



Scale: 5" / 100'  
Measured Depth Log

Well Name Reliance E23-69HN

Location NW/4NW SEC23, T6N, R65W, 6 PM

State COLORADO County WELD

Country USA Rig Number H&P 326

API Number 05-123-38143 Field GREELEY

Region DJ BASIN Drilling Completed 2/16/2015

Spud Date 2/10/2015

Surface Coordinates 1235' FNL, 755' FWL  
40.47541/-104.63728

Bottom Hole Coordinates (PROJ)  
75' FFNLL, 150' FFELL  
40.47856/-104.62144

Ground Elevation 4733' K.B. Elevation 4763'

Logged Interval 6239' To 11,732' Total Depth 11,732'

Formation NIOBRARA C-CHALK

Type of Drilling Fluid LSND

## Operator

Company Noble Energy Inc

Address 1625 Broadway Suite 2200  
Denver, CO 80202

## Geologist

Name HOLLY DUNCAN

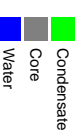
Company NOBLE ENERGY INC.

Address 1625 Broadway Suite 2200  
Denver, CO 80202

## Other

COLUMBINE LOGGING MATT HOPKINS  
ANDREW MARTENS

## 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 SAND	TUFF
CHERT	IGNEOUS	SHALE	WELDED TUFF
CLAY CHOKE SAND	SIDERITE or LIMONITE	SHALE COLORED	
CLAYSTONE	LIMESTONE	SHALE GRAY	

Accessories

GASTROPOD	ARGILLITE GRAIN	HEAVY MINERAL	ANHYDRITE STRINGER
INOCERAMUS	BENTONITE	KAOLIN	BENTONITE STRINGER
ALGAE	BITUMENOUS SUBSTANCE	MARLSTONE	COAL STRINGER
AMPHIPORA	BRECCIA FRAGMENTS	MICACEOUS	DOLOMITE STRINGER
BELEMNITE	PELECYPOD	CALCAREOUS	GYPSUM STRINGER
BIOCLASTIC	PELLET	CARBONACEOUS FLAKES	LIMESTONE STRINGER
BRACHIOPOD	PISOLITE	CHTDK	MARLSTONE (CALC) STRG
BRYOZOA	PLANT REMAINS	CHTLT	MARLSTONE (DOL) STRG
CEPHALOPOD	PLANT SPORES	COAL - THIN BEDS	SANDSTONE STRINGER
CORAL	SCAPHOPOD	DOLOMITIC	SHALE STRINGER
CRINOID	STROMATOPOROID	FELDSPAR	SILTSTONE STRINGER
ECHINOID		FERRUGINOUS PELLET	
FISH		FERRUGINOUS	TUFFACEOUS
FORAMINIFERA	ANHYDRITIC	GLAUCONITE	
FOSSIL	ARGILLACEOUS	GYPSIFEROUS	

Stringer

Oil Show

PINPOINT
VUGGY






































Engineering

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

Porosity

CONNECTION GAS	CONNECTION G	TRIP GAS	TRIP GAS (LEFT)
EARTHY	FENESTRAL	FRACTURE	INTERCRYSTALLINE
INTEROOLITIC	MOLDIC	ORGANIC	CORE - RECOVERED

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				MS MUDSTONE
Rounding					
	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		

Slide/Rotate

ROP

ROP (ft/hr)

6000  
ROP (ft/hr)

6000  
ROP (ft/hr)

238

Total Gas & Chromatograph

GAS

C1

C2

C3

C4

COLUMBINE LOGGING INC.  
RIGGED UP ON 2/10/2015  
MANNED 2-PERSON LOGGING  
WITH BLOODHOUND GAS  
CHROMATOGRAPH UNIT #0568

Mud Wt: 9.55 / 35 Vis

600000

2945u

3242u

2426u

3175u  
C1: 79.3%  
C2: 10.6%  
C3: 7.4%  
C4: 2.7%

Depth Labels

% Lith

GAMMA

GR

150  
GR (units)

150  
GR (units)

CONTINUED FROM Reliance  
E23-69HN(VERT)

Well Bore

TVD

Bit Data  
Bit #: 1  
Type: PDC  
Size: 8.75  
Depth In: 792'  
Jets: 7x15  
S/N: JJ9108

50' Sample Intervals

MD: 6,285'  
Inclination: 15.21 °  
Azimuth: 337.69 °  
TVD: 6,196.92'  
VS: -325.81'

TVD (ft)

Oil Show

E  
O  
M  
F  
T  
S

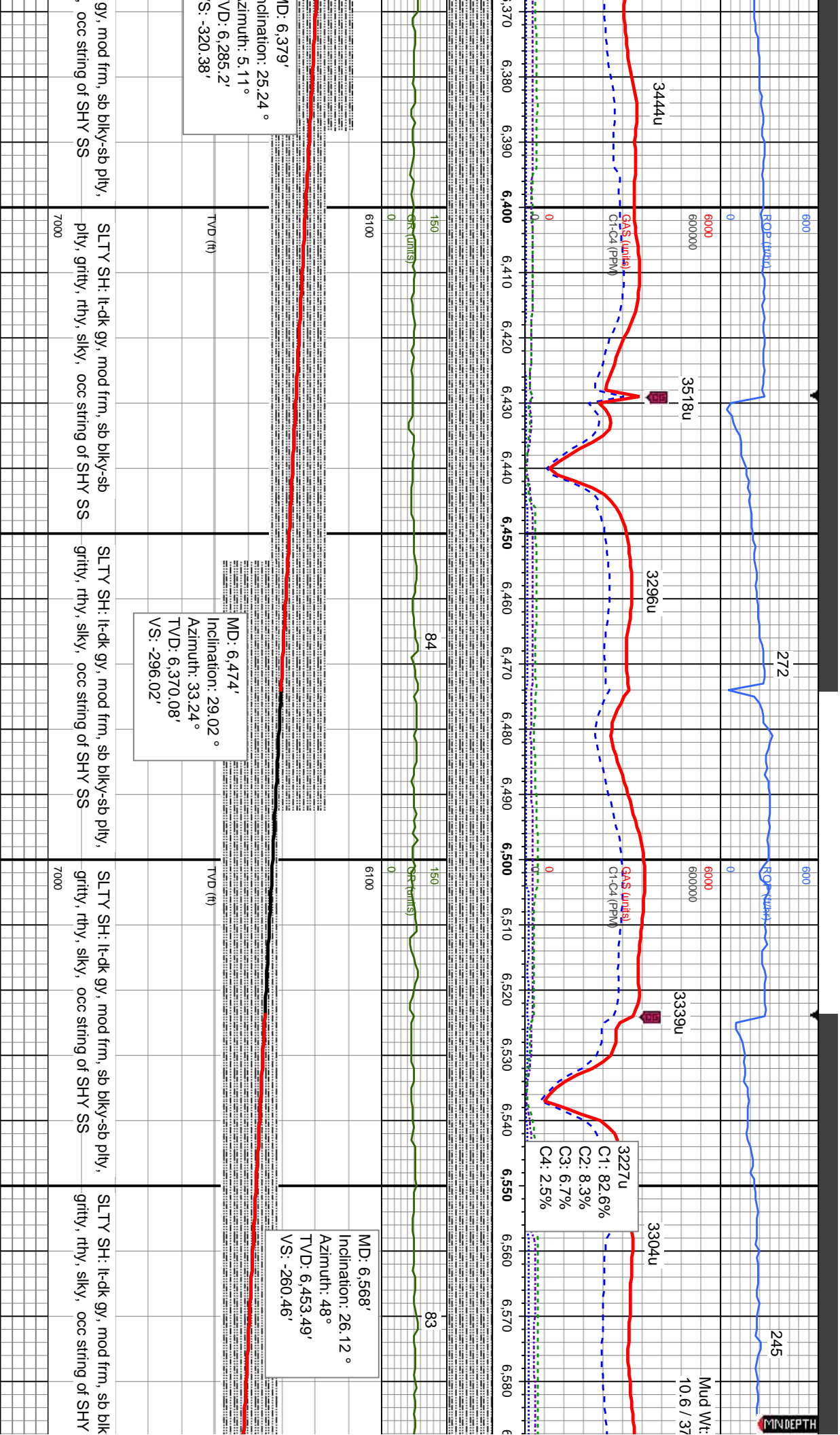
Images

SLTY SH: lt-dk gy, mod frm, sb blk-y-sb pty,  
gritty, rthy, silky, occ string of SHY SS

SLTY SH: lt-dk gy, mod frm, sb blk-y-sb pty,  
gritty, rthy, silky, occ string of SHY SS

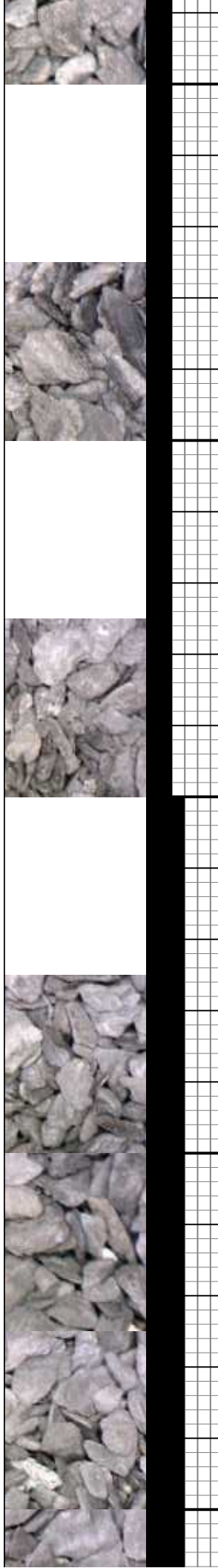
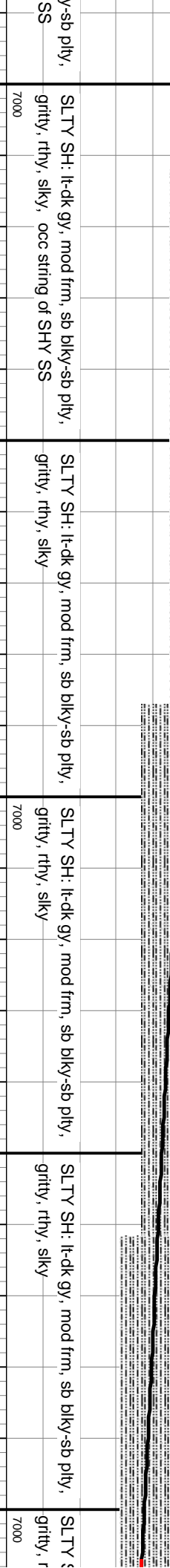
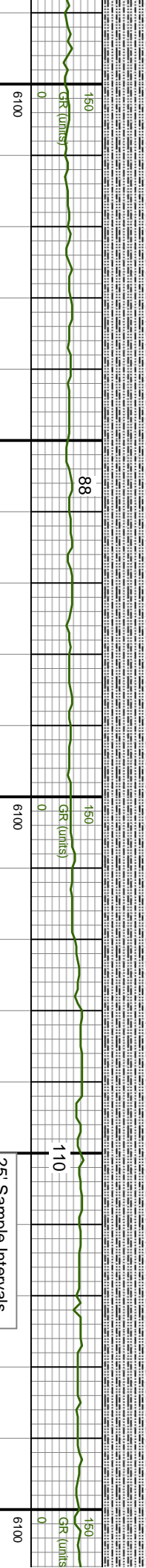
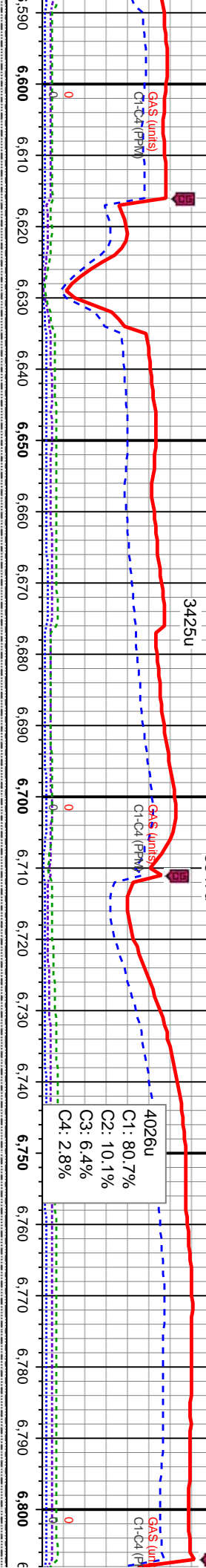
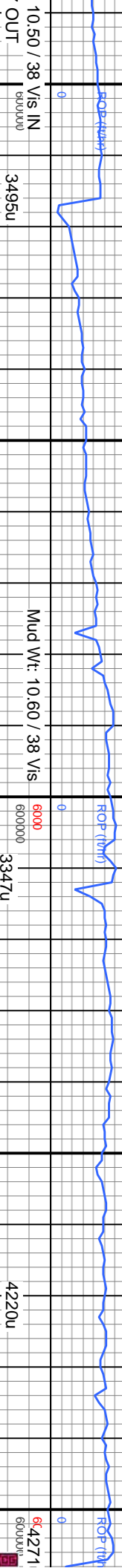
SLTY SH: lt-dk  
gritty, rthy, silky







2/12/15

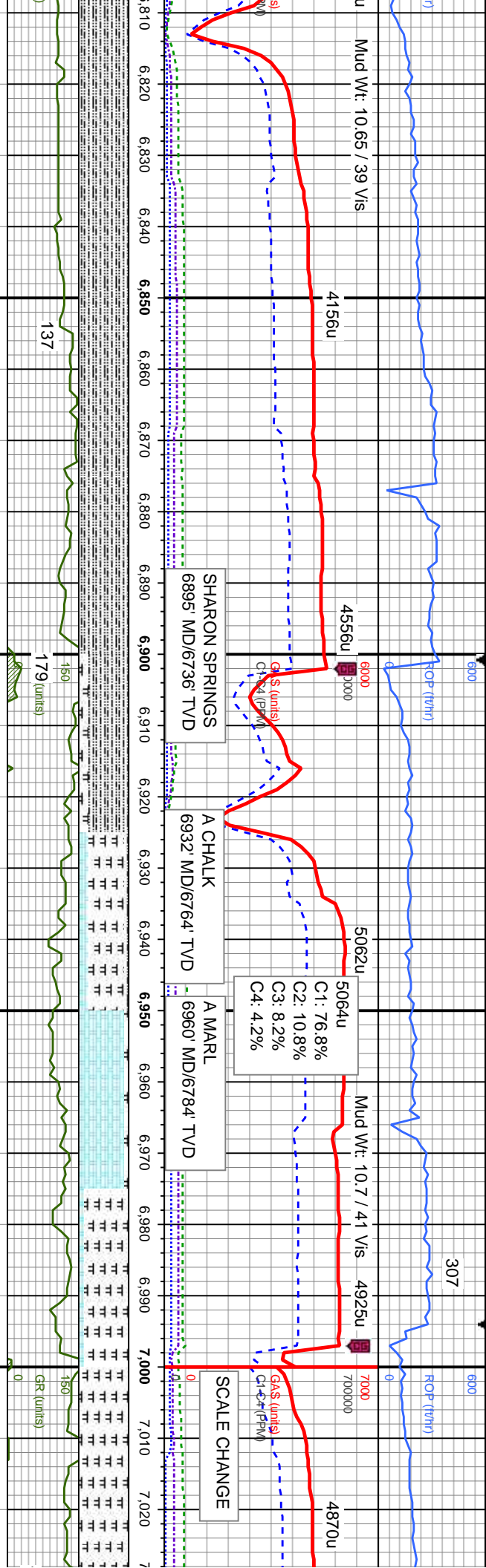


C1: 80.7%  
C2: 10.1%  
C3: 6.4%  
C4: 2.8%

MD: 6,663'  
Inclination: 28.49°  
Azimuth: 85.09°  
TVD: 6,538.51'  
VS: -219.2'

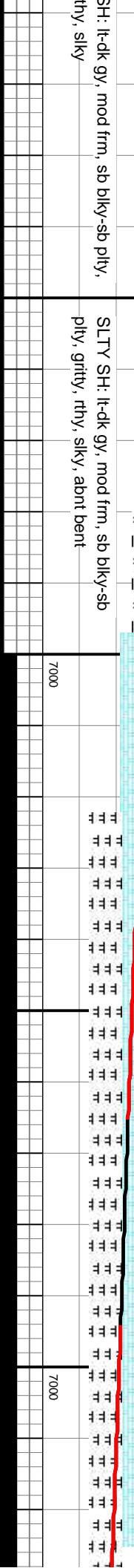
MD: 6,757'  
Inclination: 27.52°  
Azimuth: 84.39°  
TVD: 6,621.5'  
VS: -175.73'

25' Sample Intervals

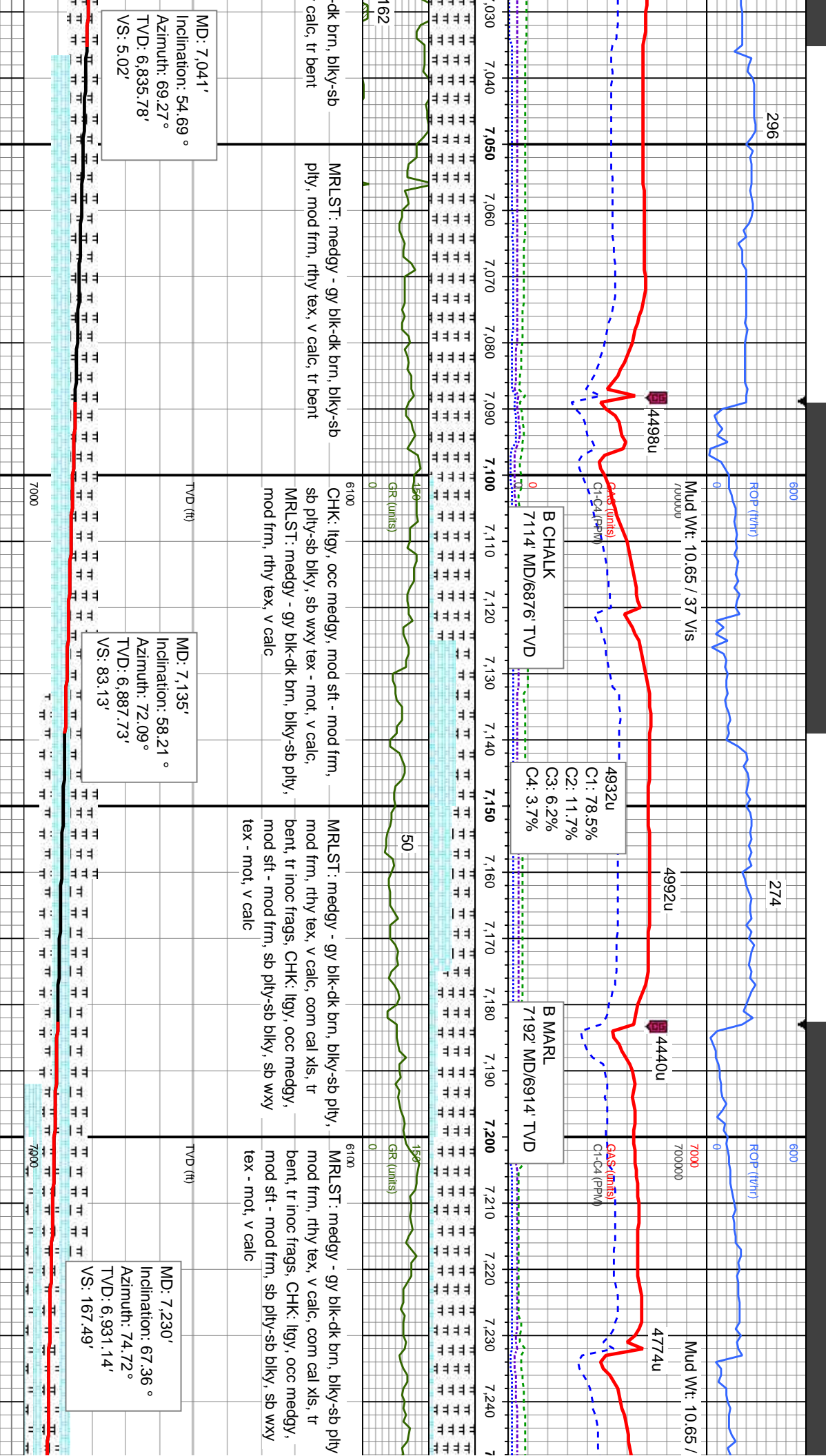


MD: 6,852'  
Inclination: 33.85 °  
Azimuth: 73.14°  
TVD: 6,703.23'  
VS: -127.55'

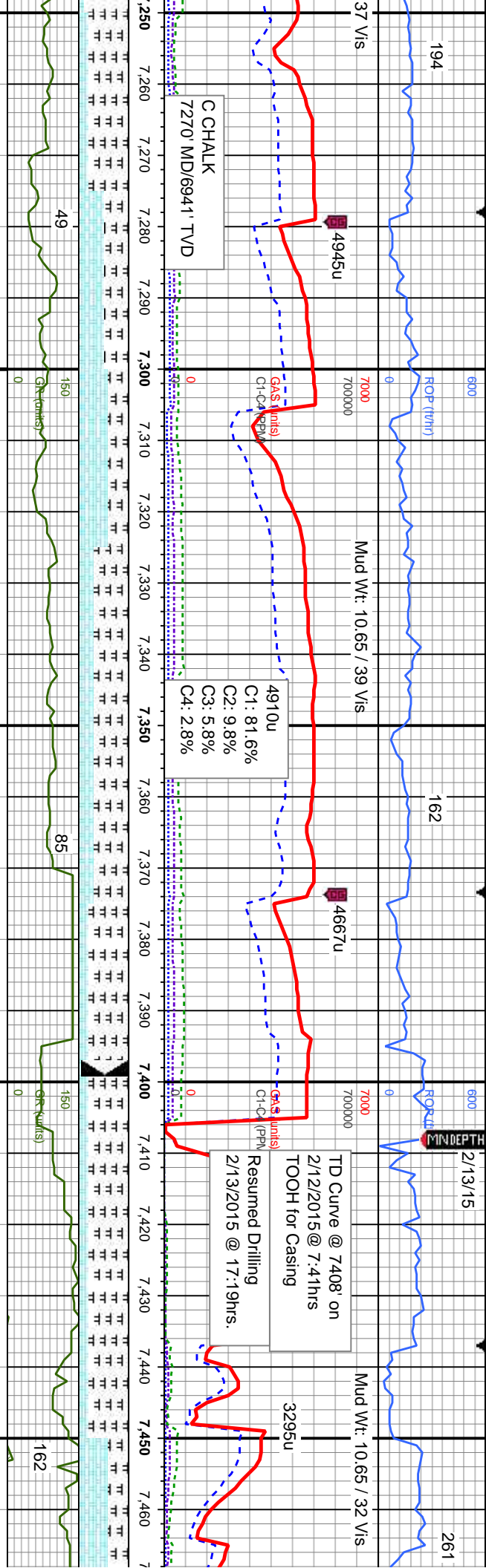
MD: 6,946'  
Inclination: 45.99 °  
Azimuth: 67.69°  
TVD: 6,775.21'  
VS: -67.59'











MRSLT: medgy - gy blk-dk brn, blkly-sb pily, mod frm, rthy tex, v calc, com cal xls, tr bent, tr inoc frags, CHK: ltgy, occ medgy, mod sft - mod frm, sb pily-sb blkly, sb wxy tex - mot, v calc

SCALE CHANGE

MD: 7,324'  
Inclination: 84.5°  
Azimuth: 78.77°  
TVD: 6,953.91'  
VS: 258.26'

CHK: ltgy, occ medgy, mod sft - mod frm, sb pily-sb blkly, sb wxy tex - mot, v calc, MRSLT: medgy - gy blk-dk brn, blkly-sb pily, mod frm, rthy tex, v calc, com cal xls, tr bent, tr inoc frags

MD: 7,360'  
Inclination: 89.43°  
Azimuth: 83.34°  
TVD: 6,955.82'  
VS: 293.98'

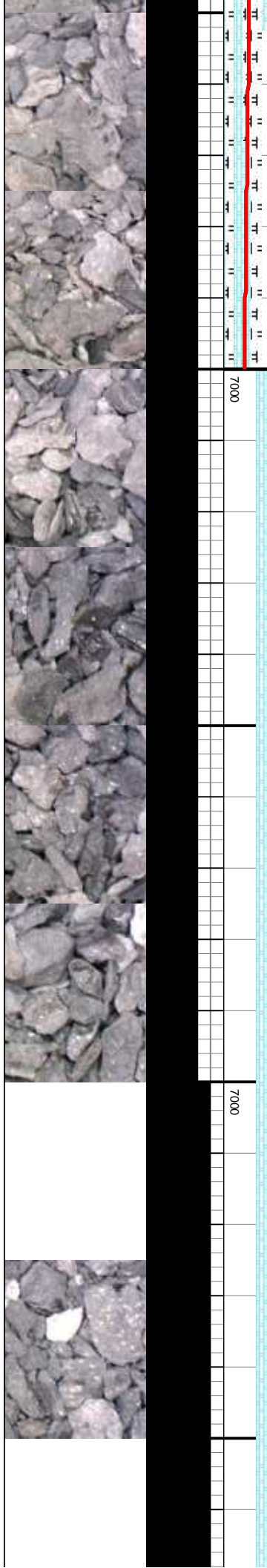
MRSLT: medgy - gy blk-dk brn, blkly-sb pily, mod frm, rthy tex, v calc, com cal xls, tr bent, tr inoc frags, CHK: ltgy, occ medgy, mod sft - mod frm, sb pily-sb blkly, sb wxy tex - mot, v calc

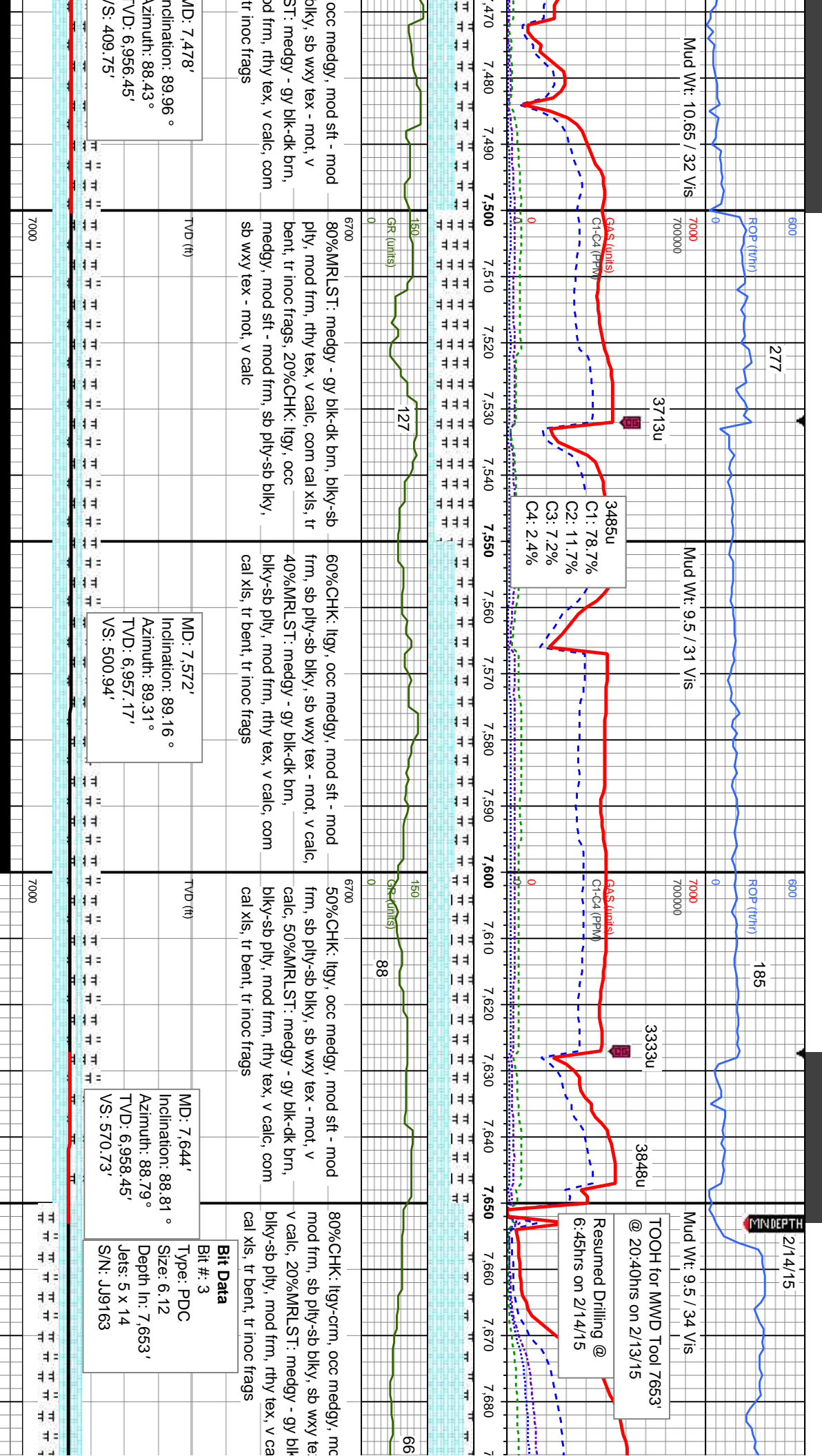
**Bit Data**  
Bit #: 2  
Type: PDC  
Size: 6.12  
Depth In: 7,408'  
Jets: 5 x 13  
S/N: JJ91664

50' Sample Intervals

80%MRSLT: medgy - gy blk-dk brn, blkly-sb pily, mod frm, rthy tex, v calc, com cal xls, tr bent, tr inoc frags, 20%CHK: ltgy, occ medgy, mod sft - mod frm, sb pily-sb blkly, sb wxy tex - mot, v calc

60%CHK: ltgy, frm, sb pily-sb calc, 40%MRSLT: blkly-sb pily, mod cal xls, tr bent,





MD: 7,478'  
Inclination: 89.96°  
Azimuth: 88.43°  
VD: 6,956.45'  
S/S: 409.75'

MD: 7,572'  
Inclination: 89.16°  
Azimuth: 89.31°  
TVD: 6,957.17'  
VS: 500.94'

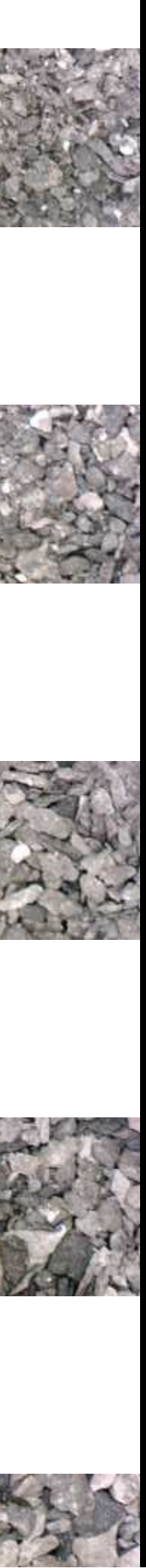
MD: 7,644'  
Inclination: 88.81°  
Azimuth: 88.79°  
TVD: 6,958.45'  
VS: 570.73'

80%CHK: Itgy, occ medgy, mod sft - mod frm, sb pty-sb blk, sb wxy tex - mot, v calc, 50%MRSLT: medgy - gy blk-dk brn, blk-sb pty, mod frm, rthy tex, v calc, com cal xls, tr bent, tr inoc frags

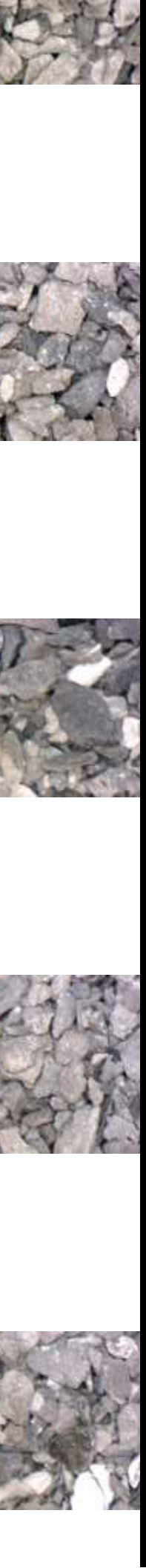
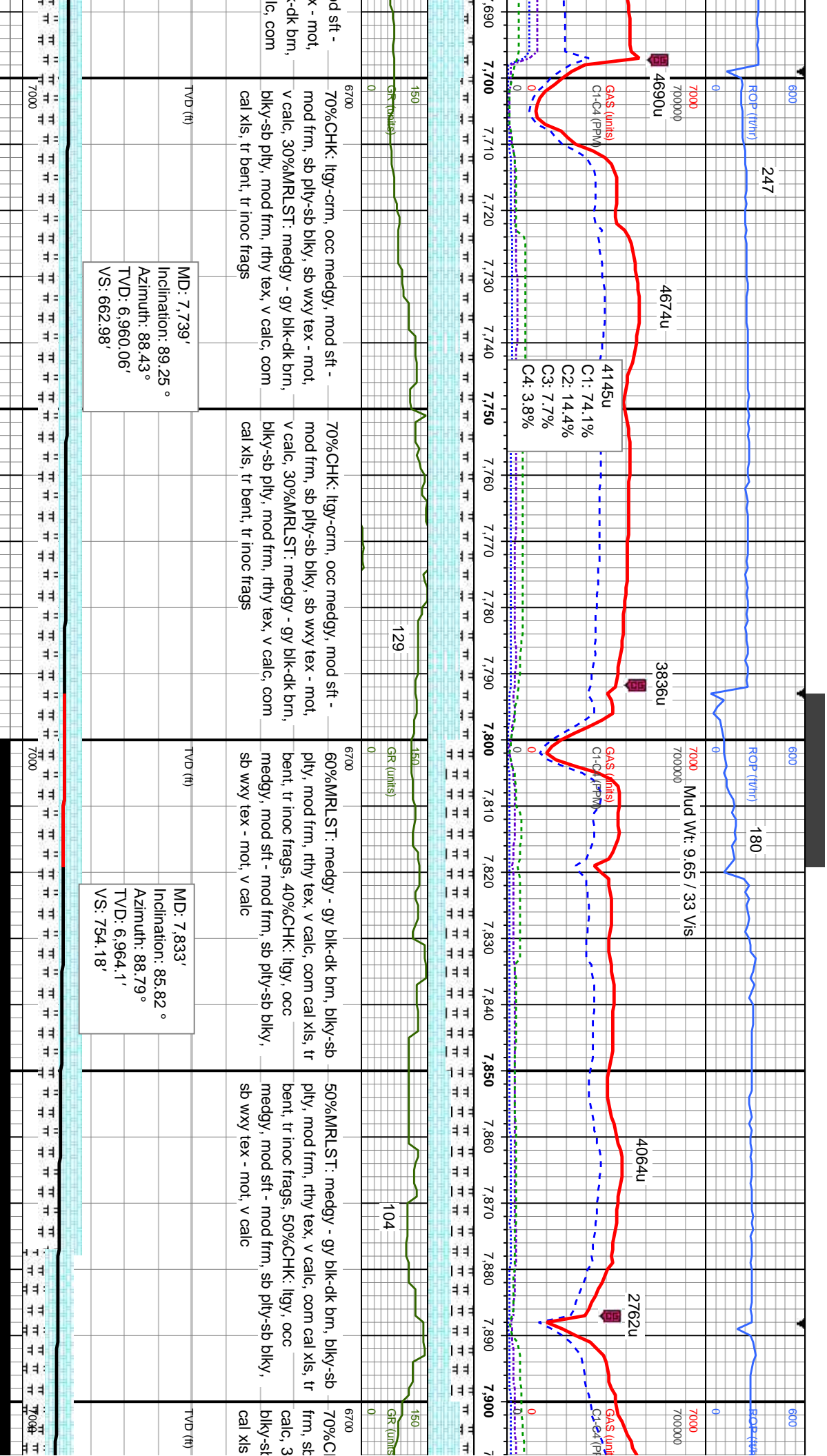
80%CHK: Itgy, occ medgy, mod sft - mod frm, sb pty-sb blk, sb wxy tex - mot, v calc, 40%MRSLT: medgy - gy blk-dk brn, blk-sb pty, mod frm, rthy tex, v calc, com cal xls, tr bent, tr inoc frags

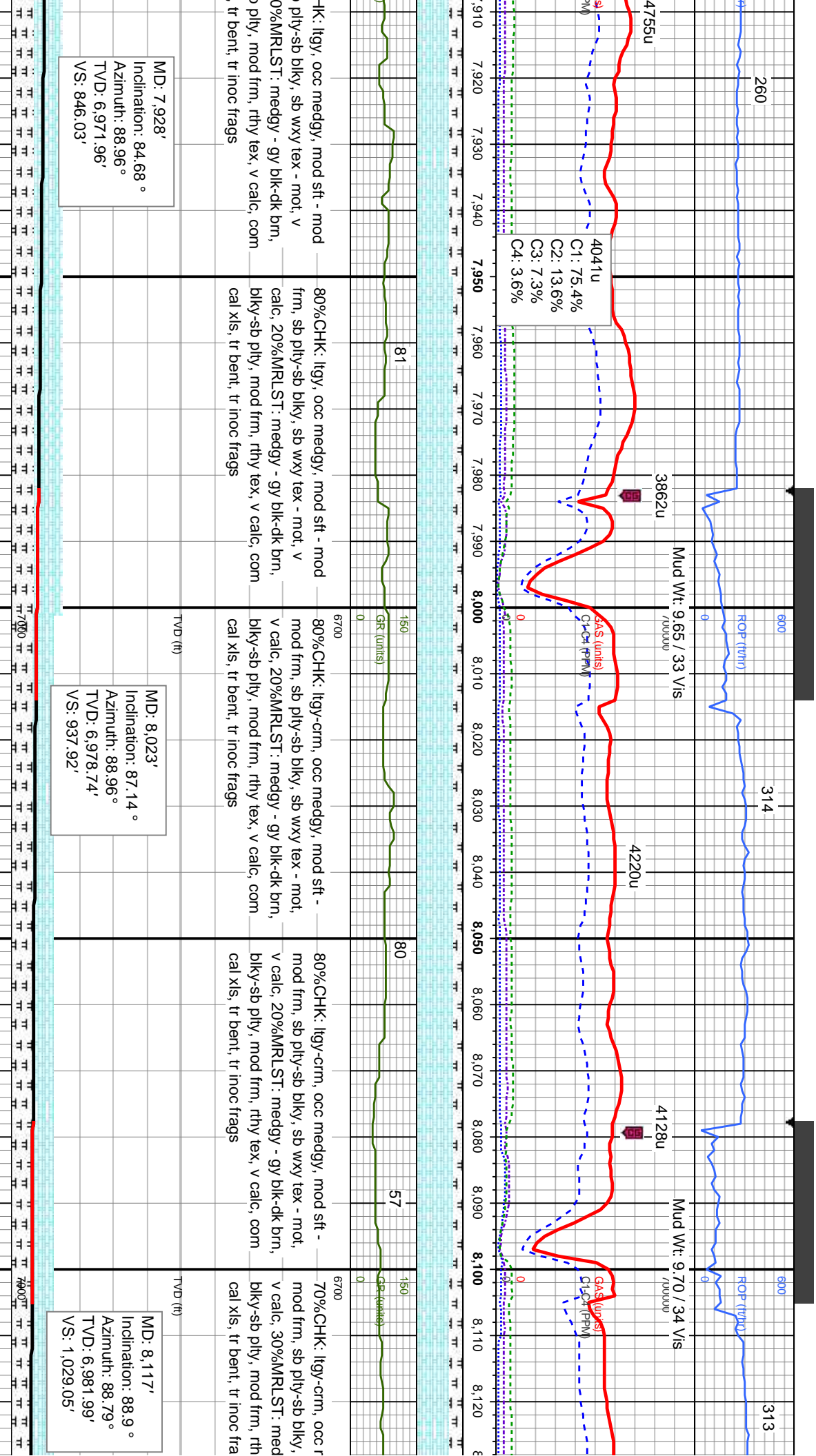
80%CHK: Itgy-crm, occ medgy, mod frm, sb pty-sb blk, sb wxy tex - mot, v calc, 20%MRSLT: medgy - gy blk-dk brn, mod frm, rthy tex, v calc, com cal xls, tr bent, tr inoc frags

Bit #: 3  
Type: PDC  
Size: 6.12  
Depth In: 7,653'  
Jets: 5 x 14  
S/N: J9163



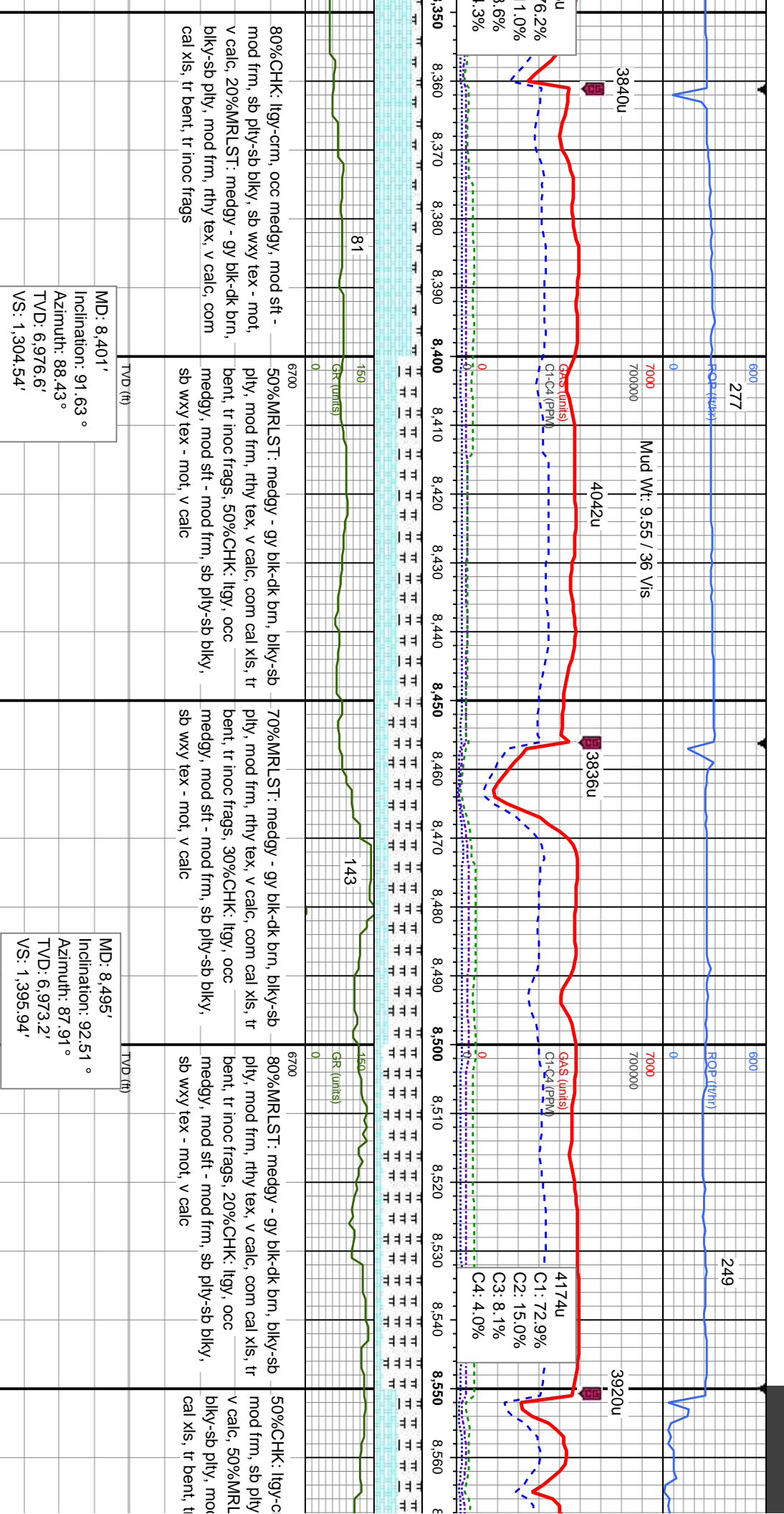


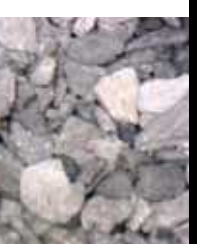
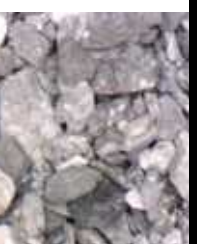
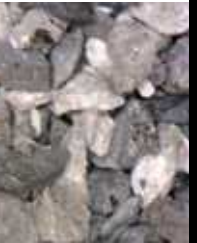
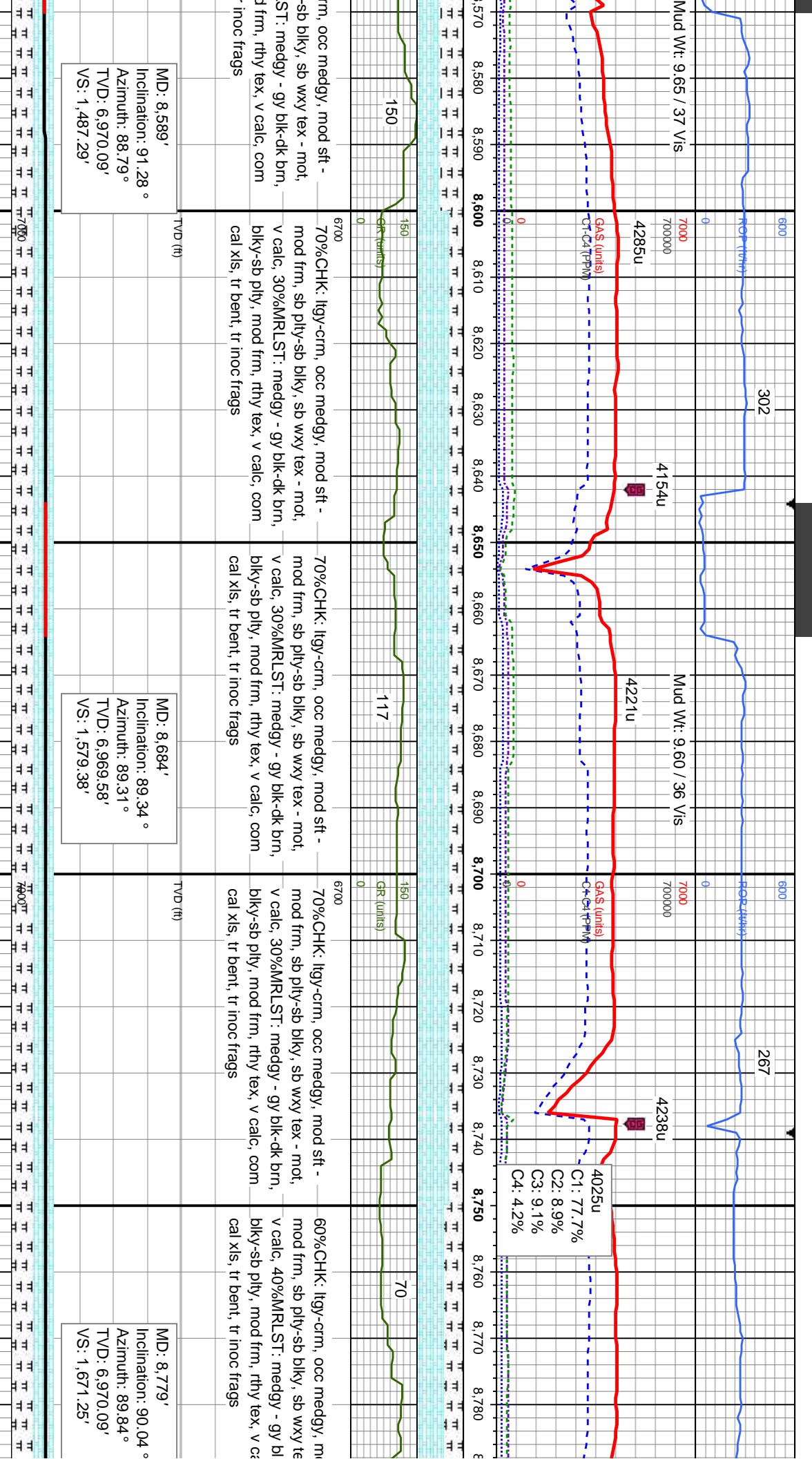




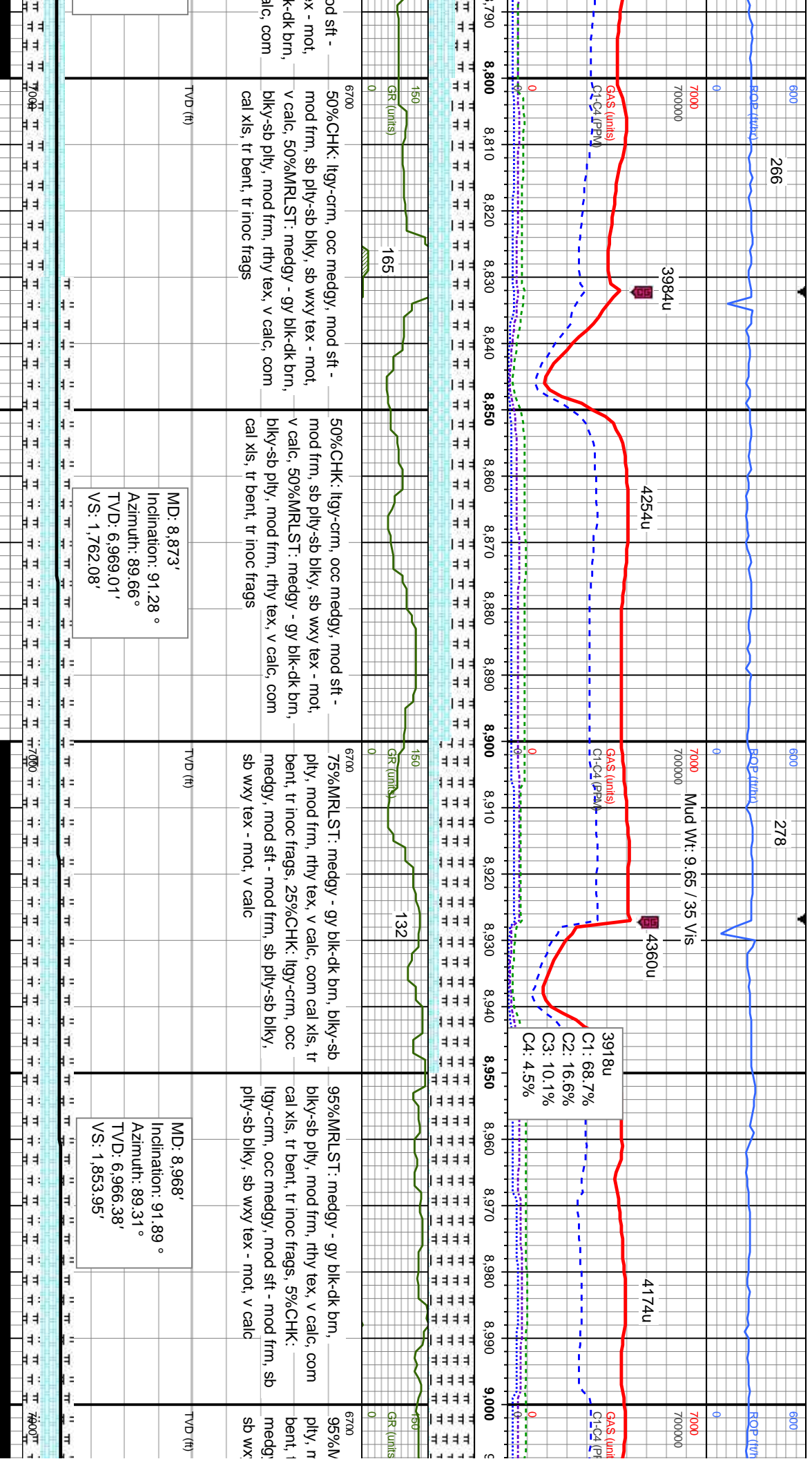




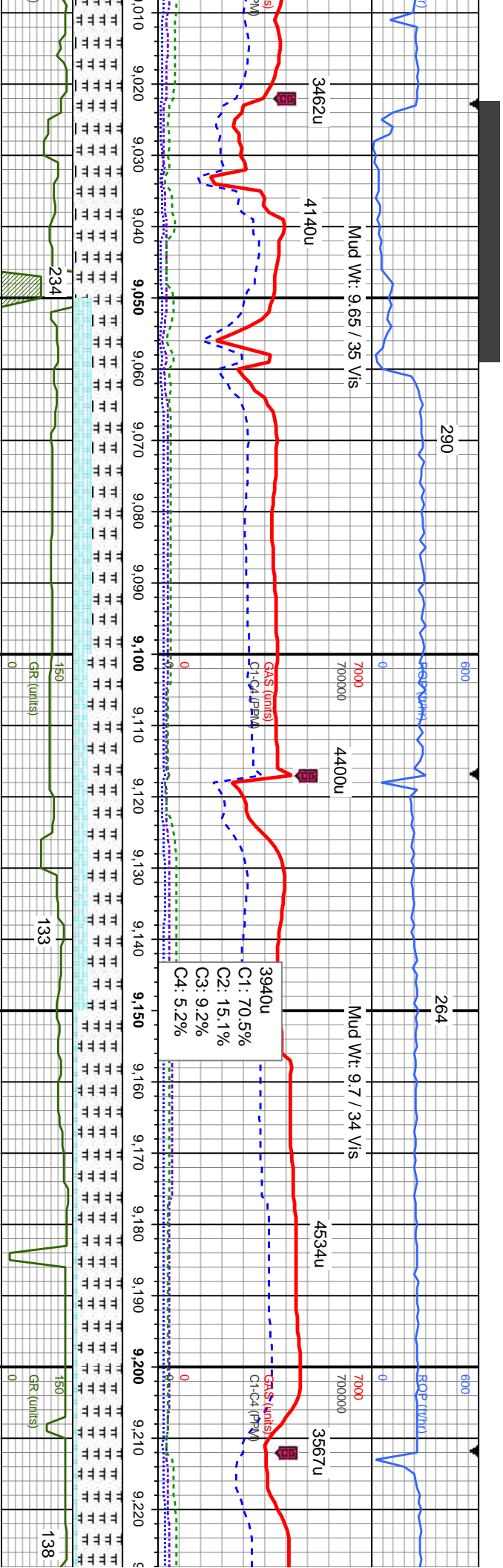








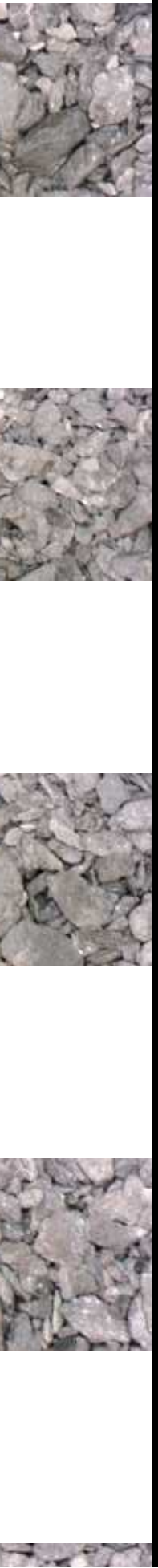


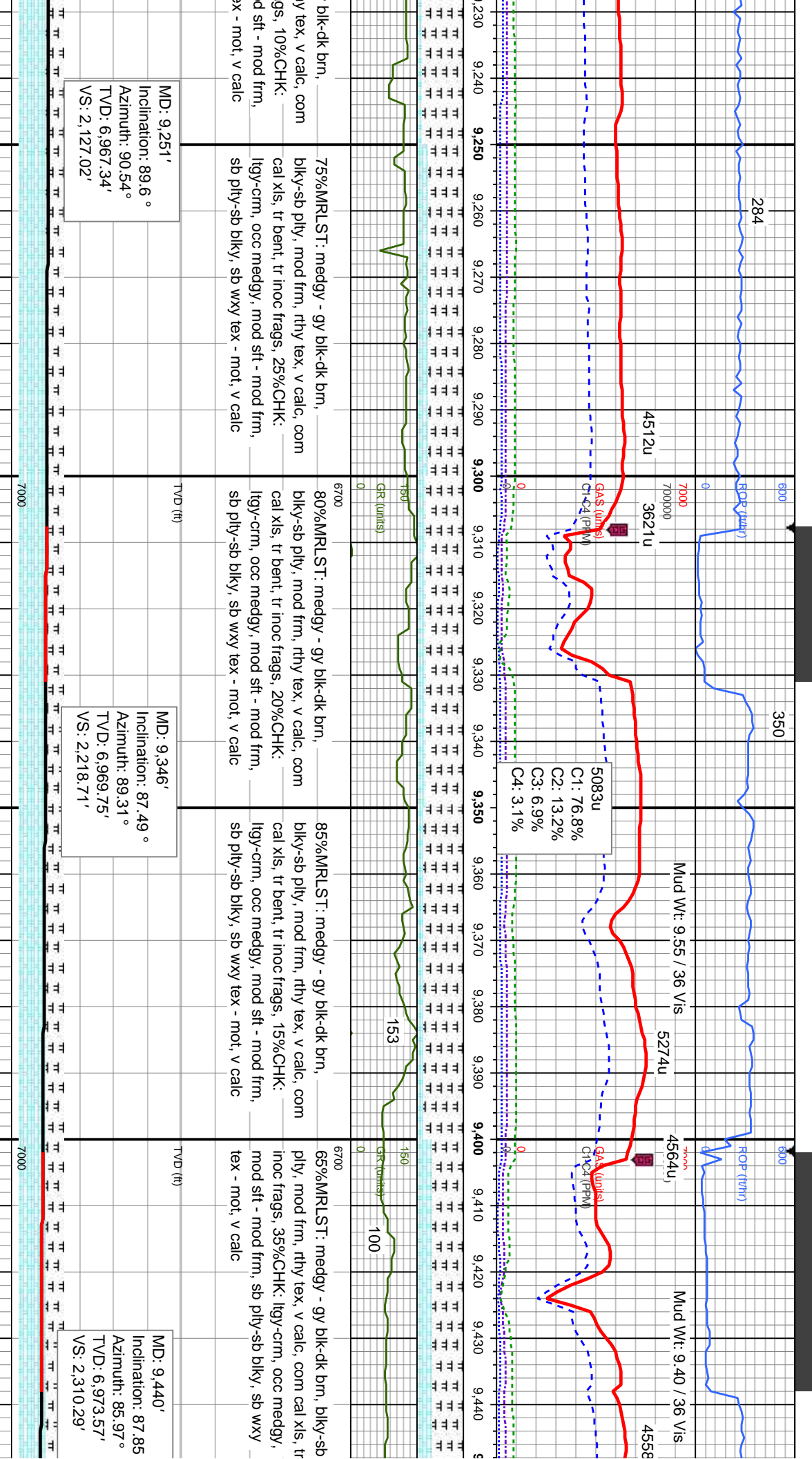


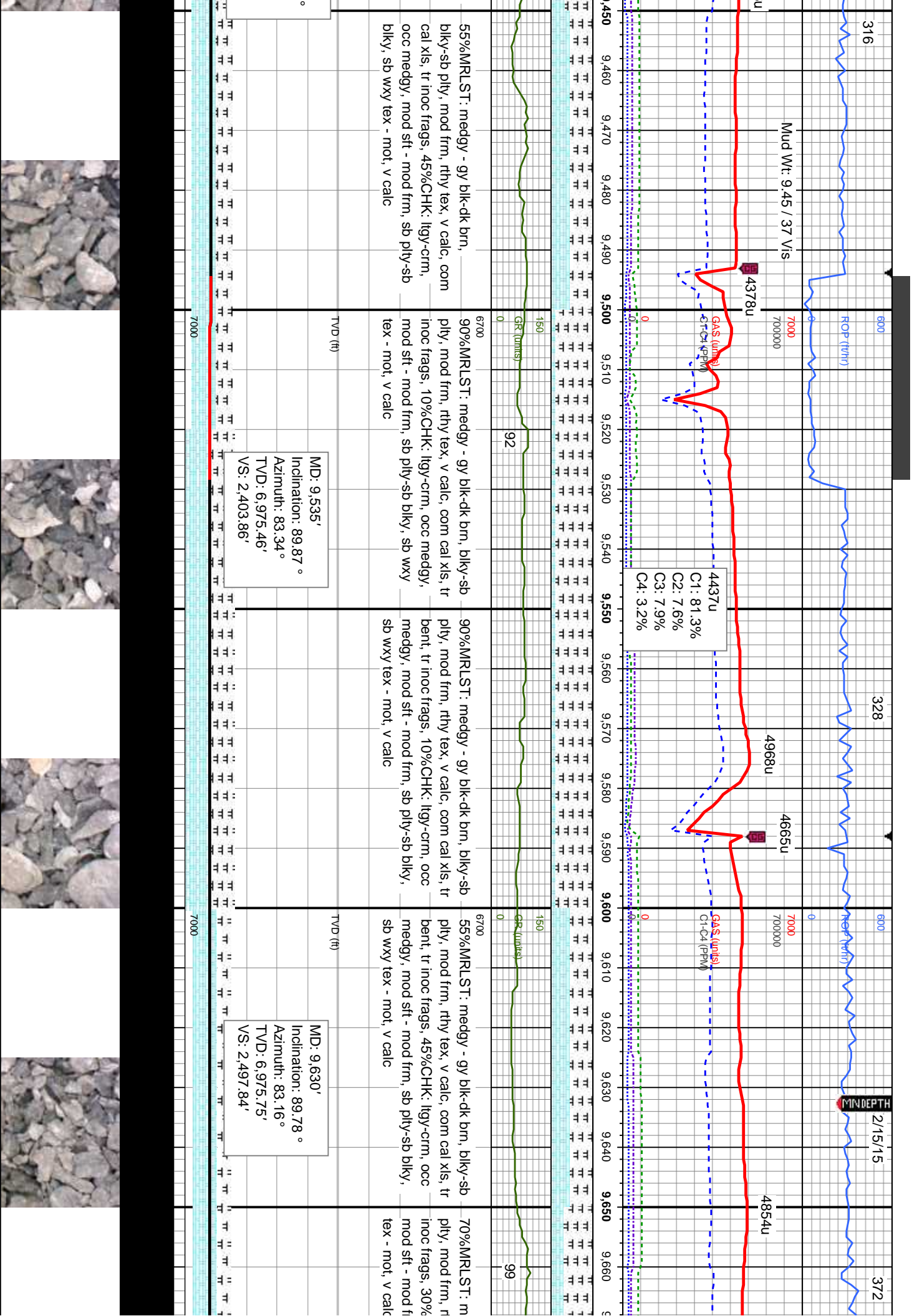
60%MRSLST: medgy - gy blk-dk brn, blk-y-sb blk-y-sb pily, mod frm, rthy tex, v calc, com cal xls, tr bent, tr inoc frags, 40%CHK: lthy-crm, occ medgy, mod sft - mod frm, sb pily-sb blk-y, sb wxy tex - mot, v calc	60%MRSLST: medgy - gy blk-dk brn, blk-y-sb pily, mod frm, rthy tex, v calc, com cal xls, tr bent, tr inoc frags, 30%CHK: lthy-crm, occ medgy, mod sft - mod frm, sb pily-sb blk-y, sb wxy tex - mot, v calc	90%MRSLST: medgy - gy blk-dk brn, blk-y-sb pily, mod frm, rthy tex, v calc, com cal xls, tr bent, tr inoc frags, 10%CHK: lthy-crm, occ medgy, mod sft - mod frm, sb pily-sb blk-y, sb wxy tex - mot, v calc
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MD: 9,062'  
Inclination: 89.25 °  
Azimuth: 90.02°  
TVD: 6,965.45'  
VS: 1,944.81'

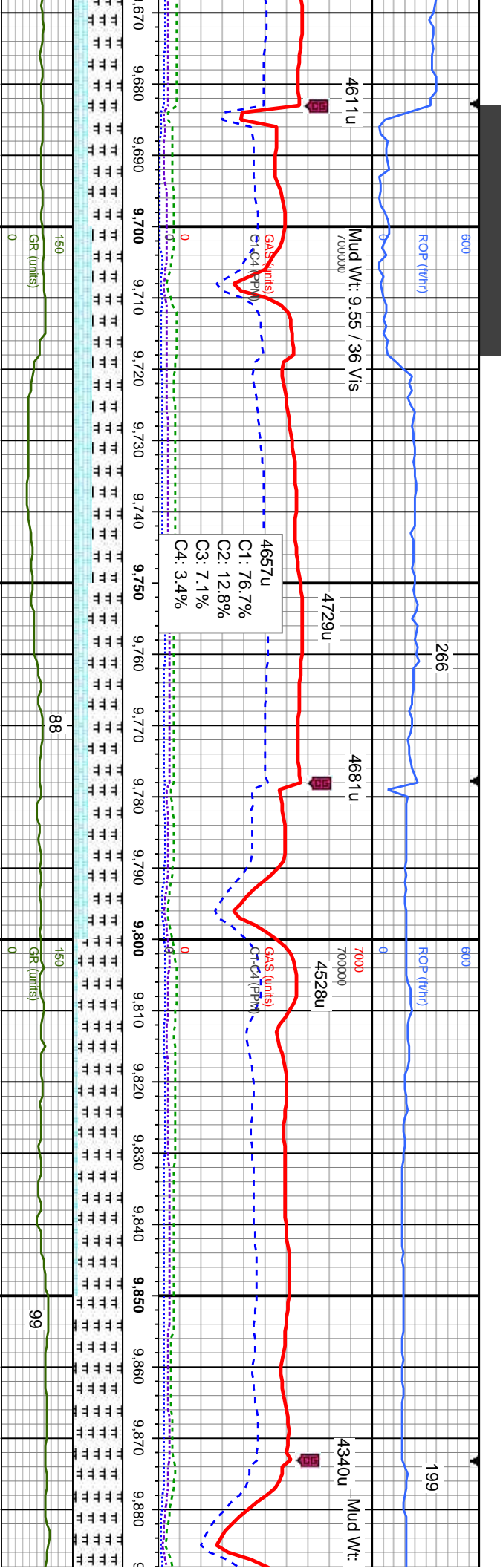
MD: 9,157'  
Inclination: 89.43 °  
Azimuth: 90.19°  
TVD: 6,966.54'  
VS: 2,036.45'











medgy - gy blk-dk brn, blk-y-sb  
rhy tex, v calc, com cal xls, tr  
CHK: ltgy-crm, occ medgy,  
m, sb pty-sb blk-y, sb wxy  
blk-y, sb wxy tex - mot, v calc

TVD (ft)

MD: 9,724'  
Inclination: 91.8°  
Azimuth: 85.45°  
TVD: 6,974.46'  
VS: 2,590.54'

70%MRSLT: medgy - gy blk-dk brn,  
blk-y-sb pty, mod frm, rhy tex, v calc, com  
cal xls, tr inoc frags, 30%CHK: ltgy-crm,  
occ medgy, mod sft - mod frm, sb pty-sb  
blk-y, sb wxy tex - mot, v calc

TVD (ft)

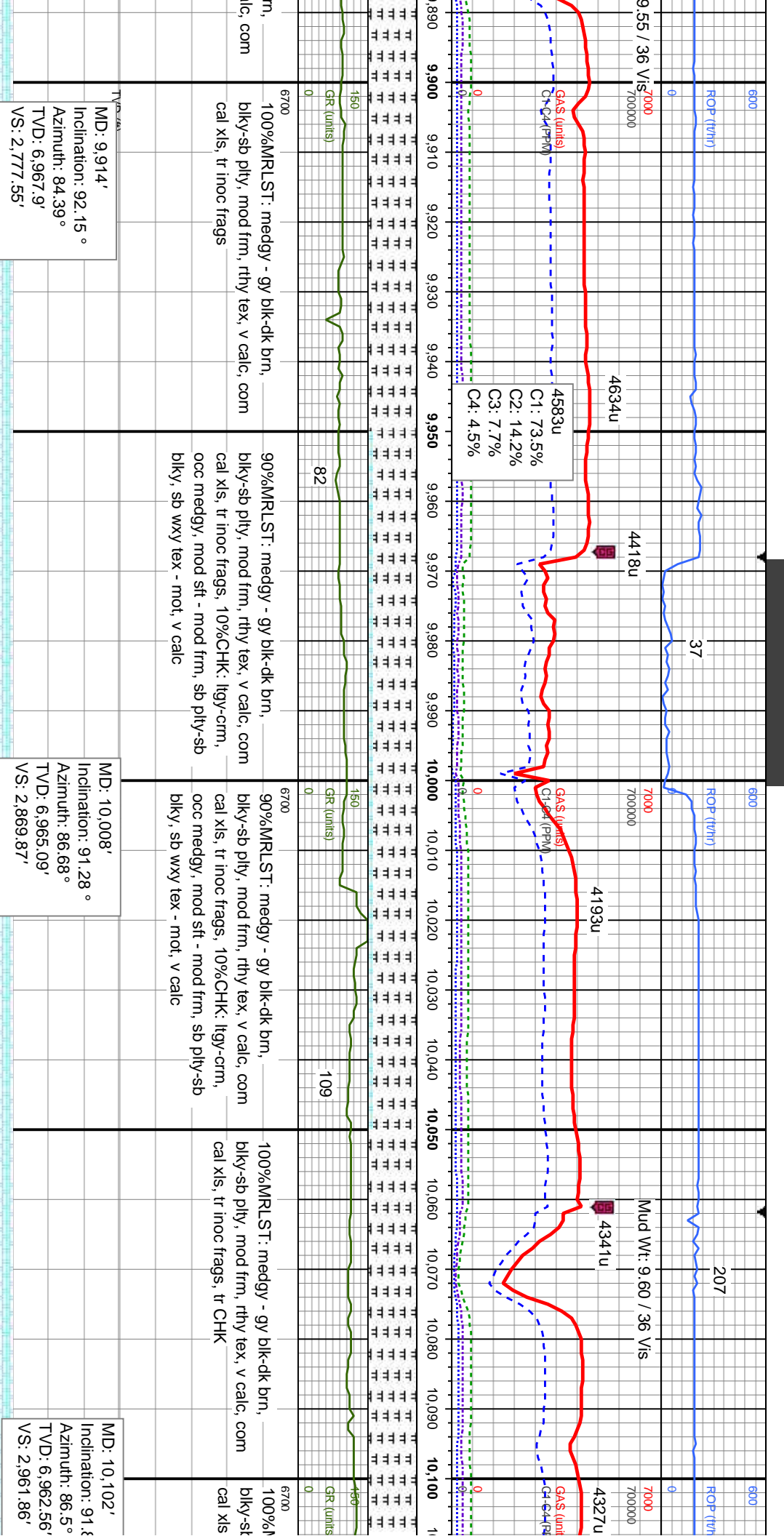
MD: 9,819'  
Inclination: 91.98°  
Azimuth: 84.74°  
TVD: 6,971.32'  
VS: 2,683.97'

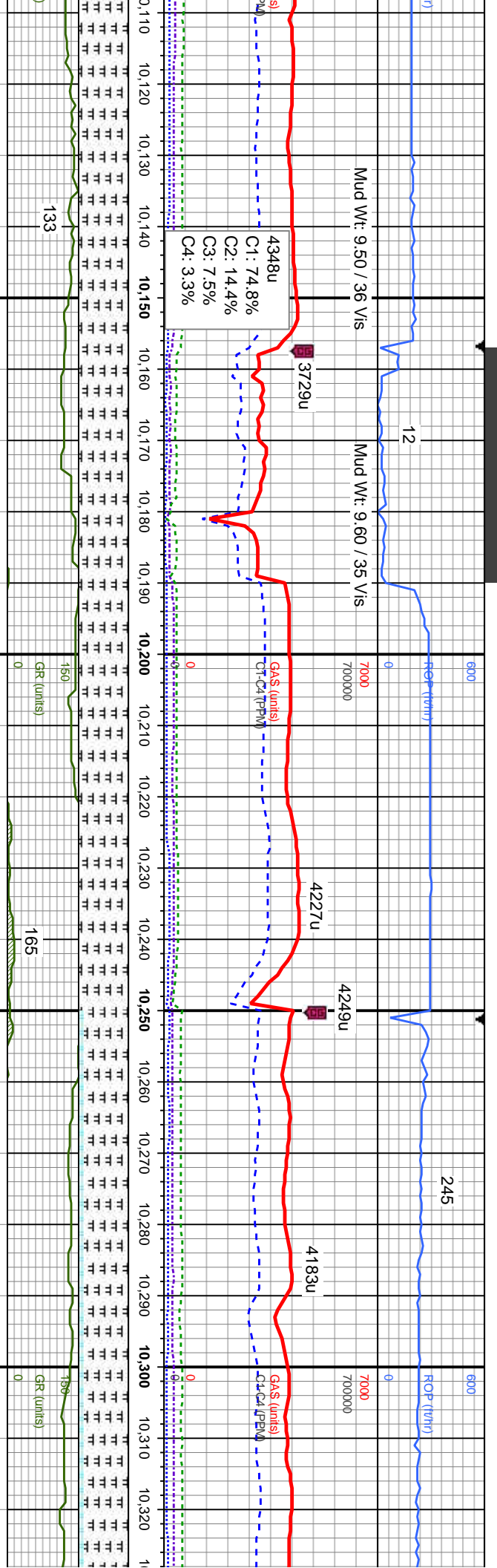
90%MRSLT: medgy - gy blk-dk brn, blk-y-sb  
pty, mod frm, rhy tex, v calc, com cal xls, tr  
inoc frags, 10%CHK: ltgy-crm, occ medgy,  
mod sft - mod frm, sb pty-sb blk-y, sb wxy  
tex - mot, v calc

100%MRSLT: medgy - gy blk-dk b  
blk-y-sb pty, mod frm, rhy tex, v ca  
cal xls, tr inoc frags









100%MLST: medgy - gy blk-dk brn, blkly-sb ply, mod frm, rthy tex, v calc, com cal xls, tr inoc frags, tr CHK

100%MLST: medgy - gy blk-dk brn, blkly-sb ply, mod frm, rthy tex, v calc, com cal xls, tr inoc frags, tr CHK

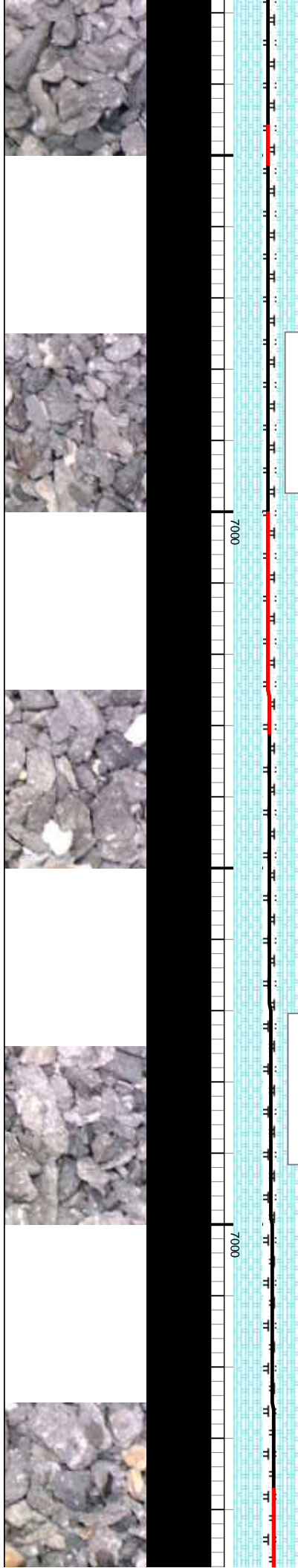
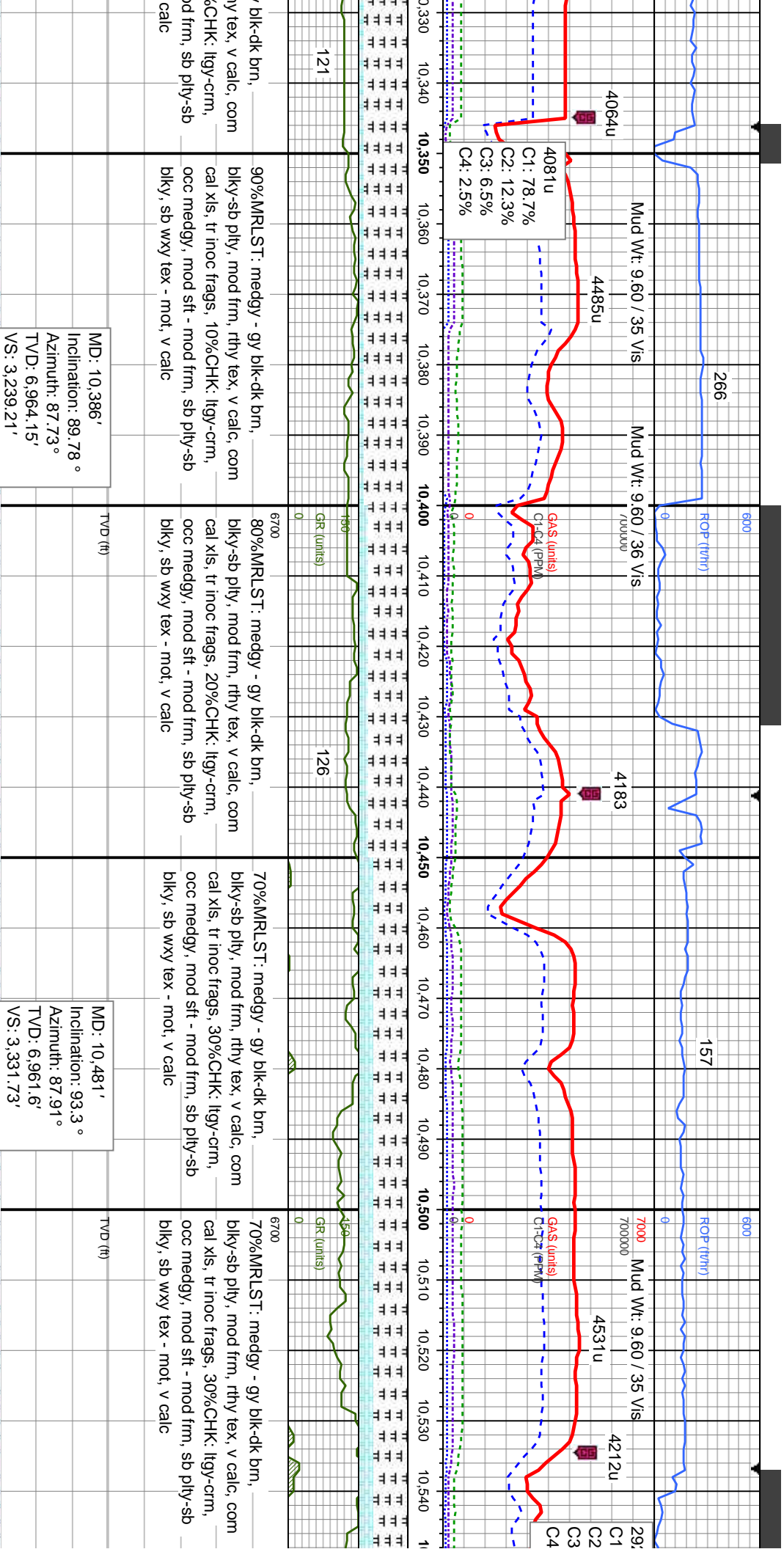
90%MLST: medgy - gy blk-dk brn, blkly-sb ply, mod frm, rthy tex, v calc, com cal xls, tr inoc frags, 10%CHK, lly-crm, occ medgy, mod sft - mod frm, sb ply-sb blkly, sb wxy tex - mot, v calc

90%MLST: medgy - gy blkly-sb ply, mod frm, rth cal xls, tr inoc frags, 10% occ medgy, mod sft - mc blkly, sb wxy tex - mot, v

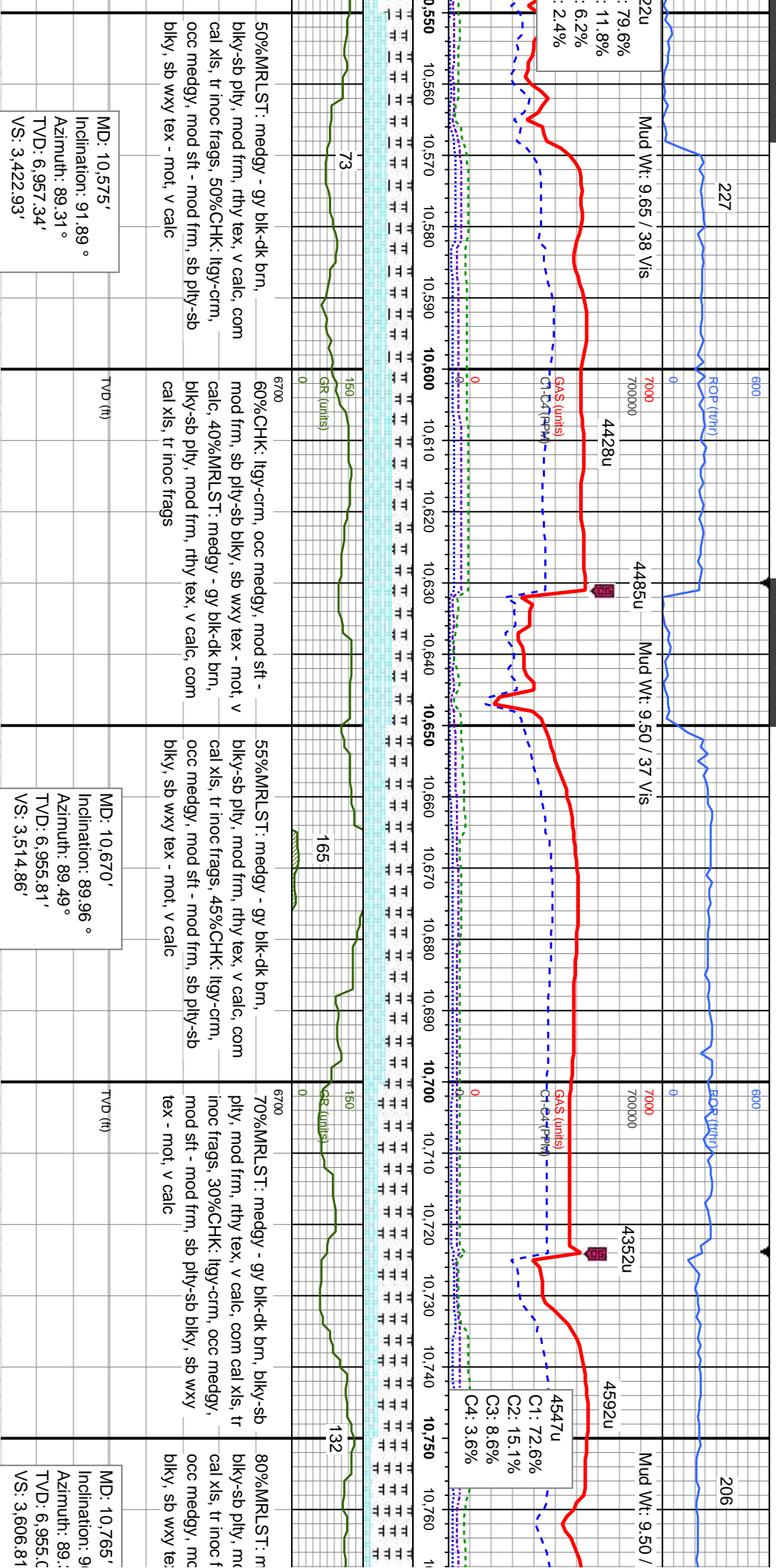
MD: 10,197'  
Inclination: 89.69 °  
Azimuth: 87.55 °  
TVD: 6,961.32'  
VS: 3,054.71'

MD: 10,292'  
Inclination: 88.55 °  
Azimuth: 87.03 °  
TVD: 6,962.78'  
VS: 3,147.46'

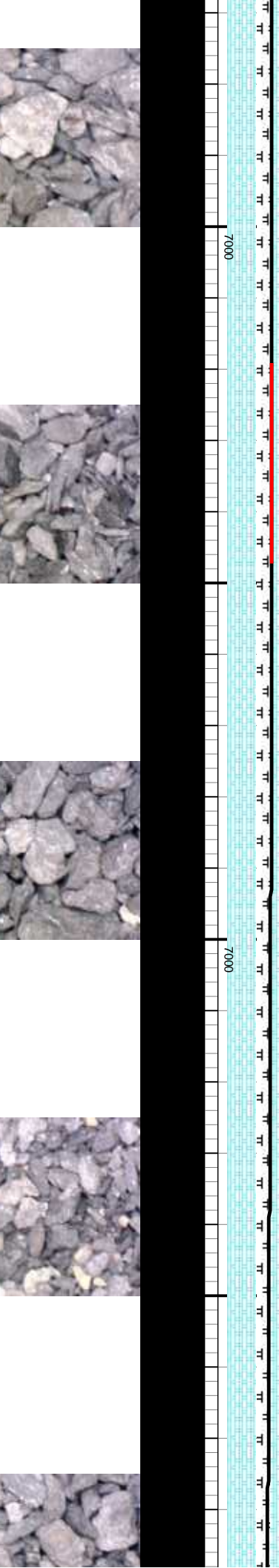
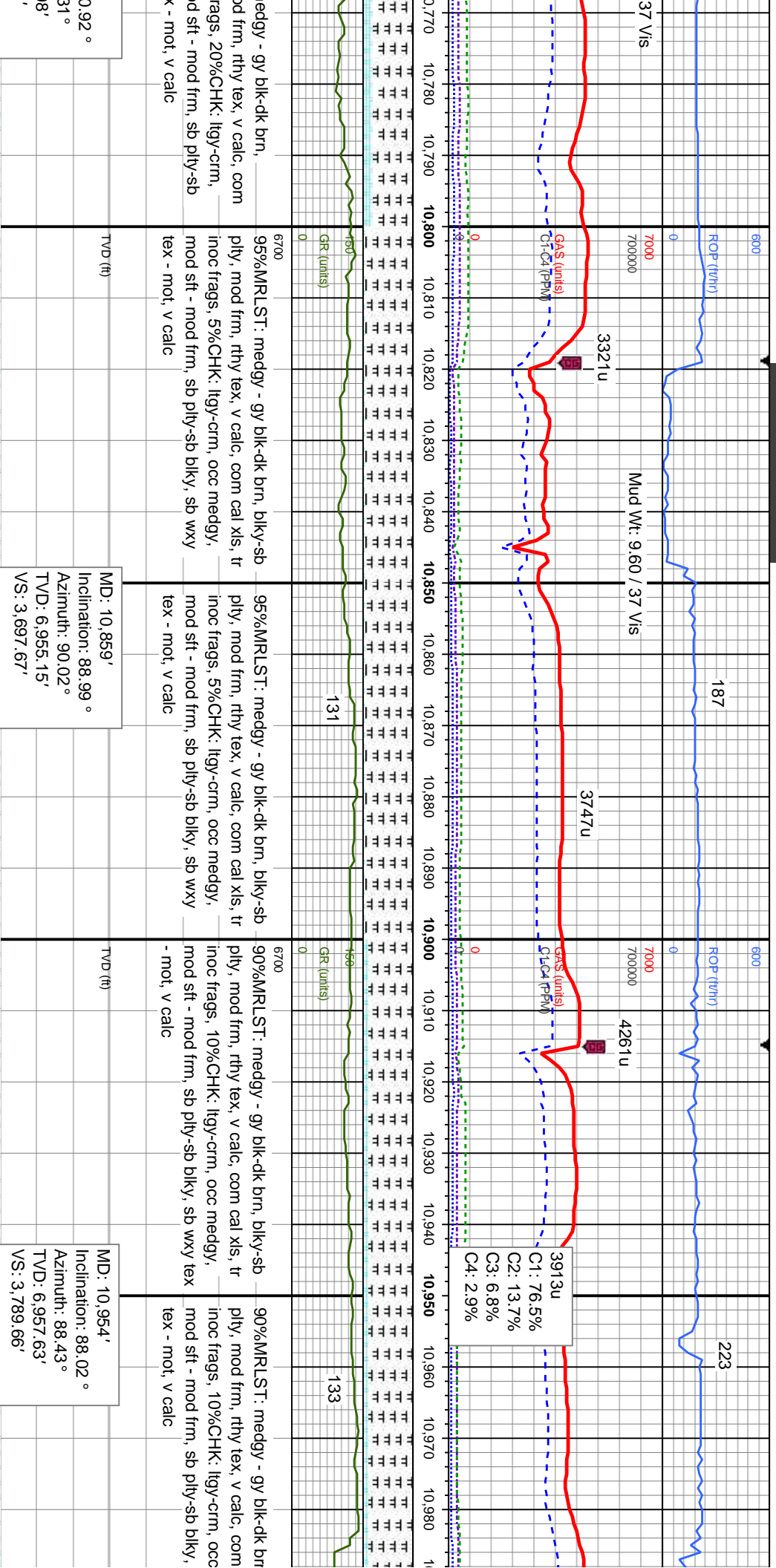


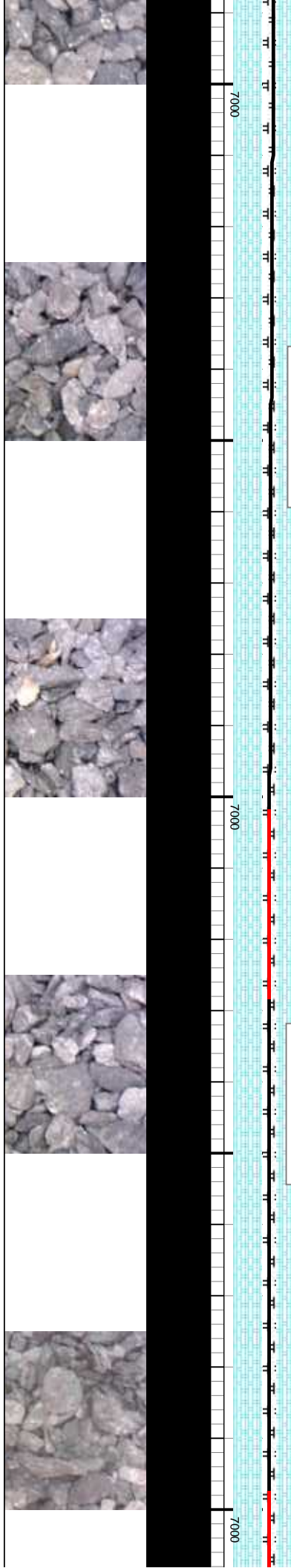
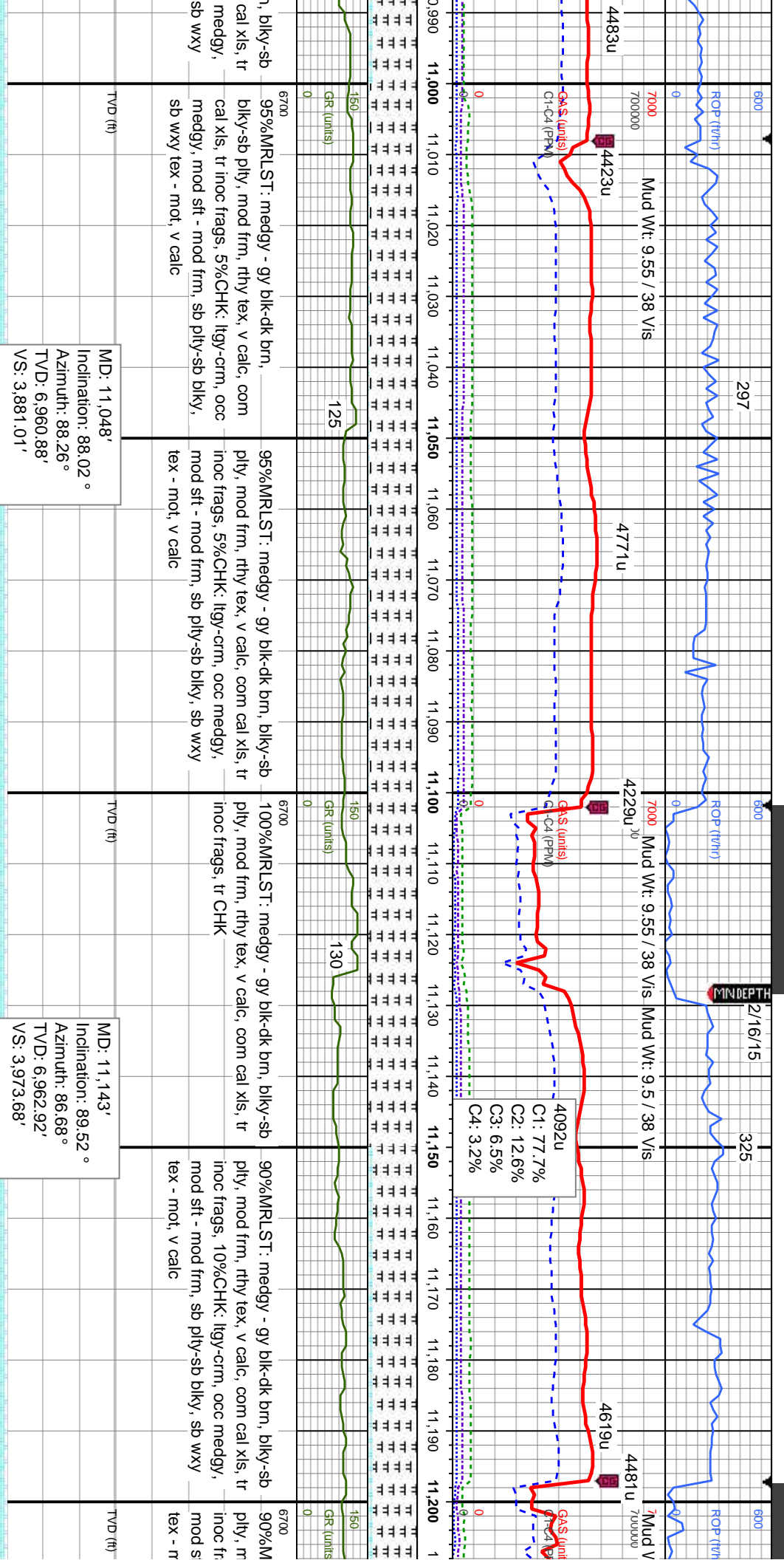


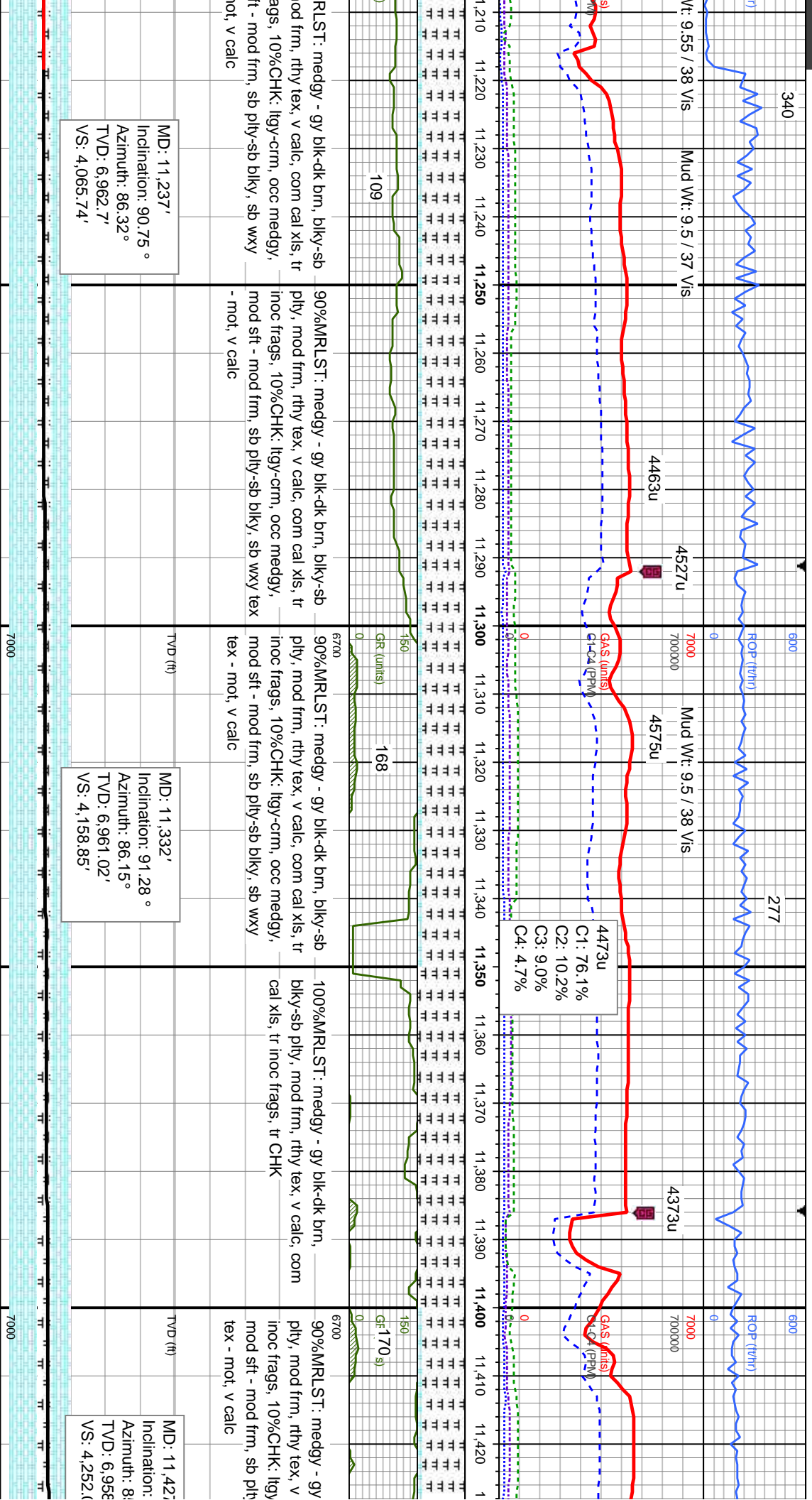












RLST: medgy - gy blk-dk brn, blk-y-sb  
 mod frm, rthy tex, v calc, com cal xis, tr  
 eags, 10%CHK: ltgy-crm, occ medgy,  
 it - mod frm, sb ply-sb blk, sb wxy  
 not, v calc

90%MR.LST: medgy - gy blk-dk brn, blkly-sb  
ply, mod frm, rthy tex. v calc, com cal xls, tr  
inoc frags, 10%CHK: ltgy-crm, occ medgy,  
mod sft - mod frm, sb ply-sb blkly, sb wxy tex  
- mot, v calc

90%**MRLST**: medgy - gy blk-dk brn, blkly-sb ply, mod frm, rthy tex, v calc, com cal xls, t inoc frags, 10%**CHK**: ltgy-crm, occ medgy, mod sft - mod frm, sb ply-sb blkly, sb wxy tex - mot, v calc

100%MR<sub>LST</sub>: medgy - gy blk-dk brn, blk-sb ply, mod frm, rthy tex, v calc, com cal xls, tr inoc frags, tr CHK

90%MR:ST: medgy - gy  
ply, mod frm, rthy tex, v  
inoc frags, 10%CHK: lty  
mod sft - mod frm, sb ply  
tex - mot, v calc

MD: 11,237'  
Inclination: 90.75 °  
Azimuth: 86.32 °  
TVD: 6,962.7'  
VS: 4,065.74'

MD: 11,332'  
Inclination: 91.28 °  
Azimuth: 86.15°  
TVD: 6,961.02'  
VS: 4,158.85'

MD: 11,427  
Inclination:  
Azimuth: 81  
TVD: 6,958  
VS: 4,252.0

