



Scale: 5" / 100'  
Measured Depth Log

**Well Name** Mahalo State AA09\_75\_HNC

**Location** SWSE, Sec. 4, T6N, R63W, 6 PM

**State** Colorado

**Country** United States

**API Number** 05-123-39055

**Region** DJ Basin

**Spud Date** 2/2/2015

**County** Weld

**Rig Number** Precision 829

**AFE #** 200303

**Field** Wattenberg

**Drilling Completed** 2/9/2015

**Surface Coordinates** 325°FSL & 2415°FEL

SWSE Sec. 4, T6N, R63W, 6th PM

**Bottom Hole Coordinates** 30°FNL & 2495°FWL

NENW Sec. 16, T6N, R63W, 6th PM

**Ground Elevation** 4695'

**Logged Interval** 6000'

**Formation** Niobrara C Chalk

**Type of Drilling Fluid** FW LSND

**K.B. Elevation** 4711'

**To** 11862'

**Total Depth** 11862'

**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.

Wellsite Geologist

Operator

c  
AY  
202

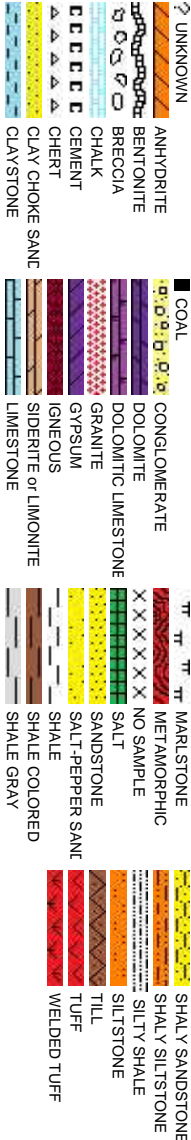
Geologist

c.  
AY  
202

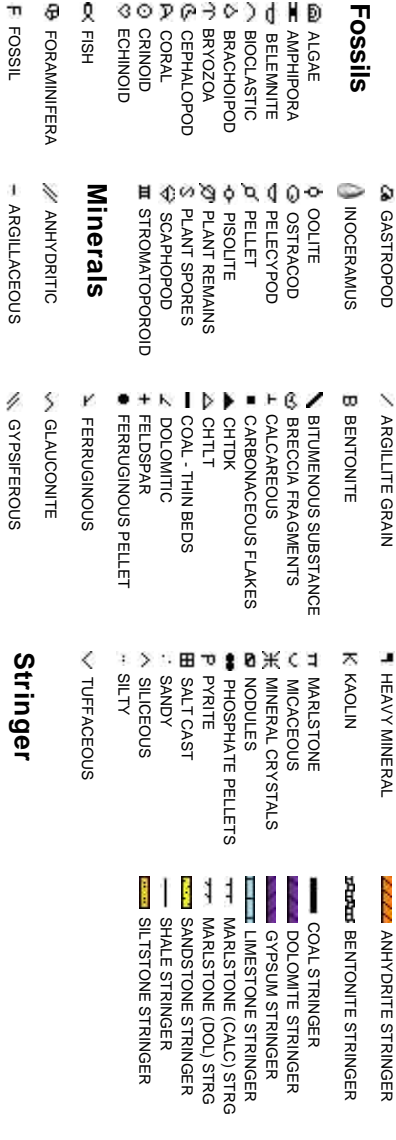
Other

602 S. Lipan St.  
Denver CO, 80223  
  
David Hensley  
Jason Bell

Rock Types



Accessories



**Fossils**

- ALGAE
- AMPHIPORA
- BELEMNITE
- BIOCLASTIC
- BRACHIOPOD
- BRYOZOA
- CERPHALOPOD
- CORAL
- CRINOID
- ECHINOID
- FISH
- FORAMINIFERA
- FOSSIL

**Minerals**

- ANHYDRITIC
- ARGILLACEOUS

**Stringer**

Other Symbols

**Oil Show**  
P PINPOINT  
V VUGGY

D DEAD

● EVEN

○ QUESTIONABLE

● SPOTTED STAINING ▲ CONNECTION (UP)

**Engineering**

▲ BIT

⋮ DST INTERVAL

⚡ FAULT

▭ FORMATION TOP

⚡ GAS SHOW

● OIL SHOW

▽ WIRELINE TESTED - LEFT E EARTHY

△ WIRELINE TESTED - RT FX FINELYXLN

▭ DRILL STEM TEST

BS GRAINSTONE

▭ MN DEPTH

L LITHOGRAPHIC

MX MICROXLN

MS MUDSTONE

**Rounding**

▲ ANGULAR

PS PACKSTONE

R ROUNDED

WS WACKSTONE

B SUBANG

↑ SUBRND

**Sorting**

M MODERATE

P POOR

W WELL

**Porosity**

▼ CONNECTION (DOWN)

▭ CONNECTION GAS

E EARTHY

▭ TRIP GAS

F FRACTURE

▭ TRIP GAS (LEFT)

X INTERCRYSTALLINE

▭ DOWN TIME GAS

◊ INTEROOLITIC

▭ DOWN TIME GAS (LEFT)

⚡ MOLDIC

↓ CORE - LOST

◻ ORGANIC

▭ CORE - RECOVERED

**Textures**

▭ SIDEWALL CORE (LEFT)

▭ SIDEWALL CORE (RIGHT)

▭ SLIDE

▭ SURVEY

BS BOUNDSTONE

○ CHALKY

○ CRYPTOXLN

Slide/Rotate

ROP  
ROF  
GAMMA

ROP Scale  
0 - 800 units

Gamma Scale  
0 - 300 units

Gas Scale  
0 - 4000 units

Total Gas & Chromatograph

GAS  
C1  
C2  
C3  
C4

COLUMBINE LOGGING, INC. RIGGED UP ON  
2/02/2015 MANNED 2-PERSON LOGGING  
WITH BLOODHOUND GAS CHROMATOGRAPH  
UNIT # 0312

Depth Labels

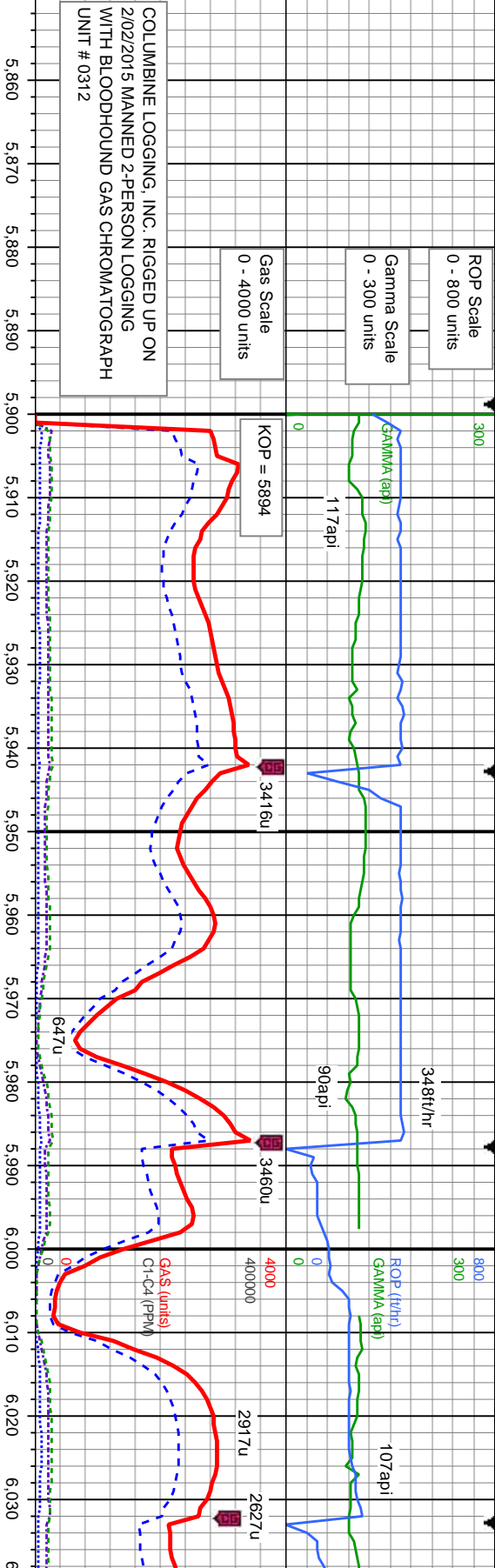
% Lith

Well Bore  
TVD

Oil Show

exc  
gd  
mod  
fr  
st

Images



Log Continued from  
Mahalo State AA09-75-HNC\_Vert

TVD Scale  
5800' - 6800'

MD: 5.978  
TVD: 5.937.07  
Inclination: 1.4  
Azimuth: 94.5  
VS: 265.38

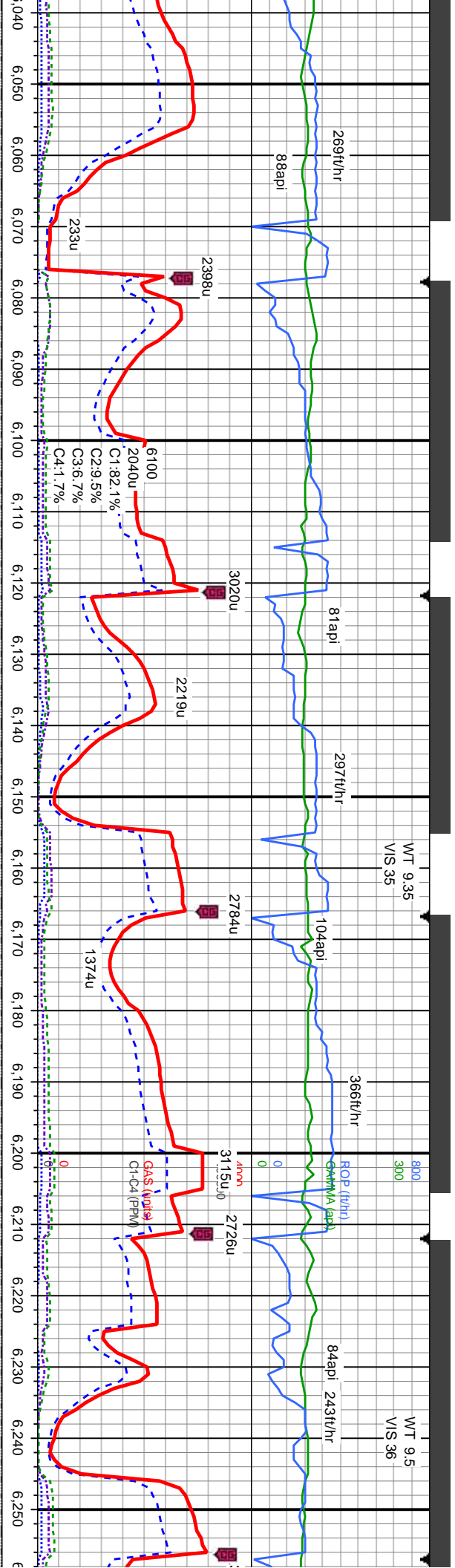
MD: 6.023  
TVD: 5.982.02  
Inclination: 4  
Azimuth: 164.9  
VS: 266.9

95% SLTY SH: med-dk gy, occ sl brn, mod  
frm-frm, silty - sm tex, occ lam, sb blkly - ply, non -  
sl calc; 5% SS lt gy-med gy, S&P, sft-sl frm, v-f-f  
gr, sb rnd-ang, mod-w srt, cly cnt

60% SLTY SH: med-dk gy - bnshgy, mod  
silty - sm tex, occ lam, sb blkly - ply, non -  
30% SHY SS lt gy-med gy, S&P, sft-sl frm  
sb rnd-ang, mod-w srt, cly cnt, sl calc; 10%  
- lt gy, s&p ip, frm, w cons, v-f-f, sb rd-rd, w  
por, sil cnt, v sl calc, mics ip







MD: 6.067  
TVD: 6.025.75  
Inclination: 8.5  
Azimuth: 171.5  
VS: 271.57

MD: 6.112  
TVD: 6.070.05  
Inclination: 11.7  
Azimuth: 174  
VS: 279.36

MD: 6.157  
TVD: 6.113.81  
Inclination: 15.2  
Azimuth: 178  
VS: 289.77

MD: 6.202  
TVD: 6.157.16  
Inclination: 15.9  
Azimuth: 176.9  
VS: 301.8

MD: 6.247  
TVD: 6.200.31  
Inclination: 17.1  
Azimuth: 168.5  
VS: 314.37

75% SLTY SH: med-dk gy - bnshgy, mod frm-frm, slty - sm tex, occ lam, sb blkly - ply, non - sl calc; 15% SHY SS lt gy-med gy, S&P, sft-sl frm, v f-f gr, sb md-ang, mod-w srt, cly cnt, sl calc; 10% SS:wh - lt gy, s&p lp, frm, w cons, v-f-f, sb rd-rd, w srt, g por, sil cnt, v sl calc, mics lp

70% SLTY SH: med-dk gy - bnshgy, mod frm-frm, slty - sm tex, occ lam, sb blkly - ply, non - sl calc; 30% SHY SS lt gy-med gy, S&P, sft-sl frm, v f-f gr, sb md-ang, mod-w srt, cly cnt, sl calc

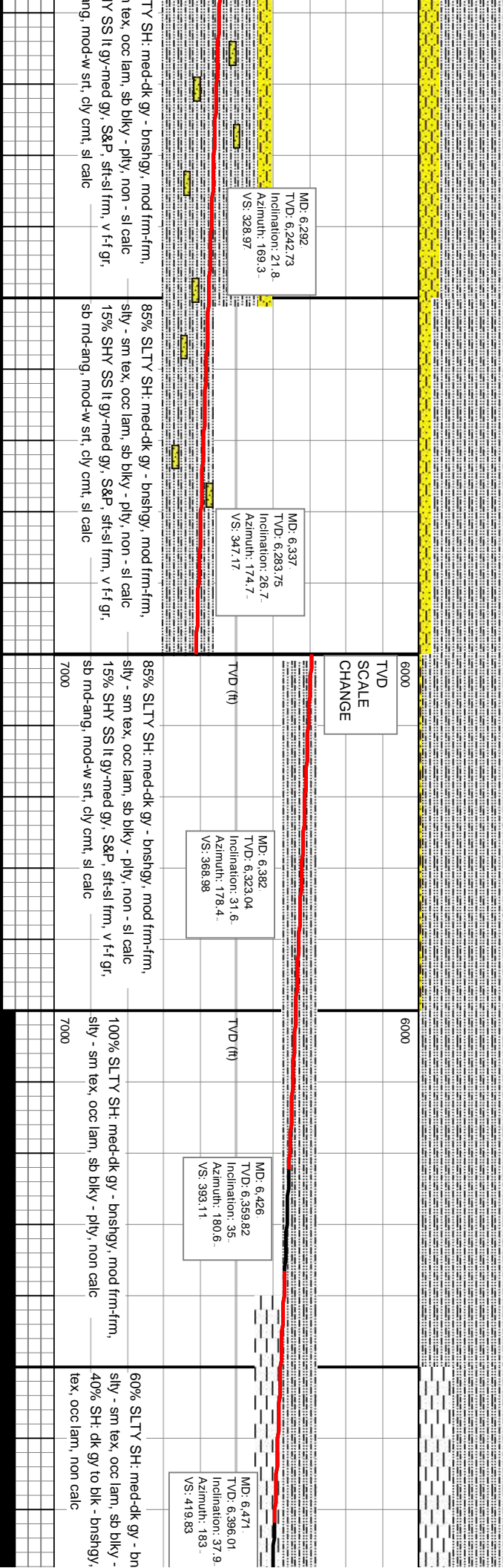
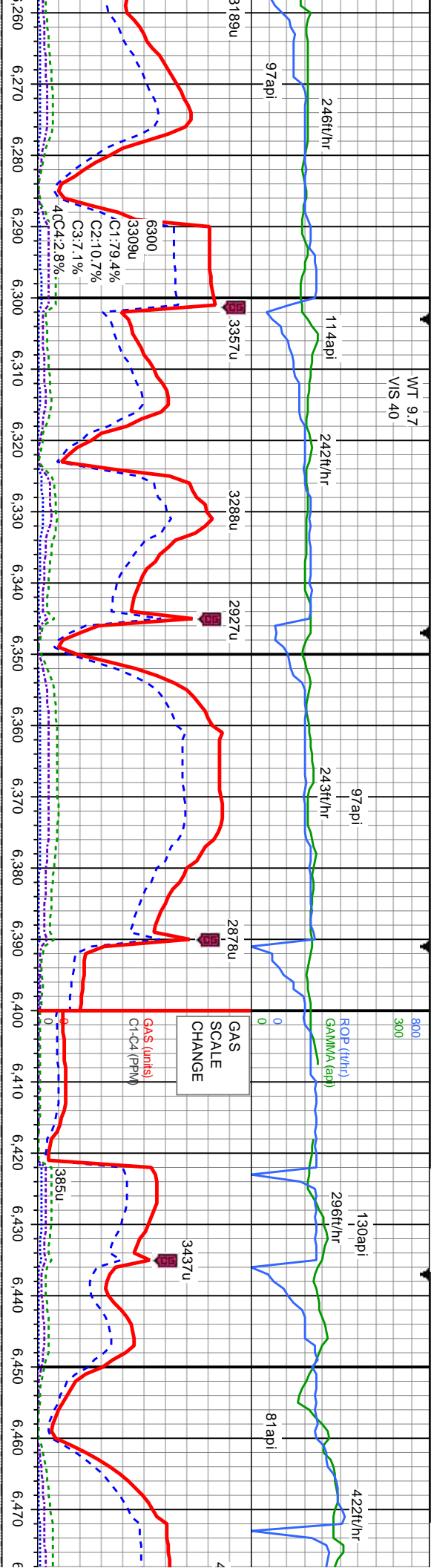
80% SLTY SH: med-dk gy - bnshgy, mod frm-frm, slty - sm tex, occ lam, sb blkly - ply, non - sl calc; 20% SHY SS lt gy-med gy, S&P, sft-sl frm, v f-f gr, sb md-ang, mod-w srt, cly cnt, sl calc

70% SLTY SH: med-dk gy - bnshgy, mod frm-frm, slty - sm tex, occ lam, sb blkly - ply, non - sl calc; 30% SHY SS lt gy-med gy, S&P, sft-sl frm, v f-f gr, sb md-ang, mod-w srt, cly cnt, sl calc

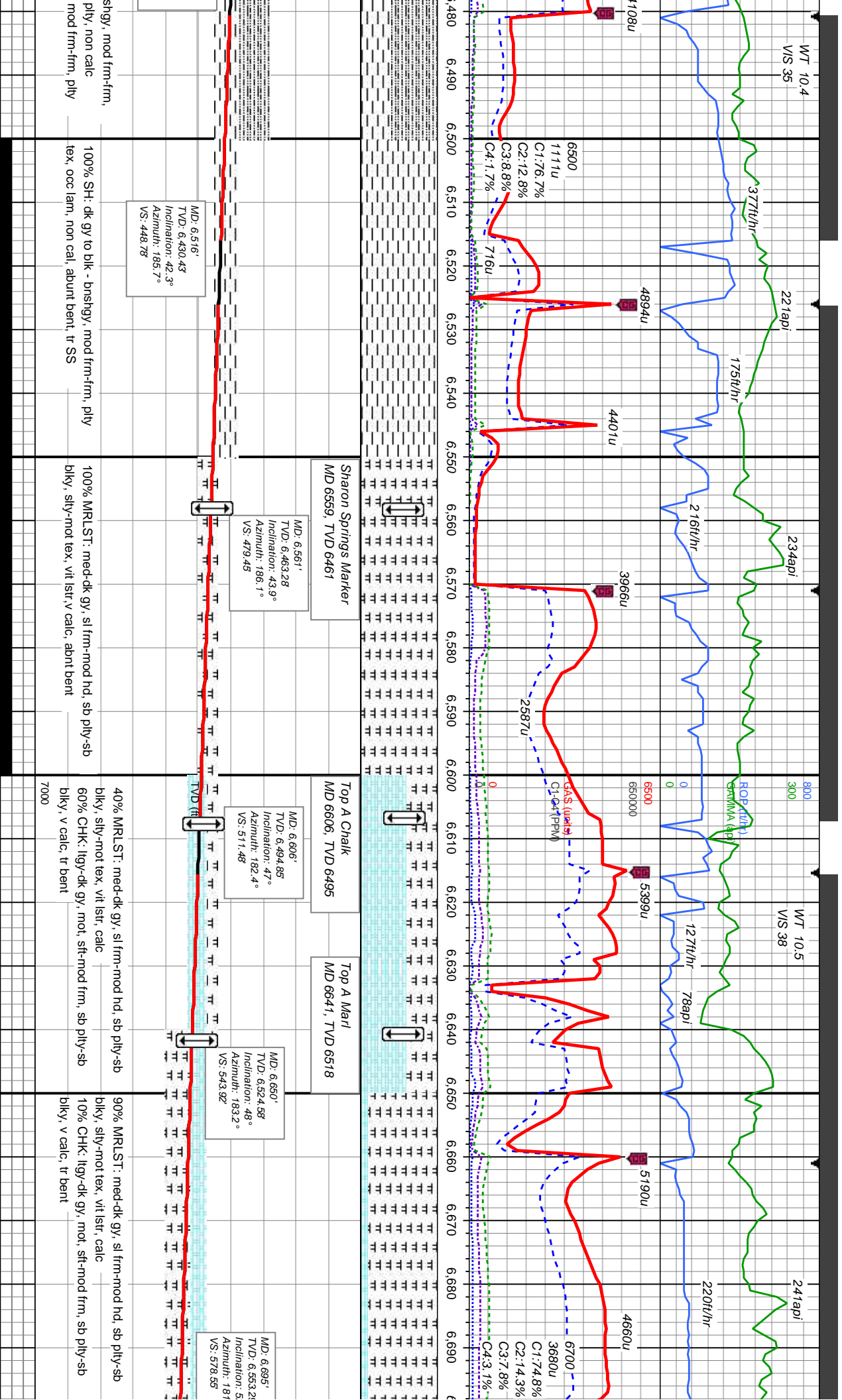
75% SLTY SH: med-dk gy - bnshgy, mod frm-frm, slty - sm tex, occ lam, sb blkly - ply, non - sl calc; 25% SHY SS lt gy-med gy, S&P, sft-sl frm, v f-f gr, sb md-ang, mod-w srt, cly cnt, sl calc





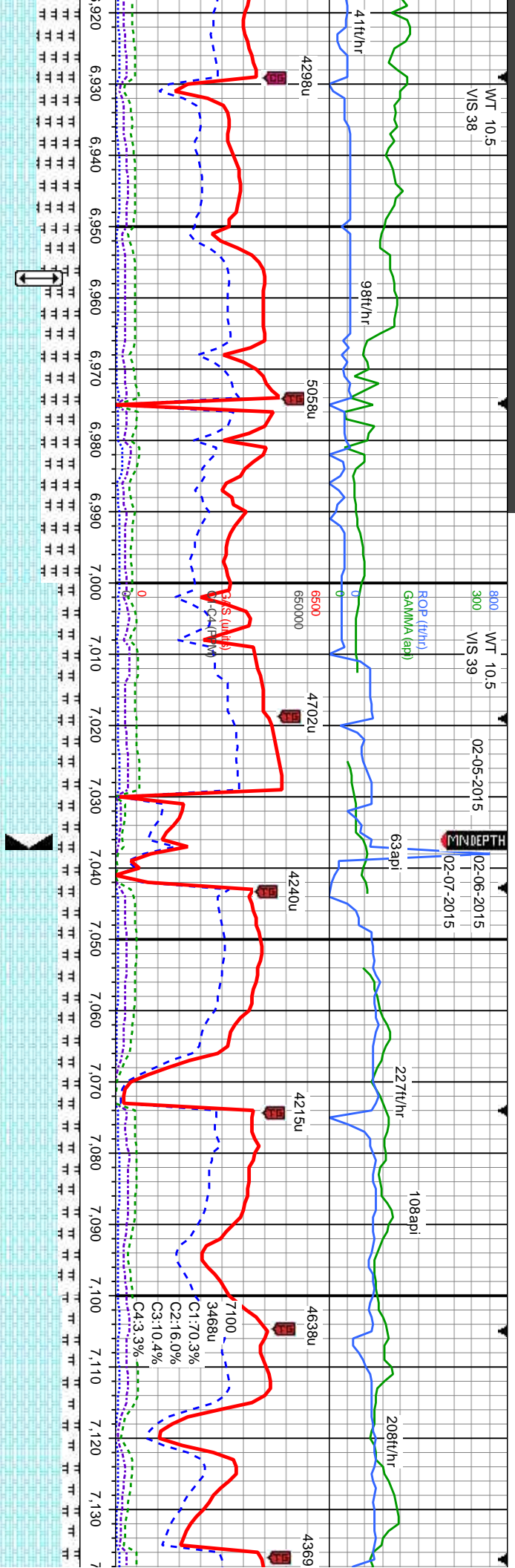






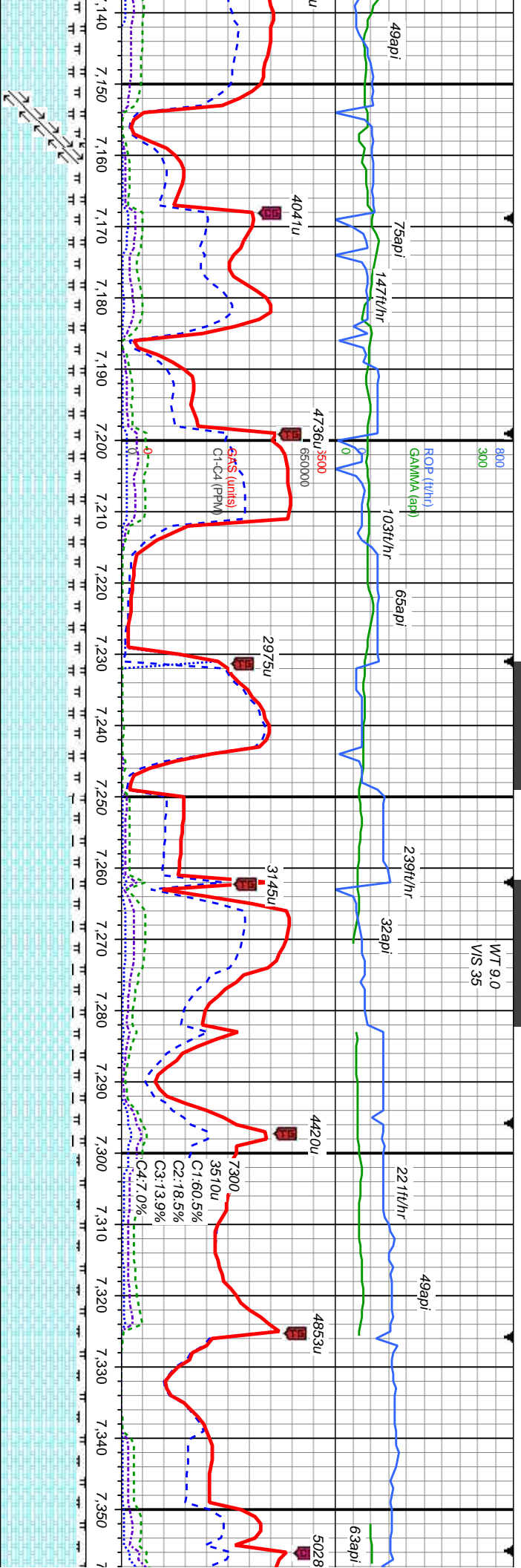




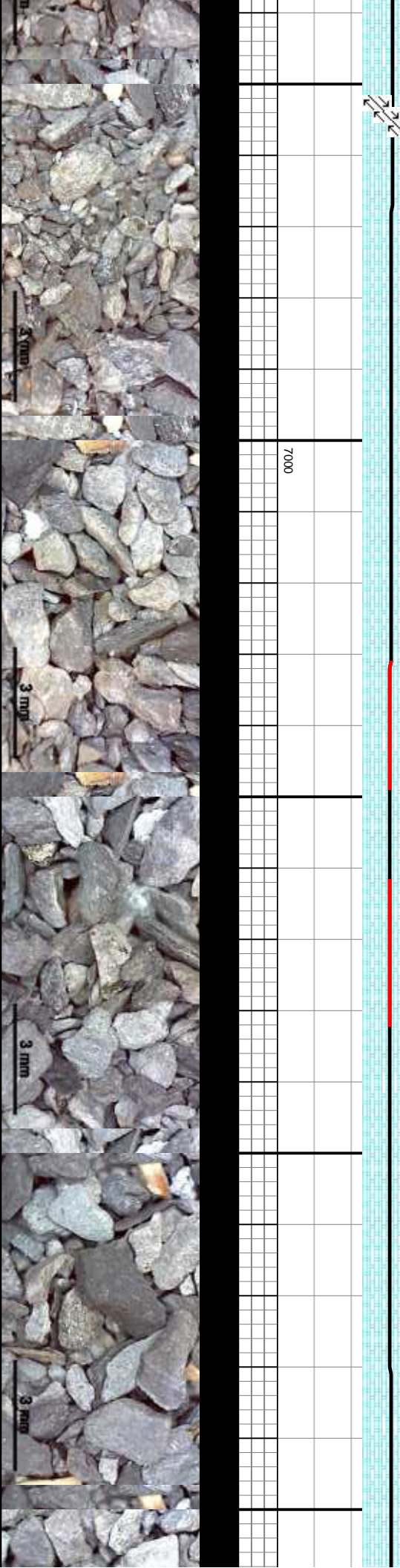


gy, sl frm-mod hd, sb ply-sb t str, calc y, mot, sft-mod frm, sb ply-sb	Top C Chaik MD 6957, TVD 6669	25% MRLST: med-dk gy, sl frm-mod hd, sb ply-sb biky, silty-mot tex, vit istr, calc 75% CHK: lgy-dk gy, mot, sft-mod frm, sb ply-sb biky, v calc, tr bent	INTERMEDIATE TD @ 7037 MD @ 03:35 MST 02/05/15	25% MRLST: med-dk gy, sl frm-mod hd, sb ply-sb biky, silty-mot tex, vit istr, calc 75% CHK: lgy-dk gy, mot, sft-mod frm, sb ply-sb biky, v calc, tr bent	MD: 7,074 TVD: 6,677.14 Inclination: 83. Azimuth: 178.9 VS: 930.95	MD: 7,106 TVD: 6,680.99 Inclination: 83.2 Azimuth: 178.71 VS: 962.67	MD: 7,137 TVD: 6,684 Inclination: Azimuth: 1 VS: 993.41
MD: 6,985 TVD: 6,661.07 Inclination: 72. Azimuth: 177.2 VS: 83.94	MD: 6,964 TVD: 6,661.07 Inclination: 78.7 Azimuth: 177.5 VS: 822.35	MD: 6,982 TVD: 6,664.26 Inclination: 80.9 Azimuth: 178.1 VS: 840.02	Resumed drilling at: 01:23AM on 02-07-2015				

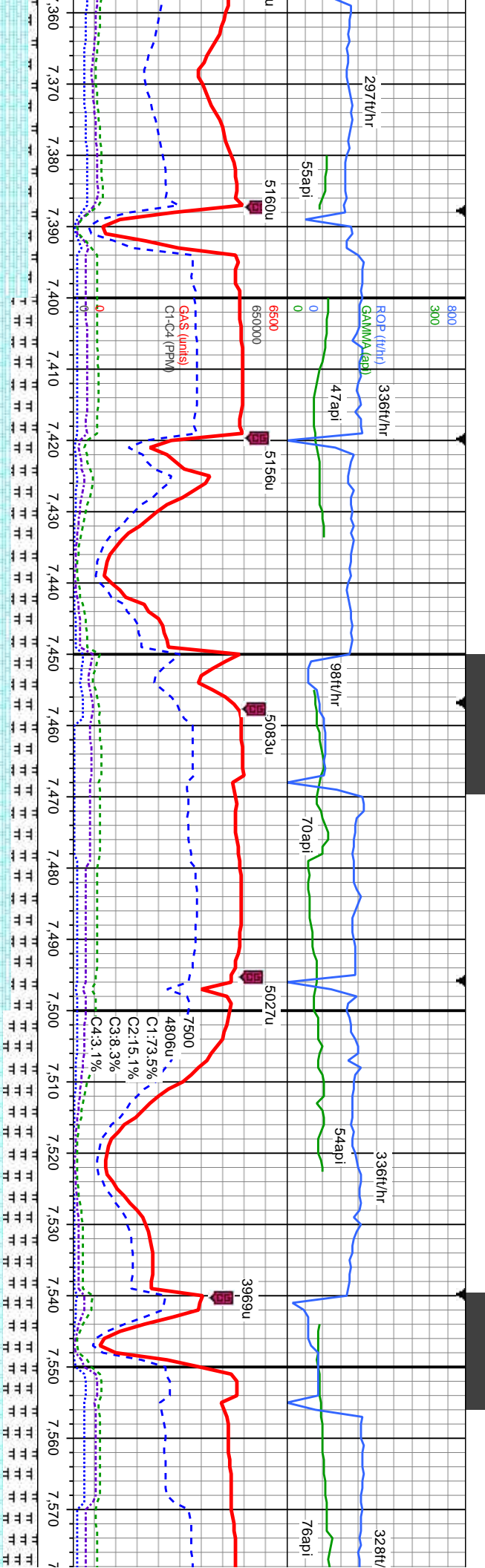




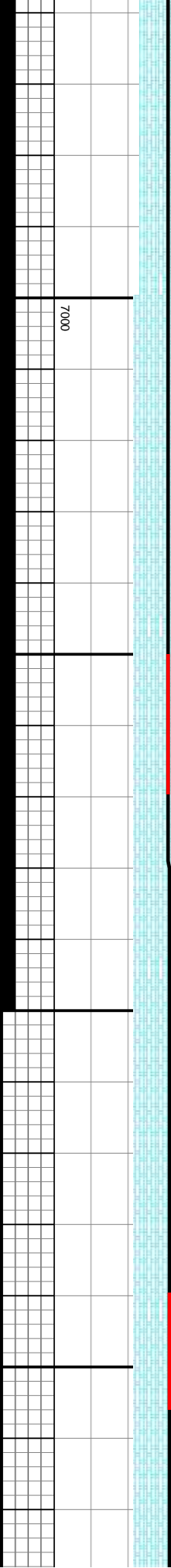
sb	20% MRLST: med-dk gy, sl frm-mod hd, sb ply-sb blkly, silty-mot tex, vit lstr, calc 80% CHK: lggy-dk gy, mot, sft-mod frm, sb ply-sb blkly, v calc	20% MRLST: med-dk gy, sl frm-mod hd, sb blkly, silty-mot tex, vit lstr, calc 80% CHK: lggy-dk gy, mot, sft-mod frm, sb ply-sb blkly, v calc	15% MRLST: med-dk gy, sl frm-mod hd, sb ply-sb blkly, silty-mot tex, vit lstr, calc 85% CHK: lggy-dk gy, mot, sft-mod frm, sb ply-sb blkly, v calc	10% MRLST: med-dk gy, sl frm-mod hd, sb ply-sb blkly, silty-mot tex, vit lstr, calc 90% CHK: lggy-med gy, mot, sft-mod frm, sb ply-sb blkly, v calc
52° 83.7° 78.52°	Fault @ 7172MD, 6687 TVD	MD: 7.169' TVD: 6.687.67 Inclination: 86.6° Azimuth: 177.6° VS: 1.025.18	MD: 7.200' TVD: 6.689.94 Inclination: 86.6° Azimuth: 176.97° VS: 1.056	MD: 7.263' TVD: 6.692.1 Inclination: 89.4° Azimuth: 176.32° VS: 1.18.67
		MD: 7.200' TVD: 6.689.94 Inclination: 86.6° Azimuth: 176.97° VS: 1.056	MD: 7.263' TVD: 6.692.1 Inclination: 89.4° Azimuth: 176.32° VS: 1.18.67	MD: 7.294' TVD: 6.692.1 Inclination: 90.6° Azimuth: 176.03° VS: 1.149.51





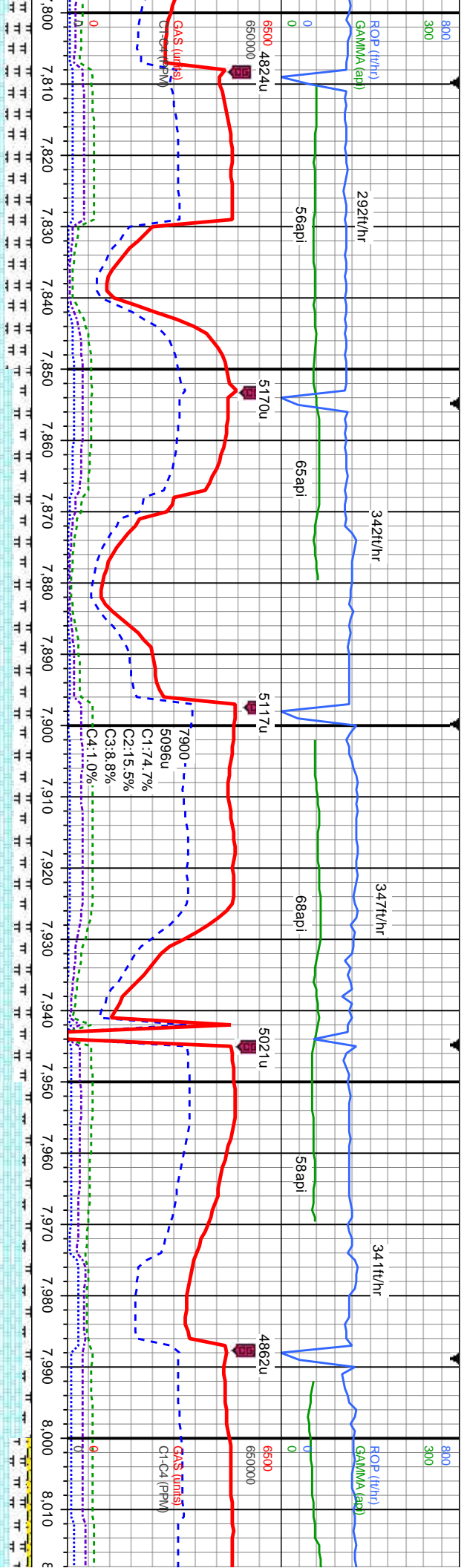


MD: 7.389 TVD: 6,690.28 Inclination: 91.6 Azimuth: 175.1 VS: 1,243.91	6000	30% MRLST: med-dk gy, sl frm-mod hd, sb ply-sb blk, silty-mot tex, vit lstr, calc 70% CHK: med gy-dk gy, mot, sft-mod frm, sb ply-sb blk, v calc	30% MRLST: med-dk gy, sl frm-mod hd, sb ply-sb blk, silty-mot tex, vit lstr, calc 70% CHK: med gy-dk gy, mot, sft-mod frm, sb ply-sb blk, v calc	MD: 7.476 TVD: 6,687.56 Inclination: 91.9 Azimuth: 175.85 VS: 1,332.3	40% MRLST: med-dk gy, sl frm-mod hd, sb ply-sb blk, silty-mot tex, vit lstr, calc 60% CHK: med gy-dk gy, mot, sft-mod frm, sb ply-sb blk, v calc	40% MRLST: med-dk gy, s ply-sb blk, silty-mot tex, vit lstr, calc 60% CHK: med gy-dk gy, mot, sft-mod frm, sb ply-sb blk, v calc
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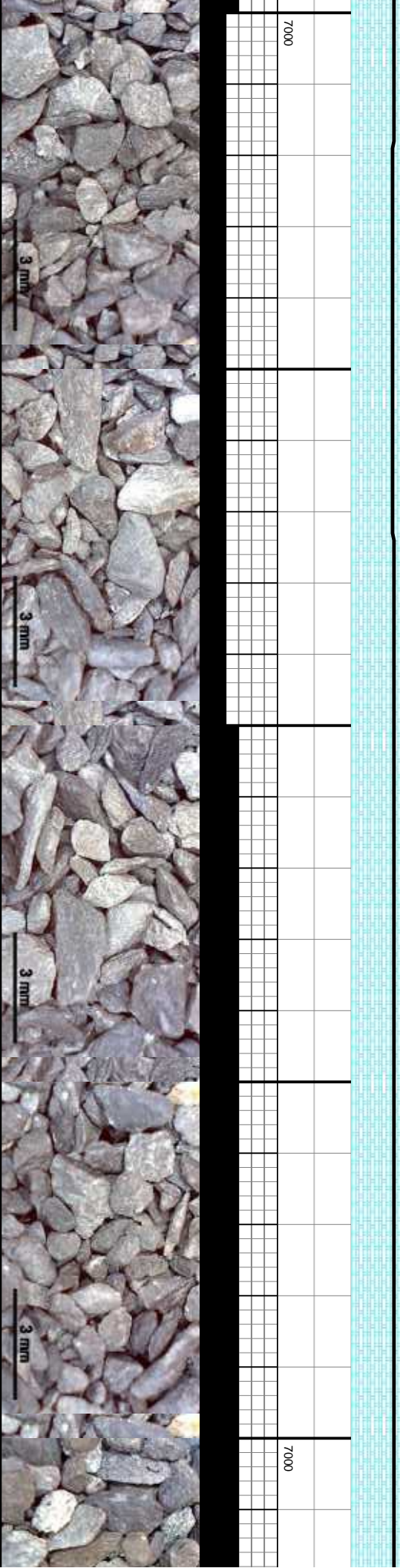




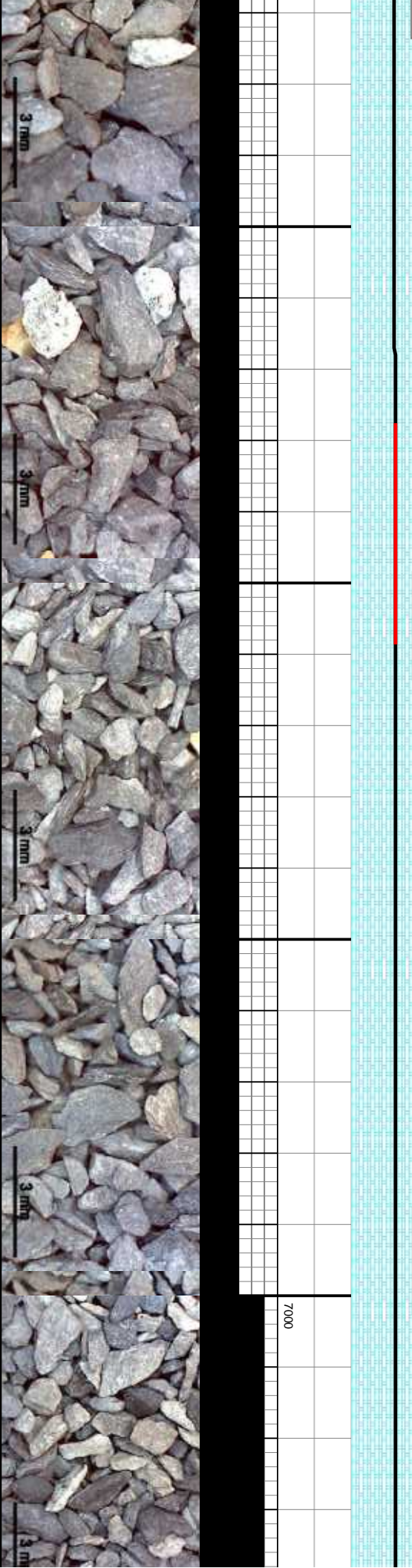
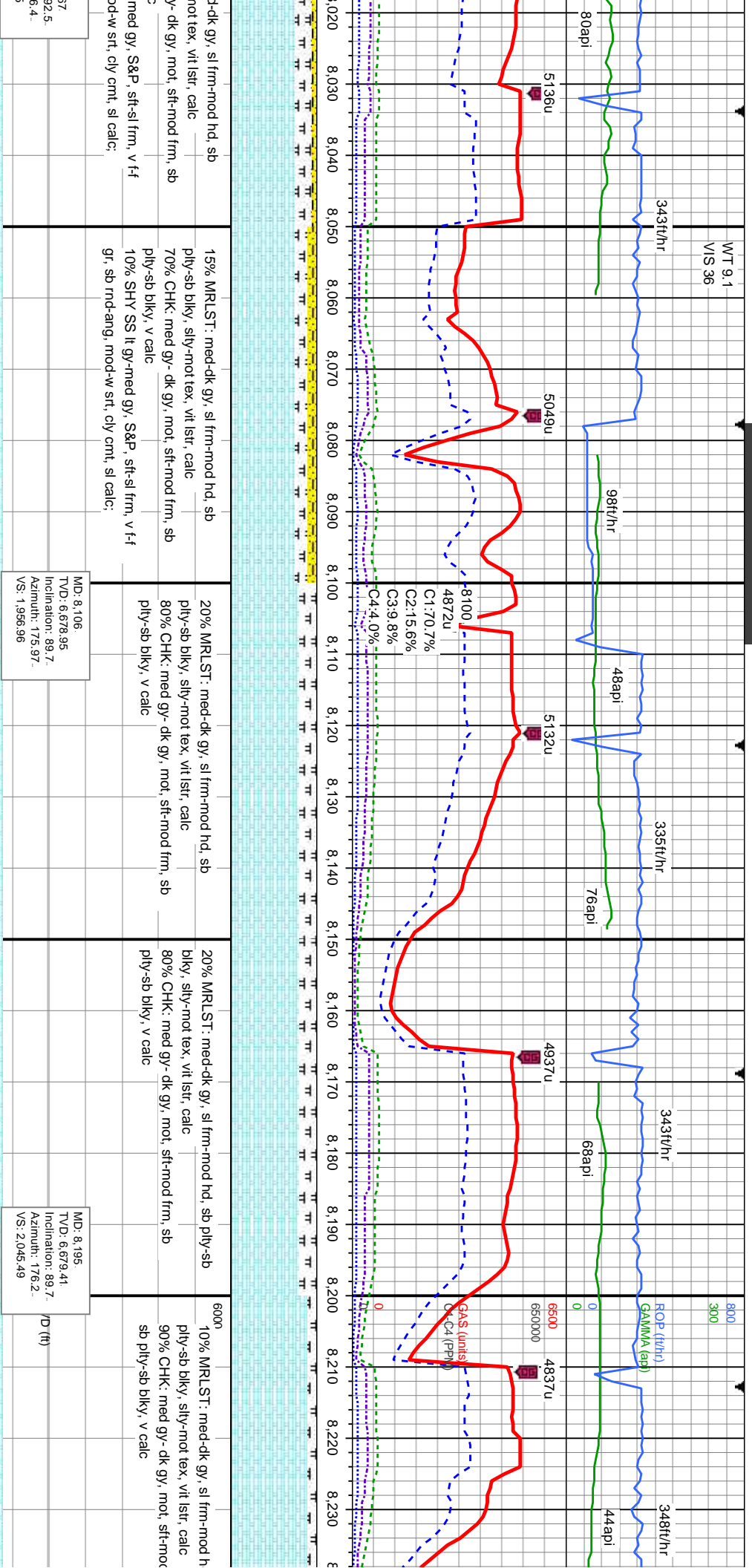




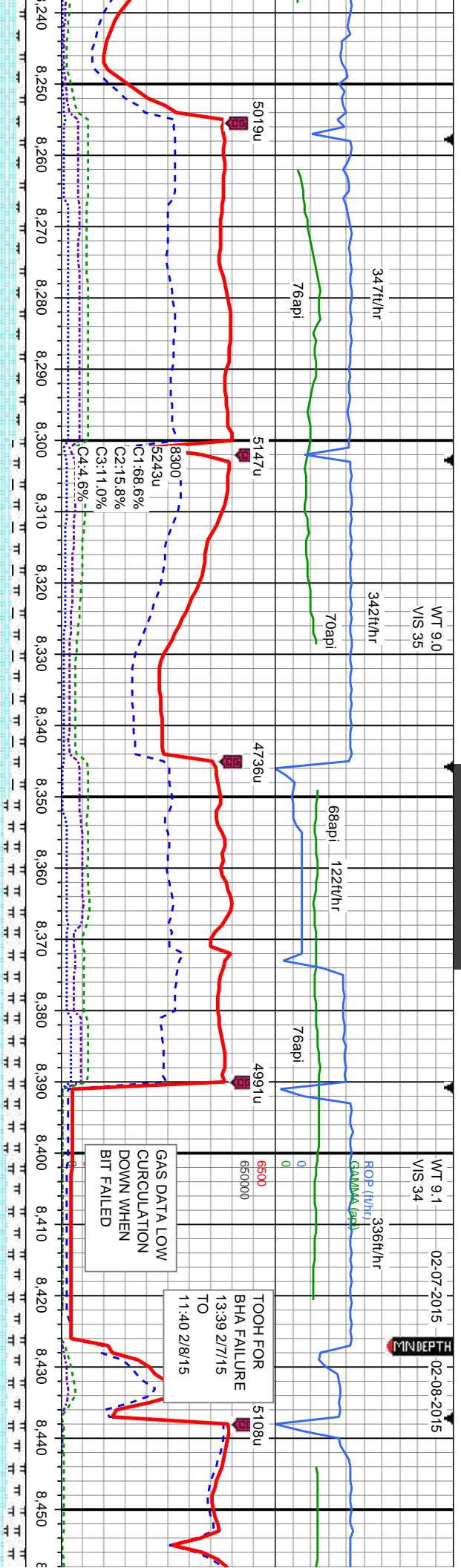
6mm	30% MRLST: med-dk gy, sl frm-mod hd, sb ply-sb blk, sily-mot tex, vit lstr, calc 70% CHK: med gy- dk gy, mot, sft-mod frm, sb ply-sb blk, v calc	20% MRLST: med-dk gy, sl frm-mod hd, sb ply-sb blk, sily-mot tex, vit lstr, calc 80% CHK: med gy- dk gy, mot, sft-mod frm, sb ply-sb blk, v calc	20% MRLST: med-dk gy, sl frm-mod hd, sb ply-sb blk, sily-mot tex, vit lstr, calc 80% CHK: med gy- dk gy, mot, sft-mod frm, sb ply-sb blk, v calc	10% MRLST: med-dk gy, sl frm-mod hd, sb ply-sb blk, sily-mot tex, vit lstr, calc 90% CHK: med gy- dk gy, mot, sft-mod frm, sb ply-sb blk, v calc	620% MRLST: med-dk gy, sl frm-mod hd, sb ply-sb blk, sily-mot tex, vit lstr, calc 75% CHK: med gy- dk gy, mot, sft-mod frm, sb ply-sb blk, v calc 5% SHY SS lt gy- gr, sb md-ang, m
TVD (ft)	MD: 7.837 TVD: 6.683.79 Inclination: 89.7- Azimuth: 176.5- VS: 1.689.35		MD: 7.927 TVD: 6.683.31 Inclination: 90.9 Azimuth: 176.51- VS: 1.778.9		MD: 8.016 TVD: 6.680.6 Inclination: 17 Azimuth: 17 VS: 1.867.45



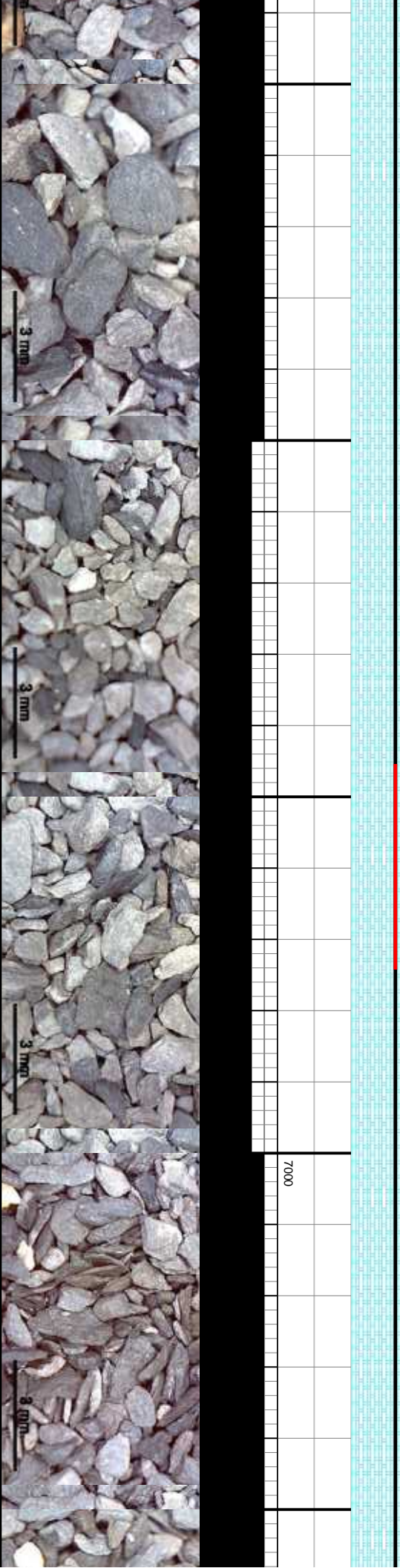




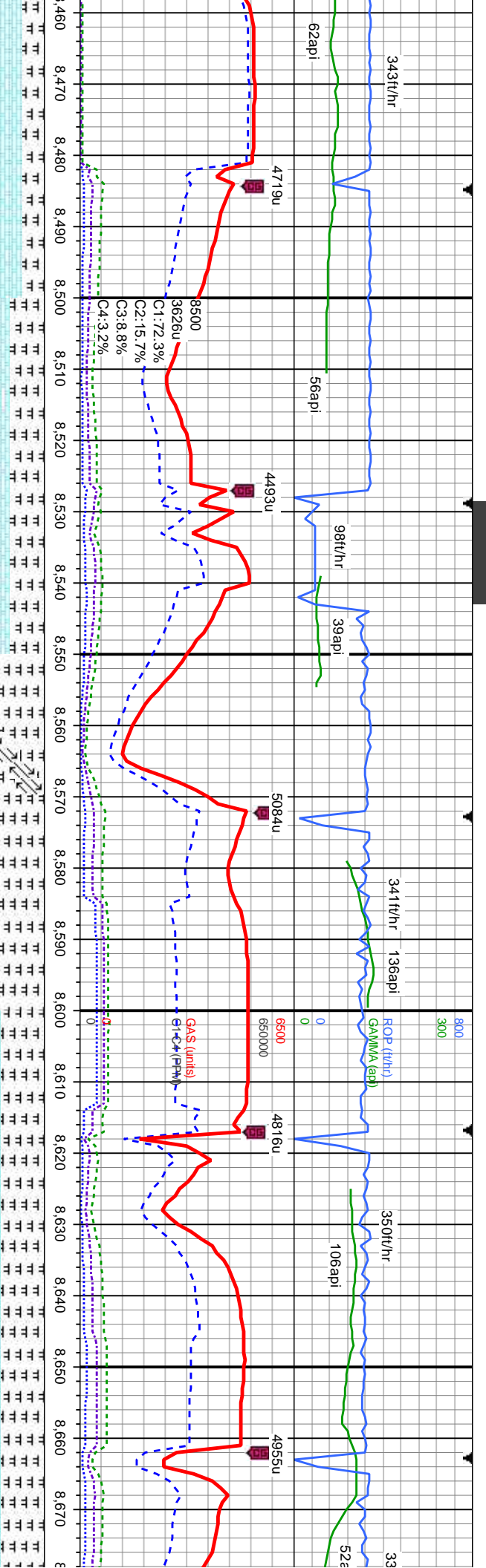




d, sb	10% MRLST: med-dk gy, sl frm-mod hd, sb	15% MRLST: med-dk gy, sl frm-mod hd, sb	25% MRLST: med-dk gy, sl frm-mod hd, sb	20% MRLST: med-dk gy, sl frm-mod hd, sb	25% MRLST: med-dk gy, sl frm-mod hd, sb
ply-sb blk, silty-mot tex, vit istr, calc	ply-sb blk, silty-mot tex, vit istr, calc	ply-sb blk, silty-mot tex, vit istr, calc	ply-sb blk, silty-mot tex, vit istr, calc	ply-sb blk, silty-mot tex, vit istr, calc	ply-sb blk, silty-mot tex, vit istr, calc
90% CHK: med gy- dk gy, mot, sft-mod frm, sb	85% CHK: med gy- dk gy, mot, sft-mod frm, sb	75% CHK: med gy- dk gy, mot, sft-mod frm, sb	75% CHK: med gy- dk gy, mot, sft-mod frm, sb	80% CHK: med gy- dk gy, mot, sft-mod frm, sb	75% CHK: med gy- dk gy, mot, sft-mod frm, sb
sb ply-sb blk, v calc	ply-sb blk, v calc	ply-sb blk, v calc	ply-sb blk, v calc	ply-sb blk, v calc	ply-sb blk, v calc
MD: 8.285 TVD: 6.679.18 Inclination: 90.6 Azimuth: 174.88. VS: 2.134.91					
MD: 8.375 TVD: 6.679.18 Inclination: 89.4 Azimuth: 175.47. VS: 2.224.29					
TVD (ft)					







MD: 8.465  
TVD: 6,679.57  
Inclination: 90.1  
Azimuth: 176.62  
VS: 2,313.81

MD: 8.555  
TVD: 6,678.86  
Inclination: 90.8  
Azimuth: 179.6  
VS: 2,403.59

MD: 8.644  
TVD: 6,678.16  
Inclination: 90.1  
Azimuth: 177.62  
VS: 2,492.43

MD: 8.465  
TVD: 6,679.57  
Inclination: 90.1  
Azimuth: 176.62  
VS: 2,313.81

MD: 8.555  
TVD: 6,678.86  
Inclination: 90.8  
Azimuth: 179.6  
VS: 2,403.59

MD: 8.644  
TVD: 6,678.16  
Inclination: 90.1  
Azimuth: 177.62  
VS: 2,492.43

MRSLT: med-dk gy, sl frm-mod hd, sb  
sb blkly, silty-mot tex, vit istr, calc  
CHK: med gy- dk gy, mot, sft-mod frm, sb  
sb blkly, v calc

40% MRSLT: med-dk gy, sl frm-mod hd, sb pily-sb  
blkly, silty-mot tex, vit istr, calc  
60% CHK: gy- mod gy, mot, sft-mod frm, sb pily-sb  
blkly, v calc

70% MRSLT: med-dk gy, sl frm-mod hd, sb pily-sb  
blkly, silty-mot tex, vit istr, calc  
30% CHK: gy- mod gy, mot, sft-mod frm, sb pily-sb  
blkly, v calc

50% MRSLT: med-dk gy, sl frm-mod hd, sb  
pily-sb blkly, silty-mot tex, vit istr, calc  
50% CHK: gy- mod gy, mot, sft-mod frm, sb  
pily-sb blkly, v calc

50% MRSLT: med-dk gy, sl frm-mod hd, sb  
pily-sb blkly, silty-mot tex, vit istr, calc  
50% CHK: gy- mod gy, mot, sft-mod frm, sb  
pily-sb blkly, v calc

MD: 8.465  
TVD: 6,679.57  
Inclination: 90.1  
Azimuth: 176.62  
VS: 2,313.81

MD: 8.555  
TVD: 6,678.86  
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MD: 8.465  
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Azimuth: 176.62  
VS: 2,313.81

MD: 8.555  
TVD: 6,678.86  
Inclination: 90.8  
Azimuth: 179.6  
VS: 2,403.59

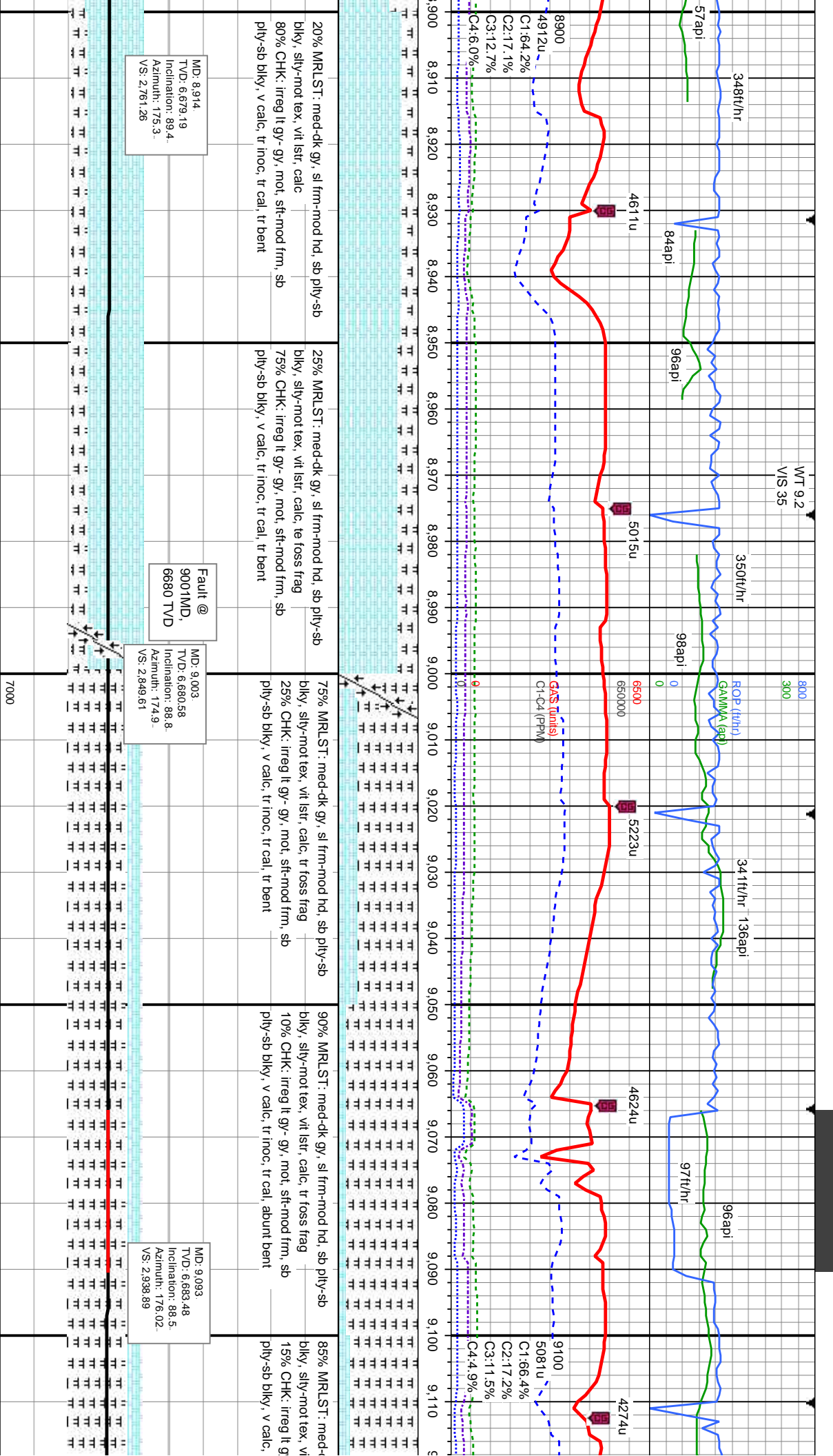
MD: 8.644  
TVD: 6,678.16  
Inclination: 90.1  
Azimuth: 177.62  
VS: 2,492.43



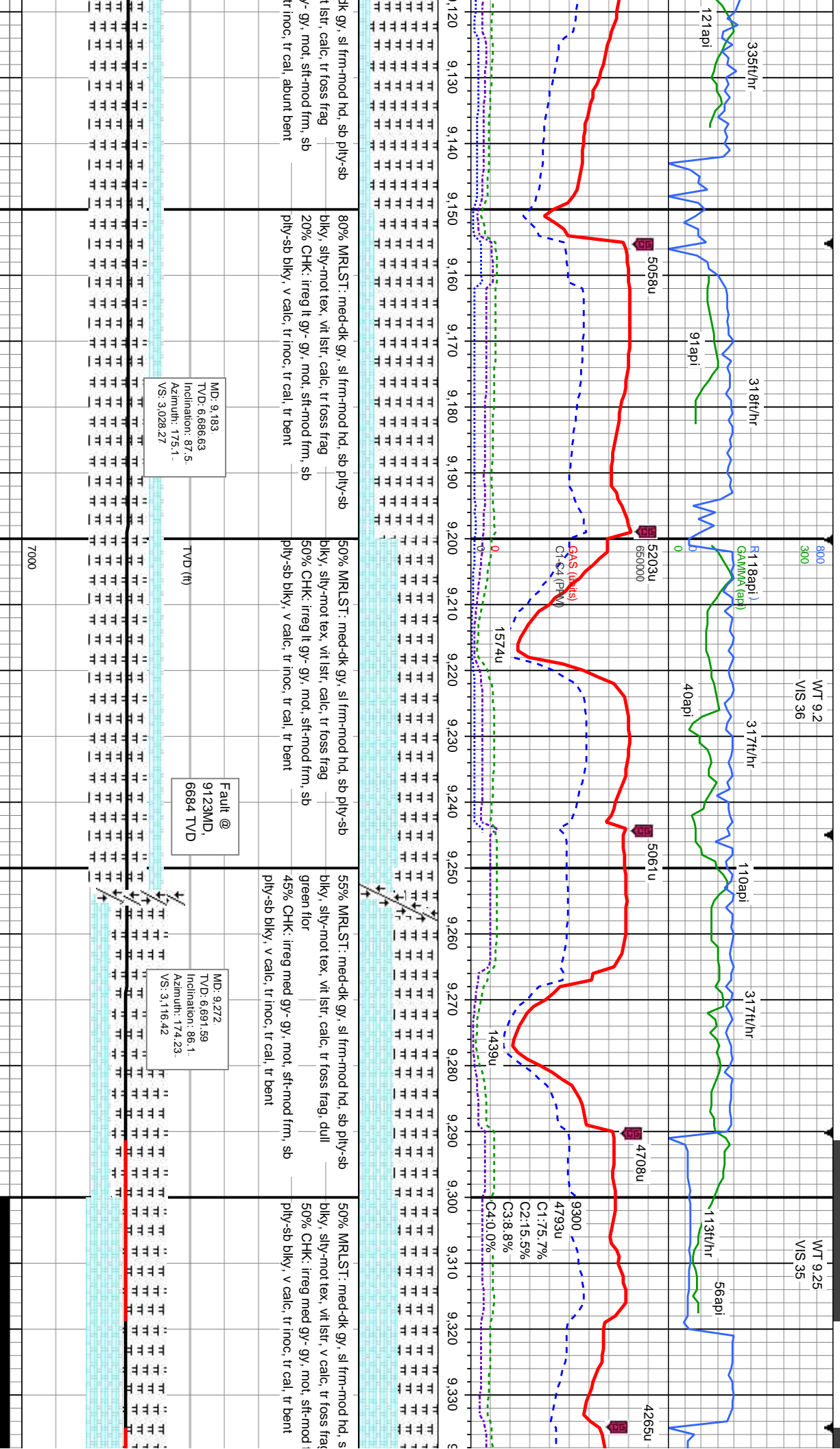








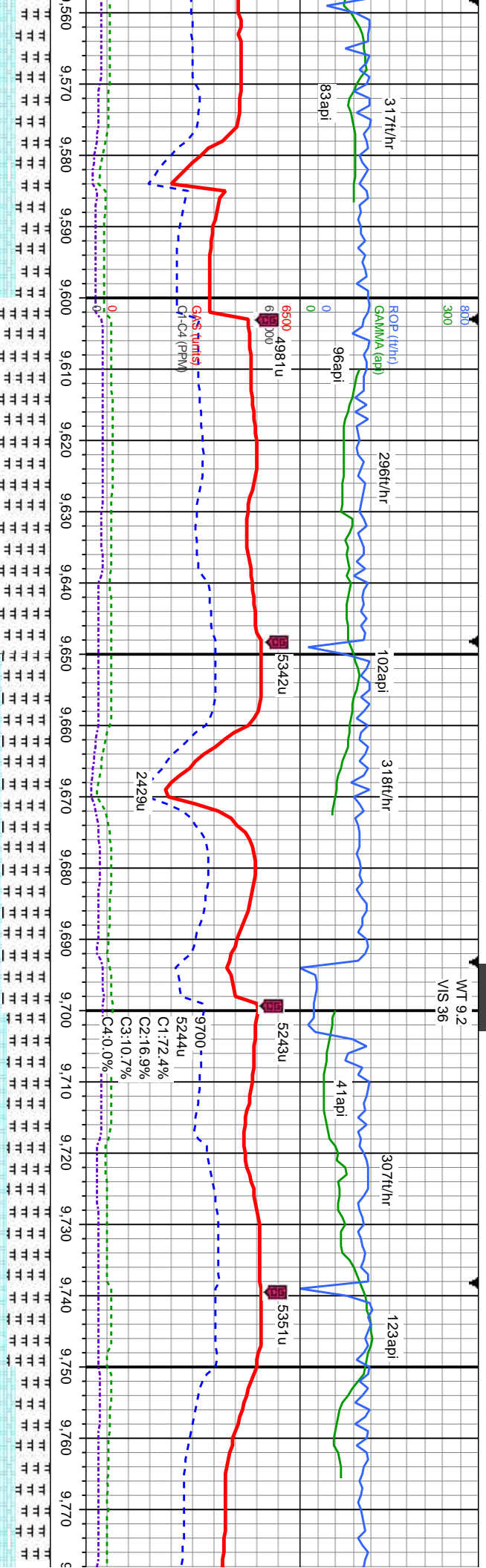




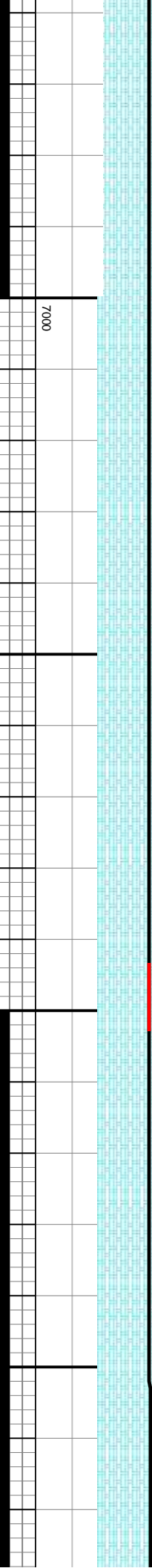








60% MRLST: med-dk gy, sl frm-mud hd, sb ply-sb biky, silty-mot tex, vit istr, v calc, tr foss frag 40% CHK: irreg med gy- gy, mot, sft-mod frm, sb ply-sb biky, v calc, tr inoc, tr cal, tr bent, dull green flor	60% MRLST: med-dk gy, sl frm-mud hd, sb ply-sb biky, silty-mot tex, vit istr, v calc, tr foss frag 40% CHK: irreg med gy- gy, mot, sft-mod frm, sb ply-sb biky, v calc, tr inoc, tr cal, tr bent, dull green flor	55% MRLST: med-dk gy, sl frm-mud hd, sb ply-sb biky, silty-mot tex, vit istr, v calc, tr foss frag 45% CHK: irreg med gy- gy, mot, sft-mod frm, sb ply-sb biky, v calc, tr inoc, tr cal, tr bent, dull green flor	50% MRLST: med-dk gy, sl frm-mud hd, sb ply-sb biky, silty-mot tex, vit istr, v calc, tr foss frag 50% CHK: irreg med gy- gy, mot, sft-mod frm, sb ply-sb biky, v calc, tr inoc, tr cal, tr bent, dull green flor	40% MRLST: med-dk gy, sl frm-mud hd, sb ply-sb biky, silty-mot tex, vit istr, v calc, tr foss frag 60% CHK: irreg med gy- gy, m ply-sb biky, v calc, tr inoc, tr ca
TVD (ft)	TVD (ft)			
MD: 9.631. TVD: 6.690.05 Inclination: 90.5. Azimuth: 177.74. VS: 3.474.53	MD: 9.721. TVD: 6.688.17 Inclination: 91.9. Azimuth: 177.94. VS: 3.564.28			



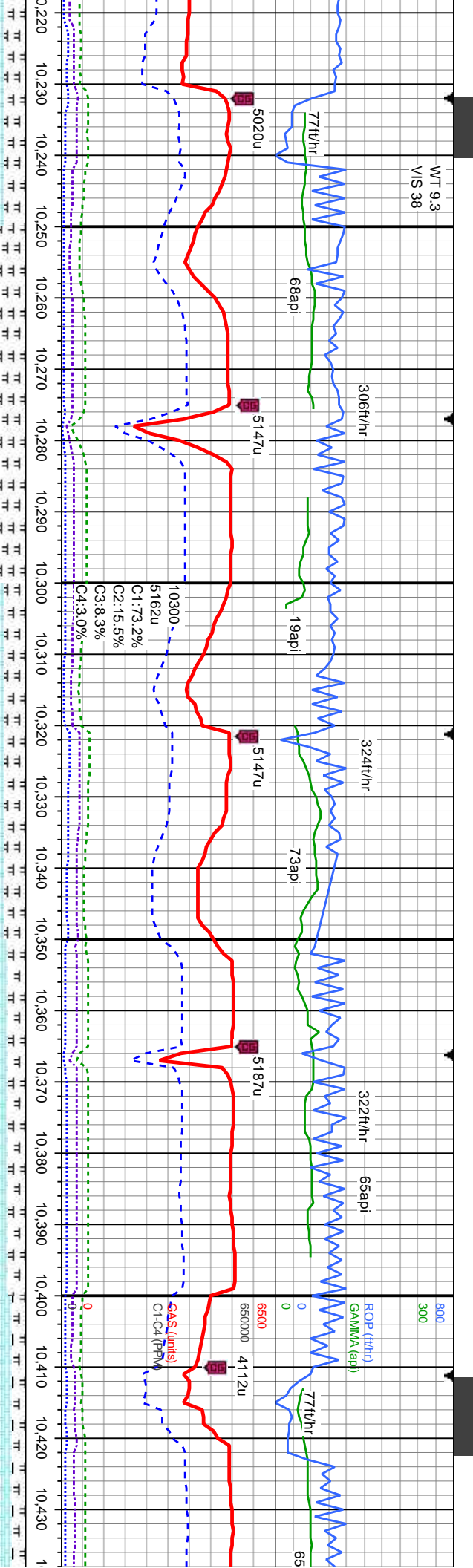




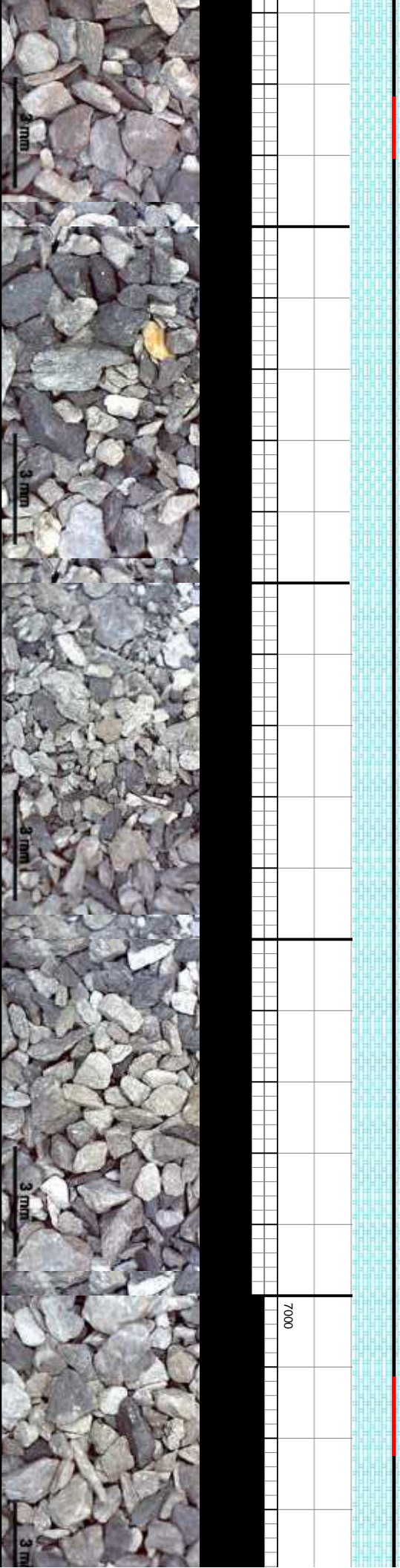






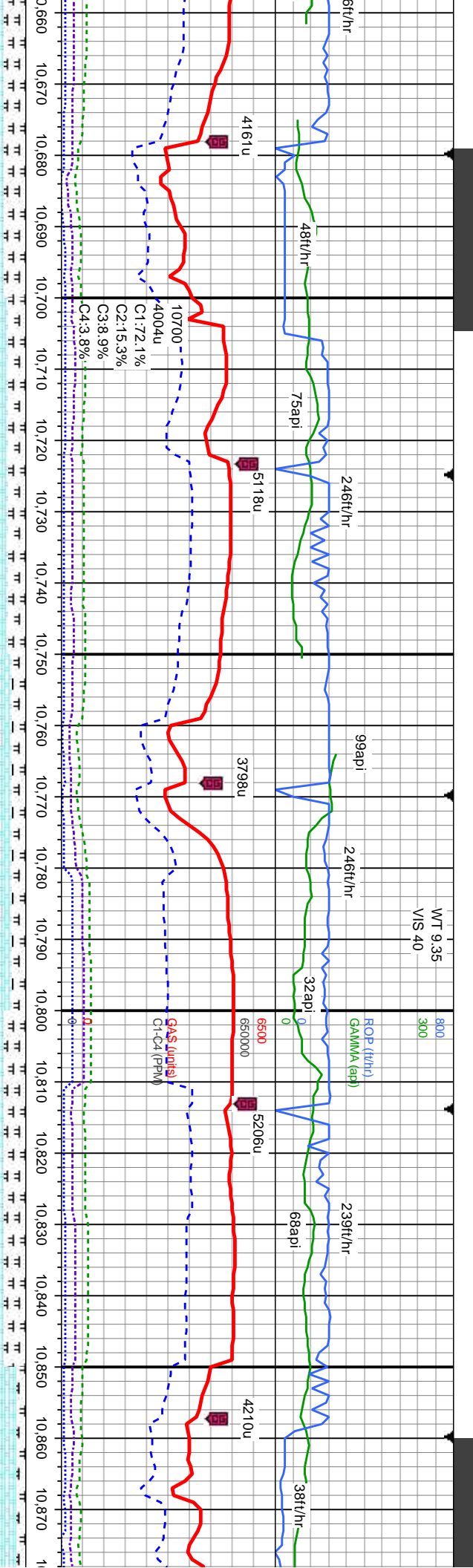


dk gy, sl frm-mud hd, sb ply-sb it str, v calc, tr foss frag d gy- gy, mot, sft-mod frm, sb tr bent, dull green flr	30% MRLST: med-dk gy, sl frm-mud hd, sb ply-sb blky, silty-mot tex, vit istr, v calc, tr foss frag 70% CHK: irreg med gy- gy, mot, sft-mod frm, sb ply-sb blky, v calc, dull green flr	25% MRLST: med-dk gy, sl frm-mud hd, sb ply-sb blky, silty-mot tex, vit istr, v calc, tr foss frag 75% CHK: med gy- gy, mot, sft-mod frm, sb ply-sb blky, v calc	20% MRLST: med-dk gy, sl frm-mud hd, sb ply-sb blky, silty-mot tex, vit istr, v calc, tr foss frag 80% CHK: med gy- gy, mot, sft-mod frm, sb ply-sb blky, v calc	15% MRLST: med-dk gy, sl frm-mud hd, sb blky, silty-mot tex, vit istr, v calc, tr foss frag 85% CHK: med gy- gy, mot, sft-mod frm, sb blky, v calc
	MD: 10,259 TVD: 6,681.35 Inclination: 90.6 Azimuth: 175.05 VS: 4,098.62	MD: 10,349 TVD: 6,680.8 Inclination: 90.1 Azimuth: 173.31 VS: 4,187.79		MD: 10,427 TVD: 6,666 Inclination: 90.6 Azimuth: 175.05 VS: 4,27
	TVDD (ft)			

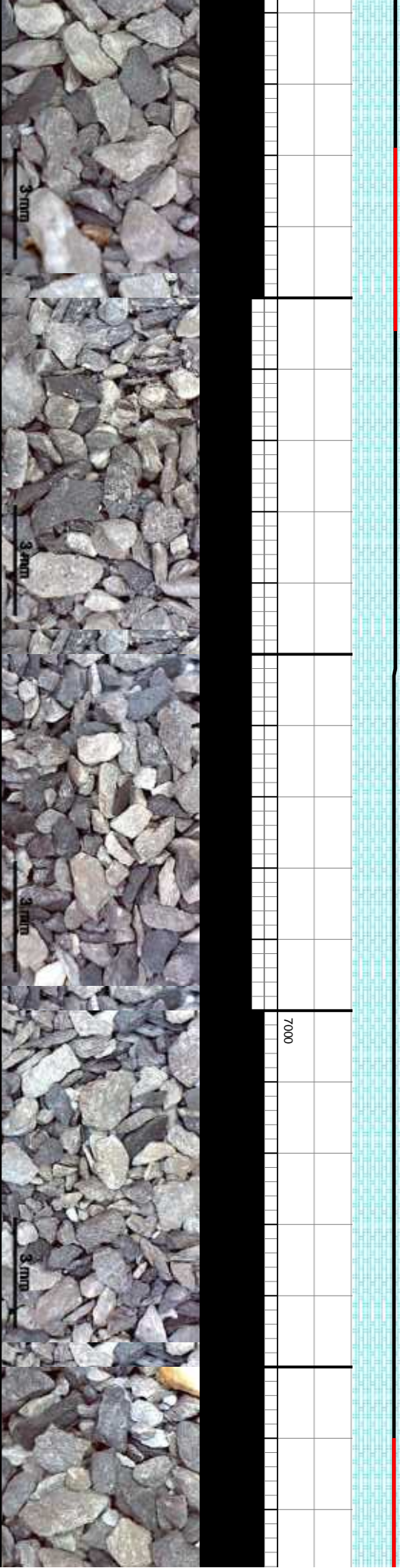








RLST: med-dk gy, sl frm-mod hd, sb biky, silty-mot tex, vit lstr, calc CHK: gy- lt gy, mot, sft-mod frm, sb ply-sb calc	20% MRLST: med-dk gy, sl frm-mod hd, sb ply-sb biky, silty-mot tex, vit lstr, calc 80% CHK: gy- lt gy, mot, sft-mod frm, sb ply-sb biky, v calc	15% MRLST: med-dk gy, sl frm-mod hd, sb ply-sb biky, silty-mot tex, vit lstr, calc 85% CHK: gy- lt gy, mot, sft-mod frm, sb ply-sb biky, v calc	25% MRLST: med-dk gy, sl frm-mod hd, sb ply-sb biky, silty-mot tex, vit lstr, calc 75% CHK: gy- lt gy, mot, sft-mod frm, sb ply-sb biky, v calc	10% MRLST: med-dk gy, sl fr biky, silty-mot tex, vit lstr, calc 90% CHK: gy- lt gy, mot, sft-n biky, v calc
MD: 10.707. TVD: 6.678.69 Inclination: 88.8 Azimuth: 180.53. VS: 4.543.86				
MD: 10.797. TVD: 6.680.65 Inclination: 88.7 Azimuth: 180.08. VS: 4.633.8				

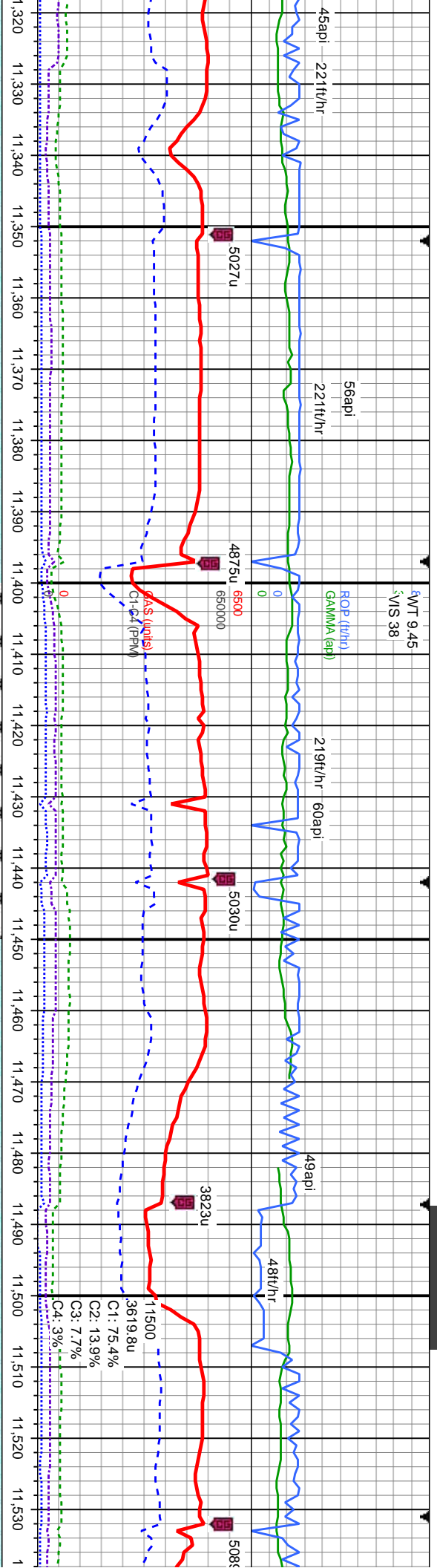








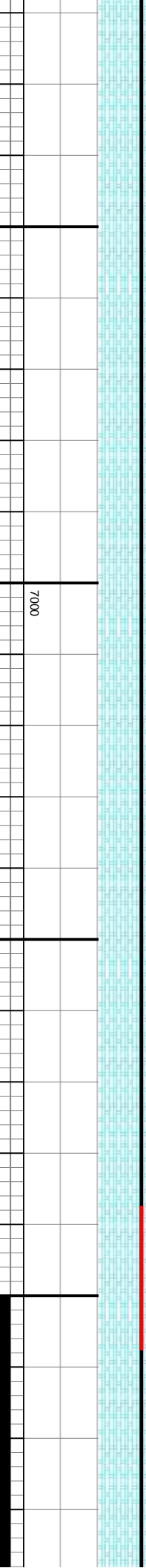




MD: 11,335  
TVD: 6,679.08  
Inclination: 90.3  
Azimuth: 181.29  
VS: 5.171.49

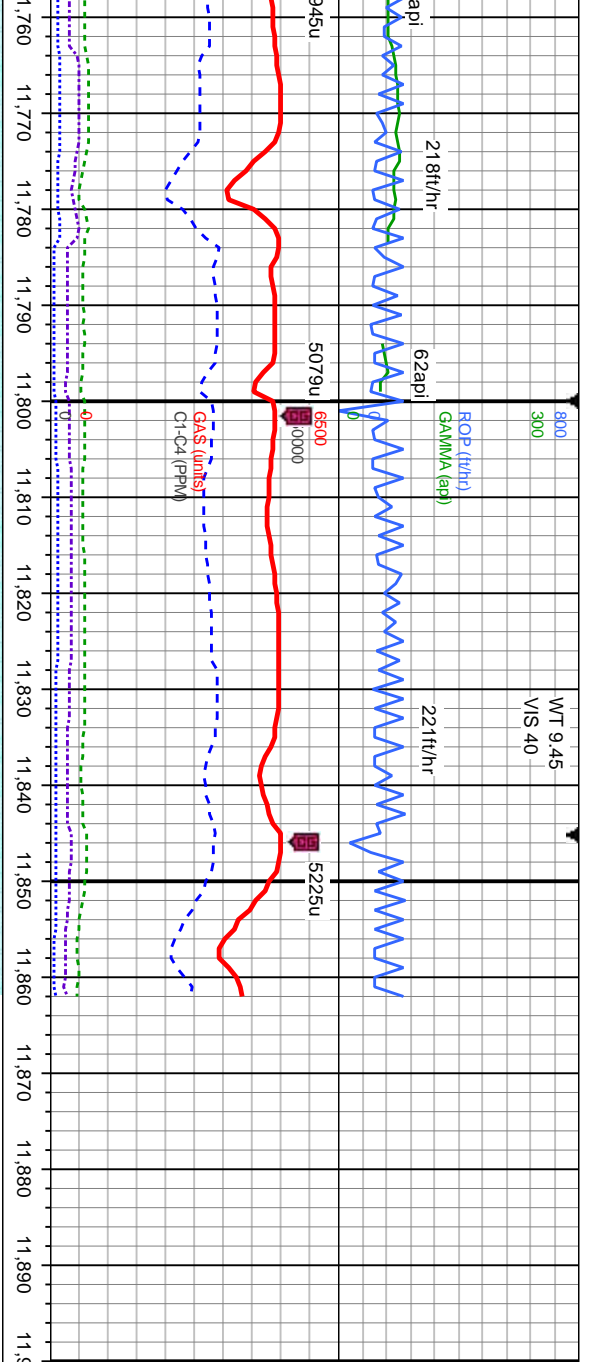
MD: 11,425  
TVD: 6,678.14  
Inclination: 90.9  
Azimuth: 180.09  
VS: 5.261.46

MD: 11,514  
TVD: 6,678.14  
Inclination: 89.1  
Azimuth: 180.63  
VS: 5.350.42









100% CHK: It gy and med It gy, mot, sft-mod frm, sb ply-sb biky, tr cal, v calc, tr foss frag

100% CHK: It gy and med It gy, mot, sft-mod frm, sb ply-sb biky, tr cal, v calc, tr foss frag

TD HORIZONTAL @ 11,862 MD  
ON 02/09/15 @ 22:20 MST

MD: 11,800  
TVD: 6,676.15  
Inclination: 91.4  
Azimuth: 178.82  
VS: 3,636.24

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