



Scale: 5" / 100'  
Measured Depth Log

Well Name Crow Creek State AC36-77-1HN HORZ

Location SEC 36 T7N R63W

State Colorado

Country USA

API Number 05-123-37133

Region DJ Basin

Spud Date 10/6/2013

Surface Coordinates SESW SEC 36 T7N R63W

270' FSL; 1,793' FWL

LAT/LON 40.52358000/-104.38780000

Bottom Hole Coordinates NENW SEC 36 T7N R63W

1,650' FWL; 535' FNL

Ground Elevation 4789

K.B. Elevation 4813

Logged Interval 6036 To 11155

Total Depth 11155

Formation Niobrara C Chalk

Type of Drilling Fluid LSND

County Weld

Rig Number H&P 315

AFE # 139140

Field Wattenberg

Drilling Completed 10/13/2013

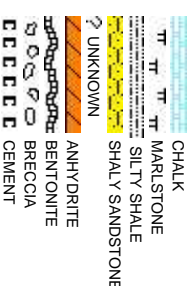
Company Noble Energy Inc

Address 1625 Broadway  
Denver, CO 80202

Name MARK COLE, JR

Company COLUMBINE LOGGING

Address 2385 S Lipan St  
Denver, CO 80202





Slide/Rotate

ROP

ROP

Curves  
GAMMA

Total Gas & Chromatograph

GAS  
C1  
C2  
C3  
C4

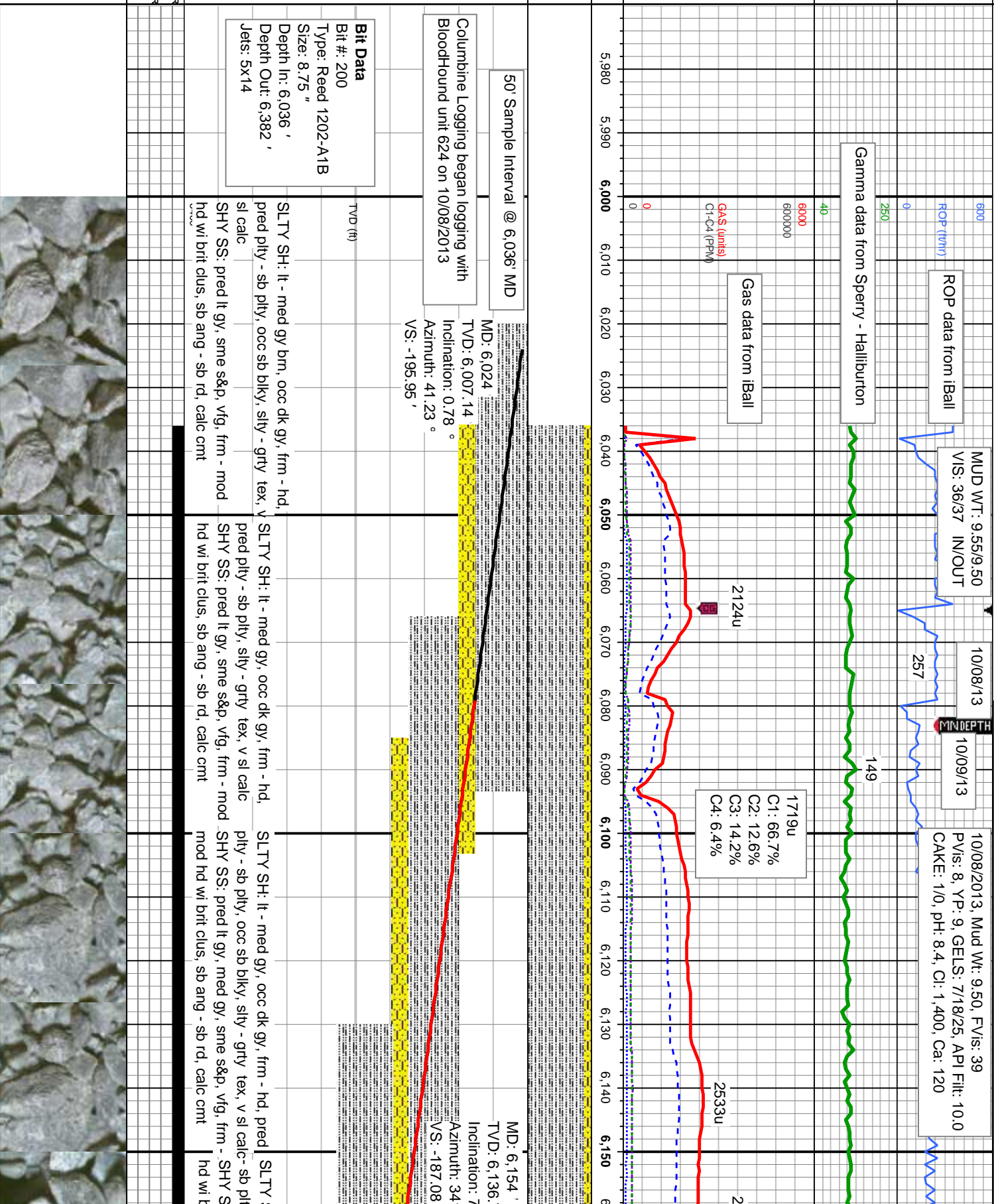
Depth Labels

% Lith

Well Bore  
TVD

Oil Show

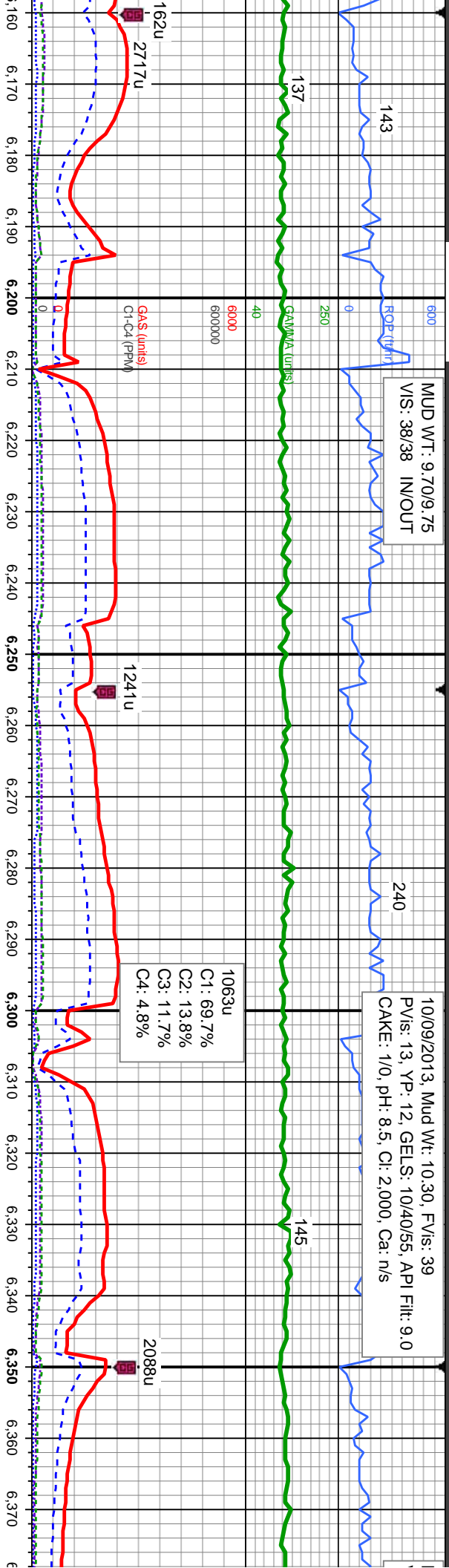
Images





MUD WT: 9.70/9.75  
VIS: 38/38 IN/OUT

10/09/2013, Mud Wt: 10.30, FV/s: 39  
PV/s: 13, YP: 12, GELS: 10/40/55, API Filtr: 9.0  
CAKE: 1/0, pH: 8.5, Cl: 2.000, Ca: n/s



<<Scale Change>>

MD: 6,201  
TVD: 6,183.14  
Inclination: 10.53 °  
Azimuth: 342.2 °  
VS: -179.98 '

MD: 6,249  
TVD: 6,230  
Inclination: 14.43 °  
Azimuth: 342.53 °  
VS: -170.01 '

MD: 6,296  
TVD: 6,275.44  
Inclination: 15.12 °  
Azimuth: 348.45 °  
VS: -158.34 '

MD: 6,344  
TVD: 6,321.54  
Inclination: 17.29 °  
Azimuth: 350.78 °  
VS: -149.07 '

TOOH @ 6,382 MD to change  
out mud motor, MWD tool, and bit

SH: It - med gy, occ dk gy, frm - hd,ply  
y, occ sb blk, sily - grty tex, v sl calc  
S: pred It gy, sme s&p, vfg, frm - mod  
crit clus, sb ang - sb rd, calc cnt

SLTY SH: It - med gy, occ dk gy, frm - hd,ply  
- sb ply, sily - grty tex, v sl calc  
SHY SS: It gy, med gy, sme s&p, vfg, frm -  
mod hd wi brit clus, sb ang - sb rd, calc cnt

SLTY SH: It - med gy, occ dk gy, frm - hd,  
pred ply - sb ply, occ sb blk, sily - grty tex,  
v sl calc  
SHY SS: pred It gy, med gy, sme s&p, vfg,  
frm - mod hd wi brit clus, sb ang - sb rd,  
calc cnt

SLTY SH: It - med gy, occ dk gy, frm - hd,ply  
- sb ply, sily - grty tex, v sl calc  
SHY SS: It gy, med gy, sme s&p, vfg, frm -  
mod hd wi brit clus, sb ang - sb rd, calc cnt

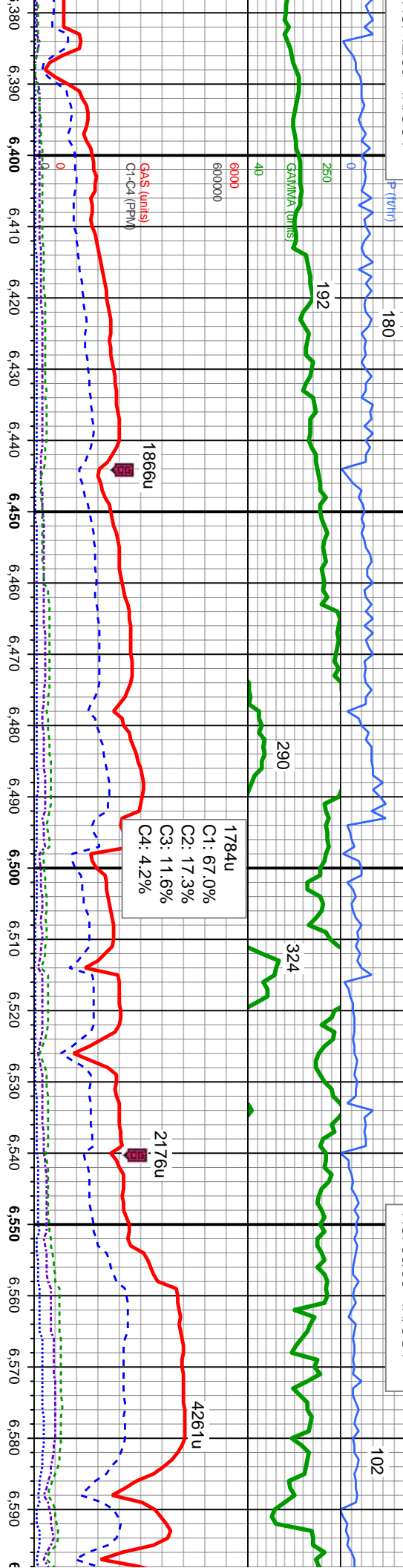
SLTY SH: It - med gy brn,  
mod hd, ply - sb ply, occ  
tex, v sl calc  
SHY SS: It - med gy, sme  
hd wi brit clus, sb ang - sb





MUD WT: 10.30/10.20  
VIS: 42/39 IN/OUT

MUD WT: 10.30/10.30  
VIS: 38/38 IN/OUT



Bit Data  
Type: Security MMD55  
Size: 8.75"  
Depth In: 6,382'  
Jets: 5x14

25 Sample Interval @ 6,500' MD

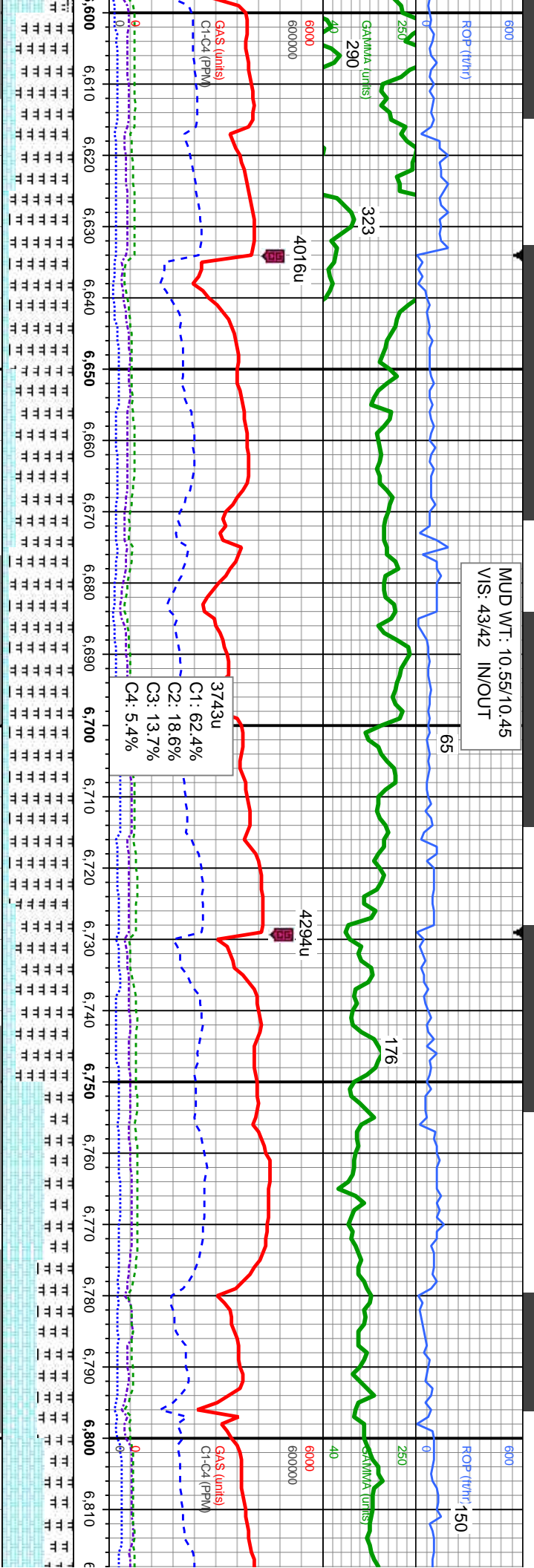
Sharon Springs Marker @ 6,511' MD: 6,469' TVD  
Niobrara Top @ 6,532' MD: 6,485' TVD

Nio A Chalk Top @ 6,562' MD: 6,508' TVD  
Nio A Marl @ 6,597' MD:

MD: 6,391'	MD: 6,439'	MD: 6,486'	MD: 6,534'	MD: 6,581'
TVD: 6,365.77'	TVD: 6,408.82'	TVD: 6,448.36'	TVD: 6,486.77'	TVD: 6,521.86'
Inclination: 22.15°	Inclination: 30.15°	Inclination: 35.25°	Inclination: 38.41°	Inclination: 44.94°
Azimuth: 350.89°	Azimuth: 353.94°	Azimuth: 355.35°	Azimuth: 357.72°	Azimuth: 359.26°
VS: -133.42'	VS: -112.46'	VS: -87.19'	VS: -58.47'	VS: -27.25'

occ dk gy, frm - sb blkly, silty - grty	SLTY SH: lt - med gy brn, occ dk gy, frm - mod hd, pty - sb pty, occ sb blkly, silty - grty	SLTY SH: lt - med gy, occ dk gy, frm - hd, pty - sb pty, silty - grty	SLTY SH: lt - med gy, occ dk gy, frm - hd, pty - sb pty, silty - grty	CHK: lt - med gy - gy brn, mot, lam, sft - frm, sb pty - sb blkly, rthy tex, v calc	SLTY SH: lt - medgy, occ dk gy, frm - mod hd, sb pty - sb blkly, silty - grty	SLTY SH: lt - medgy, occ dk gy, frm - mod hd, sb pty - sb blkly, silty - grty	SLTY SH: lt - medgy, occ dk gy, frm - mod hd, sb pty - sb blkly, silty - grty
s&p, vfg, frm - mod hd wi brit clus, sb ang - sb rd, calc cnt	mod hd, pty - sb pty, occ sb blkly, silty - grty	mod hd, pty - sb pty, occ sb blkly, silty - grty	mod hd, pty - sb pty, occ sb blkly, silty - grty	mod hd, pty - sb pty, occ sb blkly, silty - grty	mod hd, pty - sb pty, occ sb blkly, silty - grty	mod hd, pty - sb pty, occ sb blkly, silty - grty	mod hd, pty - sb pty, occ sb blkly, silty - grty





MUD WT: 10.55/10.45  
VIS: 43/42 IN/OUT

Top @ 6.533' TVD

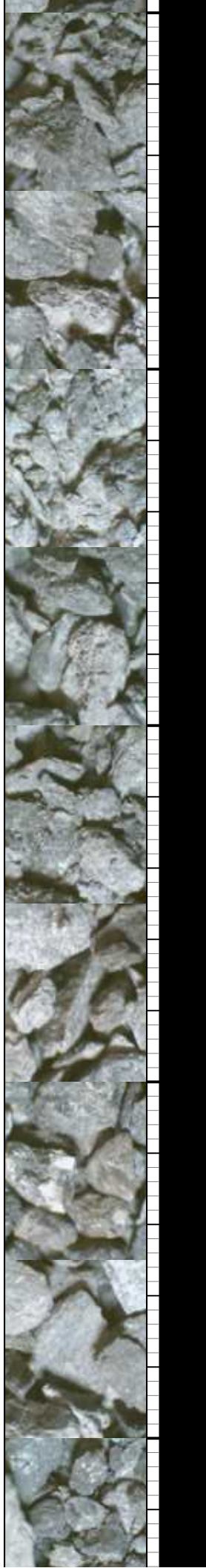
<<Scale Change>>

6.533' TVD

Nio B Chalk Top @ 6.707' MD 6.598' TVD

Nio B Marl Top @ 6.780' MD 6.632' TVD

MD: 6.629 TVD: 6.554.04 Inclination: 50.83 ° Azimuth: 0.39 ° VS: 8.34'	MD: 6.676 TVD: 6.581.93 Inclination: 56.35 ° Azimuth: 1.57 ° VS: 46.14'	MD: 6.724 TVD: 6.606.59 Inclination: 61.79 ° Azimuth: 1.57 ° VS: 87.29'	MD: 6.771 TVD: 6.627.18 Inclination: 66.23 ° Azimuth: 0.85 ° VS: 129.51'	MD: 6.817 TVD: 6.654.04 Inclination: 66.23 ° Azimuth: 0.85 ° VS: 17.00'
CHK: It - med gy - gy brn, mot, lam, sft - frm, sb pily - sb blk, rthy tex, v calc, sme bent MRL: It - med gy, sme blk, sft - mod hd, sb pily - pily, slty - grty tex	CHK: It - med gy - gy brn, mot, lam, sft - hd, sb pily - sb blk, rthy tex, v calc, tr bent MRL: It - med gy, sme blk, sft - mod hd, sb pily - pily, slty - grty tex	CHK: It - med gy - gy brn, mot, lam, sft - frm, sb pily - sb blk, rthy tex, v calc MRL: It - med gy, sme blk, sft - mod hd, sb pily - pily, slty - grty tex, tr bent	CHK: It - med gy - gy brn, mot, lam, sft - frm, sb pily - sb blk, rthy tex, v calc MRL: It - med gy, sme blk, sft - mod hd, sb pily - pily, slty - grty tex, tr bent	CHK: It - med gy - gy brn, mot, lam, sft - frm, sb pily - sb blk, MRL: It - med gy, pily - pily, slty - grty

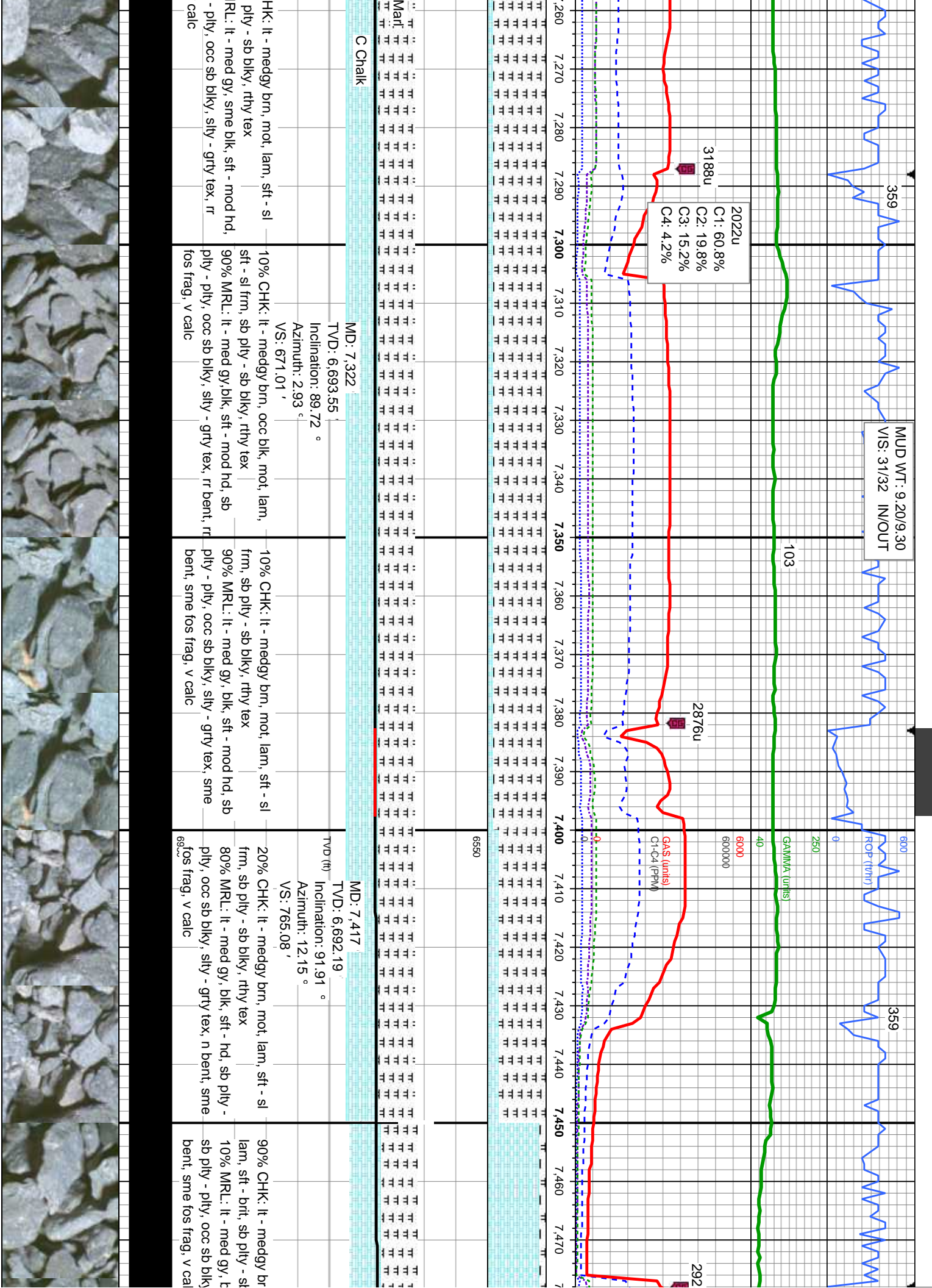
















440

MUD WT: 9.35/9.30  
VIS: 33/32 IN/OUT

10/11/2013

10/12/2013

359

MUD WT: 9.35/9.40  
VIS: 34/33 IN/OUT

ROP (ft)  
MINDEPTH

93

250  
GAMMA (units)

97

3091u

GAS (MLL)  
GOC4 (PPM)

2878u

3651u  
C1: 59.9%  
C2: 18.9%  
C3: 15.4%  
C4: 5.7%

7u  
63.6%  
19.0%  
14.0%  
3.4%

700

710

720

730

740

750

760

770

780

790

800

810

820

830

840

850

860

870

880

890

900

910

920

930

940

950

960

970

980

990

1000

1010

1020

1030

1040

1050

1060

1070

1080

1090

6550

701

6,688.9'

ation: 89.88 °

ath: 1.67 °

047.07'

MD: 7.796'

TVD: 6,689.03'

Inclination: 89.97 °

Azimuth: 3.13 °

V/S: 1,141.99'

10% CHK: lt - medgy brn, wh-crm, mot, lam,  
sft - mod hd, sb pily - sb blk, rthy tex  
90% MRL: lt - med gy, occ blk, sft - hd, sb  
pily - pily, occ sb blk, silty - grty tex, n bent, n  
fos frag, v calc

20% CHK: lt - medgy brn, wh-crm, mot, lam,  
sft - sl hd, sb pily - sb blk, rthy tex  
80% MRL: lt - med gy, occ blk, sft - mod hd,  
sb pily - pily, occ sb blk, silty - grty tex, n  
bent, n fos frag, v calc

10% CHK: lt - medgy brn, wh-crm, mot,  
lam, sft - mod hd, sb pily - sb blk, rthy tex  
90% MRL: lt - med gy, occ blk, sft - sl hd,  
sb pily - pily, occ sb blk, silty - grty tex, n  
bent, n fos frag, v calc

30% CHK: lt - medgy brn, mot, lam, sft - sl  
frm, sb pily - sb blk, rthy tex  
70% MRL: lt - med gy, blk, sft - hd, sb pily -  
pily, occ sb blk, silty - grty tex, n bent, r fos  
frag, v calc

40% CHK: lt - m  
sft - sl hd, sb pily  
60% MRL: lt - m  
sb pily - pily, occ  
bent, n fos frag,

MD: 7.891'

TVD: 6,689.61'

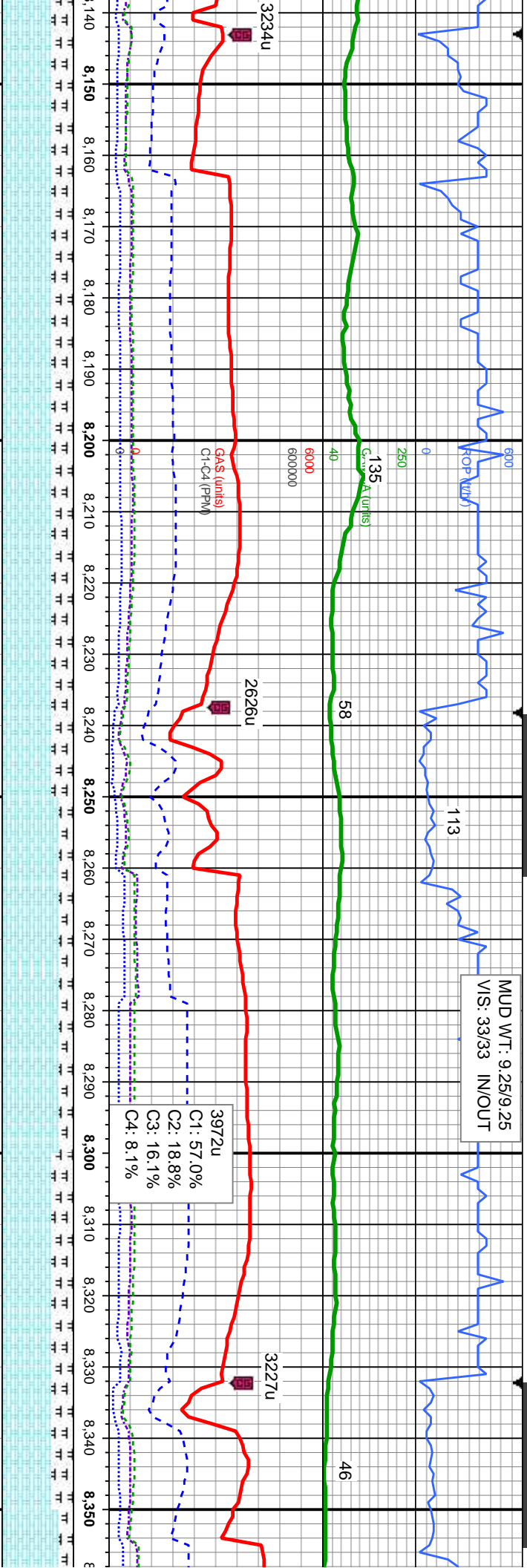
Inclination: 89.32 °

Azimuth: 2.01 °

V/S: 1,236.89'



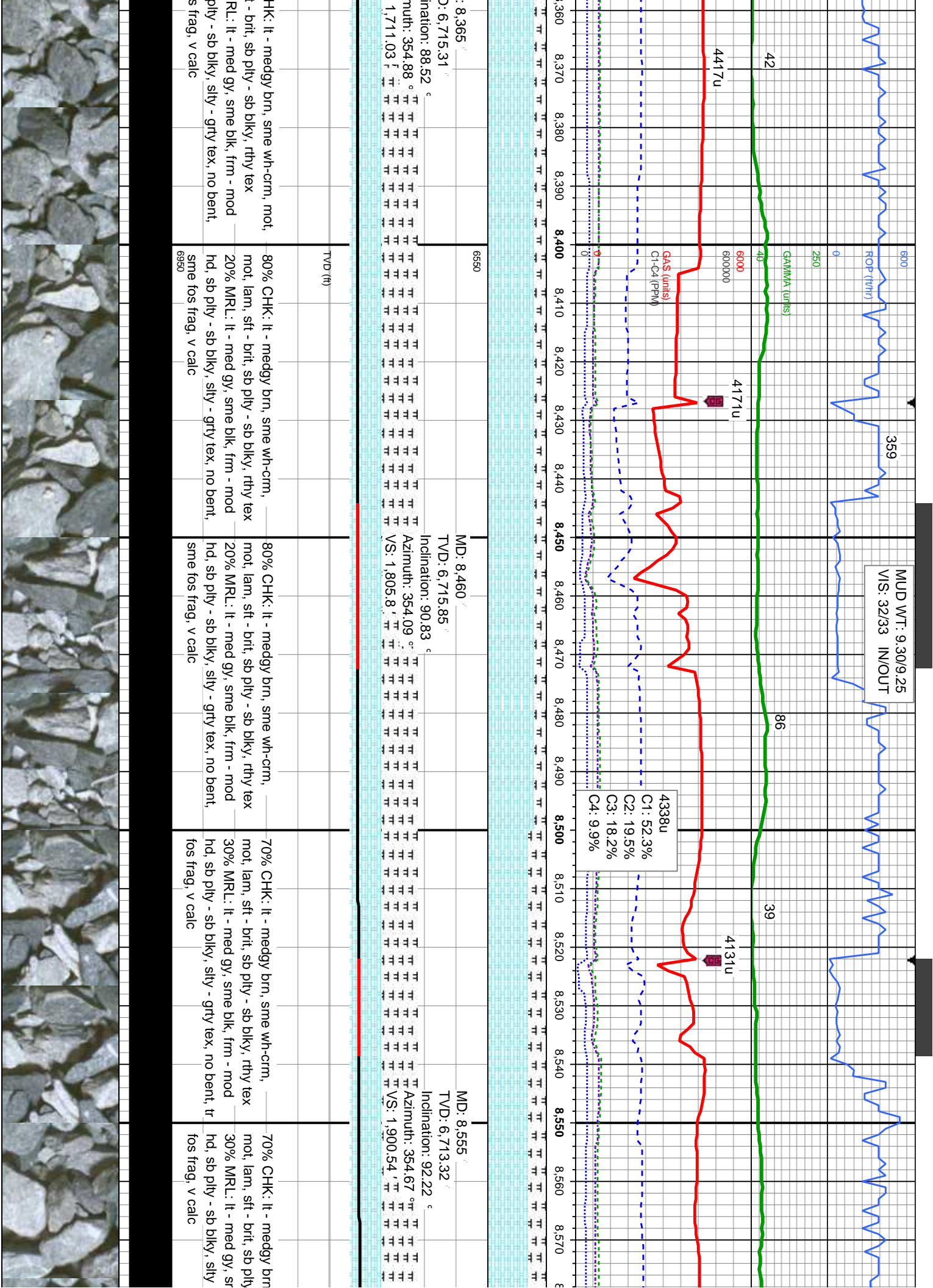




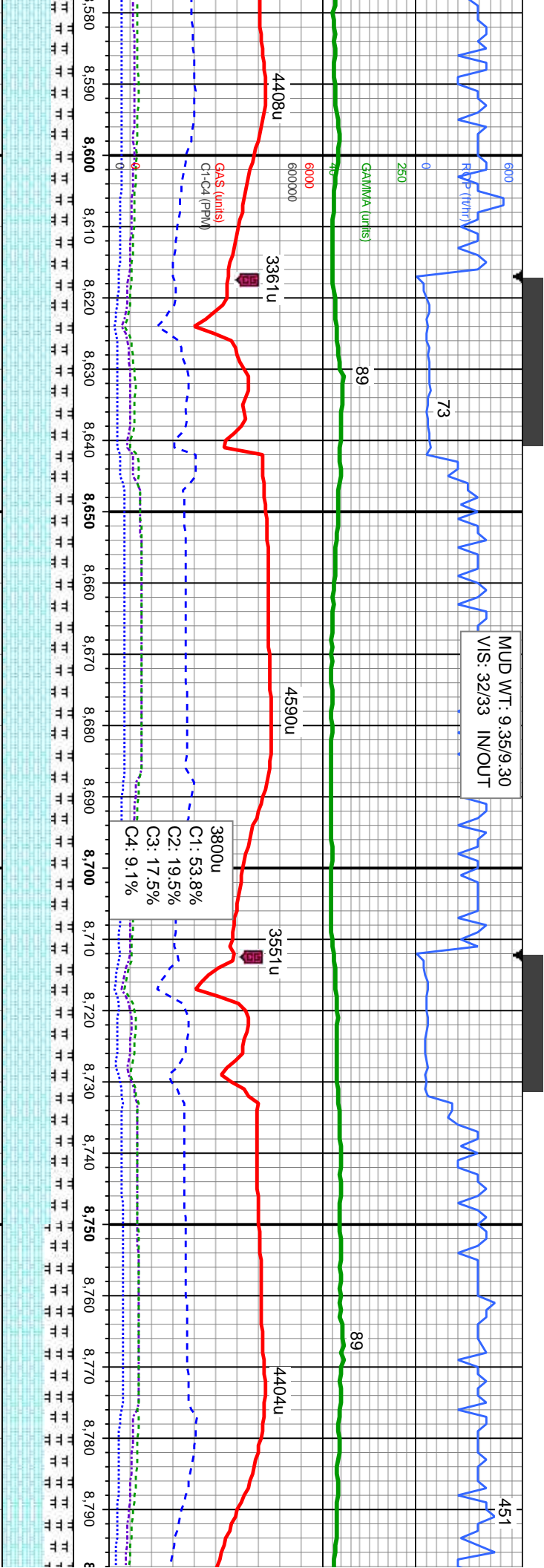
MD: 8,175 TVD: 6,704.3 Inclination: 85.03 °	6550	MD: 8,270 TVD: 6,711.25 Inclination: 86.57 °	MD: 8,270 TVD: 6,711.25 Inclination: 86.57 °
Azimuth: 353.84 ° VS: 1,521.92		Azimuth: 353.75 ° VS: 1,616.36	Azimuth: 353.75 ° VS: 1,616.36

cm, mot, tex mod no bent,	70% CHK: lt - medgy brn, sme wh-crm, mot, lam, sft - brit, sb pty - sb blk, rthy tex 30% MRL: lt - med gy, sme blk, frm - mod hd, sb pty - sb blk, silty - grty tex, no bent, sme inoc, v calc	70% CHK: lt - medgy brn, sme wh-crm, mot, lam, sft - brit, sb pty - sb blk, rthy tex 30% MRL: lt - med gy, sme blk, frm - mod hd, sb pty - sb blk, silty - grty tex, no bent, sme fos frag, v calc	80% CHK: lt - medgy brn, sme wh-crm, mot, lam, sft - brit, sb pty - sb blk, rthy tex 20% MRL: lt - med gy, sme blk, frm - mod hd, sb pty - sb blk, silty - grty tex, no bent, sme fos frag, v calc	70% CHK: lt - medgy brn, sme wh-crm, mot, lam, sft - brit, sb pty - sb blk, rthy tex 30% MRL: lt - med gy, sme blk, frm - mod hd, sb pty - sb blk, silty - grty tex, no bent, sme fos frag, v calc	80% C lam, sft 20% M hd, sb sme fo
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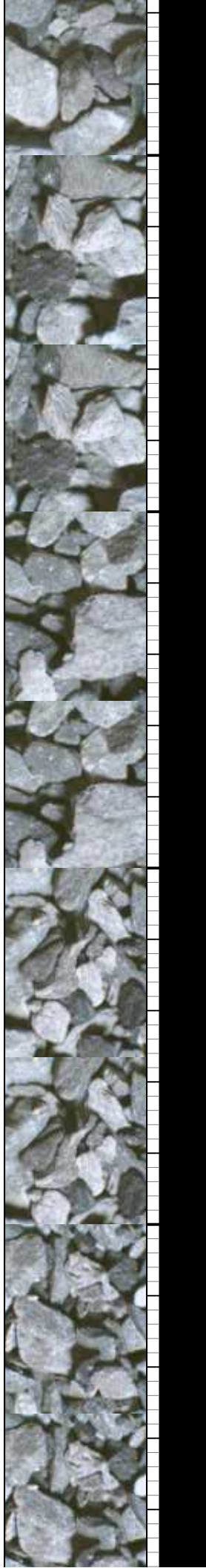


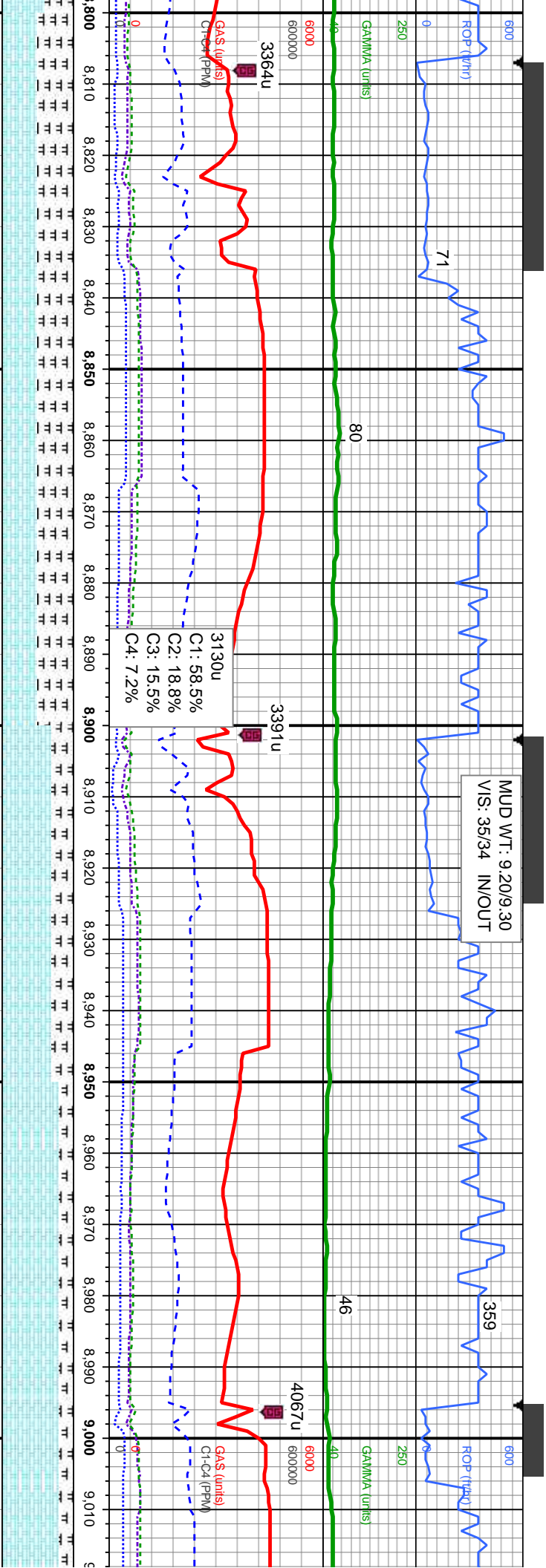




6550	MD: 8,650 TVD: 6,710.43 Inclination: 91.26 ° Azimuth: 356.9 ° VS: 1,995.39 f	MD: 8,745 TVD: 6,710.74 Inclination: 88.37 ° Azimuth: 356.35 ° VS: 2,090.34 f
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	70% CHK: lt - medgy brn, occ wh-crm, mot, lam, sft - brit, sb pty - sb blk, rthy tex 30% MRL: lt - med gy, sme blk, frm - mod hd, sb pty - sb blk, silty - grty tex, no bent, tr fos frag, v calc	70% CHK: lt - medgy brn, occ wh-crm, mot, lam, sft - brit, sb pty - sb blk, rthy tex 30% MRL: lt - med gy, sme blk, frm - mod hd, sb pty - sb blk, silty - grty tex, no bent, tr fos frag, v calc	60% CHK: lt - medgy brn, sme wh-crm, mot, lam, sft - brit, sb pty - sb blk, rthy tex 40% MRL: lt - med gy, sme blk, frm - mod hd, sb pty - sb blk, silty - grty tex, no bent, tr fos frag, v calc
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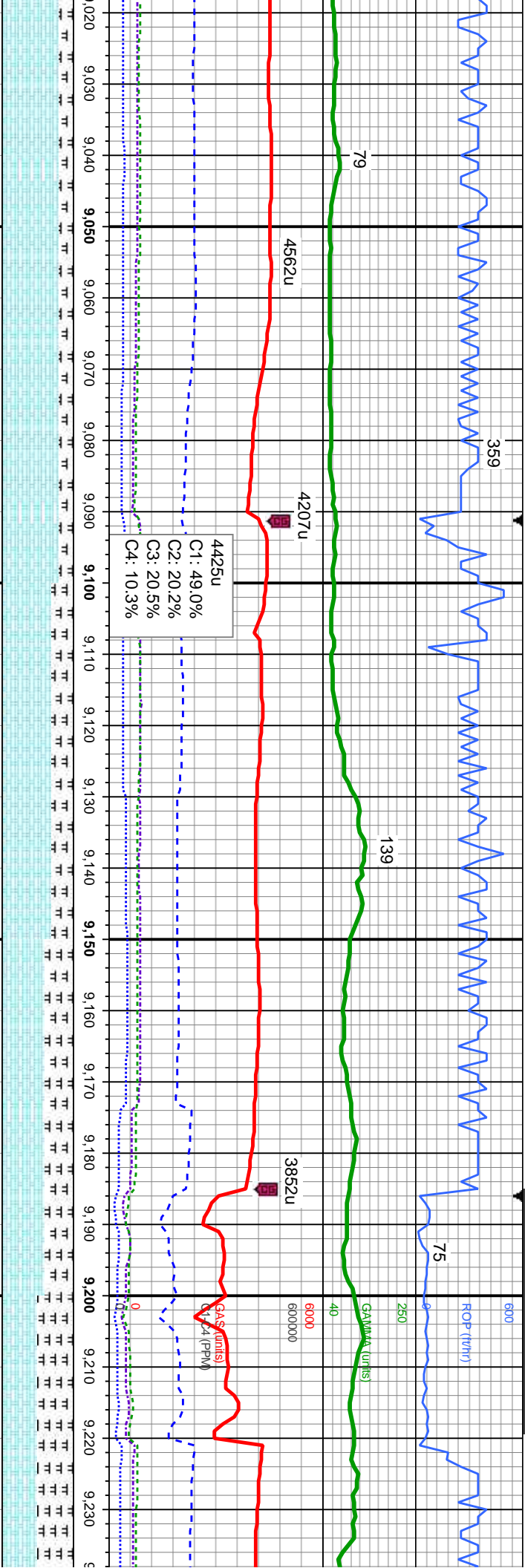




6550	MD: 8.840 TV D: 6,712.91 Inclination: 89.01 °	6550	MD: 8.935 TV D: 6,714.11 Inclination: 89.54 °	6550	MD: 8.935 TV D: 6,714.11 Inclination: 89.54 °
6550	Azimuth: 358.96 °	6550	Azimuth: 1.23 °	6550	Azimuth: 1.23 °
6550	VS: 2,185.3 ft	6550	VS: 2,280.24 ft	6550	VS: 2,280.24 ft

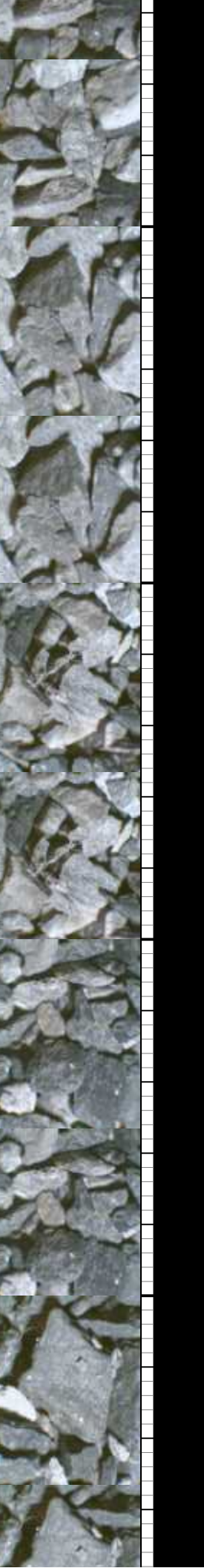
6550	50% CHK: lt - medgy brn, occ wh-crm, mot, lam, sft - brit, sb pty - sb blk, rthy tex	6550	50% CHK: lt - medgy brn, occ wh-crm, mot, lam, sft - brit, sb pty - sb blk, rthy tex	6550	80% CHK: lt - medgy brn, occ wh-crm, mot, lam, sft - brit, sb pty - sb blk, rthy tex	6550	80% CHK: lt - medgy brn, occ wh-crm, mot, lam, sft - brit, sb pty - sb blk, rthy tex
6550	50% MRL: lt - med gy, sme blk, frm - mod hd, sb pty - sb blk, silty - grty tex, no bent, sme fos frag, v calc	6550	50% MRL: lt - med gy, sme blk, frm - mod hd, sb pty - sb blk, silty - grty tex, no bent, sme fos frag, v calc	6550	30% MRL: lt - med gy, sme blk, frm - mod hd, sb pty - sb blk, silty - grty tex, no bent, tr fos frag, v calc	6550	20% MRL: lt - med gy, sme blk, frm - mod hd, sb pty - sb blk, silty - grty tex, no bent, tr fos frag, v calc
6550	6950	6550	6950	6550	6950	6550	6950



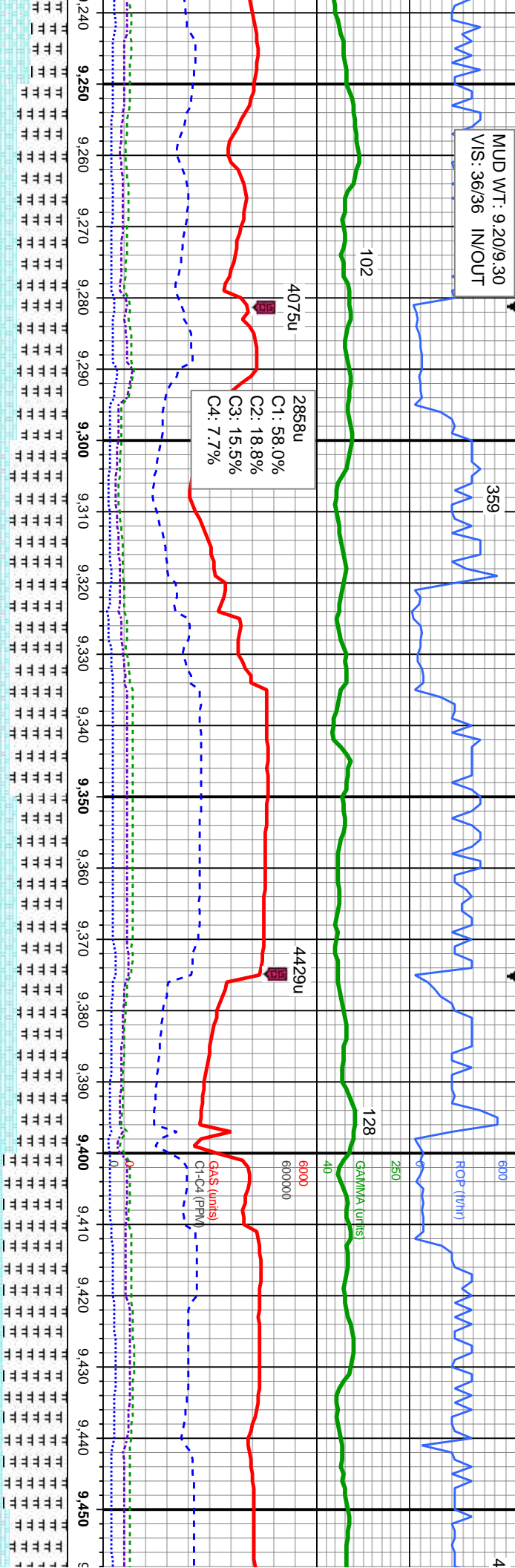


MD: 9,030 TVD: 6,713.35 Inclination: 91.39 ° Azimuth: 2.21 ° VS: 2,375.07	MD: 9,125 TVD: 6,709.51 Inclination: 93.24 ° Azimuth: 2.29 ° VS: 2,466.81	MD: 9,220 TVD: 6,705.21 Inclination: 91.94 ° Azimuth: 2.18 ° VS: 2,561.63
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medgy brn, sme wh-crm, rfrt, sb pfty - sb blk, rthy tex	80% CHK: lt - medgy brn, occ wh-crm, mot, lam, sft - brit, sb pfty - sb blk, rthy tex 20% MRL: lt - med gy, sme blk, frm - mod hd, sb pfty - sb blk, slty - grty tex, no bent, tr fos frag, v calc	70% CHK: lt - medgy brn, sme wh-crm, mot, lam, sft - brit, sb pfty - sb blk, rthy tex 30% MRL: lt - med gy, sme blk, frm - mod hd, sb pfty - sb blk, slty - grty tex, no bent, tr fos frag, v calc	60% CHK: lt - medgy brn, sme wh-crm, mot, lam, sft - brit, sb pfty - sb blk, rthy tex 40% MRL: lt - med gy, sme blk, frm - mod hd, sb pfty - sb blk, slty - grty tex, no bent, tr fos frag, v calc	50% CHK: lt - medgy brn, occ wh lam, sft - brit, sb pfty - sb blk, rth 50% MRL: lt - med gy, sme blk, fr hd, sb pfty - sb blk, slty - grty tex sme fos frag, v calc
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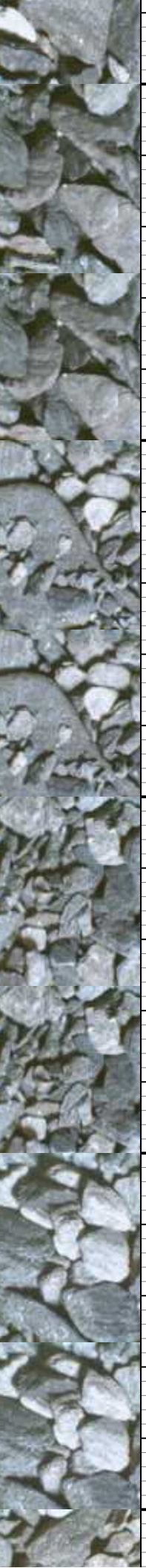
MUD WT: 9.20/9.30  
VIS: 36/36 IN/OUT



MD: 9.314  
TVD: 6.704.43  
Inclination: 89.01 °

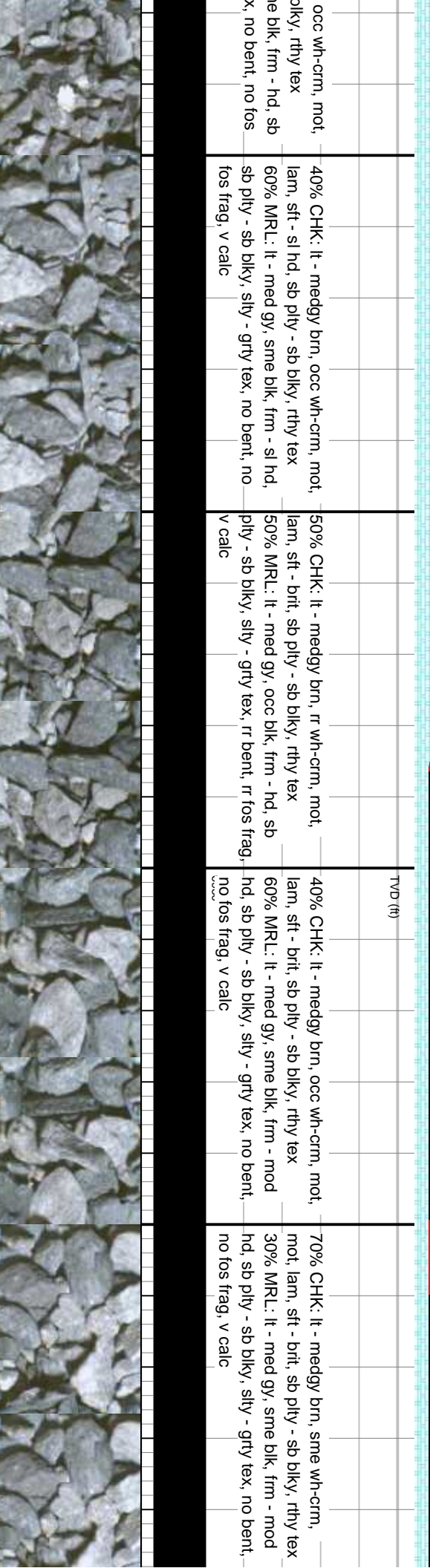
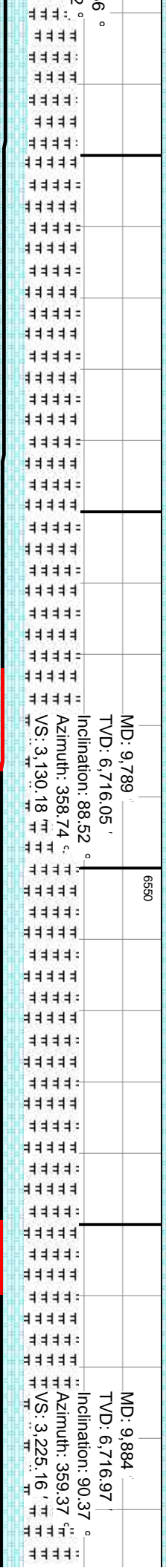
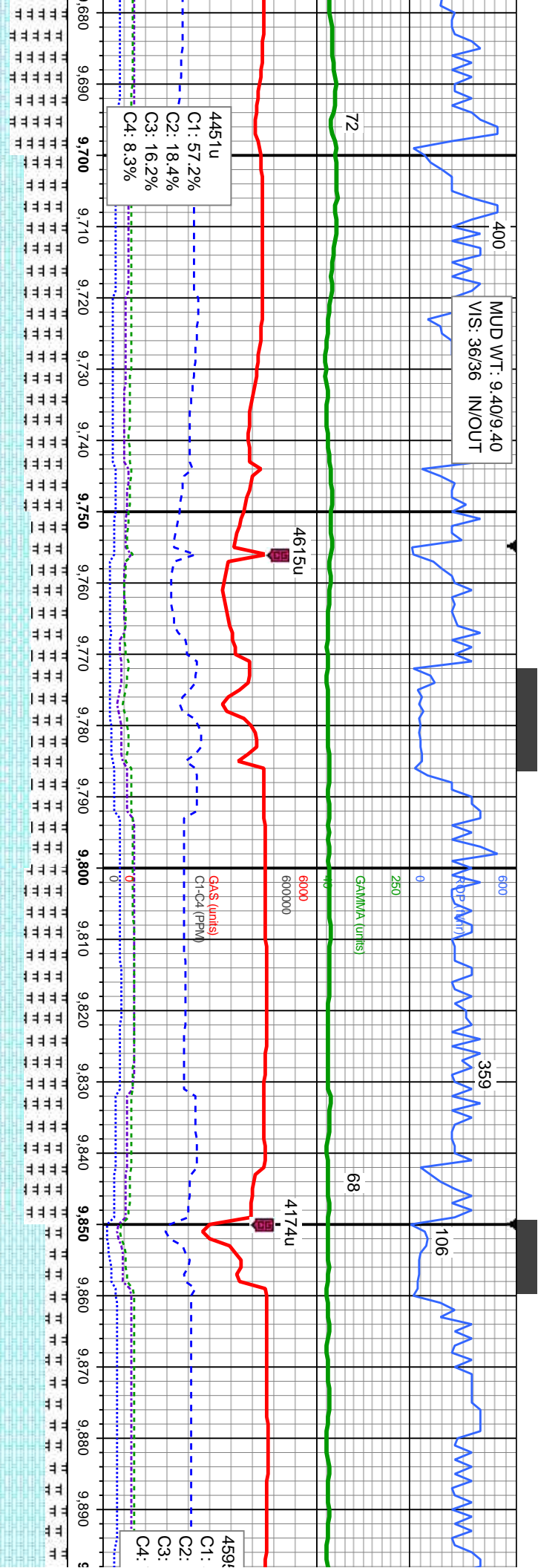
Azimuth: 0.88 °  
VS: 2.655.59 '  
VS: 2.751.51 '

30% CHK: It - medgy brn, occ wh-crm, mot, lam, sft - brit, sb pty - sb blk, rthy tex	20% CHK: It - medgy brn, occ wh-crm, mot, lam, sft - brit, sb pty - sb blk, rthy tex	30% CHK: It - medgy brn, occ wh-crm, mot, lam, sft - brit, sb pty - sb blk, rthy tex	10% CHK: It - medgy brn, occ wh-crm, mot, lam, sft - brit, sb pty - sb blk, rthy tex	20% C
m - mod	80% MRL: It - med gy, sme blk, frm - mod	70% MRL: It - med gy, sme blk, frm - mod	90% MRL: It - med gy, sme blk, frm - mod	lam, s
, no bent,	ply - sb blk, silty - grty tex, no bent, r	hd, sb pty - sb blk, silty - grty tex, no bent, r	sb pty - sb blk, silty - grty tex, no bent, r	ply -
sme fos frag, v calc	frag, v calc	fos frag, v calc	frag, v calc	frag, v



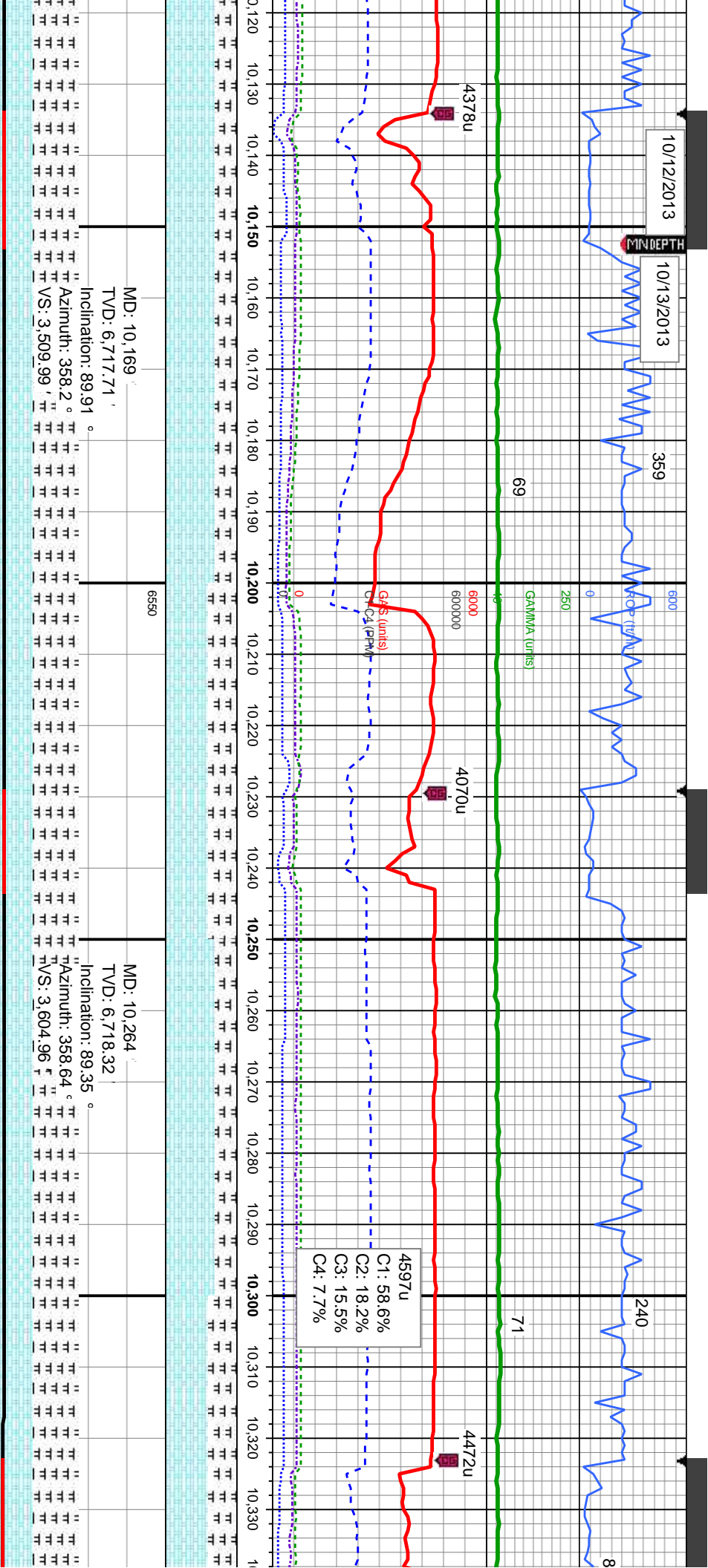




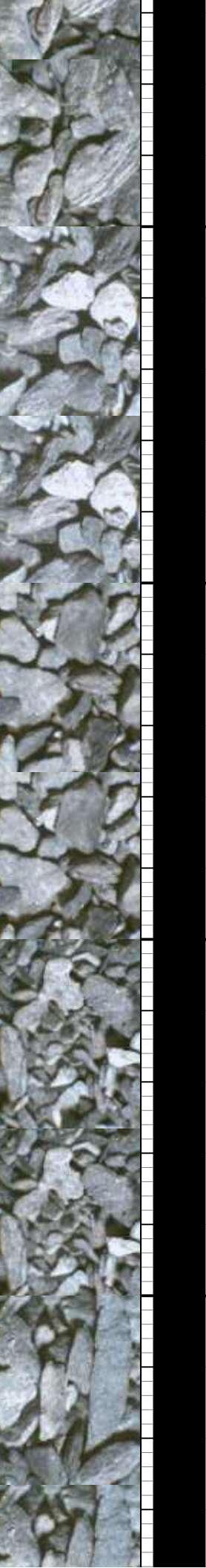








medgy brn, sme wh-crm, brit, sb ply - sb blk, rthy tex	70% CHK: It - medgy brn, occ wh-crm, mot, lam, sft - brit, occ hd, sb ply - sb blk, rthy tex	TVD (ft)	60% CHK: It - medgy brn, wh-crm, mot, lam, sft - brit, sb ply - sb blk, rthy tex	70% CHK: It - medgy brn, sme wh-crm, mot, lam, sft - brit, sb ply - sb blk, rthy tex	60% CHK: It - medgy brn, wh-crm, mot, lam, sft - sl hd, sb ply - sb blk, rthy tex
med gy, sme blk, frm - mod blk, silty - grty tex, no bent, calc	30% MRL: It - med gy, sme blk, frm - sl hd, sb ply - sb blk, silty - grty tex, no bent, fos frag, v calc		40% MRL: It - med gy, sme blk, frm - hd, sb ply - sb blk, silty - grty tex, no bent, fos frag, v calc	30% MRL: It - med gy, sme blk, frm - mod hd, sb ply - sb blk, silty - grty tex, no bent, no fos frag, v calc	40% MRL: It - med gy, sme blk, frm - mod ply - sb blk, silty - grty tex, no bent, frag, v calc



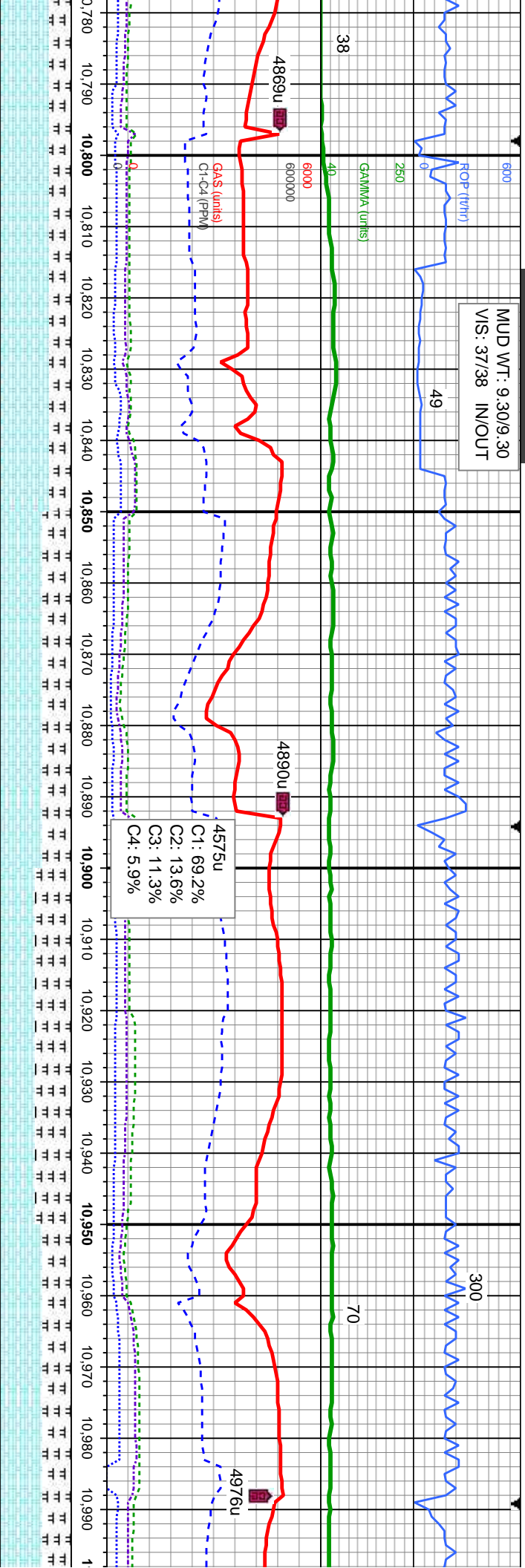






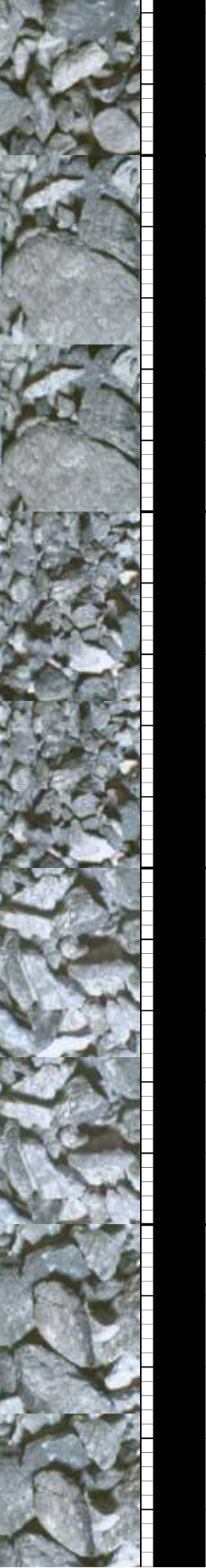


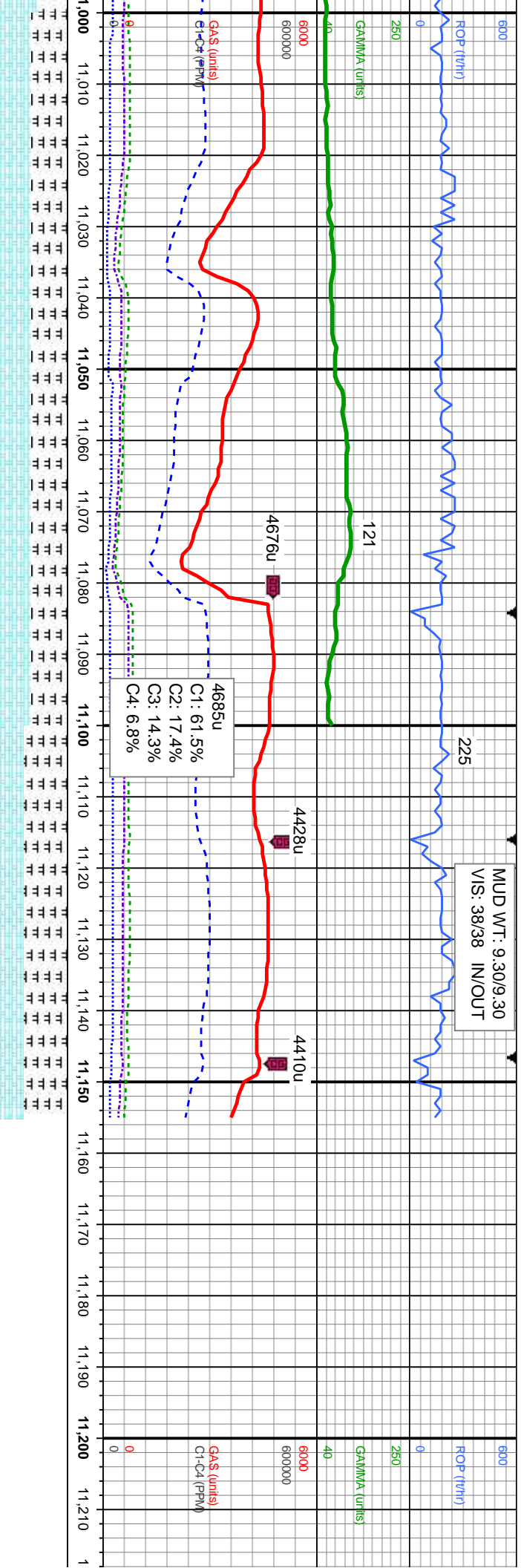
MUD WT: 9.30/9.30  
VIS: 37/38 IN/OUT



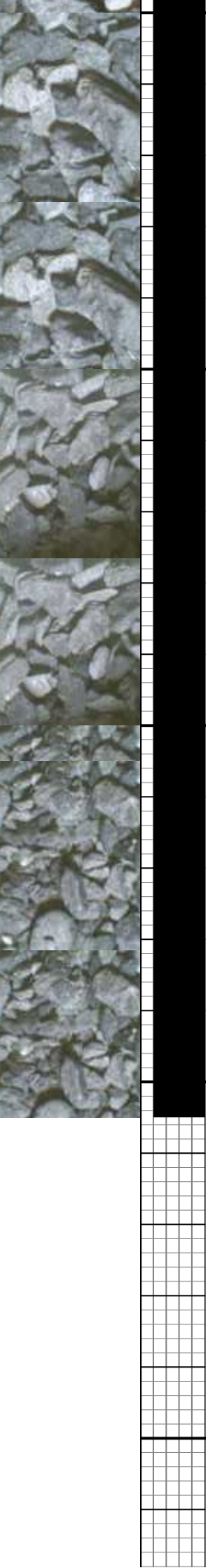
6550	MD: 10.833 TVD: 6,725.98 Inclination: 90.03 Azimuth: 0.55 VS: 4,176.17	
C Chalk		
	MD: 10.928 TVD: 6,727.1 Inclination: 88.61 Azimuth: 1.51 VS: 4,271.05	

	70% CHK: lt - medgy brn, sme wh-crm, mot, lam, sft - sl hd, sb ply - sb blk, rthy tex 30% MRL: lt - med gy, sme blk, frm - hd, sb ply - sb blk, slty - grty tex, no bent, sme fos frag, v calc	60% CHK: lt - medgy brn, sme wh-crm, mot, lam, sft - sl hd, sb ply - sb blk, rthy tex 40% MRL: lt - med gy, sme blk, frm - hd, sb ply - sb blk, slty - grty tex, no bent, sme fos frag, v calc	50% CHK: lt - medgy brn, sme wh-crm, mot, lam, sft - sl hd, sb ply - sb blk, rthy tex 50% MRL: lt - med gy, sme blk, frm - hd, sb ply - sb blk, slty - grty tex, no bent, sme fos frag, v calc	60% CHK: lt - medgy brn, sme wh-crm, mot, lam, sft - sl hd, sb ply - sb blk, rthy tex 40% MRL: lt - med gy, sme blk, frm - hd, sb ply - sb blk, slty - grty tex, no bent, sme fos frag, v calc
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MD: 11,023 TVD: 6,729.94'		MD: 11,094 TVD: 6,732.94'		MD: 11,155 TVD: 6,735.93'	
Inclination: 87.96 ° Azimuth: 0.73 ° VS: 4.365.9'		Inclination: 87.19 ° Azimuth: 0.34 ° VS: 4.436.78'		Inclination: 87.19 ° Azimuth: 0.34 ° VS: 4.497.68'	
50% CHK: lt - medgy brn, sme wh-crm, mot, lam, sft - sl hd, sb ply - sb blk, rthy tex		50% CHK: lt - medgy brn, sme wh-crm, mot, lam, sft - sl hd, sb ply - sb blk, rthy tex		40% CHK: lt - medgy brn, sme wh-crm, mot, lam, sft - sl hd, sb ply - sb blk, rthy tex	
50% MRL: lt - med gy, sme blk, frm - hd, sb ply - sb blk, slty - grty tex, no bent, sme fos frag, v calc		50% MRL: lt - med gy, sme blk, frm - hd, sb ply - sb blk, slty - grty tex, sme bent, sme fos frag, v calc		60% MRL: lt - med gy, sme blk, frm - hd, sb ply - sb blk, slty - grty tex, abnt bent, sme fos frag, v calc	
6950		6950		6950	



Wellsite Geological Services Provided  
By Columbine Logging

TD @ 11,155' MD @ 10:52 hrs MDT on 10/13



