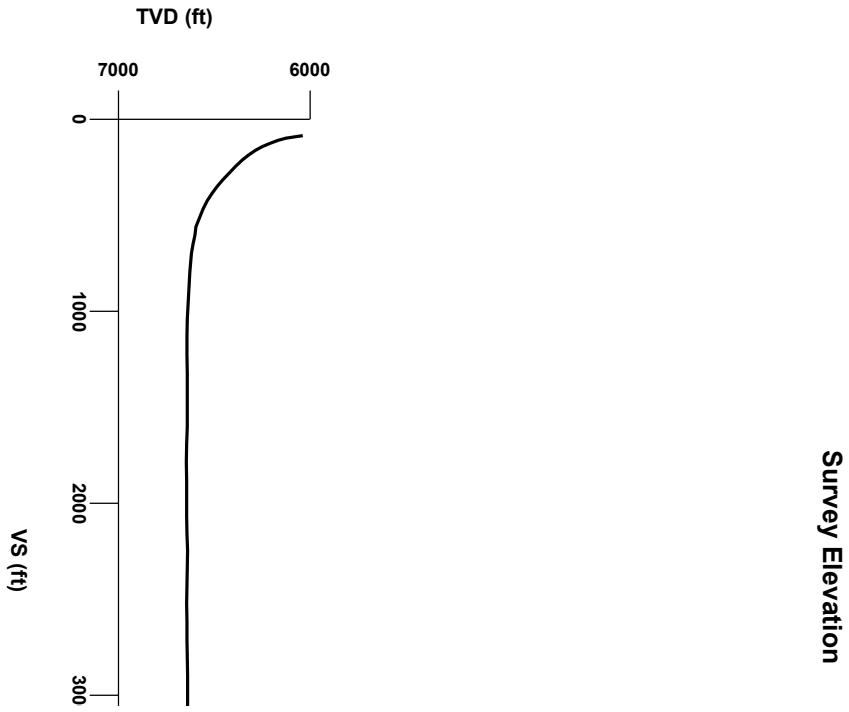
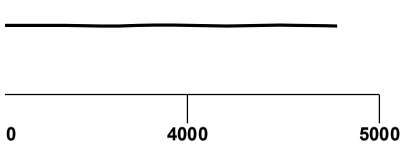
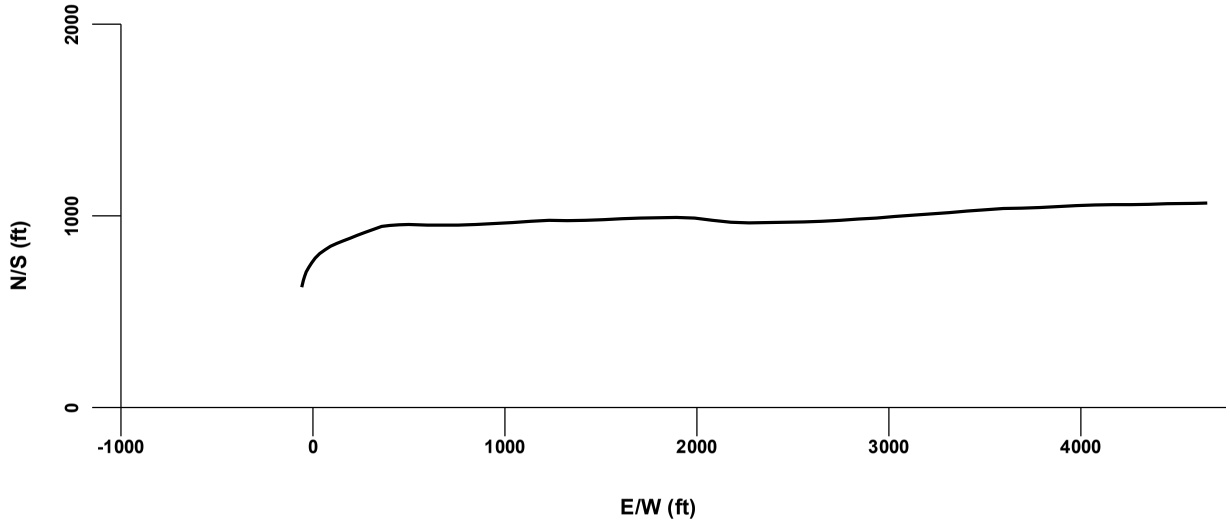
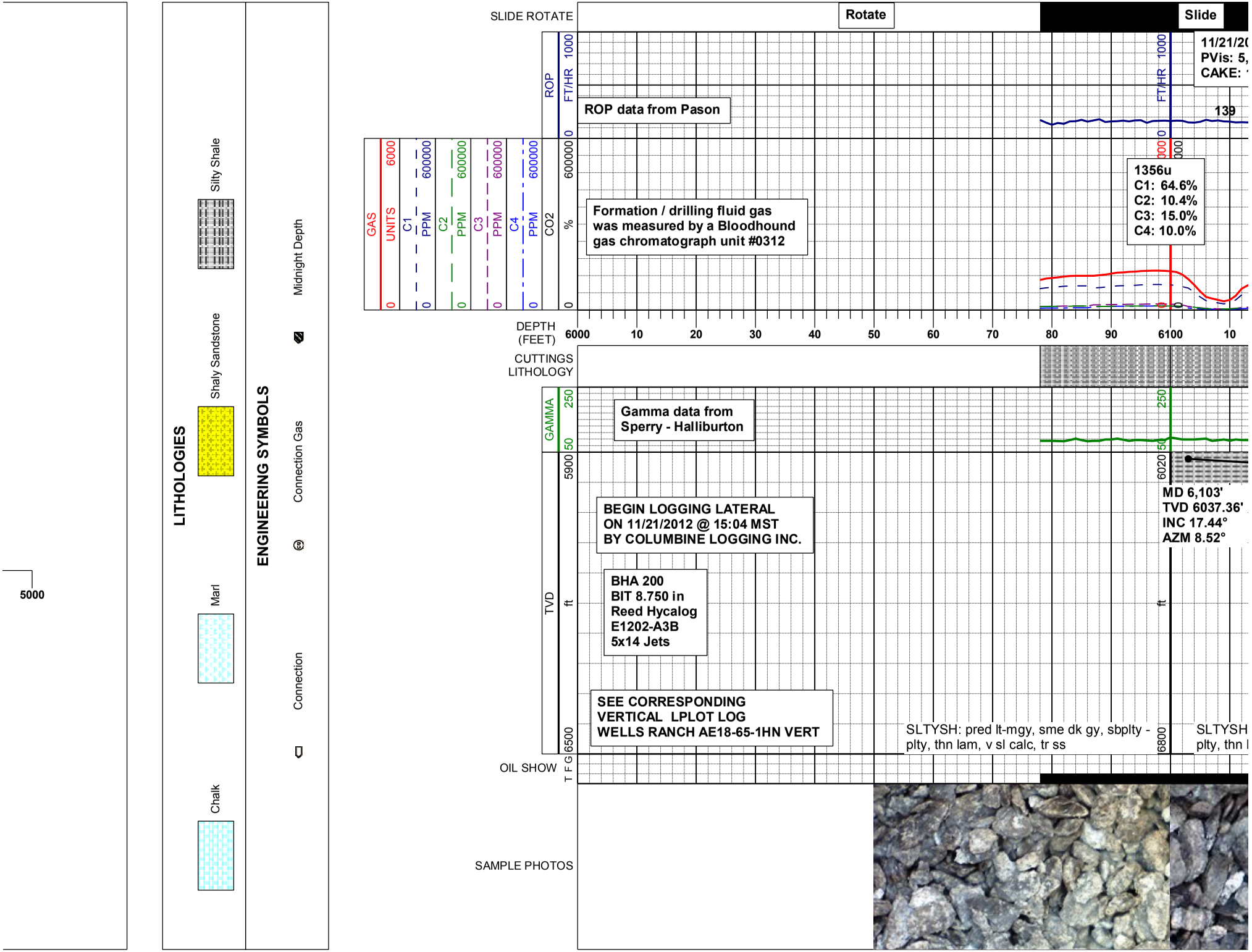
OPERATOR:	**NOBLE ENERGY INC.**
WELL:	**WELLS RANCH AE18-65-1HN**
LOCATION:	**SEC 18 T6N R62W**
COUNTY:	**WELD**
STATE:	**COLORADO**
SPOT:	**1,380' FSL; 215' FWL**
ELEVATION:	**4,832' GL; 4,856' KB**
FIELD:	**WATTENBERG**
SPUD DATE:	**11/19/2012**
TD DATE:	**11/25/2012**
DATES LOGGED:	**11/21/2012 - 11/25/2012 (HORIZONTAL)**
DEPTHS LOGGED:	**7,110' - 11,225' (HORIZONTAL)**
LOGGERS:	**MARK COLE; CHRIS COOK**
DRILLING FLUID:	**LSND**
DRILLING RIG:	**H&P 315**
API:	**05-123-35647**
LOG TYPE:	**HORIZONTAL**
SCALE:	**1:240 (5 inches per 100 feet)**
REMARKS:	**SEE CORRESPONDING VERTICAL LOG WELLS_RANCH_AE18_65_1HN_VERT. LAT/LON 40.483060/-104.374630 Wellsite Geological Services Provided by Columbine Logging Inc.**

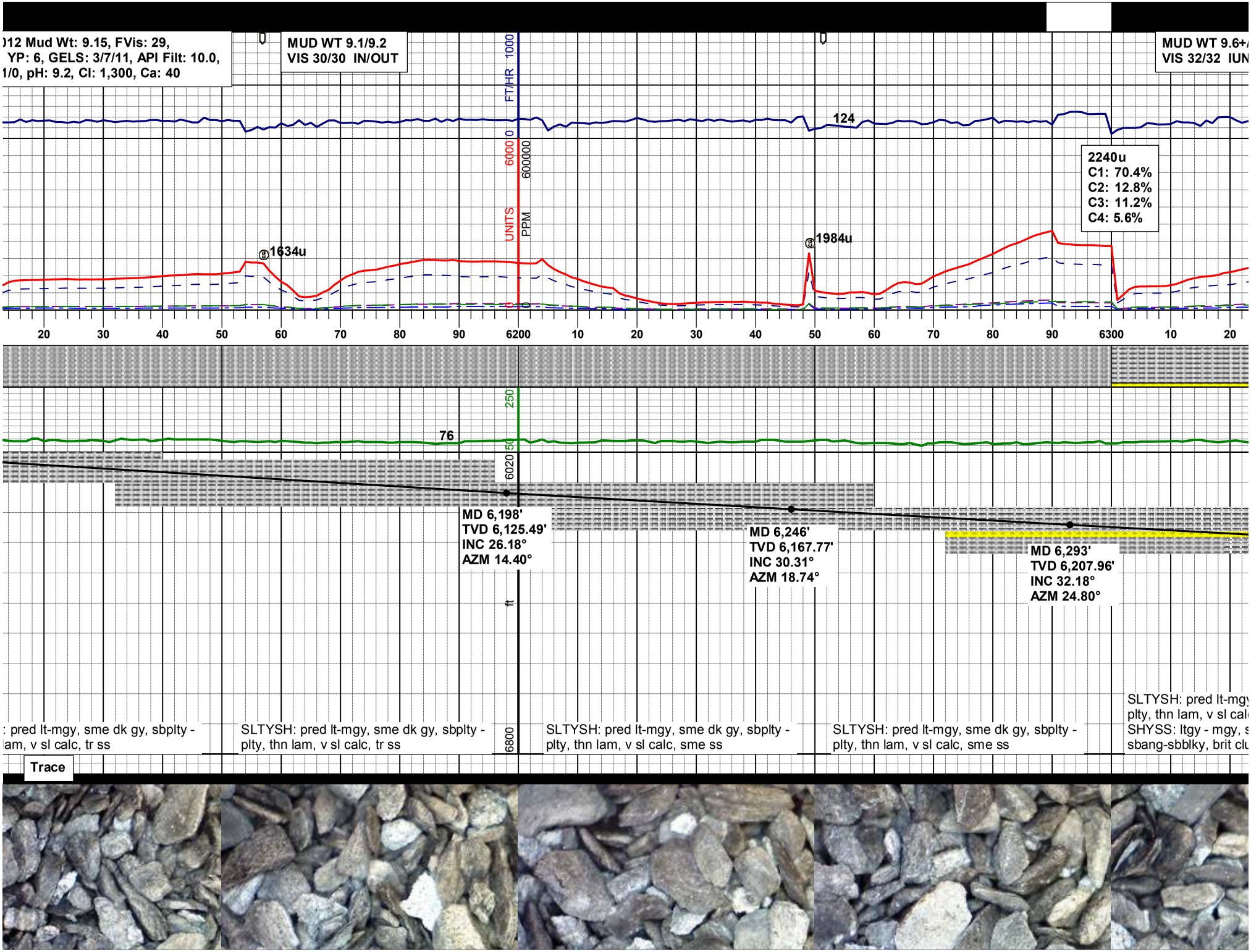


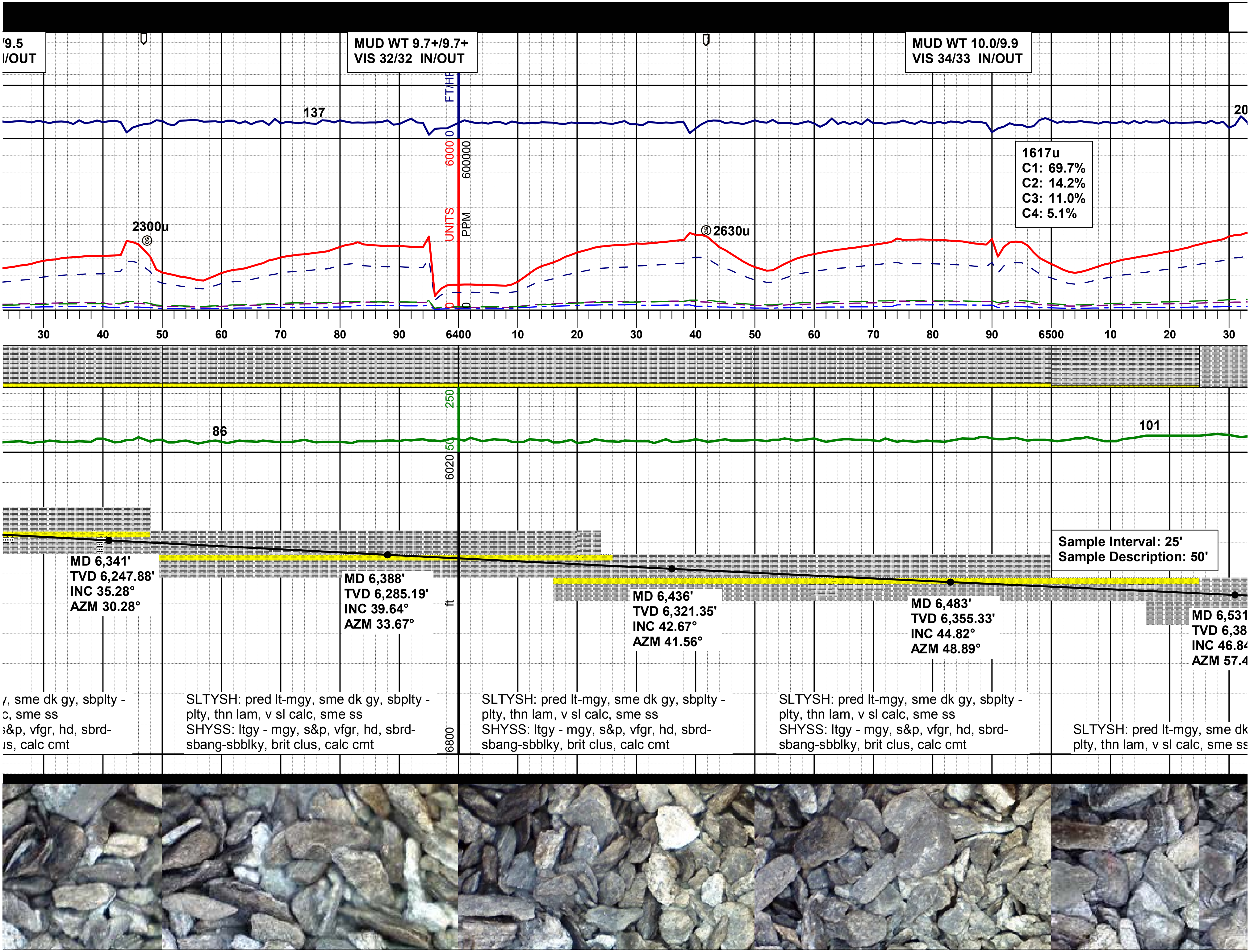


Survey Plan

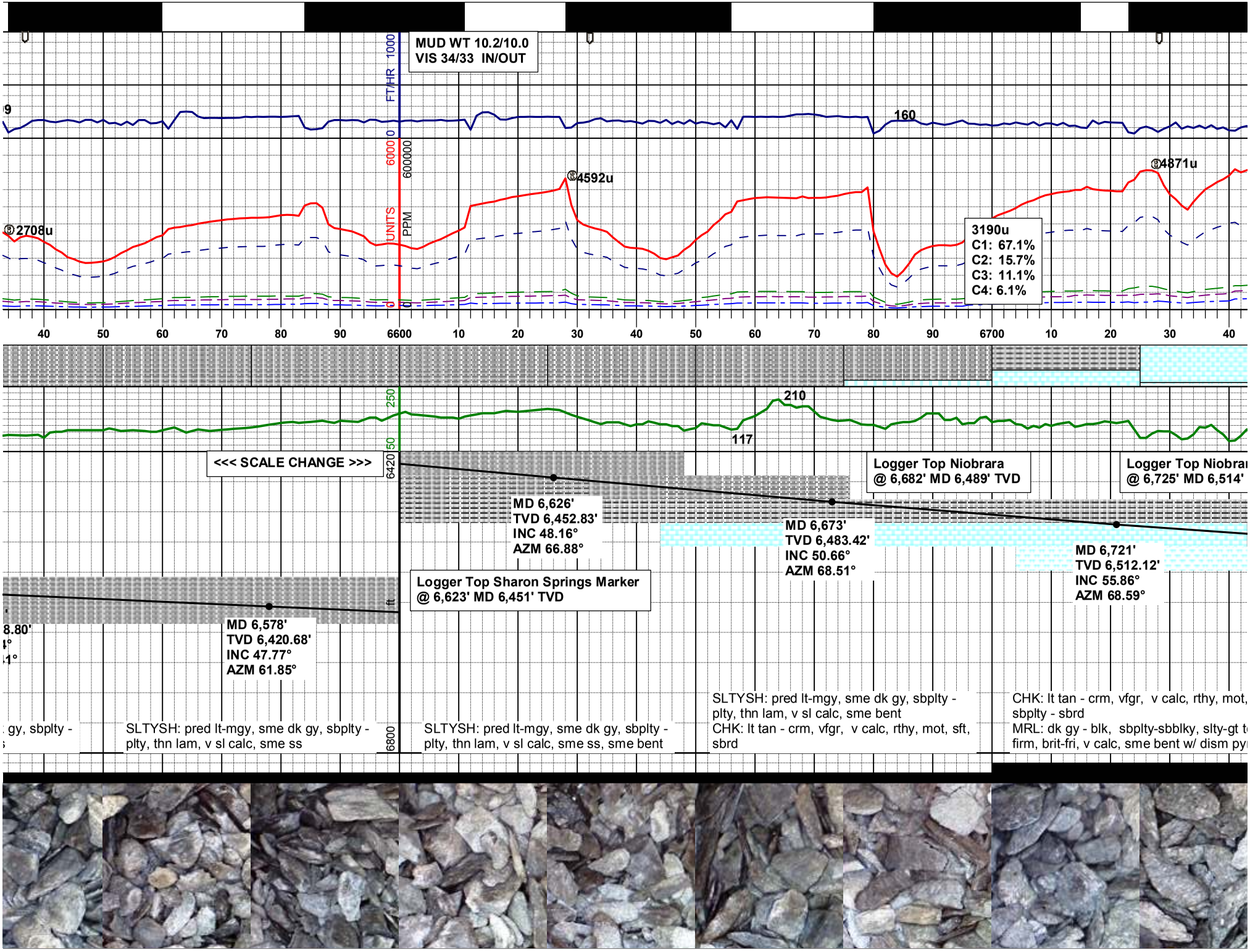


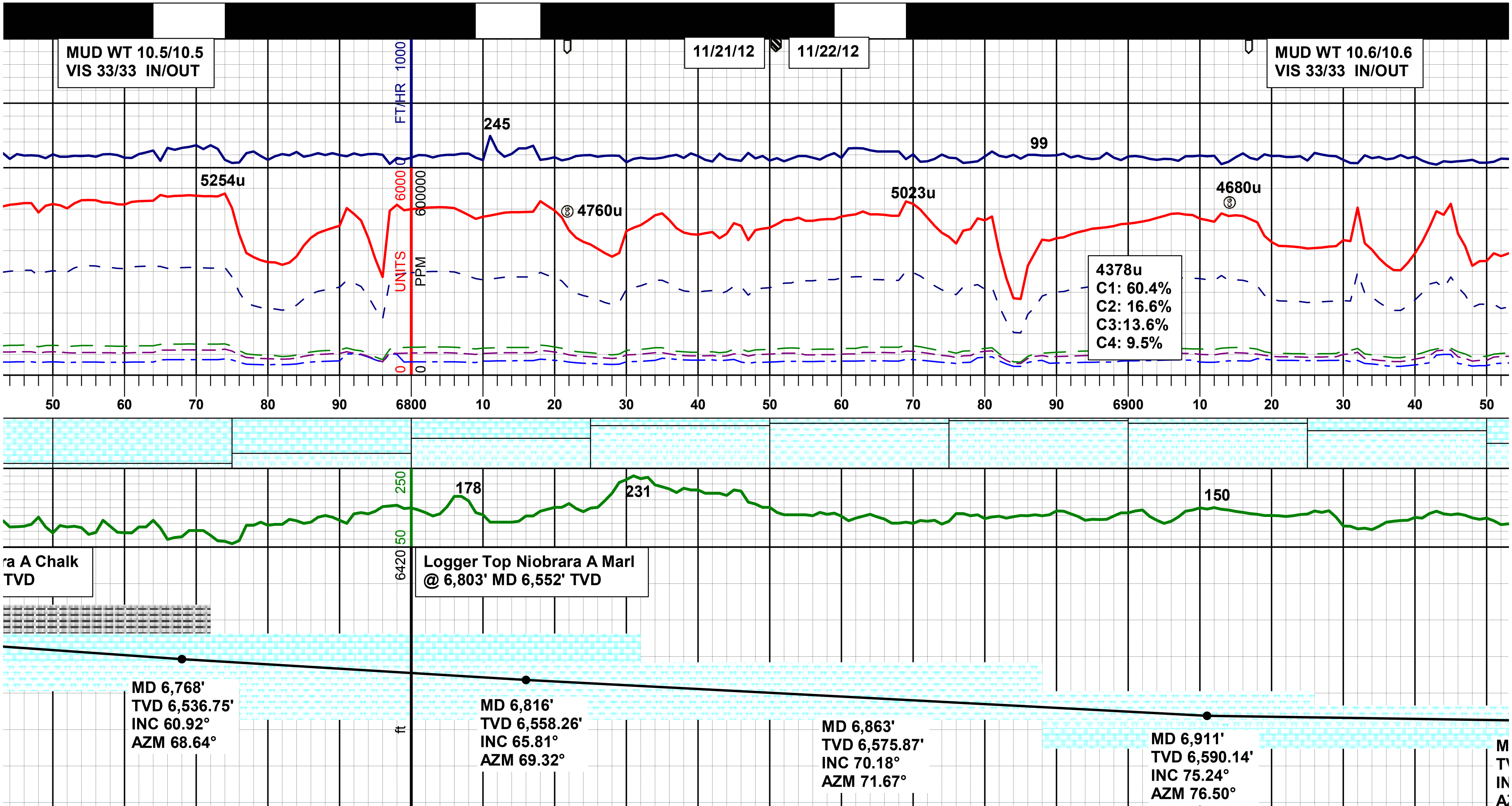

LITHOLOGIES
Silty Shale
Shaly Sandstone
Marl
Chalk
ENGINEERING SYMBOLS
Midnight Depth
Connection Gas
Connection
5000
SLIDE ROTATE
Rotate
Slide
ROP
FT/HR
1000
0
ROP data from Pason
139
GAS
UNITS
6000
C1
PPM
C2
PPM
C3
PPM
C4
PPM
600000
CO2
%
Formation / drilling fluid gas
was measured by a Bloodhound
gas chromatograph unit #0312
1356u
C1: 64.6%
C2: 10.4%
C3: 15.0%
C4: 10.0%
DEPTH
(FEET)
6000
10
20
30
40
50
60
70
80
90
6100
CUTTINGS
LITHOLOGY
GAMMA
250
50
Gamma data from
Sperry - Halliburton
6020
MD 6,103'
TVD 6037.36'
INC 17.44°
AZM 8.52°
TVD
ft
5900
6500
6800
BEGIN LOGGING LATERAL
ON 11/21/2012 @ 15:04 MST
BY COLUMBINE LOGGING INC.
BHA 200
BIT 8.750 in
Reed Hycalog
E1202-A3B
5x14 Jets
SEE CORRESPONDING
VERTICAL LPLOT LOG
WELLS RANCH AE18-65-1HN VERT
SLTYSH: pred lt-mgy, sme dk gy, sbplty -
plty, thn lam, v sl calc, tr ss
SLTYSH
plty, thn
OIL SHOW
T F G
SAMPLE PHOTOS


012 Mud Wt: 9.15, FVis: 29,
YP: 6, GELS: 3/7/11, API Filt: 10.0,
1/0, pH: 9.2, Cl: 1,300, Ca: 40
MUD WT 9.1/9.2
VIS 30/30 IN/OUT
MUD WT 9.6+/
VIS 32/32 IUN
FT/HR
1000
0
UNITS
6000
0
PPM
600000
124
2240u
C1: 70.4%
C2: 12.8%
C3: 11.2%
C4: 5.6%
1634u
1984u
20
30
40
50
60
70
80
90
6200
10
20
30
40
50
60
70
80
90
6300
10
20
250
50
76
6020
MD 6,198'
TVD 6,125.49'
INC 26.18°
AZM 14.40°
MD 6,246'
TVD 6,167.77'
INC 30.31°
AZM 18.74°
MD 6,293'
TVD 6,207.96'
INC 32.18°
AZM 24.80°
ft
6800
: pred lt-mgy, sme dk gy, sbplty -
lam, v sl calc, tr ss
SLTYSH: pred lt-mgy, sme dk gy, sbplty -
plty, thn lam, v sl calc, tr ss
SLTYSH: pred lt-mgy, sme dk gy, sbplty -
plty, thn lam, v sl calc, sme ss
SLTYSH: pred lt-mgy, sme dk gy, sbplty -
plty, thn lam, v sl calc, sme ss
SLTYSH: pred lt-mgy
plty, thn lam, v sl cal
SHYSS: ltgy - mgy, s
sbang-sbblky, brit clu
Trace



/9.5
I/OUT
MUD WT 9.7+/9.7+
VIS 32/32 IN/OUT
MUD WT 10.0/9.9
VIS 34/33 IN/OUT
FT/HR
0
137
20
6000
600000
UNITS
PPM
0
0
2300u
2630u
1617u
C1: 69.7%
C2: 14.2%
C3: 11.0%
C4: 5.1%
30
40
50
60
70
80
90
6400
10
20
30
40
50
60
70
80
90
6500
10
20
30
250
50
86
101
6020
ft
6800
MD 6,341'
TVD 6,247.88'
INC 35.28°
AZM 30.28°
MD 6,388'
TVD 6,285.19'
INC 39.64°
AZM 33.67°
MD 6,436'
TVD 6,321.35'
INC 42.67°
AZM 41.56°
MD 6,483'
TVD 6,355.33'
INC 44.82°
AZM 48.89°
MD 6,531
TVD 6,38
INC 46.8
AZM 57.4
Sample Interval: 25'
Sample Description: 50'
y, sme dk gy, sbplty -
c, sme ss
s&p, vfgr, hd, sbrd-
us, calc cmt
SLTYSH: pred lt-mgy, sme dk gy, sbplty -
plty, thn lam, v sl calc, sme ss
SHYSS: ltgy - mgy, s&p, vfgr, hd, sbrd-
sbang-sbblky, brit clus, calc cmt
SLTYSH: pred lt-mgy, sme dk gy, sbplty -
plty, thn lam, v sl calc, sme ss
SHYSS: ltgy - mgy, s&p, vfgr, hd, sbrd-
sbang-sbblky, brit clus, calc cmt
SLTYSH: pred lt-mgy, sme dk gy, sbplty -
plty, thn lam, v sl calc, sme ss
SHYSS: ltgy - mgy, s&p, vfgr, hd, sbrd-
sbang-sbblky, brit clus, calc cmt
SLTYSH: pred lt-mgy, sme dk
plty, thn lam, v sl calc, sme ss


MUD WT 10.2/10.0
VIS 34/33 IN/OUT
FT/HR 1000
0
160
6000 0
600000
UNITS
PPM
@2708u
@4592u
@4871u
3190u
C1: 67.1%
C2: 15.7%
C3: 11.1%
C4: 6.1%
40 50 60 70 80 90 6600 10 20 30 40 50 60 70 80 90 6700 10 20 30 40
250
50
210
117
<<< SCALE CHANGE >>>
6420
Logger Top Niobrara
@ 6,682' MD 6,489' TVD
Logger Top Niobrar
@ 6,725' MD 6,514'
MD 6,626'
TVD 6,452.83'
INC 48.16°
AZM 66.88°
MD 6,673'
TVD 6,483.42'
INC 50.66°
AZM 68.51°
MD 6,721'
TVD 6,512.12'
INC 55.86°
AZM 68.59°
Logger Top Sharon Springs Marker
@ 6,623' MD 6,451' TVD
ft
MD 6,578'
TVD 6,420.68'
INC 47.77°
AZM 61.85°
8.80'
1°
gy, sbplty -
SLTYSH: pred lt-mgy, sme dk gy, sbplty - plty, thn lam, v sl calc, sme ss
6800
SLTYSH: pred lt-mgy, sme dk gy, sbplty - plty, thn lam, v sl calc, sme ss, sme bent
SLTYSH: pred lt-mgy, sme dk gy, sbplty - plty, thn lam, v sl calc, sme bent
CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbrd
CHK: lt tan - crm, vfgr, v calc, rthy, mot, sbplty - sbrd
MRL: dk gy - blk, sbplty-sbblky, slty-gt t
firm, brit-fri, v calc, sme bent w/ dism py



sft,
ex,
r

CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
MRL: dk gy - blk, sbplty-sbblky, slty-gt tex, firm, brit-fri, v calc, sme bent w/ dism pyr

CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
MRL: dk gy - blk, sbplty-sbblky, slty-gt tex, firm, brit-fri, v calc, sme bent w/ dism pyr

CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
MRL: dk gy - blk, sbplty-sbblky, slty-gt tex, firm, brit-fri, v calc, sme bent w/ dism pyr

CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
MRL: dk gy - blk, sbplty-sbblky, slty-gt tex, firm, brit-fri, v calc, sme bent w/ dism pyr

Moderate

Good

MUD WT 10.6/10.6
VIS 33/33 IN/OUT

11/22/2012 Mud Wt: 10.65, FVis: 33,
PVis: 10, YP: 12, GELS: 6/15/25, API Filt: 6.8,
CAKE: 1/0, pH: 9.0, Cl: 1,400, Ca: 40

11/22/2012

11/23/2012

11/23/2012 Mud Wt: 11.00, FVis: 35
PVis: 12, YP: 10, GELS: 6/15/24, AP
CAKE: 1/0, pH: 9.0, Cl: 1,300, Ca: 4

11/23/2012 Mud Wt: 9.4, FVis: 32,
PVis: 6, YP: 5, GELS: 4/19/14, API
CAKE: 1/0, pH: 9.0, Cl: 1,400, Ca:

FT/HR 1000 0

125

47

UNITS 6000 0

PPM 600000 0

5049u

5467u

5023u

4782u
C1: 60.7%
C2: 16.8%
C3: 13.5%
C4: 9.0%

60 70 80 90 7000 10 20 30 40 50 60 70 80 90 7100 10 20 30 40 50 60

250 50

62

59

94

No Gamma Inside Casing

Logger Top Niobrara B Chalk
@ 6,986' MD 6,606' TVD

BUILD COMPLETED
@ 06:07 HR ON 11/22/2012

TOOH @ 7,110' MD FOR
INTERMEDIATE CASING

BEGAN DRILLING LATERAL
ON 11/23/2012 @ 16:55 HRS

BHA 300
BIT 6.125 in
Security
FXD54
5x11 JETS

MD 7,057'
TVD 6,618.79'
INC 82.19°
AZM 90.93°

MD 7,157'
TVD 6,627.3
INC 88.00°
AZM 91.10°

D 6,958'
VD 6,600.99'
IC 78.08°
ZM 81.44°

MD 7,006'
TVD 6,610.50'
INC 79.09°
AZM 88.32°

ft

6420

6800

CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
MRL: dk gy - blk, sbplty-sbblky, slty-gt tex, firm, brit-fri, v calc, sme bent w/ dism pyr

CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd intlam w/
MRL: m-dk gy sme blk, sbplty-sbblky, slty-gt tex, firm, brit-fri, v calc, tr bent w/ dism pyr, scat fos frag

CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd intlam w/
MRL: m-dk gy sme blk, sbplty-sbblky, slty-gt tex, firm, brit-fri, v calc, tr bent w/ dism pyr,

20% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd intlam w/
80% MRL: m-dk gy sme blk, sbplty-sbblky, slty-gt tex, firm, brit-fri, v calc, tr bent w/ dism pyr,

25% CHK:
mot, sft, sl
75% MRL:
slty-gt tex,
dism pyr,

[redacted]

MUD WT 9.1/9.1+
VIS 31/31 IN/OUT

MUD WT 9.1/9.1
VIS 31/31 IN/O

I Filt: 7.8,
0

Filt: 9.8,
40

304

122

1701u
C1: 96.8%
C2: 1.9%
C3: 0.9%
C4: 0.4%

BUBBLE JAR NOT TIGHT

FT/HR
UNITS
PPM
6000
0
600000
0

70 80 90 7200 10 20 30 40 50 60 70 80 90 7300 10 20 30 40 50 60 70

144

157

250
50
6420

MST

4'

MD 7,220'
TVD 6,630.32'
INC 86.58°
AZM 91.29°

MD 7,315'
TVD 6,635.97'
INC 86.61°
AZM 88.17°

ft
6800

lt tan - crm, vfgr, v calc, rthy,
bplty - sbrd intlam w/
m-dk gy sme blk, sbplty-sbblky,
firm, brit-fri, v calc, tr bent w/

25% CHK: lt tan - crm, vfgr, v calc, rthy,
mot, sft, sbplty - sbrd intlam w/
75% MRL: m-dk gy sme blk, sbplty-sbblky,
slty-gt tex, firm, brit-fri, v calc, tr bent w/
dism pyr,

30% CHK: lt tan - crm, vfgr, v calc, rthy,
mot, sft, sbplty - sbrd intlam w/
70% MRL: m-dk gy sme blk, sbplty-sbblky,
slty-gt tex, firm, brit-fri, v calc, tr bent w/
dism pyr, sme lnoc

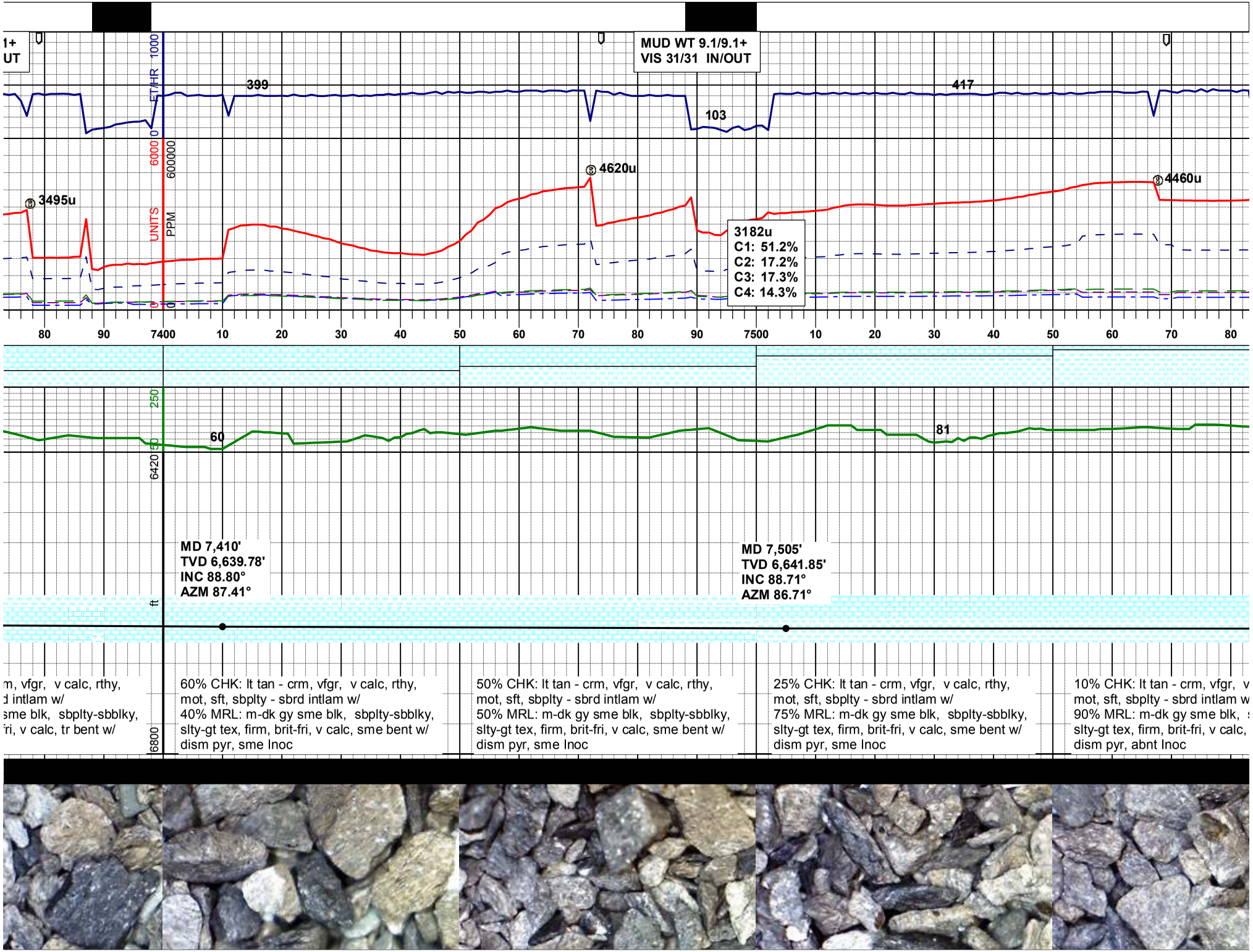
35% CHK: lt tan - crm, vfgr, v calc, rthy,
mot, sft, sbplty - sbrd intlam w/
65% MRL: m-dk gy sme blk, sbplty-sbblky,
slty-gt tex, firm, brit-fri, v calc, tr bent w/
dism pyr, sme lnoc

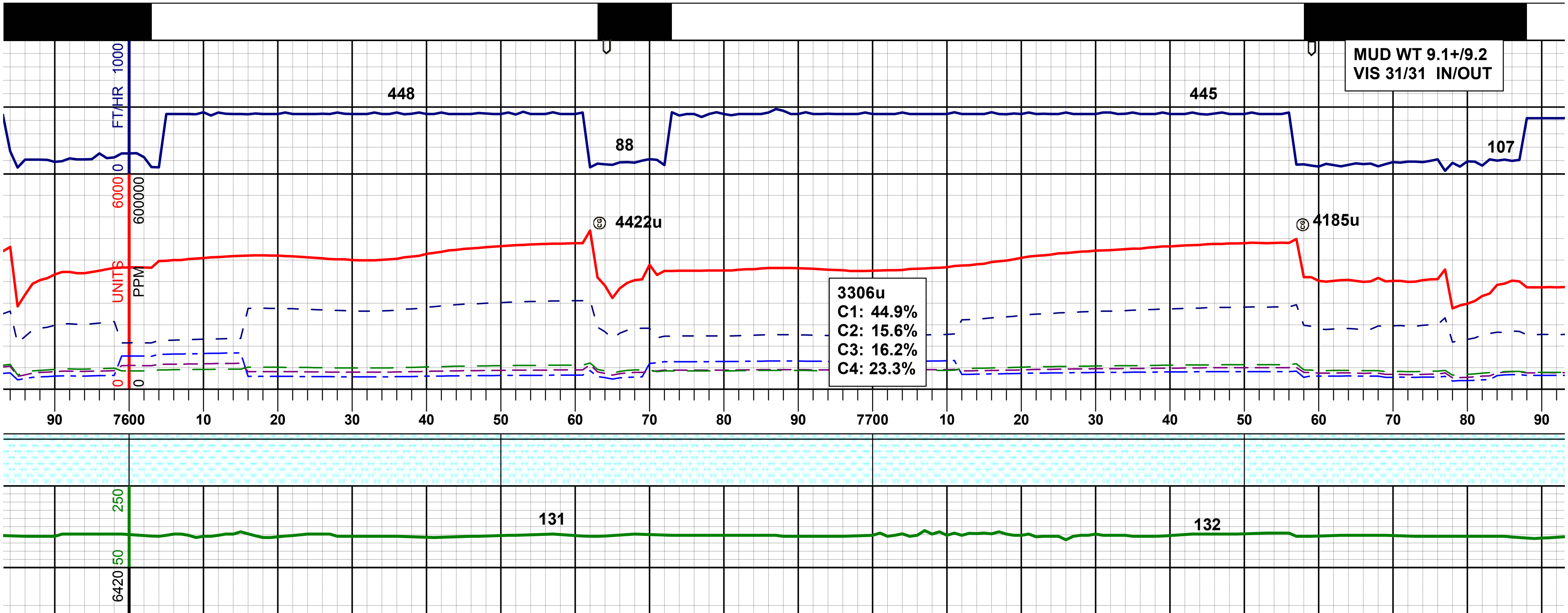
60% CHK: lt tan - cr
mot, sft, sbplty - sbr
40% MRL: m-dk gy
slty-gt tex, firm, brit-f
dism pyr, sme lnoc

[redacted]






1+
UT
MUD WT 9.1/9.1+
VIS 31/31 IN/OUT
ET/HR 1000
0
399
417
103
6000 0
600000
UNITS
PPM
3495u
4620u
4460u
3182u
C1: 51.2%
C2: 17.2%
C3: 17.3%
C4: 14.3%
80 90 7400 10 20 30 40 50 60 70 80 90 7500 10 20 30 40 50 60 70 80
250
50
6420
60
81
MD 7,410'
TVD 6,639.78'
INC 88.80°
AZM 87.41°
MD 7,505'
TVD 6,641.85'
INC 88.71°
AZM 86.71°
ft
6800
m, vfgr, v calc, rthy,
d intlam w/
sme blk, sbplty-sbblky,
ri, v calc, tr bent w/
60% CHK: lt tan - crm, vfgr, v calc, rthy,
mot, sft, sbplty - sbrd intlam w/
40% MRL: m-dk gy sme blk, sbplty-sbblky,
slty-gt tex, firm, brit-fri, v calc, sme bent w/
dism pyr, sme Inoc
50% CHK: lt tan - crm, vfgr, v calc, rthy,
mot, sft, sbplty - sbrd intlam w/
50% MRL: m-dk gy sme blk, sbplty-sbblky,
slty-gt tex, firm, brit-fri, v calc, sme bent w/
dism pyr, sme Inoc
25% CHK: lt tan - crm, vfgr, v calc, rthy,
mot, sft, sbplty - sbrd intlam w/
75% MRL: m-dk gy sme blk, sbplty-sbblky,
slty-gt tex, firm, brit-fri, v calc, sme bent w/
dism pyr, sme Inoc
10% CHK: lt tan - crm, vfgr, v
mot, sft, sbplty - sbrd intlam w
90% MRL: m-dk gy sme blk,
slty-gt tex, firm, brit-fri, v calc,
dism pyr, abnt Inoc



MD 7,600'
TVD 6,642.15'
INC 90.92°
AZM 87.05°

MD 7,695'
TVD 6,641.08'
INC 90.37°
AZM 84.79°

MD 7,790
TVD 6,64
INC 89.91
AZM 90.0

calc, rthy,
/
sbplty-sbblky,
sme bent w/

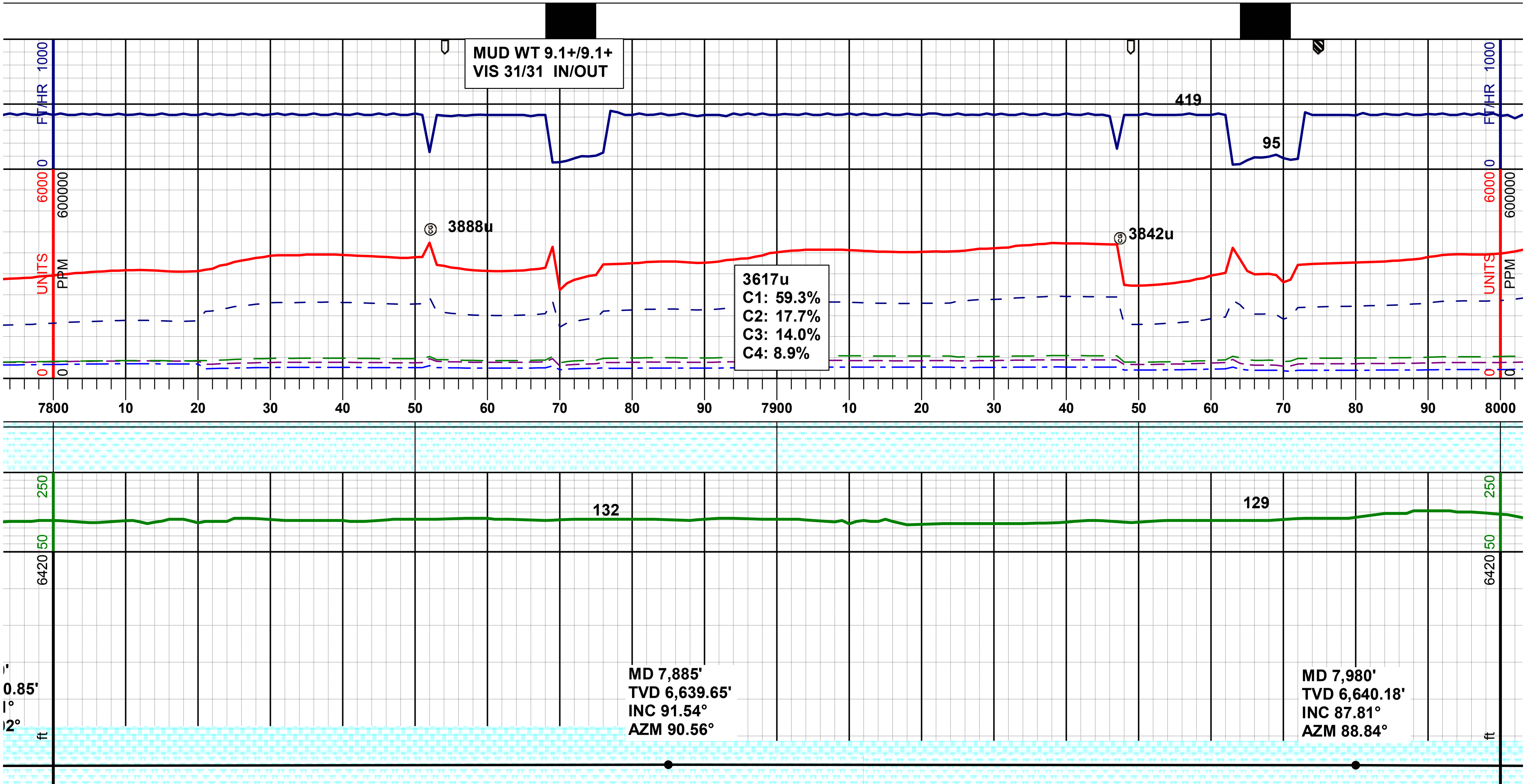
6800

10% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd intlam w/
90% MRL: m-dk gy sme blk, sbplty-sbblky, slty-gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt Inoc

10% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd intlam w/
90% MRL: m-dk gy sme blk, sbplty-sbblky, slty-gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt Inoc

10% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd intlam w/
90% MRL: m-dk gy sme blk, sbplty-sbblky, slty-gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt Inoc

10% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd intlam w/
90% MRL: m-dk gy sme blk, sbplty-sbbl
slty-gt tex, firm, brit-fri, v calc, abnt bent
dism pyr, abnt Inoc

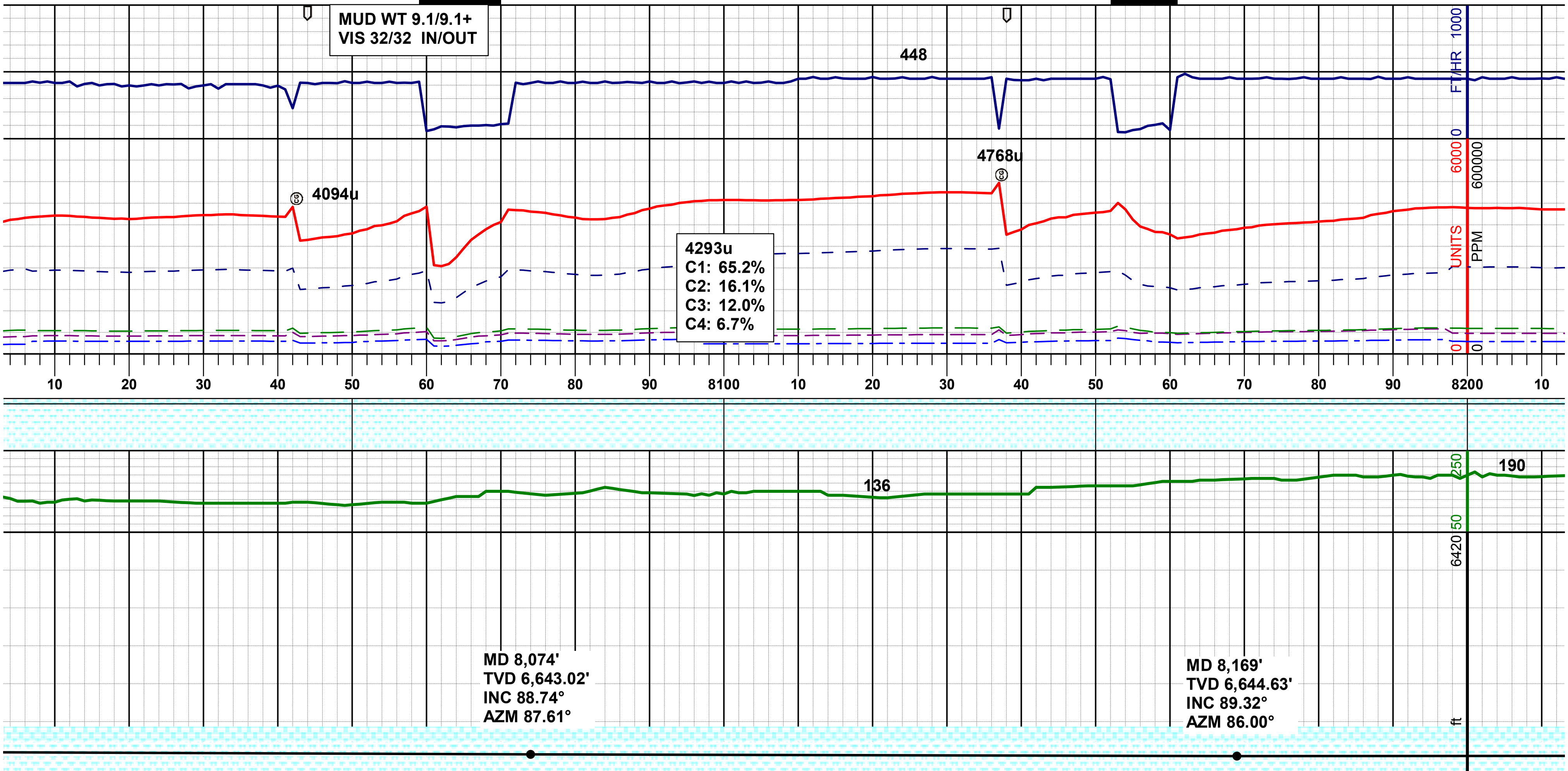


10% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd intlam w/ 90% MRL: m-dk gy sme blk, sbplty-sbblky, slty-gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt lnoc

10% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd intlam w/ 90% MRL: m-dk gy sme blk, sbplty-sbblky, slty-gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt lnoc

10% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd intlam w/ 90% MRL: m-dk gy sme blk, sbplty-sbblky, slty-gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt lnoc

10% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd intlam w/ 90% MRL: m-dk gy sme blk, sbplty-sbblky, slty-gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt lnoc



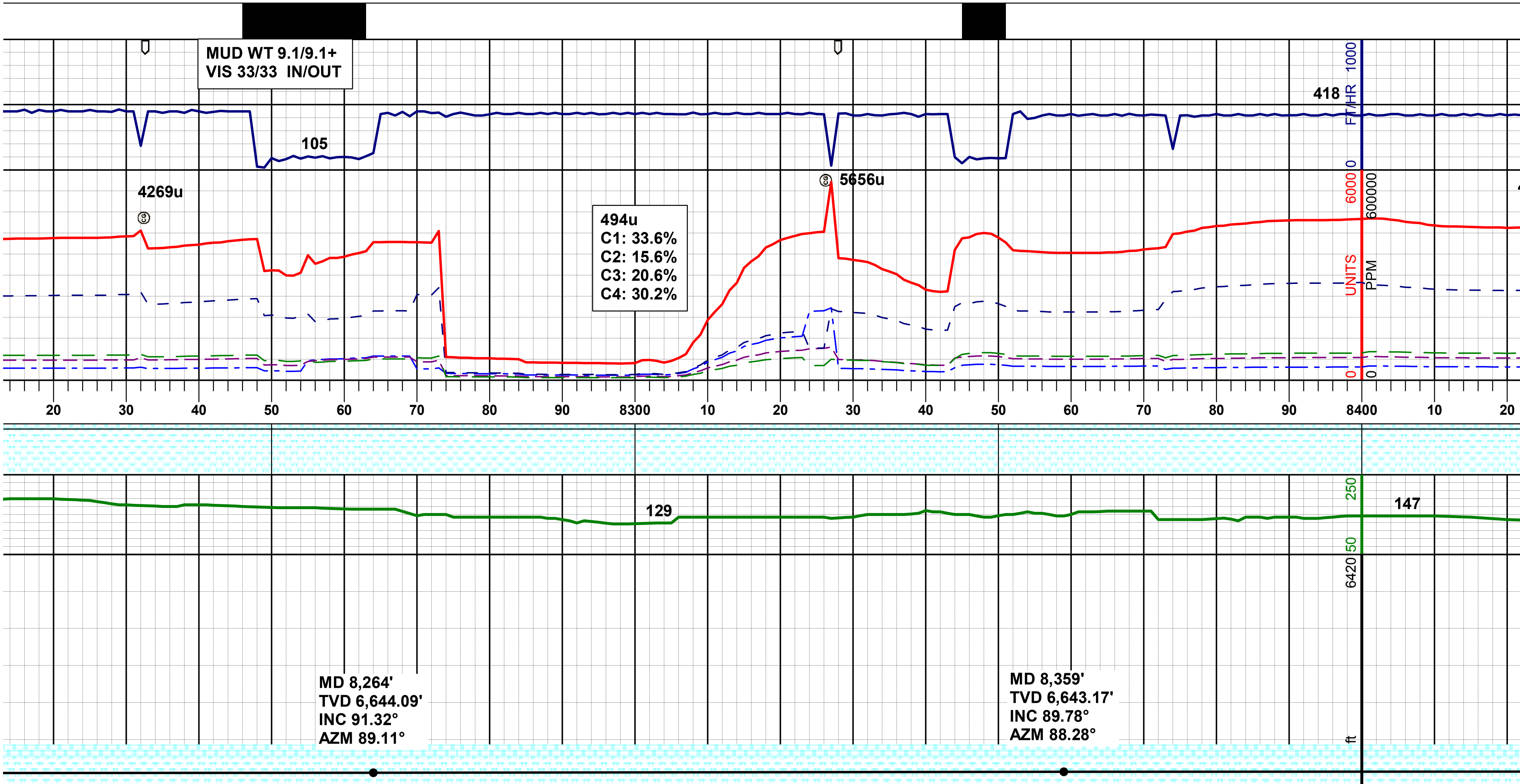
10% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd intlam w/
90% MRL: m-dk gy sme blk, sbplty-sbblky, slty-gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt Inoc

10% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd intlam w/
90% MRL: m-dk gy sme blk, sbplty-sbblky, slty-gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt Inoc

10% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd intlam w/
90% MRL: m-dk gy sme blk, sbplty-sbblky, slty-gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt Inoc

10% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd intlam w/
90% MRL: m-dk gy sme blk, sbplty-sbblky, slty-gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt Inoc

10% CHK
mot, sft, s
90% MRL
slty-gt tex,
dism pyr,



: lt tan - crm, vfgr, v calc, rthy,
bplty - sbrd intlam w/
: m-dk gy sme blk, sbplty-sbblky,
firm, brit-fri, v calc, abnt bent w/
abnt Inoc

10% CHK: lt tan - crm, vfgr, v calc, rthy,
mot, sft, sbplty - sbrd intlam w/
90% MRL: m-dk gy sme blk, sbplty-sbblky,
slty-gt tex, firm, brit-fri, v calc, abnt bent w/
dism pyr, abnt Inoc

10% CHK: lt tan - crm, vfgr, v calc, rthy,
mot, sft, sbplty - sbrd intlam w/
90% MRL: m-dk gy sme blk, sbplty-sbblky,
slty-gt tex, firm, brit-fri, v calc, abnt bent w/
dism pyr, abnt Inoc

10% CHK: lt tan - crm, vfgr, v calc, rthy,
mot, sft, sbplty - sbrd intlam w/
90% MRL: m-dk gy sme blk, sbplty-sbblky,
slty-gt tex, firm, brit-fri, v calc, abnt bent w/
dism pyr, abnt Inoc

10% CHK: lt tan - cr
mot, sft, sbplty - sbr
90% MRL: m-dkgy -
-gt tex, firm, brit-fri,
dism pyr, abnt fos fr

11/24/2012 Mud Wt: 9.15, FVis: 32,
PVis: 5, YP: 6, GELS: 4/9/15, API Filt: 9.6,
CAKE: 1/0, pH: 9.8, Cl: 1,300, Ca: 80

80

755u

4678u

4773u

4511u
C1: 58.1%
C2: 17.2%
C3: 15.2%
C4: 9.5%

FT/HR 1000 0
6000 0
600000
UNITS
PPM
0

30 40 50 60 70 80 90 8500 10 20 30 40 50 60 70 80 90 8600 10 20 30

124

135

250 50
6420

MD 8,454'
TVD 6,643.00'
INC 90.43°
AZM 89.90°

MD 8,549'
TVD 6,641.13'
INC 91.82°
AZM 94.78°

ft

6800

·m, vfgr, v calc, rthy,
·d
· blk, sbplty-sbblky, slty
v calc, abnt bent w/
·ag

20% CHK: lt tan - crm, vfgr, v calc, rthy,
mot, sft, sbplty - sbrd
80% MRL: m-dkgy - blk, sbplty-sbblky, slty
-gt tex, firm, brit-fri, v calc, abnt bent w/
dism pyr, abnt fos frag

10% CHK: lt tan - crm, vfgr, v calc, rthy,
mot, sft, sbplty - sbrd
90% MRL: m-dkgy - blk, sbplty-sbblky, slty
-gt tex, firm, brit-fri, v calc, abnt bent w/
dism pyr, abnt fos frag

20% CHK: lt tan - crm, vfgr, v calc, rthy,
mot, sft, sbplty - sbrd
80% MRL: m-dkgy - blk, sbplty-sbblky, slty
-gt tex, firm, brit-fri, v calc, abnt bent w/
dism pyr, abnt fos frag

20% CHK: lt tan - crm, vfgr, v
mot, sft, sbplty - sbrd
80% MRL: m-dkgy - blk, sbplt
-gt tex, firm, brit-fri, v calc, abr
dism pyr, abnt fos frag

MUD WT 9.2/9.2+
VIS 33/33 IN/OUT

417
88
472
4922u
4686u
4620u
C1: 60.4%
C2: 15.2%
C3: 15.1%
C4: 9.3%

FT/HR 1000 0
UNITS 6000 0
PPM 600000 0

40 50 60 70 80 90 8700 10 20 30 40 50 60 70 80 90 8800 10 20 30 40

188
126
250 50
6420

MD 8,644'
TVD 6,639.42'
INC 90.25°
AZM 98.80°

MD 8,739'
TVD 6,640.21'
INC 88.80°
AZM 94.08°

MD 8,834'
TVD 6,642.51'
INC 88.43°
AZM 89.75°

ft
6800

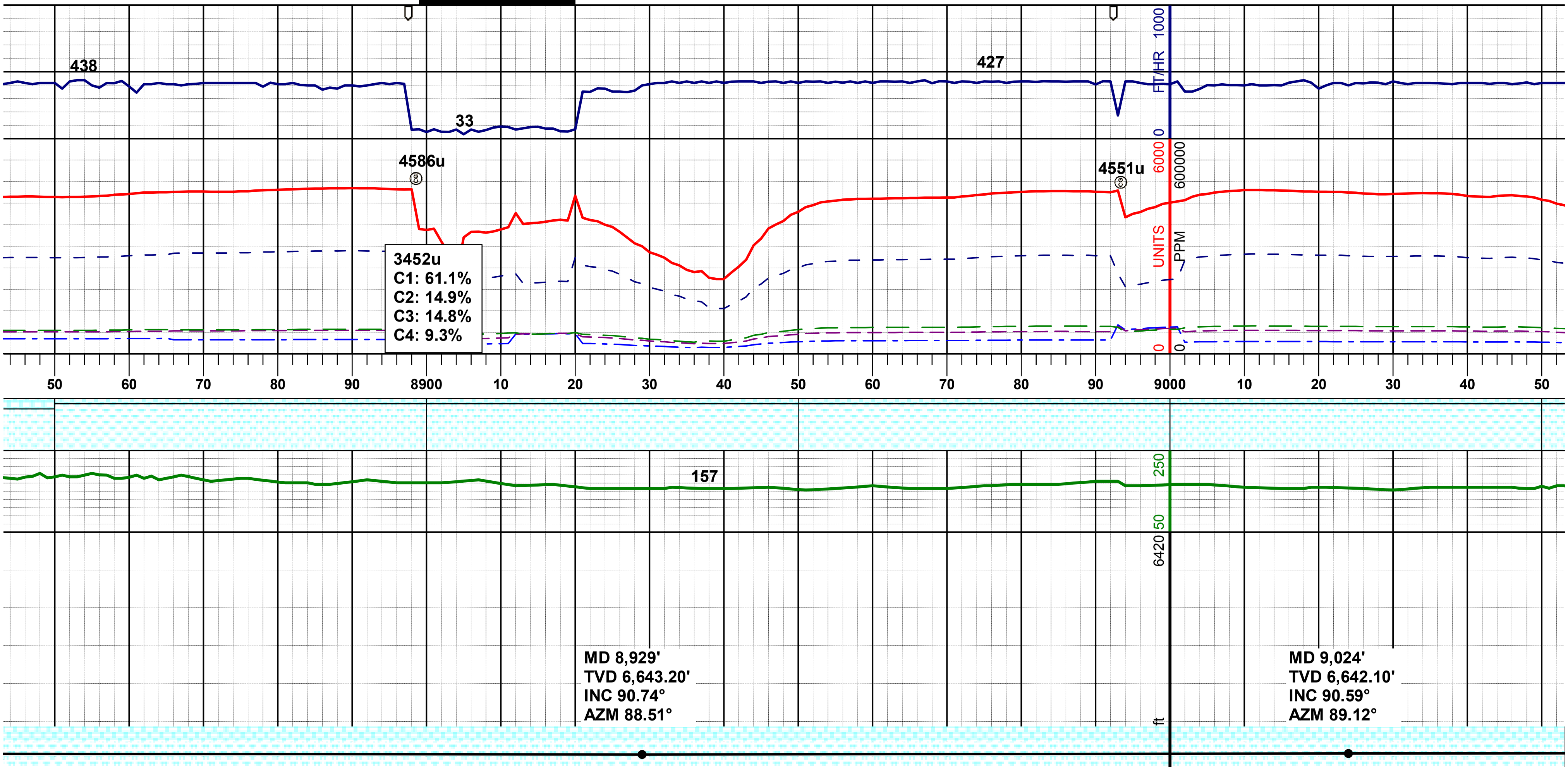
calc, rthy,
y-sbblky, slty
t bent w/

10% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
90% MRL: m-dkgy - blk, sbplty-sbblky, slty -gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt fos frag

10% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
90% MRL: m-dkgy - blk, sbplty-sbblky, slty -gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt fos frag

20% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
80% MRL: m-dkgy - blk, sbplty-sbblky, slty -gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt fos frag

20% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
80% MRL: m-dkgy - blk, sbplty-sbblky, s -gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt fos frag



slty

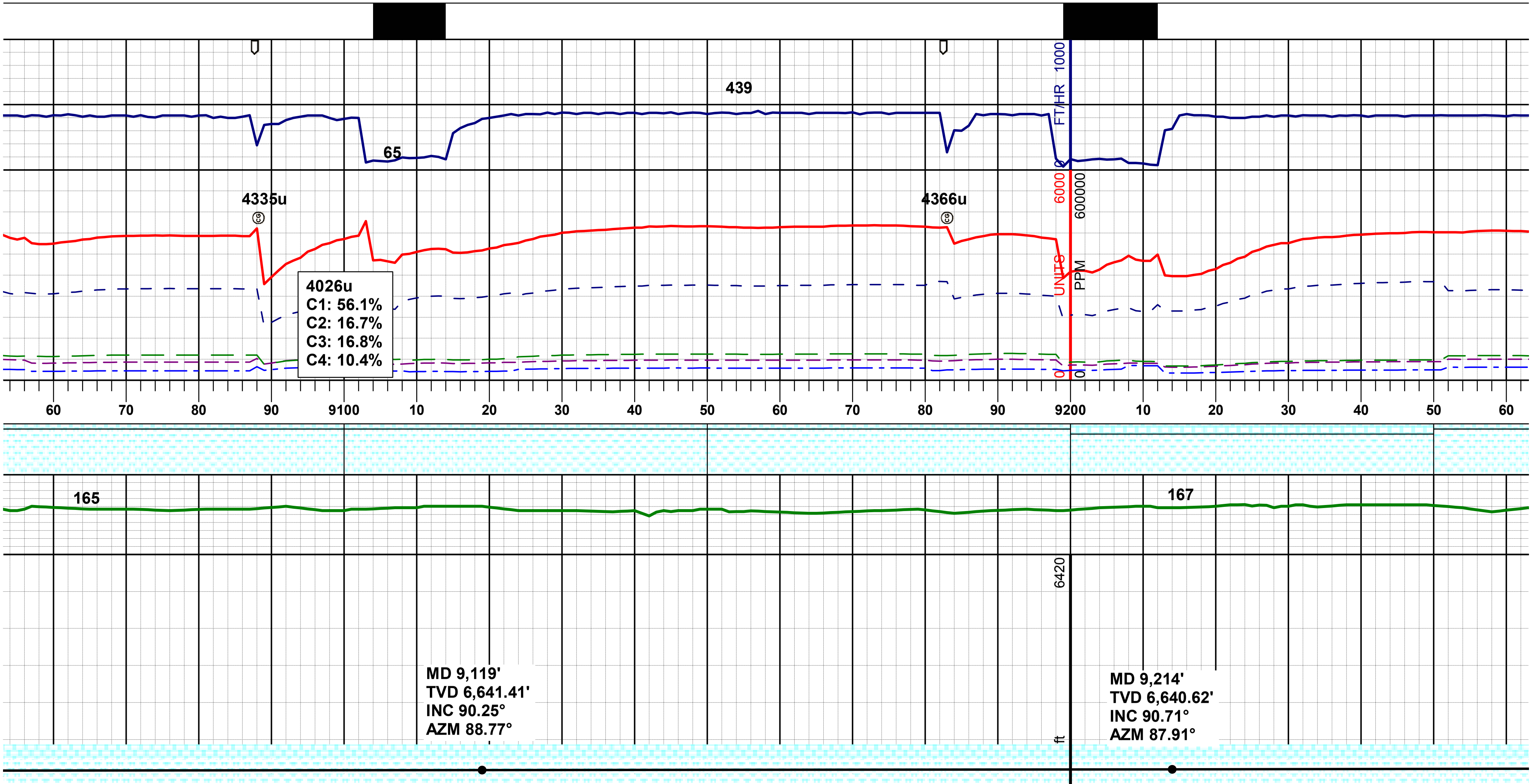
10% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
90% MRL: m-dkgy - blk, sbplty-sbblky, slty -gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt fos frag

10% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
90% MRL: m-dkgy - blk, sbplty-sbblky, slty -gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt fos frag

10% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
90% MRL: m-dkgy - blk, sbplty-sbblky, slty -gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt fos frag

10% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
90% MRL: m-dkgy - blk, sbplty-sbblky, slty -gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt fos frag

Fair



10% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
90% MRL: m-dkgy - blk, sbplty-sbblky, slty -gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt fos frag

10% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
90% MRL: m-dkgy - blk, sbplty-sbblky, slty -gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt fos frag

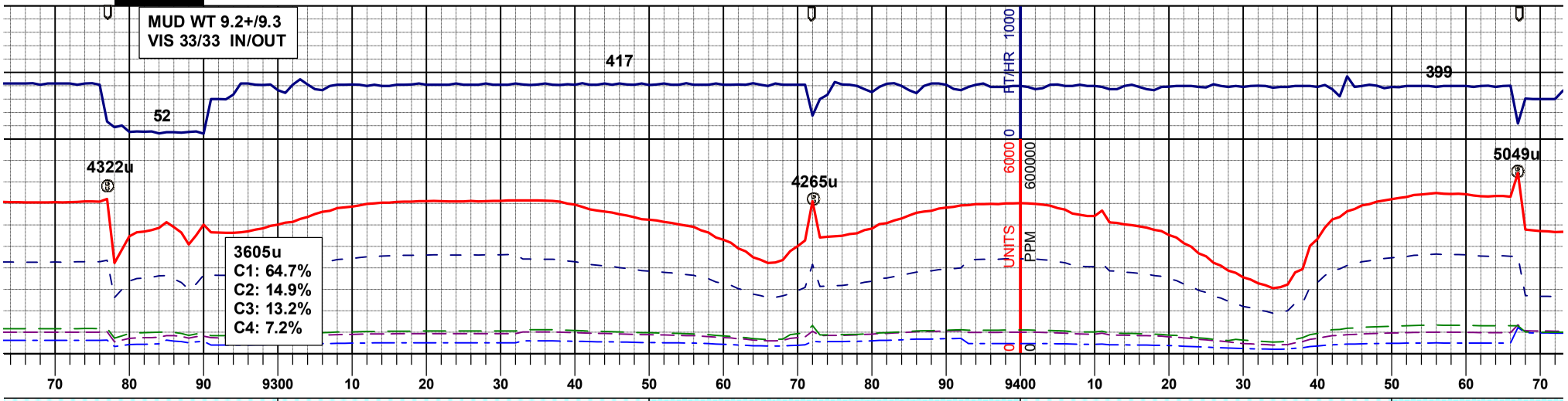
10% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
90% MRL: m-dkgy - blk, sbplty-sbblky, slty -gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt fos frag

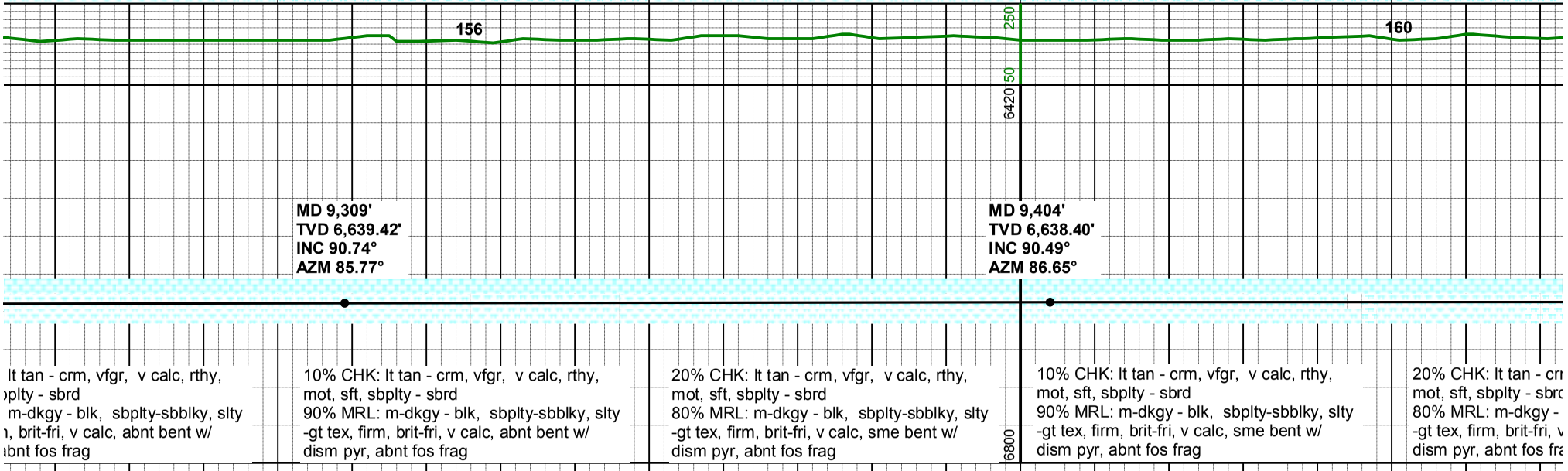
20% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
80% MRL: m-dkgy - blk, sbplty-sbblky, slty -gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt fos frag

10% CHK: mot, sft, sb
90% MRL: -gt tex, firm dism pyr, a

[redacted]

MUD WT 9.2+/9.3
VIS 33/33 IN/OUT





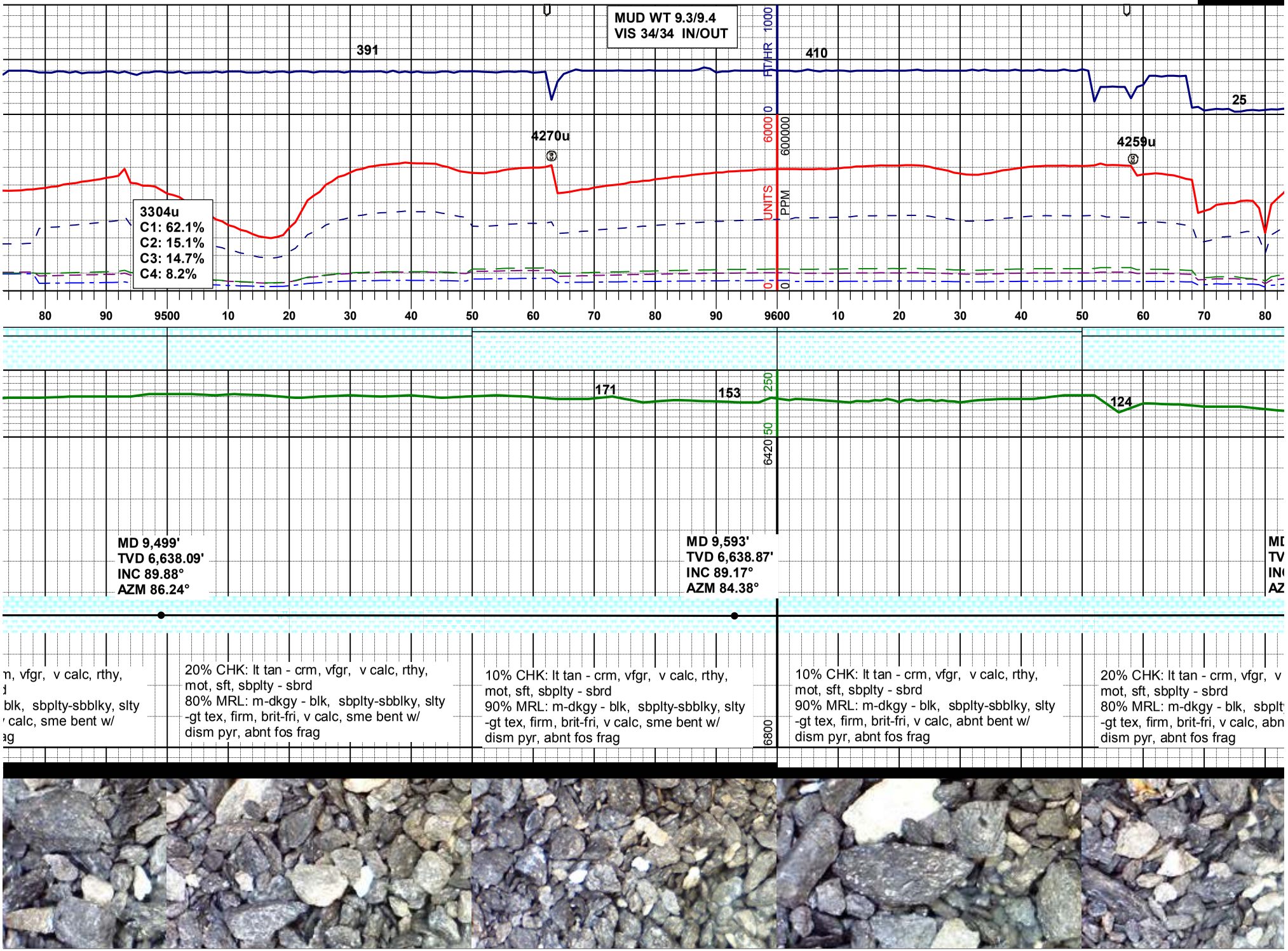
lt tan - crm, vfgr, v calc, rthy,
plty - sbrd
m-dkgy - blk, sbplty-sbblky, slty
, brit-fri, v calc, abnt bent w/
bnt fos frag

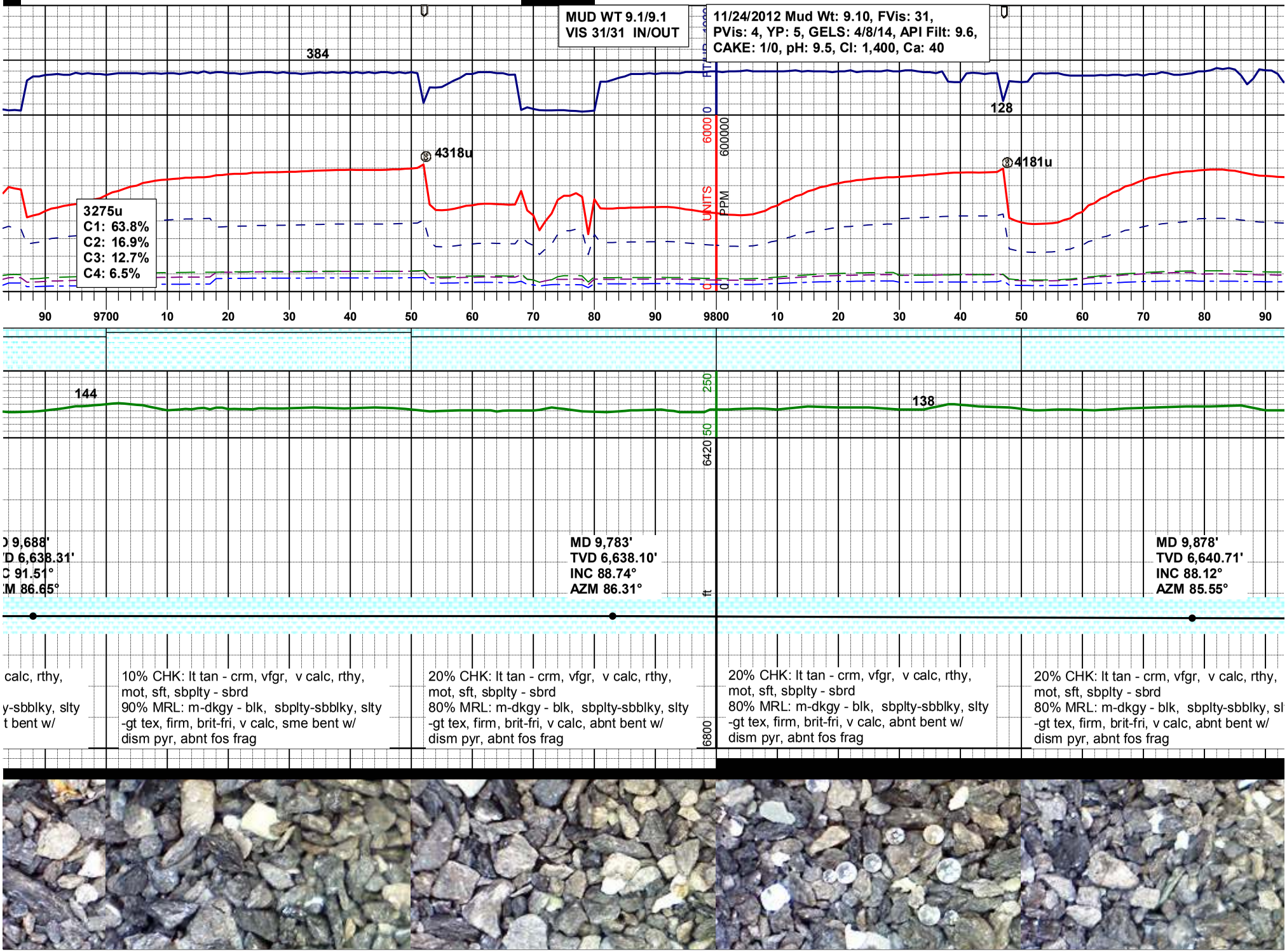
10% CHK: lt tan - crm, vfgr, v calc, rthy,
mot, sft, sbplty - sbrd
90% MRL: m-dkgy - blk, sbplty-sbblky, slty
-gt tex, firm, brit-fri, v calc, abnt bent w/
dism pyr, abnt fos frag

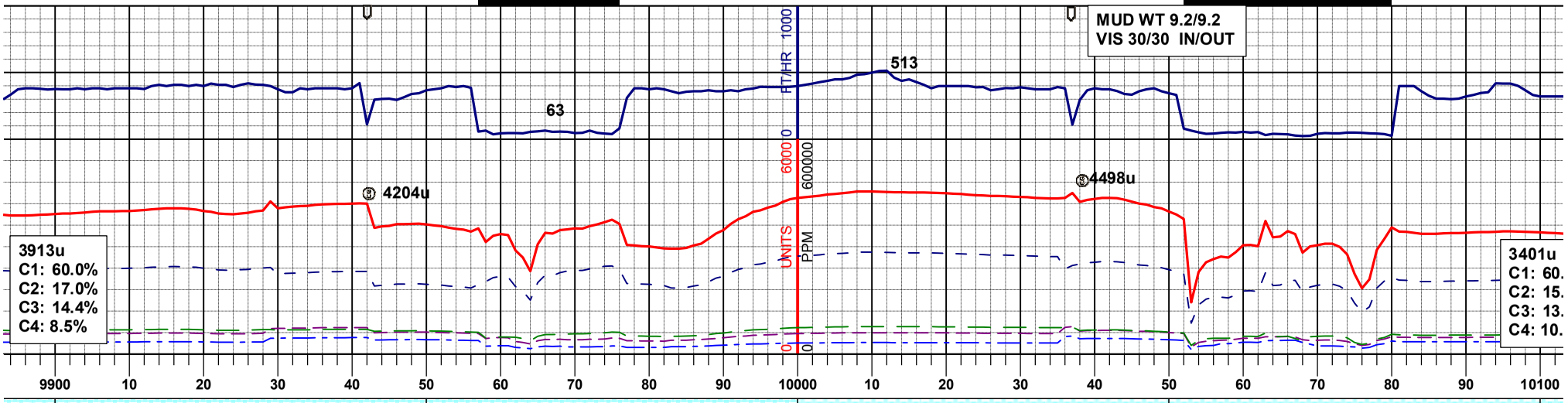
20% CHK: lt tan - crm, vfgr, v calc, rthy,
mot, sft, sbplty - sbrd
80% MRL: m-dkgy - blk, sbplty-sbblky, slty
-gt tex, firm, brit-fri, v calc, sme bent w/
dism pyr, abnt fos frag

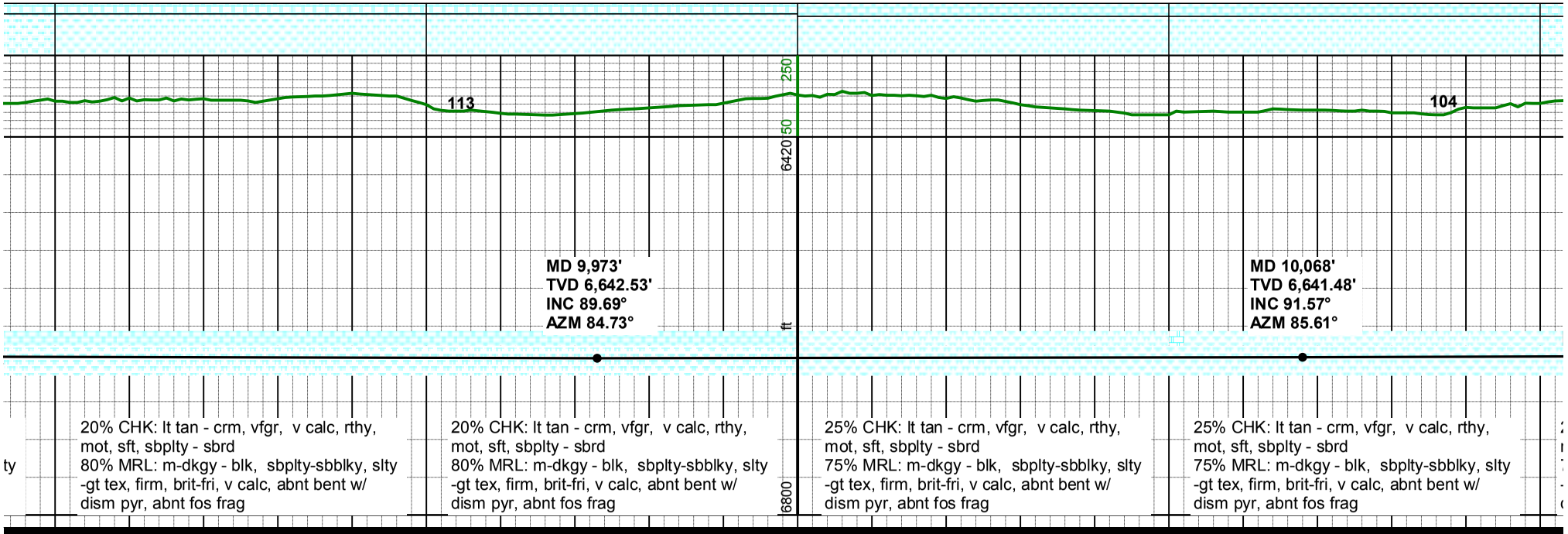
10% CHK: lt tan - crm, vfgr, v calc, rthy,
mot, sft, sbplty - sbrd
90% MRL: m-dkgy - blk, sbplty-sbblky, slty
-gt tex, firm, brit-fri, v calc, sme bent w/
dism pyr, abnt fos frag

20% CHK: lt tan - crm
mot, sft, sbplty - sbrd
80% MRL: m-dkgy -
-gt tex, firm, brit-fri, v
dism pyr, abnt fos fra


MUD WT 9.3/9.4
VIS 34/34 IN/OUT
391
410
25
FT/HR
1000
0
4270u
4259u
6000
600000
UNITS
PPM
0
0
3304u
C1: 62.1%
C2: 15.1%
C3: 14.7%
C4: 8.2%
80
90
9500
10
20
30
40
50
60
70
80
90
9600
10
20
30
40
50
60
70
80
171
153
124
250
50
6420
MD 9,499'
TVD 6,638.09'
INC 89.88°
AZM 86.24°
MD 9,593'
TVD 6,638.87'
INC 89.17°
AZM 84.38°
n, vfgr, v calc, rthy,
blk, sbplty-sbblky, slty
calc, sme bent w/
20% CHK: lt tan - crm, vfgr, v calc, rthy,
mot, sft, sbplty - sbrd
80% MRL: m-dkgy - blk, sbplty-sbblky, slty
-gt tex, firm, brit-fri, v calc, sme bent w/
dism pyr, abnt fos frag
10% CHK: lt tan - crm, vfgr, v calc, rthy,
mot, sft, sbplty - sbrd
90% MRL: m-dkgy - blk, sbplty-sbblky, slty
-gt tex, firm, brit-fri, v calc, sme bent w/
dism pyr, abnt fos frag
6800
10% CHK: lt tan - crm, vfgr, v calc, rthy,
mot, sft, sbplty - sbrd
90% MRL: m-dkgy - blk, sbplty-sbblky, slty
-gt tex, firm, brit-fri, v calc, abnt bent w/
dism pyr, abnt fos frag
20% CHK: lt tan - crm, vfgr, v
mot, sft, sbplty - sbrd
80% MRL: m-dkgy - blk, sbplt
-gt tex, firm, brit-fri, v calc, abn
dism pyr, abnt fos frag


MUD WT 9.1/9.1
VIS 31/31 IN/OUT
11/24/2012 Mud Wt: 9.10, FVis: 31,
PVis: 4, YP: 5, GELS: 4/8/14, API Filt: 9.6,
CAKE: 1/0, pH: 9.5, Cl: 1,400, Ca: 40
384
128
4318u
4181u
3275u
C1: 63.8%
C2: 16.9%
C3: 12.7%
C4: 6.5%
6000
0
600000
0
UNITS
PPM
90
9700
10
20
30
40
50
60
70
80
90
9800
10
20
30
40
50
60
70
80
90
144
138
250
50
6420
ft
MD 9,783'
TVD 6,638.10'
INC 88.74°
AZM 86.31°
MD 9,878'
TVD 6,640.71'
INC 88.12°
AZM 85.55°
6800
calc, rthy,
y-sbblky, slty
t bent w/
10% CHK: lt tan - crm, vfgr, v calc, rthy,
mot, sft, sbplty - sbrd
90% MRL: m-dkgy - blk, sbplty-sbblky, slty
-gt tex, firm, brit-fri, v calc, sme bent w/
dism pyr, abnt fos frag
20% CHK: lt tan - crm, vfgr, v calc, rthy,
mot, sft, sbplty - sbrd
80% MRL: m-dkgy - blk, sbplty-sbblky, slty
-gt tex, firm, brit-fri, v calc, abnt bent w/
dism pyr, abnt fos frag
20% CHK: lt tan - crm, vfgr, v calc, rthy,
mot, sft, sbplty - sbrd
80% MRL: m-dkgy - blk, sbplty-sbblky, slty
-gt tex, firm, brit-fri, v calc, abnt bent w/
dism pyr, abnt fos frag
20% CHK: lt tan - crm, vfgr, v calc, rthy,
mot, sft, sbplty - sbrd
80% MRL: m-dkgy - blk, sbplty-sbblky, sl
-gt tex, firm, brit-fri, v calc, abnt bent w/
dism pyr, abnt fos frag





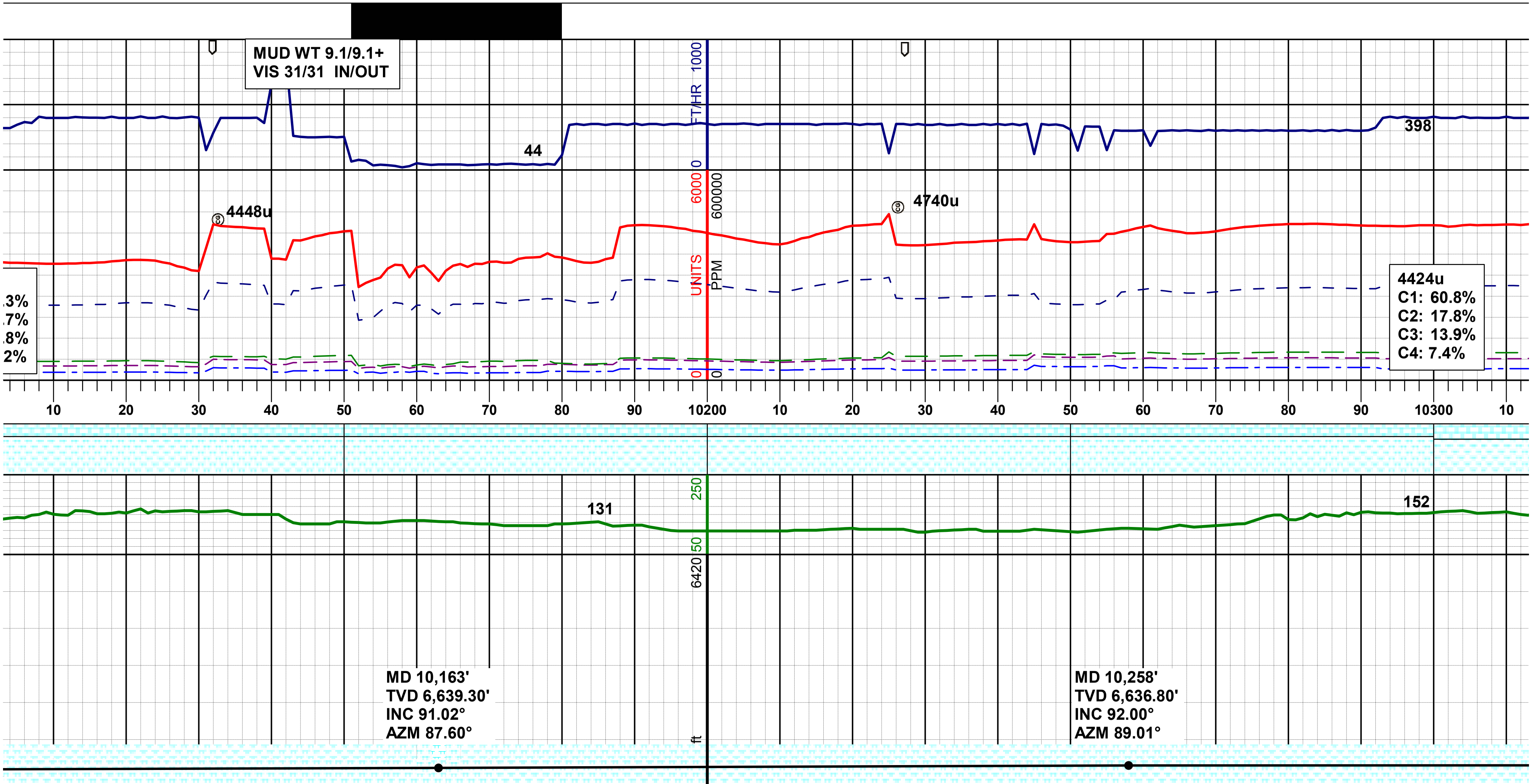
ty

20% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
80% MRL: m-dkgy - blk, sbplty-sbblky, slty -gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt fos frag

20% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
80% MRL: m-dkgy - blk, sbplty-sbblky, slty -gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt fos frag

25% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
75% MRL: m-dkgy - blk, sbplty-sbblky, slty -gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt fos frag

25% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
75% MRL: m-dkgy - blk, sbplty-sbblky, slty -gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt fos frag



25% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
75% MRL: m-dkgy - blk, sbplty-sbblky, slty -gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt fos frag

25% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
75% MRL: m-dkgy - blk, sbplty-sbblky, slty -gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt fos frag

25% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
75% MRL: m-dkgy - blk, sbplty-sbblky, slty -gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt fos frag

25% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
75% MRL: m-dkgy - blk, sbplty-sbblky, slty -gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt fos frag

30% CHK mot, sft, s
70% MRL -gt tex, firr dism pyr,

[redacted] [redacted]

MUD WT 9.1/9.1
VIS 31/31 IN/OUT

MUD WT 9.2/9.2
VIS 31/31 IN/OUT

FT/HR 1000 0

27

4535u

4430u

4413u

UNITS 6000 0

PPM 600000 0

4402u
C1: 62.2%
C2: 16.7%
C3: 13.5%
C4: 7.6%

20 30 40 50 60 70 80 90 10400 10 20 30 40 50 60 70 80 90 10500 10 20

250 50

153

137

6420

MD 10,353'
TVD 6,636.42'
INC 88.46°
AZM 87.14°

MD 10,448'
TVD 6,638.84'
INC 88.61°
AZM 87.51°

ft

6800

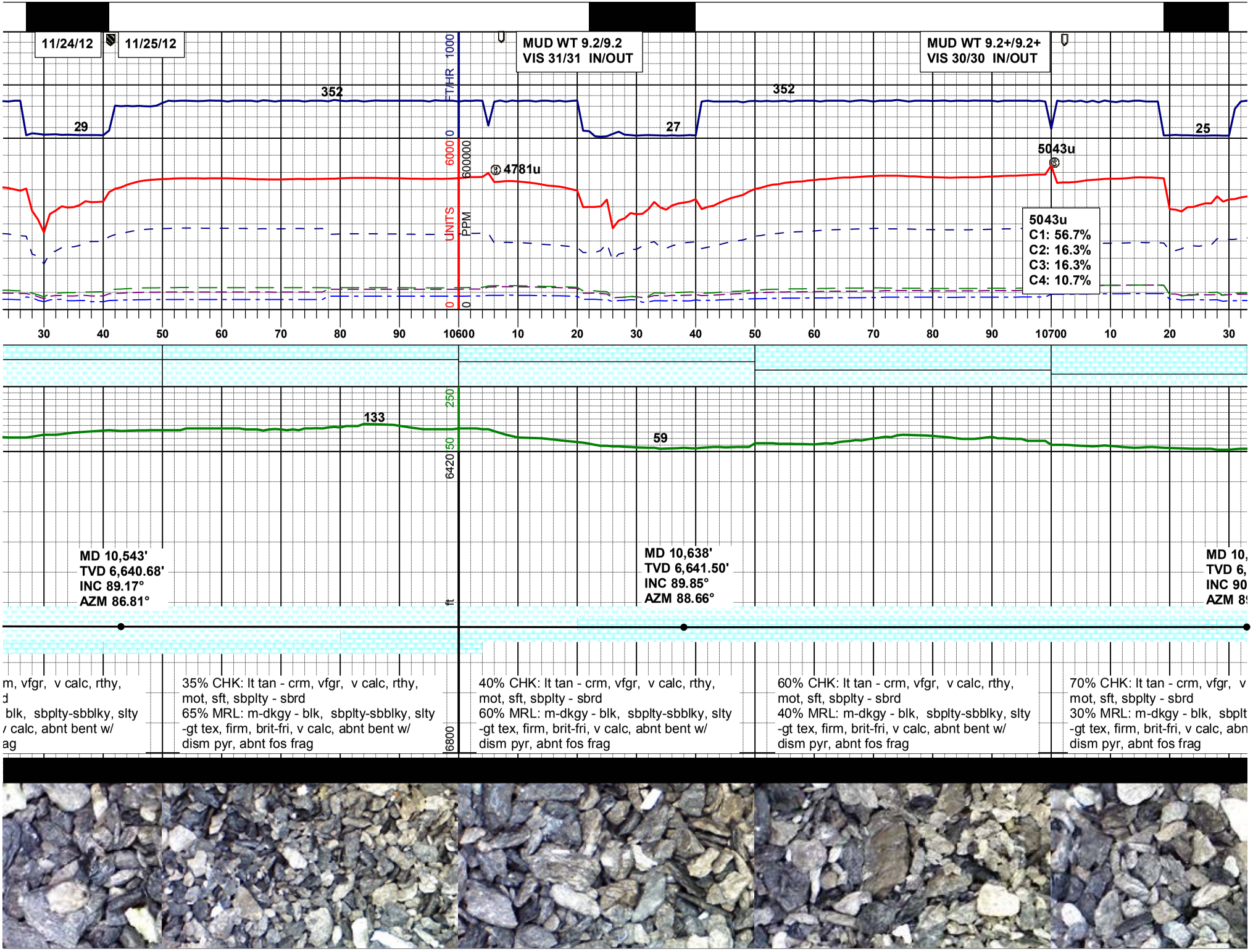
: lt tan - crm, vfgr, v calc, rthy,
bplty - sbrd
: m-dkgy - blk, sbplty-sbblky, slty
n, brit-fri, v calc, abnt bent w/
abnt fos frag

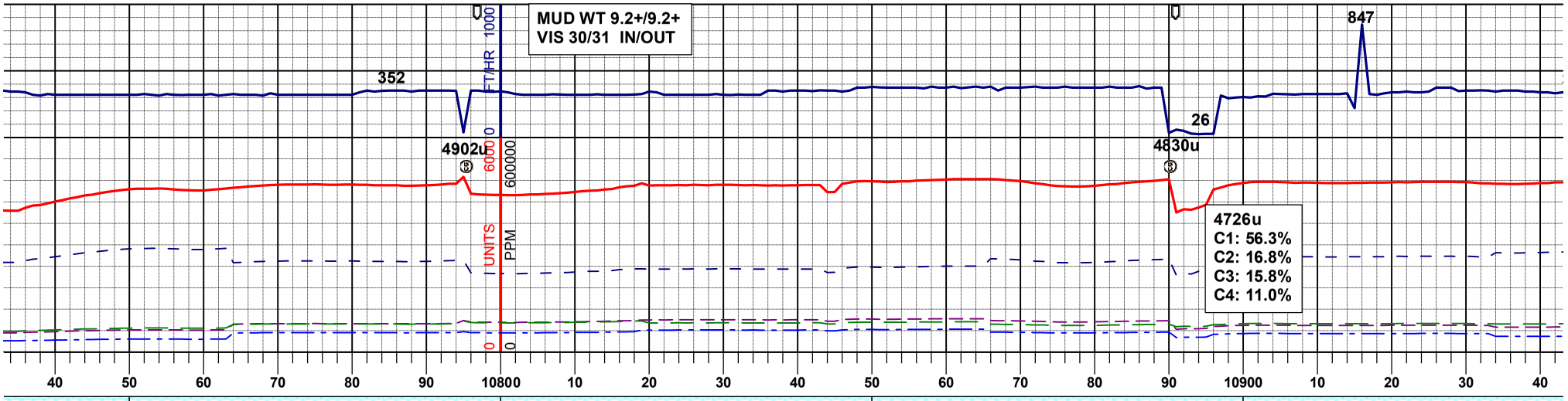
30% CHK: lt tan - crm, vfgr, v calc, rthy,
mot, sft, sbplty - sbrd
70% MRL: m-dkgy - blk, sbplty-sbblky, slty
-gt tex, firm, brit-fri, v calc, abnt bent w/
dism pyr, abnt fos frag

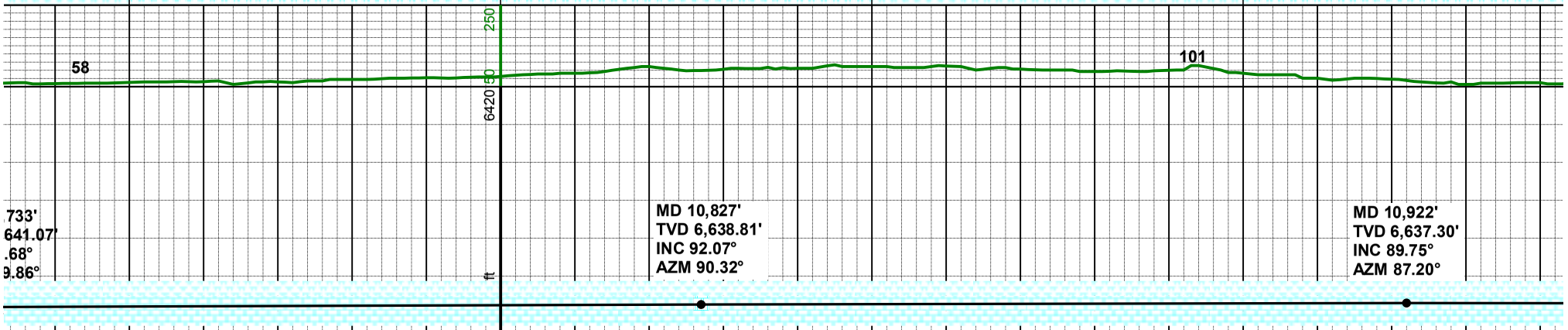
20% CHK: lt tan - crm, vfgr, v calc, rthy,
mot, sft, sbplty - sbrd
80% MRL: m-dkgy - blk, sbplty-sbblky, slty
-gt tex, firm, brit-fri, v calc, abnt bent w/
dism pyr, abnt fos frag

20% CHK: lt tan - crm, vfgr, v calc, rthy,
mot, sft, sbplty - sbrd
80% MRL: m-dkgy - blk, sbplty-sbblky, slty
-gt tex, firm, brit-fri, v calc, abnt bent w/
dism pyr, abnt fos frag

35% CHK: lt tan - cr
mot, sft, sbplty - sbr
65% MRL: m-dkgy -
-gt tex, firm, brit-fri, v
dism pyr, abnt fos fr


11/24/12
11/25/12
MUD WT 9.2/9.2
VIS 31/31 IN/OUT
MUD WT 9.2+/9.2+
VIS 30/30 IN/OUT
FT/HR
1000
0
352
29
27
352
25
6000
0
600000
UNITS
PPM
4781u
5043u
5043u
C1: 56.7%
C2: 16.3%
C3: 16.3%
C4: 10.7%
30
40
50
60
70
80
90
10600
10
20
30
40
50
60
70
80
90
10700
10
20
30
250
50
6420
6800
ft
133
59
MD 10,543'
TVD 6,640.68'
INC 89.17°
AZM 86.81°
MD 10,638'
TVD 6,641.50'
INC 89.85°
AZM 88.66°
m, vfgr, v calc, rthy,
d
blk, sbplty-sbblky, slty
/ calc, abnt bent w/
ag
35% CHK: lt tan - crm, vfgr, v calc, rthy,
mot, sft, sbplty - sbrd
65% MRL: m-dkgy - blk, sbplty-sbblky, slty
-gt tex, firm, brit-fri, v calc, abnt bent w/
dism pyr, abnt fos frag
40% CHK: lt tan - crm, vfgr, v calc, rthy,
mot, sft, sbplty - sbrd
60% MRL: m-dkgy - blk, sbplty-sbblky, slty
-gt tex, firm, brit-fri, v calc, abnt bent w/
dism pyr, abnt fos frag
60% CHK: lt tan - crm, vfgr, v calc, rthy,
mot, sft, sbplty - sbrd
40% MRL: m-dkgy - blk, sbplty-sbblky, slty
-gt tex, firm, brit-fri, v calc, abnt bent w/
dism pyr, abnt fos frag
70% CHK: lt tan - crm, vfgr, v
mot, sft, sbplty - sbrd
30% MRL: m-dkgy - blk, sbplt
-gt tex, firm, brit-fri, v calc, abn
dism pyr, abnt fos frag





calc, rthy,
y-sbblky, slty
t bent w/

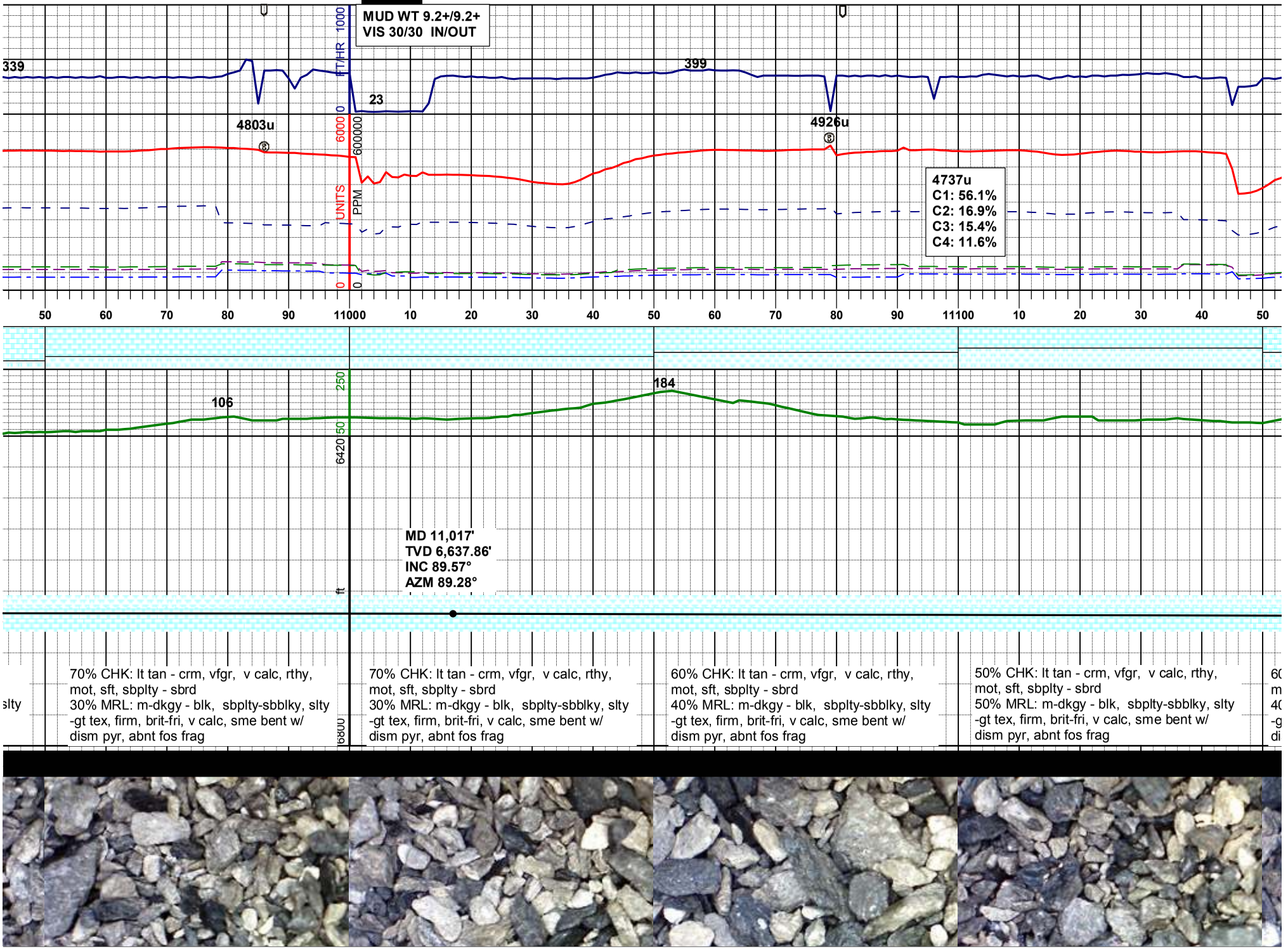
80% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
20% MRL: m-dkgy - blk, sbplty-sbblky, slty -gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt fos frag

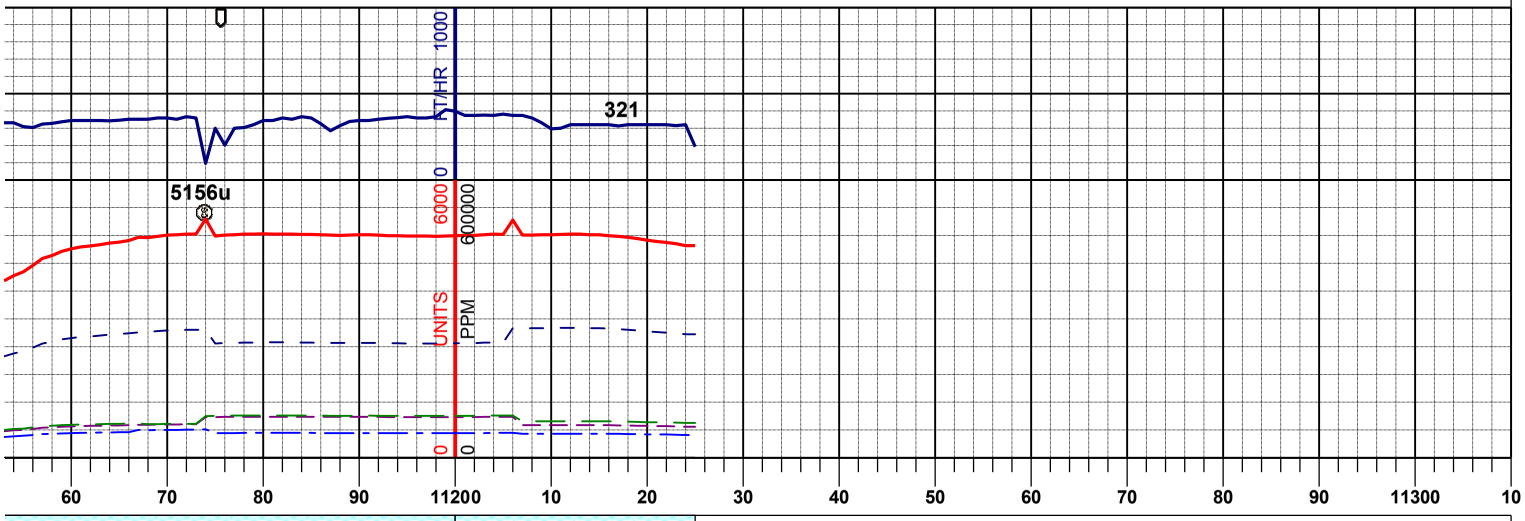
6800

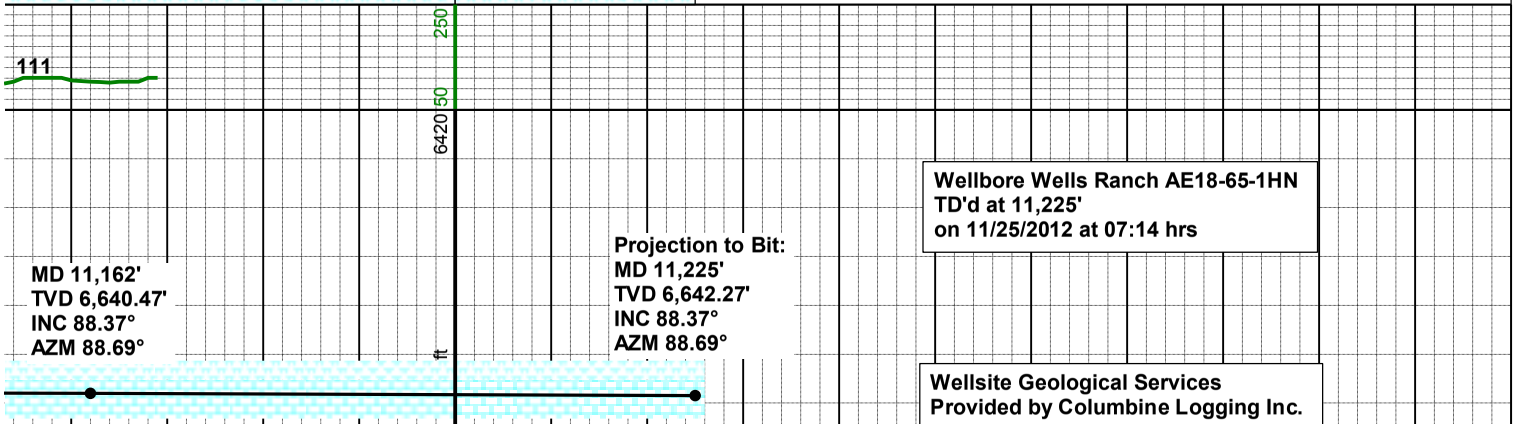
80% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
20% MRL: m-dkgy - blk, sbplty-sbblky, slty -gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt fos frag

70% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
30% MRL: m-dkgy - blk, sbplty-sbblky, slty -gt tex, firm, brit-fri, v calc, abnt bent w/ dism pyr, abnt fos frag

80% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
20% MRL: m-dkgy - blk, sbplty-sbblky, s -gt tex, firm, brit-fri, v calc, sme bent w/ dism pyr, abnt fos frag


MUD WT 9.2+/9.2+
VIS 30/30 IN/OUT
339
399
23
4803u
4926u
4737u
C1: 56.1%
C2: 16.9%
C3: 15.4%
C4: 11.6%
FT/HR
UNITS
PPM
106
184
MD 11,017'
TVD 6,637.86'
INC 89.57°
AZM 89.28°
70% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
30% MRL: m-dkgy - blk, sbplty-sbblky, slty -gt tex, firm, brit-fri, v calc, sme bent w/ dism pyr, abnt fos frag
70% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
30% MRL: m-dkgy - blk, sbplty-sbblky, slty -gt tex, firm, brit-fri, v calc, sme bent w/ dism pyr, abnt fos frag
60% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
40% MRL: m-dkgy - blk, sbplty-sbblky, slty -gt tex, firm, brit-fri, v calc, sme bent w/ dism pyr, abnt fos frag
50% CHK: lt tan - crm, vfgr, v calc, rthy, mot, sft, sbplty - sbrd
50% MRL: m-dkgy - blk, sbplty-sbblky, slty -gt tex, firm, brit-fri, v calc, sme bent w/ dism pyr, abnt fos frag





Wellbore Wells Ranch AE18-65-1HN
TD'd at 11,225'
on 11/25/2012 at 07:14 hrs

Projection to Bit:
MD 11,225'
TVD 6,642.27'
INC 88.37°
AZM 88.69°

MD 11,162'
TVD 6,640.47'
INC 88.37°
AZM 88.69°

Wellsite Geological Services
Provided by Columbine Logging Inc.

)% CHK: lt tan - crm, vfgr, v calc, rthy,
ot, sft, sbplty - sbrd
)% MRL: m-dkgy - blk, sbplty-sbblky, slty
t tex, firm, brit-fri, v calc, sme bent w/
sm pyr, abnt fos frag

60% CHK: lt tan - crm, vfgr, v calc, rthy,
mot, sft, sbplty - sbrd
40% MRL: m-dkgy - blk, sbplty-sbblky, slty
-gt tex, firm, brit-fri, v calc, sme bent w/
dism pyr, abnt fos frag

[redacted]