ft)

TVD (ft)

TVD (ft)

TVD (ft)

300  
GAMA (U/NIS)

300  
GAMA (U/NIS)

300  
GAMA (U/NIS)

300  
GAMA (U/NIS)

950

950

950

950

7000

7000

7000

7000

7000000

7000000

7000000

7000000

C1: 90%

C1: 90%

C1: 90%

C1: 90%

C2: 0%

C2: 0%

C2: 0%

C2: 0%

C3: 10%

C3: 10%

C3: 10%

C3: 10%

C4: 0%

C4: 0%

C4: 0%

C4: 0%

FOP (U/N)

FOP (U/N)

FOP (U/N)

FOP (U/N)

4034u

4558u

3883u

4086u

4665u

4233u

372

372

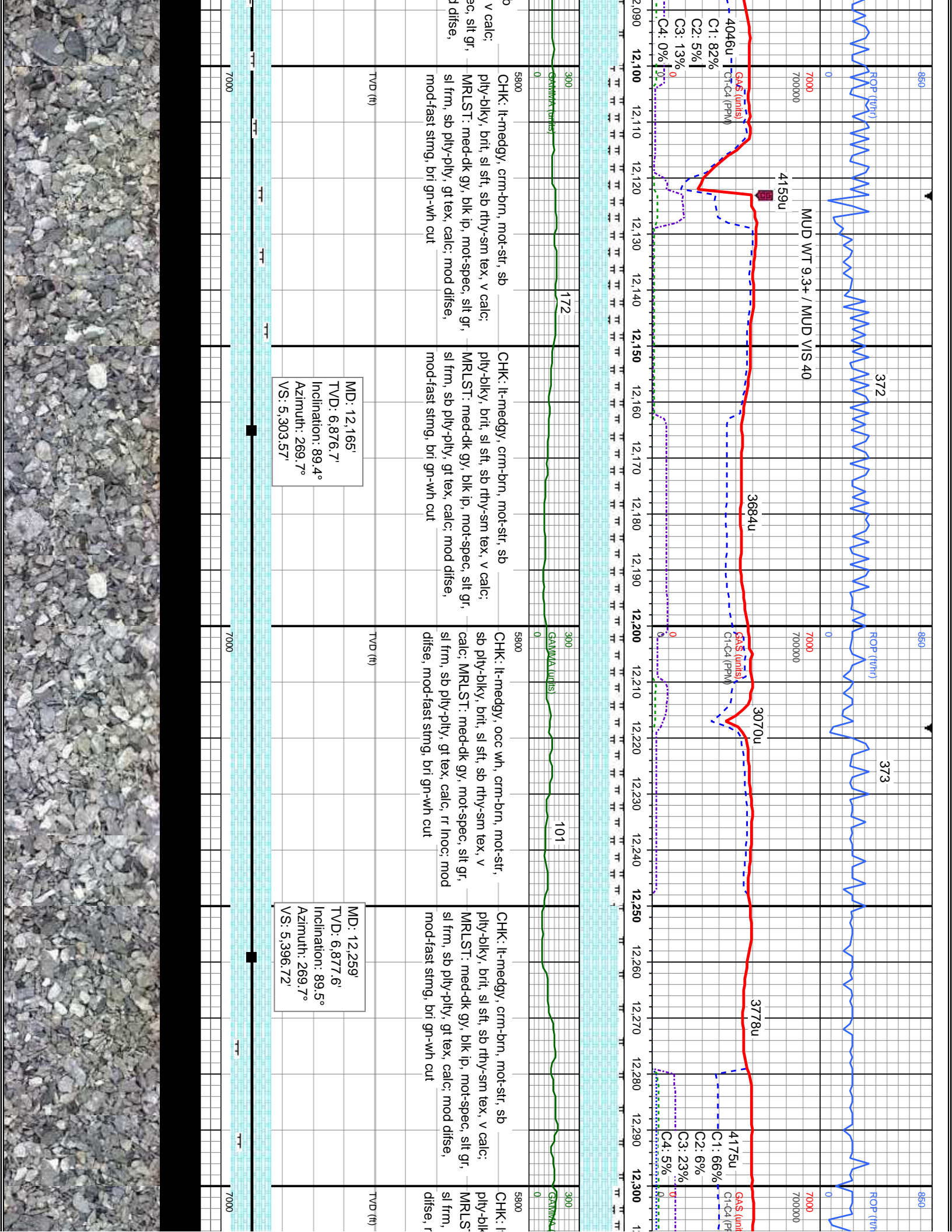
375

MUD WT 9.3 / MUD VIS 40

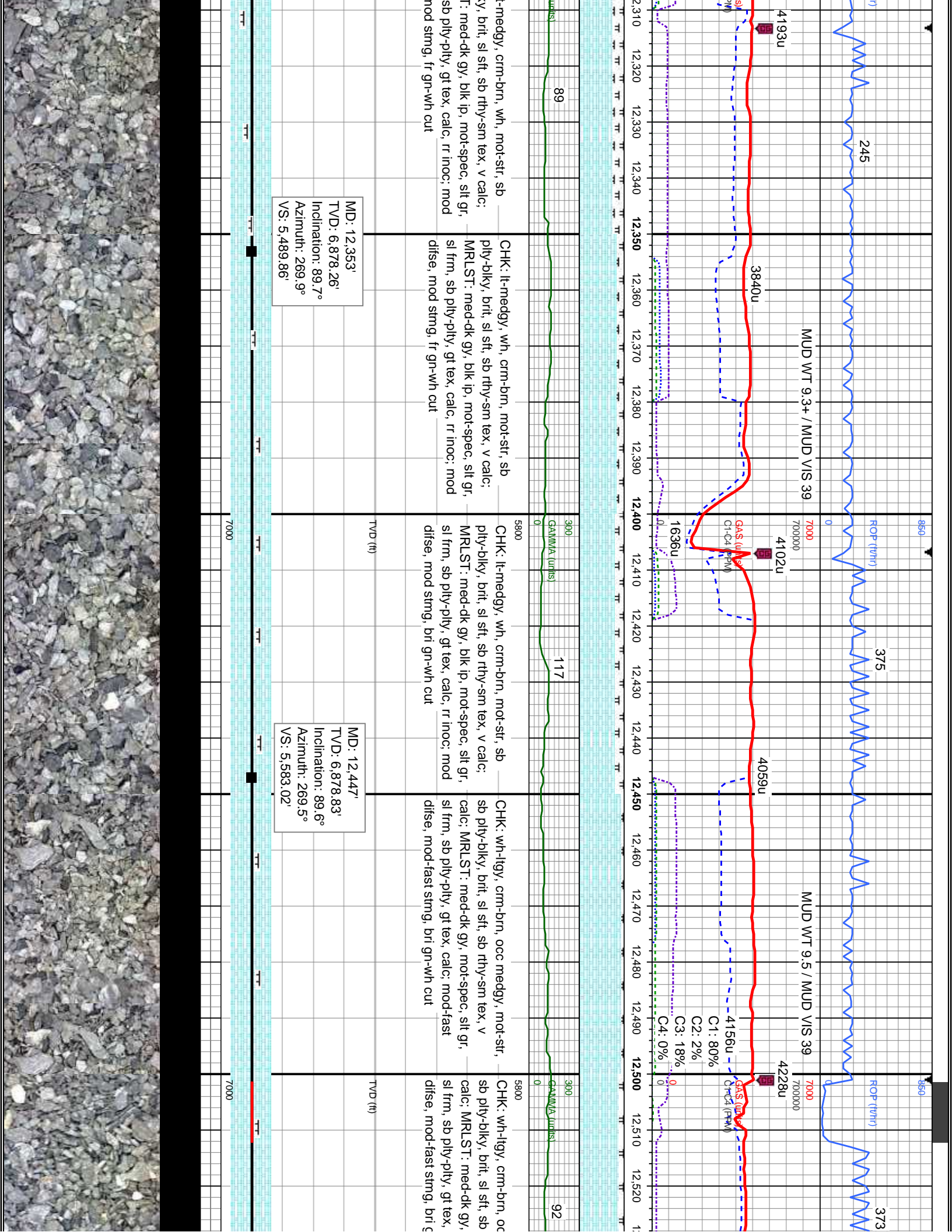
MUD WT 9.3 / MUD VIS 39

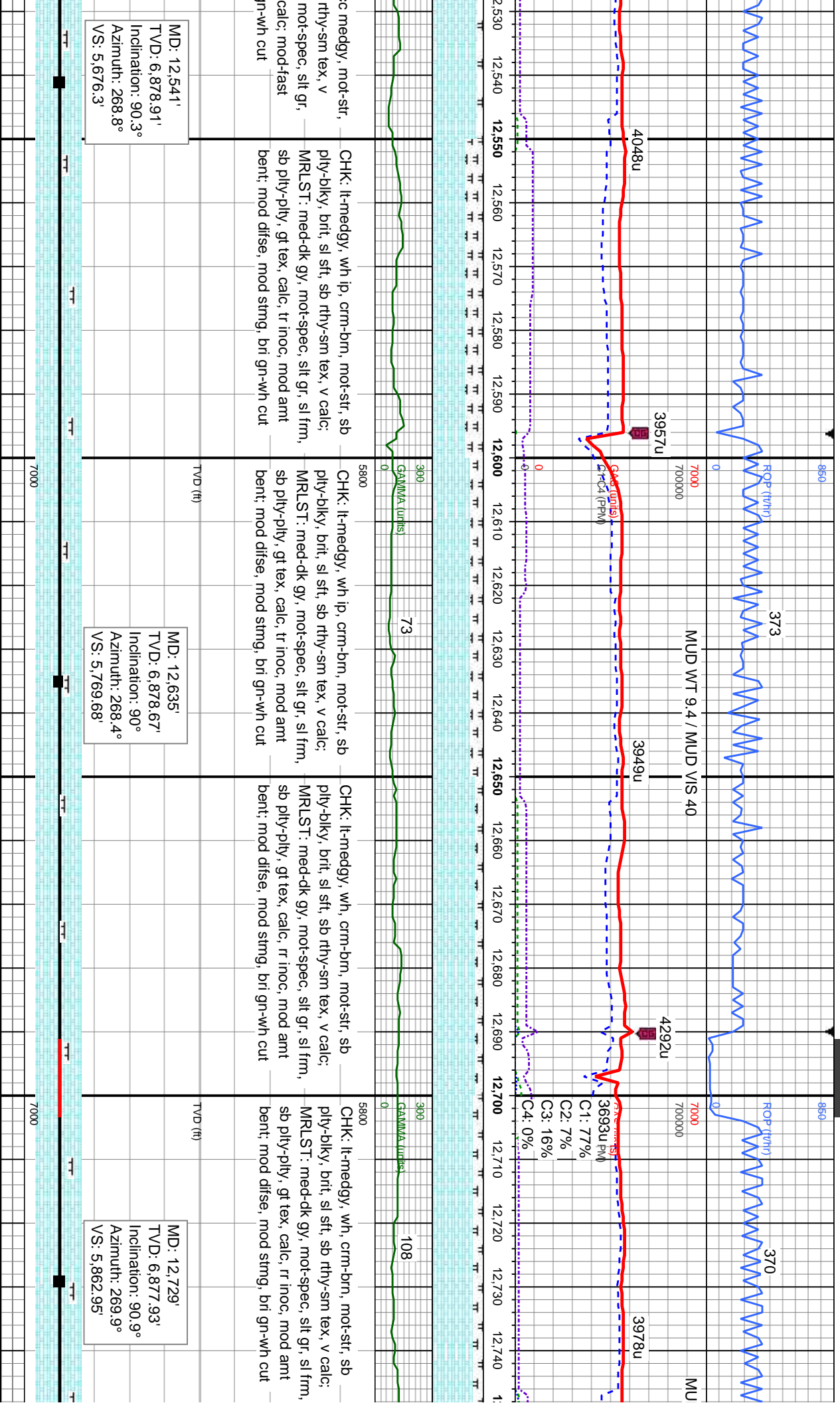
MUD WT 9.3 / MUD VIS 40

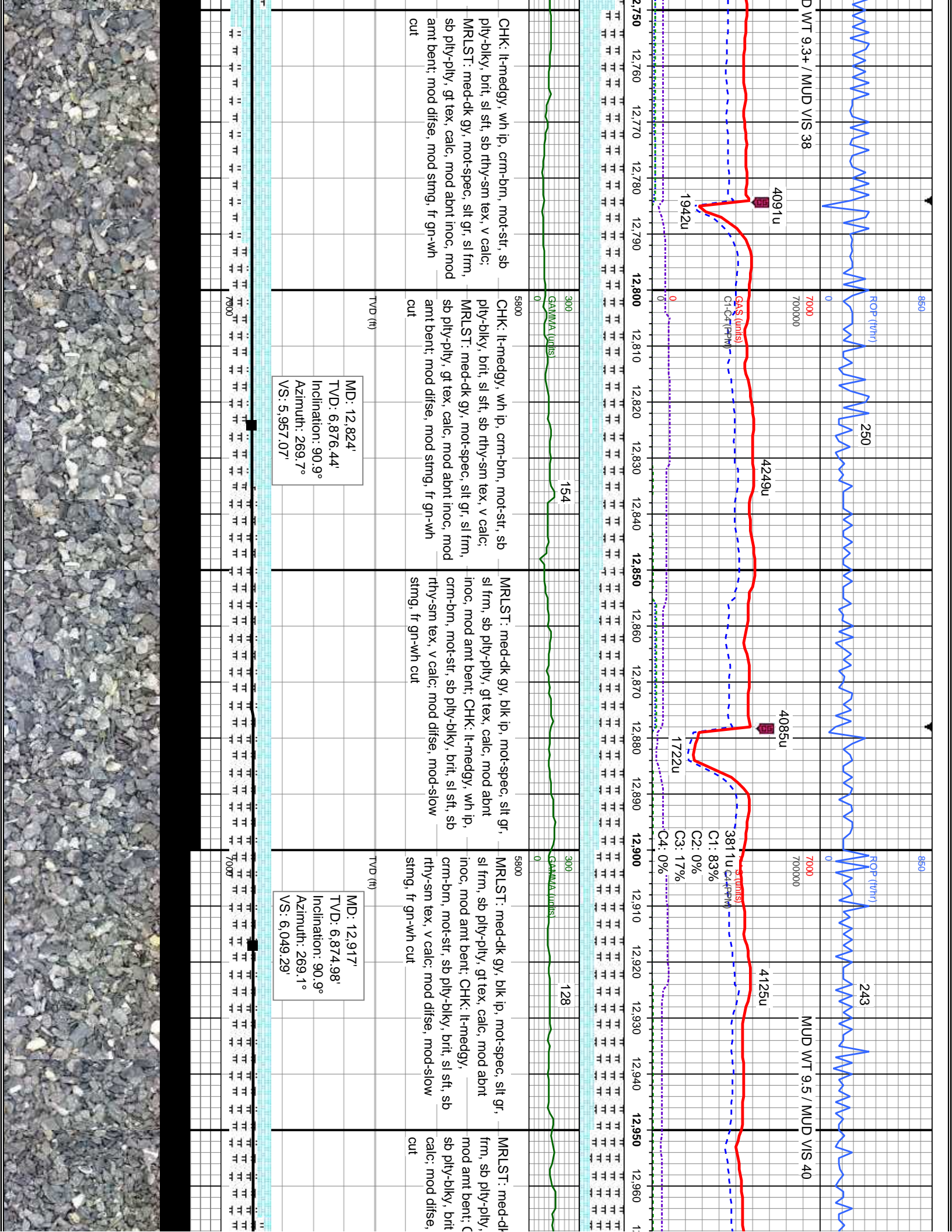
MUD WT 9.3 / MUD VIS 40











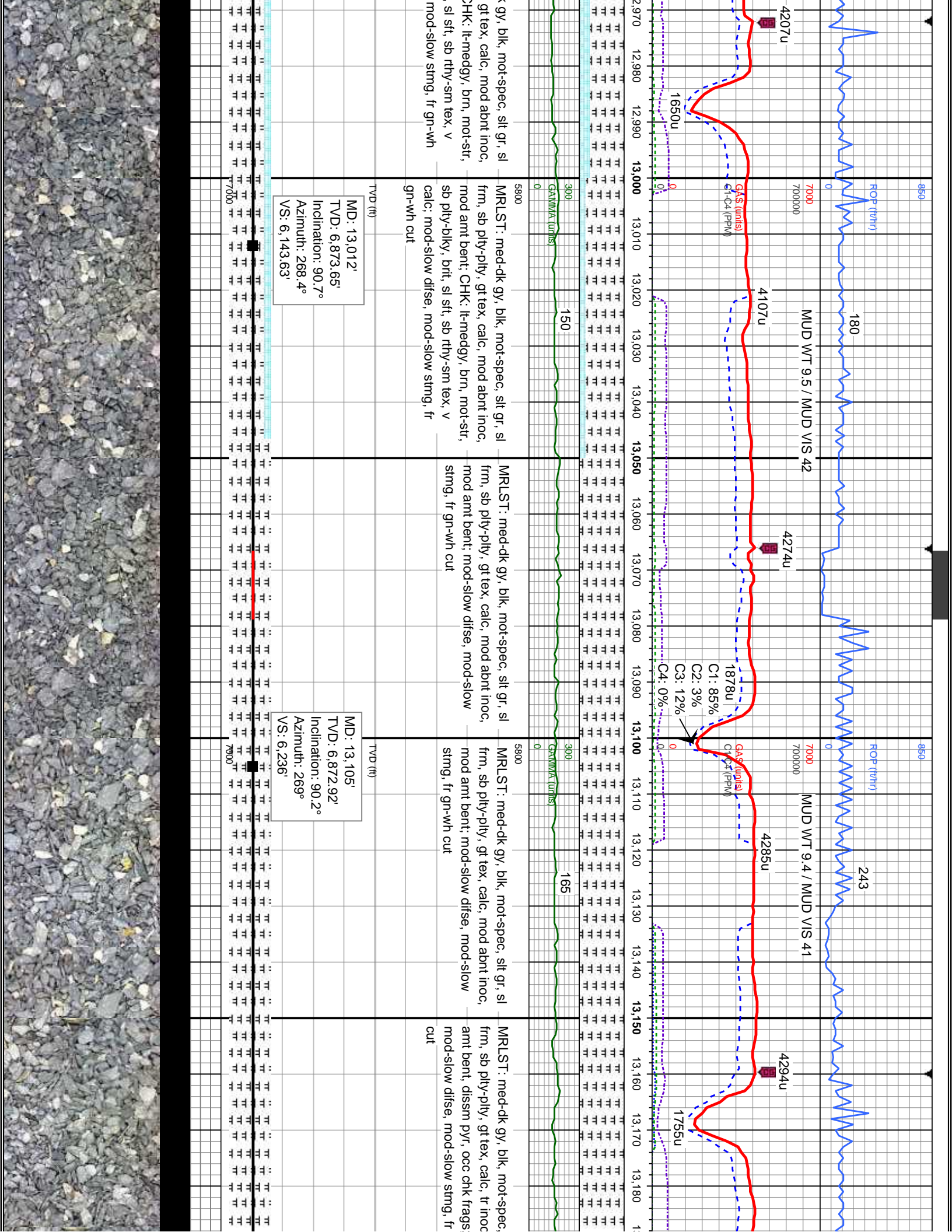
950  
 FOP (twh)  
 250  
 243  
 0  
 7000  
 7000000  
 D WT 9.3+ / MUD VIS 38  
 MUD WT 9.5 / MUD VIS 40

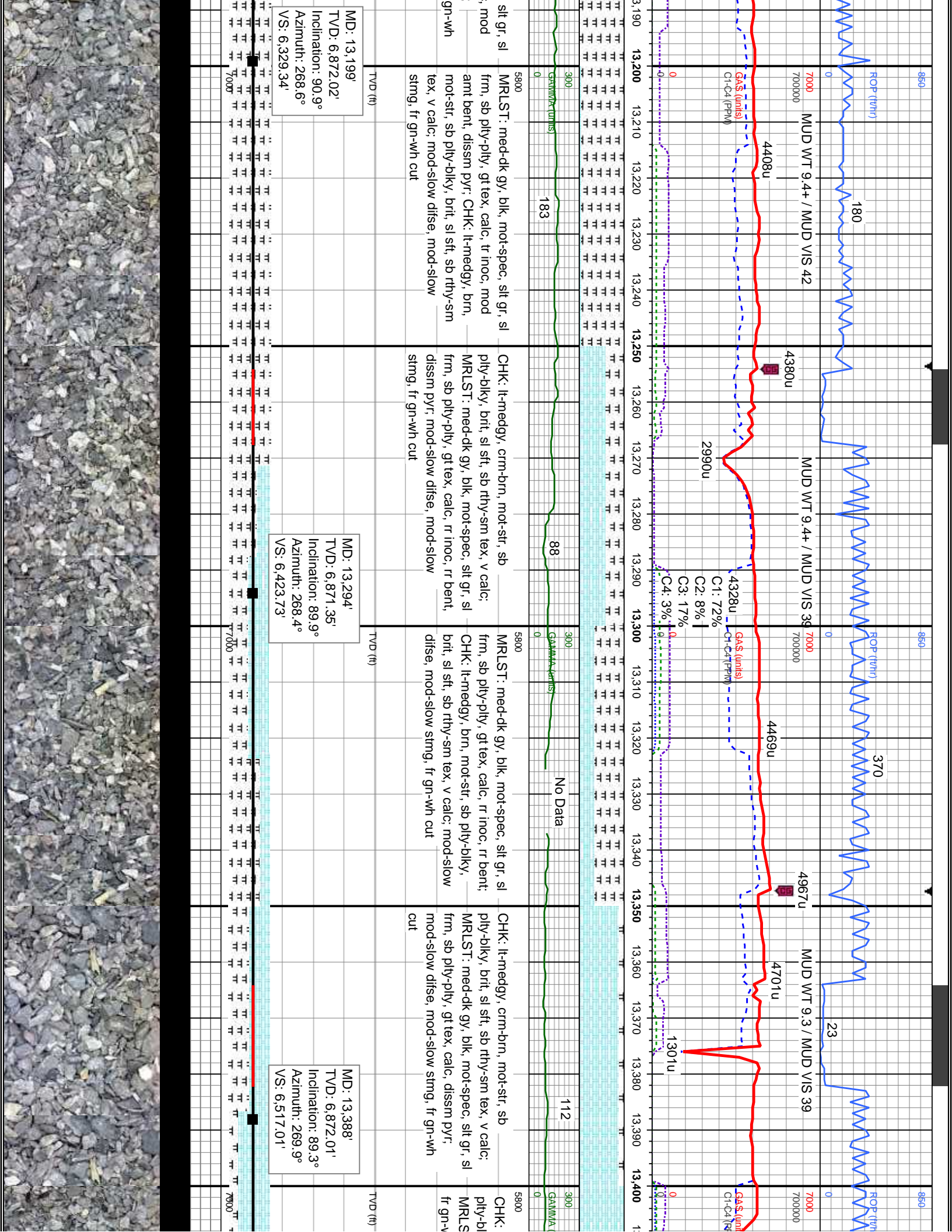
12,750 12,760 12,770 12,780 12,790 12,800 12,810 12,820 12,830 12,840 12,850 12,860 12,870 12,880 12,890 12,900 12,910 12,920 12,930 12,940 12,950 12,960

4091u  
 1942u  
 GAS (units)  
 C1: 83%  
 C2: 0%  
 C3: 17%  
 C4: 0%  
 4249u  
 4085u  
 1722u  
 3811u  
 4125u

300  
 GAMMA (units)  
 154  
 128  
 5800  
 TVD (ft)  
 MD: 12,824'  
 TVD: 6,876.44'  
 Inclination: 90.9°  
 Azimuth: 269.7°  
 VS: 5,957.07'

CHK: lt-meddy, wh ip, crm-brn, mot-str, sb pty-blky, brit, sl sft, sb rthy-sm tex, v calc;  
 MRLST: med-dk gy, mot-spec, slt gr, sl frm, sb pty-pty, gt tex, calc, mod abnt inoc, mod amt bent; mod difse, mod stmg, fr gn-wh cut  
 CHK: lt-meddy, wh ip, crm-brn, mot-str, sb pty-blky, brit, sl sft, sb rthy-sm tex, v calc;  
 MRLST: med-dk gy, mot-spec, slt gr, sl frm, sb pty-pty, gt tex, calc, mod abnt inoc, mod amt bent; mod difse, mod stmg, fr gn-wh cut  
 MRLST: med-dk gy, blk ip, mot-spec, slt gr, sl frm, sb pty-pty, gt tex, calc, mod abnt inoc, mod amt bent; CHK: lt-meddy, wh ip, crm-brn, mot-str, sb pty-blky, brit, sl sft, sb rthy-sm tex, v calc; mod difse, mod-slow stmg, fr gn-wh cut  
 MRLST: med-dk gy, blk ip, mot-spec, slt gr, sl frm, sb pty-pty, gt tex, calc, mod abnt inoc, mod amt bent; CHK: lt-meddy, crm-brn, mot-str, sb pty-blky, brit, sl sft, sb rthy-sm tex, v calc; mod difse, mod-slow stmg, fr gn-wh cut  
 MRLST: med-dk gy, blk ip, mot-spec, slt gr, sl frm, sb pty-pty, gt tex, calc, mod abnt inoc, mod amt bent; CHK: lt-meddy, crm-brn, mot-str, sb pty-blky, brit, sl sft, sb rthy-sm tex, v calc; mod difse, mod-slow stmg, fr gn-wh cut





MD: 13,199'  
 TVD: 6,872.02'  
 Inclination: 90.9°  
 Azimuth: 268.6°  
 VS: 6,329.34'

MD: 13,294'  
 TVD: 6,871.35'  
 Inclination: 89.9°  
 Azimuth: 268.4°  
 VS: 6,423.73'

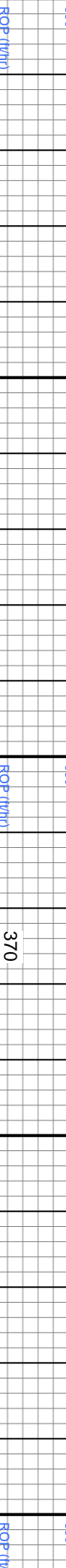
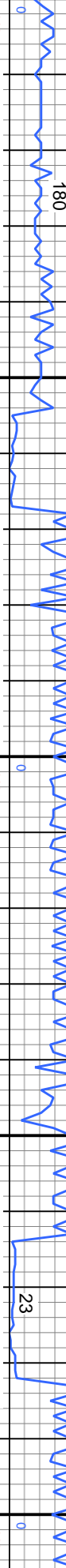
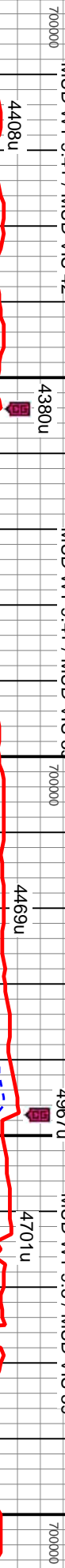
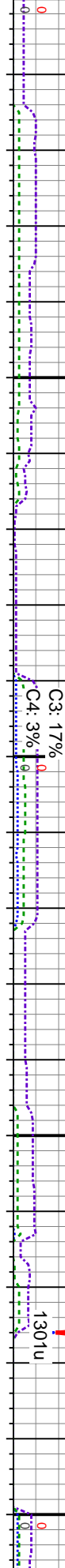
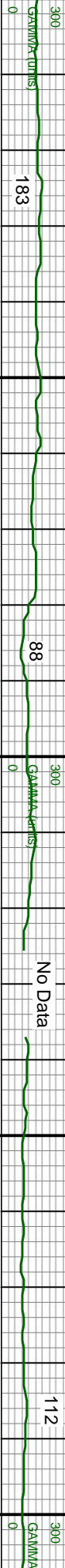
MD: 13,388'  
 TVD: 6,872.01'  
 Inclination: 89.3°  
 Azimuth: 269.9°  
 VS: 6,517.01'

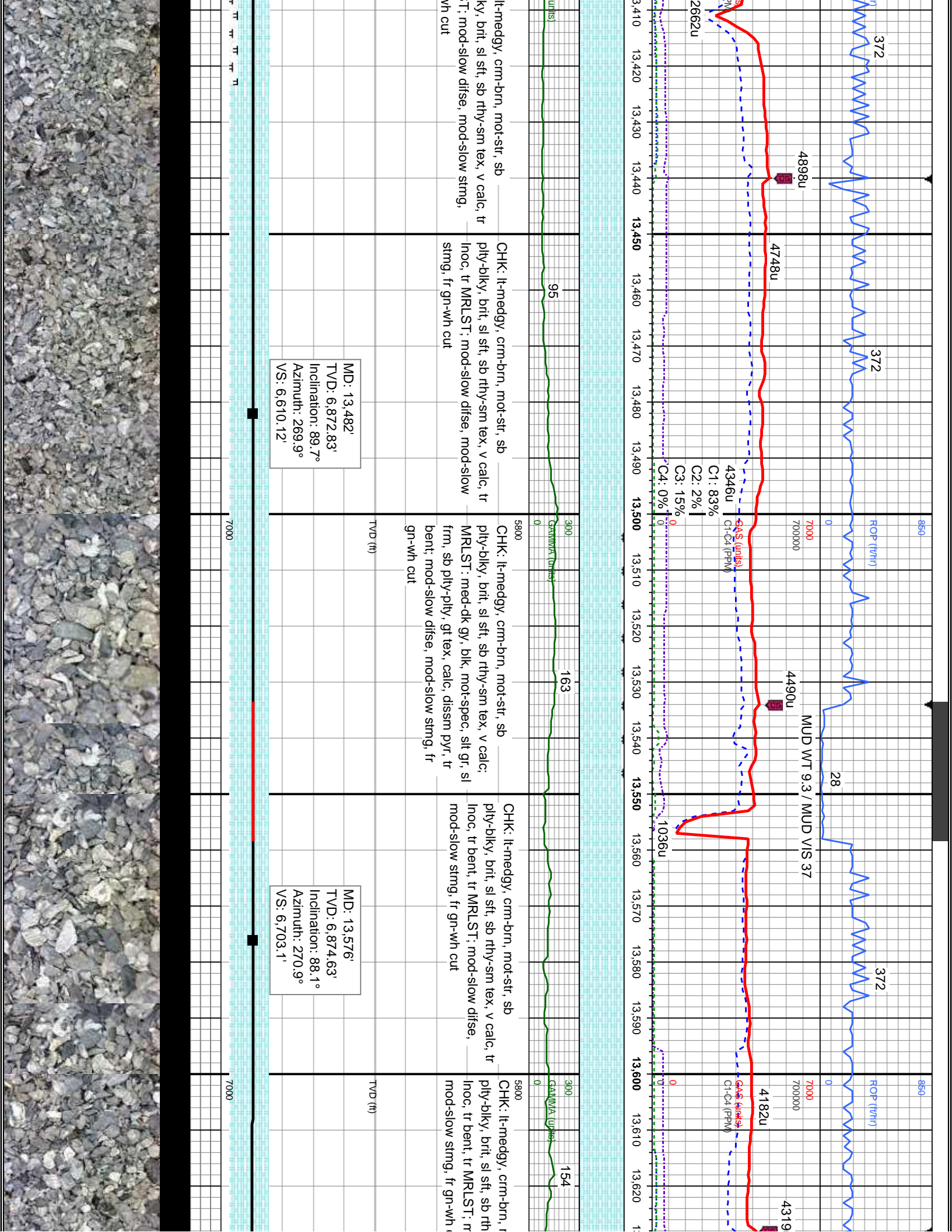
5800  
 MRLST: med-dk gy, blk, mot-spec, slt gr, sl  
 frm, sb ply-pty, gt tex, calc, tr inoc, mod  
 amt bent, dissm pyr; CHK: lt-medgy, brn,  
 mot-str, sb ply-blky, brit, sl sft, sb rthy-sm  
 tex, v calc; mod-slow disse, mod-slow  
 stimg, fr gn-wh cut

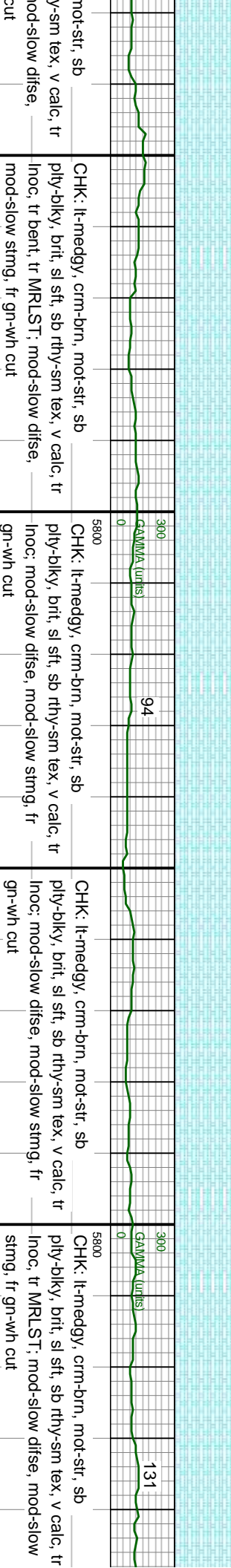
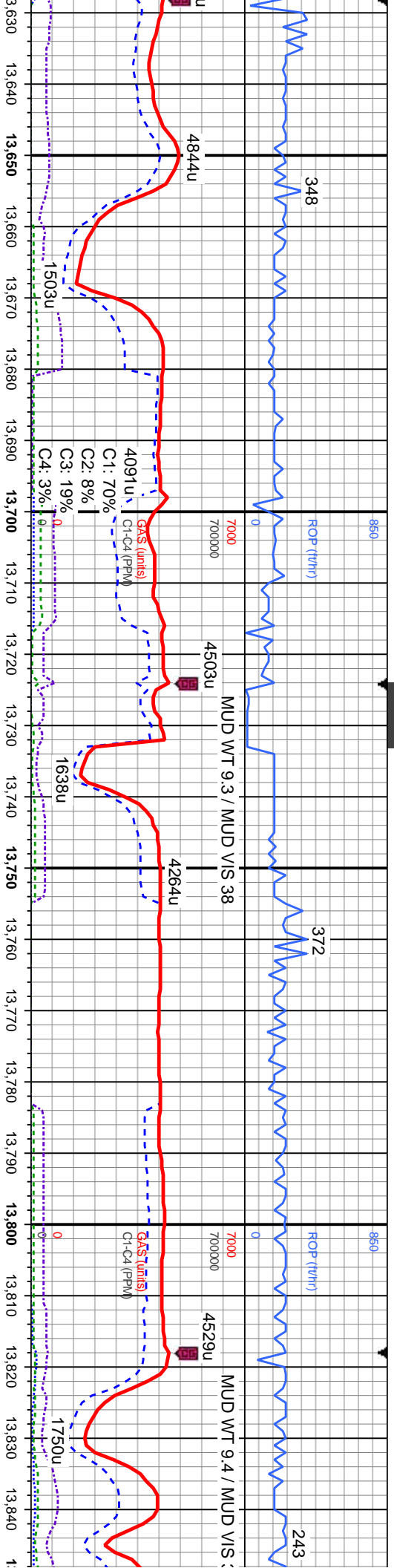
5800  
 CHK: lt-medgy, cfm-brn, mot-str, sb  
 ply-blky, brit, sl sft, sb rthy-sm tex, v calc;  
 MRLST: med-dk gy, blk, mot-spec, slt gr, sl  
 frm, sb ply-pty, gt tex, calc, r inoc, rr bent,  
 dissm pyr; mod-slow disse, mod-slow  
 stimg, fr gn-wh cut

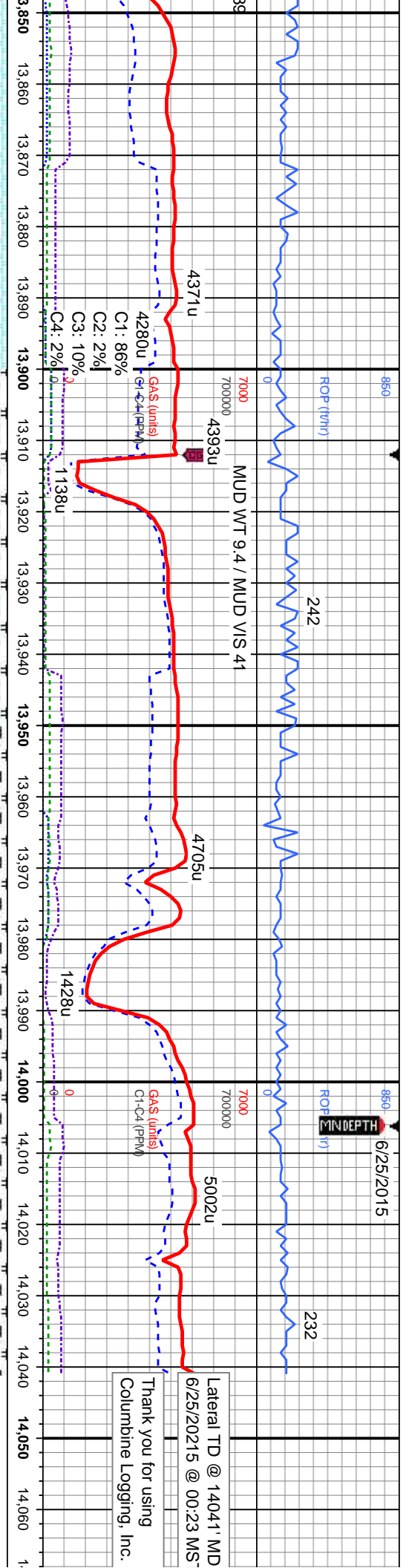
5800  
 MRLST: med-dk gy, blk, mot-spec, slt gr, sl  
 frm, sb ply-pty, gt tex, calc, r inoc, rr bent;  
 CHK: lt-medgy, brn, mot-str, sb ply-blky,  
 brit, sl sft, sb rthy-sm tex, v calc; mod-slow  
 disse, mod-slow stimg, fr gn-wh cut

5800  
 CHK: lt-medgy, cfm-brn, mot-str, sb  
 ply-blky, brit, sl sft, sb rthy-sm tex, v calc;  
 MRLST: med-dk gy, blk, mot-spec, slt gr, sl  
 frm, sb ply-pty, gt tex, calc, dissm pyr;  
 mod-slow disse, mod-slow stimg, fr gn-wh  
 cut









MD: 13,858'  
TVD: 6,880.54'  
Inclination: 89.3°  
Azimuth: 270.7°  
VS: 6,981.81'

MD: 13,986'  
TVD: 6,881.55'  
Inclination: 89.8°  
Azimuth: 269.7°  
VS: 7,108.51'

MD: 14,041'  
TVD: 6,881.74'  
Inclination: 89.8°  
Azimuth: 269.7°  
VS: 7,163.02'

TVD (ft)

TVD (ft)

Projection to Bit

CHK: lt-meddy, cfm-brn, mot-str, sb  
ply-blky, brit, sl sft, sb rhy-sm tex, v calc, tr  
lnoc, tr MRLST; mod disse, mod stmg, bri  
gn-wh

CHK: lt-meddy, cfm-brn, mot-str, sb  
ply-blky, brit, sl sft, sb rhy-sm tex, v calc;  
MRLST: med-dk gy, blk, mot-spec, sit gr, sl  
frm, sb ply-pty, gt tex, calc, dissm pyr; mod  
disse, mod stmg, bri gn-wh

CHK: lt-meddy, cfm-brn, mot-str, sb  
ply-blky, brit, sl sft, sb rhy-sm tex, v calc;  
MRLST: med-dk gy, blk, mot-spec, sit gr, sl  
frm, sb ply-pty, gt tex, calc, dissm pyr, tr  
bent; mod disse, mod stmg, bri gn-wh

CHK: lt-meddy, cfm-brn, mot-str, sb  
ply-blky, brit, sl sft, sb rhy-sm tex, v calc;  
MRLST: med-dk gy, blk, mot-spec, sit gr, sl  
frm, sb ply-pty, gt tex, calc, dissm pyr, tr  
bent; mod disse, mod stmg, bri gn-wh

