

COLUMBINE LOGGING

Scale: 5" / 100'
Measured Depth Log

Well Name Wildhorse 5-64-15-16-1BHZ

Location Sec. 15 T5S R64W

State COLORADO

County ARAPAHOE

Country USA

Rig Number TRUE 33

API Number 05-005-07267

Field WILDCAT

Geographic Region DJ BASIN

Drilling Completed 9/6/2017

Spud Date 8/11/2017

Surface Coordinates 330 FNL, 600 FEL

Sec. 15 T5S R64W

Lat: 39.615025

Long: -104.530988

Bottom Hole Coordinates 2543.25 N, 9944.52 W

Sec. 15 T5S R64W

Ground Elevation 5936'

K.B. Elevation 5963'

Logged Interval 5000' To 18483'

Total Depth 18483'

Formation B MARL, C Chalk

Type of Drilling Fluid OBM

Operator

Company Highlands Natural Resources

Address 2401 East 2nd Avenue
Suite No. 150
Denver, Colorado 80206



Geologist

Name Whit Childs

Company Highlands Natural Resources

Address 2401 East 2nd Avenue
Suite No. 150
Denver, Colorado 80206



Other

Columbine Logging Inc.

Dennis C. Vertrees
Ken Roberts

602 S. Lipan St
Denver, CO 80223

Gas Detection: Bloodhound Unit #314

Columbine Computer: #53A

DD: Michael Gurnsey, Nate Krehmeyer

LWD: Vu Ngo, Remote Ops

Color Coding

Oil

Note

Error

Condensate

Core

Water

Gas

Pressure

Seal

Rock Types

UNKNOWN

ANHYDRITE

BENTONITE

BRECCIA

CHALK

CEMENT

CHEERT

CLAY CHOKE SAND

CLAYSTONE

COAL

CONGLOMERATE

DOLOMITE

DOLOMITIC LIMESTONE

GRANITE

GYPSUM

IGNEOUS

SIDERITE or LIMONITE

LIMESTONE

MARLSTONE

METAMORPHIC

NO SAMPLE

SALT

SANDSTONE

SALT-PEPPER SAND

SHALE

SHALE COLORED

SHALE GRAY

SHALY SANDSTONE

SHALY SILTSTONE

SILT SHALE

SILTSTONE

TILL

TUFF

WELDED TUFF

Fossils

ALGAE

AMPHIB

BELEM

BIOCLA

BRACH

BRYOZU

CERPA

CORAL

CRINOI

ECHINO

FISH

FORAM

FOSSIL

Oil Sh

DEAD

EVEN

QUEST

SPOTT

Poros

EARTH

FENEST

FRACTU

INTERC

INTERO














































MOLDIC

ORGANI

Accessories

Mineral	Crystal System	Crystal Habit	Color	Streak	Diaphaneity	Hardness	Specific Gravity	Other Properties
GASTROPOD	ARGILLITE GRAIN	HEAVY MINERAL						
INOCERAMUS	B BENTONITE	K KAOLIN						
OOLITE	BITUMENOUS SUBSTANCE	M MARCASTITE						
OSTRACOD	BRECCIA FRAGMENTS	T MARLSTONE						
PELECYPOD	1 CALCAREOUS	1 MICACEOUS						
PELLET	CARBONACEOUS FLAKES	MINERAL CRYSTALS						
PISOLITE	CHITINOUS	N NODULES						
PLANT REMAINS	CHITL	PHOSPHATE PELLETS						
PLANT SPORES	COAL - THIN BEDS	P PYRITE						
SCAPHOPOD	1 DOLOMITIC	B SALT CAST						
STROMATOPOROID	+ FELDSPAR	S SANDY						
	FERRUGINOUS PELLET	S SIDERITE						
	FERRUGINOUS	S SILICEOUS						
	GLAUCONITE	S SILTY						
	ARGILLACEOUS	T TURFCEOUS						

Other Symbols

	P PINPOINT		WIRELINE TESTED - LEFT		E EARTHLY
	V VUGGY		WIRELINE TESTED - RT		F FINELYXUN
Engineering					
	O ONABLE		GAS SHOW		MN DEPTH
	B BIT		OIL SHOW		MN DEPTH
	UP CONNECTION (UP)		MN DEPTH UP		A ANGULAR
	D DOWN CONNECTION (DOWN)		MN DEPTH (DOWN)		R ROUNDED
	C CONNECTION GAS		NORMAL FAULT		S SUBANG
	CONNECTION GAS (LEFT)		OVERTURNED STRATA		S SUBUND
	T TRIP GAS		REVERSE FAULT	Textures	
	T TRIP GAS (LEFT)		CASING		SIDEWALL CORE (LEFT)
	L DOWN TIME GAS		SIDEWALL CORE (RIGHT)		B BOUNDSTONE
	C CORE - RECOVERED		SLIDE		C CHALKY
	S SURVEY		C CRYPTOXLN		L LITHOGRAPHIC
	M MICROXLN		M MUDSTONE		W WACKESTONE
	S SORTING		M MODERATE		P POOR
	W WELL				

Columbine Logging Inc. Rigged Up 2 man logging 8/30/2017 Bloodhound Unit #0314, began logging from 5000' MD at 11:12, MDST on 8/31/2017.

ROP imported via Pason

Survey Data Provided by Baker Hughes

Gamma Data Provided by Baker Hughes

Hughes from memory on LWD Tool

Gas Data From Bloodhound Unit #0314, data imported via Pason and Iball

Bit Data
Bit #: 2
Type: HCC-AT506S
Size: 8.5
Depth In: 2,185'
Depth Out: 11,319'
Hours: 52 hrs
Jets: 3X15, 3X16
S/N: 7046734

Depth Labels

% Lith

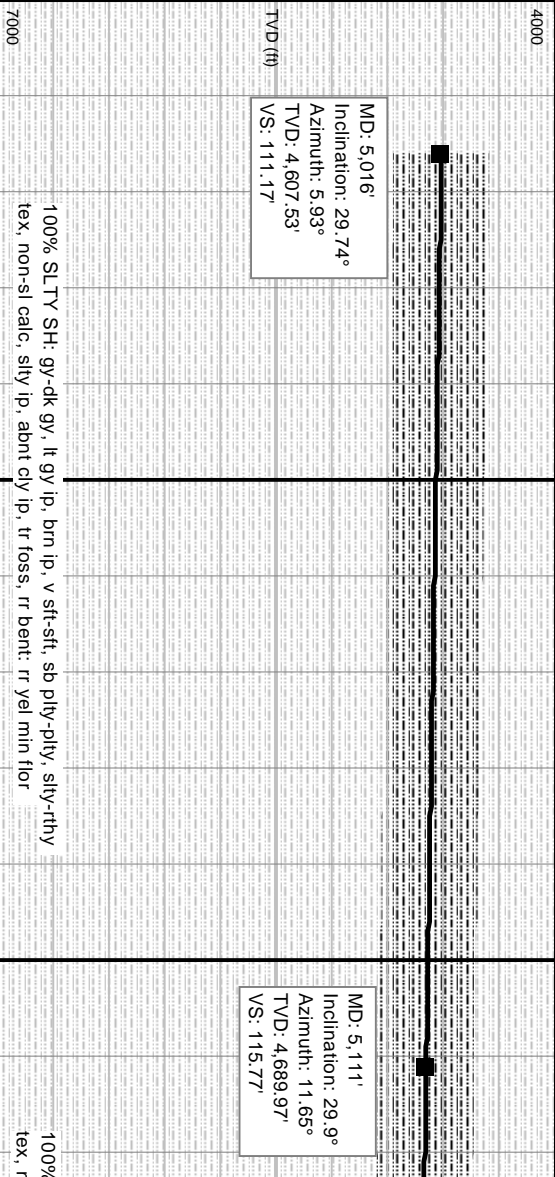
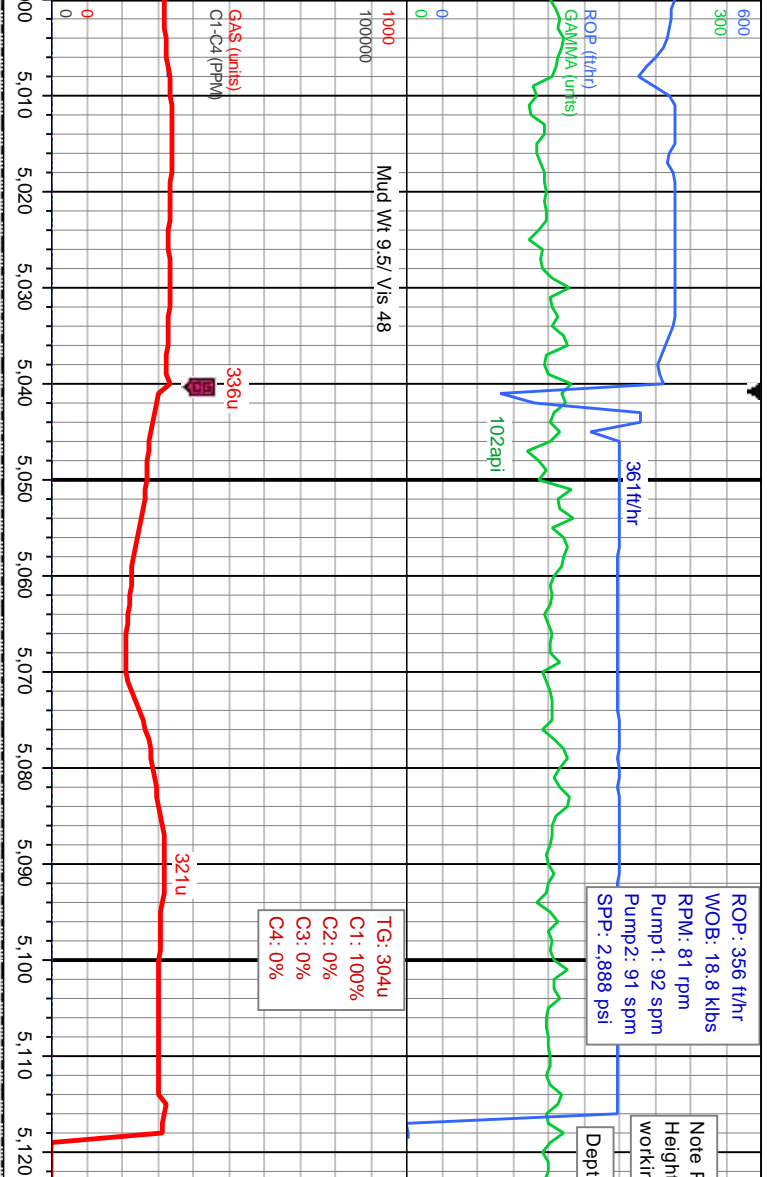
Well Bore
TVD

Images

ROP: 356 ft/hr
WOB: 18.8 klbs
RPM: 81 rpm
Pump 1: 92 spm
Pump2: 91 spm
SPP: 2,888 psi

Note P
Height
workin

Depth



ason Block
not
g properly

n Correction

309f/hr

112api

Mud Wt 9.6/ Vis 47

ROP (f/hr)

GAMMA (units)

Depth Correction

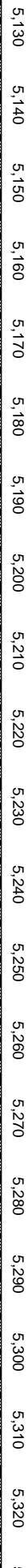
305f/hr

116api

ROP: 305 f/hr
WOB: 46.3 klbs
RPM: 80 rpm
Pump1: 93 spm
Pump2: 94 spm
SPP: 2.898 psi

Depth Correction

TG: 347u
C1: 100%
C2: 0%
C3: 0%
C4: 0%



4000

MD: 5.206'
Inclination: 30.28°
Azimuth: 12.03°
TVD: 4.772.16'
VS: 117.88'

MD: 5.301'
Inclination: 30.29°
Azimuth: 5.57°
TVD: 4.854.22'
VS: 122.55'

SLTY SH: gy-dk gy, lt gy ip, brn ip, v sft-sft, sb plty-plty, silty-rthy
on-si calc, silty ip, abnt cly ip, tr foss, rr bent: rr yel min flr

7000

100% SLTY SH: gy-dk gy, lt gy ip, brn ip, v sft-sft, sb plty-plty, silty-rthy
tex, non-si calc, silty ip, abnt cly ip, tr foss, rr bent: rr yel min flr

100% SLTY SH
tex, non-si calc

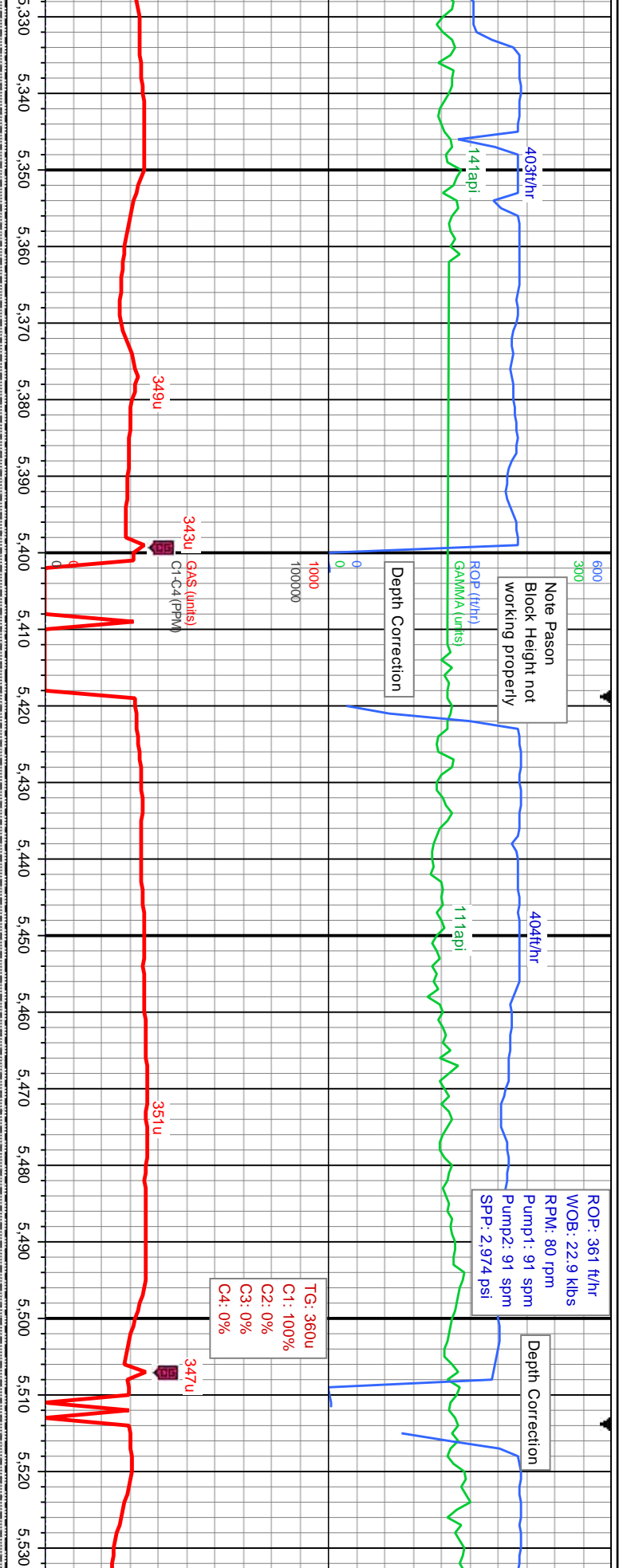
3 mm

3 mm

3 mm

3 mm

3 mm



Note Pason
Block Height not
working properly

ROP: 361 ft/hr
WOB: 22.9 kbs
RPM: 80 rpm
Pump1: 91 spm
Pump2: 91 spm
SPP: 2,974 psi

Depth Correction

TG: 360u
C1: 100%
C2: 0%
C3: 0%
C4: 0%

MD: 5,396'
Inclination: 30.29°
Azimuth: 2.02°
TVD: 4,936.26'
VS: 131.35'

TVD (ft)

MD: 5,491'
Inclination: 30.19°
Azimuth: 359.72°
TVD: 5,018.33'
VS: 142.53'

100% SLTY SH: gy-dk gy, lt gy ip, brn ip, v sft-sft, sb ply-ply, slty-rthy
tex, non-sl calc, slty ip, abnt cly ip, tr foss, rr bent: rr yel min flr

100% SLTY SH: g
tex, non-sl calc, s

3 ft

3 ft

3 ft

3 ft

Note Pason
Block Height not
working properly

Depth Correction

404ft/hr

ROP (ft/hr)

GAMMA (units)

118api

Depth Correction

ROP: 397 ft/hr
WOB: 27 klbs
RPM: 81 rpm
Pump1: 92 spm
Pump2: 91 spm
SPP: 2,952 psi

TG: 327u
C1: 100%
C2: 0%
C3: 0%
C4: 0%

GA\$ (units)
C1-C4 (PPM)

256u

265u

331u

Mud Wt 9.6/ Vis 46

349u

MD: 5.585'
Inclination: 30.23°
Azimuth: 0.13°
TVD: 5.099.57'
VS: 154.35'

MD: 5.680'
Inclination: 30.21°
Azimuth: 0.25°
TVD: 5.181.66'
VS: 166.08'

TVD (ft)

gy-dk gy, lt gy ip, brn ip, v sft-sft, sb plty-plty, silty-rthy
lty ip, abnt cly ip, tr foss, rr bent, rr yel min flr

100% SLTY SH: gy-dk gy, lt gy ip, brn ip, v sft-sft, sb plty-plty, silty-rthy
tex, non-si calc, silty ip, abnt cly ip, tr foss, rr bent, rr yel min flr

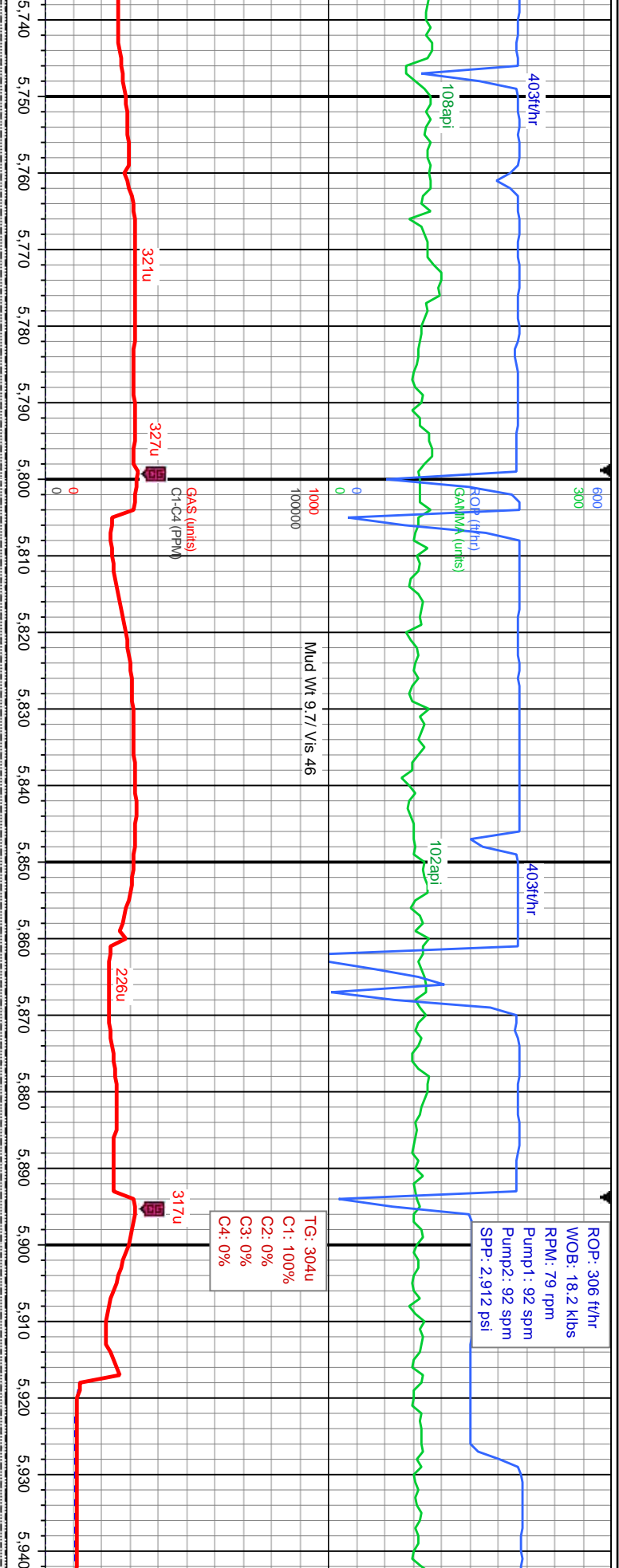
100% SLTY S
plty-plty, silty
sdy ip, tr foss

3 ft

3 ft

3 ft

3 ft



MD: 5,775'
Inclination: 30°
Azimuth: 357.51°
TVD: 5,263.85'
VS: 178.81'

MD: 5,870'
Inclination: 29.39°
Azimuth: 358.5°
TVD: 5,346.37'
VS: 192.09'

TG: 304u
C1: 100%
C2: 0%
C3: 0%
C4: 0%

SH: gy-dk gy, lt gy ip, brn ip, v sft-sft, sb
rthy tex, non-si calc, silty ip, abnt cly ip, occ
s, rr glau, rr bent: rr yel min flr

100% SLTY SH: gy-dk gy, lt gy ip, brn ip, v sft-sft, sb
plty-plty, silty-rthy tex, non-si calc, silty ip, abnt cly ip, occ
sdy ip, tr foss, rr glau, rr bent: rr yel min flr

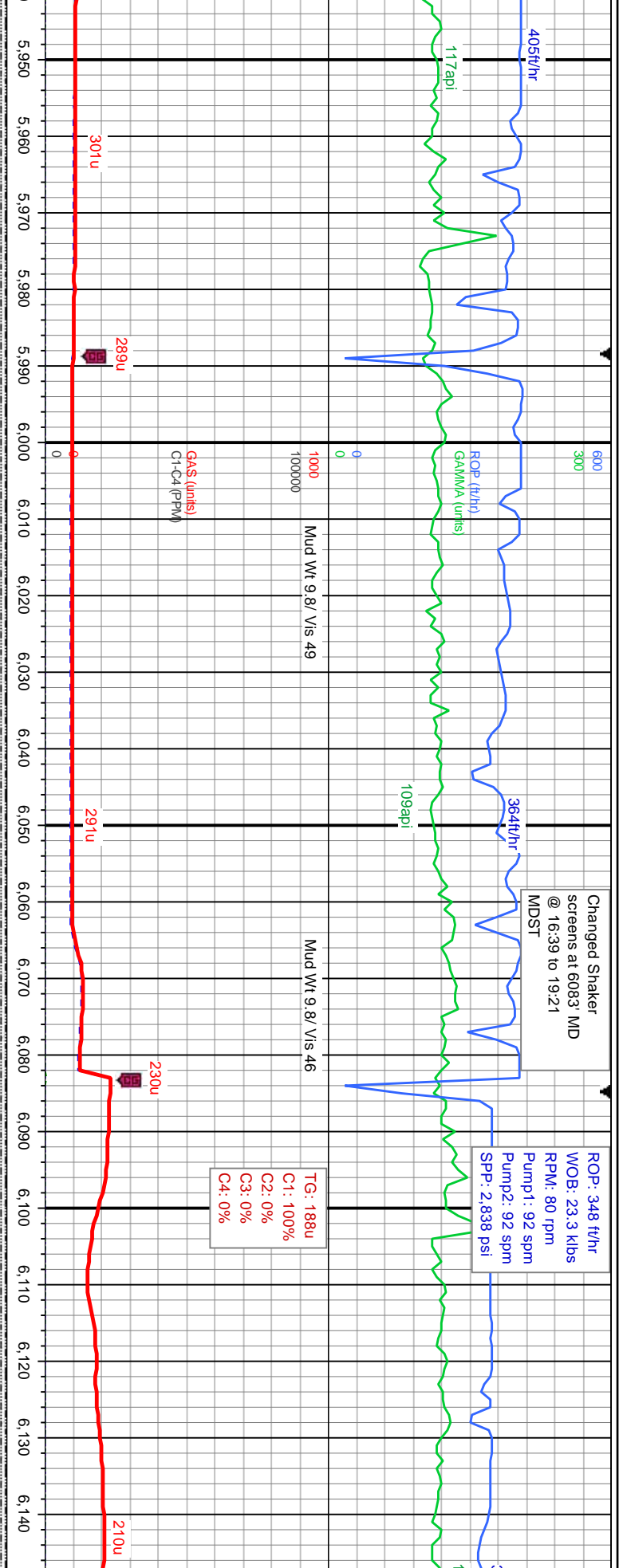
100% SLTY SH: gy-dk
plty-plty, silty-rthy tex,
sdy ip, tr foss, rr glau,

2 ft

3 ft

1 ft

4 ft



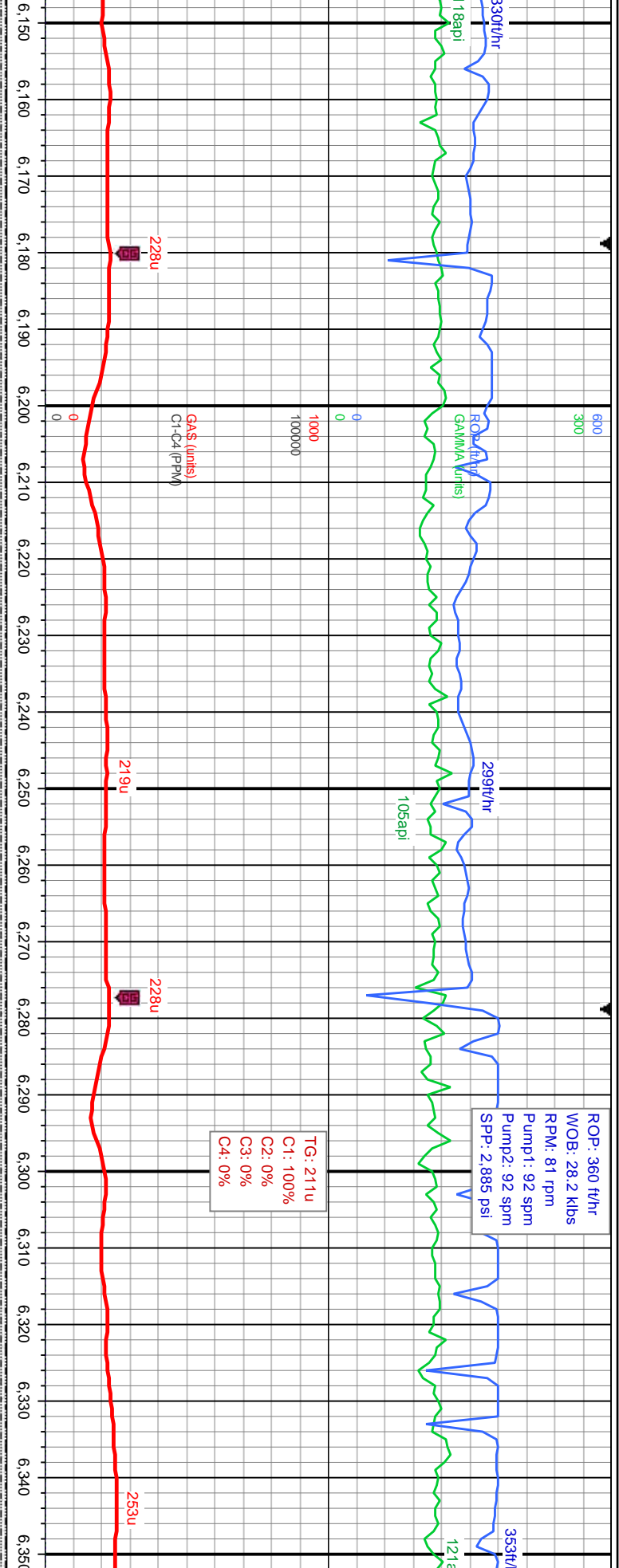
MD: 5,965'
Inclination: 29.63°
Azimuth: 3.18°
TVD: 5,429.06'
VS: 203.04'

gy, lt gy ip, brn ip, v sft-sft, sb
non-si calc, silty ip, abnt cly ip, occ
rr bent, rr yel min flr

100% SLTY SH: gy-dk gy, lt gy ip, brn ip, v sft-sft, sb
ply-pty, silty-rthy tex, non-si calc, silty ip, abnt cly ip, occ
sdy ip, tr foss, rr glau, rr bent: rr yel min flr

100% SLTY SH: gy-dk gy,
ply-pty, silty-rthy tex, non-
sdy ip, tr foss, rr glau, rr br

M
In
A
T
V



D: 6,154'
Inclination: 29.61°
Azimuth: 16.12°
D/D: 5.593, 41'
S: 211.21'

MD: 6,249'
Inclination: 27.61°
Azimuth: 15.83°
TVD: 5,676.81'
VS: 209.94'

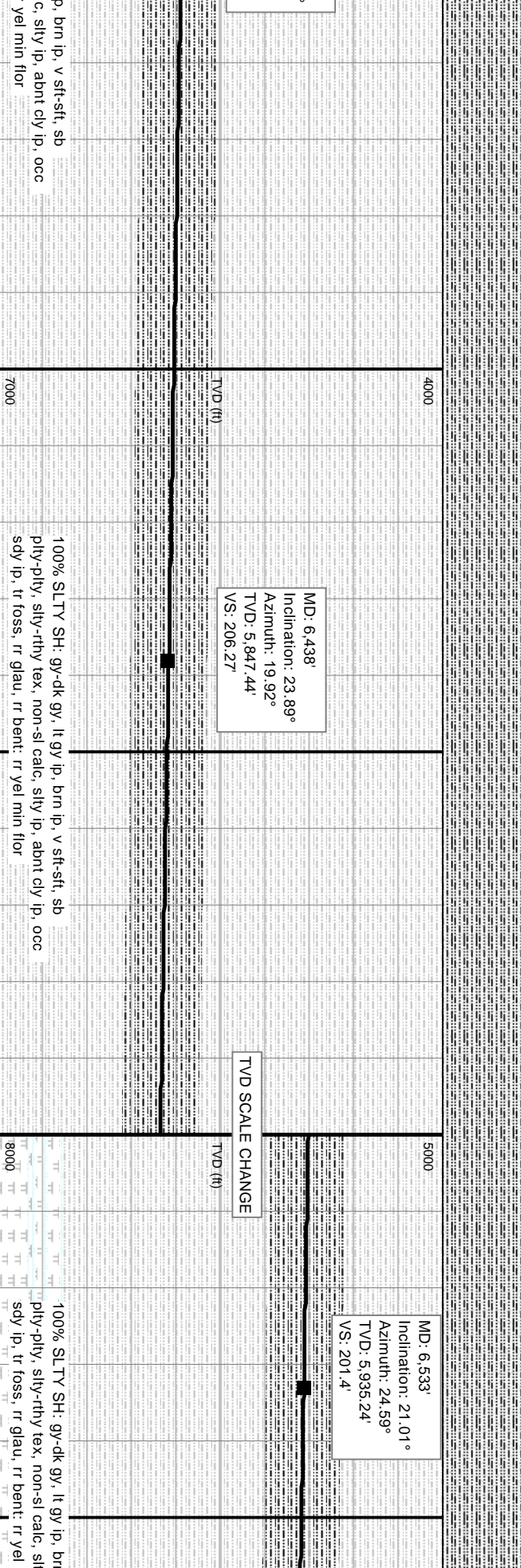
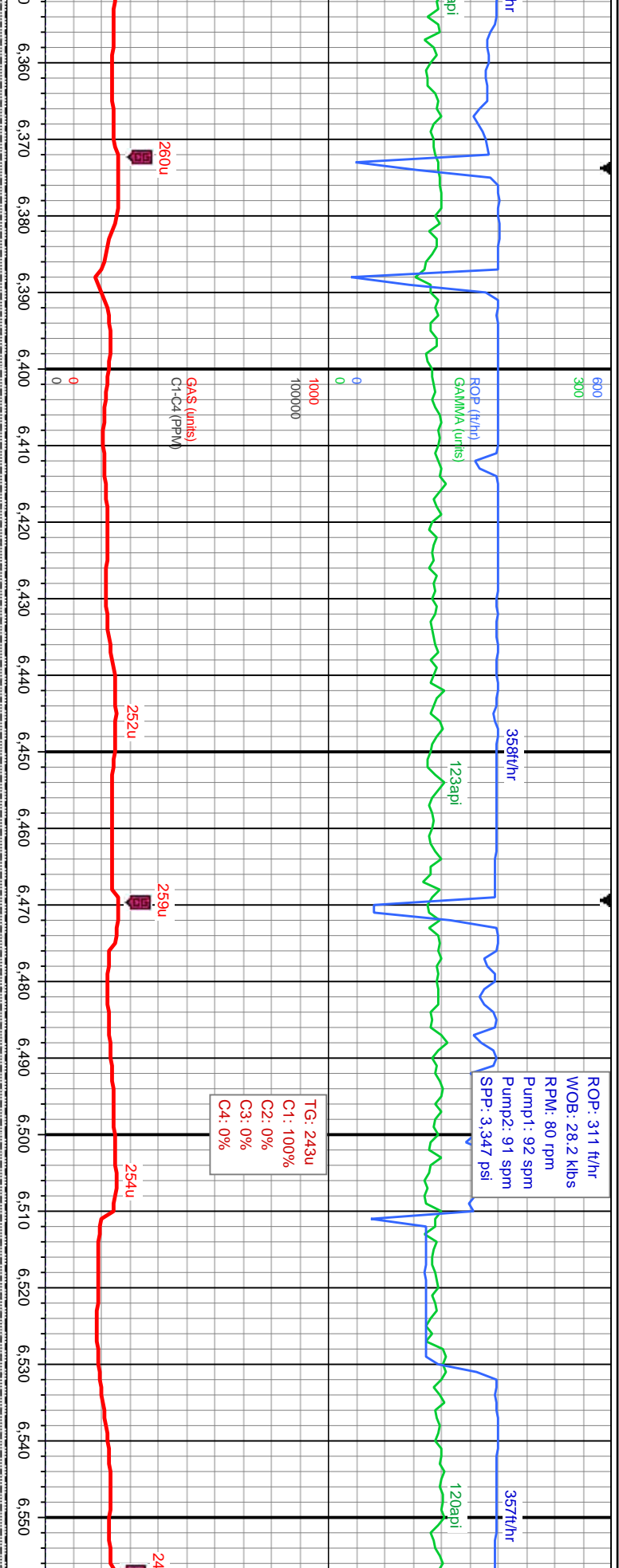
MD: 6,344'
Inclination: 25.14°
Azimuth: 16.22°
TVD: 5,761.91'
VS: 208.75'

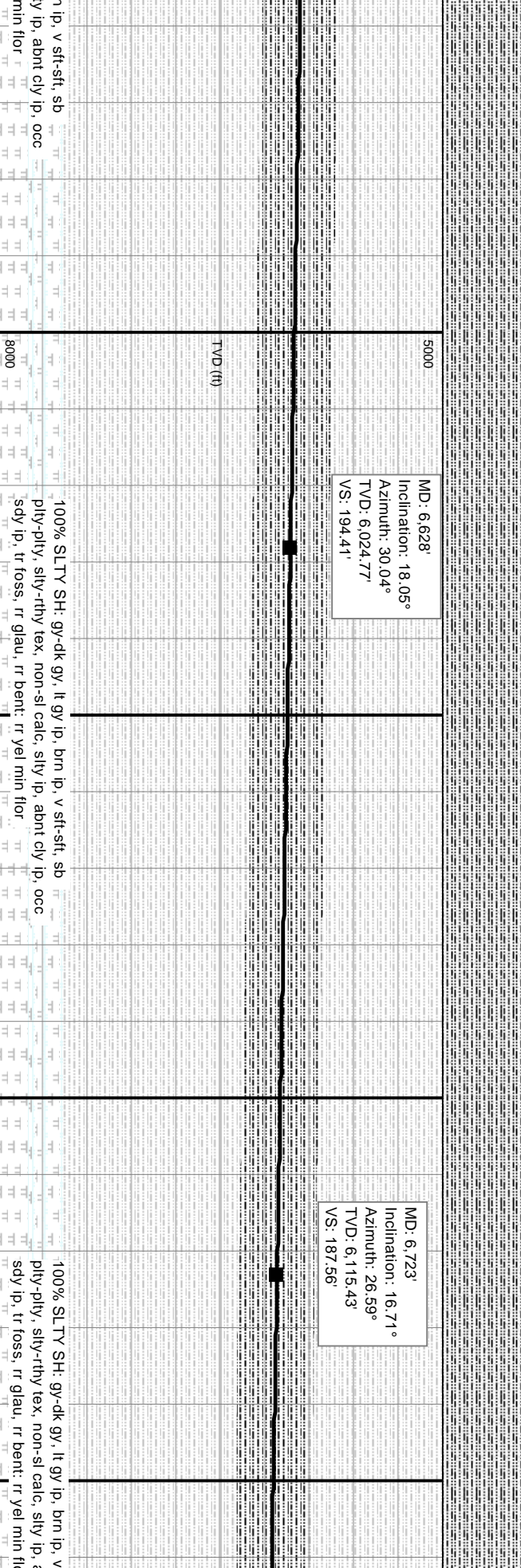
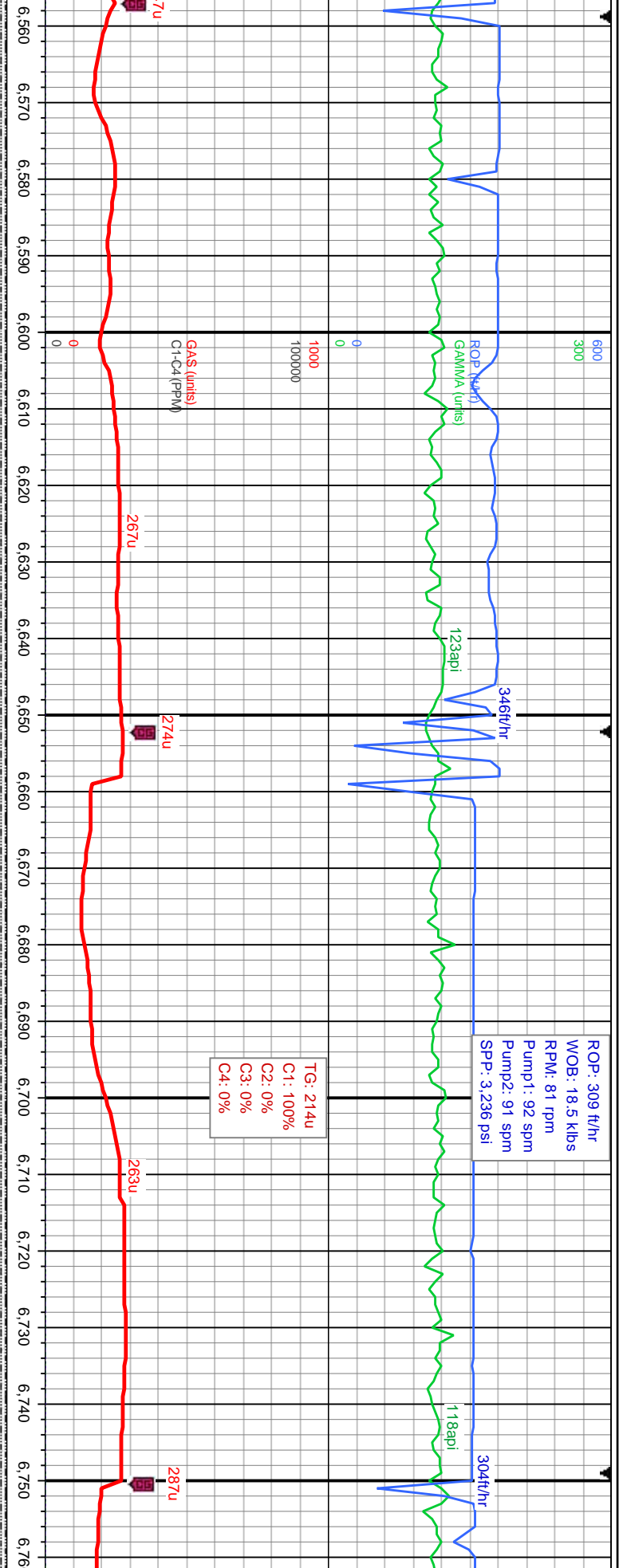
lt gy ip, brn ip, v sft-sft, sb
sl calc, silty ip, abnt cly ip, occ
ent: rr yel min flr

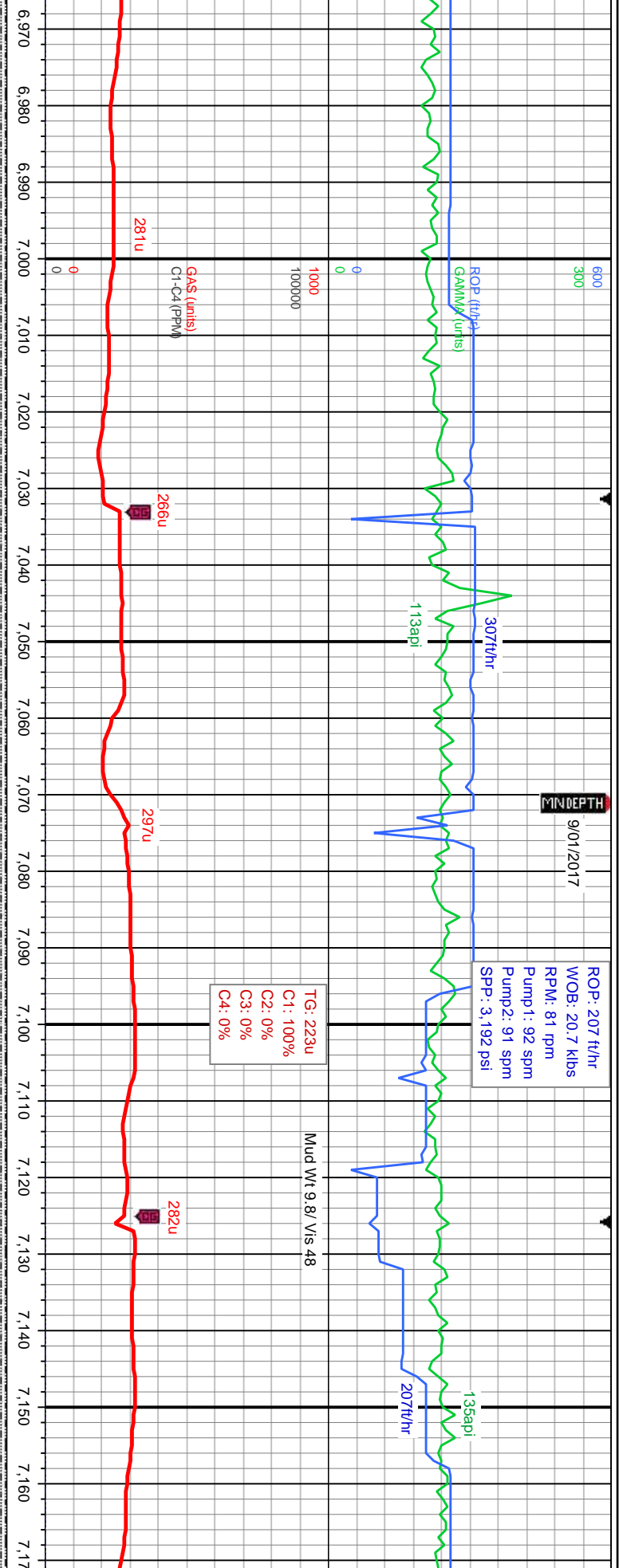
100% SLTY SH: gy-dk gy, lt gy ip, brn ip, v sft-sft, sb
ply-ply, silty-rthy tex, non-sl calc, silty ip, abnt cly ip, occ
sdy ip, tr foss, rr glau, rr bent: rr yel min flr

100% SLTY SH: gy-dk gy, lt gy ip
ply-ply, silty-rthy tex, non-sl cal
sdy ip, tr foss, rr glau, rr bent: rr



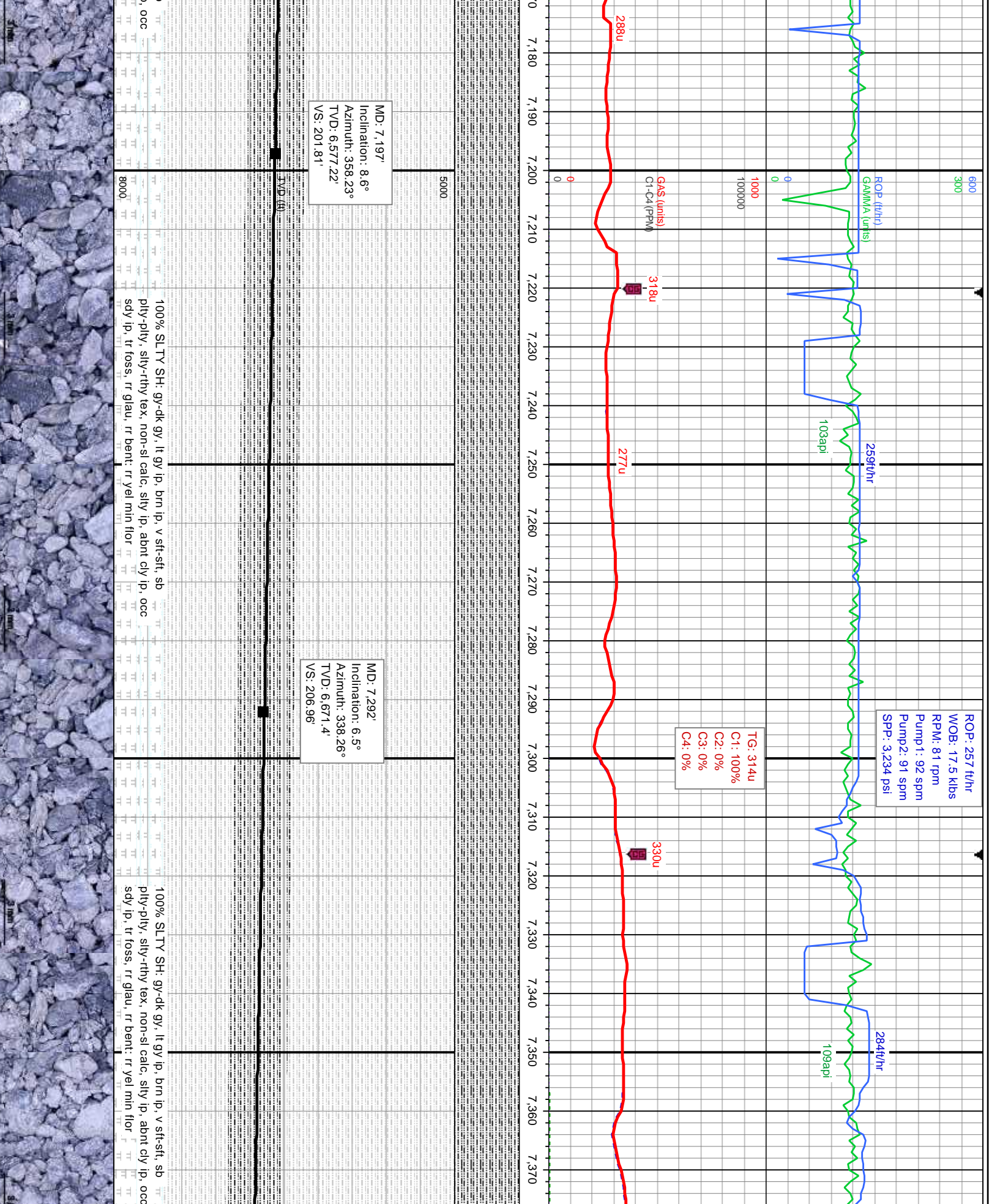






5000		MD: 7,007' Inclination: 12.26° Azimuth: 351.49° TVD: 6,390.41' VS: 195.36'		TVD: 40'		MD: 7,102' Inclination: 10.69° Azimuth: 12.62° TVD: 6,483.55' VS: 199.56'			
ft, sb	TT	TT	TT	TT	TT	TT	TT	TT	TT
clty ip, occ	TT	TT	TT	TT	TT	TT	TT	TT	TT
8000	TT	TT	TT	TT	TT	TT	TT	TT	TT
100% SLTY SH: gy-dk gy, lt gy ip, brn ip, v sft-sft, sb plty-plty, silty-rthy tex, non-si calc, silty ip, abnt cly ip, occ sdy ip, tr foss, rr glau, rr bent: rr yel min flor									
100% SLTY SH: gy-dk gy, lt gy ip, brn ip, v sft-sft, sb plty-plty, silty-rthy tex, non-si calc, silty ip, abnt cly ip, occ sdy ip, tr foss, rr glau, rr bent: rr yel min flor									





f KOP for
at 7790 MD

600
300
0

ROP (ft/hr)
GAMMA (ur/s)

257ft/hr
109api

ROP: 210 ft/hr
WOB: 9.7 klbs
RPM: 95 rpm
Pump1: 92 spm
Pump2: 91 spm
SPP: 3.076 psi

201api

156ft/hr

Stopped drilling t
clean out Possum
Belly's & Sand Tr
at 7979' MD @ 06
to 08:05 MDST

1000
100000

Gas (units)
C1-C4 (PPM)

670u

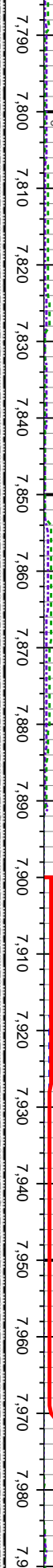
304u

Gas Scale Change
Gas (units)
C1-C4 (PPM)

TG: 303u
C1: 96.8%
C2: 1.9%
C3: 0.9%
C4: 0.4%

1,879u

498u



7000

TVD Scale Change

TVD (ft)

MD: 7,861'
Inclination: 8.09°
Azimuth: 287.82°
TVD: 7,239.35'
VS: 225.36'

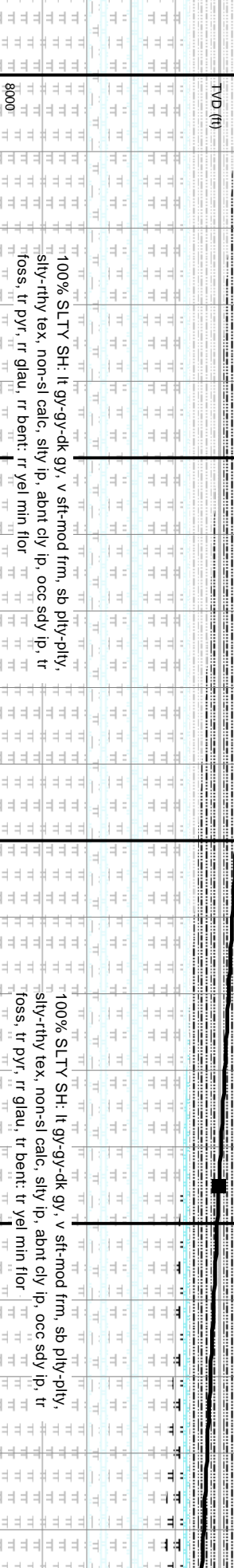
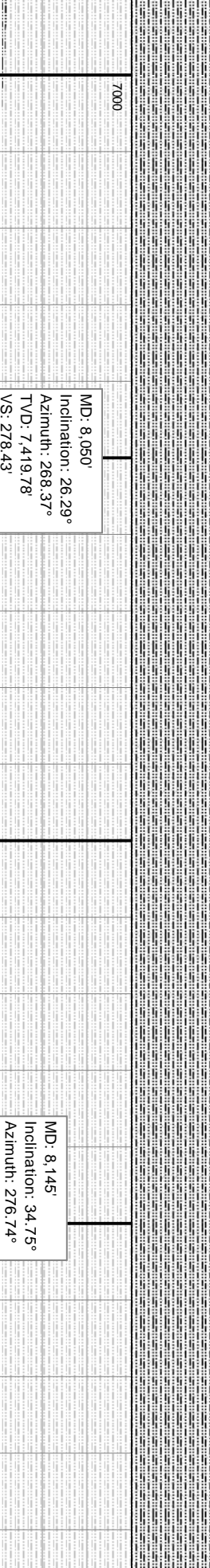
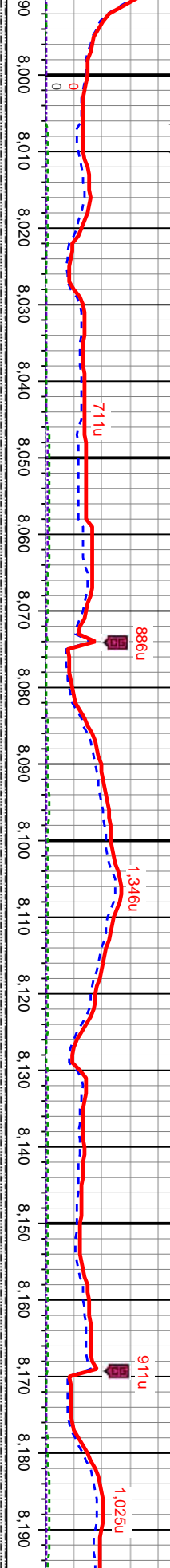
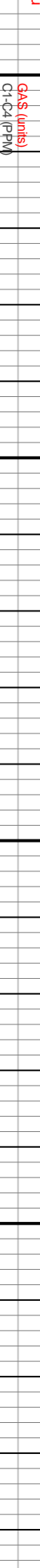
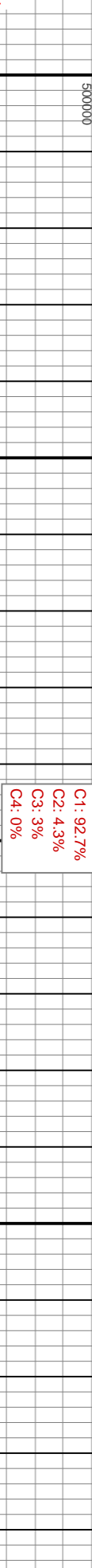
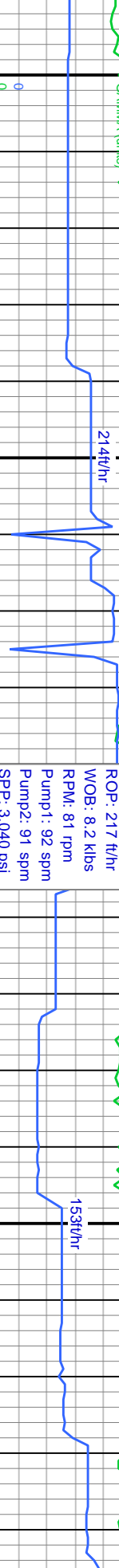
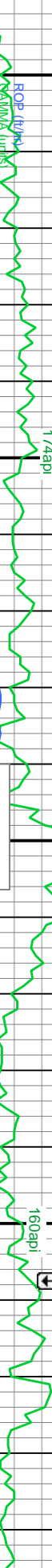
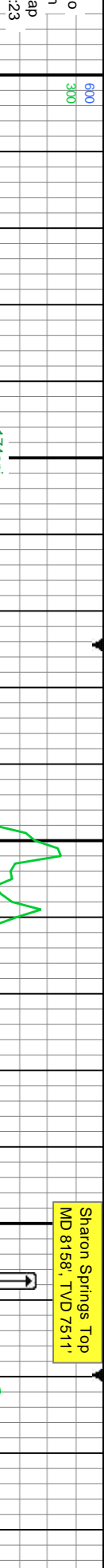
MD: 7,965'
Inclination: 16.07°
Azimuth: 288.63°
TVD: 7,331.2'
VS: 244.97'

100% SLTY SH: lt gy-gy-dk gy, v silt-mod frm, sb pily-pily,
sily-rthy tex, non-si calc, sily ip, abnt cly ip, occ sdy ip, tr
foss, tr pyr, tr glau, rr bent: rr yel min flor

100% SLTY SH: lt gy-gy-dk gy, v silt-mod frm, sb pily-pily,
sily-rthy tex, non-si calc, sily ip, abnt cly ip, occ sdy ip, tr
foss, tr pyr, tr glau, rr bent: rr yel min flor

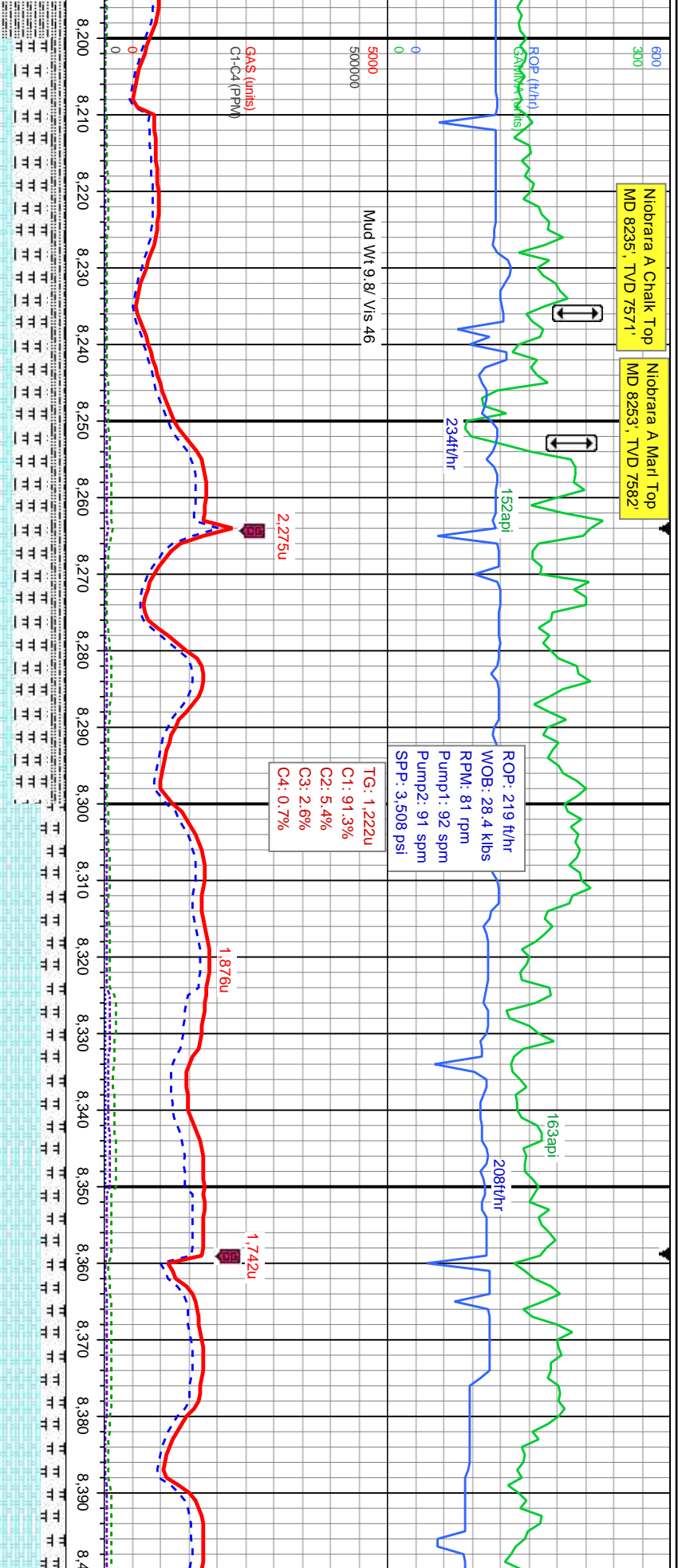


Sharon Springs Top
MD 8158', TVD 7511'



Niobrara A Chalk Top
MD 8235', TVD 7571'

Niobrara A Marl Top
MD 8253', TVD 7582'



MD: 8,240'
Inclination: 45.34°
Azimuth: 274.79°
TVD: 7,574.2'
VS: 385.92'

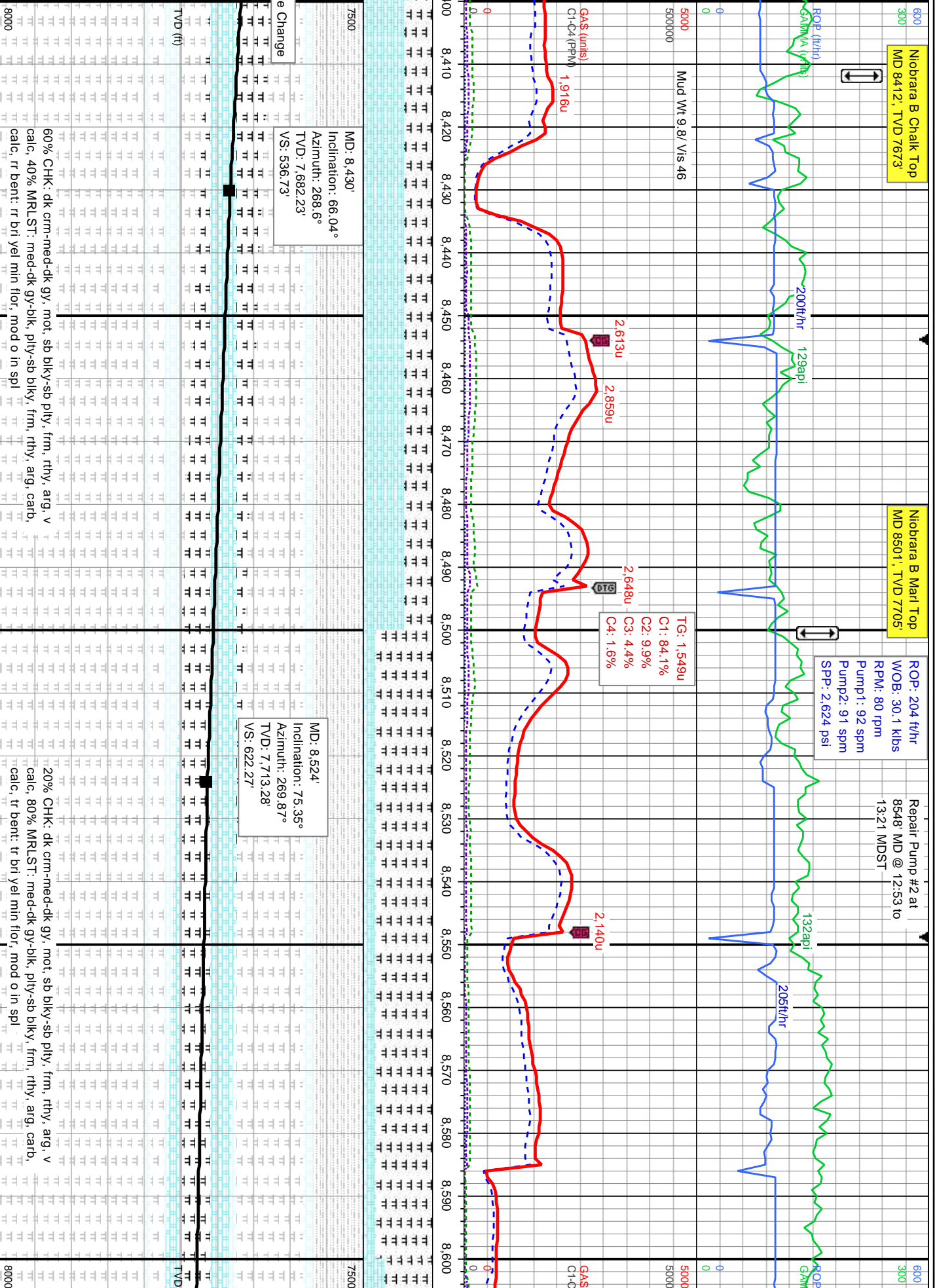
MD: 8,335'
Inclination: 54.59°
Azimuth: 270.89°
TVD: 7,635.26'
VS: 457.04'

TVD Seal

20% SLTY SH: lt gy-gy-dk gy, v sft-mod frm, sb pily-pily, sily-rthy tex, non-sl calc, sily ip, abnt cily ip, occ sdy ip, tr foss, tr pyr, rr glau, tr bent 40% CHK: med-dk gy, mod, sb blkgy-sb pily, frm, rthy, arg, v calc, 40% MRLST: med-dk gy-blk, pily-sb blkgy, frm, rthy, arg, carb, calc: tr bri yel min flor, mod o in spl

70% CHK: med-dk gy, mod, sb blkgy-sb pily, frm, rthy, arg, v calc, 30% MRLST: med-dk gy-blk, pily-sb blkgy, frm, rthy, arg, carb, calc, rr bent: rr bri yel min flor, mod o in spl





Landed curve at
8701' MD, 7736'
TVD @ 90°

ROP: 116 ft/hr
WOB: 21.9 klbs
RPM: 81 rpm
Pump1: 92 spm
Pump2: 91 spm
SPP: 3.057 psi

ROP (ft/hr)
GAAMA (u)
GAS (units)
C1-C4 (PPM)

179api
208ft/hr
179api

119api
197ft/hr

TG: 1.108u
C1: 83.2%
C2: 10.1%
C3: 6.2%
C4: 0.5%

Mud Wt: 9.85
Vis: 49
Yield Pt: 10
HTHP: 6.8@250
NAP/Water: 63.0/22.5
Chlorides: 52,500

GAS (units)
C1-C4 (PPM)

1,601u
1,705u

1,606u
1,697u

646u

7500

MD: 8,619'
Inclination: 82.84°
Azimuth: 268.54°
TVD: 7,731.24'
VS: 712.23'

MD: 8,714'
Inclination: 90.15°
Azimuth: 268.01°
TVD: 7,737.04'
VS: 803.26'

MD: 8,800'
Inclination: 90.15°
Azimuth: 268.01°
TVD: 7,737.04'
VS: 893.26'

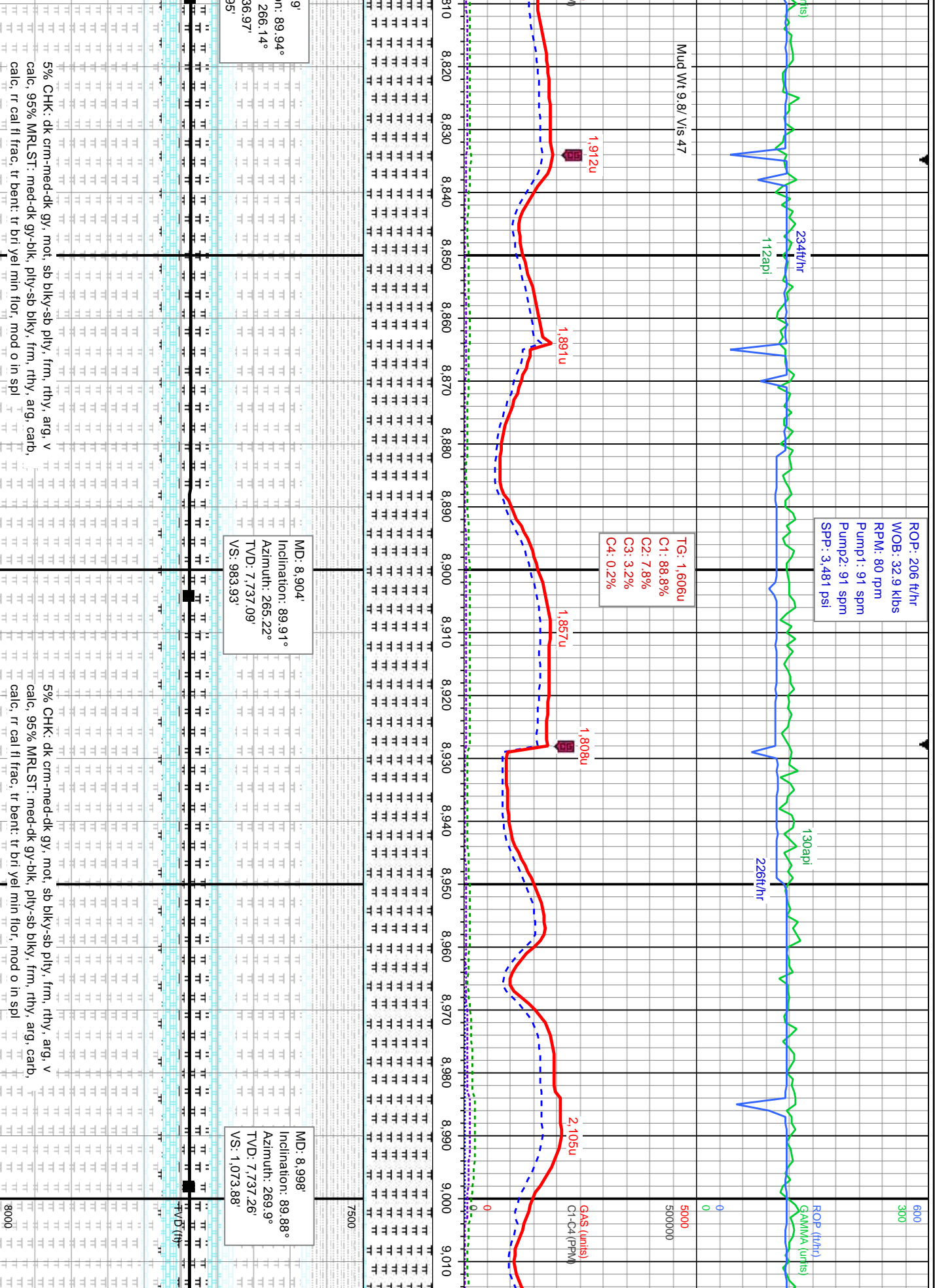
30% CHK: dk crm-med-dk gy, mot, sb blk-y-sb ply, frm, rthy, arg, v
calc, 70% MRLST: med-dk gy-blk, ply-sb blk-y, frm, rthy, arg, carb,
calc, tr bent: tr brl yel min flor, mod o in spl

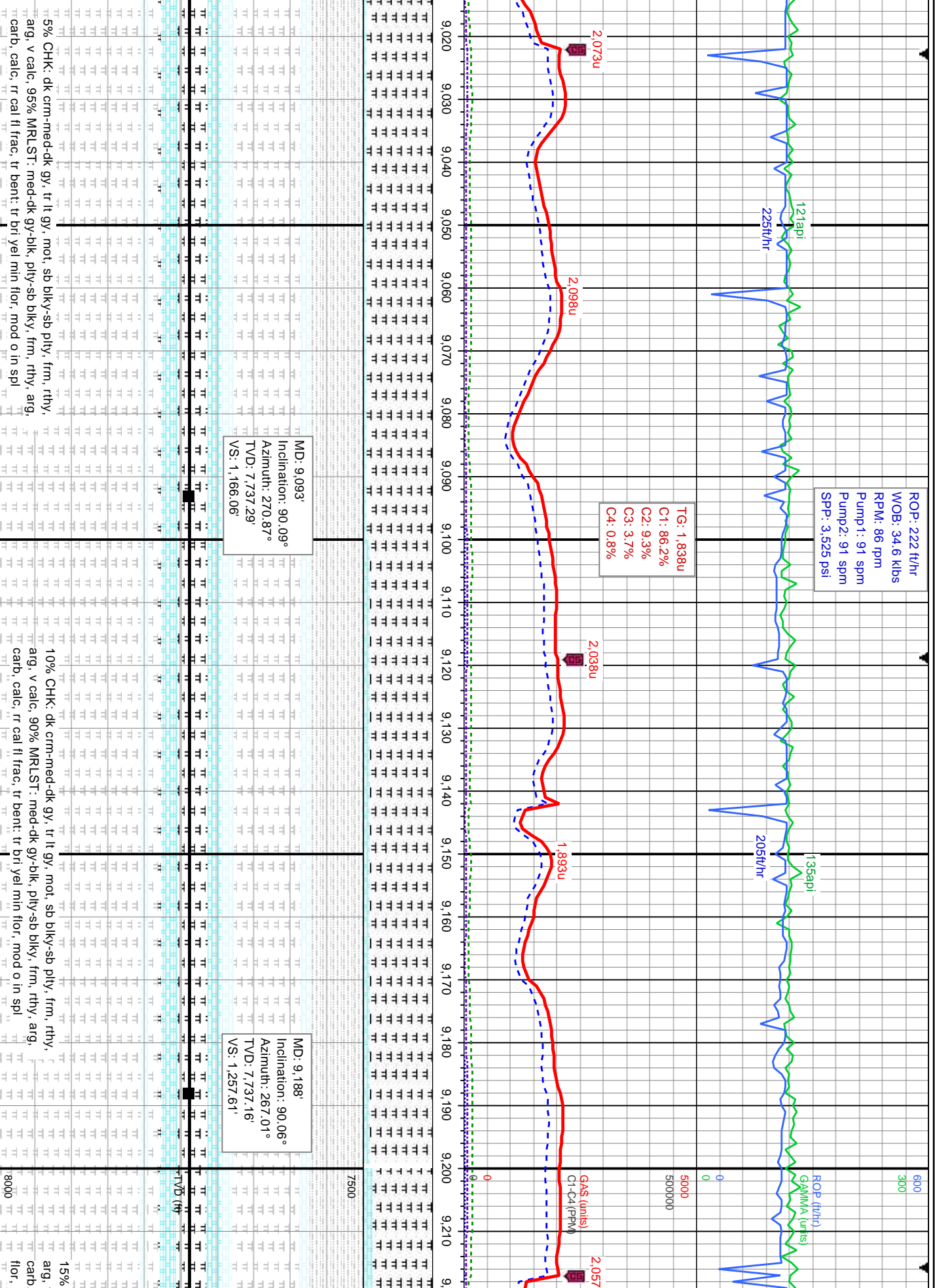
10% CHK: dk crm-med-dk gy, mot, sb blk-y-sb ply, frm, rthy, arg, v
calc, 90% MRLST: med-dk gy-blk, ply-sb blk-y, frm, rthy, arg, carb,
calc, tr bent: tr brl yel min flor, mod o in spl

3.0mm

3.0mm

3.0mm





MINDEPTH

9/02/2017

ROP: 277 ft/hr
WOB: 38 klbs
RPM: 86 rpm
Pump1: 91 spm
Pump2: 91 spm
SP: 3.615 psi

ROP (ft/hr)

GAMMA (units)

GAS (units)

C1-C4 (PPM)

2.440u

2.290u

2.350u

2.229u

2.484u

2.440u

2.290u

2.350u

2.229u

2.484u

2.440u

2.290u

2.350u

2.229u

2.484u

2.440u

2.290u

2.350u

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Fault @ 10096'
MD: 7739' TVD
14' Down Throw

ROP: 155 ft/hr
WOB: 25.3 klbs
RPM: 85 rpm
Pump1: 92 spm
Pump2: 92 spm
SPP: 3.050 psi

ROP (ft/hr)
GAMMA (units)

243ft/hr
112api
178api
187ft/hr

TG: 1.904u
C1: 88%
C2: 8.3%
C3: 3.2%
C4: 0.5%

2.640u
2.638u
2.184u
2.535u
C1-C4 (wt%)

10,040 10,050 10,060 10,070 10,080 10,090 10,100 10,110 10,120 10,130 10,140 10,150 10,160 10,170 10,180 10,190 10,200 10,210 10,220 10,230 10,240

MD: 10,136'
Inclination: 89.85°
Azimuth: 268.06°
TVD: 7,738.88'
VS: 2,180.01'

MD: 10,231'
Inclination: 89.75°
Azimuth: 270.35°
TVD: 7,739.21'
VS: 2,271.69'

10% CHK: dk crm-med-dk gy, tr lt gy, mot, sb blk-y-sb ply, frm, rthy, arg, v calc, 90% MRLST: med-dk gy-blk, ply-sb blk, frm, rthy, arg, carb, calc, rr cal fl frac, tr bent: tr bri yel min fl or, mod o in spl

10% CHK: dk crm-med-dk gy, tr lt gy, mot, sb blk-y-sb ply, frm, rthy, arg, v calc, 90% MRLST: med-dk gy-blk, ply-sb blk, frm, rthy, arg, carb, calc, rr cal fl frac, tr bent: tr bri yel min fl or, mod o in spl



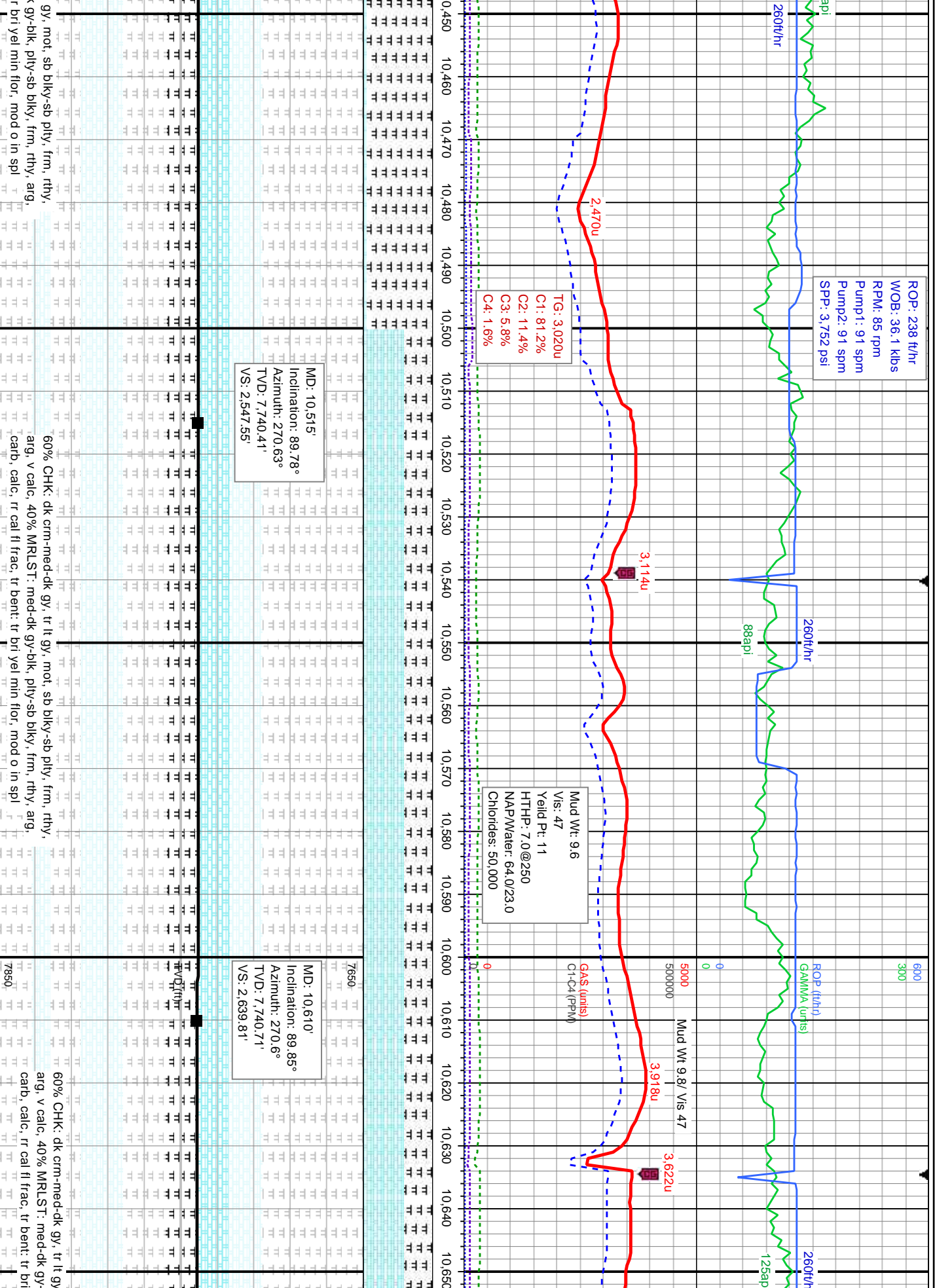
ROP: 238 ft/hr
WOB: 36.1 klbs
RPM: 85 rpm
Pump1: 91 spm
Pump2: 91 spm
SPP: 3.752 psi

TG: 3.020u
C1: 81.2%
C2: 11.4%
C3: 5.8%
C4: 1.6%

MD: 10.515'
Inclination: 89.78°
Azimuth: 270.63°
TVD: 7.740.41'
VS: 2.547.55'

Mud Wt: 9.6
Yield Pt: 11
HTHP: 7.0@250
NAP/Water: 64.0/23.0
Chlorides: 50,000

MD: 10.610'
Inclination: 89.85°
Azimuth: 270.6°
TVD: 7.740.71'
VS: 2.639.81'



ROP: 238 ft/hr
WOB: 39.2 klbs
RPM: 85 rpm
Pump1: 91 spm
Pump2: 91 spm
SPP: 3.878 psi

TG: 3.335u
C1: 85.2%
C2: 9.7%
C3: 4.4%
C4: 0.7%

MD: 10.895'
Inclination: 89.88°
Azimuth: 269.4°
TVD: 7.741.19'
VS: 2.915.79'

MD: 10.989'
Inclination: 89.85°
Azimuth: 269.33°
TVD: 7.741.41'
VS: 3.006.58'

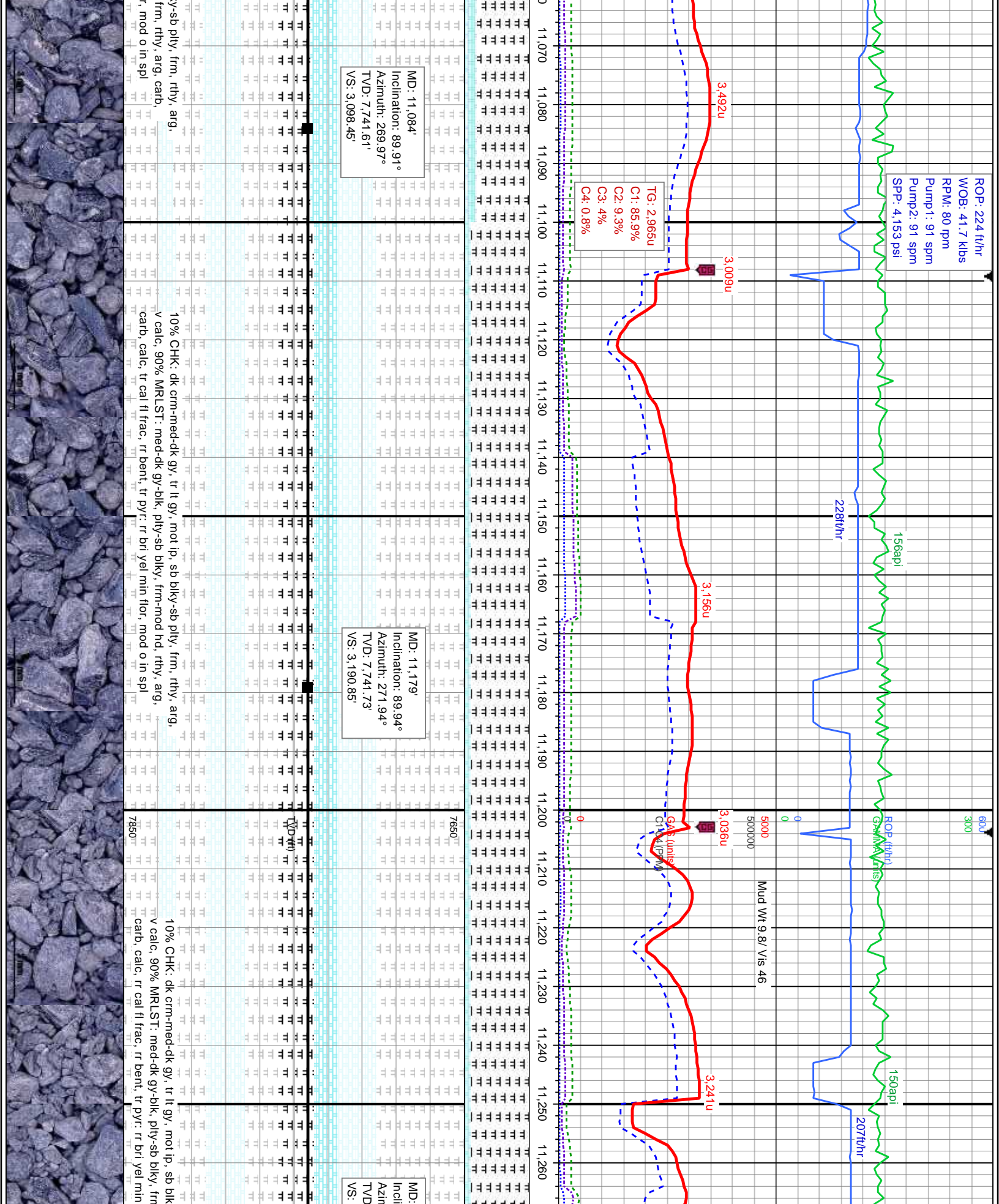
30% CHK: dk crm-med-dk gy, tr lt gy, mot, sb blk-y-sb ply, frm, rthy, arg, v
calc, 70% MRLST: med-dk gy-blk, ply-sb blk-y, frm, rthy, arg, carb, calc, tr
cal lt frac, tr bent, rr fos frag, tr pyr: tr bri yel min flo, mod o in spl

20% CHK: dk crm-med-dk gy, tr lt gy, mot, sb blk
v calc, 80% MRLST: med-dk gy-blk, ply-sb blk-y,
calc, tr cal lt frac, tr bent, tr pyr: rr bri yel min flo

3.1mm

1.1mm

0.75mm



ROP: 198 ft/hr
WOB: 28.4 klbs
RPM: 80 rpm
Pump1: 91 spm
Pump2: 91 spm
SPP: 3.581 psi

TOOH for MWD Tool at 11319'
MD @ 08:24 MDST on
9/2/17. Resumed drilling at
00:32 MDST 9/03/2017.

9/03/2017

MINDEPTH

600
300
0

ROP (ft/hr)

151api

254ft/hr

196ft/hr

3,127u

2,799u

2,213u

2,140u

Gas (units)
Cl-CAIPM

2,181u

Bit Data
Bit #: 3
Type: BHI-AT506S #2
Size: 8.5
Depth In: 11,319'
Depth Out: 18,483'
Hours: 38.5 hrs
Jets: 6X15
S/N: 7046784

Mud Wt: 9.8
Vis: 48
Yield Pt: 13
HTHP: 8.0@250
NAP/Water: 762.0/24.0
Chlorides: 48,000

TG: 1.945u
C1: 82.5%
C2: 10%
C3: 5.5%
C4: 2%

11,272'
Inclination: 89.88°
Azimuth: 268.25°
TVD: 7,741.88'
VS: 3,280.95'

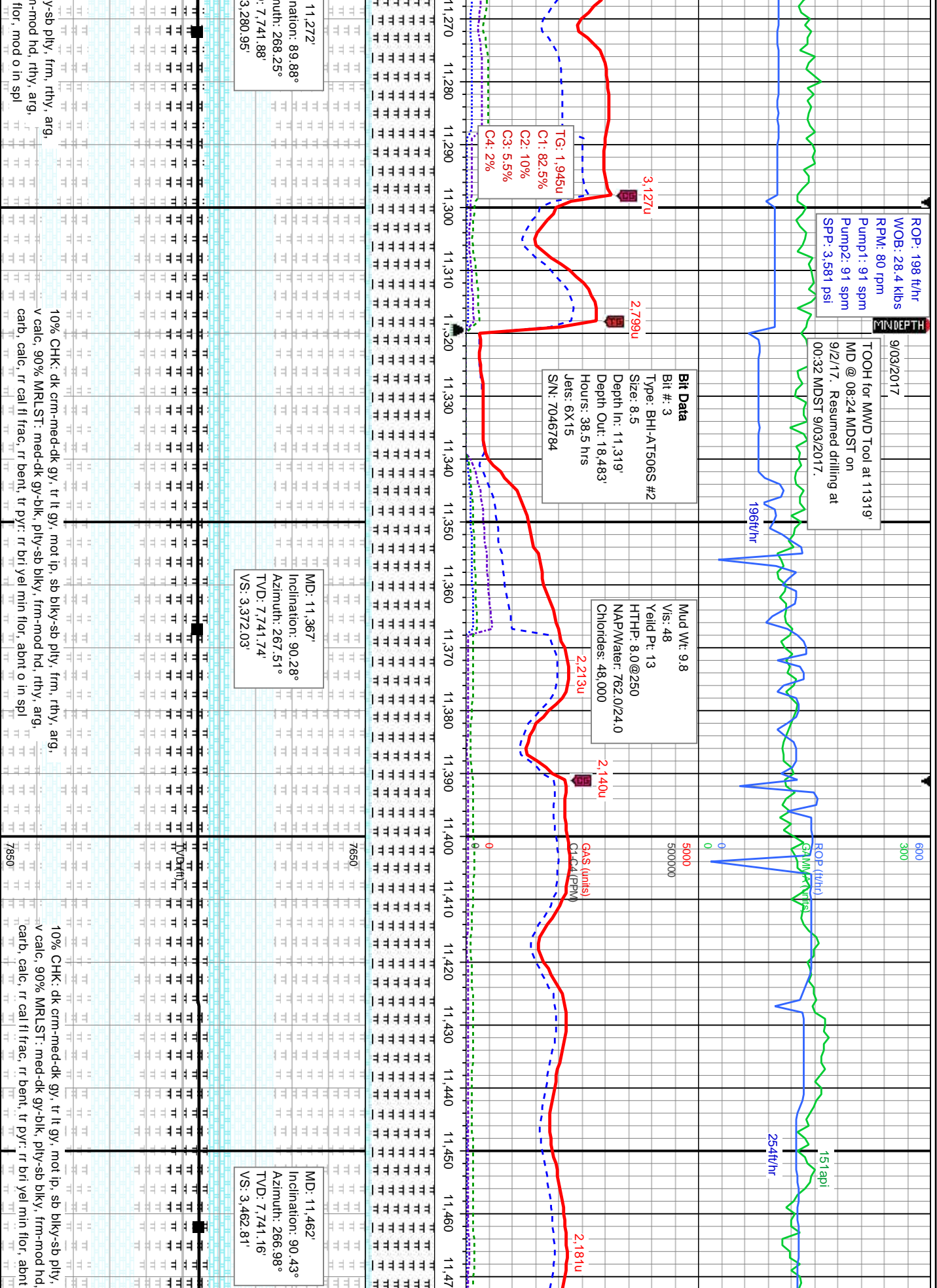
MD: 11,367'
Inclination: 90.28°
Azimuth: 267.51°
TVD: 7,741.74'
VS: 3,372.03'

MD: 11,462'
Inclination: 90.43°
Azimuth: 266.98°
TVD: 7,741.16'
VS: 3,462.81'

11,272'
Inclination: 89.88°
Azimuth: 268.25°
TVD: 7,741.88'
VS: 3,280.95'

10% CHK: dk crm-med-dk gy, tr lt gy, mot lp, sb blk-y-sb ply, frm, rthy, arg,
v calc, 90% MRLST: med-dk gy-blk, ply-sb blk-y, frm-mod hd, rthy, arg,
carb, calc, rr cal fl frac, rr bent, tr pyr: rr bri yel min flor, abnt o in spl

10% CHK: dk crm-med-dk gy, tr lt gy, mot lp, sb blk-y-sb ply,
v calc, 90% MRLST: med-dk gy-blk, ply-sb blk-y, frm-mod hd,
carb, calc, rr cal fl frac, rr bent, tr pyr: rr bri yel min flor, abnt



ROP: 157 ft/hr
WOB: 13.6 klbs
RPM: 85 rpm
Pump1: 92 spm
Pump2: 92 spm
SP: 3.303 psi

TG: 2.358u
C1: 85.9%
C2: 9%
C3: 3.9%
C4: 1.2%

Mud Wt 9.9 Vis 53

176api

258ft/hr

2.253u

GAS (lb/hr)
G-C4 (PPM)

5000
500000

155api

259ft/hr

2.975u

2.823u

MD: 11.556'
Inclination: 89.97°
Azimuth: 265.75°
TVD: 7.740.83'
VS: 3.552.19'

MD: 11.651'
Inclination: 90.31°
Azimuth: 266.24°
TVD: 7.740.6'
VS: 3.642.34'

firm, rthy, arg,
rthy, arg,
o in spl

10% CHK: dk crm-med-dk gy, tr lt gy, mot ip, sb blk-y-sb ply, frm, rthy, arg,
v calc, 90% MRLST: med-dk gy-blk, ply-sb blk-y, frm-mod hd, rthy, arg,
carb, calc, rr cal fl frac, rr bent, tr pyr: rr bri yel min flor, abnt o in spl

10% CHK: dk crm-med-dk gy, tr lt gy, mot ip, sb blk-y-sb ply, frm, rthy, arg,
v calc, 90% MRLST: med-dk gy-blk, ply-sb blk-y, frm-mod hd, rthy, arg,
carb, calc, rr cal fl frac, rr bent, tr pyr: rr bri yel min flor, abnt o in spl

ROP: 254 ft/hr
WOB: 21.1 klbs
RPM: 85 rpm
Pump1: 91 spm
Pump2: 92 spm
SP: 4.159 psi

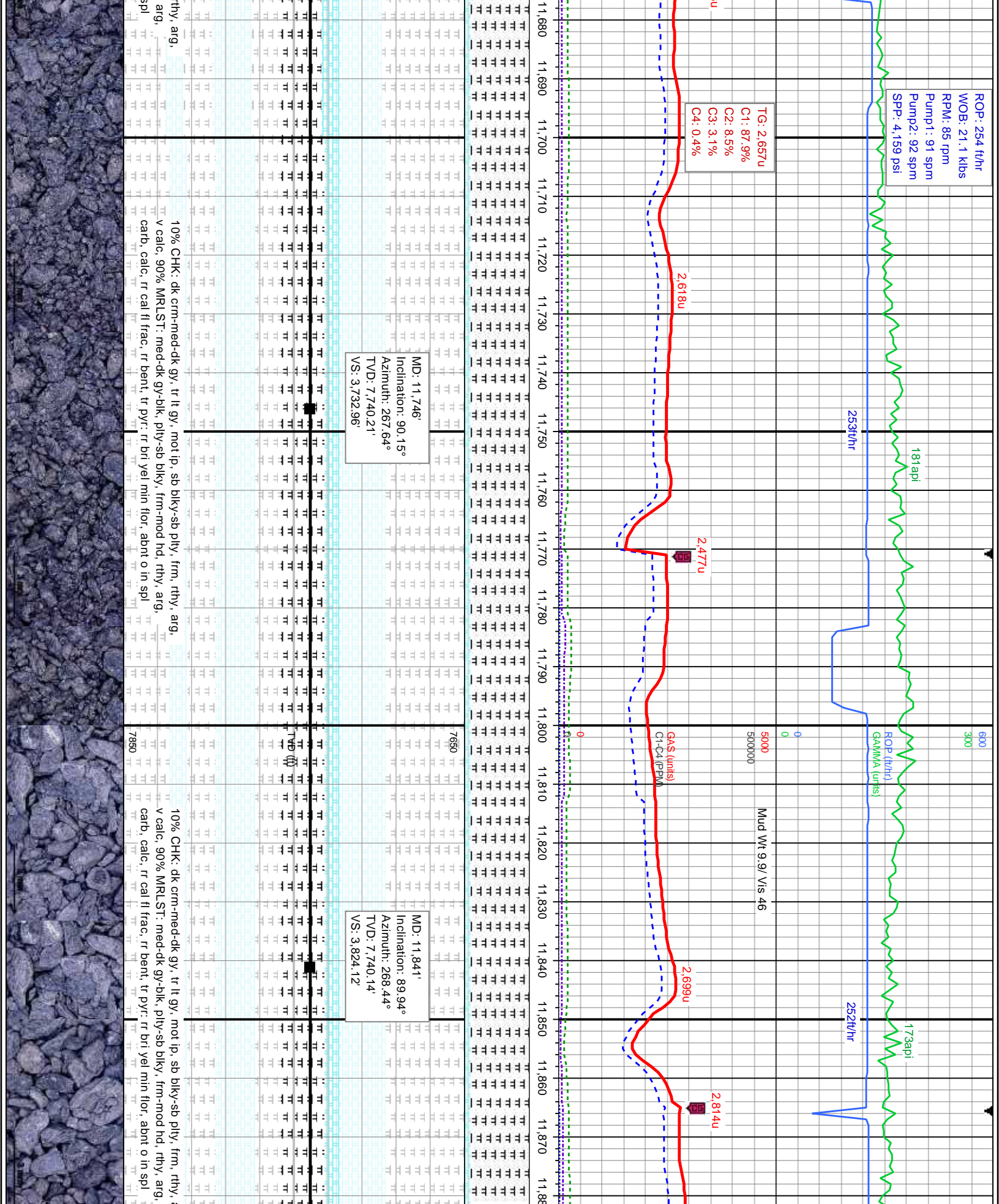
TG: 2.657u
C1: 87.9%
C2: 8.5%
C3: 3.1%
C4: 0.4%

MD: 11.746°
Inclination: 90.15°
Azimuth: 267.64°
TVD: 7,740.21'
VS: 3,732.96'

MD: 11.841°
Inclination: 89.94°
Azimuth: 268.44°
TVD: 7,740.14'
VS: 3,824.12'

10% CHK: dk crm-med-dk gy, tr ll gy, mot ip, sb bkly-sb ply, frm, rthy, arg,
v calc, 90% MRLST: med-dk gy-blk, ply-sb bkly, frm-mod hd, rthy, arg,
carb, calc, rr cal fl frac, rr bent, tr pyr: rr bri yel min flor, abnt o in spl

10% CHK: dk crm-med-dk gy, tr ll gy, mot ip, sb bkly-sb ply, frm, rthy, arg,
v calc, 90% MRLST: med-dk gy-blk, ply-sb bkly, frm-mod hd, rthy, arg,
carb, calc, rr cal fl frac, rr bent, tr pyr: rr bri yel min flor, abnt o in spl



ROP: 254 ft/hr
WOB: 18.2 kbs
RPM: 86 rpm
Pump1: 91 spm
Pump2: 92 spm
SPP: 4.082 psi

TG: 2.457u
C1: 87.6%
C2: 8.7%
C3: 3.3%
C4: 0.5%

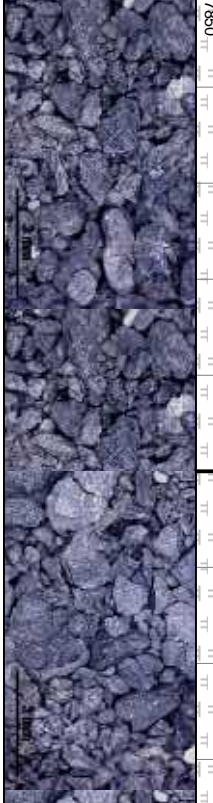
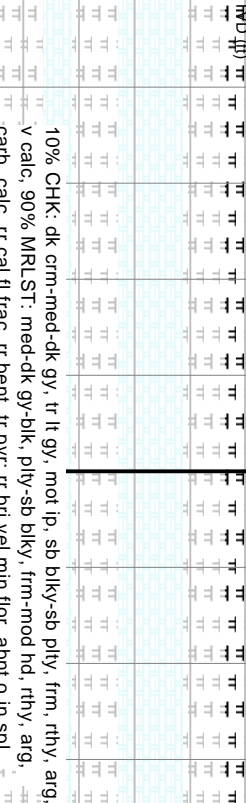
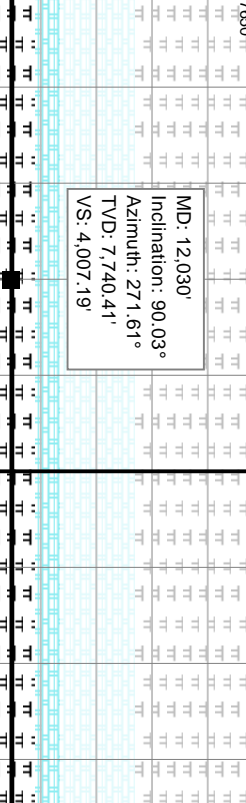
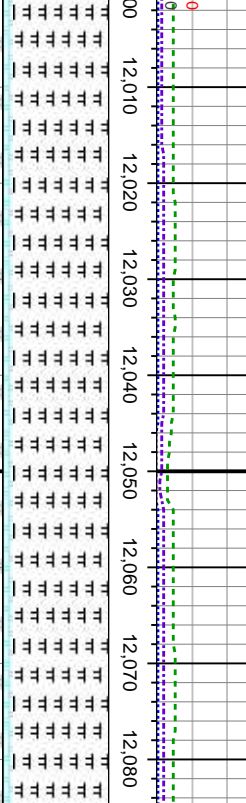
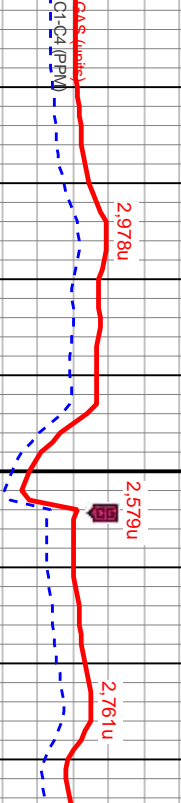
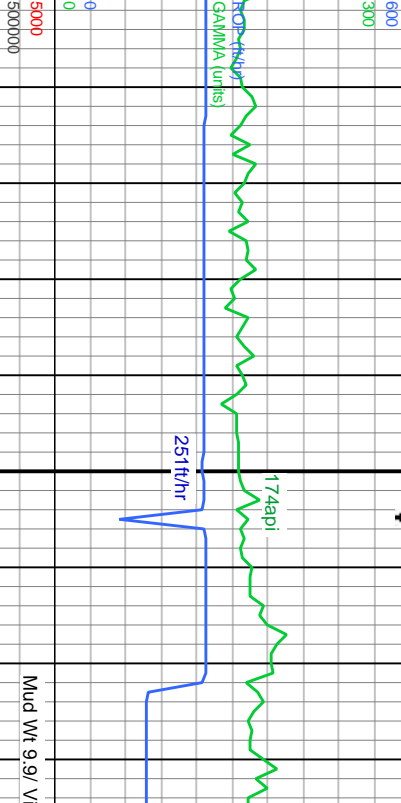
Mud Wt: 9.95
Vis: 49
Yield Pt: 12
HTHP: 9.0@250
NAPWater: 63.0/22.0
Chlorides: 50,000

MD: 11,936'
Inclination: 89.85°
Azimuth: 270.04°
TVD: 7,740.31'
VS: 3.915.82'

10% CHK: dk crm-med-dk gy, tr ll gy, mot ip, sb blk-y-sb ply, frm, rthy, arg,
v calc, 90% MRLST: med-dk gy-blk, ply-sb blk-y, frm-mod hd, rthy, arg,
carb, calc, rr cal ll frac, rr bent, tr pyr: rr bri yel min flor, abnt o in spl

MD: 12,030'
Inclination: 90.03°
Azimuth: 271.61°
TVD: 7,740.41'
VS: 4.007.19'

10% CHK: dk crm-med-dk gy, tr ll gy, mot ip, sb blk-y-sb ply, frm, rthy, arg,
v calc, 90% MRLST: med-dk gy-blk, ply-sb blk-y, frm-mod hd, rthy, arg,
carb, calc, rr cal ll frac, rr bent, tr pyr: rr bri yel min flor, abnt o in spl



ROP: 256 ft/hr
WOB: 20.4 klbs
RPM: 86 rpm
Pump1: 91 spm
Pump2: 92 spm
SPP: 4,121 psi

TG: 2.529u
C1: 85.9%
C2: 9.6%
C3: 4%
C4: 0.6%

2.914u

2.961u

GAS (units)
G1-C4 (ppm)

2.806u

2.297u

Mud Wt 9.9/ Vls 47

MD: 12.125'
Inclination: 89.72°
Azimuth: 271.05°
TVD: 7.740.62'
VS: 4.099.73'

MD: 12.220'
Inclination: 89.82°
Azimuth: 270.66°
TVD: 7.741'
VS: 4.192.09'

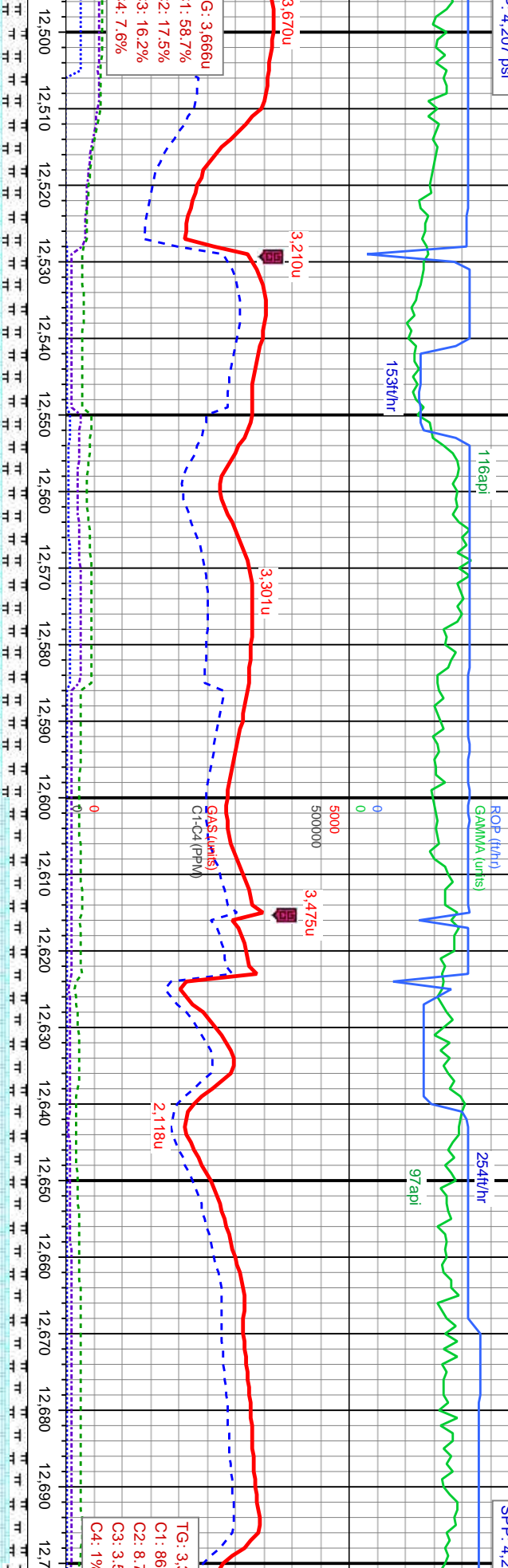
10% CHK: dk crm-med-dk gy, tr lt gy, mot ip, sb blk-y-sb pily, frm, rthy, arg, v calc, 90% MRLST: med-dk gy-blk, pily-sb blk-y, frm-mod hd, rthy, arg, carb, calc, rr cal fl frac, rr bent, tr pyr: rr bri yel min flor, abnt o in spl

5% CHK: dk crm-med-dk gy, tr lt gy, mot ip, sb blk-y-sb pily, frm, rthy, arg, v calc, 95% MRLST: med-dk gy-blk, pily-sb blk-y, frm-mod hd, rthy, arg, carb, calc, rr cal fl frac, rr bent, tr pyr: rr bri yel min flor, abnt o in spl

P: 254 ft/hr
B: 20.7 klbs
W: 80 rpm
Pump1: 92 spm
Pump2: 91 spm
P: 4.207 psi

ROP: 27
WOB: 22
RPM: 81
Pump1:
Pump2:
SP: 4.2

Repair rig electrical
at 12615 MD @
07:16 to 07:55 MDST



G: 3.666u
1: 58.7%
2: 17.5%
3: 16.2%
4: 7.6%

TG: 3.1
C1: 86
C2: 8.7
C3: 3.3
C4: 1%

MD: 12,505'
Inclination: 90.03°
Azimuth: 272.34°
TVD: 7,741.99'
VS: 4,469.21'

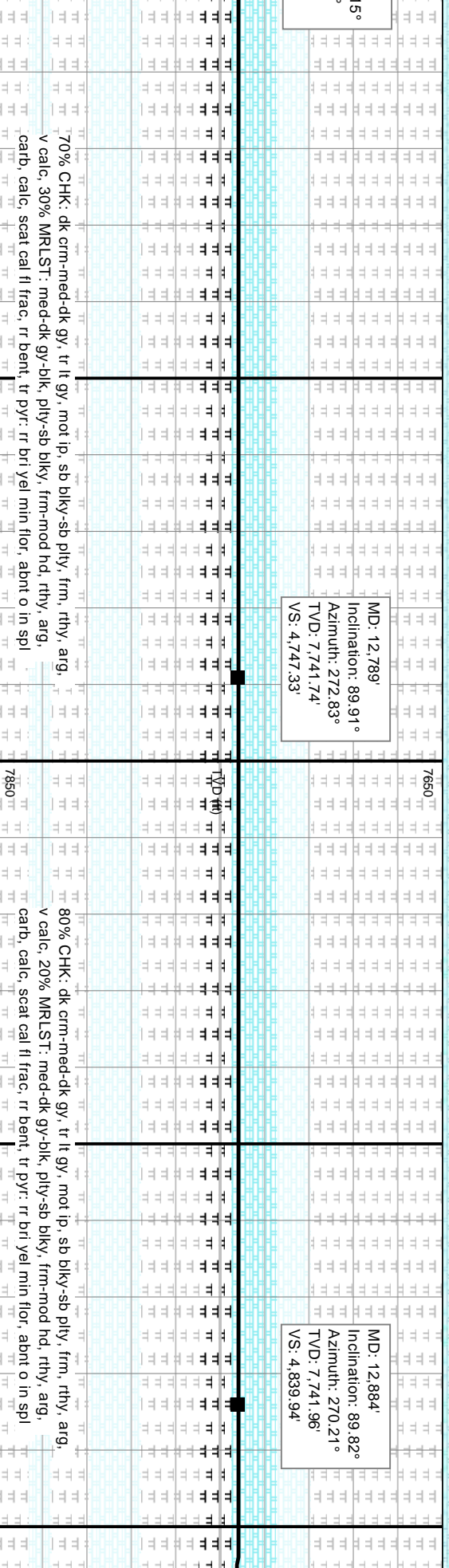
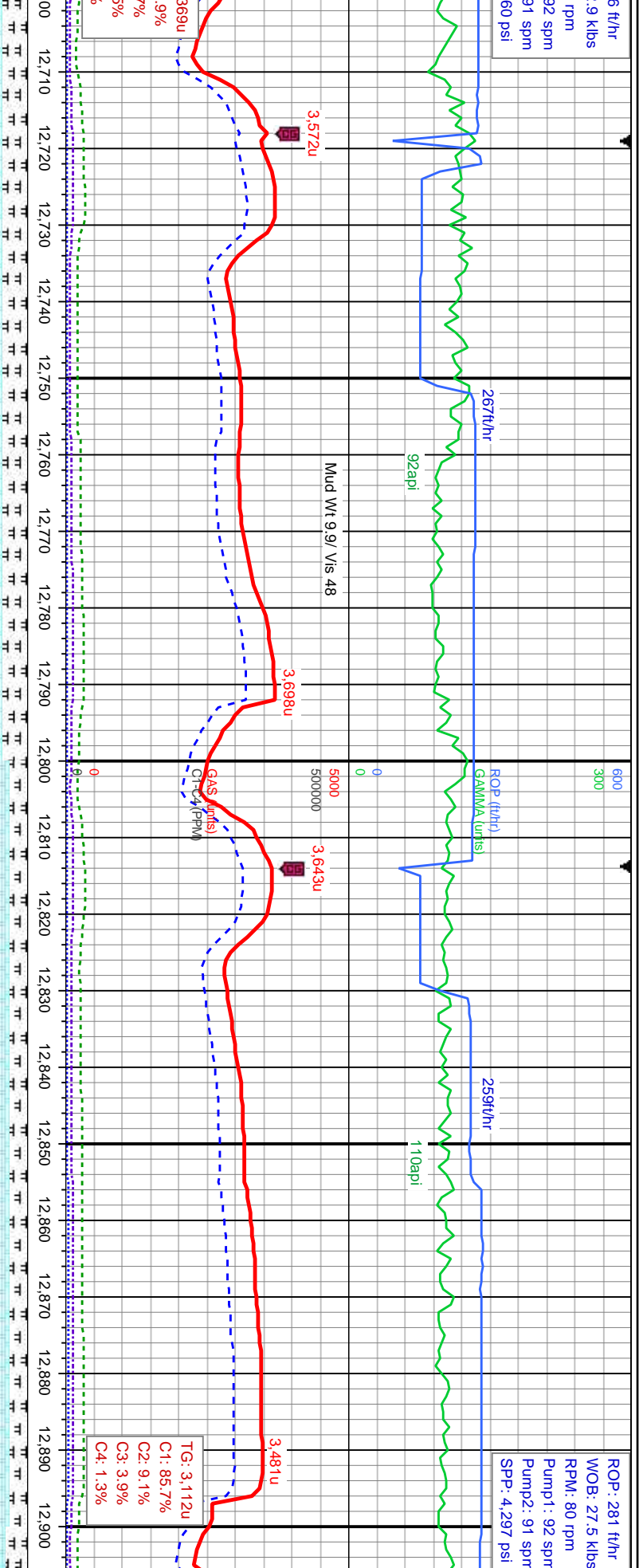
MD: 12,600'
Inclination: 90.03°
Azimuth: 272.97°
TVD: 7,741.94'
VS: 4,562.22'

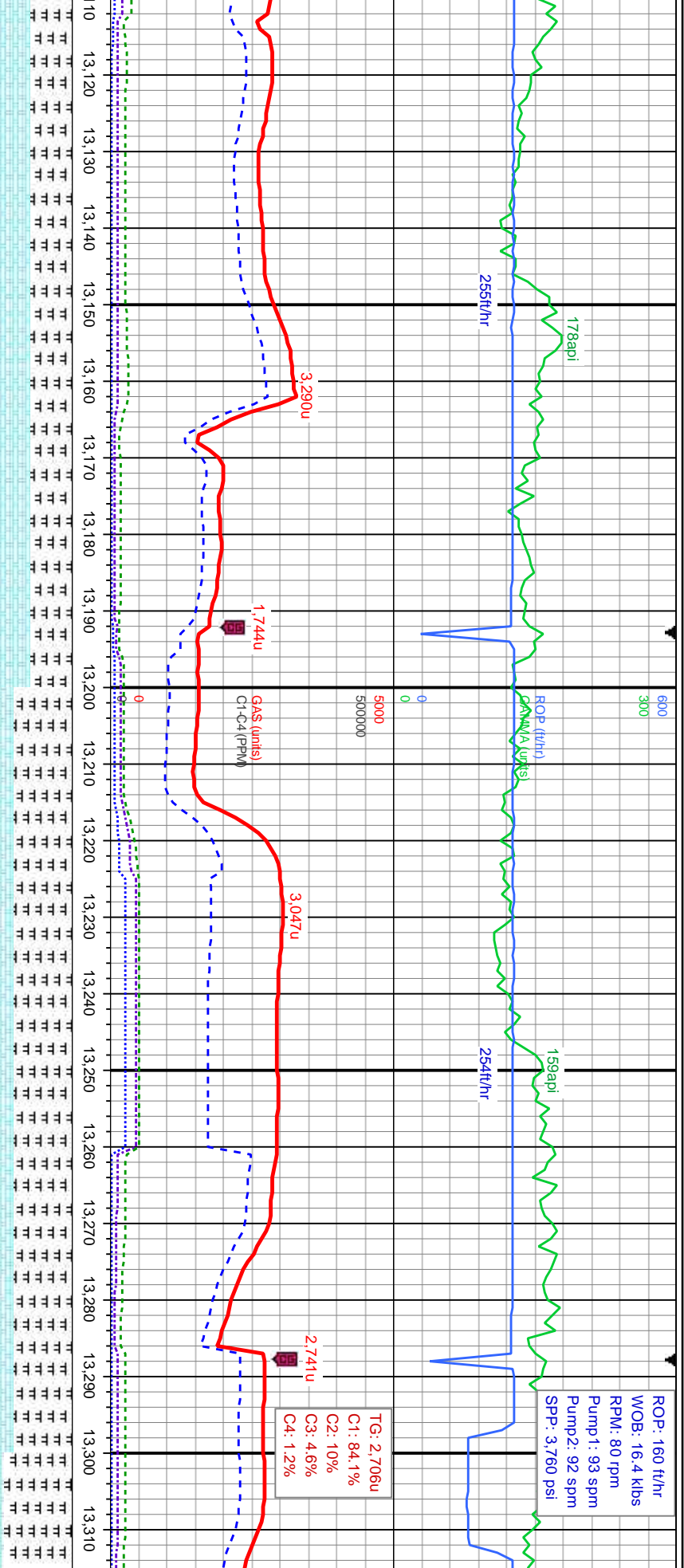
MD: 12,694'
Inclination: 90.2°
Azimuth: 272.6°
TVD: 7,741.79'
VS: 4,654.3'

70% CHK: dk crm-med-dk gy, tr lt gy, mot ip, sb blk-y-sb ply, frm, rthy, arg,
v calc, 30% MRST: med-dk gy-blk, ply-sb blk, frm-mod hd, rthy, arg,
carb, calc, scat cal lt frac, rr bent, tr pyr: rr bri yel min flor, abnt o in spl

80% CHK: dk crm-med-dk gy, tr lt gy, mot ip, sb blk-y-sb ply, frm, rthy, arg,
v calc, 20% MRST: med-dk gy-blk, ply-sb blk, frm-mod hd, rthy, arg,
carb, calc, scat cal lt frac, rr bent, tr pyr: rr bri yel min flor, abnt o in spl





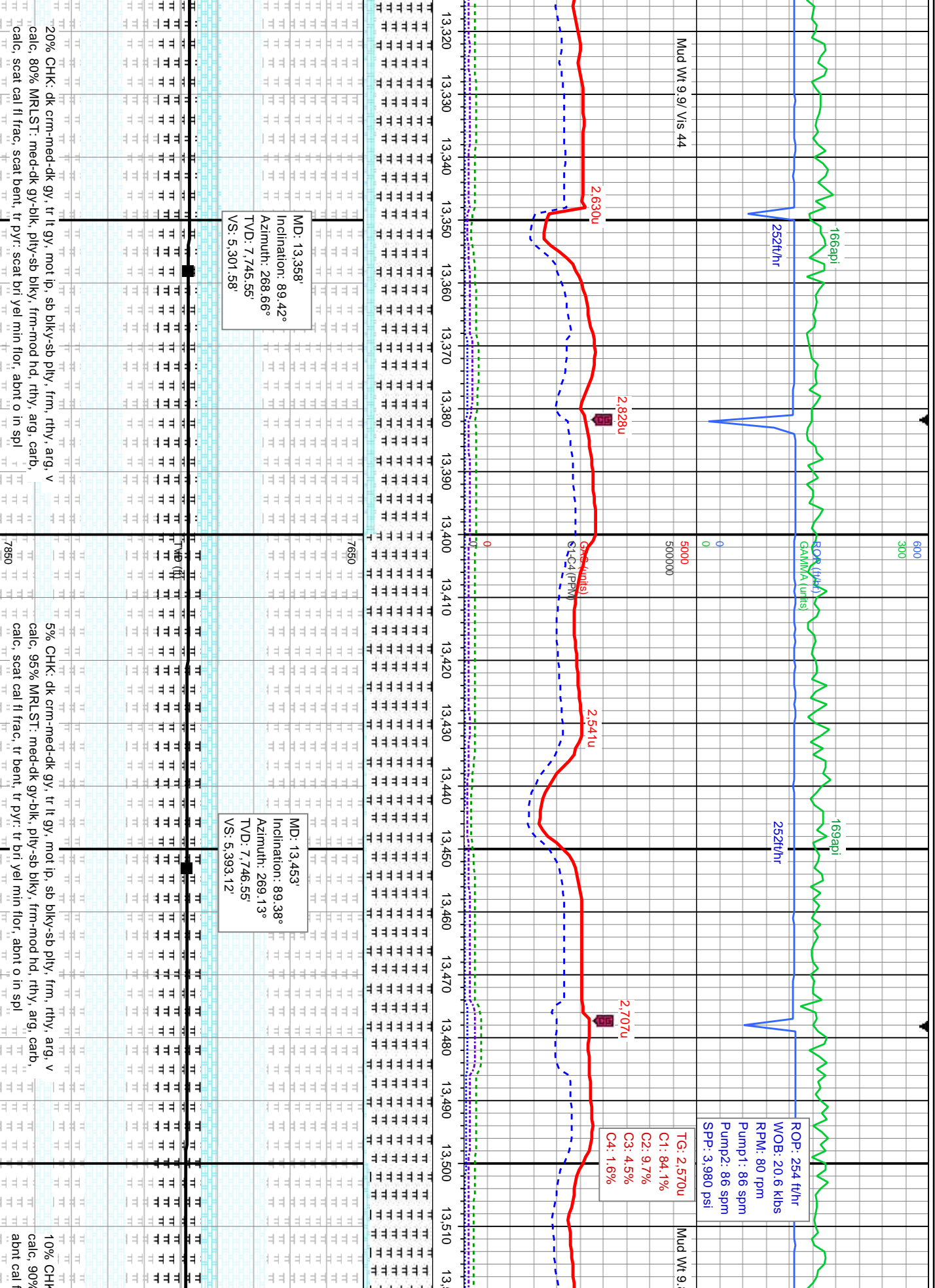


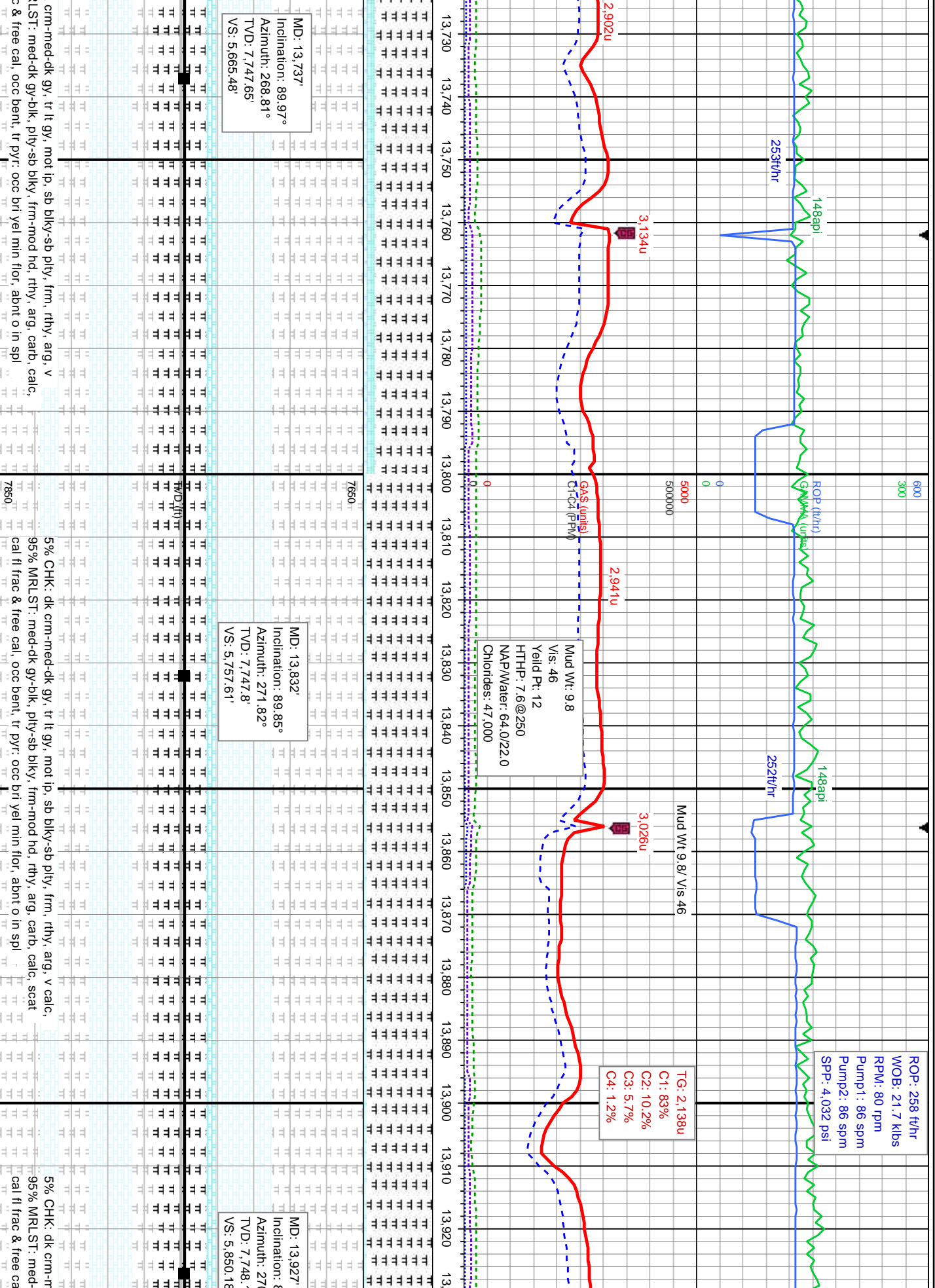
MD: 13,168'
Inclination: 89.35°
Azimuth: 271.79°
TVD: 7,744.12'
VS: 5,117.51'

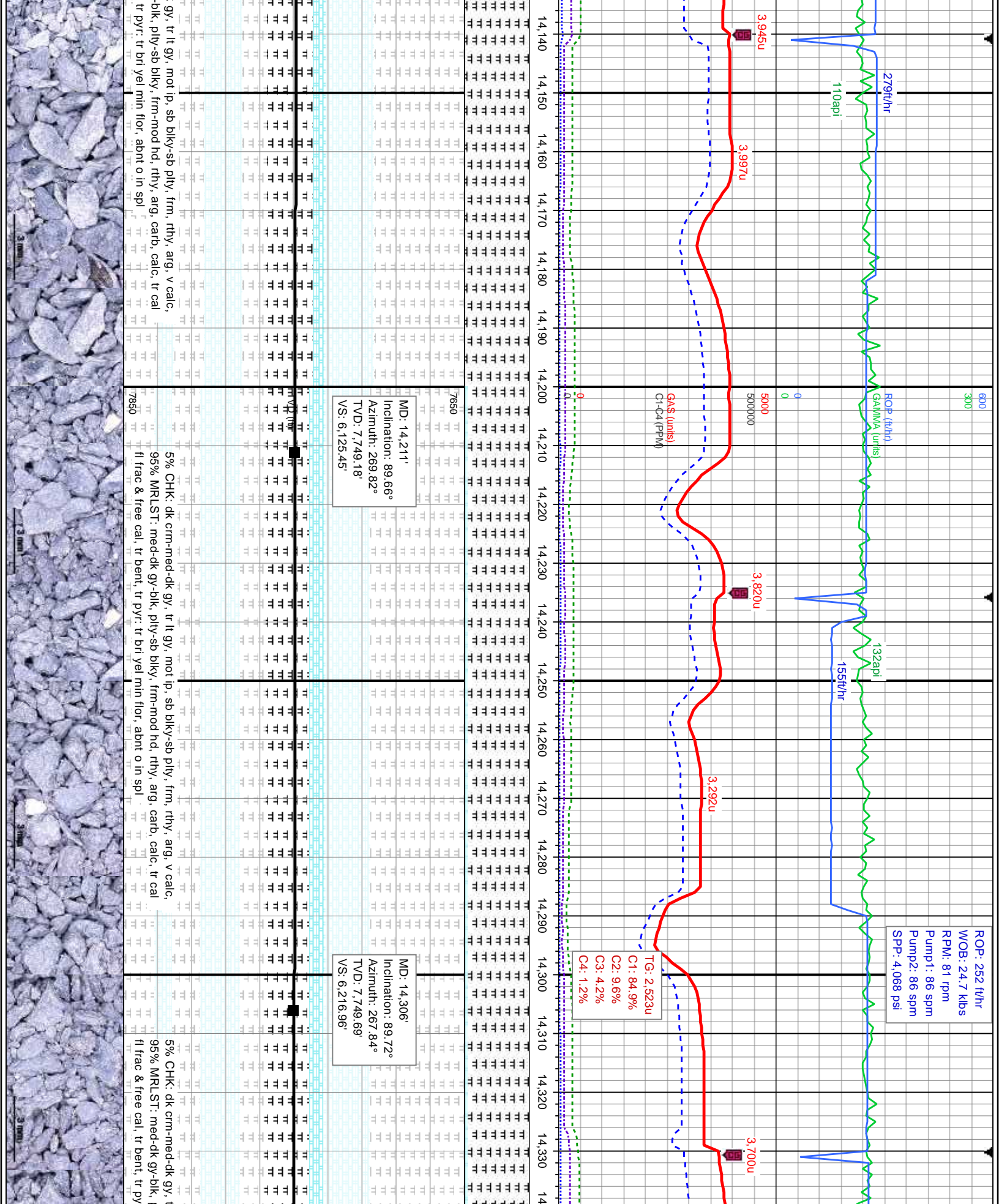
MD: 13,263'
Inclination: 89.75°
Azimuth: 269.92°
TVD: 7,744.86'
VS: 5,209.87'

50% CHK: dk crm-med-dk gy, tr lt gy, mot ip, sb blk-y-sb ply, frm, rthy, arg, v	50% CHK: dk crm-med-dk gy, tr lt gy, mot ip, sb blk-y-sb ply, frm, rthy, arg, v	30% CHK: dk crm-med-dk gy, tr lt gy, mot ip, sb blk-y-sb ply, frm, rthy, arg, v	30% CHK: dk crm-med-dk gy, tr lt gy, mot ip, sb blk-y-sb ply, frm, rthy, arg, v
calc, 50% MRLST: med-dk gy-blk, ply-sb blk-y, frm-mod hd, rthy, arg, carb,	calc, 50% MRLST: med-dk gy-blk, ply-sb blk-y, frm-mod hd, rthy, arg, carb,	calc, 70% MRLST: med-dk gy-blk, ply-sb blk-y, frm-mod hd, rthy, arg, carb,	calc, 70% MRLST: med-dk gy-blk, ply-sb blk-y, frm-mod hd, rthy, arg, carb,
calc, scat cal fi frac, scat bent, tr pyr: scat brt yel min flr, abnt o in spl	calc, scat cal fi frac, scat bent, tr pyr: scat brt yel min flr, abnt o in spl	calc, scat cal fi frac, scat bent, tr pyr: scat brt yel min flr, abnt o in spl	calc, scat cal fi frac, scat bent, tr pyr: scat brt yel min flr, abnt o in spl
7650	7650	7850	7850









ROP: 254 ft/hr
WOB: 22.8 kips
RPM: 85 rpm
Pump1: 86 spm
Pump2: 86 spm
SP: 4.086 psi

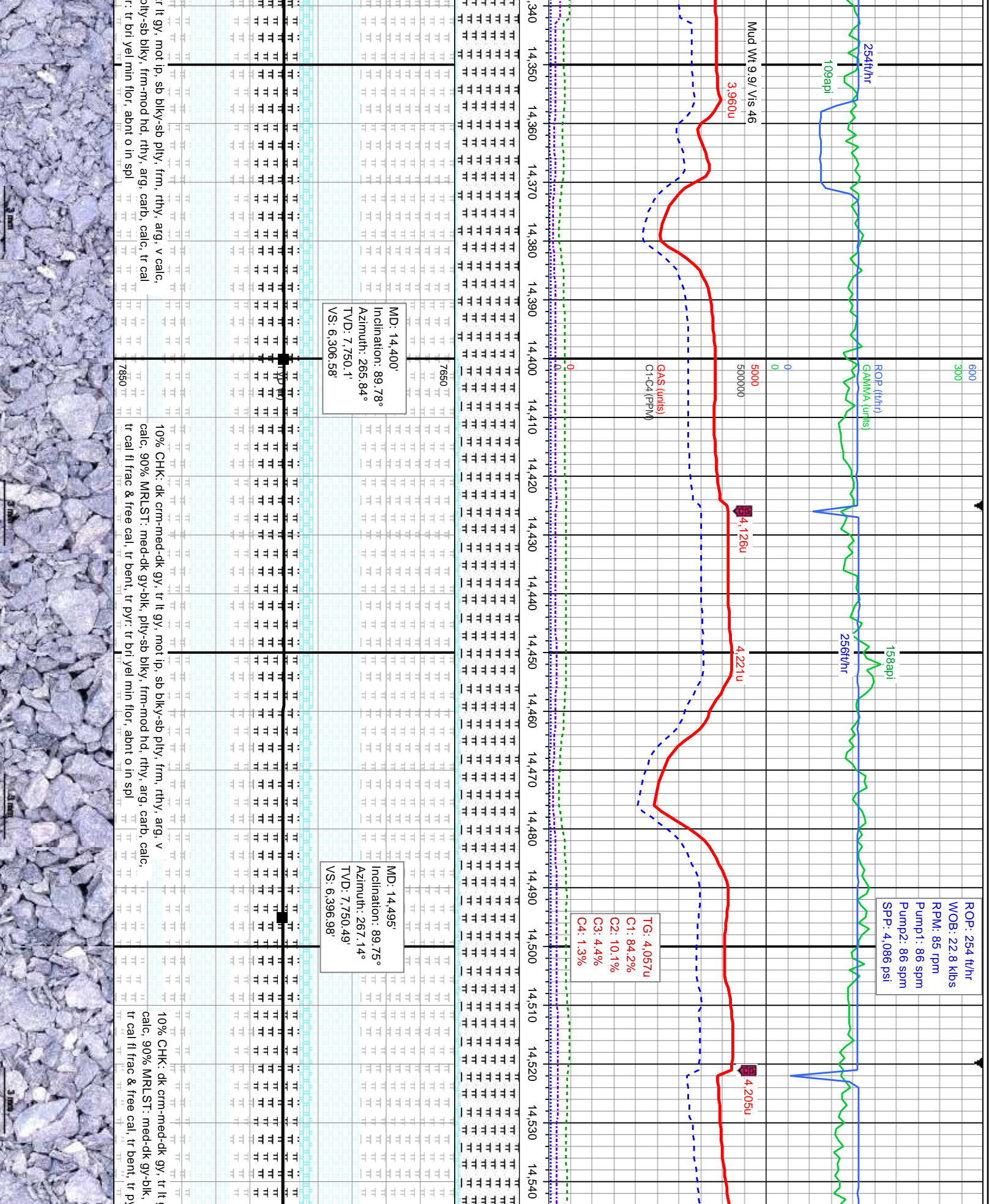
TG: 4.057u
C1: 84.2%
C2: 10.1%
C3: 4.4%
C4: 1.3%

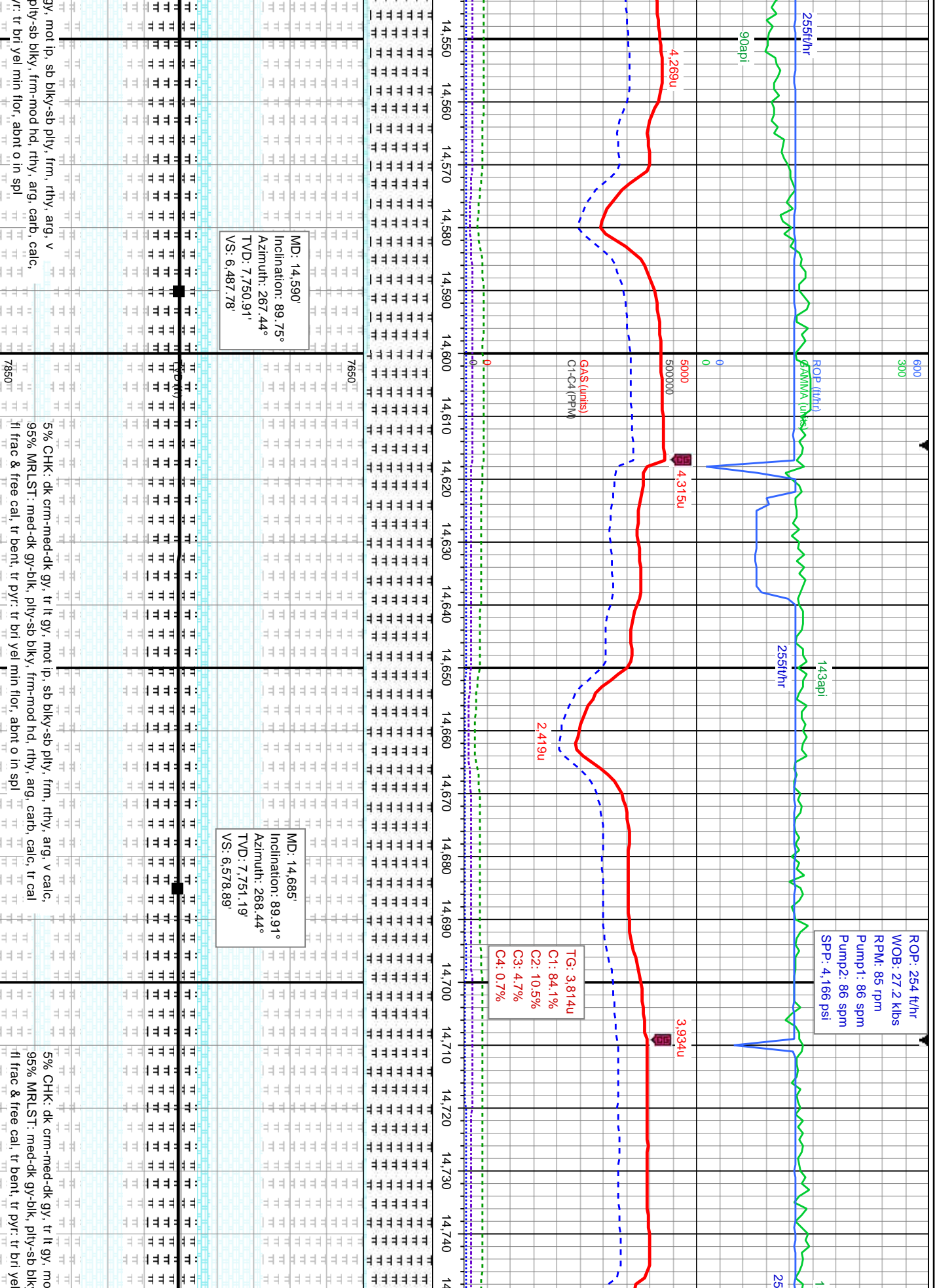
MD: 14.495'
Inclination: 89.75°
Azimuth: 267.14°
TVD: 7.750.49'
VS: 6.396.98'

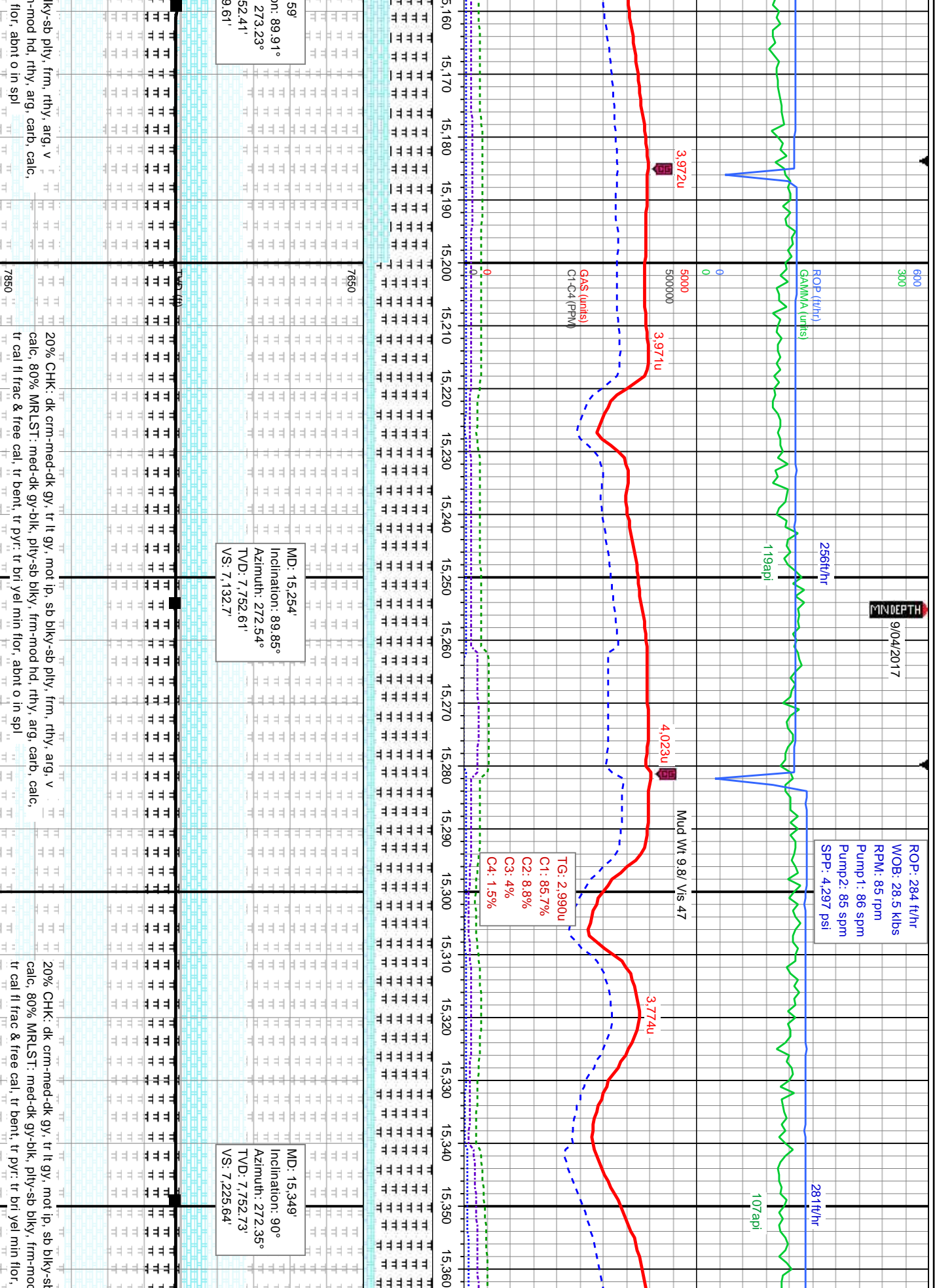
MD: 14.400'
Inclination: 89.78°
Azimuth: 265.84°
TVD: 7.750.1'
VS: 6.306.58'

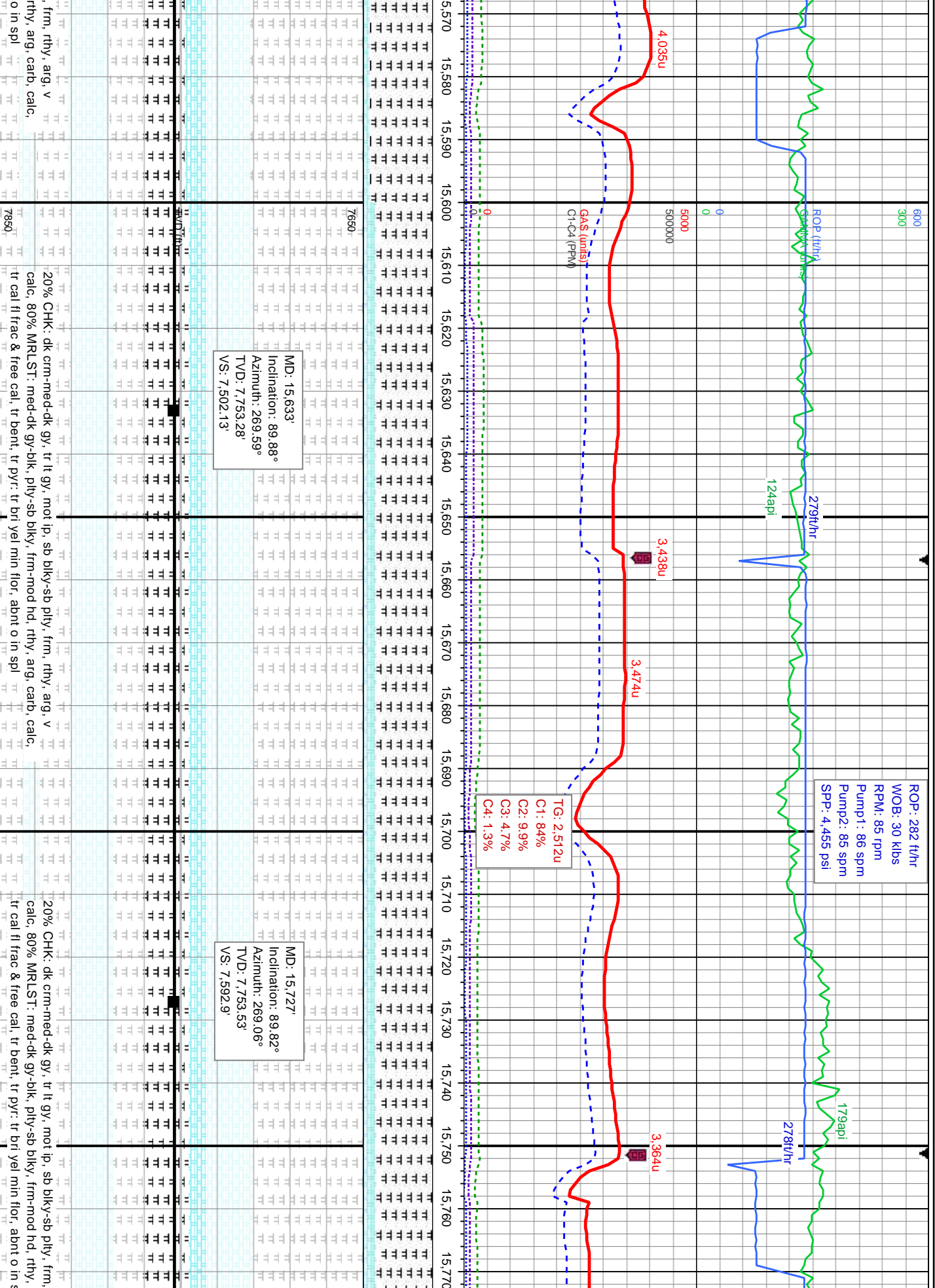
10% CHK: dk crm-med-dk gy, tr lt gy, mot ip, sb blk-y-sb ply, frm, rthy, arg, v
calc, 90% MRLST: med-dk gy-blk, ply-sb blk-y, frm-mod hd, rthy, arg, carb, calc, tr cal
tr cal fl frac & free cal, tr bent, tr pyr: tr bri, yel min flr, abnt o in spl

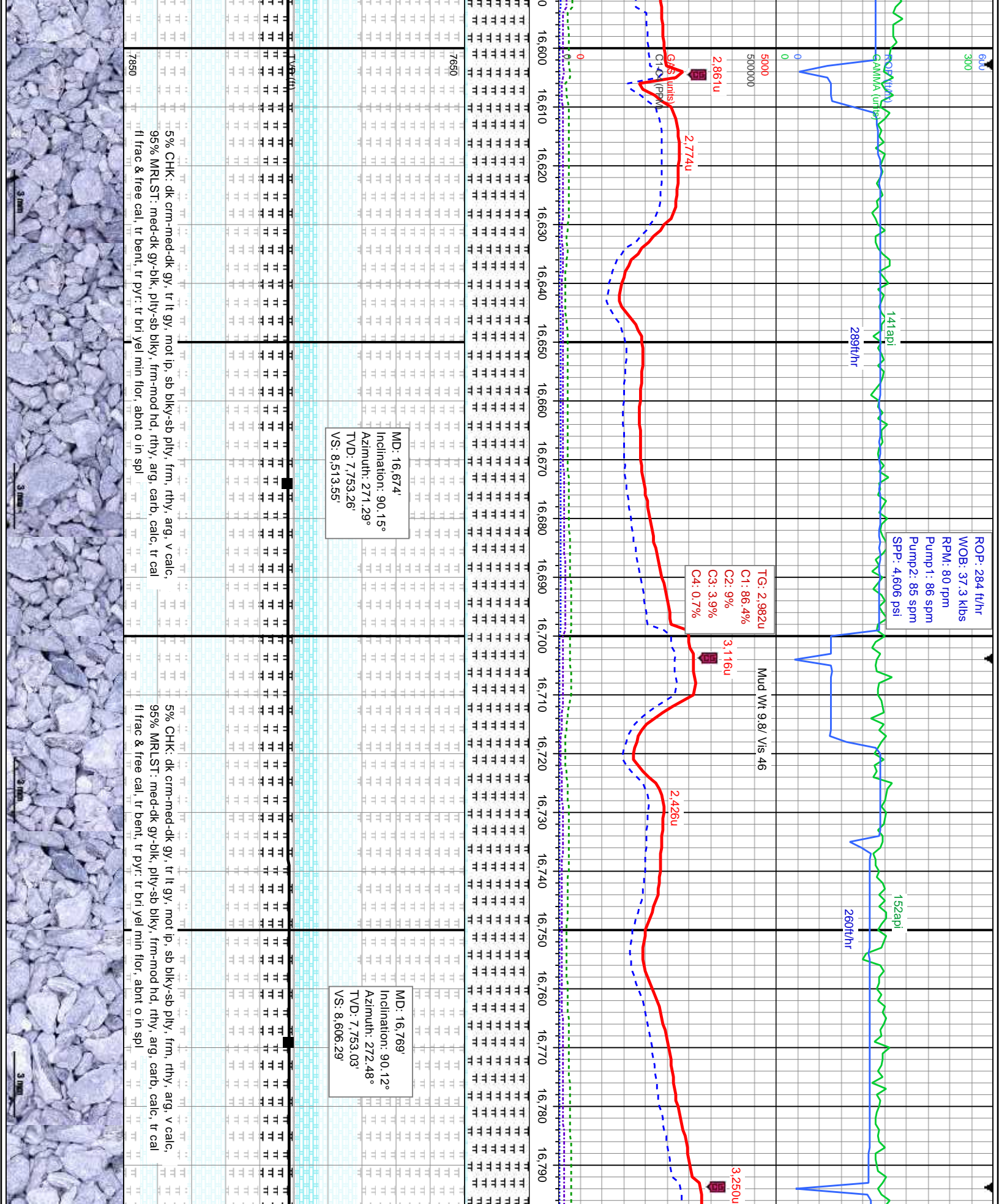
10% CHK: dk crm-med-dk gy, tr lt gy, mot ip, sb blk-y-sb ply, frm, rthy, arg, v
calc, 90% MRLST: med-dk gy-blk, ply-sb blk-y, frm-mod hd, rthy, arg, carb, calc, tr cal
tr cal fl frac & free cal, tr bent, tr pyr: tr bri, yel min flr, abnt o in spl

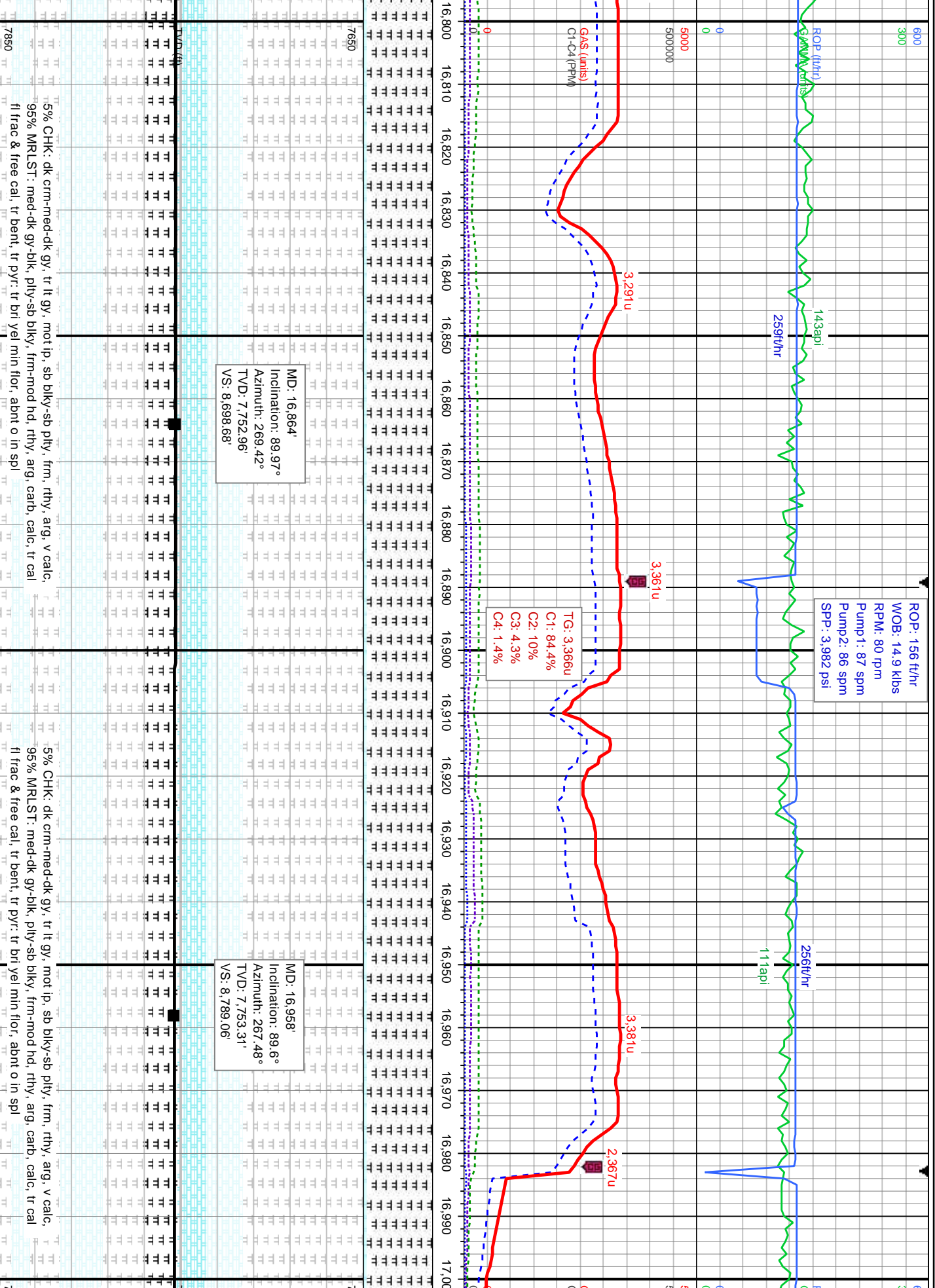


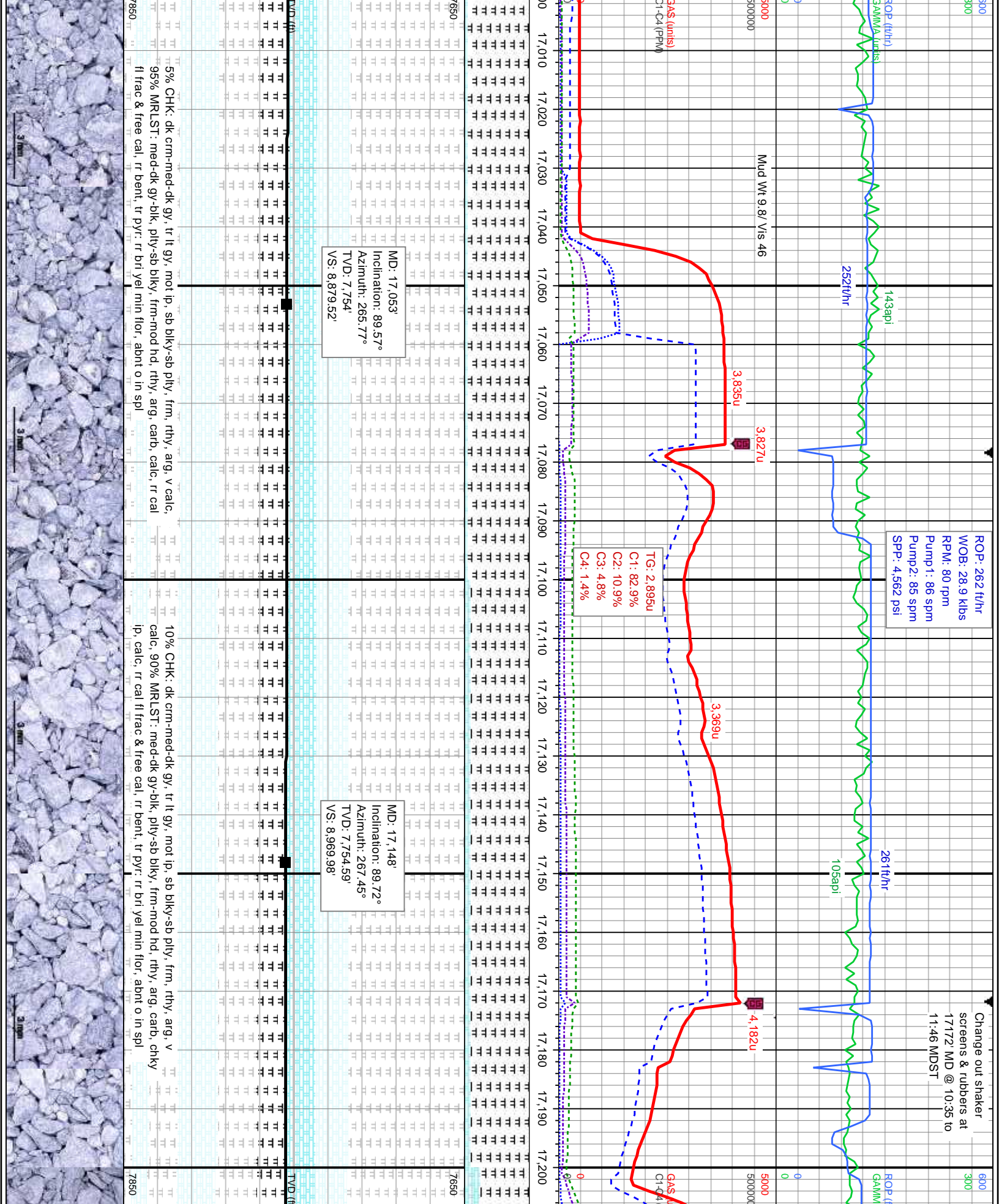


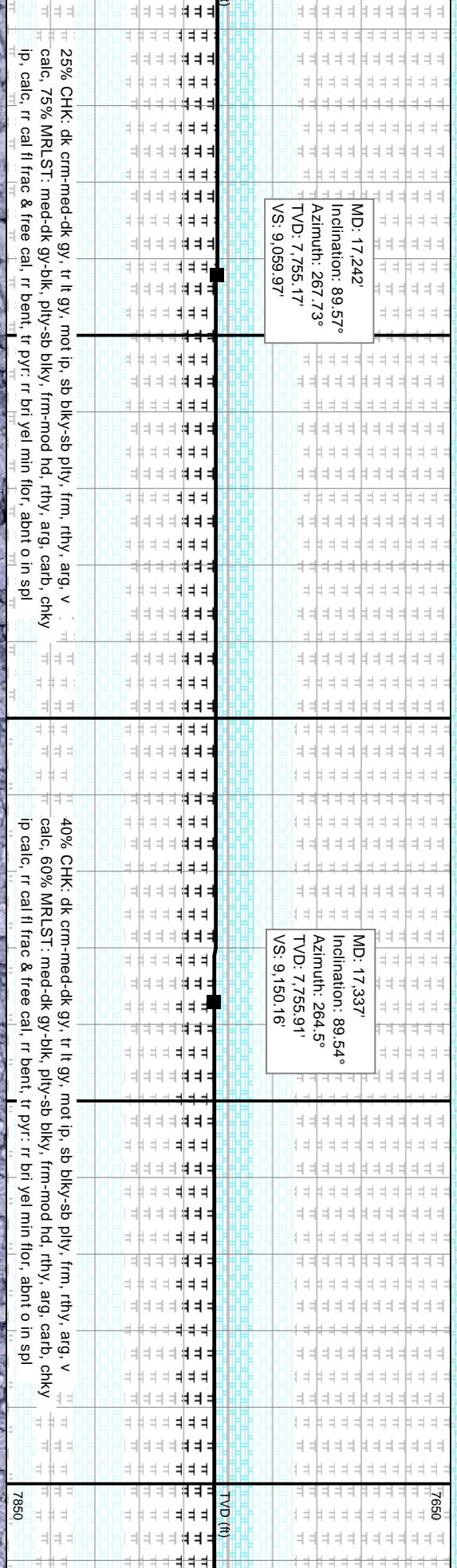
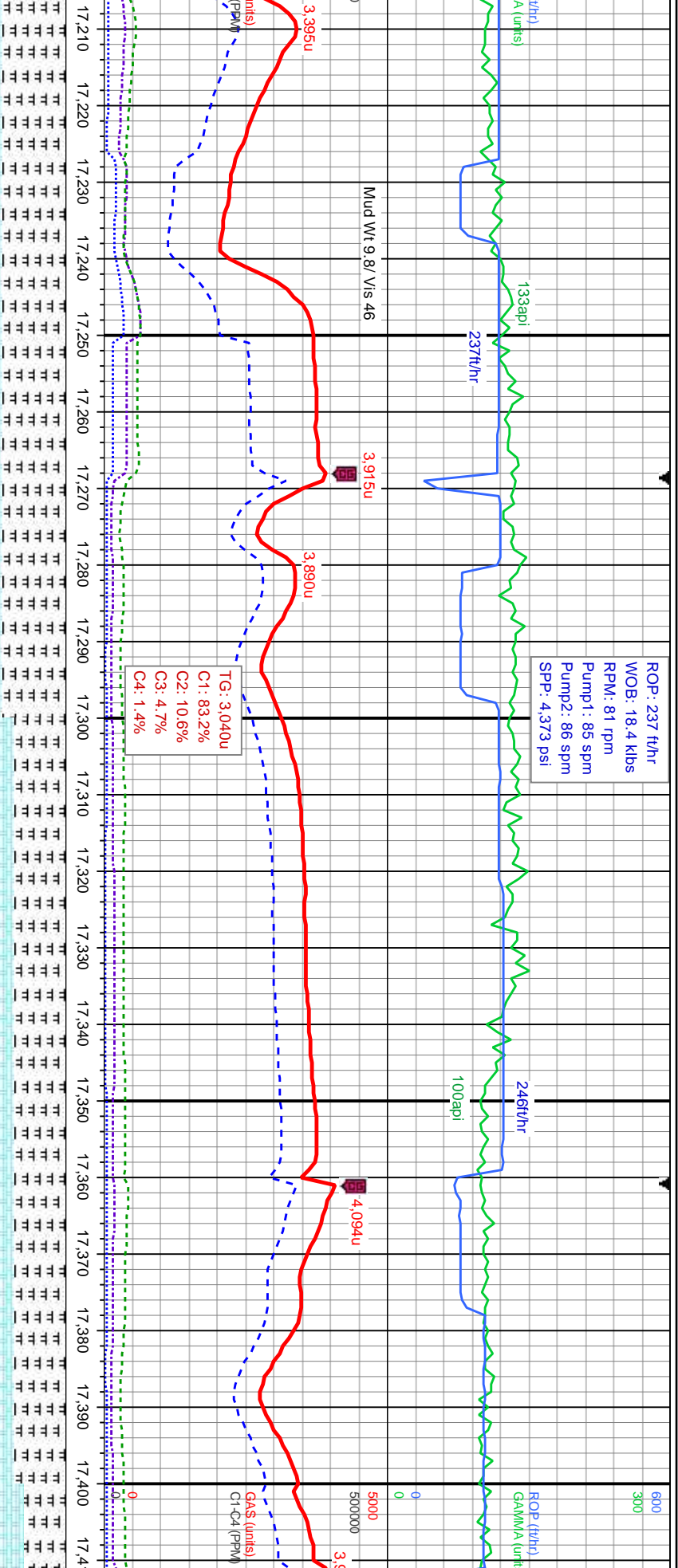


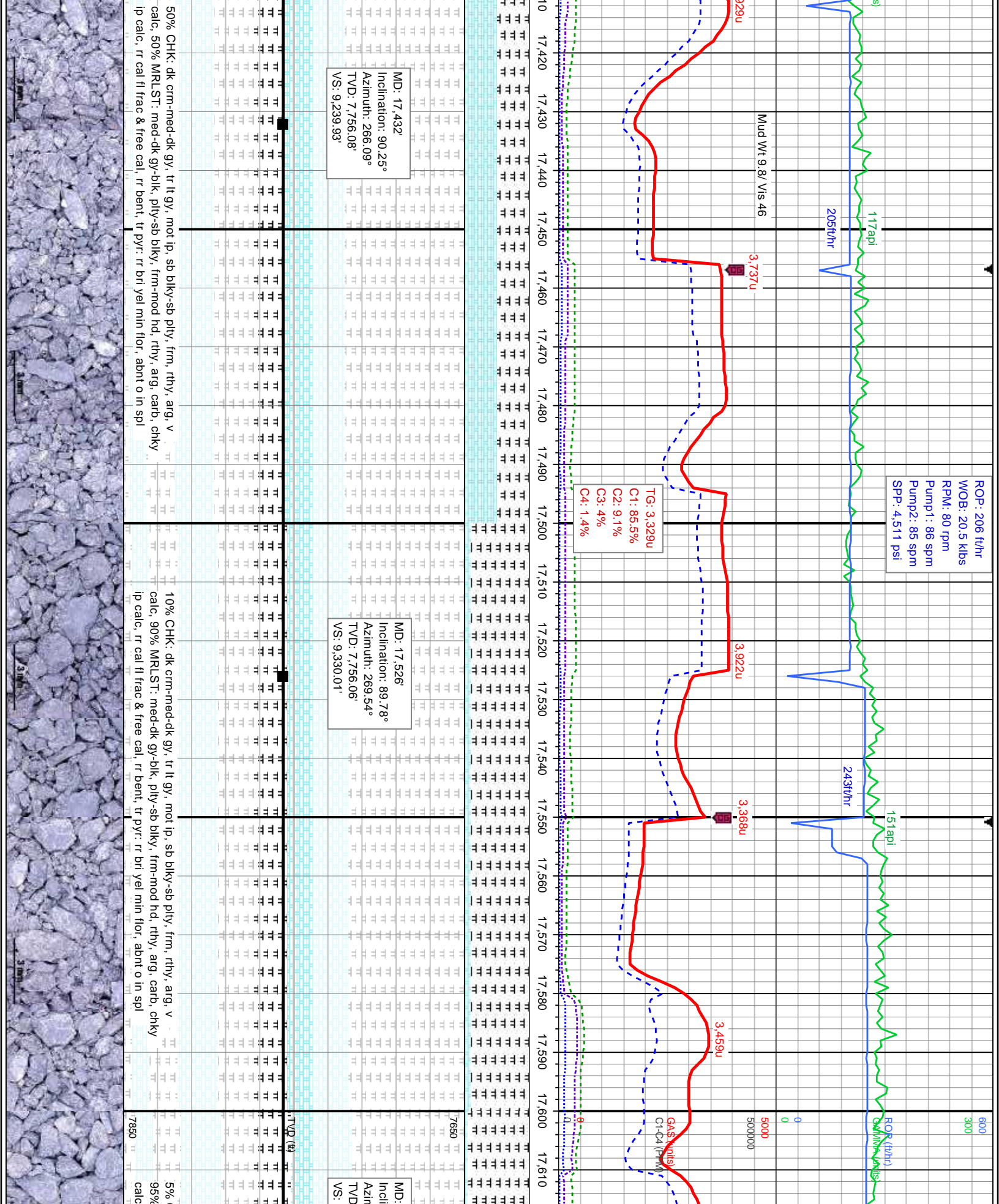


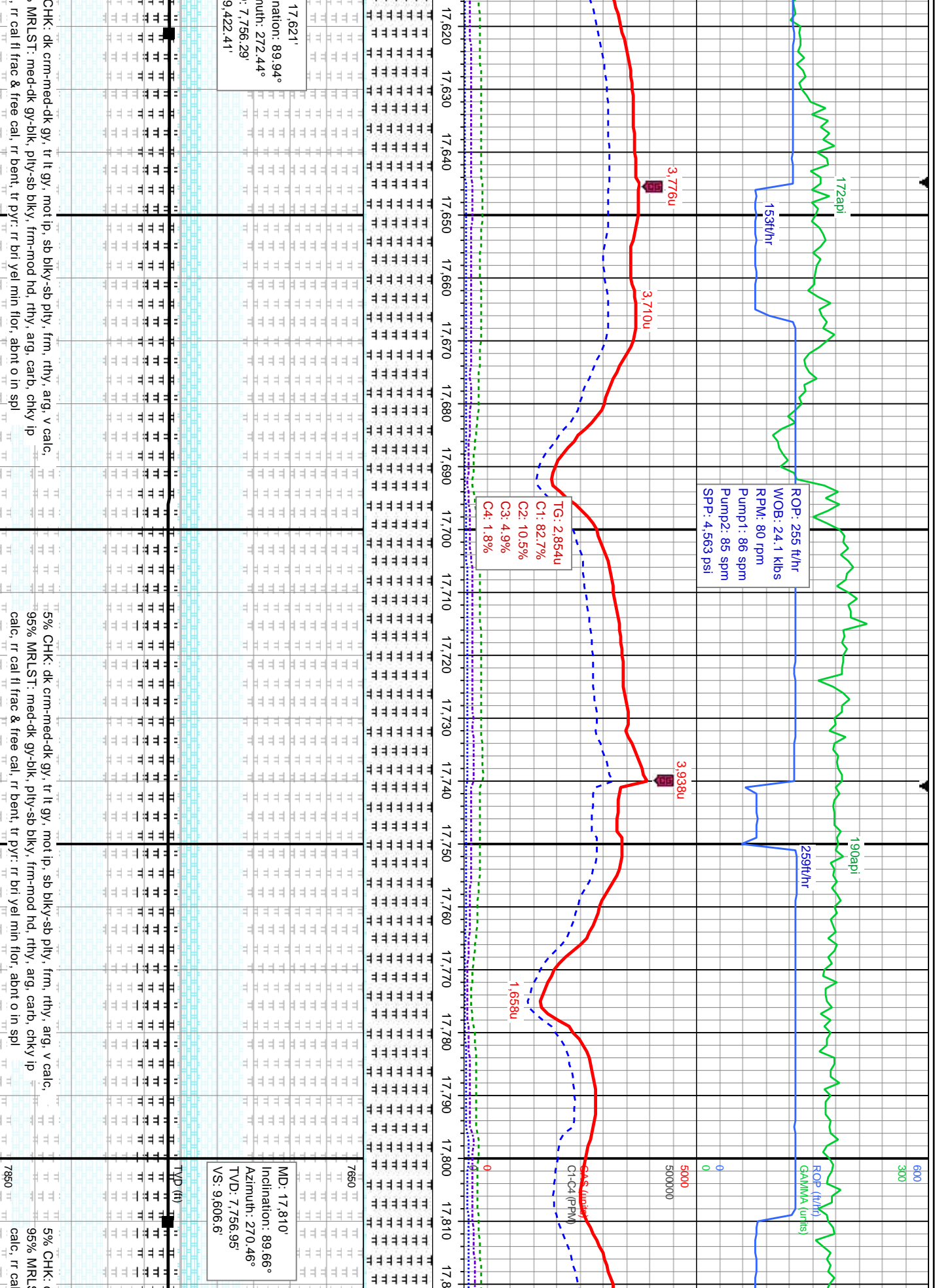


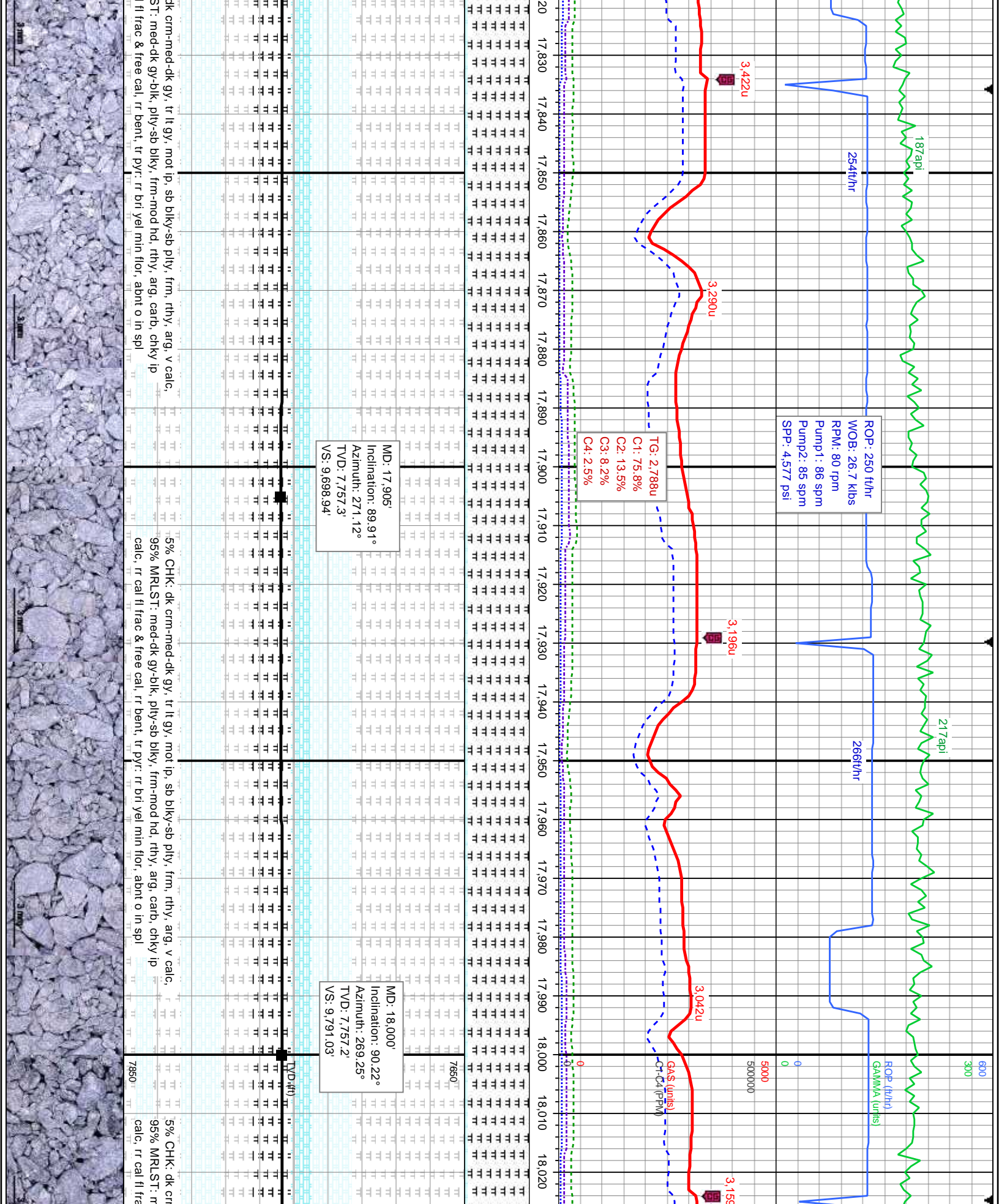


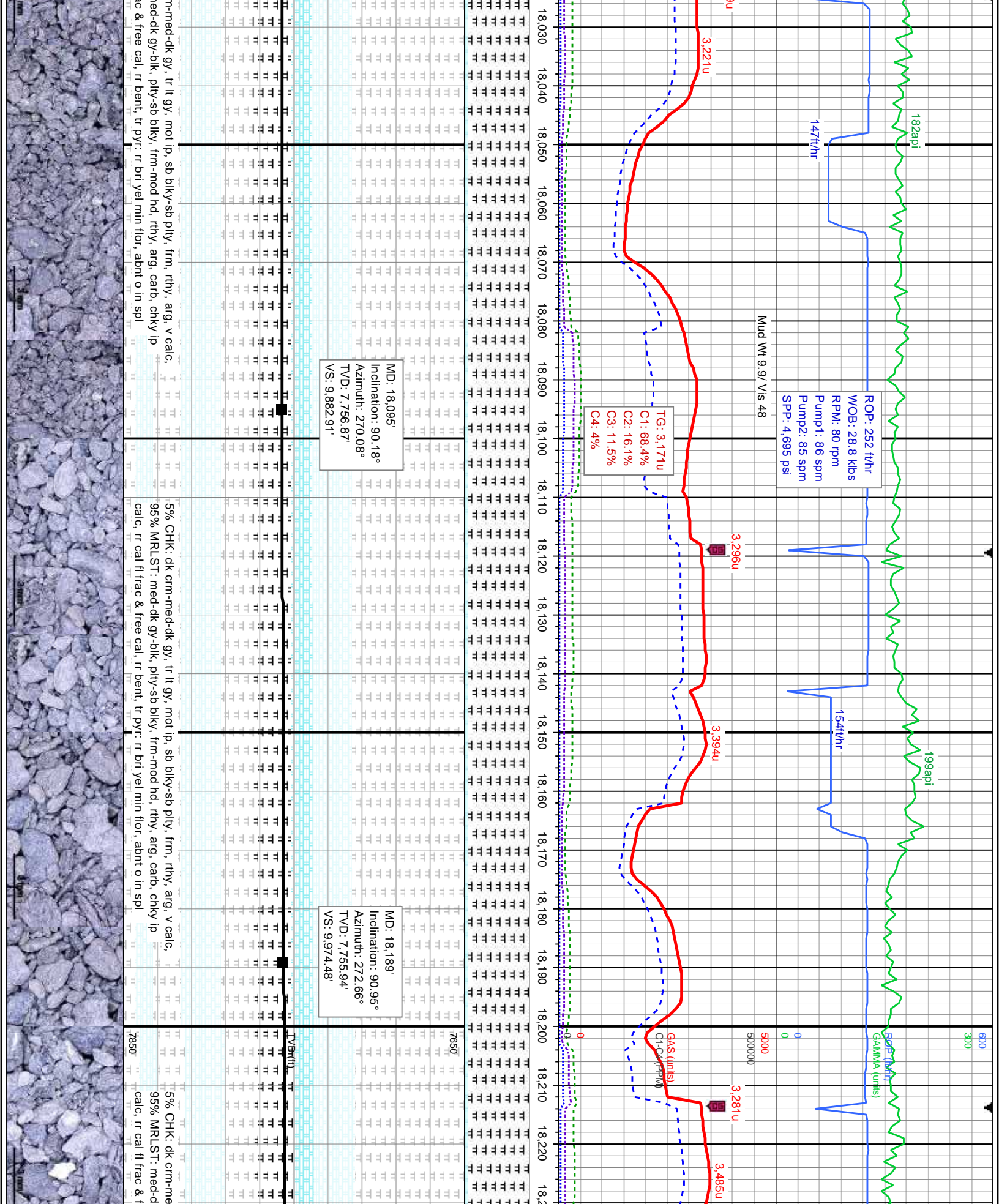


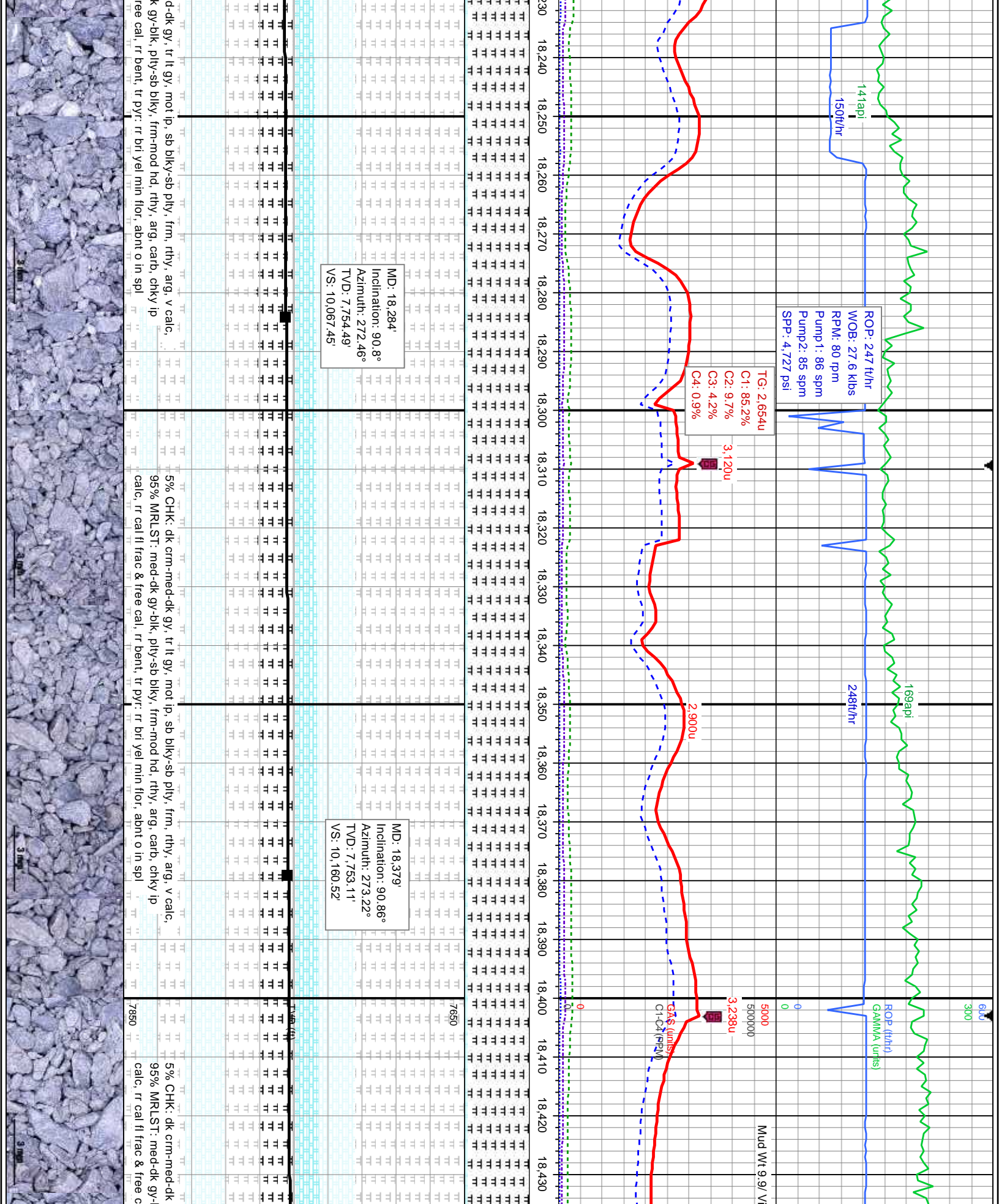


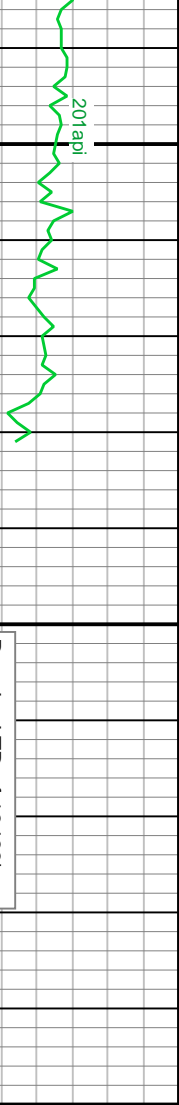








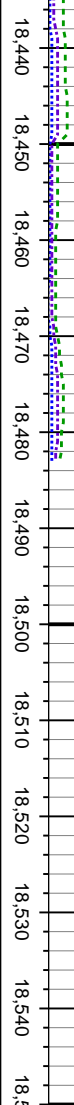




Reached TD of 18483'
MD @ 21:22 MDST on
9/4/2017

Mud Wt: 9.7
Vis: 46
Yell'd Pt: 10
HTHP: 9.4@250
NAP/Water: 55.0/22.0
Chlorides: 45.000

2.631u



MD: 18,459'
Inclination: 90.95°
Azimuth: 273.51°
TVD: 7,752.03'
VS: 10,239.13'

MD: 18,483'
Inclination: 90.95°
Azimuth: 273.51°
TVD: 7,751.63'
VS: 10,262.69'

THANK YOU FOR
USING COLUMBINE
LOGGING INC.

