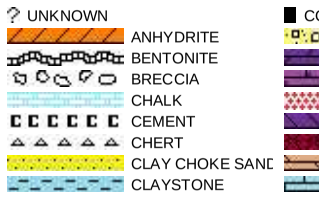
COLUMBINE LOGGING

Scale: 5" / 100'
Measured Depth Log

Well Name	Howard_37N_33HZ_MUD		
Location	NWSE: SEC: 28 TWP: 1N 67W		
State	COLORADO	**County**	WELD
Country	U.S.A.	**Rig Number**	XTREME 6
API Number	05123380320000	**AFE #**	2087575
Region	DJ BASIN	**Field**	WATTENBERG
Spud Date	1/3/2014	**Drilling Completed**	1/10/2014
Surface Coordinates	1633' FSL 1420' FEL		
Bottom Hole Coordinates	460' FSL 1570' FFELL		
Ground Elevation	5021'	**K.B. Elevation**	5037'
Logged Interval	7200' **To** 12402'	**Total Depth**	12402'
Formation	NIOBRARA		
Type of Drilling Fluid	LSND/ PHPA		

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

Name	ISAAC SMITH &
Company	COLUMBINE L
Address	2385 S. Lipan S Denver, CO 802



Operator

1800
202

Geologist

& JASON BEACH

OGGING INC.

Street
223

Rock Types

OAL
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
SILTY SHALE
SILTSTONE
TILL
TUFF
WELDED TUFF

Accessories

Fossils

ALGAE
AMPHIPORA
BELEMNITE
BIOCLASTIC
BRACHOIPOD
BRYOZOA
CEPHALOPOD
CORAL
CRINOID
ECHINOID
FISH
FORAMINIFERA
FOSSIL
GASTROPOD
INOCERAMUS
OOLITE
OSTRACOD
PELECYPOD
PELLET
PISOLITE
PLANT REMAINS
PLANT SPORES
SCAPHOPOD
STROMATOPOROID

Minerals

ANHYDRITIC
ARGILLACEOUS
ARGILLITE GRAIN
BENTONITE
BITUMENOUS SUBSTANCE
BRECCIA FRAGMENTS
CALCAREOUS
CARBONACEOUS FLAKES
CHTDK
CHTLT
COAL - THIN BEDS
DOLOMITIC
FELDSPAR
FERRUGINOUS PELLET
FERRUGINOUS
GLAUCONITE
GYPSIFEROUS
HEAVY MINERAL
KAOLIN
MARLSTONE
MICACEOUS
MINERAL CRYSTALS
NODULES
PHOSPHATE PELLETS
PYRITE
SALT CAST
SANDY
SILICEOUS
SILTY
TUFFACEOUS

Stringer

ANHYDRITE STRINGER
BENTONITE STRINGER
COAL STRINGER
DOLOMITE STRINGER
GYPSUM STRINGER
LIMESTONE STRINGER
MARLSTONE (CALC) STRG
MARLSTONE (DOL) STRG
SANDSTONE STRINGER
SHALE STRINGER
SILTSTONE STRINGER

Other Symbols

Oil Show

PINPOINT
VUGGY

Engineering

DEAD
EVEN
QUESTIONABLE
SPOTTED STAINING
BIT
CONNECTION (UP)
CONNECTION (DOWN)
CONNECTION GAS
CONNECTION GAS (LEFT)
TRIP GAS
TRIP GAS (LEFT)
DOWN TIME GAS
DOWN TIME GAS (LEFT)
CORE - LOST
CORE - RECOVERED
DST INTERVAL
FAULT
FORMATION TOP
GAS SHOW
OIL SHOW
MN DEPTH UP
MN DEPTH (DOWN)
NORMAL FAULT
OVERTURNED STRATA
REVERSE FAULT
CASING
SIDEWALL CORE (LEFT)
SIDEWALL CORE (RIGHT)
SLIDE
SURVEY
WIRELINE TESTED - LEFT
WIRELINE TESTED - RT
DRILL STEM TEST
MN DEPTH

Porosity

EARTHY
FENESTRAL
FRACTURE
INTERCRYSTALLINE
INTEROOLITIC
MOLDIC
ORGANIC

Rounding

ANGULAR
ROUNDED
SUBANG
SUBRND
BOUNDSTONE
CHALKY
CRYPTOXLN
EARTHY
FINELYXLN
GRAINSTONE
LITHOGRAPHIC
MICROXLN
MUDSTONE
PACKSTONE
WACKESTONE

Textures

Sorting

MODERATE
POOR
WELL

Slide/Rotate

ROP
ROF
GAMMA

200
GAMMA (api)
0

BEGIN HOWARD 37N-33HZ @ 7200' MD. DRILLING 8.75" HOLE. BIT #1, SMITH SDi611, JH5331. DEPTH IN: 1046' MD. KOP: 7195' MD.

COLUMBINE LOGGING INC.
2-MAN LOGGING CREW
1/4/2014 - BLOODHOUND UNIT #0312

Bit #: 1
Type: SDi611
Size: 8.75"
Depth In: 1046'
Depth Out: 8162'
Total Drilled: 7116'
Hours: 24.3
Avg Ft/Hr: 292.84
Jets: 6x18
S/N: JH5331

117

Total Gas & Chromatograph
GAS
C1
C2
C3
C4

4000
400000
GAS (units)
C1-C4 (PPM)
0

ROP/GAS DATA FROM IBALL
GAMMA DATA FROM
BAKER HUGHES

DRILLING UNDERBALANCED
W/ SUPER MUD/ GAS SEPARATOR

MUD DATA
WT: 10
FV: 45
PV: 9
YP: 13
CK: 2/NA
Sol: 9
pH: 9
Chl: 1,400

1850u
399u

PIERRE SHALE

Depth Labels
7,010 7,020 7,030 7,040 7,050 7,060 7,070 7,080 7,090 7,100 7,110 7,120 7,130 7,140 7,150 7,160 7,170 7,180

% Lith

Well Bore
TVD

6000
TVD (ft)
8000

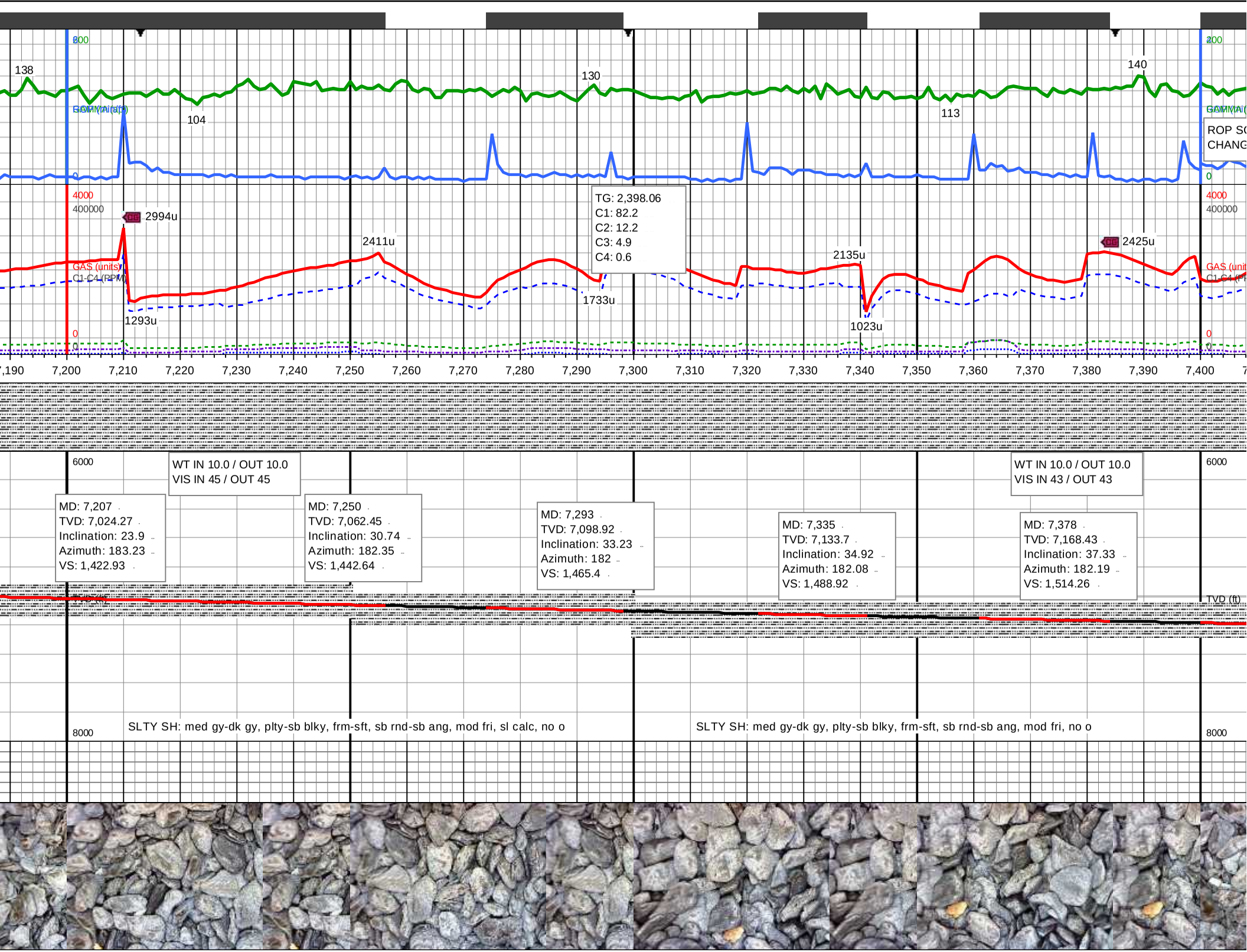
100' SAMPLE INTERVALS
100' SAMPLE DESCRIPTIONS

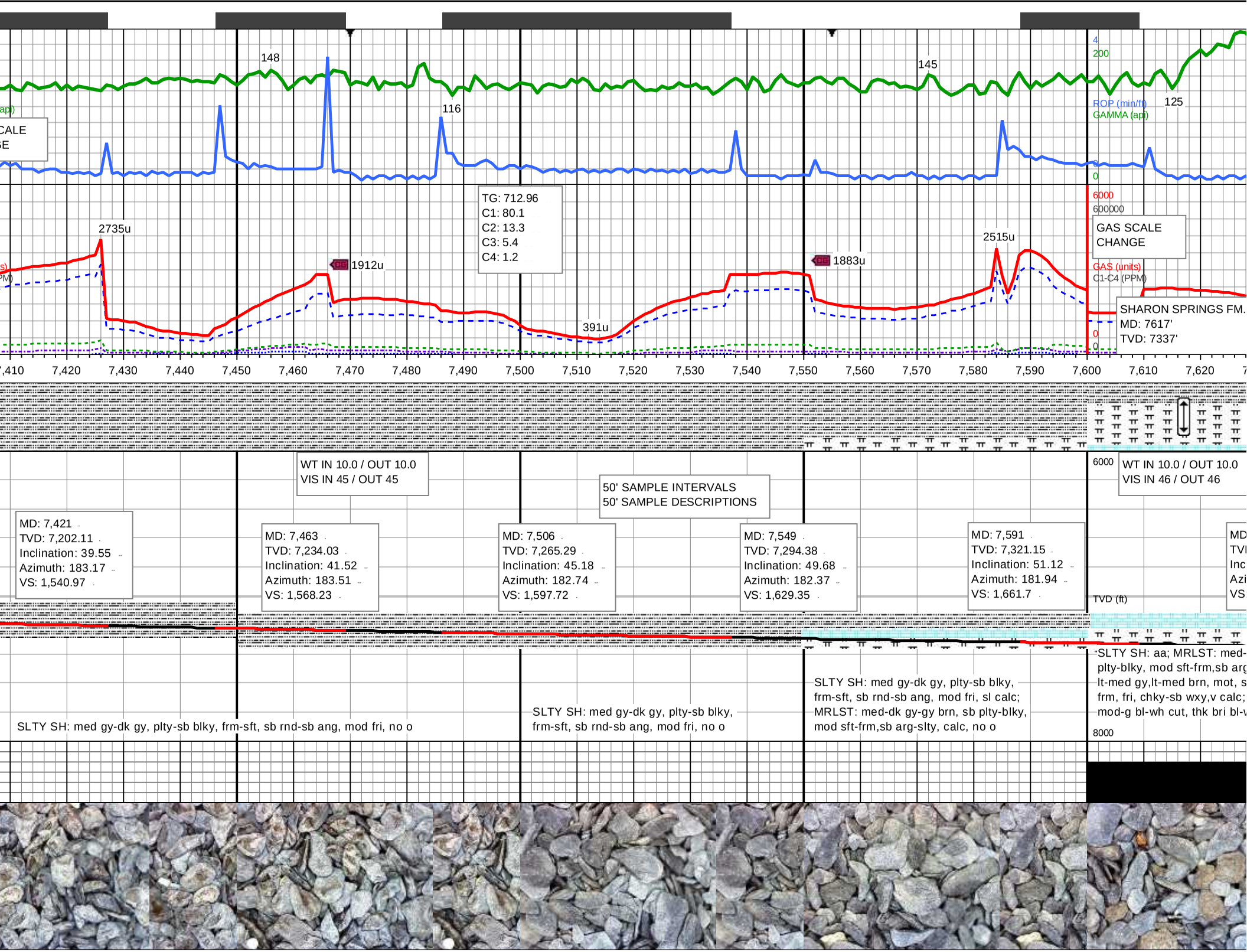
MD: 7,165
TVD: 6,985.12
Inclination: 18.47
Azimuth: 186.09
VS: 1,407.8

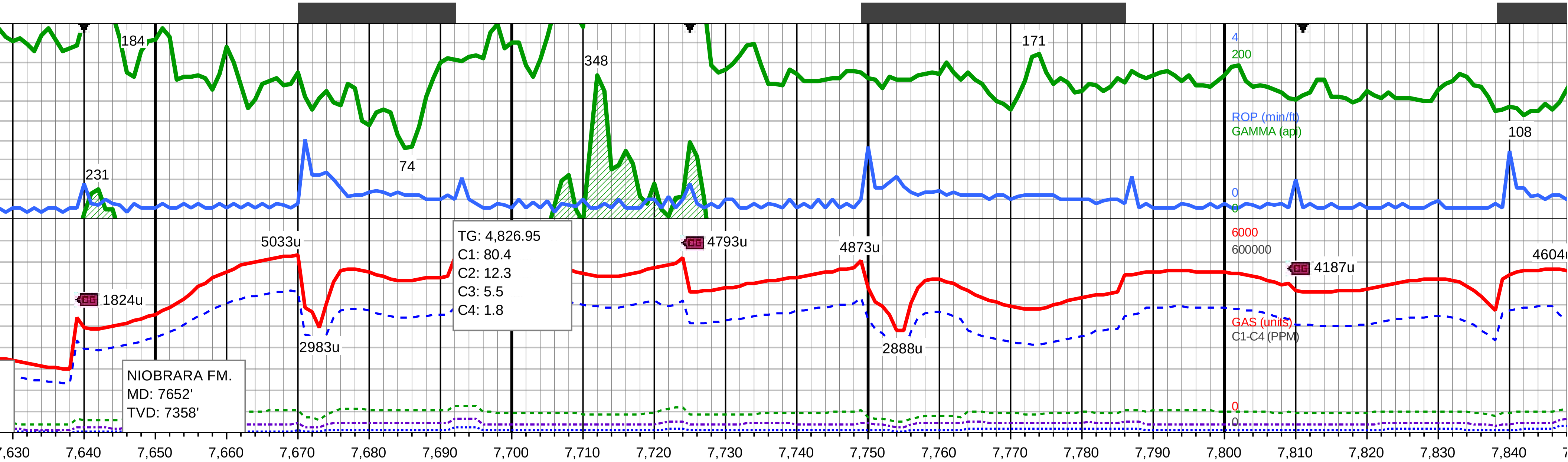
SLTY SH: med gy-dk gy, plty-sb blky, frm-sft, sb rnd-sb ang, mod fri, sl calc, no o

Oil Show
83
66
50
33
16

Images


200
138
104
130
140
113
0
4000
400000
2994u
2411u
1293u
TG: 2,398.06
C1: 82.2
C2: 12.2
C3: 4.9
C4: 0.6
1733u
2135u
1023u
2425u
GAS (units)
C1-C4 (PPM)
7,190
7,200
7,210
7,220
7,230
7,240
7,250
7,260
7,270
7,280
7,290
7,300
7,310
7,320
7,330
7,340
7,350
7,360
7,370
7,380
7,390
7,400
6000
8000
WT IN 10.0 / OUT 10.0
VIS IN 45 / OUT 45
MD: 7,207
TVD: 7,024.27
Inclination: 23.9
Azimuth: 183.23
VS: 1,422.93
MD: 7,250
TVD: 7,062.45
Inclination: 30.74
Azimuth: 182.35
VS: 1,442.64
MD: 7,293
TVD: 7,098.92
Inclination: 33.23
Azimuth: 182
VS: 1,465.4
MD: 7,335
TVD: 7,133.7
Inclination: 34.92
Azimuth: 182.08
VS: 1,488.92
WT IN 10.0 / OUT 10.0
VIS IN 43 / OUT 43
MD: 7,378
TVD: 7,168.43
Inclination: 37.33
Azimuth: 182.19
VS: 1,514.26
TVD (ft)
SLTY SH: med gy-dk gy, plty-sb blky, frm-sft, sb rnd-sb ang, mod fri, sl calc, no o
SLTY SH: med gy-dk gy, plty-sb blky, frm-sft, sb rnd-sb ang, mod fri, no o


148
116
145
125
4
200
ROP (min/ft)
GAMMA (api)
0
6000
600000
GAS SCALE CHANGE
GAS (units)
C1-C4 (PPM)
TG: 712.96
C1: 80.1
C2: 13.3
C3: 5.4
C4: 1.2
2735u
1912u
391u
1883u
2515u
SHARON SPRINGS FM.
MD: 7617'
TVD: 7337'
7,410
7,420
7,430
7,440
7,450
7,460
7,470
7,480
7,490
7,500
7,510
7,520
7,530
7,540
7,550
7,560
7,570
7,580
7,590
7,600
7,610
7,620
WT IN 10.0 / OUT 10.0
VIS IN 45 / OUT 45
50' SAMPLE INTERVALS
50' SAMPLE DESCRIPTIONS
WT IN 10.0 / OUT 10.0
VIS IN 46 / OUT 46
MD: 7,421
TVD: 7,202.11
Inclination: 39.55
Azimuth: 183.17
VS: 1,540.97
MD: 7,463
TVD: 7,234.03
Inclination: 41.52
Azimuth: 183.51
VS: 1,568.23
MD: 7,506
TVD: 7,265.29
Inclination: 45.18
Azimuth: 182.74
VS: 1,597.72
MD: 7,549
TVD: 7,294.38
Inclination: 49.68
Azimuth: 182.37
VS: 1,629.35
MD: 7,591
TVD: 7,321.15
Inclination: 51.12
Azimuth: 181.94
VS: 1,661.7
6000
TVD (ft)
8000
SLTY SH: med gy-dk gy, plty-sb blky, frm-sft, sb rnd-sb ang, mod fri, no o
SLTY SH: med gy-dk gy, plty-sb blky, frm-sft, sb rnd-sb ang, mod fri, no o
SLTY SH: med gy-dk gy, plty-sb blky, frm-sft, sb rnd-sb ang, mod fri, sl calc; MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, calc, no o
SLTY SH: aa; MRLST: med-
plty-blky, mod sft-frm,sb arg
lt-med gy,lt-med brn, mot, s
frm, fri, chky-sb wxy,v calc;
mod-g bl-wh cut, thk bri bl-v



WT IN 10.0 / OUT 10.0
VIS IN 46 / OUT 46

6000

WT IN 10.0 / OUT 10.0
VIS IN 46 / OUT 46

: 7,634
D: 7,347.61
lination: 52.91
muth: 180.97
: 1,695.59

MD: 7,676
TVD: 7,372.53
Inclination: 54.32
Azimuth: 179.59
VS: 1,729.4

MD: 7,719
TVD: 7,397.06
Inclination: 56.1
Azimuth: 179.32
VS: 1,764.7

MD: 7,762
TVD: 7,420.17
Inclination: 58.87
Azimuth: 179.31
VS: 1,800.95

MD: 7,804
TVD: 7,440.79
Inclination: 62.32
Azimuth: 179.92
VS: 1,837.53

MD: 7,847
TVD: 7,460
Inclination: 6
Azimuth: 18
VS: 1,875.99

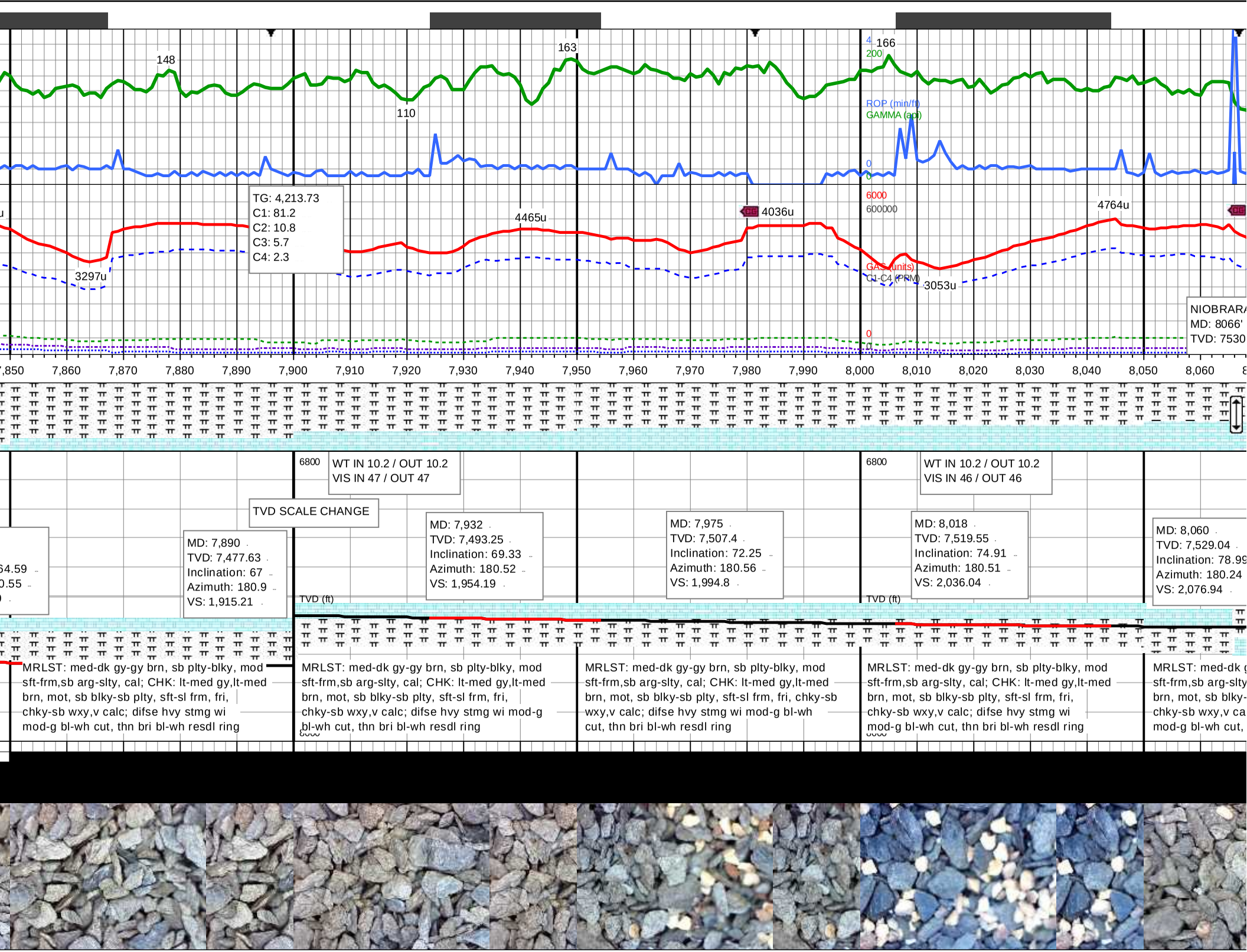
dk gy-gy brn, sb
g-slty, cal; CHK:
b blky-sb plty, sft-sl
difse hvy stmg wi
wh resdl ring

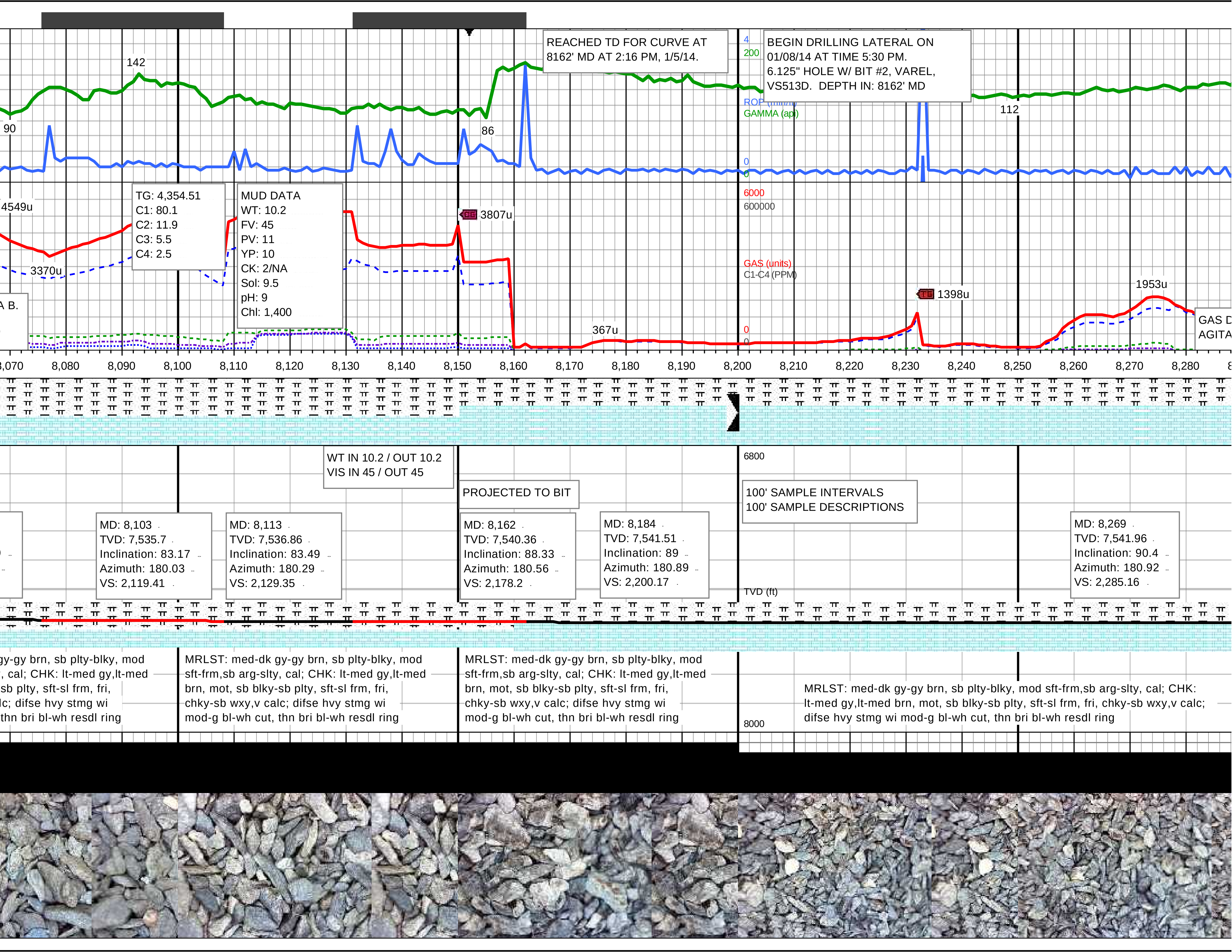
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, cal; CHK: lt-med gy,lt-med brn, mot, sb blky-sb plty, sft-sl frm, fri, chky-sb wxy,v calc; difse hvy stmg wi mod-g bl-wh cut, thk bri bl-wh resdl ring

MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, cal; CHK: lt-med gy,lt-med brn, mot, sb blky-sb plty, sft-sl frm, fri, chky-sb wxy,v calc; difse hvy stmg wi mod-g bl-wh cut, thk bri bl-wh resdl ring

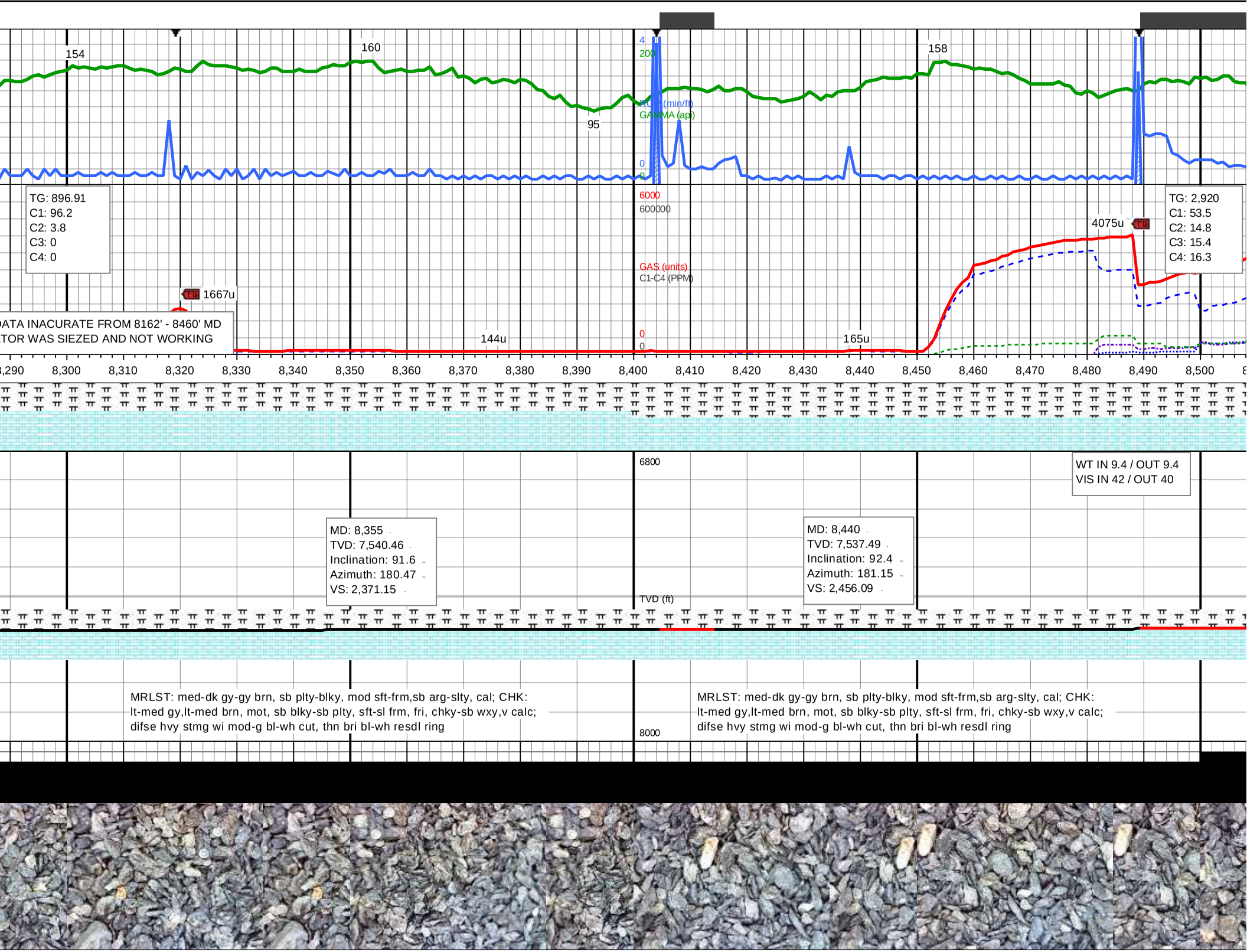
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, cal; CHK: lt-med gy,lt-med brn, mot, sb blky-sb plty, sft-sl frm, fri, chky-sb wxy,v calc; difse hvy stmg wi mod-g bl-wh cut, thk bri bl-wh resdl ring

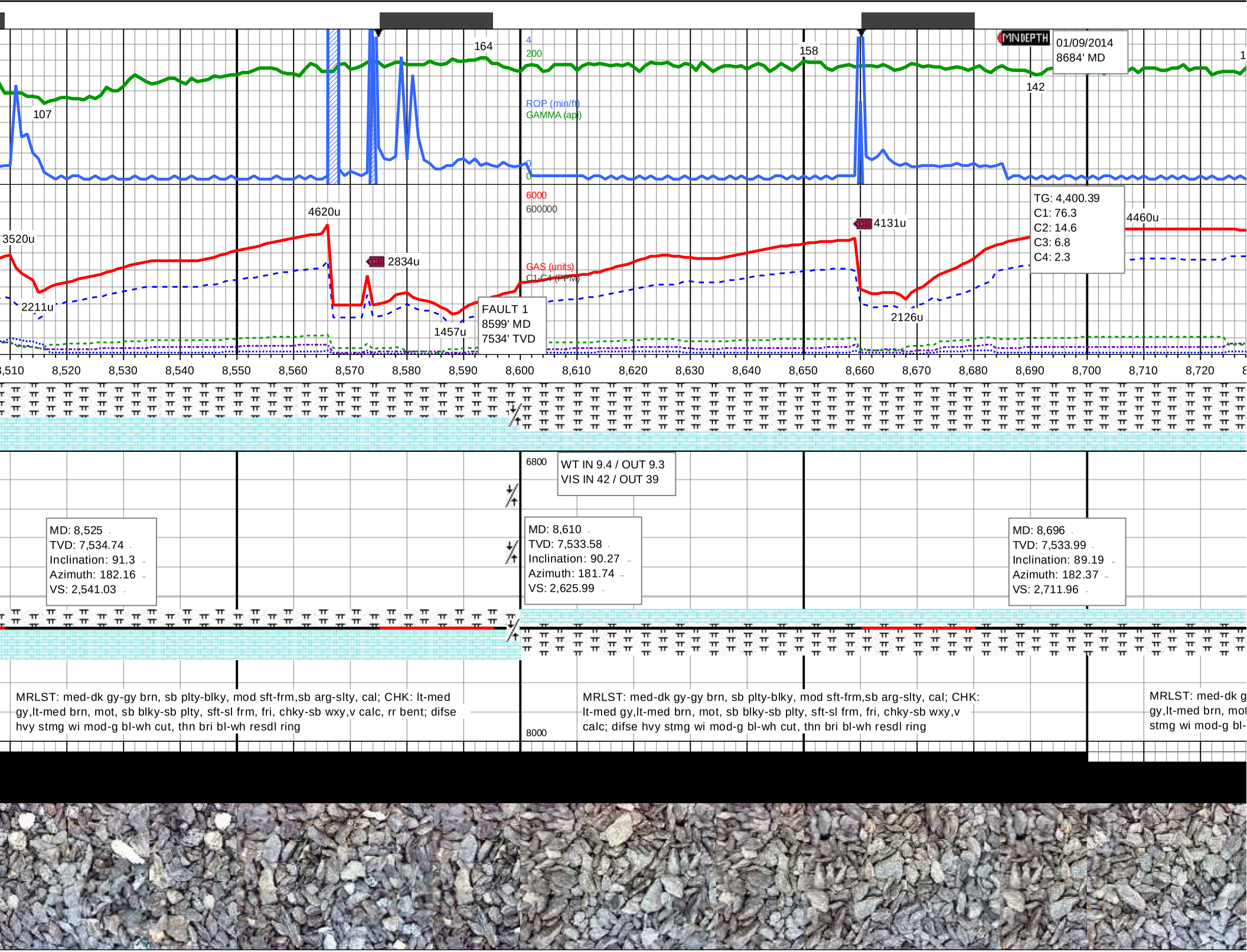
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, cal; CHK: lt-med gy,lt-med brn, mot, sb blky-sb plty, sft-sl frm, fri, chky-sb wxy,v calc; difse hvy stmg wi mod-g bl-wh cut, thk bri bl-wh resdl ring

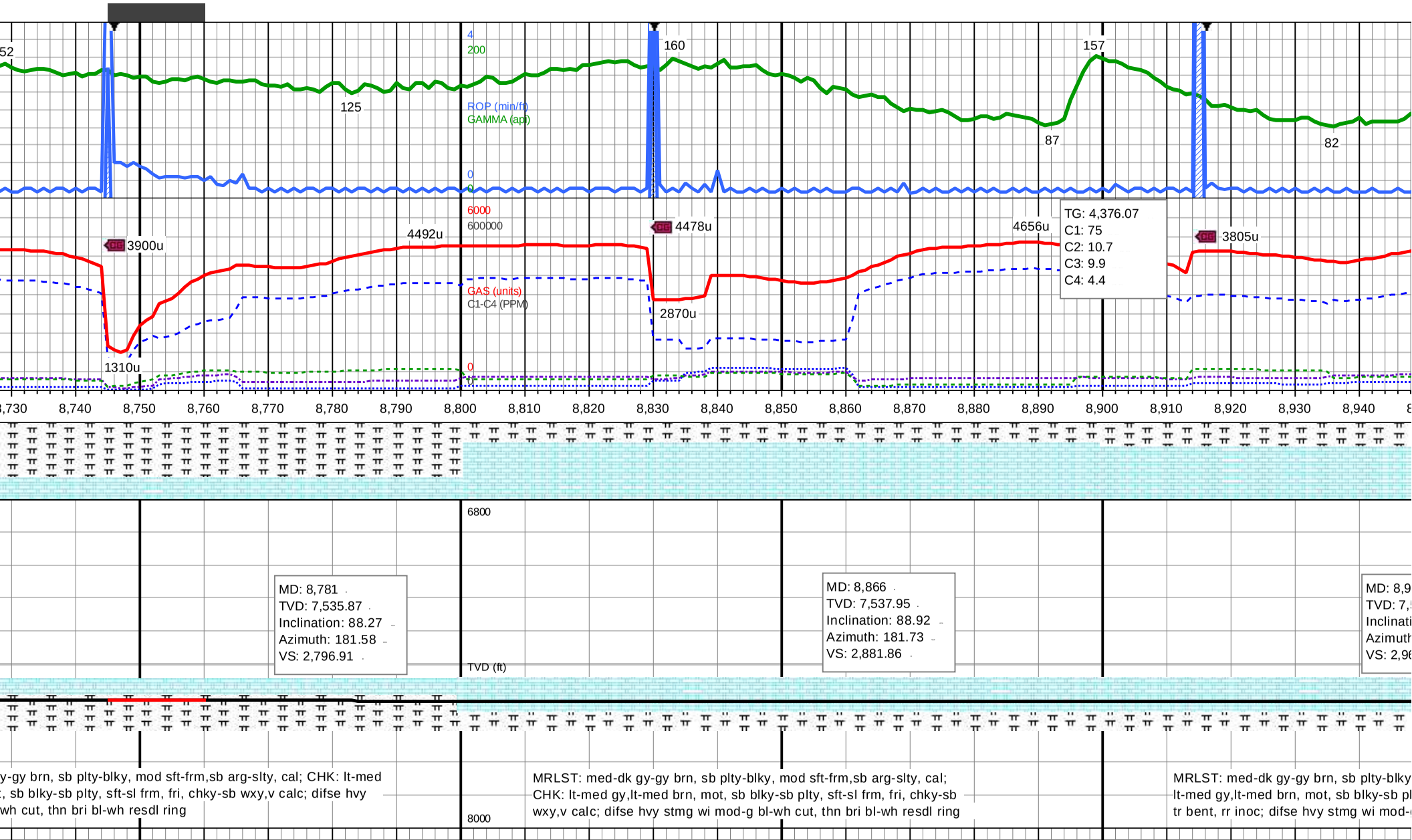

148
110
163
166
ROP (min/ft)
GAMMA (api)
TG: 4,213.73
C1: 81.2
C2: 10.8
C3: 5.7
C4: 2.3
3297u
4465u
4036u
3053u
4764u
GAS (units)
C1-C4 (PRM)
NIOBRARA
MD: 8066'
TVD: 7530
7,850
7,860
7,870
7,880
7,890
7,900
7,910
7,920
7,930
7,940
7,950
7,960
7,970
7,980
7,990
8,000
8,010
8,020
8,030
8,040
8,050
8,060
TVD SCALE CHANGE
WT IN 10.2 / OUT 10.2
VIS IN 47 / OUT 47
WT IN 10.2 / OUT 10.2
VIS IN 46 / OUT 46
MD: 7,890
TVD: 7,477.63
Inclination: 67
Azimuth: 180.9
VS: 1,915.21
MD: 7,932
TVD: 7,493.25
Inclination: 69.33
Azimuth: 180.52
VS: 1,954.19
MD: 7,975
TVD: 7,507.4
Inclination: 72.25
Azimuth: 180.56
VS: 1,994.8
MD: 8,018
TVD: 7,519.55
Inclination: 74.91
Azimuth: 180.51
VS: 2,036.04
MD: 8,060
TVD: 7,529.04
Inclination: 78.99
Azimuth: 180.24
VS: 2,076.94
TVD (ft)
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, cal; CHK: lt-med gy,lt-med brn, mot, sb blky-sb plty, sft-sl frm, fri, chky-sb wxy,v calc; difse hvy stmg wi mod-g bl-wh cut, thn bri bl-wh resdl ring



REACHED TD FOR CURVE AT 8162' MD AT 2:16 PM, 1/5/14.
BEGIN DRILLING LATERAL ON 01/08/14 AT TIME 5:30 PM. 6.125" HOLE W/ BIT #2, VAREL, VS513D. DEPTH IN: 8162' MD
ROP (min/ft)
GAMMA (api)
GAS (units)
C1-C4 (PPM)
142
90
86
112
4549u
3370u
3807u
367u
1398u
1953u
TG: 4,354.51
C1: 80.1
C2: 11.9
C3: 5.5
C4: 2.5
MUD DATA
WT: 10.2
FV: 45
PV: 11
YP: 10
CK: 2/NA
Sol: 9.5
pH: 9
Chl: 1,400
8,070
8,080
8,090
8,100
8,110
8,120
8,130
8,140
8,150
8,160
8,170
8,180
8,190
8,200
8,210
8,220
8,230
8,240
8,250
8,260
8,270
8,280
WT IN 10.2 / OUT 10.2
VIS IN 45 / OUT 45
PROJECTED TO BIT
100' SAMPLE INTERVALS
100' SAMPLE DESCRIPTIONS
6800
TVD (ft)
8000
MD: 8,103
TVD: 7,535.7
Inclination: 83.17
Azimuth: 180.03
VS: 2,119.41
MD: 8,113
TVD: 7,536.86
Inclination: 83.49
Azimuth: 180.29
VS: 2,129.35
MD: 8,162
TVD: 7,540.36
Inclination: 88.33
Azimuth: 180.56
VS: 2,178.2
MD: 8,184
TVD: 7,541.51
Inclination: 89
Azimuth: 180.89
VS: 2,200.17
MD: 8,269
TVD: 7,541.96
Inclination: 90.4
Azimuth: 180.92
VS: 2,285.16
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, cal; CHK: lt-med gy,lt-med brn, mot, sb blky-sb plty, sft-sl frm, fri, chky-sb wxy,v calc; difse hvy stmg wi mod-g bl-wh cut, thn bri bl-wh resdl ring
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, cal; CHK: lt-med gy,lt-med brn, mot, sb blky-sb plty, sft-sl frm, fri, chky-sb wxy,v calc; difse hvy stmg wi mod-g bl-wh cut, thn bri bl-wh resdl ring
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, cal; CHK: lt-med gy,lt-med brn, mot, sb blky-sb plty, sft-sl frm, fri, chky-sb wxy,v calc; difse hvy stmg wi mod-g bl-wh cut, thn bri bl-wh resdl ring


154
160
95
158
4
200
ROP (min/ft)
GAMMA (api)
0
0
6000
600000
GAS (units)
C1-C4 (PPM)
0
0
TG: 896.91
C1: 96.2
C2: 3.8
C3: 0
C4: 0
1667u
DATA INACURATE FROM 8162' - 8460' MD
TOR WAS SIEZED AND NOT WORKING
144u
165u
4075u
TG: 2,920
C1: 53.5
C2: 14.8
C3: 15.4
C4: 16.3
8,290
8,300
8,310
8,320
8,330
8,340
8,350
8,360
8,370
8,380
8,390
8,400
8,410
8,420
8,430
8,440
8,450
8,460
8,470
8,480
8,490
8,500
6800
WT IN 9.4 / OUT 9.4
VIS IN 42 / OUT 40
MD: 8,355
TVD: 7,540.46
Inclination: 91.6
Azimuth: 180.47
VS: 2,371.15
MD: 8,440
TVD: 7,537.49
Inclination: 92.4
Azimuth: 181.15
VS: 2,456.09
TVD (ft)
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, cal; CHK: lt-med gy,lt-med brn, mot, sb blky-sb plty, sft-sl frm, fri, chky-sb wxy,v calc; difse hvy stmg wi mod-g bl-wh cut, thn bri bl-wh resdl ring
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, cal; CHK: lt-med gy,lt-med brn, mot, sb blky-sb plty, sft-sl frm, fri, chky-sb wxy,v calc; difse hvy stmg wi mod-g bl-wh cut, thn bri bl-wh resdl ring
8000

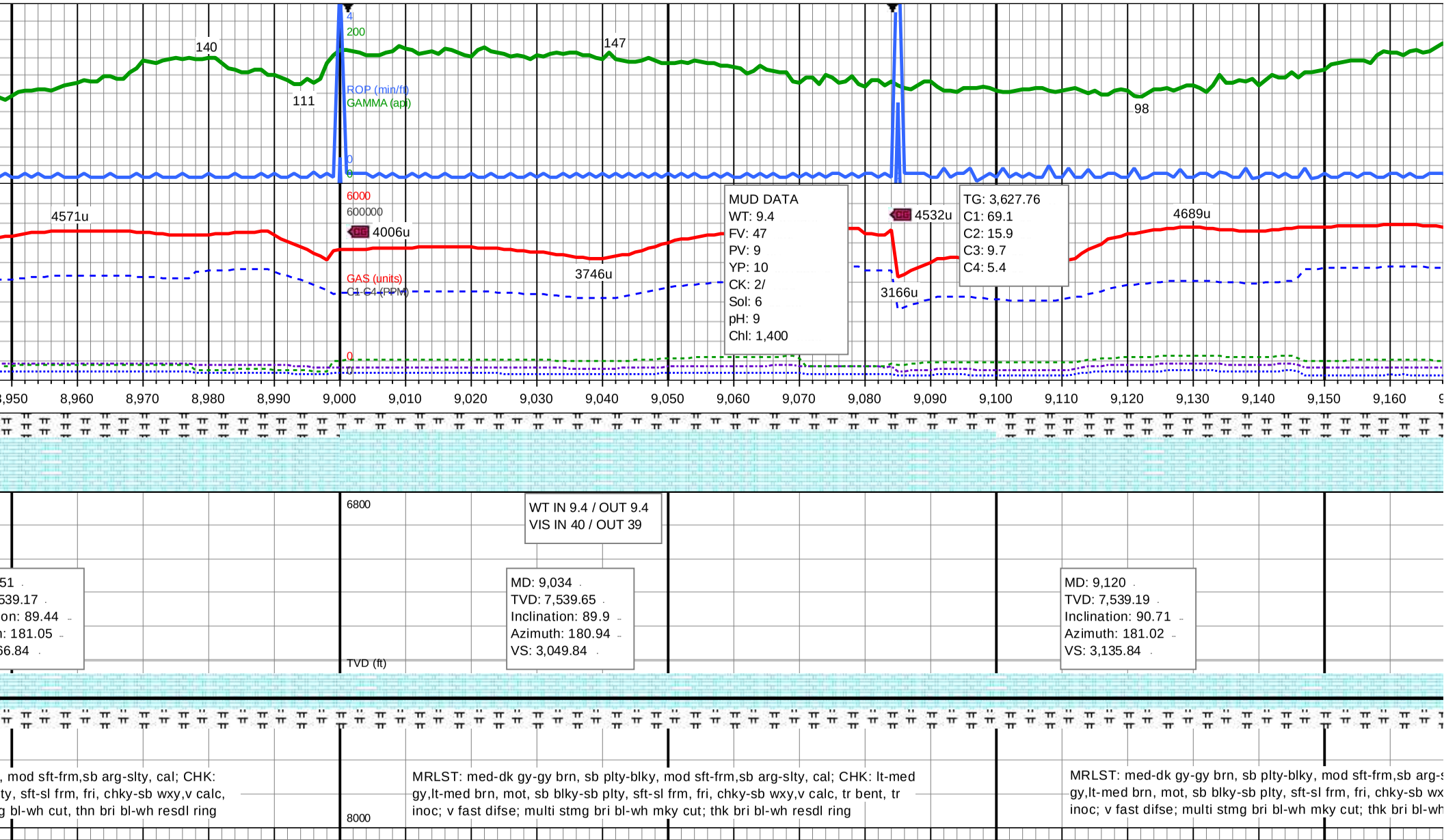

MNDEPTH
01/09/2014
8684' MD
4
200
ROP (min/ft)
GAMMA (api)
0
0
6000
600000
GAS (units)
C1-C4 (PPM)
164
158
142
107
4620u
4131u
4460u
3520u
2834u
2211u
1457u
2126u
TG: 4,400.39
C1: 76.3
C2: 14.6
C3: 6.8
C4: 2.3
FAULT 1
8599' MD
7534' TVD
8,510
8,520
8,530
8,540
8,550
8,560
8,570
8,580
8,590
8,600
8,610
8,620
8,630
8,640
8,650
8,660
8,670
8,680
8,690
8,700
8,710
8,720
6800
WT IN 9.4 / OUT 9.3
VIS IN 42 / OUT 39
MD: 8,525
TVD: 7,534.74
Inclination: 91.3
Azimuth: 182.16
VS: 2,541.03
MD: 8,610
TVD: 7,533.58
Inclination: 90.27
Azimuth: 181.74
VS: 2,625.99
MD: 8,696
TVD: 7,533.99
Inclination: 89.19
Azimuth: 182.37
VS: 2,711.96
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, cal; CHK: lt-med gy,lt-med brn, mot, sb blky-sb plty, sft-sl frm, fri, chky-sb wxy,v calc, rr bent; difse hvy stmg wi mod-g bl-wh cut, thn bri bl-wh resdl ring
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, cal; CHK: lt-med gy,lt-med brn, mot, sb blky-sb plty, sft-sl frm, fri, chky-sb wxy,v calc; difse hvy stmg wi mod-g bl-wh cut, thn bri bl-wh resdl ring
MRLST: med-dk g
gy,lt-med brn, mot
stmg wi mod-g bl-
8000

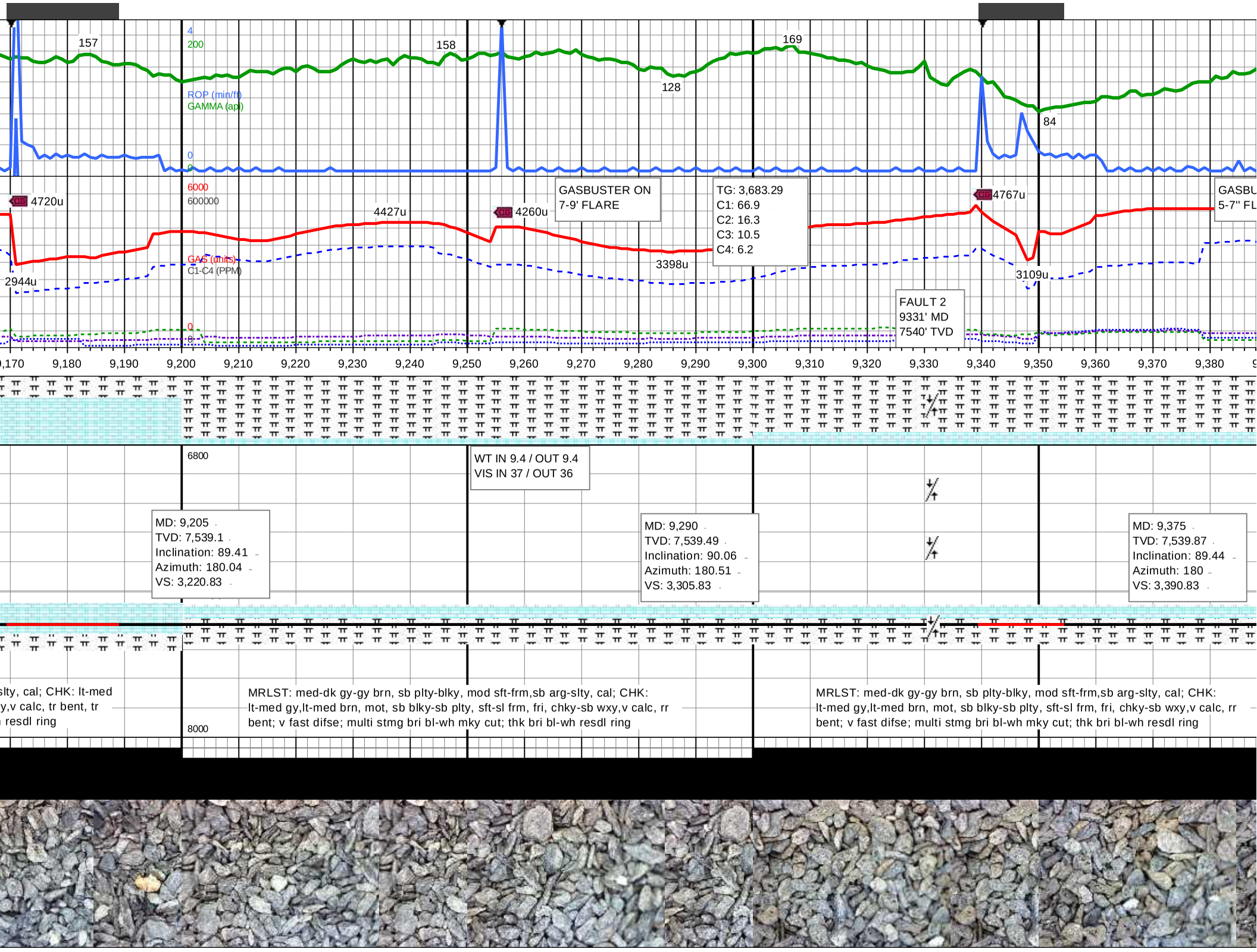


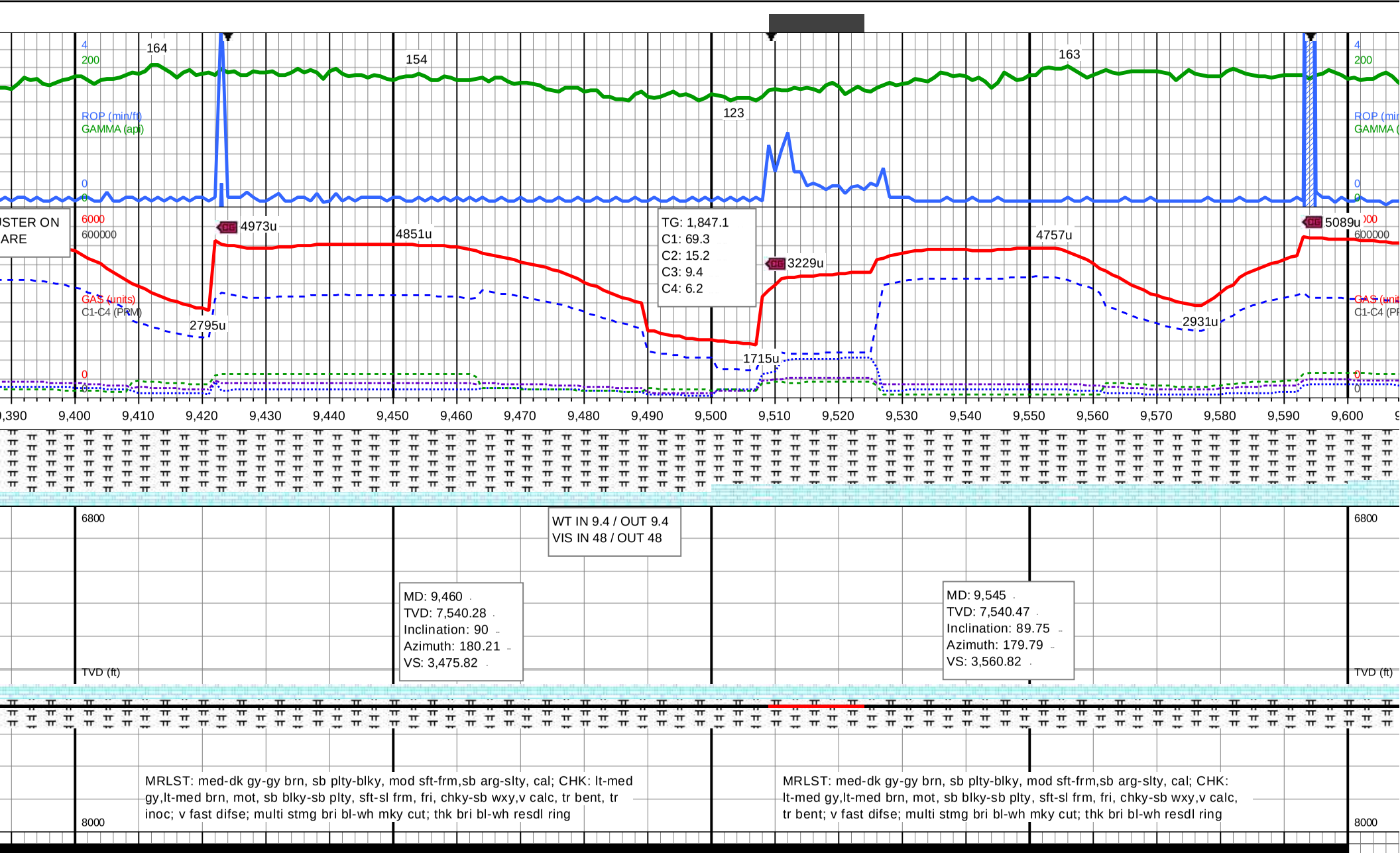
y-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, cal; CHK: lt-med
, sb blky-sb plty, sft-sl frm, fri, chky-sb wxy,v calc; difse hvy
wh cut, thn bri bl-wh resdl ring

MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, cal;
CHK: lt-med gy,lt-med brn, mot, sb blky-sb plty, sft-sl frm, fri, chky-sb
wxy,v calc; difse hvy stmg wi mod-g bl-wh cut, thn bri bl-wh resdl ring

MRLST: med-dk gy-gy brn, sb plty-blky
lt-med gy,lt-med brn, mot, sb blky-sb pl
tr bent, rr inoc; difse hvy stmg wi mod-

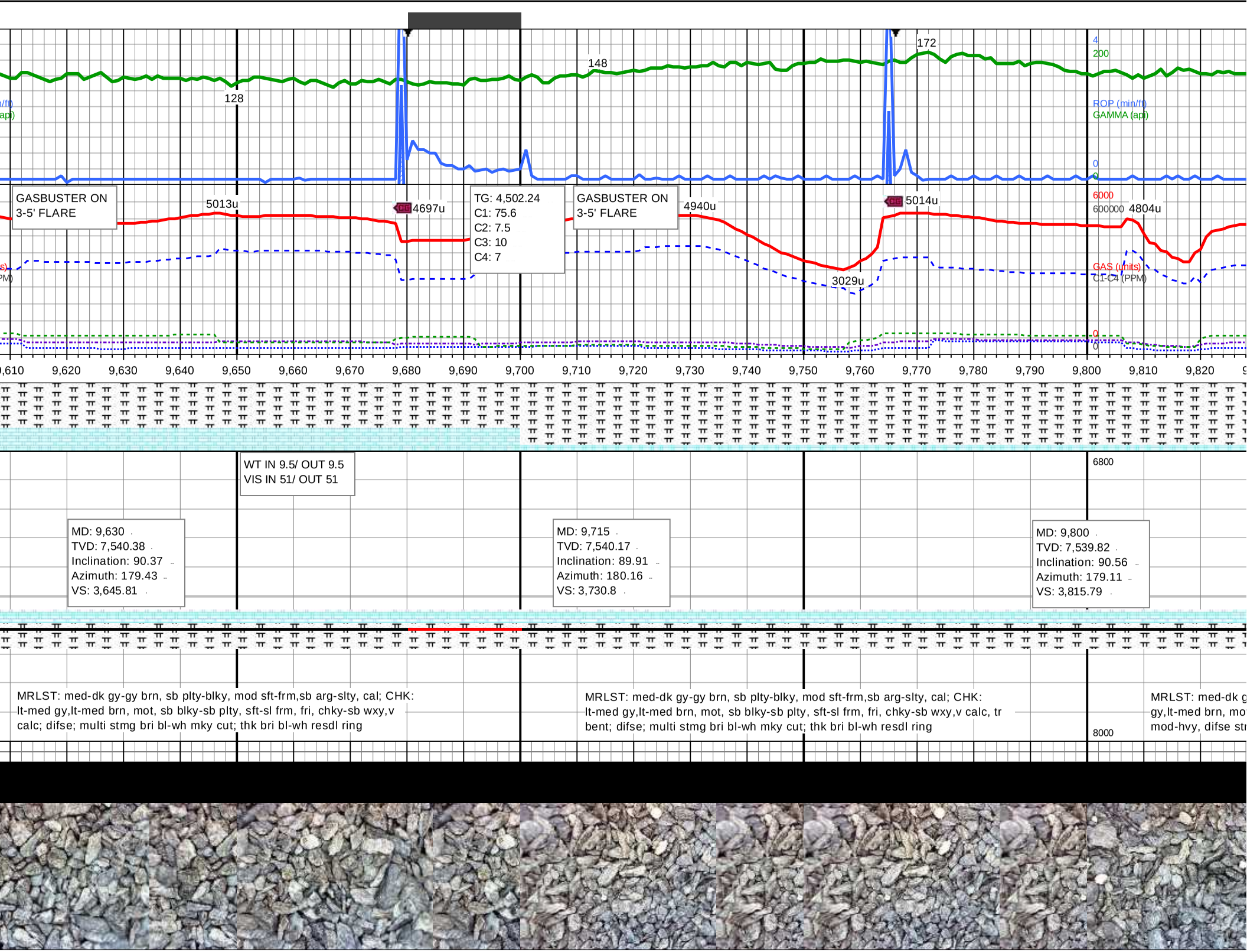

140
111
147
98
4
200
0
ROP (min/ft)
GAMMA (api)
6000
600000
4571u
4006u
3746u
4532u
3166u
4689u
GAS (units)
C1 C4 (PPM)
0
MUD DATA
WT: 9.4
FV: 47
PV: 9
YP: 10
CK: 2/
Sol: 6
pH: 9
Chl: 1,400
TG: 3,627.76
C1: 69.1
C2: 15.9
C3: 9.7
C4: 5.4
8,950
8,960
8,970
8,980
8,990
9,000
9,010
9,020
9,030
9,040
9,050
9,060
9,070
9,080
9,090
9,100
9,110
9,120
9,130
9,140
9,150
9,160
6800
WT IN 9.4 / OUT 9.4
VIS IN 40 / OUT 39
MD: 9,034
TVD: 7,539.65
Inclination: 89.9
Azimuth: 180.94
VS: 3,049.84
MD: 9,120
TVD: 7,539.19
Inclination: 90.71
Azimuth: 181.02
VS: 3,135.84
TVD (ft)
8000
, mod sft-frm,sb arg-slty, cal; CHK:
ty, sft-sl frm, fri, chky-sb wxy,v calc,
g bl-wh cut, thn bri bl-wh resdl ring
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, cal; CHK: lt-med
gy,lt-med brn, mot, sb blky-sb plty, sft-sl frm, fri, chky-sb wxy,v calc, tr bent, tr
inoc; v fast difse; multi stmg bri bl-wh mky cut; thk bri bl-wh resdl ring
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-s
gy,lt-med brn, mot, sb blky-sb plty, sft-sl frm, fri, chky-sb wx
inoc; v fast difse; multi stmg bri bl-wh mky cut; thk bri bl-wh

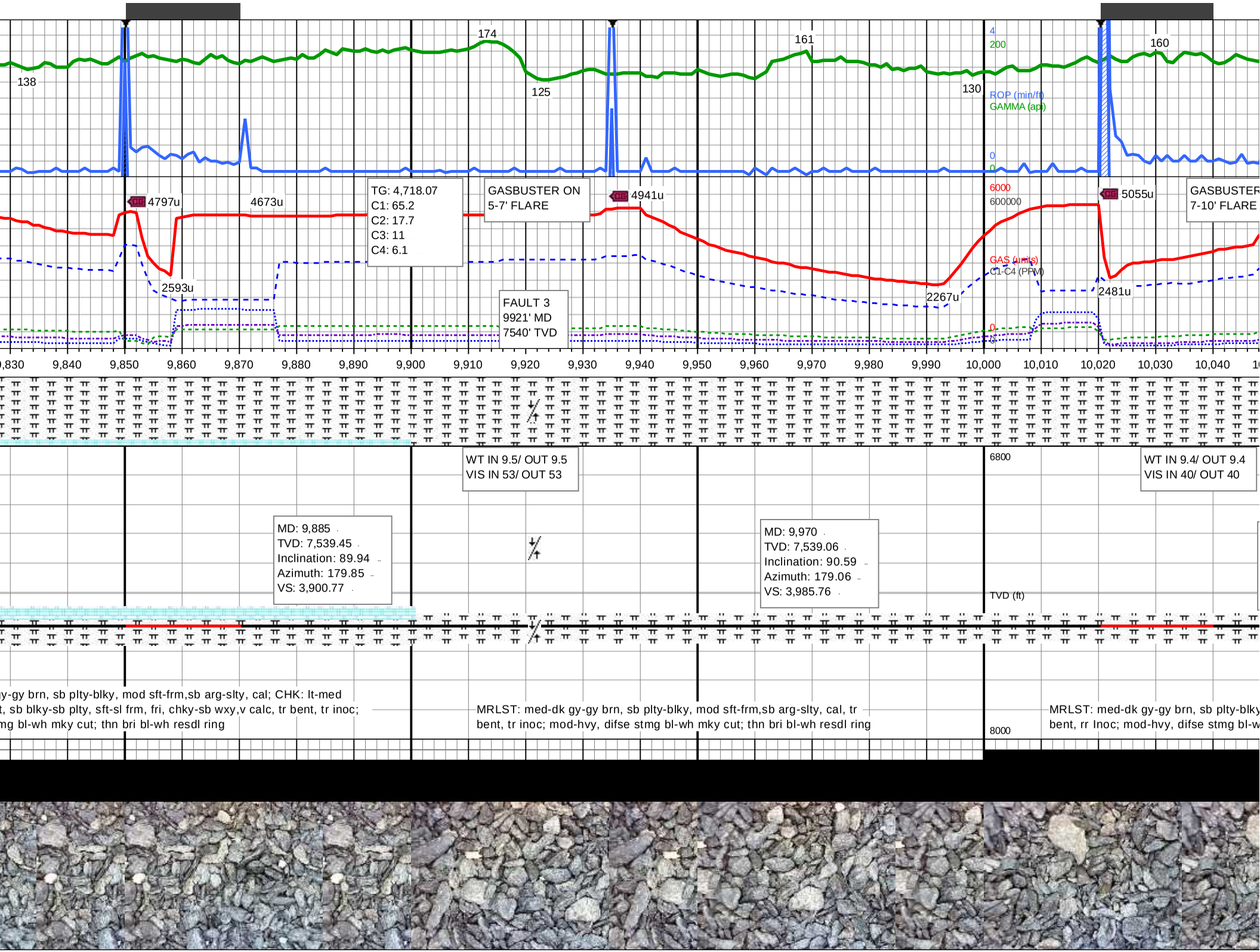

157
158
169
128
84
4
200
ROP (min/ft)
GAMMA (api)
0
0
6000
600000
4720u
4427u
4260u
4767u
GASBUSTER ON
7-9' FLARE
TG: 3,683.29
C1: 66.9
C2: 16.3
C3: 10.5
C4: 6.2
GASBU
5-7" FL
GAS (units)
C1-C4 (PPM)
2944u
3398u
3109u
FAULT 2
9331' MD
7540' TVD
0
0
9,170
9,180
9,190
9,200
9,210
9,220
9,230
9,240
9,250
9,260
9,270
9,280
9,290
9,300
9,310
9,320
9,330
9,340
9,350
9,360
9,370
9,380
6800
WT IN 9.4 / OUT 9.4
VIS IN 37 / OUT 36
MD: 9,205
TVD: 7,539.1
Inclination: 89.41
Azimuth: 180.04
VS: 3,220.83
MD: 9,290
TVD: 7,539.49
Inclination: 90.06
Azimuth: 180.51
VS: 3,305.83
MD: 9,375
TVD: 7,539.87
Inclination: 89.44
Azimuth: 180
VS: 3,390.83
slty, cal; CHK: lt-med
y,v calc, tr bent, tr
resdl ring
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, cal; CHK:
lt-med gy,lt-med brn, mot, sb blky-sb plty, sft-sl frm, fri, chky-sb wxy,v calc, rr
bent; v fast difse; multi stmg bri bl-wh mky cut; thk bri bl-wh resdl ring
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, cal; CHK:
lt-med gy,lt-med brn, mot, sb blky-sb plty, sft-sl frm, fri, chky-sb wxy,v calc, rr
bent; v fast difse; multi stmg bri bl-wh mky cut; thk bri bl-wh resdl ring
8000

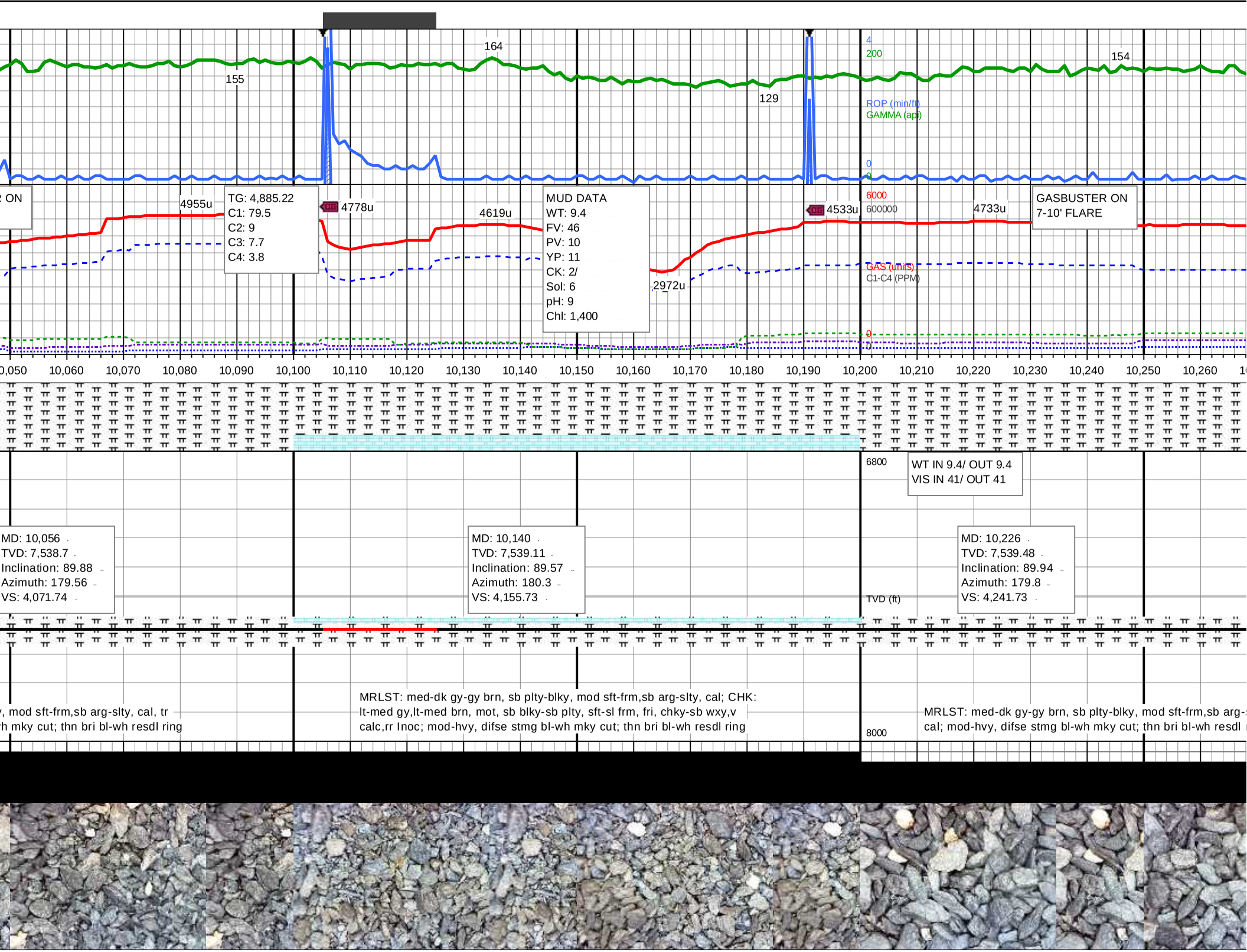


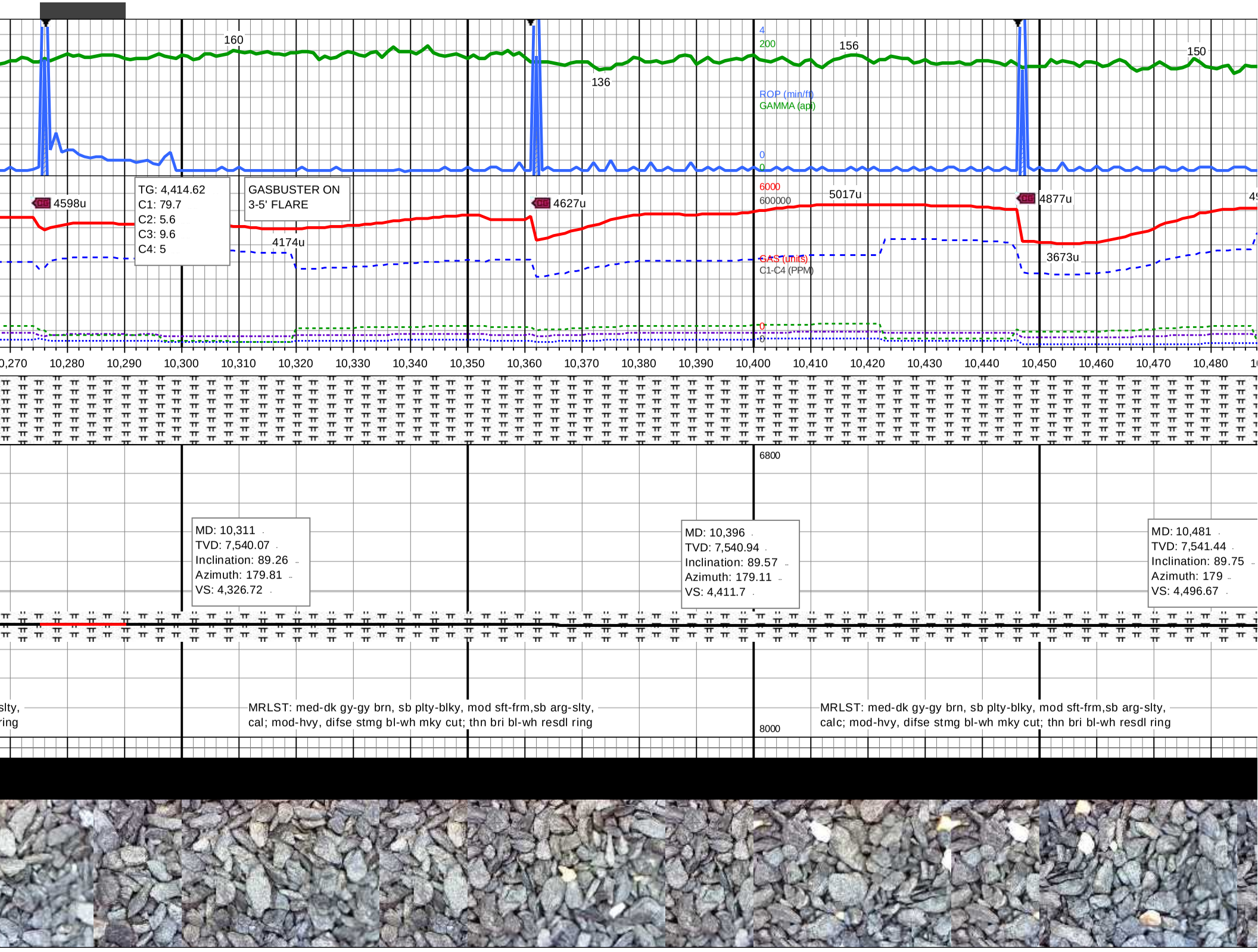
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, cal; CHK: lt-med gy,lt-med brn, mot, sb blky-sb plty, sft-sl frm, fri, chky-sb wxy,v calc, tr bent, tr inoc; v fast difse; multi stmg bri bl-wh mky cut; thk bri bl-wh resdl ring

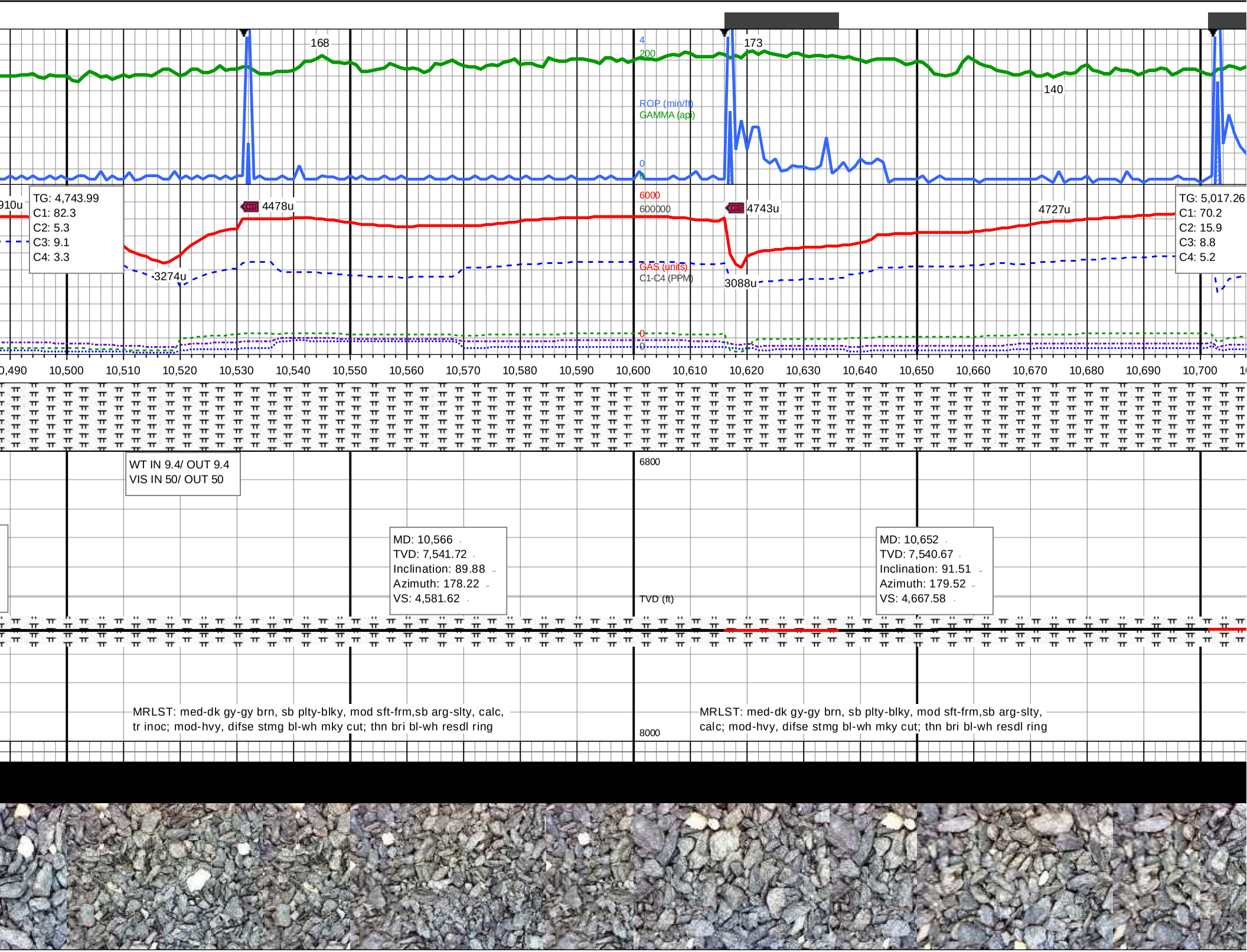
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, cal; CHK: lt-med gy,lt-med brn, mot, sb blky-sb plty, sft-sl frm, fri, chky-sb wxy,v calc, tr bent; v fast difse; multi stmg bri bl-wh mky cut; thk bri bl-wh resdl ring

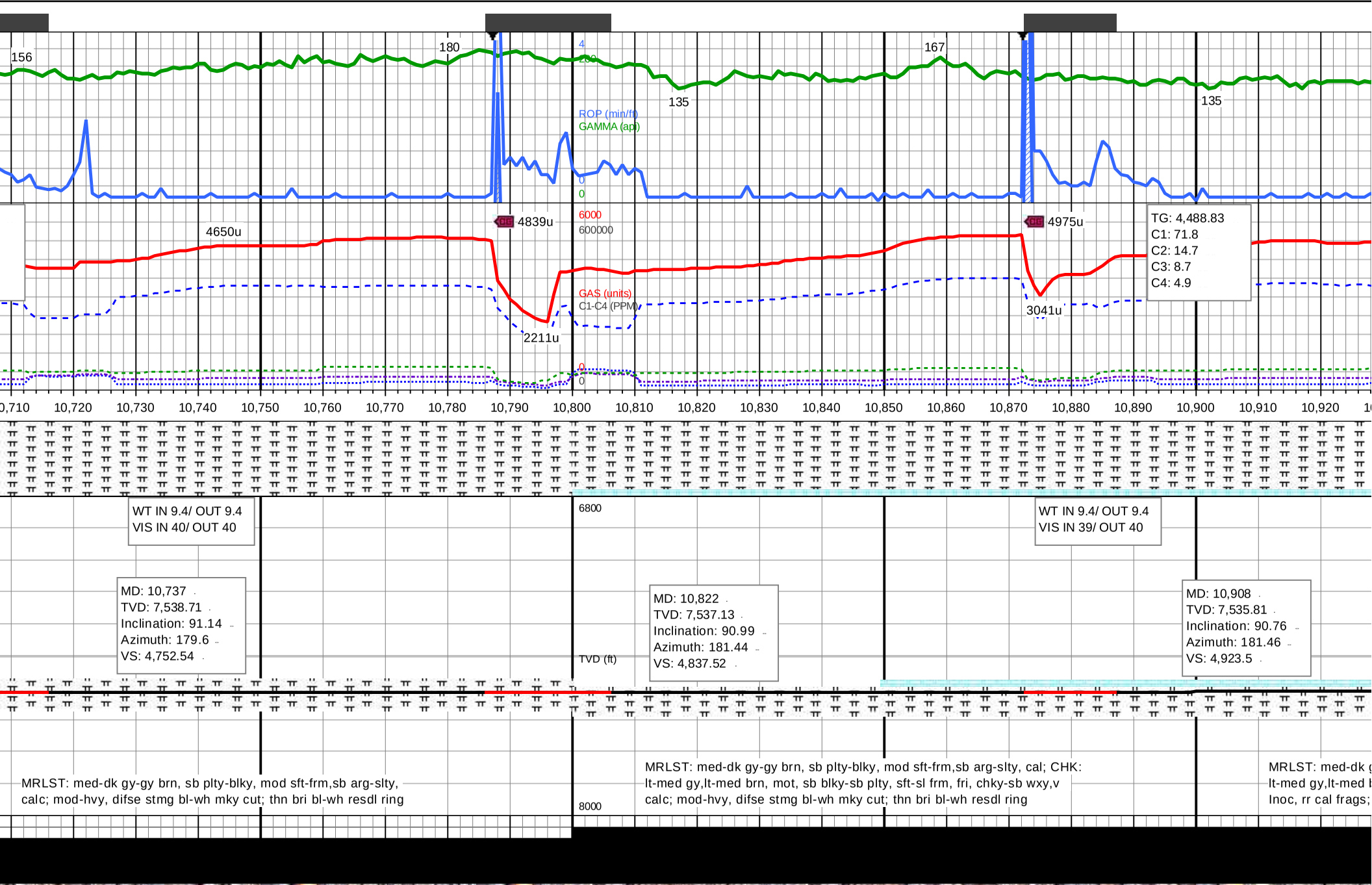

128
148
172
4
200
ROP (min/ft)
GAMMA (api)
0
0
GASBUSTER ON
3-5' FLARE
5013u
4697u
TG: 4,502.24
C1: 75.6
C2: 7.5
C3: 10
C4: 7
GASBUSTER ON
3-5' FLARE
4940u
3029u
5014u
6000
600000
4804u
GAS (units)
C1-C4 (PPM)
0
0
9,610
9,620
9,630
9,640
9,650
9,660
9,670
9,680
9,690
9,700
9,710
9,720
9,730
9,740
9,750
9,760
9,770
9,780
9,790
9,800
9,810
9,820
WT IN 9.5/ OUT 9.5
VIS IN 51/ OUT 51
6800
MD: 9,630
TVD: 7,540.38
Inclination: 90.37
Azimuth: 179.43
VS: 3,645.81
MD: 9,715
TVD: 7,540.17
Inclination: 89.91
Azimuth: 180.16
VS: 3,730.8
MD: 9,800
TVD: 7,539.82
Inclination: 90.56
Azimuth: 179.11
VS: 3,815.79
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, cal; CHK:
lt-med gy,lt-med brn, mot, sb blky-sb plty, sft-sl frm, fri, chky-sb wxy,v
calc; difse; multi stmg bri bl-wh mky cut; thk bri bl-wh resdl ring
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, cal; CHK:
lt-med gy,lt-med brn, mot, sb blky-sb plty, sft-sl frm, fri, chky-sb wxy,v calc, tr
bent; difse; multi stmg bri bl-wh mky cut; thk bri bl-wh resdl ring
8000

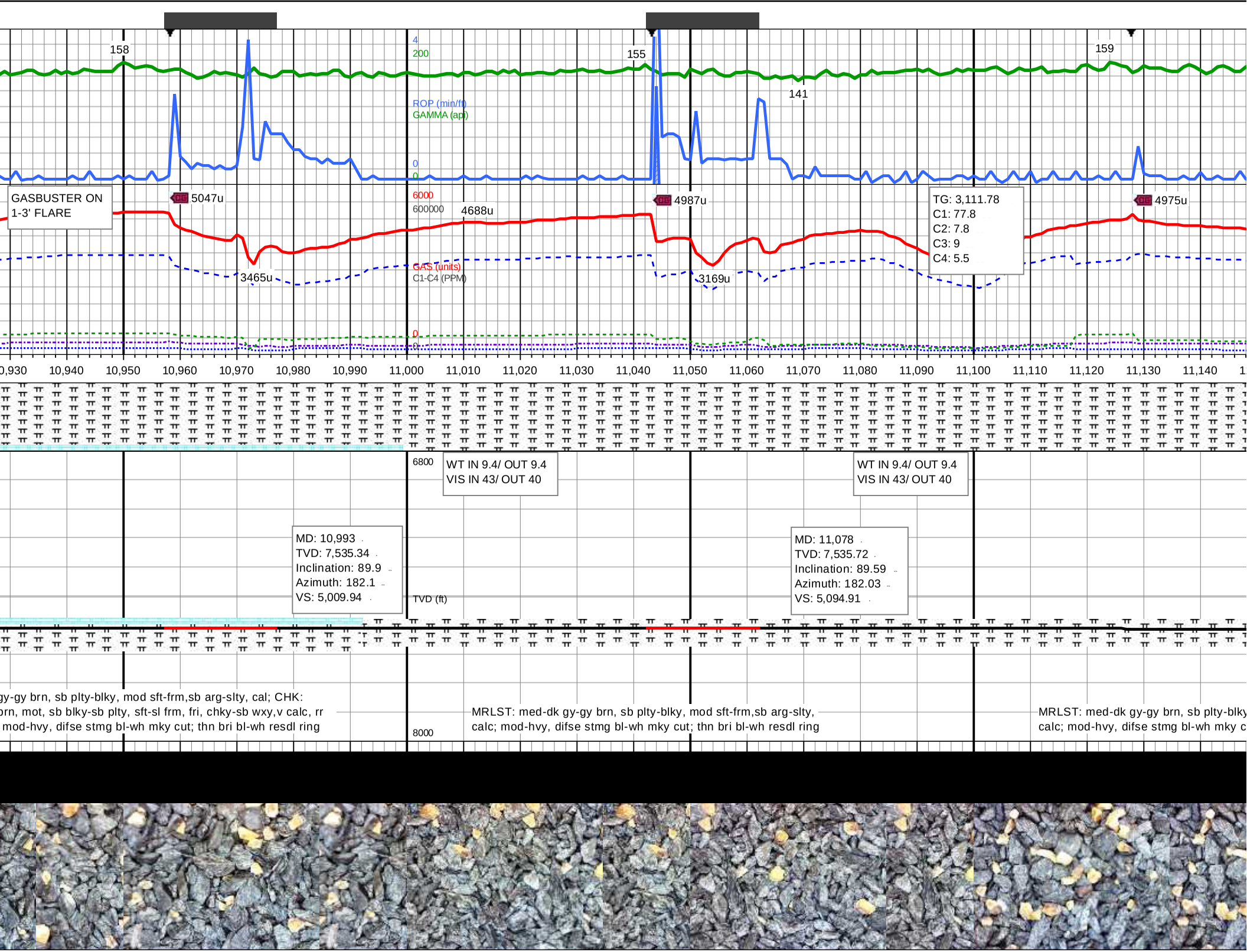

138
174
125
161
130
160
4
200
ROP (min/ft)
GAMMA (api)
0
0
4797u
4673u
2593u
TG: 4,718.07
C1: 65.2
C2: 17.7
C3: 11
C4: 6.1
GASBUSTER ON
5-7' FLARE
4941u
2267u
5055u
2481u
GASBUSTER
7-10' FLARE
6000
600000
GAS (units)
C1-C4 (PPM)
0
0
FAULT 3
9921' MD
7540' TVD
9,830
9,840
9,850
9,860
9,870
9,880
9,890
9,900
9,910
9,920
9,930
9,940
9,950
9,960
9,970
9,980
9,990
10,000
10,010
10,020
10,030
10,040
WT IN 9.5/ OUT 9.5
VIS IN 53/ OUT 53
WT IN 9.4/ OUT 9.4
VIS IN 40/ OUT 40
6800
MD: 9,885
TVD: 7,539.45
Inclination: 89.94
Azimuth: 179.85
VS: 3,900.77
MD: 9,970
TVD: 7,539.06
Inclination: 90.59
Azimuth: 179.06
VS: 3,985.76
TVD (ft)
y-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, cal; CHK: lt-med
t, sb blky-sb plty, sft-sl frm, fri, chky-sb wxy,v calc, tr bent, tr inoc;
mg bl-wh mky cut; thn bri bl-wh resdl ring
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, cal, tr
bent, tr inoc; mod-hvy, difse stmg bl-wh mky cut; thn bri bl-wh resdl ring
MRLST: med-dk gy-gy brn, sb plty-blky
bent, rr Inoc; mod-hvy, difse stmg bl-w
8000

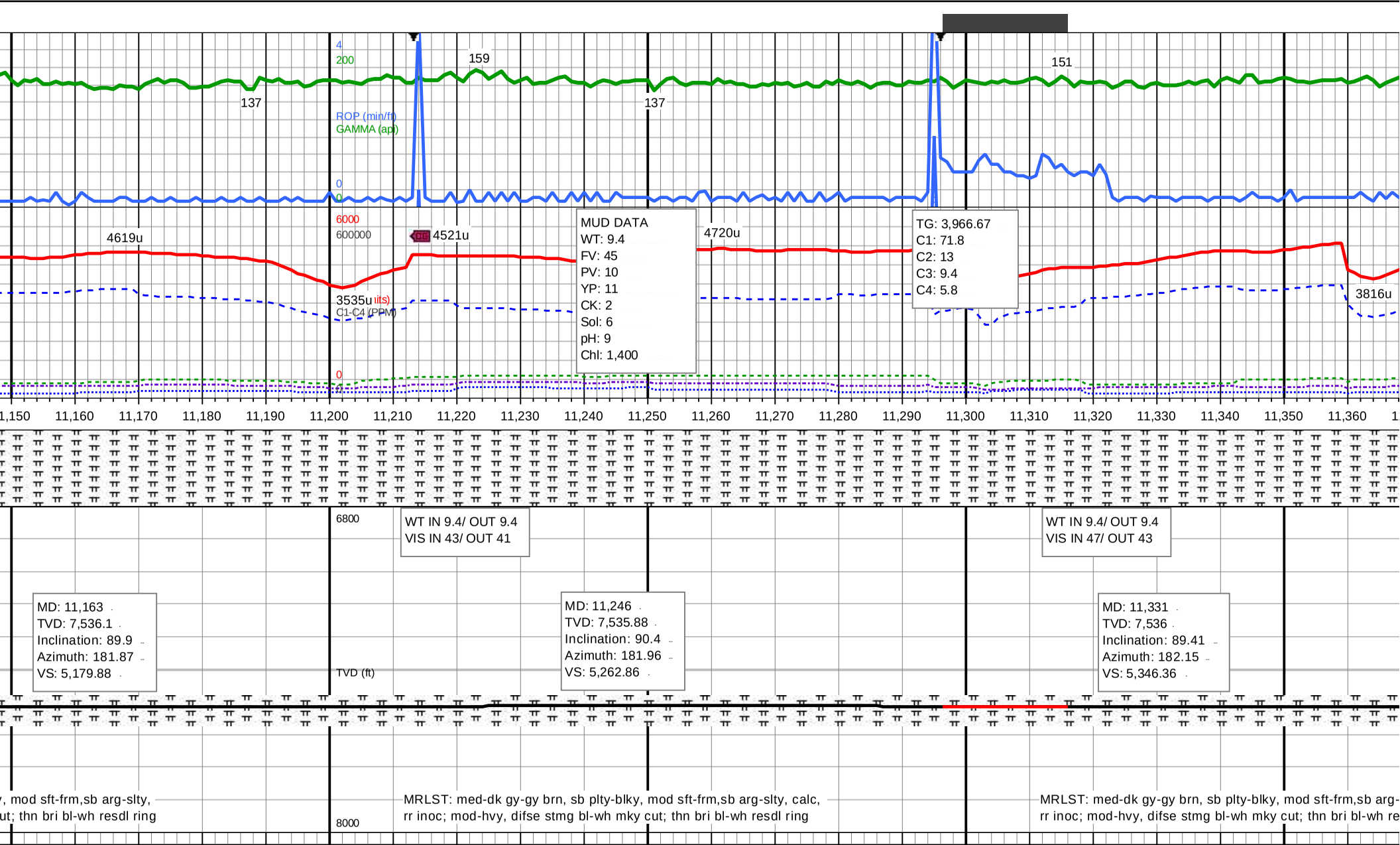

155
164
129
154
4
200
ROP (min/ft)
GAMMA (api)
0
0
R ON
4955u
TG: 4,885.22
C1: 79.5
C2: 9
C3: 7.7
C4: 3.8
4778u
4619u
MUD DATA
WT: 9.4
FV: 46
PV: 10
YP: 11
CK: 2/
Sol: 6
pH: 9
Chl: 1,400
2972u
4533u
4733u
6000
600000
GAS (units)
C1-C4 (PPM)
GASBUSTER ON
7-10' FLARE
0
0
10,050
10,060
10,070
10,080
10,090
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
10,250
10,260
6800
WT IN 9.4/ OUT 9.4
VIS IN 41/ OUT 41
MD: 10,056
TVD: 7,538.7
Inclination: 89.88
Azimuth: 179.56
VS: 4,071.74
MD: 10,140
TVD: 7,539.11
Inclination: 89.57
Azimuth: 180.3
VS: 4,155.73
MD: 10,226
TVD: 7,539.48
Inclination: 89.94
Azimuth: 179.8
VS: 4,241.73
TVD (ft)
, mod sft-frm,sb arg-slty, cal, tr
h mky cut; thn bri bl-wh resdl ring
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, cal; CHK:
lt-med gy,lt-med brn, mot, sb blky-sb plty, sft-sl frm, fri, chky-sb wxy,v
calc,rr Inoc; mod-hvy, difse stmg bl-wh mky cut; thn bri bl-wh resdl ring
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-
cal; mod-hvy, difse stmg bl-wh mky cut; thn bri bl-wh resdl
8000

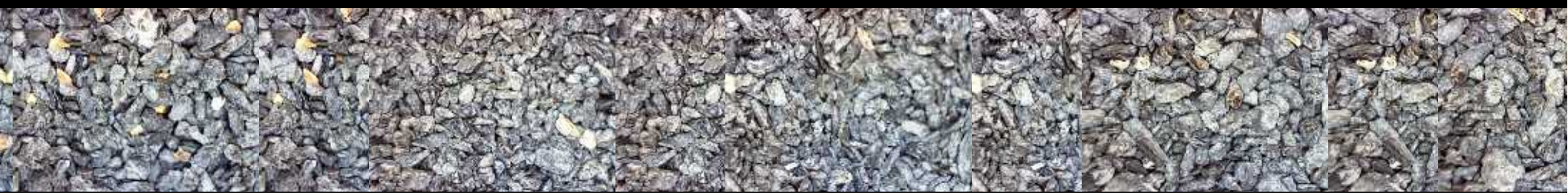

160
136
156
150
4
200
ROP (min/ft)
GAMMA (api)
0
0
4598u
TG: 4,414.62
C1: 79.7
C2: 5.6
C3: 9.6
C4: 5
GASBUSTER ON
3-5' FLARE
4174u
4627u
6000
600000
5017u
4877u
3673u
GAS (units)
C1-C4 (PPM)
0
0
10,270
10,280
10,290
10,300
10,310
10,320
10,330
10,340
10,350
10,360
10,370
10,380
10,390
10,400
10,410
10,420
10,430
10,440
10,450
10,460
10,470
10,480
6800
MD: 10,311
TVD: 7,540.07
Inclination: 89.26
Azimuth: 179.81
VS: 4,326.72
MD: 10,396
TVD: 7,540.94
Inclination: 89.57
Azimuth: 179.11
VS: 4,411.7
MD: 10,481
TVD: 7,541.44
Inclination: 89.75
Azimuth: 179
VS: 4,496.67
slty,
ring
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty,
cal; mod-hvy, difse stmg bl-wh mky cut; thn bri bl-wh resdl ring
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty,
calc; mod-hvy, difse stmg bl-wh mky cut; thn bri bl-wh resdl ring
8000

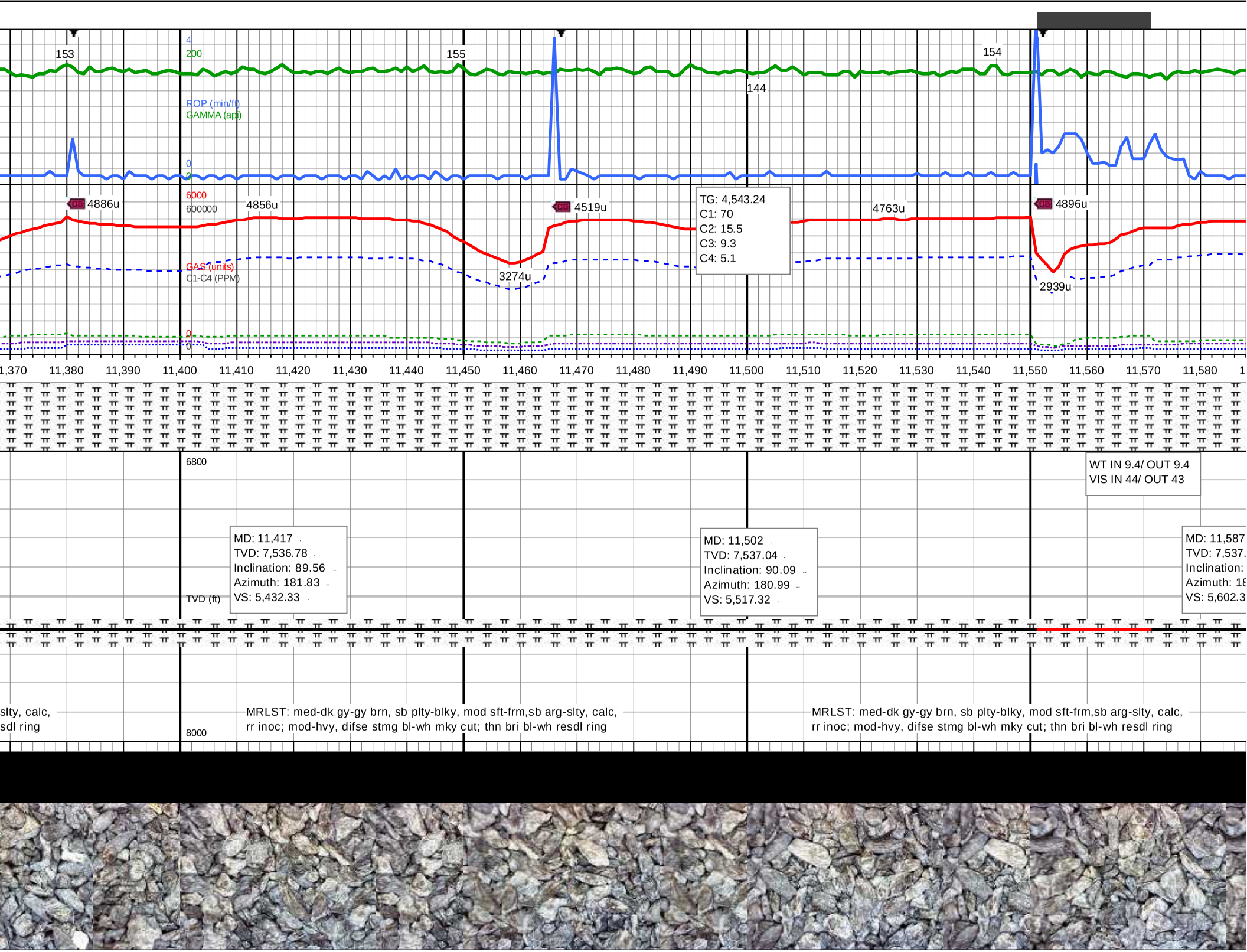

168
173
140
4
200
ROP (min/ft)
GAMMA (api)
0
910u
TG: 4,743.99
C1: 82.3
C2: 5.3
C3: 9.1
C4: 3.3
4478u
3274u
6000
600000
4743u
3088u
4727u
TG: 5,017.26
C1: 70.2
C2: 15.9
C3: 8.8
C4: 5.2
GAS (units)
C1-C4 (PPM)
0
0
10,490
10,500
10,510
10,520
10,530
10,540
10,550
10,560
10,570
10,580
10,590
10,600
10,610
10,620
10,630
10,640
10,650
10,660
10,670
10,680
10,690
10,700
WT IN 9.4/ OUT 9.4
VIS IN 50/ OUT 50
6800
MD: 10,566
TVD: 7,541.72
Inclination: 89.88
Azimuth: 178.22
VS: 4,581.62
MD: 10,652
TVD: 7,540.67
Inclination: 91.51
Azimuth: 179.52
VS: 4,667.58
TVD (ft)
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, calc, tr inoc; mod-hvy, difse stmg bl-wh mky cut; thn bri bl-wh resdl ring
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, calc; mod-hvy, difse stmg bl-wh mky cut; thn bri bl-wh resdl ring
8000

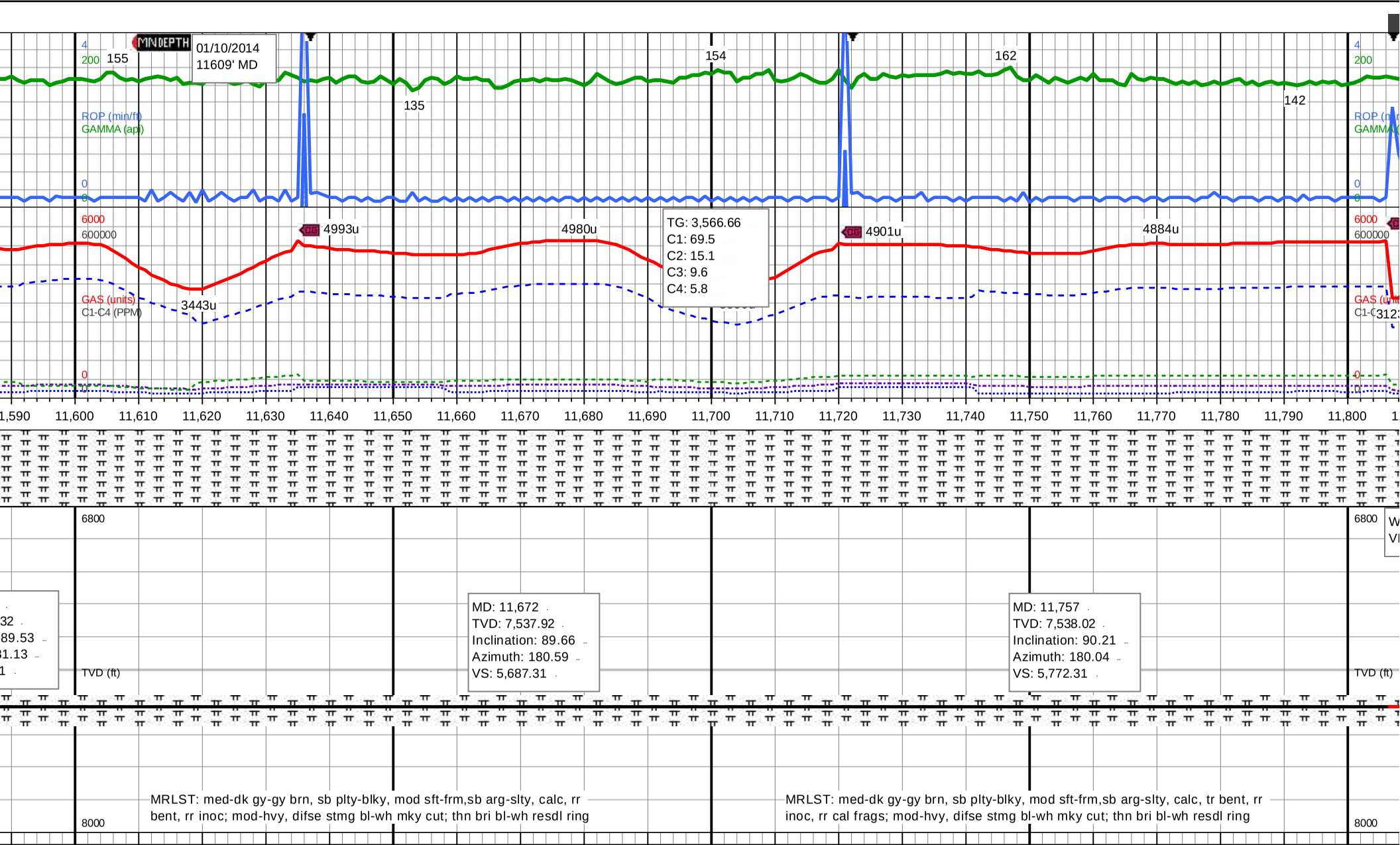

156
180
135
167
135
4
200
ROP (min/ft)
GAMMA (api)
0
0
4650u
4839u
6000
600000
4975u
TG: 4,488.83
C1: 71.8
C2: 14.7
C3: 8.7
C4: 4.9
GAS (units)
C1-C4 (PPM)
3041u
2211u
0
0
10,710
10,720
10,730
10,740
10,750
10,760
10,770
10,780
10,790
10,800
10,810
10,820
10,830
10,840
10,850
10,860
10,870
10,880
10,890
10,900
10,910
10,920
WT IN 9.4/ OUT 9.4
VIS IN 40/ OUT 40
WT IN 9.4/ OUT 9.4
VIS IN 39/ OUT 40
6800
MD: 10,737
TVD: 7,538.71
Inclination: 91.14
Azimuth: 179.6
VS: 4,752.54
MD: 10,822
TVD: 7,537.13
Inclination: 90.99
Azimuth: 181.44
VS: 4,837.52
MD: 10,908
TVD: 7,535.81
Inclination: 90.76
Azimuth: 181.46
VS: 4,923.5
TVD (ft)
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty,
calc; mod-hvy, difse stmg bl-wh mky cut; thn bri bl-wh resdl ring
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, cal; CHK:
lt-med gy,lt-med brn, mot, sb blky-sb plty, sft-sl frm, fri, chky-sb wxy,v
calc; mod-hvy, difse stmg bl-wh mky cut; thn bri bl-wh resdl ring
MRLST: med-dk g
lt-med gy,lt-med
Inoc, rr cal frags;
8000

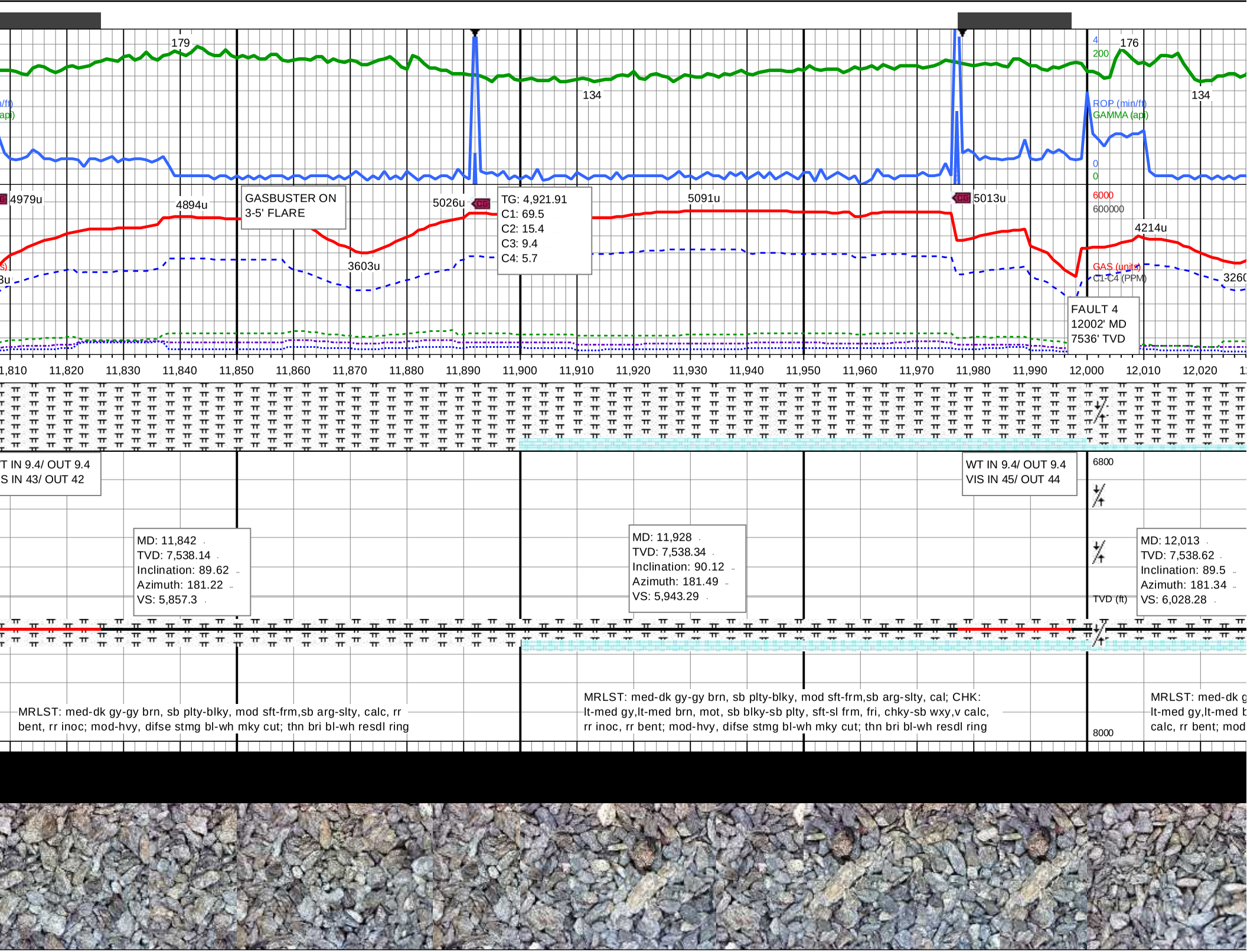

158
155
159
141
4
200
ROP (min/ft)
GAMMA (api)
0
0
GASBUSTER ON
1-3' FLARE
5047u
4688u
4987u
4975u
3465u
3169u
6000
600000
GAS (units)
C1-C4 (PPM)
0
0
TG: 3,111.78
C1: 77.8
C2: 7.8
C3: 9
C4: 5.5
10,930
10,940
10,950
10,960
10,970
10,980
10,990
11,000
11,010
11,020
11,030
11,040
11,050
11,060
11,070
11,080
11,090
11,100
11,110
11,120
11,130
11,140
6800
WT IN 9.4/ OUT 9.4
VIS IN 43/ OUT 40
WT IN 9.4/ OUT 9.4
VIS IN 43/ OUT 40
MD: 10,993
TVD: 7,535.34
Inclination: 89.9
Azimuth: 182.1
VS: 5,009.94
MD: 11,078
TVD: 7,535.72
Inclination: 89.59
Azimuth: 182.03
VS: 5,094.91
TVD (ft)
gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, cal; CHK:
brn, mot, sb blky-sb plty, sft-sl frm, fri, chky-sb wxy,v calc, rr
mod-hvy, difse stmg bl-wh mky cut; thn bri bl-wh resdl ring
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty,
calc; mod-hvy, difse stmg bl-wh mky cut; thn bri bl-wh resdl ring
MRLST: med-dk gy-gy brn, sb plty-blky
calc; mod-hvy, difse stmg bl-wh mky c
8000

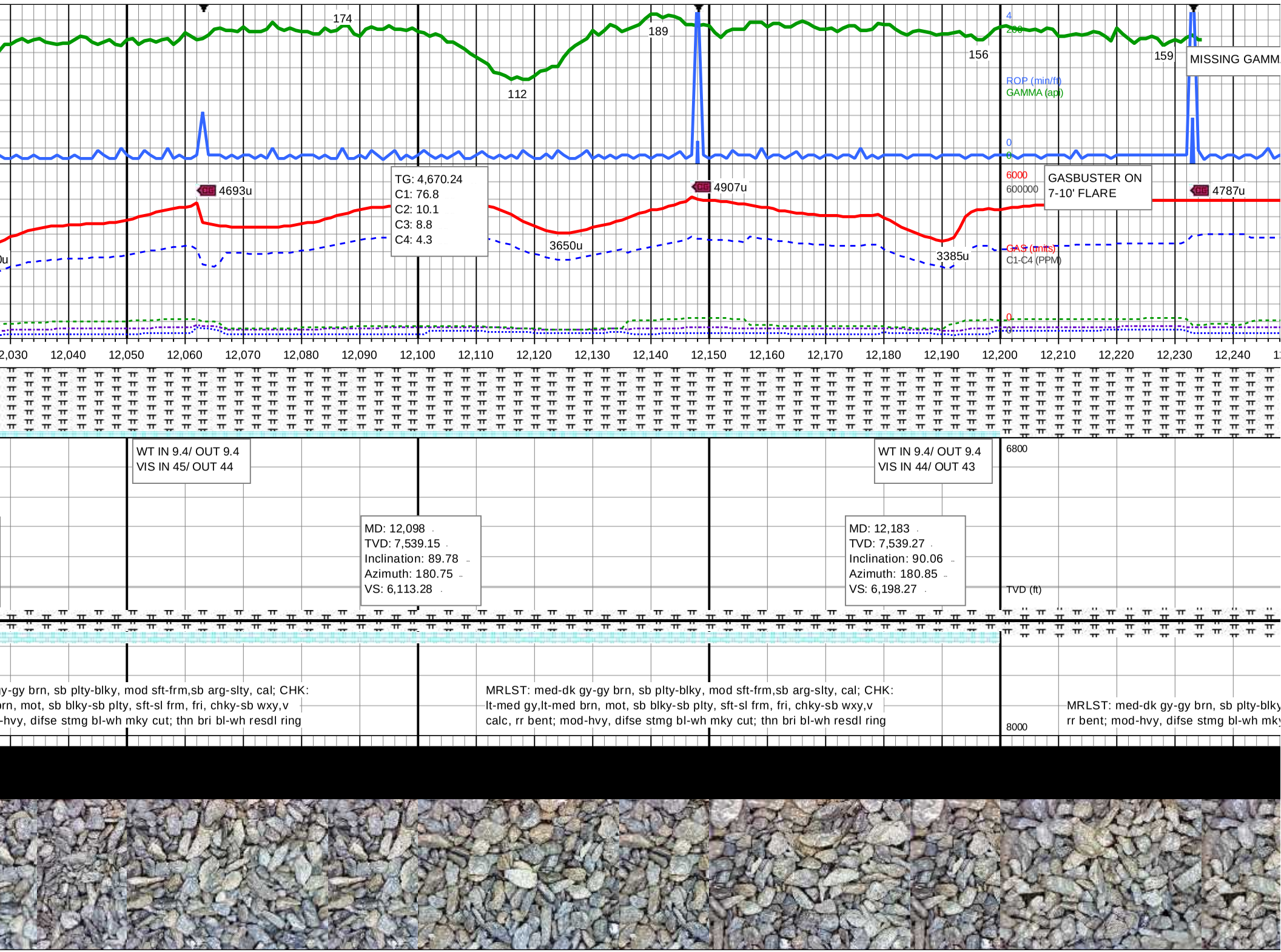

4
200
159
137
137
151
ROP (min/ft)
GAMMA (api)
0
0
6000
600000
4521u
4619u
4720u
3816u
3535u
C1-C4 (PPM)
0
MUD DATA
WT: 9.4
FV: 45
PV: 10
YP: 11
CK: 2
Sol: 6
pH: 9
Chl: 1,400
TG: 3,966.67
C1: 71.8
C2: 13
C3: 9.4
C4: 5.8
11,150
11,160
11,170
11,180
11,190
11,200
11,210
11,220
11,230
11,240
11,250
11,260
11,270
11,280
11,290
11,300
11,310
11,320
11,330
11,340
11,350
11,360
6800
WT IN 9.4/ OUT 9.4
VIS IN 43/ OUT 41
WT IN 9.4/ OUT 9.4
VIS IN 47/ OUT 43
MD: 11,163
TVD: 7,536.1
Inclination: 89.9
Azimuth: 181.87
VS: 5,179.88
MD: 11,246
TVD: 7,535.88
Inclination: 90.4
Azimuth: 181.96
VS: 5,262.86
MD: 11,331
TVD: 7,536
Inclination: 89.41
Azimuth: 182.15
VS: 5,346.36
TVD (ft)
8000
, mod sft-frm,sb arg-slty,
ut; thn bri bl-wh resdl ring
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, calc,
rr inoc; mod-hvy, difse stmg bl-wh mky cut; thn bri bl-wh resdl ring
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-
rr inoc; mod-hvy, difse stmg bl-wh mky cut; thn bri bl-wh re




153
155
154
144
4
200
ROP (min/ft)
GAMMA (api)
0
0
6000
600000
4886u
4856u
4519u
3274u
4763u
4896u
2939u
TG: 4,543.24
C1: 70
C2: 15.5
C3: 9.3
C4: 5.1
GAS (units)
C1-C4 (PPM)
0
0
11,370
11,380
11,390
11,400
11,410
11,420
11,430
11,440
11,450
11,460
11,470
11,480
11,490
11,500
11,510
11,520
11,530
11,540
11,550
11,560
11,570
11,580
6800
WT IN 9.4/ OUT 9.4
VIS IN 44/ OUT 43
MD: 11,417
TVD: 7,536.78
Inclination: 89.56
Azimuth: 181.83
VS: 5,432.33
MD: 11,502
TVD: 7,537.04
Inclination: 90.09
Azimuth: 180.99
VS: 5,517.32
MD: 11,587
TVD: 7,537.
Inclination:
Azimuth: 18
VS: 5,602.3
TVD (ft)
slty, calc,
sdl ring
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, calc,
rr inoc; mod-hvy, difse stmg bl-wh mky cut; thn bri bl-wh resdl ring
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, calc,
rr inoc; mod-hvy, difse stmg bl-wh mky cut; thn bri bl-wh resdl ring
8000


MNDEPTH
01/10/2014
11609' MD
4
200
155
135
154
162
142
ROP (min/ft)
GAMMA (api)
0
6000
600000
4993u
4980u
4901u
4884u
3443u
TG: 3,566.66
C1: 69.5
C2: 15.1
C3: 9.6
C4: 5.8
GAS (units)
C1-C4 (PPM)
11,590
11,600
11,610
11,620
11,630
11,640
11,650
11,660
11,670
11,680
11,690
11,700
11,710
11,720
11,730
11,740
11,750
11,760
11,770
11,780
11,790
11,800
6800
TVD (ft)
MD: 11,672
TVD: 7,537.92
Inclination: 89.66
Azimuth: 180.59
VS: 5,687.31
MD: 11,757
TVD: 7,538.02
Inclination: 90.21
Azimuth: 180.04
VS: 5,772.31
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, calc, rr bent, rr inoc; mod-hvy, difse stmg bl-wh mky cut; thn bri bl-wh resdl ring
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, calc, tr bent, rr inoc, rr cal frags; mod-hvy, difse stmg bl-wh mky cut; thn bri bl-wh resdl ring
8000


179
134
176
134
4
200
ROP (min/ft)
GAMMA (api)
0
0
4979u
4894u
GASBUSTER ON
3-5' FLARE
5026u
TG: 4,921.91
C1: 69.5
C2: 15.4
C3: 9.4
C4: 5.7
5091u
5013u
6000
600000
4214u
GAS (units)
C1-C4 (PPM)
3603u
FAULT 4
12002' MD
7536' TVD
11,810
11,820
11,830
11,840
11,850
11,860
11,870
11,880
11,890
11,900
11,910
11,920
11,930
11,940
11,950
11,960
11,970
11,980
11,990
12,000
12,010
12,020
T IN 9.4/ OUT 9.4
S IN 43/ OUT 42
WT IN 9.4/ OUT 9.4
VIS IN 45/ OUT 44
6800
MD: 11,842
TVD: 7,538.14
Inclination: 89.62
Azimuth: 181.22
VS: 5,857.3
MD: 11,928
TVD: 7,538.34
Inclination: 90.12
Azimuth: 181.49
VS: 5,943.29
MD: 12,013
TVD: 7,538.62
Inclination: 89.5
Azimuth: 181.34
VS: 6,028.28
TVD (ft)
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, calc, rr bent, rr inoc; mod-hvy, difse stmg bl-wh mky cut; thn bri bl-wh resdl ring
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, cal; CHK: lt-med gy,lt-med brn, mot, sb blky-sb plty, sft-sl frm, fri, chky-sb wxy,v calc, rr inoc, rr bent; mod-hvy, difse stmg bl-wh mky cut; thn bri bl-wh resdl ring
MRLST: med-dk g
lt-med gy,lt-med b
calc, rr bent; mod
8000


174
112
189
156
159
MISSING GAMM
ROP (min/ft)
GAMMA (api)
4
200
0
0
6000
600000
4693u
TG: 4,670.24
C1: 76.8
C2: 10.1
C3: 8.8
C4: 4.3
4907u
3650u
3385u
GASBUSTER ON
7-10' FLARE
4787u
GAS (units)
C1-C4 (PPM)
0
0
12,030
12,040
12,050
12,060
12,070
12,080
12,090
12,100
12,110
12,120
12,130
12,140
12,150
12,160
12,170
12,180
12,190
12,200
12,210
12,220
12,230
12,240
WT IN 9.4/ OUT 9.4
VIS IN 45/ OUT 44
WT IN 9.4/ OUT 9.4
VIS IN 44/ OUT 43
6800
MD: 12,098
TVD: 7,539.15
Inclination: 89.78
Azimuth: 180.75
VS: 6,113.28
MD: 12,183
TVD: 7,539.27
Inclination: 90.06
Azimuth: 180.85
VS: 6,198.27
TVD (ft)
y-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, cal; CHK:
rn, mot, sb blky-sb plty, sft-sl frm, fri, chky-sb wxy,v
-hvy, difse stmg bl-wh mky cut; thn bri bl-wh resdl ring
MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, cal; CHK:
lt-med gy,lt-med brn, mot, sb blky-sb plty, sft-sl frm, fri, chky-sb wxy,v
calc, rr bent; mod-hvy, difse stmg bl-wh mky cut; thn bri bl-wh resdl ring
MRLST: med-dk gy-gy brn, sb plty-blky
rr bent; mod-hvy, difse stmg bl-wh mky
8000

A DATA/ NOT PROVIDED

168

162

142

ROP (min/ft)
GAMMA (api)

4
200
0
0

Bit #: 2
Type: VS513D
Size: 6.125"
Depth In: 8162'
Depth Out: 12402'
Total Drilled: 4240'
Hours: 19.6
Avg Ft/Hr: 216.33
Jets: 3x13 / 2x12
S/N: 4006568

4857u

GASBUSTER ON
3-5' FLARE

TG: 4,061.68
C1: 71.6
C2: 15.2
C3: 8.5
C4: 4.6

4466u

4930u

GASBUSTER ON
3-5' FLARE

MUD DATA
WT: 9.4
FV: 45
PV: 10
YP: 11
CK: 2/
Sol: 6
pH: 9
Chl: 1,400

6000
600000
4850u

GAS (units)
C1-C4 (PPM)

0
0

WELL TD REACHED @ 12402' MD
ON 1/10/2014 @ 05:53 AM

12,250 12,260 12,270 12,280 12,290 12,300 12,310 12,320 12,330 12,340 12,350 12,360 12,370 12,380 12,390 12,400 12,410 12,420 12,430 12,440 12,450 12,460

6800

WT IN 9.4/ OUT 9.4
VIS IN 44/ OUT 43

PROJECTION TO BIT

THANK YOU FOR USING
COLUMBINE LOGGING INC.!

MD: 12,268
TVD: 7,538.95
Inclination: 90.37
Azimuth: 180.47
VS: 6,283.27

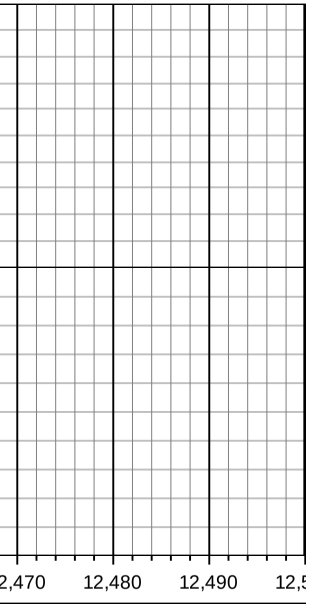
MD: 12,352
TVD: 7,538.16
Inclination: 90.71
Azimuth: 179.46
VS: 6,367.26

MD: 12,402
TVD: 7,525.15
Inclination: 90.71
Azimuth: 179.46
VS: 6,367.26

, mod sft-frm,sb arg-slty, cal,
y cut; thn bri bl-wh resdl ring

MRLST: med-dk gy-gy brn, sb plty-blky, mod sft-frm,sb arg-slty, cal,
rr bent; mod-hvy, difse stmg bl-wh mky cut; thn bri bl-wh resdl ring

8000


2,470
12,480
12,490
12,5