



Scale: 5" / 100'
Measured Depth Log

Well Name Rainbow LC28-74-1HNA

Location SWSE SEC 28 T9N R59W

State COLORADO

County WELD

Country USA

Rig Number H&P 273

API Number 05-123-38849

Field WILDCAT

Region DJ BASIN

Drilling Completed 8/9/2014

Spud Date 8/4/2014

Surface Coordinates 340' FSL; 1810' FEL

Bottom Hole Coordinates 675' FNL; 1650' FEL

Ground Elevation 4842'

K.B. Elevation 4866'

Logged Interval 5302' To 10300'

Total Depth 10300'

Formation NIOBRARA

Type of Drilling Fluid LSND

Operator

Company NOBLE ENERGY INC.

Address 1625 Broadway Suite 2200
Denver, CO 80202

Geologist

Name RENEE CLACKLER

Company NOBLE ENERGY INC.

Address 1625 Broadway Suite 2200
Denver, CO 80202

Other

Wellsite Geologist #1 Laura Kellogg

Wellsite Geologist #2 Tim Bright

Wellsite Geological Services Provided By Columbine Logging

Zone Color Coding

Oil
Note
Error























































Condensate
Core
Water

Gas
Pres
Sea

Rock Types

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


Accessories

Fossils		Stringer	
 FOSSIL	 ARGILLACEOUS	 GLAUCONITE	 TUFFACEOUS
 GASTROPOD	 ARGILLITE GRAIN	 GYPSIFEROUS	
 OOLITE	 B BENTONITE	 HEAVY MINERAL	
 AMPHIPORA	 OSTRACOD	 INOCERAMUS	 ANHYDRITE STRINGER
 BELEMNITE	 PELECYPOD	 BRECCIA FRAGMENTS	 BENTONITE STRINGER
 BIOCLASTIC	 PELLET	 CALCAREOUS	 COAL STRINGER
 BRACHIOPOD	 PISOLUTE	 CARBONACEOUS FLAKES	 DOLOMITE STRINGER
 BRYOZOA	 PLANT REMAINS	 CHTDK	 GYPSUM STRINGER
 CEPHALOPOD	 PLANT SPORES	 CHLTD	 LIMESTONE STRINGER
 CORAL	 SCAPHOPOD	 COAL - THIN BEDS	 MARLSTONE (CALC) STRG
 CRINOID	 STROMATOPOROID	 DOLOMITIC	 MARLSTONE (DOL) STRG
 ECHINOID	 FELDSPAR	 SANDY	 SANDSTONE STRINGER
 FISH		 FERRUGINOUS PELLET	 SHALE STRINGER
 FORAMINIFERA	 ANHYDRITIC	 FERRUGINOUS	 SILTSTONE STRINGER
		 SILTY	

Oil Show

Oil Show


 MOLDIC

 ORGANIC
















 PINPOINT

 DEAD

 EVEN

 VUGGY

Engineering

	QUESTIONABLE	
	SPOTTED STAINING	
	Porosity	
	BIT	
	CONNECTION (LEFT)	
	E EARTHY	
	CONNECTION (RIGHT)	
	F FENESTRAL	
	CONNECTION GAS	
	F FRACTURE	
	CORE - LOST	
	INTERCRYSTALLINE	
	CORE - RECOVERED	
	INTERPOOLITIC	
	DST INTERVAL	

Other Symbols

 FAULT  WIRELINE TESTED - LEFT **E** EARTHY

 FORMATION TOP  WIRELINE TESTED - RT **FX** FINELYXLN

 GAS SHOW **GS** GRAINSTONE

Rounding

 MINDEPTH MN DEPTH **L** LITHOGRAPHIC

 NORMAL FAULT **A** ANGULAR **MX** MICROXLN


 OIL SHOW **R** ROUNDED **MS** MUDSTONE

 OVERTURNED STRATA **B** SUBANG **PS** PACKSTONE

 REVERSE FAULT **F** SUBRND **WS** WACKESTONE

 SIDEWALL CORE (LEFT)


Textures

 SIDEWALL CORE (RIGHT)

Sorting

 SLIDE **BS** BOUNDSTONE **M** MODERATE

 SURVEY **C** CHALKY **P** POOR

 TRIP GAS **CX** CRYPTOXLN **W** WELL

Slide/Rotate

ROP

ROP

Total Gas & Chromatograph

- GAS
- C1
- C2
- C3
- C4

Depth Labels

% Lith

Gamma

GAMMA

Well Bore
TVD

Oil Show

Images

BEGAN DRILLING CURVE
@ 08:01 AM 08/06/2014

50' Sample Interval

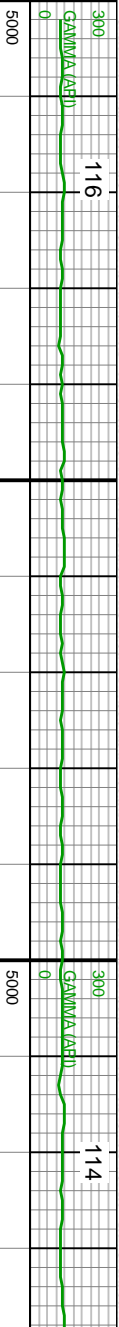
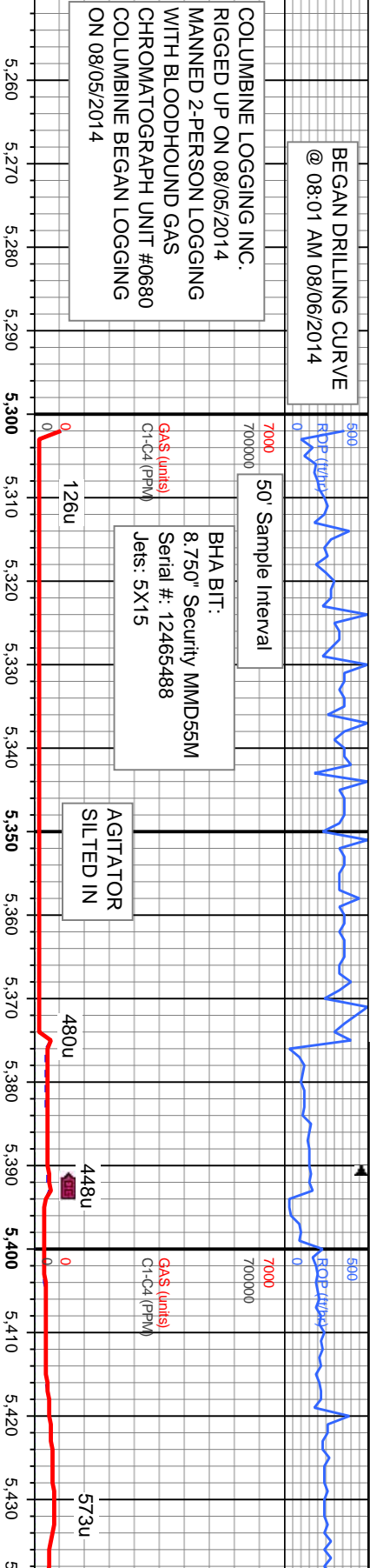
BHA BIT:
8.750" Security NMD55M
Serial #: 12465488
Jets: 5X15

AGITATOR
SILTED IN

GAS (units)
C1-C4 (PPM)

GAS (units)
C1-C4 (PPM)

COLUMBINE LOGGING INC.
RIGGED UP ON 08/05/2014
MANNED 2-PERSON LOGGING
WITH BLOODHOUND GAS
CHROMATOGRAPH UNIT #0680
COLUMBINE BEGAN LOGGING
ON 08/05/2014



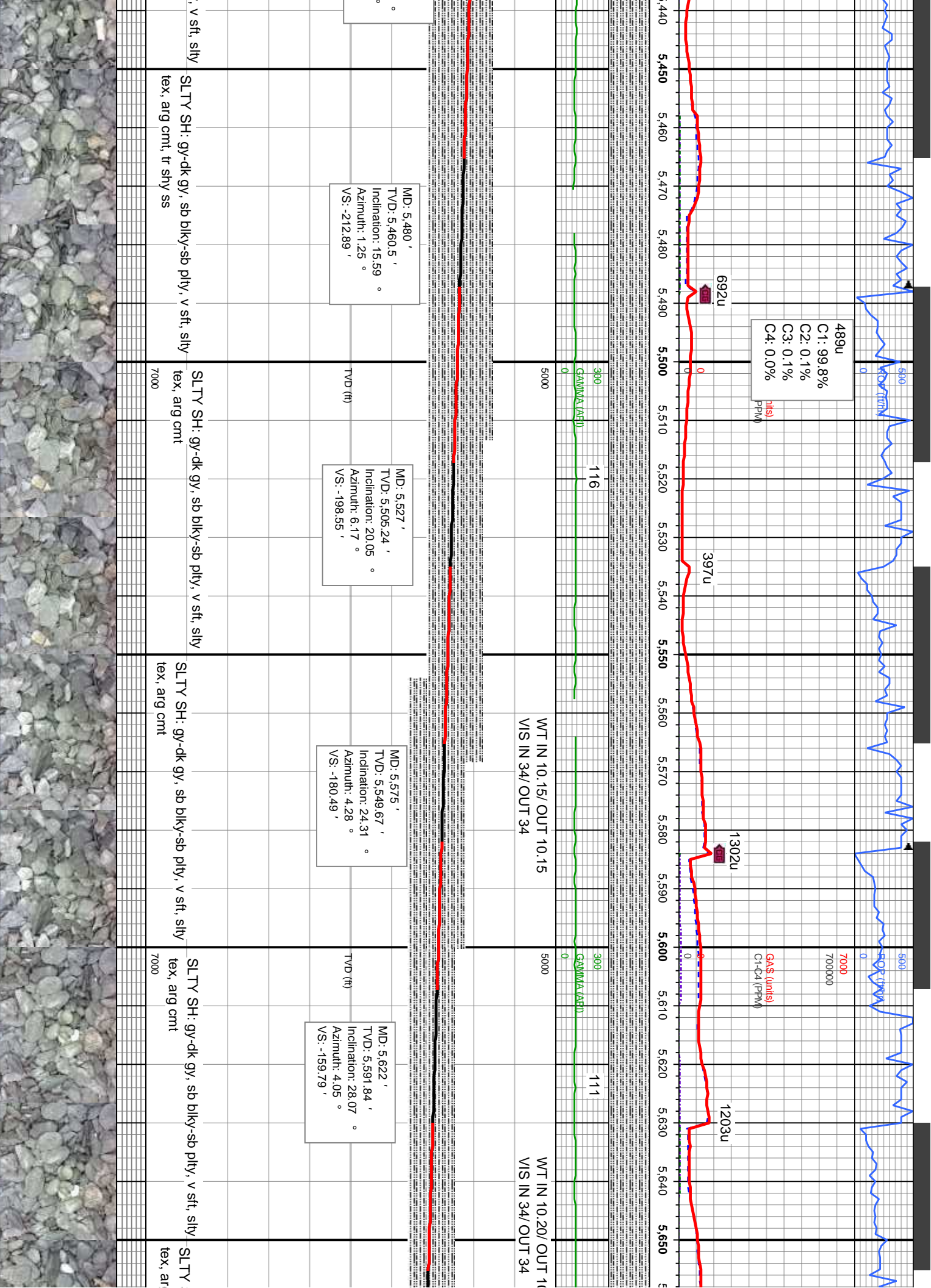
The ratings are based on 7 descriptors:
None, Slight trace, Trace, Fair, Moderate,
Good, and Excellent. The descriptor used
is based on the loggers observations and
best judgment of brilliance, color and
longevity of the cut.

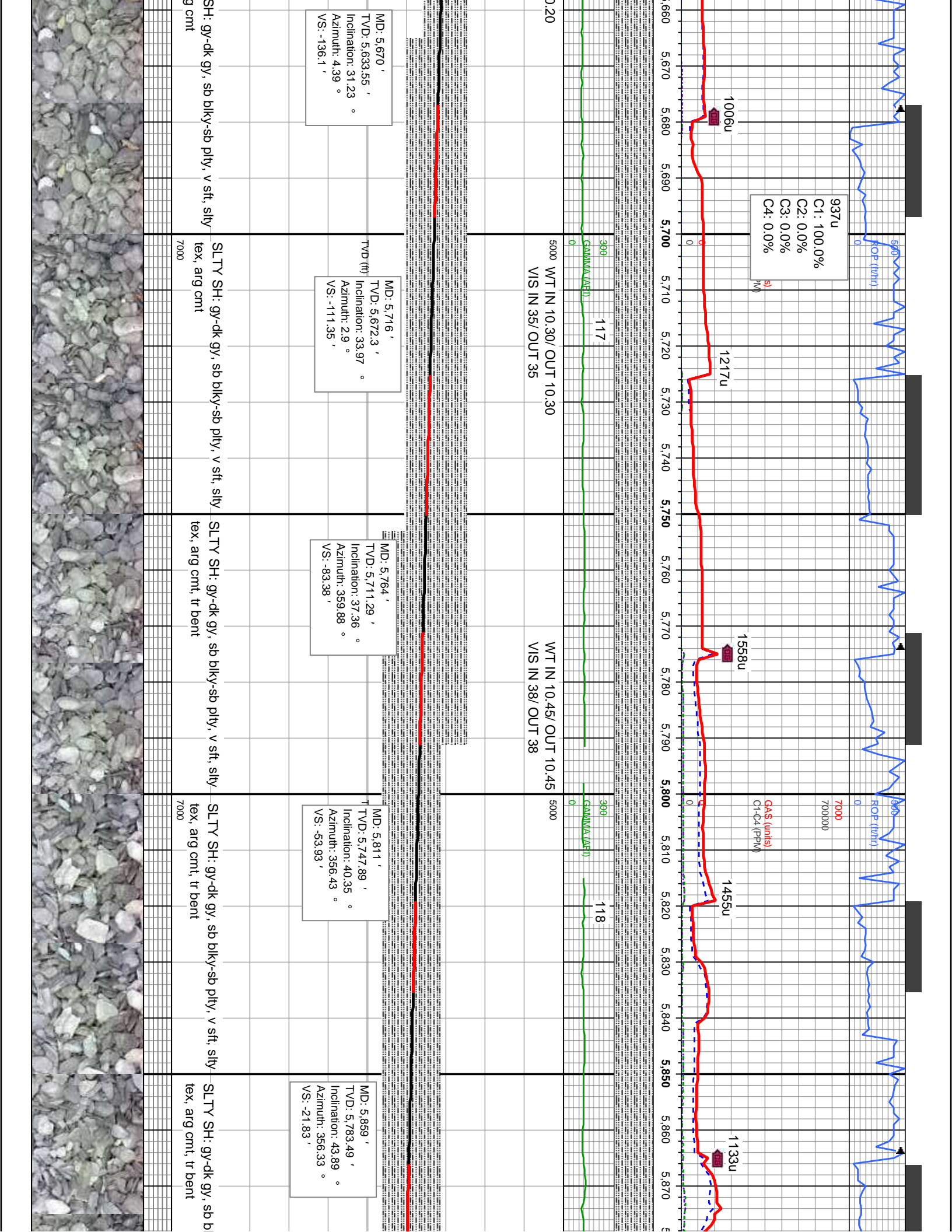
SLTY SH: gy-dk gy, sb blk-y-sb pily, v sft,
silty tex, arg cmf, tr shy ss

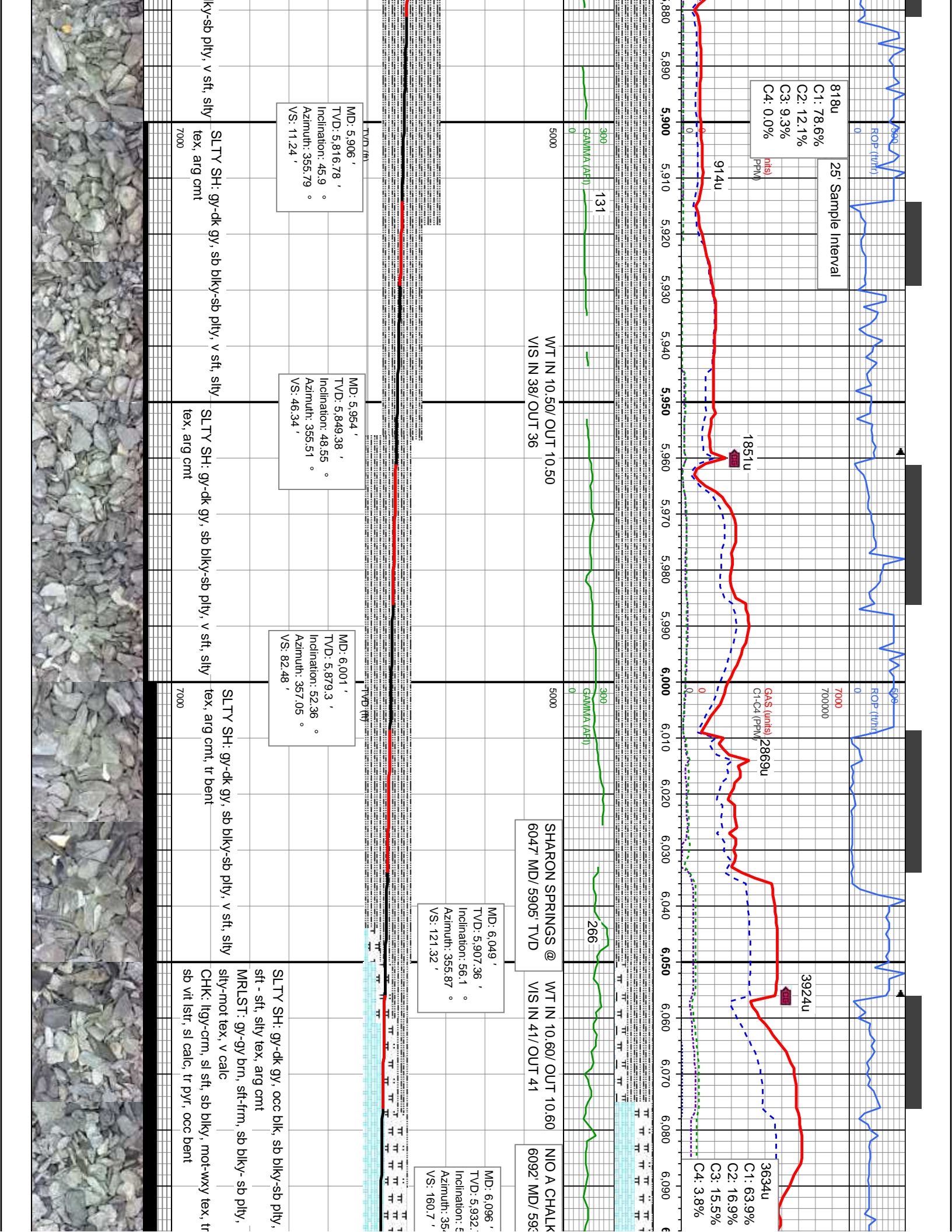
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tex, arg cmf, tr shy ss

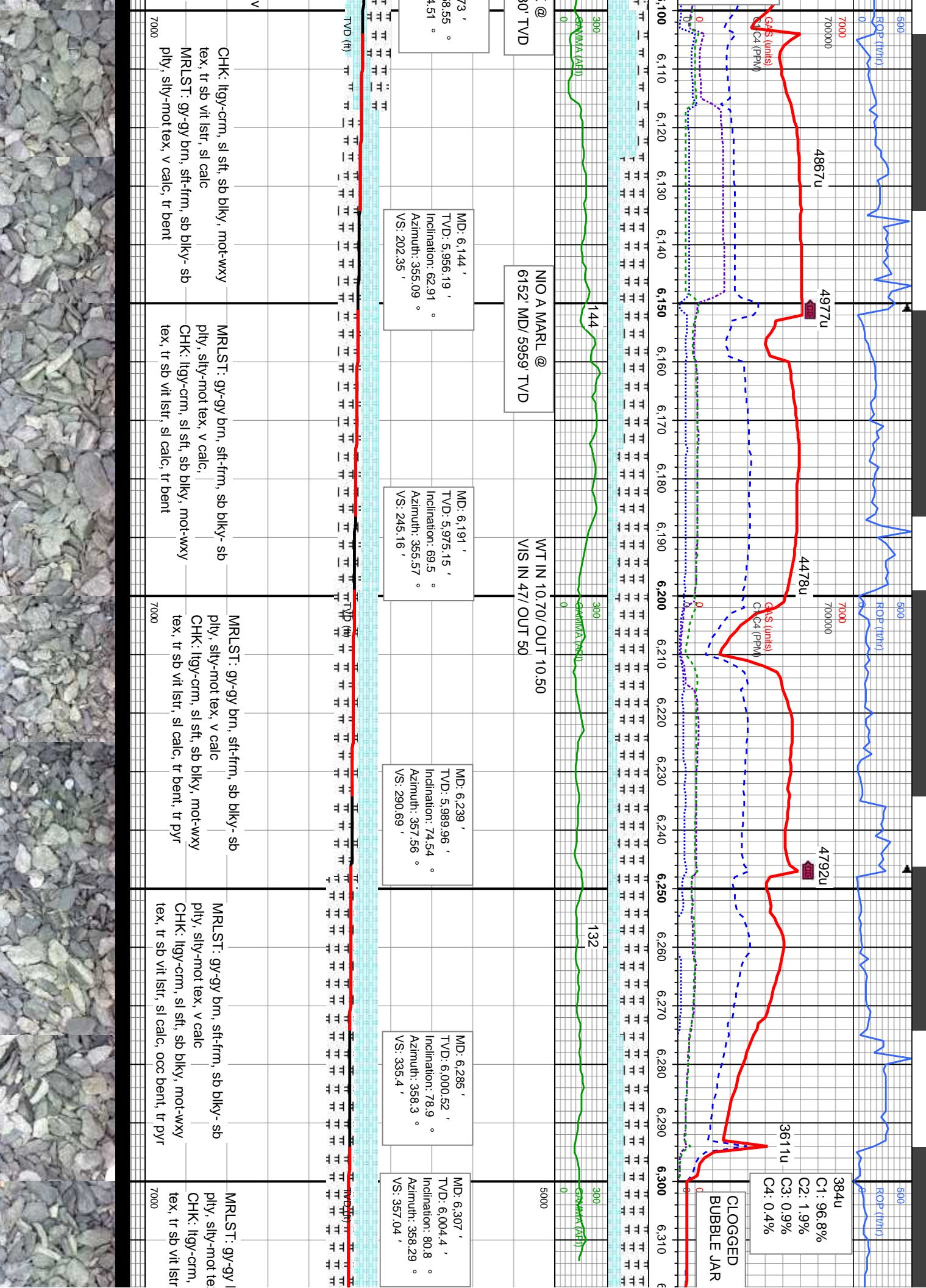
SLTY SH: gy-dk gy, sb blk-y-sb pily
tex, arg cmf, tr shy ss











TD Curve
Intermediate
Casing - 6362' MD
@ 10:15 PM on 08/06/2014

BHA BIT:
Black Diamond PDC 6.125"
Serial #: BD-025
Jets: 5x14

Resumed Drilling
3:42 AM on 08/08/2014

50' Sample Interval

3507u

4340u

4123u

4263u

2891u

C1: 69.0%
C2: 16.5%
C3: 14.6%
C4: 0.0%

MD: 6,369 '
TVD: 6,011.83 '
Inclination: 85.43 °
Azimuth: 357.71 °
VS: 418.52 '

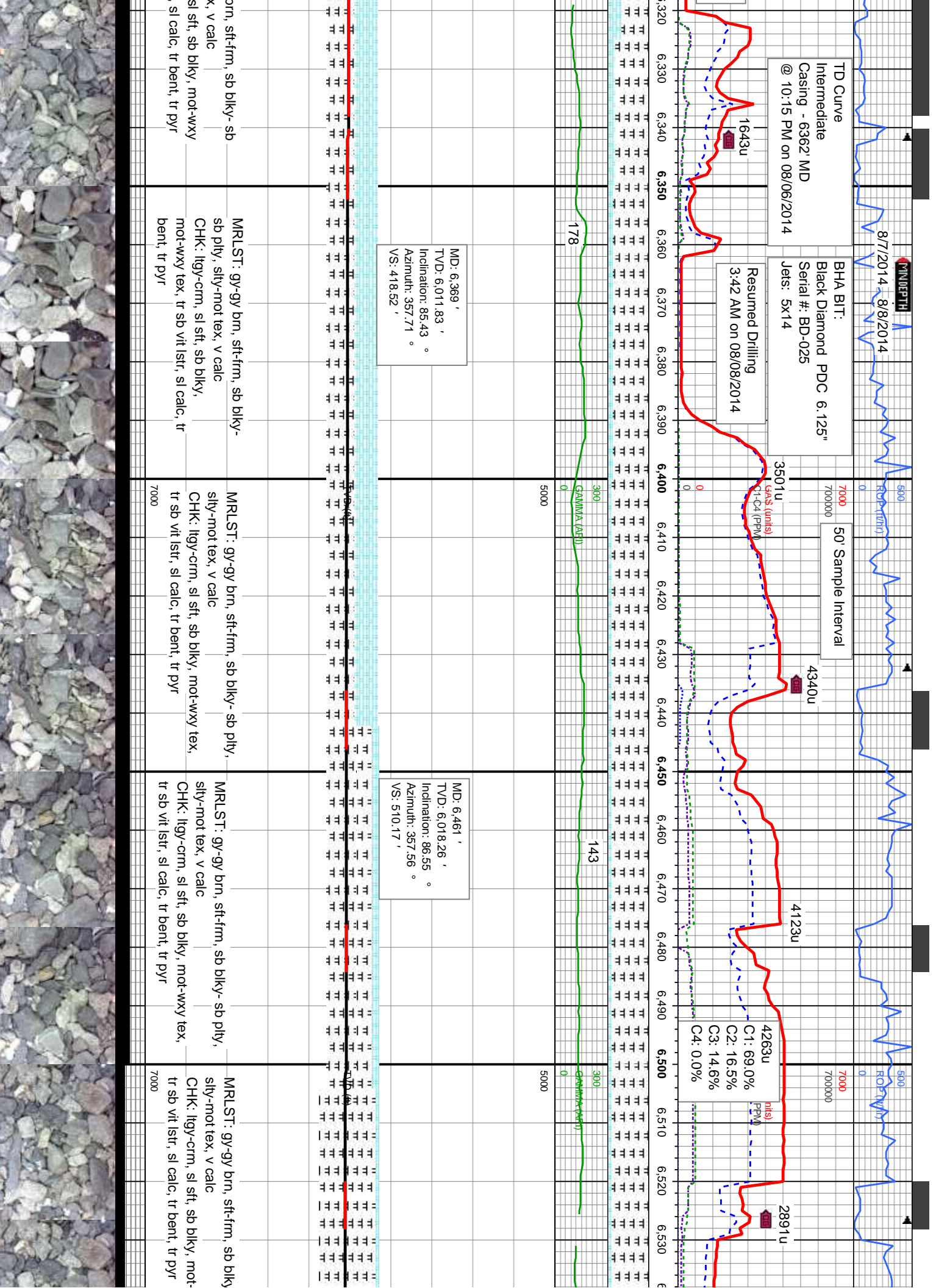
MD: 6,461 '
TVD: 6,018.26 '
Inclination: 86.55 °
Azimuth: 357.56 °
VS: 510.17 '

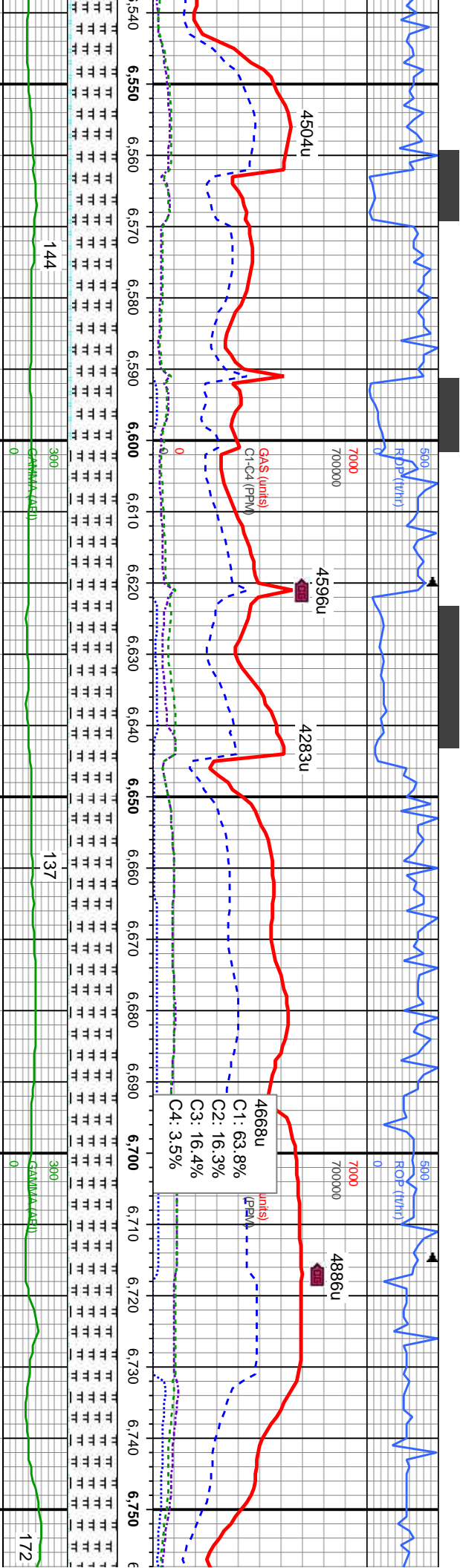
MRLLST: gy-gy brn, sft-firm, sb blk-y-
sb plty, slty-mot tex, v calc
CHK: ltgy-crm, sl sft, sb blk-y,
mot-wxy tex, tr sb vit lstr, sl calc, tr
bent, tr pyr

MRLLST: gy-gy brn, sft-firm, sb blk-y- sb plty,
slty-mot tex, v calc
CHK: ltgy-crm, sl sft, sb blk-y, mot-wxy tex,
tr sb vit lstr, sl calc, tr bent, tr pyr

MRLLST: gy-gy brn, sft-firm, sb blk-y- sb plty,
slty-mot tex, v calc
CHK: ltgy-crm, sl sft, sb blk-y, mot-wxy tex,
tr sb vit lstr, sl calc, tr bent, tr pyr

MRLLST: gy-gy brn, sft-firm, sb blk-y
slty-mot tex, v calc
CHK: ltgy-crm, sl sft, sb blk-y, mot-
tr sb vit lstr, sl calc, tr bent, tr pyr





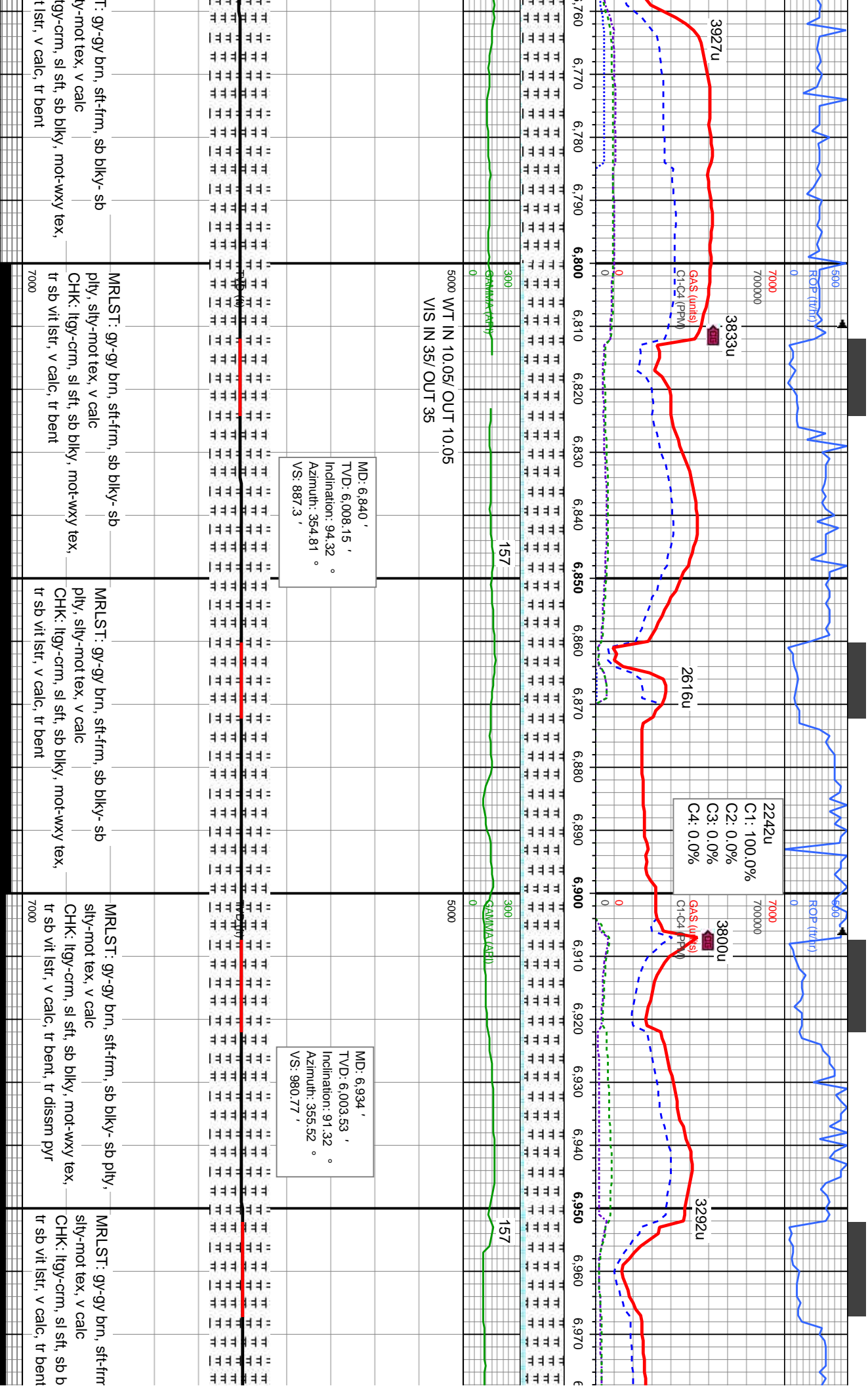
MD: 6,556 '
TVD: 6,022.38 '
Inclination: 88.49 °
Azimuth: 356 °
VS: 604.88 '

MD: 6,650 '
TVD: 6,021.44 '
Inclination: 92.65 °
Azimuth: 355.86 °
VS: 698.55 '

MD: 6,745 '
TVD: 6,015.48 '
Inclination: 94.54 °
Azimuth: 355.38 °
VS: 793.01 '

sb pty,	MRLST: gy-gy brn, sft-frm, sb blk-y- sb pty,	MRLST: gy-gy brn, sft-frm, sb blk-y- sb pty,	MRLST: gy-gy brn, sft-frm, sb blk-y- sb pty,	MRLS
slty-mot tex, v calc	slty-mot tex, v calc	slty-mot tex, v calc	slty-mot tex, v calc	pty, sl
CHK: ltgy-crm, sl sft, sb blk-y, mot-wxy tex,	CHK: ltgy-crm, sl sft, sb blk-y, mot-wxy tex,	CHK: ltgy-crm, sl sft, sb blk-y, mot-wxy tex,	CHK: ltgy-crm, sl sft, sb blk-y, mot-wxy tex,	CHK: l
tr sb vit lstr, sl calc, tr bent	tr sb vit lstr, sl calc, tr bent	tr sb vit lstr, sl calc, tr bent	tr sb vit lstr, v calc, tr bent	tr sb vit
7000	7000	7000	7000	

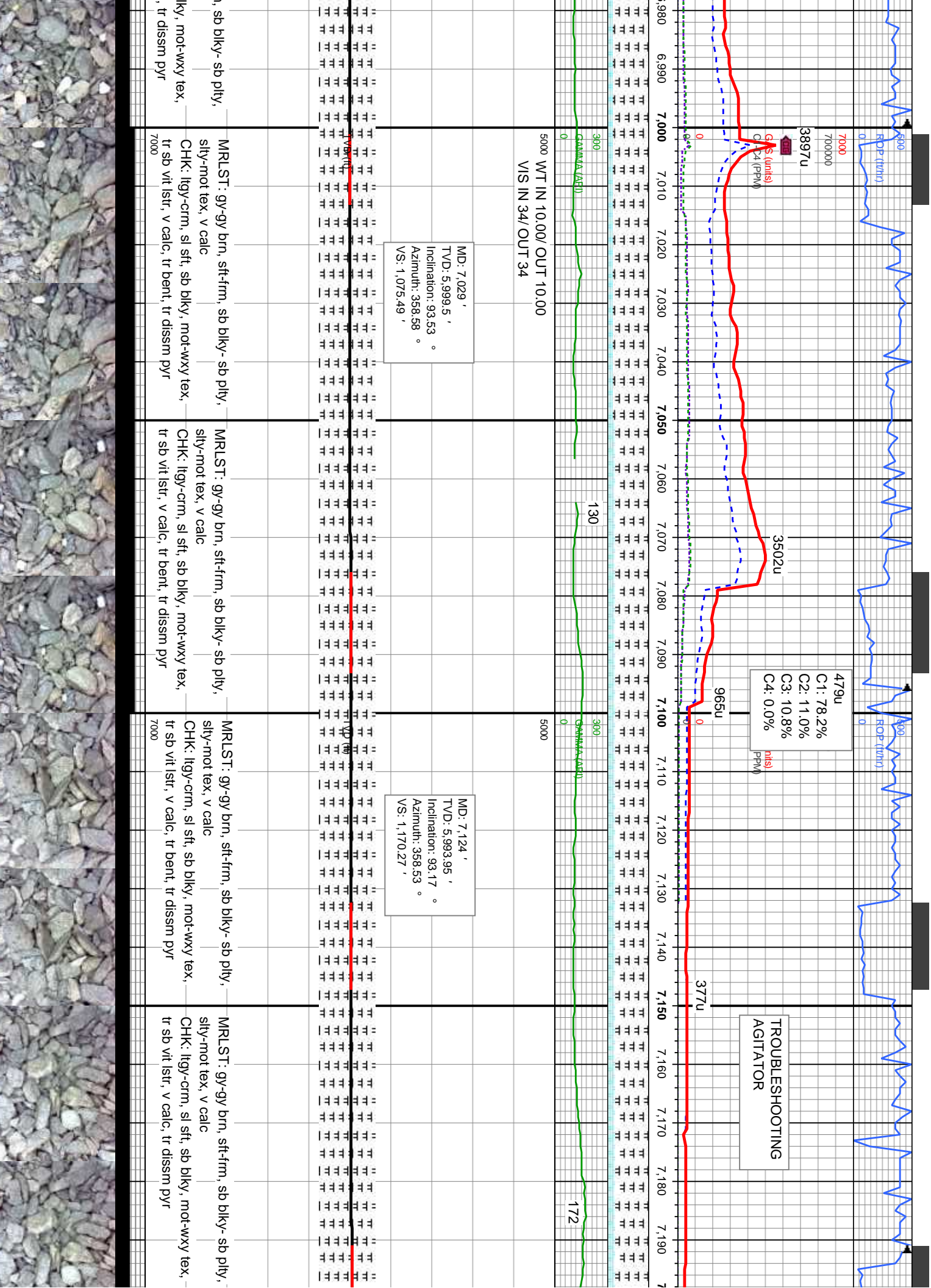




MD: 6.840 '
TVD: 6.008.15 '
Inclination: 94.32 °
Azimuth: 354.81 °
VS: 887.3 '

2242u
C1: 100.0%
C2: 0.0%
C3: 0.0%
C4: 0.0%

MD: 6.934 '
TVD: 6.003.53 '
Inclination: 91.32 °
Azimuth: 355.52 °
VS: 980.77 '



TROUBLESHOOTING
AGITATOR

479u
C1: 78.2%
C2: 11.0%
C3: 10.8%
C4: 0.0%

MD: 7,029 '
TVD: 5,999.5 '
Inclination: 93.53 °
Azimuth: 358.58 °
VS: 1,075.49 '

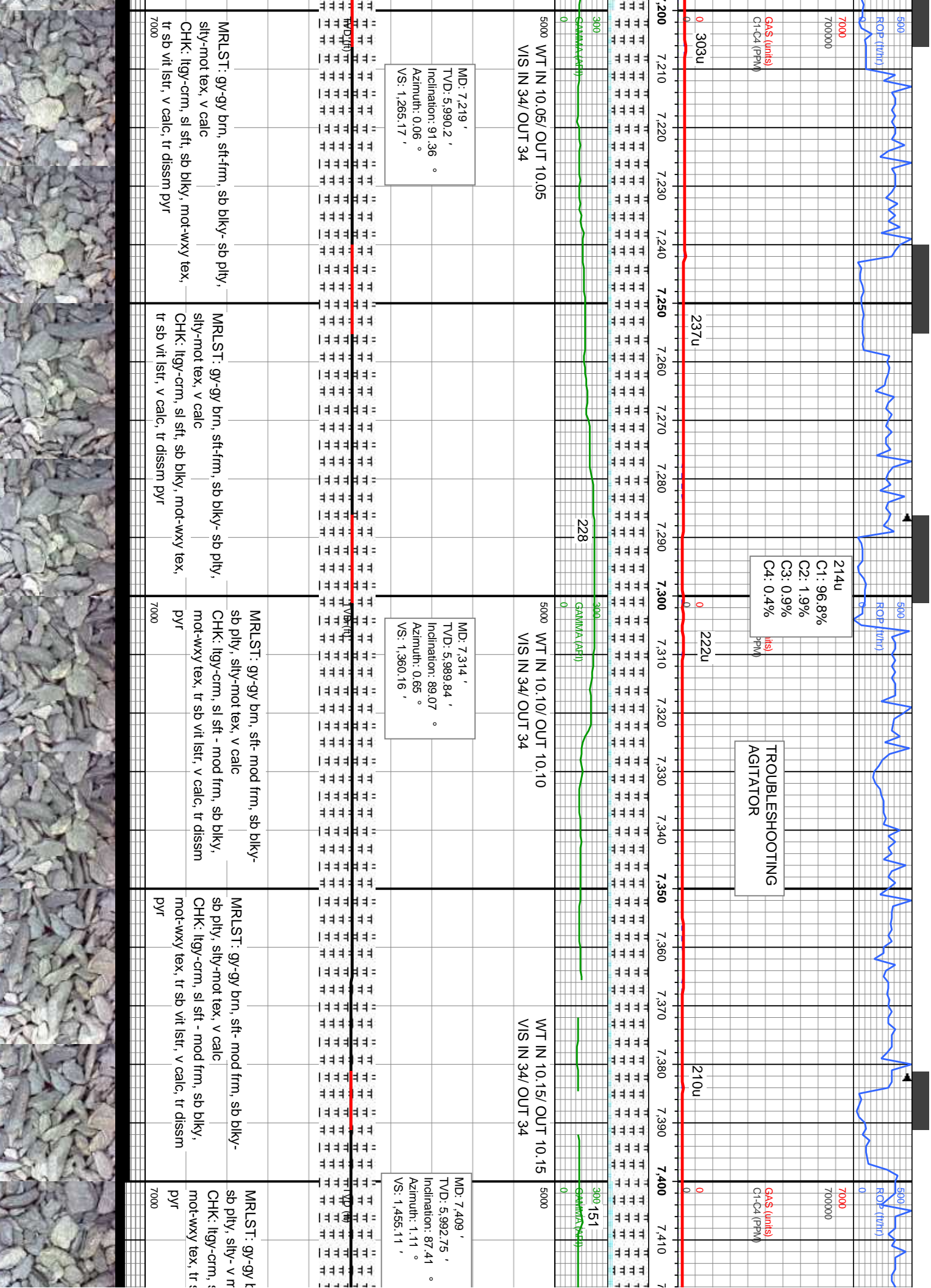
MD: 7,124 '
TVD: 5,993.95 '
Inclination: 93.17 °
Azimuth: 358.53 °
VS: 1,170.27 '

MRLST: gy-gy brn, sft-frm, sb blk- sb pily,
silty-mot tex, v calc
CHK: ltgy-crm, sl sft, sb blk, mot-wxy tex,
tr sb vit lstr, v calc, tr bent, tr diss pyr

MRLST: gy-gy brn, sft-frm, sb blk- sb pily,
silty-mot tex, v calc
CHK: ltgy-crm, sl sft, sb blk, mot-wxy tex,
tr sb vit lstr, v calc, tr bent, tr diss pyr

MRLST: gy-gy brn, sft-frm, sb blk- sb pily,
silty-mot tex, v calc
CHK: ltgy-crm, sl sft, sb blk, mot-wxy tex,
tr sb vit lstr, v calc, tr bent, tr diss pyr

MRLST: gy-gy brn, sft-frm, sb blk- sb pily,
silty-mot tex, v calc
CHK: ltgy-crm, sl sft, sb blk, mot-wxy tex,
tr sb vit lstr, v calc, tr diss pyr



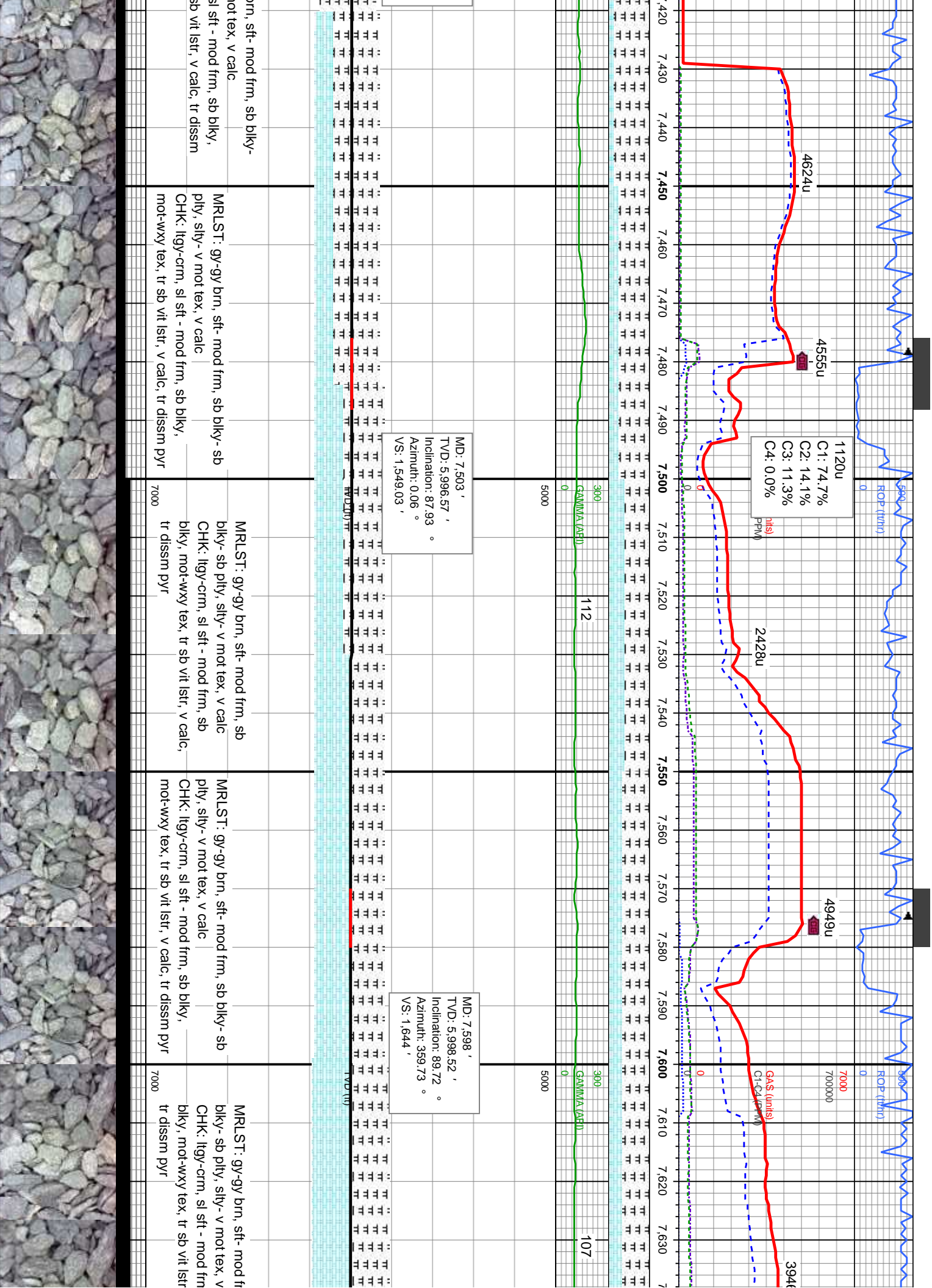
MD: 7.219 '
TVD: 5.990.2 '
Inclination: 91.36 °
Azimuth: 0.06 °
VS: 1.265.17 '

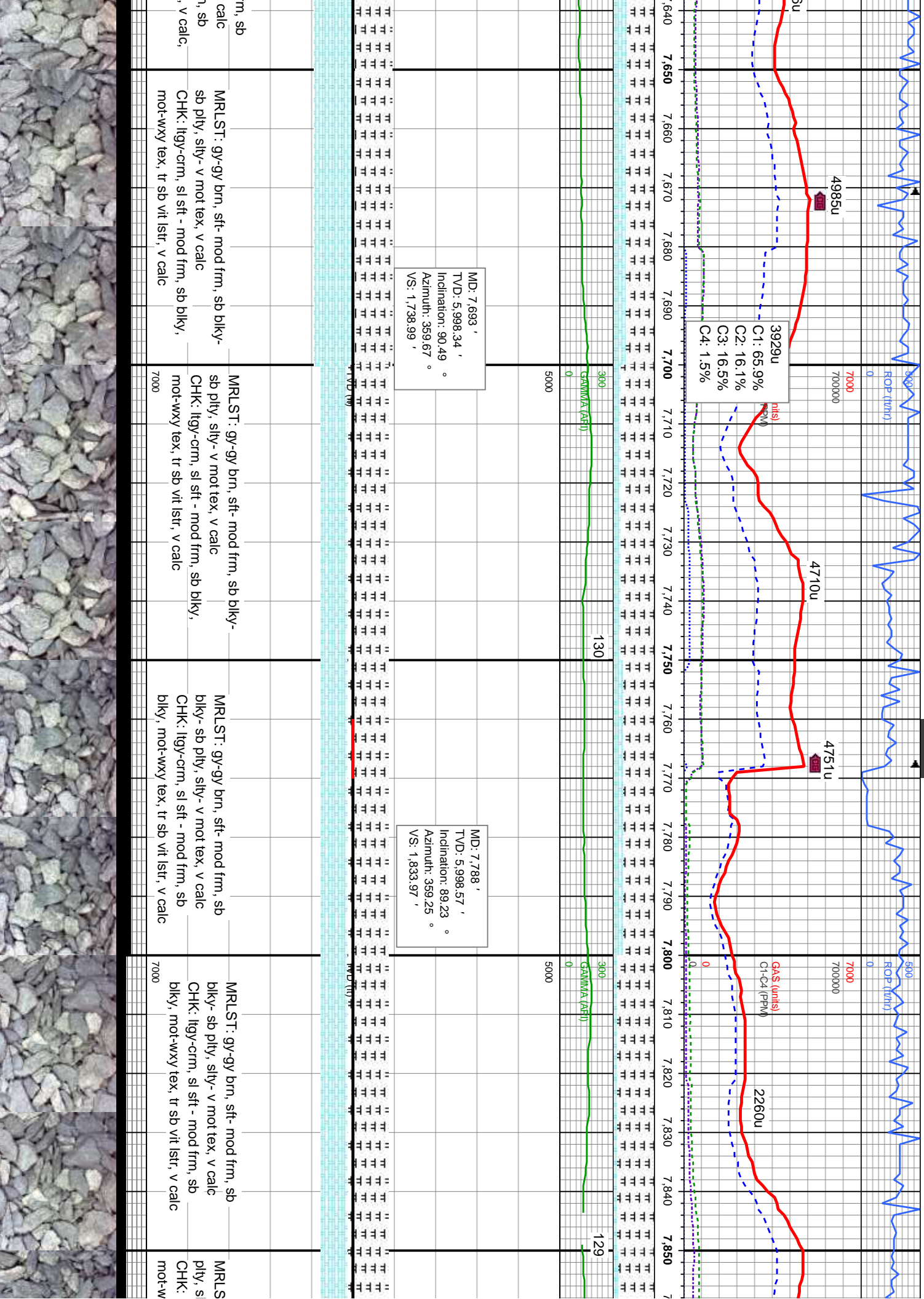
214u
C1: 96.8%
C2: 1.9%
C3: 0.9%
C4: 0.4%

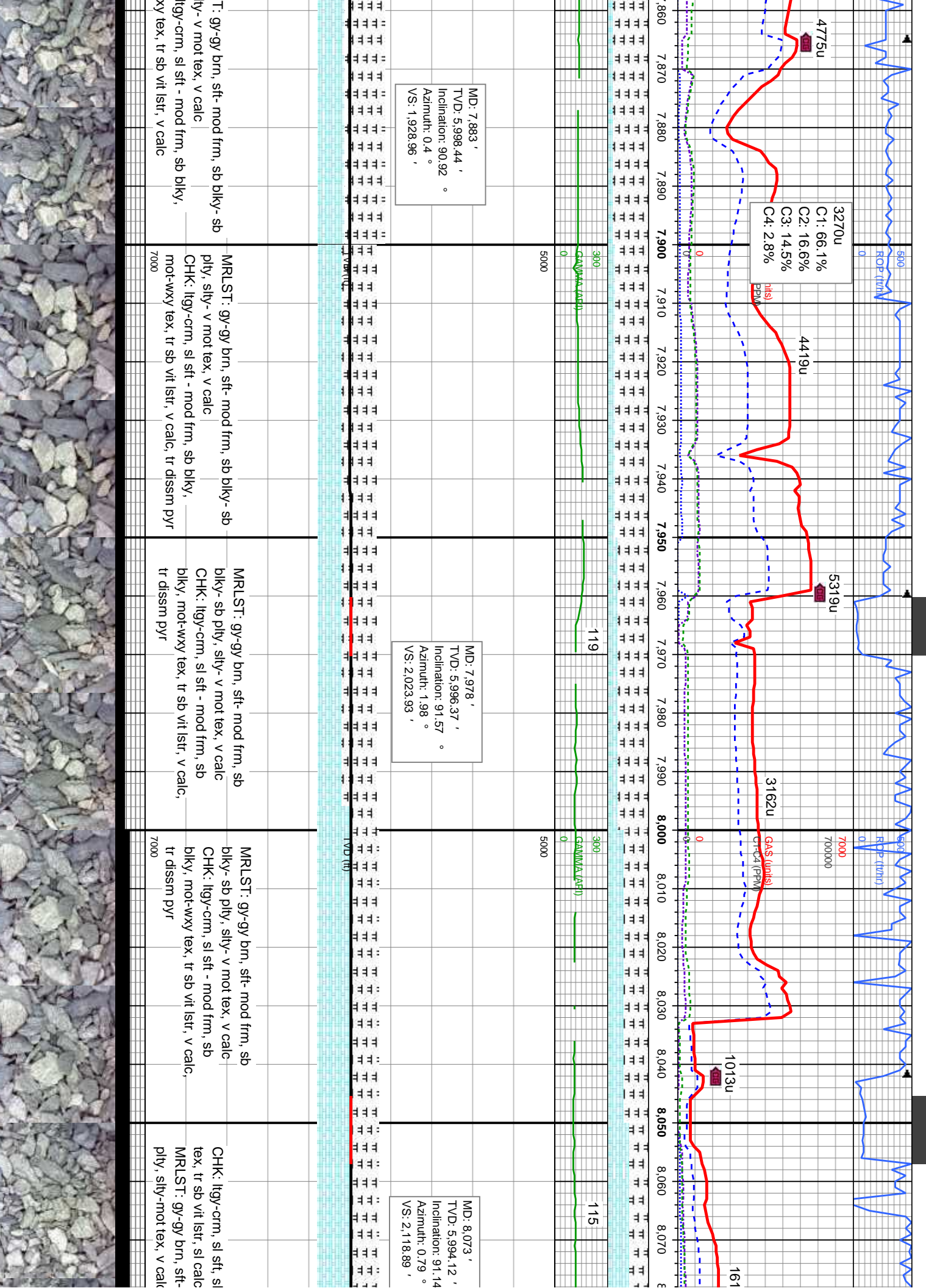
TROUBLESHOOTING
AGITATOR

MD: 7.314 '
TVD: 5.989.84 '
Inclination: 89.07 °
Azimuth: 0.65 °
VS: 1.360.16 '

MD: 7.409 '
TVD: 5.992.75 '
Inclination: 87.41 °
Azimuth: 1.11 °
VS: 1.455.11 '







4775u

4419u

5319u

3162u

1073u

161

3270u
C1: 66.1%
C2: 16.6%
C3: 14.5%
C4: 2.8%

7000
7000000

MD: 7.883 '
TVD: 5.998.44 '
Inclination: 90.92 °
Azimuth: 0.4 °
VS: 1.928.96 '

MD: 7.978 '
TVD: 5.996.37 '
Inclination: 91.57 °
Azimuth: 1.98 °
VS: 2.023.93 '

MD: 8.073 '
TVD: 5.994.12 '
Inclination: 91.14 °
Azimuth: 0.79 °
VS: 2.118.89 '

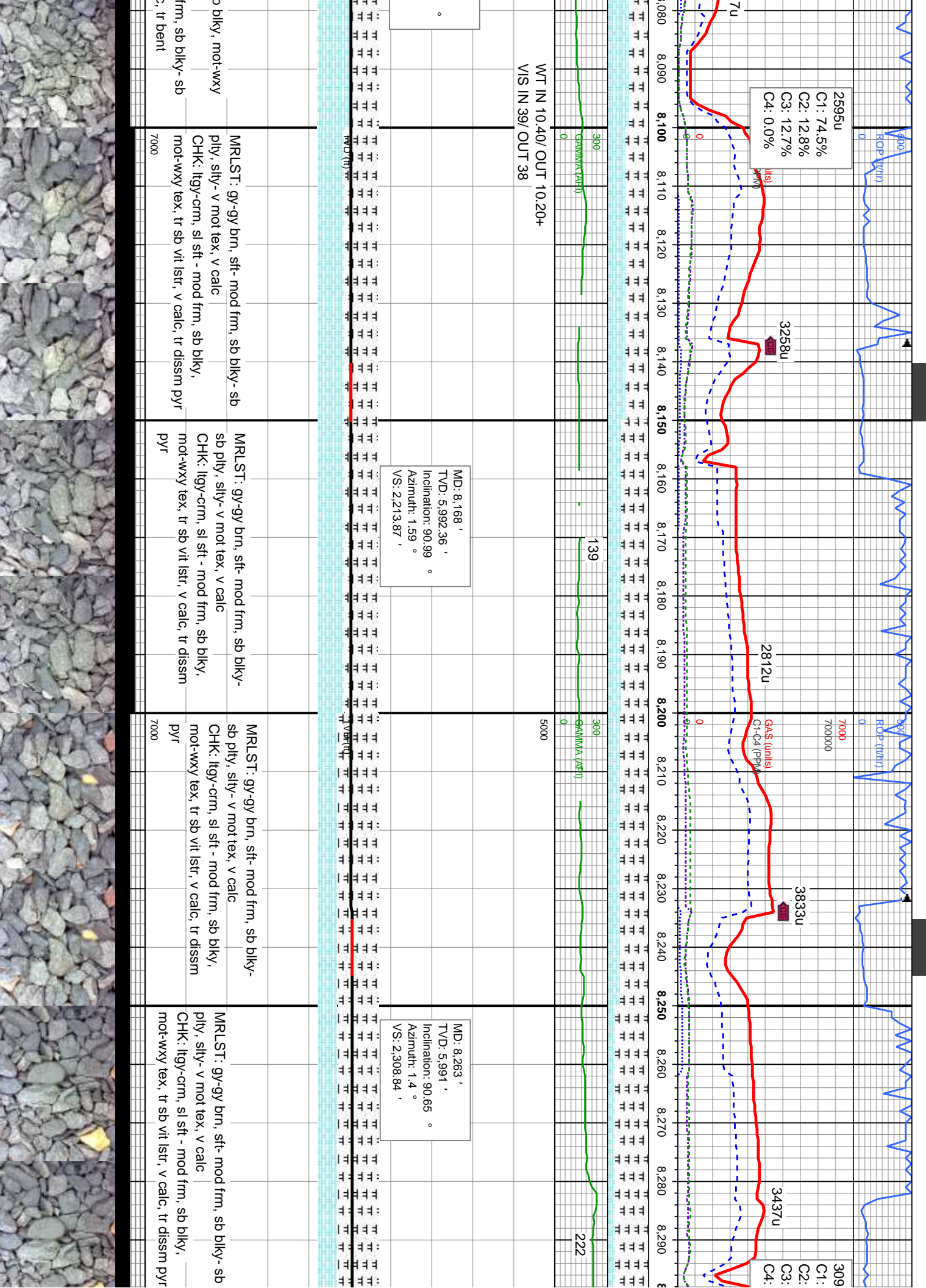
T: gy-gy brn, sft- mod frm, sb blk- sb
ply- v mot tex, v calc
CHK: lly-gy-crm, sl sft - mod frm, sb blk-
xy tex, tr sb vit lstr, v calc

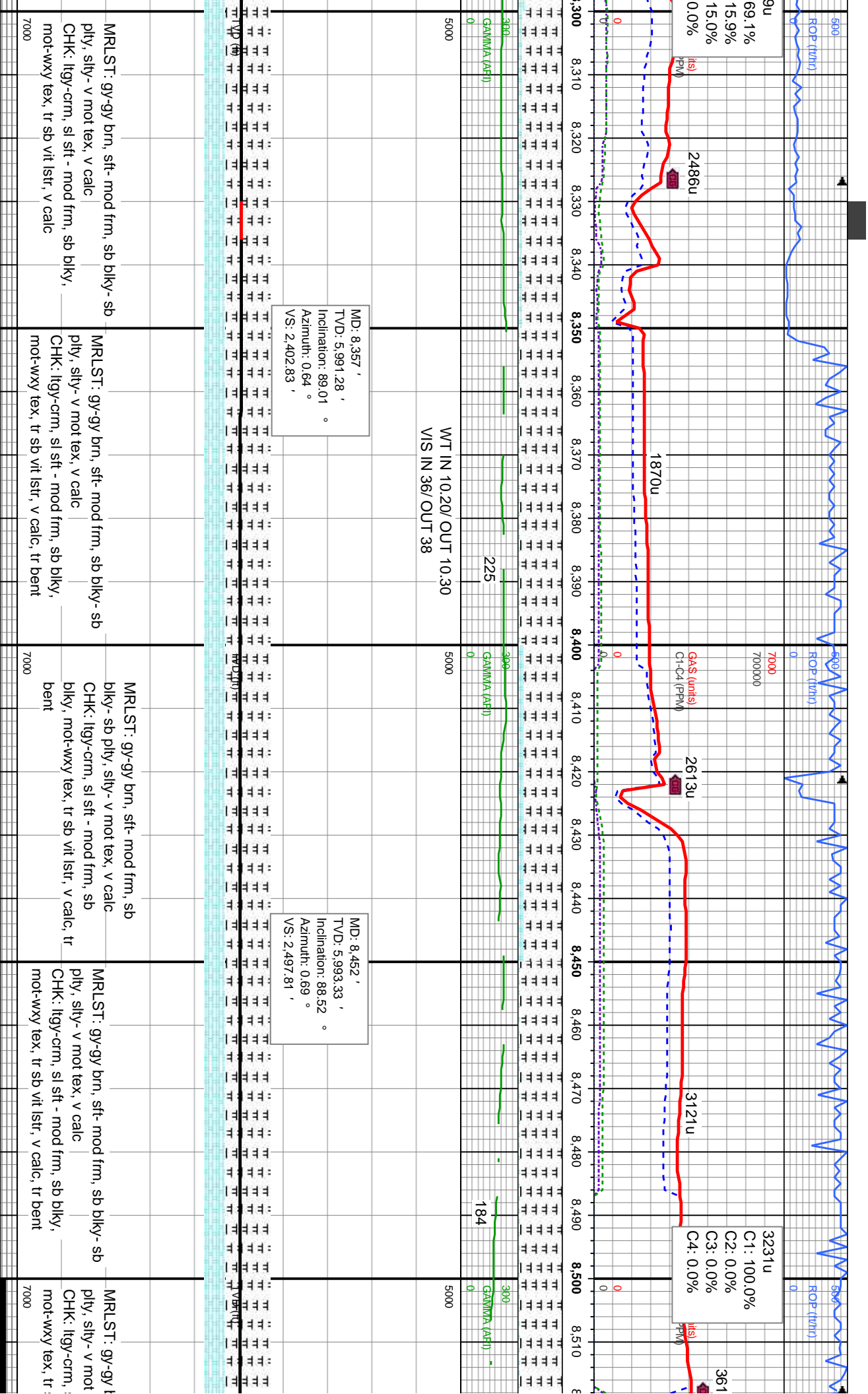
MRLST: gy-gy brn, sft- mod frm, sb blk- sb
ply, sily- v mot tex, v calc
CHK: lly-gy-crm, sl sft - mod frm, sb blk-
mot-wxy tex, tr sb vit lstr, v calc, tr dissm pyr

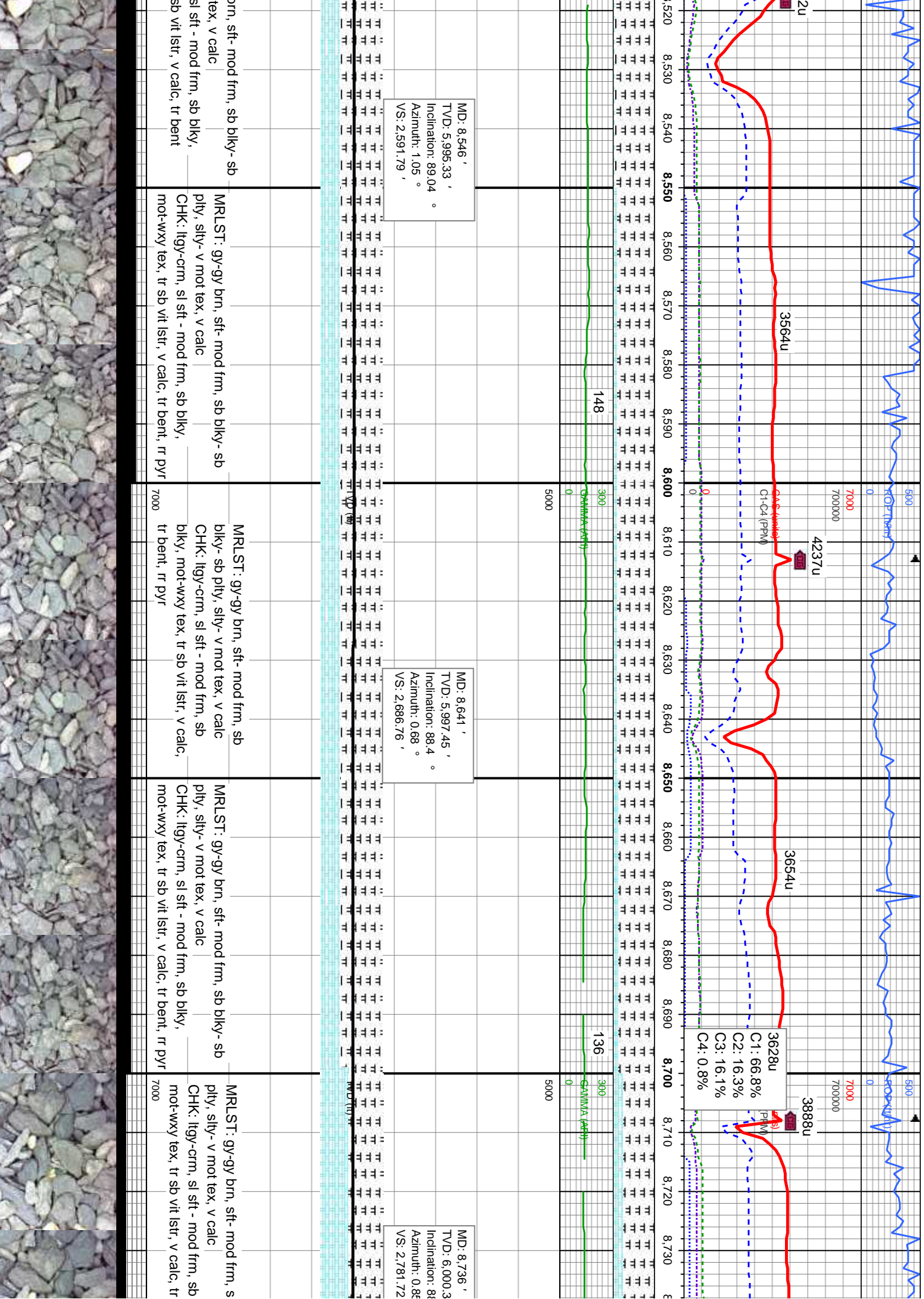
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blk- sb ply, sily- v mot tex, v calc
CHK: lly-gy-crm, sl sft - mod frm, sb
blk- mot-wxy tex, tr sb vit lstr, v calc,
tr dissm pyr

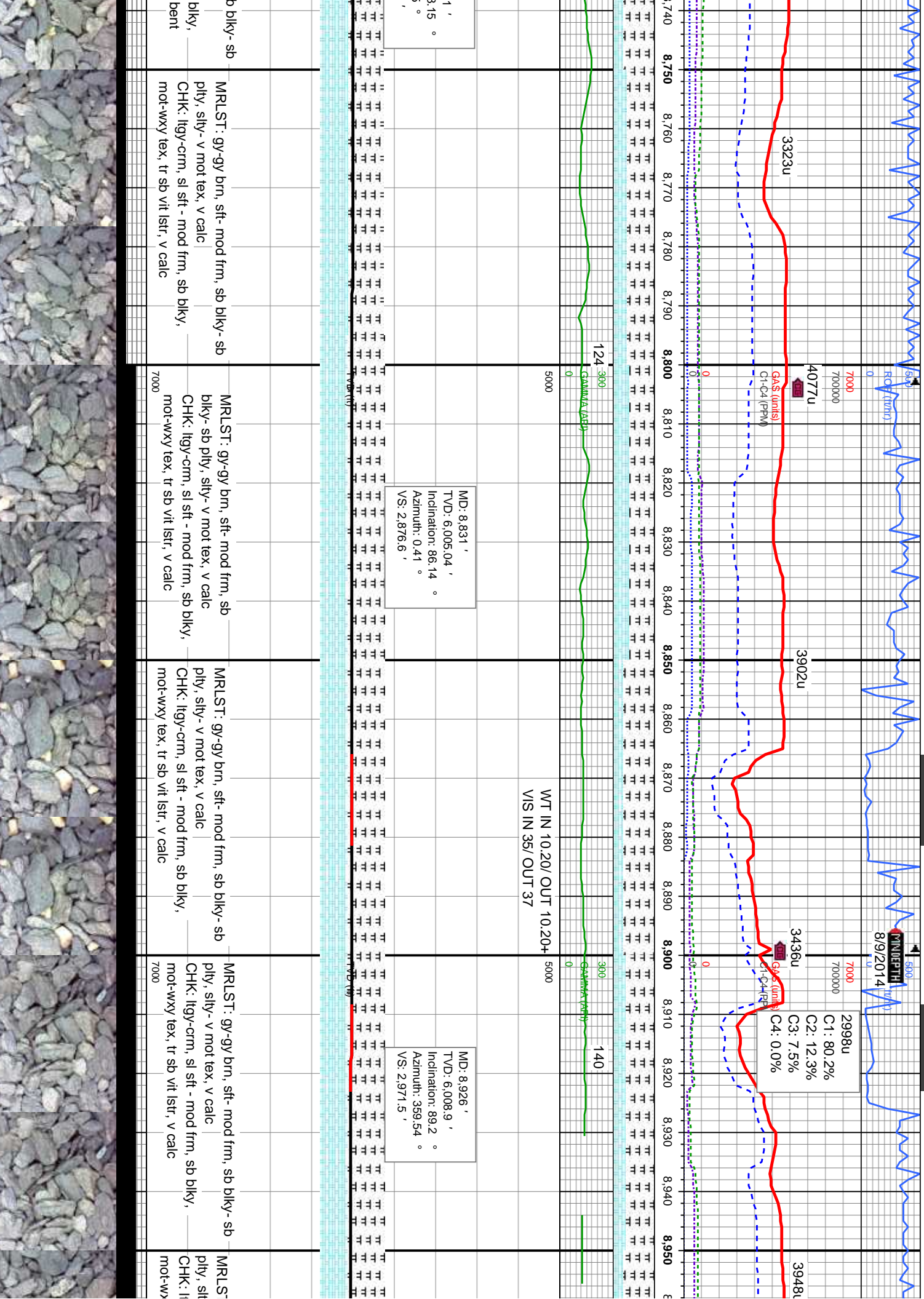
MRLST: gy-gy brn, sft- mod frm, sb
blk- sb ply, sily- v mot tex, v calc
CHK: lly-gy-crm, sl sft - mod frm, sb
blk- mot-wxy tex, tr sb vit lstr, v calc,
tr dissm pyr

CHK: lly-gy-crm, sl sft, sl
tex, tr sb vit lstr, sl calc
MRLST: gy-gy brn, sft-
ply, sily-mot tex, v calc









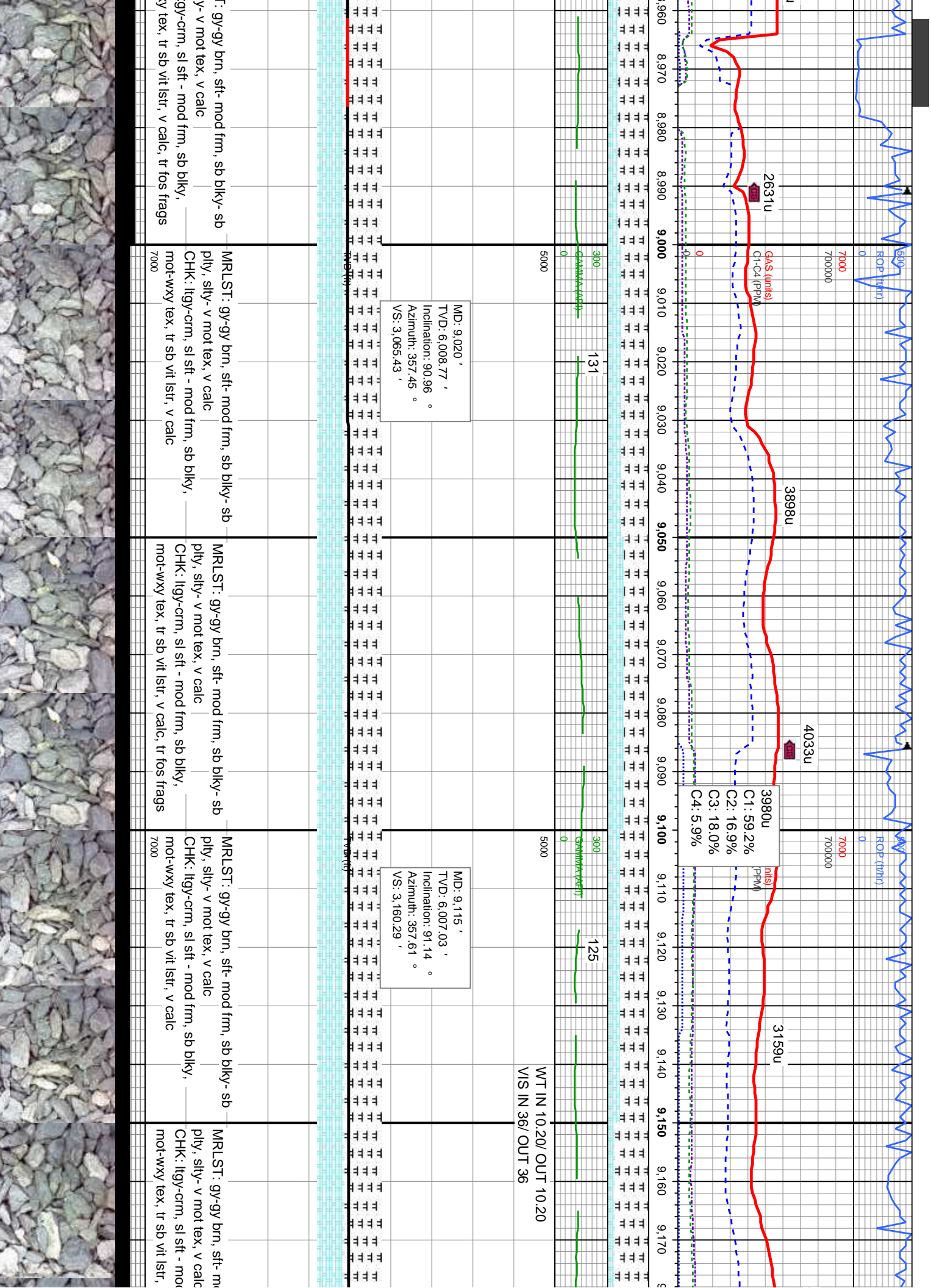
b blkly- sb
MRLST: gy-gy brn, sft- mod frm, sb blkly- sb
ply, sily- v mot tex, v calc
CHK: itgy-crm, sl sft - mod frm, sb blkly,
mot-wxy tex, tr sb vit lsfr, v calc

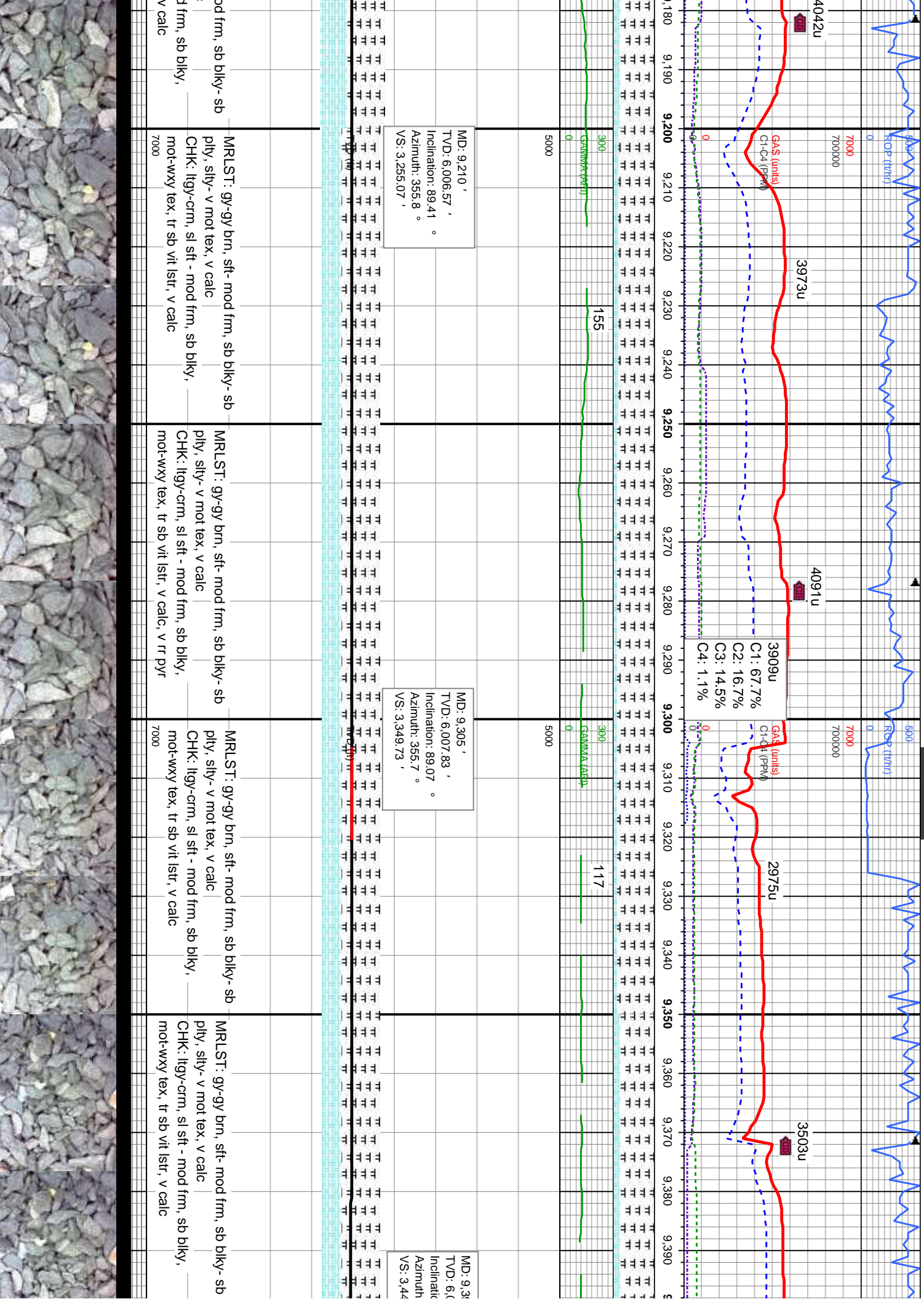
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blkly- sb ply, sily- v mot tex, v calc
CHK: itgy-crm, sl sft - mod frm, sb blkly,
mot-wxy tex, tr sb vit lsfr, v calc

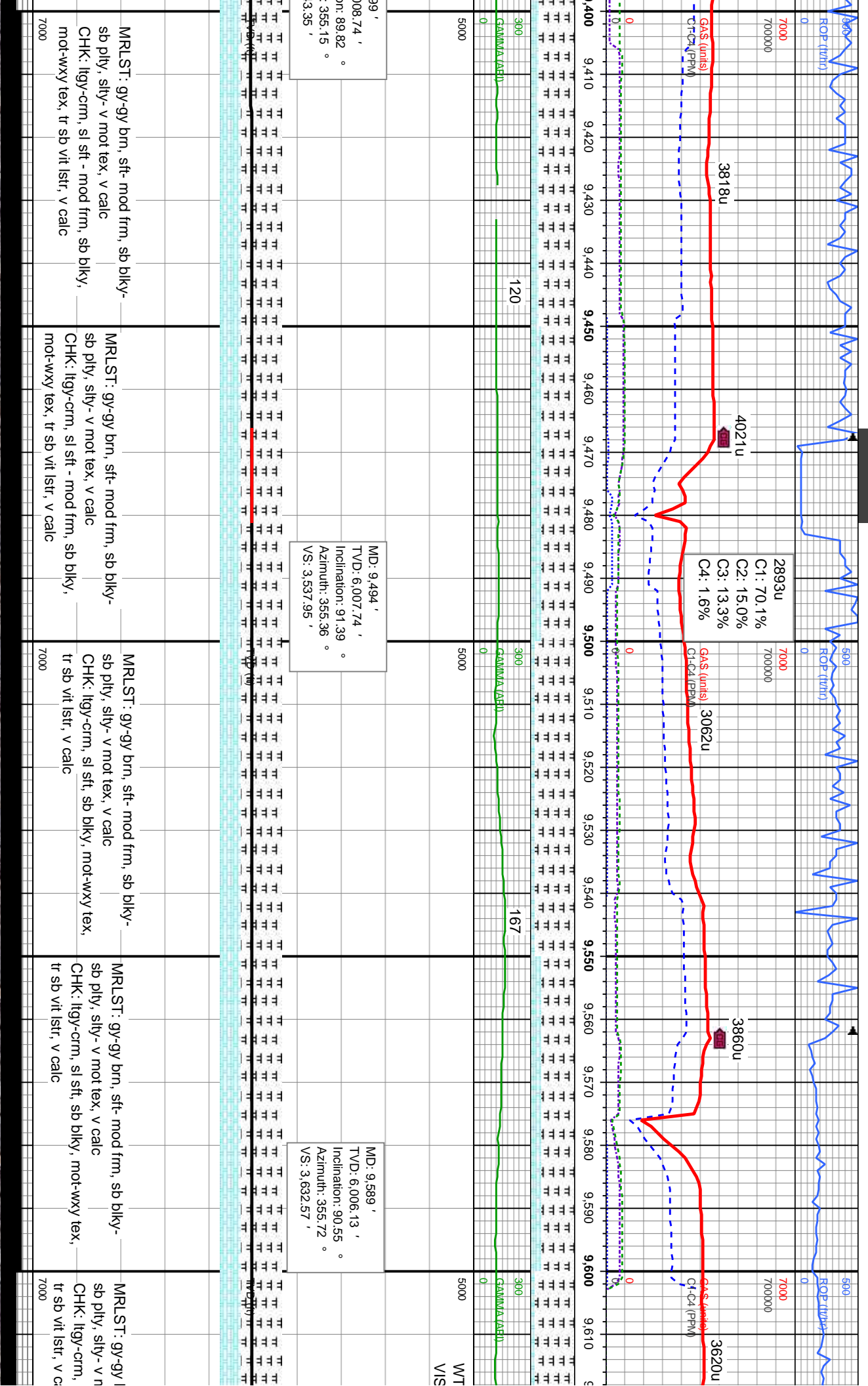
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ply, sily- v mot tex, v calc
CHK: itgy-crm, sl sft - mod frm, sb blkly,
mot-wxy tex, tr sb vit lsfr, v calc

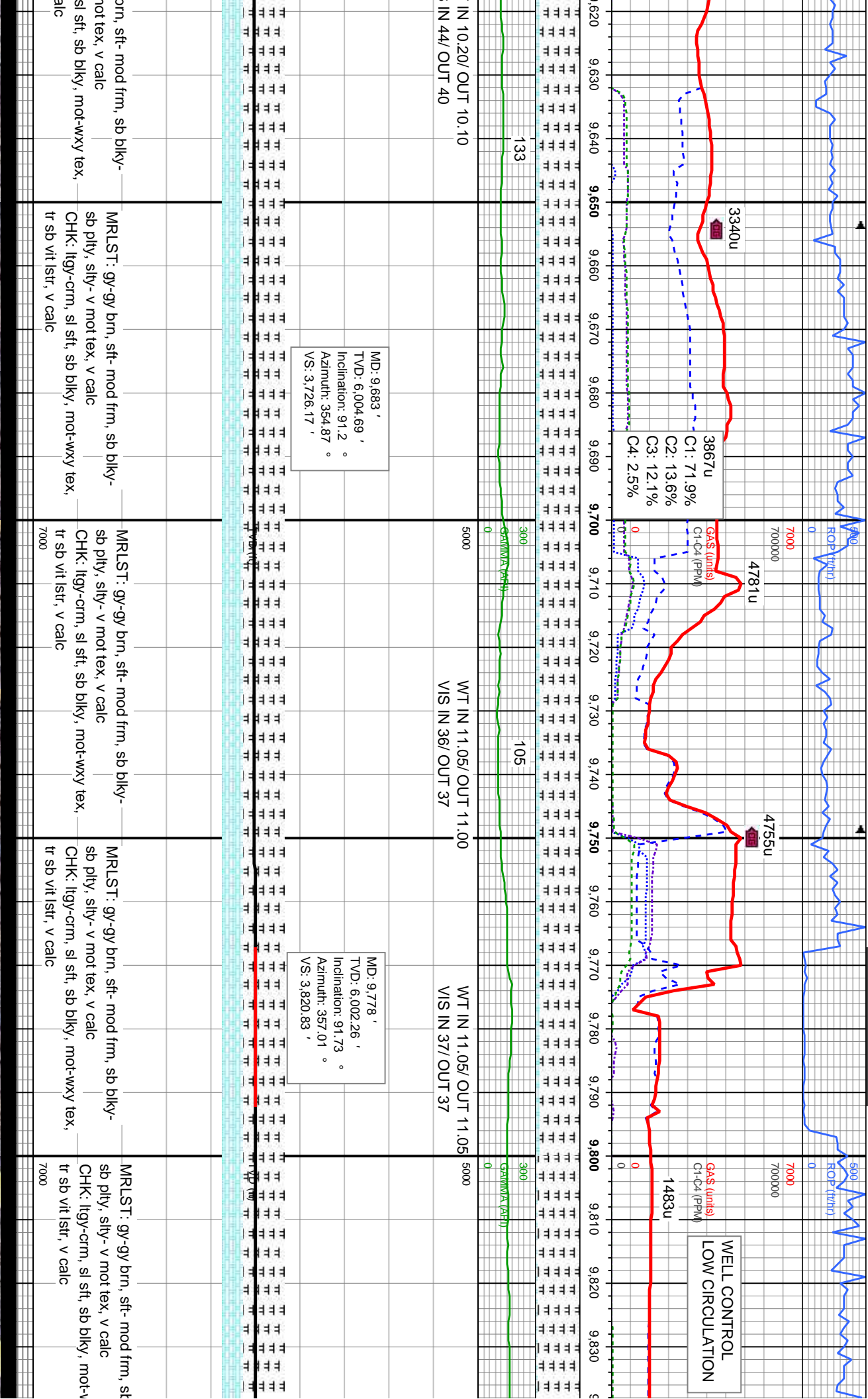
MRLST: gy-gy brn, sft- mod frm, sb blkly- sb
ply, sily- v mot tex, v calc
CHK: itgy-crm, sl sft - mod frm, sb blkly,
mot-wxy tex, tr sb vit lsfr, v calc

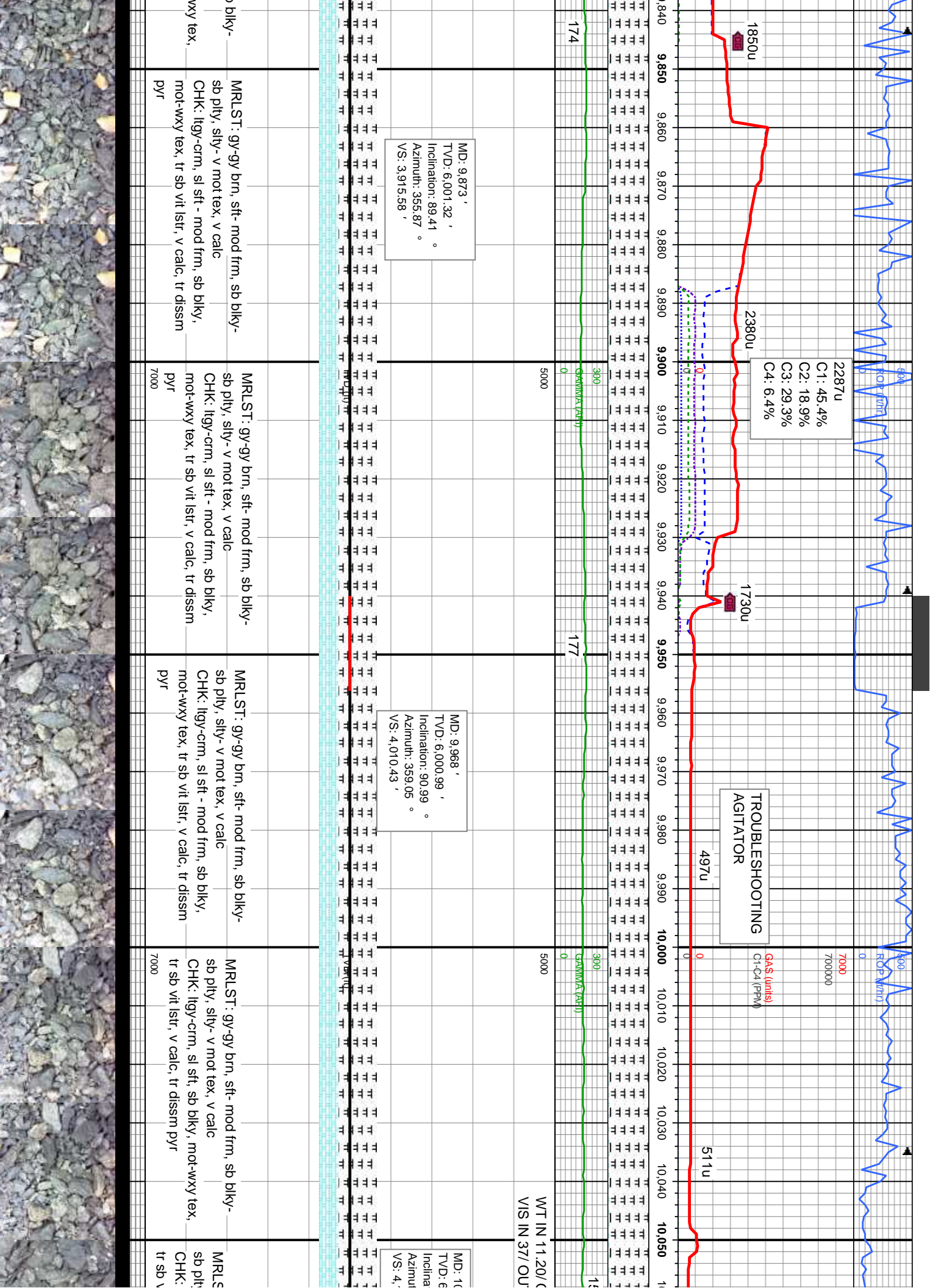
MRLST: gy-gy brn, sft- mod frm, sb blkly- sb
ply, sily- v mot tex, v calc
CHK: itgy-crm, sl sft - mod frm, sb blkly,
mot-wxy tex, tr sb vit lsfr, v calc

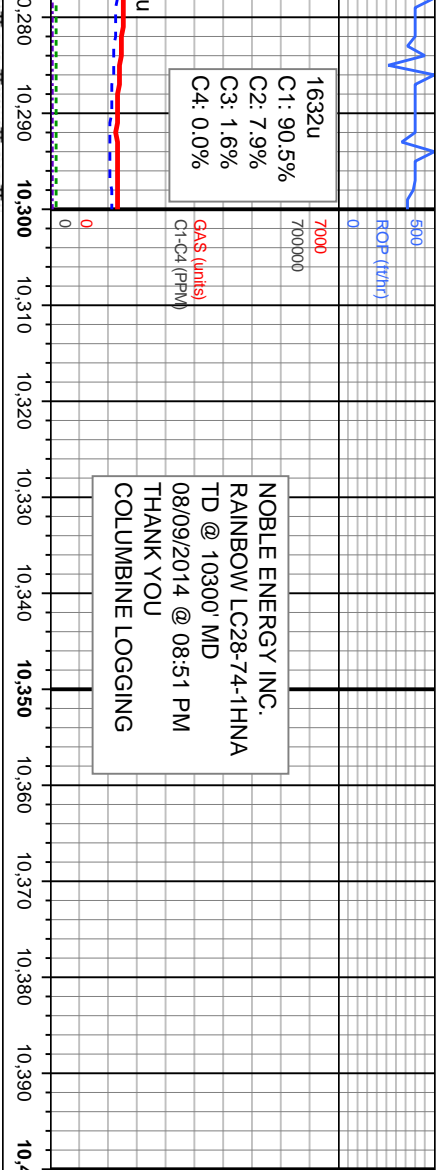












1632u
C1: 90.5%
C2: 7.9%
C3: 1.6%
C4: 0.0%

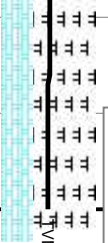
GALS (units)
C1-C4 (PPM)

NOBLE ENERGY INC.
RAINBOW LC28-74-1HNA
TD @ 10300' MD
08/09/2014 @ 08:51 PM
THANK YOU
COLUMBINE LOGGING

PROJECTED

MD: 10,300 '
TVD: 6,009.21 '
Inclination: 87.35 °
Azimuth: 355.25 °
VS: 4,341.29 '

TVD (ft)



blky- sb pty, silty-

lky, mot-wxy tex,

