



Empirica

Scale: 5" / 100'
Measured Depth Log

Well Name Thornton3_Lat_Extraction.mplot

Location Sec 8-T7N-R66W

State CO

County Weld

Country USA

Rig Number HP 280

API Number 05123 4025700

AFFE # 14- 216

Region DJ Basin

Field Wattenberg

Spud Date 2/19/2015

Drilling Completed 3/4/2015

Surface Coordinates N 1,457,075.03'

E 3,191,541.23'

Lat 40.586025'

Long -104.810366'

Bottom Hole Coordinates N 486.19' N

E 28,936.36 E

Ground Elevation 5033'

K.B. Elevation 5057'

Logged Interval 6900' To 17,347'

Total Depth 17,347'

Formation Codell

Type of Drilling Fluid Water based mud

Operator

Company Extraction Oil & Gas

Address 1888 Sherman St., Suite 500
Denver, CO 80203

Geologist

Name Vivian Spliss

Company Extraction Oil & Gas

Address 1888 Sherman St., Suite 500
Denver, CO 80203

Other

Start Logging date: 02/20/2015

2 man logging service Hana Walchauseirova/ Ed

End logging date: 03/04/2015

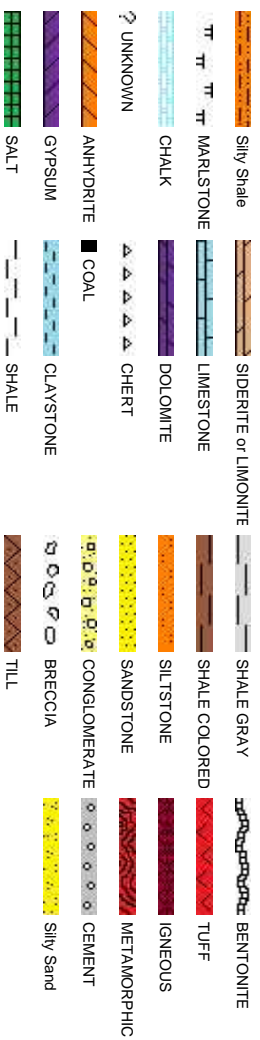
Zone Color Coding

Oil
Note
Error

Condensate
Core
Water

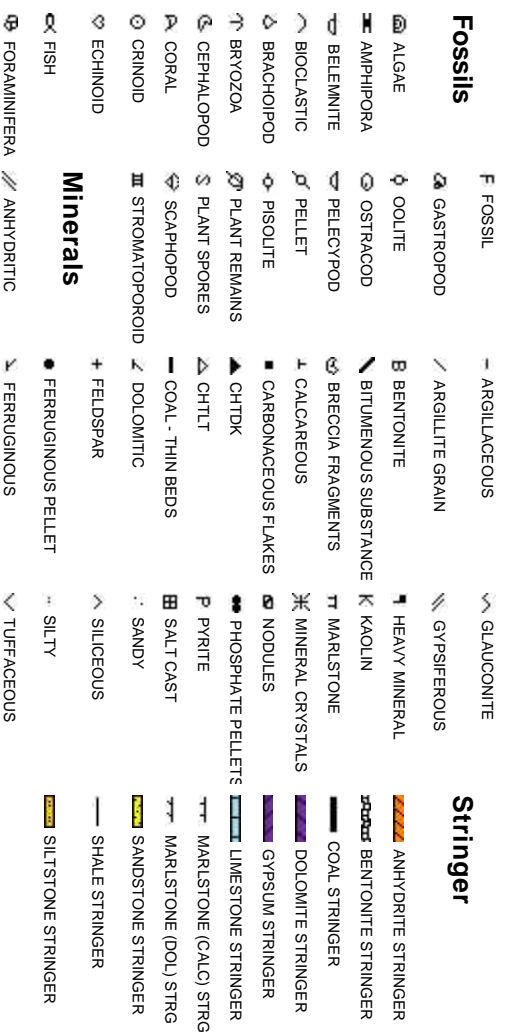
Gas
Press
Seal

Rock Types



Accessories

Fossils



Other

Oil Show



Engineering



Porosity



Symbols

▷ WIRELINE TESTED - RT L LITHOGRAPHIC

ASING MX MICROXLN

Rounding

MS MUDSTONE

ANGULAR PS PACKSTONE

ROUNDED WWS WACKESTONE

HOW

SUBBANG

Sorting

FAULT

POOR

MODERATE

Textures

POOR

BOUNDSTONE

WELL

CHALKY

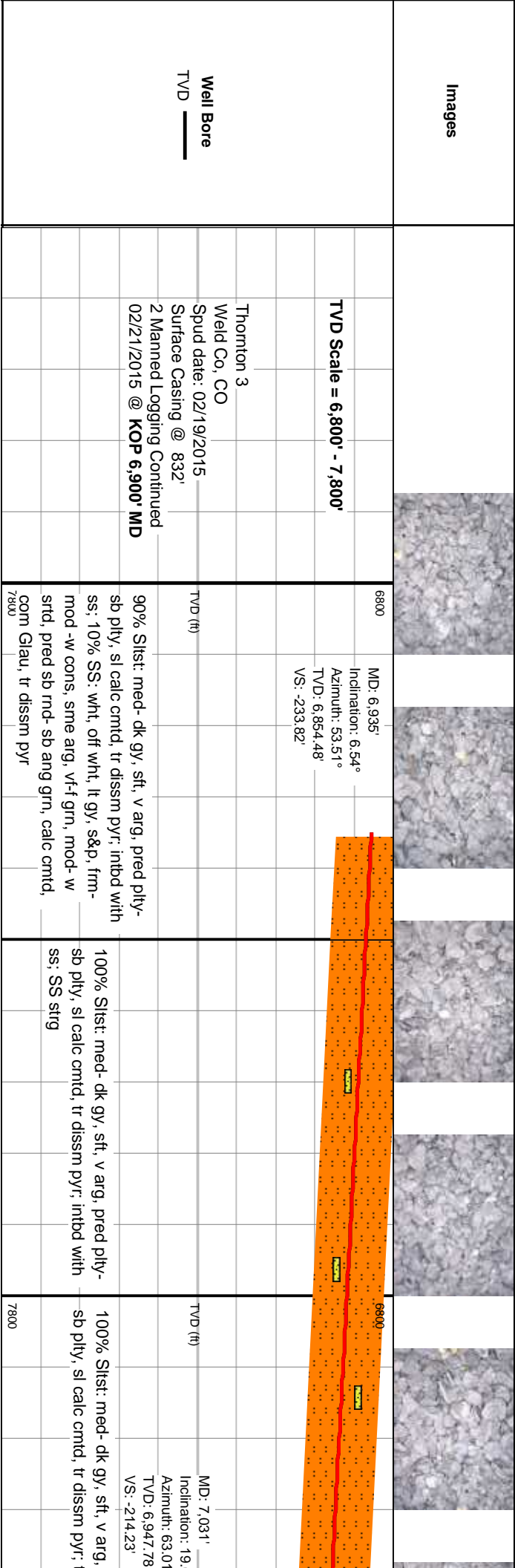
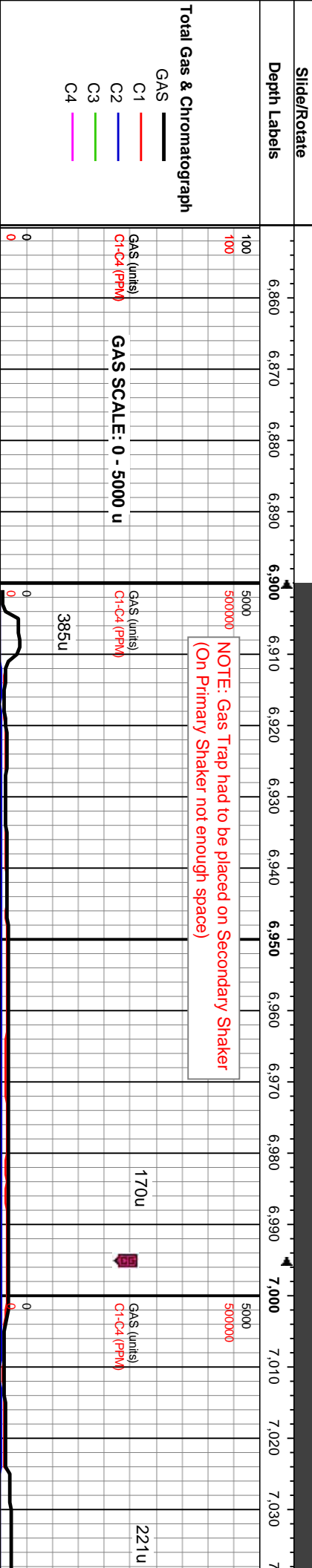
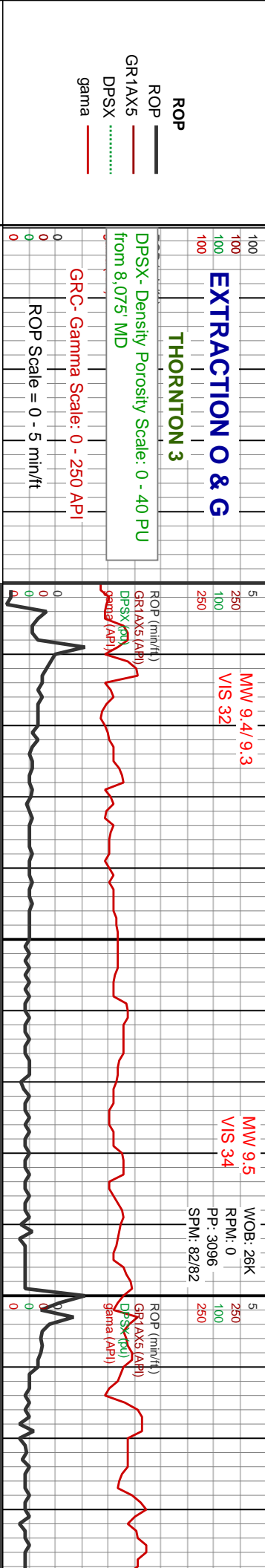
SILTY SHALE

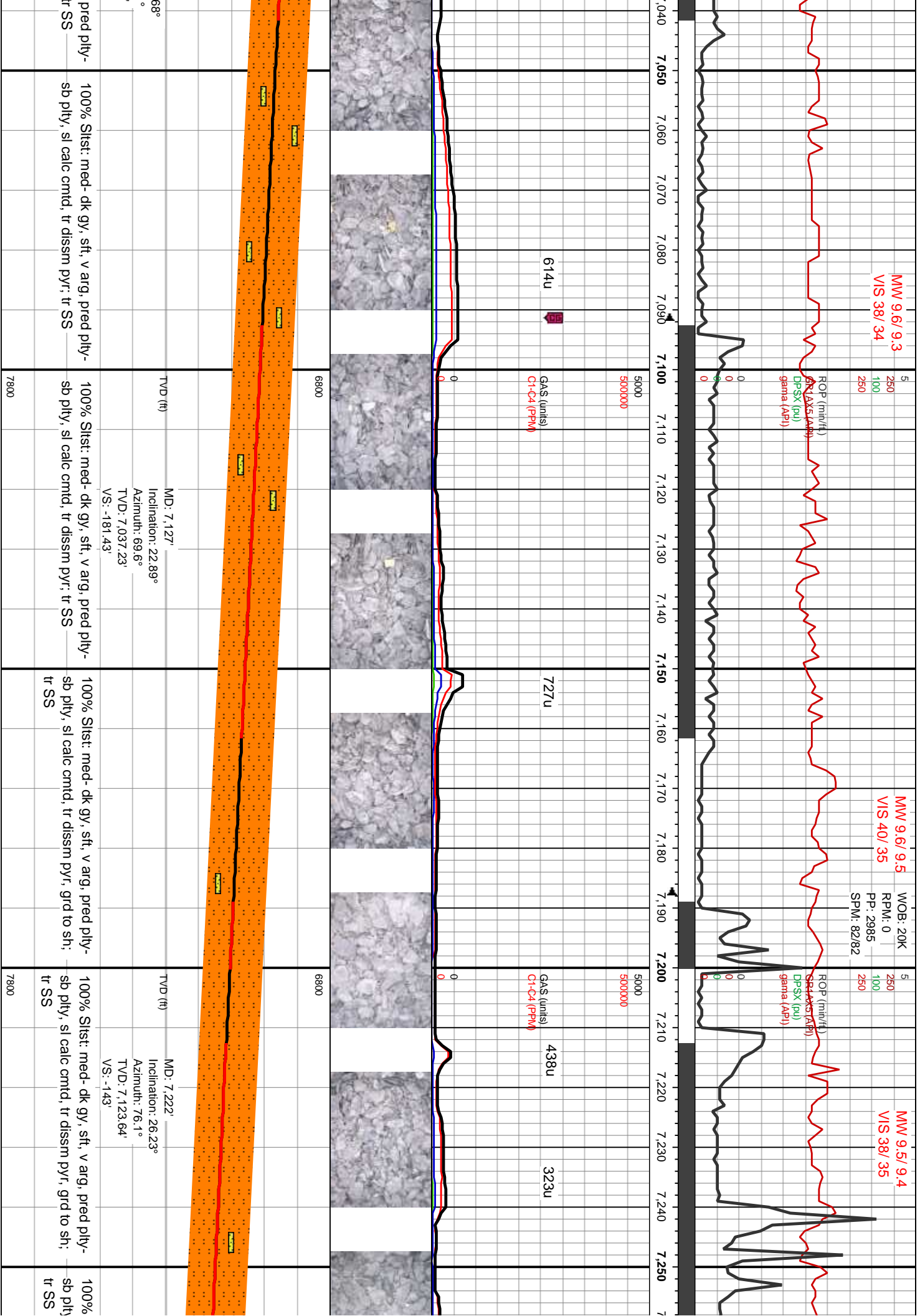
CRYPTOXLN

EARTHY

FINELYXLN

GRAINSTONE





MW 9.6 / 9.5
VIS 38

MW 9.8 / 9.6
VIS 41 / 39

Niobrara A @ 7,435' MD 7,301' TVD

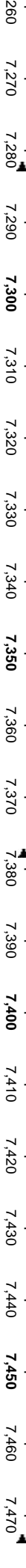
MW 9.6 / 9.5
VIS 38

ROP (min./ft)
GR1XX5 (API)
DPSX (psi)
gamma (API)

WOB: 35K
RPM: 0
PP: 3428

ROP (min./ft)
GR1XX5 (API)
DPSX (psi)
gamma (API)

Sharon Springs @ 7,387' MD 7,265' TVD SPM: 82/82



403u

909u

715u

3060u

GAS (units)
C1-C4 (PPM)

GAS (units)
C1-C4 (PPM)

MD: 7,318'
Inclination: 29.92°
Azimuth: 85.42°
TVD: 7,208.37'
VS: -98.12'

TVD SCALE CHANGE AT 7,400' MD

MD: 7,413'
Inclination: 42.75°
Azimuth: 83.48°
TVD: 7,285.46'
VS: -41.55'

TVD (ft)

TVD (ft)

Stst: med- dk gy, sft, v arg, pred pty-
arg cntd, com dissim pyr, grd to sh;

100% Stst: med- dk gy, sft, v arg, pred pty-
sb pty, arg cntd, com dissim pyr, grd to sh;
tr SS

100% Stst: med- dk gy, sft, v arg, pred pty-
sb pty, arg cntd, com dissim pyr, grd to sh;
tr SS

10% CHK: lt gy-med gy, v sft, v calc, arg, silty
ip, sb ang-sb blkly, mot, crpxln; 30% MRLST:
med gy-blk, frm, stri, silty, arg, calc, pred sb
blkly-sb pty; 40% SLTST: med gy-dk gy, pred
pty-sb pty, sft-p cons, arg cntd, v arg,
dissim pyr; 20% SH: blk, dk gy, pred pty,
arg-sil cntd, frm, brit, abnt dissim pyr

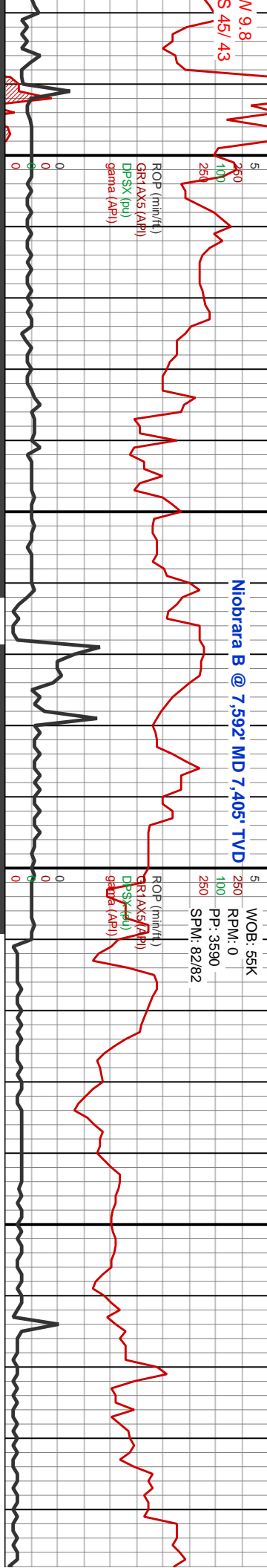
10% CHK: lt gy-med gy, v
ip, sb ang-sb blkly, mot, crpxln; 30% MRLST:
med gy-blk, frm, stri, silty, arg, calc, pred sb
blkly-sb pty; 40% SLTST: med gy-dk gy, pred
pty-sb pty, sft-p cons, arg cntd, v arg,
dissim pyr; 20% SH: blk, dk gy, pred pty,
arg-sil cntd, frm, brit, abnt dissim pyr

N 9.8
S 45/ 43

ROP (min./ft)
GR1AX5 (API)
DPSX (psi)
gamma (API)

WOB: 55K
RPM: 0
PP: .3590
SPM: 82/82

Niobrara B @ 7,592' MD 7,405' TVD



5000
5000000

2133u

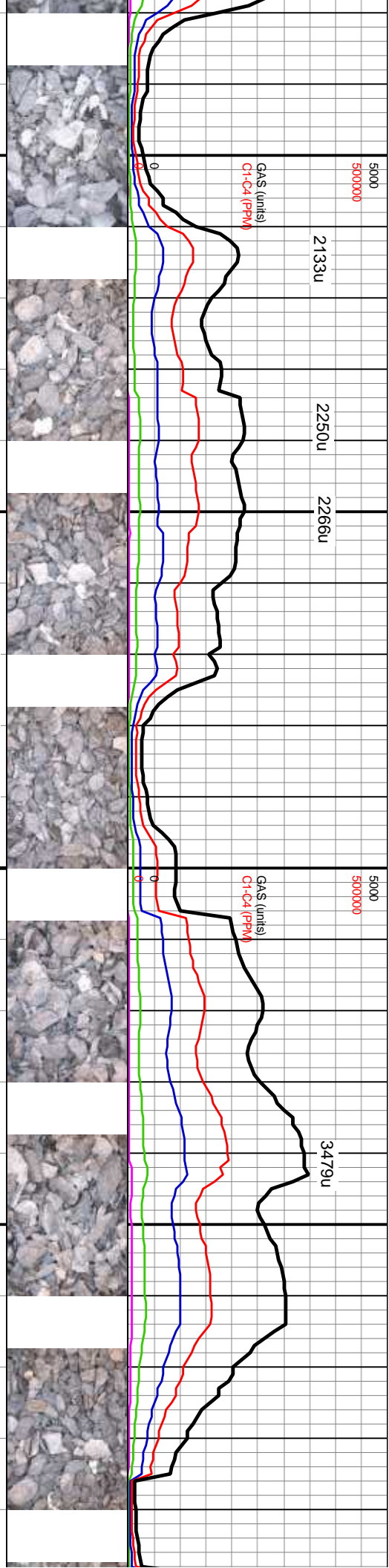
2250u

2260u

3479u

GAS (units)
C1-C4 (PPM)

GAS (units)
C1-C4 (PPM)



TVD SCALE CHANGE AT 7,600' MD

MD: 7,509'

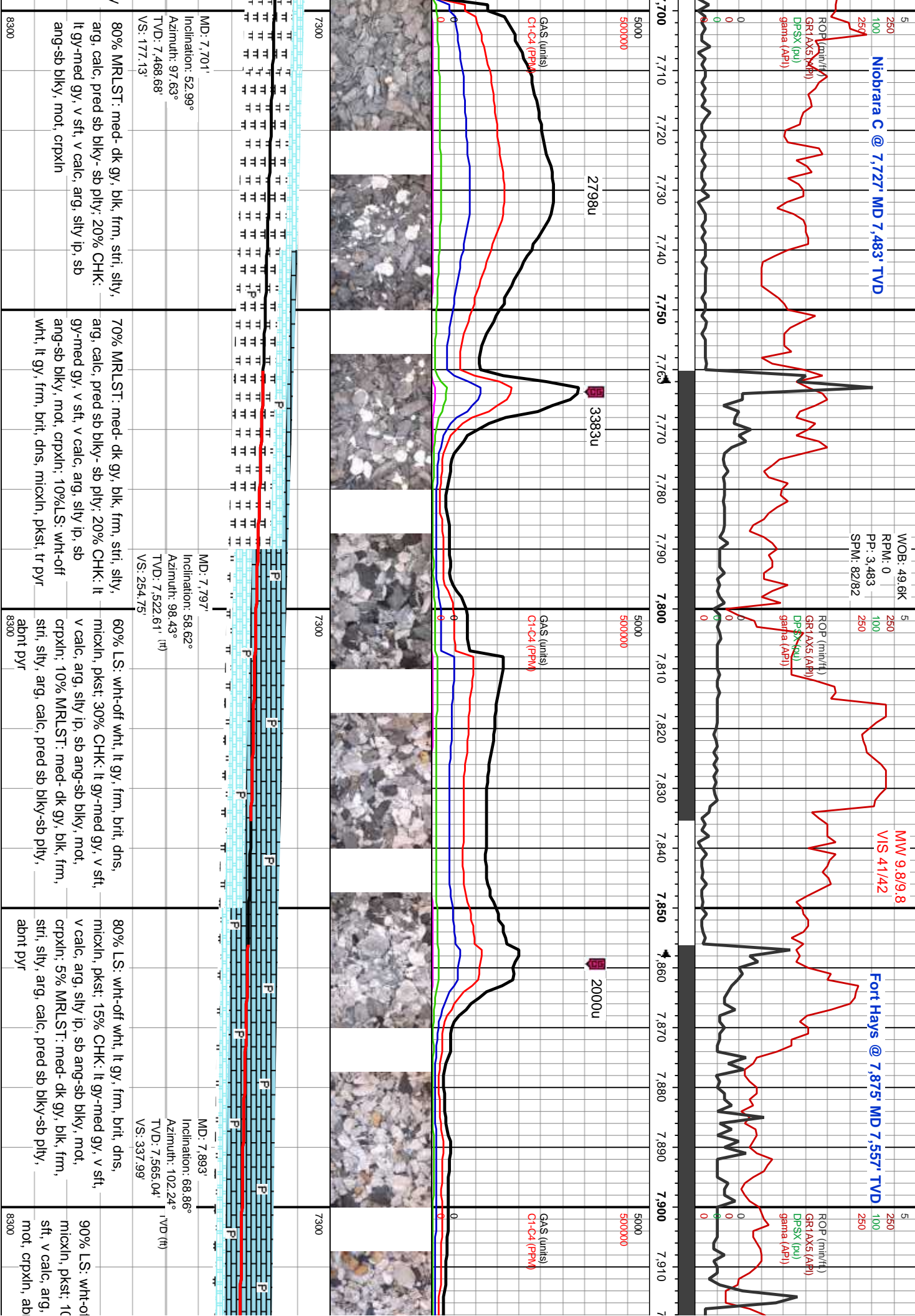
Inclination: 47.54°
Azimuth: 89.72°

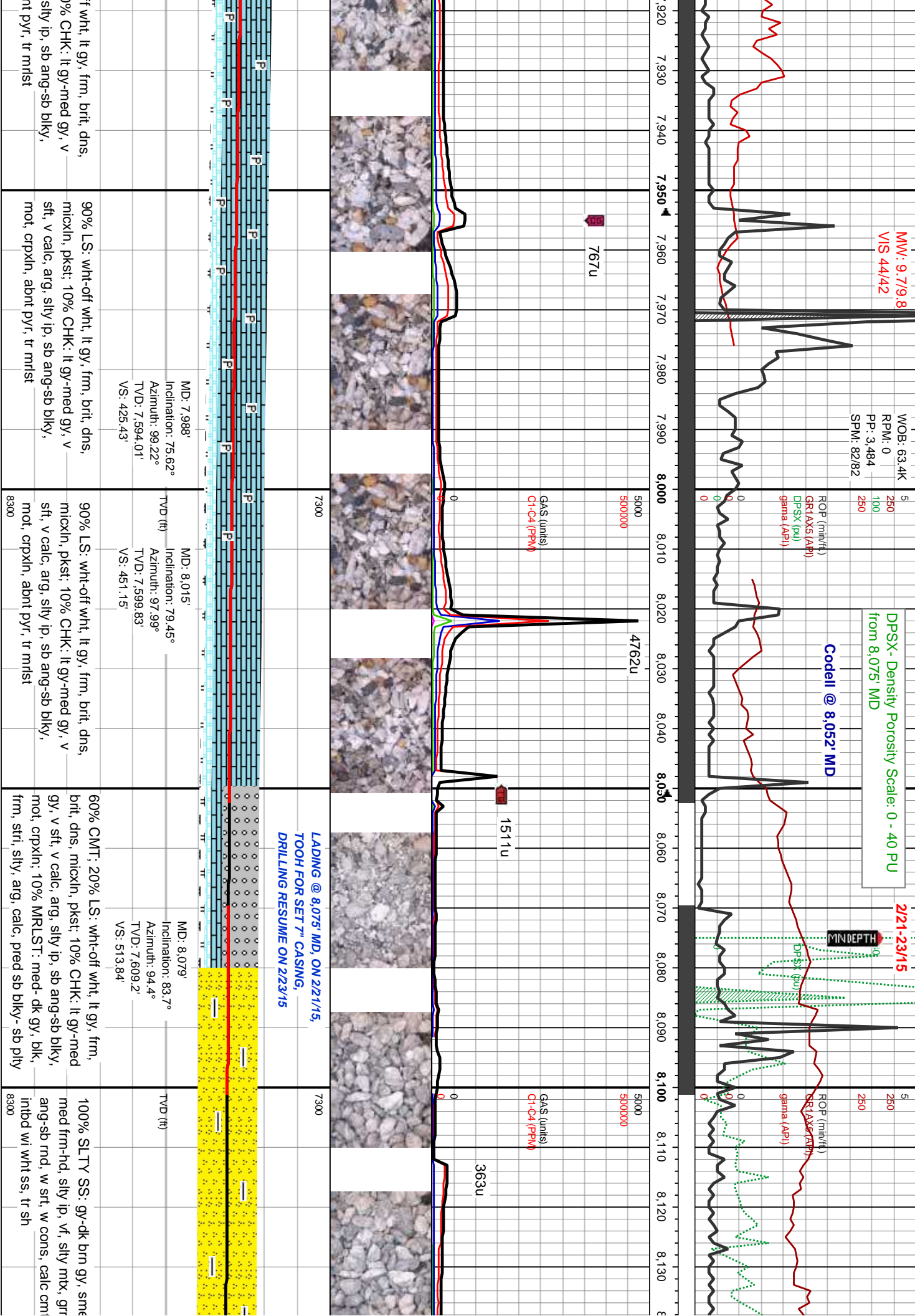
TVD: 7,353.19'
VS: 26.41'

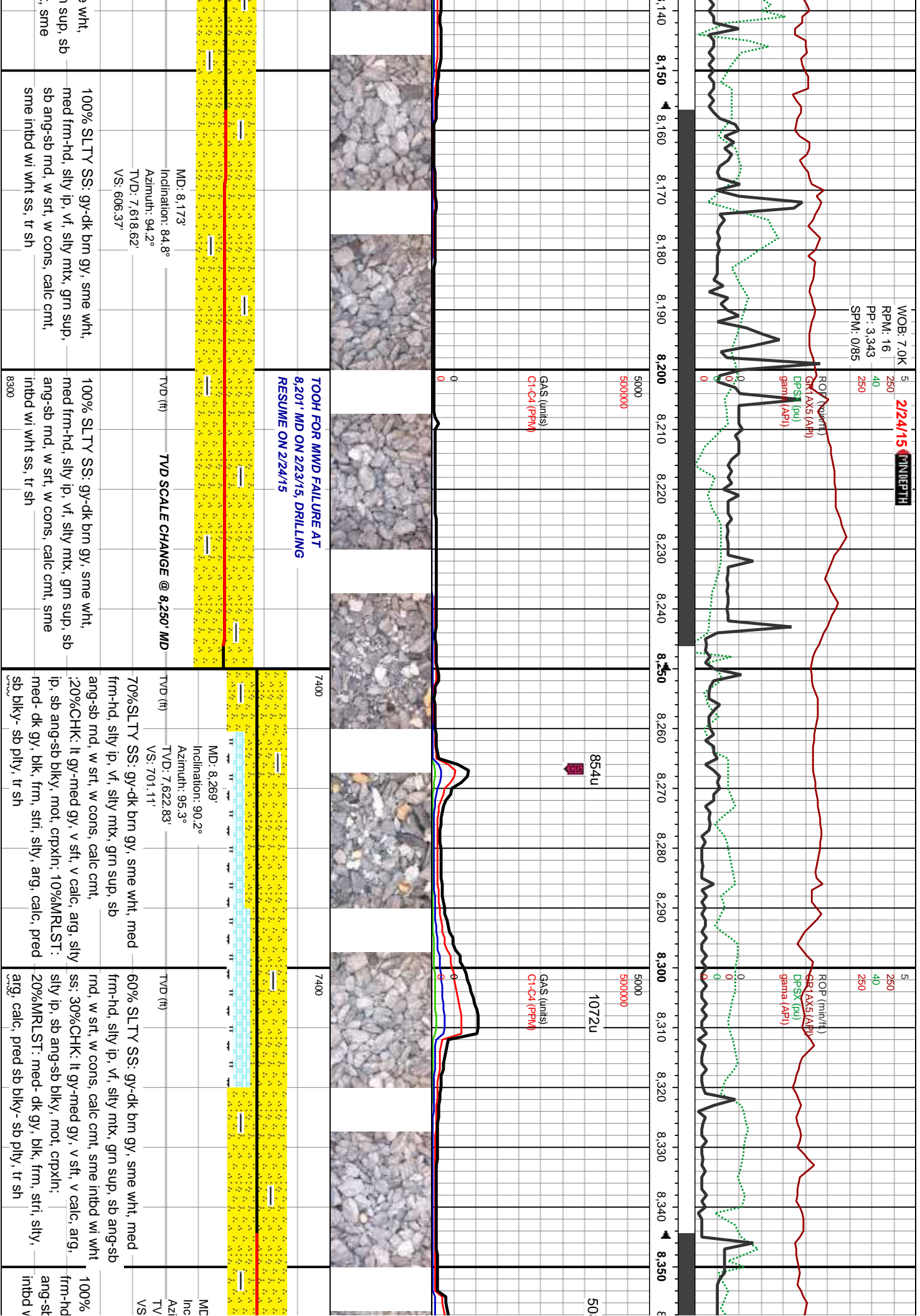
MD: 7,605'

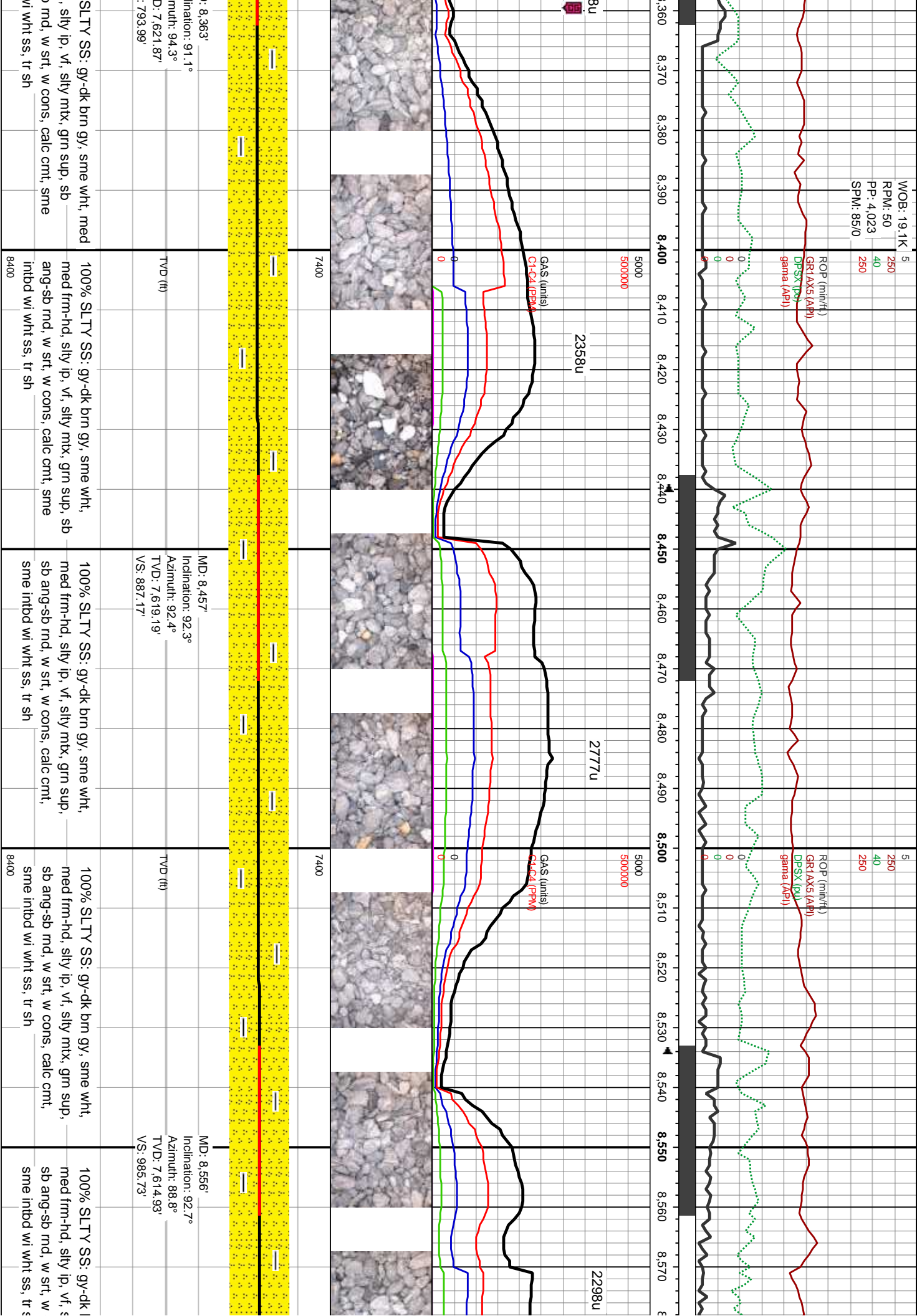
Inclination: 55.76°
Azimuth: 97.99°
TVD: 7,412.76'
VS: 100.76'

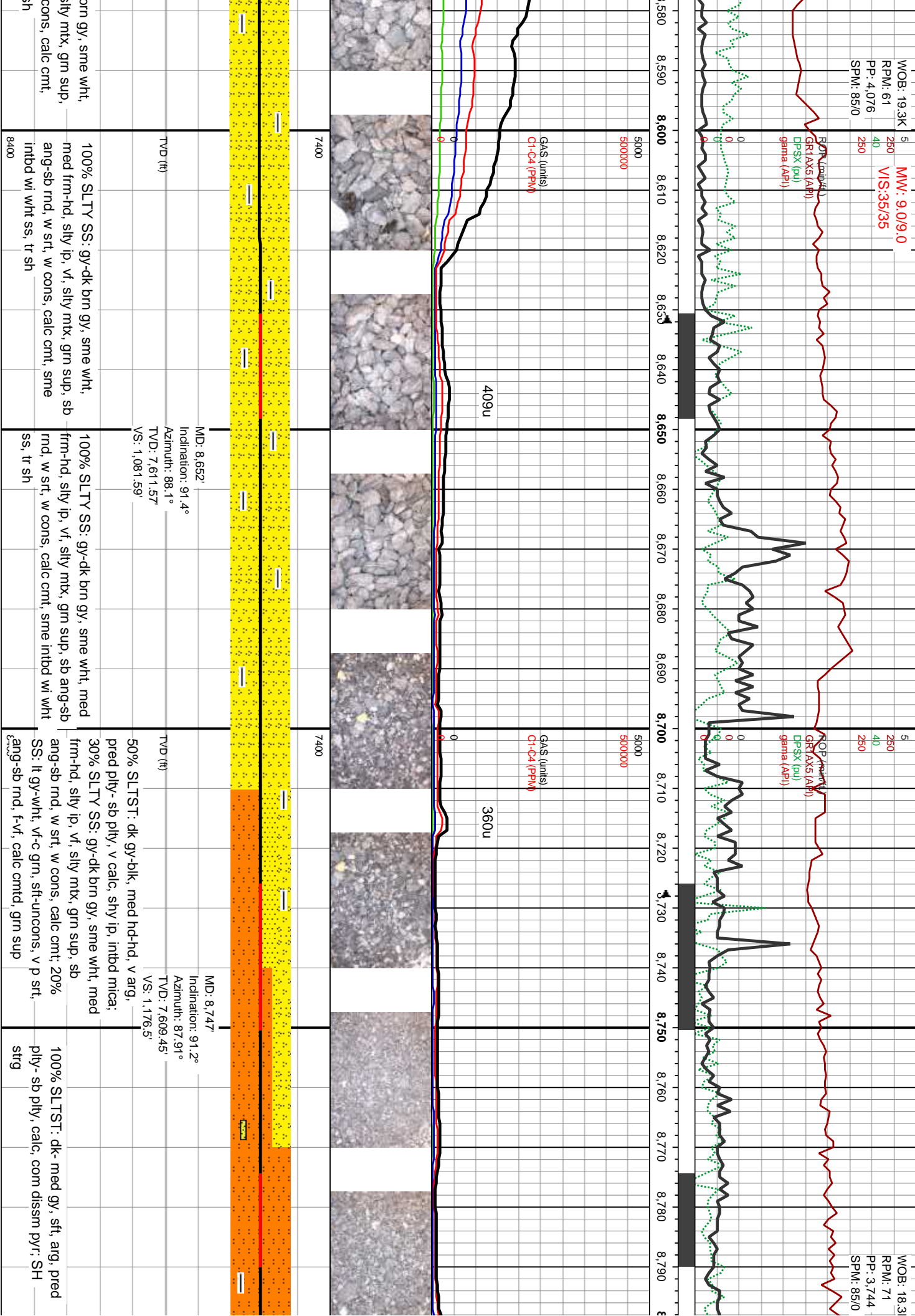
sft, v calc, arg, silty arg, calc, pred sb med gy-dk gy, pred j cmtid, v arg, dissm red pily, arg-sil pyr	80% MRLST: med gy-blk, frm, stri, silty, arg, calc, pred sb blk- sb pily, com pyr, tr ss; 20% CHK: lt gy-med gy, v sft, v calc, arg, silty ip, sb ang-sb blk, mot, crpxln	80% MRLST: med gy-blk, frm, stri, silty, arg, calc, pred sb blk- sb pily, com pyr, tr ss & ls; 10% CHK: lt gy-med gy, v sft, v calc, arg, silty ip, sb ang-sb blk, mot, crpxln	80% CHK: lt gy-med gy, v sft, v calc, arg, silty ip, sb ang-sb blk, mot, crpxln; 20% MRLST: med gy-blk, frm, stri, silty, arg, calc, pred sb blk- sb pily; com pyr	70% CHK: lt gy-med gy, v sft, v calc, arg, silty ip, sb ang-sb blk, mot, crpxln; 30% MRLST: med gy-blk, frm, stri, silty, arg, calc, pred sb blk- sb pily; com pyr

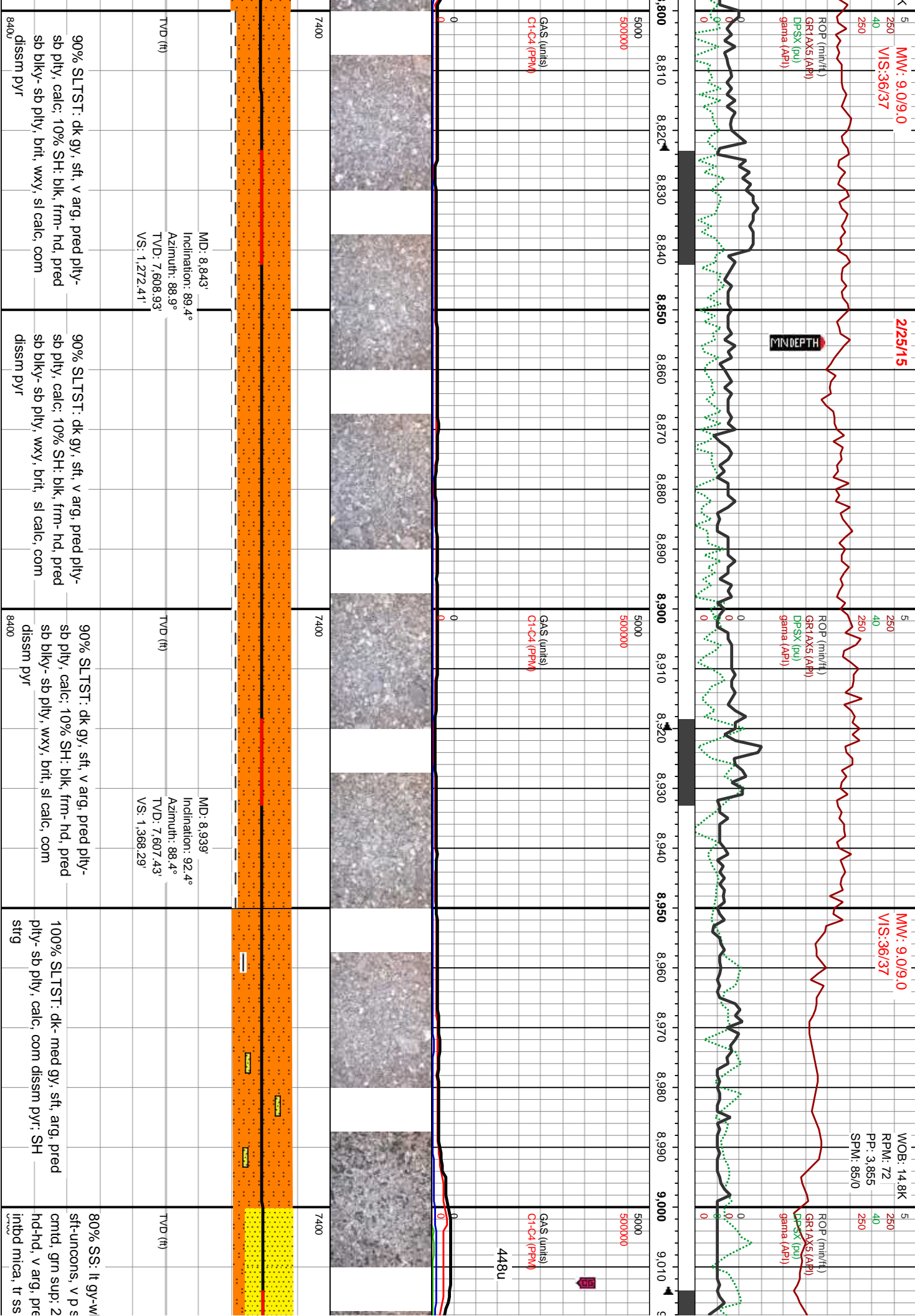


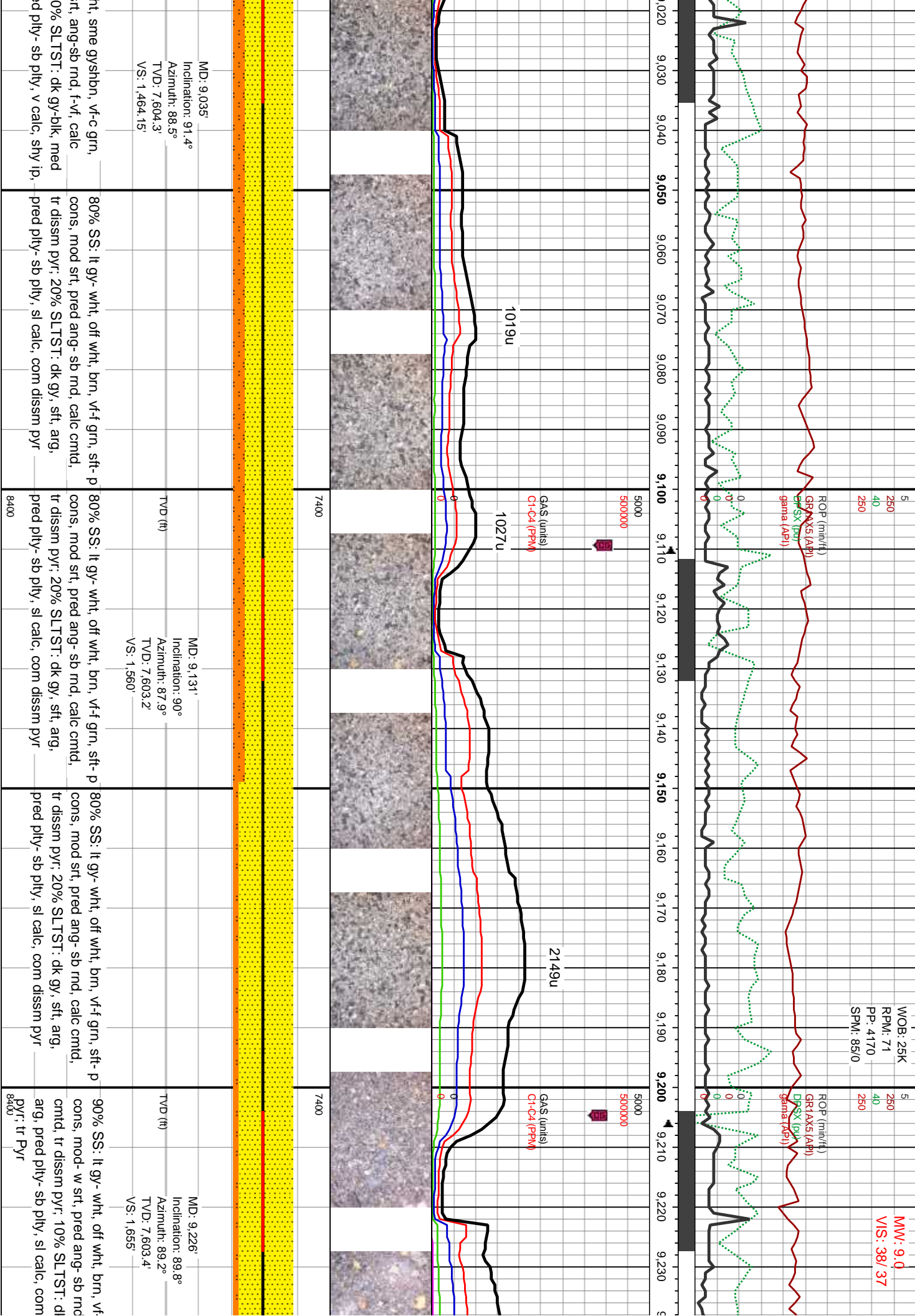


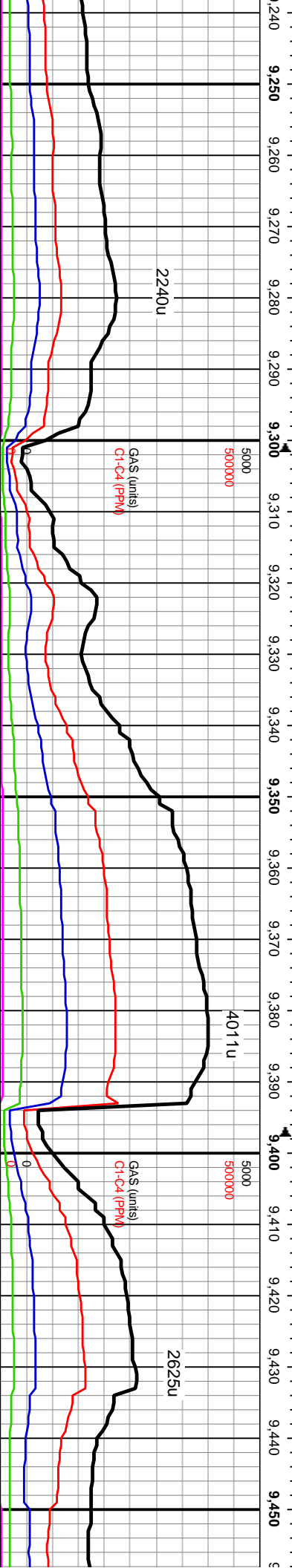
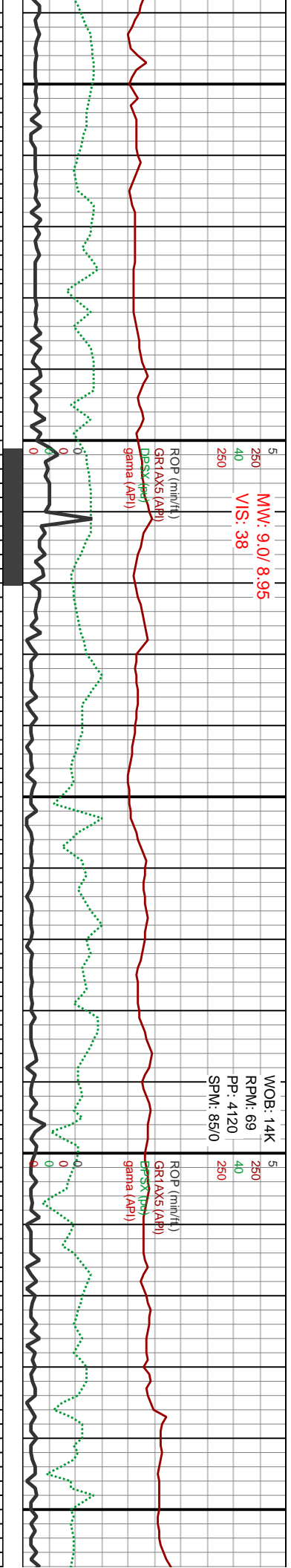




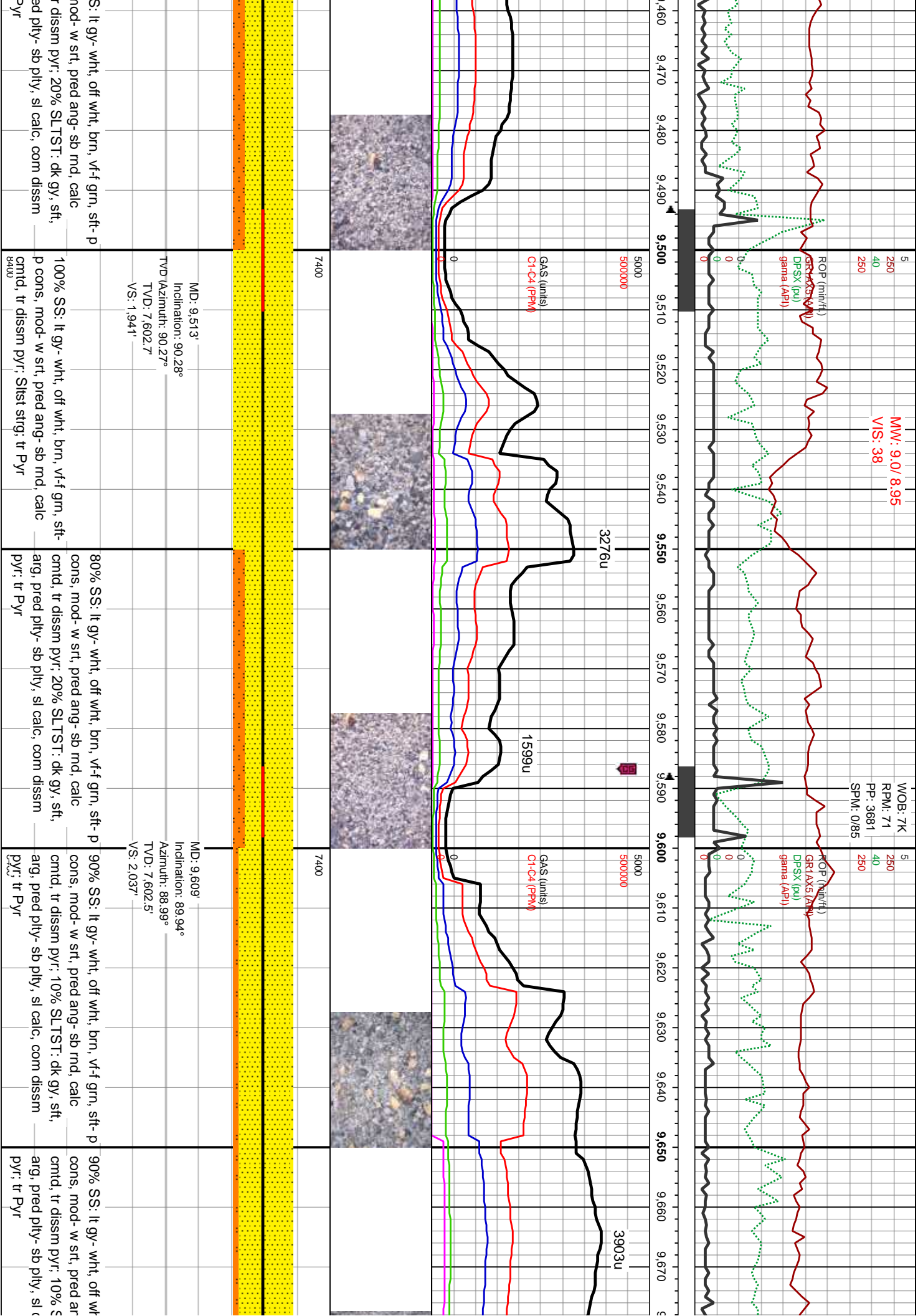


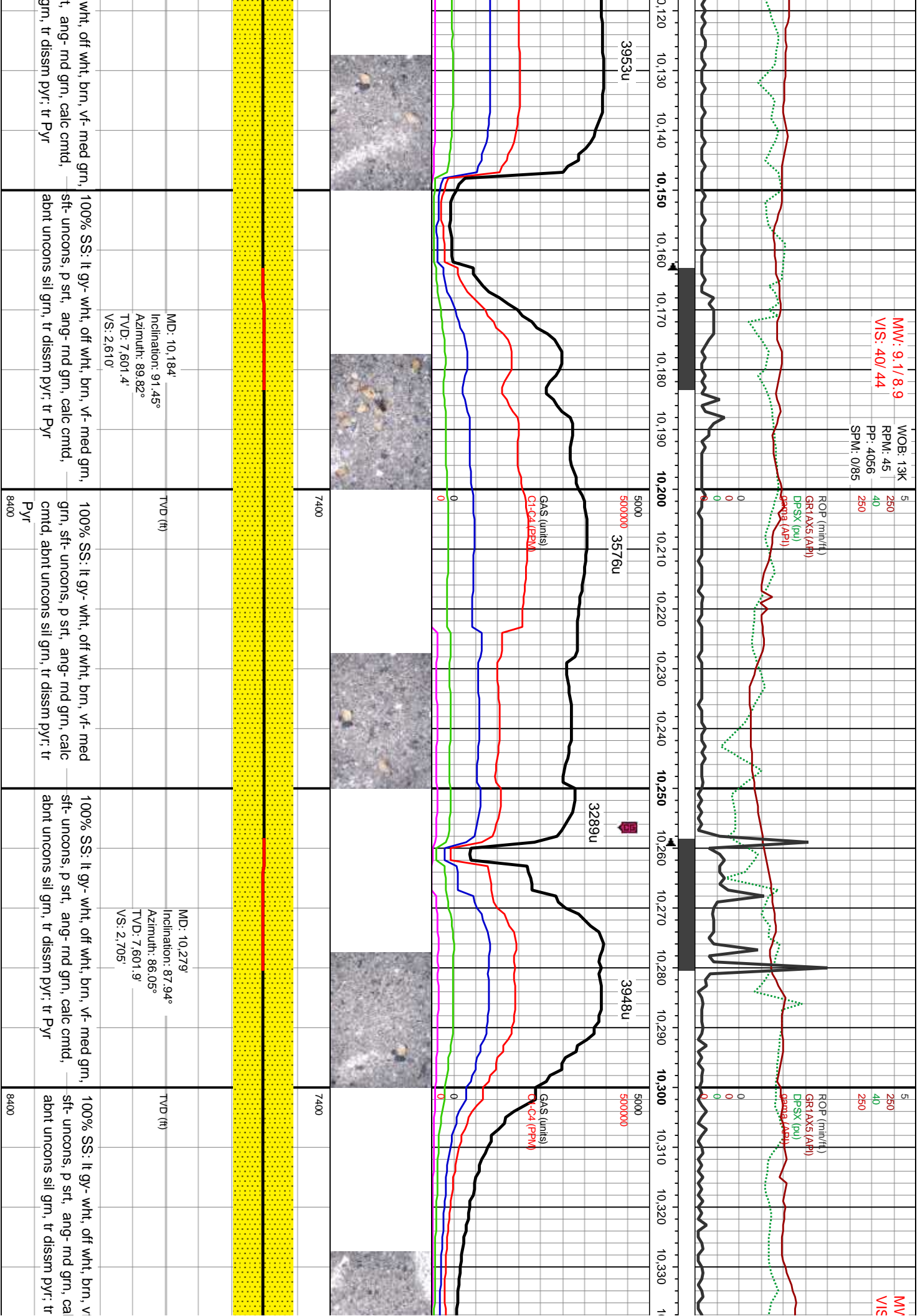






2240u		4011u		2625u	
GAS (units) C1-C4 (PPM)		GAS (units) C1-C4 (PPM)		GAS (units) C1-C4 (PPM)	
5000 5000000		5000 5000000		5000 5000000	
7400		7400		7400	
MD: 9.322' Inclination: 90° Azimuth: 90.6° TVD: 7.603.6' VS: 1.751'		MD: 9.418' Inclination: 90.4° Azimuth: 90.9° TVD: 7.603.3' VS: 1.846'		MD: 9.418' Inclination: 90.4° Azimuth: 90.9° TVD: 7.603.3' VS: 1.846'	
90% SS: lt gy- wht, off wht, brn, vf-f grn, sft- p cons, mod- w srt, pred ang- sb rnd, calc cmtd, tr dissim pyr: 10% SLTST: dk gy, sft, arg, pred plty- sb plty, sl calc, com dissim pyr: tr Pyr		90% SS: lt gy- wht, off wht, brn, vf-f grn, sft- p cons, mod- w srt, pred ang- sb rnd, calc cmtd, tr dissim pyr: 10% SLTST: dk gy, sft, arg, pred plty- sb plty, sl calc, com dissim pyr: tr Pyr		90% SS: lt gy- wht, off wht, brn, vf-f grn, sft- p cons, mod- w srt, pred ang- sb rnd, calc cmtd, tr dissim pyr: 10% SLTST: dk gy, sft, arg, pred plty- sb plty, sl calc, com dissim pyr: tr Pyr	
80% S cons, n cmtd, t arg, pr pyr: tr f		80% S cons, n cmtd, t arg, pr pyr: tr f		80% S cons, n cmtd, t arg, pr pyr: tr f	

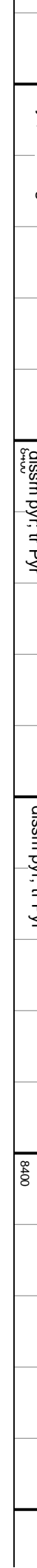
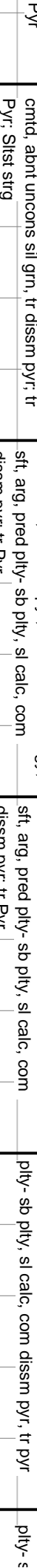
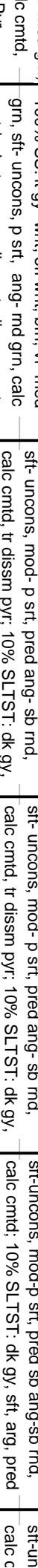
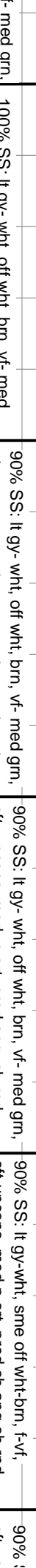
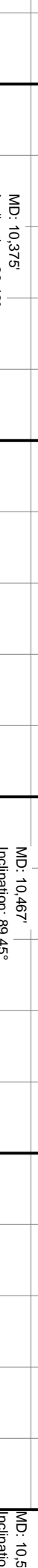
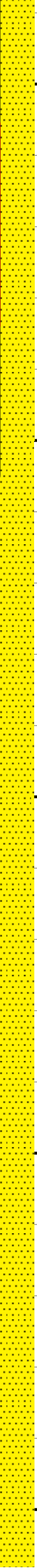
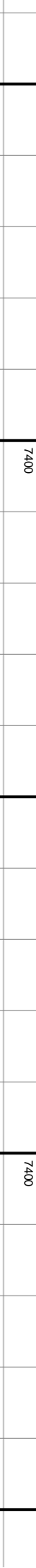
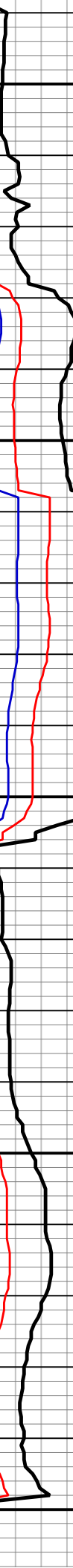
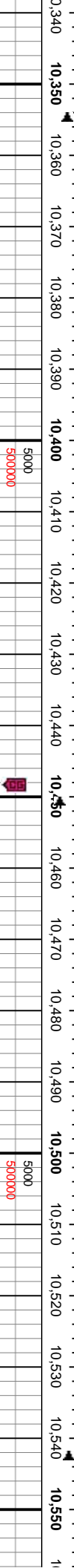
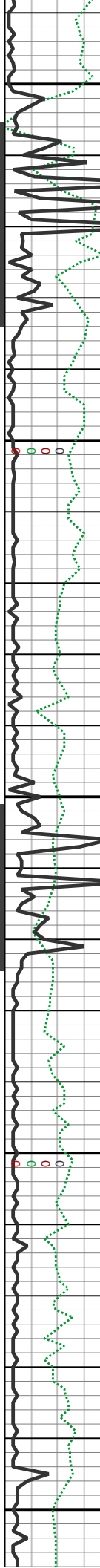




9.1/ 8.9
40/ 42

WOB: 18K
RPM: 46
PP: 4268
SPM: 0/85

ROP (min/ft)
GR1XX5 (API)
DPSX (psi)
gamma (API)



MD: 10,375'
Inclination: 88.43°
Azimuth: 87.39°
TVD: 7,604.9'
VS: 2,801'

TVD (ft)

100% SS: lt gy- wht, off wht, brn, vf- med grn, sft- uncon, p srt, ang- md grn, calc cmtid, abnt uncon sil grn, tr dissim pyr, tr Pyr; Silst strg

90% SS: lt gy- wht, off wht, brn, vf- med grn, sft- uncon, mod- p srt, pred ang- sb md, calc cmtid, tr dissim pyr; 10% SLTST: dk gy, sft, arg, pred plty- sb plty, sl calc, com dissim pyr; tr Pyr

MD: 10,467'
Inclination: 89.45°
Azimuth: 89.56°
TVD: 7,606.6'
VS: 2,893'

TVD (ft)

90% SS: lt gy- wht, off wht, brn, vf- med grn, sft- uncon, mod- p srt, pred ang- sb md, calc cmtid, tr dissim pyr; 10% SLTST: dk gy, sft, arg, pred plty- sb plty, sl calc, com dissim pyr; tr Pyr

90% SS: lt gy- wht, sme off wht-brn, f-vf, sft-uncon, mod-p srt, pred sb ang-sb md, calc cmtid; 10% SLTST: dk gy, sft, arg, pred plty- sb plty, sl calc, com dissim pyr; tr pyr

MD: 10,5
Inclination: 89.45°
Azimuth: 89.56°
TVD: 7,606.6'
VS: 2,893'

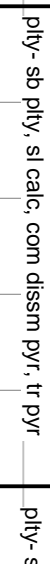
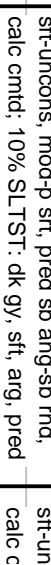
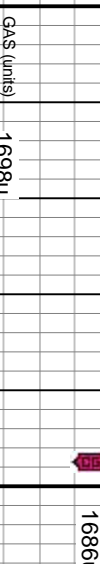
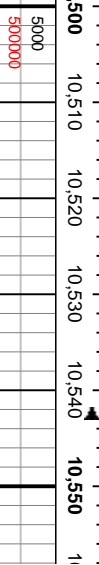
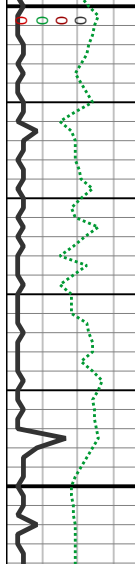
TVD (ft)

90% SS: lt gy- wht, sme off wht-brn, f-vf, sft-uncon, mod-p srt, pred sb ang-sb md, calc cmtid; 10% SLTST: dk gy, sft, arg, pred plty- sb plty, sl calc, com dissim pyr; tr pyr

9.1/ 8.9
40/ 42

WOB: 18K
RPM: 46
PP: 4268
SPM: 0/85

ROP (min/ft)
GR1XX5 (API)
DPSX (psi)
gamma (API)



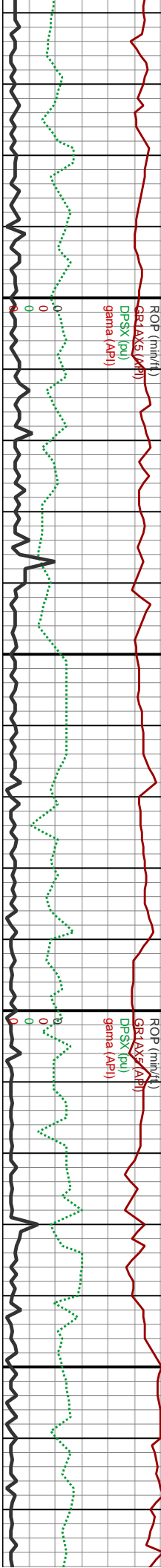
1686

W: 9.1/9
S: 37/ 39

WOB: 19K
RPM: 78
PP: 4366
SPM: 0/82

ROP (min./ft)
GR1XX5 (API)
DPSX (psi)
gamma (API)

ROP (min./ft)
GR1XX5 (API)
DPSX (psi)
gamma (API)



5000
5000000

2009u

5000
5000000

1946u

GAS (units)
C1-C4 (PPM)

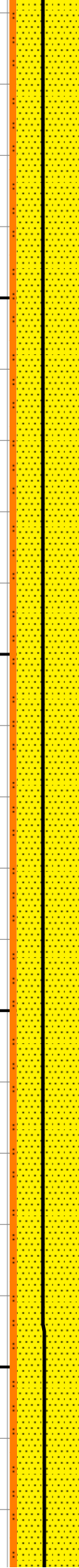
GAS (units)
C1-C4 (PPM)

1392u



7400

7400



59°
n: 90.06°
89.78°
07

TVD (ft)

MD: 10,652'
Inclination: 90.06°
Azimuth: 89.74°
TVD: 7,606.93'
VS: 3,077.51'

TVD (ft)

MD: 10,744'
Inclination: 91.76°
Azimuth: 90.16°
TVD: 7,605.47'
VS: 3,169.28'

SS: lt gy-whit, sme off wht-brn, f-vf,
sft-uncons, mod-p srt, pred sb ang-sb rnd,
calc cmtd; 10% SLTST: dk gy, sft, arg, pred
ply- sb pily, sl calc, com dissim pyr, tr pyr

90% SS: lt gy-whit, sme off wht-brn, f-vf,
sft-uncons, mod-p srt, pred sb ang-sb rnd,
calc cmtd; 10% SLTST: dk gy, sft, arg, pred
ply- sb pily, sl calc, com dissim pyr, tr pyr

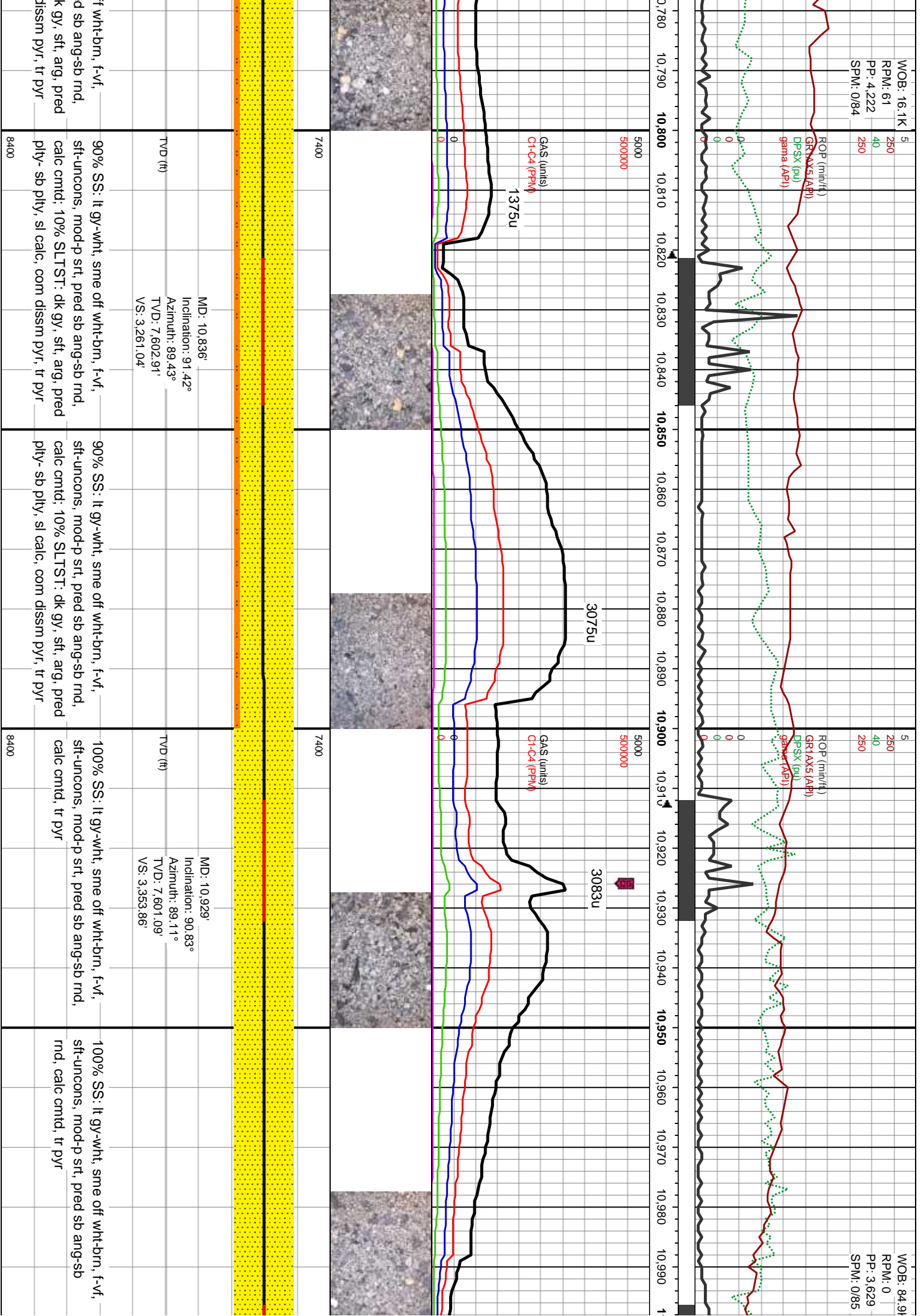
90% SS: lt gy-whit, sme off wht-brn, f-vf,
sft-uncons, mod-p srt, pred sb ang-sb rnd,
calc cmtd; 10% SLTST: dk gy, sft, arg, pred
ply- sb pily, sl calc, com dissim pyr, tr pyr

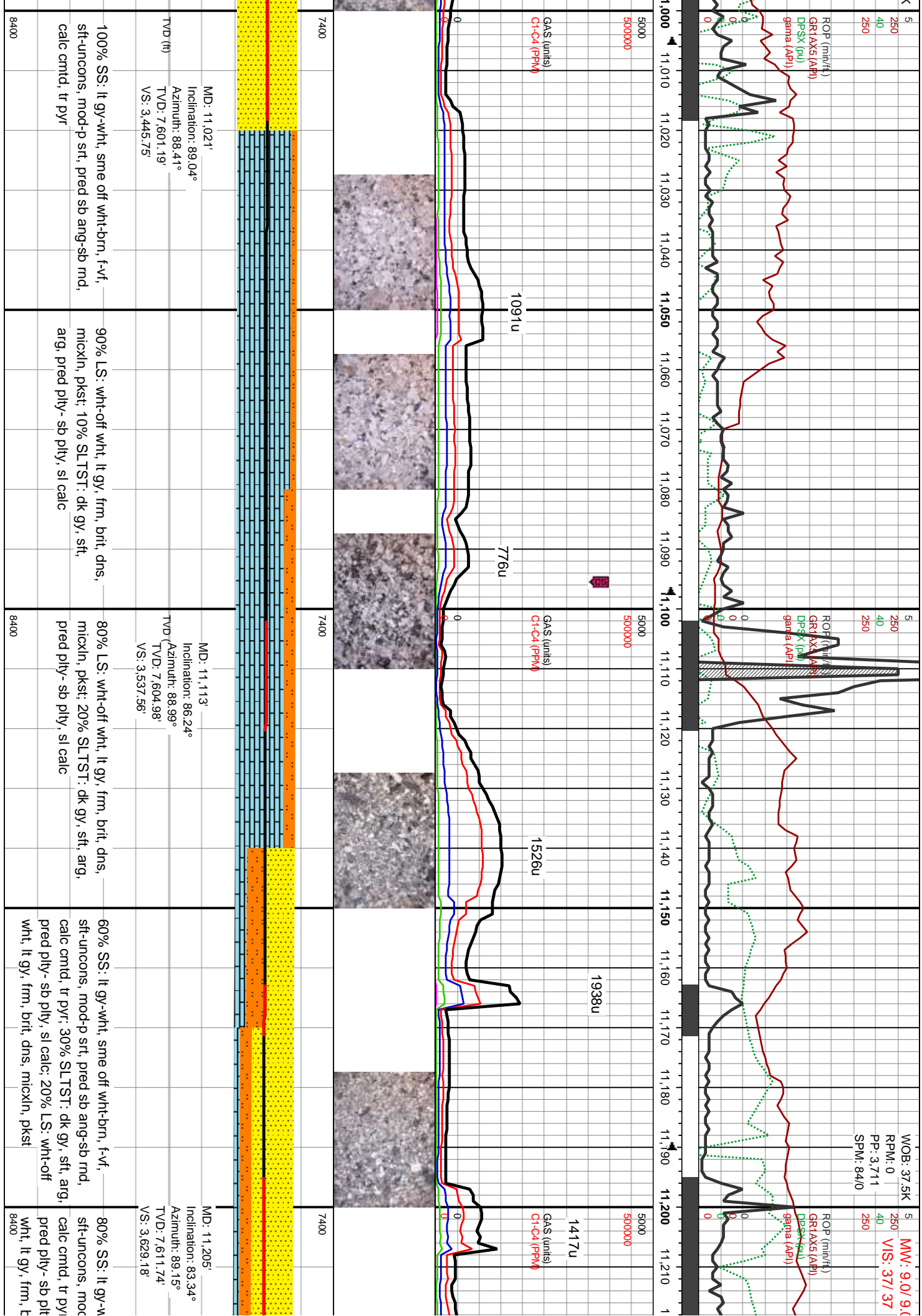
90% SS: lt gy-whit, sme off wht-brn, f-vf,
sft-uncons, mod-p srt, pred sb ang-sb rnd,
calc cmtd; 10% SLTST: dk gy, sft, arg, pred
ply- sb pily, sl calc, com dissim pyr, tr pyr

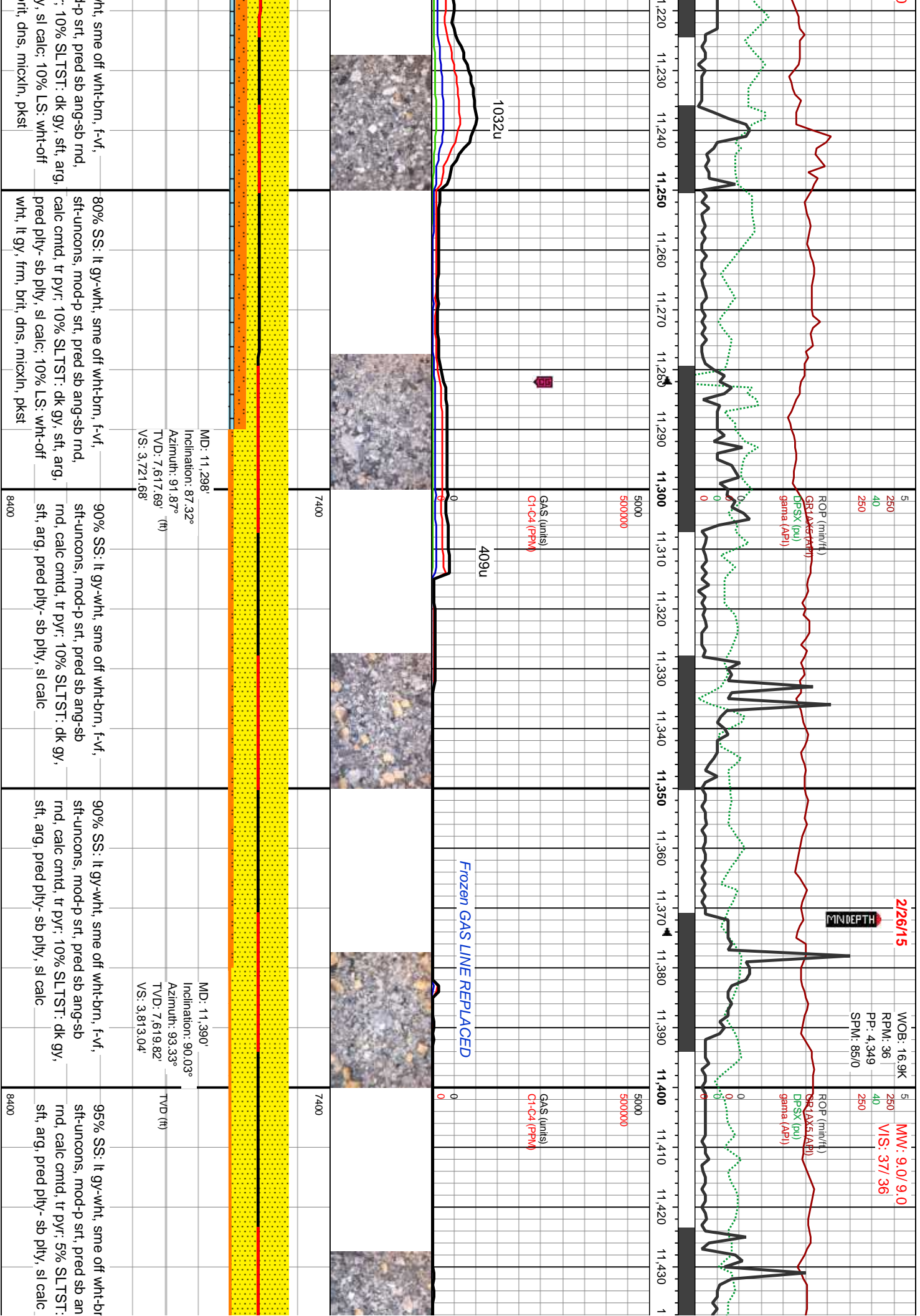
90% SS: lt gy-whit, sme off wht-brn, f-vf,
sft-uncons, mod-p srt, pred sb ang-sb rnd,
calc cmtd; 10% SLTST: dk gy, sft, arg, pred
ply- sb pily, sl calc, com dissim pyr, tr pyr

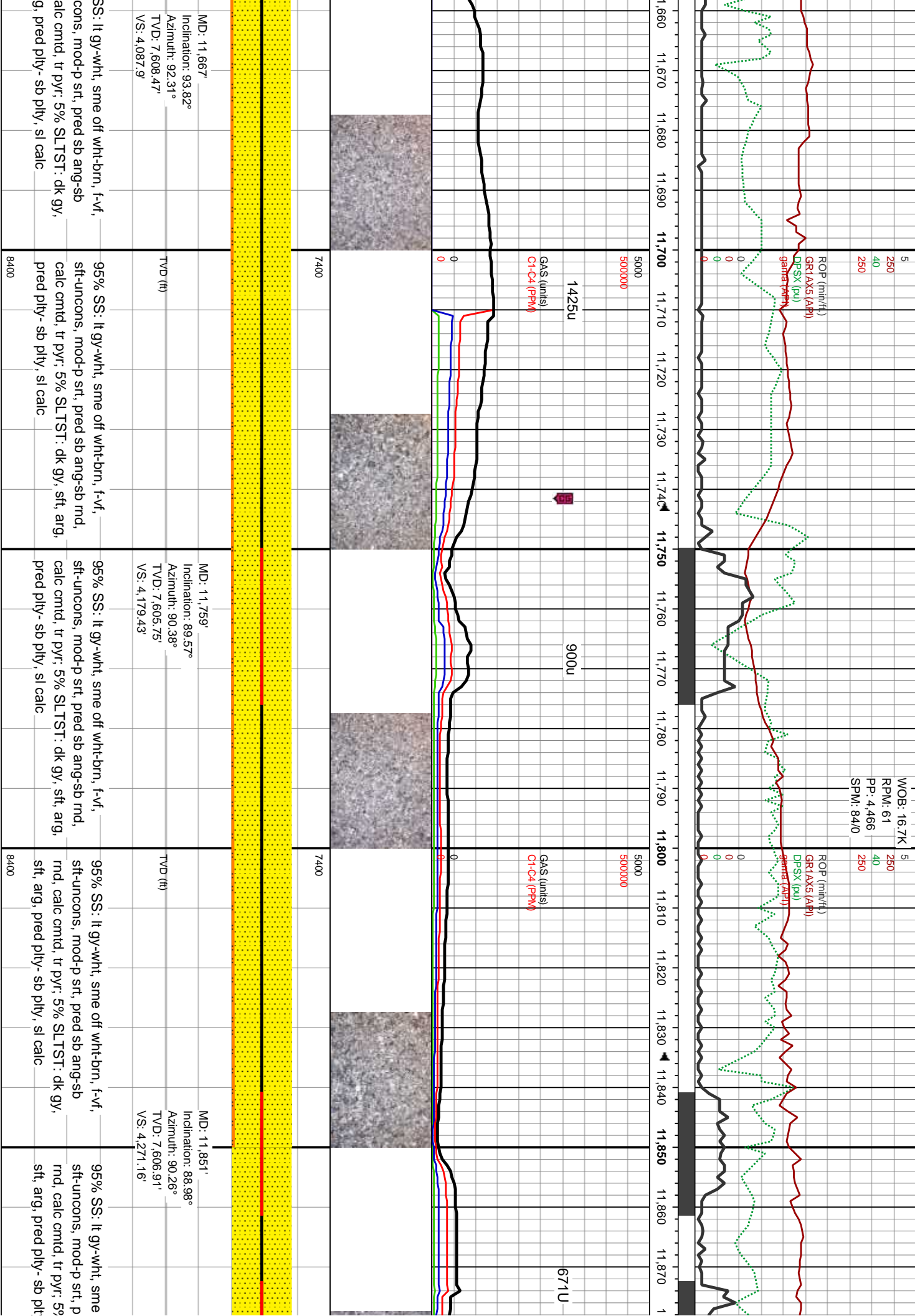
8400

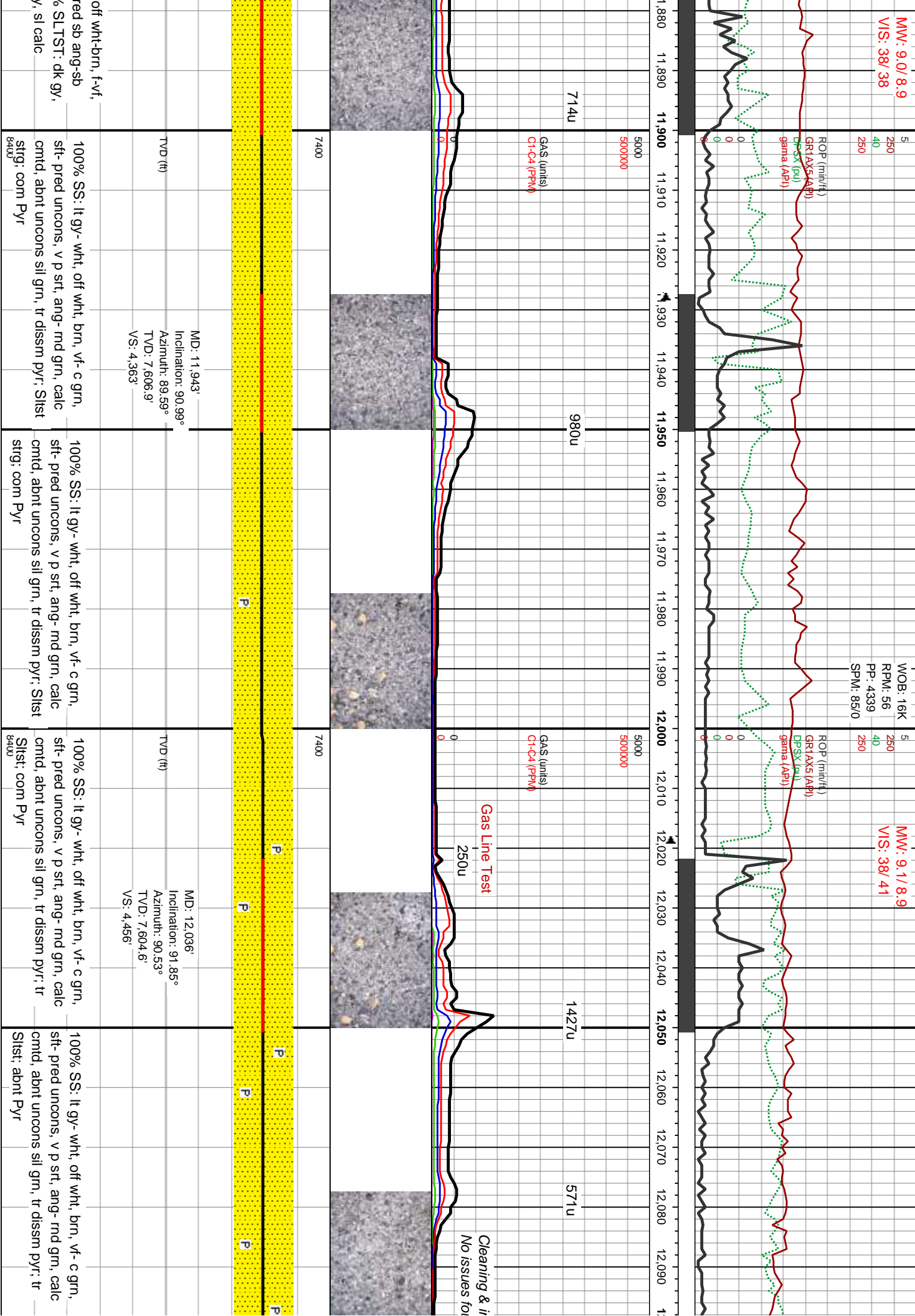
8400

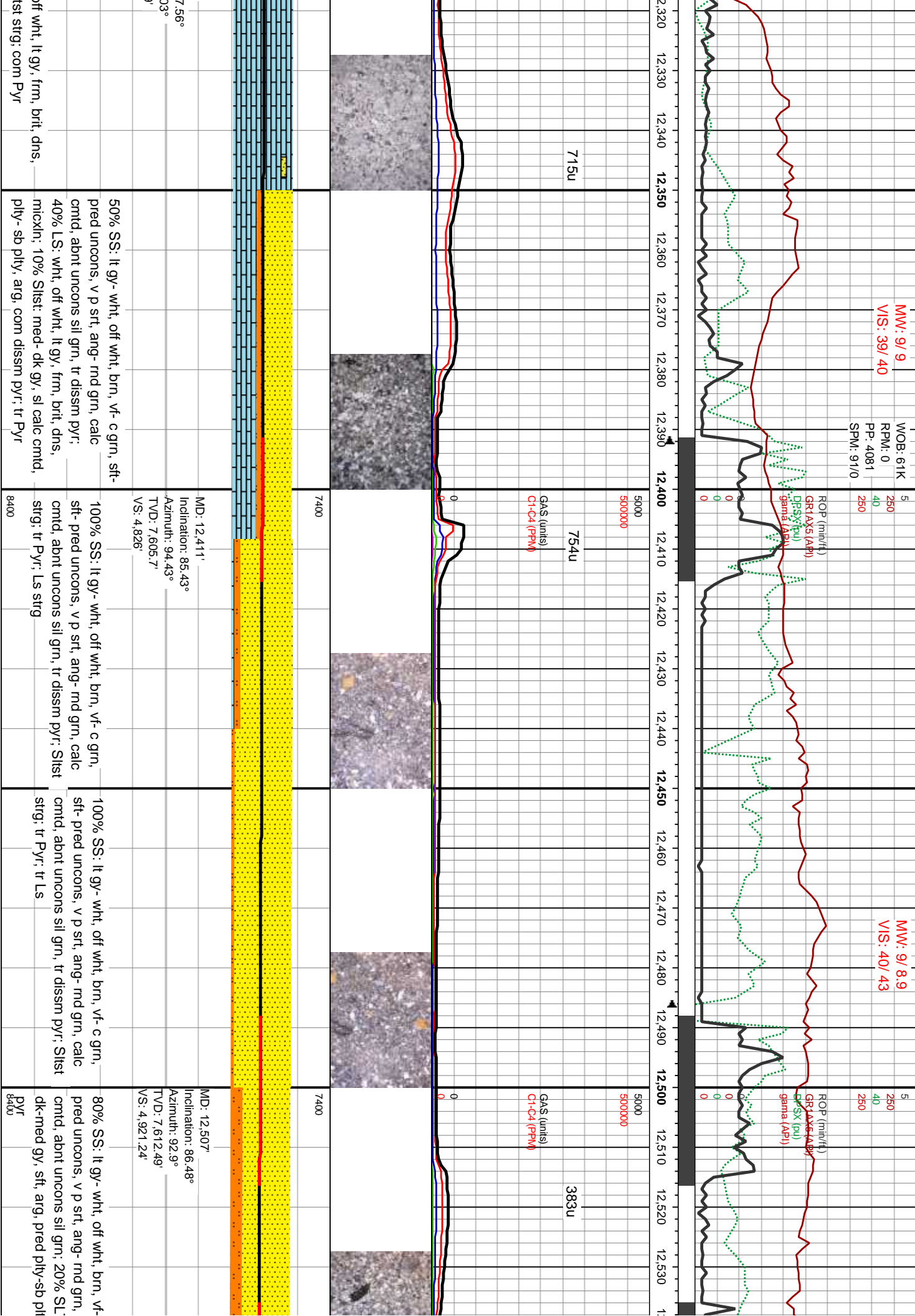


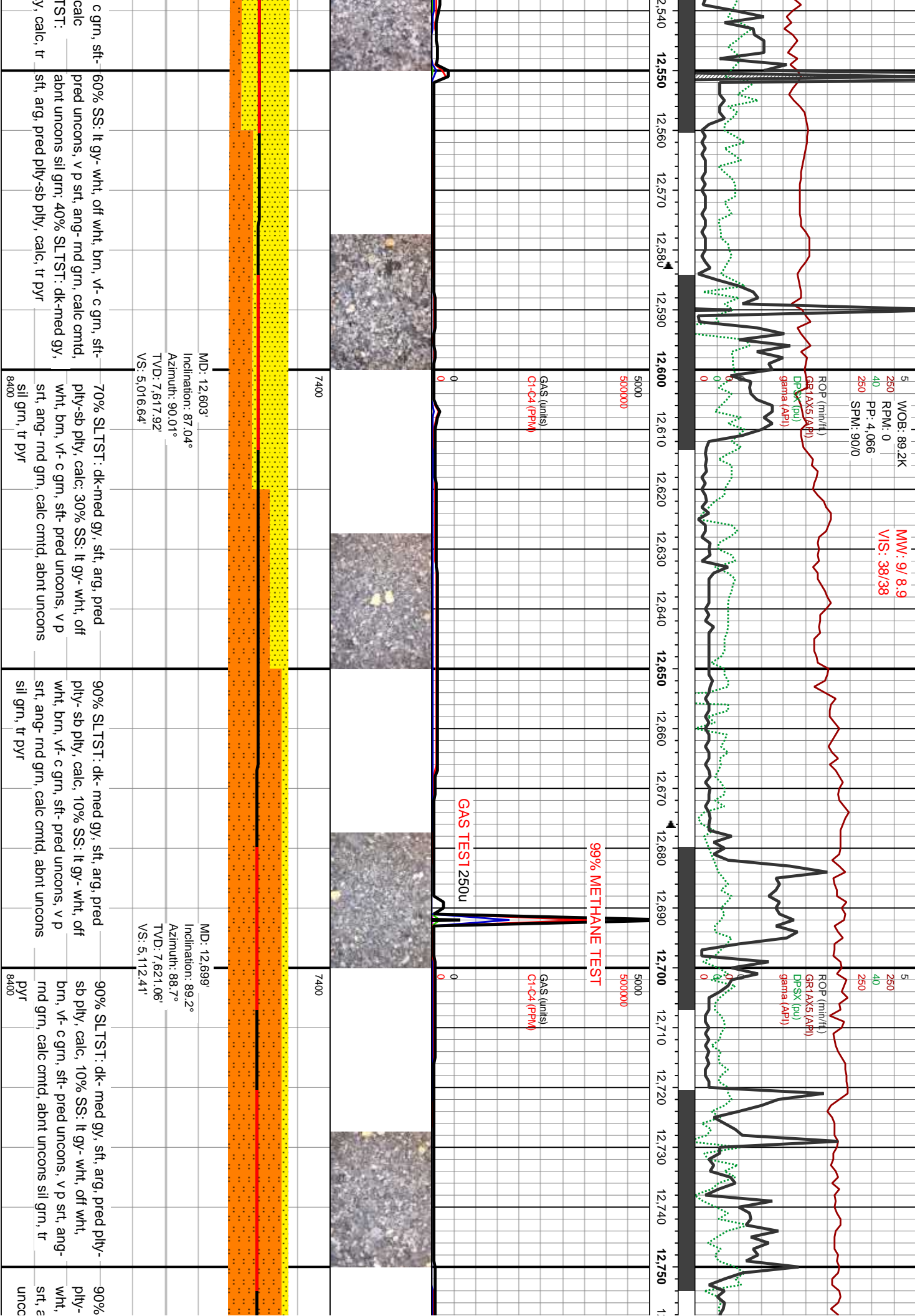


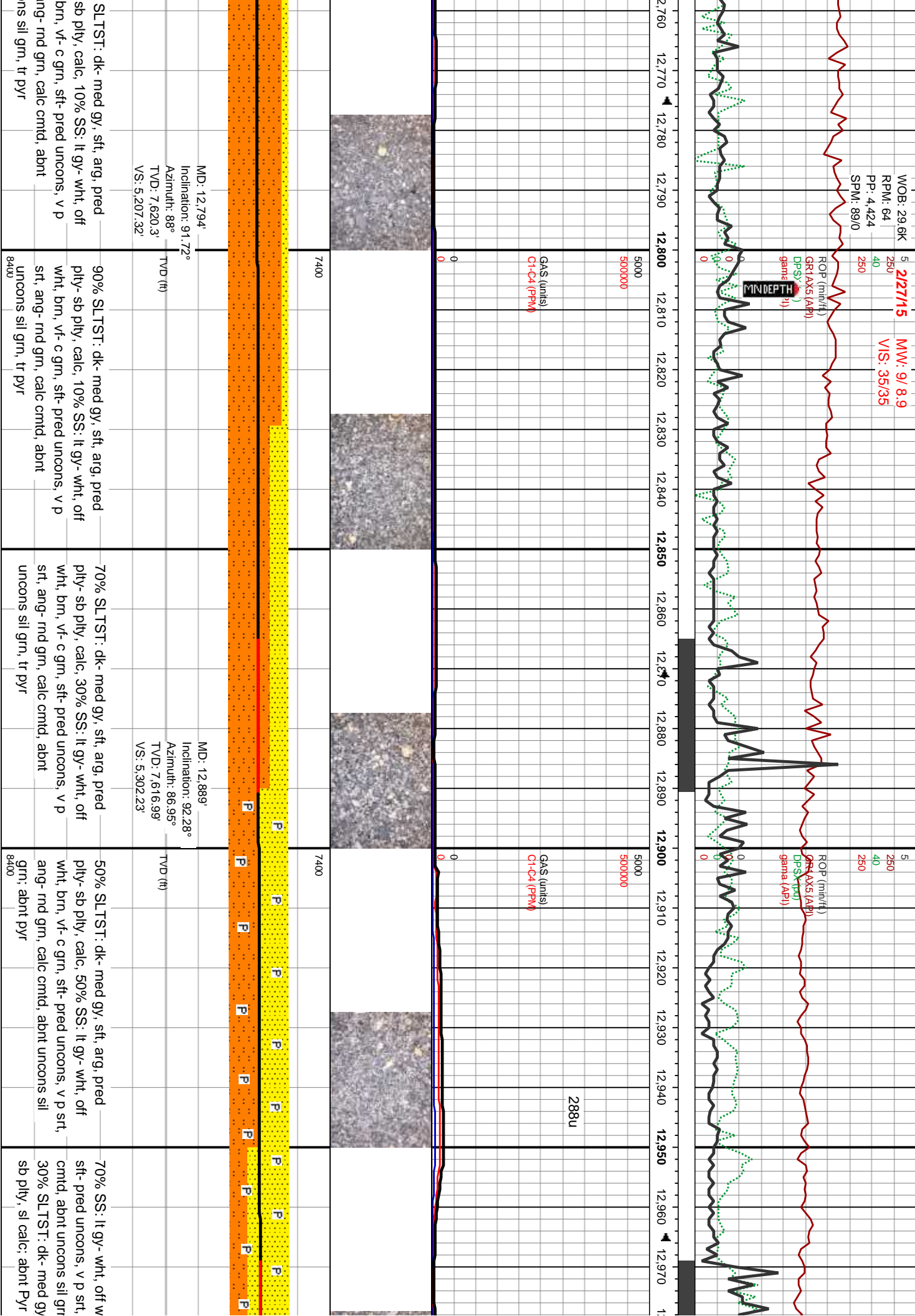


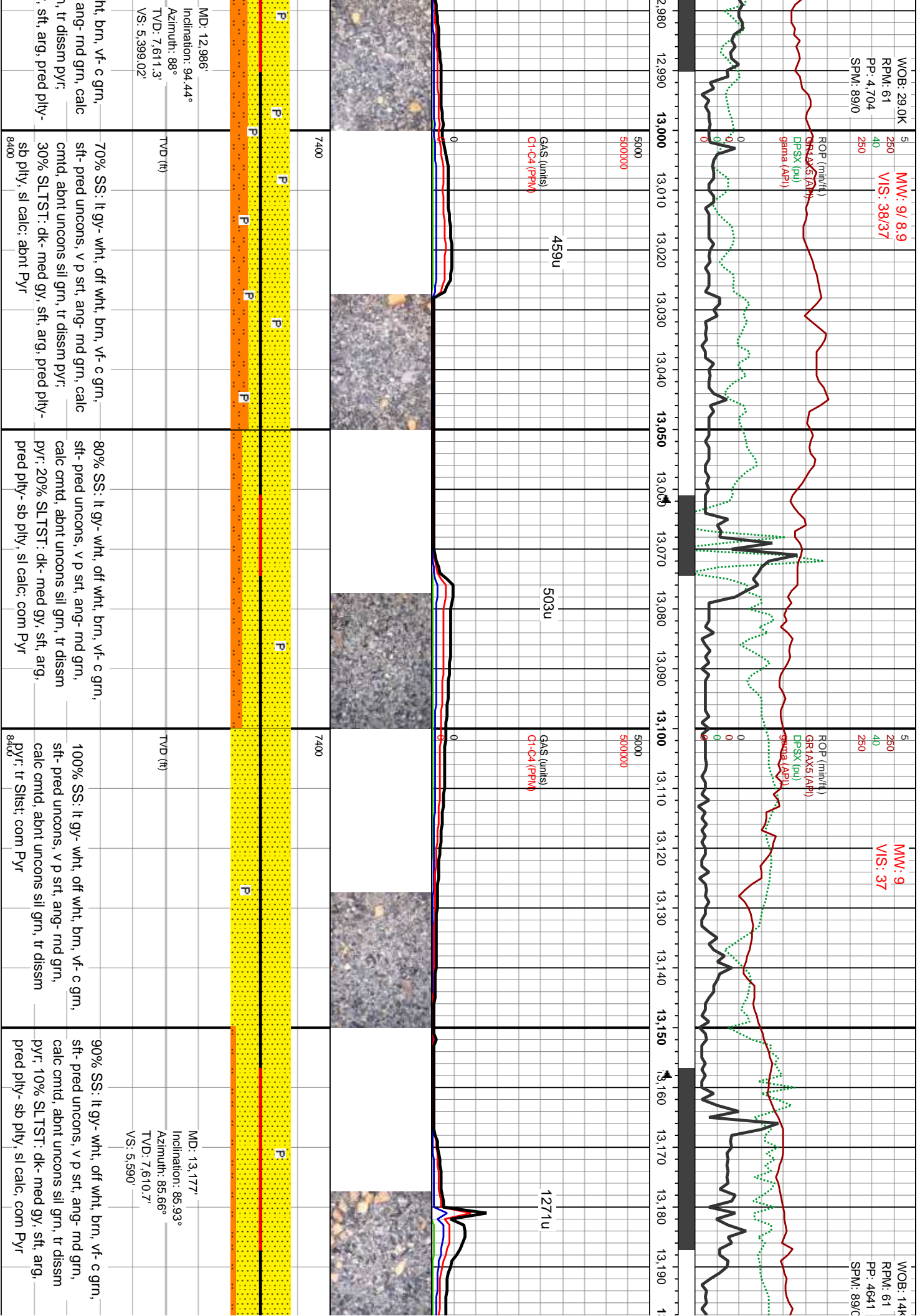


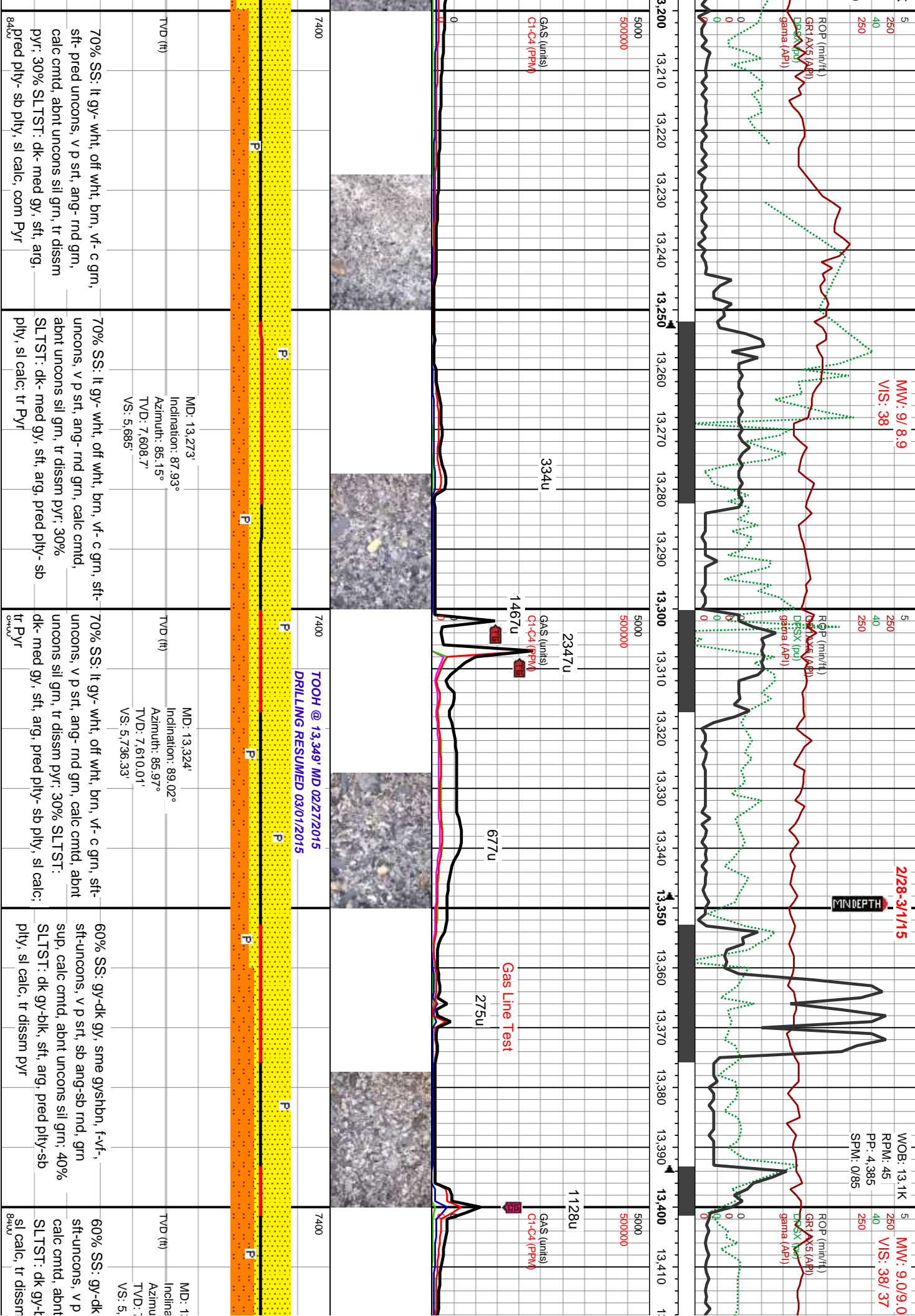


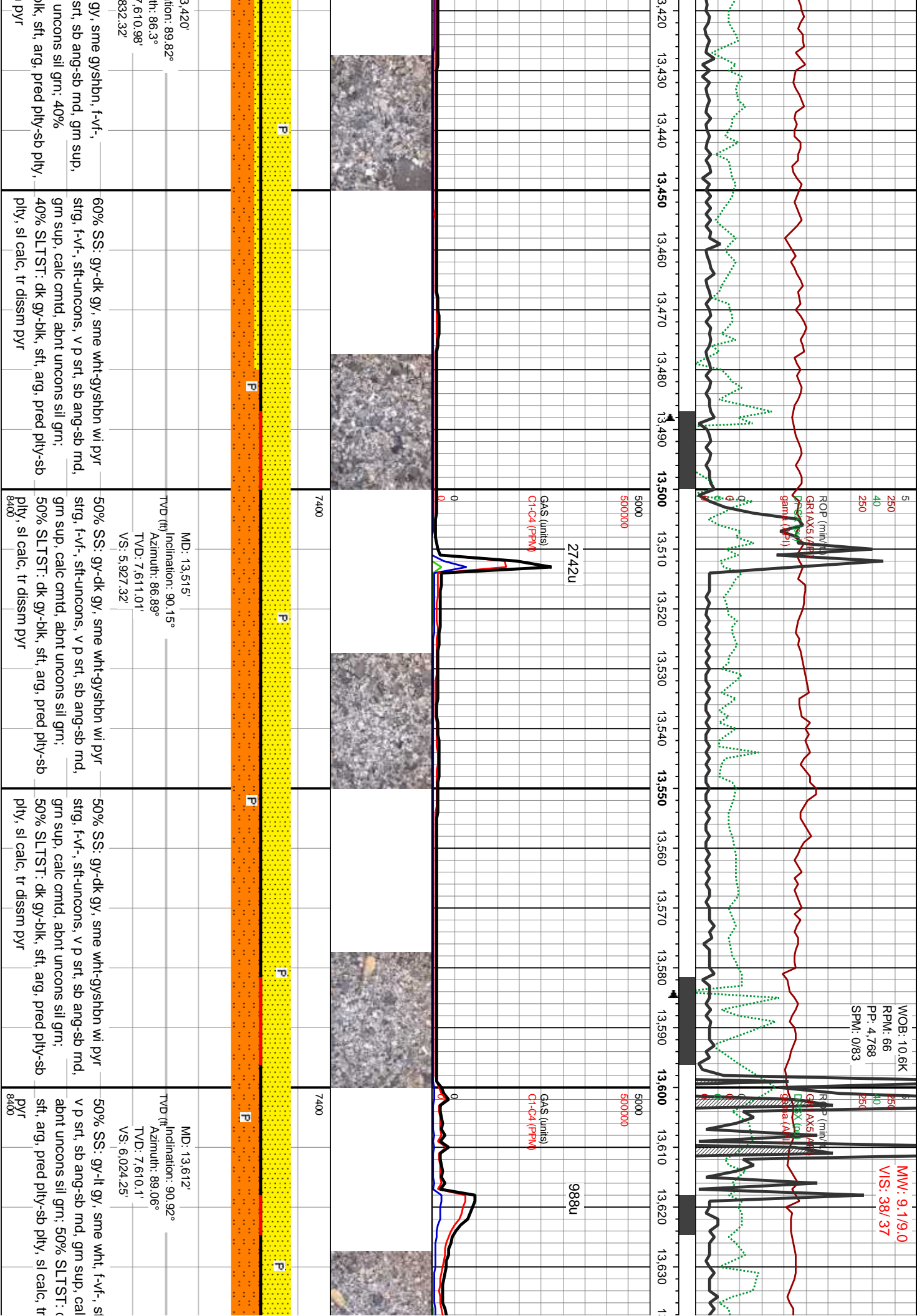


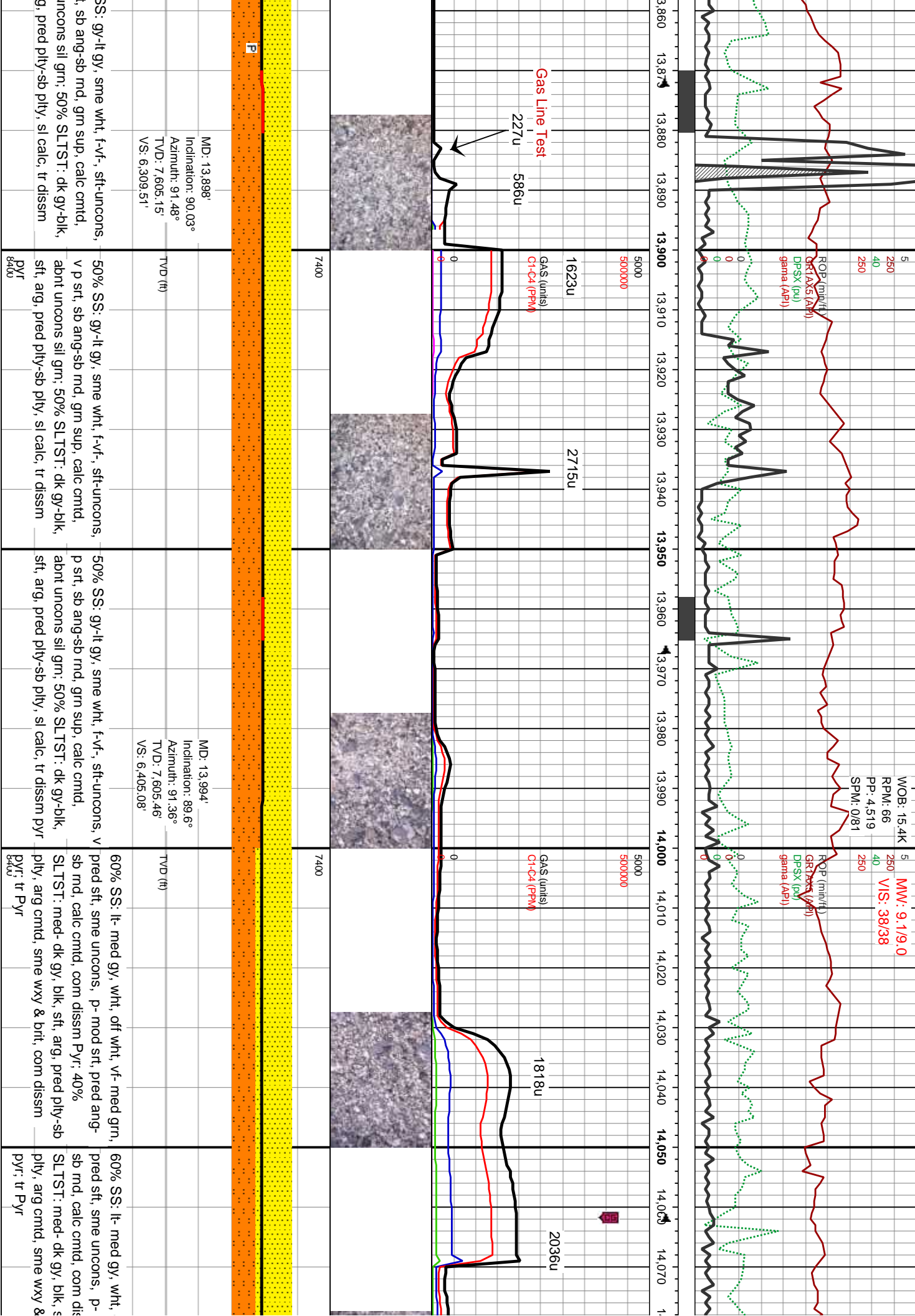


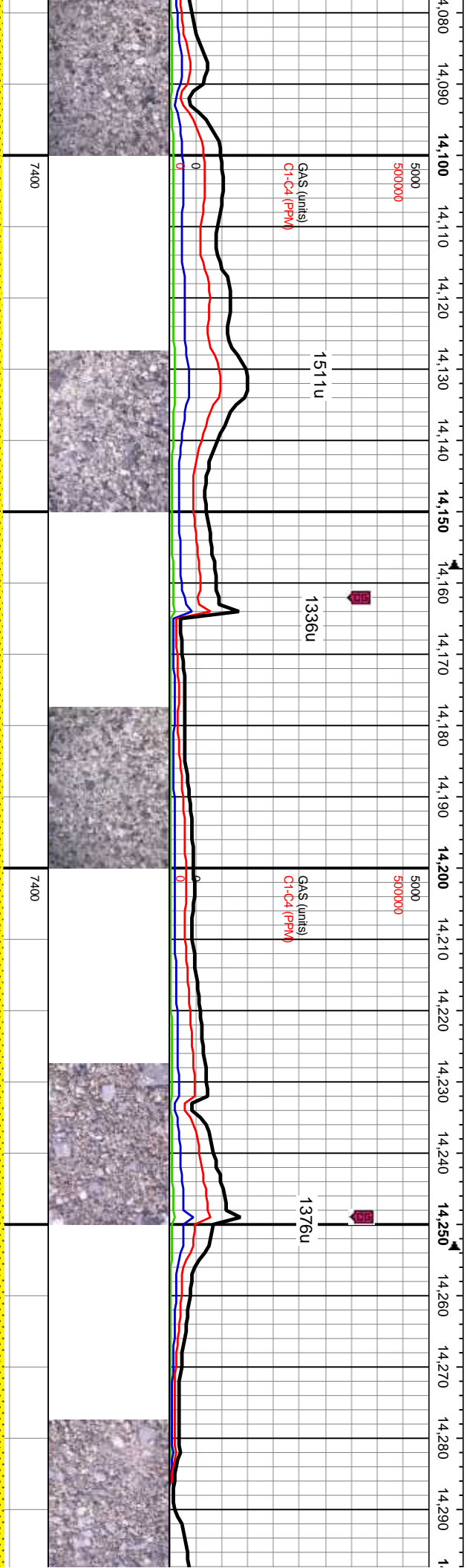
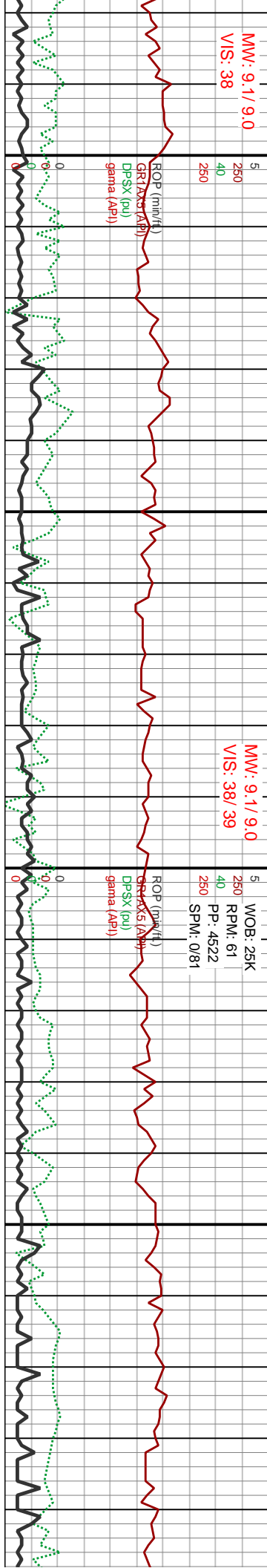










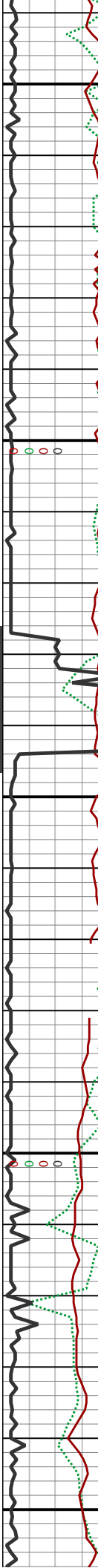


MD: 14,088' Inclination: 89.82° Azimuth: 91.29° TVD: 7,605.9' VS: 6.499'	TVD (ft)	70% SS: lt- med gy, wht, of wht, vf- med grn, pred sft, sme uncon, p- mod srt, pred ang-sb md, calc cmt, com dissim Pyr; 30%	SLTST: med- dk gy, blk, sft, arg, pred pty-sb pty, arg cmt, sme wxy & brit, com dissim —	PYR: tr Pyr
		70% SS: lt- med gy, wht, of wht, vf- med grn, pred sft, sme uncon, p- mod srt, pred ang-sb md, calc cmt, com dissim Pyr; 30%	SLTST: med- dk gy, blk, sft, arg, pred pty-sb pty, arg cmt, sme wxy & brit, com dissim —	PYR: tr Pyr
MD: 14,182' Inclination: 90.28° Azimuth: 92.01° TVD: 7,605.9' VS: 6.592'	TVD (ft)	70% SS: lt- med gy, wht, of wht, vf- med grn, pred sft, sme uncon, p- mod srt, pred ang-sb md, calc cmt, com dissim Pyr; 30%	SLTST: med- dk gy, blk, sft, arg, pred pty-sb pty, arg cmt, sme wxy & brit, com dissim —	PYR: tr Pyr
		70% SS: lt- med gy, wht, of wht, vf- med grn, pred sft, sme uncon, p- mod srt, pred ang-sb md, calc cmt, com dissim Pyr; 30%	SLTST: med- dk gy, blk, sft, arg, pred pty-sb pty, arg cmt, sme wxy & brit, com dissim —	PYR: tr Pyr
MD: 14,279' Inclination: 90.77° Azimuth: 93.32° TVD: 7,605' VS: 6.689'	TVD (ft)	60% SS: lt- med gy, wht, of wht, vf- med grn, pred sft, sme uncon, p- mod srt, pred ang-sb md, calc cmt, com dissim Pyr; 40%	SLTST: med- dk gy, blk, sft, arg, pred pty-sb pty, arg cmt, sme wxy & brit, com dissim —	PYR: tr Pyr
		60% SS: lt- med gy, wht, of wht, vf- med grn, pred sft, sme uncon, p- mod srt, pred ang-sb md, calc cmt, com dissim Pyr; 40%	SLTST: med- dk gy, blk, sft, arg, pred pty-sb pty, arg cmt, sme wxy & brit, com dissim —	PYR: tr Pyr

/ 9
42

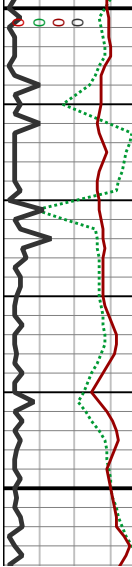
WOB: 16K
RPM: 64
PP: 4701
SPM: 800

ROP (mbl/t)
GR1X5 (Atf)
DPSX (pu)
gamma (Atf)



MW: 9.1/9
VIS: 37/42

ROP (mbl/t)
GR1X5 (Atf)
DPSX (pu)
gamma (Atf)



3075u

5000
5000000

GAS (units)
C1-C4 (PPM)

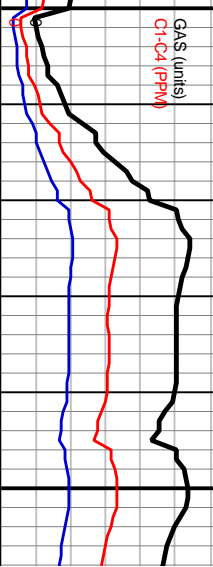


2691u

3185u

5000
5000000

GAS (units)
C1-C4 (PPM)



2731u

2679u

P

P

P

P

P

P

P

F

MD: 14,758'
Inclination: 90.74°
Azimuth: 91.72°
TVD: 7,597.8'
VS: 7,164'

TVD (ft)

100% SS: lt- med gy, wht, off wht, pred
tmsl; vf- pred med- c grn, pred uncon, v p
srt, pred sb rnd grn, calc cmt, tr diss
Pyr, abnt uncon sil grn; abnt Pyr

MD: 14,854'
Inclination: 90.03°
Azimuth: 92.46°
TVD: 7,597.2'
VS: 7,259'

TVD (ft)

100% SS: lt gy-gy, sme wht, pred tmsl, vf,
pred med-c grn, pred uncon, v p srt, pred
sb ang-sb rnd, calc cmt, grn sup, abnt
uncon sil grn, abnt pyr

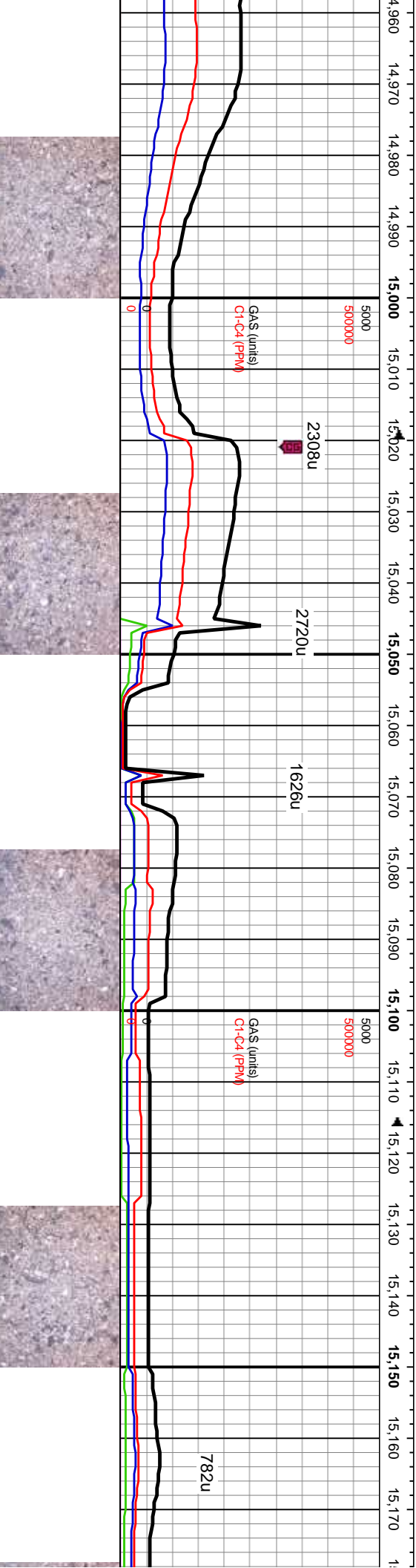
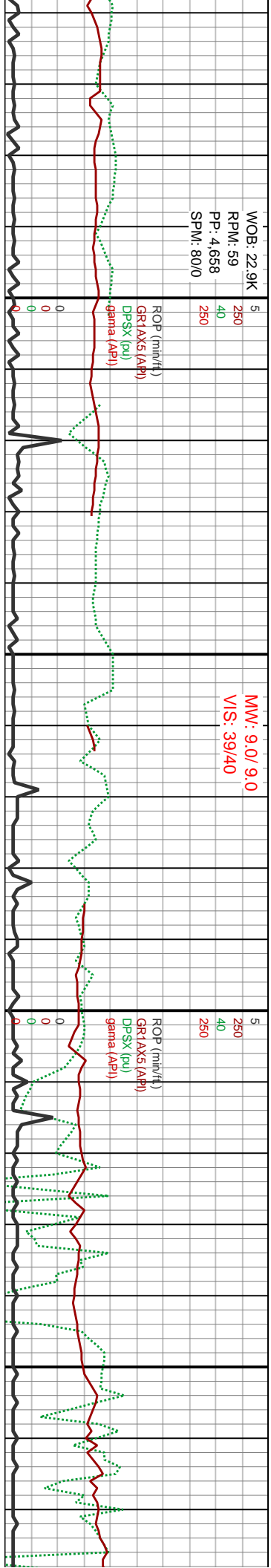
MD: 14,950'
Inclination: 88.74°
Azimuth: 90.99°
TVD: 7,598.2'
VS: 7,354.91'

TVD (ft)

100% SS: lt gy-gy, sme wht, pred tmsl, vf,
pred med-c grn, pred uncon, v p srt,
pred sb ang-sb rnd, calc cmt, grn sup,
abnt uncon sil grn, abnt pyr

pred
ons, v p
ssm

100%
vf, p
pred
abnt



		P				P				P				P				P	

