

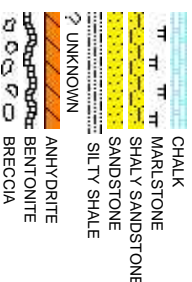


Scale: 5" / 100'  
Measured Depth Log

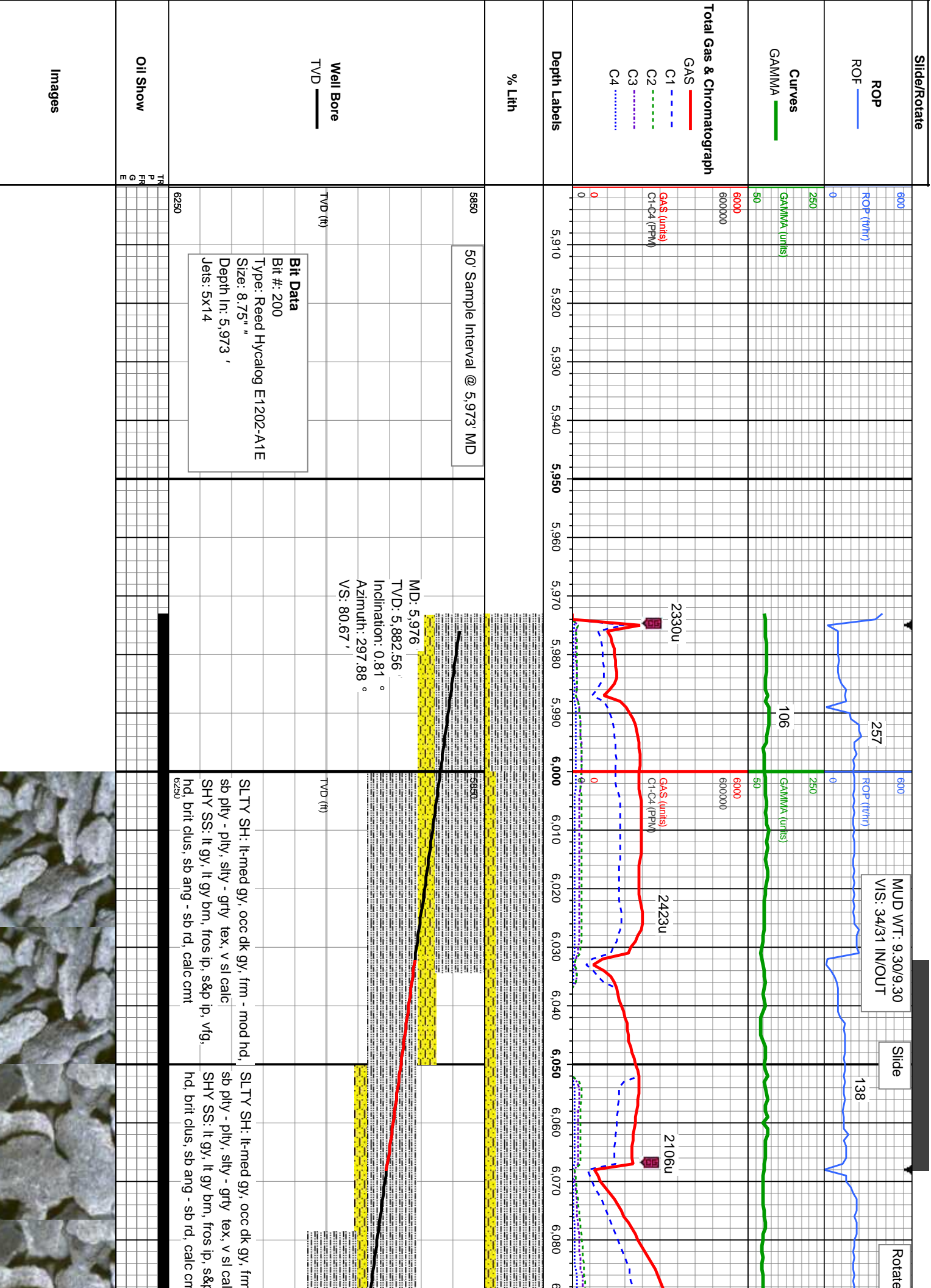
Well Name	Wolfpack B02-66-1HN HORZ		
Location	SEC 2 T5N R64W		
State	COLORADO	County	WELD
Country	USA	Rig Number	H&P 315
API Number	05-123-37328	AFE #	139195
Region	DJ BASIN	Field	WATTENBERG
Spud Date	7/16/2013	Drilling Completed	7/23/2013
Surface Coordinates	NWSW SEC 2 T5N R64W 2115' FSL; 175' FWL		
Bottom Hole Coordinates	SENE SEC2 T5N R64W 660' FEL; 2350' FNL		
Ground Elevation	4625'	K.B. Elevation	4649'
Logged Interval	5973'		
Formation	NIOBRARA B CHALK		
Type of Drilling Fluid	LSND		

Company Noble Energy Inc  
Address 1625 Broadway  
Denver, CO 80202

Name MARK COLE, N  
Company COLUMBINE LOGGING  
Address 2385 S Lipan St  
Denver, CO 80202

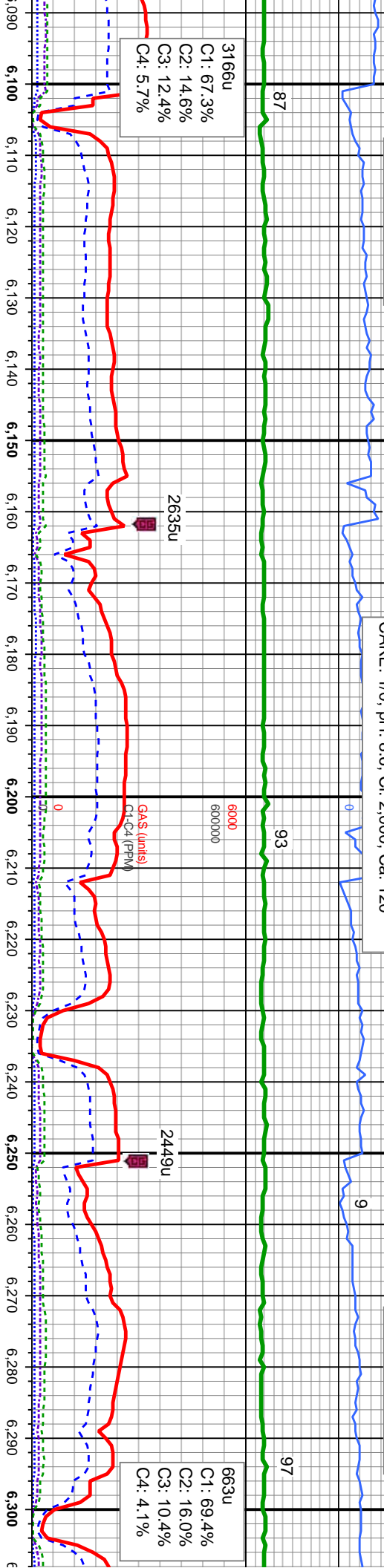








MUD WT: 9.65/9.75  
VIS: 34/33 IN/OUT



MD: 6,108  
TVD: 6,014.44  
Inclination: 4.53 °  
Azimuth: 88.21 °  
VS: 85.09

MD: 6,156 '  
TVD: 6,062.08 '  
Inclination: 9.16 °  
Azimuth: 84.25 °  
VS: 90.77 '

© 2007 Schlumberger

MD: 6,203  
TVD: 6,108.28  
Inclination: 12.07 °  
Azimuth: 86.1 °  
VS: 99.36'

MD: 6,251  
TVD: 6,154.94  
Inclination: 15 °  
Azimuth: 93.38 °  
VS: 110.34 '

MD: 6,298  
TVD: 6,199.95  
Inclination: 18.44  
Azimuth: 90.25 °  
VS: 123.51'

SLTY SH: lt-med gy, gy brn, occ dk gy, frm -  
mod hd, sb pily - pily, stly - grty tex, v sl cal  
SHY SS: lt gy, lt gy brn, fros ip, s&p ip, vfg,  
hd, brit clus, sb ang - sb rd, calc cmt

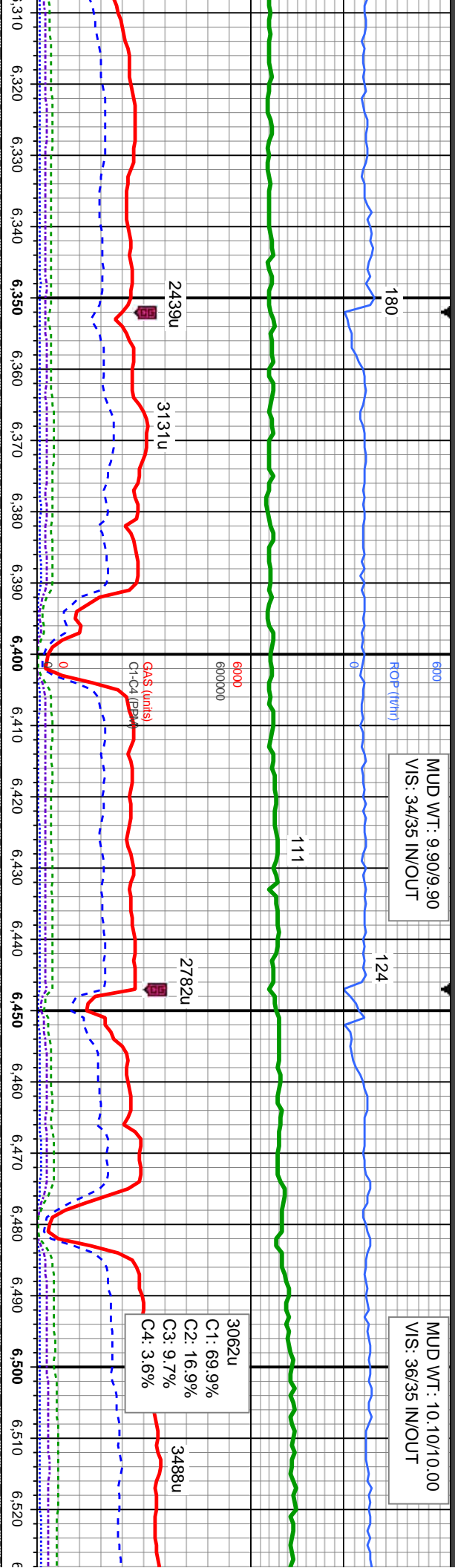
SLTY SH: lt-med gy, gy brn, occ dk gy, frm -  
mod hd, sb pty - pty, silty - grty tex, v sl calc  
SHY SS: lt gy brn, fros ip, s&p ip, vfg, hd  
brit clus, sb ang - sb rd, calc cnt

SLTY SH: lt-med gy, gy brn, occ dk gy, frm  
mod hd, sb pily - pily, silty - grty tex, v sl cal  
SHY SS: lt gy, lt gy brn, fros ip, s&p ip, vfg,  
hd, brit clus, sb ang - sb rd, calc cnt  
from

SLTY SH: lt-med gy, gy brn, occ dk gy, frm mod hd, sb pty - pty, silty - grty tex, v sl cal SHY SS: lt gy, lt gy brn, fros ip, s&p ip, vfg, hd, brit clus, sb ang - sb rd, calc cnt

SLTY  
mod h  
SHY S  
hd, bri





<<Scale Change>>

25' Sample Interval @ 6,500' MD

MD: 6,346  
TVD: 6,244.98  
Inclination: 22.06 °  
Azimuth: 91.43 °  
VS: 139.73'

MD: 6,393  
TVD: 6,288.01  
Inclination: 25.3 °  
Azimuth: 94.96 °  
VS: 157.98'

MD: 6,441  
TVD: 6,330.59  
Inclination: 29.66 °  
Azimuth: 97.15 °  
VS: 179.09'

MD: 6,488  
TVD: 6,370.83  
Inclination: 32.53 °  
Azimuth: 96.05 °  
VS: 202.18'

SLT SH: lt-med gy, gy brn, occ dk gy, frm -  
d, sb pily - pily, stly - grty tex, v sl calc  
SS: lt gy, lt gy brn, fros ip, s&p ip, vfg,  
clus, sb ang - sb rd, calc cmt

SLTY SH: lt-med gy, gy brn, occ dk gy, frm -  
mod hd, sb pily - pily, stly - grty tex, v sl calc  
SHY SS: lt gy, lt gy brn, fros ip, s&p ip, vfg,  
hd, brit clus, sb ang - sb rd, calc cmt

SLTY SH: lt-med gy, gy brn, occ dk gy, frm -  
mod hd, sb pily - pily, stly - grty tex, v sl calc  
SHY SS: lt gy, lt gy brn, fros ip, s&p ip, vfg,  
hd, brit clus, sb ang - sb rd, calc cmt

SLTY SH: lt-med gy, gy brn, occ dk gy, frm -  
mod hd, sb pily - pily, stly - grty tex, v sl calc  
SHY SS: lt gy, lt gy brn, fros ip, s&p ip, vfg,  
hd, brit clus, sb ang - sb rd, calc cmt

SLTY SH: lt-med gy, gy l  
mod hd, sb pily - pily, stly  
calc





MUD WT: 10.20/10.30  
VIS: 35/34 IN/OUT

MUD WT: 10.50/10.40  
VIS: 35/36 IN/OUT

07/18/2013

07/19/2013

ROP (ft/hr)

157

MINDEPTH

163

202

225

194

153

6000  
6000000

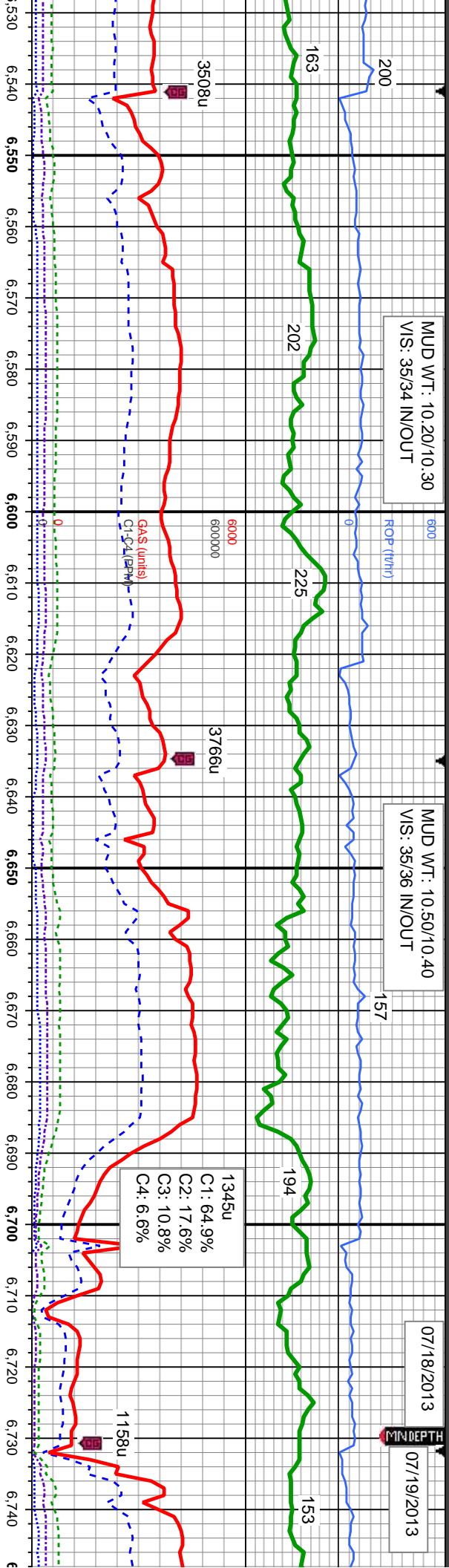
1345u  
C1: 64.9%  
C2: 17.6%  
C3: 10.8%  
C4: 6.6%

1158u

3508u

3766u

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



Sharon Springs Marker @  
6,605' MD: 6,463' TVD

Niobrara Top @  
6,635' MD: 6,484' TVD

Nio A Chalk Top @  
6,657' MD: 6,499' TVD

Nio A Marl Top @  
6,688' MD: 6,519' TVD

<<Scale Change>>

MD: 6,536  
TVD: 6,410.31  
Inclination: 36.77 °  
Azimuth: 97.84 °  
VS: 228.07'

MD: 6,583  
TVD: 6,446.86  
Inclination: 41.09 °  
Azimuth: 97.95 °  
VS: 255.93'

MD: 6,631  
TVD: 6,481.57  
Inclination: 46.25 °  
Azimuth: 98.56 °  
VS: 287.13'

MD: 6,677  
TVD: 6,511.94  
Inclination: 51.09 °  
Azimuth: 96.11 °  
VS: 319.83'

MD: 6,725  
TVD: 6,540.26  
Inclination: 56.55 °  
Azimuth: 95.25 °  
VS: 356.85'

SLTY SH: lt-med gy, frm -  
mod hd, sb pty - pty, stly - grty tex, v sl  
abt bent

SLTY SH: dk gy, blk, mod hd - hd, sb pty -  
pty, stly - gt tex, incr calc  
CHK: lt - med gy, gy brn, mot, lam, stf - frm,  
sb pty - sb blk, rthy tex, v calc  
MRL: lt - med gy, sme blk, stf - mod hd, sb  
pty - pty, stly - grty tex, abnt bent

CHK: lt - med gy, crm, speckl wi wh, mot,  
lam, stf - frm, sb pty - sb blk, rthy tex  
MRL: lt - med gy, sme blk, stf - mod hd, sb  
pty - pty, stly - grty tex, abnt bent, occ fos  
frag, v calc

MRL: lt - med gy, sme blk, stf - mod hd, sb  
pty - pty, stly - grty tex, abnt bent, occ fos  
frag, v calc  
CHK: lt - med gy, crm, speckl wi wh, mot,  
lam, stf - frm, sb pty - sb blk, rthy tex







D WT: 10.60/10.60  
: 34/34 IN/OUT

07/19/2013

07/20/2013

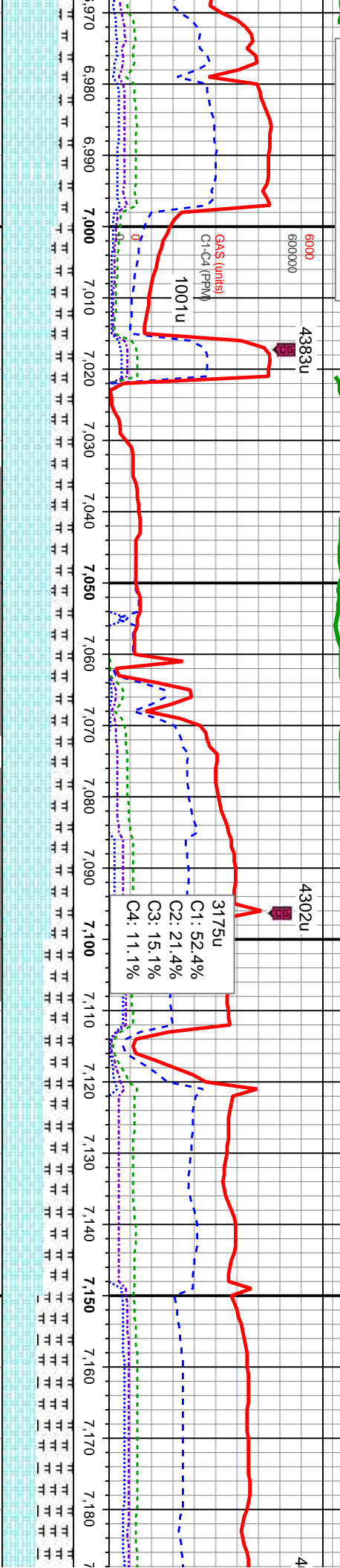
07/21/2013, Mud Wt: 10.40, FVs: 34  
PVs: 10, YP: 6, GELS: 7/13/21, API Fil: 10.5  
CAKE: 1/0, pH: 9.3, CI: 2.000, Ca: 120

MUD WT: 9.40/9.60  
VIS: 32/31 IN/OUT

ROP (t/hr)

MINDEPTH

<<No Gamma Inside Casing>>



TOOH @ 7.021 MD  
to run 7" casing

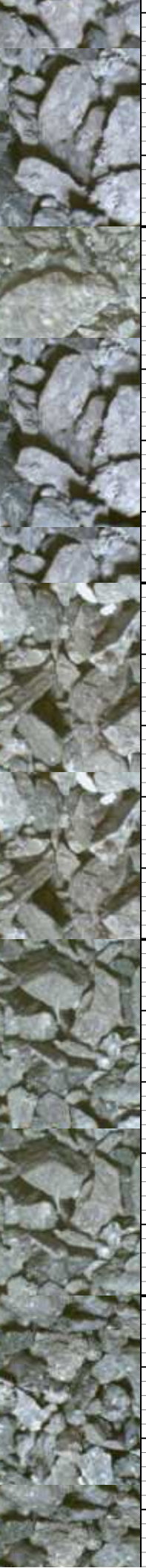
50' Sample Interval @ 7.050 MD

**Bit Data**  
Bit #: 300  
Type: PDC Security: MMMD54  
Size: 6.13"  
Depth In: 7.021'  
Jets: 5X11

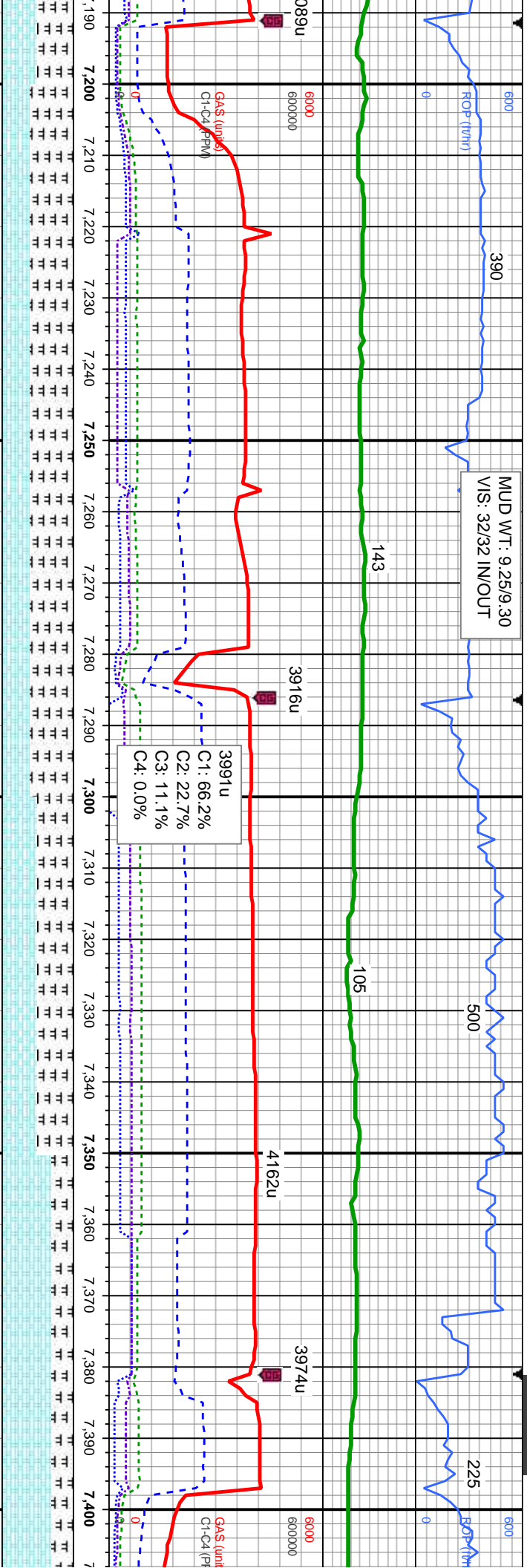
MD: 7.127  
TV D: 6.629.97  
Inclination: 89.45°  
Azimuth: 86.91°  
VS: 735.25'

TV D (ft)

cmr, speckl wi wh, mot, pty - sb blk, rthy tex	70% CHK: It - med gy, crm, speckl wi wh, mot, lam, sft - frm, sb pty - sb blk, rthy tex	70% CHK: It - med gy, crm, speckl wi wh, mot, lam, frm - mod hd, sb pty - sb blk, rthy tex	60% CHK: It - med gy, crm, speckl wi wh, mot, lam, frm - mod hd, sb pty - sb blk, rthy, v calc	50% CHK: It - med gy, crm, speckl wi wh, mot, lam, frm - mod hd, sb pty - sb blk, rthy, v calc
sme blk, sft - mod hd, sb gtry tex, tr bent, occ fos frag, v fos frag, v calc	30% MRL: It - med gy, sme blk, sft - mod hd, sb pty - pty, silty - gtry tex, tr bent, occ fos frag, v calc	30% MRL: It - med gy, sme blk, mod hd - hd, brit, pty - sb blk, silty - gtry tex, v calc, occ fos frag	40% MRL: It - med gy, sme blk, mod hd - hd, brit, sb pty - sb blk, gtry tex, occ fos	50% MRL: It - med gy, sme blk, mod hd, brit, sb pty - sb blk, gtry tex, v calc





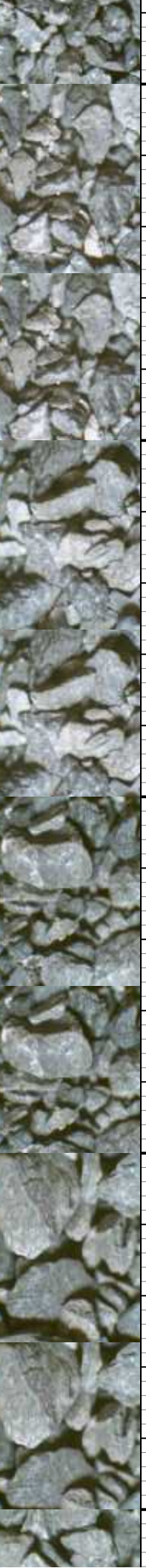


MD: 7,222'  
TVD: 6,630.33'  
Inclination: 90.12°  
Azimuth: 87.17°  
VS: 829.22'

3991u  
C1: 66.2%  
C2: 22.7%  
C3: 11.1%  
C4: 0.0%

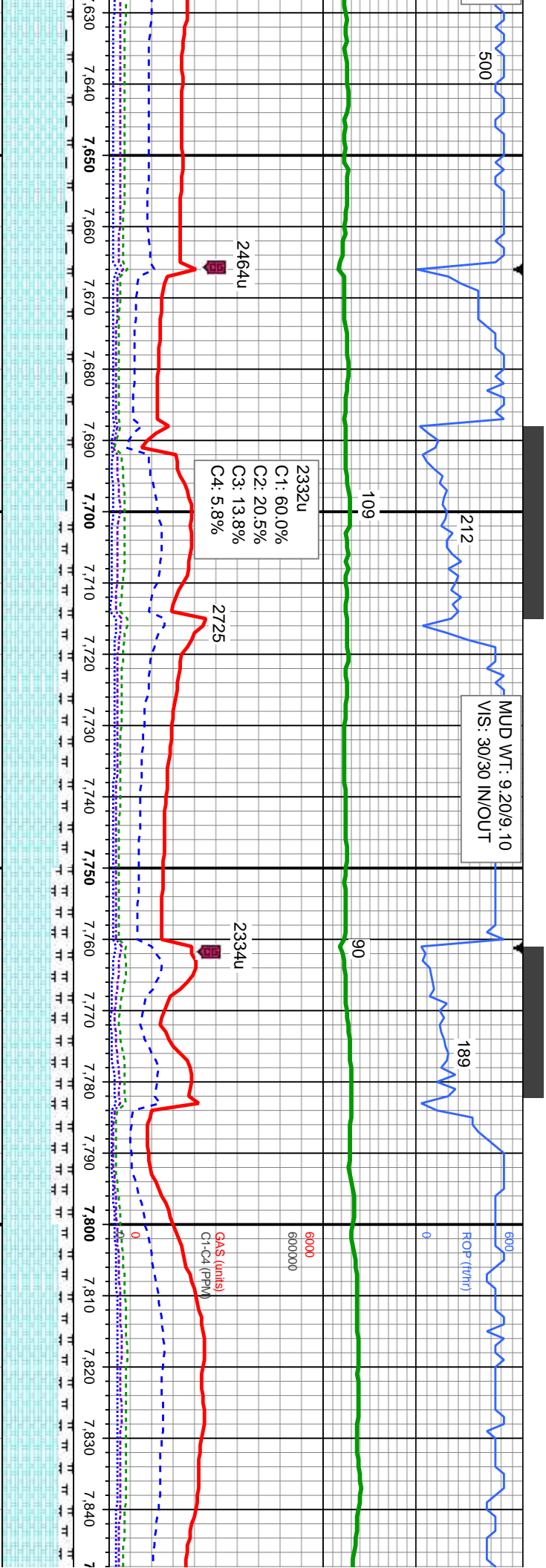
MD: 7,317'  
TVD: 6,629.28'  
Inclination: 91.14°  
Azimuth: 88.99°  
VS: 922.9'

6400	MD: 7,222' TVD: 6,630.33' Inclination: 90.12° Azimuth: 87.17° VS: 829.22'	6400	MD: 7,317' TVD: 6,629.28' Inclination: 91.14° Azimuth: 88.99° VS: 922.9'	6400	MD: 7,317' TVD: 6,629.28' Inclination: 91.14° Azimuth: 88.99° VS: 922.9'	6400	MD: 7,317' TVD: 6,629.28' Inclination: 91.14° Azimuth: 88.99° VS: 922.9'	6400	MD: 7,317' TVD: 6,629.28' Inclination: 91.14° Azimuth: 88.99° VS: 922.9'
6400	MD: 7,222' TVD: 6,630.33' Inclination: 90.12° Azimuth: 87.17° VS: 829.22'	6400	MD: 7,317' TVD: 6,629.28' Inclination: 91.14° Azimuth: 88.99° VS: 922.9'	6400	MD: 7,317' TVD: 6,629.28' Inclination: 91.14° Azimuth: 88.99° VS: 922.9'	6400	MD: 7,317' TVD: 6,629.28' Inclination: 91.14° Azimuth: 88.99° VS: 922.9'	6400	MD: 7,317' TVD: 6,629.28' Inclination: 91.14° Azimuth: 88.99° VS: 922.9'
6400	MD: 7,222' TVD: 6,630.33' Inclination: 90.12° Azimuth: 87.17° VS: 829.22'	6400	MD: 7,317' TVD: 6,629.28' Inclination: 91.14° Azimuth: 88.99° VS: 922.9'	6400	MD: 7,317' TVD: 6,629.28' Inclination: 91.14° Azimuth: 88.99° VS: 922.9'	6400	MD: 7,317' TVD: 6,629.28' Inclination: 91.14° Azimuth: 88.99° VS: 922.9'	6400	MD: 7,317' TVD: 6,629.28' Inclination: 91.14° Azimuth: 88.99° VS: 922.9'
6400	MD: 7,222' TVD: 6,630.33' Inclination: 90.12° Azimuth: 87.17° VS: 829.22'	6400	MD: 7,317' TVD: 6,629.28' Inclination: 91.14° Azimuth: 88.99° VS: 922.9'	6400	MD: 7,317' TVD: 6,629.28' Inclination: 91.14° Azimuth: 88.99° VS: 922.9'	6400	MD: 7,317' TVD: 6,629.28' Inclination: 91.14° Azimuth: 88.99° VS: 922.9'	6400	MD: 7,317' TVD: 6,629.28' Inclination: 91.14° Azimuth: 88.99° VS: 922.9'

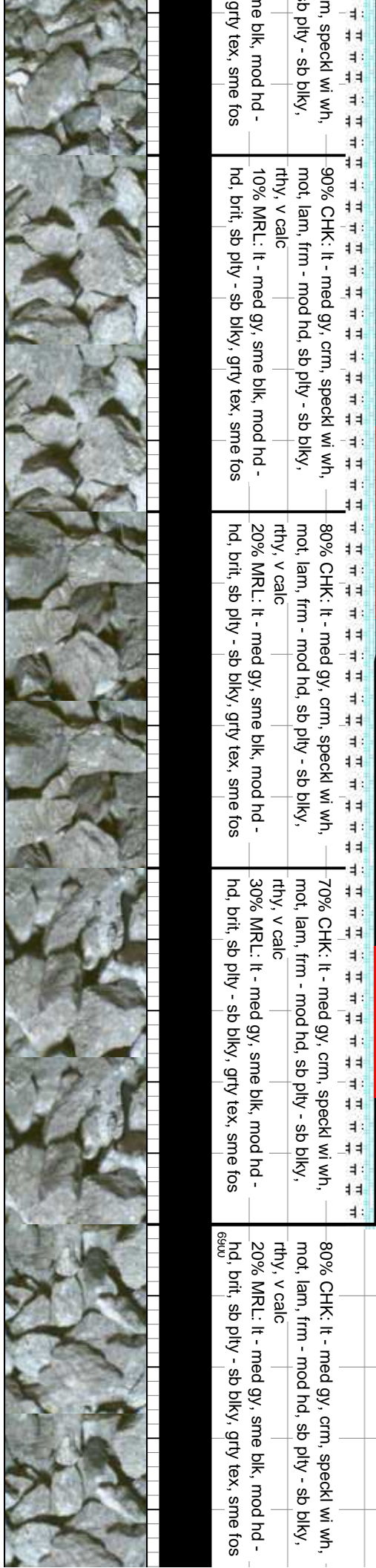






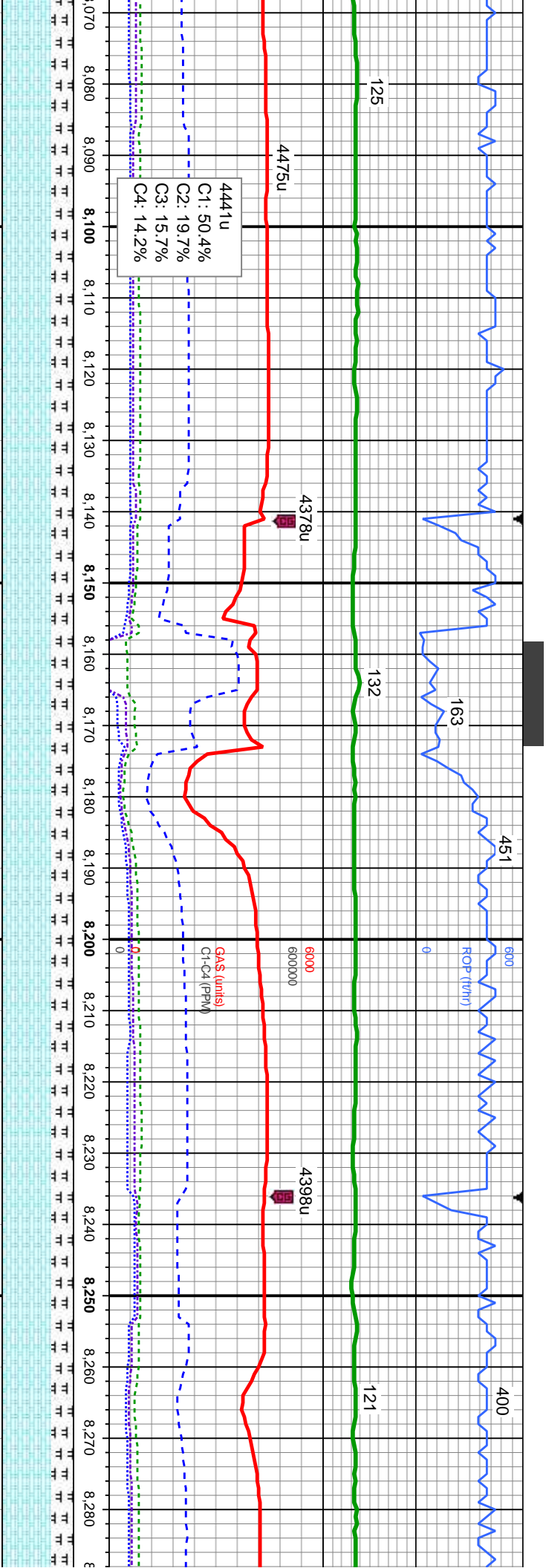


MD: 7.697 TVD: 6.627.9 Inclination: 89.48 ° Azimuth: 88.32 ° VS: 1,296.69'		MD: 7.792 TVD: 6.628.89 Inclination: 89.32 ° Azimuth: 86.09 ° VS: 1,390.61'	
ne blk, mod hd -	90% CHK: It - med gy, crm, speckl wi wh, mot, lam, frm - mod hd, sb pily - sb blk, rthy, v calc	80% CHK: It - med gy, crm, speckl wi wh, mot, lam, frm - mod hd, sb pily - sb blk, rthy, v calc	80% CHK: It - med gy, crm, speckl wi wh, mot, lam, frm - mod hd, sb pily - sb blk, rthy, v calc
gry tex, sme fos	10% MRL: It - med gy, sme blk, mod hd - hd, brit, sb pily - sb blk, gry tex, sme fos	20% MRL: It - med gy, sme blk, mod hd - hd, brit, sb pily - sb blk, gry tex, sme fos	30% MRL: It - med gy, sme blk, mod hd - hd, brit, sb pily - sb blk, gry tex, sme fos



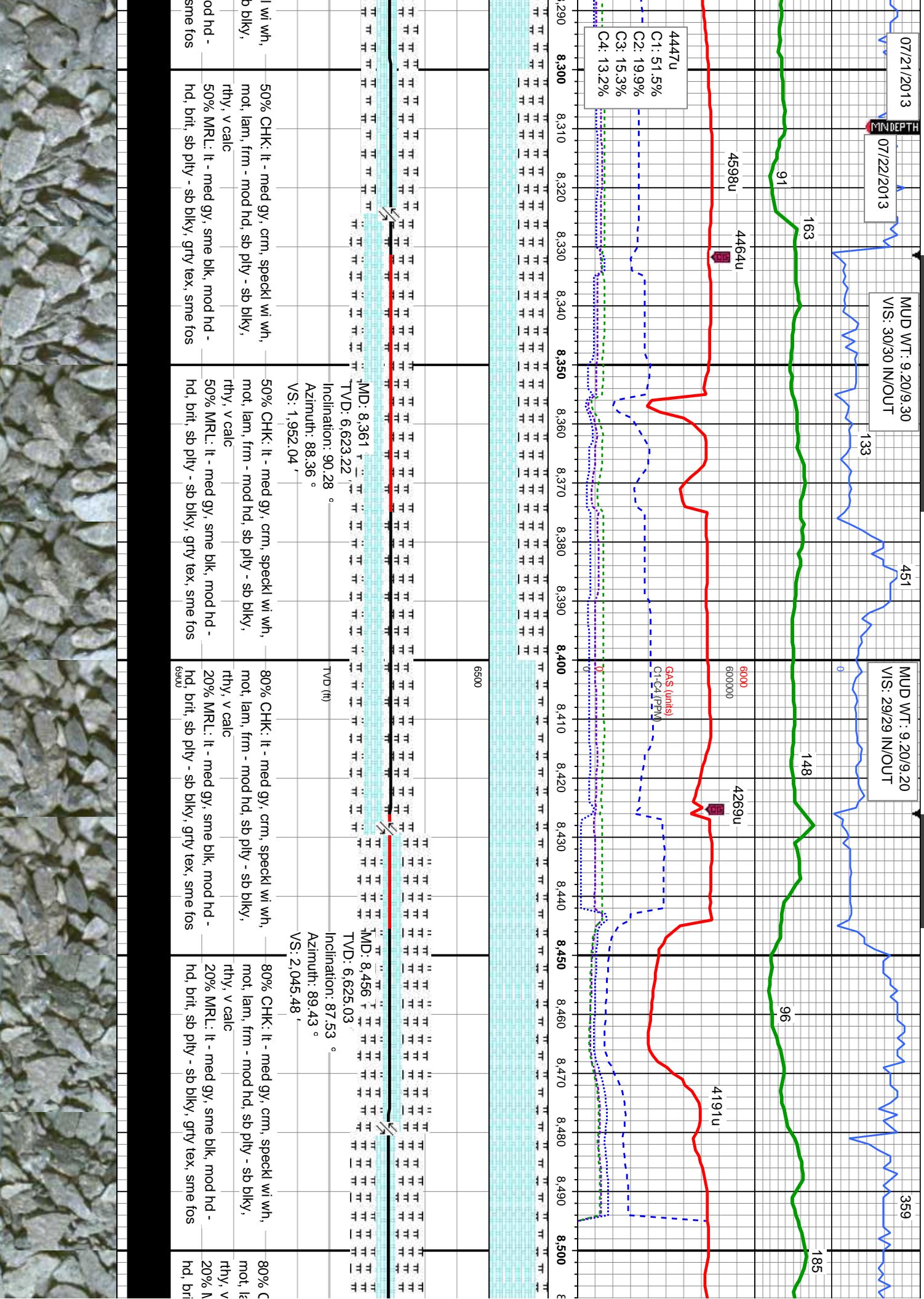




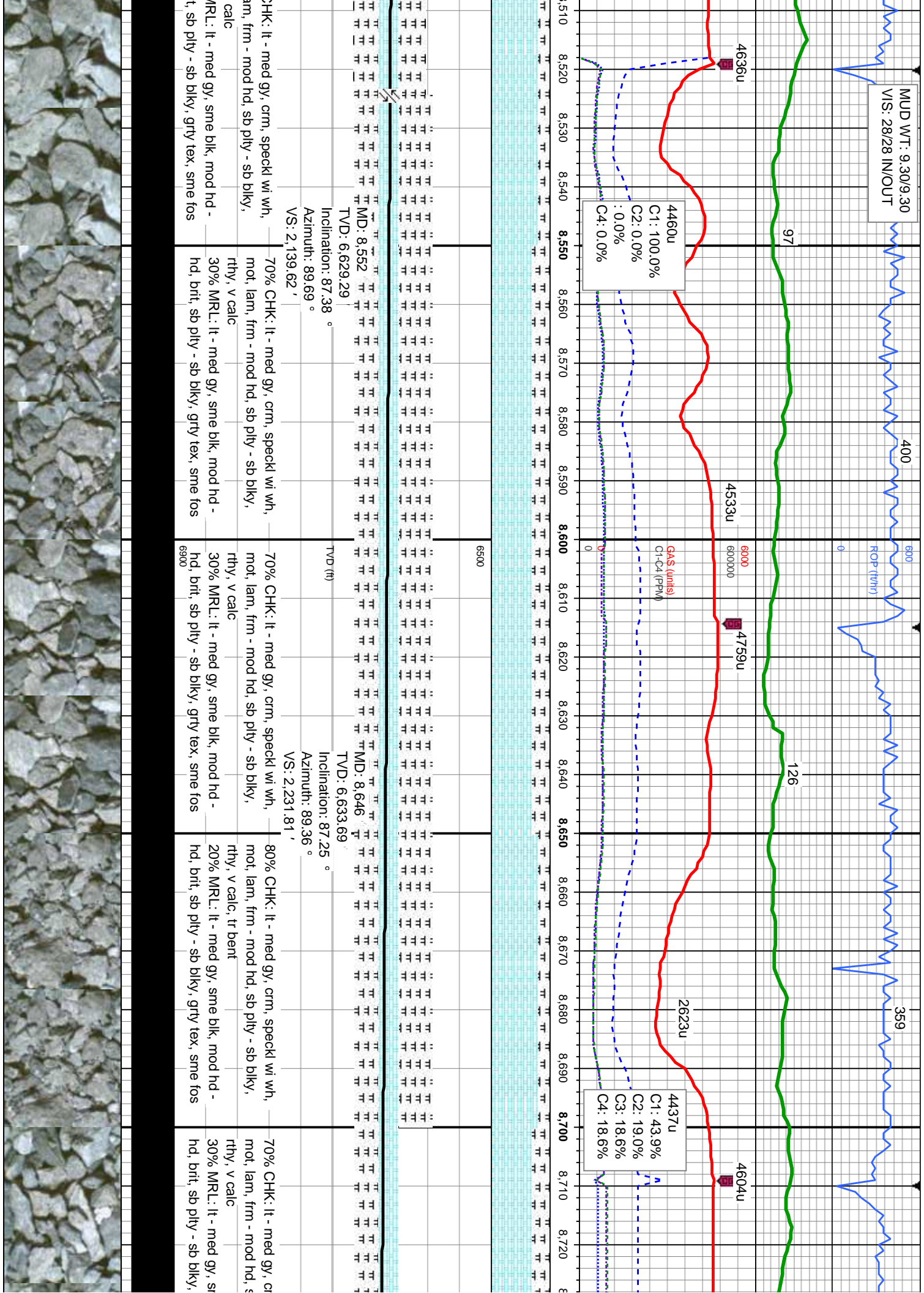


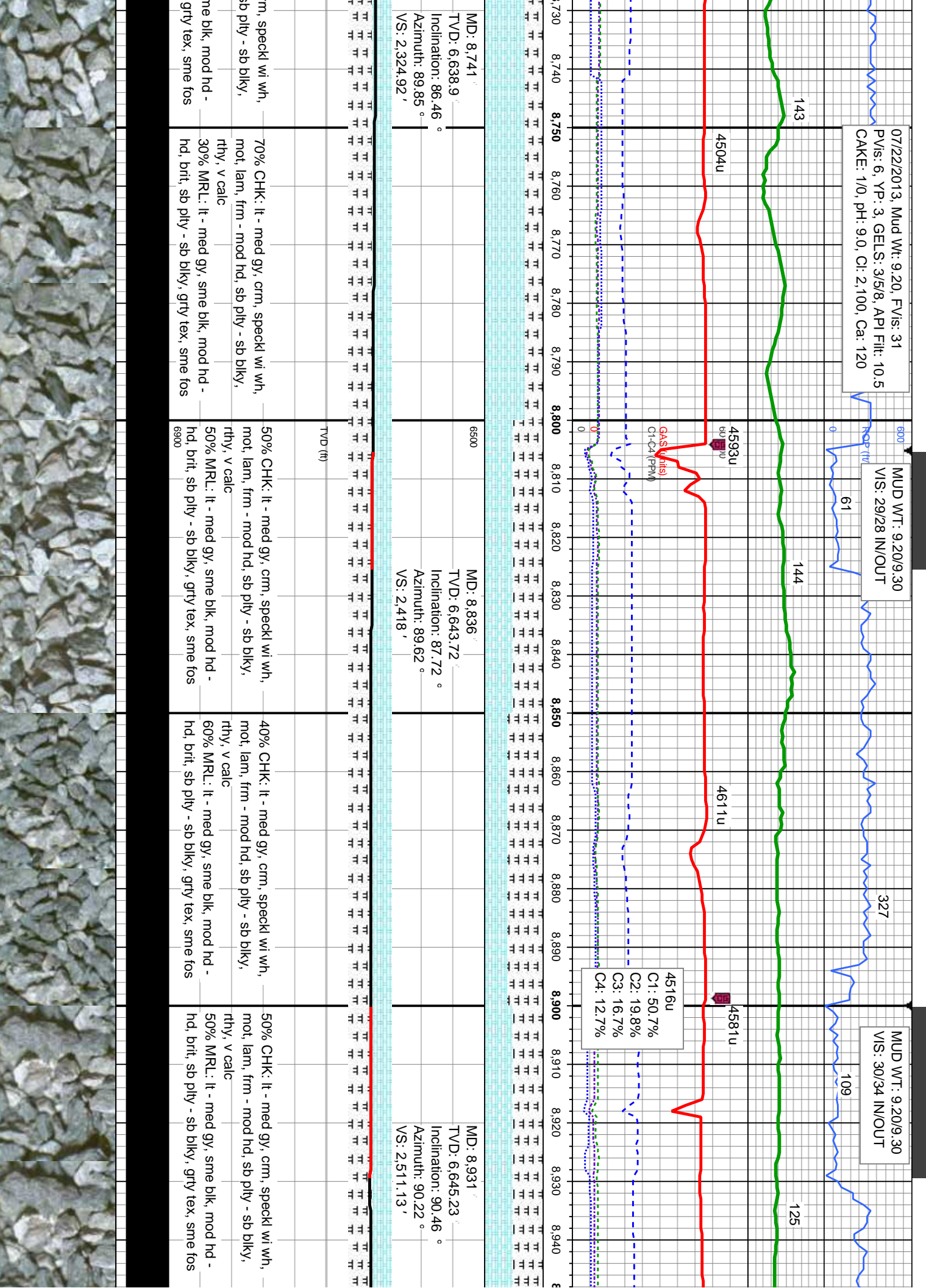
MD: 8,077' TVD: 6,626.54' Inclination: 90.68° Azimuth: 88.83° VS: 1,672.78'		MD: 8,172' TVD: 6,626.34' Inclination: 89.57° Azimuth: 89.71° VS: 1,766.13'		MD: 8,267' TVD: 6,625.06' Inclination: 91.97° Azimuth: 88.75° VS: 1,859.48'	
60% CHK: lt - med gy, crm, speckl wi wh, mot, lam, frm - mod hd, sb pty - sb blk, rthy, v calc		70% CHK: lt - med gy, crm, speckl wi wh, mot, lam, frm - mod hd, sb pty - sb blk, rthy, v calc		70% CHK: lt - med gy, crm, speckl wi wh, mot, lam, frm - mod hd, sb pty - sb blk, rthy, v calc	
40% MRL: lt - med gy, sme blk, mod hd - hd, brt, sb pty - sb blk, grty tex, sme fos		30% MRL: lt - med gy, sme blk, mod hd - hd, brt, sb pty - sb blk, grty tex, sme fos		30% MRL: lt - med gy, sme blk, mod hd - hd, brt, sb pty - sb blk, grty tex, sme fos	



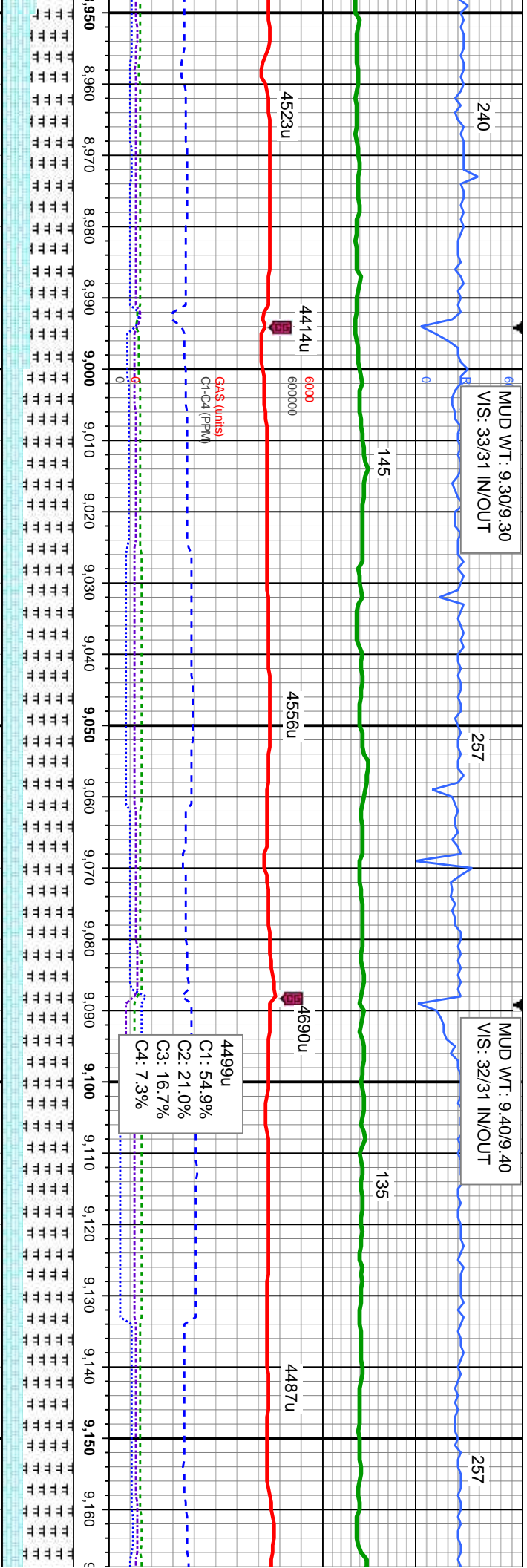






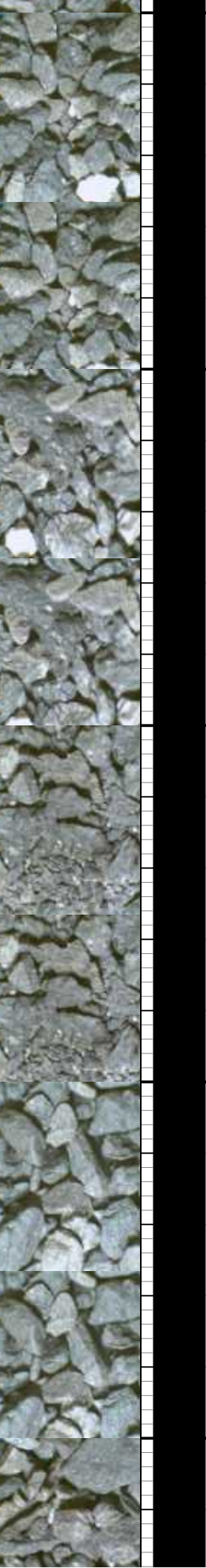






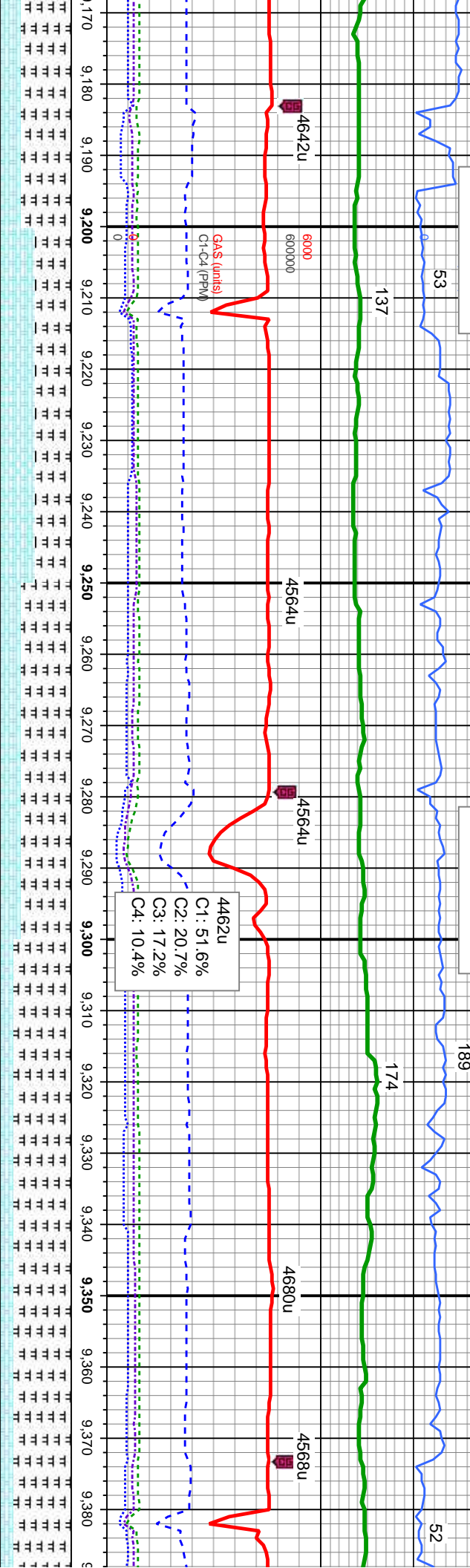
6500	MD: 9,026' TVD: 6,644.03' Inclination: 90.99 ° Azimuth: 89.46 ° VS: 2,604.29'	MD: 9,120' TVD: 6,642.89' Inclination: 90.4 ° Azimuth: 87.52 ° VS: 2,696.88'
------	---	--

40% CHK: It - med gy, crm, speckl wi wh, mot, lam, frm - mod hd, sb pily - sb blk, rthy, v calc 60% MRL: It - med gy, sme blk, mod hd - hd, brit, sb pily - sb blk, grty tex, sme fos	30% CHK: It - med gy, crm, speckl wi wh, mot, lam, frm - mod hd, sb pily - sb blk, rthy, v calc 70% MRL: It - med gy, sme blk, mod hd - hd, brit, sb pily - sb blk, grty tex, sme fos	30% CHK: It - med gy, crm, speckl wi wh, mot, lam, frm - mod hd, sb pily - sb blk, rthy, v calc 70% MRL: It - med gy, sme blk, mod hd - hd, brit, sb pily - sb blk, grty tex, sme fos	30% CHK: It - med gy, crm, speckl wi wh, mot, lam, frm - mod hd, sb pily - sb blk, rthy, v calc 70% MRL: It - med gy, sme blk, mod hd - hd, brit, sb pily - sb blk, grty tex, sme fos
--	--	--	--



MUD WT: 9.40/9.40  
VIS: 32/31 IN/OUT

MUD WT: 9.30/9.20  
VIS: 32/31 IN/OUT

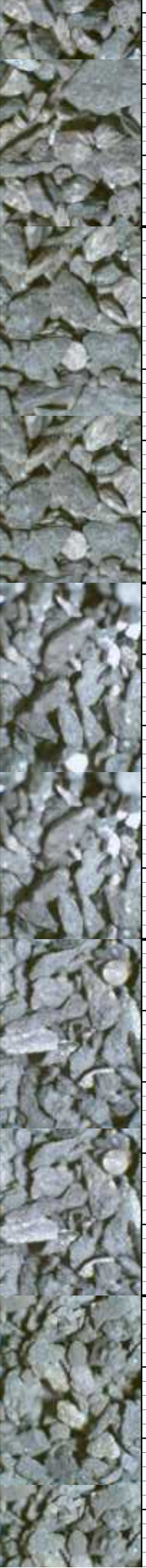


6500 MD: 9,215 '  
TVD: 6,641.48 '  
Inclination: 91.3 °  
Azimuth: 90.98 °  
VS: 2,790.21 '

MD: 9,310 '  
TVD: 6,638.98 '  
Inclination: 91.72 °  
Azimuth: 90.95 °  
VS: 2,882.97 '

TVD (ft)

med gy, crm, speckl wi wh, mod hd, sb pty - sb blk, rthy, v calc	50% CHK: It - med gy, crm, speckl wi wh, mod lam, frm - mod hd, sb pty - sb blk, rthy, v calc	30% CHK: It - med gy, crm, speckl wi wh, mod lam, frm - mod hd, sb pty - sb blk, rthy, v calc	20% CHK: It - med gy, crm, speckl wi wh, mod lam, frm - mod hd, sb pty - sb blk, rthy, v calc	20% CHK: It - med gy, crm, speckl wi wh, mod lam, frm - mod hd, sb pty - sb blk, rthy, v calc
- sb blk, sme blk, mod hd - 50% MRL: It - med gy, sme blk, mod hd - hd, brit, sb pty - sb blk, grty tex, sme fos, 6900	- sb blk, sme blk, mod hd - 50% MRL: It - med gy, sme blk, mod hd - hd, brit, sb pty - sb blk, grty tex, sme fos, 6900	- sb blk, sme blk, mod hd - 70% MRL: It - med gy, sme blk, mod hd - hd, brit, sb pty - sb blk, grty tex, sme fos, abnt bent	- sb blk, sme blk, mod hd - 80% MRL: It - med gy, sme blk, mod hd - hd, brit, sb pty - sb blk, grty tex, sme fos, abnt bent	- sb blk, sme blk, mod hd - 80% MRL: It - med gy, sme blk, mod hd - hd, brit, sb pty - sb blk, grty tex, sme fos, abnt bent







D WT: 9.40/9.40  
31/32 IN/OUT

240

62

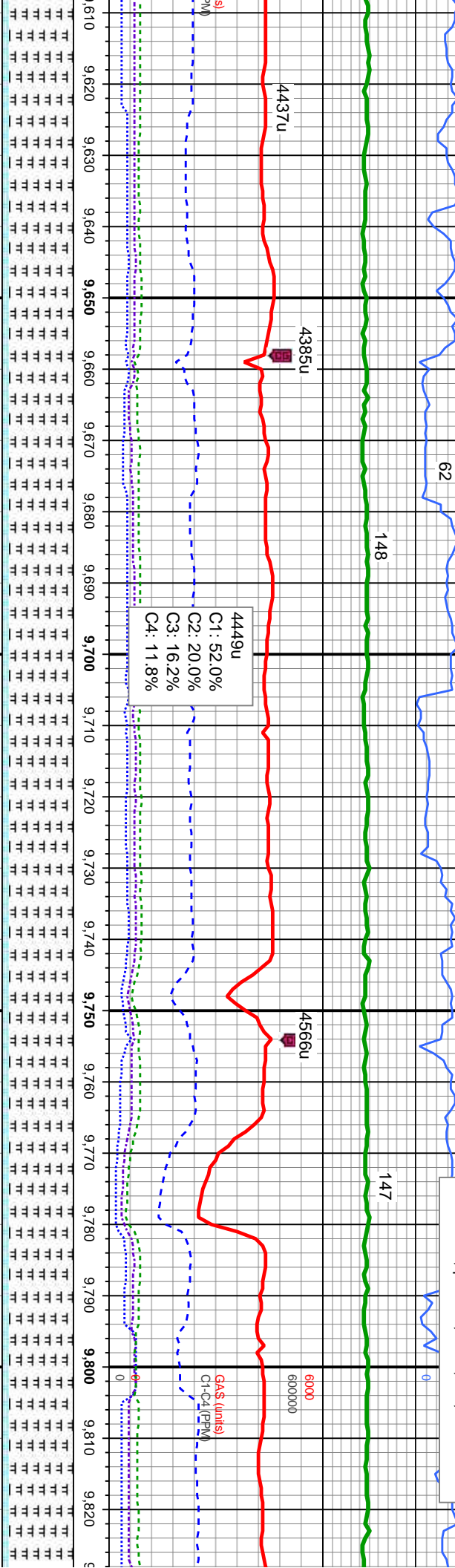
148

MUD WT: 9.50/9.40  
VIS: 33/32 IN/OUT

225

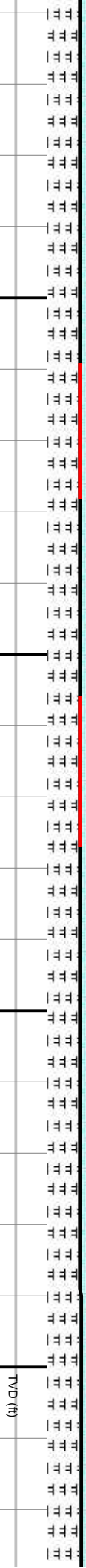
147

07/22/2013, Mud Wt: 9.40, FV/s: 33  
PV/s: 6, YP: 6, GELS: 4/6/8, API Filtr: 10.5  
CAKE: 1/0, pH: 9.2, Cl: 2,000, Ca: 120



MD: 9.690  
TVD: 6,634.03  
Inclination: 90.37 °  
Azimuth: 89.57 °  
VS: 3,253.6

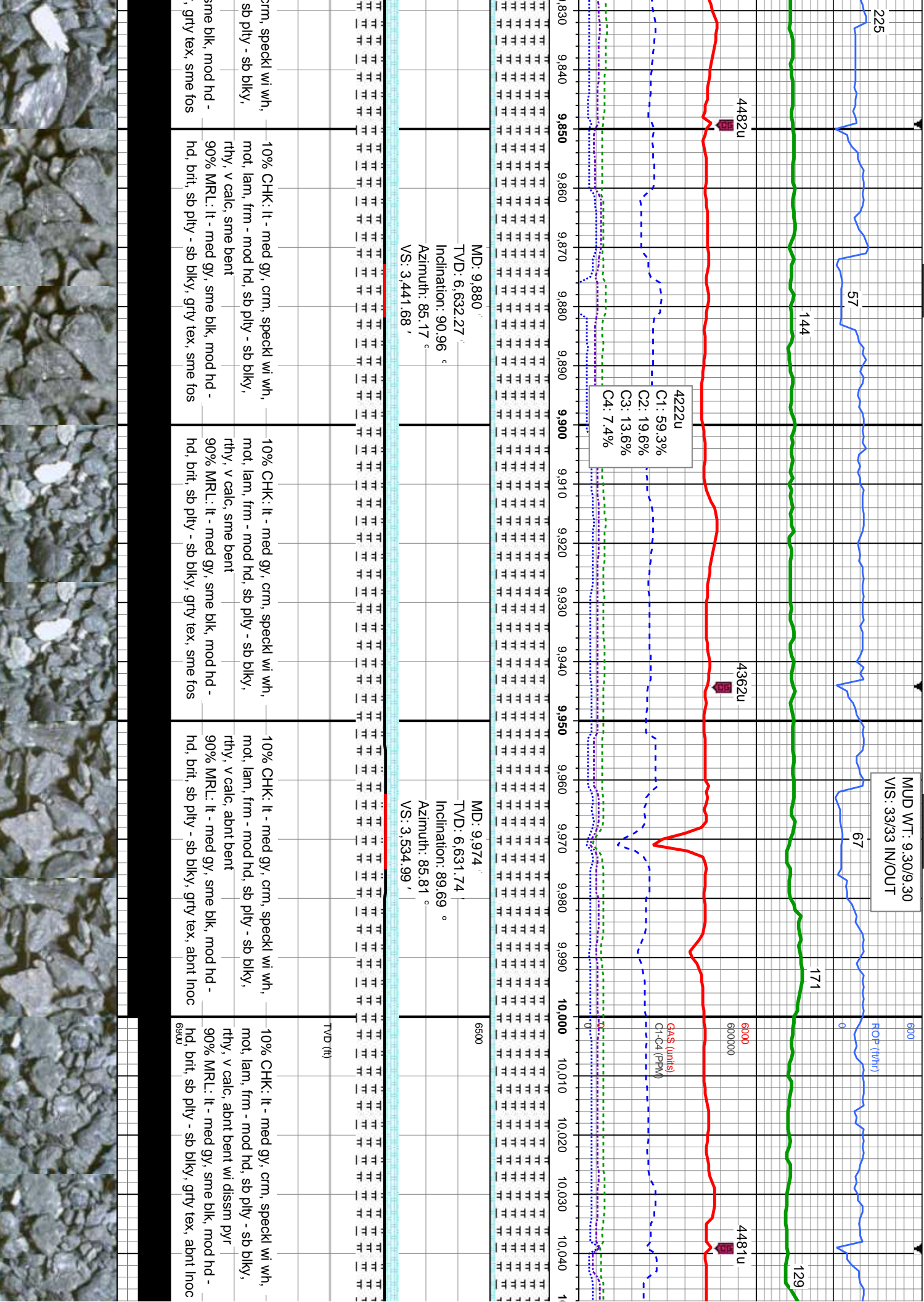
MD: 9.785  
TVD: 6,633.39  
Inclination: 90.4 °  
Azimuth: 85.85 °  
VS: 3,347.38

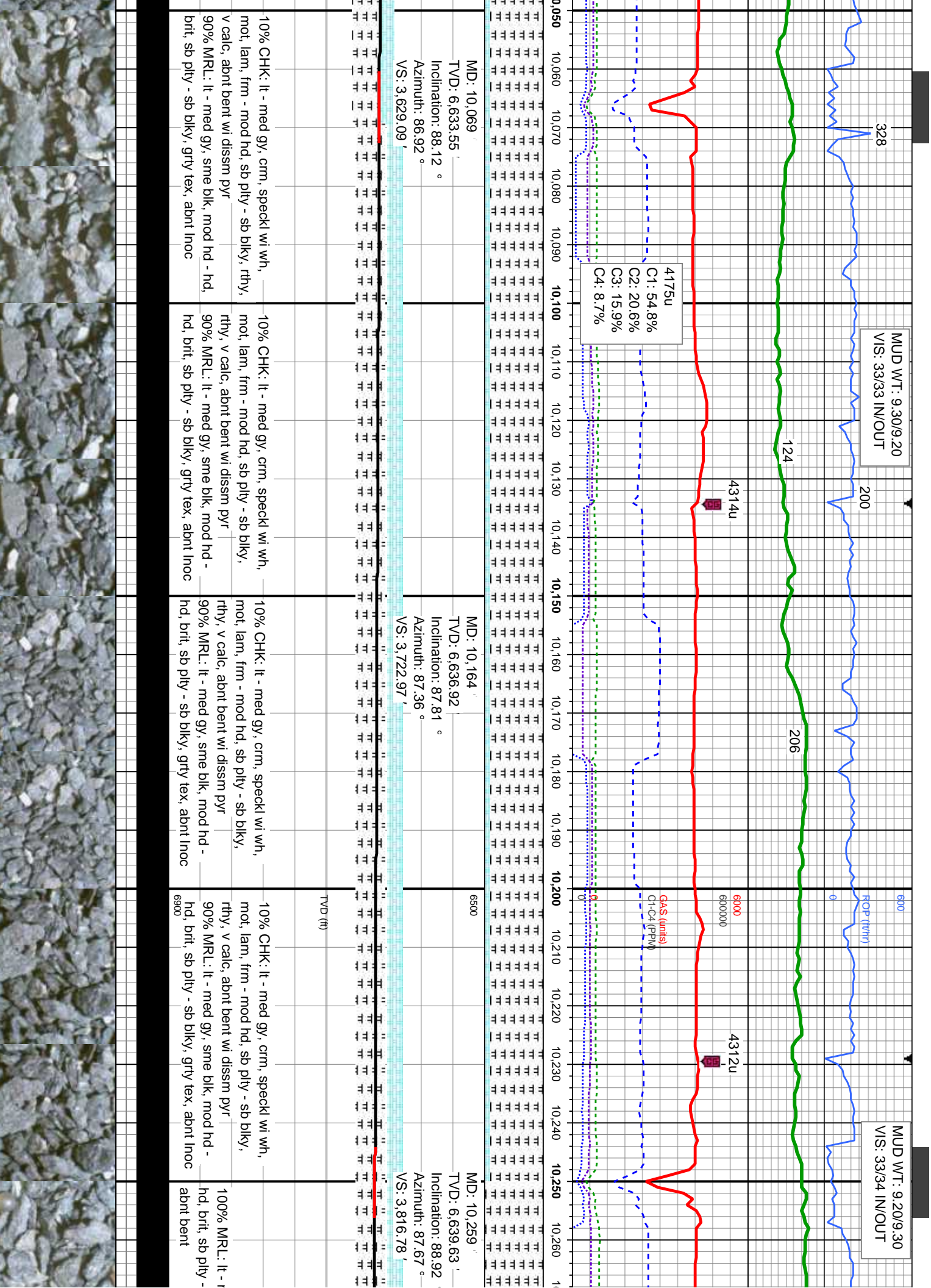


HK: It - med gy, crm, speckl wi wh, m, frm - mod hd, sb pily - sb blk, calc  
MRL: It - med gy, sme blk, mod hd - , sb pily - sb blk, grty tex, sme fos, bent  
10% CHK: It - med gy, crm, speckl wi wh, mot, lam, frm - mod hd, sb pily - sb blk, rthy, v calc  
90% MRL: It - med gy, sme blk, mod hd - hd, brt, sb pily - sb blk, grty tex, sme fos, abnt bent  
10% CHK: It - med gy, crm, speckl wi wh, mot, lam, frm - mod hd, sb pily - sb blk, rthy, v calc  
90% MRL: It - med gy, sme blk, mod hd - hd, brt, sb pily - sb blk, grty tex, sme fos  
10% CHK: It - med gy, crm, speckl wi wh, mot, lam, frm - mod hd, sb pily - sb blk, rthy, v calc  
90% MRL: It - med gy, sme blk, mod hd - hd, brt, sb pily - sb blk, grty tex, sme fos



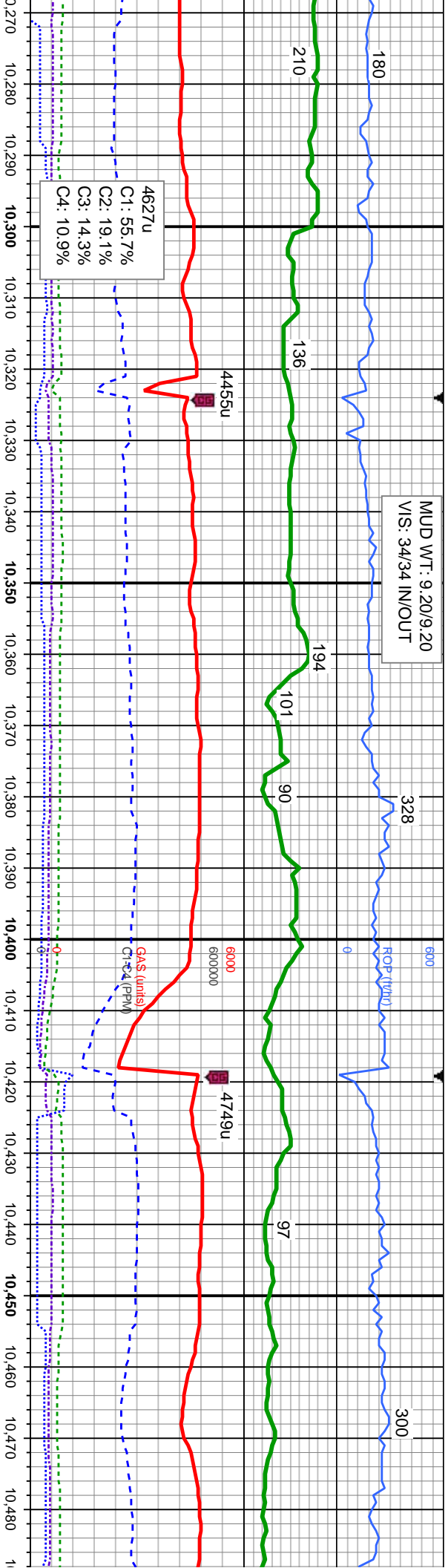








MUD WT: 9.20/9.20  
VIS: 34/34 IN/OUT



MD: 10,354  
TVD: 6,641.29  
Inclination: 89.08 °  
Azimuth: 88.17 °  
VS: 3,910.51'

MD: 10,449  
TVD: 6,643.19  
Inclination: 88.64 °  
Azimuth: 88.25 °  
VS: 4,004.15'

med gy, sme blk, mod hd -  
sb blk, grty tex, sme inoc,

100% MRL: It - med gy, sme blk, mod hd -  
hd, brit, sb pily - sb blk, grty tex, sme inoc,  
abnt bent

40% CHK: It - med gy, crm, speckl wi wh,  
mot, lam, frm - mod hd, sb pily - sb blk,  
rthy, v calc, abnt bent wi dissm pyr  
60% MRL: It - med gy, sme blk, mod hd -  
hd, brit, sb pily - sb blk, grty tex, occ fos

70% CHK: It - med gy, crm, speckl wi wh,  
mot, lam, frm - mod hd, sb pily - sb blk,  
rthy, v calc, abnt bent  
30% MRL: It - med gy, sme blk, mod hd -  
hd, brit, sb pily - sb blk, grty tex, sme fos

80% CHK: It - med gy, crm, speckl  
mot, lam, frm - mod hd, sb pily - sb  
rthy, v calc, abnt bent  
20% MRL: It - med gy, sme blk, mc  
hd, brit, sb pily - sb blk, grty tex, s

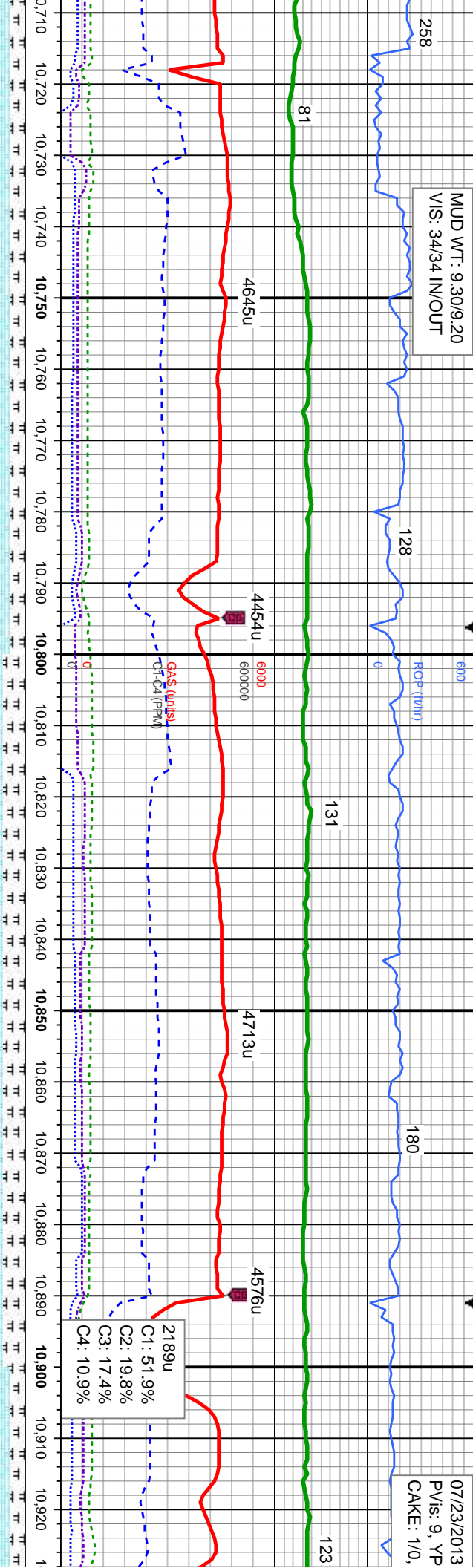






MUD WT: 9.30/9.20  
VIS: 34/34 IN/OUT

07/23/2013  
PVIS: 9, YP  
CAKE: 1/0,



MD: 10,734  
TVD: 6,642.19  
Inclination: 90.46 °  
Azimuth: 90.37 °  
VS: 4,284.02 '

MD: 10,829  
TVD: 6,641.17  
Inclination: 90.77 °  
Azimuth: 90.41 °  
VS: 4,377.01 '

MD: 10,926  
TVD: 6,639  
Inclination: 90.77 °  
Azimuth: 91  
VS: 4,471.6

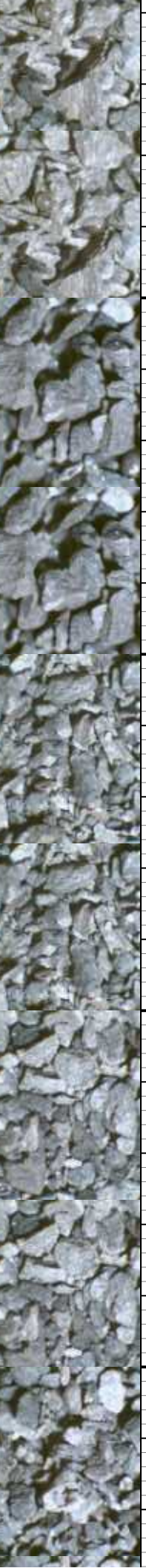
CHK: It - med gy, crm, speckl wi wh, mot, lam, frm - mod hd, sb pily - sb blk, v calc, tr bent, tr fos frag  
MRL: It - med gy, sme blk, mod hd - hd, brit, sb pily, grty tex

80% CHK: It - med gy, crm, speckl wi wh, mot, lam, frm - mod hd, sb pily - sb blk, rthy, v calc, tr bent, tr fos frag  
20% MRL: It - med gy, sme blk, mod hd - hd, brit, sb pily - sb blk, grty tex

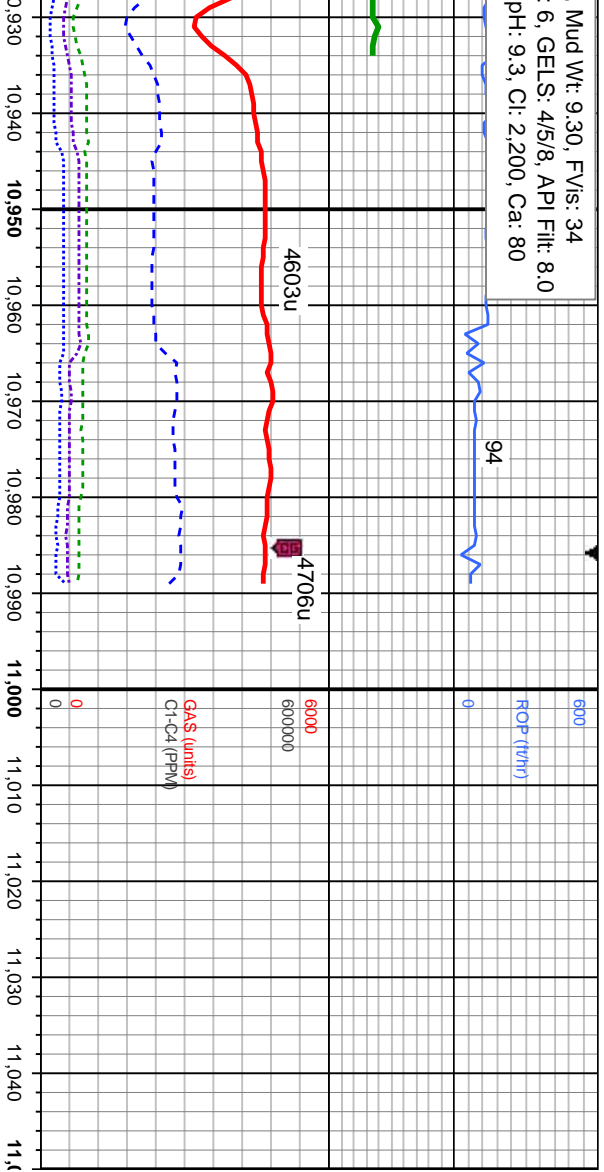
70% CHK: It - med gy, crm, speckl wi wh, mot, lam, frm - mod hd, sb pily - sb blk, rthy, v calc, tr bent, tr fos frag  
30% MRL: It - med gy, sme blk, mod hd - hd, brit, sb pily - sb blk, grty tex

70% CHK: It - med gy, crm, speckl wi wh, mot, lam, frm - mod hd, sb pily - sb blk, rthy, v calc, tr bent, tr fos frag  
30% MRL: It - med gy, sme blk, mod hd - hd, brit, sb pily - sb blk, grty tex

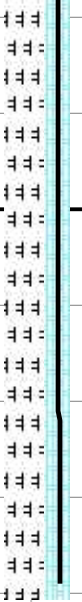
80% CHK: It - med gy, crm, speckl wi wh, mot, lam, frm - mod hd, sb pily - sb blk, rthy, v calc, tr bent, tr fos frag  
20% MRL: It - med gy, sme blk, mod hd - hd, brit, sb pily - sb blk, grty tex



Mud Wt: 9.30, FV/s: 34  
6, GELS: 4/5/8, API Filt: 8.0  
pH: 9.3, Cl: 2.200, Ca: 80



MD: 10,989  
TVD: 6,639.02  
Inclination: 90.77 °  
Azimuth: 91.85 °  
VS: 4,532.99



TVD (ft)

cm, speckl wi wh,  
sb ply - sb blk,  
frag  
ne blk, mod hd -  
grty tex

80% CHK: lt - med gy, crm, speckl wi wh,  
mot, lam, frm - mod hd, sb ply - sb blk,  
rthy, v calc, tr bent, tr fos frag  
20% MRL: lt - med gy, sme blk, mod hd -  
hd, brit, sb ply - sb blk, grty tex

6900

Wellsite Geological Services  
Provided by Columbine Logging

