

COLUMBINE LOGGING

Scale: 5" / 100'
Measured Depth Log

Well Name Brecken LD28-727

Location SWSE 28 9N 58W

State COLORADO

County WELD

Country USA

Rig Number H&P #273

API Number 05-123-41567

Field WATTENBERG

Region DJ BASIN

Drilling Completed 8/11/2015

Spud Date 8/6/2015

Surface Coordinates LAT: 40.71583

LONG: -103.86547

358' FSL

1704' FEL

Bottom Hole Coordinates 290' FNL
1179' FEL

Ground Elevation 4829'

K.B. Elevation 4853'

Logged Interval 1200' To 10579'

Total Depth 10579'

Formation NIOBRARA B MARL/B CHALK

Type of Drilling Fluid H2O, LSND

Operator

Company Noble Energy Inc.

Address 1625 BROADWAY
DENVER, CO 80202
(303) 228-4000

Geologists

Name MICHAEL ANDERSON, JOEY LUCE

Company COLUMBINE LOGGING, INC.

Address 602 S. LIPAN ST
DENVER, COLORADO 80223
(303) 289-7764

Zone Color C

Oil
Note
Error

Condensate
Core
Water

Rock Type

UNKNOWN
ANHYDRITE
BENTONITE
BRECCIA
CHALK
CEMENT
CHERT
CLAY CHOKE SA...
CLAYSTONE
COAL
CONGLOMERATE
DOLOMITE
DOLOMITIC LIMESTO...
GYP SUM
IGNEOUS
SIDERITE or LIMONITE
LIMESTONE

Accessories

Fossils		Stringer	
	GASTROPOD		ARGILLITE GRAIN
	INOCERAMUS		HEAVY MINERAL
	OOOLITE		KAOLIN
	ALGAE		MARCASITE
	AMPHIPORA		BRECCIA FRAGMENTS
	OSTRACOD		MARLSTONE
	BELEMNITE		MICAEOUS
	BIOCLASTIC		CARBONACEOUS FLAKES
	BRACHIOPOD		CHERT
	PISOLITE		NODULES
	BRYOZOA		PLANT REMAINS
	CEPHALOPOD		COAL - THIN BEDS
	CORAL		DOLOMITIC
	CRINOID		FELDSPAR
	ECHINOID		FERRUGINOUS PELLET
	FISH		FERRUGINOUS
	FORAMINIFERA		GLAUCONITE
	FOSSIL		GYPSIFEROUS
			SIDERITE
			SILICEOUS
			SILTY
			TUFFACEOUS
			SHALE STRINGER
			SILTSTONE STRINGER

Other Symbols

Oil Show		Engineering	
	PINPOINT		DST INTERVAL
	VUGGY		FAULT
	DEAD		FORMATION TOP
	EVEN		GAS SHOW
	QUESTIONABLE		OIL SHOW
	SPOTTED STAIN...		BIT
			CONNECTION (UP)
			CONNECTION (DOWN)
			MN DEPTH UP
			MN DEPTH (DOWN)
			ANGULAR
			ROUNDED
			SUBANG
			SUBRAND
			MN DEPTH
			L LITHOGRAPHIC
			MX MICROXIN
			MS MUDSTONE
			PS PACKSTONE
			WS WACKESTO...

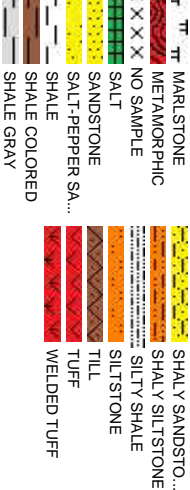
Porosity		Textures	
	E EARTHY		NORMAL FAULT
	FENESTRAL		OVERTURNED STRATA
	FRACTURE		REVERSE FAULT
	INTERCRYSTALL...		CASING
	INTEROOLITIC		SIDEWALL CORE (LEFT)
	MOLDIC		SIDEWALL CORE (RIGH..
	ORGANIC		SLIDE
			SURVEY
			BS BOUNDSTONE
			CHALKY
			CS CRYPTOXIN
			P POOR
			W WELL
			M MODERATE

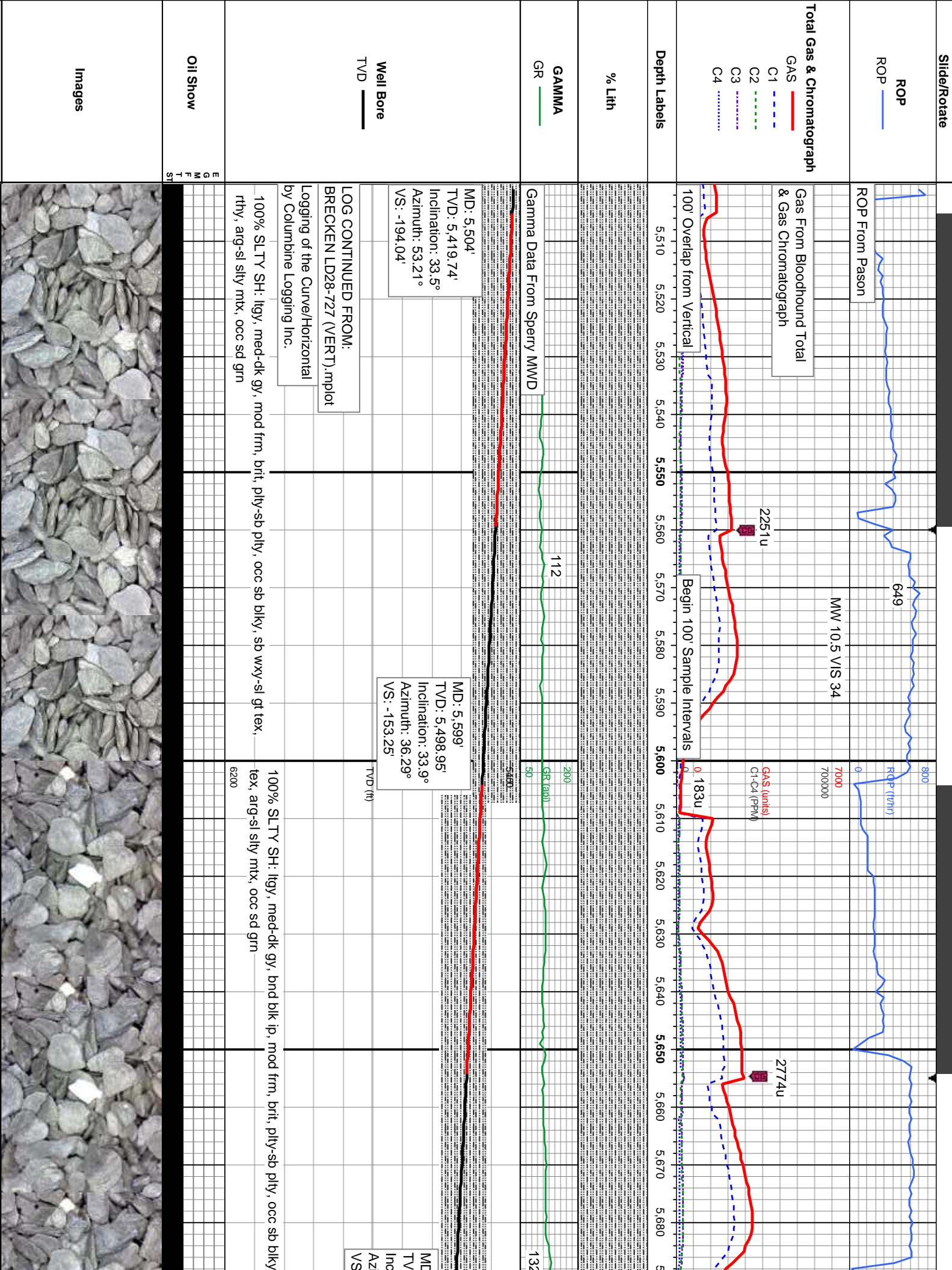
Rounding		Sorting	
	CONNECTION (UP)		MN DEPTH UP
	CONNECTION (DOWN)		MN DEPTH (DOWN)
	MN DEPTH UP		MN DEPTH (DOWN)
	ANGULAR		ROUNDED
	SUBANG		SUBRAND
	MN DEPTH		L LITHOGRAPHIC
	MX MICROXIN		MS MUDSTONE
	PS PACKSTONE		WS WACKESTO...

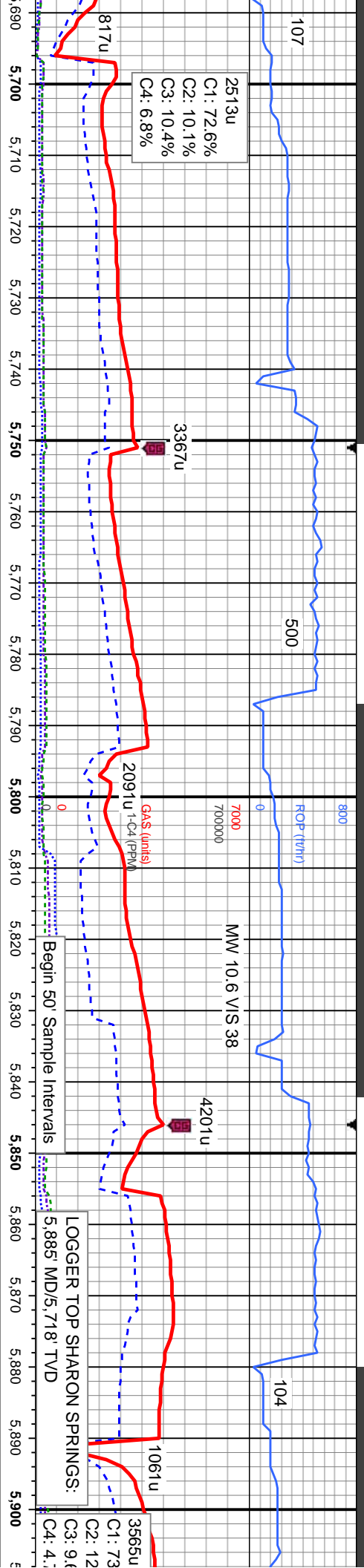
ooding



ags







2513u
C1: 72.6%
C2: 10.1%
C3: 10.4%
C4: 6.8%

3367u

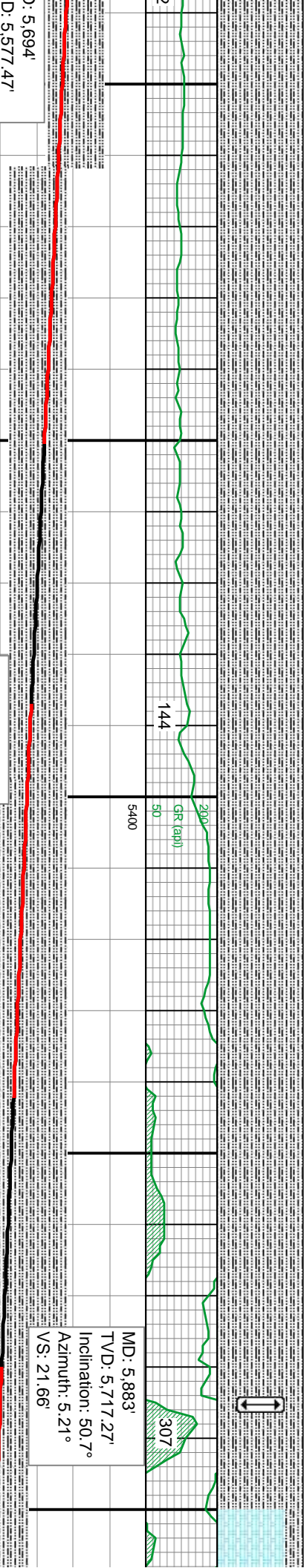
Gas (units)
7000
700000

MW 10.6 V/S 38

4201u

LOGGER TOP SHARON SPRINGS:
5,885 MD/5,718 TVD

3565u
C1: 73
C2: 12
C3: 9.0
C4: 4.1



MD: 5,694'
TVD: 5,652.16'
Inclination: 34.96°
Azimuth: 20.6°

MD: 5,789'
TVD: 5,652.16'
Inclination: 41.51°
Azimuth: 8.2°
VS: -45.98'

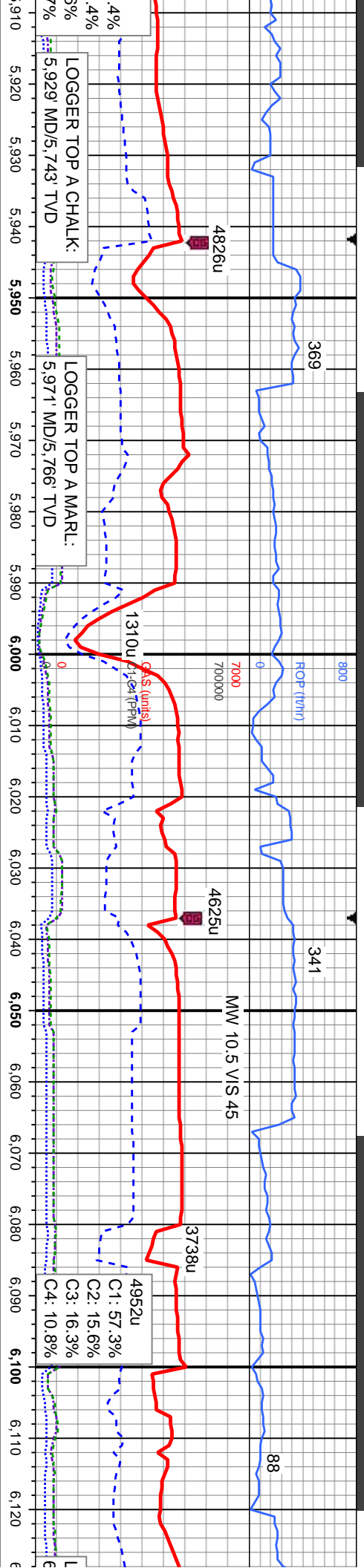
MD: 5,883'
TVD: 5,717.27'
Inclination: 50.7°
Azimuth: 5.21°
VS: 21.66'

100% SLTY SH: lgy, med-dk gy, bnd blk ip, mod frm, brit, pty-sb pty, occ sb blk, gt-rthy
tex, arg-si silty mtx, occ sd grn

100% SLTY SH: lgy ip, med-dk gy, blk-bnd
blk, mod-si frm, brit, pty-sb pty, occ sb
blk, gt-rthy tex, arg-si silty mtx, rr bent;
mod-fast dfse, mod stmg, bri bishwh milky
cut, tr sin, no od

100% SLTY SH: lgy ip, med-dk gy, blk-bnd
blk, mod-si frm, brit, pty-sb pty, occ sb
blk, gt-rthy tex, arg-si silty mtx, tr bent, rr pyr;
mod-fast dfse, mod stmg, bri bishwh milky
cut, tr sin, no od





MD: 5.978'
TVD: 5.770.74'
Inclination: 60.71°
Azimuth: 3.78°
VS: 100.01'

CHK: wh-ltgy, medgy ip, some cim-it
t-mod frm, brit-fri, sb pty-sb blk, sb
xy tex, v calc 20% SLTY SH: med-dk
t-bnd blk, mod-sl frm, brit, pty-sb pty,
blk, gt-rthy tex, arg-sl silty mx, tr
f pyr; mod difse, mod sting, bri
n cut, tr stn, no od

85% MRLST: medgy, occ ltgy, dk gy ip, mot,
sb pty-sb blk, mod frm-sft, brit, gt tex, v
calc, wi occ (15%) chk, rr pyr; mod difse,
mod sting, bri bishwh cut, tr stn, no od

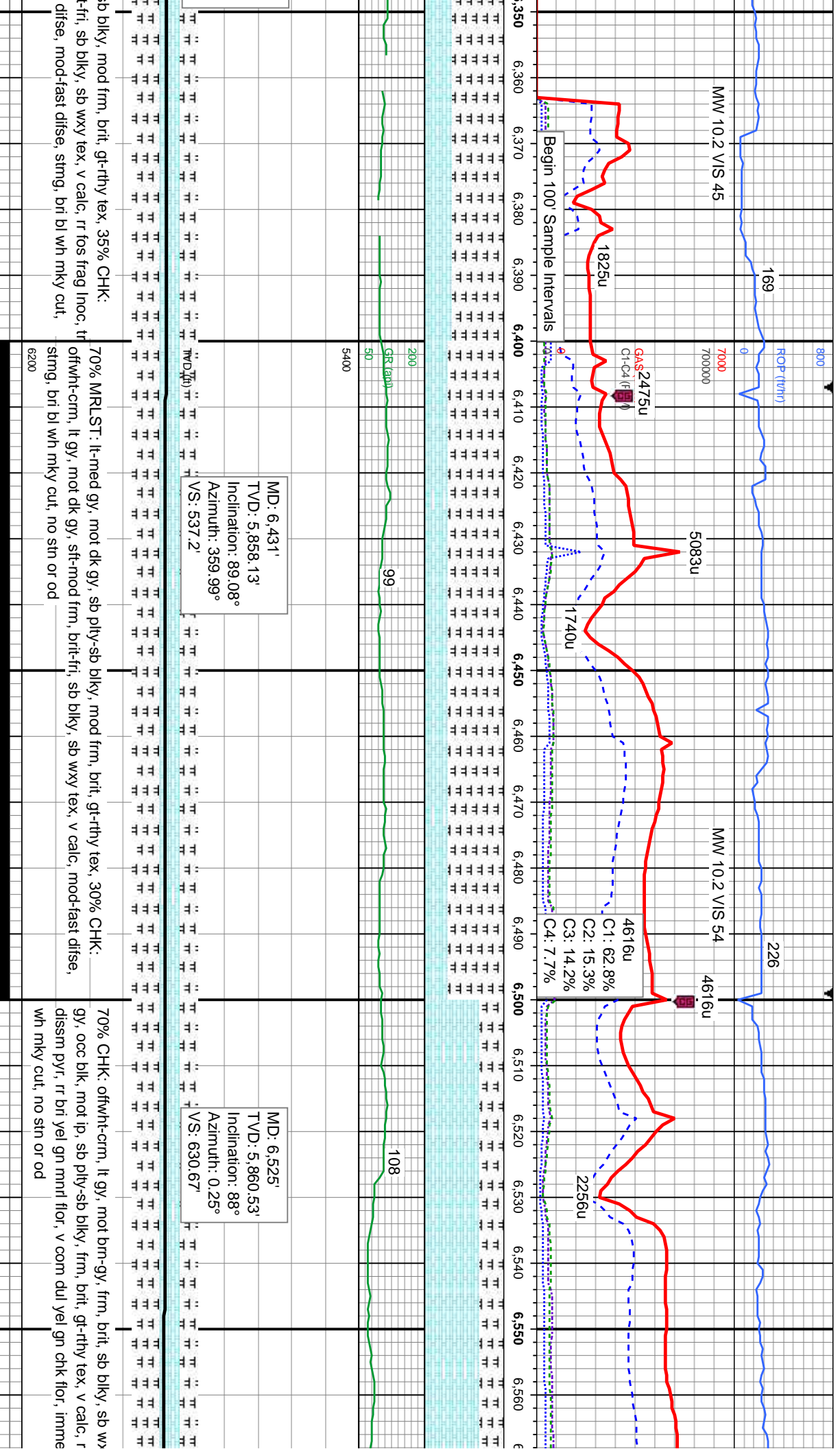
90% MRLST: medgy, occ ltgy, dk gy ip, mot,
sb pty-sb blk, mod frm-sft, brit, gt tex, v
calc, wi occ (10%) chk, rr fos frags, rr pyr;
mod difse, mod sting, bri bishwh cut, tr stn,
no od

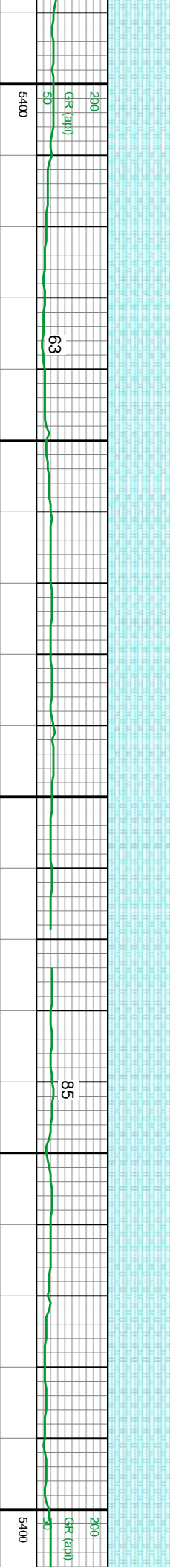
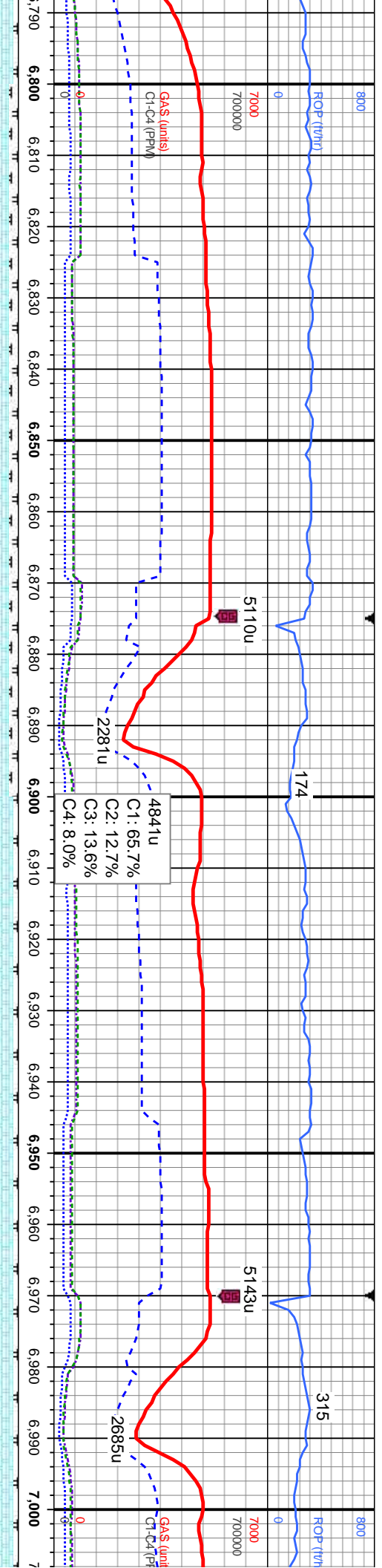
MD: 6.073'
TVD: 5.810.62'
Inclination: 69.61°
Azimuth: 3.71°
VS: 186.06'

85% MRLST: med-dk gy, some ltgy, mot, sb
pty-sb blk, mod frm-sft, brit, gt-rthy tex, v
calc, wi occ (15%) chk, rr inoc frags, rr cal wi
pyr; mod difse, mod sting, bri bishwh cut, tr
stn, no od

65% MRLST: medgy, occ
pty-sb blk, mod frm-sft, l
calc 35% CHK: wh-ltgy, r
frm, brit-fri, sb pty-sb blk
fast difse, fast sting, bri b
no od







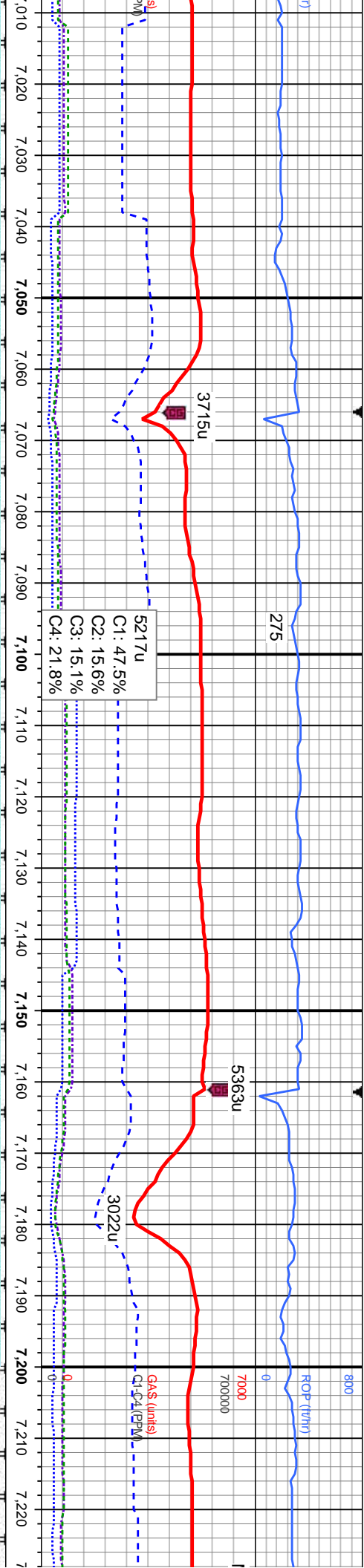
MD: 6,809'
TVD: 5,861.61'
Inclination: 90.52°
Azimuth: 1.38°
VS: 913.43'

MD: 6,904'
TVD: 5,860.84'
Inclination: 90.4°
Azimuth: 0.77°
VS: 1,008.07'

MD: 6,999'
TVD: 5,860.28'
Inclination: 90.28°
Azimuth: 1.22°
VS: 1,102.7'

90% CHK: offwht-crm, bf-brn, mot gy, frm, brit, sb blk, sb wxy tex, v calc, occ (10%) mrlst, occ fos frag Inoc, rr dissim pyr, v com dul yel gn chk flor, v fast difse, hvy stmg, v bri bl wh mky cut, no sin or od	95% CHK: offwht-crm, bf-brn, mot gy, frm, brit, sb blk, sb wxy tex, v calc, tr (5%) mrlst, occ fos frag Inoc, rr dissim pyr, tr bent, tr bri yel gn mml flor, v com dul yel gn chk flor, v fast difse, hvy stmg, v bri bl wh mky cut, no sin or od	95% C fos fra cut, m
6200		6200



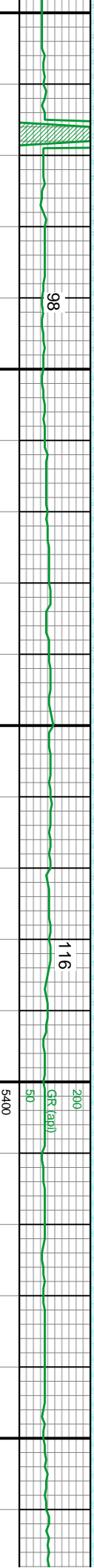
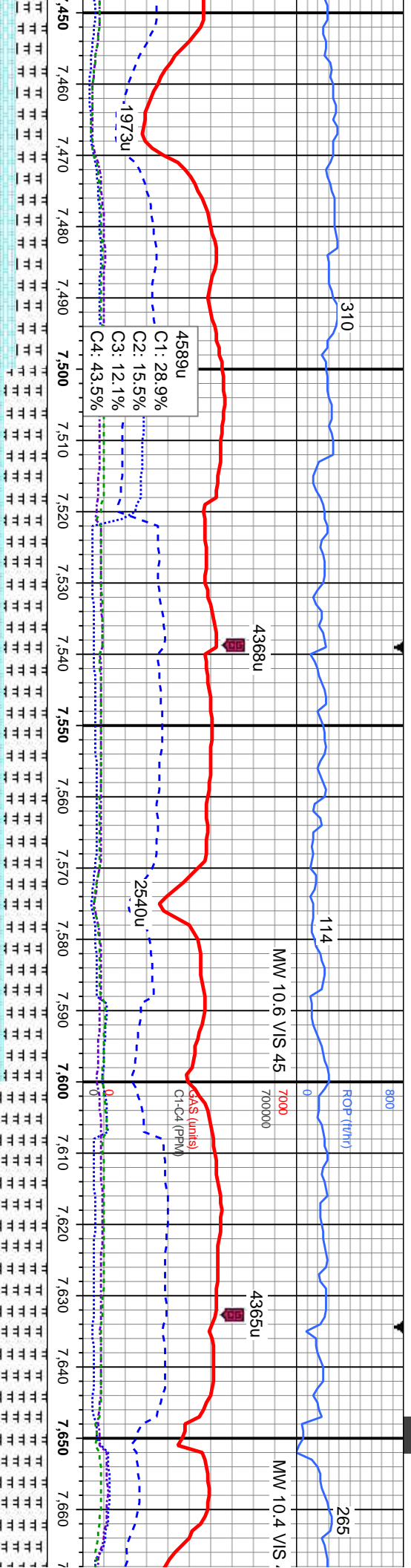


MD: 7,093'
TVD: 5,860.11'
Inclination: 89.94°
Azimuth: 0.6°
VS: 1,196.33'

MD: 7,188'
TVD: 5,860.97'
Inclination: 89.01°
Azimuth: 0.48°
VS: 1,290.89'

HK: offwht-crm, bi-bm, mot gy, frm, brit, sb blk, sb wxy tex, v calc, tr (5%) mrst, occ	95% CHK: offwht-crm, bi-brn, mot gy, frm, brit, sb blk, sb wxy tex, v calc, tr (5%) mrst, tr	90% CHK: offwht-crm, bi-
g lnoc, rr diss pyr, v com dul yel gn chk flr; immed difse, hvy string, v bri bl-wh mky	fos frag lnoc, rr diss pyr, v com dul yel gn chk flr; v fast diffuse, fast string, bri bl wh mky	tr fos frag lnoc, rr diss p
od stn, no od	cut, mod stn, no od	cut, mod stn, no od





MD: 7,472'
TVD: 5,857.95'
Inclination: 90.83°
Azimuth: 2.08°
VS: 1,574.07'

MD: 7,566'
TVD: 5,856.26'
Inclination: 91.23°
Azimuth: 1.97°
VS: 1,667.83'

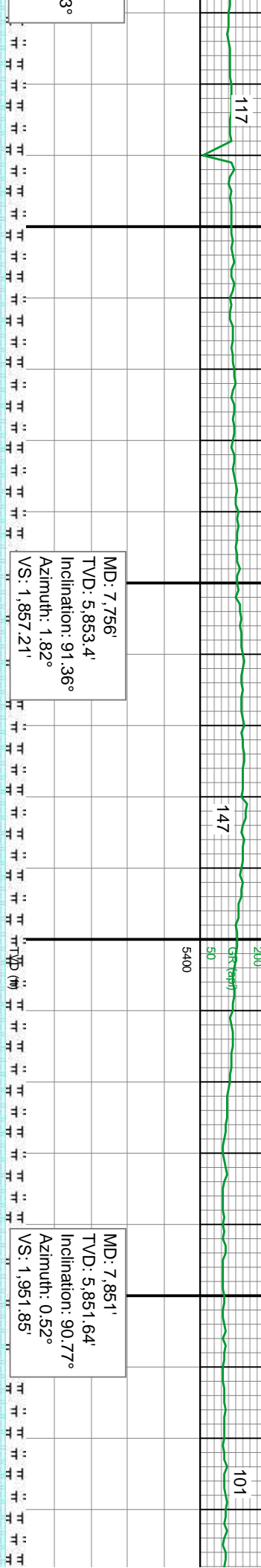
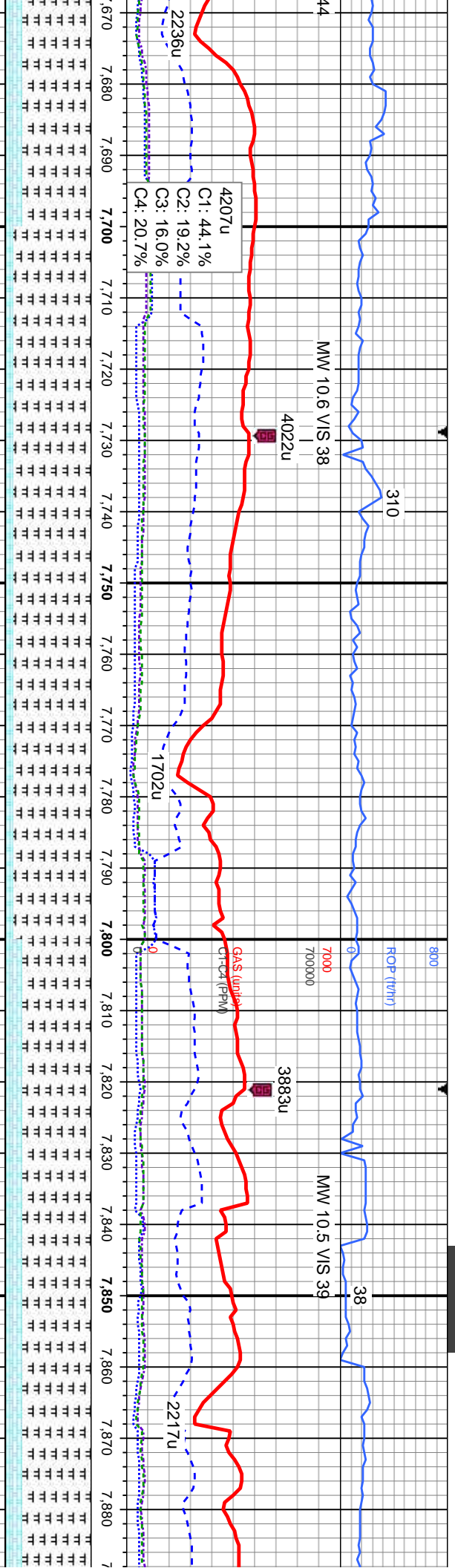
MD: 7,661'
TVD: 5,854.88'
Inclination: 90.4
Azimuth: 1.1°
VS: 1,762.52'

rit, sb biky, sb wxy-rthy tex, 35% MRLST: _____
 gt-rthy tex, v calc, rr fos frag lnc, rr dissim pyr, _____
 bl wh mky cut, mod str, no od _____

50% CHK: crm-bf-brn, gy brn, mot gy, mod-v frm, brit, sb blk, sb wxy-rthy tex, 50% MRLST: med-dk gy, occ blk, sb ply-sb blk, frm, brit, gi-rthy tex, v calc, occ fos frag inoc, rr dissim pvr, rr bent, rr bri yel mnf flor, com du yel gn chk flor, fast diffuse, stmg, bri bl wh mky cut, mod stn, no od

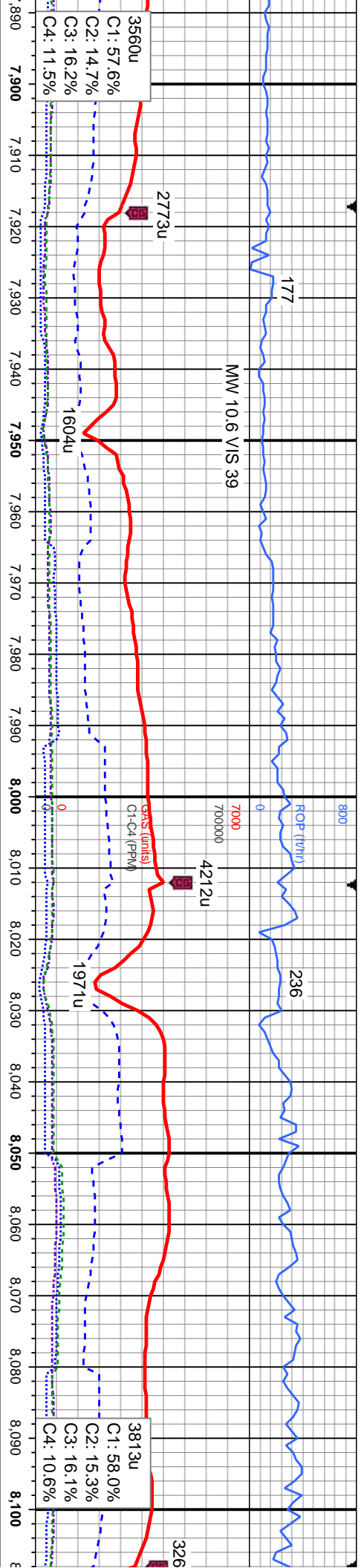
80% MRST: med-dk gy, blk, mot ip, sb pty-sb blk, mod-v frm bl-brn, med-dk gy brn, r cm cold, mot brn-dk gy, frm, brit, sb bl fos frag lnc, r diss pyr, fast dfse, fast stmg, bri wh milky cut,





MD: 7,756' TVD: 5,853.4' Inclination: 91.36° Azimuth: 1.82° VS: 1.857.21'	MD: 7,851' TVD: 5,851.64' Inclination: 90.77° Azimuth: 0.52° VS: 1.951.85'
90% MRLST: med-dk gy, blk, mot ip, sb pily-sb blkly, mod-v frm, brit, gt tex, v calc, occ (10%) chk, tr fos frag Inoc, com bent wi dissim pyr; com bri yel gn mnrl flor, fast difse, fast string, bri wh mlky cut, tr stn, no od	80% MRLST: med-dk gy, occ blk, spd wh ip, sb pily-sb blkly, mot, frm, brit, gt-calc 20% CHK: crm-bf-brn, gy brn, mod-v frm, brit, sb blkly, sb wxy-rthy tex, c gn mnrl flor, fast difse, fast string, bri wh mlky cut, mod stn, no od



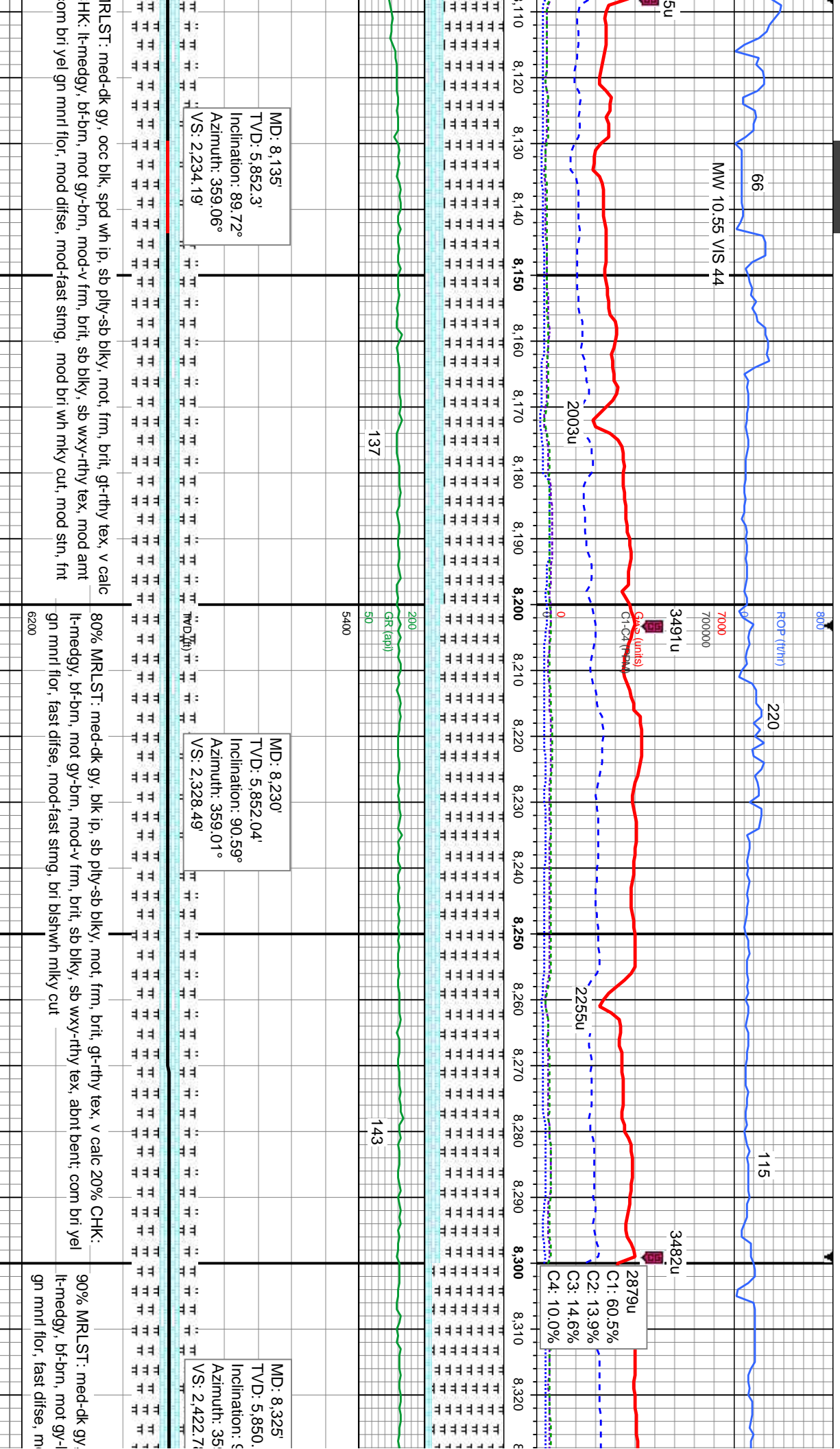


MD: 7,945'
TVD: 5,851.1'
Inclination: 89.88°
Azimuth: 359.98°
VS: 2,045.37'

MD: 8,040'
TVD: 5,851.64'
Inclination: 89.48°
Azimuth: 359.78°
VS: 2,139.82'

70% MRLST: med-dk gy, occ blk, spd wh ip, sb ply-sb blk, mot, frm, brit, gt-rthy tex, v calc	85% MRLST: med-dk gy, occ blk, spd wh ip, sb ply-sb blk, mot, frm, brit, gt-rthy tex, v calc	75% N
30% CHK: lt-medgy, bf-brn, mot gy-brn, mod-v frm, brit, sb blk, sb wxy-rthy tex, rr bent;	15% CHK: lt-medgy, bf-brn, mot gy-brn, mod-v frm, brit, sb blk, sb wxy-rthy tex, rr bent; com	25% C
com bri yel gn mnrl flr, fast dfse, fast sting, bri wh mlky cut, fr stn, no od	bri yel gn mnrl flr, fast dfse, fast sting, bri wh mlky cut, mod stn, fnt od	bent; c
	6200	od





08/10/2015
MDP (ft/hr)
MINDEPTH

158

4164u

7000
7000000

GAS (units)
GR (gpm)

2255u

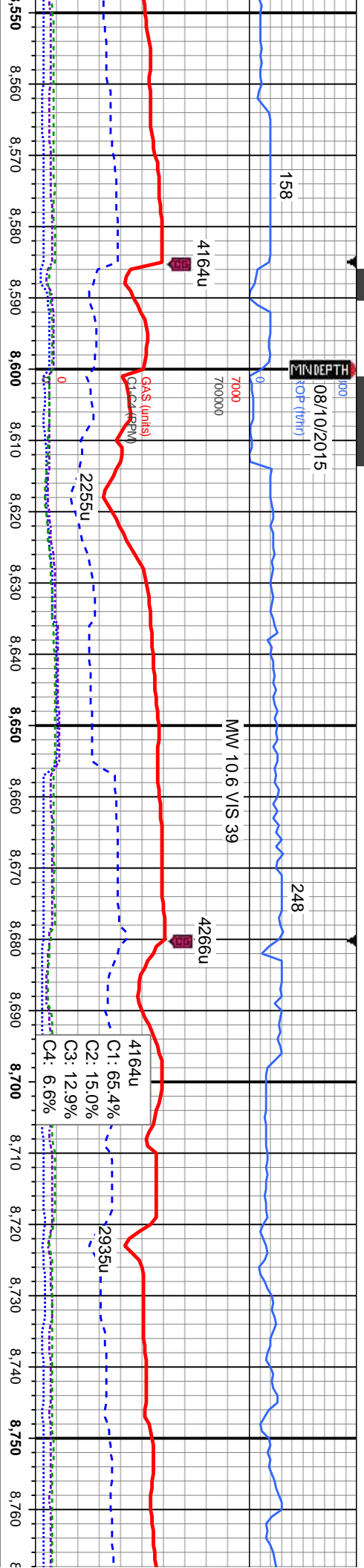
MW 10.6 VIS 39

248

4266u

4164u
C1: 65.4%
C2: 15.0%
C3: 12.9%
C4: 6.6%

2935u



113

200
50
5400

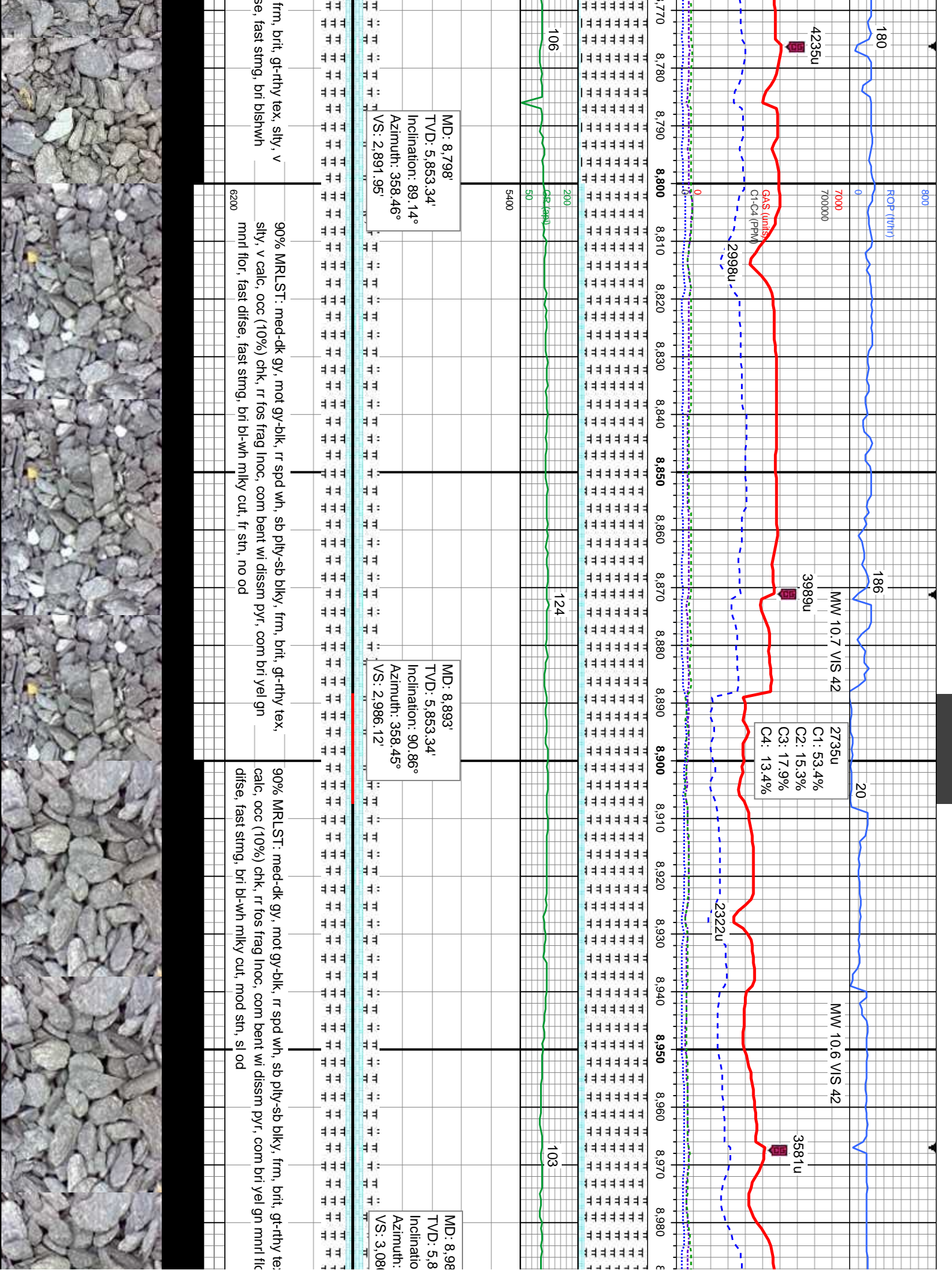
99

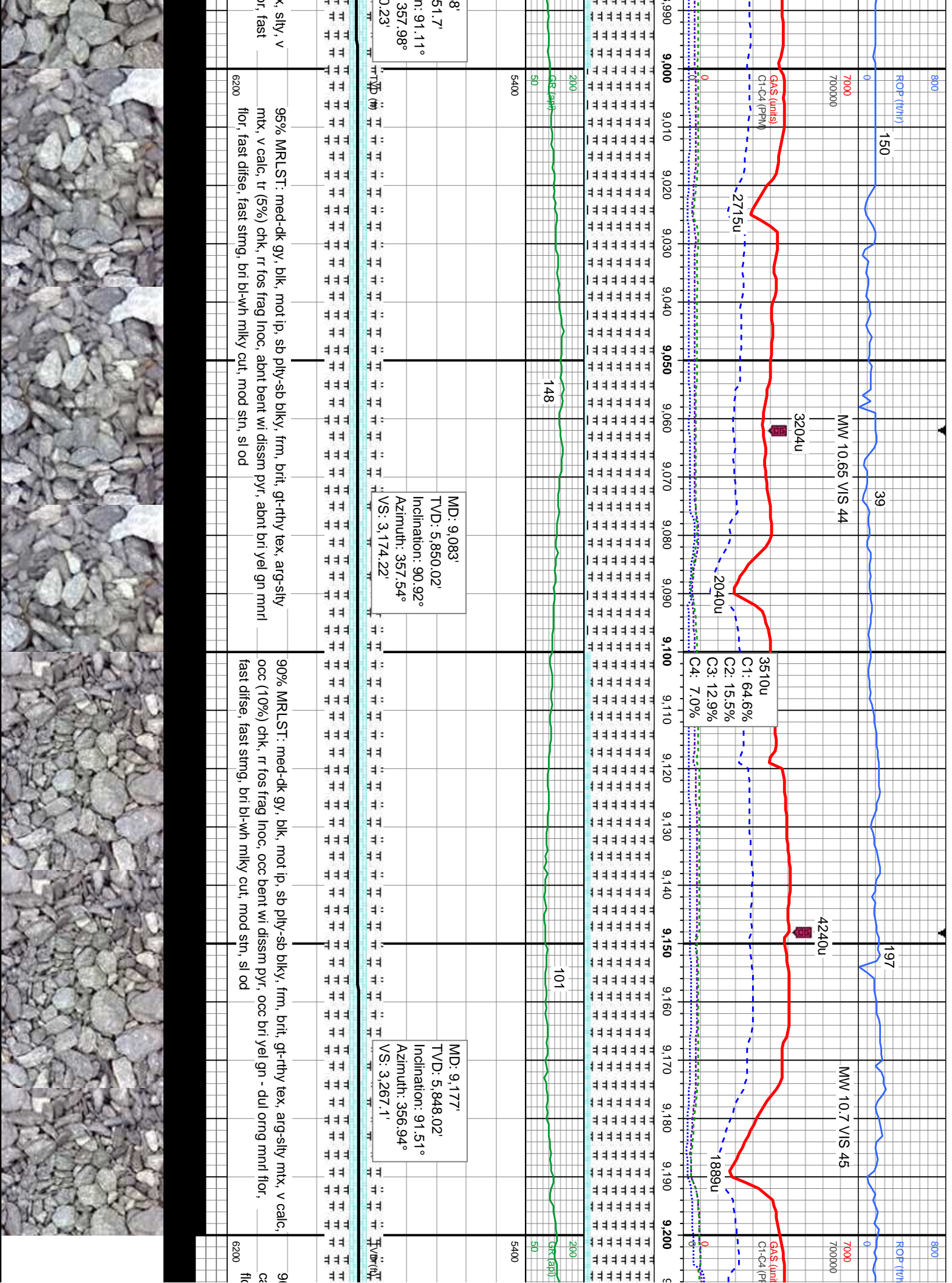
MD: 8,609'
TVD: 5,854.16'
Inclination: 89.91°
Azimuth: 358.41°
VS: 2,704.44'

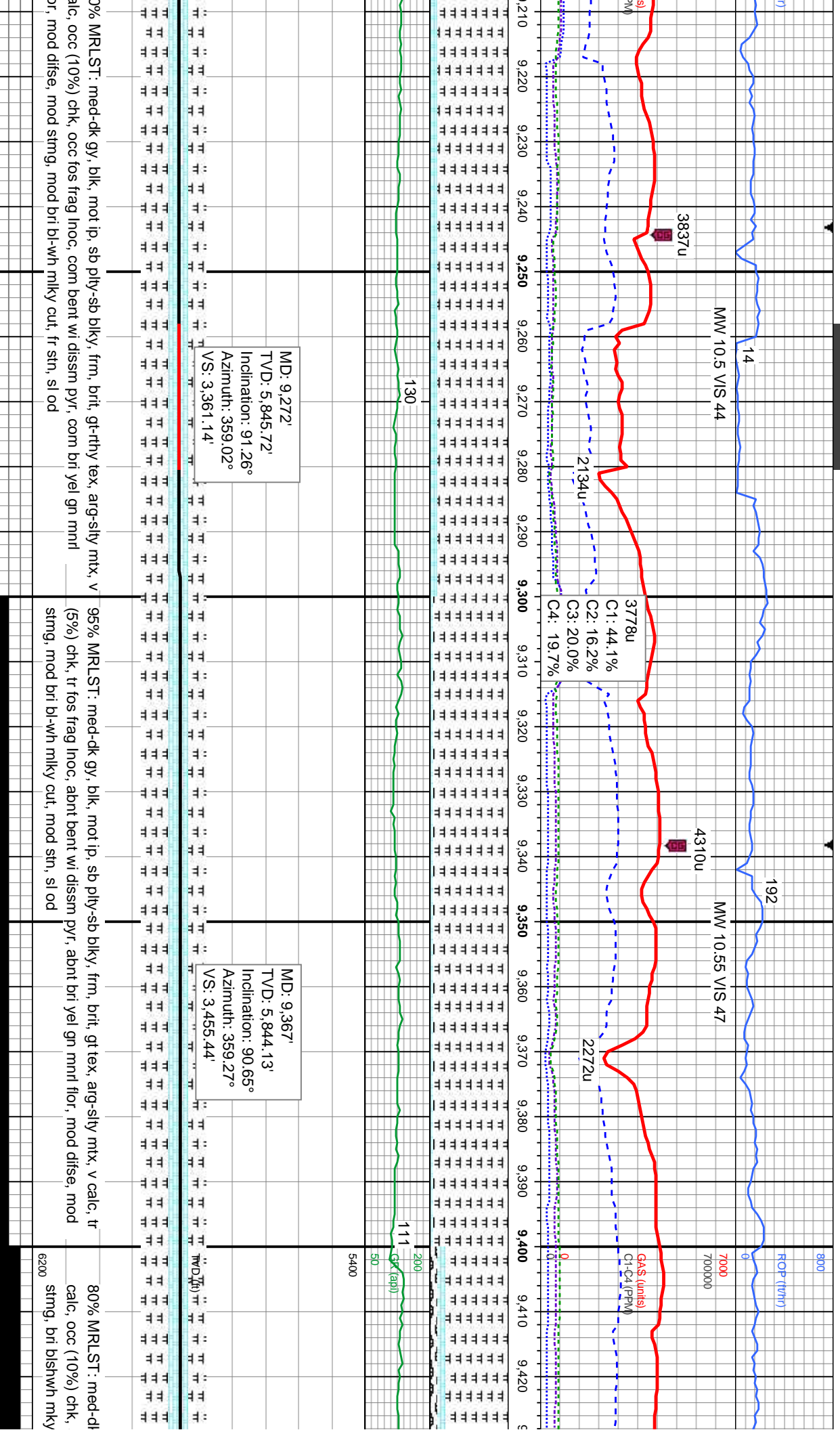
MD: 8,704'
TVD: 5,852.5'
Inclination: 89.85°
Azimuth: 358.87°
VS: 2,798.73'

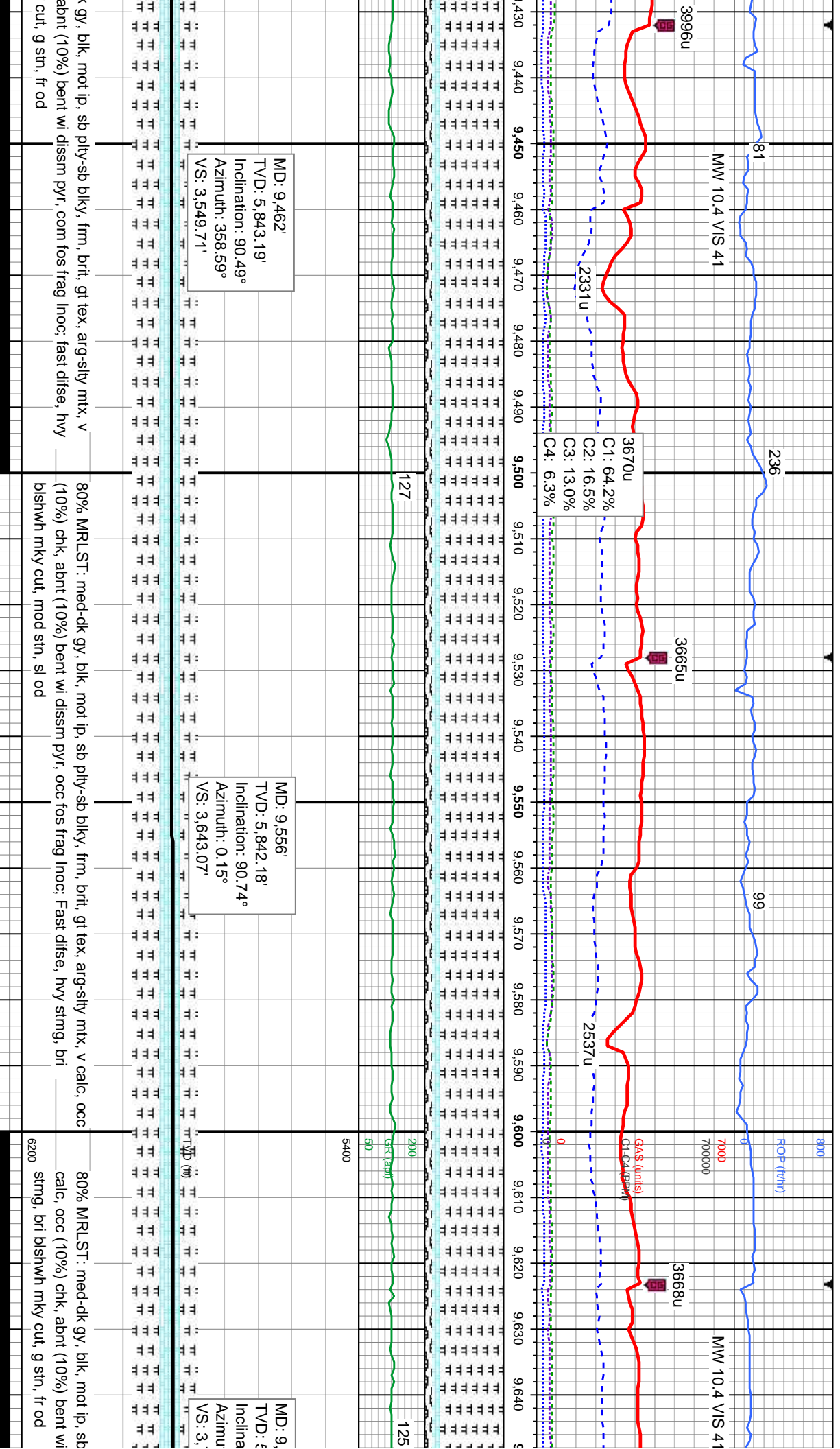
t, frm, brit, gr-rthy tex, silty, v calc 20% CHK:	95% MRLST: med-dk gy, mot gy-blk, spd wh ip, sb pty-sb blk, frm, brit, gr-rthy tex,	95% MRLST: med-dk gy, mot gy-blk, tr spd wh, sb pty-sb blk, calc, wi occ (5%) chk, occ bent: com bri yel gn mnrt flr, fast difi
brit, sb blk, wxy-rthy tex, wxy ip, abnt bent:	sting, v calc, wi occ (5%) chk, abnt bent: com bri yel gn mnrt flr, fast difi	sting, bri blshwh mlky cut
sting, bri blshwh mlky cut	6200	6200

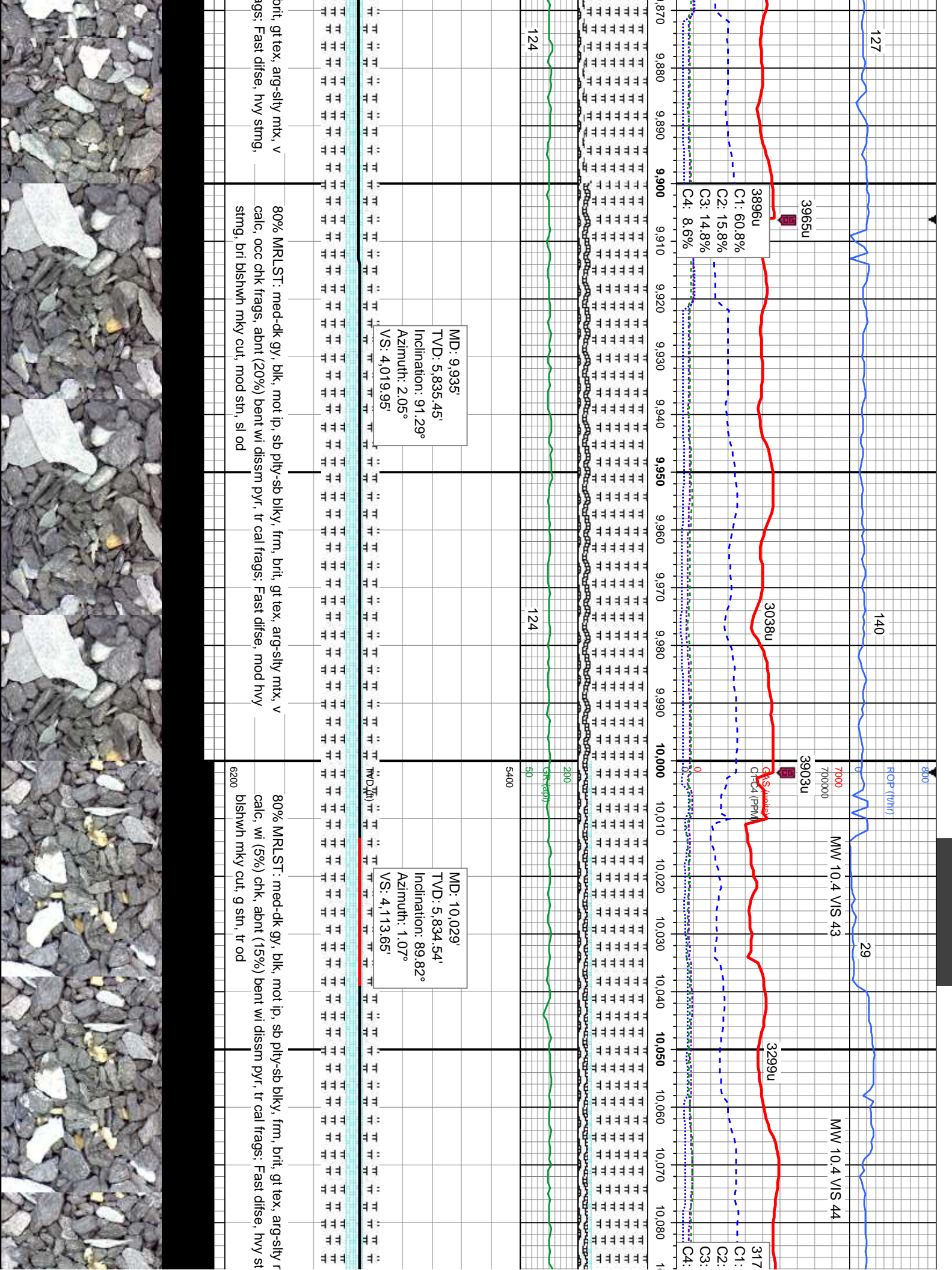


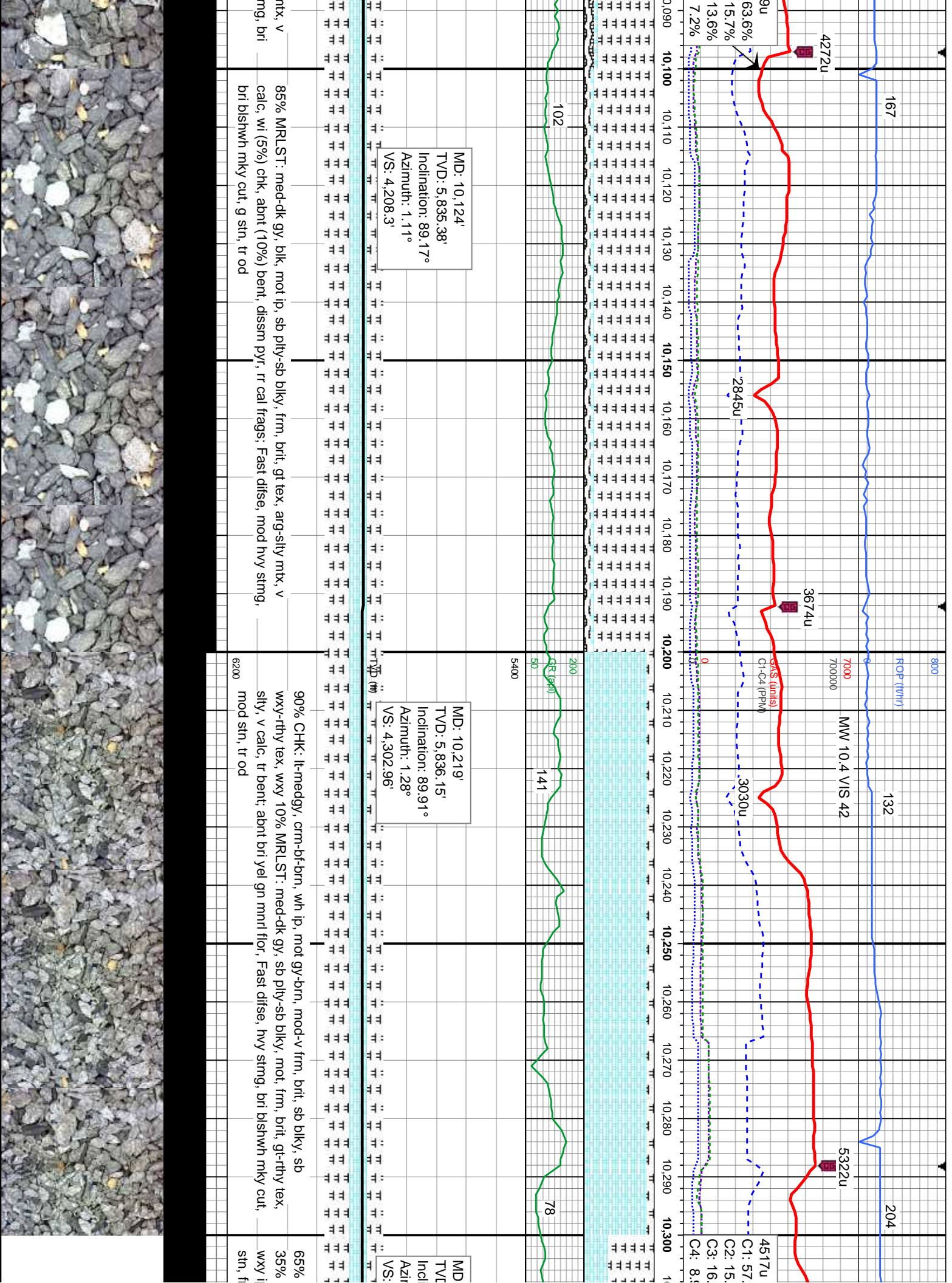












08/11/2015

172

5034u

4952u

4871u

5195u

3023u

C1: 65.0%

C2: 14.4%

C3: 13.3%

C4: 7.3%

Gas (units)
C1: 3824u

ROP (ft/hr)

7000

700000

368

7%
7%
6%

5400

110

320u

MD: 10,512'
TVD: 5,843.43'
Inclination: 86.39°
Azimuth: 1.53°
VS: 4,594.79'

MD: 10,409'
TVD: 5,838.53'
Inclination: 88.15°
Azimuth: 1.22°
VS: 4,492.25'

D/U Fault

10,314'
: 5,836.61'
ination: 89.54°
imuth: 1.09°
4,397.62'

75% MRLST: med-dk gy, blk ip, sb pty-sb blk, v calc
gt-rthy tex, stly, v calc
mod-v frm, brit, sb blk, gn mnrl flr, Fast difse, l

70% MRLST: med-dk gy, blk ip, sb pty-sb blk, mot, frm, brit, gt-rthy tex, stly, v calc
30% CHK: lt-medgy, crm-bt-brn, mod-v frm, brit, sb blk, sb wxy-rthy tex,
wxy ip, tr bent; abnt brt yel gn mnrl flr, Fast difse, hvy stmg, brt bshwh mky cut, g str,

6200
mod od

70% MRLST: med-dk gy, blk ip, sb pty-sb blk, mot, frm, brit, gt-rthy tex, stly, v calc
30% CHK: lt-medgy, crm-bt-brn, mod-v frm, brit, sb blk, sb wxy-rthy tex,
wxy ip, tr bent; abnt brt yel gn mnrl flr, Fast difse, hvy stmg, brt bshwh mky cut, mod



