COLUMBINE LOGGING

Scale: 5" / 100'
Measured Depth Log

Well Name	Storis E24-73HC HORZ		
Location	SEC 24 T6N R65W		
State	COLORADO	**County**	WELD
Country	USA	**Rig Number**	H&P 315
API Number	05-123-38151-00	**AFE #**	139612
Region	DJ BASIN	**Field**	WATTENBERG
Spud Date	5/17/2014	**Drilling Completed**	5/23/2014
Surface Coordinates	NENE 24 T6N 65W 330' FNL 1257' FEL LAT/LON: 40.47782/-104.60638		
Bottom Hole Coordinates	LAT/LON: 40.48558/-104.40308		
Ground Elevation	4,684'	**K.B. Elevation**	4,708'
Logged Interval	2,000' **To** 11,784'	**Total Depth**	11,784'
Formation	Codell Sandstone		
Type of Drilling Fluid	LSND		

Company	Noble Energy In
Address	1625 BROADW DENVER, CO 8

Name	JACK WIENER
Company	COLUMBINE LO
Address	2385 S LIPAN S DENVER, CO 8

CHALK
MARLSTONE
SILTY SHALE
SHALY SANDSTONE
UNKNOWN
ANHYDRITE
BENTONITE
BRECCIA
CEMENT

Operator

nc

/AY SUITE 2200
30202

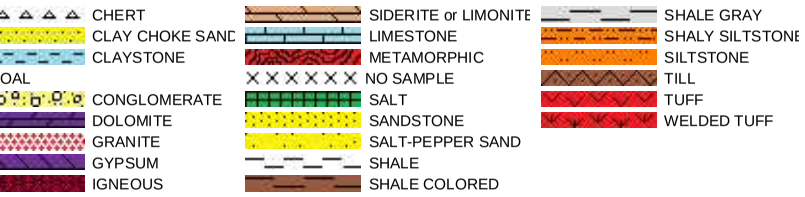
Geologist

TH, MARK KOURY

OGGING, INC

ST
30223

Rock Types



Accessories

Fossils

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

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

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

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

Porosity

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

Rounding

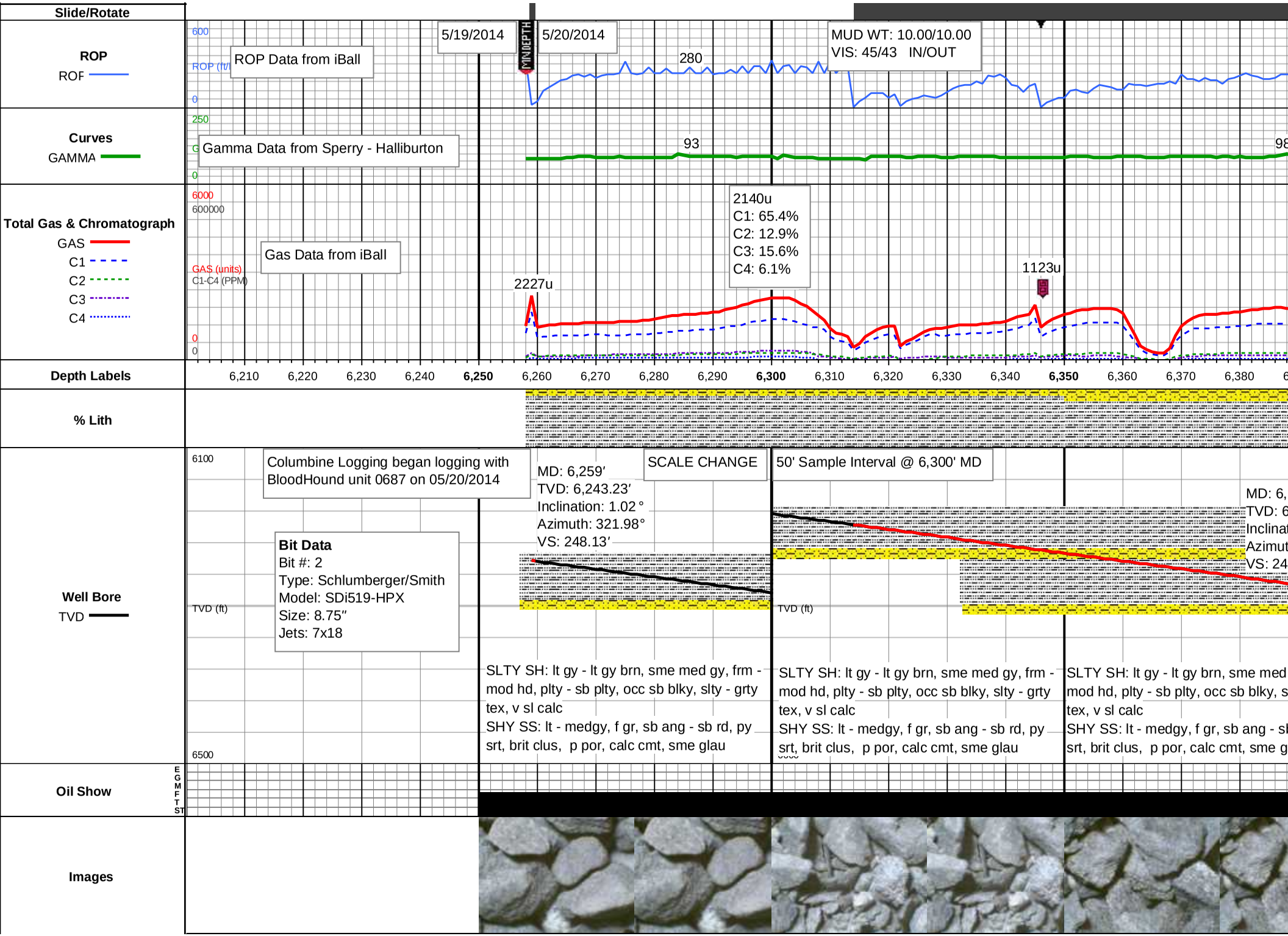
- ANGULAR
- ROUNDED
- SUBANG
- SUBRND

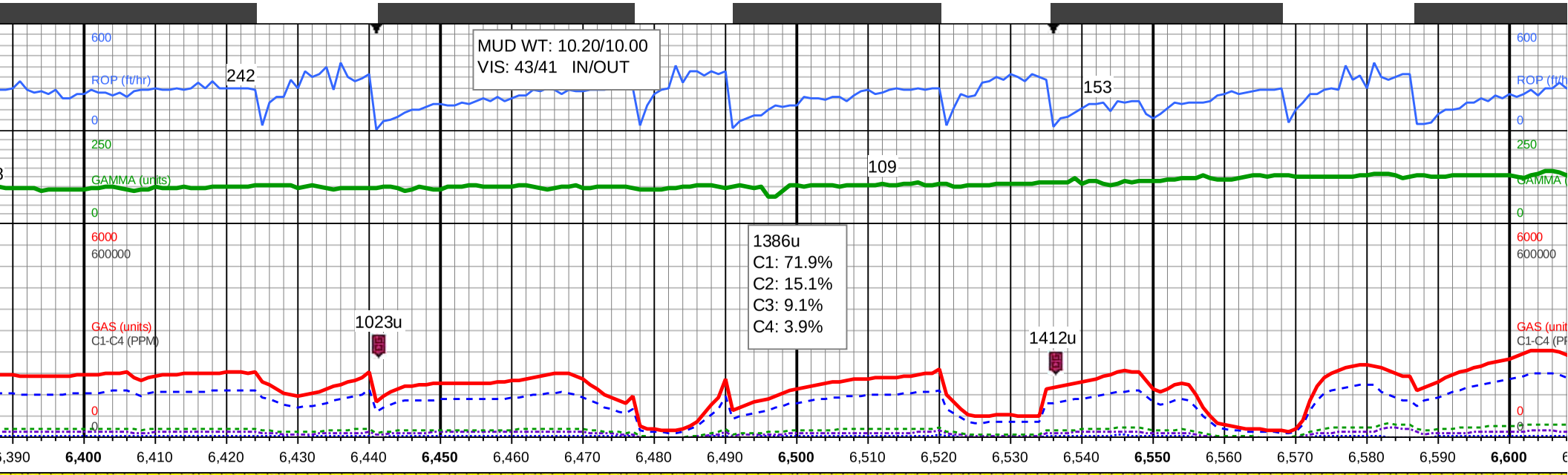
Textures

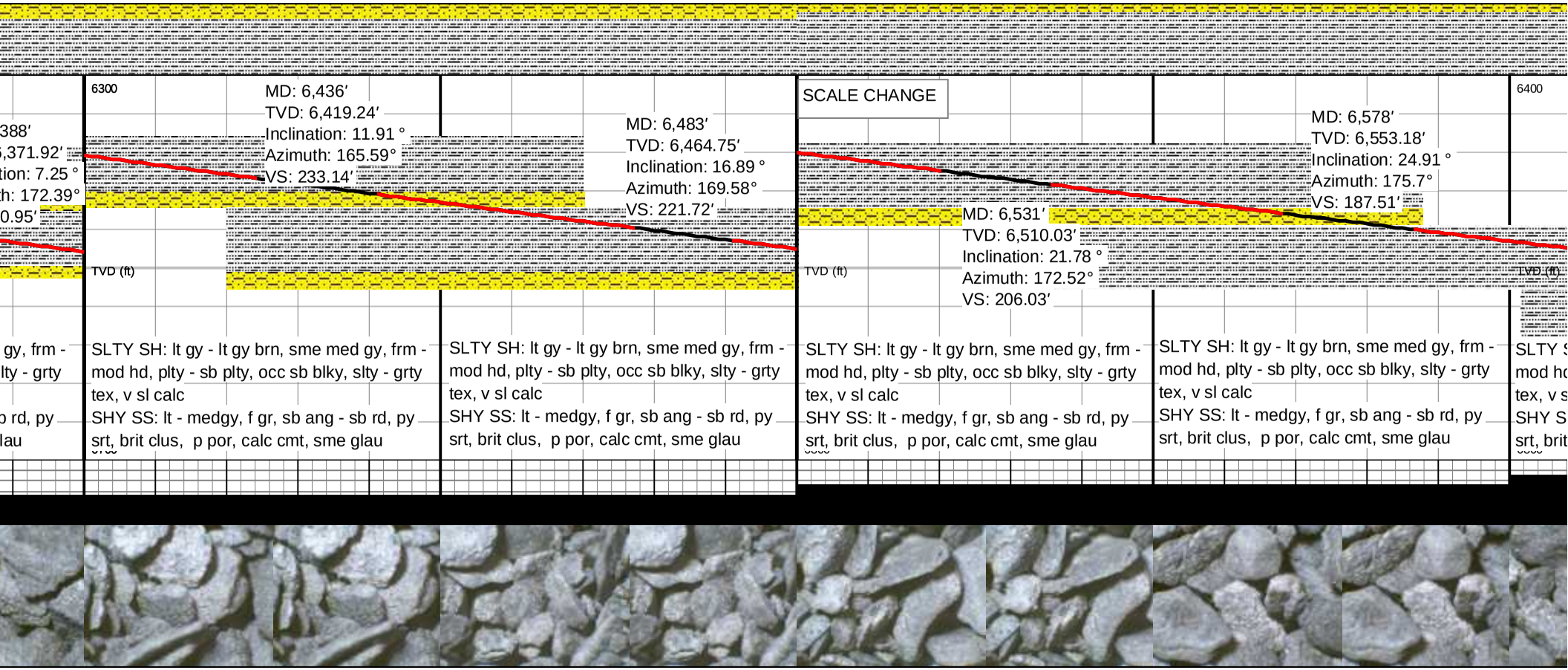
- BOUNDSTONE
- CHALKY
- CRYPTOXLN
- EARTHY
- FINELYXLN
- GRAINSTONE
- LITHOGRAPHIC
- MICROXLN
- MUDSTONE
- PACKSTONE
- WACKESTONE

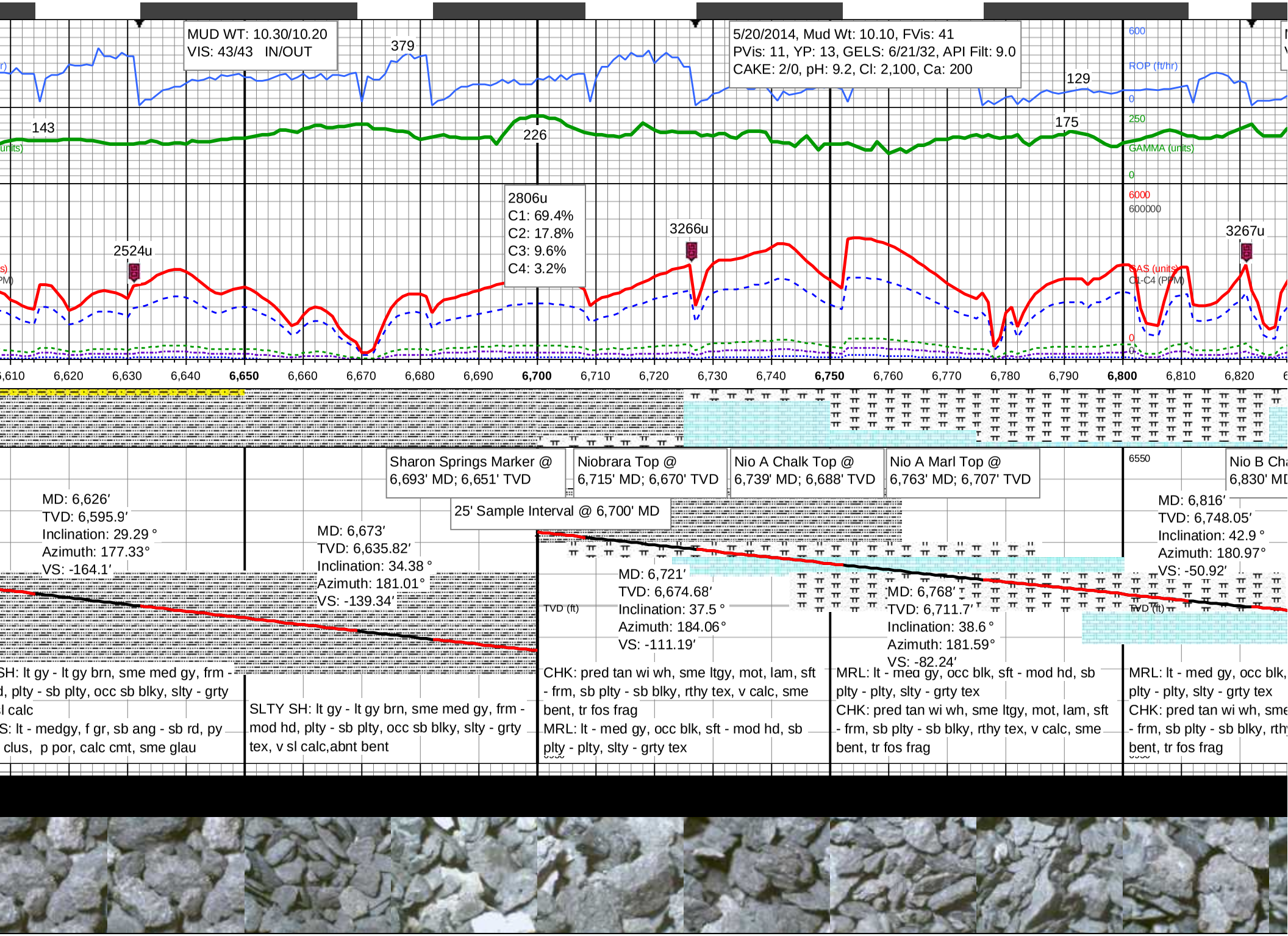
Sorting

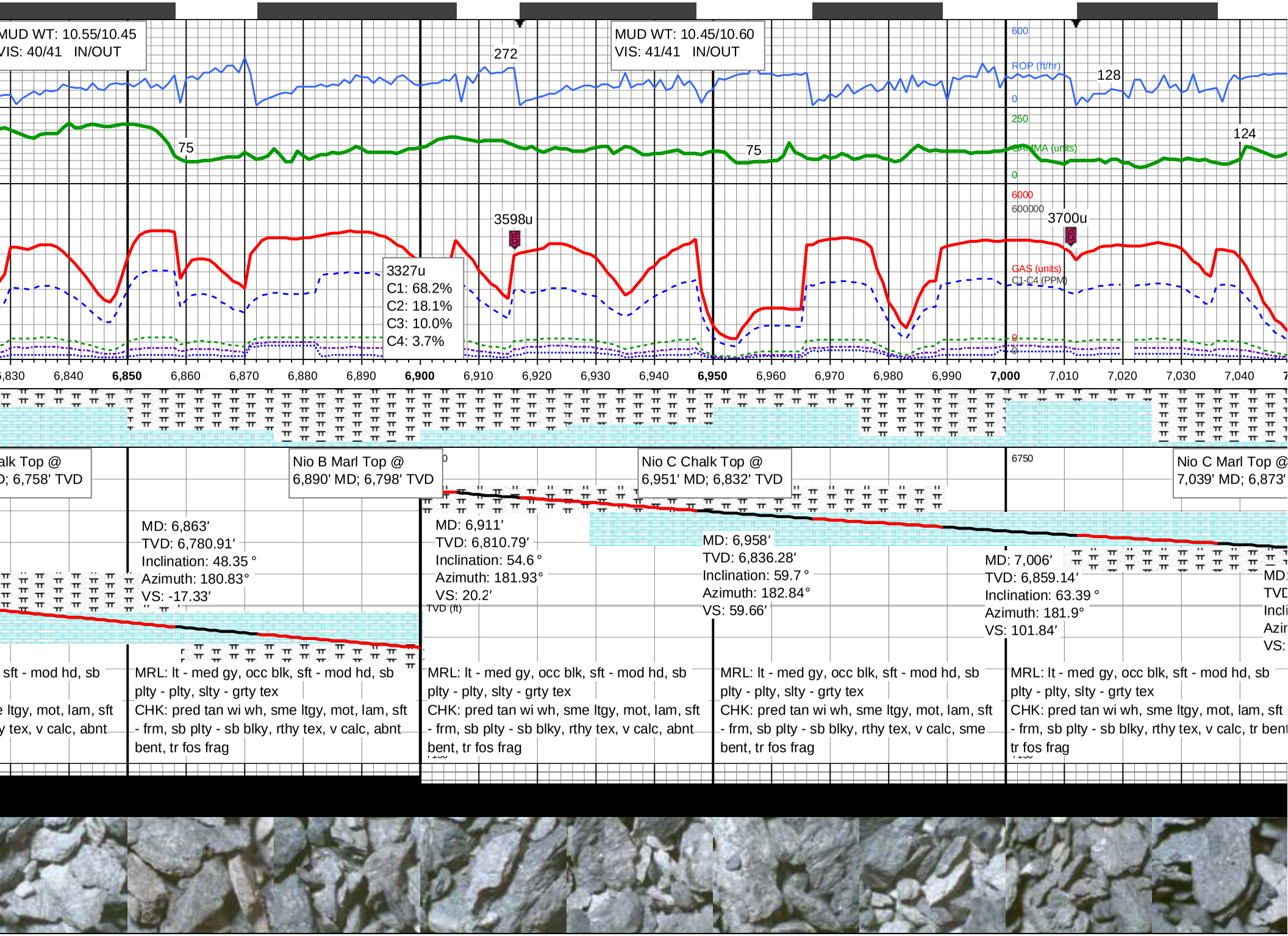
- MODERATE
- POOR
- WELL

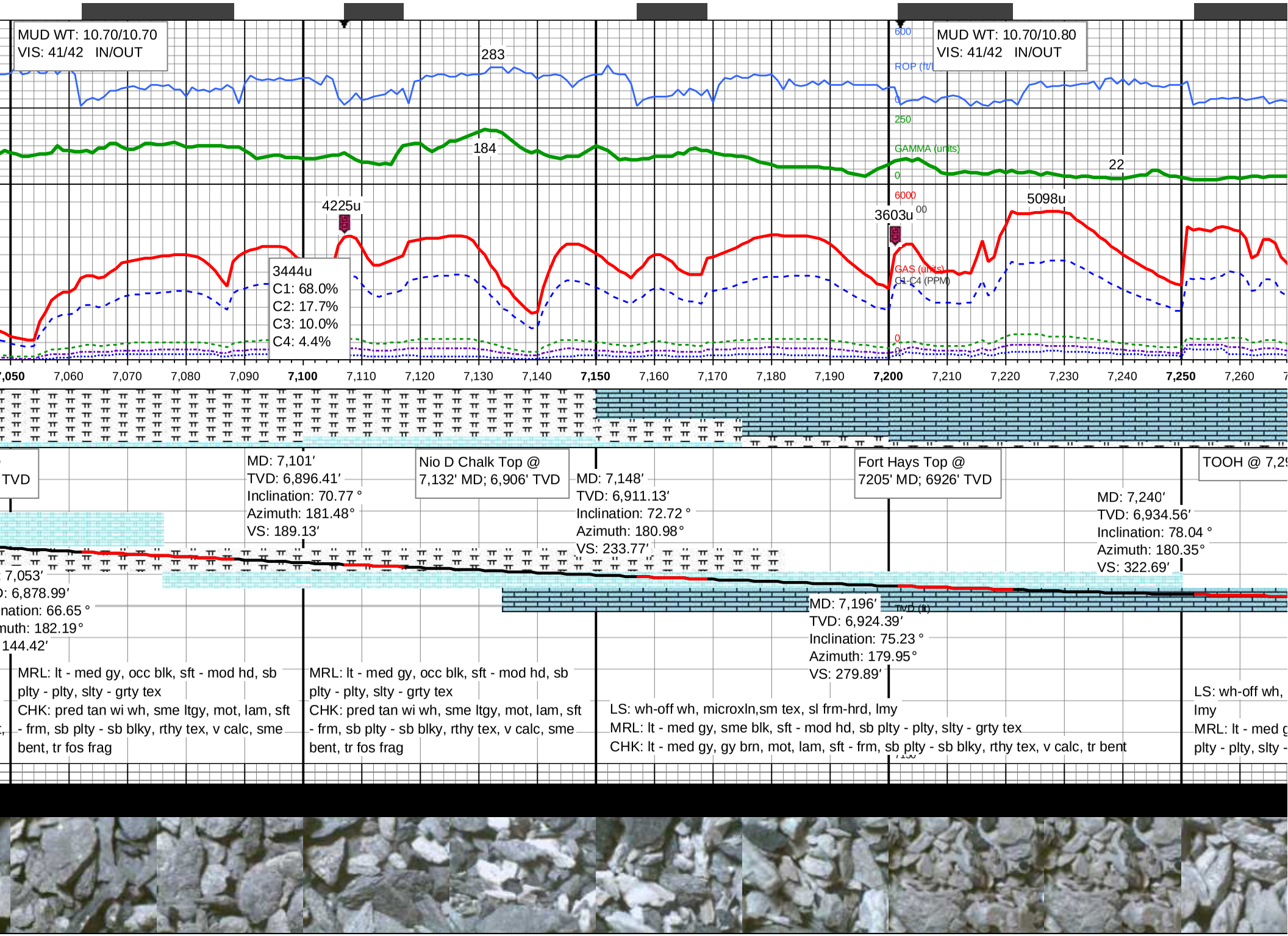

Slide/Rotate
ROP
ROP
Curves
GAMMA
Total Gas & Chromatograph
GAS
C1
C2
C3
C4
Depth Labels
% Lith
Well Bore
TVD
Oil Show
Images
600
ROP (ft/h)
0
ROP Data from iBall
5/19/2014
5/20/2014
MINDEPTH
280
MUD WT: 10.00/10.00
VIS: 45/43 IN/OUT
250
0
Gamma Data from Sperry - Halliburton
93
6000
600000
GAS (units)
C1-C4 (PPM)
0
0
Gas Data from iBall
2140u
C1: 65.4%
C2: 12.9%
C3: 15.6%
C4: 6.1%
2227u
1123u
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
6,360
6,370
6,380
6100
6500
TVD (ft)
Columbine Logging began logging with BloodHound unit 0687 on 05/20/2014
Bit Data
Bit #: 2
Type: Schlumberger/Smith
Model: SDi519-HPX
Size: 8.75"
Jets: 7x18
MD: 6,259'
TVD: 6,243.23'
Inclination: 1.02 °
Azimuth: 321.98°
VS: 248.13'
SCALE CHANGE
50' Sample Interval @ 6,300' MD
SLTY SH: lt gy - lt gy brn, sme med gy, frm - mod hd, plty - sb plty, occ sb blky, slty - grty tex, v sl calc
SHY SS: lt - medgy, f gr, sb ang - sb rd, py srt, brit clus, p por, calc cmt, sme glau
E
G
M
F
T
ST

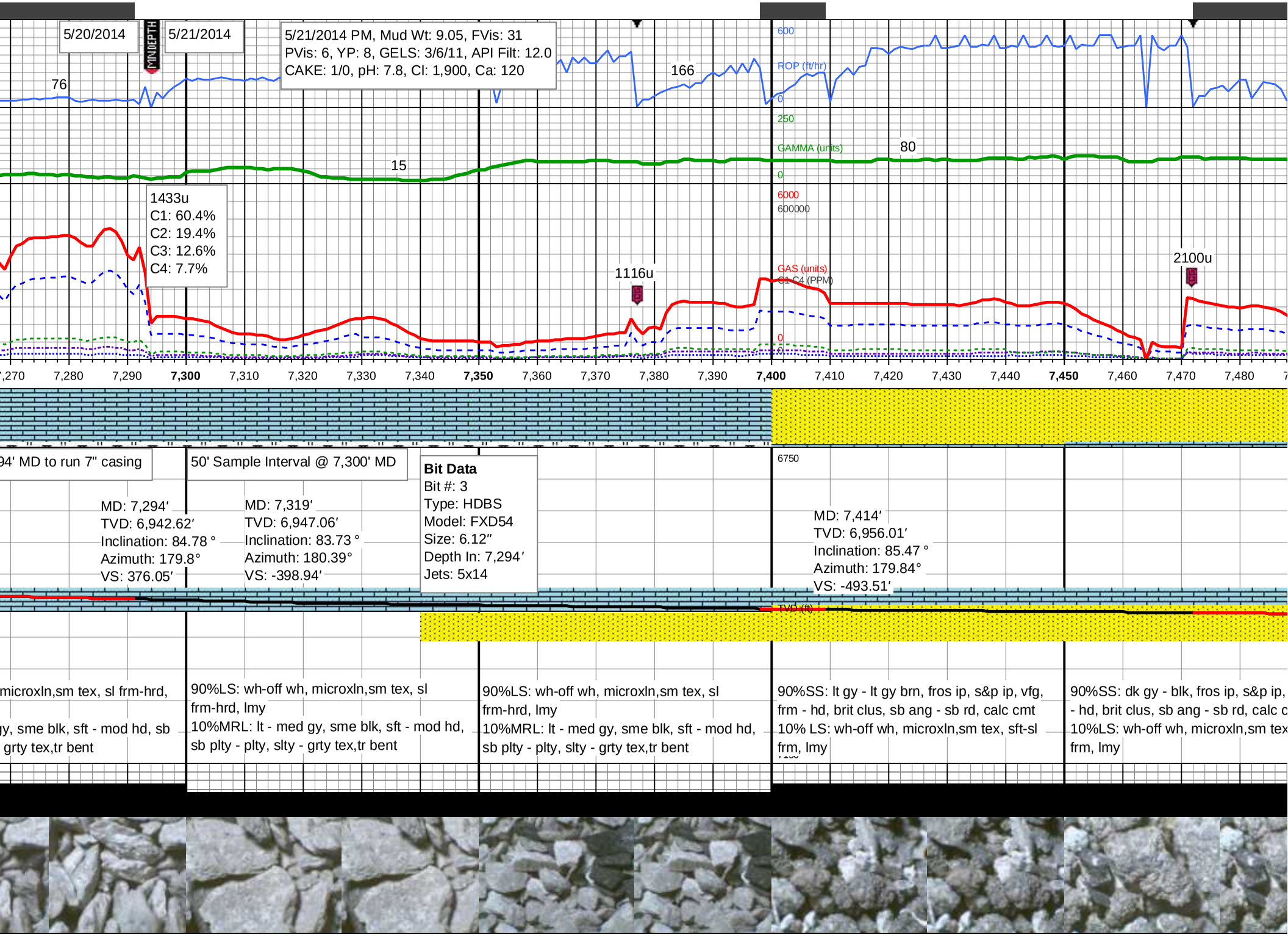

MUD WT: 10.20/10.00
VIS: 43/41 IN/OUT
600
ROP (ft/hr)
242
153
0
250
GAMMA (units)
109
0
6000
600000
GAS (units)
C1-C4 (PPM)
1386u
C1: 71.9%
C2: 15.1%
C3: 9.1%
C4: 3.9%
1023u
1412u
6,390
6,400
6,410
6,420
6,430
6,440
6,450
6,460
6,470
6,480
6,490
6,500
6,510
6,520
6,530
6,540
6,550
6,560
6,570
6,580
6,590
6,600

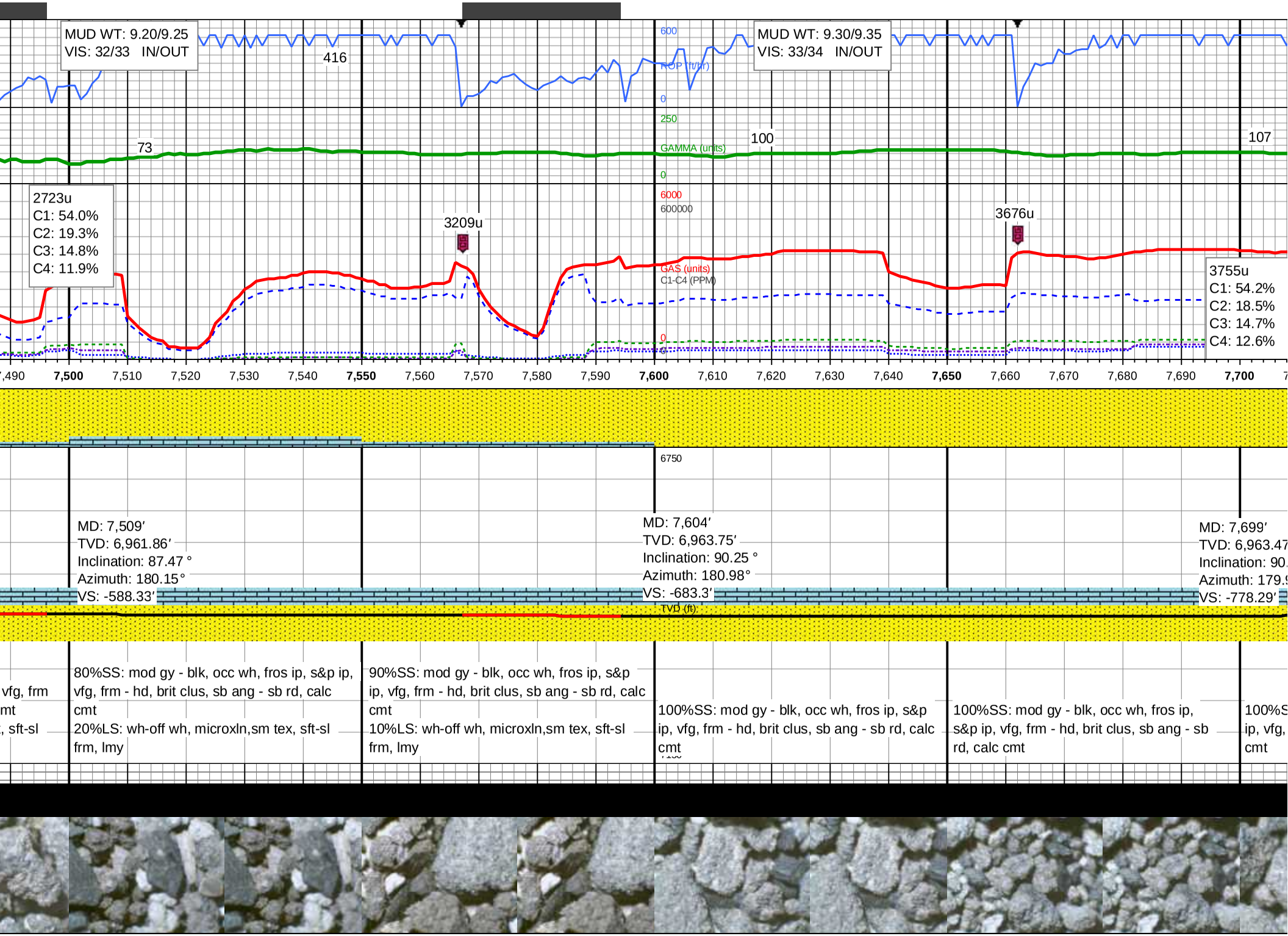

6300
MD: 6,436′
TVD: 6,419.24′
Inclination: 11.91 °
Azimuth: 165.59°
VS: 233.14′
MD: 6,483′
TVD: 6,464.75′
Inclination: 16.89 °
Azimuth: 169.58°
VS: 221.72′
SCALE CHANGE
MD: 6,531′
TVD: 6,510.03′
Inclination: 21.78 °
Azimuth: 172.52°
VS: 206.03′
MD: 6,578′
TVD: 6,553.18′
Inclination: 24.91 °
Azimuth: 175.7°
VS: 187.51′
6400
TVD (ft)
SLTY SH: lt gy - lt gy brn, sme med gy, frm - mod hd, plty - sb plty, occ sb blky, slty - grty tex, v sl calc
SHY SS: lt - medgy, f gr, sb ang - sb rd, py srt, brit clus, p por, calc cmt, sme glau

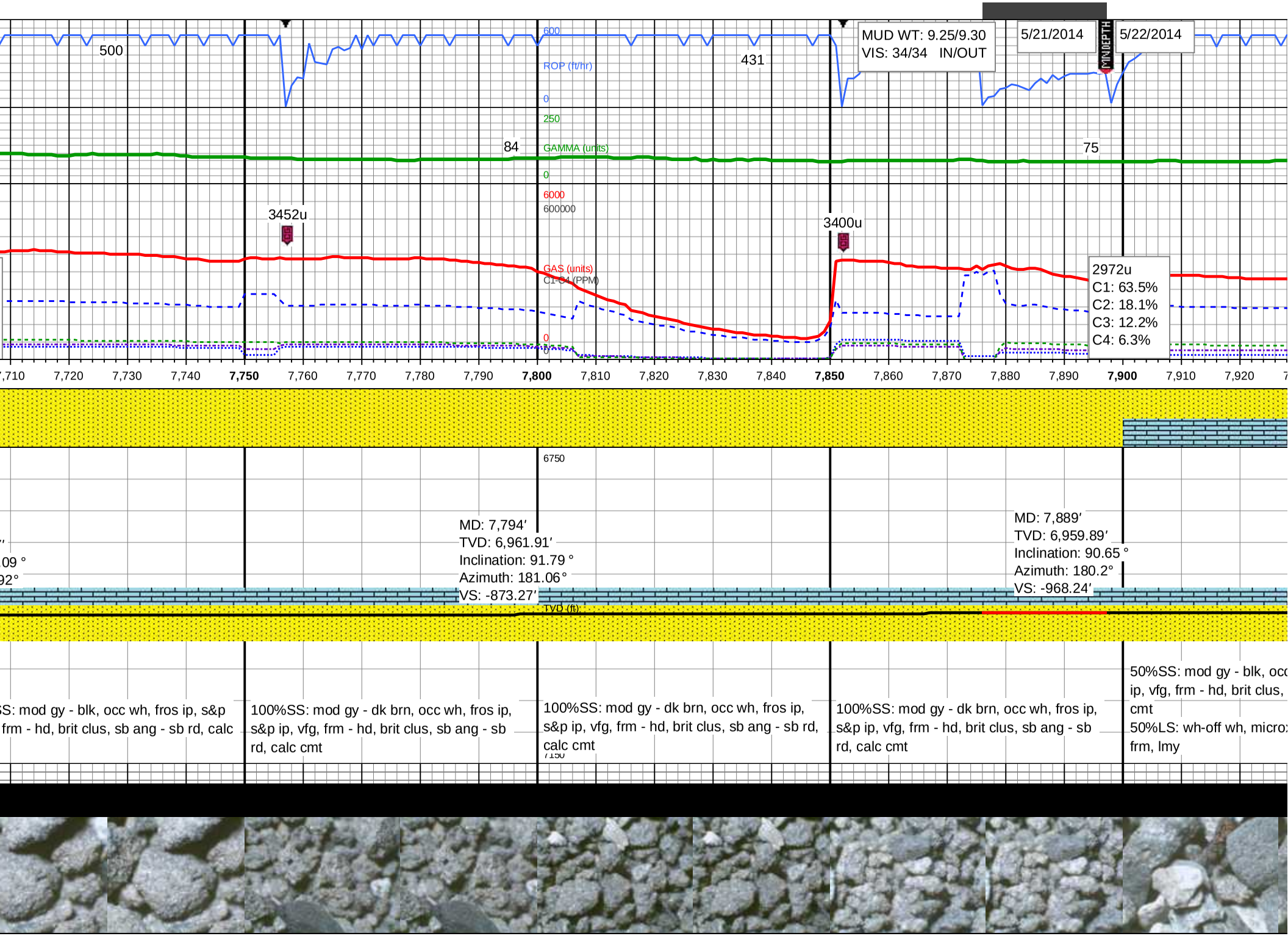

MUD WT: 10.30/10.20
VIS: 43/43 IN/OUT
5/20/2014, Mud Wt: 10.10, FVis: 41
PVis: 11, YP: 13, GELS: 6/21/32, API Filt: 9.0
CAKE: 2/0, pH: 9.2, Cl: 2,100, Ca: 200
379
143
226
129
175
ROP (ft/hr)
GAMMA (units)
2806u
C1: 69.4%
C2: 17.8%
C3: 9.6%
C4: 3.2%
2524u
3266u
3267u
GAS (units)
C1-C4 (PPM)
6,610 6,620 6,630 6,640 6,650 6,660 6,670 6,680 6,690 6,700 6,710 6,720 6,730 6,740 6,750 6,760 6,770 6,780 6,790 6,800 6,810 6,820
Sharon Springs Marker @ 6,693' MD; 6,651' TVD
Niobrara Top @ 6,715' MD; 6,670' TVD
Nio A Chalk Top @ 6,739' MD; 6,688' TVD
Nio A Marl Top @ 6,763' MD; 6,707' TVD
25' Sample Interval @ 6,700' MD
MD: 6,626′
TVD: 6,595.9′
Inclination: 29.29 °
Azimuth: 177.33°
VS: -164.1′
MD: 6,673′
TVD: 6,635.82′
Inclination: 34.38 °
Azimuth: 181.01°
VS: -139.34′
MD: 6,721′
TVD: 6,674.68′
Inclination: 37.5 °
Azimuth: 184.06°
VS: -111.19′
MD: 6,768′
TVD: 6,711.7′
Inclination: 38.6 °
Azimuth: 181.59°
VS: -82.24′
MD: 6,816′
TVD: 6,748.05′
Inclination: 42.9 °
Azimuth: 180.97°
VS: -50.92′
SH: lt gy - lt gy brn, sme med gy, frm - d, plty - sb plty, occ sb blky, slty - grty sl calc
S: lt - medgy, f gr, sb ang - sb rd, py clus, p por, calc cmt, sme glau
SLTY SH: lt gy - lt gy brn, sme med gy, frm - mod hd, plty - sb plty, occ sb blky, slty - grty tex, v sl calc,abnt bent
CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb plty - sb blky, rthy tex, v calc, sme bent, tr fos frag
MRL: lt - med gy, occ blk, sft - mod hd, sb plty - plty, slty - grty tex
CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb plty - sb blky, rthy tex, v calc, sme bent, tr fos frag
MRL: lt - med gy, occ blk, sft - mod hd, sb plty - plty, slty - grty tex
CHK: pred tan wi wh, sme - frm, sb plty - sb blky, rthy bent, tr fos frag


MUD WT: 10.55/10.45
VIS: 40/41 IN/OUT
MUD WT: 10.45/10.60
VIS: 41/41 IN/OUT
272
128
75
75
124
ROP (ft/hr)
GAMMA (units)
600
0
250
0
6000
600000
3598u
3700u
3327u
C1: 68.2%
C2: 18.1%
C3: 10.0%
C4: 3.7%
GAS (units)
C1-C4 (PPM)
6,830
6,840
6,850
6,860
6,870
6,880
6,890
6,900
6,910
6,920
6,930
6,940
6,950
6,960
6,970
6,980
6,990
7,000
7,010
7,020
7,030
7,040
alk Top @
D; 6,758' TVD
Nio B Marl Top @
6,890' MD; 6,798' TVD
Nio C Chalk Top @
6,951' MD; 6,832' TVD
Nio C Marl Top @
7,039' MD; 6,873'
6750
MD: 6,863′
TVD: 6,780.91′
Inclination: 48.35 °
Azimuth: 180.83°
VS: -17.33′
MD: 6,911′
TVD: 6,810.79′
Inclination: 54.6 °
Azimuth: 181.93°
VS: 20.2′
TVD (ft)
MD: 6,958′
TVD: 6,836.28′
Inclination: 59.7 °
Azimuth: 182.84°
VS: 59.66′
MD: 7,006′
TVD: 6,859.14′
Inclination: 63.39 °
Azimuth: 181.9°
VS: 101.84′
sft - mod hd, sb
e ltgy, mot, lam, sft
y tex, v calc, abnt
MRL: lt - med gy, occ blk, sft - mod hd, sb plty - plty, slty - grty tex
CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb plty - sb blky, rthy tex, v calc, abnt bent, tr fos frag
MRL: lt - med gy, occ blk, sft - mod hd, sb plty - plty, slty - grty tex
CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb plty - sb blky, rthy tex, v calc, abnt bent, tr fos frag
MRL: lt - med gy, occ blk, sft - mod hd, sb plty - plty, slty - grty tex
CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb plty - sb blky, rthy tex, v calc, sme bent, tr fos frag
MRL: lt - med gy, occ blk, sft - mod hd, sb plty - plty, slty - grty tex
CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb plty - sb blky, rthy tex, v calc, tr bent tr fos frag

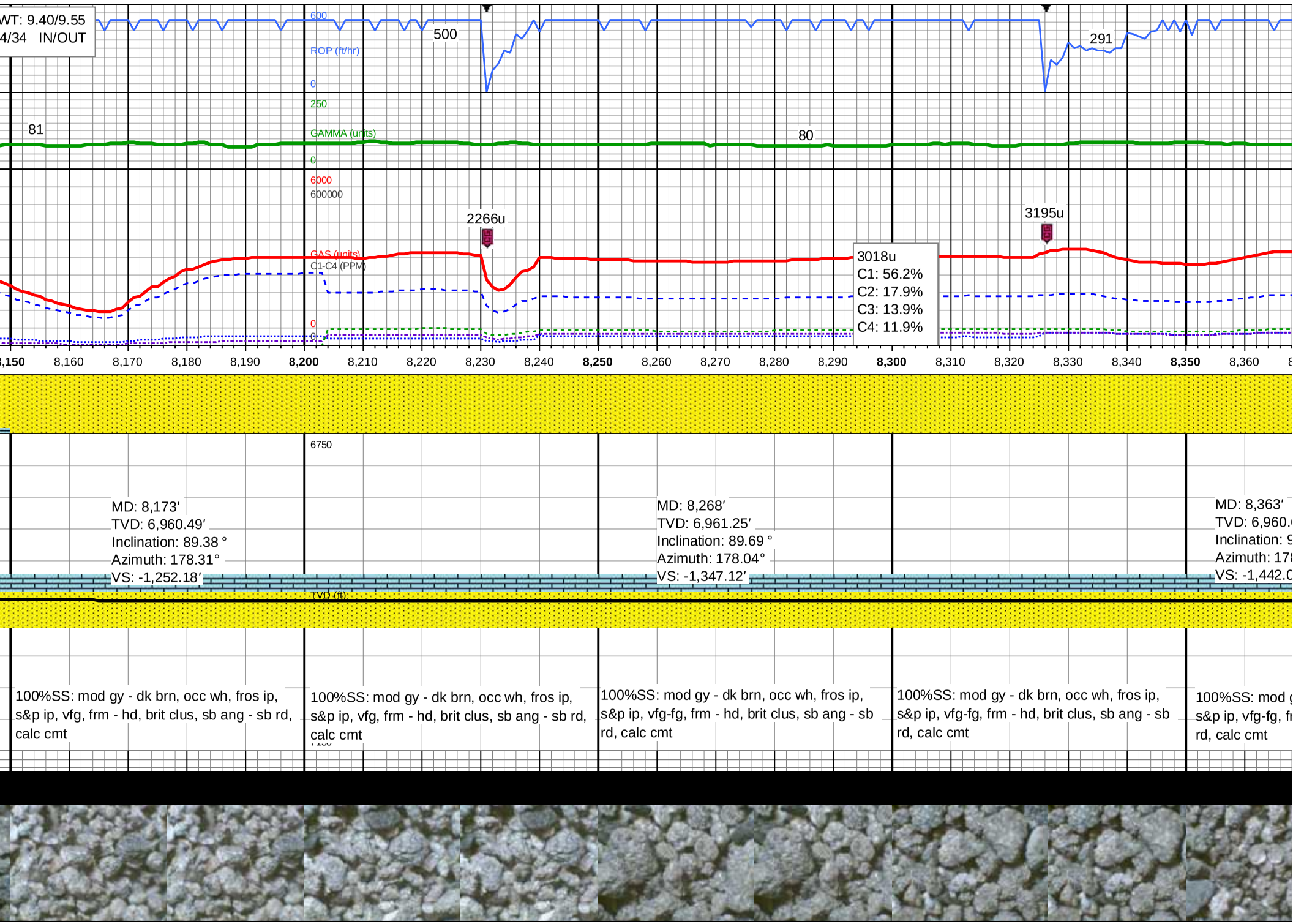

MUD WT: 10.70/10.70
VIS: 41/42 IN/OUT
MUD WT: 10.70/10.80
VIS: 41/42 IN/OUT
283
184
22
4225u
3603u
5098u
3444u
C1: 68.0%
C2: 17.7%
C3: 10.0%
C4: 4.4%
600
ROP (ft/
0
250
GAMMA (units)
0
6000
GAS (units)
C1-C4 (PPM)
0
7,050
7,060
7,070
7,080
7,090
7,100
7,110
7,120
7,130
7,140
7,150
7,160
7,170
7,180
7,190
7,200
7,210
7,220
7,230
7,240
7,250
7,260
TVD
MD: 7,101′
TVD: 6,896.41′
Inclination: 70.77 °
Azimuth: 181.48°
VS: 189.13′
Nio D Chalk Top @
7,132' MD; 6,906' TVD
MD: 7,148′
TVD: 6,911.13′
Inclination: 72.72 °
Azimuth: 180.98°
VS: 233.77′
Fort Hays Top @
7205' MD; 6926' TVD
MD: 7,240′
TVD: 6,934.56′
Inclination: 78.04 °
Azimuth: 180.35°
VS: 322.69′
TOOH @ 7,29
7,053′
6,878.99′
nation: 66.65 °
muth: 182.19°
144.42′
MD: 7,196′
TVD: 6,924.39′
Inclination: 75.23 °
Azimuth: 179.95°
VS: 279.89′
TVD (ft)
MRL: lt - med gy, occ blk, sft - mod hd, sb plty - plty, slty - grty tex
CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb plty - sb blky, rthy tex, v calc, sme bent, tr fos frag
MRL: lt - med gy, occ blk, sft - mod hd, sb plty - plty, slty - grty tex
CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb plty - sb blky, rthy tex, v calc, sme bent, tr fos frag
LS: wh-off wh, microxln,sm tex, sl frm-hrd, lmy
MRL: lt - med gy, sme blk, sft - mod hd, sb plty - plty, slty - grty tex
CHK: lt - med gy, gy brn, mot, lam, sft - frm, sb plty - sb blky, rthy tex, v calc, tr bent
LS: wh-off wh,
lmy
MRL: lt - med g
plty - plty, slty -

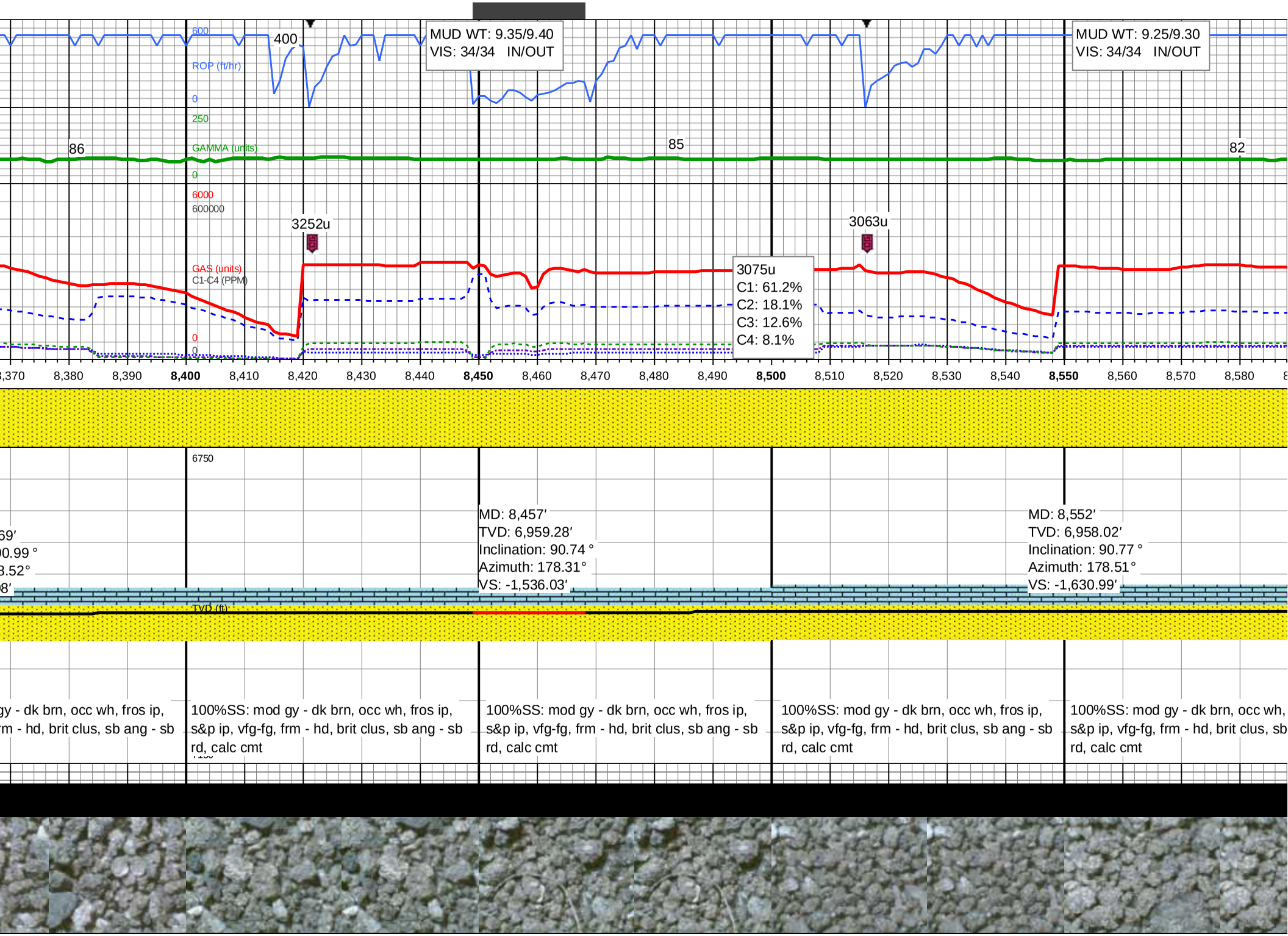

5/20/2014
5/21/2014
MWDEPTH
5/21/2014 PM, Mud Wt: 9.05, FVis: 31
PVis: 6, YP: 8, GELS: 3/6/11, API Filt: 12.0
CAKE: 1/0, pH: 7.8, Cl: 1,900, Ca: 120
76
166
600
ROP (ft/hr)
0
250
GAMMA (units)
15
80
0
6000
600000
1433u
C1: 60.4%
C2: 19.4%
C3: 12.6%
C4: 7.7%
1116u
2100u
GAS (units)
C1-C4 (PPM)
0
0
7,270
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
7,460
7,470
7,480
94' MD to run 7" casing
50' Sample Interval @ 7,300' MD
6750
Bit Data
Bit #: 3
Type: HDBS
Model: FXD54
Size: 6.12"
Depth In: 7,294'
Jets: 5x14
MD: 7,294'
TVD: 6,942.62'
Inclination: 84.78 °
Azimuth: 179.8°
VS: 376.05'
MD: 7,319'
TVD: 6,947.06'
Inclination: 83.73 °
Azimuth: 180.39°
VS: -398.94'
MD: 7,414'
TVD: 6,956.01'
Inclination: 85.47 °
Azimuth: 179.84°
VS: -493.51'
TVD (ft)
microxln,sm tex, sl frm-hrd,
y, sme blk, sft - mod hd, sb
grty tex,tr bent
90%LS: wh-off wh, microxln,sm tex, sl frm-hrd, lmy
10%MRL: lt - med gy, sme blk, sft - mod hd, sb plty - plty, slty - grty tex,tr bent
90%LS: wh-off wh, microxln,sm tex, sl frm-hrd, lmy
10%MRL: lt - med gy, sme blk, sft - mod hd, sb plty - plty, slty - grty tex,tr bent
90%SS: lt gy - lt gy brn, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
10% LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy
90%SS: dk gy - blk, fros ip, s&p ip,
- hd, brit clus, sb ang - sb rd, calc c
10%LS: wh-off wh, microxln,sm tex
frm, lmy

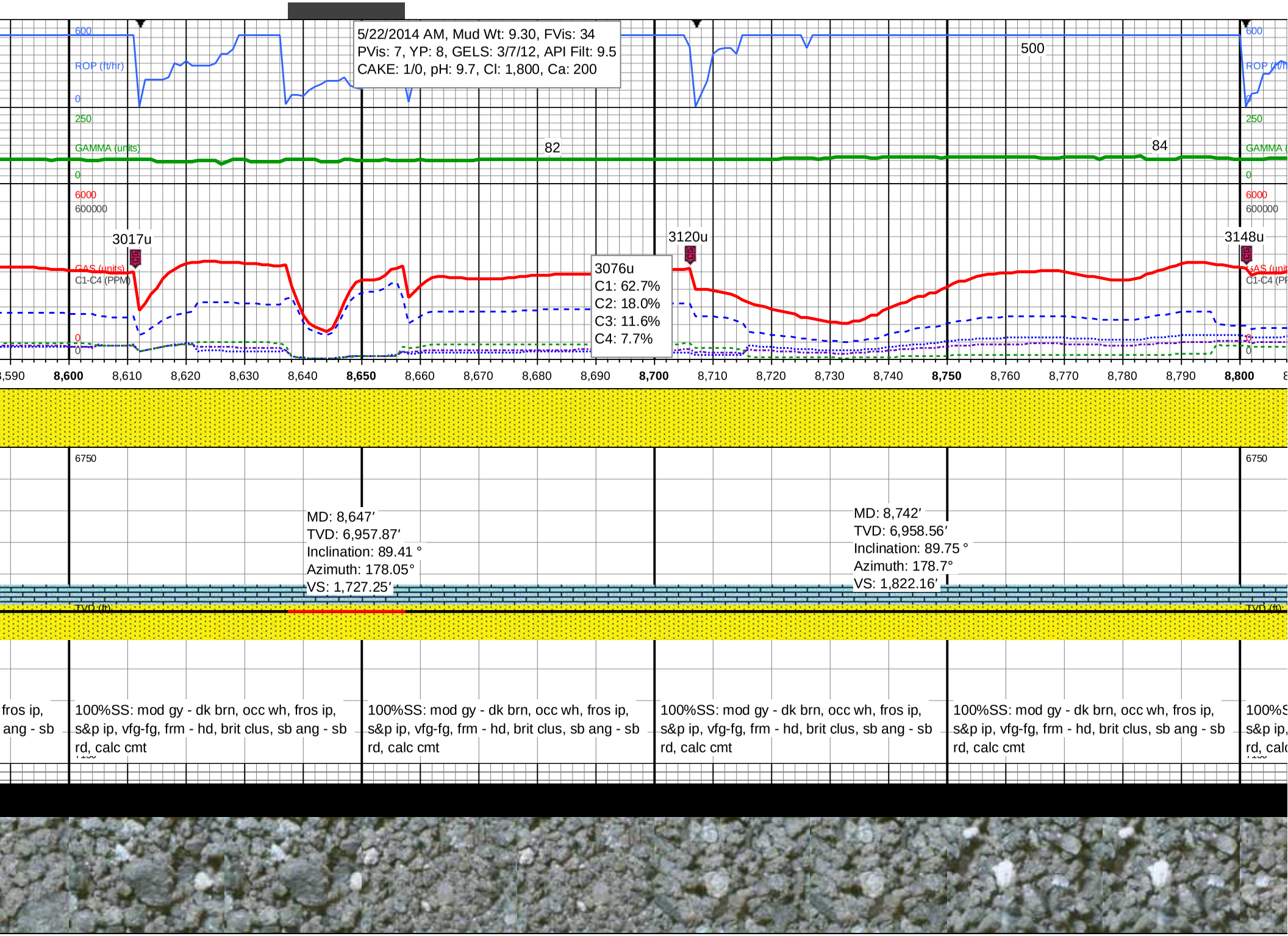

MUD WT: 9.20/9.25
VIS: 32/33 IN/OUT
416
MUD WT: 9.30/9.35
VIS: 33/34 IN/OUT
600
ROP (ft/hr)
0
250
GAMMA (units)
0
73
100
107
2723u
C1: 54.0%
C2: 19.3%
C3: 14.8%
C4: 11.9%
3209u
3676u
6000
600000
GAS (units)
C1-C4 (PPM)
0
0
3755u
C1: 54.2%
C2: 18.5%
C3: 14.7%
C4: 12.6%
7,490
7,500
7,510
7,520
7,530
7,540
7,550
7,560
7,570
7,580
7,590
7,600
7,610
7,620
7,630
7,640
7,650
7,660
7,670
7,680
7,690
7,700
6750
MD: 7,509′
TVD: 6,961.86′
Inclination: 87.47 °
Azimuth: 180.15°
VS: -588.33′
MD: 7,604′
TVD: 6,963.75′
Inclination: 90.25 °
Azimuth: 180.98°
VS: -683.3′
MD: 7,699′
TVD: 6,963.47
Inclination: 90.
Azimuth: 179.
VS: -778.29′
TVD (ft)
vfg, frm
mt
, sft-sl
80%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
20%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy
90%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
10%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy
100%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
100%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
100%S
ip, vfg,
cmt


MUD WT: 9.25/9.30
VIS: 34/34 IN/OUT
5/21/2014
5/22/2014
MD DEPTH
500
431
600
ROP (ft/hr)
0
250
84
GAMMA (units)
75
0
6000
600000
3452u
3400u
GAS (units)
C1-C4 (PPM)
0
2972u
C1: 63.5%
C2: 18.1%
C3: 12.2%
C4: 6.3%
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 7,900 7,910 7,920
6750
MD: 7,794′
TVD: 6,961.91′
Inclination: 91.79 °
Azimuth: 181.06 °
VS: -873.27′
MD: 7,889′
TVD: 6,959.89′
Inclination: 90.65 °
Azimuth: 180.2°
VS: -968.24′
TVD (ft)
09 °
92°
SS: mod gy - blk, occ wh, fros ip, s&p
frm - hd, brit clus, sb ang - sb rd, calc
100%SS: mod gy - dk brn, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
100%SS: mod gy - dk brn, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
100%SS: mod gy - dk brn, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
50%SS: mod gy - blk, occ
ip, vfg, frm - hd, brit clus,
cmt
50%LS: wh-off wh, microx
frm, lmy

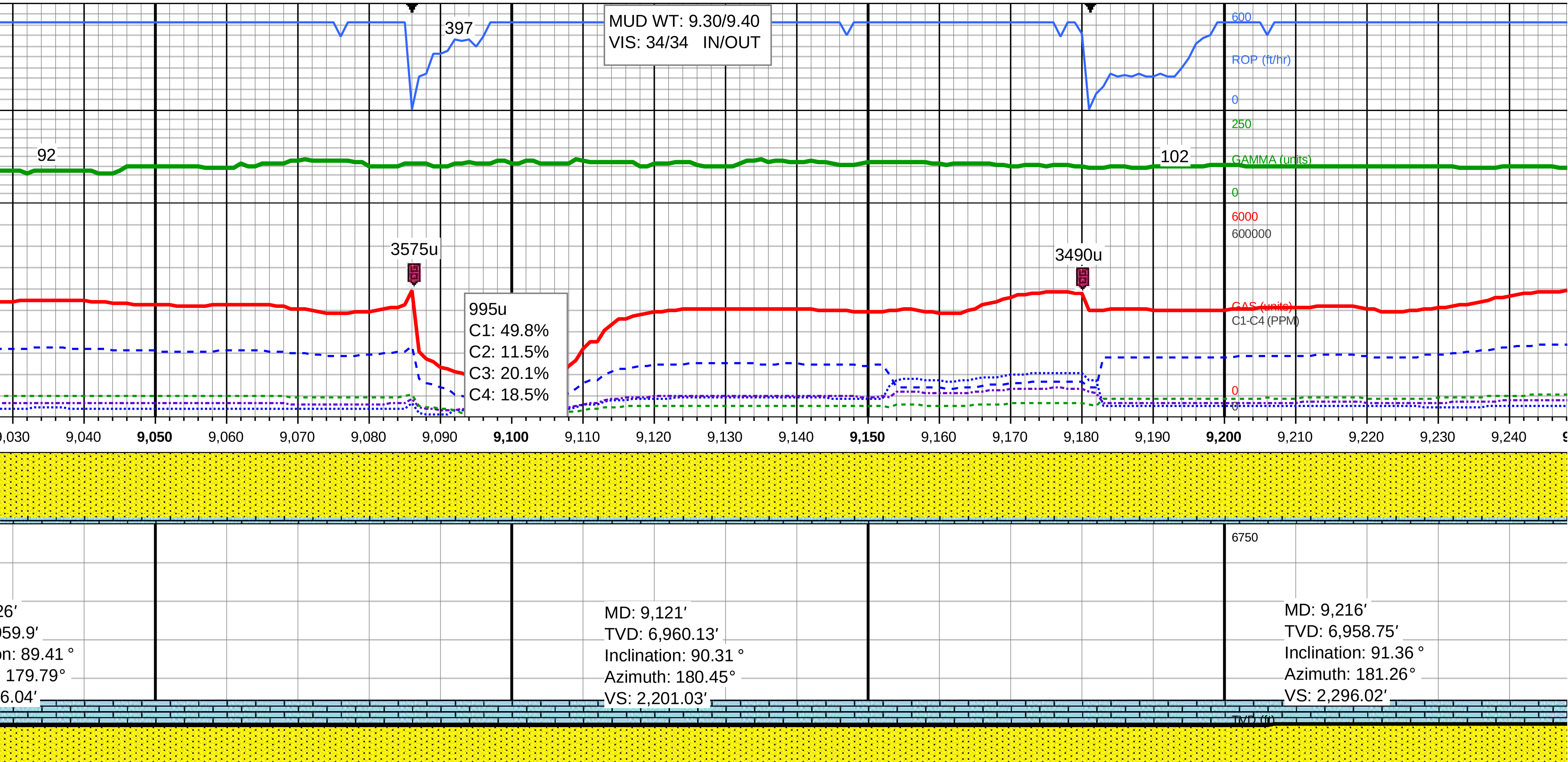

600
ROP (ft/hr)
0
281
MUD
VIS: 3
250
GAMMA (units)
0
77
6000
600000
2788u
2876u
2761u
GAS (units)
C1-C4 (PPM)
2662u
C1: 58.0%
C2: 19.3%
C3: 13.1%
C4: 9.6%
0
0
7,930
7,940
7,950
7,960
7,970
7,980
7,990
8,000
8,010
8,020
8,030
8,040
8,050
8,060
8,070
8,080
8,090
8,100
8,110
8,120
8,130
8,140
6750
MD: 7,983′
TVD: 6,958.9′
Inclination: 90.56 °
Azimuth: 179.62°
VS: -1,062.23′
MD: 8,078′
TVD: 6,959.21′
Inclination: 89.08 °
Azimuth: 178.61°
VS: -1,157.22′
TVD (ft)
c wh, fros ip, s&p
sb ang - sb rd, calc
xln,sm tex, sft-sl
90%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
10%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy
100%SS: mod gy - dk brn, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
100%SS: mod gy - dk brn, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
90%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
10%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy


WT: 9.40/9.55
4/34 IN/OUT
600
ROP (ft/hr)
0
250
GAMMA (units)
0
6000
600000
GAS (units)
C1-C4 (PPM)
0
0
500
291
81
80
2266u
3195u
3018u
C1: 56.2%
C2: 17.9%
C3: 13.9%
C4: 11.9%
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
8,290
8,300
8,310
8,320
8,330
8,340
8,350
8,360
6750
MD: 8,173′
TVD: 6,960.49′
Inclination: 89.38 °
Azimuth: 178.31°
VS: -1,252.18′
MD: 8,268′
TVD: 6,961.25′
Inclination: 89.69 °
Azimuth: 178.04°
VS: -1,347.12′
MD: 8,363′
TVD: 6,960.
Inclination: 9
Azimuth: 178
VS: -1,442.0
TVD (ft)
100%SS: mod gy - dk brn, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
100%SS: mod gy - dk brn, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
100%SS: mod gy - dk brn, occ wh, fros ip, s&p ip, vfg-fg, frm - hd, brit clus, sb ang - sb rd, calc cmt
100%SS: mod gy - dk brn, occ wh, fros ip, s&p ip, vfg-fg, frm - hd, brit clus, sb ang - sb rd, calc cmt
100%SS: mod g
s&p ip, vfg-fg, fr
rd, calc cmt


MUD WT: 9.35/9.40
VIS: 34/34 IN/OUT
MUD WT: 9.25/9.30
VIS: 34/34 IN/OUT
600
ROP (ft/hr)
400
0
250
GAMMA (units)
86
85
82
0
6000
600000
3252u
3063u
GAS (units)
C1-C4 (PPM)
3075u
C1: 61.2%
C2: 18.1%
C3: 12.6%
C4: 8.1%
0
0
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
8,560
8,570
8,580
6750
MD: 8,457′
TVD: 6,959.28′
Inclination: 90.74 °
Azimuth: 178.31°
VS: -1,536.03′
MD: 8,552′
TVD: 6,958.02′
Inclination: 90.77 °
Azimuth: 178.51°
VS: -1,630.99′
TVD (ft)
gy - dk brn, occ wh, fros ip,
rm - hd, brit clus, sb ang - sb
100%SS: mod gy - dk brn, occ wh, fros ip, s&p ip, vfg-fg, frm - hd, brit clus, sb ang - sb rd, calc cmt
100%SS: mod gy - dk brn, occ wh, fros ip, s&p ip, vfg-fg, frm - hd, brit clus, sb ang - sb rd, calc cmt
100%SS: mod gy - dk brn, occ wh, fros ip, s&p ip, vfg-fg, frm - hd, brit clus, sb ang - sb rd, calc cmt
100%SS: mod gy - dk brn, occ wh, s&p ip, vfg-fg, frm - hd, brit clus, sb rd, calc cmt


5/22/2014 AM, Mud Wt: 9.30, FVis: 34
PVis: 7, YP: 8, GELS: 3/7/12, API Filt: 9.5
CAKE: 1/0, pH: 9.7, Cl: 1,800, Ca: 200
ROP (ft/hr)
GAMMA (units)
GAS (units)
C1-C4 (PPM)
3017u
3120u
3148u
3076u
C1: 62.7%
C2: 18.0%
C3: 11.6%
C4: 7.7%
MD: 8,647′
TVD: 6,957.87′
Inclination: 89.41 °
Azimuth: 178.05°
VS: 1,727.25′
MD: 8,742′
TVD: 6,958.56′
Inclination: 89.75 °
Azimuth: 178.7°
VS: 1,822.16′
TVD (ft)
fros ip, ang - sb
100%SS: mod gy - dk brn, occ wh, fros ip, s&p ip, vfg-fg, frm - hd, brit clus, sb ang - sb rd, calc cmt


167
80
2969u
3631u
3179u
C1: 81.3%
C2: 4.2%
C3: 2.6%
C4: 12.0%
600
ROP (ft/hr)
0
250
GAMMA (units)
0
6000
600000
GAS (units)
C1-C4 (PPM)
0
0
8,810
8,820
8,830
8,840
8,850
8,860
8,870
8,880
8,890
8,900
8,910
8,920
8,930
8,940
8,950
8,960
8,970
8,980
8,990
9,000
9,010
9,020
6750
MD: 8,837′
TVD: 6,958.53′
Inclination: 90.28 °
Azimuth: 179.09°
VS: 1,917.09′
MD: 8,932′
TVD: 6,958.87′
Inclination: 89.32 °
Azimuth: 179.98°
VS: 2,012.06′
TVD (ft)
SS: mod gy - dk brn, occ wh, fros ip, vfg-fg, frm - hd, brit clus, sb ang - sb c cmt
100%SS: mod gy - dk brn, occ wh, fros ip, s&p ip, vfg-fg, frm - hd, brit clus, sb ang - sb rd, calc cmt
100%SS: mod gy - dk brn, occ wh, fros ip, s&p ip, vfg-fg, frm - hd, brit clus, sb ang - sb rd, calc cmt
90%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
10%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy
90%SS: mod gy - blk, occ ip, vfg, frm - hd, brit clus, calc cmt
10%LS: wh-off wh, microx frm, lmy



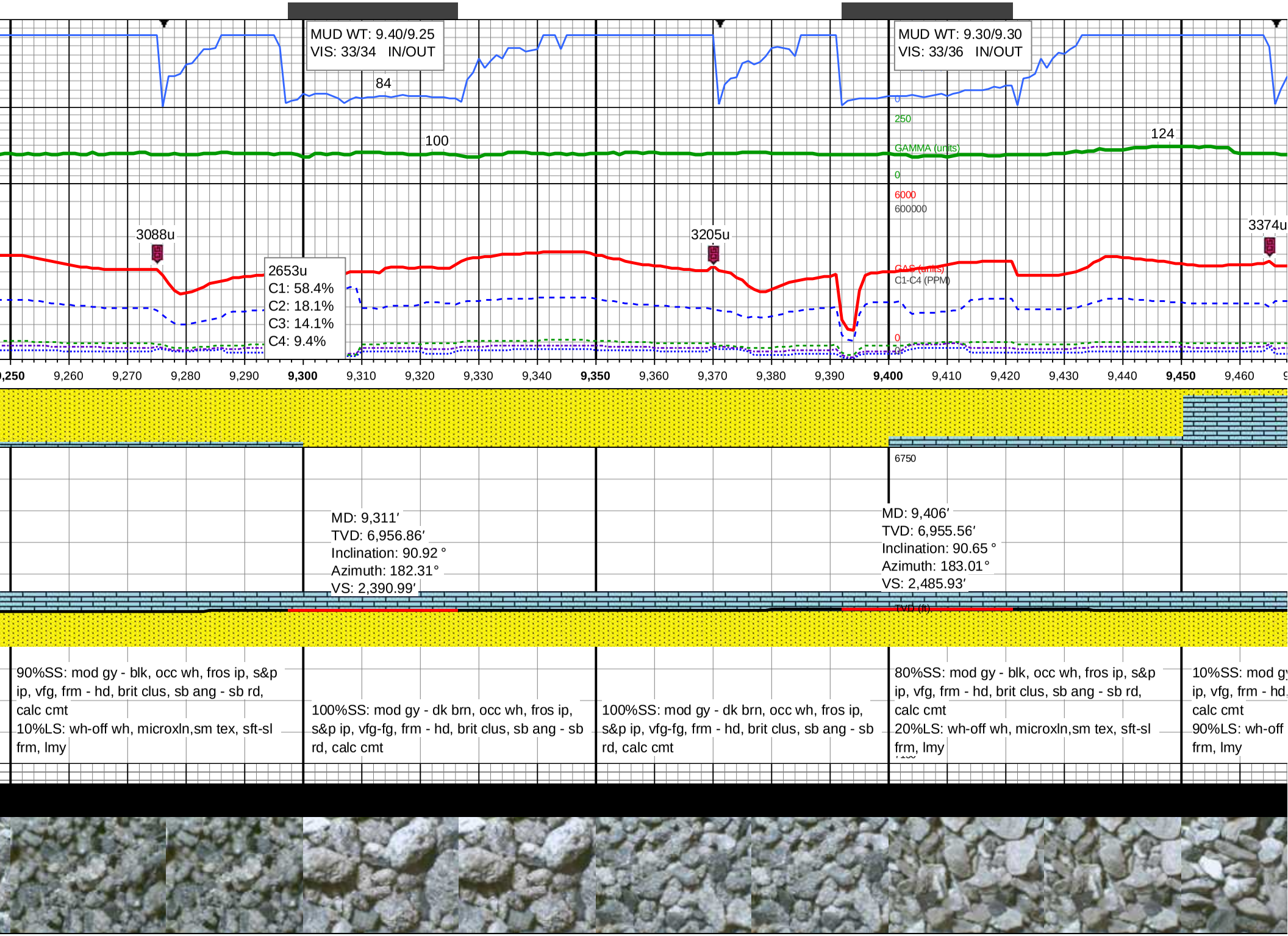
: wh, fros ip, s&p
sb ang - sb rd,
xln,sm tex, sft-sl

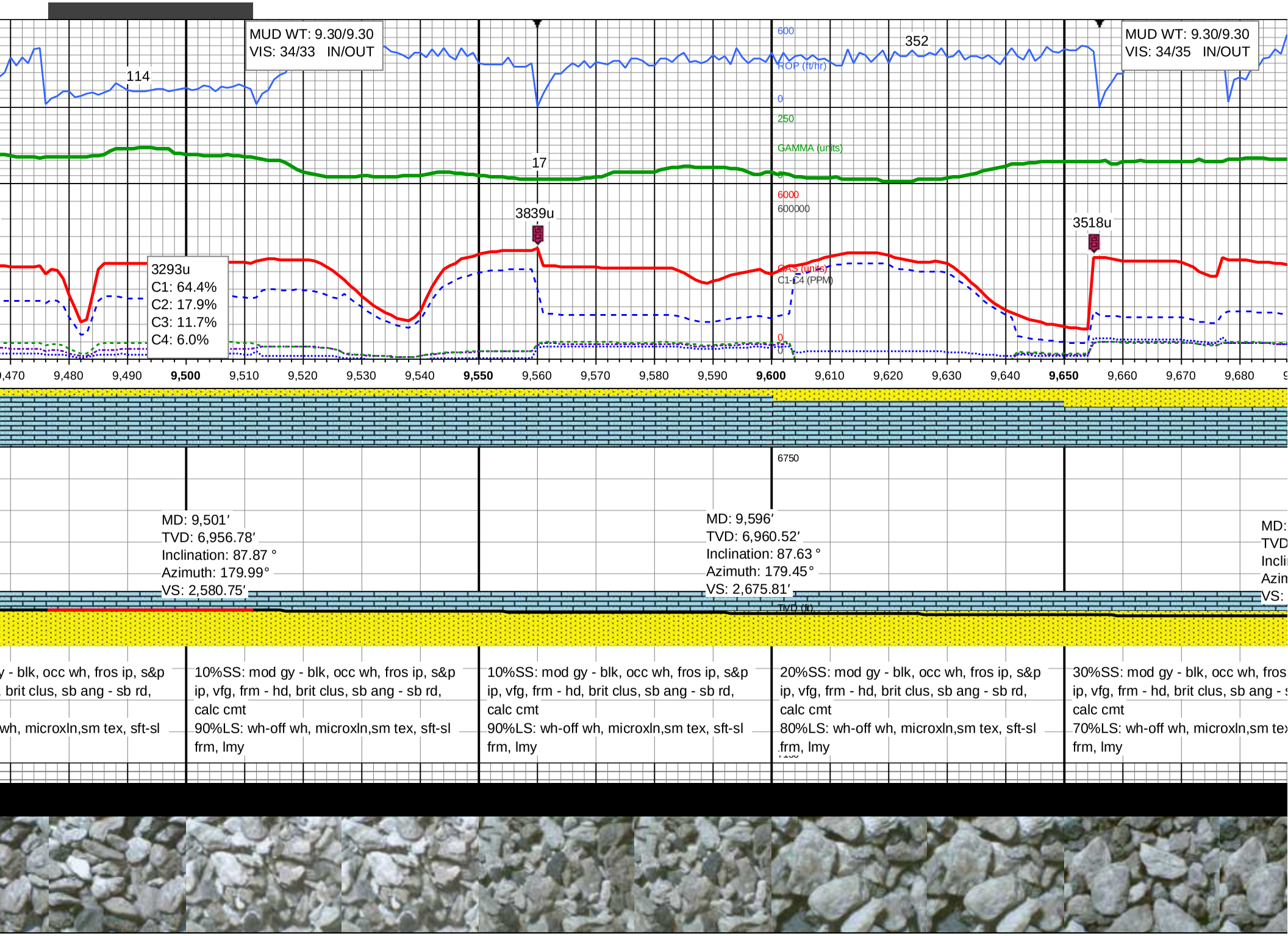
90%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
10%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy

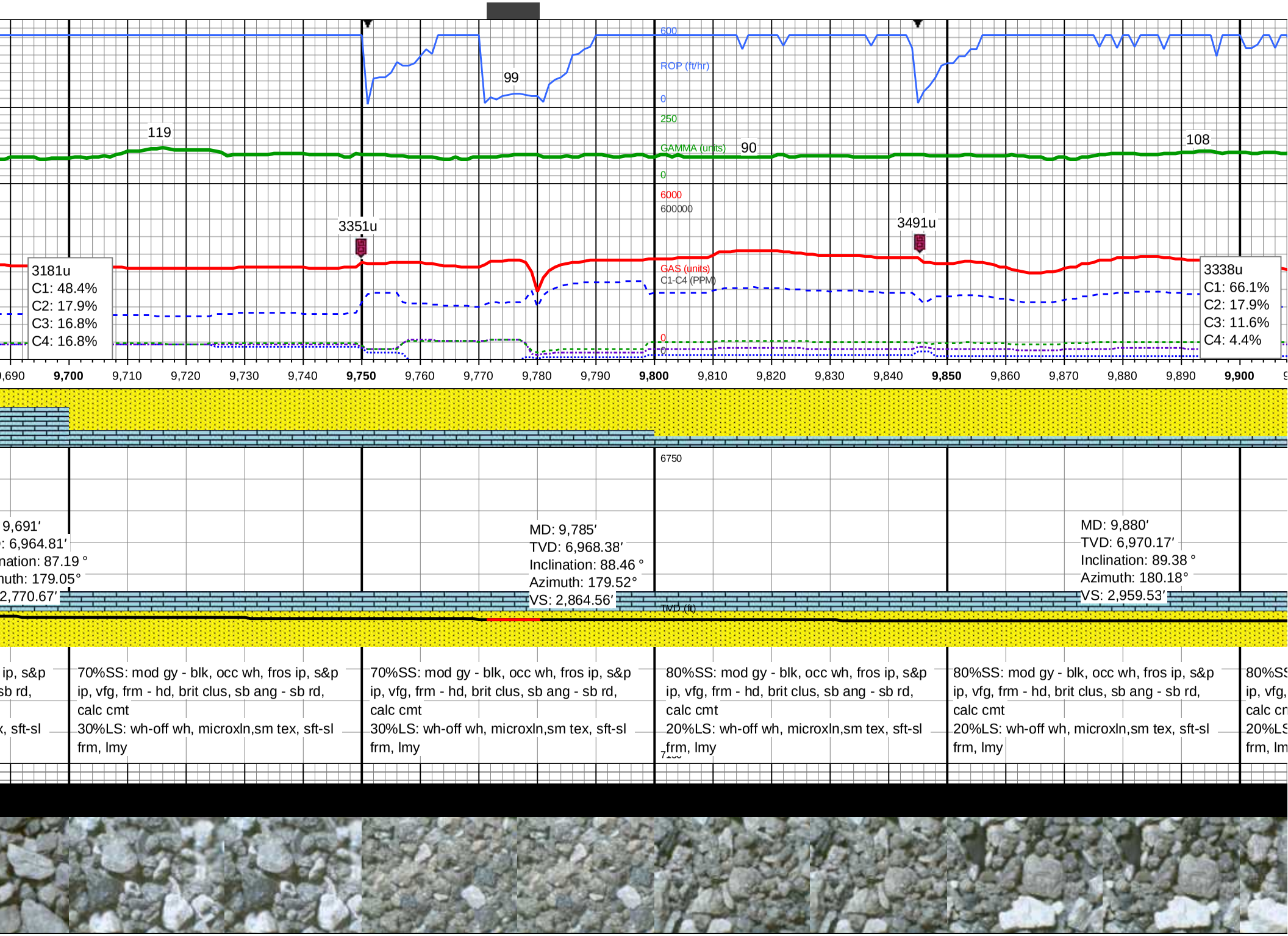
90%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
10%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy

90%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
10%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy

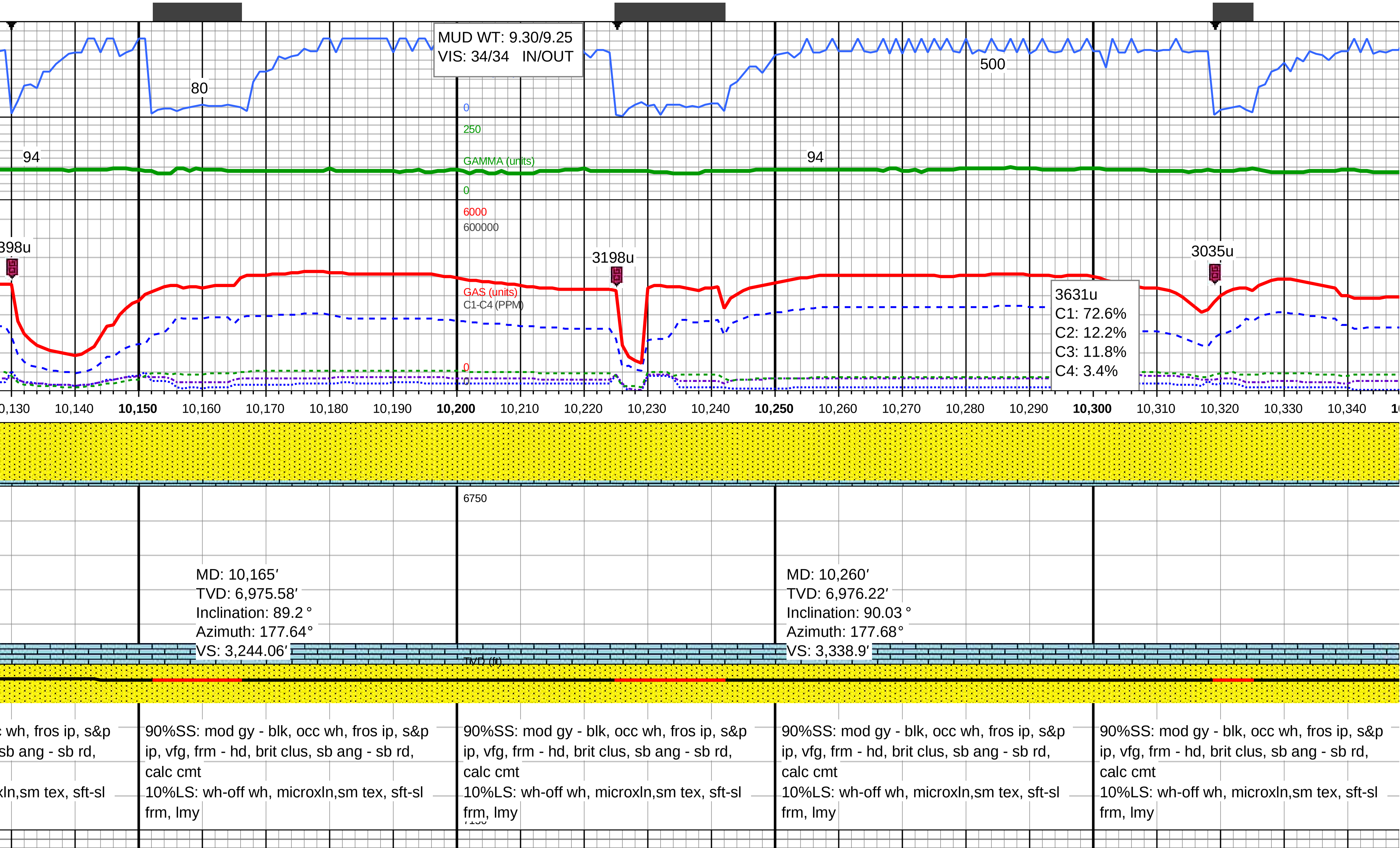
90%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
10%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy

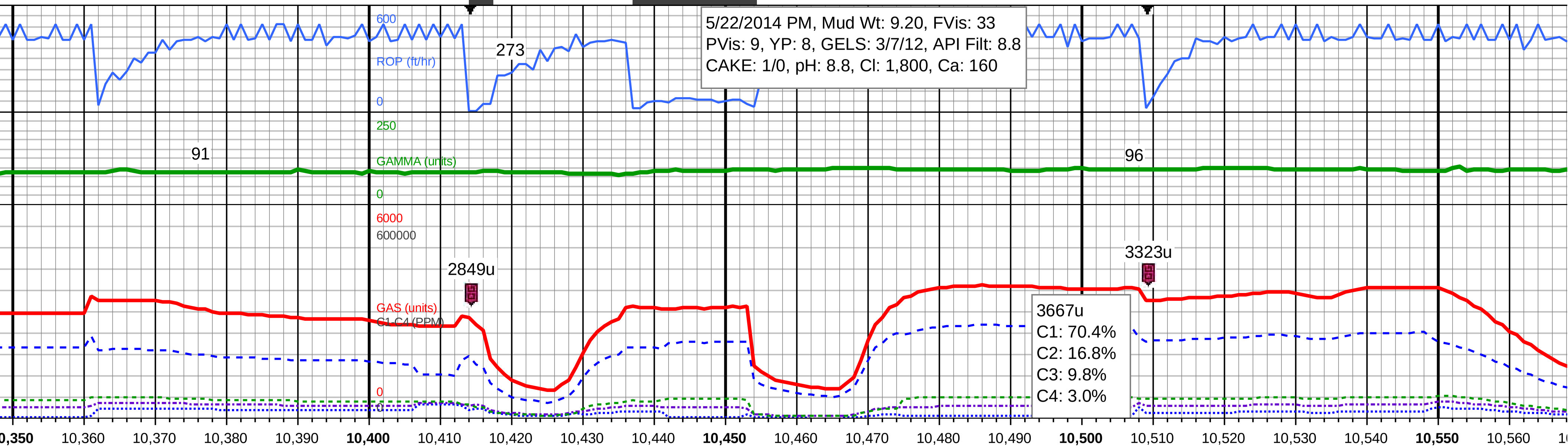

MUD WT: 9.40/9.25
VIS: 33/34 IN/OUT
84
100
MUD WT: 9.30/9.30
VIS: 33/36 IN/OUT
0
250
GAMMA (units)
0
124
6000
600000
3088u
3205u
3374u
2653u
C1: 58.4%
C2: 18.1%
C3: 14.1%
C4: 9.4%
GAS (units)
C1-C4 (PPM)
0
9,250
9,260
9,270
9,280
9,290
9,300
9,310
9,320
9,330
9,340
9,350
9,360
9,370
9,380
9,390
9,400
9,410
9,420
9,430
9,440
9,450
9,460
6750
MD: 9,311′
TVD: 6,956.86′
Inclination: 90.92 °
Azimuth: 182.31°
VS: 2,390.99′
MD: 9,406′
TVD: 6,955.56′
Inclination: 90.65 °
Azimuth: 183.01°
VS: 2,485.93′
TVD (ft)
90%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
10%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy
100%SS: mod gy - dk brn, occ wh, fros ip, s&p ip, vfg-fg, frm - hd, brit clus, sb ang - sb rd, calc cmt
100%SS: mod gy - dk brn, occ wh, fros ip, s&p ip, vfg-fg, frm - hd, brit clus, sb ang - sb rd, calc cmt
80%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
20%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy
10%SS: mod gy
ip, vfg, frm - hd,
calc cmt
90%LS: wh-off
frm, lmy


MUD WT: 9.30/9.30
VIS: 34/33 IN/OUT
MUD WT: 9.30/9.30
VIS: 34/35 IN/OUT
114
352
ROP (ft/hr)
600
0
250
GAMMA (units)
17
6000
600000
3839u
3518u
3293u
C1: 64.4%
C2: 17.9%
C3: 11.7%
C4: 6.0%
GAS (units)
C1-C4 (PPM)
0
0
9,470
9,480
9,490
9,500
9,510
9,520
9,530
9,540
9,550
9,560
9,570
9,580
9,590
9,600
9,610
9,620
9,630
9,640
9,650
9,660
9,670
9,680
6750
MD: 9,501′
TVD: 6,956.78′
Inclination: 87.87 °
Azimuth: 179.99°
VS: 2,580.75′
MD: 9,596′
TVD: 6,960.52′
Inclination: 87.63 °
Azimuth: 179.45°
VS: 2,675.81′
TVD (ft)
y - blk, occ wh, fros ip, s&p
brit clus, sb ang - sb rd,
wh, microxln,sm tex, sft-sl
10%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
90%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy
10%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
90%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy
20%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
80%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy
30%SS: mod gy - blk, occ wh, fros
ip, vfg, frm - hd, brit clus, sb ang -
calc cmt
70%LS: wh-off wh, microxln,sm tex
frm, lmy


600
ROP (ft/hr)
0
250
GAMMA (units)
0
6000
600000
GAS (units)
C1-C4 (PPM)
0
0
99
119
90
108
3351u
3491u
3181u
C1: 48.4%
C2: 17.9%
C3: 16.8%
C4: 16.8%
3338u
C1: 66.1%
C2: 17.9%
C3: 11.6%
C4: 4.4%
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
9,830
9,840
9,850
9,860
9,870
9,880
9,890
9,900
6750
9,691′
: 6,964.81′
nation: 87.19 °
muth: 179.05°
2,770.67′
MD: 9,785′
TVD: 6,968.38′
Inclination: 88.46 °
Azimuth: 179.52°
VS: 2,864.56′
MD: 9,880′
TVD: 6,970.17′
Inclination: 89.38 °
Azimuth: 180.18°
VS: 2,959.53′
TMD (ft)
ip, s&p
sb rd,
x, sft-sl
70%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
30%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy
70%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
30%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy
80%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
20%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy
80%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
20%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy
80%SS
ip, vfg,
calc cm
20%LS
frm, lm


MUD WT: 9.40/9.30
VIS: 34/34 IN/OUT
93
600
ROP (ft/hr)
0
400
250
GAMMA (units)
0
103
6000
600000
2929u
3903u
CAS (units)
C1-C4 (PPM)
0
3577u
C1: 61.0%
C2: 17.8%
C3: 12.7%
C4: 8.5%
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 10,100 10,110 10,120
6750
MD: 9,975′
TVD: 6,971.7′
Inclination: 88.77 °
Azimuth: 178.14°
VS: 3,054.46′
MD: 10,070′
TVD: 6,973.82′
Inclination: 88.68 °
Azimuth: 176.91°
VS: 3,149.27′
TVD (ft)
S: mod gy - blk, occ wh, fros ip, s&p
frm - hd, brit clus, sb ang - sb rd,
nt
S: wh-off wh, microxln,sm tex, sft-sl
y
80%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
20%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy
80%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
20%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy
80%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
20%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy
90%SS: mod gy - blk, occ
ip, vfg, frm - hd, brit clus,
calc cmt
10%LS: wh-off wh, microx
frm, lmy


MUD WT: 9.30/9.25
VIS: 34/34 IN/OUT
398u
94
80
0
250
GAMMA (units)
0
6000
600000
GAS (units)
C1-C4 (PPM)
0
3198u
94
500
3631u
C1: 72.6%
C2: 12.2%
C3: 11.8%
C4: 3.4%
3035u
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
10,270
10,280
10,290
10,300
10,310
10,320
10,330
10,340
6750
MD: 10,165′
TVD: 6,975.58′
Inclination: 89.2 °
Azimuth: 177.64°
VS: 3,244.06′
MD: 10,260′
TVD: 6,976.22′
Inclination: 90.03 °
Azimuth: 177.68°
VS: 3,338.9′
TVD (ft)
wh, fros ip, s&p
sb ang - sb rd,
xln,sm tex, sft-sl
90%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
10%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy
90%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
10%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy
90%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
10%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy
90%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
10%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy

6750

MD: 10,355′
TVD: 6,975.27′
Inclination: 91.11 °
Azimuth: 177.64°
VS: -3,432.89′

MD: 10,450′
TVD: 6,973.97′
Inclination: 90.46 °
Azimuth: 178.37°
VS: -3,527.83′

MD: 10,544′
TVD: 6,973.64′
Inclination: 89.94 °
Azimuth: 176.22°
VS: -3,621.71′

TVD (ft)

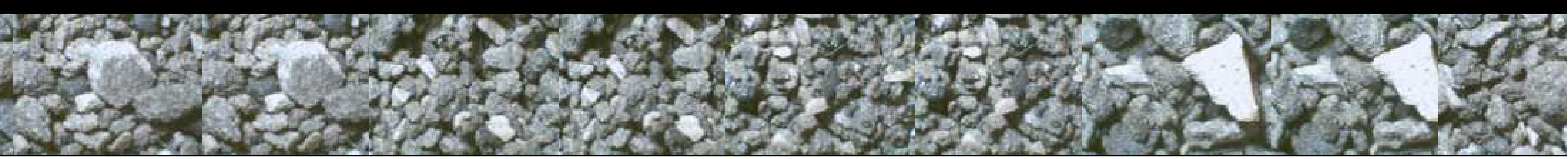
90%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
10%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy

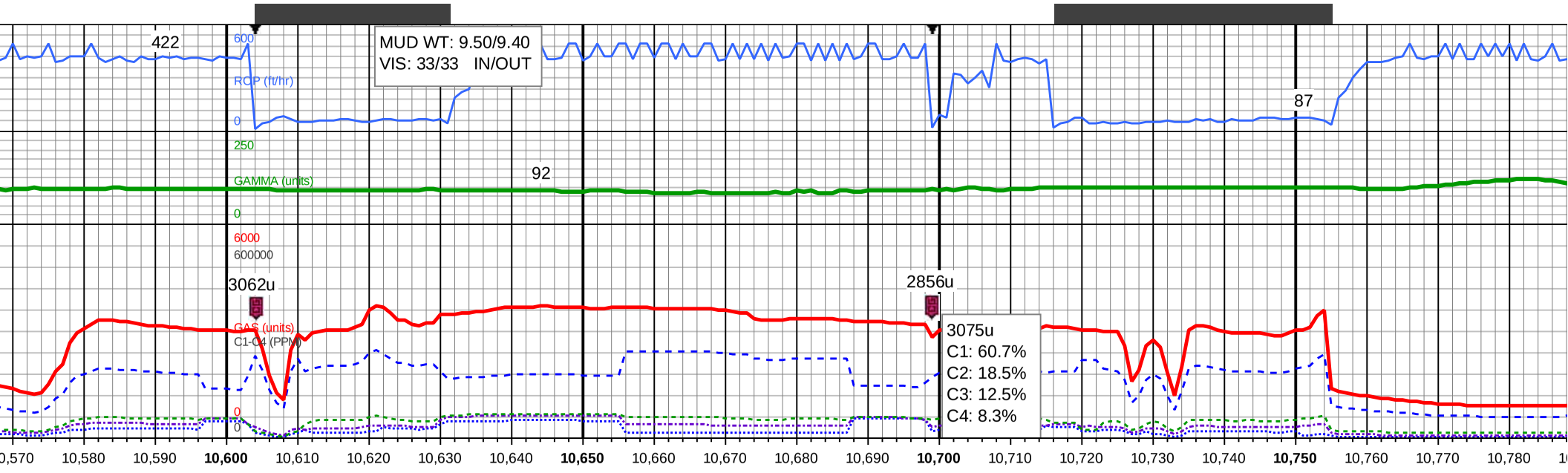
90%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
10%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy

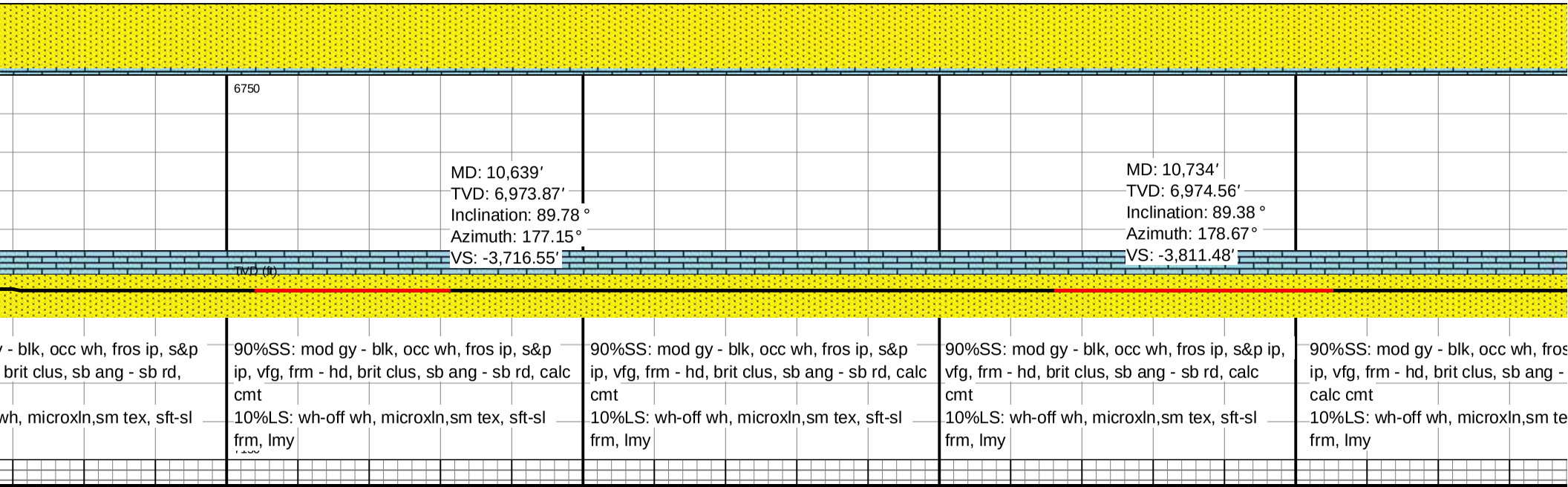
90%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
10%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy

90%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
10%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy

90%SS: mod gy ip, vfg, frm - hd, calc cmt
10%LS: wh-off frm, lmy







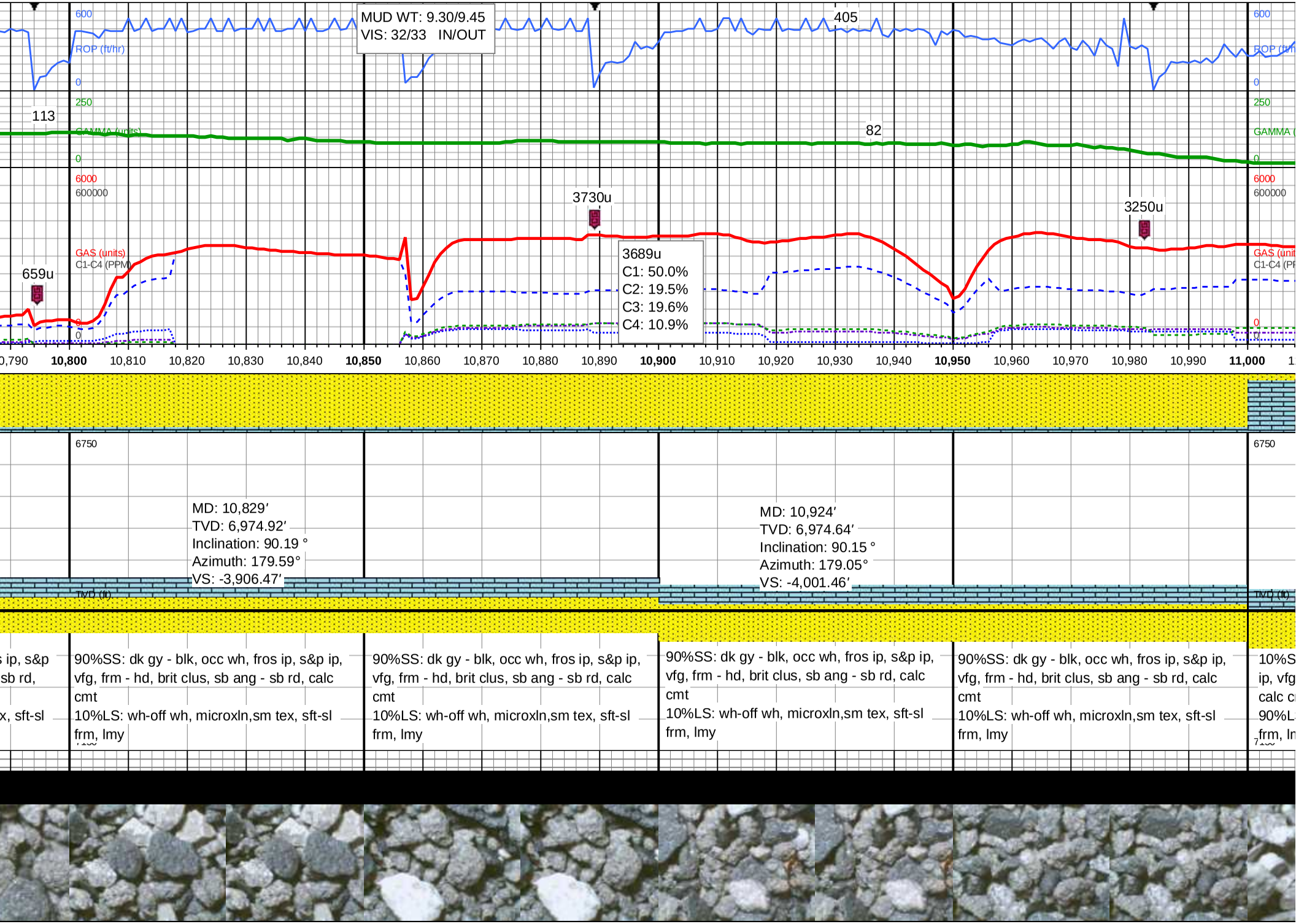
- blk, occ wh, fros ip, s&p
brit clus, sb ang - sb rd,
wh, microxln,sm tex, sft-sl

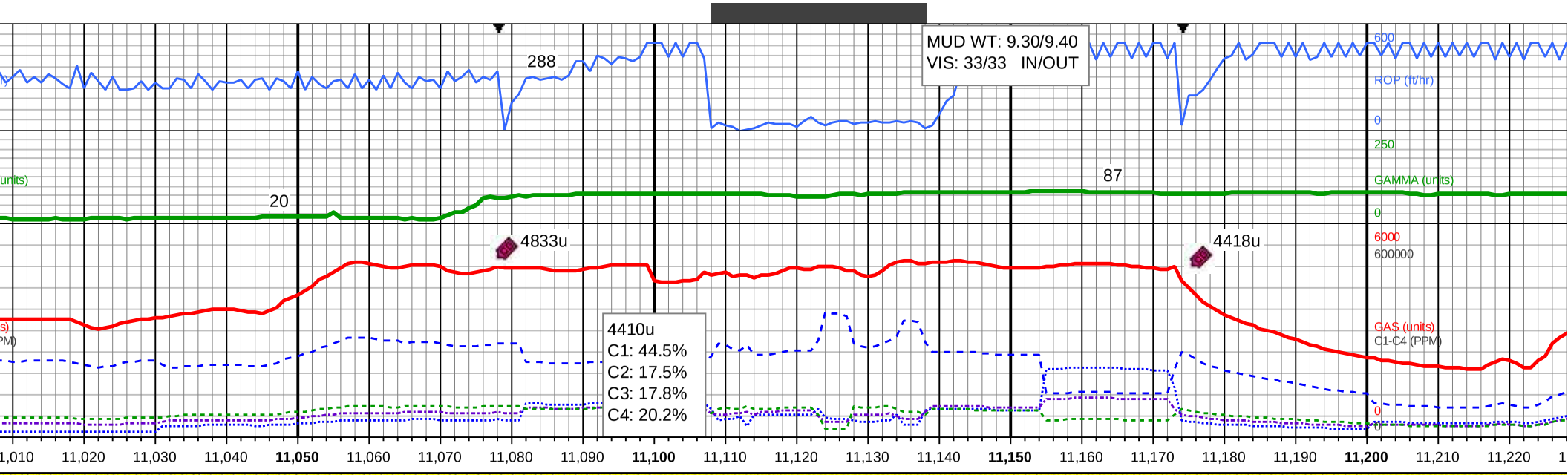
90%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
10%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy

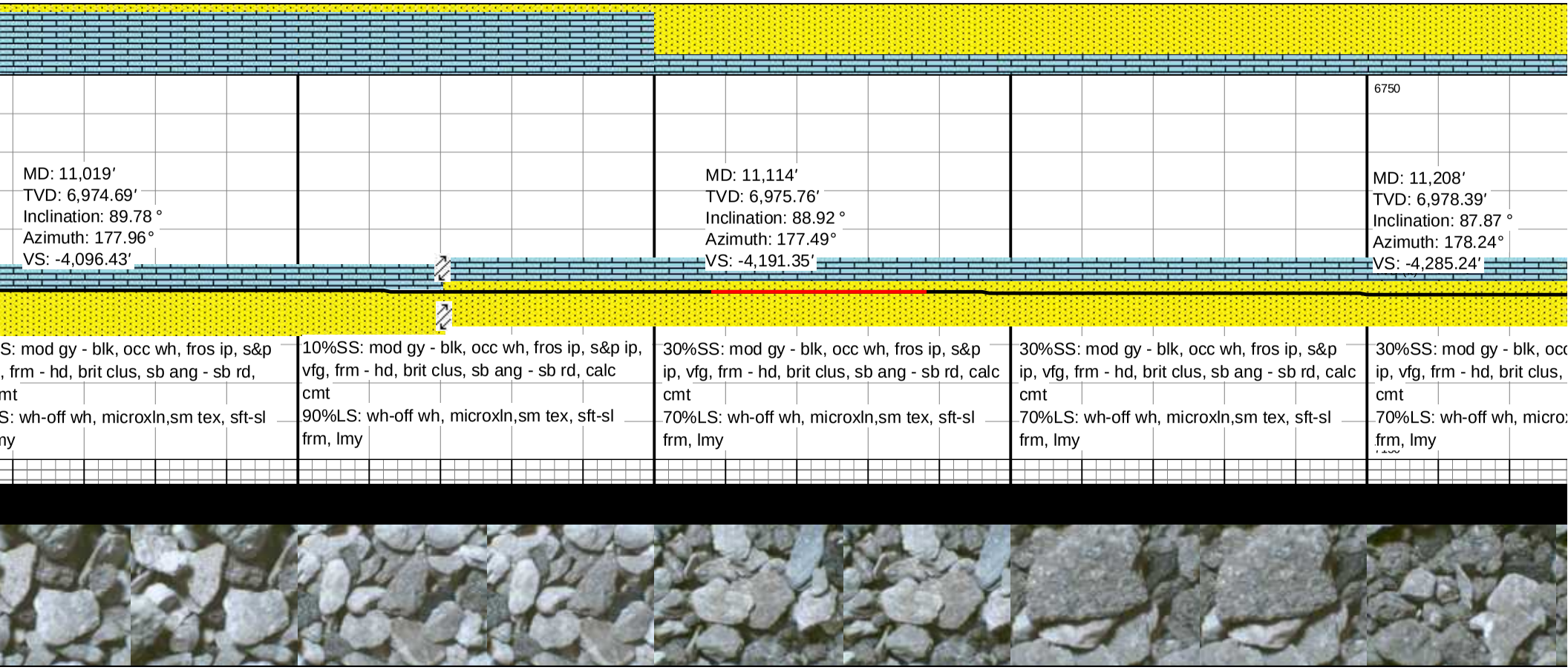
90%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
10%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy

90%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
10%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy

90%SS: mod gy - blk, occ wh, fros
ip, vfg, frm - hd, brit clus, sb ang -
calc cmt
10%LS: wh-off wh, microxln,sm te
frm, lmy


MUD WT: 9.30/9.45
VIS: 32/33 IN/OUT
ROP (ft/hr)
GAMMA (units)
GAS (units)
C1-C4 (PPM)
113
405
82
659u
3730u
3250u
3689u
C1: 50.0%
C2: 19.5%
C3: 19.6%
C4: 10.9%
10,800
10,850
10,900
10,950
11,000
6750
MD: 10,829′
TVD: 6,974.92′
Inclination: 90.19 °
Azimuth: 179.59°
VS: -3,906.47′
MD: 10,924′
TVD: 6,974.64′
Inclination: 90.15 °
Azimuth: 179.05°
VS: -4,001.46′
TVD (ft)
90%SS: dk gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
10%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy





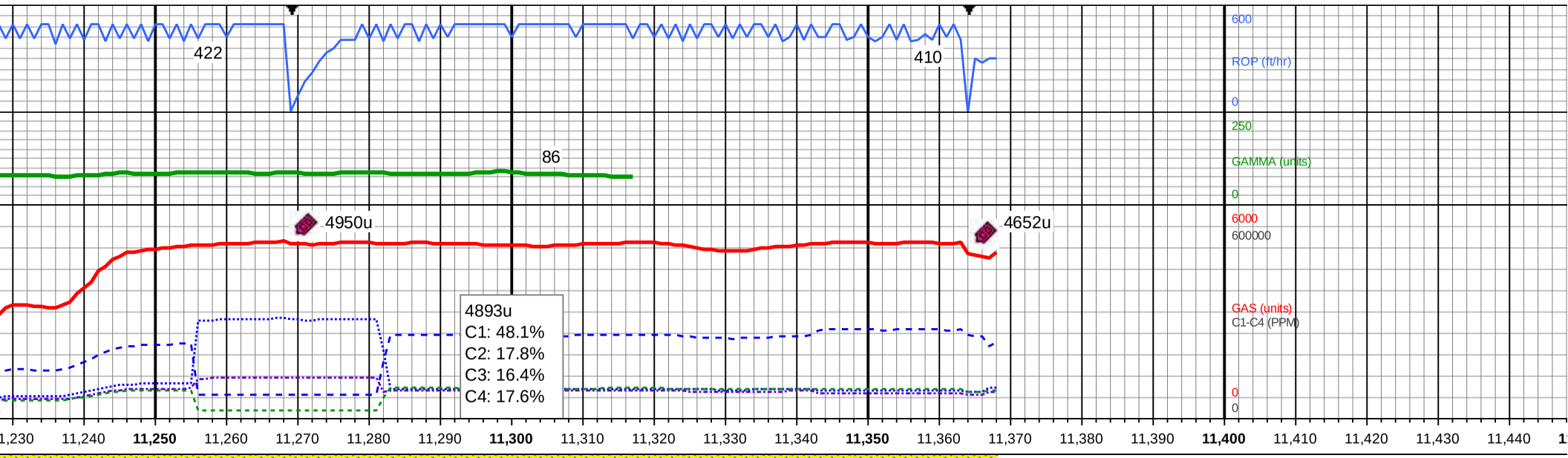
S: mod gy - blk, occ wh, fros ip, s&p
, frm - hd, brit clus, sb ang - sb rd,
mt
S: wh-off wh, microxln,sm tex, sft-sl
ny

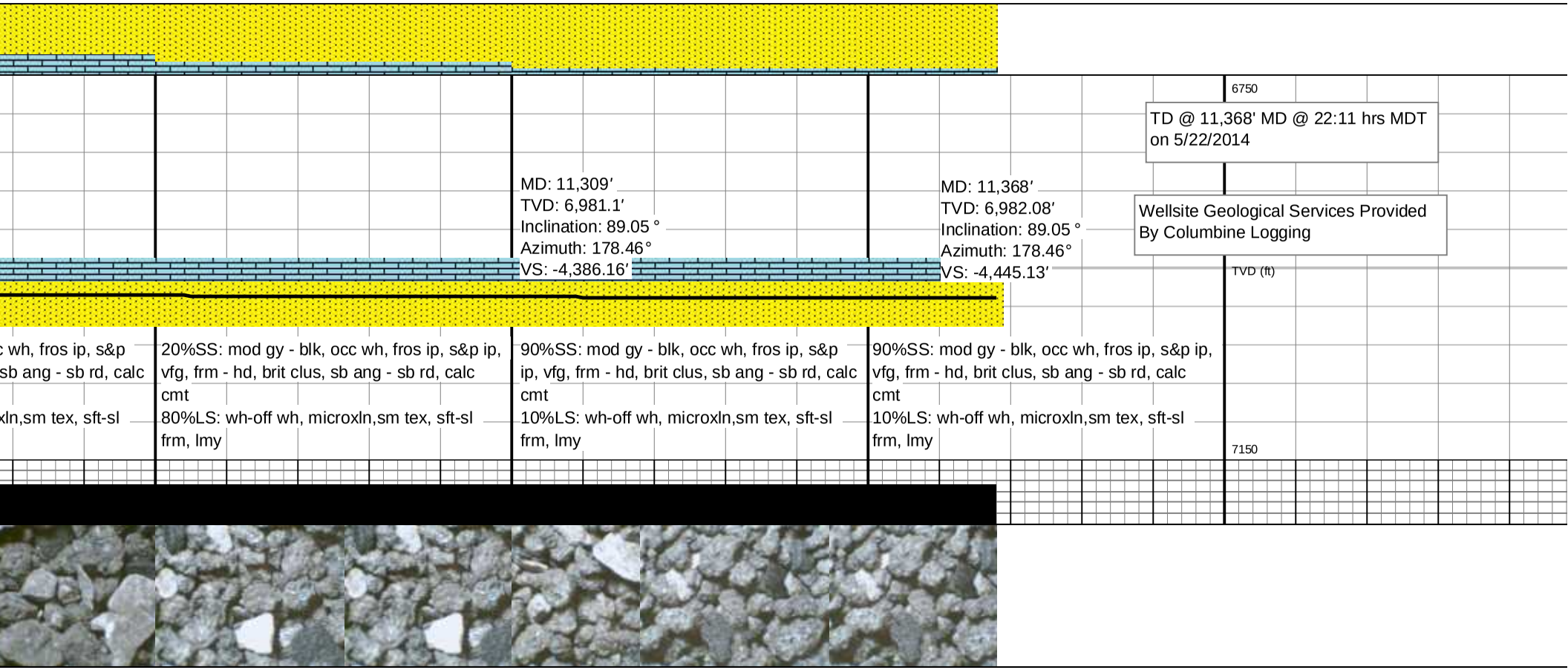
10%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
90%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy

30%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
70%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy

30%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
70%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy

30%SS: mod gy - blk, occ
ip, vfg, frm - hd, brit clus,
cmt
70%LS: wh-off wh, microx
frm, lmy


422
410
86
4950u
4652u
4893u
C1: 48.1%
C2: 17.8%
C3: 16.4%
C4: 17.6%
600
ROP (ft/hr)
0
250
GAMMA (units)
0
6000
600000
GAS (units)
C1-C4 (PPM)
0
0
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
11,370
11,380
11,390
11,400
11,410
11,420
11,430
11,440


6750
TD @ 11,368' MD @ 22:11 hrs MDT on 5/22/2014
MD: 11,309′
TVD: 6,981.1′
Inclination: 89.05 °
Azimuth: 178.46°
VS: -4,386.16′
MD: 11,368′
TVD: 6,982.08′
Inclination: 89.05 °
Azimuth: 178.46°
VS: -4,445.13′
Wellsite Geological Services Provided By Columbine Logging
TVD (ft)
c wh, fros ip, s&p
sb ang - sb rd, calc
xln,sm tex, sft-sl
20%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
80%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy
90%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
10%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy
90%SS: mod gy - blk, occ wh, fros ip, s&p ip, vfg, frm - hd, brit clus, sb ang - sb rd, calc cmt
10%LS: wh-off wh, microxln,sm tex, sft-sl frm, lmy
7150