



Scale: 5" / 100'
Measured Depth Log

Well Name Heartland State H01-74-1HN_HORZ

Location Sec 25, T4N, R65W

State Colorado

Country USA

API Number 05-123-39550

Region DJ BASIN

Spud Date 8/5/2014

Surface Coordinates 282' FSL, 784' FEL
40.27673, -104.60515

Bottom Hole Coordinates 75' FSL, 1650' FEL
40.24724, -104.60842

Ground Elevation 4834'

Logged Interval 744'

Formation Niobrara B well

Type of Drilling Fluid FW LSND

County WELD

Rig Number Precision #829

AFE # 200373

Field WATTENBERG

Drilling Completed 8/11/2014

K.B. Elevation 4850'

Total Depth 11050'

Company Noble Energy Inc
Address 1625 BROADWAY
DENVER, CO 80202

Name Holly Duncan
Company Noble Energy, Inc
Address 1625 BROADWAY
DENVER, CO 80202

Columbine Logging, Inc.
Well Site Geologists

Operator

c
AY
2022

Geologist

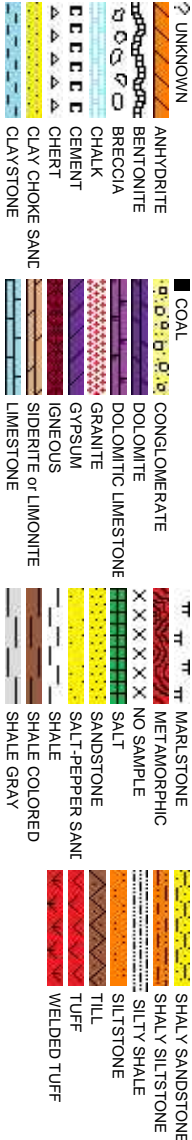
c.
AY
2022

Other

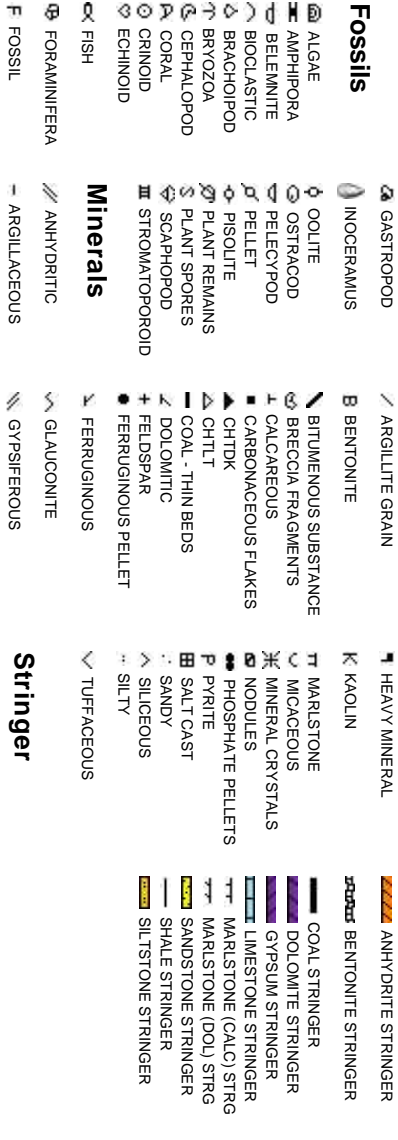
2385 S. Lipan St.
Denver, CO 80223

Ryan Shilling
Shannon Whitmore

Rock Types



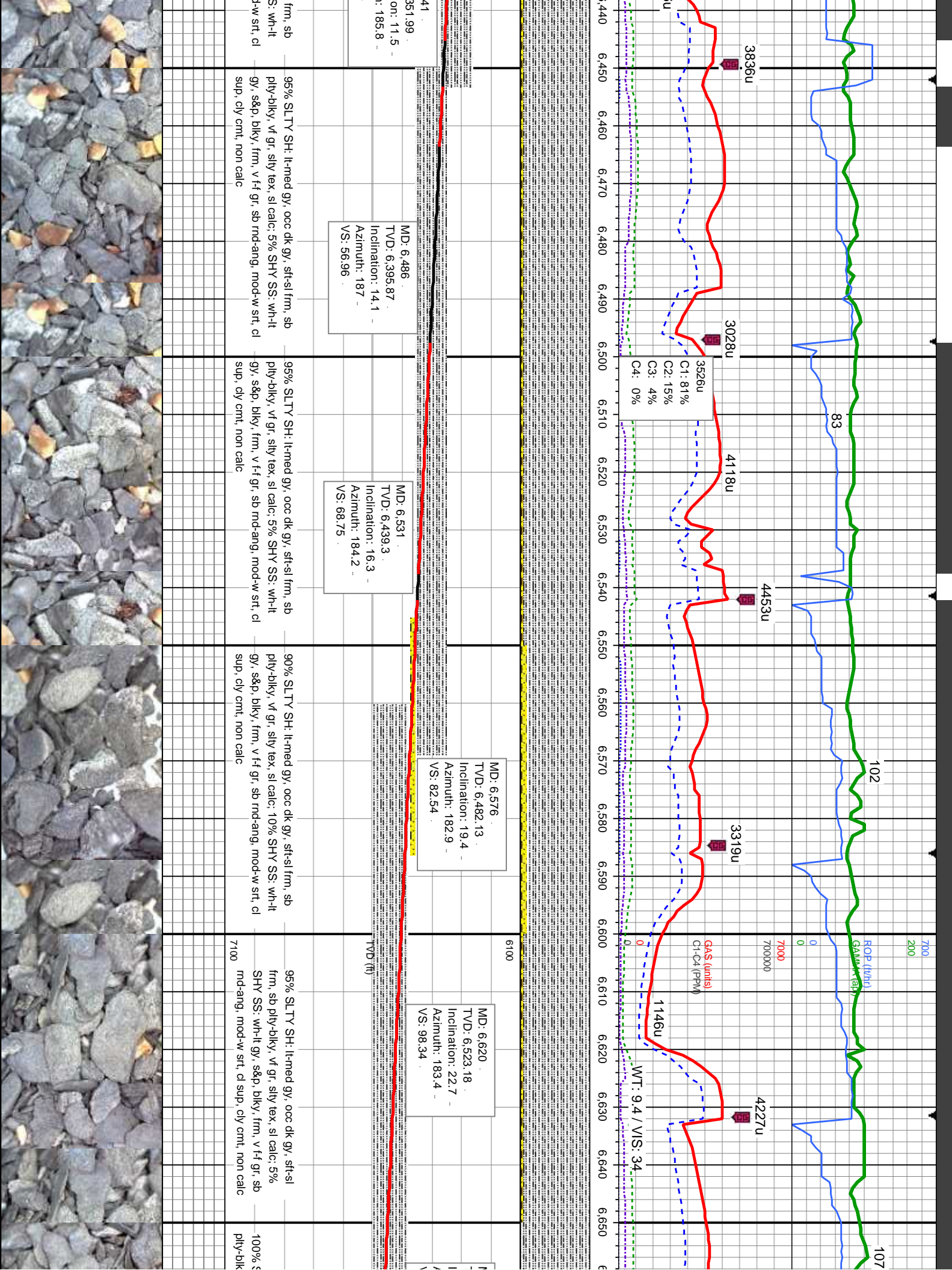
Accessories

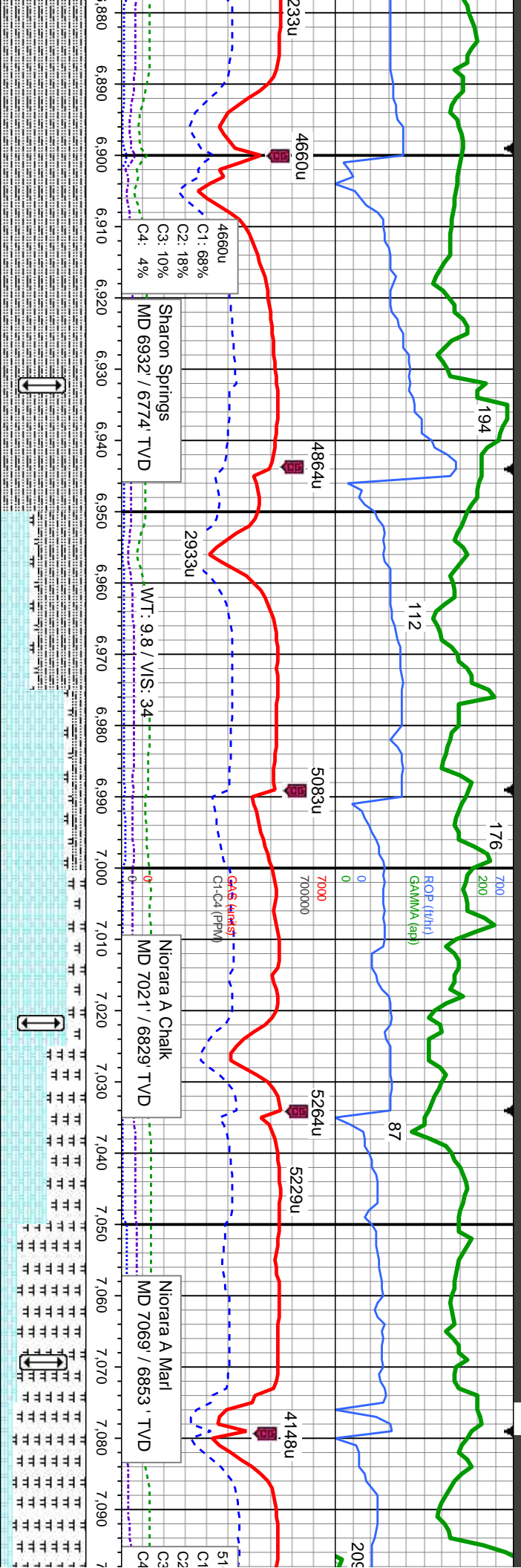


Other Symbols

Oil Show	P PINPOINT V VUGGY	DST INTERVAL FAULT	WIRELINE TESTED - LEFT WIRELINE TESTED - RT	E EARTHY FX FINELYXLN
D DEAD		FORMATION TOP	DRILL STEM TEST	GS GRAINSTONE
● EVEN	Engineering	GAS SHOW	MNDEPTH MN DEPTH	L LITHOGRAPHIC
○ QUESTIONABLE	BIT	OIL SHOW		MX MICROXLN
● SPOTTED STAINING	▲ CONNECTION (UP)	MNDEPTH UP	Rounding	MS MUDSTONE
		MNDEPTH (DOWN)	▲ ANGULAR	PS PACKSTONE
Porosity	▼ CONNECTION (DOWN)		R ROUNDED	WS WACKESTONE
E EARTHY	CONNECTION GAS	NORMAL FAULT	B SUBANG	
B FENESTRAL	TRIP GAS	OVERTURNED STRATA	I SUBRND	Sorting
F FRACTURE	TRIP GAS (LEFT)	REVERSE FAULT		M MODERATE
X INTERCRYSTALLINE	DOWN TIME GAS	CASING	Textures	P POOR
◊ INTEROOLITIC	DOWN TIME GAS (LEFT)	SIDEWALL CORE (LEFT)	BS BOUNDSTONE	W WELL
⌒ MOLDIC	CORE - LOST	SLIDE	C CHALKY	
○ ORGANIC	CORE - RECOVERED	SURVEY	CX CRYPTOXLN	

Slide/Rotate	
<div> <div>ROP</div> <div>ROP</div> <div>GAMMA</div> </div> <div> <div>ROP Scale</div> <div>0-700 f/hr</div> <div>Gamma Scale</div> <div>0 - 200 API</div> </div>	<div> <div>ROP</div> <div>ROP</div> <div>GAMMA</div> </div> <div> <div>ROP Scale</div> <div>0-700 f/hr</div> <div>Gamma Scale</div> <div>0 - 200 API</div> </div>
<div> <div>Total Gas & Chromatograph</div> <div>GAS</div> <div>C1</div> <div>C2</div> <div>C3</div> <div>C4</div> </div> <div> <div>Gas Scale</div> <div>0 - 7000 units</div> </div>	<div> <div>Total Gas & Chromatograph</div> <div>GAS</div> <div>C1</div> <div>C2</div> <div>C3</div> <div>C4</div> </div> <div> <div>Gas Scale</div> <div>0 - 7000 units</div> </div>
<div> <div>Depth Labels</div> <div>6,260 6,270 6,280 6,290 6,300 6,310 6,320 6,330 6,340 6,350 6,360 6,370 6,380 6,390 6,400 6,410 6,420 6,430</div> </div>	<div> <div>Depth Labels</div> <div>6,260 6,270 6,280 6,290 6,300 6,310 6,320 6,330 6,340 6,350 6,360 6,370 6,380 6,390 6,400 6,410 6,420 6,430</div> </div>
<div> <div>% Lith</div> <div>6100-7100'</div> </div>	<div> <div>% Lith</div> <div>6100-7100'</div> </div>
<div> <div>Well Bore</div> <div>TVD</div> <div>Bit Data</div> <div>Bit #: 2</div> <div>Type: SD1519</div> <div>Size: 8.75</div> <div>Depth In: 745'</div> <div>Depth Out: 7,546'</div> <div>Jets: 7x16</div> <div>S/N: JJ4821</div> </div>	<div> <div>Well Bore</div> <div>TVD</div> <div>Bit Data</div> <div>Bit #: 2</div> <div>Type: SD1519</div> <div>Size: 8.75</div> <div>Depth In: 745'</div> <div>Depth Out: 7,546'</div> <div>Jets: 7x16</div> <div>S/N: JJ4821</div> </div>
<div> <div>Oil Show</div> <div>Log Continued from Heartland State</div> <div>H01-74-1HN</div> </div>	<div> <div>Oil Show</div> <div>Log Continued from Heartland State</div> <div>H01-74-1HN</div> </div>
<div> <div>Images</div> <div>6100</div> </div>	<div> <div>Images</div> <div>6100</div> </div>





Sharon Springs
MD 6932 / 6774' TVD

Niorara A Chalk
MD 7021 / 6829' TVD

Niorara A Marl
MD 7069 / 6853' TVD

MD: 6,889
TVD: 6,744.4
Inclination: 45.4
Azimuth: 179.2
VS: 247.68

MD: 6,934
TVD: 6,775.35
Inclination: 47.7
Azimuth: 181.5
VS: 280.27

MD: 6,979
TVD: 6,804.36
Inclination: 52
Azimuth: 183.7
VS: 314.64

MD: 7,024
TVD: 6,830.35
Inclination: 57.4
Azimuth: 183.2
VS: 351.34

MD: 7,068
TVD: 6,852.11
Inclination: 63.3
Azimuth: 183.6
VS: 389.56

35-75% CHK: crm-lyg to brn, mot, sft-mod frm, sb
ply-bkly, v calc; 55-15% SLTY SH: lt-med gy, occ
dk gy, sft-sl frm, sb ply-bkly, vf gr, silty tex, sl calc;
10-10% MRLST: med-dk gy, sl frm-mod hd, sb
ply-bkly, silty-mot tex, calc; bent

80-55% CHK: crm-lyg to brn, mot, sft-mod frm, sb
ply-bkly, v calc; 20-45% MRLST: med-dk gy, sl
frm-mod hd, sb ply-bkly, silty-mot tex, calc

80-85% MRLST: med-dk gy, sl frm-mod hd, sb
ply-bkly, silty-mot tex, calc; 20-15% CHK: crm-lyg
to brn, mot, sft-mod frm, sb ply-bkly, v calc; tr bent

dk gy, sft-sl frm, sb
tr bent

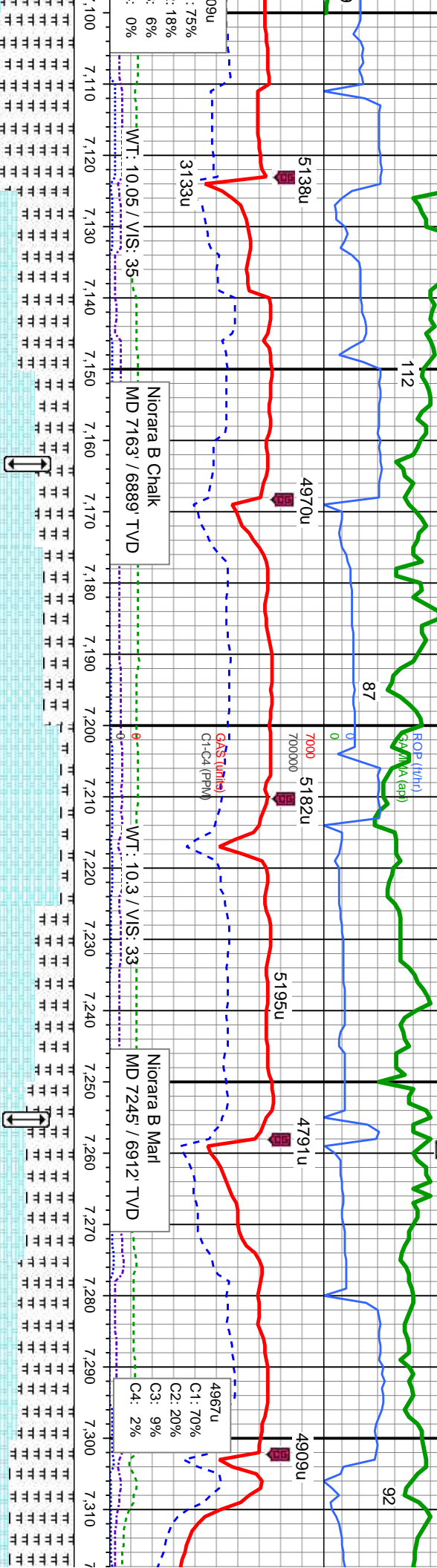
100% SLTY SH: lt-med gy, occ dk gy, sft-sl frm, sb
ply-bkly, vf gr, silty tex, sl calc; abnt bent

7100



8/8/14

MINDEPTH



Niorara B Chalk
MD 7163' / 6889' TVD

Niorara B Mail
MD 7245' / 6912' TVD

90-65% MRLST: med-dk gy, sl frm-mod hd, sb
ply-bkly, silty-mot tex, calc: 10-35% CHK: crm-llgy
to brn, spd wh incl, mot, sft-mod frm, sb ply-bkly, v
calc: tr bent

55-65% CHK: crm-llgy, spd wh incl, mot, sft-mod
frm, sb ply-bkly, v calc: 45-35% MRLST: med-dk
gy, sl frm-mod hd, sb ply-bkly, silty-mot tex, calc: tr
fos frags

85-55% CHK: crm-llgy, wht incl, mot, sft-mod frm,
sb ply-bkly, v calc: 15-45% MRLST: med-dk gy, sl
frm-mod hd, sb ply-bkly, silty-mot tex, calc: fos
frags

55-65% MRLST: med-dk gy, sl frm-mod hd, sb
ply-bkly, silty-mot tex, calc: 45-35% CHK: crm-llgy
to brn, mot, sft-mod frm, sb ply-bkly, v calc: tr fos
frags, tr bent

75-70% MRLST: m
ply-bkly, silty-mot t
to brn, mot, sft-moc
frags, tr bent

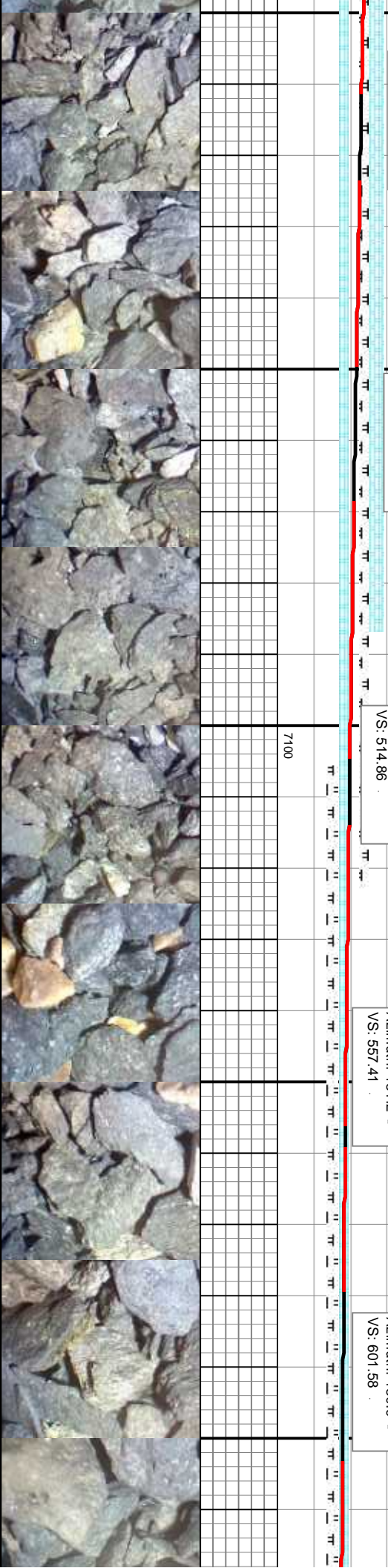
MD: 7,113
TVD: 6,870.91
Inclination: 67.3
Azimuth: 183
VS: 430.43

MD: 7,158
TVD: 6,887.48
Inclination: 69.5
Azimuth: 182.4
VS: 472.25

MD: 7,203
TVD: 6,901.83
Inclination: 73.3
Azimuth: 182
VS: 514.86

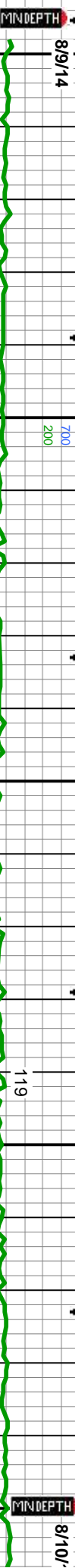
MD: 7,247
TVD: 6,912.84
Inclination: 77.7
Azimuth: 181.2
VS: 557.41

MD: 7,292
TVD: 6,921
Inclination: 81.4
Azimuth: 180.9
VS: 601.58



8/9/14

8/10/14



113

119

SHAKER MAINTENANCE

AGITATOR MAINTAINAN

GAS (units)
C1-C4 (PPM)

111u
C1: 75%
C2: 19%
C3: 6%
C4: 0%

6 MD
@ 21:01 MST
RESUME DRILLING on 8/09/14

WT: 9.0 / VIS: 35

WT: 9.1 / VIS: 35

297u

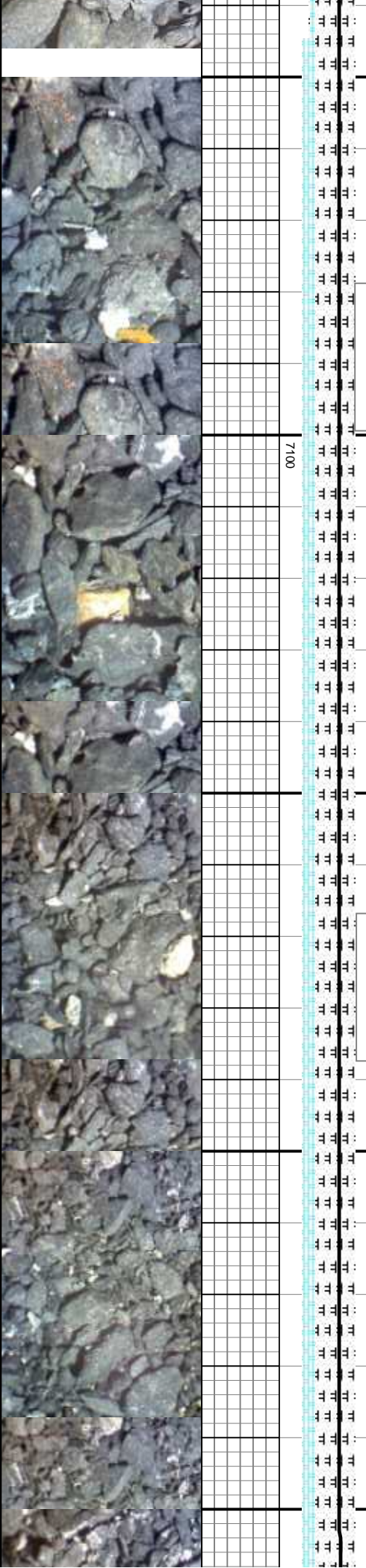
690u

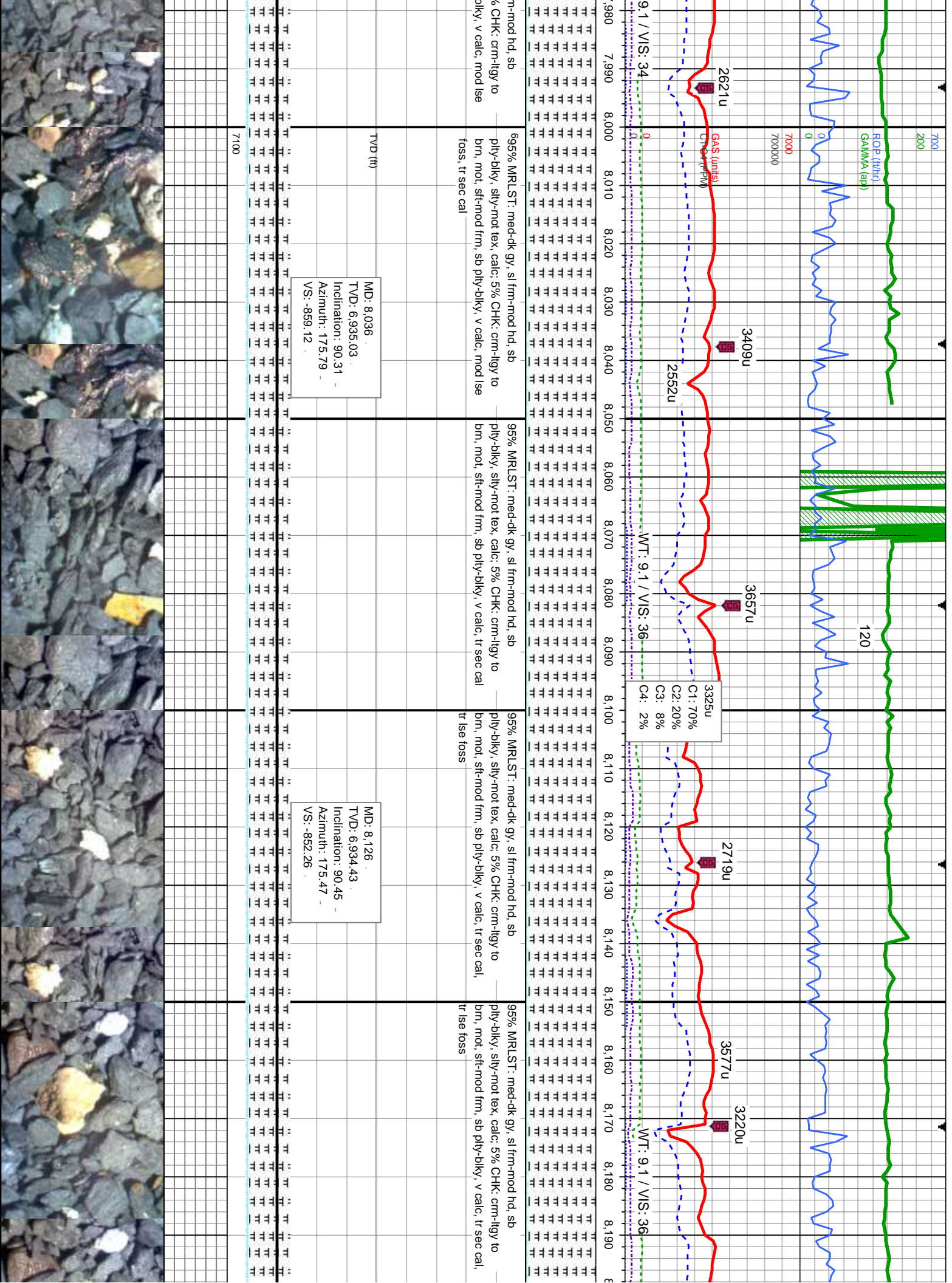
419u

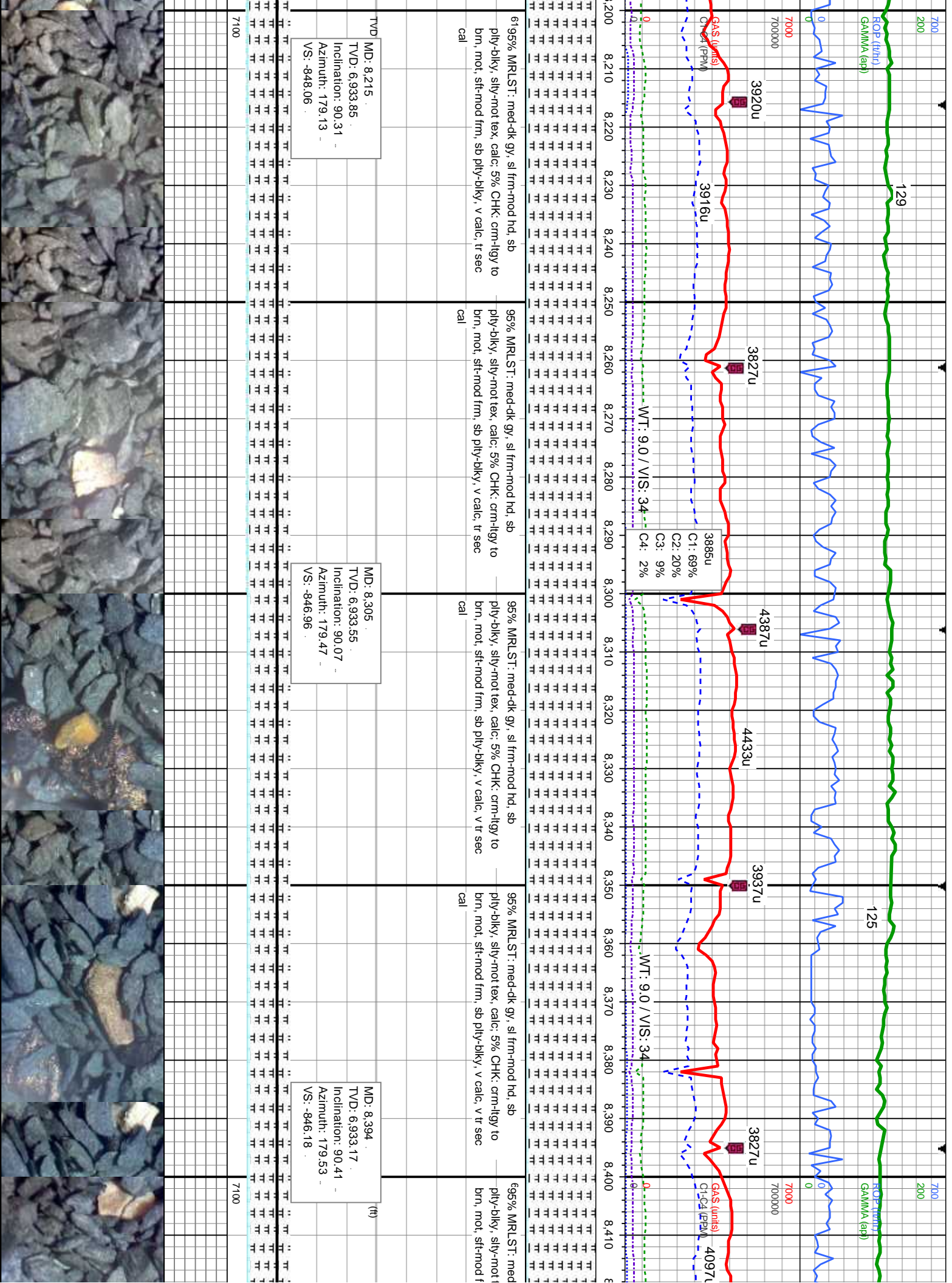
116u

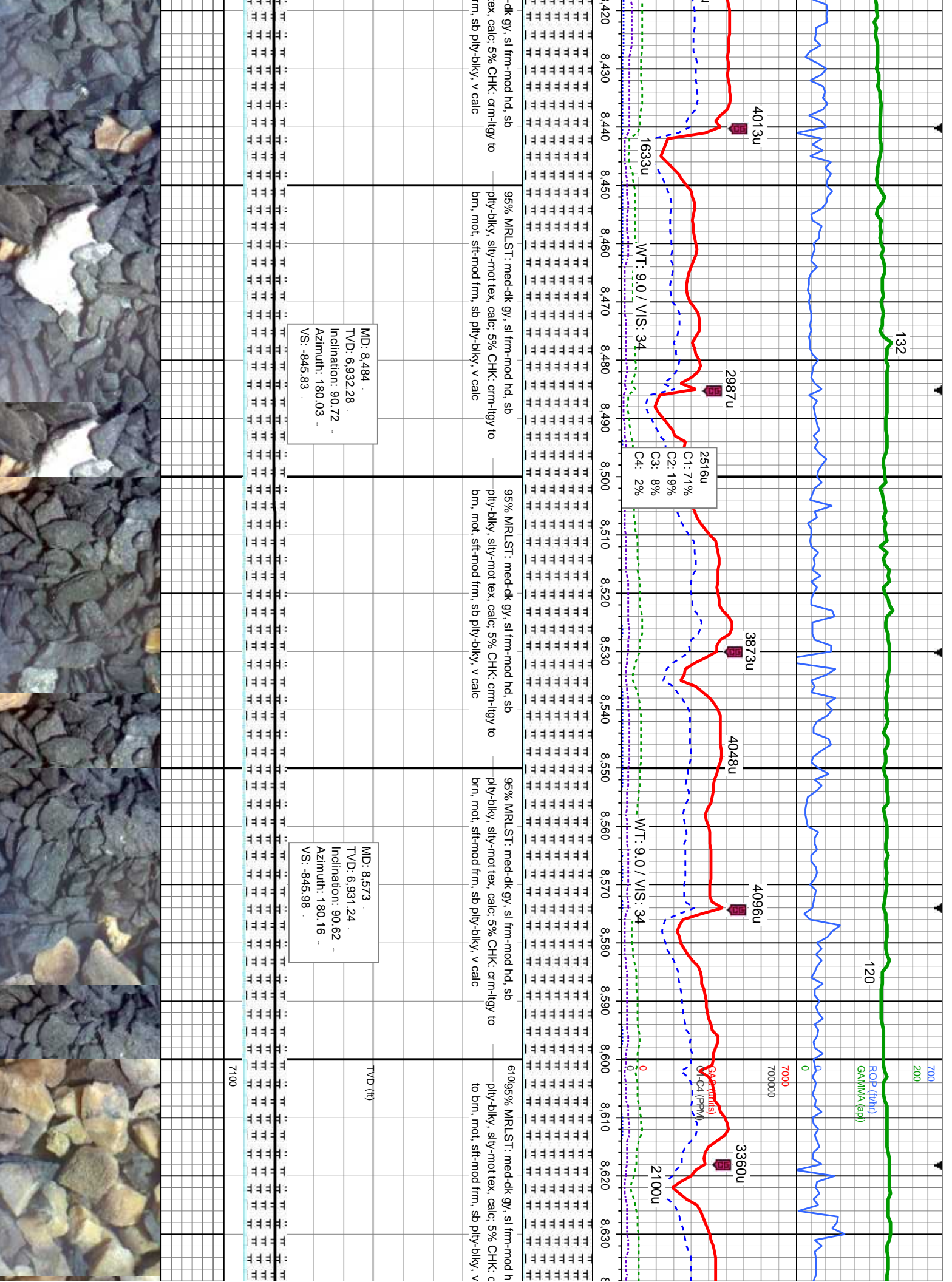
Depth (ft)	95% MRLST: med-dk gy, sl frm-mod hd, sb	6100 90% MRLST: med-dk gy, sl frm-mod hd, sb	90% MRLST: med-dk gy, sl frm-mod hd, sb	80% MRLST: med-dk gy, sl frm-mod hd, sb	75% MRLST: med-dk gy, sl frm-mod hd, sb
113	ply-biky, silty-mot tex, calc: 5% CHK: crm-ilty to brn, mot, sft-mod frm, sb ply-biky, v calc	ply-biky, silty-mot tex, calc: 10% CHK: crm-ilty to brn, mot, sft-mod frm, sb ply-biky, v calc	ply-biky, silty-mot tex, calc: 10% CHK: crm-ilty to brn, mot, sft-mod frm, sb ply-biky, v calc	ply-biky, silty-mot tex, calc: 20% CHK: crm-ilty to brn, mot, sft-mod frm, sb ply-biky, v calc	ply-biky, silty-mot tex, calc: 20% CHK: crm-ilty to brn, mot, sft-mod frm, sb ply-biky, v calc

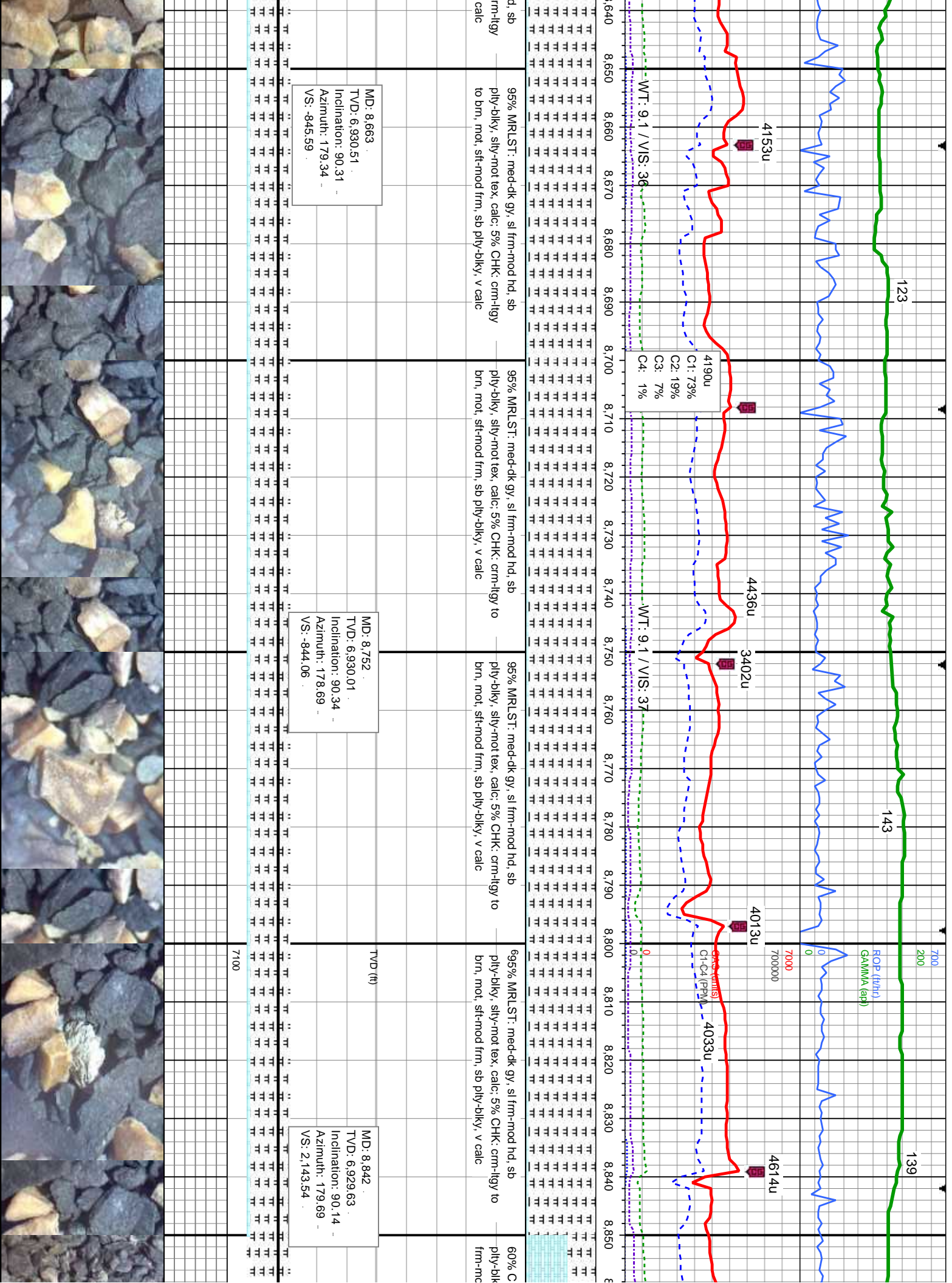
Bit Data	MD: 7.588	MD: 7.677
Bit #: 3	TVD: 6.936.72	TVD: 6.936.38
Type: MDI513	Inclination: 90.21	Inclination: 90.24
Size: 6.12	Azimuth: 182.6	Azimuth: 180.45
Depth In: 7.546	VS: -875.35	VS: -877.72
Jets: 5X12		
S/N: J15517		

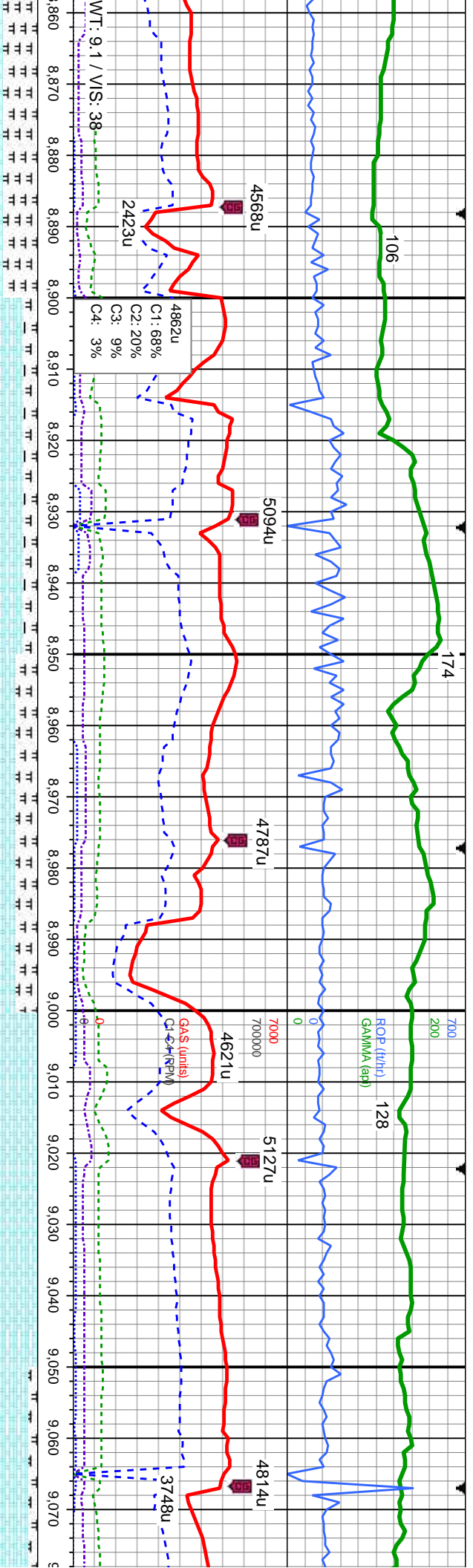












HK: crm-lgy to brn, mot, sft-mod frm, sb
ply-blky, v calc: 40% MRLST: med-dk gy, sl
hd hd, sb ply-blky, silv-mot tex, calc

85% CHK: crm-lgy to brn, mot, sft-mod frm, sb
ply-blky, v calc: 15% MRLST: med-dk gy, sl
frm-mod hd, sb ply-blky, silv-mot tex, calc

75% CHK: crm-lgy to brn, mot, sft-mod frm, sb
ply-blky, v calc: 25% MRLST: med-dk gy, sl
frm-mod hd, sb ply-blky, silv-mot tex, calc

100% CHK: crm-lgy to brn, mot, sft-mod frm, sb
ply-blky, v calc, tr mlst

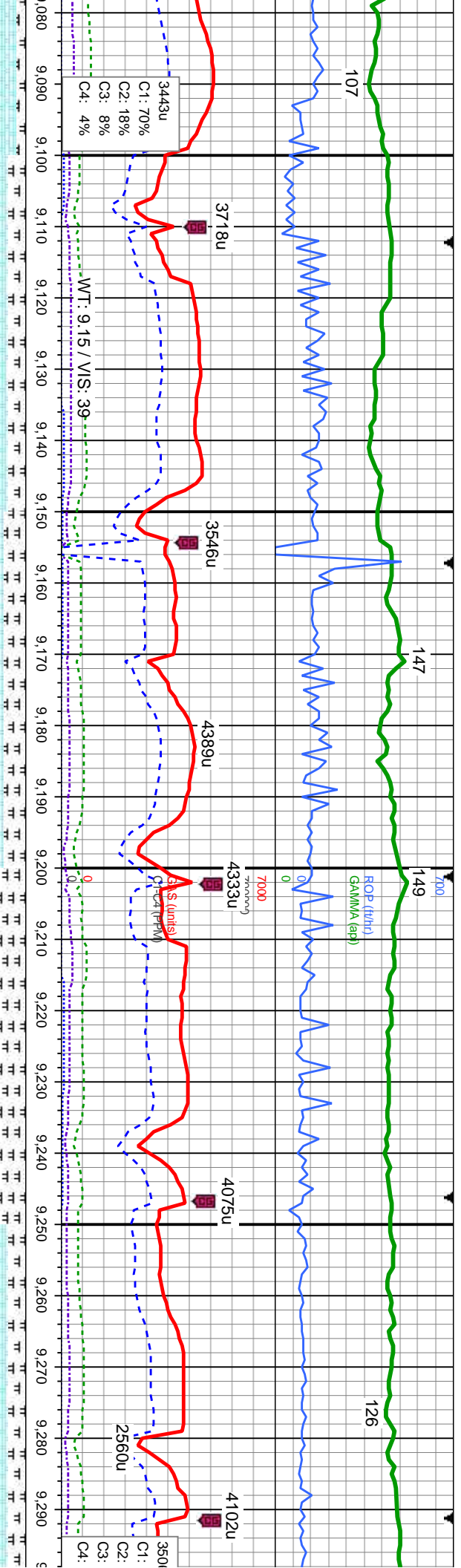
90% CHK: crm-lgy to brn, mc
ply-blky, v calc: 10% MRLST:
frm-mod hd, sb ply-blky, silv-

MD: 8.931
TVD: 6.929.15
Inclination: 90.48
Azimuth: 181.53
VS: -843.73

MD: 9.021
TVD: 6.928.5
Inclination: 90.34
Azimuth: 181.11
VS: -845.8

7100





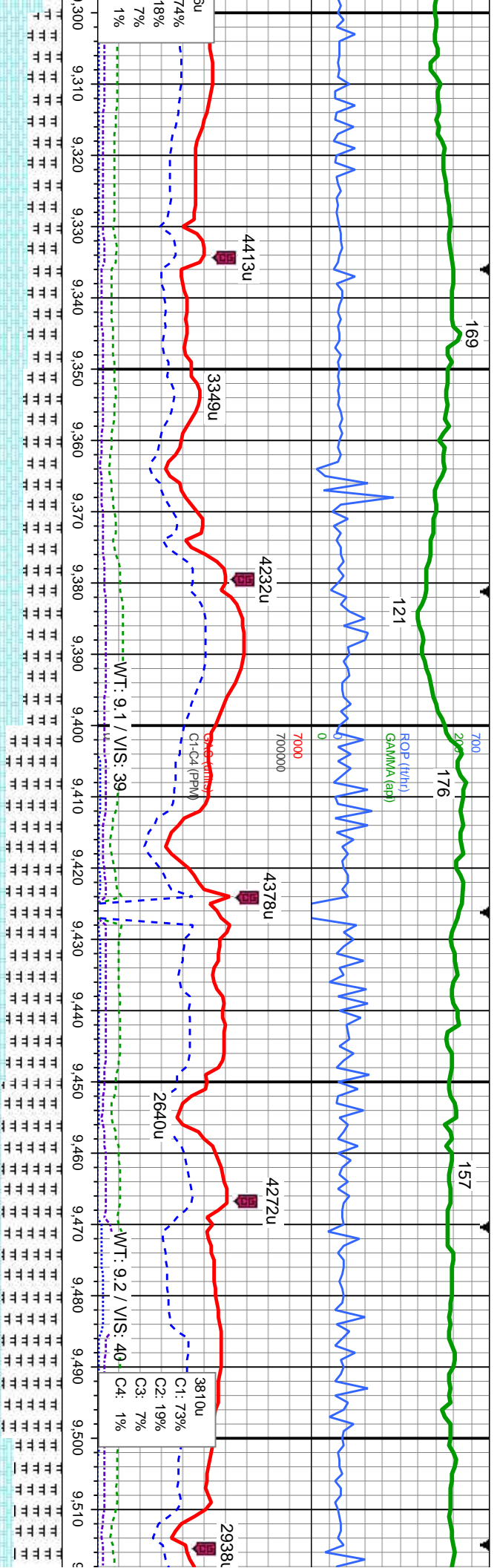
MD: 9.111
TVD: 6.928.18
Inclination: 90.07
Azimuth: 182.39
VS: -848.55

MD: 9.200
TVD: 6.928.02
Inclination: 90.14
Azimuth: 180.98
VS: -851.17

MD: 9.290
TVD: 6.927.75
Inclination: 90.21
Azimuth: 179.15
VS: -851.28

t, sft-mod frm, sb	80% CHK: crm-llgy to brn, mot, sft-mod frm, sb	6100 70% CHK: crm-llgy to brn, mot, sft-mod frm, sb	80% CHK: crm-llgy to brn, mot, sft-mod frm, sb
med-dk gy, sl	ply-blky, v calc: 20% MRLST: med-dk gy, sl	sb ply-blky, v calc: 30% MRLST: med-dk gy, sl	ply-blky, v calc: 20% MRLST: med-dk gy, sl
mot tex, calc	frm-mod hd, sb ply-blky, silty-mot tex, calc	frm-mod hd, sb ply-blky, silty-mot tex, calc	frm-mod hd, sb ply-blky, silty-mot tex, calc

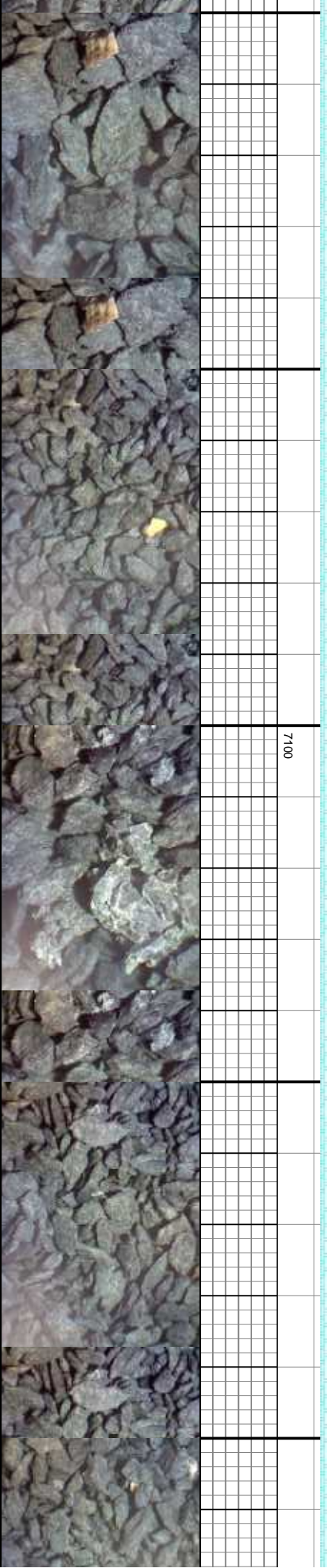
7100

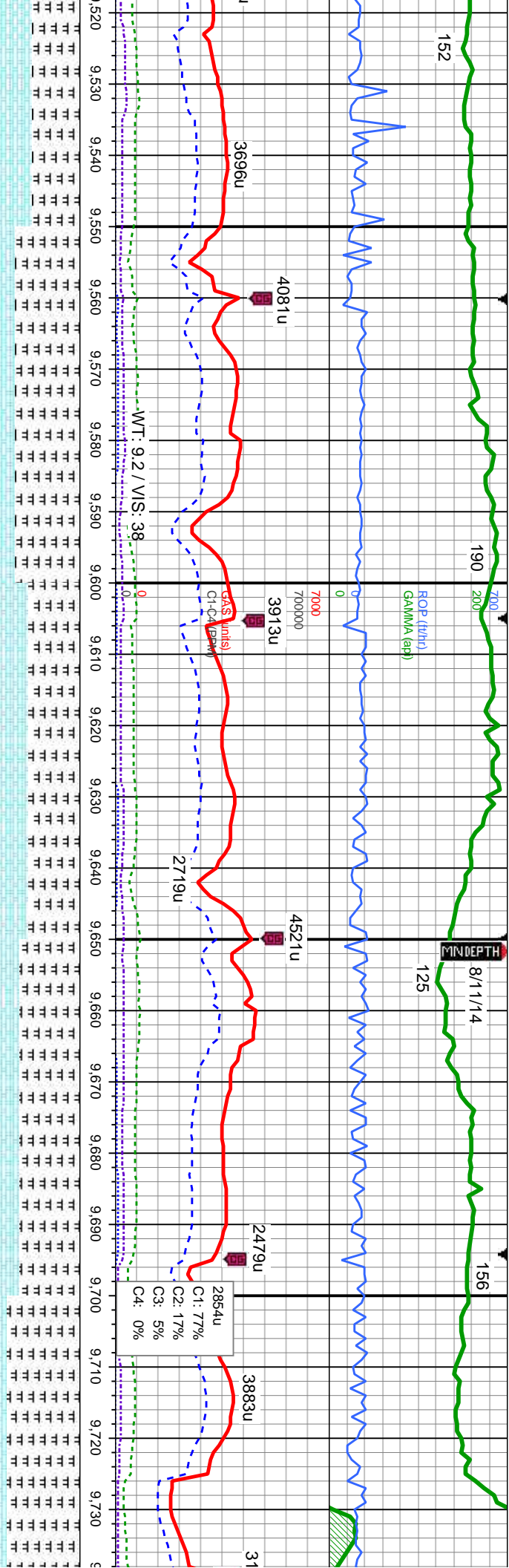


60% CHK: crm-lyg to brn, mot, sft-mod frm, sb ply-blky, v calc: 40% MRLST: med-dk gy, sl frm-mod hd, sb ply-blky, silty-mot tex, calc	65% CHK: crm-lyg to brn, mot, sft-mod frm, sb ply-blky, v calc: 45% MRLST: med-dk gy, sl frm-mod hd, sb ply-blky, silty-mot tex, calc	6100 65% MRLST: med-dk gy, sl frm-mod hd, sb ply-blky, silty-mot tex, calc: 35% CHK: crm-lyg to brn, mot, sft-mod frm, sb ply-blky, v calc	70% MRLST: med-dk gy, sl frm-mod hd, sb ply-blky, silty-mot tex, calc: 30% CHK: crm-lyg to brn, mot, sft-mod frm, sb ply-blky, v calc	55% MRLST: med-dk gy, sl frm-mod frm, sb ply-blky, silty-mot tex, calc
---------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------

MD: 9,380
TVD: 6,927.42
Inclination: 90.21
Azimuth: 179.88
VS: -850.13

MD: 9,469
TVD: 6,926.77
Inclination: 90.62
Azimuth: 176.42
VS: -852.13





dk gy, sl frm-mod hd, sb
ply-biky, silty-mot tex, calc: 45% CHK: crm-lygy to
brn, sb ply-biky, v calc

75% MRLST: med-dk gy, sl frm-mod hd, sb
ply-biky, silty-mot tex, calc: 25% CHK: crm-lygy to
brn, mot, sft-mod frm, sb ply-biky, v calc

6100 60% MRLST: med-dk gy, sl frm-mod hd, sb
ply-biky, silty-mot tex, calc: 40% CHK:
crm-lygy to brn, mot, sft-mod frm, sb ply-biky,
v calc

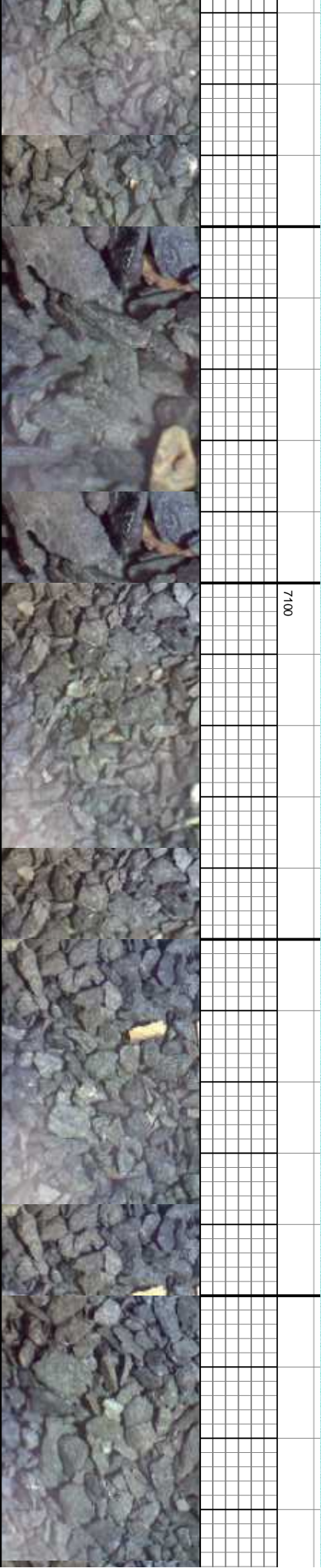
70% MRLST: med-dk gy, sl frm-mod hd, sb
ply-biky, silty-mot tex, calc: 30% CHK: crm-lygy
to brn, mot, sft-mod frm, sb ply-biky, v calc

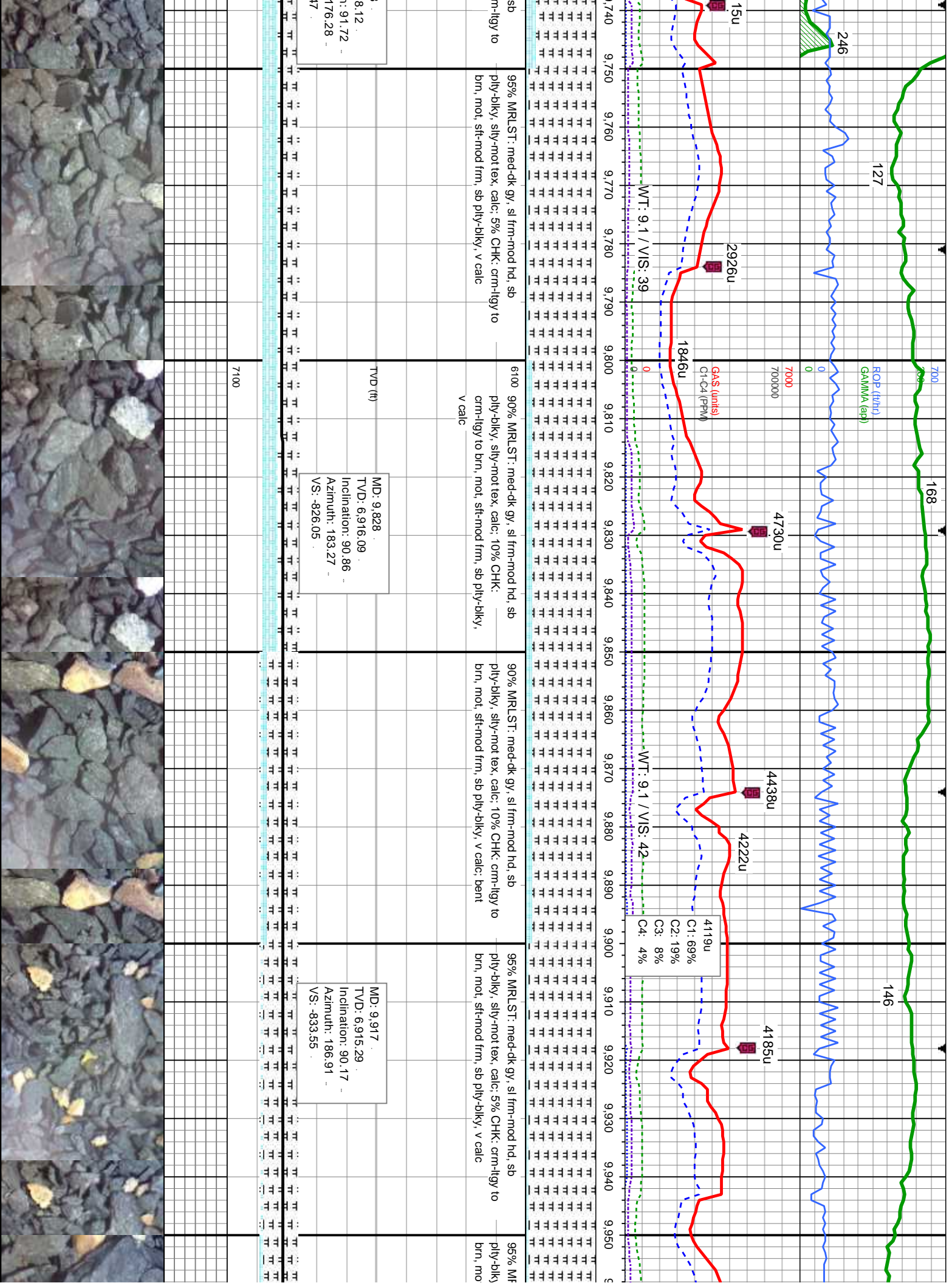
85% MRLST: med-dk gy, sl frm-mod hd,
ply-biky, silty-mot tex, calc: 15% CHK: cr
brn, mot, sft-mod frm, sb ply-biky, v calc

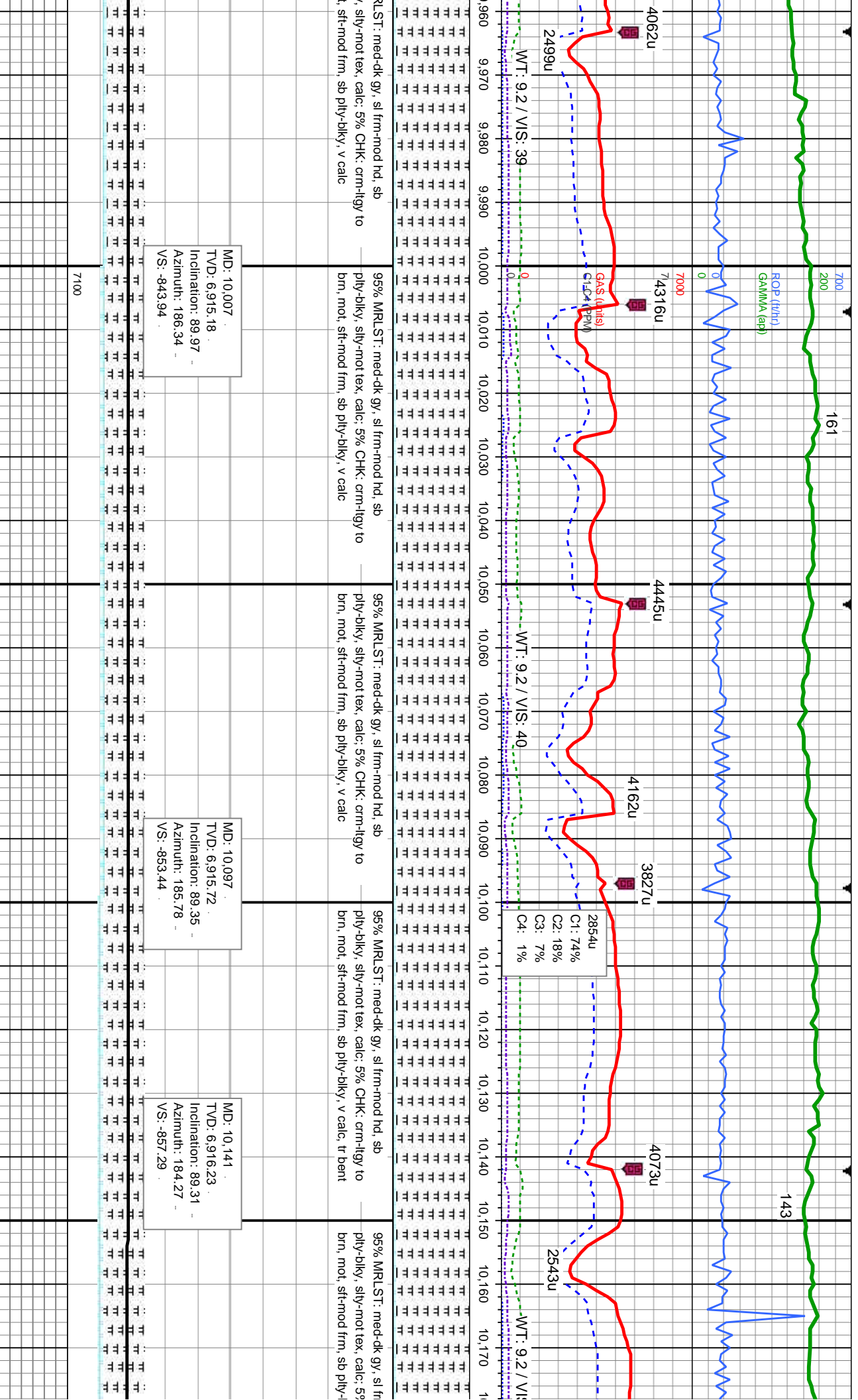
MD: 9,559
TVD: 6,924.66
Inclination: 92.06
Azimuth: 173.05
VS: -843.88

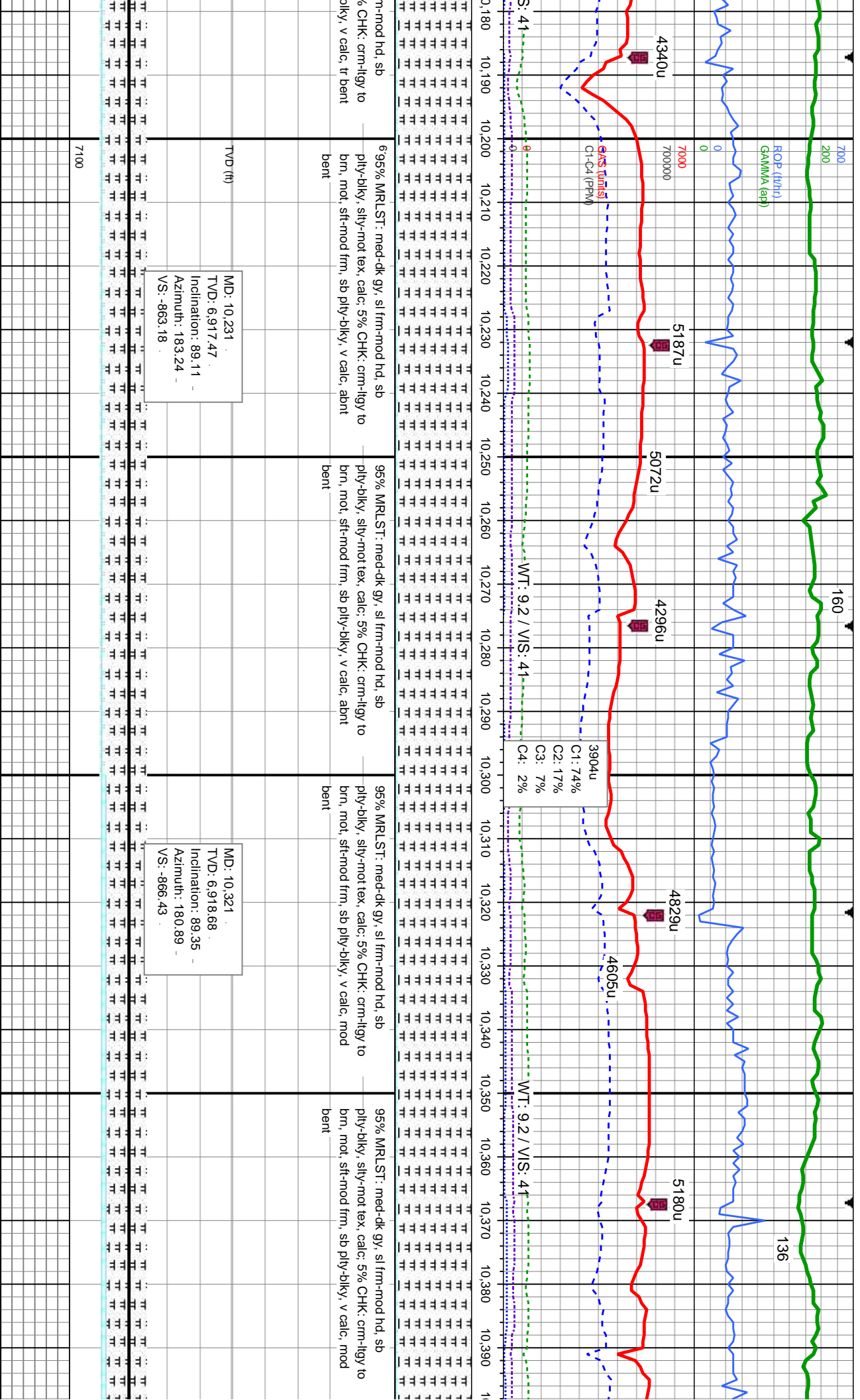
MD: 9,648
TVD: 6,921.27
Inclination: 92.3
Azimuth: 172.39
VS: -833.36

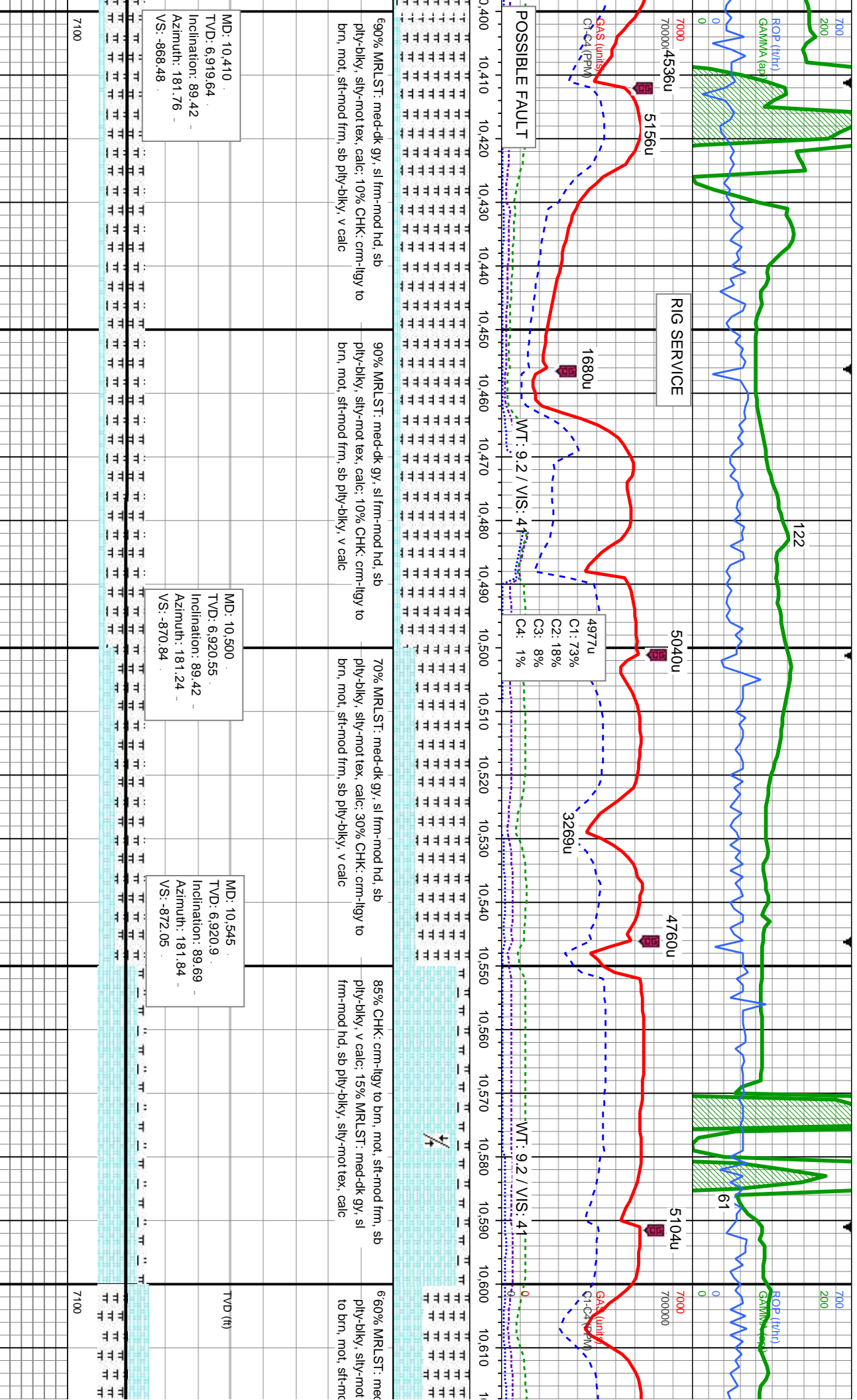
MD: 9,736
TVD: 6,91
Inclination:
Azimuth:
VS: -825.4

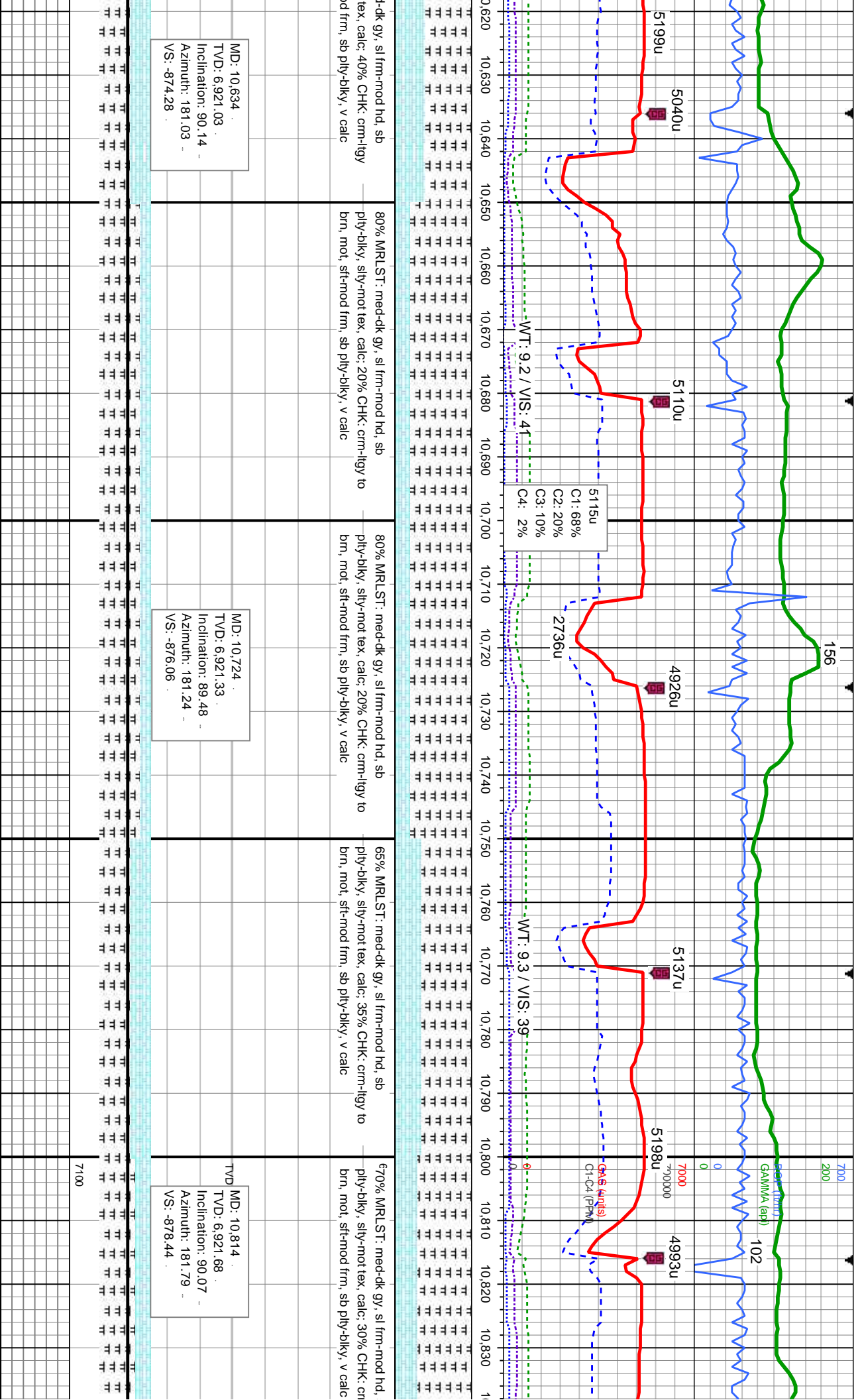












med-dk gy, sl frm-mod hd, sb
tex, calc: 40% CHK: crm-lgy
d frm, sb ply-blky, v calc

80% MRLST: med-dk gy, sl frm-mod hd, sb
ply-blky, silty-mot tex, calc: 20% CHK: crm-lgy to
brn, mot, sft-mod frm, sb ply-blky, v calc

80% MRLST: med-dk gy, sl frm-mod hd, sb
ply-blky, silty-mot tex, calc: 20% CHK: crm-lgy to
brn, mot, sft-mod frm, sb ply-blky, v calc

65% MRLST: med-dk gy, sl frm-mod hd, sb
ply-blky, silty-mot tex, calc: 35% CHK: crm-lgy to
brn, mot, sft-mod frm, sb ply-blky, v calc

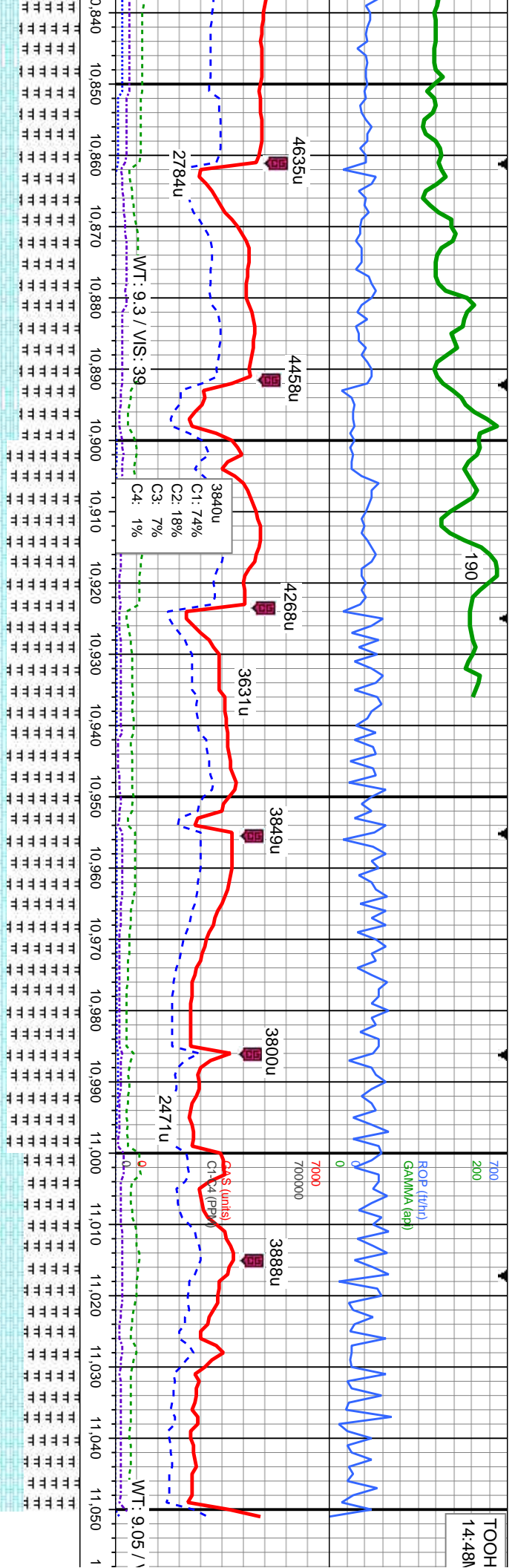
670% MRLST: med-dk gy, sl frm-mod hd,
ply-blky, silty-mot tex, calc: 30% CHK: crm
brn, mot, sft-mod frm, sb ply-blky, v calc

5115u
C1: 68%
C2: 20%
C3: 10%
C4: 2%

WT: 9.3 / VIS: 39

WT: 9.2 / VIS: 41

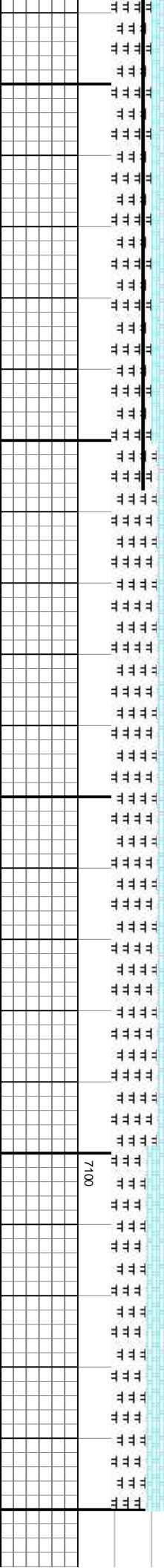
GR: 5 units
C1-C4 (ppm)



sb	70% MRLST: med-dk gy, sl frm-mod hd, sb ply-bkly, silty-mot tex, calc: 30% CHK: crm-lgy to brn, mot, sft-mod frm, sb ply-bkly, v calc	85% MRLST: med-dk gy, sl frm-mod hd, sb ply-bkly, silty-mot tex, calc: 15% CHK: crm-lgy to brn, mot, sft-mod frm, sb ply-bkly, v calc, abnt bent	85% MRLST: med-dk gy, sl frm-mod hd, sb ply-bkly, silty-mot tex, calc: 15% CHK: crm-lgy to brn, mot, sft-mod frm, sb ply-bkly, v calc, abnt bent	6100 65% MRLST: med-dk gy, sl frm-mod hd, sb ply-bkly, silty-mot tex, calc: 35% CHK: crm-lgy to brn, mot, sft-mod frm, sb ply-bkly, v calc, tt bent
10,840				
10,850				
10,860				
10,870				
10,880				
10,890				
10,900				
10,910				
10,920				
10,930				
10,940				
10,950				
10,960				
10,970				
10,980				
10,990				
11,000				
11,010				
11,020				
11,030				
11,040				
11,050				

MD: 10.907
TVD: 6.921.01
Inclination: 90.76
Azimuth: 179.94
VS: -879.84

TVD (ft)



for New Motor on 8/11/14
MST @ 11050' MD

MS: 39

11,060	11,070	11,080	11,090	11,100
--------	--------	--------	--------	--------

A blank grid paper with a 10x10 grid of squares. The grid is divided into four 5x5 quadrants by a vertical line and a horizontal line. The top-left quadrant is shaded light blue.