



Scale: 5" / 100'
Measured Depth Log

Well Name Wirkner-Vance 14C-1HZ

Location SWSW SEC 36, T3N, R67W

State COLORADO

Country USA

API Number 05-123-378820000

Region DJ BASIN

Spud Date 11/11/2013

Surface Coordinates 277' FSL & 864' FWL

Bottom Hole Coordinates 460' FSL & 2085' FWL

Ground Elevation 4822'

Logged Interval 6873' To 13057'

Formation CODELL

Type of Drilling Fluid H2O, LSND

County WELD

Rig Number ENSIGN 138

Field WATTENBERG

K.B. Elevation 4835'

Total Depth 13057'

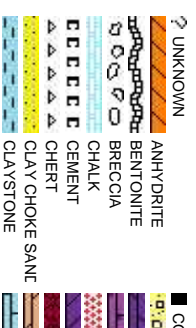
Company Anadarko

Address Granite Tower
1099 18th St. #
Denver, CO 802

Name Zach Uber & W

Company Columbine Logg

Address 2385 S. Lipan S
Denver, CO 802



Operator

1800
202

Geologist

hitney Jacks

ging, Inc.

2223

Rock Types

CONGLOMERATE

DOLOMITE

DOLOMITIC LIMESTONE

GRANITE

GYPSUM

IGNEOUS

SIDERITE or LIMONITE

LIMESTONE

MARLSTONE

METAMORPHIC

NO SAMPLE

SALT

SANDSTONE

SALT-PEPPER SAN

SHALE

SHALE COLORED

SHALE GRAY

SHALY SANDSTONE

SHALY SILTSTONE

SILTY SHALE

SILTSTONE

TILL

TUFF

WELDED TUFF

Accessories

Fossils

GASTROPOD

INOCERAMUS

OOLITE

OSTRACOD

PELECYPOD

BIOCLASTIC

BRACHIOPOD

BRYOZOA

CEPHALOPOD

CORAL

CRINOID

ECHINOID

FISH

FORAMINIFERA

F FOSSIL

ARGILLITE GRAIN

B BENTONITE

BITUMENOUS SUBSTANCE

BRECCIA FRAGMENTS

CALCAREOUS

CARBONACEOUS FLAKES

CHTDL

COAL - THIN BEDS

DOLOMITIC

SCAPHOPOD

STROMATOPOROID

FERRUGINOUS PELLET

FERRUGINOUS

GLAUCONITE

GYPSIFEROUS

HEAVY MINERAL

K KAOLIN

MARLSTONE

MICACEOUS

MINERAL CRYSTALS

NDODULES

PHOSPHATE PELLETS

PYRITE

SALT CAST

SANDY

SILICEOUS

SILTY

TUFFACEOUS

ANHYDRITE STRINGER

BENTONITE STRINGER

COAL STRINGER

DOLOMITE STRINGER

GYPSUM STRINGER

LIMESTONE STRINGER

MARLSTONE (CALC) STRG

MARLSTONE (DOL) STRG

SANDSTONE STRINGER

SHALE STRINGER

SILTSTONE STRINGER

Minerals

Stringer

Other Symbols

Oil Show

P PINPOINT

V VUGGY

D DEAD

EVEN

QUESTIONABLE

SPOTTED STAINING

CONNECTION (UP)

Engineering

DST INTERVAL

FAULT

FORMATION TOP

GAS SHOW

OIL SHOW

MINDEPTH

MINDEPTH UP

Rounding

ANGULAR

ROUNDED

SUBANG

SUBRND

MUDSTONE

Porosity

CONNECTION (DOWN)

CONNECTION GAS

CONNECTION GAS (LEFT)

TRIP GAS

TRIP GAS (LEFT)

INTERCRYSTALLINE

DOWN TIME GAS

DOWN TIME GAS (LEFT)

CORE - LOST

CORE - RECOVERED

Textures

SIDEWALL CORE (LEFT)

SIDEWALL CORE (RIGHT)

SLIDE

SURVEY

BOUNDSTONE

CHALKY

CRYPTOXLN

POOR

MODERATE

WELL

Sorting

PACKSTONE

WACKSTONE

Slide/Rotate

GAMMA SCALE:
50 - 300 API

ROP
ROF
GAMMA

ROP SCALE:
0 - 400 FT/HR

Total Gas & Chromatograph

GAS
C1
C2
C3
C4

TOTAL GAS SCALE:
0 - 4500 UNITS

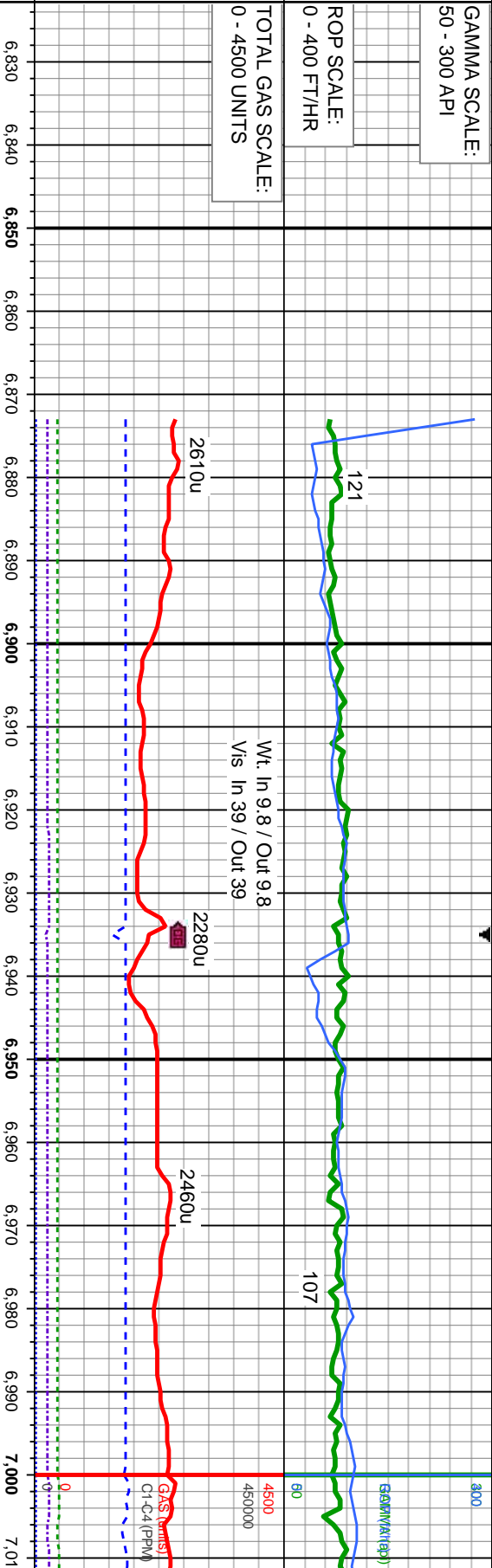
Depth Labels

% Lith

Well Bore
TVD

Oil Show

Images



KOP: 6873' MD
100' SAMPLE INTERVALS

Bit Data

Type: Smith/ SDI 611
Size: 8.75
Jets: 3x14/3x15

MD: 6,878'
TVD: 6,702.01'
Inclination: 1.6°
Azimuth: 164.5°
VS: -638.27'

COLUMBINE LOGGING RIGGED UP ON
11/12/2013 USING MANNED TWO-PERSON
LOGGING WITH BLOODHOUND GAS
CHROMATOGRAPH UNIT #0651 HZ BEGAN ON
11/12/2013 @ 15:47 HRS MST

100% SLTY SH: gy - dk gy, occ blk, sft - mod hd, sb pily - blkly, gty - rthy tex, arg - silty, non calc, tr ss

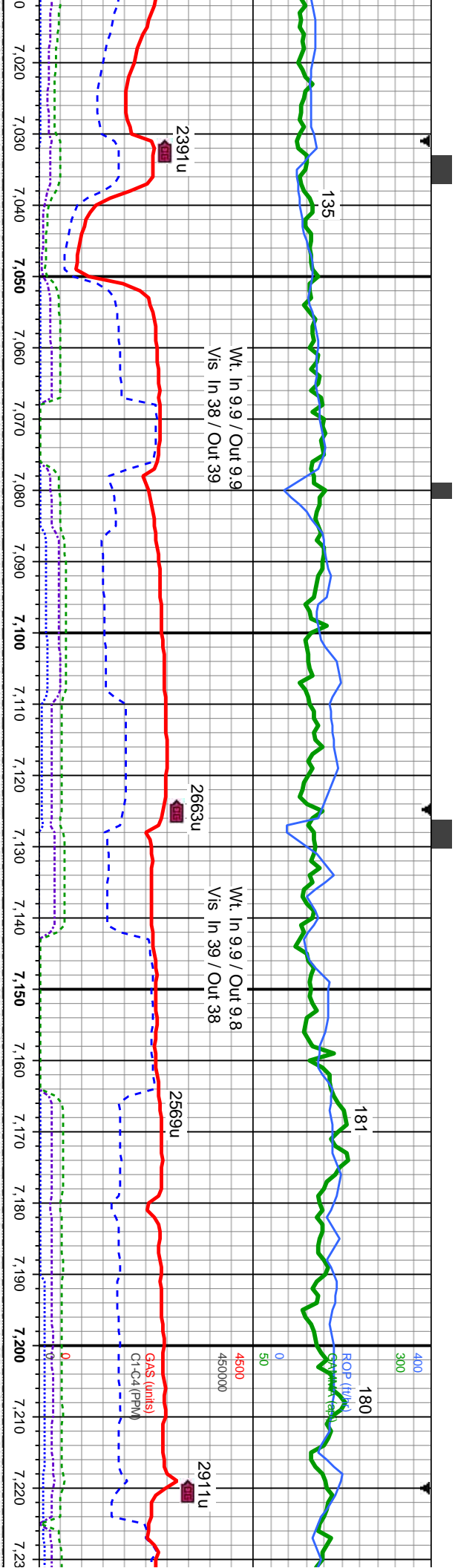


MD: 6,973'
TVD: 6,796.54'
Inclination: 8.9°
Azimuth: 161.4°
VS: -629.93'

M
TV
In
Az
VS

100%
silty,

8000



D: 7,020'
VD: 6,842.75'
Inclination: 12.1°
Azimuth: 159.8°
S: -621.76'

MD: 7,068'
TVD: 6,889.3'
Inclination: 16°
Azimuth: 159.2°
VS: -610.72'

SHARON SPRINGS TOP:
7162' MD / 6978' TVD

MD: 7,163'
TVD: 6,978.81'
Inclination: 23°
Azimuth: 154°
VS: -581.33'

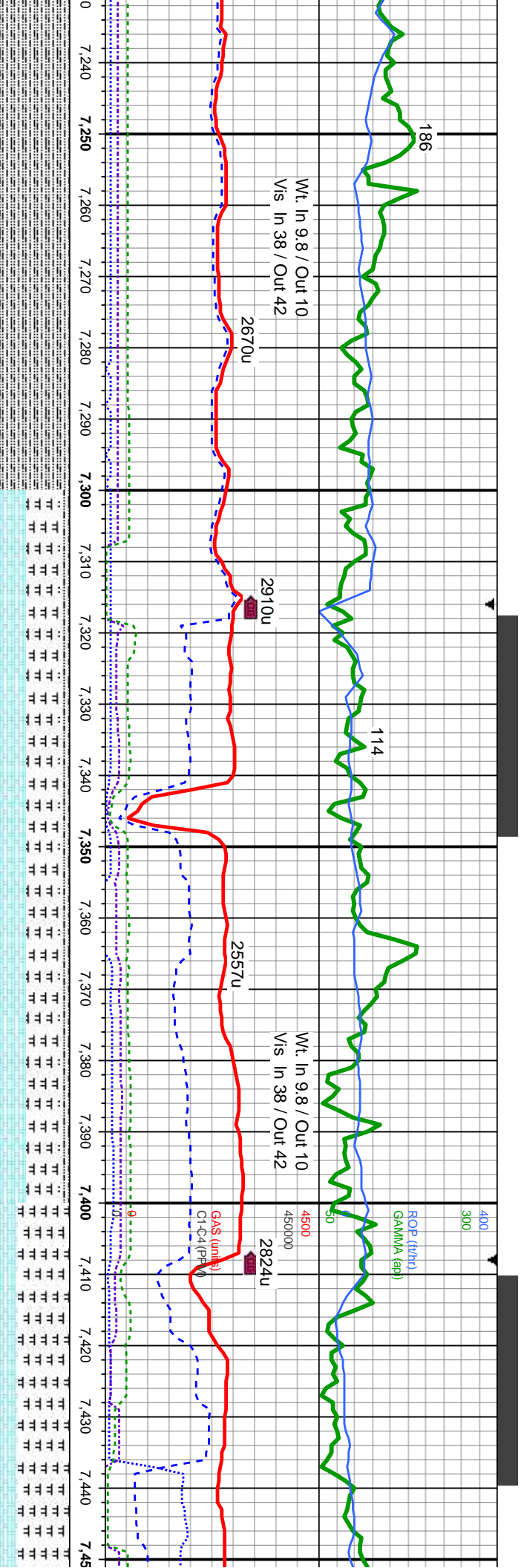
Niobrara T
7247' MD

% SLTY SH: gy - dk gy, occ blk, sft - mod hd, sb pty - blk, gty - rthy tex, arg - non calc, tr ss

100% SLTY SH: gy - dk gy, occ blk, sft - mod hd, sb pty - blk, gty - rthy tex, arg - silty, non calc, tr SS; Oil Show: thr-mod yel-gn cut, no min flr, no resd sin

85% SLTY SH: gy - dk non calc; 15% CHK: lt q mod firm, chky - sb wxy min flr, mod yel resd s



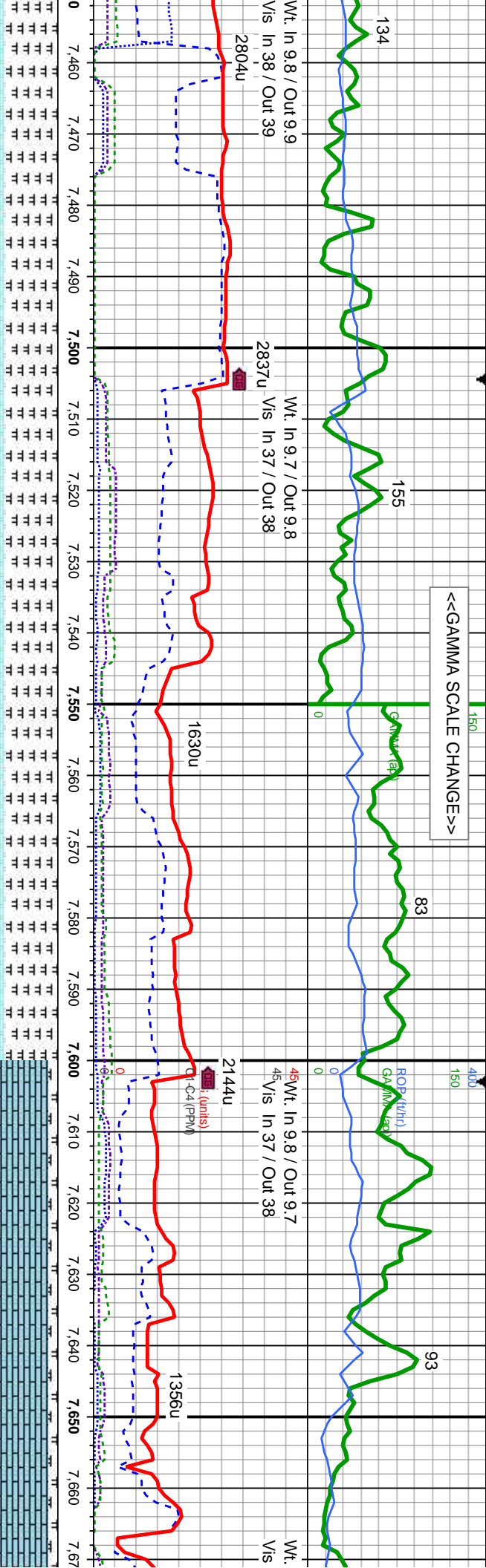


op: 7054' TVD	MD: 7,257' TVD: 7,062.92' Inclination: 29.9° Azimuth: 157.2° VS: -542.6'	Niobrara B Marl Top : 7279' MD / 7082' TVD	Niobrara B Chalk Top : 7302' MD / 7101' TVD	MD: 7,356' TVD: 7,145.01' Inclination: 38.2° Azimuth: 171.4° VS: -488.94'	Niobrara C Chalk Top : 7381' MD / 7164' TVD	MD: 7,403' TVD: 7,180.26' Inclination: 44.6° Azimuth: 177.4° VS: -457.96'	MD: 7,450' TVD: 7,230.01' Inclination: 44.6° Azimuth: 177.4° VS: -422.00'
------------------	--------------------------------------------------------------------------------------	-----------------------------------------------	------------------------------------------------	---------------------------------------------------------------------------------------	------------------------------------------------	---------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------

50% CHK: lt gy - med gy, sl lt brn, mot, blk, sb blk, occ sb ply, brit - mod firm, chky - sb wxy tex, v calc; 40% MRLST: dk gy - blk, sl dk brn, blk, sb blk, sft - frm, rthy - grty mtk, v calc, sm sl shny tex, tr bent; 10% SLTY SH: gy - dk gy, occ blk, sft - mod hd, sb ply - blk, gy - rthy tex, arg - sily, non calc; Oil Show: bl-gn string cut, fast diffuse, mod yel min flr, solid gn-yel resd sh, n od



<< GAMMA SCALE CHANGE >>



Fort Hays LS Top :
7645' MD / 7299' TVD

MD: 7,497'	MD: 7,545'	MD: 7,592'	MD: 7,640'
TVD: 7,238.2'	TVD: 7,261.76'	TVD: 7,281.21'	TVD: 7,297.15'
Inclination: 58.0°	Inclination: 63.2°	Inclination: 67.9°	Inclination: 73.3°
Azimuth: 186°	Azimuth: 187°	Azimuth: 187.3°	Azimuth: 187.7°
VS: -364.48'	VS: -343.14'	VS: -300.91'	VS: -256.28'

0'	11.39'	182.2°	83'
xy - sb blk, occ sb pty, brit - mod firm, chky	40% CHK: lt gy - med gy, sl lt brn, mot, blk, sb blk, occ sb pty, brit - mod firm, chky - sb	wxy tex, v calc: 60% MRLST: dk gy - blk, sl dk brn, blk, sb blk, occ sb pty, brit - mod firm, chky - sb	calc, sm sl shry tex, tr bent; Oil Show: bl-gn sting cut, mod yel min flr, mod gn-yel resd
blk, sl dk brn, blk - sb blk, sft - frm, rthy -			stn, no od
Show: bl-gn sting cut, mod yel min flr,			



11/14/2013

MINDEPTH

57

80

ROP (ft/hr)
GAMMA ray

ROP (ft/hr)

<<ROP SCALE CHANGE>>

In 9.7 / Out 9.7
In 37 / Out 38

Wt. In 9.8 / Out 9.7
Vis In 36 / Out 37

Wt. In 9.7 / Out 9.7
Vis In 36 / Out 37.3060u

2088u

2162u

2643u

GAS (units)
C1-C4 (PPM)

2974u

7.680 7.690 7.700 7.710 7.720 7.730 7.740 7.750 7.760 7.770 7.780 7.790 7.800 7.810 7.820 7.830 7.840 7.850 7.860 7.870 7.880 7.89

MD: 7.687'
TVD: 7.308.99'
Inclination: 77.5 °
Azimuth: 190.5 °
VS: -211.67'

MD: 7.735'
TVD: 7.318.03'
Inclination: 80.8 °
Azimuth: 189.1 °
VS: -165.53'

MD: 7.772'
TVD: 7.323.18'
Inclination: 83.2 °
Azimuth: 186.4 °
VS: -129.42'

MD: 7.787'
TVD: 7.324.73'
Inclination: 84.9 °
Azimuth: 185.6 °
VS: -114.65'

MD: 7.840'
TVD: 7.326.86'
Inclination: 90.5 °
Azimuth: 185 °
VS: -62.15'

MD: 7.872'
TVD: 7.327.4'
Inclination: 91.5 °
Azimuth: 185.6 °
VS: -30.49'

Codell SS Top :
7748 MD / 7320' TVD

TOOH @ 7840' MD FOR
INTERMEDIATE CASING
01:25 HRS ON 11/14/13

HORIZONTAL BEGAN @
10:45 HRS ON 11/15/2013

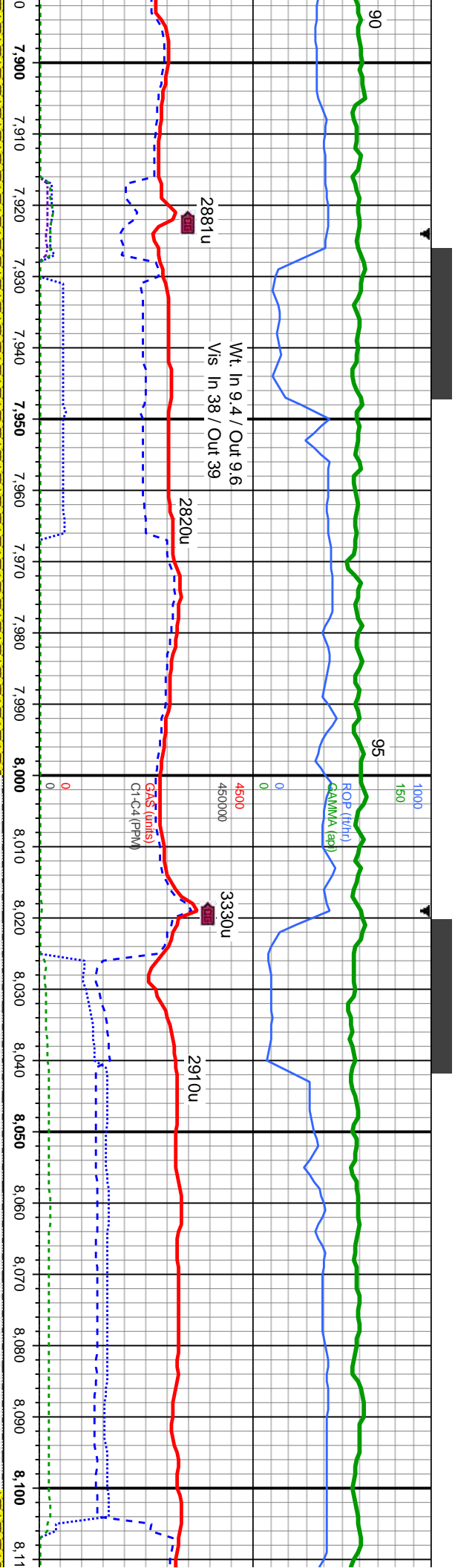
clin fiz: 10% MRLST: gy -
sily, non calc; Oil Show:

75% LS: wh - crm, fri - frm, sb blkly - ply, wxy tex, v calc, mod clin fiz; 25% SHYSS: dk gry,
clr - tmsl, priedy c gr, occ f gr, sb ang - sb rd, p - mod srt, fri - bit, mod - g cons, non - sl
calc; Oil Show: bl-gn string cut, mod yel min flr, mod gn-yel resd str, no od

80% SHYSS: dk gry, clr - tmsl, priedy c gr, occ f gr, sb ang - sb rd, p - mod srt, fri
mod - g cons, non - sl calc; 20% LS: wh - crm, fri - frm, sb blkly - ply, wxy tex, v c
mod clin fiz; Oil Show: bl-gn string cut, mod yel min flr, mod gn-yel resd str, no o



Bit
Type
Size
Jets



Data
e: Varrel/VS 513D
x: 6.12
: 5x16

MD: 7,967'
TVD: 7,325.58'
Inclination: 90.7°
Azimuth: 184.6°
VS: 63.76'

<<TVD SCALE CHANGE>>

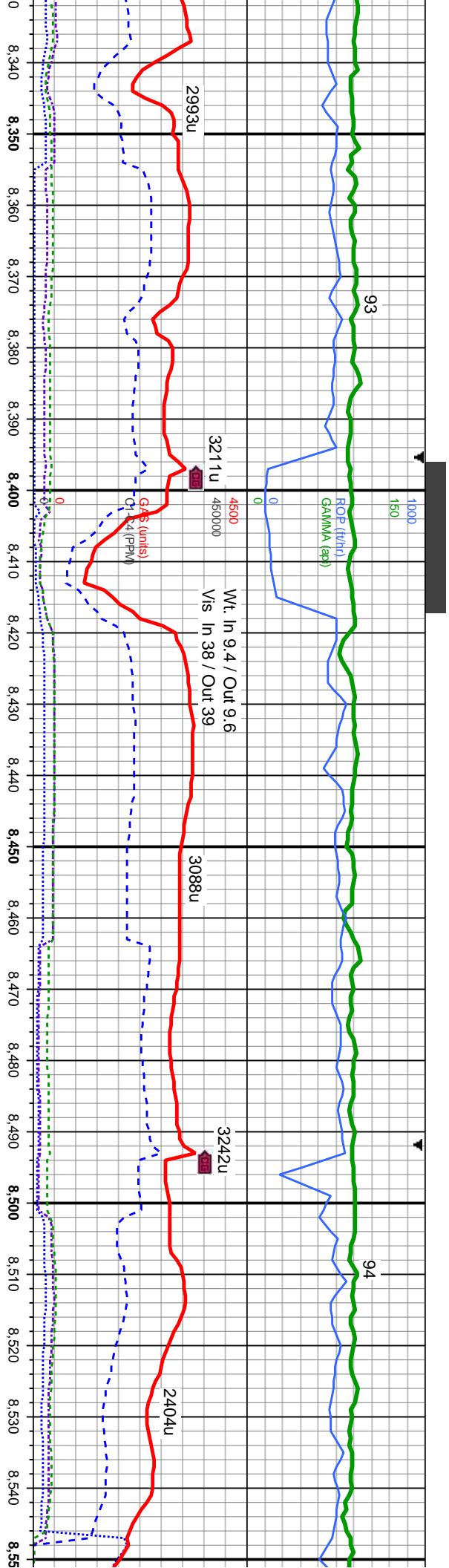
- brit,
alc,
d

100% SHYSS: dk gry, clr - tmsl, predy c gr, occ f gr, sb ang - sb rd, p - mod srt, fri - brit,
mod - g cons, non - sl calc; Oil Show: bl-gn string cut, fast diffuse, mod yel min flr, solid
yel resd strn, n od

90% SHYSS: dk gry, clr - tmsl, predy c gr, occ f gr, sb ang - sb rd, p - mod srt, fri - brit,
mod - g cons, non - sl calc; 10% SLTY SH: gy - dk gy, occ blk, sft - mod hd, sb pty -
blky, gty - rthy tex, arg - silty, non calc; Oil Show: bl-gn string cut, fast diffuse, mod yel
min flr, solid yel resd strn, n od

100% SH
mod - g
yel resd

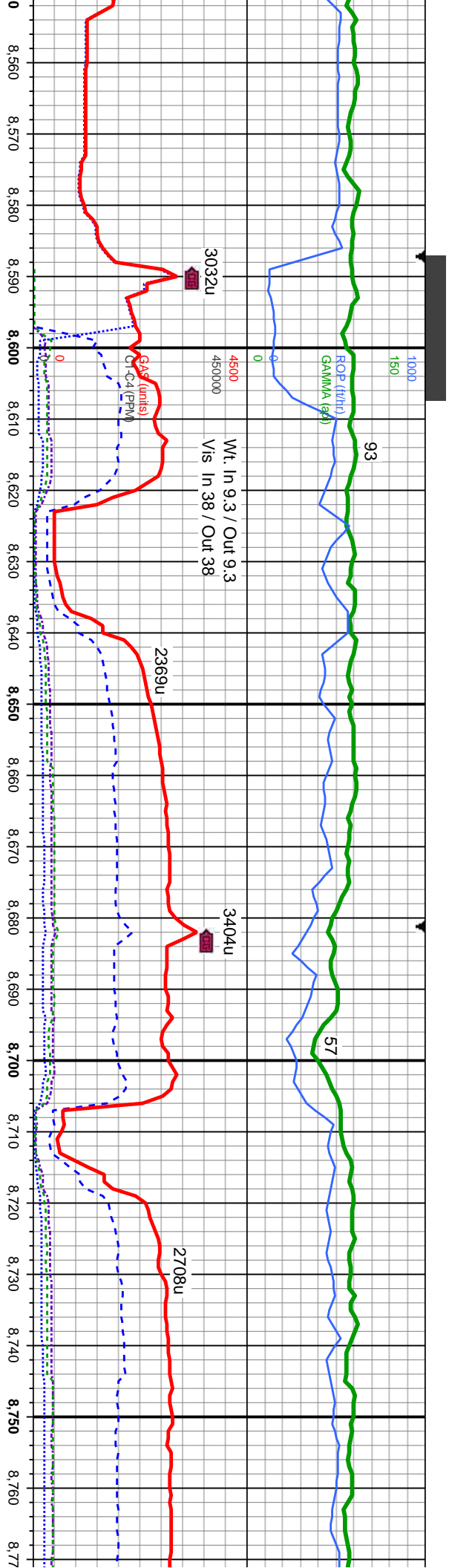




MD: 8,345' TVD: 7,327.56' Inclination: 90.7 ° Azimuth: 181 ° VS: 441.01'	6500	MD: 8,440' TVD: 7,327.39' Inclination: 89.5 ° Azimuth: 179.9 ° VS: 535.92'	MD: 8,535' TVD: 7,327.56' Inclination: 90.3 ° Azimuth: 180.9 ° VS: 630.83'
--------------------------------------------------------------------------------------	------	----------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------

trns, predy c gr, occ f gr, sb ang - sb rd, p - mod srt, fri - bit, Oil Show: occ bri yel min flor, fast diffuse, strng blu-wh mky	100% SHYSS: dk gry, clr - trns, predy c gr, occ f gr, sb ang - sb rd, p - mod srt, fri - bit, mod - g cons, non - sl calc; Oil Show: occ bri yel min flor, fast diffuse, strng blu-wh mky cut, solid gn stn	100% SHYSS: dk gry, clr - trns, predy c gr, occ f gr, sb ang - sb rd, p - mod srt, fri - mod - g cons, non - sl calc; Oil Show: gn strng resd stn, n od
------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------



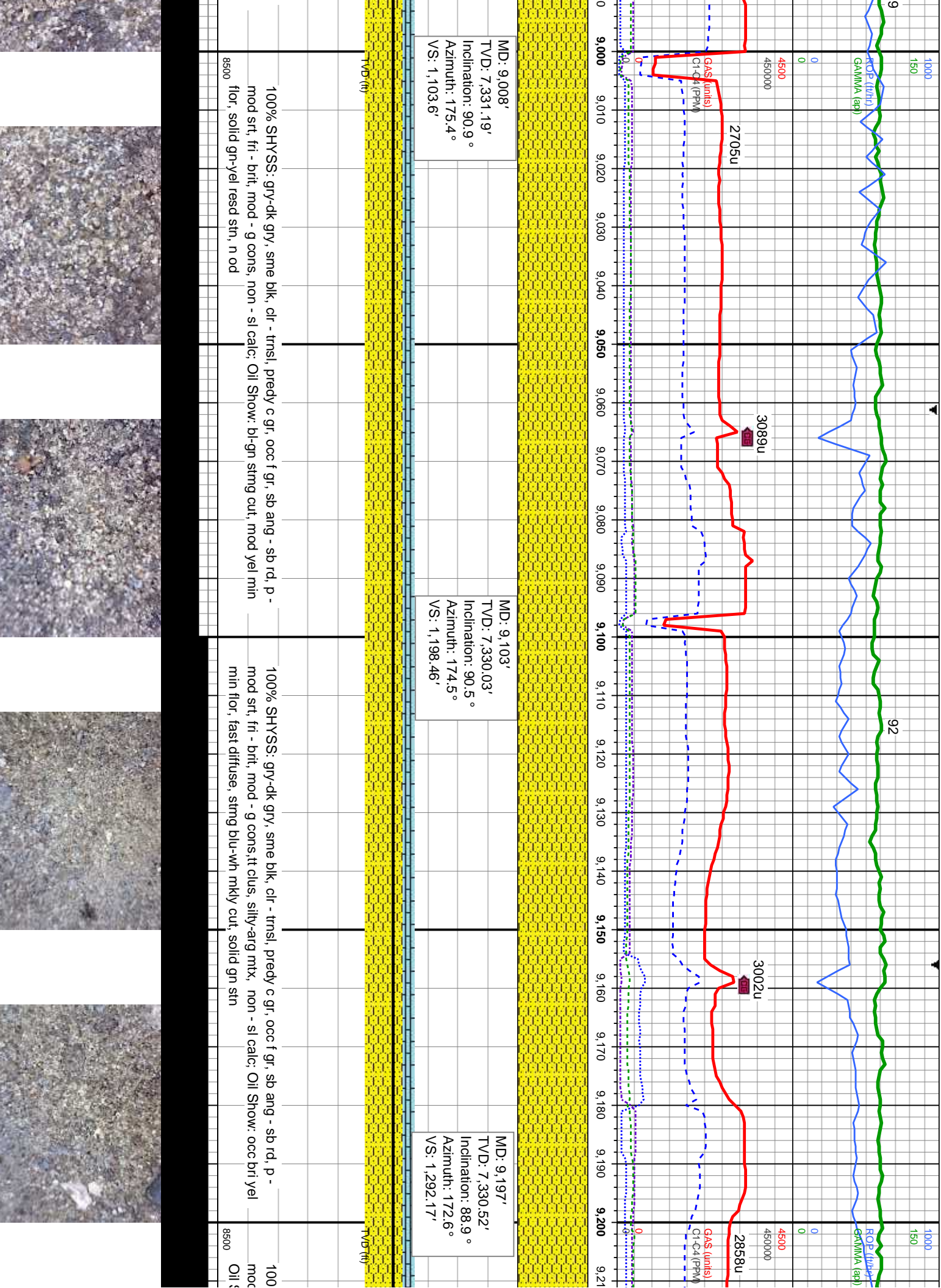


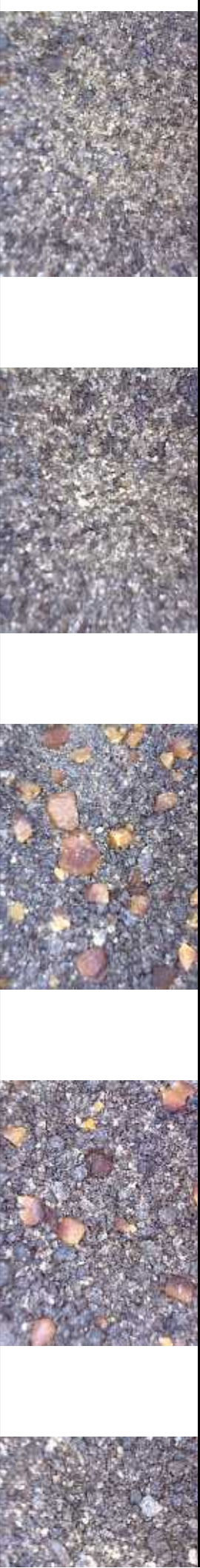
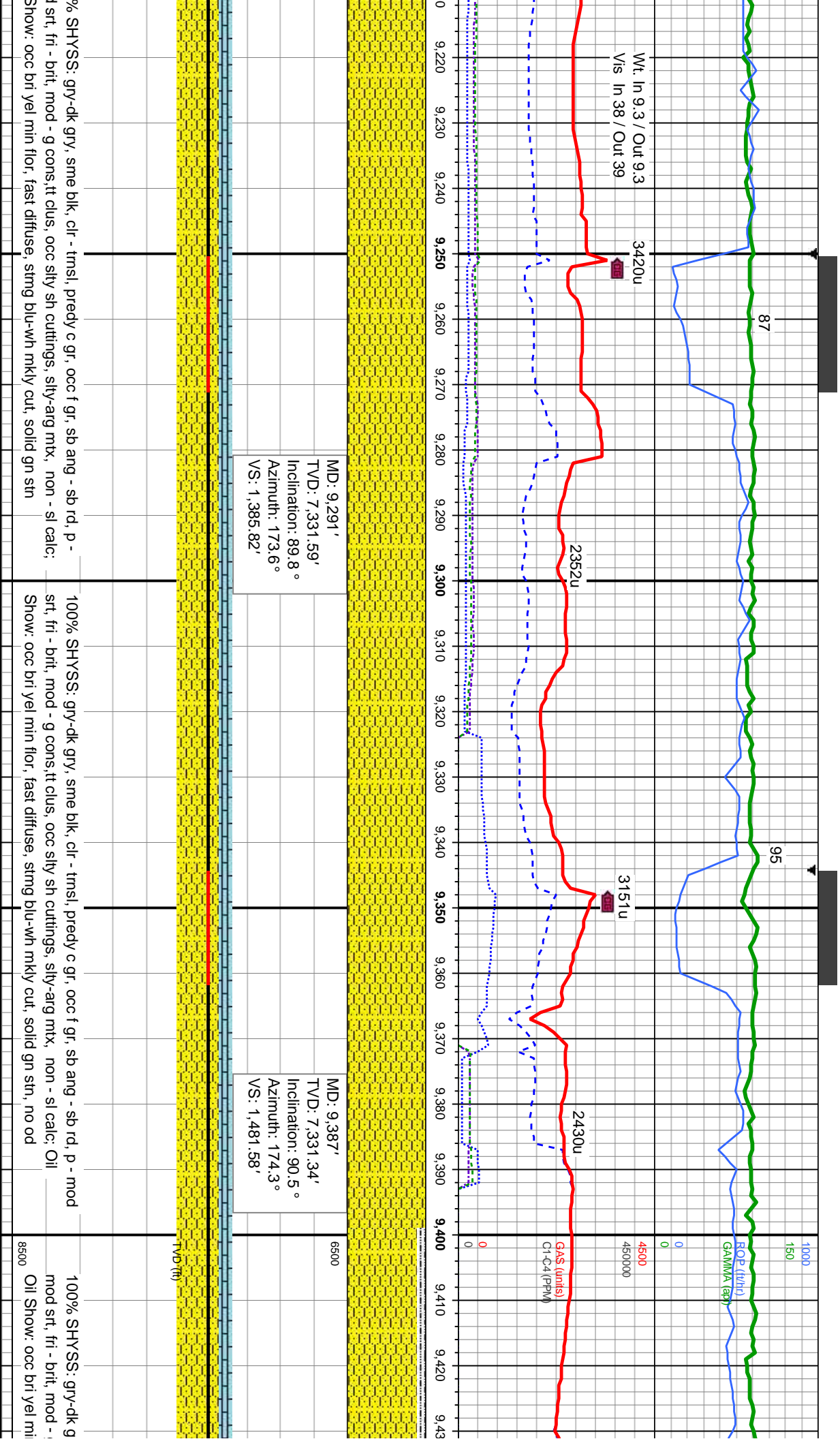
MD: 8,630'
TVD: 7,327.72'
Inclination: 89.5°
Azimuth: 178.9°
VS: 725.77'

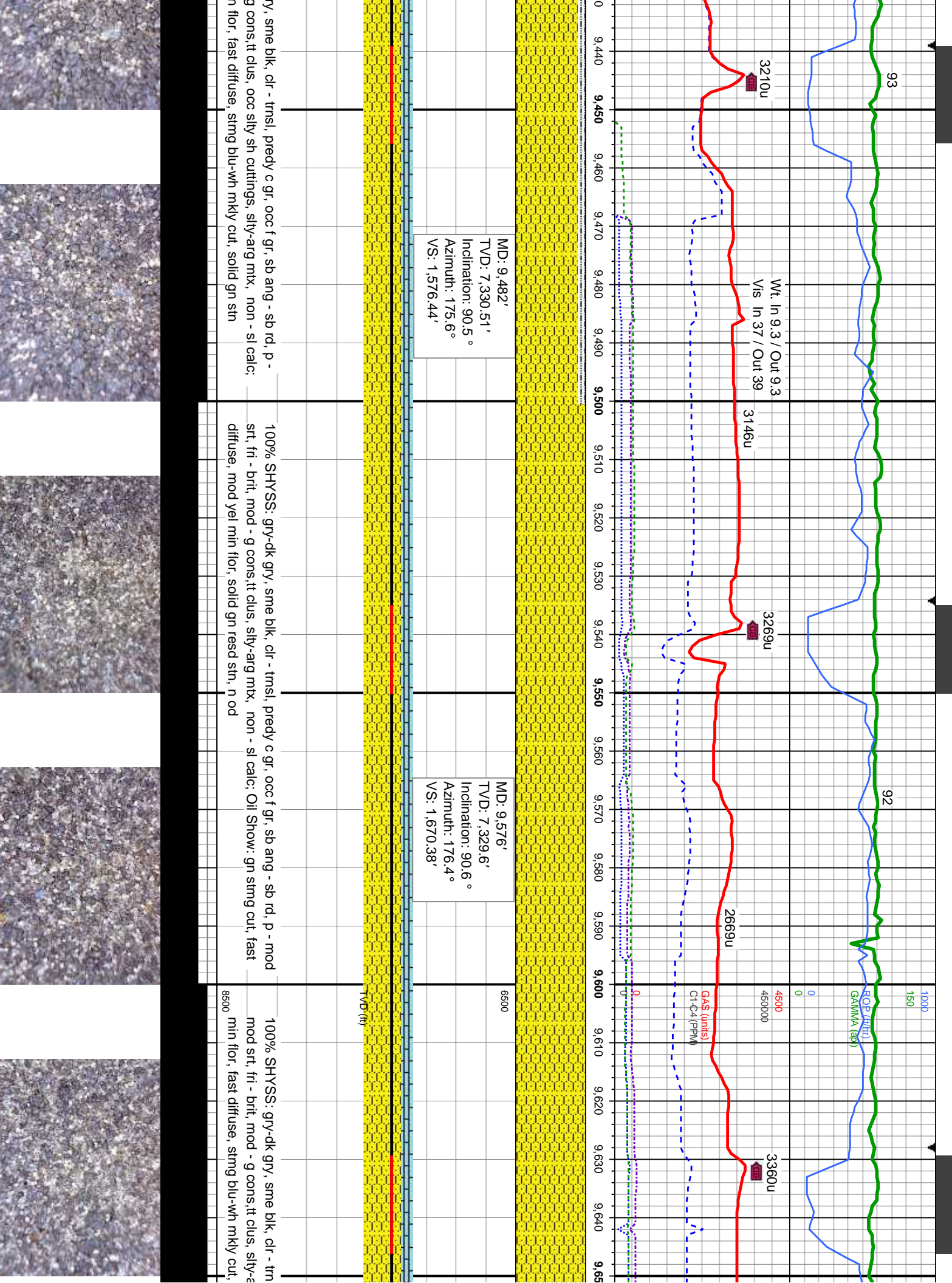
MD: 8,724'
TVD: 7,329.69'
Inclination: 88.1°
Azimuth: 177.2°
VS: 819.75'

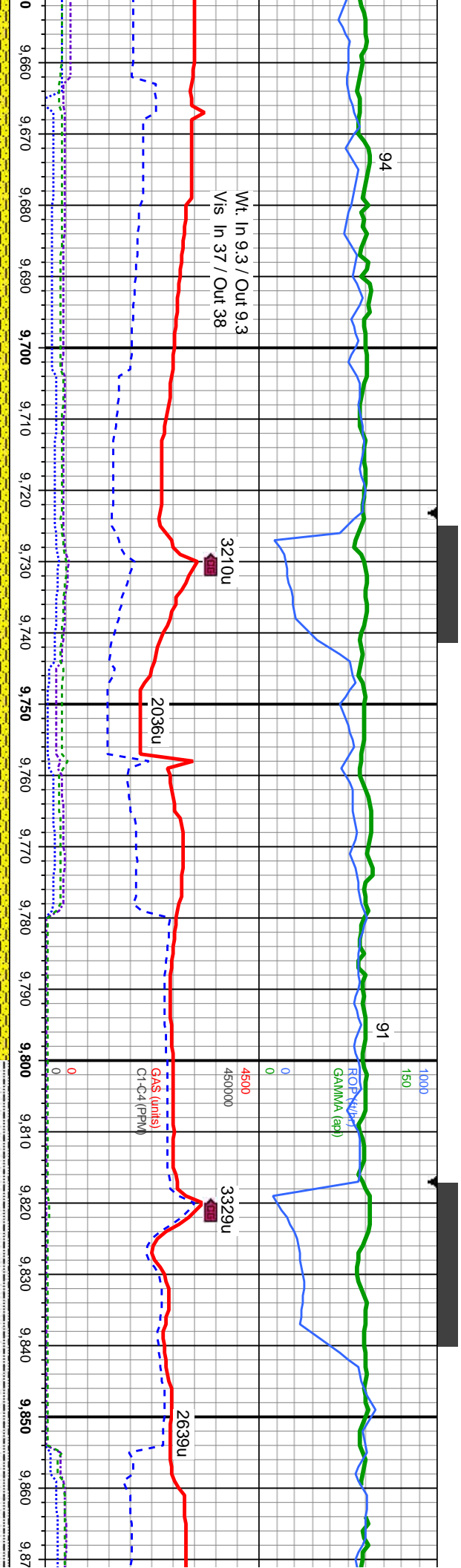
8500	100% SHYSS: gry-dk gry, sme blk, clr - trnsl, predy c gr, occ f gr, sb ang - sb rd, p - mod srt, fri - brit, mod - g cons, non - sl calc; Oil Show: gn stmg cut, fast diffuse, mod yel min flr, solid gn resd str, n od	90% SHYSS: gry-dk gry, sme blk, clr - trnsl, predy c gr, occ f gr, sb ang - sb rd, p - fri - brit, mod - g cons, non - sl calc; 10% LS: wh - crm, fri - frm, sb mod cln fiz; Oil Show: bl-gn stmg cut, mod yel min flr, mod gn-ye
------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------











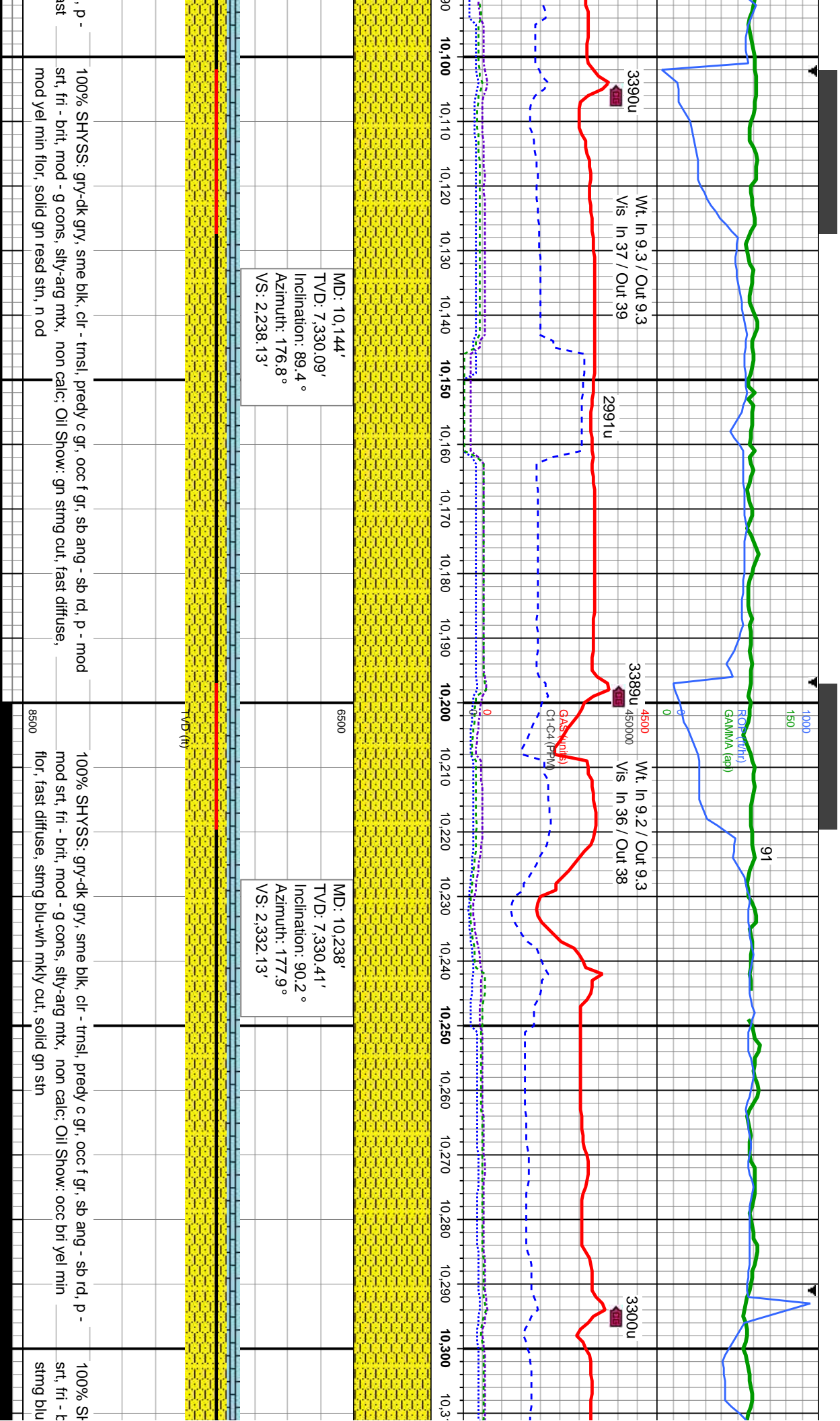
MD: 9,671'
TVD: 7,329.85'
Inclination: 89.1 °
Azimuth: 175.9 °
VS: 1,765.33'

MD: 9,765'
TVD: 7,330.67'
Inclination: 89.9 °
Azimuth: 176.2 °
VS: 1,859.27'

MD: 9,860'
TVD: 7,330.18'
Inclination: 90.7 °
Azimuth: 176.4 °
VS: 1,954.23'

sl, predy c gr, occ f gr, sb ang - sb rd, p -
arg mtx, non calc; Oil Show: occ bri yel
solid gn strn
100% SHYSS: gry-dk gry, sme blk, clr - trns, predy c gr, occ f gr, sb ang - sb rd, p -
mod srt, fri - brit, mod - g cons, silty-arg mtx, non calc; Oil Show: occ bri yel min flr,
fast diffuse, string blu-wh mky cut, solid bl-gn strn
100% SHYSS: gry-dk gry, sme blk, clr - trns, predy c gr, occ f gr, sb ang - sb rd, p -
mod srt, fri - brit, mod - g cons, silty-arg mtx, non calc; Oil Show: occ bri yel min flr,
diffuse, mod yel min flr, solid gn resd strn, n od

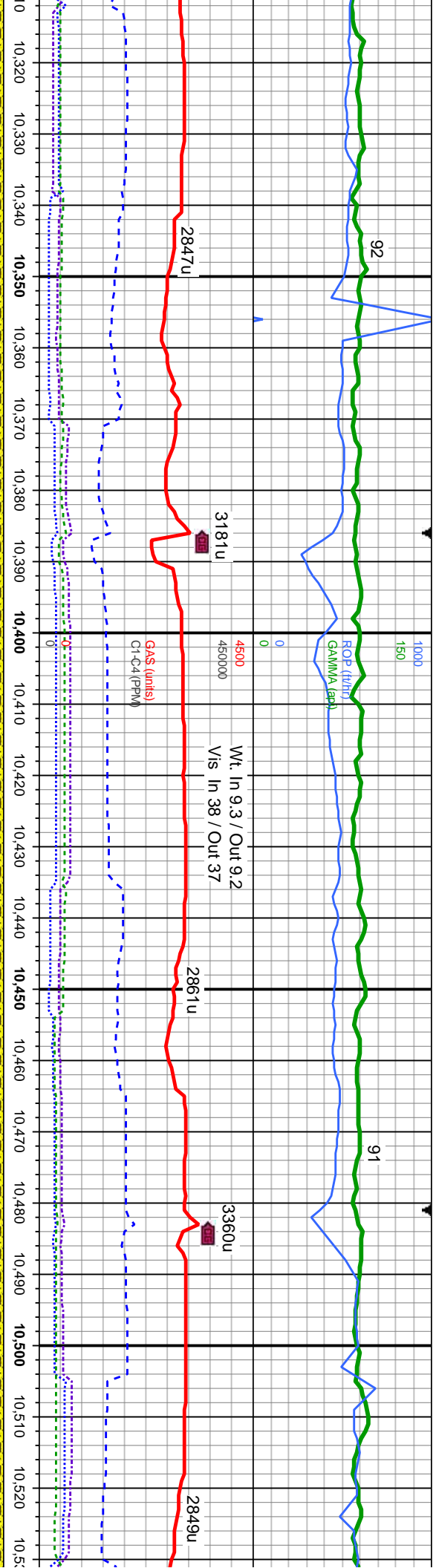




MD: 10,144'
TVD: 7,330.09'
Inclination: 89.4°
Azimuth: 176.8°
VS: 2,238.13'

MD: 10,238'
TVD: 7,330.41'
Inclination: 90.2°
Azimuth: 177.9°
VS: 2,332.13'





MD: 10,333'
TVD: 7,330'
Inclination: 90.3 °
Azimuth: 178.1 °
VS: 2,427.12'

6500

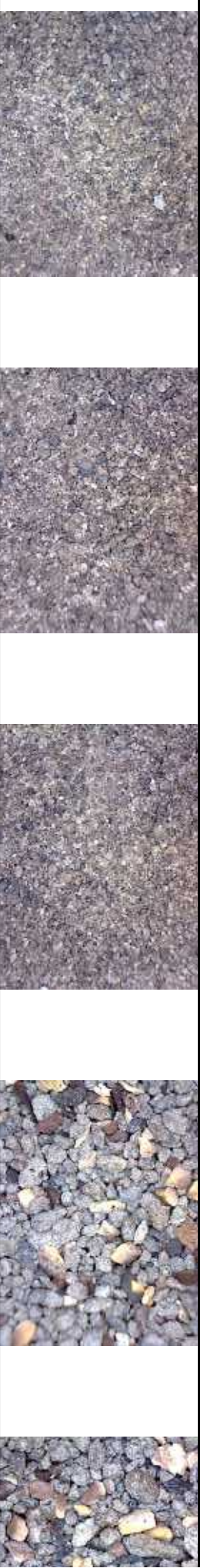
MD: 10,429'
TVD: 7,329.75'
Inclination: 90 °
Azimuth: 177.4 °
VS: 2,523.12'

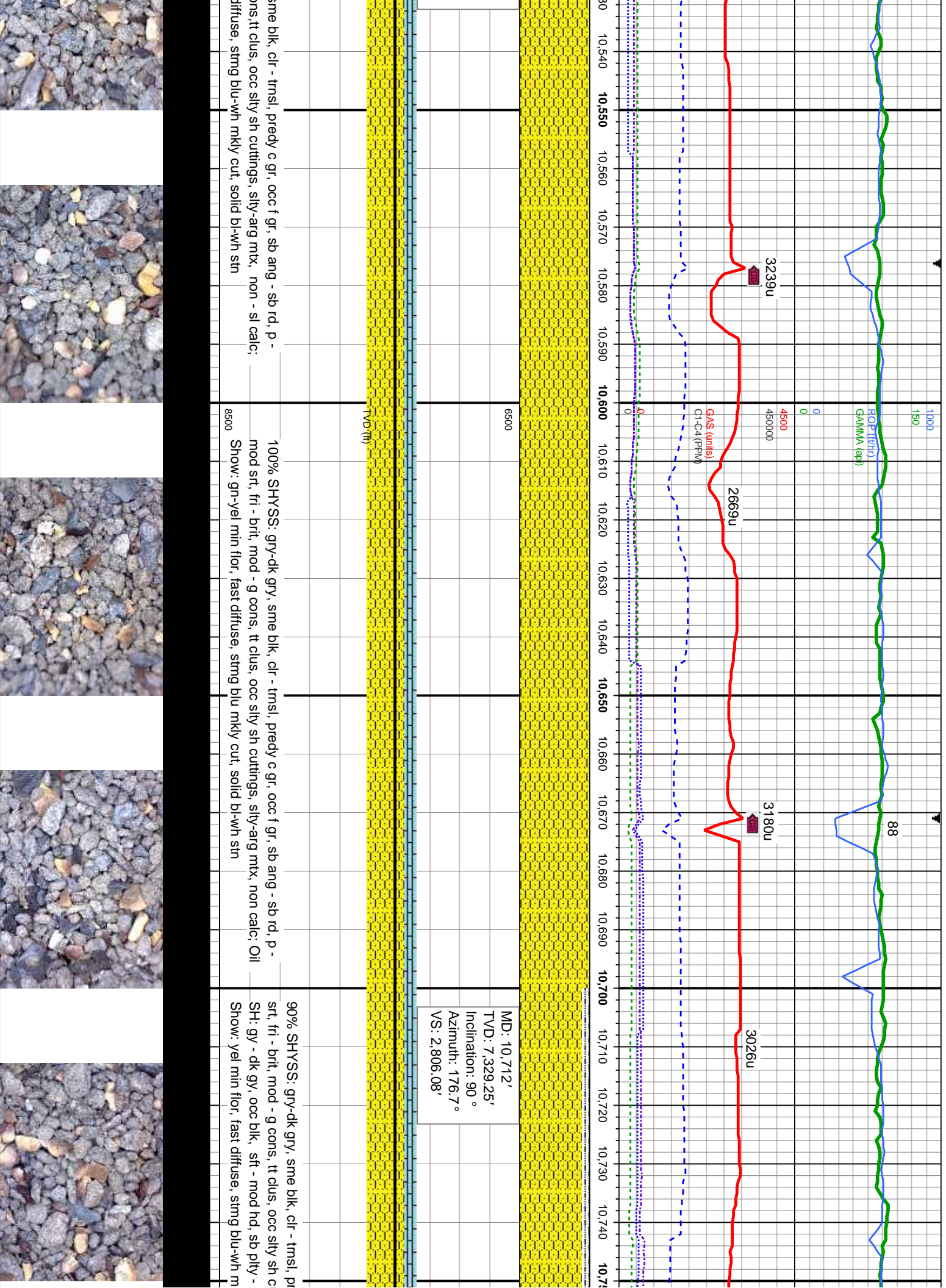
TVD (ft)

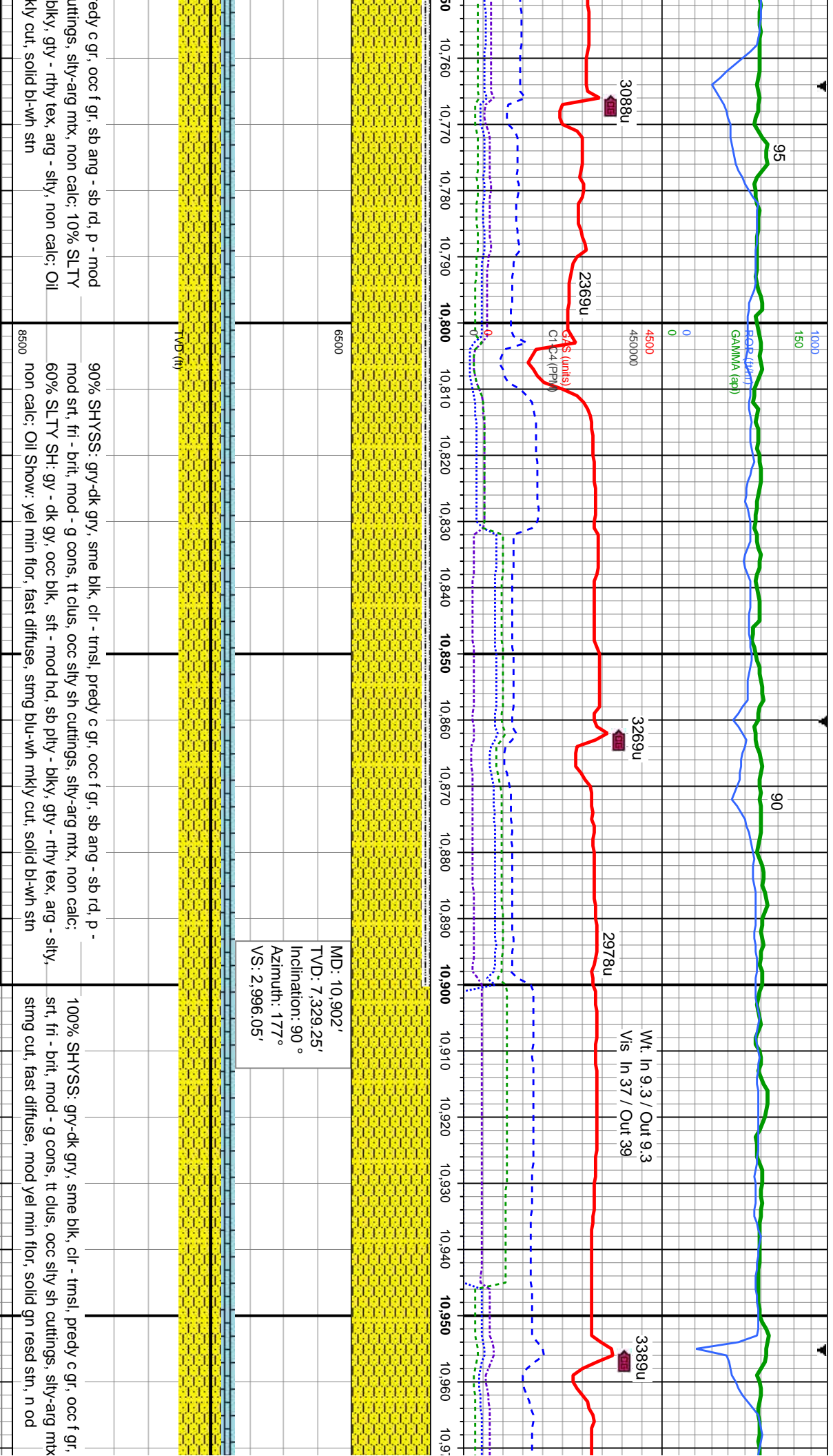
SHYSS: gry-dk gry, sme blk, clr - trns, predy c gr, occ f gr, sb ang - sb rd, p - mod
nit, mod - g cons, silty-arg mtx, non calc; Oil Show: yel min flr, fast diffuse,
wh mky cut, solid bl-wh str

100% SHYSS: gry-dk gry, sme blk, clr - trns, predy c gr, occ f gr, sb ang - sb rd, p -
mod srt, fri - brt, mod - g cons, it clus, occ silty sh cuttings, silty-arg mtx, non - sl calc;
Oil Show: yel min flr, fast diffuse, string blu-wh mky cut, solid bl-wh str

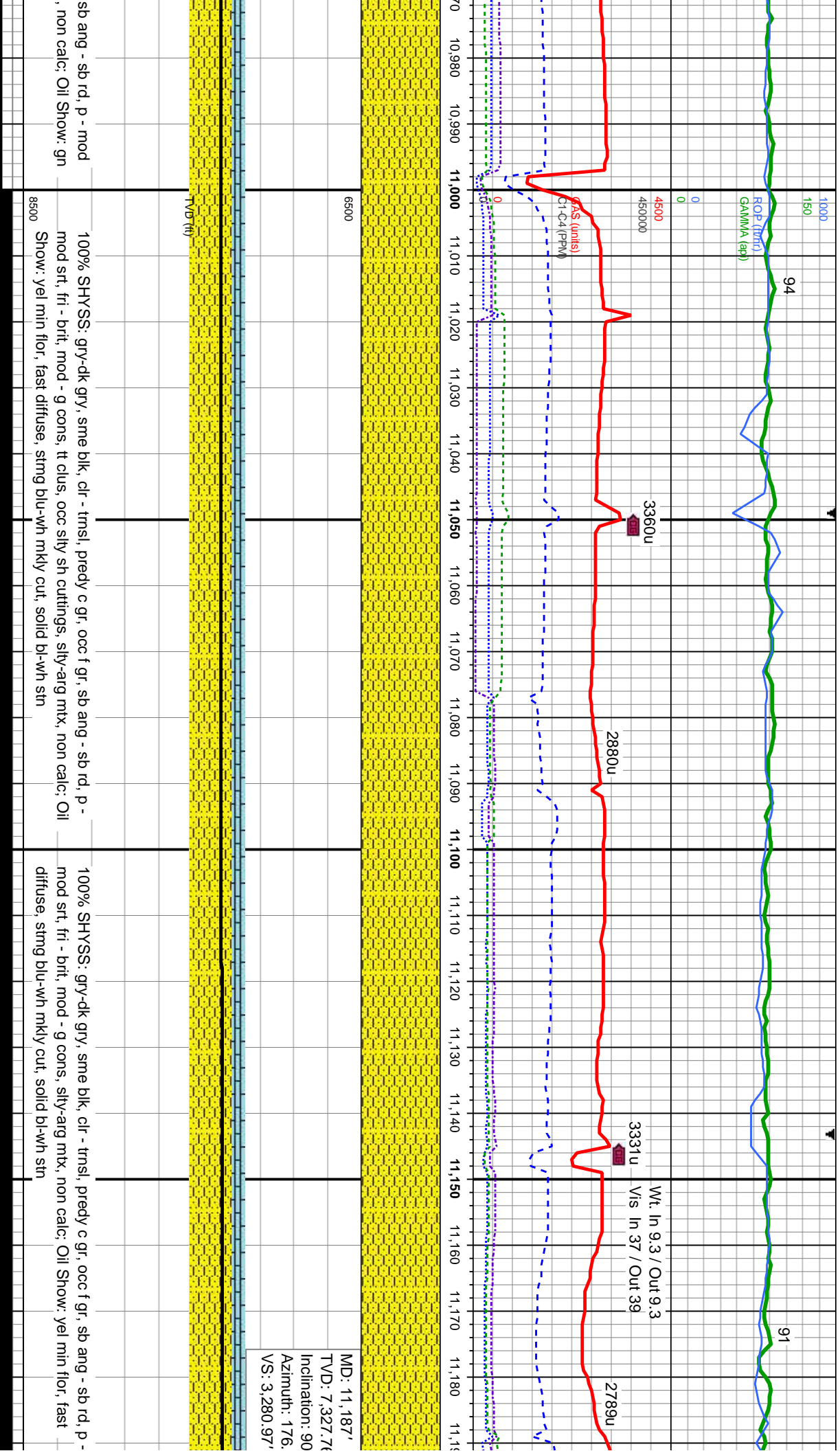
100% SHYSS: gry-dk gry, s
mod srt, fri - brt, mod - g cc
Oil Show: yel min flr, fast c

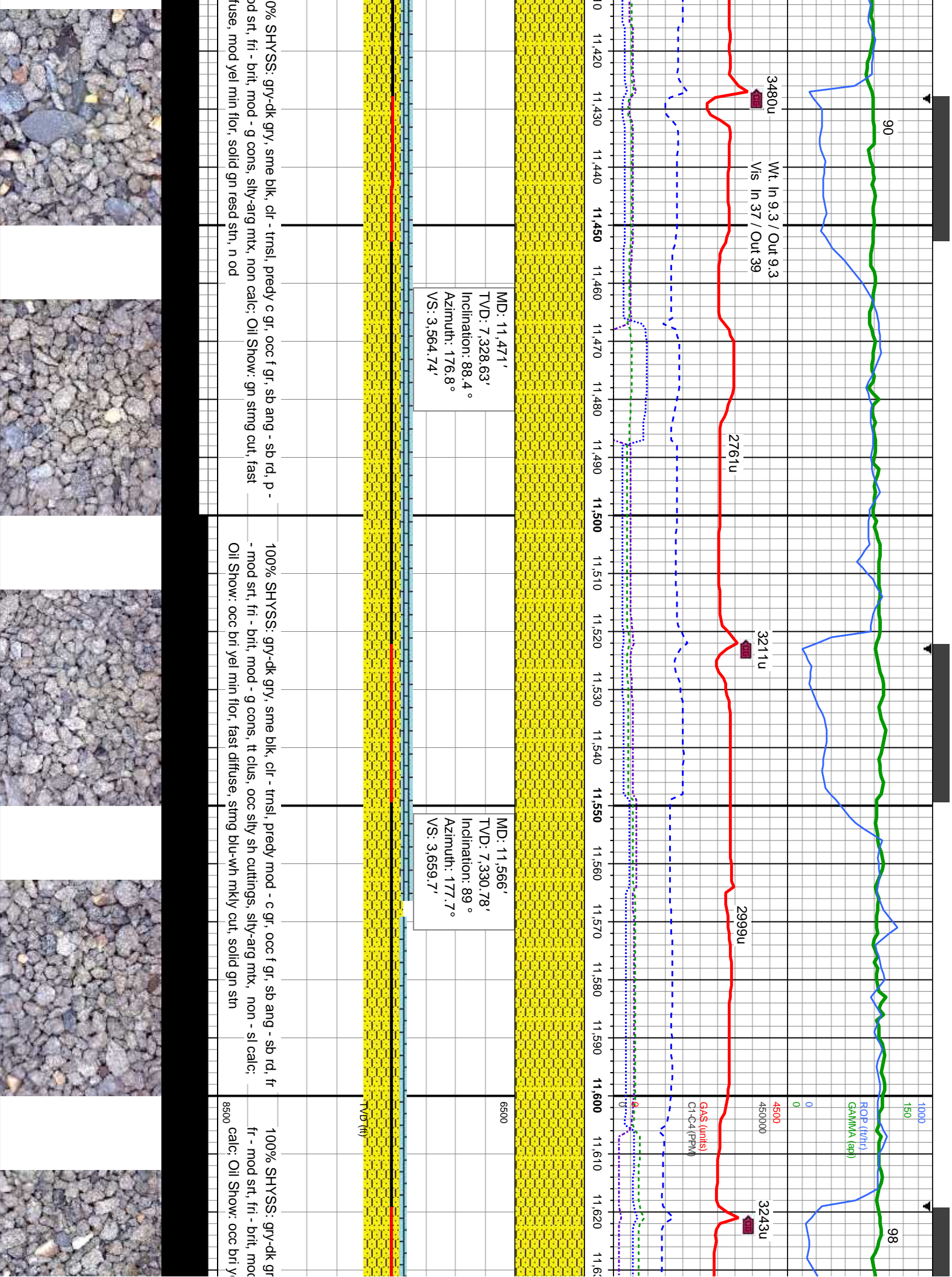






edy c gr, occ f gr, sb ang - sb rd, p - mod cuttings, silty-arg mtx, non calc; 10% SLTY blk, gty - rthy tex, arg - silty, non calc; Oil kly cut, solid bl-wh sin	90% SHYSS: gry-dk gry, sme blk, clr - trns, predy c gr, occ f gr, sb ang - sb rd, p - mod srt, fri - brit, mod - g cons, tt clus, occ silty sh cuttings, silty-arg mtx, non calc; 60% SLTY SH: gy - dk gry, occ blk, sft - mod nd, sb pty - blk, gty - rthy tex, arg - silty, non calc; Oil Show: yel min flr, fast diffuse, string blu-wh mky cut, solid bl-wh sin	100% SHYSS: gry-dk gry, sme blk, clr - trns, predy c gr, occ f gr, srt, fri - brit, mod - g cons, tt clus, occ silty sh cuttings, silty-arg mtx, string cut, fast diffuse, mod yel min flr, solid gn resd sin, n od





MD: 11,471'
TVD: 7,328.63'
Inclination: 88.4°
Azimuth: 176.8°
VS: 3,564.74'

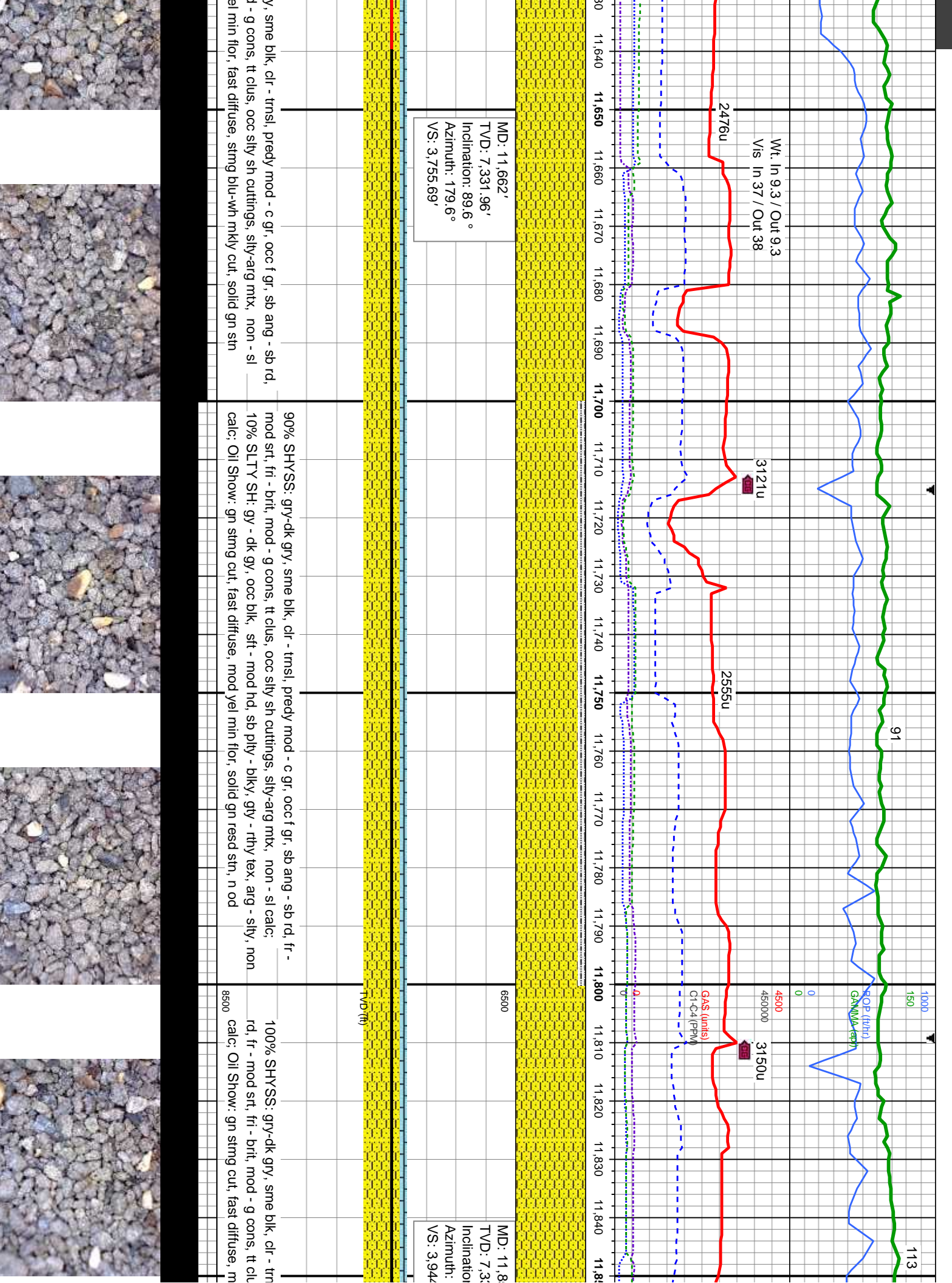
MD: 11,566'
TVD: 7,330.78'
Inclination: 89°
Azimuth: 177.7°
VS: 3,659.7'

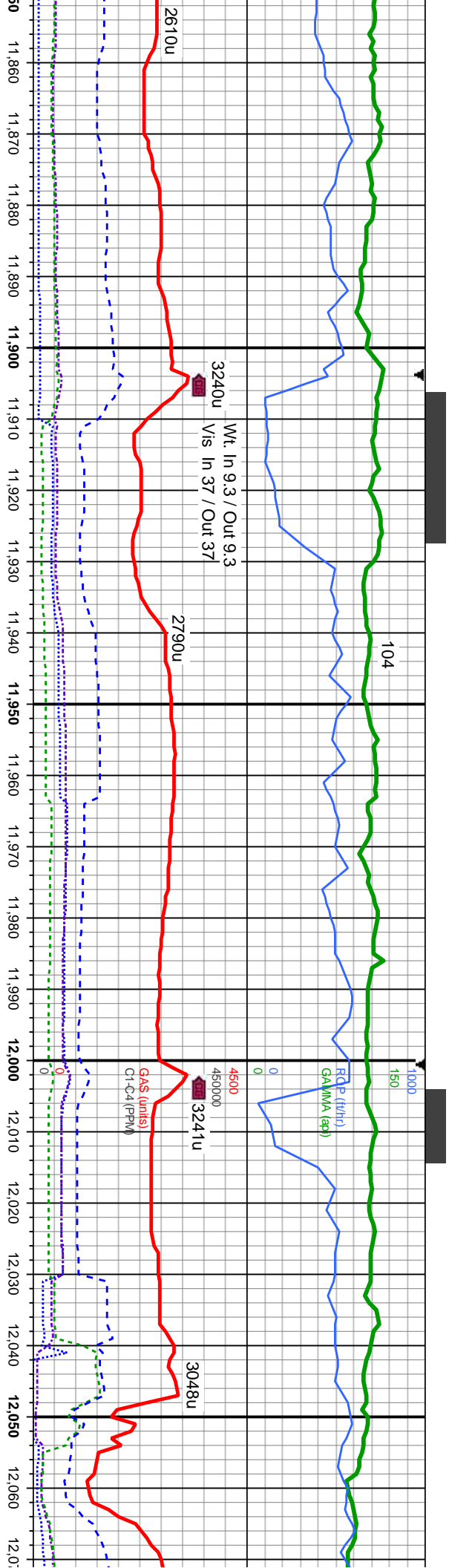
0% SHYSS: gry-dk gry, sme blk, clr - trns, predy c gr, occ f gr, sb ang - sb rd, p - mod srt, fri - brit, mod - g cons, slty-arg mtx, non calc; Oil Show: gn string cut, fast fuse, mod yel min flr, solid gn resd sin, n od

100% SHYSS: gry-dk gry, sme blk, clr - trns, predy mod - c gr, occ f gr, sb ang - sb rd, fr - mod srt, fri - brit, mod - g cons, tt clus, occ slty sh cuttings, slty-arg mtx, non - sl calc; Oil Show: occ bri yel min flr, fast diffuse, string blu-wh mky cut, solid gn str

100% SHYSS: gry-dk gry, sme blk, clr - trns, predy mod - c gr, occ f gr, sb ang - sb rd, fr - mod srt, fri - brit, mod - g cons, slty-arg mtx, non - sl calc; Oil Show: occ bri yel min flr, fast diffuse, string blu-wh mky cut, solid gn str



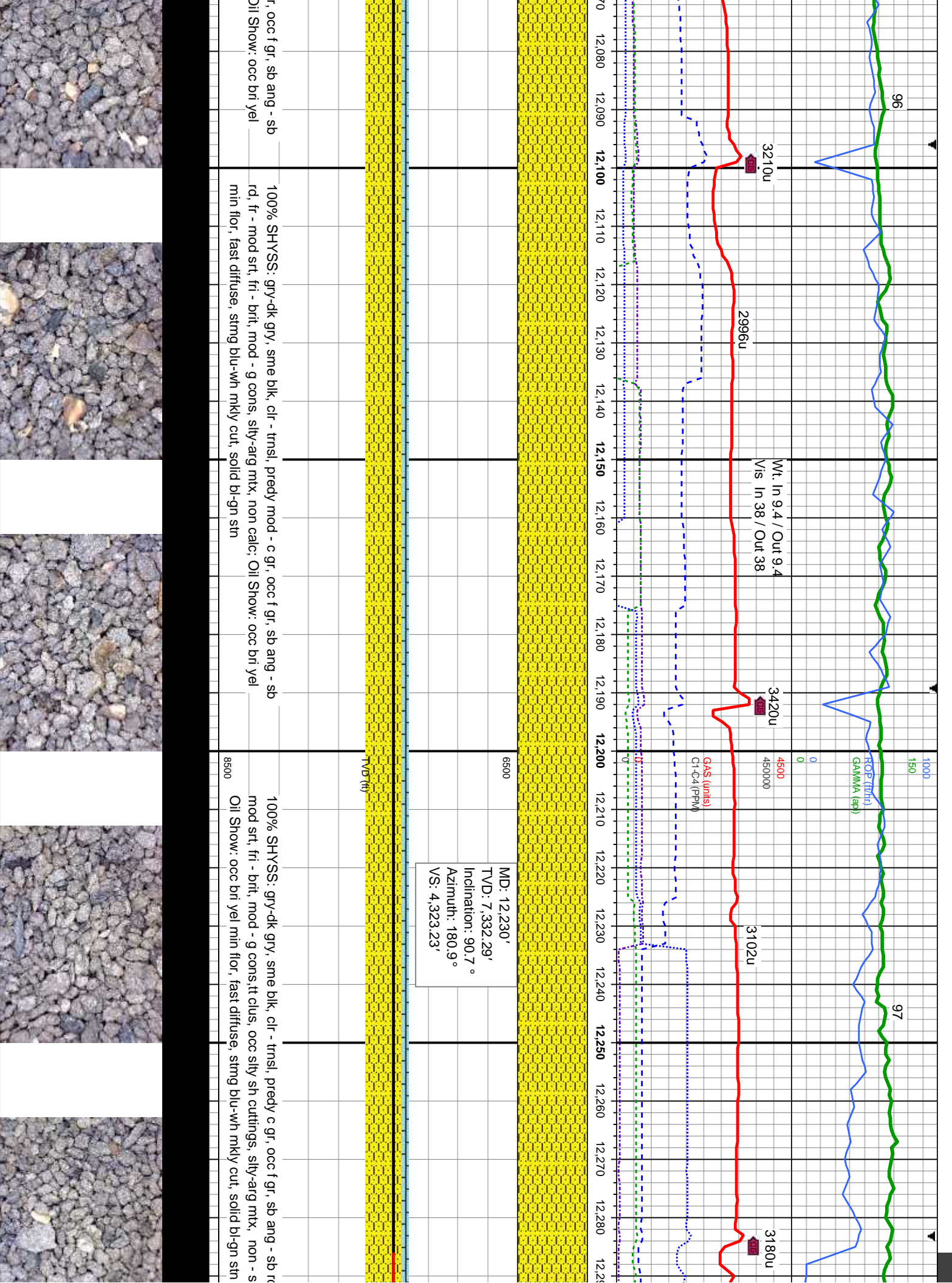




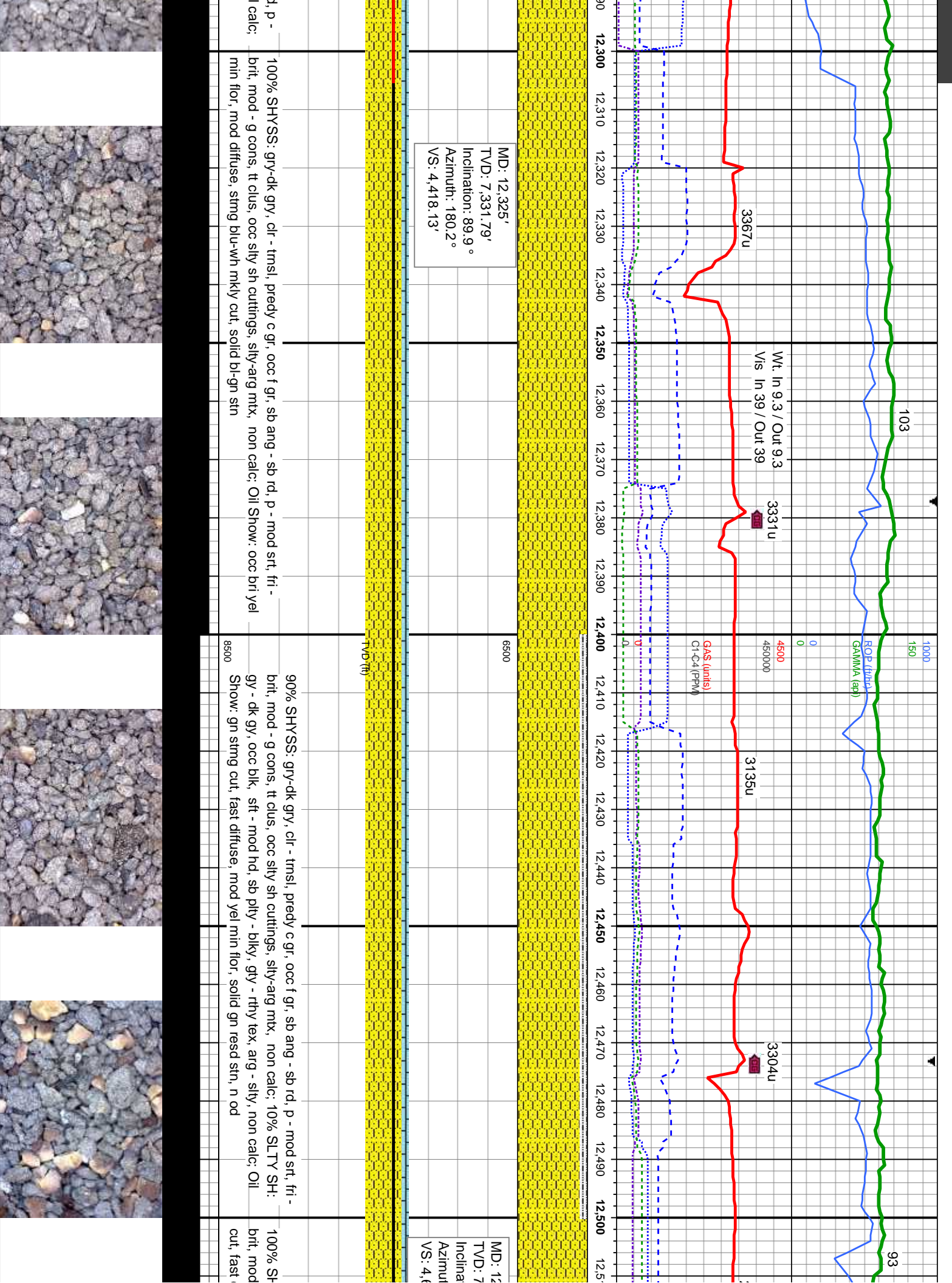
51'	MD: 11,946'	6500	MD: 12,041'
34.1'	TVD: 7,334.76'		TVD: 7,334.27'
1: 89.1°	Inclination: 90.1°		Inclination: 90.5°
179.3°	Azimuth: 180.6°		Azimuth: 180.5°
1.61'	VS: 4,039.55'		VS: 4,134.45'

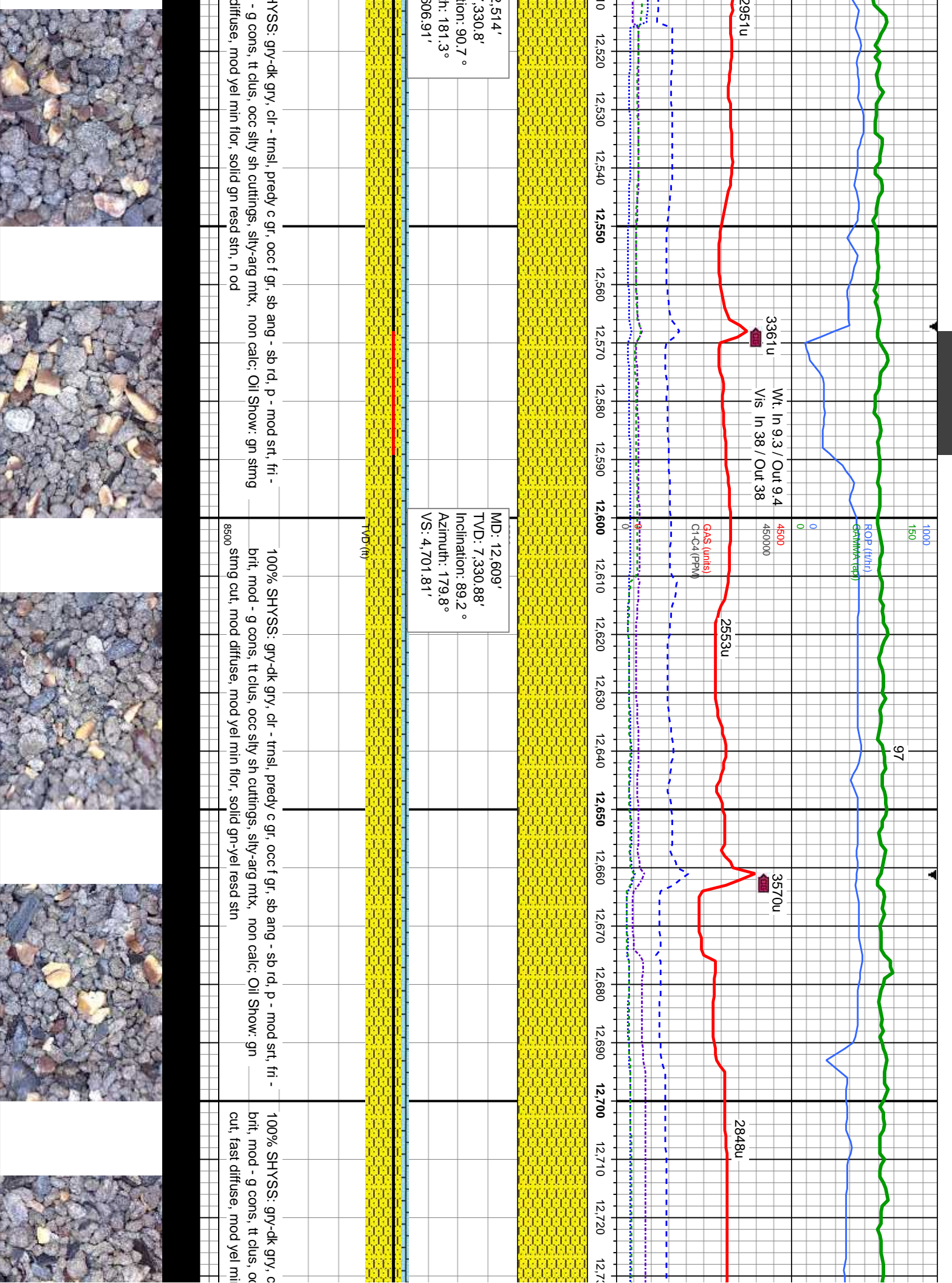
sl, predy mod - c gr, occ f gr, sb ang - sb	100% SHYSS: gry-dk gry, sme blk, clr - trns, predy mod - c gr, occ f gr, sb ang - sb rd, fr -	100% SHYSS: gry-dk gry, sme blk, clr - trns, predy mod - c g
is, occ silty sh cuttings, silty-arg mtx, non	mod srt, fri - brit, mod - g cons, tt clus, silty-arg mtx, non calc; Oil Show: occ bri yel min	rd, fr - mod srt, fri - brit, mod - g cons, silty-arg mtx, non calc; C
mod yel min flr, solid gn read strn, n od	flr, fast diffuse, sting blu-wh mky cut, solid gn sin	min flr, fast diffuse, sting blu-wh mky cut, solid bl-gn str





MD: 12,230'
TVD: 7,332.29'
Inclination: 90.7°
Azimuth: 180.9°
VS: 4,323.23'

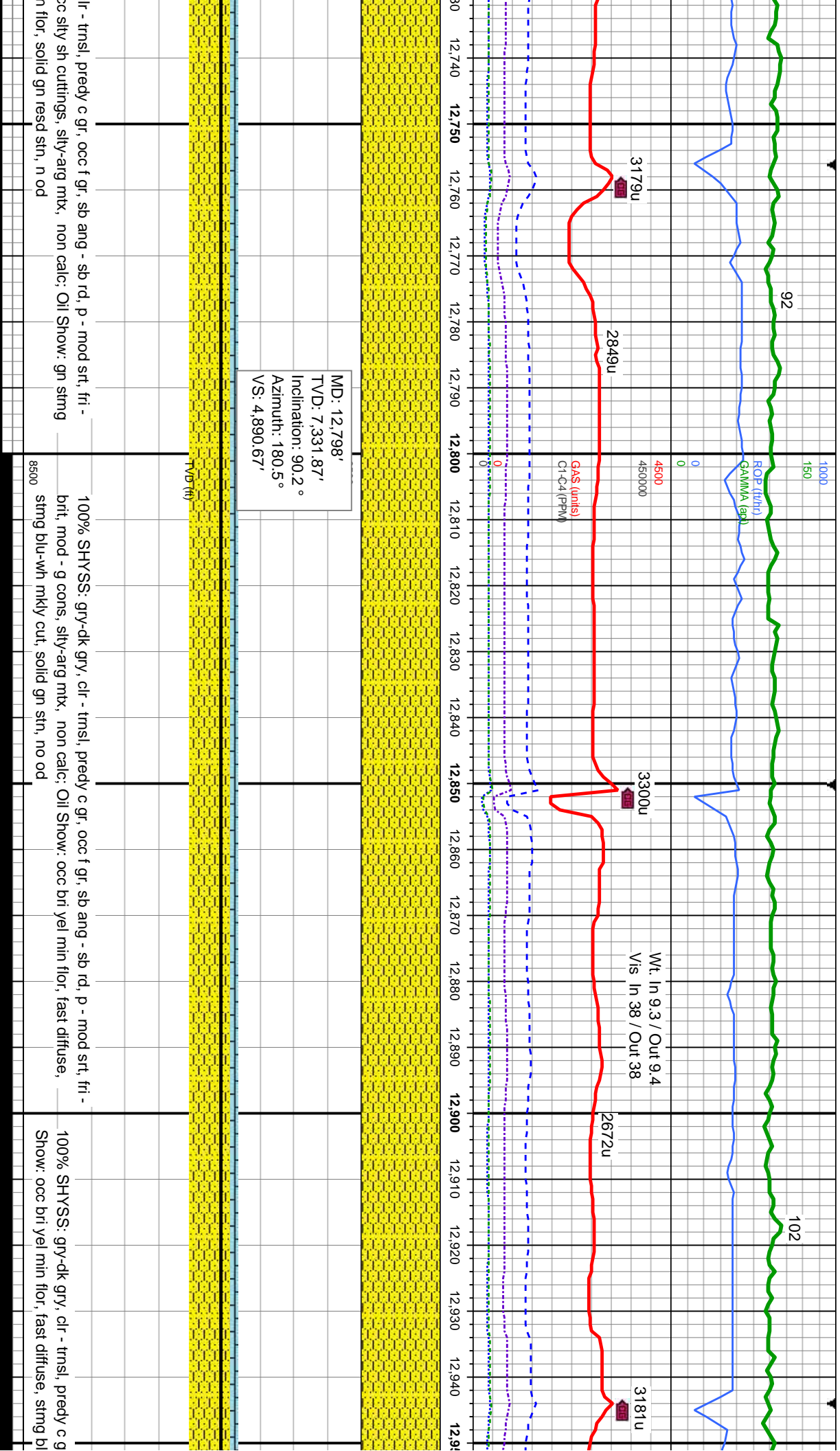


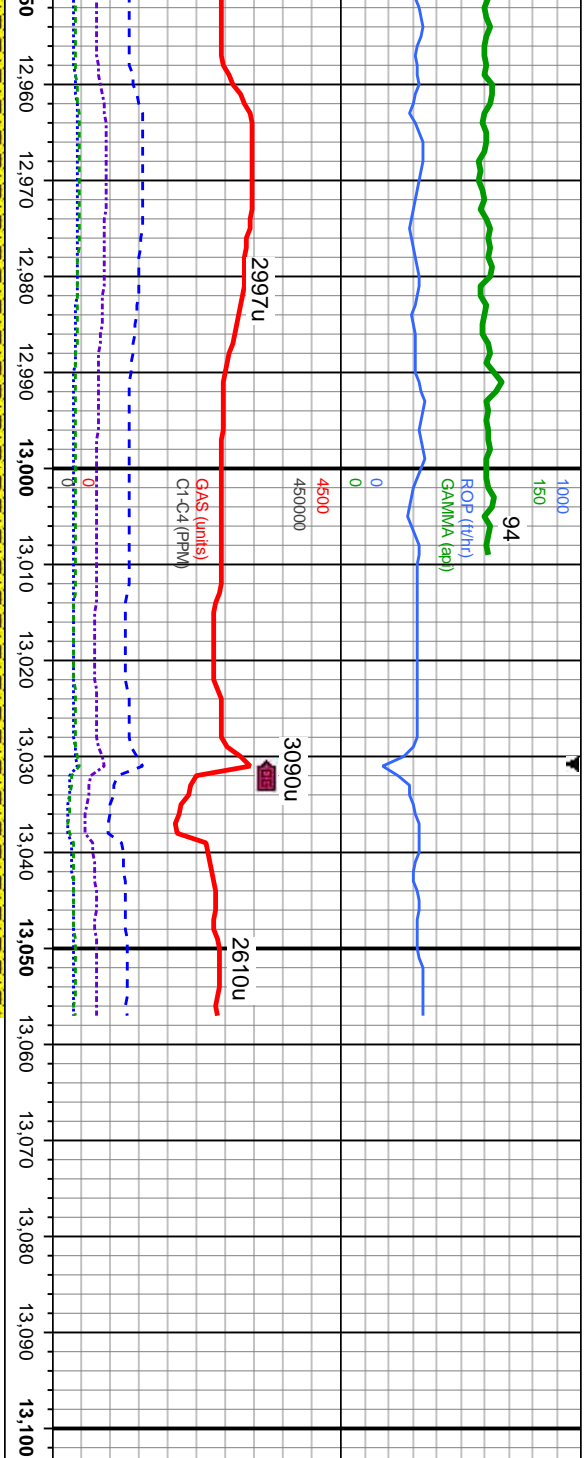


MD: 12,609'
TVD: 7,330.88'
Inclination: 89.2°
Azimuth: 179.8°
VS: 4,701.81'

100% SHYSS: gry-dk gry, clr - tmsl, predy c gr, occ f gr, sb ang - sb rd, p - mod srt, fri - bit, mod - g cons, tt clus, occ silty sh cuttings, silty-arg mxt, non calc; Oil Show: gn stmg cut, mod diffuse, mod yel min flr, solid gn-yel resd sin







MD: 13,006'
TVD: 7,331.69'
Inclination: 89.9°
Azimuth: 180.8°
VS: 5,098.44'

TVD (ft)

BIT PROJECTION:
MD: 13,057'
TVD: 7,331.8'
Inclination: 89.9°
Azimuth: 180.8°

Wirkner-Vance 14C-1HZ Wellbore TD @ ' MD @ 04:38 hrs on
11/16/2013

Thank you for using Columbine Logging, Inc.

u-w/wh mtkly cut, solid gn sin, no od
f, occ f gr, sb ang - sb rd, p - mod srt, fr - bit, mod - g cons, slty-arg mtx, non calc; Oil

8500

