

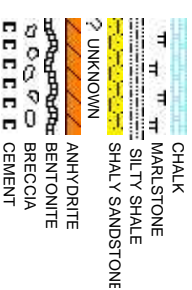
# COLUMBINE LOGGING

Scale: 5" / 100'  
Measured Depth Log

Well Name	Cougar B02-67-1HN_HORZ		
Location	SEC 2 T5N R64W		
State	COLORADO	County	WELD
Country	USA		
API Number	05-123-36406	Rig Number	H&P 315
Region	DJ BASIN	AFE #	136841
Spud Date	2/3/2014	Field	WATTENBERG
		Drilling Completed	2/9/2014
Surface Coordinates	NMNW SEC2 T5N R64W 566' FNL; 680' FWL LAT/LON 40.43407000/-104.52436000		
Bottom Hole Coordinates	NENE SEC2 T5N R64W 1650' FNL; 660' FEL		
Ground Elevation	4,641'	K.B. Elevation	4,665'
Logged Interval	2,000'	To	10,350'
		Total Depth	10,350'
Formation	NIOBRARA B CHALK		
Type of Drilling Fluid	LSND		

Company Noble Energy Inc  
Address 1625 BROADWAY  
DENVER, CO 80202

Name NATHAN MURPHY  
Company COLUMBINE LOGGING  
Address 2385 S LIPAN ST  
DENVER, CO 80229



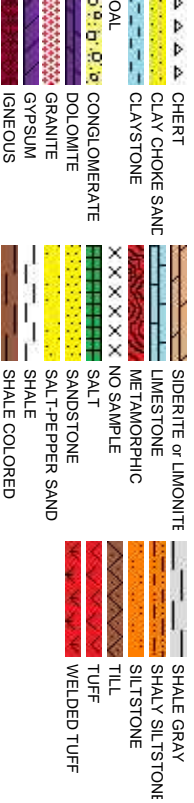
# Operator

RAY SUITE 2200  
0202

# Geologist

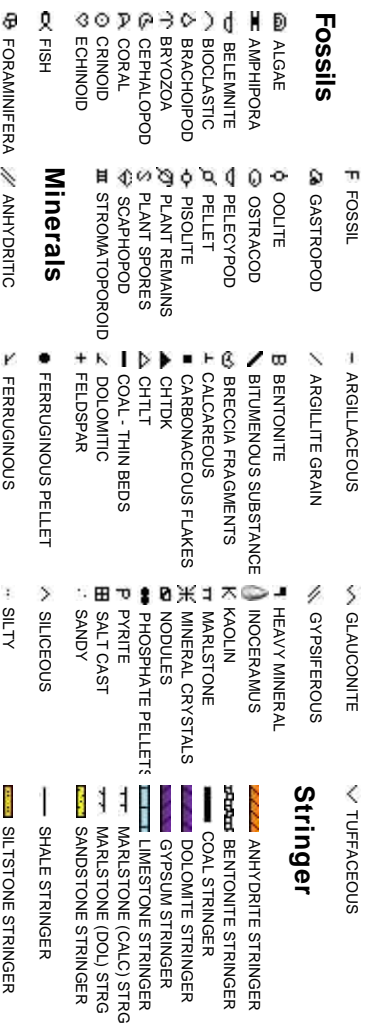
PHY, JACK W  
OGGING, INCST  
0223

## Rock Types



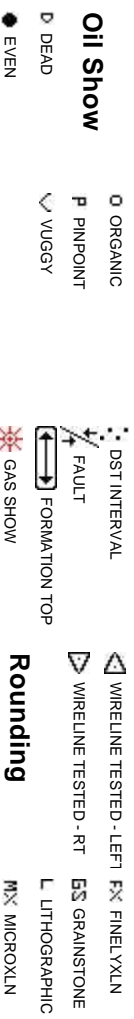
## Accessories

## Fossils



## Other Symbols

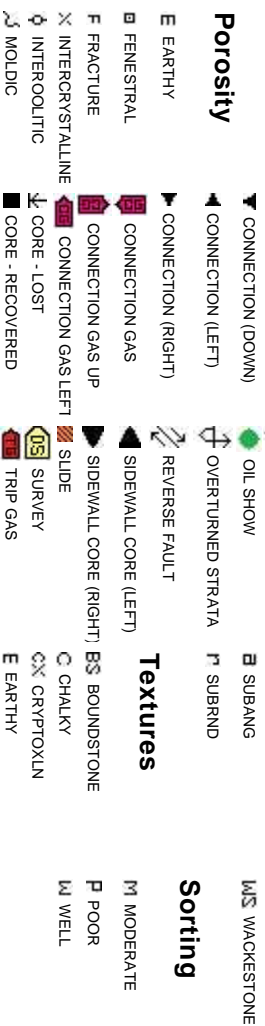
# Oil Show



# Engineering



## Porosity



## Textures



## Sorting



Slide/Rotate

ROP

ROF

Curves

GAMMA

Total Gas & Chromatograph

GAS

C1

C2

C3

C4

Gas data from iBall

ROP data from iBall

Gamma data from Sperry - Halliburton

2/06/2014, Mud Wt: 9.70, FV/s: 37  
PV/s: 9, YP: 7, GELS: 37/9, API Filt: 9.3  
CAKE: 1/0, pH: 9.5, Cl: 1,300, Ca: 120

319u  
C1: 78.7%  
C2: 9.4%  
C3: 10.3%  
C4: 1.5%

693u

Depth Labels

% Lith

Columbine Logging began logging with  
BloodHound unit 687 on 02/06/2014

50' Sample Interval @ 6,100' MD

Bit Data

Bit #: 2

Type: Smith

Model: MDi513

Size: 8.75"

Depth In: 6096'

Jets: 5x13,3x12

SLTY SH: pred lt gy, occ med gy, hd, pily - sb  
pily, occ sb blkly, silty - grty tex, v sl calc  
SHY SS: lt gy, s&g, vfg, mod hd wi brit clus,  
sb ang - sb rd, sl calc cnt

SLTY SH: pred lt gy, occ med gy, hd, pily - sb  
pily, occ sb blkly, silty - grty tex, v sl calc  
SHY SS: lt gy, s&g, vfg, mod hd wi brit clus,  
sb ang - sb rd, sl calc cnt

SLTY SH: pred lt gy, occ  
pily, occ sb blkly, silty - gr  
SHY SS: lt gy, s&g, vfg, n  
sb ang - sb rd, sl calc cnt

MD: 6,196'

TV/D: 6,092.66'

Inclination: 15 °

Azimuth: 140.39 °

VS: 308.39'

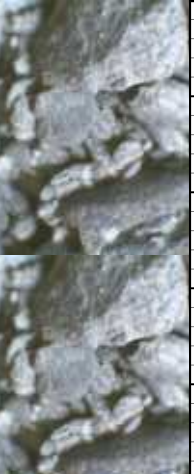
5900

<<S

Oil Show

ST  
TF  
ME

Images





MUD WT: 9.85/9.90  
VIS: 32/32 IN/OUT

MUD WT: 10.00/9.90  
VIS: 30/31 IN/OUT

242

ROP (ft/hr)

111

117

118

114

1224u

C1: 69.4%  
C2: 14.4%  
C3: 11.0%  
C4: 5.2%

GAS (units)  
C1-C4 (PPM)

2274u

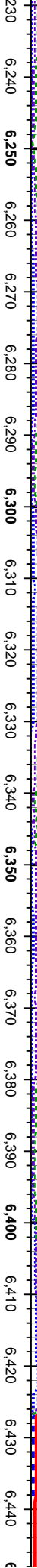
1236u

1700u

2579u

1506u

Elec



SCALE CHANGE>>

6100

MD: 6,244'  
TVD: 6,138.61'  
Inclination: 18.68°  
Azimuth: 126.29°  
VS: 320.59'

MD: 6,291'  
TVD: 6,182.73'  
Inclination: 21.71°  
Azimuth: 117.4°  
VS: 336.07'

MD: 6,386'  
TVD: 6,269.52'  
Inclination: 26.86°  
Azimuth: 107.39°  
VS: 374.25'

MD: 6,434'  
TVD: 6,311.54'  
Inclination: 30.94°  
Azimuth: 106.48°  
VS: 397.43'

TVD (ft)

TVD (ft)

SLTY SH: pred lt gy, occ med gy, hd, pily - sb  
pily, occ sb blkly, silty - grty tex, v sl calc  
SHY SS: lt gy, s&g, vfg, mod hd wi brit clus,  
sb ang - sb rd, sl calc cnt

SLTY SH: pred lt gy, occ med gy, hd, pily - sb  
pily, occ sb blkly, silty - grty tex, v sl calc  
SHY SS: lt gy, s&g, vfg, mod hd wi brit clus,  
sb ang - sb rd, sl calc cnt

SLTY SH: pred lt gy, occ med gy, hd, pily - sb  
pily, occ sb blkly, silty - grty tex, v sl calc  
SHY SS: lt gy, s&g, vfg, mod hd wi brit clus,  
sb ang - sb rd, sl calc cnt

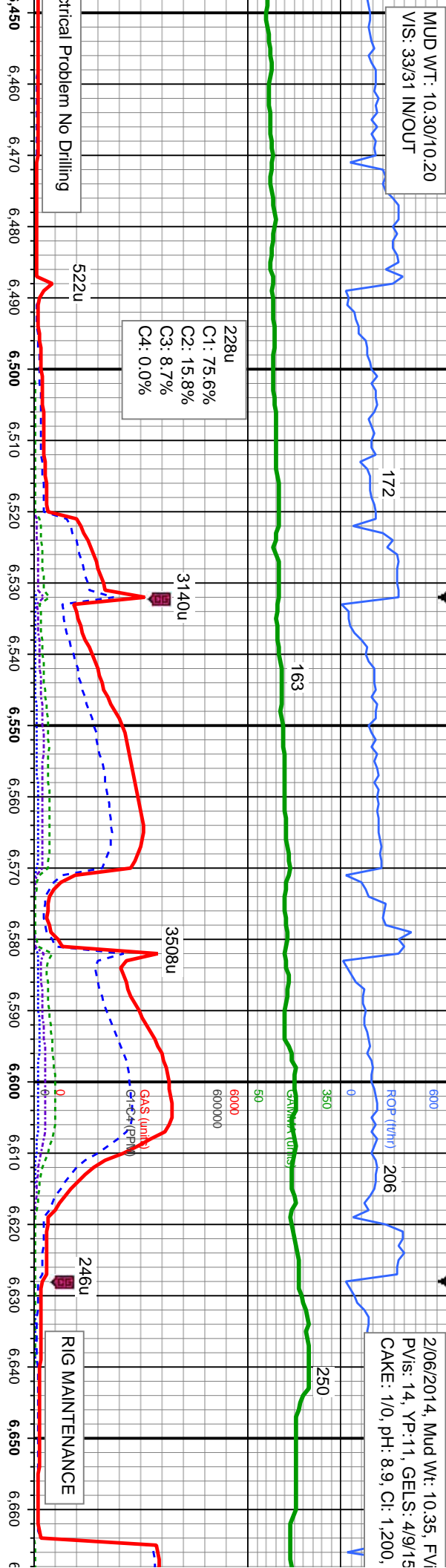
SLTY SH: pred lt gy, occ med gy, hd, pily - s  
pily, occ sb blkly, silty - grty tex, v sl calc  
SHY SS: lt gy, s&g, vfg, mod hd wi brit clus,  
sb ang - sb rd, sl calc cnt





MUD WT: 10.30/10.20  
VIS: 33/31 IN/OUT

2/06/2014, Mud Wt: 10.35, FVI  
PVIs: 14, YP: 11, GELS: 4/9/15  
CAKE: 1/0, pH: 8.9, Cl: 1.200,



<<SCALE CHANGE>>

25' Sample Interval @ 6,600' MD

Sharon  
6,674 M

MD: 6,480'  
TVD: 6,350.42'  
Inclination: 33.66 °  
Azimuth: 101.38 °  
VS: 421.98'

MD: 6,528'  
TVD: 6,389.59'  
Inclination: 36.95 °  
Azimuth: 100.53 °  
VS: 449.66'

MD: 6,575'  
TVD: 6,426.21'  
Inclination: 40.66 °  
Azimuth: 97.37 °  
VS: -1,011.07'

MD: 6,623'  
TVD: 6,461.09'  
Inclination: 46.07 °  
Azimuth: 98.2 °  
VS: -1,015.55'

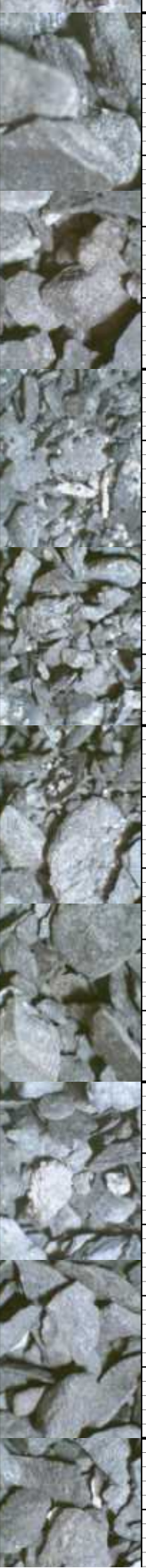
SLTY SH: pred lt gy, occ med gy, hd, pty - sb  
pty, occ sb blk, silty - grty tex, v sl calc  
SHY SS: lt gy, s&g, vfg, mod hd w/ brit clus,  
sb ang - sb rd, sl calc cnt

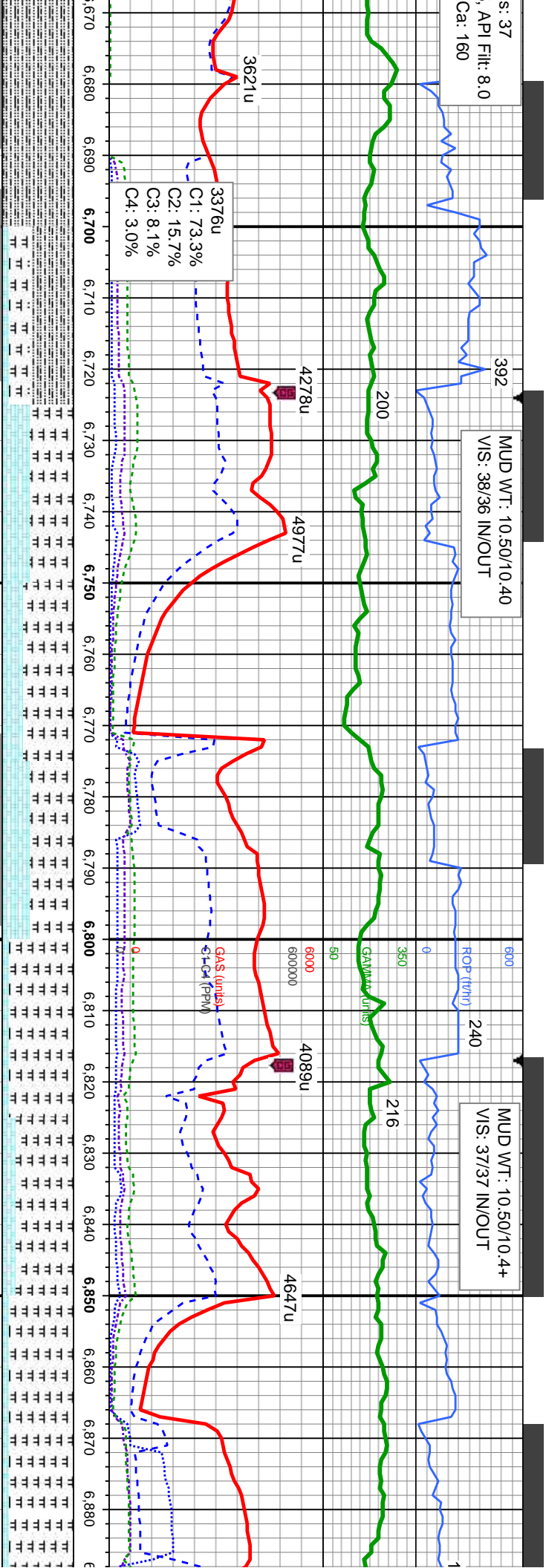
SLTY SH: pred lt gy, occ med gy, hd, pty - sb  
pty, occ sb blk, silty - grty tex, v sl calc  
SHY SS: lt gy, s&g, vfg, mod hd w/ brit clus,  
sb ang - sb rd, sl calc cnt

SLTY SH: pred lt gy, occ med gy, hd, pty -  
sb pty, occ sb blk, silty - grty tex, v sl calc

SLTY SH: pred lt gy, occ med gy, hd, pty -  
sb pty, occ sb blk, silty - grty tex, v sl calc,  
sme bent

SLTY SH: pred  
sb pty, occ sb l  
abt bent





Spring Marker @  
D: 6,494' TVD

Niobrara Top @  
6,700' MD: 6,509' TVD

Nio A Chalk Top @  
6,734' MD: 6,529' TVD

Nio A Marl Top @  
6,773' MD: 6,550' TVD

MD: 6,718'  
TVD: 6,520.62'  
Inclination: 54.98°  
Azimuth: 98.48°  
VS: -1.026.22'

MD: 6,765'  
TVD: 6,546.64'  
Inclination: 57.79°  
Azimuth: 99.05°  
VS: -1.032.18'

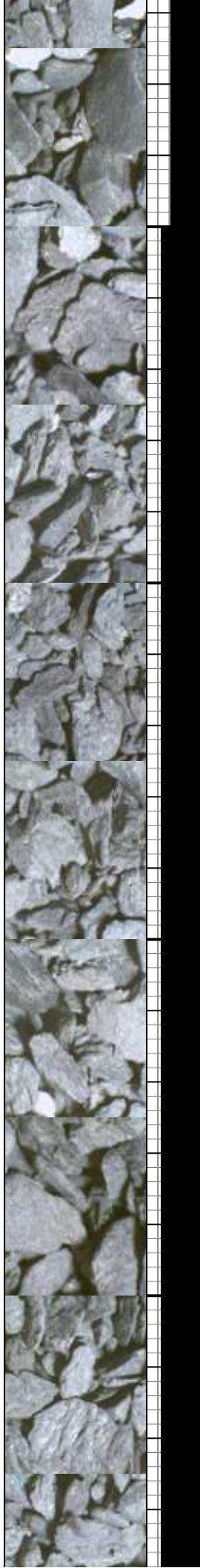
MD: 6,813'  
TVD: 6,571.07'  
Inclination: 61.01°  
Azimuth: 98.93°  
VS: -1.038.64'

MD: 6,860'  
TVD: 6,592.24'  
Inclination: 65.45°  
Azimuth: 96.88°  
VS: -1.044.39'

SLTY SH: pred lt gy, occ med gy, hd, ply -  
sb ply, occ sb blk, sily - grty tex, v sl calc  
MRL: lt - med gy, occ blk, sft - mod hd, sb  
ply - ply, sily - grty tex CHK: pred tan wi wh,  
sme lgy, mot, lam, sft - frm, sb ply - sb blk,  
rthy tex, v calc, abnt bent

MRL: lt - med gy, occ blk, sft - mod hd, sb ply  
- ply, sily - grty tex  
CHK: pred tan wi wh, sme lgy, mot, lam, sft -  
frm, sb ply - sb blk, rthy tex, v calc, sme bent

MRL: lt - med gy, occ blk, sft - mod  
- ply, sily - grty tex  
CHK: pred tan wi wh, sme lgy, mot, lam, sft -  
frm, sb ply - sb blk, rthy tex, v calc, sme bent

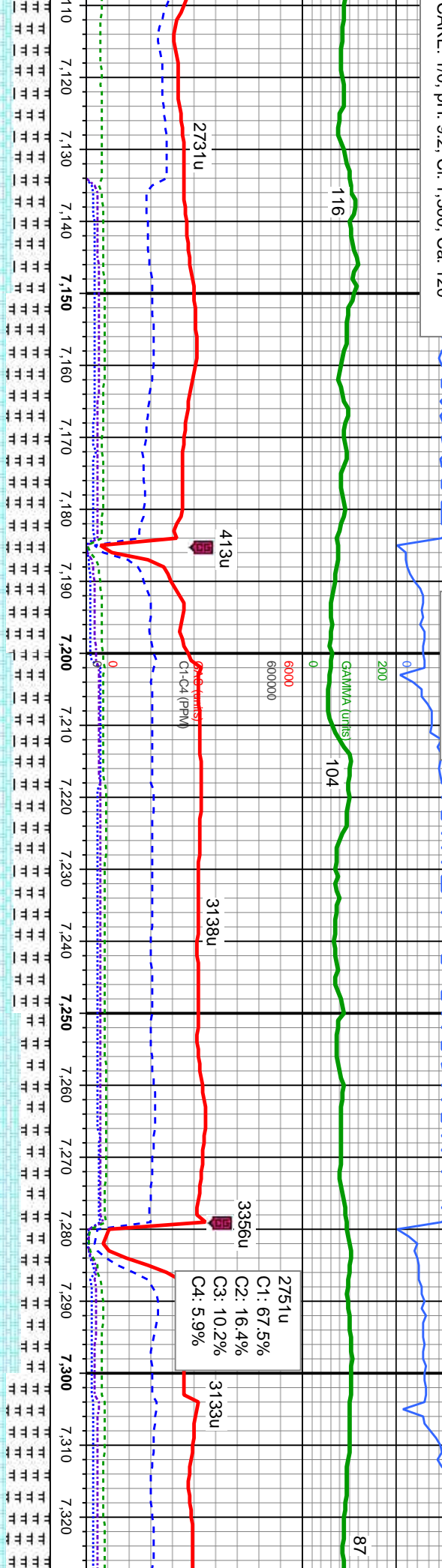






2/08/2014, Mud Wt: 10.65, FV/s: 36  
PV/s: 10, YP: 9, GELS: 3/7/13, API Filt: 8.4  
CAKE: 1/0, pH: 9.2, Cl: 1,300, Ca: 120

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



50' Sample Interval @ 7100' MD

**Bit Data**  
Bit #: 3  
Type: Varel  
Model: VS513D  
Size: 6.12"  
MD: 7,125'  
TVD: 6,655.8'  
Inclination: 85.1°  
Azimuth: 89.03°  
Depth In: 7,094'  
VS: -1,060.8'  
Jets: 5x13

MD: 7,220'  
TVD: 6,663.24'  
Inclination: 85.93°  
Azimuth: 90.67°  
VS: -1,060.56'

MD: 7,314'  
TVD: 6,668.2'  
Inclination: 88.03°  
Azimuth: 89.81°  
VS: -1,060.95'

MD (ft)	VS (ft)	Log Description
7,110	-1,060.8'	40%CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 60% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, rr bent, no fos frag
7,120	-1,060.8'	40%CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 60% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, rr bent, no fos frag
7,130	-1,060.8'	40%CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 60% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, rr bent, no fos frag
7,140	-1,060.8'	40%CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 60% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, rr bent, no fos frag
7,150	-1,060.8'	40%CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 60% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, rr bent, no fos frag
7,160	-1,060.8'	40%CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 60% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, rr bent, no fos frag
7,170	-1,060.8'	40%CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 60% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, rr bent, no fos frag
7,180	-1,060.8'	40%CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 60% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, rr bent, no fos frag
7,190	-1,060.8'	40%CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 60% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, rr bent, no fos frag
7,200	-1,060.8'	40%CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 60% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, rr bent, no fos frag
7,210	-1,060.8'	40%CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 60% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, rr bent, no fos frag
7,220	-1,060.8'	40%CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 60% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, rr bent, no fos frag
7,230	-1,060.8'	40%CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 60% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, rr bent, no fos frag
7,240	-1,060.8'	40%CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 60% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, rr bent, no fos frag
7,250	-1,060.8'	40%CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 60% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, rr bent, no fos frag
7,260	-1,060.8'	40%CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 60% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, rr bent, no fos frag
7,270	-1,060.8'	40%CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 60% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, rr bent, no fos frag
7,280	-1,060.8'	40%CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 60% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, rr bent, no fos frag
7,290	-1,060.8'	40%CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 60% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, rr bent, no fos frag
7,300	-1,060.8'	40%CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 60% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, rr bent, no fos frag
7,310	-1,060.8'	40%CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 60% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, rr bent, no fos frag
7,320	-1,060.8'	40%CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 60% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, rr bent, no fos frag

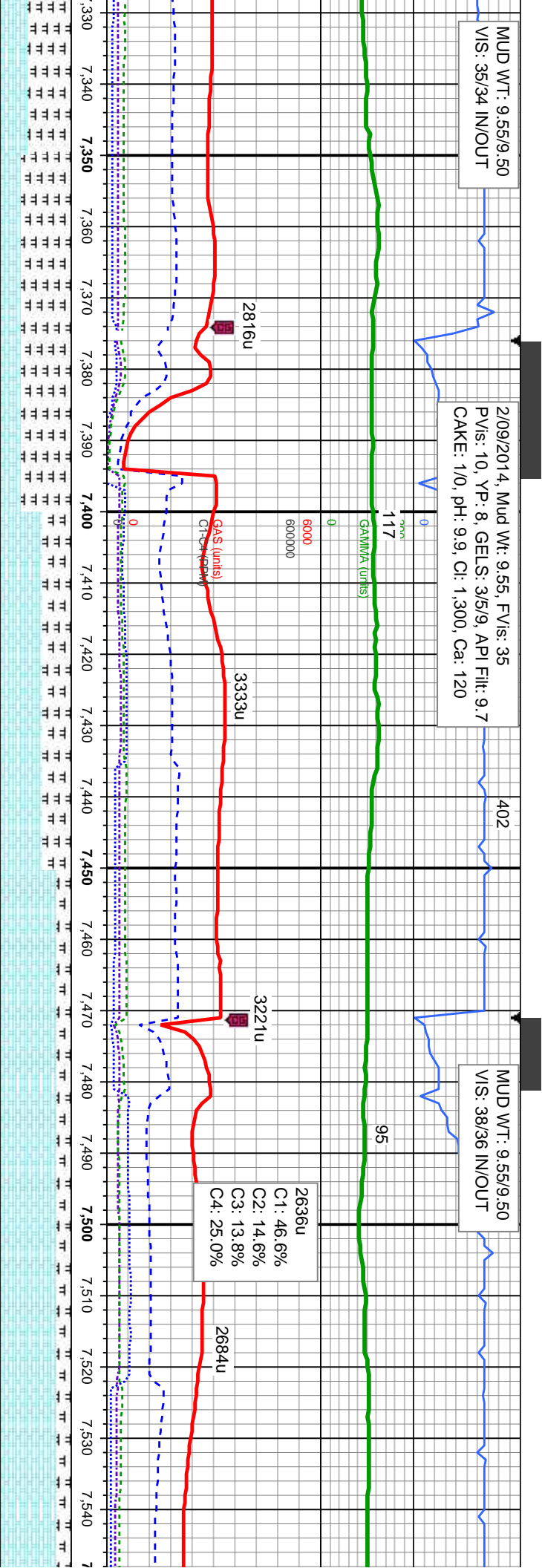




MUD WT: 9.55/9.50  
VIS: 35/34 IN/OUT

2/09/2014, Mud Wt: 9.55, FVIs: 35  
PVIs: 10, YP: 8, GEELS: 3/5/9, API Filtr: 9.7  
CAKE: 1/0, pH: 9.9, CI: 1.300, Ca: 120

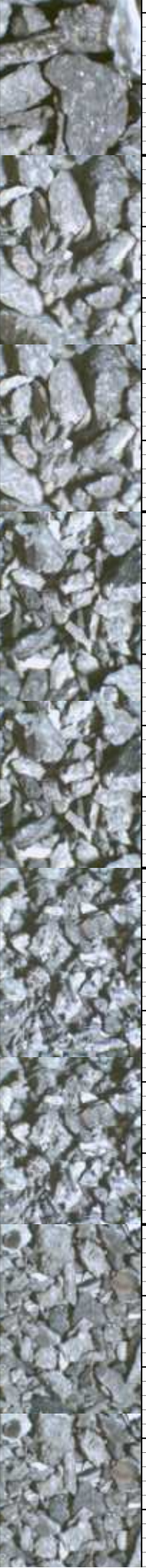
MUD WT: 9.55/9.50  
VIS: 38/36 IN/OUT

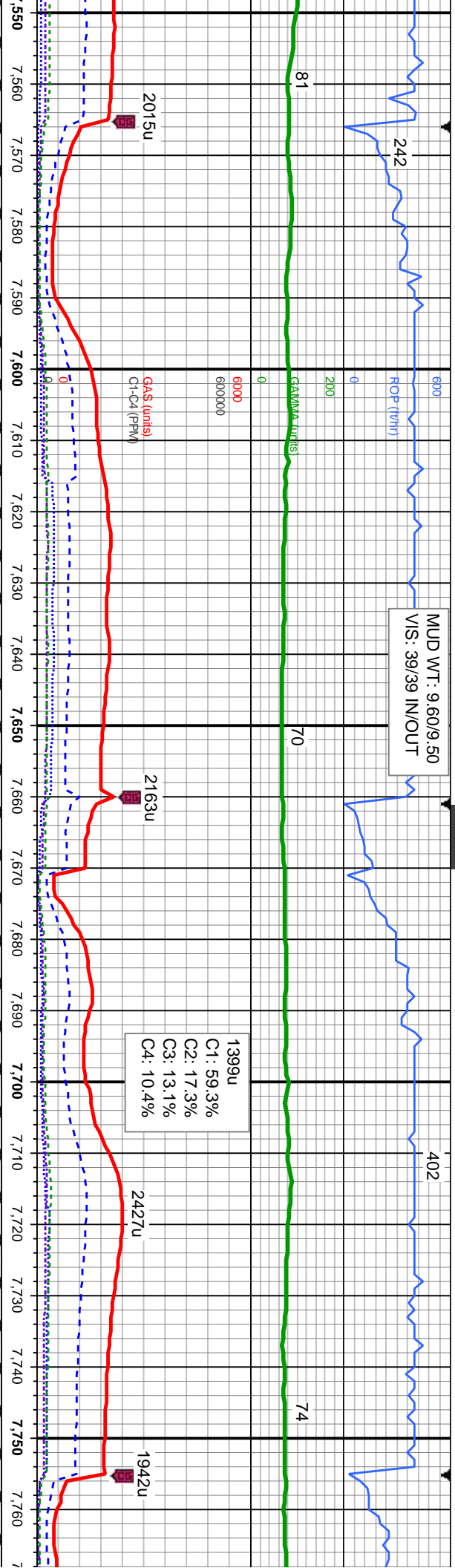


MD: 7,409'  
TVD: 6,669.53'  
Inclination: 90.37°  
Azimuth: 90.94°  
VS: 1,232.32'

MD: 7,504'  
TVD: 6,668.38'  
Inclination: 91.02°  
Azimuth: 91.65°  
VS: 1,324.75'

sne llyg, mot, blk, rthy tex, v calc	30%CHK: pred tan wi wh, sme llyg, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc	60%CHK: pred tan wi wh, sme llyg, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc	80%CHK: pred tan wi wh, sme llyg, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc	80%CHK: pred tan wi wh, sme llyg, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc
70% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grty tex, no bent, no fos	70% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grty tex, no bent, no fos	40% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grty tex, tr bent, sme fos	20% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grty tex, tr bent, sme fos	20% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grty tex, tr bent, tr fos frag





MUD WT: 9.60/9.50  
VIS: 39/39 IN/OUT

C1: 59.3%  
C2: 17.3%  
C3: 13.1%  
C4: 10.4%

MD: 7,599'  
TVD: 6,666.28'  
Inclination: 91.51°  
Azimuth: 91.35°  
VS: 1,417.24'

MD: 7,694'  
TVD: 6,663.98'  
Inclination: 91.26°  
Azimuth: 89.59°  
VS: 1,509.32'

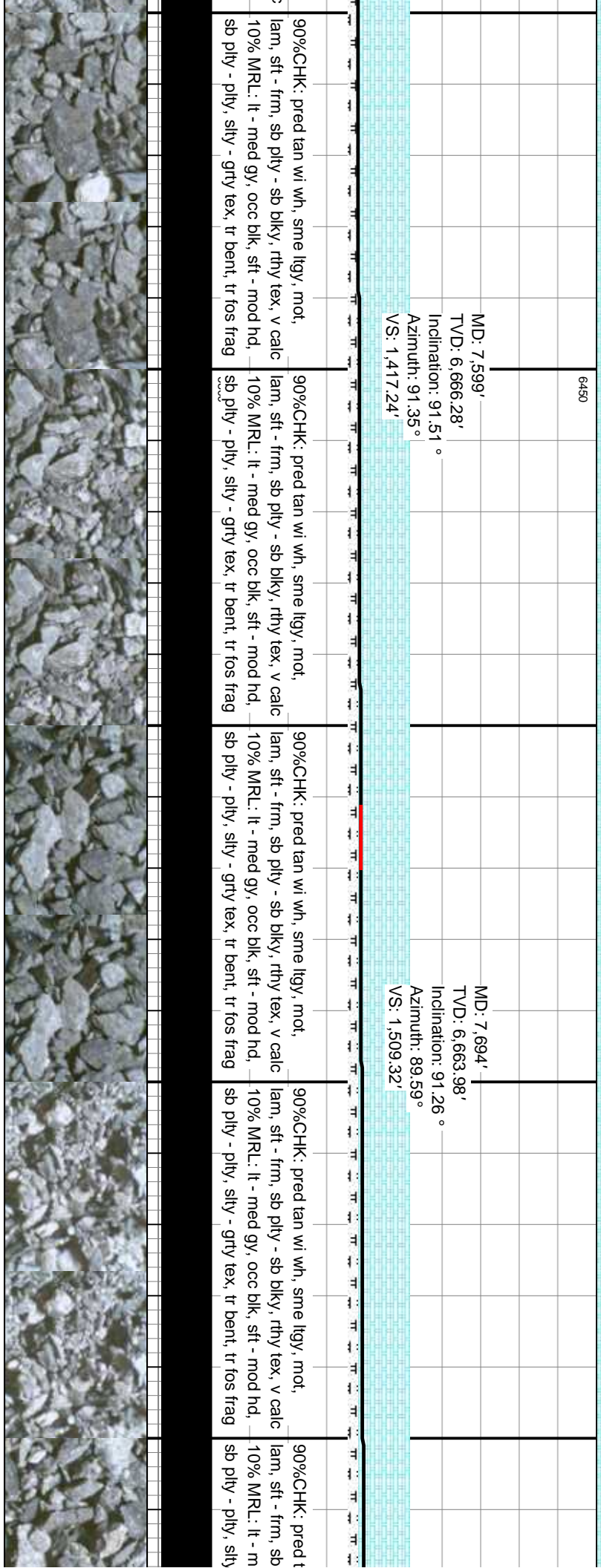
90%CHK: pred tan wi wh, sme lgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 10% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grfy tex, tr bent, tr fos frag

90%CHK: pred tan wi wh, sme lgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 10% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grfy tex, tr bent, tr fos frag

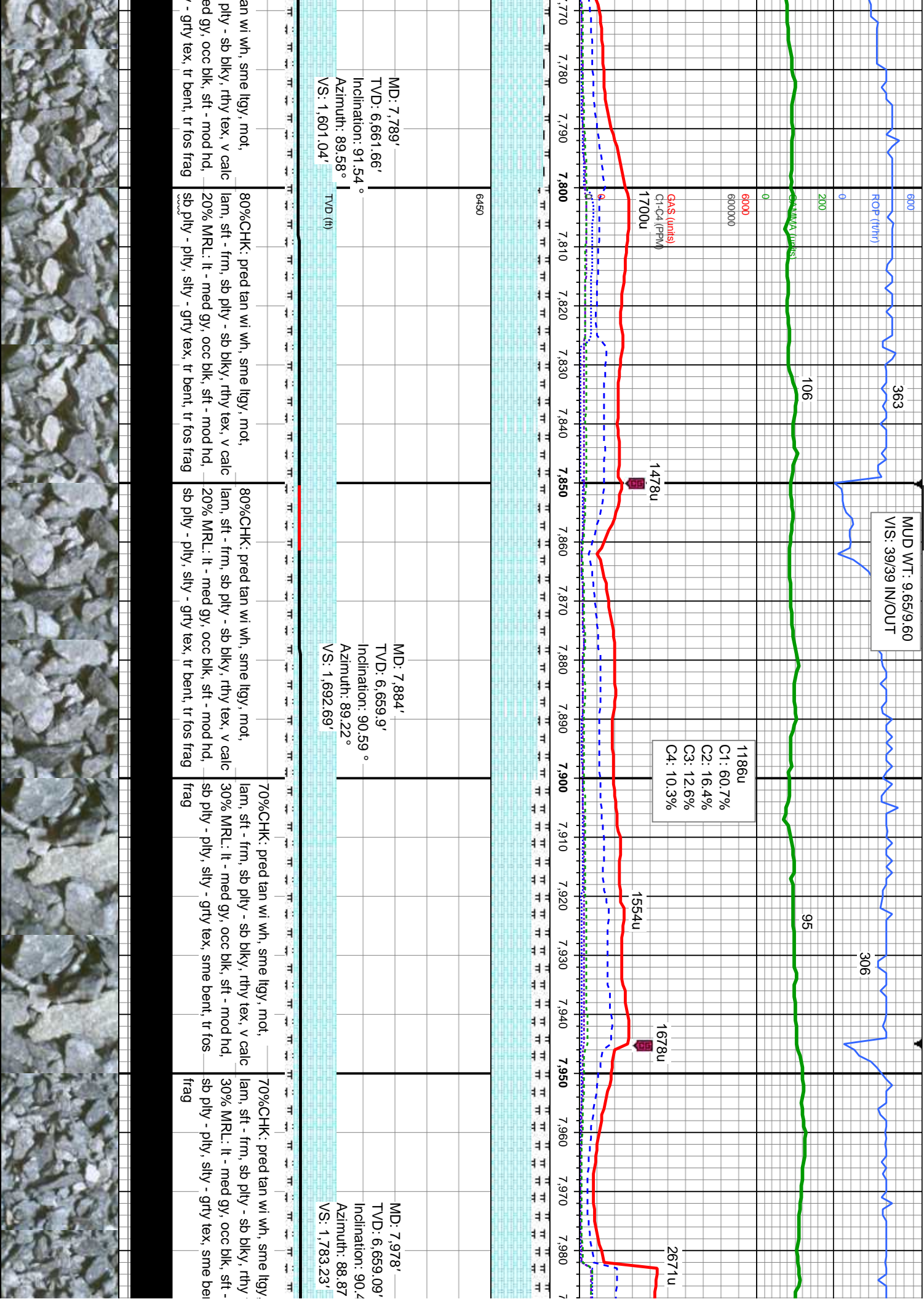
90%CHK: pred tan wi wh, sme lgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 10% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grfy tex, tr bent, tr fos frag

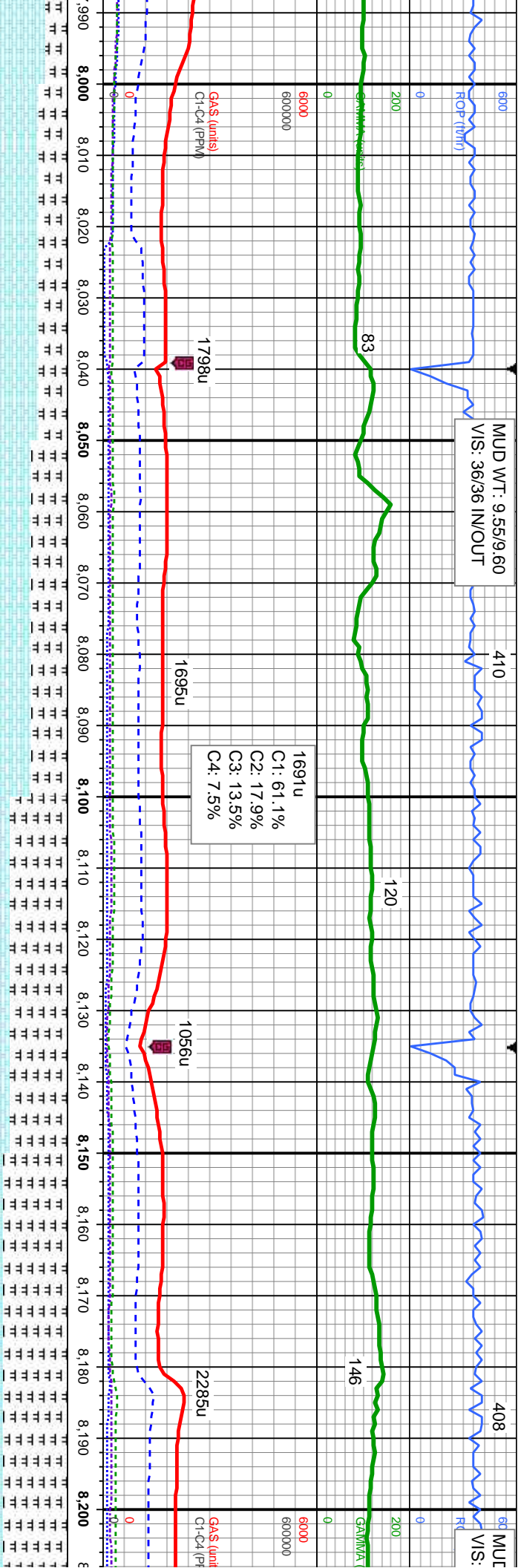
90%CHK: pred tan wi wh, sme lgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 10% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grfy tex, tr bent, tr fos frag

90%CHK: pred tan wi wh, sme lgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 10% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grfy tex, tr bent, tr fos frag





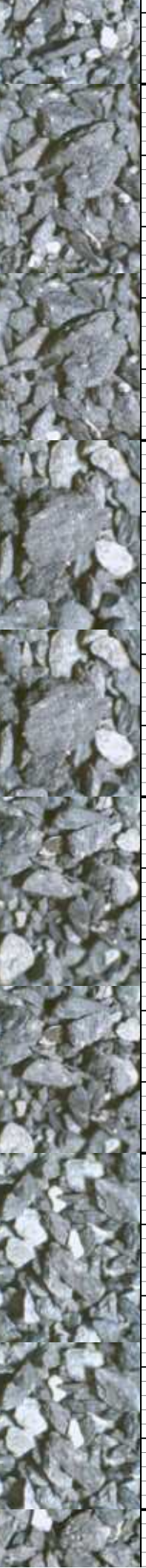




MD: 8,073'  
TVD: 6,658.78'  
Inclination: 89.97 °  
Azimuth: 88.5 °  
VS: 1,874.57'

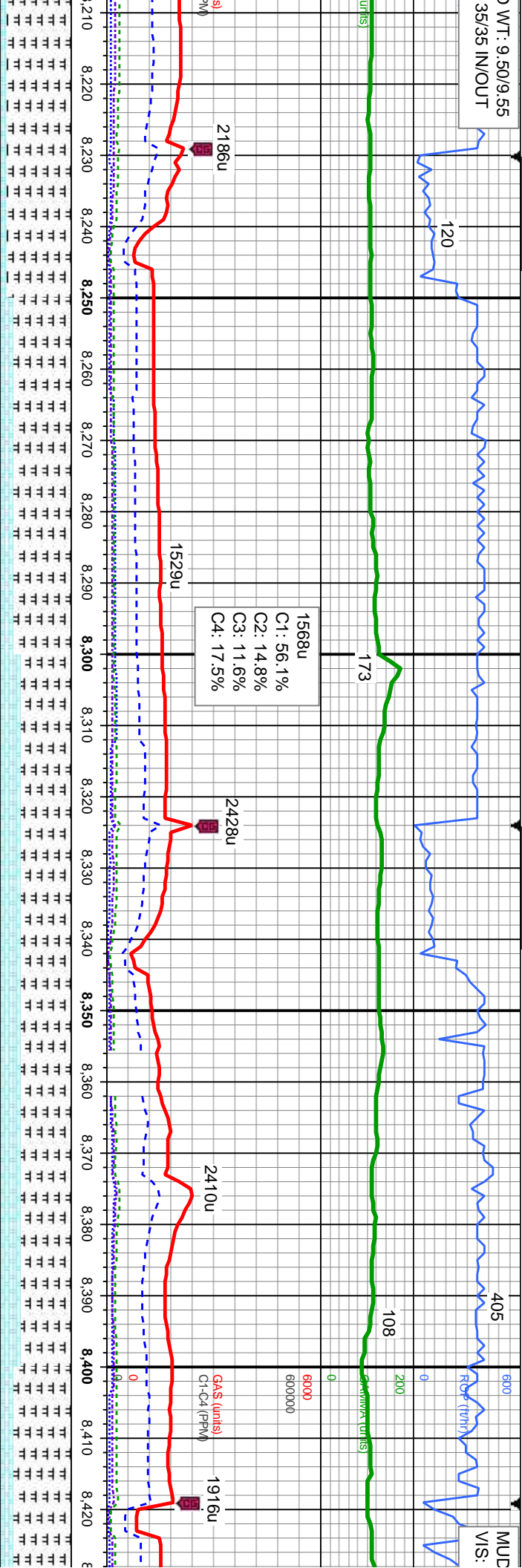
MD: 8,168'  
TVD: 6,659.47'  
Inclination: 89.2 °  
Azimuth: 87.3 °  
VS: 1,965.55'

60%CHK: pred tan wi wh, sme lly, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 40% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grfy tex, sme bent, tr fos frag	50%CHK: pred tan wi wh, sme lly, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 50% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grfy tex, abnt bent, tr fos frag	20%CHK: pred tan wi wh, sme lly, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 80% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grfy tex, abnt bent, tr fos frag	10%CHK: pred tan wi wh, sme lly, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 90% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grfy tex, v abnt bent, tr fos frag	10%CHK: pred tan wi wh, sme lly, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 90% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grfy tex, v abnt bent, tr fos frag





WT: 9.50/9.55  
35/35 IN/OUT



MD: 8,263'  
TVD: 6,660.88'  
Inclination: 89.11 °  
Azimuth: 89.59 °  
VS: 2,056.77'

MD: 8,358'  
TVD: 6,660.24'  
Inclination: 91.67 °  
Azimuth: 90.94 °  
VS: 2,148.78'

TVD (ft)

CHK: pred tan wi wh, sme lly, mod, t - frm, sb ply - sb blk, rthy tex, v calc  
MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grfy tex, v abnt bent, tr fos

20%CHK: pred tan wi wh, sme lly, mod, lam, sft - frm, sb ply - sb blk, rthy tex, v calc  
80% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grfy tex, abnt bent, tr fos frag

30%CHK: pred tan wi wh, sme lly, mod, lam, sft - frm, sb ply - sb blk, rthy tex, v calc  
70% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grfy tex, abnt bent, tr fos frag

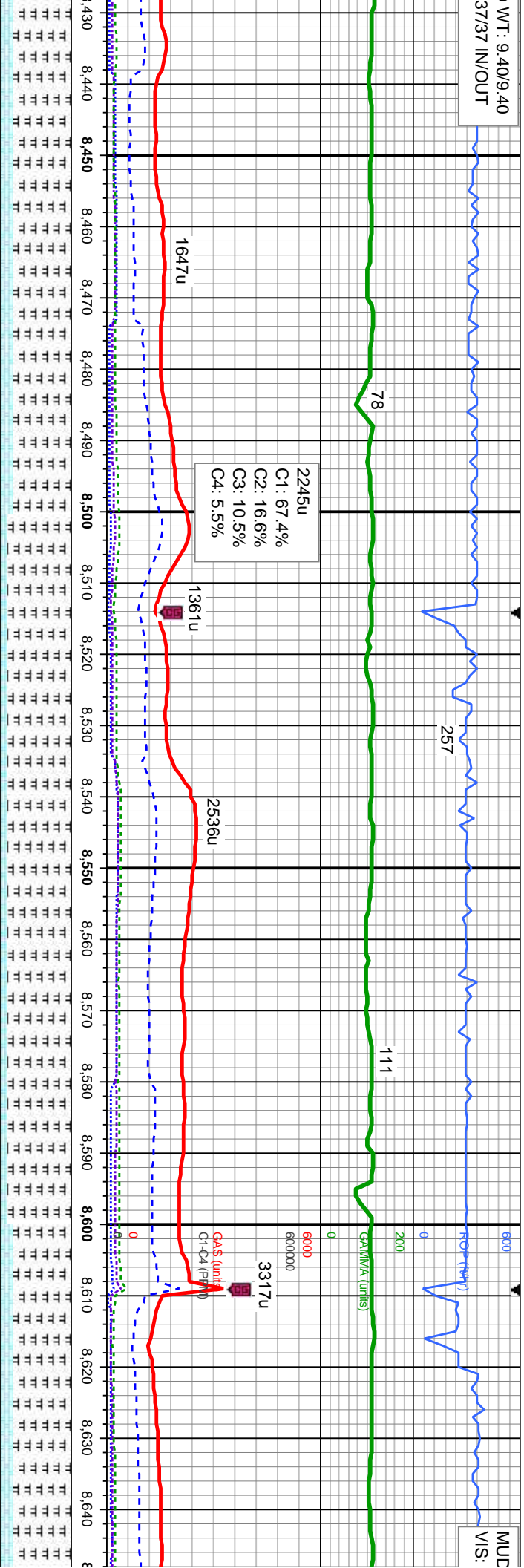
30%CHK: pred tan wi wh, sme lly, mod, lam, sft - frm, sb ply - sb blk, rthy tex, v calc  
70% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grfy tex, abnt bent, tr fos frag

20%CHK: pred tan wi wh, lam, sft - frm, sb ply - sb l 80% MRL: lt - med gy, occ sb ply - ply, silty - grfy tex frag



WT: 9.40/9.40  
37/37 IN/OUT

MUC  
VIS:



MD: 8,453'  
TVD: 6,657.48'  
Inclination: 91.66°  
Azimuth: 90.79°  
VS: 2,241.02'

MD: 8,547'  
TVD: 6,654.27'  
Inclination: 92.25°  
Azimuth: 90.75°  
VS: 2,332.23'

MD: 8,642'  
TVD: 6,651.01'  
Inclination: 91°  
Azimuth: 90.7°  
VS: 2,424.41'

sme lly, mot, 20%CHK: pred tan wi wh, sme lly, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 80% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, abnt bent, abnt fos frag

10%CHK: pred tan wi wh, sme lly, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 90% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, abnt bent, tr fos frag

10%CHK: pred tan wi wh, sme lly, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 90% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, abnt bent, tr fos frag

20%CHK: pred tan wi wh, sme lly, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 80% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, abnt bent, tr fos frag





WT: 9.55/9.60  
38/38 IN/OUT

400

113

1837u

C1: 67.8%  
C2: 17.1%  
C3: 10.3%  
C4: 4.8%

2730u

126

1401u

1666u  
C1-C4 (PPM)

MUD WT: 9.60/9.55  
VIS: 38/38 IN/OUT

116

GAAM 146 (ms)

600000

GAAS (units)

6450

1720u

8.650 8.660 8.670 8.680 8.690 8.700 8.710 8.720 8.730 8.740 8.750 8.760 8.770 8.780 8.790 8.800 8.810 8.820 8.830 8.840 8.850 8.860



MD: 8.737'  
TVD: 6.647.54'

Inclination: 92.59 °

Azimuth: 91.35 °

VS: 2.516.69'

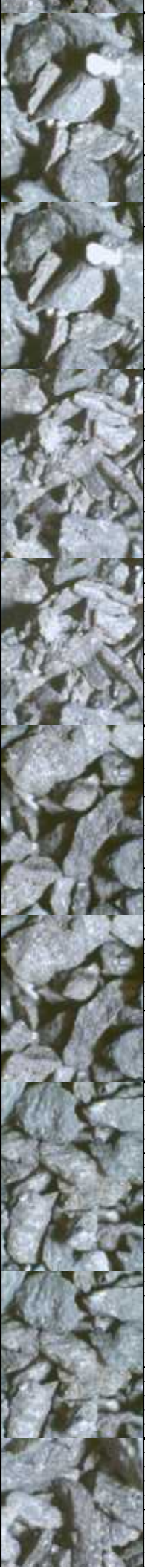
10%CHK: pred tan wi wh, sme lly, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 90% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grty tex, abnt bent, tr fos frag

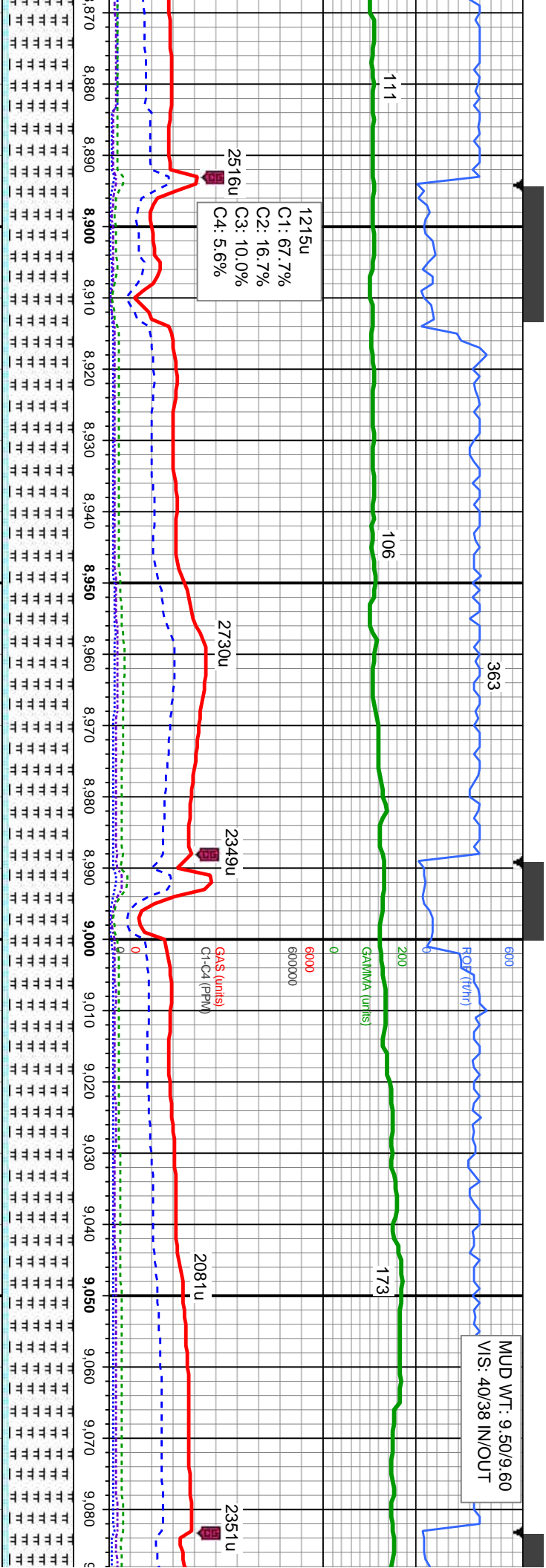
10%CHK: pred tan wi wh, sme lly, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 90% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grty tex, abnt bent, tr fos frag

10%CHK: pred tan wi wh, sme lly, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 90% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grty tex, abnt bent, tr fos frag

10%CHK: pred tan wi wh, sme lly, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 90% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grty tex, abnt bent, tr fos frag

10%CHK: pred tan wi wh, sme lly, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 90% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grty tex, abnt bent, tr fos frag

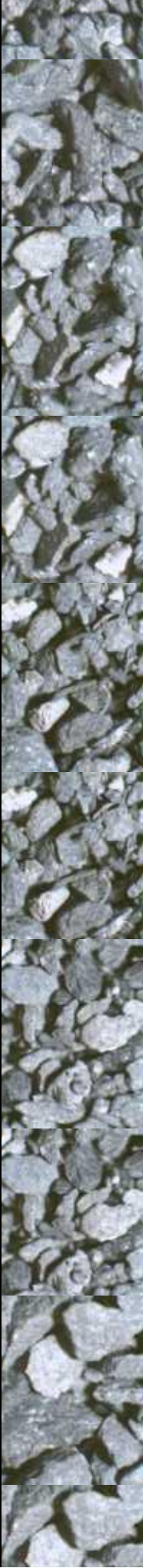




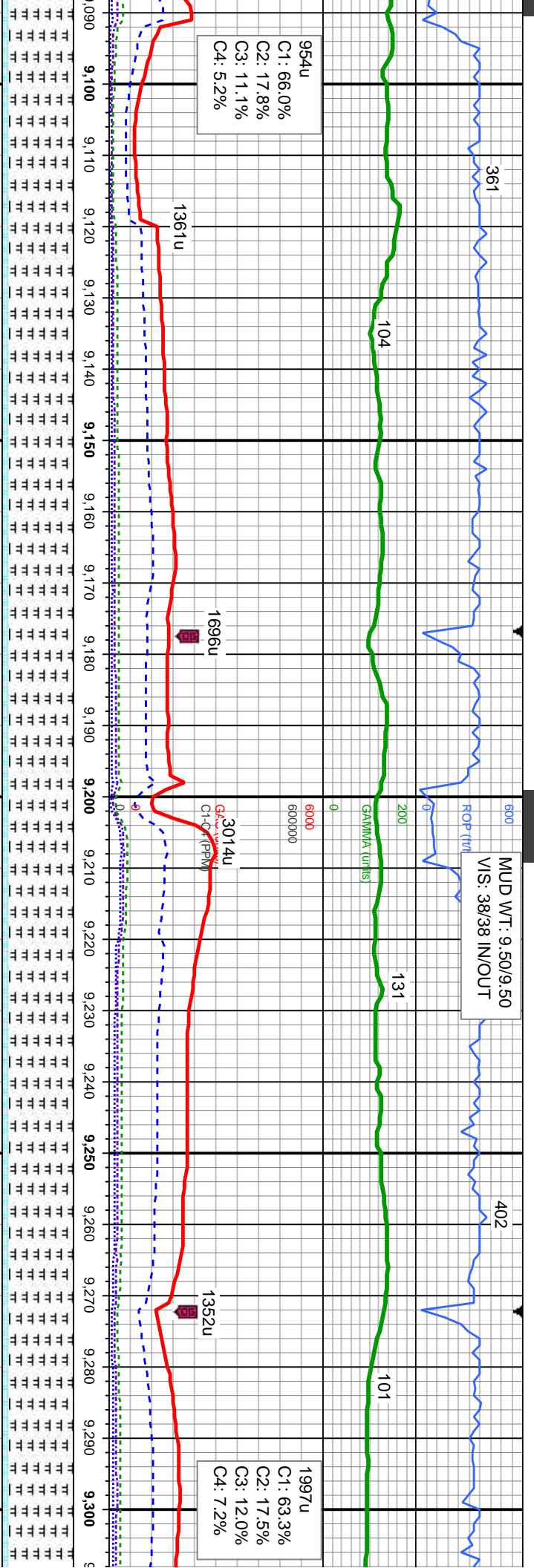
MD: 8,927'  
TVD: 6,644.58'  
Inclination: 88.77°  
Azimuth: 90.46°  
VS: 2,701.4'

MD: 9,022'  
TVD: 6,646.27'  
Inclination: 89.2°  
Azimuth: 89.26°  
VS: 2,793.24'

Interval	Description
8870 - 8900	10%CHK: pred tan wi wh, sme lgy, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 90% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, abnt bent, tr fos frag
8900 - 8950	10%CHK: pred tan wi wh, sme lgy, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 90% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, abnt bent, tr fos frag
8950 - 9000	10%CHK: pred tan wi wh, sme lgy, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 90% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, abnt bent, tr fos frag
9000 - 9050	10%CHK: pred tan wi wh, sme lgy, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 90% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, abnt bent, tr fos frag
9050 - 9080	10%CHK: pred tan wi wh, sme lgy, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc 90% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, abnt bent, tr fos frag







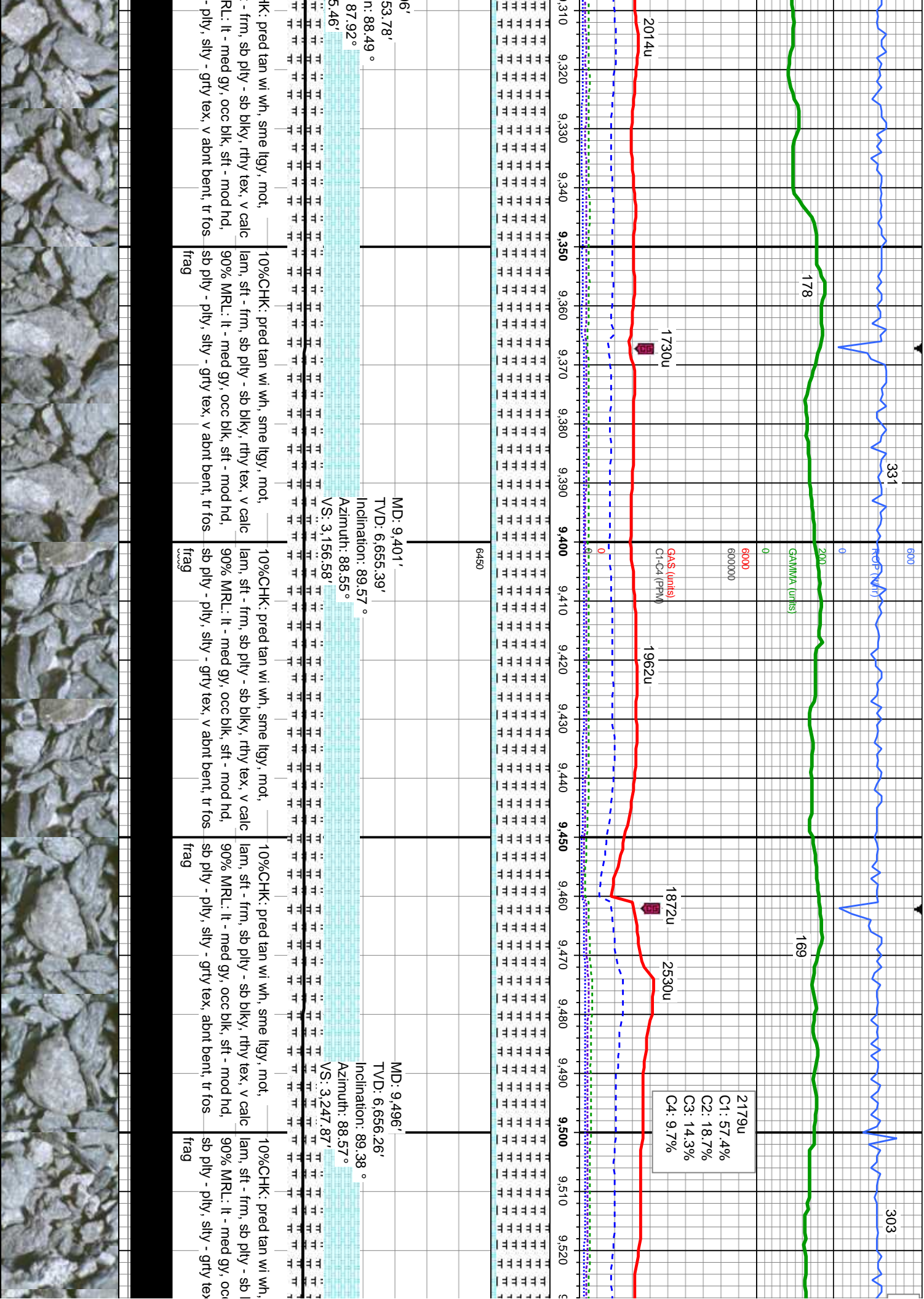
MD: 9,116'  
TVD: 6,648.62'  
Inclination: 87.94 °  
Azimuth: 87.95 °  
VS: 2,883.56'

MD: 9,211'  
TVD: 6,651.43'  
Inclination: 88.67 °  
Azimuth: 87.9 °  
VS: 2,974.51'

MD: 9,300'  
TVD: 6,6  
Inclination:  
Azimuth:  
VS: 3.06

mot, _____	10%CHK: pred tan wi wh, sme ltgy, mot, _____	10%CHK: pred tan wi wh, sme ltgy, mot, _____	10%CHK: pred tan wi wh, sme ltgy, mot, _____	10%CHK: pred tan wi wh, sme ltgy, mot, _____
tex, v calc	lam, sft - frm, sb ply - sb blk, rthy tex, v calc	lam, sft - frm, sb ply - sb blk, rthy tex, v calc	lam, sft - frm, sb ply - sb blk, rthy tex, v calc	lam, sft - frm, sb ply - sb blk, rthy tex, v calc
mod hd,	90% MRL: lt - med gy, occ blk, sft - mod hd,	90% MRL: lt - med gy, occ blk, sft - mod hd,	90% MRL: lt - med gy, occ blk, sft - mod hd,	90% MRL: lt - med gy, occ blk, sft - mod hd,
nt, tr fos	sb ply - ply, silty - grty tex, v abnt bent, tr fos	sb ply - ply, silty - grty tex, v abnt bent, tr fos	sb ply - ply, silty - grty tex, v abnt bent, tr fos	sb ply - ply, silty - grty tex, v abnt bent, tr fos
	frag	frag	frag	frag







361



Inclination: 89.91 °

VS: -1,047.36'

— —  
— =  
= =  
= =  
= =  
= =

[illegible]

e l t g y , m o t ,

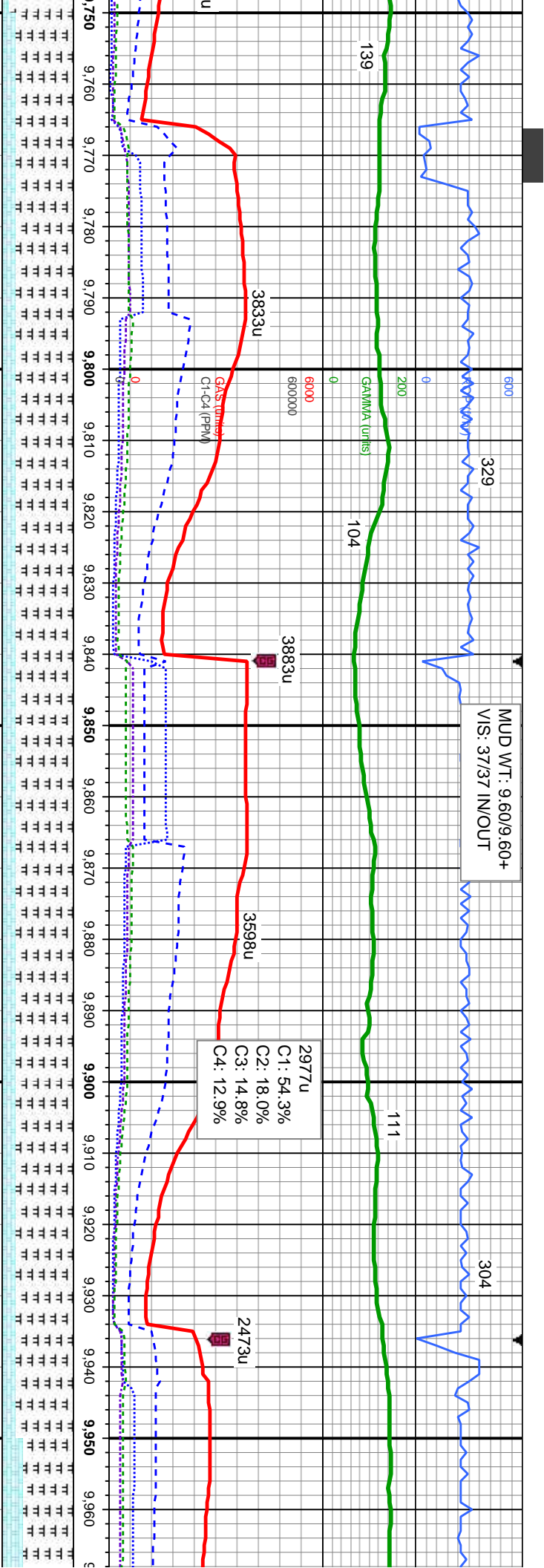
 $\kappa$ , sft - mod hd, —

—

[illegible]

10

---



MD: 9,780'  
TVD: 6,656.98'  
Inclination: 89.94°

Azimuth: 88.2°  
VS: -1,038.76'

20%CHK: pred tan wi wh, sme lgy, mot,  
lam, sft - frm, sb pty - sb blk, rthy tex, v calc  
80% MRL: lt - med gy, occ blk, sft - mod hd,  
sb pty - pty, silty - grty tex, tr bent, no fos frag

6450

TVD (ft)

VS: -1,036.11'

20%CHK: pred tan wi wh, sme lgy, mot,  
lam, sft - frm, sb pty - sb blk, rthy tex, v calc  
80% MRL: lt - med gy, occ blk, sft - mod hd,  
sb pty - pty, silty - grty tex, tr bent, no fos frag

20%CHK: pred tan wi wh, sme lgy, mot,  
lam, sft - frm, sb pty - sb blk, rthy tex, v calc  
80% MRL: lt - med gy, occ blk, sft - mod hd,  
sb pty - pty, silty - grty tex, tr bent, no fos frag

MD: 9,875'  
TVD: 6,657.33'  
Inclination: 89.63°

Azimuth: 88.6°  
VS: -1,036.11'

20%CHK: pred tan wi wh, sme lgy, mot,  
lam, sft - frm, sb pty - sb blk, rthy tex, v calc  
80% MRL: lt - med gy, occ blk, sft - mod hd,  
sb pty - pty, silty - grty tex, tr bent, no fos frag

20%CHK: pred tan wi wh, sme lgy, mot,  
lam, sft - frm, sb pty - sb blk, rthy tex, v calc  
80% MRL: lt - med gy, occ blk, sft - mod hd,  
sb pty - pty, silty - grty tex, tr bent, no fos frag

20%CHK: pred tan wi wh, sme lgy, mot,  
lam, sft - frm, sb pty - sb blk, rthy tex, v calc  
80% MRL: lt - med gy, occ blk, sft - mod hd,  
sb pty - pty, silty - grty tex, tr bent, no fos frag

VS: -1,036.11'

20%CHK: pred tan wi wh, sme lgy, mot,  
lam, sft - frm, sb pty - sb blk, rthy tex, v calc  
80% MRL: lt - med gy, occ blk, sft - mod hd,  
sb pty - pty, silty - grty tex, tr bent, no fos frag

20%CHK: pred tan wi wh, sme lgy, mot,  
lam, sft - frm, sb pty - sb blk, rthy tex, v calc  
80% MRL: lt - med gy, occ blk, sft - mod hd,  
sb pty - pty, silty - grty tex, tr bent, no fos frag

20%CHK: pred tan wi wh, sme lgy, mot,  
lam, sft - frm, sb pty - sb blk, rthy tex, v calc  
80% MRL: lt - med gy, occ blk, sft - mod hd,  
sb pty - pty, silty - grty tex, tr bent, no fos frag

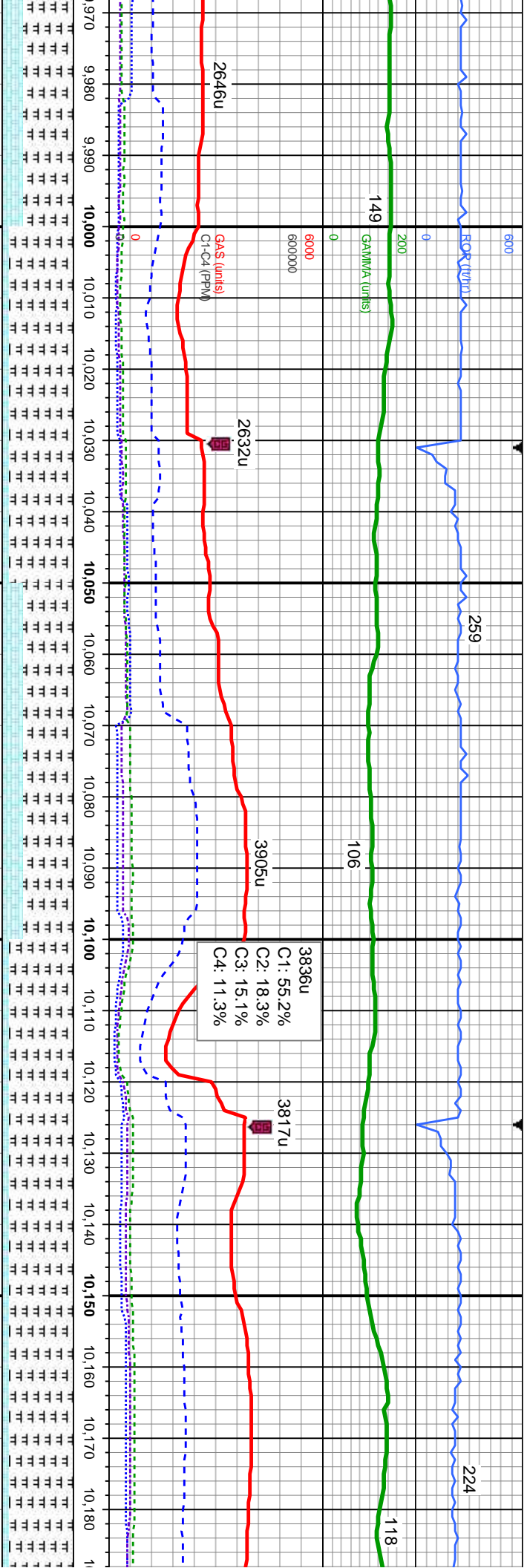
VS: -1,036.11'

30%CHK: pred tan wi wh, sme lgy, mot,  
lam, sft - frm, sb pty - sb blk, rthy tex, v calc  
70% MRL: lt - med gy, occ blk, sft - mod hd,  
sb pty - pty, silty - grty tex, tr bent, no fos frag

30%CHK: pred tan wi wh, sme lgy, mot,  
lam, sft - frm, sb pty - sb blk, rthy tex, v calc  
70% MRL: lt - med gy, occ blk, sft - mod hd,  
sb pty - pty, silty - grty tex, tr bent, no fos frag

30%CHK: pred tan wi wh, sme lgy, mot,  
lam, sft - frm, sb pty - sb blk, rthy tex, v calc  
70% MRL: lt - med gy, occ blk, sft - mod hd,  
sb pty - pty, silty - grty tex, tr bent, no fos frag



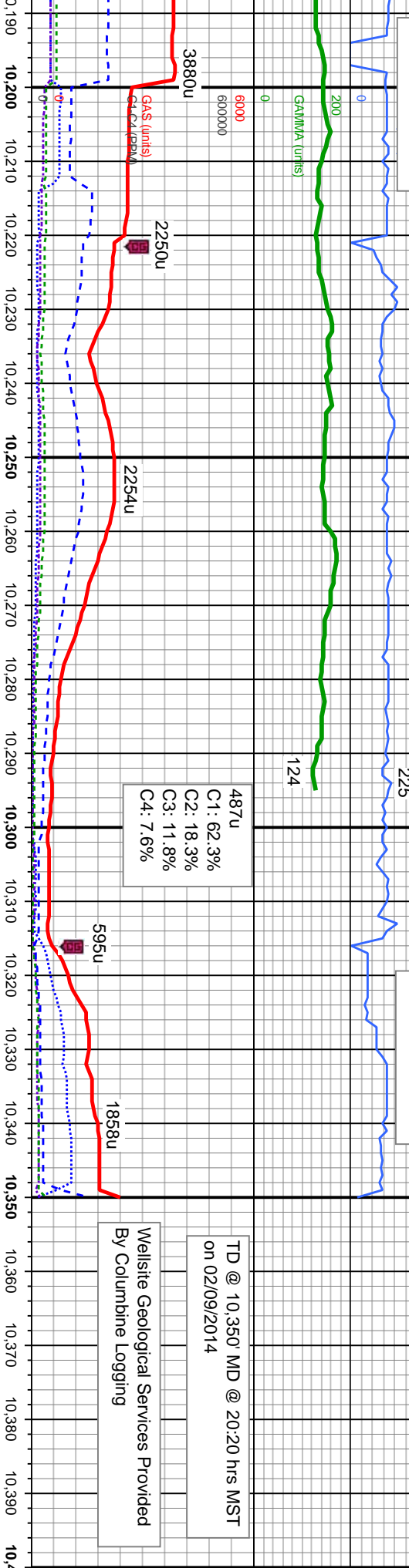


9,970'	6,657.64'	MD: 10.065'	TVD: 6,657.23'	Inclination: 90.49 °	Azimuth: 89.31 °	VS: -1,032.06'
9,980'	6,657.64'					
9,990'	6,657.64'					
10,000'	6,657.64'					
10,010'	6,657.64'					
10,020'	6,657.64'					
10,030'	6,657.64'					
10,040'	6,657.64'					
10,050'	6,657.64'					
10,060'	6,657.64'					
10,070'	6,657.64'					
10,080'	6,657.64'					
10,090'	6,657.64'					
10,100'	6,657.64'					
10,110'	6,657.64'					
10,120'	6,657.64'					
10,130'	6,657.64'					
10,140'	6,657.64'					
10,150'	6,657.64'					
10,160'	6,657.64'					
10,170'	6,657.64'					
10,180'	6,657.64'					
10,190'	6,657.64'					

10%CHK: pred tan wi wh, sme lgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 90% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grfy tex, tr bent, no tos frag	10%CHK: pred tan wi wh, sme lgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 70% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grfy tex, tr bent, no tos frag	10%CHK: pred tan wi wh, sme lgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 90% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grfy tex, tr bent, no tos frag	10%CHK: pred tan wi wh, sme lgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 90% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grfy tex, tr bent, no tos frag
10%CHK: pred tan wi wh, sme lgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 90% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grfy tex, tr bent, no tos frag	10%CHK: pred tan wi wh, sme lgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 70% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grfy tex, tr bent, no tos frag	10%CHK: pred tan wi wh, sme lgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 90% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grfy tex, tr bent, no tos frag	10%CHK: pred tan wi wh, sme lgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 90% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grfy tex, tr bent, no tos frag

MUD WT: 9.70/9.70  
VIS: 40/40 IN/OUT

MUD WT: 9.70/9.65  
VIS: 37/37 IN/OUT



MD: 10,288'  
TVD: 6,652.41'  
Inclination: 92.28 °  
Azimuth: 90.26 °  
VS: -1,030.57'

MD: 10,350'  
TVD: 6,649.94'  
Inclination: 92.28 °  
Azimuth: 90.26 °  
VS: -1,030.85'

TVD (ft)

6450

mot, 30%CHK: pred tan w/ wh, sme lty, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 70% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grty tex, tr bent, no fos frag

40%CHK: pred tan w/ wh, sme lty, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 60% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grty tex, tr bent, no fos frag

