



Scale: 5" / 100'
Measured Depth Log

Well Name Todd LC25-760 Horz

Location SESW 25 9N 59W 6 PM

State COLORADO

County WELD

Country USA

Rig Number H&P 326

API Number 05-123-40675-00

Field WATTENBERG

Region DJ BASIN

Drilling Completed 5/9/2015

Spud Date 5/4/2015

Surface Coordinates SESW 25 9N 59W 6 PM

500' FSL 2088' FWL

LAT / LONG: 40.715800 / -103.927950

Bottom Hole Coordinates SESW 25 9N 59W

330' FNL & 1980' FWL

Ground Elevation 4973'

K.B. Elevation 5003'

Logged Interval 1410' To 10695'

Total Depth 10695'

Formation NIOBRARA A MARL

Type of Drilling Fluid H2O, LSND

Operator

Company Noble Energy Inc

Address 1625 Broadway Suite 2200
Denver, CO 80202

Geologist

Name BRYAN KAPROTH-GERECHT

Company NOBLE ENERGY INC.

Address 1625 Broadway Suite 2200
Denver, CO 80202

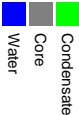
Other

Well Site Logging Company COLUMBINE LOGGING INC

Well Site Geologist (Days) JASON BEACH

Well Site Geologist (Nights) JOHN SABROSKE, SHAN

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 SANC	TUFF
CHERT	IGNEOUS	SHALE	WELDED TUFF
CLAY CHOKE SANC	SIDERITE or LIMONITE	SHALE COLORED	
CLAYSTONE	LIMESTONE	SHALE GRAY	

Accessories

GASTROPOD	ARGILLITE GRAIN	HEAVY MINERAL	
INOCERAMUS	B BENTONITE	K KAOLIN	
ALGAE	BITUMENOUS SUBSTANCE	M MARCASITE	ANHYDRITE STRINGER
AMPHIPORA	BRECCIA FRAGMENTS	TR MARLSTONE	BENTONITE STRINGER
BELEMNITE	PELECYPOD	MICACEOUS	COAL STRINGER
BIOCLASTIC	PELLET	CARBONACEOUS FLAKES	DOLomite STRINGER
BRACHIOPOD	PISOLITE	CHTK	GYPSUM STRINGER
BRYOZOA	PLANT REMAINS	CHTLT	LIMESTONE STRINGER
CEPHALOPOD	PLANT SPORES	COAL - THIN BEDS	MARLSTONE (CALC) STRG
CORAL	SCAPHOPOD	DOLOMITIC	MARLSTONE (DOL) STRG
CRINOID	STROMATOPOROID	FELDSPAR	SANDSTONE STRINGER
ECHINOID		FERRUGINOUS PELLET	SHALE STRINGER
FISH		FERRUGINOUS	SILICEOUS
FORAMINIFERA	ANHYDRITIC	GLAUCONITE	SILTY
FOSSIL	ARGILLACEOUS	GYPSIFEROUS	TUFFACEOUS

Oil Show

P PINPOINT
VUGGY

Engineering

DEAD	
EVEN	
QUESTIONABLE	BIT
SPOTTED STAINING	CONNECTION (UP)

Porosity

CONNECTION (DOWN)	CONNECTION GAS
E EARTHY	CONNECTION GAS
FENESTRAL	TRIP GAS
FRACTURE	TRIP GAS (LEFT)
INTERCRYSTALLINE	DOWN TIME GAS
INTEROOULTIC	DOWN TIME GAS (L)
MOLDIC	CORE - LOST
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  MIN DEPTH **L** LITHOGRAPHIC


 OIL SHOW **MX** MICROXLN


 MIN DEPTH UP **MS** MUDSTONE

Rounding

 MIN DEPTH (DOWN) **A** ANGULAR **PS** PACKSTONE

 NORMAL FAULT **R** ROUNDED **WS** WACKESTONE

 OVERTURNED STRATA **B** SUBANG

 REVERSE FAULT **R** 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

COLUMBINE LOGGING RIGGED UP
ON 5/5/15 MANNED 2-PERSON

MUD WT 10.5 VIS 46

ROP

ROP
GAMMA

ROP DATA IMPORTED FROM PASON EDR

ROP (ft/hr)

ROP (ft/hr)

GAMMA (api)

GAMMA (api)

MUDLOG CONTINUED FROM
"Todd LC25-760 Vert.mplot"

Total Gas & Chromatograph

GAS

C1
C2
C3
C4

GAS DATA FROM IBALL INSTRUMENTS.
BLOODHOUND CHROMATOGRAPH UNIT
#312 JOB NUMBER 214

GAS (units)

C1-C4 (PPM)

GAS (units)

C1-C4 (PPM)

Depth Labels

% Lith

SURVEY AND GAMMA DATA PROVIDED
BY ENSIGN DIRECTIONAL SERVICES

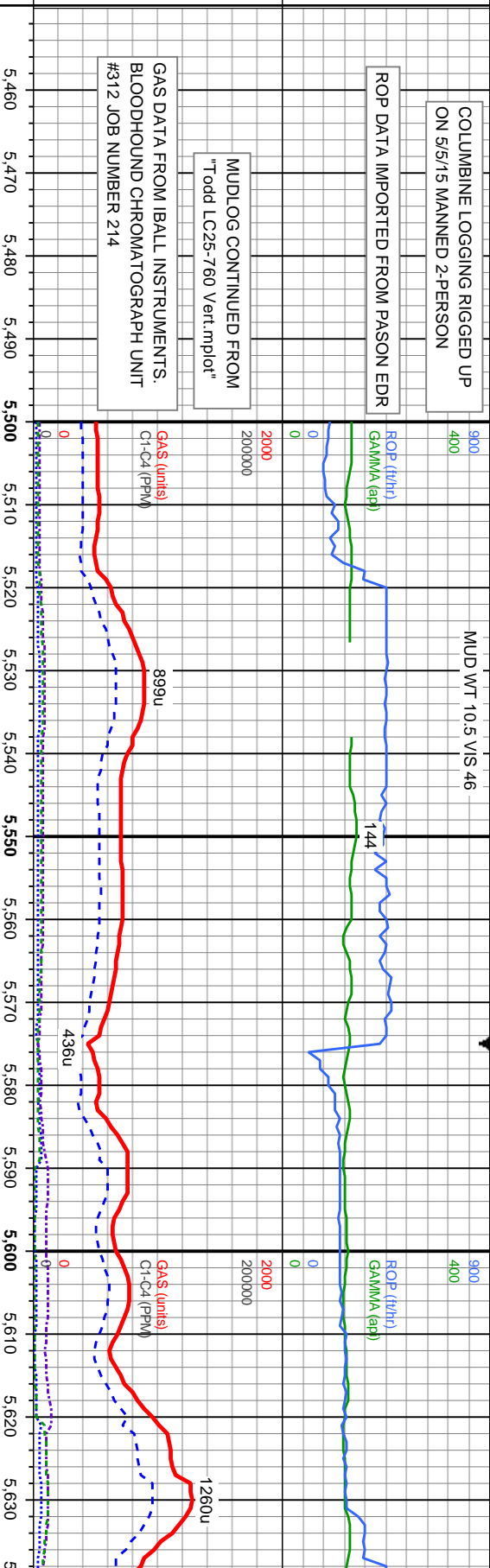
50' SAMPLE INTERVALS

Well Bore
TVD

Oil Show

EGMFTST

Images



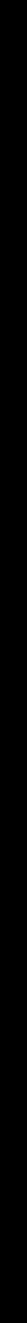
MD: 5,525'
TVD: 5,488.59'
Inclination: 16.44°
Azimuth: 14.1°
VS: -394.44'

MD: 5,620'
TVD: 5,578.69'
Inclination: 20.7°
Azimuth: 357.4°
VS: -364.76'

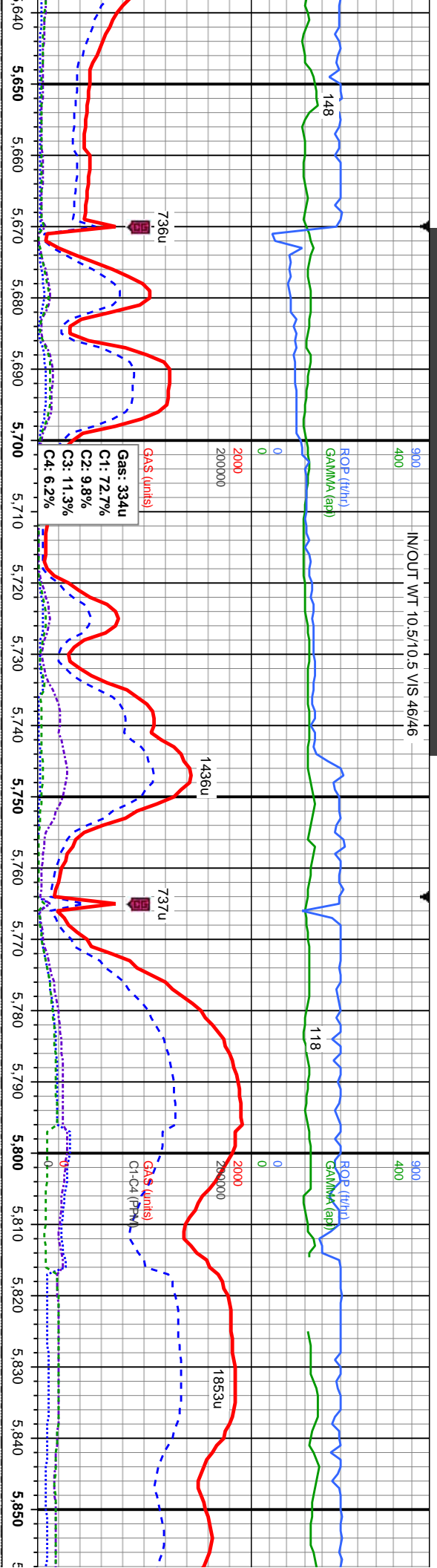
100% SLTY SH: med gy-gr brn occ spec blk, sb
ply-pty, sft-sl frm, slt tex, sl rthy lstr, occ shly
slst, non calc

100% SLTY SH: med gy-gr brn occ spec blk,
sb ply-pty, sft-sl frm, slt tex, sl rthy lstr, occ
shly slst, non calc

100% SLTY SH: med gy-gr brn occ spec
sb ply-pty, sft-sl frm, slt tex, sl rthy lstr,
slst, non calc



IN/OUT WT 10.5/10.5 VIS 46/46



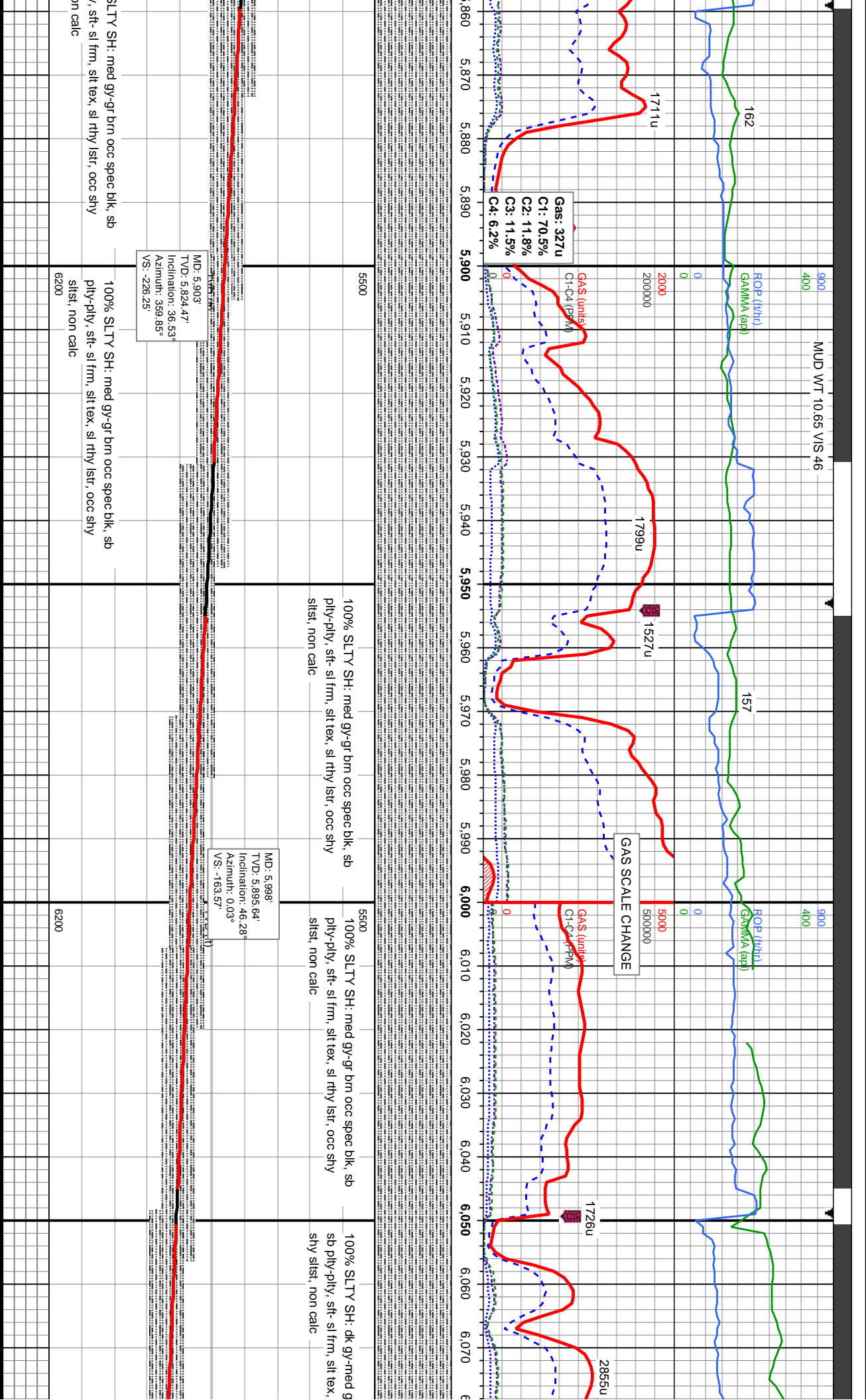
Gas: 334u
C1: 72.7%
C2: 9.8%
C3: 11.3%
C4: 6.2%

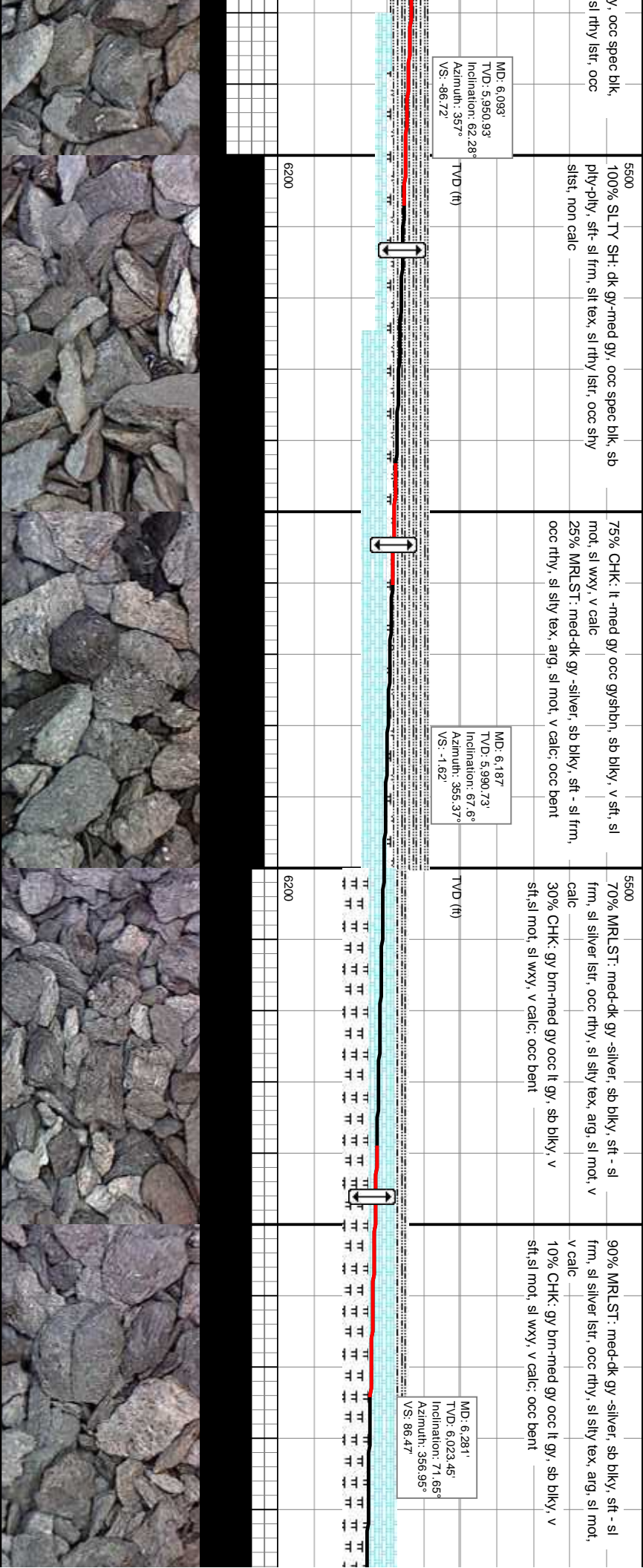
MD: 5,714'
TVD: 5,664.25'
Inclination: 28.04°
Azimuth: 359.51°
VS: -326.02'

MD: 5,809'
TVD: 5,746.64'
Inclination: 31.65°
Azimuth: 1°
VS: -278.83'

blk, occ shy	100% SLTY SH: med gy-gr brn occ spec blk, sb ply-ply, sft- sl frm, sit tex, sl rthy lstr, occ shy silst, non calc	100% SLTY SH: med gy-gr brn occ spec blk, sb ply-ply, sft- sl frm, sit tex, sl rthy lstr, occ shy silst, non calc	100% SLTY SH: med gy-gr brn occ spec blk, sb ply-ply, sft- sl frm, sit tex, sl rthy lstr, occ shy silst, non calc	100% SLTY SH: med gy-gr brn occ spec blk, sb ply-ply, sft- sl frm, sit tex, sl rthy lstr, occ shy silst, non calc	100% SLTY SH: med gy-gr brn occ spec blk, sb ply-ply, sft- sl frm, sit tex, sl rthy lstr, occ shy silst, non calc
6200					







MUD WT 10.8 V/S 48

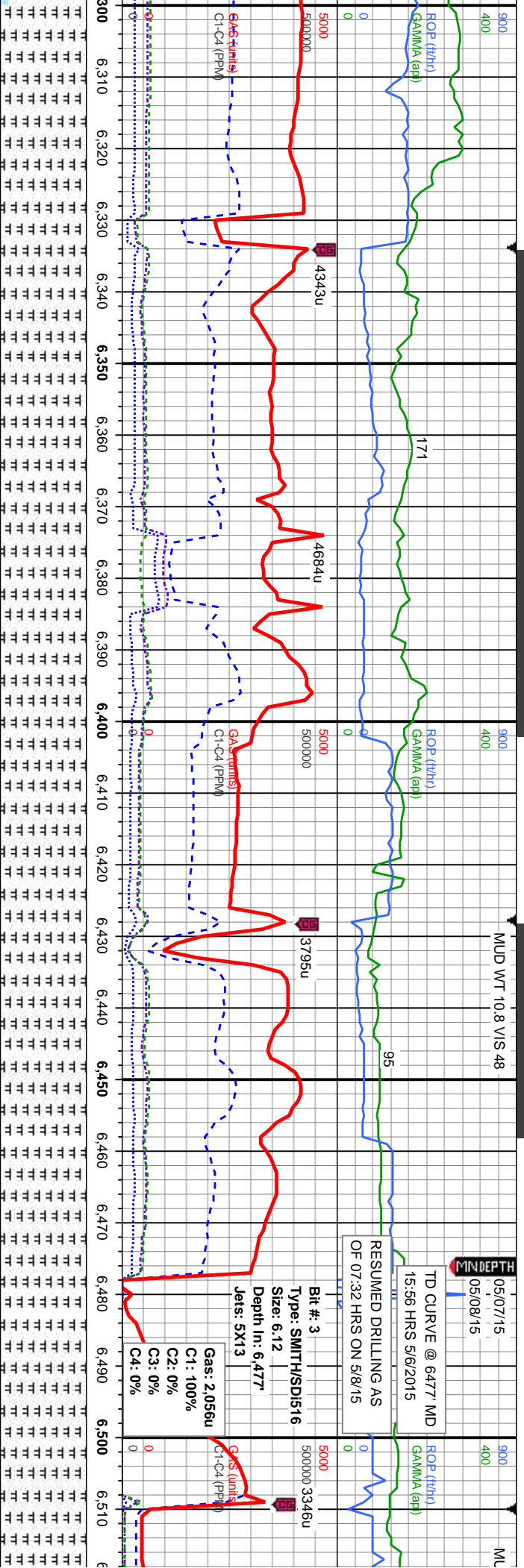
05/07/15
05/08/15
MINDEPTH

TD CURVE @ 6477 MD
15:56 HRS 5/6/2015

RESUMED DRILLING AS
OF 07:32 HRS ON 5/8/15

Bit #: 3
Type: SMITH/SD1516
Size: 6.12
Depth In: 6.477
Jets: 5X13

Gas: 2.056u
C1: 100%
C2: 0%
C3: 0%
C4: 0%



100% MRLST: med-dk gy -silver, sb blk, sft - sl frm, sl silver lsir, occ rthy, sl silty tex, arg, sl mot, v calc

100% MRLST: med-dk gy -silver, sb blk, sft - sl frm, sl silver lsir, occ rthy, sl silty tex, arg, sl mot, v calc

100% MRLST: med-dk gy -silver, sb blk, sft - sl frm, sl silver lsir, occ rthy, sl silty tex, arg, sl mot, v calc

100% MRLST: med-dk gy -silver, occ lt gy, sb blk, sb blk, sft - sl frm, sl silver lsir, occ rthy, sl silty tex, arg, sl mot, v calc

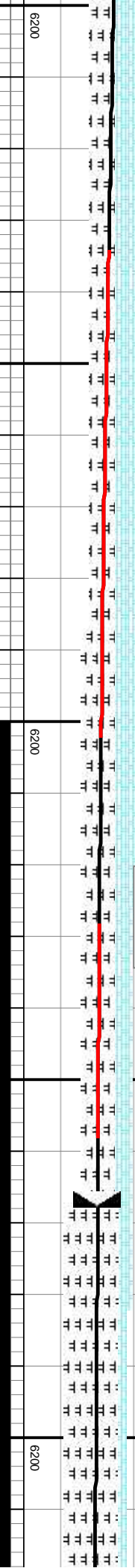
100% MRLST: med-dk gy -silver, sb blk, sft - sl frm, sl silver lsir, occ rthy, sl silty tex, arg, sl mot, v calc

MD: 6.376
TVD: 6.047.45
Inclination: 79.07°
Azimuth: 359.15°
VS: 178.3°

MD: 6.427
TVD: 6.055.15
Inclination: 83.56°
Azimuth: 359.42°
VS: 228.66°

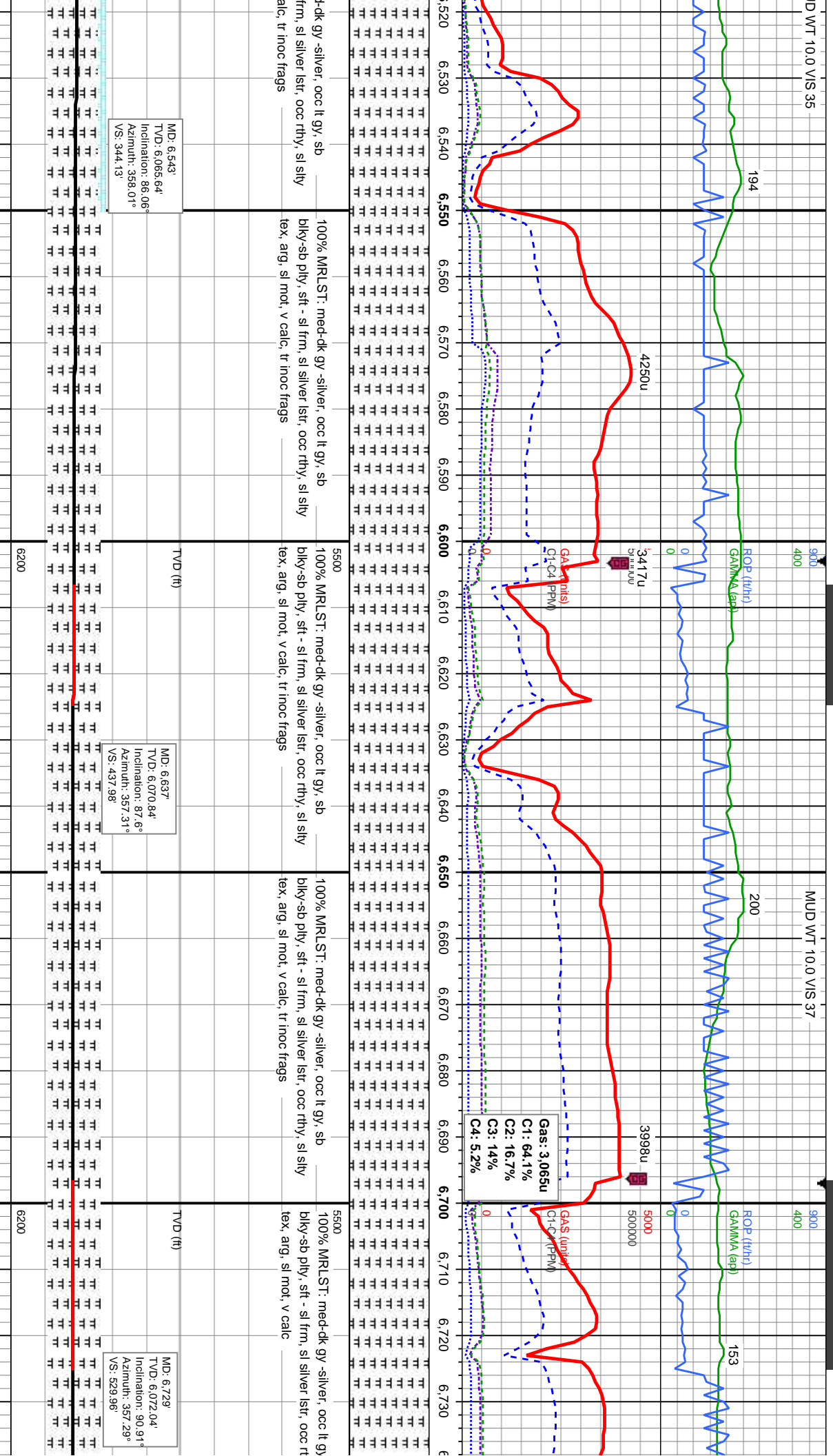
MD: 6.477
TVD: 6.058.83
Inclination: 88°
Azimuth: 358.5°
VS: 278.49°

PROJECTION TO BIT



MD WT 10.0 VIS 35

MUD WT 10.0 VIS 37



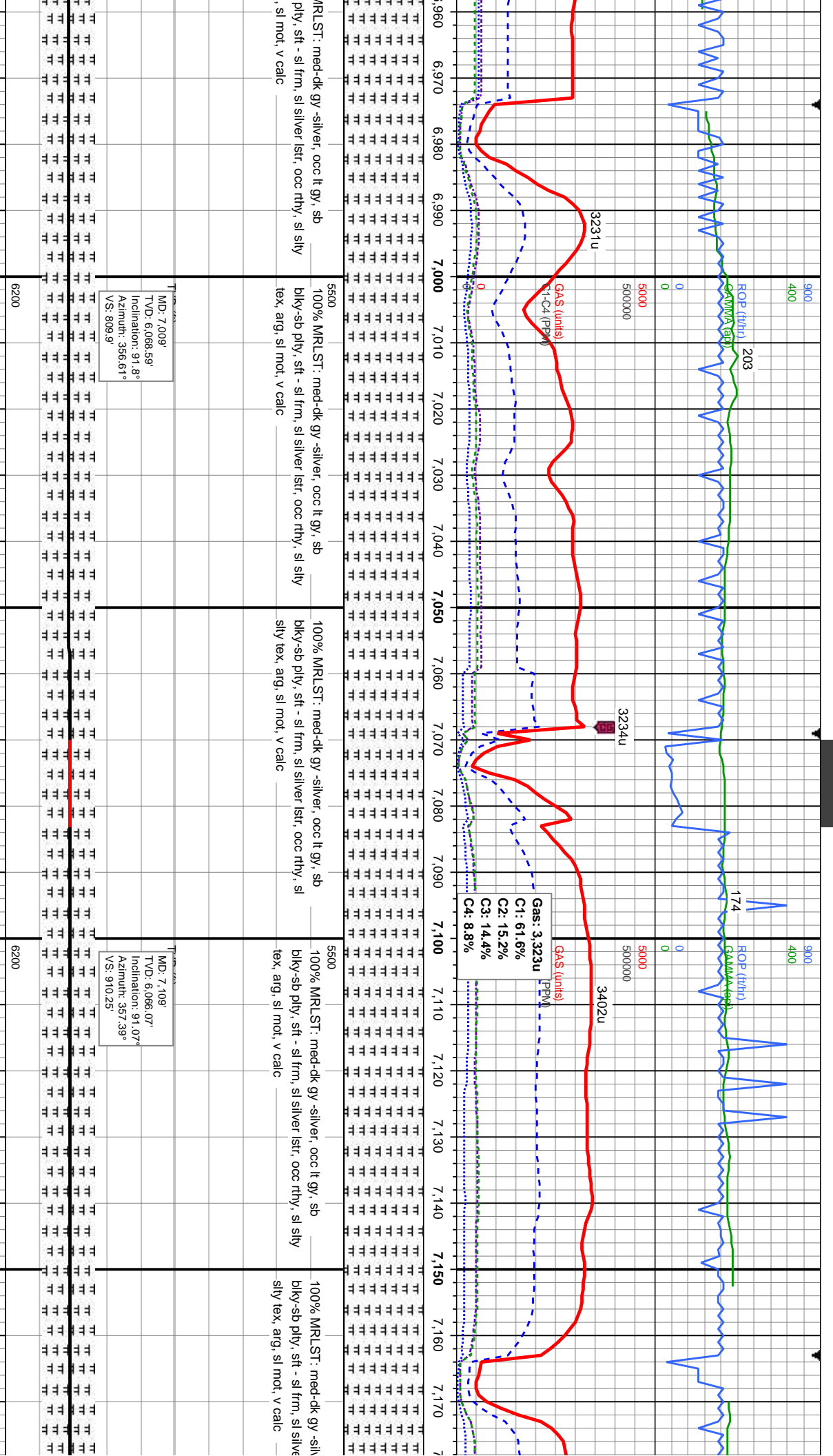
MD: 6.543'
TVD: 6.065.64'
Inclination: 86.06°
Azimuth: 358.01°
VS: 344.13'

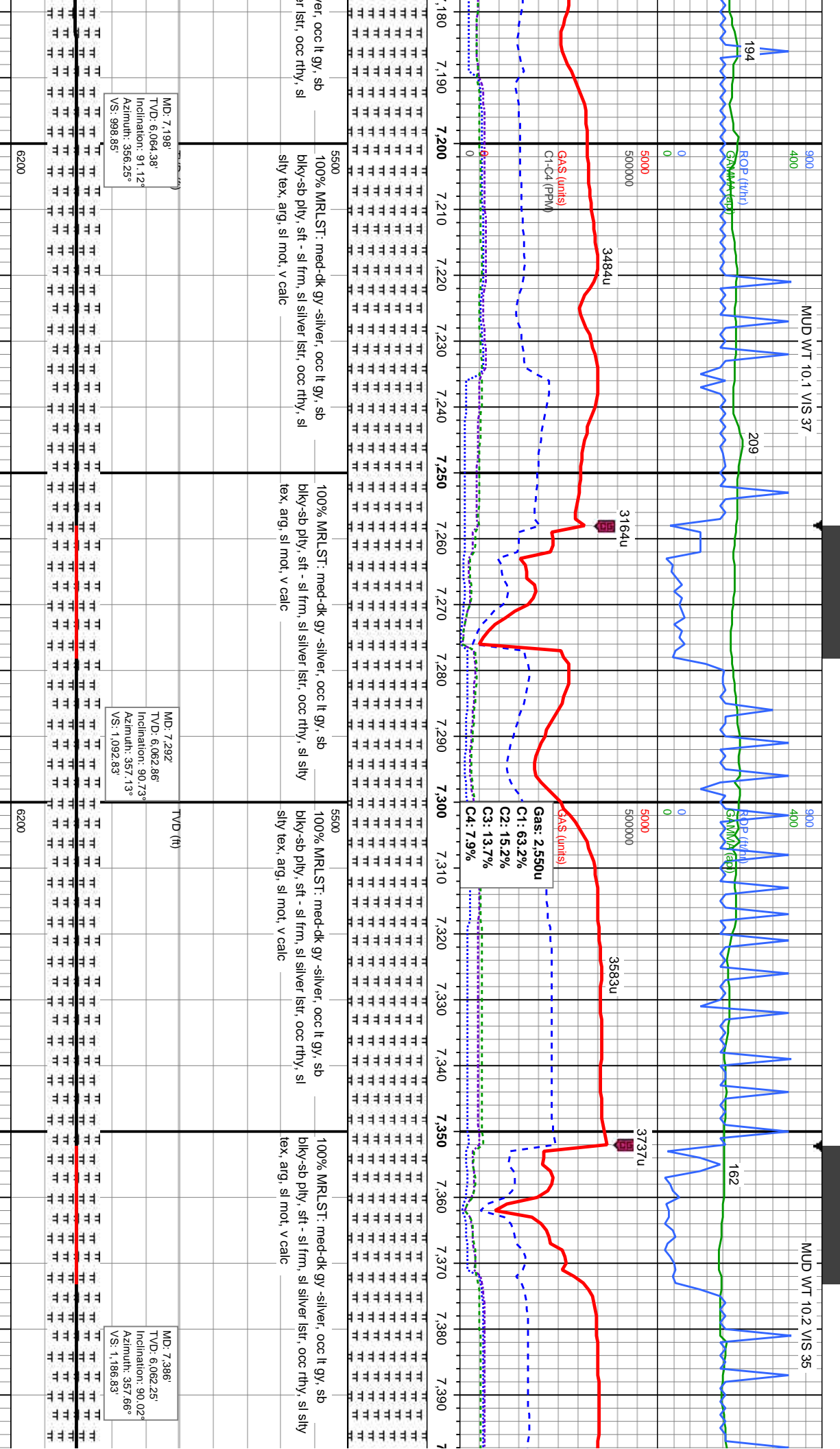
MD: 6.637'
TVD: 6.070.84'
Inclination: 87.6°
Azimuth: 357.31°
VS: 437.98'

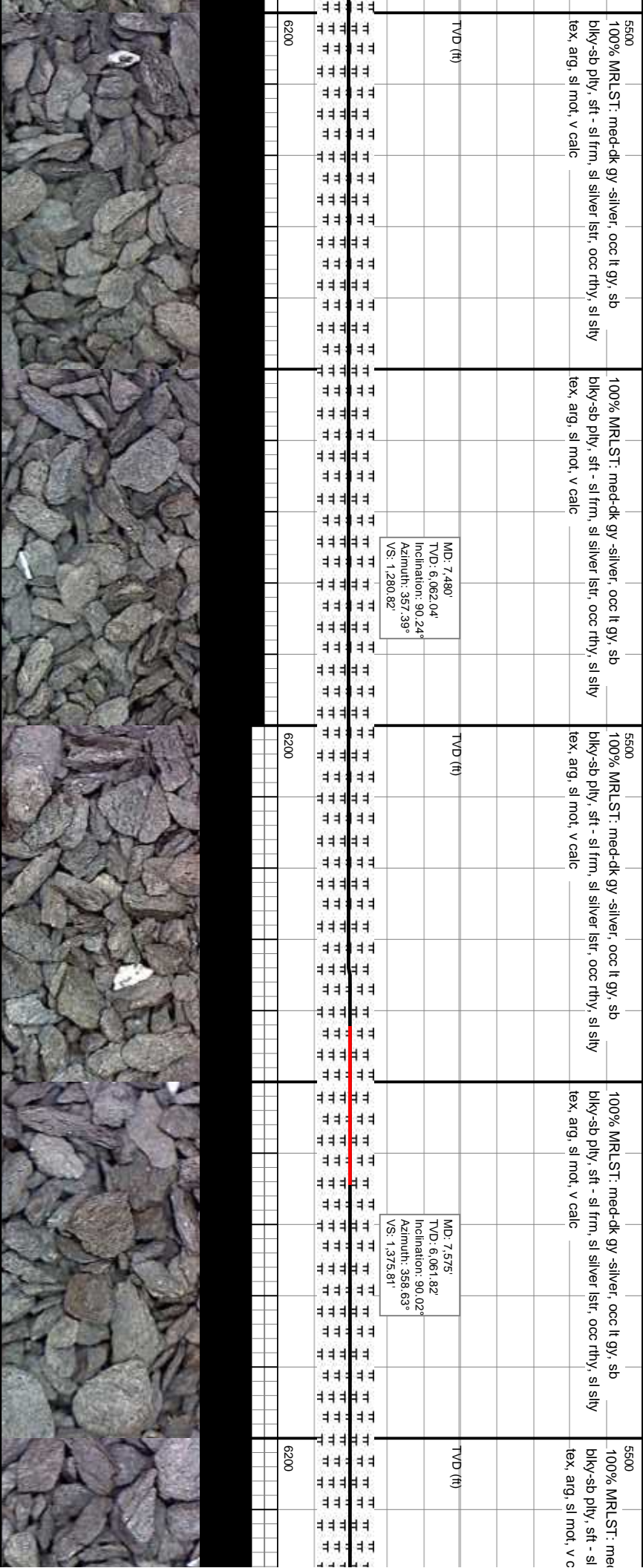
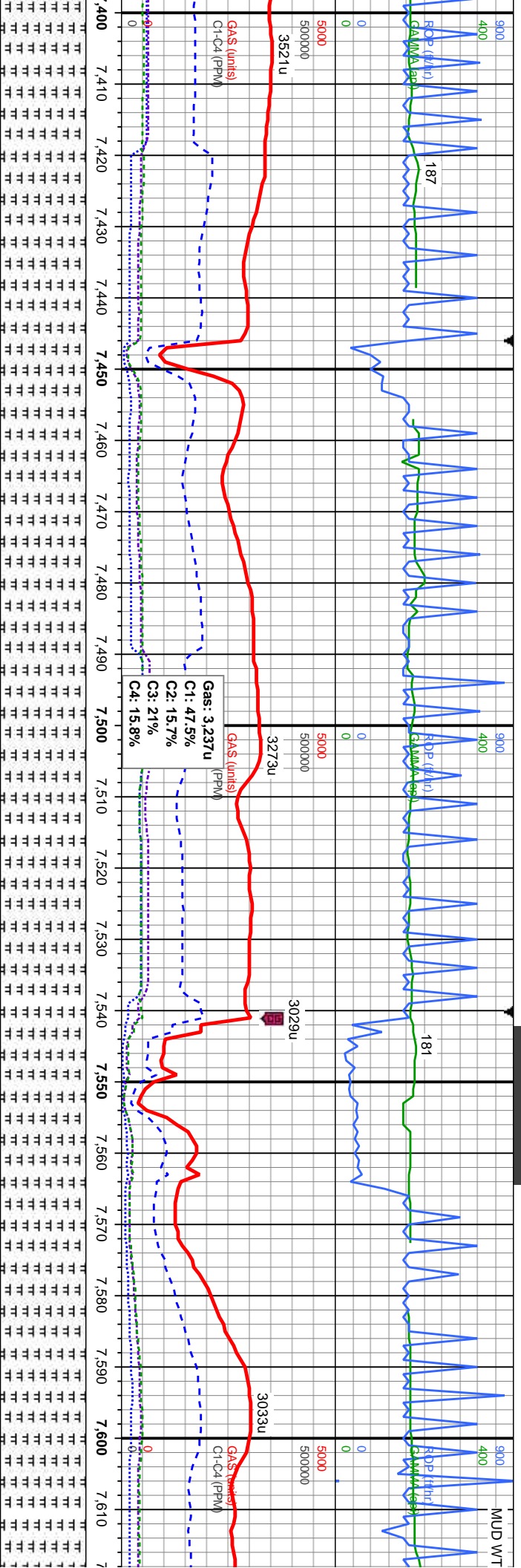
MD: 6.729'
TVD: 6.072.04'
Inclination: 90.91°
Azimuth: 357.29°
VS: 629.96'

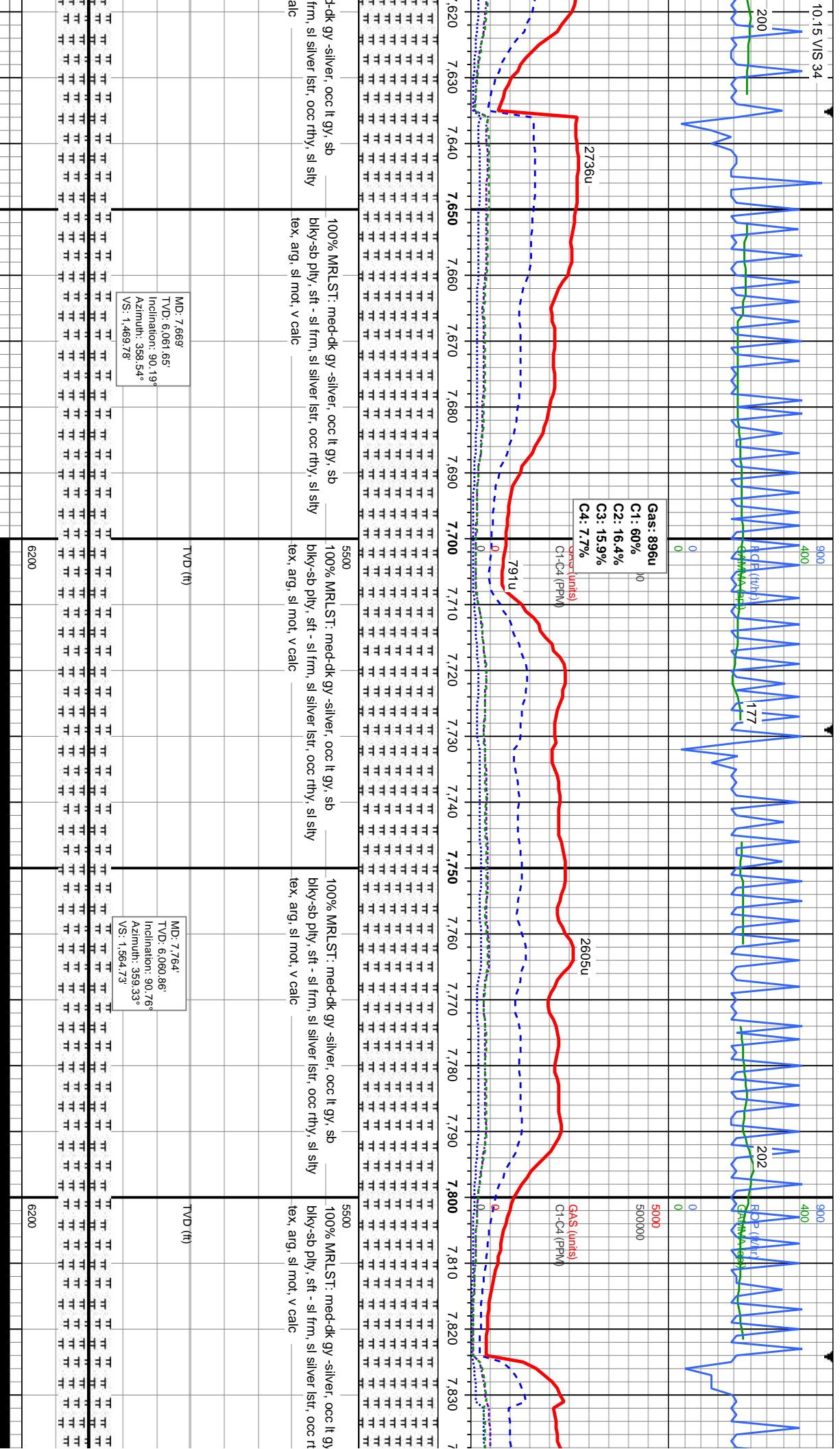
dk-gy -silver, occ lt gy, sb
frm, sl silver lstr, occ rthy, sl silty
alc, tr inoc frags
100% MRLST: med-dk gy -silver, occ lt gy, sb
bly-sb ply, sft - sl frm, sl silver lstr, occ rthy, sl silty
tex, arg, sl mot, v calc, tr inoc frags
100% MRLST: med-dk gy -silver, occ lt gy, sb
bly-sb ply, sft - sl frm, sl silver lstr, occ rthy, sl silty
tex, arg, sl mot, v calc, tr inoc frags
100% MRLST: med-dk gy -silver, occ lt gy, sb
bly-sb ply, sft - sl frm, sl silver lstr, occ rthy, sl silty
tex, arg, sl mot, v calc, tr inoc frags
100% MRLST: med-dk gy -silver, occ lt gy, sb
bly-sb ply, sft - sl frm, sl silver lstr, occ rthy, sl silty
tex, arg, sl mot, v calc, tr inoc frags

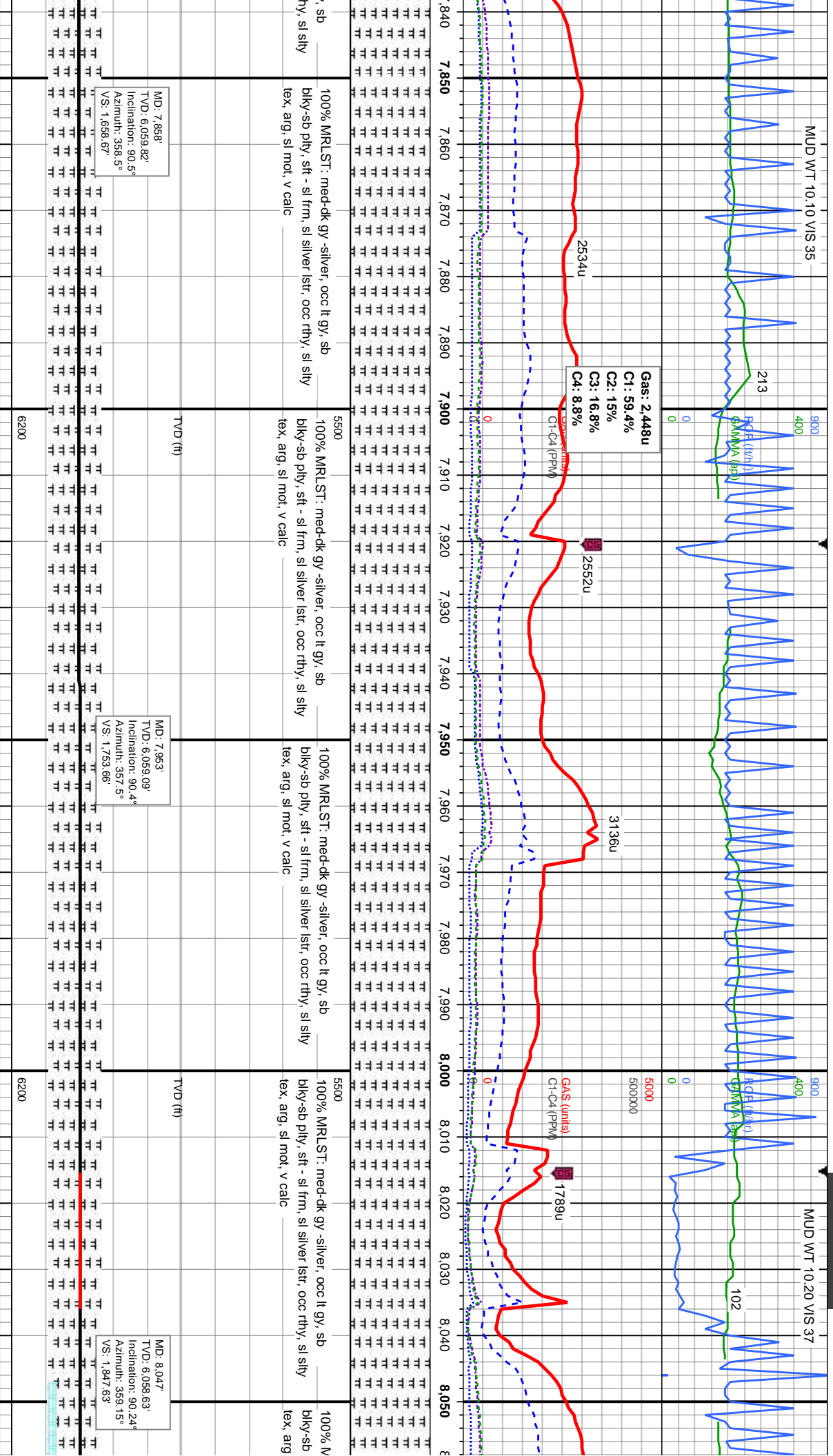
Gas: 3.065u
C1: 64.1%
C2: 16.7%
C3: 14%
C4: 5.2%

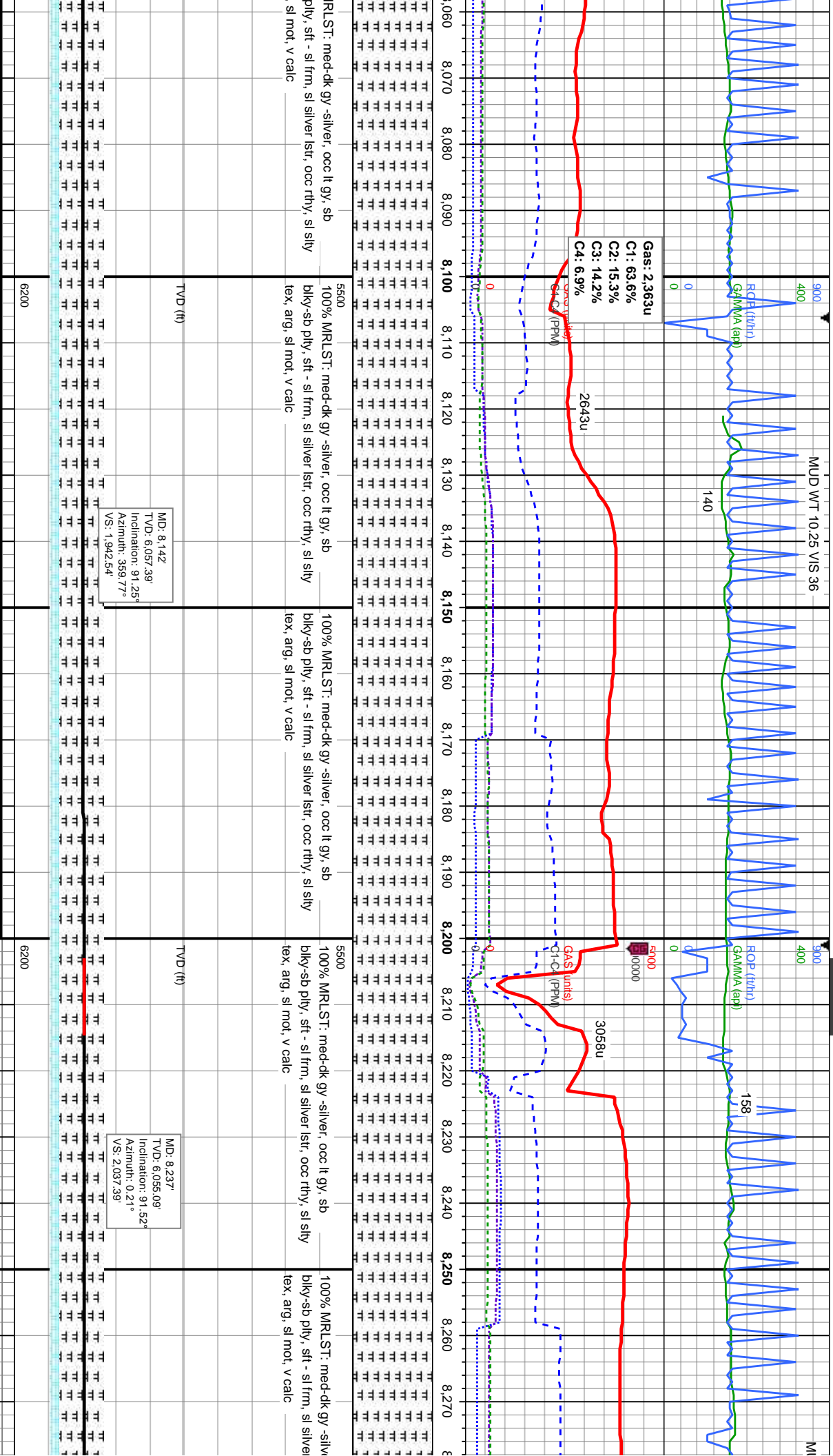


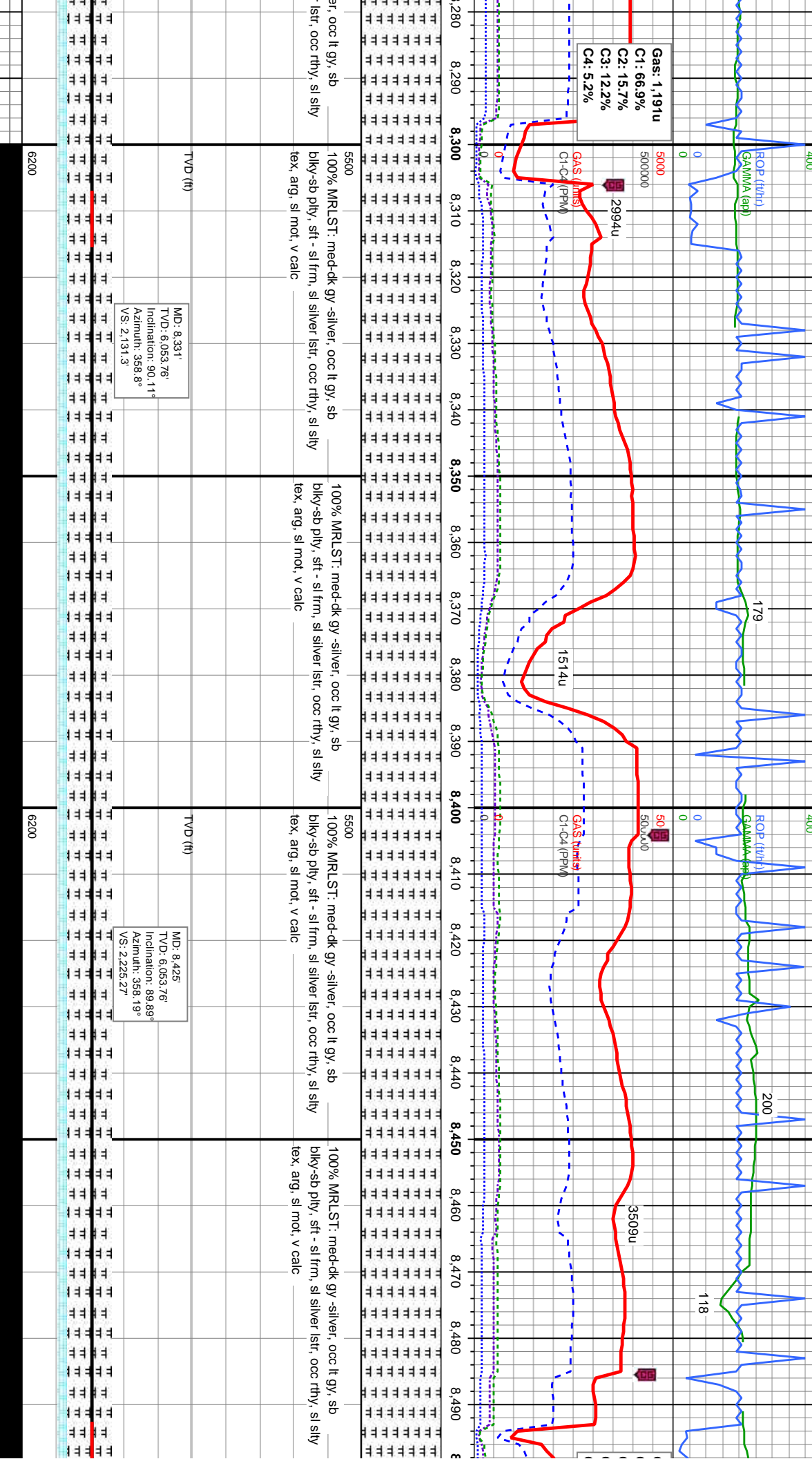


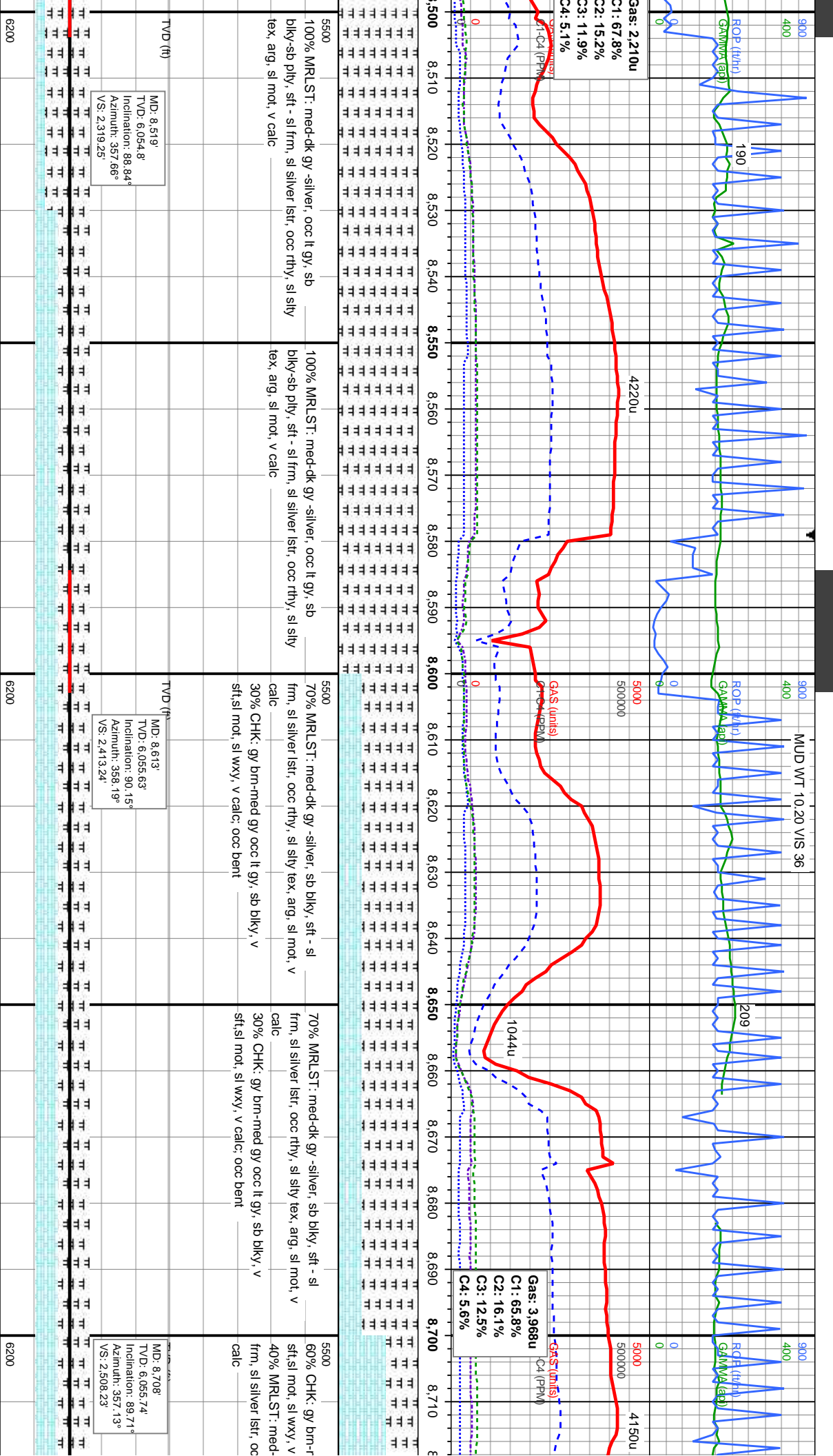


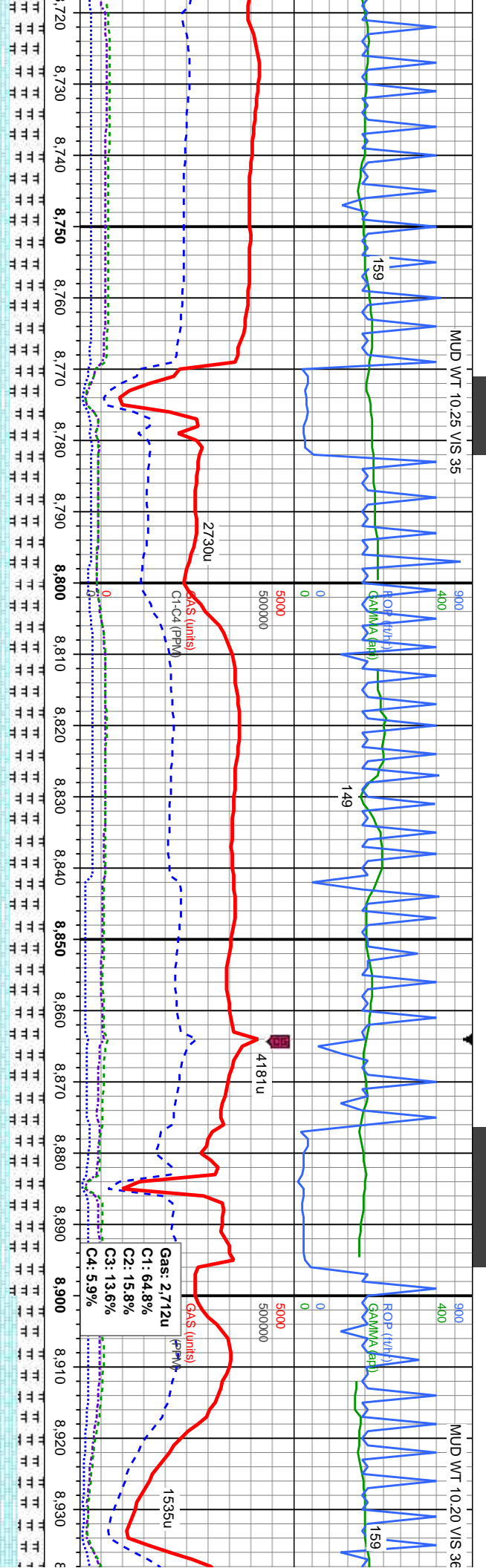












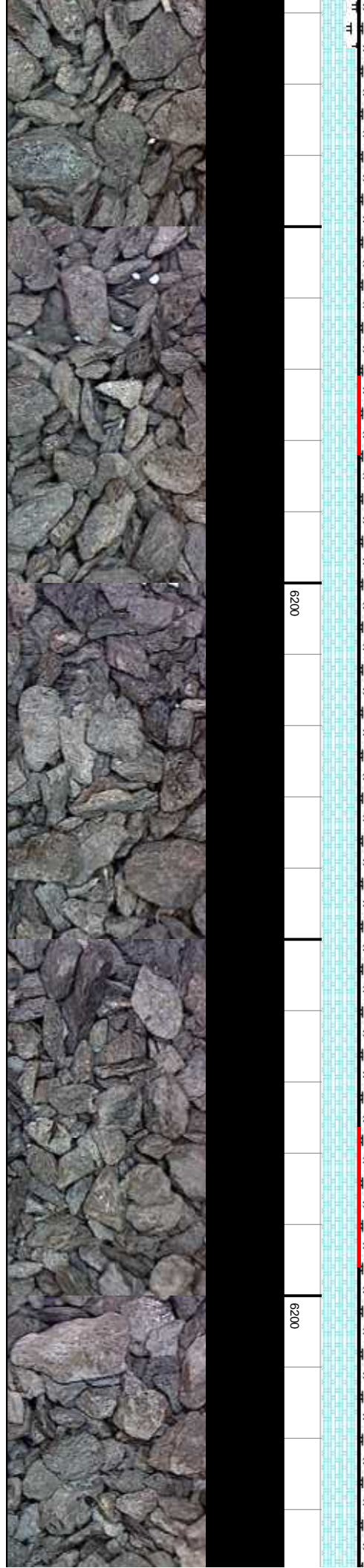
60% CHK: gy brn-med gy occ lt gy, sb blk, v
sft, sl mot, sl wxy, v calc
40% MRLST: med-dk gy -silver, sb blk, sft - sl
frm, sl silver lst, occ rthy, sl sily tex, arg, sl mot, v
calc

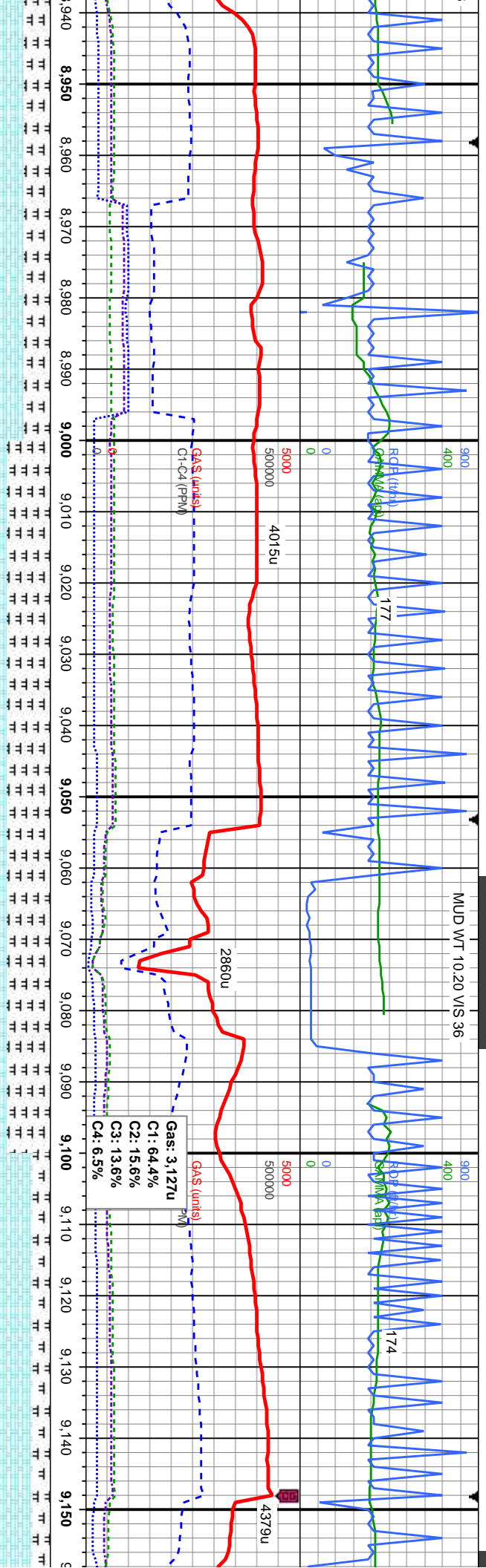
60% CHK: gy brn-med gy occ lt gy, sb blk, v
sft, sl mot, sl wxy, v calc
40% MRLST: med-dk gy -silver, sb blk, sft - sl
frm, sl silver lst, occ rthy, sl sily tex, arg, sl mot, v
calc

70% CHK: gy brn-med gy occ lt gy, sb blk
sft, sl mot, sl wxy, v calc
30% MRLST: med-dk gy -silver, sb blk, s
frm, sl silver lst, occ rthy, sl sily tex, arg, s
calc

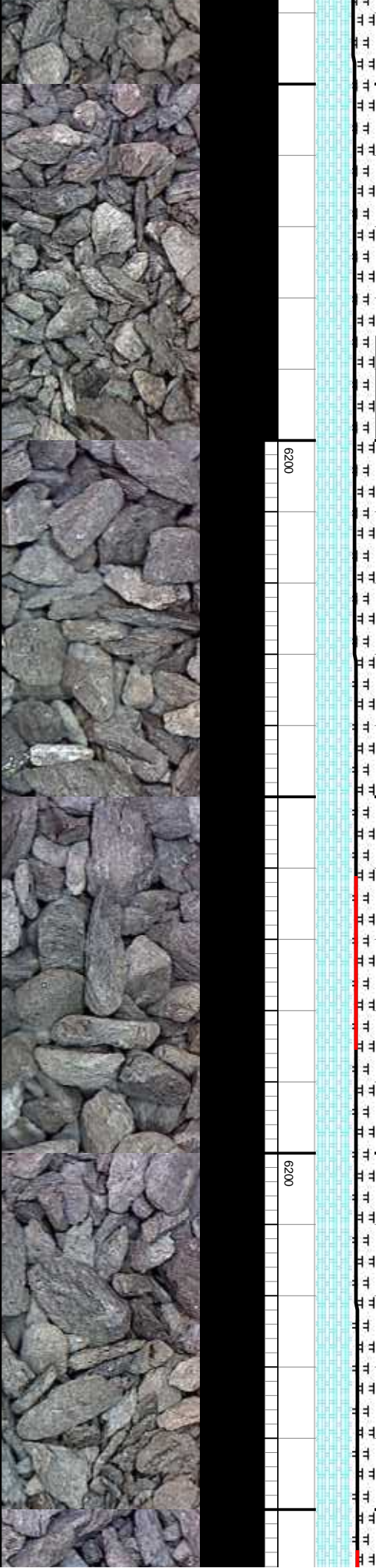
MD: 8.803
TVD: 6.056
Inclination: 89.98°
Azimuth: 357.31°
VS: 2.603.23

MD: 8.897
TVD: 6.055.2
Inclination: 90.99°
Azimuth: 358.28°
VS: 2.697.22

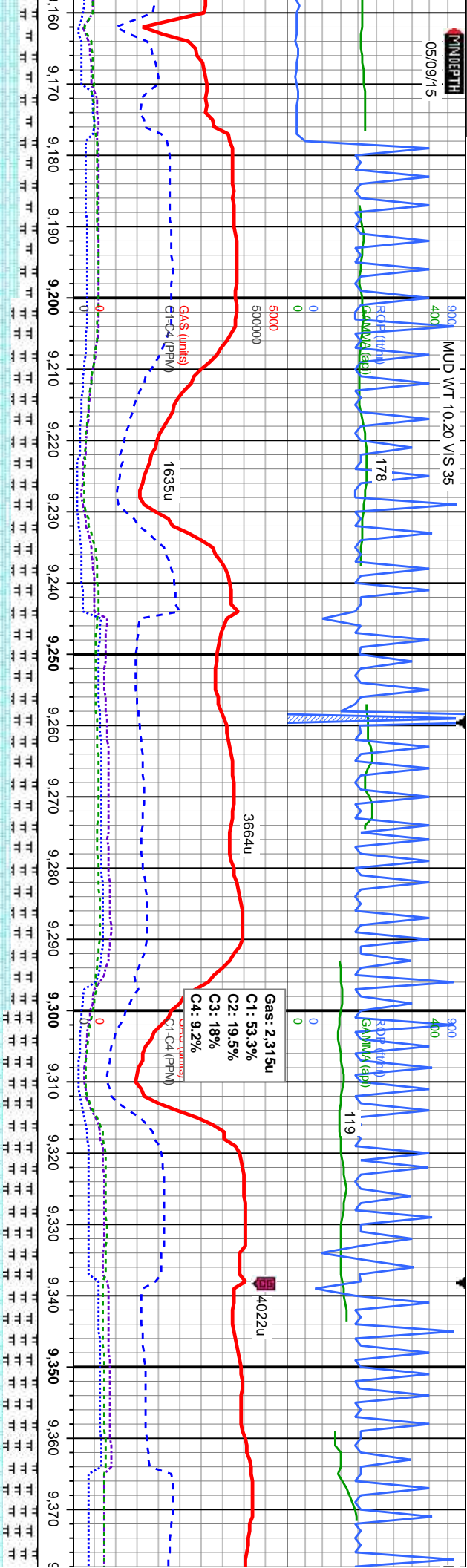




70% CHK: gy brn-med gy occ lt gy, sb blkly, v sft,sl mot, sl wxy, v calc 30% MRLST: med-dk gy -silver, sb blkly, sft - sl frm, sl silver lstr, occ rthy, sl sily tex, arg, sl mot, v calc	50% CHK: gy brn-med gy occ lt gy, sb blkly, v sft,sl mot, sl wxy, v calc 50% MRLST: med-dk gy -silver, sb blkly, sft - sl frm, sl silver lstr, occ rthy, sl sily tex, arg, sl mot, v calc	50% CHK: gy brn-med gy occ lt gy, sb blkly, v sft,sl mot, sl wxy, v calc 50% MRLST: med-dk gy -silver, sb blkly, sft - sl frm, sl silver lstr, occ rthy, sl sily tex, arg, sl mot, v calc	80% CHK: gy brn-med gy occ lt gy, sb blkly, v sft,sl mot, sl wxy, v calc 20% MRLST: med-dk gy -silver, sb blkly, sft - sl frm, sl silver lstr, occ rthy, sl sily tex, arg, sl mot, v calc
MD: 8.992' TVD: 6,052.35' Inclination: 91.74° Azimuth: 357.66° VS: 2.792.17'	MD: 9.086' TVD: 6,049' Inclination: 92.35° Azimuth: 359.68° VS: 2.886.07'		



MUD WT 10.20 VIS 35



Depth (ft)	Log Description
9160 - 9170	gy brn-med gy occ lt gy, sb blkly, v
9170 - 9180	st, sl wxy, v calc
9180 - 9190	RLST: med-dk gy -silver, sb blkly, sft - sl
9190 - 9200	silver lstr, occ rthy, sl silty tex, arg, sl mod, v
9200 - 9210	70% CHK: gy brn-med gy occ lt gy, sb blkly, v
9210 - 9220	sft, sl mot, sl wxy, v calc
9220 - 9230	30% MRLST: med-dk gy -silver, sb blkly, sft - sl
9230 - 9240	frm, sl silver lstr, occ rthy, sl silty tex, arg, sl mod, v
9240 - 9250	70% CHK: gy brn-med gy occ lt gy, sb blkly, v
9250 - 9260	sft, sl mot, sl wxy, v calc
9260 - 9270	30% MRLST: med-dk gy -silver, sb blkly, sft - sl
9270 - 9280	frm, sl silver lstr, occ rthy, sl silty tex, arg, sl mod, v
9280 - 9290	70% CHK: gy brn-med gy occ lt gy, sb blkly, v
9290 - 9300	sft, sl mot, sl wxy, v calc
9300 - 9310	40% MRLST: med-dk gy -silver, sb blkly, sft - sl
9310 - 9320	frm, sl silver lstr, occ rthy, sl silty tex, arg, sl mod, v
9320 - 9330	60% CHK: gy brn-med gy occ lt gy, sb blkly, v
9330 - 9340	sft, sl mot, sl wxy, v calc
9340 - 9350	40% MRLST: med-dk gy -silver, sb blkly, sft - sl
9350 - 9360	frm, sl silver lstr, occ rthy, sl silty tex, arg, sl mod, v
9360 - 9370	60% CHK: gy brn-med gy occ lt gy, sb blkly, v
9370 - 9380	sft, sl mot, sl wxy, v calc
9380 - 9390	40% MRLST: med-dk gy -silver, sb blkly, sft - sl
9390 - 9400	frm, sl silver lstr, occ rthy, sl silty tex, arg, sl mod, v

MD: 9.181'
TVD: 6.046.96'
Inclination: 90.11°
Azimuth: 359.95°
VS: 2.980.94'

MD: 9.275'
TVD: 6.047.25'
Inclination: 89.54°
Azimuth: 359.16°
VS: 3.074.85'

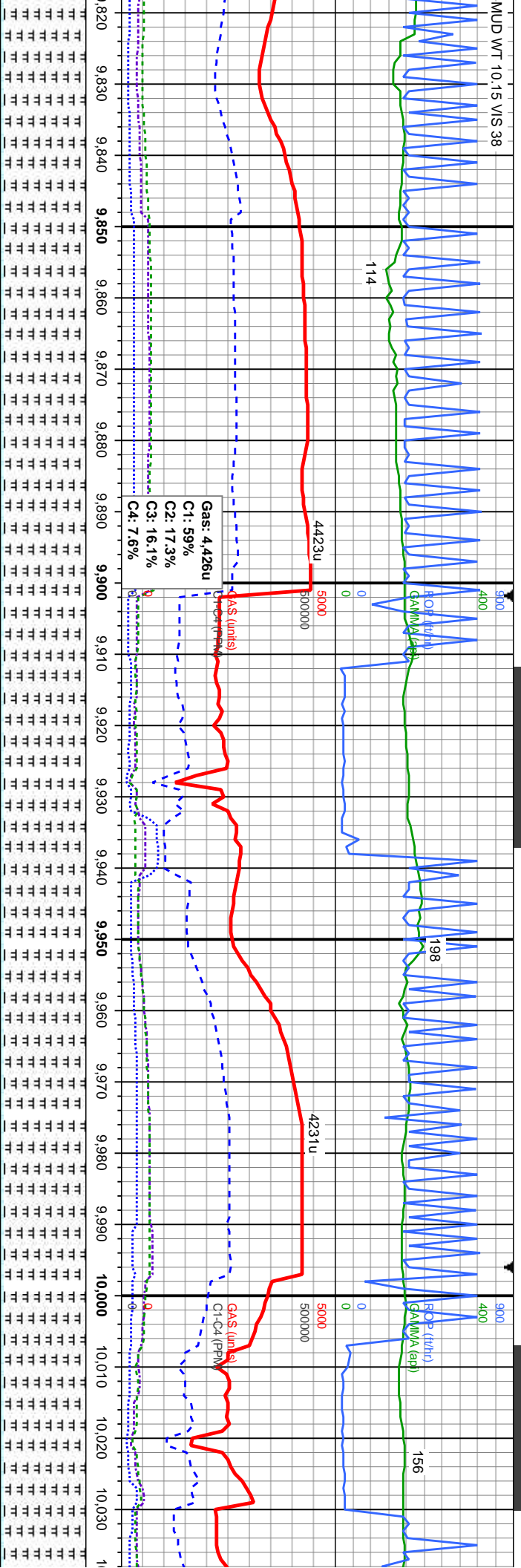
MD: 9.370'
TVD: 6.047.96'
Inclination: 90.31°
Azimuth: 359.38°
VS: 3.169.79'

6200

6200

6200





95% MRLST: med-dk gy -silver, sb blk, sft - sl frm,
sl silver lstr, occ rthy, sl silty tex, arg, sl mot, v calc
5% CHK: gy brn-med gy occ lt gy, sb blk, v sft,sl
mod, sl wxy, v calc, occ pyr

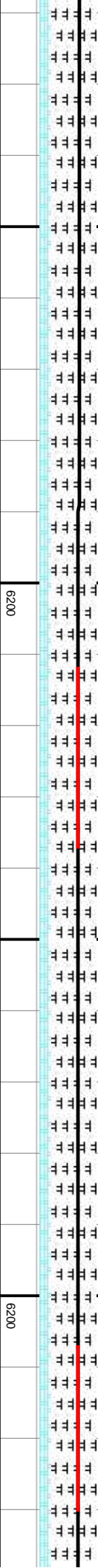
95% MRLST: med-dk gy -silver, sb blk, sft - sl frm,
sl silver lstr, occ rthy, sl silty tex, arg, sl mot, v calc
5% CHK: gy brn-med gy occ lt gy, sb blk, v sft,sl
mod, sl wxy, v calc, occ pyr

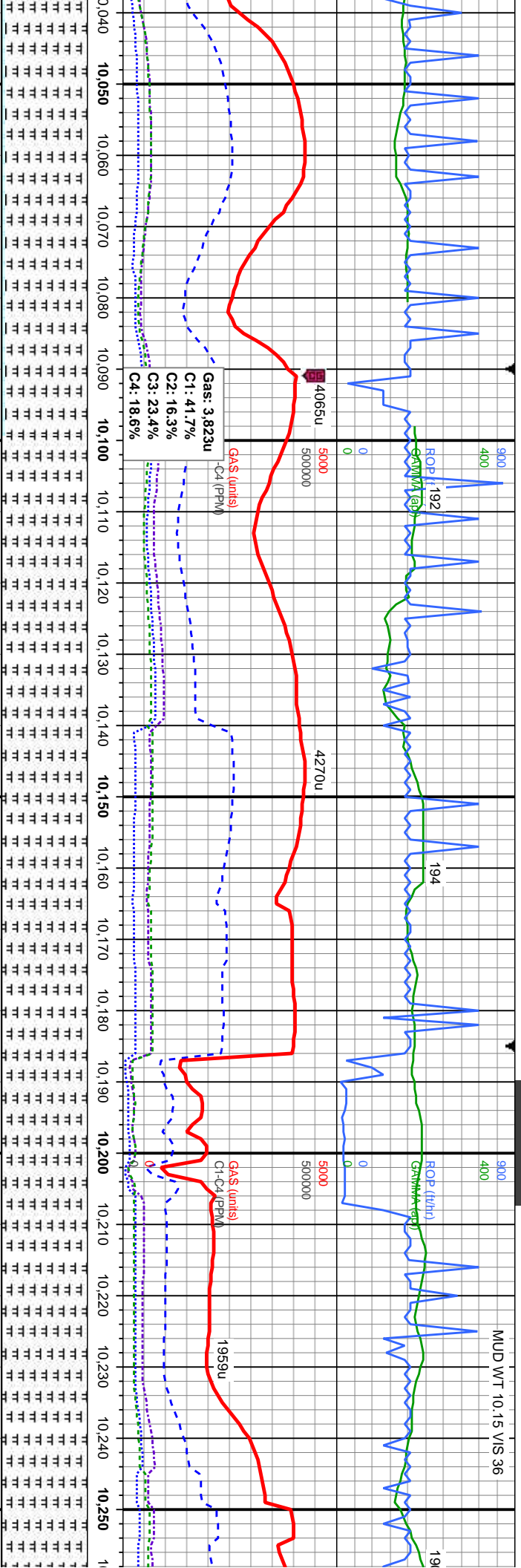
95% MRLST: med-dk gy -silver, sb blk, sft - sl frm,
sl silver lstr, occ rthy, sl silty tex, arg, sl mot, v calc
5% CHK: gy brn-med gy occ lt gy, sb blk, v sft,sl
mod, sl wxy, v calc, occ pyr

MD: 9,841'
TVD: 6,047.11'
Inclination: 88.57°
Azimuth: 358.36°
VS: 3,640.55'

MD: 9,836'
TVD: 6,049.33'
Inclination: 88.75°
Azimuth: 359.77°
VS: 3,735.47'

MD: 10,030'
TVD: 6,049.36'
Inclination: 91.21°
Azimuth: 359.85°
VS: 3,829.35'





sft - sl frm,
ot, v calc
v sft,sl

95% MKRST: med-dk gy -silver, sb blkly, sft - sl frm,
sl silver lst, occ rthy, sl sfty tex, arg, sl mot, v calc
5% CHK: gy brn-med gy occ lt gy, sb blkly, v sft,sl
mot, sl wxy, v calc

100% MRLST: med-dk gy -silver, occ lt gy, sb
blky-sb ply, sft - sl frm, sl silver lstr, occ rthy, sl silty
tex, arg, sl mot, v calc

100% MRLST: med-dk gy -silver, occ lt gy, sb		
blky-sb pty, sft - sl frm, sl silver lstr, occ rthy, sl slty		
tex, arg, sl mot, v calc		

100% MRLST: med-dk gy -silver, occ lt gy, sb blk-sb pity, sft - sl frm, sl silver lstr, occ rthy, sl slty tex, arg, sl mot, v calc		
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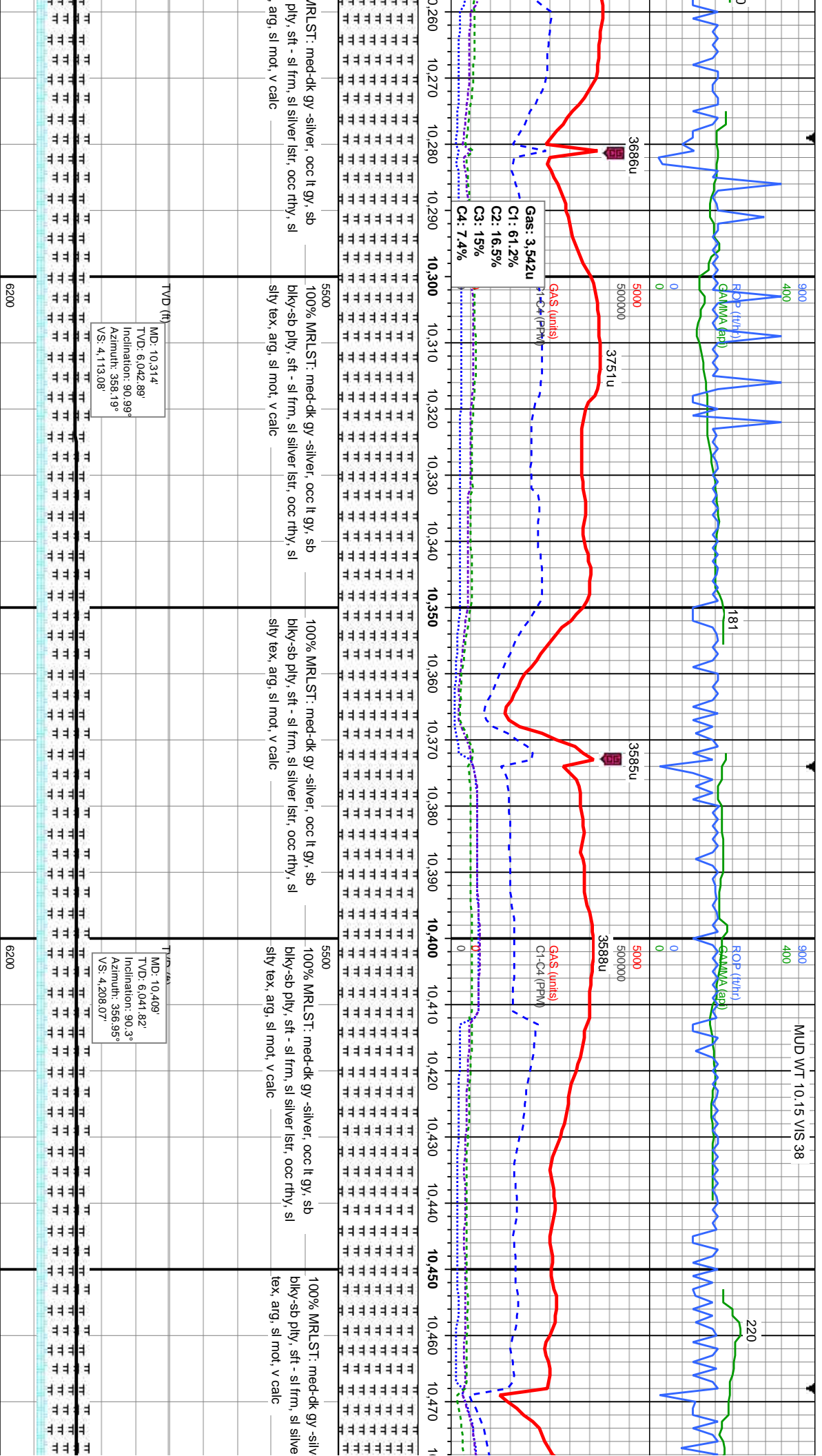
100% n
blky-sb
sity tex

TVD (ft)

MD: 10,125'
TVD: 6,046.7'
Inclination: 92°
Azimuth: 359.24°
VS: 3,924.23'

TV_D (ft)

MD: 10,220'
TVD: 6,044.37'
Inclination: 90.81
Azimuth: 359.24°
VS: 4,019.13'



THANK YOU FOR USING
COLUMBINE LOGGING INC.

