



Scale: 5" / 100'
Measured Depth Log

Well Name State Antelope 21-24-30 HNC

Location NWNW Section 30, T5N, R62W

State Colorado

County Weld

Country USA

Rig Number Cade 22

API Number 05-123-37289-00

Region DJ Basin

Field Wattenberg

Spud Date 7/1/2013

Drilling Completed 7/17/2013

Surface Coordinates 560' FNL x 1248' FWL

Bottom Hole Coordinates 598' FSL x 537' FEL

Ground Elevation 4609'

K.B. Elevation 4626

Logged Interval 5900' To 10975'

Total Depth 10975'

Formation Niobrara C Chalk

Type of Drilling Fluid FW LSND

Company Bonanza Creek

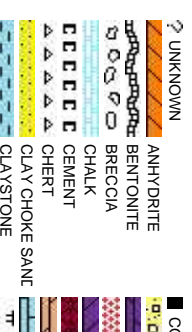
Name Paul McKay

Company Bonanza Creek

Address 410 17th Street
Denver, CO 802

Columbine Logging, Inc.

Well-site Geologists



Operator

Energy Inc.

Geologist

Energy Inc., Suite 1500
202

Other

2385 S. Lipan St.
Denver, CO 80223







































































Eli Smith
Ted Stockwell
Wedge Howland

Rock Types

[illegible]

Accessories

Fossils
























	F FOSSIL		- ARGILLACEOUS		✓ TUFFACEOUS
	GASTROPOD		/ ARGILLITE GRAIN		≡ GYPSIFEROUS
	OOOLITE		B BENTONITE		⚡ HEAVY MINERAL
	OSTRACOD		✓ BITUMENOUS SUBSTANCE		🐚 INOCERAMUS
	BELEMNITE		✓ BRECCIA FRAGMENTS		K KAOLIN
	BIOLCLASTIC		✓ CALCAREOUS		T MARLSTONE
	BRACHIOPOD		✓ CARBONACEOUS FLAKES		⚡ MINERAL CRYSTALS
	BRYOZOA		✓ CHERT		🔴 NODULES
	CEPHALOPOD		✓ CHERT		🔴 PHOSPHATE PELLETS
	CORAL		✓ COAL - THIN BEDS		P PYRITE
	CRINOID		✓ DOLOMITE		🔴 SALT CAST
	ECHINOID		✓ FELDSPAR		🔴 SANDY
	FISH		● FERRUGINOUS PELLET		✓ SILICEOUS
	FORAMINIFERA		✓ FERRUGINOUS		≡ SILTY
			≡ ANHYDRITIC		
			Minerals		
					✓ TUFFACEOUS
			Stringer		
	ALGAE		✓ ANHYDRITE STRINGER		
	AMPHIPORA		✓ BENTONITE STRINGER		
	BELEMNITE		✓ COAL STRINGER		
	BIOLCLASTIC		✓ DOLomite STRINGER		
	BRACHIOPOD		✓ GYPSUM STRINGER		
	BRYOZOA		✓ LIMESTONE STRINGER		
	CEPHALOPOD		✓ MARLSTONE (CALC) STRG		
	CORAL		✓ MARLSTONE (DOL) STRG		
	CRINOID		✓ SANDSTONE STRINGER		
	ECHINOID				
	FISH		✓ SHALE STRINGER		
	FORAMINIFERA		✓ SILTSTONE STRINGER		

Other Symbols

Oil Show

- Oil Show**
- ☒ MOLDIC
- ☐ ORGANIC
- ☐ DEAD
- ☐ EVEN
- ☒ VUGGY
- ☒ FAULT
- ☒ FORMATION TOP
- ☒ GAS SHOW
- ☒ MINDEPTH
- ☐ NM DEPTH
- Rounding**
- ☒ WIRELINE TESTED - LEFT
- ☒ WIRELINE TESTED - RT
- ☒ E EARTHY
- ☒ Fx FINELYXN
- ☒ GS GRAINSTONE
- ☒ L LITHOGRAPHIC

Engineering

	QUESTIONABLE		ANGULAR		M _X MICROX LN
	SPOTTED STAINING		OIL SHOW		M _S MUDSTONE
Engineering					
	BIT		OVERTURNED STRATA		P _S SUBANG
	CONNECTION (LEFT)		REVERSE FAULT		P _S SUBSND
	CONNECTION (RIGHT)		SIDEWALL CORE (LEFT)	Textures	
	FENESTRAL		SIDEWALL CORE (RIGHT)		B _S BOUNDSTONE
	FRACTURE		SLIDE		C CHALKY
	INTERCRYSTALLINE		SURVEY		C _R CRYPTOX LN
	INTEROOLITIC		TRIP GAS	Sorting	
	DST INTERVAL				M MODERATE
					P POOR
					W WELL

Textures

Sorting

BS BOUNDSTONE **M** MODERATE
C CHALKY **P** POOR
OX CRYPTOXLN **W** WELL

Slide/Rotate

ROP
ROF
GAMMA

ROP Limit
0 - 250 ft/hr
Gamma Limit
0 - 250 API

DEPTH
7/14/2013

ROP (ft/hr)
GAMMA (units)
MW 9.0/MIS 33

Total Gas & Chromatograph

GAS
C1
C2
C3
C4

GAS (units)
C1-C4 (PPM)
Gas Limit
0 - 6500 units

Depth Labels

% Lith

Well Bore
TVD

Oil Show

Images

SL
TR
F
M
G

Columbine Logging, Inc.
Rigged up on July 13, 2013
Bloodhound Unit #0603
Build Began 00:07 MST
on July 14, 2013

84-90% SLTY SH: lt-med gy, occ dk gy, sb blk-y-sb
ply, sft-frm, occ hd, rthy-grtly slst, occ sdy ip, tr pyr,
grdg-lt gy slst
10-16% SHY SS: wh, op-clr, lt-med gy, s&p, arg cmt,
vf-f gr, sb ang-sb md, blk-y, sl frm-hd, brit, mod strg,
scat glau, grdg-ss

80-84% SLTY SH: lt-med gy, occ dk gy, sb blk-y-sb
ply, occ ply, sft-frm, occ hd, rthy-grtly slst, occ sdy
ip, grdg-lt gy slst
16-20% SHY SS: wh, op-clr, lt-med gy, s&p, arg
cmt, vf-f gr, sb ang-sb md, blk-y, frm-hd, brit, p-mod
strg, grdg-ss

85-95%
blk-y-sb
slst, occ
15-5%
cmt, vf-f
p-mod

Bit # 3
Type:
HEO4MRSV
Size: 8.75"
Depth in: 5.900'
Jets: 3 x 20
S/N: 1335499

MD: 5.870 '
TVD: 5.807.97 '
Azimuth: 40.48 °
Inclination: 6.45 °
VS: -481.77 '

MD: 5.917 '
TVD: 5.854.66 '
Azimuth: 61.12 °
Inclination: 6.83 °
VS: -484.53 '

MD: 5.964 '
TVD: 5.901.19 '
Azimuth: 101.47 °
Inclination: 9.89 °
VS: -484.21 '

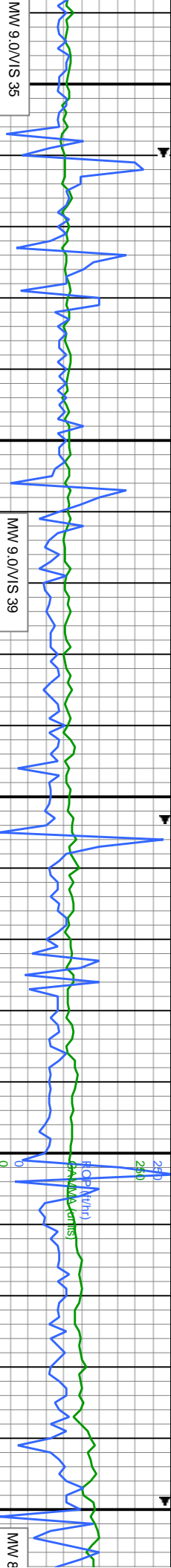
MD: 6.012 '
TVD: 5.948.25 '
Azimuth: 129.01 °
Inclination: 13.21 °
TVD VS: -478.84 '

5800

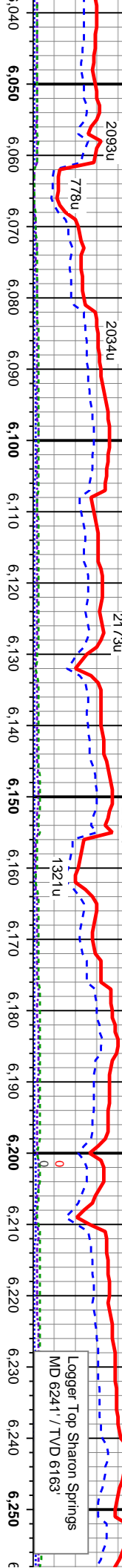
6000

GAS (units)
C1-C4 (PPM)
2455u
1216u
1981u





2361u
C1 80%
C2 9%
C3 7%
C4 4%



Logger Top Sharon Springs
MD 6241 / TVD 6163'



MD: 6.059
TVD: 5.993.87
Azimuth: 148.95
Inclination: 14.89
VS: -469.37

MD: 6.107
TVD: 6.039.93
Azimuth: 168.95
Inclination: 18.05
VS: -456.27

MD: 6.154
TVD: 6.084.15
Azimuth: 178.58
Inclination: 21.58
VS: -440.4

MD: 6.203
TVD: 6.129.37
Azimuth: 175.27
Inclination: 23.83
VS: -421.49

MD: 6.250
TVD: 6.171.77
Azimuth: 179.01
Inclination: 27.29
VS: -401.3

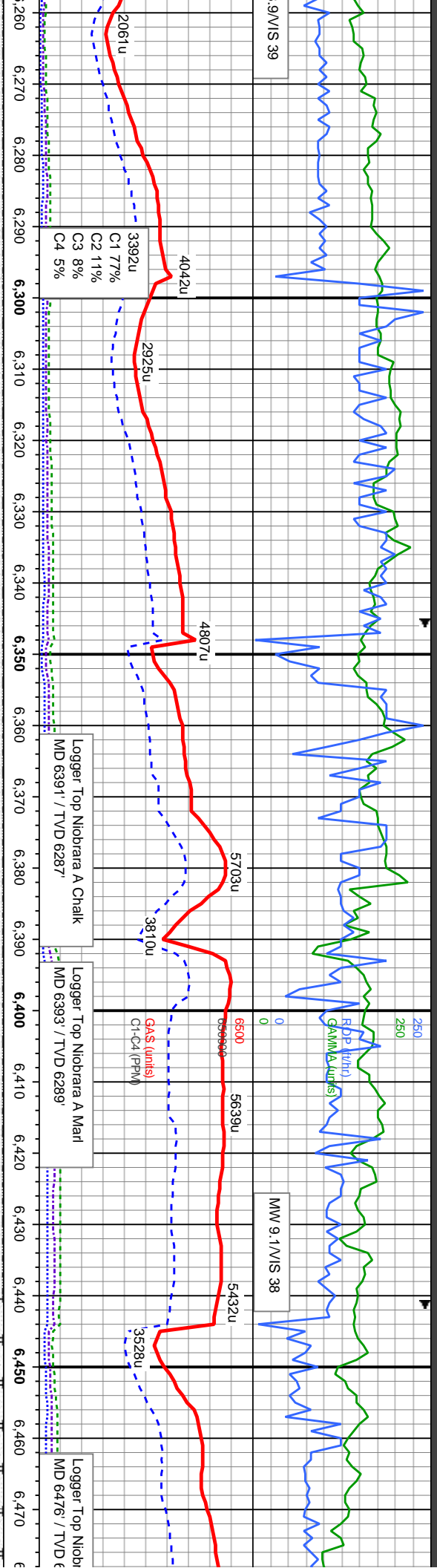
% SLTY SH: lt-med gy, occ dk gy, sb
ply, scat ply, silt-frm, occ hd, rthy-gritty
c sdy ip, grdg lt-gy siltst

95% SLTY SH: lt-med gy, sb ply-bkly, silt-sil frm,
rthy-gritty isr, grdg siltst 5% SHY SS: wh, lt gy,
s&p, arg cmt, vt-f gr, sb ang-sb md, blkly, frm-hd,
brit, mod strg, grdg ss

100% SLTY SH: lt-med gy, lt gy brn, sb ply-bkly,
silt-sil frm, rthy-gritty isr, silty-arg tex, grdg siltst, vrr
Inoc frag

100% SLTY SH: lt-med gy, lt gy brn, lt olv, sb
ply-bkly, occ ply, silt-sil frm, rthy-gritty isr, silty-arg
tex, grdg siltst ip





MD: 6,299 '
TVD: 6,214.23 '
Azimuth: 188.76 °
Inclination: 32.64 °
VS: -377.45 '

MD: 6,395 '
TVD: 6,290.73 '
Azimuth: 186.34 °
Inclination: 41.54 °
VS: -321.65 '

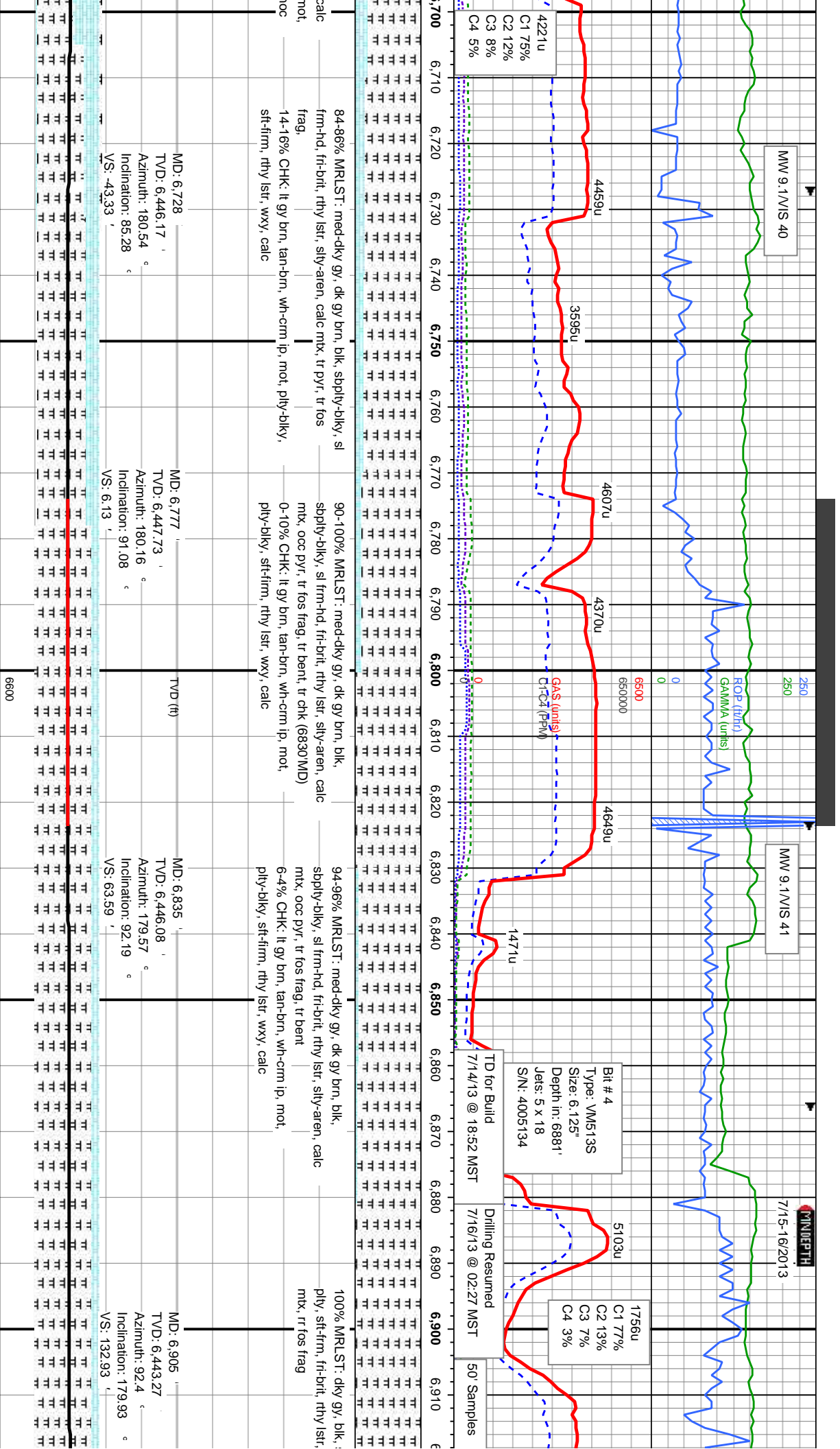
90-50% MRLST: r
sft-hd, fri-brt, rthy
gy, lt gy brn, wh-c
wxy ip, calc, tr bent

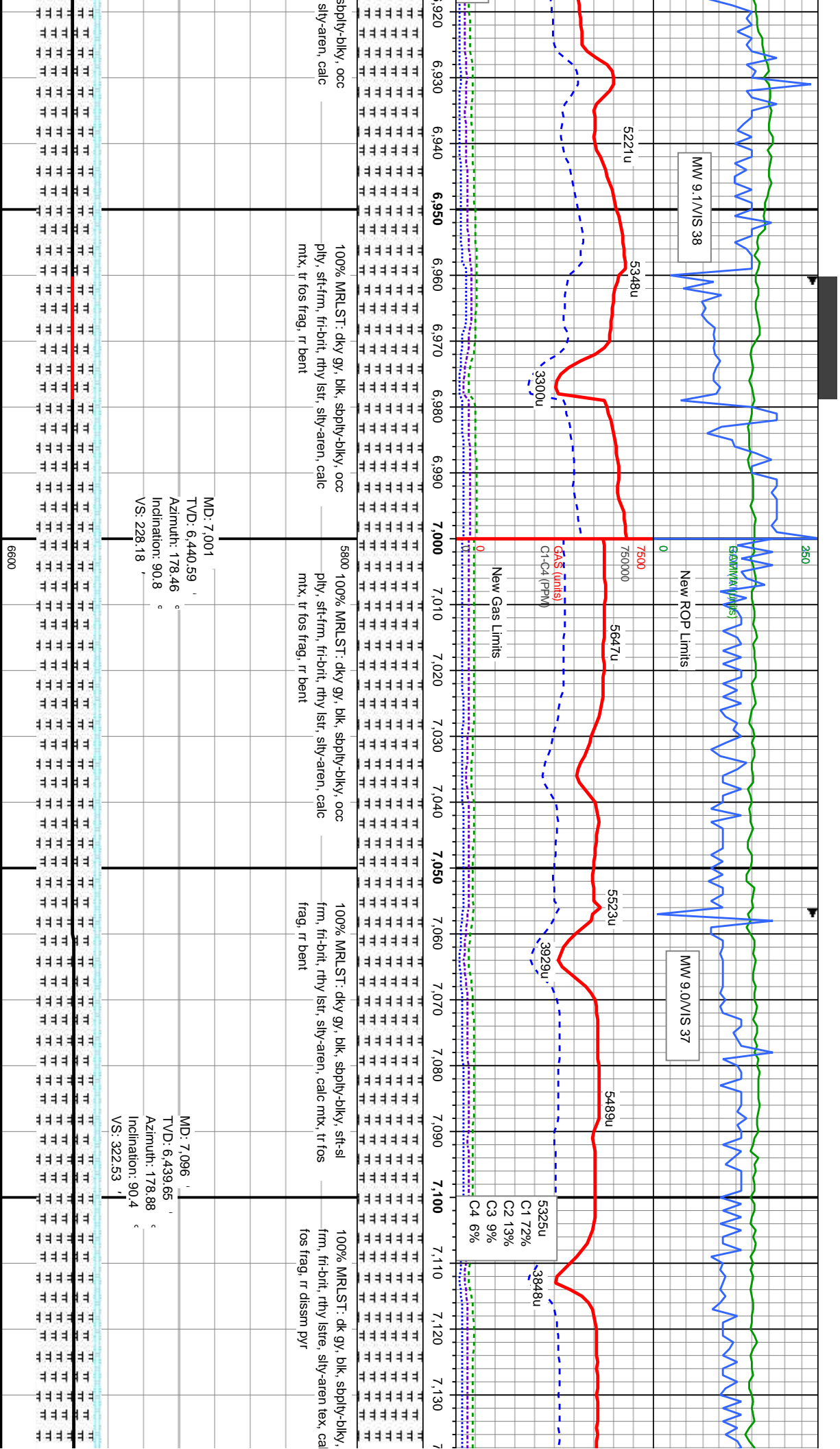
100% SLTY SH: lt-med gy, lt gy brn, occ dk gy,
sb pily-blky, occ pily, sft-sl frm, rthy-gritty lstr,
sily-arg tex, grdg siltst ip

100% SLTY SH: lt-dk gy, lt gy brn, occ lt olv,
pily-sb blky, sft-sl frm, rthy-gritty lstr, sily-arg tex,
grdg siltst ip, tr bent

60-10% SLTY SH: lt-dk gy, lt gy brn, pily-sb blky, sft-sl frm,
rthy-gritty lstr, sily-arg tex 25-90% MRLST: med-dly gy, dk
gy brn, blk, sbpily-blky, sft-hd, fri-brt, rthy lstr, sily-aren, calc
mtx 15-0% CHK: lt gy, lt gy brn, wh-crm, mot, sbpily-blky,
sft-sl frm, rthy lstr, wxy ip, calc, tr bent







sbply-biky, occ
sily-aren, calc

100% MRLST: dky gy, blk, sbply-biky, occ
ply, sfr-frm, fri-brit, rthy lstr, sily-aren, calc
mtx, tr fos frag, rr bent

5800 100% MRLST: dky gy, blk, sbply-biky, occ
ply, sfr-frm, fri-brit, rthy lstr, sily-aren, calc
mtx, tr fos frag, rr bent

100% MRLST: dky gy, blk, sbply-biky, sfr-sl
frm, fri-brit, rthy lstr, sily-aren, calc mtx, tr fos
frag, rr bent

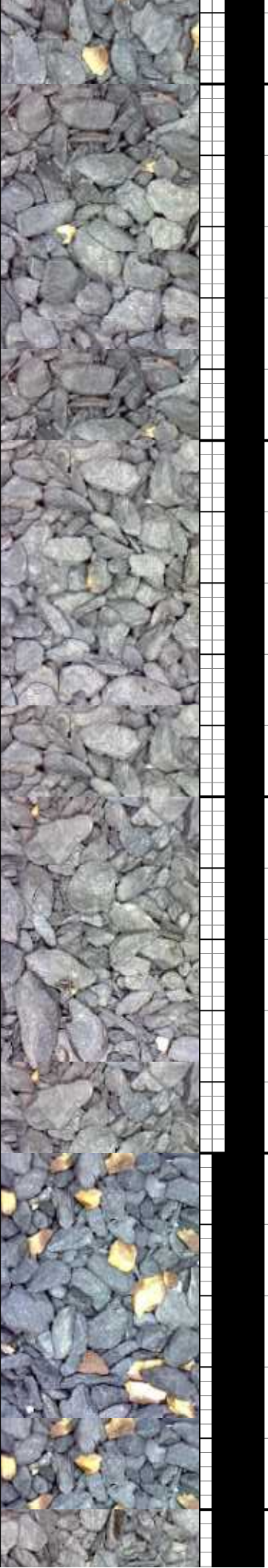
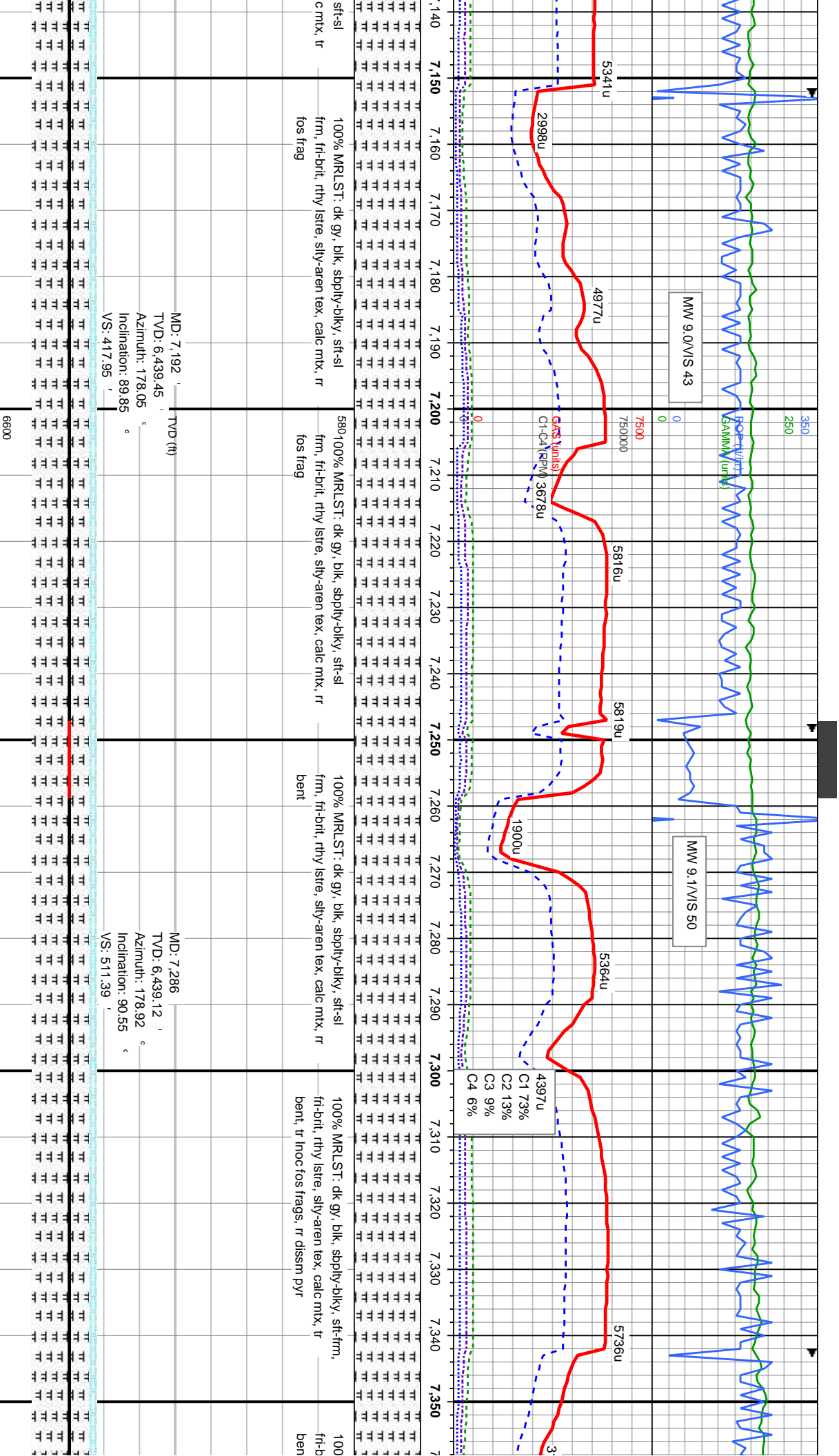
100% MRLST: dk gy, blk, sbply-biky,
frm, fri-brit, rthy lstre, sily-aren tex, cal
fos frag, rr dissim pyr

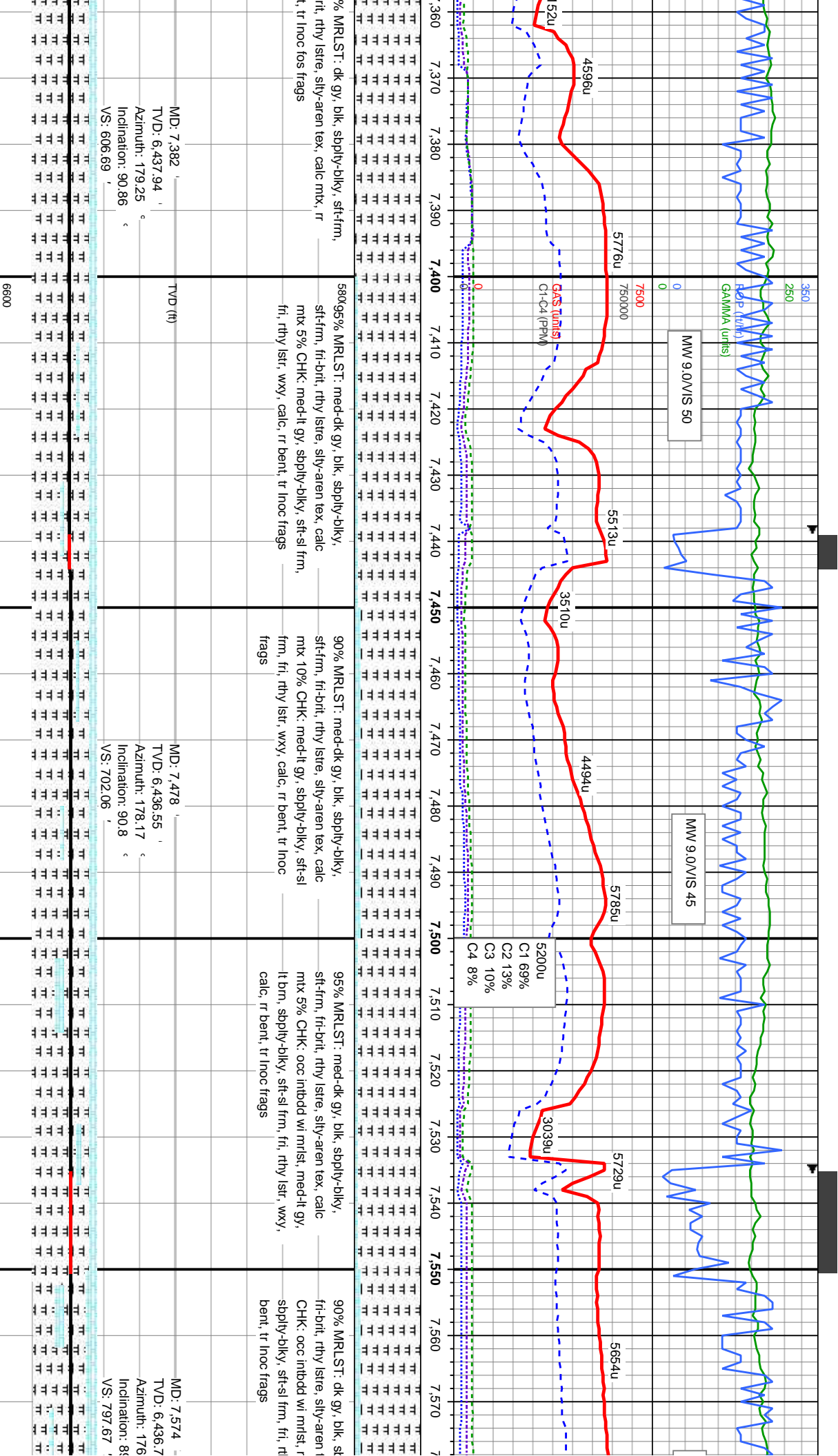
MD: 7,001
TVD: 6,440.59
Azimuth: 178.46
Inclination: 90.8
VS: 228.18

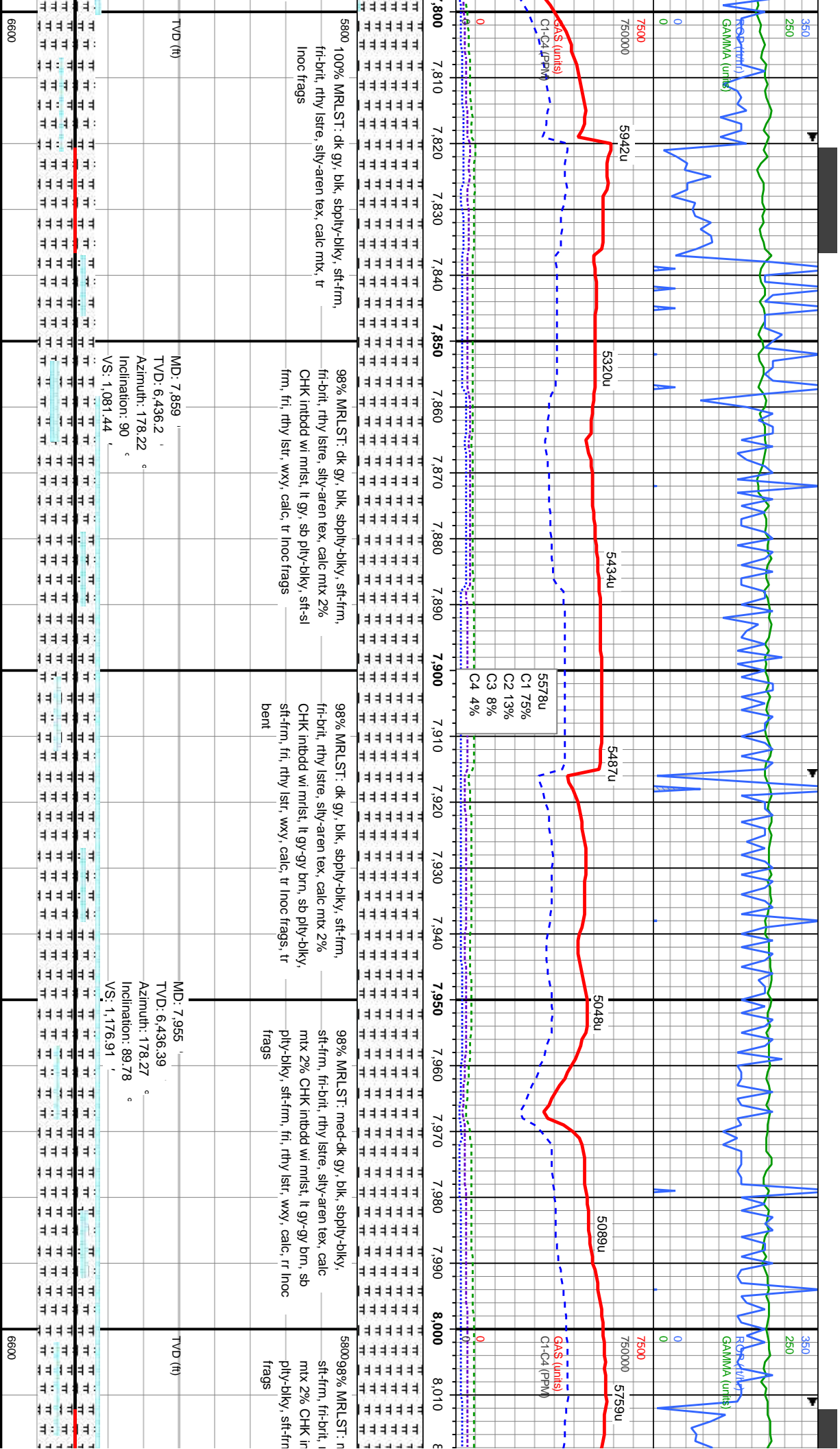
MD: 7,096
TVD: 6,439.65
Azimuth: 178.88
Inclination: 90.4
VS: 322.53

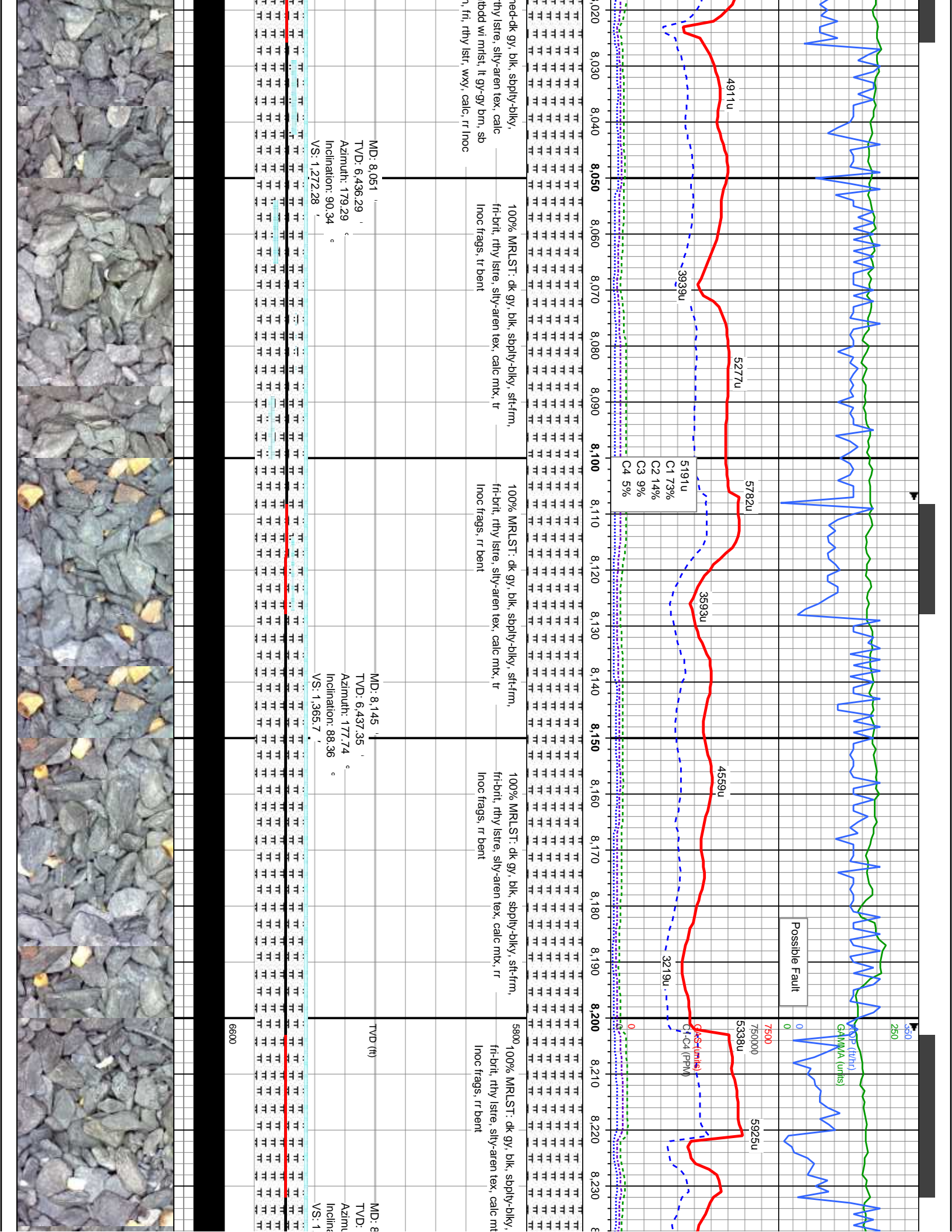
6600











MMW 9.0V/VIS 50

ROF (u/v/r)
GAMMA (units)

C1 73%
C2 13%
C3 9%
C4 5%

GAS (units)
C1-C4 (PPM)

100% MRLST: dk gy, blk, sbply-blky, sft-frn,
fri-brt, rthy lstre, silty-aren tex, calc mtx, rr
Inoc frags, rr bent

100% MRLST: dk gy, blk, sbply-blky, sft-frn,
fri-brt, rthy lstre, silty-aren tex, calc mtx, rr
Inoc frags, rr bent

100% MRLST: dk gy, blk, sbply-blky, sft-frn,
fri-brt, rthy lstre, silty-aren tex, calc mtx, rr
Inoc frags, rr bent

100% MRLST: dk gy, blk, sbply-blky, sft-frn,
fri-brt, rthy lstre, silty-aren tex, calc mtx, rr
Inoc frags, rr bent

95%
sft-fr
mtx
ply-l
frags

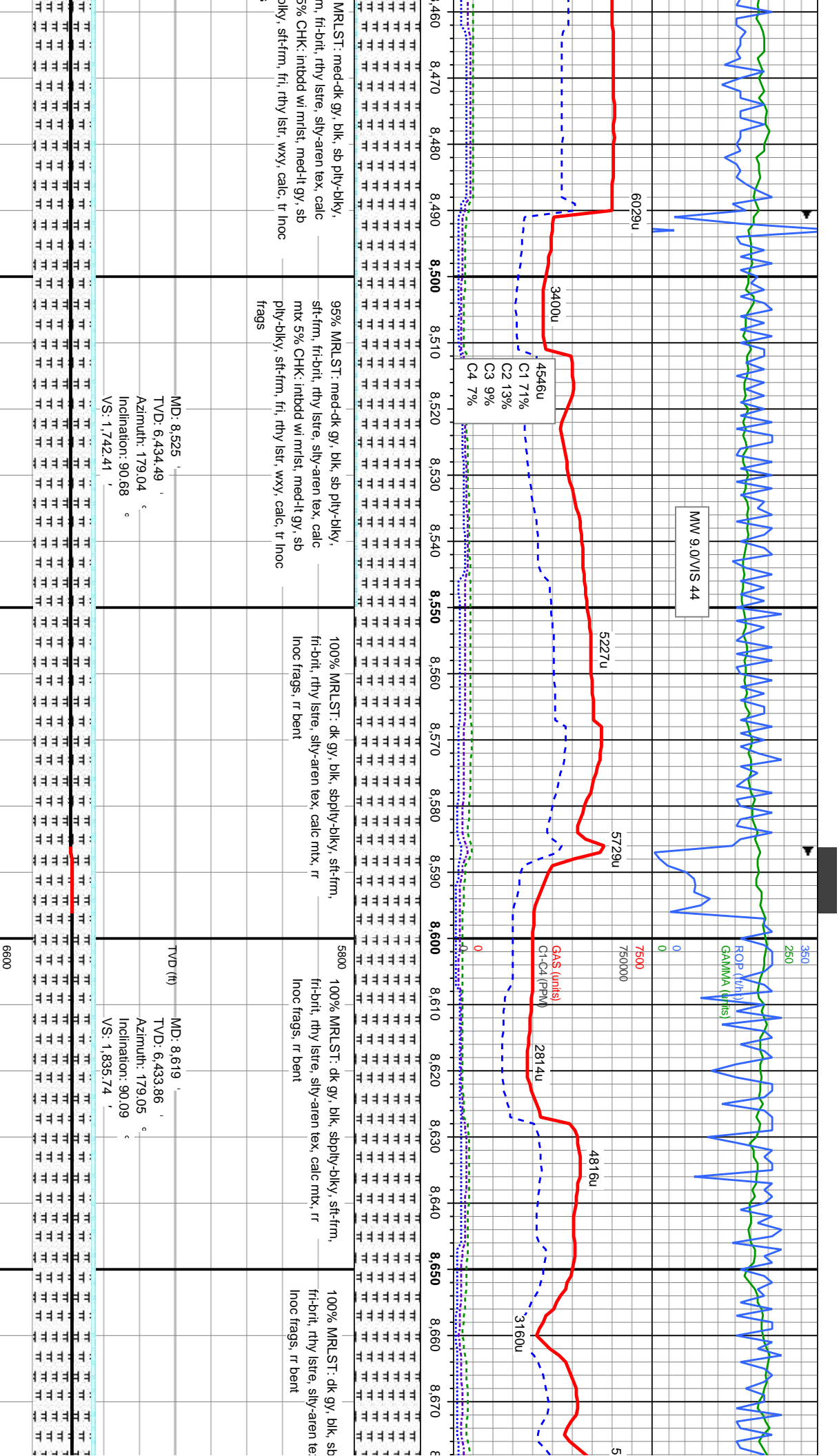
MD: 8,336
TVD: 6,437.51
Azimuth: 180.6
Inclination: 90.52
VS: 1,555.14

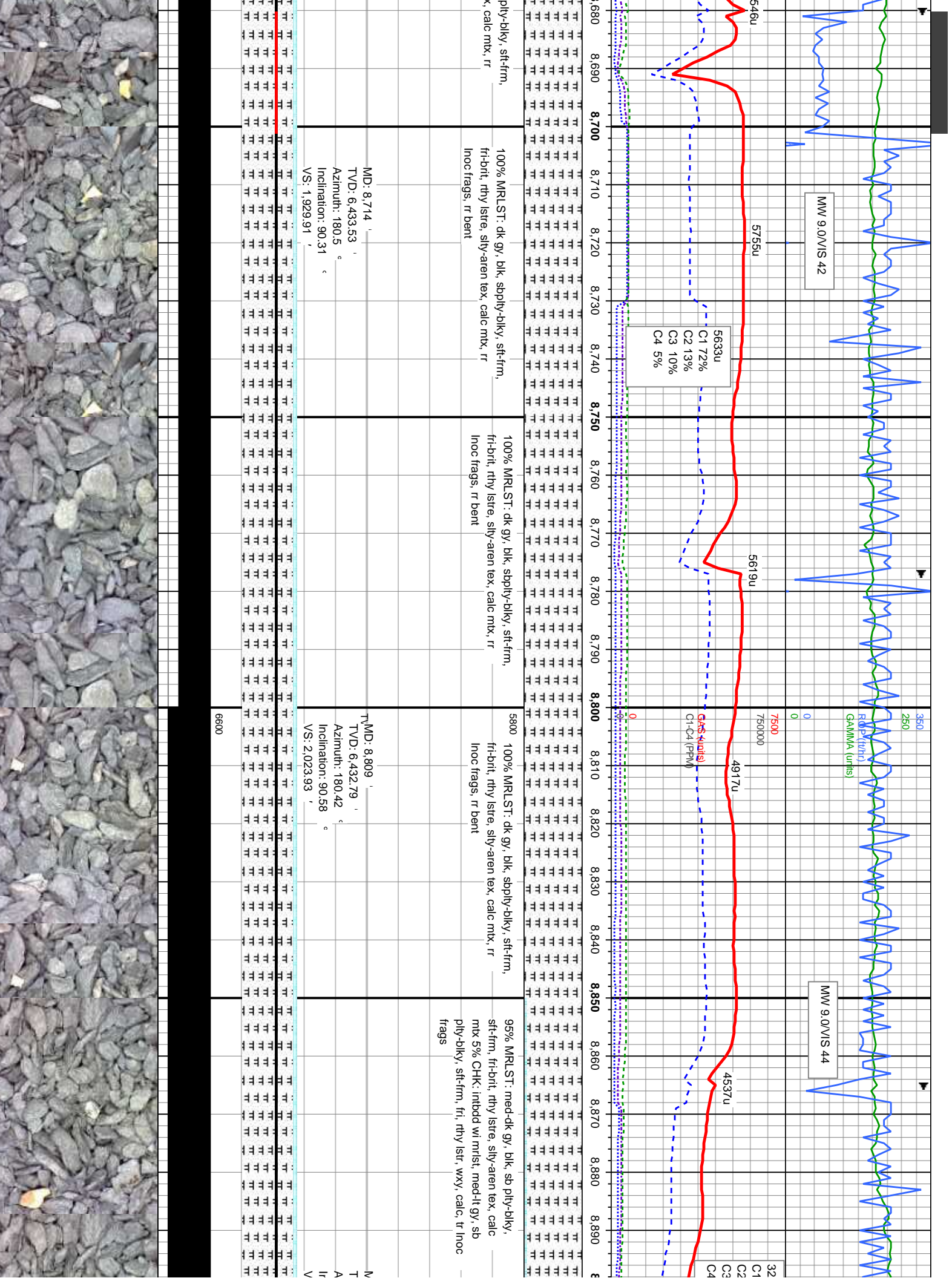
MD: 8,431
TVD: 6,436.06
Azimuth: 179.95
Inclination: 91.23
VS: 1,649.19

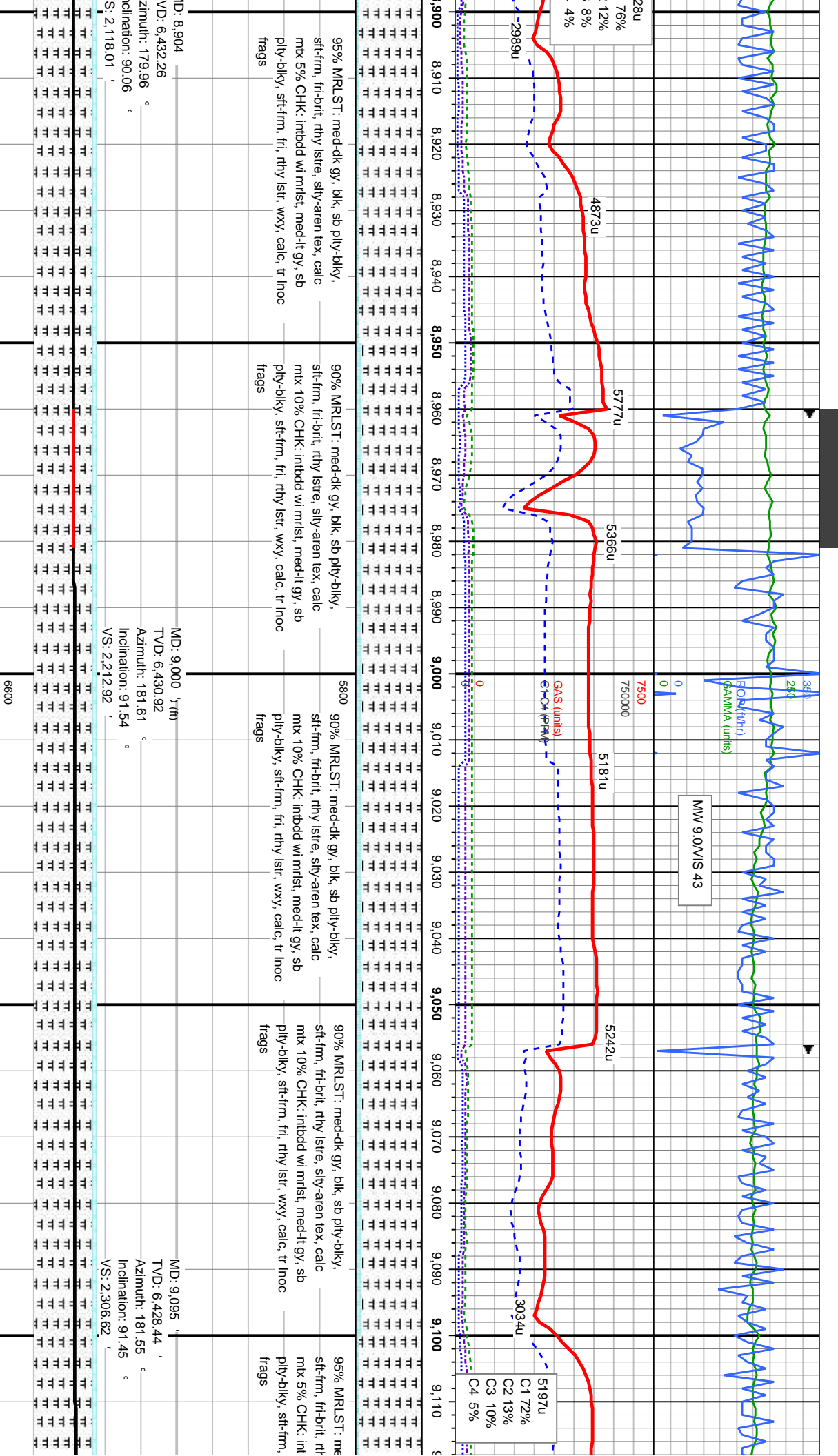
TVD (ft)

6600







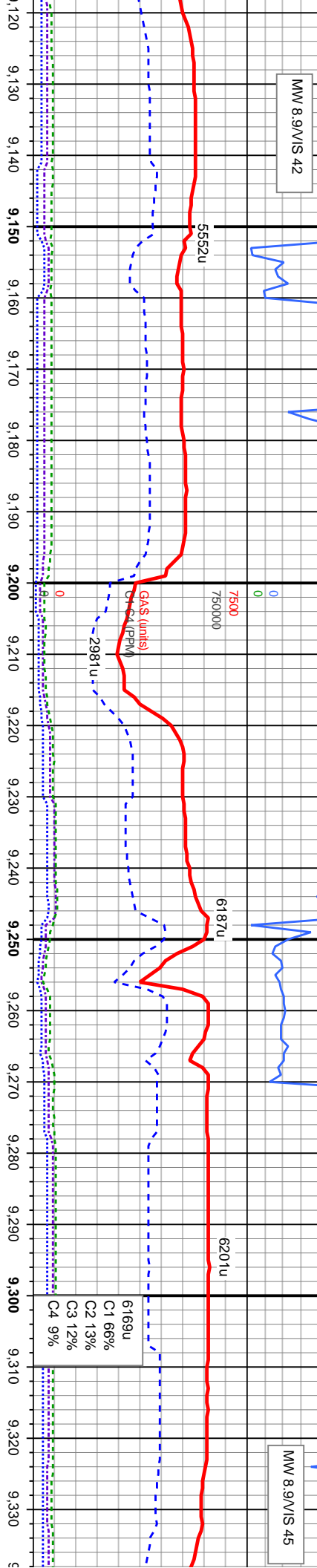


MW 8.9N/S 42

MW 8.9N/S 45

DEPTH 7/17/2013

350
250
150
50
0
-50
-100
-150
-200
-250
-300
-350
-400
-450
-500
-550
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-10000



85% MRLST: med-dk gy, blk, sb ply-biky, sft-frm, fri-brit, rthy lstre, silty-aren tex, calc mx, 15% CHK: intbdd wi mlst, med-lt gy, sb ply-biky, sft-frm, fri, rthy lst, wxy, calc, tr inoc frags	5800 65% CHK: intbdd wi mlst, med-lt gy, sb ply-biky, sft-frm, fri, rthy lst, wxy, calc, tr inoc frags, 35% MRLST: med-dk gy, blk, sb ply-biky, sft-frm, fri-brit, rthy lstre, silty-aren tex, calc mx	75% CHK: intbdd wi mlst, med-lt gy, sb ply-biky, sft-frm, fri, rthy lst, wxy, calc, tr inoc frags, 25% MRLST: med-dk gy, blk, sb ply-biky, sft-frm, fri-brit, rthy lstre, silty-aren tex, calc mx	65% CHK: intbdd wi mlst, med-lt gy, sb ply-biky, sft-frm, fri, rthy lst, wxy, calc, frags, 35% MRLST: med-dk gy, blk, sb ply-biky, sft-frm, fri-brit, rthy lstre, silty-aren tex, calc mx
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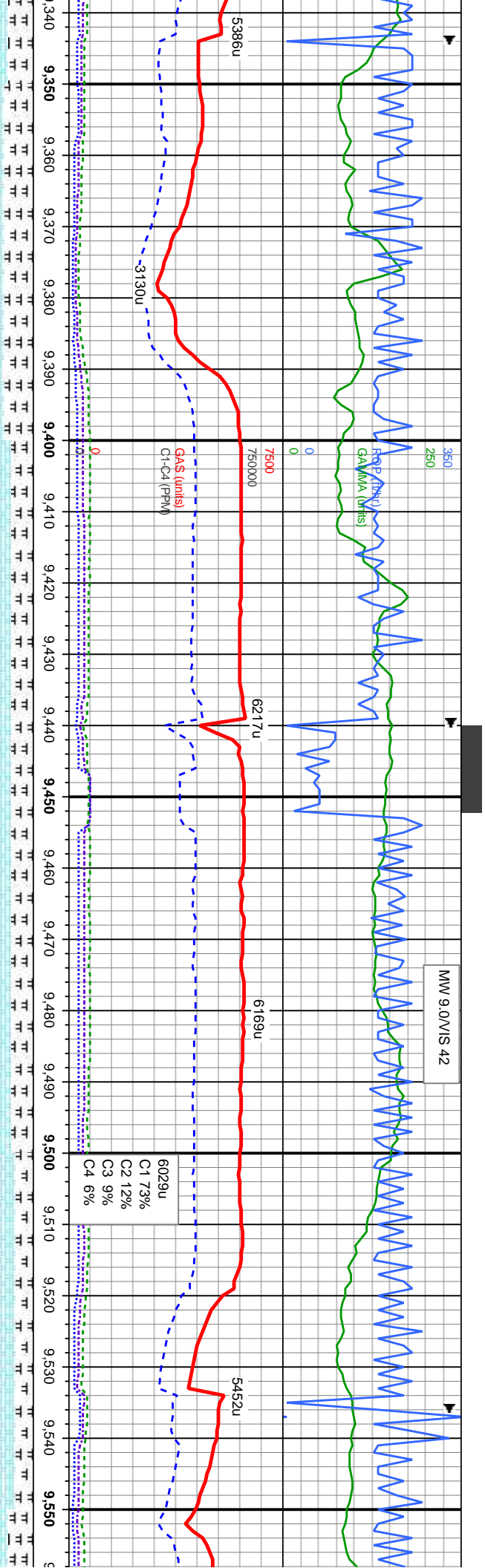
MD: 9,191
TVD: 6,426.58
Azimuth: 179.81
Inclination: 90.77
VS: 2,401.55

MD: 9,287
TVD: 6,426.06
Azimuth: 181.71
Inclination: 89.85
VS: 2,496.48

Possible Fault

6600

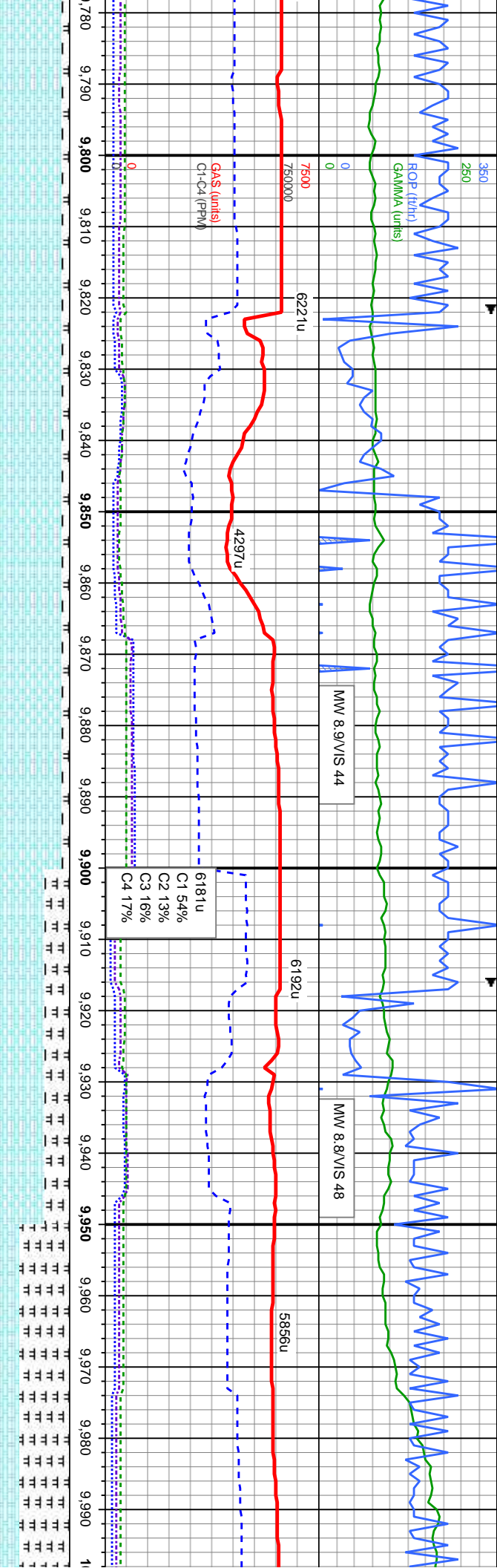




60% CHK: intbdd wi mlst, med-lt gy, sb ply-biky, sft-fm, fri, rthy lstr, wxy, calc, tr inoc frags, 40% MRLST: med-dk gy, blk, sb ply-biky, sft-fm, fri-brit, rthy lstre, sily-aren tex, calc mtx	5800 70% CHK: intbdd wi mlst, med-lt gy, sb ply-biky, sft-fm, fri, rthy lstr, wxy, calc, tr inoc frags, 30% MRLST: med-dk gy, blk, sb ply-biky, sft-fm, fri-brit, rthy lstre, sily-aren tex, calc mtx	70% CHK: intbdd wi mlst, med-lt gy, sb ply-biky, sft-fm, fri, rthy lstr, wxy, calc, tr inoc frags, 30% MRLST: med-dk gy, blk, sb ply-biky, sft-fm, fri-brit, rthy lstre, sily-aren tex, calc mtx	75% CHK: intbdd wi mlst, med-lt gy, sb ply-biky, sft-fm, fri, rthy lstr, wxy, calc, tr inoc frags, 25% MRLST: med-dk gy, blk, sb ply-biky, sft-fm, fri-brit, rthy lstre, sily-aren tex, calc mtx	65% CHK: intbdd wi mlst, med-lt gy, sb ply-biky, sft-fm, fri, rthy lstr, wxy, calc, tr inoc frags, 25% MRLST: med-dk gy, blk, sb ply-biky, sft-fm, fri-brit, rthy lstre, sily-aren tex, calc mtx
MD: 9.383 TVD: 6.426.83 Azimuth: 180.86 Inclination: 89.23 VS: 2.591.27	MD: 9.479 TVD: 6.427.55 Azimuth: 180.95 Inclination: 89.91 VS: 2.686.16			

6600				
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580% CHK: lt gy, lt gy brn, sb ply-bkly, sft-sl
frm, fri, rthy lstr, wxy, calc 10% MRLST:
med-dk gy, sb ply-bkly, sft-frm, fri-brit, rthy lstr,
sily-aren tex, calc mix, tr inoc frags

90% CHK: lt gy, med-lt gy brn, sb ply-bkly,
sft-sl frm, fri, rthy lstr, wxy, calc 10% MRLST:
med-dk gy, sb ply-bkly, sft-frm, fri-brit, rthy lstr,
sily-aren tex, calc mix, tr inoc frags

65% CHK: med-lt gy, lt gy brn, sb ply-bkly,
sft-sl frm, fri-brit, rthy lstr, wxy ip, calc 35%
MRLST: med-dk gy, sb ply-bkly, sft-frm,
fri-brit, rthy lstr, sily-aren tex, calc mix, tr inoc
frags

70% MRLST: med-dk gy, blk ip, sb ply-bkly,
sft-frm, fri-brit, rthy lstr, sily-aren tex, calc mix
30% CHK: med-lt gy, lt gy brn, sb ply-bkly,
sft-sl frm, fri-brit, rthy lstr, wxy ip, calc, occly
inbdd wi mrlst, tr inoc frags

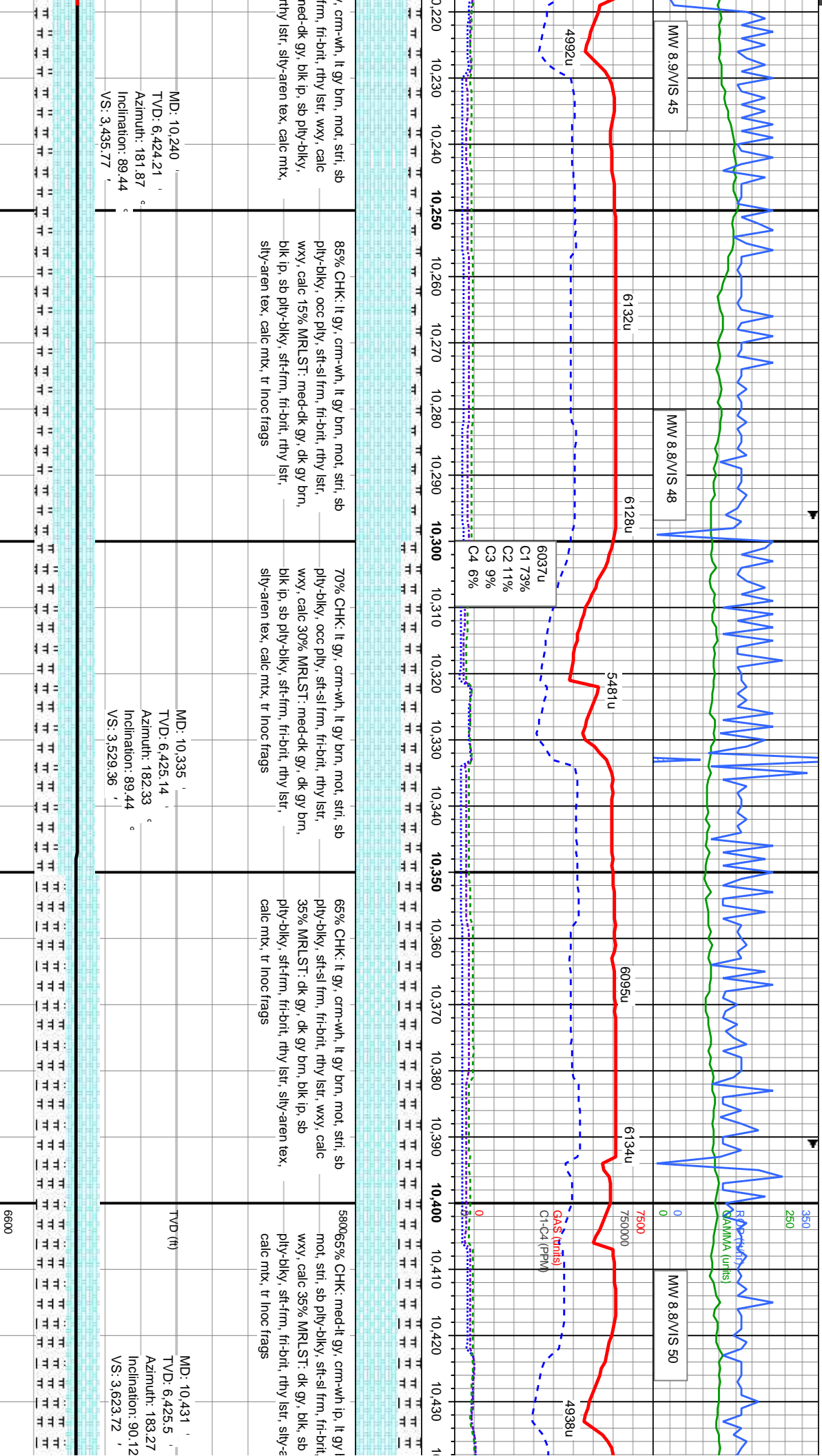
MD: 9.860
TVD: 6,431.53
Azimuth: 182.67
Inclination: 90.31
VS: 3.061,84

MD: 9.955
TVD: 6,430.12
Azimuth: 182.42
Inclination: 91.39
VS: 3.155,29

TVD (ft)
6600

small
D/U fault





MD: 10,240
TVD: 6,424.21
Azimuth: 181.87
Inclination: 89.44
VS: 3,435.77

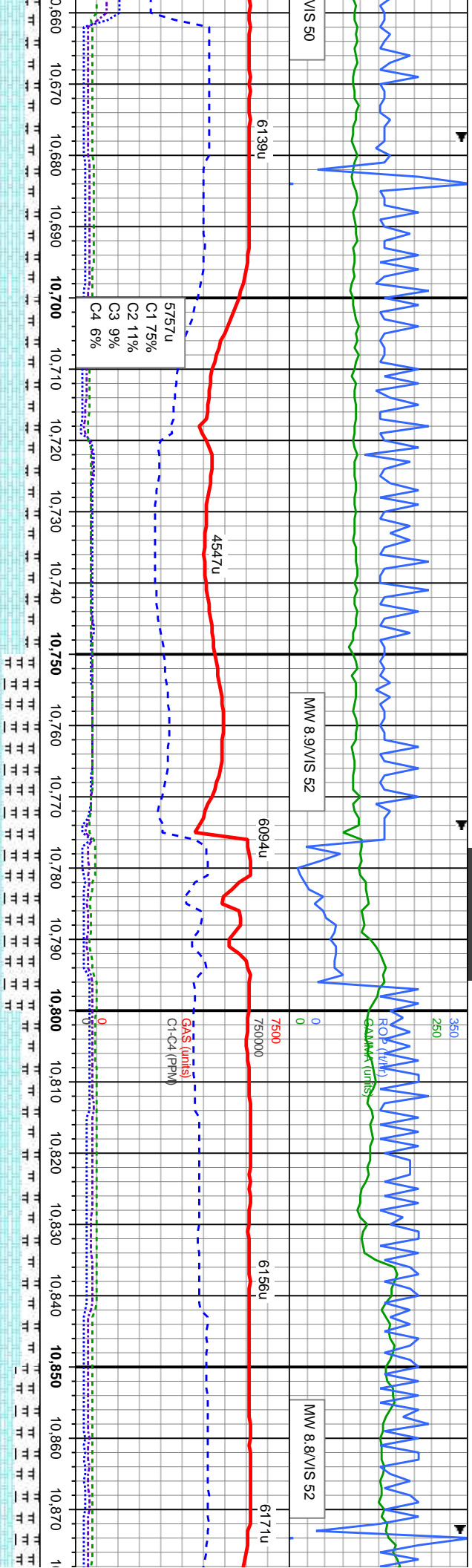
MD: 10,335
TVD: 6,425.14
Azimuth: 182.33
Inclination: 89.44
VS: 3,529.36

TVD (ft)

MD: 10,431
TVD: 6,425.5
Azimuth: 183.27
Inclination: 90.12
VS: 3,623.72

6600





% CHK: med-lt gy, crm-wh, lt gy brn, lt brn, mot, stri, sb ply-biky, sft-sl frm, fri-brt, rthy lstr, wxy, calc 20% MRLST: dk gy, dk gy brn, blk, sb ply-biky, sft-frm, fri-brt, rthy lstr, sily-aren tex, calc mtx, tr inoc frags

80% CHK: med-lt gy, crm-wh, lt gy brn, lt brn, mot, stri, sb ply-biky, sft-sl frm, fri-brt, rthy lstr, wxy, calc 20% MRLST: dk gy, dk gy brn, blk, sb ply-biky, sft-frm, fri-brt, rthy lstr, sily-aren tex, calc mtx, tr inoc frags

50% CHK: med-lt gy, lt gy brn, mot, stri, sb ply-biky, sft-sl frm, fri-brt, rthy lstr, wxy, calc 50% MRLST: med-dk gy, dk gy brn, blk, sb ply-biky, sft-frm, fri-brt, rthy lstr, sily-aren tex, calc mtx, tr inoc frags

5800 75% CHK: med-lt gy, lt gy brn, mot, stri, sb ply-biky, sft-sl frm, fri-brt, rthy lstr, wxy, calc 25% MRLST: med-dk gy, dk gy brn, blk, sb ply-biky, sft-frm, fri-brt, rthy lstr, sily-aren tex, calc mtx, tr inoc frags

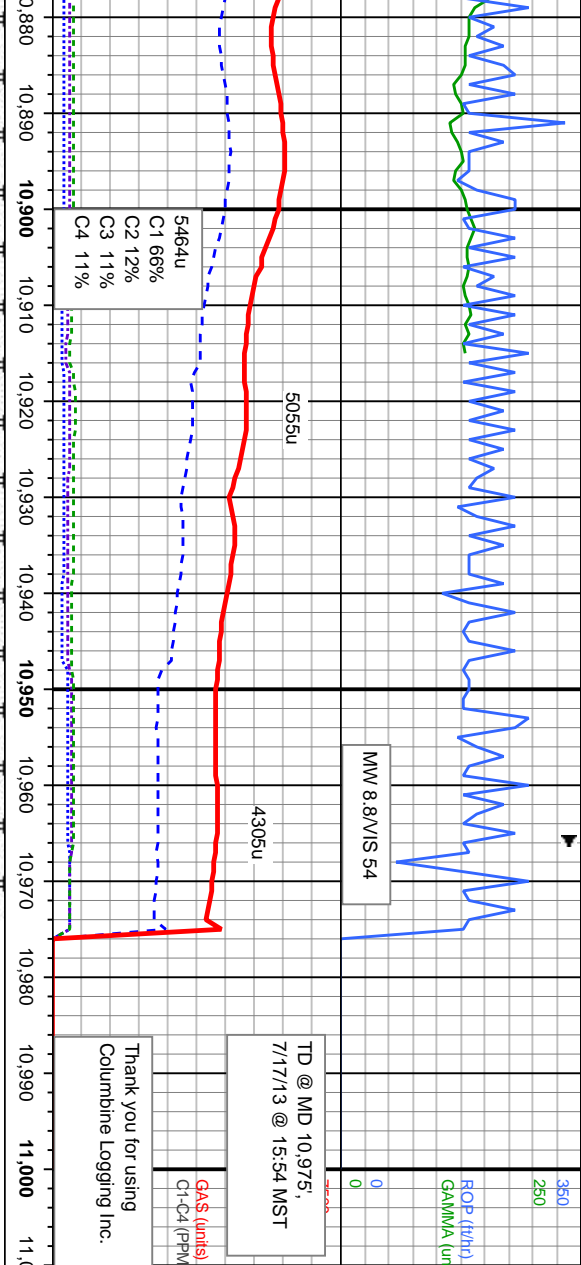
65% CHK: med-lt gy, lt gy brn, mot, stri, sb ply-biky, sft-sl frm, fri-brt, rthy lstr, wxy, calc 35% MRLST: med-dk gy, dk gy brn, blk, sb ply-biky, sft-frm, fri-brt, rthy lstr, sily-aren tex, calc mtx, tr inoc frags

MD: 10,718 '
TVD: 6,426.92 '
Azimuth: 184.6 °
Inclination: 89.91 °
VS: 3,905.39 '

MD: 10,813 '
TVD: 6,426.2 '
Azimuth: 183.47 °
Inclination: 90.96 °
VS: 3,998.37 '

6600





rn, mot, str, sb	65% CHK: med-lt gy, lt gy brn, mot, str, sb	70% CHK: med-lt gy, lt gy brn, mot, str, sb	5800
thy lstr, wxy, calc	ply-blky, sft-sl frm, fri-brt, rthy lstr, wxy, calc	ply-blky, sft-sl frm, fri-brt, rthy lstr, wxy, calc	
k gy brn, blk, sb	35% MRLST: med-dk gy, dk gy brn, blk, sb	30% MRLST: med-dk gy, dk gy brn, blk, sb	
/ lstr, silty-aren tex,	ply-blky, sft-frm, fri-brt, rthy lstr, silty-aren tex, calc mtx, tr inoc frags	ply-blky, sft-frm, fri-brt, rthy lstr, silty-aren tex, calc mtx, tr inoc frags	
	MD: 10,919 ' TVD: 6,424.65 ' Azimuth: 182.65 ° Inclination: 90.71 ° VS: 4,102.46 '	MD: 10,975 ' TVD: 6,424.65 ' Azimuth: 182.65 ° Inclination: 90.71 ° VS: 4,157.53 '	TVD (ft)
			6600

