Scale: 5" / 100'
Measured Depth Log

Well Name	Crow Creek AA01-785 HORZ		
Location	SEC 1 T6N R63W		
State	COLORADO	**County**	WELD
Country	USA	**Rig Number**	H&P 315
API Number	05-123-40160	**AFE #**	200436
Region	DJ BASIN	**Field**	WATTENBERG
Spud Date	12/31/2014	**Drilling Completed**	1/6/2015
Surface Coordinates	NWNW SEC 1 T6N R63W 290' FNL; 537' FWL LAT/LON: 40.52203/-104.39235		
Bottom Hole Coordinates	SEC 12 T6N R63W 30' FNL; 350' FWL		
Ground Elevation	4,797'	**K.B. Elevation**	4,821'
Logged Interval	6,006' **To** 11,564'	**Total Depth**	11,564'
Formation	NIO B CHALK		
Type of Drilling Fluid	LSND		

Operator

Company Noble Energy Inc

Address 1625 BROADWAY SUITE 2200
DENVER, CO 80202

Geologist

Name NATHAN MURPHY; MARK COLE

Company COLUMBINE LOGGING, INC

Address 602 S LIPAN ST
DENVER, CO 80223

Zone Color Coding

Oil
Note
Error
Condensate
Core
Water

Rock Types

CHALK
MARLSTONE
SILTY SHALE
SHALY SANDSTONE
LIMESTONE
UNKNOWN
ANHYDRITE
BENTONITE
BRECCIA
CEMENT
CHERT
CLAY CHOKE SANE
CLAYSTONE
COAL
CONGLOMERATE
DOLOMITE
GRANITE
GYPSUM
IGNEO
SIDER
METAN
NO SAN
SALT
SANDS
SALT-F
SHALE
SHALE

Gas
Pressure
Seal

US
ITE or LIMONITE
MORPHIC
MPLE
STONE
PEPPER SAND
E
E COLORED

SHALE GRAY
SHALY SILTSTONE
SILTSTONE
TILL
TUFF
WELDED TUFF

Accessories

Fossils

- ALGAE
- AMPHIPORA
- BELEMNITE
- BIOCLASTIC
- BRACHIOPOD
- BRYOZOA
- CEPHALOPOD
- CORAL
- CRINOID
- ECHINOID
- FISH
- FORAMINIFERA
- FOSSIL
- GASTROPOD
- 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
- INOCERAMUS
- KAOLIN
- MARLSTONE
- 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

- DEAD
- EVEN
- QUESTIONABLE
- SPOTTED STAINING
- ORGANIC
- PINPOINT
- VUGGY

Porosity

- EARTHY
- FENESTRAL
- FRACTURE
- INTERCRYSTALLINE
- INTEROOLITIC
- MOLDIC

Engineering

- BIT
- CONNECTION (DOWN)
- CONNECTION (LEFT)
- CONNECTION (RIGHT)
- CONNECTION GAS
- CONNECTION GAS UP
- CONNECTION GAS LEFT
- CONNECTION GAS DOWN...
- CORE - LOST
- CORE - RECOVERED
- DST INTERVAL
- FAULT
- FORMATION TOP
- GAS SHOW
- MN DEPTH
- NORMAL FAULT
- OIL SHOW
- OVERTURNED STRATA
- REVERSE FAULT
- SIDEWALL CORE (LEFT)
- SIDEWALL CORE (RIGHT)
- SLIDE
- SURVEY
- TRIP GAS
- WIRELINE TESTED - LEFT
- WIRELINE TESTED - RT

Rounding

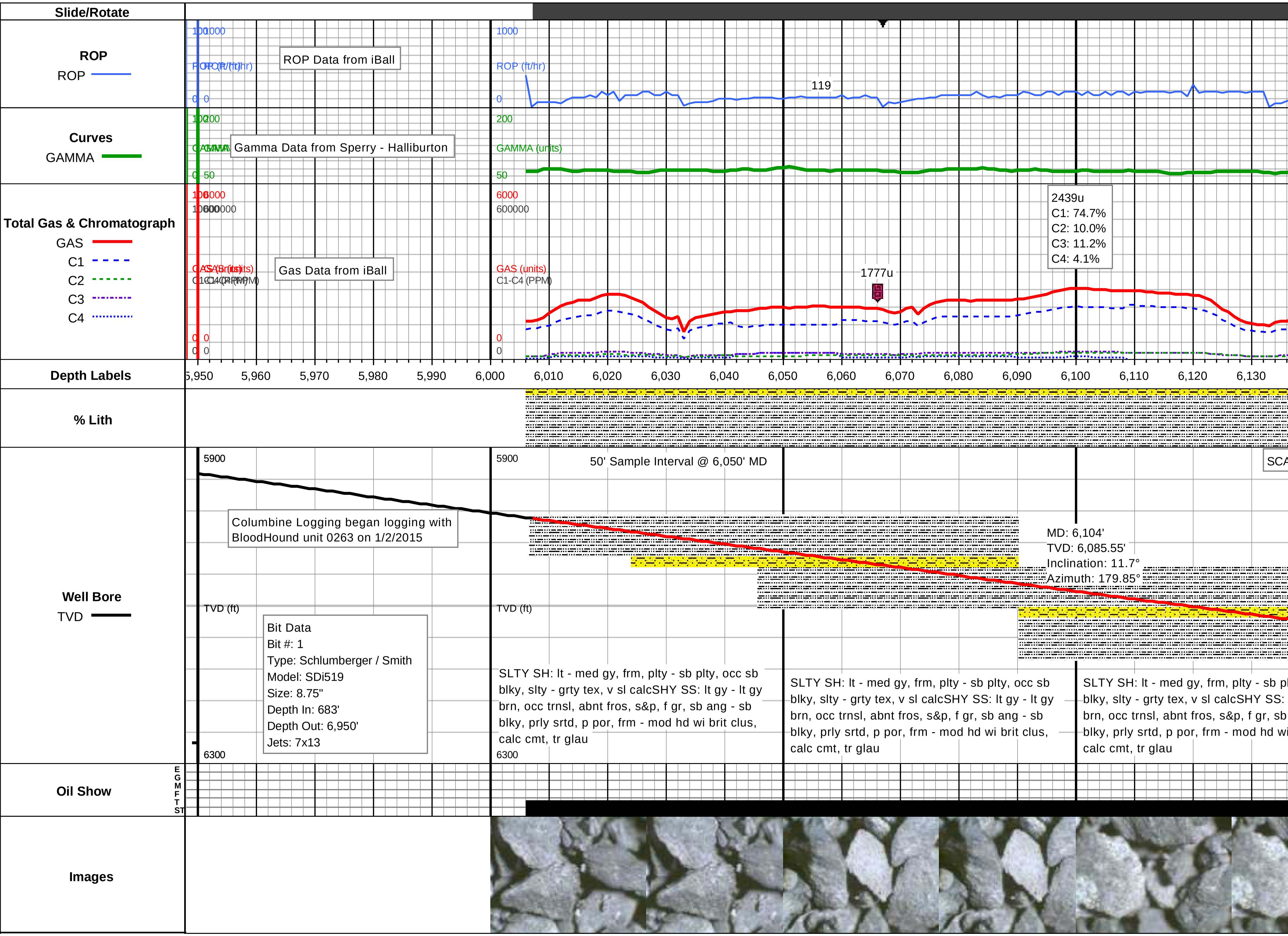
- ANGULAR
- ROUNDED
- SUBANG
- SUBRND

Textures

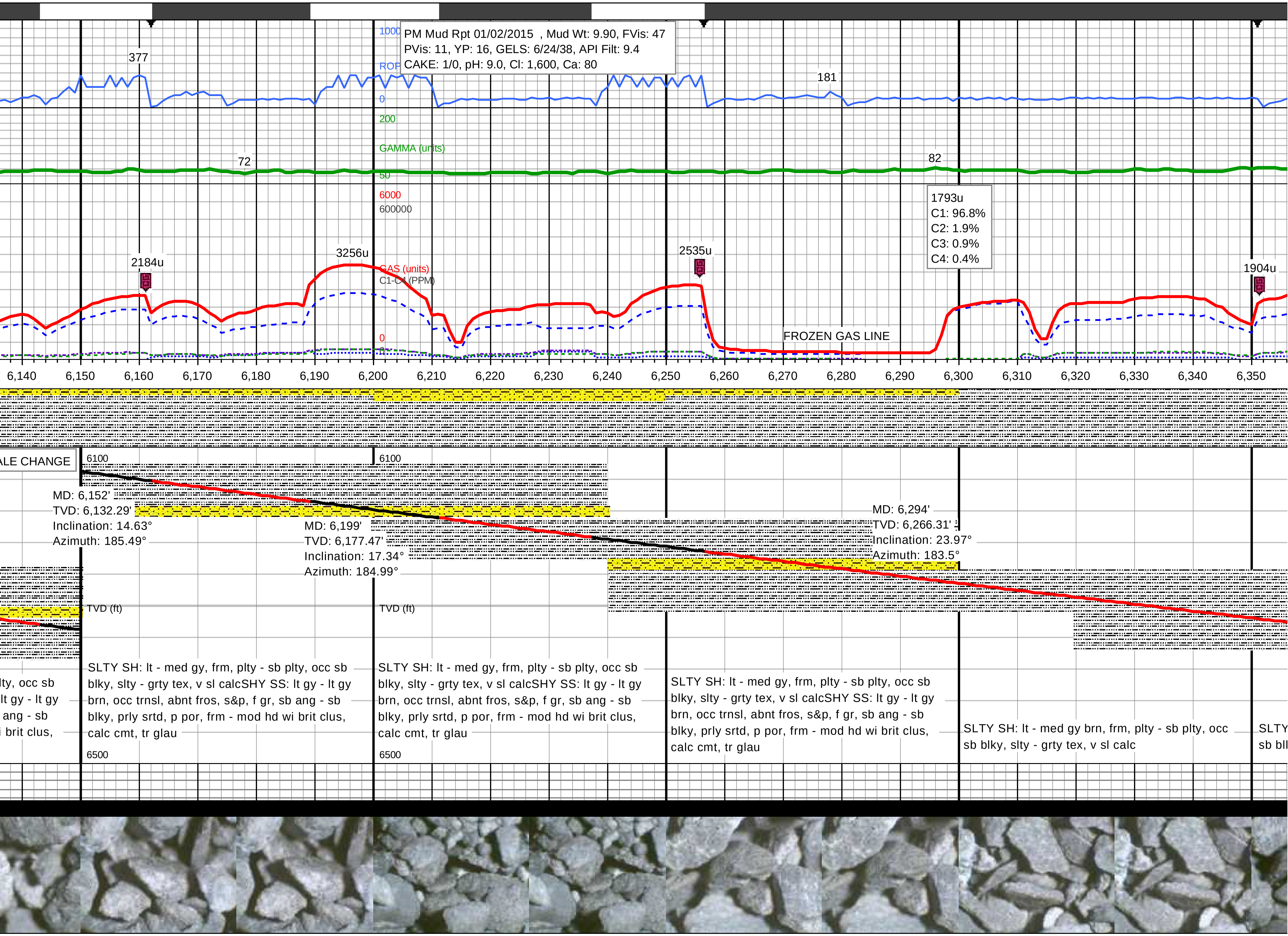
- BOUNDSTONE
- CHALKY
- CRYPTOXLN
- EARTHY
- FINELYXLN
- GRAINSTONE
- LITHOGRAPHIC
- MICROXLN
- MUDSTONE
- PACKSTONE
- WACKESTONE

Sorting

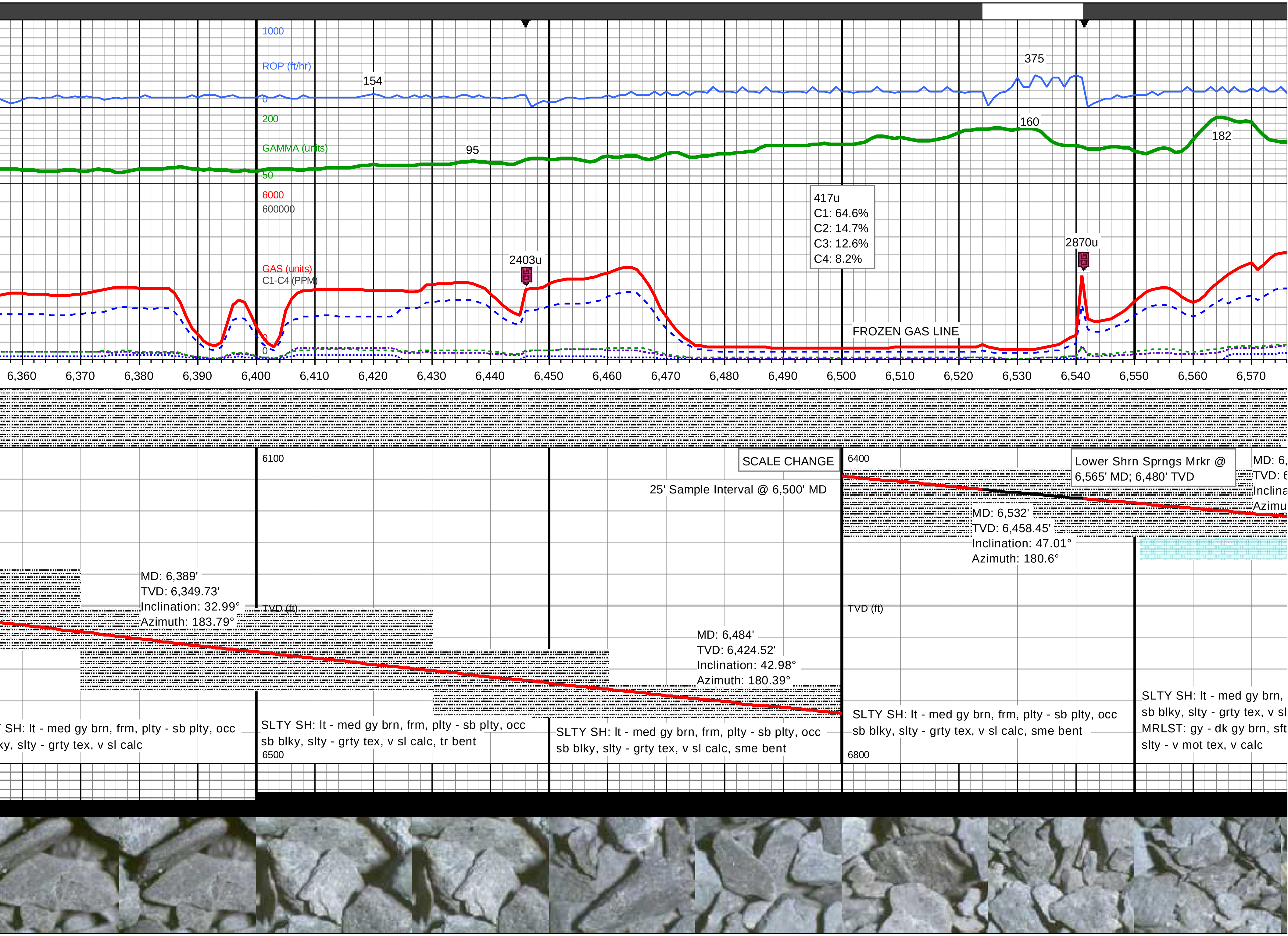
- MODERATE
- POOR
- WELL



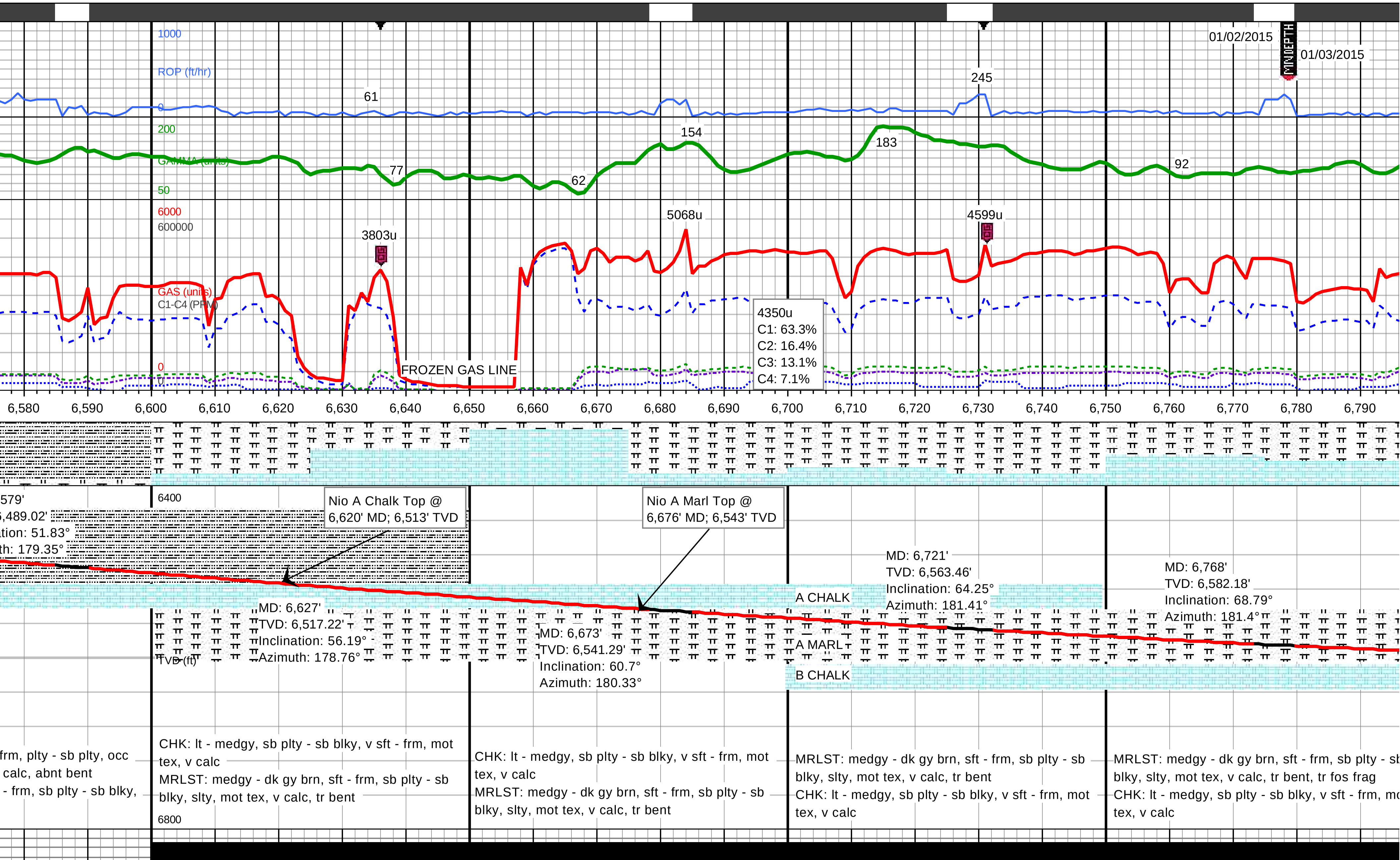
Slide/Rotate
ROP
ROP
ROP Data from iBall
ROP (ft/hr)
1000
0
119
Curves
GAMMA
Gamma Data from Sperry - Halliburton
GAMMA (units)
200
50
Total Gas & Chromatograph
GAS
C1
C2
C3
C4
Gas Data from iBall
GAS (units)
C1-C4 (PPM)
6000
600000
0
1777u
2439u
C1: 74.7%
C2: 10.0%
C3: 11.2%
C4: 4.1%
Depth Labels
5,950
5,960
5,970
5,980
5,990
6,000
6,010
6,020
6,030
6,040
6,050
6,060
6,070
6,080
6,090
6,100
6,110
6,120
6,130
% Lith
Well Bore
TVD
5900
TVD (ft)
6300
50' Sample Interval @ 6,050' MD
Columbine Logging began logging with
BloodHound unit 0263 on 1/2/2015
MD: 6,104'
TVD: 6,085.55'
Inclination: 11.7°
Azimuth: 179.85°
Bit Data
Bit #: 1
Type: Schlumberger / Smith
Model: SDi519
Size: 8.75"
Depth In: 683'
Depth Out: 6,950'
Jets: 7x13
SLTY SH: lt - med gy, frm, plty - sb plty, occ sb blky, slty - grty tex, v sl calcSHY SS: lt gy - lt gy brn, occ trnsl, abnt fros, s&p, f gr, sb ang - sb blky, prly srtd, p por, frm - mod hd wi brit clus, calc cmt, tr glau
SLTY SH: lt - med gy, frm, plty - sb plty, occ sb blky, slty - grty tex, v sl calcSHY SS: lt gy - lt gy brn, occ trnsl, abnt fros, s&p, f gr, sb ang - sb blky, prly srtd, p por, frm - mod hd wi brit clus, calc cmt, tr glau
SLTY SH: lt - med gy, frm, plty - sb pl
blky, slty - grty tex, v sl calcSHY SS:
brn, occ trnsl, abnt fros, s&p, f gr, sb
blky, prly srtd, p por, frm - mod hd wi
calc cmt, tr glau
SCA
Oil Show
E
G
M
F
T
ST
Images



PM Mud Rpt 01/02/2015 , Mud Wt: 9.90, FVis: 47
PVis: 11, YP: 16, GELS: 6/24/38, API Filt: 9.4
CAKE: 1/0, pH: 9.0, Cl: 1,600, Ca: 80
1000
ROP
0
377
181
200
GAMMA (units)
50
72
82
6000
600000
GAS (units)
C1-C4 (PPM)
0
2184u
3256u
2535u
1904u
1793u
C1: 96.8%
C2: 1.9%
C3: 0.9%
C4: 0.4%
FROZEN GAS LINE
6,140
6,150
6,160
6,170
6,180
6,190
6,200
6,210
6,220
6,230
6,240
6,250
6,260
6,270
6,280
6,290
6,300
6,310
6,320
6,330
6,340
6,350
ALE CHANGE
6100
MD: 6,152'
TVD: 6,132.29'
Inclination: 14.63°
Azimuth: 185.49°
MD: 6,199'
TVD: 6,177.47'
Inclination: 17.34°
Azimuth: 184.99°
MD: 6,294'
TVD: 6,266.31'
Inclination: 23.97°
Azimuth: 183.5°
TVD (ft)
6500
lty, occ sb
lt gy - lt gy
ang - sb
i brit clus,
SLTY SH: lt - med gy, frm, plty - sb plty, occ sb blky, slty - grty tex, v sl calcSHY SS: lt gy - lt gy brn, occ trnsl, abnt fros, s&p, f gr, sb ang - sb blky, prly srtd, p por, frm - mod hd wi brit clus, calc cmt, tr glau
SLTY SH: lt - med gy, frm, plty - sb plty, occ sb blky, slty - grty tex, v sl calcSHY SS: lt gy - lt gy brn, occ trnsl, abnt fros, s&p, f gr, sb ang - sb blky, prly srtd, p por, frm - mod hd wi brit clus, calc cmt, tr glau
SLTY SH: lt - med gy, frm, plty - sb plty, occ sb blky, slty - grty tex, v sl calcSHY SS: lt gy - lt gy brn, occ trnsl, abnt fros, s&p, f gr, sb ang - sb blky, prly srtd, p por, frm - mod hd wi brit clus, calc cmt, tr glau
SLTY SH: lt - med gy brn, frm, plty - sb plty, occ sb blky, slty - grty tex, v sl calc
SLTY
sb bl



1000
ROP (ft/hr)
0
154
375
200
GAMMA (units)
50
95
160
182
6000
600000
GAS (units)
C1-C4 (PPM)
0
2403u
417u
C1: 64.6%
C2: 14.7%
C3: 12.6%
C4: 8.2%
2870u
FROZEN GAS LINE
6,360
6,370
6,380
6,390
6,400
6,410
6,420
6,430
6,440
6,450
6,460
6,470
6,480
6,490
6,500
6,510
6,520
6,530
6,540
6,550
6,560
6,570
6100
SCALE CHANGE
25' Sample Interval @ 6,500' MD
6400
Lower Shrn Sprngs Mrkr @ 6,565' MD; 6,480' TVD
MD: 6,389'
TVD: 6,349.73'
Inclination: 32.99°
Azimuth: 183.79°
TVD (ft)
MD: 6,484'
TVD: 6,424.52'
Inclination: 42.98°
Azimuth: 180.39°
MD: 6,532'
TVD: 6,458.45'
Inclination: 47.01°
Azimuth: 180.6°
TVD (ft)
SH: lt - med gy brn, frm, plty - sb plty, occ
ky, slty - grty tex, v sl calc
SLTY SH: lt - med gy brn, frm, plty - sb plty, occ sb blky, slty - grty tex, v sl calc, tr bent
6500
SLTY SH: lt - med gy brn, frm, plty - sb plty, occ sb blky, slty - grty tex, v sl calc, sme bent
SLTY SH: lt - med gy brn, frm, plty - sb plty, occ sb blky, slty - grty tex, v sl calc, sme bent
6800
SLTY SH: lt - med gy brn,
sb blky, slty - grty tex, v sl
MRLST: gy - dk gy brn, sft
slty - v mot tex, v calc



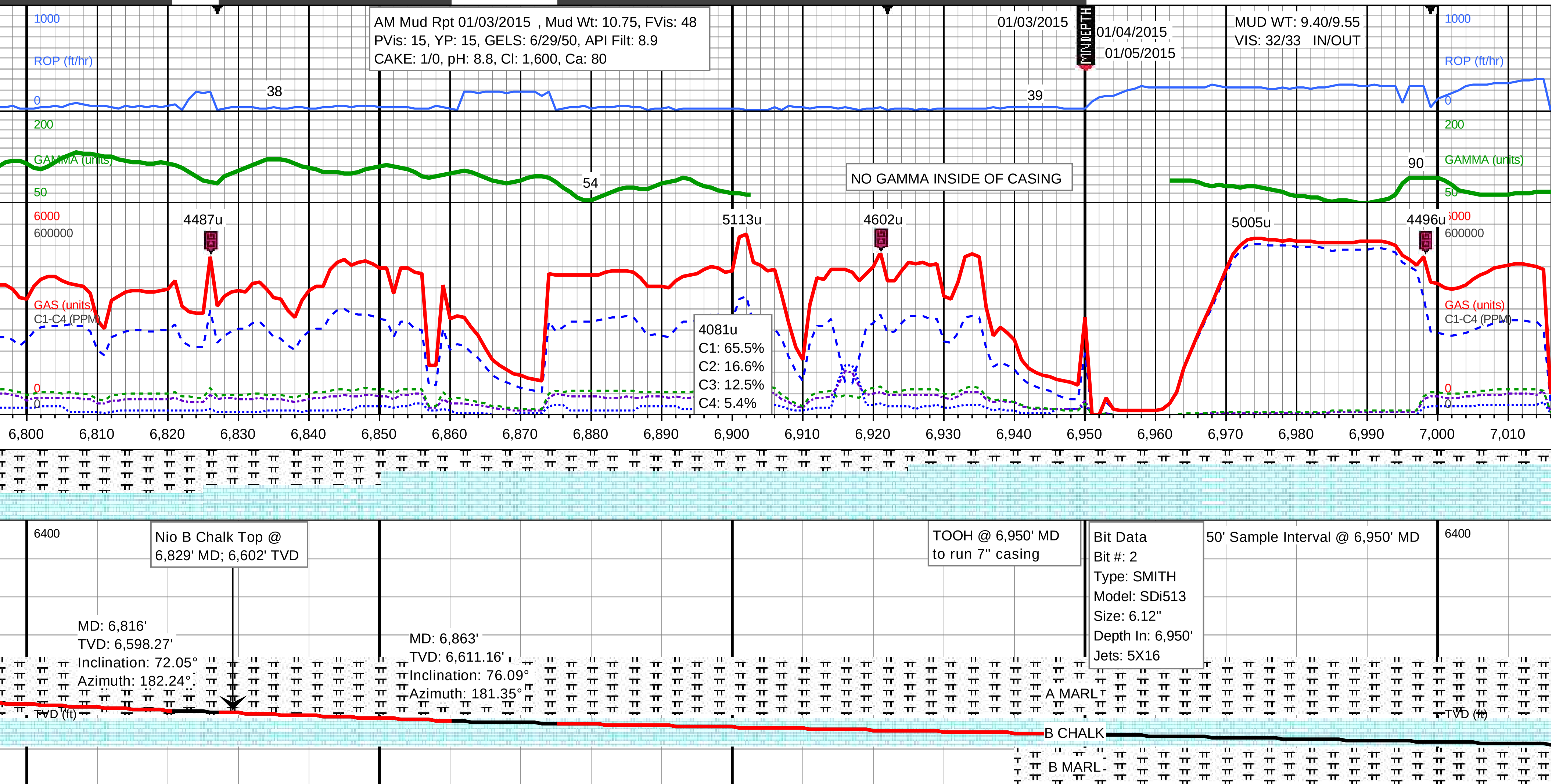
frm, plty - sb plty, occ calc, abnt bent
- frm, sb plty - sb blky,

CHK: lt - medgy, sb plty - sb blky, v sft - frm, mot tex, v calc
MRLST: medgy - dk gy brn, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent

CHK: lt - medgy, sb plty - sb blky, v sft - frm, mot tex, v calc
MRLST: medgy - dk gy brn, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent

MRLST: medgy - dk gy brn, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent
CHK: lt - medgy, sb plty - sb blky, v sft - frm, mot tex, v calc

MRLST: medgy - dk gy brn, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent, tr fos frag
CHK: lt - medgy, sb plty - sb blky, v sft - frm, mo
tex, v calc



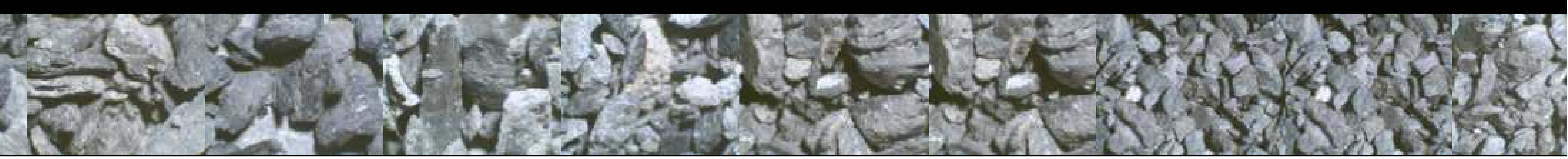
MRLST: medgy - dk gy brn, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent, tr fos frag
CHK: lt - medgy, sb plty - sb blky, v sft - frm, mot tex, v calc

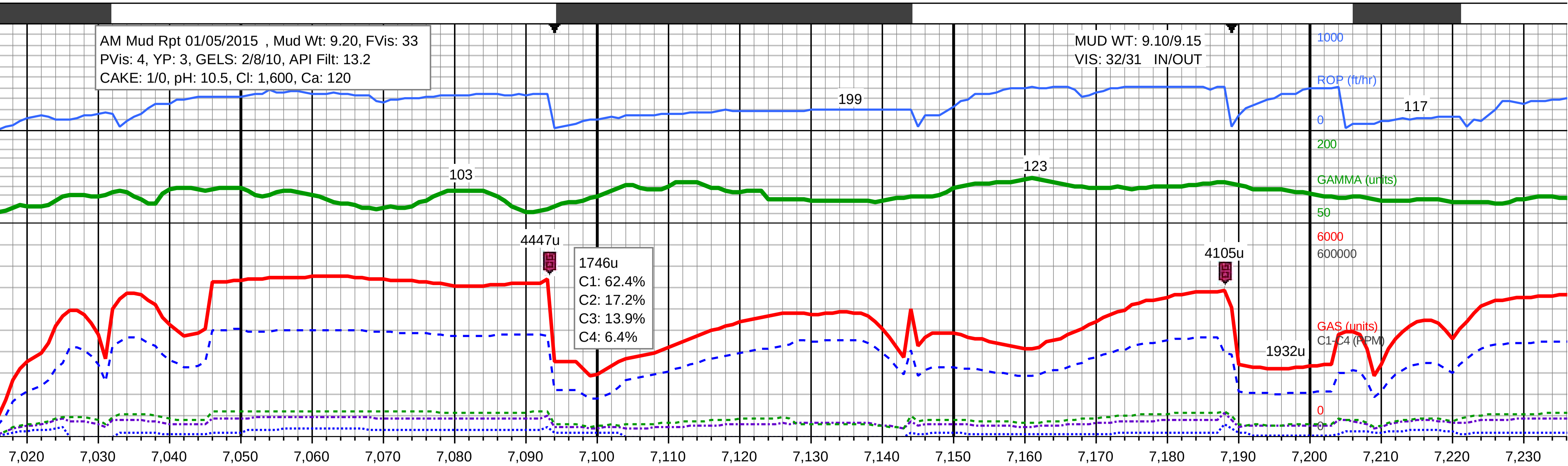
CHK: lt - medgy, sb plty - sb blky, v sft - frm, mot tex, v calc
MRLST: medgy - dk gy brn, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent, tr fos frag

CHK: lt - medgy, sb plty - sb blky, v sft - frm, mot tex, v calc
MRLST: medgy - dk gy brn, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent, tr fos frag

80% CHK: pred v lt gy, occ medgy, sb plty - sb blky, v sft - frm, mot tex, v calc
20% MRLST: med - dk gy, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent, sme fos frag

80% CHK: pred
blky, v sft - frm,
20% MRLST: m
blky, slty, mot te





6400

MD: 7,037'
TVD: 6,638.17'
Inclination: 84.54°
Azimuth: 180.9°

MD: 7,131'
TVD: 6,642.14'
Inclination: 90.62°
Azimuth: 181.06°

TVD (ft)

MD: 7,226'
TVD: 6,640.76'
Inclination: 91.05°
Azimuth: 177.7°

v lt gy, occ medgy, sb plty - sb
mot tex, v calc
ed - dk gy, sft - frm, sb plty - sb
ex, v calc, tr bent, sme fos frag

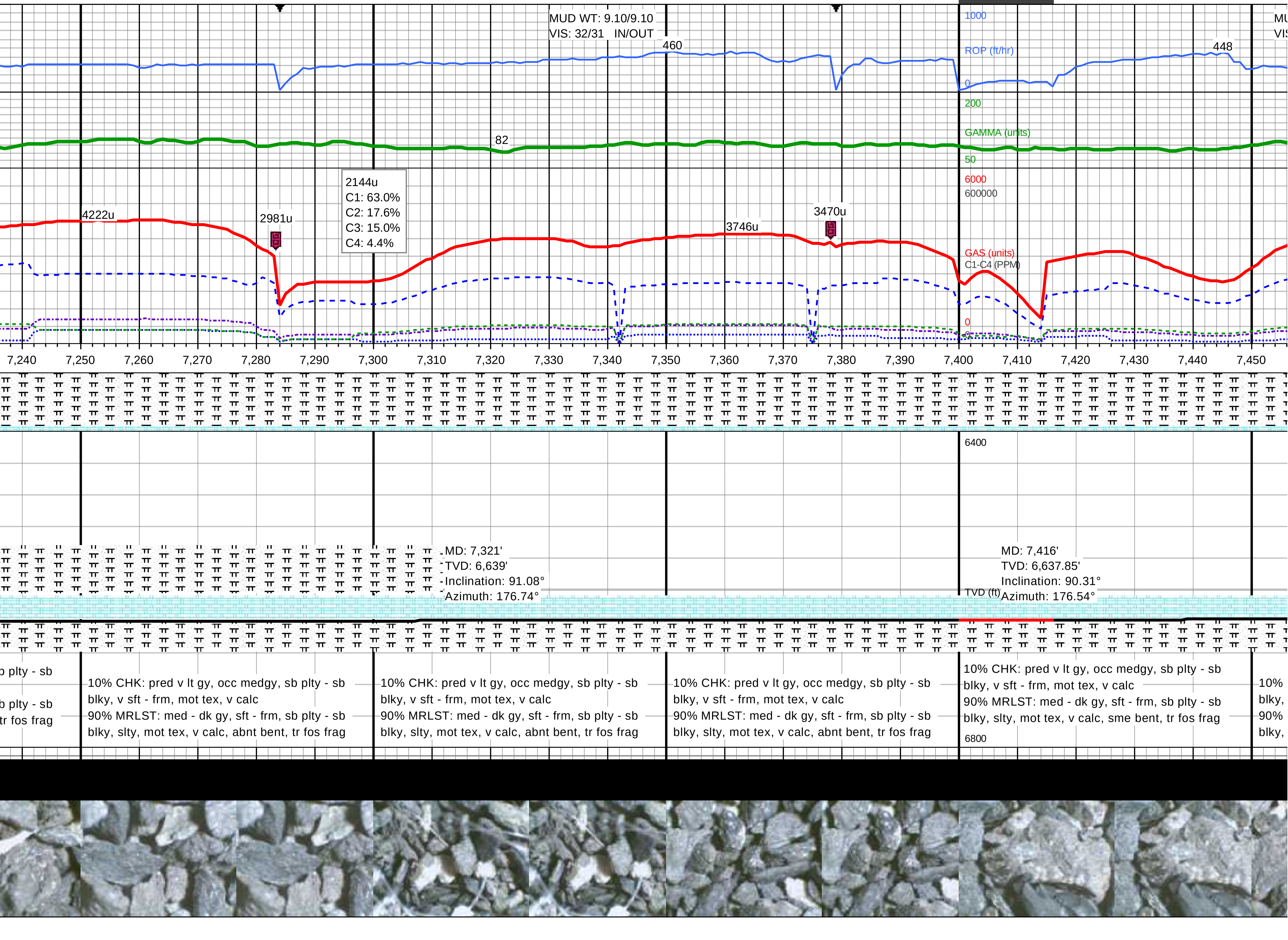
70% CHK: pred v lt gy, occ medgy, sb plty - sb
blky, v sft - frm, mot tex, v calc
30% MRLST: med - dk gy, sft - frm, sb plty - sb
blky, slty, mot tex, v calc, tr bent, sme fos frag

20% CHK: pred v lt gy, occ medgy, sb plty - sb
blky, v sft - frm, mot tex, v calc
80% MRLST: med - dk gy, sft - frm, sb plty - sb
blky, slty, mot tex, v calc, sme bent, tr fos frag

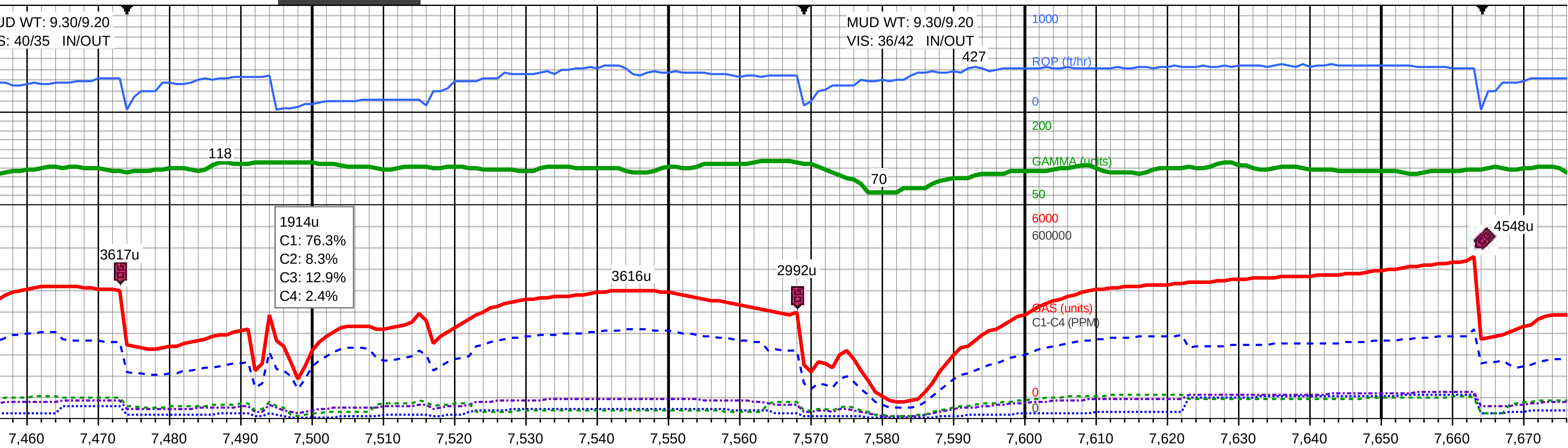
20% CHK: pred v lt gy, occ medgy, sb plty - sb
blky, v sft - frm, mot tex, v calc
80% MRLST: med - dk gy, sft - frm, sb plty - sb
blky, slty, mot tex, v calc, sme bent, tr fos frag

10% CHK: pred v lt gy, occ medgy, sb
blky, v sft - frm, mot tex, v calc
90% MRLST: med - dk gy, sft - frm, sb
blky, slty, mot tex, v calc, abnt bent,

6800



MUD WT: 9.10/9.10
VIS: 32/31 IN/OUT
460
448
1000
ROP (ft/hr)
0
200
GAMMA (units)
50
82
6000
600000
GAS (units)
C1-C4 (PPM)
0
4222u
2981u
2144u
C1: 63.0%
C2: 17.6%
C3: 15.0%
C4: 4.4%
3746u
3470u
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
7,410
7,420
7,430
7,440
7,450
6400
MD: 7,321'
TVD: 6,639'
Inclination: 91.08°
Azimuth: 176.74°
MD: 7,416'
TVD: 6,637.85'
Inclination: 90.31°
Azimuth: 176.54°
TVD (ft)
b plty - sb
b plty - sb
tr fos frag
10% CHK: pred v lt gy, occ medgy, sb plty - sb
blky, v sft - frm, mot tex, v calc
90% MRLST: med - dk gy, sft - frm, sb plty - sb
blky, slty, mot tex, v calc, abnt bent, tr fos frag
10% CHK: pred v lt gy, occ medgy, sb plty - sb
blky, v sft - frm, mot tex, v calc
90% MRLST: med - dk gy, sft - frm, sb plty - sb
blky, slty, mot tex, v calc, abnt bent, tr fos frag
10% CHK: pred v lt gy, occ medgy, sb plty - sb
blky, v sft - frm, mot tex, v calc
90% MRLST: med - dk gy, sft - frm, sb plty - sb
blky, slty, mot tex, v calc, abnt bent, tr fos frag
10% CHK: pred v lt gy, occ medgy, sb plty - sb
blky, v sft - frm, mot tex, v calc
90% MRLST: med - dk gy, sft - frm, sb plty - sb
blky, slty, mot tex, v calc, sme bent, tr fos frag
6800



6400

MD: 7,511'
TVD: 6,637.54'
Inclination: 90.06°
Azimuth: 178.06°

MD: 7,606'
TVD: 6,636.93'
Inclination: 90.68°
Azimuth: 177.83°

CHK: pred v lt gy, occ medgy, sb plty - sb
v sft - frm, mot tex, v calc
MRLST: med - dk gy, sft - frm, sb plty - sb
slty, mot tex, v calc, sme bent, tr fos frag

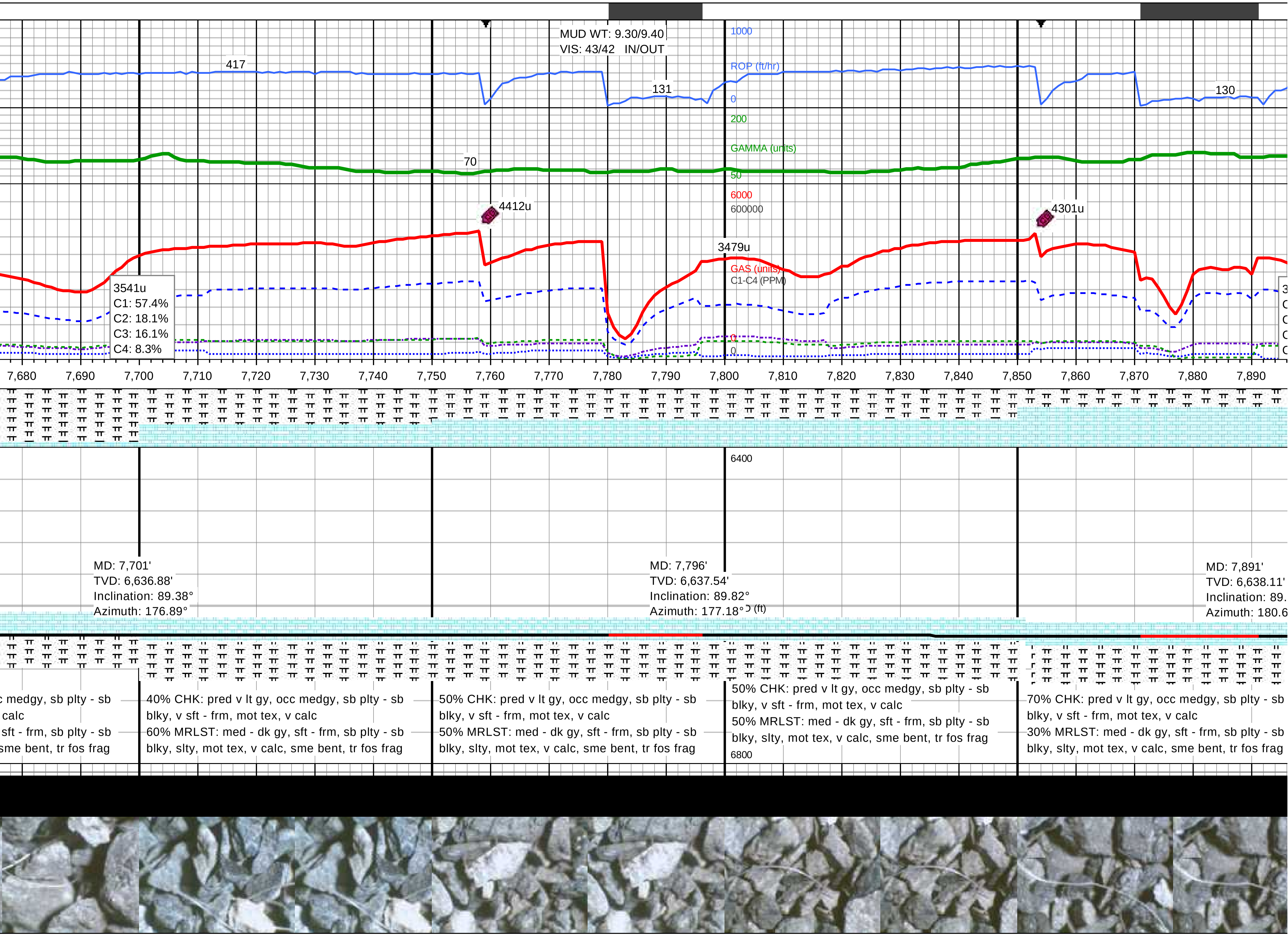
10% CHK: pred v lt gy, occ medgy, sb plty - sb
blky, v sft - frm, mot tex, v calc
90% MRLST: med - dk gy, sft - frm, sb plty - sb
blky, slty, mot tex, v calc, sme bent, tr fos frag

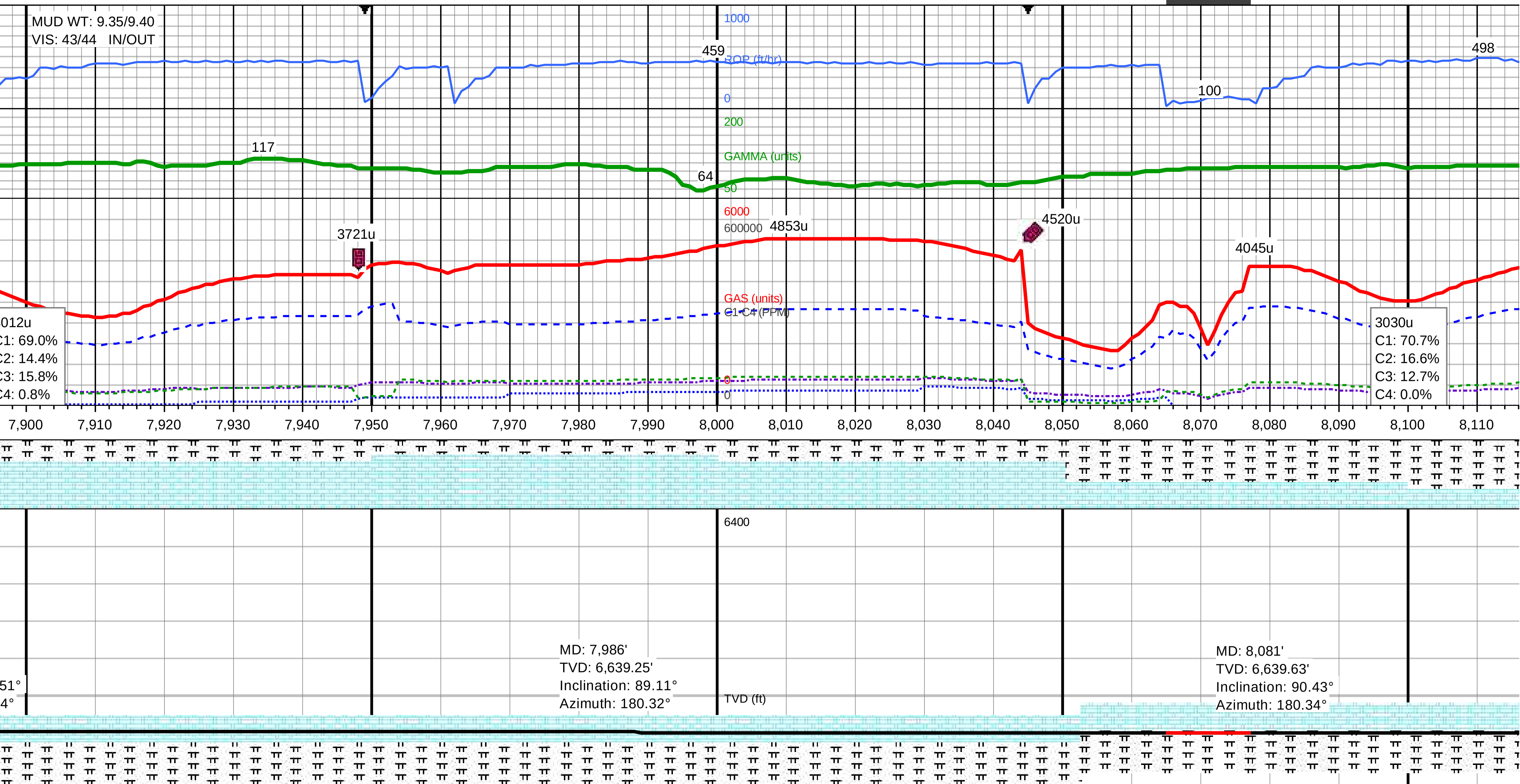
10% CHK: pred v lt gy, occ medgy, sb plty - sb
blky, v sft - frm, mot tex, v calc
90% MRLST: med - dk gy, sft - frm, sb plty - sb
blky, slty, mot tex, v calc, sme bent, tr fos frag

10% CHK: pred v lt gy, occ medgy, sb plty - sb
blky, v sft - frm, mot tex, v calc
90% MRLST: med - dk gy, sft - frm, sb plty - sb
blky, slty, mot tex, v calc, sme bent, tr fos frag

6800

10% CHK: pred v lt gy, occ
blky, v sft - frm, mot tex, v
90% MRLST: med - dk gy,
blky, slty, mot tex, v calc, s


MUD WT: 9.30/9.40
VIS: 43/42 IN/OUT
1000
ROP (ft/hr)
0
417
131
130
200
GAMMA (units)
50
70
6000
600000
GAS (units)
C1-C4 (PPM)
0
0
4412u
4301u
3479u
3541u
C1: 57.4%
C2: 18.1%
C3: 16.1%
C4: 8.3%
7,680
7,690
7,700
7,710
7,720
7,730
7,740
7,750
7,760
7,770
7,780
7,790
7,800
7,810
7,820
7,830
7,840
7,850
7,860
7,870
7,880
7,890
6400
6800
MD: 7,701'
TVD: 6,636.88'
Inclination: 89.38°
Azimuth: 176.89°
MD: 7,796'
TVD: 6,637.54'
Inclination: 89.82°
Azimuth: 177.18°
(ft)
MD: 7,891'
TVD: 6,638.11'
Inclination: 89.
Azimuth: 180.6
c medgy, sb plty - sb
calc
sft - frm, sb plty - sb
sme bent, tr fos frag
40% CHK: pred v lt gy, occ medgy, sb plty - sb
blky, v sft - frm, mot tex, v calc
60% MRLST: med - dk gy, sft - frm, sb plty - sb
blky, slty, mot tex, v calc, sme bent, tr fos frag
50% CHK: pred v lt gy, occ medgy, sb plty - sb
blky, v sft - frm, mot tex, v calc
50% MRLST: med - dk gy, sft - frm, sb plty - sb
blky, slty, mot tex, v calc, sme bent, tr fos frag
50% CHK: pred v lt gy, occ medgy, sb plty - sb
blky, v sft - frm, mot tex, v calc
50% MRLST: med - dk gy, sft - frm, sb plty - sb
blky, slty, mot tex, v calc, sme bent, tr fos frag
70% CHK: pred v lt gy, occ medgy, sb plty - sb
blky, v sft - frm, mot tex, v calc
30% MRLST: med - dk gy, sft - frm, sb plty - sb
blky, slty, mot tex, v calc, sme bent, tr fos frag



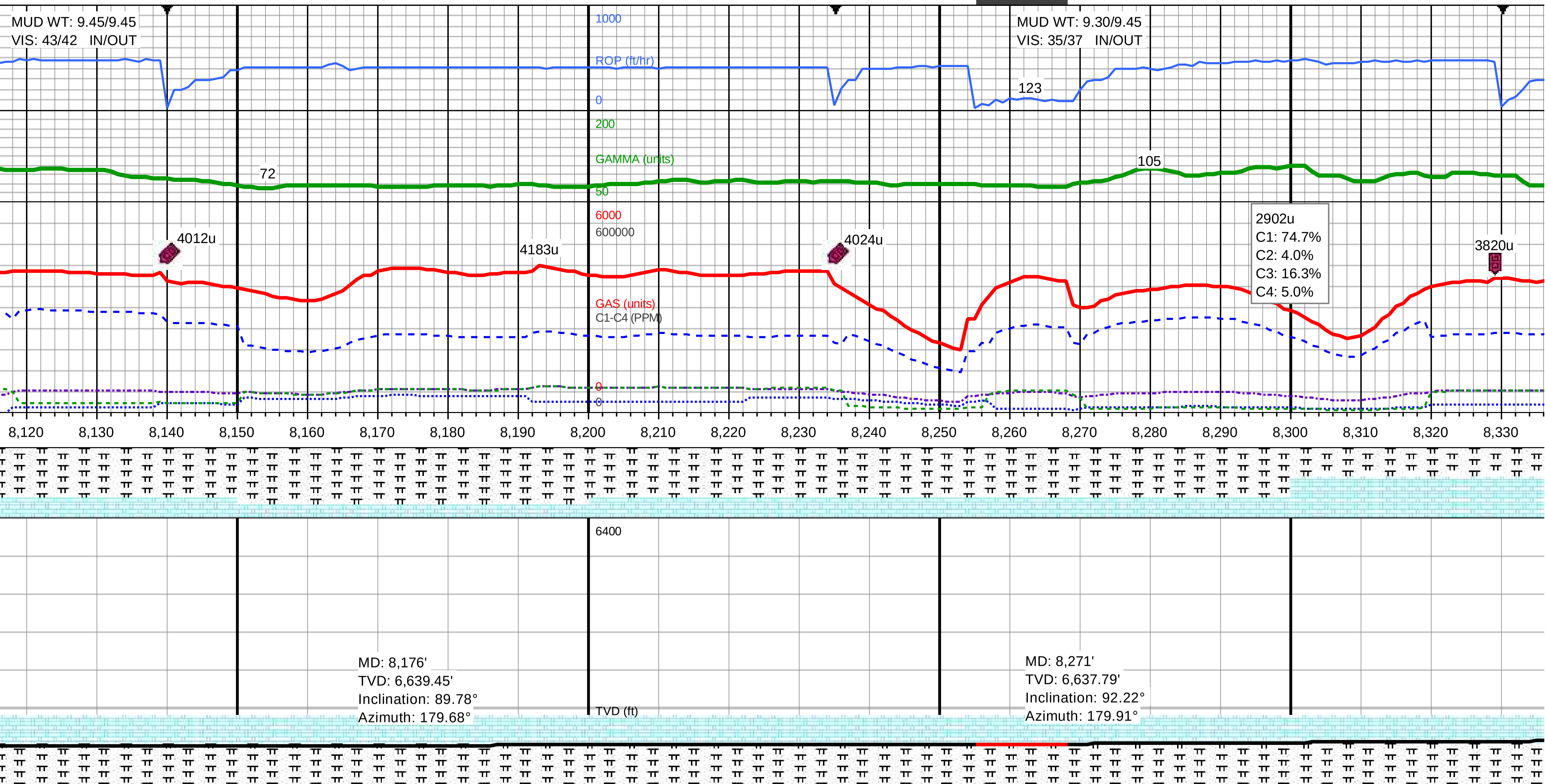
70% CHK: pred v lt gy, occ medgy, sb plty - sb blky, v sft - frm, mot tex, v calc
30% MRLST: med - dk gy, sft - frm, sb plty - sb blky, slty, mot tex, v calc, sme bent, tr fos frag

80% CHK: pred v lt gy, occ medgy, sb plty - sb blky, v sft - frm, mot tex, v calc
20% MRLST: med - dk gy, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent, tr fos frag

70% CHK: pred v lt gy, occ medgy, sb plty - sb blky, v sft - frm, mot tex, v calc
30% MRLST: med - dk gy, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent, tr fos frag

40% CHK: pred v lt gy, occ medgy, sb plty - sb blky, v sft - frm, mot tex, v calc
60% MRLST: med - dk gy, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent, tr fos frag

30% CHK: pred
blky, v sft - frm,
70% MRLST: m
blky, slty, mot te



v lt gy, occ medgy, sb plty - sb
mot tex, v calc
ed - dk gy, sft - frm, sb plty - sb
ex, v calc, sme bent, tr fos frag

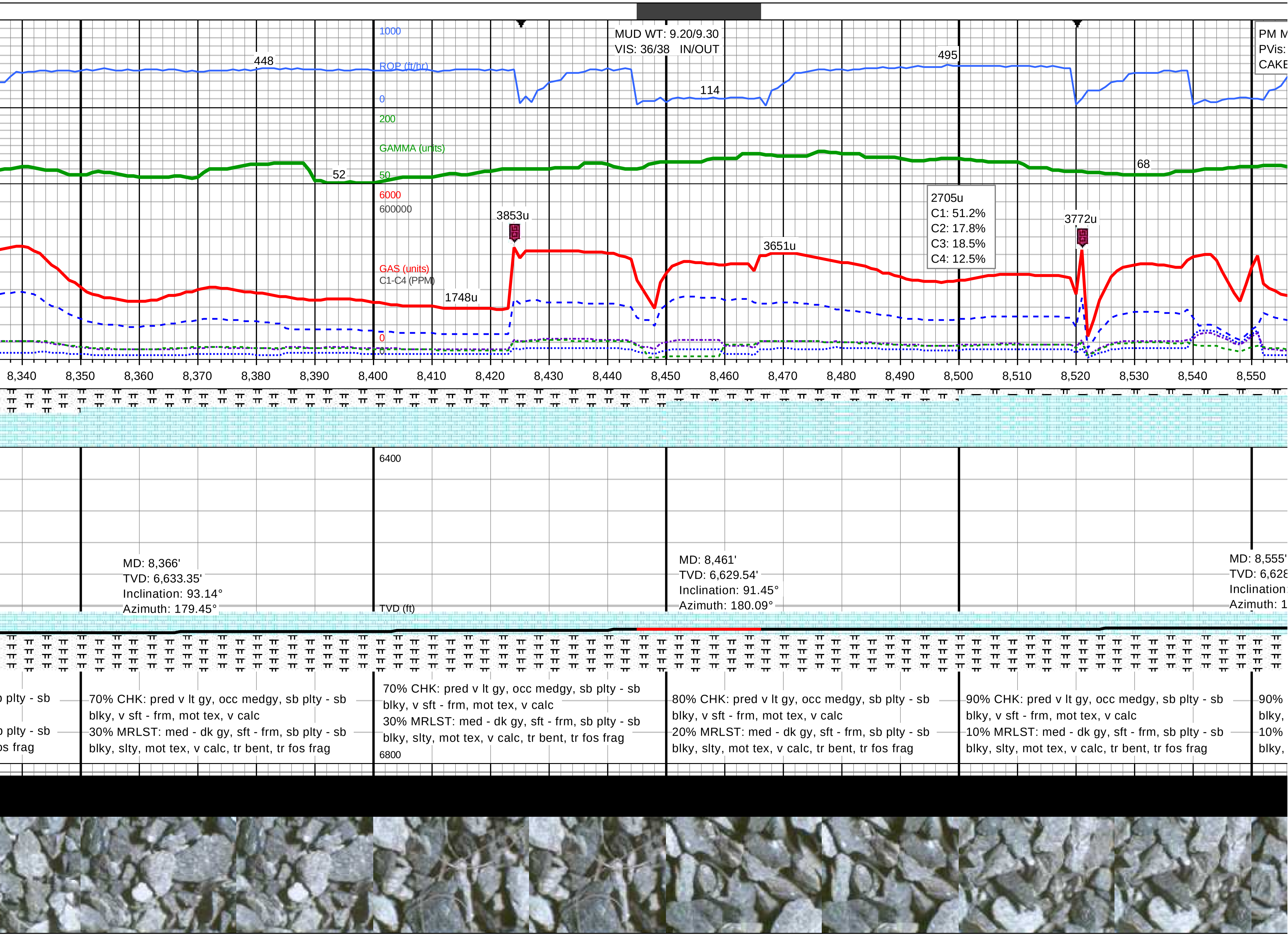
20% CHK: pred v lt gy, occ medgy, sb plty - sb blky, v sft - frm, mot tex, v calc
80% MRLST: med - dk gy, sft - frm, sb plty - sb blky, slty, mot tex, v calc, sme bent, tr fos frag

30% CHK: pred v lt gy, occ medgy, sb plty - sb blky, v sft - frm, mot tex, v calc
70% MRLST: med - dk gy, sft - frm, sb plty - sb blky, slty, mot tex, v calc, sme bent, tr fos frag

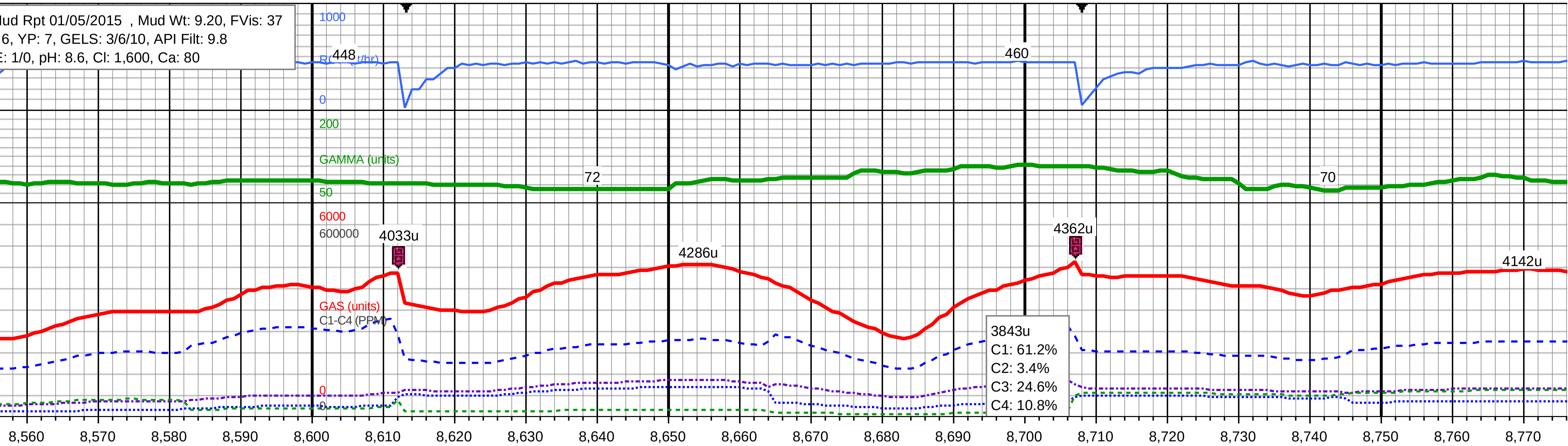
6800

30% CHK: pred v lt gy, occ medgy, sb plty - sb blky, v sft - frm, mot tex, v calc
70% MRLST: med - dk gy, sft - frm, sb plty - sb blky, slty, mot tex, v calc, sme bent, tr fos frag

60% CHK: pred v lt gy, occ medgy, sb
blky, v sft - frm, mot tex, v calc
40% MRLST: med - dk gy, sft - frm, sb
blky, slty, mot tex, v calc, tr bent, tr fo



ROP (ft/hr)
1000
0
448
114
495
MUD WT: 9.20/9.30
VIS: 36/38 IN/OUT
PM M
PVis:
CAKE
GAMMA (units)
200
50
52
68
GAS (units)
6000
0
C1-C4 (PPM)
600000
0
1748u
3853u
3651u
3772u
2705u
C1: 51.2%
C2: 17.8%
C3: 18.5%
C4: 12.5%
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
8,510
8,520
8,530
8,540
8,550
TVD (ft)
6400
6800
MD: 8,366'
TVD: 6,633.35'
Inclination: 93.14°
Azimuth: 179.45°
MD: 8,461'
TVD: 6,629.54'
Inclination: 91.45°
Azimuth: 180.09°
MD: 8,555'
TVD: 6,628
Inclination
Azimuth: 1
plty - sb
plty - sb
os frag
70% CHK: pred v lt gy, occ medgy, sb plty - sb blky, v sft - frm, mot tex, v calc
30% MRLST: med - dk gy, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent, tr fos frag
70% CHK: pred v lt gy, occ medgy, sb plty - sb blky, v sft - frm, mot tex, v calc
30% MRLST: med - dk gy, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent, tr fos frag
80% CHK: pred v lt gy, occ medgy, sb plty - sb blky, v sft - frm, mot tex, v calc
20% MRLST: med - dk gy, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent, tr fos frag
90% CHK: pred v lt gy, occ medgy, sb plty - sb blky, v sft - frm, mot tex, v calc
10% MRLST: med - dk gy, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent, tr fos frag
90%
blky,
10%
blky,



6400

.58'
: 89.72°
80.36°

TVD (ft)

MD: 8,650'
TVD: 6,628.71'
Inclination: 90.12°
Azimuth: 179.96°

MD: 8,745'
TVD: 6,627.84'
Inclination: 90.92°
Azimuth: 179.51°

CHK: pred v lt gy, occ medgy, sb plty - sb
v sft - frm, mot tex, v calc
MRLST: med - dk gy, sft - frm, sb plty - sb
slty, mot tex, v calc, tr bent, tr fos frag

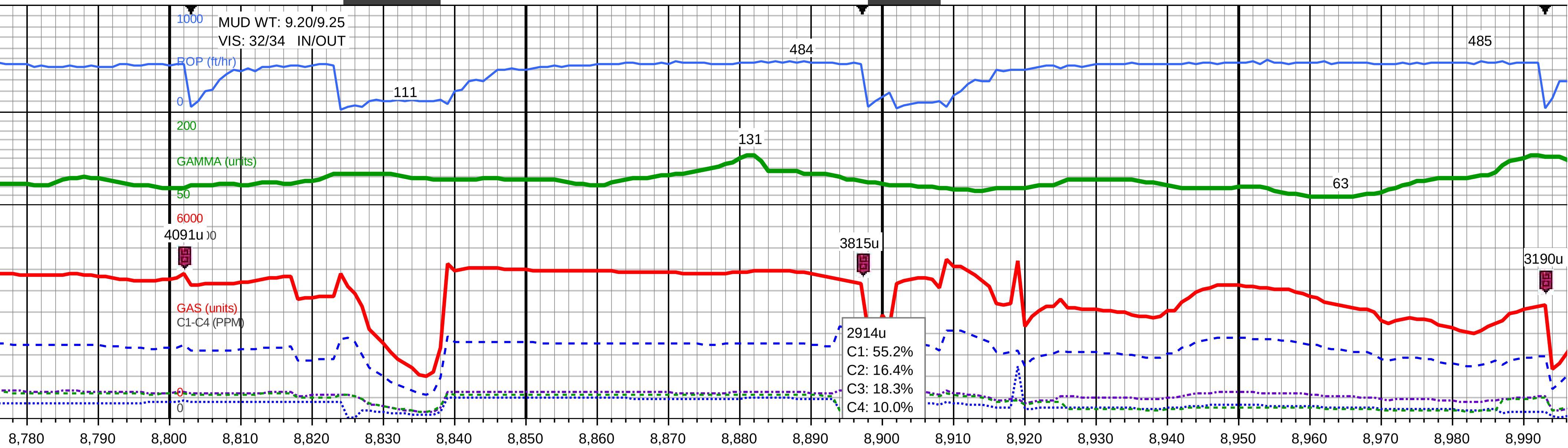
90% CHK: pred v lt gy, occ medgy, sb plty - sb
blky, v sft - frm, mot tex, v calc
10% MRLST: med - dk gy, sft - frm, sb plty - sb
blky, slty, mot tex, v calc, tr bent, tr fos frag

6800

90% CHK: pred v lt gy, occ medgy, sb plty - sb
blky, v sft - frm, mot tex, v calc
10% MRLST: med - dk gy, sft - frm, sb plty - sb
blky, slty, mot tex, v calc, v tr bent, tr fos frag

90% CHK: pred v lt gy, occ medgy, sb plty - sb
blky, v sft - frm, mot tex, v calc
10% MRLST: med - dk gy, sft - frm, sb plty - sb
blky, slty, mot tex, v calc, v tr bent, tr fos frag

90% CHK: pred v lt gy, occ
blky, v sft - frm, mot tex, v
10% MRLST: med - dk gy,
blky, slty, mot tex, v calc, v



6400

MD: 8,840'
TVD: 6,627.08'
Inclination: 90°
Azimuth: 181.31°

MD: 8,935'
TVD: 6,628.07'
Inclination: 88.8°
Azimuth: 181.27°

TVD (ft)

c medgy, sb plty - sb
calc
sft - frm, sb plty - sb
v tr bent, tr fos frag

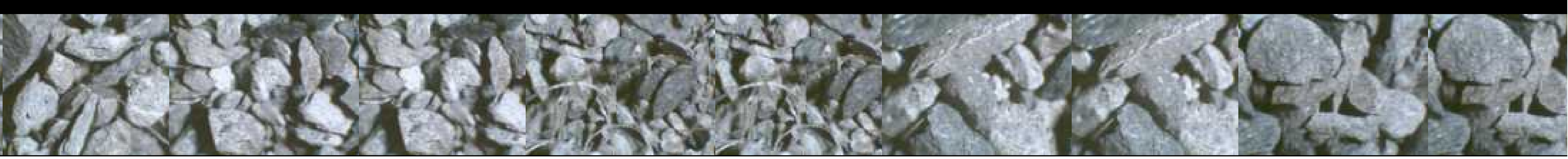
80% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot tex, v calc
20% MRLST: med - dk gy, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent, tr fos frag

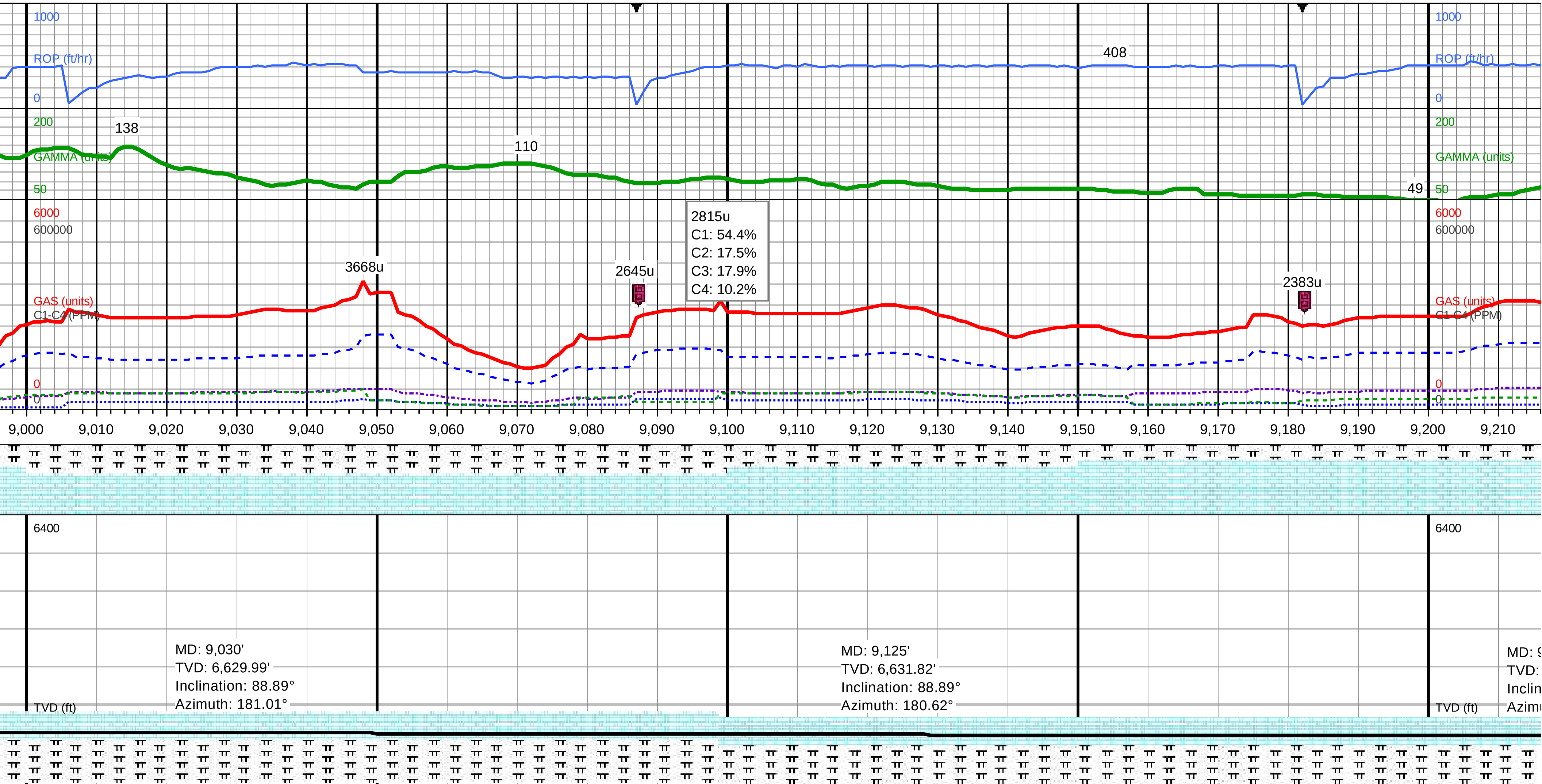
6800

80% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot tex, v calc
20% MRLST: med - dk gy, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent, tr fos frag

70% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot tex, v calc
30% MRLST: med - dk gy, sft - frm, sb plty - sb blky, slty, mot tex, v calc, rr bent, tr fos frag

70% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot tex, v calc
30% MRLST: med - dk gy, sft - frm, sb plty - sb blky, slty, mot tex, v calc, rr bent, tr fos frag





60% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot tex, v calc
40% MRLST: med - dk gy, sft - frm, sb plty - sb blky, slty, mot tex, v calc, rr bent, sme fos frag

6800

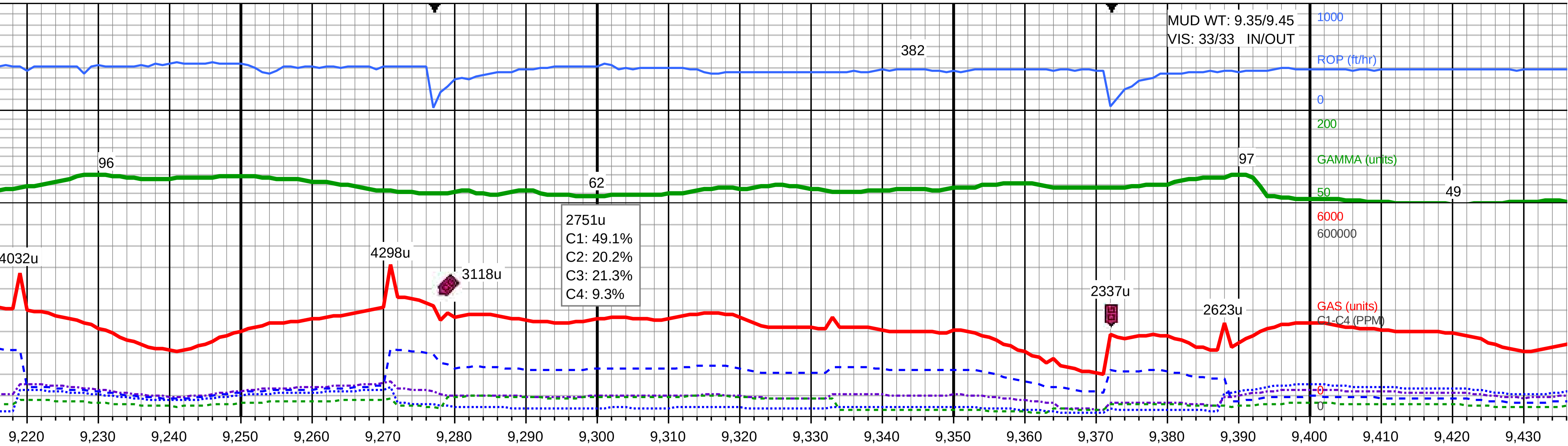
60% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot tex, v calc
40% MRLST: med - dk gy, sft - frm, sb plty - sb blky, slty, mot tex, v calc, rr bent, sme fos frag

70% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot tex, v calc
30% MRLST: med - dk gy, sft - frm, sb plty - sb blky, slty, mot tex, v calc, rr bent, sme fos frag

80% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot tex, v calc
20% MRLST: med - dk gy, sft - frm, sb plty - sb blky, slty, mot tex, v calc, rr bent, sme fos frag

80% CHK: pred
blky, sft - mod
20% MRLST: m
blky, slty, mot t

6800



6400

,220'
6,632.59'
ation: 90.18°
uth: 180.71°

MD: 9,315'
TVD: 6,632.69'
Inclination: 89.69°
Azimuth: 180.53°

MD: 9,409'
TVD: 6,633.1'
Inclination: 89.82°
Azimuth: 180.27°

lt gy, occ medgy, sb plty - sb
nd, mot tex, v calc
ed - dk gy, sft - frm, sb plty - sb
ex, v calc, tr bent, sme fos frag

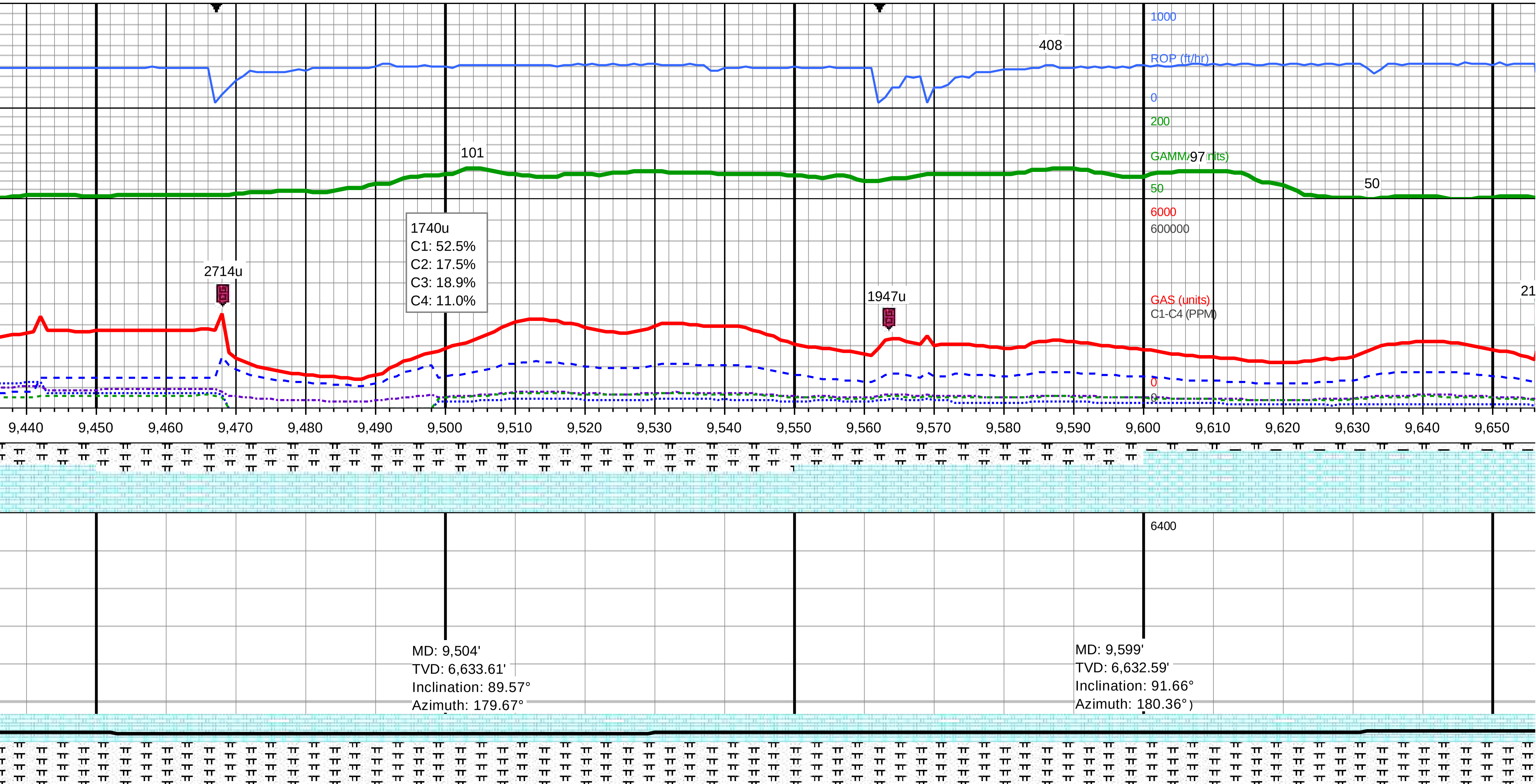
90% CHK: pred lt gy, occ medgy, sb plty - sb
blky, sft - mod hd, mot tex, v calc
10% MRLST: med - dk gy, sft - frm, sb plty - sb
blky, slty, mot tex, v calc, tr bent, sme fos frag

80% CHK: pred lt gy, occ medgy, sb plty - sb
blky, sft - mod hd, mot tex, v calc
20% MRLST: med - dk gy, sft - frm, sb plty - sb
blky, slty, mot tex, v calc, tr bent, sme fos frag

80% CHK: pred lt gy, occ medgy, sb plty - sb
blky, sft - mod hd, mot tex, v calc
20% MRLST: med - dk gy, sft - frm, sb plty - sb
blky, slty, mot tex, v calc, tr bent, sme fos frag

70% CHK: pred lt gy, occ medgy, sb
blky, sft - mod hd, mot tex, v calc
30% MRLST: med - dk gy, sft - frm, s
blky, slty, mot tex, v calc, tr bent, sm

6800



...plty - sb
...b plty - sb
...e fos frag

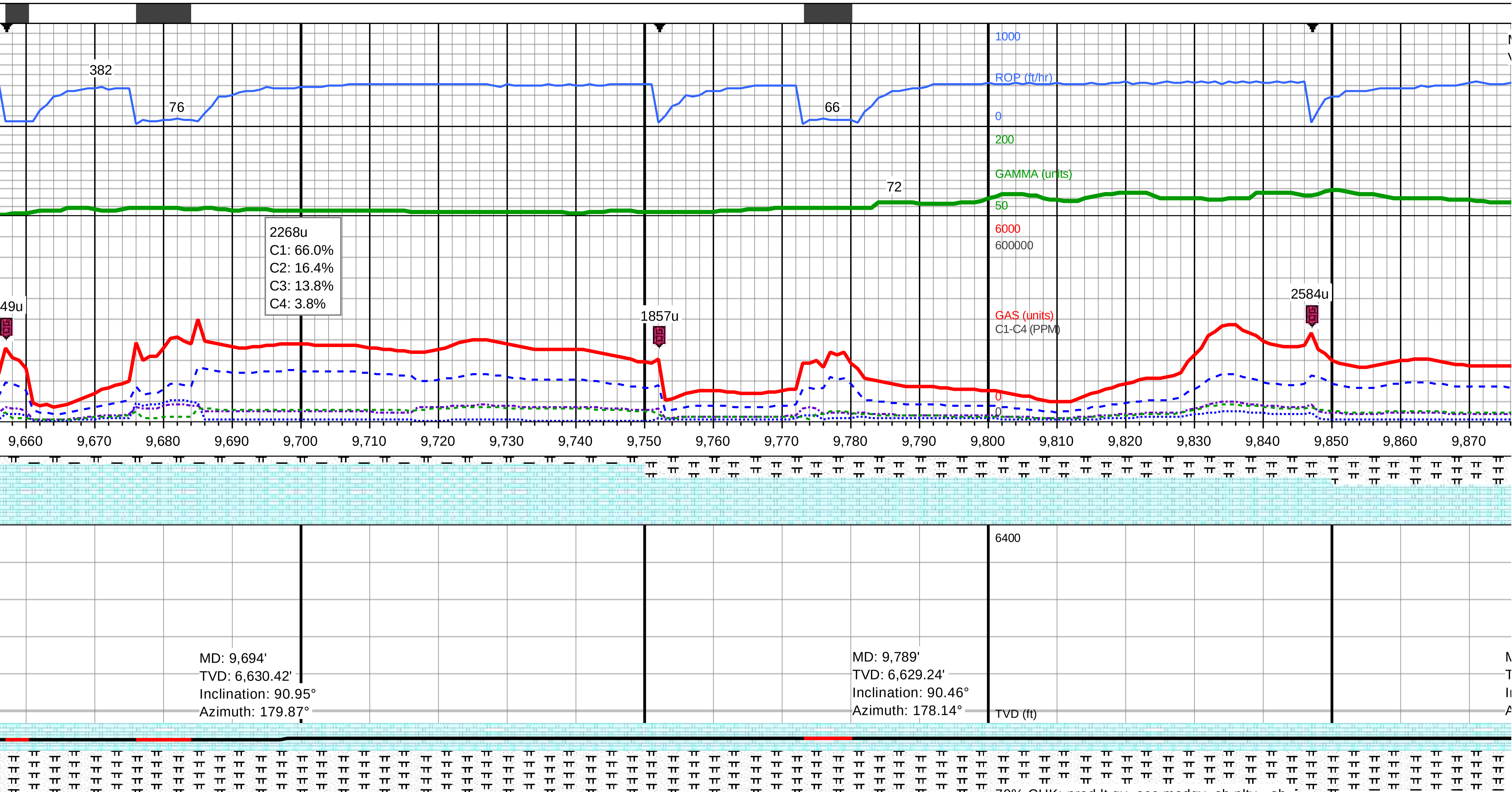
60% CHK: pred lt gy, occ medgy, sb plty - sb
blky, sft - mod hd, mot tex, v calc
40% MRLST: med - dk gy, sft - frm, sb plty - sb
blky, slty, mot tex, v calc, tr bent, sme fos frag

60% CHK: pred lt gy, occ medgy, sb plty - sb
blky, sft - mod hd, mot tex, v calc
40% MRLST: med - dk gy, sft - frm, sb plty - sb
blky, slty, mot tex, v calc, tr bent, sme fos frag

70% CHK: pred lt gy, occ medgy, sb plty - sb
blky, sft - mod hd, mot tex, v calc
30% MRLST: med - dk gy, sft - frm, sb plty - sb
blky, slty, mot tex, v calc, tr bent, sme fos frag

90% CHK: pred lt gy, occ medgy, sb plty - sb
blky, sft - mod hd, mot tex, v calc
10% MRLST: med - dk gy, sft - frm, sb plty - sb
blky, slty, mot tex, v calc, tr bent, sme fos frag
6800

90%...
blky,...
10%...
blky,...



CHK: pred lt gy, occ medgy, sb plty - sb sft - mod hd, mot tex, v calc
MRLST: med - dk gy, sft - frm, sb plty - sb slty, mot tex, v calc, tr bent, sme fos frag

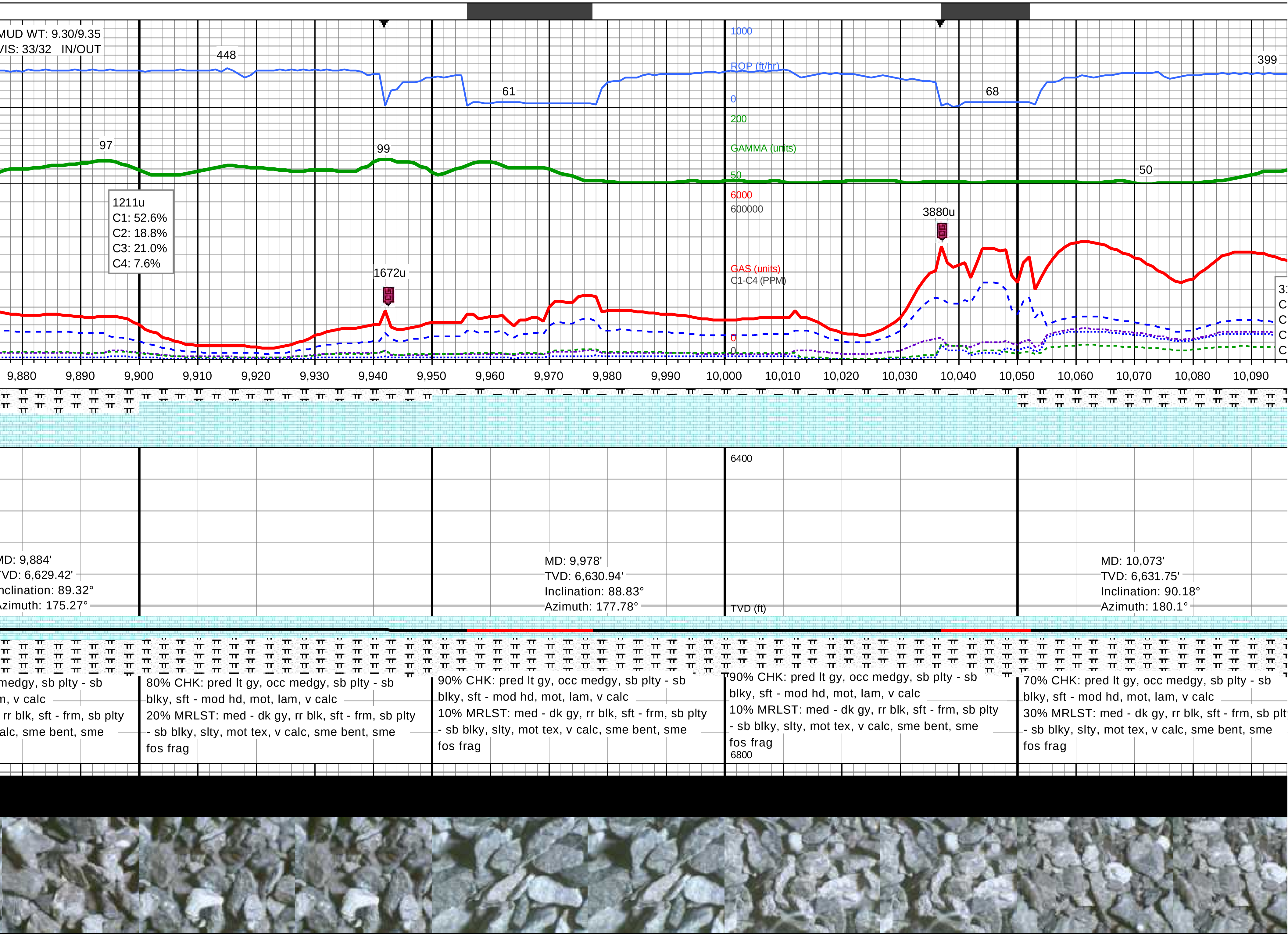
90% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot tex, v calc
10% MRLST: med - dk gy, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent, sme fos frag

70% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot, lam, v calc
30% MRLST: med - dk gy, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent, sme fos frag

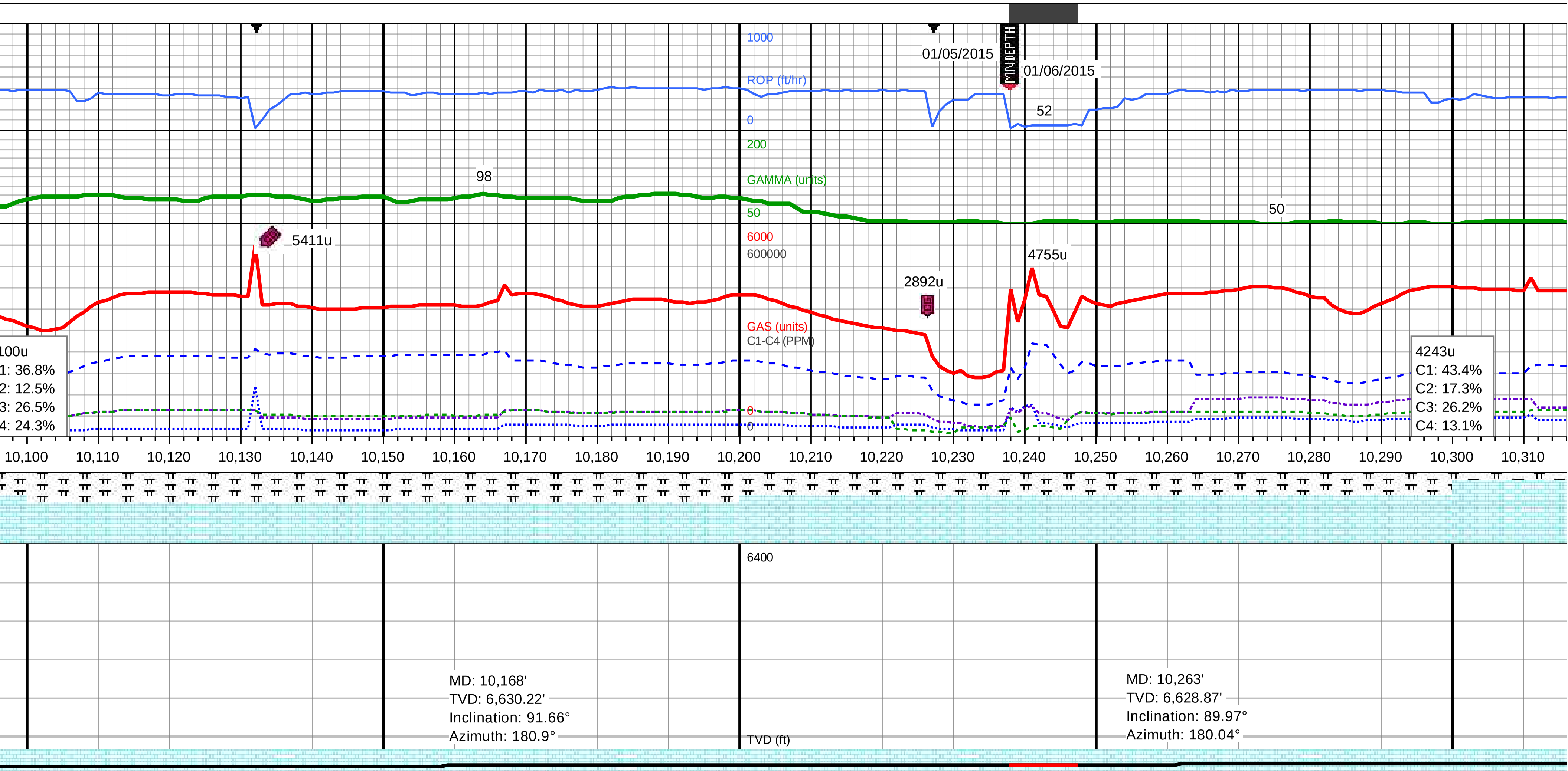
70% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot, lam, v calc
30% MRLST: med - dk gy, sft - frm, sb plty - sb blky, slty, mot tex, v calc, sme bent, sme fos frag

6800

60% CHK: pred lt gy, occ m
blky, sft - mod hd, mot, lar
40% MRLST: med - dk gy,
- sb blky, slty, mot tex, v c
fos frag



MUD WT: 9.30/9.35
VIS: 33/32 IN/OUT
1000
ROP (ft/hr)
0
448
61
68
399
200
GAMMA (units)
50
97
99
50
6000
600000
GAS (units)
C1-C4 (PPM)
0
0
1211u
C1: 52.6%
C2: 18.8%
C3: 21.0%
C4: 7.6%
1672u
3880u
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
10,050
10,060
10,070
10,080
10,090
6400
TVD (ft)
6800
MD: 9,884'
TVD: 6,629.42'
Inclination: 89.32°
Azimuth: 175.27°
MD: 9,978'
TVD: 6,630.94'
Inclination: 88.83°
Azimuth: 177.78°
MD: 10,073'
TVD: 6,631.75'
Inclination: 90.18°
Azimuth: 180.1°
medgy, sb plty - sb
m, v calc
rr blk, sft - frm, sb plty
alc, sme bent, sme
80% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot, lam, v calc
20% MRLST: med - dk gy, rr blk, sft - frm, sb plty - sb blky, slty, mot tex, v calc, sme bent, sme fos frag
90% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot, lam, v calc
10% MRLST: med - dk gy, rr blk, sft - frm, sb plty - sb blky, slty, mot tex, v calc, sme bent, sme fos frag
90% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot, lam, v calc
10% MRLST: med - dk gy, rr blk, sft - frm, sb plty - sb blky, slty, mot tex, v calc, sme bent, sme fos frag
70% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot, lam, v calc
30% MRLST: med - dk gy, rr blk, sft - frm, sb plty - sb blky, slty, mot tex, v calc, sme bent, sme fos frag



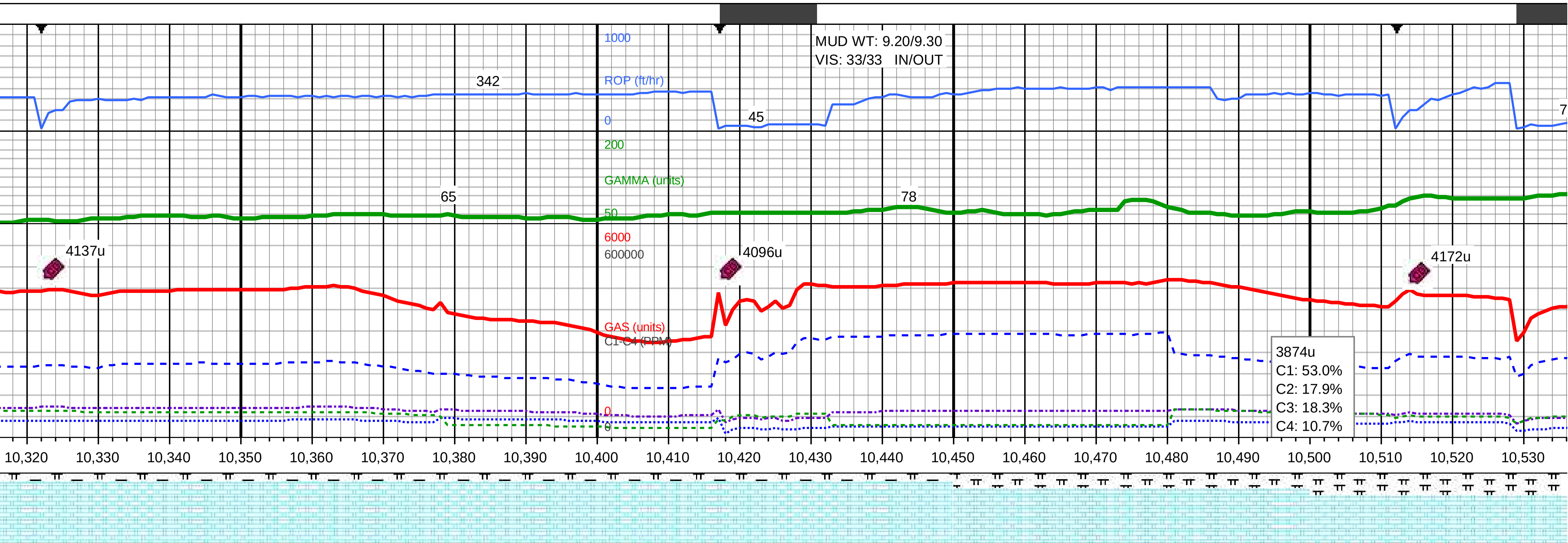
60% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot, lam, v calc
40% MRLST: med - dk gy, rr blk, sft - frm, sb plty - sb blky, slty, mot tex, v calc, sme bent, sme fos frag

60% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot, lam, v calc
40% MRLST: med - dk gy, rr blk, sft - frm, sb plty - sb blky, slty, mot tex, v calc, sme bent, sme fos frag

70% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot, lam, v calc
30% MRLST: med - dk gy, rr blk, sft - frm, sb plty - sb blky, slty, mot tex, v calc, sme bent, sme fos frag

70% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot, lam, v calc
30% MRLST: med - dk gy, rr blk, sft - frm, sb plty - sb blky, slty, mot tex, v calc, sme bent, sme fos frag

90% CHK: pred
blky, sft - mod h
10% MRLST: me
- sb blky, slty, m
fos frag



6400

MD: 10,358'
TVD: 6,628.74'
Inclination: 90.18°
Azimuth: 179.7°

TVD (ft)

MD: 10,453'
TVD: 6,628.69'
Inclination: 89.88°
Azimuth: 180.67°

lt gy, occ medgy, sb plty - sb
d, mot, lam, v calc
ed - dk gy, rr blk, sft - frm, sb plty
ot tex, v calc, sme bent, sme

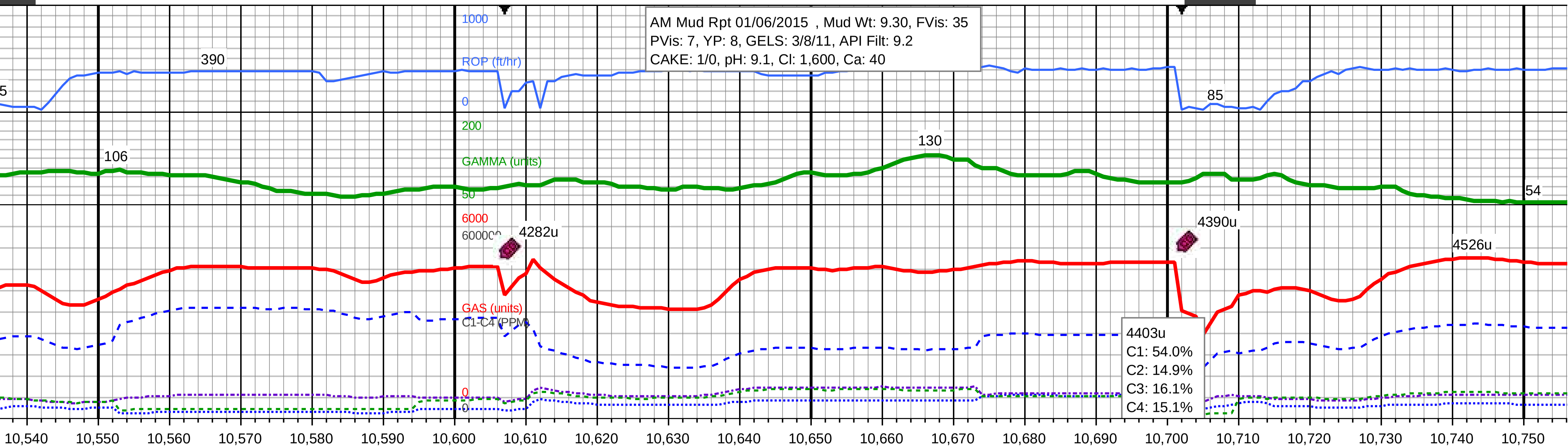
90% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot, lam, v calc
10% MRLST: med - dk gy, rr blk, sft - frm, sb plty - sb blky, slty, mot tex, v calc, sme bent, sme fos frag

90% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot, lam, v calc
10% MRLST: med - dk gy, rr blk, sft - frm, sb plty - sb blky, slty, mot tex, v calc, sme bent, sme fos frag

6800

80% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot, lam, v calc
20% MRLST: med - dk gy, rr blk, sft - frm, sb plty - sb blky, slty, mot tex, v calc, sme bent, sme fos frag

70% CHK: pred lt gy, occ medgy, sb
blky, sft - mod hd, mot, lam, v calc
30% MRLST: med - dk gy, rr blk, sft -
- sb blky, slty, mot tex, v calc, rr ben



6400

MD: 10,548'
TVD: 6,628.89'
Inclination: 89.88°
Azimuth: 182.02°

MD: 10,643'
TVD: 6,628.59'
Inclination: 90.49°
Azimuth: 182.24°

MD: 10,738'
TVD: 6,628.33'
Inclination: 89.82°
Azimuth: 180.56°

TVD (ft)

plty - sb
frm, sb plty
, tr fos frag

70% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot, lam, v calc
30% MRLST: med - dk gy, rr blk, sft - frm, sb plty - sb blky, slty, mot tex, v calc, rr bent, tr fos frag

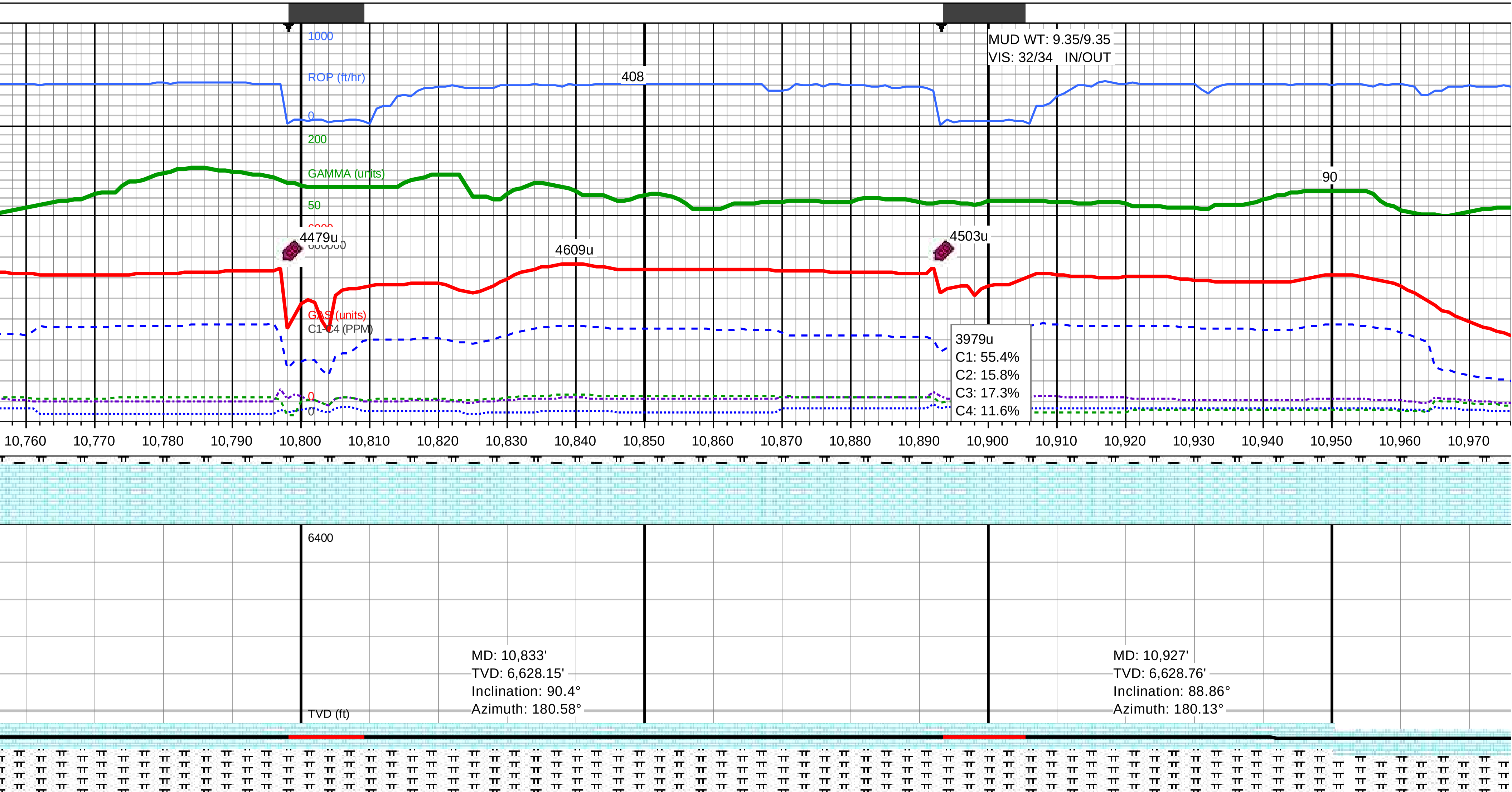
60% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot, lam, v calc
40% MRLST: med - dk gy, rr blk, sft - frm, sb plty - sb blky, slty, mot tex, v calc, rr bent, tr fos frag

6800

70% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot, lam, v calc
30% MRLST: med - dk gy, rr blk, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent, tr fos frag

90% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot, lam, v calc
10% MRLST: med - dk gy, rr blk, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent, tr fos frag

90%
blky,
10%
- sb b



CHK: pred lt gy, occ medgy, sb plty - sb
sft - mod hd, mot, lam, v calc
MRLST: med - dk gy, rr blk, sft - frm, sb plty
blky, slty, mot tex, v calc, tr bent, tr fos frag

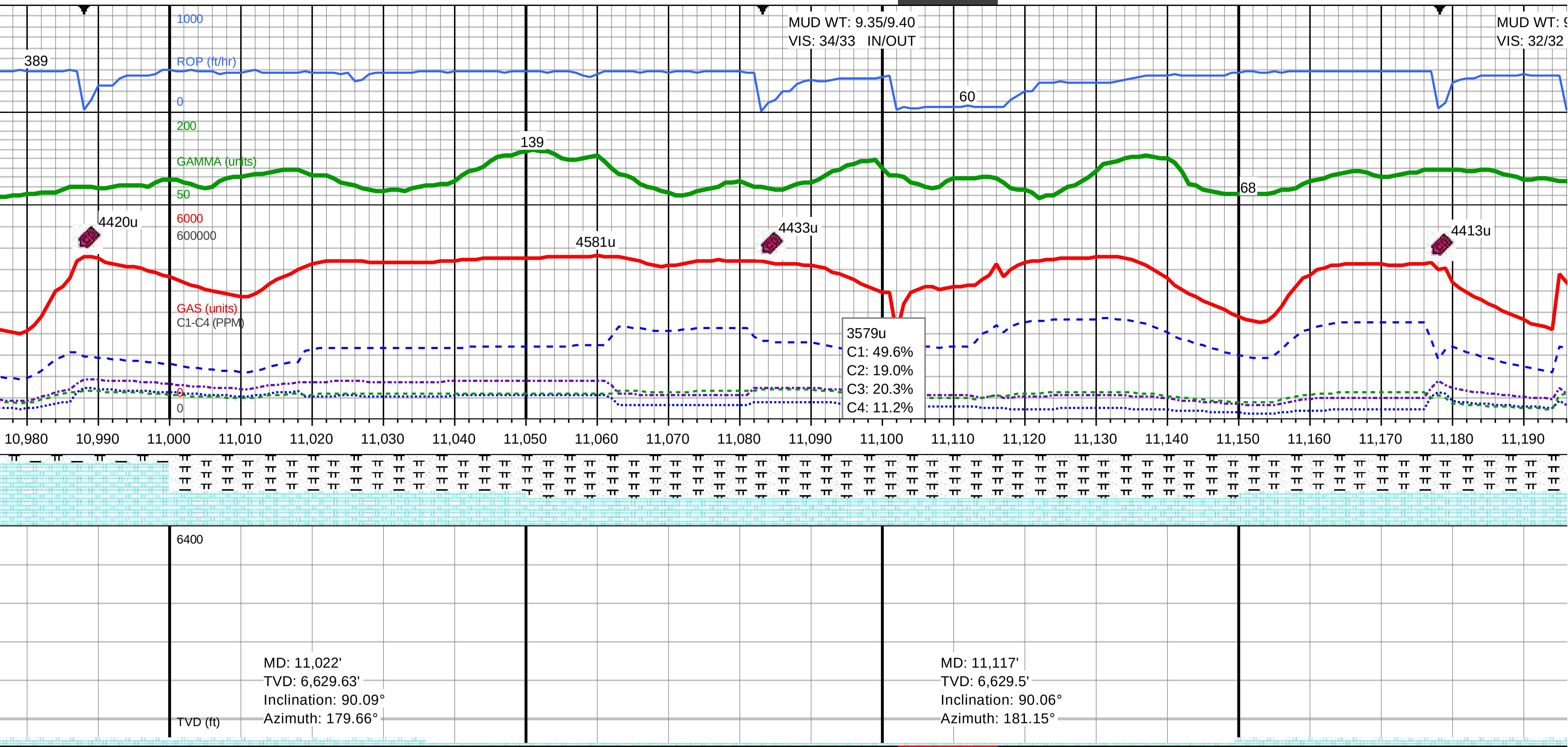
90% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot, lam, v calc
10% MRLST: med - dk gy, rr blk, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent, tr fos frag

6800

90% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot, lam, v calc
10% MRLST: med - dk gy, rr blk, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent, tr fos frag

90% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot, lam, v calc
10% MRLST: med - dk gy, rr blk, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent, tr fos frag

90% CHK: pred lt gy, occ m
blky, sft - mod hd, mot, lar
10% MRLST: med - dk gy,
- sb blky, slty, mot tex, v c



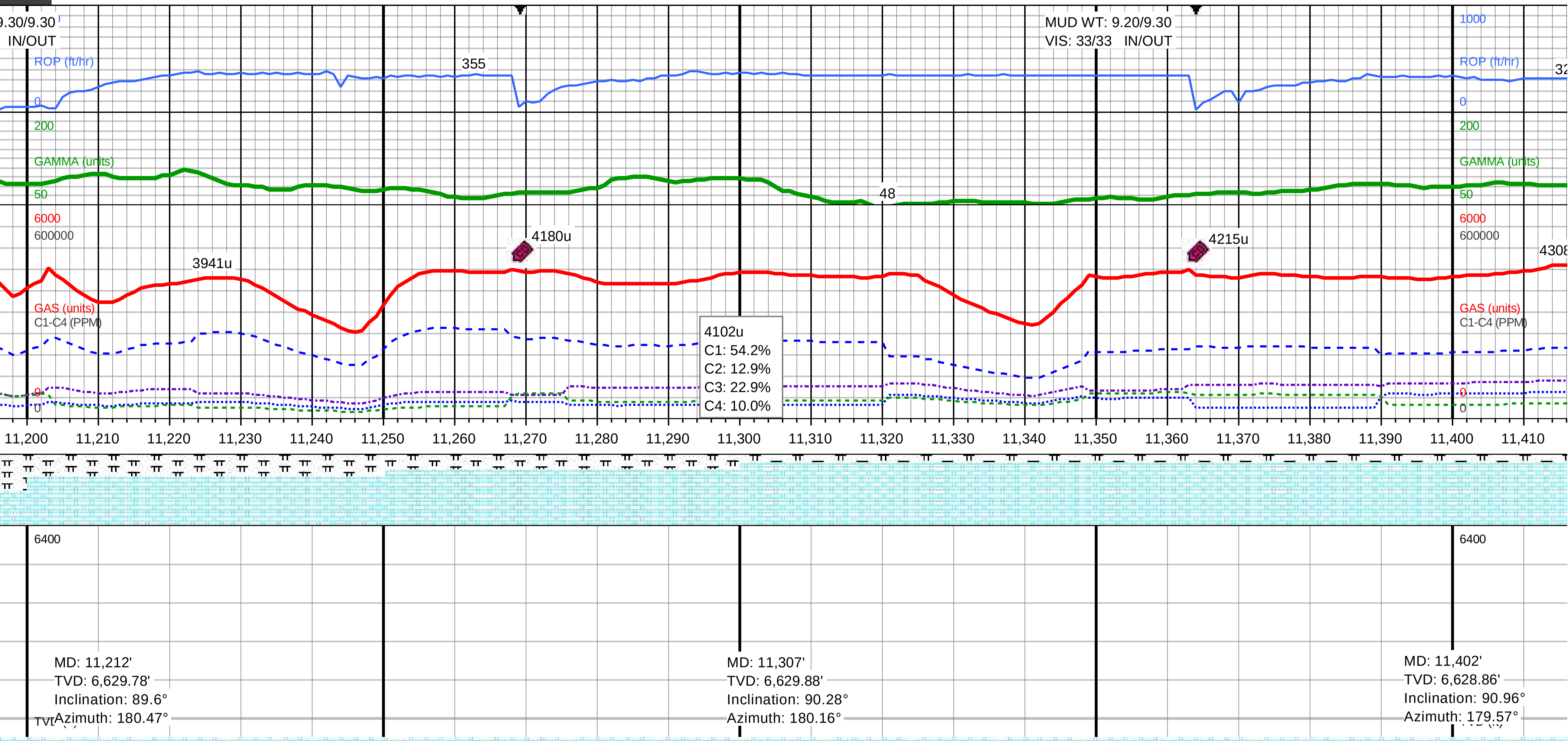
medgy, sb plty - sb
n, v calc
rr blk, sft - frm, sb plty
alc, tr bent, tr fos frag

50% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot, lam, v calc
50% MRLST: med - dk gy, rr blk, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent, tr fos frag
6800

40% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot, lam, v calc
60% MRLST: med - dk gy, rr blk, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent, tr fos frag

40% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot, lam, v calc
60% MRLST: med - dk gy, rr blk, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent, tr fos frag

50% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot, lam, v calc
50% MRLST: med - dk gy, rr blk, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent, tr fos frag



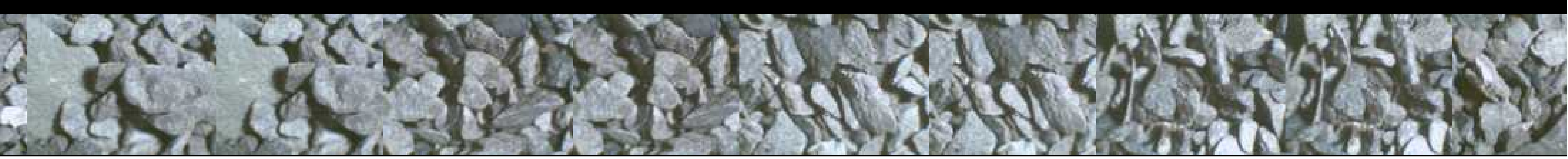
70% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot, lam, v calc
30% MRLST: med - dk gy, rr blk, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent, tr fos frag

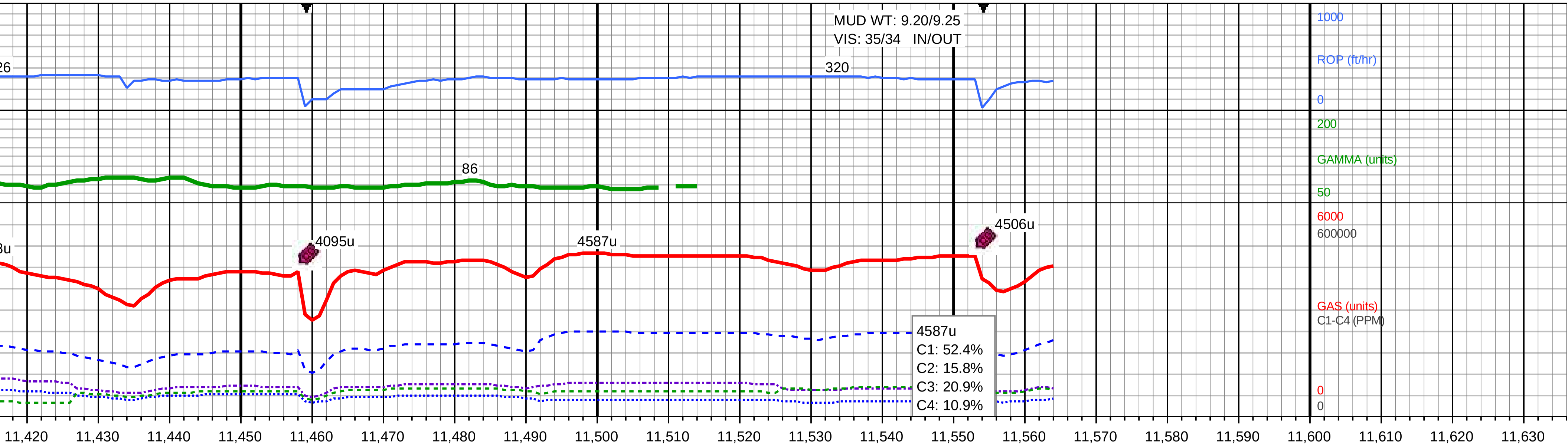
80% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot, lam, v calc
20% MRLST: med - dk gy, rr blk, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent, tr fos frag

90% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot, lam, v calc
10% MRLST: med - dk gy, rr blk, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent, tr fos frag

90% CHK: pred lt gy, occ medgy, sb plty - sb blky, sft - mod hd, mot, lam, v calc
10% MRLST: med - dk gy, rr blk, sft - frm, sb plty - sb blky, slty, mot tex, v calc, tr bent, tr fos frag

90% CHK: pred
blky, sft - mod h
10% MRLST: m
- sb blky, slty, m





6400

MD: 11,506'
TVD: 6,628.3'
Inclination: 89.66°
Azimuth: 178.36°

MD: 11,564'
TVD: 6,628.65'
Inclination: 89.66°
Azimuth: 178.36°

TVD (ft)

6800

TD @ 11,564' MD @ 9:34 hrs
MST on 1/6/2015

See Corresponding Vertical Log
Crow Creek AA01-785 VERT

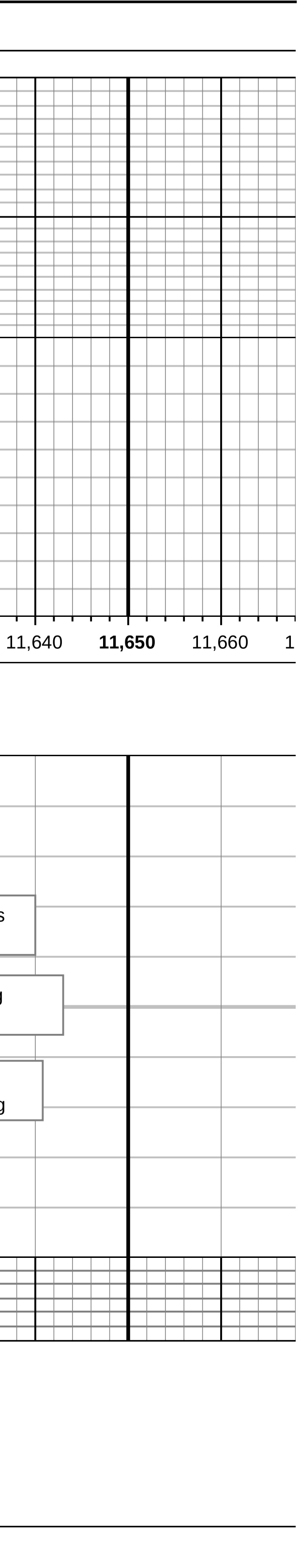
Wellsite Geological Services
Provided By Columbine Logging

lt gy, occ medgy, sb plty - sb
d, mot, lam, v calc
ed - dk gy, rr blk, sft - frm, sb plty
ot tex, v calc, tr bent, tr fos frag

90% CHK: pred lt gy, occ medgy, sb plty - sb
blky, sft - mod hd, mot, lam, v calc
10% MRLST: med - dk gy, rr blk, sft - frm, sb plty
- sb blky, slty, mot tex, v calc, tr bent, tr fos frag

90% CHK: pred lt gy, occ medgy, sb plty - sb
blky, sft - mod hd, mot, lam, v calc
10% MRLST: med - dk gy, rr blk, sft - frm, sb plty
- sb blky, slty, mot tex, v calc, tr bent, tr fos frag

90% CHK: pred lt gy, occ medgy, sb plty - sb
blky, sft - mod hd, mot, lam, v calc
10% MRLST: med - dk gy, rr blk, sft - frm, sb plty
- sb blky, slty, mot tex, v calc, tr bent, tr fos frag


11,640
11,650
11,660