



Scale: 5" / 100'
Measured Depth Log

Well Name HIGHWAY 160 38N-2HZ

Location NW/NE SEC. 2, T1N, R66W

State COLORADO

Country USA

API Number 05-123-38027

Region DJ BASIN

Spud Date 11/12/2013

Surface Coordinates 606' FNL & 1532' FEL
40.085696 -104.740314

Bottom Hole Coordinates 1' FSL & 130' FEL
40.073152 -104.735317

Ground Elevation 5102'

Logged Interval 6982' To 12599'

Formation NIOBRARA

Type of Drilling Fluid FSNL

County WELD

Rig Number ENSIGN 132

AFE # 2085779

Field WATTENBERG

Drilling Completed 11/19/2013

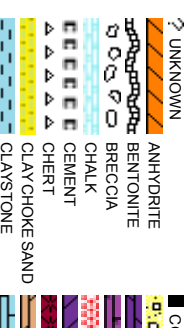
K.B. Elevation 5115'

Total Depth 5617'

Company ANADARKO PE
Address 1099 18th St, S
Denver, CO 80

Name JAKE STUART
Company ANADARKO PE
Address 1099 18th St, S
Denver, CO 80

SHANA SI



Operator

ETROLEUM INC.

uite 1800
202

Geologist

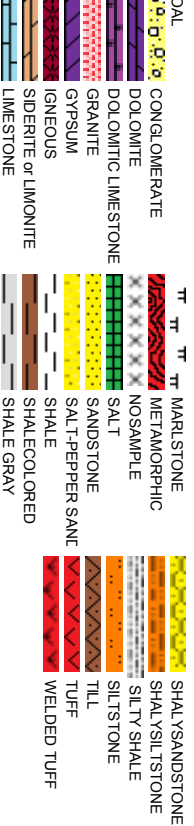
ETROLEUM INC.

uite 1800
202

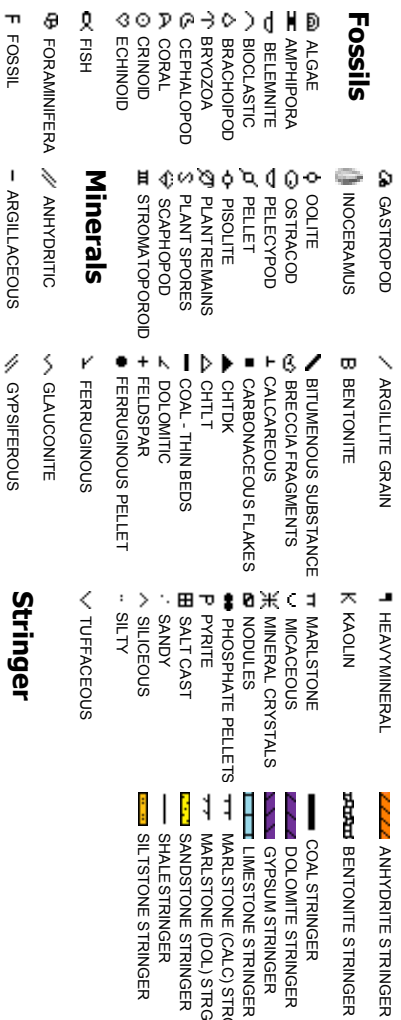
Other

WIRN, LIZ VAN DIEPEN

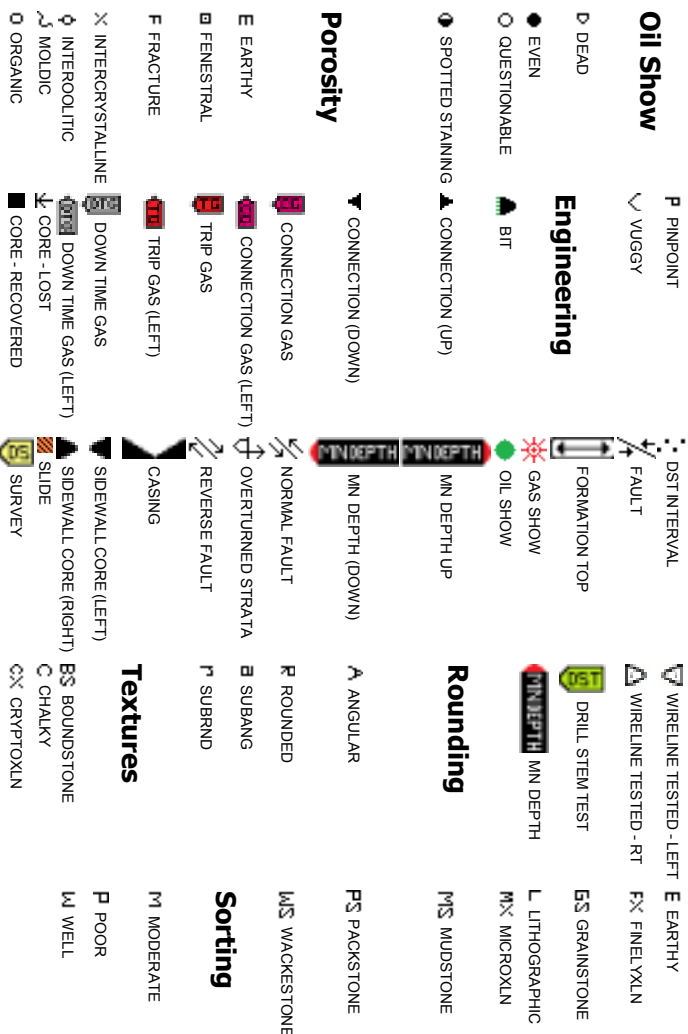
Rock Types



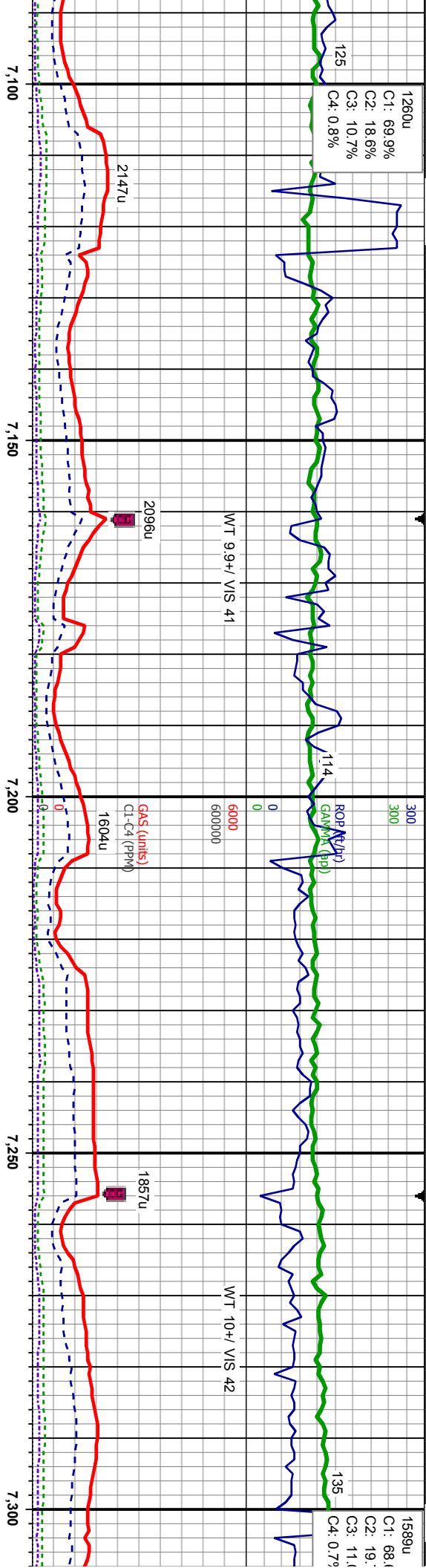
Accessories



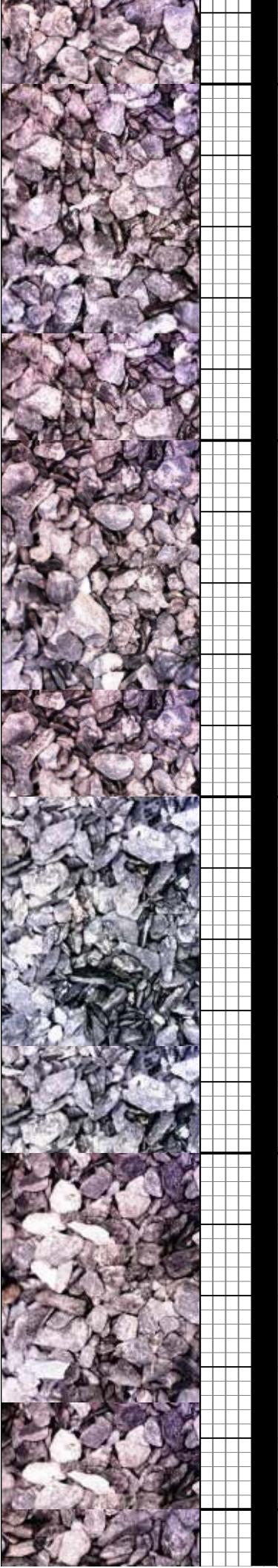
Other Symbols

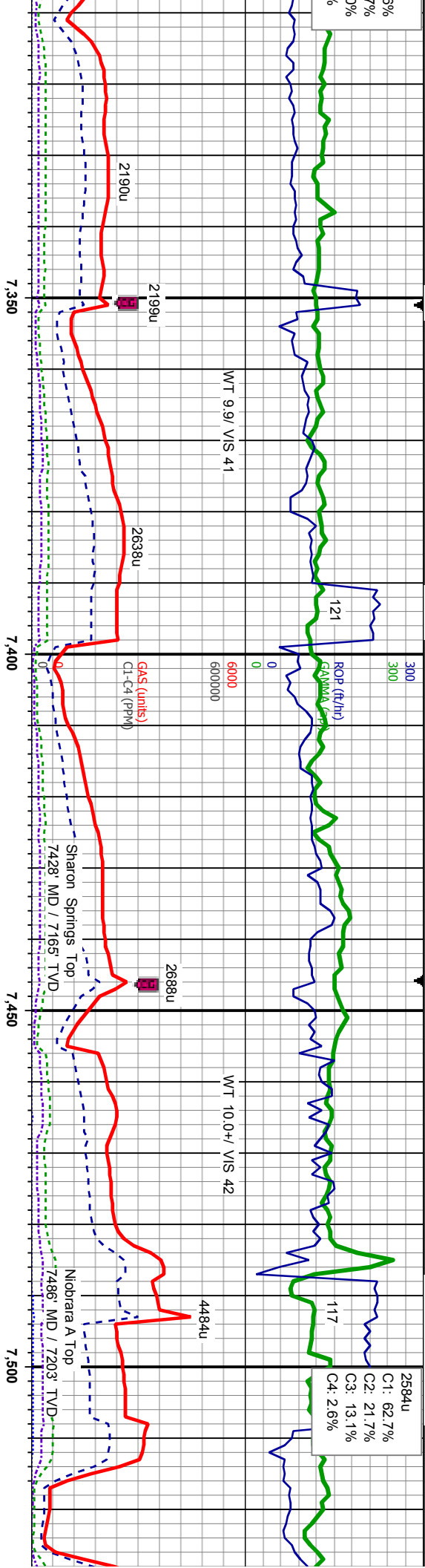


Slide/Rotate					
<div> <div>Columbine Logging Two Person Rigged Up 2200hrs 11/13/2013 With Bloodhound Unit # 0313</div> <div> <div>ROP</div> <div>ROF</div> <div>GAMMA</div> </div> <div>Logging Started @ 1245hrs 11/15/2013 at 6982' MD</div> </div>					
<div>Total Gas & Chromatograph</div> <div> <div>GAS</div> <div>C1</div> <div>C2</div> <div>C3</div> <div>C4</div> </div> <div>Bit Data Type: SMITH SDI61 Size: 8.75 Depth In: 6,932' Depth Out: 7,905' Jets: 3x14 3x15 S/N: JH4932</div>					
<div>Tripped Out of Hole for New Mud Motor @ 6932'</div>					
<div>Depth Labels</div> <div>6,950</div> <div>7,000</div> <div>7,050</div>					
<div>% Lith</div>					
<div>Begin in Sussex Formation</div>					
<div>MD: 6,973' TVD: 6,752.25' Inclination: 1.57° Azimuth: 167.1° VS: -689.52'</div> <div>SLTY SH: lt-med gy, sb ply-sb blkly, mod sft-frm, w srt, sb rnd-sb ang, mod fri, SH SS: lt gy, vf gr, sb rnd-sb ang, mod srt, sl calc, grdg-sily sh, string bl cut, dull yel ring</div> <div>TVD (ft)</div> <div>7500</div>					
<div>MD: 7,021' TVD: 6,800.15' Inclination: 5.37° Azimuth: 174.57° VS: -686.63'</div> <div>SLTY SH: lt-med gy, sb ply-sb blkly, mod sft-frm, w srt, sb rnd-sb ang, mod fri, SH SS: lt gy, vf gr, sb rnd-sb ang, mod srt, sl calc, grdg-sily sh, string bl cut, dull yel ring</div>					
<div>MD: 7,068' TVD: 6,846.79' Inclination: 8.72° Azimuth: 177.55° VS: -680.87'</div> <div>SLTY SH: lt-med gy, sb ply-sb blkly, mod sft-frm, srt, sb rnd-sb ang, mod f tr shy ss, string bl cut, du yel ring</div>					
<div>Oil Show</div>					
<div>Images</div>					



<p>MD: 7,116' TVD: 6,893.95' Inclination: 12.68° Azimuth: 176.28° VS: 671.97'</p> <p>SLTY SH: lt-med gy, sb ply-sb blkly, mod sft-frm, w srt, sb md-sb ang, mod fri, tr shy ss, sting bl cut, dull yel ring</p>	<p>MD: 7,163' TVD: 6,939.35' Inclination: 17.19° Azimuth: 175.98° VS: 689.87'</p> <p>SLTY SH: lt-med gy, sb ply-sb blkly, mod sft-frm, w srt, sb md-sb ang, mod fri, tr shy ss, sting bl cut, dull yel ring</p>	<p>MD: 7,211' TVD: 6,984.6' Inclination: 21.69° Azimuth: 179.6° VS: 643.91'</p> <p>SLTY SH: med-dk gy, sb ply-sb blkly, mod sft-frm, w srt, sb md-sb ang, mod fri, stmg bl cut, dull yel ring</p>	<p>MD: 7,258' TVD: 7,027.45' Inclination: 26.77° Azimuth: 182.85° VS: 624.86'</p> <p>SLTY SH: med-dk gy, sb ply-sb blkly, mod sft-frm, w srt, sb md-sb ang, mod fri, tr shy ss, sting bl cut, dull yel ring</p> <p>MD: 7,306' TVD: 7,069' Inclination: 1 Azimuth: 1 VS: 601.1'</p>
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SLTY SH: med-dk gy,sb ply-sb blkly, mod sft-frn, w sft, sb md-sb ang, mod fri, tr shy ss, sting bl cut, dull yel ring	SLTY SH: med-dk gy,sb ply-sb blkly, mod sft-frn, w sft, sb md-sb ang, mod fri, tr shy ss, sting bl cut, dull yel ring	SLTY SH: med-dk gy,sb ply-sb blkly, mod sft-frn, w sft, sb md-sb ang, mod fri, tr shy ss, tr bent, sting bl cut, dull yel ring	CHK: lt gy-bm, blkly-sb pily, sft-frn, sb rd-sb ang, mod fri, SLTY SH: med-dk gy,sb ply-sb blkly, mod sft-frn, w sft, sb md-sb ang, mod fri, tr shy ss, rr bent, sting bl cut, bl ring	CHK: lt-med gy- pily, sft-frn, sb r mod fri, MRLST: gy-bm, blkly-sb p sb rd-sb ang, mc sh, rr pyr, sting t ring
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MD:7,351' TVD:7,108.05' Inclination: 36.55° Azimuth: 179° VS:-574.6'	MD:7,399' TVD:7,143.73' Inclination: 41.3° Azimuth: 178.8° VS:-545.58'	MD:7,446' TVD:7,177.25' Inclination: 47.65° Azimuth: 180.0° VS:-512.67'	MD:7,494' TVD:7,208.13' Inclination: 52.25° Azimuth: 179.34° VS:-475.95'
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Problems with Gamma

500' ROP
SCALE
CHANGE

RO (ppm)

3273u
C1: 66.1%
C2: 19.5%
C3: 11.4%
C4: 3.0%

11/17/2013
11/18/2013

TD Curve @ 7905'
@ 0800hrs on 11/16/2013

Bit Data
Bit #: 04
Type: VAREL VS513D
Size: 6.12
Depth In: 7,905'
Depth Out: 12,599'
Jets: 5-16
S/N: 4006250

Started drilling the Lateral
@ 0330hrs on 11/18/2013

WT 10.2/ VIS 42
4561u

WT 9.8/ VIS 44
3574u

GAS SCALE
CHANGE
7000
GAS (units)
CL-C4 (PPM)

WT 10.2/ VIS 42
3918u

3673u

3574u

7,750

7,800

7,850

7,900

7,950

CHK: lt-med gy-brn, blk-ysb
ply, sft-firm, sb rd-sb ang,
mod fri, MRLST: med-dk
gy-brn, blk-ysb ply, sft-firm,
sb rd-sb ang, mod fri, tr cal
incl, sting bl cut, bri bl ring

MD: 7,779'
TVD: 7,318.44'
Inclination: 79.56°
Azimuth: 175.8°
VS: 217.38'

7000
CHK: lt gy-brn, blk-ysb ply,
sft-firm, sb rd-sb ang, mod
fri, MRLST: dk gy-brn,
blk-ysb ply, sft-firm, sb
rd-sb ang, mod fri, sting bl
cut, bri bl ring

CHK: lt gy-brn, blk-ysb ply,
sft-firm, sb rd-sb ang, mod
fri, MRLST: dk gy-brn,
blk-ysb ply, sft-firm, sb
rd-sb ang, mod fri, sting bl
cut, bri bl ring

CHK: lt-med gy-brn, blk-ysb
ply, sft-firm, sb rd-sb ang,
mod fri, MRLST: dk gy-brn,
blk-ysb ply, sft-firm, sb
rd-sb ang, mod fri, tr cal
incl, tr pyr, abnt bent, sting
bl cut, bri bl ring

TVD SCALE
CHANGE
7500

MD: 7,827'
TVD: 7,325.86'
Inclination: 82.84°
Azimuth: 176.9°
VS: 170.01'

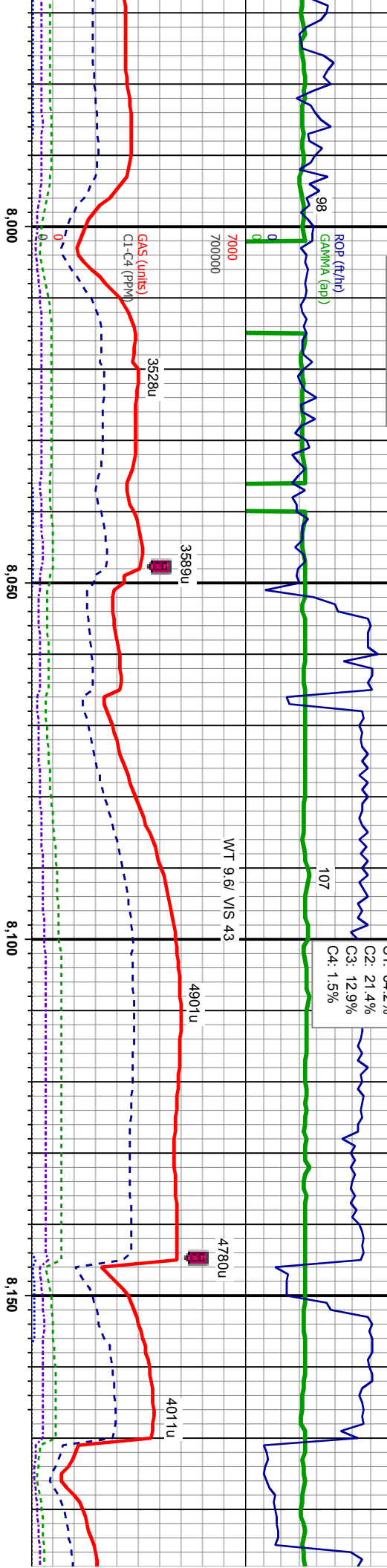
MD: 7,858'
TVD: 7,328.82'
Inclination: 86.2°
Azimuth: 177.9°
VS: 139.16'

MD: 7,905'
TVD: 7,330.47'
Inclination: 90.2°
Azimuth: 178.2°
VS: 92.2'

MD: 7,913'
TVD: 7,330.46'
Inclination: 90.37°
Azimuth: 179.09°
VS: 84.2'



500 Problems with Gamma



7000

CHK: lt-med gy-brn, blk-ysb
pity, sft-firm, sb rd-sb ang,
mod fri, MRLST: dk gy-brn,
blk-ysb pity, sft-firm, sb
rd-sb ang, mod fri, tr cal
incl, tr pyr, abnt bent, sting
bl cut, bri bl ring

TVD (ft)

MD: 8.008'
TVD: 7,330.13'
Inclination: 90.03°
Azimuth: 177.03°
VS: 10.79°

MD: 8.104'
TVD: 7,329.82'
Inclination: 90.34°
Azimuth: 177.05°
VS: 106.75°

CHK: lt gy-brn, blk-ysb pity,
sft-firm, sb rd-sb ang, mod
fri, MRLST: dk gy-brn,
blk-ysb pity, sft-firm, sb
rd-sb ang, mod fri, tr cal
incl, occ bent, sting bl cut,
bri bl ring



2608u
C1: 63.8%
C2: 20.2%
C3: 13.2%
C4: 2.7%

Problems with Gamma

500 Pro

500

300

ROP (ft/h)

GAMMA (cp)

7000

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ROP (ft/h)

GAMMA (cp)

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WT 9.5/ VIS 39

4204u

4365u

4519u

8,200

8,250

8,300

8,350

8,400

GAS (units)

CL-C4 (PPM)

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GAS (unit)

CL-C4 (P)

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CHK: lt gy-brn, blk-y-sb plty,
sft-frn, sb rd-sb ang, mod
fri, MRLST: dk gy-brn,
blk-y-sb plty, sft-frn, sb
rd-sb ang, mod fri, tr cal
incl, occ bent, sting bl cut,
bri bl ring

CHK: lt gy-brn, blk-y-sb plty,
sft-frn, sb rd-sb ang, mod
fri, MRLST: dk gy-brn,
blk-y-sb plty, sft-frn, sb
rd-sb ang, mod fri, tr cal
incl, rr bent, sting bl cut, bri
bl ring

TVD (ft)

TVD (ft)

MD-8.199'
TVD: 7,329.16'
Inclination: 90.46°
Azimuth: 179.74°
VS201.74'

MD-8.294'
TVD: 7,328.62'
Inclination: 90.18°
Azimuth: 178.48°
VS296.73'

MD-8.389'
TVD: 7,328.08'
Inclination: 90.48°
Azimuth: 179.73°
VS391.73'

7500

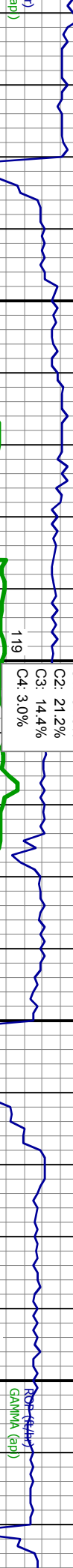


Problems with Gamma

2247u

Problems with Gamma

500
300



119

74

WT 9.5/ VIS 39

4737u

4516u

5037u

4608u

4946u

3920u

8,450

8,500

8,550

8,600

CHK: It gy-brn, blk-y-sb pily,
sft-frn, sb rd-sb ang, mod
fri, MRLST: dk gy-brn,
blk-y-sb pily, sft-frn, sb
rd-sb ang, mod fri, tr cal
incl, rr bent, sting bl cut, bri
bl ring

CHK: It gy-brn, blk-y-sb pily,
sft-frn, sb rd-sb ang, mod
fri, MRLST: dk gy-brn,
blk-y-sb pily, sft-frn, sb
rd-sb ang, mod fri, abnt cal
incl, rr fos frag, rr bent,
sting bl cut, bri bl ring

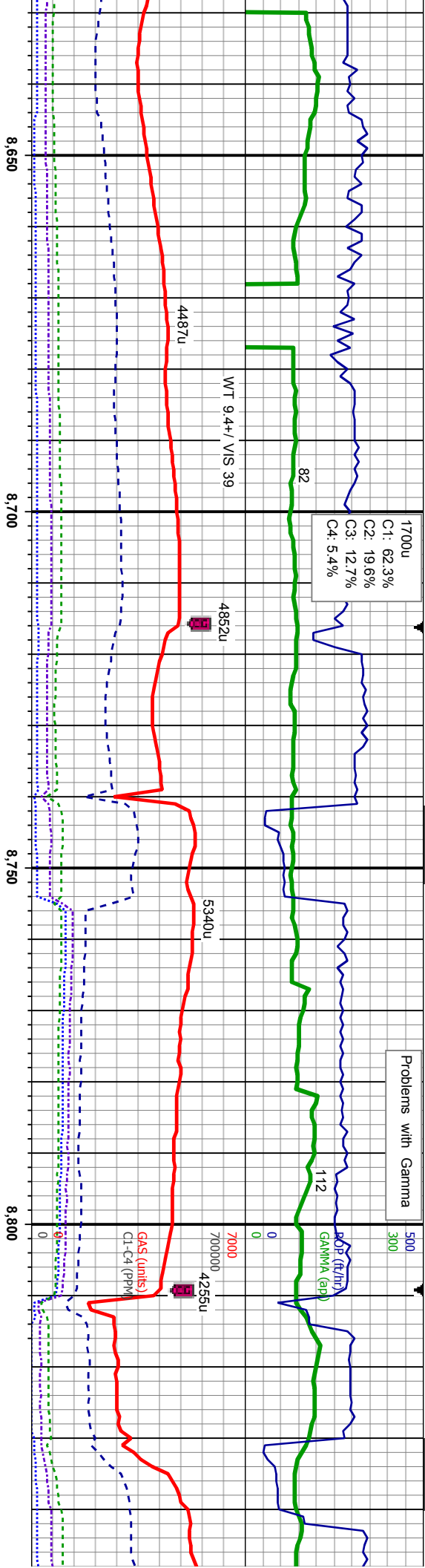
MD: 8.484'
TVD: 7,326.93'
Inclination: 90.93°
Azimuth: 178.46°
VS: 486.71'

MD: 8.579'
TVD: 7,326.73'
Inclination: 90.52°
Azimuth: 179.68°
VS: 581.7'

7500

7000

TVD (ft)



CHK: lt gy-brn, blk-y-sb pily,
sft-frn, sb rd-sb ang, mod
fri, MRLST: dk gy-brn,
blk-y-sb pily, sft-frn, sb
rd-sb ang, mod fri, abnt cal
incl, rr fos frag, rr bent,
sting bl cut, bri bl ring

CHK: lt gy-brn, blk-y-sb pily,
sft-frn, sb rd-sb ang, mod
fri, tr MRLST: dk gy-brn,
blk-y-sb pily, sft-frn, sb
rd-sb ang, mod fri, tr cal
incl, sting bl cut, bri bl ring

CHK: lt gy-brn, blk-y-sb pily,
sft-frn, sb rd-sb ang, mod
fri, tr MRLST: dk gy-brn,
blk-y-sb pily, sft-frn, sb
rd-sb ang, mod fri, abnt cal
incl, rr fos frag, rr bent,
sting bl cut, bri bl ring

MD: 8.674'
TVD: 7,324.45'
Inclination: 91.02
Azimuth: 178.85°
VS: 576.68°

MD: 8.769'
TVD: 7,325.5'
Inclination: 87.72
Azimuth: 177.53°
VS: 5771.66°



5038u
C1: 57.5%
C2: 17.7%
C3: 14.0%
C4: 10.8%

500 Problems with Gamma
300

119

4480u

4670u

4999u

WT 9.5/ VIS 41
700000

GAS (units)
C1-C4 (ppm)

4994u

5159u

9,100

9,150

9,200

9,250

CHK: lt-med gy-brn, biky-sb
ply, sft-fm, sb rd-sb ang,
mod fri, MRLST: dk gy-brn,
biky-sb ply, sft-fm, sb
rd-sb ang, mod fri, sting bl
cut, bri bl ring

CHK: lt-med gy-brn, biky-sb
ply, sft-fm, sb rd-sb ang,
mod fri, MRLST: dk gy-brn,
biky-sb ply, sft-fm, sb
rd-sb ang, mod fri, rr fos
frag, abnt cal incl, occ bent,
sting bl cut, bri bl ring

TVD (ft)

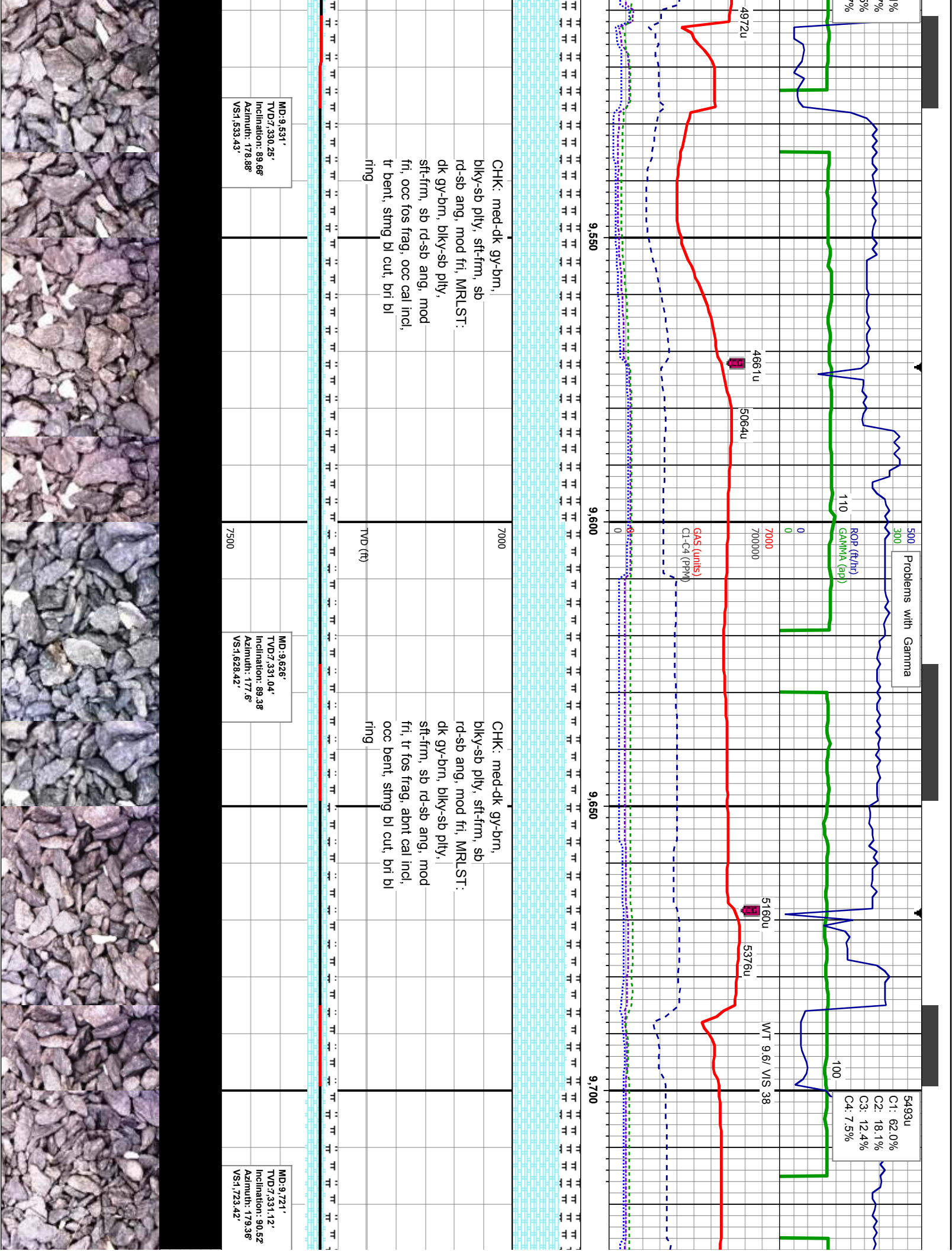
MD:9,160'
TVD:7,332.11'
Inclination: 91.02
Azimuth: 178.1°
VS:1,152.51'

MD:9,245'
TVD:7,330.47'
Inclination: 90.96
Azimuth: 177.32
VS:1,247.48'

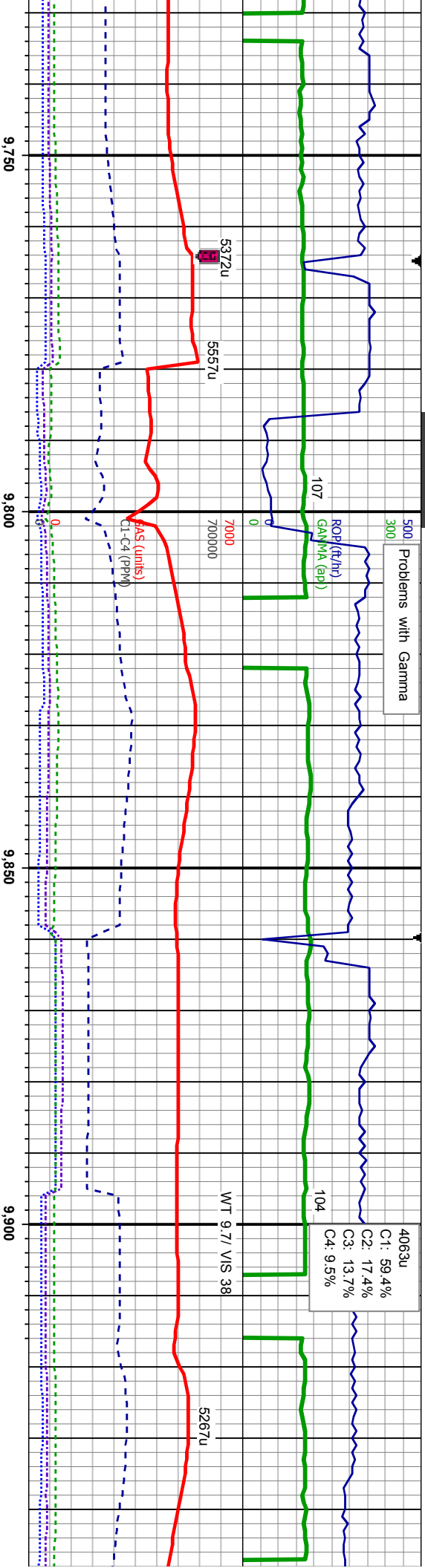
7500

7000





Problems with Gamma



CHK: med-dk gy-brn,

blky-sb pty, sft-frm, sb

rd-sb ang, mod fri, MRLST:

dk gy-brn, blky-sb pty,

sft-frm, sb rd-sb ang, mod

fri, rr fos frag, abnt cal incl,

abnt bent, sting bl cut, brt bl

ring

CHK: med-dk gy-brn,

blky-sb pty, sft-frm, sb

rd-sb ang, mod fri, MRLST:

dk gy-brn, blky-sb pty,

sft-frm, sb rd-sb ang, mod

fri, rr fos frag, abnt cal incl,

occ bent, sting bl cut, brt bl

ring

CHK: lt-dk g

pty, sft-frm,

mod fri, MRL

blky-sb pty,

rd-sb ang, n

frag, occ cal

sting bl cut,

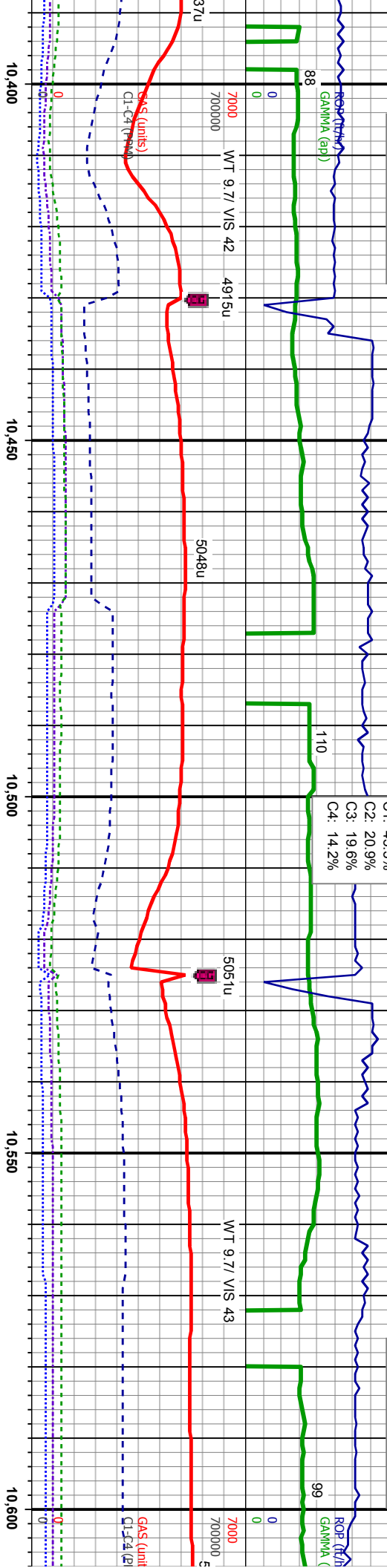
MD: 9.817'
TVD: 331.01'
Inclination: 89.6°
Azimuth: 180.58°
VS: 1,819.39'

MD: 9.912'
TVD: 332.24'
Inclination: 88.92°
Azimuth: 178.67°
VS: 1,914.36'



Problems with Gamma

Problems with Gamma



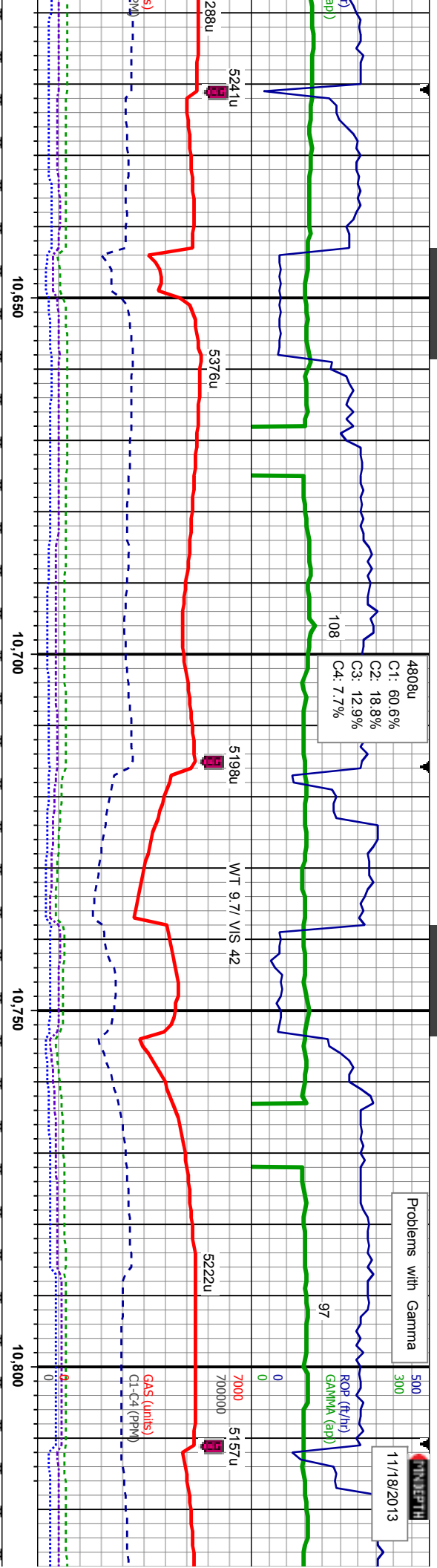
CHK: lt-med gy-brn, blk-y-sb
ply, sft-fm, sb rd-sb ang,
mod fri, MRLST: dk gy-brn,
blk-y-sb ply, sft-fm, sb
rd-sb ang, mod fri, abnt cal
incl, rr bent, stng bl cut, bri
bl ring

CHK: lt-med gy-brn, blk-y-sb
ply, sft-fm, sb rd-sb ang,
mod fri, MRLST: dk gy-brn,
blk-y-sb ply, sft-fm, sb
rd-sb ang, mod fri, abnt cal
incl, stng bl cut, bri bl ring

87'	MD:10.482'	MD:10.578'
28.36'	TVD:7,327.33'	TVD:7,325.68'
on: 90.59'	Inclination: 90.65'	Inclination: 91.33'
1: 179.95'	Azimuth: 178.83'	Azimuth: 177.55'
2.27'	VS2,484.26'	VS2,580.24'
7500		7500



Problems with Gamma



CHK: lt-med gy-bm, blyk-sb
ply, sft-frm, sb rd-sb ang,
mod fri, MRLST: dk gy-brn,
blyk-sb ply, sft-frm, sb
rd-sb ang, mod fri, abnt cal
incl, r fos frag, sting bl cut,
bri bl ring

CHK: lt-med gy-bm, blyk-sb
ply, sft-frm, sb rd-sb ang,
mod fri, MRLST: med-dk
gy-brn, blyk-sb ply, sft-frm,
sb rd-sb ang, mod fri, abnt
cal incl, sting bl cut, bri bl
ring

MD:10.673'
TVD:7,324.68'
Inclination: 89.88°
Azimuth: 178.05°
VS2,675.22'

MD:10.768'
TVD:7,325.07'
Inclination: 89.68°
Azimuth: 179.38°
VS2,770.22'



500 Problems with Gamma

5196u
C1: 59.9%
C2: 19.2%
C3: 13.4%
C4: 7.6%

89

94

ROP (ft/hr)
GAMMA (cp)
GAS (units)
C1-C4 (ppm)

5109u WT 9.7/ VIS 40

4975u WT 9.6/ VIS 40

5276u

5003u

10,850

10,900

10,950

11,000

CHK: lt-med gy-brn, blk-y-sb
ply, sft-firm, sb rd-sb ang,
mod fri, MRLST: med-dk

gy-brn, blk-y-sb ply, sft-firm,
sb rd-sb ang, mod fri, abnt
cal incl, sting bl cut, bri bl
ring

CHK: lt-med gy-brn, blk-y-sb
ply, sft-firm, sb rd-sb ang,
mod fri, MRLST: med-dk

gy-brn, blk-y-sb ply, sft-firm,
sb rd-sb ang, mod fri, abnt
cal incl, rr fos frag, sting bl
cut, bri bl ring

CHK: lt-med

ply, sft-firm,
mod fri, MRL
blk-y-sb ply,
rd-sb ang, n
incl, rr fos fr
bri bl ring

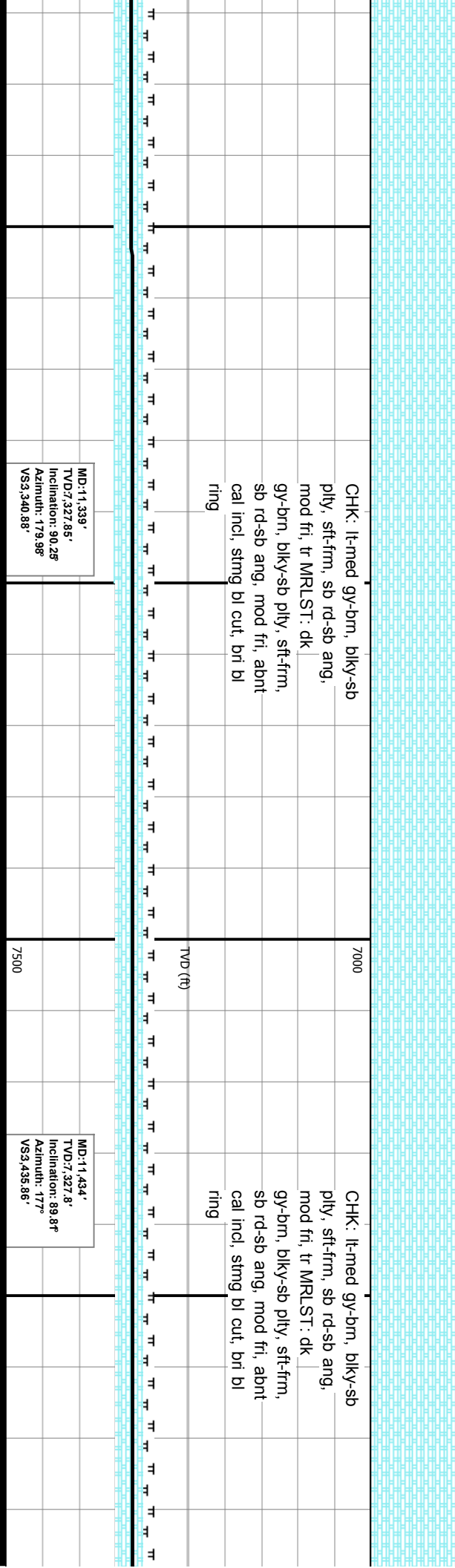
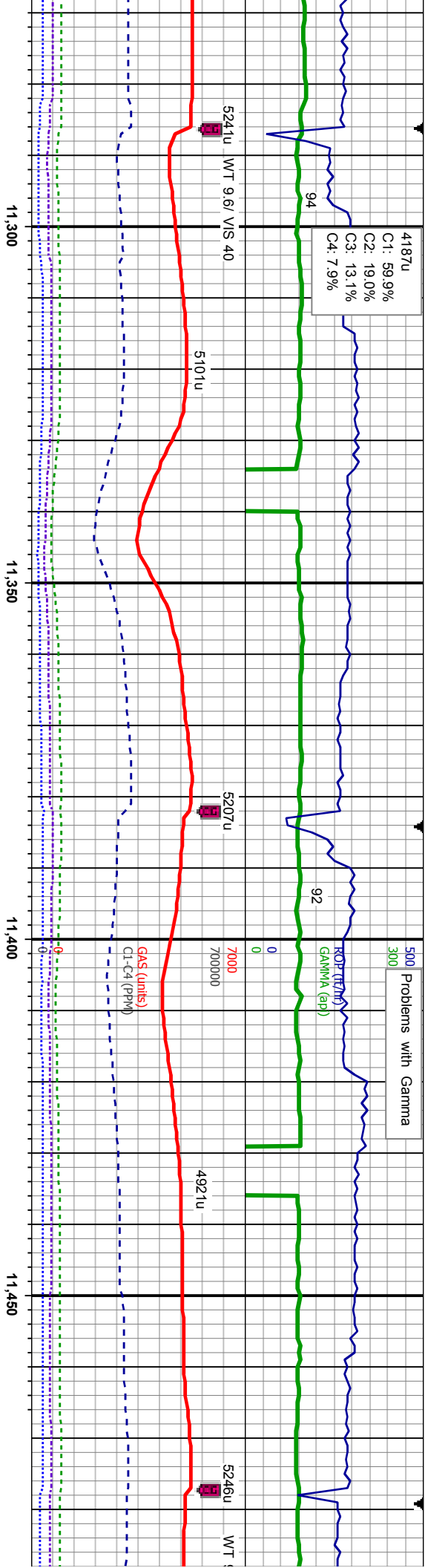
MD:10,863'
TVD:7,325.66'
Inclination: 89.63
Azimuth: 176.84
VS:2,865.21'

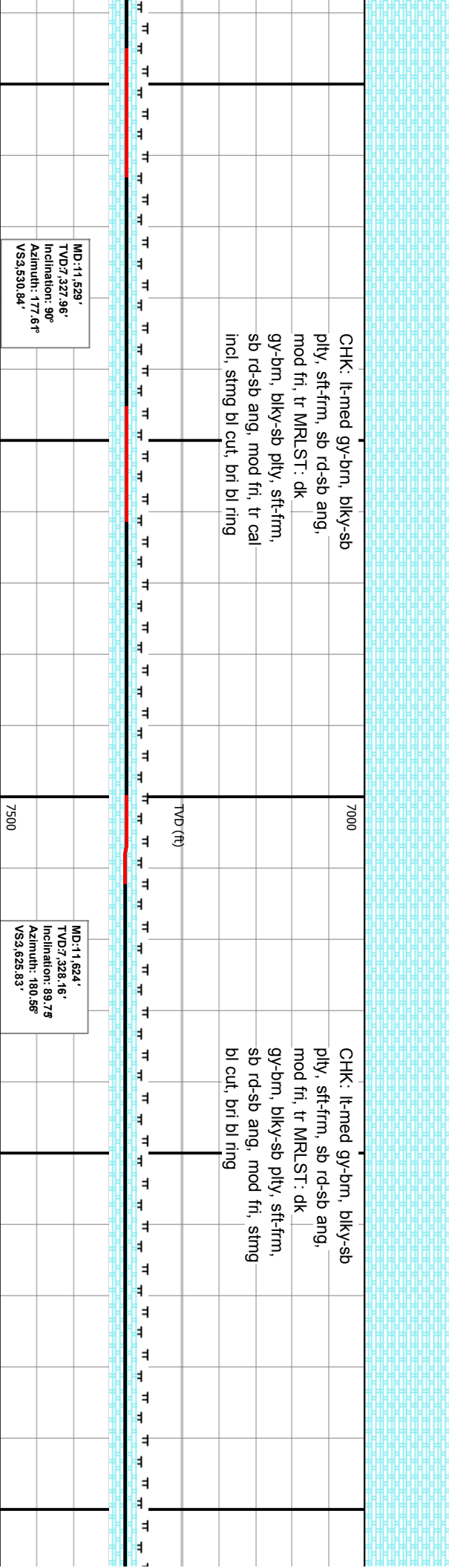
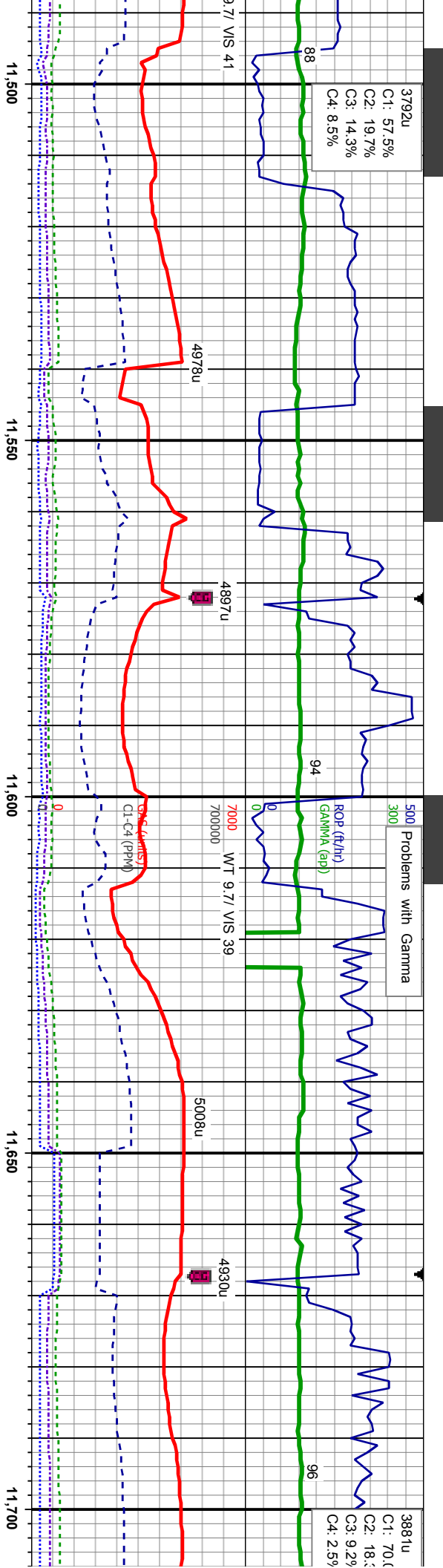
MD:10,968'
TVD:7,326.45'
Inclination: 89.41
Azimuth: 177.54
VS:2,960.17'

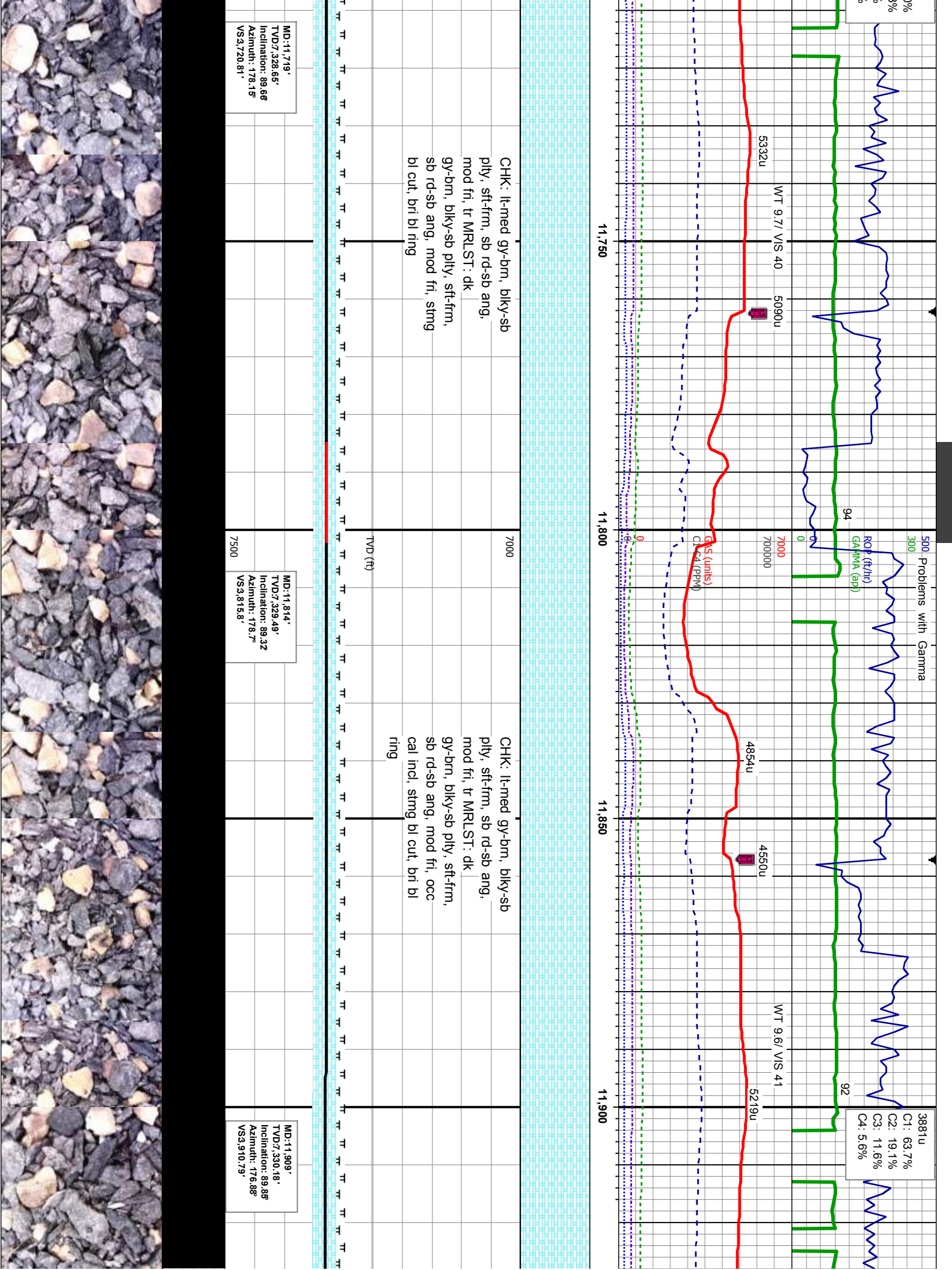
7500

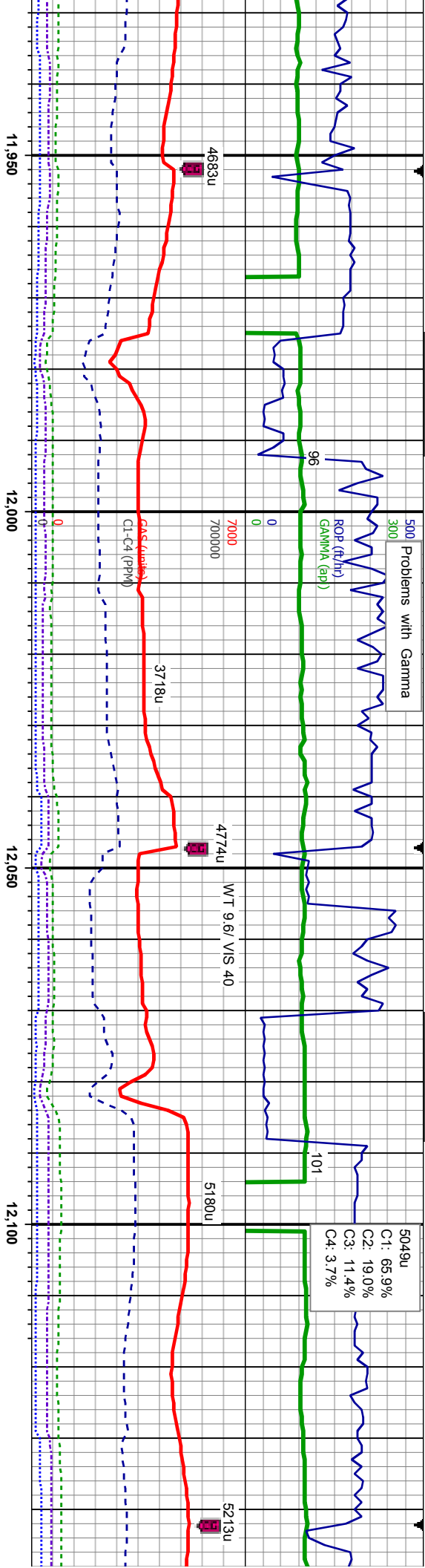
7000

TVD (ft)



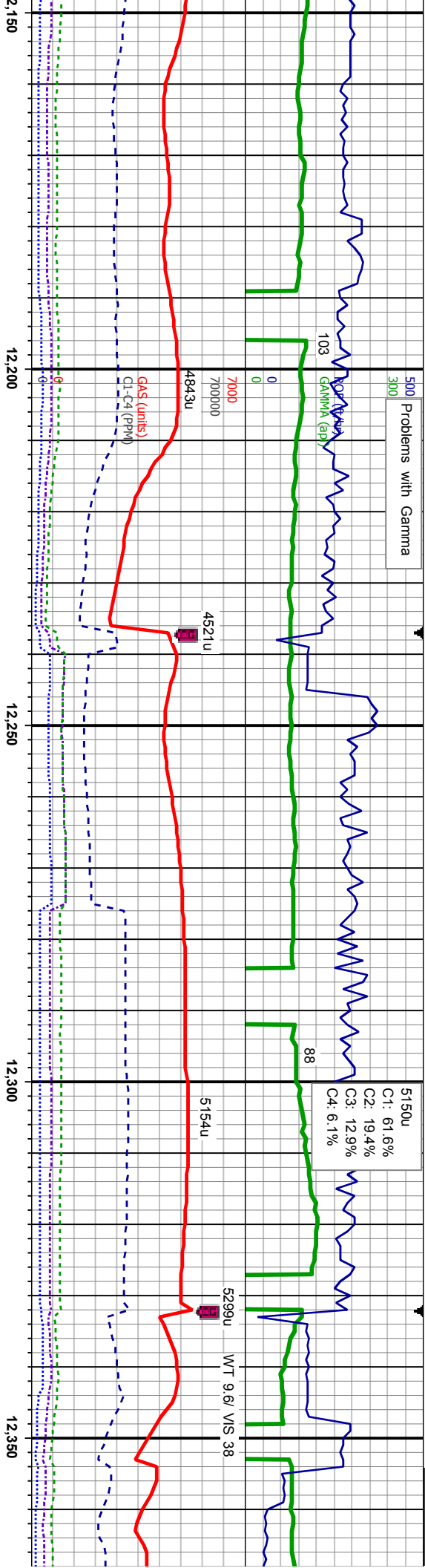






CHK: lt-med gy-brn, blk-y-sb ply, sft-frn, sb rd-sb ang, mod fri, tr MRLST: dk gy-brn, blk-y-sb ply, sft-frn, sb rd-sb ang, mod fri, occ cal incl, sting bl cut, bri bl ring	7000	CHK: lt-med gy-brn, blk-y-sb ply, sft-frn, sb rd-sb ang, mod fri, tr MRLST: dk gy-brn, blk-y-sb ply, sft-frn, sb rd-sb ang, mod fri, occ cal incl, sting bl cut, bri bl ring	MD:12,004' TVD:7,330.44' Inclination: 89.85° Azimuth: 177.34° VS4,005.76'	MD:12,099' TVD:7,330.51' Inclination: 90.08° Azimuth: 179.97° VS4,100.75'	CHK: lt-mec ply, sft-frn, mod fri, tr M gy-brn, blk-y- sb rd-sb ang cal incl, stm ring
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gy-brn, blk-y-sb
sb rd-sb ang,
RLST: dk
sb pily, sft-firm,
g, mod fri, occ
g bl cut, bri bl

7000

CHK: lt-med gy-brn, blk-y-sb
pily, sft-firm, sb rd-sb ang,
mod fri, tr MRLST: dk
gy-brn, blk-y-sb pily, sft-firm,
sb rd-sb ang, mod fri, occ
cal incl, sting bl cut, bri bl
ring

TVD (ft)

MD-12,194'
TVD: 329.77'
Inclination: 90.83°
Azimuth: 179.5°
VS4,195.72'

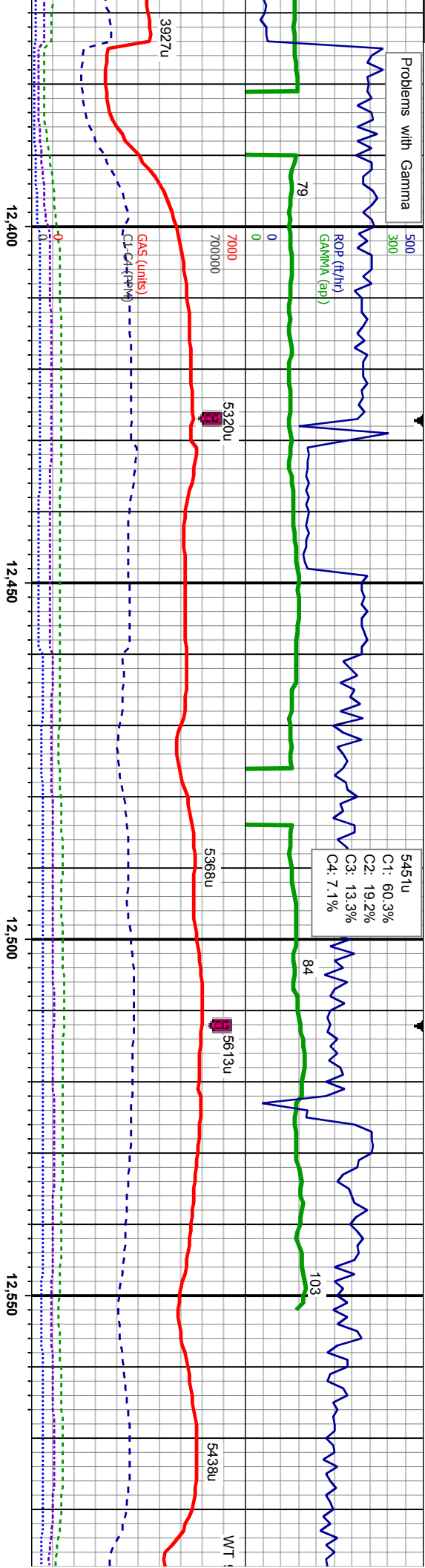
7500

MD-12,289'
TVD: 327.88'
Inclination: 91.45°
Azimuth: 178.74°
VS4,290.7'

CHK: lt-med gy-brn, blk-y-sb
pily, sft-firm, sb rd-sb ang,
mod fri, tr MRLST: dk
gy-brn, blk-y-sb pily, sft-firm,
sb rd-sb ang, mod fri, tr cal
incl, rr fos frag, sting bl cut,
bri bl ring



Problems with Gamma



5451u
C1: 60.3%
C2: 19.2%
C3: 13.3%
C4: 7.1%

CHK: lt-med gy-brn, bly-sb
ply, sft-fm, sb rd-sb ang,
mod fri, MRLST: dk gy-brn,
bly-sb ply, sft-fm, sb
rd-sb ang, mod fri, occ cal
incl, sting bl cut, bri bl ring

CHK: lt-med gy-brn, bly-sb
ply, sft-fm, sb rd-sb ang,
mod fri, MRLST: dk gy-brn,
bly-sb ply, sft-fm, sb
rd-sb ang, mod fri, occ cal
incl, sting bl cut, bri bl ring

MD-12,385'
TVD: 7,327.9'
Inclination: 88.52°
Azimuth: 177.38°
VS4,386.68'

MD-12,480'
TVD: 7,330.08'
Inclination: 88.88°
Azimuth: 176.29°
VS4,481.61'

MD-12,554'
TVD: 7,331.09'
Inclination: 89.57°
Azimuth: 175.63°
VS4,555.53'



