



Scale: 5" / 100'
Measured Depth Log

Well Name	Sater CC18-74-1HN HORZ	County	WELD
Location	SEC 18 T4N R63W	Rig Number	H&P 315
State	COLORADO	AFE #	140577
Country	USA	Field	WATTENBERG
API Number	05-123-37983	Drilling Completed	4/5/2014
Region	DJ BASIN		
Spud Date	3/30/2014		
Surface Coordinates	SESE SEC 18 T4N R63W 300' FSL; 375' FEL LAT/LON: 40.30562/-104.47239		
Bottom Hole Coordinates	NWNE SEC 18 T4N R63W 75' FNL; 1,650' FEL		
Ground Elevation	4,678'	K.B. Elevation	4,702'
Logged Interval	5,942'	To	11,637'
Formation	NIOBRARA B CHALK	Total Depth	11,637'
Type of Drilling Fluid	LSND		

Company Noble Energy Inc
Address 1625 BROADWAY
DENVER, CO 80202

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



Operator

AY SUITE 2200
0202

Geologist

ATHAN MURPHY
OGGING, INC

ST
0223

Rock Types

	CHERT		SIDERITE or LIMONITE		SHALE GRAY
	CLAY CHOKE SANC		LIMESTONE		SHALY SILTSTONE
	CLAYSTONE		METAMORPHIC		SILTSTONE
	DOLOMITE		NO SAMPLE		TUFF
	CONGLOMERATE		SALT		WELDED TUFF
	GRANITE		SANDSTONE		
	GYPSUM		SALT-PEPPER SAND		
	IGNEOUS		SHALE		
			SHALE COLORED		

Accessories

Fossils	F FOSSIL	ARGILLACEOUS	GLAUCONITE	TUFACEOUS
GASTROPOD	ARGILLITE GRAIN	GYPSIFEROUS		
ALGAE	OOLITE	HEAVY MINERAL		
AMPHIPORA	OSTRACOD	INOCERAMUS		
BELEMNITE	PELECYPOD	KAOLIN		
BIOCLASTIC	PELLET	MARLSTONE		
BRACHIOPOD	PISOLITE	MINERAL CRYSTALS		
BRYOZOA	PLANT REMAINS	NODULES		
CEPHALOPOD	PLANT SPORES	PHOSPHATE PELLETS		
CORAL	SCAPHOPOD	PYRITE		
CRINOID	STROMATOPOROID	SALT CAST		
ECHINOID	FELDSPAR	SANDY		
FISH	Minerals	FERRUGINOUS PELLETT	SILTY	SHALE STRINGER
FORAMINIFERA	ANHYDRITIC	FERRUGINOUS		SILTSTONE STRINGER

Other Symbols

Oil Show	O ORGANIC	CORE - RECOVERED	TRIP GAS	E EARTHY
DEAD	P PINPOINT	DST INTERVAL	WIRELINE TESTED - LEFT	FINELYXLN
EVEN	V VUGGY	FAULT	WIRELINE TESTED - RT	GS GRAINSTONE
QUESTIONABLE	Engineering	FORMATION TOP	L LITHOGRAPHIC	MX MICROXLN
SPOTTED STAINING	BIT	GAS SHOW	Rounding	
		MN DEPTH	A ANGULAR	MS MUDSTONE
Porosity	CONNECTION (DOWN)	NORMAL FAULT	R ROUNDED	PS PACKSTONE
CONNECTION (LEFT)	CONNECTION (RIGHT)	OIL SHOW	B SUBANG	WS WACKESTONE
FENESTRAL	CONNECTION GAS	OVERTURNED STRATA	R SUBRND	
F FRACTURE	CONNECTION GAS UP	REVERSE FAULT		
INTERCRYSTALLINE	CONNECTION GAS LEFT	SIDEWALL CORE (LEFT)	Textures	
INTERCRYSTALLINE	CONNECTION GAS DOWN...	SIDEWALL CORE (RIGHT)	BS BOUNDSTONE	M MODERATE
MOLDIC	CORE - LOST	SLIDE	C CHALKY	P POOR
		SURVEY	CX CRYPTOXLN	W WELL

Slide/Rotate

ROP

ROP

Curves
GAMMA

Total Gas & Chromatograph

GAS

C1

C2

C3

C4

Depth Labels

% Lith

Well Bore

TVD

Oil Show

Images

ROP Data from iBall

Gamma Data from Sperry - Halliburton

Gas Data from iBall

4/01/2014, Mud Wt: 10.00, FVIs: 35
PVIs: 10, YP: 9, GELS: 4/8/13, API Filt: 8.5
CAKE: 20, pH: 8.5, CI: 2.000, Ca: 80

109

GAMMA (units)

250

50

600000

1967u

GAS (units)

C1-C4 (PPM)

2449u

2696u

50' Sample Interval @ 5.950' MD

Columbine Logging began logging with
Bloodhound unit 0687 on 04/01/2014

Bit Data

Bit #: 2

Type: Security

Model: MMD55M

Size: 8.75"

Depth In: 5.942'

Jets: 5x15

SLTY SH: It gy - It gy brn, sme med gy, frm -
mod hd, pty - sb pty, occ sb blk, silty - grty
tex, v sl calc
SHY SS: It - medgy, f gr, sb ang - sb rd, py
srt, brit clus, p por, calc cmt, sme glau incl

SLTY SH: It gy - It gy brn, sme med gy, frm -
mod hd, pty - sb pty, occ sb blk, silty - grty
tex, v sl calc
SHY SS: It - medgy, f gr, sb ang - sb rd, py
srt, brit clus, p por, calc cmt, sme glau incl

SLTY SH: It gy - It gy brn, sme med gy, frm -
mod hd, pty - sb pty, occ sb blk, silty - grty
tex, v sl calc
SHY SS: It - medgy, f gr, sb ang - sb rd, py
srt, brit clus, p por, calc cmt, sme glau incl

MD: 6.007'

TVD: 5.892.44'

Inclination: 20.68 °

Azimuth: 261.57 °

VS: 103.61'

5800

MD: 6.055'

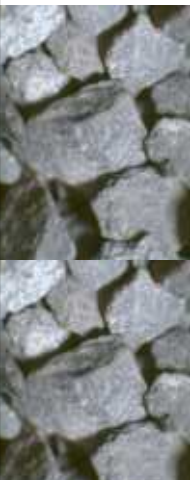
TVD: 5.936.59'

Inclination: 25.47 °

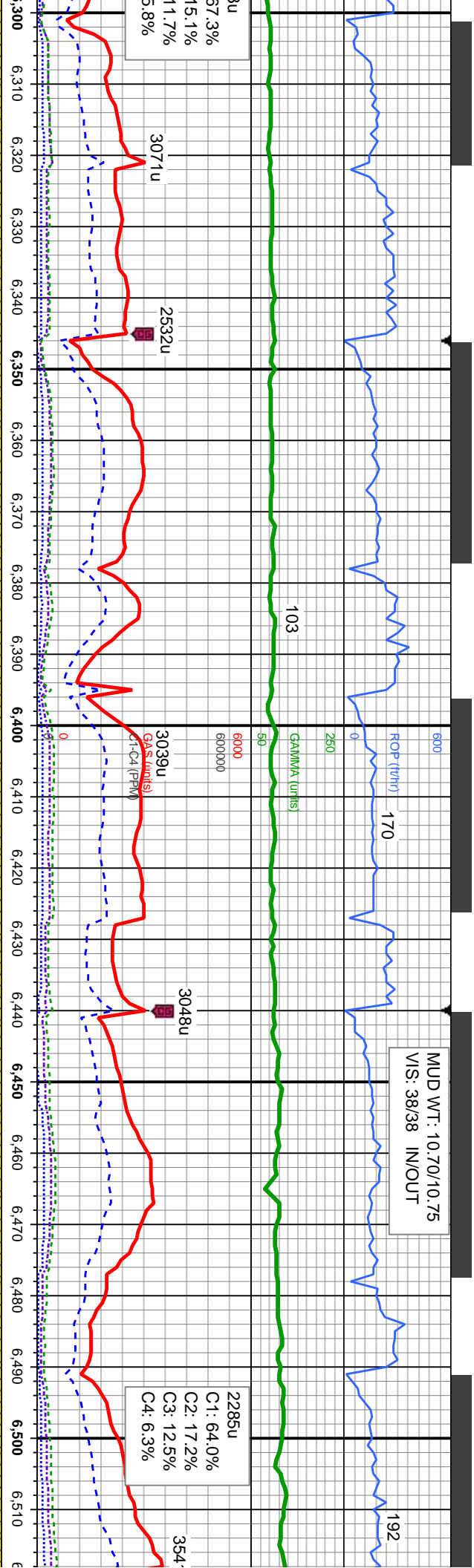
Azimuth: 264.58 °

VS: 106.3'

E
G
M
F
T
S



MUD WT: 10.70/10.75
VIS: 38/38 IN/OUT



<<Scale Change>>

MD: 6,340'
TVD: 6,171.69'
Inclination: 37.89°
Azimuth: 294.99°
VS: 167.74'

MD: 6,387'
TVD: 6,208.77'
Inclination: 38.01°
Azimuth: 301.75°
VS: 187.57'

MD: 6,435'
TVD: 6,245.69'
Inclination: 41.45°
Azimuth: 307.79°
VS: 211.01'

MD: 6,482'
TVD: 6,280.07'
Inclination: 44.55°
Azimuth: 313.87°
VS: 237.53'

SLTY SH: lt gy - lt gy brn, sme med gy, frm -
mod hd, pily - sb pily, occ sb blkly, sily - grly
tex, v sl calc
SHY SS: lt - medgy, f gr, sb ang - sb rd, py
srt, brit clus, p por, calc cmt, sme glau incl

SLTY SH: lt gy - lt gy brn, sme med gy, frm -
mod hd, pily - sb pily, occ sb blkly, sily - grly
tex, v sl calc
SHY SS: lt - medgy, f gr, sb ang - sb rd, py
srt, brit clus, p por, calc cmt, sme glau incl

SLTY SH: lt gy - lt gy brn, sme med gy, frm -
mod hd, pily - sb pily, occ sb blkly, sily - grly
tex, v sl calc
SHY SS: lt - medgy, f gr, sb ang - sb rd, py
srt, brit clus, p por, calc cmt, sme glau incl

SLTY SH: lt gy - lt gy brn, sme med gy, frm -
mod hd, pily - sb pily, occ sb blkly, sily - grly
tex, v sl calc
SHY SS: lt - medgy, f gr, sb ang - sb rd, py
srt, brit clus, p por, calc cmt, sme glau incl

SLTY SH: lt gy - lt gy brn, sme med gy, frm -
mod hd, pily - sb pily, occ sb blkly, sily - grly
tex, v sl calc
SHY SS: lt - medgy, f gr, sb ang - sb rd, py
srt, brit clus, p por, calc cmt, sme glau incl



4/01/2014
4/02/2014

MINDEPTH

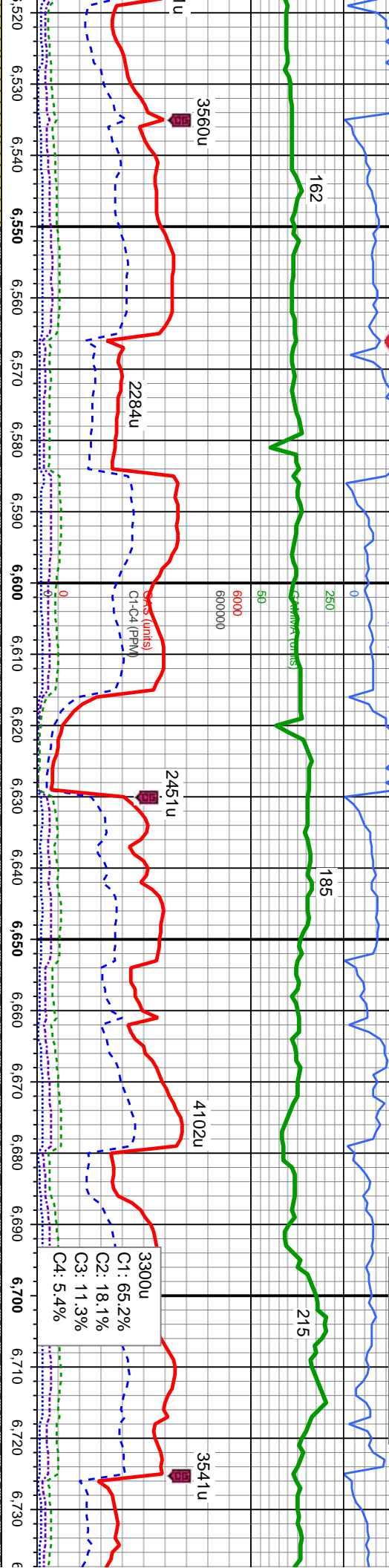
ROP (ft/hr)

320

185

215

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



25' Sample Interval @ 6,600' MD

Sharon Springs Marker @
6,698' MD: 6,420' TVD

<<Scale Change>>

Niobrara
6,749' MD

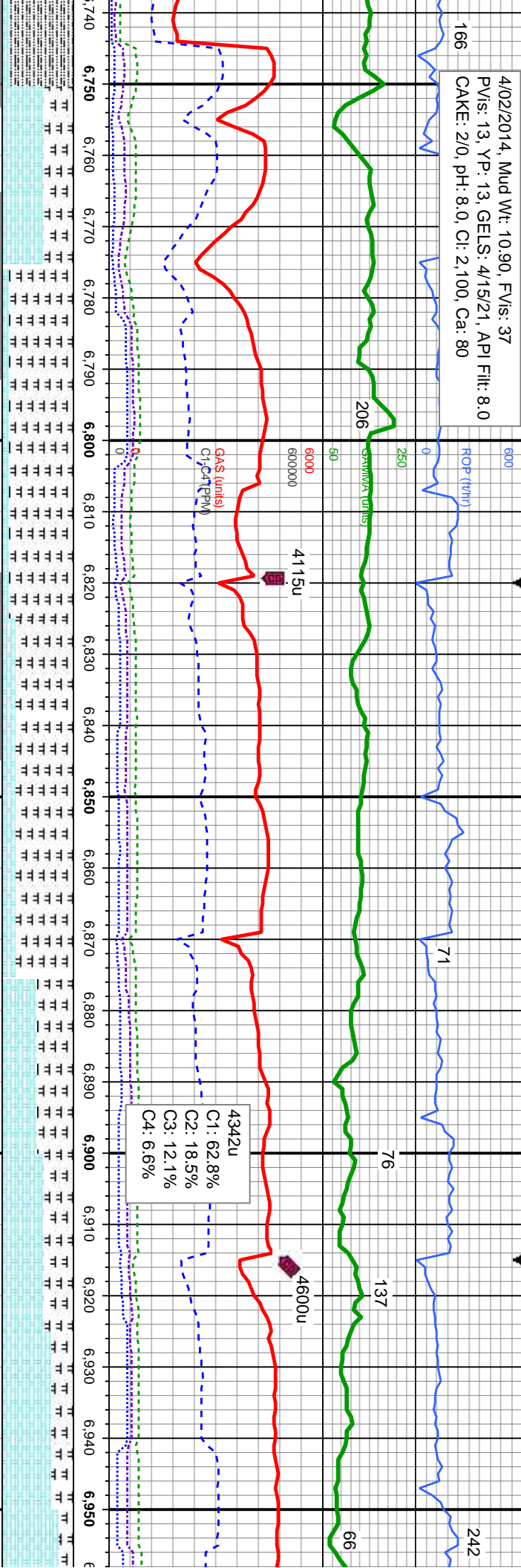
MD: 6,530'	MD: 6,576'	MD: 6,624'	MD: 6,671'	MD: 6,719'
TVD: 6,313.93'	TVD: 6,345.5'	TVD: 6,376.88'	TVD: 6,405.45'	TVD: 6,432.13'
Inclination: 45.78 °	Inclination: 47.59 °	Inclination: 50.74 °	Inclination: 54.39 °	Inclination: 58.08 °
Azimuth: 319.78 °	Azimuth: 325.15 °	Azimuth: 328.16 °	Azimuth: 330.85 °	Azimuth: 334.62 °
VS: 267.52'	VS: 298.42'	VS: 332.89'	VS: 368.85'	VS: 407.83'

It gy brn, sme med gy, frm -
ply, occ sb blk, silty - grty
SLTY SH: It gy - It gy brn, sme med gy, frm -
mod hd, ply - sb ply, occ sb blk, silty - grty
tex, v sl calc
6600

SLTY SH: It gy - It gy brn, sme med gy, frm -
mod hd, ply - sb ply, occ sb blk, silty - grty
tex, v sl calc
6750



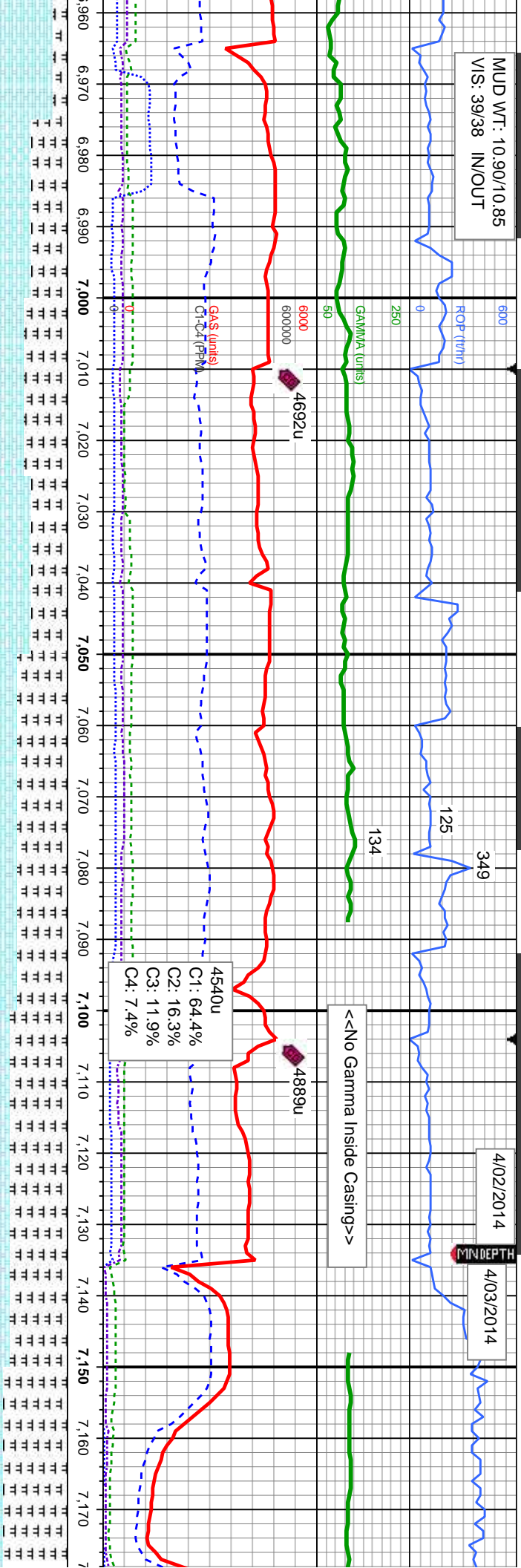
4/02/2014, Mud Wt: 10.90, FV/s: 37
PV/s: 13, YP: 13, GEELS: 4/15/21, API Filt: 8.0
CAKE: 2/0, pH: 8.0, Cl: 2.100, Ca: 80



Top @ 6,448' TVD	Nio A Marl Top @ 6,759' MD: 6,452' TVD	6350	Nio B Chalk Top @ 6,845' MD: 6,489' TVD	MD: 6,861' TVD: 6,495.74' Inclination: 68.02°	MD: 6,909' TVD: 6,512.67' Inclination: 70.69°	MD: 6,956' TVD: 6,526.88' Inclination: 74°
Chalk	A Chalk MD: 6,766' TVD: 6,455.71' Inclination: 61.69° Azimuth: 338.03°	A Marl	B Chalk MD: 6,814' TVD: 6,477.12' Inclination: 65.33° Azimuth: 342.03°	A Chalk MD: 6,861' TVD: 6,495.74' Inclination: 68.02° Azimuth: 345.82°	B Chalk MD: 6,909' TVD: 6,512.67' Inclination: 70.69° Azimuth: 349.41°	A Chalk MD: 6,956' TVD: 6,526.88' Inclination: 74° Azimuth: 351°
gy, frm - mod hd, pily - sb pily, occ sb blk, silty - grty tex	gy, frm - mod hd, pily - sb pily, occ sb blk, silty - grty tex	ply - pily, silty - grty tex	MRL: lt - med gy, occ blk, sft - mod hd, sb pily - pily, silty - grty tex	MRL: lt - med gy, occ blk, sft - mod hd, sb pily - pily, silty - grty tex	MRL: lt - med gy, occ blk, sft - mod hd, sb pily - pily, silty - grty tex	MRL: lt - med gy, occ blk, sft - mod hd, sb pily - pily, silty - grty tex
lam, sft - frm, sb pily - sb blk, rthy tex, v calc, abnt	lam, sft - frm, sb pily - sb blk, rthy tex, v calc, abnt	CHK: pred tan wi wh, sme lgy, mot, lam, sft - frm, sb pily - sb blk, rthy tex, v calc, abnt bent, tr fos frag	CHK: pred tan wi wh, sme lgy, mot, lam, sft - frm, sb pily - sb blk, rthy tex, v calc, abnt bent, tr fos frag	CHK: pred tan wi wh, sme lgy, mot, lam, sft - frm, sb pily - sb blk, rthy tex, v calc, sme bent, tr fos frag	CHK: pred tan wi wh, sme lgy, mot, lam, sft - frm, sb pily - sb blk, rthy tex, v calc, sme bent, tr fos frag	CHK: p frm, sb bent, tr MRL: lt - med gy, occ blk, sft - mod hd, sb pily - pily, s
6750	6750	6750	6750	6750	6750	6750



MUD WT: 10.90/10.85
VIS: 39/38 IN/OUT



Nio B Marl Top @
6,970' MD; 6,531' TVD

MD: 7,004'
TVD: 6,538.48'
Inclination: 77.96°
Azimuth: 353.52°
VS: 669.5'

MD: 7,050'
TVD: 6,546.37'
Inclination: 82.28°
Azimuth: 354.7°
VS: 714.23'

MD: 7,080'
TVD: 6,549.79'
Inclination: 84.63°
Azimuth: 355.58°
VS: 743.57'

TOOH @ 7,134' MD to run 7" casing

50 Sample Interval @ 7,150' MD

B Chalk

B Marl

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

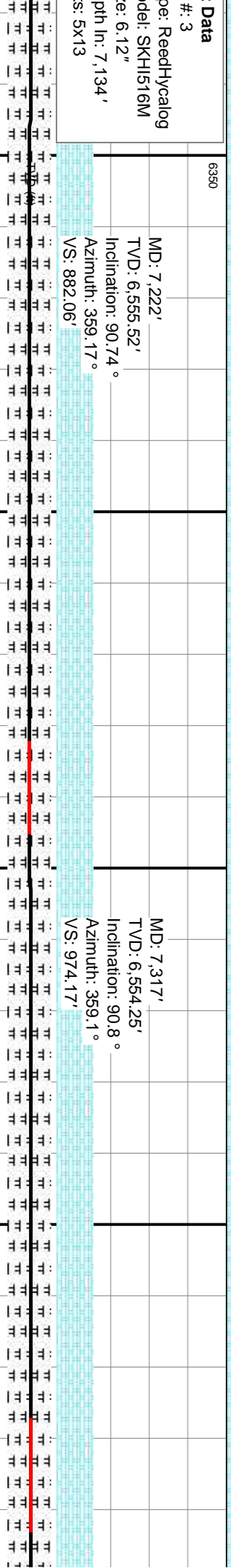
MRL: lt - med gy, occ blk, sft - mod hd, sb ply - ply, silty - grty tex
CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb ply - sb blkly, rthy tex, v calc, sme bent, sme inoc

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

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



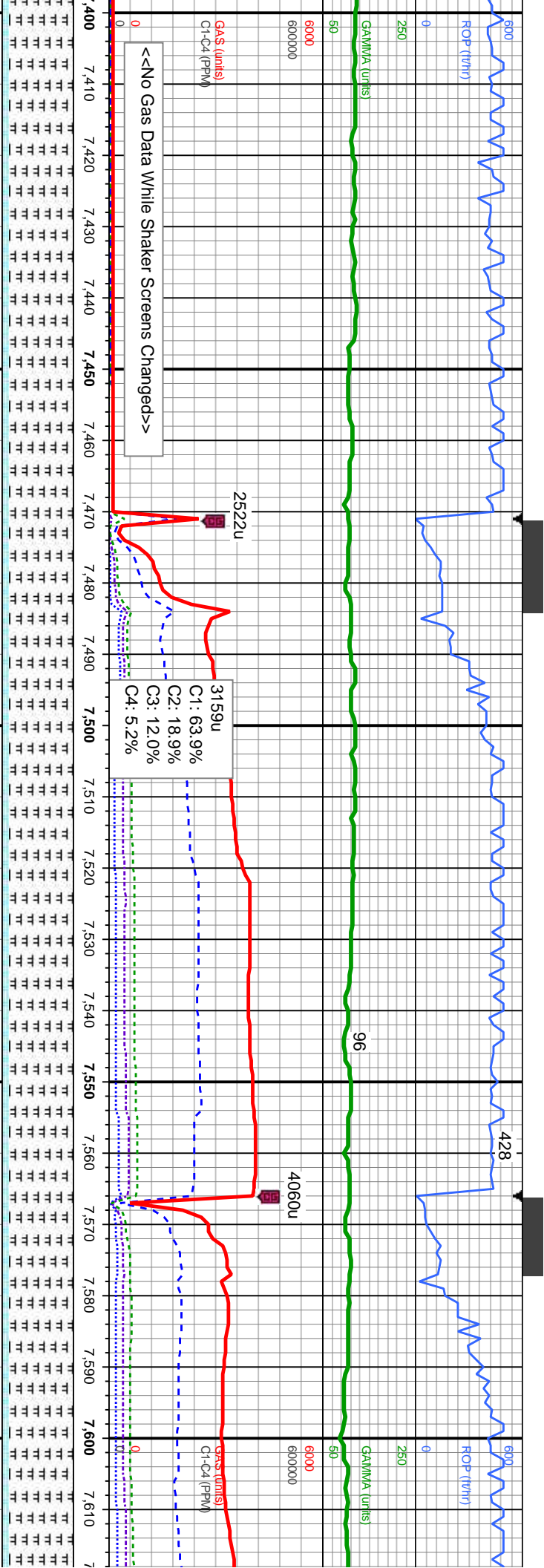
MUD WT: 9.50/9.60
VIS: 31/32 IN/OUT



MD: 7,317'
TVD: 6,554.25'
Inclination: 90.8 °
Azimuth: 359.1 °
VS: 974.17'

10% CHK; pred tan wi wh, sme ltyg, mot,
lam, sft - frm, sb ply - sb blk, rthy tex, v cal
90% MRI: lt - med gy, occ blk, sft - mod hd,
sb ply - ply, slty - gtry tex, sme bent, sme
fos





MD: 7,412'
TVD: 6,554.3'
Inclination: 89.14 °
Azimuth: 357.79 °
VS: 1,066.56'

MD: 7,507'
TVD: 6,555.09'
Inclination: 89.91 °
Azimuth: 358.95 °
VS: 1,158.98'

MD: 7,601'
TVD: 6,555.14'
Inclination: 90.03 °
Azimuth: 359.75 °
VS: 1,250.04'

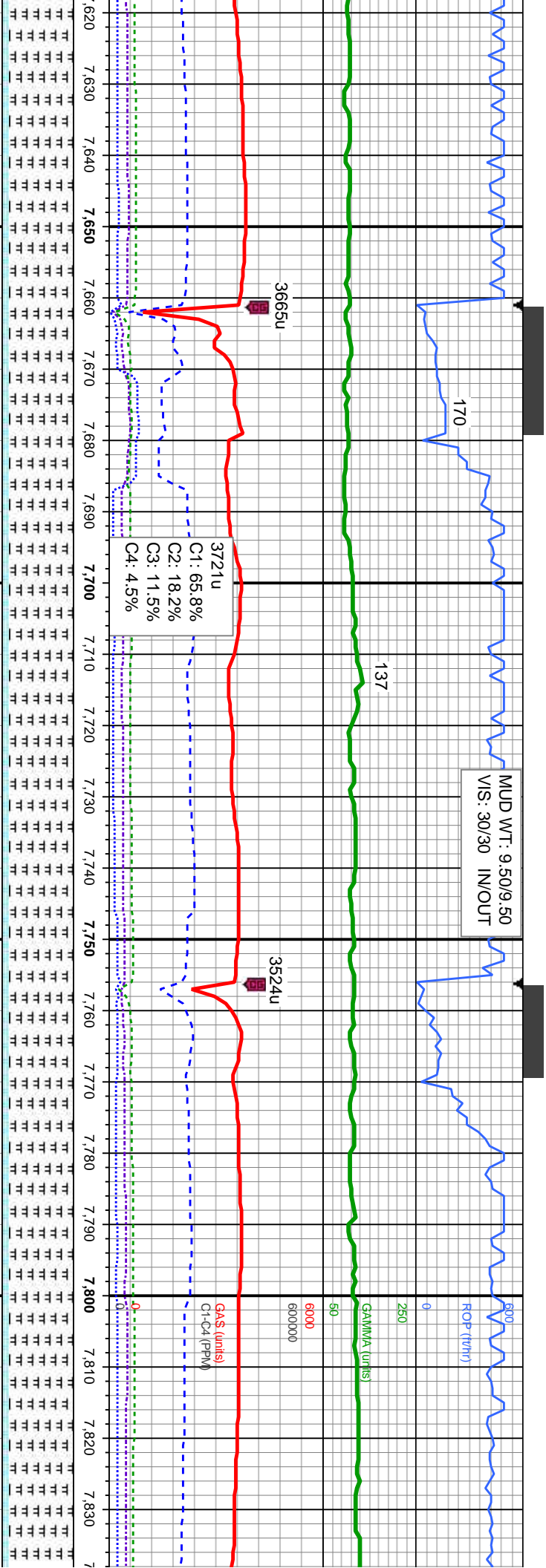
10% CHK: pred tan wi wh, sme ltgy, mot,
lam, sft - frm, sb pty - sb blk, rthy tex, v calc
90% MRL: lt - med gy, occ blk, sft - mod hd,
sb pty - pty, silty - grty tex, sme bent, sme
fos

10% CHK: pred tan wi wh, sme ltgy, 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, sme bent, sme
fos

10% CHK: pred tan wi wh, sme ltgy, 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, sme bent, sme
fos

10% CHK: pred
lam, sft - frm, sb
90% MRL: lt - m
sb pty - pty, silty
fos



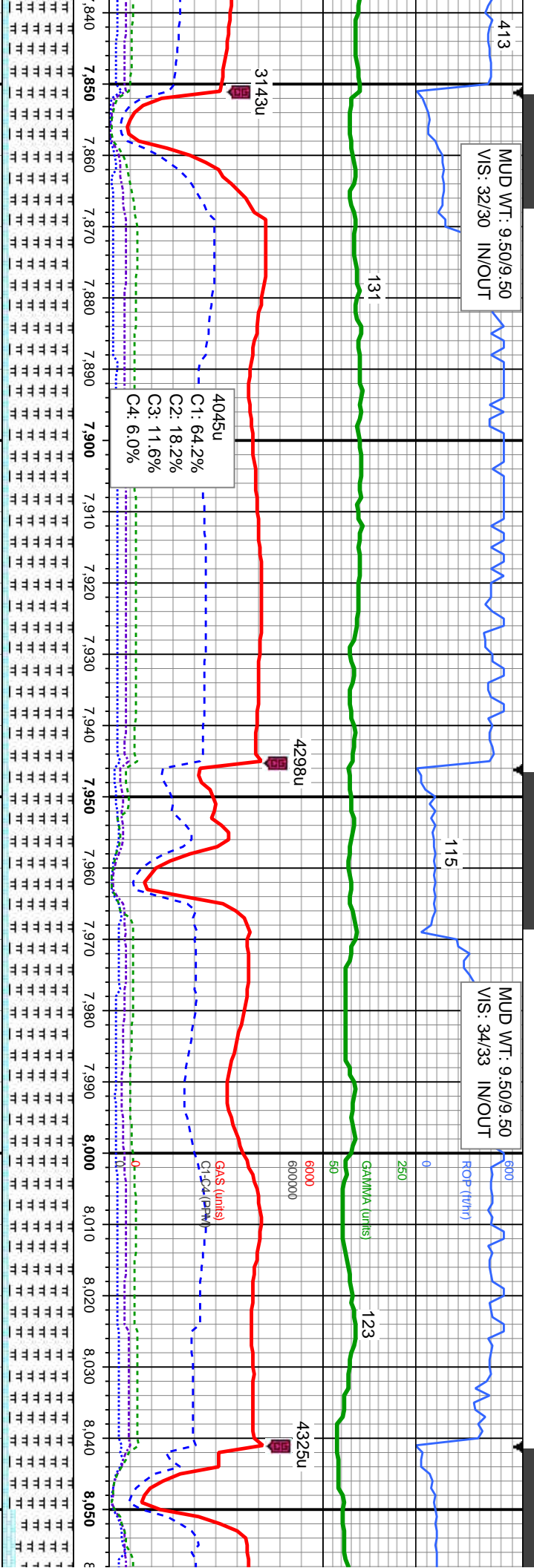


MD: 7,696'
TVD: 6,556.6'
Inclination: 88.21 °
Azimuth: 359.57°
VS: 1,341.93'

MD: 7,791'
TVD: 6,558.69'
Inclination: 89.26 °
Azimuth: 359.34°
VS: 1,433.89'

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,
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
ed 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,
- grty tex, sme bent, sme	sb ply - ply, silty - grty tex, sme bent, sme	sb ply - ply, silty - grty tex, sme bent, sme	sb ply - ply, silty - grty tex, sme bent, sme
	fos	fos	fos



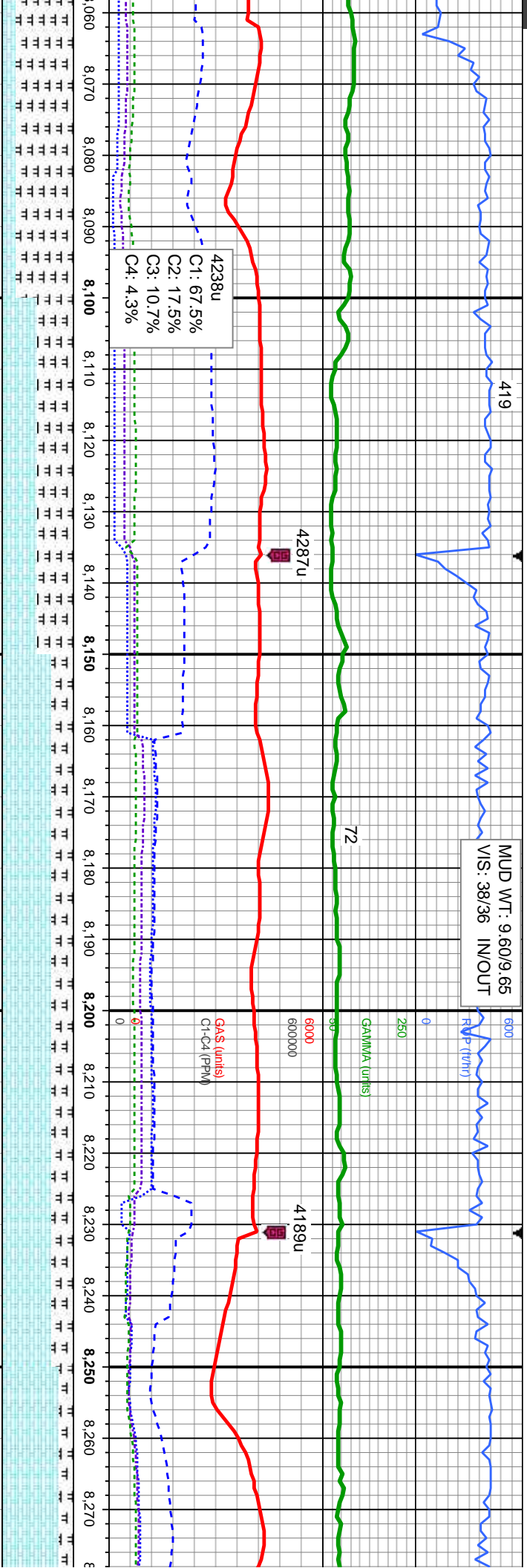


MD: 7,886'
TVD: 6,559.64'
Inclination: 89.6 °
Azimuth: 359.85 °
VS: 1,525.82'

MD: 7,981'
TVD: 6,560.79'
Inclination: 89.01 °
Azimuth: 0.37 °
VS: 1,617.52'

10% CHK: pred tan wi wh, sme ltyg, 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, abnt fos	10% CHK: pred tan wi wh, sme ltyg, 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, abnt fos	10% CHK: pred tan wi wh, sme ltyg, 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, abnt fos	10% CHK: pred tan wi wh, sme ltyg, 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, abnt fos
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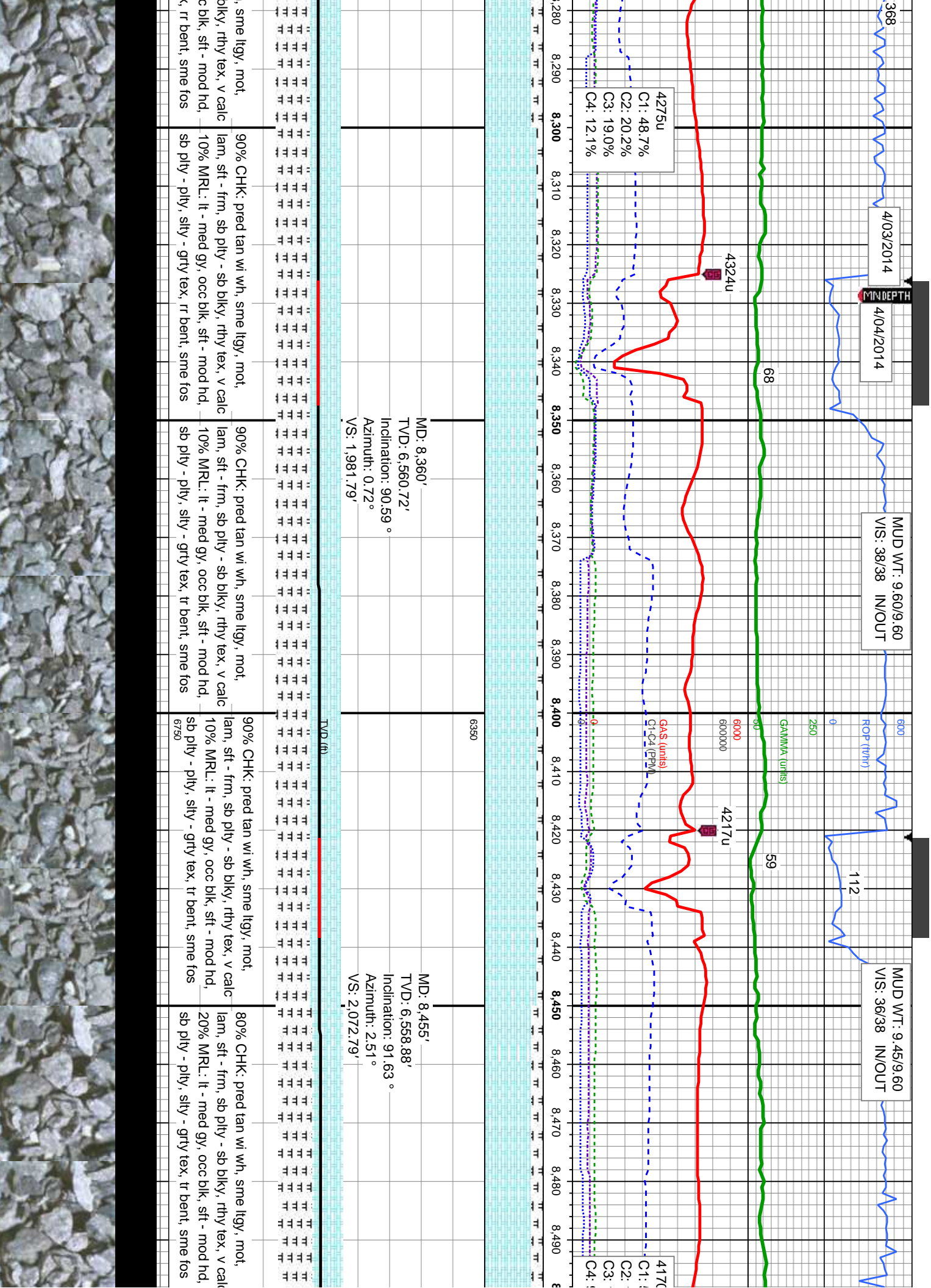
MD: 8,076'
TVD: 6,562.24'
Inclination: 89.23 °
Azimuth: 1.88 °
VS: 1,708.77'

MD: 8,171'
TVD: 6,562.47'
Inclination: 90.49 °
Azimuth: 1.45 °
VS: 1,799.77'

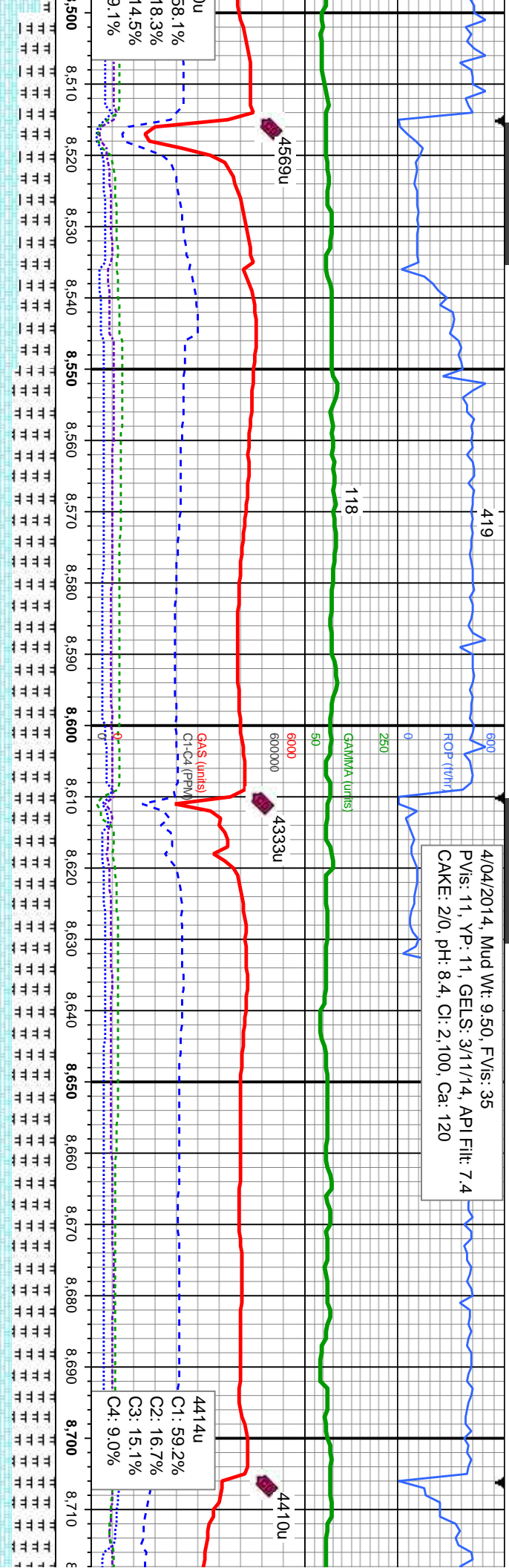
MD: 8,266'
TVD: 6,561.63'
Inclination: 90.52 °
Azimuth: 0.11 °
VS: 1,891.18'

HK: pred tan wi wh, sme ltgy, mot, t - frm, sb pty - sb blk, rthy tex, v calc	50% CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc	70% CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc	70% CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc	80% CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc
RL: lt - med gy, occ blk, sft - mod hd, - pty, silty - grty tex, sme bent, abnt	50% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grty tex, sme bent, sme fos	30% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grty tex, rr bent, sme fos	30% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grty tex, rr bent, sme fos	20% MRL: lt - med gy, occ blk, sft - mod hd, sb pty - pty, silty - grty tex, rr bent, sme fos





4/04/2014, Mud Wt: 9.50, FV/s: 35
PV/s: 11, YP: 11, GELS: 3/11/4, API Filt: 7.4
CAKE: 2/0, pH: 8.4, Cl: 2,100, Ca: 120

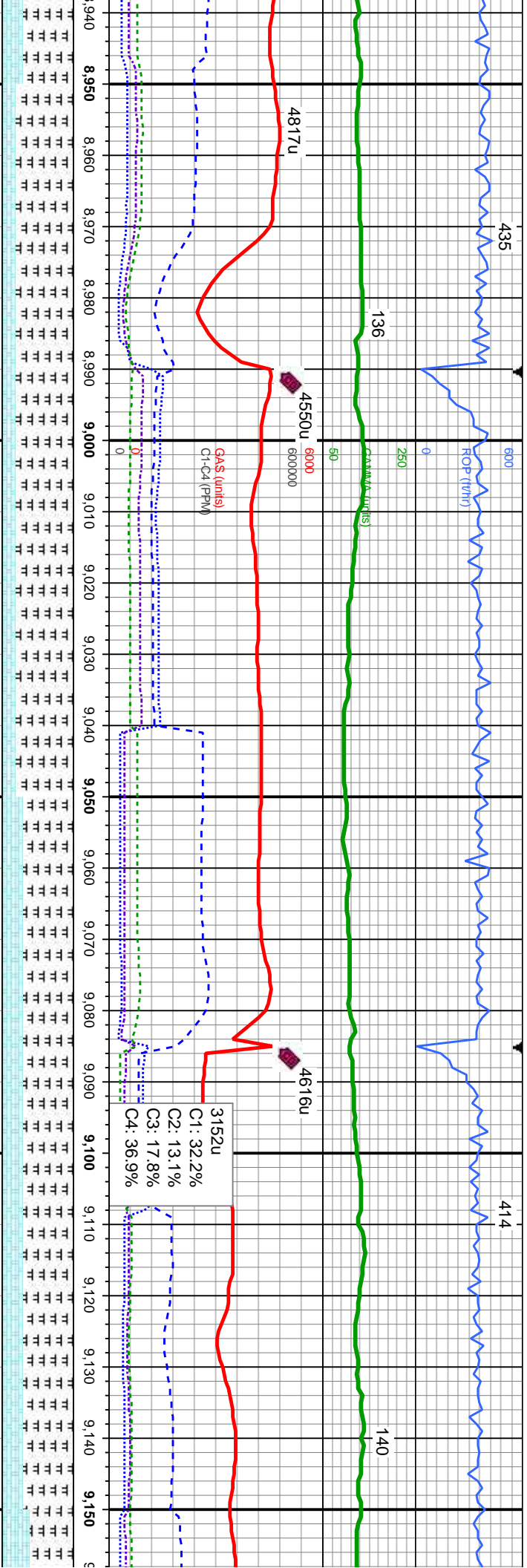


MD: 8,550'
TVD: 6,556.43'
Inclination: 91.33 °
Azimuth: 1.19°
VS: 2,163.68'

MD: 8,645'
TVD: 6,555.3'
Inclination: 90.03 °
Azimuth: 2.2°
VS: 2,254.66'

50% CHK: pred tan wi wh, sme ltyg, 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, sme bent, sme fos	40% CHK: pred tan wi wh, sme ltyg, 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, sme bent, sme fos	40% CHK: pred tan wi wh, sme ltyg, 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, sme bent, sme fos	40% CHK: pred tan wi wh, sme ltyg, 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, sme bent, sme fos
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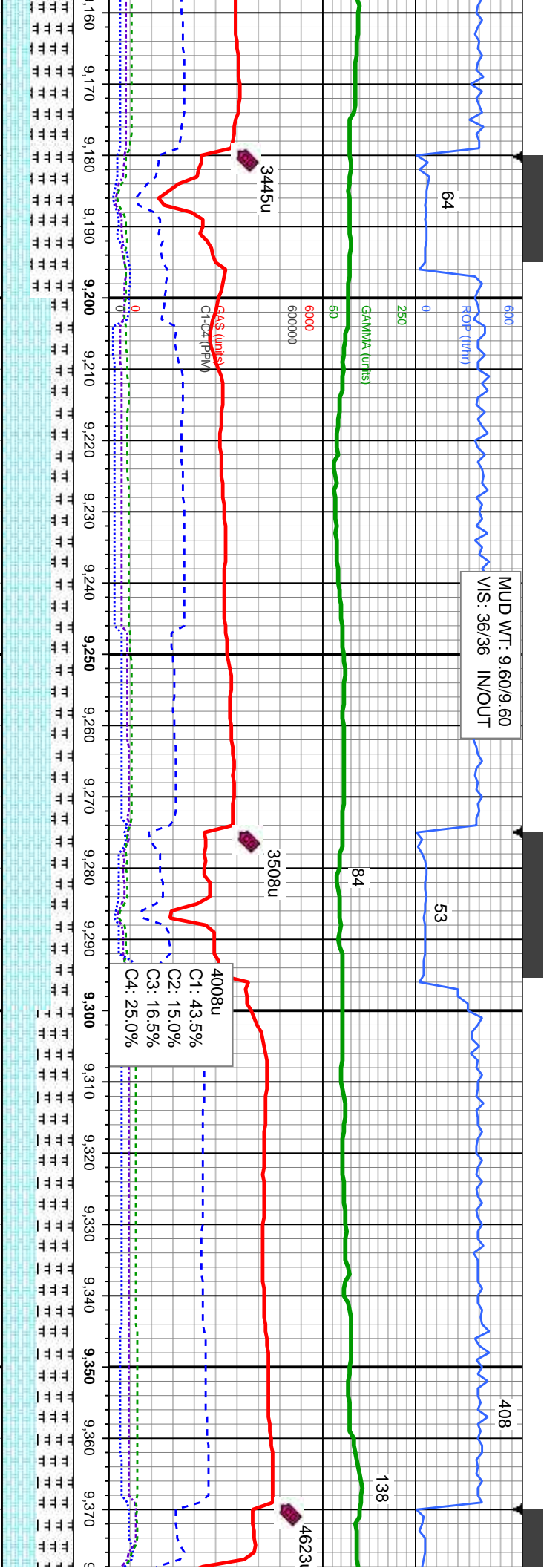


MD: 9,025'
TVD: 6,555.05'
Inclination: 89.29°
Azimuth: 2.26°
VS: 2,617.07'

MD: 9,120'
TVD: 6,554.33'
Inclination: 91.57°
Azimuth: 1.77°
VS: 2,707.9'

20% CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 80% MRL: lt - med gy, occ blk, sft - mod hd, sb ply - pty, silty - grty tex, tr bent, occ inoc frag	20% CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 80% MRL: lt - med gy, occ blk, sft - hd, sb ply - pty, silty - grty tex, tr bent, occ inoc frag	30% CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 70% MRL: lt - med gy, occ blk, sft - hd, sb ply - pty, silty - grty tex, tr bent, occ inoc frag	30% CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 70% MRL: lt - med gy, occ blk, sft - hd, sb ply - pty, silty - grty tex, tr bent, occ inoc frag	40% C
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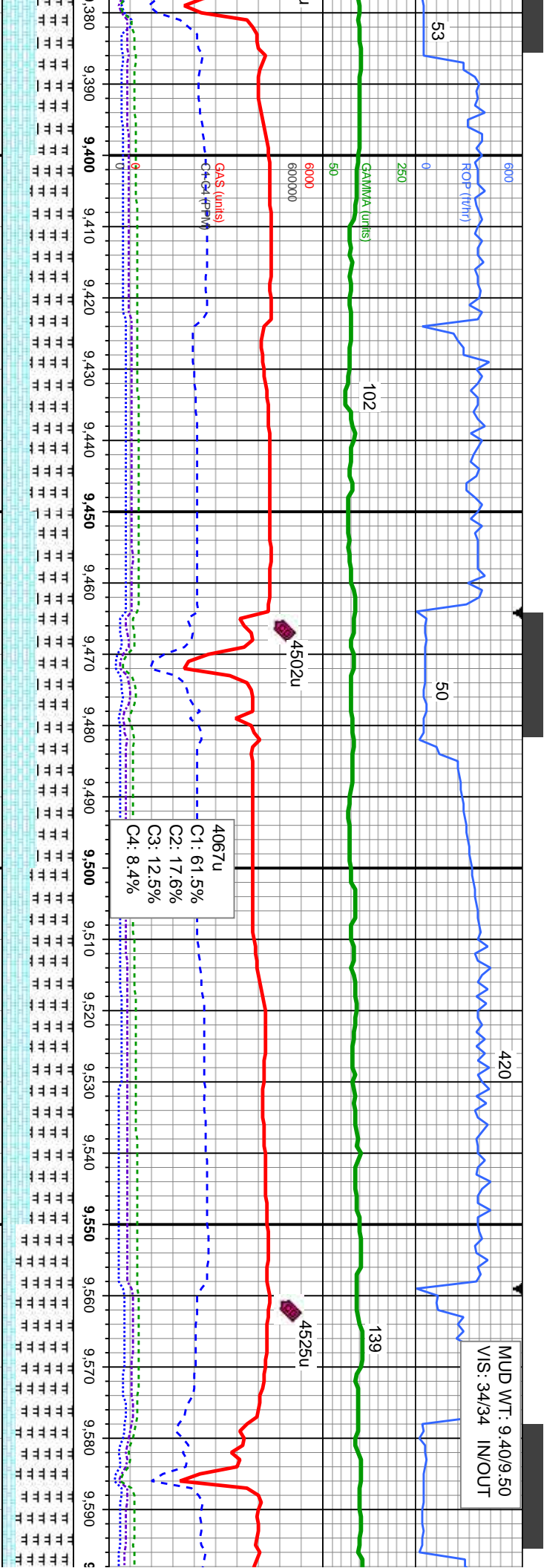
6350

MD: 9,214'
TVD: 6,552.49'
Inclination: 90.68 °
Azimuth: 2.27°
VS: 2,797.75'

MD: 9,309'
TVD: 6,551.74'
Inclination: 90.22 °
Azimuth: 0.12°
VS: 2,888.97'

70% CHK: pred tan w/ wh, sme ltyg, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 30% MRL: lt - med gy, occ blk, sft - hd, sb pty - pty, silty - grty tex, tr bent, occ inoc frag 6750	70% CHK: pred tan w/ wh, sme ltyg, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 30% MRL: lt - med gy, occ blk, sft - hd, sb pty - pty, silty - grty tex, tr bent, occ inoc frag	50% CHK: pred tan w/ wh, sme ltyg, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 50% MRL: lt - med gy, occ blk, sft - hd, sb pty - pty, silty - grty tex, tr bent, occ inoc frag	50% CHK: pred tan w/ wh, sme ltyg, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 50% MRL: lt - med gy, occ blk, sft - hd, sb pty - pty, silty - grty tex, tr bent, occ inoc frag
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MD: 9.404'

TVD: 6.552.41'

Inclination: 88.98°

Azimuth: 0.49°

VS: 2.980.59'

MD: 9.499'

TVD: 6.553.53'

Inclination: 89.66°

Azimuth: 359.79°

VS: 3.072.28'

MD: 9.594'

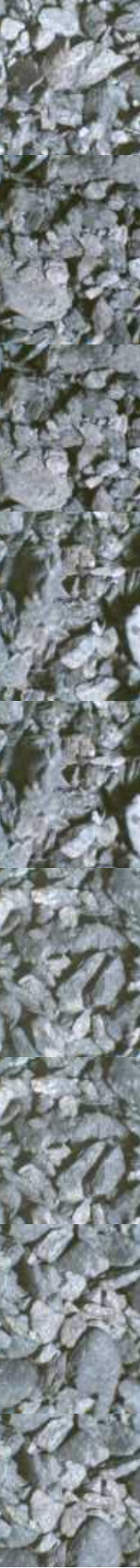
TVD: 6.554.8

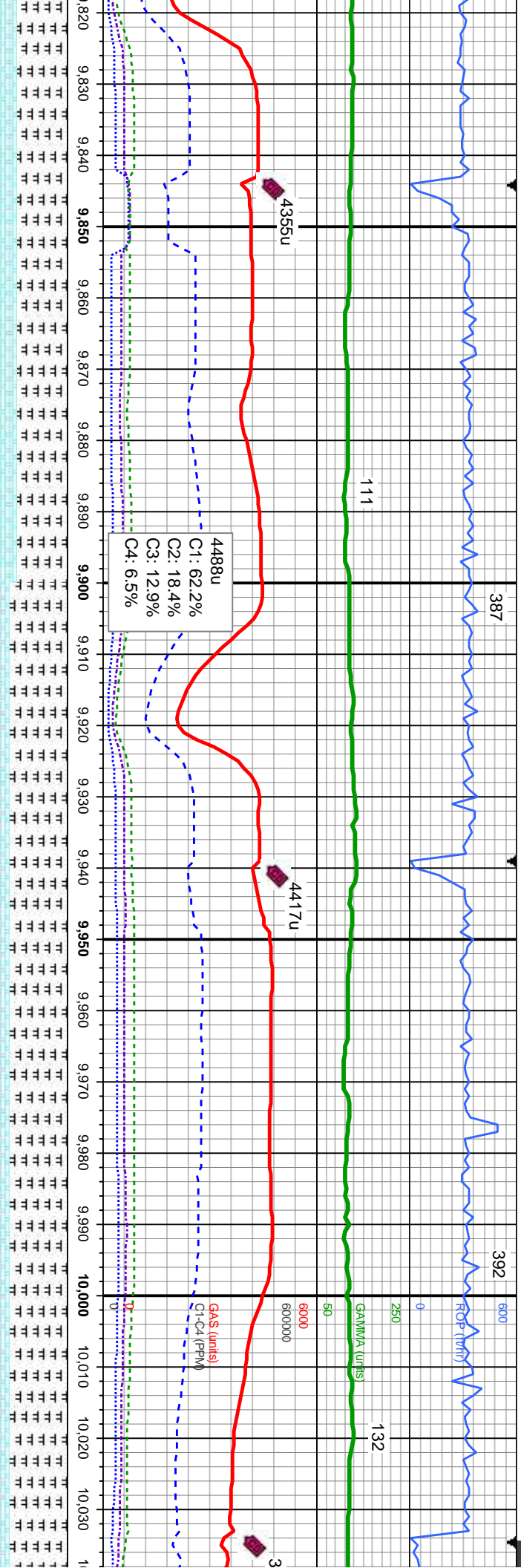
Inclination: 88°

Azimuth: 0.51

VS: 3.163.97

40% CHK: pred tan wi wh, sme itgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 60% MRL: lt - med gy, occ blk, sft - hd, sb pty - pty, silty - grty tex, tr bent, occ inoc frag	40% CHK: pred tan wi wh, sme itgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 50% MRL: lt - med gy, occ blk, sft - hd, sb pty - pty, silty - grty tex, tr bent, occ inoc frag	40% CHK: pred tan wi wh, sme itgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 60% MRL: lt - med gy, occ blk, sft - hd, sb pty - pty, silty - grty tex, tr bent, occ inoc frag	20% CHK: pred tan wi wh, sme itgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 80% MRL: lt - med gy, occ blk, sft - hd, sb pty - pty, silty - grty tex, tr bent, occ inoc frag
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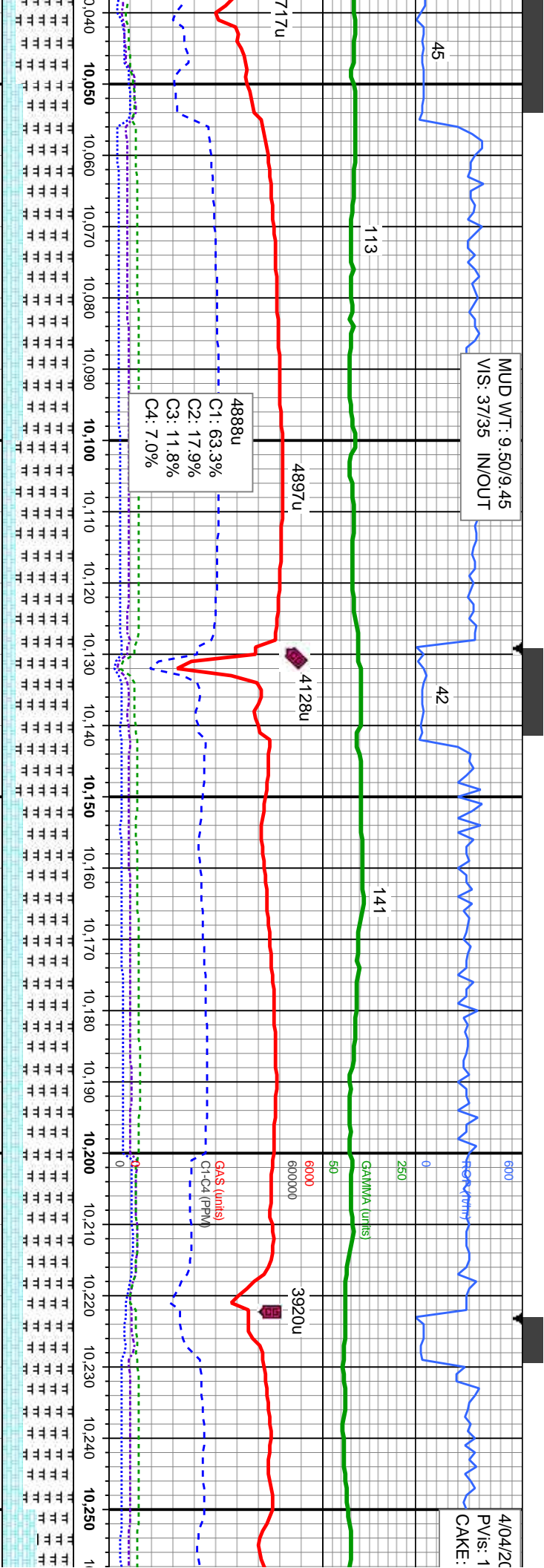


MD: 9,878'
TVD: 6,556.79'
Inclination: 89.54 °
Azimuth: 359.6°
VS: 3,437.91'

MD: 9,973'
TVD: 6,557.53'
Inclination: 89.57 °
Azimuth: 358.25°
VS: 3,530.11'

an wi wh, sme lly, mot, pty - sb blk, rthy tex, v calc	30% CHK: pred tan wi wh, sme lly, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc	20% CHK: pred tan wi wh, sme lly, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc	20% CHK: pred tan wi wh, sme lly, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc	20% CHK: pred tan wi wh, sme lly, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc
ed gy, occ blk, sft - hd, sb pty tex, tr bent, occ inoc frag	70% MRL: lt - med gy, occ blk, sft - hd, sb pty - pty, silty - grty tex, tr bent, sme inoc frag	80% MRL: lt - med gy, occ blk, sft - hd, sb pty - pty, silty - grty tex, tr bent, sme inoc frag	80% MRL: lt - med gy, occ blk, sft - hd, sb pty - pty, silty - grty tex, no bent, sme inoc frag	80% MRL: lt - med gy, occ blk, sft - pty - pty, silty - grty tex, tr bent, sm





MD: 10,068'
TVD: 6,558.94'
Inclination: 88.74°
Azimuth: 358.88°
VS: 3,622.45'

MD: 10,163'
TVD: 6,560.27'
Inclination: 89.66°
Azimuth: 359.68°
VS: 3,714.5'

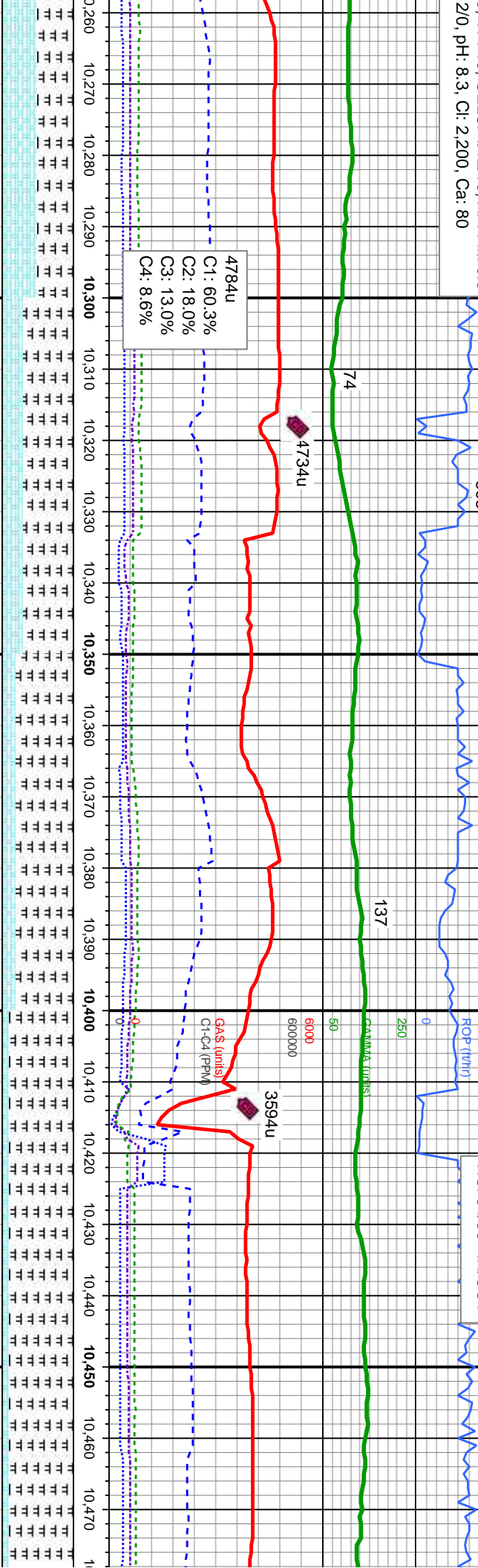
MD: 10,256'
TVD: 6,566'
Inclination: 89.66°
Azimuth: 359.68°
VS: 3,578'

ex, v calc	30% CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc	20% CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc	30% CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc	30% CHK: pred tan wi wh, sme ltgy, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc
hd, sb	70% MRL: lt - med gy, occ blk, sft - hd, sb	80% MRL: lt - med gy, occ blk, sft - hd, sb	70% MRL: lt - med gy, occ blk, sft - hd, sb	70% MRL: lt - med gy, occ blk, sft - hd, sb
e inoc frag	pty - pty, silty - grty tex, tr bent, sme inoc frag	pty - pty, silty - grty tex, tr bent, sme inoc frag	pty - pty, silty - grty tex, tr bent, sme inoc frag	pty - pty, silty - grty tex, tr bent, sme inoc frag



114. Mud Wt: 9.50, FV/s: 36
3. YP: 10, GELS: 4/12/16, API Filtr: 9.8
20, pH: 8.3, Cl: 2,200, Ca: 80

MUD WT: 9.50/9.60
VIS: 34/36 IN/OUT



8'
0.11'
: 90.52°
558.82°

MD: 10,353'
TVD: 6,558.2'
Inclination: 91.79°
Azimuth: 0.38°
VS: 3,673.73'

MD: 10,448'
TVD: 6,554.52'
Inclination: 92.65°
Azimuth: 359.62°
VS: 3,768.66'

HK: pred tan wi wh, sme ltyg, mot,
t - frm, sb pty - sb blk, rthy tex, v calc
RL: It - med gy, occ blk, sft - hd, sb
pty - grty tex, no bent, occ fos frag

30% CHK: pred tan wi wh, sme ltyg, mot,
lam, sft - frm, sb pty - sb blk, rthy tex, v calc
70% MRL: It - med gy, occ blk, sft - hd, sb
pty - pty, sily - grty tex, rr bent, occ fos frag

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

10% CHK: pred tan wi wh, sme ltyg, mot,
lam, sft - frm, sb pty - sb blk, rthy tex, v calc
90% MRL: It - med gy, occ blk, sft - hd, sb
pty - pty, sily - grty tex, no bent, occ fos frag

10% CHK: pred tan wi wh, sme ltyg, mot,
lam, sft - frm, sb pty - sb blk, rthy tex, v calc
90% MRL: It - med gy, occ blk, sft - hd, sb
pty - pty, sily - grty tex, no bent, occ fos frag



MUD WT: 9.60/9.60
VIS: 37/37 IN/OUT

4/04/2014

4/05/2014

ROP (ft/hr)

306

MUD WT: 9.50/9.50
VIS: 37/37 IN/OUT

146

250

50

600000

2537u

54.6 (units)

31-C4 (PPM)

3882u

3314u

C1: 65.3%

C2: 18.4%

C3: 12.3%

C4: 4.1%

6350

MD: 11,017'

TVD: 6,550.88'

Inclination: 89.2°

Azimuth: 2.47°

VS: 4,337.32'

MD: 11,112'

TVD: 6,551.57'

Inclination: 89.97°

Azimuth: 2.37°

VS: 4,432.23'

B Chalk

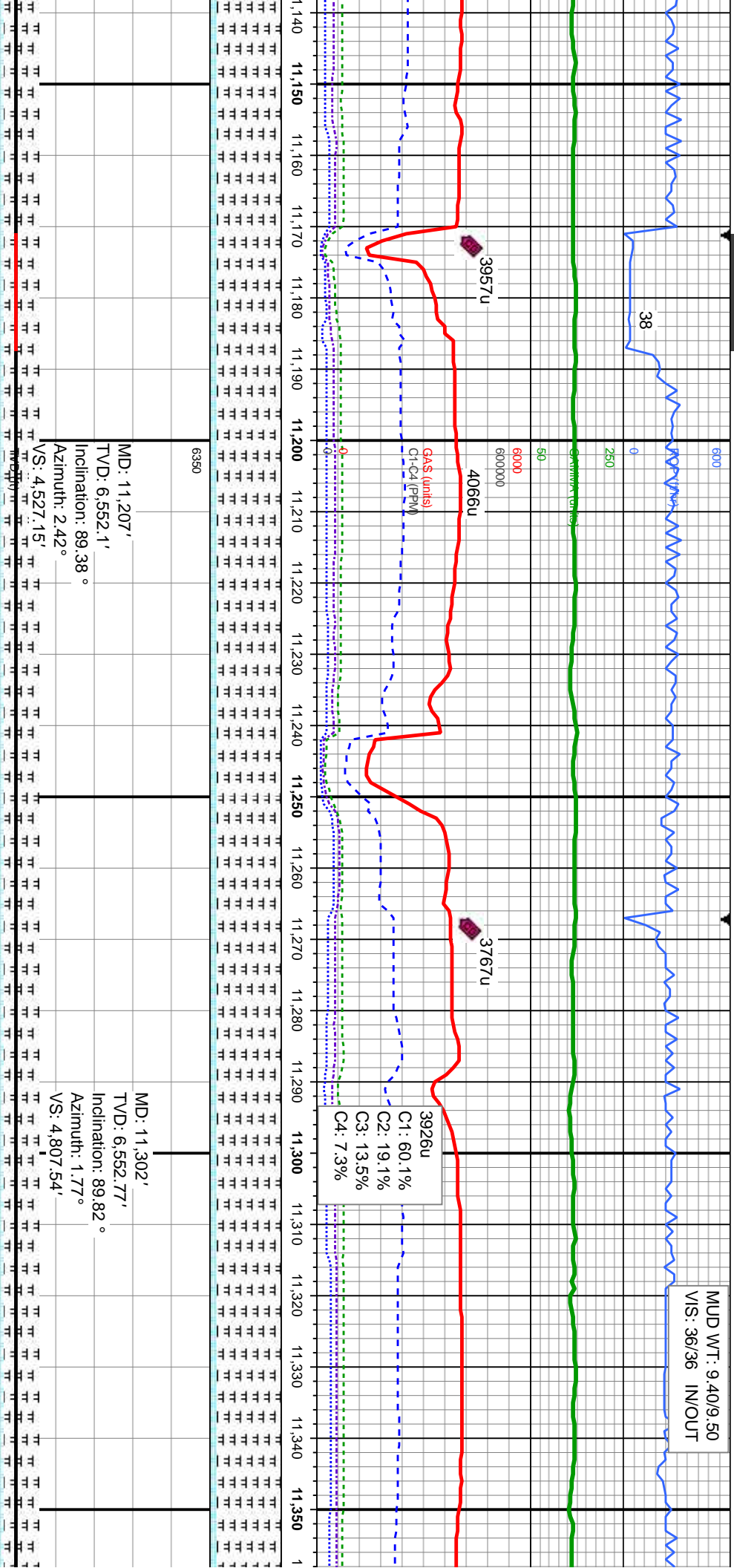
10% CHK: pred tan wi wh, sme ltyg, mot,
lam, sft - frm, sb pty - sb blk, rthy tex, v calc
90% MRL: lt - med gy, occ blk, sft - hd, sb
pty - pty, silty - grty tex, abnt bent, no fos frag

10% CHK: pred tan wi wh, sme ltyg, mot,
lam, sft - frm, sb pty - sb blk, rthy tex, v calc
90% MRL: lt - med gy, occ blk, sft - hd, sb
pty - pty, silty - grty tex, abnt bent, no fos frag

10% CHK: pred tan wi wh, sme ltyg, mot,
lam, sft - frm, sb pty - sb blk, rthy tex, v calc
90% MRL: lt - med gy, occ blk, sft - hd, sb
pty - pty, silty - grty tex, abnt bent, no fos frag

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

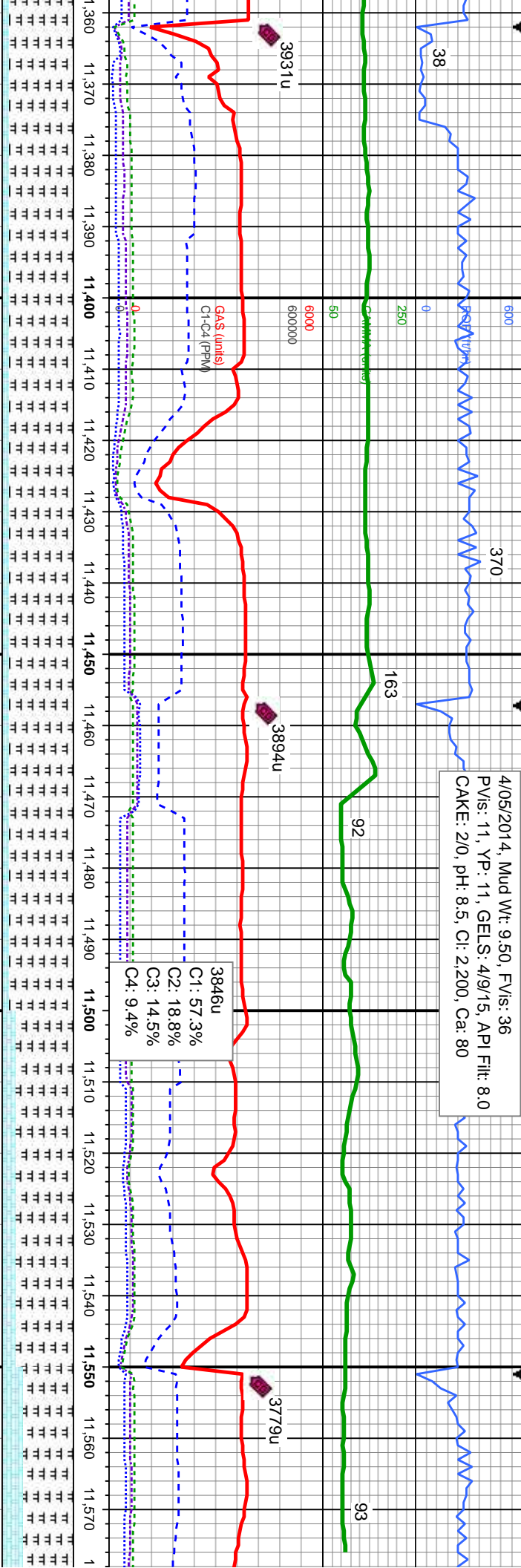
MUD WT: 9.40/9.50
VIS: 36/36 IN/OUT



10% CHK: pred tan wi wh, sme ltyg, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 90% MRL: lt - med gy, occ blk, sft - hd, sb pty - pty, silty - grfy tex, abnt bent, no fos frag	10% CHK: pred tan wi wh, sme ltyg, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 90% MRL: lt - med gy, occ blk, sft - hd, sb pty - pty, silty - grfy tex, abnt bent, no fos frag	10% CHK: pred tan wi wh, sme ltyg, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 90% MRL: lt - med gy, occ blk, sft - hd, sb pty - pty, silty - grfy tex, abnt bent, no fos frag	10% CHK: pred tan wi wh, sme ltyg, mot, lam, sft - frm, sb pty - sb blk, rthy tex, v calc 90% MRL: lt - med gy, occ blk, sft - hd, sb pty - pty, silty - grfy tex, abnt bent, no fos frag	10% C
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4/05/2014, Mud Wt: 9.50, FV/s: 36
PV/s: 11, YP: 11, GELS: 4/9/15, API Filtr: 8.0
CAKE: 2/0, pH: 8.5, Cl: 2,200, Ca: 80



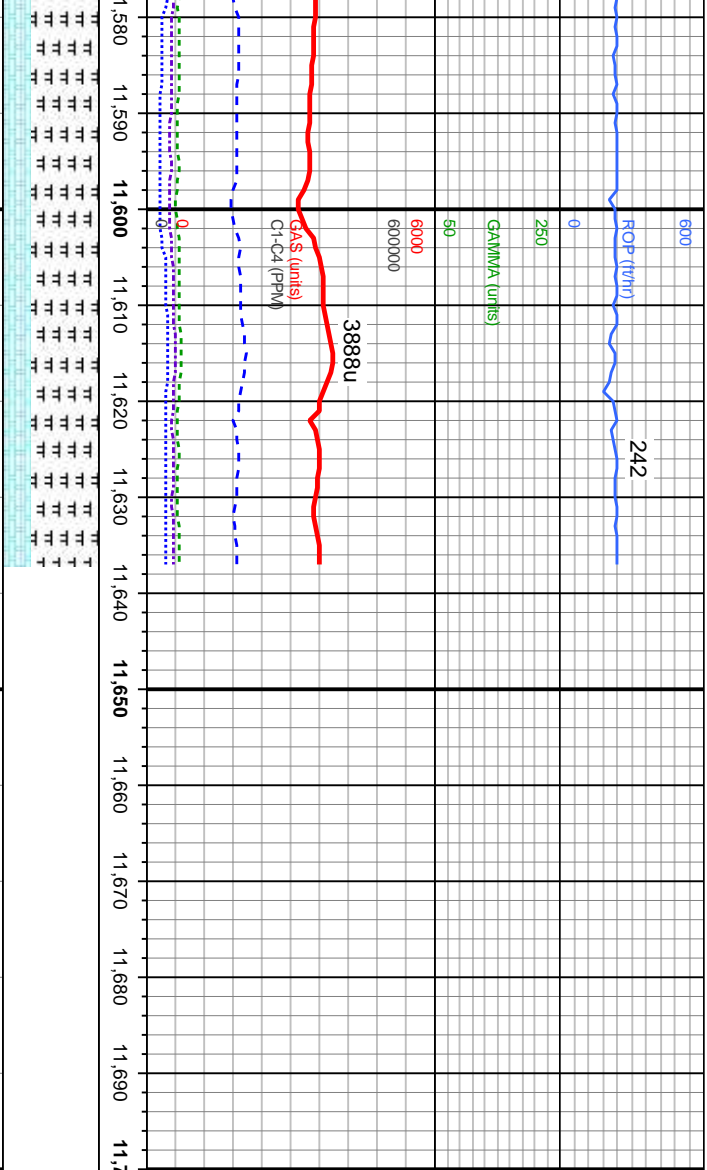
MD: 11,397'
TVD: 6,552.92'
Inclination: 90 °
Azimuth: 0.69 °
VS: 4,898.75'

MD: 11,492'
TVD: 6,553.05'
Inclination: 89.85 °
Azimuth: 0.59 °
VS: 4,990.23'

MD: 11,572'
TVD: 6,552'
Inclination: 3'
Azimuth: 3'
VS: 5,072.2'

CHK: pred tan wi wh, sme ltyg, mot, - frm, sb pily - sb blk, rthy tex, v calc	10% CHK: pred tan wi wh, sme ltyg, mot, lam, sft - frm, sb pily - sb blk, rthy tex, v calc	10% CHK: pred tan wi wh, sme ltyg, mot, lam, sft - frm, sb pily - sb blk, rthy tex, v calc	20% CHK: pred tan wi wh, sme ltyg, mot, lam, sft - frm, sb pily - sb blk, rthy tex, v calc	30% CHK: pred tan wi wh, sme ltyg, mot, lam, sft - frm, sb pily - sb blk, rthy tex, v calc
90% MRL: lt - med gy, occ blk, sft - hd, sb pily - pily, silty - grty tex, abnt bent, occ fos	90% MRL: lt - med gy, occ blk, sft - hd, sb pily - pily, silty - grty tex, abnt bent, occ fos	90% MRL: lt - med gy, occ blk, sft - hd, sb pily - pily, silty - grty tex, abnt bent, occ fos	80% MRL: lt - med gy, occ blk, sft - hd, sb pily - pily, silty - grty tex, abnt bent, occ fos	70% MRL: lt - med gy, occ blk, sft - hd, sb pily - pily, silty - grty tex, abnt bent, occ fos
frag	frag	frag	frag	frag
6750				





6350	Projection to Bit: MD: 11,637' TVD: 6,552.17' Inclination: 90.56 ° Azimuth: 359.82 ° VS: 5,130.25'	TD @ 11,637' MD @ 04:45 hrs MDT on 04/05/2014
6750	30% CHK: pred tan wi wh, sme lty, mot, lam, sft - frm, sb plty - sb blk, rthy tex, v calc 70% MRL: lt - med gy, occ blk, sft - hd, sb plty - plty, slty - grty tex, abnt bent, occ fos frag	Wellsite Geological Services Provided By Columbine Logging

