



Scale: 5" / 100'  
Measured Depth Log

**Well Name** Reliance E23-69-1HN

**Location** NWNW SEC23, T6N, R65W, 6 PM

**State** COLORADO **County** WELD

**Country** USA **Rig Number** H&P 326

**API Number** 05-123-38141 **Field** GREELEY

**Region** DJ BASIN **Drilling Completed** 2/8/2015

**Spud Date** 2/2/2015

**Surface Coordinates** 1258' FNL, 755' FWL  
40.47534/-104.63728

**Bottom Hole Coordinates** (PROJ)  
330' FFNLL, 225' FFELL  
40.477860/-104.621710

**Ground Elevation** 4733' **K.B. Elevation** 4763'

**Logged Interval** 6189' **To** 11,567' **Total Depth** 11,567'

**Formation** NIOBRARA B-CHALK

**Type of Drilling Fluid** LSND

## Operator

**Company** Noble Energy Inc

**Address** 1625 Broadway Suite 2200  
Denver, CO 80202

## Geologist

**Name** HOLLY DUNCAN

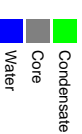
**Company** NOBLE ENERGY INC.

**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

<input checked="" type="radio"/> SPOTTED STAINING	<input checked="" type="radio"/> EVEN	<input type="radio"/> QUESTIONABLE	<input checked="" type="radio"/> BIT
<input checked="" type="radio"/> 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		MINDEPTH MN DEPTH		L LITHOGRAPHIC
	OIL TO SURFACE				MX MICROXLN
	MINDEPTH MN DEPTH UP				MS MUDSTONE
Rounding					
	MN DEPTH (DOWN)		A ANGULAR		PS PACKSTONE
	NORMAL FAULT		R ROUNDED		WS WACKESTONE
	OVERTURNED STRATA		B SUBANG		
	REVERSE FAULT		P 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

Depth Labels

% Lith

GAMMA

GR

Well Bore  
TVD

Oil Show

Images

COLUMBINE LOGGING INC.  
RIGGED UP ON 2/3/2015  
MANNED 2-PERSON LOGGING  
WITH BLOODHOUND GAS  
CHROMATOGRAPH UNIT #0568

ROP (ft/hr)

Mud Wt: 10.00 / 38 Vis IN

GAS (lb/2677u)

C1-C4 (PPM)

GAS (lb/2677u)

C1-C4 (PPM)

GAS (lb/2677u)

C1-C4 (PPM)

CONTINUED FROM Reliance  
EZ3-69-1HN(VERT)

50' Sample Intervals

Bit Data  
Bit #: 1  
Type: PDC  
Size: 8.75  
Depth In: 811'  
Jets: 3x18 & 2x17  
S/N: 12610184

TVD (ft)

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

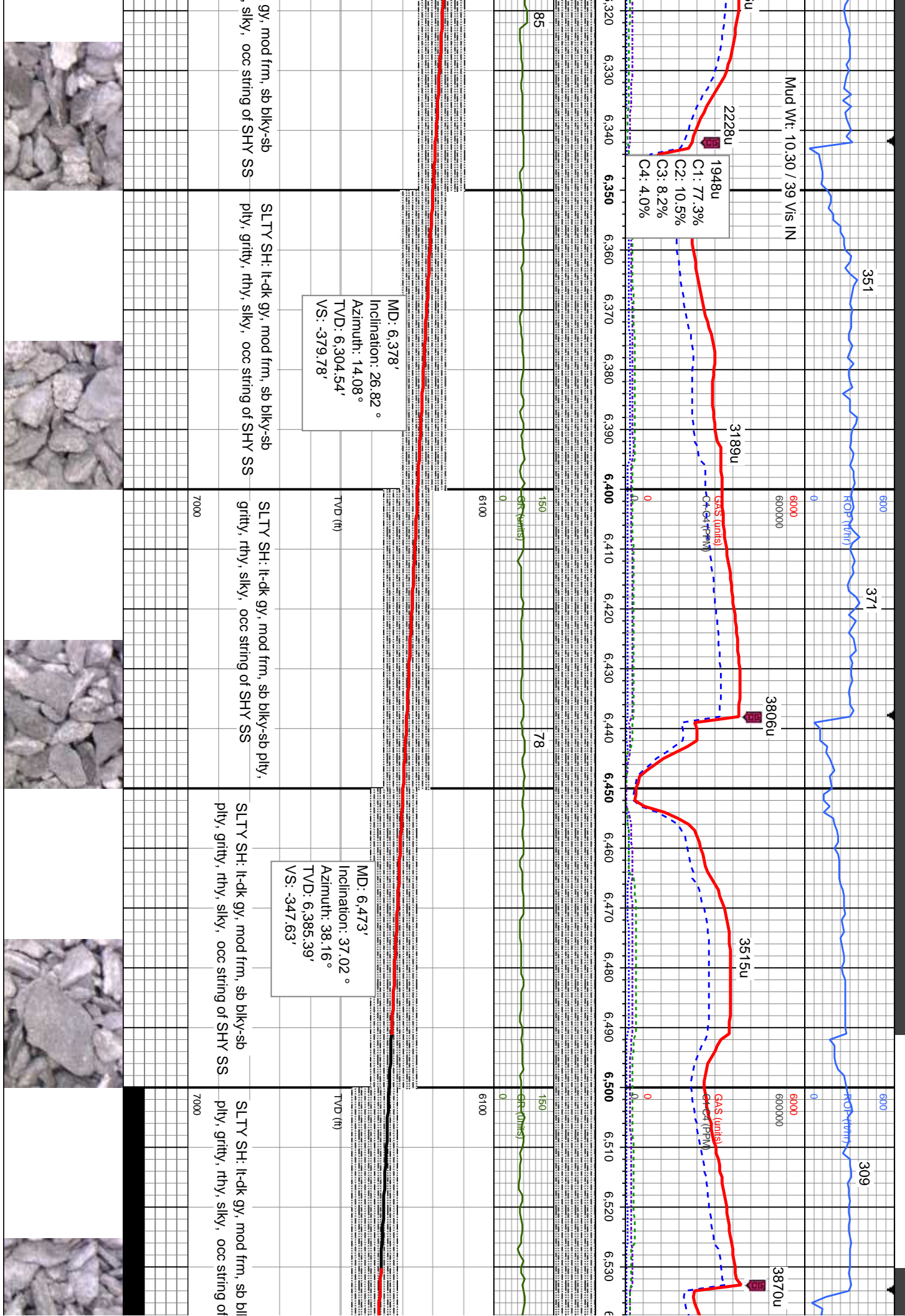
SLTY SH: lt-dk gy, mod frm, sb blk-y-sb  
ply, gritty, rthy, silky, occ string of SHY SS

SLTY SH: lt-dk  
ply, gritty, rthy

MD: 6,284'  
Inclination: 11.61 °  
Azimuth: 347.36 °  
TVD: 6,215.89'  
VS: -389.49'

TVD (ft)





Mud Wt: 10.30 / 39 Vis IN

1948u  
C1: 77.3%  
C2: 10.5%  
C3: 8.2%  
C4: 4.0%

MD: 6,378'  
Inclination: 26.82°  
Azimuth: 14.08°  
TVD: 6,304.54'  
VS: -379.78'

MD: 6,473'  
Inclination: 37.02°  
Azimuth: 38.16°  
TVD: 6,385.39'  
VS: -347.63'

TVD (ft)

TVD (ft)

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

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

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

351

371

309

3189u

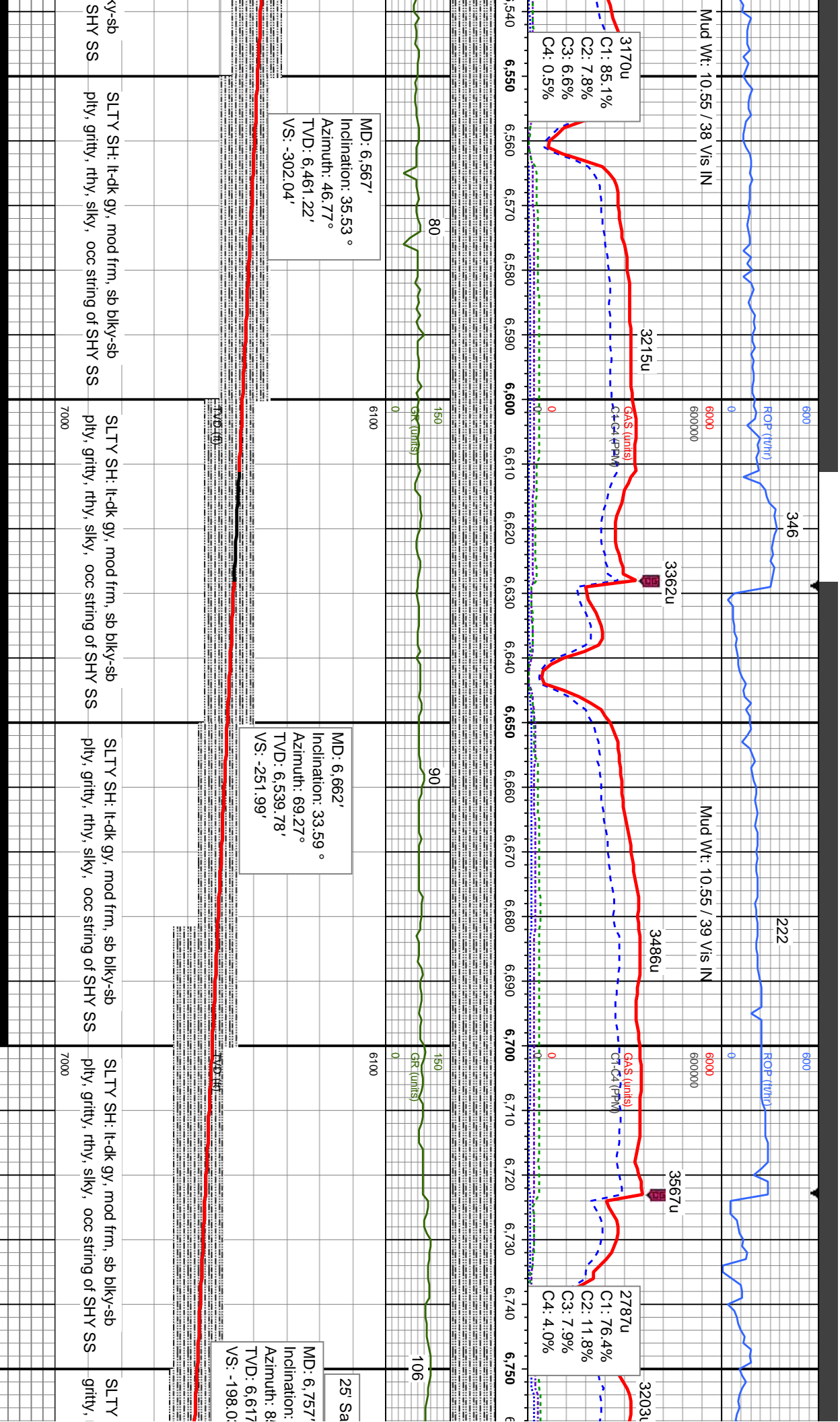
3806u

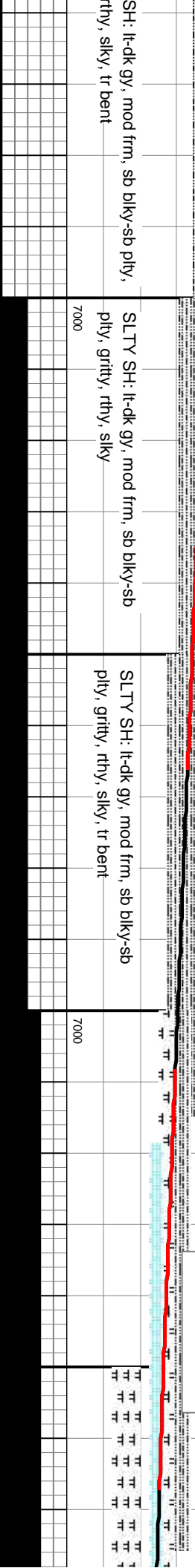
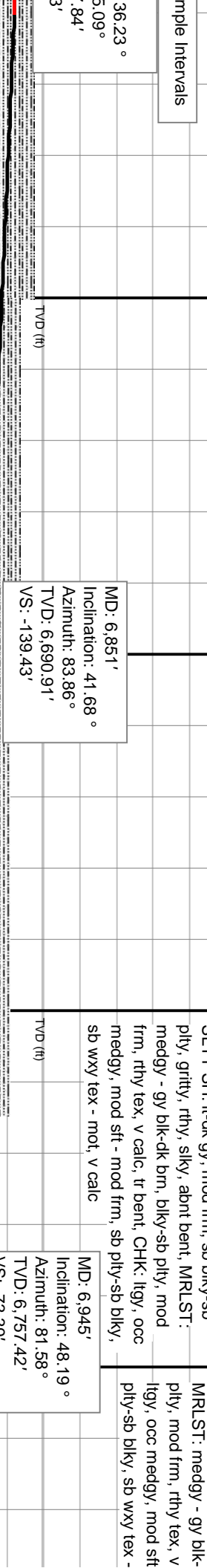
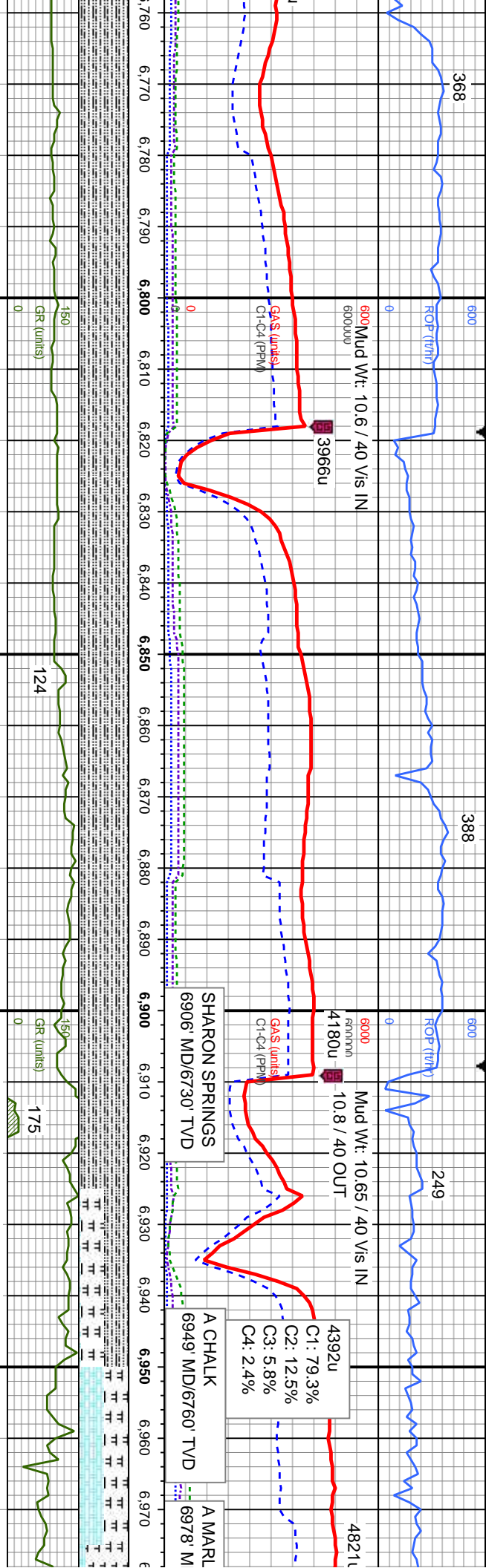
3515u

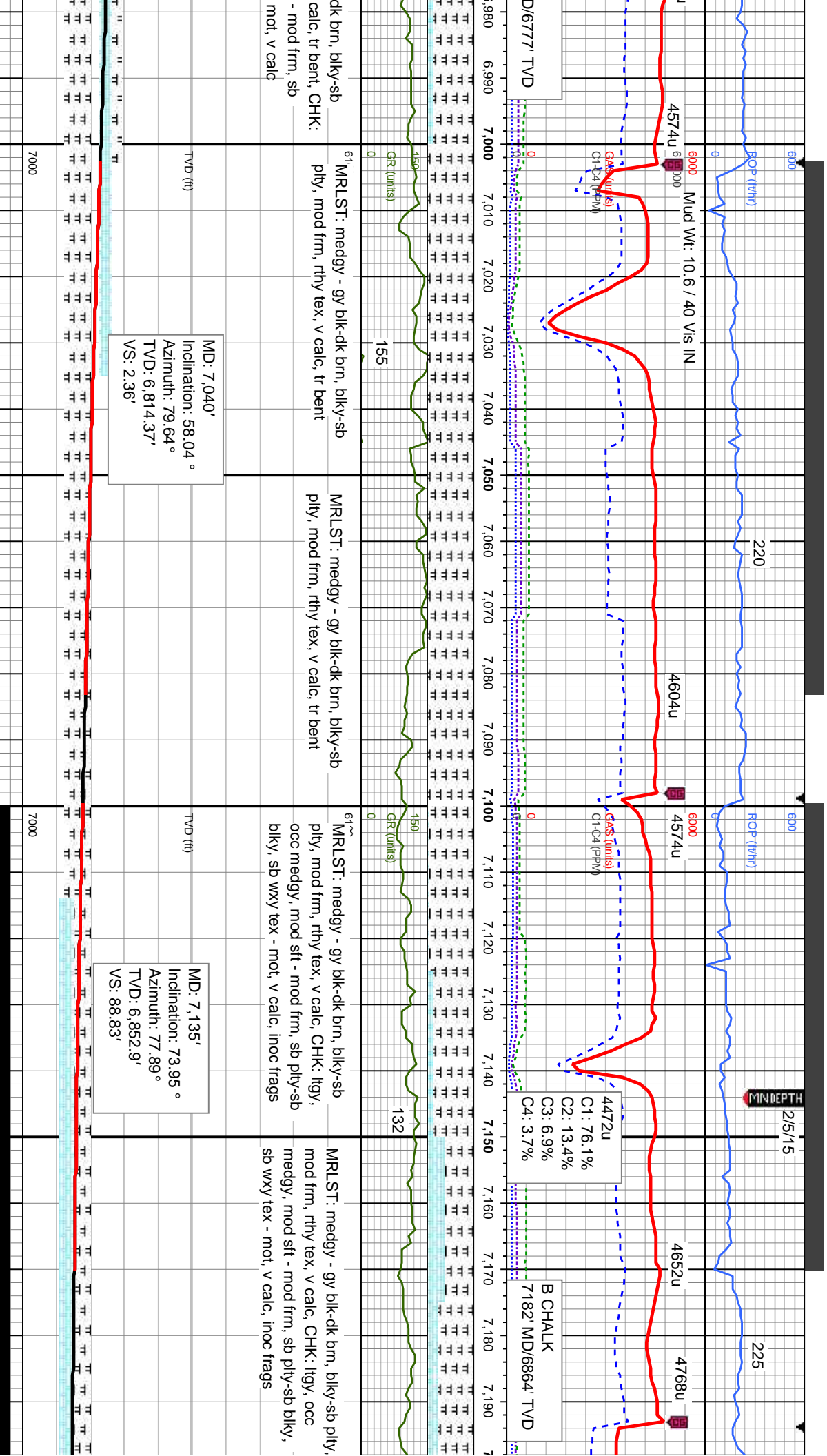
3870u

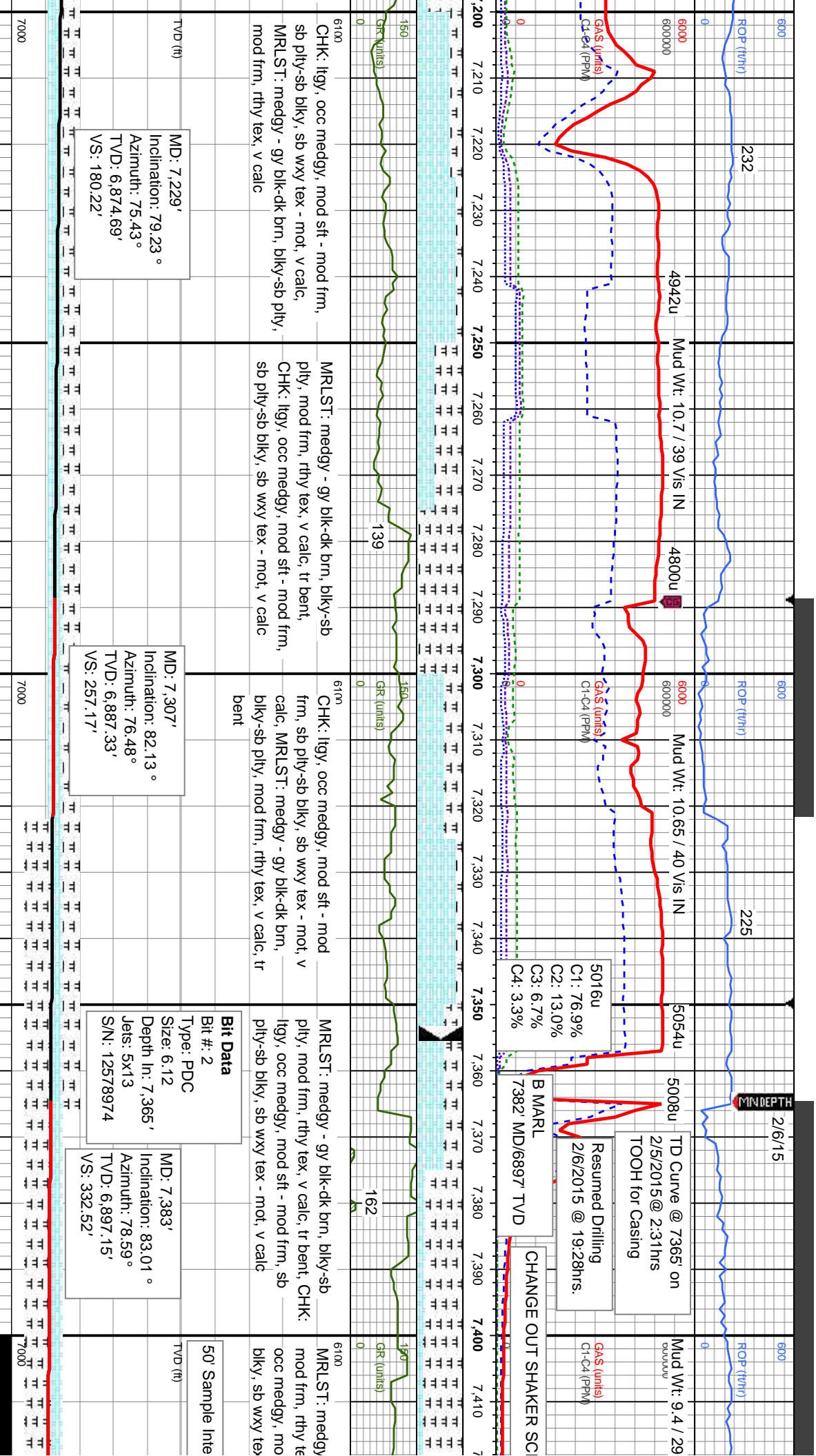
GAS (units)  
C1-C4 (PPM)

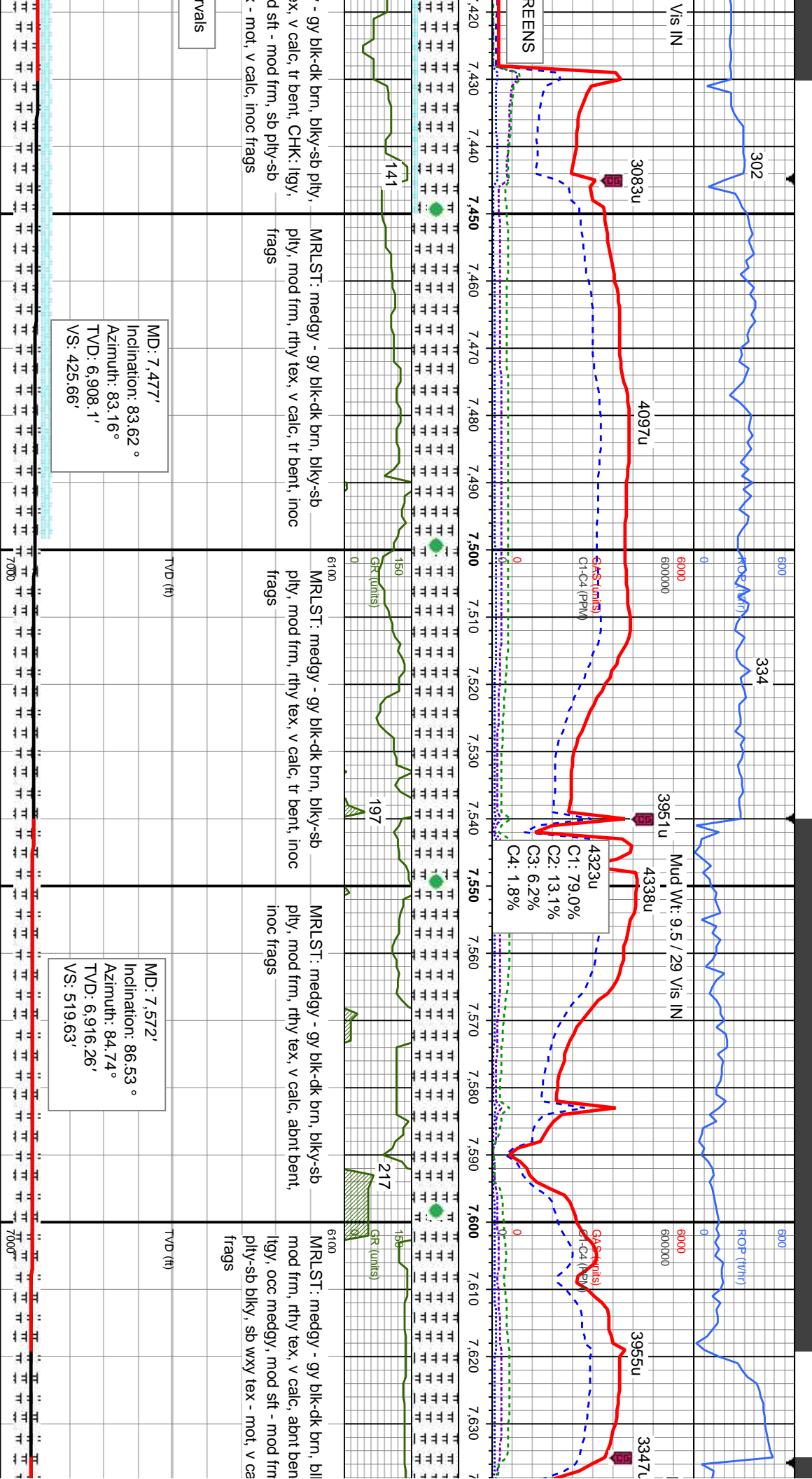
GAS (units)  
C1-C4 (PPM)











- gy blk-dk brn, blk-y-sb pty, x, v calc, tr bent, CHK: litgy, d sft - mod frm, sb pty-sb - mot, v calc, inoc frags

MRLST: medgy - gy blk-dk brn, blk-y-sb pty, mod frm, rthy tex, v calc, tr bent, inoc frags

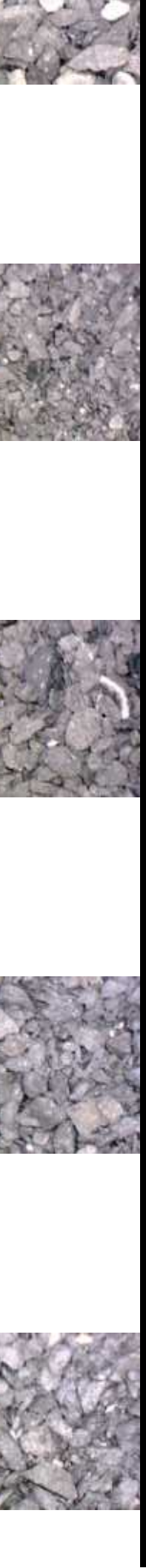
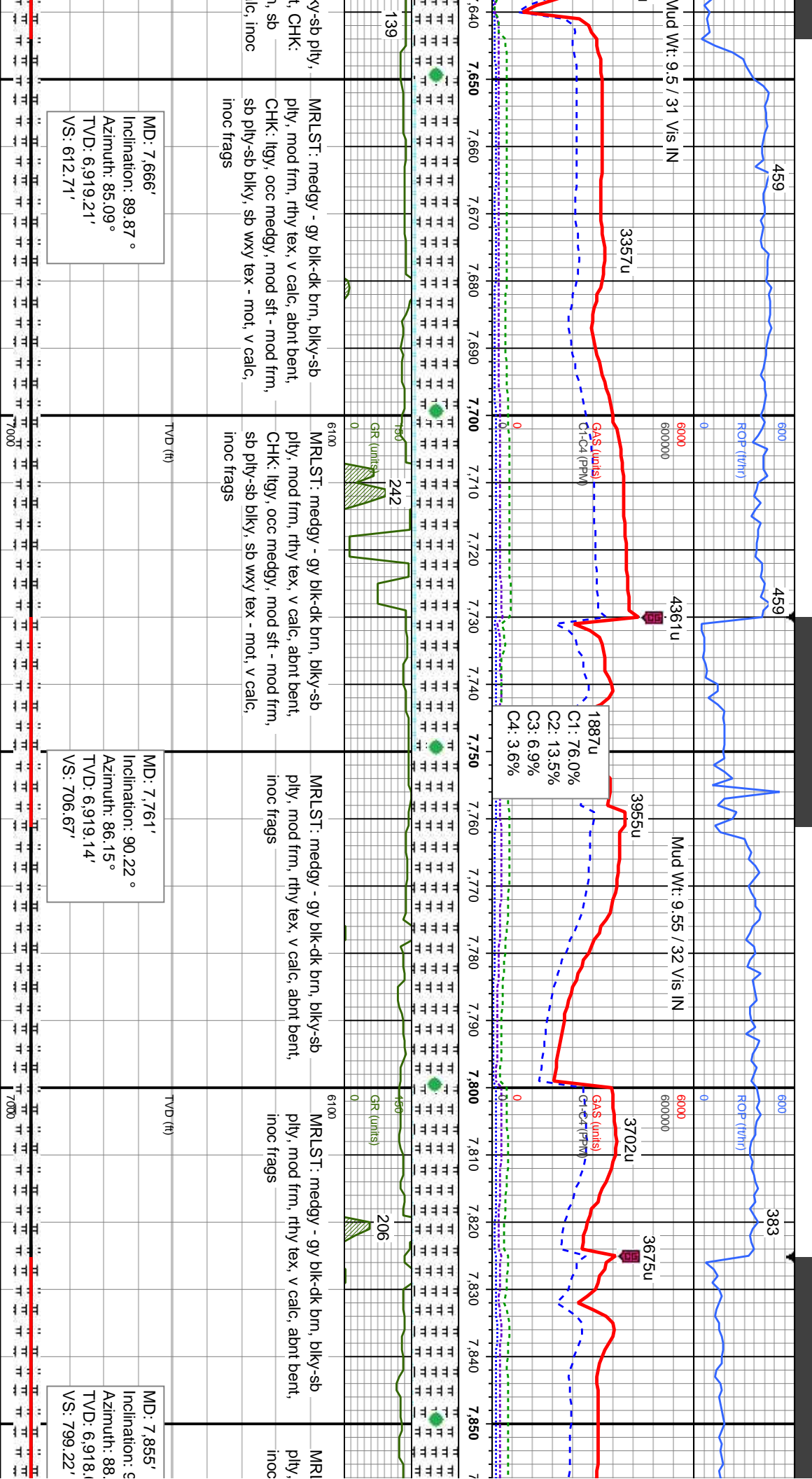
MRLST: medgy - gy blk-dk brn, blk-y-sb pty, mod frm, rthy tex, v calc, tr bent, inoc frags

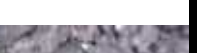
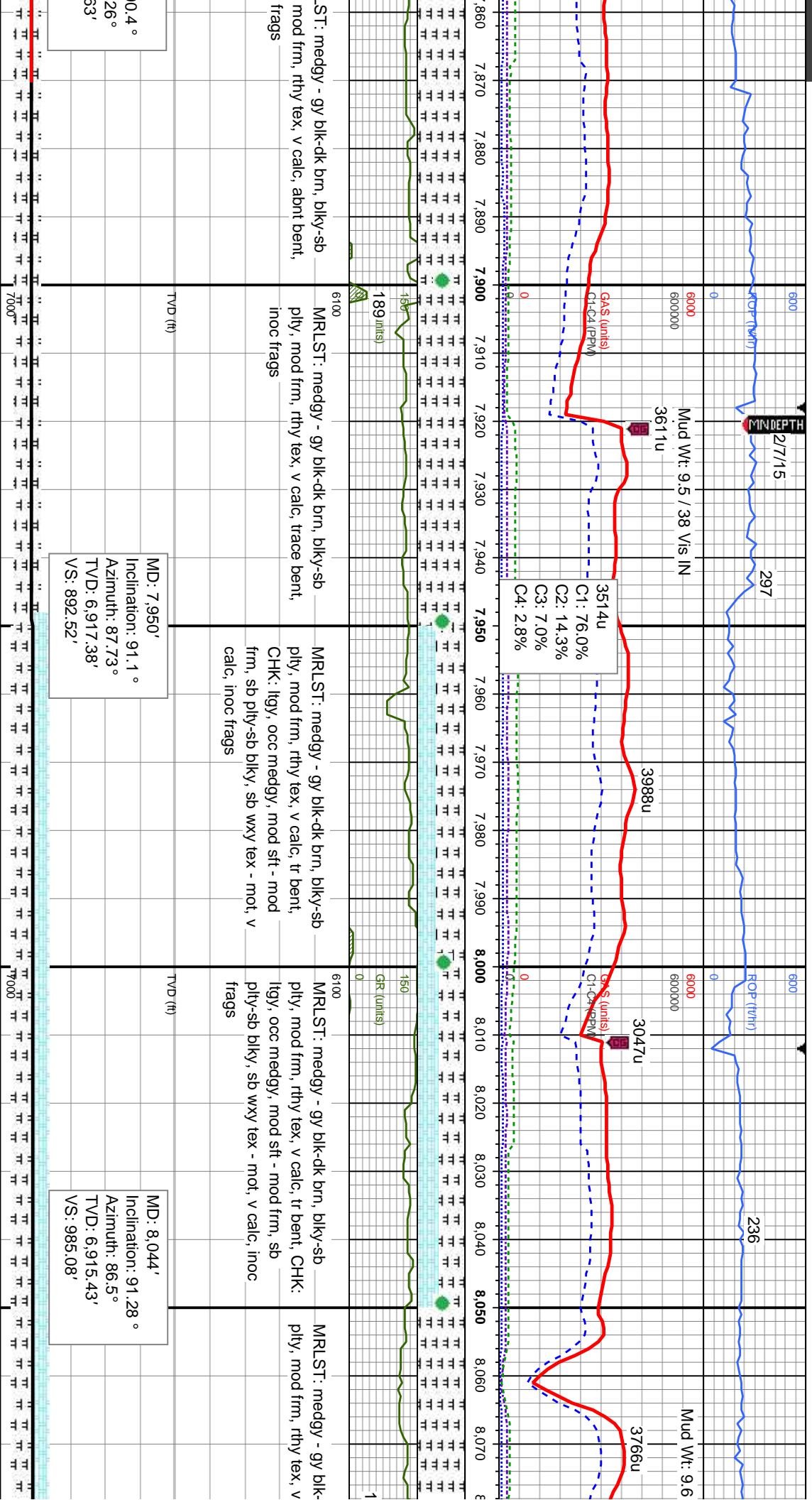
MRLST: medgy - gy blk-dk brn, blk-y-sb pty, mod frm, rthy tex, v calc, abnt bent, inoc frags

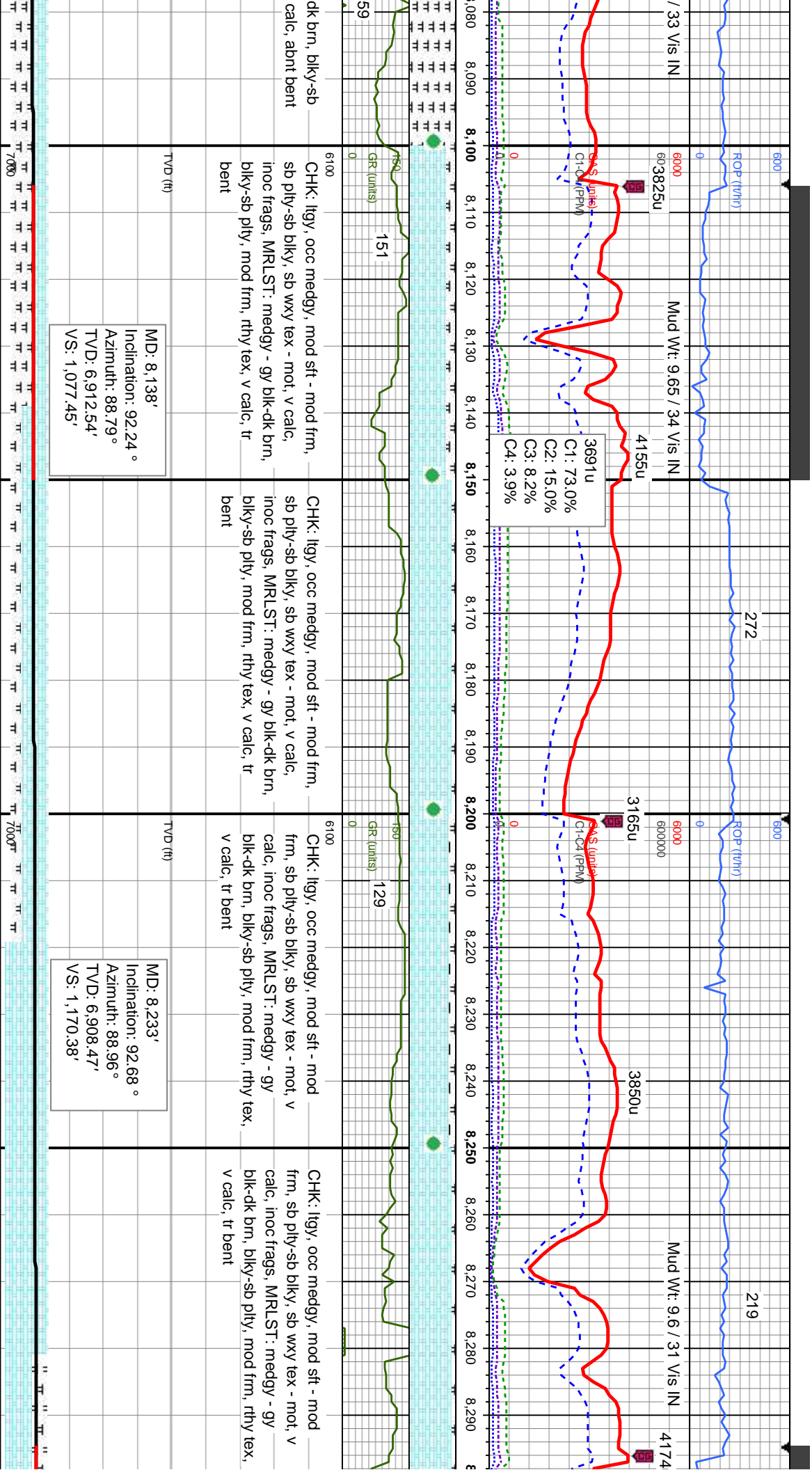
MRLST: medgy - gy blk-dk brn, blk-y-sb pty, mod frm, rthy tex, v calc, abnt bent, litgy, occ medgy, mod sft - mod frm pty-sb blk-y, sb wxy tex - mot, v calc, inoc frags

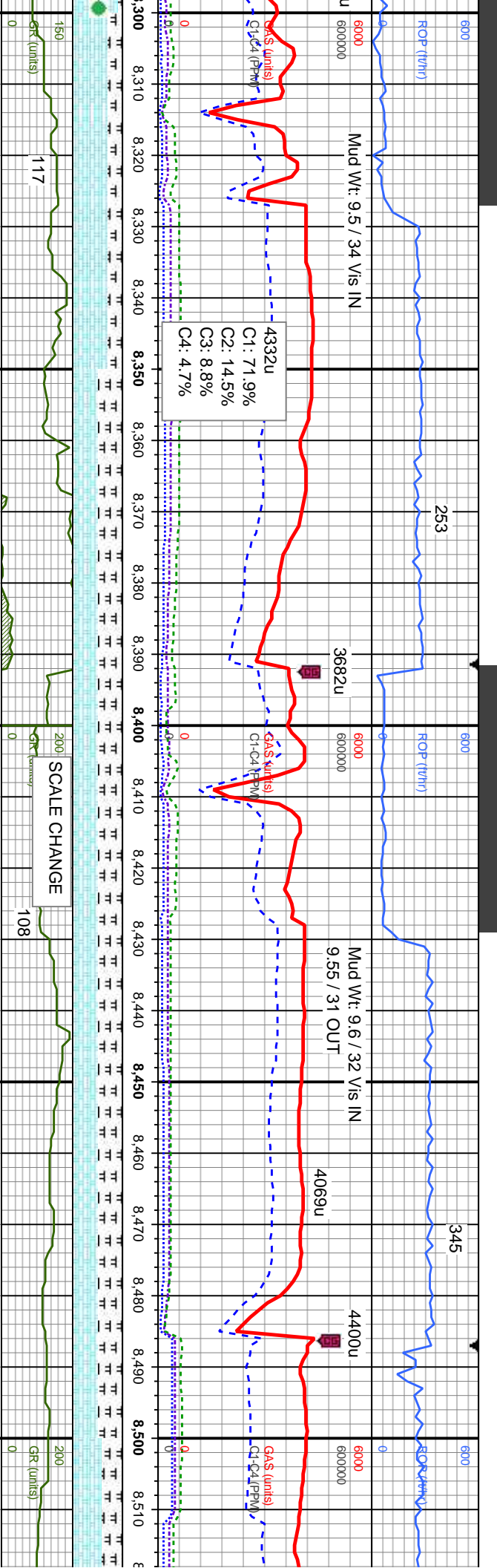
vals









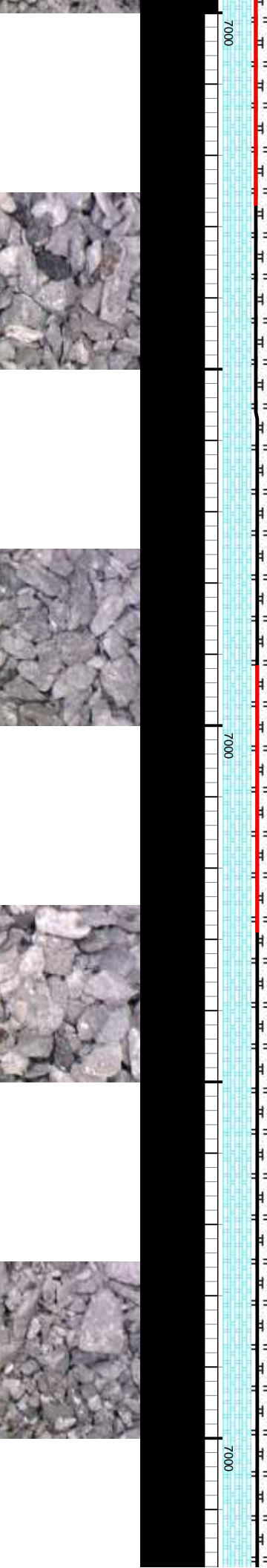


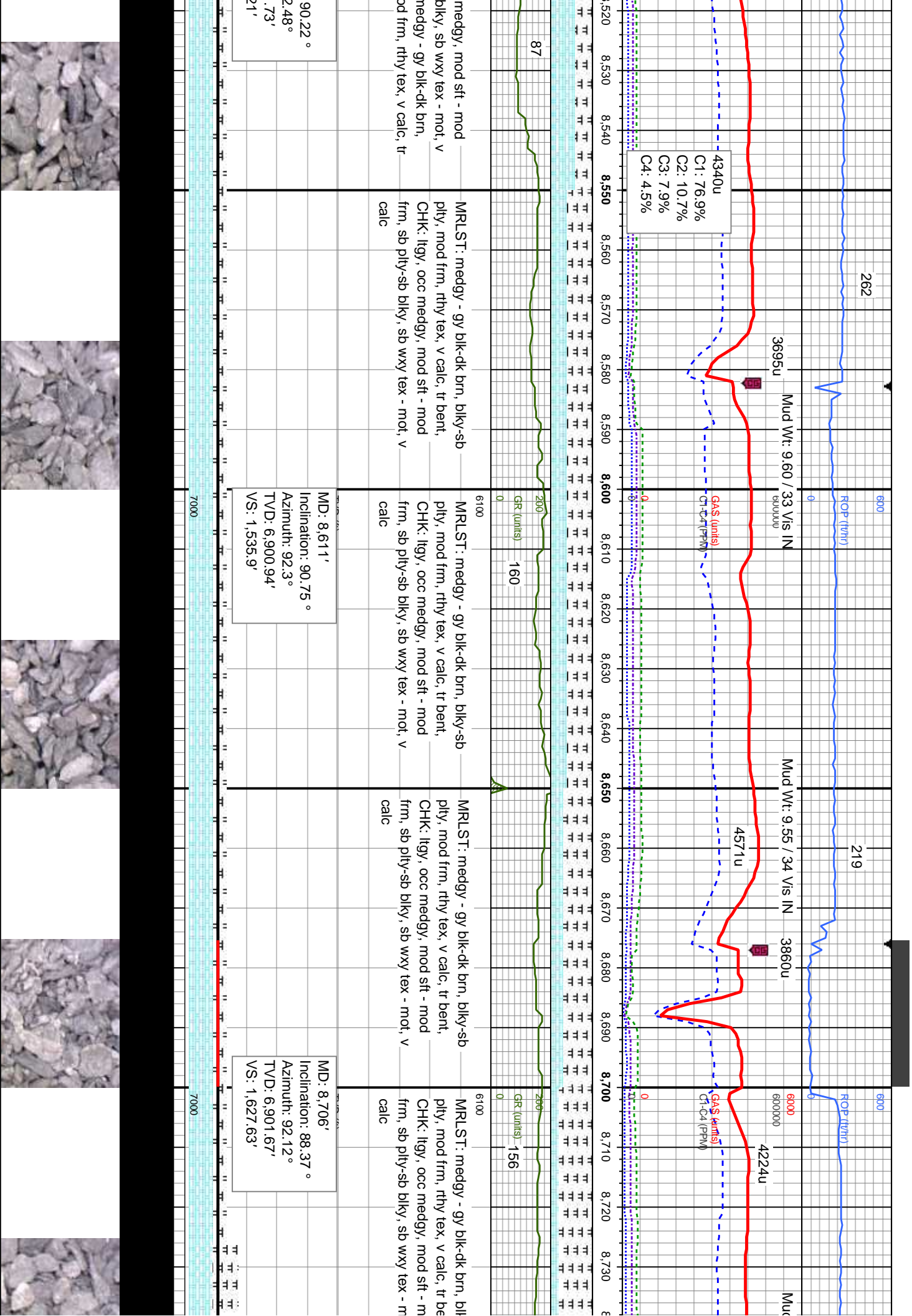
6100	CHK: Itgy, occ medgy, mod sft - mod frm, sb pily-sb blk, sb wxy tex - mot, v calc, MRLST: medgy - gy blk-dk brn, blkly-sb pily, mod frm, rthy tex, v calc, tr bent	6100	CHK: Itgy, occ medgy, mod sft - mod frm, sb pily-sb blk, sb wxy tex - mot, v calc, MRLST: medgy - gy blk-dk brn, blkly-sb pily, mod frm, rthy tex, v calc, tr bent	6100	CHK: Itgy, occ medgy, mod sft - mod frm, sb pily-sb blk, sb wxy tex - mot, v calc, MRLST: medgy - gy blk-dk brn, blkly-sb pily, mod frm, rthy tex, v calc, tr bent
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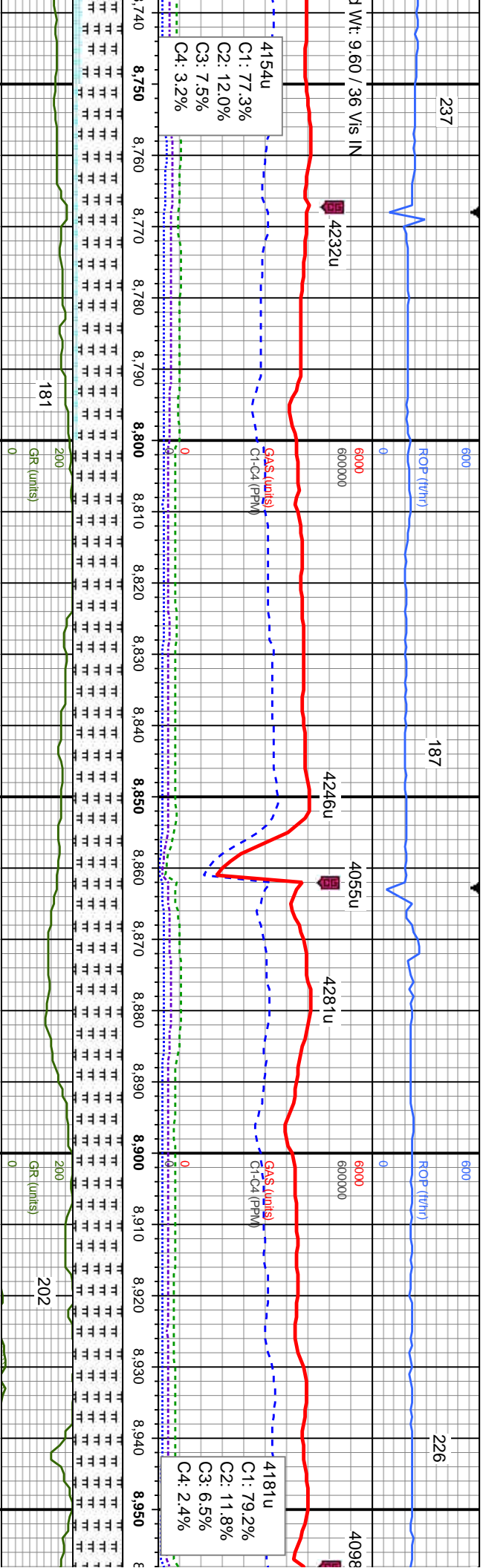
MD: 8,327'  
Inclination: 92.77 °  
Azimuth: 91.6°  
TVD: 6,904'  
VS: 1,261.81'

MD: 8,422'  
Inclination: 89.87 °  
Azimuth: 92.48°  
TVD: 6,901.81'  
VS: 1,353.59'

MD: 8,517'  
Inclination: 91.6°  
Azimuth: 91.6°  
TVD: 6,901  
VS: 1,445.2







Y-sb  
nt,  
od  
ot, v  
calc

MRLST: medgy - gy blk-dk brn, blk-y-sb  
ply, mod frm, rthy tex, v calc, tr bent,  
CHK: lty, occ medgy, mod sft - mod  
frm, sb ply-sb blk-y, sb wxy tex - mot, v

MRLST: medgy - gy blk-dk brn, blk-y-sb  
ply, mod frm, rthy tex, v calc, tr bent, tr  
CHK

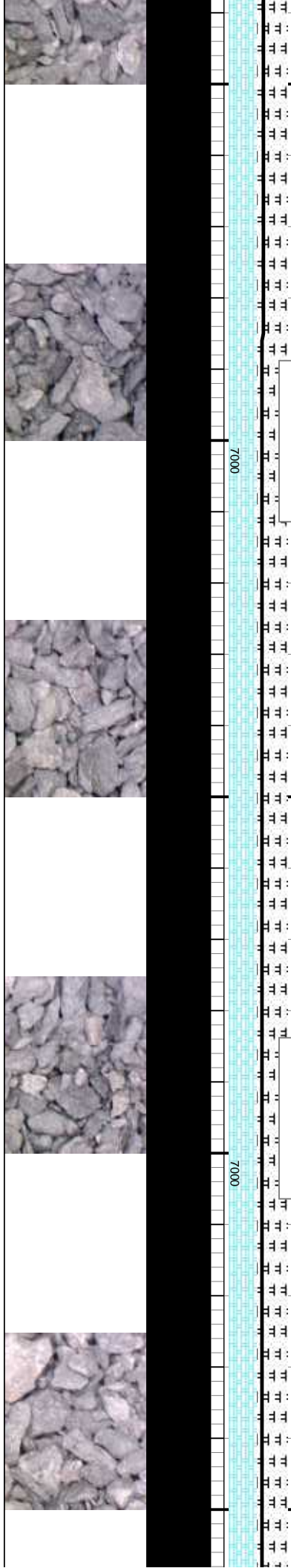
MRLST: medgy - gy blk-dk brn, blk-y-sb  
ply, mod frm, rthy tex, v calc, tr bent, tr  
CHK

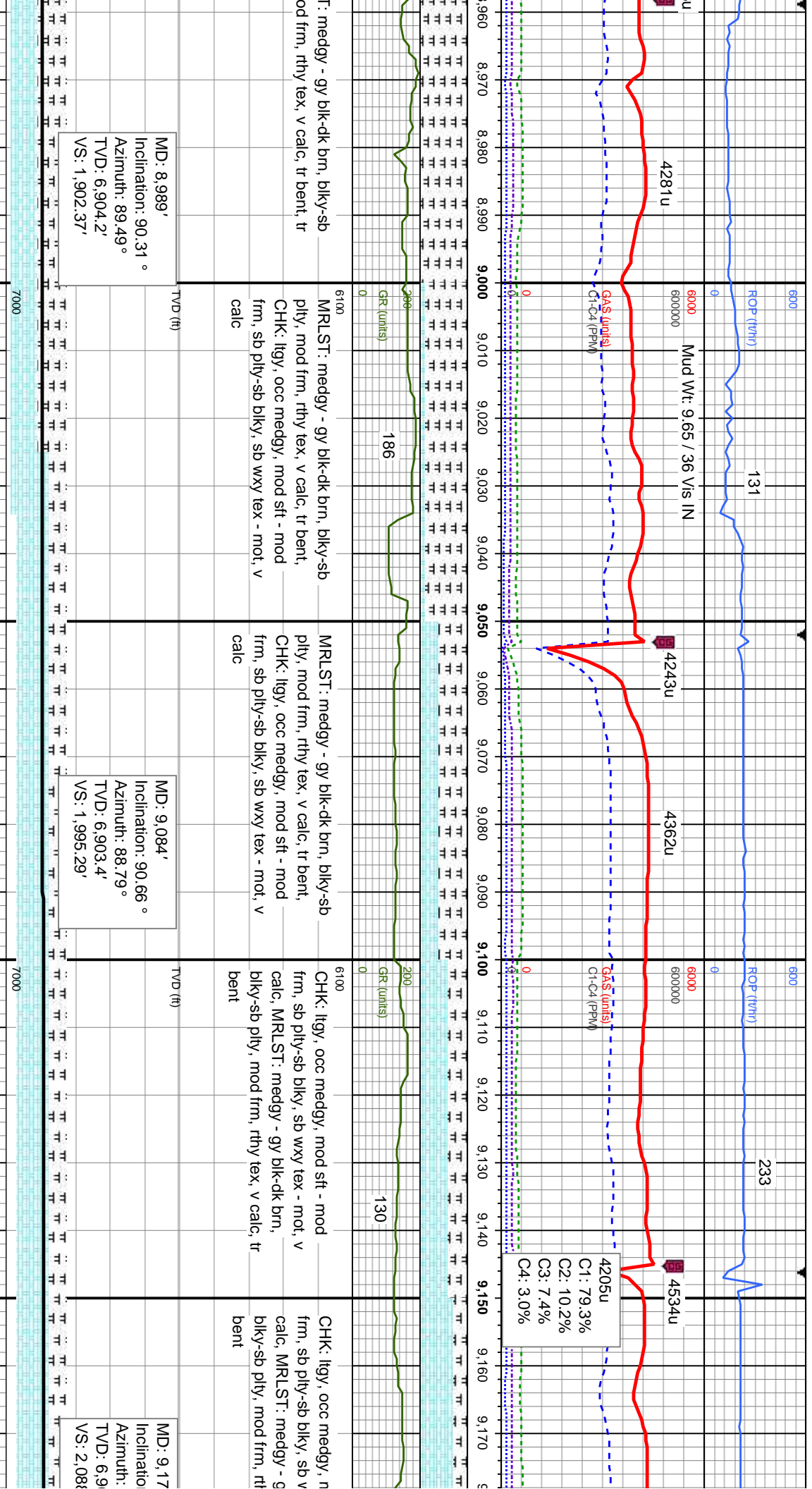
MRLST: medgy - gy blk-dk brn, blk-y-sb  
ply, mod frm, rthy tex, v calc, tr bent, tr  
CHK

MRLS  
ply, m  
CHK

MD: 8,800'  
Inclination: 89.25 °  
Azimuth: 91.6°  
TV/D: 6,903.62'  
VS: 1,718.53'

MD: 8,895'  
Inclination: 89.87 °  
Azimuth: 90.54°  
TV/D: 6,904.35'  
VS: 1,810.73'





medgy - gy blk-dk brn, blk-y-sb  
frm, rthy tex, v calc, tr bent, tr

MRLST: medgy - gy blk-dk brn, blk-y-sb  
pty, mod frm, rthy tex, v calc, tr bent,  
CHK: lgy, occ medgy, mod sft - mod  
frm, sb pty-sb blk-y, sb wxy tex - mot, v  
calc

MRLST: medgy - gy blk-dk brn, blk-y-sb  
pty, mod frm, rthy tex, v calc, tr bent,  
CHK: lgy, occ medgy, mod sft - mod  
frm, sb pty-sb blk-y, sb wxy tex - mot, v  
calc

CHK: lgy, occ medgy, mod sft - mod  
frm, sb pty-sb blk-y, sb wxy tex - mot, v  
calc, MRLST: medgy - gy blk-dk brn,  
blk-y-sb pty, mod frm, rthy tex, v calc, tr  
bent

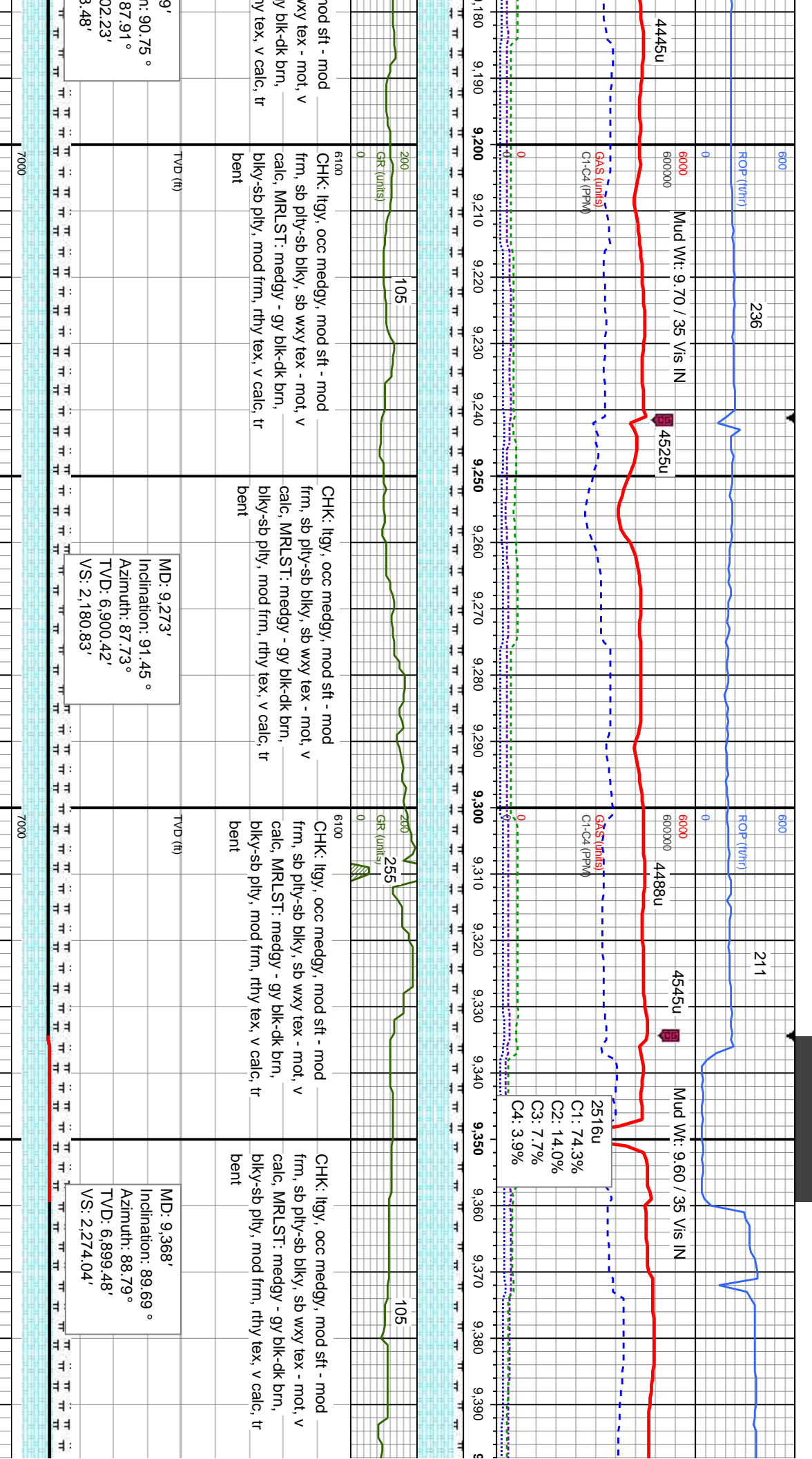
CHK: lgy, occ medgy, n  
frm, sb pty-sb blk-y, sb v  
calc, MRLST: medgy - g  
blk-y-sb pty, mod frm, rth  
bent

MD: 8,989'  
Inclination: 90.31 °  
Azimuth: 89.49 °  
TVD: 6,904.2'  
VS: 1,902.37'

MD: 9,084'  
Inclination: 90.66 °  
Azimuth: 88.79 °  
TVD: 6,903.4'  
VS: 1,995.29'

4205u  
C1: 79.3%  
C2: 10.2%  
C3: 7.4%  
C4: 3.0%





9'  
n: 90.75 °  
87.91 °  
22.23'  
3.48'

MD: 9,273'  
Inclination: 91.45 °  
Azimuth: 87.73 °  
TVD: 6,900.42'  
VS: 2,180.83'

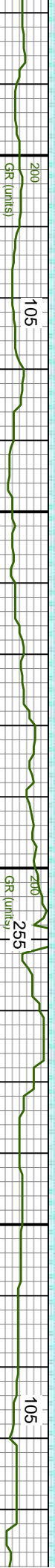
MD: 9,368'  
Inclination: 89.69 °  
Azimuth: 88.79 °  
TVD: 6,899.48'  
VS: 2,274.04'

mod sft - mod  
xy tex - mot, v  
frm, sb ply-sb blk, sb wxy tex - mot, v  
calc, MRLST: medgy - gy blk-dk brn,  
blyk-sb ply, mod frm, rthy tex, v calc, tr  
bent

CHK: Itgy, occ medgy, mod sft - mod  
frm, sb ply-sb blk, sb wxy tex - mot, v  
calc, MRLST: medgy - gy blk-dk brn,  
blyk-sb ply, mod frm, rthy tex, v calc, tr  
bent

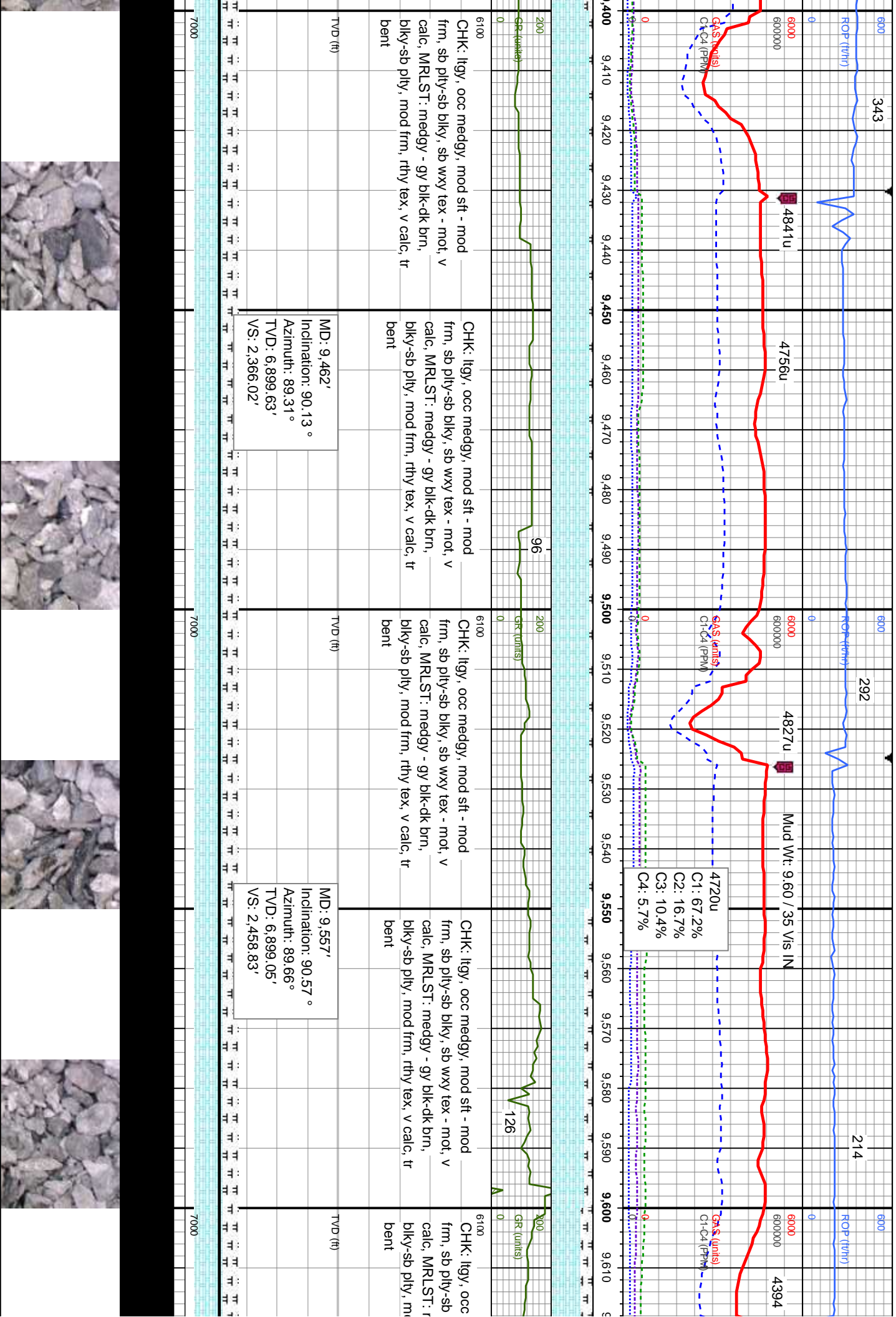
CHK: Itgy, occ medgy, mod sft - mod  
frm, sb ply-sb blk, sb wxy tex - mot, v  
calc, MRLST: medgy - gy blk-dk brn,  
blyk-sb ply, mod frm, rthy tex, v calc, tr  
bent

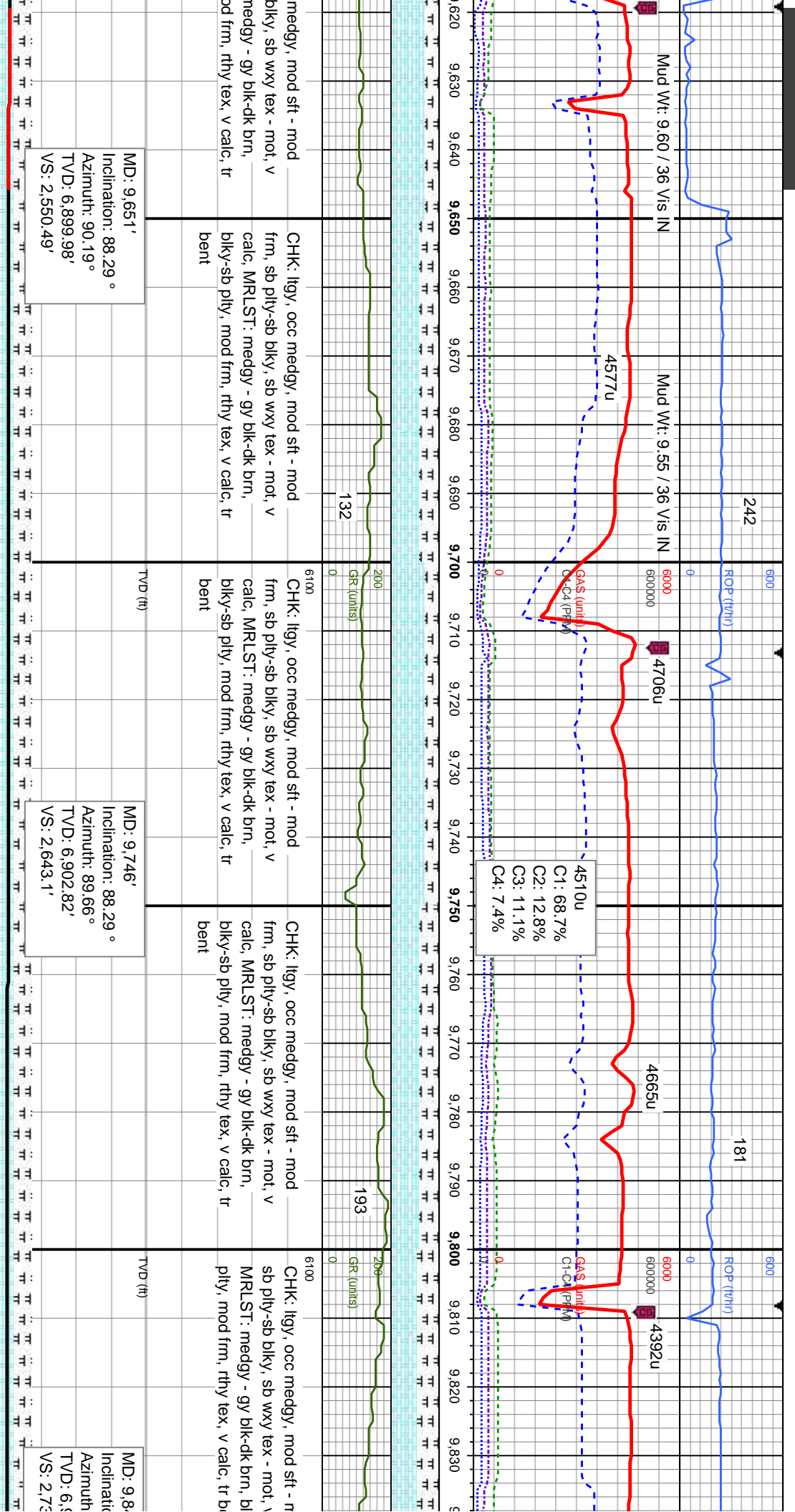
CHK: Itgy, occ medgy, mod sft - mod  
frm, sb ply-sb blk, sb wxy tex - mot, v  
calc, MRLST: medgy - gy blk-dk brn,  
blyk-sb ply, mod frm, rthy tex, v calc, tr  
bent

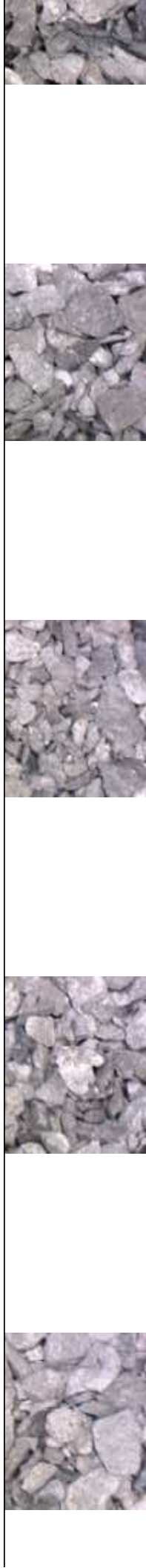
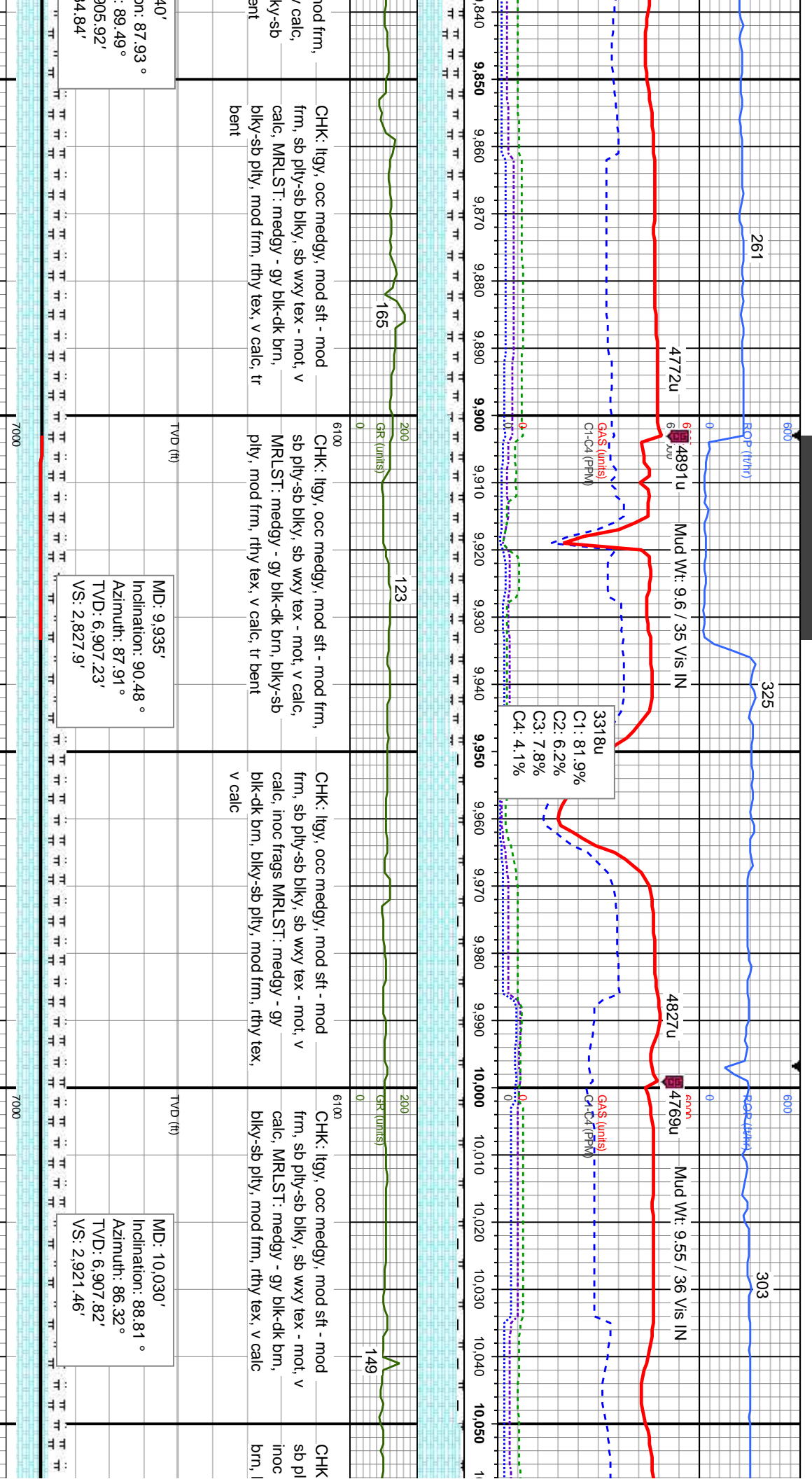


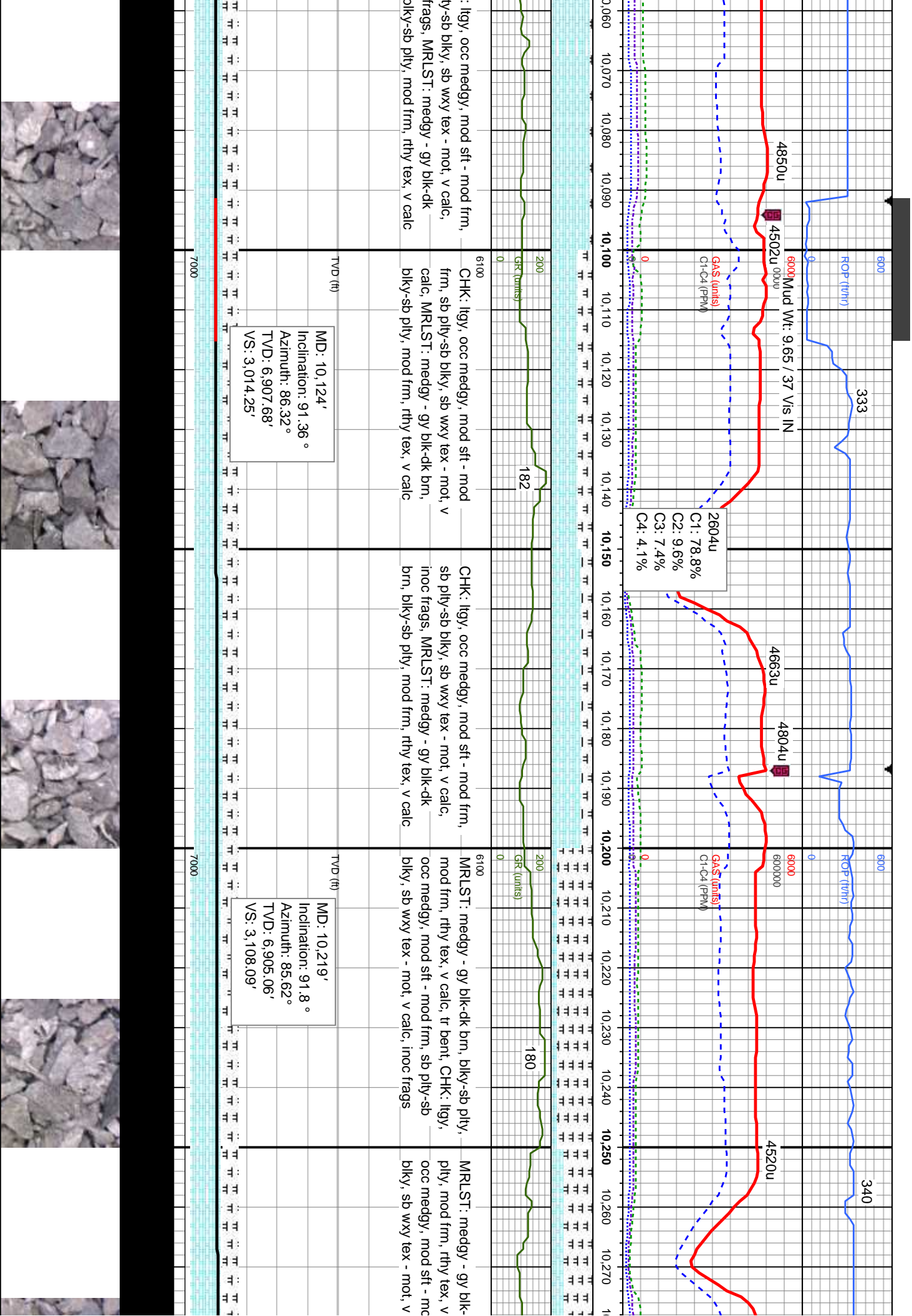
2516u  
C1: 74.3%  
C2: 14.0%  
C3: 7.7%  
C4: 3.9%

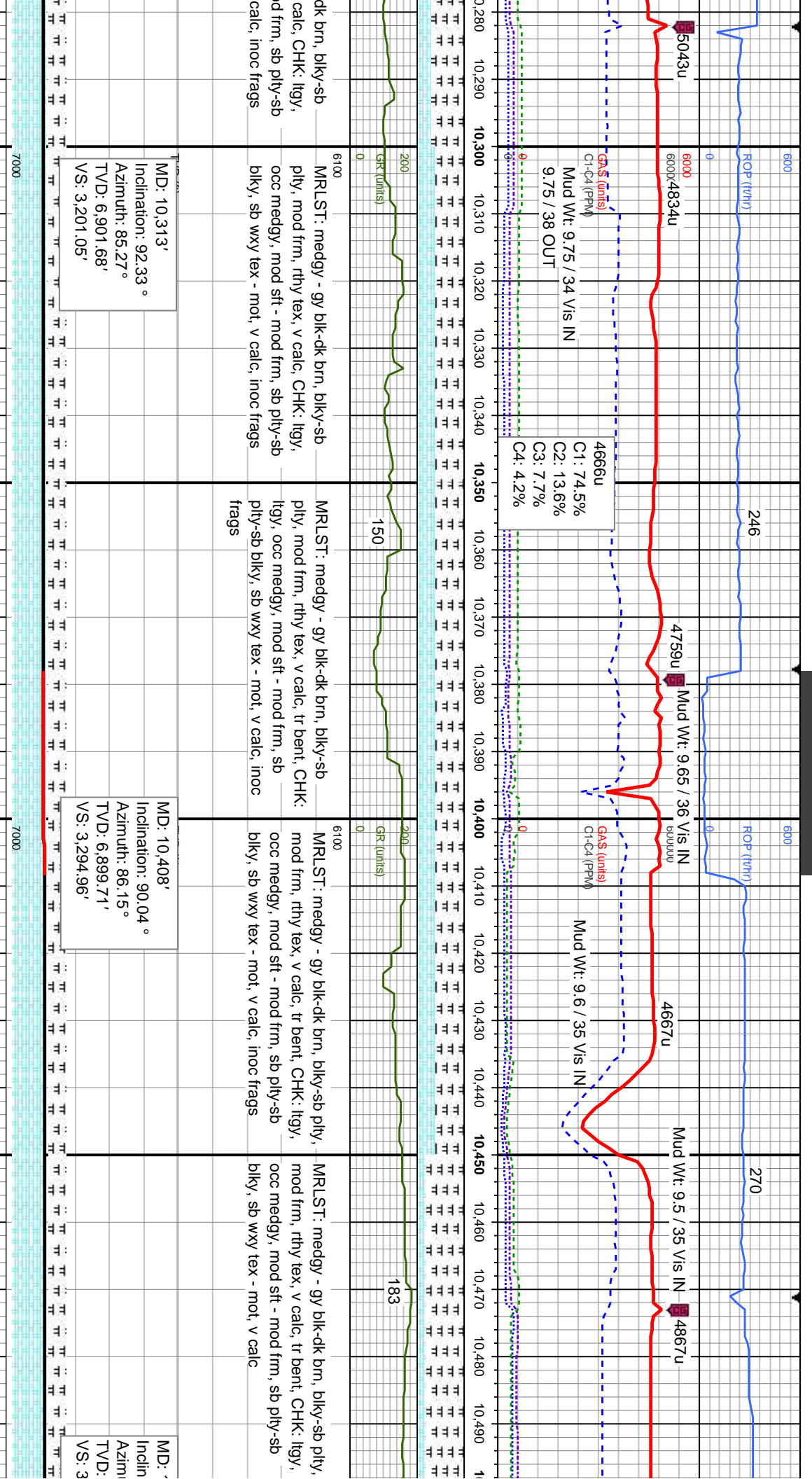










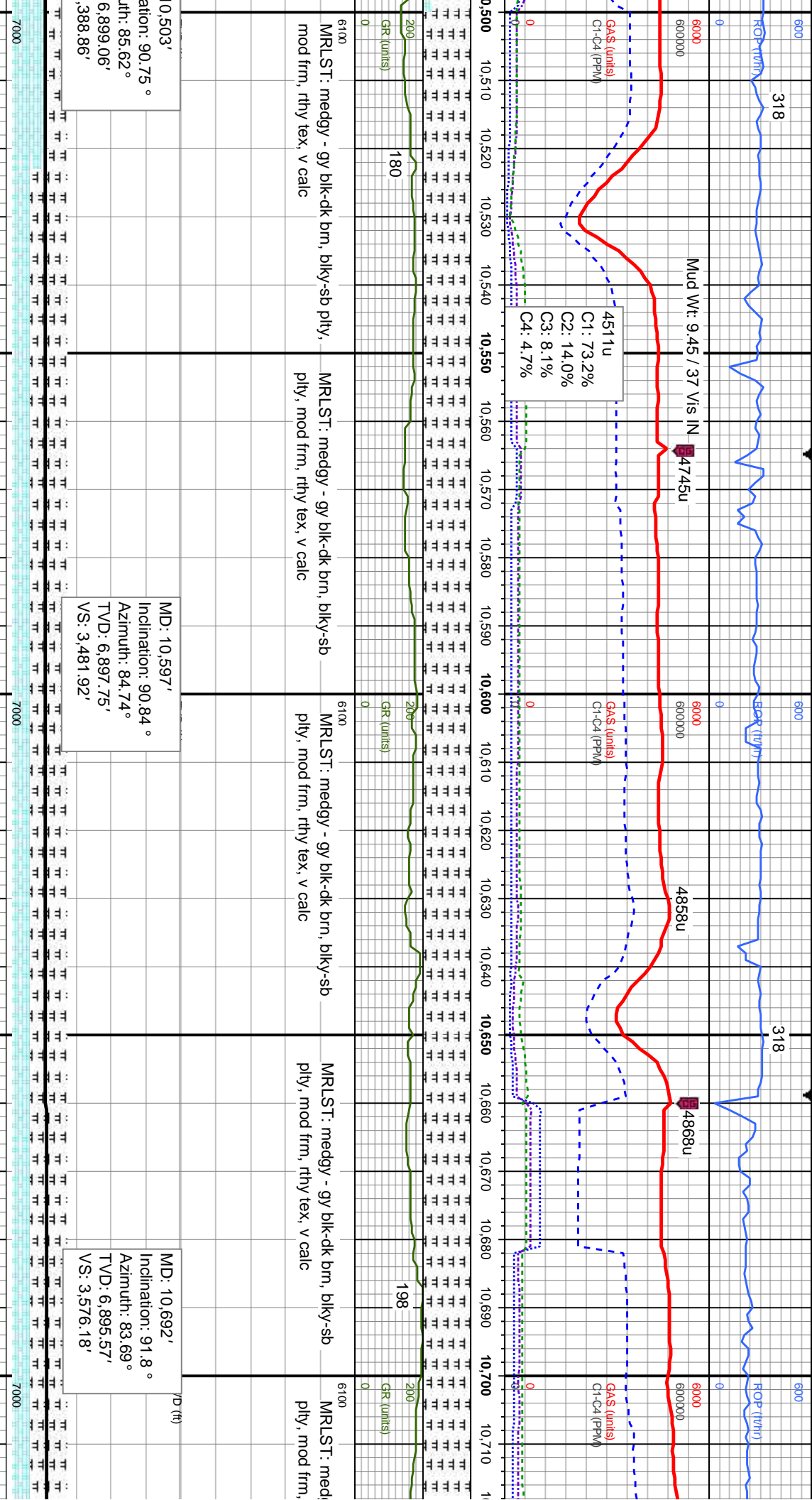


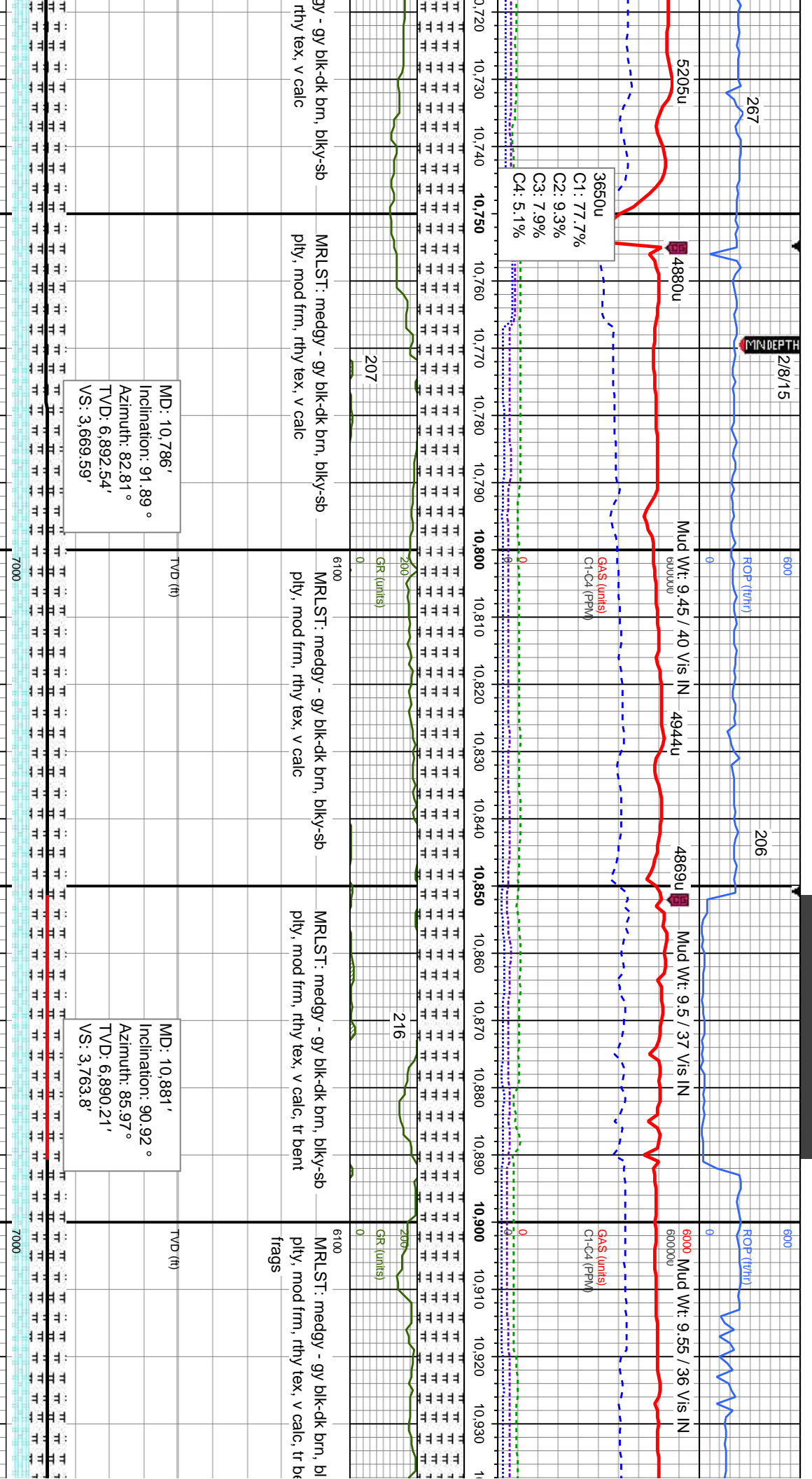
MD: 10,313'  
Inclination: 92.33°  
Azimuth: 85.27°  
TVD: 6,901.68'  
VS: 3,201.05'

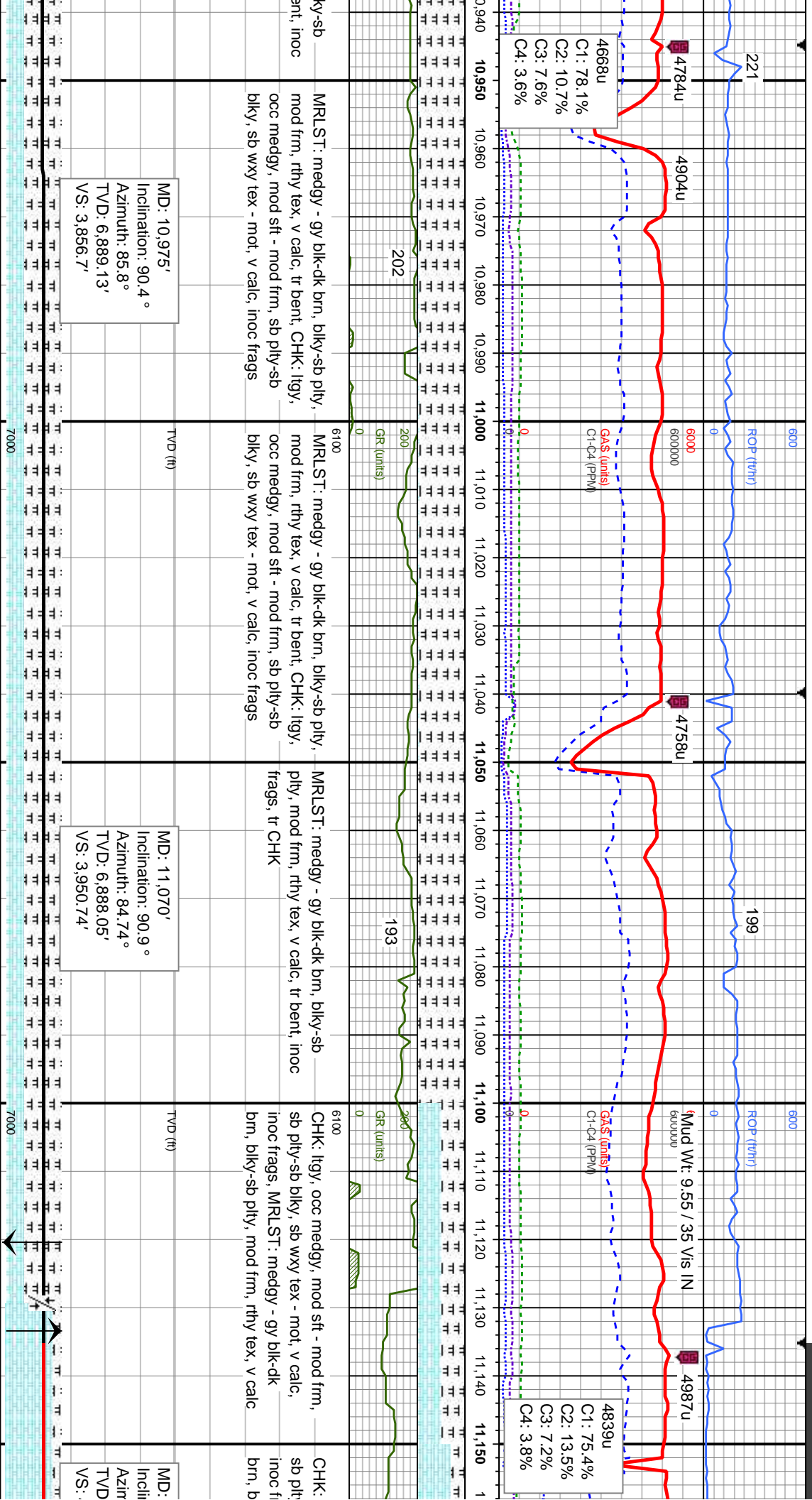
4666u  
C1: 74.5%  
C2: 13.6%  
C3: 7.7%  
C4: 4.2%

MD: 10,408'  
Inclination: 90.04°  
Azimuth: 86.15°  
TVD: 6,899.71'  
VS: 3,294.96'

MD: ·  
Inclin  
Azim  
TVD:  
VS: 3







MRLS1: medgy - gy blk-dk brn, blkly-sb pily,  
mod frm, rthy tex, v calc, tr bent, CHK: ltgy,  
mod frm, mod sft - mod frm, sb pily-sb  
occ medgy, mod sft - mod frm, sb pily-sb  
blkly, sb wxy tex - mot, v calc, inoc frags

MRSLST: medgy - gy blk-dk brn, blyk-sb ply  
mod frm, rthy tex, v calc, tr bent, CHK: ltyg,  
occ medgy, mod sft - mod frm, sb ply-sb  
blyk, sb wxy tex - mot, v calc, inoc frags

MR.LST: medgy - gy blk-dk brn, blk-y-sb  
ply, mod frm, rthy tex, v calc, tr bent, inoc  
frags, tr CHK

CHK: itgy, occ medgy, mod sft - mod frm,  
sb pily-sb blkly, sb wxy tex - mot, v calc,  
inoc frags, MRLST: medgy - gy blk-dk  
brn, blkly-sb pily, mod frm, rthy tex, v calc

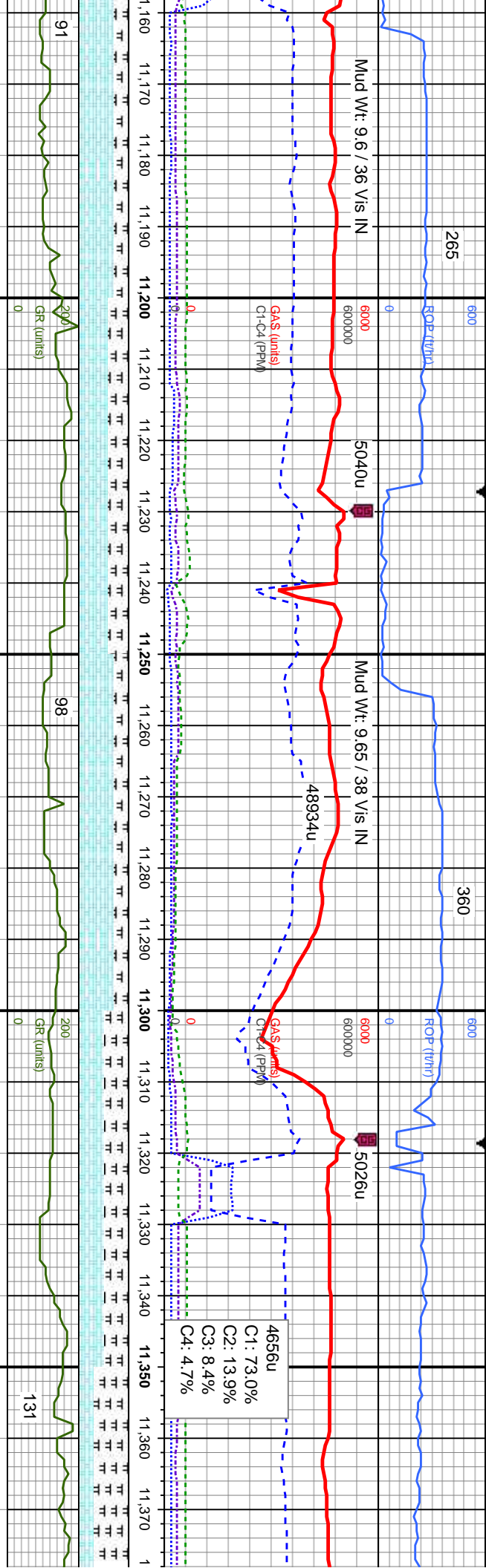
CHK:  
sb plty  
inoc fi  
brn, b

MD: 10,975'  
Inclination: 90.4°  
Azimuth: 85.8°  
TVD: 6,889.13'  
VS: 3,856.7'

MD: 11,070'  
Inclination: 90.9°  
Azimuth: 84.74°  
TVD: 6,888.05'  
VS: 3,950.74'

MD:	
Inclin	
Azimuth	
TVDD	
VS:	





lity, occ medgy, mod sft - mod frm, -  
-sb blkly, sb wxy tex - mot, v calc,  
ags, MRLST: medgy - gy blk-dk  
blkly-sb ply, mod frm, rthy tex, v calc

CHK: lity, occ medgy, mod sft - mod frm,  
sb ply-sb blkly, sb wxy tex - mot, v calc,  
inoc frags, MRLST: medgy - gy blk-dk  
brn, blkly-sb ply, mod frm, rthy tex, v calc

CHK: lity, occ medgy, mod sft - mod frm,  
sb ply-sb blkly, sb wxy tex - mot, v calc,  
inoc frags, MRLST: medgy - gy blk-dk  
brn, blkly-sb ply, mod frm, rthy tex, v calc

MRLST: medgy - gy blk-dk brn, blkly-sb ply,  
mod frm, rthy tex, v calc, tr bent, CHK: lity,  
occ medgy, mod sft - mod frm, sb ply-sb  
blkly, sb wxy tex - mot, v calc

MRLST: medgy - gy blk-dk  
mod frm, rthy tex, v calc, tr  
occ medgy, mod sft - moc  
blkly, sb wxy tex - mot, v c

11,164'  
ation: 89.78 °  
uth: 85.97 °  
: 6,887.49'  
4,043.77'

MD: 11,259'  
Inclination: 90.84 °  
Azimuth: 88.61 °  
TVD: 6,886.98'  
VS: 4,137.28'

MD: 11,353'  
Inclination: 91.89 °  
Azimuth: 88.08 °  
TVD: 6,884.74'  
VS: 4,229.46'

