

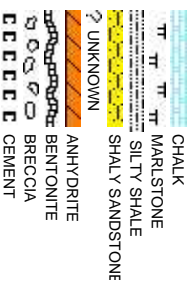


Scale: 5" / 100'
Measured Depth Log

Well Name	Cougar B02-69-1HN_HORZ		
Location	SEC 2 T5N R64W		
State	COLORADO	County	WELD
Country	USA		
API Number	05-123-36405	Rig Number	H&P 315
Region	DJ BASIN	A/E #	136839
Spud Date	1/25/2014	Field	WATTENBERG
		Drilling Completed	1/31/2014
Surface Coordinates	NMNW SEC2 T5N R64W 566' FNL; 702' FWL LAT/LON 40.43407000/-104.52428000		
Bottom Hole Coordinates	NENE SEC2 T5N R64W 990' FNL; 660' FEL		
Ground Elevation	4,641'	K.B. Elevation	4,665'
Logged Interval	5,969'	To	10,282'
		Total Depth	10,282'
Formation	NIOBRARA B CHALK		
Type of Drilling Fluid	LSND		

Company Noble Energy Inc
Address 1625 BROADWAY
DENVER, CO 80202

Name MARK COLE, JR
Company COLUMBINE LOGGING
Address 2385 S LIPAN ST
DENVER, CO 80229



Operator

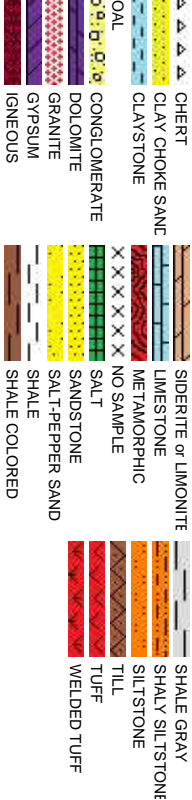
AY SUITE 2200
0202

Geologist

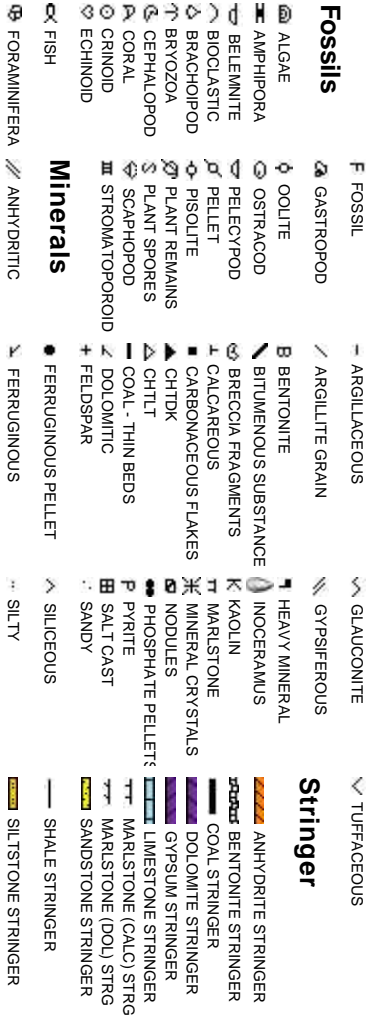
ACK WEINERTH
OGGING, INC

ST
0223

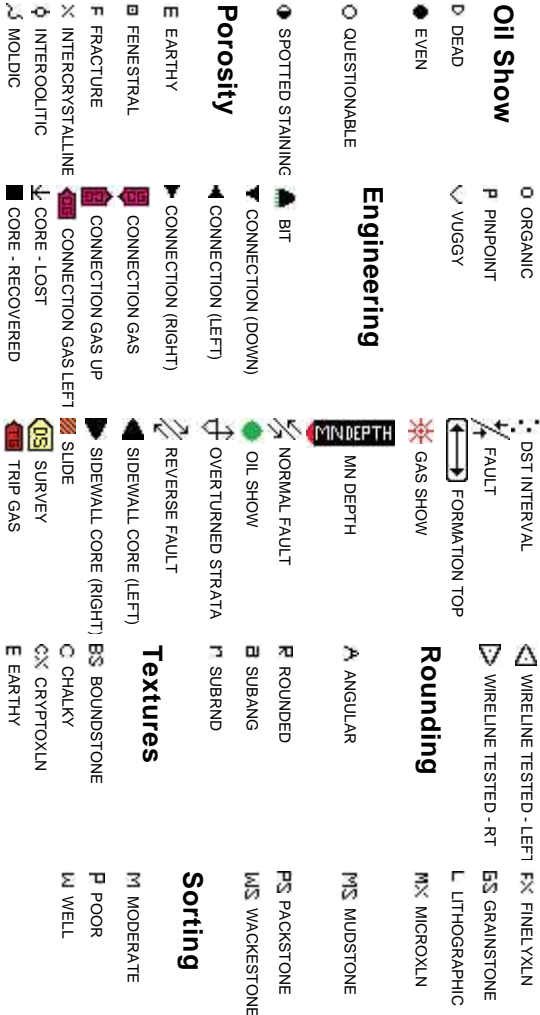
Rock Types



Accessories



Other Symbols



Slide/Rotate

ROP

ROP

ROP data from iBall

MUD WT: 10.20/9.90
VIS: 39/39 IN/OUT

1/28/2014, Mud
PVs: 11, YP: 11
CAKE: 1/0, pH:

Curves

GAMMA

Gamma data from Sperry - Halliburton

ROP (ft/hr)

256

0

350

136

GAMMA (units)

50

6000

6000000

Total Gas & Chromatograph

GAS

C1

C2

C3

C4

Gas data from iBall

2821u (ft/s)

0

2480u

C4 (PPM)

Depth Labels

% Lith

Columbine Logging began logging with
Bloodhound unit 624 on 01/28/2014

50' Sample Interval @ 6,000' MD

5900

Well Bore

TVD

Bit Data

Bit #: 2

Type: Security

Model: MMDS5M

Size: 8.75"

Depth In: 5,969'

Jets: 5x15

MD: 5,948'
TVD: 5,933.47'
Inclination: 1.27 °
Azimuth: 116.69 °
VS: 14.6'

TVD (ft)

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

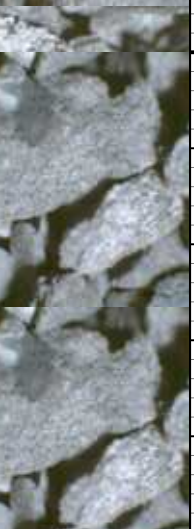
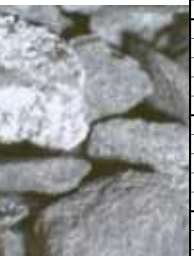
SLTY SH: pred lt gy, sme med - dk gy, hd,
pily - sb pily, occ sb blkly, slty - grty tex, v sl
calc
SHY SS: lt gy, s&p, vfq, mod hd wi brit
clus, sb ang - sb rd, sl calc cnt

SLTY SH: pred lt gy, sme med - dk
pily - sb pily, occ sb blkly, slty - grty
calc
SHY SS: lt gy, s&p, vfq, mod hd wi
sb ang - sb rd, sl calc cnt

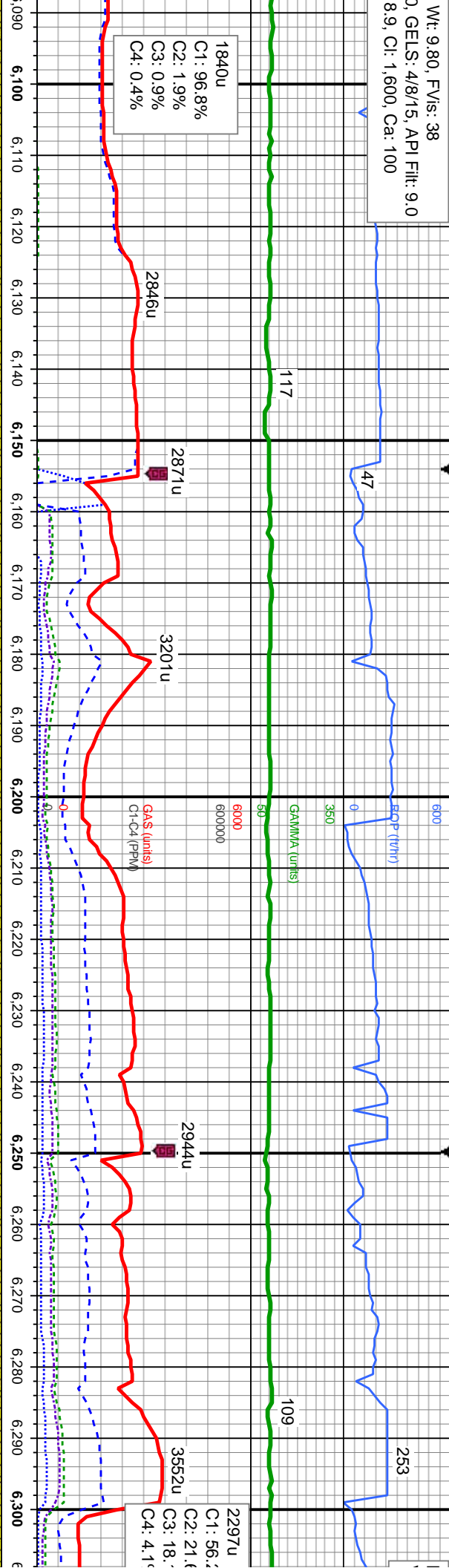
Oil Show

ST
TF
ME

Images



Wt: 9.80, FV/ls: 38
0. GELS: 4/8/15, API Filt: 9.0
8.9, CI: 1.600, Ca: 100



<<Scale Change>>

MD: 6,101'
TVD: 6,085.19'
Inclination: 12.24 °
Azimuth: 90.09 °
VS: 32.29'

MD: 6,196'
TVD: 6,176.23'
Inclination: 20.61 °
Azimuth: 87.53 °
VS: 59.1'

MD: 6,244'
TVD: 6,220.7'
Inclination: 23.58 °
Azimuth: 87.12 °
VS: 77.14'

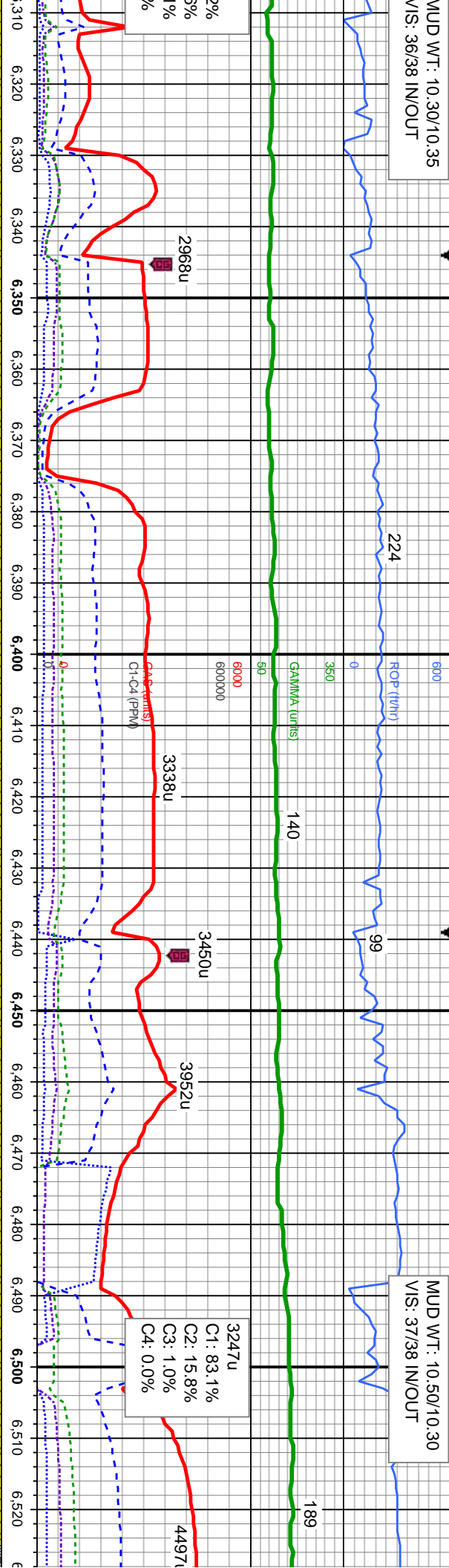
MD: 6,291'
TVD: 6,263.46'
Inclination: 25.47 °
Azimuth: 88.65 °
VS: 96.64'

gy, hd, v tex, v sl	SLTY SH: pred lt gy, sme med - dk gy, hd, pty - sb pty, occ sb blkly, slty - grty tex, v sl	SLTY SH: lt - med gy, sme med dk gy, hd, pty - sb pty, occ sb blkly, slty - grty tex	SLTY SH: pred lt gy, sme med - dk gy, hd, pty - sb pty, occ sb blkly, slty - grty tex, v sl	SLTY SH: lt - med gy, sme med dk gy, hd, pty - sb pty, occ sb blkly, slty - grty tex
calc	SHY SS: lt gy, s&p, vfg, mod hd wi brit clus, sb ang - sb rd, sl calc cmnt	SHY SS: lt gy, s&p, vfg, mod hd wi brit clus, sb ang - sb rd, sl calc cmnt	SHY SS: lt gy, s&p, vfg, mod hd wi brit clus, sb ang - sb rd, sl calc cmnt	SHY SS: lt gy, s&p, vfg, mod hd wi brit clus, sb ang - sb rd, sl calc cmnt



MUD WT: 10.30/10.35
VIS: 36/38 IN/OUT

MUD WT: 10.50/10.30
VIS: 37/38 IN/OUT



MD: 6,339'
TV/D: 6,306.02'
Inclination: 29.55 °
Azimuth: 89.08 °
VS: 118.77'

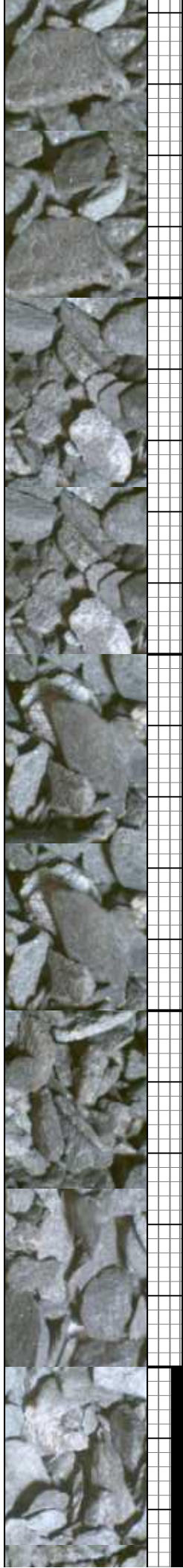
MD: 6,386'
TV/D: 6,345.83'
Inclination: 34.64 °
Azimuth: 86.2 °
VS: 143.71'

MD: 6,434'
TV/D: 6,383.27'
Inclination: 42.71 °
Azimuth: 87.61 °
VS: 173.68'

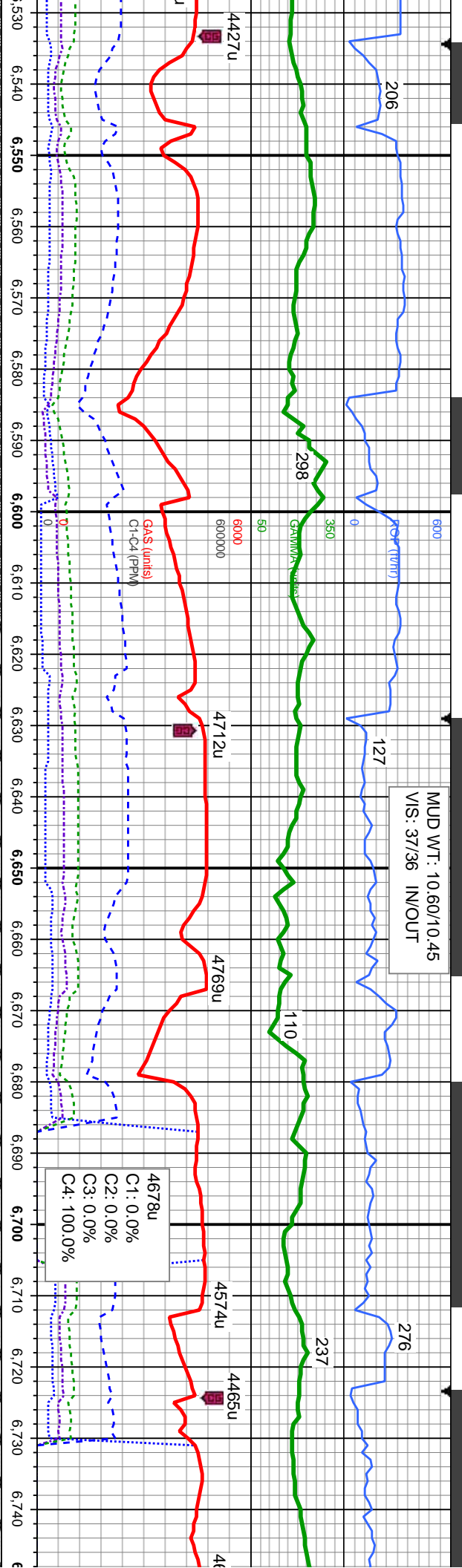
MD: 6,481'
TV/D: 6,416.93'
Inclination: 45.78 °
Azimuth: 87.57 °
VS: 206.45'

MD: 6,520'
TV/D: 6,463.40'
Inclination: 45.78 °
Azimuth: 87.57 °
VS: 224.00'

SH: pred lt gy, sme med - dk gy, hd, sb ply, occ sb blkly, silty - grty tex, v sl calc	SL TY SH: pred lt gy, sme med - dk gy, hd, ply - sb ply, occ sb blkly, silty - grty tex, v sl calc	SHY SS: lt gy, s&p, vfg, mod hd wi brit clus, sb ang - sb rd, sl calc cmt
SS: lt gy, s&p, vfg, mod hd wi brit clus, g - sb rd, sl calc cmt	SHY SS: lt gy, s&p, vfg, mod hd wi brit clus, sb ang - sb rd, sl calc cmt	SHY SS: lt gy, s&p, vfg, mod hd wi brit clus, sb ang - sb rd, sl calc cmt



MUD WT: 10.60/10.45
VIS: 37/36 IN/OUT



Sharon Springs Marker @
6,590' MD; 6,491' TVD

Niobrara Top @
6,615' MD; 6,508' TVD

Nio A Chalk Top @
6,645' MD; 6,528' TVD

Nio A Marl Top @
6,675' MD; 6,546' TVD

MD: 6,576'
TVD: 6,481.44'
Inclination: 47.88 °
Azimuth: 86.51 °
VS: 276.18'

MD: 6,624'
TVD: 6,513.63'
Inclination: 47.88 °
Azimuth: 88.06 °
VS: 311.77'

MD: 6,671'
TVD: 6,543.85'
Inclination: 52.05 °
Azimuth: 88.64 °
VS: 347.71'

MD: 6,719'
TVD: 6,571.62'
Inclination: 57.25 °
Azimuth: 87.38 °
VS: 386.82'

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

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

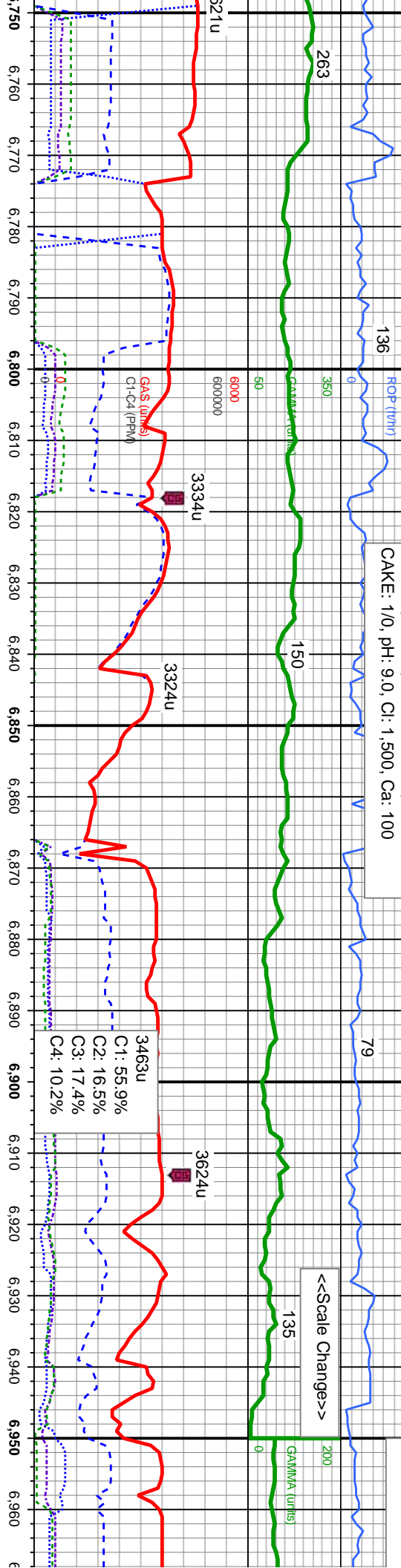
MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grty tex, abnt bent, tr fos frag CHK: pred tan w/ wh, sme ltgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc

MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grty tex, sme bent, tr fos frag CHK: pred tan w/ wh, sme ltgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc



1/28/2014, Mud Wt: 10.60, FV/s: 38
PV/s: 16, YP: 13, GELS: 5/1/23, API Filt: 8.0
CAKE: 1/0, pH: 9.0, Cl: 1.500, Ca: 100

MUD WT: 10.70
VIS: 36/38 INC



<<Scale Change>>

<<Scale Change>>

TOOH @

Nio B Chalk Top @
6,869' MD; 6,631' TVD

MD: 6,765'
TVD: 6,594.32'
Inclination: 63.58 °
Azimuth: 88.84 °

MD: 6,813'
TVD: 6,613.35'
Inclination: 69.66 °
Azimuth: 89.72 °

MD: 6,860'
TVD: 6,628.35'
Inclination: 73.13 °
Azimuth: 91.25 °

MD: 6,937'
TVD: 6,646.19'
Inclination: 80.06 °
Azimuth: 91.89 °
VS: 249.96'

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

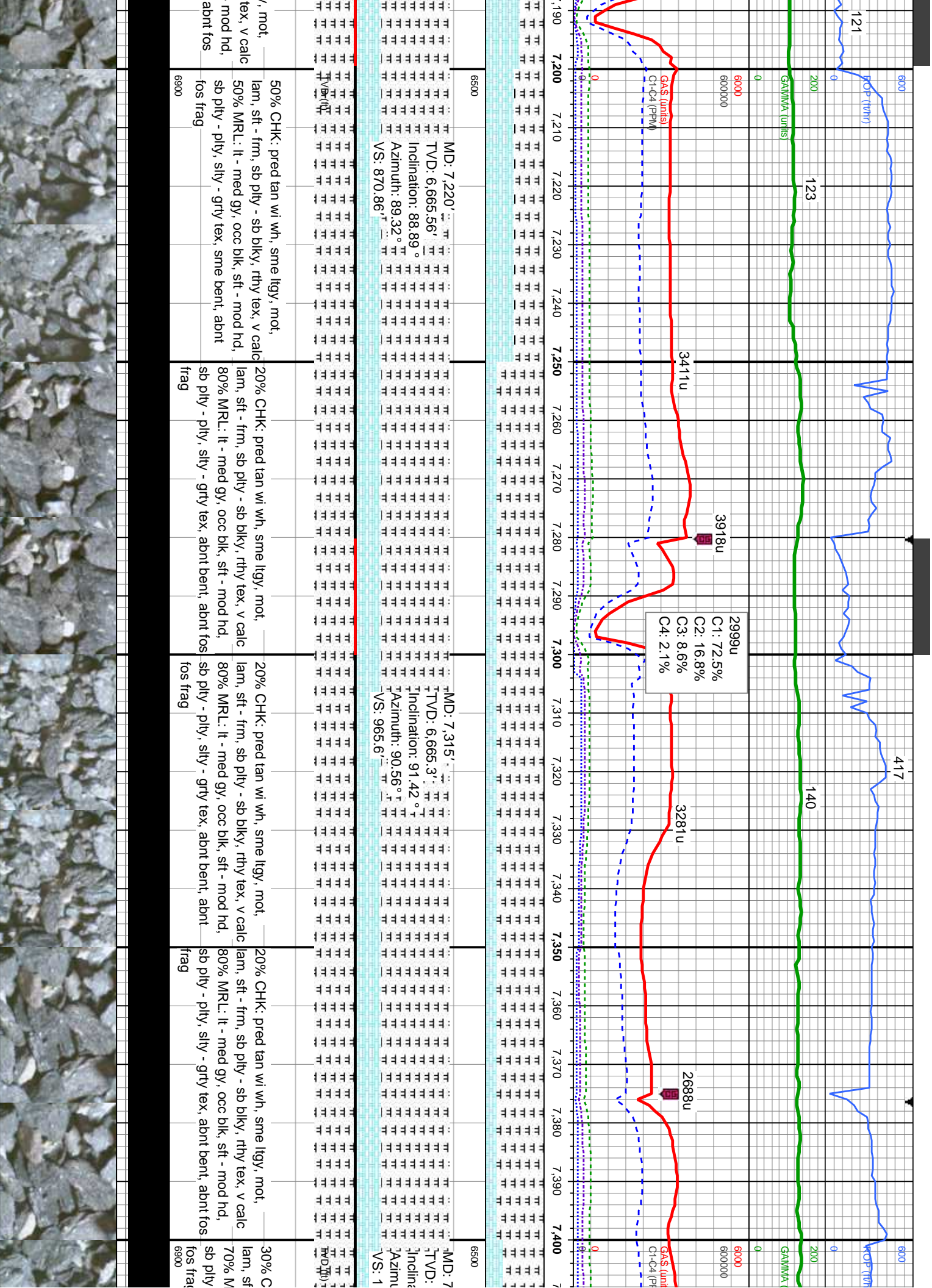
MRL: lt - med gy, occ blk, sft - mod hd, sb ply
ply - pty, silty - grty tex, sme bent, tr fos frag
CHK: pred tan wi wh, sme llyg, mot, lam, sft -
frm, sb ply - sb blk, rthy tex, v calc

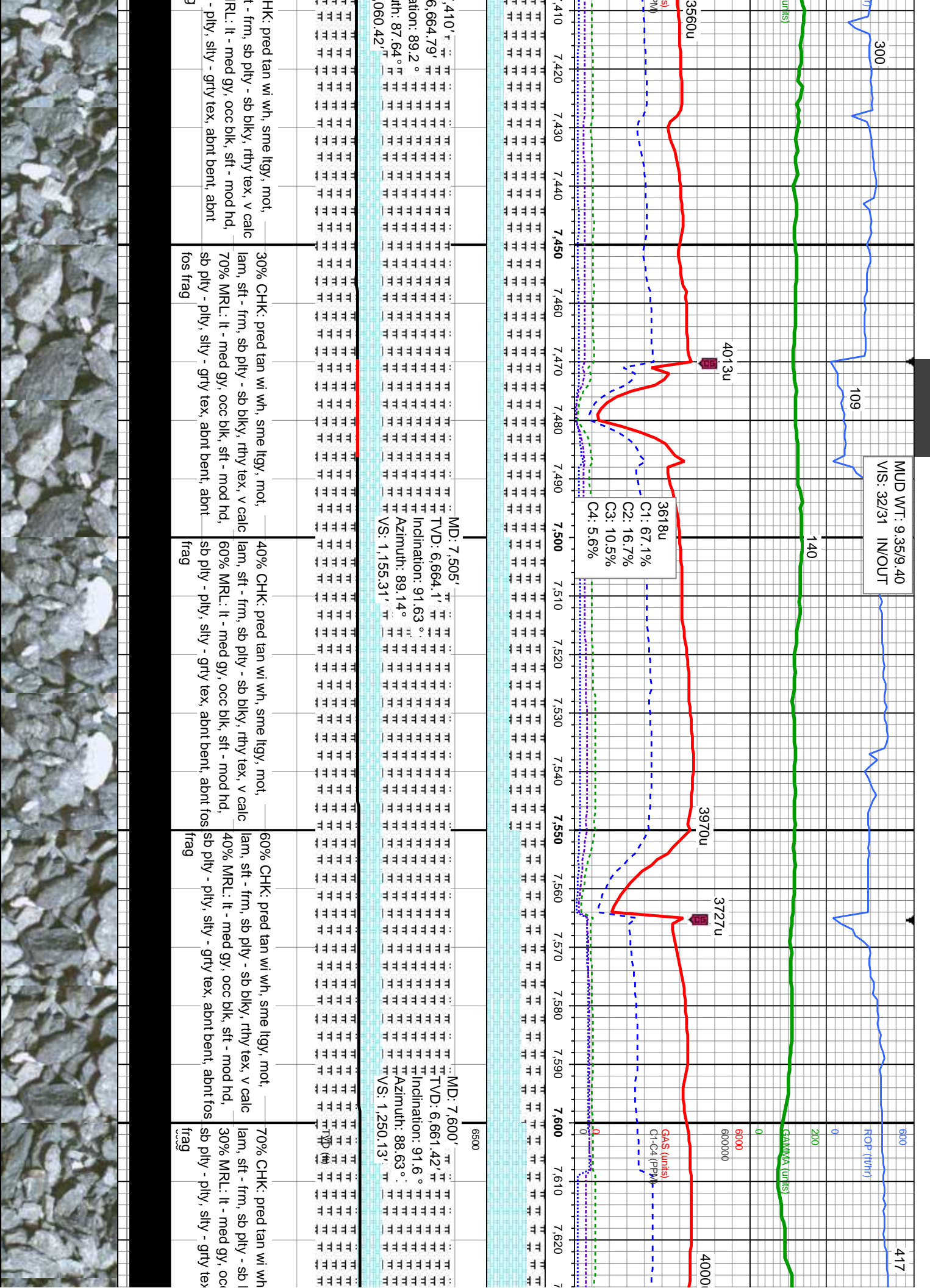
MRL: lt - med gy, occ blk, sft - mod hd, sb
ply - pty, silty - grty tex, sme bent, tr fos frag
CHK: pred tan wi wh, sme llyg, mot, lam, sft
frm, sb ply - sb blk, rthy tex, v calc

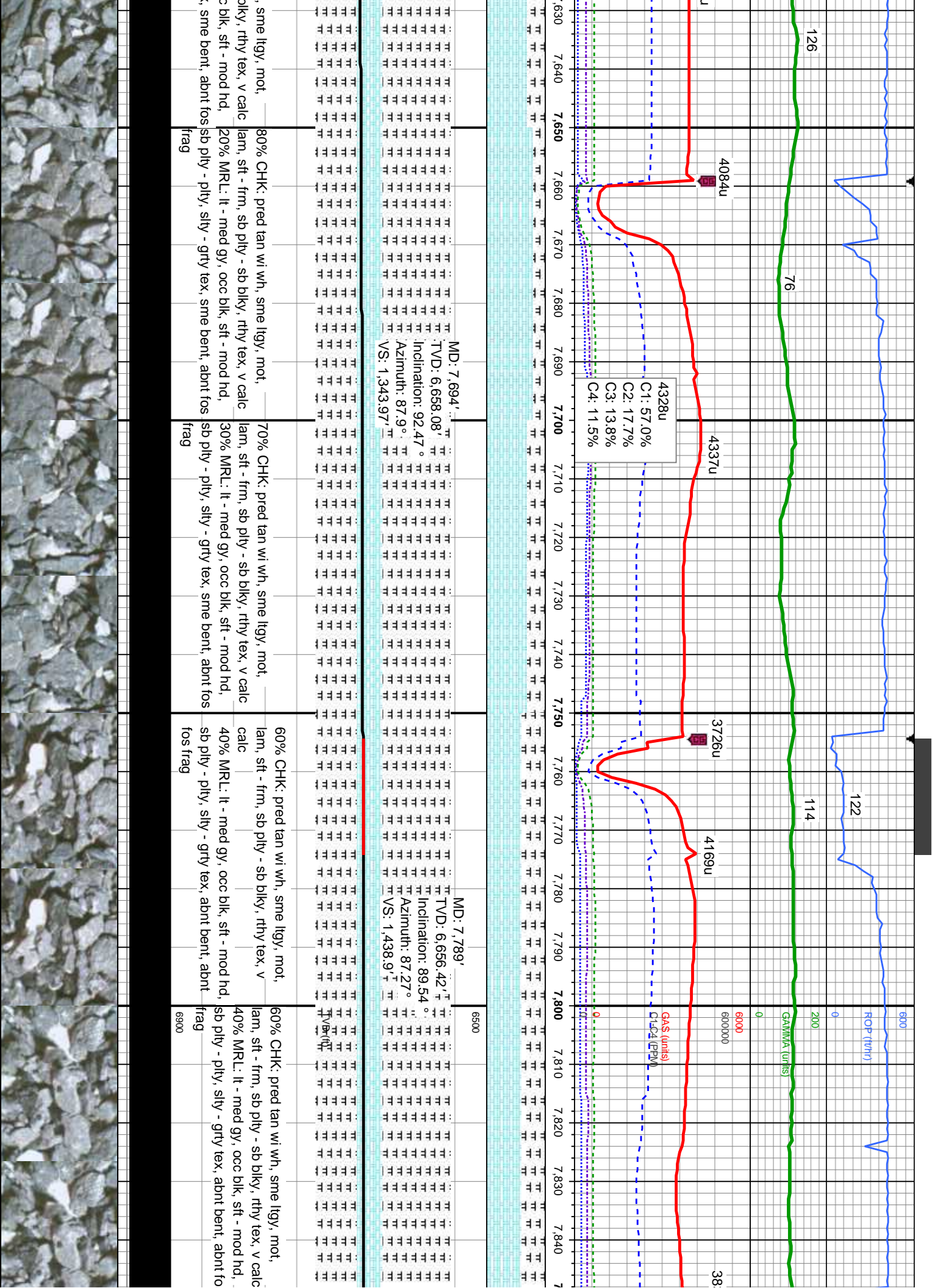
MRL: lt - med gy, occ blk, sft - mod hd, sb
ply - pty, silty - grty tex, sme bent, tr fos frag
CHK: pred tan wi wh, sme llyg, mot, lam, sft
frm, sb ply - sb blk, rthy tex, v calc

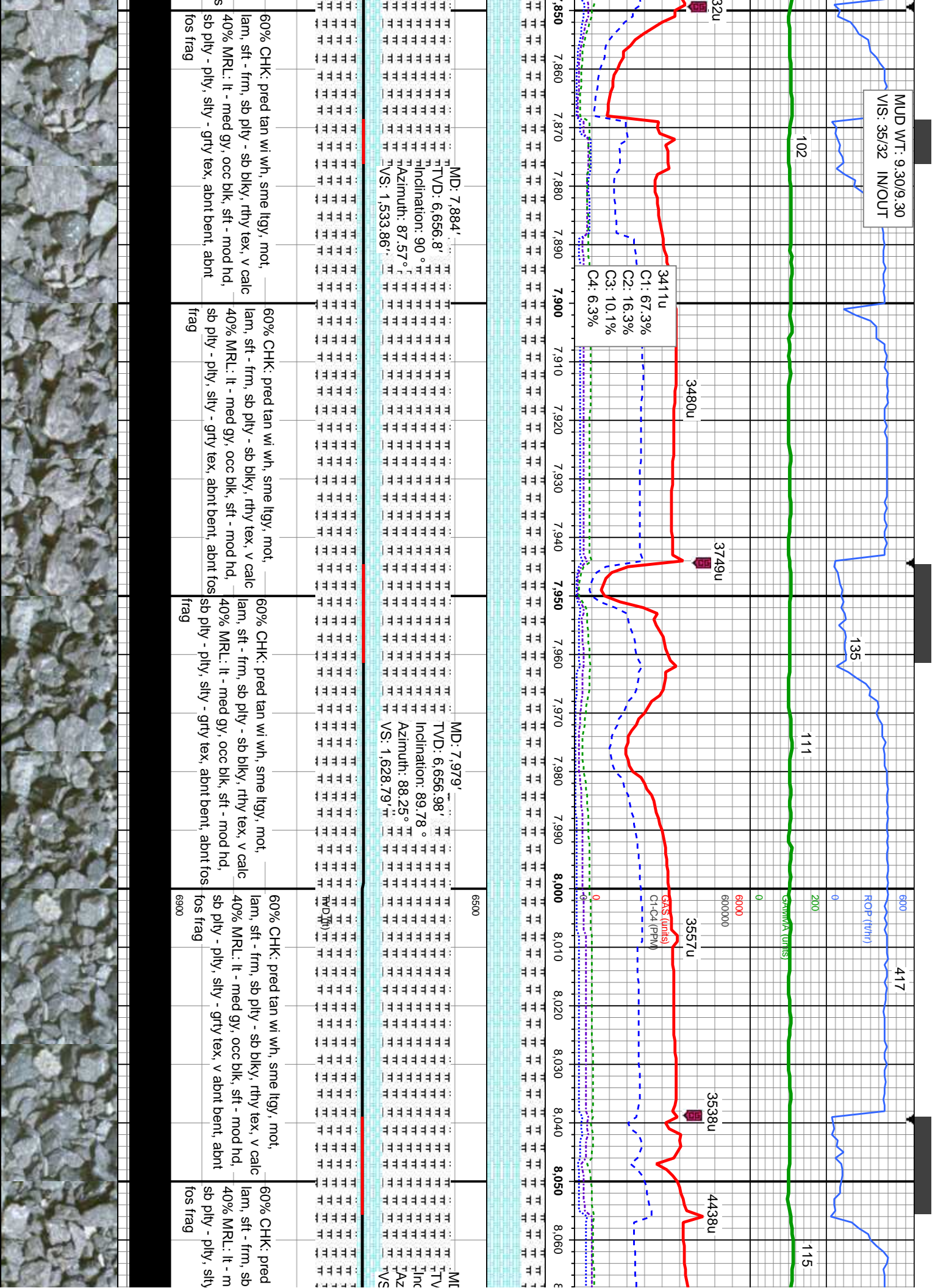
70% CHK: pred
lam, sft - frm, sb
30% MRL: lt - m
sb ply - pty, silty
frag

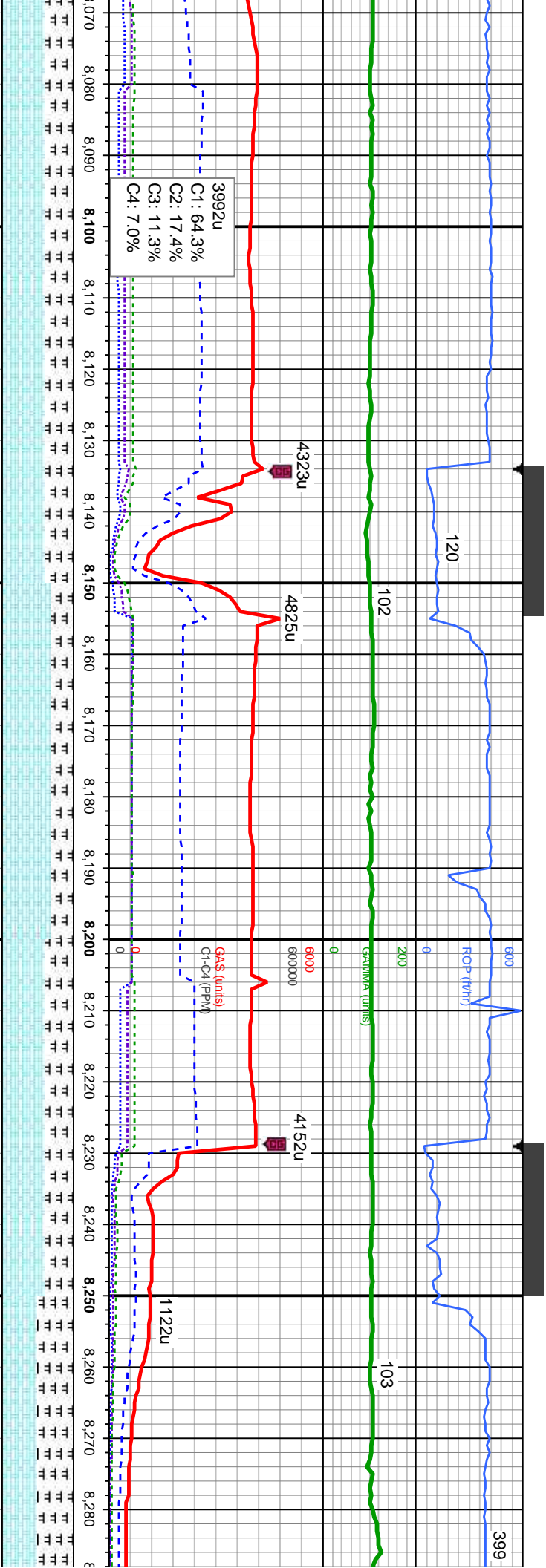




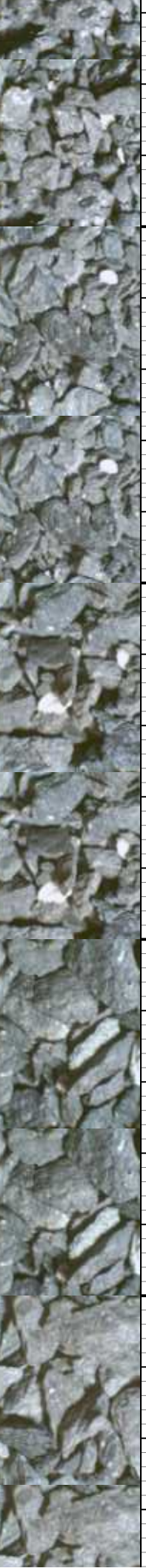








- grry tex, v about bent, about frag	60% CHK: pred tan wi wh, sme itgy, mot, lam, sft - frm, sb ply - sb biky, rthy tex, v calc 40% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grry tex, about bent, about fos
- grry tex, v about bent, about frag	70% CHK: pred tan wi wh, sme itgy, mot, lam, sft - frm, sb ply - sb biky, rthy tex, v calc 30% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grry tex, about bent, about fos
- grry tex, v about bent, about frag	60% CHK: pred tan wi wh, sme itgy, mot, lam, sft - frm, sb ply - sb biky, rthy tex, v calc 40% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grry tex, about bent, about fos
- grry tex, v about bent, about frag	50% CHK: pred tan wi wh, sme itgy, mot, lam, sft - frm, sb ply - sb biky, rthy tex, v calc 50% MRL: lt - med gy, occ blk, sft - sb ply - ply, silty - grry tex, about bent, about fos

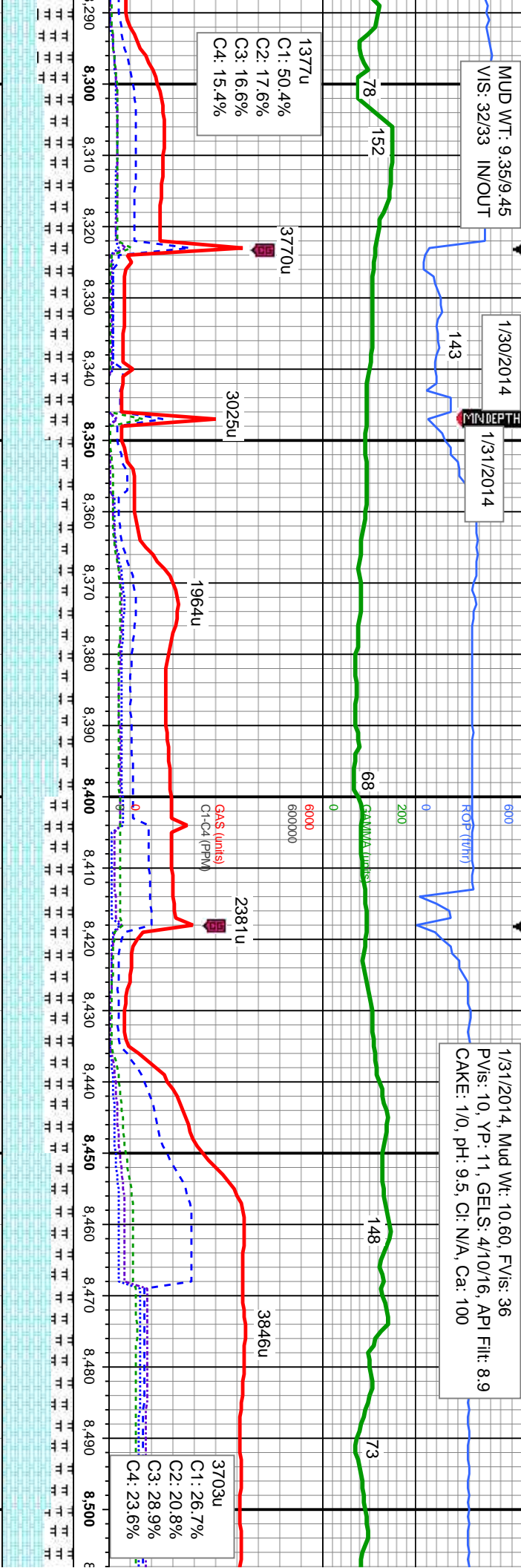


MUD WT: 9.35/9.45
VIS: 32/33 IN/OUT

1/30/2014

1/31/2014

1/31/2014, Mud Wt: 10.60, FVIs: 36
PVIs: 10, YP: 11, GELS: 4/10/16, API Filt: 8.9
CAKE: 1/0, pH: 9.5, CI: N/A, Ca: 100



B Chalk

A Marl

B Marl

C Chalk

D Chalk

E Chalk

F Chalk

G Chalk

H Chalk

I Chalk

J Chalk

K Chalk

L Chalk

M Chalk

N Chalk

O Chalk

P Chalk

Q Chalk

R Chalk

S Chalk

T Chalk

U Chalk

V Chalk

W Chalk

X Chalk

Y Chalk

Z Chalk

AA Chalk

AB Chalk

AC Chalk

AD Chalk

AE Chalk

AF Chalk

AG Chalk

AH Chalk

AI Chalk

AJ Chalk

AK Chalk

AL Chalk

AM Chalk

AN Chalk

AO Chalk

AP Chalk

AQ Chalk

AR Chalk

AS Chalk

AT Chalk

AU Chalk

AV Chalk

AW Chalk

AX Chalk

AY Chalk

AZ Chalk

BA Chalk

BB Chalk

BC Chalk

BD Chalk

BE Chalk

BF Chalk

BG Chalk

BH Chalk

BI Chalk

BJ Chalk

BK Chalk

BL Chalk

BM Chalk

BN Chalk

BO Chalk

BP Chalk

BQ Chalk

BR Chalk

BS Chalk

BT Chalk

BU Chalk

BV Chalk

BW Chalk

BX Chalk

BY Chalk

BZ Chalk

CA Chalk

CB Chalk

CC Chalk

CD Chalk

CE Chalk

CF Chalk

CG Chalk

CH Chalk

CI Chalk

CJ Chalk

CK Chalk

CL Chalk

CM Chalk

CN Chalk

CO Chalk

CP Chalk

CQ Chalk

CR Chalk

CS Chalk

CT Chalk

CU Chalk

CV Chalk

CW Chalk

CX Chalk

CY Chalk

CZ Chalk

DA Chalk

DB Chalk

DC Chalk

DD Chalk

DE Chalk

DF Chalk

DG Chalk

DH Chalk

DI Chalk

DJ Chalk

DK Chalk

DL Chalk

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DN Chalk

DO Chalk

DP Chalk

DQ Chalk

DR Chalk

DS Chalk

DT Chalk

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EB Chalk

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EE Chalk

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EH Chalk

EI Chalk

EJ Chalk

EK Chalk

EL Chalk

EM Chalk

EN Chalk

EO Chalk

EP Chalk

EQ Chalk

ER Chalk

ES Chalk

ET Chalk

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EX Chalk

EY Chalk

EZ Chalk

FA Chalk

FB Chalk

FC Chalk

FD Chalk

FE Chalk

FF Chalk

FG Chalk

FH Chalk

FI Chalk

FJ Chalk

FK Chalk

FL Chalk

FM Chalk

FN Chalk

FO Chalk

FP Chalk

FQ Chalk

FR Chalk

FS Chalk

FT Chalk

FU Chalk

FV Chalk

FW Chalk

FX Chalk

FY Chalk

FZ Chalk

GA Chalk

GB Chalk

GC Chalk

GD Chalk

GE Chalk

GF Chalk

GG Chalk

GH Chalk

GI Chalk

GJ Chalk

GK Chalk

GL Chalk

GM Chalk

GN Chalk

GO Chalk

GP Chalk

GQ Chalk

GR Chalk

GS Chalk

GT Chalk

GU Chalk

GV Chalk

GW Chalk

GX Chalk

GY Chalk

GZ Chalk

HA Chalk

HB Chalk

HC Chalk

HD Chalk

HE Chalk

HF Chalk

HG Chalk

HH Chalk

HI Chalk

HJ Chalk

HK Chalk

HL Chalk

HM Chalk

HN Chalk

HO Chalk

HP Chalk

HQ Chalk

HR Chalk

HS Chalk

HT Chalk

HU Chalk

HV Chalk

HW Chalk

HX Chalk

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II Chalk

IJ Chalk

IK Chalk

IL Chalk

IM Chalk

IN Chalk

IO Chalk

IP Chalk

IQ Chalk

IR Chalk

IS Chalk

IT Chalk

IU Chalk

IV Chalk

IW Chalk

IX Chalk

IY Chalk

IZ Chalk

JA Chalk

JB Chalk

JC Chalk

JD Chalk

JE Chalk

JF Chalk

JG Chalk

JH Chalk

JI Chalk

IJ Chalk

JK Chalk

IL Chalk

JM Chalk

JN Chalk

JO Chalk

JP Chalk

JQ Chalk

JR Chalk

JS Chalk

JT Chalk

JU Chalk

JV Chalk

JW Chalk

JX Chalk

JY Chalk

JZ Chalk

KA Chalk

KB Chalk

KC Chalk

KD Chalk

KE Chalk

KF Chalk

KG Chalk

KH Chalk

KI Chalk

KJ Chalk

KK Chalk

KL Chalk

KM Chalk

KN Chalk

KO Chalk

KP Chalk

KQ Chalk

KR Chalk

KS Chalk

KT Chalk

KU Chalk

KV Chalk

KW Chalk

KX Chalk

KY Chalk

KZ Chalk

LA Chalk

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LF Chalk

LG Chalk

LH Chalk

LI Chalk

LJ Chalk

LK Chalk

LL Chalk

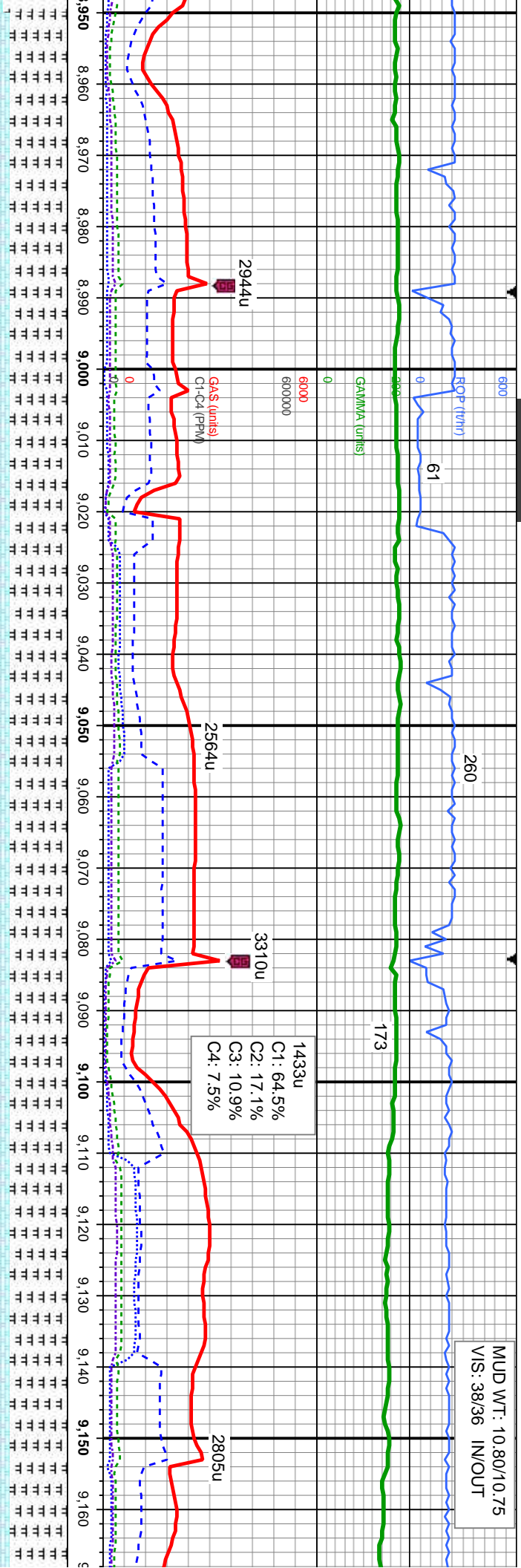
LM Chalk

LN Chalk

LO Chalk

LP

MUD WT: 10.80/10.75
VIS: 38/36 IN/OUT



MD: 9,022'
TVD: 6,648.81'
Inclination: 89.72 °
Azimuth: 90.88 °
VS: 2,669.46'

MD: 9,117'
TVD: 6,650.12'
Inclination: 88.71 °
Azimuth: 90.66 °
VS: 2,764.09'

TVD (ft)

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

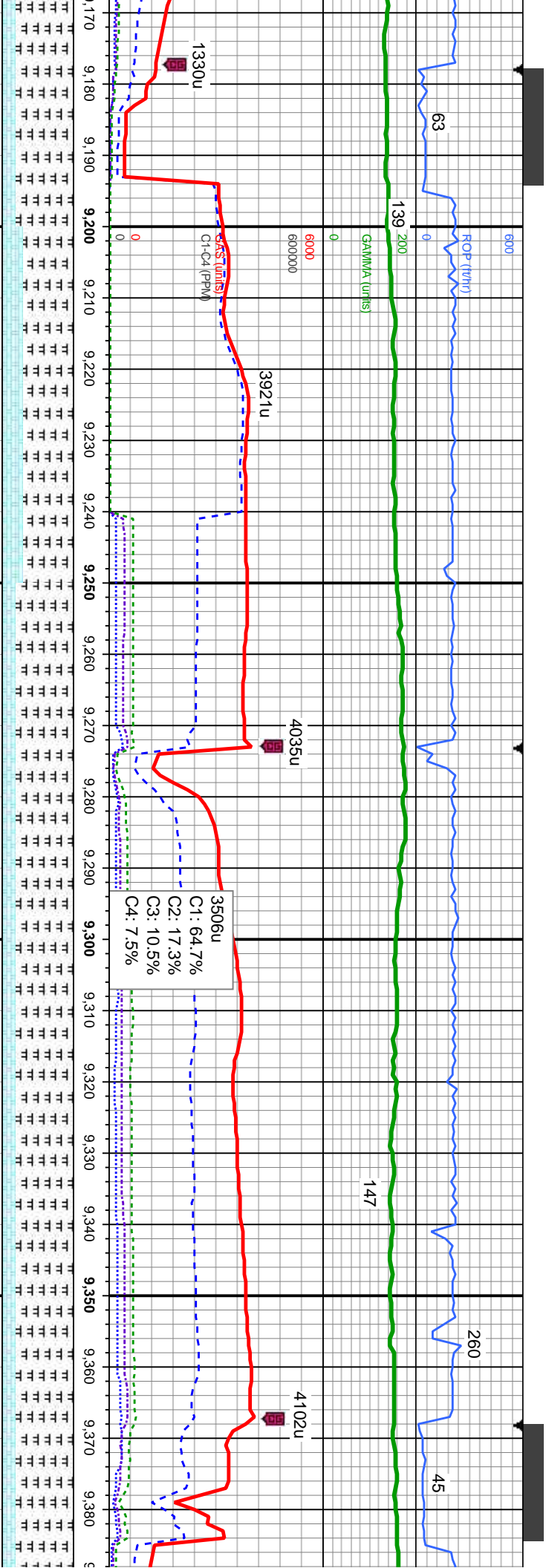
20% CHK: pred tan wi wh, sme llyg, mot, lam, sft - frm, sb pily - sb blk, rthy tex, v calc 80% MRL: lt - med gy, occ blk, sft - mod hd, sb pily - pily, silty - grty tex, sme bent, sme fos frag

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

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

20% CHK: pred lam, sft - frm, sb pily - sb blk, rthy tex, v calc 80% MRL: lt - med gy, occ blk, sft - mod hd, sb pily - pily, silty - grty tex, sme bent, sme fos frag



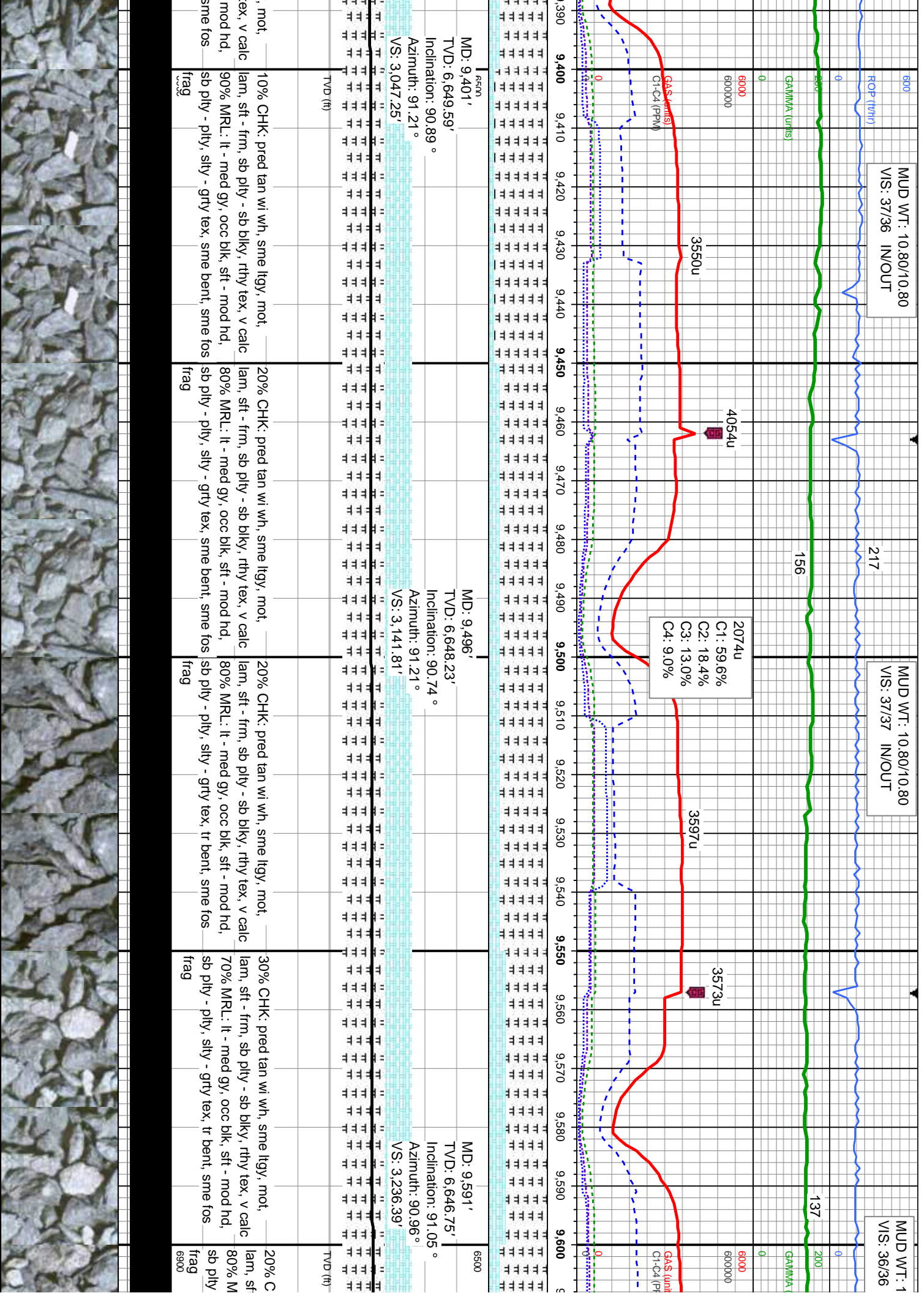


MD: 9,212'
TVD: 6,650.91'
Inclination: 90.34 °
Azimuth: 90.03 °
VS: 2,858.78'

MD: 9,307'
TVD: 6,650.48'
Inclination: 90.19 °
Azimuth: 89.33 °
VS: 2,953.55'

tan wi wh, sme ltyg, mot, ply - sb blk, rthy tex, v calc	30% CHK: pred tan wi wh, sme ltyg, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc	20% CHK: pred tan wi wh, sme ltyg, mot, lam, sft - frm, sb ply - sb blk, rthy tex, v calc	20% CHK: pred tan wi wh, sme ltyg, mot, 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 - grty tex, tr bent, sme fos	80% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, tr bent, sme fos	80% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, tr bent, sme fos	80% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex, tr bent, sme fos
frag	frag	frag	frag





0.80/10.80
IN/OUT

210

213

MUD WT : 10.90/10.90
VIS: 36/36 IN/OUT

ROP (ft/hr)

units

159

GAMMA (units)

200

GAS (units)
C1-C4 (PPM)

3769u

3715u

3718u

3673u

3466u
C1: 34.5%
C2: 15.4%
C3: 16.8%
C4: 33.3%

9610 9620 9630 9640 9650 9660 9670 9680 9690 9700 9710 9720 9730 9740 9750 9760 9770 9780 9790 9800 9810 9820

MD: 9,686'

TVD: 6,645.17'

Inclination: 90.86 °

Azimuth: 91.2 °

VS: 275.63'

MD: 9,781'

TVD: 6,643.94'

Inclination: 90.62 °

Azimuth: 91.09 °

VS: 273.73'

TVD (ft)

HK: pred tan wi wh, sme ltyg, mot,
- frm, sb pty - sb blk, rthy tex, v calc
RL: lt - med gy, occ blk, sft - mod hd,
- pty, silty - grty tex, tr bent, sme fos

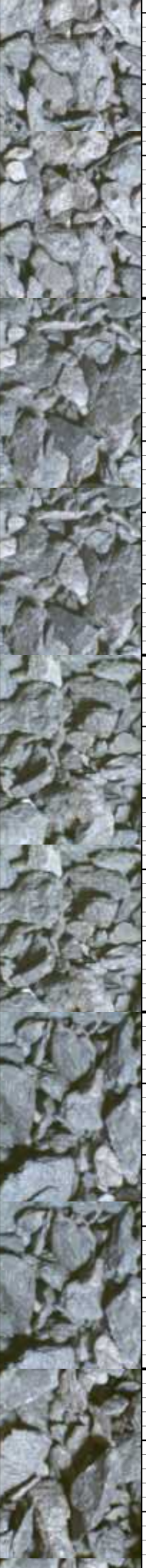
20% CHK: pred tan wi wh, sme ltyg, mot,
lam, sft - frm, sb pty - sb blk, rthy tex, v calc
80% MRL: lt - med gy, occ blk, sft - mod hd,
sb pty - pty, silty - grty tex, tr bent, sme fos
frag

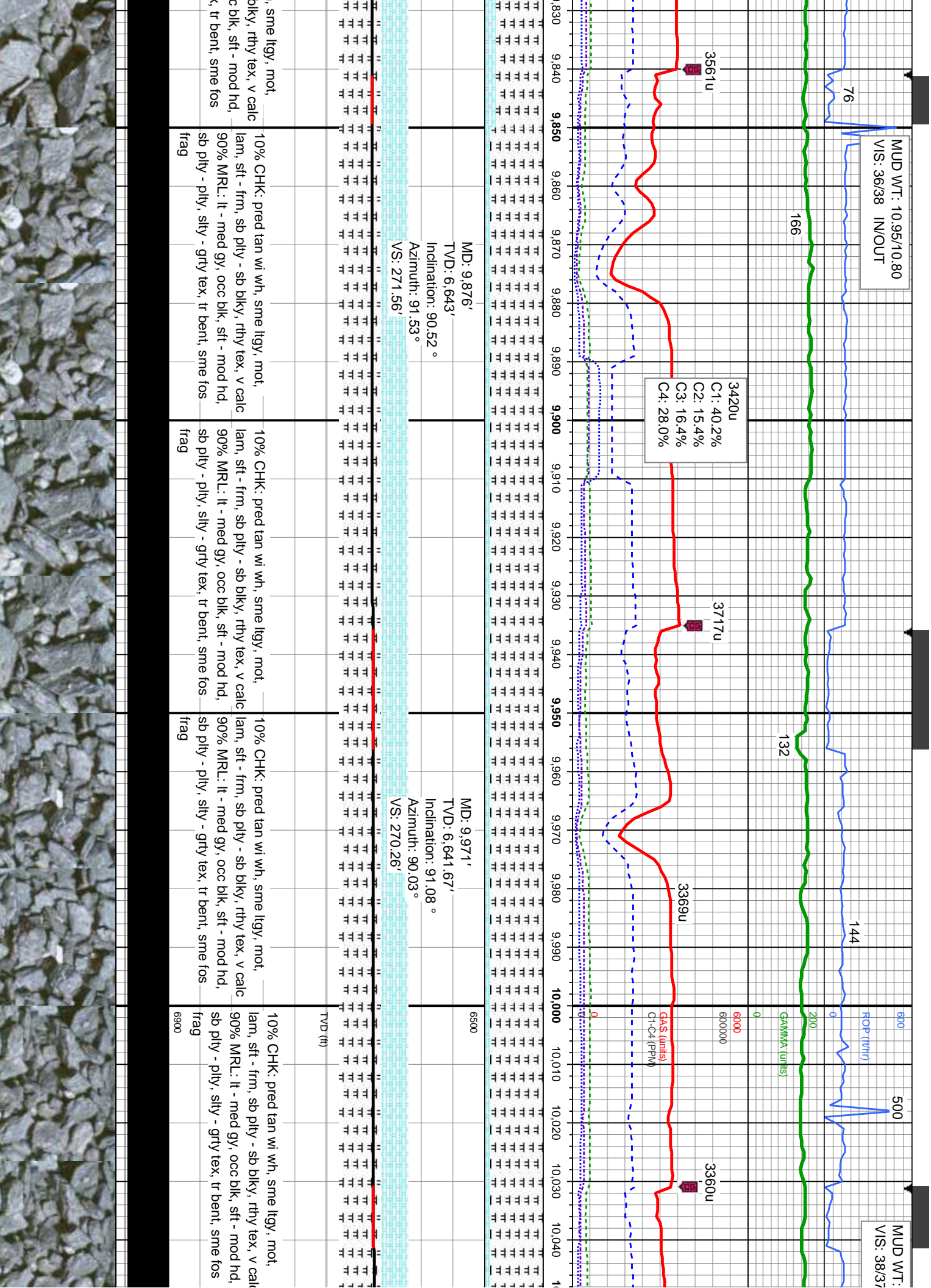
20% CHK: pred tan wi wh, sme ltyg, mot,
lam, sft - frm, sb pty - sb blk, rthy tex, v calc
80% MRL: lt - med gy, occ blk, sft - mod hd,
sb pty - pty, silty - grty tex, tr bent, sme fos
frag

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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, sme fos
frag

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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, sme fos
frag

6900

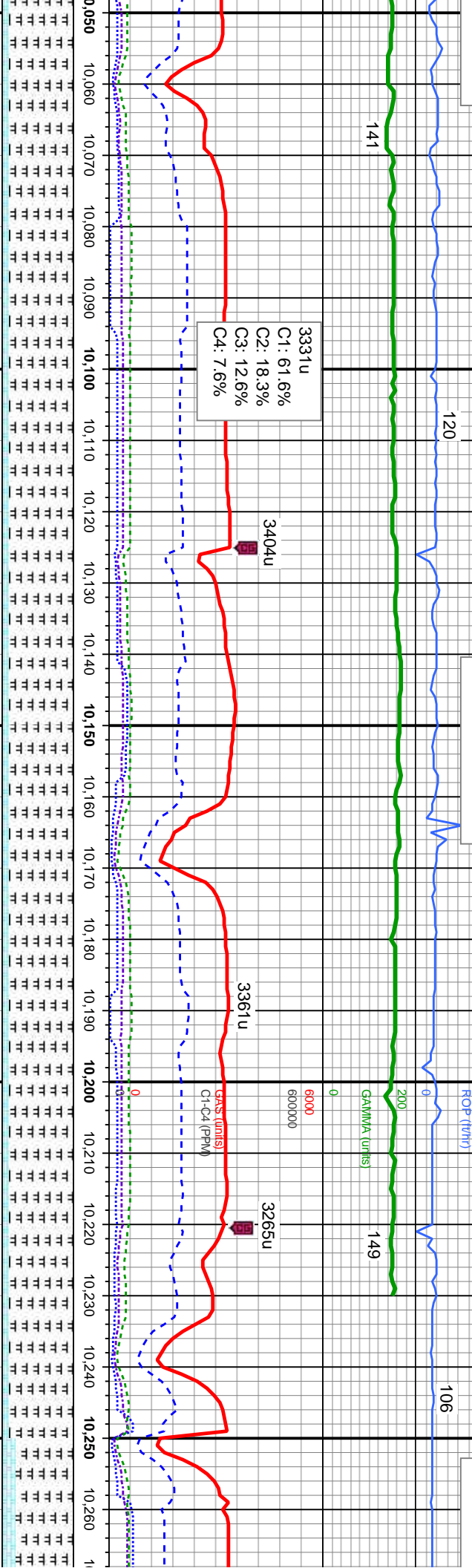




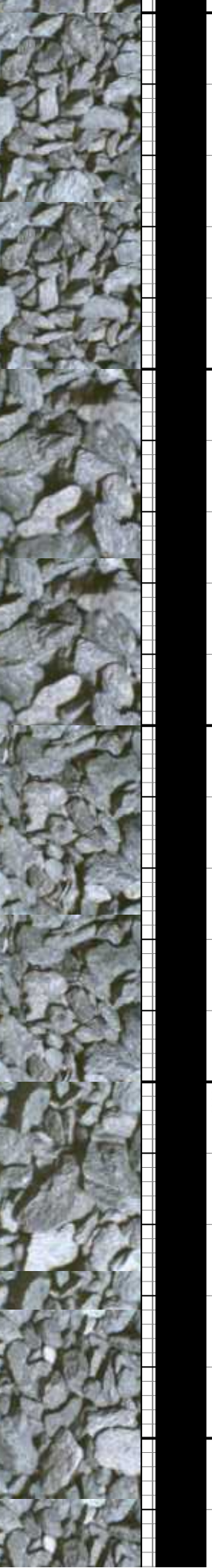
10.80/10.85
IN/OUT

MUD WT: 10.95/10.90
VIS: 38/37 IN/OUT

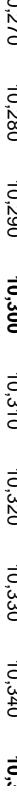
MUD WT: 10.95/10.90
VIS: 38/37 IN/OUT



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, tr bent, sme fos frag	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, tr bent, sme fos frag	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, tr bent, sme fos frag	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, tr bent, sme fos frag
MD: 10,065' TVD: 6,640.43' Inclination: 90.43 ° Azimuth: 90.43 ° VS: 269.88'	MD: 10,160' TVD: 6,639.15' Inclination: 91.11 ° Azimuth: 91.28 ° VS: 268.46'	MD: 10,221' TVD: 6,637.58' Inclination: 91.85 ° Azimuth: 91.88 ° VS: 266.78'	Projection



10


$$\pi = \pi$$

TVD: 6.635 61'

Inclination: 91.85°

115. 364 78'

$\pi = \frac{1}{2}$

By Contributing Logging

- gily ten, u bell, oile 100

